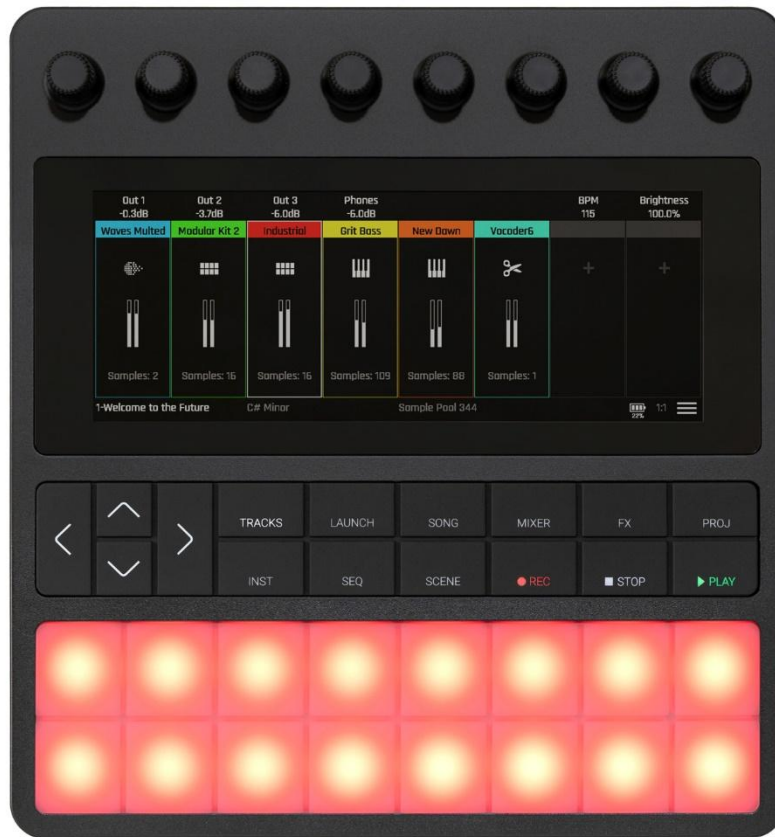


# bento

## Sampling Production Lab



## User Manual

for Firmware v1.3.17

Dec 19, 2025

1010music

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# 1: Welcome

---

This user manual starts with some exercises that walk you through the major features of bento. After that, it offers a deep dive into the features of bento, with step by step instructions for common tasks.

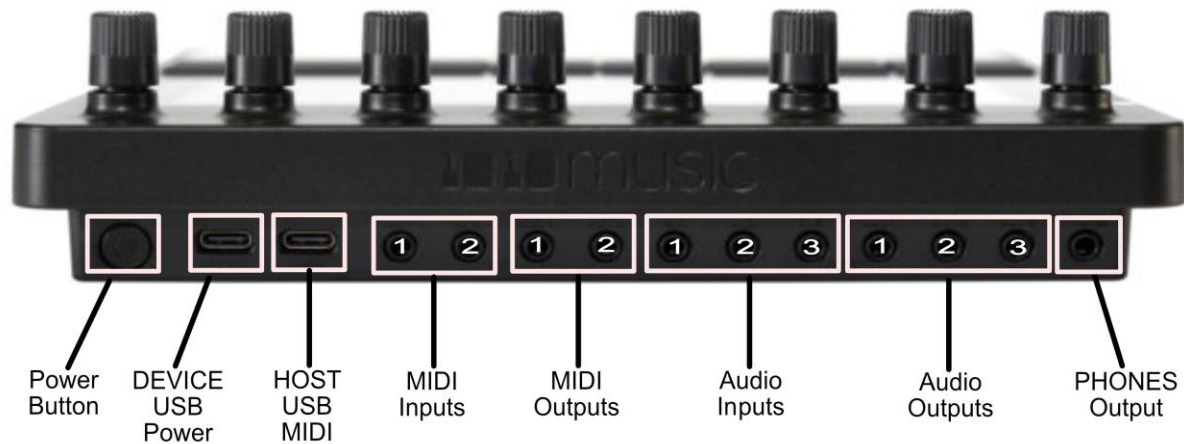
If you would like to get a quick introduction to bento's user interface and features, please take a look at the [Quick Start Guide](#).

You can also find videos on YouTube and Instagram that walk you through features and address common issues.

## 2: Setting Up

Before you begin making music with your bento, you'll need to insert the microSD card and establish audio connections. bento requires external speakers and a microSD card to operate—there's no internal memory or built-in speaker.

Take your time with these initial connections to ensure reliable operation and access to the latest features.



*Figure 2-1: Back panel connections diagram*



## Connecting External Power

Bento includes a USB-C cable for charging and external power. The built-in rechargeable battery provides three hours of operation, but you'll want external power for extended sessions and firmware updates.

### To connect external power:

1. Locate the **DEVICE USB** port on the back panel (labeled for power and computer connectivity).
2. Connect the included USB-C cable to this port.
3. Connect the other end to a USB power supply capable of providing adequate current.
4. Bento will begin charging immediately and can operate while charging.

The device charges much faster when turned off, but you can use bento while it's charging. Monitor battery status using the battery icon and percentage in the lower corner of the screen.

**Note:** Use a standard 30-Watt USB power supply that can provide at least 2000mA (2 amps) at 5V. The internal battery specifications are 3.8V - 5120mAh - 19.5Wh. Not all USB power supplies or cables are created equal—some cables are designed only for data transfer rather than adequate power delivery. Newer iPad adapters typically provide sufficient power.

## Inserting the microSD Card

Bento requires a microSD card to operate and stores all samples, patches, and projects on the card. The microSD slot is located on the right panel of the device.



*Figure 2-2: microSD card slot location*

### To insert the microSD card:

1. Locate the microSD card slot on the right panel.
2. Insert the card with metal leads facing up and the notched edge oriented correctly.
3. Push the card firmly into the slot until it clicks into place.
4. The card reader is spring-loaded—push to eject when needed later.

**Important:** Bento cannot operate without a microSD card. The card stores your projects, samples, and system data. You can remove and reinsert the microSD card while bento is powered up but save your work first to prevent data loss.

## Connecting To Headphones

Bento provides a dedicated **PHONES** output buss for private monitoring. This output buss has independent level control and receives the same mix as Output 1.

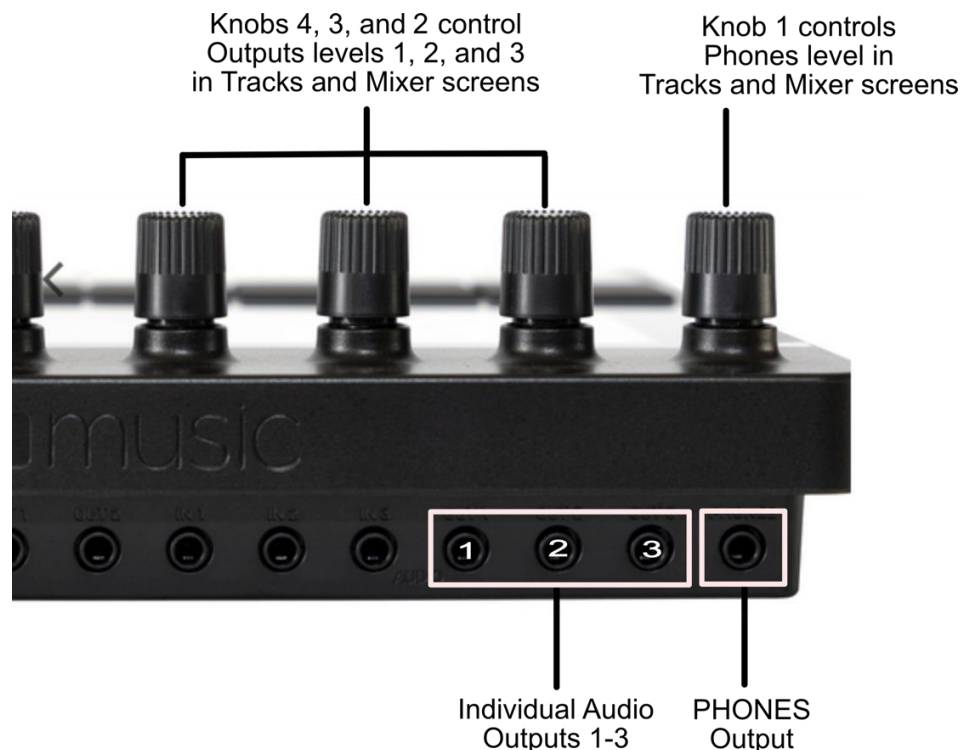
### To connect headphones:

1. Locate the **PHONES** audio output jack on the back panel.
2. Connect your headphones using a 3.5mm TRS stereo cable.
3. The PHONES output buss receives audio routed to Output 1 and Output 1 w/ Mod FX, along with the metronome.

The PHONES audio output uses a 3.5mm TRS connector and provides adequate power for most headphones.

## Connecting To a Mixer or Amplifier

Bento provides four stereo audio outputs for connecting to mixers, amplifiers, or audio interfaces. The audio outputs use 3.5mm TRS jacks and operate at Eurorack levels (+/- 5 volts), which is louder than consumer line level.



*Figure 2-3: Audio outputs diagram showing PHONES and Out 1 ports*

**To connect external audio equipment:**

1. Connect a 3.5mm TRS stereo cable from **audio output 1** to your mixer or amplifier input.
2. Set your mixer or amplifier to a low level initially.
3. Gradually increase levels to avoid distortion, as bento's output is louder than typical consumer electronics.

**Important:** Bento's audio outputs operate at Eurorack levels, which can cause distortion if your receiving equipment expects consumer line levels. Start with low levels and adjust gradually.

In the Next Steps section, we'll suggest connecting to other audio outputs for more complex routing configurations.

## Powering Up for the First Time

Bento ships with a microSD card loaded with the latest firmware available at the time of manufacture, so it may not have the newest features described in this manual. To access the latest bento features, install the latest firmware before using the device.

### To download and prepare the latest firmware:

1. Visit [1010music.com/downloads](https://1010music.com/downloads) to find the latest official firmware releases and content files.
2. Download the latest firmware package and release notes.
3. Extract the files (bento1.bin and bento2.bin) if the download is in a compressed format (ZIP).
4. Use your computer to copy the bento1.bin and bento2.bin files to the root directory of the microSD card (this will replace the original firmware files).
5. Check the release notes for any additional files you might need to install on the microSD card.
6. Safely eject the microSD card from your computer and insert it into bento.

### To power up and access the bootloader:

1. Ensure the microSD card with updated firmware is properly inserted.
2. Verify power connections are secure.
3. Hold the power button (located on the back right corner) down until the **Bootloader** screen appears.

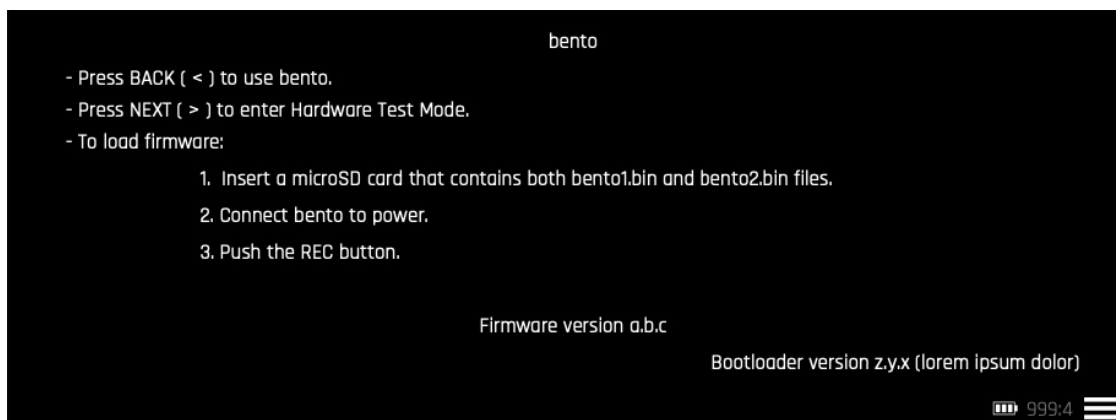


Figure 2-4: Bootloader screen

4. The Bootloader screen shows three options and indicates the current firmware version installed on bento.

**Warning:** If you explore the Bootloader's hardware test option, disconnect bento's audio outputs from headphones, speakers, or other equipment. The hardware audio test generates an extremely loud audio signal that could damage your hearing or connected equipment.

## Installing Firmware

Unlike some other 1010music instruments, bento does not boot directly from firmware files on the microSD card. If bento has firmware installed, it can operate without accessing the bento1.bin and bento2.bin files on the microSD card.

### To install firmware:

1. With the Bootloader screen displayed, press the **REC** button to install firmware from the microSD card.
2. The bootloader displays progress of the firmware installation.
3. Wait for the firmware installation process to complete—do not disconnect power or eject the microSD card during installation.
4. Bento will restart automatically when installation finishes.

**Important:** Bento must be connected to power to perform firmware updates. Firmware upgrades cannot be performed while running on battery power alone.

## Verifying Firmware Installation

After firmware installation completes, bento automatically restarts and displays the firmware version during startup, then loads the Tracks screen.

### To verify successful installation:

1. Observe the firmware version displayed during startup.
2. Confirm that bento displays the Tracks screen when startup completes.
3. Look for “1-Welcome to the Future” in the bottom left corner of the Tracks screen, indicating the current project name.

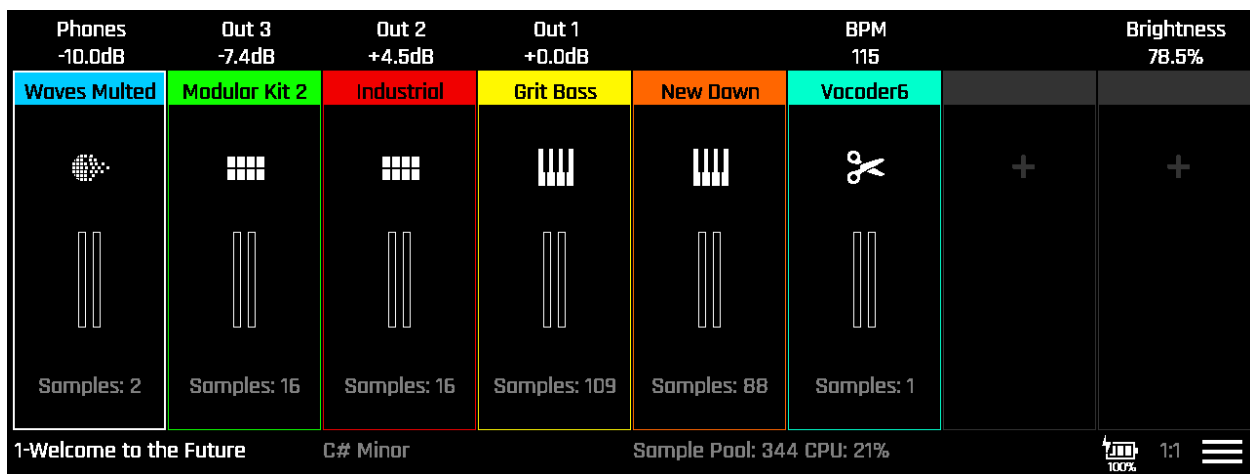


Figure 2-5: Tracks screen showing Welcome to the Future project








You can check the firmware version anytime by pressing **PROJ**—the firmware version appears in the lower left corner of the screen.

## Playing Tracks from the Pads

Once bento has completed firmware installation and startup, you can test basic functionality by triggering the built-in sounds using the velocity-sensitive pads.

Bento supports 7 different track types.

*Table 2-6: Track Types and Symbols*

Track Type	Icon	Description	How to Use
<b>Granular</b>		Granular synthesis engine (limit 1 per project)	Play notes with pads, extensive sound design options
<b>One-shot</b>		16 individual samples	Trigger samples using pads
<b>Multisample</b>		Chromatically playable instruments	Play notes with pads, change octaves with Up/Down arrows
<b>Loop</b>		16 loops that can be synchronized to tempo	Trigger loops with pads
<b>Slicer</b>		WAV file with user-defined slices	Trigger individual slices with pads
<b>Wavetable</b>		Wavetable synthesis engine (limit 2 per project)	Play notes with pads, change octaves with Up/Down arrows
<b>External</b>		External MIDI instruments with audio input	Play external gear with pads/sequences, mix with bento's effects

### To test pad functionality:

1. Press the **TRACKS** button to access the track selection screen.
2. Tap a track to select it—you'll see the track highlighted.
3. Press the pads to trigger sounds from the selected track.
4. Try different tracks to hear various instrument types.



5. Use the up and down arrow buttons to change octaves for melodic tracks and slice ranges for slicers.

The 16 velocity and pressure-sensitive pads respond to your playing dynamics. Press gently for quiet sounds and firmly for louder sounds.

## Adjusting the Phones Level

Proper headphone level setting prevents hearing damage and provides comfortable monitoring. The Tracks screen assigns encoder knob 1 to the Phones output buss level.

### To adjust headphone levels:

1. Connect headphones to the **PHONES** audio output.
2. Play some tracks using the pads to generate audio.
3. On the Tracks screen, use encoder knob 1 (labeled “Phones”) to adjust the level
4. Start with a low level and gradually increase until comfortable.
5. Set the level so you can hear details without strain.

**Important:** Protect your hearing by starting with low levels and increasing gradually. The PHONES output can drive headphones to high levels that may cause hearing damage.

## Adjusting the Output 1 Level

Output 1 typically serves as your main output buss for connecting to mixers or amplifiers. The Tracks screen assigns encoder knob 4 to the Output 1 buss level. Adjusting the Output 1 level affects what you hear both in the Phones mix and from the audio output 1 port, but adjusting the Phones level does not affect what you hear from the audio output 1 port.

### To adjust Output 1 levels:

1. Play tracks on bento to generate audio signal
2. On the Tracks screen, use encoder knob 4 (labeled “Out 1”) to adjust the level
3. Notice how this affects both the headphone mix and the signal from audio output 1
4. Adjust the level to optimize signal-to-noise ratio without distortion
5. Monitor for distortion and reduce level if necessary

Remember that bento's audio outputs operate at Eurorack levels, which are higher than consumer line levels. You may need to reduce bento's output level or increase your mixer's input headroom to prevent distortion.

## Next Steps

You have now successfully installed the latest firmware, verified that bento works properly, and played the pads to hear each of bento's 8 tracks individually. With bento properly set up and tested, you're ready to explore its creative capabilities through the walkthrough exercises in the next chapter.

The **Finding Your Way Around** chapter will guide you through:

- **Launching Sequences** to understand musical arrangements
- **Mixing Tracks** to balance levels and apply effects
- **Recording Sequence Notes** to capture your musical ideas
- **Editing One-Shot Tracks** to modify drums and samples
- **Backing Up Projects** to protect your work

These walkthroughs will help you understand bento's workflow and unlock its full potential for music creation and performance.

## 3: Finding Your Way Around

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Now that you have your bento set up, it's time to explore what it can do. This chapter will guide you through three hands-on exercises that introduce bento's core capabilities. By working through these exercises, you'll learn the essential skills needed to create music with bento.

Each exercise builds on the previous one:

- First, you'll explore bento's included patches and learn basic playback, mixing, and project management.
- Next, you'll arrange musical ideas using sequences, scene creation, and dynamic track control.
- Finally, you'll discover loop tracks and build complete arrangements using real-time loop launching and mixing.

After completing these exercises, you'll be ready to dive deeper into any aspect of bento that interests you most.

## Exercise 1: Exploring Patches and Basic Mixing

Now that you have your bento set up, listen to the patches it includes and get familiar with how you play, arrange, and mix with it.

In this exercise, you will:

- Load the demo project and explore its two tracks.
- Play different types of tracks using the pads.
- Try playing in different octaves and keys.
- Change the project's musical key and save your work.

### Loading the Demo Project and Exploring Tracks

1. Press **PROJ** to open the project browser.
2. Load the "0-Start Here" project by either double-tapping its name or tapping once to select it and then pressing **Load**. You will see the Tracks screen for this project.
3. Identify that Track 1 is a granular track by looking at its icon.
4. Identify that Track 2 is a One-Shot track by looking at its icon.
5. Select Track 1 in the Tracks screen by tapping it.
6. Play Track 1 from bento's pads. Try varying the pressure to hear how the sound changes.

Notice the colors of the pads follow Track 1's color (blue).

## Playing Both Tracks and Exploring Transposition

1. Select Track 2 on the Tracks screen by tapping it.
2. Play Track 2 from bento's pads. Try pushing the pads with different velocities to hear how the sound varies.

Notice the colors of the pads follow Track 2's color (green).

3. Select Track 1 (Razored Waves, the granular track).
4. Transpose the notes by pressing the **Up** arrow button on the front panel.
5. Press the **Down** arrow button on the front panel to transpose down.
6. Select Track 2 (Pulsy Kit 2, the One-Shot track) and try transposing with the **Up** and **Down** arrows.

Notice that Track 2 doesn't respond to transposing because it's a One-Shot track and each of its 16 one-shots is tuned individually.

## Viewing Project Settings and Changing the Key

1. Select Track 1.

Notice the Tracks screen shows "A# Minor" as the project's key.

2. Press **PROJ**.
3. Tap the **Menu** icon in the lower right corner.
4. Tap **Project Settings**. You are now on the Project Settings screen.
5. Turn **Knob 1** to change the Root Note from A#.
6. Turn **Knob 2** to change the Scale from "Minor" to other modes like Chromatic.
7. Push the pads to hear how the sound changes as you select different Root Notes and Scales. Since Track 1 is selected, you can play Track 1 here using the blue pads.
8. Press **TRACKS** to get back to the Tracks screen.

## Saving the Project with a New Name

Now that you've changed a couple of things in the project, save it with a different name.

1. Press **PROJ**.
2. Tap **Save As** at the bottom of the screen.
3. Edit the name with the on-screen keyboard (bento already edited it a little by appending 2 to the original name, making it "O-Start Here 2").
4. Press **Enter**.

When bento is done saving your new project, the Tracks screen returns.

The new name and edited key appear at the bottom of the screen.

## Playing Sequences and Adjusting Tempo

1. With the Tracks screen open, press the **PLAY** button.  
You should hear something being played on both tracks.  
The Tracks screen will show signal levels for each track's stereo signal.
2. If bento's output is too quiet or too loud, adjust the phones level with **Knob 1**.
3. If your audio system is connected to bento's audio Out 1, adjust that level with **Knob 4**.

The BPM (80) appears at the top of the screen.

4. Speed it up by turning the tempo knob - you'll hear everything play faster.
5. Find a tempo you prefer and leave it there, so you have audio to work with on the Mixer screen.

## Mixing Tracks in the Mixer

1. Press the **MIXER** button.

Notice the tracks in the lower half of the screen.

Notice the output levels in the top part: Phones, Out 3, Out 2, Out 1 (in that order from left to right), and Main in the top right corner.

2. Before turning any knobs, notice there are more than 8 things you can adjust in the Mixer screen.

You must select the things you want to adjust with the knobs.

3. Touch any of the controls in the top part of the screen - a white rectangular outline surrounds those 5 output level controls.

These are assigned to **Knobs 1-4** and **Knob 8**.

4. Touch the Track 1 or Track 2 area (the area for Tracks 3-8 is empty).

They get highlighted and **Knobs 1** and **2** now adjust Tracks 1 and 2's levels.

5. Adjust the levels to balance the tracks.

Notice the 4 controls below the tracks area labeled **Level** (currently selected), **Mute**, **Delay**, and **Reverb**.

Only one is active at a time because the knobs match the function of the currently chosen control.

6. Tap **Level** to adjust track levels.
7. Tap **Mute** - turning a track's knob clockwise mutes the track, turning counterclockwise unmutes it. You can also tap a track while Mute is active to toggle the track's mute state. Muted tracks appear dim and have an M below the track name.
8. Tap **Delay** and the knobs now control the track's send level to bento's Delay effect, which appears as a thin line to the right of each track's signal level indicator.
9. Tap **Reverb** and the knobs now control each track's Reverb send level, indicated by the same thin line to the right of the track's signal level.
10. Use the knobs to adjust the level, mute, delay, and reverb settings.
11. Make sure you unmute the tracks before continuing.
12. Tap **Level** and adjust the levels one last time.
13. Touch the **Phones** control at the top of the screen to highlight the top row of controls.



14. Adjust the phones or Out 1 level again to remind yourself that screens often require you to select groups of controls so that you can edit them with bento's 8 knobs.
15. Press Stop once when you are done listening to this project. The sequences will continue to play until they reach the quantization break specified for each sequence, and then they will stop.

**Note:** If you hear some bleed through of audio when a track is muted, you are hearing the output of the Effects for that track, including pad level effects sends. We will discuss this more later.

## Saving Your Work

1. Press **PROJ**.
2. Tap **Save** in the Projects screen.

Your edited project is now saved so you can load it again later.

## What You Accomplished

In this exercise, you:

- Loaded a demo project and identified different track types by their icons
- Played granular and One-Shot tracks using the pads and observed how pad colors match track colors.
- Learned that granular tracks respond to transposition while one-shot tracks don't.
- Changed the project's musical key and scale in Project Settings.
- Saved the project with a new name.
- Started sequence playback and adjusted the tempo.
- Explored the Mixer screen and learned how to select different control groups.
- Balanced track levels and experimented with mute, delay, and reverb effects.
- Saved your edited project for future use.

You now understand the basics of loading projects, playing tracks, mixing, and saving your work. These skills will be essential as you explore more advanced features in the following exercises.

## Exercise 2: Arranging with Tracks and Sequences

Building on your basic familiarity with bento, learn to arrange musical ideas using sequences and real-time mixing.

In this exercise, you will:

- Load a multi-track project and explore different track types.
- Mix and balance multiple tracks playing simultaneously.
- Launch and stop individual sequences for dynamic arrangement.
- Copy and edit sequences to create variations.
- Create and recall scene combinations for song structure.

### Loading and Exploring a Multi-Track Project

1. Press **PROJ** to open the project browser.
2. Load the “3-lofi tracks” project by either double-tapping its name or tapping once to select it and then tapping **Load**.

**Note:** As the project loads, watch the Loading count go down as the samples used for this track are loaded. When Loading is complete, take a look at the Sample Pool number below the orange track (Track 5). This number tells you how many sample slots are available for this project. Each project may use up to 576 samples.

Notice there are 6 tracks: Waves Malted (granular), Vinyl Kit 1 (One-Shot), Breaks 5 (slicer), Toys (One-Shot), Vintage EP (multisample), and Outside (One-Shot).

3. Select each track by tapping on it on the Tracks screen.
4. Play the pads for each track to hear the different sounds.
5. Press **PROJ**, tap **Menu**, then choose **Save As** to save with a different name.

When the Tracks screen returns, you can see the new name of the project in the lower left of the screen. You’re now ready to explore sequences.

## Mixing Multiple Playing Tracks

1. Press **PLAY** and you'll hear each track playing a different part.
2. Press **MIXER** to adjust the track levels.
3. Turn down or mute tracks to remove them from the mix.
4. Turn them up or unmute them to bring them back into the mix.
5. Make sure the knobs are assigned to the tracks by touching the track area.
6. Check that the **Level** control is selected (not Mute, Delay, or Reverb).
7. Practice adjusting track levels to hear what each track contributes to the mix.

## Playing Tracks Live While Sequences Run

1. Notice that all the pads have the same color.
2. If you play the pads, you can play the selected track while the sequences are playing.

It might be difficult to hear what you're playing while sequences are running.

3. Press **STOP** so you can clearly hear the pads.
4. Play the pads and, if you want, change the selected track's level in the **MIXER**.
5. To change the selected track, press **TRACKS** and tap a different track.

Notice the pad colors change to match the new selected track.

6. Press **MIXER** to adjust its level and send levels if desired.
7. Press **TRACKS** again when ready for the next task.

## Launching Individual Sequences

1. Press **LAUNCH** to open the Sequence Launcher screen.

Notice 8 columns of 8 sequence slots - column 1 shows sequences for Track 1, column 2 for Track 2, and so on.

2. Tracks 7 and 8 are currently empty.

Notice the top row of pads (9-16) change colors to match Tracks 1-6.

Notice pads 15 and 16 are unlit because Tracks 7 and 8 are empty.

Notice the bottom row of pads (1-8) are unlit because there are no sequences for those pads.

3. Push Pad 3 (the pad below the red pad).

4. Press **PLAY** to start playing sequences again. If the sequences don't start, push the lit-up blue, green, yellow, orange and teal pads to launch the individual sequences.

You'll see colored progress bars moving in the top row of each column for the 6 loaded tracks, except Track 3.

5. Track 3's sequence didn't launch automatically - tap pad 11 (3rd pad in the top row) to launch it.
6. Tap pad 3 (below pad 11) to stop Track 3's sequence - it stops at the end of the current bar.
7. Hold Launch and push the yellow pad or the pad below it. This causes all sequences for the yellow track to stop playing.
8. Try launching and stopping other tracks by pressing their pads (lit launches, unlit stops) or holding Launch while pressing a pad to stop the sequence for that track.

All sequences in this project start or stop when each bar starts.

## Understanding Bar and Beat Timing

1. Push **Launch** if needed to return to the Launch screen.
2. Turn **Knob 8** to turn on the Metronome so you can hear the timing. If you don't hear the metronome, connect your speakers to the Phones output. The metronome only plays to the Phones output.
3. Look at the lower right of the screen, to the left of the **Menu** icon.  
Bento displays the current bar and beat in grey text.
4. Press **STOP** then press **PLAY** and you'll see it return to bar 1, beat 1 as "1:1".
5. Press **STOP** twice, then press **PLAY** - no sequences resume playing.
6. Pressing **STOP** twice stops immediately.
7. Hold **STOP** for 2 seconds. This resets sequence cues.
8. Launch whichever sequences you want with the pads before or after pressing **PLAY**.
9. Try launching different combinations of sequences.
10. Press **MIXER** to change the mix at any time, then return with **LAUNCH**.

## Exploring Multiple Sequence Rows

1. Notice the white rectangular outline around the top two rows of all 8 tracks.
2. Press the **Down** arrow button to move to rows 3 and 4.  
These contain no sequences and all pads are unlit.
3. Press **Down** again to highlight rows 5 and 6, then 7 and 8 - all empty.
4. Press the **Up** arrow button a couple times to return to rows 1 and 2.  
The top row of pads lights up again.

## Copying and Editing Sequences

1. Tap the first sequence in Track 5's column (Vintage EP) to select it.
2. Tap the **Menu** icon and choose **Copy Seq.**
3. Tap the empty slot below "Seq 1" in Track 5's column (automatically named "Seq 2").
4. Tap **Menu** and choose **Paste Seq.**  
 Pad 13 is now lit, indicating you can cue two sequences for Track 5 with pads 5 and 13.
5. If transport isn't running, press **PLAY** and use pads 5 and 13 to cue each sequence.  
 The sequences are identical copies, so you don't hear any difference yet.
6. Tap the second sequence under Track 5 to select it.
7. Tap **Menu**, choose **Rename Seq.**
8. When the keyboard appears, press **Clear** at the bottom.
9. Type something different like "EP1" and tap **Enter** to return to the Sequence Launcher.
10. Make sure your renamed sequence is selected, then press **SEQ** to open the Piano Roll editor.  
 You'll see the notes that your sequence plays.
11. Drag a rectangle across the lowest 4 notes to select them.
12. Turn **Knob 3** (mapped to "Note") to move the selected notes up or down.
13. Select other notes and move them with **Knob 3** or change their timing with **Knob 2** (Start).
14. When done editing, press **LAUNCH**.
15. Use the pads to switch Track 5 between Seq 1 and your edited sequence to hear the difference.
16. Hold **Launch** and push either pad 5 or pad 13. Note that all sequences for that Track 5 stop playing.

### Note:

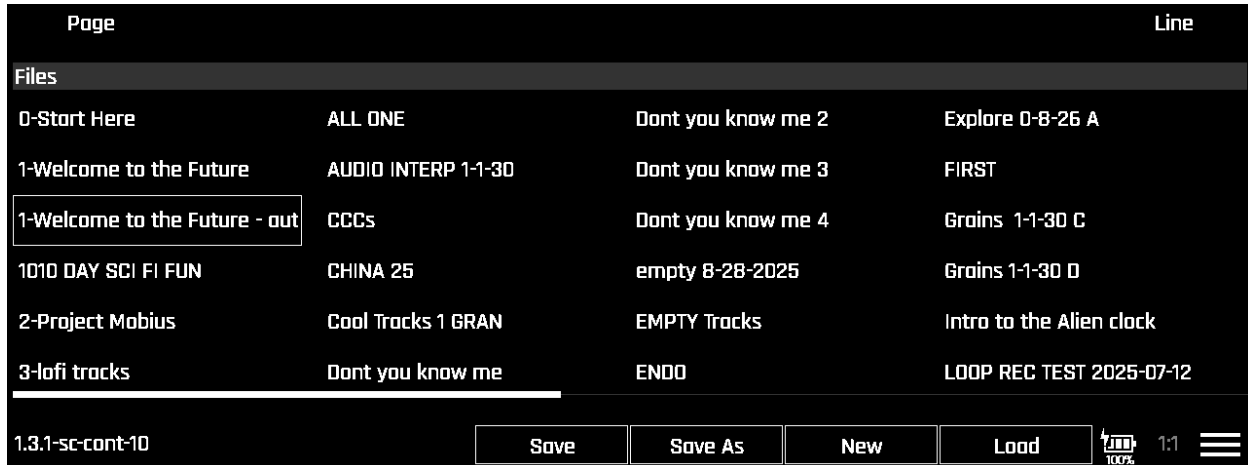
- Tapping the screen to select a sequence selects it for editing but does not play it. Pushing a pad starts the sequence playing but does not select it for editing.
- Only one sequence per track can play at a time.

## Creating and Using Song Scenes

1. Press **STOP** twice to clear all sequence cues.
2. In the Sequence Launcher screen, press pads 9 and 10 to cue sequences for Tracks 1 and 2.
3. Press **PLAY** - you're now listening to what might be an introduction.
4. Tap **Menu** and choose **Snap Scene** to capture this combination.
5. Press **SONG** to open the Song Scenes screen with 8 scene columns. Each scene has a row for each of the 8 tracks.
6. Scene 1 should be selected - tap **Menu** and choose **Paste Scene**.  
You'll see the sequence names you cued pasted into Scene 1.
7. Press **LAUNCH** to return to the Sequence Launcher.
8. Cue your edited sequence for Track 5 with pad 5.
9. Choose **Snap Scene** from the menu again.
10. Press **SONG**, tap Scene 2 to select it, then choose **Paste Scene** from the menu.  
You now see which sequences will launch for Scene 1 and Scene 2.
11. Notice the top row of pads lights up in green - you can launch scenes 1-8 with pads 9-16.
12. Tap the **Song** button at the bottom of the screen to the left of the menu to enable Song mode.
13. While sequences play, use pads 9 and 10 to switch between scenes and hear the differences. A progress bar appears above the name of the playing scene.  
Notice scenes wait until the end of the bar to stop or start.
14. Turn **Knob 8** (Quant Size) from "1 bar" to "1/4".  
Now when you switch between scenes, they start at the next downbeat or quarter note.
15. Push pad 1 to start scene 1 and don't change scenes. The song will play through all the loaded scenes and then stop.
16. Tap **Play Count** at the bottom of the screen. Note the knobs are now controlling the Scene Play count for each scene.
17. Turn Knob 1 to select a play count of 2.
18. Push Pad 9 to start scene 1. Let it play through until Scene 2 starts. Note that Scene 1 plays two times before advancing to Scene 2.

## Saving Your Work

1. Press **PROJ**.
2. Tap **Save** to save your edited project.



## What You Accomplished

In this exercise, you:

- Loaded a complex multi-track project with 6 different track types.
- Observed how the Sample Pool reflects the number of open sample slots remaining for a project.
- Mixed multiple tracks playing simultaneously and learned to balance levels.
- Launched and stopped individual sequences for dynamic arrangement control.
- Understood bar and beat timing with the metronome and visual feedback.
- Explored multiple sequence rows and navigation.
- Copied, renamed, and edited sequences to create musical variations.
- Used the Piano Roll editor to modify note pitches and timing.
- Created song scenes to capture and recall sequence combinations.
- Adjusted quantization timing for smoother scene transitions.
- Adjusted the Play Count for a scene to make it loop the desired number of times.
- Saved your arrangement work for future sessions.

You now understand how to arrange music dynamically using sequences, create variations through editing, and build song structures using scenes. These skills form the foundation for creating complete musical compositions with bento.



## Exercise 3: Building Songs with Loop Tracks

Take your skills further by building complete songs using loop tracks and advanced arrangement techniques.

In this exercise, you will:

- Create a new project and load loop tracks.
- Understand how loop tracks differ from other track types.
- Launch and mix multiple loops simultaneously.
- Work with loop tracks in different bento screens.
- Build arrangements using loop combinations and scenes.
- Understand tempo considerations for loop playback.

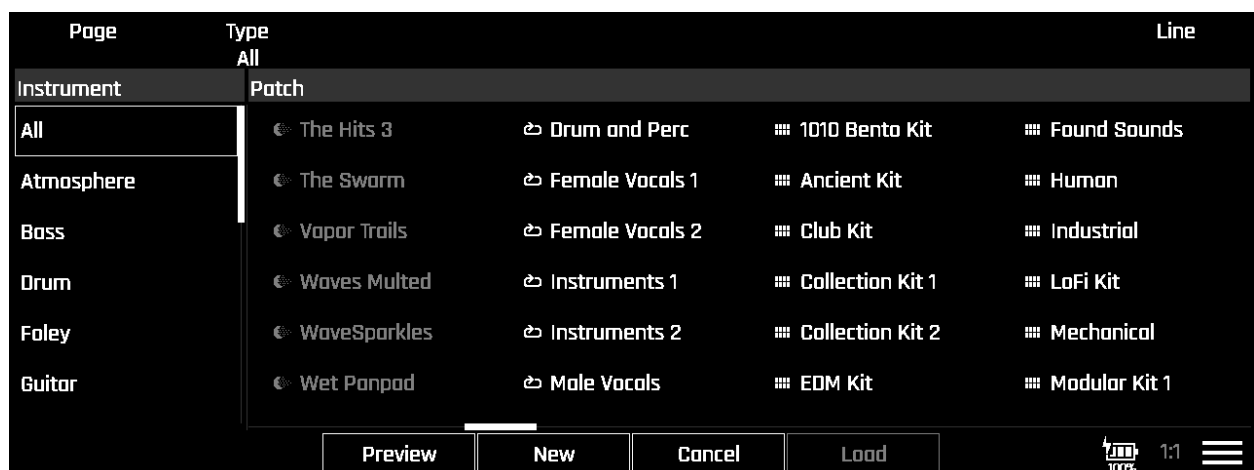
### Creating a New Project for Loop Work

1. If you haven't already saved your project from Exercise 2, do so now.
2. Press **PROJ** and tap the **Menu** icon.
3. Choose **New** from the menu.
4. When the keyboard screen appears, change the new project name to “whole lotta loops” or something you'll recognize.
5. Tap **Enter** and you'll see a completely empty Tracks screen.

### Loading Your First Loop Track

1. Double-tap Track 1 to open bento's patch browser screen.

You'll see Instrument categories in the left column and patch names with type icons on the rest of the screen. You will also see a Type filter assigned to knob 2.



2. Select the **All** Instrument category on the left (if it's not already highlighted with a white rectangle), and set the Type knob to **Loop**.

The list becomes all loop patches, with user patches appearing first, followed by factory patches. If the Type knob was to **All**, the list would be ordered by user vs factory patches, then by patch type, then by patch name. Loop patches have this

icon: 

3. Select **Drum and Perc** using the Line knob or touch, and then tap **Load**.

## Understanding Loop Tracks vs. Sequences

1. Press **LAUNCH** to see what happened.

Instead of sequence names, you see the names of 8 loops in the slots.

This is because bento treats each loop as both a sample AND timing details for sync.

The Loop patch contains 16 loops, but you can't hear them unless transport is running.

2. Press **PLAY**.

Now when you play the pads, you're launching loops instead of playing notes.

## Exploring the Loop Bank

1. Select Track 1 in the Tracks screen.
2. Press **INST** to open Track 1's Loop Bank screen.

The 16 samples are arranged in 2 rows of 8 loops.

3. As you play the pads, each pad toggles a corresponding loop on or off (pad 3 starts/stops loop 3, pad 9 starts/stops loop 9).

Notice bento lets you play any combination of loops simultaneously from the Loop bank screen.

4. When you play pads, the most recent pad stays lit in white instead of track color (blue for Track 1) to show it is selected.

The Loop Bank screen highlights the selected loop when you play pads. A progress bar on a cell on the Loop Bank screen indicates that loop is playing.

5. Launch a couple of loops from both the top and bottom rows of pads.

## Mixing Individual Loops

1. While loops are running, look at the top of the Loop Bank screen.

There are 8 level controls you can adjust with bento's 8 knobs for the 8 loops in the currently selected row.

2. The row selection changes (indicated by white rectangular outline) when you play a pad or tap a loop.
3. Try adjusting the volumes of the loops you're playing.
4. Notice how easy it is to mix this one track as if it were multiple instruments.

## Loop Tracks in the Sequence Launcher

1. While samples continue playing, press **LAUNCH**.

You'll see the loops currently playing on Track 1.

Pads 1 and 9 are blue, indicating you can launch two of Track 1's loops.

2. Play pads 1 and 9 to launch those loops.

Notice that launching loops from the Sequence Launcher only lets you cue one loop at a time.

Doing so stops all other loops, just like sequences.

3. For multiple simultaneous loops, use the Tracks screen, Loop Bank screen (**INST**), or other screens that show all 16 pads.

The Launcher only gives access to the "top row" of loops (9-16) because there are only 8 sequence slots.

## Creating Scenes with Loop Tracks

1. From the Launcher screen, launch a loop.
2. Tap the **Menu** icon and choose **Snap Scene**.
3. Press **SONG**.
4. Tap the **Menu** icon and choose **Paste Scene**.

This creates arrangements you can launch from pads, just like Exercise 2.

bento also lets you set up Song Scenes to play one after another in Song mode.

## Adding More Loop Tracks

1. Using the same steps as Track 1, load the Loop patch **Instruments 1** into Track 2.
2. Load **Female Vocals 2** into Track 3.
3. Press **PLAY** and start and stop loops by selecting tracks in the Tracks screen and pushing the pads.
4. Press **INST** to see the Loop Bank screen and play the pads.

Don't be surprised if some loop combinations sound better than others.

5. They were recorded in different keys or at different tempos.

## Understanding Tempo and Loop Playback

1. Loop tracks play loops in sync with bento's transport without changing pitch.  
If a sample is recorded at a specific BPM (say, 120), 1010music recommends keeping playback tempo within 10 BPM of the original.
2. Look at loop names in each track - factory patches include original BPM in filenames.
3. Try listening to how Tracks 1-3 respond to slower and faster tempos.
4. Adjust the project tempo and notice the differences in how loops sound.

## Final Mixing and Arrangement

1. Open the **Mixer** to adjust relative volumes of the loop tracks.  
You may need to lower all levels to prevent the final mix from clipping.
2. Return to the Mixer if volumes need adjusting or to add reverb or delay to inspiring loops.
3. With multiple loops and tracks, try working from the Launcher screen.
4. Capture different combinations of loops with **Snap Scene** and **Paste Scene**.
5. Move between the Launcher and Song Scenes screens.
6. Build a set of arrangements using just three Loop tracks.
7. Develop muscle memory with bento's unique workflows.

## Saving Your Loop Project

1. Press **PROJ**.
2. Tap **Save** to save your loop project.

## What You Accomplished

In this exercise, you:

- Created a new project from scratch and loaded multiple loop tracks.
- Learned how loop tracks differ from sequence-based tracks.
- Discovered that loops function as both samples and timing elements.
- Explored the Loop Bank interface for detailed loop control.
- Mixed individual loops within tracks using dedicated level controls.
- Understood the difference between loop launching in various bento screens.
- Learned that the Sequence Launcher limits loop playback compared to other screens.
- Created scenes using loop combinations for arrangement building.
- Added multiple loop tracks with different musical content.
- Understood tempo considerations and BPM matching for optimal loop playback.
- Applied mixing techniques to balance multiple loop tracks.
- Built complete arrangements using loop combinations and scene management.

You now understand how to work with loop tracks as a powerful arrangement tool. Loop tracks offer a different approach to music creation, allowing you to build complex arrangements by layering and mixing individual loops in real-time. These skills complement your sequence-based arrangement knowledge from previous exercises, giving you multiple creative approaches for building complete songs with bento.

## What's Next?

After completing these three exercises, you'll have hands-on experience with bento's core features. You can now:

- Load and manage projects with confidence.
- Work with different track types and understand their unique behaviors.
- Create dynamic arrangements using sequences and loops.
- Mix tracks and apply effects for polished results.
- Build song structures using scenes and real-time launching.
- Save your musical work.

The following chapters will provide detailed information about each track type and advanced techniques for getting the most from your bento. You're now ready to explore any aspect of bento that captures your musical imagination.

# 4: Managing bento Projects

After setting up your bento and following the walk-through exercises in the previous chapters, you'll have seen and heard the scope of bento's features, one at a time. To combine bento's features in ways that suit your own forms of creative expression and develop efficient music creation workflows, you'll need to know how to manage bento projects. Projects organize the elements of your musical compositions, arrangements, and performances as manageable units, so they can be stored and recalled collectively.

The following sections in this chapter describe the foundation of managing bento projects:

To do this...	read...
Learn how bento loads and saves track settings, sequences, mix levels, song settings, scenes settings and effects settings collectively as projects	<a href="#">Understanding Projects</a>
Save projects to microSD cards	<a href="#">Saving Projects</a>
Load entire projects from microSD cards	<a href="#">Loading Projects</a>
Create new projects	<a href="#">Creating New Projects</a>
Adjust project-wide settings like tempo, key, and scale	<a href="#">Editing Project Settings</a>
Adjust global settings like screen brightness, pad sensitivity, and TRS MIDI connector polarity.	<a href="#">Editing Global Settings</a>
Back up your projects, patches, and samples.	<a href="#">Managing Project Files</a>

Unlike some music software that automatically saves changes, bento requires you to manually save projects. This intentional design prevents accidental modifications to your saved work, but it means you need to develop good saving habits to protect your creative efforts.



## Understanding Projects

A project serves as the master container for your musical composition. When you load a project, bento retrieves all the track assignments, sample mappings, sequence data, effects settings, and mix parameters that define your arrangement.

Each project contains:

- Track and Instrument settings, such as pitch, filter, envelope, polyphony, sample playback settings, MIDI configuration, and audio routing for up to eight tracks of any supported type.
- All sequences for those tracks.
- Effects settings for Delay, Reverb, and Mod FX (chorus, phasor, flanger+distortion).
- Mixer settings, including levels and routing assignments.
- Playback and performance settings like tempo and swing for sequences, and the key root and mode for the pads.
- Names and locations of all samples used by each track.
- Samples that have been recorded into tracks for this project.

Projects do not contain:

- The actual sample data at the core of most bento tracks. bento streams patch samples directly from specific locations on microSD cards.
- Global settings like screen brightness and pad sensitivity threshold.
- System-wide MIDI configurations like the MIDI pitch-bend range and the TRS MIDI connector polarity, generally referred to as the TRS MIDI type.

Understanding this distinction helps you manage your sample libraries effectively and troubleshoot issues when moving projects between different microSD cards.

**Note:** All project data is stored as complete projects on microSD. bento does not support saving and loading individual sequences, mix levels, or effects settings. You can save the instrument settings for a track as a new patch that can be loaded into other tracks and other projects.

**Note:** After you load a patch into a project, the project will use the files from the patch, but all other patch settings are disconnected from the original patch. Changes to patch parameter settings will not change the parameter settings for projects that were previously created with that patch. If you move the files for a patch, however, that will break the projects that were created with that patch.

## Opening the Projects Screen

The Projects screen provides the central interface for all project management operations. From here you can load existing projects, save your current work, create new projects, and access project-wide settings.

To open the Projects screen, press the **PROJ** button on the front panel.

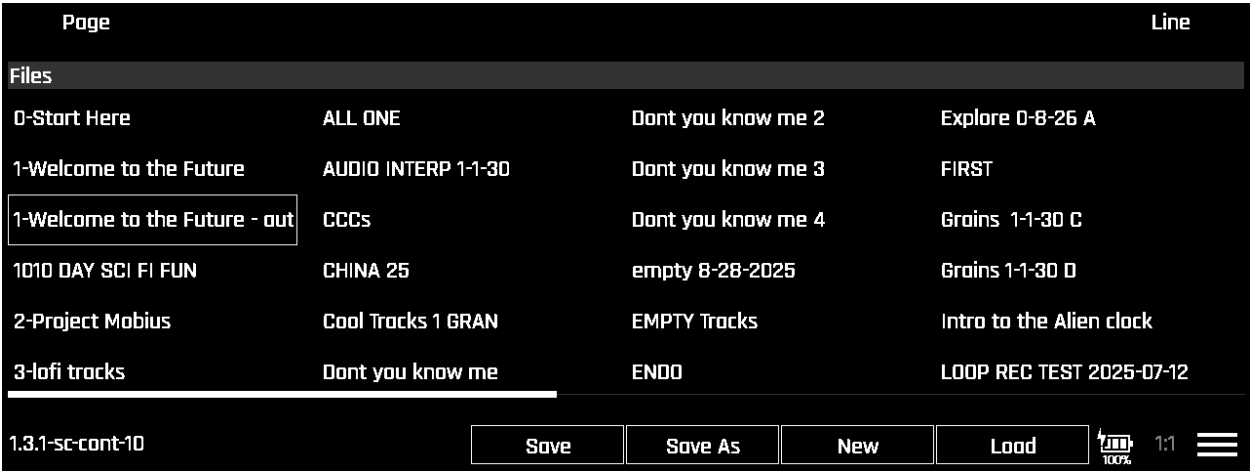


Figure 4-1: Projects screen with 1-Welcome to the Future project selected

The Projects screen displays a list of available projects on your microSD card. The currently loaded project appears highlighted, and this highlight moves when you use the touch screen to select different projects. Basic project operations are always available from this screen.

As you save your own projects, the Project screen will present them in pages of four columns that you can scroll through by swiping the touchscreen left and right, or by adjusting Knob 1, which scrolls through pages of the project list.

## Saving Projects

Saving preserves your current creative work as a named project on your microSD card. Regular saving prevents loss of work and provides stable reference points as your composition develops.

### To save the current project:

- 1. Press **PROJ** to access the Projects screen.
- 2. Tap **Save** to save the current project.

The save operation preserves all tracks, sequences, mix settings, effects configurations, and project-wide parameters. If this is a new project, bento prompts you to enter a project name before saving.

**Important:** Bento saves projects immediately when you tap Save. The Save button will become grayed out to show that there are no changes to save.

### Saving with a Different Name

Creating copies of projects allows experimentation without affecting your original work. This approach helps preserve successful arrangements while exploring creative variations.

### To save a copy of the current project with a different name:

- 1. Press **PROJ** to access the Projects screen.
- 2. Tap the **Save As** button on the bottom of the screen to save a copy with a new name.



Page		Line	
Files			
0-Start Here	ALL ONE	Dont you know me 2	Explore 0-8-26 A
1-Welcome to the Future	AUDIO INTERP 1-1-30	Dont you know me 3	FIRST
1-Welcome to the Future - out	CCCs	Dont you know me 4	Grains 1-1-30 C
1010 DAY SCI FI FUN	CHINA 25	empty 8-28-2025	Grains 1-1-30 D
2-Project Mobius	Cool Tracks 1 GRAN	EMPTY Tracks	Intro to the Alien clock
3-lofi tracks	Dont you know me	END0	LOOP REC TEST 2025-07-12
1.3.1-sc-cont-10		Save	Save As
		New	Load
		 1:1 	

Figure 4-2: Projects Screen Menu

- 3. Enter a new project name using the on-screen keyboard.

4. Tap **Enter** to save the copy.

Both the original project and the new copy exist independently on your microSD card. Changes to the project settings for one copy do not affect the other, allowing you to develop different versions of your musical ideas. However, the copied project will still point to the sample files used by the original project, even if they are stored in the original project's folder.

## Monitoring Project Resources

Each project operates within specific resource limitations that affect your creative possibilities. Monitoring these limitations helps you plan your arrangements and avoid resource conflicts.

Project limitations include:

- Maximum of eight tracks per project.
- Sample Pool of 576 individual samples across all tracks.
- Individual sample size limit of 4GB each.
- One granular track maximum per project.
- Two Wavetable tracks maximum per project

The bottom of the Tracks screen displays your current resource usage, showing both individual track sample counts and your remaining sample allocation.

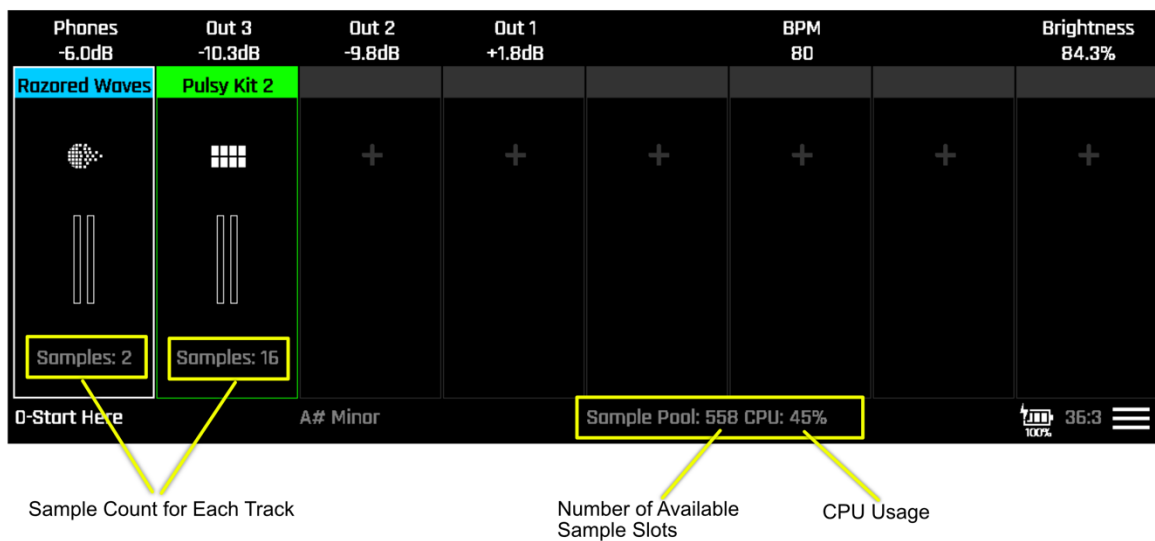


Figure 4-3: Tracks screen showing resource indicators

This real-time feedback helps you manage resources as you build complex arrangements.

If the loaded tracks use more than 576 samples, any tracks loaded after that will not load properly because there are no sample slots left. If you find that a track doesn't play, check your Sample Pool. If it is zero, then you may have loaded too many samples. Remove a track to free up the Sample Pool and then reload the faulty track.

## Loading Projects

Loading retrieves a complete saved project from your microSD card, replacing your current work with the loaded project's tracks, sequences, and settings. This operation provides quick access to previously saved musical compositions.

### To load an existing project:

1. Press **PROJ** to access the Projects screen.
2. Tap the project name you want to load.
3. Tap **Load** to load the selected project.

Loading takes several moments, especially for projects containing many samples or complex configurations. During loading, bento retrieves all project data and initializes tracks according to the saved settings.

**Important:** Loading a project discards any unsaved changes to your previous project. bento does not warn you about unsaved changes, so develop the habit of saving frequently to protect your work.

When a project loads successfully, all tracks, sequences, and settings return to their saved state. If the project references samples that are missing from your microSD card, those tracks may not load properly or may produce no sound.

While the project is opening the sample files needed for this project, a Loading countdown is displayed at the bottom of the Tracks screen. The number indicates how many samples still need to be loaded for this project. Large files take longer to load. To ensure you are hearing the full sound of your tracks, wait until Loading is finished before playing the tracks or sequences.

# Creating New Projects

New projects start with empty tracks and default settings, providing a clean slate for your musical ideas. Creating a new project helps you organize different compositions and prevents creative work from interfering with existing projects.

## To create a new project:

- 1. Press **PROJ** to access the Projects screen.



Figure 4-4: Projects Screen

- 2. Tap the **New** button at the bottom of the screen.

The file naming screen appears for entering your project name.

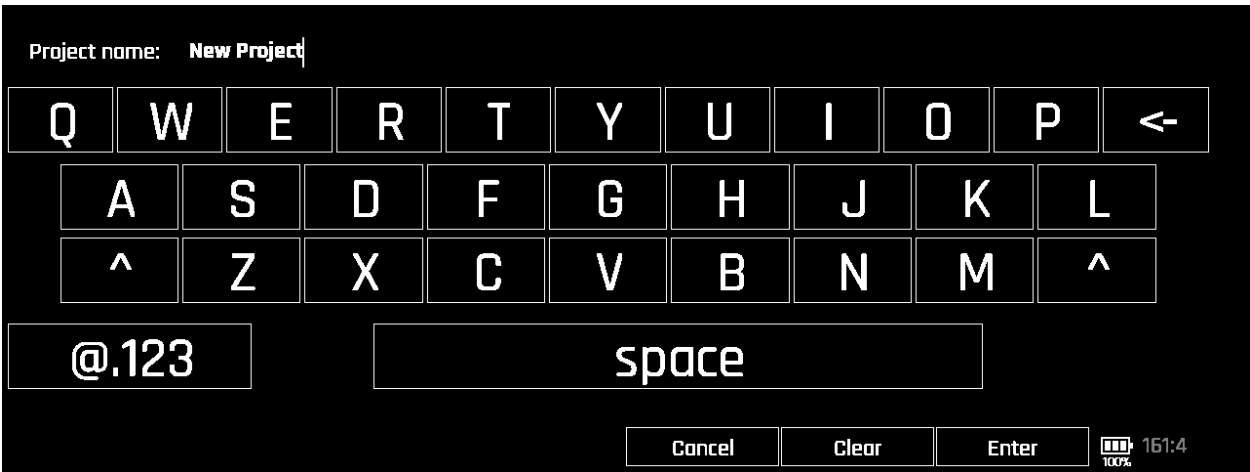


Figure 4-5: Naming keyboard screen

- 3. Enter a descriptive name for your project by tapping the keys in the on-screen keyboard.

4. Tap Enter to create and load the new empty project.

Bento displays the Tracks screen with eight empty track slots.

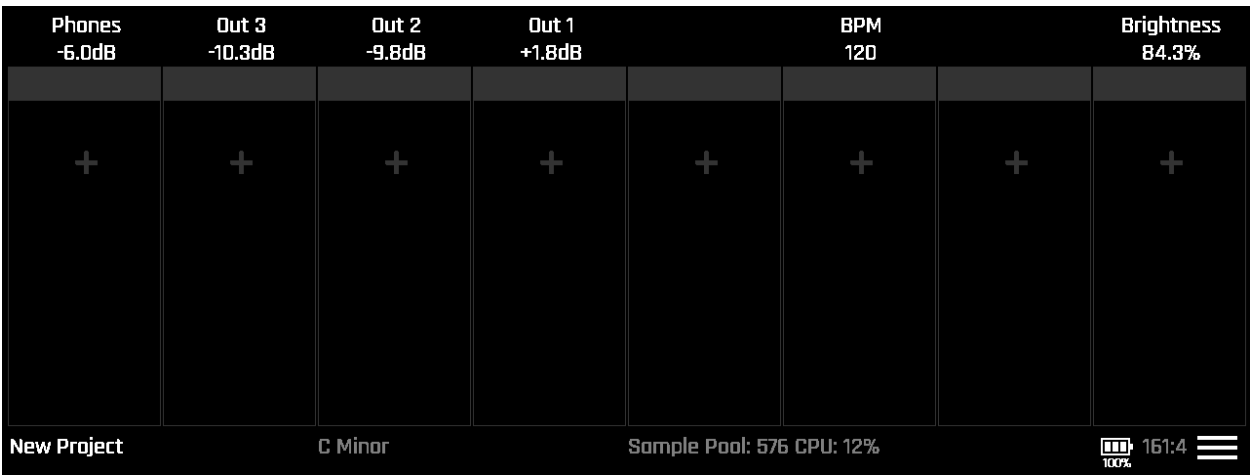


Figure 4-6: Tracks screen showing new project

Your new project begins with default settings and no assigned tracks. You can immediately begin adding tracks, loading samples, and creating sequences. Remember to save frequently as you develop your new composition.

For details on managing tracks in the current project, see [Managing Tracks](#).

## Editing Project Settings

Project settings control parameters that affect all tracks within your project. These settings include musical parameters like tempo and key, as well as technical settings that influence how the project behaves.

### To access project settings:

1. Press **PROJ** to access the Projects screen.
2. Tap the **Menu** button.



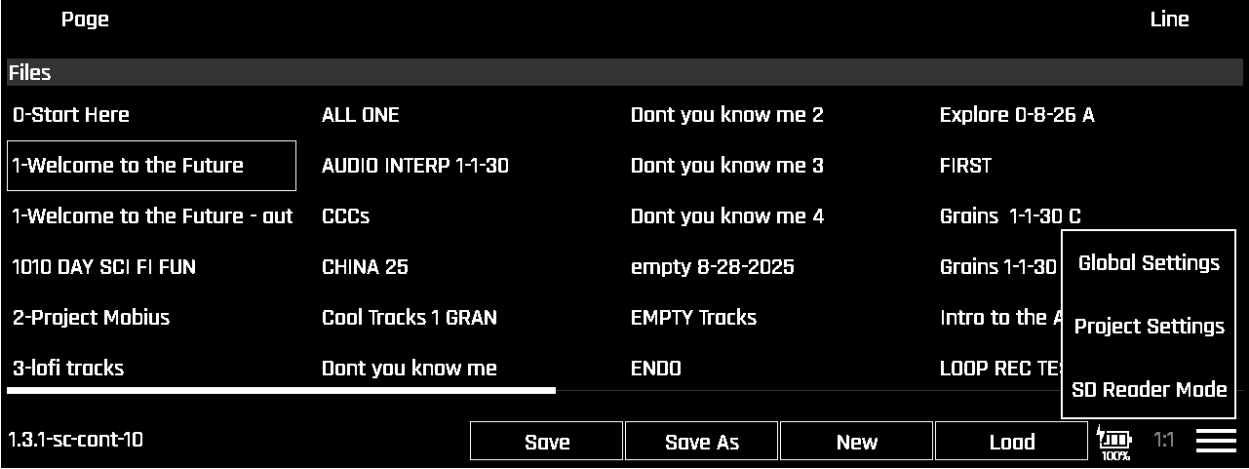


Figure 4-7: Projects screen menu opened

- 3. Select **Project Settings** from the menu options. The Project Settings screen opens.



Figure 4-8: Project Settings screen

The Project Settings screen displays the Config parameter group. The knobs are assigned to the visible parameters, allowing you to adjust settings directly without touching the screen. Settings save automatically as you change them.

*Table 4-1: Project Settings Parameters*

<b>Parameter</b>	<b>Knob</b>	<b>Description</b>
Root Note	1	Musical root note for scale-based playing modes (A to G#)
Scale	2	Scale selection including Chromatic, Major, Major Pentatonic, Minor, Minor Pentatonic, Minor Blues, Raga Bhairav, Taga Todi, Gypsy, Arabian, Egyptian, Miyakobushi, Ryukyu, Wholetone, Diminished, Harmonic Minor, Melodic Minor, Dorian, Phrygian, Lydian, Mixolydian, Aeolian, and Locrian
Swing	5	Sequence swing timing (1 to 99, with 50 being no swing)
BPM	6	Master tempo for sequences and synchronization (40 to 250)

Changes to project settings affect all tracks and sequences within the project. These settings save with the project and load automatically when you reload the project later.

# Editing Global Settings

Global settings affect all projects and control system-wide behaviors that persist across power cycles. Unlike project settings, global settings maintain their values independent of the Project Settings.

## To access global settings:

- 1. Press **PROJ** to access the Projects screen.
- 2. Tap the **Menu** button.

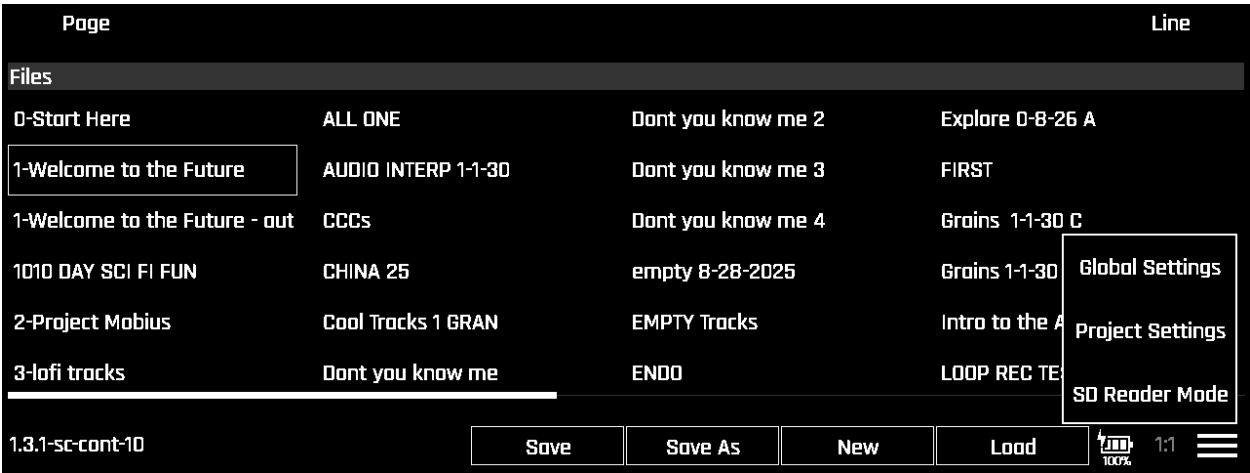


Figure 4-9: Projects screen menu opened

- 3. Select **Global Settings** from the menu options. The Global Settings screen opens.

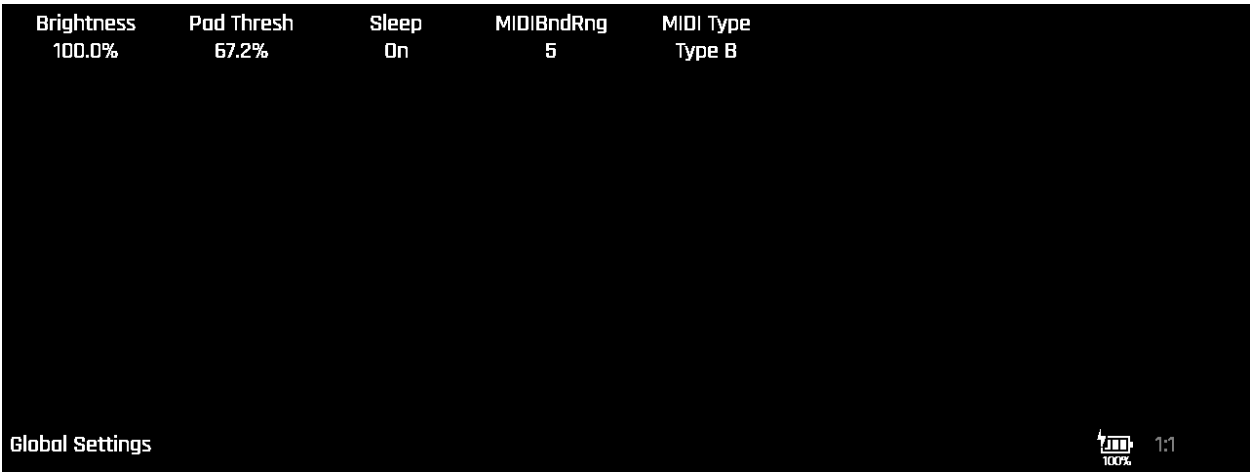


Figure 4-10: Global Settings Screen

The following table describes each parameter in the Config group and identifies the knob assigned to it.

*Table 4-2: Global Settings Parameters*

<b>Parameter</b>	<b>Knob</b>	<b>Description</b>
Brightness	1	Screen brightness level (0-100%)
Pad Thresh	2	Pad sensitivity threshold for triggering (0-100%)
Sleep	3	Automatic sleep timer settings. Turn sleep mode on to conserve battery. Touch any button to wake up from sleep mode.
MIDIBndRng	4	MIDI pitch bend sensitivity range
MIDI Type	5	TRS MIDI connector polarity (Type A or Type B)

Global settings take effect immediately and persist across all projects. These settings remain active even after powering off bento and loading different projects.

## Managing Project Files

Effective file organization becomes increasingly important as your sample library and project collection grows. Understanding how bento organizes files helps you maintain a manageable creative environment.

When creating new projects, consider your intended workflow and resource requirements. Planning ahead helps you make the most of bento's capabilities within the system limitations.

Project limitations include:

- Maximum of eight tracks per project.
- Sample pool of 576 individual samples across all tracks.
- One granular synthesis track per project.
- Two wavetable tracks per project.
- Maximum of 8 sequences per track.

Understanding these limitations helps you plan your projects effectively and make the most of bento's capabilities.

## Project Backup Strategies

Protecting your creative work requires regular backups and thoughtful file management practices. Developing backup habits prevents loss of important musical work.

Effective backup practices include:

- **Regular project saves:** Save frequently during creative sessions.
- **Periodic microSD card backups:** Copy entire cards to computer storage.
- **Version management:** Use Save As to create project snapshots at important milestones.

Consider using multiple microSD cards for different types of projects or maintaining backup cards with copies of your most important work.

## Understanding bento's File Structure

Bento organizes files on your microSD card using a specific directory structure that supports efficient project management and sample organization.

Key directories include:

- **Root directory:** Contains firmware files and system data.
- **Projects folder:** Contains individual project files and data, including WAV files recorded with bento's sample recording features.
- **Patches folder:** Contains preset instrument configurations.
- **User Patches folder:** Contains patches created by user, saved from the Tracks screen.

Projects reference samples by their file paths, so maintaining consistent sample organization prevents broken links when you reload projects later.

## How bento's Patch and Project Files Relate to Each Other

In bento, Patches are used like templates. When you load a patch into a track, bento copies all of the settings for the patch into the project file. This includes references to the WAV files that are stored with the patch in its folder. This allows each project to modify the settings to fit the current work in progress, while making use of the same sample files.

- Any changes made to the patch in the future will not affect any projects that were created from that patch.
- Any changes to the projects will not affect the patch, unless you choose to save over that patch.

*The only link between the patch used to load a track and the resulting project file is a pointer from the project file to the WAV files that are stored with the patch. Keep in mind that this means that if you delete, move or rename the patch files, you could break any projects that are using those files. To learn more about patches, see [Managing Patches](#).*

## Sample File Organization Strategy

Organizing your sample library effectively improves workflow efficiency and prevents project loading problems when samples move or become unavailable.

Effective sample organization includes:

- **Consistent folder structures:** Use predictable naming and hierarchy.
- **Descriptive folder names:** Choose names that clearly indicate content.

- **Logical categorization:** Group related samples together.
- **Consistent file naming:** Use systematic naming conventions.

Well-organized sample libraries make it easier to find sounds during creative sessions and reduce the likelihood of missing sample references when sharing projects or moving to different microSD cards.

## Managing Sample Dependencies

Projects depend on external sample files, which can create complications when sharing projects or moving them between different microSD cards. Understanding these dependencies helps you maintain project integrity.

Sample dependency considerations include:

- **Project Dependency on Patch Files:** If a track was loaded from a patch, the track will point to the WAV files in the folder for that patch.
- **Missing samples:** Projects may load with silent tracks if samples are unavailable.
- **File path changes:** Moving samples to different folders can break project links and patches.
- **Sample organization:** Consistent organization reduces dependency problems.
- **Project portability:** Consider sample availability when sharing projects.

Planning your sample organization strategy early in your bento workflow prevents these complications and maintains reliable project loading across different scenarios.

## Next Steps

With a solid understanding of project management, you're ready to dive deeper into bento's creative capabilities. Effective project management provides the foundation for all your musical work on bento.

Consider exploring this topic next:

- **Track Management:** Learn to create and configure different track types.

Strong project management skills enhance every aspect of your bento experience, from initial creative exploration through final project completion and sharing.

# 5: Managing Tracks

This chapter provides an overview of the features that all bento tracks have in common and just enough information about their differences to help you prepare for them when you start exploring each track in later chapters.

**To do this...**

Understand the components of each bento track

**read ...**

*Loading a Track from a Patch*

You can quickly build a set of instruments for a new project by loading patches into tracks.

- 1. Open a project that has an empty track, or select a loaded track, then tap menu and select Cut Track to clear the contents of the selected track.
- 2. Open the patch browser for that track by either double-tapping the track, or selecting the track and then pushing INST. The Patch browser will appear.

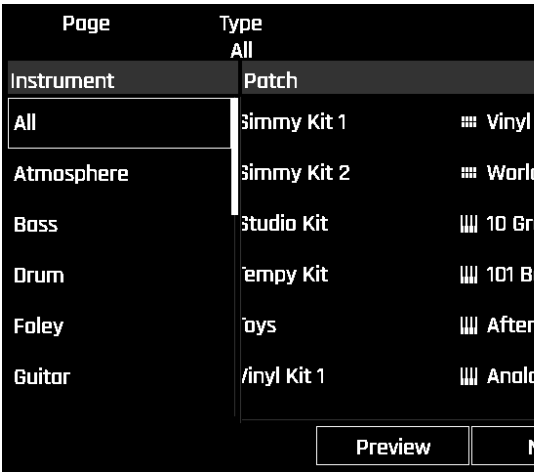


Figure 6-1: Patch Browser Screen

Select the All Instrument from the left, and the All Type using Knob 2 to see all of the



**To do this...****read ...**

available patches. In this view, the patches are organized with all User patches followed by all Factory patches. Within those groups, the files are organized by Patch Type, as indicated by the icon, and then alphabetically by patch name.

3. Select an Instrument tag to filter the list of patches. These tags are designed to help you find the type of musical sound you are looking to add to your project. At the bottom of the list of Instruments is the User tag. Select this if you want to see all of the user patches that have been saved on this bento. You can further refine the list if you know what patch type you are looking for. Use the Type knob to select a specific patch type, such as One-Shot or Granular.
4. Preview the patches by tapping the preview button and then selecting the file you want to preview. Tap preview again to toggle off patch previews.
5. Use the Page knob to scroll the list of patches horizontally by four columns at a time. Use the Line knob to scroll through the list one file at a time. You can also use swipe and tap gestures to scroll through the list and select a file. When you have found the file you want, load it by double-tapping the file, or selecting the file and tapping the Load button.

Bento will copy the parameter information for the patch into the

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project file and point to the WAV files in the patch folder. The track name will be set to the name of the Patch that was loaded.

**Note:**

- Patches that are grayed out on the Patch browser cannot be loaded at this time. This is because you already have the maximum number of allowed tracks of that patch type in the current project.
- If you want to reset a track back to the original parameter settings from the patch used to create it, use the Change Patch feature. By default, the track was assigned the same name as the patch used to create it. If you changed that name, check the file path for the WAV files used by the patch. The track should point to the WAV files in the folder for the source patch. The folder has the same name as the patch. Just be sure to check if it is a user patch or a factory patch, because you could have a factory patch and a user patch with the same name.

## **Changing the Patch Used for a Track**

If you want to explore using the sequences in a track with the sounds from a different patch, you

**To do this...****read ...**


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can change the patch used by the track.

1. Push Tracks and tap to select the Track you want to change.
2. Tap the menu in the lower right corner, then tap Change Patch in the list of menu options.
3. Use the patch browser to find the patch you want to load into the track.

**Note:** To preserve your sequences, One-shot tracks can only be swapped with other one-shot tracks due to the different way one-shot tracks are sequenced. Loop patches cannot be sequenced, so choosing a loop patch here will result in the loss of your sequences. For best results, swap in a patch of the same patch type used to create the sequences for this track. Once you have the desired patch selected, tap Load. The patch selected will be loaded into the current track. If the original and new track are compatible, the sequences will remain.

## Renaming a Track

By default, a track is assigned the name of the patch used to create it. You can change that to better match how you are using that instrument in your project.

1. Push Tracks and select the track you want to rename.
2. Tap the menu in the lower right corner, then tap Rename Track.

**To do this...**

**read ...**

Identify elements of traditional samplers and synthesizers in bento tracks and how these make bento's unique combination of sample engines easier to master.

Recognize similarities between bento's user interfaces for editing each type of track.

Discover bento's track editing screens and develop workflows that suit your own personal approach to improvising, composing, performing and recording.

Follow the audio signal flow of each bento voice, from its VCA through output routing and effects sends, through bento's mixer and compressor, and out through bento's four audio outputs.

Find the simple habits that you can develop to avoid overloading bento.

Save a track to microSD card as a patch.

3. Use the onscreen keyboard to enter the new name. You can use the Clear button to erase the current name. Use the **^** buttons to toggle between upper and lower case letters. Use the button in the lower left to toggle between the letter keyboard and the number plus characters keyboards.
4. Tap Enter to save the change and return to the TRACKS screen.

*Understanding bento Tracks*

*How the Signal Path Impacts Sound*

*Where to Find the Instrument Controls for a Track*

*Navigating the Track Editing Screens*

*Audio Routing, Effects Processing, and Mixing*

*Balancing Sample Playback Quality and CPU Usage*

Saving a Track as a Patch

**Note:** Wavetable patches were not included on the microSD card created at the factory. To add wavetable patches to your bento,

To do this...

read ...

follow the instructions in [Updating the Factory Patch Set](#).

Loading a Track from a Patch

You can quickly build a set of instruments for a new project by loading patches into tracks.

- 5. Open a project that has an empty track, or select a loaded track, then tap menu and select Cut Track to clear the contents of the selected track.
- 6. Open the patch browser for that track by either double-tapping the track, or selecting the track and then pushing INST. The Patch browser will appear.

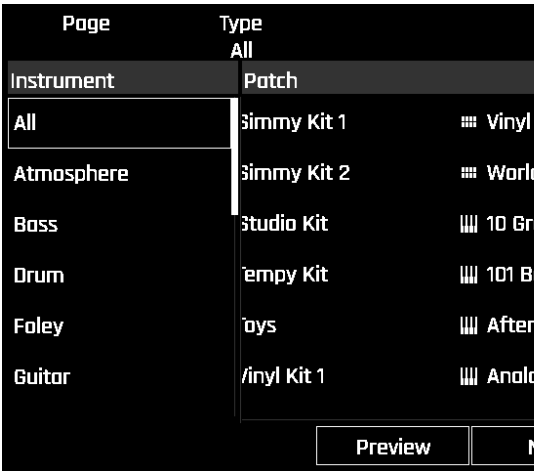


Figure 6-1: Patch Browser Screen

Select the All Instrument from the left, and the All Type using Knob 2 to see all of the available patches. In this view, the patches are organized with

**To do this...****read ...**


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all User patches followed by all Factory patches. Within those groups, the files are organized by Patch Type, as indicated by the icon, and then alphabetically by patch name.

7. Select an Instrument tag to filter the list of patches. These tags are designed to help you find the type of musical sound you are looking to add to your project. At the bottom of the list of Instruments is the User tag. Select this if you want to see all of the user patches that have been saved on this bento. You can further refine the list if you know what patch type you are looking for. Use the Type knob to select a specific patch type, such as One-Shot or Granular.
8. Preview the patches by tapping the preview button and then selecting the file you want to preview. Tap preview again to toggle off patch previews.
9. Use the Page knob to scroll the list of patches horizontally by four columns at a time. Use the Line knob to scroll through the list one file at a time. You can also use swipe and tap gestures to scroll through the list and select a file. When you have found the file you want, load it by double-tapping the file, or selecting the file and tapping the Load button.

Bento will copy the parameter information for the patch into the project file and point to the WAV files in the patch folder. The track

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name will be set to the name of the Patch that was loaded.

**Note:**

- Patches that are grayed out on the Patch browser cannot be loaded at this time. This is because you already have the maximum number of allowed tracks of that patch type in the current project.
- If you want to reset a track back to the original parameter settings from the patch used to create it, use the Change Patch feature. By default, the track was assigned the same name as the patch used to create it. If you changed that name, check the file path for the WAV files used by the patch. The track should point to the WAV files in the folder for the source patch. The folder has the same name as the patch. Just be sure to check if it is a user patch or a factory patch, because you could have a factory patch and a user patch with the same name.

## **Changing the Patch Used for a Track**

If you want to explore using the sequences in a track with the sounds from a different patch, you can change the patch used by the track.

**To do this...****read ...**

- 
10. Push Tracks and tap to select the Track you want to change.
  11. Tap the menu in the lower right corner, then tap Change Patch in the list of menu options.
  12. Use the patch browser to find the patch you want to load into the track.

**Note:** To preserve your sequences, One-shot tracks can only be swapped with other one-shot tracks due to the different way one-shot tracks are sequenced. Loop patches cannot be sequenced, so choosing a loop patch here will result in the loss of your sequences. For best results, swap in a patch of the same patch type used to create the sequences for this track. Once you have the desired patch selected, tap Load. The patch selected will be loaded into the current track. If the original and new track are compatible, the sequences will remain.

## Renaming a Track

By default, a track is assigned the name of the patch used to create it. You can change that to better match how you are using that instrument in your project.

13. Push Tracks and select the track you want to rename.
14. Tap the menu in the lower right corner, then tap Rename Track.
15. Use the onscreen keyboard to enter the new name. You can use the Clear button to erase



**To do this...****read ...**

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the current name. Use the **^** buttons to toggle between upper and lower case letters. Use the button in the lower left to toggle between the letter keyboard and the number plus characters keyboards.

16. Tap Enter to save the change and return to the TRACKS screen.

*Saving a Track as a Patch*

## Loading a Track from a Patch

You can quickly build a set of instruments for a new project by loading patches into tracks.

17. Open a project that has an empty track, or select a loaded track, then tap menu and select Cut Track to clear the contents of the selected track.
18. Open the patch browser for that track by either double-tapping the track, or selecting the track and then pushing INST. The Patch browser will appear.



Figure 6-1: Patch Browser Screen

Select the All Instrument from the left, and the All Type using Knob 2 to see all of the available patches. In this view, the patches are organized with all User patches followed by all Factory patches. Within those groups, the files are organized by Patch Type, as indicated by the icon, and then alphabetically by patch name.

19. Select an Instrument tag to filter the list of patches. These tags are designed to help you find the type of musical sound you are looking to add to your project. At the bottom of the list of Instruments is the User tag. Select this if you want to see all of the user patches that have been saved on this bento. You can further refine the list if you know what patch type you are looking for. Use the Type knob to select a specific patch type, such as One-Shot or Granular.
20. Preview the patches by tapping the preview button and then selecting the file you want to preview. Tap preview again to toggle off patch previews.
21. Use the Page knob to scroll the list of patches horizontally by four columns at a time. Use the Line knob to scroll through the list one file at a time. You can also use swipe and tap gestures to scroll through the list and select a file. When you have found the file you want, load it by double-tapping the file, or selecting the file and tapping the Load button.

Bento will copy the parameter information for the patch into the project file and point to the WAV files in the patch folder. The track name will be set to the name of the Patch that was loaded.

**Note:**

- Patches that are grayed out on the Patch browser cannot be loaded at this time. This is because you already have the maximum number of allowed tracks of that patch type in the current project.
- If you want to reset a track back to the original parameter settings from the patch used to create it, use the Change Patch feature. By default, the track was assigned the same name as the patch used to create it. If you changed that name, check the file path for the WAV files used by the patch. The track should point to the WAV files in the folder for the source patch. The folder has the same name as the patch. Just be sure to check if it is a user patch or a factory patch, because you could have a factory patch and a user patch with the same name.

## Changing the Patch Used for a Track

If you want to explore using the sequences in a track with the sounds from a different patch, you can change the patch used by the track.

22. Push Tracks and tap to select the Track you want to change.
23. Tap the menu in the lower right corner, then tap Change Patch in the list of menu options.
24. Use the patch browser to find the patch you want to load into the track.  
**Note:** To preserve your sequences, One-shot tracks can only be swapped with other one-shot tracks due to the different way one-shot tracks are sequenced. Loop patches cannot be sequenced, so choosing a loop patch here will result in the loss of your sequences. For best results, swap in a patch of the same patch type used to create the sequences for this track. Once you have the desired patch selected, tap Load. The patch selected will be loaded into the current track. If the original and new track are compatible, the sequences will remain.

## Renaming a Track

By default, a track is assigned the name of the patch used to create it. You can change that to better match how you are using that instrument in your project.

25. Push Tracks and select the track you want to rename.
26. Tap the menu in the lower right corner, then tap Rename Track.

27. Use the onscreen keyboard to enter the new name. You can use the Clear button to erase the current name. Use the **^** buttons to toggle between upper and lower case letters. Use the button in the lower left to toggle between the letter keyboard and the number plus characters keyboards.
28. Tap Enter to save the change and return to the TRACKS screen.

## Understanding bento Tracks

In practice, each bento track behaves like an individual sample-based instrument that you can play from bento's physical pads, from a MIDI controller, or from a sequence stored as part of the track.

Each track's voice begins with a sample being played by a sample engine that serves as the equivalent of a traditional synthesizer oscillator, routed through a filter and a VCA controlled by an envelope generator. External tracks don't have a voice of their own and instead send MIDI out to other devices and bring external audio into the mixer.

## Choosing the Right Track Type

Beyond the common voice parameters, each track type provides specialized controls tailored to its synthesis method. One-shot tracks include percussion-optimized settings like choke groups. Granular tracks offer grain size, density, and position controls. Loop tracks provide recording and tempo synchronization features. External tracks replace sample controls with audio input processing parameters. These specialized features receive detailed coverage in the track type-specific chapters.

*Table 5-1: Differences Between Track Types*

Track Type	Sample Engine	Notes
Multisample	<p>Key-mapping and velocity-mapping sample playback, with interpolation options for lower CPU impact or higher quality.</p> <p>1 sample per voice, played start-to-end with optional sustain loop if there are loop points in each sample file.</p>	<p>Samples are loaded when track is first created and cannot be changed afterwards.</p> <p>Sample start, end and loop points must be specified in the sample files before loading.</p> <p>Some Multisample patches use a large number of samples. Plan carefully to avoid exceeding the limit of 576 samples per project.</p>

Track Type	Sample Engine	Notes
Granular	Each voice loads two samples into two granular oscillators, each of which divides the sample into small “grains” that they play in a variety of manners to produce textures that are at both familiar and abstract at the same time. The sound can be further enhanced by adding a periodic waveform oscillator.	<p>Samples can be replaced or cleared at any time.</p> <p>Tends to be CPU intensive, so bento supports only one granular track in each project.</p>
One-shot	16 samples, mapped to 16 pads and MIDI notes 36-51. 1 sample per voice, played start-to-end, with no sustain loop option.	Samples can be replaced or cleared at any time.
Loop	16 samples, mapped to 16 pads and MIDI notes 36-51. 1 sample per voice, played start-to-end, with optional loop, time stretched to match the tempo.	<p>Samples can be replaced, unloaded (cleared), or recorded from live audio sources or resampled from the mixer output. The 8 loops in the top row can be launched with sequences on the Launch screen. The bottom 8 loops are useful for bouncing down loops.</p>
Slicer	Divide a sample into multiple slices, which play as if they were independent sample files, each mapped to consecutive pads and MIDI note numbers starting with pad 1 and MIDI note 36.	After loading a sample into a slicer track, you cannot replace it with another sample, but you can modify slice positions at any time.
Wavetable	Each voice loads two wavetable positions into two wavetable oscillators. Modulate the wavetable position for each of these oscillators to add dynamics to the sound. Further enhance the sound with a periodic waveform oscillator.	<p>Swap out each wavetable individually at any time.</p> <p>Tends to be CPU intensive, so bento only supports two wavetable tracks in each project.</p> <p>Bento uses mono wavetables.</p>

Track Type	Sample Engine	Notes
External	No sample engine. Provides a convenient way to integrate external MIDI instruments and audio sources with bento's unique workflows.	Anything played from bento's pads and sequences or received over MIDI can be sent to external MIDI instruments and their audio outputs fed back into bento and blended with other tracks with bento's Mixer and Delay and Reverb effects.

Some of bento's sample engines are modeled after sampling instruments that have gained acceptance over the years for introducing new sounds to the public, often to the degree that they are associated with specific types of sounds (e.g., Multisample instruments are for emulating pianos and orchestral instruments) despite being capable of much more. There is nothing preventing anyone from doing the unexpected with any of bento's track types.

## Manage the Sample Pool Across Tracks

Each track loads a set of WAV files that are used to generate sound. Some track types, like Slicers and Granular tracks, use only 1 or 2 files per track. Other track types, like Multisamples and One-shots can load many samples. Each bento project is allowed a pool of 576 samples. If you try to exceed that count, the track will not load all of the WAV files necessary to play properly. To help manage this, the TRACKS screen displays a sample count for each track and a Sample Pool number that represents the number of samples that are available to be loaded from the pool.

## Adjust Sound Controls Common to All Track Types

Every track type includes a core set of voice parameters that control how sounds behave when you play them. These parameters work the same way whether you're adjusting a drum sample, a piano note, or an experimental granular texture.

The main voice parameters include Level, Pitch, Pan, Overdrive, Filter, Resonance, and envelope controls (Attack, Decay, Sustain, Release). Most track types also include LFO parameters for adding movement to your sounds.

## How the Signal Path Impacts Sound

Each of bento's sample-based tracks uses a voice architecture based on a common analog synthesizer voice.

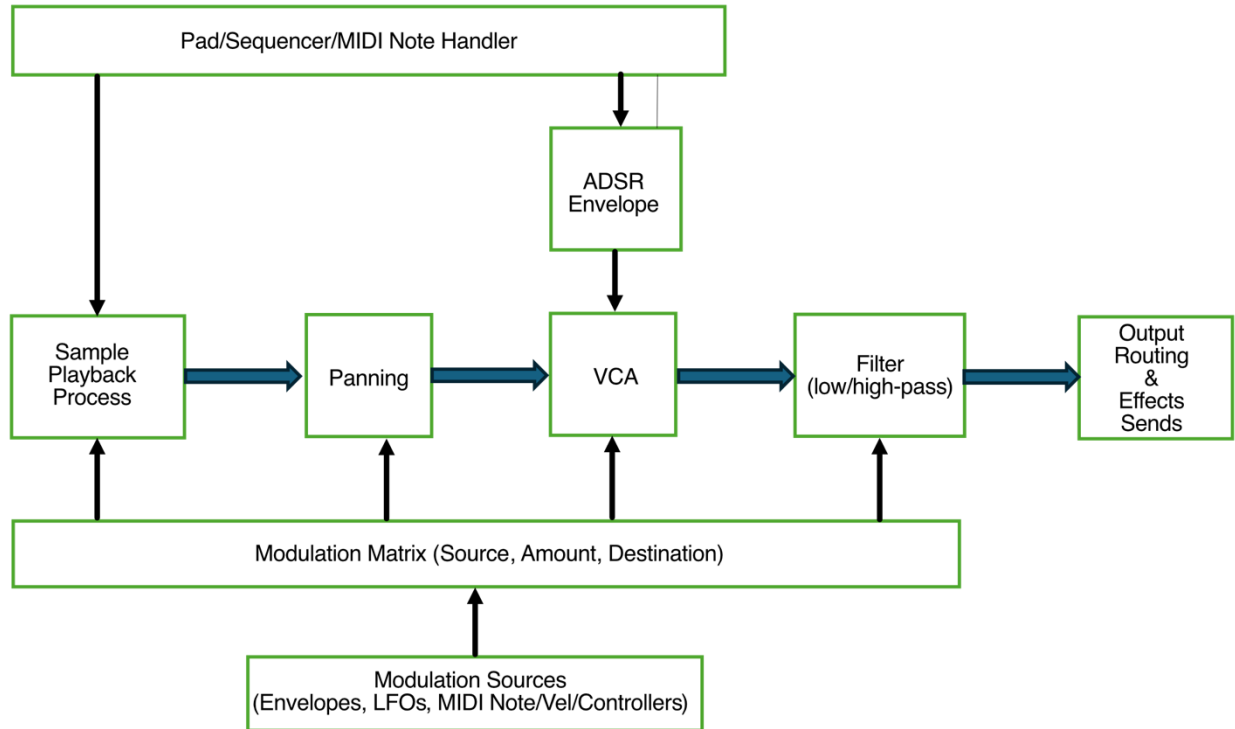


Figure 5-1: Bento Track Voice Architecture

Voice Component	Description
Sample Playback Engine	<p>The sample equivalent of an oscillator, implemented in software and executed by bento's CPU.</p> <p>Plays one sample, from a start point to an endpoint, potentially looped between loop start and end points while sustaining notes, transposed from the sample's root pitch for purposes of melodic performance or textural effect.</p> <p>During playback, bento streams sample data directly from the microSD card.</p> <p><b>Note:</b> Granular and Slicer track types employ sophisticated techniques to divide samples into multiple regions that can be played back, start-to-end, as if they were individual samples.</p>
Resonant Filter	<p>Modifies harmonic content of audio signal by emphasizing frequencies at, below, or above a cutoff frequency according to filter type (low-pass, high-pass).</p> <p><b>Note:</b> Granular tracks include two independent filters that support low-pass, high-pass, band-pass, and notch filtering.</p>
VCA	Emulates analog voltage-controlled amplifier (VCA) to impart dynamic characteristics on the audio signal modulating the level with a dedicated ADSR envelope generator.
ADSR Envelope Generator	Traditional 4-stage envelope (Attack, Decay, Sustain, Release)
Voice Panning	Produces 2-channel audio, with voice positioned in the stereo field.
Modulation Matrix	Defines which parameters are impacted by the available modulation sources, and by how much. For example, sample playback pitch can be used to modulate filter cutoff for a track or pad.
Modulation Sources	Provide signals that can be applied as modulation sources through the modulation matrix. Modulation sources always include at least one low frequency oscillator (LFO).



Voice Component	Description
Output Routing and Effects Sends	<p>Sends a variable amount of each voice's audio to bento's Delay and Reverb effects processors and routes the voice's 2-channel audio signal to one of four available output busses, three of which correspond to bento's audio outputs 1-3 and a fourth that routes the signal through a modulation effects processor before routing the signal to output buss 1.</p> <p>Effects send levels, output buss levels, main mix level, and phone output levels are controlled on the central mixer.</p>
Pad/Sequencer/MIDI Note Handler	<p>Routes each note played from bento's pads or sequences or received over MIDI to the appropriate voice. Sends control signals to the voice's sample playback engine and ADSR envelope, each of which then render the voice with the correct pitch and dynamics.</p> <p>Each track's note handling is subject to parameters such as Poly Mode (limits how many of the track's voices can play simultaneously), Launch Mode (trigger, gate or toggle), MIDI In Channel (which channel messages to accept) and MIDI Out channel (which channel to use when sending notes to external MIDI devices).</p> <p>The note handling parameters are accessible for editing in each track's Track Configuration screen and Dashboard.</p>

## Where to Find the Instrument Controls for a Track

Bento organizes track controls across a small number of user interface screens.

*Table 5-2: Voice Editor Screens*

<b>Voice Editor Screen</b>	<b>Description</b>
Dashboard	For editing voice parameters, such as: <ul style="list-style-type: none"> <li>• Sample playback pitch, Launch mode, and Poly Mode.</li> <li>• Filter cutoff and resonance VCA.</li> <li>• Envelope ADSR values.</li> <li>• LFO shape, rate, and depth.</li> <li>• Track level and stereo panning.</li> </ul>
Sample Waveform screen	Displays a sample waveform and controls for configuring the sample engine to play the sample. Called a “WAV” screen for Multisample, slicer, one-shot, and loop tracks, and called a “Grain” screen for granular tracks.
Modulation screen	Provides a central location for routing modulation sources to modulation targets, and for setting a modulation amount for each. This screen can be accessed from the Menu of the Dashboard screen for each track or pad.
Sample Bank screen	One-shots and loops have similar voice architectures as Multisample and slicer voices, except that each one-shot (or loop) has its own dashboard with independent settings and is mapped to a single pad and MIDI note number. You can consider one-shot and loop tracks as groups of 16 “sub-tracks” with their own dashboards, sample waveform screens, and modulation screens.
Track Configuration screen	The Track Configuration screen provides control over track-level settings like audio output and MIDI configuration. It also provides controls for renaming the selected track and for replacing the track’s current patch settings without erasing the current track’s sequences.

## Dashboards

The following is a screenshot of the most common form of Dashboard, used by multisample, slicer, one-shot, and loop tracks:

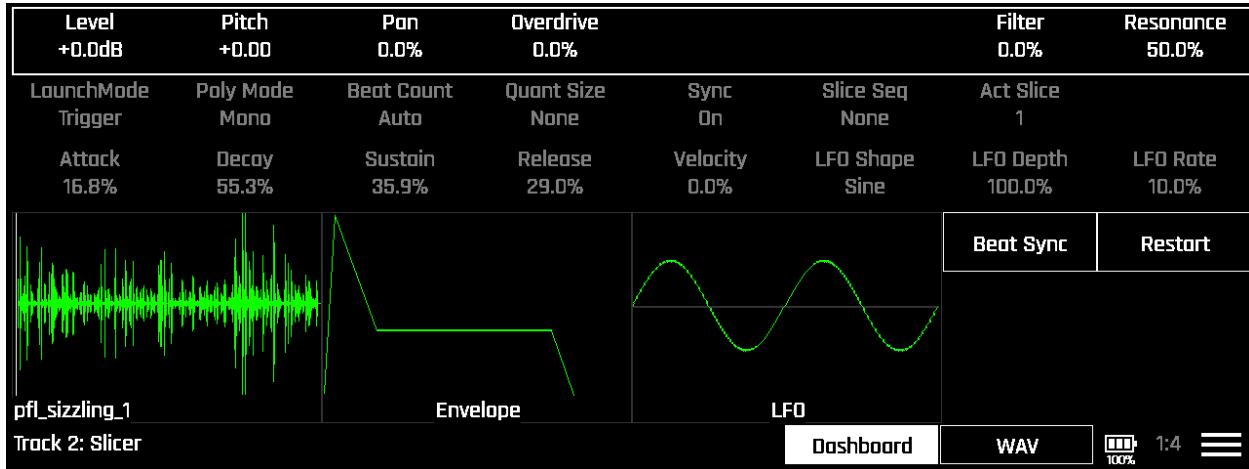


Figure 2-1: Dashboard for Slicer Track

The dashboard gives access to the sound design controls for a track, with the track, one-shot, or loop name in the lower left of the screen and the shape of the voice's waveform, envelope and LFO, rendered in the track color.

The lower right corner of the screen contains navigation controls for opening the Dashboard, WAV, and Modulation screens, the latter visible as a menu option when you touch the Menu icon.

The granular and wavetable track dashboards pack double the controls in one screen compared to the other track types primarily because each granular and wavetable voice features two granular oscillators, a periodic waveform oscillator, two envelopes, two LFOs, and more.

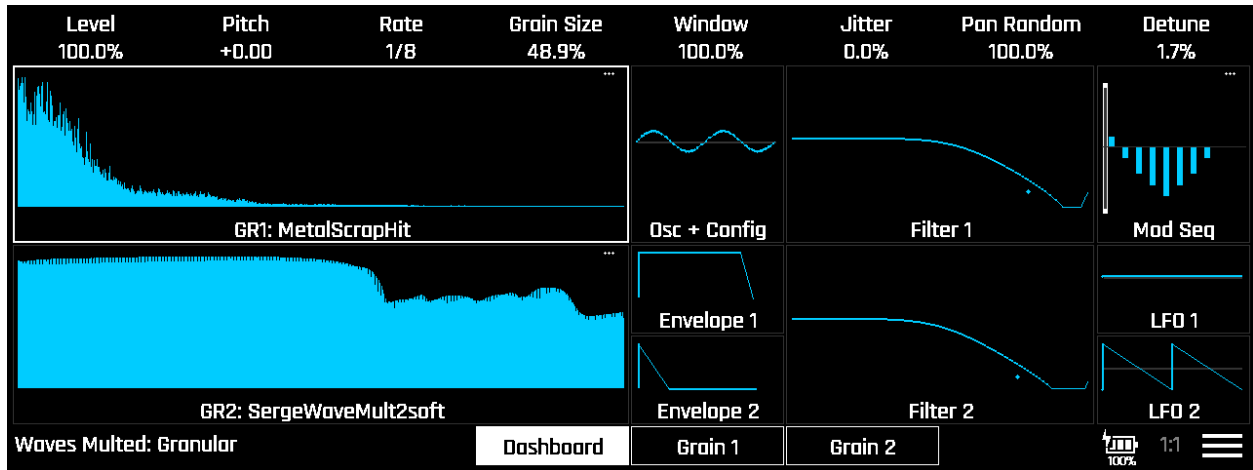


Figure 5-2: Dashboard for Granular Track

External tracks do little more than route audio inputs to bento's mixer and route inbound MIDI messages out to external MIDI instruments, so its Dashboard controls are minimal:



Figure 5-3: Dashboard for External Track

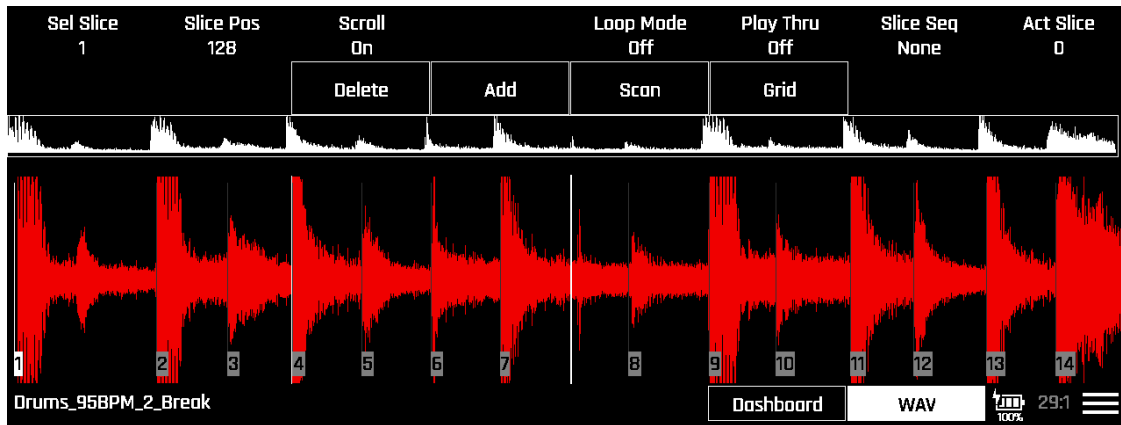
**Note:** Some track types have additional screens for editing features unique to them. For example, granular tracks have a Modulation Sequencer screen for a feature not included in any other track type.

## WAV Screens

Each Sample Waveform screen displays a visual representation of the sample and controls for configuring some aspects of the sample engine.

For example, the Slicer track WAV screen includes:

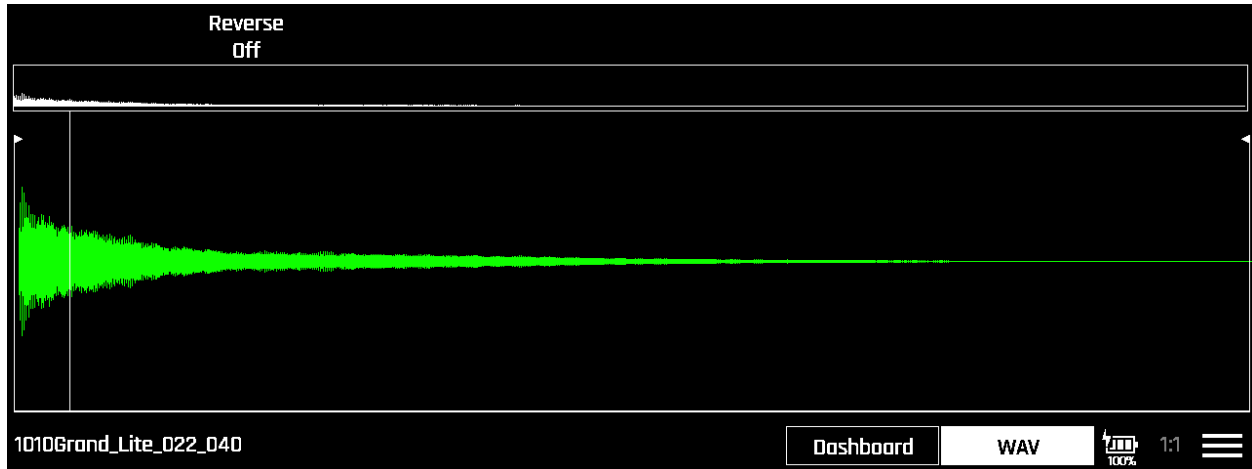
- the positions of each slice,
- controls for editing individual slices,
- controls for automatically adding slices on a grid,
- controls for adding slices that coincide with transients in the sample, and
- controls for playback options.



*Figure 5-4: Slicer Track WAV Screen*

On this screen, you can watch how the playback position moves through the waveform in real-time.

The following screenshot is from a Multisample track WAV screen. It does little more than display the waveform of one sample in the track's Multisample set and provide a parameter mapped to knob 2 for reversing the playback direction of all samples in the track.



*Figure 5-5: Multisample Track WAV Screen*

The simplicity of the Multisample WAV screen hides the fact that bento automatically takes care of the tedious task of finding details about each sample when it first loads a set of samples into a new Multisample track. One step in bento's auto-mapping process is looking for information in sample file headers, in loop point tags, and in sample filenames, which often include note names and numbers.

Bento analyzes the sample meta data to create a keymap that spans the complete range of MIDI notes and velocities to which each sample is assigned a limited range of notes, so that bento won't need to transpose it by more than a couple of steps up or down from its root note, minimizing undesirable audible artifacts, such as aliasing.

When playing a multisample instrument, bento automatically identifies the best sample to use for the triggered note and velocity, and adjusts the audio if an exact match is not found.

Like the WAV screens, the granular track Grain 1 and Grain 2 screens (one screen for each granular oscillator sample) display the main sample waveform, but when bento plays this track, this screen displays the motion of each grain.

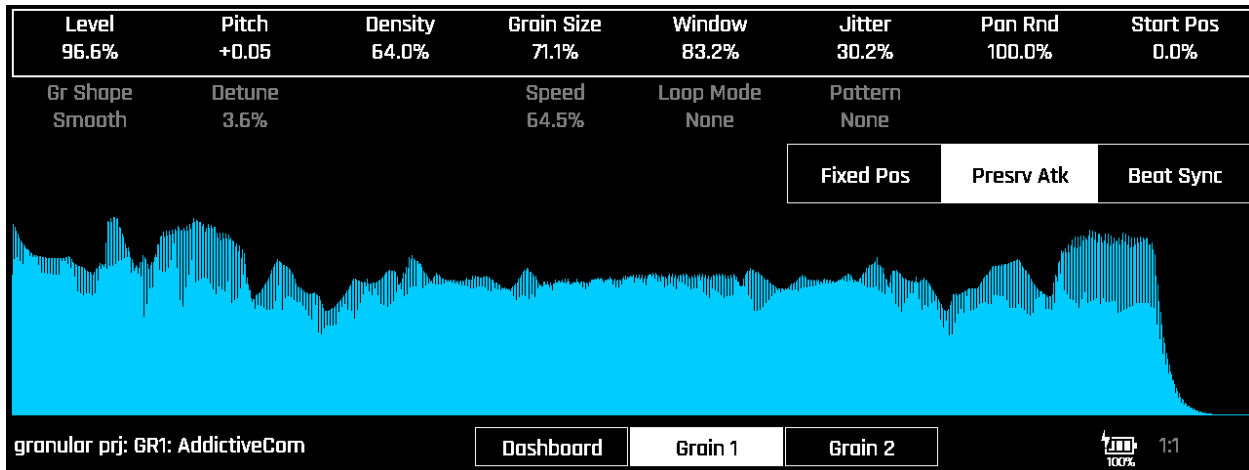


Figure 5-6: Granular Track Grain 1 Screen

Slicer, Loop, and One-shot track WAV screens provide access to a WAV Edit screen for trimming, normalizing, and saving samples. Figure 5-7 shows the WAV Edit screen for a Loop track. Here you can trim the ends of a file and normalize the audio level.

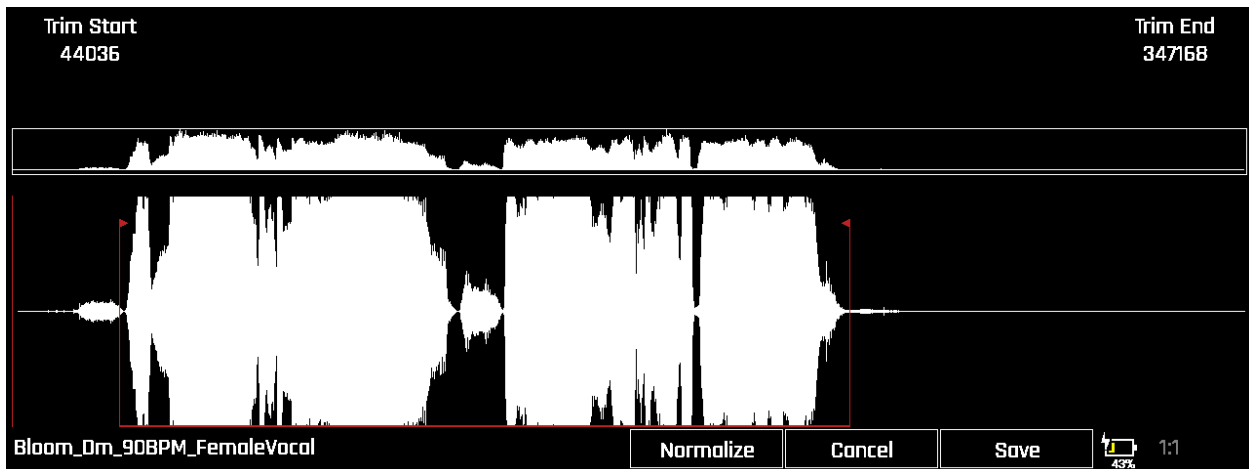
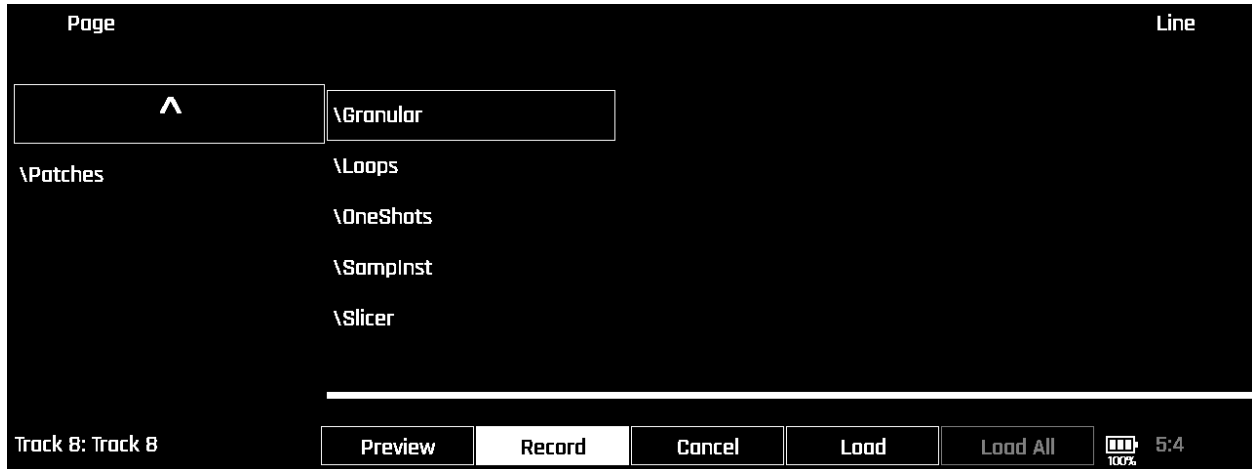


Figure 5-7: Loop Track WAV Edit Screen

## Sample Recording

All sample-based track types provide sample recording features. Loop and One-shot tracks have Sample Bank Recording screens. Other types of tracks present sample recording options in the Sample Browser screen when creating new Multisample or Slicer tracks, or when loading samples into Granular tracks.

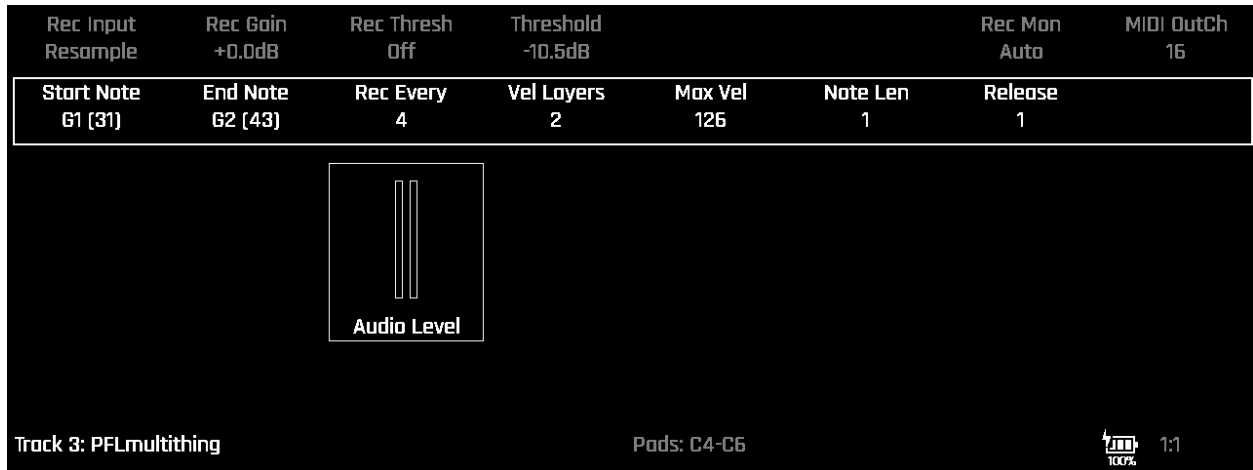
Figure 5-8 shows the Record option that appears in the Sample Browser screen when creating a new Slicer track.



*Figure 5-8: Record Option in the Sample Browser Screen*

The sample recording screens vary with each type of track. For example, the Multisample Recording screen lets you specify how to record entire sets of samples in one operation.





*Figure 5-9: Multisample Recording Options*

Samples recorded into a track are stored in the folder for the current project. This folder has the same name as the project and is under the \Projects folder on the microSD card.

## Modulation Screens

Parameter modulation lets you route sources like envelopes, LFOs, velocity, and MIDI controllers to modulate various sound parameters, creating dynamic, expressive sounds.

All track types use the same modulation interface, though the available parameters and sources vary with each track type.

The following Modulation screen shows parameters that are modulation “targets” in the first column, which are selected by the Line knob. Touch gestures can also be used to scroll and select modulation targets in the list for this track. Three sets of Source and Amount parameters for each target are mapped to Knobs 2-7.

Line	Source 1	Amount 1 10.0%	Source 2	Amount 2 0.0%	Source 3	Amount 3 0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
GR1: Pitch	LFO 1	10.0%	[None]		[None]		20
GR1: Level	[None]		[None]		[None]		19
GR1: Density	Macro Y	17.6%	[None]		[None]		21
GR1: Rate	[None]		[None]		[None]		22
GR1: Grain Size	Macro X	-24.0%	Pressure	74.8%	[None]		23
GR1: Window	[None]		[None]		[None]		24
GR1: .litter	[None]		[None]		[None]		25
Waves Multed: Granular							<div>Dashboard</div> <div>100%</div> <div>1:1</div>

Figure 5-10: Modulation Screen showing parameter routing

In the case of this Modulation screen, the highlighted parameters indicate that 10.0% of the LFO 1 signal is modulating the Pitch of the GR1 granular oscillator, possibly to apply some vibrato.

## Sample Bank Screens

When you press INST to start editing a bento One-shot or Loop tracks, you will first see a Sample Bank or Loop Bank screen which displays a grid containing the names of 16 One-shots or 16 Loops, organized in two rows of 8 grid cells.

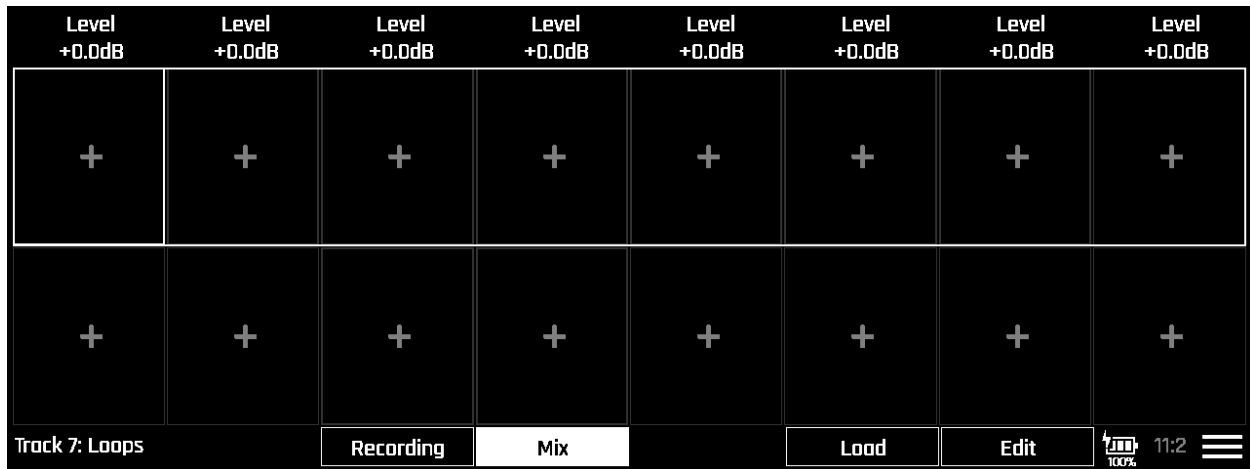


Figure 5-11: Sample Bank Screen for a Loop Track

The first step to opening a one-shot or loop dashboard is selecting the one-shot or loop in the Sample Bank. bento offers two ways to select a cell in the Sample Bank:

- Tap the cell.
- Play the pad corresponding to the cell.

With the cell selected, to open the dashboard, do one of the following:

- Tap the **Edit** on-screen control.
- Press the **RIGHT** arrow button.
- Double-tap the cell in the Sample Bank or Loop Bank screen.

The one-shot and loop Dashboards look very similar to the Multisample and slicer Dashboards, but the pads only light up if they correspond to a Sample Bank cell that already loaded a sample. Also, one of the pads is white instead of the track color to indicate that it is the selected one-shot or loop.

**Note:** You can switch which cell you are editing on the Dashboard by playing pads 1-16 or by playing MIDI notes 36-51 (C1-D#2) from a MIDI controller. The controller must send MIDI notes on the same channel as the track's MIDI In channel, set in the Track Configuration screen.

## Track Configuration Screens

The Track Configuration screen lets you control track-level settings, such as audio output and MIDI configuration.

The following screenshot is an example of the Track Configuration screen used for slicer, one-shot, and loop tracks.



*Figure 5-12: Slicer Track Configuration Screen*

External tracks do not have the usual voice architecture common across all other track types, because its “sound” comes from an external source connected to one of bento’s 3 audio inputs. The External Track Configuration screen includes an Input parameter, with which you can choose which audio input will provide the External track’s audio signal that will be routed to the mixer and eventually to the bento Output specified by the **Output** parameter.



Figure 5-13: External Track Configuration Screen

The Track Configuration screen for granular, wavetable, one-shot, multisample and external tracks includes MIDIOutPrt and MIDI OutCh parameters. Below is a full list of parameters available on the Track Configuration screen.

Parameter	Description
Output	Choose the audio output port the track will send its audio signal to. This also includes an option to route the audio to the Mod FX before sending it to Output 1.
Input	Choose the audio input port an external track will use as its audio signal.
MIDI In Ch	This track will respond to notes and MIDI CC signals received on the MIDI channel specified here. It will listen to all MIDI Input ports.
MIDIOutPrt	Tracks that support MIDI output will send MIDI out on this MIDI Output port when notes are triggered by the pads, the sequencer or external MIDI. This includes external, granular and multisample tracks.
MIDI OutCh	Tracks that support MIDI output will send MIDI out on this MIDI Channel when notes are triggered by the pads, the sequencer or external MIDI. This includes external, granular and multisample tracks.

## Navigating the Track Editing Screens

The first step in editing bento tracks is selecting a track. Most often you will select a track directly from the Tracks screen. From that point, you can navigate to any of the track editing screens.

The following figure shows the navigation paths from the Tracks screen to each of the track editing screens for multisample, slicer, granular, and wavetable tracks.

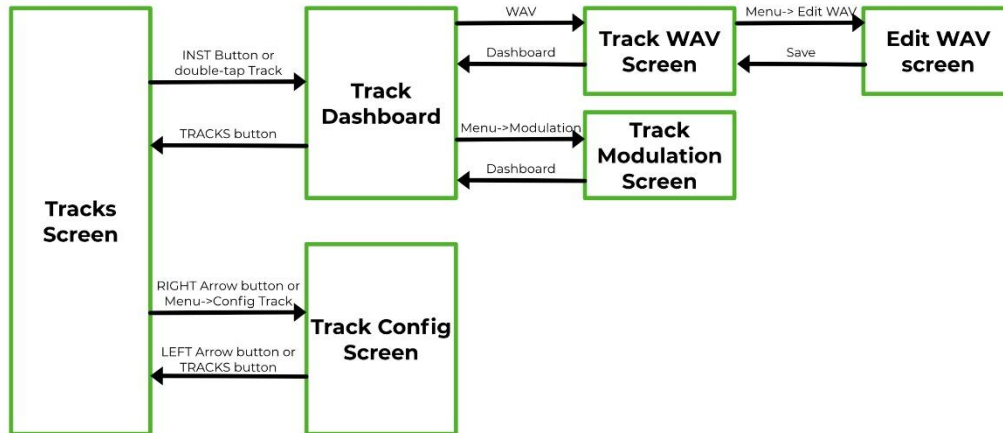


Figure 5-14: Slicer Track Screen Navigation

The following figure shows the navigation paths from the Tracks screen to each of the track editing screens for one-shots and loop tracks.

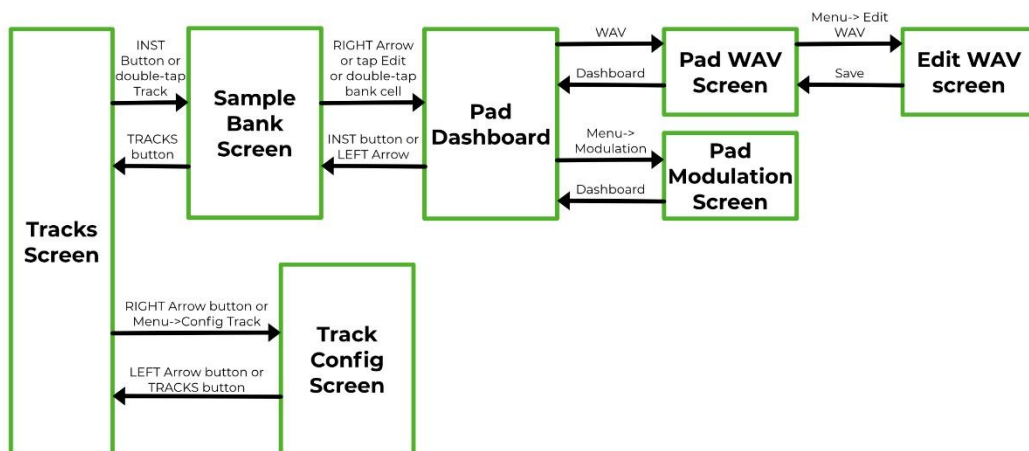
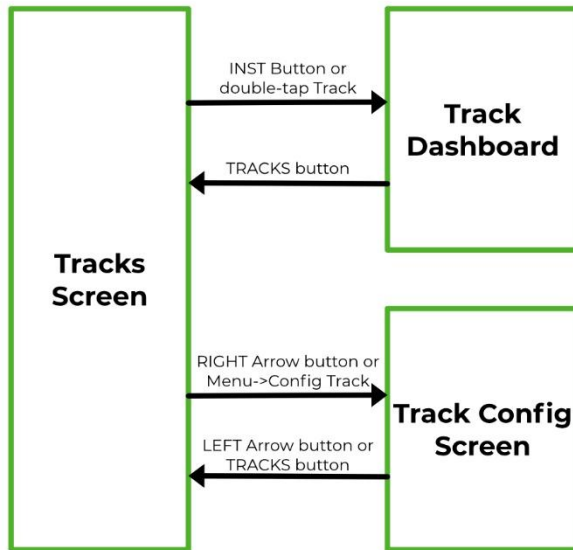


Figure 5-15: One-shot Track Screen Navigation

External Tracks have a much simpler set of screens as shown below.



*Figure 5-16: One-shot Track Screen Navigation*

**Tip:** The above diagrams show all navigation paths start at the Tracks screen, but you can also initiate these navigation paths by pressing **INST** from other screens, such as the Sequence Launcher and Sequence editor screens because the “selected track” doesn’t change when you open other screens unless you tap the screen to select something in a different track.

## Audio Routing, Effects Processing, and Mixing

Bento provides four audio output routing options, each with different characteristics.

Table 5-3: Bento Audio Output Routing Options

Output	Description
1	Serves as the main output and is the only output buss that includes delay and reverb effects. This is the default routing for new tracks.
1 w/ Mod FX	This routing sends the track through one of the modulation effects (chorus, phaser, or flanger+distortion) before reaching Output 1.
2	Provides a dry signal with no effects processing.
3	Provides a dry signal with no effects processing.

The following diagram shows how the audio is routed from a single voice to one of the three independent audio outputs.

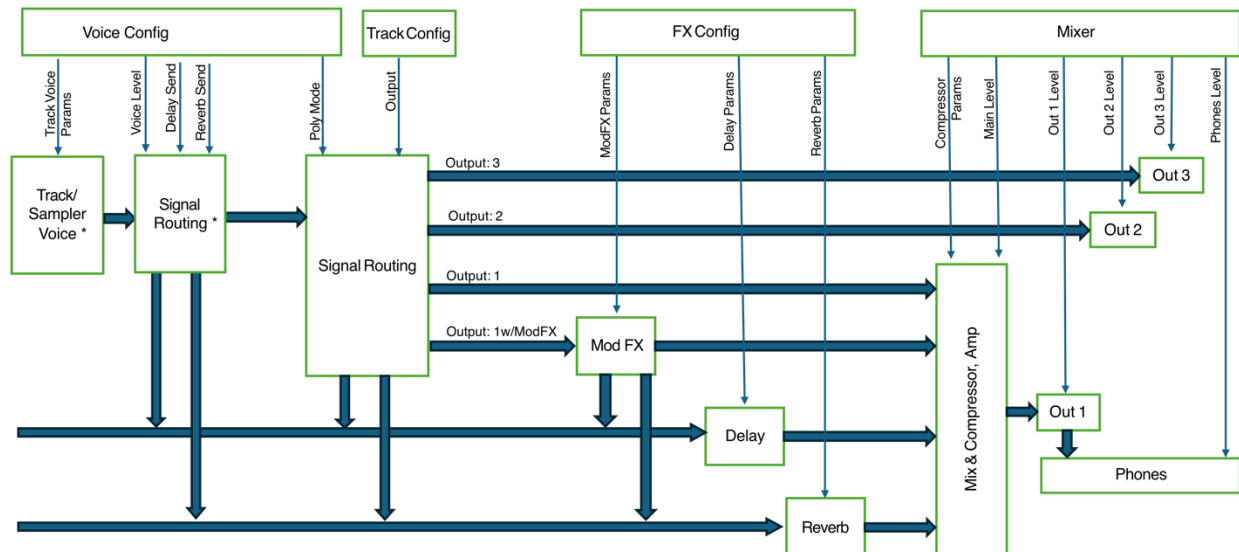


Figure 5-17: Bento Voice Audio Signal Routing

The Phones output jack will have the same signal as Output 1, with the addition of the metronome.



## Pre-Mixer Effects Sends

The signal routing diagram shows the flow of audio from the single voice to the Mixer, to bento's individual audio outputs, and to bento's effects processors. All track types have Delay and Reverb Sends on the Mixer screen.

For one-shot and loop tracks, the first pair of effects sends comes from individual voices of individual pads before being routed to the Mixer, which means they are not affected by the track's level in the Mixer. As a result, there may be occasions when you fade out a track in the Mixer but continue to hear the track at a very low volume through the Delay or Reverb effects.

To fix this type of "leakage" there are potentially 16 pairs of effects sends to adjust for each one-shot and loop track.

## Balancing Sample Playback Quality and CPU Usage

When you play a bento track, the track's sample engine determines which samples it needs to play and how to play them, which, depending on the track's sample engine type, keeps bento's CPU busy for the duration of every note you play.

For example, when you load a complex patch, such as the 10 Grand piano, into a Multisample track, bento transposes each sample by a specific interval to reach the pitch of each note played while also making sure that each sample's timbre responds to the dynamics of your performance, all without introducing any notable latency.

Bento is powerful enough and flexible enough to take on the challenge of allocating voices dynamically, even with an unforeseeable range of demands on its CPU, but it does have finite processing resources. If you give bento too much to do, there's a chance that it might make compromises to keep up with your demands and a chance that you might not like how those compromises sound.

One way that bento encourages you to play within reasonable boundaries is its limit of one granular track per project. While that's an understandable first step, it does not guarantee you won't find other ways to overload bento's CPU. Fortunately, bento provides a small set of parameters for setting limits on processes that could eventually push bento too far.

The following table summarizes parameters that you can turn to if bento starts sounding like it's having a hard time keeping up with you. Look for these parameters, try them out and see if perhaps you could make a habit of not setting every track's Poly Mode to Poly X, or if you could get used to leaving some tracks empty when you feel the need to max-out a new granular track.

*Table 5-4: Parameters for Limiting Impact on bento CPU Usage*

<b>Parameter</b>	<b>Location</b>	<b>Impact</b>
Poly Mode	Dashboards	Limits how many notes bento lets you play for each track, one-shot, or loop. For Wavetable tracks, this parameter also has the option to control Unison mode. Higher numbers of Poly and Unison will require more CPU.
Grain Density & Rate	Granular Track Dashboard and Grain 1 and Grain 2 screens	Grain Density and Grain Rate determine how many grains (short regions of a main sample) the sample engine plays for each note. This is somewhat like stacking multiple voices for each note, and though the samples are very short and not triggered simultaneously, the sample engine must calculate each grain's start and end points and trigger their corresponding grain envelopes (grain shape) before playing them. The very nature of granular tracks makes them more CPU-intensive than traditional sample engines, which is why bento only lets you include one granular track per project. The Density parameter applies when Beat Sync is Off, while the Rate parameter is used when Beat Sync is On. Higher Density and Rate values require more CPU.
Grain Size	Granular Track Dashboard and Grain 1 and Grain 2 screens	Grain Size determines how long each grain continues to play. When the grain size is larger, you are more likely to end up with a larger number of grains being played at one time, requiring a larger amount of CPU processing.

Parameter	Location	Impact
Interpolation quality (Interp)	Multisample and One-shot Dashboards	Like all samplers, bento's sample engine performs calculations to transpose samples by equal tempered intervals and in small increments for pitch bends, and to emulate notes played with different levels of velocity, as the Multisample engine does when given dozens or hundreds of related samples played at multiple pitches and velocity levels. High-quality interpolation techniques minimize audible artifacts, such as aliasing while preserving the original waveforms of the emulated instrument. Hi-quality interpolation requires more CPU processing, however, so in some situations you might have to use "normal" interpolation to free up the CPU to support tracks with higher Poly Mode settings, such as Poly X. "Normal" interpolation does not create audible artifacts for most samples, so only use "High Q" mode when needed.

## 6: Managing Patches

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This chapter explains how to use patches to load instrument sounds into tracks and how to manage patches. It also explains the relationship between patches and tracks and projects.

To do this...	read ...
Understand what a patch is and how it relates to tracks and projects	<a href="#"><i>Understanding Patches</i></a>
Use a patch to configure the instrument settings for a track	<a href="#"><i>Loading a Track from a Patch</i></a>
Use a different patch for a track	<a href="#"><i>Changing the Patch Used for a Track</i></a>
Modify a track name to match how it is used in a project	<a href="#"><i>Renaming a Track</i></a>
Make the settings for a track available for use in other tracks and other projects	<a href="#"><i>Saving a Track as a Patch</i></a>
Load new patches provided by 1010music onto your microSD card	<a href="#"><i>Updating the Factory Patch Set</i></a>
Get new patches on your bento by reusing presets created on a nanobox	<a href="#"><i>Importing a nanobox / lemondrop or nanobox / fireball Preset</i></a>

### Understanding Patches

Patches in bento are designed to simplify reusing track instrument settings on other tracks and projects. Each patch behaves like a template that can be used to set up a track in a project. When a patch is loaded into a track, bento copies the parameter information from that patch into the project file, including links to the sample files used by that patch. Because of this, any future changes made to the patch parameters will not impact tracks on other projects that were created from that patch. However, if you delete, move or replace the WAV files that are used by that patch, the projects will be affected by that change.

### Patch Organization

There are hundreds of patches pre-loaded on the microSD card from the factory, and more are available in the factory content set made available with the v 1.3 release on the [1010music downloads page](#). You can also create your own user patches by saving

a track as a patch. You cannot overwrite the factory patches from within bento. Any patch you save will be saved as a user patch. Patches are stored in two main folders:

- \Patches: this folder contains the factory patches provided by 1010music.
- \UserPatches: this folder contains the patches that have been saved on bento.

Within these folders, the patches are stored in folders organized by Patch Type. Within each patch type folder, there is a folder for each individual patch.

When you save a patch, you can assign Instrument tags to the patch. These instrument tags control which Instrument categories on the Patch Browser screen will display this patch. All user patches are automatically assigned to the User tag, which appears at the bottom of the Instrument tag list. This tag mapping is stored in the PatchIndex.xml files under the \Patches and \UserPatches folders.

**Note:** Wavetable patches were not included on the microSD card created at the factory. To add wavetable patches to your bento, follow the instructions in [Updating the Factory Patch Set](#).

## Loading a Track from a Patch

You can quickly build a set of instruments for a new project by loading patches into tracks.

- 29. Open a project that has an empty track, or select a loaded track, then tap menu and select Cut Track to clear the contents of the selected track.
- 30. Open the patch browser for that track by either double-tapping the track, or selecting the track and then pushing INST. The Patch browser will appear.



Figure 6-1: Patch Browser Screen

Select the All Instrument from the left, and the All Type using Knob 2 to see all of the available patches. In this view, the patches are organized with all User patches followed by all Factory patches. Within those groups, the files are organized by Patch Type, as indicated by the icon, and then alphabetically by patch name.

31. Select an Instrument tag to filter the list of patches. These tags are designed to help you find the type of musical sound you are looking to add to your project. At the bottom of the list of Instruments is the User tag. Select this if you want to see all of the user patches that have been saved on this bento. You can further refine the list if you know what patch type you are looking for. Use the Type knob to select a specific patch type, such as One-Shot or Granular.
32. Preview the patches by tapping the preview button and then selecting the file you want to preview. Tap preview again to toggle off patch previews.
33. Use the Page knob to scroll the list of patches horizontally by four columns at a time. Use the Line knob to scroll through the list one file at a time. You can also use swipe and tap gestures to scroll through the list and select a file. When you have found the file you want, load it by double-tapping the file, or selecting the file and tapping the Load button.

Bento will copy the parameter information for the patch into the project file and point to the WAV files in the patch folder. The track name will be set to the name of the Patch that was loaded.

**Note:**

- Patches that are grayed out on the Patch browser cannot be loaded at this time. This is because you already have the maximum number of allowed tracks of that patch type in the current project.
- If you want to reset a track back to the original parameter settings from the patch used to create it, use the Change Patch feature. By default, the track was assigned the same name as the patch used to create it. If you changed that name, check the file path for the WAV files used by the patch. The track should point to the WAV files in the folder for the source patch. The folder has the same name as the patch. Just be sure to check if it is a user patch or a factory patch, because you could have a factory patch and a user patch with the same name.

## Changing the Patch Used for a Track

If you want to explore using the sequences in a track with the sounds from a different patch, you can change the patch used by the track.

34. Push Tracks and tap to select the Track you want to change.

35. Tap the menu in the lower right corner, then tap Change Patch in the list of menu options.
36. Use the patch browser to find the patch you want to load into the track.  
**Note:** To preserve your sequences, One-shot tracks can only be swapped with other one-shot tracks due to the different way one-shot tracks are sequenced. Loop patches cannot be sequenced, so choosing a loop patch here will result in the loss of your sequences. For best results, swap in a patch of the same patch type used to create the sequences for this track. Once you have the desired patch selected, tap Load. The patch selected will be loaded into the current track. If the original and new track are compatible, the sequences will remain.

## Renaming a Track

By default, a track is assigned the name of the patch used to create it. You can change that to better match how you are using that instrument in your project.

37. Push Tracks and select the track you want to rename.
38. Tap the menu in the lower right corner, then tap Rename Track.
39. Use the onscreen keyboard to enter the new name. You can use the Clear button to erase the current name. Use the **^** buttons to toggle between upper and lower case letters. Use the button in the lower left to toggle between the letter keyboard and the number plus characters keyboards.
40. Tap Enter to save the change and return to the TRACKS screen.

## Saving a Track as a Patch

You can save any track in your current project to microSD as a patch so that you can load it into other projects later. When you save a patch, bento creates or updates the contents of the patch folder. All of the parameters accessed on the INST screen for a track are saved in the patch xml file. All of the files used by the track are copied and saved in the patch folder. The patch xml file is updated to point to this new copy of the files. Additionally, a preview file is stored with the patch. This preview file will be played when you are browsing patches with the Preview option enabled.

### To save a track as a patch:

1. Press **TRACKS** to open the Tracks screen.
2. Tap the Menu icon and choose **Save Patch**.

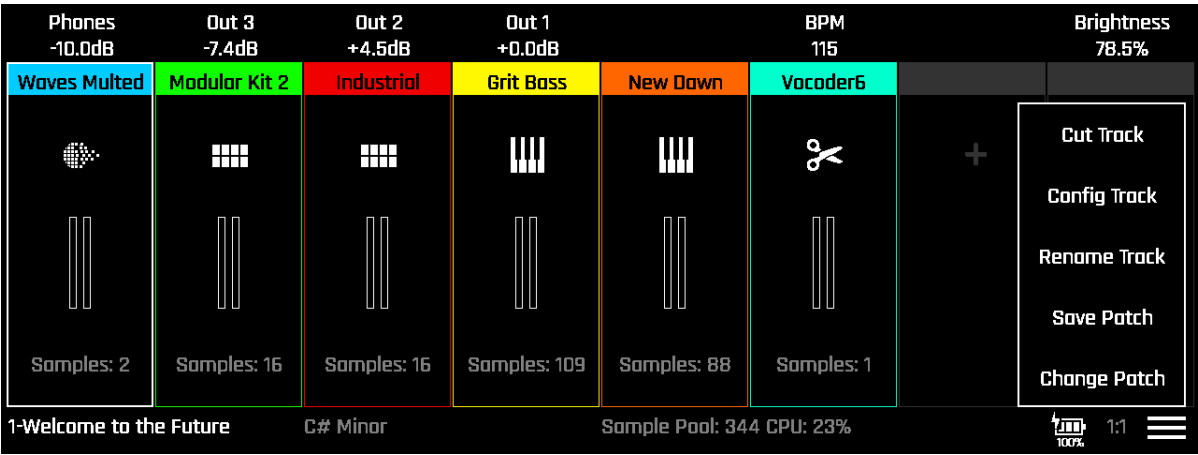


Figure 6-2: Save Patch Option in Tracks Screen Menu

- 3. When the Patch Naming screen opens, enter the name for the patch, then tap **Enter**.

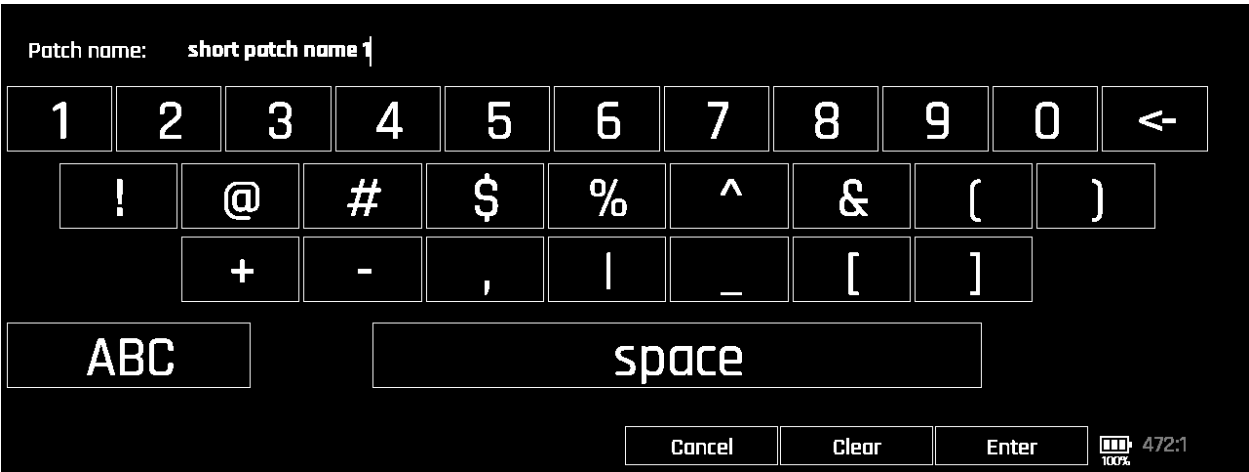


Figure 6-3: Patch Naming Screen



If there is already a patch with the same name, bento prompts to either change the name or overwrite the existing patch on the microSD card. Choosing No re-opens the Patch Naming screen.

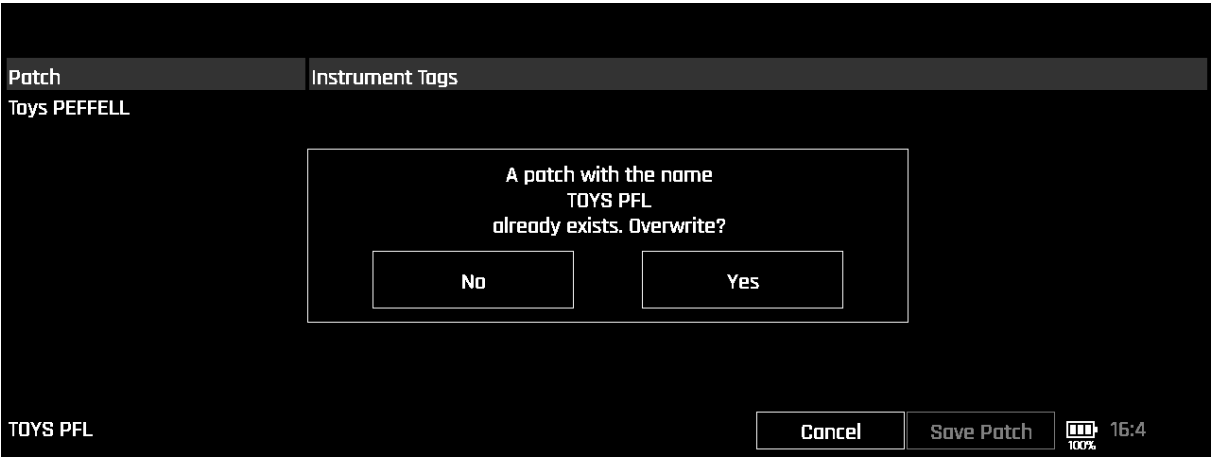


Figure 6-4: Patch Overwrite Confirmation

- 4. To overwrite the current patch, tap **Yes**.

The patch tagging screen opens with the names of patch categories.

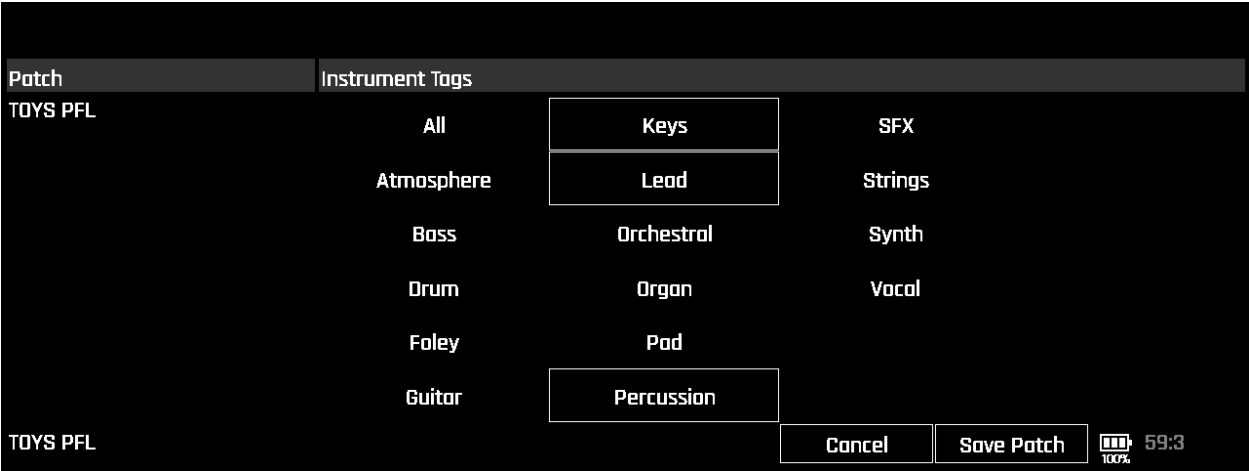


Figure 6-5: Patch Tagging Screen

- 5. Choose the tags you want to set for the new patch by tapping the tag names listed in the Patch Tagging screen, then tap **Save Patch**.  
You must tap **Save Patch** on the Patch Tagging screen to finish saving the patch.  
The new patch is saved to the User Patches folder.

The next time you load a track from microSD, the new patch will appear in the User category and in the categories matching its tags, before the factory patches.



Figure 6-6: User Patch Listed in User Category

When you load the patch into a track, bento uses the patch name for the track name.

## Updating the Factory Patch Set

The updated factory content pack released with firmware version 1.3 contains files that support the Patch Preview feature and the Wavetable track type. Here is how to install the content update:

1. **First, back up your microSD card.**
2. Update the Patch Files
  - a. Download and unzip the Patch Files from here:  
[Downloads - 1010music LLC: https://1010music.com/downloads](https://1010music.com/downloads)
  - b. Copy the contents of the Patches folder in the zip file to the Patches folder on the bento microSD card. Allow all files to be replaced. This will not impact your User Patches. The factory Patch files contain the following updates:
    - i. add new Wavetable patches,
    - ii. fix issues with starting octave in some factory patches, and
    - iii. add the files needed to support Patch Previewing for factory patches.
3. Update the Project Files (Optional):
  - a. Download and unzip the Project Files from here:  
<https://download.1010music.com/BentoContentProjectsOnly13RC5.zip>
  - b. Copy the folders in the zip to replace the folders with the same name within the Projects Folder on the microSD card. These files will fix

issues with starting octave in some factory projects and add a new project that demonstrates the Wavetable track type and song mode.

## Importing a nanobox | lemondrop or nanobox | fireball Preset

You can import a preset from a nanobox | lemondrop or nanobox | fireball into a patch on bento.

1. Copy lemondrop .NNL files or fireball .NNF files onto your bento microSD card along with their related WAV files to prepare to import them. The patch importer uses relative pathing to look for the WAV files to import. There are two options for organizing the files:

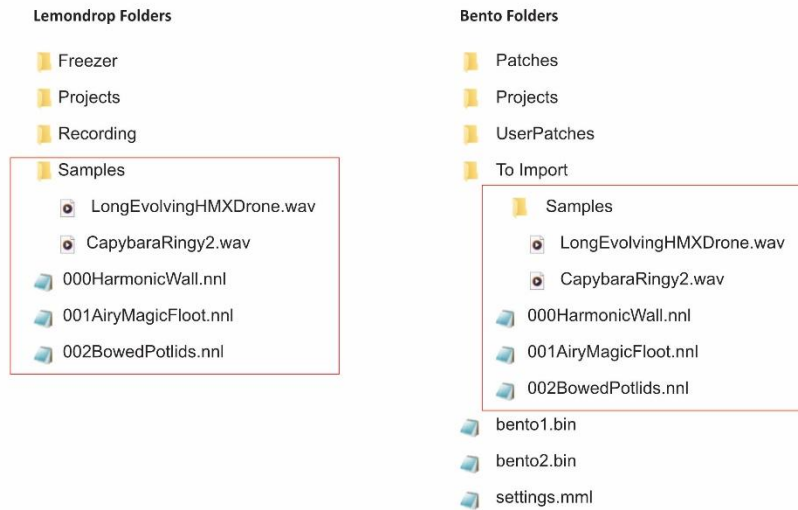
### Option A:

- Put the WAV files in the same folder on the bento card as the preset .nnl and .nnf files.

### Option B:

- This option is preferred if you are moving over multiple preset files that may have WAV files in different folders but with the same file name.
- Place the .NNL or .NNF file from your lemondrop or fireball microSD card into a new folder on the bento card. Place the needed sample files in subdirectories recreating the relative file path from the lemondrop or fireball card under the folder that contains the .nnf and .nnl files.
- If you want to make it easy to clean up the files when you are done, put the .nnl and .nnf files in a new temporary folder. Here's an example:
  - The lemondrop card has the WAV files in a \Samples folder at the root of the card. All .nnl and .nnf files are always in the root folder of the microSD card.
  - On the bento card, you put the .nnl or .nnf files in a folder named To Import.
  - On the bento card, you need to put the WAV files in the folder \To Import\Samples because the patch importer is looking for the

WAV files in a relative path under \To Import. The diagram below shows what this looks like.



- Open a new project.
- Double-tap an empty track to open the patch browser.
- Tap **Menu->Import** in the lower right corner.
- Navigate to the preset file you want to import and tap **Load**.
- Tap to select the Instrument Tags you want to apply to the patch.
- Tap **Save Patch**.
- The patch is created with the same name as the preset and is loaded into the track.
- You can now delete the WAV files and preset files used from lemondrop and fireball. The files needed have been copied into the \UserPatches folder for the new patch.

**Note:** You must have an available granular or wavetable slot to import the corresponding preset.

## 7: Exploring Multisample Tracks

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Multisample tracks spread a folder full of WAV files across the keyboard to get more realistic instrument sounds or to map different sounds to each key on the keyboard.

Multisample tracks excel at recreating traditional instruments like pianos, strings, and synthesizers where different samples capture the natural timbral variations across pitch and velocity ranges.

To do this...	read...
Understanding Multisample Tracks	<a href="#">Understanding Multisample Tracks</a>
Configure audio routing and MIDI routing.	<a href="#">Configuring Multisample Track Playback Parameters</a>
Playing Multisample tracks with bento's pads and from a MIDI controller.	<a href="#">Playing Multisample Tracks</a>
Editing Multisample track voice parameters.	<a href="#">Editing Voice Parameters in the Multisample Dashboard</a>
Creating new Multisample tracks.	<a href="#">Creating a New Multisample Track</a>

## Understanding Multisample Tracks

Multisample tracks create melodic instruments by mapping multiple samples across different pitch and velocity ranges, enabling natural-sounding chromatic performance.

Each Multisample track contains a collection of audio samples that have been organized into zones based on pitch (root note) and velocity ranges. When you play a note, bento automatically selects the appropriate sample based on the note's pitch and velocity, then transposes it minimally to reach the exact requested note.

Multisample tracks respond to the full 128-note MIDI range (C-1 to G9), automatically selecting appropriate samples based on the note pitch and velocity. A greater number of pitches sampled in the sample set will minimize transposition and interpolation artifacts.

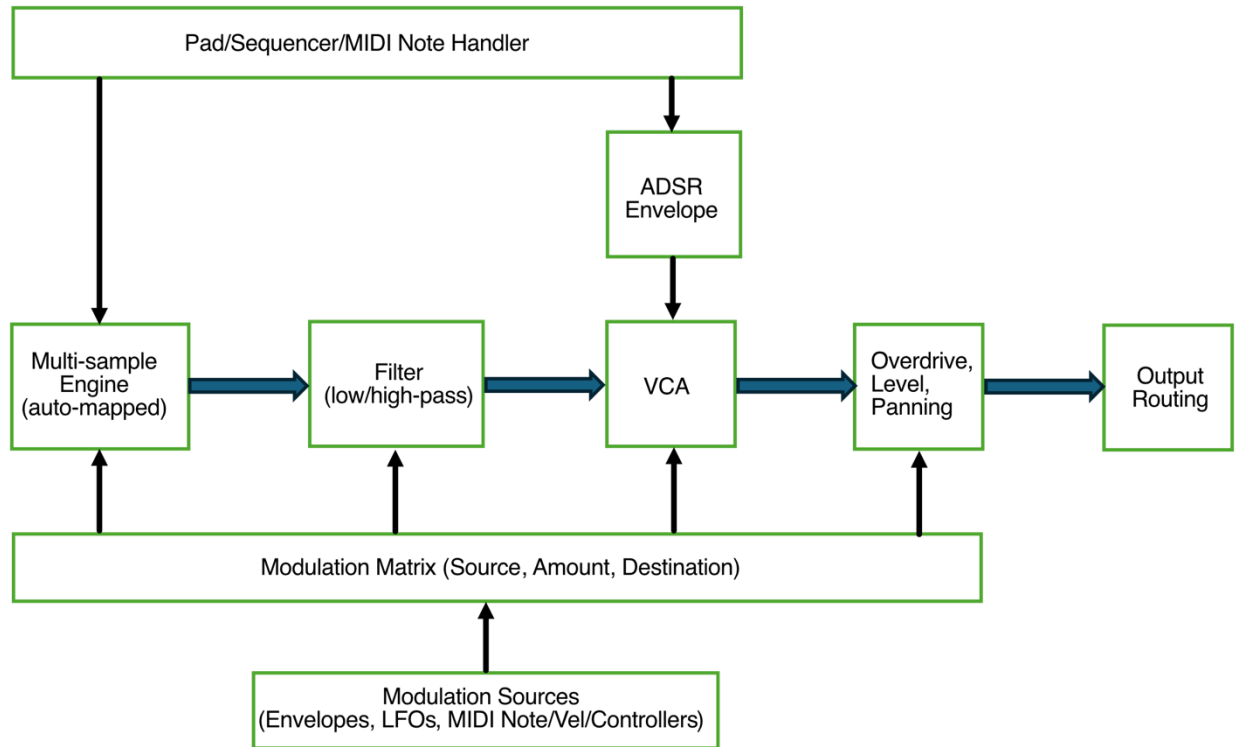
A great example of Multisample tracks is 1010music's "10 Grand" piano patch, which includes a set of over 120 sample files, each of which is a recording of one piano note played at one of three different dynamics (MIDI velocities), and no more than three semitones above or below the next sample. When you play a note, bento finds the samples recorded at the nearest note and then selects the sample recorded with similar dynamics. Because the sample root notes are no more than 3 three semitones apart, it never transposes any sample up or down by more than a semitone or two.

Bento also uses the note velocity to interpolate between two of the velocity-specific samples for the note, emulating the original sound source when played at different dynamic levels.

Bento's Multisample implementation lets you load patches with factory sample sets or create new Multisample tracks using your own samples. bento creates sample maps automatically when the track is created by gathering details about each sample from the sample file names and data embedded in the sample file headers.

## Voice Architecture

The sample engine in bento Multisample tracks maintains a map of note and velocity ranges for each sample. When you play a note, bento picks the sample closest to the note you played, to minimize the artifacts of transposing the sample and of interpolating between samples recorded at different velocities.



*Figure 7-1: Multisample Track Voice Architecture*

Multisample tracks have one set of voice parameters for all notes, whether the track uses one sample or 100 samples.

## Multisample Track Control Screens

Multisample tracks provide four main control screens for comprehensive parameter editing and sample management.

*Table 7-1: Multisample Track Control Screens*

Screen	Description
<b>Multisample Dashboard</b>	<p>Displays voice parameters and performance controls organized into four sections (Main, Config, Env, LFO).</p> <p><b>Note:</b> Multisample track screens do not include a sample map editor. bento configures sample maps automatically when the track is created or loaded.</p>
<b>Multisample WAV screen</b>	<p>Displays the waveform of one of the track's samples and offers <b>Reverse</b> parameter for controlling sample playback direction.</p>
<b>Multisample Modulation screen</b>	<p>Provides a central location for routing modulation source to modulation targets, and for setting a modulation amount for each.</p>
<b>Multisample Track Config screen</b>	<p>Manages MIDI routing and audio output assignment.</p>



The first step in accessing the Multisample track control screens is selecting the track.

### To select a Multisample track:

1. Press **TRACKS** to open the Tracks screen.
2. Tap the Multisample track you want to select.
3. The pad colors change to match the color of the track you selected.
4. Play the pads to confirm that you selected the Multisample track you want to edit or examine.
5. To access the other Multisample track screens, follow the navigation paths shown in the following figure.

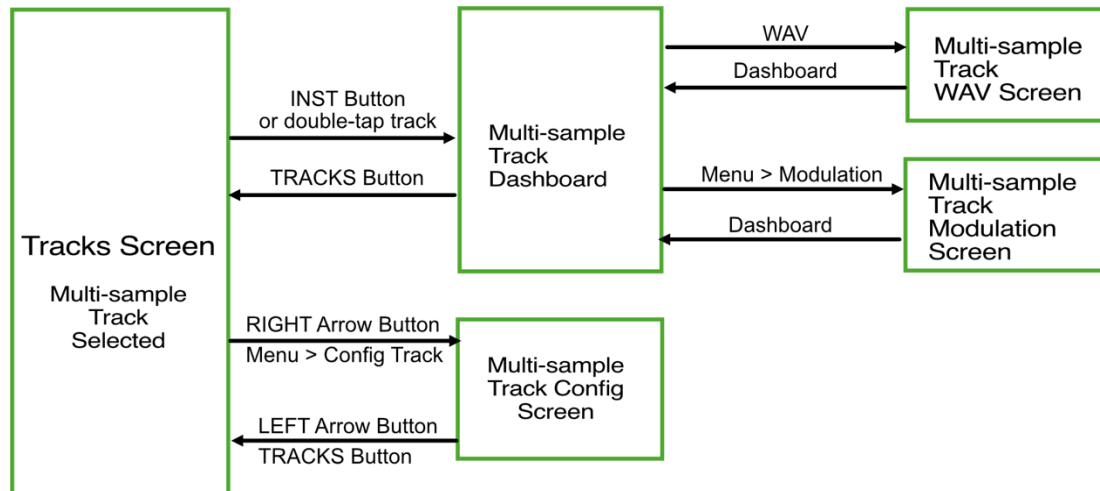


Figure 7-2: Multisample Track Control Screen Navigation

**Note:** The Multisample track screens do not include editors for sample-mapping or for individual sample parameters, such as start and end points, loop points, or root note. If you want to use your own samples in Multisample tracks, you can embed the relevant details in each sample or in the sample file names. For details on preparing samples for Multisample tracks, see [Preparing Your Own Samples for Multisample Tracks](#).

## Configuring Multisample Track Playback Parameters

The Multisample Track Config screen manages track-level operational settings including audio routing and MIDI channel assignments.

### To access the Multisample Track Config screen:

1. Select the Multisample track, then tap **Menu** and select **Config Track**.



Figure 7-3: Multisample Track Config screen with routing and MIDI settings

2. Adjust track configuration parameters.

The following table describes the parameters mapped to bento's knobs.

Table 7-2: Multisample Track Config Parameters

Parameter	Knob	Range	Description
<b>Output</b>	1	1, 1 w/Mod FX, 2, and 3	Audio output routing destination
<b>MIDI In Ch</b>	6	None, 1-16	MIDI input channel for external control
<b>MIDI OutPrt</b>	7	All, 1, 2	MIDI output port routing destination
<b>MIDI OutCh</b>	8	None, 1-16	MIDI output channel for controlling external gear

3. To return to the Multisample track Dashboard, press **INST**.

For details on the **Rename Track** and **Change Patch** features, see [Managing Tracks](#).

When values are selected for MIDI Out P and MIDI Out C, notes triggered for the track via pads, MIDI or sequences will be sent out on the selected MIDI port and channel.

## Playing Multisample Tracks

Multisample tracks respond to musical input like other bento track types, triggering notes that play through the Multisample voice architecture. You can play Multisample tracks using bento's built-in pads, sequencer, or from external MIDI controllers, in any combination up to the maximum number of voices allocated to it through its **Poly Mode** parameter setting.

### Playing Multisample Tracks with bento's Pads

Bento's pads provide immediate access to Multisample tracks with chromatic note mapping and octave transposition controls.

#### To play Multisample tracks with pads:

1. Select the Multisample track from the Tracks screen.

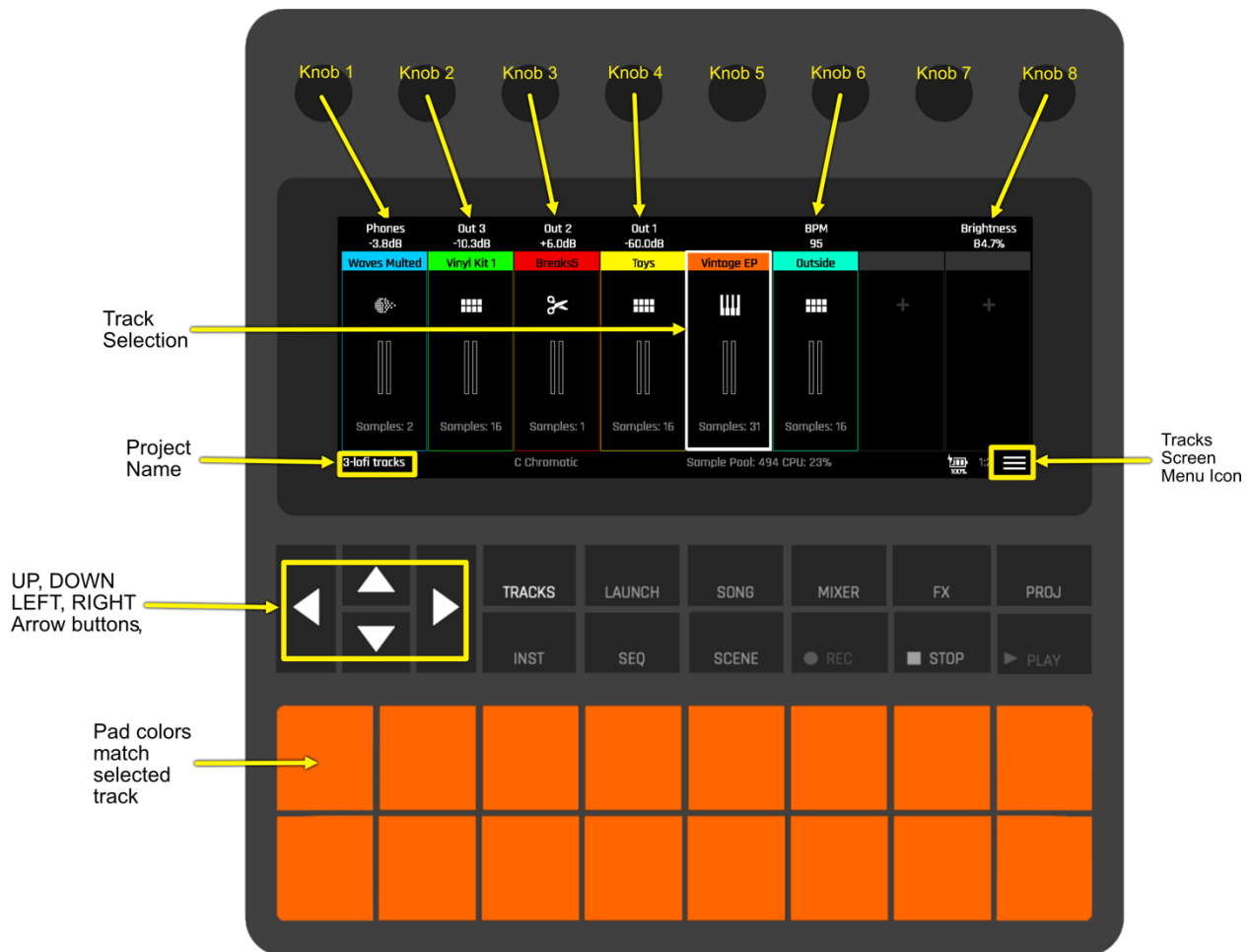


Figure 7-4: Multisample track icon and track selection interface

Note the key and scale information displayed at the bottom of the screen.

2. Play the pads to hear the Multisample track.
3. Use the **UP** and **DOWN** arrow buttons to transpose the pad range controlled by the pads by octaves.
4. To increase the number of notes you can play, adjust the Multisample track's **Poly Mode** parameter in the Multisample Track Dashboard screen.
5. If you want to configure the pads to play in a specific scale, edit the **Root Note** (Knob 1) and **Scale** (Knob 2) in the Project Settings screen. For details, see [Editing Project Settings](#).
6. Press **TRACKS** to return to the Tracks screen.

## Playing Multisample Tracks over MIDI

External MIDI controllers provide the most natural interface for Multisample track performance, especially keyboard controllers that match the chromatic mapping structure. Full velocity sensitivity and continuous controller support enable professional-level expression and integration.

### To play Multisample tracks via MIDI:

1. Open the Multisample Track Config screen and set the track's **MIDI In Ch** parameter to a channel not used by any other track. For details, see [Configuring Multisample Track Playback Parameters](#).
2. Set your MIDI controller to send note messages on the same channel as the **MIDI In Ch** parameter.

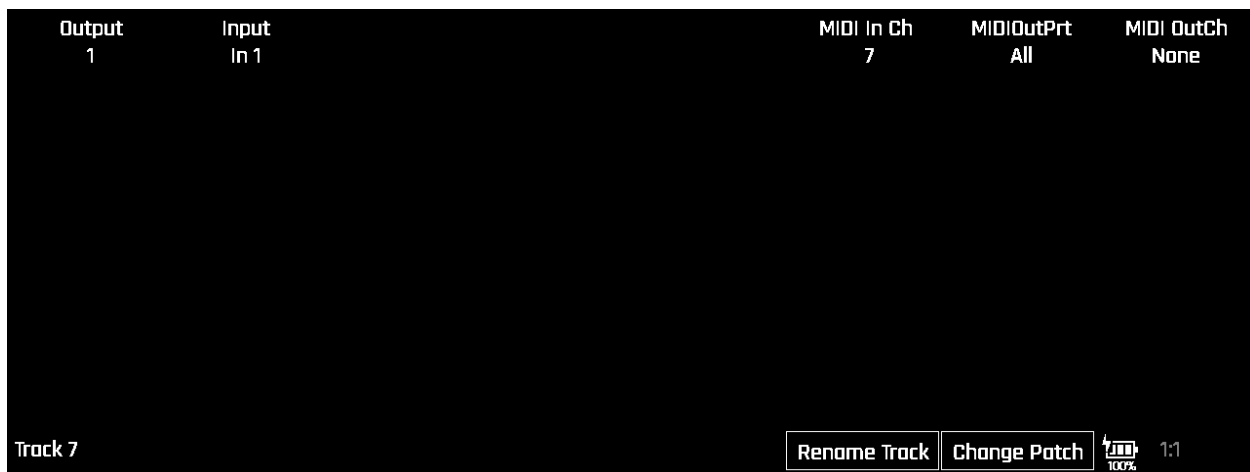


Figure 7-5: Multisample Track Config with MIDI In Channel 1

3. Play notes on your controller and listen as the Multisample track plays.

**Note:** When you play a track over MIDI, the pads only light up when you play notes in the current octave range of the pads.

## Editing Voice Parameters in the Multisample Dashboard

The Multisample Dashboard provides immediate access to the voice parameters, organized into three rows of controls. Tap a row of controls to quickly switch between different parameter sets using the same eight knobs. The active row has white text and a white frame around it.

### To navigate the Multisample Dashboard:

1. Press **TRACKS** to open the Tracks screen, then tap the Multisample track you want to edit.
2. Press **INST** to open the Multisample Dashboard.

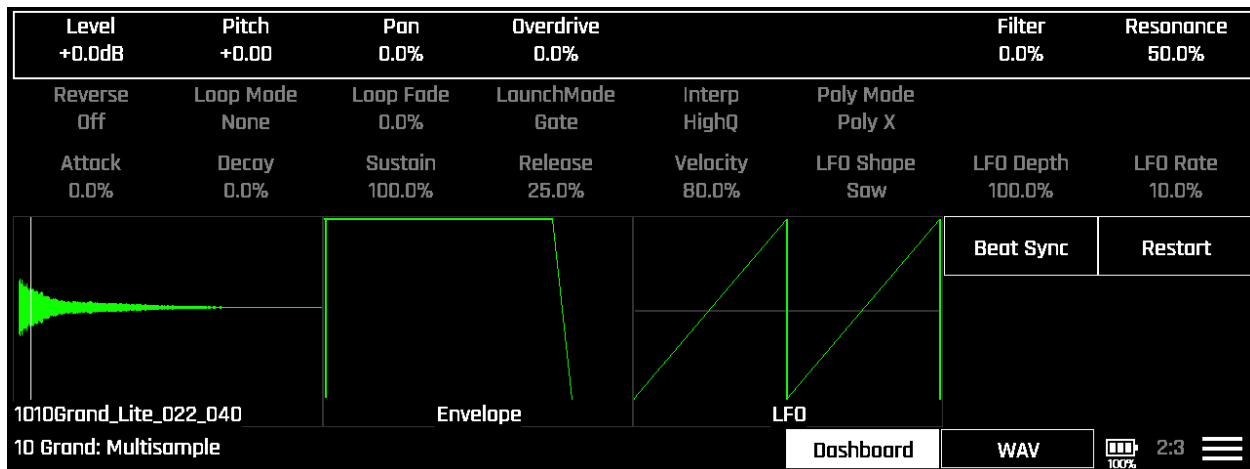


Figure 7-6: Multisample Dashboard

The Multisample track parameters are arranged in three rows. The bottom half of the screen contains three graphs that display a sample waveform, the envelope shape, and LFO shape.

3. To edit a parameter, tap anywhere in the parameter's row or tap one of the graphs, then use knobs 1-8 to adjust the parameters mapped to them.

**Note:** The Multisample track screens do not include editors for sample-mapping or for individual sample parameters, such as start and end points, loop points, or root note. If you want to use your own samples in Multisample tracks, you can embed the relevant details in each sample or in the sample file names. For details on preparing samples for Multisample tracks, see [Preparing Your Own Samples for Multisample Tracks](#).

## To edit multisample track parameters in row 1:

1. Tap on any of the parameters in row 1 or tap the waveform graph in the lower half of the screen. Knobs 1-8 correspond to the parameters of row 1.

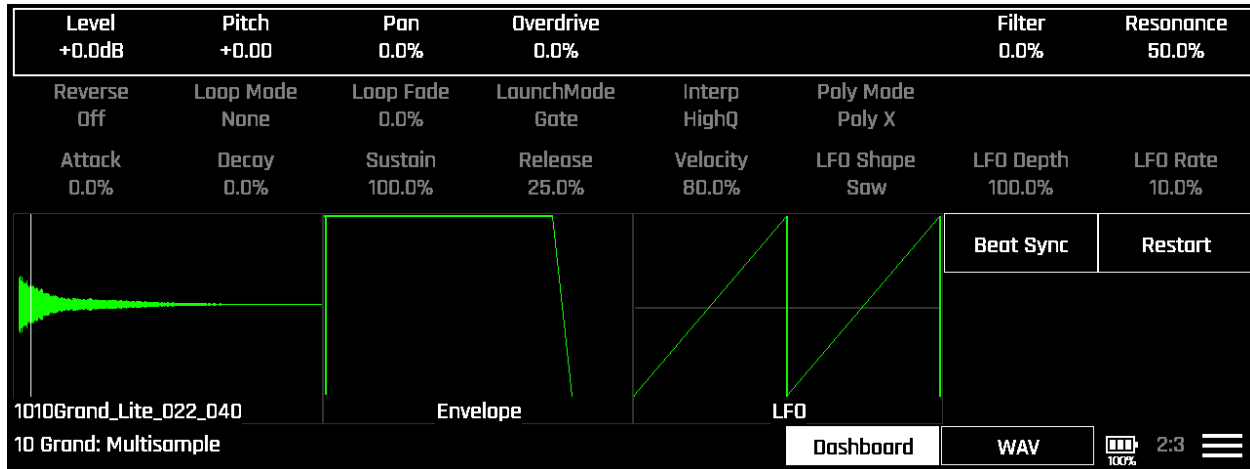


Figure 7-7: Multisample Dashboard with Row 1 Selected

2. To adjust the parameters, use the knobs mapped to them.

Table 7-3 describes the parameters in row 1 of the Multisample Dashboard and the knobs mapped to them

Table 7-3: Multisample Track Parameters in Row 1

Parameter	Knob	Range	Description	Modulation Target?
Level	1	-96dB to +12dB	Overall track volume	Yes
Pitch	2	-24 to +24 semitones	Global pitch offset for entire track	Yes
Pan	3	-100% to +100%	Stereo positioning from full left to full right	Yes
Overdrive	4	0 to 100%	Sets the level of distortion applied to the loop's output audio. Caution: Overdrive causes significantly higher track audio levels.	Yes
Filter	7	-100% to 100%	Filter cutoff frequency. Negative values control a low pass filter. Positive values control a high pass filter.	Yes
Resonance	8	0 to 100%	Filter resonance amount	Yes

## To edit multisample track parameters in row 2:

1. Tap on any of the parameters in row 2. Knobs 1-8 correspond to the parameters of row 2.

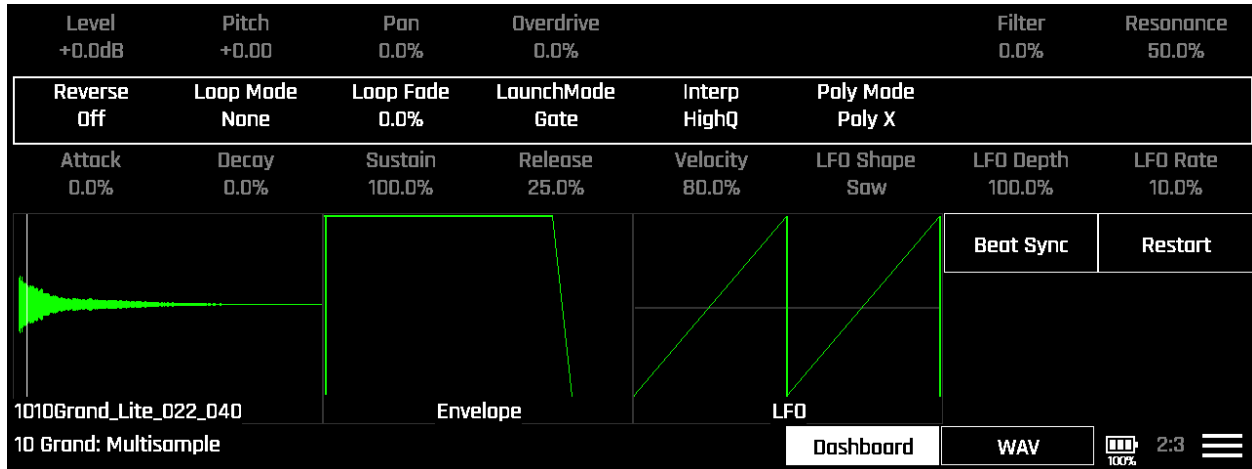


Figure 7-8: Multisample Dashboard with Row 2 Selected

2. To adjust the parameters, use the knobs mapped to them.

Table 7-4 describes the parameters in row 2 of the Multisample Dashboard and the knobs mapped to them



Table 7-4: Multisample Track Parameters in Row 2

Parameter	Knob	Range	Description	Modulation Target?
Reverse	1	Off, On	When on, samples play backwards. When off, samples play normally.	No
Loop Mode	2	None, Forward, Bidirect	Sample looping behavior	No
Loop Fade	3	0 to 100%	Crossfade amount at loop points. Increase this amount to smooth the transition when the sample loops during sustained notes.	No
Launch Mode	4	Trigger, Gate, Toggle	Trigger: Play the track from the pads or from a MIDI controller. bento will start playback of the WAV file and play through to the end. Gate: Begin the WAV file playback in the same manner as Trigger mode. But in Gate mode, playback will stop when you release the pad or the MIDI note. Toggle: Begin the WAV file playback in the same manner as Trigger mode. When another trigger event happens for this note, the playback will stop.	No
Interp	5	Normal, High Q	Sample quality when transposed. To minimize impact on the CPU, only use High Q when needed to reduce artifacts.	No
Poly Mode	6	Mono, Poly 2, Poly 4, Poly 6, Poly 8, Poly X	Maximum simultaneous notes. Poly X will make use of all notes available.	No

### To edit envelope and LFO parameters in row 3:

1. Tap on any of the parameters in row 3. Knobs 1-8 correspond to the parameters of row 3 or tap the envelope or LFO graphs in the lower half of the Dashboard.

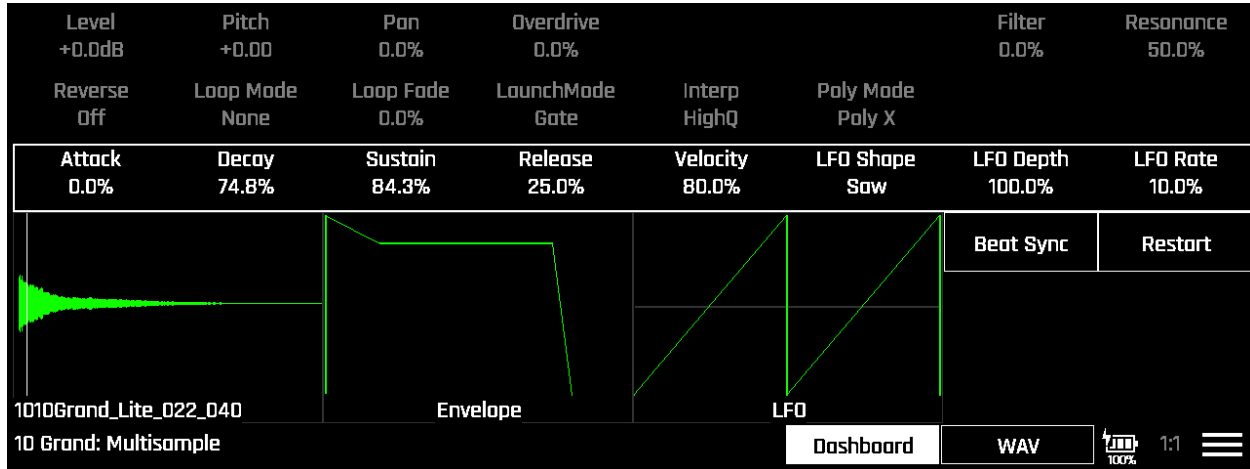


Figure 7-9: Multisample Dashboard with Row 3 Selected

2. To adjust the parameters, use the knobs mapped to them or tap the **Beat Sync** or **Restart** buttons.

The following table describes the parameters in row 3 of the Multisample Dashboard and the knobs mapped to them, along with the two buttons that control the LFO.

Table 7-5: Multisample Track Parameters in Row 3

Parameter	Knob	Range	Description	Modulation Target?
<b>Attack</b>	1	0 to 100% 100% = 9 seconds	Envelope attack time	Yes
<b>Decay</b>	2	0 to 100% 100% = 38 seconds	Envelope decay time	Yes
<b>Sustain</b>	3	0 to 100%	Envelope sustain level	Yes
<b>Release</b>	4	0 to 100% 100% = 38 seconds	Envelope release time	Yes
<b>Velocity</b>	5	0 to 100%	Velocity sensitivity amount	Yes
<b>Shape</b>	6	Sine, Pos Sine, Triangle, Pos Tri, Square, Pos	LFO shape selection	No

Parameter	Knob	Range	Description	Modulation Target?
		Square, Saw, Rev Saw, Random		
<b>Depth</b>	7	0 to 100%	LFO modulation intensity	Yes
<b>Rate</b>	8	0 to 100%	The frequency of the LFO from about 0.1Hz to 12 Hz.	Yes
		<b>When Beat Sync is On:</b> 8, 4, 2, 1, $\frac{1}{2}$ , $\frac{1}{2}$ T, $\frac{1}{4}$ , $\frac{1}{4}$ T, $\frac{1}{8}$ , $\frac{1}{8}$ T, $\frac{1}{16}$ , $\frac{1}{16}$ T, $\frac{1}{32}$ , $\frac{1}{32}$ T, $\frac{1}{64}$	When Beat Sync is On, the value is specified in beats and measures.	
<b>Beat Sync</b>	n/a	Off, On	Synchronize LFO to project tempo	No
<b>Restart</b>	n/a	Off, On	Reset LFO phase on each note	No

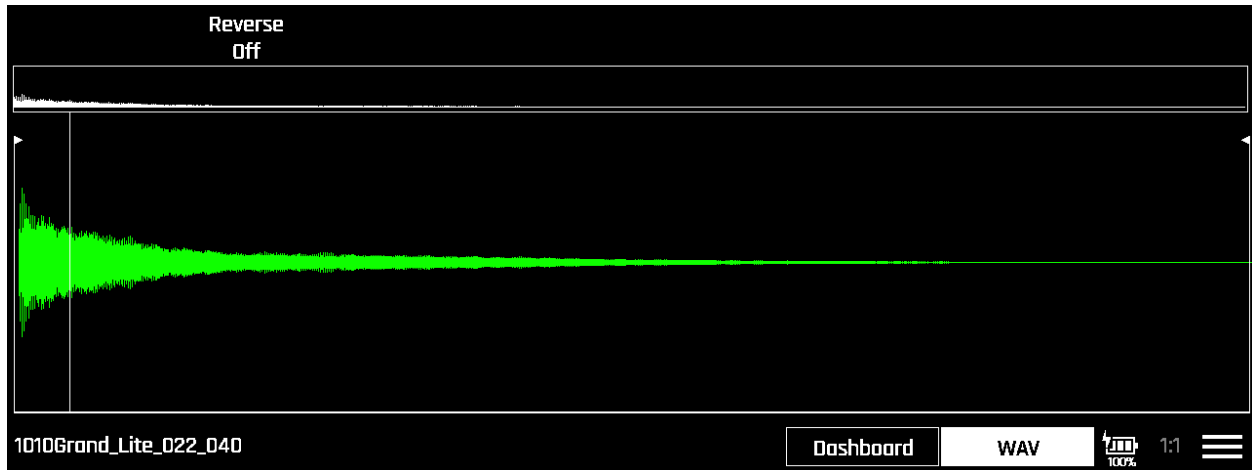
## Multisample WAV Screen

The Multisample WAV screen provides a live view of sample playback and a **Reverse** parameter for reversing the playback direction of all samples in the Multisample track.

### To access the Multisample WAV screen:

1. Tap **WAV** in the Multisample Dashboard.

The Waveform screen opens.



*Figure 7-10: Multisample Waveform screen*

When you play a note from the pads, sequencer, or over MIDI, a vertical line moves across the waveform display.

If the sample file has embedded loop points, and if the Multisample track's Loop Mode is either Forward or Bidirect (in the Multisample track Dashboard), bento loops between those points while the note is held.

2. Zoom in or out on the waveform by pinching or spreading the touchscreen with two fingers.
3. Scroll through the waveform by swiping left or right on the touchscreen.
4. To change the Multisample track's playback direction, adjust the **Reverse** parameter (On = reverse playback) with Knob 2.
5. Tap **Dashboard** to return to the main parameter interface.

## Editing Multisample Track Modulation

Bento's modulation system enables dynamic control of Multisample parameters through various sources such as note velocity, envelopes, LFOs, and external MIDI controllers.

### To configure modulation in a Multisample track:

1. Open the Multisample track dashboard, then tap the **Menu** icon in the lower right corner of the screen.

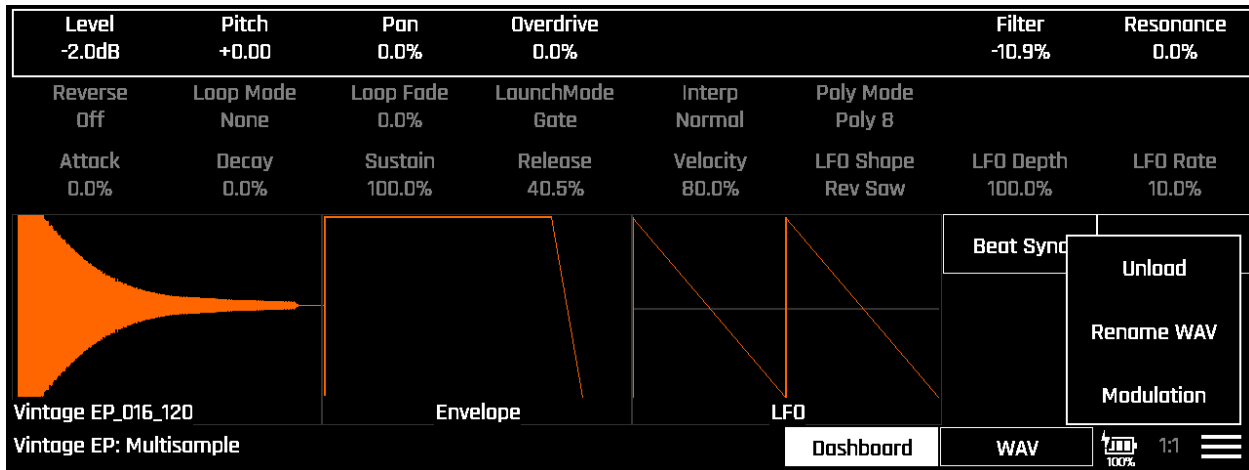


Figure 7-11: Multisample Dashboard Modulation Menu Option

2. Tap **Modulation** in the Menu.

The Multisample Track Modulation Screen opens.

Line	Source 1	Amount 1	Source 2	Amount 2	Source 3	Amount 3	
		15.5%		0.0%		0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
Level	Velocity	11.3%	[None]		[None]		7
Pitch	Mod Wheel	15.5%	[None]		[None]		94
Pan	[None]		[None]		[None]		10
Attack	[None]		[None]		[None]		73
Decay	[None]		[None]		[None]		75
Release	[None]		[None]		[None]		72
LFO Depth	[None]		[None]		[None]		12
Grit Bass							

The bottom bar shows 'Dashboard', a battery icon at 100%, and a 1:1 aspect ratio indicator.

Figure 7-12: Multisample Track Modulation Screen

The first column in the Modulation screen contains the name of every granular track parameter that can be a modulation “target.” Columns 2 through 7, let you set up three modulation sources and three modulation amount values for the modulation target of the selected row.

3. To see the complete list of modulation targets in the Modulation screen you can do any of the following:
  - swipe the screen up or down,
  - turn Knob 1 to scroll up and down through the Modulation screen, or
  - push the UP and DOWN arrow buttons to move through the list one row at a time.
4. Select the line of the parameter you want to modulate, then use Knobs 2-7 to configure one or more modulation sources and modulation levels.

The following table describes the parameters you can modulate, the modulation sources you can route to them, and the range of modulation levels.

*Table 7-6: Modulation Parameters Mapped to bento Knobs*

Parameter	Knob	Range	Description
<b>Line</b>	1	Level Pitch Pan Attack Decay Release Filter Cutoff Filter Resonance LFO Depth LFO Rate	Moves the Modulation screen’s line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.
<b>Source 1</b>	2	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (1 of 3)
<b>Amount 1</b>	3	-100% to +100%	Modulation Amount (1 of 3)
<b>Source 2</b>	4	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (2 of 3)

Parameter	Knob	Range	Description
<b>Amount 2</b>	5	-100% to +100%	Modulation Amount (2 of 3)
<b>Source 3</b>	6	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (3 of 3)
<b>Amount 3</b>	7	-100% to +100%	Modulation Amount (2 of 3)

5. To return to the Multisample track Dashboard, tap **Dashboard** or press **INST**.

## Creating a New Multisample Track

Creating a new Multisample track involves either loading samples from bento's factory microSD card or building custom instruments from your own sample libraries. In either case, loading samples into a new Multisample track requires all samples to be in the same folder on the microSD card.

The process of creating a new Multisample track is simple, but to create a Multisample track that maps multiple samples across the entire MIDI note range and across multiple velocity layers, the samples themselves need to be configured and named in specific ways.

There are two ways to create new Multisample tracks:

- Select existing samples on the microSD card when creating the Multisample track.  
You can load entire folders of samples into new Multisample tracks, either from the factory patches or from a folder containing your own samples.
- Record a new set of samples to the microSD card when creating the Multisample track.  
During the recording of multisample sets, bento sends MIDI Note messages corresponding to each sample that it will record. The most common use for these MIDI Note messages is to play notes on a MIDI-equipped instrument you want to record, or to produce a sound that you can use as a prompt for each note that you will play manually.

### To create a new Multisample track with samples on the microSD card:

1. Choose an empty track in your bento project.
2. Double-tap the empty track slot on the Tracks screen.
3. Tap **New** and select **Multisample** from the track type options.

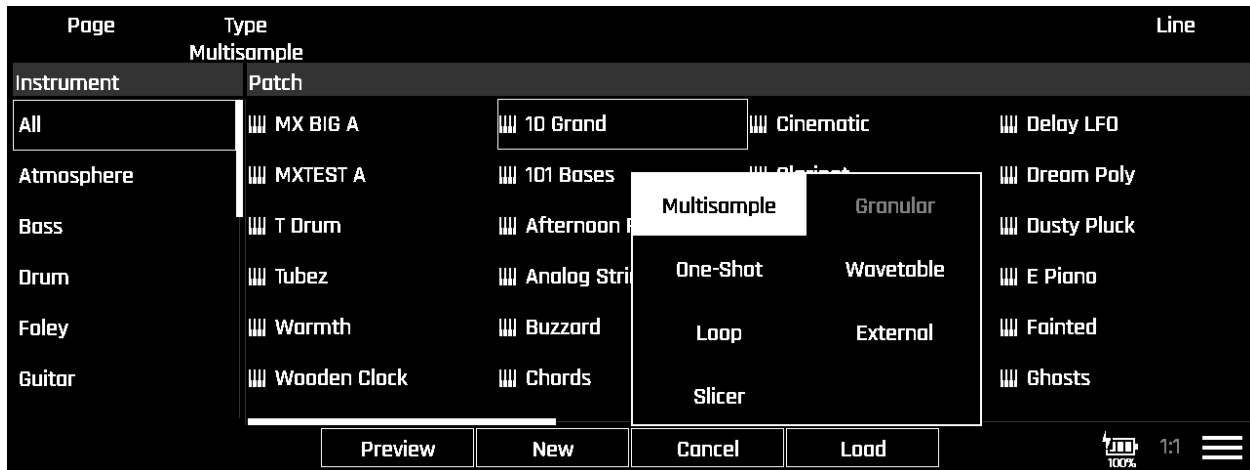


Figure 7-13: Creating a New Multisample from the Patch Browser Screen

The Multisample track sample browser screen opens.

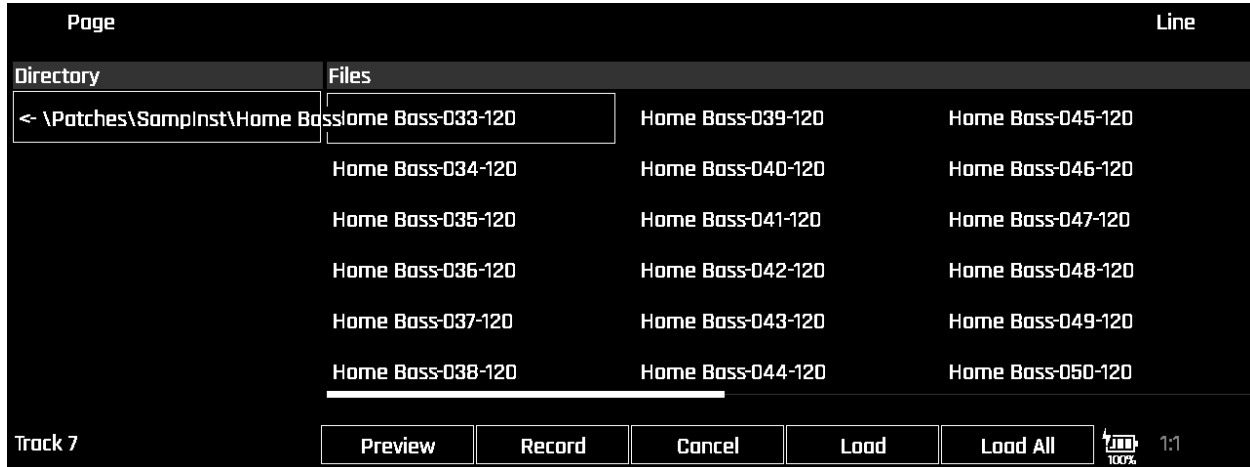


Figure 7-14: Multisample Track Sample Browser

**Note:** The Instrument categories do not appear in the sample browser because bento lets you browse for samples in any folder on the microSD card. bento only displays instrument categories when you browse for patches to load into a track.

4. Browse to the location of the samples you want to load, whether they are in a factory patch folder or in a folder you copied to the microSD card with your custom samples.



- To listen to samples as you browse, tap **Preview** to turn it on.
- Select any of the samples in the sample folder source and tap **Load All**.

Bento reads the headers and file names of every sample in the folder to create a complete sample map for the new track and then returns you to the Tracks screen, where the new track is selected and displayed with a default name.

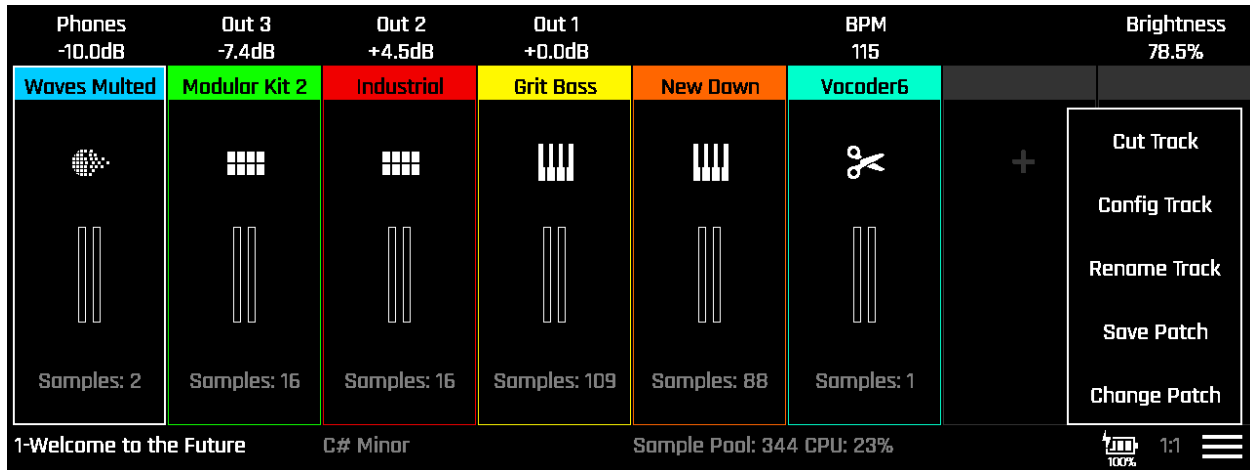


Figure 7-15: Config Track Option in Tracks Screen Menu

**Note:** If you want to hear how bento has mapped each sample by playing the pads, consider changing the current project Scale to “Chromatic” in the Project Settings.

- To rename the new track, select the track, tap the menu and then tap **Rename Track**. The Track Naming screen opens.

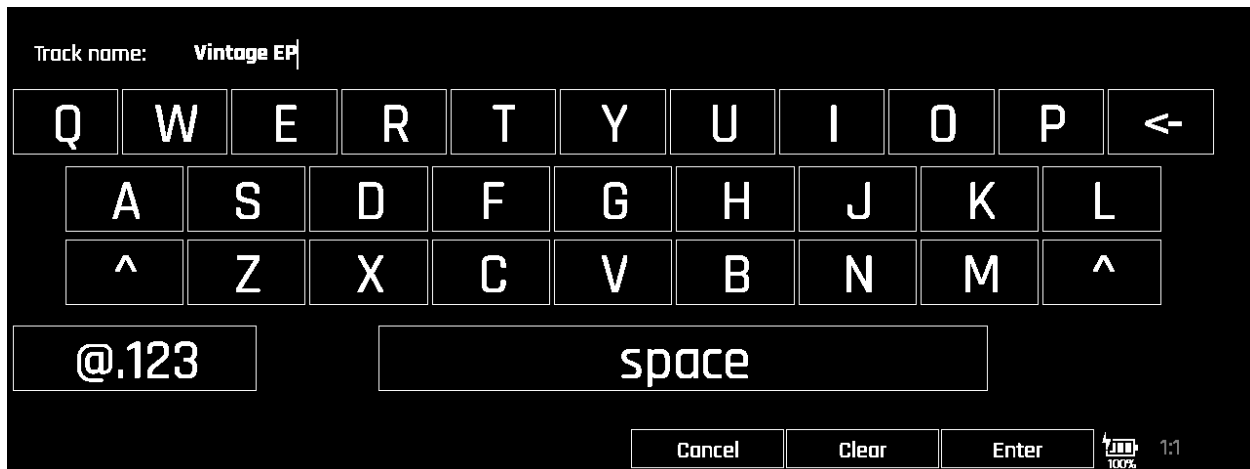


Figure 7-16: Track Naming Screen

- Tap the keys to enter a new track name in the naming keyboard screen., then tap **Enter**.

The track now appears on the Tracks screen with its new name.

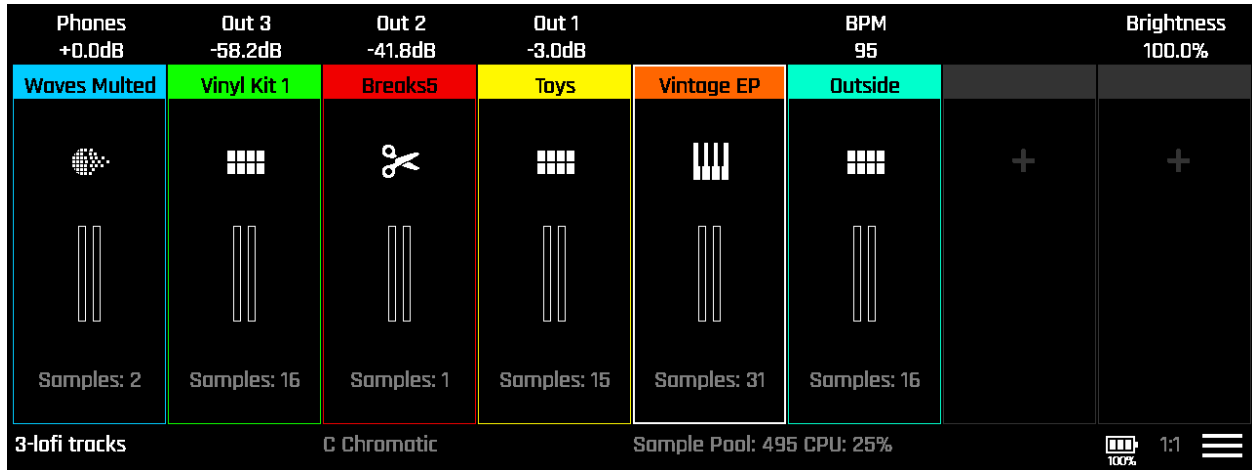


Figure 7-17: Tracks Screen with New Multisample Track

**Note:**

- In order to hear the Preview for a patch, you must have the preview file for that patch. The updated Patch Content available at [Downloads - 1010music LLC](#) has the preview files for the factory patches.
- To create the preview file for a user patch, load the patch, and then save the track as a patch. See [Saving a Track as a Patch](#) to learn more about patch saving.

### To record new samples for a new Multisample track:

Bento will automatically record a full set of WAV files for a multisample track based on the number and range of samples and velocities you specify.

1. Choose an empty track in your bento project.
2. Double-tap the empty track slot on the Tracks screen.
3. Tap **New** and select **Multisample** from the track type options.

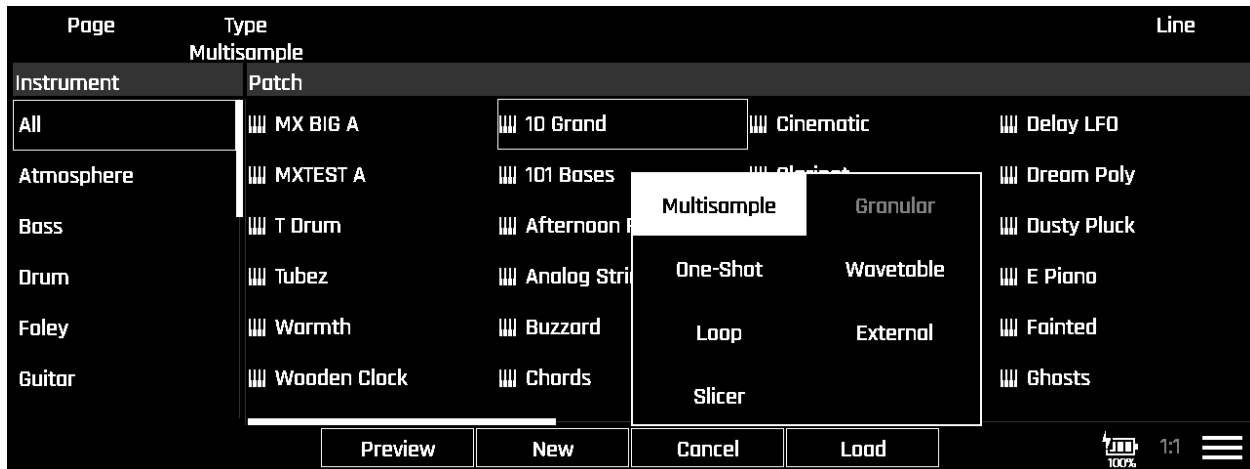


Figure 7-18: Creating a New Multisample from the Patch Browser Screen

The Multisample track sample browser screen opens.

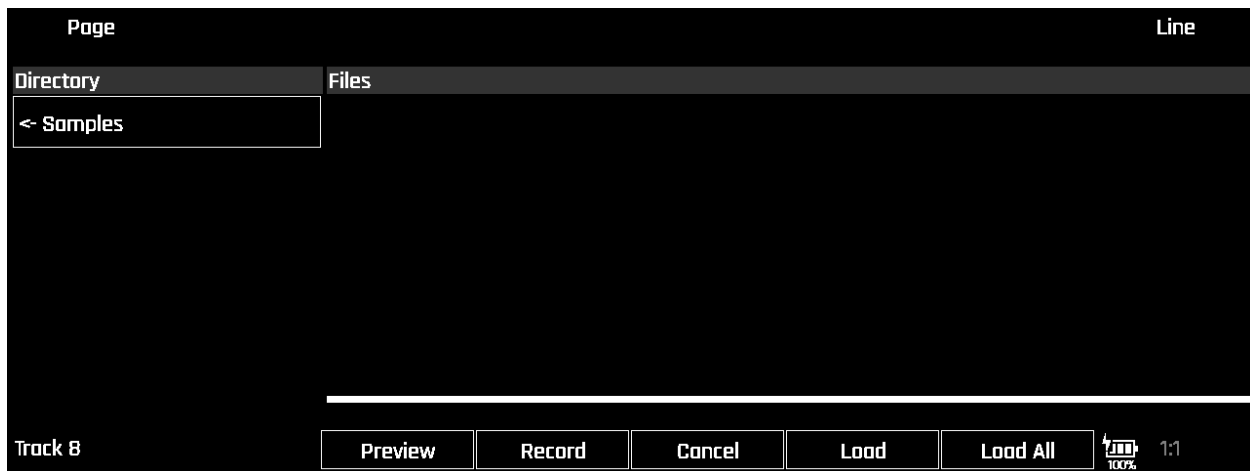


Figure 7-19: Multisample Track Sample Browser

4. Tap **Record** in the Sample Browser.

The File Naming screen opens. This screen lets you specify a prefix for the filenames of the samples you will record.

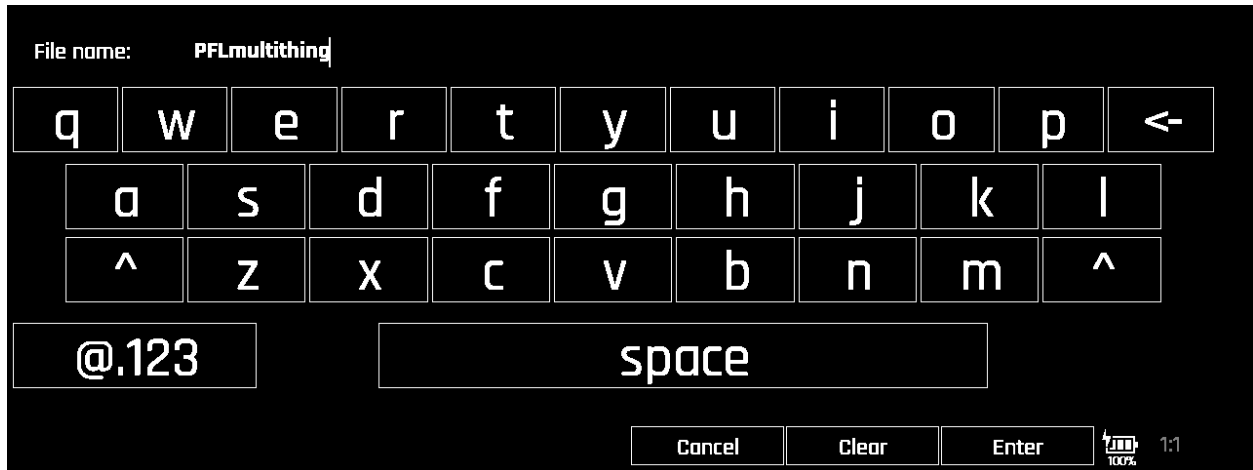


Figure 7-20: Multisample File Prefix Naming Screen

5. Enter a prefix for the sample filenames in this multisample file set, then press **Enter**.

The Multisample Recording screen opens with the first row selected.

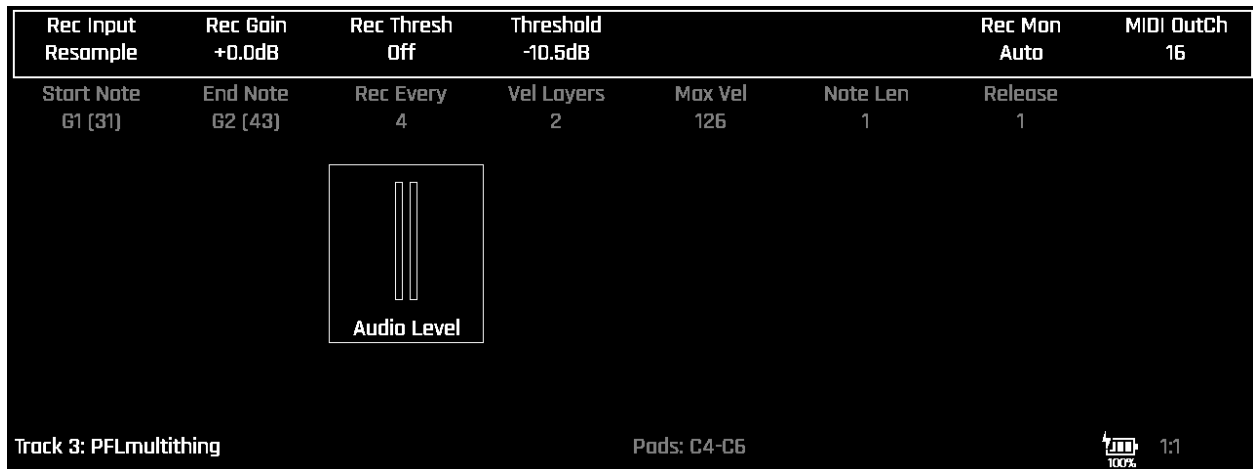


Figure 7-21: Multisample Recording Screen with Row 1 Selected

6. Use knobs 1-8 to set the sample recording settings.

The following table describes the recording parameters.

Table 7-7: Multisample Recording Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description
<b>Rec Input</b>	1	In 1, In 2, In3, In 1L, In 2L, In 3L, Resample	Audio source for sample recording. Use 1L, 2L or 3L for mono recording while sending a signal into the left channel of the corresponding input.
<b>Rec Gain</b>	2	-60dB to +12dB	Audio input gain.
<b>Rec Thresh</b>	3	Off, On	When Rec Thresh is “On,” sample recording waits for audio input level to go over the Threshold.
<b>Threshold</b>	4	-96dB to 0dB	Sets a recording threshold for sample recording when Rec Thresh is On.
<b>Rec Mon</b>	7	Off, Auto	Specifies when audio inputs are played out through bento’s main audio output. When set to Auto, monitoring is only heard while actively recording.
<b>MIDI OutCh</b>	8	1-16	MIDI channel number of the MIDI instrument that will produce sound for each recorded note.

**Note:** Set your audio source level and the bento Rec Gain to avoid clipping and adjust while maintaining good signal-to-noise ratio. The input meter on the pad should stay as high as possible without entering the red range.

7. Tap on the second row of parameters.

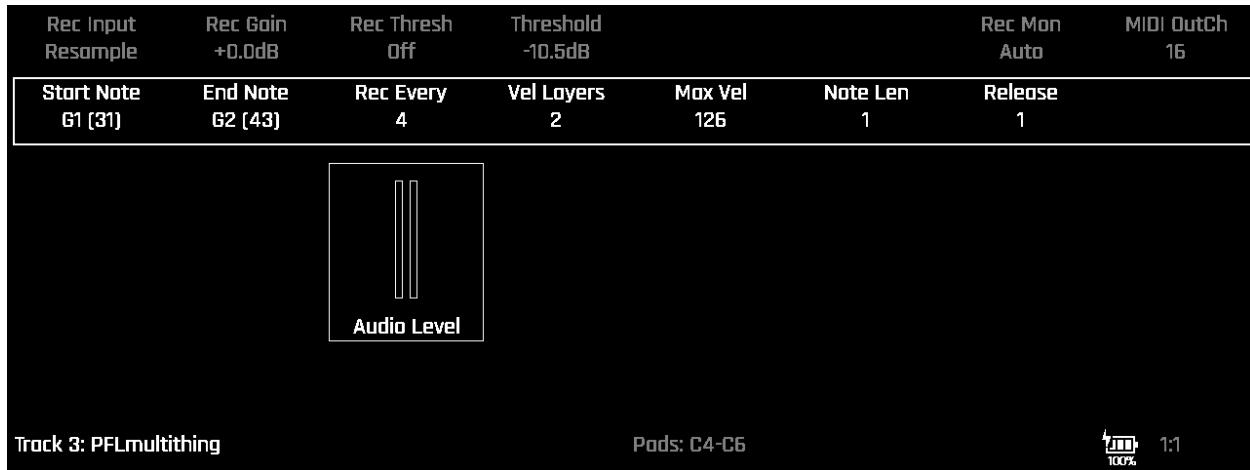


Figure 7-22: MIDI Configuration Parameters in Multisample Recording Screen

8. Enter the details about the notes you will record, from which bento will produce the appropriate MIDI Note messages during recording.

Table 7-8 describes the MIDI configuration parameters in row 2.

Table 7-8: Multisample Recording Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description
<b>Start Note</b>	1	None, 1-127	Lowest note to be sampled.
<b>End Note</b>	2	None, 1-127	Highest note to be sampled.
<b>Rec Every</b>	3	1-16	Interval between each note sampled.
<b>Vel Layers</b>	4	1-16	The number of velocity levels for which you will record each note in the Vel Layers parameter.
<b>Max Vel</b>	5	1-127	Enter the velocity that will correspond to the loudest note that you record in the Max Vel parameter.
<b>Note Len</b>	6	1-60	Number of seconds you will hold each note in the Note Length parameter.
<b>Release</b>	7	1-15	Number of seconds it will take for each note to fade out in the Release Len parameter.

9. To start recording, press and hold the **REC** button, then press the **PLAY** button.

Bento starts sending MIDI note messages to the instrument you are recording, starting from the lowest note, at multiple velocity levels (if configured to do so), up to the highest note, with each note higher than the previous note by the number of semitones specified by the **Rec Every** parameter.

When bento finishes recording the last sample, the Tracks screen opens, with the new Multisample track selected. The new files are stored in a new folder under the Project Folder. The new folder has the name you entered while setting up for recording.

# 8: Exploring Granular Tracks

Granular tracks provide bento’s most sophisticated synthesis capabilities, combining two independent granular oscillators with comprehensive modulation and effects processing. Each granular track can load two different samples and process them through separate signal paths with independent envelopes, filters, and modulation sources. A shaped-based oscillator signal is then added to the mix to add even more character to the sound.

Table 8-1: Chapter 6 Navigation

To do this...	read...
Understand how granular synthesis works on bento	<a href="#">Understanding Granular Tracks</a>
Play granular tracks using pads and MIDI	<a href="#">Playing Granular Tracks</a>
Edit voice parameters and granular-specific controls	<a href="#">Editing Granular Tracks</a>
Configure audio and MIDI routing	<a href="#">Editing Track Configuration Settings</a>
Create new granular tracks from scratch	<a href="#">Creating New Granular Tracks</a>
Apply best practices for granular synthesis	<a href="#">Best Practices for Granular Tracks</a>



## Understanding Granular Tracks

Granular synthesis is a sample playback technique that plays short segments of a sample in many ways beyond the traditional linear method. These short segments are called 'grains.' The result is a 'granular oscillator' - a sophisticated alternative to the simple sample playback engines found in other track types.

The results range from slightly textured versions of the original sample to completely transformed soundscapes that barely resemble the source. Each granular track gives you control over how many grains play, their size, which parts of the sample they come from, and how these factors change over time. Like bento's other sample-based tracks, granular oscillators feed through the same familiar filters, envelopes, and effects that you can play polyphonically.

### Granular Synthesis Concepts

Each granular oscillator selects small pieces, or grains, of sound from loaded samples. You can manipulate the sound by adjusting the size and position of the grains, the frequency at which new grains are triggered, and the range of the sample from which grains are selected. You can also add randomness to the timing of the grain triggers and the stereo position of each grain.

Due to the complexity of bento's granular oscillators and the impact on bento's CPU, bento projects can only include one granular track.

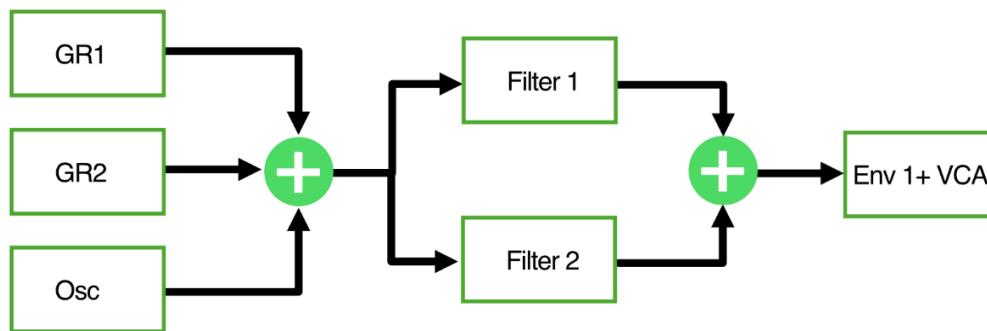
## Granular Track Architecture

At the heart of each granular track are two granular oscillators, each of which loads a different sample from microSD and applies granular synthesis techniques with separate granular parameter settings.

You can customize the sound with a third traditional waveform oscillator, 2 filters, 2 envelopes, 2 LFOs, a modulation sequencer and effects engines, with everything accessible from a small number of granular track editor screens.

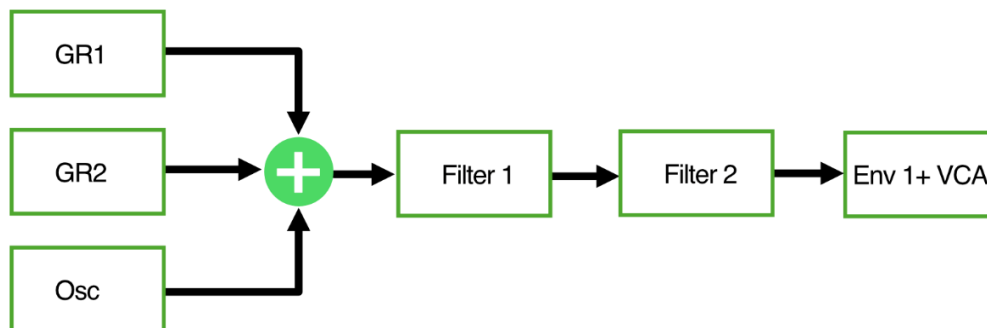
The signal flow of each granular track voice resembles that of traditional synthesizer voices, with a mix of one or more oscillators fed into a filter and on to an Envelope+VCA for final dynamics processing before routing to a voice mixer and effects. What makes bento's Granular tracks different, however, is its ability to route the oscillators through two separate filters in three different configurations.

The following figure shows the signal flow when the filters are configured in parallel.



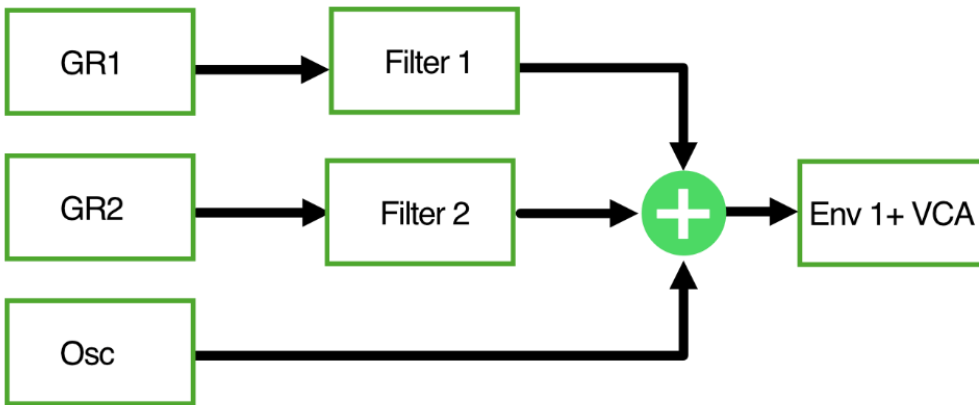
*Figure 8-1: Granular Track Voice Signal Flow with Parallel Filter Configuration*

The following figure shows the signal flow when the filters are configured in series.



*Figure 8-2: Granular Track Voice Signal Flow with Series Filter Configuration*

When the filters are configured in a one-per-oscillator configuration, each granular oscillator runs through a dedicated filter, and the waveform oscillator goes directly to the Envelope+VCA as show in the following figure.



*Figure 8-3: Granular Track Voice Signal Flow with Per-Oscillator Filter Configuration*

For details on configuring granular track filter configuration, see [Editing Granular Track Filters](#).

## Granular Track Control Screens

Bento organizes granular track controls across four main screens to manage the complexity while maintaining intuitive access:

- The Granular Track Dashboard provides a view of both granular oscillators with animated representations of every grain and quick access to essential parameters from bento's 8 knobs.
- The Grain 1 screen provides access to the parameters that affect the GR1 granular oscillator. Within this screen, parameters are organized in two rows of parameters plus a few buttons to allow easy adjustment from bento's eight knobs and the touch screen.
- The Grain 2 screen provides access to the parameters that affect the GR2 granular oscillator. This screen uses the same organization as the Grain 1 screen.
- The Track Configuration screen provides control over track-level settings for audio output and MIDI configuration.

## Playing Granular Tracks

Granular tracks respond to musical input like other bento track types do, triggering notes that play through the granular oscillators and voice architecture. You can play granular tracks using bento's built-in pads or external MIDI controllers, with each method offering different advantages for performance and control.

*Table 8-2: Granular Track Playing Methods*

Method	Description	Best Use
Pad Playing	Direct triggering using bento's touch pads	Quick experimentation, live performance
MIDI Input	External keyboard or controller input	Precise pitch control, complex sequences
Velocity and Pressure Control	Dynamic response to playing strength, applied as a modulation source to any granular track parameter that is a modulation "target."	Expressive parameter modulation
Mod Wheel	Real-time parameter control, applied as a modulation source to any granular track parameter that is a modulation "target."	Live texture manipulation

Both playing methods trigger the same granular synthesis engine, with pads offering immediate experimentation and MIDI providing precise control. You can switch between methods during performance or use MIDI controllers alongside pad playing for hybrid control. Understanding these performance options prepares you to effectively shape granular textures through the editing controls covered in the next section.

## Playing Granular Tracks with bento's Pads

Bento's pads provide immediate access to granular textures with velocity-sensitive triggering, pressure-sensitive modulation, and octave transposition controls.

### To play a granular track using the pads:

1. Press **TRACKS** to open the Tracks screen.
2. Select a granular track by tapping its track slot.

The color of the pads changes to match the selected track's color.

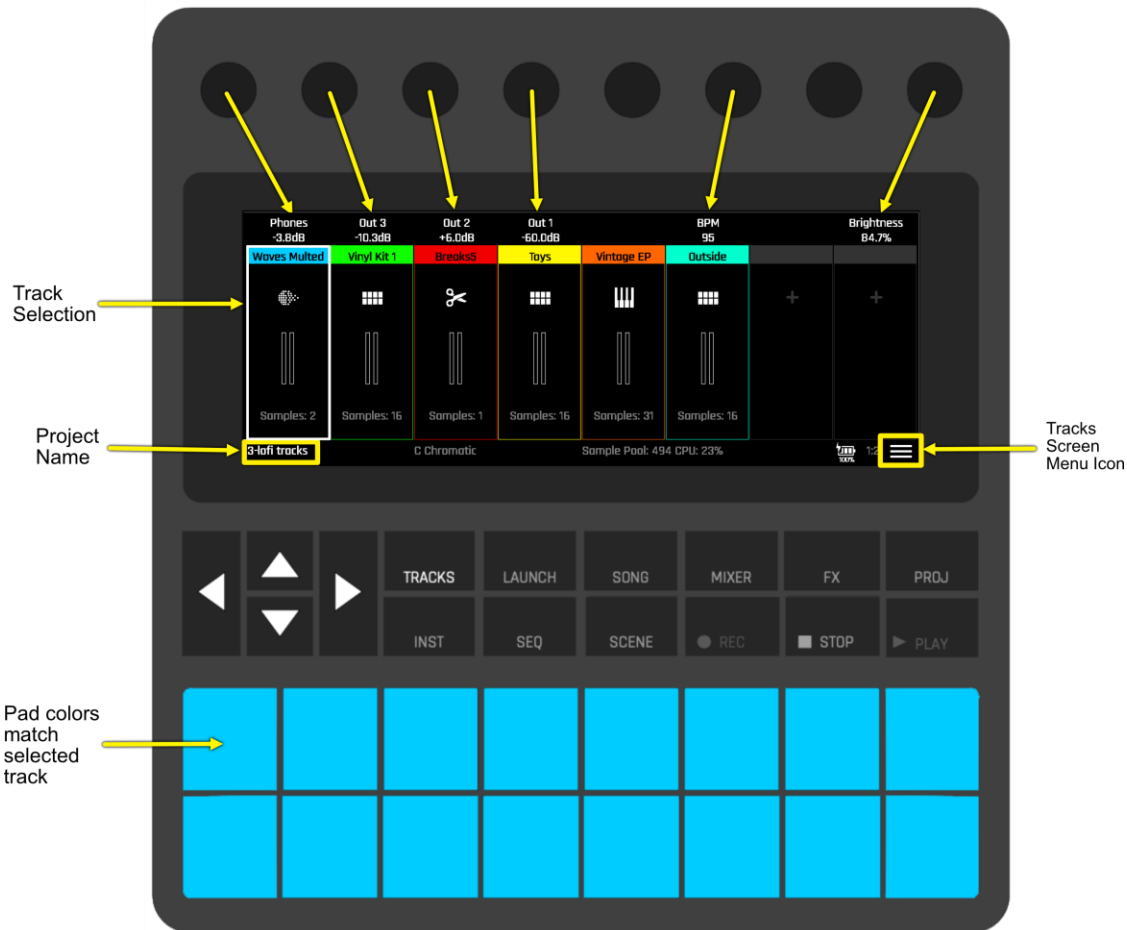


Figure 8-4: Tracks screen with granular track selected and matching pad colors

3. Play the pads to trigger notes across the current scale and octave.
4. Use the **UP** and **DOWN** arrow buttons to shift the pads to control different octaves.

## Playing Granular Tracks over MIDI

External MIDI controllers offer precise pitch control and access to continuous controllers for real-time granular parameter manipulation.

### To play a granular track via MIDI:

1. Connect your MIDI controller to bento's MIDI input.
2. Select the granular track on the Tracks screen.
3. Tap the menu, then tap Track Config to open the Track Configuration screen for the granular track. Adjust Knob 6 to set the MIDI In Ch parameter to the same channel number as the one your MIDI controller uses.



*Figure 8-5: Track Configuration screen showing MIDI In Ch parameter settings*

4. Play notes on your MIDI controller to trigger granular textures.
5. Use continuous controllers (mod wheel, aftertouch) for real-time parameter control.

## Editing Granular Tracks

Granular tracks provide multiple levels of parameter control, from common voice parameters shared with other track types to specialized granular synthesis controls unique to this track type.

This section digs into bento's granular synthesis features so you can develop new skills and habits as you explore granular tracks.

To do this...	read...
Locate granular track voice parameters	<a href="#">Opening the Granular Track Dashboard</a>
Explore bento's two granular oscillators	<a href="#">Editing the Granular Oscillators</a>
Explore the granular track waveform oscillator	<a href="#">Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)</a>
Explore granular track envelopes	<a href="#">Editing Granular Track Envelopes</a>
Explore granular track filters	<a href="#">Editing Granular Track Filters</a>
Explore granular track modulation options	<a href="#">Editing Granular Track Modulation</a>
Configure LFOs for granular track modulation	<a href="#">Editing the Granular Track LFOs</a>
Configure the Modulation Sequencer for granular track modulation	<a href="#">Editing the Granular Track Modulation Sequencer</a>
Allocate voices for granular tracks	<a href="#">Editing Granular Track Configuration Settings</a>
Configure granular tracks for receiving and sending MIDI	<a href="#">Editing Granular Track Configuration Settings</a>
Route granular tracks to specific audio outputs	<a href="#">Editing Granular Track Configuration Settings</a>

## Opening the Granular Track Dashboard

The granular track Dashboard provides a high-level view of the granular track's settings and presents parameter names and values across the top of the screen to indicate which parameters you can adjust with bento's 8 knobs. At any given time, only one granular track component (such as an oscillator, envelope, or filter) is selected for editing.

### To open the Granular Track dashboard for Track 1:

1. Press **TRACKS** to open the Tracks screen.
2. Tap the Granular Track you want to edit to select it.
3. Play the pads to hear track 1's current settings.
4. To open the selected track's dashboard, press **INST**.

The granular track dashboard opens. The three dots in the top right corner of the grain graphs and the Mod Seq graph are a hint that you can open these graphs in a larger view by double tapping the graphs.

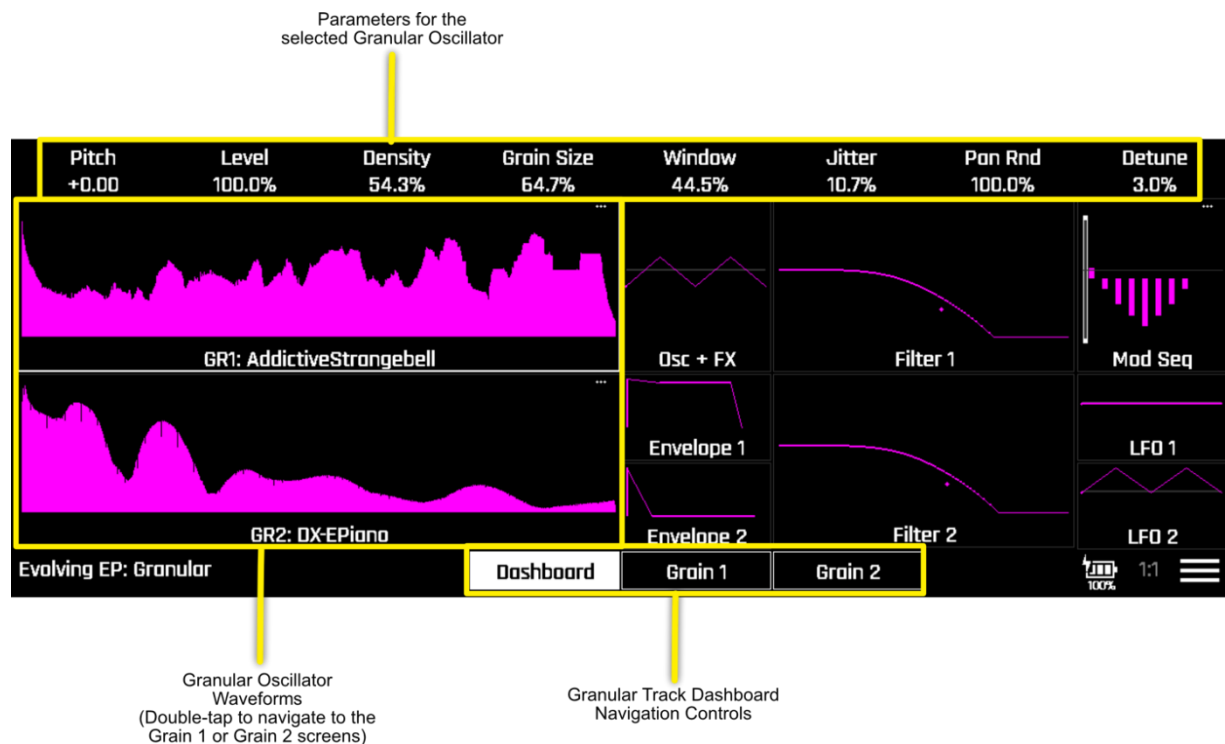


Figure 8-6: Granular Track Dashboard with Grain 1 Selected

Figure 8-6 shows the white selection rectangle around GR1's sample waveform, so the parameters at the top of the screen correspond to GR1. At the bottom of the Dashboard are three controls for navigating to the Dashboard, the Grain 1 screen



(with additional parameters for GR1, and the Grain 2 screen (with additional parameters for GR2).

When notes are playing for a Granular track, the Grain 1 and Grain 2 graphs display a moving white line for each grain that is playing.

Figure 8-7 identifies the location of granular track feature controls that you can select for editing.

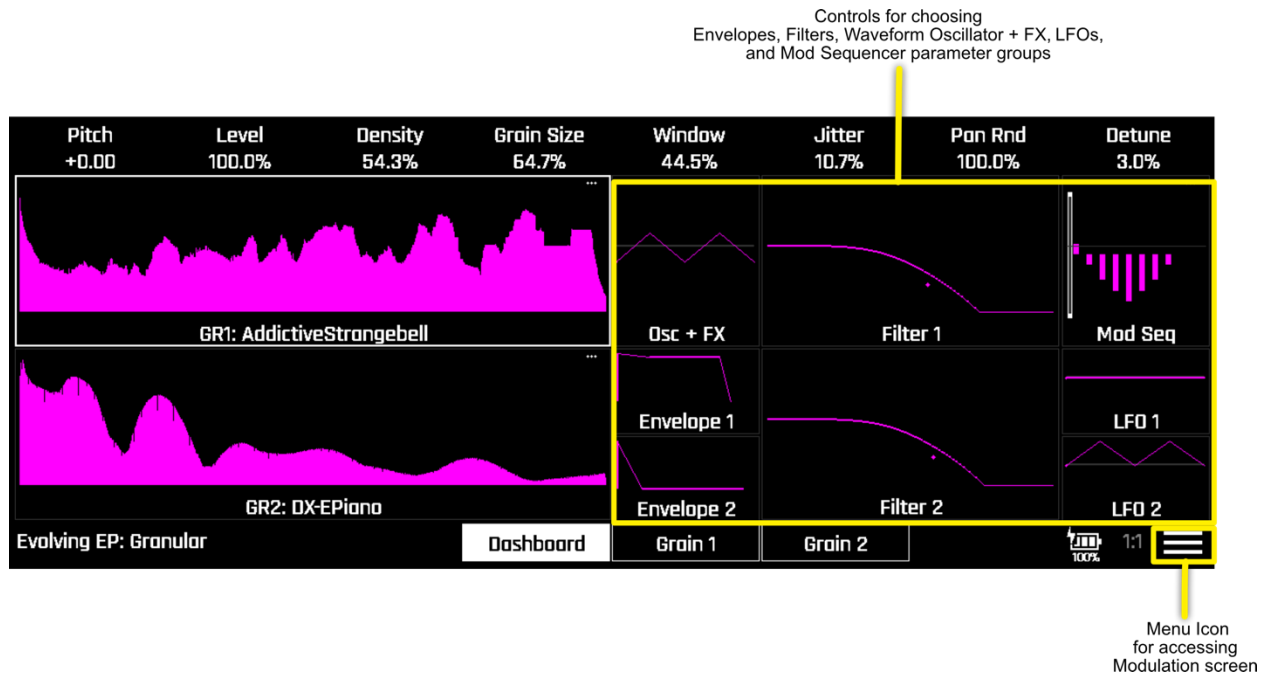


Figure 8-7: Granular Track Feature Controls

The Menu icon in the lower right corner opens a menu from which you can navigate to a central Modulation screen.

The following table summarizes the granular track features that you can edit and which section in this chapter to read for more details.

<b>To edit this granular track feature...</b>	<b>See this section...</b>
Granular Oscillator GR1 and GR2	<a href="#"><i>Editing Granular Tracks</i></a>
Waveform oscillator	<a href="#"><i>Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)</i></a>
Envelope 1 and Envelope 2	<a href="#"><i>Editing Granular Track Envelopes</i></a>
Modulation Sequencer	<a href="#"><i>Editing the Granular Track Modulation Sequencer</i></a>
Filter 1 and Filter 2	<a href="#"><i>Editing Granular Track Filters</i></a>
LFO 1 and LFO 2	<a href="#"><i>Editing the Granular Track LFOs</i></a>
Parameter Modulation	<a href="#"><i>Editing Granular Track Modulation</i></a>

## Editing the Granular Oscillators

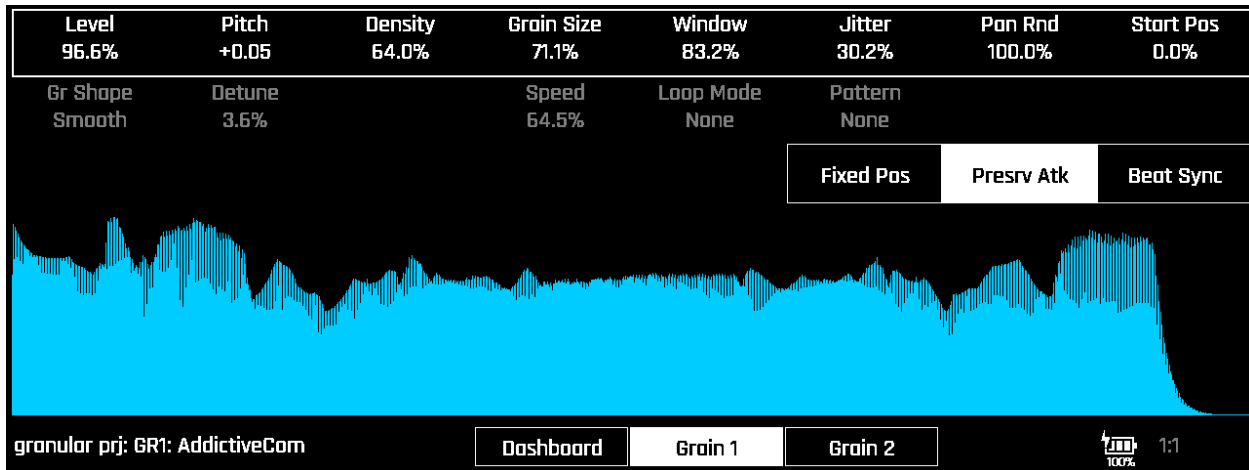
Granular-specific parameters control the unique aspects of granular synthesis, including grain characteristics, playback behavior, and oscillator interaction.

You can edit any of the granular oscillator parameters or you can replace either of the samples currently loaded into GR1 or GR2.

### To edit granular oscillator parameters:

1. Open the granular track Dashboard, then tap the GR1 or GR2 graph. The knobs now provide access to the first level of controls for the selected granular oscillator.
2. Tap **Grain 1** or **Grain 2** to open the editing screen for GR1 or GR2.

The Grain editor screen opens.



### *Grain Editor Screen with Row 1 Selected*

The Grain 1 and Grain 2 screens display two rows of eight parameters and values across the top of the screen, and three buttons below the second row.

**Note:** The eight parameters that appear in the granular track dashboard also appear in the first row of the Grain 1 and Grain 2 screens.

3. To edit parameters in a particular row, tap anywhere in the row, then use the corresponding knobs, directly above the parameter's location at the top of the screen (more or less). Tap a button to toggle its state.

The following table describes the granular oscillator parameters in row 1 of the Grain editor screen.

*Table 8-3: Granular Oscillator Parameters in Row 1 of the Grain Editor Screen*

Parameter	Knob	Range	Description	Modulation Target?
<b>Level</b>	1	0 to 100% (-96dB to +12dB)	The relative audio level of this waveform.	Yes
<b>Pitch</b>	2	-24 to +24 semitones	How many semitones up or down you want to shift the pitch.	Yes
<b>Density</b> (Beat Sync=Off)	3	0 to 100%	When Beat Sync is OFF, the density controls the number of grains played per second. At the lowest end, you will get about 1 grain every few seconds. At 100% you will get maximum overlap of the grains.	Yes
<b>Rate</b> (Beat Sync=On)	3	1/64, 1/32T, 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2T, 1/2, 1 bar, 2, bars, 4 bars, 8 bars (T = Triplet)	When Beat Sync is On, the musical interval between selection of new grains.	
<b>Grain Size</b>	4	0 to 100%	The length of the small segments of the WAV file that will be played, ranging from about 20 msec to about 1 second.	Yes

Parameter	Knob	Range	Description	Modulation Target?
<b>Window</b>	5	0 to 100%	The length of file on either side of the current playback position from which the grains are selected. When set to 0%, the grains are always pulled from the same place in the WAV file. When set to 100%, the grains are pulled from a window of about a few seconds around the current playback position.	Yes
<b>Jitter</b>	6	0 to 100%	How much random deviation is applied to the timing of the triggering of the grains. At 0%, it's machine like and smooth. At 100% it's chaotic.	Yes
<b>Pan Random</b>	7	0 to 100%	The stereo width of the random panning.	No
<b>Play Pos</b> (when Fixed Pos=On)	8	0 to 100%	The current position of the play head which serves as the center of the grain selection window.	Yes
<b>Start Pos</b> (when Fixed Pos=Off)	8	0 to 100%	When <b>Play Mode</b> is Moving, this controls the starting position within the WAV file for selecting grains. See also <b>Play Mode</b> and <b>Preserv Atk</b> .	No

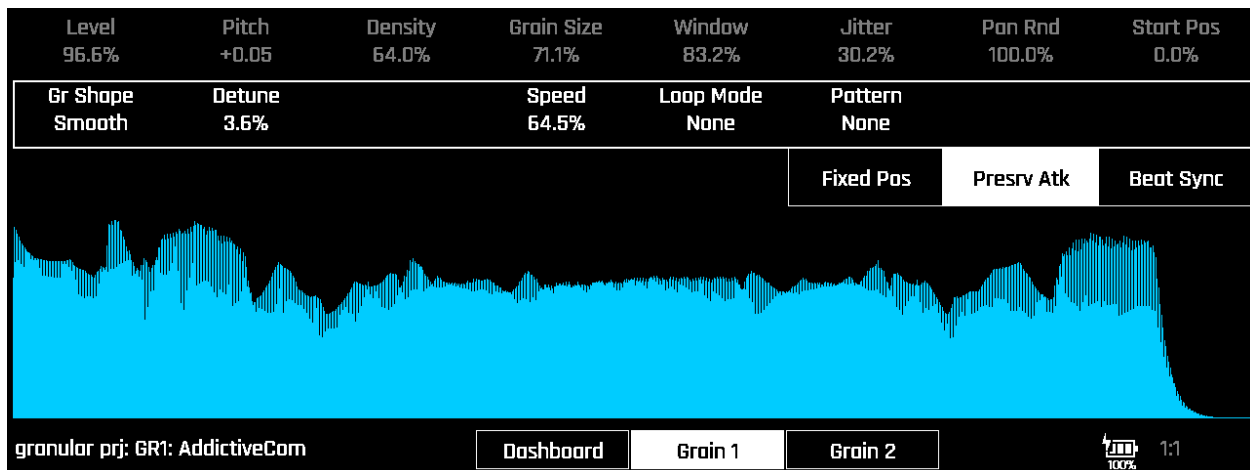


Figure 8-8: Grain Editor Screen with Row 2 Selected

Table 8-4 describes the granular oscillator parameters in row 2 of the Grain editor screen and the three buttons below it.

*Table 8-4: Granular Oscillator Parameters in Row 2 of the Grain Editor Screen*

Parameter	Knob	Range	Description	Modulation Target?
<b>Gr Shape</b>	1	Smooth, Ramp Down, Ramp Up	Grain envelope shape	No
<b>Detune</b>	2	0 to 100%	The range of pitch deviation from the triggered note that may be used for each grain, from 0 to 1 semitone.	No
<b>Speed</b> (when Fixed Pos=Off)	4	0 to 200%	When <b>Fixed Pos</b> is Off, the speed at which the play head moves through the WAV file. 100% is normal audio playback speed.	Yes
<b>Loop Mode</b> (when Fixed Pos=Off)	5	none, Forward, Bidirect	When <b>Fixed Pos</b> is Off, this controls what happens when you reach the end of the sample. If None, the play position stays at the end of the file. If Forward, it loops back to the beginning of the WAV file. If Bidirect, it starts playing in reverse and then bounces forward again when it reaches the other end.	No
<b>Pattern</b>	4 or 6	None, Octaves, Fifths	Rhythmic grain patterns. When set to Octaves or Fifths, the sound engine will add pitch variations in increments of +/- 12 semitones for Octaves, or +/- 7 semitones for Fifths.	No

Parameter	Knob	Range	Description	Modulation Target?
<b>Fixed Pos</b>	N/A	Off, On	Controls whether the play head stays in one Fixed position or is Moving through the WAV file at a rate controlled by the Speed parameter.	No
<b>Presrv Atk</b>	N/A	Off, On	When ON, the playback will draw grains from the beginning of the WAV file for the attack. It will then select grains from the <b>Start Pos</b> (if Moving) or <b>Play Pos</b> (if Fixed) when the attack is complete. When OFF, playback will begin at <b>Start Pos</b> or <b>Play Pos</b> .	No
<b>Beat Sync</b>	N/A	On, Off	When ON, the <b>Rate</b> parameter is used to control how frequently grains are chosen in a way that is synced to musical intervals. When OFF, the <b>Density</b> parameter is used to select how frequently grains are chosen and how many are chosen.	No

### To load a different sample into a granular oscillator:

1. Open the granular track Dashboard, then tap **Grain 1** or **Grain 2** to open the editing screen for GR1 or GR2.

The Grain editor screen opens.

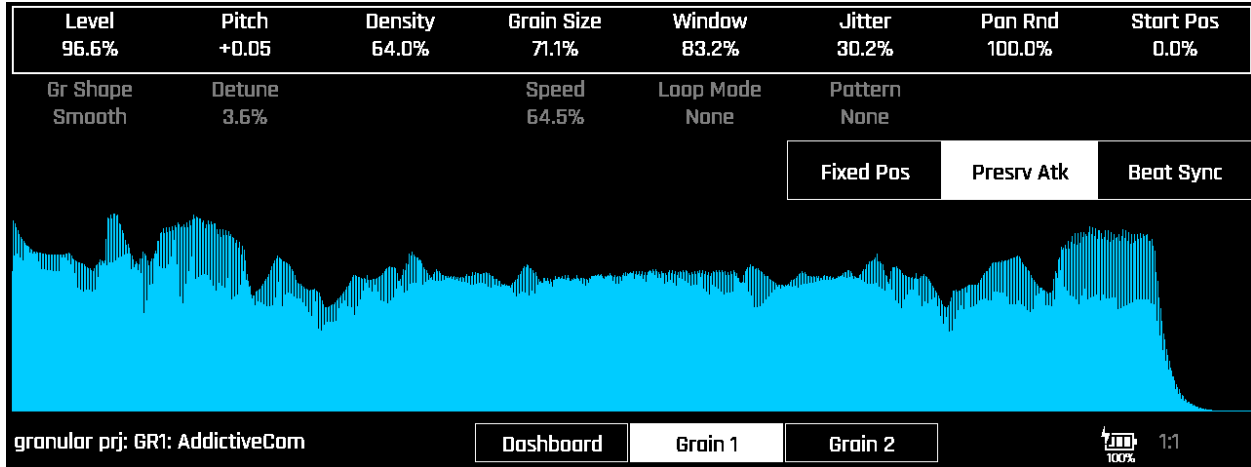


Figure 8-9: Grain 1 Editor Screen

2. Double-tap the sample waveform. The Sample Browser screen opens.

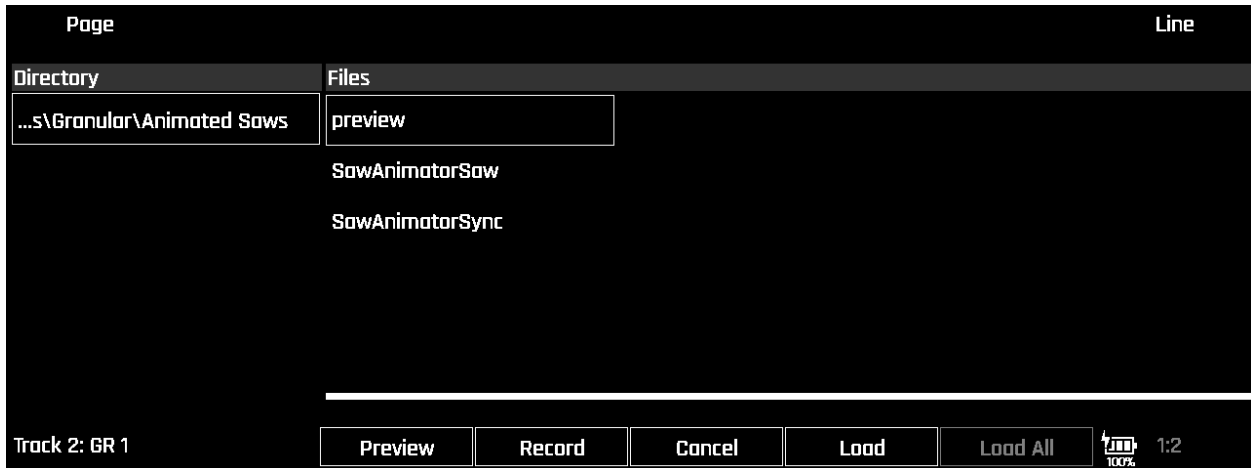


Figure 8-10: Sample Browser Screen for Granular Tracks

3. Tap the directory name on the left to go up to the root of the microSD card, then browse for a different sample to load into your chosen granular oscillator.

You can navigate by double-tapping a folder you want to open or using Knob 2 to select a folder and then tap **Load**.

4. When you find a sample that interests you, tap **Preview** to turn it on (if necessary), then tap the sample you are considering loading.

The sample starts playing. If you don't want to load the sample or don't want to continue previewing it, continue browsing for other samples and previewing them.

When you decide on which sample you want to load, press **Load**. The Grain edit screen reopens with the new sample loaded into the granular oscillator.



**To record a new sample for a granular oscillator:**

- 1. Open the granular track Dashboard, then tap Grain 1 or Grain 2 to open the editing screen for GR1 or GR2.
- The Grain editor screen opens.

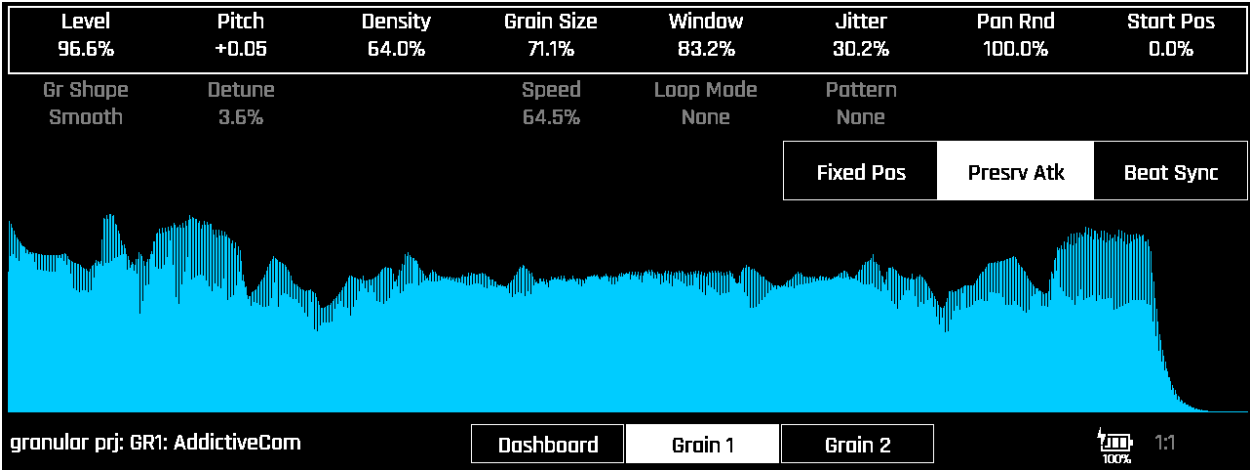


Figure 8-11: Grain 1 Editor Screen

- 2. Double-tap the sample waveform. The Sample Browser screen opens.

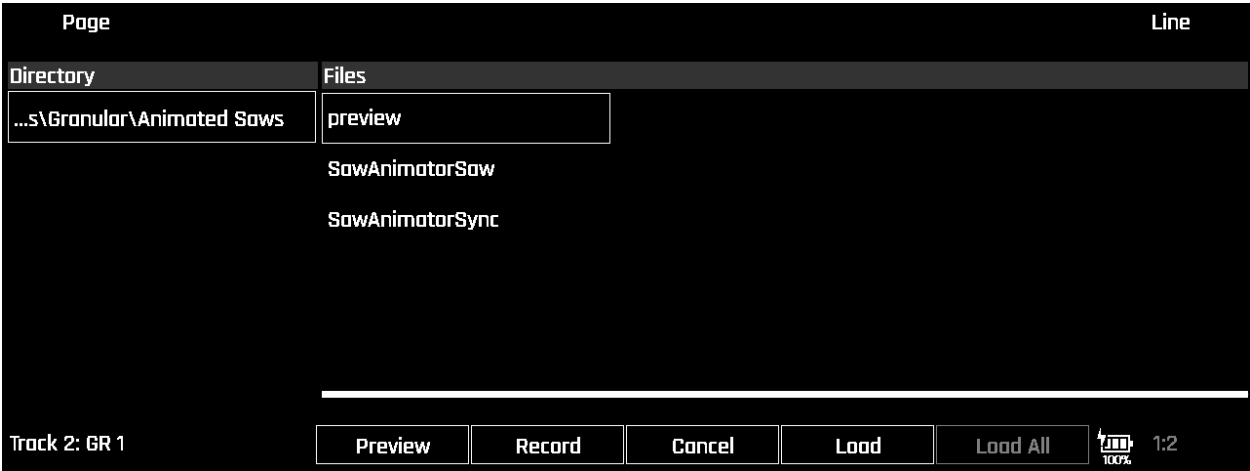


Figure 8-12: Sample Browser Screen

3. Tap **Record** in the Sample Browser screen. The File Naming screen opens. This screen lets you specify a prefix for the filenames of the samples you will record.

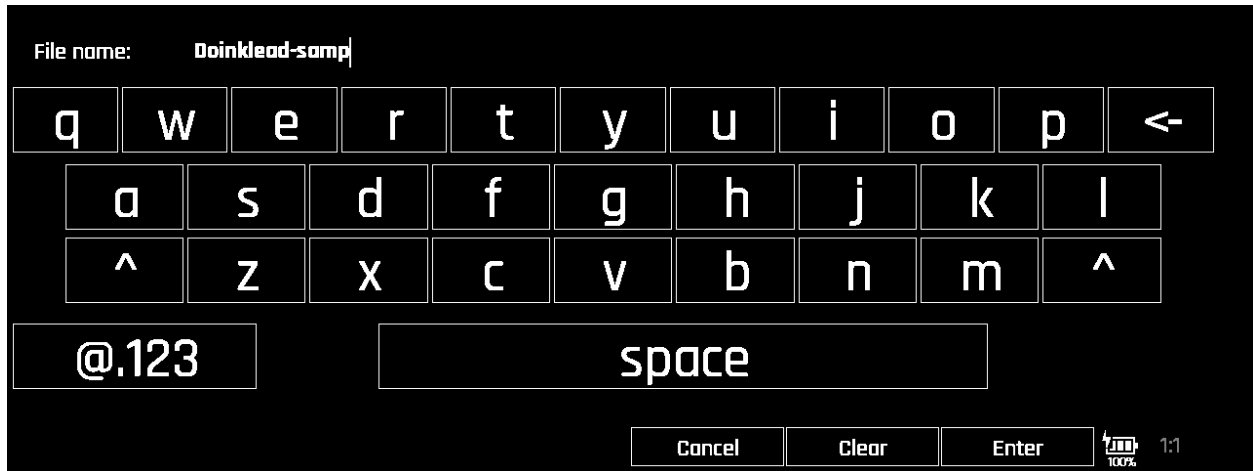


Figure 8-13: Sample File Naming Screen

4. Enter a sample filename, then press **Enter**. The Granular Recording screen opens.

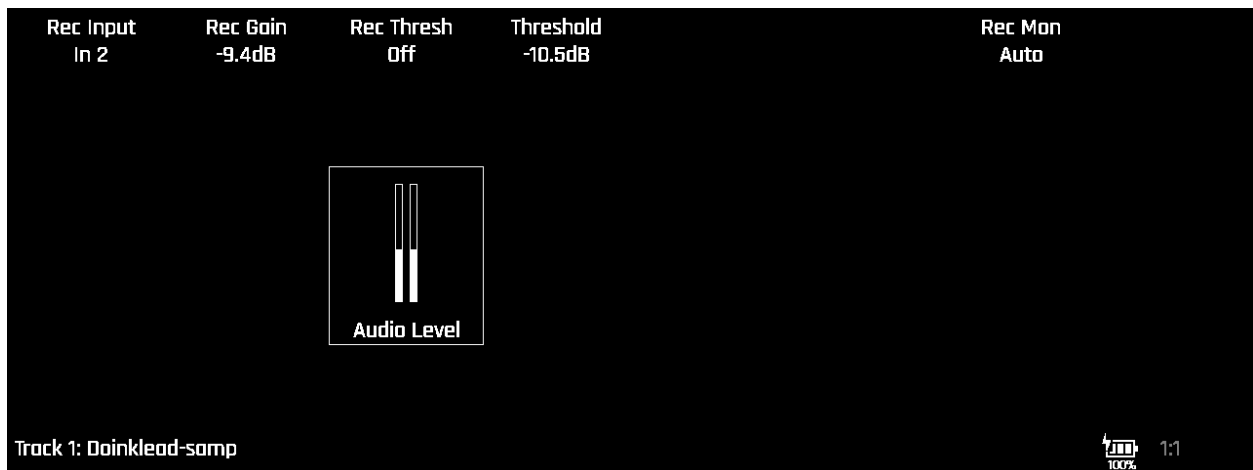


Figure 8-14: Granular Recording Screen with Row 1 Selected

5. Use knobs 1-8 to set the sample recording settings.

Table 8-5 describes the recording parameters.

*Table 8-5: Granular Recording Parameters Mapped to bento Knobs*

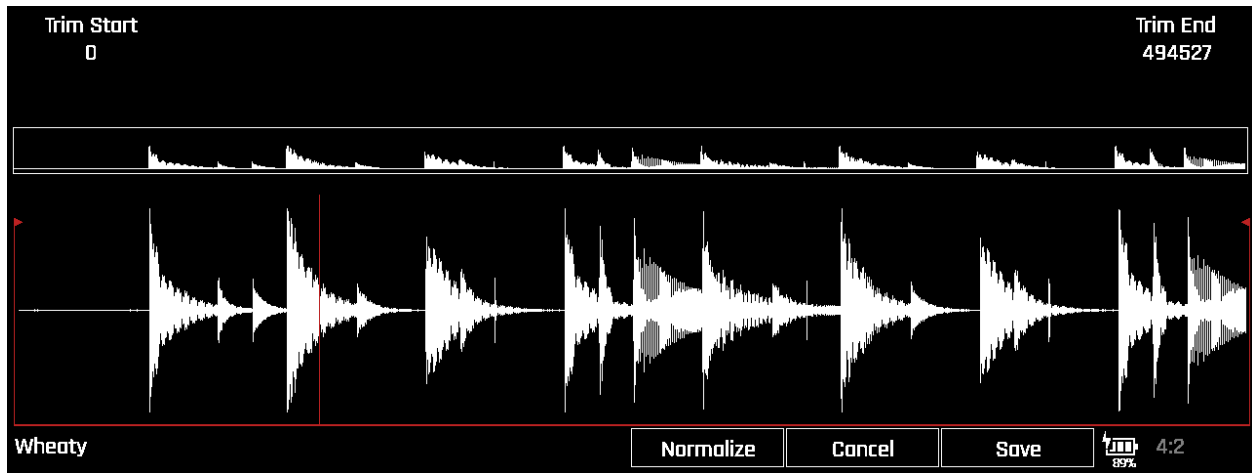
Parameter	Knob	Range	Description
<b>Rec Input</b>	1	In 1, In 2, In3, In 1L, In 2L, In 3L, Resample	Audio source for sample recording. Use 1L, 2L or 3L for mono recording while sending a signal into the left channel of the corresponding input.
<b>Rec Gain</b>	2	-60dB to +12dB	Audio input gain.
<b>Rec Thresh</b>	3	Off, On	When Rec Thresh is “On,” sample recording waits for audio input level to go over the Threshold.
<b>Threshold</b>	4	-96dB to 0dB	Sets a recording threshold for sample recording when Rec Thresh is On.
<b>Rec Mon</b>	7	Off, Auto	Specifies when audio inputs are played out through bento’s main audio output. When set to Auto, monitoring is only heard while actively recording.

**Note:** Set your audio source level and the bento Rec Gain to avoid clipping and adjust while maintaining good signal-to-noise ratio. The input meter on the pad should stay as high as possible without entering the red range.

- To start recording, press and hold the **REC** button, then press the **PLAY** button.

7. To stop recording, press **STOP**.

The new Granular WAV Edit screen opens with the new sample loaded.



*Figure 8-15: Granular Track WAV Edit Screen after Recording*

8. To normalize the sample, tap **Normalize**. Bento applies gain to the sample to increase the overall level of the waveform without clipping its highest peaks.
- To trim the recorded sample, adjust the **Trim Start** with knob 1 and the **Trim End** with knob 2. To save the new sample file with only the audio between the selected start and end points, tap **Save**.
9. The Tracks screen opens with the Granular track selected.
  10. Press INST and verify the new sample has replaced the original sample in the Dashboard.

## Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)

Granular tracks include a third oscillator that produces a traditional waveform, such as triangle, sine wave, sawtooth, noise, and square wave with variable pulse width.

While its relatively simple waveforms may make the third oscillator seem out of place when compared with bento's two granular oscillators (per voice), it can become very useful as a tonal anchor against the backdrop of dozens of overlapping grains jumping from one random point in a sample file to another.

Bento's granular track Dashboard groups the waveform oscillator's parameters with the Delay and Reverb send level parameters for the entire granular track.

### To configure a granular track's waveform oscillator and polyphony:

1. Open the granular track dashboard, then tap the **Osc + Config** control to select it, as shown in the following screenshot.

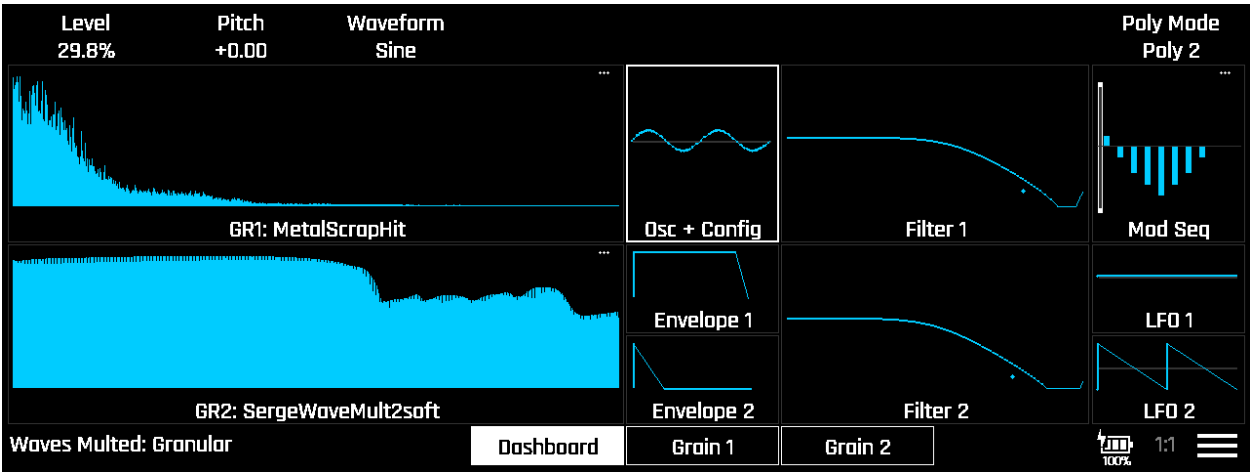


Figure 8-16: Osc + Config Parameters in Granular Track Dashboard

2. To edit the parameters displayed across the top of the screen, adjust the knobs that correspond to each parameter.

The following table describes the parameters and the knobs to which they are mapped when **Osc + Config** is selected in the granular track Dashboard.

Table 8-6: OSC + Config Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Level</b>	1	0 to 100% (-96dB to +12dB)	Level of granular patch waveform oscillator	Yes
<b>Pitch</b>	2	-24 to +24 semitones	Transposition of granular patch oscillator	Yes
<b>Waveform</b>	3	Saw, Triangle, Square, Sine, Noise	Waveform of granular patch waveform oscillator	No
<b>Pulse Width</b> (Waveform = Square)	4	0 to 100%	Only applies when Square is selected for the Waveform. The portion of the wave that will have a high signal. A value of 50% will create a wave that is high half the time and low half the time. A value of 75% will create a wave that is high 3/4 of the time and low 1/4 of the time.	Yes
<b>Poly Mode</b>	8	Mono, Poly 2, Poly 4, Poly 6, Poly 8, Poly X	Maximum simultaneous notes. Poly X will make use of all notes available.	No

## Editing Granular Track Envelopes

Each granular track voice includes two ADSR envelopes, Envelope 1 and Envelope 2.

In granular tracks, Envelope 1 always controls the VCA, but it can also be used as a modulation source. Envelope 2 is only used as a modulation source.

### To edit envelope parameters:

1. Open the granular track dashboard, then touch either **Envelope 1** or **Envelope 2**.

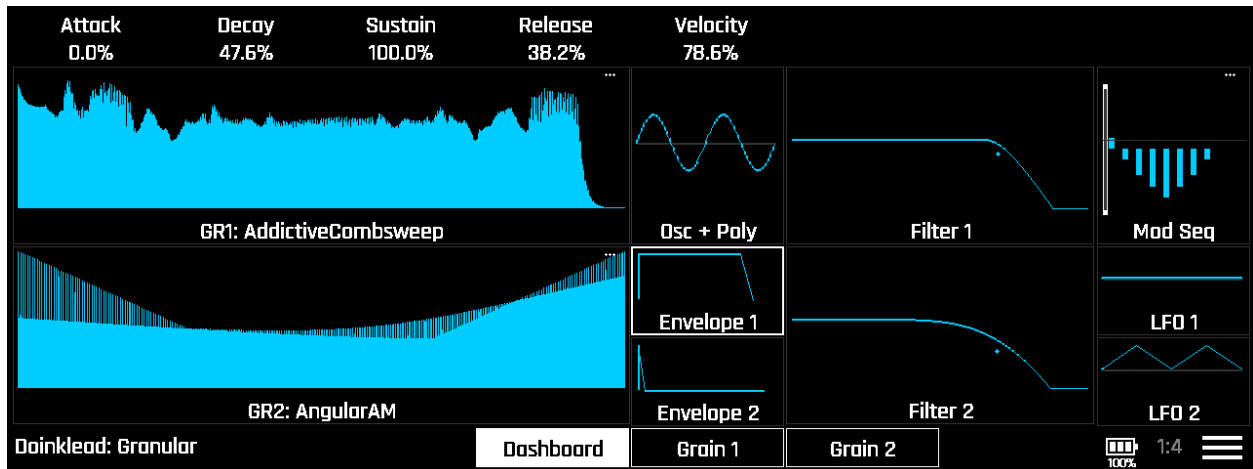


Figure 8-17: Envelope 1 selected for editing in Granular Track Dashboard

The five ADSR and Velocity parameters at the top of the screen represent the settings of the currently selected Envelope. The following table describes the envelope parameters for each of the two envelopes.

Table 8-7: Granular Track Envelope Parameters

Parameter	Knob	Range	Description	Modulation Target?
<b>Attack</b>	1	0 to 100% 100% = 9 seconds	Time to reach peak level after note trigger	Yes
<b>Decay</b>	2	0 to 100% 100% = 38 seconds	Time to fall from peak to sustain level	Yes
<b>Sustain</b>	3	0 to 100%	Level maintained while note is held	Yes
<b>Release</b>	4	0 to 100%	Time to fade to silence after note release	Yes

Parameter	Knob	Range	Description	Modulation Target?
		100% = 38 seconds		
<b>Velocity</b>	5	-100 to 100%	Velocity sensitivity amount	Yes

2. Adjust envelope parameters using knobs 1-5 and play the track from the pads or over MIDI to hear the impact of the envelopes on the sound and how the envelope shape displayed in the Dashboard changes.

**Remember:** Envelope 2 only serves as a modulation source in granular tracks. Only Envelope 1 affects the VCA in granular tracks. If you edit Envelope 2 but don't hear any changes in a granular track's sound, it could be that the track doesn't use Envelope 2 for modulation.



## Editing Granular Track Filters

Each granular track voice includes two filters, Filter 1 and Filter 2, which can be independently configured as Low-pass, High-pass, Band-pass, or Notch filters and configured in series or in parallel when processing a mix of the two granular oscillators and waveform oscillator.

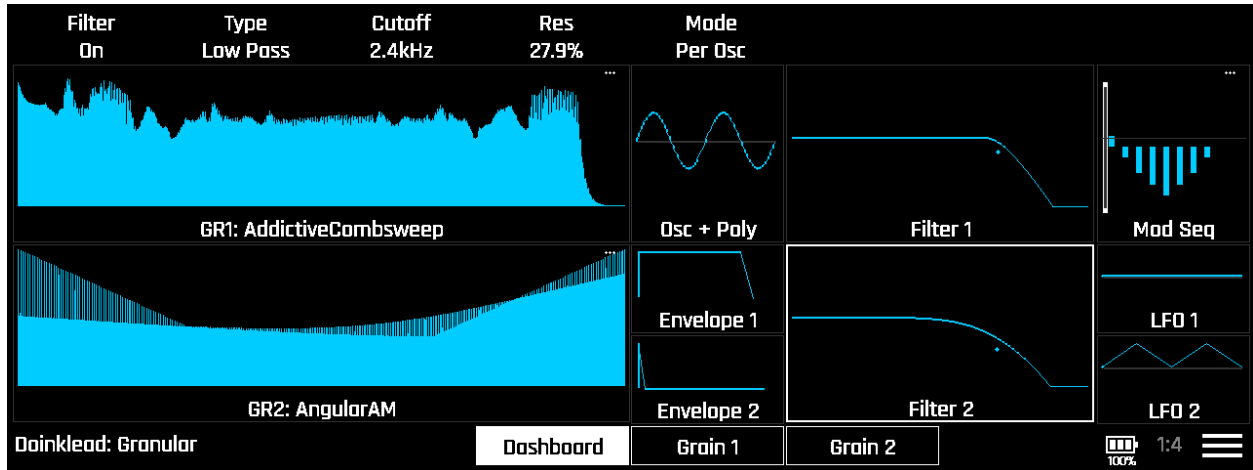


Figure 8-18: Filter editing screen showing frequency response and parameter controls

### To edit filter parameters:

1. Open the granular track dashboard.
2. Tap **Filter 1** or **Filter 2** to select the filter you want to edit.  
The five parameters at the top of the screen represent the settings of the currently selected Filter.
3. Adjust filter parameters using knobs 1-8.
4. Listen to the filtering effect in real-time and notice how the selected filter's response curve changes in the Dashboard.

The following table describes the filter parameters mapped to Knobs 1-8 when one of the filters is selected.

Table 8-8: Granular Track Filter Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Filter</b>	1	On/Off	Enables or disables the selected filter.	No
<b>Type</b>	2	Low Pass, High Pass, Band Pass, Notch	The type of filter that will be applied.	No
<b>Cutoff Frequency</b> (Low Pass or High Pass)	3	20Hz to 20.4kHz	For High Pass and Low Pass filters, the frequency where the filter begins to attenuate the signal.	Yes
<b>Center Frequency</b> (Band Pass or Notch)	3	20Hz to 20.4kHz	For Notch and Band Pass filters, the frequency at the middle of the notch or band. This is the frequency that will be most attenuated.	Yes
<b>Res</b> (Low Pass or High Pass)	4	0% to 100%	For High Pass and Low Pass filters, controls how much of a boost is given to the signal near the cutoff frequency.	Yes
<b>Width</b> (Band Pass only)	4	0% to 100%	For Band Pass filters, the width of the frequency range around the center point included in the notch or band.	Yes
<b>Q (Notch)</b>	4	0% to 100%	For Notch filters, Q controls the level of attenuation at and around the center frequency.	Yes

Parameter	Knob	Range	Description	Modulation Target?
<b>Mode</b> (Filter 2 only)	5	Serial, Parallel, or Per Osc	<p>Determines how bento routes granular track oscillator signals through Filter 1 and Filter 2 before reaching the VCA. When Mode is “Serial” or “Parallel,” all three oscillators are mixed and then routed through Filter 1 and Filter 2 configured in series or parallel.</p> <p>When Mode is “Per Osc,” GR1 is routed through Filter 1, GR2 is routed through Filter 2, and the waveform oscillator is routed directly to the VCA, bypassing both filters.</p>	No

## Editing Granular Track Modulation

Each bento Track includes a central Modulation screen within which you can configure all modulation settings.

### To configure modulation in a granular track:

1. Open the granular track dashboard, then tap the **Menu** icon in the lower right corner of the screen. The Menu opens, displaying a single option, Modulation.

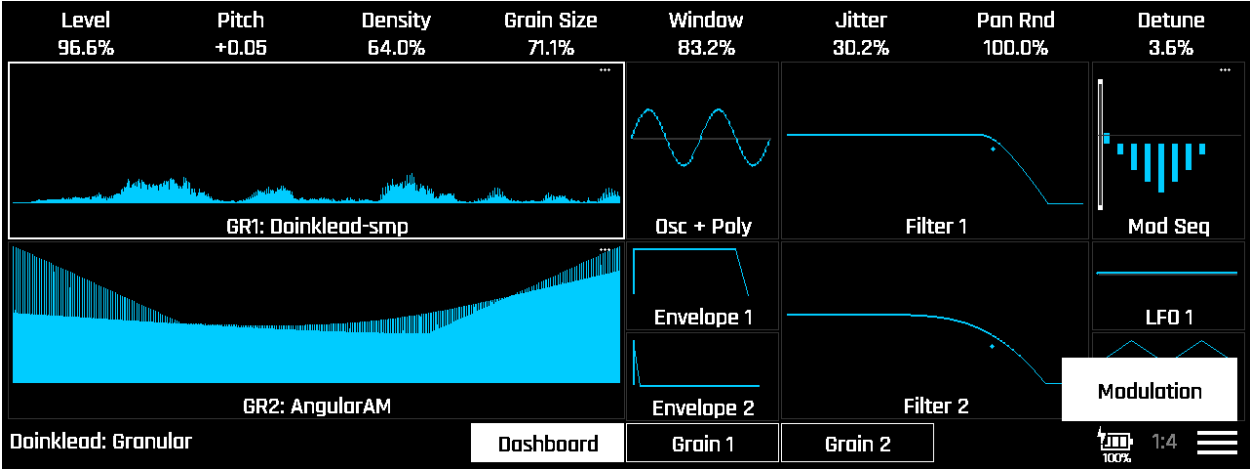


Figure 8-19: Modulation option in Granular Track Dashboard Menu

2. Tap **Modulation**.

The Granular Track Modulation screen opens.

Line	Source 1	Amount 1	Source 2	Amount 2	Source 3	Amount 3	
		10.0%		0.0%		0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
GR1: Pitch	LFO 1	10.0%	[None]		[None]		20
GR1: Level	[None]		[None]		[None]		19
GR1: Density	Macro Y	17.6%	[None]		[None]		21
GR1: Rate	[None]		[None]		[None]		22
GR1: Grain Size	Macro X	-24.0%	Pressure	74.8%	[None]		23
GR1: Window	[None]		[None]		[None]		24
GR1: Jitter	[None]		[None]		[None]		25
Waves Multed: Granular							

Figure 8-20: Granular Track Modulation Screen

The first column in the Modulation screen contains the name of every granular track parameter that can be a modulation “target.” Columns 2 through 7, let you set up three modulation sources and three modulation amounts for the modulation target of the selected row.

To see the complete list of modulation targets in the Modulation screen you can either:

- swipe the screen up or down, or
  - turn Knob 1 to scroll up and down through the Modulation screen. turn Knob 1 to scroll up and down through the Modulation screen. turn Knob 1 to scroll up and down through the Modulation screen.
3. To see if a specific granular track parameter is a modulation target, refer to the appropriate parameter tables elsewhere in this chapter and check the Modulation Target? column for the parameter you want to modulate.

Table 8-9 describes the parameters on the Modulation screen.

Table 8-9: Modulation Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Line</b>	1	GR1/GR2: Pitch, Level, Density, Rate, Grain Size, Window, Jitter, Play Pos, Speed  Osc: Pitch, Level, Pulse Width  Filt1/Filt2: Freq/Cen, Res/Width/Q  Env1/Env2: Attack, Decay, Release  LFO1/LFO2: Rate, Depth	Moves the Modulation screen's line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.	No
<b>Source 1</b>	2	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (1 of 3)	No
<b>Amount 1</b>	3	-100% to +100%	Modulation Amount (1 of 3)	No
<b>Source 2</b>	4	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (2 of 3)	No
<b>Amount 2</b>	5	-100% to +100%	Modulation Amount (2 of 3)	No
<b>Source 3</b>	6	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (3 of 3)	No
<b>Amount 3</b>	7	-100% to +100%	Modulation Amount (2 of 3)	No

## Editing the Granular Track LFOs

Bento's two LFOs serve as internal modulators. They are great for adding life and variety to any sound. You can choose a different waveform for each of the two LFOs in the granular track dashboard and then apply them as modulation sources in the granular track's Modulation screen.

### To configure one of the LFOs in a granular track:

1. Open the granular track dashboard, then tap **LFO 1** or **LFO 2** to select the LFO for editing.

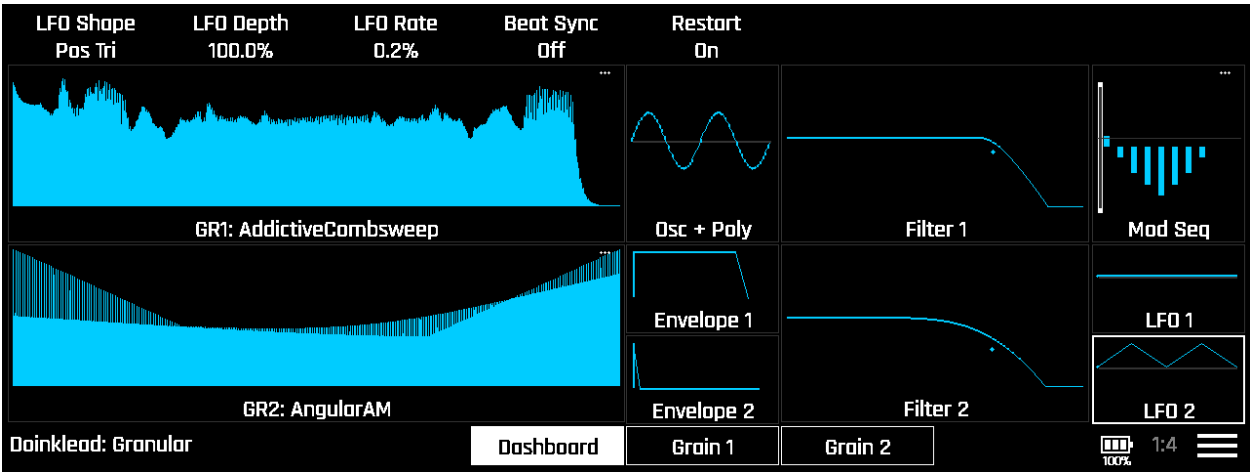


Figure 8-21: LFO Parameters in the Granular Track Dashboard

Table 8-10 describes the parameters mapped to Knobs 1-8 when one of the LFOs is selected.

Table 8-10: Granular Track LFO Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Waveform</b>	1	Saw, Rev Saw, Triangle, Pos Tri, Sine, Pos Sine, Square, Pos Square, Random	The shape of the wave used by the low frequency oscillator.	No
<b>Depth</b>	2	0 to 100%	The amplitude of the oscillating wave. Set this to 0 to disable the LFO.	Yes
<b>Rate</b>	3	When Beat Sync = Off: 0 to 100% (~0.1Hz to 12 Hz.)  When Beat Sync=On, rate is specified in beats and measures: 8, 4, 2, 1, 1/2, 1/2 T, 1/4, 1/4 T, 1/8, 1/8 T, 1/16, 1/16 T, 1/32, 1/32 T, 1/64 bars	The frequency of the LFO.	Yes
<b>Beat Sync</b>	4	Off, On	Controls the behavior of the LFO Rate parameter. When Beat Sync=On, the LFO synchronizes with bento's transport.	No
<b>Restart</b>	5	Off, On	When On, the LFO restarts each time you trigger the track from a pad.	No



## Editing the Granular Track Modulation Sequencer

The Modulation Sequencer is a sequencer reserved for granular track parameter modulation. It is another great way to add some life and variety to the sound. You can set the number of steps and the step length. You can also turn on the Quantize option to snap the values to pitch frequencies.

Unlike bento's track sequencers, the Modulation Sequencer runs whenever you play the granular track, even if bento's transport is stopped.

### To configure the Modulation Sequencer in a granular track:

1. Open the granular track dashboard, then tap **Mod Seq** to select the Modulation Sequencer for editing.

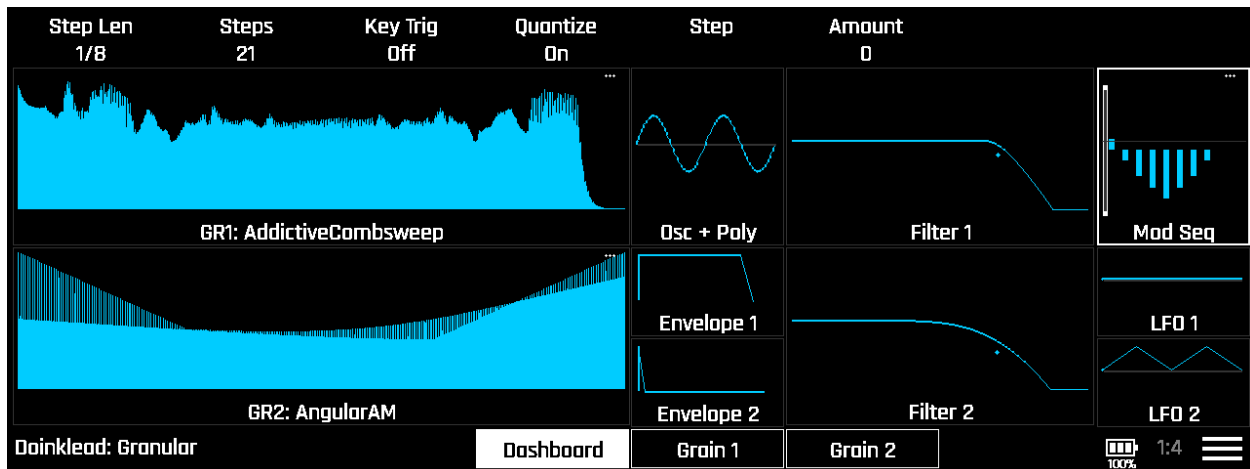


Figure 8-22: Modulation Sequencer Parameters in the Granular Track Dashboard

The granular track Dashboard displays the Modulation Sequencer parameters across the top of the screen. You can edit the parameters from the Dashboard and observe the Mod Sequence's step levels change in the Mod Seq control's thumbnail. You can also navigate to the Modulation Sequencer screen for a magnified view of the step levels.

2. To open the Modulation Sequencer screen, do one of the following:
  - Press the RIGHT arrow button, or
  - Double-tap the Mod Seq control.

The magnified view of the Modulation Sequencer Opens.

The Modulation Sequencer screen displays the same parameters across the top of the screen that were visible in the Dashboard, and it also presents the same sequence steps as the ones in the Mod Seq control's thumbnail, but the magnified view makes it much easier to detect changes in each step's level as

you edit them. You can also drag your finger across the screen to draw the sequence.

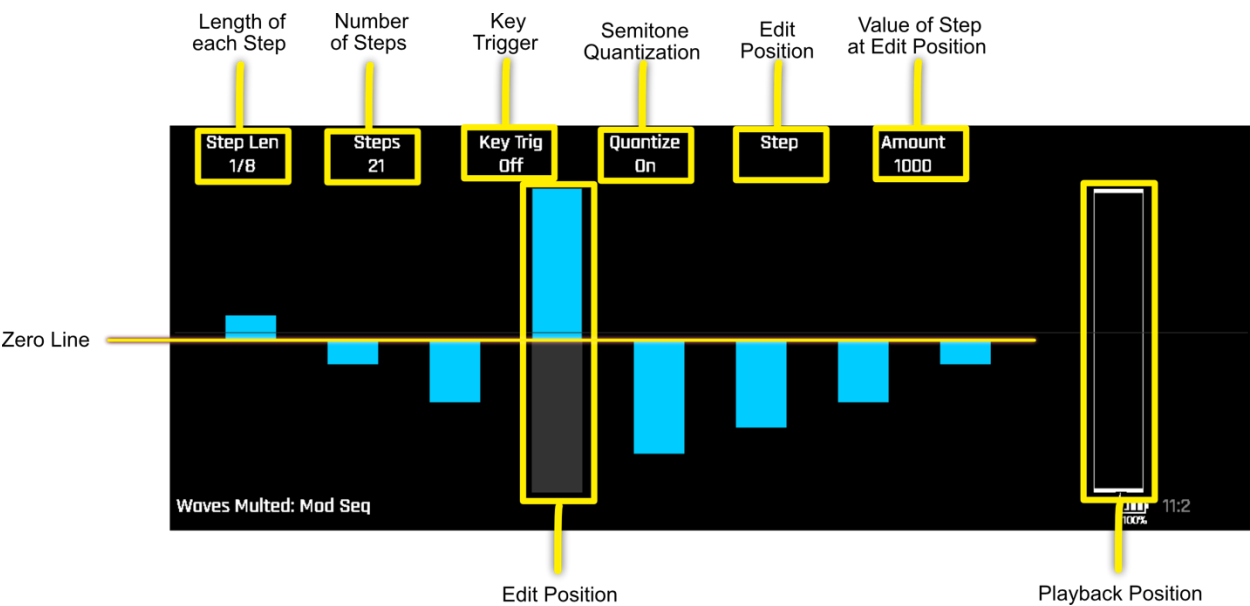


Figure 8-23: Modulation Sequencer Screen Parameters

Table 8-11 describes the Modulation Sequencer's parameters mapped to Knobs 1-8 when the Mod Seq is selected in the granular track Dashboard or when the Mod Seq screen is open.

Table 8-11: Modulation Sequence Parameters Mapped to *bento* Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Step Len</b>	1	1/64, 1/32T, 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2T, 1/2, 1 bar, 2 bar (T=Triplet)	The length of each step in the sequence.	No
<b>Steps</b>	2	2 to 32	The number of steps in the sequence.	No
<b>Key Trig</b>	3	Off, On	When On, the sequencer is restarted when each note begins. When Off, it plays constantly in the background and resumes at current position when a new note is triggered.	No
<b>Quantize</b>	4	Off, On	When On, the levels of the sequencer are quantized to 12 distinct values (plus the off value). This allows for precise semitones in a pitch modulation.	No
<b>Step</b>	5	1 to 32	Select the step to edit.	No
<b>Amount</b>	6	-1000 to +1000	Changes the value of the selected step.	No

3. To return to the granular track dashboard from the Mod Seq screen, press **INST** or **Left Arrow**.
4. Note that the knobs continue to perform the same functions in the Dashboard when **Mod Seq** is selected as they did in the Modulation Sequencer screen.
5. If the Modulation Sequencer is not already modulating anything, go to the Modulation screen and apply it as a modulation source.

For example, try modulating one of the Filter's cutoff or center frequency, or modulating the waveform oscillator's pulse width. You may have to change the oscillator's Waveform to "Square" to hear the results, but it's well worth the effort!

## Editing Granular Track Configuration Settings

Track configuration settings control MIDI input, audio routing, and other track-level parameters that affect how the granular track integrates with your project.

**To access granular track configuration settings:**

- 1. Select the granular track on the Tracks screen.
- 2. Press the **RIGHT** arrow button to open the **Track Configuration** screen.



Figure 8-24: Track configuration screen showing MIDI and routing settings

Table 8-12 describes the parameter that you can edit from the Track Configuration screen.

Table 8-12: Track Configuration Parameters

Parameter	Knob	Range	Description	Modulation Target?
Output	1	1, 1 w/ Mod FX, 2, 3	Audio routing destination	No
Input In 1	2	In 1, In 2, In 3	Audio Input Port	No
MIDI In Ch	6	None, 1 – 16	Input MIDI channel	No
MIDI OutPrt	7	ALL (1 and 2 are not functional values)	MIDI Output port	No
MIDI OutCh	8	None, 1 – 16	Output MIDI channel	No

Configuration settings save with the project and affect how the granular track responds to external control and integrates with other project elements.

## Creating New Granular Tracks

Creating new granular tracks allows you to load custom samples and build instruments tailored to your creative needs. You can learn a lot about bento's granular tracks by exploring the granular tracks in the projects that 1010music includes on bento's factory microSD card, or by loading the factory granular tracks patches into an empty track and then exploring the granular track parameters with the techniques described in this chapter.

At some point, you may decide to create your own granular tracks, starting from a blank slate. Fortunately, bento makes it easy to create new granular tracks with a set of useful, but not overwhelming parameter settings that are perfect for making a fresh start. It also allows you to record a WAV file for each of the Granular oscillators so you can create a full granular track from scratch.

### To create a new granular track with default settings:

1. Press **TRACKS** to open the Tracks screen.
2. If the project has no empty tracks, you could cut one of the currently loaded tracks by choosing **Cut Track** from the Tracks screen's Menu in the lower right corner of the Tracks screen, or you could create a completely new project with 8 empty tracks. Either way, make sure that your project doesn't already include a granular track before you try to create a new one because bento projects can only include one granular track.

**Reminder:** If you're not sure that your current project is already saved on the microSD card, this would be as good a time as any to back up your current bento project! For tips on saving copies of bento projects, see [Managing Project Files](#).

3. When you have found an empty track, double-tap the empty track. The patch browser screen opens. At the bottom of the screen, are the **New**, **Cancel**, and **Load** controls.

4. Tap **New** to create a custom track. A menu of bento track types opens.

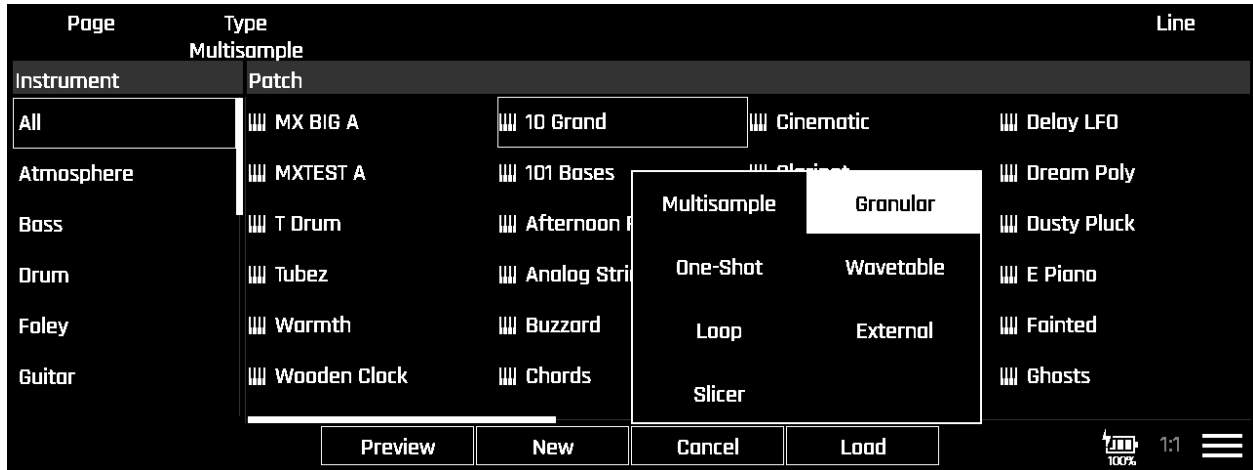


Figure 8-25: New Granular Option in the Patch Browser Screen

If the Granular option is disabled, your project probably still has a granular track.

5. Tap **Granular** in the options menu. The granular track Dashboard opens with default parameter settings and no samples loaded into either GR1 or GR2, indicated by “No WAV” displayed where there should be a waveform.

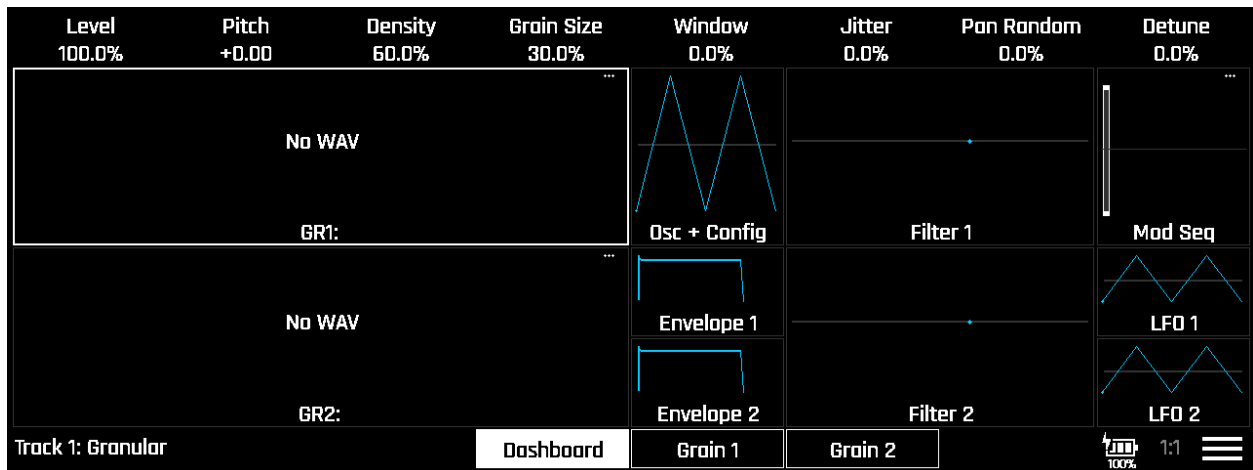


Figure 8-26: Initial Granular Track Dashboard

6. Load samples into GR1 or GR2 using the sample browser:
- Navigate to the Grain 1 page by either tapping Grain 1 in the Dashboard or double-clicking the GR1 control area in the Dashboard. The Grain editor screen displays “Double-tap here to select a WAV” in the middle of the screen.
  - Double-tap in the middle of the Grain editor screen. The sample browser screen opens.

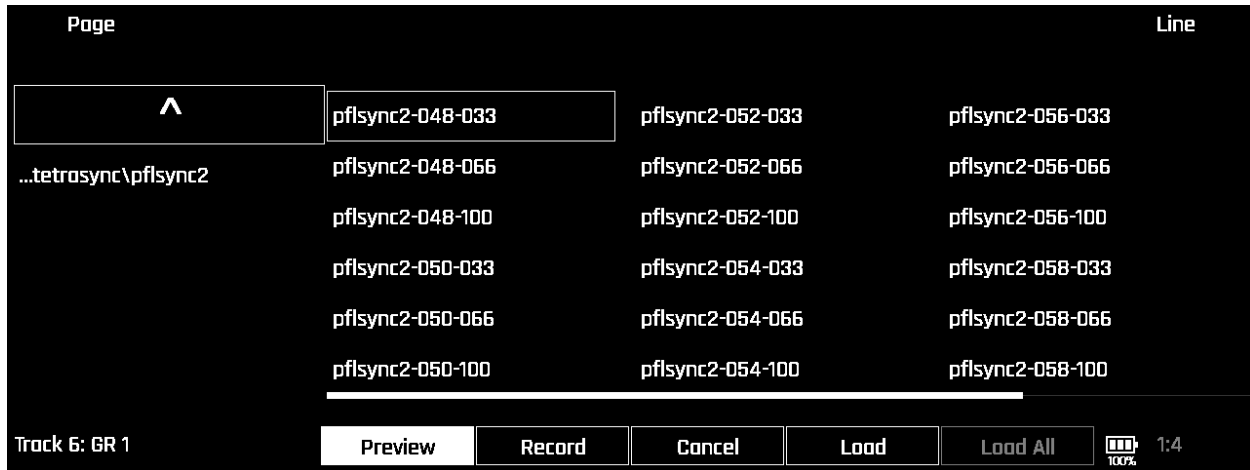


Figure 8-27: Sample Browser Screen for Granular Tracks

**Note:** The Sample Browser includes a Record option for recording a new sample instead of loading an existing sample. For details on recording a new sample for Granular tracks, see [Editing the Granular Oscillators](#).

- c) Browse for an interesting sample on the microSD card, then press Preview to hear it.
- d) When you decide which sample to load, you can load it by doing one of the following:
  - tap it to select the sample you want to load and then press **Load**, or
  - double-tap the sample you want to load.

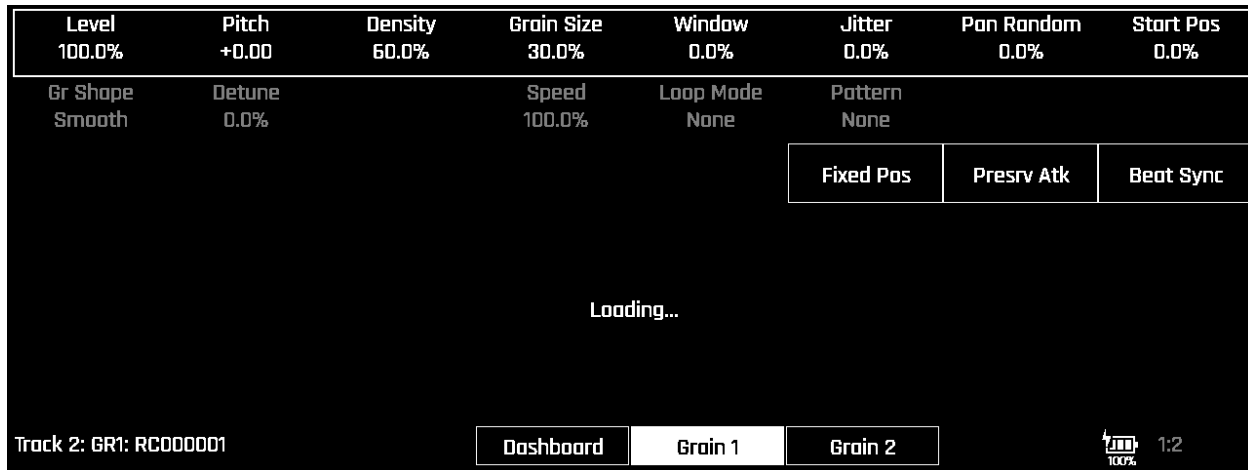
When the granular track Dashboard reopens, it displays the new sample waveform loaded in the granular oscillator.

Bento's default parameters for new granular tracks are great for getting started, but you will probably find that they don't produce the kind of sounds that you planned to hear.

7. Load other samples and adjust the granular track's parameters. You'll find help with bento's granular synth editing capabilities in the previous sections in this chapter.

### To record WAV files into Granular Oscillators:

1. Push TRACKS and select a Granular track. Create a new Granular track if needed.
2. Select the granular track and push INST to open the granular dashboard.
3. Double-tap the GR1 or GR2 waveform to open the Grain screen.



*Figure 8-28: Grain 1 Screen with no WAV Loaded*

4. Double-tap the waveform area to open the WAV file browser.
5. Tap Record at the bottom of the screen. The File Naming keyboard appears.
6. Enter a name for the file you are about to record and then tap Enter. The WAV recording screen appears.
7. If you are recording from an external source, connect the audio input source to In 1, In 2, or In 3.
8. Select the corresponding input using the Rec Input knob. If you are using a mono source, select In 1 L, In 2 L or In 3 L. If you are resampling from an internal source, select Resample here.
9. Play something using the audio input source to test the audio level. Adjust the Rec Gain knob until the level meters reach as close to the top as possible without turning red.
10. If you want the recording to wait until an audio signal is received, set Rec Thresh to On, and select an appropriate minimum audio level to trigger recording using the Threshold parameter.
11. Set Rec Mon to Auto so you can hear what you are recording through the output assigned to this track.
12. Push Rec and Play together to initiate recording and start the audio signal you want to record. Recording will start immediately if Rec Thresh is off. If Rec Thresh is On, recording will start as soon as the input signal level exceeds the Threshold selected.
13. When you have finished recording, push Stop. The WAV Edit screen is displayed.
14. Use knob 1 and knob 8 to set the desired start and end points for trimming the WAV file. The audio file will be destructively edited to trim off the audio before the Trim Start setting and the audio after the Trim End setting.



15. Tap Save to replace the recorded WAV file with the trimmed version. You are now on the grain screen and the waveform for the recorded Granular Oscillator is updated to show the WAV you just recorded and trimmed.

**Note:** The file you recorded is stored in the folder for this project. E.g. If your project name is Apollo, then the file is stored in the folder \Projects\Apollo.

## Best Practices for Granular Tracks

Effective granular track design balances technical understanding with creative experimentation. These practices help you achieve professional results while maintaining musical coherence.

### Sample Selection Strategy

Choose samples with rich harmonic content and interesting internal textures. Percussive samples work well for rhythmic granular effects, while sustained tones excel for atmospheric textures. Longer samples provide more material for granular exploration, but shorter samples can create focused, intense effects.

Consider the spectral content of your samples. Samples with complex harmonic structures yield more interesting granular textures, while simple waveforms may sound repetitive when granulated. Field recordings and acoustic instruments often provide excellent source material due to their natural complexity.

If a sample is longer than 30 seconds, the granular engine will only use the first 30 seconds of the sample.

### Parameter Relationship Management

Understanding how granular parameters interact helps you create cohesive sounds. Start with moderate grain sizes and densities, then adjust individual parameters to hear their specific effects. Small grain sizes create smooth, pitch-shifted textures, while large grains preserve more of the original sample character.

Position and Window parameters work together to control sample exploration. Low Window values create focused effects, while high Window values produce random, evolving textures. Use Window sparingly for realistic sounds, generously for abstract textures.

### Modulation Strategy

Route modulation sources to multiple granular parameters for complex, evolving sounds. LFO modulation of position creates sweeping effects, while modulation of density produces rhythmic pulsing. Envelope modulation adds dynamic response to your playing, making the instrument feel more responsive and musical.

Consider the musical context when setting modulation amounts. Subtle modulation works well in ensemble situations, while dramatic modulation can create solo textures that capture listener attention. Layer different modulation sources for rich, complex movement.

## **Performance Optimization**

Balance CPU usage by managing grain density and overlap. Higher densities create smoother textures but require more processing power. Higher Grain size will increase the likelihood of overlap. Monitor your system's performance and adjust parameters accordingly.

Select lower values for the Poly Mode setting to reduce the number of simultaneous notes the granular engine needs to manage.

## 9: Exploring Loop Tracks

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Loop tracks provide rhythmic foundation and textural layering capabilities through collections of audio loops that can be triggered, layered, and manipulated in real-time. Each Loop track contains up to 16 individual loops that you can trigger independently or combine for complex rhythmic arrangements.

This chapter covers essential techniques for working with Loop tracks, from understanding their playback capabilities through recording new loop content. You'll learn how to organize loop collections, control playback behavior, record external audio sources, and integrate loop content into dynamic musical arrangements.

To do this...	read...
Understand how Loop tracks enable rhythmic loop playback.	<a href="#">Understanding Loop Track Capabilities</a>
Trigger and control loops with pads and MIDI.	<a href="#">Playing Loop Tracks</a>
Manage loop banks and record new loop content.	<a href="#">Editing Loop Tracks</a>
Record new loops from external sources and internal submixes.	<a href="#">Recording New Samples in Loop Tracks</a>
Set up new loop-based instruments.	<a href="#">Creating New Loop Tracks</a>
Optimize loop selection and recording workflows.	<a href="#">Best Practices for Loop Tracks</a>

Unlike One-shot tracks that play individual samples once or Multisample tracks that provide chromatic performance, Loop tracks specialize in continuous, repeating audio content that forms the backbone of rhythmic arrangements. The loops can play independently or in synchronized combinations, providing flexible foundation elements for your musical compositions.

## Understanding Loop Tracks

Loop tracks organize audio loops into a 16-slot bank where each pad can trigger a specific loop for continuous playback. The loops can play independently or in combination, enabling you to build complex rhythmic textures by layering multiple loop elements.

Loop tracks excel at providing rhythmic foundation, adding textural layers, and creating evolving arrangements through real-time loop triggering and layering. The ability to start and stop individual loops during performance makes them particularly effective for live arrangement and dynamic musical development.

You can use bento's pads to cue loops to start or stop playing in sync with bento's transport, giving you direct access to bring loops in and out of live performances or recording environments.

Loop tracks let you record new WAV files directly into any of the Sample Bank's 16 loops. The 8 loops in the top row can be triggered on the Launch screen and in Scenes. The 8 loops in the bottom row provide a workspace for creating loops that can be resampled together into consolidated loops in the top row.

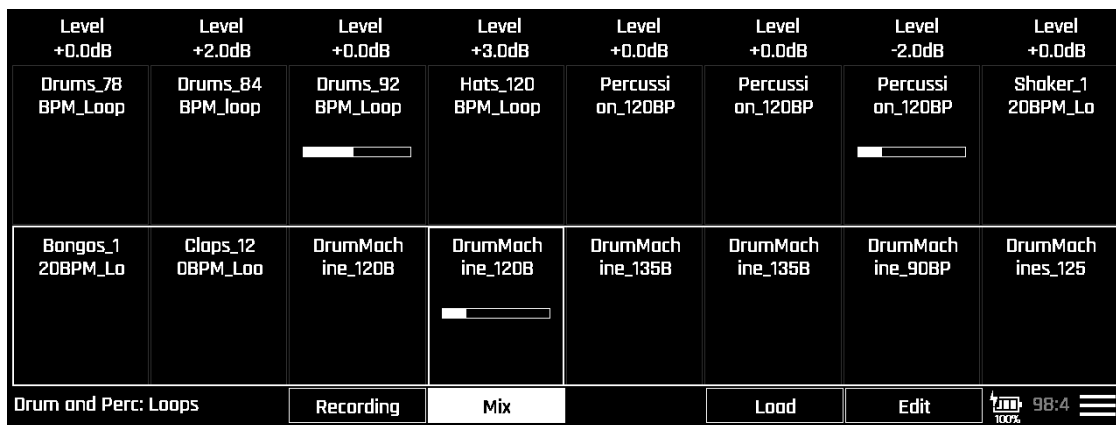


Figure 9-1: Loop track interface showing 16-slot bank with loaded loops

Loop tracks treat each loop as an independent instrument with its own sample, playback settings, filter, envelope, LFO, modulation settings, and individual levels, panning, and effects sends.

The loop sample engine provides transport synchronization so that loops stay in time with your project tempo if the difference between the loop's original tempo and the project tempo is within 10 BPM. This synchronization enables you to combine loops from different sources while maintaining tight rhythmic coordination. When the difference in tempo is greater than 10 BPM, you may begin to hear artifacts of bento's sync mechanism. Because of this inherent connection to tempo, you must start the transports by pushing Play before the loops will be triggered.

## Individual Loops and Screens

Each loop has its own sample, playback settings, filter, envelope, LFO, modulation settings and even their own individual FX sends.

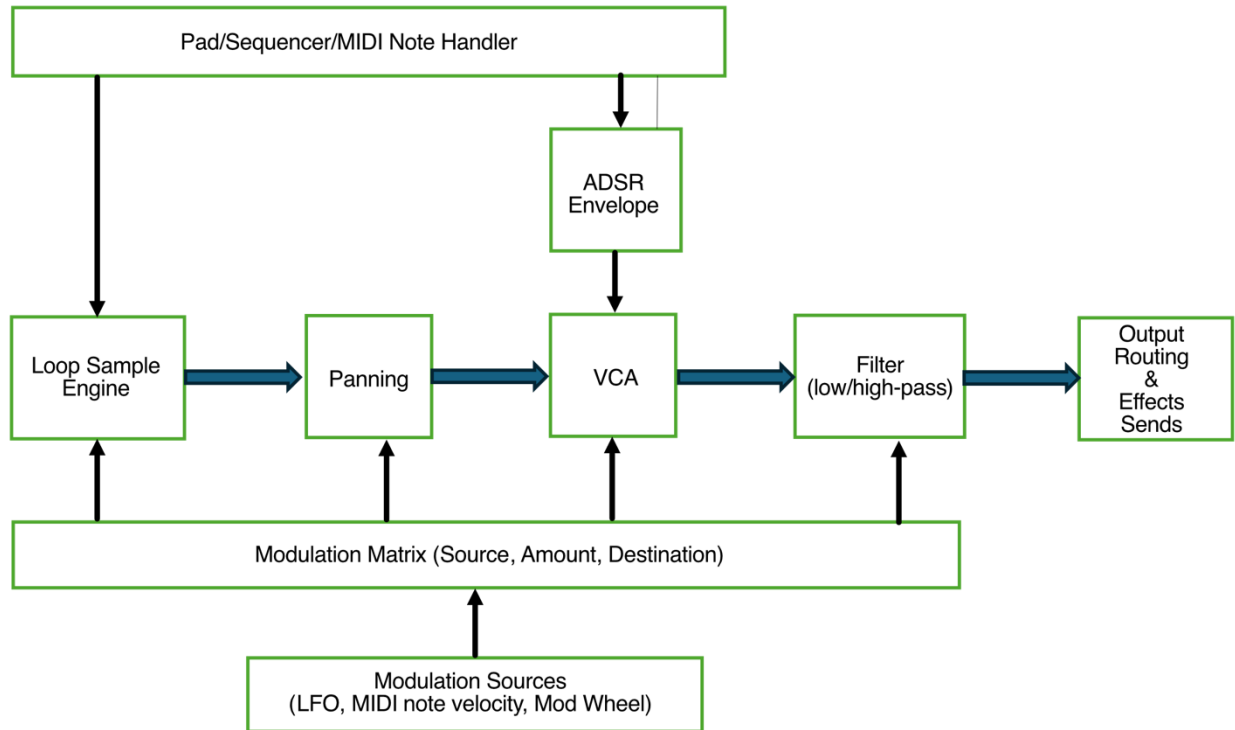


Figure 9-2: Loop Track Voice Architecture

## Loop Track Screens

Loop tracks provide four main control screens for comprehensive parameter editing and sample management.

*Table 9-1: Loop Track Screens*

Screen	Description
<b>Loop Sample Bank</b>	Displays 16 loops, with visual indicators for loops with samples loaded and progress bars for loops currently playing. Each loop shows the loaded sample name and provides access to the corresponding loop Dashboard for configuring loop voice settings. You can also adjust the levels of the individual loops to balance their mix.
<b>Loop Track Config screen</b>	Manages MIDI routing and audio output assignment.
<b>Loop Dashboards</b>	Displays voice parameters and performance controls organized into four sections (Main, Config, Env, LFO). These controls are for each individual loop.
<b>Loop WAV screen</b>	Displays the waveform of the sample assigned to the selected loop and allows you to turn Looping on or off.
<b>WAV Edit screen</b>	Destructively trims the start and end of the WAV file and normalizes the level.
<b>Loop Modulation screen</b>	Provides a central location for routing modulation sources to modulation targets, and for setting a modulation amount for each. Modulation is applied to each loop individually.

Navigation between loop track screens and individual loop Dashboards uses standard bento navigation patterns.

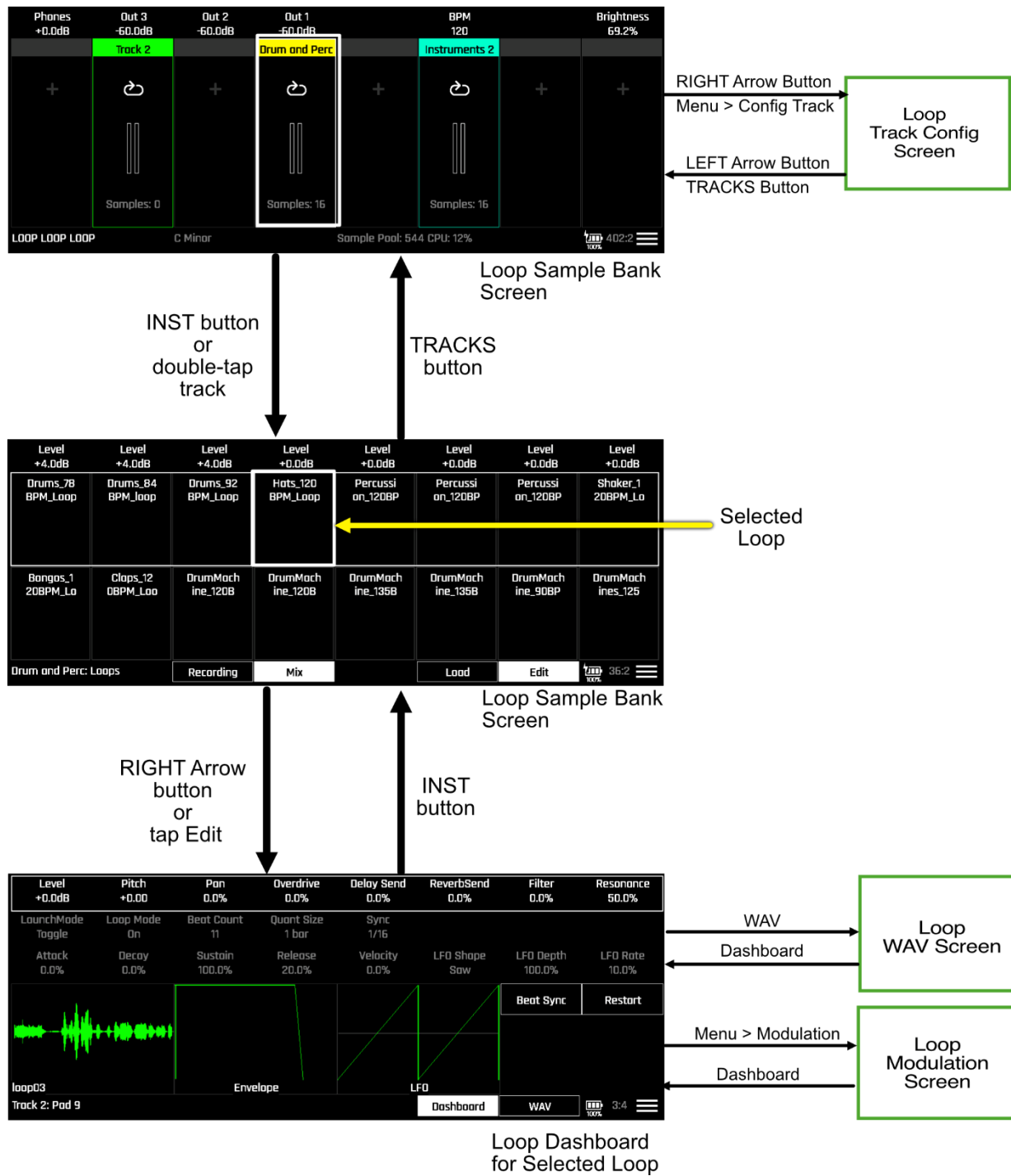


Figure 9-3: Loop Track Screen Navigation

## Playing Loop Tracks

Loop tracks provide immediate access to rhythmic foundation elements and textural layers that you can trigger and combine in real-time. The playback system ensures that loops stay synchronized with your project tempo while providing flexible control over individual loop behavior.

The combination of independent loop control and synchronized playback makes Loop tracks ideal for building dynamic arrangements, adding rhythmic complexity, and creating evolving musical textures through live performance.

## Playing Loop Tracks with bento's Pads

The hardware pads provide immediate tactile control over loop triggering and stopping, enabling you to build arrangements dynamically during performance.

### To control loops with pads:

1. Push Play to start the Transports.
2. Select your Loop track from the Tracks screen.
3. Press pads to start individual loops.
4. Press playing pads again to stop specific loops.
5. Combine multiple loops for layered arrangements.

Each pad corresponds to a specific loop slot, with visual indicators showing which loops are currently playing. The pad interface provides immediate feedback about loop status, making it easy to manage complex combinations during live performance.



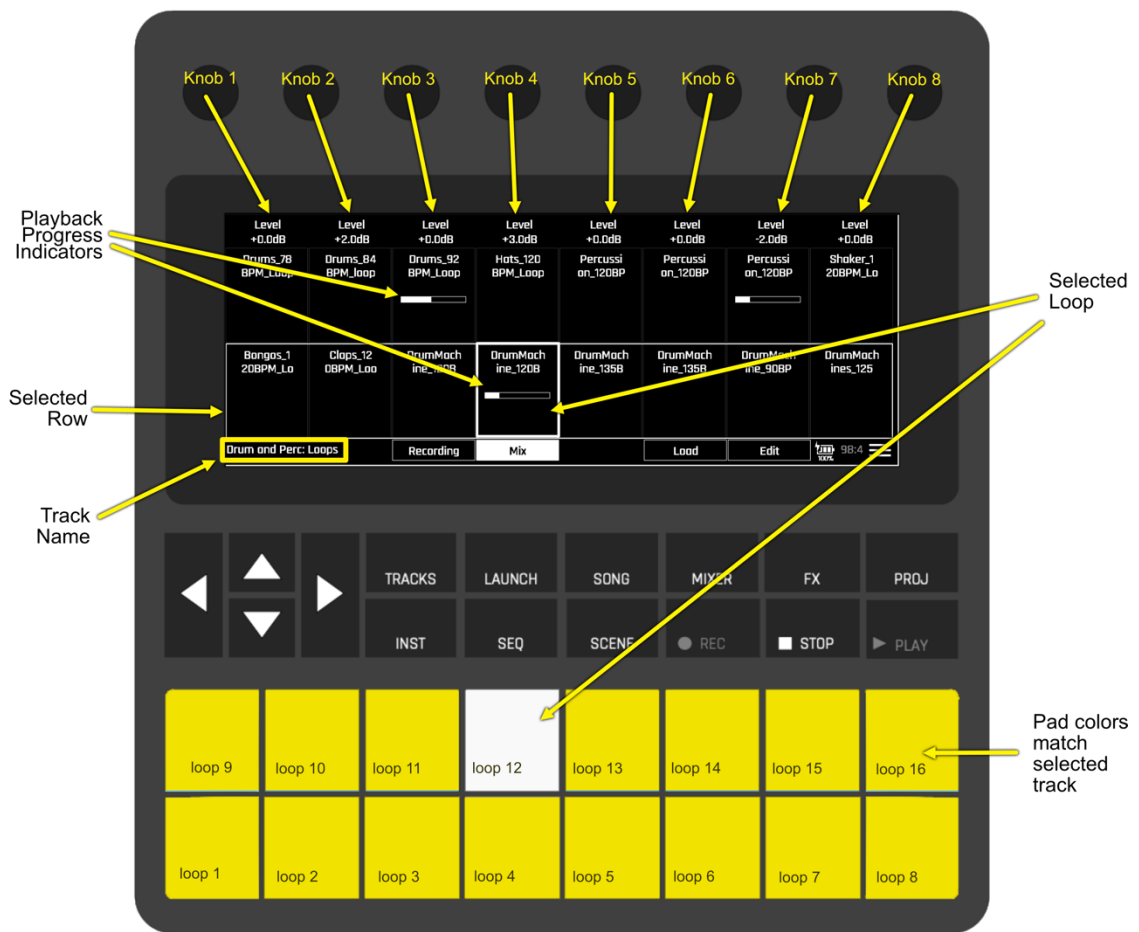


Figure 9-4: Loop pad launching

Loop triggering responds to project tempo and quantization settings, ensuring that loops start and stop at musically appropriate times. This synchronization maintains tight rhythmic coordination even when triggering multiple loops in rapid succession.

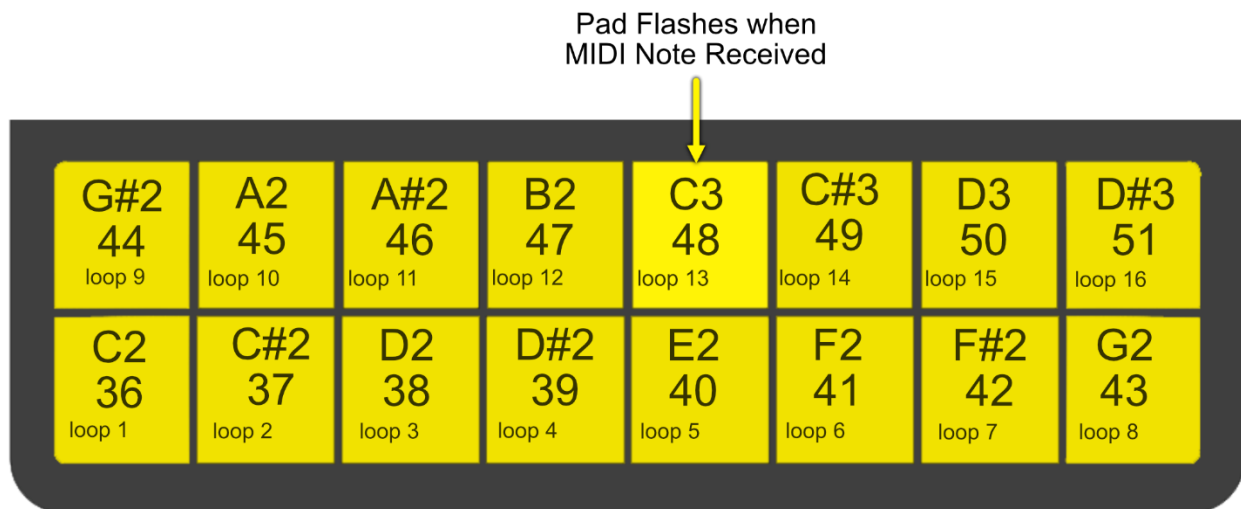
## Playing Loop Tracks over MIDI

External MIDI controllers expand your loop control possibilities and enable integration with sequencers, controllers, and automation systems for complex arrangement development.

### To control Loop tracks via MIDI:

1. Configure MIDI routing to your Loop track.
2. Push Play on your bento to start the transports.
3. Send MIDI note messages to trigger and stop specific loops.
4. Use MIDI automation for dynamic loop control.

MIDI control follows the same pad mapping as the hardware interface, with loops mapped to consecutive MIDI notes starting at C2.



*Figure 9-5: MIDI Note Mapping for Pads for Loop Tracks*

This standardized mapping enables integration with drum controllers, pad controllers, and sequencer automation for sophisticated loop arrangement techniques.

MIDI velocity and other controller data can modulate loop parameters, providing expressive control over loop playback characteristics and enabling dynamic arrangement development through external controller input.

## Editing Loop Tracks

Loop tracks provide comprehensive editing capabilities for managing loop collections, configuring playback behavior, and recording new loop content. Understanding these tools helps you create effective rhythmic arrangements and capture new musical ideas through live recording.

The editing workflow balances loop bank management with detailed playback control, allowing you to organize effective loop collections while fine-tuning individual loop characteristics and overall track behavior.

## Editing Loop Banks

The loop bank provides tools for loading, organizing, and replacing loops within your Loop track. These operations affect the loop assignments while preserving voice parameter settings and playback configurations.

Loop bank editing focuses on building and maintaining effective collections of rhythmic content that work well together and serve your musical arrangement needs.

### Creating a new Loop Track

Let's start with an empty loop track so we can explore adding new loops to it.

1. From the Tracks screen, select an empty track and push **INST**. You are now on the Patch Browser screen.
2. Tap the New button at the bottom of the screen.
3. Tap Loop. You are now looking at an empty Loop bank.

### Loading Samples into Empty Slots

Adding new loops to empty slots expands your Loop track's capabilities and provides additional elements for dynamic arrangement building.

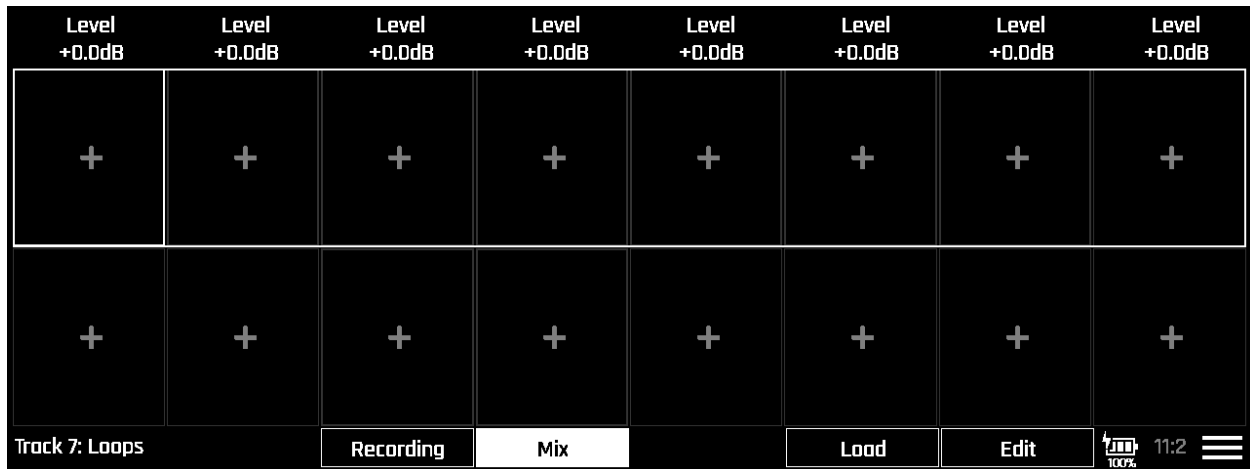


Figure 9-6: Pad 9 Selected in Loop Sample Bank Mix Screen

## To load a loop into an empty slot:

1. Select an empty loop slot in your Loop track, then tap **Load**.

The sample browser screen opens.

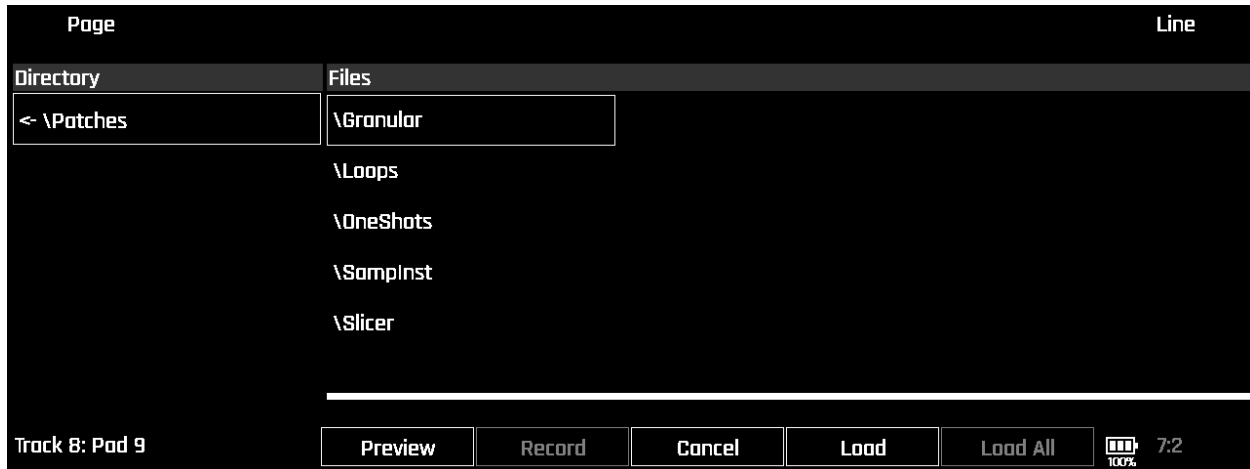


Figure 9-7: Sample Browser Screen for Loop Tracks

The current directory appears in the Directory column. The current directory's contents appear in the Files area. "<" appears to the left of the current directory name to indicate that it is a control for navigating up to the parent of the current directory.

2. Navigate to bento's patch folders on the microSD card.
  - To open a directory listed in the Files area, tap the directory name, then tap **Load**.
  - To open the parent of the current directory, tap the current directory's name in the Directory column.
3. Bento's factory samples are in the top-level Patches folder, organized by patch type (Granular, Loops, etc.). You can load samples from any of these categories, even if they were not originally intended to be played as a loop.
4. To hear a preview of a sample before you load it, tap **Preview**.
 

When you select samples with **Preview** enabled, bento starts playing the sample.
5. When you have decided which sample to load, tap **Load**.
6. Bento re-opens the Sample Bank screen, with your chosen sample loaded in the selected loop.

## Unloading Samples

Removing loops from your Loop track frees up memory resources and simplifies your loop bank organization for focused musical arrangements.

1. Select the loop slot containing the loop you want to remove.
2. Tap the menu icon in the lower right.
3. Choose the unload option to remove the loop from the slot.

The slot becomes empty and available for new loop assignments. Unloading unused loops helps manage bento's sample memory efficiently and keeps your loop banks focused on currently needed content.

## Replacing Samples in the Sample Bank

Substituting existing loops allows you to update your rhythmic arrangements and experiment with different groove elements without rebuilding entire loop collections.

1. Select the loop slot containing the loop you want to replace.
2. Tap the Load button. You will see the WAV file browser.
3. Choose a new loop to substitute for the existing one.
4. Double-tap the file name or tap Load to complete the swap.

The new loop inherits the playback settings from the previous loop, maintaining consistent behavior while providing new rhythmic content. This approach preserves your arrangement structure while updating the underlying musical elements.

## Editing Voice Parameters in the Loop Dashboard

Each Loop Dashboard provides immediate access to a specific Loop's voice parameters, organized into four parameter groups: Main, Config, Envelope, and LFO. The parameter group selection buttons allow quick switching between different parameter sets using the same eight knobs.

### To navigate to the Loop Dashboard:

1. Open the Loop Bank screen from the Tracks screen by selecting the Loop track and pressing **INST**.
2. In the Loop Bank screen, select the loop you want to edit and then either tap **Edit** or push the **Right Arrow** button.

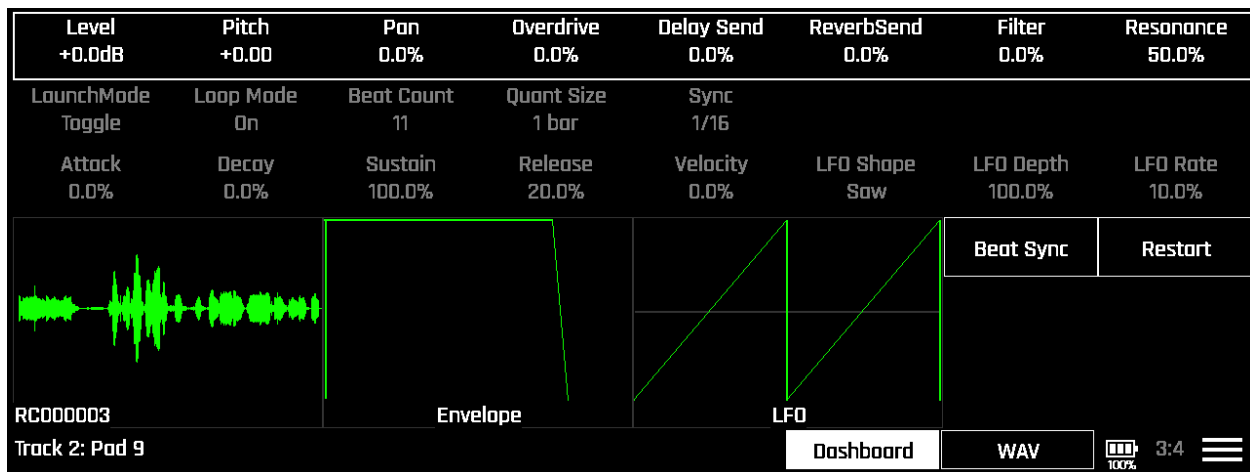


Figure 9-8: Loop track dashboard showing common voice parameters

The Loop track parameters are arranged in three rows. The bottom half of the screen contains three graphs that display a sample waveform, the envelope shape, and LFO shape.

3. To edit a parameter, tap anywhere in the parameter's row or tap one of the graphs, then use knobs 1-8 to adjust the parameters mapped to them.

## To edit loop track parameters in row 1:

1. Tap on any of the parameters in row 1 or tap the waveform graph in the lower half of the screen. Knobs 1-8 correspond to the parameters of row 1.

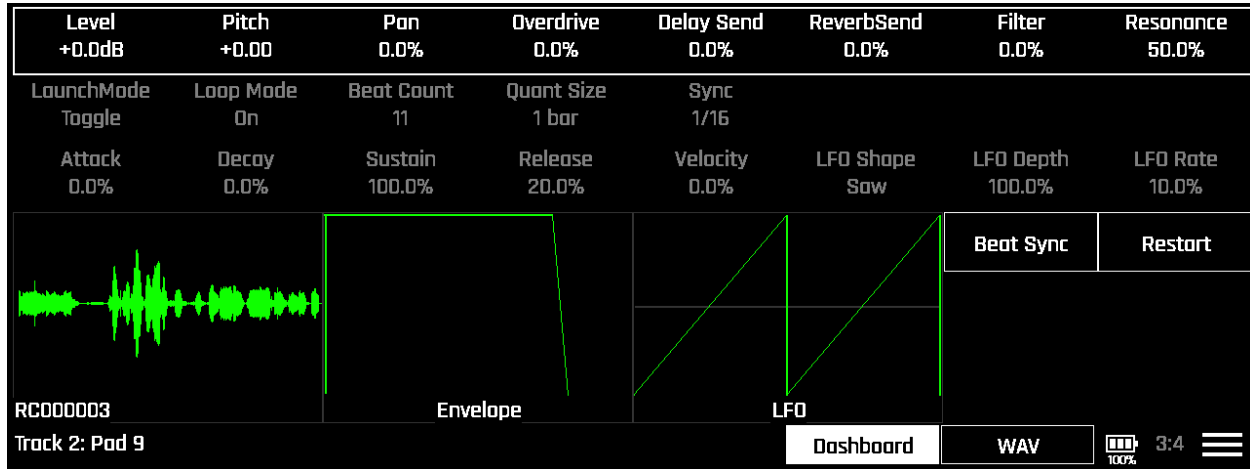


Figure 9-9: Loop Dashboard with Row 1 Selected

2. To adjust the parameters, use the knobs mapped to them.

The following table describes the parameters in row 1 of the Loop Dashboard and the knobs mapped to them

Table 9-2: Loop Track Parameters in Row 1

Parameter	Knob	Range	Description	Modulation Target?
Level	1	-96dB to +12dB	Overall track volume	Yes
Pitch	2	-24 to +24 semitones	Global pitch offset for entire track	Yes
Pan	3	-100% to +100%	Stereo positioning from full left to full right	Yes
Overdrive	4	0 to 100%	Sets the level of distortion applied to the loop's output audio. Caution: Overdrive causes significantly higher track audio levels.	Yes
Delay Send	5	0 to 100%	Loop signal level sent to bento's Delay effect.	Yes
Reverb Send	6	0 to 100%	Loop signal level sent to bento's Reverb effect.	Yes



Parameter	Knob	Range	Description	Modulation Target?
Filter	7	-100% to 100%	Filter cutoff frequency. Negative values control a low pass filter. Positive values control a high pass filter.	Yes
Resonance	8	0 to 100%	Filter resonance amount	Yes

### To edit loop track parameters in row 2:

1. Tap on any of the parameters in row 2. Knobs 1-8 correspond to the parameters of row 2.

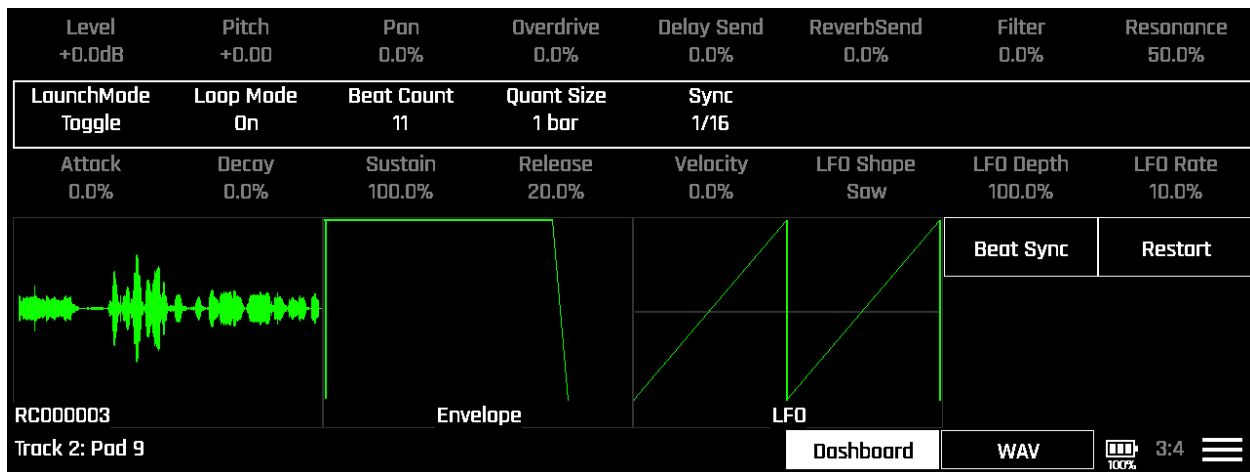


Figure 9-10: Loop Dashboard with Row 2 Selected

2. To adjust the parameters, use the knobs mapped to them.

Table 9-3 describes the parameters in row 2 of the Loop Dashboard and the knobs mapped to them

Table 9-3: Loop Track Parameters in Row 2

Parameter	Knob	Range	Description	Modulation Target?
Launch Mode	1	Trigger, Gate, Toggle	<p>Trigger: Play the track from the pads or from a MIDI controller. bento will start playback of the WAV file and play through to the end.</p> <p>Gate: Begin the WAV file playback in the same manner as Trigger mode. But in Gate mode, playback will stop when you release the pad or the MIDI note.</p> <p>Toggle: Begin the WAV file playback in the same manner as Trigger mode. When another trigger event happens for this note, the playback will stop.</p>	No
Loop Mode	2	On, Off	When Loop Mod is On, bento plays the sample in a loop. When Loop Mode is Off, bento plays the sample like a one-shot, stopping when playback reaches the end of the sample.	No
Beat Count	3	Auto, 1-512	Synchronization reference for tempo.	No
Quant Size	4	8 bars, 4 bars, 2 bars, 1 bar, 1/2, 1/4, 1/8, 1/16, none	<p>Quantizes loop playback timing to bento transport. For example, if you play a pad when Quant Size is 1/4, the loop does not start playing until the next beat, which means the transport must be running. If Quantize is "none," loops will start as soon as they are triggered.</p> <p><b>Note:</b> Loops can only play when the transport is running.</p>	No

Parameter	Knob	Range	Description	Modulation Target?
Sync	5	None, 1/16, 1/8, 1/4, 1/2, 1 bar, slice	Prevents timing drift that can occur when the length and BPM of a clip does not align exactly with the tempo of playback. When Sync is used, bento will realign the audio to match the clock at the step size specified here. Even slight differences between WAV file BPM and clock tempo can cause significant drift over time. Select a value for Sync that will control the size of the musical unit to which the clip will be synchronized. Choose small settings, like 1/16th, for rhythmic or percussion clips. Choose large settings, like 1-bar, for sustained tones or drones. Sync is enabled when quantizing is enabled ( <b>Quant Size</b> is not None).	No

### To edit envelope and LFO parameters in row 3:

1. Tap on any of the parameters in row 3. Knobs 1-8 correspond to the parameters of row 3 or tap the envelope or LFO graphs in the lower half of the Dashboard.

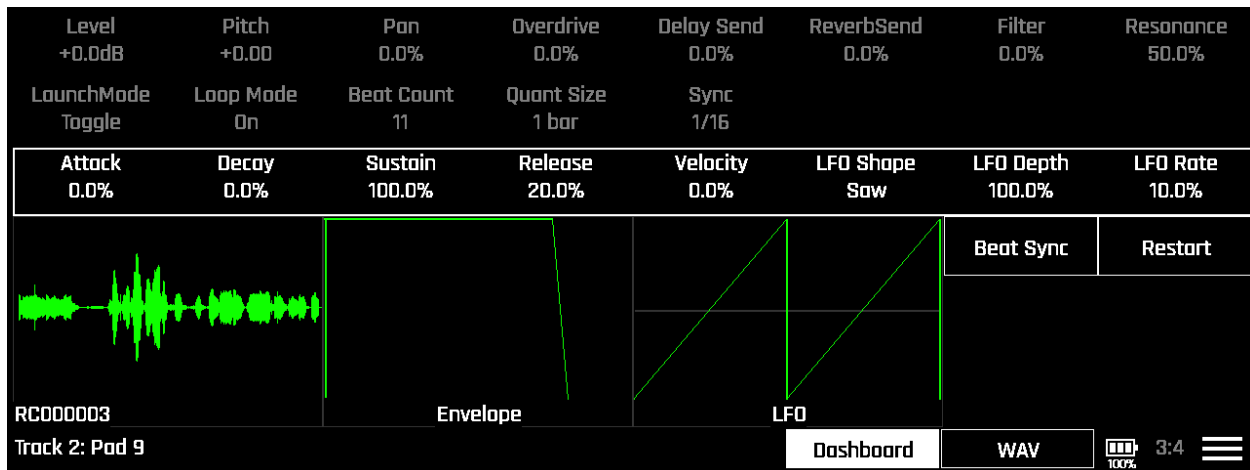


Figure 9-11: Loop Dashboard with Parameter Row 3 Selected

2. To adjust the parameters, use the knobs mapped to them.

Table 9-4 describes the parameters in row 3 of the Loop Dashboard and the knobs mapped to them.

Table 9-4: Loop Envelope and LFO Parameters in Row 3

Parameter	Knob	Range	Description	Modulation Target?
Attack	1	0 to 100% 100% = 9 seconds	Envelope attack time	Yes
Decay	2	0 to 100% 100% = 38 seconds	Envelope decay time	Yes
Sustain	3	0 to 100%	Envelope sustain level	No
Release	4	0 to 100% 100% = 38 seconds	Envelope release time	Yes
Velocity	5	-100 to 100%	Velocity sensitivity amount. Negative values cause an inverse response to the velocity.	No
LFO Shape	6	Sine, Pos Sine, Triangle, Pos Tri, Square, Pos Square, Saw, Rev Saw, Random	LFO shape selection	No
LFO Depth	7	0 to 100%	LFO modulation intensity	Yes
LFO Rate	8	If Beat Sync is Off: 0 to 100% If Beat Sync is On: 8 bars, 4 bars, 2 bars, 1 bar, 1/2, 1/2T, 1/4, 1/4 T, 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32 T, 1/64	LFO speed from slow to fast	Yes
Beat Sync	n/a	Off, On	Synchronize LFO to project tempo	No
Restart	n/a	Off, On	Reset LFO phase on each note	No

**Note:** When working with empty loop slots, double-tapping or editing a slot on the loop bank screen will open different screens depending on whether Recording or Mix is selected at the bottom of the screen. When Mix is selected, editing an empty slot will take you to the WAV Browser screen to load a file into the slot. When Recording is selected, it will take you to the loop dashboard, enabling you to pre-configure the slot for use in live loop recording scenarios.

## Editing Loop Modulation

Each bento track includes a central Modulation screen within which you can configure all modulation settings.

The modulation system enables dynamic control of Loop parameters through various sources such as note velocity, envelopes, LFOs, and external MIDI controllers.

The specific modulation sources available vary with each track type.

### To configure Loop modulation:

1. Open the Loop Dashboard, then tap the **Menu** icon in the lower right corner of the screen. The **Menu** opens, displaying a single option, **Modulation**.

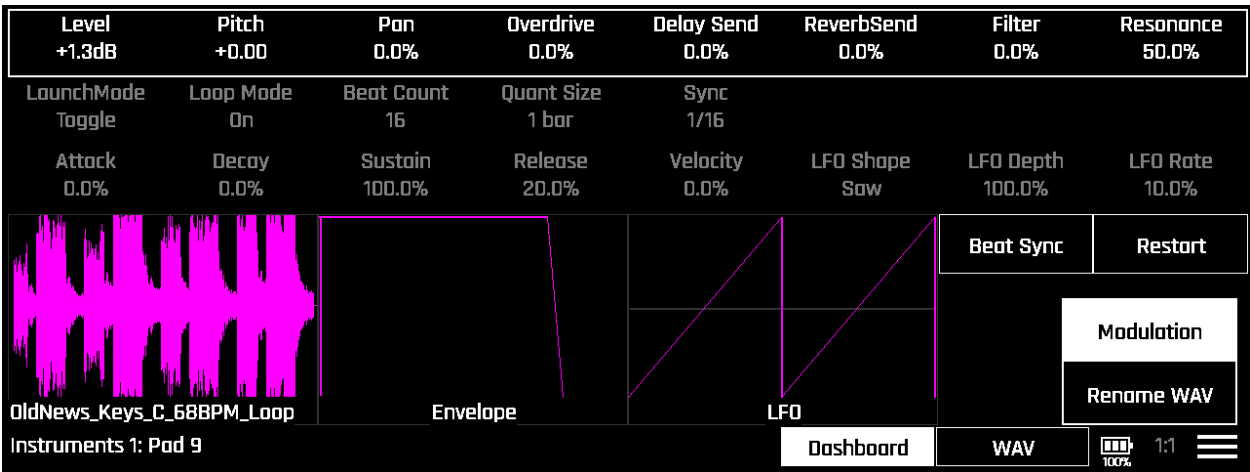


Figure 9-12: Loop Dashboard Modulation Menu Option

## 2. Tap Modulation.

The Loop Modulation Screen opens.

Line	Source 1	Amount 1 0.0%	Source 2	Amount 2 0.0%	Source 3	Amount 3 0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
Attack	[None]		[None]		[None]		
Decay	[None]		[None]		[None]		
Release	[None]		[None]		[None]		
LFO Depth	[None]		[None]		[None]		
LFO Rate	[None]		[None]		[None]		
Filter Cutoff	[None]		[None]		[None]		8
Filter Res	[None]		[None]		[None]		70
Female Vocals 1: Pad 4						Dashboard	100% 1:1

Figure 9-13: Loop Track Modulation Screen

The first column in the Modulation screen contains the name of every Loop parameter that can be a modulation “target.” Columns 2 through 7 let you set up three modulation sources and three modulation amount values for the modulation target of the selected row. The CC column displays the CC number that can be used to control that parameter. Each pad of a Loop track has different CC numbers so that you can control each pad independently.

- To see the complete list of modulation targets in the Modulation screen you can do any of the following:
  - swipe the screen up or down,
  - turn Knob 1 to scroll up and down through the Modulation screen, or
  - use the Up Arrow and Down Arrow buttons to scroll up and down through the Modulation screen.

4. Select the line of the parameter you want to modulate, then use Knobs 2-7 to configure one or more modulation sources and modulation levels.

Table 9-5 describes the parameters you can modulate, the modulation sources you can route to them, and the range of modulation levels.

*Table 9-5: Modulation Parameters Mapped to bento Knobs*

Parameter	Knob	Range	Description
Line	1	Level, Pitch, Pan, Attack, Decay, Release, Filter Cutoff, Filter Resonance, LFO Depth, LFO Rate	Moves the Modulation screen's line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.
Source 1	2	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (1 of 3)
Amount 1	3	-100% to +100%	Modulation Amount (1 of 3)
Source 2	4	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (2 of 3)
Amount 2	5	-100% to +100%	Modulation Amount (2 of 3)
Source 3	6	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (3 of 3)
Amount 3	7	-100% to +100%	Modulation Amount (2 of 3)

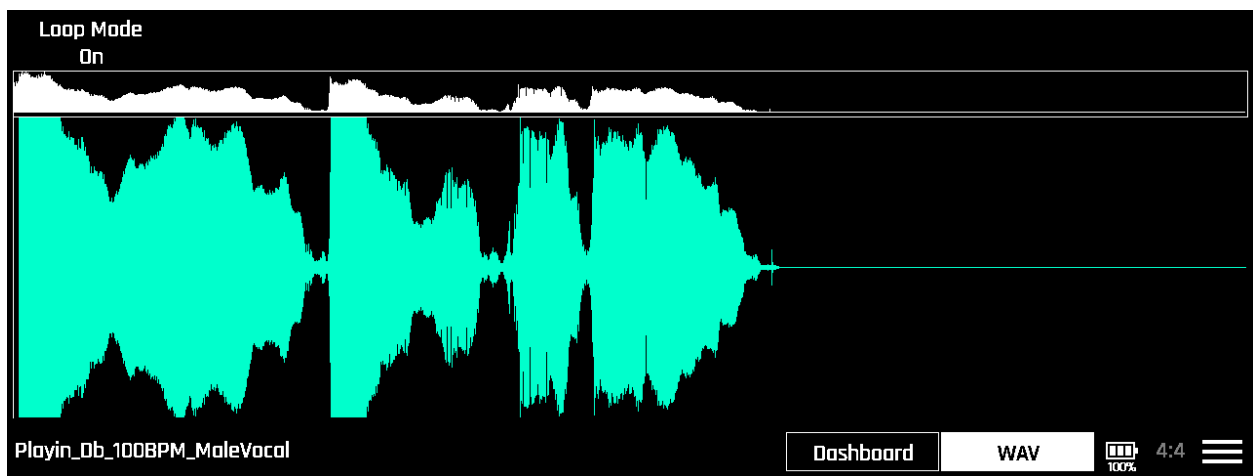
5. To return to the Loop Dashboard, tap **Dashboard** or press **INST**.

## Viewing the Loop WAV Screen

The Loop WAV screen provides a live view sample playback and a **Loop Mode** parameter for turning looping playback on or off.

### To access the Loop WAV screen:

1. From the Loop Dashboard, tap **WAV** in the navigation area.  
The Waveform screen opens.



*Figure 9-14: Loop WAV Screen*

When you play a note from the pads, sequencer, or over MIDI, a vertical line moves across the waveform display. Remember that the transports must be running for loops to play.

2. Zoom in or out on the waveform by pinching or spreading the touchscreen with two fingers.
3. Scroll through the waveform by swiping left or right on the touchscreen.
4. Tap **Dashboard** to return to the Loop Dashboard.



## Editing the Loop Sample in the WAV Edit Screen

You can open the Loop's sample in bento's WAV Edit screen to:

- Trim the sample.
- Normalize the sample.

Bento saves the edited WAV file to the current project's folder on microSD card.

### To edit the loop sample in the WAV Edit screen:

1. Open the loop's Dashboard by tapping the loop in the Loop Sample Bank screen and tapping **Edit**.
2. In the loop's Dashboard, tap **WAV** to open the Waveform screen.

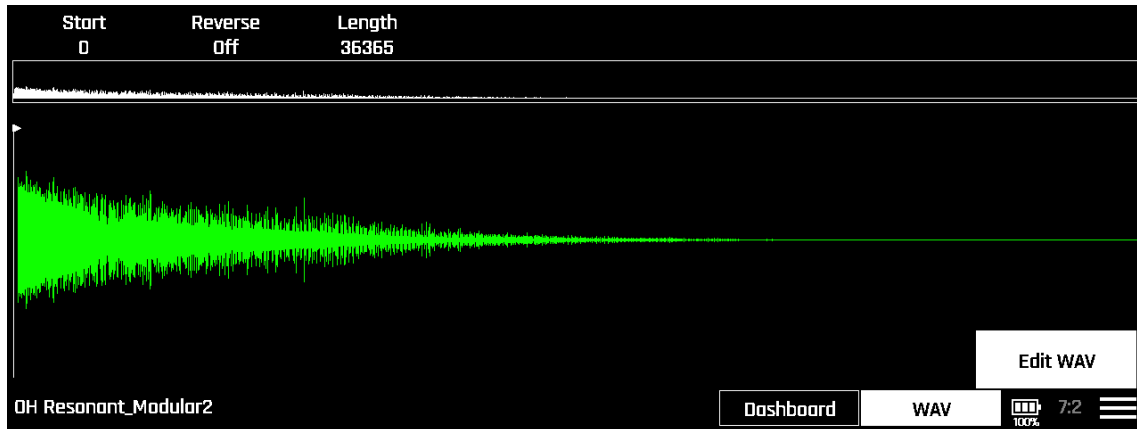


Figure 9-15: Loop WAV Screen Menu with Edit WAV Selected

3. Tap the **Menu** icon, then tap **Edit Wav** to open the WAV Edit screen.

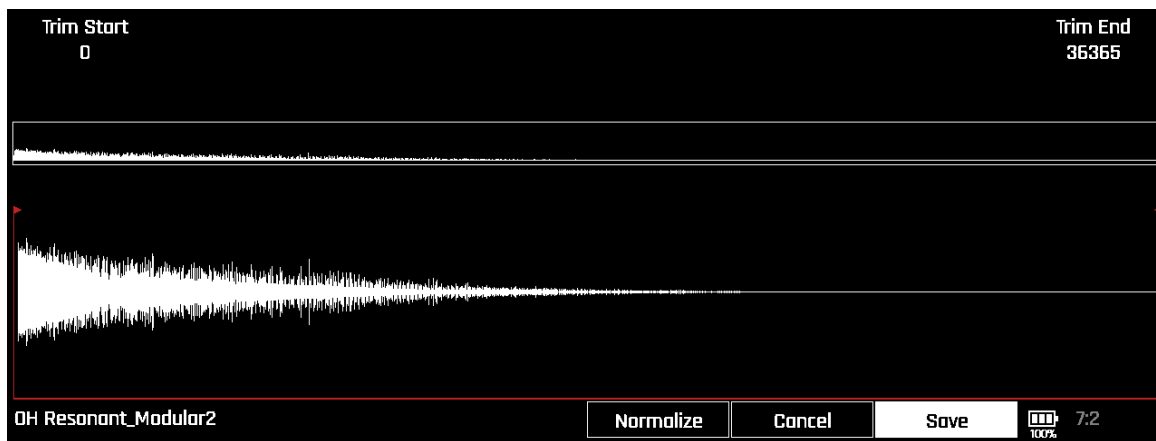


Figure 9-16: Wave Edit Screen with Loop Sample

**Important:** If you choose **Save** after editing the waveform, bento will create a new WAV with your edits that replaces the original one, bento will save it to the current project's folder on the microSD card and update the track to use the new sample, but bento does not save the current project automatically.

To change the sample's start position, adjust **Trim Start** with Knob 1.

4. To change the sample's end position, adjust **Trim End** with Knob 8.
5. To normalize the entire sample, tap **Normalize** to turn it on.
6. To save your edits, tap **Save**. The edited Waveform now appears in the Loop's Dashboard, indicating that bento has edited the track to use the new WAV file.
7. To save the project with the edited track, press **PROJ**, then tap **Save**.

**Note:**

If you normalize and trim at the same time, the entire original audio will be used in the normalization. For better results, save the trimming first, then go back and Normalize the file.

## Editing Track Configuration Settings

Track configuration settings include output routing for complex mixing scenarios, and MIDI channel options for inbound and outbound note messages.

### To navigate to the Loop Track Configuration Screen:

1. Open the Tracks screen and select the Loop track you want to configure, then push the **Right Arrow** button.

The Loop Track Configuration screen opens.

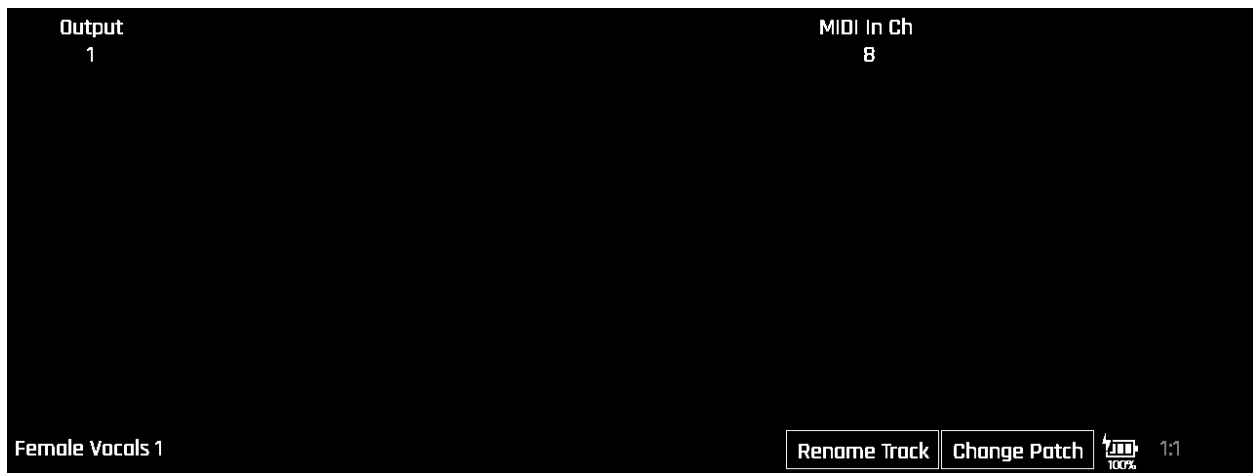


Figure 9-17: Loop track configuration settings screen

2. Use bento's knobs to edit the Loop Track Configuration settings.

The following table describes the parameters mapped to bento's eight knobs.

Table 9-6: One-shot Track Config Parameters

Parameter	Knob	Range	Description
Output	1	1, 1 w/Mod FX, 2, and 3	Audio output routing destination.
MIDI In Ch	6	None, 1-16	MIDI input channel for launching loops from external controllers. Pads 1-16 respond to MIDI notes 36-51.

3. To return to the Tracks screen, press **TRACKS**.

## Recording New Samples in Loop Tracks

Loop tracks provide comprehensive recording capabilities for capturing external audio sources and creating new rhythmic content. The recording system integrates seamlessly with loop playback, enabling you to build arrangements by layering recorded content with existing loops.

Bento's recording workflow supports both recording external audio input and resampling of bento's main audio output buss, providing flexibility for capturing live performances, sampling other tracks.

## Connecting Audio Sources for Loop Recording

Input level optimization prevents distortion while ensuring that your recorded loops have sufficient dynamic range and low noise floor. Proper monitoring during setup saves time and ensures consistent recording quality.

### To prepare external audio sources:

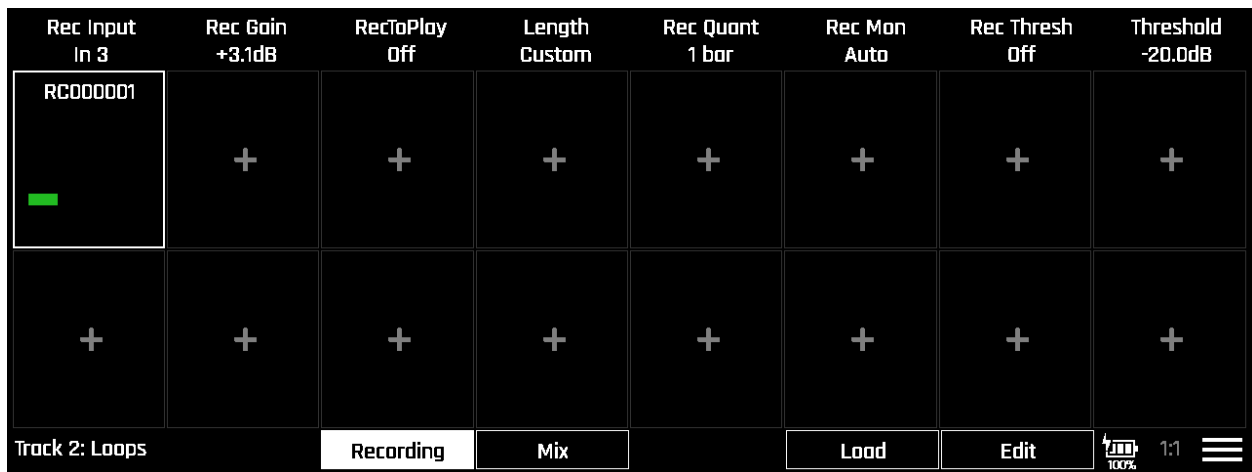
1. Connect your audio source to one of bento's audio inputs.
2. Monitor the input signal through bento's input metering. See [Adjusting the Loop Recording Settings](#).
3. Set your audio source level and the bento **Rec Gain** to avoid clipping and adjust while maintaining good signal-to-noise ratio. The input meter on the pad should stay as high as possible without entering the red range.
4. Test the audio path before beginning recording sessions.

## Adjusting the Loop Recording Settings

Recording configuration affects both the technical quality and musical integration of your recorded loops. Proper setup ensures that recorded content synchronizes correctly with existing project elements and maintains consistent audio characteristics.

The Loop Sample Bank's recording configuration screen prepares Loop tracks for capturing new audio with appropriate timing, quality, and integration settings.

1. Select the Loop track in the Tracks screen, and push **INST** to open the Loop Bank screen.
2. Select an empty loop cell.
3. From the Loop Bank screen, tap **Recording** at the bottom of the screen.



*Figure 9-18: Loop recording configuration showing length, timing, and sync settings*

4. Set the loop recording settings with bento's knobs. Watch the input meter that appears on the loop cell to ensure you have the correct input selected and the proper gain amount.

Table 9-7 describes the loop recording options:

*Table 9-7: Loop Recording Settings in the Loop Sample Bank Recording Screen*

<b>Parameter</b>	<b>Knob</b>	<b>Range</b>	<b>Description</b>
Rec Input	1	1, 2, 3, 1L, 2L, 3L, or Resample	Audio source for loop recording. Use 1L, 2L or 3L for mono recording while sending a signal into the left channel of the corresponding input.
Rec Gain	2	-60dB to +6dB	Audio input gain.
RectoPlay	3	On, Off	Set to On to start playing the loop as soon as recording stops.
Length	4	Custom, 1/4 to 128 bars.	Specify length of new loop recordings before recording starts. If Length is “Custom,” recording starts by pressing the REC button while the transports are running and recording ends when REC is pressed a second time or when you push Stop.
Rec Quant	5	8 bars – 1/16, None	Quantizes recording to start at a specific beat or measure division after the REC button is pressed, so that recordings start and end in sync with bento’s transport.
Rec Mon	6	Off, Auto, On	Specifies when audio inputs are played out through bento’s main audio output. When set to Auto, monitoring is only heard while actively recording.
Rec Thresh	7	Off, On	When Rec Thresh is “On,” loop recording waits for audio input level to go over the Threshold.
Threshold	8	-96.0 dB to 0.0 dB	Sets a recording threshold for loop recording when Rec Thresh is On.

## Recording New Samples

The loop recording process captures audio input as new loop content that immediately becomes available for triggering and arrangement integration.

### To record a new loop:

1. Open the Loop Bank's Recording screen.
2. Start bento's transport by pressing PLAY.
3. Select an empty loop with bento's touchscreen, bento's pads or from a MIDI controller (notes 36-51).
4. If wanted, launch any sequences or loops that you want to hear while recording.
5. Press **REC** to start recording at the next Quant time.

The Loop Bank Recording screen shows the recording progress in the form of bars:beats. This real-time monitoring helps you capture precise loop lengths and musical timing for seamless integration.

If the Loop recording Length parameter is anything other than Custom, recording will stop automatically after recording the specified number of beats.

6. If Length is Custom, press **REC** a second time to end the recording at the next "quant" time.

If **RecToPlay** is On, the new loop starts playing in sync with bento's transport.

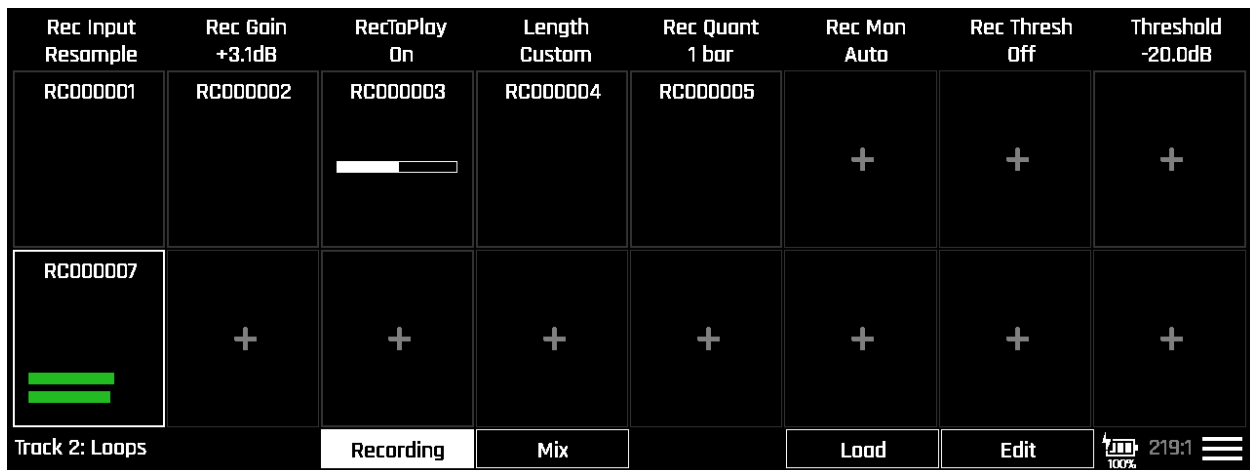


Figure 9-19: Loop 1 Selected for Recording in the Loop Sample Bank Screen

7. To record additional loops, select other loops, then press Rec to start and end each recording.
8. If you are dissatisfied with a new loop and want to try recording into the same loop slot, choose **Unload** from the Loop Bank Menu.

The new recording is unloaded from the Loop Bank, and you can continue recording into the same loop slot. Unloading does not remove the WAV file from the microSD card.

Bento stores each new loop in the root of your current project's folder on the microSD card. Filenames start with RC000001 and increment with each successive recording.

New loop recordings are available for use in bento Loop tracks, or any of bento's other sample-based tracks.

**Note:** When working with empty loop slots, double-tapping or editing a slot on the loop bank screen will open different screens depending on whether Recording or Mix is selected at the bottom of the screen. When Mix is selected, editing an empty slot will take you to the WAV Browser screen to load a file into the slot. When Recording is selected, it will take you to the loop dashboard, enabling you to pre-configure the slot for use in live loop recording scenarios.



## Creating New Loop Tracks

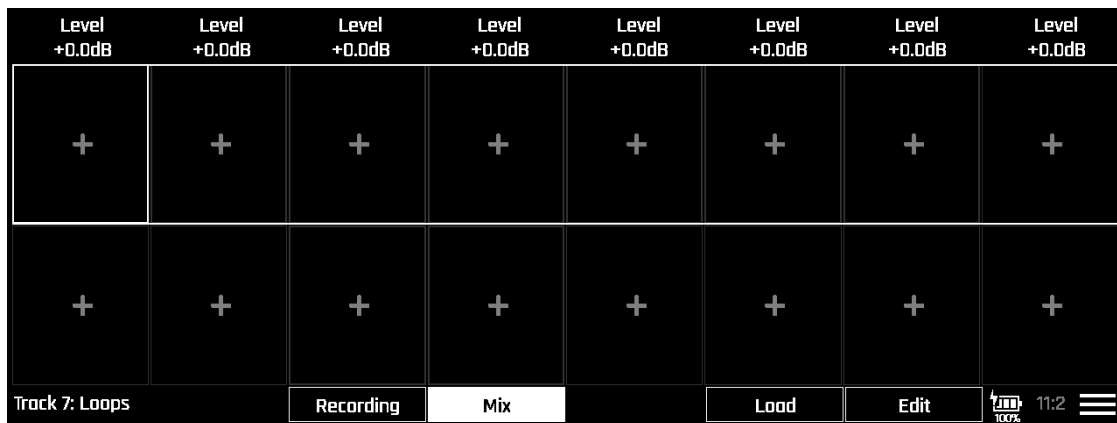
Setting up effective Loop tracks requires planning your loop organization and selecting appropriate source material for your intended rhythmic applications. The process involves both technical considerations about loop characteristics and creative decisions about arrangement structure.

A well-designed Loop track balances rhythmic coherence with dynamic possibility, providing the foundation elements you need while enabling flexible real-time arrangement development.

### To create a new Loop track:

1. Double-tap an empty track slot on the Tracks screen.
2. Tap New on the Patch Browser screen and select **Loop** from the track type options.
3. Begin loading loops into the empty bank slots or prepare for recording.
4. Configure playback parameters for musical integration.
5. Test loop combinations and timing relationships.

The empty Loop track provides 16 available slots for building your rhythmic foundation. Consider the musical relationships between loops and how they will combine in your intended arrangements.



*Figure 9-20: Initial Loop Sample Bank*

The empty Loop track provides 16 available slots for building your rhythmic foundation. Consider the musical relationships between loops and how they will combine in your intended arrangements. Keep in mind that only the loops in the top row will be available on the Launch screen and in Scenes.

## Best Practices for Loop Tracks

Successful Loop track implementation depends on thoughtful loop selection, effective organizational strategies, and consistent recording practices. These approaches help you build reliable rhythmic foundations while maintaining flexibility for creative arrangement development.

Developing systematic approaches to loop preparation, recording workflow, and arrangement integration enables you to create professional-quality rhythmic content that enhances your musical compositions.

## Using Custom Loop Banks in Loop Tracks

Source material selection significantly impacts your Loop track's musical effectiveness and arrangement possibilities. Choose loops with complementary rhythmic characteristics and compatible tempo relationships for your intended musical applications.

Effective Loop track source characteristics include loops recorded at consistent quality levels for seamless integration, compatible rhythmic feels that work well in combination, appropriate loop lengths that maintain musical interest without becoming repetitive, and tempo flexibility that enables synchronization across different musical contexts.

Organize your loop libraries with clear tempo and style identification before loading into bento. This preparation streamlines the selection process and ensures effective musical relationships in your finished arrangements.

## Backing Up Your Work

Loop tracks combine audio content with complex playback configurations and arrangement data. Regular backups should include both your loop source files and the complete bento project files containing all configuration and arrangement information.

Document effective loop combinations and arrangement techniques for future reference. Successful rhythmic patterns can serve as templates for similar projects and provide starting points for new creative work.

Export meaningful loop arrangements and combinations as audio stems when you develop particularly effective rhythmic foundations. This documentation preserves your creative work and provides reference material for arrangement techniques and musical applications.

## Next Steps

With effective Loop tracks established, explore advanced arrangement techniques such as real-time loop layering for dynamic builds, tempo manipulation for creative effects, and integration with other track types for complete musical arrangements.

Loop tracks work particularly well as foundation elements that support melodic content from Multisample tracks and rhythmic accents from One-Shot tracks, providing the stable rhythmic base that enables other elements to shine in your musical compositions.

## 10: Exploring Slicer Tracks

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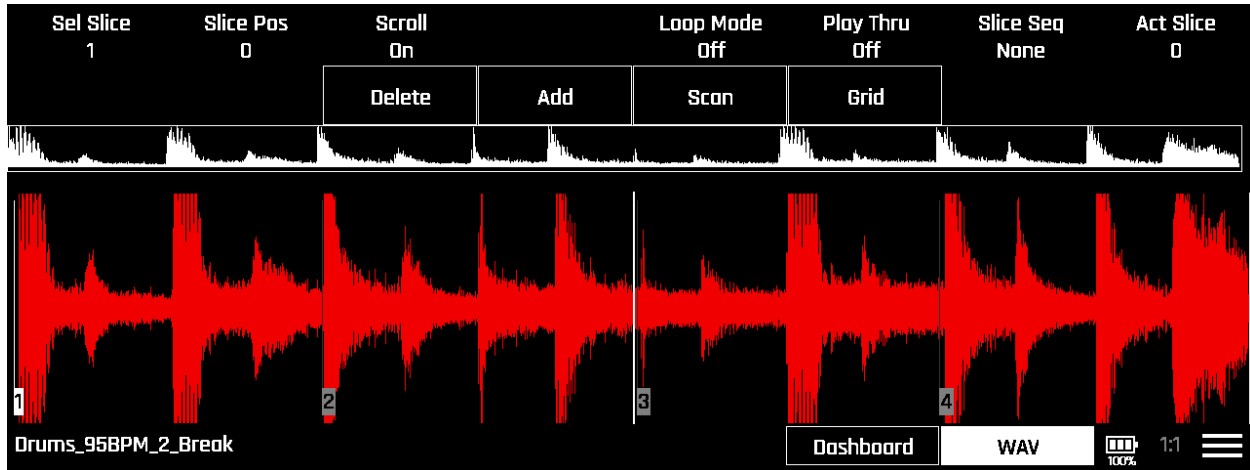
Slicer tracks transform a single source sample into multiple playable segments that can be triggered independently, providing access to internal audio structure without requiring separate sample files. Each slicer track analyzes source material to create slice points that divide the audio into musically useful segments, combining the flexibility of individual sample triggering with the efficiency of single-file storage.

Slicer tracks enable creative reconstruction of existing audio material, allowing you to reorganize rhythmic elements, create stutter effects, and build new arrangements from familiar source content. The slice system references specific time ranges within your source sample while applying shared track-level processing for consistent sonic character.

To do this...	read...
Understanding slicer tracks, signal flow, and control screens.	<a href="#">Understanding Slicer Tracks</a>
Configure audio routing and MIDI routing.	<a href="#">Configuring Slicer Track Playback Parameters</a>
Playing slicer tracks with bento's pads and from a MIDI controller.	<a href="#">Playing Slicer Tracks</a>
Editing slicer track voice parameters.	<a href="#">Editing Voice Parameters in the Slicer Dashboard</a>
Edit slices.	<a href="#">Editing Slices in the Slicer Track WAV Screen</a>
Modulate slicer track voice parameters.	<a href="#">Editing Slicer Track Modulation</a>
Creating new slicer tracks.	<a href="#">Creating New Slicer Tracks</a>

## Understanding Slicer Tracks

Slicer tracks organize a single source sample into multiple virtual segments that can be triggered independently while maintaining reference to the original audio file. This architecture enables access to internal sample structure without duplicating audio data or requiring separate sample files for each segment.



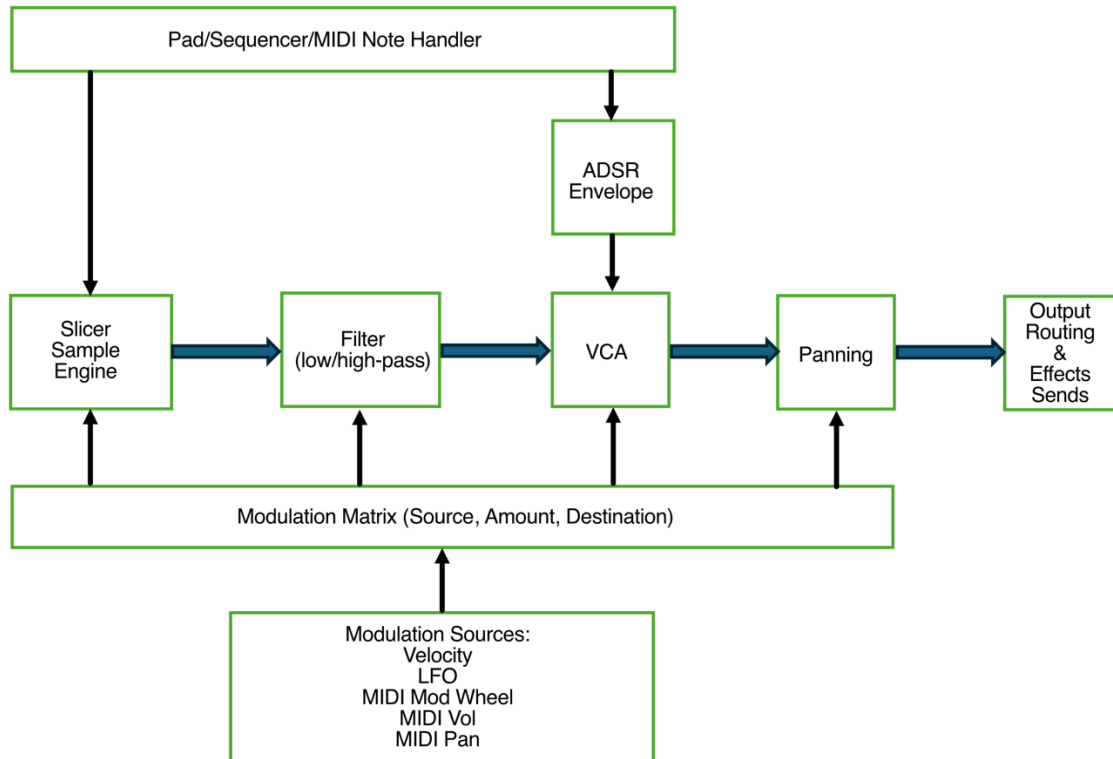
*Figure 10-1: Slicer Track WAV Screen*

Each slice references specific start and end points within the source audio while sharing track-level filtering, envelope, and effects settings. Bento supports up to 128 individual slices in each slicer track.

Bento's slicer track control screens let you add, delete, and move slices manually or automatically by detecting transients in the sample or by defining grid divisions in the sample.

The slice selection process maps pads or consecutive MIDI note numbers, so that when played from the bento's pads, sequencer, or from MIDI controllers, the appropriate sample region plays. This approach preserves the original audio quality and slice order while providing random access to the individual sample slices in any order.

## Slicer Voice Architecture



*Figure 10-2: Slicer Track Voice Architecture*

The signal flow begins with slice selection from pad triggers, MIDI input, or a sequence. The slicer sample engine determines which slice to play by the note it receives, with note 36 corresponding to slice 1, 37 corresponding to slice 2, and so on, up to the last slice. If you transpose the pads up or down an octave with the **UP** and **DOWN** arrow buttons, you shift the range of slices mapped to the pads.

Slicer tracks have one set of voice parameters for all notes, whether the track contains one slice or 128 slices.

## Slicer Track Control Screens

Slicer tracks provide four main control screens for comprehensive parameter editing and sample management.

*Table 10-1: Slicer Track Control Screens*

Screen	Description
Slicer Dashboard	Displays voice parameters and performance controls organized into four sections (Main, Config, Env, LFO).
Slicer WAV screen	Displays the waveform of the track's sample and offers controls for editing the slice points and parameter for controlling slice playback.
Slicer Modulation screen	Provides a central location for routing modulation source to modulation targets, and for setting a modulation amount for each.
Slicer Track Config screen	Manages MIDI routing, audio output assignment, and other track-level configuration that affects how the Slicer track integrates with your project's performance and mixing systems.

The first step in accessing the slicer track control screens is selecting the track.

### To select a slicer track:

1. Press **TRACKS** to open the Tracks screen.
2. Tap the slicer track you want to select.
3. The pad colors change to match the color of the track you selected.
4. Play the pads to confirm that you selected the slicer track you want to edit or examine.
5. To access the other slicer track screens, follow the navigation paths shown in the following figure.

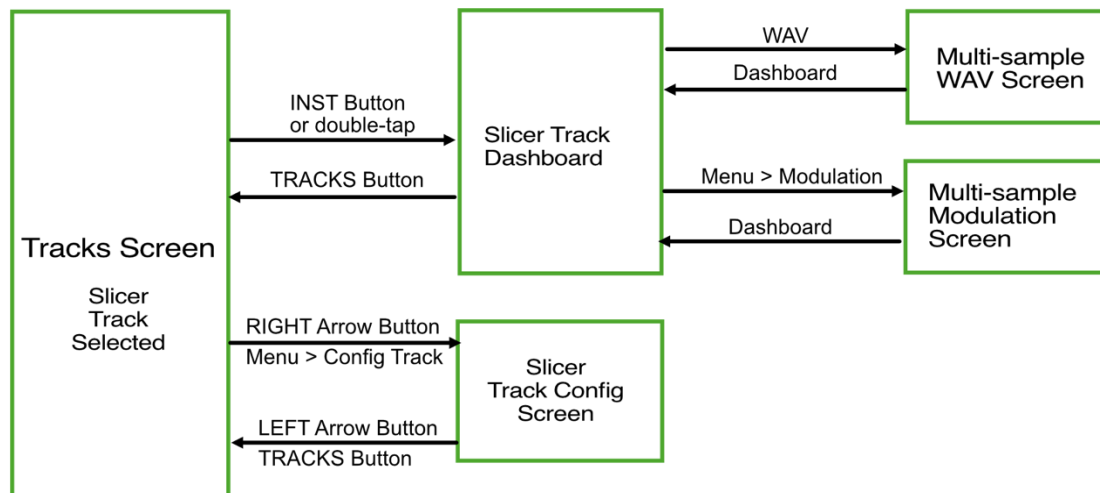


Figure 10-3: Slicer Track Control Screen Navigation



## Configuring Slicer Track Playback Parameters

The Slicer Track Config screen manages track-level operational settings including audio routing, polyphony limits, and MIDI channel assignments.

### To access the Slicer Track Config screen:

1. Select the Slicer track, then do one of the following:
  - Tap **Menu** and select **Config Track**.
  - Press **RIGHT** arrow button.



Figure 10-4: Slicer Track Config screen with routing and MIDI settings

2. Adjust track configuration parameters.

Table 10-2 describes the parameters mapped to bento's eight knobs.

Table 10-2: Slicer Track Config Parameters

Parameter	Knob	Range	Description
Output	1	1, 1 w/Mod FX, 2, and 3	Audio output routing destination
MIDI In Ch	6	None, 1-16	MIDI input channel for external control
MIDI OutPrt	7	All, 1, 2	The MIDI Output port that will send out MIDI for this track
MIDI OutCh	8	None, 1 - 16	The MIDI Channel that will be used when sending out MIDI for this track.

3. To navigate to the Slicer track's Dashboard, press **INST**.

For details on the **Rename Track** and **Change Patch** features, see [Managing Tracks](#).

## Playing Slicer Tracks

Slicer tracks respond to musical input like other bento track types, triggering notes that play through the Slicer voice architecture.

You can play Slicer tracks using bento's built-in pads, sequencer, or from external MIDI controllers, in any combination up to the maximum number of voices allocated to it through its **Poly Mode** parameter setting.

The sample engine in slicer tracks selects each sample slice according to which pad you play or by the note it receives over MIDI or from bento's sequencer.

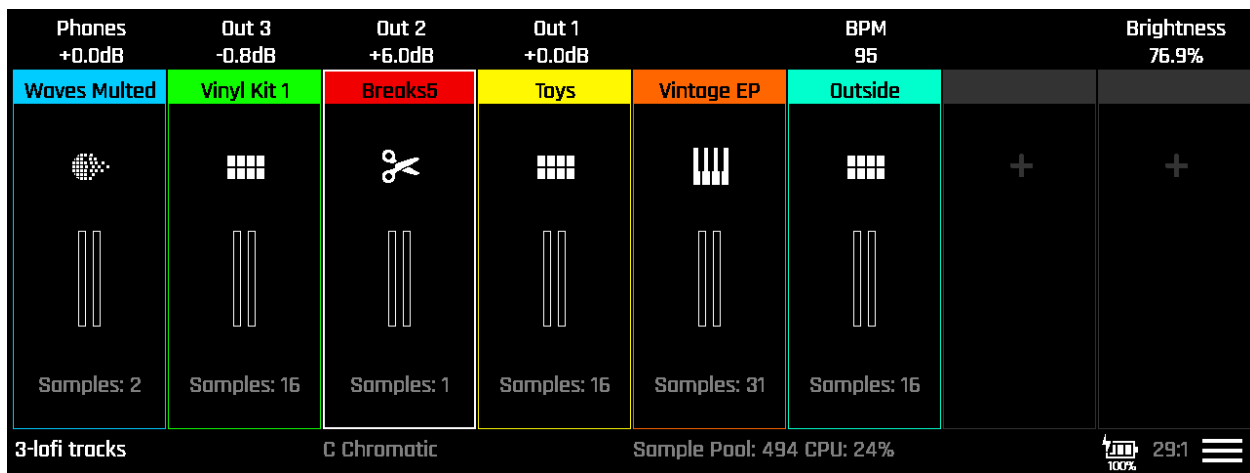


Figure 10-5: Slicer Track Selected in Tracks Screen

## Playing Slicer Tracks with bento's Pads

Bento's 16 pads provide direct access to the first 16 slices of your slicer track, with UP and DOWN arrow controls extending access to 92 slices.

### To play slices using the pads:

1. Select your Slicer track on the **Tracks** screen.

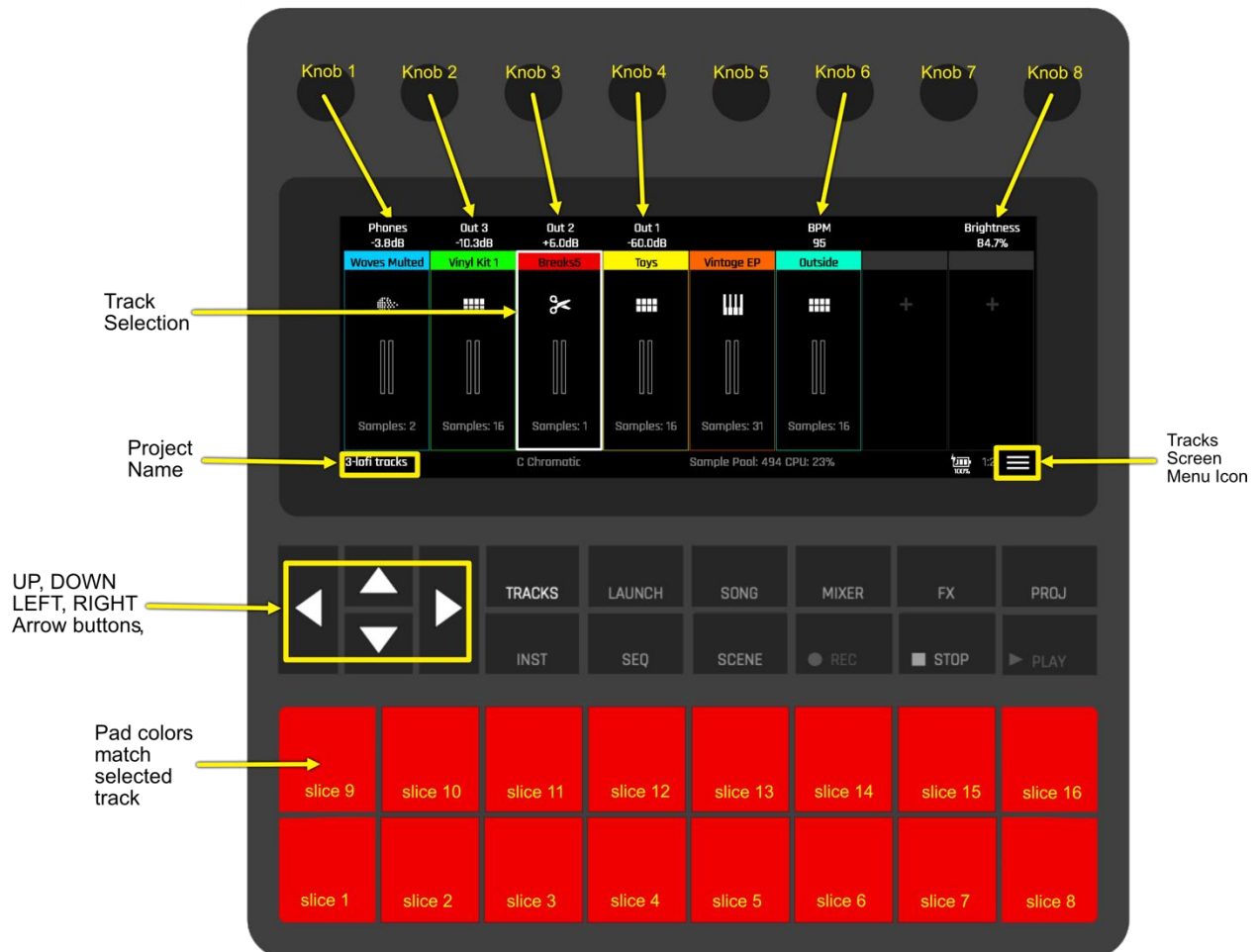


Figure 10-6: Slicer track icon and track selection interface

2. Play pads 1-16 to trigger the corresponding slices.
3. Press **UP** arrow to access slices 17-32 on pads 1-16.
4. Press **DOWN** arrow to return to slices 1-16.
5. Continue using the **UP** and **DOWN** arrow buttons to access the full range of slices, 16 at a time.

- To change the number of notes you can play simultaneously (either Mono or Poly 2), adjust the Slicer track's **Poly Mode** parameter in the Slicer Dashboard screen. For details, see [Editing Voice Parameters in the Slicer Dashboard](#).
- Press **TRACKS** to return to the Tracks screen.

## Playing Slicer Tracks over MIDI

External MIDI controllers provide the most natural interface for Slicer track performance, especially keyboard controllers that match the chromatic mapping structure. Full velocity sensitivity and continuous controller support enable professional-level expression and integration.

### To play Slicer tracks via MIDI:

- Open the Slicer Track Config screen and set the track's **MIDI In Ch** parameter to a channel not used by any other track. For details, see [Configuring Track MIDI Input](#).
- Set your MIDI controller to send note messages on the same channel as the **MIDI In Ch** parameter.

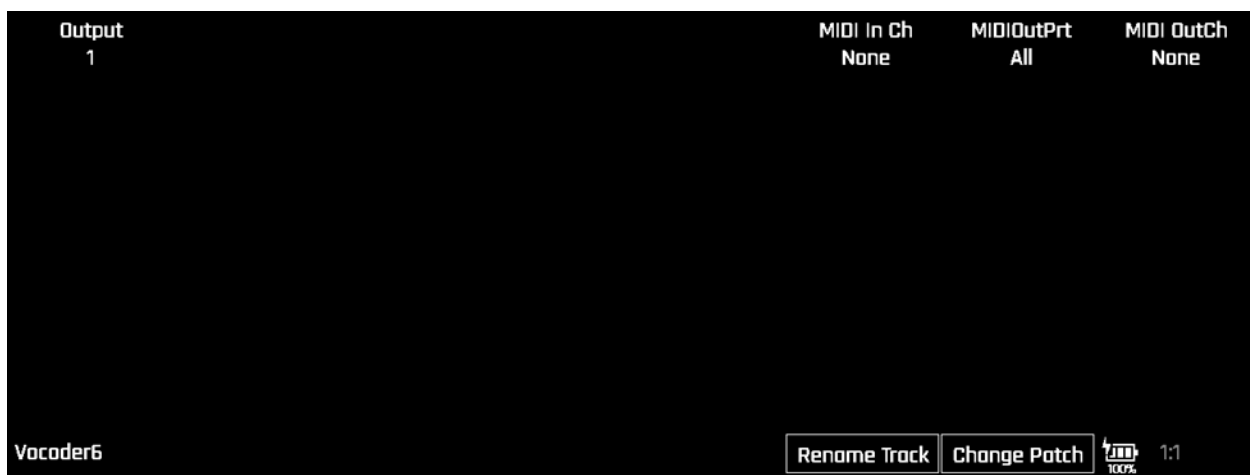


Figure 10-7: Slicer Track Config with MIDI In Channel 1

- Play notes on your controller starting at note number 36 (C1) and listen as the slicer track plays.
- To increase the number of notes you can play, adjust the Slicer track's **Poly Mode** parameter in the Slicer Dashboard screen. For details, see [Editing Voice Parameters in the Slicer Dashboard](#).

**Note:** When you play a track over MIDI, the pads always light up when you play notes 36-51 (C1-D#2), regardless of the pads' current transposition or the current project's **Root Note** and **Scale** parameters.

## Editing Voice Parameters in the Slicer Dashboard

The Slicer Dashboard provides immediate access to the most frequently used voice parameters, organized into four parameter groups: Main, Config, Envelope, and LFO. The parameter group selection buttons allow quick switching between different parameter sets using the same eight knobs.

### To open the Slicer Dashboard:

1. Press **TRACKS** to open the Tracks screen.
2. Select a Slicer track by tapping it.

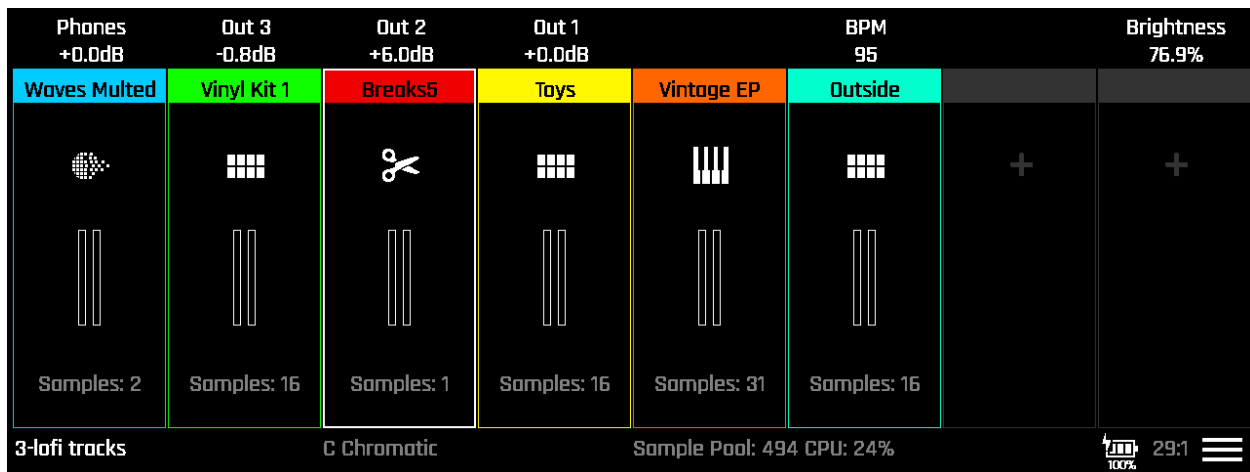


Figure 10-8: Slicer Track Selected in Tracks Screen

3. Press **INST** to open the Slicer track dashboard.

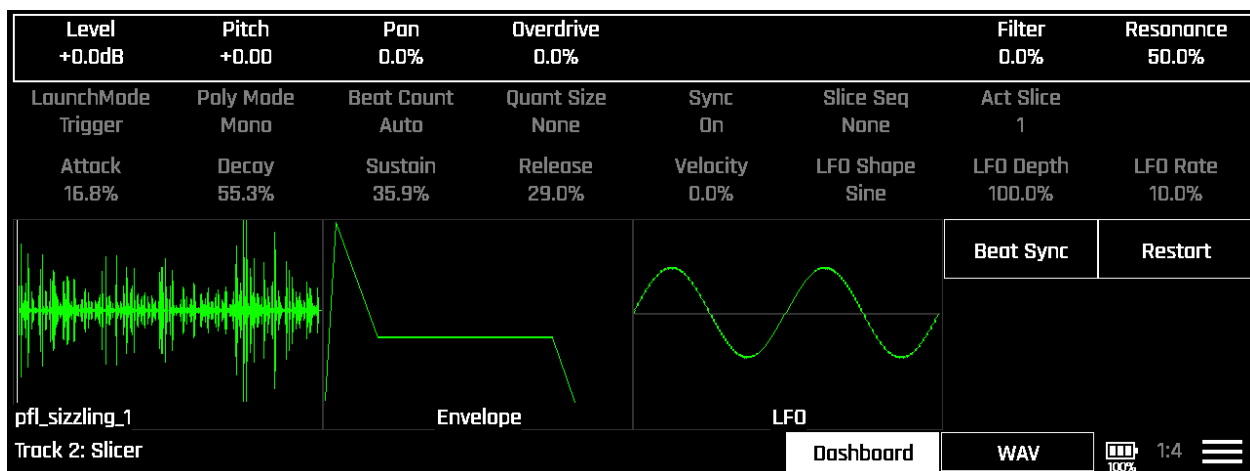


Figure 10-9: Slicer Track Dashboard with Parameter Row 1 Selected

The dashboard displays the currently active slice number and provides real-time parameter feedback. Parameter groups appear as selectable sections at the top of the screen, with Knobs 1-8 mapped to the parameters in the currently selected group.

4. To edit a parameter, tap anywhere in the parameter's row or tap one of the graphs, then use knobs 1-8 to adjust the parameters mapped to them.

### To edit slicer track parameters in row 1:

1. Tap on any of the parameters in row 1 or tap the waveform graph in the lower half of the screen. Knobs 1-8 correspond to the parameters of row 1.

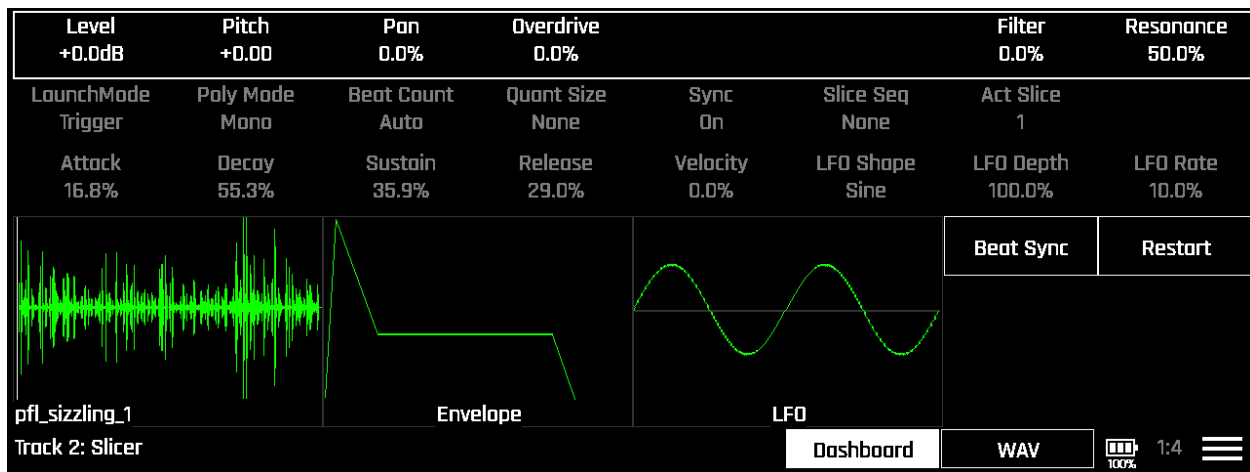


Figure 10-10: Slicer Dashboard with Row 1 Selected

Table 10-3 describes the parameters in row 1 of the Slicer Dashboard and the knobs mapped to them

Table 10-3: Slicer Track Parameters in Row 1

Parameter	Knob	Range	Description	Modulation Target?
Level	1	0 to 100% (-96dB to +12dB)	Overall track volume	Yes
Pitch	2	-24 to +24 semitones	Global pitch offset for entire track	Yes
Pan	3	-100% to +100%	Stereo positioning from full left to full right	Yes
Overdrive	4	0 to 100%	Sets the level of distortion applied to the track's output audio. Caution: Overdrive causes significantly higher track audio levels.	No
Delay Send	5	0 to 100%	Track signal level sent to bento's Delay effect. Mirrors the send level set in the Mixer.	No
Reverb Send	6	0 to 100%	Track signal level sent to bento's Reverb effect. Mirrors the send level set in the Mixer.	No
Filter	7	-100% to 100%	Filter cutoff frequency and filter type. Negative values set the cutoff frequency of a low pass filter. Positive values set the cutoff frequency of a high pass filter.	Yes
Resonance	8	0 to 100%	Filter resonance amount	Yes

### To edit slicer track parameters in row 2:

1. Tap on any of the parameters in row 2. Knobs 1-8 correspond to the parameters of row 2.

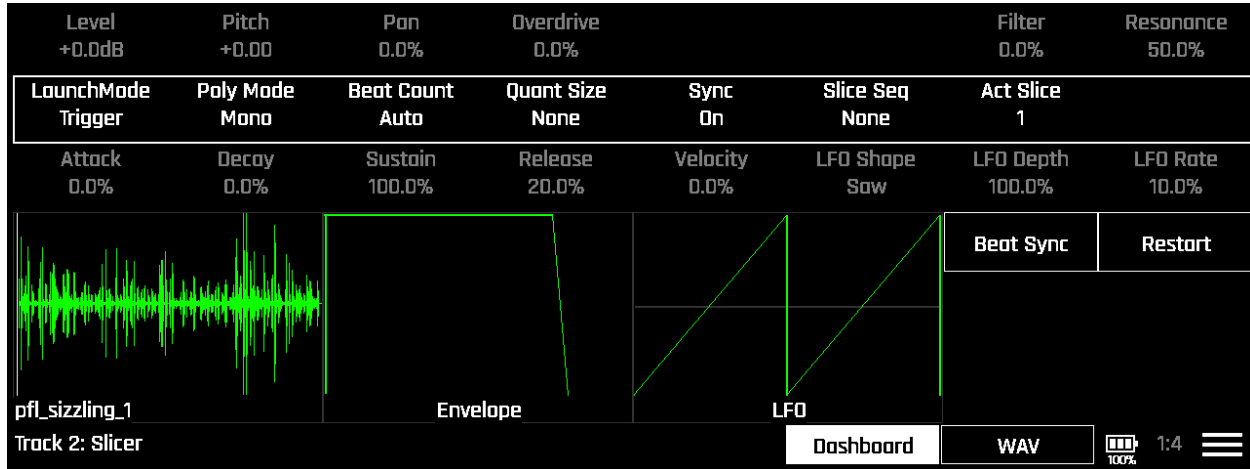


Figure 10-11: Slicer Dashboard with Row 2 Parameters Selected

2. To adjust the parameters, use the knobs mapped to them.

Table 10-4 describes the parameters in row 2 of the Slicer Dashboard and the knobs mapped to them.



Table 10-4: Slicer Track Dashboard Parameters in Row 2

Parameter	Knob	Range	Description	Modulation Target?
<b>Launch Mode</b>	1	Trigger, Gate, Toggle	Determines each voice responds to notes (note-on, note-off) played from pads, MIDI input, and track sequences.	No
<b>Poly Mode</b>	2	Mono, Poly 2	Number of slicer voices bento can play simultaneously.	No
<b>Beat Count</b>	3	Auto, 1-512	Synchronization reference for tempo.	No
<b>Quant Size</b>	4	2 bars, 1 bar, 1/2, 1/2T, 1/4, 1/4T, 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32T, 1/64, none	Quantizes slice playback timing to bento transport. For example, if you play a pad when Quant Size is 1/4, the slice does not start playing until the next beat, which means the transport must be running. If Quantize is "none," you can play slices while the transport is stopped.	No
<b>Sync</b>	5	Off, On	Enables tempo synchronization.	No
<b>Slice Seq</b>	6	None, Forward, Backwards, Random, Stagger	Advances the slice number on consecutive notes using one of 5 patterns. When <b>Slice Seq</b> is "Forward," playing pad 9 three times causes bento to play slice 9, 10, and 11. When <b>Slice Seq</b> is "none" playing pad 11 plays slice 11 repeatedly.	No
<b>Act Slice</b>	7	1-128	Slice number for first step when Slice Seq starts.	No

Config parameters control the fundamental operational behavior of the slicer track, affecting how notes trigger, sustain, and loop within each sample.

### To edit envelope and LFO parameters in row 3:

1. Tap on any of the parameters in row 2. Knobs 1-8 correspond to the parameters of row 2 or tap the envelope or LFO graphs in the lower half of the Dashboard.

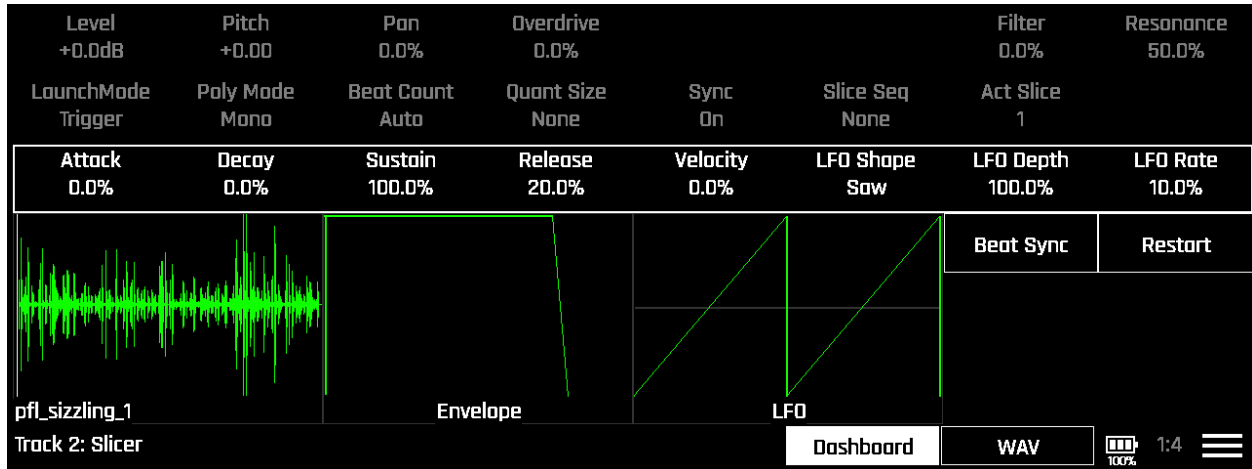


Figure 10-12: Slicer Dashboard with Envelope parameter group selected

2. To adjust the parameters, use the knobs mapped to them.

The following table describes the envelope and LFO parameters in row 3 of the Slicer Dashboard and the knobs mapped to them.

*Table 10-5: Slicer Track Envelope and LFO Parameters in Row 3*

Parameter	Knob	Range	Description	Modulation Target?
<b>Attack</b>	1	0 to 100% 100% = 9 seconds	Envelope attack time	Yes
<b>Decay</b>	2	0 to 100% 100% = 38 seconds	Envelope decay time	Yes
<b>Sustain</b>	3	0 to 100%	Envelope sustain level	No
<b>Release</b>	4	0 to 100% 100% = 38 seconds	Envelope release time	Yes
<b>Velocity</b>	5	0 to 100%	Velocity sensitivity amount	No
<b>Shape</b>	1	Sine, Triangle, Square, Saw, Random	LFO shape selection	No
<b>Depth</b>	2	0 to 100%	LFO modulation intensity	Yes
<b>Rate</b>	3	0 to 100%	LFO speed from slow to fast	Yes
<b>Beat Sync</b>	4	Off, On	Synchronize LFO to project tempo	No
<b>Restart</b>	5	Off, On	Reset LFO phase on each note	No

## Editing Slices in the Slicer Track WAV Screen

The Slicer Track WAV screen provides a live view of slice playback, slice playback options, and a set of tools for editing slices.

### Opening the Slicer WAV Screen

The Slicer WAV screen provides comprehensive slice creation and editing capabilities, displaying your source material's waveform with visual slice markers and slice management tools.

#### To open the Slicer Track WAV screen:

1. Select the slicer track, then press **INST** to open the Slicer Track Dashboard.
2. From the Slicer Track Dashboard, tap **WAV** in the navigation area.

The Slicer Track WAVE screen opens.

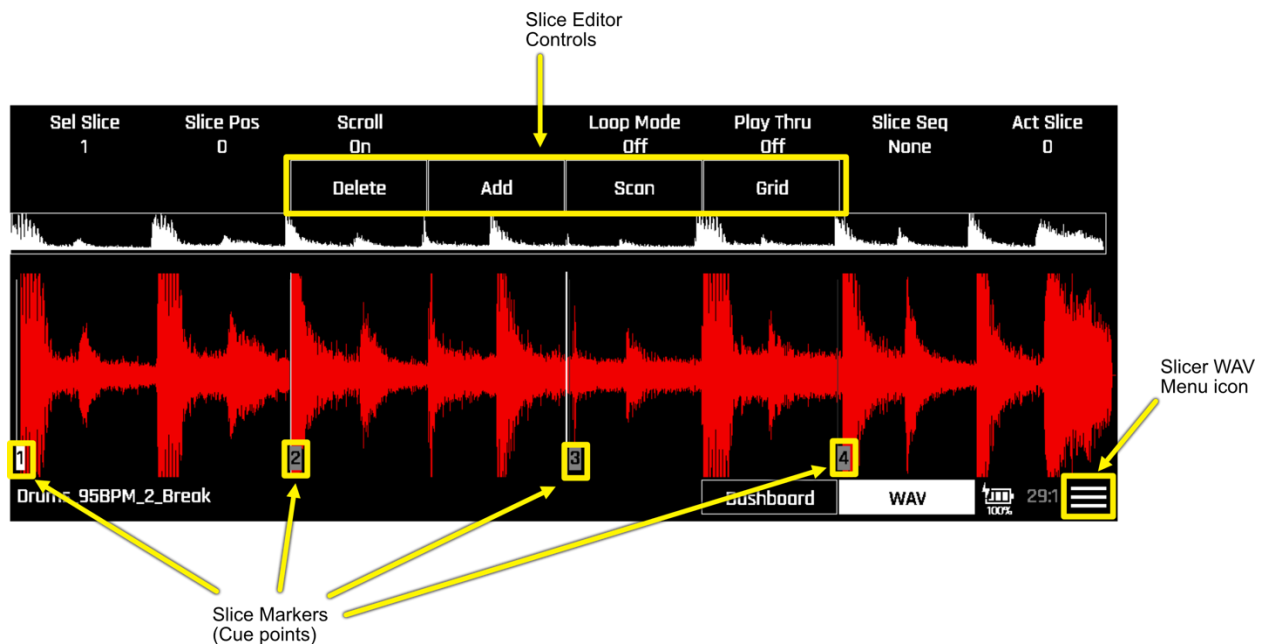


Figure 10-13: Slicer Track WAV screen

The Slicer Track WAV screen includes:

- A waveform display area that contains the waveform (in the same color as the track's pads) of the sample loaded in the slicer track, with numbered markers representing the slice points.
- A zoomed-out waveform overview in white for moving the waveform display area from one from one part of the sample to another.
- The names and current values of voice parameters that you can edit with bento's eight knobs.
- A set of controls for editing the slice points and a Menu that includes a Clear All control for removing all slice points.

The following table describes the slicer track parameters displayed across the top of the WAV screen.

*Table 10-6: Parameters in the Slicer Tract WAV Screen*

Parameter	Knob	Range	Description	Modulation Target?
<b>Sel Slicer</b>	1	1 to the number of slices.	Selects a slice marker for editing.	No
<b>Slice Position</b>	2	0 to number of samples.	Sets the sample position at which the selected slice begins playing when triggered.	No
<b>Scroll</b>	3	Off, On	Disables screen scrolling during slice playback. Useful when screen is zoomed in on a small region of the sample.	No
<b>Loop Mode</b>	5	Off, On	Specifies if bento loops each slice during playback ( <b>Loop Mode</b> = On) or plays the slice once and stops ( <b>Loop Mode</b> = Off) like a one-shot.	No
<b>Play Thru</b>	6	Off, On	Specifies if bento plays from the beginning of one slice to the beginning of the next slice (Play Thru = Off) or if bento plays from the beginning of one slice to the end of the sample (Play Thru = On).	No
<b>Slice Seq</b>	7	None, Forward, Backwards, Random, Stagger	Advances the slice number on consecutive notes using one of 5 patterns. When <b>Slice Seq</b> is "Forward," playing pad 9 three times causes bento to play slice 9, 10, and 11. When <b>Slice Seq</b> is "none" playing pad 11 plays slice 11 repeatedly.	No
<b>Act Slice</b>	8	1-128	Slice number for first step when Slice Seq starts.	No

## Editing Slice Playback Parameters

When the Slicer Track WAV screen is open, Knobs 5-7 correspond to parameters that affect how bento plays slices.

**Loop Mode** (Knob 5) and **Play Thru** (Knob 6) determine how each note is played.

When **Loop Mode** is On, each slice plays in a loop while a note is held until the voice's envelope ends its release phase or until another note steals the voice. When **Loop Mode** is Off, bento plays the slice like a one-shot.

When **Play Thru** is On, each sample plays from its slice position to the end of the sample and then stops, unless **Loop Mode** is On, in which case playback returns to the sample start and loops the entire sample.

The **Slice Seq** (Knob 7) and **Act Slice** (Knob 8) parameters let you configure slicer tracks to handle each consecutive note by establishing a pattern for selecting a slice instead of playing the slice mapped to each note. **Act Slice** sets the next slice to be played and **Slice Seq** sets a pattern (None, Forward, Backwards, Random, or Stagger) for choosing the slice to play for subsequent notes.

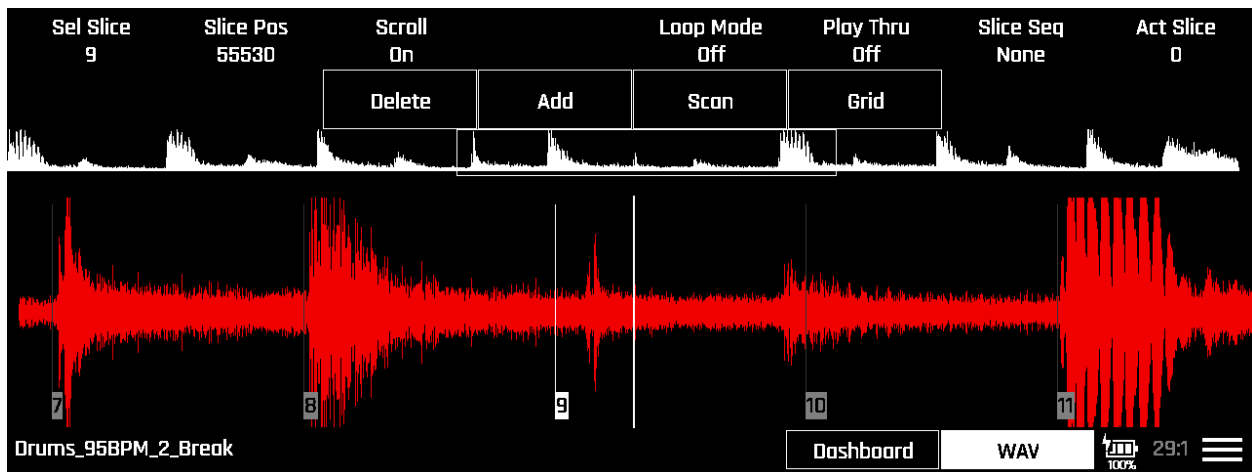
## Moving Individual Slices

Knobs 1 and 2 are mapped to the **Sel Slice** and **Slice Pos** parameters, respectively, which make it easy to select and move existing slices.

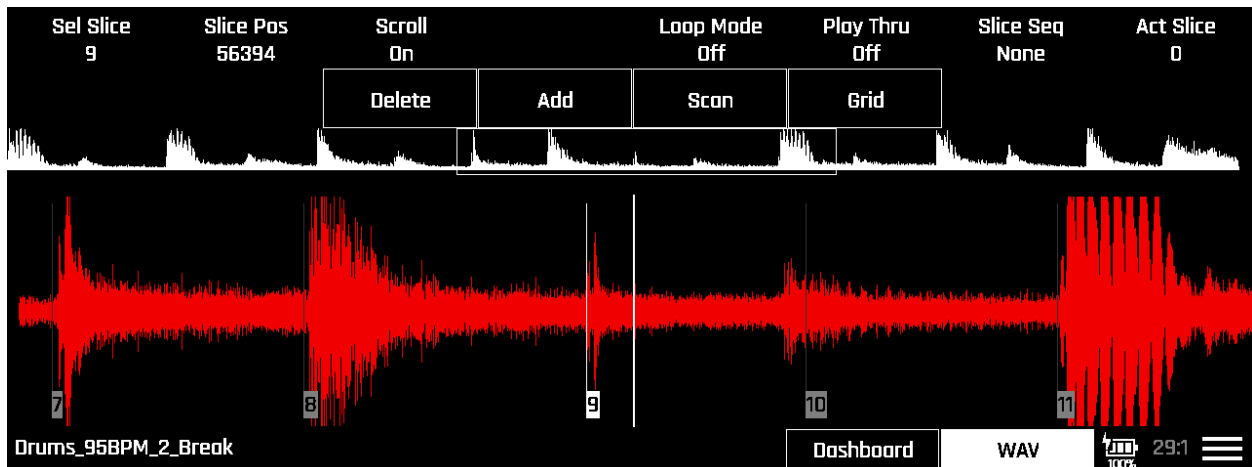
### To move a slice:

1. Adjust Knob 1 to select a slice for editing. The marker of the selected slice is highlighted in white.

For example, in the following screen, **Sel Slice** has selected slice 9, which begins at position 55530, slightly ahead of a transient.



2. Adjust Knob 2 to move the selected slice's marker to the correct position. For example, in the following screenshot, slice 9 has been moved from 55530 to 563934.

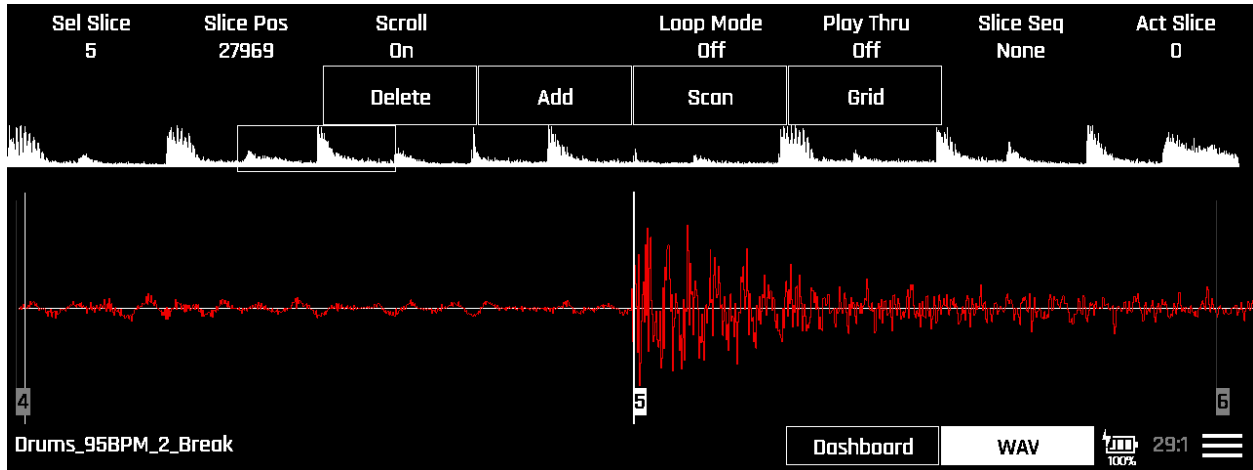


3. To view or edit the positions of other slices, use Knob 1 to select and Knob 2 to adjust each slice.



## Zooming In and Out

When you play the pads, a vertical white line moves across the corresponding slice in the display as it plays. If the Slicer track's sample slices are difficult to distinguish, you can zoom in to see a range of slices in more detail by spreading the screen with two fingers or zoom out by pinching with two fingers.



*Figure 10-14: Slicer WAV Screen Zoomed-in*

Zooming in makes it easier to view and move slice markers. For example, in the above screenshot, Knob 2 (Slice Pos) was able to move slice 5 to start precisely at slice position 27969 because of the waveform magnification.

Above the main waveform display, is a complete overview of the sample's waveform, with the current zoom region highlighted. You can tap anywhere in the waveform overview to move the display to a different region while keeping the current magnification.

## Disabling Playback Scrolling

If you zoom in on a slice point and then play a pad to test the new slice position, the display may scroll past the currently visible part of the sample. While this is the Slicer WAV screen's usual behavior, it can be distracting when you are trying to edit slice points.

Fortunately, the Slicer WAV scroll feature can be disabled with the **Scroll** parameter, which is mapped to Knob 3 in the Slicer Track WAV screen.

To disable playback scrolling, adjust Knob 3 to change **Scroll** to Off. When **Scroll** is off, the waveform display maintains its current view position and magnification even if you play slices that are not on screen, unless you intentionally move to a different part of the sample by swiping the screen with two fingers or tapping in the waveform overview.

## Adding a New Slice

You can add new slices at any position in the slicer track's sample.

### To add a new slice:

1. Using swiping and zooming gestures, move the waveform display so that the white vertical line in the middle of the waveform display coincides with the position in the sample where you want to add a new slice.

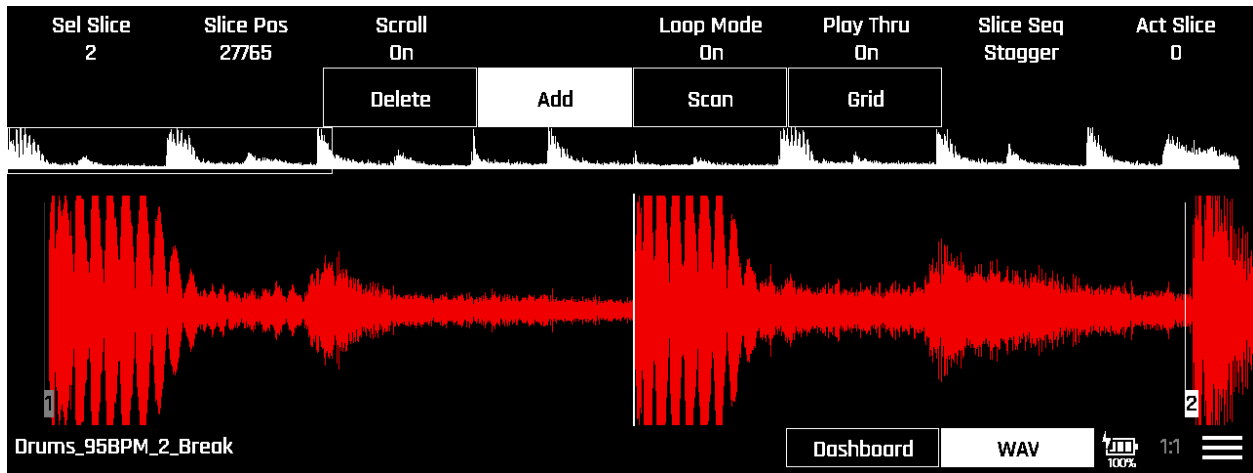


Figure 10-15: Positioning the Slicer Track Waveform to Add a New Slice

2. Tap **Add** in the Slicer Track WAV screen.

The new sample is added at the chosen position.

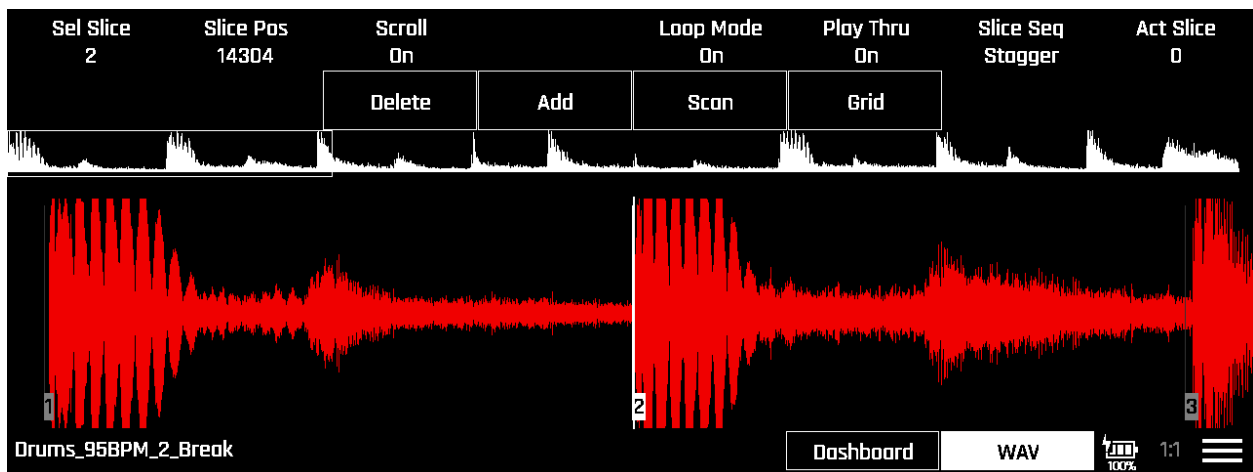


Figure 10-16: New Slice in Slicer Track WAV Screen

Note that adding a new slice increases the slice numbers of higher-numbered slices.

## Deleting a Slice

You can delete existing slices from slicer track

### To delete an existing slice:

1. Using swiping and zooming gestures, move the waveform display so that the white vertical line in the middle of the waveform display is slightly to the left of the slice you want to delete.

For example, the vertical position line is a slightly before the slice 3 marker.

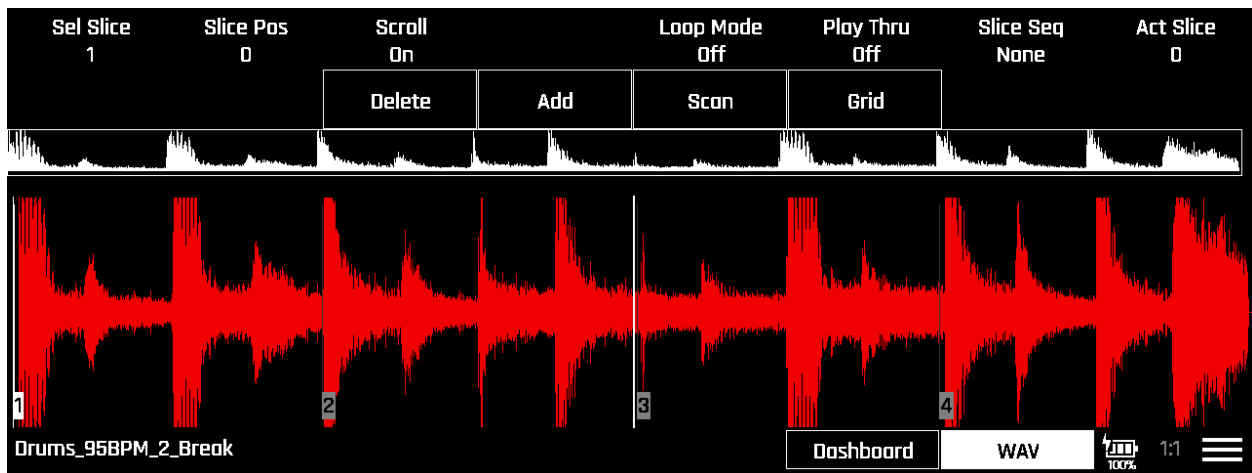


Figure 10-17: Positioning the Slicer Track Waveform to Delete a Slice

2. Tap **Delete** in the Slicer Track WAV screen.

The selected slice is deleted from the slicer track.

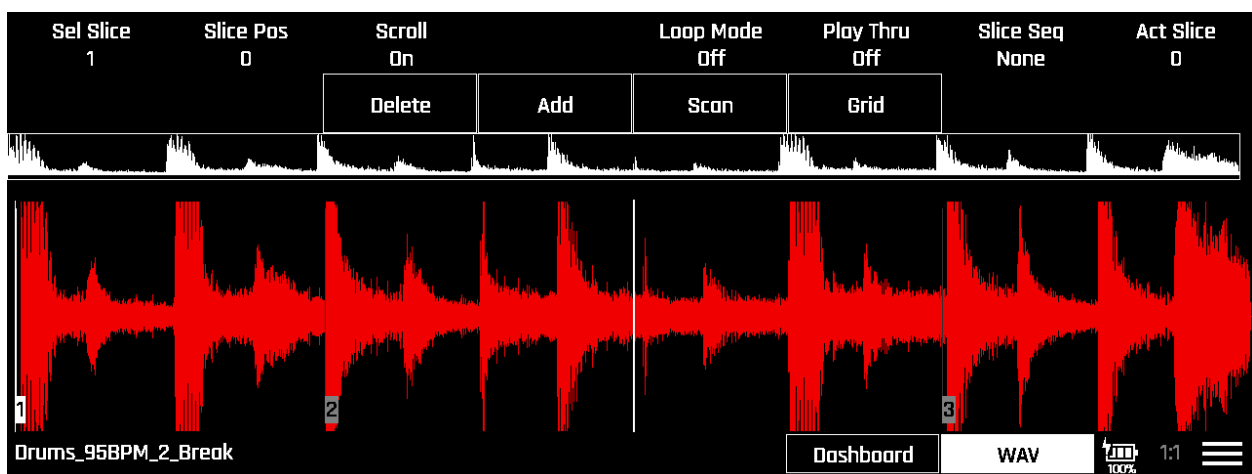


Figure 10-18: Slicer Track WAV Screen after Deleting a Slice

Note that deleting a slice decreases the slice numbers of higher-numbered slices.

## Creating Slices at Sample Transients

The Slicer Track WAV screen's Scan control lets you create slices that begin at transients in the sample waveform.

**Caution:** Creating slices with the Scan control deletes all existing slices.

### To configure slices at transients in the sample:

1. Tap **Scan** in the Slicer Track WAV screen. A dialog appears with a default **Scan Threshold** (25%) for detecting transient in the sample.

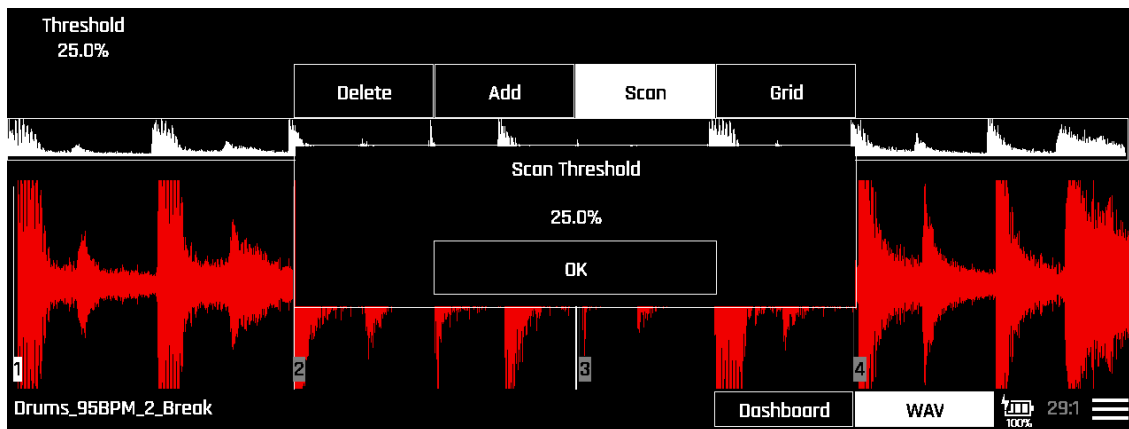


Figure 10-19: Setting Scan Threshold Detecting Transient Detection

**Scan** analyzes amplitude changes and frequency content to identify likely slice points at musical boundaries. Higher sensitivity settings create more slice points, while lower settings focus on the most prominent transients.

2. Adjust **Scan Threshold** with Knob 1 then tap **OK**.

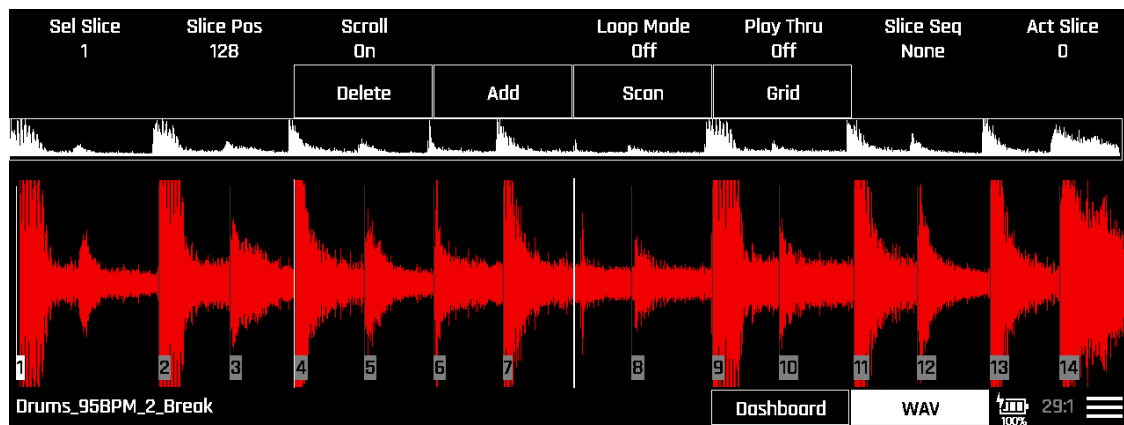


Figure 10-20: Slices Added at Waveform Transients

You can now keep, move, or delete any of the new slices manually.

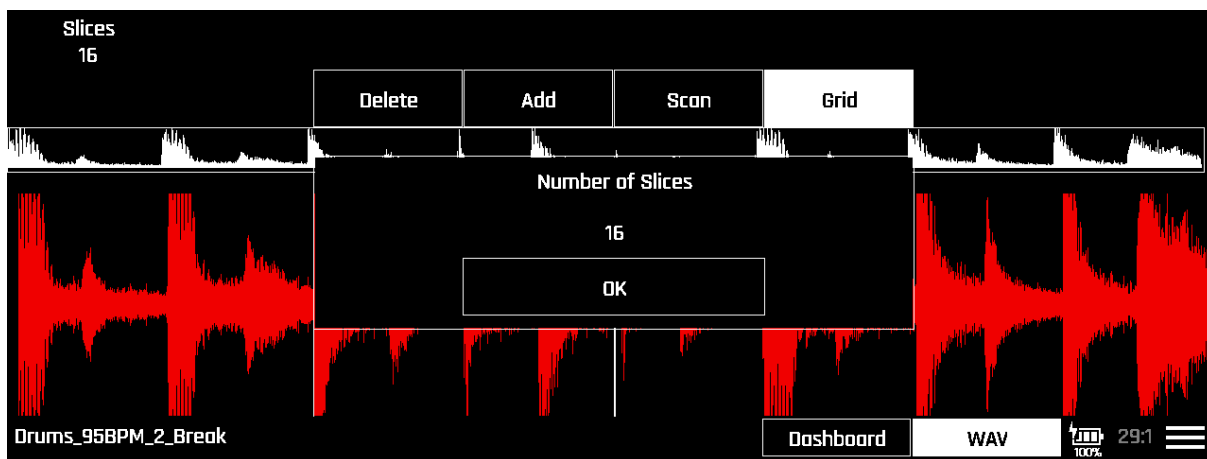
## Creating Slices on a Grid

Grid-based slicing creates mathematically equal divisions, useful for material with consistent rhythmic structure or for creating specific slice counts. This approach works well with loops and rhythmic content where exact timing relationships are important.

**Caution:** Creating slices with the **Grid** control deletes all existing slices.

### To create grid-based slices:

1. Tap **Grid** in the Slicer Track WAV screen. A dialog appears with a default Number of Slices (16) for the slice grid.



*Figure 10-21: Setting the Number of Slices in the Grid*

2. Adjust Knob 1 to change the **Slices** parameter, which specifies the number of slices to be added at evenly spaced grid points and tap **OK**.

The Slicer Track WAV screen adds the chosen number of slices at evenly spaced positions in the sample. In the following screenshot, 32 slices have been created in a grid.

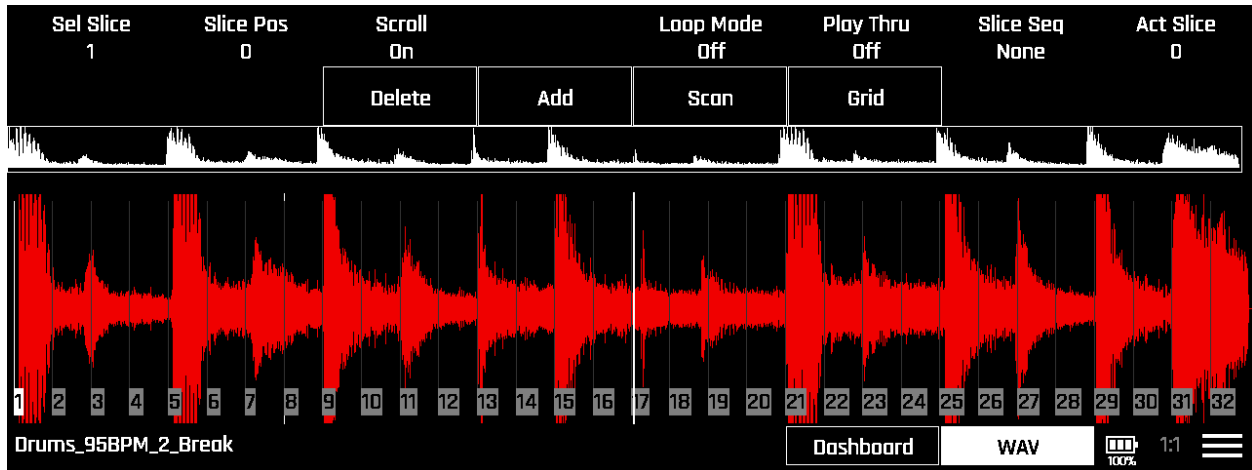


Figure 10-22: Slicer Track WAV Screen with 32 Slices

You now move or delete any of the new slices manually or keep the as they are.

## Clearing All Slices

The Slicer Track WAV screen's menu provides access to a Clear All control that lets you delete all slices from the slicer track.

### To clear all slices from the slicer track:

1. Tap the **Menu** icon in the Slicer Track WAV screen. The menu opens to display the **Clear All** control.

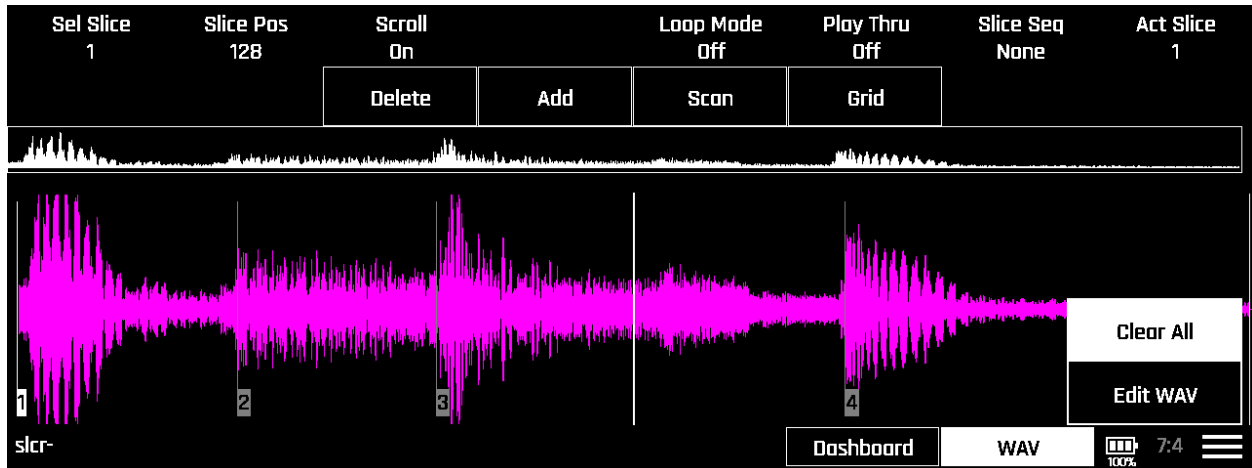


Figure 10-23: Clear All in Slicer Track WAV Screen Menu

2. Tap **Clear All**.

All slices are removed from the slicer track.

## Editing the Slicer Sample in the WAV Edit Screen

You can open the slicer track's sample in bento's WAV Edit screen to:

- Trim the sample.
- Normalize the sample.

Bento saves the edited WAV file to the current project's folder on microSD card.

### To edit the slicer sample in the WAV Edit screen:

1. Open the slicer track's Dashboard by selecting the slicer track in the Tracks screen and pressing **INST**.
2. In the slicer track's Dashboard, tap **WAV** to open the Waveform screen.
3. Tap the **Menu** icon, then tap **Edit Wav** to open the WAV Edit screen.

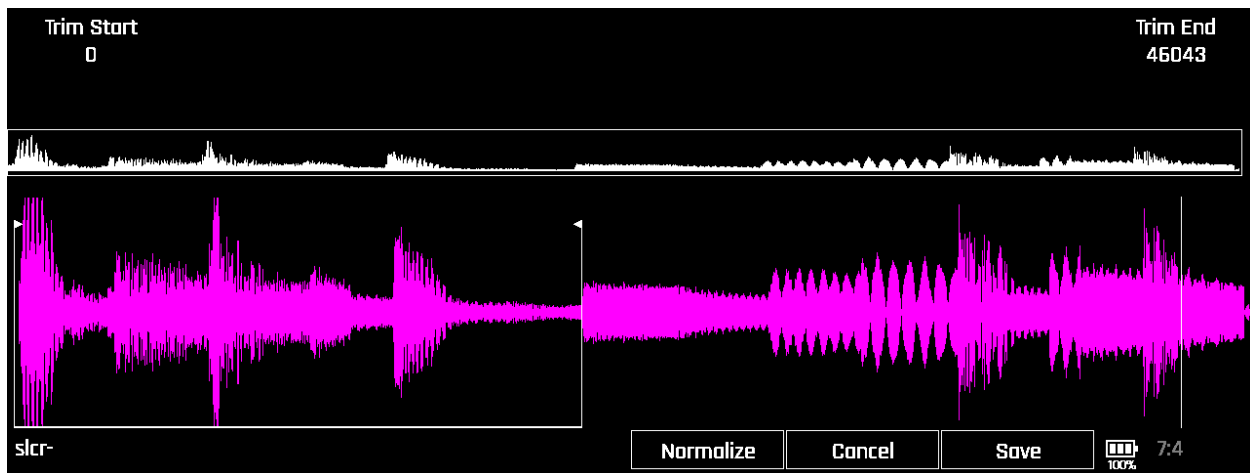


Figure 10-24: Wave Edit Screen with Slicer Sample

**Important:** If you choose **Save** after editing the waveform, bento will create a new WAV file with your edits, bento will save it to the current project's folder on the microSD card and update the track to use the new sample, but bento does not save the current project automatically.

4. To change the sample's start position, adjust **Trim Start** with Knob 1.
5. To change the sample's end position, adjust **Trim End** with Knob 8.
6. To normalize the entire sample, tap **Normalize** to turn it on.
7. To save your edits, tap **Save**. The edited Waveform now appears in the Slicer track Dashboard, indicating that bento has edited the track to use the new WAV file.
8. To save the project with the edited track, press **PROJ**, then tap **Save**.



## Editing Slicer Track Modulation

Each bento Track includes a central Modulation screen within which you can configure all modulation settings. The modulation system enables dynamic control of Slicer parameters through various sources such as note velocity, envelopes, LFOs, and external MIDI controllers.

### To configure modulation in a slicer track:

1. Open the slicer track dashboard, then tap the **Menu** icon in the lower right corner of the screen. The **Menu** opens, displaying a single option, **Modulation**.

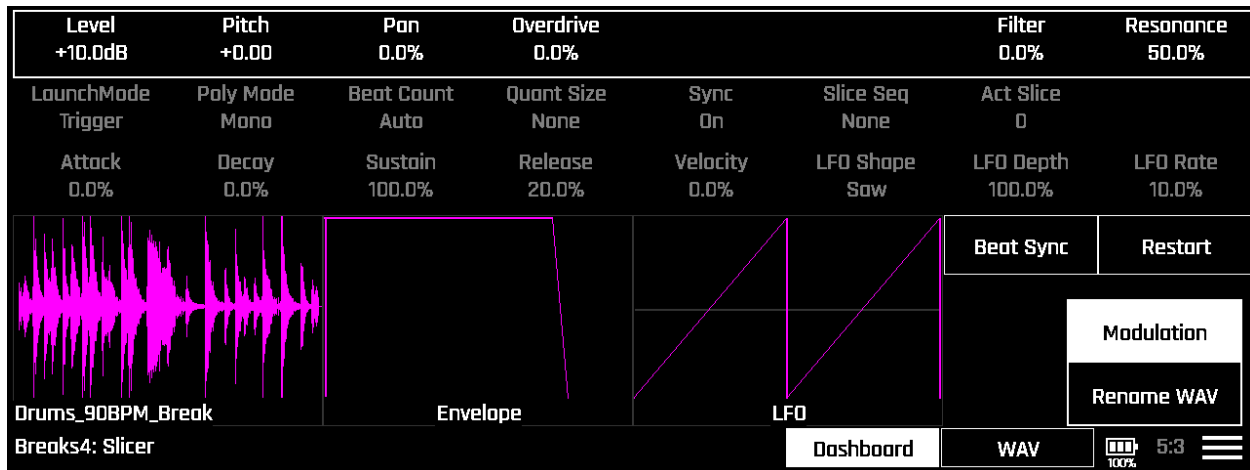


Figure 10-25: Slicer Dashboard Modulation Menu Option

2. Tap **Modulation**. The Slicer Track Modulation Screen opens.

Line	Source 1	Amount 1 0.0%	Source 2	Amount 2 0.0%	Source 3	Amount 3 0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
Level	Velocity	29.7%	[None]		[None]		7
Pitch	Mod Wheel	54.1%	[None]		[None]		94
Pan	[None]		[None]		[None]		10
Attack	[None]		[None]		[None]		73
Decay	[None]		[None]		[None]		75
Release	[None]		[None]		[None]		72
LFO Depth	[None]		[None]		[None]		12

Vocoder1: Slicer

Dashboard 100% 5:3

Figure 10-26: Slicer Track Modulation Screen

The first column in the Modulation screen contains the name of every slicer track parameter that can be a modulation “target.” Columns 2 through 7 let you set up

three modulation sources and three modulation amount values for the modulation target of the selected row.

3. To see the complete list of modulation targets in the Modulation screen you can either:
  - swipe the screen up or down, or
  - turn Knob 1 to scroll up and down through the Modulation screen.
4. Select the line of the parameter you want to modulate, then use Knobs 2-7 to configure one or more modulation sources and modulation levels.

The following table describes the parameters you can modulate, the modulation sources you can route to them, and the range of modulation levels.

Table 10-7: Modulation Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description
<b>Line</b>	1	Level Pitch Pan Attack Decay Release Filter Cutoff Filter Resonance LFO Depth LFO Rate	Moves the Modulation screen's line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.
<b>Source 1</b>	2	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (1 of 3)
<b>Amount 1</b>	3	-100% to +100%	Modulation Amount (1 of 3)
<b>Source 2</b>	4	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (2 of 3)
<b>Amount 2</b>	5	-100% to +100%	Modulation Amount (2 of 3)
<b>Source 3</b>	6	Velocity LFO Mod Wheel MIDI Vol MIDI Pan	Modulation Source (3 of 3)
<b>Amount 3</b>	7	-100% to +100%	Modulation Amount (2 of 3)

5. To return to the slicer track Dashboard, tap **Dashboard** or press **INST**.

## Creating New Slicer Tracks

There are two ways to create new Slicer tracks:

- Select an existing sample on the microSD card when creating the Slicer track. You can load a sample from the factory patches or from a folder containing your own samples.
- Record a new sample to the microSD card when creating the Slicer track. Samples recorded during this process are saved to the current project's folder on the microSD card.

**Note:** Creating a new slicer track requires an empty track. If you cut a track from a project, the sequences for that track are also cut.

### To create a new slicer track with a sample on the microSD card:

1. Organize your original samples in folders on the microSD card. To avoid confusion, create your sample folders at the root level of the microSD card, and not under the factory Patches and Project folders.
2. Choose an empty track in your bento project.
3. Double- tap the empty track slot on the Tracks screen. The Patch Browser opens.

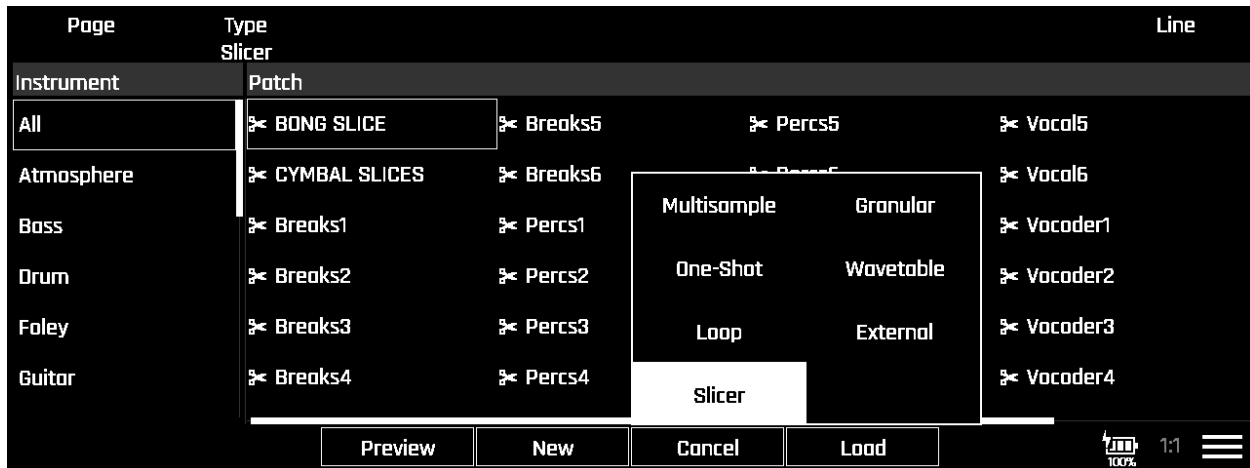


Figure 10-27: New Slicer Track Menu Option in Patch Browser Screen

4. Tap **New** and select **Slicer** from the track type options.

The slicer track sample browser screen opens.

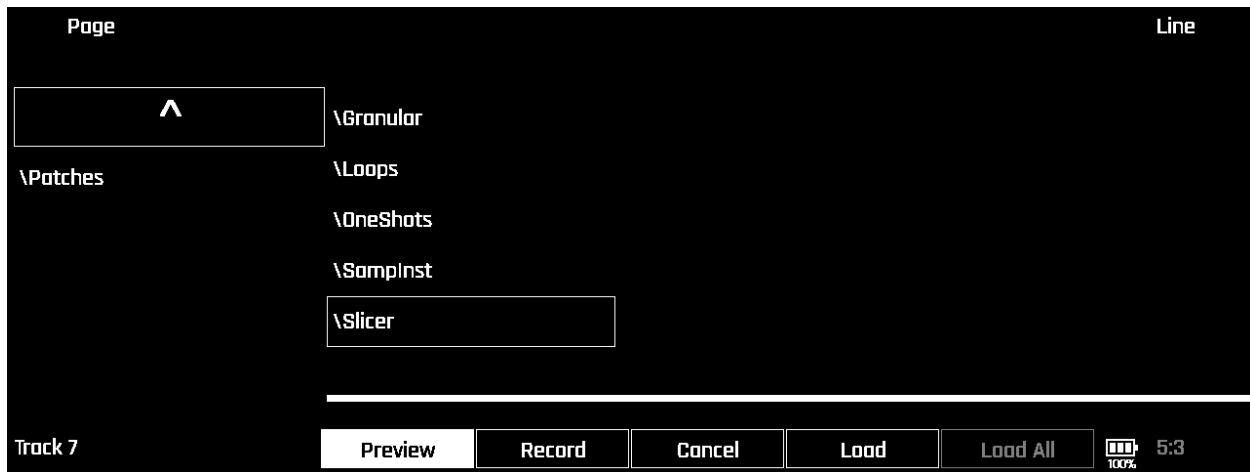


Figure 10-28: Slicer track sample browser

**Note:** The Instrument categories do not appear in the sample browser because bento lets you browse for samples in any folder on the microSD card. bento only displays instrument categories when you browse for patches to load into a track.

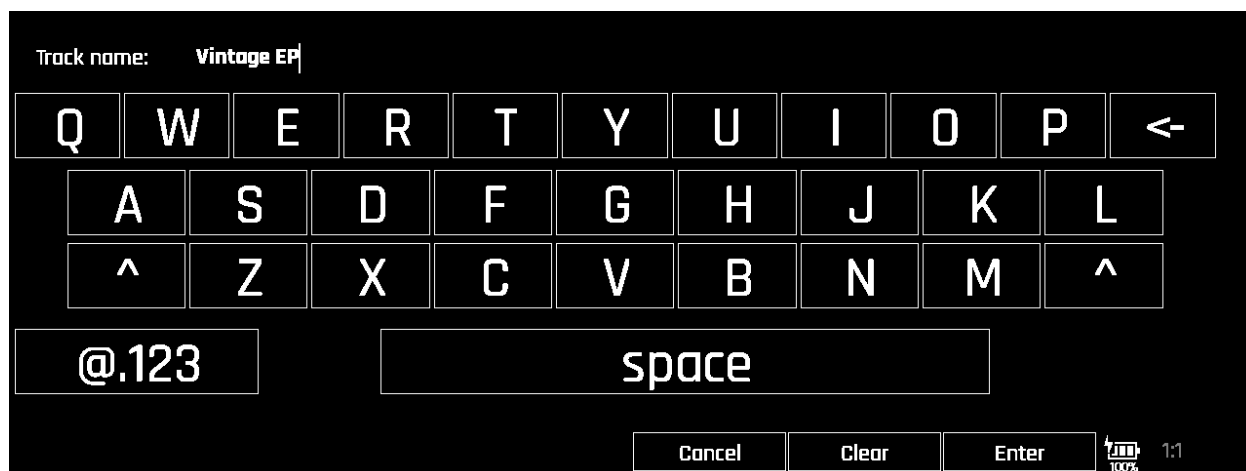
Browse to the location of the sample you want to load in the new slicer track.

5. To listen to samples as you browse, tap **Preview** to turn it on.
6. Select the sample you want to load, then tap **Load**.

Bento reads the sample file header to find cue points that it can use as slice points in the new slicer track and then returns you to the Tracks screen, where the new track is selected and displayed with a default name.

7. Play the new slicer track from bento's pads and listen for any slices that bento may have created automatically from cue points in the WAV file header.

To rename the new track, open the new track's Track Config screen by choosing **Config Track** from the Track Screen menu, and then tapping **Rename Track**. The Track Naming screen opens. Tap the keys to enter a new track name in the naming keyboard screen, then tap **Enter**.



*Figure 10-29: Naming Keyboard Screen*

The track now appears in the Tracks screen with its new name.

### To record a new sample for a new Slicer track:

1. Choose an empty track in your bento project.
2. Double- tap the empty track slot on the Tracks screen. The Patch Browser opens.

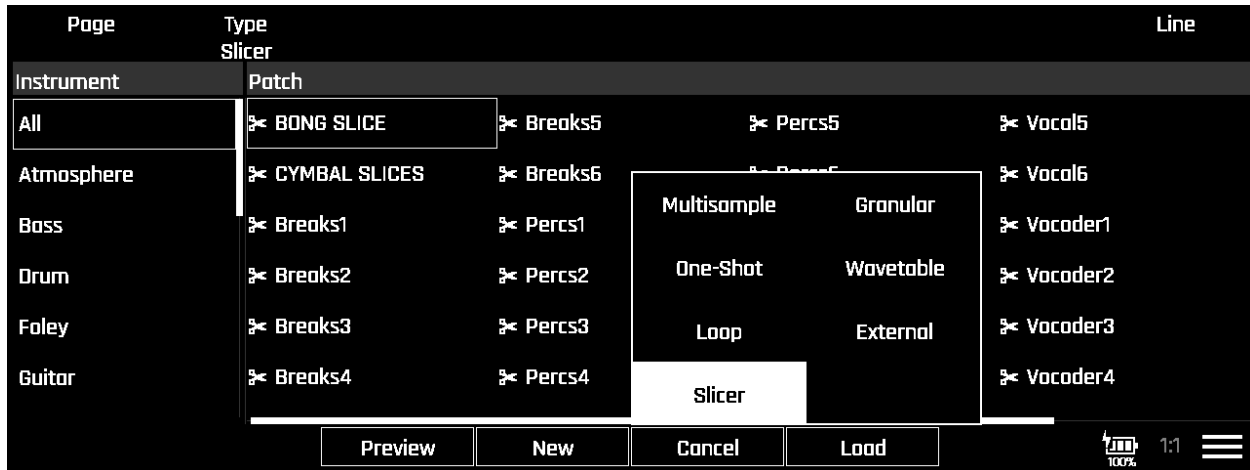


Figure 10-30: Patch Browser Menu with Slicer Selected

3. Tap **New** and select **Slicer** from the track type options.

The slicer track sample browser screen opens.

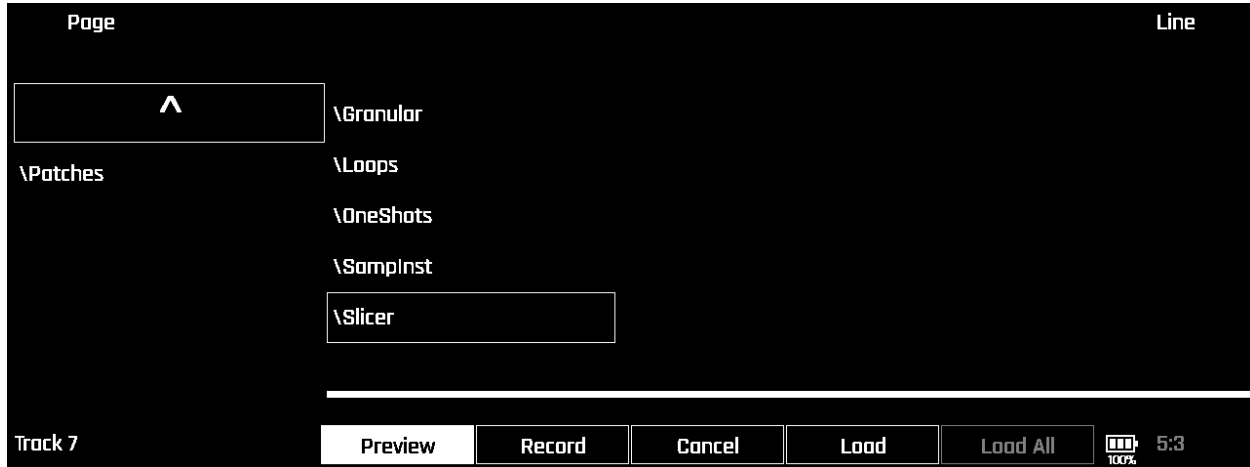
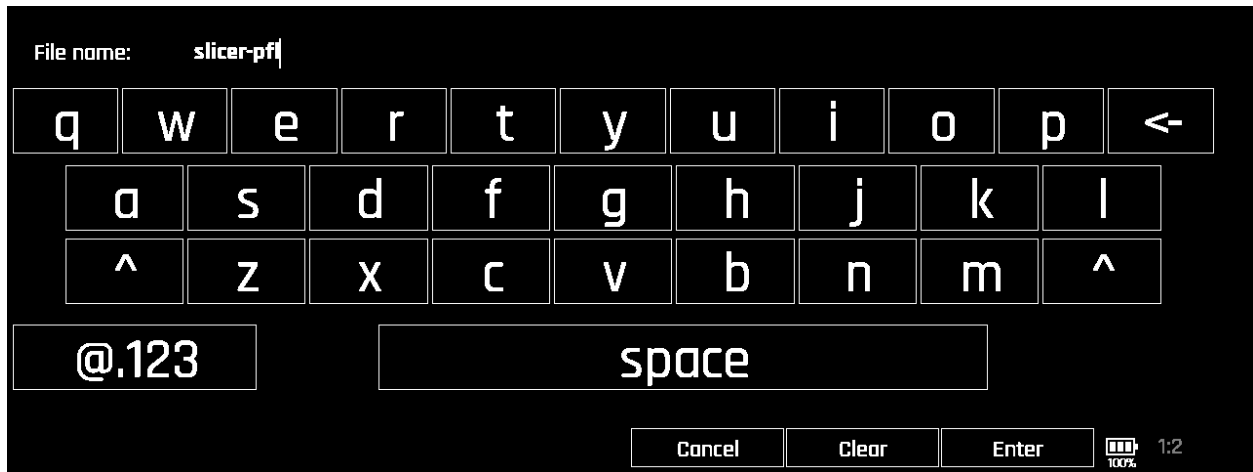


Figure 10-31: Slicer track sample browser

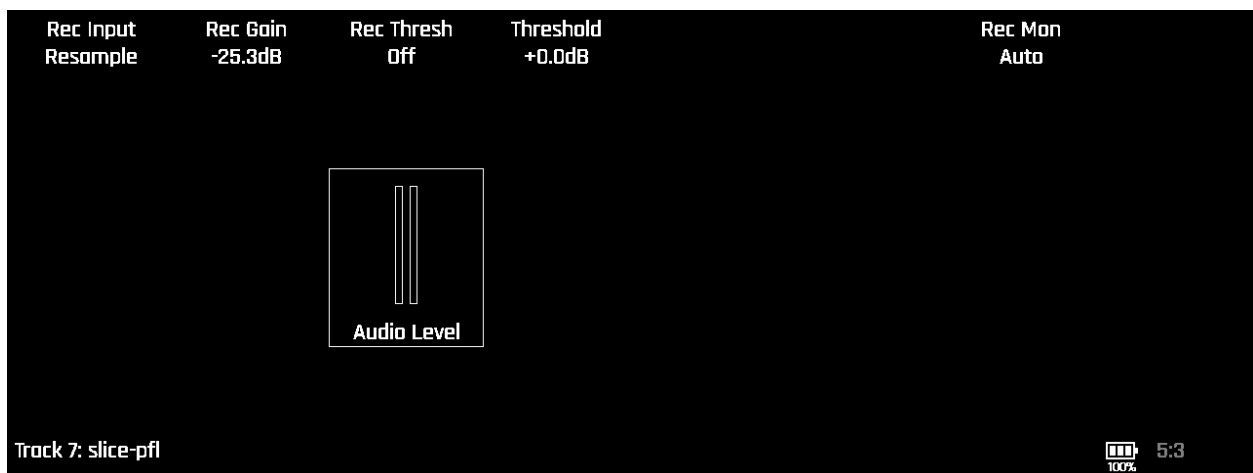
4. Tap **Record**. The Sample Naming screen opens.



*Figure 10-32: Sample File Naming Screen*

Enter the filename for the new sample, then press **Enter**.

5. The Slicer Recording screen opens.



*Figure 10-33: Slicer Recording Screen*

6. Use knobs 1-8 to set the sample recording settings.



Table 10-8 describes the recording parameters.

*Table 10-8: Slicer Recording Parameters Mapped to bento Knobs*

Parameter	Knob	Range	Description
<b>Rec Input</b>	1	In 1, In 2, In3, In 1L, In 2L, In 3L, Resample	Audio source for sample recording. Use 1L, 2L or 3L for mono recording while sending a signal into the left channel of the corresponding input.
<b>Rec Gain</b>	2	-60dB to +12dB	Audio input gain.
<b>Rec Thresh</b>	3	Off, On	When Rec Thresh is “On,” sample recording waits for audio input level to go over the Threshold.
<b>Threshold</b>	4	-96dB to 0dB	Sets a recording threshold for sample recording when Rec Thresh is On.
<b>Rec Mon</b>	7	Off, Auto	Specifies when audio inputs are played out through bento’s main audio output. When set to Auto, monitoring is only heard while actively recording.
<b>MIDI OutCh</b>	8	1-16	MIDI channel number of the MIDI instrument that will produce sound for each recorded note.

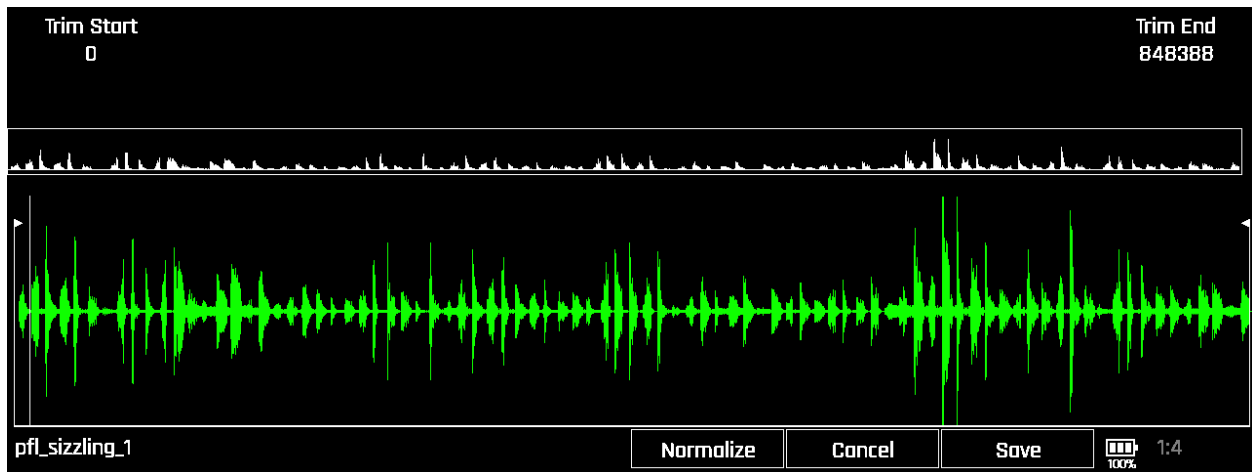
**Note:** Set your audio source level and the bento Rec Gain to avoid clipping and adjust while maintaining good signal-to-noise ratio. The input meter on the pad should stay as high as possible without entering the red range.

- To start recording, hold the **REC** button, then press the **PLAY** button.

**Note:** If the Metronome’s Lead In parameter is enabled (in the Sequence Launch screen), recording will start after four beats.

- To stop recording and bento’s transport, press the **STOP** button.

The recording opens in the WAV Edit screen. The sample filename appears in the lower left corner of the screen, indicating that the Slicer track has been created and has already loaded the new WAV file.



*Figure 10-34: New Slicer Sample in the WAV Edit Screen*

You can trim the sample or normalize the sample and save the edited sample now, or you can tap **Cancel** to exit the WAV Edit screen and return to the Tracks screen.

9. To open the Tracks screen and play the new Slicer track, tap **Cancel**.
10. To edit the sample before playing the new Slicer track, use the WAV Edit screen's options, then tap **Save**.

For details on trimming and normalizing slicer samples, see [Editing the Loop Sample in the WAV Edit Screen](#).

# 11: Exploring One-shot Tracks

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One-shot tracks provide the foundation for drum programming, percussion performance, and sound effect triggering in bento. Each One-shot track contains up to 16 individual samples that you can trigger independently using the hardware pads or external MIDI controllers.

This chapter covers essential techniques for working with One-shot tracks, from understanding their sample bank organization through creating effective instrument collections. You'll learn how to load and organize samples, configure playback parameters, and integrate One-shot content into your musical arrangements.

To do this...	read...
Understand how One-shot tracks organize individual samples	<a href="#">Understanding One-shot Tracks</a>
Trigger samples with pads or MIDI for live performance	<a href="#">Playing One-shot Tracks</a>
Manage sample banks and individual sample assignments	<a href="#">Editing One-shot Tracks</a>
Set up new One-shot instruments from individual samples	<a href="#">Creating New One-shot Tracks</a>
Optimize sample selection and performance workflows	<a href="#">Best Practices for One-shot Tracks</a>

While Loop tracks play tempo synchronized audio files, and Slicer tracks allow you to trigger different segments of long samples, One-shot tracks are designed for sequencing playback of individual samples. This makes them ideal for building drum kits, organizing percussion sounds, or creating banks of sound effects that you can trigger on demand.

## Understanding One-shot Tracks

One-shot tracks organize individual samples into a 16-slot sample bank where each pad triggers a specific sample. This direct one-to-one relationship between pads and samples makes One-shot tracks an obvious choice for creating a custom drum machine-like instrument or for crafting a unique live electronic percussion performance instrument.

One-shot tracks are the only type of track that let you change each one-shot's sample start and end points in real time.

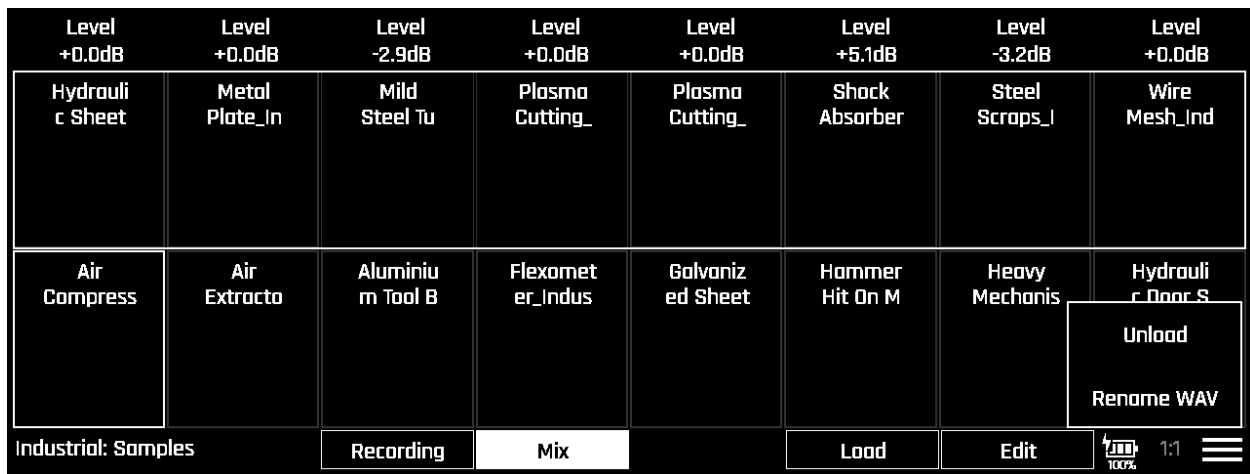


Figure 11-1: One-shot Sample Bank screen in Mix View

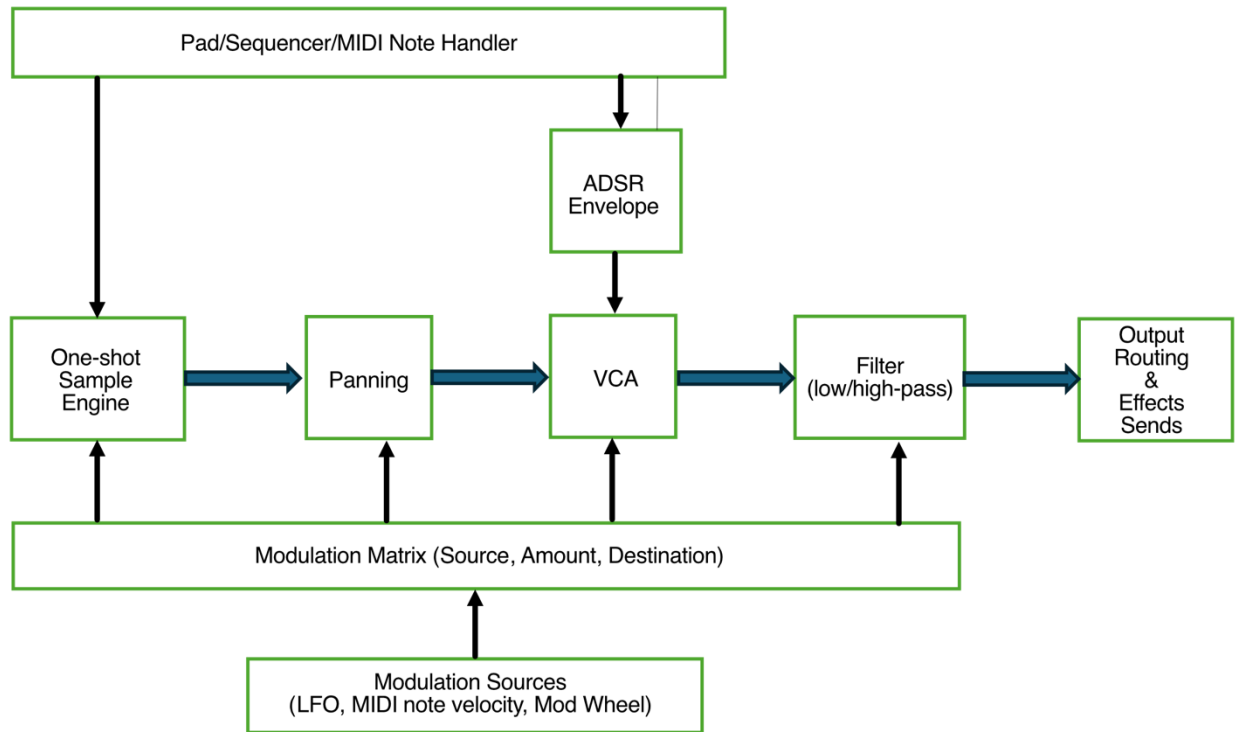
One-shot tracks treat each one-shot as an independent instrument with its own sample, playback settings, filter, envelope, LFO, modulation settings, and individual levels, panning, and effects sends.

You could just as easily load 16 tonal instrument samples and play chords or melodies from bento's pads or from a MIDI controller.

The sample bank structure provides both flexibility and organization. You can load different samples into each slot, creating custom drum kits or sound collections tailored to your musical needs. Empty slots remain available for additional samples, and you can replace existing samples without affecting the overall track configuration or sequences.

## Individual One-shots and Screens

Each one-shot has its own sample, playback settings, filter, envelope, LFO, modulation settings and even their own individual FX sends.



*Figure 11-2: Individual One-shot Voice Structure*

## One-shot Track Screens

Multisample tracks provide four main control screens for comprehensive parameter editing and sample management.

*Table 11-1: One-shot Track Screens*

Screen	Description
One-shot Sample Bank	Displays 16 one-shots in Mix and Recording Views. Each one-shot displays a progress bar when it is playing. Each one-shot shows the loaded sample name and provides access to the corresponding one-shot Dashboard for configuring one-shot voice settings.
One-shot Track Config screen	Manages MIDI routing and audio output assignment.
One-shot Dashboards	Displays voice parameters and performance controls organized into four sections (Main, Config, Env, LFO).
One-shot WAV screen	Displays the waveform of one of the track's samples and offers controls for the sample playback start point and playback length, and Reverse parameter for controlling sample playback direction.
One-shot Modulation screen	Provides a central location for routing modulation sources to modulation targets, and for setting a modulation amount for each.

Navigation between One-shot track screens and individual One-shot Dashboards uses standard bento navigation patterns.

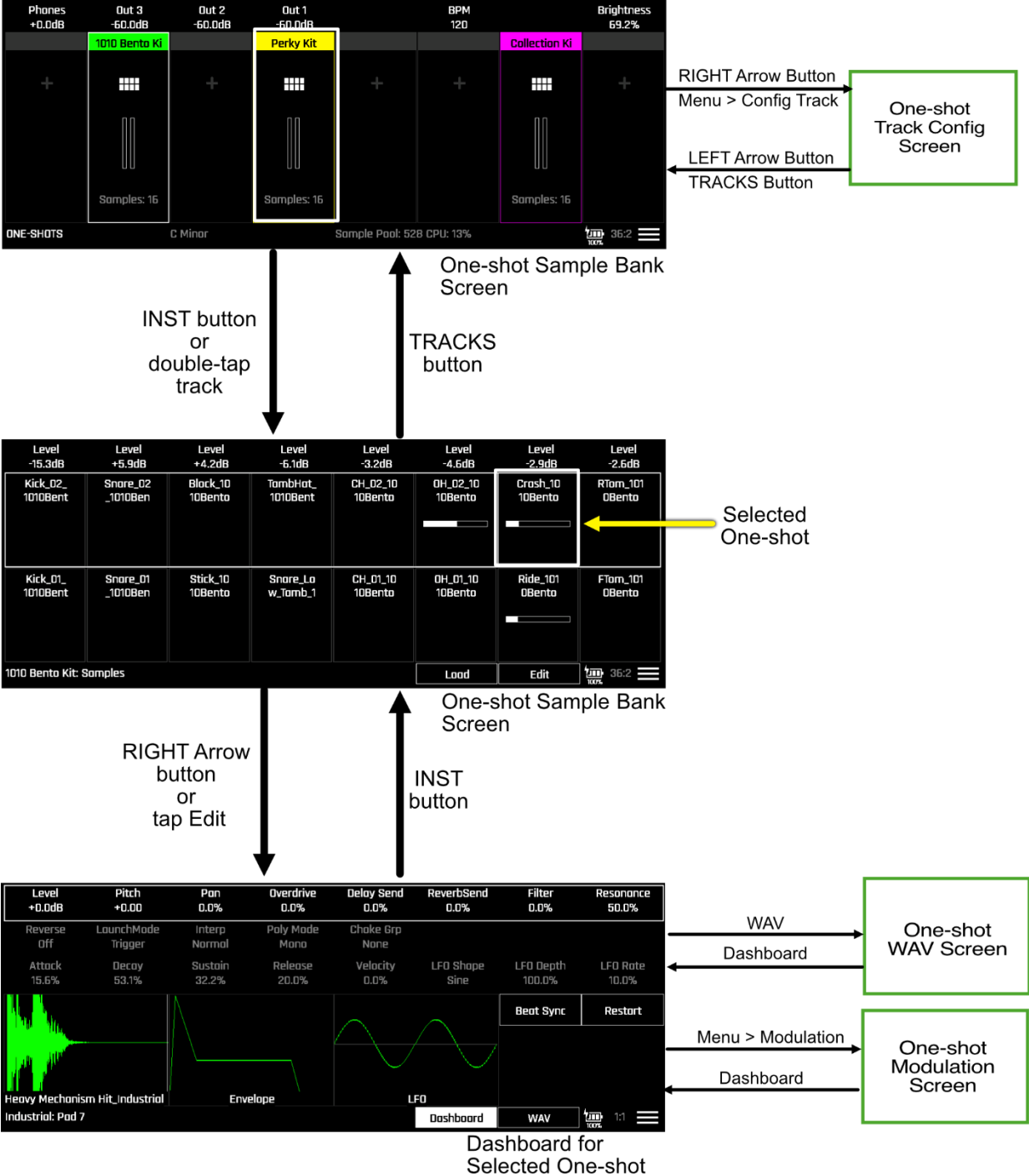


Figure 11-3: One-shot Track Screen Navigation

## Playing One-shot Tracks

One-shot tracks excel in live performance situations where you need immediate access to individual sounds. Each pad triggers its assigned sample with velocity and pressure sensitivity, providing dynamic control over your drum programming and percussive performance.

The direct pad-to-sample relationship makes One-shot tracks particularly effective for building rhythm tracks, adding percussion accents, and triggering sound effects at precise moments in your arrangements.

### Playing One-shot Tracks with bento's Pads

The hardware pads provide immediate tactile control over your One-shot samples, responding to both velocity and pressure for expressive performance possibilities.

#### To trigger One-shot samples with pads:

1. Select your One-shot track from the Tracks screen.
2. Press the pads to trigger individual samples.
3. Vary your touch pressure and velocity for dynamic control.

Each pad corresponds directly to a sample slot—pad 1 triggers sample slot 1, pad 2 triggers sample slot 2, and so forth. This consistent mapping makes it easy to develop muscle memory for drum patterns and percussive performances.



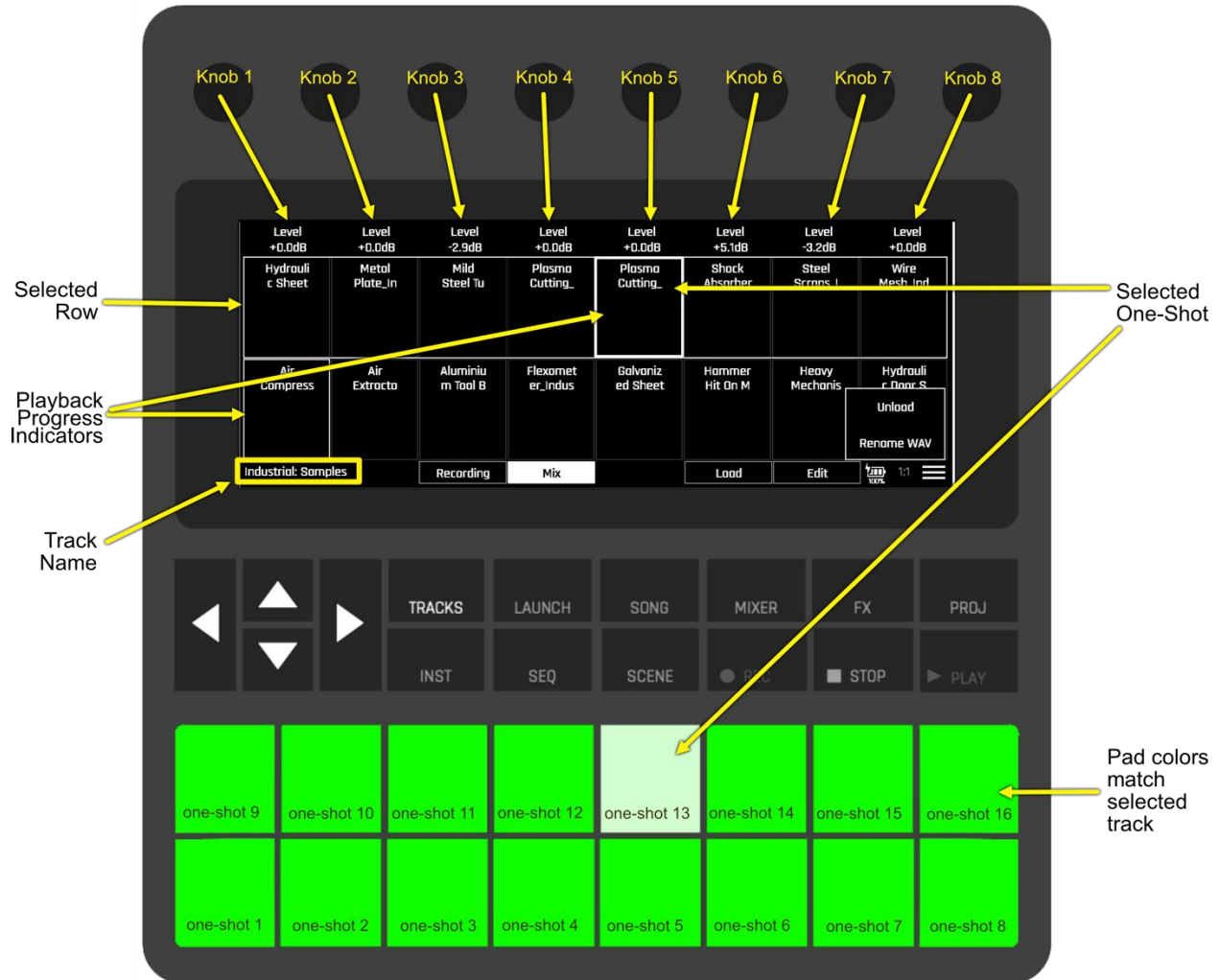


Figure 11-4: One-shot pad triggering with velocity response

The velocity-sensitive pads respond to your playing dynamics, allowing you to create natural-sounding drum performances with varying intensity levels. Light touches produce quiet sounds while firm presses generate louder outputs, mimicking the response of acoustic drums.

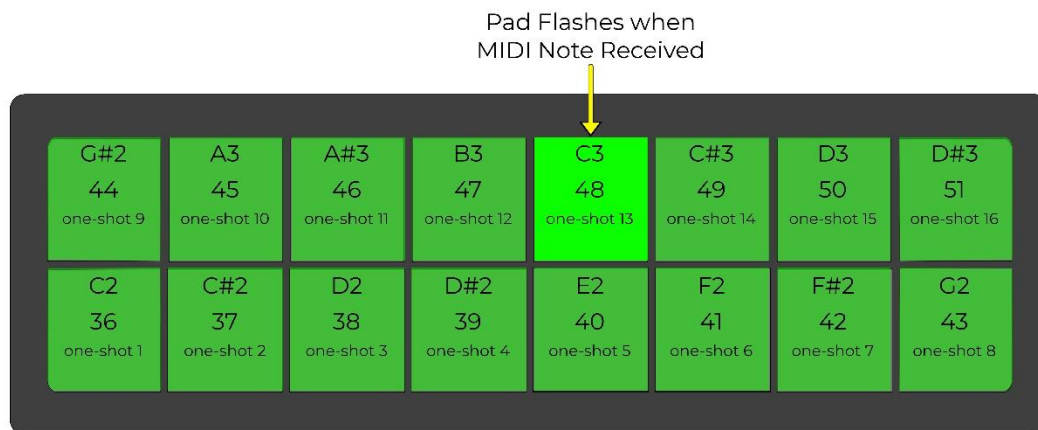
## Playing One-shot Tracks over MIDI

External MIDI controllers expand your performance possibilities and enable integration with sequencers, drum controllers, and keyboard instruments.

### To control One-shot tracks via MIDI:

1. Configure MIDI routing to your One-shot track.
2. Send MIDI note messages to trigger specific samples.
3. Use velocity data for dynamic control.

Bento maps One-shot samples to MIDI notes starting at C2 (MIDI note 36).



*Figure 11-5: MIDI Note to One-shot Mapping*

Sample slot 1 responds to C2, slot 2 to C#2, slot 3 to D2, and so forth. This standard drum mapping enables compatibility with drum machines, drum controllers, and DAW drum tracks.

MIDI velocity data translates directly to sample playback dynamics, allowing you to program realistic drum parts with varied intensity levels and create expressive performances through external controllers.

**Note:** If the One-shot Sample Bank Screen is open, each MIDI note-on makes a pad a little brighter than the other pads to show it is playing. The most recently triggered pad turns white to show it is selected for editing.

## Editing One-shot Tracks

One-shot tracks provide comprehensive editing capabilities for both individual samples and overall track behavior. Understanding these parameter groups helps you create polished drum kits and percussion instruments that integrate seamlessly into your musical arrangements.

The editing workflow balances sample bank management with detailed parameter control, allowing you to organize your sounds effectively while fine-tuning individual sample characteristics.

## Editing One-shot Sample Banks

The one-shot sample bank provides tools for loading, organizing, and replacing samples within your One-shot track. These operations affect the sample assignments without changing the underlying track voice parameters.

Sample bank editing focuses on the practical aspects of building and maintaining your sample collections, ensuring that your One-shot tracks contain the sounds you need for your musical projects.

## Loading Samples into Empty Slots

Adding new samples to empty slots expands your One-shot track's capabilities and builds custom instrument collections.

Level +5.2dB	Level +4.0dB	Level +6.6dB	Level +3.7dB	Level +3.5dB	Level +1.3dB	Level +6.6dB	Level +4.8dB
Kick Degraded	Snare Degraded	Tamb Degraded	Snap Degraded	CH Lite 02_Vinyl	OH Clean 01	Crash Clean_Vi	Tom Degraded
Kick Dark Har	Snare Clean 01	Guira Clean_Vi	+	CH Lite 01_Vinyl	OH Degraded	Ride Phaser_V	Tom Degraded
Vinyl Kit 1: Samples					Load	Edit	100% 1:1

Figure 11-6: Empty One-shot Available for Loading a Sample

## To load a sample into an empty one-shot:

1. Select an empty slot in your One-shot Sample Bank, then tap **Load**.

The sample browser screen opens.

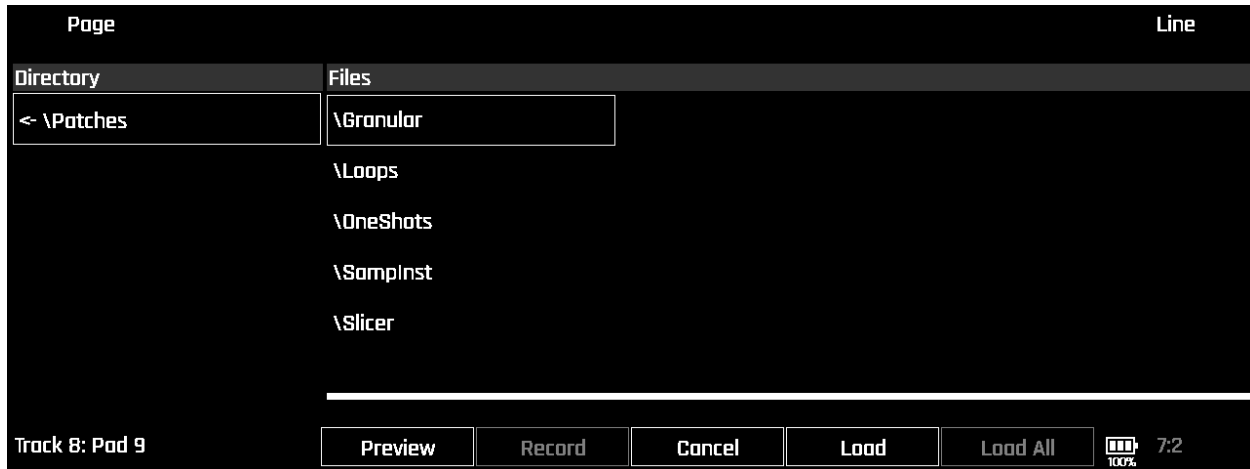


Figure 11-7: Sample Browser Screen for One-shot Tracks

The current directory appears in the Directory column. The current directory's contents appear in the Files area. "<-" appears to the left of the current directory name to indicate that it is a control for navigating up to the parent of the current directory.

2. Navigate to bento's patch folders on the microSD card.
  - To open a directory listed in the Files area, tap the directory name, then tap **Load**.
  - To open the parent of the current directory, tap the current directory's name in the Directory column.

Bento's factory samples are in the top-level Patches folder, organized by patch type (Granular, Loops, etc.). You can load samples from any of these categories, even if they were not originally intended to be played as a one-shot.

3. To hear a preview of a sample before you load it, tap **Preview**.

When you select samples with Preview enabled, bento starts playing the sample.

4. When you have selected a sample to load, tap **Load**.

Bento re-opens the Sample Bank screen, with your chosen sample loaded in the selected one-shot.

The newly loaded sample becomes immediately available for triggering through the corresponding pad.

## Unloading Samples

Removing samples from your One-shot track frees up memory resources and simplifies your sample bank organization.

### To unload a one-shot:

1. Select the sample slot containing the sample you want to remove.
2. Tap the menu icon in the lower right.
3. Choose the **Unload** option to remove the sample from the slot.

The slot becomes empty and available for new sample assignments. Unloading samples helps you manage bento's 576-sample limit across all tracks and keeps your sample banks focused on currently needed sounds.

## Replacing Samples in the Sample Bank

Substituting existing samples allows you to update your drum kits and percussion collections without rebuilding entire sample banks.

### To replace an existing sample:

1. Select the sample slot containing the sample you want to replace.
2. Tap **Load**.
3. Choose a new sample to substitute for the existing one.
4. Tap Load to complete the swap.

The new sample inherits the voice parameter settings from the previous sample, maintaining consistent sound character while providing new source material. This approach preserves your parameter tweaks while updating the underlying audio content.

## Editing Voice Parameters in the One-shot Dashboard

Each One-shot Dashboard provides immediate access to a specific One-shot’s voice parameters, organized into four parameter groups: Main, Config, Envelope, and LFO. The parameter group selection buttons allow quick switching between different parameter sets using the same eight knobs.

### To navigate to the One-shot Dashboard:

1. Open the One-shot Sample Bank screen from the Tracks screen by selecting the One-shot track and pressing **INST**.
2. In the Sample Bank screen, select the One-shot you want to edit and then either tap **Edit** or push the **Right Arrow** button.

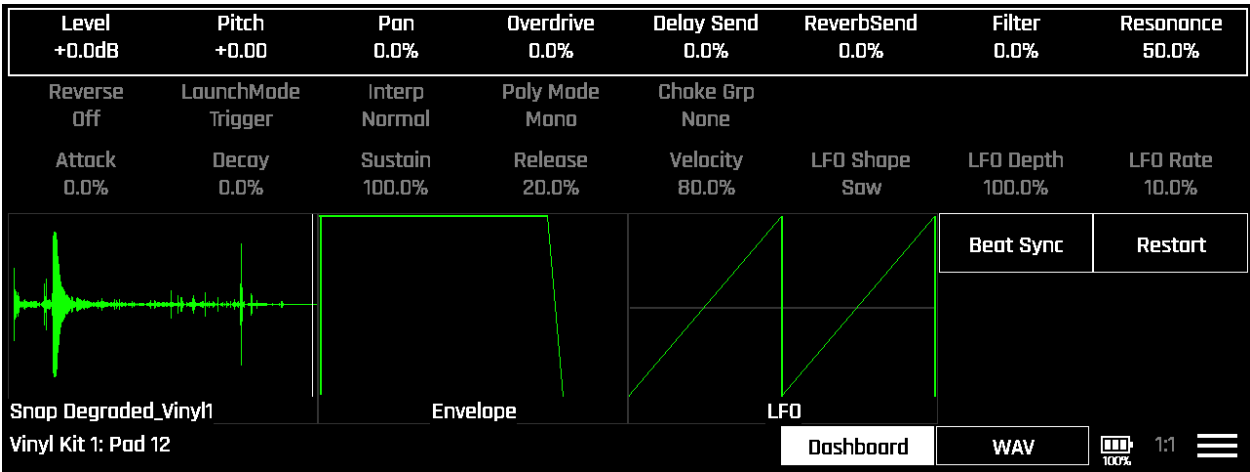


Figure 11-8: One-shot track dashboard showing common voice parameters

The One-shot track parameters are arranged in three rows. The bottom half of the screen contains three graphs that display the sample waveform, the envelope shape, and LFO shape.

3. To edit a parameter, tap anywhere in the parameter’s row or tap one of the graphs, then use knobs 1-8 to adjust the parameters mapped to them.
4. To view or edit the Dashboard settings of another One-shot in same track, press the INST button or the Left Arrow button, then open the Dashboard again with the Right Arrow button or by tapping Edit.

**Note:** You can also switch to the Dashboard of another One-shot without returning to the Sample Bank screen by playing the corresponding pad (1-16) or playing the corresponding note (C1/26 to D#2/51) from a MIDI controller. Bento indicates which One-shot is currently selected by changing the corresponding pad color to white.

To edit one-shot track parameters in row 1:

- 1. Tap on any of the parameters in row 1 or tap the waveform graph in the lower half of the screen. Knobs 1-8 correspond to the parameters of row 1.

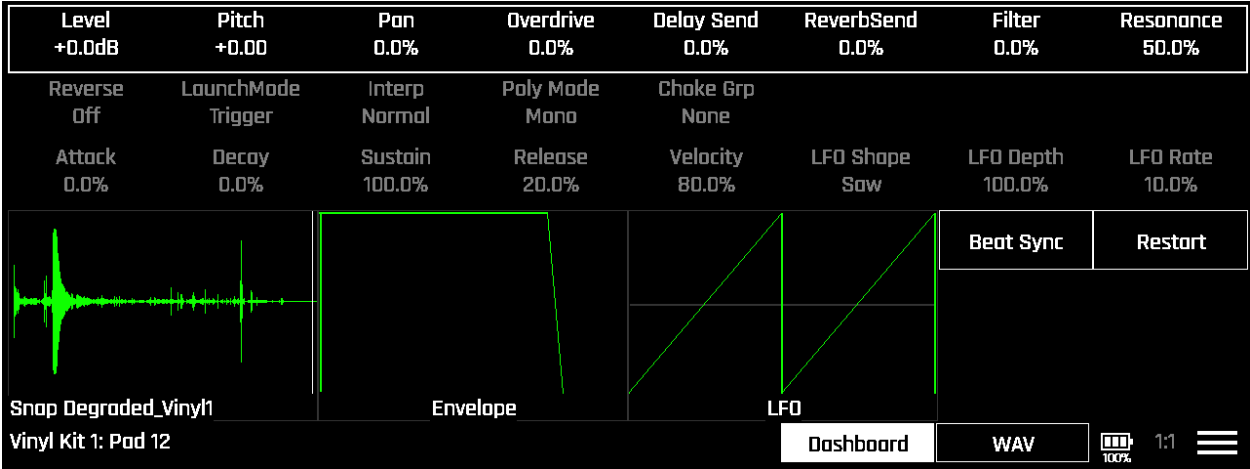


Figure 11-9: One-shot Dashboard with Row 1 Selected

- 2. To adjust the parameters, use the knobs mapped to them.  
  
The following table describes the parameters in row 1 of the One-shot Dashboard and the knobs mapped to them

*Table 11-2: One-shot Track Parameters in Row 1*

<b>Parameter</b>	<b>Knob</b>	<b>Range</b>	<b>Description</b>	<b>Modulation Target?</b>
Level	1	-96dB to +12dB	Overall track volume	Yes
Pitch	2	-24 to +24 semitones	Global pitch offset for entire track	Yes
Pan	3	-100% to +100%	Stereo positioning from full left to full right	Yes
Overdrive	4	0 to 100%	Sets the level of distortion applied to the one-shot's output audio. Caution: Overdrive causes significantly higher track audio levels.	Yes
Delay Send	5	0 to 100%	One-shot signal level sent to bento's Delay effect.	Yes
Reverb Send	6	0 to 100%	One-shot signal level sent to bento's Reverb effect.	Yes
Filter	7	-100% to 100%	Filter cutoff frequency. Negative values control a low pass filter. Positive values control a high pass filter.	Yes
Resonance	8	0 to 100%	Filter resonance amount	Yes



To edit one-shot track parameters in row 2:

- 1. Tap on any of the parameters in row 2. Knobs 1-8 correspond to the parameters of row 2.

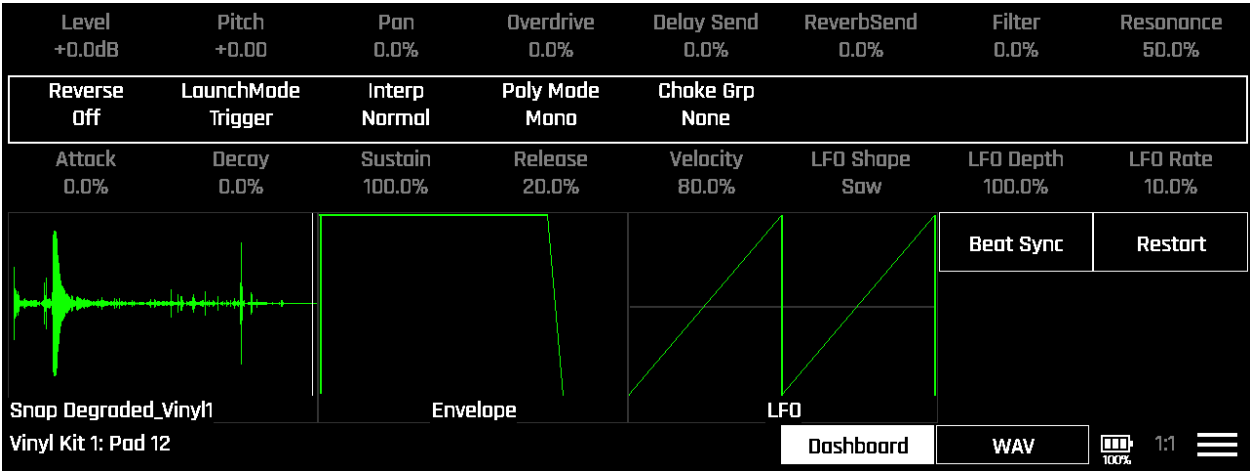


Figure 11-10: One-shot Dashboard with Row 2 Selected

- 2. To adjust the parameters, use the knobs mapped to them.

The following table describes the parameters in row 2 of the One-shot Dashboard and the knobs mapped to them

Table 11-3: One-shot Track Parameters in Row 2

Parameter	Knob	Range/Options	Description	Modulation Target?
Reverse	1	Off, On	When On, One-shot plays backwards, starting at its end position and ending at its Start position, according to the Start and Length parameters, set in the One-shot Wav screen.	No

Parameter	Knob	Range/Options	Description	Modulation Target?
Launch Mode	2	Trigger, Gate, Toggle	<p>Trigger: Play the track from the pads or from a MIDI controller. bento will start playback of the WAV file and play through to the end.</p> <p>Gate: Begin the WAV file playback in the same manner as Trigger mode. But in Gate mode, playback will stop when you release the pad or the MIDI note.</p> <p>Toggle: Begin the WAV file playback in the same manner as Trigger mode. When another trigger event happens for this note, the playback will stop.</p>	No
Interp	3	Normal, High Q	<p>Sample quality when samples are transposed. To conserve CPU, choose Normal unless you hear artifacts that are improved by High Q mode.</p>	No
Poly Mode	4	Mono, Poly 2, Poly 4, Poly 6, Poly 8, and Poly X	Maximum simultaneous notes for this One-shot track. Poly X will make use of all notes available.	No
Choke Group	5	None, A, B, C, D	Joins the one-shot to one of four “choke” groups (A-D), in which no two one-shots can play simultaneously. Typically used to deliver realistic open/closed/in-between hi-hat response when playing multiple hi-hat one-shots from multiple pads.	No

### To edit envelope and LFO parameters in row 3:

1. Tap on any of the parameters in row 3. Knobs 1-8 correspond to the parameters of row 3 or tap the envelope or LFO graphs in the lower half of the Dashboard.

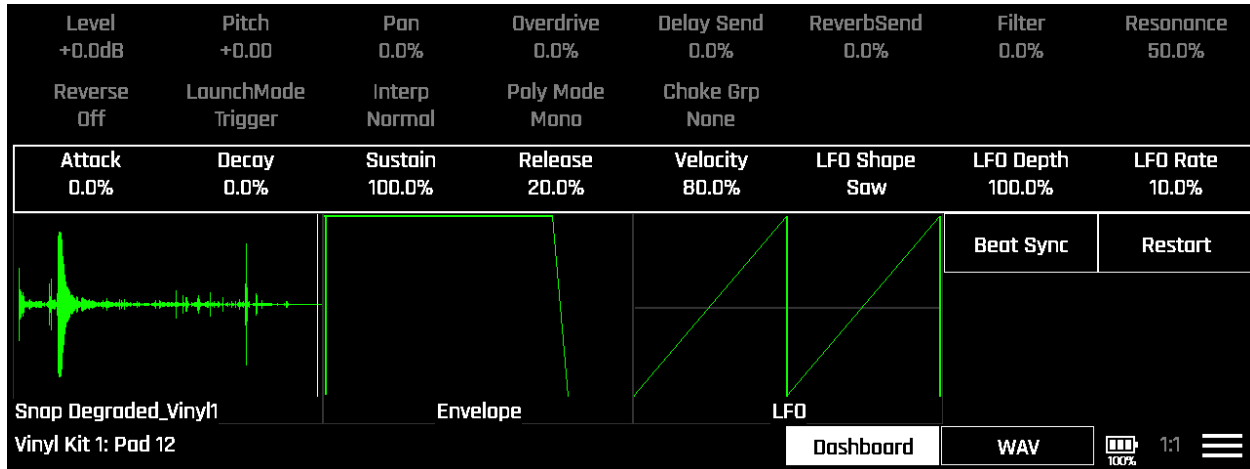


Figure 11-11: One-shot Dashboard with Parameter Row 3 Selected

2. To adjust the parameters, use the knobs mapped to them.

The following table describes the parameters in row 3 of the One-shot Dashboard and the knobs mapped to them.

Table 11-4: One-shot Envelope and LFO Parameters in Row 3

Parameter	Knob	Range	Description	Modulation Target?
Attack	1	0 to 100% 100% = 9 seconds	Envelope attack time	Yes
Decay	2	0 to 100% 100% = 38 seconds	Envelope decay time	Yes
Sustain	3	0 to 100%	Envelope sustain level	No
Release	4	0 to 100% 100% = 38 seconds	Envelope release time	Yes
Velocity	5	-100 to 100%	Velocity sensitivity amount. Negative values cause an inverse response to the velocity.	No
LFO Shape	6	Sine, Pos Sine, Triangle, Pos Tri, Square, Pos Square, Saw, Rev Saw, Random	LFO shape selection	No

Parameter	Knob	Range	Description	Modulation Target?
LFO Depth	7	0 to 100%	LFO modulation intensity	Yes
LFO Rate	8	If Beat Sync is Off: 0 to 100% If Beat Sync is On: 8 bars, 4 bars, 2 bars, 1 bar, 1/2, 1/2T, 1/4, 1/4 T, 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32 T, 1/64	LFO speed from slow to fast	Yes
Beat Sync	n/a	Off, On	Synchronize LFO to project tempo	No
Restart	n/a	Off, On	Reset LFO phase on each note	No

## Editing One-shot Modulation

Each bento track includes a central Modulation screen within which you can configure all modulation settings.

The modulation system enables dynamic control of One-shot parameters through various sources such as note velocity, envelopes, LFOs, and external MIDI controllers.

The specific modulation sources available vary with each track type.

### To configure One-shot modulation:

1. Open the One-shot Dashboard, then tap the **Menu** icon in the lower right corner of the screen. The **Menu** opens, displaying a single option, **Modulation**.

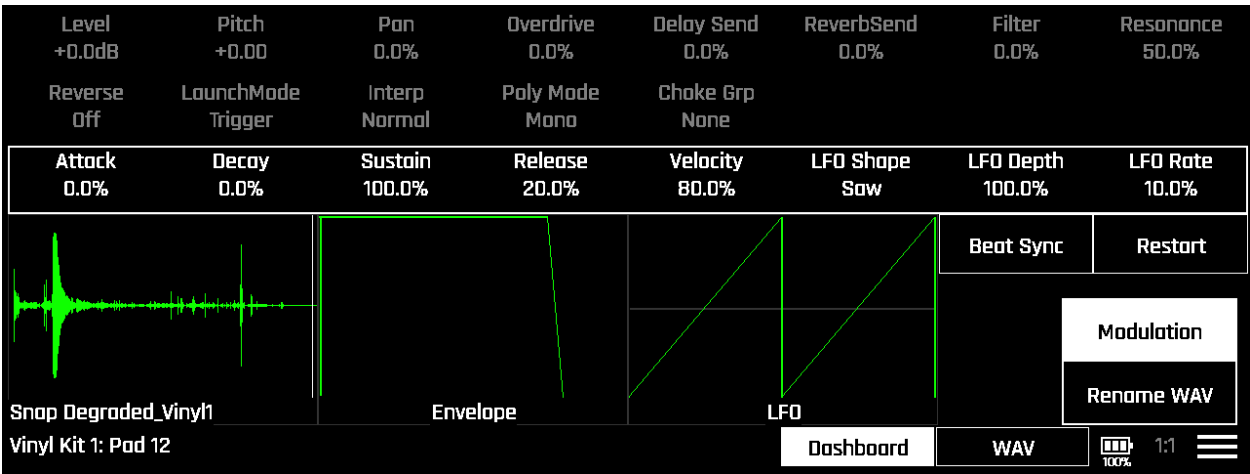


Figure 11-12: One-shot Dashboard Modulation Menu Option

Tap Modulation.

The One-shot Modulation Screen opens.

Line	Source 1	Amount 1 0.0%	Source 2	Amount 2 0.0%	Source 3	Amount 3 0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
Level	[None]		[None]		[None]		3
Pitch	[None]		[None]		[None]		28
Pan	[None]		[None]		[None]		
Attack	[None]		[None]		[None]		
Decay	[None]		[None]		[None]		
Release	[None]		[None]		[None]		
1 On Ninth EDM Kit: Pad 1	[None]		[None]		[None]		


Dashboard  100% 1:1

Figure 11-13: One-shot Track Modulation Screen

The first column in the Modulation screen contains the name of every One-shot parameter that can be a modulation “target.” Columns 2 through 7 let you set up three modulation sources and three modulation amount values for the modulation target of the selected row. The CC column is a reference for use when setting up MIDI CC control. Note that each pad in a one-shot track has a different CC number mapping to allow control of parameters for individual pads.

2. To see the complete list of modulation targets in the Modulation screen you can do any of the following:
- swipe the screen up or down,
  - turn Knob 1 to scroll up and down through the Modulation screen, or
  - use the **Up Arrow** and **Down Arrow** buttons to move the line selection.
3. Select the line of the parameter you want to modulate, then use Knobs 2-7 to configure one or more modulation sources and modulation levels.

The following table describes the parameters you can modulation, the modulation sources you can route to them, and the range of modulation levels.

*Table 11-5: Modulation Parameters Mapped to bento Knobs*

Parameter	Knob	Range	Description
Line	1	Level, Pitch, Pan, Attack, Decay, Release, Filter Cutoff, Filter Resonance, LFO Depth, LFO Rate	Moves the Modulation screen's line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.
Source 1	2	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (1 of 3)
Amount 1	3	-100% to +100%	Modulation Amount (1 of 3)
Source 2	4	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (2 of 3)
Amount 2	5	-100% to +100%	Modulation Amount (2 of 3)
Source 3	6	Velocity, LFO, Mod Wheel, MIDI Vol, MIDI Pan	Modulation Source (3 of 3)
Amount 3	7	-100% to +100%	Modulation Amount (3 of 3)

4. To return to the One-shot Dashboard, tap **Dashboard** or press **INST**.

## Viewing the One-shot WAV Screen

The One-shot WAV screen provides a live view of sample playback and controls for the Start, Length and direction of playback of the sample

### To access the One-shot WAV screen:

1. From the One-shot Dashboard, tap **WAV** in the navigation area.  
The Waveform screen opens.

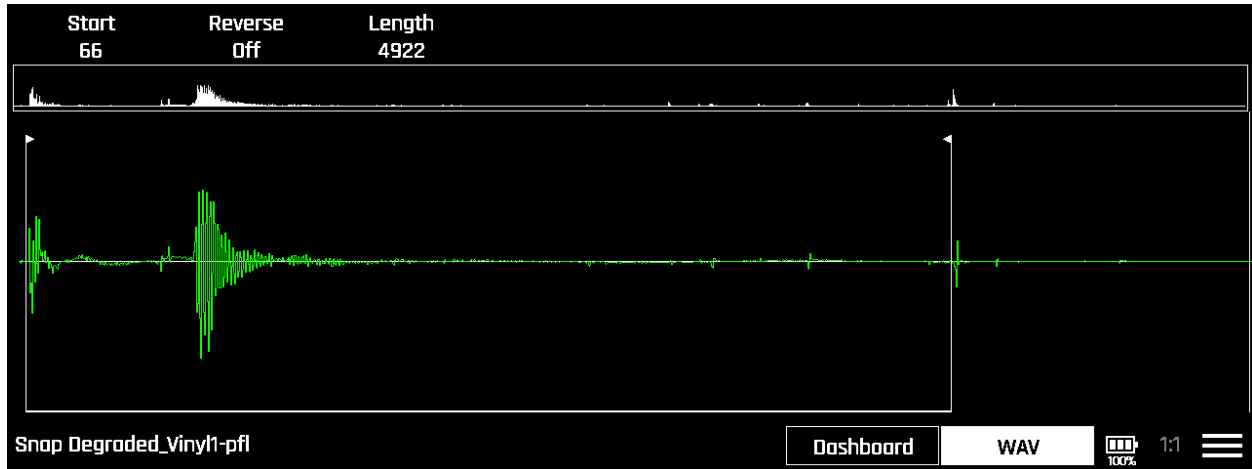


Figure 11-14: One-shot WAV screen

When you play a note from the pads, sequencer, or over MIDI, a vertical line moves across the waveform display.

2. Zoom in or out on the waveform by pinching or spreading the touchscreen with two fingers.
3. Scroll through the waveform by swiping left or right on the touchscreen.
4. To change the One-shot's start and end sample positions, or change its playback direction, use Knobs 1-3.

As you adjust Knob 1 and Knob 3, the Waveform display moves the start and end points between which the One-shot plays. A vertical white line moves across the waveform when the One-shot is played.



The following table describes the three parameters mapped to Knobs 1-3 and how they affect the playback of the One-shot.

*Table 11-6: One-shot WAV Screen Parameters*

Parameter	Knob	Range	Description	Modulation Target?
<b>Start</b>	1	0 – sample length	Sets the sample position from which the One-shot begins playback. If <b>Reverse</b> is On, playback ends at the Start position.	No
<b>Reverse</b>	2	Off, On	When <b>Reverse</b> is On, the One-shot plays backwards within the range specified by the Start and Length parameters.	No
<b>Length</b>	3	0 – sample length	Sets the number of samples that get played, which bento uses as an offset from the Start point to calculate the “end” sample position at which the One-shot ends playback. If <b>Reverse</b> is On, playback starts at the “end” sample position and ends at the Start position.	No

**Note:** The Waveform screen displays the sample of the One-shot that was selected when you tapped WAV in the Dashboard or when you pushed the Right Arrow button to open it, even if you change the selected One-shot from the pads or from a MIDI controller.

Tap **Dashboard** to return to the One-shot Dashboard.

## Editing the One-shot Sample in the WAV Edit Screen

You can open the One-shot's sample in bento's WAV Edit screen to to:

- Trim the sample.
- Normalize the sample.

Bento saves the edited WAV file to the current project's folder on microSD card.

### To edit the one-shot sample in the WAV Edit screen:

1. Open the one-shot's Dashboard by tapping the one-shot in the One-shot Sample Bank screen and tapping **Edit**.
2. In the one-shot's Dashboard, tap **WAV** to open the Waveform screen.

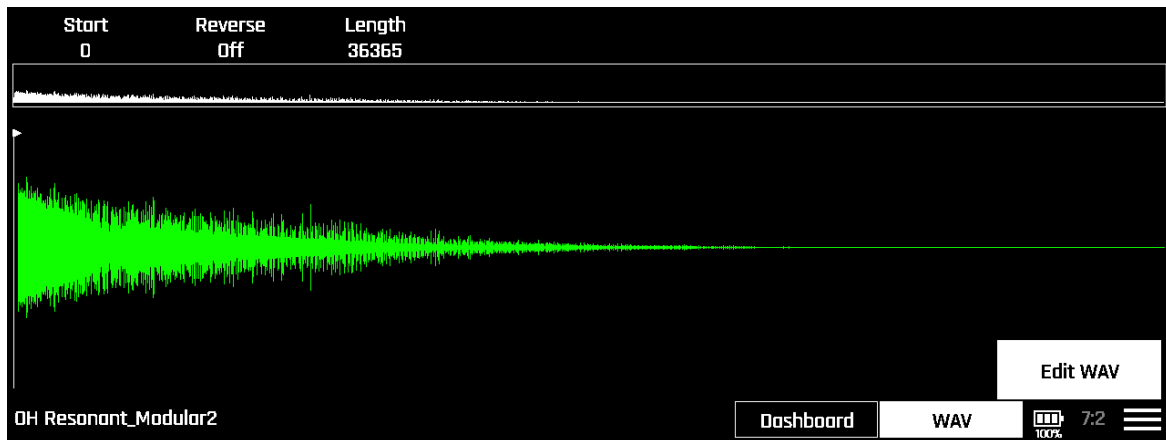


Figure 11-15: One-shot WAV Screen Menu with Edit WAV Selected

3. Tap the **Menu** icon, then tap **Edit Wav** to open the WAV Edit screen.

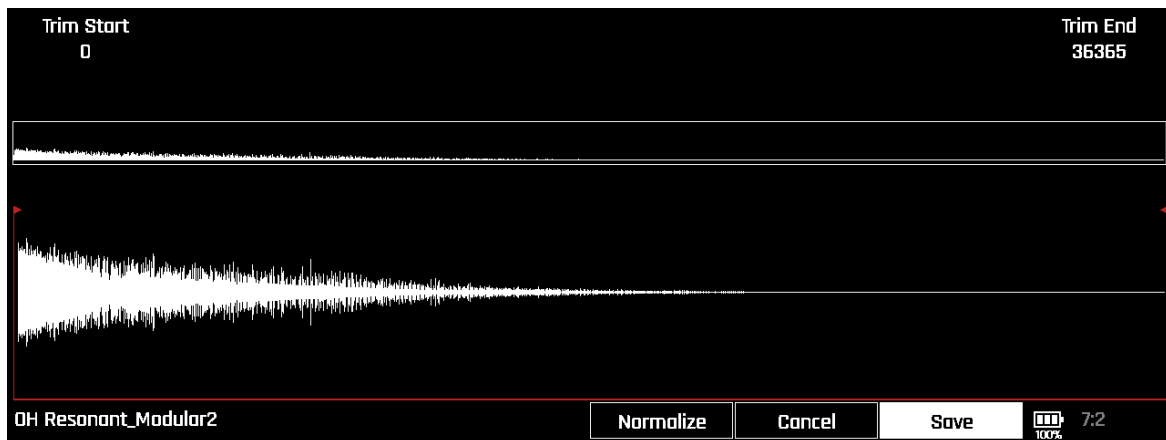


Figure 11-16: Wave Edit Screen with One-shot Sample

**Important:** If you choose **Save** after editing the waveform, bento will create a new WAV file with your edits, bento will save it to the current project's folder on the microSD card and update the track to use the new sample, but bento does not save the current project automatically.

4. To change the sample's start position, adjust **Trim Start** with Knob 1.
5. To change the sample's end position, adjust **Trim End** with Knob 8.
6. To normalize the entire sample, tap **Normalize** to turn it on.
7. To save your edits, tap **Save**. The edited Waveform now appears in the One-shot's Dashboard, indicating that bento has edited the track to use the new WAV file.
8. To save the project with the edited track, press **PROJ**, then tap **Save**.

## Editing Track Configuration Settings

Track configuration settings include output routing for complex mixing scenarios, and MIDI channel options for inbound and outbound note messages.

### To navigate to the One-shot Track Configuration Screen:

1. Open the Tracks screen and select the One-shot track you want to configure, then push the **Right Arrow** button. The One-shot Track Configuration screen opens.



Figure 11-17: One-shot Track Configuration Screen

2. Use bento's knobs to edit the One-shot Track Configuration settings. The following table describes the parameters mapped to bento's eight knobs.

Table 11-7: One-shot Track Config Parameters

Parameter	Knob	Range	Description
Output	1	1, 1 w/Mod FX, 2, and 3	Audio output routing destination.
MIDI In Ch	6	None, 1-16	MIDI input channel for launching One-shots from external controllers. Pads 1-16 respond to MIDI notes 36-51.
MIDI OutPrt	7	ALL (1 and 2 are not functional values)	MIDI Output port
MIDI OutCh	8	None, 1 – 16	Output MIDI channel

3. To return to the Tracks screen, press **TRACKS**.

## Recording New Samples in One-shot Tracks

Bento's sample recording workflow supports both recording external audio input and resampling of bento's main audio output buss, providing flexibility for capturing live performances, sampling other tracks.

### Connecting Audio Sources for One-shot Recording

Input level optimization prevents distortion while ensuring that your recorded samples have sufficient dynamic range and low noise floor. Proper monitoring during setup saves time and ensures consistent recording quality.

#### To prepare external audio sources:

1. Connect your audio source to one of bento's audio inputs.
2. Monitor the input signal through bento's input metering. See [Adjusting the One-shot Recording Settings](#).
3. Set your audio source level and the bento **Rec Gain** to avoid clipping and adjust while maintaining good signal-to-noise ratio. The input meter on the pad should stay as high as possible without entering the red range.
4. Test the audio path before beginning recording sessions.

## Adjusting the One-shot Recording Settings

Recording configuration affects both the technical quality and musical integration of your recorded samples. Proper setup ensures that recorded content synchronizes correctly with existing project elements and maintains consistent audio characteristics.

The One-shot Sample Bank's recording configuration screen prepares One-shot tracks for capturing new audio with appropriate timing, quality, and integration settings.

1. Select the One-shot track in the Tracks screen, and push **INST** to open the One-shot Sample Bank screen.
2. Select an empty one-shot cell.
3. From the One-shot Sample Bank screen, tap **Recording** at the bottom of the screen.

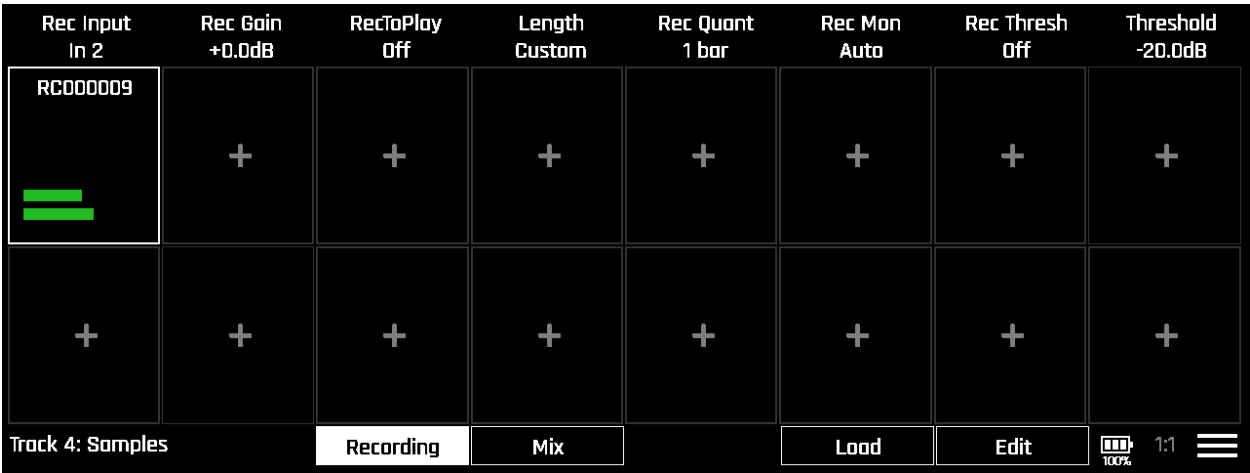


Figure 11-18: One-shot recording configuration showing length, timing, and sync settings

4. Set the one-shot recording settings with bento's knobs. Watch the input meter that appears on the one-shot cell to ensure you have the correct input selected and the proper gain amount.

The following table describes the one-shot recording options:

*Table 11-8: One-shot Recording Settings in the One-shot Sample Bank Recording Screen*

Parameter	Knob	Range	Description
Rec Input	1	1, 2, 3, 1L, 2L, 3L, or Resample	Audio source for sample recording. Use 1L, 2L or 3L for mono recording while sending a signal into the left channel of the corresponding input.
Rec Gain	2	-60dB to +6dB	Audio input gain.
RectoPlay	3	On, Off	Set to On to start playing the one-shot as soon as recording stops.
Length	4	Custom, 1/4 to 128 bars.	Specify length of new sample recordings before recording starts. If Length is "Custom," recording starts by pressing and holding the <b>REC</b> button then pressing the <b>PLAY</b> button while the transports are running and recording ends when you push the <b>STOP</b> button.
Rec Quant	5	8 bars – 1/16, None	Quantizes recording to start at a specific beat or measure division after the <b>REC</b> button is pressed, so that recordings start and end in sync with bento's transport.
Rec Mon	6	Off, Auto, On	Specifies when audio inputs are played out through bento's main audio output. When set to Auto, monitoring is only heard while actively recording.
Rec Thresh	7	Off, On	When Rec Thresh is "On," sample recording waits for audio input level to go over the Threshold.
Threshold	8	-96.0 dB to 0.0 dB	Sets a recording threshold for sample recording when Rec Thresh is On.

## Recording New Samples

The one-shot recording process captures audio input as new one-shot content that immediately becomes available for triggering and arrangement integration.

### To record a new one-shot sample:

1. Open the One-shot Bank's Recording screen.
2. Select an empty one-shot with bento's touchscreen, bento's pads or from a MIDI controller (notes 36-51).
3. If wanted, launch any sequences or loops that you want to hear while recording.
4. Press and hold **REC**, then press the **PLAY** button to start recording at the next Quant time.

The One-shot Bank Recording screen shows the recording progress in the form of bars:beats. This real-time monitoring helps you capture precise sample lengths and musical timing for seamless integration.

If the one-shot recording **Length** parameter is anything other than Custom, recording will stop automatically after recording the specified number of beats.

5. If Length is Custom, press **REC** or **STOP** to end the recording at the next "quant" time.

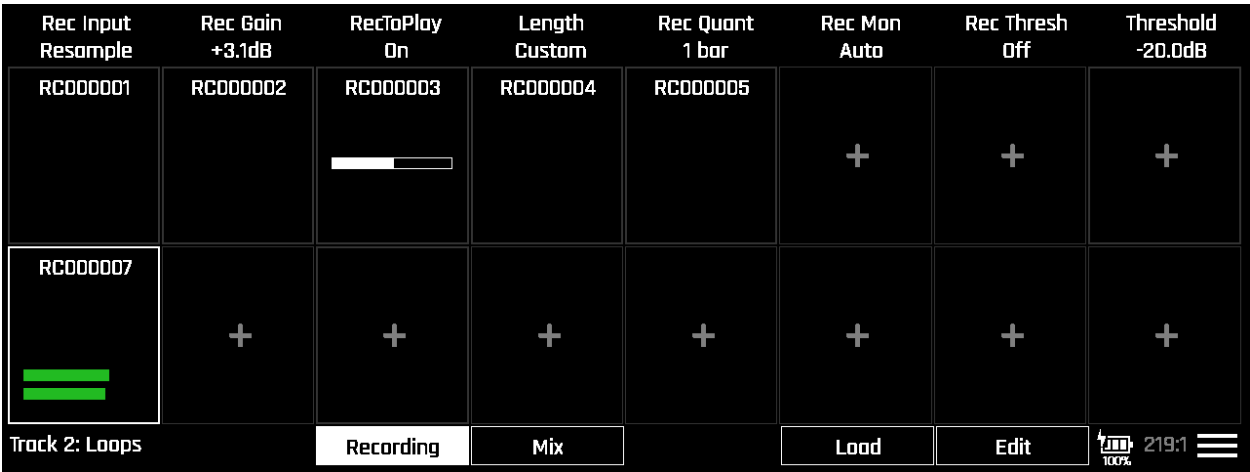


Figure 11-19: One-shot #1 Selected for Recording

6. To record additional one-shots, select other cells, then press **REC** and **PLAY** to start and end each recording.
7. If you are dissatisfied with a new one-shot and want to try recording into the same one-shot slot, choose **Unload** from the One-shot Sample Bank Menu.



The new recording is unloaded from the One-shot Sample Bank, and you can continue recording into the same cell. Unloading does not remove the WAV file from the microSD card.

Bento stores each new sample in the root of your current project's folder on the microSD card. Filenames start with RC000001 and increment with each successive recording. You do not have to save the project to keep new recordings.

**Note:** New recordings are available for use in any of bento's other sample-based tracks.

To rename a one-shot sample file, tap the Sample Bank Menu icon and choose **Rename WAV**, enter the new name in the Sample Naming screen, and tap **Enter**.

# Creating New One-shot Tracks

Setting up effective One-shot tracks requires planning your One-shot organization and selecting appropriate source material for your intended rhythmic applications. The process involves both technical considerations about One-shot characteristics and creative decisions about arrangement structure.

A well-designed One-shot track balances rhythmic coherence with dynamic possibility, providing the foundation elements you need while enabling flexible real-time arrangement development.

## To create a new One-shot track:

1. Double-tap an empty track slot in the Tracks screen.
2. When the patch browser appears, tap **New**, then select **One-shot** from the track type options.

Bento creates the new One-shot track and opens the One-shot Sample Bank screen.

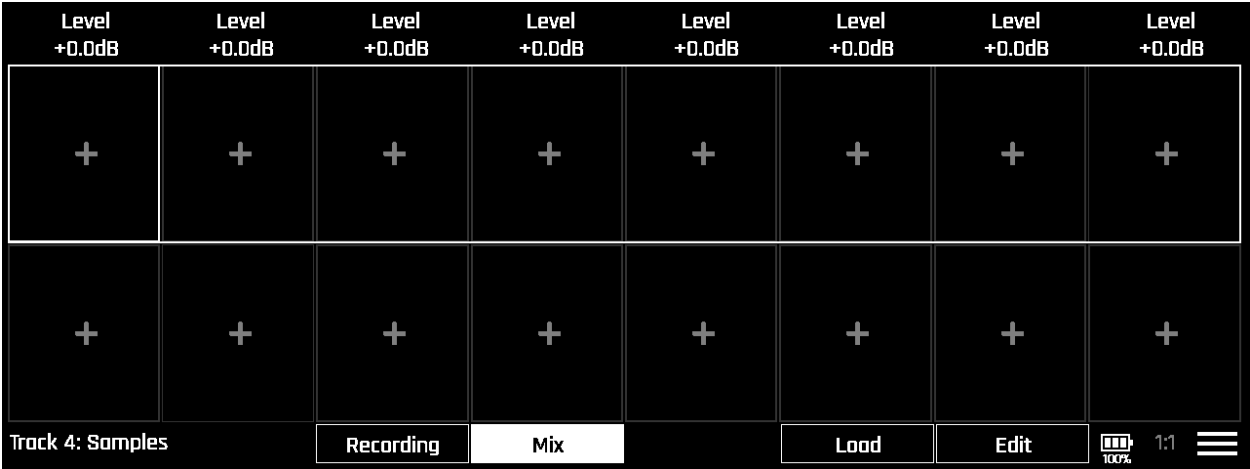


Figure 11-20: Initial One-shot Sample Bank

3. Assemble your One-shot Sample Bank by loading, unloading, or replacing One-shots as described in *Editing One-shot Sample Banks*.
4. Configure One-shot voice parameters as described in *Editing Voice Parameters in the One-shot Dashboard*.
5. Save the new One-shot track with the other tracks in the current project.

## 12: Exploring Wavetable Tracks

---

Wavetable tracks provide a flexible and expressive form of synthesis, combining two independent wavetable oscillators with comprehensive modulation and effects processing. Each wavetable track can load two different wavetables and process them through separate signal paths with independent wavetable positions, filters, and modulation sources. A periodic waveform oscillator signal is then added to the mix to add even more character to the sound. There is also an envelope to control the over all voice and a separate envelope strictly for modulation.

*Table 12-1: Chapter 6 Navigation*

To do this...	read...
Understand how wavetable synthesis works on bento	<a href="#"><i>Understanding Wavetable Tracks</i></a>
Play wavetable tracks using pads and MIDI	<a href="#"><i>Playing Wavetable Tracks</i></a>
Edit voice parameters and wavetable - specific controls	<a href="#"><i>Editing Wavetable Tracks</i></a>
Configure audio and MIDI routing	<a href="#"><i>Editing Wavetable Track Configuration Settings</i></a>
Create new wavetable tracks from scratch	<a href="#"><i>Creating New Wavetable Tracks</i></a>
Apply best practices for wavetable synthesis	<a href="#"><i>Best Practices for Wavetable Tracks</i></a>

## Understanding Wavetable Tracks

Wavetable synthesis makes use of a group of waveforms in a manner that supports switching between samples in real time to add expressiveness and variety to the sound. This group of waveforms is called a wavetable. The result is a 'wavetable oscillator' - a sophisticated alternative to the simple sample playback engines found in other track types.

Wavetables can be created from a variety of recordings, allowing for a wide range of sounds. By using modulation to select a file or 'position' within the wavetable, you can add variety and expressiveness to each note.

Due to the complexity of wavetables, bento does not support recording your own wavetables, but it does allow you to make use of mono wavetables that are widely available.

**Note:** An updated factory patch pack is available on the 1010music website that includes 65 wavetable patches. Because wavetable synthesis was added to bento after the initial release of the product, you will need to download this update to get the factory wavetable patches. You can find the patch pack on the [1010music Downloads page](#).

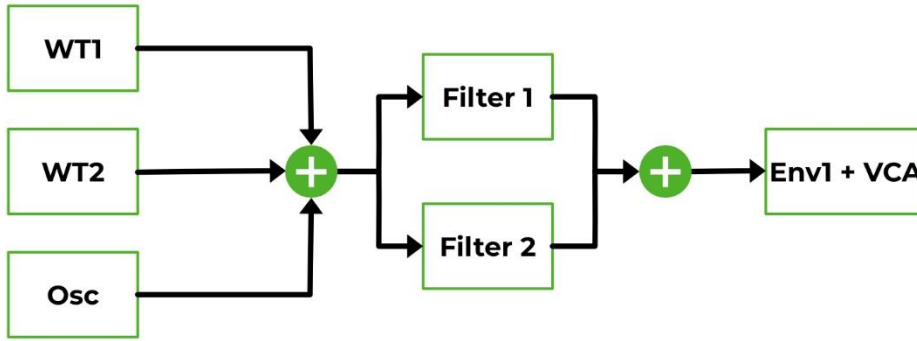
### Wavetable Track Architecture

Each wavetable track has two wavetable oscillators, each of which can load a different wavetable and select wavetable position independently.

You can customize the sound with a third periodic waveform oscillator, 2 filters, 2 envelopes, 2 LFOs, a modulation sequencer and effects engines, with everything accessible from a small number of wavetable track editor screens.

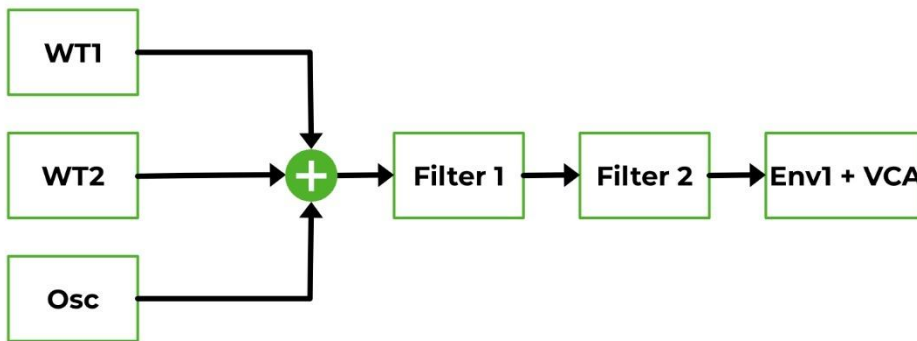
The signal flow of each wavetable track voice resembles that of traditional synthesizer voices, with a mix of one or more oscillators fed into a filter and on to an Envelope+VCA for final dynamics processing before routing to a voice mixer and effects. What makes bento's Wavetable tracks different, however, is its ability to route the oscillators through two separate filters in two different configurations.

The following figure shows the signal flow when the filters are configured in parallel.



*Figure 12-1: Wavetable Track Voice Signal Flow with Parallel Filter Configuration*

The following figure shows the signal flow when the filters are configured in series.



*Figure 12-2: Wavetable Track Voice Signal Flow with Series Filter Configuration*

For details on configuring wavetable track filter configuration, see Editing Wavetable Track Filters [Editing Granular Track Filters](#).

## Wavetable Track Control Screens

Bento organizes wavetable track controls across two main screens:

- The Wavetable Track Dashboard provides a view of both wavetable oscillators with animated representations of wavetable position and quick access to essential parameters from bento's 8 knobs.
- The Track Configuration screen provides control over track-level settings for audio output and MIDI configuration.

## Playing Wavetable Tracks

Wavetable tracks respond to musical input like other bento track types do, triggering notes that play through the wavetable oscillators and voice architecture. You can play wavetable tracks using bento’s built-in pads or external MIDI controllers, with each method offering different advantages for performance and control.

Table 12-2: Wavetable Track Playing Methods

Method	Description	Best Use
Pad Playing	Direct triggering using bento’s touch pads	Quick experimentation, live performance
MIDI Input	External keyboard or controller input	Precise pitch control, complex sequences
Velocity and Pressure Control	Dynamic response to playing strength, applied as a modulation source to any wavetable track parameter that is a modulation “target.”	Expressive parameter modulation
Mod Wheel	Real-time parameter control, applied as a modulation source to any wavetable track parameter that is a modulation “target.”	Live texture manipulation

Both playing methods trigger the same wavetable synthesis engine, with pads offering immediate experimentation and MIDI providing precise control. You can switch between methods during performance or use MIDI controllers alongside pad playing for hybrid control. Understanding these performance options prepares you to effectively shape wavetable textures through the editing controls covered in the next section.

## Playing Wavetable Tracks with bento's Pads

Bento's pads provide immediate access to wavetable synthesis with velocity-sensitive triggering, pressure-sensitive modulation, and octave transposition controls.

### To play a wavetable track using the pads:

1. Press **TRACKS** to open the Tracks screen.
2. Select a wavetable track by tapping its track slot.

The color of the pads changes to match the selected track's color.

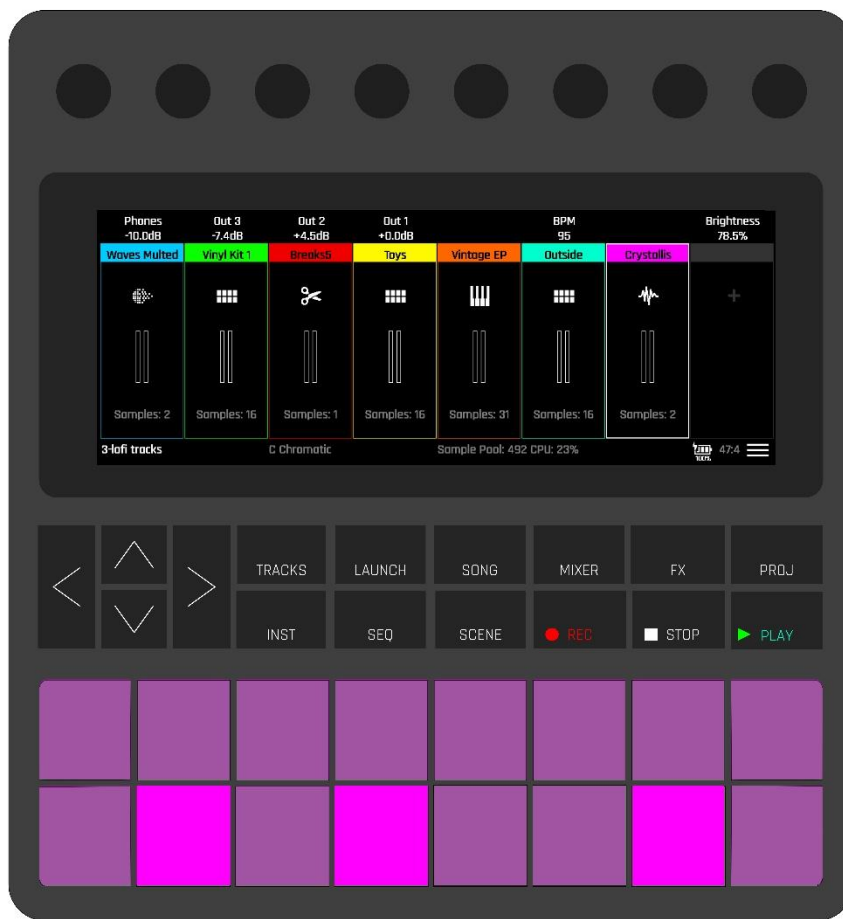


Figure 12-12-3: Tracks screen with wavetable track selected and matching pad colors

3. Play the pads to trigger notes across the current scale and octave.
4. Use the **UP** and **DOWN** arrow buttons to shift the pads to control different octaves.

## Playing Wavetable Tracks over MIDI

External MIDI controllers offer precise pitch control and access to continuous controllers for real-time wavetable parameter manipulation.

### To play a wavetable track via MIDI:

1. Connect your MIDI controller to bento's MIDI input.
2. Select the wavetable track on the Tracks screen.
3. Tap menu then select Config Track to open the Track Configuration screen for the wavetable track. Adjust Knob 6 to set the MIDI In Ch parameter to the same channel number as the one your MIDI controller uses.



*Figure 12-4: Track Configuration screen showing MIDI In Ch parameter setting*

4. Play notes on your MIDI controller to trigger wavetable notes.
5. Use continuous controllers (mod wheel, aftertouch) for real-time parameter control.



## Editing Wavetable Tracks

Wavetable tracks provide multiple levels of parameter control, from common voice parameters shared with other track types to specialized wavetable synthesis controls unique to this track type.

This section digs into bento's wavetable synthesis features so you can develop new skills and habits as you explore wavetable tracks.

To do this...	read...
Locate wavetable track voice parameters	<a href="#">Opening the Wavetable Track Dashboard</a>
Explore bento's two wavetable oscillators	<a href="#">Editing the Granular Oscillators</a>
Explore the wavetable track periodic waveform oscillator	<a href="#">Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)</a> <a href="#">Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)</a>
Explore wavetable track envelopes	<a href="#">Editing Wavetable Track Envelopes</a>
Explore wavetable track filters	<a href="#">Editing Wavetable Track Filters</a>
Explore wavetable track modulation options	<a href="#">Editing Wavetable Track Modulation</a>
Configure LFOs for wavetable track modulation	<a href="#">Editing the Wavetable Track LFOs</a>
Configure the Modulation Sequencer for wavetable track modulation	<a href="#">Editing the Granular Track Modulation Sequencer</a>
Allocate voices for wavetable tracks	<a href="#">Editing Wavetable Track Configuration Settings</a> <a href="#">Editing Granular Track Configuration Settings</a>
Configure wavetable tracks for receiving and sending MIDI	<a href="#">Editing Wavetable Track Configuration Settings</a>
Route wavetable tracks to specific audio outputs	<a href="#">Editing Wavetable Track Configuration Settings</a> <a href="#">Editing Granular Track Configuration Settings</a>

## Opening the Wavetable Track Dashboard

The wavetable track Dashboard presents parameter names and values across the top of the screen to indicate which parameters you can adjust with bento's 8 knobs. At any given time, only one wavetable track component (such as an oscillator, envelope, or filter) is selected for editing.

### To open the Wavetable Track dashboard for Track 1:

1. Press **TRACKS** to open the Tracks screen.
2. Tap the Wavetable Track you want to edit to select it.
3. Play the pads to hear track 1's current settings.
4. To open the selected track's dashboard, press **INST**.

The wavetable track dashboard opens. The three dots in the top right corner of the Mod Seq graph are a hint that you can open this graph in a larger view by double tapping the graph.

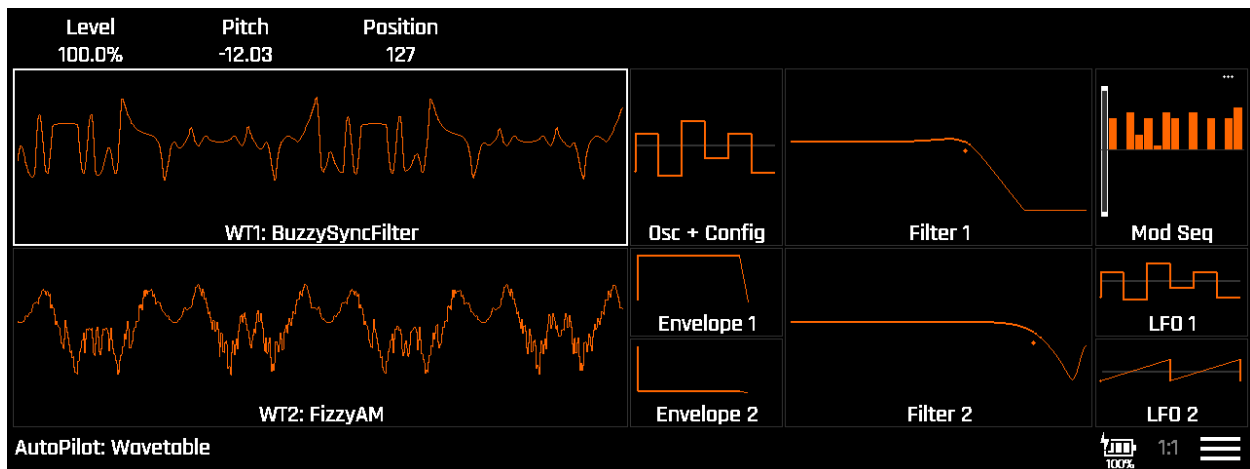


Figure 12-5: Wavetable Track Dashboard with Wavetable 1 Selected

Figure 8-6 shows the white selection rectangle around WT1's sample waveform, so the parameters at the top of the screen correspond to WT1. When notes are playing for a wavetable track, the WT 1 and WT 2 graphs display the waveforms associated with the currently playing positions in each of the wavetables.

You can also select any of the graphs to right of the wavetable graphs to control them.

The Menu icon in the lower right corner opens a menu from which you can navigate to the Modulation screen.

The following table summarizes the wavetable track features that you can edit and which section in this chapter to read for more details.

<b>To edit this wavetable track feature...</b>	<b>See this section...</b>
Wavetable Oscillator WT1 and WT2	<a href="#"><i>Editing the Wavetable Oscillators</i></a>
Periodic waveform oscillator	<a href="#"><i>Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)</i></a>
Envelope 1 and Envelope 2	<a href="#"><i>Editing Wavetable Track Envelopes</i></a>
Modulation Sequencer	<a href="#"><i>Editing the Granular Track Modulation Sequencer</i></a>
Filter 1 and Filter 2	<a href="#"><i>Editing Wavetable Track Filters</i></a>
LFO 1 and LFO 2	<a href="#"><i>Editing the Wavetable Track LFOs</i></a>
Parameter Modulation	<a href="#"><i>Editing Wavetable Track Modulation</i></a> <a href="#"><i>Editing Granular Track Modulation</i></a>

## Editing the Wavetable Oscillators

Wavetable oscillators have a Position parameter that allows control over which waveform in the wavetable is playing.

You can edit the wavetable oscillator parameters, or you can replace either of the wavetables currently loaded into WT1 or WT2.

### To edit wavetable oscillator parameters:

Open the wavetable track Dashboard, then tap the WT1 or WT2 graph. The knobs now provide access to the controls for the selected wavetable oscillator.

The following table describes the wavetable oscillator parameters.

*Table 12-3: Wavetable Oscillator Parameters*

Parameter	Knob	Range	Description	Modulation Target?
<b>Level</b>	1	0 to 100% (-96dB to +12dB)	The relative audio level of this waveform.	Yes
<b>Pitch</b>	2	-24 to +24 semitones	How many semitones up or down you want to shift the pitch.	Yes
<b>Position</b>	3	0 to number of positions in the wavetable	A wavetable holds many different single-cycle waveforms arranged in a sequence. This control chooses which specific waveform will repeat continuously during playback. Modulate this position parameter to sweep through the entire wavetable and create dynamic, evolving timbres.	Yes

### To load a different wavetable into a wavetable oscillator:

1. Open the wavetable track Dashboard.
2. Double-tap the **WT 1** or **WT 2** graph to open the File Browser screen.

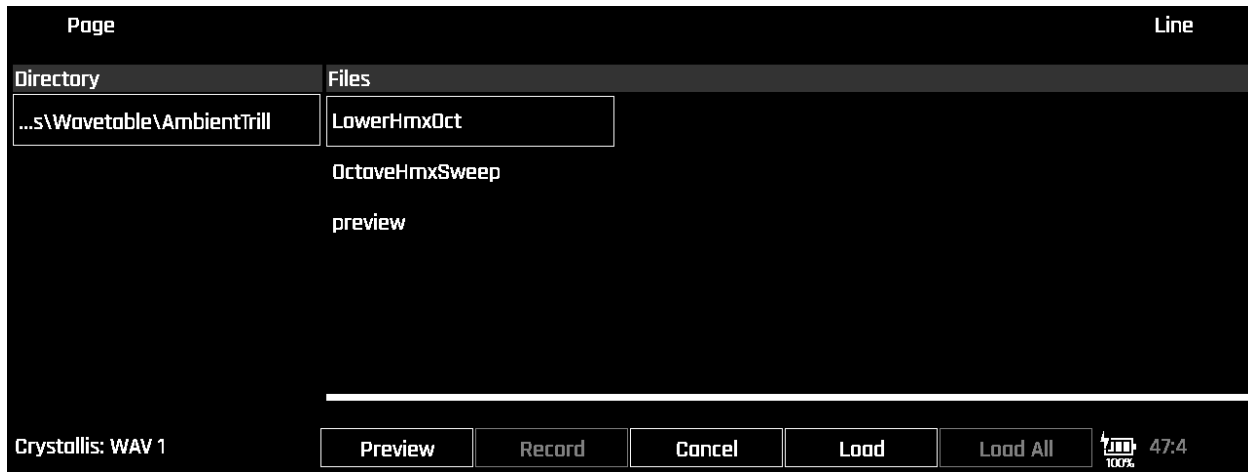


Figure 12-6: File Browser Screen

3. Tap the directory name on the left to go up to the root of the microSD card, then browse for a different sample to load into your chosen wavetable oscillator.

You can navigate by double-tapping a folder you want to open or using Knob 2 to select a folder and then tap **Load**.

4. When you find a wavetable that interests you, tap **Preview** to turn it on (if necessary), then tap the wavetable you are considering loading.

The wavetable starts playing. The preview will sweep through the positions in the wavetable, so listen for a couple of seconds to hear how the sound evolves. If you don't want to load the wavetable or don't want to continue previewing it, continue browsing the other wavetables and previewing them.

5. When you decide on which wavetable you want to load, press **Load**. The wavetable dashboard screen reopens with the new wavetable loaded.

**Note:** Bento is designed to use mono wavetables with 2048 samples per cycle with between 1 and 256 cycles. You can use 16-bit, 24-bit or 32-bit files. bento and the nanobox | fireball both support the same format. Serum is a good tool for creating wavetable files. You can learn more about how to create your own wavetables [in this video](#).

## Editing Oscillator 3 Settings and Track Polyphony (Poly Mode)

Wavetable tracks include a third oscillator that produces a periodic waveform, such as triangle, sine wave, sawtooth, noise, and square wave with variable pulse width.

While its relatively simple waveforms may make the third oscillator seem out of place when compared with bento's two wavetable oscillators (per voice), it can become very useful as a tonal anchor.

Bento's wavetable track Dashboard groups the waveform oscillator's parameters with the Polyphony and Wavetable Reset parameters for the entire wavetable track.

To configure a wavetable track’s waveform oscillator and polyphony:

- 1. Open the wavetable track dashboard, then tap the **Osc + Config** graph to select it, as shown in the following screenshot.

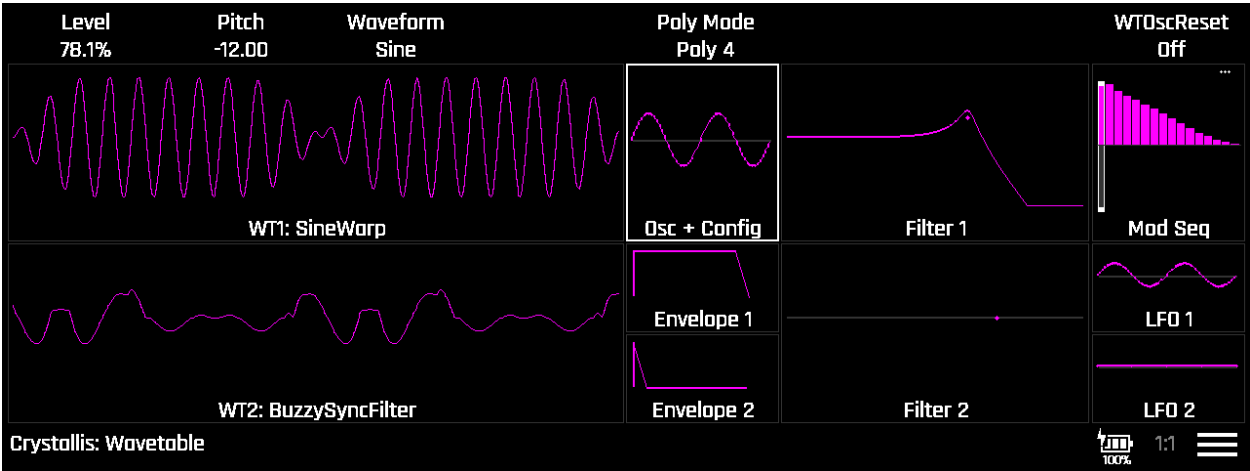


Figure 12-7: Osc + Config Control Parameters in Wavetable Track Dashboard

- 2. To edit the parameters displayed across the top of the screen, adjust the knobs that correspond to each parameter.

The following table describes the Osc + Config parameters.

Table 12-4: OSC + Config Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Level</b>	1	0 to 100% (-96dB to +12dB)	Level of periodic waveform oscillator	Yes
<b>Pitch</b>	2	-24 to +24 semitones	Transposition of periodic waveform oscillator	Yes
<b>Waveform</b>	3	Saw, Triangle, Square, Sine, Noise	Shape of periodic waveform oscillator	No
<b>Pulse Width</b> (Waveform = Square)	4	0 to 100%	Only applies when Square is selected for the Waveform. The portion of the wave that will have a high signal. A value of 50% will create a wave that is high half the time and low half the time. A value of 75% will create a wave that is high 3/4 of the time and low 1/4 of the time.	Yes
<b>Poly Mode</b>	8	Unison 1, Unison 2, Unison 3, Unison 4, Unison 5, Unison 6, Unison 7, Unison 8, Poly 2, Poly 3, Poly 4, Poly 5, Poly 6, Poly 7, Poly 8	When a Unison option is selected, the wavetable track is monophonic, and each note received will trigger the number of voices specified by the Unison number selected. This fattens the sound. Use Unison 1 when you want monophonic mode without doubling. When a Poly option is selected, the wavetable track is polyphonic and triggers one note a time. The Poly option selected controls the maximum simultaneous notes.	No

Parameter	Knob	Range	Description	Modulation Target?
<b>Detune</b> (Poly Mode = Unison 1 thru 8)		0 to 100%	When a Unison option is selected for Poly Mode, this specifies the width of the range of pitches that will be used by the generated notes. Higher numbers add more depth to the sound.	
<b>Pan Spread</b> (Poly Mode = Unison 1 thru 8)		0 to 100%	When a Unison option is selected for Poly Mode, this controls the breadth of the stereo field of the generated notes.	
<b>WTOscReset</b>		On, Off	If On, with each new note, the oscillator will start the wave at 0. If Off, the oscillator will pick up from before. (Does not apply to LFOs.)	



## Editing Wavetable Track Envelopes

You can configure two ADSR envelopes for each wavetable track, Envelope 1 and Envelope 2. Envelope 1 is applied to the combined output of the three oscillators before the signal is sent to the filters. You can also apply either envelope as a modulation source for parameters with modulation slots.

### To edit envelope parameters:

1. Open the wavetable track dashboard, then touch either **Envelope 1** or **Envelope 2**.

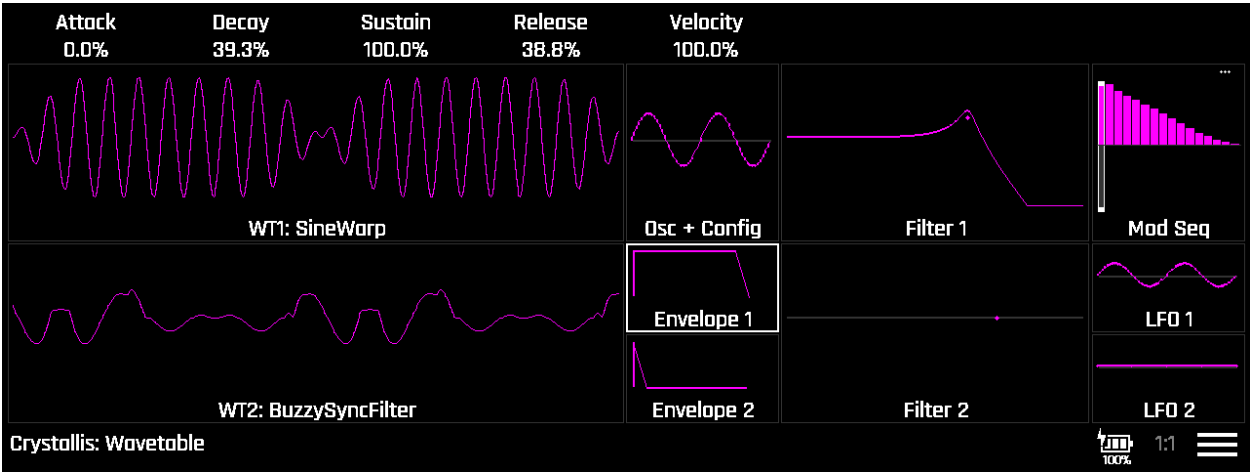


Figure 12-8: Envelope 1 selected for editing in Wavetable Track Dashboard

The five ADSR and Velocity parameters at the top of the screen represent the settings of the currently selected Envelope. The following table describes the envelope parameters for each of the two envelopes.

Table 12-5: Wavetable Track Envelope Parameters

Parameter	Knob	Range	Description	Modulation Target?
Attack	1	0 to 100% 100% = 9 seconds	Time to reach peak level after note trigger	Yes
Decay	2	0 to 100% 100% = 38 seconds	Time to fall from peak to sustain level	Yes
Sustain	3	0 to 100%	Level maintained while note is held	Yes

Parameter	Knob	Range	Description	Modulation Target?
<b>Release</b>	4	0 to 100% 100% = 38 seconds	Time to fade to silence after note release	Yes
<b>Velocity</b>	5	-100 to 100%	Velocity sensitivity amount	Yes

2. Adjust envelope parameters using knobs 1-5 and play the track from the pads or over MIDI to hear the impact of the envelopes on the sound and see how the envelope shape displayed in the Dashboard changes.

**Remember:** Envelope 2 only serves as a modulation source in wavetable tracks. Only Envelope 1 affects the VCA in wavetable tracks. If you edit Envelope 2 but don't hear any changes in a wavetable track's sound, it could be that the track doesn't use Envelope 2 for modulation.

## Editing Wavetable Track Filters

Each wavetable track voice includes two filters, Filter 1 and Filter 2, which can be independently configured as Low-pass, High-pass, Band-pass, or Notch filters and configured in series or in parallel when processing a mix of the two wavetable oscillators and waveform oscillator.

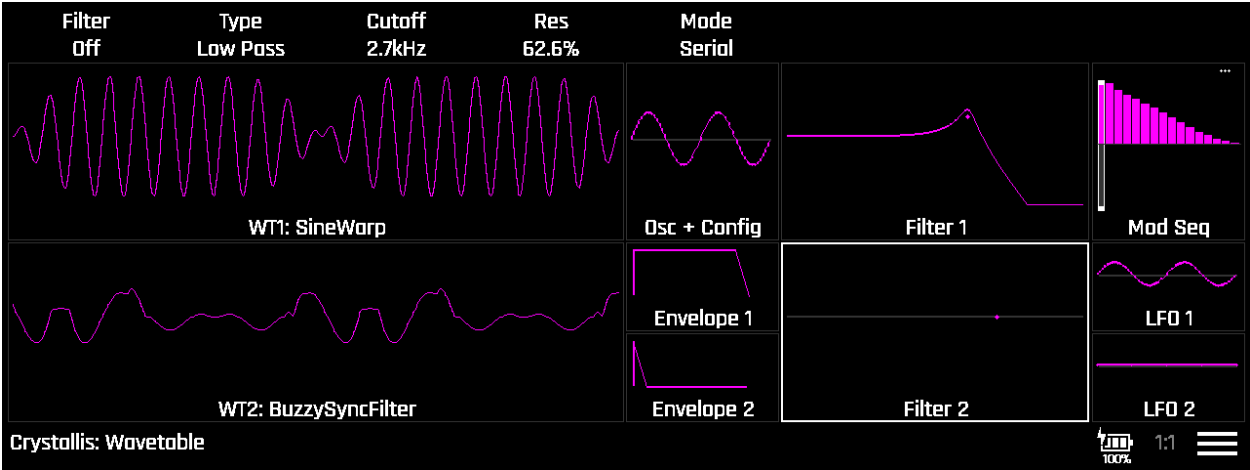


Figure 12-9: Filter editing screen showing frequency response and parameter controls

### To edit filter parameters:

1. Open the wavetable track dashboard.
2. Tap **Filter 1** or **Filter 2** to select the filter you want to edit.  
The four or five parameters at the top of the screen represent the settings of the currently selected Filter.
3. Adjust filter parameters using the knobs.
4. Listen to the filtering effect in real-time and notice how the selected filter's response curve changes in the Dashboard.

The following table describes the filter parameters mapped to the knobs when one of the filters is selected.

Table 12-6: Wavetable Track Filter Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Filter</b>	1	On/Off	Enables or disables the selected filter.	No
<b>Type</b>	2	Low Pass, High Pass, Band Pass, Notch	The type of filter that will be applied.	No
<b>Cutoff Frequency</b> (Low Pass or High Pass)	3	20Hz to 20kHz	For High Pass and Low Pass filters, the frequency where the filter begins to attenuate the signal.	Yes
<b>Center Frequency</b> (Band Pass or Notch)	3	20Hz to 20.4kHz	For Notch and Band Pass filters, the frequency at the middle of the notch or band.	Yes
<b>Res</b> (Low Pass or High Pass)	4	0% to 100%	For High Pass and Low Pass filters, controls how much of a boost is given to the signal near the cutoff frequency.	Yes
<b>Width</b> (Band Pass only)	4	0% to 100%	For Band Pass filters, the width of the frequency range around the center point included in the band.	Yes
<b>Q (Notch)</b>	4	0% to 100%	For Notch filters, Q controls the width of the rejected frequency band around the center frequency. Higher Q values create a narrower, more selective notch, while lower Q values	Yes

Parameter	Knob	Range	Description	Modulation Target?
			create a wider, more gradual rejection.	
<b>Mode</b> (Filter 2 only)	5	Serial or Parallel	Determines how bento routes wavetable track oscillator signals through Filter 1 and Filter 2 before reaching the VCA. When Mode is “Serial” or “Parallel,” all three oscillators are mixed and then routed through Filter 1 and Filter 2 configured in series or parallel.	No

## Editing Wavetable Track Modulation

Each bento Track includes a central Modulation screen within which you can configure all modulation settings.

### To configure modulation in a wavetable track:

1. Open the wavetable track dashboard, then tap the **Menu** icon in the lower right corner of the screen. The Menu opens, displaying a single option, Modulation.

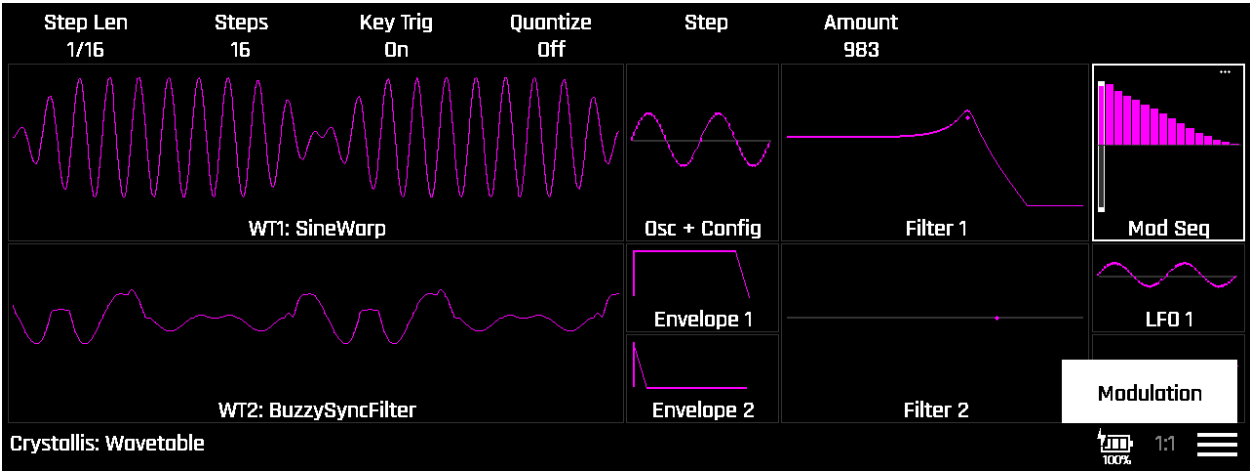


Figure 12-10: Modulation option in Wavetable Track Dashboard Menu

2. Tap **Modulation**.

The Wavetable Track Modulation screen opens.

Line	Source 1	Amount 1	Source 2	Amount 2	Source 3	Amount 3	
		10.0%		0.0%		0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
ENV2: Attack	[None]		[None]		[None]		3
ENV2: Decay	Velocity	18.7%	[None]		[None]		9
ENV2: Release	[None]		[None]		[None]		14
LF01: Depth	[None]		[None]		[None]		12
LF01: Rate	[None]		[None]		[None]		13
LF02: Depth	Mod Wheel	84.1%	[None]		[None]		15
LF02: Rate	[None]		[None]		[None]		16

LittleBigBass: Wavetable

Dashboard 100% 1:1

Figure 12-11: Wavetable Track Modulation Screen

The first column in the Modulation screen contains the name of every wavetable track parameter that can be a modulation “target.” Columns 2 through 7, let you set up three modulation sources and three modulation amounts for the modulation target of the selected row.

3. To see the complete list of modulation targets in the Modulation screen you can either:
  - swipe the screen up or down, or
  - turn Knob 1 to scroll up and down through the Modulation screen.
4. To see if a specific wavetable track parameter is a modulation target, refer to the appropriate parameter tables elsewhere in this chapter and check the Modulation Target? column for the parameter you want to modulate.

Table 12-7 describes the parameters on the Modulation screen.

Table 12-7: Modulation Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Line</b>	1	WT1/WT2: Pitch, Level, Position Osc: Pitch, Level, Pulse Width Filt1/Filt2: Freq/Cut, Res/Width/Q Env1/Env2: Attack, Decay, Release LFO1/LFO2: Amount, Rate	Moves the Modulation screen's line selection through the parameters listed in the first column. Once you have selected a modulation target, you can configure up to 3 modulation sources and modulation amounts with knobs 2-7.	No
<b>Source 1</b>	2	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (1 of 3)	No
<b>Amount 1</b>	3	-100% to +100%	Modulation Amount (1 of 3)	No
<b>Source 2</b>	4	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (2 of 3)	No
<b>Amount 2</b>	5	-100% to +100%	Modulation Amount (2 of 3)	No
<b>Source 3</b>	6	Velocity, Pressure, Envelope 1, Envelope 2, LFO 1, LFO 2, Mod Seq. Key, Mod Wheel, Macro X, Macro Y	Modulation Source (3 of 3)	No
<b>Amount 3</b>	7	-100% to +100%	Modulation Amount (2 of 3)	No



## Editing the Wavetable Track LFOs

Bento's two LFOs per track serve as internal modulators. They are great for adding life and variety to any sound. You can choose a different waveform for each of the two LFOs in the wavetable track dashboard and then apply them as modulation sources in the wavetable track's Modulation screen.

### To configure one of the LFOs in a wavetable track:

1. Open the wavetable track dashboard, then tap **LFO 1** or **LFO 2** to select the LFO for editing.

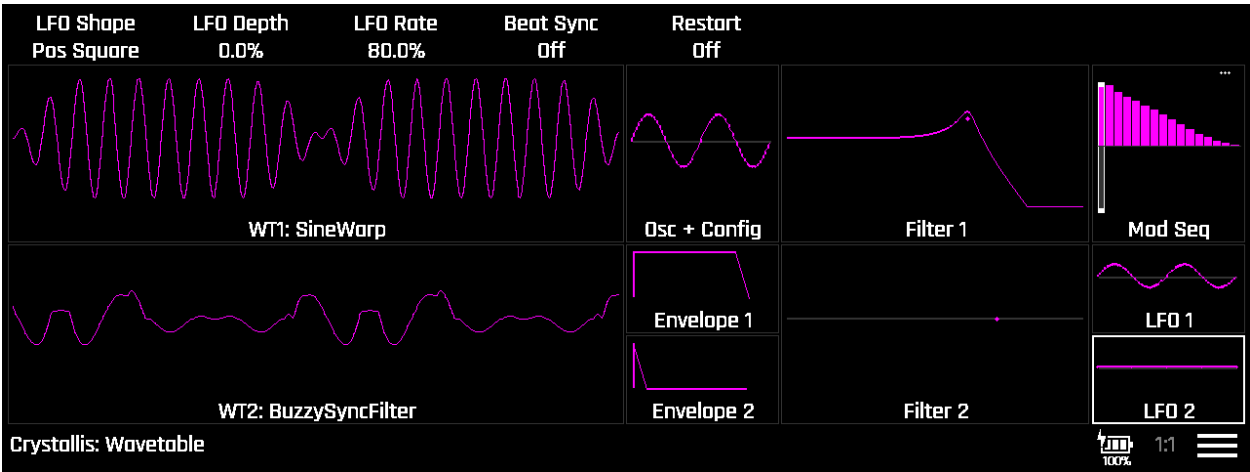


Figure 12-12: LFO Parameters in the Wavetable Track Dashboard

Table 12-8 describes the parameters mapped to the knobs when one of the LFOs is selected.

Table 12-8: Wavetable Track LFO Parameters Mapped to bento Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>LFO Shape</b>	1	Saw, Rev Saw, Triangle, Pos Tri, Sine, Pos Sine, Square, Pos Square, Random	The shape of the wave used by the low frequency oscillator.	No
<b>LFO Depth</b>	2	0 to 100%	The amplitude of the oscillating wave. Set this to 0 to disable the LFO.	Yes
<b>LFO Rate</b>	3	When Beat Sync = Off: 0 to 100% (~0.1Hz to 12 Hz.)  When Beat Sync=On, rate is specified in beats and measures: 8, 4, 2, 1, 1/2, 1/2 T, 1/4, 1/4 T, 1/8, 1/8 T, 1/16, 1/16 T, 1/32, 1/32 T, 1/64 bars	The frequency of the LFO.	Yes
<b>Beat Sync</b>	4	Off, On	Controls the behavior of the LFO Rate parameter. When Beat Sync=On, the LFO synchronizes with bento's transport.	No
<b>Restart</b>	5	Off, On	When On, the LFO restarts each time you trigger the track from a pad.	No

## Editing the Wavetable Track Modulation Sequencer

The Modulation Sequencer is a sequencer reserved for wavetable track parameter modulation. It is another great way to add some life and variety to the sound. You can set the number of steps and the step length. You can also turn on the Quantize option to snap the values to pitch frequencies.

Unlike bento's track sequencers, the Modulation Sequencer runs whenever you play the wavetable track, even if bento's transport is stopped.

### To configure the Modulation Sequencer in a wavetable track:

1. Open the wavetable track dashboard, then tap **Mod Seq** to select the Modulation Sequencer for editing.



Figure 12-13: Modulation Sequencer Parameters in the Wavetable Track Dashboard

The wavetable track Dashboard displays the Modulation Sequencer parameters across the top of the screen. You can edit the parameters from the Dashboard and observe the Mod Sequence's step levels change in the Mod Seq control's thumbnail. You can also navigate to the Modulation Sequencer screen for a magnified view of the step levels.

2. To open the Modulation Sequencer screen, do one of the following:
  - Select the Mod Seq graph, then press the RIGHT arrow button, or
  - Double-tap the Mod Seq control.

The magnified view of the Modulation Sequencer Opens.

The Modulation Sequencer screen displays the same parameters across the top of the screen that were visible in the Dashboard, and it also presents the same sequence steps as the ones in the Mod Seq control's thumbnail, but the magnified view makes it much easier to detect changes in each step's level as

you edit them. You can also drag your finger across the screen to draw the sequence.

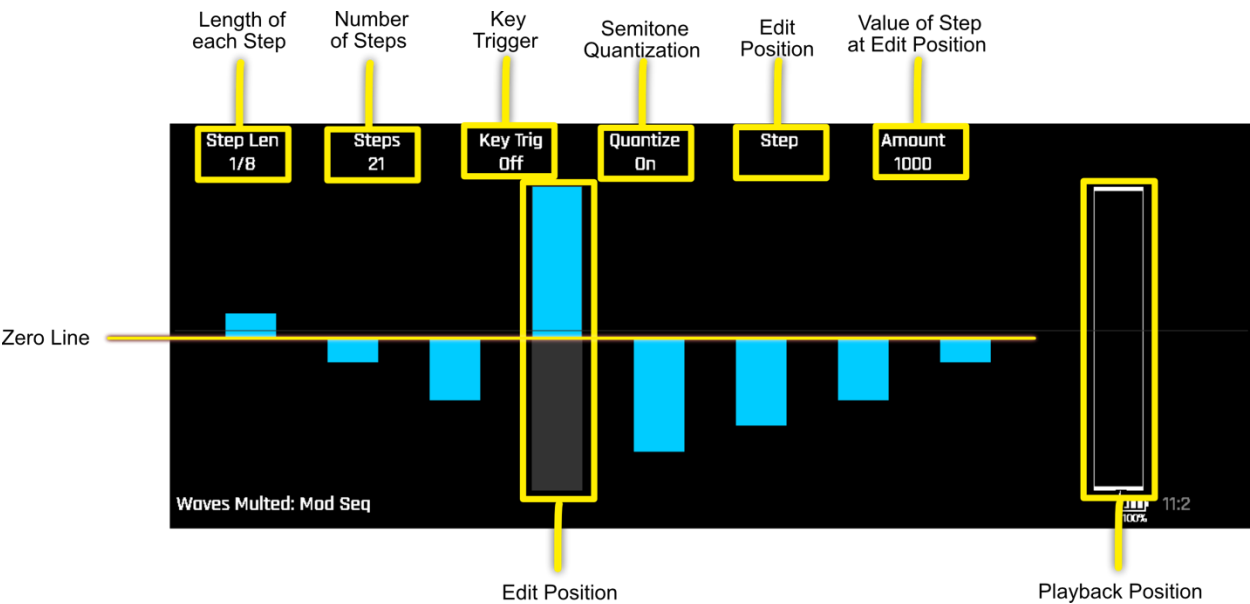


Figure 12-14: Modulation Sequencer Screen Parameters

Table 12-9 describes the Modulation Sequencer’s parameters mapped to the knobs when the Mod Seq is selected in the wavetable track Dashboard or when the Mod Seq screen is open.

Table 12-9: Modulation Sequence Parameters Mapped to *bento* Knobs

Parameter	Knob	Range	Description	Modulation Target?
<b>Step Len</b>	1	1/64, 1/32T, 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2T, 1/2, 1 bar, 2 bar (T=Triplet)	The length of each step in the sequence.	No
<b>Steps</b>	2	2 to 32	The number of steps in the sequence.	No
<b>Key Trig</b>	3	Off, On	When On, the sequencer is restarted when each note begins. When Off, it plays constantly in the background and resumes at current position when a new note is triggered.	No
<b>Quantize</b>	4	Off, On	When On, the levels of the sequencer are quantized to 12 distinct values (plus the off value). This allows for precise semitones when modulating pitch. The actual values are -1000 to +1000. This does not translate directly to semitones. Example: -2 semitones will show as -166.	No
<b>Step</b>	5	1 to 32	Select the step to edit.	No
<b>Amount</b>	6	-1000 to +1000	Changes the value of the selected step.	No

3. To return to the wavetable track dashboard from the Mod Seq screen, press **INST** or **Left Arrow**.
4. Note that the knobs continue to perform the same functions in the Dashboard when **Mod Seq** is selected as they did in the Modulation Sequencer screen.
5. If the Modulation Sequencer is not already modulating anything, go to the Modulation screen and apply it as a modulation source.

For example, try modulating one of the Filter's cutoff or center frequency, or modulating the waveform oscillator's pulse width. You may have to change the oscillator's Waveform to "Square" to hear the results, but it's well worth the effort!

## Editing Wavetable Track Configuration Settings

Track configuration settings control MIDI input and output, audio routing, and other track-level parameters that affect how the wavetable track integrates with your project.

**To access wavetable track configuration settings:**

- 1. Select the wavetable track on the Tracks screen.
- 2. Tap menu, then select Config Track.



Figure 12-15: Track configuration Screen Showing MIDI and Routing Settings

The table below describes the parameters that you can edit from the Track Configuration screen.

Table 12-10: Track Configuration Parameters

Parameter	Knob	Range	Description	Modulation Target?
Output	1	1, 1 w/ Mod FX, 2, 3	Audio routing destination	No
MIDI In Ch	6	None, 1 – 16	Input MIDI channel	No
MIDIOutPrt	7	ALL (1 and 2 are not functional values)	MIDI Output port	
MIDI OutCh	8	None, 1 – 16	Output MIDI channel	No

## Creating New Wavetable Tracks

Creating new wavetable tracks allows you to load custom wavetables and build instruments tailored to your creative needs. You can learn a lot about bento's wavetable tracks by exploring the wavetables tracks by loading factory wavetable patches into an empty track and then exploring the wavetable track parameters with the techniques described in this chapter.

**Note:** If your bento did not come pre-loaded with wavetable patches, you can download an updated patch set at [1010music Downloads page](#).

At some point, you may decide to create your own wavetable tracks, starting from a blank slate. Fortunately, bento makes it easy to create new wavetable tracks with a set of useful, but not overwhelming parameter settings that are perfect for making a fresh start.

### To create a new wavetable track with default settings:

1. Press **TRACKS** to open the Tracks screen.
2. If the project has no empty tracks, you could cut one of the currently loaded tracks by choosing **Cut Track** from the Tracks screen's Menu in the lower right corner of the Tracks screen, or you could create a completely new project with 8 empty tracks. Either way, make sure that your project doesn't already include two wavetable tracks before you try to create a new one because bento projects can only include two wavetable tracks.

**Reminder:** If you're not sure that your current project is already saved on the microSD card, this would be as good a time as any to back up your current bento project! For tips on saving copies of bento projects, see [Managing Project Files](#).

3. When you have found an empty track, double-tap the empty track. The patch browser screen opens. At the bottom of the screen, are the **New**, **Cancel**, and **Load** controls.

4. Tap **New** to create a custom track. A menu of bento track types opens.

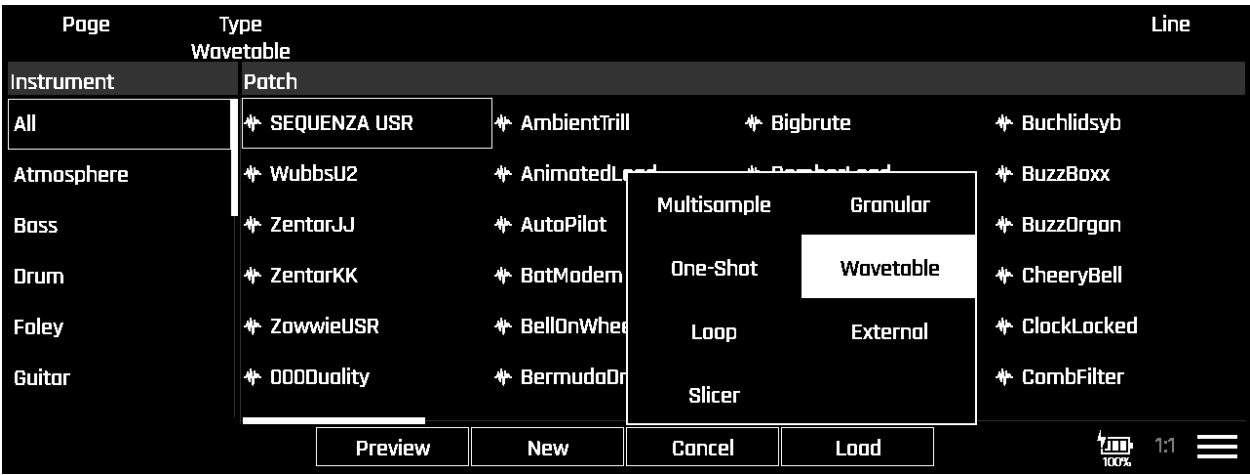


Figure 12-16: New Wavetable Option in the Patch Browser Screen

- If the Wavetable option is disabled, your project probably already has 2 wavetable tracks.
5. Tap **Wavetable** in the options menu. The wavetable track Dashboard opens with default parameter settings and no wavetables loaded into either WT1 or WT2, indicated by “Double-tap to load WAV” displayed where there should be a waveform.

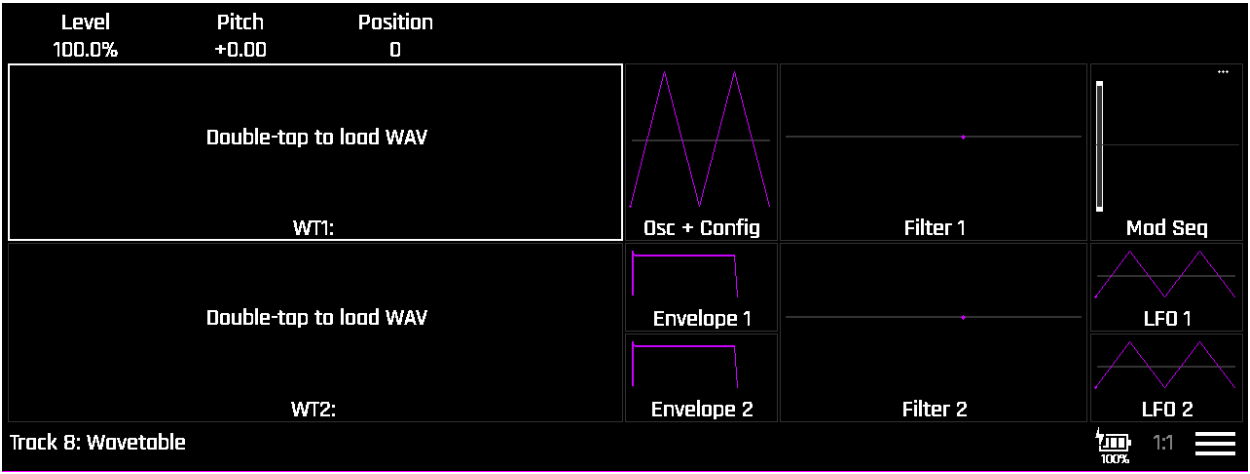


Figure 12-17: Initial Wavetable Track Dashboard

6. Load wavetables into WT1 or WT2 using the file browser:
- e) Navigate to the Wavetable dashboard. The Wavetable graphs display “Double-tap here to select a WAV”.
  - f) Double-tap in the middle of the WT1 or WT2 graph. The file browser screen opens.



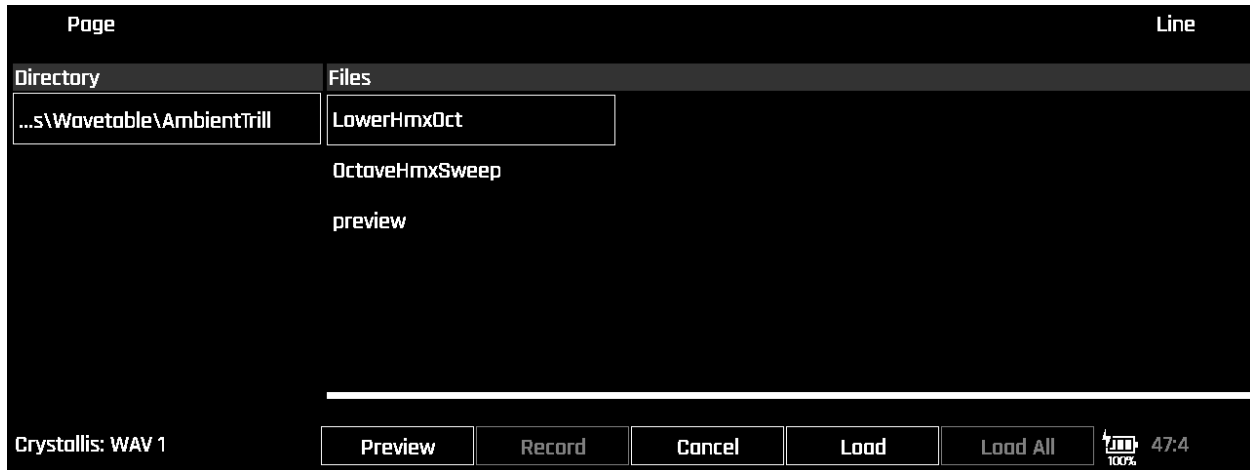


Figure 12-18: Sample Browser Screen for Wavetable Tracks

**Note:** The File Browser's Record option is disabled when browsing for Wavetables because bento does not support recording Wavetables.

- g) Browse for an interesting wavetable on the microSD card, then press Preview to hear it. You can find the wavetables used in the bento factory patches in the folders under the \Patches\Wavetable folder.
- h) When you decide which wavetable to load, you can load it by doing one of the following:
  - tap it to select the wavetable you want to load and then press **Load**, or
  - double-tap the wavetable you want to load.

When the wavetable track Dashboard reopens, it displays the waveform associated with Position 0 for the wavetable loaded in the wavetable oscillator.

Bento's default parameters for new wavetable tracks are great for getting started, but you will probably find that they don't produce the kind of sounds that you planned to hear. To take full advantage of wavetable synthesis, use modulation to vary the Position parameter for each wavetable oscillator.

7. Load other wavetables and adjust the wavetable track's parameters. You'll find help with bento's wavetable synth editing capabilities in the previous sections in this chapter.

## Best Practices for Wavetable Tracks

Effective wavetable track design balances technical understanding with creative experimentation. These practices help you achieve professional results while maintaining musical coherence.

### Modulation Strategy

Route modulation sources to multiple wavetable parameters for complex, evolving sounds. LFO modulation of position creates sweeping effects. Envelope modulation adds dynamic response to your playing, making the instrument feel more responsive and musical.

Consider the musical context when setting modulation amounts. Subtle modulation works well in ensemble situations, while dramatic modulation can create solo textures that capture listener attention. Layer different modulation sources for rich, complex movement.

### Performance Optimization

Balance CPU usage by managing Unison and Polyphony choices. Higher values for Unison or Poly Mode options create more depth of sound but require more processing power. Monitor your system's performance and adjust parameters accordingly.

## 13: Exploring External Tracks

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External tracks enable seamless integration of external MIDI instruments, synthesizers, and sound modules into your bento arrangements. Unlike other track types that rely on internal samples or synthesis, External tracks send MIDI data to external gear while processing the returning audio through bento's mixing and effects systems.

Each External track functions as a bridge between bento's sequencing and performance capabilities and your external hardware instruments. You can trigger external gear using bento's pads, record and playback MIDI sequences, and process the returning audio through bento's level, panning, and effects controls for cohesive integration.

To do this...	read...
Understand how External tracks integrate external gear	<a href="#">Understanding External Tracks</a>
Configure audio input for external instruments	<a href="#">Configuring the Audio Input</a>
Configure MIDI output routing	<a href="#">Configuring the MIDI Output</a>
Control external instruments with pads and sequences	<a href="#">Playing External Tracks</a>
Adjust audio processing and monitoring	<a href="#">Editing External Tracks</a>
Set up new external instrument integrations	<a href="#">Creating New External Tracks</a>
Optimize workflow and avoid common issues	<a href="#">Best Practices for External Tracks</a>

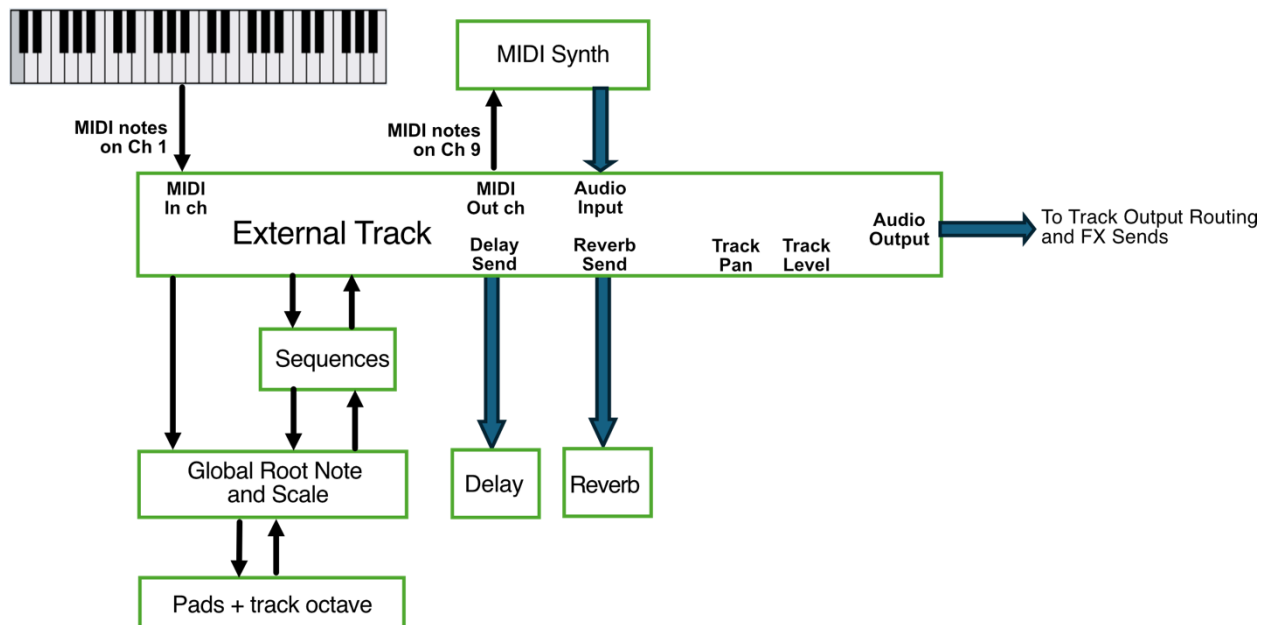
External tracks impose minimal load on bento's CPU and provide exceptional flexibility - you can use them purely for MIDI control, pure audio processing, or complete bidirectional integration. Some users create projects with multiple External tracks to use bento as a dedicated sequencer and mixer for external gear.

## Understanding External Tracks

External tracks serve dual purposes that make them uniquely flexible within bento's track system. They control external MIDI instruments from bento's pads, sequences, and MIDI controllers while simultaneously processing audio from external instruments through bento's mixing and effects systems.

Bento's External tracks accomplish both functions by:

- Sending note and parameter control messages to external instruments over MIDI instead of triggering internal sample engines.
- Routing audio input signals through the same mixing path that bento provides for sample-based tracks (level, panning, and effects sends).



*Figure 13-1: External Track MIDI and Audio Signal Flows*

This bidirectional architecture enables you to use bento as both a controller for external gear and a processing platform for external audio sources. The system coordinates MIDI output timing with audio input processing to maintain tight synchronization between control and sound.

Key features of External tracks include:

- MIDI output configuration for controlling external instruments on specific channels.
- Audio input processing for integrating external instrument returns.
- Real-time visual feedback for both MIDI transmission and audio signal levels.
- Level, pan, delay send, and reverb send processing for external audio.
- Sequence recording and playback with external instrument timing coordination.

External tracks provide specialized visual feedback including MIDI transmission indicators (showing both incoming and outgoing MIDI activity), audio input level meters, and connection status displays that help you verify proper communication and signal flow during setup and performance.

The External track interface emphasizes connection configuration and signal monitoring, displaying MIDI transmission indicators and audio input levels while providing essential processing controls. This approach creates seamless integration that feels natural and responsive while expanding your available sounds beyond bento's internal capabilities.

## Configuring the Audio Input

External tracks process audio from external instruments through bento's mixing system. Proper audio input configuration ensures optimal signal levels and prevents clipping while enabling you to shape external instrument sounds through bento's level, panning, and effects processing.

Setting up audio input correctly provides the foundation for integrating external instrument audio with your bento arrangements while maintaining professional signal quality throughout your sessions.

### To configure audio input for an external instrument:

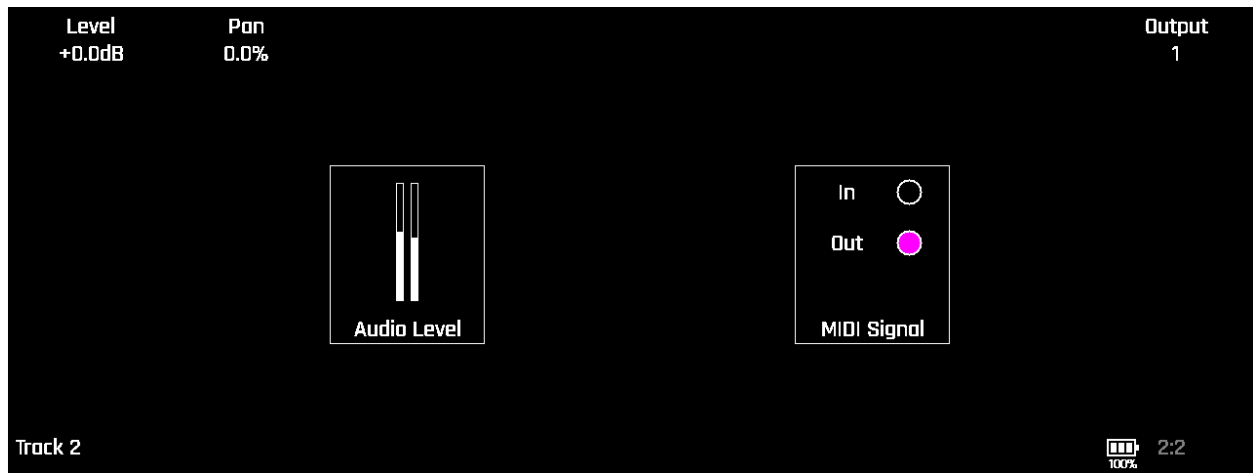
1. Connect your external instrument's audio output to one of bento's audio inputs using appropriate audio cables.
2. Select your External track on the Tracks screen by tapping the track.
3. Open the Track Config screen by tapping Menu and selecting **Config Track**.
4. Set the **Audio In** parameter using the knobs to assign the appropriate input (1, 2, 3, 1 Left, 2 Left, 3 Left) to this External track.



*Figure 13-2: Selecting the Audio Input in the External Track Config screen*

5. Push **INST** to open the External Track Dashboard.
6. Play your external instrument while monitoring the **Audio Level** meter in the dashboard.

- Adjust your external instrument's output level until the **Audio Level** meter shows consistent signal without reaching the red clipping indicators.



*Figure 13-3: Audio Input Level Indicator in the External Track Dashboard*

Test the audio processing by adjusting the Level knob while playing your external instrument to confirm audio is routing through bento's mixer.

The Audio Level meter provides real-time feedback about incoming signal strength, enabling you to maintain optimal signal-to-noise ratio while preventing digital clipping that could degrade audio quality. Proper level setting ensures your external instrument integrates cleanly with bento's internal tracks and effects processing.

## Configuring the MIDI Output

External tracks send MIDI note and controller data to external instruments through configured MIDI channels and ports. Proper MIDI output configuration ensures reliable communication between bento and your external gear while preventing conflicts when using multiple external instruments.

MIDI output setup establishes the control relationship that enables bento's pads, sequences, and external MIDI controllers to trigger and control your external instruments with precise timing and responsiveness.

### To configure MIDI output for an external instrument:

1. Connect bento's MIDI output to your external instrument's MIDI input using a MIDI cable or USB connection.
2. Configure your external instrument to receive MIDI on a specific channel. (Consult your external instrument's manual for MIDI setup procedures).
3. Select your External track on the Tracks screen by tapping the track.
4. Open the Track Config screen by opening the Track menu and selecting **Config Track**.
5. Set the **MIDI Out C** parameter using the knobs to match the MIDI channel your external instrument is configured to receive.
6. Set the **MIDI Out P** parameter to identify which of bento's MIDI Out ports (All, 1, 2) will send out the MIDI messages for this track.



Figure 13-4: Setting MIDI Out Channel C in External Track Configuration Screen



Return to the External Track Dashboard by pushing **INST**.

7. Verify complete signal flow by playing pads while monitoring both the **MIDI Signal** indicator and hearing audio from your external instrument.

**Example Configuration:** If your external synthesizer receives MIDI on channel 5, set MIDI Out C to "5". If you connected the MIDI Out 2 port of bento to the MIDI input of your external gear, set MIDI Out P to "2". The MIDI Signal indicator will flash purple when bento transmits MIDI data to your external instrument.

Successful MIDI output configuration creates reliable communication that enables expressive control over external instruments while maintaining tight timing coordination with bento's internal sequencing and performance systems.

## Playing External Tracks

External tracks respond to bento's pads, external MIDI controllers, and sequence playback to trigger external instruments while processing the returning audio through bento's mixing system. The streamlined providing comprehensive control over external gear.

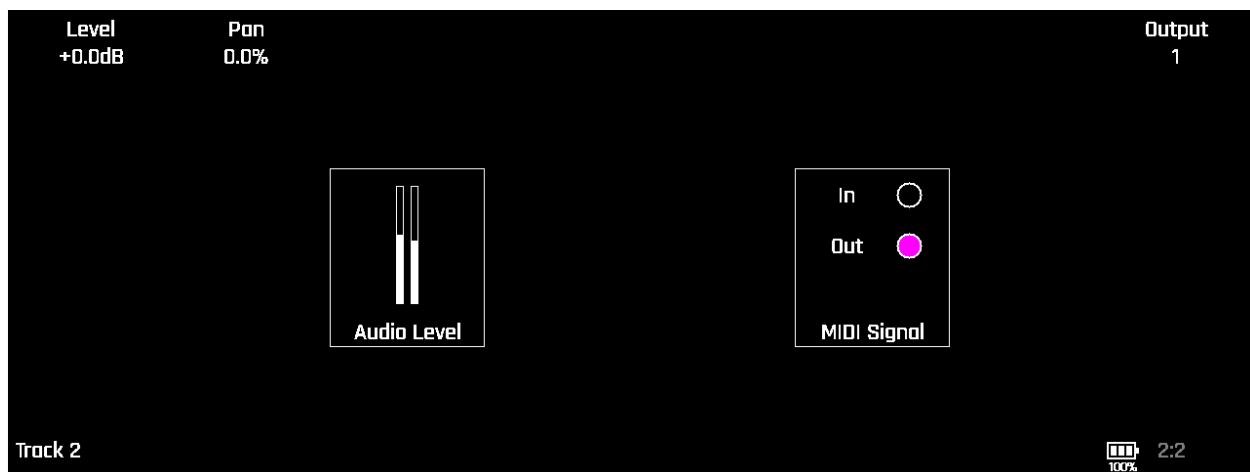
Playing External tracks involves triggering MIDI transmission to external instruments and monitoring the audio return, creating an immediate and responsive performance experience that integrates seamlessly with bento's other track types.

### Playing External Tracks with Pads

Bento's pads provide immediate access to external instrument control with velocity sensitivity and real-time audio processing feedback.

#### To play External tracks using pads:

1. Select your External track on the Tracks screen by tapping the track.
2. Play the pads to trigger your external instrument. Each pad sends MIDI note data based on bento's current key and scale settings.
3. Monitor the **MIDI Signal** indicator in the External Track Dashboard to confirm MIDI transmission.
4. Listen for audio from your external instrument while watching the **Audio Level** meter for signal confirmation.



*Figure 13-5: Audio Level and MIDI Signal Activity in the External Track Dashboard*

The pads provide immediate feedback about MIDI transmission while simultaneously processing the inbound audio through bento's voice parameters. Velocity sensitivity translates your performance dynamics into MIDI velocity data,

enabling expressive control over external instruments that respond to dynamic input.

## Playing External Tracks over MIDI

External MIDI controllers can control External tracks for complex routing scenarios where MIDI input controls MIDI output while processing external audio through bento's systems.

### To control External tracks via external MIDI controllers:

1. Configure your MIDI controller to send MIDI data to bento on the appropriate channel.
2. Set the **MIDI In Ch** parameter in your External track's Track Config screen to match your controller's output channel.
3. Verify the **MIDI Out C** parameter matches your external instrument's receive channel.
4. Play your external MIDI controller to trigger the external instrument through bento's MIDI processing.

This MIDI-through-MIDI configuration enables complex routing scenarios where bento acts as a MIDI processor and audio mixer for external instrument chains. The approach works particularly well for keyboard controllers triggering external synthesizers or external sequencers controlling multiple external instruments through bento's track system.

## Editing External Tracks

External tracks provide essential audio processing controls for integrating external instrument audio with bento's mixing and effects systems. The streamlined parameter set focuses on the most important integration controls without the complexity of synthesis parameters found in other track types.

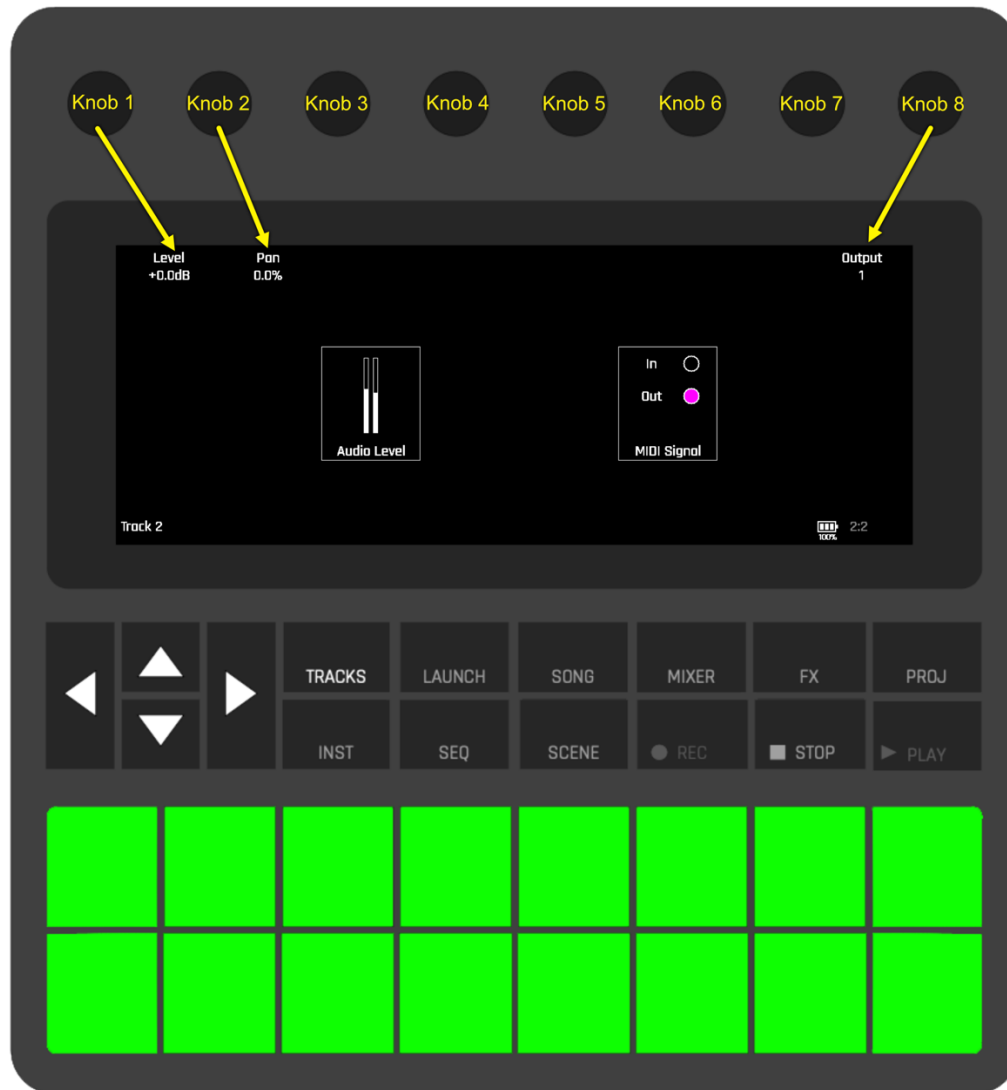
External track editing centers on audio level management, spatial positioning, and effects integration to ensure external instruments blend naturally with your bento arrangements while maintaining professional signal quality.

## Adjusting Audio Processing Parameters

External tracks provide two essential parameters for audio integration accessed through the External Track Dashboard. You can apply effects from the MIXER screen.

### To edit External track audio parameters:

1. Select your External track on the Tracks screen by tapping the track.
2. Open the External Track Dashboard by double-tapping the track.
3. Adjust the **Level** parameter using Knob 1 to control the external instrument's volume in bento's mix.
4. Adjust the **Pan** parameter using Knob 2 to position the external instrument in the stereo field.
5. Push the **MIXER** button to open the MIXER screen.
6. Tap any of the Track meters to make sure you are controlling the tracks.
7. Tap **Delay** at the bottom of the screen.
8. Adjust the knob for the External track to control the amount of the track's audio signal that is sent to the Delay effect.
9. Tap **Reverb** at the bottom of the screen.
10. Adjust the knob for the External track to control the amount of the track's audio signal that is sent to the Reverb effect.



*Figure 13-6: Knobs mapped to Voice Parameters in External Track Dashboard*

These parameters work identically to their counterparts on other track types, enabling consistent mixing workflows regardless of whether you're working with internal samples or external instrument audio. The **Audio Level** meter provides visual feedback for proper gain staging throughout parameter adjustments.

## Monitoring Signal Status

External tracks provide real-time visual feedback about MIDI communication and audio signal flow through dedicated dashboard indicators.

The **Audio Level meter** displays incoming signal strength from your external instrument, helping you maintain optimal levels and identify signal problems. The **MIDI Signal indicator** flashes when bento transmits or receives MIDI data, confirming successful communication with external gear.

These indicators enable quick troubleshooting during setup and provide ongoing confirmation of proper signal flow during performance and recording sessions.

# Creating New External Tracks

Setting up new External tracks requires coordinating physical connections, MIDI configuration, and audio routing to create seamless integration between bento and your external instruments. The process involves both technical setup and creative decisions about how external instruments will function within your arrangements.

A well-configured External track provides transparent integration that makes external gear feel like a natural extension of bento’s internal capabilities while maintaining unified workflow and control.

## To create a new External track:

- 1. Connect your external instrument’s MIDI input to bento’s MIDI output using appropriate MIDI cables or USB connections.
- 2. Connect your external instrument’s audio output to one of bento’s audio inputs using appropriate audio cables.
- 3. Configure your external instrument to receive MIDI on a specific channel (refer to your instrument’s manual).
- 4. Double-tap an empty track slot on the Tracks screen to access track creation options.
- 5. Tap the **New** button, then select **External** from the track type options to create a new External track.

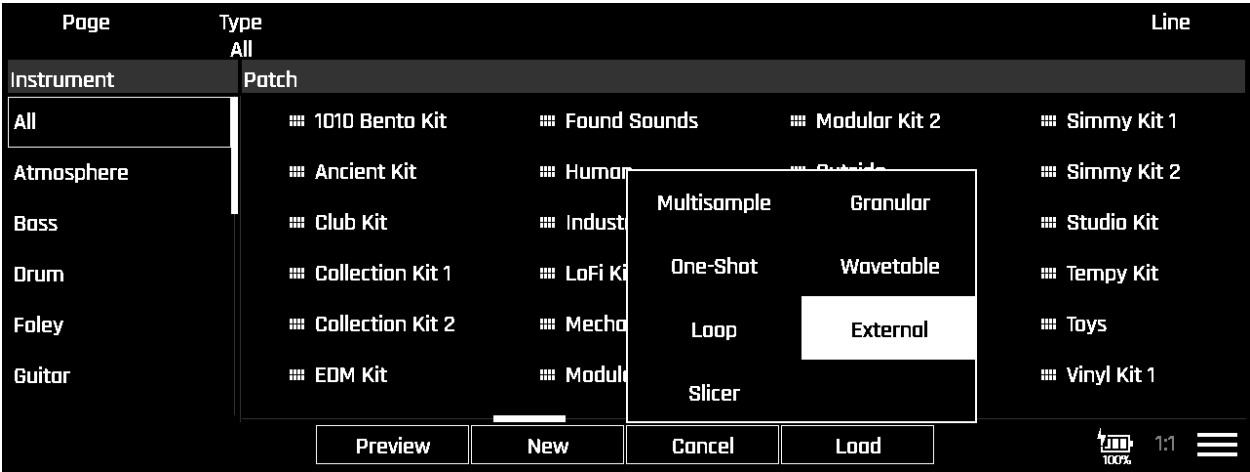


Figure 13-7: Choosing External from the New Track Menu

- 6. Configure MIDI output routing by opening the Track Config screen (Menu->Config Track) and setting **MIDI Out C** and **MIDI Out P** parameters.

Configure audio input routing by setting the **Audio In** parameter to match your physical audio connection.

7. Push **INST** to open the External track dashboard.
8. Test the complete signal path by playing pads while monitoring **MIDI Signal** and **Audio Level** indicators.
9. Adjust audio levels using your external instrument's output controls and bento's **Level** parameter for optimal integration.

The External track creation process requires attention to both MIDI and audio signal paths. Proper setup ensures reliable communication and high-quality audio integration that enhances rather than complicates your musical workflow.

Successfully created External tracks expand your sonic palette while maintaining the responsive, immediate feel of bento's internal track types. The bidirectional design enables you to leverage both bento's sequencing capabilities and your external instrument's unique character within unified arrangements.



## Best Practices for External Tracks

Successful External track implementation depends on systematic approach to gear integration, reliable connection management, and understanding how external instruments enhance bento's capabilities. These practices help you create stable external instrument setups while maximizing creative possibilities.

Developing consistent approaches to external gear configuration, signal routing, and performance integration enables you to reliably incorporate external instruments into your workflow while maintaining professional results.

### MIDI Setup Strategies

Choose MIDI channel assignments that avoid conflicts between multiple external devices and prevent feedback loops when using MIDI controllers with synthesizers. Plan your MIDI routing before connecting gear to ensure clean signal paths and reliable communication.

#### For MIDI controller plus separate synthesizer setups:

- Set unique MIDI channels for each external instrument.
- Configure controller to send on channels that don't match any receiving instruments.
- Use bento's **MIDI In Ch** parameter to route controller input to appropriate External tracks.
- Test each connection individually before creating complex routing.

#### For keyboard synthesizer setups:

- Turn off Local Control on the keyboard to prevent double triggering.
- Set the keyboard to transmit on a different channel than it receives.
- Configure **MIDI In Ch** and **MIDI Out C** to avoid feedback loops.
- Use the keyboard's audio output while controlling it via bento's pads and sequences.

## Signal Path Optimization

Maintain clean signal paths between bento and external instruments to ensure professional audio quality and reliable MIDI communication throughout your sessions.

Use high-quality MIDI and audio cables with proper shielding to minimize noise and interference. Keep MIDI cables separated from audio cables when possible and avoid running cables parallel to power sources that might introduce noise.

Monitor signal levels throughout the external instrument chain using bento's Audio Level meters and your external instrument's output indicators. Maintain consistent signal levels that provide good signal-to-noise ratio without clipping or distortion.

Set external instrument output levels for optimal signal transfer to bento's inputs, then use bento's Level parameter for mix balance. This approach maintains clean signal quality while providing flexible level control during performance and mixing.

## Multiple External Instrument Management

When using multiple External tracks, organize MIDI channel assignments systematically to prevent conflicts and enable efficient workflow during complex arrangements.

Document your MIDI channel assignments and connection configurations for quick reference during setup and troubleshooting. Consider using sequential channel numbering (1, 2, 3, etc.) for simplicity, or group related instruments on adjacent channels.

Plan your audio input usage to accommodate multiple instruments while maintaining clean signal separation. bento's three audio inputs can support multiple external instruments through mixing consoles or audio interfaces when needed.

## Backup and Documentation

External tracks combine MIDI routing configurations with audio processing settings that may be complex to recreate from memory. Save complete bento project files and document external instrument configurations that aren't stored within bento projects.

Keep notes about successful external instrument arrangements and performance configurations as reference material for future projects. Document any custom external instrument settings, MIDI channel assignments, and connection approaches that work reliably for your setup.

Regular project saves during External track development prevent loss of configuration work and enable you to experiment with different setups while maintaining working configurations as fallback options.

# 14: Exploring Sequences

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Bento organizes musical patterns into sequences that you can launch individually, collectively, or automatically in a specified order.

The following sections in this chapter describe how you can use sequences in your own music production workflows:

To do this...	read...
Start and stop individual sequences.	<a href="#">Launching Sequences</a>
Launch loops and sequences together.	<a href="#">Launching Loops</a>
Add and edit sequence notes and sequence settings.	<a href="#">Editing Sequences</a>
Record new sequences from the pads or a MIDI controller.	<a href="#">Recording Sequences in Real-Time</a>
Launch multiple sequences simultaneously as a group.	<a href="#">Creating, Launching, and Editing Scenes</a>
Arrange multiple groups of sequences for playback in a specific order.	<a href="#">Launching Scenes in Song Mode</a>

## Understanding bento Sequences

Bento organizes musical patterns into sequences that you can trigger individually or collectively in a variety of ways. Each sequence functions as a musical loop or phrase that repeats until you stop it or launch a different sequence on the same track.

Each track in a bento project can accommodate eight sequences that you can launch individually from bento's pads, but you can launch only one sequence at a time on each track. Launching a new sequence on a track immediately replaces the currently playing sequence on that track. Since bento projects accommodate eight tracks, however, you can launch eight sequences simultaneously, with each sequence played by a different sample-based instrument.

Some track types can send sequenced notes to external instruments over MIDI. If you configure certain types of tracks for MIDI output, bento can simultaneously send the sequence notes to external instruments over MIDI and to bento's tracks simultaneously.

Each sequence includes key, velocity, duration, timing of each note-on and note-off event. You can create sequences by entering each note manually through bento's Sequence editor screen, or by recording events in real-time as they are played from bento's pads or from a MIDI controller.

While most types of tracks can be played by their eight sequences, Loop tracks are already played in sync with bento's transport and can't be played by sequences. Instead, bento treats one half of the loops in a loop track as the loop equivalent of a set of eight sequences that it can launch one at a time, while the other half of the loops operate completely independent of sequences.

Bento lets you define combinations of sequences and loops that you can launch collectively and save as a "scene." Bento projects accommodate eight scenes that can be launched manually from the pads or launched automatically in a specific order as a song.

### Note:

- Sequences are limited to 256 steps in length, though each step can be assigned a length ranging from a 64th note to 8 bars.
- Each sequence can contain a maximum of 512 events.

# Launching Sequences

To start or stop sequences playing in sync while bento's transport is running, open the Sequence Launcher screen and launch sequences individually with the pads, whose 2 rows correspond to a pair of lines in the Sequence Launcher.

To open the Sequence Launcher, press **LAUNCH**.

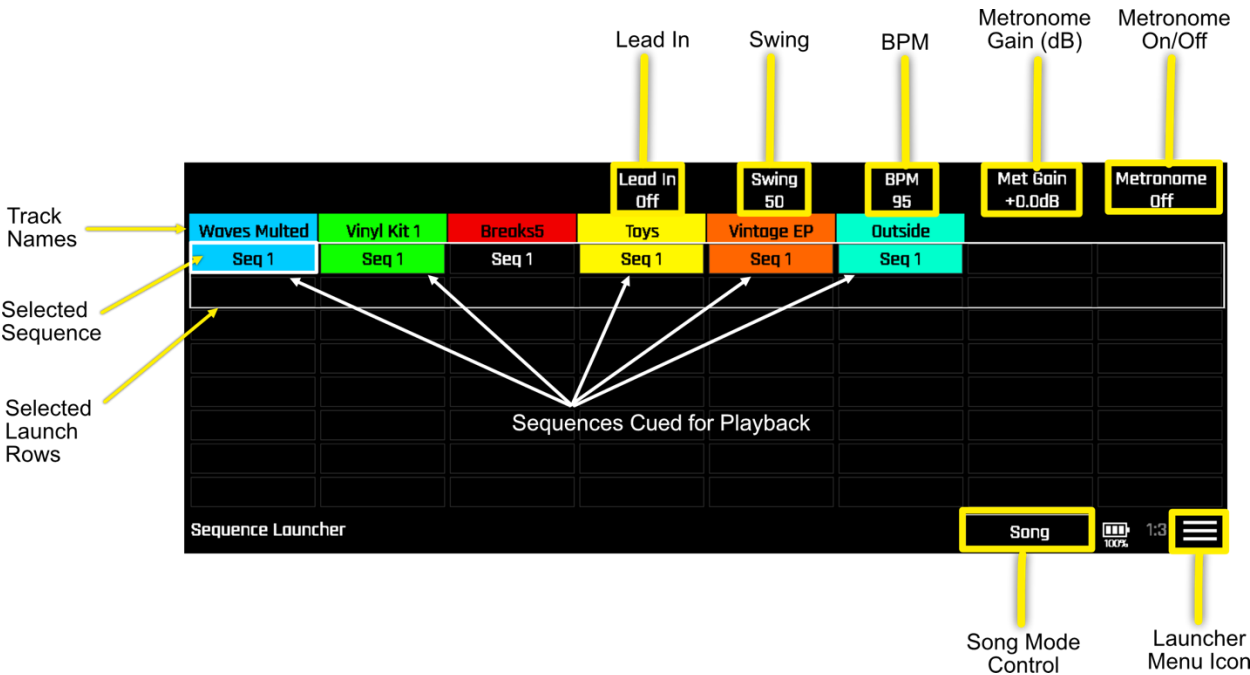


Figure 14-1: Sequence Launcher

*Table 14-1: Sequence Launcher Screen Parameters*

Parameter	Knob	Range	Description	Modulation Target?
Lead-in	4	Off, On	Enable or disable 4-beat metronome count-in before recording starts.	No
Swing	5	1% to 99%	Applies swing to eighth notes. 50% = no swing.	No
BPM	6	40 to 250	Bento transport tempo	No
Met Gain	7	-60db to +6.0dB	Metronome level in phones output mix. <b>This is a global setting that will persist across project changes.</b>	No
Metronome	8	Off Play Rec	Specifies when Metronome appears in bento's phones output	No

The Sequence Launcher Menu contains items for managing (copy, cut, paste, rename) entire sequences.

The **Song** control determines if bento's sequencer will operate in Song mode, in which sequences are launched automatically as an 8-scene "song" in which each scene lists multiple sequences to be launched at the same time and then played for a predetermined number of times before advancing to the next scene. You will do most of your sequence recording and editing with Song mode off.

## Assigning the Pads to Sequence Rows

When the Sequence Launcher screen is open, the pads light up to indicate that you can press them to launch sequences.

Figure 14-2 shows how 6 of the pads in the top row light up with the color of one of the tracks. Unlit pads indicate that they are currently mapped to an empty sequence.

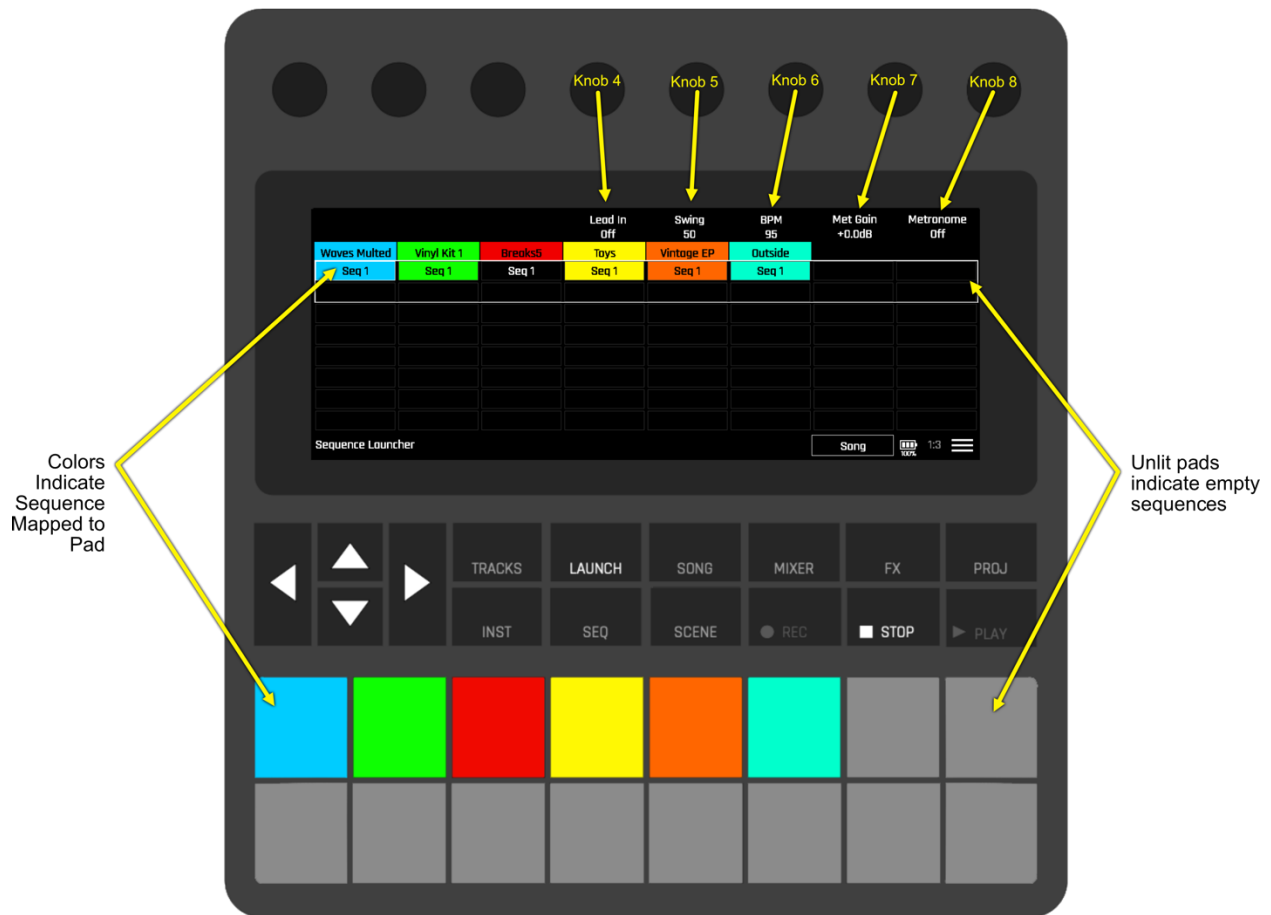
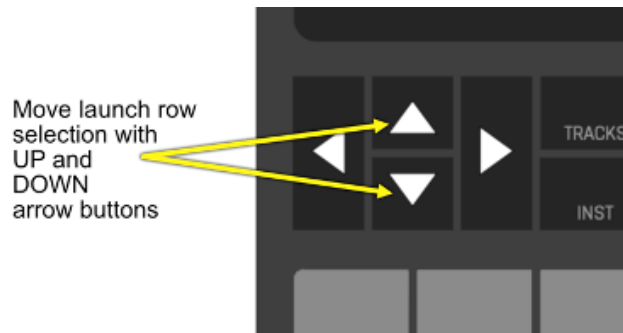


Figure 14-2: Selected Rows in Sequence Launcher



Each track can have up to eight sequences, but there are only two rows of pads. By default, the pads are assigned to rows 1 and 2, indicated by a white selection outline around the two rows.

To assign the pads to one of the 4 pairs of sequence rows, use the **UP Arrow** and **DOWN Arrow** buttons to move the row selection.



*Figure 14-3: Selected Sequence Rows with the UP Arrow and DOWN Arrow buttons*

### To launch a sequence from the pads:

1. Press **LAUNCH** to open the Sequence Launcher.
2. If **Song** is enabled, tap it to disable Song mode.
3. Use the **UP Arrow** and **DOWN Arrow** buttons to move the row selection outline to include the sequence you want to launch.

For example, if rows 1 and 2 are currently selected, and you want to launch the third sequence on the track 1, press **DOWN Arrow** once to select rows 3 and 4.

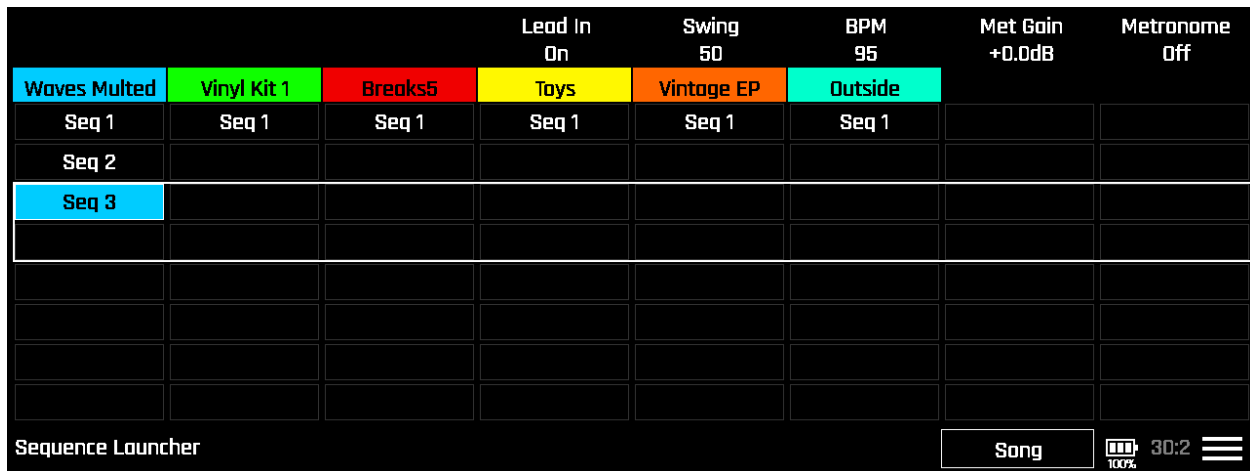


Figure 14-4: Rows 3 and 4 Selected in the Sequence Launcher screen

4. Press the pad that corresponds to the sequence you want to launch.

For example, to launch the sequence in the third row of track 1, you would press pad 9 (top left). In the Sequence Launcher, the launched sequence turns the color of the track and becomes the selected sequence, indicated by the white outline.

On the screen, the launched sequence turns the color of its track and then behaves as a playback progress bar.

If the transport is already running, bento waits for the transport to reach a beat subdivision before the sequence starts playing in sync with the transport.

**Note:** Each sequence has a **Quant Size** parameter setting that determines the beat subdivisions at which the sequence starts and stops. By default, sequences start and stop at the beginning of the next bar. If you want a sequence to start on the next down beat, set its Quant Size to 1/4. For details on changing sequence settings, see [Editing Sequence Settings](#).

5. If the transport is not already running, press **PLAY**.

The sequence starts playing immediately.

6. To launch other sequences, use the Up Arrow and Down Arrow buttons to select the row that contains the sequence you want to launch, and push the corresponding pad.

If you launch a sequence on the same track as one that is already playing, the first sequence stops and the second sequence starts at the same beat subdivision. If the two sequences have different **Quant Size** settings, bento uses the second sequence's setting to determine when this happens.

### To stop sequences:

1. To stop one sequence without stopping others, do one of the following:
  - Launch an unnamed empty sequence on the same track.
  - Press and hold **LAUNCH**, then press any pad for any sequence on the same track.
2. To stop all sequences, do one of the following:
  - To make each sequence stop playing when it reaches the next "quant" subdivision press **STOP** once.
  - To make all sequences stop playing immediately, press **STOP** twice.

When you stop the transport, bento retains the launch status of the sequences on each track and leaves them cued to launch automatically the next time you press **PLAY**.

### To clear the list of cued sequences:

1. Press **LAUNCH** to open the Sequence Launcher screen.
2. Press and hold **STOP** for about 2 seconds.

Bento clears each track's cued sequence.

### To play a track from the pads while sequences are playing:

1. Press **TRACKS** to open the Tracks screen.
2. Choose the track you want to play from the pads. The pad colors turn the selected track's color, indicating you can play that track. You can now play the pads while the sequences you launched continue playing.
3. If you want to edit the track's sound or edit the levels of the tracks, press **INST** or **MIXER** to open the corresponding screen. You can continue playing the pads while you make changes to the track's sound or balance the mix levels.

To continue launching or stopping more sequences, press **LAUNCH** and resume launching and stopping sequences.

## Saving Sequences with the Project

When you save a project, bento also saves the sequences that are currently cued to launch even if they are not playing at the time. The next time you load the project bento cues the same sequences so that they launch simultaneously when you press **PLAY**.

### To save the project so that sequences are cued for playback when you load it:

1. Launch the sequences you want to automatically launch when the project is loaded. It doesn't matter if the transport is running or not.
2. Press **PROJ**, and either tap **SAVE** to save with the current project name or tap the Menu icon and choose **Save As** to save a copy of the project with a different name.
3. Verify the sequence launch states have been saved with the project:
  - Press PROJ, then choose the saved project and press **Load**.
  - When project has reloaded, press **PLAY** to verify that the project saved the sequences with their launch states.

## Launching Loops with the Sequence Launcher

Loop tracks integrate with bento's sequencer so that you can launch them the same way that you can launch sequences, while maintaining their unique ability to synchronize sample playback with the transport without affecting their pitch.

When a project includes a Loop track, the launcher automatically assigns loops 9-16 (top row of the Sample Bank) to the Loop track's sequence slots in the Sequence Launcher.



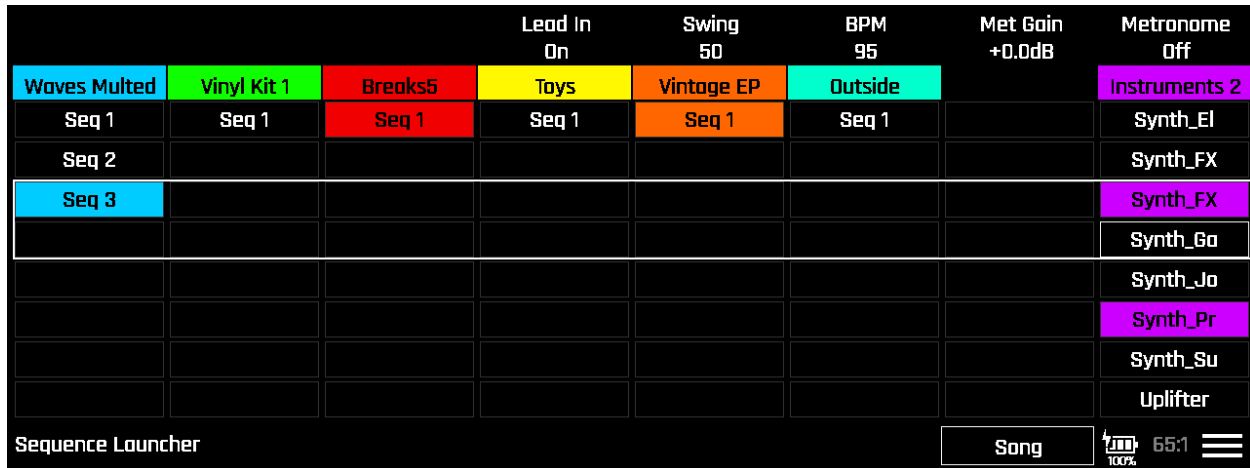
						Lead In On	Swing 50	BPM 95	Met Gain +0.0dB	Metronome Off
Waves Malted	Vinyl Kit 1	Breaks5	Toys	Vintage EP	Outside					Instruments 2
Seq 1	Seq 1	Seq 1	Seq 1	Seq 1	Seq 1					Synth_El
Seq 2										Synth_FX
Seq 3										Synth_FX
										Synth_Ga
										Synth_Jo
										Synth_Pr
										Synth_Su
										Uplifter
Sequence Launcher									Song	 100%         6:4 

Figure 14-5: Loops 9-16 in Sequence Launcher with Loop

The names in sequence slots 1 through 8 are those of loops 9 through 16.

From the Sequence Launcher you can only launch one loop at a time, just as you can only launch one sequence per track. From the Loop track's Sample Bank screen, however, you can launch multiple loops in which case the Sequence Launcher shows multiple Loops playing at the same time.



*Figure 14-6: Sequence Launcher with Multiple Loops Playing*

The Sequence Launcher does not indicate whether Loops 1 through 8 are playing or not and it has no control over any loops besides the ones that appear in the Sequence Launcher.

For example, if you launch loop 16 from the Sequence Launcher while loops 11 and 14 are playing (Figure 14-6), loops 11 and 14 stop playing and loop 16 starts playing. If loops 3 and 7 were also playing, they continue to play because they are not visible in the Sequence Launcher or controlled by it. All 16 loops are visible in the Loop Sample Bank screen (Figure 14-7), so it shows all three loops (3, 7, and 16) playing.

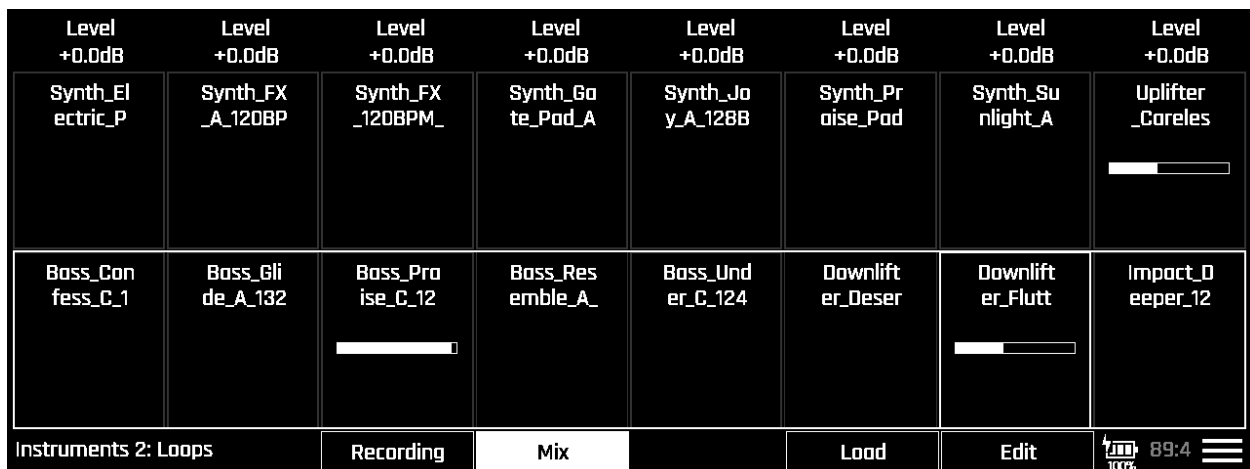


Figure 14-7: Loop Sample Bank Screen with Loops 1-8 unaffected by Sequence Launcher

### To launch a loop from the Sequence Launcher:

1. Press **LAUNCH** to open the Sequence Launcher.
2. If **Song** is enabled, tap it to disable Song mode.
3. Use the **UP Arrow** and **DOWN Arrow** buttons to move the row selection outline to include the loop you want to launch.
4. Press the pad that corresponds to the loop you want to launch.

For example, to launch the loop in sequence slot 3, you would select rows 3 and 4, then press the top pad for that track to launch loop 11. On the screen, the launched slot turns the color of the Loop track and becomes the selected “sequence,” indicated by the white outline.

If the transport is already running, bento waits for the transport to reach a beat subdivision before the loop starts playing in sync with the transport.

Each of the 16 loops has its own **Quant Size** parameter setting that determines the beat subdivisions at which it starts and stops. If you want a loop to start on the next down beat, set its Quant Size to 1/4. For details on changing a loop’s **Quant Size**, see [Editing Voice Parameters in the Loop Dashboard](#).

5. If the transport is not already running, press **PLAY**.  
The loop starts playing immediately.
6. To launch more loops, press INST to open the Loop track’s Sample Bank screen, then play pads 1-16 to start and stop loops. The Sequence Launcher is not involved in launching loops in the Sample Bank screen, so you are not limited to launching one loop at a time.
7. When you are ready to launch other sequences and loops, press LAUNCH to open the Sequence Launcher, and resume launching loops 9-16 one at a time.

Note that if any loops in the Sample Bank’s bottom row (loops 1-8) were playing when you opened the Sequence Launcher, they continue to play.

8. To stop a loop without stopping other sequences or loops 1-8, press and hold **LAUNCH**, then press any pad mapped to the Loop track.

## Editing Sequences

There are three ways to edit sequence notes:

- Add notes in the Sequence screen with touchscreen gestures.
- Record notes in real-time from the pads.
- Record notes in real-time from a MIDI controller.

Bento lets you use any combination of these methods at the same time.

You can start recording a sequence with the pads, use a MIDI controller to add notes beyond the range of the pads, and open the Sequence screen to view, edit, or add notes. Bento offers convenient sequence management tools for making copies of existing sequences that you can use to create variations on themes, chord progressions, and beats, or simply for backup purposes.



## Managing Sequences

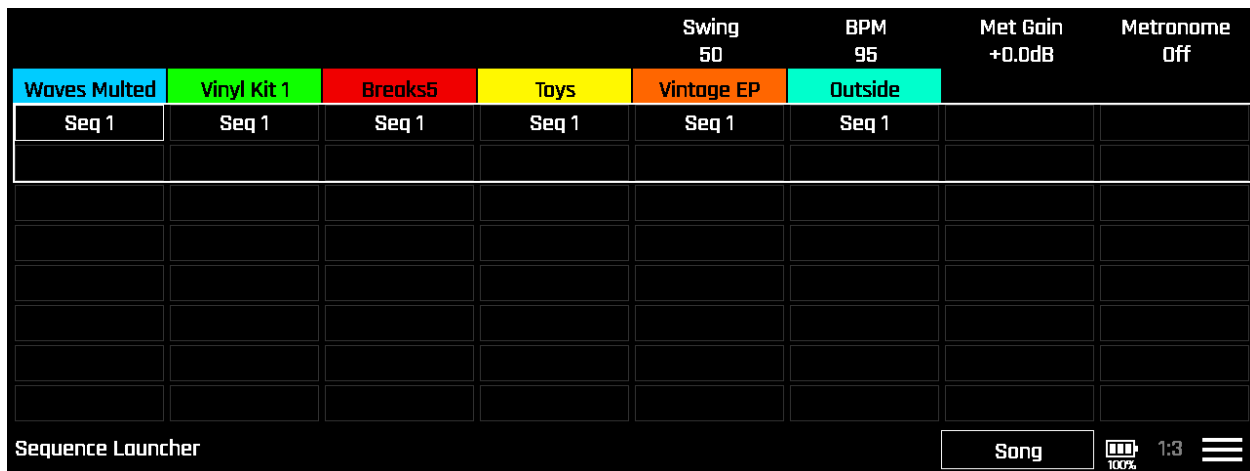
When you load a project, bento loads any sequences saved with the tracks. The Sequence Launcher provides tools for basic sequence management, such as copy, cut, paste, and rename, all of which are important for developing variations and backups of existing sequences.

Most sequence management activities begin with selecting a sequence in the Sequence Launcher.

### To select a sequence from the Sequence Launcher:

1. Press **LAUNCH** to open the Sequence Launcher.

Notice that a sequence slot is already selected, indicated by a white outline.



*Figure 14-8: Example of Initial Sequence Selection in the Sequence Launcher*

The pad colors indicate which sequences are loaded for each track. By default, bento selects the sequence most recently edited or selected when you open the Sequence Launcher.

2. If you want to work on a different sequence than the currently selected sequence, do one of the following:
  - Tap the sequence.

**Note:** Selecting a sequence from the touchscreen does not launch it.

  - Use the **UP Arrow** and **DOWN Arrow** buttons to move the row selection rectangle to include the sequence, then play the corresponding pad to launch it.

**Note:** Launching a sequence also selects it.

The white selection outline moves to the sequence you selected.

Selecting a sequence also selects the sequence's track. Bento keeps track of both selections so that you don't have to select a track or select a sequence every time you open a different screen.

For example, after selecting a sequence, you can:

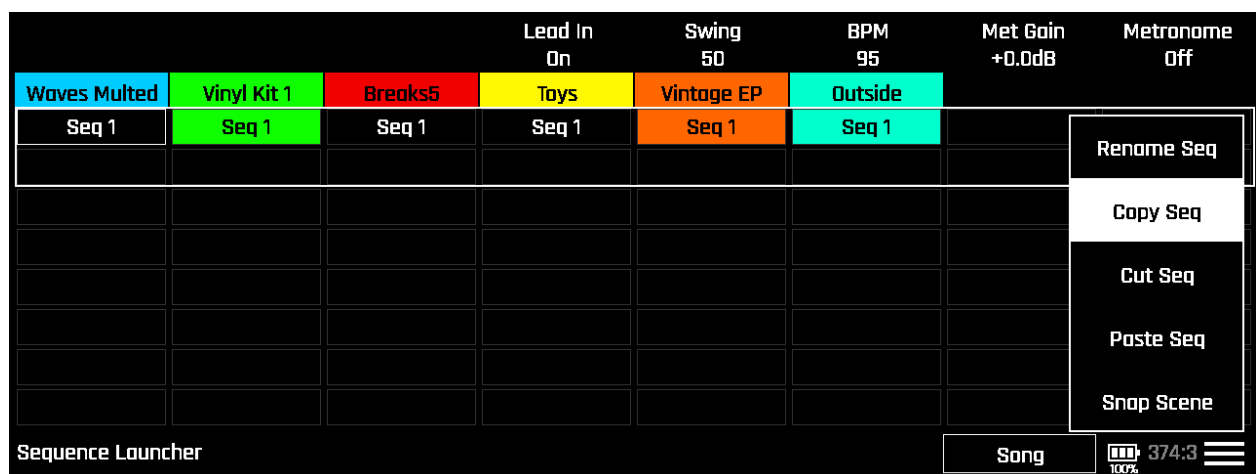
- Press **SEQ** to open the Sequence screen.
- Press **INST** to open the instrument dashboard or sound bank.
- Press **MIXER** to adjust track levels and effects sends.
- Press **FX** to configure the Delay, Reverb, and Modulation effects.

As you move from one screen to the next, the pad colors remain the same as the currently selected track's color. When all pads have the same color, it indicates which track is currently selected and that you can play the selected track from the pads as you switch from editing a sequence to adjusting the track's filter cutoff, to adjusting the levels of all eight tracks, or to finding a delay time that feels right when applied to the combined rhythms of multiple sequences playing at the same time.

### To make a copy of a sequence:

1. Press **LAUNCH** to open the Sequence Launcher.
2. Select the sequence you want to copy by tapping it.
3. Tap the Menu icon and choose **Copy Seq.**

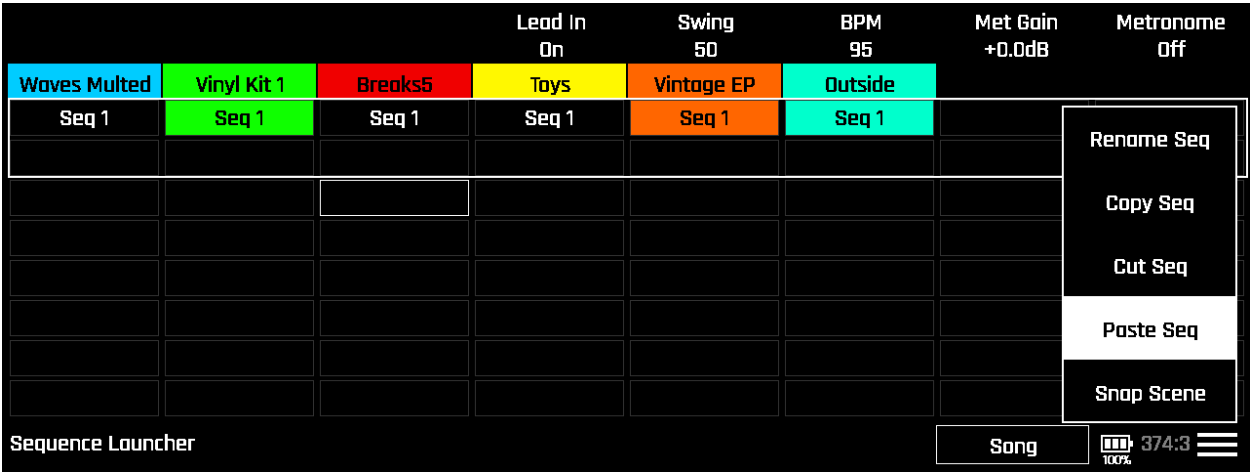
**Note:** If you try to Copy a sequence from a Loop track, the sequence management options in the menu will be grayed out. Loops only appear in the Sequence Launcher for launching and monitoring.



4. Tap the sequence slot to which you want to paste the copy.

**Note:** If the copied sequence is from a One-shot track, you can only paste it to other One-shot track sequences.

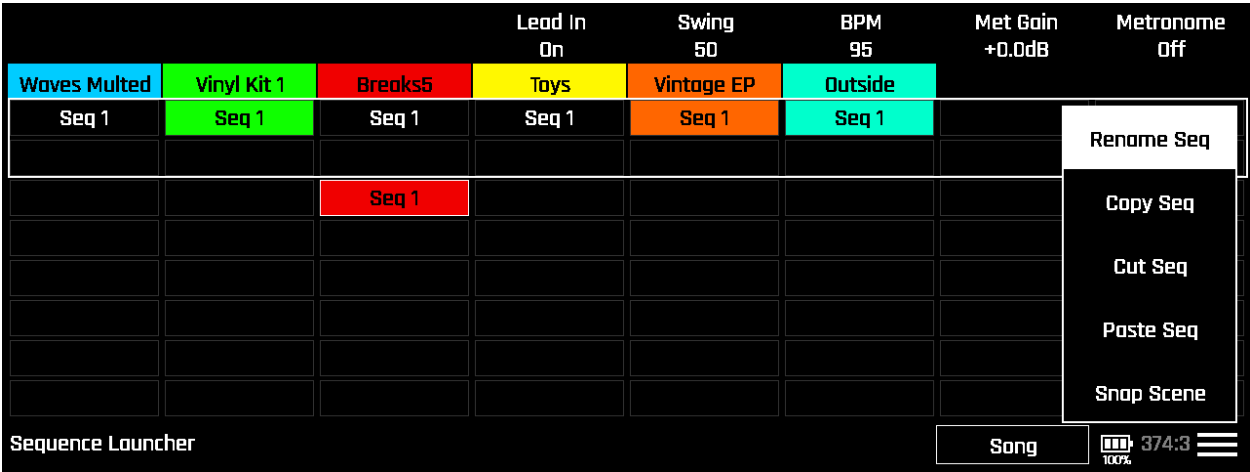
Tap the Menu icon and choose **Paste Seq.**



Note: Bento gives the new sequence the name of the original sequence. Consider editing the sequence name so that it won't be confused with the original in other sequence-related screens, such as the Scene and Song screens.

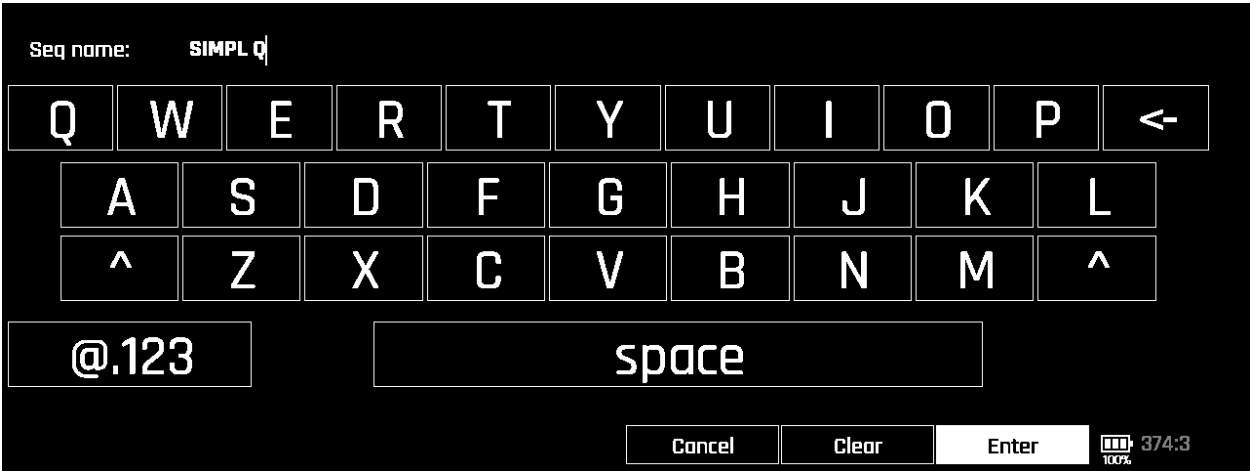
To rename a sequence:

- 1. Press **LAUNCH** to open the Sequence Launcher.
- 2. Select the sequence you want to rename by tapping it.
- 3. Tap the Menu icon and choose **Rename Seq.**



The Sequence Naming Keyboard screen opens with the original sequence name at the top of the screen with the cursor at the end of the name, ready for editing.

- 4. Edit the sequence name with the on-screen keys.

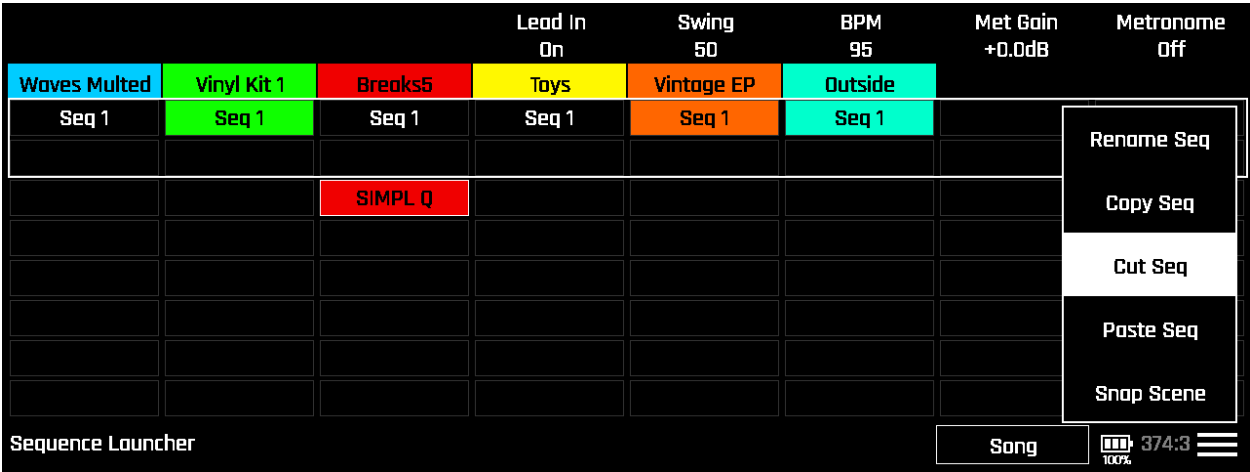


**Note:** You can clear the current name by tapping **Clear** at the bottom of the screen or cancel the renaming process by tapping **Cancel**.

- 5. When you are done editing the sequence name, tap **Enter**.

To delete a sequence:

- 1. Press **LAUNCH** to open the Sequence Launcher.
- 2. Select the sequence you want to delete by tapping it.
- 3. Tap the Menu icon and choose **Cut Seq.**



The sequence slot no longer indicates a sequence name, indicating that the sequence has been restored to its original unnamed, empty state. The sequence is also in the clipboard and can be pasted to a different sequence slot.

## Adding and Editing Notes in the Sequence Screen

Adding or editing notes in the Sequence screen lets you see each note as you add or clear them with the touchscreen.

### To edit notes in the in the Sequence Screen:

1. Select the sequence you want to edit in the Sequence Launcher using the methods described in [Managing Sequences](#).
2. If you want to hear the sequence as you edit it, launch the selected sequence, then press **PLAY** to start the transport if it's not already running.
3. Press **SEQ** to open the Sequence screen.

**Note:** If you try to select a sequence from a Loop track, bento displays a reminder that Loop tracks don't have sequences. Loops only appear in the Sequence Launcher for launching and monitoring.

Figure 14-9 shows the Sequence screen's Step Sequencer interface for editing sequences in One-shot tracks.

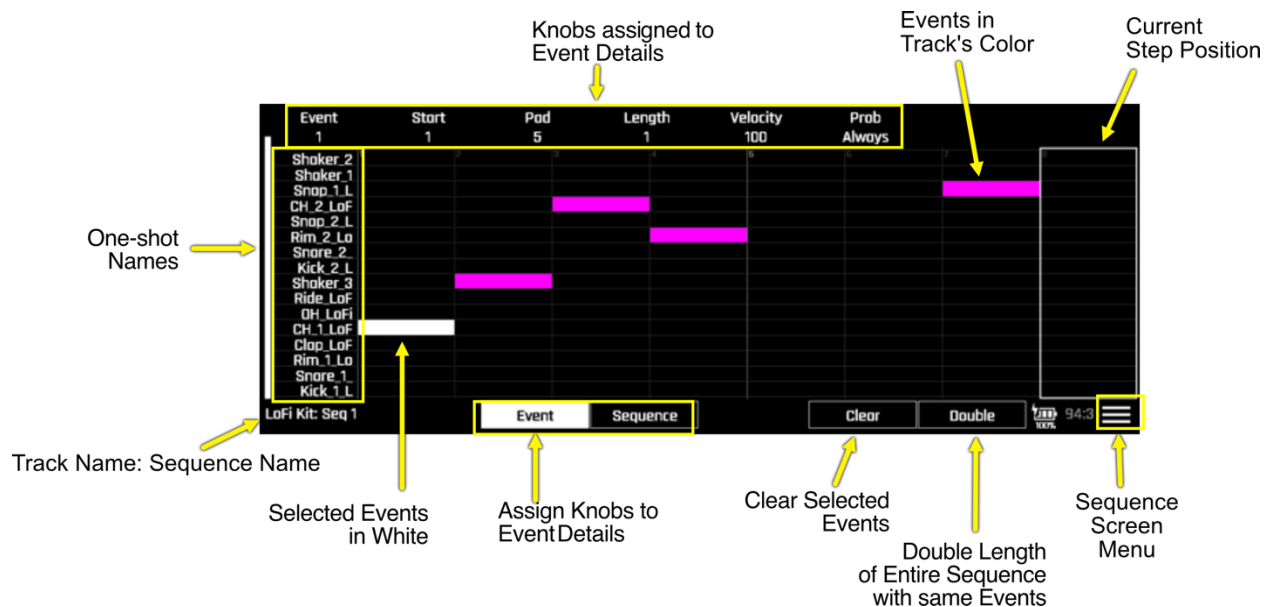


Figure 14-9: Sequence Screen Step Sequence Editor for One-shot Track in Event Details View

The names of the one-shots in the track's Sample Bank appear along the left side of the screen. Events for each one-shot appear on the same line to the right, in the color of the one-shot track. The note most recently added, edited, or selected appears in white.

If the selected sequence is in a multisample, granular, slicer, or external track, the Sequence screen opens with a Piano Roll interface for editing sequence notes. Figure 14-10 shows the Sequence screen's Piano Roll interface.

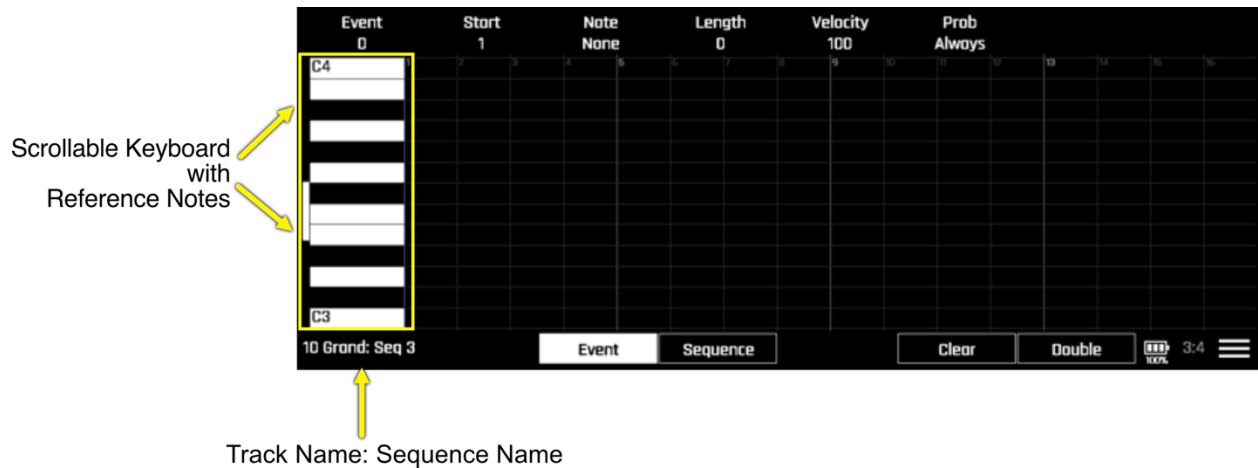


Figure 14-10: Sequence Screen Piano Roll interface in Event Details View

A. keyboard appears along the left side of the Sequence screen, with indicators of the currently displayed octaves.

To add notes, tap in the main display area. Notes appear in the same color as the selected track. The most recently added, edited, or selected note appears in white.

Note that each new note snaps to the current grid, which corresponds to the Event Len parameter, which you can change in the Sequence screen's Sequence Details view. For details on changing the Sequence settings, see [Editing Sequence Settings](#).

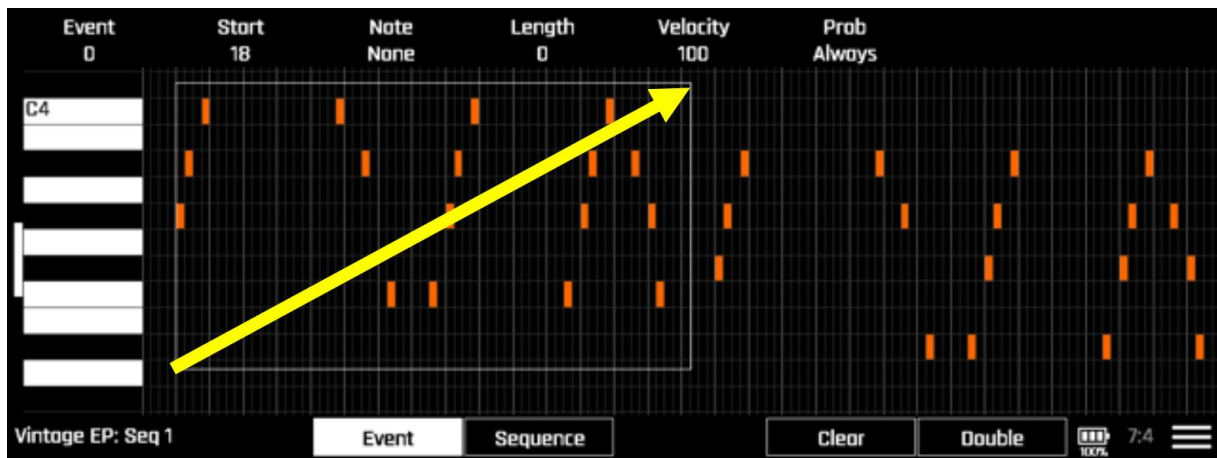
4. To remove a note, tap it.
5. Examine the parameters at the top of the screen, which correspond to the entire sequence. These parameters appear when you choose the “Event” option at the bottom of the screen.

Table 14-2 describes each of these event details for notes and one-shots.

*Table 14-2: Event Details in the Sequence Screen (Event View)*

Parameter	Knob	Value Range	Description
Event	1	0 to number of events	Selects an event in the sequence screen.
Start	2	1 to Step Count	Step number at which the event starts.
Pad (one-shot tracks) Note (all other tracks)	3	1 to 16 (one-shot tracks) C#-1 to G9 (all others)	One-shot pad number or note name.
Length	4	1 to 128 (maximum of Step length)	Number of steps the event is sustained.
Velocity	5	1 to 127	MIDI Velocity of the note.
Prob	6	1 to 99, Always	Probability of the event

- Use knob 1 to select an individual event you want to edit.
- To select multiple events for editing, draw a selection rectangle around the notes by dragging one finger diagonally across the events.



*Figure 14-11: Touchscreen Gesture to Select Multiple Events in Sequencer Screen*



When you release your finger from the screen, the selected notes appear in white.

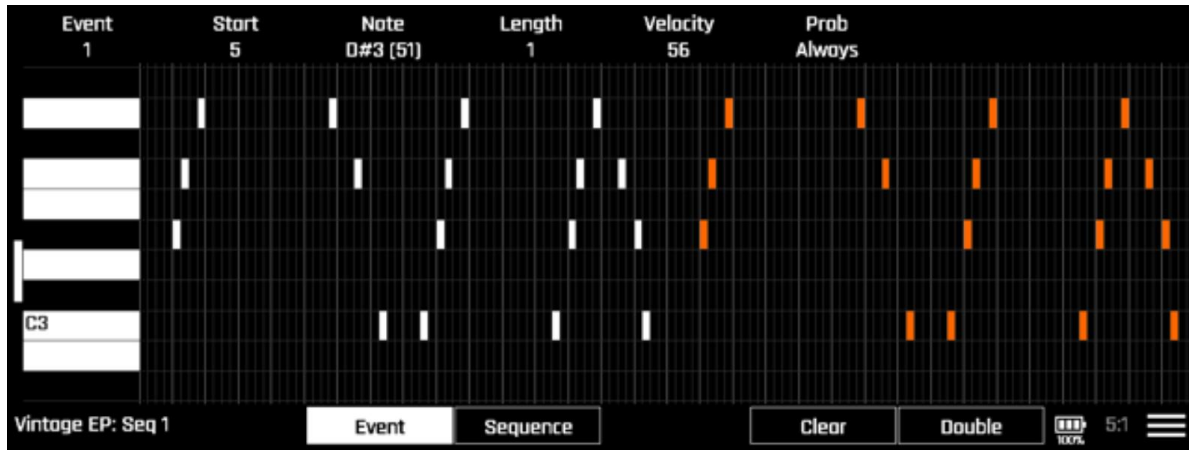


Figure 14-12: Multiple Notes Selected in Sequence Screen

8. Use knobs 2 through 6 to edit the selected events:
  - Use knob 2 to move the event's start forwards or backwards in the sequence.
  - Use knob 3 to move the event to a different note or one-shot.
  - Use knob 4 to change the length of the event.
  - Use knob 5 to adjust the event's velocity to make it softer or louder.
  - Use knob 5 to make the event more or less likely to be played when the sequence repeats.

If you select an event that is outside the current range of displayed events, the event display area automatically shifts the event range.

9. To clear selected notes, tap **Clear**.
10. To double the sequence length and repeat its notes, tap **Double**.
11. To undo the last change made to the sequence, tap the Menu icon and choose **Undo**.

**Note:** The Copy Seq, Paste Seq, and Cut Seq commands in the Sequence editor's menu (bottom right screen corner) are sequence management commands that are intended for tasks such as making copies of entire sequences, and deleting sequences. They are not related to the note selection and note editing techniques discussed in this section.

12. If the sequence has notes outside the current range of notes, use the Sequence screen's touchscreen gestures to scroll the event display and to zoom in or out to see more events. For details on using touchscreen gestures, see [Using Touchscreen Gestures in the Sequence Screen](#).

**Note:** The selected sequence is not the same as the playing sequence. If the sequence you are editing is not playing, go back to the Launch screen and launch the sequence using the pads, then push SEQ to return to editing the sequence.

## Using Touchscreen Gestures in the Sequence Screen

The Sequence editor screen takes advantage of bento's touchscreen by supporting common touchscreen gestures to help you navigate through MIDI notes and to narrow in on specific notes so you can select them and edit them as a group.

### To scroll the event display area up or down:

1. To display lower notes, swipe up with two fingers.

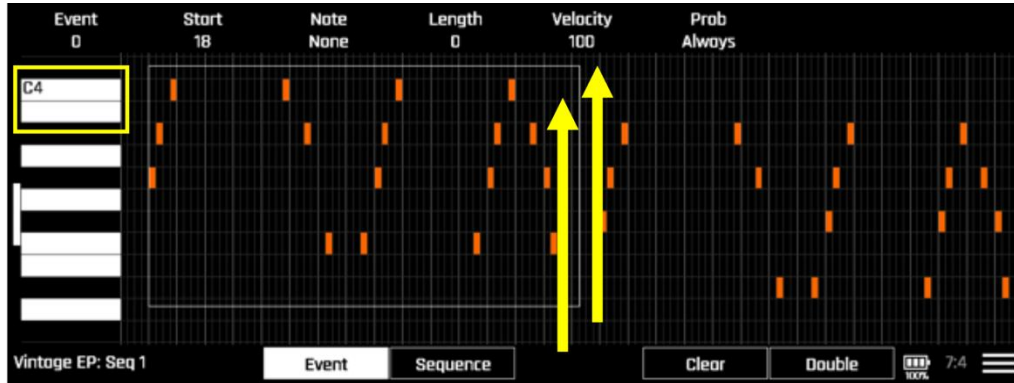


Figure 14-13: Swiping Up to View Lower Notes

Note the octave indicators (e.g. C4) in the keyboard change as the range of notes in the display area gets lower.

2. To display higher notes, swipe down with two fingers.

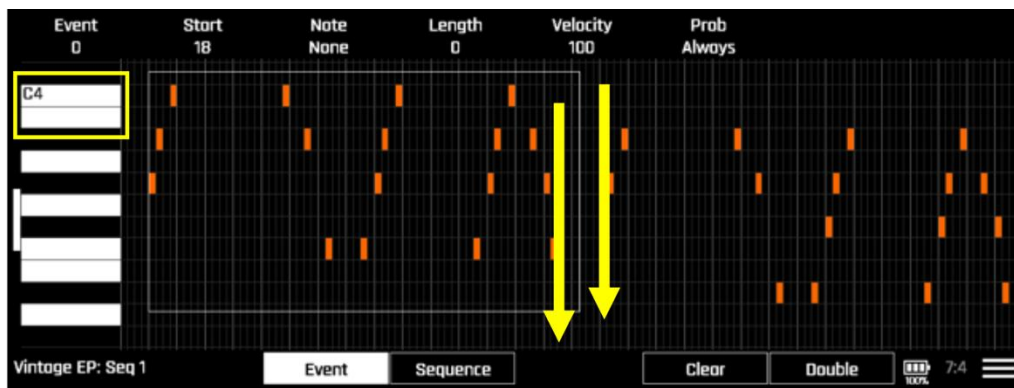
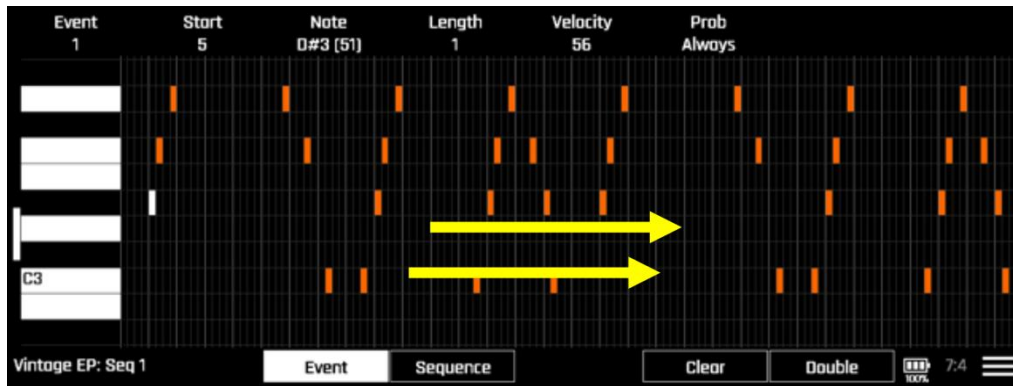


Figure 14-14: Swiping Down to View Higher Notes

Note the octave indicators (e.g. C4) in the keyboard change as the range of notes in the display area gets higher.

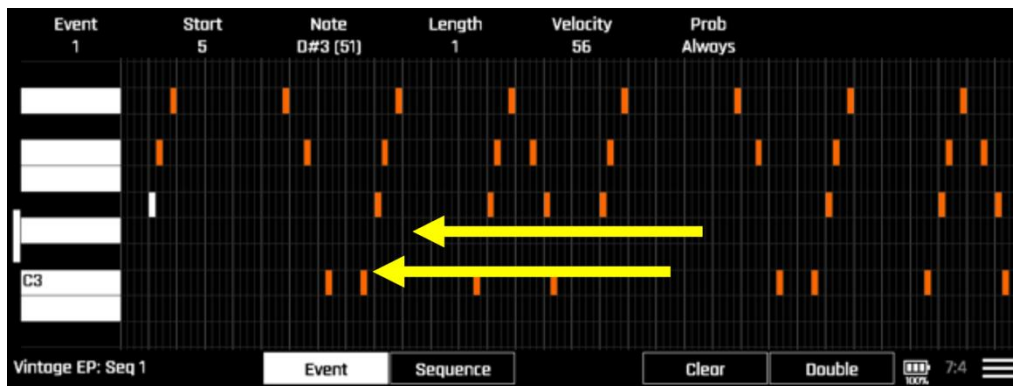
**To scroll the event display area up or down:**

1. To display events with earlier start times, swipe right with two fingers.



*Figure 14-15: Swiping Right to View Later Events*

2. To display events with later start times, swipe left with two fingers.



*Figure 14-16: Swiping Left to View Earlier Events*

### To zoom in and out in the event display area:

1. To zoom-out the event timeline and increase the number of visible notes, pinch two fingers together horizontally on the touchscreen.

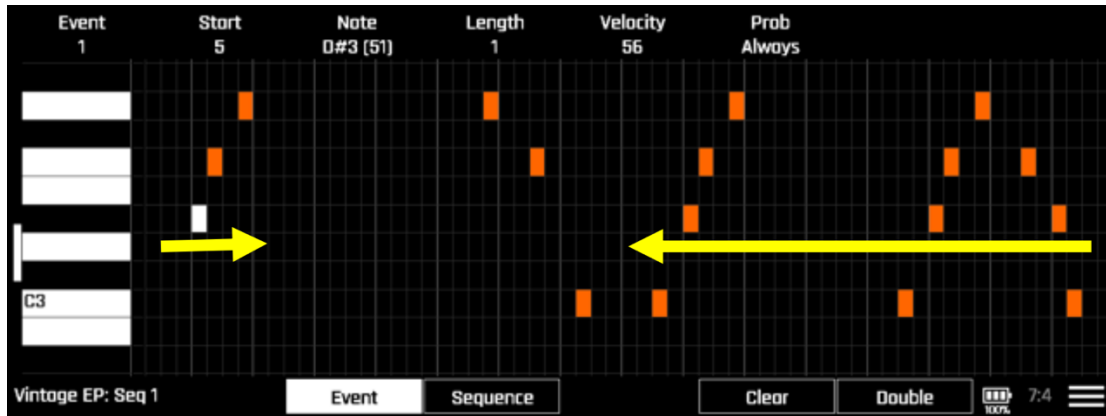


Figure 14-17: Zooming Out the Timeline With Two Fingers

2. To zoom in on a narrow range of visible notes, spread two fingers apart horizontally on the touchscreen.

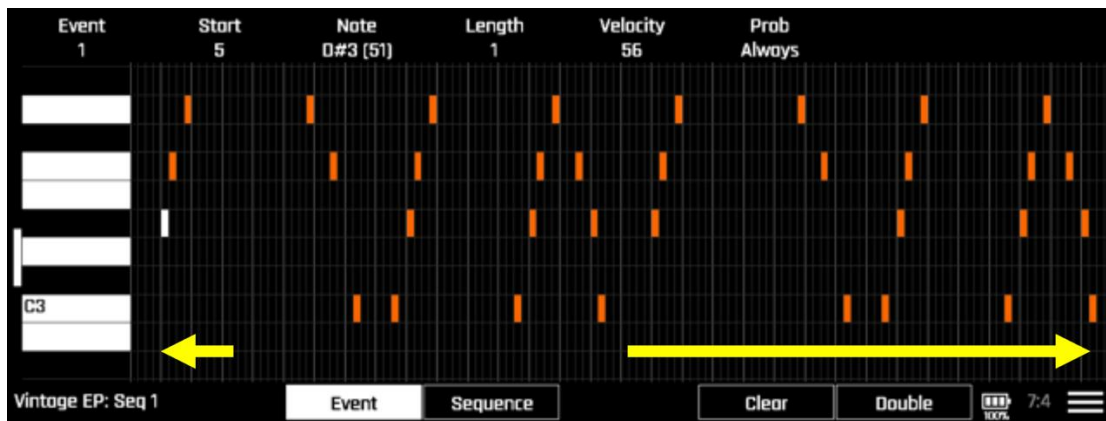


Figure 14-18: Zooming In on the Timeline With Two Fingers

To zoom out to see a wider range of notes (25 maximum), pinch two fingers together vertically on the touchscreen.

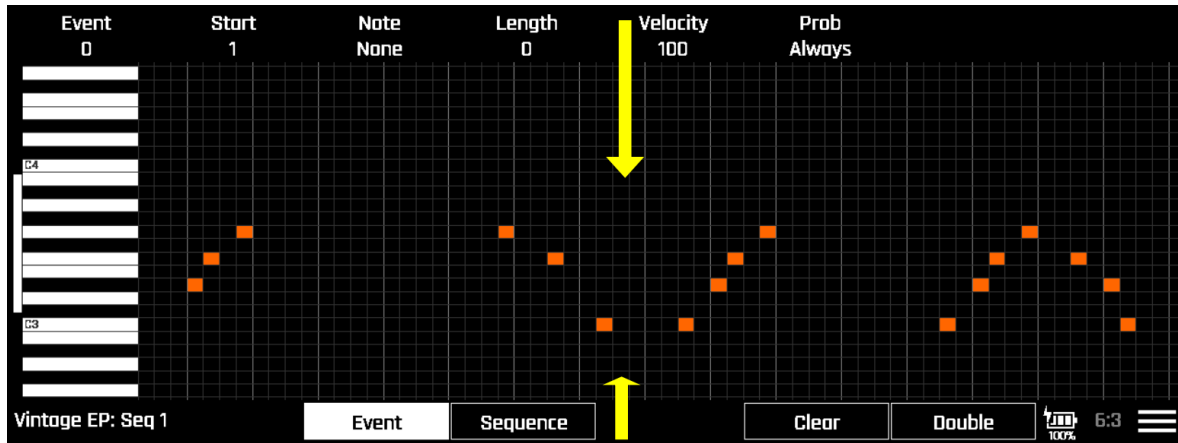


Figure 14-19: Zooming Out the Note Range With Two Fingers

3. To zoom in on a narrow range of notes (7 minimum), spread two fingers apart vertically on the touchscreen.

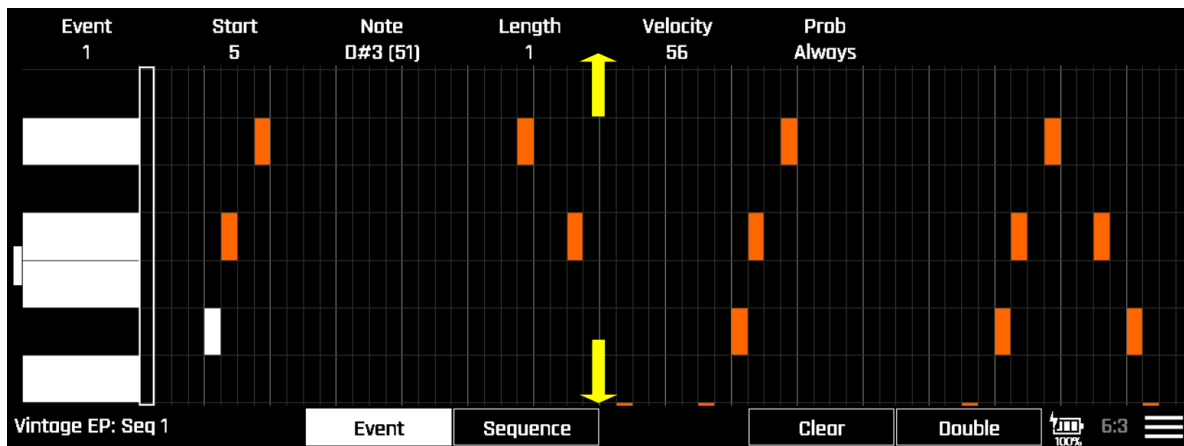


Figure 14-20: Zooming In on a Narrow Note Range With Two Fingers

## Editing Sequence Settings

The first time you add notes to a sequence bento gives the sequence a default name and default settings. You can edit the sequence settings before or after recording notes or editing notes.

### To edit the Sequence Details for the Selected Sequence:

1. Press **LAUNCH** open the Sequence Launcher.
2. Select the sequence you want to edit.
3. Press **SEQ** to open the Sequence screen.
4. Tap **Sequence** to choose the Sequence Details view.

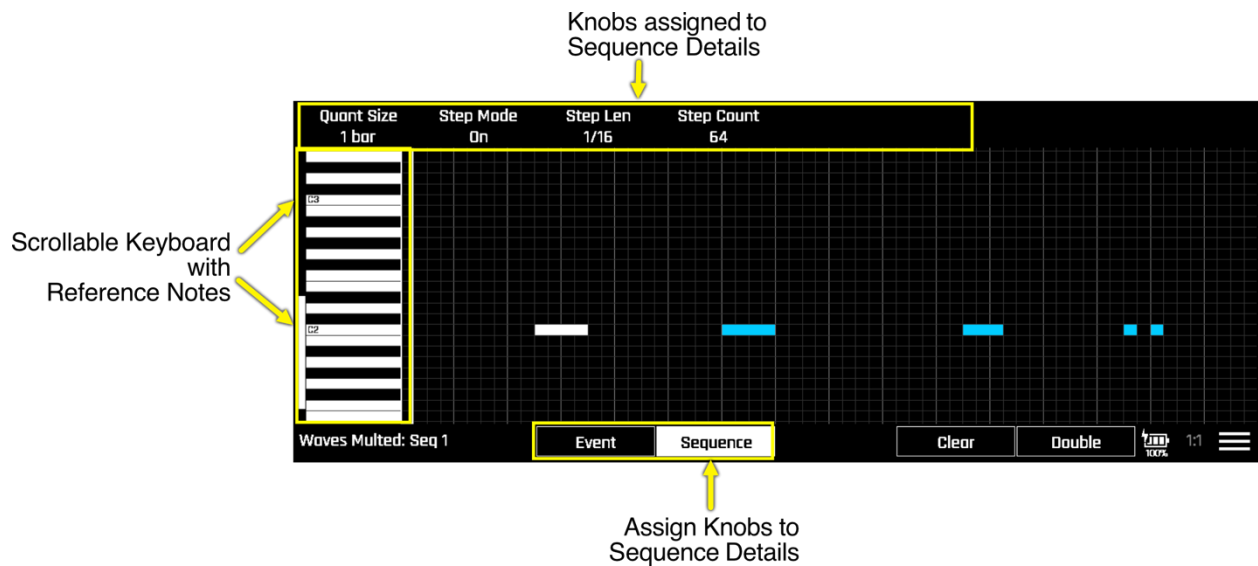


Figure 14-21: Sequence Screen in Sequence Details View

Table 14-3 describes the parameters you can edit with knobs 1-4 in Sequence Details, and the default values.

*Table 14-3: Sequence Settings and Defaults*

Parameter	Knob	Value	Description
<b>Quant Size</b>	1	1/64 to 2 bars Default: 1 bar	Beat subdivision at which the sequence can start or stop playing after being launched. To ensure continuous looping, set this to a size that is no larger than the sequence itself.
<b>Step Mode</b>	2	Off/On Default: On	When “On,” note start and stop times align with beat subdivisions.  When “Off,” sequences recorded in real-time retain the timing of the recorded performance.
<b>Step Len (when Step Mode is off)</b>	3	1/64 to 2 bars Default: 1/16	Specifies the default duration of events entered from the touchscreen and the resolution of the sequence’s time grid for real-time recordings in Step Mode.
<b>Step Count</b>	4	1 to 256 Default: 16	The length of the sequence, expressed as the number of steps. When <b>Step Count</b> is 16 steps and <b>Set Len</b> is 1/16, the sequence is 1-bar long. You can also set different <b>Step Count</b> values for each sequence. <b>Note:</b> Lowering the <b>Step Count</b> does not truncate the sequence. The notes will still be there if you increase the step count later.

**Note:** If the **Step Count** is lower than the **Quant Size**, bento will not start the next loop until the quant size is reached. For example, if step length is 1/16 and step count is 12, but the **Quant Size** is 1 bar, there will be 4 empty steps at the end of the loop. Decrease the quant size to make smaller sequences start the next loop immediately after the last step.



## Recording Sequences in Real-Time

Real-time sequence recording captures your musical performance directly into sequences, preserving timing and velocity as you play.

### Preparing for Sequence Recording

Before recording, establish the sequence parameters and ensure proper track configuration for optimal results. New sequences have default settings that are useful while becoming familiar with bento, but you may find them too restrictive at some point. For details about sequence settings and the defaults for new sequences, see [Editing Sequence Settings](#).

#### To set the tempo and metronome:

1. Press **LAUNCH** to open the Sequence Launcher.
2. Press **PLAY** to start the transport.
3. If you want to hear the metronome when you record, use Knob 8 to set **Metronome** to “Rec,” then adjust Knob 7 to set **Met Gain** to a level that you like.
4. Adjust the tempo with Knob 6.
5. If you want to hear a 1-bar count-in from the metronome before recording begins, turn Knob 4 clockwise to turn on **Lead In**.

#### To select sequences that you want to hear while recording:

1. Make sure Song mode is off. The Song button at the bottom of the Launch screen should have a black background. If it is enabled (has a white background) tap it to toggle Song mode off.
2. Stop any sequences you don't want to hear. If you're not sure yet, stop all sequences on all tracks by holding **LAUNCH** and playing any pad mapped to each track, for example pads 1-8 or 9-16.
3. Launch any existing sequences you want to hear when you record the new sequence.

**Important:** The Sequence Launcher only allows playing one sequence at a time, so avoid launching any sequence on the same track as the one you are going to record.

4. Press **STOP** to stop all sequences.

## Preparing Sequences for Recording

When recording sequences for a new project, all eight sequences on each of the eight tracks are empty and ready for recording. You can start recording into the empty sequences right away, but their default settings may not be ideal for the sequences you want to record.

### To configure an empty sequence for recording:

1. If there are no empty sequences available in the track you want to record, you may have to delete some existing sequences with the **Cut Seq** function in the Sequence Launcher Menu.
2. Decide which unnamed empty sequence you want to record, then move the sequence row selection with the **UP Arrow** and **DOWN Arrow** buttons to include the sequence you chose for recording.
3. Push the pad for the sequence you chose, then press **SEQ** to open the Sequence screen.
4. Verify that the track and sequence names that appear in the lower left screen corner match the track and sequence you want to record.
5. Choose **Sequencer** at the bottom of the Sequencer screen.

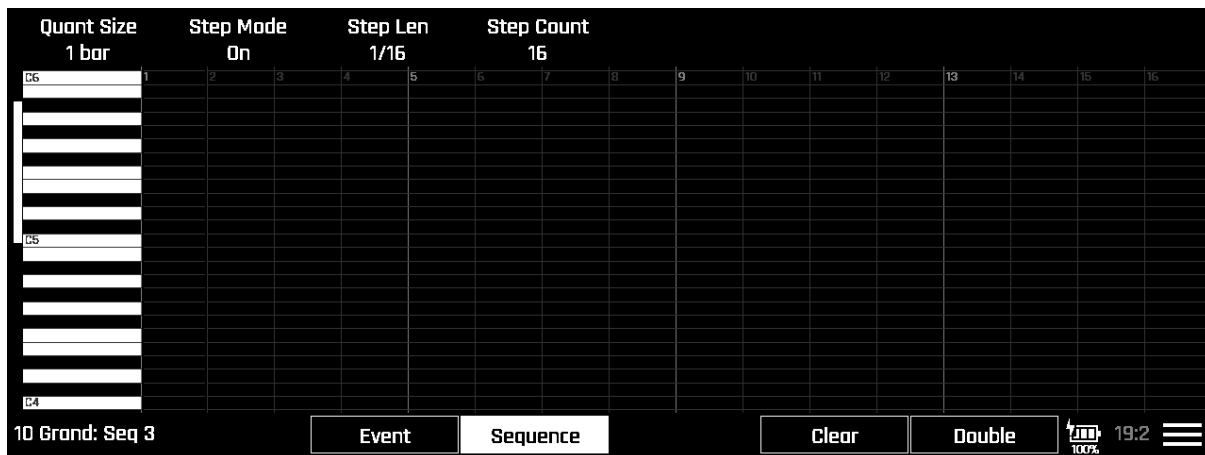


Figure 14-22: Choosing Sequence Detail View in the Sequence Editor Screen

Use Knobs 1-4 to edit the sequence settings:

- Adjust Knob 1 to set the sequence's **Quant Size** to the desired bar subdivision. By default, sequences launch and stop at the beginning of the next bar.
- If you want bento to quantize the notes you play during recording, leave **Step Mode** On. If you don't want bento to quantize the notes you play, adjust Knob 2 to turn **Step Mode** Off.
- If Step Mode is On, adjust Knob 3 to set the **Step Len** to the resolution you want.
- Adjust Knob 4 to set **Step Count** to the desired length. For example, if you want to record a 4-bar sequence and **Step Len** is 1/16, set **Step Count** to 64. Bento uses **Step Len** and **Step Count** to determine the sequence length even if **Step Mode** is Off.

**Important:** Sequences are limited to 512 steps total. At 1/32 note resolution, sequences can contain 16 beats maximum. At 1/16 note resolution, sequences can contain 32 beats maximum. Recording at lower resolutions (1/4, 1/2) let you record longer sequences at the expense of the timing accuracy.

6. To prepare additional empty sequences for recording, repeat steps 1-6.

**Note:** If the **Step Count** is lower than the **Quant Size**, bento will not start the next loop until the quant size is reached. For example, if step length is 1/16 and step count is 12, but the **Quant Size** is 1 bar, there will be 4 empty steps at the end of the loop. Decrease the quant size to make smaller sequences start the next loop immediately after the last step.

## Recording Sequences

The process of recording a new sequence is simple after the sequences are configured for the type of music you plan to record.

### To start recording the new sequence:

1. Press **LAUNCH** to open the Sequence Launcher and verify that the sequence row selection still includes the sequence you are about to record.
2. If the transport is still running, press **STOP**.
3. Press the pad mapped to the new sequence to cue it for launching and recording.
4. To start recording, hold **REC** and press **PLAY**.

If you configured the metronome for a lead-in count, bento waits 4 beats before it starts recording.

**Note:** The lead in time will still be respected even if the metronome is off.

5. Press **SEQ** to open the sequence screen. The pads turn the color of the track with the sequence you are going to record.

**Important:** Always make sure the pads are of the same color before playing the pads. If you forget to select the sequence's track, you might inadvertently play the pads while the Sequence Launcher is still open and launch the wrong sequence for recording.

6. Play the pads and listen for the notes you played when the sequence begins repeating. Continue playing the pads to record more notes.
7. To exit recording mode, press **REC**.

The new sequence is still playing, and if you check the Sequence Launcher you can verify that it is still the selected sequence, which means you can tap the Menu icon and copy it and paste it to another sequence, delete it, or rename it.

You can also press **INST** to see and adjust the track's voice parameters while the sequence plays or press **SEQ** to view and edit the recorded notes or to change sequence settings such as the **Step Len** and **Step Count**.

### To continue recording with another empty sequence:

1. Press **LAUNCH** to open the Sequence Launcher.
2. Launch the next empty sequence with the corresponding pad, using the **UP Arrow** and **DOWN Arrow** buttons to select the sequence's row first if necessary.
3. Press **REC** to resume recording.
4. Push Seq to open the Sequence screen.
5. Play the notes you want to record from the pads.
6. Press **REC** again to exit recording.

### Real-time Recording from a MIDI Controller

Recording sequences from MIDI controllers gives you more options for the types of performances you can record. If a controller can send MIDI continuous control messages, you can also use the controller to modify track voice parameters.

The only configuration required for recording notes from a MIDI controller is setting the MIDI controller to send notes on the same MIDI channel as the **MIDI In** channel of the track with the sequence you want to record.

Fortunately, bento assigns default MIDI In channels to tracks based on the track number. Track 1 listens on MIDI channel 1, Track 2 listens on MIDI channel 2 and so on up to Track 8 listening on MIDI channel 8. Unless you have a specific reason to use channels other than 1-8, all that is required is configuring the MIDI controller to send on the same channel as the track with the sequence you want to use for recording.

Setting up a MIDI controller to transmit MIDI on the same channel as a bento track is easy, but it only ensures that the controller can send notes to bento for recording. Bento does not support using MIDI for launching sequences. This means that you still need to use bento's pads to launch the sequences that you want to record.

### To verify the MIDI channels of the bento project's tracks:

1. Press **TRACKS** to open the Tracks screen.
2. For each track:
  - a) Tap the track to select it.
  - a) Tap the menu and select **Config Track** to open the Track Configuration screen.
  - b) Verify the track's **MIDI In Ch** parameter so you can either set the MIDI controller channel to match the track's **MIDI In Ch** or change the track's **MIDI In Ch** to match the MIDI controller's MIDI out channel.

**To record notes from the MIDI Controller:**

1. Press **LAUNCH** to open the Sequence Launcher.
2. Launch the next empty sequence with the corresponding pad, using the **UP Arrow** and **DOWN Arrow** buttons to select the sequence's row first if necessary.
3. Configure the MIDI controller to send note messages on the same MIDI channel as the recording track's **MIDI In Ch** value.  
  
For example, if you launch the first sequence on track 3, set the MIDI controller to send notes on channel 3.
4. Hold **REC** while you press Play to start recording.
5. Play the notes you want to record from the MIDI controller.
6. To continue recording into a different sequence:
  - a) Launch the sequence from the pads.
  - b) Change the MIDI controller's MIDI Out channel to match the selected track's **MIDI In Ch** setting if you are sequencing a different track.
  - c) Play the notes you want to record from the MIDI controller.
7. Press **REC** again to exit recording.

## Creating, Launching, and Editing Scenes

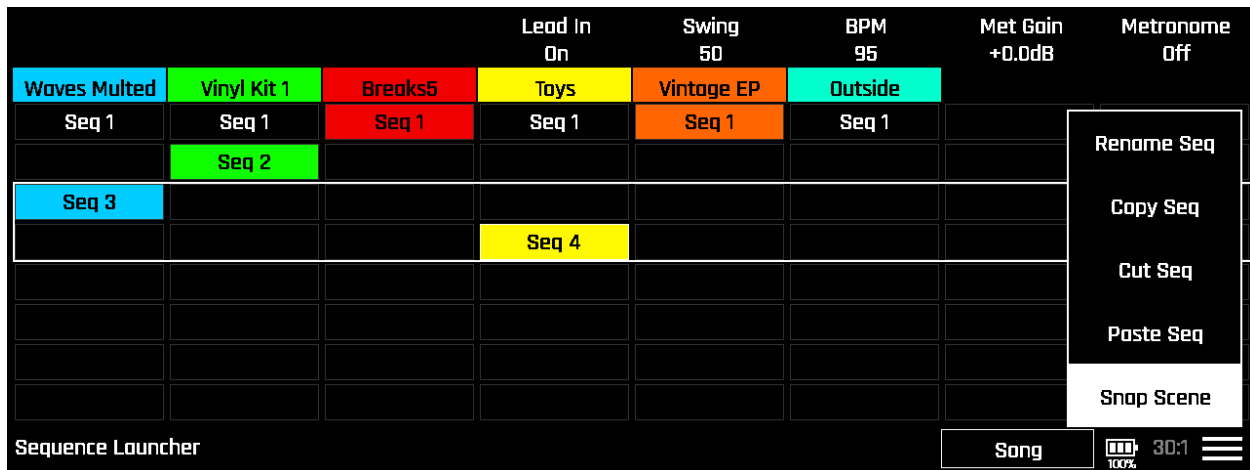
Scenes capture combinations of sequences and loops across multiple tracks, enabling you to create complete musical arrangements and transition between different song sections seamlessly.

### Snapping Scenes from the Sequence Launcher

A scene represents a specific musical moment that combines sequences from multiple tracks. Each scene can include up to 8 sequences (one per track) and serves as a snapshot of your arrangement at a particular point in your composition.

#### To create a scene from currently playing sequences:

1. Press **LAUNCH** to open the Sequence Launcher.
2. Launch one or more sequences and loops using the **UP Arrow** and **DOWN Arrow** buttons to select the sequence's row and then playing the pads.
3. When you find a combination of sequences that work well together, tap **Menu** and choose **Snap Scene**.

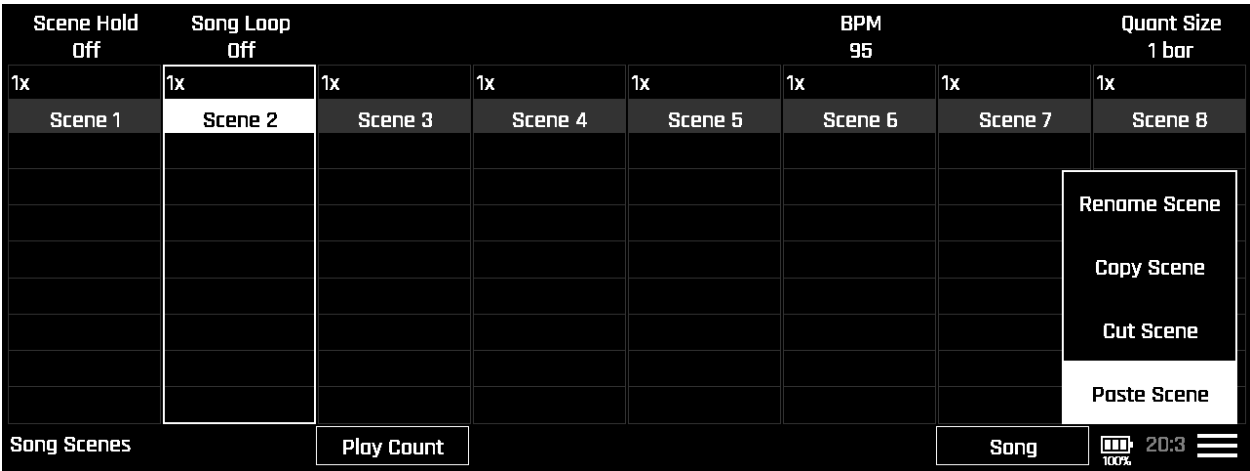


Bento takes a “snapshot” of the sequences currently launched and creates a “scene” that identifies a set of sequences that can be launched simultaneously as a group and copies it to its clipboard.

- 4. Press **Song** to open the Song Scenes screen.

The Song Scenes screen presents a set of eight “scene” columns, with default names (Scene 1, Scene 2, and so on) and eight slots that will eventually show the names of sequences that bento can launch as a group.

- 5. Tap the first column to select Scene 1, then tap the Song Scenes Menu icon and choose **Paste Scene**.



The slots of Scene 1 now show the names of the sequences that were launched when you chose **Snap Scene** from the Sequence Launcher menu.

Pad 9 lights up in a light red color, indicating that you can launch the new scene by playing pad 9.



**To launch a scene manually from the Song Scenes screen:**

1. Open a project that has at least 3 scenes in it.
2. Press **LAUNCH** to open the Sequence Launcher, then press and hold **LAUNCH**, while you play the top row of pads, leaving no sequence launched or cued for launching.
3. Press **PLAY** to confirm that no sequences launch.
4. Press **SONG** to open the Song Scenes screen.
5. Confirm that Song mode is Off by tapping the Song button in the lower right corner of the screen until the button is in the inactive state (dark background with white text).
6. Play pad 9 (the top left pad) to launch Scene 1.
7. Press **LAUNCH** and verify that the Scene's sequences have launched. Since Song mode is off, the scene will continue to loop until you take action to stop it or trigger another scene.
8. Press **SONG**, then play pad 11 to launch Scene 3.
9. Press **LAUNCH** and verify that the Scene's sequences have launched.
10. Press **SONG**, then play pad 1, in the lower left corner.

Scene 3 stops playing, though not immediately. Bento aligns the launching and stopping of Scenes with bar subdivisions just like it does when you launch sequences.

In the top left corner of the screen, you'll find a **Quant Size** parameter, mapped to Knob 8. This **Quant Size** setting affects the launching of all eight scenes.

You can return to this screen any time you want to launch a scene.

11. Adjust Knob 8 to change **Quant Size** from 1-bar to  $\frac{1}{4}$ , then play pad 9 to confirm that Scene 1 launches much sooner than before.

**Tip:** It is easier to hear how Quant Size affects launching scenes when the metronome is running.

**To make copies of a scene:**

1. Press **SONG** to open the Song Scenes screen.

2. Tap on the scene you want to copy.

A white rectangular outline surrounds the selected Scene.

**Note:** Selecting a scene on the screen does not launch it.

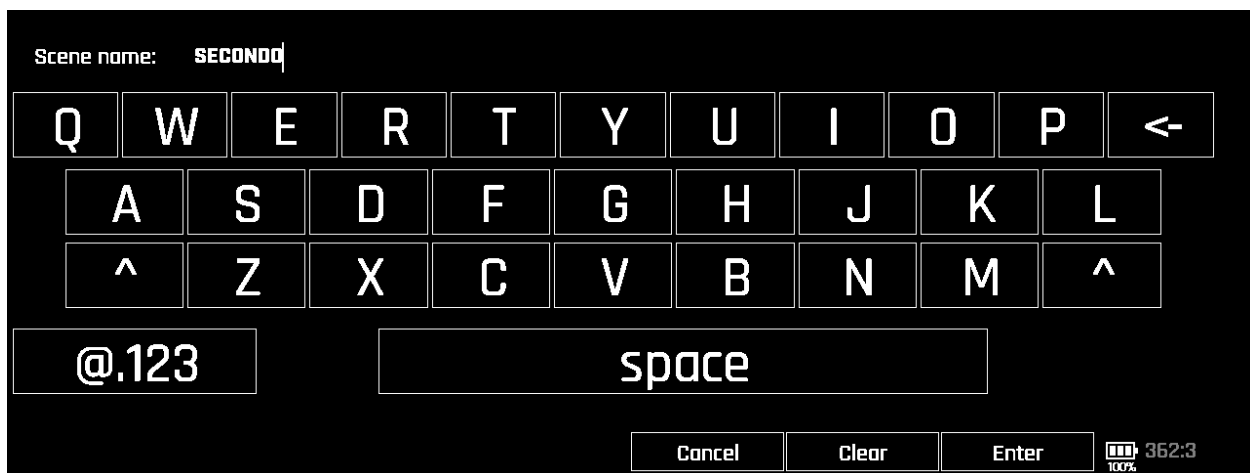
3. Tap the Song Scenes Menu icon and choose **Copy Scene**.

4. Select an empty scene slot by tapping it, then tap the Song Scenes Menu icon and choose **Paste Scene**.

Both scenes now have the same name and contain the same sequences.

5. Tap the new scene to select it, then Tap **Menu** and choose **Rename Scene**.

6. In the Naming Keyboard screen, edit the name of the new scene so you won't mistake it for the original, then tap **Enter**.



*Figure 14-23: Scene Naming Screen*

The Song Scenes screen now shows the original scene and the renamed copy and the corresponding pads light up to indicate you can launch the scenes.

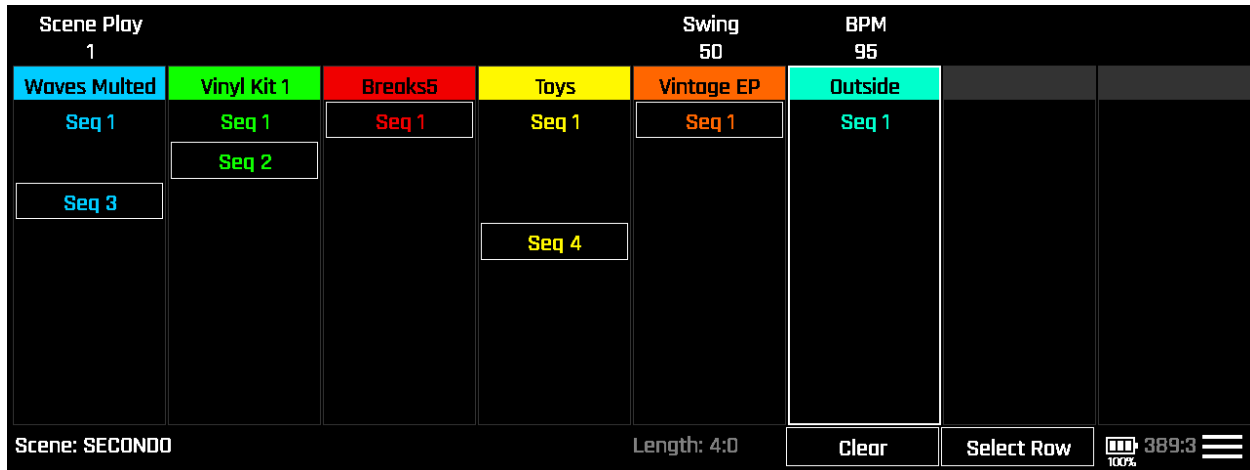
**Reminder:** Don't forget to save your project or to save it with a different name so the original project is still available in its original form.

**To create or edit a scene:**

1. Press **SONG** to open the Song Scenes screen.

Tap the scene you want to edit.

Press **SCENE** to open the Scene editor screen.



*Figure 14-24: Scene Editor Screen*

The Scene editor presents the tracks and their sequences in the same layout as in the Sequence Launcher, but there are outlines around more than one sequence, but only one (maximum) in each track. Each selected sequence is part of the currently selected scene, whose name appears in the lower left screen corner.

2. To remove a sequence from the scene, tap it. The sequence is no longer selected.
3. To change the sequence included in the scene, tap the sequence you want. The original sequence is no longer selected, and the new sequence is selected.
4. Press **SONG**, and verify the edited scene shows different sequence names for each track.
5. Press **SCENE** to open the Scene editor screen.
6. Tap **Select Row** to turn it on
7. Tap on the individual sequences under each track.

When you select a sequence that is on the same row as other sequences, all of them become selected. This is a convenient way to create scenes when sequences are created to work as a group and placed in the same row.

8. Tap **Select Row** to turn it off.

9. To clear all sequences from the current scene, tap **Clear** at the bottom of the screen.

The scene's "launch" pad is no longer lit.

10. Tap the Menu icon and note that you can copy, cut, paste, and rename sequences in both the Scene editor screen and the Song Scenes screen. You can copy a scene from the Scene editor screen and paste it into a difference scene in the Song Scenes screen, and vice-versa. The **Paste Scene** function also lets you paste scenes copied from the Sequence Launcher with the **Snap Scenes** function.

**Note:** The **Scene Play** parameter is not used when song mode is off. See [Launching Scenes in Song Mode](#) for more information about the Scene Play parameter.

## Launching Scenes in Song Mode

A bento Song is a collection of scenes that you can launch, one at a time, in two very different ways:

- Press PLAY and launch scenes manually from the pads and let it play for as long as you want, while you modify sequences, tracks, mix levels and effects, and play tracks manually, until you decide to launch another scene.
- Turn on Song mode, press PLAY and let bento launch each scene automatically, in the order in which they appear in the Song screen, for the number of repeats specified for each scene. Each scene plays up to 32 times before bento launches the next scene.

These scene-launching methods combine with the bento's sample-centric tracks to form a toolset designed for musicians eager to experiment and improvise, to retain and organize musical expressions that they feel are worth repeating, and to build musical structures they can replicate or reinterpret in live performance.

Each bento project contains one song that has eight slots available for scenes. You don't have to create the song or the eight scenes. You just need to know how to launch sequences, combine them into scenes, and launch them from the pads, all of which is described earlier in this chapter.

The Song screen is where you make the finishing details:

- Launching scenes in Song mode.
- Changing the Quant Size.
- Changing each scene's Play Count setting.
- Changing the scene order.
- Putting a scene on hold.
- Using Song Loop mode.



If the selected scene is empty, bento will look for the next scene that includes at least one sequence and launch it.

Bento plays each scene for the number of times displayed above the scene's name. 1x means "play once," 2x means "play twice" and so on, up to a maximum of 32 times. Bento then finds the next valid scene and repeats the process until it reaches the eighth scene.

After playing the eighth scene, bento stops launching scenes, unless the **Song Loop** option is enabled, in which case bento starts again from scene 1.

At any time while launching scenes in Song mode, you can launch a scene from the pads, at which point bento restarts the scene's play counter and resumes Song mode.

## Changing the Song Quant Size

Bento uses a single **Quant Size** setting to quantize the times at which scenes start or stop playing after launching manually from the pads or automatically in Song mode. **Quant Size** is expressed as a bar subdivision, ranging from 2 bars down to 1/64. The default **Quant Size** is 1-bar. Which means that scenes always launch on the first downbeat of a 4/4 measure.

1. Press **SONG** to open the Song screen.
2. Adjust knob 8 to change the **Quant Size** setting.

If a scene includes sequences of different lengths, bento will keep playing until the sequences all land on the same downbeat, which may take longer than you might expect. Using lower Quant Size values (1/16 or 1/32) can help bento to finish playing the scene and continuing to the next scene.

## Putting the Current Scene on Hold

You can temporarily play a scene on repeat at any time by turning on the **Scene Hold** option.

### To enable Scene Hold:

1. Press **SONG** to open the Song screen.
2. If **Play Count** is on, turn it off by tapping **Play Count** at the bottom of the screen.

The Scene Hold parameter appears at the top of the screen, mapped to Knob 1.

3. To turn on **Scene Hold**, turn Knob 1 clockwise.

The scene currently playing continues to play on repeat, and its play counter continues to increase with each repetition, even beyond the Play Count for the scene.

4. To turn off **Scene Hold**, turn Knob 1 counterclockwise.



## Changing Scene Play Settings

The Scene Play setting controls how many times a scene repeats before advancing to the next scene in Song Mode.

There are three ways to edit the Scene Play for a scene.

### To edit the Scene Play parameters of Scenes 1-8 with bento's knobs 1-8:

1. Press **SONG** to open the Song screen.
2. Tap **Play Count** to turn it on.

The **Scene Play** parameters for scenes 1-8 appear at the top of the Song screen, mapped to knobs 1-8.

3. Change the **Scene Play** setting for scenes 1-8 by adjusting knobs 1-8.

### To edit the Scene Play using the Arrow buttons:

1. Press **SONG** to open the Song screen.
2. Select the scene you want to change by tapping it.
3. To increase the selected scene's **Scene Play** parameter, press the **UP Arrow** button.
4. To decrease the selected scene's **Scene Play** parameter, press the **DOWN Arrow** button.

### To edit the Scene Play parameter of the selected scene in the Scene screen:

1. Press **SONG** to open the Song screen.
2. Select the scene you want to change by tapping it.
3. Press **SCENE** to open the Scene editor screen.
4. Adjust Knob 1 to edit the selected scene's **Scene Play** parameter.
5. Press **SONG** to open the Song screen.
6. Verify the number above the selected scene's name matches the **Scene Play** setting you chose in the Scene editor screen.

## 15: Mixing and Applying FX

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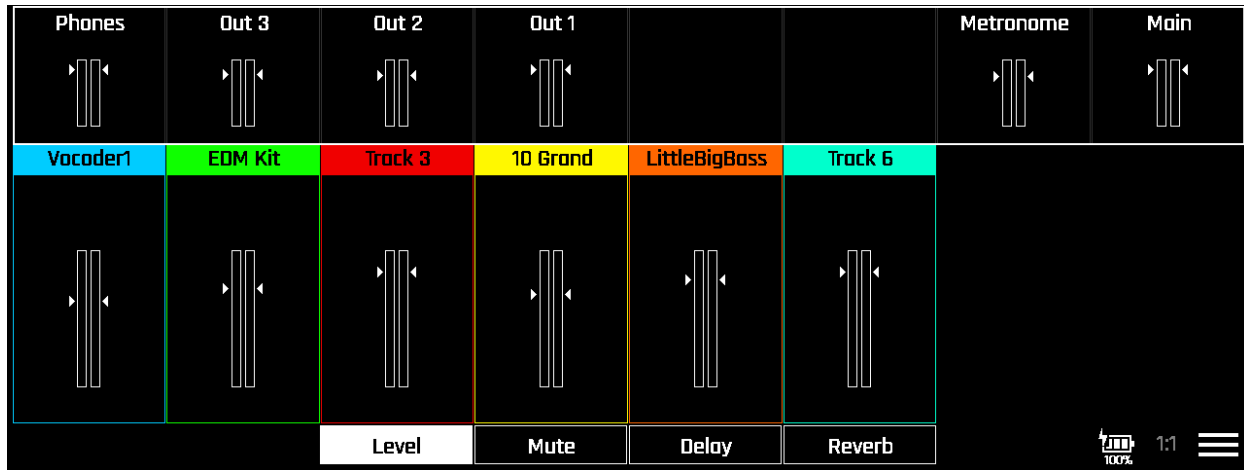
Bento's mixing capabilities enable you to balance track levels, apply effects, and route audio signals to multiple outputs. The mixing system combines individual track controls with a centralized mixer interface, giving you both detailed control and quick access to essential parameters. The FX system allows you to add reverb, delay and modulation effects to tracks, individual one-shot sample pads, and individual loops.

This chapter covers bento's complete signal flow, from individual track processing through effects and final output routing.

To do this...	read ...
Understand the Mixer's Capabilities and Controls	<a href="#">Accessing The Mixer</a>
Adjust Track levels, effects sends or mute individual tracks.	<a href="#">Using the Tracks Controls</a>
Adjust signal levels for bento's audio outputs.	<a href="#">Using the Meter Bridge Controls</a>
Configure Delay, Reverb, Mod FX, and Compression settings.	<a href="#">Configuring FX and Compression</a>

## Accessing The Mixer

To access the mixer, press **MIXER**.



*Figure 15-1: Mixer Meter Bridge and Track Meter Controls*

The Mixer consists of two main control groups:

- The Meter Bridge group, which presents meters and faders for each of bento's audio outputs and a Main level control that affects all four outputs.
- The Tracks group, which presents meters, faders, and controls for individual tracks.

The knobs are assigned to the faders in the selected group, indicated by the white rectangular outline. To choose the group you want to adjust, tap anywhere in that group's control area. In Figure 15-1, the Meter Bridge is selected.

## Using the Tracks Controls

When the Tracks group is selected, knobs 1-8 affect the level, mute, delay send, or reverb send for tracks 1-8, according to the option chosen at the bottom of the screen. The Mixer displays meters and faders for tracks that are not empty.

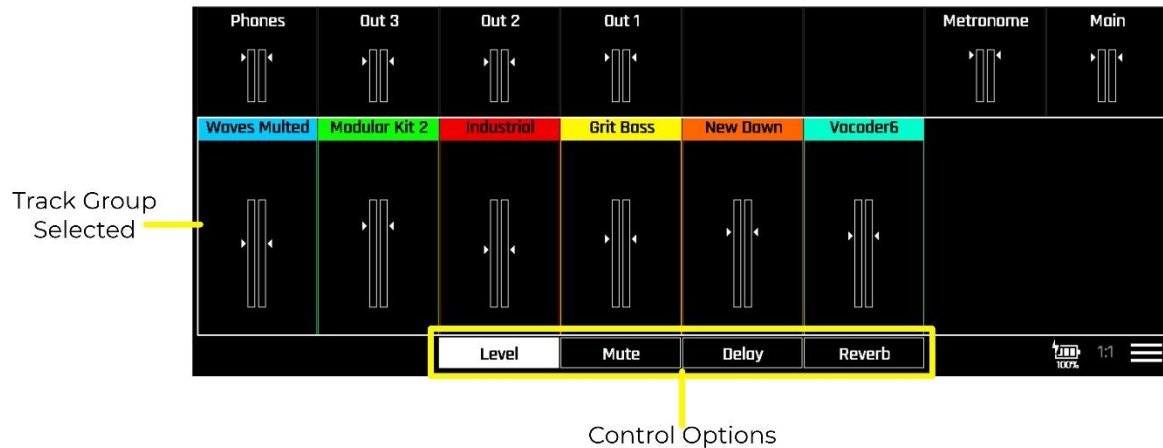
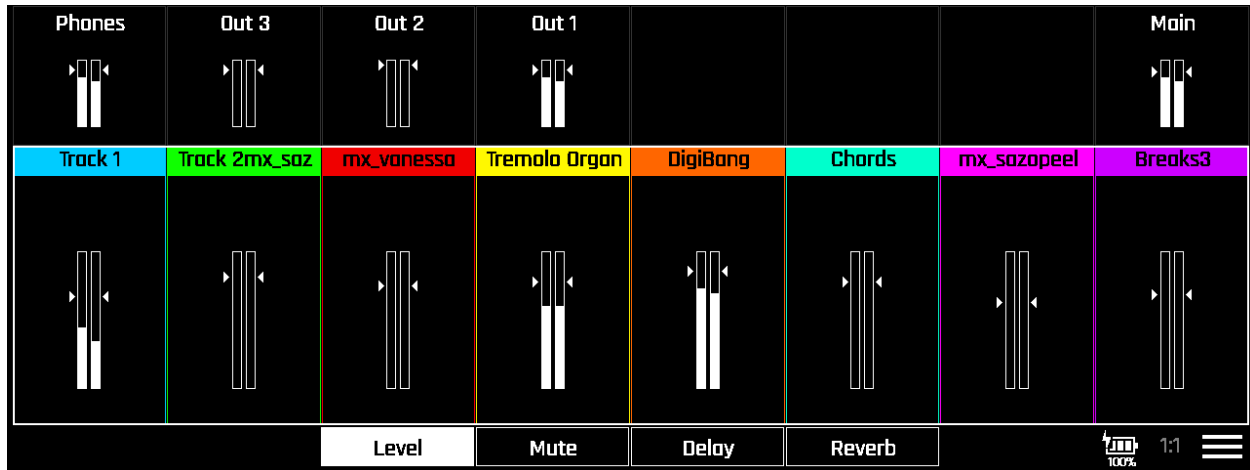


Figure 15-2: Mixer Track Group Selected`

**Note:** Loop tracks and One-shot tracks let you adjust the individual signal levels and effects send levels for the 16 samples in their sample banks in the Loop and One-shot Dashboards. Adjusting Loop or One-shot tracks levels in the Mixer affects the entire track level, while maintaining the individual sample levels set in the Loop or One-shot Dashboards. The Mixer's controls do not affect individual Loop or One-shot effects send levels set in the Loop or One-shot Dashboards.

**To view or adjust track mix levels:**

1. Press the **MIXER** button to open the Mixer screen.
2. Select the track controls by touching any of the track level indicators.
3. Choose **Level** from the control below the track level indicators.



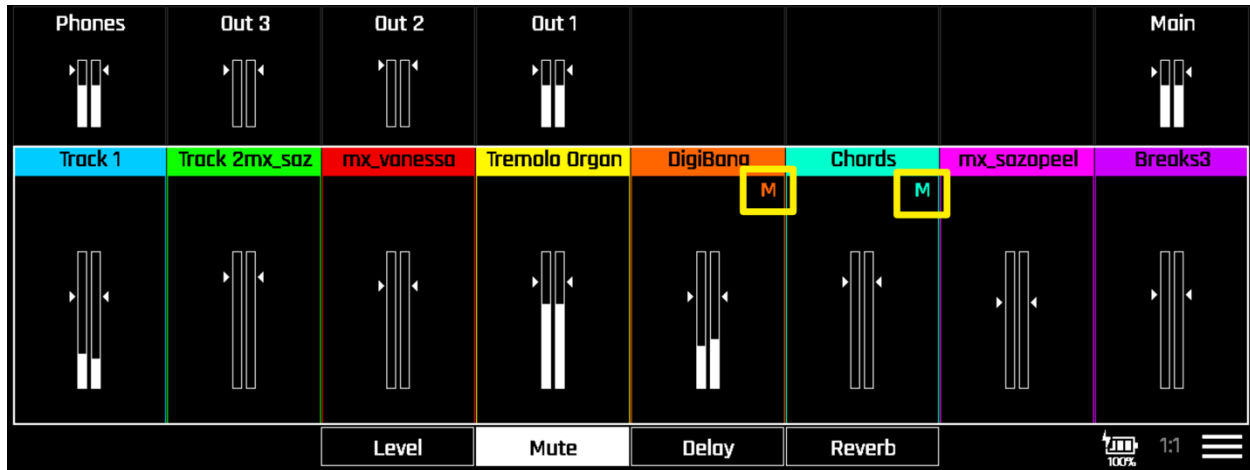
*Figure 15-3: Adjusting Track Levels in the Mixer*

4. Use Knobs 1 through 8 to adjust the levels of tracks 1-8. The combined levels of all 8 tracks appears in the Main mix level in the top right screen corner.

**Note:** The Mixer's **Level** settings do not affect individual Loop or One-shot effects send levels set when the Delay and Reverb Control Options are selected at the bottom of the Mixer screen.

**To mute or unmute tracks:**

1. Press the **MIXER** button to open the Mixer screen.
2. Select the track controls by touching any of the track level indicators.
3. Tap the **Mute** control below the track level indicators.



*Figure 15-4: Muting and Unmuting Tracks in the Mixer*

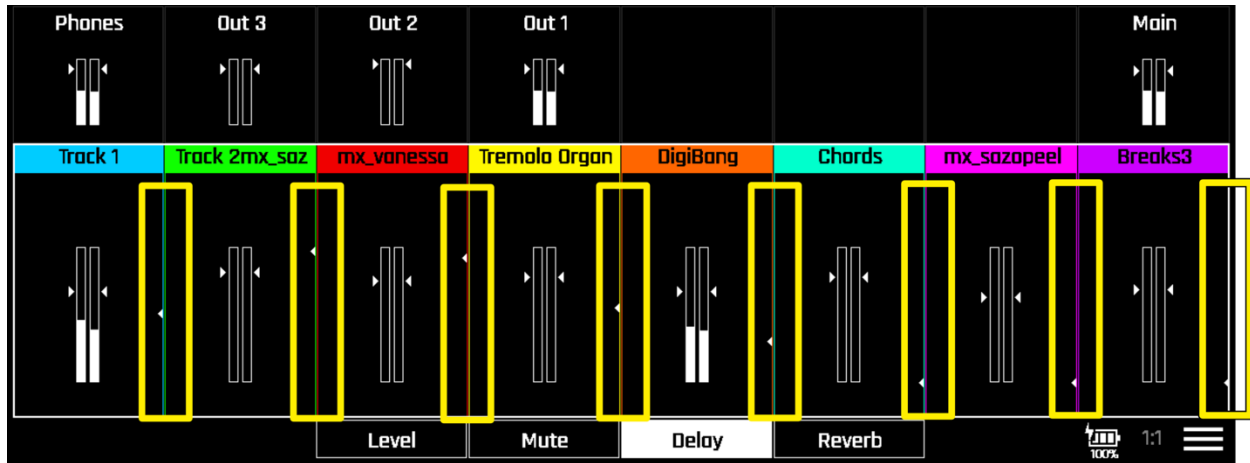
4. Tap a track to toggle its mute state.

“M” appears in the top right corner of each muted track, and the corresponding level meter is grayed out.

**Note:** Muting a track does not mute the track’s Delay Send and Reverb Send signals.

**To view or adjust track Delay send levels:**

1. Press the **MIXER** button to open the Mixer screen.
2. Select the track controls by touching any of the track level indicators.
3. Tap the **Delay** control below the track level indicators.



*Figure 15-5: Adjusting Track Delay Send Levels in the Mixer*

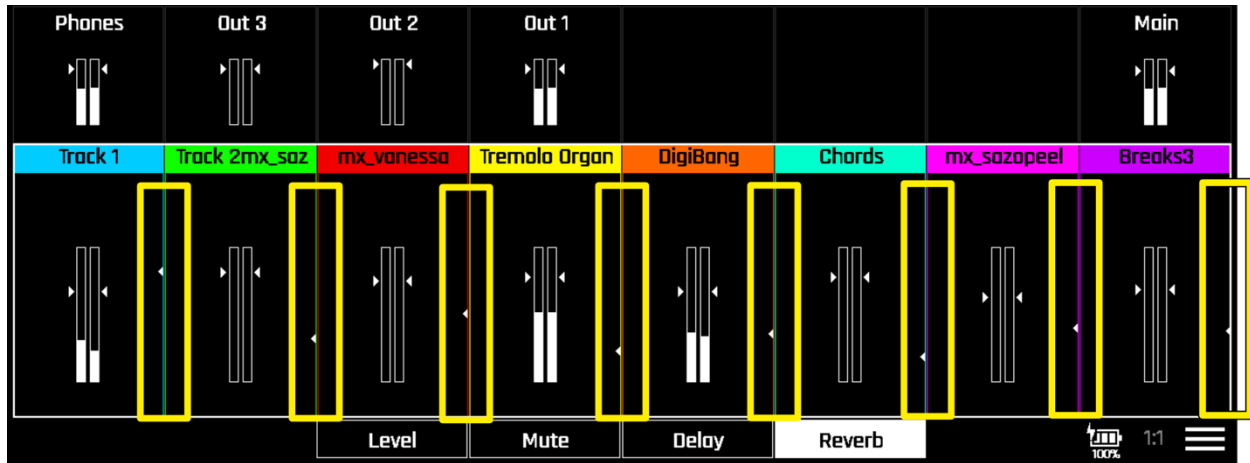
Each track's current Delay send level appears to the right of the track's level meter.

4. Use Knobs 1 through 8 to adjust individual track Delay send levels.

**Note:** The track Delay send levels do not affect the Loop or One-shot Delay send levels set in the 16 individual Loop Dashboards in a Loop track or the 16 individual One-shot Dashboards in a One-shot track.

**To view or adjust track Reverb send levels:**

1. Press the **MIXER** button to open the Mixer screen.
2. Select the track controls by touching any of the track level indicators.
3. Tap the **Reverb** control below the track level indicators.



*Figure 15-6: Adjusting Track Reverb Send Levels in the Mixer*

Each track's current Reverb send level appears to the right of the track's level meter.

4. Use Knobs 1 through 8 to adjust individual track Reverb send levels.

**Note:** The track Reverb send levels do not affect the Loop or One-shot Reverb send levels set in the 16 Loop Dashboards in each Loop track or the 16 One-shot Dashboards in each One-shot track.



## Using the Meter Bridge Controls

When the Meter Bridge group is selected, bento's knobs control the output levels of the four audio outputs.

### To Adjust Output Levels:

1. Press the **MIXER** button to open the Mixer screen.

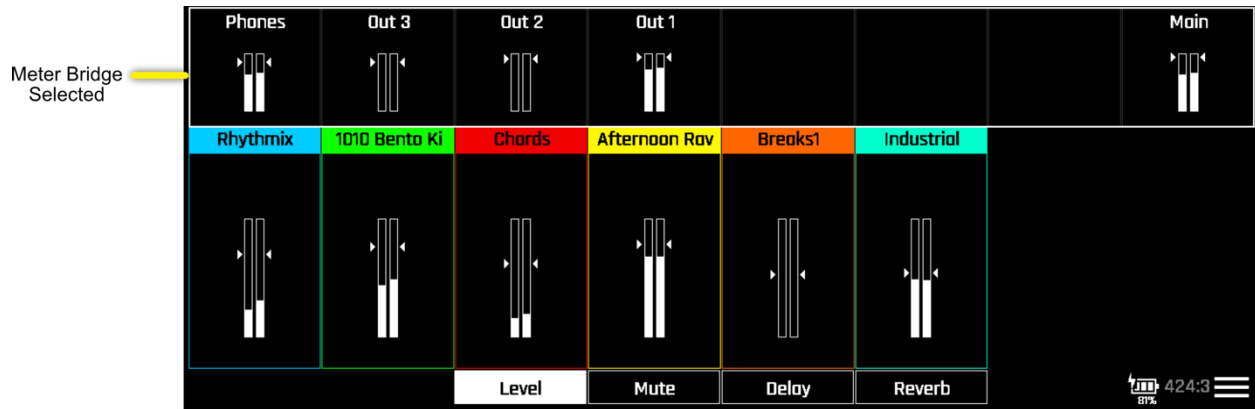


Table 15-1: Figure 15-7: Mixer Meter Bridge Group

2. Select the Meter Bridge control group by touching meter at the top of the screen. Table 15-2 describes the controls assigned to knobs 1-4 and 8.

Table 15-2: Knob Assignment in Mixer Meter Bridge

Parameter	Knob	Range	Description
<b>Phones</b>	1	-60dB to 0dB	Sets the signal level of the phones output, which contains tracks assigned to Out 1 and the metronome signals. <b>Note:</b> The Phones level does not affect the Metronome signal.
<b>Out 3</b>	2	-60dB to 0dB	Sets the signal level of audio output 3, which contains tracks assigned to Out 3, and no effects.
<b>Out 2</b>	3	-60dB to 0dB	Sets the signal level of audio output 2, which contains tracks assigned to Out 2, and no effects.
<b>Out 1</b>	4	-60dB to 0dB	Sets the signal level of audio output 1, which contains tracks assigned to Out 1 or Out 1w/Mod FX, and effects.
<b>Metronome</b>	7	-60dB to +6.0 dB	Sets the signal level of the metronome that is sent to the Phones output. <b>This is a global setting and will persist across projects.</b>
<b>Main</b>	8	-60dB to 0dB	Attenuates the signals sent to the four audio outputs. <b>Note:</b> The Main level does not affect the Metronome signal.

Use knob 8 to adjust the signal level of the overall mix and avoid clipping.

- Use knobs 2-4 to adjust the signal levels sent to the three individual audio outputs.
- Use knob 1 to adjust the signal level at the Phones output.

**Note:** The metronome level in the Phones output is not affected by the Phones level.

- To adjust the metronome level, use Knob 7. This is the same level that is controlled by the Met Gain knob on the Launch screen. Unlike other settings on the mixer screen, the Metronome level is a global setting and will persist across projects.

## Configuring FX and Compression

Bento includes three effects:

- Delay
- Reverb
- Mod FX (Chorus, Phaser, or Flanger+Distortion)

Each track has a pair of effects sends for Delay and Reverb. Within each Loop and One-shot track, each of the 16 Loops and One-shots has its own Delay and Reverb sends.

The Mod FX is treated as an in-line processor for tracks routed to Out 1 w/FX by their Output parameter in the Track Configuration screen. On the FX screen you can choose from Flanger+Dist, Chorus and Phaser for Mod FX.

All effects outputs are mixed with tracks routed to Out 1 or Out 1 w/ Mod FX, processed by bento's Compressor, and then routed to bento's Output 1 and Phones outputs.

All effects are configured in the FX screen. Compressor settings are in a separate screen. Effects and compressor settings are saved and loaded as part of each project's configuration.

### To configure the delay:

1. Press the **FX** button to open the FX screen.

Mod FX						
Type	Chrs Depth	Chrs Rate			Delay Send	ReverbSend
Chorus	16.6%	22.1%			0.0%	0.0%
Delay						
Feedback	Filter	Cutoff	Width	Ping Pong	Beat Sync	Delay
60.4%	On	3.6kHz	54.5%	On	On	1/160
Reverb						
Style	Time	Level	Hi C	Low Cut	Pre Delay	Freeze
Dark Hall	45.4%	81.1%	100.0%	0.0%	30 ms	Off

2. Touch anywhere in the **Delay** parameters group.
3. Use Knobs 1 through 7 to adjust the delay effect settings.

Table 15-3 describes the Delay parameters and the knobs mapped to them.

Table 15-3: Delay FX Parameters

Parameter	Knob	Range	Description	Modulation Target
Feedback	1	0 to 100%	The amount of regeneration or echo in the delayed signal. Set to 0% to get a single echo.	No
Filter	2	On/ Off	Turn Filter On and then adjust the cutoff and width parameters to filter the delay.	No
Cutoff	3	20 Hz to 20.4 kHz	When Filter is On, this is the center frequency for the band pass filter.	Yes
Width	4	0 to 100%	When Filter is On, the width of the range of frequencies included.	No
Ping Pong	5	On/ Off	When Ping Pong is on, the echoes will alternate (or ping pong) from side to side. When off, the echoes are the same in the left and right channels.	No
Beat sync	6	On/ Off	When on, the delay is measured in musical time intervals. When off, it is controlled as a percentage.	No
Delay Time	7	If Beat sync is off: 0 to 100% If Beat sync is on: 1/64, 1/32T, 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2T, 1/2, 1 bar, 2, bars, 4 bars, 8 bars	Determines the delay length. When Beat Sync is On, delay is specified in musical intervals. When Beat Sync is off, delay is specified as a percentage, where 100% is 4 seconds	Yes

**To configure the reverb:**

1. Press the **FX** button to open the FX screen.

Mod FX						
Type	Chrs Depth	Chrs Rate			Delay Send	ReverbSend
Chorus	16.6%	22.1%			0.0%	0.0%
Delay						
Feedback	Filter	Cutoff	Width	Ping Pong	Beat Sync	Delay
60.4%	On	3.6kHz	54.5%	On	On	1/160
Reverb						
Style	Time	Level	Hi C	Low Cut	Pre Delay	Freeze
Dark Hall	45.4%	81.1%	100.0%	0.0%	30 ms	Off

 148:1  
100%

*Table 15-4: Reverb Parameter Group in FX Screen*

2. Touch anywhere in the **Reverb** parameters group.
3. Use Knobs 1 through 7 to adjust the Reverb settings.

Table 15-5 describes the Reverb parameters and the knobs mapped to them.

*Table 15-5: Reverb FX Parameters*

Parameter	Knob	Range	Description	Modulation Target
Style	1	Tight Amb, Bright Room, Large Room, Wide Slap, Notchy Amb, Reso Room, Marble Hall, Chamber, Dark Hall, Small Hall, Gated, Arena, Long Bright Bloom, Gravitas, Clouds	Reverb simulation model.	No
Time	2	0 to 100%	How much the reverberation will ring out.	Yes

Parameter	Knob	Range	Description	Modulation Target
Level	3	0 to 100%	How much of the wet signal is sent to the outputs. <b>Note:</b> The amount of the dry signal is controlled with the Mixer Level.	Yes
Hi Cutoff	4	0 to 100%	Sets the amount of high-frequency damping applied to the reverb. As you turn it up, higher frequencies in the reverb tail will damp out sooner than low frequencies, simulating a room with absorbent walls.	Yes
Low Cutoff	5	0 to 100%	Sets the amount of low-frequency damping applied to the reverb to prevent reverb tail from becoming muddy. As you turn it up, lower frequencies in the reverb tail will damp out sooner than high frequencies.	Yes
Pre Delay	6	0 to 1000 msec	The amount of time between the original dry sound, and the audible onset of early reflections.	Yes
Freeze	7	On/Off	When Freeze is on, reverb tails sustain indefinitely. When off, reverb tails decay over the time set by the Time parameter.	Yes

## Configuring Modulation FX

There are three different types of modulation effects that can be applied to a bento project: Flanger+Dist, Chorus, and Phaser. Only one of these effects is active at any time. The list of Mod FX parameters available will change based on which Type of Mod FX is selected.

**Note:** Granular tracks make use of the modulation effects to craft their unique sound. Therefore, when you load a granular patch into a track, the Mod FX settings saved with the patch will be loaded into the project. When you save a user granular patch, the Mod FX settings will be saved with that patch.

### To Apply Mod Fx to a Track:

1. Push **TRACKS** to open the Tracks screen.
2. Tap the track you want to configure to select it.
3. Tap menu then select **Config Track** to open the Track Config screen.
4. Turn knob 1 to select **1 w/Mod FX** as the value for the Output setting.

### To configure Mod FX for Flanger+Distortion:

1. Press the **FX** button to open the FX screen.

Mod FX						
Type Flanger+Dist	Fng Depth 0.0%	Flange Rot 50.0%	Fng Fdbk 60.0%	Dist Depth 0.0%	Delay Send 34.0%	ReverbSend 0.0%
Delay						
Feedback 40.0%	Filter Off	Cutoff 20.4kHz	Width 100.0%	Ping Pong On	Beat Sync On	Delay 1/80
Reverb						
Style Chamber	Time 45.4%	Level 81.1%	Hi C 100.0%	Low Cut 0.0%	Pre Delay 30 ms	Freeze Off

Figure 15-8: Mod FX Parameter Group with Flanger+Distortion Settings

2. Touch anywhere in the **Mod FX** parameter group.
3. Adjust Knob 1 to change the **Type** parameter to Flanger+Dist,
4. Use Knobs 1 through 8 to adjust the Flanger+Distortion effect settings.

Table 15-6 describes the Mod FX parameters for Flanger+Distortion and the knobs mapped to them.

*Table 15-6: Mod FX Parameters for Flanger+Distortion*

<b>Parameter</b>	<b>Knob</b>	<b>Range</b>	<b>Description</b>	<b>Modulation Target</b>
Type	1	Flanger+Dist, Chorus, Phaser	Specifies the modulation effect type to apply to tracks routed to the 1 w/ Mod FX output buss.	No
Flngr Depth	2	0 to 100%	The depth of the flanger effect.	No
Flngr Rate	3	0 to 100%	The rate used to control the flanger.	Yes
Flngr Fdbk	4	-100% to +100%	The amount of feedback used in the flanger effect.	No
Dist Depth	5	0 to 100%	The depth of the distortion effect.	No
Delay Send	7	0 to 100%	Mod FX signal level sent to bento's Delay effect.	No
Reverb Send	8	0 to 100%	Mod FX signal level sent to bento's reverb effect.	No



## To configure Mod FX as Chorus

1. Press the **FX** button to open the FX screen.

Mod FX						
Type	Chrs Depth	Chrs Rate			Delay Send	ReverbSend
Chorus	16.6%	22.1%			0.0%	0.0%
Delay						
Feedback	Filter	Cutoff	Width	Ping Pong	Beat Sync	Delay
60.4%	On	3.6kHz	54.5%	On	On	1/160
Reverb						
Style	Time	Level	Hi C	Low Cut	Pre Delay	Freeze
Dark Hall	45.4%	81.1%	100.0%	0.0%	30 ms	Off

Figure 15-9: Mod FX Parameter Group with Chorus Settings

2. Touch anywhere in the **Mod FX** parameter group.
3. Adjust Knob 1 to change the **Type** parameter to Chorus,
4. Use Knobs 2 through 8 to adjust the Chorus settings.

Table 15-7 describes the Mod FX parameters for Chorus and the knobs mapped to them.

Table 15-7: Mod FX Parameters for Chorus

Parameter	Knob	Range	Description	Modulation Target
Type	1	Flanger+Dist, Chorus, Phaser	Specifies the modulation effect type to apply to tracks routed to the 1 w/ Mod FX output buss.	No
Chrs Depth	2	0 to 100%	The depth of the Chorus effect.	No
Chrs Rate	3	0 to 100%	The rate used to control the chorus.	No
Delay Send	7	0 to 100%	Mod FX signal level sent to bento's Delay effect.	No
Reverb Send	8	0 to 100%	Mod FX signal level sent to bento's Reverb effect.	No

**To configure Mod FX as Phaser:**

1. Press the **FX** button to open the FX screen.

Mod FX						
Type Phaser	Phase Amou 0.0%	Phase Rate 50.0%	Phse Feedb 50.0%		Delay Send 34.0%	ReverbSend 0.0%
Delay						
Feedback 40.0%	Filter Off	Cutoff 20.4kHz	Width 100.0%	Ping Pong On	Beat Sync On	Delay 1/80
Reverb						
Style Chamber	Time 45.4%	Level 81.1%	Hi C 100.0%	Low Cut 0.0%	Pre Delay 30 ms	Freeze Off

Figure 15-10: Mod FX Parameter Group with Phaser Settings

2. Touch anywhere in the **Mod FX** parameter group.
3. Adjust Knob 1 to change the **Type** parameter to Phaser.
4. Use Knobs 2 through 8 to adjust the Phaser settings.

Table 15-8 describes the Mod FX parameters for Phaser and the knobs mapped to them.

Table 15-8: Mod FX Parameters for Phaser

Parameter	Knob	Range	Description	Modulation Target
Type	1	Flanger+Dist, Chorus, Phaser	Specifies the modulation effect type to apply to tracks routed to the 1 w/ Mod FX output buss.	No
Phase Depth	2	0 to 100%	The depth of the Phaser effect.	No
Phase Rate	3	0 to 100%	The rate used to control the effect.	Yes
Phse Fdbk	4	-100% to +100%	The amount of feedback included in the effect.	No
Delay Send	7	0 to 100%	Mod FX signal level sent to bento's Delay effect.	No
Reverb Send	8	0 to 100%	Mod FX signal level sent to bento's Reverb effect.	No

## Configuring the Compressor

All tracks routed to Out 1 are mixed with the outputs of bento's Delay, Reverb, and Mod FX and routed to the compressor to control the dynamic range of the audio at Output 1 and the Phones output.

### To configure the compressor:

1. Do one of the following:
  - Press the **MIXER** button twice.
  - Press the **MIXER** button, then tap the Menu icon and choose **Compressor**.

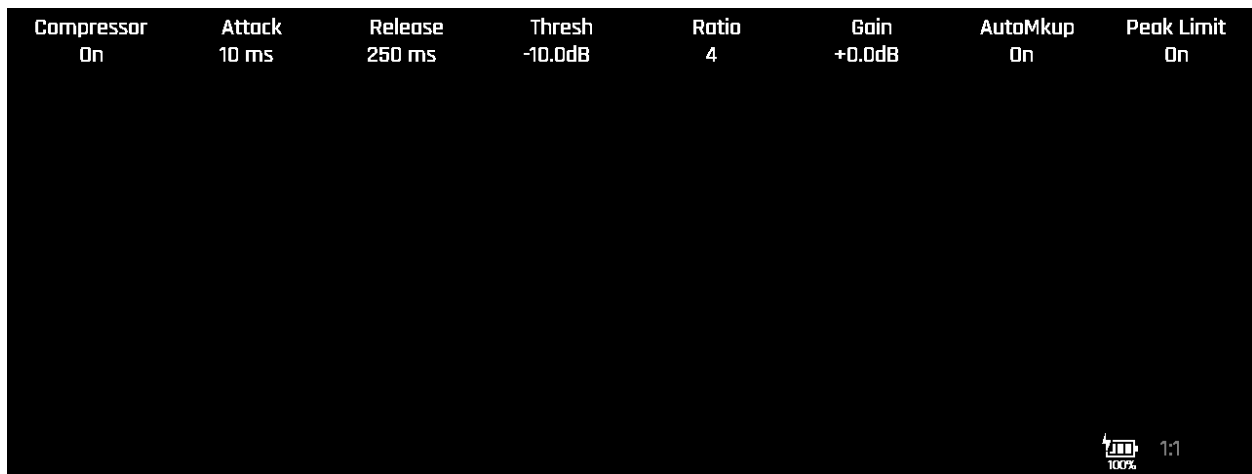


Figure 15-11: Compressor screen

2. Use Knobs 1 through 8 to adjust the Compressor settings.

Table 15-9 describes the Compressor parameters and the knobs mapped to them.

Table 15-9: Compressor Parameters

Parameter	Knob	Range	Description
Compressor	1	Off, On	When on, compression is applied to the Out 1 buss. When off, the compressor is bypassed.
Attack	2	0 – 25 msec	Compression attack time.
Release	3	0 – 1000 msec	Compression release time.
Thresh	4	-48dB – 0dB	Compression threshold.
Ratio	5	1 – 100	Compression ratio.
Gain	6	-36dB - +36dB	Make-up gain applied after compression.

Parameter	Knob	Range	Description
AutoMkup	7	Off, On	When on, the compressor automatically applies make-up gain based on the compression threshold and ratio.
Peak Limit	8	Off, On	When on, the compressor engages a peak limiter to prevent clipping.

## 16: Managing CPU & Sample Slots

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### CPU

Bento is a powerful tool, but it does have limitations. If you are hearing crackling and other poor sound artifacts, there's a good chance that you are asking the CPU to do more than it can handle. We considered adding more limits to bento, but we choose instead to let you decide where you want to spend the CPU. Here are some tips to reduce the load on the CPU and get more out of your bento:

- **Reduce Polyphony:** If you don't need to play 8 or more notes at one time, then dial back the polyphony by adjusting the Poly Mode setting on each track and each pad (for banked instruments). For granular instruments polyphony can have a significant impact on CPU in scenarios when dialing back the Polyphony may not be noticed.
- **Reduce Unison setting for Wavetable tracks:** The Unison options under the Poly Mode parameter for wavetable tracks will definitely fatten the sound but there is a cost for that. Consider using a lower Unison value.
- **Reduce the number of grains triggered by Granular notes:** The following parameters all impact the number of grains that may be playing at any point in time. Dialing these parameters back can reduce CPU load:
  - Density - when Beat Sync is off, Density controls how frequently new grains are triggered
  - Rate - when Beat Sync is on, Rate controls how frequently new grains are triggered
  - Grain Size - this controls how long grains continue to play
  - Speed - this controls how quickly each grain moves through the file.
- **Resample a granular sequence:** Consider resampling a sequence that is CPU intensive. It could be less processor intensive to play back the loop or one-shot sample than to play the sequence in real time. This gives you back some CPU you can use for other things.
- **Interp:** Most samples play back just fine when using the Normal setting for the Interp parameter. Using High Q is more CPU intensive. If your sample sounds great on the Normal setting, then leave it there.

### Sample Slots

Each bento project can use 576 samples spread across all 8 tracks. When you load a project or patch, the Sample Pool number will be updated to indicate how many

sample slots are still available in the pool. Each track has a sample count below the level meter so you can keep track of how each track impacts the available sample pool. If you keep loading tracks after the Sample Pool reaches 0, the track will not load properly. It may load only a subset of the required samples. Playback of that track will be compromised. If you prefer to delete a different track to make room for the last loaded track, you will need to reload the track took the pool down to zero so that bento can load the needed samples.

## 17: Controlling bento Over MIDI

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bento flourishes when you control it over MIDI. MIDI integration enables you to play multiple tracks simultaneously from external keyboards, control parameters in real-time with continuous controllers, and synchronize bento with other instruments and DAW software.

This chapter covers bento's comprehensive MIDI implementation, from basic note input through advanced parameter control and external instrument integration.

To do this ...	read...
Understand how bento processes MIDI messages	<a href="#">Understanding MIDI in bento</a>
Configure tracks for MIDI input and control	<a href="#">Setting Up MIDI Control</a>
Play bento tracks from MIDI keyboards	<a href="#">Playing Tracks via MIDI</a>
Control track parameters with MIDI controllers	<a href="#">Controlling Parameters with MIDI</a>
Synchronize bento with external devices	<a href="#">MIDI Clock and Synchronization</a>
Use bento to play external MIDI instruments	<a href="#">External Instrument Integration</a>
Reference complete MIDI implementation details	<a href="#">MIDI Parameter Reference</a>

### Understanding MIDI in bento

bento's MIDI implementation supports:

- playing individual tracks melodically or percussively with MIDI note messages,
- controlling track parameters directly with continuous controllers and indirectly as a modulation source with a selection of MIDI messages, and
- controlling bento's transport for synchronization of MIDI devices such as sequencers with bento's internal sequences and loops.

Understanding how bento handles MIDI messages will help you understand how to configure your MIDI controllers and instruments to integrate bento with other devices in your studio or on your desk.

## MIDI Message Routing

When bento receives MIDI channel messages, it delivers them to tracks whose **MIDI In Ch** parameter matches the MIDI message's channel number. Tracks with **MIDI In Ch** set to "None" cannot receive MIDI input and can only be played from bento's pads or track sequences.

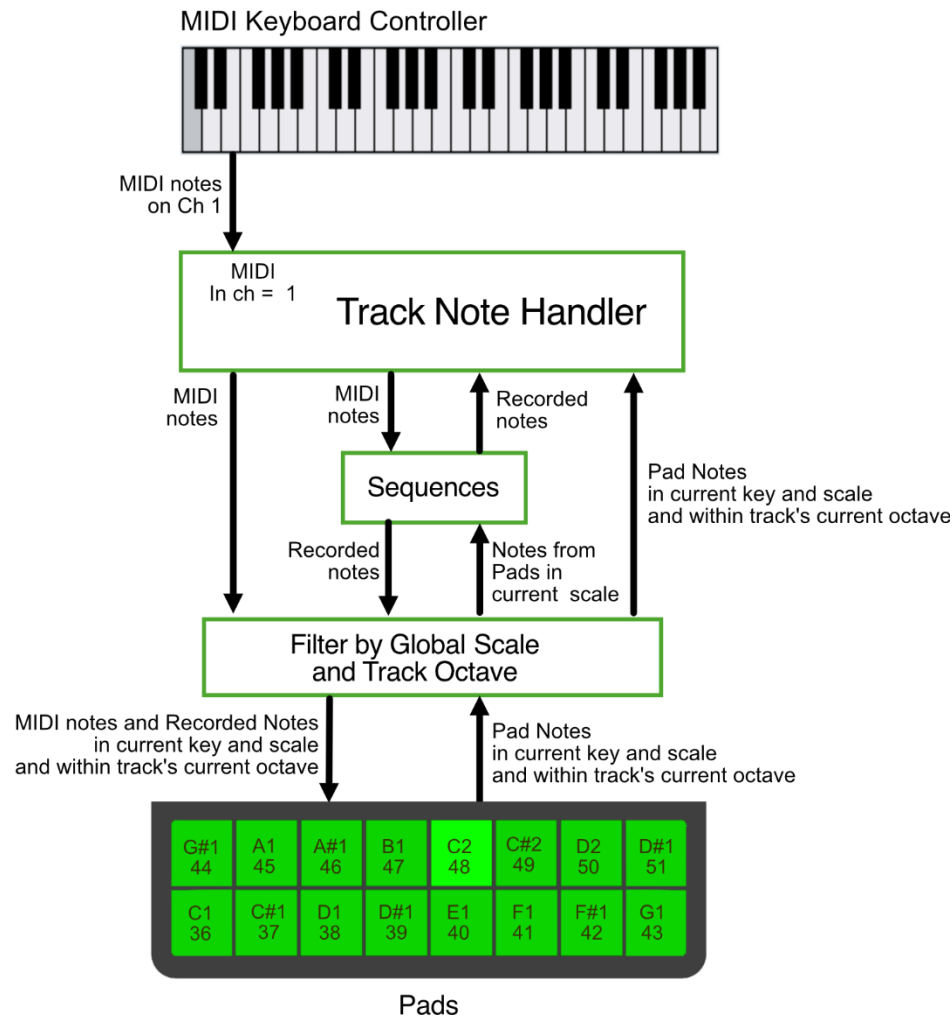


Figure 17-1: MIDI Note Message Handling



## Note Handling and Filtering

Bento processes MIDI note messages through a sophisticated filtering system that integrates with the pad interface and global scale settings:

**Track Note Handler:** Routes MIDI notes to tracks configured to receive MIDI on the same channel, and then to route the messages to the track's sample engine for playback, to the track sequencer for recording, and to the pads, which then light up when the notes received over MIDI or the sequencer are in the current global scale and within the pads' range of notes.

**Scale and Octave Filtering:** When all 16 pads light up with the same color, they become the main mechanism for playing an individual track, at which point bento assigns specific notes to each pad, based on the current global **Root Key** and **Scale** parameters and the track's current "pad octave" range (adjusted with **UP** and **DOWN** arrow buttons). When you play the pads, they only play notes in the current scale and when you play the track from a MIDI controller, the pads only light up for MIDI or sequencer notes that are also in the current global scale and within the track's current "pad octave."

**Track Playback:** The track itself plays all received MIDI notes regardless of scale filtering, providing full chromatic control even when pads show only scale-appropriate notes.

**Pad Integration:** When pads are played directly, they send notes in the current global scale, which are combined with MIDI input and sequence playback.

## Parameter Control with MIDI

Bento maps MIDI Continuous Controller (CC) messages to track parameters, enabling real-time control of levels, effects, filters, and synthesis parameters. Each parameter has a dedicated CC number that works consistently across all compatible tracks.

## Setting Up MIDI Control

Proper MIDI configuration ensures reliable communication between bento and external controllers while providing the parameter control you need for creative performance.

### Configuring Global MIDI Settings

Global MIDI settings affect all tracks and establish fundamental MIDI behavior for pitch bend sensitivity and hardware compatibility.

#### To access global MIDI settings:

1. Press **PROJ** to open the Project screen.
2. Tap **Menu** and choose **Global Settings**.
3. Navigate to the MIDI section and configure the following parameters.

*Table 17-1: Global MIDI Settings*

Parameter	Range	Description	Default
<b>Bend Range</b>	1-24 semitones	MIDI pitch bend sensitivity range	2
<b>MIDI Type</b>	Type A, Type B	TRS MIDI connector polarity for hardware compatibility	Type B

## Configuring Track MIDI Input

Each track must be configured for MIDI input to receive note and controller messages.

### To configure track MIDI input:

1. Select a track in the Tracks screen.
2. Tap menu, then select **Config Track** to access the Track Configuration screen (see Figure 17-2).



*Figure 17-2: Setting MIDI In Channel in the Track Configuration Screen*

3. Use Knob 6 to set **MIDI In Ch** to the desired MIDI channel (1-16) or “None” to disable MIDI input.

**Note:** Tracks with **MIDI In Ch** set to “None” cannot receive MIDI messages and can only be played from bento’s pads or sequences.

## Testing MIDI Connections

Verifying MIDI communication ensures reliable control and helps identify configuration issues before performance or recording sessions.

### To verify MIDI input:

1. Configure a track’s **MIDI In Ch** to match your MIDI controller’s channel.
2. Play notes on your MIDI controller.
3. Observe that the corresponding pads illuminate when notes match the current scale and octave range.
4. Verify that the track produces audio for all played notes, regardless of pad illumination.

## Playing Tracks over MIDI

MIDI note input provides full chromatic control over bento tracks, enabling you to play complex musical parts that extend beyond the pad interface.

### Basic MIDI Note Input

MIDI keyboards and controllers provide full chromatic access to bento tracks, extending musical possibilities beyond the 16-pad interface.

#### To play a track from a MIDI keyboard:

1. Configure the track's **MIDI In Ch** to match your keyboard's transmission channel.
2. Set the global **Root Key** and **Scale** to match your musical context.
3. Use the **UP** and **DOWN** arrow buttons to select an appropriate octave range.
4. Play your MIDI keyboard.

All notes will trigger the track regardless of scale settings.

5. Observe that pads illuminate only for notes within the current scale and octave range.

### Recording Sequences with MIDI Controllers

MIDI input integrates seamlessly with bento's sequencing system, enabling you to record complex musical phrases.

#### To record a sequence from MIDI:

1. Select the track and sequence you want to record in the Sequence Launcher.
2. Launch the sequence by pressing the corresponding pad.
3. Press **PLAY** to start bento's transport.
4. Press **REC** to enable sequence recording.
5. Play your MIDI controller. All notes will be recorded into the sequence.
6. Press **REC** again to stop recording.

**Note:** MIDI input recording captures full chromatic information regardless of current pad scale settings, providing complete musical flexibility.

## Controlling bento Track Parameters with MIDI

Bento provides two ways to control track parameters with MIDI:

- Use continuous controllers to control track parameters to which they are mapped directly.
- Use specific MIDI messages as modulation sources to modify track parameter settings indirectly.

When External tracks receive a MIDI channel message (note, CC, etc.), they send the same message out bento's MIDI outputs with the channel changed to the track's MIDI Out Ch parameter value.

## Controlling Track Parameters Directly with MIDI CCs

Most of the parameters you can control directly varies with each track type. For example, Multisample and Slicer tracks have their Pitch parameter mapped to CC #94, whereas Granular tracks have three Pitch parameters for their two Grains and waveform oscillator mapped to CC#s 20, 29, and 50. Loop and One-shot tracks both have 16 Pitch parameters, each mapped to CC# 28-50.

Bento routes MIDI messages to all tracks whose **MIDI In** parameter matches the message's channel number. If multiple tracks have the same **MIDI In** value, all of them will receive the same MIDI CC messages.

### To control track parameters via MIDI CC:

1. Configure the track's **MIDI In Ch** to match your controller's channel.
2. Set your MIDI controller to transmit the desired CC numbers.
3. Adjust controller values. Changes appear immediately in bento's interface.
4. Parameter changes affect both the current sound and can be recorded as sequence automation.

**Note:** If you decide to configure multiple tracks to use the same **MIDI In C** channel, be careful to remember that each track may respond entirely differently, or not at all, when you send MIDI CCs on the shared MIDI channel.

Table 17-2 identifies the 4 CC#s that are interpreted the same way by all 6 bento track types.

*Table 17-2: Common MIDI CC Mappings*

Parameter	CC#	Description	Tracks
<b>Level</b>	7	Track output level	All
<b>Pan</b>	10	Stereo positioning	All
<b>Reverb Send</b>	91	Track signal level sent to reverb effect	All
<b>Delay Send</b>	92	Track signal level sent to delay effect	All

For details about the CCs mapped directly to each bento track type and how the CC values are mapped to different parameter value ranges, see [MIDI Parameter Reference](#).

## Using MIDI as a Modulation Source

Bento supports a limited set of MIDI continuous controllers for use as modulation sources in track Modulation screens. Figure 17-3 shows MIDI modulation sources in a Wavetable track Modulation screen.


Line	Source 1	Amount 1 10.0%	Source 2	Amount 2 0.0%	Source 3	Amount 3 0.0%	
Param	Source 1	Amount	Source 2	Amount	Source 3	Amount	CC
ENV2: Attack	[None]		[None]		[None]		3
ENV2: Decay	Velocity	18.7%	[None]		[None]		9
ENV2: Release	[None]		[None]		[None]		14
LF01: Depth	[None]		[None]		[None]		12
LF01: Rate	[None]		[None]		[None]		13
LF02: Depth	Mod Wheel	84.1%	[None]		[None]		15
LF02: Rate	[None]		[None]		[None]		16
LittleBigBass: Wavetable						Dashboard	 100% 1:1

Figure 17-3: MIDI Modulation Sources in the Granular Track Modulation Screen

The specific MIDI data that bento makes available as modulation sources varies with each track type.

identifies MIDI data sources you can use as modulation sources and the track types that include them as source in their Modulation screens.

*Table 17-3: MIDI Data Sources for Track Modulation*

<b>This MIDI data...</b>	<b>is a modulation source for these track types...</b>
Note-on key	- Granular
Note-on velocity	- Multisample - Slicer - Loop - One-shot
Mod Wheel (CC# 1)	- Granular - Multisample - Slicer - Loop - One-shot
Volume (CC# 7)	- Multisample - Slicer - Loop - One-shot
Pan (CC# 10)	- Multisample - Slicer - Loop - One-shot

For details on configuring modulation in each track type, see the corresponding track type-specific chapters, such as [Exploring Multisample Tracks](#) and [Exploring One-shot Tracks](#).



## MIDI Clock and Synchronization

Bento provides MIDI clock support for synchronizing with external devices, DAW software, and other MIDI instruments.

Bento can synchronize with other instruments over MIDI by receiving and sending MIDI System Real-Time messages.

Bento supports the following MIDI System Real-Time messages:

MIDI Message	Receive	Transmit
MIDI Clock (248)	Yes	Yes
Start (250)	Yes	Yes
Stop (252)	Yes	Yes

## Receiving MIDI Clock from Other Instruments

Bento can receive and follow external MIDI clock for synchronization with other devices.

### To synchronize bento to external MIDI clock:

1. Connect the external device's MIDI output to bento's MIDI input.
2. Start the external device's transport.
3. When bento receives MIDI Start (250) followed by MIDI Clock (248), it automatically starts its transport and follows the external tempo.
4. Bento forwards received clock messages to both MIDI output ports for daisy-chaining.

**Note:** Bento currently provides no setting for disabling MIDI clock output. All transport operations generate MIDI clock messages.

## Synchronization Workflow for DAW integration:

1. Set your DAW to send MIDI clock to bento.
2. Configure bento tracks for MIDI input on appropriate channels.
3. Start playback from your DAW. Bento will automatically synchronize.
4. Record and play sequences in bento while maintaining sync with your DAW.

## Sending MIDI System Real-Time Messages to External Devices

Bento automatically sends MIDI clock messages (MIDI message 248) from both MIDI output ports whenever the transport is started, stopped, or running, enabling external devices to synchronize to bento's tempo

### MIDI transport behavior:

- **PLAY button or MIDI Start:** bento sends MIDI Start (250) followed by MIDI Clock at the current tempo.
- **STOP button or MIDI Stop:** bento sends MIDI Stop (252) and stops clock output.
- **Transport running:** Continuous MIDI Clock output at current tempo.

## MIDI Implementation Notes

Table 17-4 identifies common MIDI messages and the degree to which they are implemented in bento.

*Table 17-4: MIDI Implementation Notes*

MIDI Message	Implementation
Pitch Bend	Supported on all tracks. Pitch bend range set by global Bend Range parameter
Channel Pressure and Aftertouch	Not currently supported
System Exclusive	Not supported
MIDI Time Code:	Not supported
Active Sensing	Ignored if received

## External Instrument Integration

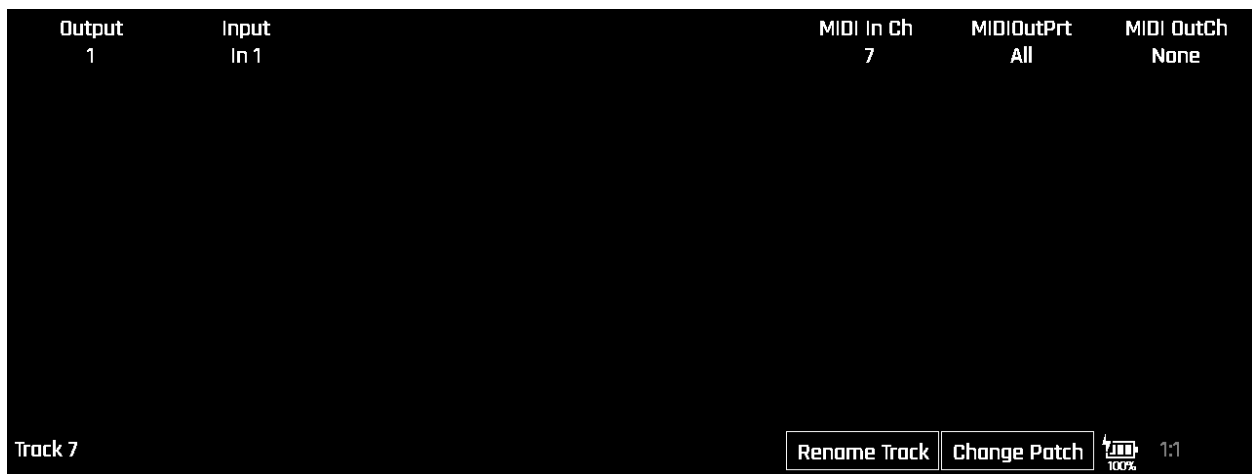
Bento can control external MIDI instruments while mixing their audio input through bento's effects and mixer, creating integrated multi-instrument setups.

### MIDI Output Configuration for Tracks

Granular, Multisample, One-shot, Slicer, Wavetable and External tracks can send MIDI notes to external instruments via bento's MIDI output ports.

#### To configure MIDI output:

1. Select a track that supports MIDI Out.
2. Tap the menu then tap **Config Track** to access the Track Configuration screen.



*Figure 17-4: MIDI OutCh parameter in External Track Config Screen*

3. Use Knob 7 to set **MIDIOutPrt** (MIDI Output Port) to All or the desired bento MIDI Out port.
4. Use Knob 8 to set **MIDI OutCh** (MIDI Output Channel) to the desired channel (1-16).

## Using MIDI Out with an External Track

External tracks are designed specifically for controlling external MIDI instruments while mixing their audio through bento.

### To set up an external instrument:

1. Create an External track or select an empty track and choose External type.
2. Configure the track's **MIDI Out** settings to match your external instrument.
3. Connect your external instrument's audio output to one of bento's audio inputs.
4. Configure the External track's audio input routing in Track Configuration.
5. Play the External track from pads, MIDI input, or sequences - notes are sent to the external instrument.
6. Mix the external instrument's audio using bento's mixer and effects.

## Using MIDI Out with Granular, Multisample and Wavetable Tracks

Granular, Multisample and Wavetable tracks can simultaneously play their internal synthesis engine and send MIDI notes to external instruments.

### To use a track for external control:

1. Configure the track's **MIDI Out** settings.
2. The track will send all received notes (from pads, MIDI input, or sequences) to both the internal track and the configured external MIDI instrument.

**Note:** External instrument audio must be mixed separately - Granular, Multisample and Wavetable tracks don't provide audio input mixing.

## Using MIDI Out with One-shot and Slicer Tracks

Once configured for MIDI Output as described above, One-shot and Slicer Tracks send out notes that are mapped to their pads or slices over MIDI.

### MIDI note mapping for One-Shot tracks:

One-shot tracks map each one-shot pad to a note as show in Figure 17-5:

G#2 44 one-shot 9	A3 45 one-shot 10	A#3 46 one-shot 11	B3 47 one-shot 12	C3 48 one-shot 13	C#3 49 one-shot 14	D3 50 one-shot 15	D#3 51 one-shot 16
C2 36 one-shot 1	C#2 37 one-shot 2	D2 38 one-shot 3	D#2 39 one-shot 4	E2 40 one-shot 5	F2 41 one-shot 6	F#2 42 one-shot 7	G2 43 one-shot 8

Figure 17-5: MIDI Note Mapping for One-Shot Tracks

### MIDI note mapping for Slicer tracks:

When configured to send MIDI out, Slicer tracks map each slice to a MIDI note. The mapping starts with note number 36 (C1) for slice 1 and moves up one note number for each additional slice.

## Multisample Recording Integration

When recording samples for new Multisample tracks, bento can send MIDI notes to external instruments for sampling purposes.

### To sample external instruments:

1. Access the Multisample recording screen.
2. Configure the MIDI output channel to match your external instrument.
3. Connect the external instrument's audio output to bento's audio input.
4. Use bento's recording workflow to capture samples from the external instrument.

## MIDI Parameter Reference

This section provides complete MIDI implementation details for advanced users and MIDI controller programming.

## How bento Maps CC Values to Track Parameter Values

MIDI Continuous Controllers support 128 integer values (0-127), while bento parameters use various ranges and resolutions. Bento automatically maps CC values to appropriate parameter ranges.

The following sections describe how bento maps its parameters to the CC values it receives.

### -100% to +100% Value Mappings to CC Values

Many of bento's parameters have values in the range of -100% to +100%. For parameters expressed with percentages, bento maps these parameter values to MIDI continuous controller values as follows:

*Table 17-5: Mapping CC Values to Parameters with Range of -100% to +100%*

Percentage	CC Values
+100.0	127
0.0	64
-100.0	0

For example, sending the value 34 to CC# 74 to a Multisample track would set the track's Filter cut-off parameter to -46.9% putting the filter into its low-pass range of cut-off frequencies. Sending the value 107 would set the track's Filter cut-off parameter to +67.2, putting the filter into its high-pass range of cut-off frequencies.

## Level Mappings to CC Values

Table 17-6 shows how bento maps continuous controller values in the range of 0-127 to the dB Levels in the Mixer and Pad Configuration pages.

*Table 17-6: Mapping CC Values to Levels*

To set this level...	Send this CC value...
+12.0	127
0.0	64
-96.0	0

## Pitch Mappings to CC Values

Bento maps the Pitch Values in the Macro and Pad Configuration pages to continuous controller values in the range of 0-127 as follows:

*Table 17-7: Mapping CC Values to Pitch Change*

To adjust pitch by this number of semitones...	Send this CC value...
+24.0	127
0.0	64
-24.0	0

## Multisample Track CC Mappings

Multisample tracks use only track-level parameters for MIDI CC control.

*Table 17-8: Multisample Track Parameters*

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pitch</b>	94
<b>Pan</b>	10
<b>Attack</b>	73
<b>Decay</b>	75
<b>Release</b>	72
<b>Filter Cutoff</b>	74
<b>Filter Resonance</b>	71
<b>Reverb Send</b>	91
<b>Delay Send</b>	92
<b>Damper Pedal</b>	64
<b>LFO Depth</b>	12
<b>LFO Rate</b>	13
<b>Overdrive</b>	3



## Granular Track CC Mappings

Granular tracks include track-level parameters plus individual controls for each grain oscillator (GR1 and GR2) and an additional oscillator.

*Table 17-9: Granular Track-Level Parameters*

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pan</b>	10
<b>Env 1 Attack</b>	73
<b>Env 1 Decay</b>	75
<b>Env 1 Release</b>	72
<b>Filter 1 Cutoff/Center</b>	74
<b>Filter 1 Resonance/Width</b>	71
<b>Reverb Send</b>	91
<b>Delay Send</b>	92
<b>Damper Pedal</b>	64
<b>LFO 1 Depth</b>	12
<b>LFO 1 Rate</b>	13
<b>Env 2 Attack</b>	3
<b>Env 2 Decay</b>	9
<b>Env 2 Release</b>	14
<b>LFO 2 Depth</b>	15
<b>LFO 2 Rate</b>	16
<b>Filter 2 Cutoff/Center</b>	17
<b>Filter 2 Resonance/Width</b>	18

*Table 17-10: Granular Grain 1 (GR1) Parameters*

Parameter	CC#
Level	19
Pitch	20
Density	21
Rate	22
Grain Size	23
Window	24
Jitter	25
Play Pos	26
Speed	27

*Table 17-11: Granular Grain 2 (GR2) Parameters*

Parameter	CC#
Level	28
Pitch	29
Density	30
Rate	31
Grain Size	35
Window	41
Jitter	46
Play Pos	47
Speed	48

*Table 17-12: Oscillator (Osc) Parameters*

Parameter	CC#
Level	49
Pitch	50
Pulse Width	51

## Wavetable Track CC Mappings

Wavetable tracks include track-level parameters plus individual controls for each wavetable oscillator (WT1 and WT2) and an additional periodic waveform oscillator (Osc).

*Table 17-13: Wavetable Track-Level Parameters*

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pan</b>	10
<b>Env 1 Attack</b>	73
<b>Env 1 Decay</b>	75
<b>Env 1 Release</b>	72
<b>Filter 1 Cutoff/Center</b>	74
<b>Filter 1 Resonance/Width</b>	71
<b>Reverb Send</b>	91
<b>Delay Send</b>	92
<b>Damper Pedal</b>	64
<b>LFO 1 Depth</b>	12
<b>LFO 1 Rate</b>	13
<b>Env 2 Attack</b>	3
<b>Env 2 Decay</b>	9
<b>Env 2 Release</b>	14
<b>LFO 2 Depth</b>	15
<b>LFO 2 Rate</b>	16
<b>Filter 2 Cutoff/Center</b>	17
<b>Filter 2 Resonance/Width</b>	18

*Table 17-14: Wavetable 1 (WT1) Parameters*

Parameter	CC#
Level	19
Pitch	20
WT Position	21

*Table 17-15: Wavetable 2 (WT2) Parameters*

Parameter	CC#
Level	28
Pitch	29
WT Position	30

*Table 17-16: Oscillator (Osc) Parameters*

Parameter	CC#
Level	49
Pitch	50
Pulse Width	51

## Slicer Track CC Mappings

Slicer tracks use only track-level parameters for MIDI CC control.

Table 17-17: Slicer Track Parameters

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pitch</b>	94
<b>Pan</b>	10
<b>Attack</b>	73
<b>Decay</b>	75
<b>Release</b>	72
<b>Filter Cutoff</b>	74
<b>Filter Resonance</b>	71
<b>Reverb Send</b>	91
<b>Delay Send</b>	92
<b>LFO Depth</b>	12
<b>LFO Rate</b>	13
<b>Overdrive</b>	3

## Loop and One-Shot Track CC Mappings

Loop and One-Shot tracks share identical MIDI CC implementations, with one additional mapping for One-Shot tracks. Each track contains 16 sample bank slots (1-16), with multiple parameters available for each slot plus track-level parameters.

*Table 17-18: Loop and One-Shot Track-Level Parameters*

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pan</b>	10
<b>Reverb Send</b>	91
<b>Delay Send</b>	92
<b>Damper Pedal</b> (One-shot tracks only)	64

Both Loop and One-Shot tracks provide multiple parameters for each sample bank slot.

*Table 17-19: CC Mappings for Slot-specific Sample Bank Parameters*

Slot #	Level	Pitch	Delay Send	Reverb Send	Filter	Resonance
<b>1</b>	3	28	56	104	2	67
<b>2</b>	9	29	57	105	4	68
<b>3</b>	14	30	58	106	5	69
<b>4</b>	15	31	59	107	8	70
<b>5</b>	16	35	60	108	11	76
<b>6</b>	17	41	61	109	34	77
<b>7</b>	18	46	62	110	36	78
<b>8</b>	19	47	63	111	37	79
<b>9</b>	20	48	85	112	39	80
<b>10</b>	21	49	86	113	40	81
<b>11</b>	22	50	87	114	42	82
<b>12</b>	23	51	88	115	43	83
<b>13</b>	24	52	89	116	44	84
<b>14</b>	25	53	90	117	45	93
<b>15</b>	26	54	102	118	65	95
<b>16</b>	27	55	103	119	66	96

**Note:** Loop and One-shot tracks have a track-level panning parameter, but it is not accessible through the track editing screens. Sending MIDI CC 10 **messages and configuring modulation are the only ways to control it.**

## External Track CC Mappings

External tracks provide minimal MIDI CC control, focusing on essential mixing parameters.

*Table 17-20: External Track Parameters*

Parameter	CC#
<b>Mute</b> (0=unmute, 127=Mute)	6
<b>Level</b>	7
<b>Pan</b>	10
<b>Reverb Send</b>	91
<b>Delay Send</b>	92



## Bento MIDI CC Mapping Reference

Table 17-21 presents a complete list of continuous controllers that bento maps to track parameters, sorted numerically.

**Note:** Controller numbers 120-127 are reserved for Channel Mode Messages, which rather than controlling sound parameters, affect the channel's operating mode.

*Table 17-21: All MIDI CC to Parameter Mappings*

CC#	Parameter Mappings		
1	(Mod Wheel) only used as a modulation source	8	- One-shot 4 Filter - Loop 4 Filter
2	- One-shot 1 Filter - Loop 1 Filter	9	- Granular Env 2 Decay - Wavetable Env 2 Decay - One-shot 2 Level - Loop 2 Level
3	- Multisample Overdrive - Granular Env 2 Attack - Wavetable Env 2 Attack - Slicer Overdrive - One-shot 1 Level - Loop 1 Level	10	- Multisample Pan - Granular Pan - Wavetable Pan - Slicer Pan - One-shot Pan (entire track) - Loop Pan (entire track) - External Pan
4	- One-shot 2 Filter - Loop 2 Filter	11	- One-shot 5 Filter - Loop 5 Filter
5	- One-shot 3 Filter - Loop 3 Filter	12	- Multisample LFO Depth - Granular LFO 1 Depth - Wavetable LFO 1 Depth - Slicer LFO Depth
6	- Multisample Mute - Granular Mute - Wavetable Mute - Slicer Mute - One-shot Mute - Loop Mute - External Mute	13	- Multisample LFO Rate - Granular LFO 1 Rate - Wavetable LFO 1 Rate - Slicer LFO Rate
7	- Multisample Level - Granular Level - Wavetable Level - Slicer Level - One-shot Level - Loop Level - External Level	14	- Granular Env 2 Release - Wavetable Env 2 Release - One-shot 3 Level - Loop 3 Level
		15	- Granular LFO 2 Depth - Wavetable LFO 2 Depth

	<ul style="list-style-type: none"> <li>- One-shot 4 Level</li> <li>- Loop 4 Level</li> </ul>
16	<ul style="list-style-type: none"> <li>- Granular LFO 2 Rate</li> <li>- Wavetable LFO 2 Rate</li> <li>- One-shot 5 Level</li> <li>- Loop 5 Level</li> </ul>
17	<ul style="list-style-type: none"> <li>- Granular Filter 2 Frequency/Cutoff</li> <li>- Wavetable Filter 2 Frequency/Cutoff</li> <li>- One-shot 6 Level</li> <li>- Loop 6 Level</li> </ul>
18	<ul style="list-style-type: none"> <li>- Granular Filter 2 Resonance/Width/Q</li> <li>- Wavetable Filter 2 Resonance/Width/Q</li> <li>- One-shot 7 Level</li> <li>- Loop 7 Level</li> </ul>
19	<ul style="list-style-type: none"> <li>- Granular GR1 Level</li> <li>- Wavetable WT1 Level</li> <li>- One-shot 8 Level</li> <li>- Loop 8 Level</li> </ul>
20	<ul style="list-style-type: none"> <li>- Granular GR1 Pitch</li> <li>- Wavetable WT1 Pitch</li> <li>- One-shot 9 Level</li> <li>- Loop 9 Level</li> </ul>
21	<ul style="list-style-type: none"> <li>- Granular GR1 Density</li> <li>- Wavetable WT1 Wavetable Position</li> <li>- One-shot 10 Level</li> <li>- Loop 10 Level</li> </ul>
22	<ul style="list-style-type: none"> <li>- Granular GR1 Rate</li> <li>- One-shot 11 Level</li> <li>- Loop 11 Level</li> </ul>
23	<ul style="list-style-type: none"> <li>- Granular GR1 Grain Size</li> <li>- One-shot 12 Level</li> <li>- Loop 12 Level</li> </ul>
24	<ul style="list-style-type: none"> <li>- Granular GR1 Window</li> <li>- One-shot 13 Level</li> <li>- Loop 13 Level</li> </ul>

25	<ul style="list-style-type: none"> <li>- Granular GR1 Jitter</li> <li>- One-shot 14 Level</li> <li>- Loop 14 Level</li> </ul>
26	<ul style="list-style-type: none"> <li>- Granular GR1 Play Pos</li> <li>- One-shot 15 Level</li> <li>- Loop 15 Level</li> </ul>
27	<ul style="list-style-type: none"> <li>- Granular GR1 Speed</li> <li>- One-shot 16 Level</li> <li>- Loop 16 Level</li> </ul>
28	<ul style="list-style-type: none"> <li>- Granular GR2 Level</li> <li>- Wavetable WT2 Level</li> <li>- One-shot 1 Pitch</li> <li>- Loop 1 Pitch</li> </ul>
29	<ul style="list-style-type: none"> <li>- Granular GR2 Pitch</li> <li>- Wavetable WT2 Pitch</li> <li>- One-shot 2 Pitch</li> <li>- Loop 2 Pitch</li> </ul>
30	<ul style="list-style-type: none"> <li>- Granular GR2 Density</li> <li>- Wavetable WT2 Wavetable Position</li> <li>- One-shot 3 Pitch</li> <li>- Loop 3 Pitch</li> </ul>
31	<ul style="list-style-type: none"> <li>- Granular GR2 Rate</li> <li>- One-shot 4 Pitch</li> <li>- Loop 4 Pitch</li> </ul>
32	- Not Used
33	- Not Used
34	<ul style="list-style-type: none"> <li>- One-shot 6 Pitch</li> <li>- Loop 6 Pitch</li> </ul>
35	<ul style="list-style-type: none"> <li>- Granular GR2 Grain Size</li> <li>- One-shot 5 Pitch</li> <li>- Loop 5 Pitch</li> </ul>
36	<ul style="list-style-type: none"> <li>- One-shot 7 Filter</li> <li>- Loop 7 Filter</li> </ul>
37	<ul style="list-style-type: none"> <li>- One-shot 8 Filter</li> <li>- Loop 8 Filter</li> </ul>
38	<ul style="list-style-type: none"> <li>- <i>Multisample Solo (Future)</i></li> <li>- <i>Granular Solo (Future)</i></li> <li>- <i>Wavetable Solo (Future)</i></li> </ul>

	<ul style="list-style-type: none"> <li>- <i>Slicer Solo (Future)</i></li> <li>- <i>One-shots Solo (Future)</i></li> <li>- <i>Loops Solo (Future)</i></li> <li>- <i>External Solo (Future)</i></li> </ul>
39	<ul style="list-style-type: none"> <li>- One-shot 9 Filter</li> <li>- Loop 9 Filter</li> </ul>
40	<ul style="list-style-type: none"> <li>- One-shot 10 Filter</li> <li>- Loop 10 Filter</li> </ul>
41	<ul style="list-style-type: none"> <li>- Granular GR2 Window</li> <li>- One-shot 6 Pitch</li> <li>- Loop 6 Pitch</li> </ul>
42	<ul style="list-style-type: none"> <li>- One-shot 11 Filter</li> <li>- Loop 11 Filter</li> </ul>
43	<ul style="list-style-type: none"> <li>- One-shot 12 Filter</li> <li>- Loop 12 Filter</li> </ul>
44	<ul style="list-style-type: none"> <li>- One-shot 13 Filter</li> <li>- Loop 13 Filter</li> </ul>
45	<ul style="list-style-type: none"> <li>- One-shot 14 Filter</li> <li>- Loop 14 Filter</li> </ul>
46	<ul style="list-style-type: none"> <li>- Granular GR2 Jitter</li> <li>- One-shot 7 Pitch</li> <li>- Loop 7 Pitch</li> </ul>
47	<ul style="list-style-type: none"> <li>- Granular GR2 Play Pos</li> <li>- One-shot 8 Pitch</li> <li>- Loop 8 Pitch</li> </ul>
48	<ul style="list-style-type: none"> <li>- Granular GR2 Speed</li> <li>- One-shot 9 Pitch</li> <li>- Loop 9 Pitch</li> </ul>
49	<ul style="list-style-type: none"> <li>- Granular Osc Level</li> <li>- Wavetable Osc Level</li> <li>- One-shot 10 Pitch</li> <li>- Loop 10 Pitch</li> </ul>
50	<ul style="list-style-type: none"> <li>- Granular Osc Pitch</li> <li>- Wavetable Osc Pitch</li> <li>- One-shot 11 Pitch</li> <li>- Loop 11 Pitch</li> </ul>
51	<ul style="list-style-type: none"> <li>- Granular Osc Pulse Width</li> <li>- Wavetable Osc Pulse Width</li> </ul>

52	<ul style="list-style-type: none"> <li>- One-shot 13 Pitch</li> <li>- Loop 13 Pitch</li> </ul>
53	<ul style="list-style-type: none"> <li>- One-shot 14 Pitch</li> <li>- Loop 14 Pitch</li> </ul>
54	<ul style="list-style-type: none"> <li>- One-shot 15 Pitch</li> <li>- Loop 15 Pitch</li> </ul>
55	<ul style="list-style-type: none"> <li>- One-shot 16 Pitch</li> <li>- Loop 16 Pitch</li> </ul>
56	<ul style="list-style-type: none"> <li>- One-shot 1 Delay Send</li> <li>- Loop 1 Delay Send</li> </ul>
57	<ul style="list-style-type: none"> <li>- One-shot 2 Delay Send</li> <li>- Loop 2 Delay Send</li> </ul>
58	<ul style="list-style-type: none"> <li>- One-shot 3 Delay Send</li> <li>- Loop 3 Delay Send</li> </ul>
59	<ul style="list-style-type: none"> <li>- One-shot 4 Delay Send</li> <li>- Loop 4 Delay Send</li> </ul>
60	<ul style="list-style-type: none"> <li>- One-shot 5 Delay Send</li> <li>- Loop 5 Delay Send</li> </ul>
61	<ul style="list-style-type: none"> <li>- One-shot 6 Delay Send</li> <li>- Loop 6 Delay Send</li> </ul>
62	<ul style="list-style-type: none"> <li>- One-shot 7 Delay Send</li> <li>- Loop 7 Delay Send</li> </ul>
63	<ul style="list-style-type: none"> <li>- One-shot 8 Delay Send</li> <li>- Loop 8 Delay Send</li> </ul>
64	<ul style="list-style-type: none"> <li>- Multisample Damper Pedal</li> <li>- Granular Damper Pedal</li> <li>- Wavetable Damper Pedal</li> <li>- One-shot Damper Pedal</li> </ul>
65	<ul style="list-style-type: none"> <li>- One-shot 15 Filter</li> <li>- Loop 15 Filter</li> </ul>
66	<ul style="list-style-type: none"> <li>- One-shot 16 Filter</li> <li>- Loop 16 Filter</li> </ul>
67	<ul style="list-style-type: none"> <li>- One-shot 1 Resonance</li> <li>- Loop 1 Resonance</li> </ul>
68	<ul style="list-style-type: none"> <li>- One-shot 2 Resonance</li> <li>- Loop 2 Resonance</li> </ul>
69	<ul style="list-style-type: none"> <li>- One-shot 3 Resonance</li> <li>- Loop 3 Resonance</li> </ul>

70	- One-shot 4 Resonance - Loop 4 Resonance
71	- Multisample Filter Resonance - Granular Filter 1 Resonance/Width/Q - Wavetable Filter 1 Resonance/Width/Q - Slicer Filter Resonance
72	- Multisample Release - Granular Env 1 Release - Wavetable Env 1 Release - Slicer Release
73	- Multisample Attack - Granular Env 1 Attack - Wavetable Env 1 Attack - Slicer Attack
74	- Multisample Filter Cutoff - Granular Filter 1 Frequency/Cutoff - Wavetable Filter 1 Frequency/Cutoff - Slicer Filter Cutoff
75	- Multisample Decay - Granular Env 1 Decay - Slicer Decay
76	- One-shot 5 Resonance - Loop 5 Resonance
77	- One-shot 6 Resonance - Loop 6 Resonance
78	- One-shot 7 Resonance - Loop 7 Resonance
79	- One-shot 8 Resonance - Loop 8 Resonance
80	- One-shot 9 Resonance - Loop 9 Resonance
81	- One-shot 10 Resonance - Loop 10 Resonance
82	- One-shot 11 Resonance

	- Loop 11 Resonance
83	- One-shot 12 Resonance - Loop 12 Resonance
84	- One-shot 13 Resonance - Loop 13 Resonance
85	- One-shot 9 Delay Send - Loop 9 Delay Send
86	- One-shot 10 Delay Send - Loop 10 Delay Send
87	- One-shot 11 Delay Send - Loop 11 Delay Send
88	- One-shot 12 Delay Send - Loop 12 Delay Send
89	- One-shot 13 Delay Send - Loop 13 Delay Send
90	- One-shot 14 Delay Send - Loop 14 Delay Send
91	- Multisample Reverb Send - Granular Reverb Send - Wavetable Reverb Send - Slicer Reverb Send - One-shot Reverb Send - Loop Reverb Send - External Reverb Send
92	- Multisample Delay Send - Granular Delay Send - Wavetable Delay Send - Slicer Delay Send - One-shot Delay Send - Loop Delay Send - External Delay Send
93	- One-shot 14 Resonance - Loop 14 Resonance
94	- Multisample Pitch - Slicer Pitch
95	- One-shot 15 Resonance - Loop 15 Resonance
96	- One-shot 16 Resonance - Loop 16 Resonance

102	- One-shot 15 Delay Send - Loop 15 Delay Send
103	- One-shot 16 Delay Send - Loop 16 Delay Send
104	- One-shot 1 Reverb Send - Loop 1 Reverb Send
105	- One-shot 2 Reverb Send - Loop 2 Reverb Send
106	- One-shot 3 Reverb Send - Loop 3 Reverb Send
107	- One-shot 4 Reverb Send - Loop 4 Reverb Send
108	- One-shot 5 Reverb Send - Loop 5 Reverb Send
109	- One-shot 6 Reverb Send - Loop 6 Reverb Send
110	- One-shot 7 Reverb Send - Loop 7 Reverb Send
111	- One-shot 8 Reverb Send - Loop 8 Reverb Send

112	- One-shot 9 Reverb Send - Loop 9 Reverb Send
113	- One-shot 10 Reverb Send - Loop 10 Reverb Send
114	- One-shot 11 Reverb Send - Loop 11 Reverb Send
115	- One-shot 12 Reverb Send - Loop 12 Reverb Send
116	- One-shot 13 Reverb Send - Loop 13 Reverb Send
117	- One-shot 14 Reverb Send - Loop 14 Reverb Send
118	- One-shot 15 Reverb Send - Loop 15 Reverb Send
119	- One-shot 16 Reverb Send - Loop 16 Reverb Send

## Troubleshooting MIDI Issues

### Common MIDI Problems:

#### No MIDI input response:

- Verify track **MIDI In Ch** matches controller channel.
- Check MIDI cable connections and controller settings.
- Confirm MIDI Type setting matches hardware (Type A vs Type B).

#### Parameter control not working:

- Ensure MIDI controller transmits on correct channel.
- Verify CC numbers match bento's implementation.
- Check that track **MIDI In Ch** is not set to "None."

#### Synchronization problems:

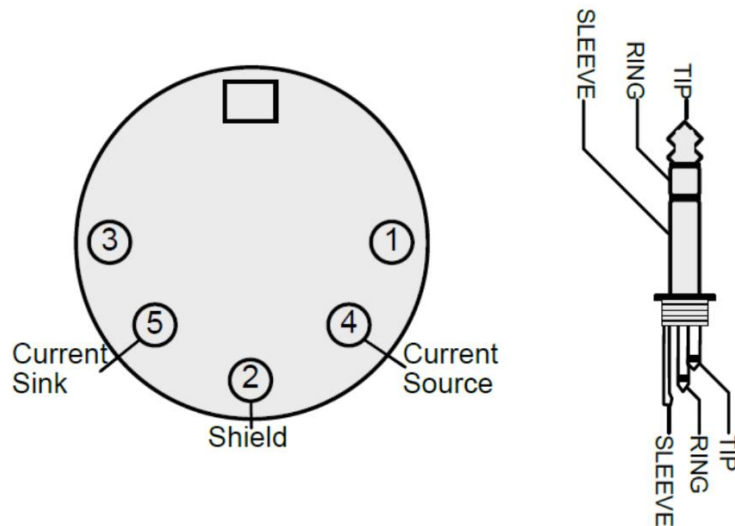
- Verify MIDI clock source device is sending Start and Clock messages.
- Check MIDI cable connections for clock input.
- Confirm external device tempo is stable.

#### External instrument issues:

- Verify **MIDI Out C** setting matches external instrument's receive channel.
- Verify **MIDI Out P** is set to "All."
- Check MIDI cable connections to external instrument.
- If bento is connected to the external instrument with 3.5mm TRS cable, make sure bento's **MIDI Type** parameter (in the Global Settings screen) matches the external instrument's MIDI input.
- Confirm the external instrument is configured to receive on correct channel.

## Pin Mapping for Mini TRS Jack to MIDI 5 Pin DIN Connectors

The musical instrument industry currently uses several different ways of mapping MIDI 5 Pin DIN signals to mini TRS jack connectors. The diagram below shows the numbering of the pins on a MIDI connector and the labels of the connection components of a mini TRS jack.



*Figure 17-6: MIDI Connector Pin Numbering*

The following table shows how each of a MIDI DIN connector's pins connects to a Mini-TRS Type B MIDI connector.

*Table 17-22: MIDI Connector to Mini TRS Jack Signal Mapping*

MIDI Signal	MIDI Connector	Mini TRS Type B
Current Source	Pin 4	Tip
Current Sink	Pin 5	Ring
Shield	Pin 2	Sleeve

Bento's MIDI Input and Output jacks are compatible with MIDI TRS Type A and Type B, but both of bento's MIDI Outputs must be configured for the same MIDI connector type, by editing the **MIDI Type** parameter in bento's Global Settings screen. For details, see [Configuring Global MIDI Settings](#).

**Note:** 1010music MIDI Adapters do not pass through power.

## Best Practices for MIDI Integration

### Controller Setup Strategies

**Dedicated Track Control:** Assign each MIDI channel to a specific bento track for independent control of multiple tracks simultaneously.

**Universal Controllers:** Use CC 7 (Level), CC 10 (Pan), CC 91 (Reverb), and CC 92 (Delay) for consistent control across all track types.

**Performance Mapping:** Map frequently adjusted parameters to easily accessible controller knobs or faders for live performance.

### Workflow Optimization

**Template Setup:** Create projects with pre-configured MIDI channel assignments for your typical controller setup.

**Multi-Track Performance:** Use different MIDI channels for simultaneous control of multiple tracks from a single controller.

**DAW Integration:** Configure consistent MIDI channel assignments between bento and your DAW for seamless workflow.

### Creative Applications

**Real-Time Modulation:** Use CC messages to create dynamic parameter changes during performance or recording.

**External Instrument Layering:** Combine bento tracks with external instruments for rich, layered textures.

**Rhythmic Parameter Control:** Sequence CC changes using your DAW to create rhythmic parameter modulation in sync with bento's sequences.

### Next Steps

With effective MIDI control established, explore advanced integration techniques such as complex multi-device synchronization, automated parameter sequences, and creative real-time performance techniques that leverage bento's comprehensive MIDI implementation.

MIDI control works particularly well when combined with bento's sequencing and mixing capabilities, enabling you to create dynamic, expressive musical performances that respond to your playing style and creative intentions.



## 18: Working with the microSD Card

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All the files used by bento are stored on the microSD card. This allows you to have as many copies of the microSD card as needed to provide backups or to make use of alternate content sets. Bento has been tested with cards up to 1 TB. We recommend the SanDisk Extreme (Pro) A2. 64GB, 128GB, 256GB, and 512GB cards. These cards have all been tested with bento and work well.

There are two ways to access the files on the microSD card:

- Remove the card from bento, place it in a microSD to USB adapter or microSD to SD Card adapter and place the adapter in your computer. The card will appear as a drive on your computer. Be sure to follow the instructions for your operating system to Eject the drive before you remove it from your computer.
- Place bento in SD Reader Mode and use a USB cable between the bento and your computer to manage files. Again, be sure to follow the instructions for your operating system to Eject the drive before you disconnect the bento from your computer.

### Accessing Files with SD Reader Mode

In SD Reader Mode, bento becomes a giant microSD card to USB adapter. To work in SD Reader Mode:

1. Connect bento to the computer:
  - a. If bento can run on battery: Connect a USB cable between the Device Port on bento and your computer. Note that bento will charge from the connected device when connected without the USB C Power/Data Splitter.
  - b. If bento needs power: Find the USB C Power/Data Splitter that came with your bento. Connect the Splitter to the Device Port on your bento. Connect the power side ⚡ to a USB cable connected to a power source. Connect the USB Side 🔌 to a USB cable connected to your Windows PC or Mac.
2. Save any changes to the current project. You cannot use bento to make music while managing the files on the disk. When you enter SD Reader Mode, all project files will be closed.



3. Push PROJ to open the Project Browser.
4. Tap menu, then SD Reader Mode. If you have any unsaved changes in your project, bento will give you the option to Save, Don't Save, or Cancel entering SD Mode. Choose Don't Save or Save from the pop-up window to proceed to SD Reader Mode.
5. On bento, you will see a window titled "bento microSD File Management Mode" with instructions about how to protect your files and exit this mode safely. On your computer or iOS device, you should now see a new microSD drive in your file browser with the contents of your microSD card.
6. Use your file browser to move files between your bento and your computer. You can also delete unneeded files. We recommend that you do not delete Patch files, as this will result in missing files that are still listed in the Patch index file. The files will still appear in the Patch browser, but you won't be able to open them because they aren't there.
7. When you are done working with the files, close any files that are in use, wait for any file movements to complete, then Eject the bento microSD drive:
  - c. On a Windows PC: In File Explorer, right click the drive label and click on Eject.
  - d. On macOS device: In Finder, right click the drive label and click on Eject, or click on the triangular eject icon to the right of the drive name.
  - e. On iPad or iPhone, close the file browser or any other apps that are connected to the bento microSD card.
8. To resume using bento, on your bento, push the ◀ button to exit SD Reader Mode. Bento will reboot and open the last used project. To install new firmware, use the power button to turn off bento, then proceed to install new firmware as usual.
9. Disconnect bento from the external device.

### Hardware Compatibility of SD Reader Mode

We have tested the following Operating System versions with solid results:

- Windows 10 and 11
- MacOS Big Sur (11.7), Tahoe (26.1) and Sequoia (15.6.1),

We have tested with the following OS versions and they work with specific cabling configurations:

- MacOS Catalina (10.15.7) – generally worked with USB C to USB C connection. Other cable options were less reliable.
- iPhone 14 Pro iOS 26.0.1(lightning). Works with USB C to USB A to Camera Connection Kit (CCK) adapter.

- Does not work with the USB C power/data splitter adapter. This means that bento will draw power and charge the battery while connected to the iPhone.
- iPad Pro iOS 18.6.2 and 18.5(USB-C)
  - Does not work with the USB C power/data splitter adapter. This means that bento will draw power and charge the battery from the iPad while connected.
  - Works with USB C to USB C connection.
  - Works with USB C to USB A to Camera Connection Kit (CCK) adapter if you connect cables before entering SD Reader Mode.

## 19: Using Custom Samples

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If you have worked with other sampling instruments before using bento, you may already have a collection of samples or even a collection of sound libraries that you would like to load into your bento projects. This chapter describes how to make sure your samples are ready to be loaded into bento tracks.

To do this...	read...
Make your samples compatible with bento.	<a href="#">Bento Sample File Requirements</a>
Make your sample files loadable into bento tracks.	<a href="#">Bento File Naming Requirements</a>
Prepare related samples for loading into specific note ranges of bento multisample tracks.	<a href="#">Preparing Your Own Samples for Multisample Tracks</a>
Prepare samples for loading into bento Loop tracks.	<a href="#">Using Custom Samples in Loop Tracks</a>
Prepare samples for loading into bento Slicer tracks.	<a href="#">Using Custom Samples in Slicer Tracks</a>
Prepare samples for loading into bento Granular tracks.	<a href="#">Using Custom Samples in Granular Tracks</a>

**Note:** One-shot tracks have no additional sample requirements beyond the basic sample file and naming requirements described in this chapter. Simply load your samples into the One-shot sample bank as described in Chapter 9.

## Bento Sample File Requirements

Before copying your own sample files to a microSD card, make sure the sample files meet bento's criteria:

- Sample format: WAV file format.
- Audio Channels: 1 or 2.
- Resolution: 16-, 24-, or 32-bit.
- Sample Rate: Bento supports any sample rate up to 48kHz, but to minimize load on the microprocessor, use 48kHz, bento's native sample rate.
- Wavetables: mono wavetables with 2048 samples per cycle with between 1 and 256 cycles. You can use 16-bit, 24-bit or 32-bit files. Serum is a good tool for creating wavetable files. You can learn more about how to create your own wavetables [in this video](#).

## Bento File Naming Requirements

Bento only recognizes sample files that meet the following criteria:

- Fewer than 256 characters, including the path name.
- May include alpha numeric characters (A-Z, 0-9) and some special characters.
- Must not contain any of the following characters:
- “/ \ ? \* < > : |

**NOTE:** Bento will not recognize or load sample files that do not meet its naming criteria.

## Preparing Your Own Samples for Multisample Tracks

Bento's multisample recording feature lets you record complete sets of samples when you create a Multisample track. This is an excellent option for building polyphonic sample-based recreations of vintage analog synths and acoustic instruments.

If you already have your own sets of samples and just want to load them into a Multisample track, the process is simple:

1. Put the samples into their own folder on a bento microSD card.
2. From bento's Tracks screen double-tap an empty track to open the Patch browser.
3. Tap New, then choose Multisample.
4. When the Sample browser window opens, navigate to your samples folder, and tap **Load All**.

Regardless of how similar or different the samples are, bento will create a new Multisample that maps every sample to its own MIDI note, range of MIDI notes, or to the same note over a unique range of MIDI velocities. While this is certainly a valid Multisample track, you may find the sample mappings to be too random to play in a conventional manner.

Fortunately, you can influence the way that bento loads your samples so that they are spread across MIDI note ranges in a more playable manner.

To prepare your own Multisample file sets using your own samples, make sure your sample files meet the following criteria:

- All samples meet bento's requirements.
- All sample filename meets bento's file naming requirements.
- Each sample's Root Note is easy for bento to detect.
- Samples with the same Root Note are created with different dynamics, expressed as MIDI velocity values that are easy for bento to detect.

For details on bento's sample and file naming requirements, see [Bento Sample File Requirements](#) and [Bento File Naming Requirements](#).

For details about how bento detects the Root Note and velocity of sample files, see [Where bento Looks for Note and Velocity Information](#).

## Where bento Looks for Note and Velocity Information

When you use the **Load All** feature to load multiple files into a Multisample track, bento looks for each file's Root Note so it can map the file to a MIDI Note, and if multiple files have the same Root Note, bento looks for velocity information so it can map each file to a range of MIDI Note velocities and respond dynamically to the way a performer plays each note.

To find the Root Note and velocity information, the bento looks in the following places, in the following order until it finds what it needs:

1. SMPL tags of the WAV files
2. INST tags of the WAV files
3. The file names for the WAVs

When parsing the file names, it looks for the following format:

[Text name] + [ - or \_ ] + [note number] + [ - or \_ ] + [Vel1] + [ - or \_ ] + [Vel2]

Bento interprets the [note number] as a decimal MIDI Note number. If bento finds both [Vel1] and [Vel2], it will use them as the lowest and highest velocities for playing this WAV.

Table 19-1 presents three examples of filenames that indicate that the samples have the same root note (048) and one of three velocity ranges.

*Table 19-1: Sample Filenames with Velocity Ranges*

Filename	Root Note	Velocity Range
tetrasync-048-000-049.wav	48 (C3)	0-49
tetrasync-048-050-083.wav	48 (C3)	50-83
tetrasync-048-084-127.wav	48 (C3)	84-127

If bento finds only Vel1, it will use that as the center point for the range of velocities when this WAV should be applied.

Table 19-2 presents three examples of filenames that indicate that the samples have the same root note (048) and one of three unique mid-point velocities.

*Table 19-2: Sample Filenames with Mid-point Velocities*

Filename	Root Note	Velocity Mid-point	Velocity Range
tetrasync-048-033.wav	48 (C3)	33	0-49
tetrasync-048-066.wav	48 (C3)	66	50-83
tetrasync-048-100.wav	48 (C3)	100	84-127

**Note:** The file names in Table 19-2 and Table 19-1 are different, but they represent the same Root Notes and velocity ranges, so bento would map either set of sample files to MIDI Notes in an identical manner.

If bento doesn't find the root note information in those three places, it will map the files in alphabetical order, starting at C2 (MIDI Note 36) and map one file per semi-tone, one velocity per note. If bento finds no velocity information, it will use one WAV file for all velocities.

## Loading tangerine and blackbox Multisample File Sets

If you have created Multisample file sets with a 1010music tangerine or blackbox, you can load those file sets into Multisample tracks on bento with the Load All feature.

The files that tangerine and blackbox generate include enough information in their filenames and in the SMPL and INST tags for bento to determine how to map WAV files to an appropriate span of MIDI notes and MIDI velocities.



## Using Custom Samples in Loop Tracks

Source material selection significantly impacts your Loop track's musical effectiveness and arrangement possibilities. Choose loops with complementary rhythmic characteristics and compatible tempo relationships for your intended musical applications.

Effective Loop track source characteristics include loops recorded at consistent quality levels for seamless integration, compatible rhythmic feels that work well in combination, appropriate loop lengths that maintain musical interest without becoming repetitive, and tempo flexibility that enables synchronization across different musical contexts.

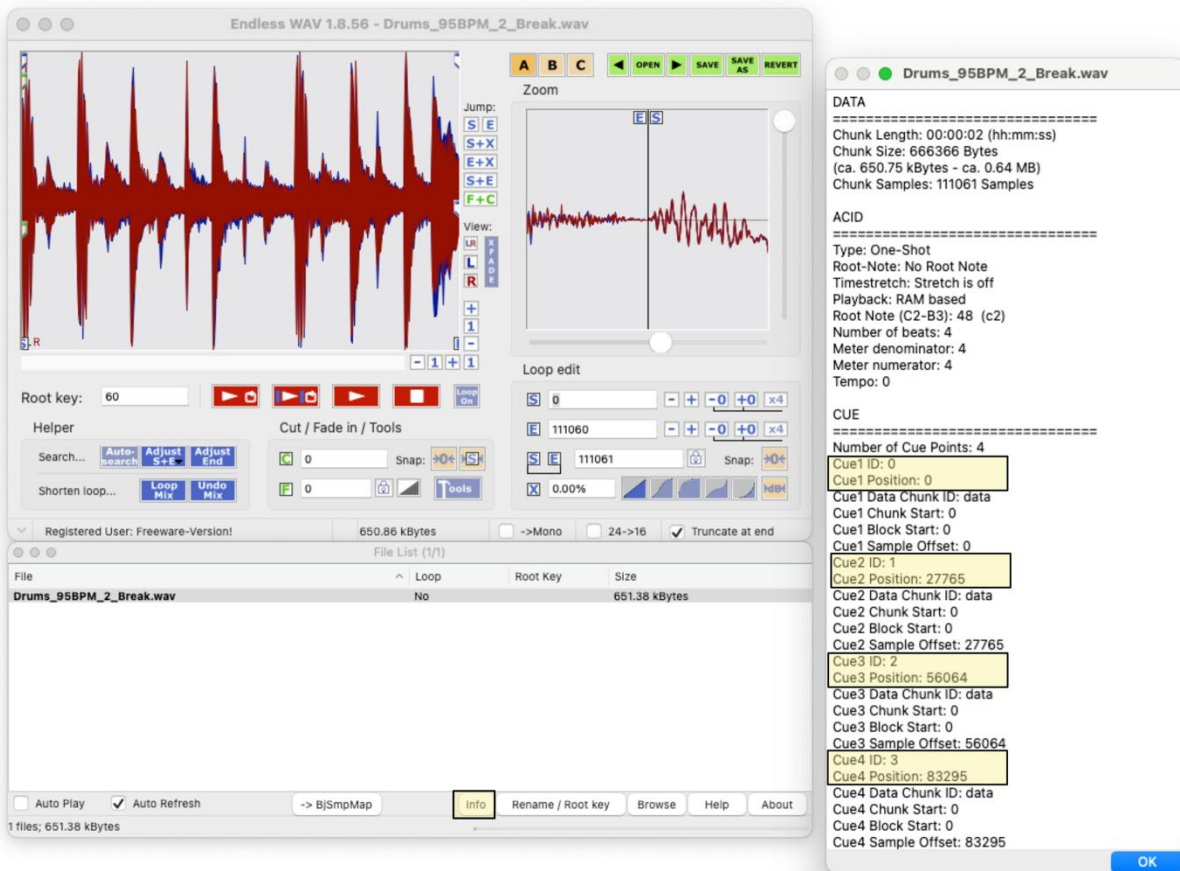
Bento's loop sample engine provides transport synchronization so that loops stay in time with your project tempo within a narrow range of tempos. This synchronization makes it easy to combine loops from different sources while maintaining tight rhythmic coordination, but deviations in tempo of greater than 10 BPM between the sample and the project tempo may result in low sound quality.

Organize your loop libraries with clear tempo and style identification before loading into bento. This preparation streamlines the selection process and ensures effective musical relationships in your finished arrangements.

## Using Custom Samples in Slicer Tracks

If you plan to use your own samples in slicer tracks, you can add cue points to the sample files with software tools such as Sound Forge or even with hardware devices such as 1010music's tangerine and blackbox, which let you load a sample into a pad, edit slices, and then save a copy of the sample with the new slice markers (cue points) to microSD card.

If you're not sure if a file already has cue points, use a tool like Endless Wave to view the sample file details.



In this example, Drums\_95BPM\_2\_Break.wav has four slices (cue points):

<b>Cue1 ID: 0</b>	<b>Cue1 Position: 0</b>
<b>Cue2 ID: 1</b>	<b>Cue2 Position: 27765</b>
<b>Cue3 ID: 2</b>	<b>Cue3 Position: 56064</b>
<b>Cue4 ID: 3</b>	<b>Cue4 Position: 83295</b>

**Note:** If you create a slicer track and load a sample that contains cue points, bento uses those cue points as slice markers, but you can edit them with the slice-editing tools in the Slicer Track WAV screen and save them as part of the project. The next time you load the project bento restores the saved slice markers instead of the embedded cue points.

## Using Custom Samples in Granular Tracks

Effective granular track design balances technical understanding with creative experimentation. These practices help you achieve professional results while maintaining musical coherence.

Choose samples with rich harmonic content and interesting internal textures. Percussive samples work well for rhythmic granular effects, while sustained tones excel for atmospheric textures. Longer samples provide more material for granular exploration, but shorter samples can create focused, intense effects.

Consider the spectral content of your samples. Samples with complex harmonic structures yield more interesting granular textures, while simple waveforms may sound repetitive when granulated. Field recordings and acoustic instruments often provide excellent source material due to their natural complexity.

**Note:** If you load a sample more than 30 seconds long into a granular track, the granular engine will only use the first 30 seconds of the sample.