MegaCommand Live

Firmware Version 2.20

Justin Mammarella

Contents

Introduction

1.1 Preface

The following document is intended as an operating manual for the MegaCommand Live firmware. For instructions on how to upload the firmware, or to learn how to build a MegaCommand MIDI controller please see the links below [1]***.***

1.2 Hello

Welcome to MegaCommand Live,

MegaCommand Live (MCL) is a firmware designed for the MegaCommand MIDI controller that enhances the Elektron MachineDrum's (MD) sequencing, sound design and live performance capabilities.

At the heart of MCL lies the ability to copy individual Tracks from the MD and store them on the MegaCommand (MC) for later recall. During a performance, tracks from different patterns can be loaded and mixed together. Chain Mode, inspired by classic music trackers, allows multiple tracks to be linked together to form complex musical pharses.

MCL features a modern sequencer upgrade for the Elektron Machinedrum. It consists of 20 local sequencer tracks with individual track lengths, parameter locks, micro-timing and conditional trigs. Sixteen of these tracks can be used to sequence the Elektron MD, the remaining four tracks are polyphonic and can be used to sequence external instruments such as the Elektron Analog 4.

Other features of the MCL firmware include: MD Trigger Interface, Chromatic + Polyphonic Mode, Level Mixer, Mute + Cue System, Single Cycle Waveform Designer, Turbo 8x MIDI and much more.

[1] MegaCommand documentation:`https://github.com/jmamma`.

Key Concepts

- Page:
  The MCL firmware consists of pages accessible through the MC's function and encoder buttons. Each page contains unique behaviour and is described in this manual.
- Project:
  A project stored on the Micro SD-Card. Each project contains one Grid. The maximum number of projects is only limited by the SD Card capacity.
- Grid:
  The MCL Firmware uses a Grid/Slot system to store Tracks. The grid dimensions are 128 Rows x 20 Slots.
- Row/Pattern:
  A row of the Grid. Each row consists of 20 slots and can store 16 MD tracks, a complete MD pattern + 4 external sequencer or A4 tracks.
- Slot:
  A position in the Grid where a Track can be stored. (Either occupied or unoccupied).
- Tracks
  A track copied from the Elektron MD or Analog4, or an external MIDI track.

  There are 3 types of tracks.

  - MachineDrum Track (Slots 0-15):
    A track copied from the MD containing: Machine Settings, MD Sequencer Data, Local Sequencer Data, Master Effects Settings
  - Analog4 Track (Slots 16-19):

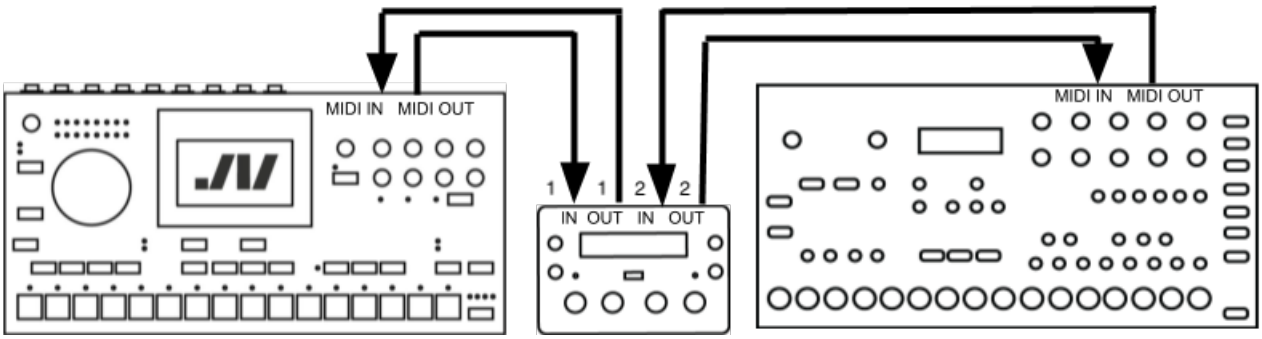
    A track copied from the A4 containg Sound Settings, Local Sequencer Data (no A4 sequencer data is supported at this time)
  - Ext Track (Slots 16-19):

    Local Sequencer Data
- Internal Sequencer:
  MCL's 20 track internal sequencer.

MIDI Setup

3.1 Connectivity:

1. **Machinedrum**: Connect the MIDI-Out of the Machinedrum to the MIDI-In (1) of the MegaCommand. and connect the MIDI-Out (1) of the MegaCommand to MIDI-In of the Machinedrum.
2. **External Midi:** (Optional): A MIDI Keyboard, or sequencer can be connected to MIDI-In (2). Attached MIDI Keyboards can be used to play notes in chromatic mode. Attached sequencers can be used as external clock source.
3. **Analog4:** (Optional): Connect the MIDI-Out of the Analog4 to the MIDI-In (2) of the MegaCommand. and connect the MIDI-Out (2) of the MegaCommand to MIDI-In of the Analog 4.



3.2 MachineDrum Settings

MCL communicates with the MachineDrum using SYSEX messages, and will configure your MD's global settings automatically. MCL will overwrite MD's global settings slots 7 and 8. These slots should always be reserved for MCL.

3.3 Analog4 Settings:

The following configuration must be manually applied in the Analog 4's Global Settings menu:

- MIDI Port Config:
  1. Output to MIDI
  2. Input to MIDI
  3. Keyboard CFG = EXT
  4. Receive Notes = True
  5. Receive CC/NPRN = True
- MIDI Channels:

  Tracks 1-6 channels need to be set to MIDI Channels 1-6 respectively.

3.4 Turbo MIDI

MCL supports Elektron's Turbo MIDI protocol with selectable speeds 1x, 2x, 4x, 8x.

Each MIDI port can be configured with a unique speed and is configurable in the **MIDI Menu** accessible from **Global Settings**.

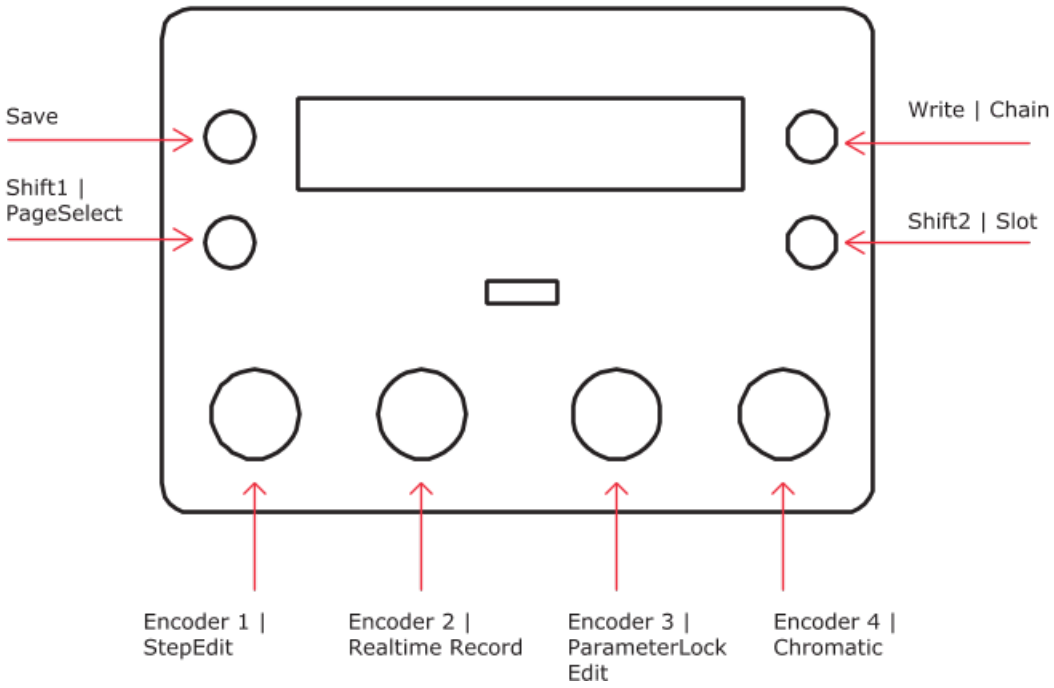
*For optimal firmware performance, reduced transmission latency and lowest sequencer jitter, use the default **Turbo 8x speed.***

3.5 Active Peering:

When a MIDI device is connected to ports 1 or 2. The MegaCommand will automatically detect the attached device and set the chosen Turbo MIDI speed. If the attached device cannot be identified it will default to General MIDI (GM) Device.

MCL has no method of detecting a snapshot change on the MachineDrum. If a new snapshot is loaded on the MD either the MC or MD will need to be powercycled to reform the peer.

GUI



The MegaCommand's four upper function buttons are used to enter submenus and activate commands:

4.1 Function Buttons:

From the Grid Page the function buttons perform the following actions:

- **[Save]**: Enters the Save Page
- **[Write | Chain]**: Enters the Write or Chain page
- **[Shift1 | PageSelect]**: Enters the PageSelect page
- **[Shift2 | Slot]**: Opens the slot Menu

Combined Button Presses:

- **[Save] + [Write | Chain]**: Opens the Global Settings menu

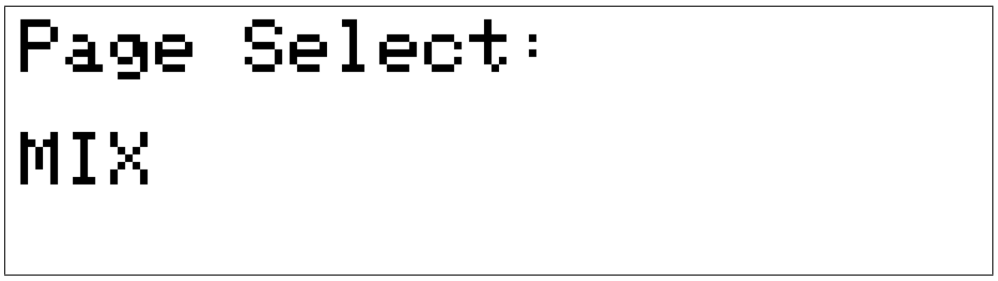
4.2 Encoder Buttons

From the Grid Page the encoder buttons are used to access Sequencer Pages:

- **[Encoder 1]**: Enter sequencer StepEdit page
- **[Encoder 2]**: Enter sequencer RealTimeRecord page
- **[Encoder 3]**: Enter sequencer ParameterLock page
- **[Encoder 4]**: Enter sequencer Chromatic page

4.3 Page Select

The PageSelect page is accessed by holding the **[Shift1 | PageSelect]** button.



The PageSelect page allows quick access to auxillary pages not accessible through the main GUI buttons. When open, the PageSelect page displays the Page to be loaded, releasing **[Shift1 | PageSelect]** will load the selected page.

Rotating **[Encoder 1]** will scroll through the available PageSelect pages.

- 1. Mixer Page
- 2. Cue Page
- 8, Wav Designer

The MD's trigger interface can be used to quickly toggle between pages in the PageSelect page.

4.4 Trigger Interface

When connected to the Elektron MachineDrum, MCL will use the MD's 16 trigger buttons as additional GUI input.

Depending upon the current page, the Trigger Interface (TI) can be used to work in a variety of ways. For example, the TI can be used to enter sequencer data in to the internal sequencer; to select multiple tracks in the Mixer window and attenuate their volume simultaneously; to save or load Grid Slots from the Save or Write/Chain pages and much more.

4.5 Trigger Interface Limitations

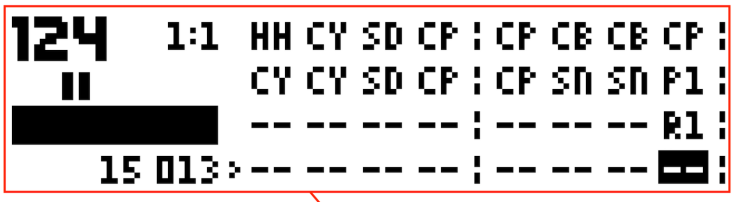
The MD TI is not natively supported by the MD and is instead achieved using a Global Slot/MIDI Channel exploit. The exploit is used to differentiate between notes triggered by the sequencer and notes triggered by a user key-press.

The TI will cease working whenever the MD display is updated unexpectedly, for example, when a machine parameter's value is changed; or when a submenu on the MD is opened.

As a precaution, whenever entering a Page on the MC that uses the TI, the MD track will be automatically changed to track 16. This avoids unexpected display updates, that may be caused by transmitted Parameter Changes. Parameter Locks on Track 16 will therefor not be transmitted when the TI is active.

*Recovery: If the Trigger Interface stops working exit all submenus on both the MD and MC. On the MD press **[Func + Extended]** to reset the state of the MD.*

Grid/Slot System:



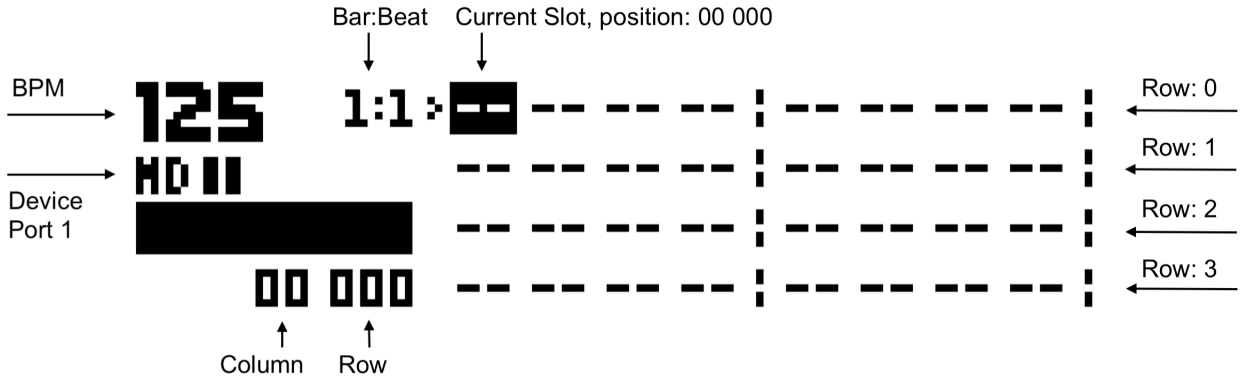
Row: 00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Row: 12	BD	XT	XT	09	GA	GB	09	RE	HH	CY	SD	CP	CP	CB	CB	CP	A0	A1	A2	A3
Row: 13	BD	GA	SD	SD	CP	XT	XT	MA	CY	CY	SD	CP	CP	SN	SN	P1	--	--	--	--
Row: 14	BD	05	25	33	09	09	40	40	--	--	--	--	--	--	--	R1	--	--	--	--
Row: 15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Row: 16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Row: 128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

The Grid is a data structure consisting of 128 rows with each containing 20 slots.

The first 16 slots of a row are reserved for MD tracks. The remaining 4 slots are used for Analog4 or External MIDI tracks.

Grid Page

The first page you will be presented with after loading or creating a new project is the Grid Page. This is the main page of MCL and is used to access the firmware's sub-pages and menus.



MCL displays the Grid on screen. Four rows are drawn on screen at any one time with each row showing 8 out of 20 slots.

Occupied slots will show the Machine Type associated with the track for example "BD" for Bass Drum. Unoccupied Slots are represented by two lines of "–" . For clarity, a dashed vertical line is printed after every fourth slot.

The current slot's column and row are displayed towards the bottom left of the screen.

An interactive cursor indicates the current slot position and is distinguished by a slot printed with inverted colours.

Encoder Assignment:

Rotating encoders 1 or 2 will allow the current slot position to change.

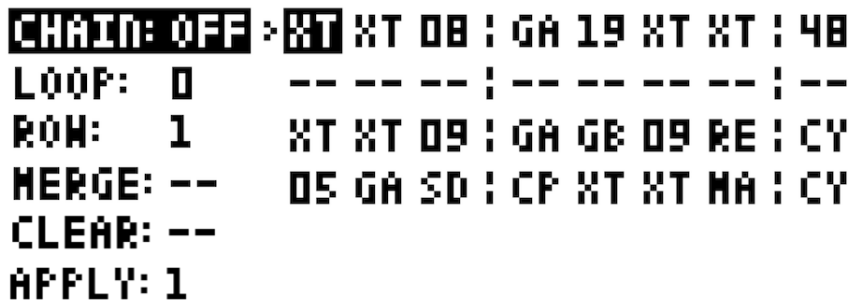
When the cursor reaches the edges of the screen you can continue to scroll through the grid:

- **[Encoder 1]:** scrolls the grid horizontally.
- **[Encoder 2]:** scrolls the grid vertically.
- **[Encoder 3]:** –
- **[Encoder 4]:** –

Slot Menu:

The Slot Menu is an important sub-menu of the Grid Page and is used to manipulate slots in many ways.

It can be used to clear one or more slots in a row, to merge MD sequencer data in to the internal sequencer or to configure a slot's chain settings. It also provides a quick way to activate or deactivate various Global Chain Modes.



*The SlotMenu is accessible from the GridPage by holding down the **[Shift2]** function button. When **[Shift2]** is released, any changes to the menu will be applied to the current slot. If the APPLY value is greater than 1, changes will be applied sequentially; starting from the current slot and up to the number of slots specified by the APPLY value*

*For users running MCL on a **HD44780 LCD**, the SlorMenu is accessible from the GridPage by holding down the **[Shift2]** function button and pressing a corresponding encoder button. For example if slots 5 to 8 are displayed on screen, holding **[Shift2]** and then pressing **[Encoder3]** will open the slot menu for slot 7.*

7.1 Slot Menu Options:

Slot Menu has following options and selectable values:

- Chain: [–, auto, manual, random]
  - auto: enables chain auto mode global setting
  - manual: enables chain manual mode global setting
  - random: enables chain random mode global setting
- Loops: (0, 64)
  - specify how many times to loop track/slot
- Row: (0,127)
  - specify which row to load/jump to after n loops.
- Seq: [–, merge]
  -merge slot's MD sequencer data in to the internal sequencer

- Clear: [–, YES]

  - clear the selected slot.

- Apply: (0,20)

  - apply the above changes to the next N slots upon exit of SlotMenu.

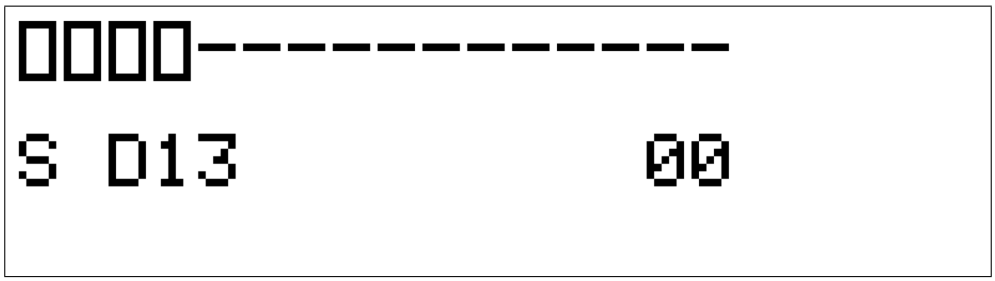
Save Page

The Save Page is used to copy track data from the Machinedrum to a specific slots in the current row of the Grid.

When a track is copied to a slot, the MC's internal sequencer data for that track is also stored alongside the copied track data.

Master Effects settings are also saved with each MD Track.

*The Save Page is accessible from the GridPage by pressing the **[Save]** function button.*



8.1 Saving Tracks

The Save Page uses the Trigger Interface to specify which tracks are to be saved.

Pressing multiple triggers on the MD and then releasing them will cause the selected tracks to be stored in the corresponding slots of the current row.

The default behaviour is to store tracks to slots in a one-to-one mapping. That is to stay. Pressing triggers 1,2,3,4 will store MD tracks 1,2,3,4 in MC slots 1,2,3,4 of the current row.

Holding **[Shift1]** will cause the mapping to be offset by the MD's current track number. For example: If the MD currently has track 5 selected and triggers 1,2,3,4 are chosen then the MD Track's 5,6,7,8 will be stored in slots 1,2,3,4 of the current row.

8.2 Store a pattern/row:

To save an entire pattern/row press **[Shift2]** from within the Save Page. All A4 sounds or external sequencer data will also be saved.

8.3 Pattern Selection:

Changing the Bank+Pattern allow you to specify the MD's source pattern location. The MD's currently loaded pattern and kit are used by default

Modes of Operation

MCL features two modes of operation: Write Mode and Chain Mode. It is important that you understand how these modes differ, as they affect how MCL loads and transfers sequencer + machine data to your MD.

Tracks are either Written, or Chained, and are selected using the Trigger Interface from either the Write or Chain Pages respectively.

Chain mode is enabled through the SlotMenu or GlobalSettings–>Chain menu.

9.1 Write Mode vs Chain Mode

Write mode is useful for transferring kit or pattern data to and from the MC.

Write mode works by automatically receiving current pattern and kit dumps from the MD. The MC then inserts the selected track(s) in to the pattern/kit and transfers them back. Once a transfer is complete, the internal sequencer data for the selected tracks is loaded on the MC and tracks are un-muted as per quantization settings.

Sending pattern data to the MD is relatively slow, so you will generally need to use quantization settings to avoid hearing audible artefacts.

Chain mode on the other hand loads sequencer and machine data seamlessly and allows individual tracks to be linked together to form complex musical phrases.

Chain mode does not transfer pattern data to the MD. It instead loads up the internal sequencer data for the selected track(s) on the MC. Machine settings for tracks are transferred using SYSEX and CC messges (not kit dumps) and are interleaved between 16th notes of the step sequencer. This allows for seamless loading of tracks and their corresponding sequences. Loaded tracks can be made to automatically transition to a slot on another row without any audible delay.

Because chain mode does not send the MD sequencer data to the MD, you must rely on the MC's internal sequencing capabilities. You can choose to merge a slot's MD sequencer data in to the internal sequencer data. When this is done and a track is writtern, the MC will sequence the original MD pattern. The resulting sequence will be indistinguishable from the original.

Quantization differences:

Quantization settings work differently in each mode.

In Write mode tracks are un-muted at the step next corresponding to the quantization setting.

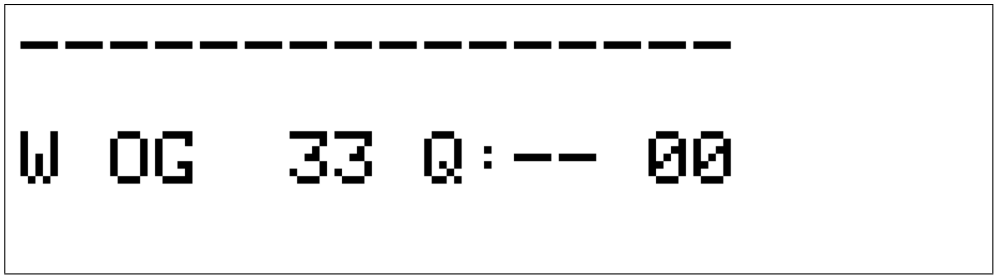
Chain Mode will schedule a track transition at the step next corresponding to the quantization setting, and the track's sequence will begin from step 0 at the transition step.

Write Page:

The Write Page is used to transfer tracks stored the Grid's current row, to the MD or A4.

When tracks are written to either device, their corresponding External Sequencer track data will be loaded.

*The Write Page is assessable from the GridPage by pressing the **[Write]** function button.*



Encoder Assignment:

- **[Encoder 1]:** Destination Pattern
- **[Encoder 2]:** Destination Kit
- **[Encoder 3]:** Mute Quantization (Q)
- **[Encoder 4]:** –

10.1 Writing Tracks

The Write Page uses the Trigger Interface to specify which slots are to be transferred to the MD.

Pressing multiple triggers on the MD and then releasing them will cause the selected slots from the current row to be writen to the corresponding Tracks on the MD.

The default behaviour is to write slots to tracks in a one-to-one mapping. That is to stay. Pressing triggers 1,2,3,4 will write MC slots 1,2,3,4 of the current row to MD tracks 1,2,3,4.

Holding **[Shift1]** will cause the mapping to be offset by the MD's current track number. For example: If the MD currently has track 5 selected and triggers 1,2,3,4 are chosen then tge MC Slots's 1,2,3,4 of the current row will be written to MD tracks 5,6,7,8

10.2 Write a pattern/row:

To write an entire pattern/row press **[Shift2]** from within the Write Page. All A4 sounds or external sequencer data will also be transferred/loaded. Master Effects settings of the first Track in the row will be written to the MD.

10.3 Pattern + Kit Selection:

Changing the Bank+Pattern encoders or the Kit encoders allow you to specify the transfer location for either the Pattern or Kit. The MD's current pattern and kit are shown by default.

If the bank encoder is rotated to the value "OG" the pattern a will sent to its original location. If the kit encoder is rotated to the value "OG" the kit will sent to its original location.

10.4 Step count:

The step count is synced to the MIDI Clock and will display the number of steps that have elapsed since the start of the pattern. The step count resets to 0 every 64 steps.

10.5 A4 Data Transfer:

When writing a track to the A4 only the sound data for the specific track is transferred. This is copied in to "workspace" memory of the Analog4 and will not overwrite any saved data.

10.6 Quantization Modes:

Quantization modes are used to control the behaviour of the write operations and allow for write events to be musically timed.

When a numerical quantization value is chosen, the selected tracks will be muted before any data is transferred. After both the pattern and kit is received by the MD the selected tracks will be un-muted on the next specified multiple of the step-count.

Basic Mute Quantization:

- –: Write tracks to current pattern as soon as possible, no muting.
- 02: Unmute new tracks on next possible 2nd step
- 04: Unmute new tracks on next possible 4th step
- 08: Unmute new tracks on next possible 8th step
- 16: Unmute new tracks on next possible 16th step
- 32: Unmute new tracks on next possible 32th step
- 64: Unmute new tracks on next possible 64th step

Advanced Modes:

- P+:Transfer tracks to adjacent pattern and schedule pattern change.
- P-: Transfer tracks to previous pattern and schedule pattern change
- CU: Send new tracks to Audio Cue
- LV: Set volume of new tracks to 0

Toggle Mode: When P+ mode is used, P- mode is automatically selected for the next write operation. When P- mode is used, P+ mode is automatically selected for the next write operation. With this functionality in mind you can alternate between two patterns. If the current kit is selected it will automatically be reloaded on the scheduled pattern change.

Audio Cue: By sending new tracks to the Audio Cue, new tracks can be previewed with a pair of headphones before being played through the Master Output.

Chain Mode:

Chain mode was inspired by old school music trackers that generate music by iterating through sequences and sounds stored in a vertical column.

Why:

Often you require a sequence that extend for multiple bars and exceed the 64 step limit of the MD. Alternatively, you may wish that both the sequence and sound for a particular track change after some pre-determined interval. Using the MD sequencer you may have achieved these behaviours by chaining multiple patterns together. Chain Mode on the MC improves this ability by allowing you to chain individual tracks together without the need to switch patterns.

How:

Each slot in the Grid has the ability to play for N loops and then jump to another slot in a specific row of the same column. These values are specified by the LOOPS and ROW settings in the SlotMenu and apply to the current slot. Jumping between slots is referred to as a transition. Just before a transition occurs, Machine settings are sent to the MD and the internal sequencer data for that track is loaded. All 20 tracks can be configured to transition at the same time.

Chain mode will not send pattern data to the MD. Therefor you must perform all your sequencing using MCL's internal sequencer. For your convenience it is possible to merge a slot's MD sequence data in to the internal sequencer using the SlotMenu->Merge option. Furthermore you can configure the MD to automatically merge sequencer data whenever a slot is saved, by setting GlobalSettings–>MD–>Seq Merge to AUTO.

Enabling Chain Mode

Chain Mode can be enabled in the SlotMenu or GlobalSettings–>ChainMode menu by setting ChainMode to one of 3 three settings: Automatic, Manual and Random.

- Automatic: If the number of loops is greater than 0, slots will automatically jump to the specified Row after N loops.
- Manual: Automatic slot jumping is disabled, but tracks can be chained using the quantization rules in the Chain Page.
- Random: Slots will jump after a random number of iterations to a random row position bounded by the min and max settings specified in GlobalSettings–>Chain Mode

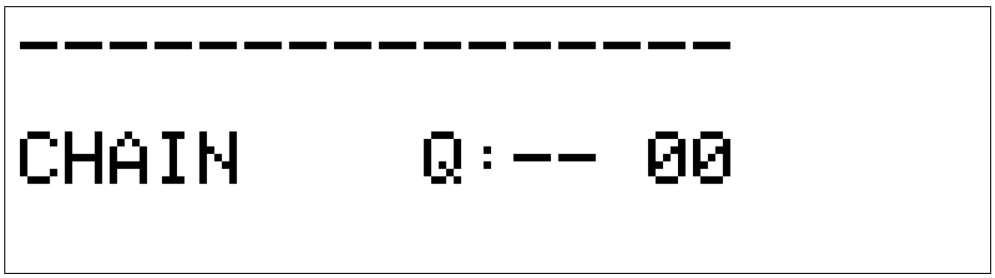
Chain Page

When chain mode is enabled the Write Page is replaced with the Chain Page.

The chain page allows you to manually load slots at a specific transition interval defined by the Quantization rules.

The minimum Quanitization value is 4 steps. Quantization values can be changed by adjusting the ”Q:” parameter.

*When Chain Mode is enabled, the Chain Page is assessable from the GridPage by pressing the **[Write | Chain]** function button.*



Encoder Assignment:

- **[Encoder 1]:** –
- **[Encoder 2]:** –
- **[Encoder 3]:** Quantization (Q)
- **[Encoder 4]:** –

Internal Sequencer:

MCL features a powerful 20 track internal sequencer. There are 16 tracks dedicated to the MD and 4 tracks dedicated to the Analog 4 or an External Midi device.

MD Sequencer Tracks:

- 16 Track Sequencer with independent track lengths (64 max steps).
- Conditional Trigs and Micro Timing per step (10 degrees left or right of centre.)
- 4 lockable parameters per track with 64 locks per parameter. Lockable parameters are MIDI learnt and recordable from the MD.
- Trigless Locks.
- Real time record for both step and lock data. Chromatic Mode. (Machine pitch values are chromatically mapped to the MD. Melodies are recordable)

A4 or ExtMIDI Sequencer tracks:

- 4 x 4-Note Polyphonic On-Off sequencer tracks. Each track can run in either high or low resolution modes.
- Each track transmits on MIDI-OUT2, Midi channel = Track Numbers 1 to 6.
- Conditional Trigs and MicroTiming (6 degrees for high res, 10 degrees for low res)
- Low resolution mode up to 128 steps per track,
- High resolution mode up to 64 steps per track with the ability trigger successive 16th notes.
- Chromatics Mode with selectable scales.
- Legato record

The internal sequencer is synced to the MIDIClock source.

13.1 Internal Sequencer: Loading and Saving

Internal sequencer tracks are linked to the slot positions in the Grid.

When storing a track within the Save menu, the internal sequencer data for that track is stored along with the track data in the specified slot.

Internal Sequencer tracks are loaded when tracks are sent to the MD or A4 in the Write page.

13.2 Internal Sequencer Pages:

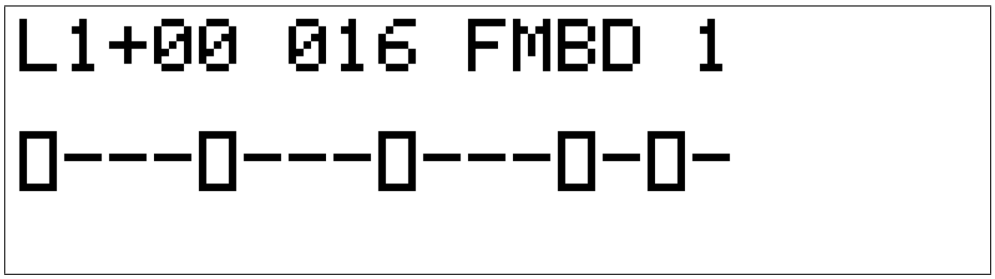
*The primary Sequencer Pages are accessed using [**Encoder Buttons (1-4)].** Each sequencer page has access to secondary pages accessible by pressing **[Save]***

- Encoder 1: MD Step edit [A4 Step edit]
- Encoder 2: MD Record Live [MD Record Parameter Locks Live]
- Encoder 3: MD Parameter Lock Page A [MD Parameter Lock Page B]
- Encoder 4: MD/A4 Pitch Mode [MD/A4 Pitch Record Mode]

MD StepEdit Page:

The MD StepEdit page is used to program MCL's internal sequencer for a selected track. The programmed sequence will run alongside the MD's sequence for the same track.

*To enter the MD StepEdit Page: First select desired track on the MD **[Function + Track N]**. From the MCL grid menu press **[Encoder Button 1]**.*



Encoder Assignment:

- **[Encoder 1]:** Trig Condition
- **[Encoder 2]:** MicroTiming
- **[Encoder 3]:** Track Length
- **[Encoder 4]:** Note

GUI:

- The Step Edit Page uses the TI. The trigger buttons on the MD correspond to the 16 steps on the current page of the current track.
- The 16 steps are displayed on the bottom row
- Trig Conditions and Microtiming settings are per step and selectable from encoders 1 and 2 respectively.

Trig Conditions:

- L1,L2,L3,L4,L5,L6,L7,L8 (For Ln, step is only triggered after every n iterations of track)
- P10, P25, P50, P75, P90 (For Pxx, step has a xx percent chance of being triggered)

Program a sequence:

1. Press and hold trigger button(s) on the MD to place triggers in the sequence.
2. Rotate encoders 1 and 2 to change the conditional mode or microtiming if desired.

Clearing a sequence:

1. To clear the current track, press the **[Write]**
2. To clear all MD tracks, **[Shift2] + [Write]**

Rotating visible sequence:

Each track consists of 4 pages of 16 steps, for a total of 64 steps per track.

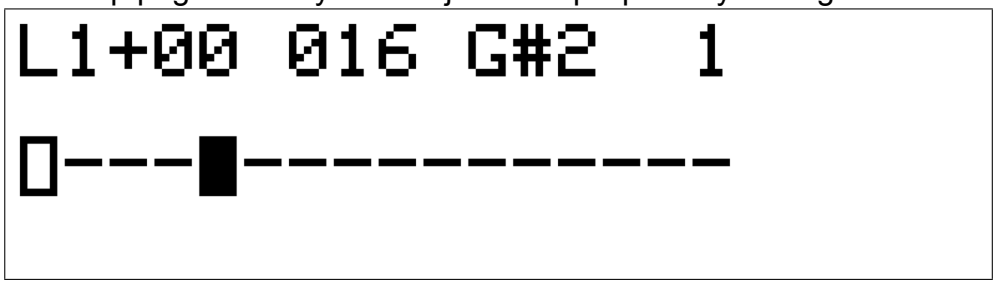
1. Rotate the current track-page by pressing the **[Shift1]** button.

Changing track length:

1. Track length is controlled by rotating **[Encoder 3]**. Only steps less than the current track length are drawn.
2. To change the lengths of all 16 tracks simultaneously hold down **[Shift 2]** whilst rotating **[Encoder 3]**.

14.1 Chromatic Step Edit:

The step page allows you to adjust a step's pitch by setting a note value.



*Press and hold trigger button(s) on the MD. Rotating **[Encoder 4]** will allow you change the note value of the selected steps.*

Pitch values will be stored in one available Parameter Slot for the selected track.

PolyStep Edit Page:

The PolyStep Edit page is used to program sequences for the Analog 4 or attached External MIDI device.

*To enter the PolyStep edit mode: Enter the MD Step Edit mode by pressing **[Encoder 1]** from within the MCL grid menu. Press the **[Save]** button to enter PolyStep Edit Page.*

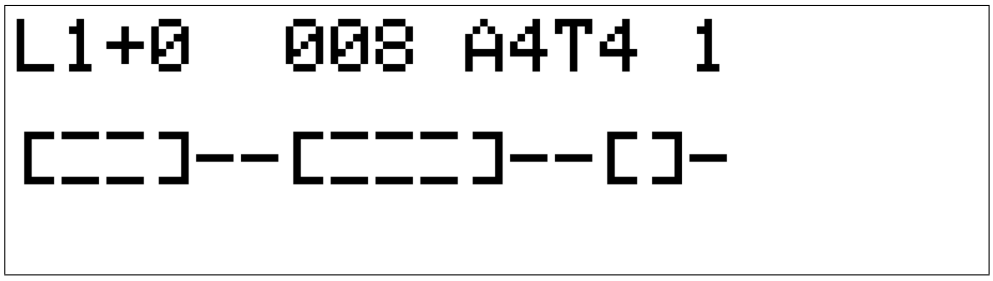
Track Selection n PolyStep edit mode:

If using the Analog 4, select the desired track using the A4's track select buttons. The first note played on the mini keyboard will cause the PolyStep edit page to switch to the corresponding external sequencer track.

Poly Sequencer:

The Poly Sequencer is a 'Note on' and 'Note off' sequencer. There is no note length, instead for each 'Note on' event, a corresponding 'Note off' event should be placed on a step elsewhere in the sequence.

Each step can hold a maximum number of 4 NoteOn or NoteOff events.



NoteOn events notes are shown in uppercase, NoteOff events notes are shown in lowercase.
The first note event entered for a specific note number is always of event type NoteOn.
The next time the same note is entered it will automatically be placed as a NoteOff event.

Encoder Assignment:

- **[Encoder 1]:** Trig Condition
- **[Encoder 2]:** MicroTiming
- **[Encoder 3]:** Track Length
- **[Encoder 4]:** –

Program a Sequence:

The trigger interface on the MD is used to edit the steps of the step sequence in the PolyStep Edit page.

The notes of the Analog4 keyboard or External Midi keyboard are used to edit the note data.

1. Press and hold the desired trigger on the MD whilst simultaneously pressing one or a maximum of 4 notes on the Analog4/Ext keyboard.
2. Adjust conditional mode or microtiming as needed using encoders 1 and 2.
3. Repeat the above for another step in the sequence, (Selecting the exact same notes). This time the notes will be entered as NoteOff events.

Clearing a sequence:

1. To clear the current track, press the **[Write]**
2. To clear all Analog4/ExtMIDI tracks, **[Shift2] + [Write]**

Rotating visible sequence:

Each polyphonic track consists of 8 pages of 16 steps, for a total of 128 steps per track.

1. Rotate the current track-page by pressing the **[Shift1]** button.

Changing track length:

1. Track length is controlled by rotating **[Encoder 3]**. Only steps less than the current track length are drawn.
2. To change the lengths of all 4 polyphonic tracks simultaneously hold down **[Shift 2]** whilst rotating **[Encoder 3]**.

Resolution Modes:

The polyphonic step sequencer has 2 resolution modes (high resolution and low resolution).

By default High Resolution mode is activated and the maximum number of steps per pattern is 128 x 32th note steps, equivalent to 64 x16th note steps.

- High resolution mode is required, if you intend to play 16th notes in quick succession. This mode is best for live recording.
- Low resolution mode is 128 x 16th note steps. This is perfect for slow melodic progressions where sequential 16th notes are not required

Switching Between Low and High Resolution Modes.

*Press **[Shift2]** followed by **[Shift1]***

MD Realtime Record Page:

The RTRK Page is used to record tracks in Realtime. If the sequencer is running, trigger presses on the MD will be recorded.

Thanks to micro-timing, trigger presses are recorded at 1/192th note resolution and have a much more organic feel than the MD's real-time record mode.

*To enter RTRK Page: from the MCL grid menu press **[Encoder 2]**.*

When in RTRK Page, the current sequencer Track will automatically change according to the track corresponding to the last MD Trigger pressed.

To minimise record latency the display is prevented from updating unless a GUI action occurs.

Encoder Assignment:

- **[Encoder 1]:** –
- **[Encoder 2]:** –
- **[Encoder 3]:** Track Length
- **[Encoder 4]:** –

Clearing a sequence:

1. To clear the current track, press the **[Write]**
2. To clear all MD tracks, **[Shift2] + [Write]**

Rotating visible sequence:

Each track consists of 4 pages of 16 steps, for a total of 64 steps per track.

1. Rotate the current track-page by pressing the **[Shift1]** button.

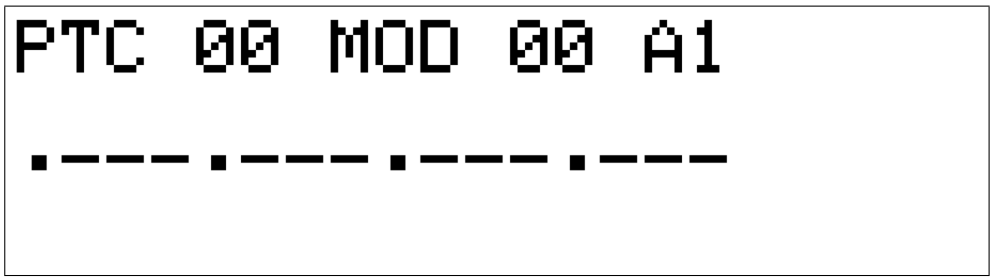
Changing track length:

1. Track length is controlled by rotating **[Encoder 3]**. Only steps less than the current track length are drawn.
2. To change the lengths of all 16 tracks simultaneously hold down **[Shift 2]** whilst rotating **[Encoder 3]**.

Parameter Locks:

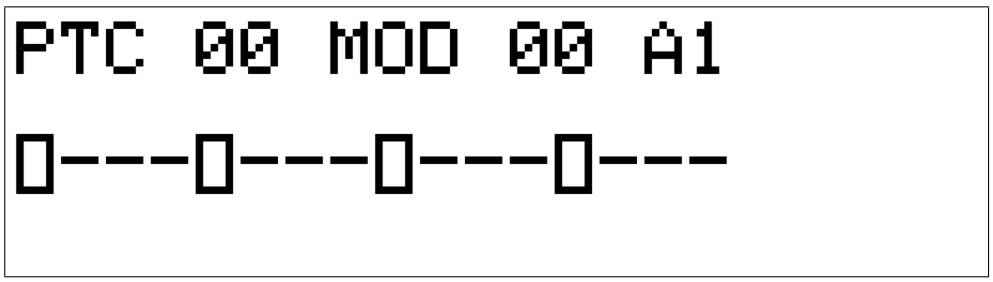
Each Track has access to 4 Parameter Locks, with 64 steps per lock. Trigless locks are supported, meaning parameter values can change without retriggering the sound.
Unique characters are used to represent the types of locks.

Lockless Trigs:



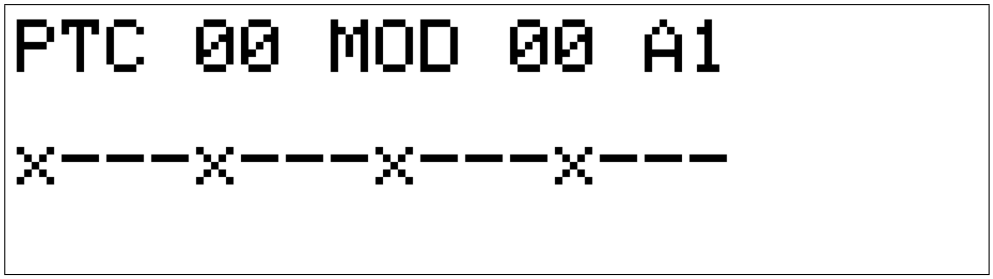
Triggers on steps 1, 5, 9 ,13. No locks.
Trigs can only be added or removed from the StepEdit page.

Locked Trigs:



Triggers and locks on steps 1, 5, 9, 13.

Trigless Locks:



Locks on steps 1,5,9,13 . No triggers

Parameter Lock Record Page:

The RLCK Page is used to record Parameter Locks in real-time. If the sequencer is running, any parameter changes on the MD will be recorded.

*To enter the RLCK Page: Enter the RTRK Edit mode by pressing **[Encoder 2]** from the Grid Page. Press the **[Save]** button to enter RLCK mode.*

For each track parameter locks are automatically MIDI learnt. If a free parameter lock slot is available, it will automatically be assigned to the last Parameter received.

When in RLCK Page, the current sequencer Track will automatically change according to the track of the last MD Parameter modified.

Clearing:

To clear the current track of all parameter locks, press the **[Write]** (top right)

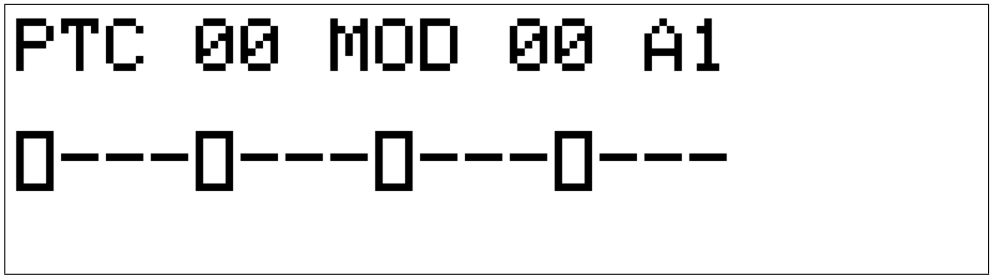
To clear all MD tracks of all parameter locks, press **[Shift2] + [Write]**

Parameter Edit Pages:

The ParamEdit Pages are used to add or remove Locks to the track's sequence.

There are two dedicated pages used to edit the four Parameter locks per track.
Each page can be used to edit two parameters at a time.

Unassigned parameters or locks are indicated by a '–'.



*To enter the ParamEdit Page: Select desired track on MD by pressing **[Function] + [Track n**]. Enter the ParamEdit A mode by pressing **[Encoder 3]** from within the MCL grid menu.*

*Pressing **[Save**] button will toggle between the available Parameter Edit Pages.*

Encoder Assignment:

- **[Encoder 1]:** Param Type 1
- **[Encoder 2]:** Step Value
- **[Encoder 3]:** Param Type 2
- **[Encoder 4]:** Step Value

Setting step locks:

To change a Parameter type rotate Encoders 1 or 3.
To change a Parameter Value for a specific step:

- Press and hold one or more triggers on the MD trigger interface
- Rotate encoders 2 or 4 to specify the parameter lock value for the specific step(s).

For each track parameter locks are automatically MIDI learnt. If a free parameter lock slot is available, it will automatically be assigned to the last Parameter received.

Clearing :

- To clear the current track of all parameter locks, press the **[Write]**
- To clear all MD tracks of all parameter locks, **[Write] + [Shift2]**

Chromatic Pages:

The PTC page, also known as the Chromatic Page is used to play MD tracks chromatically using the MD Trigger interface or an attached MIDI Keyboard.

For supported track types, the Track's Pitch is mapped to Notes of a selected scale across the MD Trigger interface.

Melodies can be recorded in real-time.

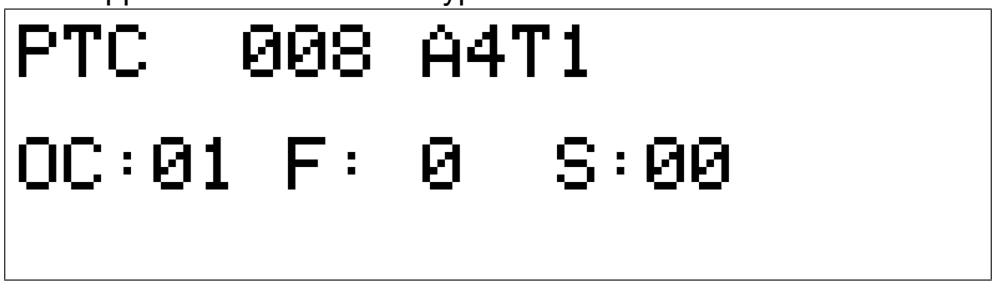
*To enter the PTC Page: Select desired track on MD by pressing **[Function] + [Track N]**. Enter the PTC mode by pressing **[Encoder 4]** from within the MCL Grid Page.*

Encoder Assignment:

- **[Encoder 1]:** Octave (OC)
- **[Encoder 2]:** Fine Tune (F)
- **[Encoder 3]:** Track Length
- **[Encoder 4]:** Scale Type (S)

A4 + ExtMIDI:

The PTC Page is also used to record/play the Analog4 or ExtMIDI tracks. Scale modes are also supported for these track types.



Recording a sequence:

*Press the **[Save]** button to enable record mode, RPTC.*

Play notes on either the MD or A4/ExtMidi to record a melody

Clearing Recorded Sequence:

To clear the current track press the **[Write]**

To clear all tracks of the current track type press **[Shift2] + [Write]**

Changing Track Length:

Track length is controlled by rotating **[Encoder 3]**.

To change the lengths of all tracks of the same track type simultaneously hold down **[Shift 2]** whilst rotating **[Encoder 3]**.

A4 or ExtMidi

Melodies and chords can be played and recorded from the Analog4 or ExtMIDI device in the PTC and RPTC pages.

If using the Analog 4, select the desired track using the A4's track select buttons. The first note played on the mini keyboard will cause the PolyStep edit page to switch to the corresponding external sequencer track.

Switching Between Low and High Resolution Modes on Poly Sequencer Tracks. Press [shift2] followed by [shift1]

Polyphonic Mode

The MD can be configured to perform as a 16 voice polyphonic synthesizer.

Two or more MD tracks need to be assigned as polyphonic voices. Once this has occurred, parameter changes are distributed accross the selected voices. Tracks will be allocated rotationally, with repeated notes using the same voice.

Voice control

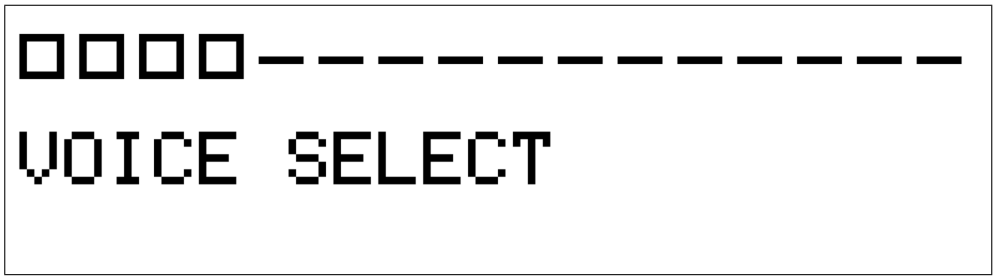
The polyphonic tracks can be played using the MD TI from the PTC page.

An external MIDI keyboard connected to PORT2 can be used to play the MD. To achieve this set the MD control channel in **Global Settings–>MD–>CTRL CHAN** to the output channel of your controller.

Voice Select Page

The voice select page is used to assign MD tracks as polyphonic voices.

The TI is used to assign tracks as polyphonic voices.

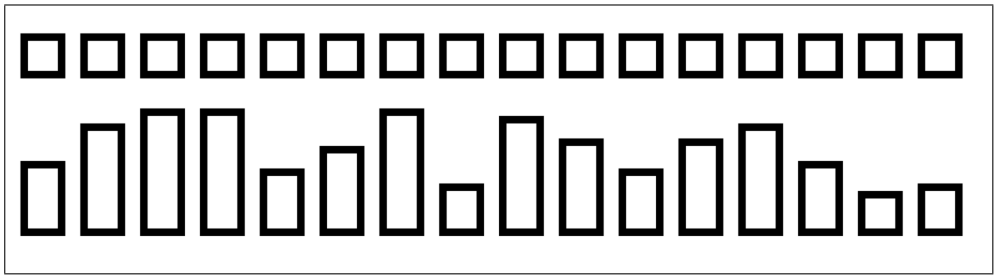


*To open the voice select page. Enter **GlobalSettings–>MD–>POLY CONFIG***

Mixer Page:

The mixer page graphically illustrates the Volume Levels of the sixteen MD tracks of the current Kit.

The trigger interface is used in conjunction with encoders to raise or lower the volume of multiple tracks simultaneously.



*The Mixer Page is accessible from the PageSelect page.Pressing **[Save]** from within the Mixer Page allows you to toggle between the Mute and Mixer pages.*

Encoder Assignment:

- **[Encoder 1]:** Level
- **[Encoder 2]:** Level
- **[Encoder 3]:** Level
- **[Encoder 4]:** Level

Toggling Mutes

The top row of mixer page shows the mute state of each Track.

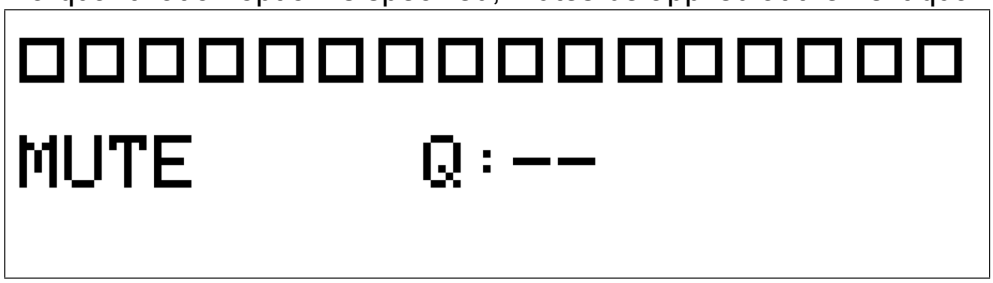
Holding down **[Write]** and pressing a trigger button on the MD allows you to quickly toggle the mute state of a track

Note: There is no method of detecting Mute changes that occur from the MD's mute window, MCL attempts to learn the mute state as MIDI notes are detected.

Mute Page

The Mute page graphically illustrates the mute values of the sixteen MD tracks of the current Kit.

The trigger interface is used in conjunction with encoders to mute or un-mute selected tracks. If a quantization option is specified, mutes be applied at the next quantization interval.



*The Mute Page is accessible from the PageSelect page.Pressing **[Save]** from within the Mixer Page allows you to toggle between the Mute and Mixer pages.*

Encoder Assignment:

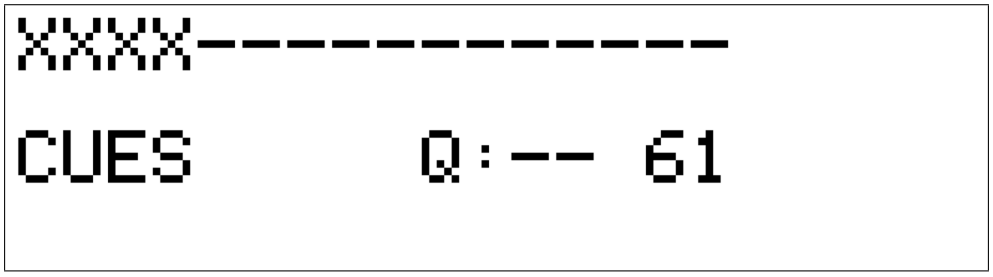
- **[Encoder 1]:** –
- **[Encoder 2]:** –
- **[Encoder 3]:** Quantization
- **[Encoder 4]:** –

Cue Page:

Cue Page functionality when Chain Mode is enabled is currently experimental
The Cue Page is used to send the audio of a specific track to the Audio Cue output. The audio cue output is Audio Output F on the MD.

The CUE Page can be used in one of two ways. As an alternative to the MD Mute menu. Cued tracks are muted on the Master Output. Or as a way to preview tracks before they are played on the MD Master output, much like cueing a track on a traditional DJ mixer.

Tracks with audio routed to the AudioCue output are denoted with an X as depicted below.



The Cue Page is accessible from the PageSelect page.

Encoder Assignment:

- **[Encoder 1]:** –
- **[Encoder 2]:** –
- **[Encoder 3]:** Quantization
- **[Encoder 4]:** –

The Trigger Interface is used to interact with CUE Page. Pressing a MD trigger will toggle the CUE output of the corresponding track.

Quantization Modes:

Quantization modes are used to control the behaviour of the cue operations and allow for cue events to be musically timed.

When a numerical quantization value is chosen the selected track's cue will be toggled on the next specified multiple of the step-count.

- –: Write tracks to current pattern as soon as possible, no muting.
- 02: Toggle cue on next possible 2nd step
- 04: Toggle cue on next possible 4th step
- 08: Toggle cue on next possible 8th step

- 16: Toggle cue on next possible 16th step
- 32: Toggle cue on next possible 32th step
- 64: Toggle cue on next possible 64th step
- LV: Set volume of selected tracks to 0 and toggle cue.

WAV Designer

WAV designer is a single-cycle waveform generator optimized for the Elektron MD.

WAV Designer is a 3 oscillator additive synthesis engine with a mixer.

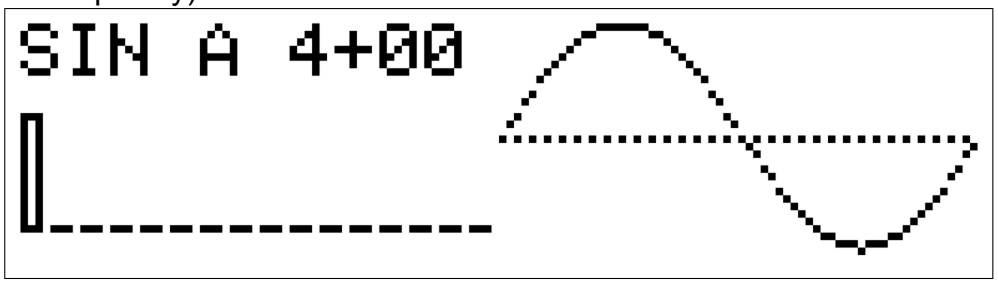
Each oscillator can be set to a unique waveform and pitch, the 3 oscillators are then mixed together and rendered in to a WAV file which can be transferred to the MD using the MIDI sample dump specification.

To ensure the resulting waveform is played back optimally on the MD, WAV Designer performs all the heavy lifting for you. This involves calculating sample length, auto detecting loop points and setting a variable sample rate based on the fundamental frequency.

25.1 Waveforms:

SIN:

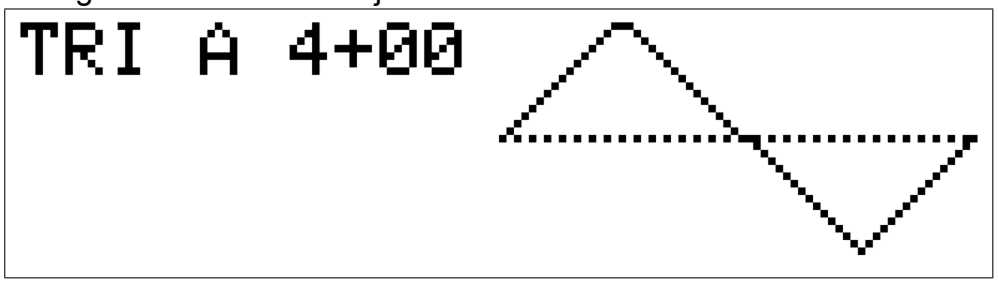
Sine waveform with adjustable overtones (each overtone is an octave above the fundamental frequency)



Overtones are added by using the MD trigger interface and rotating **[Encoder 4]**.

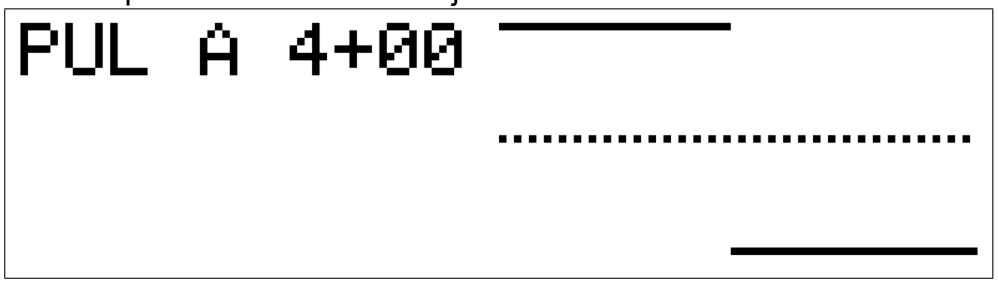
TRI:

Triangle waveform with adjustable width.



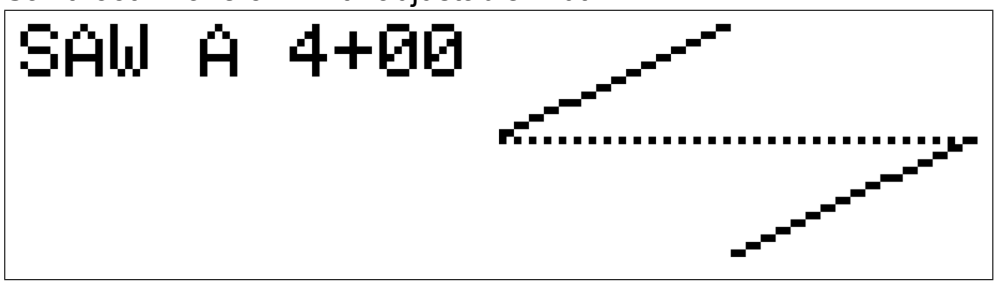
PUL:

Pulse/Square waveform with adjustable width.



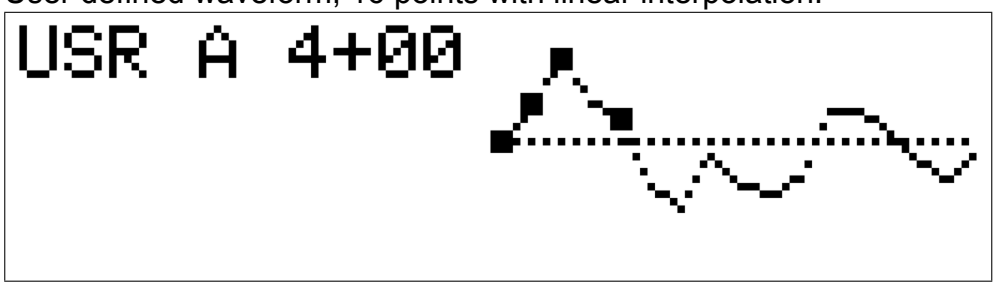
SAW:

Sawthooth waveform with adjustable width

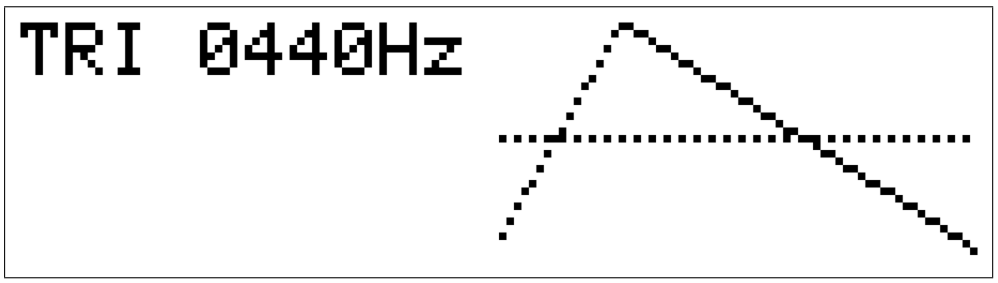


USR:

User defined waveform, 16 points with linear interpolation.



Sample values are modified by using the MD trigger interface and rotating **[Encoder 4]**.



- 3 Oscillator Additive Synthesiser. Generates single cycle waveforms and sends them to a MD sample slot.

25.2 Wav Designer Pages:

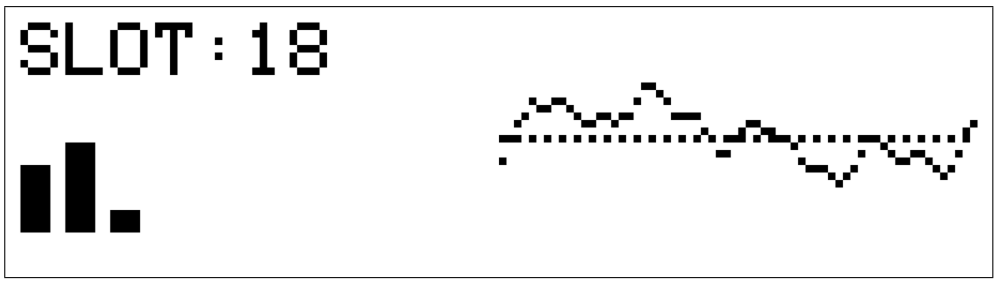
WAV designer is accessed through the PageSelect menu.

There are 4 pages to the WavDesigner. **[Encoder 1-3]** buttons select oscillators 1-3 respectively.

Oscillator Page

- Oscillator wavform can be changed by pressing top left button repeteadly.

Mixer Page:



- The MD trigger interface together with encoder 4 can be used to manipulate the SIN and USR waveforms. - Encoder 1 pitch adjusts frequency by semitone. - Encoder 2 is fine tune +-100 Cents - Encoder 3 is pulse width.

Oscillator Mixer Page: - The wav designer mixer page has volume levels for each of the oscillators.

- From the mixer page, top right button can be used to render and transmit the waveform. (Some of the MD GUI will lock up when receiving samples, see bug description above) - Encoders 1-3 adjust oscillator volume - Encoder 4 adjusts MSD destination sample slot.

/subsectionTransferring Samples SAmples are transfrred from the Mixer Page. Once you are satisifed with the Mix, select a sample dump slot and press [Write] to transfer the sample.

Alternatively, you can press the [Save] button to quickly load the Sample Manager page on the MD and select a receive position from the MD before transferring the sample.

Important: The MD firmware features a nasty bug that causes the user interface to stop responding if a sample dump is received at any point after specific SYSEX messages are requested. As MCL uses SYSEX for all communication with the MD, the MD's GUI will lock up after a sample is received from WavDesigner. The only known work around at this time is to reset the MD.