

REQUANTIZING DIY MIDI SEQUENCER

USER MANUAL

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dream it yourself

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1. Welcome to LoopA!

The midiphy LoopA is a small but powerful DIY requantizing MIDI sequencer with six fully independent MIDI tracks and six scenes for a total of 36 MIDI clips. A crisp graphical OLED displays noteroll information along with powerful live performance tools such as live note requantization, time-based sequence slicing (beatlooping), live transposition, and real-time effects that tap into your creativity!

If you have a soldering iron and mid-level DIY experience, it can be built in a few evenings. An extensive build video tutorial covers each construction step.

LoopA comes in two case variants: a cheaper but sturdy full acrylic variant, and a "pro metal case" variant proudly made by Hallik Engineering.

LoopA is small enough to take everywhere and can even be powered by a USB powerbank. Boot-up only takes a few seconds and then it is ready for your next live session! Enjoy!



2. Features

- MIDIbox/FreeRTOS (real-time operating system) STM32F4 microcontroller-based application resulting in minimal MIDI jitter/latency
- Responsive and optimized UI for an easy-to-use workflow with a fast learning curve: it is ideal for recording concepts/ideas in your studio and for live performances on stage
- Holds 36 MIDI clips in a matrix of 6 tracks (horizontal) and 6 scenes (vertical)
- Clips contain notes recorded with their original timing, allowing for nearly unlimited polyphony and unquantized storage of about 10 000 notes per session (polyphony is naturally limited by MIDI throughput)
- Dynamic requantization of notes at any time (including during recording) and real-time application of other LiveFX such as quantized swing and note-skip probabilities
- Support for 30 different time signatures: 4/4 time being the default, but also uncommon time signatures like 7/16 are available
- Classic "step sequence" recording mode with support for sustained notes, pauses and polyphonic step recording: good for Berlin School or bassline sequences :)
- Support for polyrhythmic/polymetric sequences, freely configurable clip lengths allow them to "drift apart from each other"
- High-resolution CC recording/playback support with 1024 CC data points per clip
- Extensive CC waveform editor with multi-CC range editing: applicable transformation algorithms and waveform generators allow either modification of a recorded CC waveform or creation of arbitrary CC waveforms from scratch
- Two freely mappable footswitch ports with user-configurable commands, e.g. "jump to next scene", "apply clip velocity dampening effect", etc.
- Overdubbing (adding notes) without erasing existing notes (looper approach)
- Optional "note overwrite" mode with a special footswitch command
- Clip scrolling, clip length changes, clip zooming/stretching and note transposition at any time (including during recording)
- Two performance modes with a dedicated knob for live transposition and "beatloop", offering different sequence-scrambling time progressions that can completely alter a rhythm or melody line while keeping the harmony and sequence runtime identical to the unaltered version
- Manual sequence scrubbing/time scratching with a dedicated knob
- Dedicated scene progression knob, which launches six new clips for song progression and also allows for single clip progression, e.g. to replace a drum clip on a drum track while the other 5 tracks remain on the same scene
- Data entry with push-to-accelerate rotary encoders: pushing the DATA knob while turning expedites changes, useful e.g. for moving a note many steps or transposing by many semitones

- High-speed two-key "muscle memory" menu navigation and shortcut SHIFT functions for direct clip launching/track mute/ track unmute access from any screen
- Dedicated clip COPY/PASTE/DELETE keys
- Three DIN MIDI OUT ports and two DIN MIDI IN ports allow direct connectivity of most classic MIDI gear
- Four virtual USB MIDI IN/OUT ports can drive VSTs/software synthesizers and connect to your DAW
- Graphical OLED offering instant live feedback on all operations such as transposition, note probabilities, beatloops and more
- Integrated note editor for editing sequences without a computer/mouse and to quickly correct recording mistakes
- Full-sized SD card to store sessions and for data backup
- Light-weight design and a space-saving case fits into any backpack and can be portably powered for hours using a standard USB powerbank
- Very quick boot-up times and automatic last-session recall: continue with your work exactly when inspiration strikes and not after a required operating system software update!
- Support for up to two assignable footswitches for hands-free realtime control
- Clip lengths of up to 1024 steps, allowing for loops that extend to several minutes

3. Quickstart

The following steps get you jamming pronto!

If you get stuck somewhere, please read through the “Menu Usage and LoopA Screens” chapters. These describe every action on each screen in much more detail.

1. Insert a FAT32-formatted SD card into the SD card slot to skip the diagnostics mode, which is mostly useful to test hardware functions during the build.
2. Attach LoopA to your favourite synth (synth MIDI OUT to LoopA MIDI IN1 and LoopA MIDI OUT1 to synth MIDI IN).
3. Attach a USB B cable to power up LoopA (you can use a mobile USB charger, a USB power bank, or just a USB port from your computer).
4. After starting up LoopA, the first track is selected and unmuted (the upper-left key is illuminated blue-green = cyan) and ARM is activated (2nd lower-row key is illuminated red), we are thus already set up to record a sequence on Track 1.
5. Press and hold the MENU key (labeled with a “burger symbol” icon) and push the lower rightmost key to access the TRACK configuration screen, then release both keys to access the TRACK screen.
6. Push the second upper-row key to activate the “MIDI Output Channel” selector and use the DATA knob to choose the MIDI channel of your synth.
7. Using the Menu, go back to the MUTE Screen and press RUN/STOP to start the sequencer. The time cursor starts moving, the current track (step or 16th note-equivalent) positions in the lower part of the display are updated.
8. While the sequence is running, play a few notes and try to match the timing to the blinking RUN/STOP key (beat LED). When the sequence loops, you should hear the recorded notes in (currently) unquantized playback. If you are unhappy with your current recording, press DELETE (lower right key) at any time to start over.
9. Use the lower-left track knob to choose a different active track and watch the blue active-track indicator move across the top six keys. Adjust the output MIDI settings in the TRACK screen if necessary.
10. Record a second sequence (e.g. a bassline), which is stacked on top of the playback of track 1.
11. At any time, have a look in the NOTES, CLIP and LIVEFX screens to modify your recording. Here you could delete or modify single notes, transpose the whole clip, requantize, apply swing and randomization, change the length of your clip, change the playback speed of notes, time-scroll notes and much more!
12. Attach more synths (also software synths can be directly driven by the virtual USB MIDI ports) and set them up in the TRACK screen. The “live forward” feature allows forwarding of notes played on your main keyboard to the configured MIDI OUT port/channel of the currently active track, so you can listen to e.g. rackmount synths when using a separate MIDI keyboard for recording.

13. With the SCENE knob, you can cycle through multiple scenes. Use the COPY and PASTE keys to copy clips (that could be then modified or overdubbed) and thus conjure up a simple “song” when progressing through the six available scenes.
14. Use the LIVE knob to test performance features like live transpose and beatloop. Push it to cycle through those live performance modes.
15. Push and turn the SELECT knob to scrub (manually scroll the time cursor) through the sequence (while playback is active).
16. Optionally look at the TEMPO, SETUP, ROUTER and (MIDI)MONITOR screens to learn more about LoopA.
17. If you are lost, push and hold SHIFT and the HELP key to get context-sensitive information.
18. Once happy with your jam, don’t forget to save it on the DISK screen. If you turn off LoopA at any time, the last saved (or loaded) session will be automatically fully recalled upon restart.

4. Back Panel Connectors

Here are the LoopA connectors/ports:



- The USB port is used to power LoopA, to upload new firmware and to transfer MIDI data to a computer. Make sure that you connect it to a sufficiently capable USB PSU (i.e. a '2A USB phone charger' type of PSU) or a computer USB port, that is capable of delivering at least 500mA. If you are connecting LoopA to a computer, you can make use of four virtual USB LoopA MIDI input/output devices; this is great for recording notes/CC data directly from the computer or for driving VSTs.
- The "Reset" switch is normally not required, but it can be helpful to push it after performing a firmware update. A "reset" is normally required to reinitialize the OLED or just power LoopA off and on by unplugging the USB cable and then plugging it back in.
- The IN1 and IN2 MIDI ports receive MIDI data from e.g. a MIDI synthesizer, a plain MIDI keyboard or any MIDI controller. You can use LoopA's built-in MIDI router to route any input ports/channels to any output ports/channels, e.g. you could route a keyboard attached to IN2 to a USB output MIDI port to directly drive a software synthesizer, completely independent from the LoopA functionality. Setting up MIDI routes allows you to wire up and connect a small MIDI project studio.
- The BLM port connects LoopA to the big midiphy MatriX user interface extension.

- The OUT1 to OUT3 MIDI ports send MIDI data to normal synthesizers. Note: if you want to connect more than one synthesizer per MIDI output port (which makes perfect sense), you could use a midiphy MULTI MIDI THRU splitter to drive up to seven synths from one port, with minimal MIDI latency.
- The 3.5mm "GATE" accepts two +5V gate input sources. It is a "stereo" 3.5mm socket with the following pinout:
 - TIP = gate 1 input (requires a +5v gate voltage to trigger)
 - RING = gate 2 input (requires a +5v gate voltage to trigger)
 - SLEEVE = 0V (ground)
- The 6.35mm "FOOTSW." port accepts up to two foot switches; these can either be "normally closed" or "normally open" types or a mix of both. Configure their type and command mapping in the SETUP screen. To attach them, use a 6.35mm Y-cable/stereo splitter cable. Here is the pinout of this 6.35mm "stereo" socket:
 - TIP = footswitch 1 input (connect to or disconnect from SLEEVE to trigger)
 - RING = footswitch 2 input (connect to or disconnect from SLEEVE to trigger)
 - SLEEVE = +5v (current-limited to 0.5mA)

5. User Interface Overview

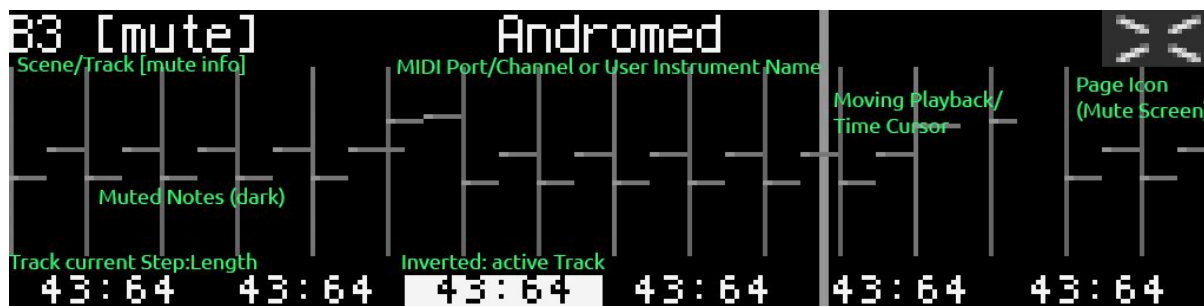
Here is the metal case LoopA frontpanel:



The user interface consists of a 256x64 pixel, 16 grayscale-level OLED, four black knobs with status indication LEDs around the upper knobs and thirteen mechanical keyswitches organized in two rows. The upper keys are typically associated with onscreen actions of the currently active screen and the lower keys operate basic functions (e.g. sequencer RUN/STOP) that are available from every screen.

5.1 Graphical Display

During operation the display is normally divided into three sections: a title line providing general information about the active screen; a central section most often showing note/CC data (also used for MIDI router or setup configuration data); and a footer line, which “labels” or maps the upper six upper-row keys to actions or settings:



Here the MUTE screen of Track 3, Scene B is displayed, which is currently muted and mapped to user instrument “Andromed” and the current playback position of this clip is step 43 of 64. The sequencer is running and the time cursor is almost three quarters through the clip. The six tracks can be muted and unmuted by pushing the upper-row keys in this screen.

5.2 Encoder Knobs

- SCENE**
 Selects the currently active scene. LoopA has six tracks and six scenes and thus stores 36 MIDI clips in memory. The scenes are enumerated from A to F and the tracks are enumerated from 1 to 6, which can be concatenated to “1A” or similar. This concatenated number consisting of scene number and track number is displayed on most screens in the upper-left corner of the OLED. The nearby LEDs visualize the currently active scene.
- SELECT**
 Multipurpose knob, but on many screens usually selects the active track. On the NOTES screen, it selects the edited note; on the CONFIG and ROUTER screens, it selects the active configuration item.
Tip: Pushing down the SELECT knob while turning scrubs the playback position, allowing quick fast-forward or rewinds when the sequencer is running.
- LIVE**
 Live performance knob. Pushing the knob alternates between two performance modes. The default mode is “live transposition”, where turning the knob transposes any channels that are enabled for live transposition. When switched to “beatloop”, turning adjusts the position of the playback cursor to repeat or skip beats/measures. Settings are visualized with the nearby LEDs and if neither transposition nor beatloop is active, two illuminated center LEDs indicate a “zero” effect.
- DATA**
 For entering command and parameter data. A command/operation is first selected by pushing an upper-row key, then the value is adjusted with the knob. For

example, choose the “track length” command from the CLIP screen and then turn this knob to select a step-length equivalent for the clip (e.g. 64 steps). Pushing the knob while simultaneously turning usually accelerates inputs (“Accel.”), but is also useful in certain situations to “lock” the input to useful increments. An example is adjusting track transposition in the CLIP screen, where pushing and holding while turning this knob transposes in octaves rather than semitones.

5.3 Status LEDs

The current setting of SCENE and LIVE values is indicated by adjacent status LEDs. Note that the recommended colors scheme is different for the final LoopA revision.



- The six middle LEDs near the SCENE knob (here green LEDs) indicate the currently active scene. Pressing the SCENE knob cycles between the default full-scene switching mode and single-clip progression. Turning the SCENE knob in full-scene mode changes all clips, whereas only the active track clip is changed in single mode. For instance, continue to loop the bassline and melody and add a drum pattern variation by progressing to a new clip on the drum track. The upper and lower LEDs (here red) indicate the active mode, described as "ALL" and "TRACK" on the frontpanel.
- The six middle LEDs around the LIVE knob (here green LEDs) indicate the parameter value of the currently active LIVE mode. The upper and lower LEDs (here red) indicate the live-mode type (labeled "TRANSPose" or "BEATLOOP" on the frontpanel), which can be switched by just pressing the LIVE knob.

5.4 Keys

The six upper-row keys typically control actions displayed in the bottom line of the OLED. In many screens, these keys choose parameter/value selectors or toggle between states:



In this example displaying the MUTE states, pushing one of the six upper keys mutes or unmutes one of the six tracks. In this picture, unmuted tracks are illuminated in green but this behavior may be inverted in the SETUP screen if muted tracks should have an “active” LED state. The currently active track is indicated with a blue backlit key. Therefore, if a track is both active and unmuted, this leads to a cyan color mix (green and blue); see track three in the above picture.

The seven lower-row keys are per default mapped to these functions (from left to right):

- RUN/STOP: start or stop the sequencer
 - ARM: enable recording on the current track
 - SHIFT: press and hold to display shift menu
 - MENU: press and hold to display the page/screen selection menu
 - COPY: copy active/selected clip to memory buffer
 - PASTE: paste memory buffer to active/selected clip
 - DELETE: deletes clip notes and extra data (e.g. CCs) on active/selected clip.
- Specials: Push and hold the SELECT knob while pressing DELETE to just clear the clip's extra data layer, e.g. recorded CC data, but retain everything else (e.g. the MIDI notes). Push and hold the VALUE knob while pressing DELETE to just clear the clip's note data and retain the extra data layer, e.g. recorded CC data.

Most keys perform direct actions. Press and hold MENU or SHIFT to directly choose the desired secondary action or page/screen. An onscreen keymap then displays the actions of the remaining twelve keys (see SHIFT and "Menu Usage" chapters).

6. Recording Modes

LoopA supports two recording modes:

- unquantized recording to store note data that can be (re)quantized at any point in time (even during recording). This mode is the standard recording mode and is active when the sequencer engine is running.
- step recording, which is only active when the sequencer engine is stopped.

For recording to take place, LoopA must be ARMED (red LED lit) and the received MIDI input data must arrive on an active input interface/input channel (as defined in the TRACK screen). By default all input data (from all input ports and all input channels) will be recorded, as indicated by the standard TRACK-screen configuration **I: ALL** and **IC: ALL**. Modifying these input parameters can filter out certain MIDI input data if required.

6.1 Unquantized Recording

With the sequencer engine running, LoopA records incoming data at the current cursor position. The default operation mode is to add new notes to the active clip (additive overdubbing), but the "Punch in" footswitch control overwrites data while the footswitch is pressed. This is useful to remix a region of the clip rather than deleting the entire contents.

With the LIVEFX quantize command activated, note timing can be quantized even during recording. This quantization can also be disabled at any time, as notes are always stored with their original high-resolution timestamps.

6.2 Step Recording

Step recording mode is active when the sequencer engine is not running. The time cursor moves forward by a given increment when entering notes in this mode. The increment length is freely adjustable from the "Step Record" item in the CONFIG screen.

Further commands/shortcuts for step recording:

- Push the SELECT knob and turn it to scrub the time cursor during step recording to enter rests or jump to a different position of the clip.

- Push and hold SELECT before recording a note to record a sustained (long) note. Depending on how the synth interprets such MIDI data, a slide or portamento might be played, e.g. on a bassline synth.
- Push and hold SELECT and turn the DATA knob to change the recorded note length, even while recording is active. Note that the default step recording increment can be adjusted on the CONFIG screen.

Tip: This mode is nice for bassline sequences and "Berlin School" noodles, give it a try :)

7. The SHIFT Function

The SHIFT key provides access to shortcuts and additional screens:



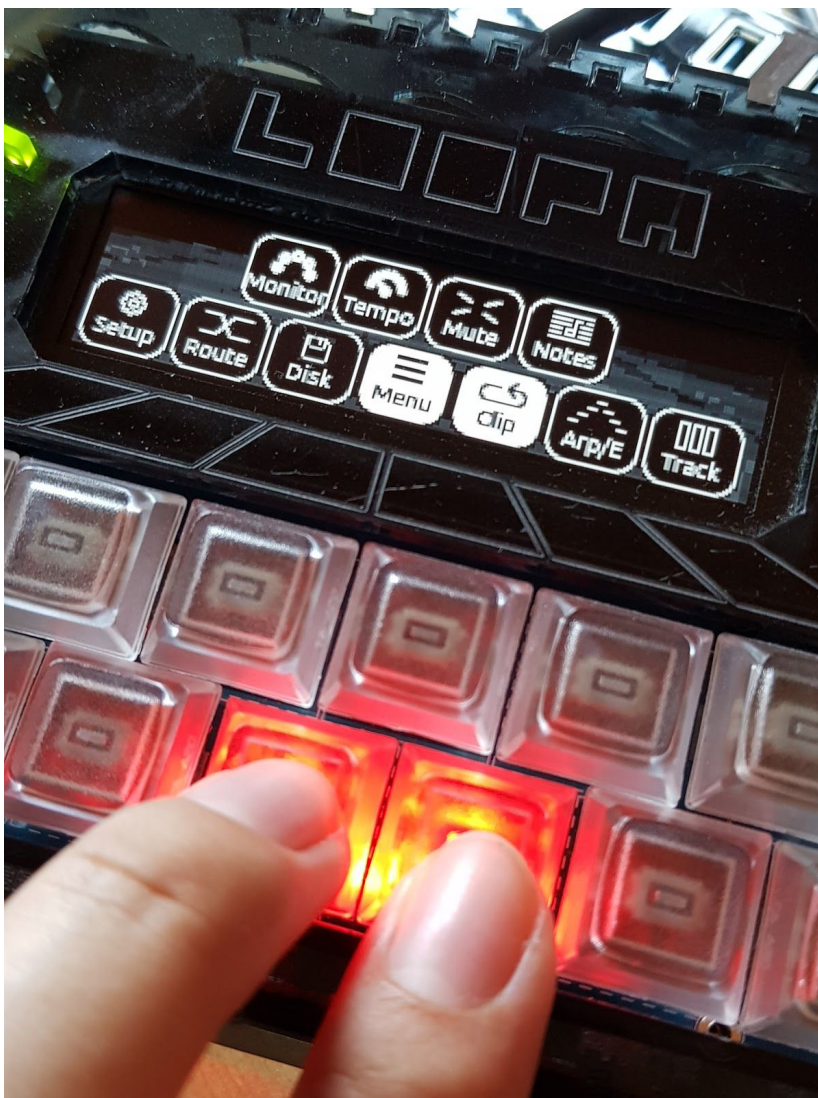
- Hold SHIFT: shows the muted/unmuted state of the current track clips and to what scene they are assigned (see above screenshot).
- Hold SHIFT + press upper-row keys 1-6: mute/unmute tracks or launch clips from any screen (synchronized to the next measure).
- Hold SHIFT + press and hold ARM: displays context-sensitive help screen describing the functionality of the currently active screen.
- Hold SHIFT + press LIVE knob: resets the currently active live-mode parameter to zero. E.g. push the LIVE knob to reset transposition while in "live transpose" mode.
- Hold SHIFT + press LIVE again to revert back to the previous value. Use this to toggle between a nice transposition (or beatloop value) and no effect. These "toggle" buffers are also stored in the session file. E.g. save a session with "zero" transposition and recall a preset transposition value during performance.

8. MENU Usage and LoopA Screens

LoopA offers a two-finger navigation menu system for quick one-handed navigation. These “muscle memory” shortcuts provide access to often-used screens.

Navigate to the CLIP screen by pushing and holding the MENU key and pressing the CLIP key, then releasing both keys.

All available screen names are displayed on the OLED and the corresponding keys are backlit in red.



8.1 SETUP Screen

Within the SETUP screen, basic runtime parameters of LoopA can be modified. Changes are directly saved to the SD card file called “setup.txt”, which can also be edited manually in a text editor. To move an active configuration over to another LoopA, copy this file to the new SD card root.



In the SETUP screen, use the lower-left SELECT knob to scroll through the configuration items and to select an active item. Use the upper-row keys below the OLED to select parameter values and either “toggle” the the value by pushing the respective upper-row key (e.g. toggle Beat LEDs “on” or “off”), or if a value is selected, use the lower-right DATA knob to change settings (e.g. change the OLED Screensaver activation time).

8.1.1 Configurable Setup Parameters

Here is a list of configurable setup parameters:

- **System Font:** changes the system font from a normal/sharp system font (type “a”) to a smoother, antialiased system font (type “b”).
- **Beat LEDs:** repurposes the four lower-right key backlights to display sixteenth note steps. This alters the behavior of the Run key illumination.
- **Beat Display:** lightly flashes the OLED display background to match measure and beat.
- **Screensaver:** activates the LoopA screensaver (either a blank screen or a voxelspace mountainscape scrolling by) after a defined number of minutes.
- **Invert OLED:** inverts the OLED colors to a white background with black text. This might be aesthetically better for the white metal cases but draws more current.
- **Metronome:** defines a MIDI synth as a metronome with a configurable MIDI port/channel (or a user instrument, see below) and defines the notes to be played when the measure and beat starts.
- **Tempo Dn/Up:** defines the tempo rate of change when the “Slower” and “Faster” keys are pressed in the TEMPO screen. Five preconfigured rates of change allow linear tempo fades with different speeds.

- **Inv Footsw.:** inverts any footswitch state (normally closed, normally open) to suit the hardware. Even use two different footswitch types!
- **Footsw 1. & Footsw. 2:** maps the following functions to footswitches:
 - "Punch In": overwrites clip data under the time cursor for replacing notes while the sequencer is running
 - "RunStop": starts/stops the sequencer
 - "Arm": arms/disarms recording
 - "ClearClip": clears the currently active clip
 - "JumpToStart": if the sequencer is running, moves the time cursor to the sequence start
 - "JumpToPrecount": if the sequencer is running, jumps to a "count in" position one measure before the end of the active clip, simplifying recording of the next loop
 - "Metronome": toggles the metronome
 - "PreviousScene": jumps to the previous scene
 - "NextScene": jumps to the next scene
 - "PreviousTrack": switches the active track to the previous track
 - "NextTrack": switches the active track to the next track
 - "FXDampen": activates velocity dampening of all clips (with configurable dampening percentage values on the FX screen)
- **Inv. MuteLED:** illuminates track mute LEDs in the MUTE screen when a track is muted; unmuted LEDs indicate unmuted tracks.
- **Track Switch:** enables track activation by "long pressing" mute keys in the MUTE screen. Hold down a mute key (0.2 or 0.4 seconds) to activate the respective track.
- **Follow Track:** configure LoopA to activate tracks when unmuted or muted.
- **LED Notes:** LoopA visualizes notes in the MUTE screen by flashing the respective track keys red. This can be helpful to determine what track plays the music :).
- **Pos. Display:** specifies how active clip playback positions are displayed on the MUTE screen. Sixteenth notes are displayed per default, with the clip starting from "0" (or optionally "1") or can show full measures instead of sixteenth notes.
- **Step Record:** activates step recording mode when the sequencer is not running but LoopA is armed. This parameter defines the step recording time cursor increment. Push and turn the SELECT knob to scrub the time cursor through defined note intervals during step recording. Push and hold SELECT (without turning) to record a slide. Good for "Berlin School"/101/303 synth noodles!
- **FX Dampen:** defines the default velocity dampening percentage for the FX screen. Velocity dampening for each clip can be manually configured on the FX screen. Dampening of all clips can be triggered with a footswitch.

- **MCLK IN/OUT:** toggles MIDI clock input and output devices, where DIN are standard MIDI ports and USB are virtual USB devices. Be careful to not accidentally create a MIDI clock loopback, which might occur if other devices are echoing the MIDI clock back to LoopA and the receiving input port is configured as the MIDI clock master.

All settings within the setup.txt file can be edited with a computer text editor. Certain sections are not (yet) editable within LoopA itself. The “INSTRUMENT” entries, for example, are described in the next section.

8.1.2 Defining Named User Instruments

Upon opening setup.txt in a text editor, 32 lines are available to define very helpful “user instrument” abbreviations.

By default, the user instruments are disabled and enumerated as follows:

```
INSTRUMENT 0 Synth_A OUT1 0
INSTRUMENT 0 Synth_B OUT1 0
INSTRUMENT 0 Synth_C OUT1 0
...
```

The INSTRUMENT identifier is followed by the instrument number (0-31), a string of up to eight characters for the synth or device, and the output port and channel. Named User Instruments can be assigned to any output port, including USB ports.

Transform these lines by using a computer text editor to reflect a custom instrument/synth setup. LoopA can therefore use “instrument names” instead of otherwise cryptic MIDI port/channel combinations:

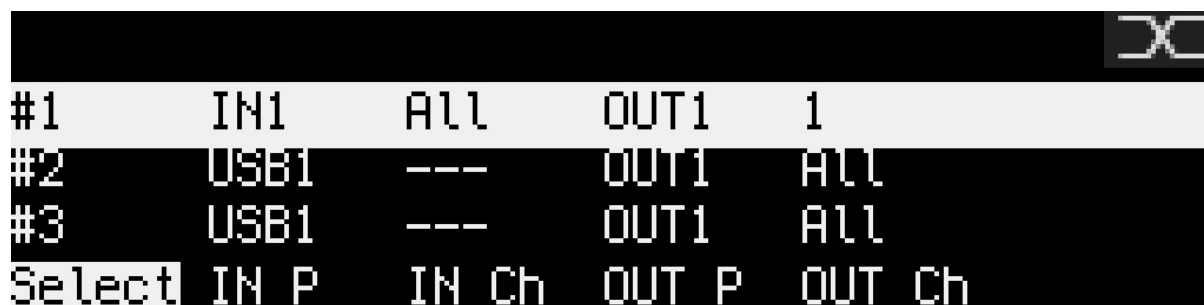
```
INSTRUMENT 0 Andromed OUT1 1
INSTRUMENT 1 Dominion OUT1 2
INSTRUMENT 2 MoogLP OUT1 3
INSTRUMENT 3 Anushri OUT1 4
INSTRUMENT 4 ESQm OUT1 5
INSTRUMENT 5 EX8000 OUT1 6
INSTRUMENT 6 K3M OUT1 7
INSTRUMENT 7 uWave1 OUT1 8
...
```

E.g. in line 2 (“INSTRUMENT 1”), a synth called “Dominion” is configured to use MIDI OUT1, MIDI channel 2. Once a MIDI channel other than “0” is defined, the respective instrument is enabled. Always start with INSTRUMENT 0 and never leave a gap between instruments, as

LoopA stops scanning for further user instruments after encountering an output channel of "0").

8.2 (MIDI) ROUTER Screen

The ROUTER screen defines up to 16 permanent routing paths between LoopA and any connected MIDI equipment. For example, forward a MIDI controller connected to IN1 (accepting all channels) to a synth connected on OUT1 and transform the output channel to channel 1:



#1	IN1	All	OUT1	1
#2	USB1	---	OUT1	All
#3	USB1	---	OUT1	All
Select	IN P	IN Ch	OUT P	OUT Ch

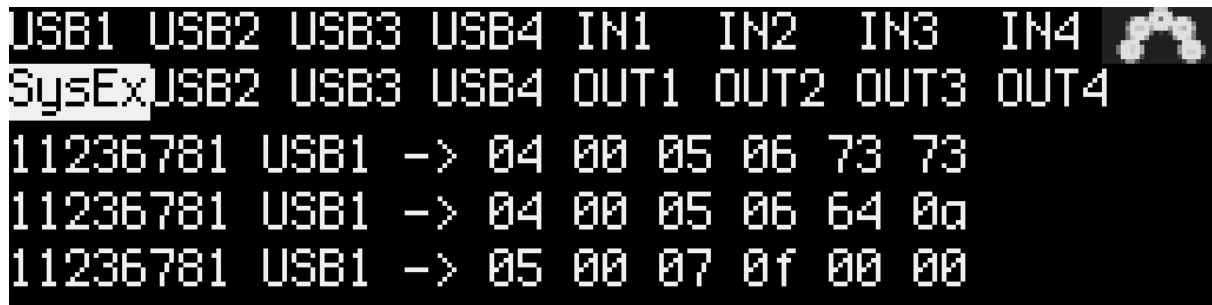
MIDI packets can also be forwarded to (or sent from) a virtual USB MIDI port (when connecting LoopA to Windows 10 or Mac OS. Four independent MIDI USB devices are available and could redirect MIDI traffic around a studio.

The router screen offers "commands" that are selected with the upper-row keys:

- Select: Select currently active "route" (also select routes by turning the SELECT knob).
- IN P: Choose the input port of the active route (IN1-IN4, USB1-USB4). Only MIDI packets arriving on this port are forwarded to the configured MIDI output
- IN Ch: Define the input channel of the active route (1-16 or "All"). If a specific channel is chosen, only MIDI packets on this channel are forwarded to the configured output.
- OUT P: Define the output port of the active route.
- OUT Ch: Define the output channel of the active route. If a numerical value is chosen, the packet is sent only on this destination channel. If "All" is selected, the input channel number is used (and is not modified).

8.3 (MIDI) MONITOR Screen

The MONITOR screen shows current MIDI traffic from an interface perspective as well as a short hexdump log:



The above image displays outgoing SysEx traffic on USB1, with three log lines of MIDI packets sent at the timestamp 11236 (seconds), 781 (milliseconds). The output port is the USB1 virtual MIDI port (-> arrow) and the hexadecimal string is the actual transmitted data.

Tip: this screen is useful for checking the activity of ports and for inspecting the datastream. E.g. determine the Control Change (CC) number received by a MIDI controller. CC messages are identified by three-byte sequences of the format "Bz nn vv", where z is the MIDI channel, nn is the control change number and vv is the value.

8.4 DISK Operations Screen

Save and load Sessions to/from SD card from the DISK operations screen:



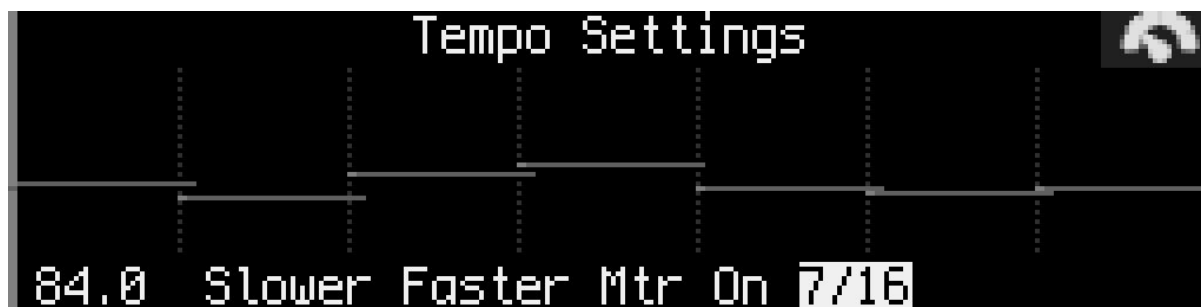
Scroll through the enumerated sessions with the lower/left SELECT knob (accessed by number). Upper-row key 2 saves the current session to disk, upper-row key 3 loads a session from disk, and upper-row key 4 initializes a completely new session, deleting all track and note data.

LoopA remembers the last session loaded or saved upon restart.

Copy the relevant files in the SESSIONS directory on the SD card to backup sessions.

8.5 TEMPO Screen

Controls the current playback speed and optionally configures a MIDI metronome for a recording guide or click track:



Press upper-row key 1 to select the current BPM to be modified with the DATA knob.

Tip: push and turn the DATA knob for accelerated BPM adjustments.

The SLOWER and FASTER commands (keys 2 and 3) modify the tempo linearly while the keys are pressed. Choose from five different tempo rates in the SETUP screen under the setting "Tempo Dn/Up".

The METRONOME (Metron.) switch activates a MIDI metronome that can play different notes at the start of measures and beats. Configure the metronome in the SETUP screen by defining the output port for MIDI metronome notes and what notes are played when a full measure or a full beat is reached.

Choose the time signature of the active session with upper-row key 4 + the DATA knob. Although the default is standard 4/4 time (four quarter notes per measure), many different time signatures are available. This setting also affects the default clip lengths. LoopA will attempt to remap notes within existing clips upon changing the time signature, but it is recommended to set the time signature before recording clips.

8.6 MUTE Screen

The MUTE screen is probably the most important screen of LoopA. If clips in the CLIP/NOTES/LIVEFX screens aren't being modified (see below), the MUTE screen provides a good overview of the sequences and allows clips to be quickly recorded, muted and unmuted:



The above screenshot displays a 64-step sequence with stored note data on track 6, scene "E", shortened to "6E". The output port is USB4 MIDI port, channel 8.

The six upper-row keys launch/unmute clips of the currently active scene or stop/mute them again. Muting and unmuting is always synchronized to a measure, so can be "pre-unmuted" in advance and the clip will be launched with perfect timing.

Recording a sequence is most comfortable from the MUTE screen, as the active track is easily chosen and (also visualized by the blue upper-row key and also the black-on-white sequence position display; see the screenshot above). Press ARM and record notes with a MIDI keyboard, MIDI drumpad or another instrument.

The six number slots on the lower line show the current sixteenth-note-equivalent playback positions and clip lengths for all six LoopA tracks. A display of 09:64 indicates that playback is at step (or sixteenth note) 9 of a total clip length of 64 steps (or sixteenth notes).

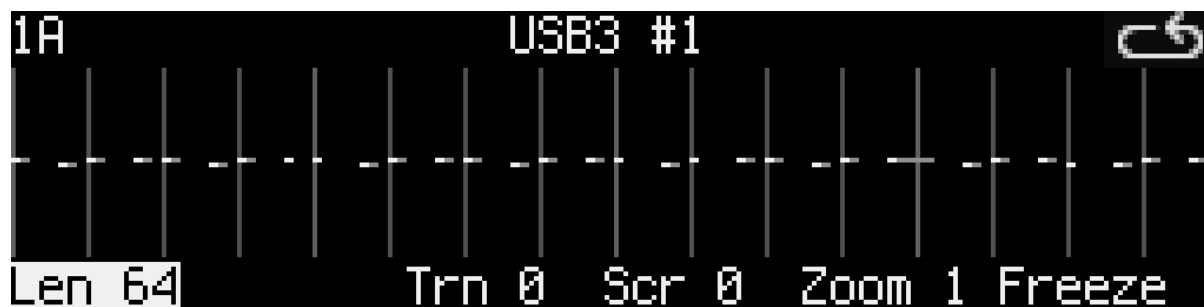
The top-left corner of the MUTE screen displays the currently active track and scene. If LoopA is armed, notes will be recorded on this track within this scene.

The center-top line displays the output instrument of the currently active track. This takes the form of any selected user instrument. It is strongly recommended to make use of user instruments (e.g. "ANDROMED"; see chapter: SETUP Screen). Otherwise the MIDI output port and MIDI channel are displayed (e.g. USB4 8).

Note: "Track Switch" can be configured (see SETUP screen) to jump to any track upon a "long press" of an upper-row key. Similarly, enabling "Follow Track" sets the active track based on mute-state changes.

8.7 CLIP Screen

The CLIP screen configures/modifies all 36 clips stored in LoopA.

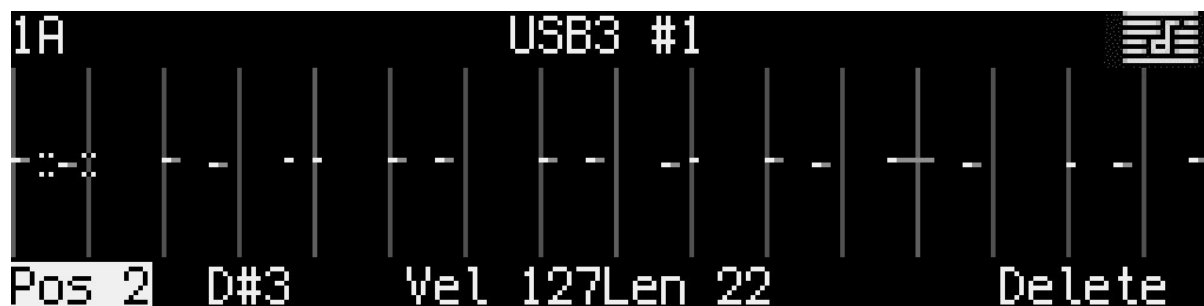


The active clip is displayed in the top-left corner (e.g. 1A corresponding to track 1, scene A). The following operations are available on the upper-row keys and (apart from Freeze) modified with the DATA knob:

- Key 1 (Len) sets the clip length. The length can be reconfigured at any time without losing notes, even with the sequencer running. Available clip lengths are dependent on the chosen time signature. For 4/4 time, the defaults are 4, 8, 16, 32, 64, 128, 256, 512 and 1024 steps.
Tip: "fine-adjust" clip lengths by pushing and turning the DATA knob to enable polyrhythmic/polymetric sequences.
- Key 2 is currently without function, but is reserved to select one "Extra Layer" for each clip. This currently defaults to a "CC Layer" for recording MIDI CC data and will be extended for further extra layers in later LoopA revisions.
- Key 3 (Trn) transposes the whole clip.
Tip: when this operation is active, press the DATA knob and turn it to transpose full octaves. This is handy during live performance.
- Key 4 (Scr) scrolls the track notes forwards and backwards, wrapping around at both ends.
- Key 5 (Zoom) zooms notes in or out. For example a zoom of 0.5 speeds up the sequence by a factor of 2 by "compressing" the note lengths.
- Key 6 (Freeze) stores a clip with transformations applied and resets all clip parameters to zero. Any notes are deleted if they fall outside the displayed area, e.g. if the clip length was shortened. Just like in mathematics, the order of operations strongly determines the outcome of applied transformations. Freeze "locks in" a change before progressing to the next transformation. Compare scroll, freeze, zoom versus zoom, freeze, scroll.

8.8 NOTES Screen

The NOTES screen allows adjustment of individual clip notes, e.g. to correct minor recording mistakes, or to adjust timing, length or velocity of notes:



Use the lower-left SELECT knob to choose the currently active note, indicated by a small dotted box.

The following operations are available on the upper-row keys:

- Key 1 (Pos): horizontally adjust the note or correct its timing. Pushing the DATA knob while turning accelerates inputs, for instance to easily move a note longer distances in the clip.
- Key 2 (Note): adjust the note itself; here D#3 is shown, which could be adjusted to any other MIDI note using the DATA knob.
- Key 3 (Vel): adjust the velocity of the note with the DATA knob. Individual notes with velocity value 0 are muted; this is different from muting a whole track
- Key 4 (Len): adjust the length of the played note relative to the recorded note length with the DATA knob.
- Key 6 (Delete): deletes a note.

Tip: before undertaking extensive note editing, push COPY to store a copy of the clip in the buffer. If editing goes wrong, DELETE the track and press PASTE to undo.

8.9 LIVEFX Screen

Use LiveFX functions to alter clips during performance:



The following operations are selected with the upper-row keys and modified with the DATA knob:

- Key 1 (QU) dynamically (re)quantizes clip notes to defined note lengths. In this example a simple drum clip was requantized to eighth notes.
Tip: use requantization to alter the rhythmic structure of sequences. E.g. if the above clip was requantized to quarter notes during playback, the audible speed of each note would halve.
- Key 2 (SW) introduces swing to quantized clip notes. Swing is applied to every second quantized note. A swing setting of 50% indicates that no swing is applied and the note should stay at its quantized position. Swing values >50% (such as 66% in the example above) push every second quantized note forward in time up to the next quantization point, and swing values <50% push the note backwards in time.
Tip #1: 32/33% or 66/67% swing settings enable triplet swing timing
Tip #2: The swing effect sometimes changes dramatically with slight changes to BPM, try it out!
- Key 3 (PR) introduces non-zero note-skip probabilities. These are visualized as a randomly blinking note-cloud. A note-skip probability of 100% would mute all notes in the sequence.
Tip #1: A low note-skip probability of a few percent can spice up otherwise static drumloops
Tip #2: Use note-skip probabilities in a live performance to "break up"/"fade out" a sequence. It is especially fun to use on polyphonic/chord sequences! :)
- Key 4 (Dm) activates or deactivates clip velocity dampening. Configure the default velocity dampening percentage in SETUP and modify the clip dampening value by turning the DATA knob when this command is active.
Tip: configure a footswitch to activate dampening on all tracks.

8.10 CC EDIT Screen

The CC editor is a powerful tool to either modify prerecorded CC waveforms or to synthesize new waveforms from scratch:



Quick overview:

- Turning the SELECT knob modifies the beginning of the selection range
- Key 1 (CC) configures the output CC number (0-127), engages "LEARN#" mode (automatically selecting the first received CC number for this clip) or disables CC output ("off")
- Key 2 (Range) changes the selection range
- Key 3 (Value) vertically shifts CC values of the selection range
- Key 4 (Move) horizontally shifts the selection range (overwriting neighboring areas when moving the range)
- Key 5 picks from a list of algorithms and generators that transform the selected CC range. A dotted preview is rendered before transforming
- Key 6 executes the transformation selected with key 5 and instantiates the dotted preview

These features can quickly select a range of CCs and transform the selection in interesting ways. E.g. generate a sine wave (as shown above) in the selected area, then use key 3 (value) to push the sine wave to the upper limit to clip the CCs at their maximum value of 127, then move the selection down again to produce a clipped waveform.

Note: the selection start and range lock to a "grid" aligned to measure length dividers. This allows seamless generation of contiguous waveforms (with different step-equivalent lengths).

Note: push and hold the SELECT knob while turning to fine-adjust the selection range start position (to override the grid mentioned in the previous tip).

Tip #1: try stacking multiple operations, e.g. first create a sine wave, then apply a sample-and-hold operation and then smoothen the newly created waveform.

Tip #2: to quickly "draw" a waveform, set a positive range, then push key 3 to enter "value modification mode". Then use both the SELECT and DATA knobs with two hands to move the selected range while changing the selected values, for instance to quickly draw waveforms and envelopes. After drawing, optionally use a smooth algorithm over the full waveform to round off any rough edges.

Available algorithms and generators (key 5):

- DELETE: deletes the selected range of CCs
- LINEAR: draws a line from left-to-right in the selected range
- SMOOTH: filters and fills the selection range with an "averaging effect"
- FILTER: like SMOOTH but more aggressive
- SHOLD1: sample and hold effect with four equally sized areas in the selection
- SHOLD2: similar to SHOLD1 but with sixteen equally sized areas
- NOISE: adds 10% noise to the selection
- RAND: fully randomizes the selection
- CSHRNK: decreases waveform values by 10% around the center
- CGROW: like CSHRNK but increases values
- SCRMBL: divides and randomly reorders the selection range as eight equal blocks
- SINE1: draws one sine waveform cycle in the selection range
- SINE2: similarly draws two sine waveform cycles
- SINE3: similarly draws three sine waveform cycles
- SINE4: similarly draws four sine waveform cycles
- PULSE1: draw one pulse (top -> bottom) waveform in the selection range
- PULSE2: similarly draws two pulses
- PULSE3: similarly draws three pulses
- PULSE4: similarly draws four pulses
- TRI1: draws one triangle (bottom -> top -> bottom) in the selection range
- TRI2: similarly draws two triangles
- TRI3: similarly draws three triangles
- TRI4: similarly draws four triangles
- SAW1: draws one saw waveform in the selection range
- SAW2: similarly draws two saw waveforms
- SAW3: similarly draws three saw waveforms
- SAW4: similarly draws four saw waveforms
- ISAW1: draw one inverted saw waveform in the selection range
- ISAW2: similarly draws two inverted saw waveforms
- ISAW3: similarly draws three inverted saw waveforms
- ISAW4: similarly draws four inverted saw waveforms

8.11 TRACK Screen

A track typically represents an "instrument", with the six vertical scene clips in a track representing variations of melody lines or drum patterns. The following TRACK screen is an example of such a MIDI instrument setup:



The following operations are selected or toggled with the upper-row keys and modified with the DATA knob:

- Keys 1 and 2 respectively define the MIDI port and channel to which LoopA should send MIDI notes for the current track. Four virtual USB ports are also available that could be mapped to software instruments (e.g. VSTs) on a computer.
Highly recommended tip: Turn the DATA knob further to display user instruments with custom naming e.g. "ANDROMED" instead of cryptic OUT1/Channel 1 combinations. Read the SETUP screen chapter for more details.
- Keys 3 and 4 respectively define the input MIDI port and channel associated with the current track. The default value of "All" recognizes input from any MIDI IN ports including virtual USB ports. Use this to filter the incoming MIDI stream.
- Key 5 (Fwd) enables live-forwarding of received MIDI note data on the current track. This is essential if a MIDI controller keyboard is attached to an input port, and a software/hardware synth is attached to the configured MIDI output port. This way MIDI data is echoed to the synth **only if the track is active**. This feature enables auditioning of multiple rack/keyboards synthesizers with only a single master keyboard. Turn the SELECT knob to cycle between tracks with this feature enabled.
- Key 6 (LTr) enables and disables live transposition for the current track. Live transposition is performed with the upper-right LIVE knob and enables measure-synchronized transposition of all tracks that have this feature enabled (LTr On).
Tip: Disable live transposition on drum tracks. MIDI notes are typically mapped to specific notes and transposition would probably result in unwanted drums being played (though some interesting effects might result!).

9. Live Performance Modes

LoopA supports two live performance modes. Push the upper-right LIVE performance knob to cycle through these modes. The active live performance mode is indicated by LEDs near the LIVE knob. Turning the live performance knob changes the respective live performance value as displayed by the nearby LED arc.

9.1 Live Transposition Mode

In live transposition mode, LoopA transposes any track with LTr ON (live transposition active) in their respective TRACK screen. It makes sense to disable live transposition for drum tracks in most cases. Jump through preset transpositions by turning the LIVE knob to transpose by +5, +7, +12 (and so on) semitones in the positive range and -5, -7, -12 (and so on) in the negative range.

The LEDs around the LIVE knob indicate the current live transposition value. Live transpositions are always time synchronized to the next measure (if the sequencer is running).

Tip: Push SHIFT and press the LIVE knob to quickly switch from the current live transposition value to zero live transposition. Push SHIFT and press the LIVE knob again to cycle back to the previous transposition value. This live transposition value is also saved to the session, so can store and toggle a nice live transposition setting when loading another session.

9.2 Live Beatloop Mode

If beatloop mode is engaged, one of fourteen time-scanning algorithms is chosen with the LIVE knob. The currently active algorithm is visualized with the LED arc near the LIVE knob.

During playback, the time progression cursor progresses differently for each algorithm from mild to wild: try it out! Some algorithms repeat previous measures or beats, some scan forward or skip measures and some continue to play back the sequence with identical runtime with large jumps applied to the time cursor.

Tip #1: Try "scrambled" beatloop mode with simple melody lines to get completely new melodies while keeping harmonies intact. After finding a nice beatloop value, toggle between this value and "zero beatloop" as desired by pressing the SHIFT key + the LIVE knob.

Tip #2: Try "repetition beatloops" of increasingly shortened repeat time (first a measure, then a beat, then a sixteenth note) to create a flam/drumroll effect that can be released by resetting the beatloop with SHIFT plus a press of the LIVE knob.

10. What's New/Changelog

In case you have been using LoopA for a while and wonder which changes were introduced in newer software revisions, have a look here:

V2.07 (released on 2020/08/23):

- Added "CC" Recording function and added a powerful CC waveform editor/generator page equipped with CC multi-value/range editing, algorithmic modifiers and extensive waveform generators.
- "Single Track Scene Progression Mode" (push upper-left knob to engage this alternative scene progression mode) - this allows to cycle through all clips of a drum track without changing the other tracks' clips.
- Now supporting many different time signatures (e.g. 9/16 time, default is 4/4 time). This also scales the default clip lengths to the changed measure times
- Added a fully flexible clip length system for polyrhythmic/polymetric sequences - to change to an "uncommon" clip length, press down the data knob while turning it (CLIP screen clip length command)
- Implemented "classic step recording": when the sequencer engine is not running, but LoopA is armed, notes can be entered. You can define the time cursor/position increments for this mode in the CONFIG screen. You can also push the SELECT knob and turn it to scrub the time cursor during step recording, e.g. to enter "pauses". Push SELECT and record a note to place a sustained (long) note, that will often cause a slide/portamento effect. Good for bassline sequences and "Berlin School"/101 synth noodles! :)
- Added new "Dampen" live effect command (FX screen), that reduces the velocity of played notes of the currently active clip, similar to a dampening pedal on a piano - the applied default velocity reduction (in percent) is configurable in the SETUP screen and clip dampening values can be individually configured on the FX screen - dampening of all clips can also be temporarily activated by a new footswitch command (Thanks, Robert)
- Added configurable clip position time indications in the MUTE screen: choose between either sixteenth notes/steps or measures as a position indicator and define if counting should start at "0" or "1" (thanks Michael and Robert!)
- "Auto session increment after initialize" (Thanks, lp1977!)— this prevents accidental overwriting of existing sessions with new sessions, when SAVE is clicked after NEW.
- Switched positions of "Faster" and "Slower" commands in the TEMPO screen for a more logical arrangement (Thanks, Andy and Robert!)
- Added "Screensaver = completely turn off" configuration option to reduce wear on the OLED screen in screensaver mode (Thanks, Robert)
- Fixed a bug where deleted notes were potentially still editable in the note editor (Thanks, Eugene!)
- Fixed a bug with the screensaver not really saving the screen when the OLED inversion mode was on :) (Thanks, Robert!)

V2.06 (released on 2020/04/15):

- Now supporting 256, 512 and 1024 step-equivalent clip lengths (previous limit was 128)
- Fixed settings (e.g. metronome config) Mattias key illumination bug (thanks, Eugene!)
- Illuminate SHIFT-ABOUT and SHIFT-HELP keys in red when they are pressed
- Fixed a bug with "hanging" illuminated matias SETUP-screen LEDs, when navigating away from the SETUP screen in the menu (Thanks, Eugene!)
- Enabled respective key highlighting, when copy/paste/delete keys are pressed
- Enabled run/stop beat LED flashing to flash red on full measure, green on beat
- Fixed 0xFA MIDI clock start command, that was sent twice on run/stop sequencer start (Thanks, Eugene!)
- Improved display responsiveness/refresh rate, if the LoopA core is not under load
- Improved initial BPM/timing stability, just a after a sequence was started (Thanks Michael!)
- Enabled frontpanel LED outputs for MIDI activity on IN1/IN2/BLM ports
- New option "Inv. Footsw": software footswitch inversion support to support both types of normal/inverted footswitches.
- Added customizable footswitch functions: choose any two of "CursorErase", "RunStop", "Arm", "ClearClip", "JumpToStart", "JumpToPrecount", "Metronome", "PreviousScene", "NextScene", "PreviousTrack", "NextTrack"
Holding down the footswitch for CursorErase allows "overwriting" clip notes under the time cursor, this allows for live re-recording of new notes while the sequencer is running. JumpToPrecount allows jumping to a count-in point of a sequence, pushing the footswitch thus simplifies re-recording of a clip.
- New option "Inv. MuteLED" to invert mute LEDs (Thanks, Michael!)
- New option "Track Switch": when enabled, "long-pressing" a mute key switches to that track. With configurable key hold time in the SETUP screen. (Thanks, Eugene!)
- New Option "Tempo Up/Dn": Configurable BPM delta speed (faster/slower buttons)
- New Option "Follow Track": automatic track following when muting/unmuting, can be set to "disabled"/"when unmuting"/"when muting or unmuting" (Thanks, Eugene!)
- New Option "LED Notes": visualizes played notes via temporarily red illuminated track buttons in the MUTE screen - when the sequencer is running, this indicates which track is actively playing notes.

11. Acknowledgements

Many thanks to:

- Andy aka latigid on, who designed the PCBs, was always available for talks & suggestions and who finally proofread and corrected this manual. Thanks, man! :)
- Thorsten aka TK. who created MIDibox, the hardware and software platform of LoopA. It would have been impossible to build without your work! Thank you!
- Adrian Hallik, who creates beautiful cases and front panels. Thanks a lot for your fantastic work, also on this unit!
- Adrian Smith aka Smithy, who seeded initial thoughts about a "perfect MIDI looping device". Thanks, man!
- **All current and future users of LoopA, who made this device possible and ensure continuous development. You know who you are! :-)**

