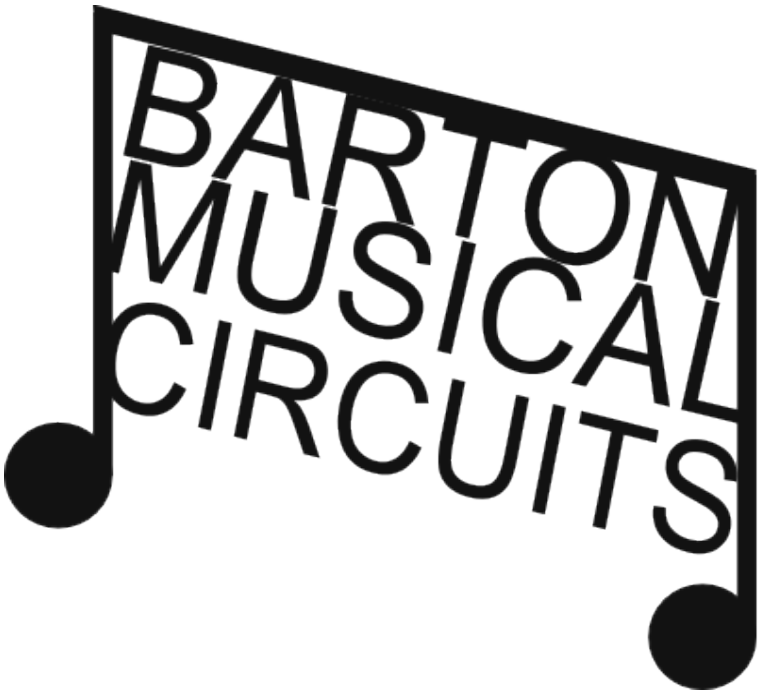


BMC103. 4HP Clipper Bank.

Last updated March 20, 2023

If you have any questions, or need help trouble shooting, please e-mail Michael@Bartonmusicalcircuits.com

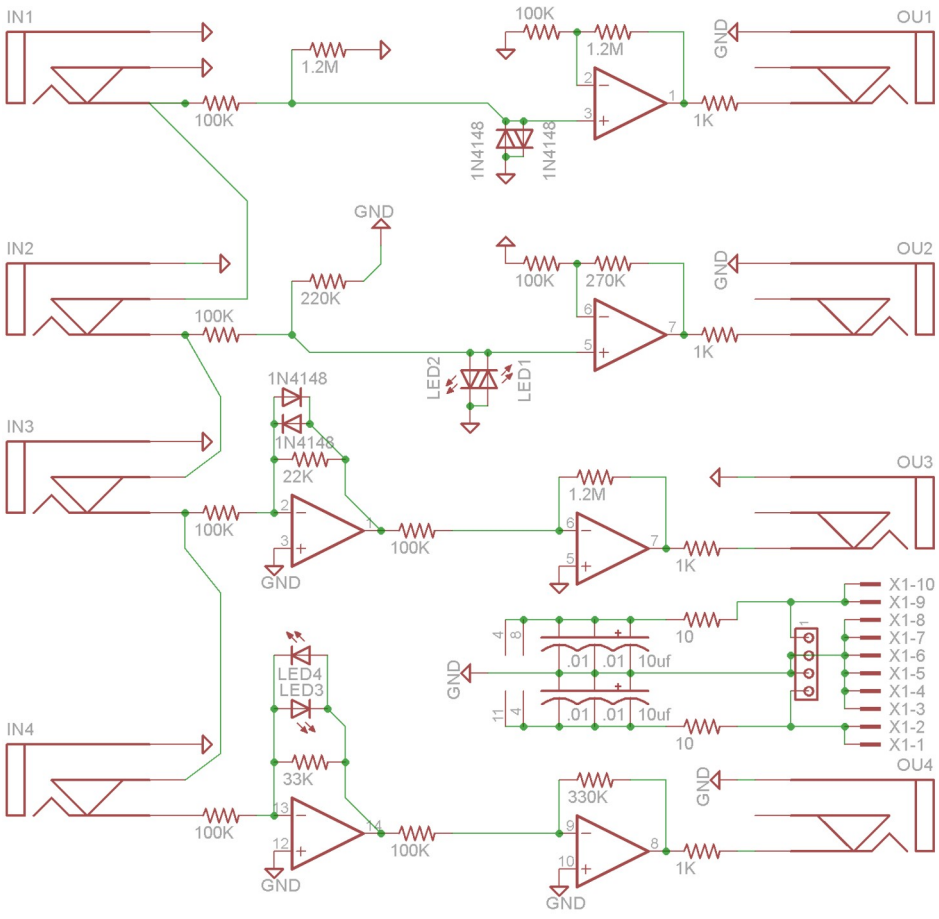
I. Overview/Features

This module is composed of four clipper/distortion circuits. Each circuit has a DC coupled input and output with no controls. Patching through this circuit after a VCA makes for a simple way to add new harmonic content dynamically. The four circuits are are arranged in order of how much they clip the input signal from most to least. The inputs are normalized so a single input can be sent to all four outputs. The four circuits are:

1. 1N4148 diodes in “hard” clipping arrangement.
2. Red LEDs in “hard” clipping arrangement.
3. 1N4148 diodes in “soft” clipping arrangement.
4. Red LEDs in “soft” clipping arrangement.

DEMO MP3. In this clip, a sine wave is fed through a VCA and into the module and the outputs of each channel are listened to going from softest clipping to hardest. This is then repeated with a triangle wave and finally a triangle wave with a positive voltage offset added to it.

II. Schematic.



On the right is the schematic for the module. The top two clipper circuits are the ones in “hard” clipping arrangement, meaning the diodes connect to ground.

Each of these circuits are composed of a voltage divider to attenuate the input composed of a 100K resistor in series with the input and a 1.2M or 220K resistor to ground. Attenuating the input helps control how much signal is clipped by the diodes. This connects to the diodes which will limit the signal swing to just +/- the forward voltage of the diodes.

After the diodes is a non-inverting op-amp gain stage which brings the output signal back up the +/-5V range.

Beneath these stages are the “soft” arrangements. In these the input signal connects to an inverting amplifier with its gain set by the 100K input resistor and the 22K or 33K feedback resistor, making the gain of the stage approximately -0.2 or -0.33. In parallel with the feedback resistor are a pair of diodes. When the output voltage of the op-amp exceeds the forward voltage of the diode, the diode will conduct and bypass the feedback resistor, temporarily providing much greater negative feedback.

The output of these inverting gain stages are fed to additional inverting stages which provide make-up gain to return signal swing to +/-5V and get the output signal in phase with the input signal.

Power connections are shown on the right. It’s my standard arrangement of 10ohm/10uf passive low pass filtering with .01uf caps at the power pins for further HF .

III. Construction

A.Parts List

Semiconductors

Name	Quantity	Notes
TL074	1	DIP package
TL072	1	DIP package
1N4148	4	
LED	4	3mm red LED

Resistors

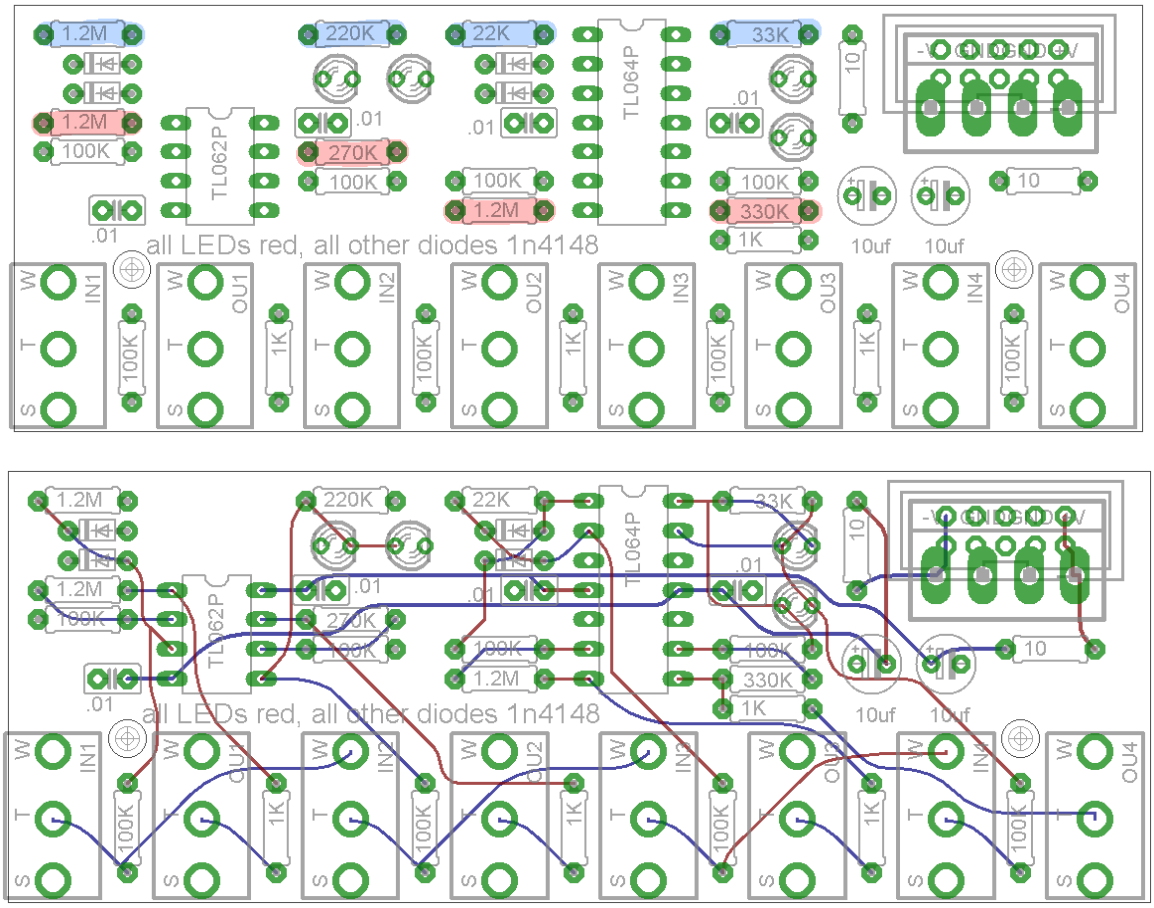
Name/Value	Quantity	Notes
10 ohm	2	1/4W Metal film for resistors unless otherwise noted
1K	4	
22K	1	
33K	1	
100K	8	
220K	1	
270K	1	
1.2M	3	

Capacitors

Name/Value	Quantity	Notes
.01uf	4	Ceramic disk
10uf	2	Eletrolytic

Other

Name/Value	Quantity	Notes
Power connecter	1	Right angle 2x5 2.54mm, like this.
Jack	8	PCB is designed around these jacks: PJ-323M
14 pin DIP socket	1	
8 pin DIP socket	1	



B. The PCB

Above are renderings of the PCB with and without traces. The PCB is 37mm x 98mm with the jacks spaced 12.7mm apart.

The rendering on the left has resistors highlighted in blue and red. Adjust these to tweak the circuit sto your liking, especially if trying other diodes. The resistors are arranged with all of the parts for one circuit in a column.

The blue resistors are used to control how much the input is attenuated. Decreasing their values will attenuate more input signal and result in less clipping. The red resistors control how much make-up gain is applied after clipping. Increasing their values will increase the gain and create a larger output signal.

Below is a photo of a completed module.