

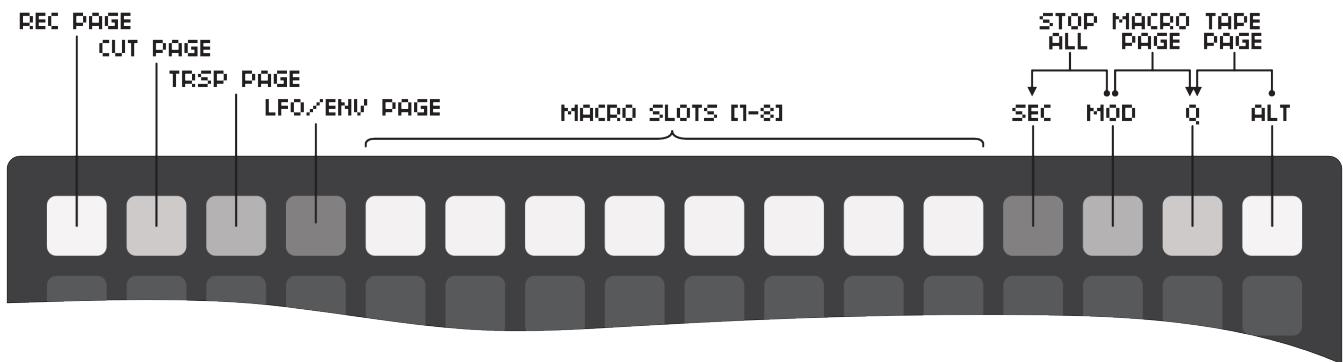
mlre is an extended version of brian crabtree's mlr for norns. new features and functionality were added with performative aspects in mind, attempting to extend the capabilities and expressiveness of the script. like mlr, mlre runs on softcut, a multi-voice playback and recording system for manipulating audio buffers in real time, which was written by ezra buchla. thank you both, as well as many others from the norns community for all your efforts, countless contributions and sharing of knowledge.

TABLE OF CONTENTS:

GRID NAVIGATION:	2
MAIN VIEW:	3
REC PAGE:	5
CUT PAGE:	7
TRSP PAGE:	8
LFO PAGE:	9
ENV PAGE:	11
MACRO PAGE:	13
P-MACROS:	17
TAPE PAGE:	19
PARAMETERS:	25
ARC CONTROLS:	32

GRID NAVIGATION:

The top row of the grid is referred to as the **GRID NAVIGATION** and is accessible from all pages. If a grid 256 is used, there will be two grid navigation rows at the centre of the grid. Their functionality is identical except for the macro slots, which can be customized independently.



PAGES:

- ▶ Press the keys **REC PAGE** - **LFO PAGE** to change the grid interface to the corresponding page.
- ▶ Press **LFO PAGE** key twice to access the **ENV PAGE**.
- ▶ Hold **ALT** and press **Q** to access the **TAPE PAGE**.
- ▶ Hold **MOD** and press **Q** to access the **MACRO PAGE**.
- ▶ Hold **Q** access the **QUANTIZATION MENU**. Use **K2** or **K3** to switch page and **E2** and **E3** to change the corresponding parameter values (see **GLOBAL PARAMETERS > quantization**).

MACROS:

- ▶ **MACRO SLOTS** are used to store and recall events. There are three different macro types: **pattern**, **snapshot** and **punch-in**. Read more about macro types in the **MACRO PAGE** section.
- ▶ Hold **SEC** to access the **secondary MACRO SLOTS**. The behaviour of the **SEC** key can be changed from momentary to toggle by holding **ALT** and pressing **SEC**.

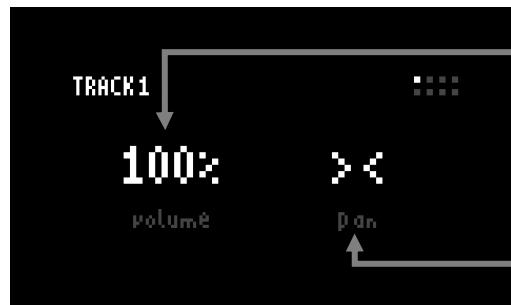
ACTIONS:

- ▶ Hold **ALT** and press **REC PAGE** to **clear** the **active splice** of the **focused** track.
- ▶ Hold **ALT** and press **CUT PAGE** to **clear** the **whole tape** of the **focused** track.
- ▶ Hold **ALT** and press **TRSP PAGE** to **clear** both tape sides for **all** tracks (clear the whole buffer).
- ▶ Hold **ALT** and press **MOD** to reset the playback position of all playing tracks to the first step (loops are cleared).
- ▶ Hold **MOD** and press **SEC** to **stop all** tracks and patterns.

MAIN VIEW:

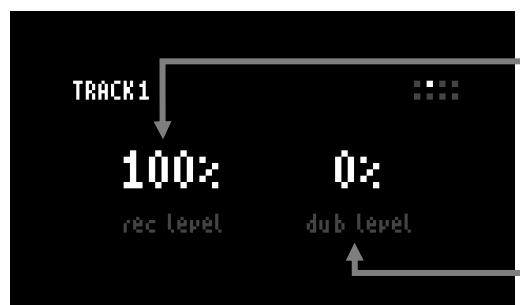
Main view is referred to as norns' interface while on the **REC PAGE**, **CUT PAGE** and **TRSP PAGE**. All other grid pages display their own set of page-specific parameters / options.

In main view the screen displays 16 track parameters distributed over 8 pages. Use **K2** and **K3** to cycle through the 8 pages and **E2** and **E3** to change the values of the displayed parameters. The focused track can be selected with **E1** or via grid (see corresponding **PAGE** sections). Hold **K1** to access the **P-MACROS** (see **MACRO PAGE**).



track volume [0 - 100%]:

If a track is muted (**ALT** + **PLAY**) the **PLAY** key of the corresponding track pulses slowly.



rec level [0 - 100%]:

Sets the level of input signal that is recorded.

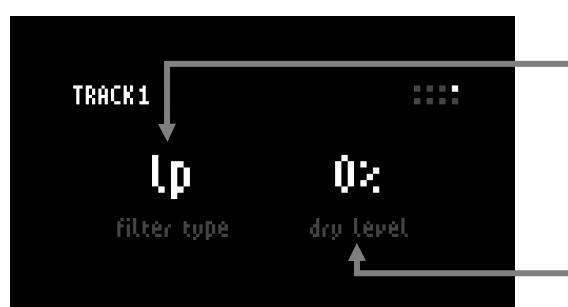


filter cutoff [20 - 18000Hz] / [LP100 - 100HP]:

Sets the filter cutoff frequency in Hz when the filter type is set to **lp**, **hp**, **bp** or **br**. When set to **dj** it ranges from 100% **lp** (CCW) to 100% **hp** (CW).

filter q [0 - 100%]:

Higher values lead to higher resonance.



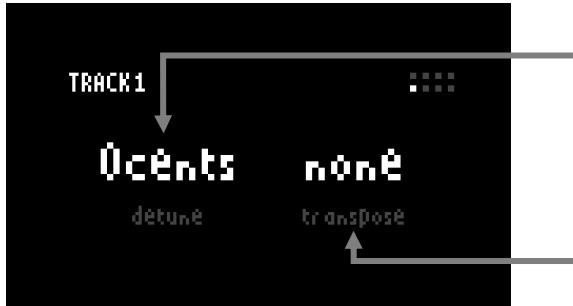
filter type [lp, hp, bp, br, dj, off]:

Sets the filter type.

dry level [0 - 100%]:

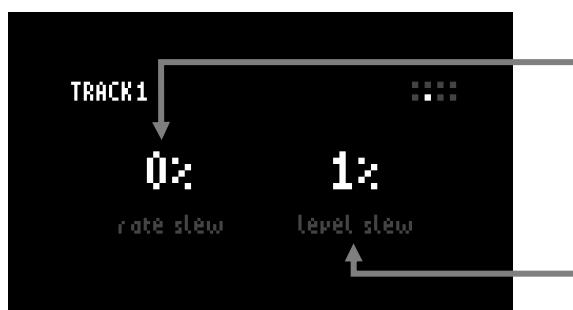
Sets the amount of dry signal mixed to the output. When the filter is set to **dj** or **off** the **dry level** has no effect.

MAIN VIEW continued:



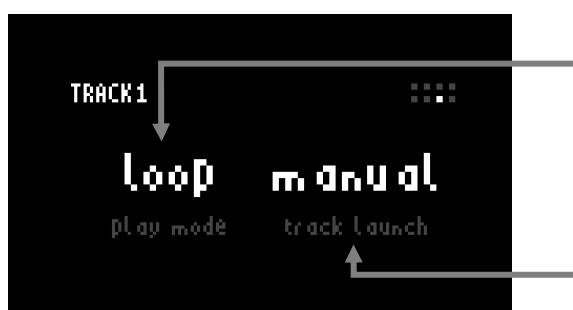
detune [-600 - 600 cents]:

Fine tune in cent steps (changes playback rate).



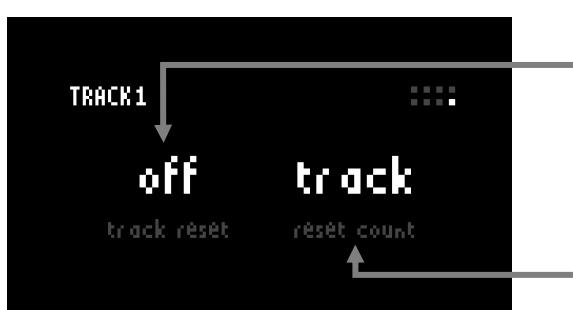
rate slew [0 - 2s]:

Sets the slew time of rate changes.



play mode [loop, oneshot, gate]:

Sets the playback mode of the corresponding track (see **TRACK PARAMETERS**).



track reset [off, on]:

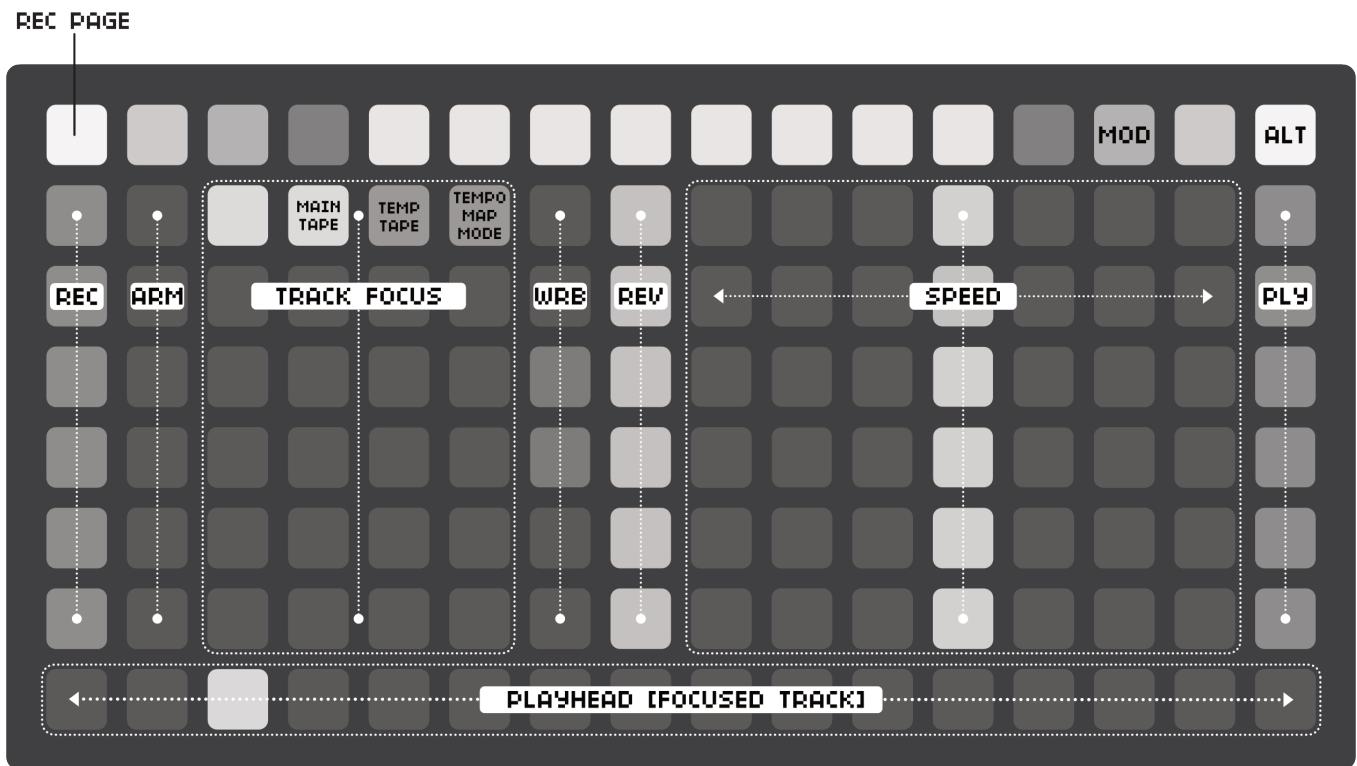
Activates track reset behaviour (see **TRACK PARAMETERS**).

reset count [track - 64 beats]:

If **track reset** is enabled the start position is reset after the specified number of beats (synced to the system clock). When set to **track** (default setting) the number of beats is automatically set according to the track length. Tracks need to be tempo-mapped for this option to work as intended.

REC PAGE:

The **REC PAGE** consists of six track rows divided in six sections. The bottom row displays the playhead of the **focused** track as found on the **CUT PAGE**. If a grid 256 is connected the bottom row is not displayed when the **REC PAGE** is displayed on the *upper* half of the grid.



- ▶ Press **REC** to toggle recording on/off for tracks the corresponding track.
 - ▷ Hold **MOD** and press **REC** to **undo** a previous recording if **auto-backup** is active (see *GLOBAL PARAMETERS > recording*).
 - ▷ Hold **ALT** and press **REC** to activate **fade out mode**.
 - ▷ First hold **MOD** then hold **ALT** and then press **REC** to **deactivate rec-enable** for the corresponding track. The **REC** key will go dim, and recording cannot be enabled when deactivated.
- ▶ Press **ARM** to enable **one-shot recording**.
 - ▷ Hold **ALT** and press **ARM** to activate **auto-length mode**.
- ▶ Press any of the four **TRACK FOCUS** keys to **focus** one of the 6 tracks.
 - ▷ Hold **ALT** and press any **TRACK FOCUS** key to cycle though the **tempo map** modes (see *TAPE PAGE*). The rightmost **TRACK FOCUS** key is dim if no tempo-mapping is applied, mid-bright if in **resize** mode and full bright if in **repitch** mode.
 - ▷ Hold **MOD** and press any key within the row to switch **tape** sides. The two centre keys indicate whether the **main tape** (left) or the **temporary tape** (right) is active (see *TAPE INTERFACE*).

REC PAGE continued:

- ▶ Hold **[ALT]** and press **[WRB]** key to toggle the **tape warble** effect on/off. When tape warble is active, hold **[WRB]** and use **E2/E3** to change the corresponding parameters (see *TRACK PARAMETERS > tape warble*). The **[WRB]** key displays warble activity.
- ▶ Press **[REV]** to reverse playback for the corresponding track.
- ▶ Press a **[SPEED]** key to change the speed the corresponding track (+/- 3 octaves).
 - ▷ Hold **[ALT]** + centre **[SPEED]** key to randomize parameters (see *GLOBAL PARAMETERS > randomization*).
- ▶ Press **[PLY]** to toggle playback for corresponding track. Playback starts according to the **track launch** settings.
 - ▷ Hold **[ALT]** and press **[PLY]** to **mute** the track.
 - ▷ Hold **[MOD]** and press **[PLY]** to toggle **track select** for the corresponding track.

Fade-out mode:

- When **fade-out** is enabled (**[ALT]** + **[REC]**), the track will be overwritten with silence according to the **dub level** even when **[REC]** is off. Higher **dub level** values result in longer fadeouts as more material is preserved per overwrite. When **rec-enable** is deactivated fade-out mode toggled off.

One-shot recording:

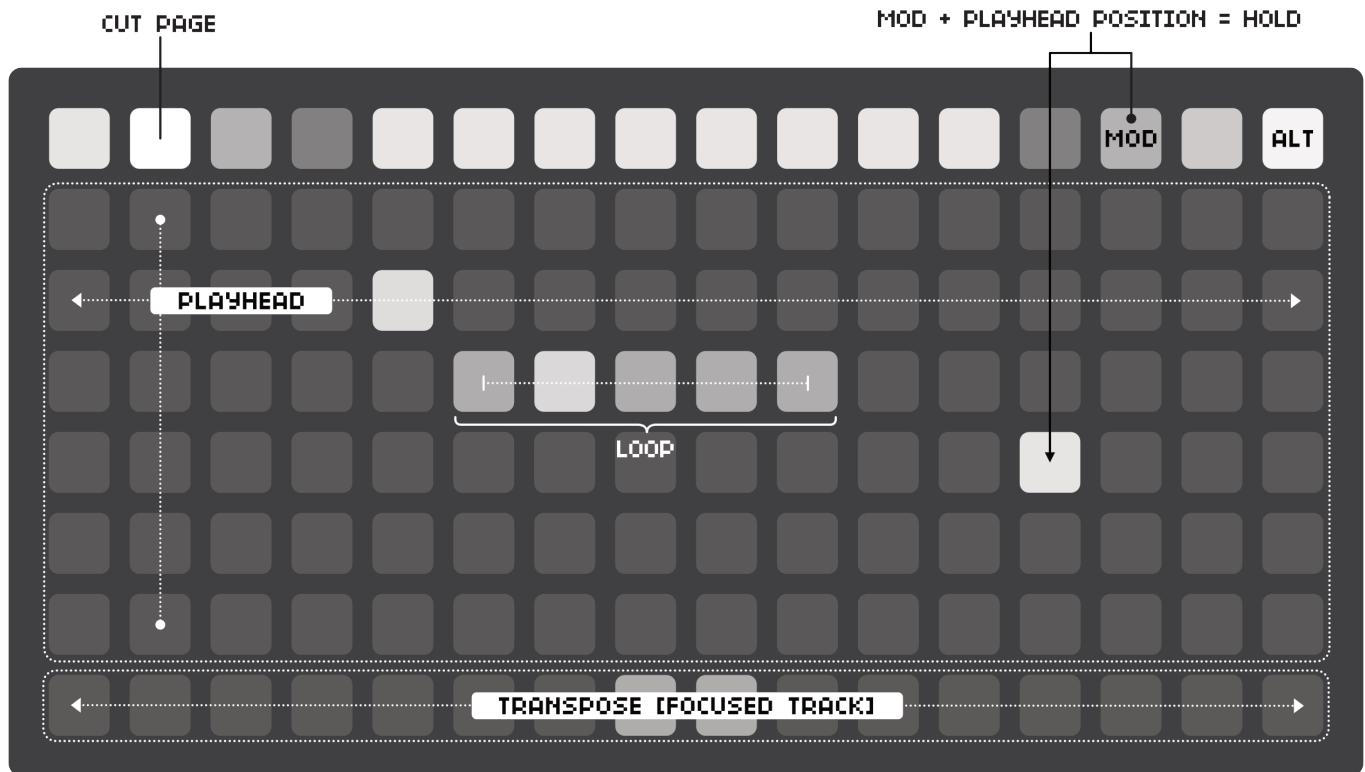
- When **[ARM]** is active, recording starts when the threshold of the incoming audio signal (specified in *GLOBAL PARAMETERS > rec threshold*) is reached. If the track is not playing, the recording will start at the first step. If a track is playing, the recording will start wherever the playhead is. Recording is deactivated after one cycle i.e., the length of the track **or** current loop.
- If **[REC]** is pressed **before** the end of the one-shot cycle, a track loop is set corresponding to the playhead position.
- When **auto-length mode** is enabled (**[ALT]** + **[ARM]**) and **[REC]** is pressed **before** the end of the one-shot cycle is reached, the track length is set according to the length of the recorded clip. If a track is playing while enabling **auto-length mode**, playback is automatically stopped before recording can start.

Track select mode:

- When **track select** is active (**[MOD]** + **[PLY]**) the **[PLY]** key of the corresponding track is slightly brighter than the others. When **randomize @ step count** is **on**, these tracks randomize specified track parameters according to the randomization settings (see *GLOBAL PARAMETERS > randomization*). Tracks that have **track select** activated also respond to MIDI start messages (see *GLOBAL PARAMETERS > track control*).

CUT PAGE:

The **CUT PAGE** consists of six track rows displaying the playhead position of the corresponding track. The bottom row displays the transpose value of the **focused** track as found on the **TRSP PAGE**. If a grid 256 is connected the bottom row is not displayed when the **CUT PAGE** is displayed on the *upper* half of the grid.

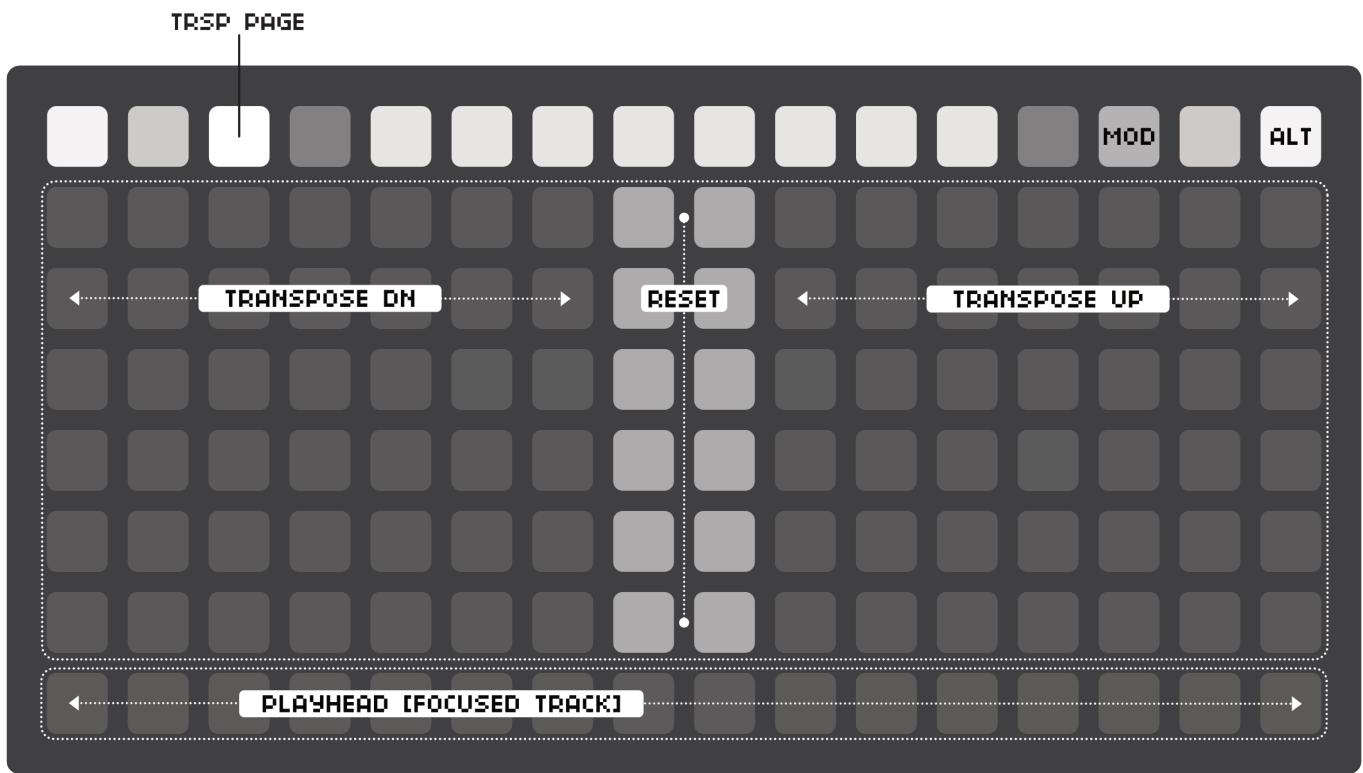


CUT PAGE ACTIONS:

- ▶ **CUT:** Press any **PLAYHEAD** key of a track row to set the playhead to the corresponding position.
- ▶ **LOOP:** Press and hold any **PLAYHEAD** key of a track row to set initial position of the loop and then press any other **PLAYHEAD** key within the track row to set the loop size. Looping starts when the keys are released.
- ▶ **HOLD:** Hold **MOD** and press any **PLAYHEAD** key to set a one-key-loop.
- ▶ **PLAYBACK:** Hold **ALT** and press any **PLAYHEAD** key to toggle playback of the corresponding track.
- ▶ By pressing a **PLAYHEAD** key, the **track focus** is set to the corresponding track. Alternatively, turn **E1** to focus a track or if an **arc 4** is connected hold the **CUT PAGE** key and turn **encoder 4** to select which track is in focus (this allows to set focus without pressing a **PLAYHEAD** key).

TRSP PAGE:

The **TRSP PAGE** consists of six track rows displaying the transpose value of the corresponding track. The bottom row displays the playhead of the **focused** track as found on the **CUT PAGE**. If a grid 256 is connected the bottom row is not displayed when the **TRSP PAGE** is displayed on the *upper* half of the grid.

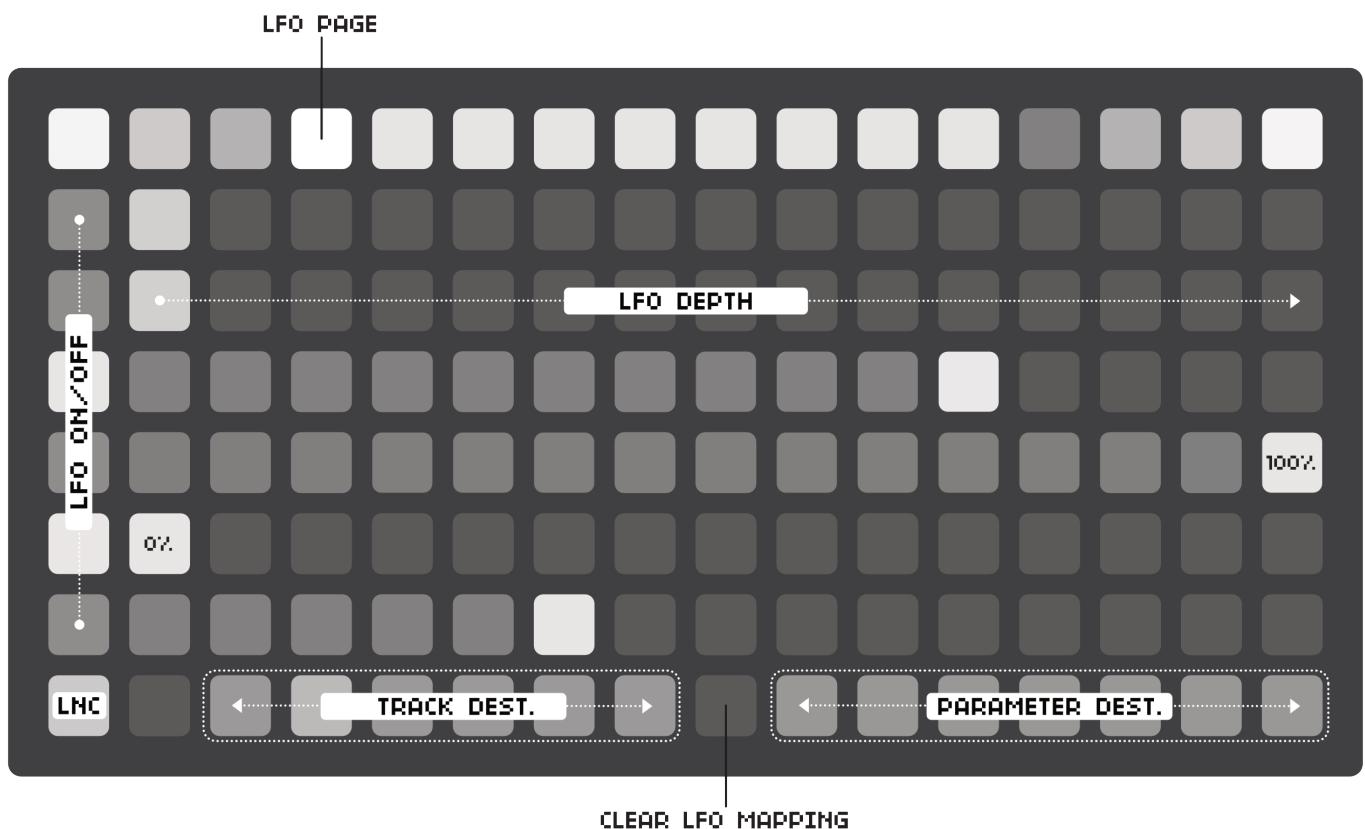


TRSP PAGE ACTIONS:

- ▶ Pressing the **TRANSPOSE DN** keys transpose the track **down** and pressing the **TRANSPOSE UP** keys transpose track **up**, specified by the scale settings in **PARAMETERS > global > scale**. Scales can be easily modified (see **GLOBAL PARAMETERS > scales**). Transposition is achieved by changing the playback speed.
- ▶ Press the **RESET** key to reset the transposition.
 - ▷ Hold **ALT** and press a **RESET** key of a track row to toggle playback of the corresponding track.
 - ▷ Hold **MOD** and press the **left RESET** key to **decrease** speed or the **right RESET** key to **increase** speed, which will result in octave jumps (see **REC PAGE**).
- ▶ By pressing any key, the **track focus** is set to the corresponding track.

LFO PAGE:

The **LFO PAGE** is used to assign any of the 6 LFOs to any of the available destinations. The available destinations are **volume**, **pan**, **overdub**, **detune**, **transpose**, **rate slew** and **filter cutoff** of any of the 6 tracks. Use **E1** or alternatively press any key within the LFO rows to select the corresponding LFO.



LFO PAGE ACTIONS:

- ▶ Press the **LFO ON/OFF** key to toggle the state of the corresponding LFO 1-6.
- ▶ Press a **LFO DEPTH** key to set the depth of the corresponding LFO 1-6.
- ▶ Press and **hold** a **TRACK DEST.** key to select the track (1-6) of destination.
- ▶ Press a **PARAMETER DEST.** key to set the destination of the selected LFO.
- ▶ Press the **CLEAR LFO MAPPING** key to clear the destination mapping of the selected LFO.
- ▶ Press the **LNC** key to set the launch behaviour of the LFOs. When unlit the LFOs will start as soon as they are turned on, when mid-bright the LFOs start at the next beat and when bright the LFOs will start at the next downbeat.

Assigning an LFO to a destination:

Select an **LFO** → select and hold a **TRACK DEST.** key → select the **PARAMETER DEST.** → **LFO is now assigned.**

LFO PAGE PARAMETERS:

While on the **LFO PAGE** the screen displays the parameters of the currently **selected LFO**. Use **K2** and **K3** to cycle through the 3 parameter pages and use **E2** and **E3** to change the corresponding parameter values.

The figure consists of three screenshots of the LFO Page, each showing a different parameter page for LFO4. The first screenshot shows the depth and offset parameters. The second shows shape and phase. The third shows mode and rate.

selected LFO: LFO4

assigned track and parameter: - T1 pan -

depth [0 - 100%]: Sets the depth of the LFO (at 100% it swings from the minimum to maximum value of the assigned parameter).

offset [-100 - 0%], [-50 - 50%], [0 - 100%]: Sets the deviation from the starting point of the LFO (the offset range depends on the baseline of the assigned parameter).

shape [sine, tri, square, random, ramp up, ramp down]: Sets the waveshape of the LFO.

phase [0 - 100%]: Sets the start phase of the LFO.

mode [clocked, free]: Sets the mode of the LFO (when clocked the LFO rate is synced to the system clock).

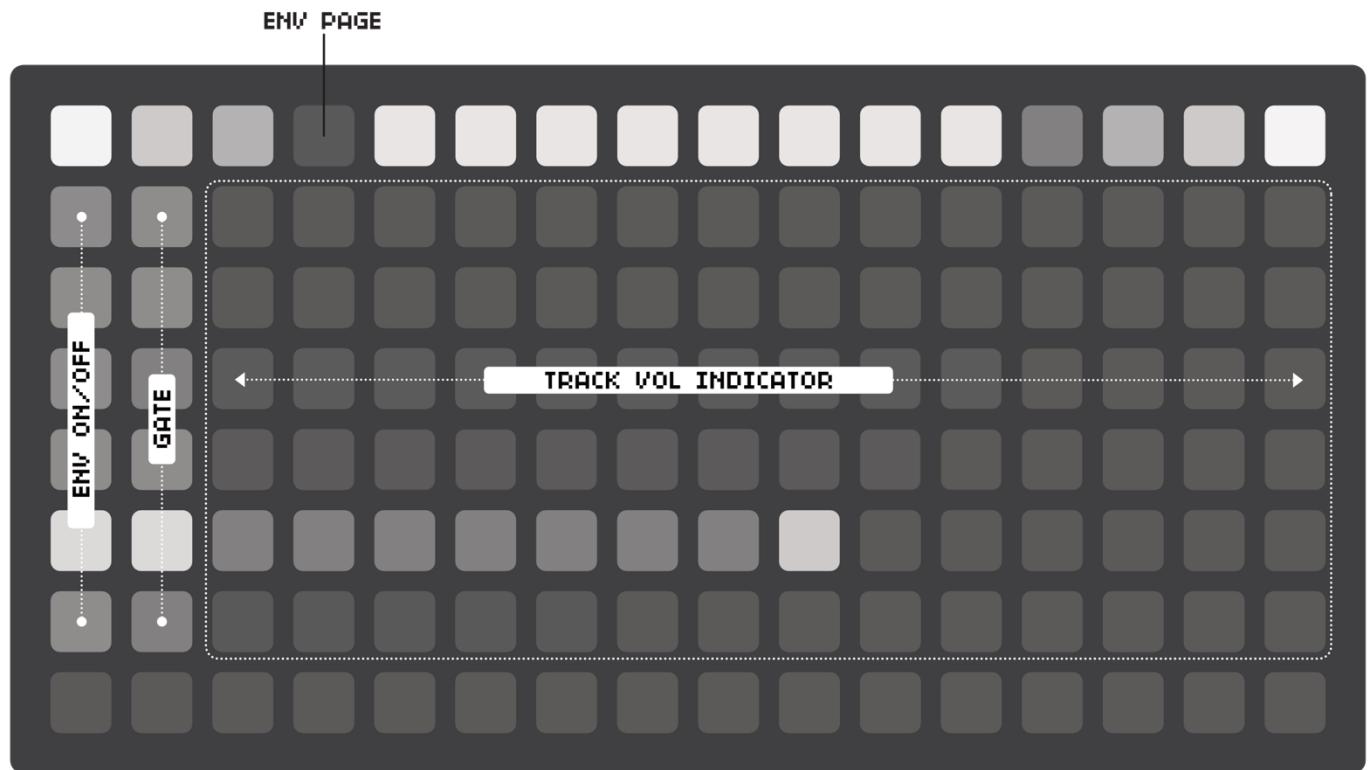
rate [1/32 - 128 beats], [0.1 - 300s]: Sets the rate if the LFO (the displayed values depend on the LFO mode).

LFO TIPS:

- Mapped parameters will **not** respond to any other controls while the LFO is active.
- LFO state** is an event, i.e. the on/off state of the LFOs can be recorded into a **pattern**, saved within a **snapshot** or recalled with a **punch-in** event.
- Map a fast random LFO to **dub level** and activate **REC** occasionally for a "degrading loop" effect.
- LFO rate and depth can be modulated with **P-MACROS**.
- All LFO parameters that are not surfaced in the UI are accessible under **PARAMETERS > modulation > lfo n.**

ENV PAGE:

The **ENV PAGE** displays the 6 ADSR envelopes that can control the volume of the corresponding track. Is used to set the parameters of the envelopes, toggle their state and trigger gate on/off events.

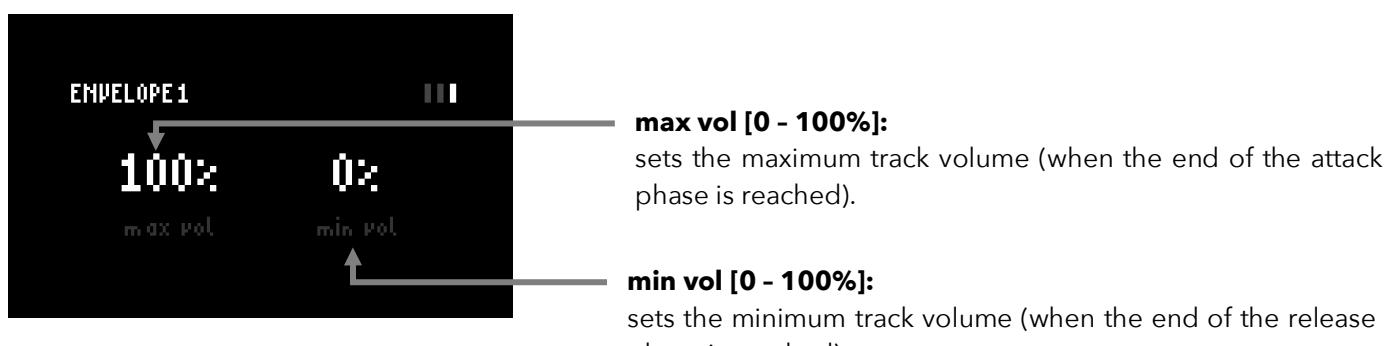
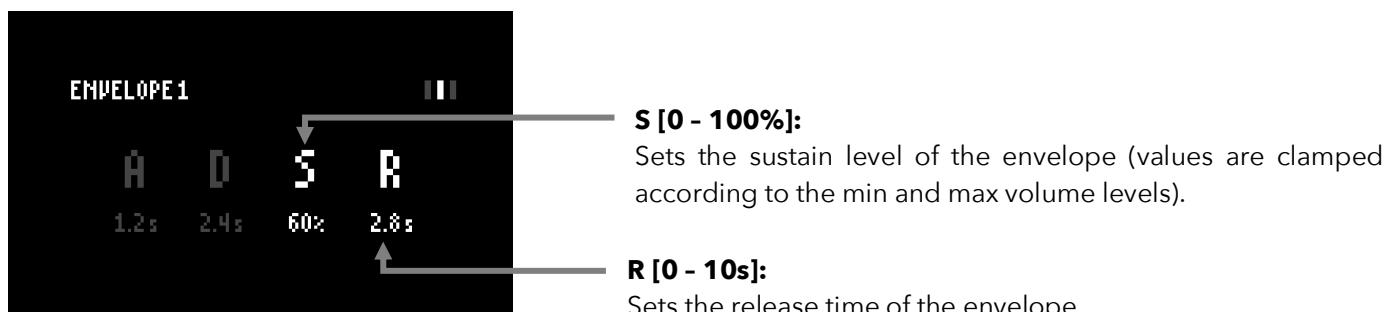
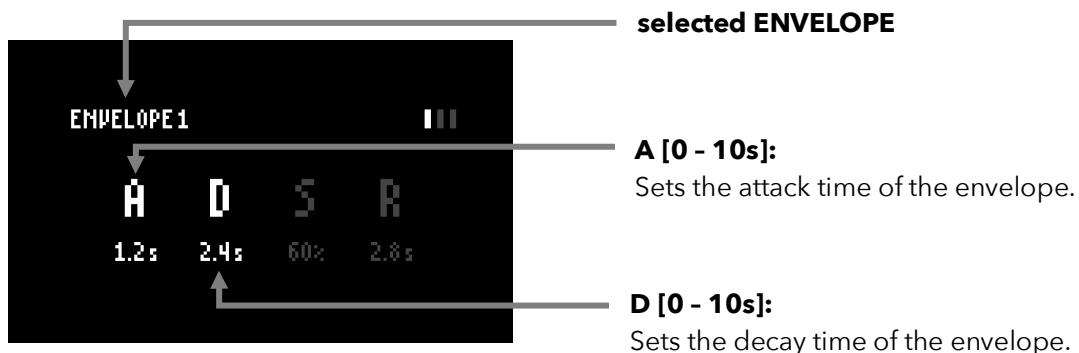


ENV PAGE ACTIONS:

- ▶ Press the **ENV ON/OFF** key to toggle the state of the corresponding envelope. When on, the track volume will be set to the specified **min volume** envelope parameter (see **ENV PAGE PARAMETERS**).
- ▶ Press the **GATE** key to trigger a **gate on** event and release the **GATE** key to trigger a **gate off** event for the corresponding envelope. While a gate is **on** the **attack** and **decay** segments of the envelope will occur. During the **attack** phase the track volume will transition from the **min volume** value to the **max volume** value over the specified attack duration. Immediately after the attack phase the track volume will transition from the **max volume** to the **sustain level** over the specified **decay** duration. If the key is held the track volume will stay at the specified sustain level. When the key is released the **release** phase of the envelope starts and the track volume transitions from the **sustain level** to the **min volume** level over the specified duration.
- ▶ The **TRACK VOL INDICATOR** keys display the track volume if the envelope is active.

ENV PAGE PARAMETERS:

While on the **ENV PAGE** the screen displays the parameters of the currently **selected** envelope. Use **K2** and **K3** to cycle through the 3 parameter pages and use **E2** and **E3** to change the corresponding parameter values.



ENV - TIPS & TRICKS:

- When a track envelope is on, gate on/off events are also triggered with **TRACK PLAYHEAD** keys as found on the **REC-**, **CUT-**, **TRSP-** and **TAPE PAGE**.
- Gate on/off events can be recorded into **patterns** or triggered with **punch-in** macros.
- Envelopes are re-triggered if a gate on event occurs before the release phase is over.

MACRO PAGE:

The **MACRO PAGE** is used to setup the behaviour of the **MACRO SLOTS** and **P-MACRO** encoders. The **MACRO SLOTS** can store and recall **events** in three different ways. The **P-MACROS** (performance macros) are used to momentarily morph a specified set of parameters for all 6 tracks simultaneously.

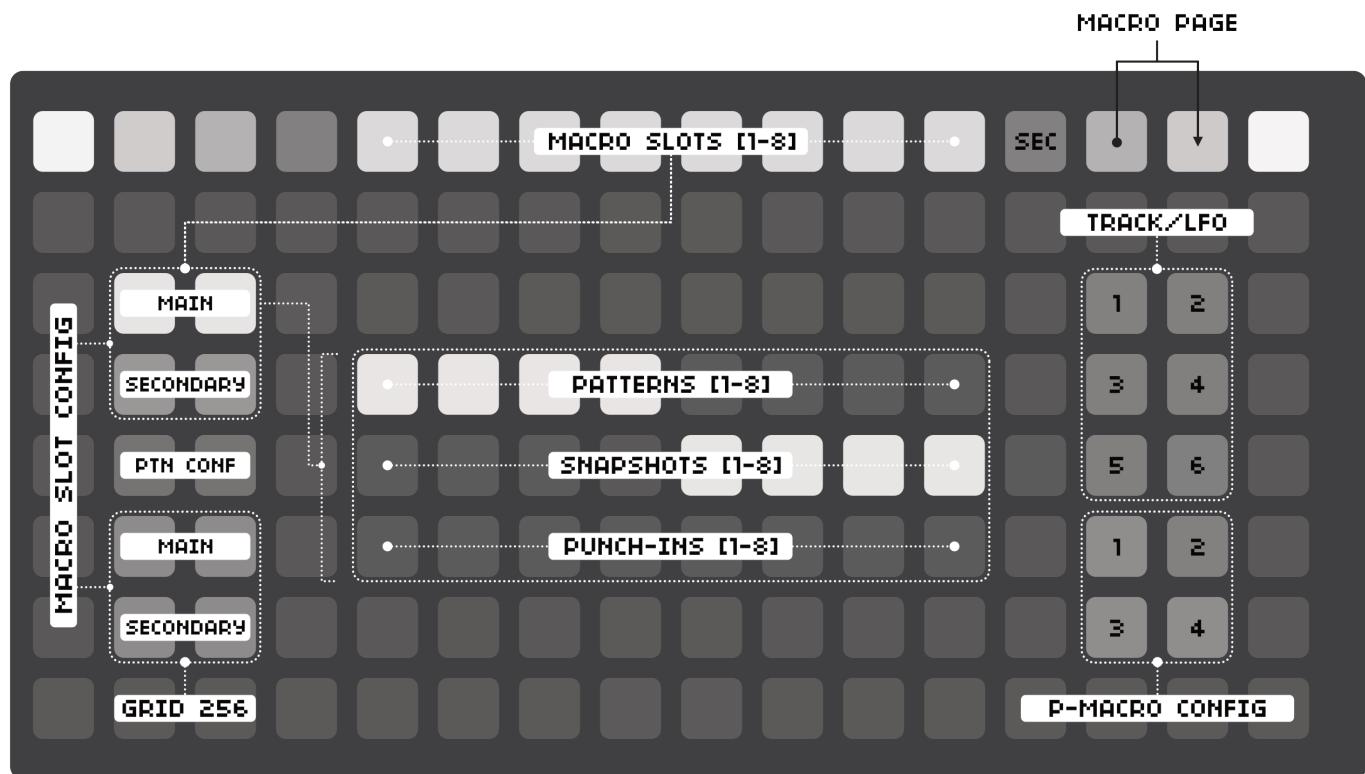
MACRO TYPES and EVENTS:

In mlre, specific key presses are first registered as **events** and then executed. These events can be recorded and played back as a **pattern**, stored and recalled as a **snapshot**, or momentarily set as a **punch-in**. Following keypresses and/or states are registered:

EVENT:	PATTERN:	SNAPSHOT:	PUNCH-IN:
REC	REC state changes	current REC state	REC state changes
PLY	playback state changes	current playback state	playback state changes
PLAYHEAD	playhead position changes and loop position and state	current loop size and state	set playhead position and loop position and state
REV	REV state changes	current REV state	REV state changes
SPEED	SPEED changes	current SPEED value	SPEED changes
TRANSPOSE	transpose changes	current transpose value	transpose changes
MUTE: ALT + PLY	MUTE state changes	current MUTE state	MUTE state changes
GATE	GATE ON/OFF events	NA	GATE ON/OFF events
LFO ON/OFF	LFO state changes	current LFO state	LFO state changes
TRACK 5/6 SEND	track SEND changes	current track SEND states	track SEND changes
TAPE SPLICE	active SPLICE changes	current active SPLICE	active SPLICE changes

MACRO SLOT CONFIGURATION:

In total there are 8 **pattern**-, 8 **snapshot**- and 8 **punch-in** slots available to store and recall events. The **main** and **secondary** row of **MACRO SLOTS** can be configured to hold any combination of the three macro types. When a grid 256 is used there are two **GRID NAVIGATION** rows, and their main and secondary **MACRO SLOTS** can be configured independently. When using a grid 128 the lower **MACRO SLOT CONFIG** keys are inactive.



When **PTM CONF** is **deselected** the centre of the **MACRO PAGE** displays three rows containing all 8 **pattern**-, **snapshot**- and **punch-in** slots.

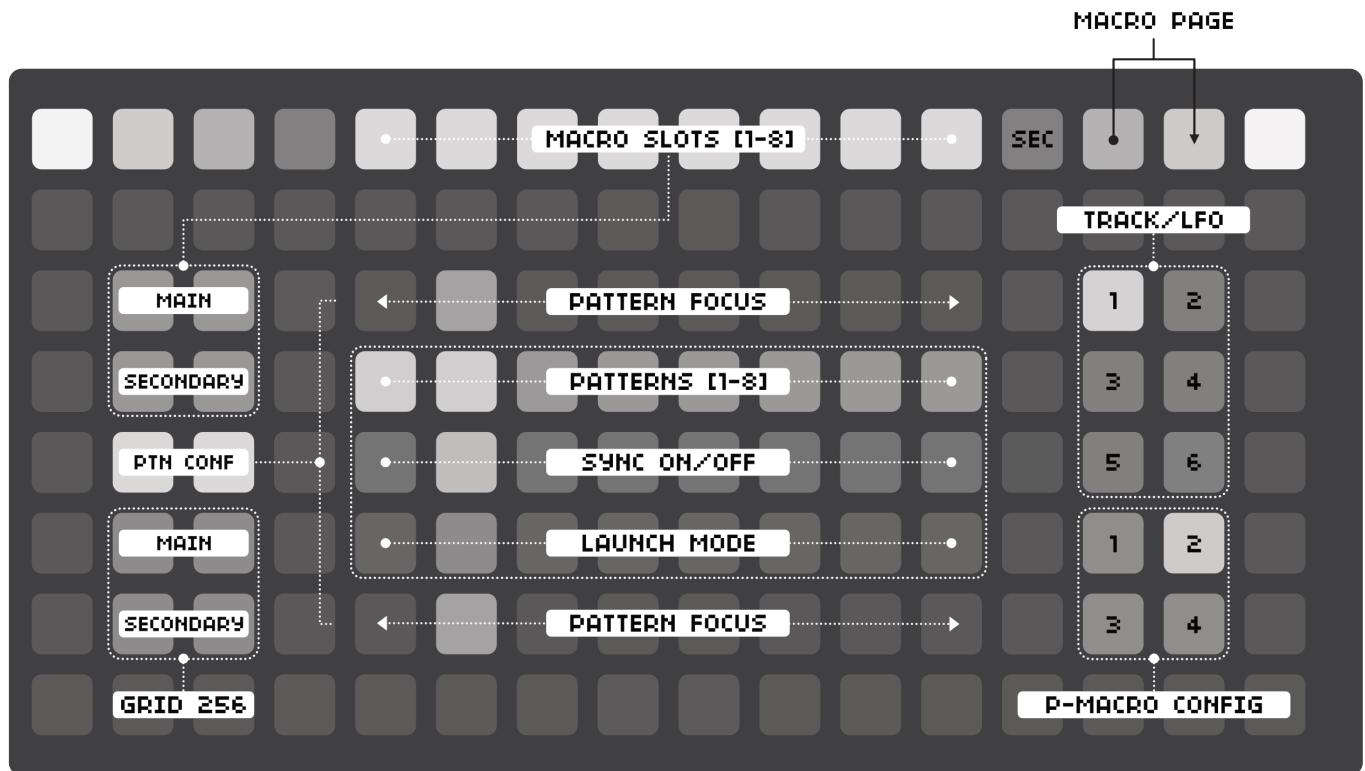
- ▶ Press and hold a **MACRO SLOT CONFIG** key (**MAIN** or **SECONDARY**) to configure which **MACRO SLOT** is assigned to which macro type. Press the corresponding **PATTERN**, **SNAPSHOT** or **PUNCH-IN** keys to assign the macro type to one of the 8 available slots. In the example above the first four keys assigned to **patterns 1-4** and the next four keys assigned to **snapshots 5-8** for the **main MACRO SLOTS**.
- ▶ If **MACRO SLOT CONFIG** is **inactive** the three centre rows can be used to launch the corresponding macros.



The screen will display the current **MACRO SLOT** configuration and which macro slots are populated (grey background).

PATTERN CONFIGURATION:

When **PTM CONF** is selected, the centre of the **MACRO PAGE** displays the **SYNC** and **LAUNCH MODE** configuration keys for patterns 1-8 and norns' menu displays the parameters of the selected pattern (**PATTERN FOCUS**).



PATTERN PARAMETERS:

Use **K2** and **K3** to cycle through the 2 parameter pages and use **E2** and **E3** to change the corresponding parameter values.



selected pattern

meter [2/4, 3/3, 4/4, 5/4, 6/4, 7/4, 9/4, 11/4]:

If pattern **SYNC** is on, the meter of the pattern can be selected (otherwise "-" is displayed).

length [1 - 64 bars]:

If pattern **SYNC** is on, the length of the pattern can be selected (otherwise "manual" is displayed).



launch [manual, beat, bar]:

Sets the launch mode of a pattern slot (when set to manual, the pattern starts immediately, otherwise playback starts at the next bar / beat according to the system clock).

play mode [loop, oneshot]:

Sets the pattern play mode (when set to oneshot, playback stops after one cycle).

MACRO RECORDING AND PLAYBACK:

PATTERNS:

Each **pattern** can store and loop a sequence of events (see **MACRO TYPES and EVENTS**).

- ▶ Press an empty **PATTERN** slot to **arm** recording (indicated by a fully lit pad).
- ▶ Enter a sequence of key presses. Recording starts as soon as the first event is registered and is indicated by a flashing pattern slot key.
 - ▷ If pattern **SYNC** is **on**, recording will automatically end after the specified number of bars and continue with a looped pattern playback (if playback mode is set to **loop**).
 - ▷ If pattern **SYNC** is **off**, then the **PATTERN** slot needs to be pressed again to end pattern recording and continue with a looped pattern playback (if playback mode is set to **loop**).
- ▶ To **add** events (overdub) to a playing pattern, hold **MOD** and press the **PATTERN** slot. The corresponding key flashes to indicate that recording is enabled. Additional key presses are added to the current looping pattern.
 - ▷ Press the **PATTERN** slot again to **stop recording** and continue pattern playback.
 - ▷ To **undo** any added key presses, hold **MOD** and press the flashing **PATTERN** slot whilst pattern recording is still on. The pattern will revert to its original sequence (pre overdub) after a complete cycle ends.
- ▶ Hold **ALT** and press the corresponding **PATTERN** slot to **clear** the pattern.

SNAPSHOTS:

As the name suggests, snapshots store the state of almost all events at once (see **MACRO TYPES and EVENTS**). When a snapshot slot is pressed the stored event states are recalled *if* recall is enabled for the specific event type (see **GLOBAL PARAMETERS > macros**). Therefore, it is possible to customize snapshot behaviour and ignore specific event types (e.g. mute state, LFO state etc.).

- ▶ Press an empty **SNAPSHOT** slot to **save** a snapshot (slots with saved snapshots are brighter than empty slots).
- ▶ Press a populated **SNAPSHOT** slot to **recall** the **snapshot**. The last used snapshot slot is brighter than the others. While on the **REC PAGE** hold **TRACK FOCUS** and press **SNAPSHOT** to recall the snapshot **only** for the focused track.
- ▶ Hold **ALT** and press a populated **SNAPSHOT** slot to **clear** the snapshot.

PUNCH-IN:

Each **punch-in slot** can **store** specified events (see **MACRO TYPES and EVENTS**). When a populated **PUNCH-IN** slot key is pressed the stored events are executed and when the **PUNCH-IN** key is released the previous state is **restored**. Unlike snapshots, the events for punch-in slots need to be entered manually:

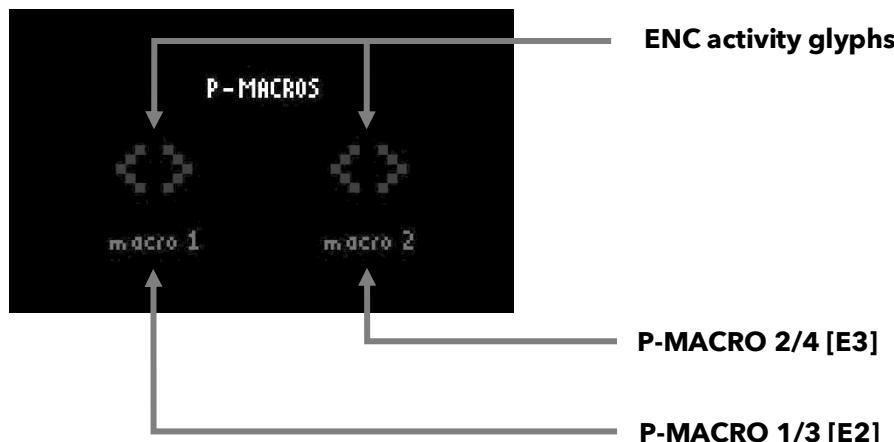
- ▶ Press and **hold** an empty **PUNCH-IN** slot to **arm** recording (indicated by a fully lit pad).
- ▶ Trigger the events that you wish to store by pressing the corresponding keys. Press the **PUNCH-IN** slot again to **store** the key states (slots with data are slightly less bright than armed slots).
- ▶ Hold **ALT** and press the corresponding **PUNCH-IN** slot to **clear** the punch-in events.

MACRO SLOT TIPS:

- The length of a pattern can be changed even after a pattern has been recorded.
- Pattern **SYNC** can be turned on after a pattern has been recorded in **manual** mode. The pattern is then looped according to the meter/length settings.
- Utilize snapshots together with different tape splices to create scenes/parts of a musical piece.
- Snapshot launch can be quantized to the beat or downbeat (see **GLOBAL PARAMETERS > macros**).
- Utilize punch-ins to add momentary effects like enabling track sends or reversing the playback of specific tracks.
- **Warning:** If **punch-in** macros are quickly fired multiple times in a row, the previous state might **not** be restored. Also, if **key quantization** is **active**, the duration of a **punch-in** keypress needs to be at least as long as the **key quantization** value.

P-MACROS:

Performance macros can be a powerful tool for creating transitions between parts of a performance or for momentary parameter changes. The **P-MACROS** can be accessed from all pages except the **TAPE PAGE** by holding **K1**.



s

While in **P-MACRO** mode, the arc and/or norns encoders can be used to change multiple parameters of multiple tracks simultaneously. When **K1** is released all the parameters **revert** to their **previous** values, so parameter morphing is never applied permanently.

On the arc 4 the encoders 1-4 correspond to the **P-MACROS 1-4**. On norns the UI is split in two pages where the encoders **E2** and **E3** control **P-MACROS 1/2** or **P-MACROS 3/4**.

- ▶ Press **K2** or **K3** to toggle between the two pairs of **P-MACRO** encoders.

P-MACROS continued:

The four **P-MACRO** configurations correspond to four **P-MACRO** encoders. Each **P-MACRO** configuration stores a **morph value** for **6 track parameters** and **2 LFO parameters** for all 6 tracks/LFOs. An example of a **P-MACRO** morph-matrix is shown below:

P-MACRO 1	cutoff	filter q	volume	pan	detune	rate slew	LFO depth	LFO rate
Track/LFO 1	100%	-5%	0%	20%	0%	0%	0%	0%
Track/LFO 2	-50%	10%	0%	0%	0%	0%	0%	0%
Track/LFO 3	0%	0%	0%	0%	0%	0%	0%	0%
Track/LFO 4	0%	0%	0%	0%	0%	0%	0%	0%
Track/LFO 5	0%	0%	0%	0%	0%	0%	0%	0%
Track/LFO 6	0%	0%	0%	0%	0%	0%	0%	0%

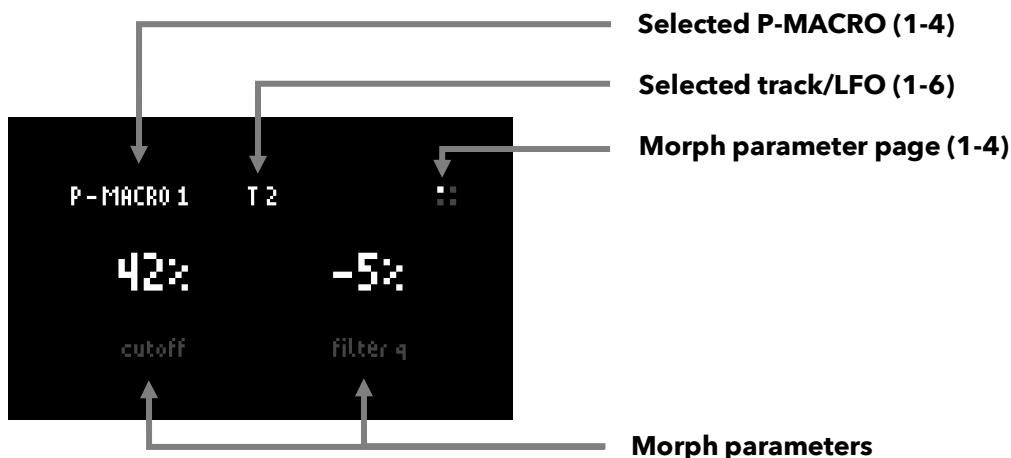
The morph values for all parameters range from **-100%** to **100%** where $\pm 100\%$ refers to a **delta multiplier** of ± 1 . Negative morph values will invert the delta values of the encoder and values smaller than $\pm 100\%$ will scale the delta values linearly. Taking the morph values from the table above the following will happen when turning the **P-MACRO 1** encoder **CW** by 1 "tick" (delta):

- the **cutoff** value of **track 1** will **increment** by **1**
- the **filter q** value of **track 1** will **decrement** by **0.05**
- the **pan** value of **track 1** will **increment** by **0.2**
- the **cutoff** value of **track 2** will **decrement** by **0.5**
- the **filter q** value of **track 2** will **increment** by **0.1**

When turning the encoder **CCW** the values will be inverted. How much a parameter will effectively change with 1 delta depends on the parameter. However, most parameters have a resolution of 100, i.e. 100 deltas are required to go from their **min** to **max** value.

P-MACRO CONFIG:

- ▶ While on the **MACRO PAGE** press one of the four **P-MACRO CONFIG** keys to access the corresponding **P-MACRO** configuration menu.
- ▶ Press one of the six **TRACK/LFO** keys to select which track/LFO morph values should be edited.
- ▶ Cycle through the four morph parameter pages with **K2** or **K3** and set the morph value for the corresponding track/LFO parameters with **E2** and **E3**.

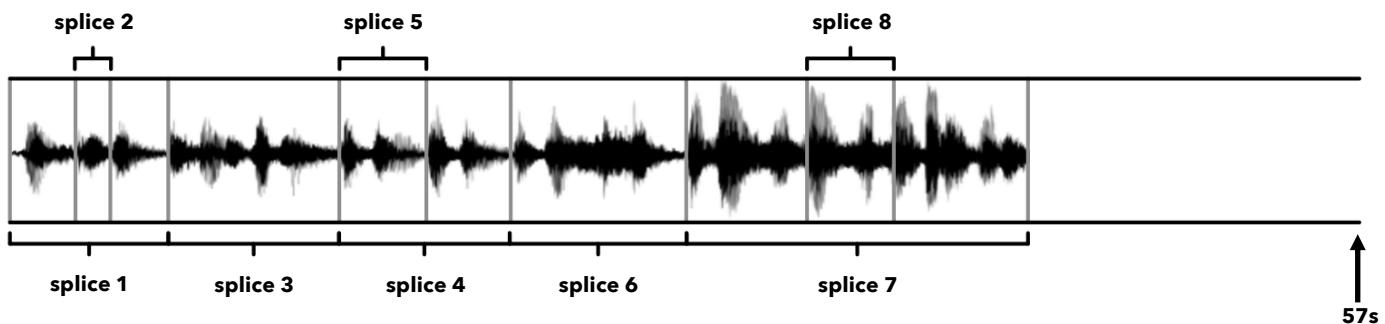


TAPE PAGE:

The **TAPE PAGE** is used to set up all "audio management" for the 6 tracks and can be used to load previously saved sessions (psets).

TAPE CONCEPT:

Each track has a total of **57s** of buffer available to record and/or load audio material into. This buffer is referred to as the **track tape**. The **active playback window** of a track is specified by a **tape splice**. Each track has 8 different splices, which point to different parts of the track tape. A track can be set to play back any of the 8 splices at any given time. Tape splices may overlap, have different lengths, and represent **any** portion of the track tape. By default, each track is assigned to its own track tape. However, it is possible to assign multiple tracks to the same track tape (see **TRACK PARAMETERS > track options**).



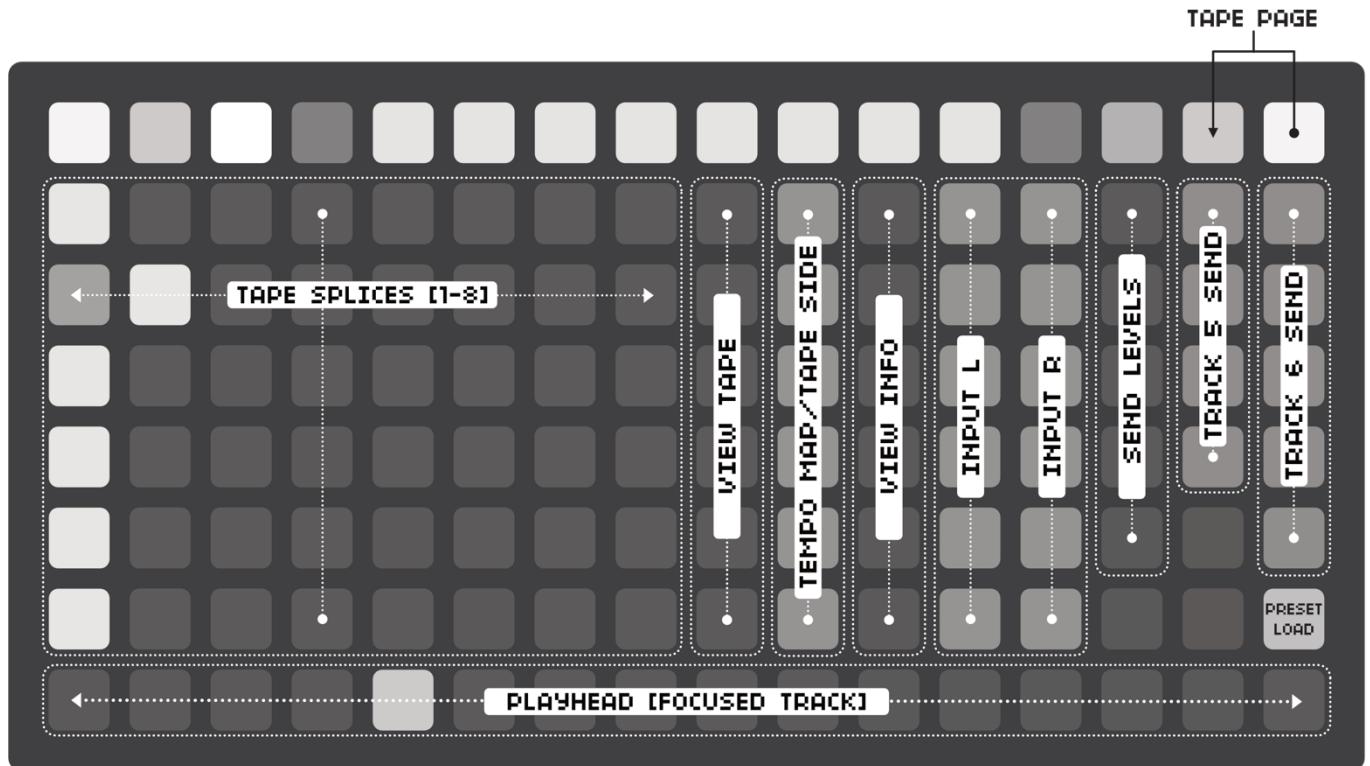
It is possible to **load/save** audio to/from tape splices, **delete** splices, **copy** splices, and **paste** them to other splices on the same track or on different tracks. It's important to keep in mind that if splices overlap, deleting a splice will result in deleting parts of another splice. For example, if splice 8 in the example above would be deleted, it a gap of silence would result within splice 7. Plan ahead when loading audio files e.g.: In the example **splice 1** above has a length of **4.2s**. Splice 2 is a **subset** of splice 1 and has a length of **1.1s**. If a **6s** audio file is imported to **splice 2**, all audio from the **endpoint** of **splice 2 + 6s** will be replaced, resulting in overwriting parts of splice 1 and splice 3. For more information about placing and moving splice markers see **TAPE INTERFACE**.

Each track tape has two sides (like two sides of a tape), which are referred to as the **main side** and the **temporary side**. It is possible to switch between the main and temporary sides and copy splices from one side to the other. The **main side** is **saved** to disk together with a **pset** and the temporary side is discarded when the script is closed. The initial idea behind the temporary side was to have the possibility to save "backups" of recordings before overdubbing, which makes it possible to revert to the previous recording if required. However, the use of the temporary side has evolved and is used in conjunction with different features:

- When auto-backup is active (see **GLOBAL PARAMETERS > recording**), each time **REC** is turned on the current splice is copied over to the temporary side. When **undo** (**MOD** + **REC**) is pressed, the previously copied audio is pasted back to the main side.
- When a preset is silently loaded (see **SILENT LOAD**) the whole buffer of the loaded preset is copied to the temporary buffer.

TAPE PAGE OVERVIEW:

The **TAPE PAGE** consists of six track rows displaying multiple parameters for each track. The bottom row displays the playhead of the **focused** track as found on the **CUT PAGE**. If a grid 256 is connected the bottom row is not displayed when the **TAPE PAGE** is displayed on the *upper* half of the grid.



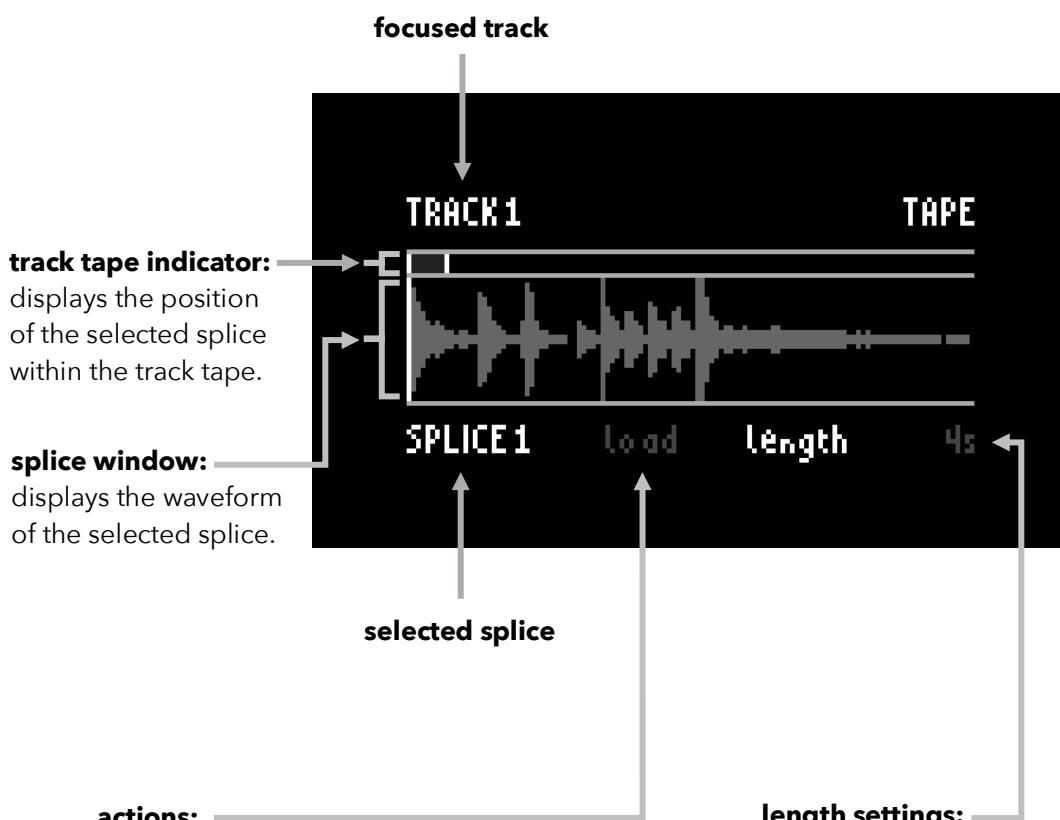
- ▶ Press one of the 8 **TAPE SLICE** key to **select** a **splice** 1-8 of the corresponding track 1-6 (rows). The highlighted row displays which track is **focused** and the dimly lit key which **splice** is **selected**. A brightly lit key indicates which **splice** is **active**.
 - ▷ Hold **ALT** and press a **TAPE SLICE** key to set the **active splice** of the corresponding track. The selected splice will be loaded according to the splice launch settings (see **GLOBAL PARAMETERS > quantization**).
 - ▷ Hold **MOD** and press a **splice** key within a track row to copy the **selected splice** to the other tape side.
- ▶ Hold **VIEW TAPE** to display the whole track tape in the **splice window**. This is referred to as **tape preview** and can be useful to get an idea of how much space is left.
- ▶ Hold **ALT** and press the corresponding **TEMPO MAP** key to cycle through the **tempo-map-modes**. The key brightness indicates whether a track is not tempo-mapped (dim) or set to **resize** (mid bright) or **repitch** (bright). The tempo-map-mode is also indicated on the screen.
- ▶ Hold **MOD** to display which is the active **track tape** and press **TAPE SIDE** key to switch sides (bright key → **main side**, dim key → **temporary side**).
- ▶ Hold **VIEW INFO** to display the **splice info** (file name, length / repitch value).

TAPE PAGE OVERVIEW continued:

- ▶ Press an **INPUT L** / **INPUT R** key to toggle the **left/right input** of the corresponding track on/off.
- ▶ Press a **TRACK 5 SEND** key to toggle the internal routing of the corresponding track (1-4) to **track 5** and press a **TRACK 6 SEND** key to toggle the internal routing of the corresponding track (1-5) to **track 6**. Track routings are post-filter and post-fader, and the send levels can be set for each track independently. Hold **SEND LEVELS** to display the **track send levels** and set the send levels with **E2** / **E3**.

TAPE INTERFACE:

While on the **TAPE PAGE** norns' screen displays the interface for managing the **track splices / audio content**.



- ▶ Use **E2** to scroll through the *splice actions* and press **K2** to trigger the action.
- ▶ Hold **K1** and use **E1** to scroll through the *length actions* and press **K2** to trigger the action.
- ▶ use **E3** to scroll though the options for *resizing* the selected splice and press **K3** to apply to the splice.
- ▶ Hold **K1** and press **K3** to *reset* the splice to its last saved settings.

TAPE INTERFACE continued:

Splice Actions:

Splice actions are used to edit splice markers and manage audio material. All audio is expected as (mono, 48kHz).

- ▶ **populate:** Loads multiple audio files into subsequent splices. After selecting a file from the menu, a prompt will appear to specify the number of files to be loaded (1-8). After confirmation, the **consecutive** audio files will be loaded (e.g. if the specified number is four, the selected file + the next three will be loaded). If the total file length exceeds the maximum tape length *or* number of files exceeds the number of available splices, the excessive files will not be loaded, and a warning message will be displayed. Splice start- and endpoints, and default splice markers are set automatically. All start points will be set to the end of the previous splice.
- ▶ **load:** Loads a single audio file into the selected splice. If the file exceeds the maximum tape length a warning message will be displayed. The splice start- and endpoints, and default splice markers are set automatically. If the selected splice is > 1 the start point will be set to the end of the previous splice.
- ▶ **clear:** Clears the selected splice. **Warning:** clearing audio will affect all splice markers that share the cleared region.
- ▶ **save:** Save the selected splice to norns. Files are located under **dust/audio/mlre/**.
- ▶ **copy:** Copies the **splice markers** to the clipboard (not the audio). If the selected splice corresponds to the active splice *and* a track loop is active, **only** the **loop** will be copied and **not** the whole splice. This is useful to copy parts of the active splice to another splice.
- ▶ **paste:** Pastes the audio (referenced by the data of the clipboard) to the selected splice. If the selected splice is > 1 the start point will be set to the end of the previous splice.
- ▶ **-1dB:** Reduce the level of the audio by 1dB.
- ▶ **+1dB:** Increase the level of the audio by 1dB.
- ▶ **rename:** Rename the selected splice.
- ▶ **format >:** Format the next splice according to the attributes of the **selected** splice (length, default markers). The start point of the next splice is automatically set to the endpoint of the selected splice.
- ▶ **format >>:** Formats all consecutive splices according to the attributes of the **selected** splice.

Length Settings:

By default, tracks are **not** tempo-mapped, i.e. the length of a splice has no reference to the system tempo settings. The **length setting** displays discrete lengths in seconds (1-57s) and splice length is set manually, defaulting to 4s. Turn **E3** and press **K3** to set the length of the splice to the displayed value. When the splice length does **not** correspond to the value displayed in the length settings, the value is dimmed. If the splice length exceeds the maximum tape length a warning message is displayed. The length of a splice can be set to any value between the proposed integers. Each splice contains a set of **splice markers** which define the **start** and **end** position within the track tape.

TAPE INTERFACE continued:

While holding **K1** the encoders and keys of the tape interface have different functions and can be used to manually change the splice start position and length, as well as saving and resetting the default splice markers.

- ▶ Hold **K1** and turn **E2** to set the **start position** and **E3** to change the **length** of the **selected splice**.
- ▶ Hold **K1** and turn **E1** so select a length action: **[:2, set, x2]** and press **K2** to trigger the action:
 - ▷ **:2:** halves the current tape length.
 - ▷ **set:** saves the current splice markers (start and length) as the splice **default** splice markers.
 - ▷ **x2:** doubles the current tape length.
- ▶ Hold **K1** and press **K3** to **reset** the splice to the **default** splice markers.

Tempo-Mapping:

When a track is **tempo-mapped** the track length **or** playback speed are calculated according to the system tempo settings and **tempo-map-mode**. The **length settings** display measures (1/4 - 64/4) instead of seconds. There are two tempo-map-modes:

Resize:

The lengths of the track splices are re-sized according to the measure selected in the length settings. Example: If the clip length setting is set to **4/4** the splice length will be re-sized to 1 bar at the current system tempo. In this example the system tempo is set to 124bpm, which results in a splice length of **1.94s** (1 bar at 124bpm ~ 1.94s). Use this tempo-map-mode is when you want loaded audio files to preserve their original pitch when the system tempo deviates from the original tempo.

```
TRACK1 > resize          TAPE
>>some_loop_82bpm
--length:1.94s--
SPLICE1    load   length   4/4
```

Repitch:

If tempo-map mode is set to **repitch** the lengths of the splices are preserved. However, the **playback speed** of the splices is recalculated according to the measure selected in the length settings. Example: if the system tempo is set to 124bpm the playback speed of a 1-bar clip, that was recorded at 82bpm will be 1.51 x faster, as the original splice length of 2.93s (1 bar at 82bpm) needs to be played back within 1.94s (1 bar at 124bpm).

```
TRACK1 > repitch          TAPE
>>some_loop_82bpm
--repitch factor:1.51--
SPLICE1    load   length   4/4
```

N.B.:

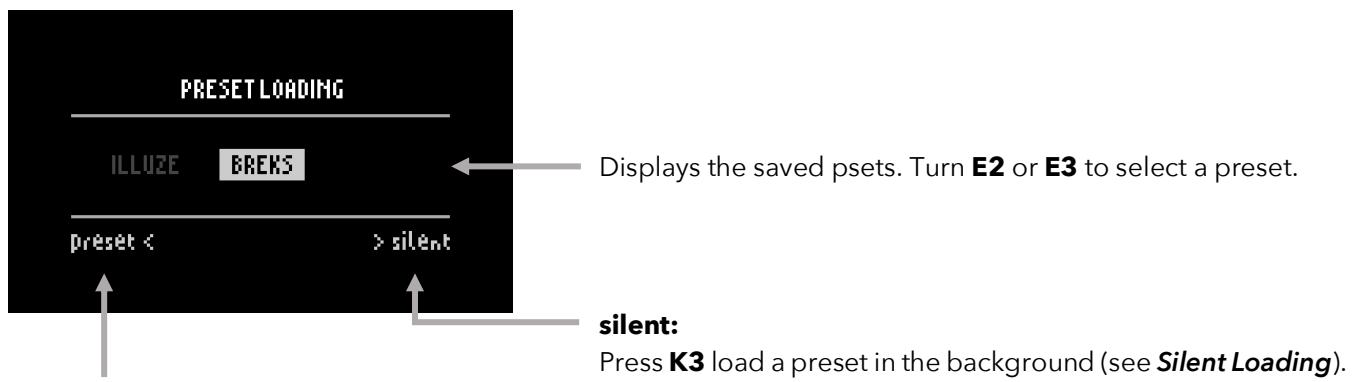
- Lower repitch factors will result in lower play-head speeds and the audio quality will be degraded. If you wish to record audio it is advised to set the tempo-map-mode to **resize** and **not repitch** OR make sure that the repitch factor is set to 1.
- If you require more space for recording, set the length to the desired measure **and then** extend the endpoint of the splice until the repitch factor reaches 1 again.

SAVING AND LOADING PRESETS:

Complete sessions can be **saved** and **loaded** via norns' pset manager. When a pset is **saved** a folder within **data/mlre** is created with the corresponding pset number (e.g., **data/mlre/01**). Within this folder a **my_pset_session.data** file, which contains all track, macro and splice data, as well as the whole **main** buffer as a **my_pset_buffer.wav** file (50.3MB) are saved.

- ▶ When a pset is **loaded** the **.pset** file together with the **.data** file and buffer are loaded into mlre. Loading a preset will stop all playing patterns. The **REC** and **PLAY** states of tracks persist (do not change state).
- ▶ When a pset is **deleted** the corresponding directory (e.g., **data/mlre/01**) is deleted together with the files **my_pset_session.data** and **my_pset_buffer.wav**.

Saved presets can also be accessed directly via grid on the **TAPE PAGE**. Press the **PRESET LOAD** key to access the **PRESET LOADING** page. The screen displays the names of the saved psets and two options for loading.



preset:

Press **K2** to instantly load a preset (equivalent to loading a pset via pset-menu). Hold **K1** and press **K2** to load the **parameters only** (this is useful to re-load the parameters while leaving the buffer and splices unchanged e.g. after silent loading).

Silent Loading:

This option is intended for creating smooth transitions between different presets in a live situation. When a preset is loaded via **silent load** the following actions occur immediately:

- ▶ The buffer of the loaded preset is copied to the **temporary** buffer (in the background).
- ▶ All **macros** and macro settings are loaded.
- ▶ All **silent load global parameters** are loaded accordingly (see **GLOBAL PARAMETERS > silent load**).
- ▶ All stopped tracks are "flipped" i.e. the current track tape is replaced with the one from the loaded preset, **tempo-map** settings are applied, and the **silent load track parameters** are set according to the silent load settings (see **GLOBAL PARAMETERS > silent load**).

All playing track will remain unaffected unless they are tempo-mapped and **silent load tempo** is set to **transition**. To "flip" a playing track press any **PLAYHEAD** key of the corresponding track or the flashing **TRACK FOCUS** key on the **REC PAGE** or flashing **TAPE SPICE** key on the **TAPE PAGE**. Stopping an "un-flipped" track will "flip" it.

PARAMETERS:

The parameter section on norns is divided three main sections: **global**, **tracks** and **modulation**. Most parameters for track and modulation are accessible over the grid / norns UI. Most global parameters are only available over the parameter menu. All parameters are MIDI-mappable.

GLOBAL PARAMETERS:

scale:

- Sets the scale for transposition: "**major**", "**natural minor**", "**harmonic minor**", "**melodic minor**", "**dorian**", "**phrygian**", "**lydian**", "**mixolydian**", "**locrian**" and "**custom**". All scales can be easily modified under `code/mlre/lib/scales.lua`.

quantization:

- **time signature [2/4-11/4]:** Defines the measure of a bar.
- **key quantization [off - 1/2]:** Sets the quantization of key presses/events.
- **snapshot launch [manual, beat, bar]:** Sets the quantization for recalling snapshots.
 - ▷ **manual:** the key quantization value is applied
 - ▷ **beat:** snapshots are launched at the next beat
 - ▷ **bar:** snapshots are launched at the next bar
- **splice launch [manual, beat, bar, queue]:** Set the quantization for loading a splice.
 - ▷ **manual:** the key quantization value is applied
 - ▷ **beat:** splices are loaded at the next beat
 - ▷ **bar:** splices are loaded at the next bar
 - ▷ **queue:** splices are loaded when the playhead reaches the end of the current loop

recording:

- **rec source [adc/eng, adc/tape, adc/eng/tape]:** Sets which sources are routed to softcut for recording.
- **rec threshold [-40-0dB]:** Sets the threshold for one-shot recording (see **REC PAGE**).
- **rec slew [1-10ms]:** Sets the slew time of the record head level changes. Higher values reduce clicks, lower values preserve more transients.
- **rec filter [off/on]:** Enables/disables the pre-recording low pass filter.
- **auto-backup [off/on]:** Toggles auto-backup. When **REC** is toggled **on**, the active splice is copied to the temporary tape. Pressing **MOD** + **REC** will copy the splice back to the main tape.

GLOBAL PARAMETERS continued:

snapshots:

The snapshots parameter section sets the behaviour of the snapshots. Specific parameters can be ignored depending on one's preferences.

- **active splice [ignore, recall]:** When set to **recall**, the active splice will be loaded with a snapshot.
- **playback [ignore, recall]:** When set to **recall**, the playback states will be recalled and the playhead positions **reset** when a snapshot is loaded. This also **resets** the counter for **track reset**.
- **loops [ignore, recall]:** When set to **recall**, track loops will be set/cleared with a snapshot.
- **rec state [ignore, recall]:** When set to **recall**, the track rec state will be recalled with a snapshot.
- **mute state [ignore, recall]:** When set to **recall**, the mute state will be recalled with a snapshot.
- **rev state [ignore, recall]:** When set to **recall**, the rev state will be recalled with a snapshot.
- **speed [ignore, recall]:** When set to **recall**, speed value will be recalled with a snapshot.
- **transposition [ignore, recall]:** When set to **recall**, the transpose value will be recalled with a snapshot.
- **track sends [ignore, recall]:** When set to **recall**, state of the track sends will be recalled with a snapshot.
- **lfo state [ignore, recall]:** When set to **recall**, the state of the LFOs will be recalled with a snapshot.

silent load:

The silent load configuration is saved independently from psets, so the settings remain consistent over different presets. The silent load config let's one customize which parameters are ignored, loaded or reset with silent load.

- **>> save config:** saves the configuration to a file. this is required to save any changes made in the silent load configuration.
- **global params:** The global params are loaded together with the silent load action or affect global states.
- **track load sync [manual, beat, bar]:**
 - ▷ **manual:** the key quantization value is applied
 - ▷ **beat:** track is loaded at the next beat
 - ▷ **bar:** track is loaded at the next bar
- **tempo [ignore, load, transition]:** Please note that tempo changes are only applied when the system clock is set to **internal** or **link**.
 - ▷ **ignore:** the preset tempo is ignored
 - ▷ **load:** the system tempo is immediately set to the stored tempo with silent load.
 - ▷ **transition:** the system tempo transitions from the current tempo to the stored tempo over the number of beats specified under **transition**.

GLOBAL PARAMETERS continued:

- **transition [2-16beats]:** Sets the number of beats it takes to transition from one tempo to the other.
- **key quantization [ignore, recall]:**
 - ▷ **ignore:** the current key quantization setting is maintained
 - ▷ **recall:** sets the key quantization to the stored value
- **time signature [ignore, recall]:**
 - ▷ **ignore:** the current time signature setting is maintained
 - ▷ **recall:** sets the time signature to the stored value
- **scale [ignore, recall]:**
 - ▷ **ignore:** the current scale setting is maintained
 - ▷ **recall:** sets the scale to the stored value
- **lfos [ignore, recall]:**
 - ▷ **ignore:** the current LFO settings are maintained
 - ▷ **recall:** sets all LFO to the stored settings
- **track params:** The track params are loaded together with the individual tracks. The options for all track params are **ignore**, **recall**, and **reset**. The following parameters can be configured: **track reset, reset count, track loops, volume, pan, rev, speed, detune, transpose, sends, warble state, track select, track fade and active splice.**
 - ▷ **ignore:** the current track parameter setting is maintained
 - ▷ **recall:** the track parameter is set to the stored value
 - ▷ **reset:** the track parameter is reset to its default value
- **remote control:** Map the parameters below to momentary keys of a midi controller to select presets and trigger silent loads without navigating to the **TAPE PAGE**. Norns' screen will display which preset is selected.
 - **>> silent load:** trigger the silent load of the currently selected preset.
 - **> inc pset:** move to the next preset.
 - **< dec pset:** move to the previous preset.

GLOBAL PARAMETERS continued:

track control:

The main purpose of this section is for MIDI mapping specific track parameters that otherwise are only available via grid interface.

midi output:

- **midi transport [off, send, receive]:** Set whether MIDI start/stop messages are sent received or ignored.
 - ▷ **ignore:** MIDI transport is ignored
 - ▷ **send:** A MIDI **start** message is sent as soon as track playback of any track is started. All consecutive track starts are ignored until a MIDI stop message is sent. To send a MIDI **stop** message press **STOP ALL** (**ALT** + **SEC**).
 - ▷ **receive:** Incoming MIDI start messages will start any track that have **track select** activated. Incoming MIDI **stop** messages will stop all tracks and patterns.

- **midi device [device list]:** Set the MIDI device to send MIDI start/stop messages to or the MIDI device for sending **track triggers** (see *TRACK PARAMETERS > track triggers*).

global track control: MIDI map parameters to control global playback.

- **start all:** starts all tracks
- **stop all:** stops all tracks and patterns
- **reset positions:** resets the playhead position of all playing tracks

focused track control: MIDI map parameters to control parameters of the currently focused track.

- **play:** toggle playback
- **mute:** toggle mute
- **rec:** toggle record
- **rev:** toggle reverse
- **speed +:** increase speed
- **speed -:** decrease speed
- **randomize:** randomize parameters (see *GLOBAL PARAMETERS > randomize*)

individual track control: MIDI map parameters to control parameters of a specific track.

- same parameters as **focused track control**.

GLOBAL PARAMETERS continued:

randomization:

- **randomize @ step count [off, on]:** If turned on and **track select** is active for a given track the specified parameters are randomized after the number of "grid steps" set in **>>step count**.
- **>> step count [1 - 128]:** Set the number of steps between randomization events for **randomize @ step count**.
- **parameters:** The following section allows the specification of the parameters that are randomized: **transposition, volume, pan, reverse, loop-points, speed** (octaves) and **cutoff frequency**. The bounds of **speed** (octaves) and **cutoff** can be specified.

While on the **REC PAGE** track parameters can be randomized manually by holding **[ALT]** and pressing the **centre SPEED** key of the corresponding track.

arc settings:

The arc settings parameters are only displayed if an arc controller is connected.

- **arc orientation [0°, 90°, 180°, 270°]:** Set the orientation of the arc controller.
- **enc1 > start [off, on]:** If on, touching **ENC1** will start playback of the **focused** track.
- **enc1 > direction [off, on]:** If on, rotating **ENC1** CCW will set the playback direction to forward and rotating the encoder CW will set the playback direction to reverse of the **focused** track.
- **enc1 > mod [off, warble, scrub]:** If set to **warble**, moving the encoder will temporarily speed up/slow down the playback speed of the **focused** track. If set to **scrub**, moving the encoder will scrub through the clip of the **focused** track.
- **mod sensitivity [1 - 10]:** Set the sensitivity of **ENC1**. Lower values result in less sensitivity i.e., the scrubbing/warble effect is less pronounced.
- **p-macro sensitivity [1 - 10]:** Set the sensitivity of the encoders when in **P-MACRO** mode. Higher values result in more sensitivity i.e., the delta values of the encodes are smaller.

TRACK PARAMETERS:

The track parameters are divided into 7 sections: **track options, levels, pitch, filter, warble, envelope, and track triggers**. Parameters that haven't been covered in depth elsewhere in the manual are listed below:

track options:

- **track tape [1-6]:** Assign a tape to a track. By default, each track is assigned to its own tape. However, it is possible to assign multiple tracks to the same tape. This is particularly useful when setting up a multi-playhead audio mangler, where multiple tracks record and playback different parts of the same tape at different speeds. Please note that when rec- and playheads cross there can be noticeable clicks.

TRACK PARAMETERS continued:

- **play mode [loop, oneshot, gate]:** Each track can be set to different playback modes, with different behaviours. Looping sections of a clip (via grid key combo or arc control) works the same in all modes.
 - ▷ **loop-mode** is the default setting, where the play-head jumps to the start of the playback window when the end is reached or vice versa.
 - ▷ In **oneshot-mode** the playback is stopped when the play-head reaches the end / start of the playback window.
 - ▷ In **gate-mode** playback is active if a **PLAYHEAD** key is held. At key release the playback is stopped. Starting playback via **PLAY** key, playback key combos and MIDI start messages ignore **gate-mode**.
N.B.: While **quantization** is **on** in **gate-mode** all events called in sync according to the key quantization settings. This means when you hold a **PLAYHEAD** key, playback will start at the next quantization event and when you release a key playback will stop next quantization event. Depending on the key quantization settings, fast key presses will not be registered as expected.
- **track reset [off, on]:** When track reset is **enabled** the **playhead position** of the track will **reset** after the number of beats specified under **reset count**. When reset count is set to "track" the number of beats is calculated according to the track length. Please note that this only works as intended when a track is **tempo-mapped**, and the track length is set with the **length settings** (see **TAPE INTERFACE**). **Important:** When track playback starts or the playhead position is reset with the loading of a snapshot the beat counter is reset. To achieve best results set **track launch** and/or **snapshot launch** to **beat** or **bar**.

How this is useful: Due to the nature of softcut the playhead positions of multiple tracks will drift over time when the playback rate of individual tracks is modulated by different amounts e.g. by tape warble, speed changes, rate slew, direction changes. Track reset offers a way to periodically re-align the playback position of multiple tracks.

tape warble:

When **tape-warble** is enabled (**ALT** + **WRE**) the playback speed is modulated. The modulation is based on over 20 different "warble curves". Look for **wrb.curves** in the code (**mlre.lua**) and play around with the numbers, add/remove entries if you like. Dial in some **rate slew** to smoothen out the curves. Available warble settings are:

- **state [off, on]:** toggles the warble effect on/off.
- **amount [1 - 100%]:** sets the chance for a "warble event" to occur.
- **intensity [10 - 100%]:** sets how strong the warble effect is.

TRACK PARAMETERS continued:

track triggers:

Track to trigger mode was suggested by lines user @mlogger. The request is related to the way *Charles Cohen played the Easel* by clocking it using a looper pedal. The trigger functionality is available over a connected **MIDI device** and/or **crow**. The following parameters are available per track:

- **rec@step [off, 1-16]:** If set to other than off record will be toggled (on/off) for the corresponding track at the specified step (1 - 16).
- **trig@step [off, 1-16]:** If set to other than off an envelope / note on MIDI event will be sent over the selected trig output at the specified step (1 - 16).
- **trig@count [off, 1-16]:** If set to other than off an envelope / note on MIDI event will be sent over the selected trig output after a specified number of step counts (1 - 16). Stopping a track resets the counter.
- **trig output [off, crow 1, crow 2, crow 3, crow 4, midi]:** Select the output destination. If the output is set to "crow 1-4" a pulse or AD envelope will be sent via the corresponding crow output and the crow parameters for the AD settings will be visible below the trig output parameter. If set to "midi" a MIDI note will be sent via the MIDI device specified under **parameters > global > track control > midi output** and the MIDI parameters will be visible below the trig output parameter.

crow parameters: These parameters define crow's behaviour when receiving a trig command.

- **trig mode [pulse, envelope]:** When set to pulse the corresponding output sends a short rising-edge pulse. When set to envelope an AD envelope with is sent through the corresponding output.
- **amplitude [0-10v]:** Amplitude of the AD envelope in volts.
- **attack [0-1s]:** Attack time of the AD envelope in seconds.
- **decay [0.01-1s]:** Decay time of the AD envelope in seconds.

midi parameters: These parameters define the MIDI note triggered by the corresponding track.

- **midi channel [1 - 16]:** Sets the MIDI channel.
- **midi note [1 - 127]:** Sets the MIDI note which is sent when receiving a trig command.
- **midi velocity [1 - 127]:** Sets the MIDI velocity of the note.

There are many ways how **track triggers** can be used. To get started here are a few ideas:

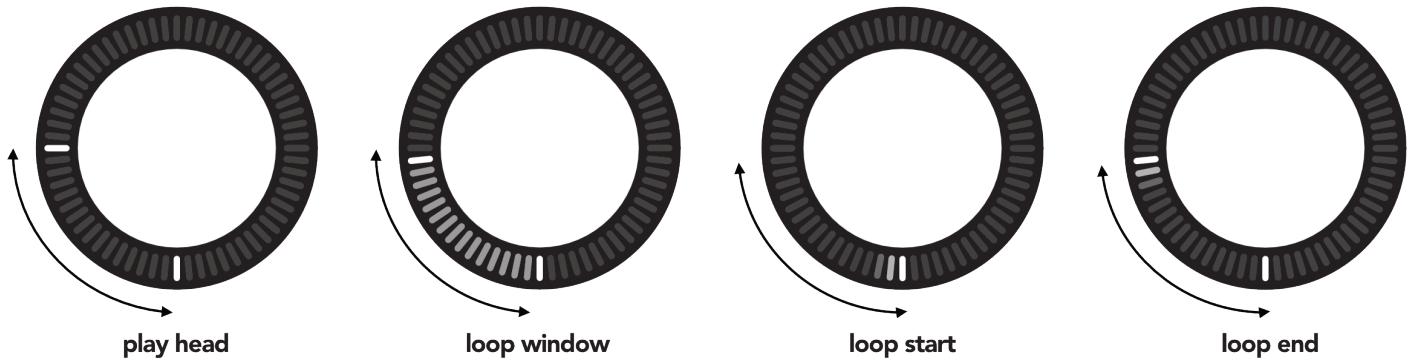
- Use the trigs to fire scripts on your teletype.
- Use multiple tracks to send trigs to the same destination to create rhythms.
- Clock your sequencer(s) and record the back to norns.
- Run your norns output through filters, effects etc. and modulate them with trigs and envelopes.
- Use MIDI to fire samples from your sampler of choice.

ARC CONTROLS:

While on the **REC-**, **CUT-** or **TRSP PAGE** there are two arc pages available: **PLAY** and **LEVELS**. On the **LFO-**, **ENV-** and **TAPE PAGE** page-specific controls are displayed. The orientation of the arc controller can be selected under **parameters > global > arc settings**.

- ▶ Hold **K1** and turn **E1 CCW** to set the page to **PLAY** and turn **E1 CW** to set the page to **LEVELS**. On 2025 edition arcs tapping the key toggles between the two pages.
- ▶ While on the **CUT PAGE** holding the **CUT PAGE** key will display the focused track on the encoder ring of **ENC4**. Turn **ENC4** to select the focused track without having to press any **PLAYHEAD** keys.
- ▶ Hold **K1** (or the arc key on 2025 arcs) on any **PAGE** except the **TAPE PAGE** to surface the **P-MACROS**. The arc encoders 1-4 correspond to the **P-MACRO** encoders 1-4.

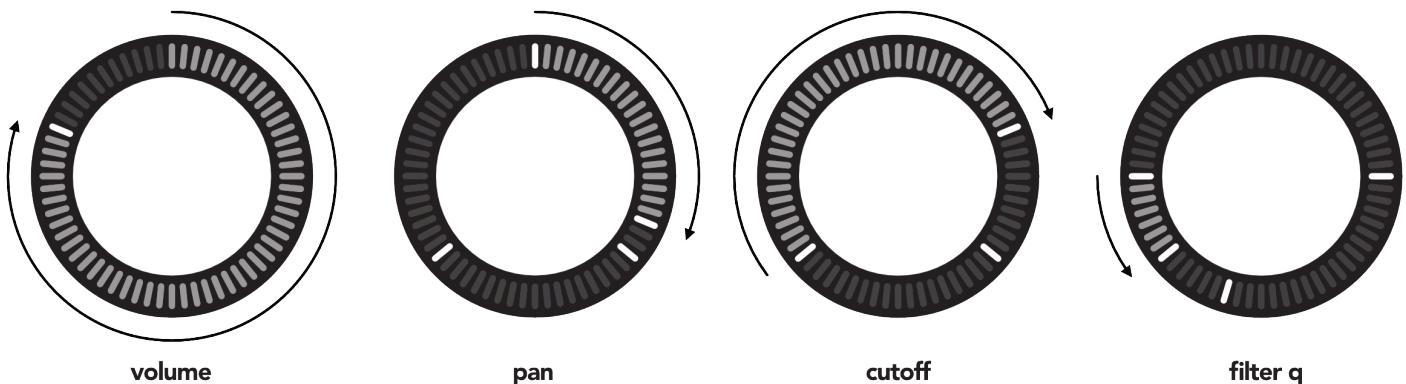
PLAY



- **ENC1 - play-head:** The play-head encoder ring displays the position of the play-head at a 64-step resolution. The indicator rotates CW for tracks playing forward and CCW for tracks playing in reverse. **ENC 1** has different functions depending on the arc settings.
 - ▷ **enc1 > start [off, on]:** If enabled moving the encoder will start playback of the focused track.
 - ▷ **enc1 > direction [off, on]:** If enabled, rotating the encoder CCW will set the playback direction of the focused track to forward and rotating the encoder CW will set the playback direction to reverse.
 - ▷ **enc1 > mod [off, warble, scrub]:** If set to **warble**, moving the encoder will temporarily speed up/slow down the playback speed of the focused track. If set to **scrub**, moving the encoder will scrub through the clip of the focused track. The **sensitivity** can be set under **parameters > global > arc settings**.
- **ENC2 - loop window:** The loop window encoder ring displays the loop window of the focused track. If looping is active the loop window is gradually adjusted by moving the encoder. If looping is inactive, moving the encoder will activate looping. Any further encoder movements are ignored for 0.5s. This brief time-out prevents accidental loop changes while activating loops via arc. To deactivate looping hold **ALT** and move the encoder.
- **ENC3 - loop start:** Set the start point of the loop window.
- **ENC4 - loop end:** Set the end point of the loop window.

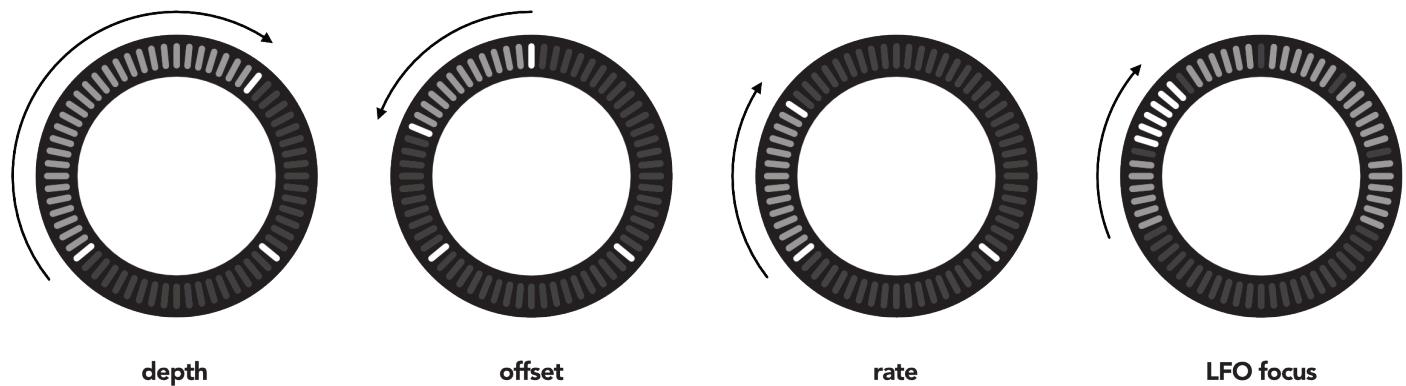
ARC CONTROLS continued:

LEVELS



- **ENC1 - volume:** Set the volume of the focused track.
- **ENC2 - pan:** Set the pan of the focused track.
- **ENC3 - cutoff:** Set the filter cutoff of the focused track.
- **ENC4 - filter q:** Set the filter q of the focused track.

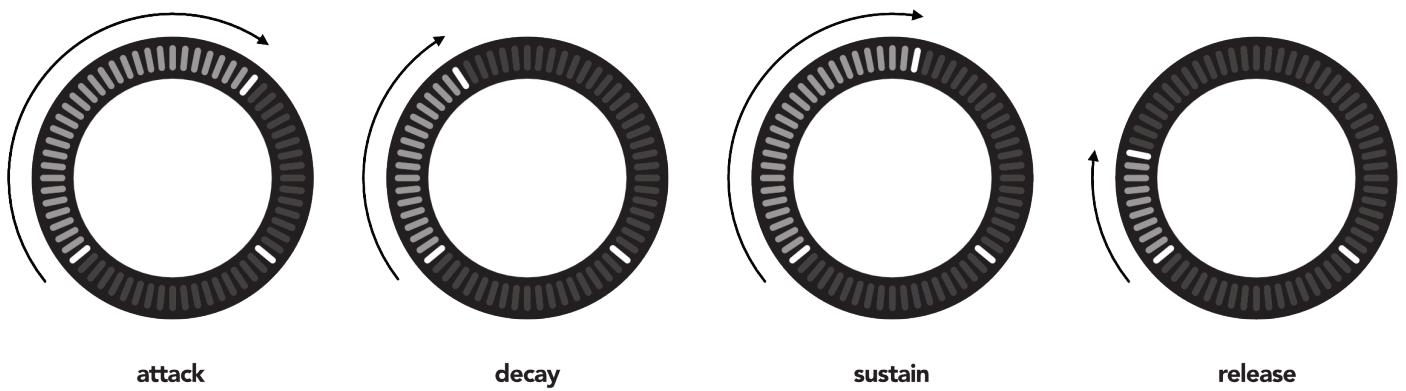
LFO



- **KEY:** Hold to enter **P-MACRO** mode.
- **ENC1 - depth:** Set the depth of the focused LFO. Setting the depth to values > 0 will automatically turn the LFO on. Turning the encoder fully CCW will turn the LFO off.
- **ENC2 - offset:** Set the offset of the focused LFO.
- **ENC3 - rate:** Set the frequency of the focused LFO.
- **ENC4 - focus:** Turn the encoder to set which LFO is in focus.

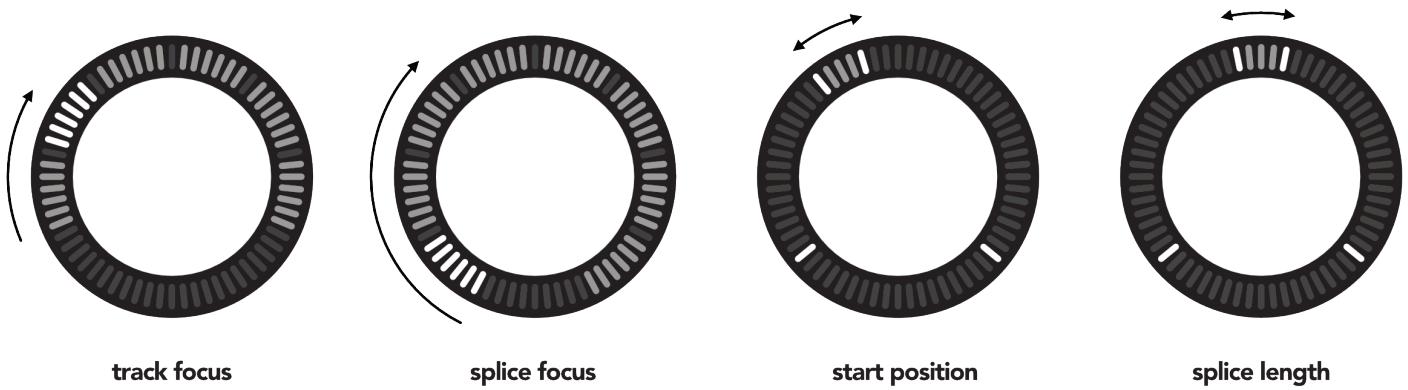
ARC CONTROLS continued:

ENV



- **KEY:** Hold to enter **P-MACRO** mode.
- **ENC 1 - attack:** Set the attack time.
- **ENC 2 - decay:** Set the decay time.
- **ENC 3 - sustain:** Set the sustain level.
- **ENC 4 - release:** Set the release time.

TAPE



- **KEY:** Hold to enable high resolution for **ENC3** and **ENC4**.
- **ENC1 - track focus:** Turn the encoder to select the focused track.
- **ENC2 - splice focus:** Turn the encoder to select a splice.
- **ENC3 - start position:** Turn the encoder CW to increase or CCW to decrease the start position of the selected splice.
- **ENC4 - splice length:** Turn the encoder CW to increase or CCW to decrease the length of the selected splice.