

BMC049. Attenuverting Mixer.

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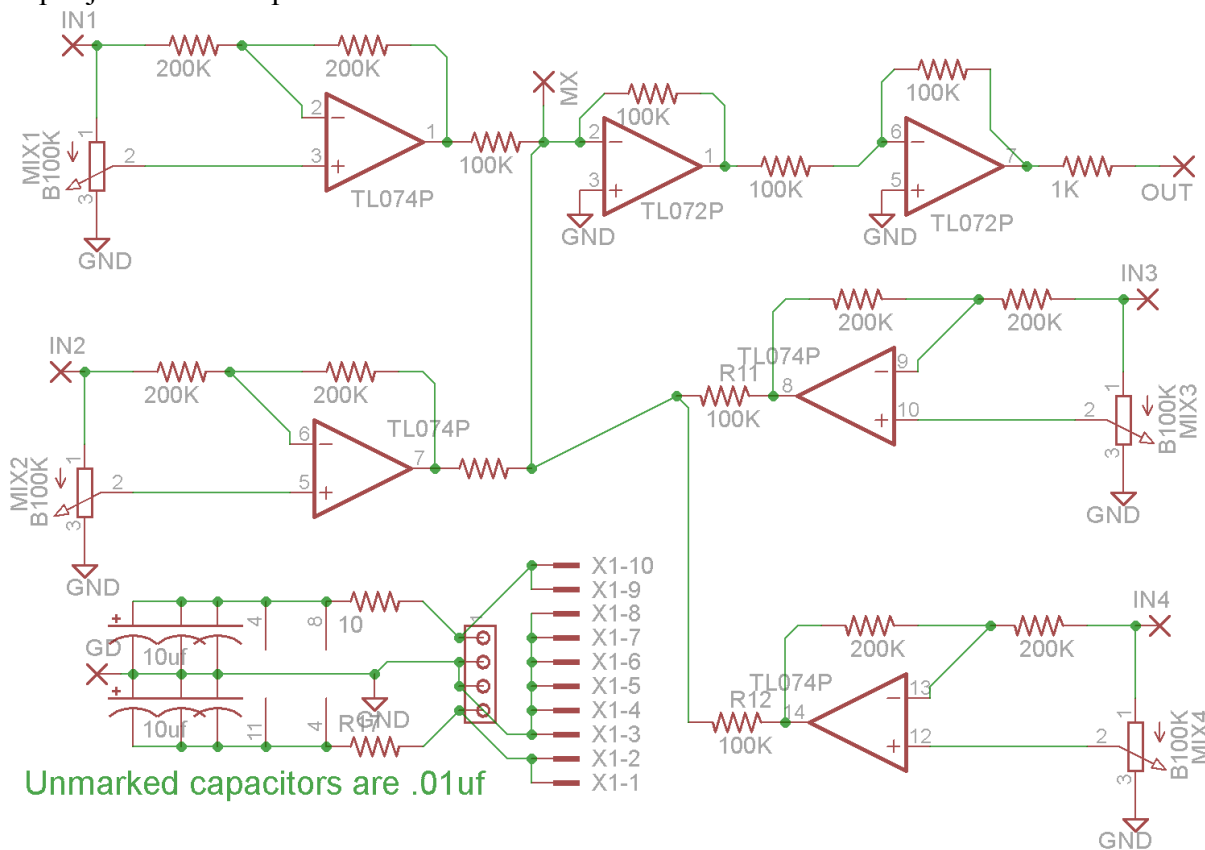
I. Features

A. How it works

This module is a four knob DC mixer. Each knob can both attenuate and invert the signal for its corresponding input, thus “attenuverting.” It can be used with both audio and CV signals. There is also an additional wirepad for the mix bus, allowing for two PCBs to be used in conjunction to create an 8 channel mixer.

B. Controls/Inputs/Outputs

1. Attenuverting Knobs – Each of these controls how much of a signal is present in the mixed output and whether it is the original or inverted version of the signal. When the knob is at 12'O Clock there will be no signal present, as you turn it clockwise, the original signal will be added and when turned counter-clockwise the inverted signal will be added to the mix.
2. Input Jacks – Used for inputting the signals to the mixer.
3. Output jack – The output of the mixer.

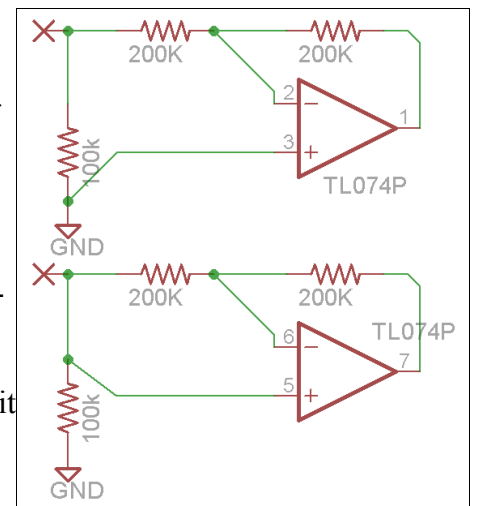


II. Schematic.

Above is the schematic for this project's PCB. The attenuverter cell is repeated four times. Each begins with an input wirepad that is connected to both a potentiometer and a 200K resistor. This 200K resistor is connected to the inverting input of an op-amp and also to a 200K feedback resistor that connects to the op-amp's output. The potentiometer's wiper is connected to the non-inverting input of the op-amp and the outer lug is connected to ground.

On the right is a diagram showing how this circuit looks when the potentiometer is at its two extreme positions. On the top, the circuit resembles a standard inverting amplifier with a gain of 1, and on the bottom it resembles a non-inverting amplifier with a gain of 1.

The output of the attenuverters are connected with 100K resistors. Where these 100K resistors meet is known as the “mix bus,” and the “MX” wirepad



allows you to connect the mix bus from another PCB in order to expand the mixer to eight channels. The mix bus is then sent to an inverting amplifier with a gain of 1 to sum the voltages and then another to uninvert the signal. The output of the second amplifier goes through a 1K resistor to the output wirepad.

III. Construction

A. Parts List

Semiconductors

Value	Qty	Notes
TL072	1	8 pin DIP packaging
TL074	1	14 pin DIP packaging

Resistors

Value	Qty	Notes
10 ohm	2	7.5mm lead spacing, 1/4W Metal film
1K ohm	1	" "
100K ohm	8	" "
200K ohm	8	" "
B100K Potentiometer	4	16mm pot, PCB mounted, Linear taper.

Capacitors

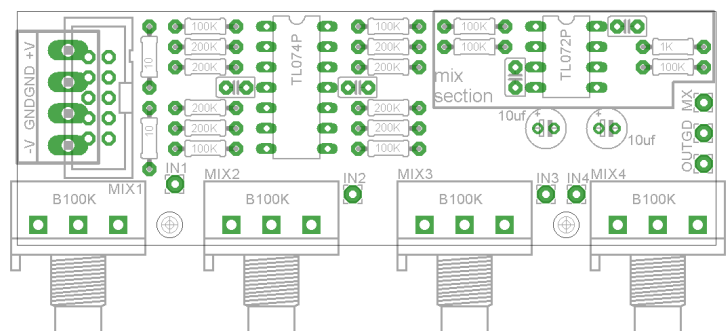
Value	Qty	Notes
.01uf	4	cheap ceramic 2.54mm
10uf	2	Electrolytic

Other

Value	Qty	Notes
Power Connector	1	Either Eurorack or MOTM
8pin DIP socket	1	
14pin DIP Socket	1	
Jacks	5	The jack that your synth format uses
Knobs	4	

B. The Board

To the right is a picture of the PCB. The PCB's dimensions are 88mmx30mm. The pots are spaced 24.1mm apart. The mounting holes are spaced 49.5mm apart.



C.Wiring Notes

For a normal four channel build: The tip of each input jack should be wired to the corresponding “INx” wirepad. The Output jack's tip should be wired to the “OUT” wirepad and “GD” should be wired to the sleeve of a jack to ground panel. The image below shows the wiring of a four channel.



If building a two PCB, eight channel mixer, connect the “MX” wirepads between the two PCBs and do not install the components in the section marked “mix section” on one PCB. You should use the “OUT” wirepad of the PCB with it's “mix section” installed. You can run wires from your unused power connector footprint between the two boards so you only have to use a single power header. Connect the input jacks to the PCBs in the same way.