

TMNT

DanT Modules

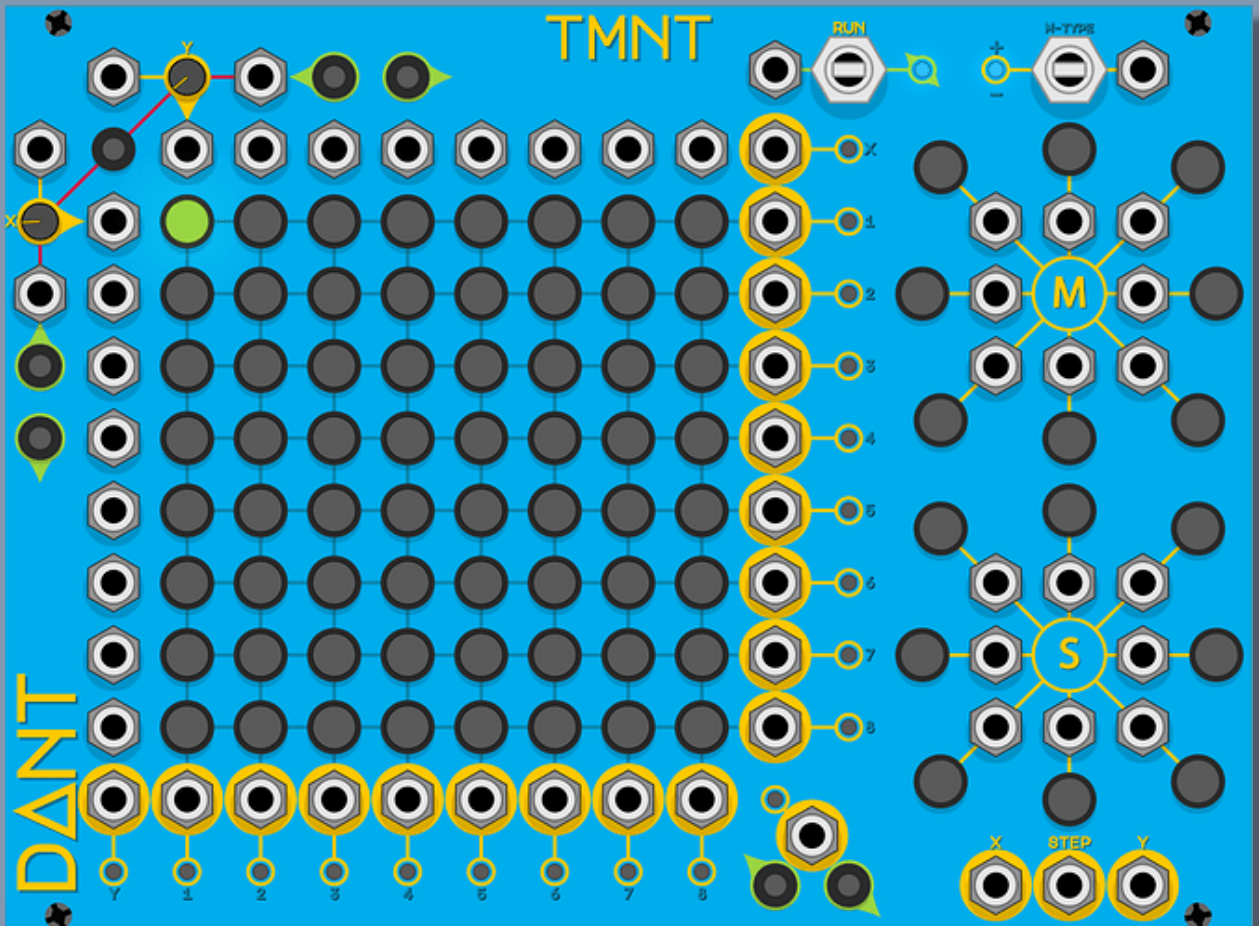
TMNT is a contrived acronym for "Timed Mutating Non-Linear Triggers" and is a sequencer designed to produce random, mutating patterns. TMNT can generate three types of signals:

- BMP triggers Used to control clocks on other modules.
- Step triggers Used to create generative rhythms.
- Step values Used as either pitch or modulation sources.

The main focus would be using the Step triggers for generative rhythms. But of course, there are no rules, and you can use the outputs in any way you please.

Note on Polyphony. This module is not currently compatible with VCV Rack's Polyphonic cables. If you would like polyphonic support, you can let me know via an [issue](#), via the [VCV Rack Community](#), or via my [Instagram](#).

Module size: 34hp



Quick Start

Step 1

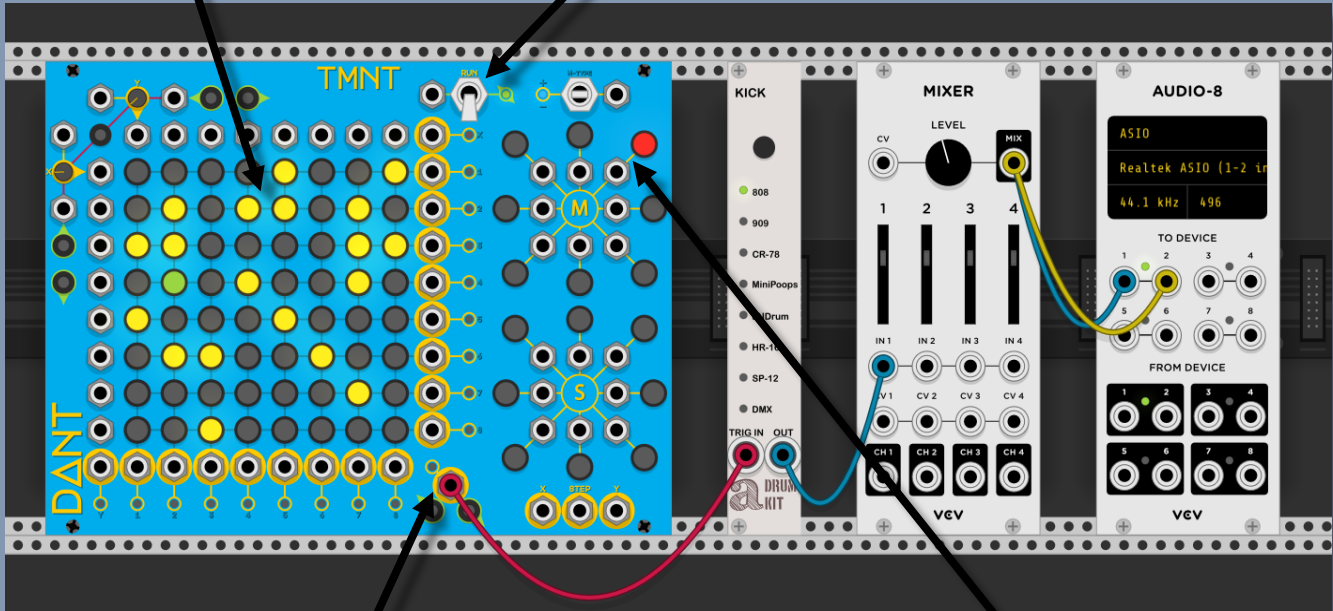
1. Click on some of cells in the 8x8 grid to enable them.

Step 4

4. Click on the Run switch to start sequencer (Up is Run backwards, Down is Run forwards)

Step 5

5. You should now hear the kick being triggered by TMNT



2. Connect a cable from the Active step output to the Trig In on the Kick module. Connect Kick module to the mixer and connect the Mixer to your Audio output.

Step 2

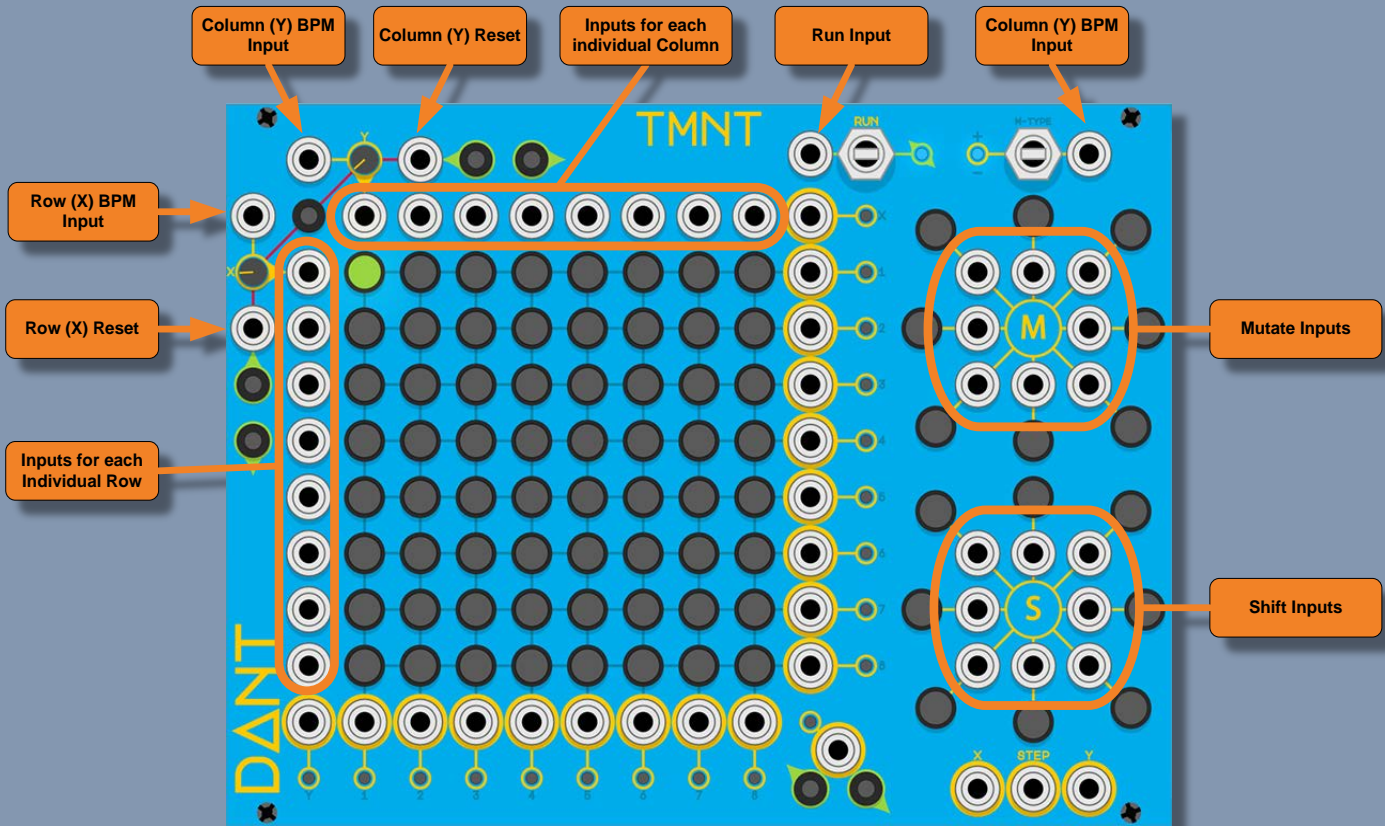
3. Click on some cells in the mutation section.

Step 3

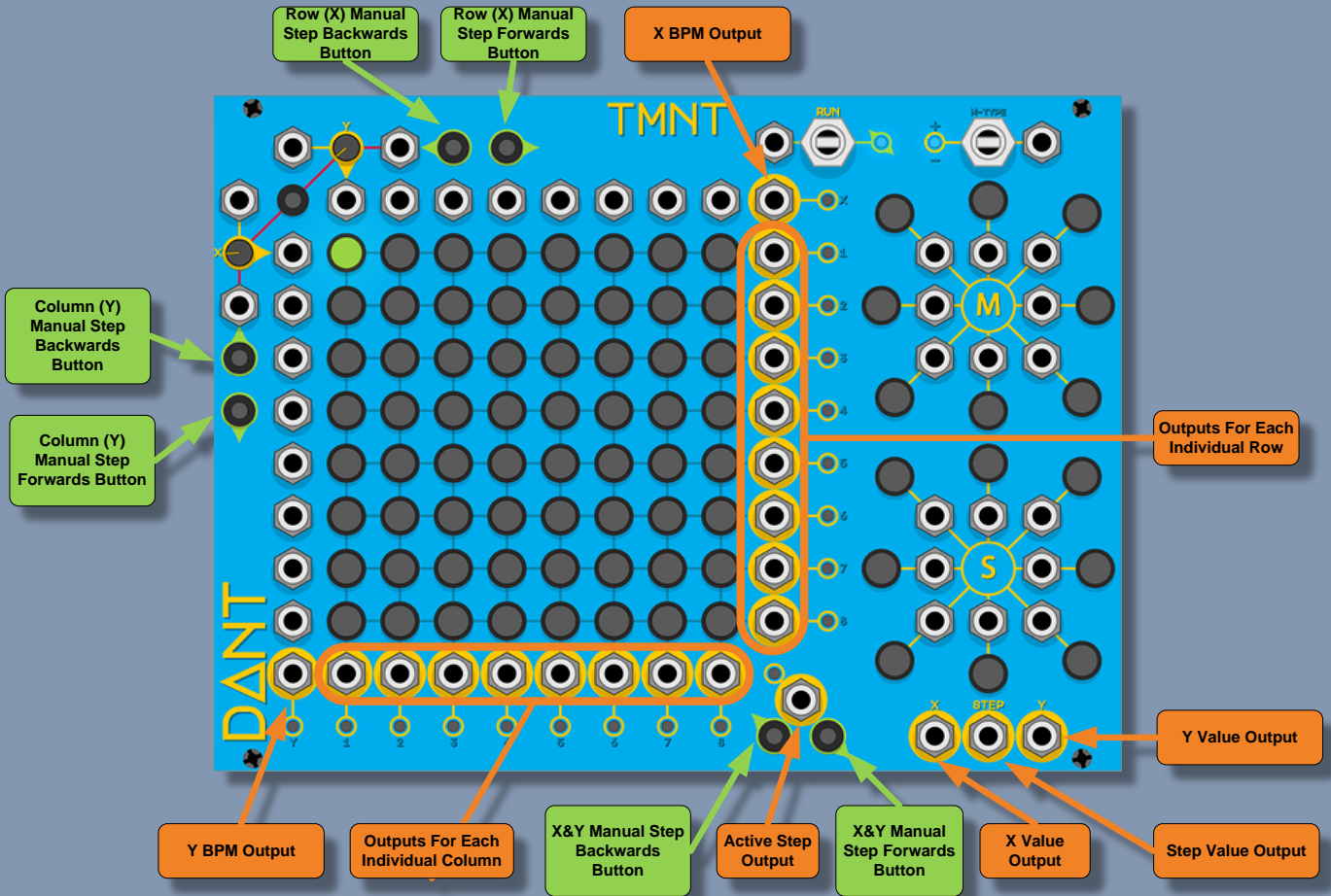
Videos

- BPMs & Resets [Demo Video](#)
- Manual Steps [Demo Video](#)
- Enabling Steps [Demo Video](#)
- Mutating Steps [Demo Video](#)

Inputs



Outputs



Row (X) Manual Step Backwards Button

Row (X) Manual Step Forwards Button

X BPM Output

Column (Y) Manual Step Backwards Button

Column (Y) Manual Step Forwards Button

Outputs For Each Individual Row

Y Value Output

Y BPM Output

Outputs For Each Individual Column

X&Y Manual Step Backwards Button

Active Step Output

X&Y Manual Step Forwards Button

X Value Output

Step Value Output

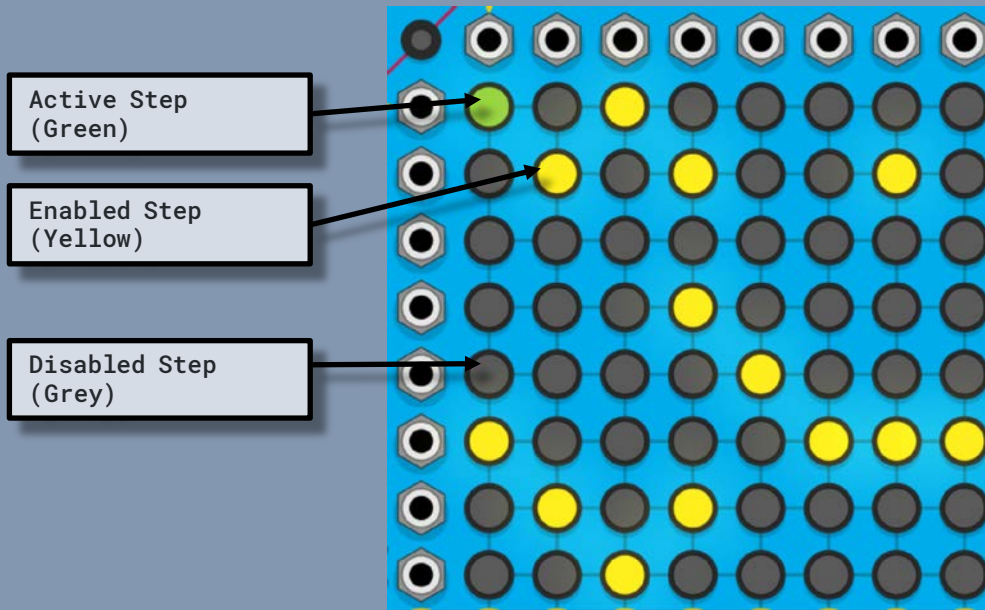
Basic Operation

Sequencer Grid

The sequencer grid consists of 64 steps. There are 8 rows and 8 columns, each with 8 steps. You can left click on each step to enable or disable it.

The currently active step will be green.
Enabled steps will be yellow.
Disabled steps will be grey.

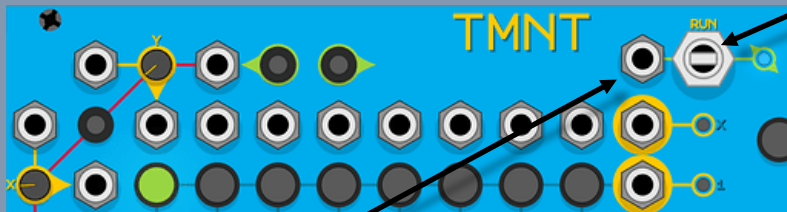
When the active step advances horizontally, if the newly activated step is enabled, its corresponding Column (Y) will fire a trigger.
When the active step advances vertically, if the newly activated step is enabled, its corresponding Row (X) will fire a trigger.
When any Row (X) or Column (Y) step trigger fires, the Active Step output will also fire.



Run Modes

Use the RUN switch to start and stop the sequencer. There are 3 modes that can be selected using the Run control switch:

- Stopped (Centered, Blue indicator, 0)
- Forwards (Down, Green indicator, 1)
- Backwards (Up, Red indicator, -1)



The RUN CV Input

- $S < -1$ volt Backwards
- $-1 \text{ volt} \geq S \geq 1 \text{ volt}$ Stopped
- $S > 1$ volt Forwards

An unconnected Run input or 0 volt signal will have no effect on the current Run mode. When in a run mode, the Y-BPM controls the speed at which the active step advances vertically and the X-BPM controls the speed at which the active step advances horizontally

Run Mode (cont.)

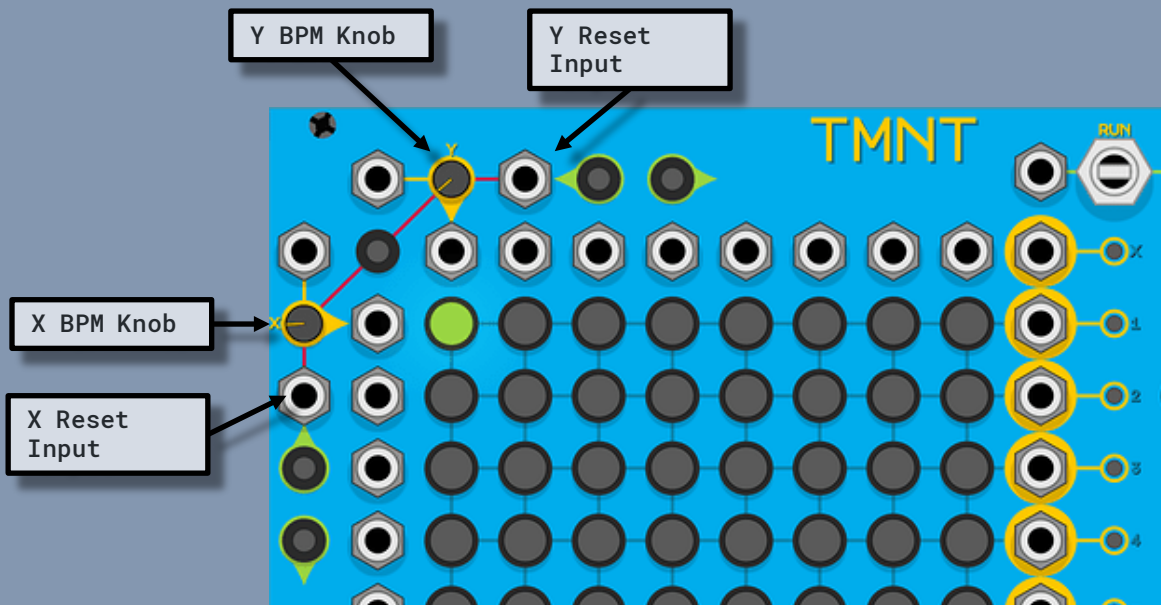
The X & Y BPM value is determined by the control knob value, plus the input signal multiplied by 100, but note that both values are truncated to integers first and the input is normalised to 0 volts.

- For example: X BPM knob value set to 355.5
- X BPM input receives a signal of -2.3 volts.
- The resultant BPM would be $355 + -230 = 125\text{BPM}$

The knob value itself is limited to between 0 and 1000 BPM, however the calculated result is not.

An interesting consequence of this calculation is that using a +10 volt signal you could create 2000 BPM, or using a low knob value with a negative signal you could create a negative BPM. In fact, using a module like [NYSTHI Fixed Voltage Source](#) you can create crazy value BPMs.

A temporarily negative BPM can be used to create a pause in the generated rhythm. While the BPM is negative, the inter-trigger time accumulates, when the BPM returns to positive, that accumulated inter-trigger time must be played out before the next trigger will be fired.



In addition to the BPM inputs, both X & Y have a reset input and there is a reset button with an indicator light. Pressing the button will reset both X & Y, so the active step will become 1, and the indicator light will flash red. The reset inputs will fire for any positive value > 0 , the X reset will set the active step to be in column 1, the Y reset will set the active step to be in row 1. The indicator light will flash yellow for an X reset, purple for a Y reset, and white for X & Y simultaneous.

Note that when a reset is fired, if the target step is enabled this will fire a new trigger, even if the step number does not change.

Mutating Steps

The Mutate Type switch has 3 modes:

- Up : Mutation directions will enable the adjacent steps.
- Center: Enabled mutation directions will toggle the adjacent steps.
- Down: Enabled mutation directions will disable the adjacent steps.

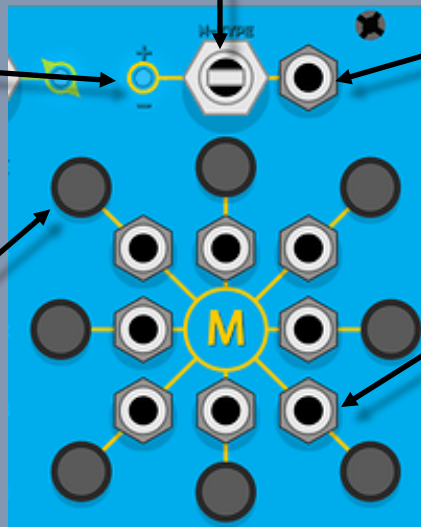
Mutate Indicator Light

- Up: Green
- Center: Blue
- Down: Red

Mutate Switch CV

Buttons to enable mutation directions (The eight buttons correspond to the eight directions on the sequencer grid).

Mutation Direction CV



A non-zero signal S given to the Mutate Type input will override the Mutate mode currently selected by the control switch as follows:

- $S < -2.5$ volts Remove
- $-2.5 \text{ volts} \geq S \leq 2.5$ volts Toggle
- $S > 2.5$ volts Insert

An unconnected Mutate Type input or 0 volt signal will have no effect on the current Mutate mode.

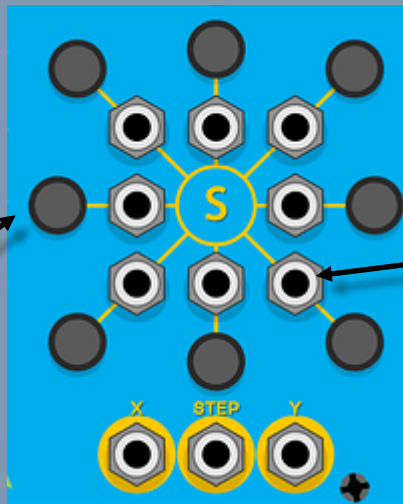
Each of the 8 cardinal directions (North, North-East, East, South-East, South, South-West, West, North-West) has a button and an input. Clicking the button will toggle that mutation direction between enabled (red) and disabled (dark). Any signal > 0 sent to an input will enable that mutation direction. So, for example, you could use an LFO to toggle a mutation direction on and off.

Any enabled mutation directions will take effect whenever the active step advances (either due to X or Y BPM or a manual step). The 8 adjacent steps to the newly active step will have their state altered by the enabled mutation directions. Adjacency wraps at the edge of the grid, so for example, when step 1 becomes active, an enabled North mutation would act upon step 57.

Shifting Steps

Below the mutation section are the Shift controls, these work in a very similar fashion. The 8 cardinal directions have buttons and inputs that work exactly the same but with enabled shift directions being yellow.

Any enabled shift direction will take effect as the active step advances (either due to X or Y BPM or a manual step). For any enabled shift direction, when the next active step is evaluated, it will be moved one step in that direction. All directions will be evaluated before being applied, therefore enabling, for example, both North and South shift directions will result in no shift.



Buttons to enable shift directions (The eight buttons correspond to the eight directions on the sequencer grid).

Shift Direction CV

Step Values

X Value Output



Y Value Output

Step Value Output

These 3 outputs have their values set by the currently active step.

The X & Y step value outputs will range from 1.25 volts to 10 volts depending on the active steps row and column number. So for example when the active step is 23 (column = 7, row = 3), the X step value output will be 8.75 volts and the Y step value output will be 3.75 volts.

The step value output will range from 0.15625 volts to 10 volts depending on the active step number. So for example when the active step is 63, the step value output will be 9.844 volts.

Annotated Image



Image provided by [@rsmus7](#)

Inputs & Controls

1. Y BPM input - provide a CV signal to modulate the speed at which the active step moves vertically
2. Y BPM knob - sets the speed at which the active step moves vertically, from 0 (static) to 1000 BPM (fast)
3. Y Reset input - provide a CV signal that will be processed as a trigger (a trigger will fire when the signal moves from 0 to 1) The trigger will reset the active step to Row 1 (the top row) and the reset LED will flash purple
4. X BPM input - provide a CV signal to modulate the speed at which the active step moves horizontally
5. X Reset input - provide a CV signal that will be processed as a trigger (a trigger will fire when the signal moves from 0 to 1) The trigger will reset the active step to column 1 (the left column) and the reset LED will flash yellow
6. Column 1 step activation input - provide a CV signal above 0 to activate this column, this signal combined with any currently active row will trigger the corresponding step to toggle its enabled state (enabled becomes disabled, and vice versa)
7. Column 2 step activation input
8. Column 3 step activation input
9. Column 4 step activation input
10. Column 5 step activation input
11. Column 6 step activation input
12. Column 7 step activation input
13. Column 8 step activation input
14. Run direction input - provide a CV signal to modulate the run direction, a 0 signal has no effect, lower than -1 sets backwards, higher than 1 sets forwards, between -1 and 1 (excluding 0) sets stopped
15. Run direction switch - sets the direction the active step moves in, stopped means the active step does not move, backwards means the active steps moves upwards and leftwards, forwards means the active step moves downwards and rightwards
16. Row 1 step activation input - provide a CV signal above 0 to activate this row, this signal combined with any currently active column will trigger the corresponding step to toggle its enabled state (enabled becomes disabled, and vice versa)
17. Row 2 step activation input
18. Row 3 step activation input
19. Row 4 step activation input
20. Row 5 step activation input
21. Row 6 step activation input
22. Row 7 step activation input
23. Row 8 step activation input
24. Mutation Type switch - sets the way that steps are mutated when the mutation direction is enabled, insert (up) sets the step to enabled, toggle (middle) flips the step state, remove (down) disables the step
25. Mutation Type input - provide a CV signal to modulate the mutation type, a 0 signal has no effect, lower than -2.5 sets remove, higher than 2.5 sets insert, between -2.5 and 2.5 (excluding 0) sets toggle
26. NW Mutation Direction input - provide a CV signal to modulate this mutation directions state, any signal higher than 0 will enable this direction
27. N Mutation Direction input
28. NE Mutation Direction input
29. W Mutation Direction input
30. E Mutation Direction input
31. SW Mutation Direction input

32. S Mutation Direction input
33. SE Mutation Direction input
34. NW Shift Direction input - provide a CV signal to modulate this shift directions state, any signal higher than 0 will enable this direction
35. N Shift Direction input
36. NE Shift Direction input
37. W Shift Direction input
38. E Shift Direction input
39. SW Shift Direction input
40. S Shift Direction input
41. SE Shift Direction input
42. X BPM knob - sets the speed at which the active step moves horizontally, from 0 (static) to 1000 BPM (fast)

Outputs

- A. Y BPM output - outputs a trigger at the current Y BPM value
- B. Column 1 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 1
- C. Column 2 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 2
- D. Column 3 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 3
- E. Column 4 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 4
- F. Column 5 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 5
- G. Column 6 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 6
- H. Column 7 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 7
- I. Column 8 output - outputs a trigger when the active steps moves horizontally and lands on an enabled step in column 8
- J. X BPM output - outputs a trigger at the current X BPM value
- K. Row 1 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 1
- L. Row 2 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 2
- M. Row 3 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 3
- N. Row 4 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 4
- O. Row 5 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 5
- P. Row 6 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 6
- Q. Row 7 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 7
- R. Row 8 output - outputs a trigger when the active steps moves vertically and lands on an enabled step in row 8
- S. Active step output - outputs a trigger when the active step lands on any enabled step
- T. X value output - outputs a CV signal based on which column the active step currently occupies
- U. Step value output - outputs a CV signal based on the absolute step number of the active step (steps are numbered from 1 to 64 where step 1 is top left and step 64 is bottom right)
- V. Y value output - outputs a CV signal based on which row the active step currently occupies