

BMC070. Trigger To Gate Converter

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I What it does

II Schematics

III Construction

A.Parts List

B.The Board

I. What it Does

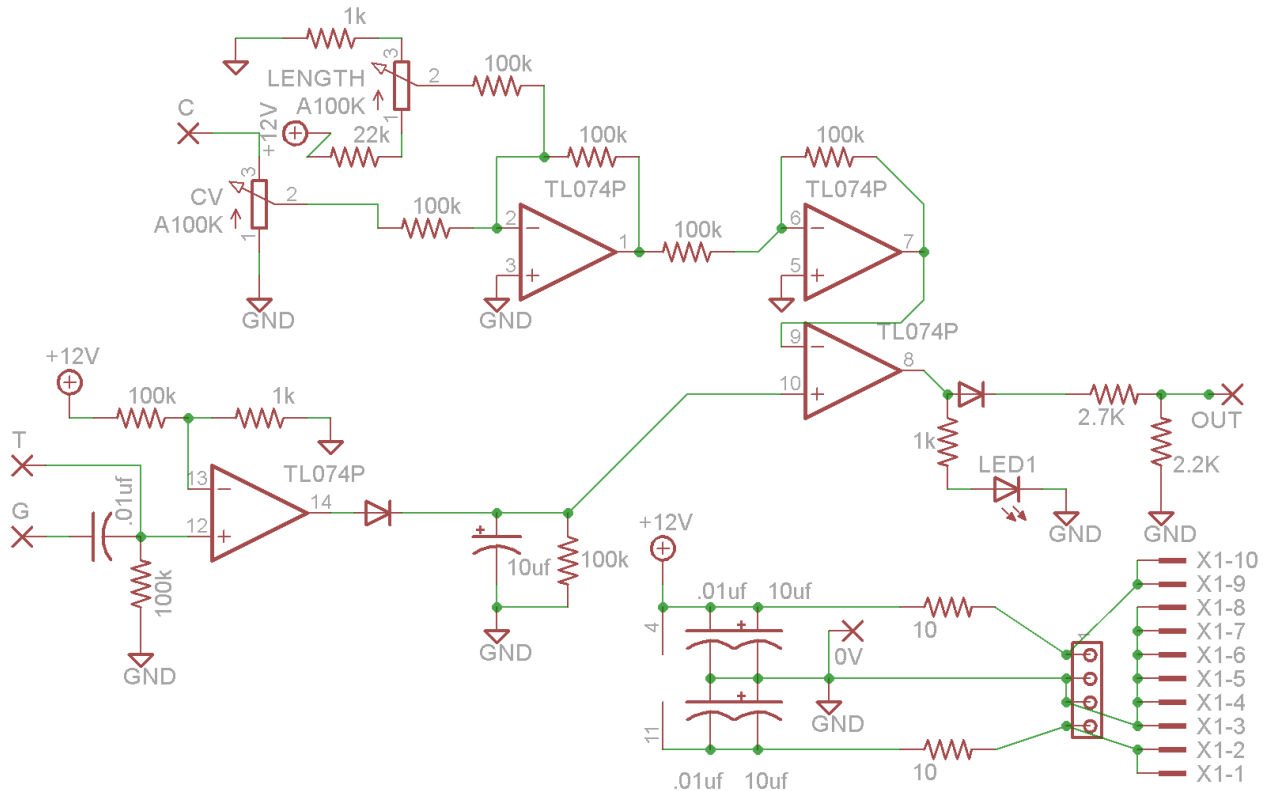
This module takes an input from a trigger or gate and outputs a gate of variable length. It can also be used to extend the length of gate signals. Length of gates or extension can range from approximately five milliseconds to five seconds.

The module is designed to work with +/-12V and +/-15V systems with only a single resistor value needing to be replaced.

INPUTS/OUTPUTS/CONTROLS

1. G input – “Gate Input.” The main timing signal input. Gates or triggers can be input here and a variable length gate will be output.
2. T input - “Trigger Input.” This input bypasses an input capacitor allowing for some very short or lower voltage trigger inputs to be used with the circuit. Inputting a gate to this input will extend the length of the gate.
3. CV input – Input jack for control voltage. The more positive the control voltage, the shorter the gate length will be
4. Output – A +5V gate is output here.
5. Length Knob – The more clockwise this knob is turned the longer the gate.
6. CV Knob – The more clockwise this knob is turned the more the CV affects the gate length.

II. Schematic



Above is the schematic for this project. Starting at the top, we see the two potentiometers, CV and Length. Length is wired so that the voltage on the wiper increases as the knob is turned counter clockwise and its' maximum and minimum voltages are controlled a 1K and 22K resistor. The voltages on the wipers of the two pots are summed together by a pair of op-amps wired as inverting amplifiers.

Bottom left we see the timing inputs, T and G. Each connects to the input of a comparator with it's threshold set at .012V by a 100K/1K resistor pair forming a voltage divider. The "G" input is in series with a .01uF capacitor which will shorten the gate to a single pulse when the gate first turns on. The output of the comparator goes through a 1N4148 diode to only pass positive voltages.

When the comparator's output goes positive, current passes through this diode to charge a 10uF capacitor. When the comparator's output goes negative the capacitor discharges through a 100K resistor slowly lowering the voltage on the capacitor.

The capacitor is connected to the positive input of a second comparator. The threshold of this comparator is connected to the voltage summing amplifiers fed by the Length and CV controls. When the voltage on the capacitor is higher than the Length voltage, the comparator will turn on and the output gate will be active. The output of the comparator is connected to an LED through a 1k current limiting resistor as well as a 1N4148 switching diode in series with a 2.7K/2.2K resistor pair that form a voltage divider setting the output voltage at +5V. When building for a +/-15V system, replace the 2.7K with a 3.3K.

At the bottom are power connections. The PCB has footprints for MOTM and Eurorack style power connectors, these are in parallel with each other. The positive and negative rails are filtered by a 10 ohm / 10 uf passive RC low pass filter, and additional filtering is done at the power pins of the TL074 by .01uf capacitors.

III Construction

A.PARTS LIST

SEMICONDUCTORS

Name/Value	QTY	Notes
TL074	1	8 pin DIP package
1N4148	2	Or other small switching diode
LED	1	3mm

RESISTORS

Name/Value	QTY	Notes
10 ohms	2	All resistors 1/4W metal film except potentiometers
1K	3	
2.2K	1	
2.7K	1	
22K	1	
100K	8	
A100K potentiometer	2	16MM PCB mounted, like this .

CAPACITORS

Name/Value	QTY	Notes
.01uf	3	cheap ceramic disc.
10uf	3	Electrolytic, 16V or higher rating.

OTHER

Name/Value	QTY	Notes
14 pin DIP socket	1	
Power connecter	1	Eurorack or MOTM depending on your system
Jacks	4	

B. THE BOARD

The PCB is 49mm x 39mm. The pots are spaced 31.1mm apart. Below are images of the PCB with and without traces present and a photograph of a completed module. The image of the PCB with traces does not show connections to ground.

WIRING

The “G” “T” “C” and “OUT” wirepads each should be wired to the tip connectors of their respective jacks. The “0V” wirepad is ground, and should connect to the sleeve of a jack.

TWEAKING THE CIRCUIT

To change the overall time range of the circuit, adjust the value of the 100K resistor that drains current off the 10uF capacitor. This resistor can be found above the words “CV” above the CV Knob. Increasing the value of the resistor will slow down the timing and decreasing it will speed up the timing.

To decrease the maximum gate time, increase the value of the 1K connected to the length knob. To increase the minimum gate time, increase the value of the 22K resistor connected to the Length knob.

