BMC042. Single AR.

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If you have any questions, or need help trouble shooting, please e-mail
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I. Overview/Features

This module provides "Attack/Release" or "Attack/Decay" when used with a gate or trigger signal respectively. It's name is a reference to BMC001 the "Simple Quantizer," much like it, this uses just two 8 pin chips and D/A conversion based on PWM.

CONTROLS
1. Attack – This pot controls the rate at which the output voltage rises.
2. Decay – This pot controls the rate at which the output voltage lowers.
3. Time – This toggle makes the voltage change at a rate 16 times slower when engaged.
4. Loop – This toggle causes the voltage to begin to rise again as soon as it has lowered back down to zero. This lets you use the unit as an LFO.

I/O
1. Input – A trigger, gate or LFO should be patched to the input. When the input rises above 2.5 volts, this will cause the output voltage to return to zero and begin the attack phase. The decay phase will begin once the output voltage reaches 5V AND the input voltage is 2.5 volts or lower.
2. Output – The output voltage. This is zero volts at the lowest and 5V at the highest.

II. Schematic.

On the next page is the schematic for this project. On the far right is the 12F683 microcontroller. Pins 1 and 8 are used for powering the chip. Pins 2 and 3 are the Loop/Time controls which are tied down with 100K resistors on a bussed array.

Pin 4 is the input pin. The input wirepad is connected to a comparator with a threshold of 2.5 Volts, the output of which goes through a network of diodes and resistors to ensure that the voltage on the PIC stays in the 0 to 5V range.

Pin 5 is the PWM output pin. PWM stands for "Pulse Width Modulation." This pin oscillates as a set frequency and the amount of time that the output is high during each oscillation is modified in the code. The 33K resistor and .1uf capacitor form a low pass filter which removes the oscillation and leaves just a DC voltage which is buffered by the op amp, which drives the output jack and an LED.

Pins 6 and 7 are connected to the Attack and Decay pots. Each of these is wired as a voltage divider with it's wiper being filtered by a .01uf capacitor to reduce high frequency noise.

On the left is the power section. There are PCB footprints for two types of power connecter. The positive and negative rails are filtered by a 10 ohm/10uf passive low pass filter and then .01uf capacitors are placed near the power pins of the ICs to further filter noise out. The positive power rail is then connected to a 7805 voltage regulator which provides power for the PIC and the controls.

III. Construction

A. Parts List

Semiconductors

Name	Quantity	Notes
12F683	1	Comes with your PCB
TL072	1	8 pin DIP package
7805	1	TO-220 package
1N4148	1	Or other small signal switching diode
1N60P	1	Or other schottky diode,
LED	1	3mm

Resistors

Name/Value	Quantity	Notes
10 ohm	2	1/4W Metal film for resistors unless otherwise noted
1K	2	
33K	1	
100K ohm	3	
100K buss, 5 Pin	1	Or can be made with 4 resistors
B100K Potentiometer	2	PC Mounted 16MM

Capacitors

Name/Value	Quantity	Notes
.01uf	3	Ceramic disk
.1uf	1	Metal film box
10uf	2	Eletrolytic

Other

Name/Value	Quantity	Notes
Power connecter	1	Eurorack or MOTM
Jack	2	
Toggle	2	SPST or SPDT
8 pin DIP socket	2	
Knob	2	

B. The PCB

To the right is a rendering of the PCB. It's dimensions are 40x44mm. The mounting holes are spaced 35.56mm apart, and the pots are spaced 22.86mm apart.

The "IN" and "O" wirepads should be connected to the tips of the In and Out jacks respectively. The "T" and "LP" wirepads should be connected to the center lugs of toggles. "+5" should be wired to the bottom lugs of these toggles. "GD" should be wired to the sleeve of a jack.

Below is an image showing the steps to installing the LEDs onto the PCB.

1. Place
2. Cut
3. Bend
4. Solder in