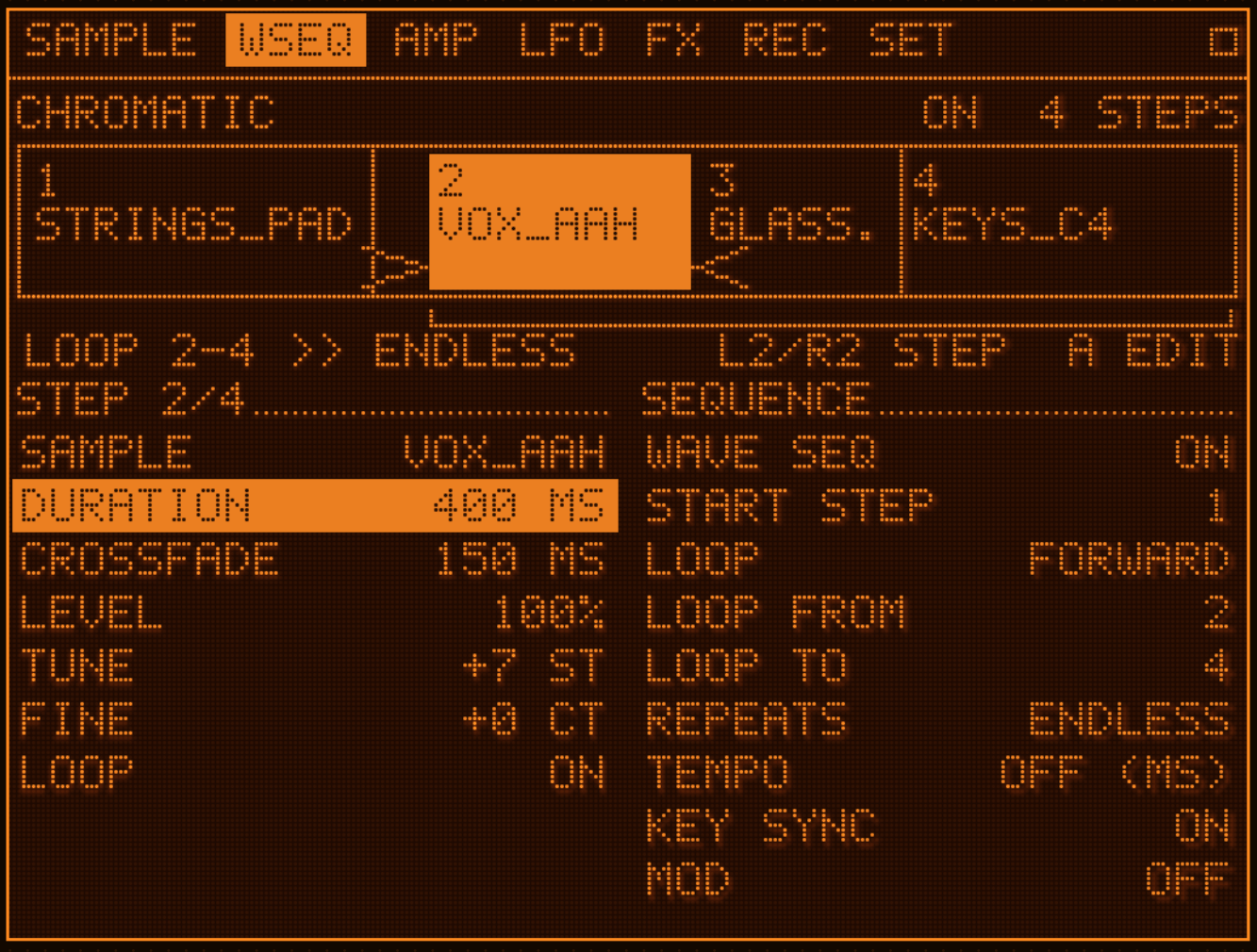
BRICKSAMPLER

User manual · version 2.0.3

A sampler with wave sequencing, FX and recording, for the TrimUI Brick (KNULLI)



Free software · GNU GPL v3

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> **TIP** Hold **SELECT** on the Brick at any time to see the controls on screen. Let go to close it.

WELCOME

BrickSampler turns the TrimUI Brick into a small sampler, in the spirit of the samplers of the 80s and 90s. You play it from a USB MIDI keyboard, record your own sounds from the built-in mic or any USB audio device, and shape them with loops, envelopes, an LFO and an FX section.

Version 2.0 adds **wave sequencing**, inspired by the Korg Wavestation: one key plays a chain of samples, one after the other, with crossfades between them. It is a great way to make sounds that move and change while you hold a note.

What you can do

- **Chromatic mode**: one sample across the whole keyboard, 8 voices, sustain pedal and pitch bend.
- **Kit mode**: 16 pads for drums and one-shots, on MIDI notes 36 to 51.
- Trim the sample, loop it with a crossfade, play it backwards, chop it onto pads, time-stretch it.
- Build wave sequences of up to 64 steps from your own samples.
- Envelope (attack, decay, sustain, release) and velocity.
- One LFO for pitch, volume and filter, with the mod wheel as depth.
- FX: drive, bitcrush, downsample, filter, stereo delay, reverb. No clicks when you switch them.
- Record from the built-in mic, a USB audio interface, a USB mic or a synth with USB audio.
- MIDI learn: move any FX or LFO value from a knob on your keyboard.
- Projects with names, four display colours, low latency (8 ms).

What you need

- A **TrimUI Brick** with **KNULLI** on the SD card (tested on KNULLI Scarab).
- A **USB MIDI keyboard** to play it (any class-compliant one). Without a keyboard you can still audition sounds with the **X** button.
- Some **WAV files**, or a way to record: the built-in mic, or a USB audio device.
- Headphones or speakers on the Brick's headphone jack (the built-in speaker works too).

> **TIP** The Brick has only one USB-C port. To use a MIDI keyboard and a USB audio interface at the same time, you need a small USB hub. Many audio interfaces also have MIDI in, which saves a cable.

Install

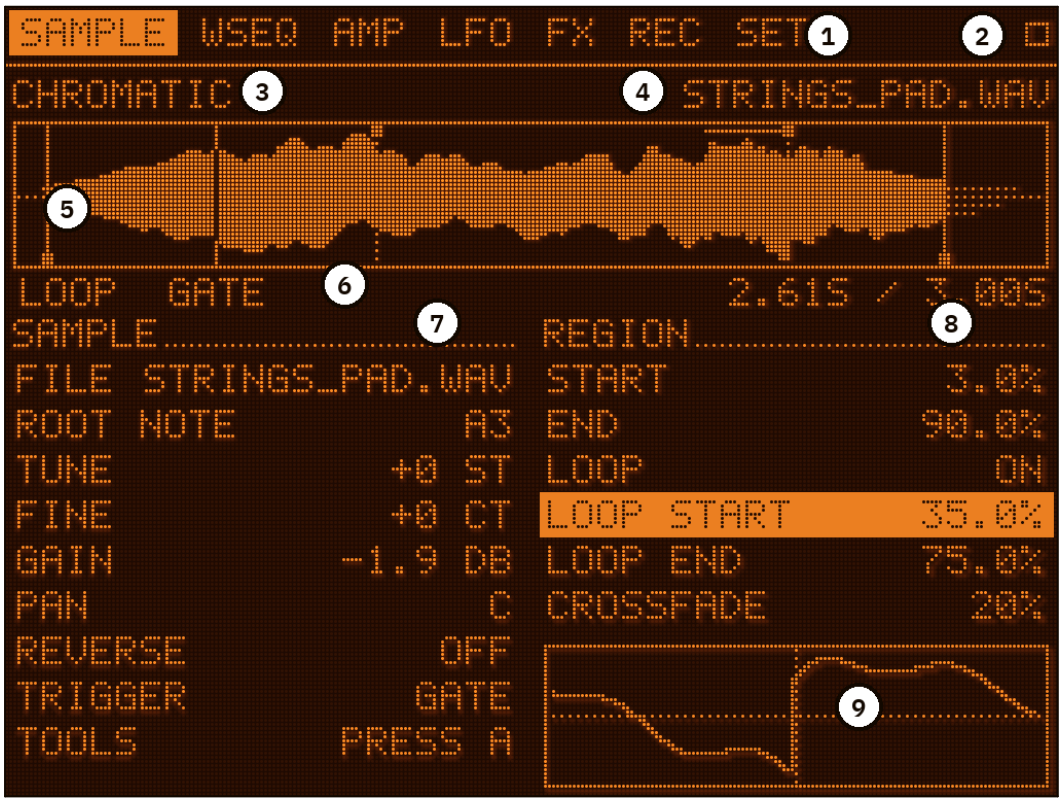
1. Download **BrickSampler_v2.0.3.zip** from brickworldhub.com and unzip it on your computer.
2. Put the Brick's SD card in your computer.
3. Copy **BrickSampler.sh**, the two **.keys** files and the **bricksampler** folder into **roms/ports** on the SD card.
4. Put the card back in the Brick and start **BrickSampler** from **Ports**. Not in the list? Update the games list in the KNULLI menu.
5. The first start takes a few seconds longer: the app unpacks NumPy, the maths library it uses.

Update from an older version

Copy the new files over the old ones. Your sounds (**bricksampler/samples**), your projects (**bricksampler/projects**) and your settings (**settings.json**) are not in the zip, so they stay as they are. Projects made with 1.x open in 2.0.

THE SCREEN

The screen looks like an old dot-matrix LCD. At the top are the pages; under them is the page you are on. This is the SAMPLE page:



The SAMPLE page in chromatic mode, with a looped string pad.

1	The pages: SAMPLE, WSEQ, AMP, LFO, FX, REC and SET. The page you are on is lit. **L1** / **R1** move between them.
2	MIDI light. A small square when a MIDI device is connected; it lights up when notes come in.
3	What you are editing: CHROMATIC, or the pad number and its note in kit mode.
4	The sample loaded here.
5	The waveform. The solid part is the region that plays; dotted lines are the loop start and end.
6	Loop, reverse and trigger tags, the length of the region and of the whole sample.
7	Settings of the sample: file, root note, tune, gain and so on.
8	Region and loop settings.
9	The loop seam: the end of the loop (left) joined to its start (right). A smooth line means a smooth loop.

Moving around

Every page works the same way. The selected setting is a solid bar. **Up** / **Down** move the bar, **Left** / **Right** change the value. Hold **Y** while you press Left or Right for small steps (fine adjust). On ROOT NOTE, Y jumps a whole octave.

Hold Left or Right to keep changing the value. When a setting says **Press A**, **A** opens it (a menu, a list or the keyboard). **B** goes back or closes a menu.

Playing

- Play from your MIDI keyboard: all channels are received, no setup needed. Plug it in at any time.
- **X** plays the current sound (the chromatic sample at its root note, or the selected pad), so you can hear changes without a keyboard.
- The **volume buttons** on the side of the Brick set the output volume in 5% steps. The volume is kept for all projects.

Chromatic and kit mode

A short press on **SELECT** switches between **chromatic** and **kit** mode. Each mode keeps its own sounds, so you can switch freely: the chromatic sample and the 16 pads all stay in the project. A long press on SELECT shows the help screen instead.

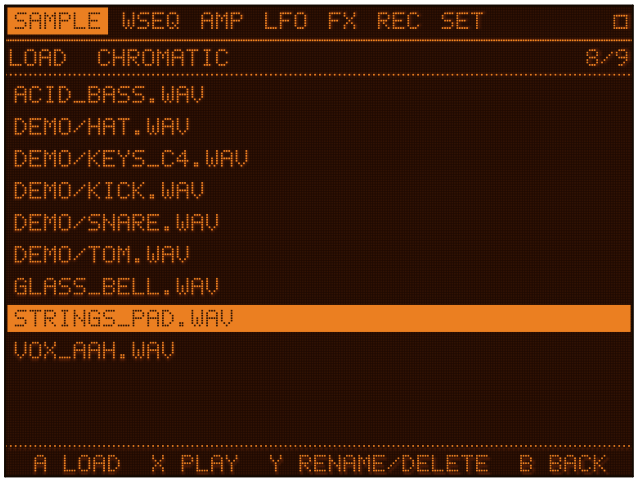
SAMPLE PAGE

Everything about one sound is on this page: which file, how it is tuned, which part plays, how it loops, and the TOOLS menu.

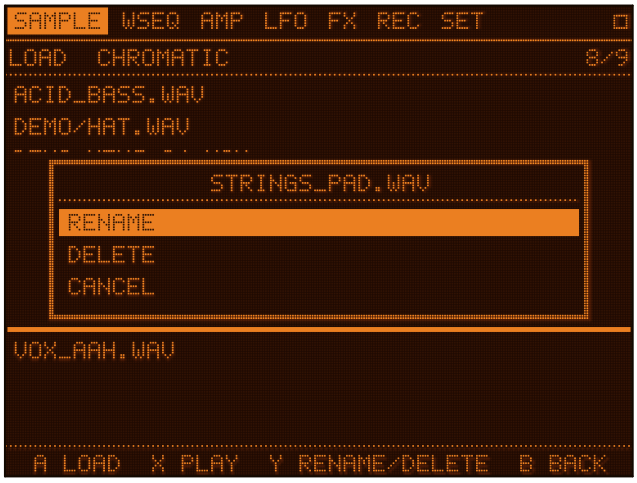
Load a sample

Select **FILE** and press **A**. The sample list opens with every WAV file in the **samples** folder, including sub-folders. **Up** / **Down** pick a file, **L1** / **R1** jump 8 files, **X** loads it and plays it so you can audition, **A** loads it and closes the list, **B** closes the list.

Quicker still: with FILE selected, **Left** / **Right** step through all the samples without opening the list.



The sample list.



Y on a file: RENAME or DELETE.

Press **Y** on a file to **rename** or **delete** it. Deleting removes the file from the SD card, so the app asks twice. Any pad or slot using it becomes empty.

WAV files of any kind work: 8, 16, 24 or 32 bit, float, any sample rate, mono or stereo. Copy them into **bricksampler/samples** from your computer.

Sample settings (left column)

FILE	The sample. A opens the list, Left / Right step through the samples.
ROOT NOTE	The key where the sample plays at its own pitch (chromatic mode). Hold Y for octaves.
PAD	Kit mode only, instead of ROOT NOTE: which of the 16 pads you are editing.
TUNE / FINE	Pitch in semitones (±24) and cents (±100).
GAIN	Level of this sound.
PAN	Left / right position.
REVERSE	Plays the sample backwards.
TRIGGER	**Gate**: plays while you hold the key. **One-shot**: always plays to the end, even if you let go. Pads are one-shot when they are loaded.
TOOLS	Opens the TOOLS menu (next page).

Region and loop (right column)

START / END	The part of the sample that plays. The rest is kept, just not played.
LOOP	On: while you hold the key, the part between LOOP START and LOOP END repeats. When you let go, the release plays out. (Loops work in Gate mode.)
LOOP START / END	Where the loop begins and ends. They always stay inside the region.
CROSSFADE	Blends the end of the loop into its start, 0-50% of the loop length, to hide the join.

> **TIP** Watch the loop seam in the bottom-right corner while you move LOOP START and LOOP END. When the line runs smoothly across the middle, the loop won't click. Then try a little CROSSFADE, or TOOLS > ZERO SNAP.

TOOLS

Select **TOOLS** on the SAMPLE page and press **A**.



The TOOLS menu.



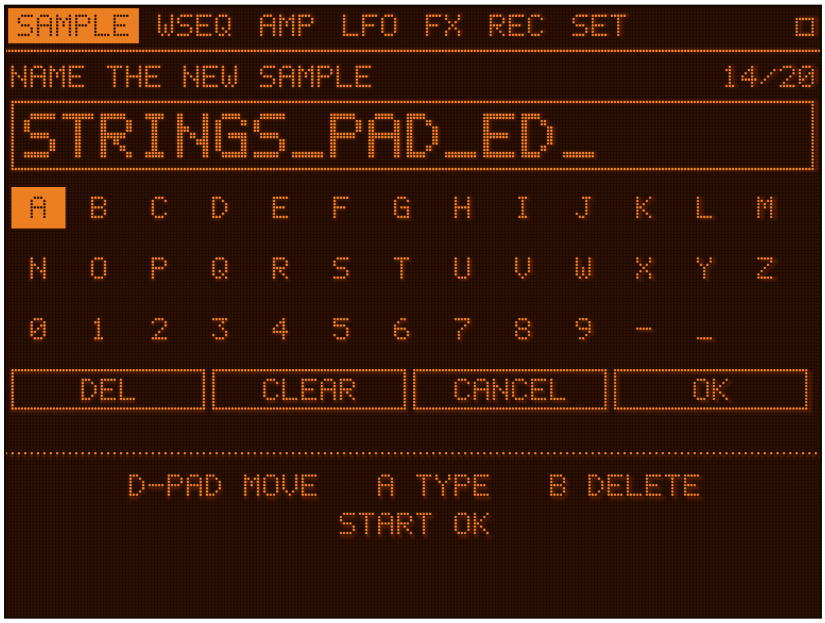
CHOP ONTO PADS.

CHOP ONTO PADS	Cuts the region into 4, 8 or 16 equal slices, or AUTO at each attack (good for drum loops), and puts them on pads 1, 2, 3... The app switches to kit mode. The pads share the same file, so no space is used. If those pads already have sounds, it asks first.

TIME-STRETCH	Makes the sound longer or shorter without changing its pitch: 50% to 200% of its length. The result is saved as a new WAV (you name it) and loaded in place of the old one. Long samples take a moment: TOOLS shows the progress.
ZERO SNAP THE LOOP	Moves the loop start and end to the nearest point where the wave crosses zero. This often removes a click in the loop.
SAVE REGION AS NEW	Saves only the part between START and END as a new 24-bit WAV, next to the original, and loads it. The region becomes 0-100% and the loop points move with it. The original file is not touched.
OVERWRITE ORIGINAL	The same, but the region replaces the original file. The app asks first and tells you if other pads or wave sequence steps use the file: they are reloaded and reset.

Naming a file

When the app needs a name (a new sample, a take, a project) the on-screen keyboard opens with a name already filled in, for example **STRINGS_PAD_ED**. If it's fine, just press **START**.



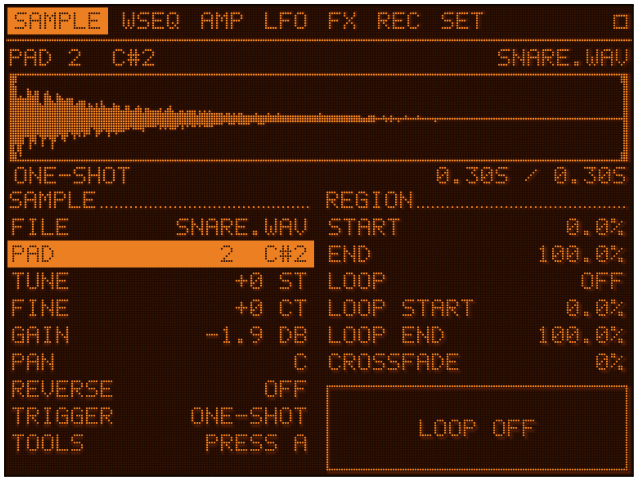
The on-screen keyboard.

- **D-pad** moves around the letters, **A** types the letter (or presses DEL, CLEAR, CANCEL, OK).
- **B** deletes the last letter, **START** is OK.

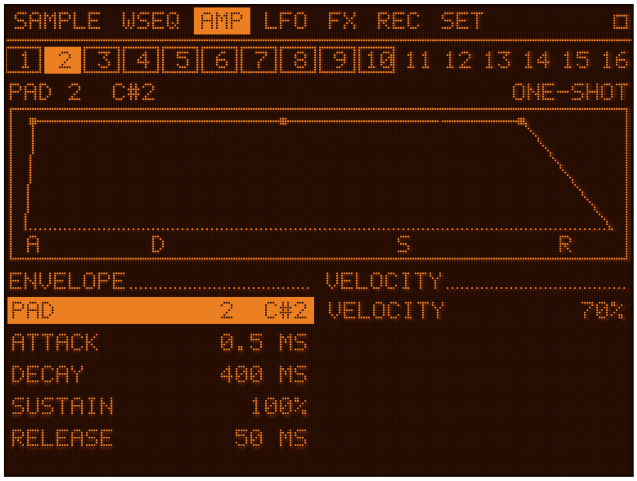
> **TIP** SAVE REGION AS NEW is the way to make a wave sequence step from part of a long recording: trim it with START and END, save it, then use the new file in the sequence.

KIT MODE

Press **SELECT** to switch to kit mode. Now there are 16 pads, each with its own sample and its own settings (tune, region, envelope and so on). Pads are on MIDI notes **36 to 51**, the General MIDI drum layout: kick on 36 (C1), snare on 38, closed hi-hat on 42.



SAMPLE page in kit mode: pad 2 has a snare.



On AMP and REC the 16 pads are shown on top.

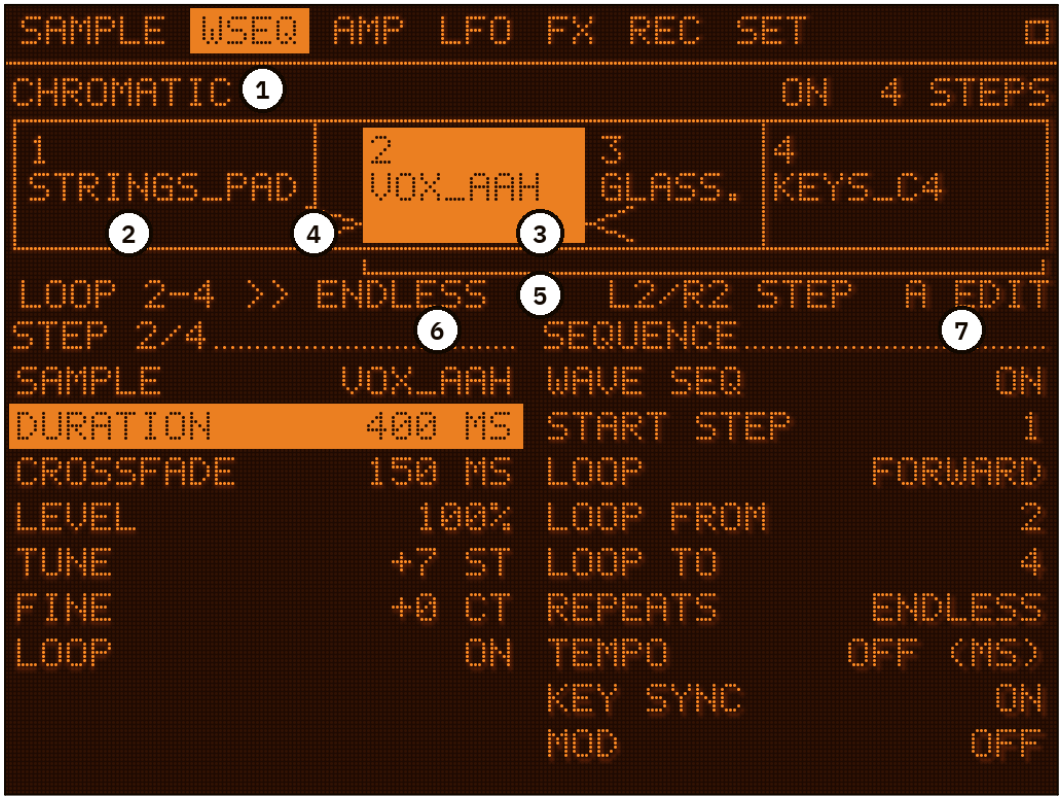
- **L2** / **R2** pick the previous / next pad. Or change the **PAD** setting with Left / Right.
- Playing a pad from your keyboard also selects it, so you can hit a pad and edit it straight away.
- A pad that is hit again cuts itself off, like a real drum machine.
- On the AMP and REC pages the pad strip shows which pads have a sound (a frame) and which one is selected.

> **TIP** To record straight onto a pad, pick the pad first, then go to the REC page. The take goes on that pad.

WAVE SEQUENCING

A wave sequence is a list of **steps**. Each step is a sample that plays for a set time, then fades into the next step. When you hold a key, BrickSampler plays through the steps: a pad turns into a voice, the voice turns into a bell, the bell into a piano, and so on. The sequence can loop, go back and forth, follow a tempo or be scanned by hand with the mod wheel.

This idea comes from the Korg Wavestation (1990). Every slot (the chromatic slot and each of the 16 pads) can have its own wave sequence.

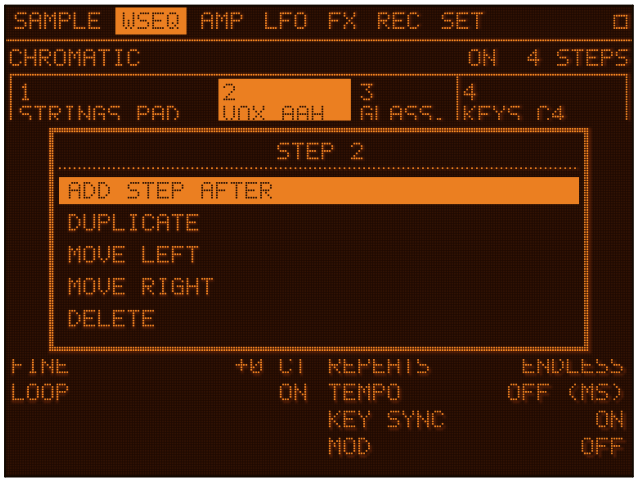


The WSEQ page: a 4-step sequence, looping steps 2 to 4.

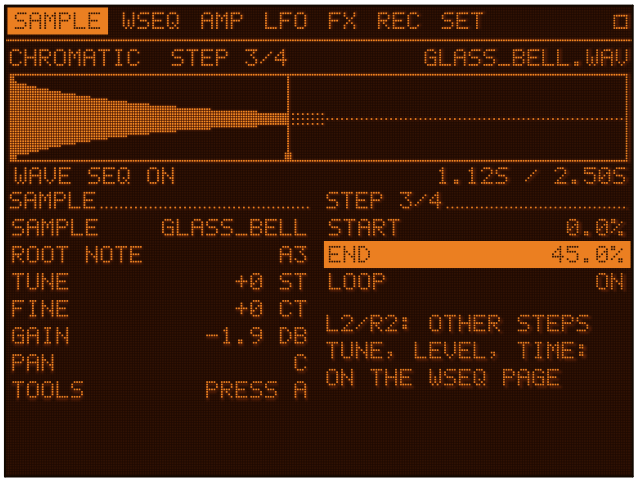
1	What you are editing, and the sequence status: ON / OFF, number of steps, tempo.
2	The steps. The width of each block is its duration. The thin line moving across shows what is playing.
3	The selected step (solid). **L2** / **R2** pick another step.
4	An X between two steps is a crossfade. A straight line is a hard cut. A dotted line under a step means GATE (the step lasts until you let go).
5	The loop bracket under the steps, and the loop in words: from, to, direction, how many times.
6	Settings of the selected step.
7	Settings of the whole sequence.

Your first wave sequence

1. Load a sample on the SAMPLE page, as usual.
2. Go to **WSEQ** (**R1**). Set **WAVE SEQ** to **On**. Step 1 is your sample.
3. Select any step setting (for example **DURATION**) and press **A**. Choose **ADD STEP AFTER** and pick a sample for step 2 from the list.
4. Add a few more steps the same way. Play a long note: you hear the steps one after the other.
5. Set **DURATION** and **CROSSFADE** of each step. Long crossfades give smooth, morphing sounds; short ones give rhythmic patterns.
6. Set **LOOP** to **Forward** and choose **LOOP FROM** and **LOOP TO**: the sound keeps moving for as long as you hold the key.



A on a step setting: the step menu.



With the sequence on, the SAMPLE page edits the selected step.

The step menu (**A** on a step setting): **ADD STEP AFTER**, **DUPLICATE**, **MOVE LEFT**, **MOVE RIGHT**, **DELETE**. On **SAMPLE**, **A** opens the sample list for the step (**X** auditions, **A** loads). With no steps yet, **A** offers **ADD FIRST STEP**.

Step settings

SAMPLE	The sample of this step. A opens the list.
DURATION	How long the step lasts: 10 ms to 8 s. With TEMPO on, a note value from 1/32 to 4 bars. Go past the top for **GATE**: the step lasts until you let go of the key.
CROSSFADE	How long it takes to fade into the next step: **Cut** (hard switch) or 5 ms to 8 s.
LEVEL	Volume of the step.
TUNE / FINE	Pitch of the step in semitones (±24) and cents (±100), on top of the slot's tuning.
LOOP	On: the step's sample loops if it is shorter than the step. Off: it plays once.

Sequence settings

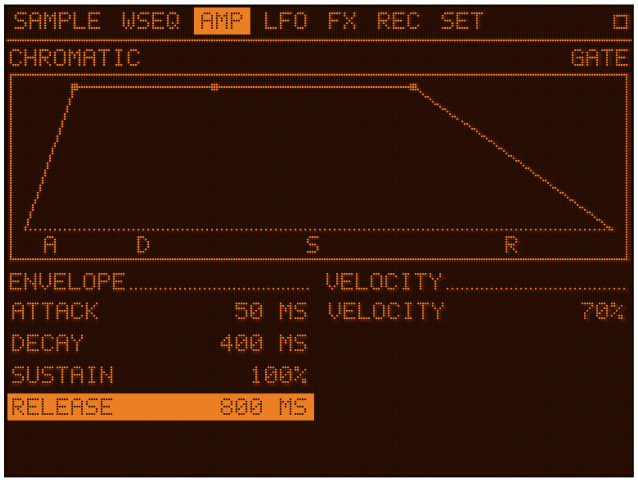
WAVE SEQ	On: this slot or pad plays the sequence. Off: it plays its sample as before. The steps are kept.
START STEP	Where the sequence starts.
LOOP	**Off**: plays once and holds the last step. **Forward**: repeats LOOP FROM to LOOP TO. **Back-fwd**: goes forwards, then backwards, like a ping-pong.
LOOP FROM / TO	The steps that loop.
REPEATS	How many times the loop plays (1-126) before the sequence moves on, or **Endless**.
TEMPO	**Off (ms)**: durations in milliseconds. Or 40-300 BPM: durations become note values, so the sequence plays in time.
KEY SYNC	**On**: every note starts the sequence from the start. **Off**: the sequence runs freely and new notes join it where it is.
MOD	**Velocity**: the harder you play, the later the start step. **Wheel scan**: the mod wheel moves through the steps by hand, and the time settings are ignored.

The SAMPLE page with the sequence on

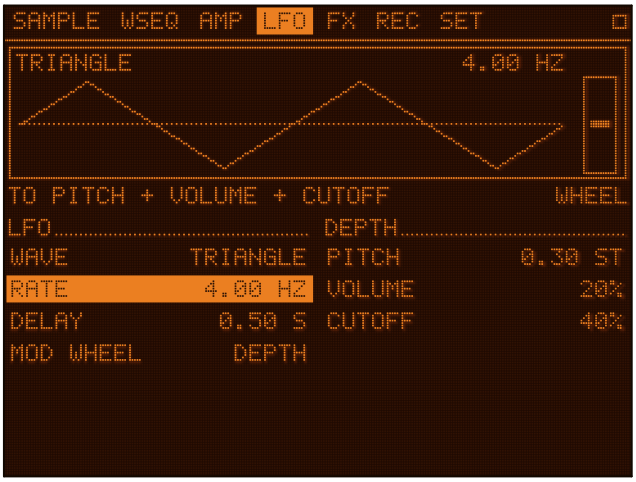
When WAVE SEQ is on, the SAMPLE page shows the **selected step's** sample instead of the slot's. **START** / **END** trim the step's sample and **LOOP** is the step's loop. **L2** / **R2** move between steps here too. ROOT NOTE, TUNE, FINE, GAIN and PAN are still for the whole slot. TOOLS offers TIME-STRETCH, SAVE REGION AS NEW and OVERWRITE ORIGINAL for the step's sample.

> **TIP** The AMP envelope, the LFO and the FX work on the whole sequence, just like on a single sample. Try a slow attack and a long release with a long crossfade sequence for evolving pads.

AMP AND LFO



AMP: the envelope is drawn above the settings.



LFO: the wave and its depth, live.

AMP page

The envelope shapes the volume of each note. In kit mode each pad has its own envelope (pick the pad with PAD or L2 / R2).

ATTACK	How long the note takes to reach full volume (0.5 ms to 5 s).
DECAY	How long it takes to fall to the sustain level (5 ms to 10 s).
SUSTAIN	The level while you hold the key.
RELEASE	How long the sound takes to fade out after you let go (2 ms to 10 s).
VELOCITY	How much playing harder makes the note louder. 0% = every note at full level.

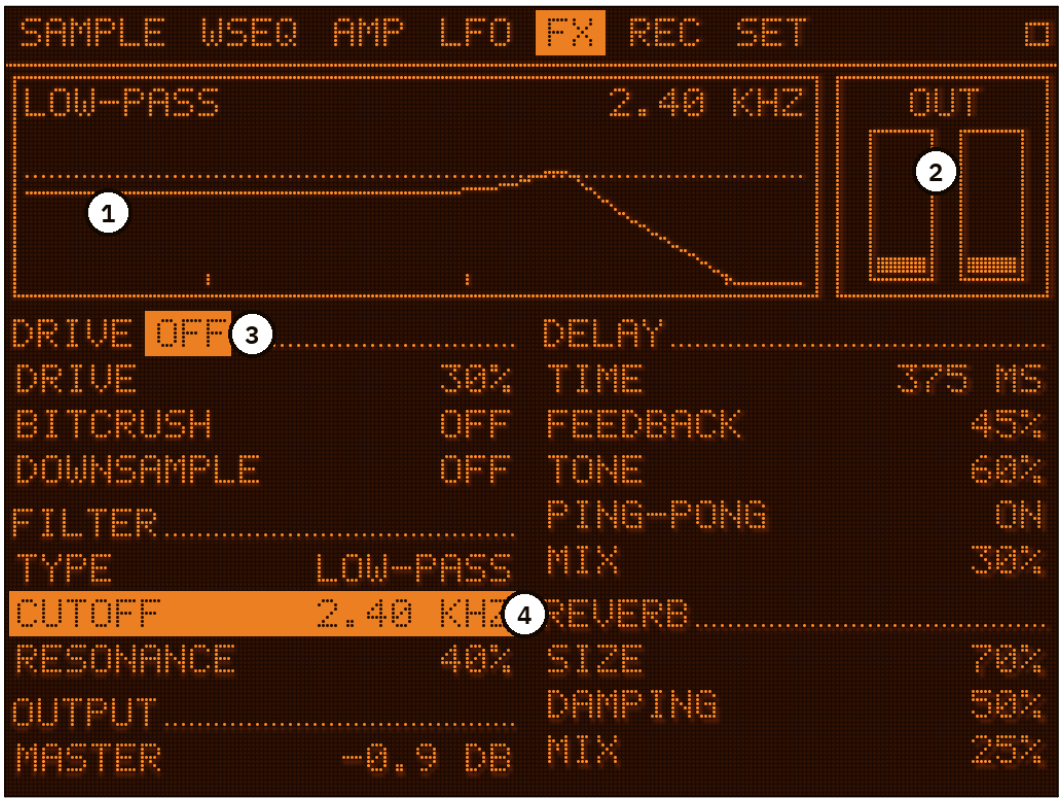
LFO page

One LFO (a slow wave) for the whole project. It can wobble the pitch (vibrato), the volume (tremolo) and the filter cutoff. It starts again with the first note after silence.

WAVE	Sine, Triangle, Saw, Square or S&H (random steps).
RATE	Speed, 0.05 to 20 Hz.
DELAY	The LFO fades in over this time after the note starts (Off to 4 s). Nice for vibrato.
MOD WHEEL	**Depth**: the mod wheel sets how much LFO you hear, from none to the depths below. **Off**: the depths are always on.
PITCH	Depth of pitch movement, up to 12 semitones.
VOLUME	Depth of volume movement.
CUTOFF	Depth of filter movement (the filter on the FX page must be on).

FX

The FX section is on the output of the whole sampler, in this order: drive, filter, delay, reverb, master. Its settings are saved with the project.



The FX page: DRIVE is switched off, a low-pass filter is on.

1	The filter curve, with its type and cutoff.
2	Output meters, left and right.
3	A switched-off section shows **OFF** next to its name. **A** on any setting of a section switches the whole section on or off. Its settings are kept.
4	The selected setting.

DRIVE	Warm saturation, up to heavy distortion.
BITCRUSH	Fewer bits (16 down to 2): from gritty to very lo-fi. Off = 16 bit.
DOWNSAMPLE	Lowers the sample rate for that old sampler sound (1 = off, up to 32).
TYPE	Filter type: Off, Low-pass, High-pass, Band-pass.
CUTOFF / RESONANCE	Filter frequency (30 Hz to 18 kHz) and how much it rings around that frequency.
MASTER	Output level.
TIME / FEEDBACK	Delay time (25 ms to 2 s) and how many echoes.
TONE	Darker or brighter echoes.
PING-PONG	Echoes bounce between left and right.
MIX (delay)	How loud the echoes are.
SIZE / DAMPING	Reverb room size, and how quickly the high end fades in the room.
MIX (reverb)	How much reverb you hear.

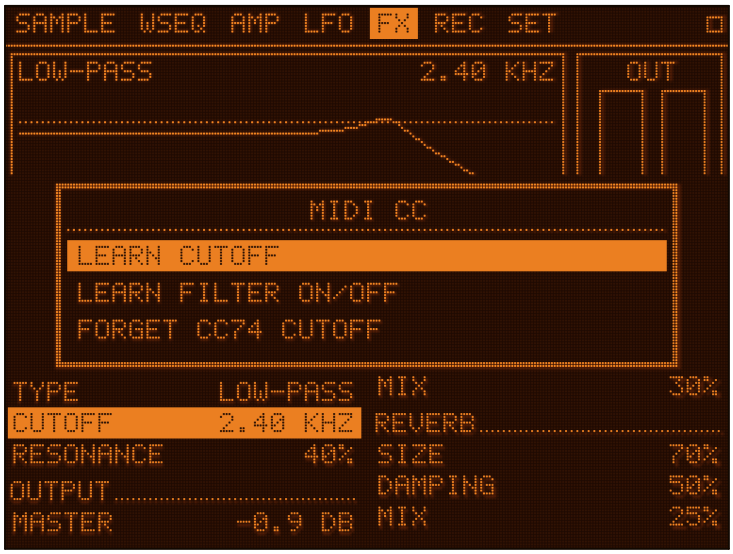
> **TIP** Switching sections on and off makes no click. Drive and filter fade over 10 ms. When you switch off the delay or the reverb, only their input closes: the echoes and the tail ring out naturally, like on a hardware unit.

MIDI learn

Any FX or LFO value can follow a knob or slider on your MIDI keyboard.

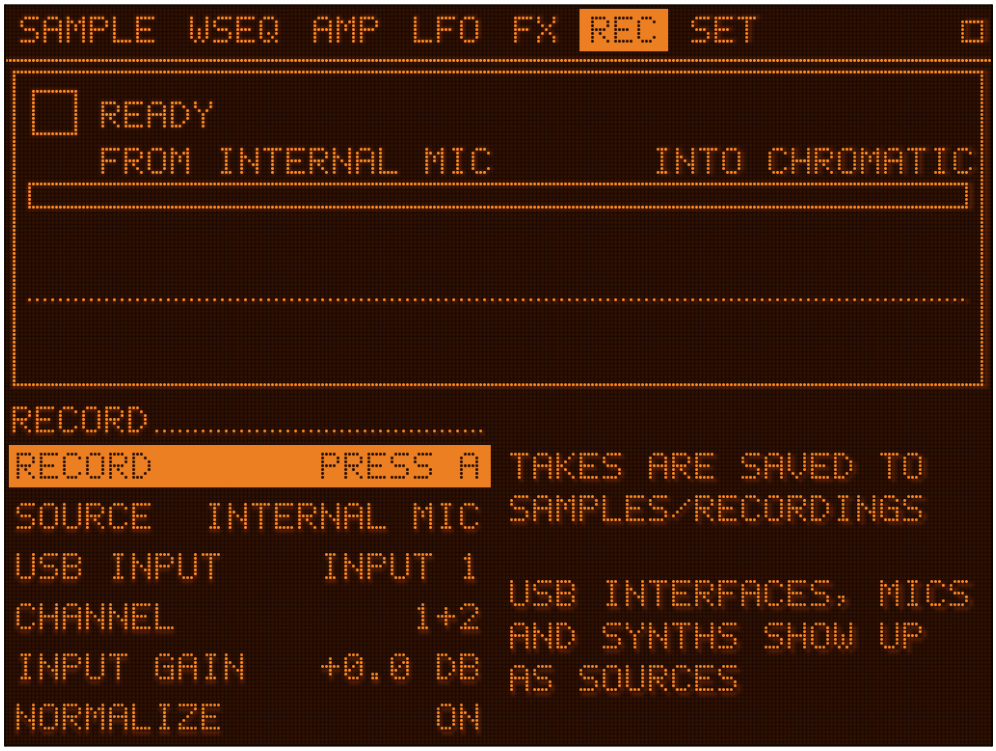
1. Select the value on the FX or LFO page and press **B**.
2. Choose **LEARN**. The screen says **MOVE A KNOB**.
3. Turn a knob on your keyboard. Done: that knob now moves the value. (**B** cancels.)

On FX pages the same menu can also learn a **section on/off** switch (a button or a knob: over half way = on), and **FORGET** a knob already set. The map is kept for all projects. Out of the box, CC74 moves the cutoff, CC71 the resonance and CC7 the master level. You can see and clear the whole map on the SET page.



B on CUTOFF: the MIDI CC menu.

RECORDING



The REC page, ready to record from the built-in mic.

Record a take

1. Choose where the take goes: the chromatic slot, or in kit mode the pad (PAD row, or **L2** / **R2**).
2. Go to the **REC** page and choose the **SOURCE**.
3. Make a sound and watch the meter. Set **INPUT GAIN** so the loudest part doesn't hit the end.
4. Select **RECORD** and press **A** to start. Press **A** again to stop.
5. Name the take on the keyboard (**REC_001**, **REC_002**... are filled in) and press **START**. Or choose DISCARD.
6. The take is saved in **samples/recordings** and loaded in the slot or pad. Trim it on the SAMPLE page.

REC settings

RECORD	A starts and stops. While recording it shows the time.
SOURCE	**Internal mic**, or **USB** for any USB audio device the Brick sees: an audio interface, a USB mic, a synth with USB audio. With two plugged in you see USB 1 and USB 2. If the saved device is not plugged in, it shows USB (off).
USB INPUT	USB only: which input of the USB device to record from. Some adapters have more than one (for example a mic in and a line in): pick **Input 1**, **Input 2**... With only one input it stays on Input 1. Each USB device remembers its own choice.
CHANNEL	USB only: record channel **1**, channel **2** or **1+2** mixed together.
INPUT GAIN	Makes the input louder or quieter before it is recorded.
NORMALIZE	On: the take is made as loud as it can be without clipping when you stop.

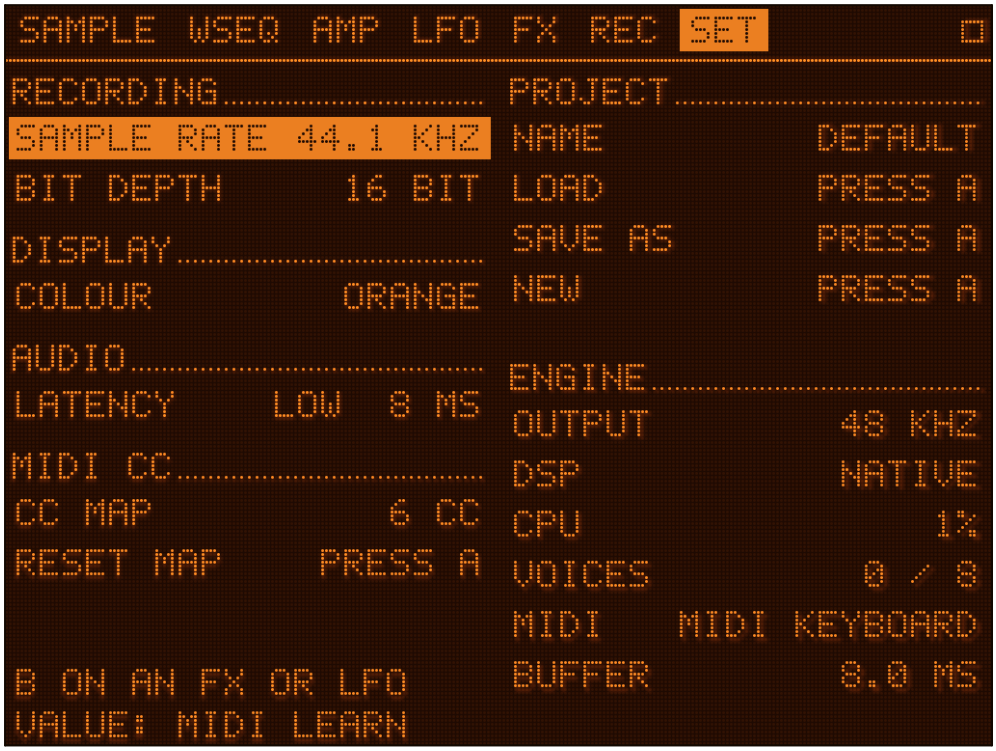
Internal mic or USB?

- **USB**: the device stays open, the meter works all the time and you keep hearing the sampler while you record. Best quality.

- **Internal mic**: the Brick can't play and record with its own sound chip at the same time, so the sound stops while you record and comes back when you stop. Fine for quick ideas and voices.

> **TIP** Sample rate and bit depth of the takes are on the SET page: 32, 44.1 or 48 kHz, 8, 16 or 24 bit. For a gritty old-sampler sound, record at 32 kHz and 8 bit: the file itself is saved that way.

SETTINGS AND PROJECTS



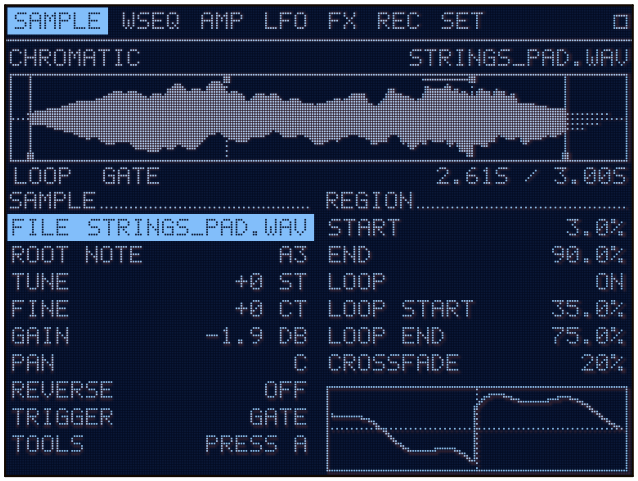
The SET page.

SAMPLE RATE / BIT DEPTH	How new takes are saved: 32 / 44.1 / 48 kHz, 8 / 16 / 24 bit.
COLOUR	Display colour: Orange, Blue, Red or Green. Kept for all projects.
LATENCY	Time between pressing a key and hearing it: **Low** 8 ms, **Mid** 16 ms, **Safe** 32 ms. Use Low; if you hear crackles with many notes and FX, go up one step.
CC MAP	A lists the knobs you set with MIDI learn. A on one removes it.
RESET MAP	Back to the default map (CC74 cutoff, CC71 resonance, CC7 master).
NAME	The open project. A renames it.
LOAD	Opens the project list. A opens a project (the current one is saved first). Y renames or deletes one.
SAVE AS	Saves a copy under a new name and keeps working on the copy.
NEW	Starts an empty project with a new name.
ENGINE	Status: output rate, engine (NATIVE is the fast one), CPU, voices playing, MIDI devices, buffer.

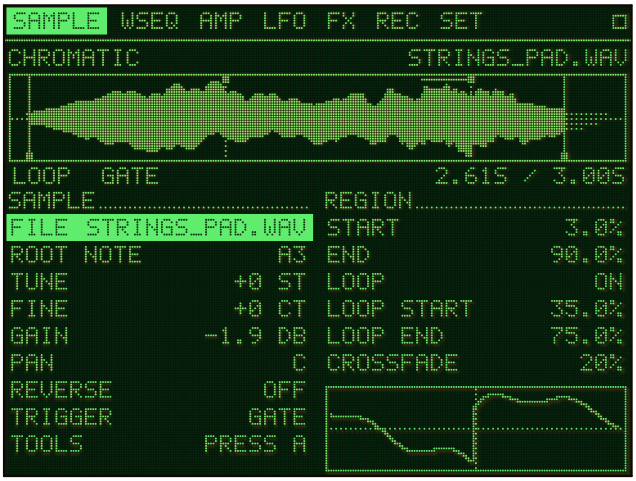
Projects

A project is everything you set up: the chromatic sample, the 16 pads, all their settings, the wave sequences, the LFO and the FX. **START** saves the project at any time; it is also saved when you quit and when you switch project. The last project opens again next time.

Projects keep a link to the sample files, they don't copy them. If you rename or delete a sample in the app, the pads using it are updated; if you move files on your computer, put them back in the same place.



Blue.



Green.

FILES AND MIDI

Where things are on the SD card

roms/ports/BrickSampler.sh	The launcher you start from Ports.
bricksampler/samples/	Your WAV files. Sub-folders are fine. **demo/** has a few sounds made by the app at the first start.
bricksampler/samples/recordings/	Your takes.
bricksampler/projects/	One **.json** file per project.
bricksampler/settings.json	Settings for all projects: colour, latency, MIDI map, record source, volume.
bricksampler/log.txt	What happened at the last start (**log_previous.txt** is the one before). Look here if something goes wrong.

New files from SAVE REGION AS NEW and TIME-STRETCH go next to the original sample (never into **demo/**). All files are normal WAVs: copy them to your computer and use them anywhere.

MIDI

Notes and velocity	Play the chromatic sample (8 voices) or the pads (notes 36-51).
Pitch bend	±2 semitones.
CC1 mod wheel	LFO depth (when MOD WHEEL is Depth) and wave sequence scan (when MOD is Wheel scan).
CC64 sustain pedal	Holds the notes.
CC74 / CC71 / CC7	Cutoff, resonance and master level (default map, change it with MIDI learn).
Any other CC	Free for MIDI learn.
CC120 / CC123	All sound off / all notes off.

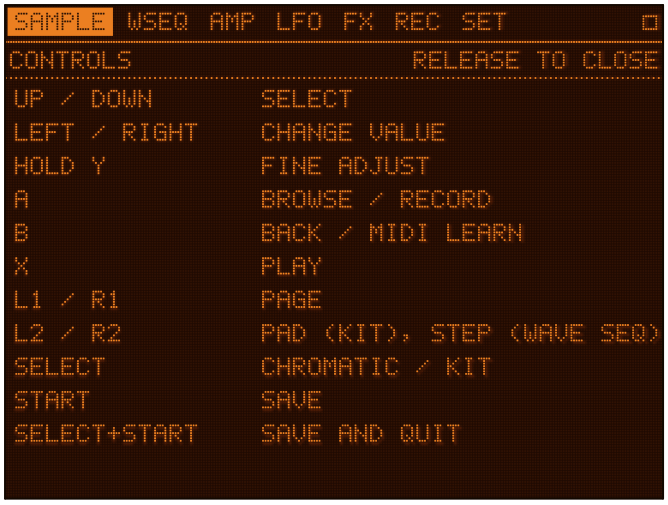
Any class-compliant USB MIDI device works, on all channels: keyboards, pad controllers, synths with USB MIDI, USB-MIDI cables. Devices are found when you plug them in, also while the app is running.

ALL THE CONTROLS

BRICK	WHAT IT DOES	COMPUTER KEYBOARD
Up / Down	Select a setting	Up / Down
Left / Right	Change the value (hold to repeat)	Left / Right
hold Y	Fine adjust (octaves on ROOT NOTE)	hold Shift
A	Open, confirm, record	Z or Enter
B	Back, close; on FX / LFO values: MIDI learn menu	X or Esc
X	Play the current sound	Space
L1 / R1	Previous / next page	[ ]
L2 / R2	Previous / next pad (kit) or step (wave sequence)	, .
SELECT (short)	Chromatic / kit mode	Tab
SELECT (hold)	Help screen with the controls	–
START	Save the project (OK on the keyboard)	Ctrl+S
SELECT + START	Save and quit (MENU + START also quits)	Ctrl+Q
Volume buttons	Output volume	–
–	Piano keys	A W S E D F T G Y H U J K O L P
–	Octave down / up	- =
–	Record	R

In the sample list

Up / Down	Pick a file
L1 / R1	Jump 8 files
X	Load and play (audition)
A	Load and close
Y	Rename / delete the file (projects: rename / delete the project)
B	Close



Hold SELECT: the controls on screen.

PROBLEMS AND ANSWERS

BrickSampler is not in Ports.

Check that BrickSampler.sh is in roms/ports (not in a sub-folder), then update the games list in the KNULLI menu.

It closes at the start, or shows an error.

Open bricksampler/log.txt on your computer: the last lines say what went wrong. Make sure the whole bricksampler folder was copied, including native/ and vendor_numpy.zip.

No sound.

Check the volume buttons, and MASTER on the FX page. Press X to play the current sound. If the screen says AUDIO ERROR, see log.txt.

Crackles when I play many notes.

SET > LATENCY: go from Low to Mid. Heavy reverb plus 8 long notes is the hardest case.

My MIDI keyboard does nothing.

Look at the MIDI light at the top right and at SET > ENGINE > MIDI. Try another cable, or a powered hub if the keyboard needs power.

The USB source shows USB (off).

The device saved in the settings isn't plugged in. Plug it in, then choose SOURCE again on the REC page.

The internal mic records nothing.

The sound stops while the internal mic records: that's normal. If the take is silent, see log.txt, and try INPUT GAIN.

The loop clicks.

Watch the loop seam, move LOOP START / END a little, add CROSSFADE, or use TOOLS > ZERO SNAP THE LOOP.

The wave sequence plays the whole recording.

Trim each step on the SAMPLE page with the sequence on (START / END of the step), or save the part you want with SAVE REGION AS NEW.

Still stuck?

Report a bug or share an idea from the BrickSampler page on brickworldhub.com, or write to info@brickworldhub.com. Please attach log.txt.

Licence and thanks

BrickSampler is free software under the GNU GPL v3. The full source is in the zip and on GitHub (brickworldhub/brickworldhub.github.io, folder src/bricksampler). You can use it, share it and change it.

Inspired by GrainBrick by ETRNLIAM, which showed what the Brick can do with Python, Pygame and NumPy, and by the Korg Wavestation. Included: NumPy (BSD) and the DejaVu fonts. This manual uses IBM Plex Mono and Doto (SIL Open Font Licence). TrimUI and Brick are trademarks of their owners; Korg and Wavestation are trademarks of Korg Inc. BrickWorld is not affiliated with TrimUI or Korg. Made by Alessandro Pietrosanti.