BMC021. Full Wave Dual Rectifier Documentation

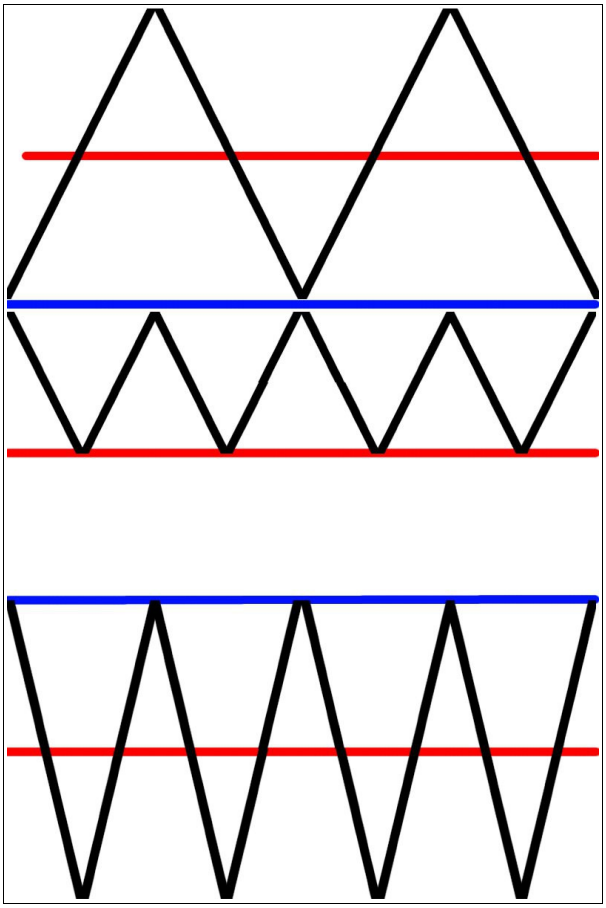
Written November 5th, 2016

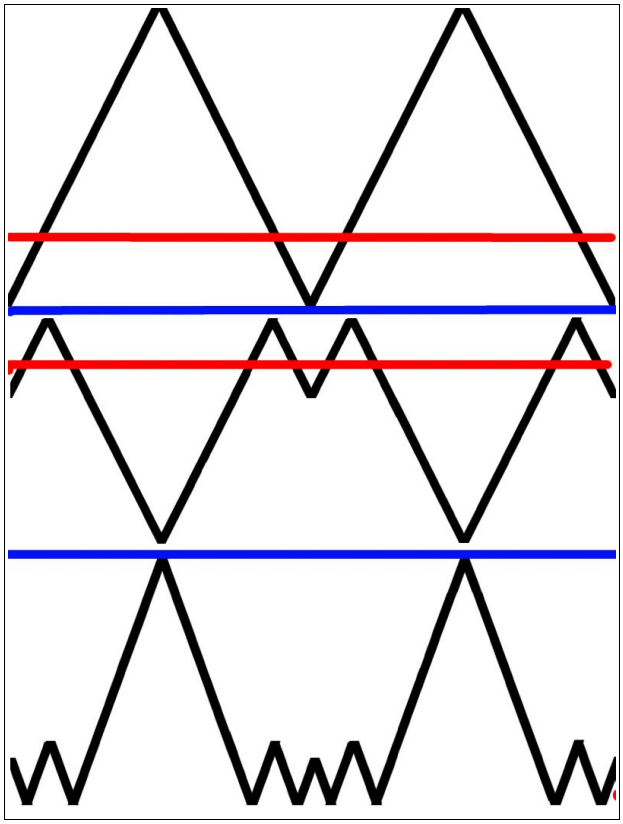
NOTE: ERROR ON LATEST BOARD, SEE LAST PAGE OF DOCUMENT

I. Using The Module

The Full Wave Dual Rectifier module is a waveshaping type module. It containts two full wave rectifying circuits. In the diagram in the lower left, you see the effects of full wave rectification on a triangle wave. The red line is indicating zero volts. At the top, we see a normal triangle wave, below we see that triangle wave with all of it's negative voltages turned positive by the rectifier. And at the bottom we see this signal amplified and offset. As you can see, the frequency is doubled.

On the diagram to the lower right, we see what happens when we apply an offset to the bias of the input. At the top, the red line indicates zero volts again, but a positive offset has been applied. Below that, we see it's output. If we feed that output to another rectifier (with the red line again indicating zero), we'll then get the final output on the bottom.



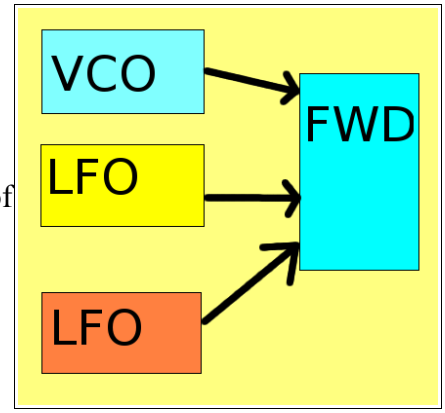


INPUT/OUTPUT/CONTROLS

This module consists of the same circuit repeated twice, it has the following inputs, outputs and controls, per channel.

1.Signal Input - This is where the audio should be input.
2.Bias Input - This is where a DC voltage to offset the bias should be input.
3.Output - This is the rectified output.
4.Bias - This sets the bias manually.
5.Bias Input Attenuate - This attenuates how much the external bias will affect the rectifier.

Sample Patches

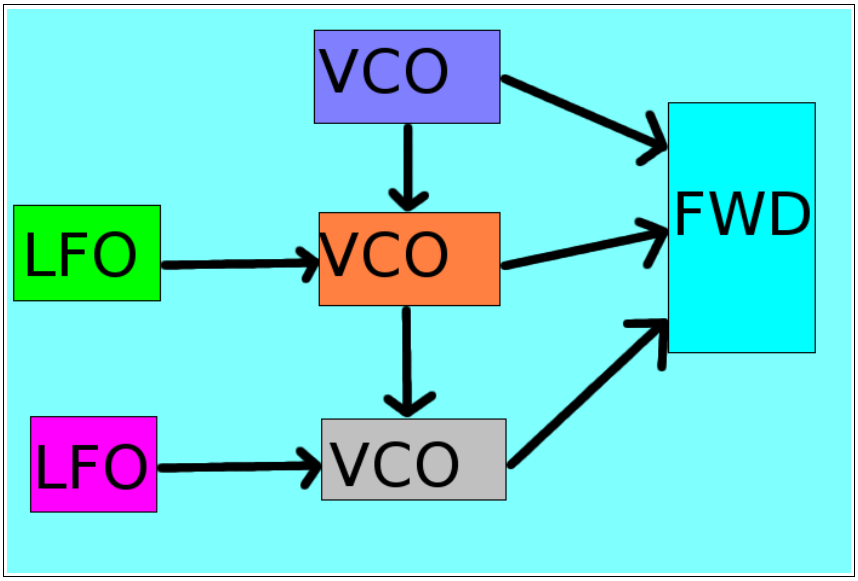


Sample 1 can be heard here. (turn your speakers down, it's a bit loud)

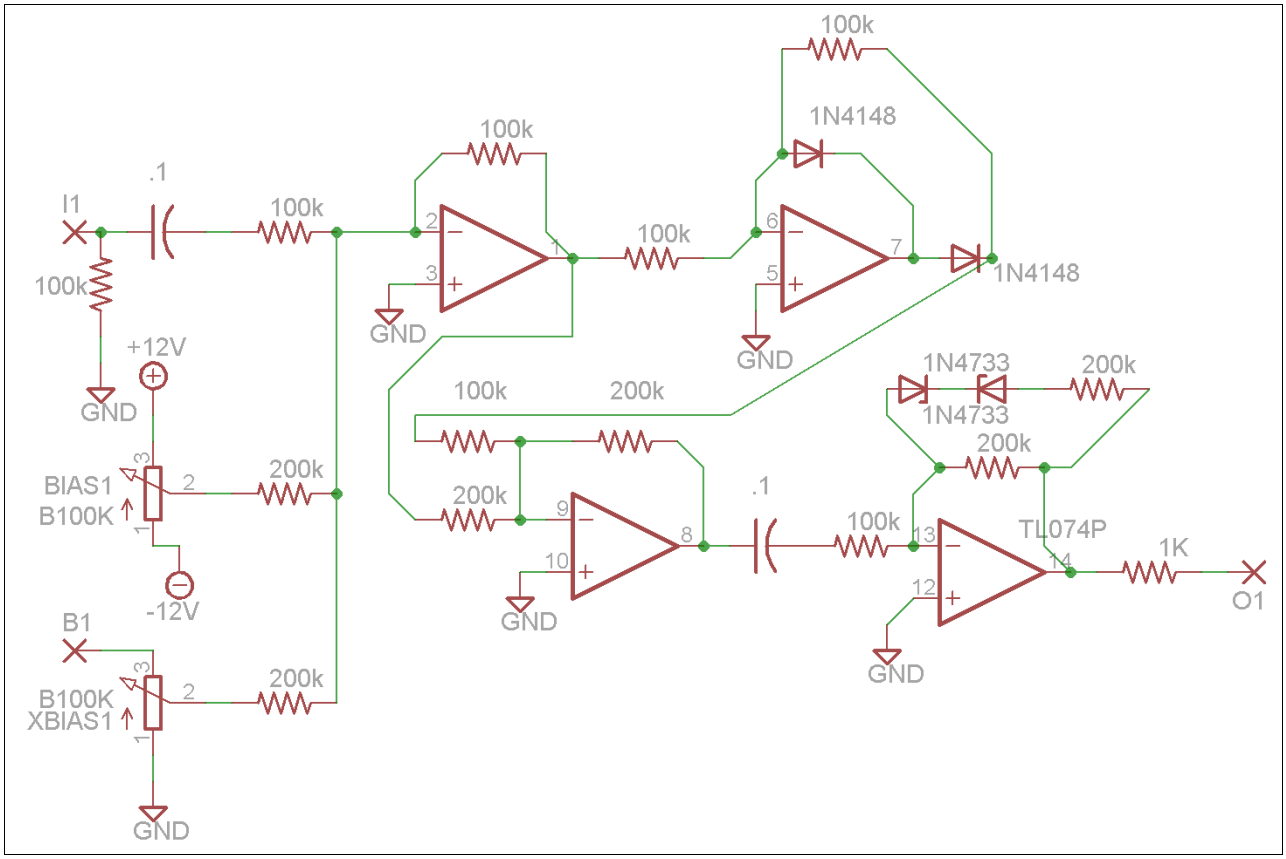
This patch shows a very simple use of the rectifier. The output of one rectifier is being fed into the input of the other, and each has it's bias being modulated by an LFO. The original signal is provided by a VCO.

Sample 2 can be heard here. (again, loud)

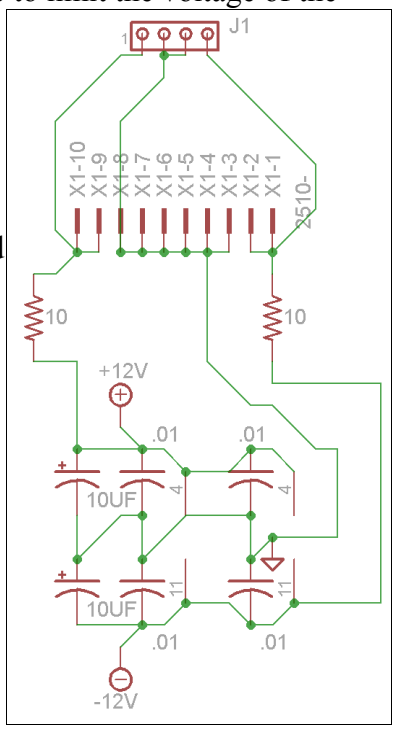
This patch is a bit more complicated, but produces a really dark sound. A VCO1 provides the input signal for the rectifier, and it's also linked to the SYNC input of a second VCO. VCO2 is modulating the bias of one rectifier and providing a SYNC frequency for VCO3. VCO3 is modulating the bias for the other rectifier. LFOs are modulating the frequencies of both VCO2 and VCO3.



II. Schematics



Above is the schematic for each of the rectifiers. On the left, we see the inputs, on top is the audio input, which is AC coupled through the .1uf capacitor. This signal is then mixed with the DC voltage from the bias control and the external bias input. The output of the mixing op-amp is then sent to the full wave rectifier circuit, composed of the next two op-amps. The rectified signal is then AC coupled and sent to a final amplifier stage bringing the signal back up to +/-5V. The two zener diodes and resistor in the feedback loop of the op-amp are there to limit the voltage of the output, as rectified signals can exceed the 10V peak to peak range that most synthesizer modules expect to see. They can be omitted if this is not important to your system.



On the right is the schematic for the power supply. It consists of two power connecters, 10 ohm resistors for filtering and then filtering and decoupling capacitors for the op amps.

III Construction

Parts List

Resistors

Value	Quant	Notes
10 ohm	2	7.5mm lead spacing,
1K ohm	2	" "
100K ohm	14	" "
200K ohm	12	" "
100K Linear Pot	4	PC mount 16MM

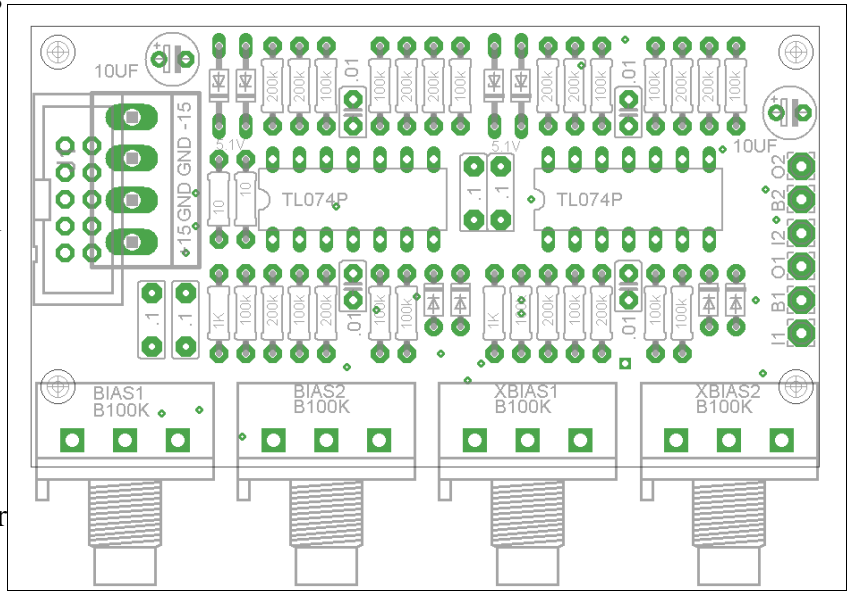
Capacitors

Calue	Quant	Notes
.01uf	4	Ceramic disk 2.5mm lead spacing, value not critical
.1uf	4	Poly box type 5mm lead spacing.
10uf	2	Electrolytic 2.5mm lead spacing.

Other

Value	Quant	Notes
TL074	2	DIP 14 pin
1N4148	4	
1n4733	4	or other low wattage 5.1v Zener
DIP socket	2	14 pin
Power Connecter	1	either Eurorack or MOTM
Jack	6	Either 1/4" or 1/8". It's suggested that one be switching
Knob	4	

To the right is an image of the PCB it is 75mm x 42xmm. The mounting holes are 70mm x 32.5mm. The pots are spaced at 3/4"



Wiring is very simple. Attach each wiring pad to the tip connecter for the jack according to that function. It's suggested that for Input 2 you use a switching jack and connect the switch to output 1 for normalized serial use of the rectifiers. Connect the sleeve of one of the jacks to one of the center pads of the unused power

connecter to ground your jacks.

ERROR ON LATEST BOARD:

If your PCB looks like the one on the right, there is an error in the screenprinting for the MOTM connector. The -V and +V labels were accidentally reversed due to bad formatting of a part in my CAD program. The pad closer to the pots is the positive voltage pad and the one further is the negative pad.

This will be fixed on the next run of PCBs.