Nemo x2 User Reference

Updated: August 2017, for Community Edition version 5.00 and based on the original Navigation Guide by.....

genoQs Machines, Stuttgart, Germany ©2009   v1.6200

Original Introduction

Welcome, and sincere congratulations to the purchase of your new sequencer, a genuine genoQs Machines Nemo!

You now own one of the definitely finest MIDI instruments ever built. We proudly put in your hands a device built to drive your creativity and provide you joy for years to come.

Nemo is conceived as a living instrument with long-lasting value, to help you search and discover new sonic territory, rewarding you with an unequalled haptics experience.

We invite you to explore the capabilities of Nemo as you like and provide this manual as a start-up guide. Herein, you will recognize many known terms and concepts. However, others may be used slightly differently from what you would expect and some may be entirely puzzling.

This is why we recommend that once you are over the first wave of pushing buttons, flashing lights and turning knobs you read this guide end-to-end carefully - and we are aware that no-one likes to read the manual.

Taking a step back, we do appreciate the complexity that Nemo is able to provide. Don't get intimidated! You will soon discover fast ways of operation to best suit your style and preference, the comfort zone where you are most productive.

But remember that only few clicks away await things that you had never thought of doing or achieving. This is what Nemo is about - at every stage and no matter what - you are encouraged to experiment, explore and push the boundaries!

Gabriel Seher and Marcel Achim
Stuttgart, Germany 2009

Please check our web site regularly for latest news, software and documentation
http://www.genoqs.net

Basic Reference:

Middle C:	Note number 60 = C5
Reboot Sequencer	Hold Esc and press the Stop button, then release both.
In Track view:	To move to a different Track just turn the desired Track MIX encoder.
MCC:	If set to any value other than "none" then the chase light will be orange rather than red.
MCC Attribute:	At Track level sets the MCC control for that Track, i.e. '10' = Pan. At Step level sets the amount of 'Pan' (in above case), i.e '64' = 'centre'.
OS Version:	Reboot machine whilst holding Esc button, the version will show on the matrix.

LED comparison

Red	=	Blue
Green	=	Yellow
Orange	=	Purple

User Reference
Operating System v5.00

Firstly, with much appreciation & many thanks, I commend Wilson Stockman for giving up his valuable time to code all of the new features (see page 9) and bug fixes (see v5.00 Release Notes).
The functioning of any new features are described within.
This updated reference (which is not a beginner guide) was initially developed for my own reference - to speed up the creative process by allowing quick access to information via an alphabetical index and re-ordered information. Through usage of this wonderful instrument additional notes and charts have subsequently been added. Jean.

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Nemo x2

Transformation
The new Nemo x2 operating system transforms the Nemo as follows:-

Nemo	*x1*	*x2*
Number of Pages	64	128
Number of Tracks per Page	4	8
Concurrent Pages	4	8
Concurrent Tracks	16	64

Navigating between x1 and x2
The navigation button for the Nemo x2 mode is the Mode Block Step Button and the indicator is the Mode Block Step Led.
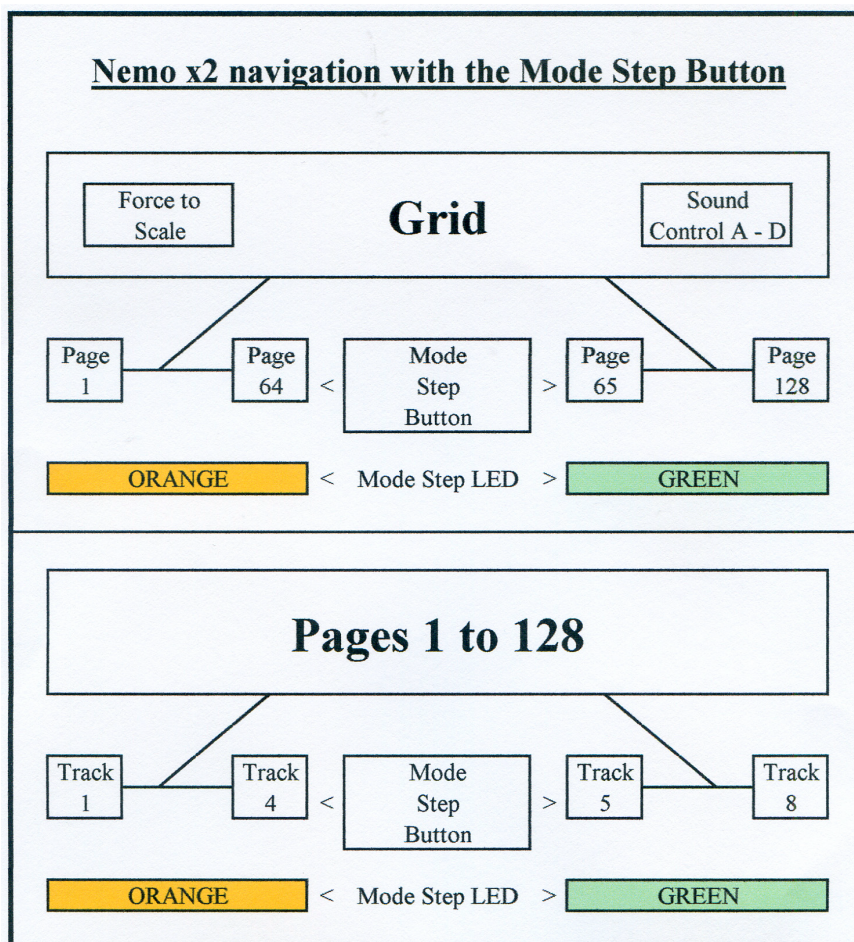
Other New Features

In addition to the above increases in Pages and Tracks the following new features have also been added:

Stacked Notes available in chords (v2)

Additional Chord mode - Chord Octave View

Track Chase Light Follow when tracks chained across two matrix views

Reset to First Page, available when using page clusters

New Grid modes for 'on the beat' page changes

Improved Recording re-take/overdub

Step Zoom now available from Edit Steps State & Edit Perform State

Cluster Page Hold function

Bug Fixes

This software version release includes bug fixes for the known outstanding issues of v1.6200 (the last official release by Genoqs Machines).

2. Step Mode

Step Mode Index

Step Zoom

Holding the Step Mode button and pressing any key in the matrix selects the corresponding step into the zoom focus of the STEP mode. Alternatively, if you want to edit a step in the same track, you may press its corresponding button in the bottom row to switch view to that particular step.

Step Zoom Menu					
Row 3 Options					
Value					**Event**
Step Offset					**Step**
Attribute	Default				PIT
PIT	0	**Chord / Octave**	PIT	Root	PIT
		Strum level	STA	0	VEL
		Polyphony	AMT	1	LEN
VEL	0				STA
LEN	12				AMT
STA	0				GRV
AMT	0				MCC
GRV	0				MCH
MCC	Null				POS
					DIR

Step attributes

Looking at the front panel you see lots of buttons lit up in row 2, including the ones labelled PIT, VEL, LEN, STA, AMT, GRV, MCC. One of them will be blinking orange, by default that is PIT. The lit buttons indicate the attributes that are selectable for the step, and the blinking button indicates the currently selected attribute, per default PIT, which stands for "pitch". You may click in row 2 on each of the lit buttons and observe what happens. In row 2 the blinking moves from one attribute to another, while row 1 displays various information. Clicking on a non-lit button in row 2 will have no effect.

Step pitch (PIT)

As you may expect, the PIT row shows the pitch value for the step.
The number displayed is really an offset that the step applies to the track pitch.
Turning the PIT knob will now cause the obvious - it will change the pitch for the step, which you will hear once the step is played.
Just as for velocity, step pitch may be a positive or negative offset relative to the base track pitch. Negative offsets are shown in the same manner as positive offsets, but additionally the 3 LEDs in columns 14-16 are lit green.

Step velocity (VEL)

The contents of the VEL row may look familiar - a number is represented here, with the red LEDs counting the tens and the green LED pointing to the ones value. This value may be changed in a more conventional fashion by simply turning the VEL knob.

The step velocity offset may be a positive or negative number. Negative offsets are shown in the same manner as positive offsets, but additionally the 3 LEDs in columns 14-16 are lit green.

Please note that the total velocity of a step is determined by adding the individual step velocity offset to the base Track velocity. This allows a wide range of velocities in a track while still giving you one place (the track velocity) to adjust them all up or down and still maintain the relationships set for each step.

Step length (LEN)

The same principles apply to all the other step attribute values in the page, except for the display of their values.

Change the length on the step by turning its LEN knob. As you increment the value (turning the knob clock-wise) you will see a green dot advancing up to 11 after which the red value will be incremented.

Each green increment corresponds to 1/192 of a note and each red value corresponds to 12/192 = 1/16 of a note.

The minimum step length is 1/192. A decrement beyond that point will light the last 4 LEDs green. This means that the step is set to legato mode - i.e. no note off MIDI signal will be played for this step.

The natural maximum length of a step is one full note - 192/192.

Step start (STA)

Selecting this parameter allows us to see the start of a step. Click on the STA button in row 2. By default you will see that the STA line shows a green / orange / red status bar. The 2 orange LED indicate the current STA value of the step. By default in the centreline, this tells us that the step plays right on the bar.

Turn the STA knob clockwise and you will see the orange spot move to the right – you are just delaying ("pushing") the step – every time by 1/192. The maximum push is 5/192 of a note. Turn the knob back (counter-clock wise) until you reach the default position. Now turn the knob further back into the green area – you are now pulling the step to the front of the beat. The maximum pull is 5/192 of a note.

Note that the real effect of this setting is directly dependent on the value of the track STA attribute.

Step amount (AMT)
The next parameter in line would be AMT (amount). We will get into the details later, for now it is enough to mention that this indicates the amount to which an event programmed on this step will affect the current track.

Step phrasing (GRV)
A Step may be enriched at playtime by a certain amount of notes determined by phrases that are pre-programmed into something we call phrases. There are three banks of 16 phrases, for a total of 48. They are roughly covering delays, rhythmic delays and note intervals respectively. As you turn the GRV encoder to the right you will see the phrase number increase from 1 to 16 (0 means no phrase is selected). Once 16 is reached in a bank, the colour of the pointer LED will switch to the next bank, as you can tell from the colour.

Step phrase time compression (POS)
The POS value will become visible as soon as a phrase is selected from the pool for the respective step and represents the time compression value for the particular step phrase. A value of 8 is neutral.
Values lower than 8 will speedup the playback of the phrase, while values greater than 8 will slow down the playback.

Step MIDI continuous controller (MCC)
The MCC value represents the amount of MIDI CC sent at this particular step position. This of course only applies when the track is told to do so. *More on this in the TRACK view.
The display uses a decimal representation similar to that used for VEL, with the exception that is has a "void" value, indicated by 4 green LEDs in the last positions of the track. This means that no value is sent out on that track - since 0 would be a valid value for a MIDI continuous controller.
If set to any value other than "none" then the chase light will be orange rather than red.

*Attribute at Track level sets the MCC control for that Track,
i.e. '10' = Pan.
Attribute at Step level sets the amount of 'Pan' (in above case),
i.e. '64' = 'centre'.

Operations

Step clear (CLR)
Pressing this will recall the pre-set values for the attributes of the selected step and will also turn the step of, if it was turned on before.

The default Step attributes values are:

VEL offset   = 0
PIT   offset   = 0
LEN   = 1/16
STA   offset   = 0
AMT   = 0
MCC   = none

Step skip
To skip a step, press and hold the step button in question and click on the MUT button. You will see the step LED turn red. Repeat the procedure for as many steps as you would like.
To un-skip a step and let it play again, just press it once and the red light will go off.
It means that the chase-light will simply ignore the step and just move to the next un-skipped one.

Step Copy
When zoomed into a Step simply click the Copy button to copy all of the step attributes.

Step Paste
Clicking the Paste button will paste the previously copied step at the currently selected step location. The paste operation is confirmed by the step led which ceases to flash once the paste operation is complete.

Ghost toggle
Press and hold pressed two or more step buttons placed in separate rows but in the same column. Let's use for instance the rows 3 and 4.
Press a step in row 3 and at the same time a step in row 4 - and make sure you do not release the buttons yet.

Now toggle steps in row 3 - and you will see that the steps in the same column of row 4 will be toggled as well. Or you may press steps in row 4 and see the steps in row 3 toggle as well. We call this behaviour "ghost toggle".

Step Offset Invert
When zoomed into a step, the offsets values for attributes PIT, VEL or AMT may changed quickly between positive and negative values by simply clicking the 8va button on row 1.

Working with step selections

Inverse step selection editing
In PAGE mode, active step selections are edited using the EDIT encoders for the respective attribute.
Additionally, when a step selection is active, the steps that are not selected, in the tracks that contain selected steps, may be edited as well, using the MIX encoders of the respective attribute.
For example, assuming a step selection is active with steps selected in tracks 2 and 4, the EDIT encoder PIT modifies all steps in the step selection, while the MIX encoder will modify the pitch of all steps that are not currently selected in the tracks 2 and 4.

Step selection stores
In PAGE mode, active step selections are stored for later recall in one of 4 stores available per page. This allows to group steps and modify them at once beyond track boundaries.
The stores 1-4 are accessible while a step selection is active via the buttons labelled A, B, C & D in the CC MIX TARGET row below the matrix.
For example: To make a step selection hold the SEL button pressed and click on at least one active step (green) in the page. You should see the selected step blink green and the current selection indicated by the blinking light in the Sound Control row. By default it should be A.
Now press the B key in the CC MIX TARGET area and the selection will disappear. This is because step selection 2 is empty. Let's fill it. Press and hold the SEL button and select another step or more and watch them blink. Press the 1 in the CC MIX TARGET area and you should see your previous selection blink active. You can toggle between your selections at will using

the CC MIX TARGET buttons, and use the encoders to really bend your material.

A track selection occupies the same 'virtual space' as a step selection, however a track selection is 'stored' on the Sel button (Sel led red), and if all tracks are de-selected the Sel led is off (no track selection stored). On the other hand, whilst holding the Sel button, Step Selections may be stored on locations A to D – however, although these step selections may be de-selected they still remain in the allocated store location AND with that store location selected it is <u>not possible</u> to make a track selection!
Therefore, it is important to not store step selections to all A - D locations, leave one empty, if the multiple track selection function is wanted on that page.

Remove a Step Selection as follows: Toggle off all step in the selection except one Step(A), exit Selection mode and turn off Step A. Re-enter Selection mode (no selection will be flashing), now exit Selection mode and turn on Step A.

Note: Rebooting the sequencer will delete all step selections.

With the Sel button held and making a Step Selection the Step Mode led will change to flashing red when just <u>one step</u> is selected and then back to green or orange (depending on matrix view) when additional steps are added to the Selection.
With the Step Mode led flashing red a single-click of the Step Mode button will, as usual, change the matrix view but a double-click will enter step mode with the selected step 'in focus'.

Step chords

The next section will assume we are working in Step mode. To follow along, please make sure to enter Step mode (by double clicking a step button in Page mode) before we move on.

Steps may be set to play more than one pitch at a time, effectively forming chords. Chords can be directly programmed in, or directly recorded (via MIDI In) into a Step.

To set the stage, go to Step mode first and look at the content of row 3. With the PIT attribute selected in row 2, three options are available: Chord, Value and Event

Click on the Chord button to switch view to Chord. You should now see in row 1 a blinking LED, indicating the pitch of the current step, and in row 2 the options PIT, STA, and AMT available. Per default PIT is selected and blinking orange, telling us that row 1 shows the pitch of the step.

Chord Modes

There are two Chord modes, Chord View mode and Octave View mode, they both display chord note data but in two different ways.

Switching between the two modes is done by double-clicking the Chord button - when in Chord View mode the Chord led will be steady orange and when in Octave View mode it be flashing (colour will be dependant on chord octave).

Entering a Step Chord containing a note which is the same in 2 or more octaves may only be done in Octave View mode.

Chord ground rules for Chord View mode

Step chords are formed of up to 7 notes which may range over up to three octaves. The chord is made up of the step pitch as the base and additional notes that are stacked "on top" and which are always higher than the base pitch. This means of course that changing the PIT offset of the step will also transpose the chord.

The chord display should be read as follows: the base pitch of the step blinks orange. Notes within one octave (12 semitones) of the base pitch will light orange. Notes in the second octave up light green, and notes in the third octave up light red.

To toggle the notes manually in and out of the chord following toggle sequence applies: off > orange > green > red > off.

Building chords in Chord View Mode

To build a chord in the step simply add notes to the base pitch. All you need to do is press the key notes of row 1 and you should see the corresponding LEDs light up.

For this the following toggle sequence applies:

off > orange > green > red > off.

Every time the step is played, you should hear the chord that you have programmed in. To remove the chord from a step, simply remove all "extra notes" from the chord. The base pitch will not be removable at any time. Steps that are set to play chords will be shown in the Page mode as an orange dot. Steps that play only single notes are green.

Building chords in Octave View Mode

It should be noted that the note colour scheme is radically different in Octave View mode as much more information is being conveyed when viewing the chords 'octave view'.

Enter Octave View mode by double clicking the Chord button, from default the Chord led will flash orange. Assuming the step is turned on and contains a single note, Row 1 will have a flashing orange led - this is the root note. Other notes (in this octave) may be turned on or off by clicking their respective buttons - if turned on their led(s) will be orange.

Now click the Chord button and its led will change to flashing green - this means we are now looking at the octave above the root note (octave 2) and any notes that were entered in octave 1 will now be shown with red leds (the chord root note will be flashing red).

The red led(s) simply means that the note exists in a different octave to the one you are looking at.

Again steps can be toggle on and off, and again when turned on they will be orange unless the note already exists in octave 1 in which case the note led will turn green - signifying that the note is on in the currently viewed octave, and also another octave.

Now click the Chord button and its led will change to flashing red - this means we are now looking at the next octave up (octave 3), which works in similar matter to the previous octaves.

The led of a note that exists in all three octave will Shine_Green and if the root note exists in all three octave it will Shine_Red.

See chart below for Octave View mode note signalling:-

Octave View Mode - Chord button is used to toggle through chord octaves	
Chord: LED colour	*State Description*
LED - ORANGE	view/edit root octave range i.e. C1-B1
LED - GREEN	view/edit 2nd octave range i.e. C2-B2
LED - RED	view/edit 3rd octave range i.e. C3-B3

Octave View Mode - row 1 represents Notes as shown	
Note: LED colour	*State Description*
LED - BLINK	Chord root note
LED - SHINE_RED	Chord root note all 3 Octaves (full stack)
LED - ORANGE	Note IS set ONLY in currently viewed Octave
LED - GREEN	Note IS set in currently viewed Octave AND also in another Octave
LED - RED	Note NOT set in current Octave, but IS set in one or more of the other Octave(s)
LED - SHINE_GREEN	Note IS set in ALL 3 Octaves (full stack)

Note: Although chord notes may be turned on or off in either chord mode if the root note is 'stacked' then notes at the other octaves can only be turned off in Octave View mode.

Adding Octave spaced notes
If there are no notes at a pitch in any of the available octaves then double-clicking the note will turn <u>on</u> that pitch in all three octaves.

Removing Octave spaced notes
From any 'octave view', if there are notes at that pitch in other octaves (i.e. led, red, green or shine_green) then, double-clicking the pitch will turn the note <u>on</u> in the current octave, and any note(s) at that pitch <u>off</u> in the other octaves. Removing notes at the octaves above the root note is accomplished by turning them off in their respective octaves.

Remembering the Chord Mode
When returning to Page mode with the Esc button from either of the Chord Modes, the last used Chord Mode is remembered - therefore when again zooming into a Step you immediately enter your preferred Chord Mode.

Strumming chords

Back to Step mode and looking at the chord you may have built before, you may now strum it. To do so, select STA in the second row, such that the STA LED is blinking orange.

By default row 1 will not show any value - yet. Now turn the main rotary clock-wise. You will be able to set a strum level between 0 and 9 shown as green values. This also means that the chord will be strummed up.

Turning the main rotary counter-clockwise will show the same range of values (from 0 to 9), with the LED 16 additionally lit up, indicating the negative value in this case. The message is that you are now strumming the chord down.

Note that in Nemo the strum configuration affects the note start values only. Also, the strum effect increases exponentially with the strum level chosen as shown the chart below.

Chord Strum Timings in Ticks									
Strum	1	2	3	4	5	6	7	8	9
Note 2	0	+1	+1	+2	+2	+3	+3	+4	+5
Note 3	+1	+2	+3	+4	+5	+6	+7	+8	+10
Note 4	+1	+2	+4	+6	+8	+9	+10	+13	+17
Note 5	+2	+3	+5	+9	+11	+13	+15	+19	+23
Note 6	+2	+3	+6	+12	+15	+18	+21	+27	+30
Note 7	+3	+6	+9	+16	+19	+24	+29	+36	+45

Note: A strum can also be set on a single note step (i.e. no chord), setting a strum on a single note step will result in the note being played followed by 6 duplicate notes played at the set strum timing.

Step polyphony

Step polyphony offers an exciting playground for experimentation and variation, especially with regard to dynamic pitch variation, as in random note picks from the chord pool.

Assuming you have built a C-E-G chord, let's think about polyphony. The natural polyphony of the step is of course 3, since it is playing 3 notes at the same time. However, polyphony may be adjusted independently of step chord contents, i.e. without changing the number of notes in the chord.

Let's assume you have a chord of three notes and a set step polyphony of 1. In this case, only one note will play and the note will be chosen at random from the pool of three available notes.

Now let's assume you have a chord of three notes and a step polyphony of 5. In this case, picture a cabinet with 5 drawers, 3 of which are filled with notes, 2 of which are empty. At playtime, three random drawers will be picked and their notes will be played. This means that you will always end up with at least one note and at most three notes at playtime.

Random note picks from chord pool
To set a step's polyphony, from Step mode select the Chord view, and in the chord view select the AMT value. You see in the first row two overlapping bars: a red one and a green one. If you just see one orange bar it is because the green and the red bars are overlapping - producing the orange bar. Now taking them apart:-
The green bar represents the number of notes in the step's chord. The red bar is per default just as long, which means that the polyphony is equal to the chord size.
Turning the value knob will modify the value of the step polyphony, enabling you to produce the results described above.

Random note picks for random step rest
The principle of Random note picks from chord pool can also be used without a chord, i.e. on single notes, thus effectively giving the chance of a note or a rest on a specific step as follows:
Zoom into a step with just one note and set the polyphony using the Chord AMT value to 2, then effectively the step is {note, rest} and when playing the step there is a 50% chance of a note being played & 50% chance of a rest, likewise if the polyphony AMT is set to 4 the step is {note, rest, rest, rest} hence a 25% chance of the note being played.
Note: Step GRV will not function as expected on a step set to random step rest.

Step phrases

Overview
There are the four main attributes (VEL, PIT, LEN, STA) of all 8 phrase notes. In addition, there is phrase polyphony and phrase type.

The available phrase types are as follows:

Type 1:	Forward: notes are played in the order 1,2,3..	
Type 2:	Reverse: notes are played in the order 8,7,6..	
Type 3:	Random pitch programmed notes pitches are played in random order, determined at playtime.	
Type 4:	Random all: programmed note attributes played in random combinations, determined at playtime.	

The Nemo Step Phrases fall into the following categories:

Phrase's Green	1 to 16:	Delays and rhythmic delays
Phrase's Red	1 to 16:	Pitched delays and arpeggio's
Phrase's Orange	1 to 4:	STA wobbles
	5 to 8:	VEL wobbles
	9 to 12:	Combined STA & VEL wobbles
	13 to 16:	Combined STA, VEL & PIT wobbles

The charts below show the attributes values of each Step Phrase. If the Polyphony attribute is shown as 'x' then the phrase polyphony is not defined, but still may be set at step level if desired.

Step GRV Phrase Reference (Green)

Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Type	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Poly	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Note 8 VEL					0											
Note 8 PIT					0											
Note 8 LEN					0											
Note 8 STA					80											
Note 7 VEL				0	0											
Note 7 PIT				0	0											
Note 7 LEN				0	0											
Note 7 STA				102	72											
Note 6 VEL				0	-50			-40		-50	-50	-50	-50	-40	-50	-50
Note 6 PIT				0	0			0		0	0	0	0	0	0	0
Note 6 LEN				0	0			0		0	0	0	0	0	0	0
Note 6 STA				80	60			104		120	120	128	108	120	120	120
Note 5 VEL				-40	-40			-20		-40	-40	-40	-40	-34	-40	-40
Note 5 PIT				0	0			0		0	0	0	0	0	0	0
Note 5 LEN				0	0			0		0	0	0	0	0	0	0
Note 5 STA				60	48			80		84	96	96	84	108	96	84
Note 4 VEL			-30	-30	-30	-20	-20	-17	0	-30	-30	-30	-30	-30	-30	-30
Note 4 PIT			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Note 4 LEN			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Note 4 STA			72	42	36	48	72	60	36	72	60	80	72	96	72	36
Note 3 VEL		-20	-20	-20	-20	-30	-30	-30	-40	-20	-20	-20	-20	-20	-20	-20
Note 3 PIT		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Note 3 LEN		0	0	0	0	14	14	14	0	0	0	0	0	0	0	0
Note 3 STA		48	48	26	24	36	48	36	72	36	48	48	24	24	60	24
Note 2 VEL	-10	-10	-10	-10	-10	-39	-39	-39	0	-10	-10	-10	-10	-10	-10	-10
Note 2 PIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Note 2 LEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Note 2 STA	24	24	24	12	12	12	16	12	15	24	12	32	12	12	24	12
Base Note 1 VEL						0	0	0	-30							
Base Note 1 PIT						0	0	0	0							
Base Note 1 LEN						26	26	22	0							
Base Note 1 STA						0	0	0	0							
Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Step GRV Phrase Reference (Red)

	Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Type	1	1	3	3	3	1	2	2	3	3	3	2	1	1	1	1
	Poly	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Note 8	VEL																
	PIT																
	LEN																
	STA																
Note 7	VEL							-49				-49					
	PIT							0				0					
	LEN							0				0					
	STA							60				120					
Note 6	VEL				-39		-43	-43				-43	-32				
	PIT				0		24	0				0	3				
	LEN				0		0	0				0	0				
	STA				108		75	24				48	144				
Note 5	VEL		-37	0	-36	-27	-27	-27	-40	-40	-33	-27	-40		0	0	0
	PIT		7	0	12	8	0	0	0	12	12	0	5		19	19	20
	LEN		0	0	0	0	0	0	0	0	0	0	0		0	0	0
	STA		96	0	96	16	21	6	80	96	48	12	160		0	48	48
Note 4	VEL	-50	-40	-40	-40	-50	-46	-50	0	-30	-36	-50	0	0	0	0	0
	PIT	12	12	7	7	7	-12	12	5	7	12	12	5	12	12	12	12
	LEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STA	72	72	120	60	72	108	36	64	72	108	72	128	36	36	36	36
Note 3	VEL	-40	-30	-30	-30	-40	-40	-40	-21	-36	-40	-40	-21	0	0	0	0
	PIT	7	7	12	5	5	0	5	12	5	3	5	12	28	24	24	24
	LEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STA	48	48	96	48	48	72	24	37	48	72	48	78	24	24	24	24
Note 2	VEL	-20	-20	-20	-20	-20	-20	-20	-30	-10	-20	-20	-30	-20	-20	-20	-20
	PIT	0	5	9	2	-2	12	-7	4	5	12	-7	4	12	12	12	0
	LEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STA	24	24	24	12	24	36	12	36	24	36	24	64	12	12	12	12
Base Note 1	VEL	0				0	0	0	0	0	0	0	0				
	PIT	12				3	0	7	-7	2	12	7	-7				
	LEN	0				0	0	0	0	0	0	0	0				
	STA	0				0	0	0	0	0	0	0	0				
	Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Step GRV Phrase Reference (Orange)

	Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Type	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Poly	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Note 8	VEL				0								0	0	0	0	0
	PIT				0								0	19	19	19	19
	LEN				0								0	0	0	0	0
	STA				9								9	0	0	0	9
Note 7	VEL				0			-35	-50				-35	0	0	0	-50
	PIT				0			0	0				0	12	12	12	12
	LEN				0			0	0				0	0	0	0	0
	STA				7			0	0				7	0	0	0	7
Note 6	VEL				0			35	50				35	0	0	0	50
	PIT				0			0	0				0	17	17	17	17
	LEN				0			0	0				0	0	0	0	0
	STA				5			0	0				5	0	0	0	5
Note 5	VEL				0		-20	-20	-35		-20	-20	-35	0	-20	-20	-35
	PIT				0		0	0	0		0	0	0	19	19	19	19
	LEN				0		0	0	0		0	0	0	0	0	0	0
	STA				4		0	0	0		0	0	4	0	0	0	4
Note 4	VEL			0	0		20	20	35		20	20	35	0	20	20	35
	PIT			0	0		0	0	0		0	0	0	12	12	12	12
	LEN			0	0		0	0	0		0	0	0	0	0	0	0
	STA			3	3		0	0	0		0	3	3	0	0	3	3
Note 3	VEL		0	0	0	-10	-10	-10	-20	-10	-10	-10	-20	-10	-10	-10	-20
	PIT		0	0	0	0	0	0	0	0	0	0	0	24	24	24	24
	LEN		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STA		2	2	2	0	0	0	0	0	2	2	2	0	2	2	2
Note 2	VEL	0	0	0	0	10	10	10	20	10	10	10	20	10	10	10	20
	PIT	0	0	0	0	0	0	0	0	0	0	0	0	12	12	12	12
	LEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STA	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Base Note 1	VEL																
	PIT																
	LEN																
	STA																
	Phrase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Step GRV Phrase timing with reference to POS number

POS = 1

Bar	Step	Tick
1	1	0
1	1	3
1	1	6
1	1	9
8x Speed		

POS = 2 — Dotted

Bar	Step	Tick	Change
1	1	0	
1	1	6	-3/32
1	1	12	-6/32
1	1	18	-9/32
Quad Speed			

POS = 3 — Triplet

Bar	Step	Tick
1	1	0
1	1	8
1	1	16
1	1	24

POS = 4 — Dotted

Bar	Step	Tick	Change
1	1	0	
1	1	9	-5/64
1	1	18	-5/32
1	1	27	-15/64

POS = 5 — 1/2 Step

Bar	Step	Tick	Change
1	1	0	
1	1	12	-1/16
1	1	24	-2/16
1	1	36	-3/16
Double Speed			

Note: 1/16 note/step GRV Phrase will have this as **Neutral** (ie POS 8), effectively all ticks halved.

POS = 6 — Triplet

Bar	Step	Tick
1	1	0
1	1	16
1	1	32
1	2	0

POS = 7 — Dotted

Bar	Step	Tick	Change
1	1	0	
1	1	18	-1/32
1	1	36	-2/32
1	2	6	-3/32
Doubling Echo 1/16 notes			

POS = 8 — Neutral

Bar	Step	Tick
1	1	0
1	1	24
1	2	0
1	2	24
1/8 note/step GRV Phrase		

POS = 9 — Triplet

Bar	Step	Tick
1	1	0
1	1	32
1	2	16
1	3	0

POS = 10 — Dotted

Bar	Step	Tick	Change
1	1	0	
1	1	36	+1/16
1	2	24	+2/16
1	3	12	+3/16
Doubling Echo 1/8 notes			

POS = 11 — On-Beat

Bar	Step	Tick	Change
1	1	0	
1	2	0	+1/8
1	3	0	+2/8
1	4	0	+3/8
1/2 Speed			

POS = 12 — Triplet

Bar	Step	Tick
1	1	0
1	2	16
1	3	32
-	-	-

POS = 13 — Dotted

Bar	Step	Tick	Change
1	1	0	
1	2	24	+4/16
1	4	0	+8/16
-	-	-	

POS = 14 — On-Beat

Bar	Step	Tick	Change
1	1	0	
1	3	0	+6/16
-	-	-	
-	-	-	
1/4 Speed			

POS = 15 — Triplet

Bar	Step	Tick
1	1	0
1	3	32
-	-	-
-	-	-

POS = 16

Bar	Step	Tick
1	1	0
Same as 15		
-	-	-
-	-	-

Hypersteps

Let's start with a short background, to help explain the idea of hyper- steps. Normally steps trigger notes in the following sense: they provide the start, the velocity, and the length (playtime) of the played note.

Now imagine that the played note is not "only" a note but rather a note sequence. And imagine the step is now providing the start, velocity and playtime of the note sequence, such that the note sequence always plays to its end, always time-adjusted to the given playtime.
The final bit of the picture here is that our presumed note sequence may be a track which is controlled by a step in the manner described.
We call such a step a hyper step. In short, hypersteps are steps that do not trigger notes, but trigger tracks in their respective page.
Therefore, if a track is linked to a hyperstep, once the hyperstep is played, the track is being triggered to play at a speed corresponding to the step absolute length (in 1/192), and taking over the hyperstep's velocity and pitch offset.
On making a step a hyperstep is LEN is automatically set to 192/192 and on destroying a hyperstep the step LEN is reset to the default value of 12/192.
Scaling the Track LEN of the track containing the hyperstep will scale the hyped-track tick length, speeding up the hyped-track. The maximum length of a hyped-track is 192 ticks, however Step LEN within the hyped-track can be increased by 'skipping' steps - see Hyperstep LEN Reference below:

Hyperstep Step LEN (Ticks)	Hyperstep Track LEN (Scaling)	--------------- Number of Steps in Hyped-Track ---------------															
		16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
192	8	12	12	13	14	16	17	19	21	24	27	32	38	48	64	96	192
192	7	11	11	12	13	14	16	17	19	21	25	29	35	44	58	88	176
192	6	10	10	11	12	13	14	16	17	20	22	26	32	40	53	80	160
192	5	9	9	10	11	12	13	14	16	18	20	24	28	36	48	72	144
192	4	7	7	8	8	9	10	11	12	14	16	18	22	28	37	56	112
192	3	6	6	6	7	8	8	9	10	12	13	16	19	24	32	48	96
192	2	3	3	3	3	4	4	4	5	6	6	8	9	12	16	24	48
192	1	1	1	1	1	1	1	1	1	2	2	2	3	4	5	8	16
Track of 16 steps		---------------- Hyped-Track Step LEN (Ticks) ----------------															

By 'Scaling' the Hyperstep Track LEN the Hyped-Track can be speeded up (8, neutral - 1, fastest).   Scaling 9 - 12 will get the same result as 8 and 13 - 16 will get the same result as 1 - 4 respectively.

Note: By muting steps in the hyperstep track the number of steps played in the hyped-track is also reduced. However, this can also be manipulated by LEN scaling - either by changing the track LEN of the hyperstep track or changing the note LEN of the hyperstep.

Hyperstep PIT and VEL
In addition to a 'Hypedtrack' being controlled by the Hyperstep LEN, the Hyperstep PIT and VEL also control the hypedtrack pitch and velocity. Therefore, the hypedtrack will assume both the pitch and the velocity values of the hyperstep.
Changes to the hyperstep PIT and VEL will influence the hypedtrack in real-time – hence changing the hyperstep PIT or VEL offsets will influence the hypedtrack steps at the position of the chase light !

Engaging hypersteps
To use hypersteps, go to PAGE mode, hold a track selector down, and at the same time designate the hyperstep in the matrix, in a row other than the track's (by pressing it down as well). You will see that both the track selector and the hyperstep start flashing between green & orange.
There can be multiple hypersteps in one track (pointing to different hyped-tracks) but a hyped-track can only have one associated hyperstep.
Hypersteps cannot be 'nested', i.e. it is not possible to have a hyperstep within a hyped-track.

Destroying hypersteps
To disengage or destroy the hyperstep of a hyped track, hold the respective track selector of the hyped track pressed and then press any step button in the matrix row of the hyped track. The association between the step and the track will be removed.

Variable Step Sequences

By using hypersteps we can vary the number of steps played in the hyped-track each time the hyperstep is triggered.

Here's how:- Set up a hyperstep (on step 1) and its associated hyper-track, on the hyped-track mute steps 9 -16 (so it will only play 8 steps).

On the hyperstep track mute steps 5 - 16 (so it will only play 4 steps) and set the hyperstep track LEN to 8 (default), then zoom into the hyperstep and change the step length from 192/192(default) to 48/192 (4 steps). Now zoom into step 4 (last step) of the hyperstep track and set up a step event for LEN with an AMT of -1.

Each time the hyperstep track plays it will 'scale' the LEN on the hyped-track, so in the above configuration the number of steps played will vary between 5 steps and 8 steps - the length time taken to play will be the same.

By populating some of the hyped-track steps with MCC we effectively have something very similar to a Sample & Hold LFO

Step events

Steps may be used to generate so called events. Events are simply automated changes that happen at runtime. In general terms, an event is a programmed change of the attributes of a track and is attached to a step. All track attributes may be modulated by events.
The finer definition is however, that for the DIR, POS, and MCH events the track attribute value changes, while in the case of the other attributes, (VEL, PIT, LEN, STA, AMT, GRV, and MCC) what changes is really the attribute map factor of any steps having offsets from the track value.
Please refer to the section on attribute maps for details.

Creating events
To create an event, double click on a step to zoom into it, and select one of the attributes in the SEL column. As discussed earlier, initially these are all lit, waiting to be selected. Once selected as an event, they will blink.
You will notice that some are coloured orange, some green. The orange attributes indicate that their events will influence the attribute map factor, while the events for the green ones will change the attribute value directly.

The step led of an event will be orange.

Note: If the 'Snapshot' button is set to red (Snapshot Mode) then the events will not be retained when the sequencer is 'stopped'.

Set event values
The amount (AMT) value of the step determines the change in the track attribute every time the step is played.
In the case where the set amount is larger than the possible value range of the target, a modulo operation will be carried out to bring it into the range.
Note that the changes can be positive or negative, according to the amount value.

Random event values
Random event values, via a non-zero value of the GRV attribute for the step generating an event, is a disabled feature in version 1.6203 and later.

Clearing events

Events may be cleared from a track by zooming into the step and pressing the flashing SEL attribute button so it is solid orange or green again.

Event range settings

Sometimes it makes sense to limit the range in which the event change occurs to a value below the size of its natural range. Those MAXIMUM values are 17 for each of the attribute map factors, 16 for DIR and 32 for MCH.
POS Step Event changes the Track POS, not the Step POS(GRV)
DIR Step Event will change on the following step (this is only relevant when using a custom DIR with multiple steps per slice).

To change the size of the interval used by events, press the Range button (located next to the Event button) and modify the value using the main encoder.
What you should notice is that the changes produced by the events will be bound between the base value of the track for that attribute and the sum of the base and the interval size. The event is therefore always incremental.

Event execution

Another detail that may be of interest is that events will always execute exactly on the beat and not be influenced by the step's STA value to be pulled or pushed against the time line.

Step event offset reset

Finally, a step AMT of 0 (zero) will discard the offset that was produced by a step event.

AMT events

You may have noticed that while the AMT value of a step determines the effect an event has on its respective attribute, the AMT map factor may be modified by events as well.
By creating AMT events, you are effectively able to have dynamic changes in the actual amount of change that is being applied to an attribute map factor, so we will be seeing changes to the change rate!
This is a powerful instrument to create evolving and to a large degree unpredictable sequences.

Understanding Step Events
Step offsets changed by Step Events are influenced by 3 things, Track Attribute Scaling, Step Event Range and the Step Event AMT.
Step Events will only influence steps whose attributes have been offset from their respective track values.

Track Attribute Scaling will affect the Step Event Range, the chart below shows the actual step offset (in blue), the neutral value - which is the case when the Track Attribute has <u>not</u> been scaled - hence the maximum Step Event Range will be 8 (7 to 0). If the Track Attribute has been expanded to, say, **11** (see section on Attribute maps) then effectively the 'neutral' line will be at 5 **(11)** and in this case the maximum Step Event Range will be 5 (4 to 0).
The Track Attribute will have to be compressed to its maximum amount **(0)** for the full Step Event Range of 17 to be available.

Step Event Range is subordinate to Track Attribute Scaling, therefore if an attribute map has been scaling to the maximum (expanded) amount then step events for that attribute will have no effect.
Step Event Range sets the range by which a step event can change the track attribute scaling.

Step Event AMT simply changes to Track Attribute Scaling (within the Step Event Range) each time the Step Event is executed.
If Step Event AMT is greater than the Step Event Range then the AMT will be divided by the Step Event Range and the remainder will be applied to the Track Attribute Scaling amount.

Example for attributes (VEL, PIT, LEN, STA, GRV, AMT & MCC):
Assume Track Attribute has <u>not</u> been scaled, and the Step Event Range is set to 3. With the Step Event AMT set to 0 the neutral values (shown blue on the chart below) will be applied to the attribute, if the Step Event AMT is set to +1 then the following occurs:
The track attribute will be scaled by +1 each time the step event is executed, therefore the offset in row 7 **(9)** of the chart will now be applied, then row 6 **(10)** then row 5 **(11)** - as the Step Event Range is set to 3 the next Step event will cause the offset in row 8 (neutral) to be applied. So in this example, if the initial step offset was **'12'** then the sequence of the step offsets would be 12, 14, 17, 20, 12, 14, 17, 20, 12 and so on.
An AMT of -1 will result in the same offsets except the sequence will be in reverse order, thus, 12, 20, 17, 14, 12, 20, 17, 14, 12.

Maximum Event Range	Track Attribute Map factor Scaling shown in Green, - values 0 - 7 compress, and values 9 - 16 expand.																
16 (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 (3)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	2
12 (4)	0	0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3
11 (5)	0	0	0	1	1	1	2	2	2	3	3	3	4	4	5	5	5
10 (6)	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
9 (7)	0	0	1	2	3	4	5	5	6	7	8	9	10	10	11	12	13
8 - Neutral	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Numbers in Blue are the actual Step Attribute Offset																	
7 (9) A	0	1	2	3	4	6	7	8	9	10	12	13	14	15	17	18	19
6 (10) B	0	1	2	4	5	7	8	10	11	12	14	15	17	18	20	21	23
5 (11) C	0	1	3	5	6	8	10	11	13	15	17	18	20	22	23	25	27
4 (12) D	0	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31
3 (13) E	0	2	4	6	8	11	13	15	17	20	22	24	26	29	31	33	35
2 (14)	0	2	5	7	10	12	15	17	20	23	25	28	30	33	35	38	40
1 (15) F	0	3	6	9	12	16	19	22	25	29	32	35	38	42	45	48	51
0 (16)	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64
The maximum Event Range is 17, however it is shown 0...16 as represented on row 1																	

Using AMT to scale AMT

Firstly, for step event with an AMT of 1 the changes that would occur by adding an additional step event for the AMT attribute will be reflected in the column of offset [1] A to F. If the step event has an AMT of 4 then the changes that would occur by adding an additional step event for the AMT attribute will be reflected in the column of offset [4] A to F.

It should be noted that changes to the Track Attribute Map factor Scaling of the AMT attribute are only available with event range of 6, shown on the chart above and marked A to F. The designation of A to F are fixed, therefore if the Track attribute map factor for AMT is scaled to, say, (11) then changes will be limited to C to F. Also, if the Track attribute map factor for AMT is compressed then Step Events using AMT to scale AMT will not work as expected (as AMT will compress itself) - therefore, scaling the Track attribute map factor for AMT is best avoided.

Maximum Event Range	Track Attribute Map factor Scaling shown in Green, - values 0 - 7 compress, and values 9 - 16 expand.															
16 (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 (1)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2
14 (2)	1	1	1	1	2	2	2	2	3	3	4	4	5	5	6	6
13 (3)	2	3	3	4	5	5	6	6	7	8	9	10	11	12	13	14
12 (4)	4	5	6	7	8	9	10	11	13	15	17	19	21	23	24	26
11 (5)	7	8	10	11	12	14	15	17	20	23	25	28	31	34	37	40
10 (6)	10	12	14	16	18	20	22	24	29	33	37	41	45	49	54	58
9 (7)	16	20	23	26	30	33	36	40	47	53	60	67	73	80	87	94
8 - Neutral	**20**	**24**	**28**	**32**	**36**	**40**	**44**	**48**	**56**	**64**	**72**	**80**	**88**	**96**	**104**	**112**
Numbers in Blue are the actual Step Attribute Offset																
7 (9) A	24	29	34	39	43	48	53	58	68	78	87	97	107	117	126	127
6 (10) B	28	34	40	46	51	57	63	69	80	92	103	115	126	127	127	127
5 (11) C	34	40	47	54	61	68	74	81	95	108	122	127	127	127	127	127
4 (12) D	39	47	54	62	70	78	86	94	109	125	127	127	127	127	127	127
3 (13) E	44	53	62	71	80	89	98	107	125	127	127	127	127	127	127	127
2 (14)	51	61	71	81	92	102	112	122	127	127	127	127	127	127	127	127
1 (15) F	64	77	90	103	116	127	127	127	127	127	127	127	127	127	127	127
0 (16)	80	96	112	127	127	127	127	127	127	127	127	127	127	127	127	127
The maximum Event Range is 17, however it is shown 0...16 as represented on row 1																

Example of using AMT to scale AMT

Take a step offset of VEL +8 and change the Track attribute map factor of VEL, compress to (4), now add a Step Event for VEL with an AMT of +4, this will render the sequence change in VEL values (from the chart above [8]), 1, 8, 15, 32, 6, 13, 25, 4, 11, 20, 2, 9, 17, 1 and so on.

Now, by adding a Step Event AMT of AMT +1 to the track the VEL AMT of +4 will be scaled from A to F (as in the chart above [4]), in other words, rather than the Track attribute map factor changing by +4 it will change by 4, then 5, then 6, then 7, then 8. then 12, before repeating. We can count these scaling changes against the VEL offsets (from the chart above [8]), and see that it will render the sequence change in VEL values as follows: 1, 8, 15, 1, 11, 1 15, 13, 25(change 4), 6(change 5), 17(change 6), 6(change 7), 25(change 8), 20(change 12), 2, 11, 32, 11, 2, 1, 8 etc.

Considerations:

If the Velocity is 0 then the note is not transmitted.

When 'shifting' maps (Track POS) a step event will remain on its original step, it will not 'shift'.

Attributes DIR, POS & MCH are absolute, hence if DIR is 6 a Step Event of '+2' will change it to 8.

Step AMT of '0' will not reset POS, DIR or MCH values. These must be reset using the opposite amount of the values by which they were changed.

Track attribute AMT scales its own offset and is therefore best left at the 'neutral' value.

DIR & MCH will default to the Track attribute amount when the sequencer stops and but changes made using Step Events may only be viewed as they occur in Track Zoom.

POS does not restore to the start POS(ition) when stopping the sequencer.

POS Step Event changes the Track POS, not the Step POS(GRV).

3. Track Mode

Track Mode Index

x2 Quick Navigation in Track mode:

- Grid LED Green
- Page LED Green
- Track LED flashing Orange
  - If Step LED is Orange the page is showing tracks 1 to 4
  - If Step LED is Green the page is showing tracks 5 to 8
  - Clicking the Step button toggles the track view

Track Zoom
Decide which track you want to zoom into and double click its selector button.

Track Zoom Menu							
Row 3 Options							
Effector		Value		Factor			
Feed	Listen	Track Attribute		Attribute Scaling		MCC Stream	Flow
Default = off		Attribute	Default	Attribute	Default	Default = 1	Default = 1
on/off	on/off	PIT	Track PIT	PIT	8		1 - 9
		VEL	64	VEL	8		
		LEN	12	LEN	8		
		STA	0	STA	8		
		AMT	50	AMT	8		
		GRV	0	GRV	8		
		MCC	Null	MCC	8	**MCC Stream**	
		MCH	1			1 - 4	
		POS	1				
		DIR	1				
		PgmCh	Null				
		Speed	1				

Track attributes

Track pitch (PIT) and velocity (VEL)
Pitch and Velocity values are displayed in the same manner we have seen in STEP mode.
The meaning of the values is interesting - they represent the base value and are to be seen in the context of the values pertaining to the steps in the particular track.
When zoomed into a Track the pitch (PIT) octave may be changed with the 8vb and the 8va buttons on row 1.

Under the hood
When playing, the values of the steps in that track are added to the base track pitch or velocity. As a consequence, the baseline for a track is set by the track pitch and velocity. Step values are just offsets to this base. Nemo uses the convention that middle C (MIDI note #60 decimal) maps to C5. The default Track PIT values for Tracks 1 - 8 are as follows: A5, G5, E3, D5, A3, G3, E3 and D3.

Track LEN and STA factors

The Length and Start rows show visually the values for the length and start factors of a track. The STA and LEN factors are simply multipliers that are applied to the STA and LEN offsets of the steps in a track.

This means, that a high factor value will result in the effect of the STA or LEN offsets being amplified, while a low factor value will result in the effect of the step offsets being diminished or voided altogether.

In the middle setting of 8, the effect of the map is unchanged and therefore played "through".

In the zero setting, the STA and LEN step offsets will be ignored altogether, while in the 16 position the step offsets will be amplified by a total factor of roughly 2.

As an example, have a track play some default length notes, and simply turn the LEN knob to the left. You will hear that the note lengths are decreasing as you go, and quite the opposite will happen as you turn the knob to the right.

For the STA factor, use a track with notes playing off the beat (so you hear the effect). Reducing the factor will play the notes closer to the "on the beat" time, effectively quantizing the play, while increasing the factor will move the steps further away from the on the beat position (see below).

On a side note, in order to modify the actual length and start point of a track, use the step skip option.

Note: If a Step STA is advanced (Pull), then the Step will not play if the preceding step is skipped and a Track STA of less than 8 will have no effect on this behaviour.

Track LEN Reference Chart

Track LEN	Step LEN (lengthen)												Ticks
16	6	12	18	24	48	96	144	192	192	192	192	192	x2
15	5	10	15	21	42	84	126	168	192	192	192	192	
14	4	9	13	18	36	72	108	144	180	192	192	192	x1.5
13	3	8	12	16	33	66	100	132	166	192	192	192	
12	3	7	11	15	30	60	90	120	150	180	192	192	
11	3	7	10	14	28	57	85	114	142	171	192	192	
10	3	6	10	13	27	54	82	108	136	162	188	192	
9	3	6	9	12	25	52	76	102	126	152	178	192	
Step LEN	**3**	**6**	**9**	**12**	**24**	**48**	**72**	**96**	**120**	**144**	**168**	**192**	
7	2	5	8	11	22	46	68	90	112	134	156	180	
6	2	5	7	10	21	42	63	84	105	126	148	168	
5	2	4	6	9	18	36	54	72	90	108	126	144	3/4
4	1	3	5	7	15	30	45	60	76	90	104	120	
3	1	3	4	6	12	24	36	48	60	72	84	96	1/2
2	1	1	2	3	6	12	18	24	30	36	42	48	1/4
1	1	1	1	1	1	4	4	6	7	9	10	12	
0	1	1	1	1	1	1	1	1	1	1	1	1	
Track LEN	Step LEN (shorten)												Ticks

Track LEN 8 Neutral (shown in blue)

If Track LEN 16 then Step LEN multiplied by 2
If Track LEN 14 then Step LEN multiplied by 1.5
If Track LEN   5 then Step LEN multiplied by 3/4
If Track LEN   3 then Step LEN halved (divided by 2)
If Track LEN   2 then Step LEN quartered (divided by 4)

Track STA Reference Chart

Track STA	Step STA (advance- pull)						Step STA (retard- push)					
16	-12	-10	-7	-5	-2	0	+2	+5	+7	+10	+12	
15	-11	-9	-6	-4	-2	0	+2	+4	+6	+9	+11	
14	-10	-8	-6	-4	-2	0	+2	+4	+6	+8	+10	x2
13	-9	-7	-5	-3	-1	0	+1	+3	+5	+7	+9	
12	-8	-6	-4	-3	-1	0	+1	+3	+4	+6	+8	
11	-7	-5	-4	-2	-1	0	+1	+2	+4	+5	+7	
10	-6	-4	-3	-2	-1	0	+1	+2	+3	+4	+6	
9	-5	-4	-3	-2	-1	0	+1	+1	+3	+4	+5	
Step STA	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	**+4**	**+5**	
7	-4	-3	-2	-1	0	0	0	+1	+2	+3	+4	
6	-4	-3	-2	-1	0	0	0	+1	+2	+3	+4	
5	-3	-2	-2	-1	0	0	0	+1	+2	+2	+3	
4	-3	-2	-1	-1	0	0	0	+1	+1	+2	+3	
3	-2	-2	-1	-1	0	0	0	+1	+1	+2	+2	
2	-2	-1	-1	0	0	0	0	0	+1	+1	+2	
1	-1	0	0	0	0	0	0	0	0	0	+1	
0	0	0	0	0	0	0	0	0	0	0	0	

Track STA   Step STA (advance- pull)   Step STA (retard- push)

Track STA 8 Neutral (shown in blue)

If Track STA 14 then Step STA multiplied by 2

Note: When using track multipliers of less than 1 (reduced speed) the maximum Step STA advance (green) will be -12 ticks with reference to the x1 speed.

Track position (POS)

The POS line will show the pattern of set steps in the track at hand. Turning the POS knob will shift the steps around, depending on the turn direction, modifying the contents of the play window, just to use the same terms.

Track direction (DIR)

This line indicates the chosen play direction for a track. Consider it as an index into the following default mapping:

1 - Forward play
2 - Reverse play
3 - Ping-Pong
4 - Brownian, i.e. 2/3 probability forward, 1/3 probability reverse play
5 - Random order

Track amount (AMT)

AMT represents the amount of randomization applied to the track when the RMX function is called.

Track groove (GRV)

The GRV value determines how much shuffle is applied to the track, the range is 0 - 16.

Shuffle means that the steps with an even index in the track (i.e. 2, 4, 6 .... 16) will be played with a delay. Generally, the larger the GRV amount, the longer the delay that makes up the shuffle.

One other intricacy is that the odd GRV values will produce steady shuffle delays, while the even GRV values will produce delays that are variable within one 1/192 and which are determined at runtime. The delay values applied are as shown below:

Setting	Delay (1/192)	Setting	Delay (1/192)
1	1	9	5
2	0-2	10	4-6
3	2	11	6
4	1-3	12	5-7
5	3	13	7
6	2-4	14	6-8
7	4	15	8
8	3-5	16	7-9

Track MIDI continuous controller (MCC)
The MCC row determines whether or not this track sends MCC.
The "none" flag is represented as four green LEDs in the positions 13- 16.
The value range here is of course 0-127 and please keep in mind that a value of 0 does indicate a valid controller value.
Two exception are the BENDER and CHANNEL PRESSURE flags.
The BENDER flag is shown as a red dot in position 16 of the MCC row and is indicating that the track will be sending MIDI pitch bend messages according to the MCC values stored in that track's steps.
The CHANNEL PRESSURE flag is indicated by two red dots in the positions 15 and 16 of the MCC row, and is telling us that the track will be sending CHANNEL PRESSURE messages according to the MCC values stored in that track's steps.
If a track has an MCC parameter value other than "none" (i.e. the 4 green LEDs in the positions 13-16), its chase light colour in the matrix will be orange, while the tracks whose MCC values are set to "none" have a red chase light.

Track MIDI channel (MCH)
The MCH row indicates the MIDI channel for this track. Default value for all tracks is channel 1 on port 1. This is represented by a green light in the 1 position.
Now turn the MCH rotary encoder slowly to the right until you reach 16. Turning it once more to the right will light the LED in position 1 red. This means that channel 1 on port 2 is now selected.
Therefore, green 1-16 assigns a track to MIDI port 1 and
red 1-16 to MIDI port 2.

Track program change (PgmCh)
Tracks may carry a program change value that will be sent out on their MIDI channel as soon as it is dialled in via the main encoder or the row 1 key. Also, the program change will be sent out when the sequencer is started from a stop state.

Track speed
Operation and selection
To change a track's tempo multiplier, go to Track mode, and in the second row click on the Speed button. As soon as the selection of Speed is active you should observe the indicator in row 1. By default it is a red 1, showing a multiplier of 1, i.e. plain master tempo. Double click on the second button

of row 1, labelled 2. You should see in the bottom row that the speed of the track has doubled. Double clicking the 3 button will select a multiplier of 3, and so forth. The available multipliers are 1-8 and 16. Additionally you may also select a speed multiplier of 1,5 by double clicking button 15. This button is denoted by a triplet symbol on the bottom. To select master clock divisors (i.e. 1/multipliers), use the same keys as described above, but single click to get a green indicator.

Considerations
Note that when the sequencer is playing, the changes of the track clock multiplier are effective on the next 1/16th beat of the master clock and not immediately. This provides better track alignment and improves the general feel of the sequence without the need to explicitly align after a track clock switch.

Operations

Track Solo
Pressing the SOL button solo's the track within its page. Note that no other pages playing concurrently will be affected. Pressing it again
will un-solo the track in the page.

Track clear
CLR will recall the preset values for the selected track.
Only the track PIT and the MIDI Channel assignment (MCH) will remain unchanged. Note that the factory pitch assignment can be recalled by calling the Clear mutator upon a PAGE. If you are at the PAGE level and grab a Track and clear it, everything is reset.

Copying tracks
Go ahead and press the track selector button of the corresponding TRACK and keep it pressed. You will see some changes in the LED pattern of the panel; don't worry about it for now. You will see that once you have grabbed a track, you see that the Copy button is now lit orange.
Press the Copy button and release the track (move your finger off the selector). You have just copied the track you have grabbed to an internal buffer*.
You have not copied the full track data, but only a reference to it. This means that at the time of the paste operation you will get the most recent

data of the just copied track and not the data at the time of the copy operation. Therefore, any changes between the copy and the paste operation are permanent and not recoverable.

Pasting copied tracks

Now grab an empty track as described above by pressing its selector and keeping it pressed. You will notice that paste is now available, indicated by the lit Paste button. Press the Paste button to paste the contents of your source track into the destination

Track remixes (RMX)

There are two operational modes for Remix, as follows:-
When zoomed into a track clicking the RMX button will change the step pattern for that track, i.e. steps will be randomly turned on or off.
When a track is selected by holding the Track Selection button clicking the RMX button will no longer change the step pattern but will instead influence the step attributes hence the track remix used in this manner will generate variations of a track without altering it too much.
It does have some random elements which are influenced by the value indicated in Track AMT. Below is an overview of what the RMX function does:

Influenced Map*	Random Shift Map	Random Step Offset
VEL	+	+
PIT	+	
LEN	+	+
STA	+	+
POS	+	

Track FLAT (FLT)

The FLT function is used mainly to combine the pitch content of several tracks into just one track in the same page.
This function was conceived as a creative tool and not as a track space-saving feature, as it may appear at first sight. In some instances it may be useful as such, but just in some. Please keep this in mind!
FLT will only become available when you have selected two or more tracks in a page. There is a notion of a destination track, which is always the one from the selection with the lowest index.
Applying FLT to the track selection will fill the destination track with content from the source tracks.

For every active step in any of the source tracks, you will get the corresponding step activated in the target track. Skipped steps will simply be ignored.

If more than one step is active in the same column across the selected tracks, the lowest 7 pitches of active steps will get stacked to form a chord on the respective step in the destination track.

Note that if source track steps contain chords already, only their base pitch will be considered for FLT. The additional chord data in the source tracks will be ignored.

The base pitch of the resulting chord will be the lowest pitch encountered in the respective column, with the other found pitches being stacked on top.

Another detail worth mentioning is the influence of FLT on the VEL, LEN and STA values of the steps in the destination track. FLT always carries over the VEL, LEN and STA attributes of the last encountered active step for a particular column/position inside the destination track.

Also something to realize is that FLT is MIDI channel agnostic - you may FLT different tracks playing on different channels, but the result will always play on the MIDI channel of the destination track.

With that in mind, let us suggest two best practice usage methods for FLT. Firstly, before you are applying FLT to your track selection, make sure the target track is muted.

This way you do not get any double notes playing if the target track is set to the same MIDI channel as any source tracks. You then can do a smooth blend-in of the new material, which may be useful when playing live for example.

Secondly, you may want to make sure the target track MIDI channel is different from any of the source tracks before you apply FLT. This will effect the obvious - the new material is going to sound fresh right away. And of course you can use both of these techniques combined to achieve the result that is best for you!

Step GRV is always reset to '0' when using FLT unless source and destination tracks have the same GRV settings.

Track chaining

Track chains explained
A track chain is simply a defined sequence of playing tracks from a page, in a given consecutive order. Track chains are always configured in PAGE mode and are useful in creating structures longer than 16 steps per page.
Playing considerations
Chain configurations influence the set track parameters. Each track's steps are played using the same set of track parameters at the base. The reference point is always the head track of a chain meaning that the tracks will be played taking over the values held in the head track as a base reference.
Selecting chain members
While in PAGE mode, define first the group of tracks that you would like to chain by creating an appropriate selection.
Creating a track chain While the selection is active (blinking orange), press the Chain button to build the chain made up by these tracks. You will now see that they start playing in sequence. The play sequence is per default top to bottom (i.e. row 1 to row 4).

Under the hood
Every chain has a head and a tail. The head is a track, while the tail may be made of none, one or more other tracks. When you create a selection, the top-most track of a selection will be defined as the head of the new chain, and the other selected tracks will make up the tail. Should any of the newly chained tracks have been part of a chain before (regardless if head or tail); they will be removed from their original chain(s) and added to the new one. The original chains will simply get reduced by the tracks re-allocated to the new chain.

Showing track chains
Once a track chain has been created, you can also easily see how it is spread across the page. Simply select a track that is part of a chain, and you should see the following information in the selector LED column. The track selected (one you have your finger on) is blinking orange. Other track members may be lit green and red. In red you can recognize the head track of the chain, in green the other chain members that are not the head. If the head and the selected track are the same, you will only see a blinking orange LED.

Track base switch

You can configure page chains to use either individual base values (the track respective ones) or to use a single common track base value, that of the head track. To do this you may simply hold down the selector of a chain member and then toggle the MIX Attribute button between green and red. Green means that tracks are being played in their natural state but in chained order. Red means that the tracks will be played taking over the values held in the head track as a base reference.

Muting chained tracks

One more thing to mention about the track base for a chain - in the context of muting or un-muting tracks that are actually part of a chain. The mute operation of any chain members will apply to all tracks in that chain. Note that it will be a toggle operation, so it will invert the mute pattern of the set of chained tracks.

Chain Chase Light follow

To activate double click Mode Step button. When multiple tracks are chained the page view will change automatically between tracks 1 to 4 and tracks 5 to 8 following the chase light.

If sequencer is stopped showing the second matrix view, then on Play matrix view will reset to head of the track chain.

NB: When chase light follow is active the Mode Step LED will be flashing when representing the matrix view options above.

Track attribute factors and flows

Simply put, track attribute factors for a track are parameters that determine how intense the step attribute offsets will play on that track. As an example, let's assume that within a track we have a range of step offsets with a minimum of -50 and a maximum of 50. A neutral factor leaves the offsets unchanged. A factor of 0,5 compresses the range to -25 /+25, and a factor of 1,5 will extend the range to -75 /+ 75. The main advantage we get from flows and factors is the factoring or scaling of step attribute effect on the play result. Using a scaling factor for each attribute of a track, we can determine to what degree step offsets apply to the play data. In fact, track LEN and STA themselves are really scaling factors for the corresponding attribute maps.

Working with attribute factors
The attribute factor value for the attribute selected in row 2 is shown in row 1. For all attributes the factors have a range of 1 to 16. The value may be modified using the main encoder, as we have seen it before in the case of track attribute values. Alternatively you may dial in a factor value directly using the keys in row 1.

In Use
The Scaling Factor will only effect 'offsets', therefore steps that are
not offset from the Track attributes will not be changed - with the
exception of DIR, POS and MCH.

In Use with Step Events
Step Events are changes to the Scaling Factor and again the
scaling factor changes will only effect 'offsets'.

Attribute Scaling Reference Chart

Expand

16	0	4	8	12	16	32	64	96	127	127	**x4**
15	0	3	6	9	12	25	51	77	103	127	*x3 Lower Values*
14	0	2	5	7	10	20	40	61	81	102	
13	0	2	4	6	8	17	35	53	71	89	*x2 Lower Values*
12	0	1	3	5	7	15	31	47	62	78	
11	0	1	3	5	6	13	27	40	54	68	
10	0	1	2	4	5	11	23	34	46	57	
9	0	1	2	3	4	9	19	29	39	48	
Value	**0**	**1**	**2**	**3**	**4**	**8**	**16**	**24**	**32**	**40**	**x1**
7	0	0	1	2	3	6	13	20	26	33	
6	0	0	1	1	2	4	8	12	16	20	*/2 Lower Values*
5	0	0	0	1	1	2	5	8	11	14	
4	0	0	0	0	0	1	3	5	7	9	
3	0	0	0	0	0	1	2	3	4	5	**/8**
2	0	0	0	0	0	0	0	1	1	2	
1	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	

Compress

Expand

16	127	127	127	127	127	127	127	127	127	127	**x4**
15	127	127	127	127	127	127	127	127	127	127	
14	122	127	127	127	127	127	127	127	127	127	
13	107	125	127	127	127	127	127	127	127	127	
12	94	109	125	127	127	127	127	127	127	127	
11	81	95	108	122	127	127	127	127	127	127	
10	69	80	92	103	115	126	127	127	127	127	
9	58	68	78	87	97	107	117	126	127	127	
Value	**48**	**56**	**64**	**72**	**80**	**88**	**96**	**104**	**112**	**120**	**x1**
7	40	47	53	60	67	73	80	87	94	100	
6	24	29	33	37	41	45	49	54	58	62	*/2 Lower Value*
5	17	20	23	25	28	31	34	37	40	43	
4	11	13	15	17	19	21	23	24	26	28	
3	6	7	8	9	10	11	12	13	14	15	**/8**
2	2	3	3	4	4	5	5	6	6	7	
1	0	1	1	1	1	1	1	2	2	2	
0	0	0	0	0	0	0	0	0	0	0	

Compress

What is an attribute flow?

Glad you asked. Simply put, an attribute flow is the collection of offsets for a particular attribute and for an entire track.

Let's look at an example: a VEL flow as a horizontal line means that all offset values are equal (and per default at 0). A linear ramp means that the velocity will increase in the course of the track.

Nemo provides a set of pre-defined flows that can be applied to any track attribute that has a factor.

To see which ones they are, switch to Track mode and click on the Factor button in row 3. You will see that PIT, VEL, LEN, STA, AMT, GRV, and MCC light up. Apart from setting the step offsets using flows, you are of course free to modify the individual step attributes in Step mode, as described in the section dealing with the Step mode.

Once a Flow factor is selected from row 4, any existing offsets will be literally replaced by the chosen Flow factor.

The relative Flow factor values for each Flow are shown in the chart below:-

Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flow 1 Offset	Linear - All offsets to the same value															
Flow 2 Offset	-56	-48	-40	-32	-24	-16	-8	0	+8	+16	+24	+32	+40	+48	+54	+56
Attr Scaled to 3	*-7*	*-6*	*-5*	*-4*	*-3*	*-2*	*-1*	*0*	*+1*	*+2*	*+3*	*+4*	*+5*	*+6*	*+7*	*+7*
Flow 3 Offset	+56	+54	+48	+40	+32	+24	+16	+8	0	-8	-16	-24	-32	-40	-48	-56
Attr Scaled to 3	*+7*	*+7*	*+6*	*+5*	*+4*	*+3*	*+2*	*+1*	*0*	*-1*	*-2*	*-3*	*-4*	*-5*	*-6*	*-7*
Flow 4 Offset	-56	-50	-40	-24	+8	+40	+46	+56	+56	+46	+40	+8	-24	-40	-50	-56
Attr Scaled to 3	*-7*	*-6*	*-5*	*-3*	*+1*	*+5*	*+6*	*+7*	*+7*	*+6*	*+5*	*+1*	*-3*	*-5*	*-6*	*-7*
Flow 5 Offset	0	0	-8	-40	-60	-24	0	+24	+40	+54	+56	+56	+40	+24	+8	0
Attr Scaled to 3	*0*	*0*	*-1*	*-5*	*-7*	*-3*	*0*	*+3*	*+5*	*+7*	*+7*	*+7*	*+5*	*+3*	*+1*	*0*
Flow 6 Offset	0	0	+8	+40	+56	+56	+24	0	-24	-46	-40	-24	-16	-8	-4	-2
Attr Scaled to 3	*0*	*0*	*+1*	*+5*	*+7*	*+7*	*+3*	*0*	*-3*	*-6*	*-5*	*-3*	*-2*	*-1*	*-1*	*0*
Flow 7 Offset	-40	-24	-8	0	+8	+24	+40	+56	-40	-24	-8	0	+8	+24	+40	+56
Attr Scaled to 3	*-5*	*-3*	*-1*	*0*	*+1*	*+3*	*+5*	*+7*	*-5*	*-3*	*-1*	*0*	*+1*	*+3*	*+5*	*+7*
Flow 8 Offset	0	+56	+56	+56	-56	-56	-56	+24	+24	+24	-24	-24	-24	+8	+8	-8
Attr Scaled to 3	*0*	*+7*	*+7*	*+7*	*-7*	*-7*	*-7*	*+3*	*+3*	*+3*	*-3*	*-3*	*-3*	*+1*	*+1*	*+1*
Flow 9 Offset	-63	-8	+40	+56	-54	0	+5	+8	-8	-29	-4	0	-12	-6	-2	0
Attr Scaled to 3	*-8*	*-1*	*+5*	*+7*	*-7*	*0*	*+1*	*+1*	*-1*	*-4*	*0*	*0*	*-1*	*-1*	*0*	*0*
Flow 10 Offset	-63	+40	+56	+58	+56	+36	+8	+24	0	-40	+40	-24	+14	-4	-6	0
Attr Scaled to 3	*-8*	*+5*	*+7*	*+7*	*+7*	*+4*	*+1*	*+3*	*0*	*-5*	*+5*	*-3*	*+2*	*0*	*-1*	*0*

MCC Stream resolution

MIDI CC flows have an additional specific property associated with them, and that is stream resolution. Per default, MIDI CC messages are sent on each step, according to the respective track and step MCC values. In addition, intermediate CC messages may be sent between CC steps. This effectively increases resolution of the MCC stream, resulting in smoother controller flows. When selecting the track MCC factor, row 4 lets you determine the resolution level, i.e. the resolution for the current track may be selected via the four rightmost buttons of the fourth row. The default level is 1, with one CC message is sent per step. The levels 2, 3 and 4 mean that 3, 5, and 7 CC messages are sent per step. The first message is always sent right on the step, the others are distributed evenly across the interval of time until the next step is triggered. The intermediate values automatically create a linear slope to next value.

Track Pause/retrigger

A track may be paused by grabbing the track (holding the appropriate track selector pressed) and pressing the Pause transport button. The procedure applies also to a selection of more than one track.
When a selected track is paused and the Pause button is clicked again, all paused tracks will advance one step but still remain paused.
When restarting a paused track, the track button of the paused track is held, the play button is clicked and the track will start playing from its first non-skipped step.
To make paused track continue playing from its current position simply hold the track button of a different track when clicking the play button. This is also useful if multiple tracks are paused and one is required to restart from the first non-skipped step whilst the others restart from their respective paused positions.

The Effector

To be precise, the Effector is not as much a function as it is a state switch, enabling the track to participate in cross modulation across the PAGE.
Some additional explanation is needed here, so let's start with the theory.
In each Nemo page there is the notion of an Effector.
In simple terms, the effector is a mechanism allowing tracks inside a page to modulate other tracks inside the same page.
Modulation here refers to projecting Step attribute offsets from one track to another at a time at which the modulator track is being played.
The affected Step attributes are Step VEL, PIT, LEN and MCC.

The Effector mechanism

The modulation is always happening "top-down", i.e. matrix upper tracks may modulate matrix lower tracks, but not vice-versa.
Here "upper" and "lower" refers to the matrix not the track index. For example, track 1 may modulate all other tracks but track 8 cannot modulate any other track.

Feeders, Listeners and Listening Feeders
Modulator tracks are called "feeders" and modulated tracks "listeners", for a better distinction of terms.
Because the effect of the feeder tracks is additive up the track indexes, you may picture the feeder tracks as feeding the effector and listener tracks listening to whatever is in the effector at their particular index slot.
A track may also be both a listeners and a feeder, which we call a listening feeder. This means that if that track itself is playing notes, then the attributes of those notes are modulated, while the resulting values will modulate the corresponding listeners below it.

Effector dry-run
In the example below, Track 1 is feeding its Step offsets for VEL, PIT and LEN into the effector.

This means that all listeners in the page may be modulated by those offsets.
In this example we have set tracks 2, 4 and 7 as listeners, and therefore to be modulated by track 1's offsets.
Assuming that Track 1 is currently at a Step whose PIT offset is +3, and assuming no other feeders exist, the notes played in the tracks 2, 4, and 7

will be played 3 semitones higher than defined in those tracks for the current position.

But: track 3 is also a feeder, and modulates all listeners below it, i.e. Tracks 4 and 7. Assuming that the current Step in track 3 has a PIT offset of -1, listener tracks below will see a total PIT modulation effect of +3 -1 = +2.

Similarly, Track 6 is set as a further feeder, which means that the last listener, Track 7, is being modulated by three feeders: Tracks 1, 3, and 6. Assuming Track 6 has a Step PIT offset of -3, this means that the net PIT offset for row 7 is: +3 -1 -3 = -1.

Remarks

The values fed into the effector are really the deltas between the actual step offset for a given attribute and the default value of that attribute. In the above example the default step offset was always 0.

The first remark here is that the offsets fed into the effector may obviously be both positive and negative.

The second remark to make is that the attribute values fed into the effector by both feeders and listening feeders will be influenced by the factor set for that particular track.

When using step events to scale both the feeder track and the listener track, the feeder offsets are only applied to the listener after the listener has itself been scaled.

Using EFF with events

The effector may be used in conjunction with using events to modulate the track attribute map factors.

We will not elaborate further on the possible results, and leave it as an exercise to the reader, but this does open quite new ways of cross modulation among the page tracks.

Playing the Effector

Feeders/Listener
On to the operation of the Effector. Just as a reminder, the Effector is a track specific attribute and as such it must be toggled in TRACK mode by clicking either the Feed or Listen button in row 3 changing its led to orange

Listening feeders
A listening feeder gets modulated first and then amplifies the incoming modulation with its own effector feed. To make a track a listening feeder both the Feed or Listen button should be toggled, and both leds will be orange

Playing
For the Effector to work, it is merely the offsets of its Steps that count, and it is completely irrelevant whether those steps are generating MIDI notes or not.
However, if an effector feeder does contain active steps, these will be played regularly, as they would independent of the effector.

Muting
If a feeder track is muted, it will not have any effect on listener tracks. Toggling feeder tracks is a quick way to introduce changes to a track and then to go back to the original sound.

The Effector at work
Designate a feeder track. Set step 1 in the feeder track and pitch it up or down.
Now select a track with an index larger than the effector feeder (this is essential) and build a pattern into it involving lots (if not all) steps.
Make sure that step 1 is set as part of the pattern and play the pattern.
Now make this track listen to the effector by toggling its Effector Listen button to orange by clicking on the Listen button.
You should now hear that the step in column 1 of the listening track is now played differently, with the PIT offset from the Feeder track applied to it.
The popular thing to do now is to start changing the track lengths for feeder and listener to get long-running modulation results.

Note: The Feeder steps will only pass a MCC value if the Feeder Track is set to an MCC (the step MCC is passed - not the track MCC), therefore, to avoid unexpected effects, set the Feeder track to a different MCH from the listener(s).

If a Feeder step LEN attribute is set to legato then the listener track(s) will output their step LEN attribute at the minimum step length (not legato)

4.   Page Mode

Page Mode Index

x2 Quick Navigation In Page mode:

- Grid LED Green
- Page LED flashing Orange
    If Step LED is Orange the page is showing tracks 1 to 4
    If Step LED is Green the page is showing tracks 5 to 8
    Clicking the Step button toggles Page tracks in view

NB: When single Step selected (STEP Mode LED Blink Red indicating double-click to enter STEP mode) unless SEL is kept held indicating that the user may wish to add more steps to their selection (STEP toggle behaves as x2)

Page mutator functions

When in PAGE mode, holding the PAGE key pressed will make some mutator functions available for the page itself - the expected results should be quite obvious. Applying them is a matter of pressing the appropriate mutator button.

Play

Pressing Play will toggle the page play status in the grid

Solo

Page will be solo-ed and un-solo-ed. When solo-ed, the Page LED will blink green as opposed to orange

Clear

Using Clear on a page will reset the page to the default page values, including resetting the tracks to their forward moving direction.

Remix

All tracks in the page will be applied the RMX function. See track mode for details.

Copy

Page can be copied to the copy buffer. The copy operation will include the chain configuration local to the page at the time of copy.

Paste

Copy buffer will be pasted into the present page position.

Switching pages

Holding PAGE pressed and pressing a matrix key other than the one blinking and in any row will take you directly to the page associated with that key in the grid.

Snapshots

The Snapshot function mode provides the capability to try new things in a page, in a non-destructive manner. Press the Snapshot key to take a snapshot of the currently playing page in a bank for later recall. That could be for example as soon as the results of your editing do not live up to your expectations. Also note that the Snapshot function may be called from both page mode and from grid mode.

Taking a snapshot

To take a snapshot press the green Snapshot button on the right hand side. As soon as you press it you should see it blink orange. Now make all the

changes and editing that you need to make to your page, until you reach a point of satisfaction, or possibly slight regret.

Make changes permanent
To keep the page, simply press Snapshot again to make the changes permanent. The Snapshot LED will turn back to green.

Discard changes and recall snapshot
To discard the changes since you took the snapshot, double click the Snapshot key, which will recall your old state.
Note that stopping the sequencer (pressing Stop) is equivalent to restoring your old state, i.e. you will lose any changes made since you took the last snapshot.

Page POSITION in GRID
Another function available is jumping to another page of the grid. As you press the PAGE key you will notice a orange LED blink in the Matrix. This indicates the position of the current page in the grid. If none of the Matrix LEDs blink orange switch to the alternative Matrix view using the Step button.

Mix Mode

x2 navigation in Mix Mode:

In Mix Mode:
> If Step LED is Orange the page is showing mix map 1 to 4
> If Step LED is Green the page is showing mix map 5 to 8
> Clicking the Step button toggles the mix map view

The MIX block

In the previous sections we have talked to a large extent about what the EDITOR block does – in short, it is used to change the attributes of a selected entity, track or step, where applicable.
The MIX block may do one of two things: it may either change a particular attribute value of the tracks corresponding to each of the knobs, or it may send out sound control (CC) data via MIDI. To choose the track attribute to be modified simply hold the MIX button pressed and you should see in row 2 all relevant track attributes light up green, with one of them blinking

orange. You guessed it by now - the orange blinking one is the selected attribute. With the MIX button still pressed, select any other track attribute you like to assign the MIX block another attribute to modify.

Attribute MIX maps
Double click the MIX button. The four matrix rows show the corresponding values for their tracks, and for the selected MIX attribute. Generally, we call this view the "MIX map". At the moment you have an attribute selected for the MIX map. To verify which attribute this is, hold the MIX button pressed again and you should see in row 2 a picture you are already familiar with: all available attributes in green, with the selected one blinking orange. Also, if the selected MIX attribute is any of PIT, VEL, LEN, or STA, and as a shortcut, there will be an orange blinking LED in the appropriate row of the SEL column. The orange blinking LED indicates the attribute that is being shown: PIT, VEL, LEN and STA, in this particular order for selectors 1-4.

Working with MIX maps
As you have seen already, while viewing MIX maps, you may work with a particular track attribute value directly, for all tracks at once. You may tweak the value of any one track, or apply some functions to all tracks in the page.

Clear
Clear the MIX map using the CLR button – this will reset the MIX map to default values for each track in the page, all at once.

Randomize
You may randomize the displayed values using the Remix button. This will assign random values to all tracks at once, and only for the selected attribute of course.

CC Map sound control

CC MIX maps and Sound Control

An additional species of MIX maps are the ones related to Sound Control via CCs. These are explained in their separate section. For now it suffices to understand that they provide separate functionality using very similar operation principles. To select a CC MIX map you would simply press any of the Sound Control buttons A, B, C, or D.

CC MIX maps and Sound Control

Using a CC MIX map, any MIX knob can be assigned an individual CC on a chosen MIDI channel. This is best explained using an example: from plain Page mode double click on Sound Control A to edit it. By default you will see the number 64 displayed in every row. Now press and hold the MIX button. Notice that the AMT button will blink orange in row 2 indicating that AMT is selected for display. Therefore, the matrix shows the per-track AMT values. With the MIX button still pressed, select the MCC button. Release the MIX button and now you should see the Midi CCs assigned to each of the tracks. You can now modify the CC for every individual track using the rotary knobs. Remember that four green LEDs in positions 13, 14, 15, and 16 indicate that no CC has been assigned. Using the same procedure, select the MCH view to show the MIDI channels. This view allows you to assign the MIDI channel on which the CC signal is sent for each of the knobs. Note that this MIDI channel has nothing to do with the actual MIDI channel of the Track - the track's MIDI channel is an entirely independent parameter used for the track's output. The Sound Control MIDI channel is used for the CC sent by the encoder.

Map	Instrument	Parameter	Track	M.Ch	MCC	AMT (default)
A			1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			

Map	Instrument	Parameter	Track	M.Ch	MCC	AMT (default)
B			1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			

Map	Instrument	Parameter	Track	M.Ch	MCC	AMT (default)
C			1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			

Map	Instrument	Parameter	Track	M.Ch	MCC	AMT (default)
D			1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			

EDIT state

Nemo provides a quick way of previewing steps, in the sense that you can immediately hear what they contain, and how they would play under the chase-light.
This is particularly interesting of course when you are tweaking something to sound just right.

By default, in PAGE mode the EDIT LED button lights steady green. Click on it once to toggle it to blinking orange.

When the EDIT LED is lit steady green, everything behaves as you know it: the step buttons toggle the step states. When turned to blinking orange you are in the EDIT Steps state.
To return to the default state (steady green), press the EDIT button twice (again - twice, and not double-click!).

Editing Steps state (*Flashing Orange - Edit Realtime*)

First make sure the EDIT LED is flashing orange.
Now press some buttons in the matrix. You will notice that no steps will be set (as we have done it before), but that the MIDI data of the steps is played out of the MIDI port as it is.
Grab a step and now tweak its attributes, for example pitch, to take the most obvious one: you will hear that with every click of the encoder the steps is re-triggered and played such that you can hear the change in real time.
The step velocity is shown and editable in the numeric quadrant of the outer circle, the pitch in the inner circle.

In this mode the step length may also be adjusted in the matrix, by pressing another button at a distance to denote the length in 1/16th intervals.

With a matrix Step button held the Step Mode led will change to Red indicating that by clicking the Step Mode button will enter Step mode, thus Steps can fully edited or be toggled on/off without leaving Edit Steps state.

Editing Tracks

Pressing the track selectors in preview mode will produce a result similar to the steps buttons.
The note played will basically reveal the tracks velocity and pitch settings, producing a result equivalent to having a non-modified step playing in that track.

EDIT PERFORM state (*Flashing Green - Berlin*)

Use this mode for tweaking Steps.

An alternative and quite rewarding mode of working with a step sequence (depending on your style and preference) is that of tweaking a set sequence of steps in realtime, while the sequence keeps playing.
You can also do this to some degree without a special mode, but EDIT PERFORM takes this to perfection.

EDIT PERFORM is actually similar to the EDIT state, with the exception that no MIDI data is transmitted when you operate on the matrix. This is particularly interesting for the Berlin School type of performances.

By default, in PAGE mode the EDIT LED button lights green. Click on it once to toggle it to blinking orange, and once more to make it blink green.

Again, when the EDIT LED lights steady green, everything behaves as you know it: the step buttons toggle the step states. When EDIT blinks orange you are in EDIT mode, and when EDIT blinks green you are in EDIT PERFORM mode.

In this mode the step length may also be adjusted in the matrix, by pressing another button at a distance to denote the length in 1/16th intervals

With a matrix Step button held the Step Mode led will change to red indicating that by clicking the Step Mode button will enter Step mode, thus Steps can fully edited or be toggled on/off without leaving Edit Perform State.

Editor ATR state

In Page mode, the EDIT encoder group may be temporarily assigned an attribute of PIT, VEL, LEN, STA to be modified while in Page mode.

Engage
To engage it, hold any of the track selector buttons 1-4, while pressing the EDIT button. This makes the actual assignment of the attributes PIT, VEL, LEN, STA respectively, and the indicator for the Knob group will light orange, indicating activity.
In this mode the EDIT knobs will behave just like another group of MIX knobs for the just selected attribute.

Disengage
Pressing the EDIT master button once will cancel the assignment and return to the legacy mode of operation.

Editor MCC state

The EDIT button has one more state - that is the MCC send state.
This is used to make the editor knobs send MCC data.

Sending MCC data
The MCC amounts sent will be on the MIDI channel and controller chosen in their corresponding tracks. See section on Track Attributes if you don't remember the details for setting up Track MIDI CCs.

Engage
To activate the MCC state, double-click on the EDIT button turning it red.

Disengage
To deactivate the MCC state, just press the EDIT button once.

5. Grid Mode

Grid Mode Index:

x2 Quick Navigation in Grid mode:

- Grid LED flashing Orange
     If Step LED is Orange the grid is showing pages 1 to 64
     If Step LED is Green the grid is showing pages 65 to 128
     Clicking the Step button toggles the Grid pages in view

Switching Grid modes:

Activation/deactivation of Pages occurs instantly
Grid Edit mode (default)   Edit LED flashing Orange,
Click Edit button once
Grid Live mode   Edit LED Green

Double click Edit button

Activation/deactivation of Pages occurs 'on the beat'
Grid Edit 'on the beat' mode   Edit LED flashes Red
Click Edit button once
Grid Live 'on the beat' mode   Edit LED Red

Operations

Grid Clear - Resetting to start-up defaults
Please note that doing this will erase any changes you have made and possibly want to keep, so use this with extreme caution!
Press and hold the GRID mode button, while pressing the Clear button. Again, this only clears the RAM (volatile) memory contents and leaves the content of the FLASH (non-volatile) memory untouched.
This function is only available from the first matrix view (Step Mode led: orange).

Other Operations
In Grid Edit modes to following operations are available, Page Clear, Page Solo, Page Copy, Page Paste & Page Remix. Simply hold the relevant Page in the Matrix and click the required mutator.

Grid Modes

Essentially there are two Grid modes and two Page activation modes within each Grid mode.
Grid EDIT mode with page activation occurring 'instantly'
Grid LIVE mode with page activation occurring 'instantly'
Double clicking the Edit button will switch between the two Page activation modes.
Grid EDIT mode with page activation occurring 'on the beat'
Grid LIVE mode with page activation occurring 'on the beat'

Grid EDIT mode
Furthermore, you should take quick notice of the EDIT LED. It should light flashing orange or flashing red to indicate that we are currently operating in Grid EDIT mode.

Grid LIVE mode
As mentioned earlier in the Page operations section, the page operations you have learned so far were part of the EDIT mode. As the name suggests, this mode is suited for applications where you work with the material in an editing sense.

The Grid live mode is more suited in the cases where you are playing your material live, hence the name. In Grid live mode the matrix buttons will act as toggles for the respective pages. This provides more immediate and intuitive handling of material in live situations.
Switching to Grid live mode is quite easy if the EDIT LED is flashing orange or flashing red press it once to turn it green or red.

Operating in Grid live mode is easily explained. In principle, the page buttons now act as page toggles, much similar to the way things work in page mode, where buttons act as step toggles.
For Example: Pressing a page button that is red (page is not playing), will turn that page on. Pressing the button of a playing page (green) will turn that page off.

Grid-Track mode
GRID-TRACK is a sub-mode of the Grid Mode.
GRID-TRACK provides most of the Grid functionality described above, allowing a different view on your MIDI data. Here, matrix buttons represent tracks and have the functionality of track selectors, as described for the Page Mode. We may refer to them as virtual track selectors.

Entering GRID-TRACK
To enter GRID-TRACK press GRID first and then press the green-lit TRACK button. The TRACK button will blink orange, and the GRID button will stay lit in orange. This is the indicator for the GRID-TRACK mode.

Remote track selectors
The Matrix appearance needs some explanation now. For each page playing in the GRID, you will see a lit bar of 8 LEDs, from position 1 to position 8. Each lit button acts as a remote track selector and the LEDs indicate the toggle state of the corresponding track. The term remote track selector is used to express that the buttons act as if you would have displaced the actual track selector from their pages and placed them somewhere else - in this case in the GRID-TRACK matrix.

Hands-on
As an example, let's assume there is only one page playing in the GRID in bank 1 of the grid and no tracks are muted in that page. You should see a bar of 8 green LEDs in row 1, positioned on the left part of the row. Working with tracks via remote track selectors The EDIT block indicator blinks orange, as you may use the encoders to modify the track selected via the remote selectors. This should come pretty naturally (or so we think).

Besides tweaking away at the parameters of the individual tracks you may select a set of tracks that do not need to be in the same page and edit them collectively.

Zooming into tracks
You may do much lower-level editing of tracks, simply by double-clicking a virtual selector to enter TRACK mode for that track, i.e. zooming into that track. And you know your way around there already. Coming back to GRID TRACK is easy - simply press GRID and TRACK at the same time.
Grid-Track live mode The GRID-TRACK live mode is much similar to the live mode in Grid mode. Enter it by pressing EDIT. The EDIT LED should turn from blinking orange to steady green. When in live mode, the matrix buttons will act as toggles for the respective tracks. This provides more immediate and intuitive handling of material in live situations.
Leaving Grid-Track mode In order to exit the GRID-TRACK mode, press either the GRID or the TRACK button. Both of them will simply take you back to Grid mode. Or press ESC to return to the page currently in focus in the Grid.

Page Clusters

Cluster activation
Create a page cluster consisting of three pages in a row of your choice.
Once the cluster is built, make sure the sequencer is playing and toggle one of the pages in the cluster to green (i.e. make it play).
The page will keep on playing.
Activate cluster play for the row in which the cluster exists by pressing the SEL button of that row once - toggling it from red to green.
When green, you will notice that once the currently playing page is finished playing the next page in the cluster starts to play and so forth.

Chase Light Page Cluster Follow
If the RECORD transport button is active (led flashing red) then the Page View will change depending on the chase light.

Cluster Page Hold
With an active Page Cluster any page can be made a 'hold page', cluster play will not advance beyond the 'hold page' until the 'hold' is turned off - see Page Repeats (STA). When a Cluster Hold Page is playing it will be shown in the Grid as flashing green.

Page play parameters

Page repeats (STA)
Page clustering can become even more fun, as you can set the number of repetitions individually for each page. For example, page A can play 4 times, page B 2 times and page C 1 time. The number of repetitions can be any value between 0 and 16, where 1 is the default value.
In order to set the repetition value for a page, simply keep it pressed and turn the STA encoder to select any number between 0 and 16.
Note: Page STA value of 0 is a special value that signifies a Cluster Hold Page, i.e. Cluster Page Play will not advance to the next Page until the 'held' page STA is changed to a value other than 0.

Page length (LEN)
As we have seen, clustering pages is a way to create structures spanning more than one page. However, if you have worked with pages that contain tracks of different lengths and had these be part of clusters, you may have wondered what determines the moment of switching from one page to the next. In short, the switch mechanism between or across the pages relies on a variable that we term the "page length". Using the page length variable you may influence the page switch behaviour directly and can create some rhythmically interesting results. To set the page length for a page, make sure you are in GRID mode, and from there press and hold the button of the page whose length you want to read or modify. With the button of the page pressed, turn the LEN encoder to select a value between 1 and 8 x 16. The default is a red LED in the first position of the top row. This indicates that the page is playing a full 16 step cycle. Note that the maximum length of a page can be set up to be 8 cycles, or 128 step lengths(at x1 speed), and the minimum is one step.

Page trigger behaviour
Page lengths below 16 steps will cause the page to re-trigger every time a start is invoked. This is useful when you create chopped-up beats and the like. If the page length is 16 or greater, the page will continue playing on new starts and will not re-trigger.
Hence, for Page STA with Page LEN values below 16 then the Page STA acts as a page repeat but when used with a Page LEN of 16 or more then effectively Page STA acts as a Page LEN multiplier.

A Page LEN of less than 16 will influence a Page whether or not it is activated for cluster play.

Setting the Loop Length of an Indeterminate Length Track Direction
A Track with a DIR containing brownian slices will effectively have an indeterminate length. It may be musically desirable to fix the loop point of such a track, and this can be done putting the indeterminate length Track on a separate Page and using the Page Cluster Page LEN function.

Page transposition (PIT)
When a page is selected in the grid, you may notice that the indicator of the EDIT encoder block lights up. It indicates that the encoders are available for operation. Therefore, you may use the PIT encoder to transpose the page as a whole.

Page velocity factor (VEL)
Similar to the factors we see in conjunction with the track attribute maps, there is a page velocity factor that may be adjusted from the grid mode. The page velocity factor is a master determinant of the velocity produced by note content in a particular page. Assuming the patch on your sound source is velocity sensitive, you should be able to easily create fade-ins and fade-outs using this functionality.
Select a page in the grid, and while selected, turn the VEL encoder. The row 1 will display the factor value.

Musical Scales

Nemo's note output may be associated with a particular musical scale. Once a scale is active, all notes are forced to play in that chosen scale.

Force to scale
Force to scale is enabled from Grid mode. Switch to Grid mode and simply press the green lit (default) Scale button. You will see its LED turn blinking orange and the machine switch to the scale select screen. In row 1 all 12 scale notes will light up. By default C will light red and the rest will light green. This is to indicate that C is the base note of the scale and all other notes are in the scale as well - we are seeing the chromatic scale. A scale is composed of at least one base note plus other notes that determine the interval signature of the scale. Next we will see how we can edit the base note and the signature to compose any musically meaningful scale.

Composing scales
Pivotal for the scale composition editing is the EDIT key. By default EDIT will blink green, showing that we are editing the "green" part of the scale, i.e. the notes and hence the scale's interval signature. With the EDIT key blinking green, we may press any of the key notes in row 1 to toggle them into and out of our current scale. Now press the EDIT key once and see it turn blinking red. Pressing now any note key will move the base note to the respective position, also moving the signature of the scale accordingly. Note that this will not transpose your material. It just creates the scale to which your material is forced.

Preset scale signatures
Nemo provides 4 preset signatures for quick recall. The signatures are Pentatonic, Minor, Major and Diminished. They are called using the mutator buttons 1-4 respectively. For example, in order to get G Major, you would set EDIT to blinking red, press G and then the mutator in row 3.

Scale slots
Nemo provides 4 slots to store any scale you compose, as a means of quickly switching between scales if that is appropriate for your style. Notice the selector column shows 3 green LEDs and an orange blinking one. These indicate the scale slots 1-4. Switching between scale slots is simply done by pressing the appropriate selector button. Any scale that you program in a scale slot will remain there until you change it again. As soon as you press another scale slot, the scale stored in that slot becomes active.

Locking the scale for the Grid
Nemo's output is forced to scale as soon as you enter Scale mode. From Scale mode, apart from editing the scale there are two general options: exit and ignore the scale, or exit but lock the scale such that all output of the machine is forced to the scale. To exit and ignore the scale setting press the ESC button. This will take you back to Grid mode and the Scale button will light green. To lock the scale for all output press the Scale button once more. This will take you back to the Grid and the Scale LED will be lit red.

Locking the Scale for a Page
Once a Scale has been composed in Grid Scale mode it can be opted into at Page level by simply clicking the Scale button and turning it to red.

Global master clock
This clock runs through a cycle of 16 steps after which it starts over.
This is the lowest-level Nemo clock and the only interaction you have with it is when you change the master tempo.

Where are you from?
As a simple reference and reminder as to which page you came from into the GRID, you may press the PAGE button in the MODE block and you should see a orange blinking light at the respective position.
If none of the Matrix LEDs blink orange switch to the alternative Matrix view using the Step button.

Bank mute toggles
In GRID mode, the buttons in the MUT column act as bank mute toggles. Pages in muted banks will continue playing in sync with all active ones, but their output will not be sent out to MIDI. This provides more immediate and intuitive handling of material in live situations.

Chase-light align
There are many reasons why your chase-light in a page may become mis-aligned in a visual sense. Sometimes that's what you want, but sometimes not. In order to line up all tracks in a page, simply press the Align button. This will re-synchronize all tracks to the Nemo global master-clock.

As a side comment, the chase-light will also be realigned whenever you Stop and then play a sequence. Pause and Resume (pressing pause again) will not realign the chase-light

Interface locking
Sometimes you may want to hide the Nemo from preying eyes or even unauthorized button pressers. At any time, regardless of the playing status of the machine, you can engage the interface lock by holding GRID and pressing ESC at the same time. The result will be that the interface will go blank. All LEDs will be turned off, and seemingly all keys will be disabled. The sequencer will keep playing and the only operating knob will be the tempo knob. In order to unlock the machine you may double click on the GRID

Bypassing memory reload
By the same token, if you hold the CLR button down while powering up the machine, Octopus will not load the FLASH memory contents, but will simply start with the factory defaults.

Start-up defaults
The defaults include having the master tempo at 120 BPM, all tracks running on direction 1, all tracks set to send on MIDI channel 1 of port 1, and a particular pitch assignment for tracks 1 - 8 as follows: A5, G5, E3, D5, A3, G3, E3 and D3.

6. Recording

Recording Index:

Note stream recording

Nemo is capable of recording incoming MIDI note, MIDI controller, pitch bend and channel pressure data onto its tracks, at (sequencer) runtime.
Note recording is polyphonic, meaning that chords may be recorded in from an external keyboard onto a track. Not only that, but you may also record on more than one track at a time.
Moreover, Nemo is capable of forcing MIDI input into its scale without actually recording the output, and a few tricks more.

Arm recording
To record a track, got to PAGE mode, press the REC key to activate the Recording mode, and then simply hold a Track SEL button while pressing the REC key again, to arm that track for recording.
Press Play to start the sequencer if it was not playing, and you are ready to start MIDI recording.
Use any external MIDI controller to record MIDI data on the selected track.
Note that with one track armed for recording the MIDI input is automatically re-channelled to the channel of the armed track.
While in stop mode this provides for a comfortable way to pre-listen to what the tracks will output, or to trigger their connected MIDI destination.
This is especially convenient as all data, including notes, pressure, pitch bend and CCs are being routed through.

You can browse through the tracks in a page by selecting them one by one and have the record selection state move along. Together with the noted re-channelling behaviour you can use a single MIDI keyboard to play and hear all tracks, in both Stop and Record mode.

Record rehearsing

Sometimes you may just want the re-channel capability described above but without the actual recording being done. This is useful when you want to play along an instrument of a given track but do not want to record straight away.

To enter record rehearsing, make sure all record activity is of (no track SEL blinking red, the REC key is not blinking red). Now hold a track SEL button pressed and click on the REC button.
The Track SEL LED will blink red, indicating rehearse mode. Pressing the REC key again will finally enable recording for the armed track.

Multitrack recording

In order to record on more than one channel at a time, you may make a multi-track selection and press the REC, just as above.
However, note that in multitrack recording the MIDI source to be recorded needs to send on the same MIDI channel as that of the destination tracks - i.e. the one you have just armed for recording. Also, make sure to send the MIDI data into the correct MIDI IN port on the Nemo, i.e. the one that the track is set to send on (IN 1 or 2).
To cancel multitrack recording press a track selector in combination with the Stop key to disable track record selection for all tracks in all pages. This basically allows for record re-channelling the next time a track is armed for recording.

Recording chords

A track will stack the note data input such that you can make up chords by simply playing one note on top of another. Of course, you will need to be good on timing with this one. Playing chords directly on your keyboard will also generate a chord on the Nemo step under the chase-light, making it very easy.
When stacking notes up to make up a chord, you will notice that the length, velocity and start value of the step will use the values of the last played note for all notes in the chord.

Note that chord recording is subject to the same restrictions that apply to building chords into steps - a chord cannot span more than three octaves.

Disable recording
To disable recording for the track in question, simply press the blinking REC button, to return to rehearse mode. From there press REC again to return to normal operation.

Step note recording

Nemo offers an alternative to note stream recording, and that what we term step-note recording. Note that this is not the same as step recording in other sequencers, therefore the slightly different name.
The idea is simple. Once a page is armed for recording, you hold down a step button, play a note on your keyboard (or whatever MIDI controller you're using), and voila! The step is entered. This only requires the page to be armed for recording. Simple!

Arming a page for recording
With no track selected, hold down the PAGE button and then press the REC key, and you should see the REC LED blink orange. You have now armed the page for recording, allowing you to perform step-note recording and more.

Step-note recording
Holding a step on the matrix, and playing a key on your keyboard will assign the note data (including velocity) to the selected step.
To record more than just one step in a take, simply keep playing on your keyboard and you should see the played notes fill in one after another. They will default to length 1/16 and will simply follow the flow of the respective track.
Also note that the recording of MIDI data will follow the pattern described in the following.

Fresh recording
If you step-note record on a step that is turned of (i.e. you pressed it once on, then of again and did not release the button yet), the step will be freshly assigned the value of the incoming note.

Stacked recording
Step-note recording on a step that is turned on will stack the incoming pitch on top of the already existing data, letting you effectively create chords.

Chord recording
You may record chords directly, in the same manner as simple notes. You can record chords stacking on top of what's there already, or starting from scratch.

View Step Chord Record
Whilst in Step Note record zoom into any step and with the PIT attribute selected click the Chord button (if the step is off, row 1 will show the Track PIT as there is no current offset on the step).
As notes are entered from the keyboard and they will be stacked on the selected step and displayed (at their respective octaves) on row 1.
To change the step notes simply toggle the step off and enter new notes - once the step is toggled off the previous notes will still be shown in row 1 but any new note received via midi in will erase the previous values.

Track live transposition
Finally, if a track is selected while a page is armed for recording (a track selection may also be locked in using the SEL button), you will dynamically and directly change the pitch assignment for that particular track effectively transposing it a playtime.
With only one track selected, and holding the track selector pressed, you may observe the change in pitch assignment directly in the pitch circle.

Step real-time entry

There is a simple way to tap steps into a track in real time.
Simply grab the track you would like to tap into - you will notice that the STEP LED in the MODE block turns red.

Step tapping
While the sequencer is playing, tap the STEP key as you go and you will see that the steps under the chase-light get toggled on as you tap.
In fact they are placed into the track at the precise position of the tap, within a 1/192 resolution, trying to reflect to the greatest extent possible what you have entered.
If you are less than satisfied with the results of your play, you may clean up the mess by simply clearing the track as we have already seen before.

Quantized recording
In the section on attribute map factors, we have described the workings of the factoring mechanism. One application is non-destructive quantization of track content, including recorded material as you record it during a live session.
In order to get quantized output, you may want to set the STA factor for the track to the lowest possible value, in which case the map is not in effect.
Note that you may always increase the factor for the STA map in order to gradually increase the amount by which steps are pulled or delayed during play.

Chained track recording
At any time, only one track will be recorded into, and that will be the recording armed track of the current page.
In order to record takes that are longer than 16 steps, simply build a track chain and enable one of the chain tracks for recording.

Chained page recording
In complement to the above, you may record takes longer than 128 steps too, by using the page clustering function.
Simply cluster the necessary number of pages, set their track chain configurations, and enable in each of the pages the recording tracks.

Generally, when a recording track is part of a chain, the recording "lock" (blinking red selector LED) will carry along with the chase-light in that track and move from one track of the chain to the next.
Note that the Track DIR setting will be followed even during MIDI recording.
Try taking the output of another sequencer and recording it, while the Random or Brownian DIR is set. Interesting things may happen.

Recording re-take/overdub
If you absolutely do not like what you have recorded you can always use the Clear functionality, as we have seen it before.
Alternatively, you may overdub to a track, and there are two other options as follows:- Whilst the sequencer running, clicking the Play button will delete the track under the chase light - and, if recording to a track chain a double-click of the Play button will delete all notes in the track chain.
It should be noted that whilst the sequencer is running in the 'armed for record' mode then the Align function will not be available because the Play button is allocated to the track/chain re-take function.

Data intervals
There is a limitation on the range of data that may be recorded.
While the MIDI protocol allows for pitch and velocity values to be in the range 0...127, this range is constrained by the internal architecture of Nemo.

MIDI Control Map learning

While somewhat unrelated to what we have discussed so far, another aspect of MIDI recording is the ability to have a MIDI Control Map learn from the MIDI input.

Enter Sound Control edit mode
Enter the Sound Control edit mode by going to Page mode, disabling any recording mode if necessary, and double click on one of the Sound Control selectors (A, B, C, D).

Arm Sound Control learning
While in Sound Control edit mode, press the REC key to arm the learn mode. As soon as you press the REC key you will see that a red blinking light will appear in the selector column of the page.

Select target
Pressing across the selector buttons will move the position of the red light, and effectively select the encoder for which we want to make the assignment.
Per default you will see the amounts of the map displayed, and this is the most spectacular place to be: if you are turning knobs on an external controller you will see the amounts of the learning encoder go up and down immediately.
However, note that the MIDI channel and the controller number are recorded as well.

Disable Sound Control learning
Simply press the REC key again to exit MIDI Control Map learning mode, and you may switch the view of the MIDI Control Map accordingly, to verify your results.

7. MIDI

MIDI Index:

MIDI clock synchronization

MIDI clock selection
Per default, Nemo does not send or react to MIDI Clock information.
However, Nemo may act as a MIDI clock source in your setup, or will synchronize to some other source.
When Nemo is MIDI clock master, MIDI Clock signal will be sent out of both MIDI ports.
The central switch of the clock behaviour (master, slave, or agnostic), is the Stop button in the transport bar, also labelled "Clock".
While in Grid mode, holding down the Clock (also Stop) button will show the two options Master and Slave as selectable, i.e. green.
Once a state is selected, the appropriate LED will turn orange.
The MIDI Clock state is remembered as part of the machine state, when the machine state is saved.

Master
To set Nemo as clock master, hold down the Clock (Stop) button, and click on Master (Play).

Slave
To configure Nemo as MIDI clock slave, you hold pressed the Clock (Stop) button and press Slave (Pause).
Change of clock selection (switching between master and slave mode) is possible only in GRID mode.

When Nemo acts as MIDI clock slave, MIDI clock will be received on a single port. The MIDI port that receives MIDI Clock will be automatically detected and requires no explicit selection by the user.

Disconnecting from midi clock Slave Mode
The Nemo led flash rate is derived from the midi clock, whether in clock Master or Slave mode. Therefore, when in Slave Mode and the midi clock is disconnected, or when switching back to Master clock mode - all Nemo leds will cease to flash. The led 'flash' will be restored upon sequencer Play when in master clock mode.

MIDI Clock echo (in slave mode)
MIDI clock that is received while the machine is in MIDI slave mode is sent out to the MIDI out, so other devices can be slaved along the same chain.

ALL NOTES OFF message
When the sequencer is not running but is defined as MIDI master or slave, pressing the Stop button will send out an ALL NOTES OFF message (controller 123) on each of the 32 MIDI channels.

Forcing MIDI notes to a Nemo scale
While in page mode, with the page armed for recording (press and hold PAGE while clicking REC), your external MIDI input will be forced to the scale of the current page. Of course, this is assuming you have a scale enabled for the respective page.
This is especially interesting in performance situations, obviously.

MIDI merge
By selecting a chromatic scale for your page you can effectively implement a MIDI merger functionality of the data your Nemo is producing and the data that you provide on the MIDI in port.
Note that this is only applying to note data, and not to other MIDI data, such as controllers.

MCC Stream resolution
MIDI CC flows have an additional specific property associated with them, and that is stream resolution. Per default, MIDI CC messages are sent on

each step, according to the respective track and step MCC values. In addition, intermediate CC messages may be sent between CC steps. This effectively increases resolution of the MCC stream, resulting in smoother controller flows.

When selecting the track MCC factor, row 4 lets you determine the resolution level, i.e. the resolution for the current track may be selected via the four rightmost buttons of the fourth row. The default level is 1, with one CC message is sent per step. The levels 2, 3 and 4 mean that 3, 5, and 7 CC messages are sent per step.

The first message is always sent right on the step, the others are distributed evenly across the interval of time until the next step is triggered. The intermediate values automatically create a linear slope to the next value.

8.   Load/Save

Load/Save Index:

Saving the instrument state

Nemo can save the full instrument state for later recall - all settings are stored to FLASH memory and automatically recalled upon power-on.
Note that only one state may be saved to FLASH, replacing any previously saved machine state.
Also note that in order to perform this operation the sequencer has to be stopped.

WARNING:
Please make sure that Nemo is not turned off or reset during the save operation!

Saving the machine state
To perform a save of the machine state go to GRID Mode and press and hold the GRID button.
While you hold down the GRID key, the Program (record) LED will start to flash.
Pressing the Program (record) key will start the save operation. Expect the save operation to take about 5-10 seconds. Progress will be displayed in row 1.

Saving individual pages

Occasionally it may be useful to save individual pages only, as opposed to the full instrument state. For this to work the machine has to be stopped, and you have to be in GRID mode.

While in GRID mode, make sure that the EDIT LED is lit up flashing orange, otherwise press it once to make it light flashing orange.

Now press and hold the matrix button corresponding to the page you are about to save. This will reveal a red blinking Program(record) button (among others).

While holding the matrix button pressed, click on the red blinking Program button to save the respective page to memory.

Loading individual pages from flash

To recall an individual page from flash memory, go to PAGE mode of the page you want to recall from flash first.

Now press and hold the PAGE button, and press the green blinking ESC button. Note that this operation may be performed at playtime, i.e. the sequencer does not have to be stopped for this operation.

Save Progress

The progress of the save operation is depicted in row 1, and operation completion is signalled by a complete line.

NOTE: If a save operation does not complete, the saved memory contents will be irreversibly lost and the previously saved instrument state will likely become corrupted as well.

Things to remember

You can always revert back to the last saved state by simply holding the ESC button and clicking Stop to the reboot the Nemo, this will clear all changes made since the last save operation.

Exporting memory content to MIDI

Nemo may export content of its memory by the means of MIDI system exclusive (SYSEX) dumps.
This is particularly useful when you would like to archive data on a computer, or even share memory content across Nemo machines.
Before you continue, please make sure that the sequencer is stopped.
Connect the MIDI Out 1 port of your Nemo with your receiving device, considering that SYSEX data will be export out of the Nemo port 1 only.

Export content mode
Three types of SYSEX export streams are available: PAGE, BANK and GRID. In order to trigger the export operation (SYSEX dump operation), you need to be in the SYSEX dump mode on the Nemo.
To enter the SYSEX dump mode, press and hold GRID while pressing the green blinking Align button. You should see the Align LED turn orange and blink steadily.
To exit the SYSEX dump mode you may press ESC and return to Grid mode.

Page export
A PAGE export will output the full contents of a page as MIDI SYSEX stream, including the sound control maps. To trigger a page save, simply press the button of the page that you would like to export.
Only lit matrix buttons will have an effect, preventing you from dumping data of unused pages.
Notice that the Export Content LED will stop blinking for the duration of the data transfer. A single exported page should take on the order of 10 KB.

Page import
When played back to the Nemo, a previously exported page will be reloaded into its original and natural location in the grid, i.e. the position it was in at the time of its export. This means also that it will overwrite any content in that location.

Note that playback of SYSEX content to the Nemo may occur at any time, including while the sequencer is running.

Once the page is received, the machine will switch to GRID mode and the page data is pasted from the incoming SYSEX buffer into the page memory. This operation is equivalent to a page copy.

Bank exports

 A bank export will export all non-empty pages in a bank, and behaves very similarly to exporting page content, basically chaining several page export operations.

To trigger a bank export, simply press the button of the bank you would like to export, in the SEL column.

The duration of a bank export is dependent on the number of pages that will be exported, but as an indicator, the size of a full bank is on the order of 160KB. Here as well, the circle acts as an indicator to show progression of the transmission.

Grid exports

The GRID export is covering all the data that is not page related, but has an influence on the overall machine behaviour. This includes parameters like strum levels for example.

To initiate a grid export, simply press the green lit MIX button on the bottom left side of the front panel.

The exported GRID content will take on the order of 37K, and the circle is used to show the progression of the transmission.

All pages and full machine state export

Two more options are available for SYSEX dump: dump all pages at once via the SEL key, and dump the full machine state at once via the EDIT key. The same results may be achieved by several partial dumps as described above.

Data transmission rate

The throughput of SYSEX data is dependent on the tempo set at transmission time. Adjusting it knowingly may be useful in cases where your external periphery needs a lower transmission rate than Nemo is potentially capable of providing. Obviously, a lower transmission rate will result in more time required by the dump to complete. You may want to experiment a bit to find the rate that is best suited for your particular setup.

Remarks
Note that you can use the export functionality only while the sequencer is stopped. This is a measure to ensure concurrent data integrity of the SYSEX dump and timing stability of the material played.
You may however, receive SYSEX data while the sequencer is playing. This makes it particularly convenient to substitute memory content on the fly, during performance.

9. Appendix

Appendix Index:

I.   Nemo Grid Usage Chart

Start Date:	
Sysex Filename:	
Previous Sysex Filename:	

Bank	----------------------------------- Page -----------------------------------															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2																
3																
4																
5																
6																
7																
8																

Notes:

II.   Nemo Grid Usage List

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
1	**1**			**9**		
	2			**10**		
	3			**11**		
	4			**12**		
	5			**13**		
	6			**14**		
	7			**15**		
	8			**16**		

Bank	Page Clusters, Bank 1 - First Page:	Page Clusters, Bank 1 - Last Page:
1		

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
2	**1**			**9**		
	2			**10**		
	3			**11**		
	4			**12**		
	5			**13**		
	6			**14**		
	7			**15**		
	8			**16**		

Bank	Page Clusters, Bank 2 - First Page:	Page Clusters, Bank 2 - Last Page:
2		

II.   Nemo Grid Usage List

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
3	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank	Page Clusters, Bank 3 - First Page:	Page Clusters, Bank 3 - Last Page:
3		

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
4	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank	Page Clusters, Bank 4 - First Page:	Page Clusters, Bank 4 - Last Page:
4		

II.   Nemo Grid Usage List

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
5	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank	Page Clusters, Bank 5 - First Page:	Page Clusters, Bank 5 - Last Page:
5		

Bank	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
6	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank	Page Clusters, Bank 6 - First Page:	Page Clusters, Bank 6 - Last Page:
6		

II.　　Nemo Grid Usage List

Bank 7	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank 7	Page Clusters, Bank 7 - First Page:	Page Clusters, Bank 7 - Last Page:

Bank 8	Page	Song / Instrument	BPM	Page	Song / Instrument	BPM
	1			9		
	2			10		
	3			11		
	4			12		
	5			13		
	6			14		
	7			15		
	8			16		

Bank 8	Page Clusters, Bank 8 - First Page:	Page Clusters, Bank 8 - Last Page:

III.　　Page Note Chart

Song Name:

Tempo:　　　　　　　Date:　　　　　　　Page Length:

Page	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Page Reference:
Bank				1	2	3	4			5	6	7	8				

	Synth/Sound:																	
Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Trk Mch	-- Note --																DIR
1																	
2																	
3																	
4																	

	Synth/Sound:																	
Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Trk Mch	-- Note --																DIR
5																	
6																	
7																	
8																	

Mark this column when tracks chained ^

IV.   Song Page Reference Chart

Song Name: **Date:**   **Tempo:**

Nemo SYX File: **Nemo Page:**

Instrument Setup:

Circle Tracks used in each TSEQ

Information	\multicolumn{8}{c}{Nemo Sequencer Track}	TSEQ
	1	2	3	4	5	6	7	8	**1**
	1	2	3	4	5	6	7	8	**2**
	1	2	3	4	5	6	7	8	**3**
	1	2	3	4	5	6	7	8	**4**
	1	2	3	4	5	6	7	8	**5**
	1	2	3	4	5	6	7	8	**6**
	1	2	3	4	5	6	7	8	**7**
	1	2	3	4	5	6	7	8	**8**
	1	2	3	4	5	6	7	8	**9**
	1	2	3	4	5	6	7	8	**10**
	1	2	3	4	5	6	7	8	**11**
	1	2	3	4	5	6	7	8	**12**
	1	2	3	4	5	6	7	8	**13**
	1	2	3	4	5	6	7	8	**14**
	1	2	3	4	5	6	7	8	**15**
	1	2	3	4	5	6	7	8	**16**
MCH									**MCH**

Give each combination of tracks a different TSEQ number

*List other Pages used in this Song*	
Pages	**Bars**

Track Midi Channels

Song Bar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TSEQ																
Song Bar	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
TSEQ																
Song Bar	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TSEQ																
Song Bar	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
TSEQ																
Song Bar	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
TSEQ																
Song Bar	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
TSEQ																
Song Bar	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
TSEQ																
Song Bar	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
TSEQ																

V. Song Grid Reference Chart

Song Name:

Tempo: Date:

List of Concurrent Pages:

Bank	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page
1	/	/	/	/	/	/	/	/
2	/	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/
5	/	/	/	/	/	/	/	/
6	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/

Song Name:

Tempo: Date:

List of Concurrent Pages:

| Bank	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page	Bar #:/ Page
1	/	/	/	/	/	/	/	/
2	/	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/
5	/	/	/	/	/	/	/	/
6	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/

VI.   Mounting the Nemo

There are 6 mounting holes in the rear plate of the Nemo, they are all threaded to 4mm and have clear plastic 'blanks' - we only need to use 3.

The Roland PDS-10 is a sturdy floor stand, which has fully adjustable height and adjustable angled clamp. Alternatively, if a floor stand is not required, the Roland APC-33 Clamp Set can be used.

Mounting Plate

To use the Nemo with the PDS-10 or APC-33, a metal mounting plate must be fabricated to the following dimensions:-

Aluminium Plate: Width 300mm x Depth 120mm x Thickness 2mm
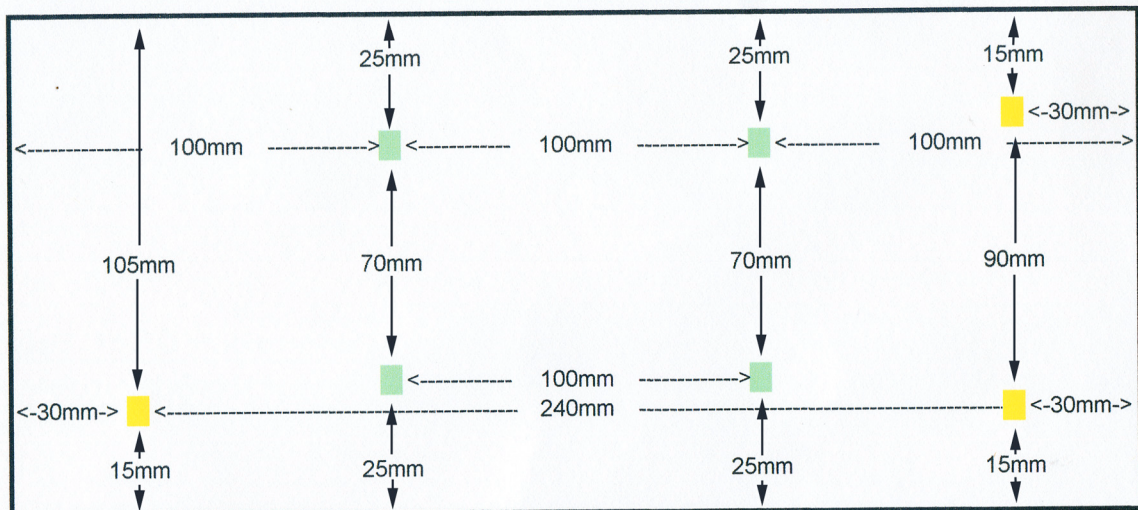
All holes should be 5mm diameter, the holes marked in green are for bolting the plate to the stand/clamp and the holes marked yellow are for mounting the assembled plate(and stand/clamp) to the Nemo.

Additional parts required:-
4x   Countersunk bolt, 4mm thread, length 20mm
3x   Hex head bolt, 4mm thread, length 20mm
10x   Nut, 4mm
11x   Washer, 4mm

Assembly Instructions

1.   Drill 7 holes with a 5mm diameter in the mounting plate as per the dimensions above.

2.   Bolt the Roland stand/clamp to the mounting plate using the countersunk bolts - with the mounting plate viewed as shown above, the mounting plate will be on top and the countersunk bolts will be inserted from below (i.e. once assembled the countersunk head will be touching the rear of the Nemo).

3.   Assemble the 3 hex head bolts as follows:
        Spin 2 nuts onto each bolt, measure the second nut so it is 7mm from the end of the bolt thread and tighten the first nut onto it.
        *NOTE: A 7mm thread length, minus 1mm washer thickness, minus 2mm mounting plate thickness, will leave 4mm thread depth in the Nemo - **do not exceed this amount.***
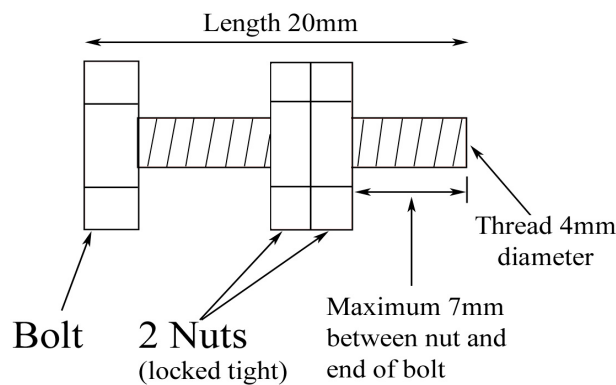
4.   With the Nemo viewed from the rear, remove the 'blanks' from the following threaded holes, bottom left, top right and bottom right. ***The top left hole is NOT used as the motherboard cable is just below the hole!*** You can always check that your Nemo has not been assembled with the internal cabling in a different configuration by removing the rear panel.

5.   Using the 3 prepared bolts(shown above) and 3 washers, attach the mounting plate to the back of the Nemo - finger tightness should be sufficient and the assembled bolts should make mounting and removal easier.

        Note: Mounting the Nemo is done at your own risk!