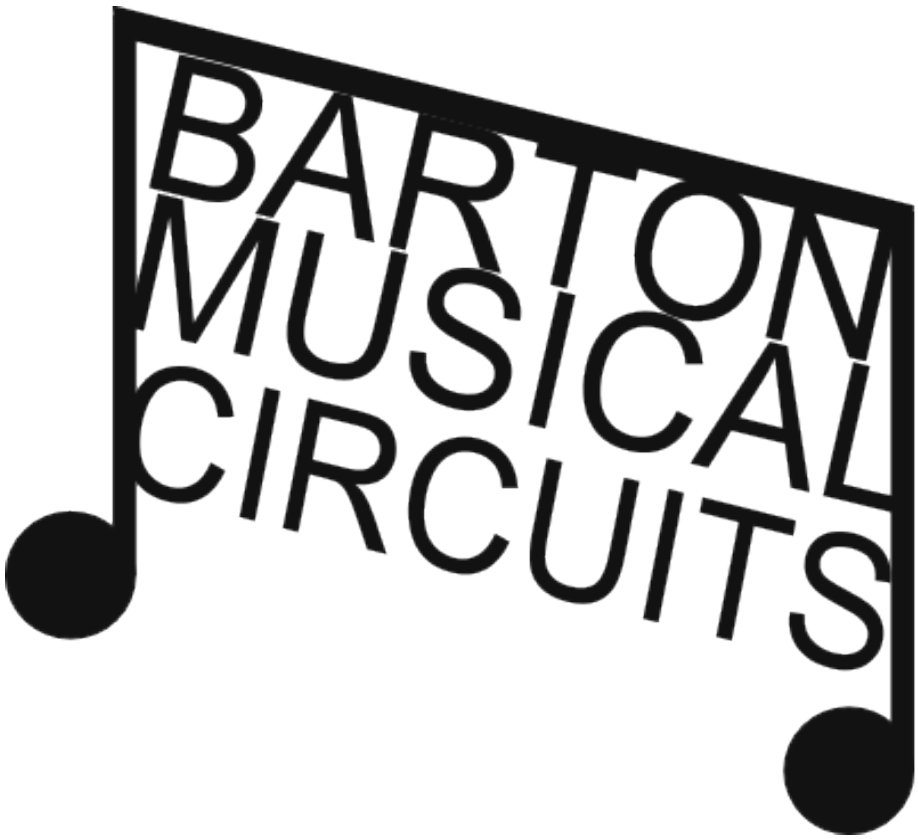


BMC 079. Rise and Fall Detector
Build Documentation.

I. Using The Module.

This module detects whether a voltage on the input is rising, falling or staying the same. It can be used with any input signal and outputs +5V gates.
Patch ideas for using this:

-Break a melody/sequence into two by using different voices when the pitch ascends or descends.

-Detect when the glide/glissando on a note is finished using the Stay output.

-Create drum patterns from melodies

-Modulate pitch to change intonation depending on whether a note is rising or falling.

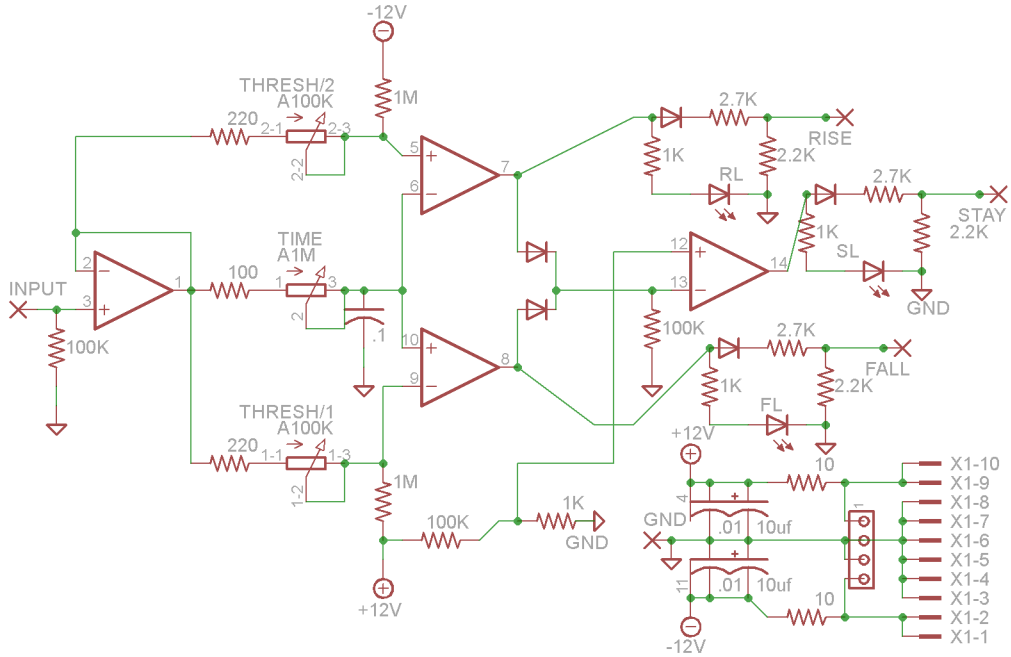
INPUTS/OUTPUTS

1. Main input. Any signal can be patched in.
2. Rise output. +5V gate output when the input voltage is rising.
3. Stay output. +5V gate output when the input voltage is neither rising or falling.
4. Fall output. +5V gate output when the input voltage is falling.

CONTROLS

1. Time – This controls over what length of time the input voltage is delayed when checking whether it is rising or falling. It will affect the sensitivity and how long gates stay on.
2. Threshold – This controls how large of a voltage difference is required to turn an output on. This can be adjusted so that small changes in voltage can be ignored.

II. Schematic.



Above is the schematic for this module. On the left we see the main input connects to a 100K input impedance resistor and then onto an op-amp buffer. The buffer splits the signal three ways, at top and bottom it goes through 220 ohm resistors in series with the 100K dual gang Threshold pot. The threshold pot's two gangs form voltage dividers with the 1Meg resistors to +/-12V and the resulting

voltages set the thresholds for a pair of op-amps wired as comparators.

The buffer also sends the input signal through a 100 ohm resistor in series with the 1Meg Time control, and a .1uf capacitor to ground. The resistor and capacitor form a slew/low-pass circuit, making it so that when the input voltage changes, the voltage at the .1uf capacitor will always be slightly delayed as the capacitor charges through the Time pot.

This slewed signal is then sent to the two comparators mentioned earlier. The threshold voltages of these are slightly offset versions of the input signal. This makes it so that when the input voltage rises, the voltage on pin 5 of the TL074 will rise faster than the voltage on pin 6, and while the voltage on pin 6 is lower than pin 5, pin 7 will go up to +12V.

The outputs of the comparators are sent to the indicator LEDs through 1K resistors and to the output jacks through switching diodes (to only allow positive voltages) and a 2.7K/2.2K resistor pair to attenuate the +12V output to +5V.

They are also sent through diodes to a third comparator wired as an inverting comparator. A 100K/1K resistor pair sets it's threshold so that the output goes high when pin 13's voltage goes below .12V, and a 100K resistor to ground sets it so that pin 13 will reduce to 0V when neither of the other two comparators' outputs are high. The output of this comparator goes through LEDs/diodes/resistors like the other two.

At the bottom are power connections. Footprints for MOTM and Eurorack style connectors, with a 10ohm/10uf low pass filter for the +/-12V rails which have additional .01uf capacitors attached at the power pins of the IC.

IF BUILDING FOR +/-15V systems: Replace all 2.7K resistors with 3.3K ressistors. You may also want to replace the 1Meg resistors with 1.2M or 1.5M if you're having trouble setting small thresholds.

III. Construction

A. Parts List

Semiconductors

Value	Quantity	Notes
TL074	1	14 pin DIP
1N4148	5	Or other small switching diode
LED	3	3mm

Resistors

Value	Quantity	Notes
10 ohm	2	5mm lead spacing. Use 3.5mm body length or stand up
100 ohm	1	
220 ohm	2	
1K ohm	4	Value can be increased to lower LED brightness
2.2K ohm	3	
2.7K ohm	3	
100K ohm	3	
1M ohm	2	

A100K Dual Gang Pot	1	PC Mounted 16mm/17mm. Like This.
A1Meg Potentiometer	1	PC Mounted 16mm/17mm. Like this.

Capacitors

Value	Quantity	Notes
.01uf	2	Small ceramic disc. Value not critical
.1uf	1	Polyester or Polypropelene Film
10uf	2	Electrolytic

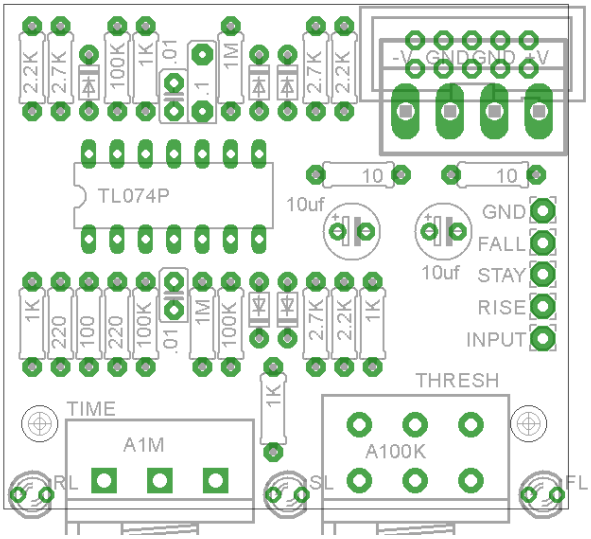
Other/Off Panel

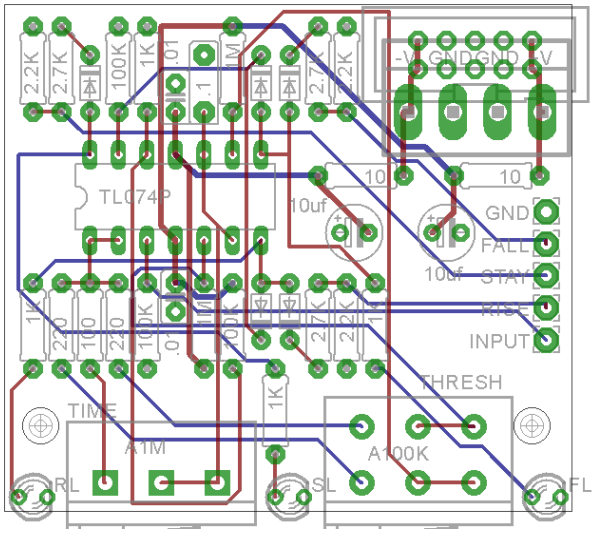
Value	Quantity	Notes
Power connecter	1	Eurorack or MOTM style
Jacks	4	
14 pin DIP Socket	1	
Knobs	2	

B. PCB Layout

Below are renderings of the PCB. The rendering showing the traces does not show the ground fill plane, so assume any missing connection is a ground fill.

The PCB measures 50mm x 45mm and the pots are spaced 22.86mm apart





Wiring of this module is very straightforward. The tip connector of each jack should be wired to the corresponding wirepad. The GND wirepad should then be wired to the sleeve connector of one of the jacks.

To the right is a photo of the wiring.