

BMC011. Wave Animator

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I. What Is A Wave Animator?

The Wave Animator is a module that belongs in the "effect" category. When fed a ramp, triangle or sine wave, it creates a chorus or string like effect. The only controls are three knobs which control the speeds of three internal LFOs, there is no external voltage control. It is inspired by on Bernie Hutchins' "Sawtooth-Driven Multi-Phase Waveform Animator" from Electronotes #87, March 1978. [Electonotes is available for purchase here, it's awesome.](#)

Below are a few MP3 demos of my Wave Animator. In each demo, it starts with a low pitch and the LFOs set to the slowest rate, I increase LFO rate to maximum, then change the pitch of the oscillator, then freely adjust settings.

[SAW DEMO](#)

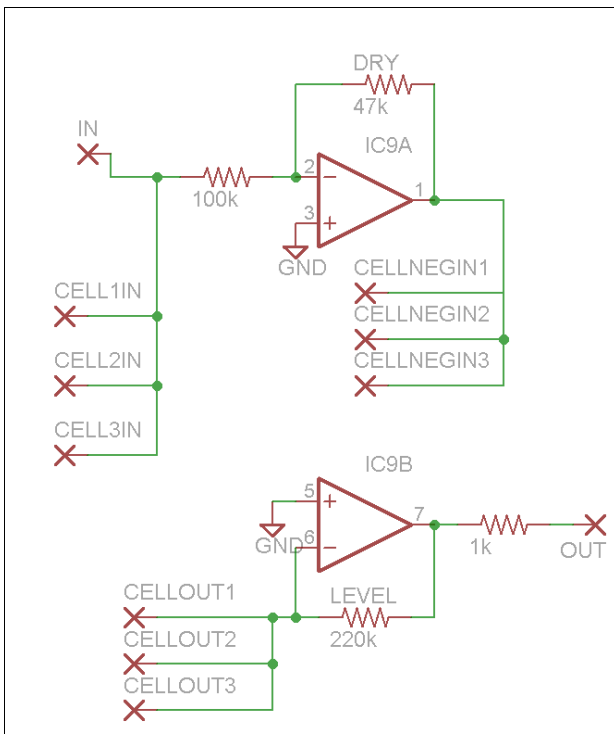
[TRIANGLE DEMO](#)

[SINE DEMO](#)

It should be noted that when no signal is input, the LFOs will make an audible pop on the output as the LFOs cycle, this is normal, but you should remember this so that you don't patch a VCA before the wave animator.

II. Circuit Description/Schematic.

The circuit is composed of three parts, the power supply, the input inverter/output summer, and the main "cell" which is repeated three times. We will look at the input/output circuitry first:



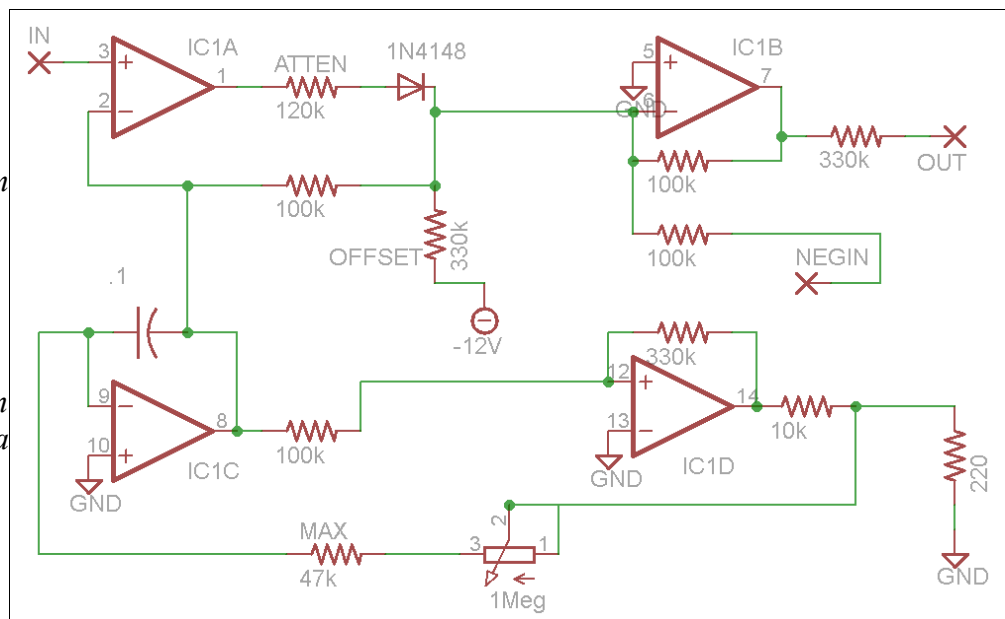
INPUT/OUTPUT: In the upper left hand of the image we see a point marked "IN" is the input of the circuit and should be connected to the tip of an input jack. This gets fed directly to the inputs of the three repeating cells, and then through an inverting amplifier with a gain of 0.5. The output of this amplifier is also sent to the three repeating cells.

Below this circuit we see the output amplifier, it's input is being fed from three output cells and it's output goes through a 1k resistor to prevent shorting the op-amps output to ground when plugging jacks in.

The resistors in the feedback loops of these two amplifiers are marked "DRY" and "LEVEL." Adjusting the value of the "DRY" resistor will change how affected the signal will sound. With 47k it sounds very affected. Increasing the value of

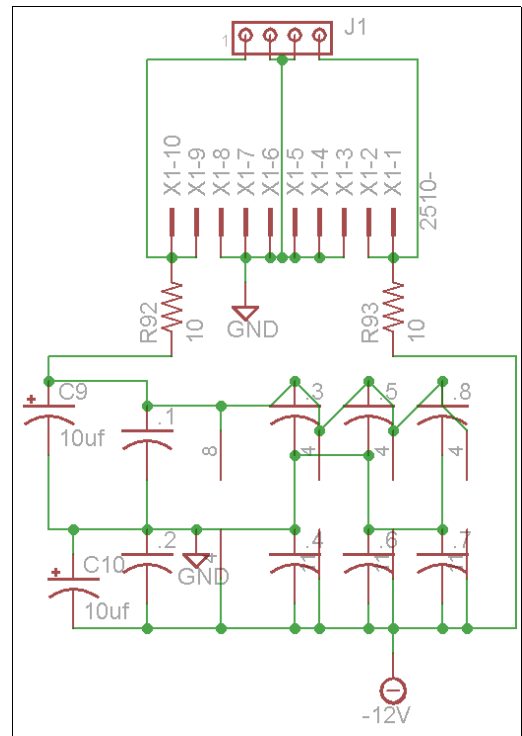
this resistor will make the effect of the module seem less intense, and will also increase the signal level of the module. Adjusting the value of the "LEVEL" resistor changes the output level of the module, making it smaller will decrease the output and making it larger will increase the output, when adjusting the "DRY" resistor, you might need to also adjust the "LEVEL" resistor.

REPEATING CELL: This cell is repeated three times, but is only drawn once. The two bottom op-amps are an integrator/schmitt-trigger type low frequency oscillator, which should be familiar to DIYers. In the top left corner is a comparator circuit with one input tied to the input of the module and the other to the output of the



LFO. The output of this circuit goes through a resistor and then a diode, so that only a portion of the positive output is sent on to the next stage. The next op-amp is a mixer, which mixes in a negative DC offset (because we only used the positive half of the comparator output, we need to recenter to zero), some of the LFO's signal, and the inverted input signal. The output of the mixer goes through a 330k and then on to the output mixer.

POWER SUPPLY: *The power supply for this circuit is very simple, consisting of a connector for the power supply, a small value resistor to isolate low frequency noise out of the power lines, a pair of 10uf smoothing capacitors, and small bypass capacitors at each op-amps power supply pin.*



III. Construction

A. Parts List

RESISTORS

<i>Value</i>	<i>Quantity</i>	<i>Notes</i>
<i>100k</i>	<i>13</i>	<i>7.5mm lead spacing</i>
<i>120k</i>	<i>3</i>	<i>" "</i>
<i>330k</i>	<i>9</i>	<i>" "</i>
<i>10k</i>	<i>3</i>	<i>" "</i>
<i>220 ohm</i>	<i>3</i>	<i>" "</i>
<i>47k</i>	<i>4</i>	<i>" "</i>
<i>220k</i>	<i>1</i>	<i>" "</i>
<i>10 ohm</i>	<i>2</i>	<i>" "</i>
<i>1 K</i>	<i>1</i>	<i>" "</i>
<i>1Meg Pot</i>	<i>3</i>	<i>16mm PCB Mount. "C" Taper.</i>

CAPACITORS

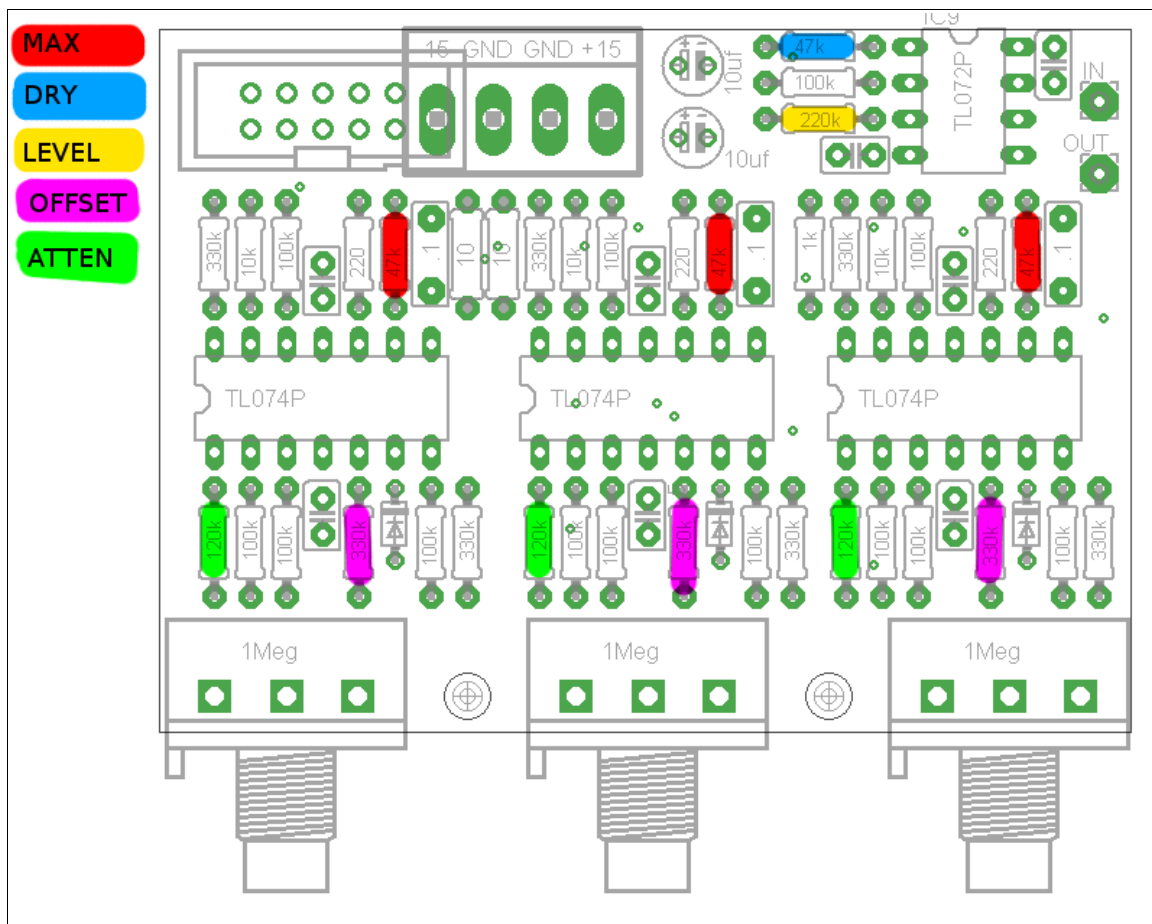
<i>Value</i>	<i>Quantity</i>	<i>Notes</i>
<i>.1uf</i>	<i>3</i>	<i>5mm lead spacing. Metal box film</i>
<i>.01uf</i>	<i>8</i>	<i>2.5mm lead spacing. Cheap ceramic disc, value non-critical.</i>
<i>10uf</i>	<i>2</i>	<i>2.5mm lead spacing.</i>

SEMICONDUCTORS

<i>Value</i>	<i>Quantity</i>	<i>Notes</i>
<i>TL074</i>	<i>3</i>	<i>DIP package, other quad op-amps should work fine</i>
<i>TL072</i>	<i>1</i>	<i>" "</i>
<i>1n4148</i>	<i>3</i>	<i>Or other small signal diode 5mm lead spacing.</i>

OTHER

<i>Value</i>	<i>Quantity</i>	<i>Notes</i>
<i>Power Connector</i>	<i>1</i>	<i>Either Eurorack or MOTM style</i>
<i>14pin DIP socket</i>	<i>3</i>	<i>optional, but recommended</i>
<i>8 pin DIP socket</i>	<i>1</i>	<i>optional, but recommended</i>
<i>Jack</i>	<i>2</i>	<i>1/4", 3.5mm or banana.</i>



PCB Information: The PCB measures 68mm by 50mm, the pots are spaced 1 inch apart. In this diagram, the important resistors from the circuit description are marked, to make fine-tuning/modification/troubleshooting easier later on.