TEMPERA

Owner's Manual

beetlecrab.audio

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1   INTRODUCTION

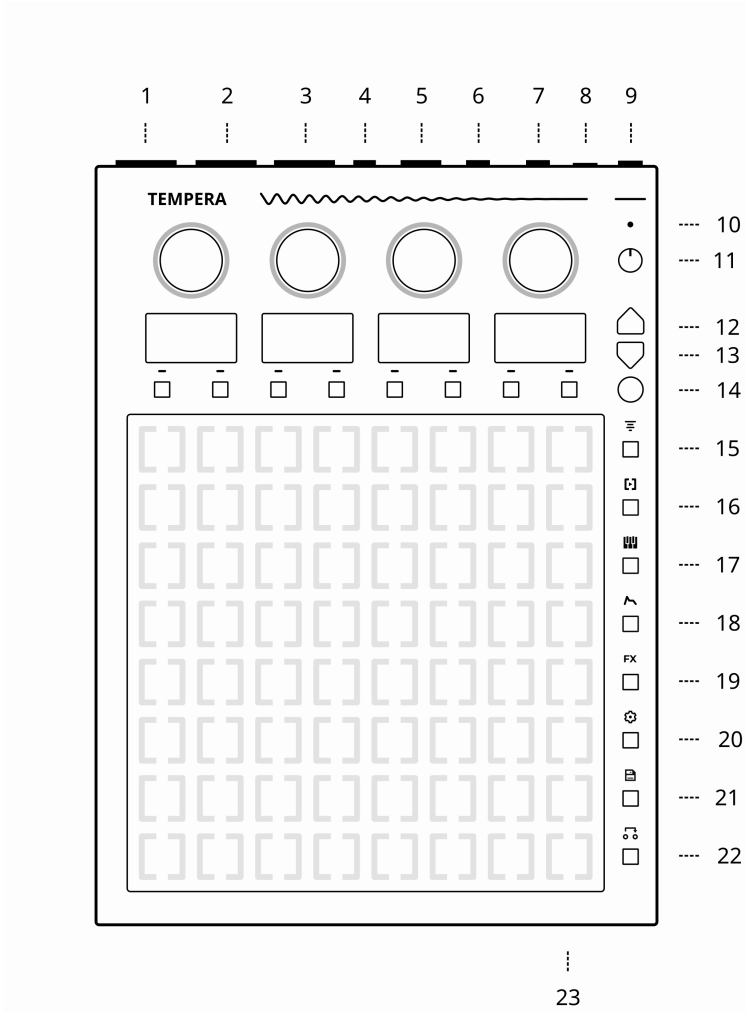Tempera is a multi-sample, 16-voice polyphonic granular synthesizer.

You can think of it as eight parallel stereo tape tracks, laid in columns next to each other, forming a kind of 2D tape surface. Your fingers then become generators (aka *Emitters*) of one or many tape heads (aka *Grains*) riding across the surface.

This main control interface – the touchgrid – is a fully polyphonic touch sensitive surface on which emitters are laid, which in turn produce streams of grains.

Tempera can be many things: a percussive drum bed, a pad station, sampler, granular cloud generator, an ambient machine, remix and sample-chopping instrument, recorder, an accompaniment to other instruments, a procedural composition tool, a sample wrangler, an in-the-box resampler.

Above all, it can be the companion to wherever your music takes you.

This user guide will walk you through Tempera's various functions and how to use them, as well as some tips and answers to frequently asked questions.

LAYOUT

TEMPERA

1 2 3 4 5 6 7 8 9

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1. 6.35mm mono left audio or stereo headphones output – careful, the outputs can be very hot (up to 13dBu or 10Vpp)

2. 6.35mm mono right audio output

3. 6.35mm stereo audio input

4. USB host

5. USB device

6. TRS MIDI in

7. TRS MIDI out

8. Power input (12V/2.5A DC center positive) – please use the provided power supply for best performance

9. Power switch

10. Onboard microphone

11. Volume knob

12. Page up

13. Page down

14. Context switch (Round button)

15. Tracks

16. Emitters

17. Overlay keyboard

18. Modulators

19. Effects

20. Settings

21. Save and load canvas

22. Custom macros

23. Micro SD card slot

Each of the four main knobs' function is determined by menu navigation and associated with the display below it.

There are 2 buttons for each display, and their function changes depending on context. The function is always displayed above them.

The **Round button** serves several purposes:

1. Hold it to reveal an alternate context for buttons below the displays

2. Hold it while turning a knob to move through the parameter faster

3. When recording, press it to stop recording

The column of buttons to the right of the touchgrid are navigation buttons that take you to various places inside Tempera, and the **Up** and **Down** arrows navigate across the menu pages. There are little dots on the right-most display showing the current page out of a total.

Tip

Certain actions, like saving and loading canvases or detecting pitch on a sample are performed in the background. When the background task is busy, the knobs will light in a moving wave. This is always initiated by you and never spontaneously on its own. Tempera is fully usable during that time, however do not turn off the power when saving canvases or samples.

Most parameter values are shown between 0.00 and 1.00. The internal resolution is however much higher and only the displayed value is truncated to two decimal places.

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3   GETTING STARTED

After you start Tempera for the first time, you will be greeted with the **Initial** canvas. Before making sound, check your **Output volume** and set it to around 25%. We will adjust as necessary later.

On the touchgrid, you can see that there are a few color cells, and two white rows at the bottom.

The color cells are emitters that are already pre-placed in the canvas. Each placed emitter is one of the four primary colors. If a placed **emitter** is e.g. **blue**, then it behaves according to the **Blue emitter** settings.

The two white rows at the bottom are the **Overlay Keyboard**. In the initial canvas, it is horizontally two octaves of C Major scale.

Let's make some sound: place and hold your finger on any one cell in the **Overlay Keyboard** region. You are now playing a note and all emitters started triggering grains depending on their location on the grid and their configuration. Keep holding the note.

You can see that some emitters are triggering rhythmically, while the blue emitter has some kind of rotating motion. We will learn how to configure emitters for different uses in another section of this guide.

Release the note. We could see that one primary color, red, was not placed anywhere. Hold a note one more time, and this time with your other hand, place your finger somewhere in the right half of the grid. You can hear that the red emitter is configured to play a denser cloud of grains.

Move your emitter finger around to explore the sound at each location of the canvas. Try placing multiple fingers at different

places at once to find interesting blends. Try playing multiple notes as well.

Release the note.

Let's try moving the original placed emitters around, but in order to experiment with emitter placement, let's enable **Keyboard hold** so you can use both hands for emitters: go to the **Overlay Keyboard** 🎹 menu, and then press **Hold** below one of the displays. This activates the sustain pedal on the overlay keyboard.

To remove the pre-placed emitters, go to **Emitters** [·] menu, and **Select** the blue emitter. Place your finger on a grid cell where the blue emitter is and it will be removed.

Play a note one more time, and this time release your finger from the overlay keyboard, the note will keep playing.

Place your finger on a grid cell where there isn't an emitter yet, a **Selected** (currently blue) emitter will be placed there.

Experiment with emitter placement for a while, play a few more notes and chords. Then go ahead and read the rest of this user guide.

Tip

If you have a different canvas loaded after start up, you'll find it in **System** folder, at the very end there is **Initial.canvas**. You can play a note from the internal overlay keyboard, or from an external MIDI keyboard connected via MIDI TRS or USB.

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4   CANVAS

A full patch for Tempera is called a *canvas*. It contains eight audio samples, all emitters' and modulators' configuration, as well as optionally pre-placed emitters.

Tempera comes with a suite of canvases designed specifically for it, with its unique workflow.

When you load a canvas, try playing a note to get an idea of what it is, and then modify it to your liking. Some canvases are melodic, other are percussive, and the rest are anything in between.

After you explore the built-in canvases, it's time to make your own!

Tip

- When you make your own canvas, save it directly onto an SD card and share it around!
- Try combining samples from different canvases.
- To start with a clean slate, load the **Empty.canvas** inside the **System** folder, near the end of the list.

5   TRACKS ☰

Each column on Tempera's touchgrid represents a track, going from top to bottom. Each track contains a loaded or recorded audio sample, which can be up to 11 seconds long.

When you play a note, all placed emitters start emitting grains which ride on the tracks and play audio from their locations. For the engine to know how fast or slow the playback of each sample needs to be in order to match the note being played, each track needs to have its base **tuning** configured. This base tuning frequency is the frequency of the sample when played at its original speed.

For example, if a base frequency of a sample is 440Hz and you play the A3 note, Tempera knows to play the grain at half speed, since A3 is at 220Hz. If you don't know the tuning of the original sample, try using the **pitch detector**.

In addition to tuned samples, it is possible to load percussive ones. But in that case the sample playback needs to match not with your note played, but with your BPM tempo. For this, turn the track into **BPM mode**, and when any note is played, the track playback will slow down and tune down, or speed up and tune up, to match your project BPM. It is possible to load percussive loops of different BPMs and they will be all synced perfectly.

The tracks' names and volumes are shown on the displays above them, in groups of two. Turning the corresponding knob tweaks the volume of the selected track.

Each display has two context actions:

- **Switch** which of the two tracks is selected
- **Edit** the selected track sample

Holding the **Round button** reveals alternate context:

- **Rec** arms a track for recording. Recording begins the moment input audio crosses the *Threshold* set in **Settings** ⚙. When recording, pressing the **Round button** again stops recording.

> **Tip**
> - You can press the **Tracks** ≡ button twice to go quickly to last edited track.
> - Press the **Up** and **Down arrows** to scroll between tracks.

When editing a track, you are presented with these actions:

· **Load** a sample from the sample browser

· **Rename** the sample

· **To Hz** toggles the sample's tuning representation between Hz and BPM.

· **Snap** snaps the frequency to the note (i.e. 441.3125Hz becomes 440Hz, 120.1 BPM becomes 120.0)

· **Trim** the sample in the **Waveform preview**

· **Delete** the track contents

· **Play** to play preview the track

· **Export** saves the audio sample onto the internal or external memory

Holding the **Round button** reveals alternate context:

· **Detect** the pitch of the sample. It is possible to enter the note/frequency manually by turning the knob (turn faster by holding the round button)

· **Copy** the track into the clipboard

· **Paste** a track from the clipboard

· **< Swap** the track to the left

· **Swap >** the track to the right

6   LOAD AND EDIT A SAMPLE

Tempera supports many common audio formats as samples, stores them internally as 16-bit 48kHz, and processes them with 32-bit floating point math.

The maximum length of a sample loaded into track is about 11 seconds, however when a longer audio file (up to 5 minutes) is loaded, it is possible to select which slice of audio to load.

When the waveform is now shown across all 4 displays, gray vertical bars are hinting at where the cell boundaries will be. If you're loading a percussive sample, you will likely want to line the markers with sample transients.

To load a sample into a track:

1. Go to **Tracks**

2. Choose the track you want to load a sample into and press **Edit**

3. Press **Load** to go to the file browser

4. Choose a sample and press **Load**

5. Adjust the **Start** and **End** points and press **Load**. Scroll faster by holding the Round button.

6. The sample is now loaded into the track, don't forget to adjust its **Base tuning**

To edit a sample when it's already loaded into a track:

1. Go to **Tracks**

2. Choose the track you want to load a sample into and press **Edit**

3. Press **Trim**

Then, on the Trim page:

- Turn the first and last knobs to adjust the start and end points

- **Listen** to the whole sample or just its tail

- **Normalize** it, and **Trim** everything before or after the start and end points, respectively.

- **Rev** to reverse the sample

Frequently Asked Questions

- *Why does Tempera export audio files as .flac?*
  FLAC is an open lossless compression algorithm, which makes audio around 50% smaller at zero loss of quality. Think of it like a zip file, and not like an mp3.

- *After saving a canvas, can I move or delete the original audio files used as samples?*
  Yes, the saved .canvas file is fully self-contained.

- *When previewing/auditioning audio samples, the volume is too loud.*
  Adjust **Audition Volume** in **Settings** ⚙.

Tip

While Tempera will accept and play any audio, here are a few general recommendations for making your own samples:
- If you're making a harmonic sound (such as a synth waveform), try keeping the base sample to a lower tuning, such as 110Hz or 220Hz.
- When making sequenced sounds, it's nice if the audio sample is neatly divisible in 8 equal length slices. This will make it align well with the touchgrid cells.
- When making a sample with an embedded melody that's meant to be played with a keyboard, it's usually a good choice to have the melody run in "safe" notes, such as octaves and fifths. For a bonus challenge: try making a sample melody more with timbre and less with pitch.

7   EMITTERS ⯈

An emitter can be placed on a cell on the touchgrid, from where it will start emitting a stream of grains. All placed emitters are activated per each voice. Each emitter can be one of four color-coded configurations.

Tempera will only make sound when there is an emitter placed and a voice is played.

Turning the corresponding knob tweaks the volume of the emitter and each display corresponds to one emitter:

· **Edit** the emitter configuration

· **Select** the emitter for placing

Holding the **Round button** reveals alternate context:

· **Clear** all placed emitters

· **Pause** / **Unpause** emitter grain generation

Emitters have many parameters that determine their behavior in time an space. Some parameters can be modulated, and some can be added an optional **Jitter**.

· **Grain length** is how long each grain is, measured in grid cells.

· **Grain note** changes the grain length to a note *duration* in time signature.

· **Grain density** determines how many grains are generated. A density of 1 means that there will be one grain played shoulder to shoulder.

· **Grain trigger** crossfades between grain generation based on free length/density, and grains triggers synced to time.

· **Sync time** sets the time signature at which new grains are emitted when synced to time.

· **Spray X** and **Y** sets amount of randomness in grain spawning horizontally (across tracks) and vertically (along a track).

· **Align** makes the emitted grain always start at the beginning of a cell. When not set, grains might be emitted from positions in between.
Setting this on is be useful for percussion tracks, where there's likely a transient at beginning of each cell

· **Relative X** and **Y** manually scrubs the grain trigger position away from its home base.

· **Grain envelope** determines how sharp the envelope of each grain is. Low value makes sharp transient grains, high value makes each grain smooth.

· **Tone** will apply a gentle low-pass and/or high-pass filter pair. This is essentially a variable-width band-pass filter.

· **Grain pan** (**L/R**) or **Grain mid-side** (**M/S**) controls the spread of grains in the stereo space.

· **Tune spread** to give each grain a random tuning variation, in range of ±1 octave. Apply very gently for a thickening detune.

- **Snap 5** and **Snap 8** will quantize the grains random variation to fifths and/or octaves, in both directions.

- **Octave** transposition of generated grains.

- **FX send** sets the amount of audio sent to the FX chain.

- **Name** of the emitter

- **Placement** changes the touchgrid behavior:

  - **Instant**: touch to place, release to remove

  - **Toggle**: touch to toggle

  - **Latch**: once all fingers are removed, all emitters are cleared at next placement

  - **Lock** the placed emitter to prevent it from being replaced by another

  - When **2-lane** is on, the emitter gains exclusive access to the pair of tracks below it. For example, when activated for the blue emitter, anytime an emitter is placed on the first two tracks, it will be blue regardless of which emitter is selected.

- **Channel** determines which MIDI channel the emitter listens to. When set to **Global**, it follows the MIDI channel set in **Settings** ⚙.

- **Fade in** and **out** of emitted grains after the emitter is placed or removed.

> **Tip**
>
> - Set **Grain density** to below 1 and try playing with super short **Grain size**.
> - Press the **Emitters** [·] button twice to edit the last edited emitter.
> - Once a grain is generated and already in flight, it will stop either when it runs its course, or if the *voice* playing it is released.
> - Regardless of FX send setting, per-voice amplitude envelope and filter are always applied.
> - **Octave** and **Grain detune** are not applied for tracks in **BPM mode**.
> - When editing an emitter, holding the **Round button** and pressing the **Emitters** [·] button will cycle to the next emitter for editing. This makes it easy to adjust the same parameter for multiple emitters quickly.

Frequently Asked Questions

- *How can I scrub through a sample smoothly?*

  It is possible to modulate an emitter's **Rel X** and **Rel Y** (short for *relative*) positions with a modulator or MIDI input. Emitting short grains is recommended for smooth scrubbing. With longer grains it is possible to do grain sequencing.

- *Can effects be applied to each emitter separately?*

  As of the current firmware this isn't possible.

- *My high-density short grain emitter sounds very metallic, as if glitched. Why?*

  When a lot of grains are emitted from exactly the same position periodically, for example 100 times per second, this will create an audible frequency component of 100Hz. Add a tiny amount of unaligned Spray Y and grain trigger will no longer be harmonic.

8   OVERLAY KEYBOARD 🎹

While it's possible to use an external MIDI keyboard connected to Tempera, an overlay keyboard can be brought up which will occupy some potion of the touchgrid.

The **Overlay keyboard** 🎹 menu has the following options:

- **Transpose** the overlay keyboard by semitones
- **Channel** sets which MIDI channel the overlay keyboard plays at
- **Play mode** determines the arrangement of notes on the grid:
  - **Base note**: each key is the same note. Useful for percussive scenarios.
  - **Scale maj**: each row/column is an octave, each cell is a tone in a major scale
  - **Scale min**: each row/column is an octave, each cell is a tone in a minor scale
  - **Chromatic**: the keyboard is of a piano-type layout
- **Overlay** selects which portion of the touchgrid the overlay keyboard will occupy with two context options:
  - **Clear** all held notes
  - **Hold** keys on the virtual keyboard (like a sustain pedal)
- **Channel** sets the MIDI channel at which each emitter is responsive

- **Effects send** toggles enable or disable voices played on individual MIDI channels to be sent to the effects chain. This is per midi channel, while Emitter's FX send is per-emitter.

Frequently Asked Questions

- *Which notes are which on the overlay keyboard?*

  The overlay keyboard begins on a root note set with **Transpose** on the bottom-left cell. Increasing the layout size will increase the keyboard range upwards. In major or minor scale modes, each row is one octave.

Tip

- Set various emitters to different MIDI channels to achieve multi-timbrality.
- Setting your percussive emitters to a separate MIDI channel can be useful.
- Press a shortcut combo **Round button** and **Overlay Keyboard** ⌨ to quickly show and hide the overlay keyboard.
- It is possible to have notes toggled on multiple MIDI channels at once. Useful for a held percussive or drone note on one channel, and playing along on a different channel.

9   MODULATORS ∿

Modulators allow changing a parameter's value over time, to produce a more complex and dynamic sound. Each modulator can be set to an envelope, a periodic wave, or a slow randomized noise. The modulator can be routed to one of the available targets. Multiple modulators can be routed to the same target.

On the Tempera, there are ten modulators per voice played, plus a a full ADSR amplitude envelope generator.

The first menu page is dedicated to the ADSR amplitude envelope, while the following pages are dedicated to each of the modulators. These can be of different shape, destination, speed and scaling:

- **Target/Size** switches between adjusting modulation target and modulation size.
- **Speed** of the LFO with an optional tempo **Sync** and **Phase** offset. When not synced with the tempo, a modulator can be set to be **Free** running.
- **+-** sets if the modulation wave is unipolar or bipolar

When a parameter is modulated, a small vertical line will appear over it for each voice played.

Tip

- **AD** and **AR** are two-stage simplified variants of the full ADSR envelope – attack-decay and attack-release.
- You can freely grain-scrub through a sample by modulating **Emitter Relative Y** with e.g. the Modwheel. Make sure you have enough grain density.

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10   EFFECTS ^{FX}

Tempera has a carefully crafted effects suite: **Chorus**, **Delay** and **Reverb**. Apply them with a light touch!

All effects are processed in the order they are listed in the menus and are applied on the master. Except the **Filter** which is processed per-voice.

Filter parameters:

- **Cutoff** frequency
- **Emphasis** aka filter resonance
- **Type** of the filter: **LP12**, **BP12**, **HP12**, **LP24** and **Formant**
- Adjustable **Key tracking**

Chorus parameters:

- **Depth** of modulation
- modulation **Speed**
- **Flange** sets the amount of feedback
- amount of wet signal **Mix**

Delay parameters:

- **Feedback** with optional stereo ping **Pong**
- **Time** with optional time signature **Sync**
- **Color** adjusts the bandpass filter frequency
- amount of wet signal **Mix**

Reverb parameters:

- **Size** of the reverb. Setting this to 1 will essentially freeze
- **Color** adjusts a smooth bandpass filter frequency
- **Damp** high frequencies from bouncing
- amount of wet signal **Mix**

Frequently Asked Questions

- *Why does Delay Mix go above 1.0?*
  An active color filter on the Delay will reduce the loudness of echos. To compensate for this you can add some additional amplification.

- *The Formant filter doesn't seem to do anything.*
  Increase the amount of Emphasis, which works as a cross-fade between original and formant-filtered.

- *How is the filter routed internally?*
  The filter is per-voice. That is, per each key played from a MIDI controller or the Overlay Keyboard, and per each note send from an external sequencer. This also means that when the Filter Cutoff parameter is modulated by e.g. sine LFO, it is applied to each voice separately. To apply filtering to each Emitter, use the Emitter's Tone filter instead.

11 SETTINGS ⚙

It is possible to adjust many system-wide parameters. These are saved automatically every time the **Settings** ⚙ menu is exited, such as going from Settings to **Emitters** ⸬ or **Tracks** ☰.

- **Rec source** determines the audio input type and gain.

- When a track is armed and input audio volume exceeds the **Rec threshold**, Tempera will begin recording.

- **Rec monitor** adjusts how much of audio input is sent directly to audio output. This can be used to monitor while recording, or as audio pass-through.

- There are several **Recording modes**:

  – **Overdub** to add audio input to the track

  – **Replace** existing audio in the track

  – **Mix** audio input and original. This is similar to **Overdub** except after each recording the oldest audio is gradually decreases in volume

- **Pitchbend size** can be adjusted in semitones.

- **Midi thru** enables direct passing of MIDI messages between MIDI TRS ports (IN to OUT).

- **Clock source** determines if Tempera will **Send** or **Receive** midi clock at 24 PPQN (pulses per quarter note), or run on **Internal** clock.

- Set global **BPM**. The value will change automatically when **Clock source** is set to **Receive** once MIDI clock is detected.

- Wiring of the **MIDI TRS** jacks is switchable between **Type A** and **Type B**.

- **Velocity curve** of incoming MIDI notes can be set to **Linear**, **Exp** (exponential), **Rev exp** (reverse exponential) or **Fixed** (velocity is ignored).

- **LED light** adjusts the brightness of the touchgrid and encoder backlight.

- **Display light** dims the OLED displays.

- **Audition volume** sets the volume of listening to / previewing audio samples in the **Tracks** ☰ menu.

- **Max volume** sets the volume of Tempera's main audio output

- **SD Card Eject** and **Flashdrive Eject** should be used before unplugging the external media to avoid data corruption.

- When **Micro SD card USB bridge** is activated, the micro SD card inserted into Tempera will be bridged over the USB cable to a computer as a mass storage device. See the External storage section for more information.

- All global settings can be **Reset** to default configuration.

- The **MIDI channel** on which Tempera receives MIDI messages can be set to any of 1 to 16 or **All**.

- Enable or disable the **Grid idle splash** animation after a timeout. The displays will still go blank.

- **Emitter x-scroll** determines if cycling the pages of an emitter's configuration will scroll through to the next emitter after reaching the final page.

> **Tip**
>
> Press and hold the **Settings** ⚙ button to reveal information about memory usage and firmware version.

12   MACROS ⚇

Each canvas requires fast access to a different set of parameters. To make this happen, you can bind most parameters anywhere in the menus to a slot in the **Macros** ⚇ menu.

When you then navigate into Macros, all the parameters will be laid out for convenience during a performance.

For example, you might want to have these parameters handy:

· **Filter cutoff**

· a **Modulator speed**

· an **Emitter grain size**

· a different **Emitter grain density**

To assign the **Filter cutoff** to macro slot:

1. Find the **Filter cutoff** on the first page of **Effects** ᶠˣ

2. Hold the **Macros** ⚇ button and keep holding

3. Turn the **Filter cutoff** knob a little bit

4. Release the **Macros** ⚇ button

5. Select which macro slot to place at

Macro assignments are saved along with the canvas.

13   RECORDING

You can record audio into a track from one of several audio sources, including on-device resampling (record Tempera's output).

Follow this example procedure to fill a track with recorded audio:

1. Set your desired audio input source in **Settings** ⚙
2. Make sure the meter is moving when audio streams in and adjust the gain
3. Adjust recording **Threshold**, once a track is armed and audio input goes above this threshold, Tempera will start recording
4. In the **Tracks** ☰ menu, hold the **Round button** and press one of the context buttons to arm the chosen track
5. Release the **Round button** at which point the track is waiting for audio input
6. Play audio into Tempera. If the audio input is set to **Internal mic**, the displays will go blank for the duration of recording to eliminate interference
7. Press the **Round button** to stop recording
8. Your audio is now recorded in the track

While in the **Tracks** ☰ menu, you can press **Edit** and **Trim** the newly recorded track to your preference.

Tip

- Try recording random sounds around you with the internal microphone! Mangling them with granular processing will reveal many interesting facets of our environment.
- Have you recorded an interesting and unusual sample? Share it with others and see it used in a completely different way!

14   LOAD AND SAVE CANVASES 🖹

To save or load a canvas, go to the **Load and save** 🖹 menu.

The organizational structure for Tempera's saving and loading is files and folders. There are four top-level folders:

· **System** is read-only and contains factory canvases

· **User** for your samples and canvases

· **SD Card**

· **Flashdrive**

You can **Enter** a folder and navigate with **Up** and **Down** arrow buttons, and go one folder up at the top of each folder.

To load a canvas, navigate to it and press **Load**. Changing canvases can be seamless or jarring depending on how different the two canvases are.

Placed emitters are saved along with a canvas, but played and held notes are not.

To save a canvas, navigate to where you want to save it and press **Save**. You will then be presented with a text input display:

- **Blue encoder** scrolls the text cursor

- **Green encoder** scrolls the selected character

- **OK** to confirm and save the canvas

- **Cancel** and go back to choosing where to save to

- **Insert** types the selected character

- **Delete** a character at the cursor

- **Random** generates a randomized name

- **Shift** toggles between upper and lower case characters

- While holding the **Round button**, **Alt** reveals numeric and space characters

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Tip

- When loading a canvas while the current one has held and playing notes, these will be carried over to the loaded canvas. Since the new canvas may have a different **Overlay Keyboard** configuration, the played notes might appear outside of the overlay keyboard. It is possible to release all held notes by pressing the **Round button** and **Clear** in the **Overlay Keyboard** 🎹 menu.

14.1 Sharing your canvas

When you make your own canvas, whether from scratch or by remixing parts of different canvases, it's time to share your creation with other Tempera players!

After you save the canvas onto a micro SD Card or USB flash-drive, upload it to the **Gallery** at https://gallery.beetlecrab.audio.

At the Gallery you can also download canvases others have created and get inspired, try them out!

> **Tip**
> - Pick a short, but descriptive and evocative name
> - It's nice to write a short commentary or tips on how to use your canvas
> - Other people will be interested to know how you made it, and what inspired you to create it!
> - Give it a nice cover image that sets the right mood

15   EXTERNAL STORAGE

Tempera has a total internal memory of 8GB, and some of it is used for the firmware and built-in samples and canvases. The lossless internal conversion to FLAC happens seamlessly and more than doubles the amount of samples that will fit.

If you're a sample collector and this is not enough room, you can attach a micro SD card at the front, or a USB flashdrive at the back. On the external storage medium, create two folders, one named "samples" and another "programs" and place your samples and canvases there.

15.1 Firmware upgrade

After downloading a Tempera firmware file, place it onto a USB flashdrive or micro SD card (formatted with FAT32 or exFAT). When Tempera is off, insert it, and turn Tempera on while holding the **Round button**.

Tempera will then load the firmware upgrade file and provide further instructions on the displays.

Don't turn off the power before the firmware update is finished.

Tip

- Organize your canvases and samples into folders. There can be as many levels of nesting as you need.
- You can find the most recent firmware at beetlecrab.audio/tempera/support.

15.2 Micro SD card USB bridge

Tempera has a functionality to bridge the micro SD card contents over USB to a computer (using a cable connected to the USB Device port on Tempera). This option can be accessed in the **Settings** ⚙ menu.

When the bridge is activated, Tempera will act as a class-compliant mass storage device. This means that it appears as if the SD card was inserted directly into the computer and files and folders can be copied and moved to and from Tempera.

During the bridge, Tempera will not make sound or allow navigation in the menus, until it is deactivated again.

16   SHORTCUTS

To make common workflow quicker, Tempera has a handful of shortcuts as button combos.

While holding the **Round button**, the displays will reveal if there are any alternate context actions:

- The **Save and load** ▤ button will quicksave your current canvas into User/Quicksave. New quicksave will overwrite the old.
- When editing an emitter, pressing the **Emitters** [·] button will cycle through emitters on the same page. For example, this allows to quickly adjust Grain Size on all 4 emitters.
- The **Overlay Keyboard** ⸾ button will toggle the Overlay Keyboard.

Moreover, turning any knob while holding the round button will increment the value faster.

There are a few shortcuts not involving the round button:

- Double pressing the **Emitters** [·] button will toggle between emitter overview and last edited emitter's settings.
- Double pressing the **Tracks** ≡ button will toggle between track overview and last edited track's settings.
- Pressing the **Save and load** ▤ button while already in file browser will bring you to the top-level folder.

Lastly, there is an info-screen that displays available storage on internal and external media, name of the loaded canvas, and current firmware version. Access this by holding the **Settings** ⚙ button.

17   MIDI INPUT

It is possible to control many of Tempera's internal parameters by MIDI CC.

Grid cells for emitter placement are numbered starting at top left, column by column. To place or remove emitters:

· First set the **Active emitter** by sending CC10 with value between 0 and 3. Value of 0 is the first (blue) emitter.

· Send CC11 with value between 0 and 63 to place an emitter

· send CC12 with value between 0 and 63 to remove an emitter

For example, to place emitter 1 on the first cell of first track:

· Send CC10 with value 0 to set the active emitter to 1

· Send CC11 with value of 0 to place the emitter

Or remove emitter 2 from the second cell of the second track

· Send CC10 with value 1 to set the active emitter to 2

· Send CC12 with value 9 to remove the emitter

In other words, cells in the first track are 0 to 7, second track are 8 to 15, third track are 16 to 23, and so on.

18   SPECIFICATIONS

- ARM® Cortex™-A72 quad core with NEON™ DSP instructions
- 32-bit internal processing
- 16-voice polyphony with per-voice filters
- A global pool of 4096 stereo grains. This means that all the grains can be distributed to the 16 voices of polyphony, but also all into a single voice!
- Headphone amplifier
- 12V/2.5A DC power supply (5.5/2.1mm, center-positive)
- Dual 6.35 mm jacks for audio output, up to 10Vpp or 13dBu (either headphone or separate left and right channels)
- 6.35 mm stereo jack for audio input, up to 5.9Vpp or 8.6dBu (line in or instrument switchable)
- Internal microphone
- MIDI TRS input and output ports (Type A and B switchable in configuration)
- USB MIDI host and device ports (both capable of input and output)
- Micro SD card slot and USB flash drive support for storage and data transfer
- Firmware easily upgradable with a USB flash drive or micro SD card
- VESA-compatible mounting holes on the rear panel (100×100mm spacing, M4 screws. Absolute maximum thread depth inside Tempera is 5mm)

18.1 Health and Safety

Use common sense when handling Tempera. Standard guidelines for handling electronic devices apply, which, among others, are:

- Use only the supplied power supply (PSU-02)

- Do not expose the machine to any liquids or excessive levels of humidity

- Do not use screws longer than 5mm for the rear panel mounting holes

> **Tip**
>
> Found a bug or something is not working as you expect? Reach out to us at *makers@beetlecrab.audio* or on our Discord server.