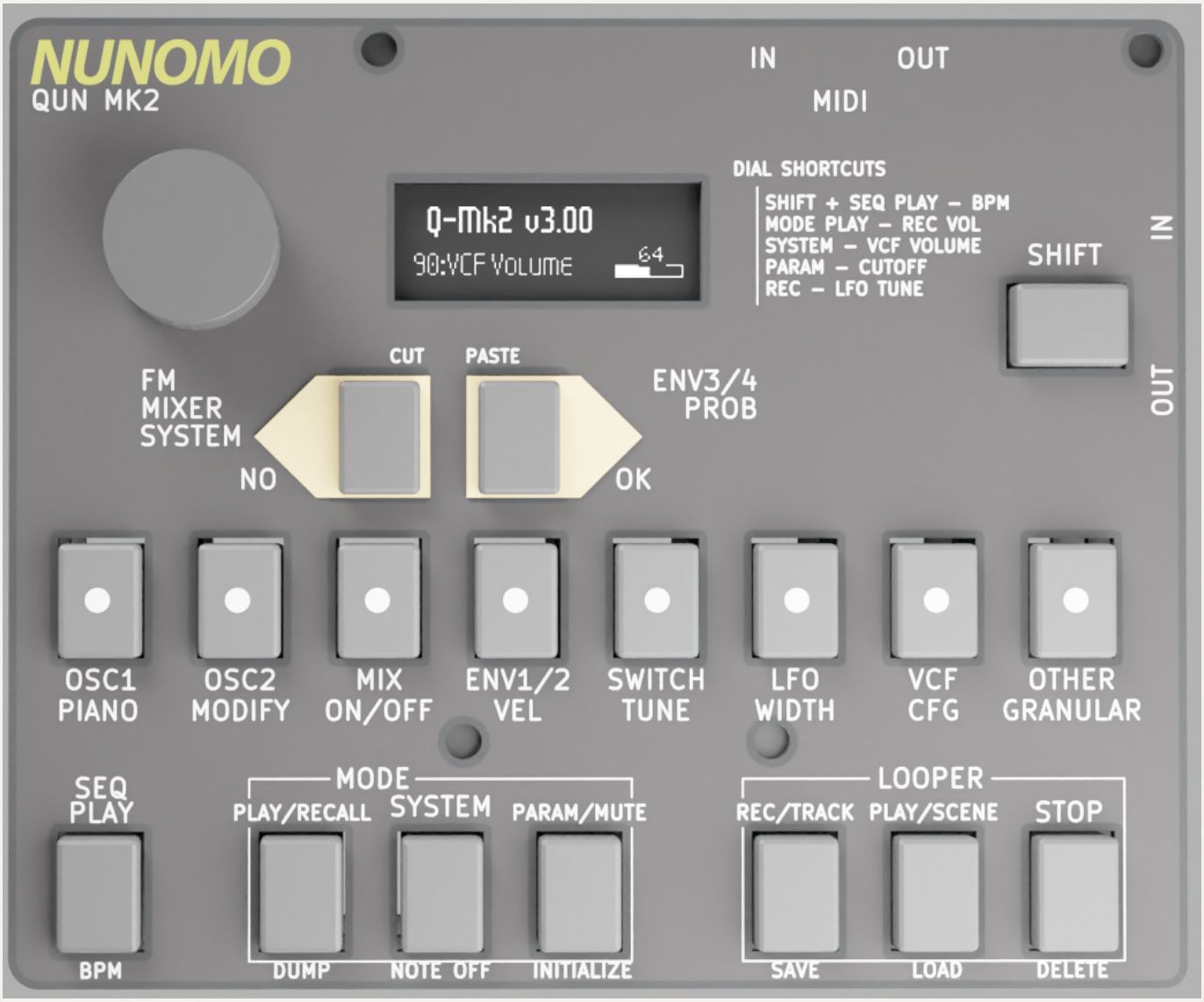
Contact

- Email: info@nunomo.net
- Github : Open an issue if you have GitHub account. It's the best place to submit bugs.
- Discord : Nunomo's Discord server to have a chat, an announcement, and events.
- Social media links:
    - Instagram : @nunomo1
    - Twitter (Japanese) : @nunomo1
    - Youtube : https://youtube.com/@nunomollc

Qun-mk2

Qun-mk2 is a small synthesizer with powerful sound engine, sequencer and looper.



Links and Information

- Online Shop: Purchase your own one from our website.
- Presets for tone presets. We constantly update the tone presets.
- Issues: Report issues when you have problems or questions.
- Firmware: For firmware updates.
- CheatSheet : For cheat sheet.

We are looking for your feedback! For general impressions and feedback, please email them to info@nunomo.net, or join Discord server!

Overview of the QUN mk2

Qun mk2 has two-oscillator virtual analog, FM, granular sound engine. 2 oscillators can be used separately.

A sequencer is 8-step based sequencer, supports up to 32/64 steps. You can store 8 patterns for each preset. It has 8 preset and sequencer pattern buckets. You can switch 8 presets and 64 patterns quickly.

Three track looper with 5 scenes, you can swap 3 track x 5 scenes while playing.

- **Analog Modeling engine**
    - The analog modeling engine is **an original, made from scratch**. It uses advanced algorithms for great organic sound. The engine is not a copy of a classic synth, it is designed to make modern sounds.
    - Low latency.
    - All analog modeling engine parameters can be configured through MIDI.
    - Clean 2 Oscillators. Cheap synthesizers compromise this part sometimes, but QUN has no-alias noise Oscillators. All of the internal calculation is done by floating point for the sound quality.
    - Oscillators can be used as 1 oscillator per voice, or 2 oscillators per voice.
    - Voice can be configured as 4 voices (Quad mode) or 2 voices (Dual mono).
    - The sound engine is compatible with Qun mk1.
    - Multiple QUN synths can be stacked to achieve a **Polyphonic** setup.
    - Flexible MOD routing.
    - 2 inputs can be used for **external audio signal**, or **external CV inputs**
    - 4 Envelope Generators
    - FM (4 Operators x 2)
    - **Granular / Sampler engine**

        - 1 LFO
        - 1 Organic sounding VCF
            - 2/4 Poles, Low-pass, Band-pass, High-pass, Notch)
            - Key sync
        - 1 Effect (Delay, Chorus, Flanger, BitCrusher)
        - MIDI clock sync
- Player / Sequencer
        - Player (piano mode)
        - MIDI out to control external synths
        - **8/16 step sequencer has 4 pages, up to 64-step sequencer** will generate inspiring beats for you
            - Note On/Off/Double/Triple/4th
            - Modifiers (Transpose, shuffle, repeat steps and more)
            - Parallel pattern running up to 3 patterns
            - Scale quantize
            - Live recording
        - Looper
            - Sequencer synchronized, internal or externally clocked.
            - Looper can record the sound up to around 30 sec for each recording.
            - You can record the sound from sound engine or external audio.
            - **3 tracks**, **5 Scenes**, total 15 recordings in one Session
            - Scene change while playing (Something like Ableton Live's session view)
            - Cut / Paste
            - Play / Rec / Overdub
        - Mixer
            - Looper tracks can be panned for stereo
            - Integrated compressor (Fixed parameters: 30ms attack, 100ms release, 1:3)
            - Stereo output
            - Mute by track
        - Micro SD card

- Qun mk2 comes with micro SD card.
- All looper recordings, preset and granular sample is stored to SD card

CONNECTIONS

- Power: Use a good quality USB power supply. Connect the USB cable to `POWER` labeled USB port (Top one).
- MIDI: Use **TRS A** MIDI adapter to connect MIDI cables. TRS A type adapter is the same as KORG, AKAI and Make Noise's adapter. This is the lowest latency option. The synth comes with MIDI TRS A cable.
- It has microphones and stereo line input.
- LINE IN and PHONE OUT is located at right side. Output is not strong, so please connect to headphone amp or mixer. Looper mixer is stereo. **Please use a stereo cable for the sound input and output**.
- It comes with micro SD card. Qun mk2 always needs SD card. SDHC is supported (SDXC is NOT supported, so the disk size is up to 32GB). Class 10 card (Normally it's indicated as Circled 10) or higher is required to satisfy the bandwidth. It's safe to remove when the access indicater is not lid, but it's not hot swappable, Please reset the device when you remove SD card.

MAJOR MODES

The synth has three major modes.

BUTTON	FUNCTION
Play	Play Mode. It’s for sequencer / looper.
System	Setting. For load / save / system setting.
Param	Parameter Mode. Change synthesizer’s parameters.

BASIC OPERATION

Each major mode has sub modes. Select sub mode. For example, `OSC1` is a sub mode for Oscillator 1.

- To switch submode, press SHIFT + 1-8 button or NO/OK buttons to change sub mode.
  After you enter the sub mode you want, press 1-8 button to select parameter.
- Press one of 8 buttons + rotate dial = Change parameter
- Rotate the dial = Change the current parameter.
- Long press the button to show the parameter full name and value.
- For initial training, cheatsheet(./cheatsheet.pdf) would be useful. Also you can turn on parameter caption mode in System2 menu, button 3.

- If you want to do fine value adjustment, you can use NO/OK buttons to change the value by 1. To do this, keep pressing one of 8 buttons and press NO or OK button.

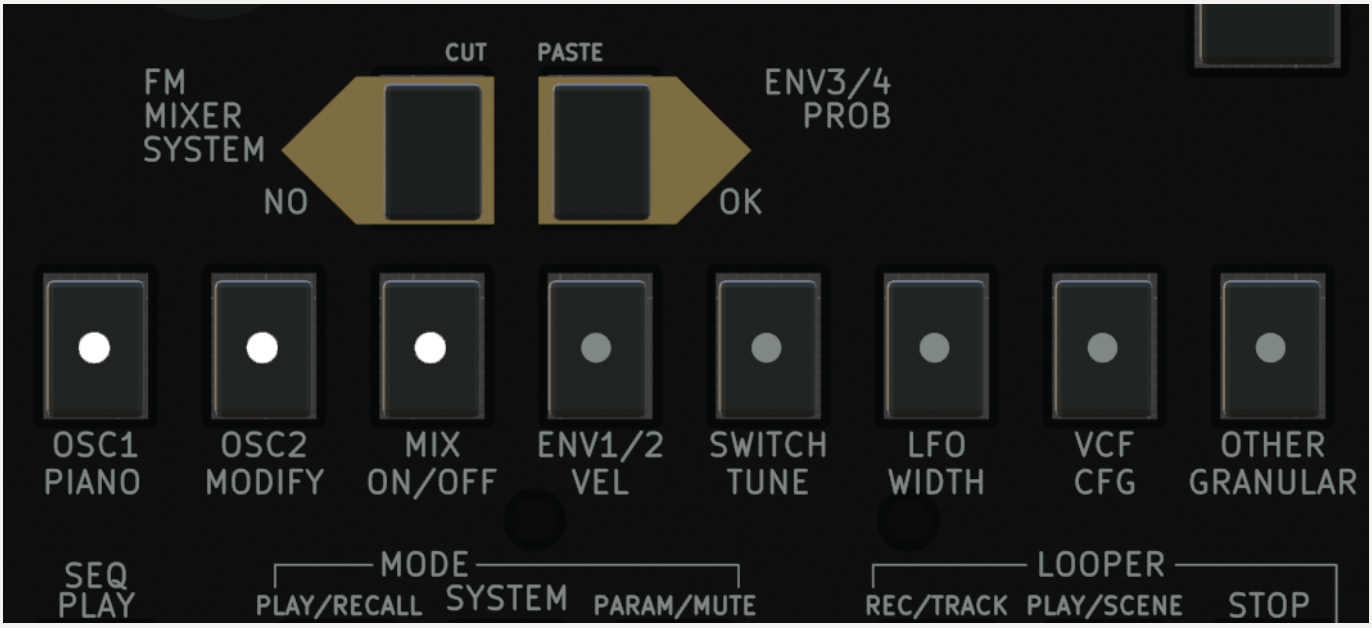
BUTTON	PRIMARY FUNCTION
SHIFT	Shift + [1-8] button or NO/OK button to select sub mode
[1-8] button	Select parameter in selected sub mode
NO	Select previous sequencer pattern
OK	Select next sequencer pattern
Dial	change parameters
SEQ PLAY	Start / Stop sequencer
REC + SEQ PLAY	Start sequencer live recording
MODE PLAY	Select Play mode
SYSTEM	Select System mode
PARAM	Select Param mode
LOOPER REC + LOOPER PLAY	Start looper recording
LOOPER PLAY	Start looper playing
LOOPER STOP	Stop looper playing
RST button on the base board	Reset the device
4 touch buttons at the bottom board	This can be used as a touch slider. See Touch slider section for detail.
SHIFT + NO + OK	Sleep (Shutdown) the device. It will turn off most of power consuming components like main CPU and the screen. Press RST button to restart the device.

BASIC SHORTCUTS

BUTTON	FUNCTION
SHIFT + MODE PLAY	Dumping current preset to MIDI OUT. This is useful to transfer current preset to another Qun / Qun mk2 synthesizer.
SHIFT + SYSTEM	All notes off
SHIFT + PARAM	Initialize the preset
SHIFT + SEQ PLAY + turn dial	Set BPM
MODE PLAY + turn dial	Record volume (Stay -6.0dB or lower to avoid clipping)
MODE PLAY + SYSTEM + turn dial	looper master volume
SYSTEM + turn dial	VCF volume
PARAM + turn dial	VCF cutoff
REC + turn dial	LFO tune
LOOPER PLAY + [1-5]	Select Scene
REC + [1-3, 7,8]	Select recording track. A,B,C are mono tracks. Press 7, 8 for stereo recording. 7=A(Left)+B(Right), 8 = B+C. When you do stereo recording, you may want to set pan to left and right for the selected stereo tracks.
PARAM + [1-3]	Mute track
MODE PLAY + [1-8]	Recall preset bucket

SEQ PLAY + [1-8]	Select Sequencer pattern
SHIFT + LOOPER PLAY + turn dial	Load session when you are not in System mode or Granular mode.
SHIFT + LOOPER PLAY + [1-3] button	Import wav file from import folder to selected track
SYSTEM + [1-8] : Temporary piano mode	

LED indicators



The synth has 8 LED indicators on the switch.
Solid LED shows selected pattern number.

- When playing, another LED shows current position of the sequencer.

- When trying to switch Scene (When pressing LOOPER PLAY) shows current selected Scene.
- When trying to switch Track (When pressing LOOPER REC) shows current selected Track
- When trying to mute Track (When pressing PARAM) shows current mute status of the Tracks.
- When trying to switch bucket (When pressing MODE PLAY) shows current selected Bucket.

MIDI learning

Assigning proper MIDI CC to your MIDI keyboard is recommended for frequently used parameters, however, you can override MIDI CC temporary by the following operation:

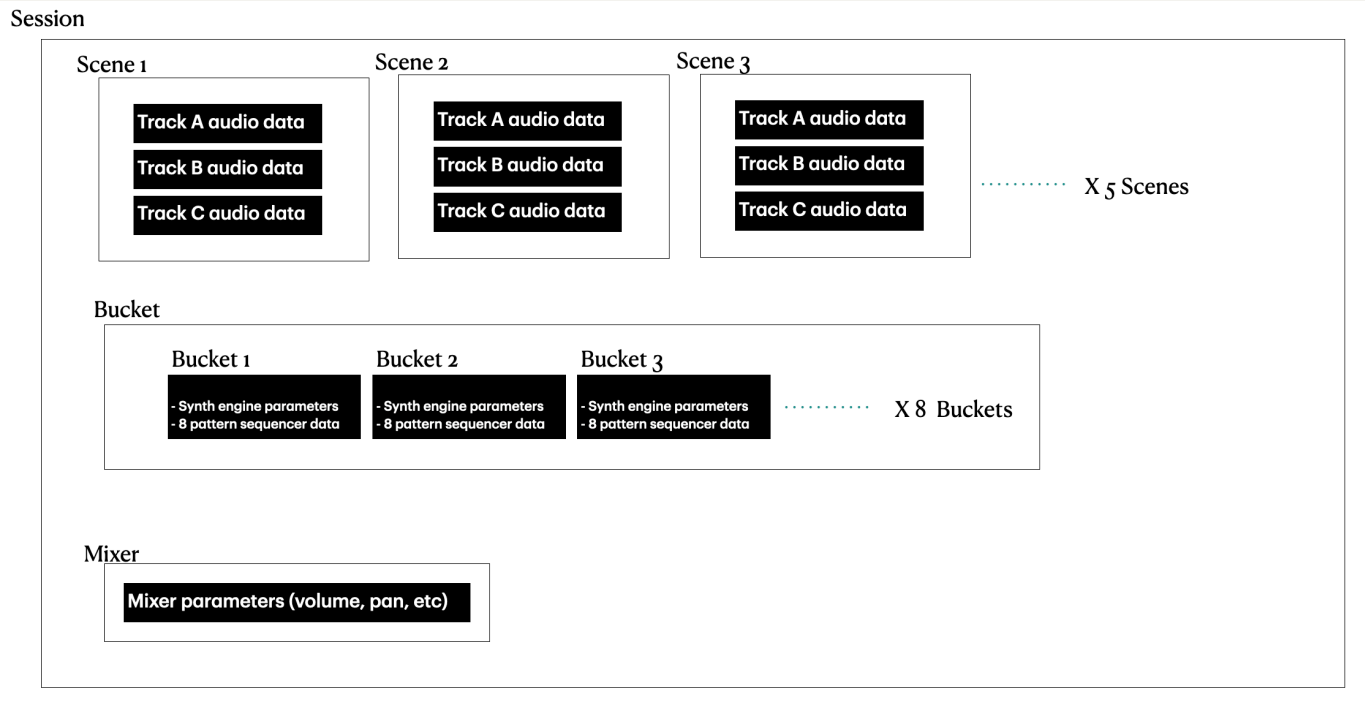
1. In parameter mode, press corresponding parameter long time (about 3 sec). For example, OSC1's Pulse Width is button 2 in OSC1 sub mode.
2. Then the parameter name and value will be shown in the screen. Keep pressing the button about 3 sec.
3. Send MIDI CC signal from your MIDI keyboard (Turn the knob or move fader). The sent MIDI CC# will control the assigned parameter.

Once the parameter is assigned, then "*" mark is indicated before the CC number. Original CC assignment is still working. It won't be affected with MIDI dumping.
MIDI learning will take any MIDI channel. For example, even if you set the device to receive MIDI channel 2, MIDI learning can receive CC# for channel 3, or any other channels.

To cancel the override, do the same operation again.

To avoid confusion, this setting won't be saved.

Session



Session is the biggest data unit of the synth.
Session includes 8 preset buckets. Each bucket contains one preset with 8 pattern sequencer data.

There is no "new session" function. The synth always create a new session when booting. Reboot the device for new sesion.

Session button operations work in Parameter mode or Play mode

BUTTON	FUNCTION
SHIFT + LOOPER PLAY	Show current session number
SHIFT + LOOPER PLAY + Turn Dial	Load session
NO or OK button while you selecting session	Scroll session page when you have more than 32 sessions
SHIFT + REC	Save session (Looper stop will perform session save when autosave is on)
SHIFT + REC (Long press)	Name session
SHIFT + REC + B[1-3]	Load wav file to looper track A, B or C
Press B[1-8] while booting	Load previous LOOPER folder. (Button1 means LOOPER00, Button 2 means LOOPER01, and so on)

To load session, press SHIFT + LOOPER PLAY when you are not in System mode or Granular mode. Current session number "Looper00:0001" will be indicated. Turn dial to select the session you want to load.

Saving session is semi-automated.
Looper recording data will be saved immediately after the recording.
Mixer and Bucket data will be saved when LOOPER STOP button is pressed.
This can be turned off in System2 menu.

You can import WAV files to session. Put WAV files under "import" folder. Folder structure is supported so you can make subfolders to organize samples.
WAV format has to be **16-bit, 48000Hz, Mono**. Otherwise "Format error" message is shown.

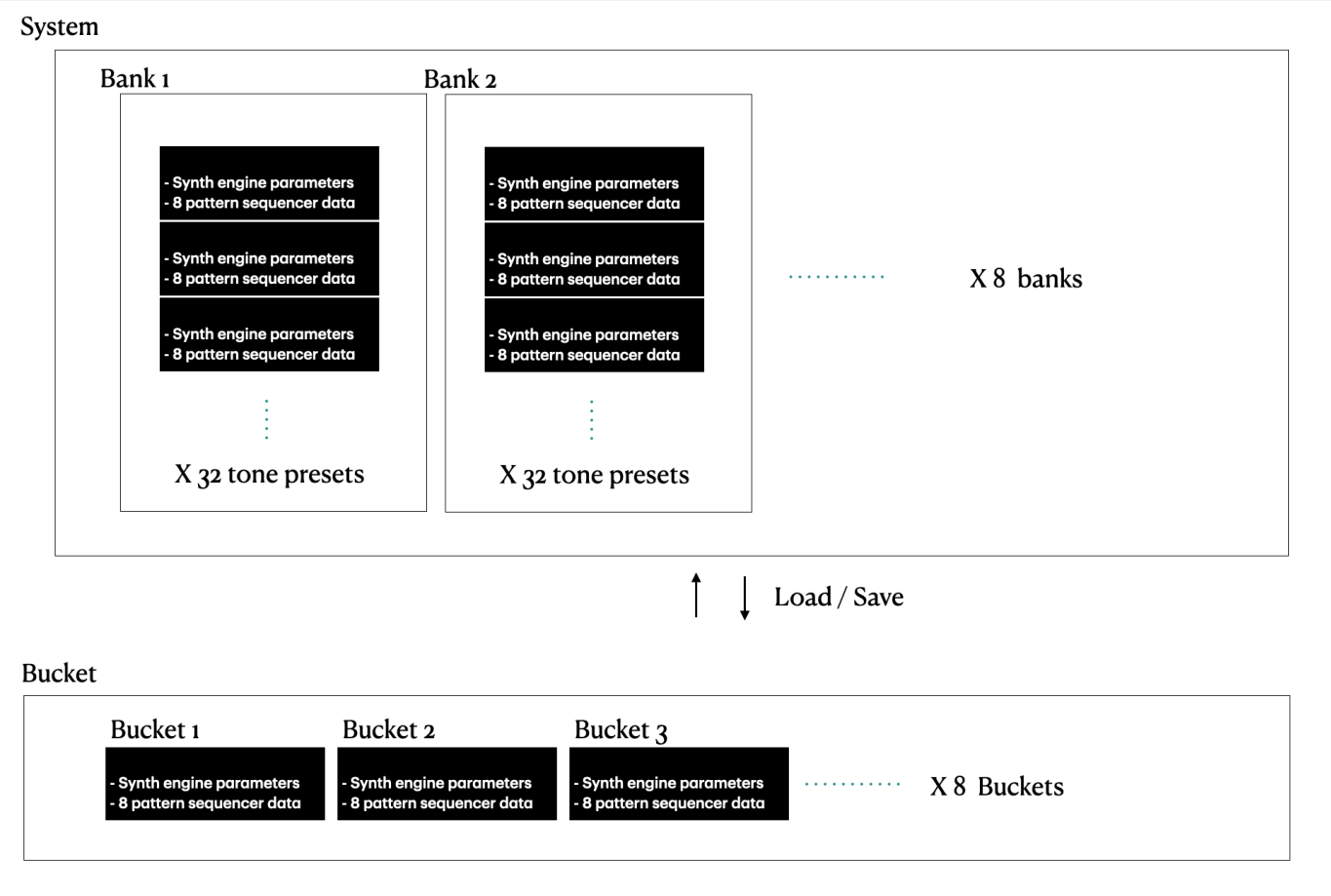
To import file, set proper BPM first, then press SHIFT + LOOPER PLAY + [1-3] button. [1-3] button corresponds the destination track.
The data is trimmed to the closest the end of the measure.

To load the file without exiting file selection, press SHIFT+OK instead of OK. You can control looper and sequencer while you are in the file selection mode. Play the loop by pressing LOOPER PLAY and SEQ PLAY to start looper playing.

If you have existing recordings in the session, WAV file will be cut to the current scene's looper length. You can use empty recorded track just to cut the WAV file to match the loop length. Otherwise it's trimmed to the longest point of the end of the measure.

Preset bucket

The synth has 8 preset buckets to recall preset quickly. Each bucket contains one preset and 8 sequencer pattern.



BUTTONS	DESCRIPTION
MODE PLAY + B[1-8]	Switch Bucket

Solid LED indicates current bucket you are in when pressing MODE PLAY button.

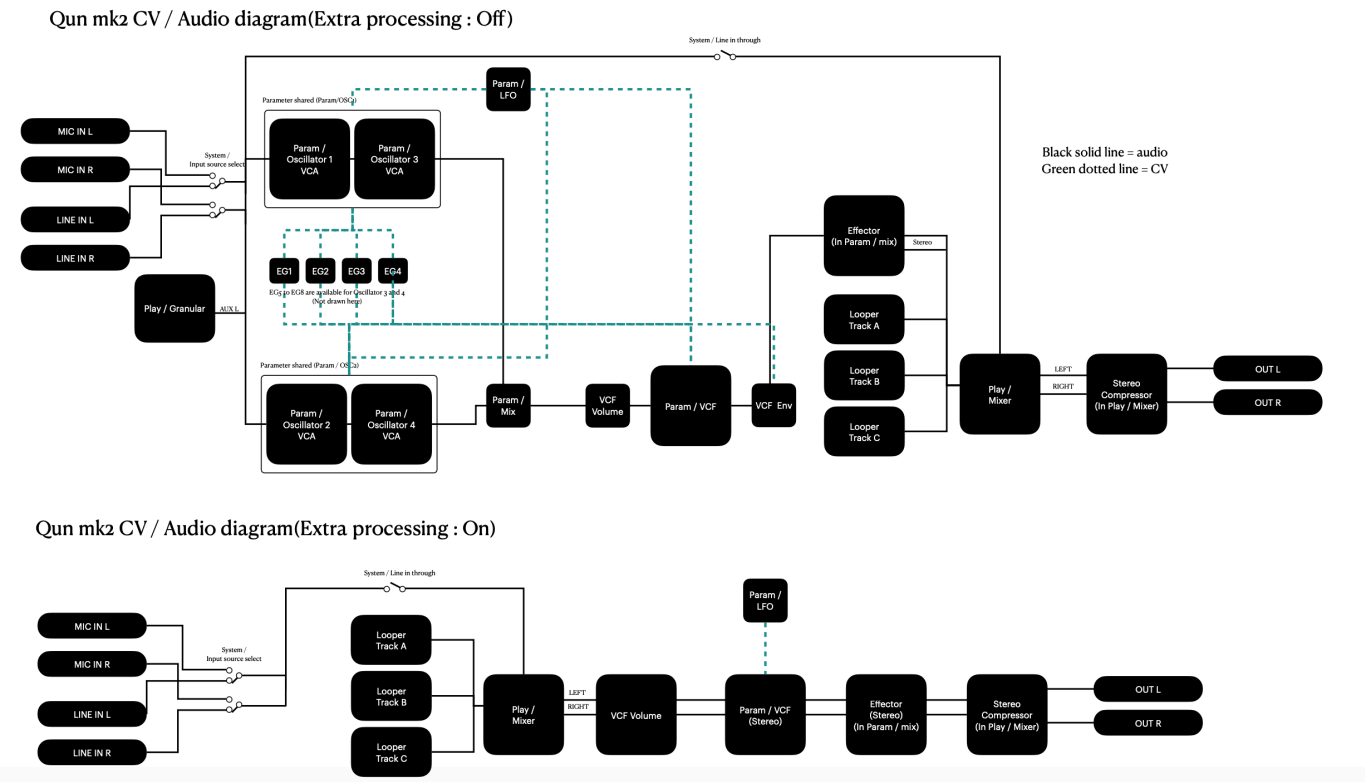
Bucket information is automatically saved with Session.

To understand how bucket works, try the following steps:

1. Reset the board
2. Change some parameter to configure the sound, let's set it to Sine wave.
3. Press Recall(Mode/Play) + Button 2 to switch Bucket 2
4. Then the sound should be changed to the default SAW wave.
5. Change some parameters to program, let's set it to White noise.
6. Press Recall + Button 1 to switch back to Bucket 1
7. The first sound you configured should be recalled.
8. Press Recall + Button 2 to switch to Bucket 2 again
9. White noise should be recalled.

There is no copy function between bucket, but you can use preset bank 1 to bank 8 as a copy buffer.
When you save the preset or load the preset from bank 1 to 8, the name is used to indicate the bucket, so always recommending to set name by saving or loding preset.

Signal diagram



Parameter Mode

PRM:OSCILLATOR1,2

The parameter position in the display corresponds button assignment.

```
1  3  5  7
2  4  6  8
```

The oscillator is a hybrid of classic analog synth, FM and granular.

BUTTONS	DESCRIPTION
1	SHAPE. `Saw, Sine, S&H, Square, Triangle, W Noise, P Noise, FM, AUX`. *AUX means audio input from LINE or MIC. *Granular synth engine is connected to AUX L channel when it's active. See Granular section for detail.
2	PULSE WIDTH. Triangle, Square and Granular can take PWM. In guranular mode, playing position will be changed by PWM.
3	TUNE
4	OCTAVE
5	MOD TUNE. MOD modulation to tune. Default MOD source is EG1.
6	MOD WIDTH. MOD modulation to pulse width.
7	LFO TUNE. LFO modulation to tune.
8	LFO WIDTH. LFO modulation to pulse width.

PRM:MIX

Mix controls mixer and effects.

BUTTON	DESCRIPTION
1	OSC MIX. Balance between OSC1 and OSC2
2	FM modulation OSC2 to OSC1
3	VCF Volume. Input gain to VCF
4	Line In / Mic gain
5	Effect type . Off, Delay, Chorus1, Chorus2, Flanger1, Flanger2, Crusher (Bit crusher), MDelay(Mono delay), DDelay(BPM Synchronized digital delay), RSVD(Reserved for the future update)
6	Effect Speed. Controls Effect LFO rate or delay time.
7	Effect Depth
8	Effect Feedback

Effector tips

- The Delay speed can be set very short. Very short delay can be used to create an interesting simulation of flute or violin. Mono Delay will work better for the use delay as a resonator.
- You can widen stereo image by short delay.
    - Effector Type : Delay
    - Speed : Around 30
    - Depth : Around 30
    - Feedback : 0

- Digital delay is BPM synchronized. It also can be used as beat repeat by setting 100% of feedback, and 100% of depth.

PRM:ENV1/2

The synth has four Envelope generators. ENV1 and ENV2 are both independently and fully configurable. ENV3 and ENV4 shares the parameter. ENV3 / ENV4 is connected to FM operators when it's configured (FM ENV3 CONN).

BUTTON	DESCRIPTION
1	ENV 1 Attack
2	ENV 1 Decay
3	ENV 1 Sustain
4	ENV 1 Release
5	ENV2 Attack
6	ENV2 Decay
7	ENV2 Sustain
8	ENV2 Release

PRM:OSC Switches

Switches and modulation routing.

BUTTON	DESCRIPTION
1	OSC1 Env(VCA) source
2	OSC1 Wide tune switch. When it's on, OSC1's tune reacts much more sensitive.
3	OSC1 Modulation source
4	Env1 invert switch. It's useful when you use it as modulation source.
5	OSC2 Env(VCA) source
6	OSC2 Wide tune switch
7	OSC2 Modulation source
8	Env2 invert switch

PRM:LFO

BUTTON	DESCRIPTION
1	LFO SHAPE. `Saw, Sine, RevSaw, S&H, Square, Triangle, AUX, OSC2, OSC2EG`. OSC2EG is the signal from OSC after Envelope Generator processing.
2	LFO PULSE WIDTH. When it's applied to SAW wave or SINE wave, it will affect to phase offset, it's useful with BPM sync and retrigger.
3	LFO TUNE
4	KEYSPLIT. This is a unique feature of the synth. When it is not zero, then note number above the parameter becomes LFO rate controller. If you set 60, then C4 or higher note becomes LFO controller.Higher notes will generate higher LFO rate. If you press multiple notes, it doubles and triples the rate, great for live performance.
5	LFO MOD TUNE. MOD modulation to tune.
6	LFO MOD WIDTH. MOD modulation to pulse width.
7	LFO MOD Source. `EG1, EG2, EG3, EG4, AUX, OSC2, OSC2EG, FRQ1, FRQ2`
8	LFO Retrig. LFO’s phase is reset by every note hit when it is ON.

PRM:VCF

BUTTON	DESCRIPTION
1	CUTOFF
2	RESONANCE
3	VCF TYPE `LPF,BPF,HPF,Notch`.
4	VCF KEY SYNC. When it is not zero, VCF's cutoff will follows the playing note. Higher value is more sensitive.
5	VCF MOD CUTOFF. MOD modulation to cutoff.
6	VCF LFO CUTOFF. LFO modulation to cutoff.
7	VCF MOD SRC. MOD moculation source : `EG1, EG2, EG3, EG4, AUX, OSC2, OSC2EG, FRQ1, FRQ2, ON`.
8	VCF LFO Volume. LFO modulation to VCF's input volume. It can be used as vibrato.

PRM:KEY/OTHER

Configures other parameters.

BUTTON	DESCRIPTION
1	VCF 4/2 POLE / NoLinear. Select VCF number of poles and linear or no linear. 2P/4P/2PNL/4PNL.
2	VCF ENV Src. Applying Envelopes to the signal after VCF. You might want to set OSC1/2's Env sel to "ON" to utilize this parameter. This is useful only with Mono mode.
3	GLIDE. Smooth transition between notes. Works with Mono.
4	BEND RANGE. Pitch bend range.
5	OSC1/2 Keysync. This is a switch to connect MIDI input note and oscillators. Y = Follow MIDI note pitch. N =Ignore MIDI note. You can still use freq1 freq2 for modulation to use MIDI note pitch.
6	VELOCITY SW. Envelope generators become velocity sensitive when it’s ON.
7	MONO/QUAD/POLY (Voice mode). Long press to sync Oscillator parameters. Check the following section for detail.
8	LFO BPM sync. LFO rate will synchronize with Sequencer's BPM when it is ON.

Voice Mode

One synthesizer can be used as Monophonic or Quadphonic.

- Mono = Mono (2 OSCs per voice)
- Quad = Quad Tone (1 OSC per voice, and the engine has total 4 oscillators for the extra voices)
- PolyMono = 2 OSCs per voice, but you can get 2 voices
- PolyQuad = 1 OSC per voice. It's for Polyphonic setup when you have multiple Qun synthesizers.

When the mode is Quad or Poly Quad, MIX and "OSC2 Env Src" are ignored. MIX is always set to middle, and OSC2 Env Src is always set to EG2. Most of cases you want to use the same parameters between Osc1 and Osc2 with Quad mode.
To copy the parameter from OSC1 to OSC2 (and EG1 and EG2), long press button 7. "OSCs

synched" message will be shown.

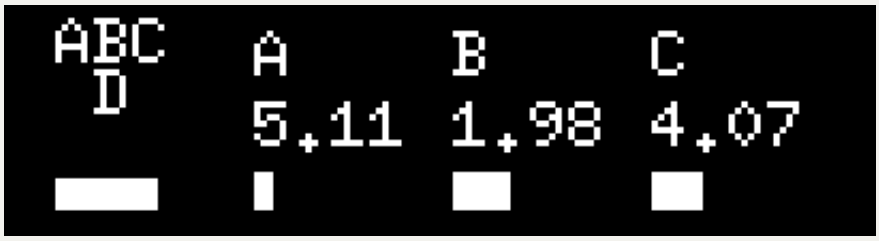
Here is an example to set up Quad mode

```
1. Initialize tone.
2. Configure OSC1 as you like.
3. Set this parameter to "Quad" mode by pressing button 7.
4. If you want to copy OSC1 parameters to OSC2, in the same submode,
long press button 7 until "OSCs synched" message shown.
5. Play two notes by external MIDI keyboard. You will hear four
voices.
```

Poly Mono can be used when you want 2 voices with 2Oscs per voice configuration.

Poly Quad is for multiple device stacked configuration. You can use multiple Qun Synthesizers to build polyphonic synth.
Please see “Polyphonic setup” for detail.

PRM:FM



The synth has 2 x 4 operator FM engine. OSC1 or OSC2 can be set to FM mode.
Each operator has sine wave.
OSC1 and OSC2 share the FM parameter.

BUTTON	DESCRIPTION
1	FM Algorithm
2	D Amplitude
3	A Frequency
4	A Amplitude
5	B Frequency
6	B Amplitude
7	C Frequency
8	C Amplitude

FM ALGORITHM

"ABCD" indicates each operator.
Vertical relationship means upper operator modulates lower operator.
For example,

```
    A
B C D
```

This means that operator A modulates operator D. B, C and modulated D will be mixed in parallel.

```
A
B
C - D
```

This means A modulates B, the result modulates C, the result modulates D.

Oscillator (ABC)’s frequency (multiple of frequency of D)
When FM FREQ SNAP (In ENV3/4 Other sub-menu) is off, it be adjust to the exact frequency of harmonics (2,3,4,5..). If you want clean FM sound, turn FM FREQ SNAP on.

PRM:ENV3/4 / Other

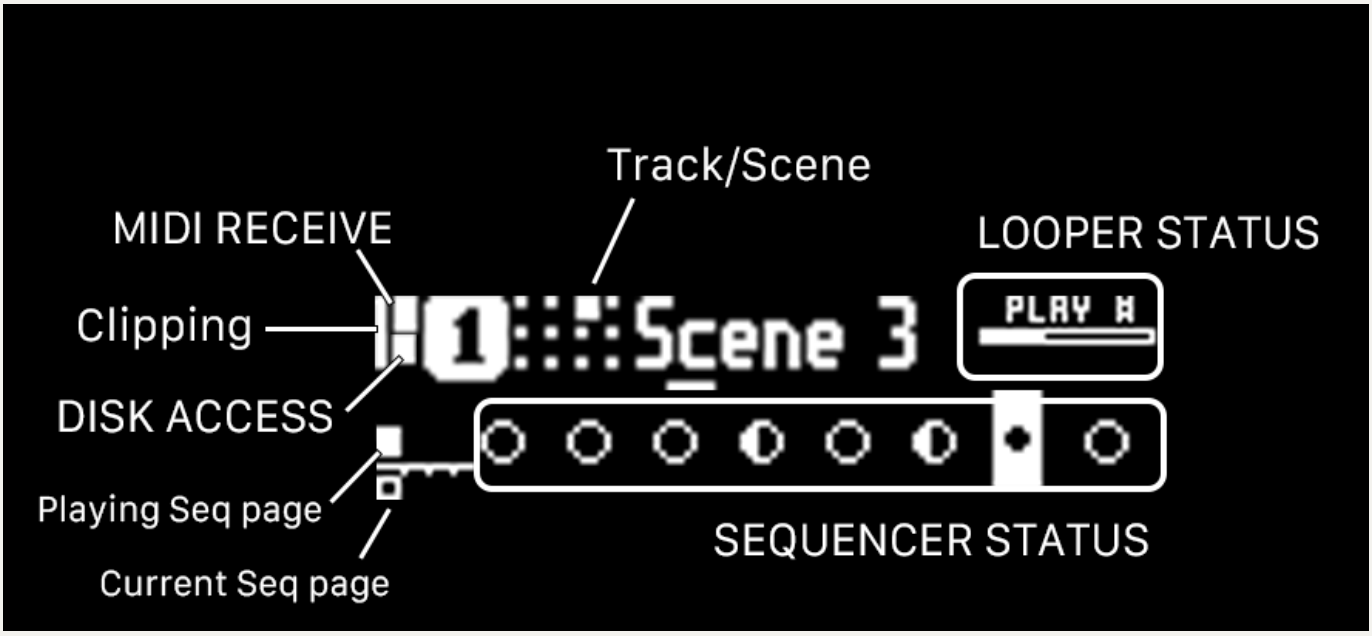
BUTTOM	DESCRIPTION
1	2ND FILTER. See the following section for detail.
2	FM FREQ SNAP SW. Frequency snapping for FM. When it's ON, FM frequency will be snapped to numbers. When it's OFF, FM has more character, the signature sound of the QUN synth.
3	Wavefolding. Wevefolding curve selection. This filter is located in VCF.
4	FM ENV3 CONN. Select FM operator(s) to connect ENV3/4. After the processing, it will be filtered by ENV1 or ENV2.
5	ENV3/4 ATTACK
6	ENV3/4 DECAY
7	ENV3/4 SUSTAIN
8	ENV3/4 RELEASE

2nd filter

Second filter can be used when you use 2 pole filter for VCF. It's disabled when 4pole is selected.

MODE	DESCRIPTION
NC200	Notch filter at 200Hz. It will remove some muddy.
NC1K	Notch filter at 1kHz. It will remove some highs.
LS100	Low-shelf at 100Hz. It will boot bass without cutting high.
LS150	Low-shelf at 150Hz. It will boot bass without cutting high.
LS200	Low-shelf at 200Hz. It will boot bass without cutting high.
LS300	Low-shelf at 300Hz. It will boot bass without cutting high.
HP80	Highpass at 80Hz. It will remove low-end bass to get more clear sound.
LP4K	Lowpass at 4kHz. It will remove high-end.
PK100	Peak filter at 100Hz. Similar to band-pass filter, but Peak filter boots the peak frequency but it will not cut other frequency like band-pass filter.
PK150	Peak filter at 150Hz.
PK200	Peak filter at 200Hz.
PK300	Peak filter at 300Hz.
PK400	Peak filter at 400Hz.
PK800	Peak filter at 800Hz.

PLAY MODE



Disk access indicator is active when system is accessing SD card. Some actions are restricted while writing.

Track / Scene tile shows selected track (A,B or C) and Scene number (1 to 5).

Looper status shows Looper position and status.

Clipping indictor is active when signal is clipped at the end of signal chain, after compressor.

COMMON SEQUENCER / LOOPER OPERATIONS

Most of action works in any major mode, not limited to Play mode.

BUTTON	FUNCTION
SEQ PLAY	Start / Stop Sequencer
REC + SEQ PLAY	Start Sequencer live recording
LOOPER PLAY	Start Looper

LOOPER STOP	Stop Looper
LOOPER REC + LOOPER PLAY	Start looper recording
SHIFT + SEQ PLAY + turn dial	Set BPM
LOOPER PLAY + [1-5]	Select Scene
REC + [1-3, 7,8]	Select recording track. A,B,C are mono tracks. Press 7, 8 for stereo recording. 7=A(Left)+B(Right), 8 = B+C. When you do stereo recording, you may want to set pan to left and right for the selected stereo tracks.
PARAM + [1-3]	Mute track
PARAM + NO	Toggle Extra processing
MODE PLAY + [1-8]	Recall preset bucket
SEQ PLAY + [1-8]	Select Sequencer pattern
SEQ PLAY + NO / OK	Move to previous / next Sequencer page
SHIFT + SEQ PLAY + NO / OK	Copy Sequencer page to previous / next Sequencer page
SEQ PLAY + [1-8] + turn dial	Copy sequencer pattern to other pattern. If you want to cancel the operation, turn to the end, then "CANCEL" will be indicated as the destination. To initialize the bank data, turn the dial to "CLEAR".

NO	Select previous pattern
OK	Select next pattern
SHIFT + LOOPER STOP	Delete all track recordings in the current scene, reset recording length
REC + NO	CUT Looper track
REC + OK	PASTE Looper track
REC + PARAM	UNDO last recording for the track
MODE PLAY + PARAM + Turn Dial	Parameter Lock Morphing

Sequencer overview

Tutorial video (https://www.youtube.com/watch?v=vZqdzkTQ1Mg)

The sequencer is an 8/16 step sequencer. One page has 8/16 steps and it can have up to 4 pages.

The sequencer UI is influenced by analog 8 step pattern based sequencer. You can on and off pattern and change parameters for the steps.

Sequencer data will be saved when you save tone preset, and with the Session. Each preset can have 8 sequencer patterns.

You can run multiple sequencer at the same time, up to three patterns, as normal parallel running or relative running. See PLY:SEQ CONFIG for detail.

Sequencer live recording

You can record live playing to the sequencer. Rec + SEQ PLAY to start recording. Play on Piano mode or play with external MIDI keyboard to record notes. It's always overdubbing. Note, Width(length) and velocity will be recorded.
Sequencer playing position indicator changes when live recording.

Normal:

Live recording:

Press SEQ PLAY to exit recording mode, sequencer will keep playing. Press SEQ PLAY again to stop sequencer.

You can (re)enter recording mode while playing. Press Rec + SEQ Play to enter recording mode.

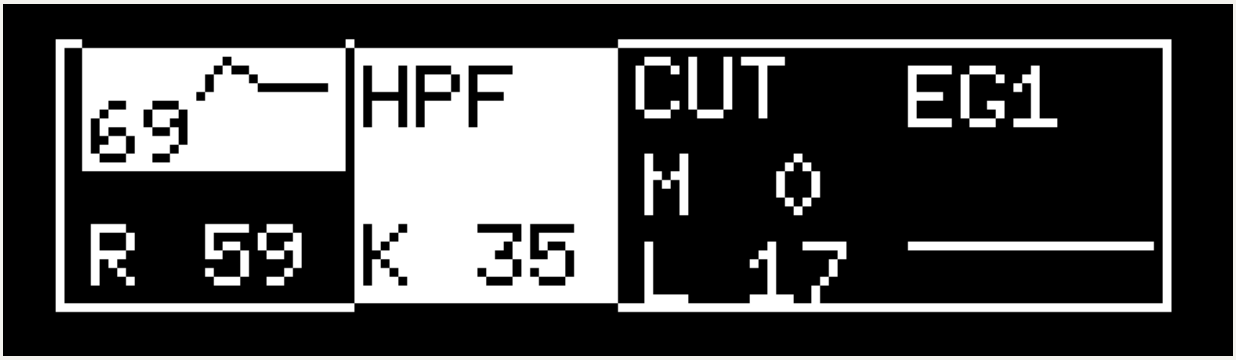
Click sound (metronome) plays when live recording is ongoing.

Parameter Lock

Parameter lock is the term used in Elektron sequencers, which is temporary parameter change available only in the specific sequencer step. The parameter change appears only when the sequencer is playing the step.

Here is the steps to set Parameter Lock:

1. In Play mode, you should be one of the following modes: ON/OFF, Tune, Width, Velocity, or Probability, press button 1-8 to select the step that you want to set Parameter Lock
2. Keep pressing the button, and press [PARAM]. Mode switches to Parameter Lock mode. White frame indicates you are in Parameter Lock mode.
3. Change the parameters that you want to change. Once the parameter changed, the parameter area will be inverted, indicating the step is modified.



4. You can set up to three parameters to modify.
5. To finish the editing, press [PLAY] to go back the sequencer page.
6. You will see [""] mark at the top of the step when the step has Parameter Lock.

7. To reset the modification, long press Button 1-8 + [PARAM] when entering Parameter Lock mode, or long press [PARAM] when in Parameter Lock mode.
8. Once you changed one parameter, you can change the last edited Locking parameter by pressing [1-8] + [PARAM] + Turning dial without re-selecting the parameter.

Parameter lock will be triggered only when the step is turned on.

Shift + turn dial is a useful way to sweep between submodes to find out modified parameters.

Parameter Lock morphing

You can morph Parameter Locking between two patterns.

1. Let's say you are in pattern 1. Set Morph Pattern in Sequencer configuration menu. Set the Morph pattern to 2. (Long press button 4)

2. Copy pattern 1 to 2 by SEQ PLAY + [1-8] + Turn dial
3. Move to pattern 2
4. Modify the Parameter Locking in pattern 2
5. Go back to pattern 1
6. Morph can be done by pressing [MODE PLAY] + [PARAM] + Turn dial

Looper overview

Tutorial video (https://www.youtube.com/watch?v=iD4WpX3tHUE)

The looper is designed to work with sequencer. The looper always tries to sync with sequencer play. Looper won't start playing when sequencer is not running. Use blank sequencer pattern when you don't want to make sound from sequencer.

To start looper recording, hit LOOPER REC + LOOPER PLAY. If the sequencer is not running, it will not start recording but it's stand by for recording. In this case, press SEQ PLAY to start recording. When the sequencer is playing, the recording will be started at the beginning of the next measure.

First recorded track will define the length of the loop.

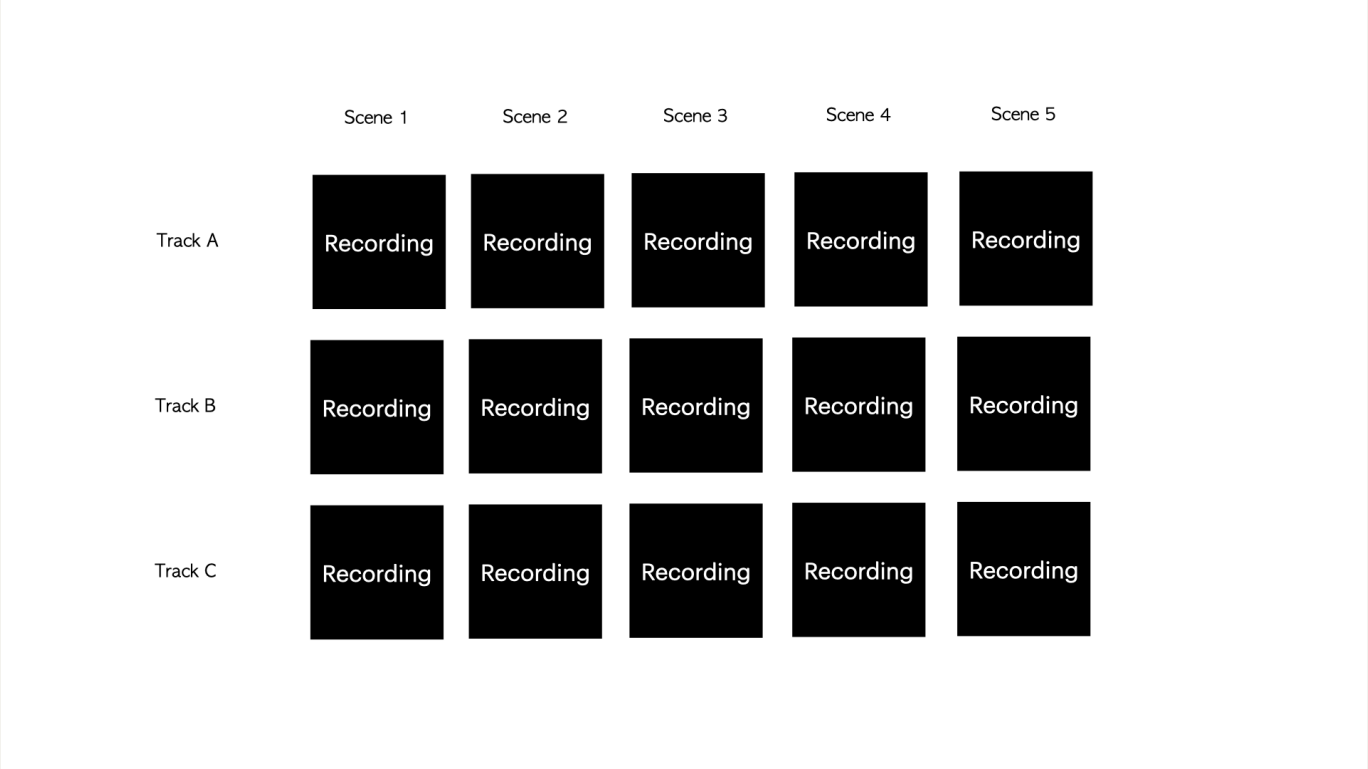
Press LOOPER STOP when you finished the recording. You don't need to press the stop button precisely, you can press earlier, then recording will be finished at the end of the measure.

Looper keeps playing the recorded sound. All recorded data will be saved to SD card immediately.

When you press REC + LOOPER PLAY twice (or shift + REC + Looper play), the recording mode will be REC mode. In REC mode, it will overwrite existing recording. It will change loop length when the new recording is longer than the existing one.

Looper has 3 mono tracks. REC + [1-3] button to select recording track. Each recording can go up to about 25 seconds. You can record track as stereo by pressing REC +[7 or 8]. A(Left)+B(Right) or B+C will be selected. With stereo recording, you may want to set pan to left and right for the selected stereo tracks.

One set of recordings is called Scene. Looper has 5 Scenes. LOOPER PLAY + [1-5] to select scene.



Reduce record volume (-3.0dB or more) in Mixer to avoid clipping. MODE PLAY + turn dial to change the value.

Cut / Paste can be used for temporary saved area or delete the track. REC + NO to Cut, REC + OK to Paste.

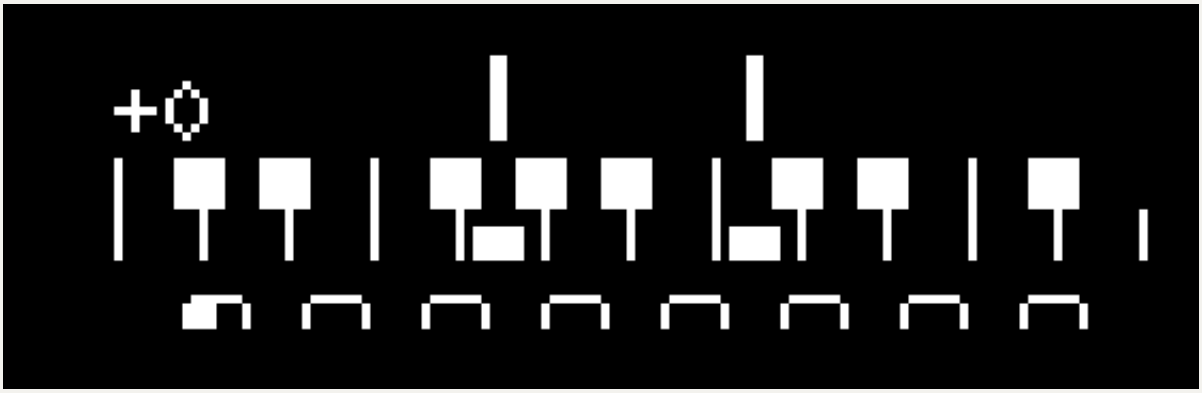
All recorded data, Preset bucket and Mixer data will be saved as a Session automatically. Recording data save immediately and other data will be saved when looper playing is stopped. Recording data is standard WAV file so you can import them to DAW.

Looper live playing / Partial scene switch

Scene is powerful feature. You can play looper like Ableton Live's Session view.
Play sequencer and looper, then LOOPER PLAY + [1-5] to select scene. Scene will be switched at the end of the measure. Synchronized switching works only when sequencer is playing.
You can switch Scene even if it's not the end of the recording. Changing point is the end of sequencer's measure.
Normally all tracks moves to new Scene, however, you can partially switch scene as well. Press LOOPER PLAY + [6-8] + [1-5]. [6-8] buttons tells which tracks you want to switch, and [1-5] is the scene number. Looper length can be different.
PARAM + [1-3] to mute tracks.

Use Preset Bucket to keep preset settings. You can recall tone preset and patterns in a sec by using Preset Bucket.

PLY:PLAY PIANO

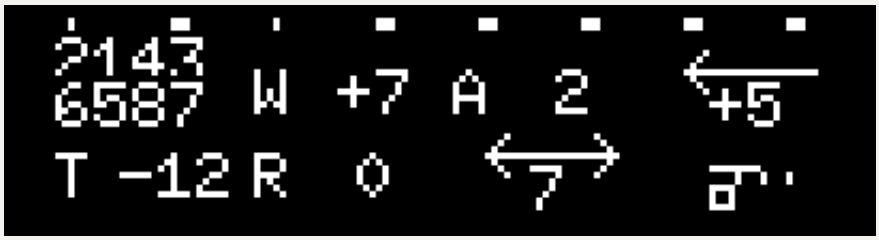


The mode is simple piano playing mode. Default is chromatic scale, but the scale and key can be changed by the scale setting in SEQ Config mode. Turn dial to transpose.

Temporary piano mode

You can activate Piano mode anytime by keep pressing SYSTEM + button 1-8. You can change transpose by turning dial once piano mode is activated.

PLY:SEQ MODIFY



This controls modifier of the sequencer pattern.

BUTTON	FUNCTION
1	Pattern shuffle.
2	Transpose.
3	Width Offset (note length). / Long press for playing Pattern shuffle
4	Note Randomness
5	Arpeggiator
6	Rewind Period
7	Rewind Steps
8	Apply modifiers to the current sequence page

The Modifier is powerful feature, it will give algorithmic effects to the pattern. Those effects will be applied to current pattern without breaking the pattern data. Also you can apply modifiers to the pattern to make the effect as permanent.

- Transpose will add offset to the pattern. Scale quantize (SEQ Config button 3) will help to keep the result musical.

- Width Offset will change the note length.
- Randomness will add some randomness to playing notes. Scale quantize (SEQ Config button 3) will help to keep the result musical.
- Arpeggiator will add note offset. Scale quantize (SEQ Config button 3) is important to generate usable Arpeggiator result.
- Pattern Shuffle will shuffle the playing order of the pattern. It is not random shuffle, so you can make creative and unexpected result without randomness.
- Rewind period and Rewind steps define the periodical rewind of the sequencer. However, the step goes back to 1 when playing count reaches the length of the pattern.

You can permanently apply the modifiers by pressing button 8. The result will be stored to selected sequence page. If you want to apply only partial steps of the page, you can press [1-8] buttons to unselect steps. Press OK to apply the modifiers while pressing [1-8] buttons.

You will be asked resetting the modifiers or not resetting the modifiers. If you don't reset modifiers, then the modifiers will be reapplied to the result, so resetting modifiers is recommended to avoid confusions.

If the pattern has more than 8 steps, the modifier will be applied to only the current page. If you want to apply the modifiers to all pages, you don't want to reset modifiers.

After you applied the modifiers, the modifier values would be reset. Apply is powerful tool to create generative pattern.

PLY:SEQ ON/OFF

The sequencer has 8 steps per page, but it has more modes than ON/OFF.
You can set different type of notes by turning dial while you press the button.

STATUS	MEANING
Left-filled circle	One note in the step.
Right-filled circle	One note in the step but it plays at the second half.
Fully-filled circle	Two notes in the step (1/16th).
Striped circle	3 notes in the step (triplet).
Striped square	4 notes in the step (1/32th)

PLY:SEQ VELOCITY / WIDTH / PROBABILITY

Press one of the eight buttons and turn the dial, then it will modify velocity / width / probablity for each step.

If you press NO or OK while pressing [1-8] button, you can edit subdivision's parameter.

INDEX NUMBER	MEANING
0	Main value, it will be used for the first-half note and other notes when other Index number is off
1	2nd half of the note (Used with 1/16th note)
2	3rd of the note (Used with triplet)
+0	Main value for the second voice. Useful with Quad mode
+1	2nd half value for the second voice. Useful with Quad mode
+2	3rd value for the second voice. Useful with Quad mode

PLY:SEQ TUNE

Press one of the eight buttons and turn the dial, then it will modify tune offset for each step.

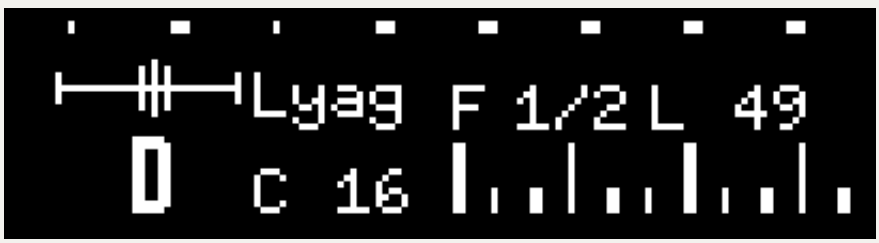
If you press NO or OK while pressing [1-8] button, you can edit subdivision's parameter.

INDEX NUMBER	MEANING
0	Main value, it will be used for the first-half note and other notes when other Index number is off
1	2nd half of the note (Used with 1/16th note)
2	3rd of the note (Used with triplet)
+0	Main value for the second voice. Useful with Quad mode
+1	2nd half value for the second voice. Useful with Quad mode
+2	3rd value for the second voice. Useful with Quad mode
++0	Main value for the 3rd voice. Useful with Quad mode
++1	2nd half value for the 3rd voice. Useful with Quad mode
++2	3rd value for the second voice. Useful with Quad mode
+++0	Main value for the 4th voice. Useful with Quad mode
+++1	2nd half value for the 4th voice. Useful with Quad mode
+++2	3rd value for the 4th voice. Useful with Quad mode

Playing note capturing from external MIDI keyboard

Alternatevely, you can step record notes by external MIDI keyboard. Play note by MIDI keyboard while you are pressing one of the eight buttons, the note will be recorded as the tune for the step. Chord playing can be captured as well.
https://www.youtube.com/watch?v=aV2YL0idMHA

PLY:SEQ CONFIG



BUTTON	FUNCTION
1	16th Swing / Long press for Sequencer MIDI channel out.
2	Key (for scale). / Long press for 2nd pattern
3	Scale. Playing note will be quantized by this scale. / Long press for 3rd pattern
4	Sequencer loop count. Default is 8. / Long press for Morph pattern.
5	BPM factor. Playing speed can be double, normal, 1/2, 1/4 or 1/8. Long press for 8th Swing
6	Velocity accent period (steps).
7	Velocity for the non-accent notes.
8	Velocity accent Period Offset

Velocity period settings (Button 6 - 8) provide a convenient way to make rythmic velocity.

Sequencer MIDI channel out is useful setting with external synthesizer. When you set it, the sequencer starts to emit MIDI out signal to external synthesizers. Since it's the parameter of sequencer pattern, you can assign different MIDI channel for every single pattern.

Morph pattern is used for Parameter Lock Morphing. Please refer "Parameter Lock Morphing" section in this manual.

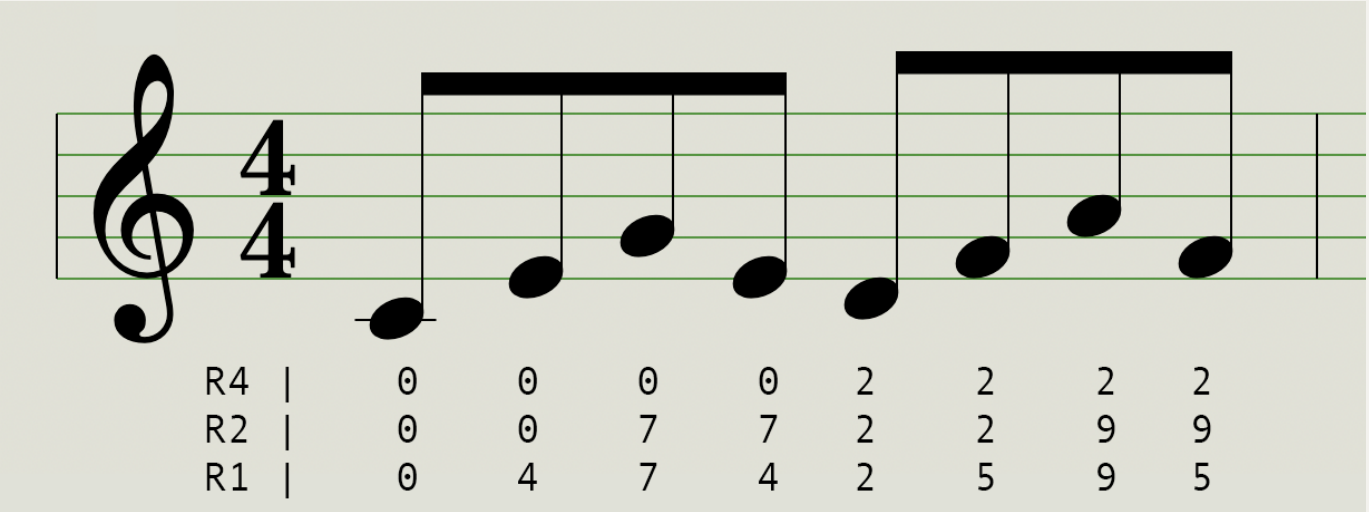
Running multiple sequence patterns

You can run multiple sequeence patterns at the same time, up to 3 patterns by setting "2nd pattern" (Long press button 2) or/and "3rd pattern" (Long press button 3). The status is shown like this:

```
2nd Pt : 2 R 4
```

The first number is the sequence pattern number you want to run (1 to 8).
The second number after "R" means period length for relative pattern run.
Select "R0" for the normal parallel run.

If you select R1 to R8, the second (or third) pattern will run as relative pitch to the primary pattern.
In this setting, C5 is the center (zero). The sequencer will update the transpose every configured period (R1 to R8) by looking at the current pitch in the primary pattern.



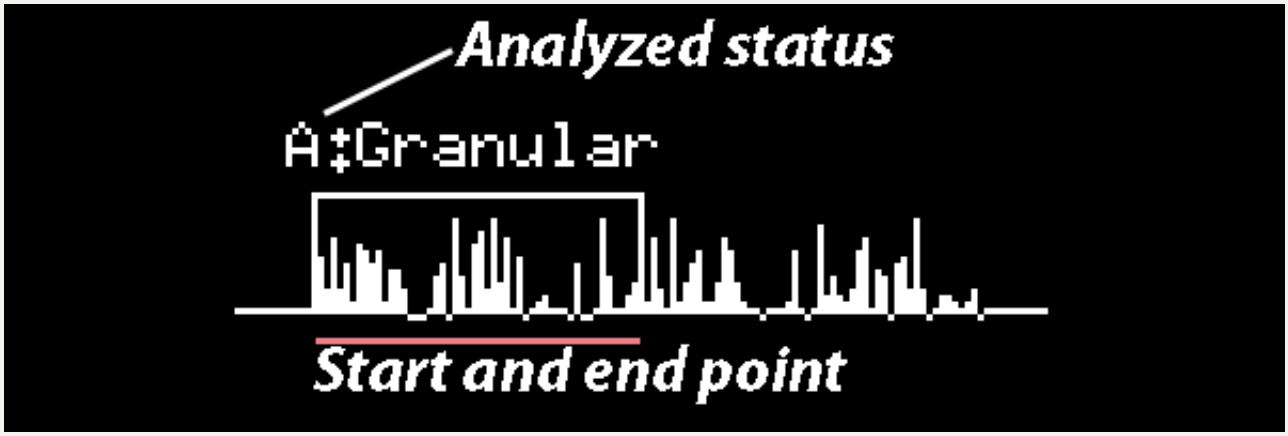
Let's say the above figure shows the primary pattern.

If you set "R4" for the second pattern, the transpose for the pattern will be updated every 4 steps. In this figure, 0-0-0-0 then 2-2-2-2 (The number is half steps).

If you set "R2" for the pattern, the transpose for the pattern will be updated every 2 steps. In this figure, 0-0 then 7-7, 2-2, 9-9 and so on.

In relative run mode, the second/third pattern's scale will be ignored, and primary pattern's scale quantize will be applied.

PLY: Granular



Overview

The synth features a Granular synthesis recorder.

- When GRN mode is set, ths Granular engine's signal is connected to AUX L channel. It means **Granular engine can be used as one of Oscillator shape**. You can assign Granular engine to Oscillator 1, and you still have Oscillator 2.
- You can make up to 8 slices when Slice Spread is not zero.
- You can record audio from LINE IN or MIC. Input sensitivity can be modified by "AUX In Gain" parameter in PARAM Mix menu.
- Pulse Width modulation will change File position (starting position) of the audio. That means the File position can be modulated by LFO and others.
- 4 Modes are available. **One shot, One shot with time stretch, Repeat, Repeat with time stretch**.
- Time stretch result will be improved when you process "Analyze" on the sample (Button 1 and select "Analyze"). "A" mark will be indicated when it's done.
- With One shot mode, you can route the signal to OSC1 AUX L and OSC2 AUX L.
- With initialized state of oscillator, +1 octave then C4 is the original pitch of the audio.
- The number of voice is limited in some Granular modes.

This is a simple setup to use the granular engine:

1. Move to Granular sub mode, and record or import audio.
2. Adjust parameters in Granular mode
3. Change GRN mode from OFF to something else. It overrides AUX L channel to

Granular engine's output.

4. Go Oscillator parameter page, and select OSC shape to "AUX L"
5. Play notes, set Octave +1 if needed.

Operation

BUTTON	FUNCTION
1	Process samples. Options are Analyze, Normalize, Reverse and Trim to head. Analyze will give better result with Time stretch.
2	Slice spread, half-steps. Please see below section for detail.
3	File position (Starting point).
4	Length
5	Speed. It won't work with non-time stretch modes.
6	Number of Grain. It won't work with One-shot modes.
7	Detune. (Octave highs and lows)
8	GRN Mode. OFF, ONE(One shot), ONE_TS(One shot with time stretch), RPT(Repeat), RPT_TS(Repeat with time stretch). When the mode is not OFF, It will override AUX L signal to granular output when you use AUX L as Oscillator shape. With time stretch, playing speed will be preserved. Without it, pitch and speed are linked like an analog tape. Execute Analyze(Button 1) for time streching modes.
NO (<)	Previous slice
OK (>)	Next slice
LOOPER REC + LOOPER PLAY	Start recording granular sample
LOOPER PLAY	Start playing (Preview)
LOOPER STOP	Stop playing

SHIFT + LOOPER REC	Save Recording data
SHIFT + LOOPER PLAY	Load Recording data

LOOPER buttons acts as sample player in granular mode.

Having multiple slices (Slice Spread)

You can have multiple slices. To edit current slice, button 3 (Start point) and button 4(Length). NO or OK to switch between slices. If the slice length is zero then the following numbers of slices will be ignored.

When Slice Spread (Button 2) is set to more than zero, each slice 1-8 will be applied from the C4(60) note. One spread means half step.

Setting the Slice Spread to 1 is the most common use. Then the mapping will be the following:

```
- C4 : Slice 1
- C#4 : Slice 2
- D4 : Slice 3
```

And so on. This is useful for drum kit, or simple sample slicing.

Let's have another example. If you have piano sample of C4 and F#4, then you want to set Slice Spread to 5. The mapping will be the following:

```
- C4 : Slice 1 (Original pitch)
- C#4, D4 : Slice 1 with pitch shifting
- E4, F4 : Slice 2 with pitch shifting
- F#4 : Slice 2 (Original pitch)
```

And so on. As you see C4 and F#4 has 5 half-tone distance. It can be used for melodic instrument with multiple sampling points.

Slice Spread works on Repeat modes as well.

Import wav file from SD card

You can import WAV file if you put WAV file under /granular folder in SD card. And the looper record files will be shown at the end of the list, so you can load looper recorded data to granular as well.

Shift + Looper Play to import WAV file, Shift + Looper REC to export WAV file.

You can load the sample without exiting filelist mode. Press [SHIFT] + [OK] instead of [OK]. Press Looper Play to listen the loaded sample.

When granular mode is not OFF, the recording data will be saved when you save preset, so normally you don't need to save recording data here. It's designed to export recording data.

Granular synth tips

- Execute Analyze for better result of time stretch
- Play note slur with One-shot mode. It works very well. You can keep the tempo with One shot with time stretch mode.
- PWM (Width) will change sample starting point, it will generate interesting result.
- Glide parameter is fun parameter with Granular.
- Speed can go negative.
- Set the following to do unpredictable wavetable. Change start position or Pulse width for fun.
    - granular mode to RPT
    - Grain to 1

- Short GRN Length (Less than 30)

PLY:MIXER

Three track Mixer. At the last stage, signal can be **stereo** by panning tracks.

BUTTON	FUNCTION
1	Track A volume
2	Track A Pan
3	Track B volume
4	Track B Pan
5	Track C volume
6	Track C Pan
7	Compressor threshold
8	Compressor makeup
MODE PLAY + turn dial	Record volume
MODE PLAY + SYSTEM + turn dial	Looper master volume
SYSTEM + PARAM + turn dial	Cross fade between Record volume and Looper volume

This mixer has a compressor. Ratio, attack time and release time are fixed (1:3, attack 30ms, release 100ms).

To turn off compressor, set Compressor threshold to zero.

See clipping incidator if you want to avoid clipping. The synth does soft clipping, so the clipped sound is preferrable sometimes.

Mixer setting will be saved when Session is saved.

Extra processing

This is the mode to use the sound engine to use as an effector.

You can toggle Extra processing mode by **PARAM + NO** button.

When it's enabled, the Oscillators are turned off, but filter and effector becomes stereo, and connected to after Looper.
You can apply filter, filter volume, and effects against Looper recording. **See the signal diagram to understand how it works.**

LFO is still available for filter modulation.

Extra processing can be recorded back to looper.

```
1. Stop the sequencer.
1. Select the recording track.
1. Turn on Extra Processing (PARAM + NO)
1. Set OVERDUB (REC+Looper Play) or REC (Rec+ Looper Play twice)
1. Start the sequencer, looper start recording
1. Hit looper stop button to stop recording
```

The following parameters are still available with Extra processing:

- All parameters in VCF sub-mode
- VCF Mod Sel
- VCF Volume
- 2 / 4 pole
- 2nd Filter (When VCF is 2 pole)
- All parameters in LFO submode
- Effector parameters (Type, Speed, Depth and Feedback)

SYSTEM MODE

Bank (1 to 8)

Load or save preset. Each bank can store up to 40 preset. Bank 6, 7 and 8 is used for factory install preset, but you can edit it.

BUTTON	FUNCTION
SHIFT + LOOPER REC	Save
SHIFT + LOOPER PLAY	Load

Sequencer data will be stored with preset.
Granular record data will be saved when granular mode is not OFF.

You can delete preset by pressing SHIFT + STOP (delete) while you are selecting preset.

SYS:SYSTEM

System Setting is the setting that is not included in the patch setting. To change the parameter, press the one of 8 buttons and rotate the dial.

BUTTON	FUNCTION
1	Input source (AUX) select
2	Number of devices
3	Device Index
4	Receive MIDI Channel
5	MIDI forwarding
6	Line in through
7	Line in HPF
8	Sync mode

AUX: Input source select. Select Mic (the board has two onboard microphones) or Line in. The setting will be stored in the flash memory. When you use LINE IN, set this setting to "LINE IN(2CH)". You can record the source to granular engine.

Number of devices: Number of devices for poly mode. Set 1 if you don’t have multiple devices. It will be stored in the flash memory.

Device Index: Device Index. Set 1 if you don’t have multiple devices. It will be stored in the flash memory.

RECV MIDI Ch: Configure receiving MIDI channel. Default is ALL. If you use it with Polyphonic setup, set the same channel or ALL for all devices.

MIDI Forwarding: MIDI message forwarding for standalone polyphonic configuration. When the option is ON, the message forwarding is active with PolyMono or PolyQuad configuration. It's not for generic MIDI forwarding like MIDI THRU. Do not turn this option with DAW configuration. Most of DAW will echo received MIDI message, it will cause an infinite MIDI message loop.

LINE in THRU: If it is AUTO, it is automatically turn on or off LINE IN pass through by mono / poly setting. If it is on, the synth always passes the signal to looper. If it is off, then line in through is always off. The gain is fixed to 1.

LINE in HPF: On is default. LINE in has two HPFs, one is external, one is internal HPF in the chip. This setting turns internal HPF. Turning this off will reduce HPF effect.

Sync Mode: `STOP, MIDI, 2PPQ, 4PPQ, 24PPQ, MOUT, MOUT2`. Select clock source for sequencer and LFO. See `Clock synchronization` for detail.

SYS:SYSTEM2

System2 is page 2 of system menu.
In System major mode, SHIFT + [OK] to go System2 menu.

BUTTON	FUNCTION
1	Quad mode On/Off
2	Ext MIDI Scale Quantize
3	Parameter caption On/Off
4	Session Autosave On/Off
5	Preroll for Click(Metronome)
6	Master volume
7	Slider assignment. See Touch Slider section for detail.
8	Screen Contrast

Quad mode enables quad voice (4 voices, 1 oscillator per voice) or dual-mono (2 voices, 2 oscillators per voice)
When the mode is off, voice will be Duo (2 voices, 1 oscillator per voice) or mono. Setting this mode will help to reduce system load.

Ext MIDI Scale Quantize : When it's on, sequencer's scale and key will be applied to external MIDI keyboard input. Default is off.

When the parameter caption is On, the parameter name will be shown when you press the button. It's a good option for initial training.

Master Volume controls hardware volume of the audio chip. Normally MAX(Default) is recommended. This is useful when your effector or recorder doesn't expect line level input.

Touch Slider

The four buttons located at the bottom board (Play, Set, Vol-, Vol+) can be used as a touch slider. Place your finger on the Bottons and slide.

Configure Slider assignment (System2, button 7) to activate the slider.

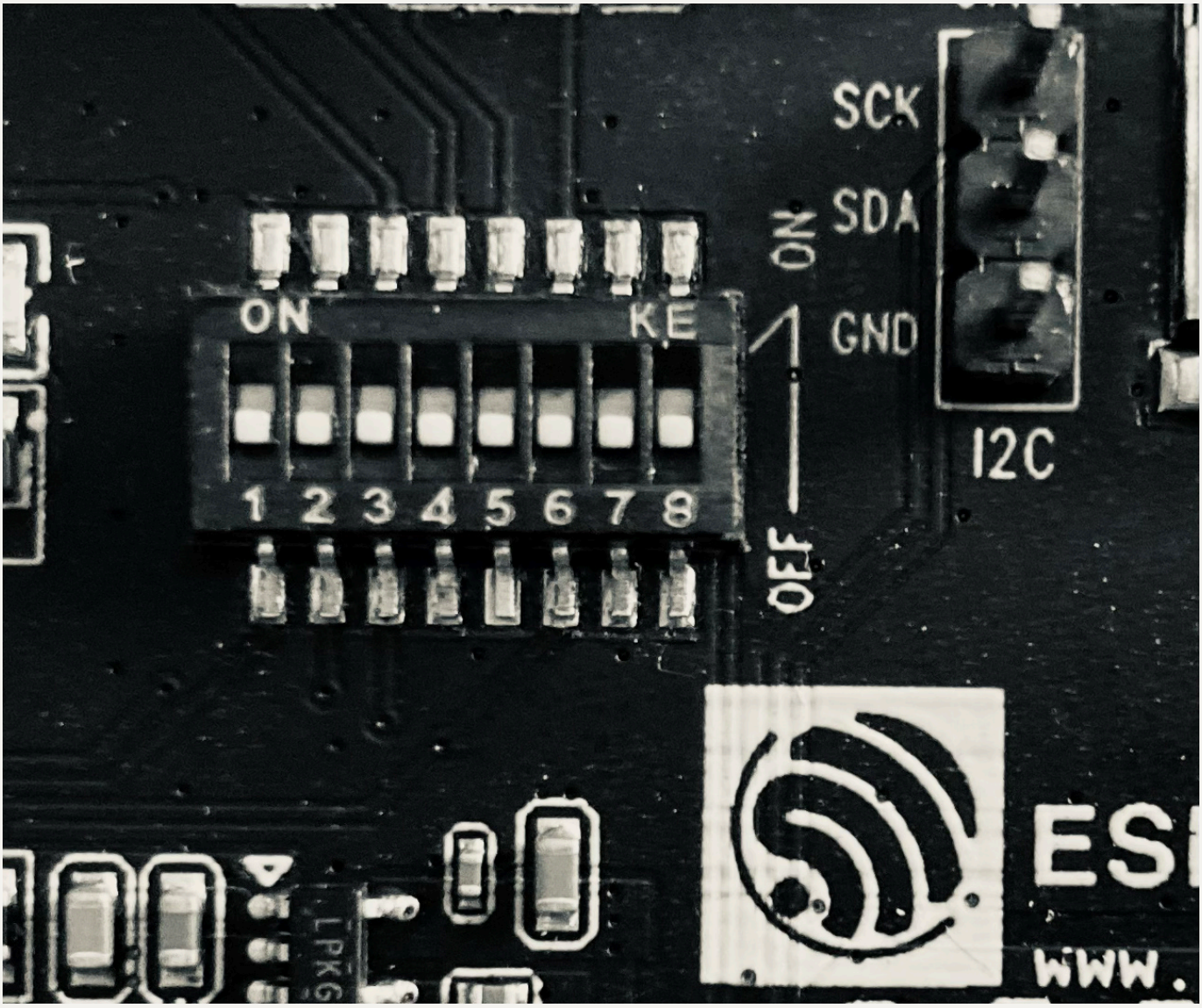
If you want to assign the slider to other than pre-defined ones, assign it to Mod wheel (or other MIDI CC parameters), and you can use MIDI learning to assign Mod wheel to any available synth parameters. See MIDI learning section for detail.

Note: Qun mk2's bottom board is generic development board. Touch buttons are not ideal for touch slider use, so the experience is not the best.

Touch Slider DIP switch configration

If you received Qun mk2 synth before firmware v4.02, you need to change DIP switch setting. DIP switch is located at the bottom board, you need to unscrew bottom board to access the DIP switch. If the current setting is `Up, Up, Down, Down, Down, Down, Down, Down`, then turn the first two switches to Down.

All switches should be Down to activate Touch slider.



POLYPHONIC SETUP

The synth can be used as Mono, dual Mono or Quad(4) voice if you have one device. Please see "MONO/QUAD/POLY (Voice mode)" section for detail.

The number of the voice can be increased if you have more than one device. The voice number can be increased up to 16 (with Quad mode), by stacking up the synths.

Tested well with two devices, using more than 2 devices is experimental at this stage.

Audio connection

There are two ways for audio setup:

1. Connect Slave's audio out to Master's Line IN to combine outputs.
2. Connect all audio signals to your mixer.

MIDI connection

Use TRS cable to connect Master's MIDI out to Slave's MIDI IN.

On the master device, turn on MIDI Forwarding in System menu. All received MIDI signal will be forwarded to the slave device.

Preset setup for Polyphonic

Minimum setup to achieve PolyMono (2 Oscillators per voice) will be the following with 2 devices setup:

1. In System menu, "Num of devices" should be 2 for all devices. Set Dev Index=1 for Master device, 2 for Slave device. This will be saved to flash memory.
2. Initialize a preset (SHIFT + PARAM) on Master device.
3. Make sure it plays initial SAW wave sound.
4. Go Key / Other sub-menu and set MonoQuadPolyMode to "PolyMono"
5. SHIFT + MODE PLAY button to dump all preset parameters as MIDI CC messages. After the dump, all preset state should be in sync between devices.
6. Play multiple notes. You should hear four voices.
7. Turn off Compressor of the Slave device (Play:Mixer:Comp threshold to 0.0dB) to match volume

Minimum setup to achieve PolyQuad (1 Oscillator per voice) will be the following with 2 devices setup:

1. In System menu, "Num of devices" should be 2 for all devices. Set Dev Index=1 for Master device, 2 for Slave device.

2. Initialize a preset (SHIFT + PARAM) on Master device.
3. Make sure it can play initial SAW wave sound.
4. Go Key / Other sub-menu and set MonoDuoPolyMode to "PolyQuad"
5. SHIFT + MODE PLAY button to dump all preset commands. After the dump, all preset state should be in sync between devices.
6. Play multiple notes. You should hear 8 voices.
7. Turn off Compressor of the Slave device (Play:Mixer:Comp threshold to 0.0dB) to match volume

Polyphonic tips

Long press in Modo/Quad/Poly param (Long-press button 6 in Key/Other menu) to synchronize parameters between ocillators.

To synchronize all parameters between multiple Qun synthesizers, press SHIFT + MODE PLAY to dump all parameters. It will be sent to slave devices. If you still see issues like out of tune in slave device, try MIDI RECV toggle switch (SHIFT + SYSTEM). It will reset pitch bend or other controller values.

TIPS/TROUBLESHOOTING

- Unknown MIDI messages sent with device reset?
    - When booting some noise is sent (it's ESP32's boot message) . Please avoid to receive MIDI signals when you reset the device. Use initializing preset (SHIFT +PARAM), instead of hardware reset.
- Trouble with Duo Mode: You need to set up properly to play duo mode properly.
    - Go Key / Other sub-menu and long press button 7. It will sync the parameters OSC1 and OSC2, it will resolve most of issues.
- No sound suddenly
    - Reset the preset. SHIFT + PARAM to initialize the preset.
    - Probably it’s because of last parameter you changed, or some unexpected MIDI cc signal. See the 2nd line of the display, it indicates the parameter received at last.
    - Level overflow may cause the silent, e.g. giving massive delay feedback.

    - Check "Device Index" and "Number of Devices" in system menu. If the Device Index is 2 or more, and you are using it as a primary device, then it may produce no sound. Set the index to 1.
    - Receiving MIDI channel is wrong. Check system setting.
    - Check MIDI Receiving status (Small Square dot in the screen. See PLAY MODE section for detail)
- A noise when you connect multiple devices (chained audio)
    - It is likely because of a ground loop. Use separated power supply.
- Noise but nothing is connected to the line in.
    - Toggle MIC/LINE select (in System menu), set to Line in.
    - Toggle Line In THRU to off.
    - Initialize a preset.
    - Check Mono/Poly Mode setting. If it's poly mode, LINE IN pass through turns ON.
- Use different power supply, you get less noise using separated charger.
- Don't be afraid to get clipped! The synth has 3 great clipping algorithms. Clipping could be the gateway to a whole new sound.
- I want to use AUX as CV IN
    - CV signal from modular synthesizers may have **HIGH VOLTAGE**! Please attenuate the voltage to normal LINE level (1 to 1.5V).
    - AUX is connected to a lot of modules for CV control, so you can use AUX to control tune/width/LFO and others. However, the LINE in has capacitor in the path, it means the signal is AC. Using it as LFO should work, probably down to 2 to 5Hz. But DC signal, e.g. holding the same voltage 5 seconds, might not work.
- MIDI is flooding when I connect MIDI out to DAW.
    - MIDI forwarding is ON.
- Glithes with looper playing
    - One known issue is looper might get gliches when Granular's grain is high with scene loading. It's because of limitation of RAM bandwidth.

External Audio processing

You can use LINE IN signal for various purposes. LINE IN is stereo input.

- As CV input to control synth parameters
- As oscillator source. Select "AUXL" or "AUXR" as oscillator source. VCF / effector / Clipping will be applied. If you want to process LINE IN signal as an audio signal, then set Oscillator(1/2)'s signal as "AUXR" or "AUXL", and set the ENV SEL as "ON" (in OSC Switches). Set the gain by changing "VCF Volume" and "AUX In Gain" in Mix sub-menu.
- Line In Through to Looper. Setting is in System -> Line In Through. It pass through the sound engine, then combined with the output of the sound engine. You can record the input to looper. Compressor will be applied.

Clock synchronization

The synth can take external clock sources from other synthesizers. When the sync is enabled, sequencer BPM / start / stop is synchronized with external synthesizer or sequencer.
Setting is available in the System menu. Default is OFF. The setting will be saved to internal flash memory.

MIDI clock

When you set sync mode to "MIDI", the synth will be clock slave mode. Set your DAW to send MIDI clock. We tested Ableton Live, Logic Pro X and KeyStep Pro. It has some latency so please adjust latency setting in your DAW to match the timing.

If you set sync mode to "MOUT" or "MOUT2", then the synth will be clock master. It sends MIDI clock as well as play/stop MIDI messages. Try "MOUT2" if you feel slight delay between devices. MOUT2 will send extra clock signal when start playing because some devices start sequencing from the second clock (Roland MC-101 is the example). If you clock another Qun, use MOUT.

Sync IN

The synth can take 2PPQ, 4PPQ or 24 PPQ signals. Don't supply high voltage to the synth, it will break. The signal must be supplied to LEFT channel (tip of TRS connector). Using the tip as a sync signal is compatible with Teenage Engineering's Pocket Operator. Supply voltage needs to be more than 500mV. RIGHT channel (AUXR) still can be used as audio signal or CV in.

SD card folder structure

WAV file can be used by other software. Format is mono, 48kHz, 16 bit.

LOOPER00

Session data is stored here. It includes Looper recording data.

FILENAME	DESCRIPTION
[T000_1A.wav]	T means track recording, and next 3 digit is Session number, and 1 is Scene number, and A is track number. "0Z" is clipboard data.
[G000_01.wav]	G is for Granular data. The last 2 digits incidates the bucket index.
[M000_00.dat]	M means mixer data. The first 3 digit means Session number. The second 2 digit is always zero.
[B000_00_***.dat]	B means Bucket data. This contains 8 preset and 64 sequencer pattern. The first 3 digit means Session number. The second 2 digit is always zero. When session has a name, *** indicates the name of the session.
[Z000_00.dat]	Z is for undo buffer.

File number limit and accessing to the old folder

When the directory has more than 500 files, then "LOOPER01" will be created to avoid performance issue. Once a new folder created, the new folder is always selected. Only one LOOPERXX folder is accessible, however, you can specify old folder by pressing Button 1 to 8 when booting. (Button1 means LOOPER00, Button 2 means LOOPER01, and so on)

PRESET

Preset (Bank 1 to 8) is stored here.

FILENAME	DESCRIPTION
[G_AAAAAA.WAV]	G means Granular record data. This is saved when Granular mode is not OFF.
[G_AAAAAA.DAT]	G means Granular, it stores analyzed result
[P_AAAAAA.DAT]	P means preset data.
[S_AAAAAA.DAT]	S means sequencer data. One file contains 8 pattern.

GRANULAR

This is the place to export or import Granular record data. You can put your WAV file here to load the file to Granular engine. Format has to be 48000Hz, 16 bit, Mono.

FILENAME	DESCRIPTION
[G_AAAAAA.WAV]	G means Granular record data. This is saved when You perform save command in Granular mode. If you save in Bank1 to Bank8 mode, Granular recording data is stored under Preset folder.

SSHOTS

Screnshots is stored here. To take screenshot, press LOOPER STOP + PARAM.

IMPORT

Import is the folder to import loops to session.
Format has to be mono, 48kHz, 16 bit. See "Session" section for detail.

Supported MIDI Control numbers

All tone-related parameters can be controlled by MIDI CC signal.

A set of MIDI CC signal can be used as preset save data. Press SHIFT + MODE PLAY button to dump MIDI CC messages.

If you want to control parameters by your MIDI keyboard, use the chart below to check the CC number.
Or, you can see the CC# in the screen at the top of the parameter name.
Assigned CC# can be override temporary.

When you change CC parameters through MIDI keyboard or any other devices, the changed parameter will be shown on the display in real-time, you will see what you are changing, the value and mode names just like when you change parameters directly on the QUN.

Suggested MIDI CC parameters to be assigned if your MIDI keyboard has some knobs:

- MIX: (92)
- FM: (33)
- Cutoff: (22)
- Resonance: (91)
- LFO Tune: (24)
- VCF Volume: (90)

```
0                            "Save Preset", //0x0
1                            "Mod Wheel", //1
2                            "", //2
3                            "", //3
4                            "", //4
5                            "", //5
6                            "", //6
7                            "Volume", //7
8                            "", //8
9                            "", //9
10                            "", //a
11                            "VCF Volume", //b
12                            "", //c
13                            "", //d
14                            "", //e
15                            "", //f
                            //----------------------0x10
16                            "", //0x0
17                            "", //1
18                            "", //2
19                            "Slice Spread", //3
20                            "VCF Env Src", //4
21                            "OSC1 Tune(MSB)", //5
22                            "VCF Cutoff(MSB)", //6
23                            "OSC2 Tune(MSB)", //7
24                            "LFO Tune(MSB)", //8
25                            "ENV3/4 Attack", //9
26                            "ENV3/4 Decay", //a
27                            "ENV3/4 Sustain", //b
28                            "ENV3/4 Release", //c
29                            "GRN File Pos", //d
30                            "GRN Length", //e
31                            "GRN Speed", //f
                            //----------------------0x20
```

```
32                          "GRN Grain", //0x0
33                          "FM", //1
34                          "Efct Feedback", //2
35                          "LFO Pulse Width", //3
36                          "OSC1 Pulse Width", //4
37                          "OSC2 Pulse Width", //5
38                          "LFO Pulse Width", //6
39                          "Efct Speed", //7
40                          "VCF Type", //8
41                          "Efct Depth", //9
42                          "OSC1 Bypass", //a
43                          "GRN Detune", //b
44                          "Efct Type", //c
45                          "VCF OSC1 bypass SW", //d
46                          "GRN Detune", //e
47                          "GRN Mode", //f
                        //----------------------0x30
48                          "LFO Mod Tune", //0x0
49                          "LFO Mod Width", //1
50                          "FM Algorithm", //2
51                          "FM ENV3 Conn", //3
52                          "", //4
53                          "OSC1 Tune(LSB)", //5
54                          "Cutoff(LSB)", //6
55                          "OSC2 Tune(LSB)", //7
56                          "LFO Tune(LSB)", //8
57                          "FM A Amp", // 9
58                          "FM A Freq", //a
59                          "FM B Amp", //b
60                          "FM B Freq", //c
61                          "FM C Amp", //d
62                          "FM C Freq", //e
63                          "FM D Amp", //f
                        //----------------------0x40
64                          "", //0x0
65                          "OSC2 Mod Sel", //1
```

```
66                          "LFO Mod Sel", //2
67                          "ENV1 Inv SW", //3
68                          "OSC1 Env Sel", //4
69                          "OSC2 Env Sel", //5
70                          "ENV2 Inv SW", //6
71                          "LFO Gatesync SW", //7
72                          "FM FREQ SNAP SW", //8
73                          "OSC1 Wide Tune SW", //9
74                          "OSC2 Wide Tune SW", //a
75                          "OSC2 Octave", //b
76                          "OSC1 Octave", //c
77                          "OSC1 Keysync SW", //d
78                          "Velocity SW", //e
79                          "OSC1 LFO Tune", //f
                        //----------------------0x50
80                          "OSC1 LFO Width", //0x0
81                          "OSC2 LFO Tune", //1
82                          "OSC2 LFO Width", //2
83                          "Mono/Duo/Polly", //3
84                          "VCF LFO Volume", //4
85                          "VCF Mod Cutoff", //5
86                          "LFO Keysplit", //6
87                          "VCF LFO cutoff", //7
88                          "OSC1 Mod Sel", //8
89                          "VCF Mod Sel", //9
90                          "VCF Volume", //a
91                          "VCF Resonance", //b
92                          "OSC Mix", //c
93                          "OSC1 Shape", //d
94                          "OSC2 Shape", //e
95                          "LFO Shape", //f
                        //----------------------0x60
96                          "ENV1 Attack", //0x0
97                          "AUX In Gain", //1
98                          "", //2 (Won't be dumped)
99                          "", //3 (Won't be dumped)
```

```
100                             "Mod Wheel Mode", //4
101                             "", //5 (Won't be dumped)
102                             "ENV1 Decay", //6
103                             "ENV1 Sustain", //7
104                             "ENV1 Release", //8
105                             "ENV2 Attack", //9
106                             "ENV2 Decay", //a
107                             "ENV2 Sustain", //b
108                             "ENV2 Release", //c
109                             "OSC1 Mod Tune", //d
110                             "OSC1 Mod Width", //e
111                             "VCF Pole / NoLinear", //f
                              //----------------------0x70
112                             "OSC2 Mod Tune", //0x0
113                             "OSC2 Mod Width", //1
114                             "Glide", //2
115                             "Bend Range", //3
116                             "Mod Mode", //4
117                             "VCF Keysync", //5
118                             "Voice Number", //6
119                             "LFO Sync SW", //7
120                             "All Notes Off", //8
121                             "", //9
122                             "", //a
123                             "All Notes Off", //b
124                             "", //c
125                             "", //d
126                             "", //e
127                             "" //f
```

Quick Setup with Third-party Software & Hardware

The QUN synth can be setup quickly for use with third-party software and hardware by downloading the appropriate configuration file from Configurations. The following configurations files are currently available:

- Native Instruments Maschine
- Native Instruments Komplete Kontrol