

## **BMC 087. Voltage Controlled Release Build Documentation.**

*I. Using The Module*

*II. Schematic*

*III. Construction*

- A. Parts List
- B. PCB Layout
- C. Wiring

## I. Using The Module.

This module is an envelope generator providing envelopes with near instant attack and voltage controlled release. It has two identical channels, the controls, inputs and outputs listed below are listed for a single channel.

The slowest possible envelope I've recorded is 3 minutes long and the fastest is 1ms.

### INPUTS/OUTPUTS

1. Trigger input – A pulse (gate or trigger) input to this jack will create an instant attack, no sustain and then voltage controlled release. This input ignores the length of the pulse used for input, and will have trouble if fed non-pulse inputs.

2. Gate input – A pulse input to this jack will create an instant attack, then sustain until the pulse goes low and then voltage controlled release. This input pays attention to pulse length and should still activate if fed a triangle wave or other non-pulse input.

3. CV input – Control voltage is input to this jack for modifying release time. Increasing voltage will result in a shorter release time.

4. Output – The envelope signal outputs to this jack with a range of 0 to +5V

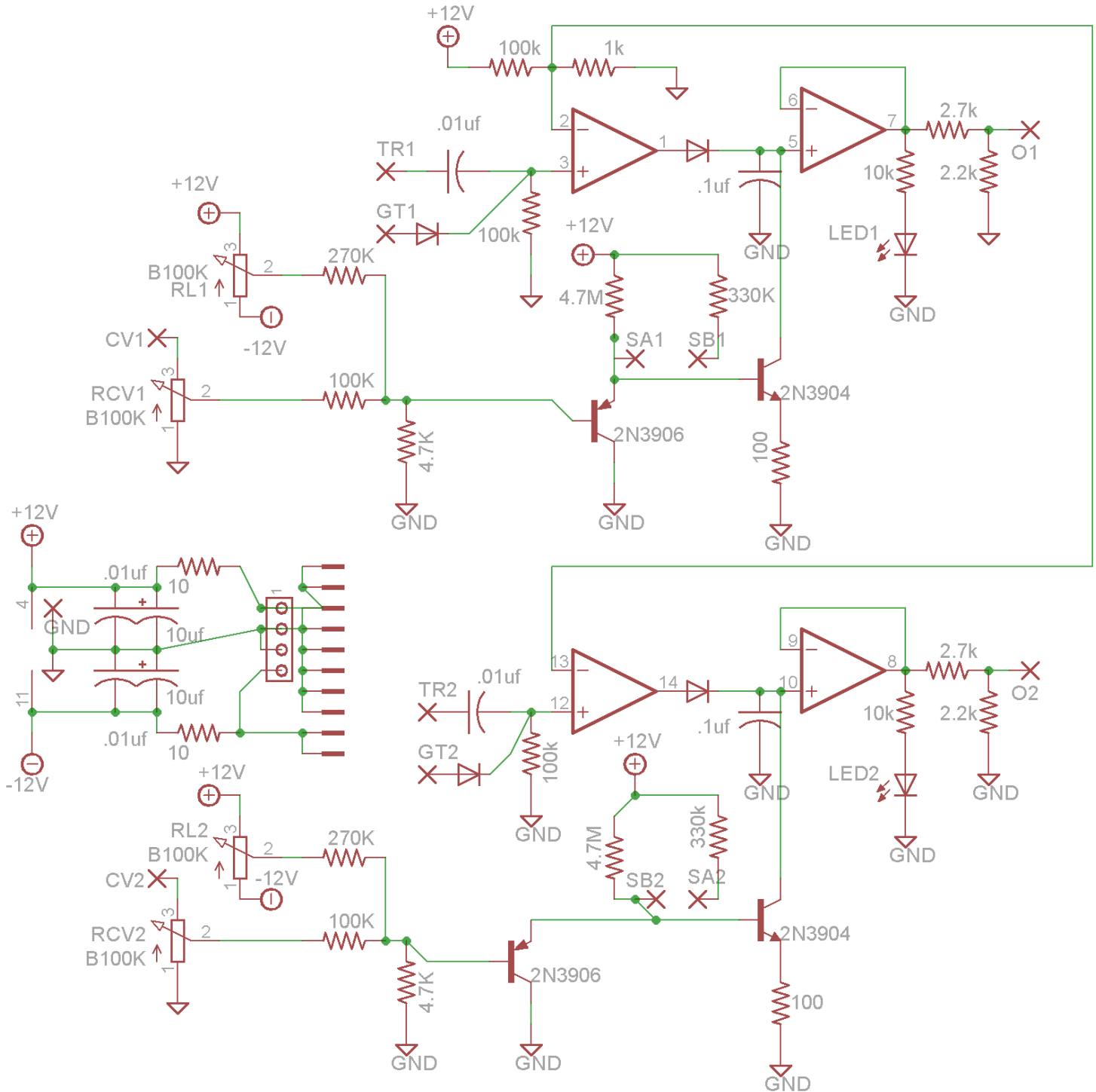
### CONTROLS

1. Release Knob– Controls how long it takes for the envelope to go from +5V to 0V. Turning this knob clockwise makes release time shorter, with near instant release at the most clockwise position.

2. Speed Toggle – This toggle sets how slow the slowest settings of the release knob/cv will be.

3. CV Knob – This knob attenuates the voltage input to the CV input.

## II. Schematic.



Above is the schematic for this module. The schematic depicts two channels which are identical.

The TR and GT wirepads connect to the Gate and Trigger inputs and couple to a comparator. The TR couples through a .01uF capacitor which forms a high pass filter with the 100K resistor to ground reducing the signal to a small pulse. The Gate couples through a switching diode, allowing only positive voltage to pass to the comparator. The threshold of the comparator is set at 0.12V by the 100K/1K resistor pair.

The output of this comparator goes through a diode allowing it to charge a .1uf capacitor to ground, but not discharge it. The diode is discharged by a 2N3904 transistor and the capacitor's voltage is buffered by an op-amp. The output of this op-amp lights an LED through a 10K current limiting resistor and is then fed to the output wirepad after being attenuated by a 2.7K/2.2K resistor pair.

The 2N3904 transistor's rate of current draw from the .1uf capacitor is controlled by the Release pot and the CV input. The wipers of these pots are mixed together by a 270K and 100K resistor and then attenuated to a small signal by a 4.7K resistor to ground. These voltages control the amount of current drawn through 2N3906 transistor to ground.

The emitter of this 2N3906 connects to the base of the 2N3904 discharging the .1uf capacitor and also connects to V+ through either a 4.7M resistor or a 330K resistor depending on the position of the Slow Toggle.

At the bottom right of the module are the power connections. Footprints for Eurorack and MOTM style connectors are in parallel. The positive and negative rails are filtered by a 10ohm/10uf capacitor pair and further filtered at the TL074's power rails by .01uf capacitors.

### III. Construction

#### A. Parts List

##### Semiconductors

Value	Quantity	Notes
TL074	1	14 pin DIP
1N4148	4	Or any small signal diode
2N3904	2	TO-92 package, other small NPN transistors should work
2N3906	2	TO-92 package, other small PNP transistors should work

##### Resistors

Value	Quantity	Notes
10 ohm	2	5mm lead spacing. Use 3.5mm body length or stand up
100 ohm	2	
1K ohm	1	
2.2K ohm	2	
2.7K ohm	2	Replace with 3.3K for 15V build
4.7K ohm	2	
10K ohm	2	
100K ohm	5	
270K ohm	2	Replace with 330K ohm for 15V build
330K ohm	2	
4.7M ohm	2	
B100K Potentiometer	4	PC Mounted 16mm <a href="#">like this package.</a>

## Capacitors

Value	Quantity	Notes
.01uf	4	Small ceramic disc. Value not critical
.1uf	2	Polyester or Polypropelene Film
10uf	2	Electrolytic

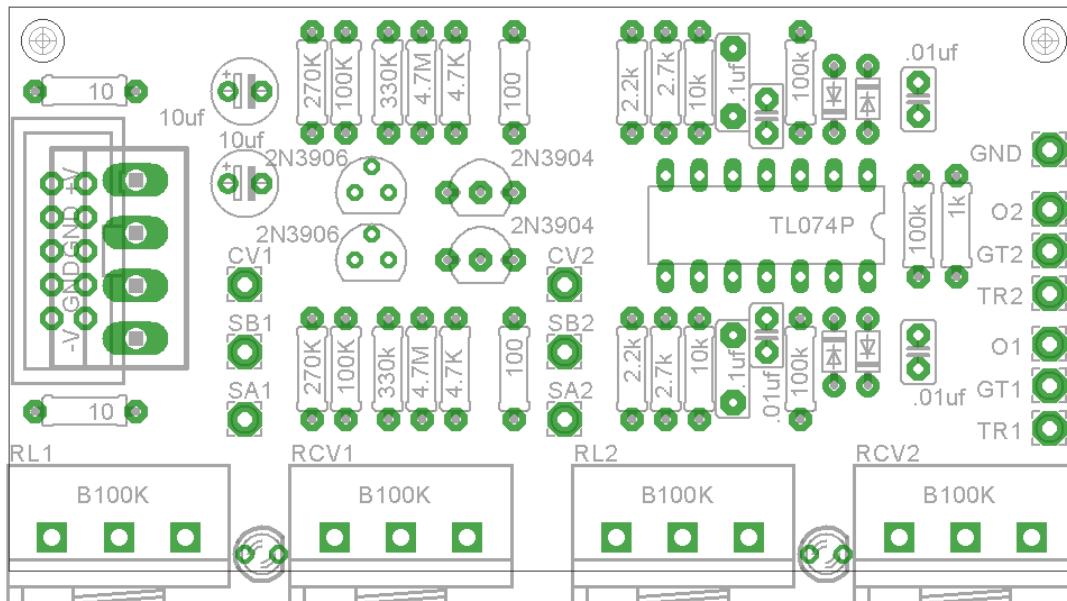
## Other/Off Panel

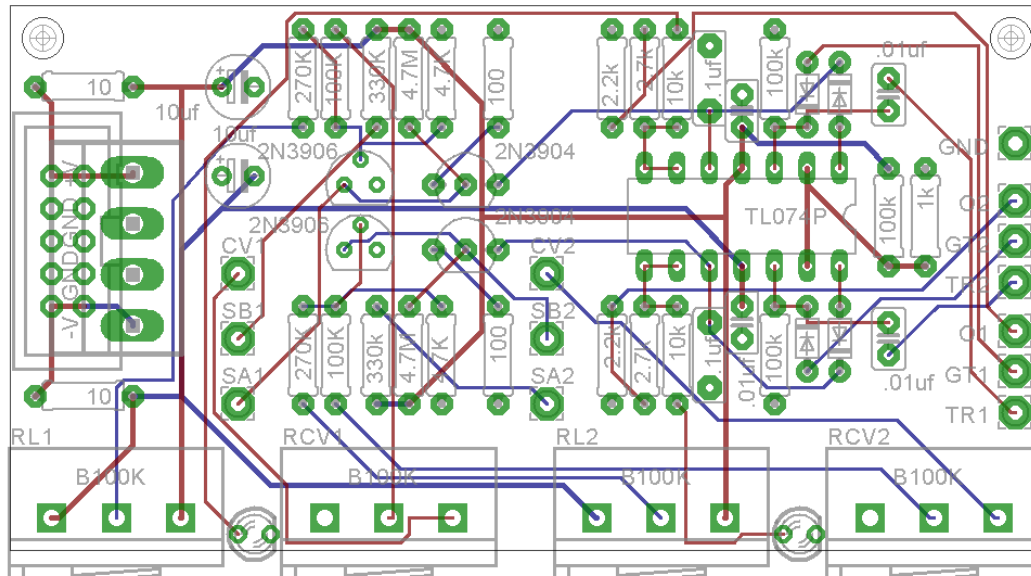
Value	Quantity	Notes
Power connecter	1	Eurorack or MOTM style
Jacks	6	
Toggle Switch	2	SPST or SPDT
14 pin DIP Socket	1	
Knobs	4	

## 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 80mm x 43mm and the pots are spaced 21mm apart.





**WIRING**, repeat for each channel :

- SA – Wire to the bottom lug of the Slow Toggle
- SB – Wire to the middle lug of the Slow toggle.
- CV – Wire to tip of the CV jack.
- TR – Wire to the tip of the Trigger In Jack
- GT – Wire to the tip of the Gate In Jack
- O – Wire to the tip of the output Jack
- GND – Wire to the sleeve of any jack.

