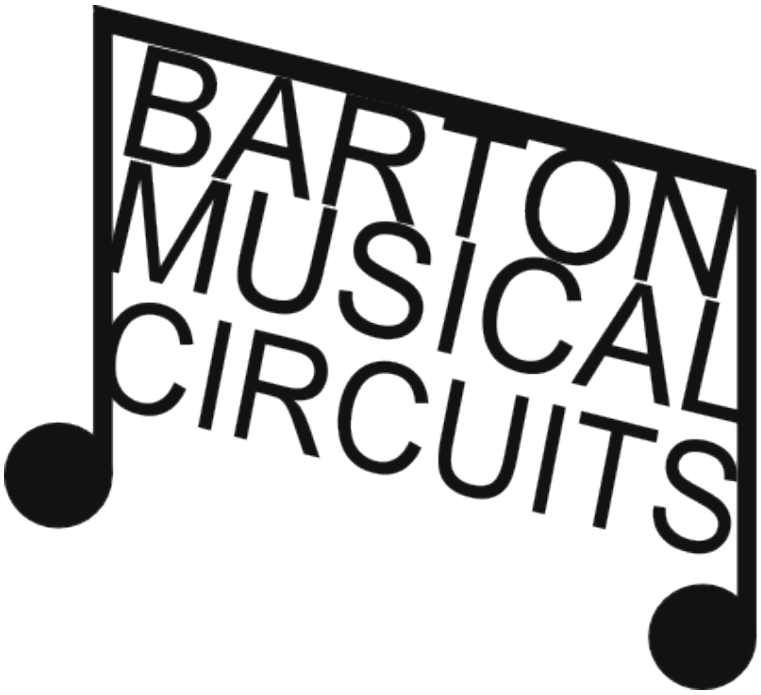


BMC106. Resonant Glide

Last updated 11-17-2023

I. Features

This module is composed of two Sallen-Key low pass filters designed to be used on very low frequencies. When pitch control voltages are processed through this, it creates a portamento which then turns into vibrato. Depending on resonance control, this vibrato can die out almost immediately or go on for the duration of the note. When used with envelope generators, this module can be used to add extra “bumpiness” to an envelope signal allowing for more harmonic content. With a gate signal, the module can be used as a simple envelope generator with equal sloped attack and release.

The two channels are independent and identical. Thismodule works on +/-15V systems without any modification.

CONTROLS

1. SLEW – One for each channel. This controls how quickly the output voltage changes. As you turn this knob up the output will move more slowly.
2. RESONANCE – One for each channel. This controls the strength of the vibrato and “overshoot” is present on the output signal. When turned all the way up the module will self oscillate.

INPUTS/OUTPUTS

1. Voltage Inputs – One for each channel. Typically an envelope, control voltage or gate signal would be input here.
2. Voltage Outputs – One for each channel.

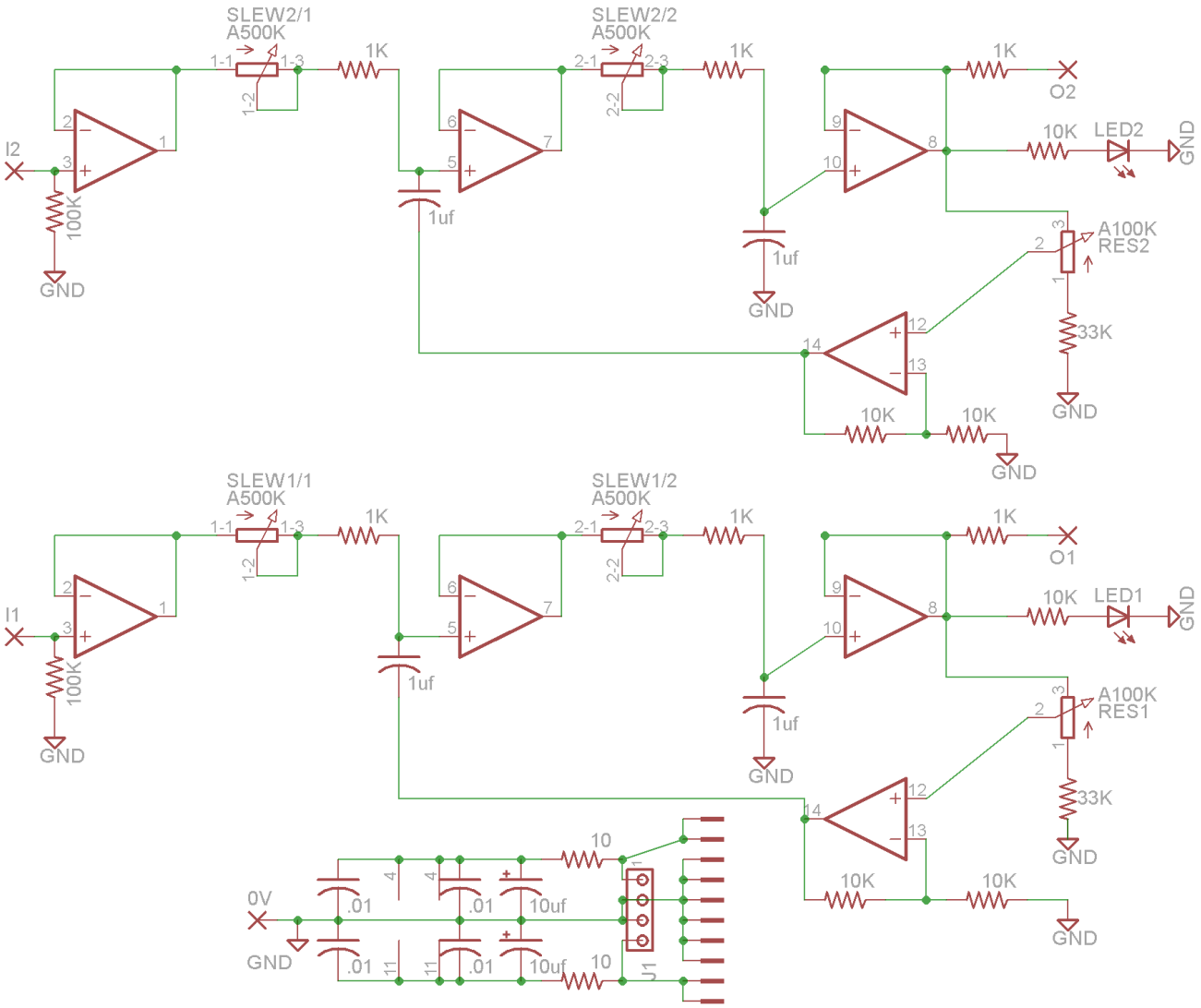
MP3 Demos

1. Glide.

A CV controlling pitch of a VCO is processed. At first both controls are turned down, then only the slew control, then both controls.

2. Envelope

An envelope controlling filter cutoff is processed.



II Schematic

Above is the schematic. Each channel is identical, so only the first channel will be described. I1 wirepad connects to an op-amp wired as a unity buffer with a 100K resistor providing ground reference. This buffer connects to one gang of a dual gang 500K potentiometer that controls slew. The gangs of the pot are each wired as variable resistors and are in series with 1K resistors that limit the maximum frequency. This resistor then connects to a 1uf capacitor which provides feedback from the resonance control, and another buffer.

The combined resistance of the pot/resistor and the 1uf capacitor together form the first pole of the low pass filter. Because the 1uf capacitor connects to the output of the resonance amplifier instead of ground, a positive feedback loop is made which allows for the already filtered signal to be reinjected to the middle of the circuit, which is what creates the vibrato like effects.

The output of the second buffer goes through another 500K pot and 1K resistor in series which this time lead to a 1uf capacitor that connects to ground, forming another low pass filter pole, though simpler in that it references ground. The 2nd pole is buffered and sent to the output through a 1K resistor and to an indicator LED through a 10K current limiting resistor.

Output buffer signal also goes to an outside lug of the resonance pot, a 100K potentiometer which is wired as a variable voltage divider. The other outside lug connects to ground through a 33K resistor, making it so the pot can never fully attenuate the signal to 0V.

The wiper of the resonance pot connects to the positive terminal of an op-amp wired as a non-inverting amplifier. The 10K resistor to ground on the negative terminal and the 10K resistor

connecting the negative terminal to output set the gain of this amplifier at 2. This amplifier connects to the 1uf capacitor of the 1st filter pole.

III. Construction

Parts List

Semiconductors

Value	Qty	Notes
TL064	2	Or any quad package op-amp with the same pinout.
3mm LED	2	

Resistors

Value	Qty	Notes
10 ohm	2	1/4W Metal Film
1K	6	1/4W Metal Film
10K	6	1/4W Metal Film
33K	2	
100K	2	1/4W Metal Film
A500K Dual Gang Potentiometer	2	16mm PCB mounted. See Parts Substitions on final page for info if A500Ks are hard to find
A100K* Potentiometer	2	16mm PCB mounted.

*Changing the pot taper from A100K to B100K might be better for a lot of users. A100K gives finer control over subtle amounts of resonance, but more blunt control when dialing in a large amount of resonance. B100K will give a more even amount of control across the resonance scale.

Capacitors

Value	Qty	Notes
.01uf	4	Ceramic disc. 2.5mm lead spacing
1uf Film capacitor	4	Box type, 5mm lead spacing.
10uf electrolytic	2	Non-polarized can be used if at least 15V voltage rating.

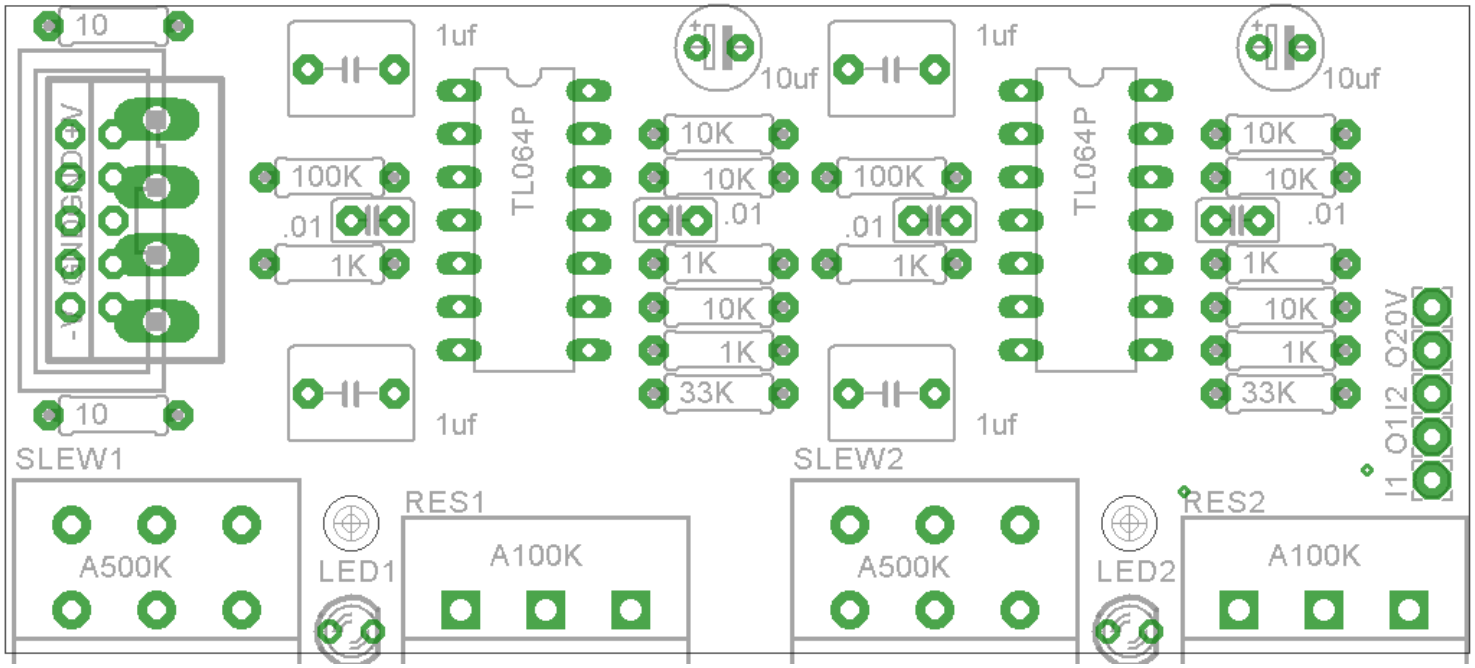
Other

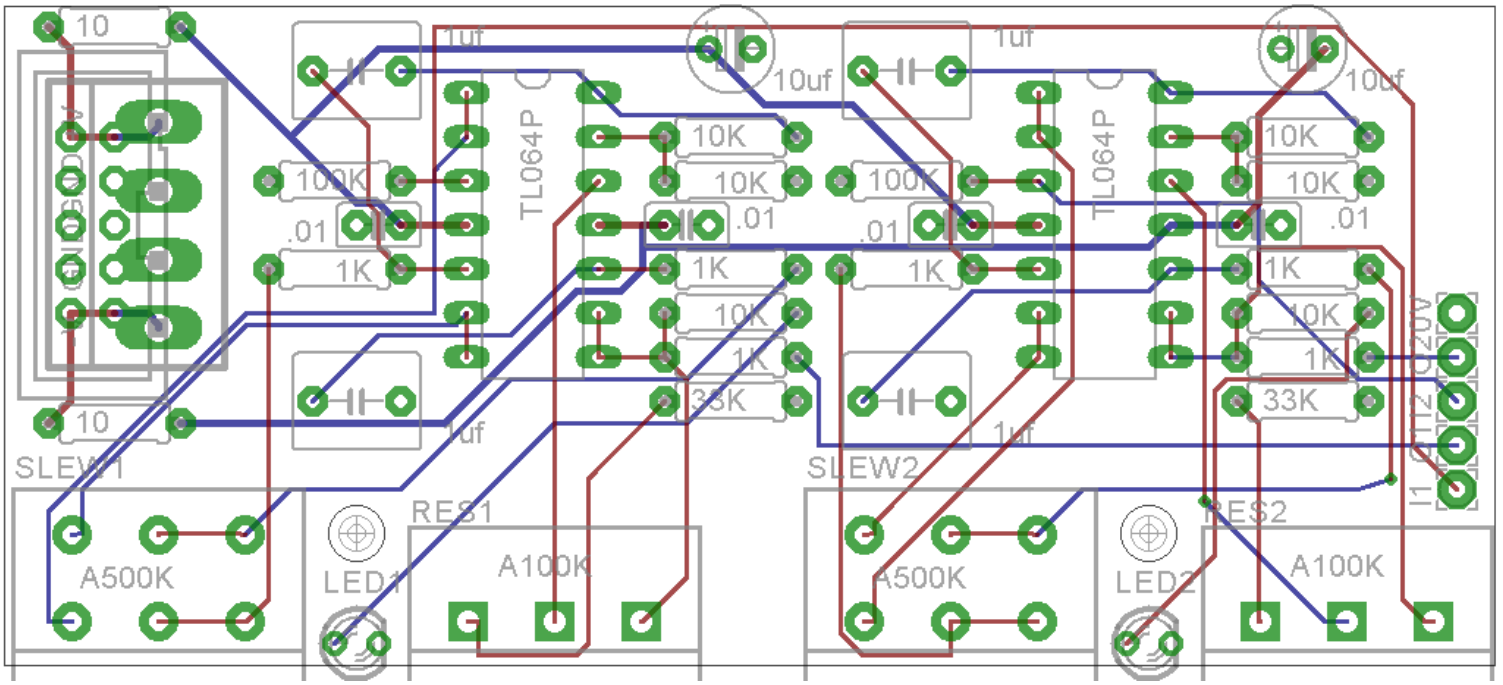
Value	Qty	Notes
Power Connecter	1	Eurorack or MOTM style
Jack	4	At least two should be switching jacks
Knob	4	
14 Pin DIP socket	2	

The Board

Below are renderings of the PCB both with and without traces shown. The PCB's dimensions are 86mm x 38mm, the pots are spaced 22.86mm and the mounting holes are spaced 45.72mm apart.

WIRING.
The 0V wirepad is the ground connection. It should be wired to the sleeve of any jack. If using a non-metal panel, then connect the sleeves of other jacks.
The remaining wirepads should each be wired to the tip of their associated jack. I1/I2 are input jacks and O1/O2 are output jacks.



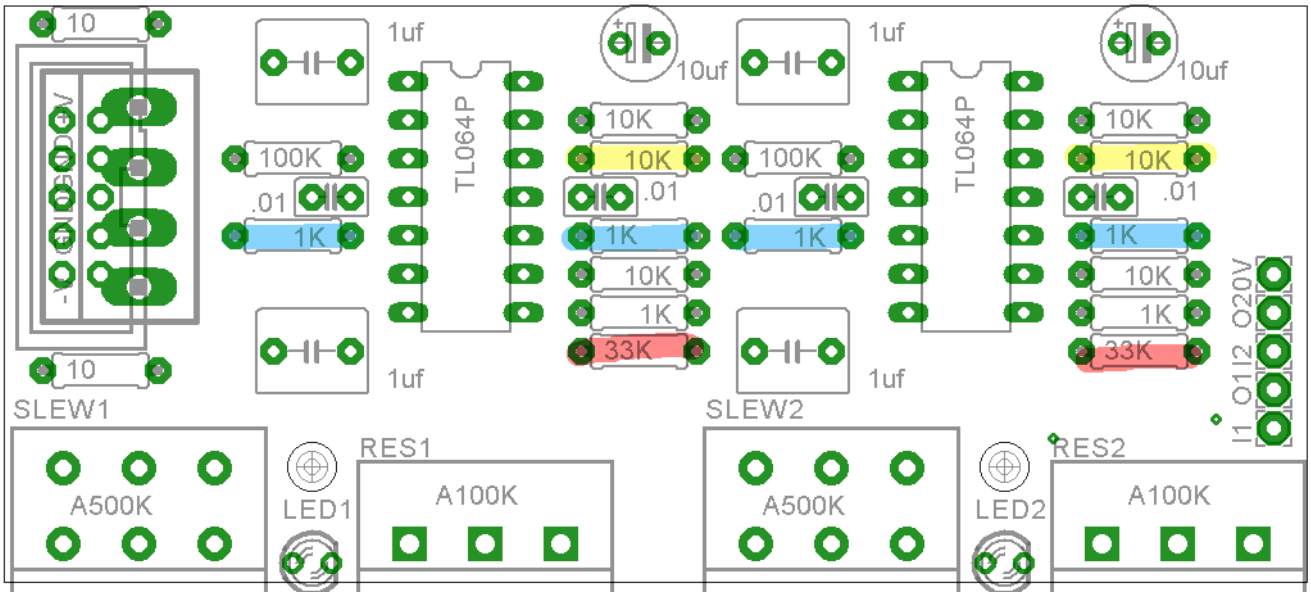


MODs
All of these mods are untested.

1.Increase minimum slew – The 1K resistor in series with the Slew pots sets the minimum slew. When setting the resonance to maximum and creating oscillations this may be too high a frequency to be audible, so the 1K resistor could be increased to a 4.7K or 10K. These resistors are highlighted in blue below.

2.Adjust maximum resonance – The amount of gain in the feedback loop can be controlled by adjusting the value of the 10K to ground on the negative terminal. Increasing the value will decrease the amount of gain if you'd like to avoid oscillations. Try a 12K or 15K. These resistors are highlighted in Yellow

4.Adjust minimum resonance – The 33K resistors connecting the resonance knob to ground control the minimum resonance. To increase minimum resonance increase these values to 47K or 68K. This should give finer control over high resonance settings. These are highlighted in red.



PARTS SUBSTITIONS
If A500K pots are hard to find, the 1uf capacitor can be changed to accommodate using the table below. If using an electrolytic, make sure it's rated for at least 24V since this module can create oscillations that go over the entire voltage range.

If replacing the dual gang A500k with	Then replace 1uf capacitor with
A1M	.47uf film capacitor
A250K	2.2uf film capacitor
A200K	2.2uf film capacitor
A100K	4.7uf non-polarized electrolytic capacitor
A50K	10uf non-polarized electrolytic capacitor