

Stepper

Version m, build #29, 2023-04-25



Together with **Tone Event** module this module can be used to build up a step sequencer. Several Steppers may be cascaded, even with less than 8 steps each.

Function

Basically **Stepper** works as circle counter. That means, after step #*n* counter restarts with step #1. This is realized in *circle run mode*. Number of steps can be set from 1 to 8.

In order to build up a sequencer with more than eight steps, *extend run mode* can be used. Now internal counter starts with step #1 too. But when step #*n*+1 is reached, *cv out #n* gets OFF, a *resume out* pulse is delivered and *trig out* repeats *trig in* signal to use at *trig in* of appended **Stepper**.

Appended **Stepper** starts operation now. At step $n+1$ it stops operation and sends a **resume out** pulse as well as **trig out** pulses to following **Stepper** in cascade.

Basically last **Stepper's** **resume out** pulse may be sent back to **resume in** of first **Stepper**. That works, when first **Stepper** is not defined as **master**. But because of VST host timing, one trigger pulse will be lost, so that sequencer cascade cycle will insert a silent step before first **Stepper** restarts operation.

In order to get a regular stepping behavior, first **Stepper** should be set to **master**. When that toggle button is on, another digital counter display appears. Please set this counter to total sum of all **Stepper's** step counters. This counter value is used instead of **resume in** for **Stepper #1** restart, when a new sequencer cycle begins.

In order to prevent **Stepper** from undefined state, **resume in** jack will not function, when **Stepper** is defined as **master**.

So all cascaded **Stepper** modules form just one circle counter. And each **Stepper** can set to any step number from 1 to 8. Whole cascade will work with total sum of preset steps.

Usually with sequencers trigger pulses are used as GATE signal too. **Stepper** works that way with **gate cv out mode**. For special use **trig cv out mode** may be chosen. Now only a short pulse occurs at each **cv out** jack when a step stage gets active.



Input jack for external clock signal. Every OFF ON change switches one step forward.

LED flashes at OFF ON change.



This signal is used to trigger next appended **Stepper**. In **extended run mode** this output repeats **trig in** signal, after actual stepper exceeds preset step count.



An CV OFF-ON change at this input jack sets all **CV OUTs** to OFF and internal step counter to zero.

Sliding switch lets you select, whether **Stepper** jumps to state 0 or 1 after reset is done.



Allows actual **Stepper** operation. It is used in **extended run mode** only when **master** toggle switch is off.



This output gets active, when **trig in** pulse #(n+1) is received. (n = preset number of **Stepper's** usable step stages) Normally it is used in **extended run mode** to enable appended **Stepper** operation.

In **circle run mode** as well as in **extended run mode** this signal can be used to trigger other events at each sequencer cycle restart.



This value determines number of step stages for actual **Stepper**. It can be increased or decreased with arrow buttons.

While reducing number of steps it can happen, that active step is on a higher number. In this case it will be deactivated and last possible stage will get activated.



Two radio buttons allow selection of two different run modes. Visibility of several control elements depends on selected mode.

Common mode is **circle** run mode. It is used for a single **Stepper**.



If several **Steppers** are chained, **extended run mode** has to be selected.

A **master** toggle button appears.



Master button should be toggled on, when actual **Stepper** is the first one in a **Stepper** cascade.

Counter **total steps** becomes visible as well as arrow buttons and a knob.

Counter's value must be equal to total sum of defined step stages for whole **Stepper** cascade. It can be increased and decreased with arrow buttons. You might better use orange knob to preset higher numbers. Also a right click on the knob lets you chose "Edit Value". Then you can input a number with PC keyboard.

For special case it makes sense to set *total steps* to a lower value. That will resolve in an earlier restart of master stepper, while cascade would continue until last step.



Every **Stepper** stage has a *cv out* jack. Type of delivered signal depends on selected *cv out mode*.



In **gate** *cv out mode* LED is on, when step is active. In **trig** *cv out mode* LED flashes once, when step gets active.

These radio buttons allow selection of output signal type.

gate - An active output will deliver a static voltage (5 V). For one millisecond it will stay at 0 V. A change from **trig** to **gate** mode will activate both **LED** and *cv out* of active stage. (This 1 ms delay is important for use with **P.moon Switch 8 to 1**).

trig - When an output gets active, it sends a short 5 V pulse with 1 msec duration. A change from **gate** to **trig** mode will deactivate both **LED** and *cv out* of active stage.



This output sends a 5 volt signal, when a Stepper's step stage is active. It is especially helpful in trig out mode.

Example Preset



Here you can see an example preset with three chained **Stepper** devices.

- All chained Steppers must be set to **extended run mode**.
- Define first Stepper as **master**.
- Because Steppers are set to use 6, 8 and 4 steps, **total steps** counter must be set to $6+8+4 = 18$.
- Connect cables as shown.
- Feed the trigger clock signal into **trig in** jack of **master** Stepper.

You can find more example presets and PDF manuals at:

<https://p-moon-modules.de/presets.htm#ps>