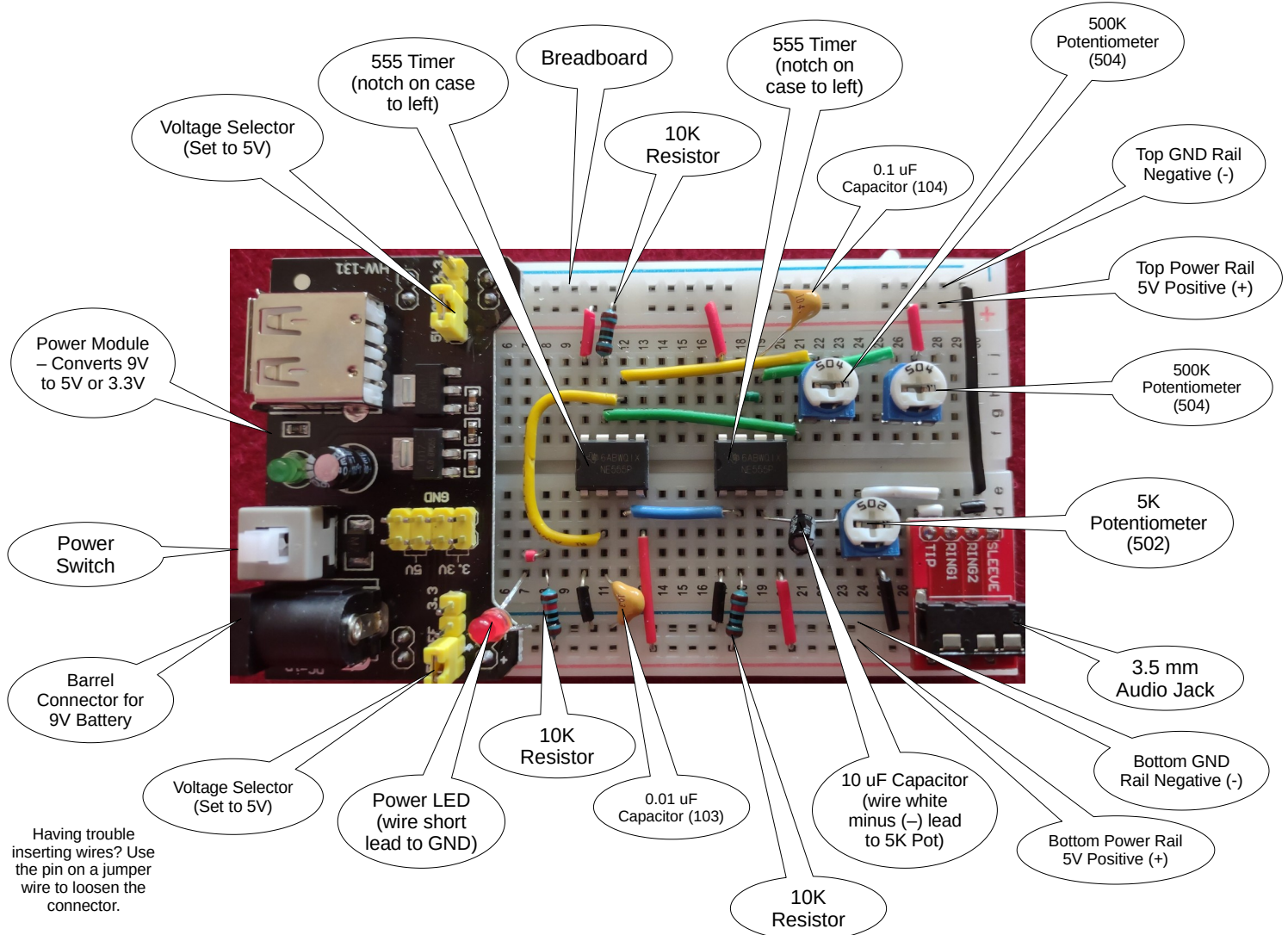


Wildwood Punk Synth

Retro Lo-Fi Sound Synthesizer – Dual NE555 Timers – No Soldering Required

Headphones and 9V Battery not Included



What is Electricity & Current? Electricity is the movement of tiny invisible particles called electrons. Current is the speed of that flow—think of it like water rushing through a garden hose

What is a Circuit? A circuit is a continuous, unbroken loop. Electrons must be able to leave the power supply, travel through your components, and loop all the way back to the start. If a wire drops out, the loop breaks and the synth goes silent.

What is Polarity? Some components are directional. They have a positive (+) front door and a negative (-) back door. If you plug your LED or the 10 μ F capacitor in backward, electricity cannot flow, or it can damage the part!

What is a Breadboard? It is a prototyping playground! Inside the plastic block are hidden rows of metal clips. On the main board, all 5 holes in a vertical column (Rows A-E or F-J) are clamped together by a hidden metal strip. The long outer rows running horizontally are connected all the way across—these are your Power Rails.

What is a Resistor? A resistor acts like a clamp on our garden hose. It squeezes the line to slow down current. We use a 10K resistor to protect your Red LED so it doesn't get slammed with too much energy and burn out.

What is a Capacitor? A capacitor acts like a tiny, hyper-fast rechargeable battery. It stores electricity for a fraction of a second and then dumps it out all at once. The size of the capacitor decides how fast your synth timers can charge up and release!

What is an Audio Waveform? Sound is just vibrating air. When your synth sends pulses of electricity to your headphones, the electric magnet in the headphones pushes a cone of paper or other material back and forth, which vibrates the air. Because the 555 timer turns completely ON and completely OFF instantly, it creates a Square Waveform—a jagged, blocky shape that sounds raw, robotic, and retro!

WARNING: CHOKING HAZARD – Contains small parts. Not for children under 3 years.

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Wildwood Punk Synth – Assembly Instructions

Step 1: Power & Status Light

Plug the power module into the far left edge of the breadboard (columns 1 & 5).
Make sure the small yellow plastic jumpers on the power module are both set to 5V.
Insert the 10K resistor into the bottom (+) rail and column 8, row A.
Insert the long leg (+) of the red LED into column 7, row A. Insert the short leg (-) into the bottom (-) rail. Connect column 7 and 8 at row B using a jumper wire.

Step 2: Place the Synthesizer Brains

Look closely at the 555 timers. There is a notch on the narrow end of the top surface.
Pins are always numbered counter-clockwise, starting to the left of the notch.
Insert 555 timer #1 across the center groove at column 10 with the notch to the left.
Insert 555 timer #2 across the center groove at column 17 with the notch to the left.
Connect pin 1 of both chips to the bottom (-) ground rail.
Connect pin 4 to the bottom (+) power rail and pin 8 to the top (+) power rail.

Step 3: Wire Up Timer #1 (The Tone Pitch)

Connect pin 2 of timer #1 to pin 6 of timer #1.
Insert the 0.01 μ F capacitor (labeled 103) so that it connects timer #1, pin 2 and the bottom (-) rail.
Connect a 10K resistor from timer #1, pin 7 to the top (+) rail.
Plug a 500K potentiometer into the top half of the board around column 21. Connect its center pin to timer #1, pin 6, and one outer pin to timer #1, pin 7.

Step 4: The Brain Link & Timer #2 (The Tone Sculptor)

Connect timer #1, pin 3 to timer #2, pin 2.
Connect a 10K resistor from timer #2, pin 2 to the bottom (+) rail.
Connect pin 6 to pin 7 of timer #2.
Insert the 0.1 μ F capacitor (labeled 104) so that it connects timer #2, pin 6 and the top (-) rail.
Plug your second 500K potentiometer into the top half around column 25. Connect its center pin to timer #2, pin 6, and one outer pin to the top (+) rail.

Step 5: Audio Output & Volume Control

Plug the 5K volume potentiometer into the bottom half around column 23.
Electrolytic capacitors must be wired in the correct orientation for safe operation.
The longer leg goes toward the positive side (5V power) of the circuit.
The shorter leg marked with a black on white minus (-) goes toward the negative side (ground) of the circuit.
Insert the longer leg of the 10 μ F electrolytic capacitor so that it connects to timer #2, pin 3.
Insert the shorter leg of the 10 μ F electrolytic capacitor so that it connects to an outer pin of the 5K volume pot.
Connect the opposite outer pin of the 5K volume pot to the bottom (-) ground rail.
Plug your 3.5mm audio jack breakout into the far right edge of the board so that tip and ring1 are connected to the middle pin of your 5K volume pot, and its ring2 and sleeve are connected to the top (-) rail.

Step 6: Make some Noise!

Turn the 5K volume knob halfway up.
Plug your headphones or a pocket speaker into the 3.5mm jack.
Connect your 9V battery clip to the power module and press the power switch.
Twist the knobs to create retro arcade synth soundscapes!

Hack This Circuit!

Once your Punk Synth is up and running, you don't have to stick to the rules. In electronics, changing a single component changes the entire instrument! Try these hardware hacks:

The Glitchy Drum Mod: Locate the 0.01 μ F capacitor (the tiny one labeled 103 on Timer #1). Swap it out for a larger capacitor, like a 0.1 μ F (104). Your synth will drop from a screeching arcade tone down to a low, chugging, industrial techno heartbeat!

The Laser Beam Mod: Locate the 0.1 μ F capacitor (labeled 104 on Timer #2). Swap it out for a tiny 0.01 μ F (103) capacitor. The audio output will stretch out, turning your instrument into an ultra-high pitch space laser box!

The Light-Theremin Upgrade: Pull out the first 500K potentiometer entirely. Plug a Photoresistor (Light Sensor) into those exact same holes. Now, you can play your synth like a Theremin just by waving your hands to block the light over the sensor.

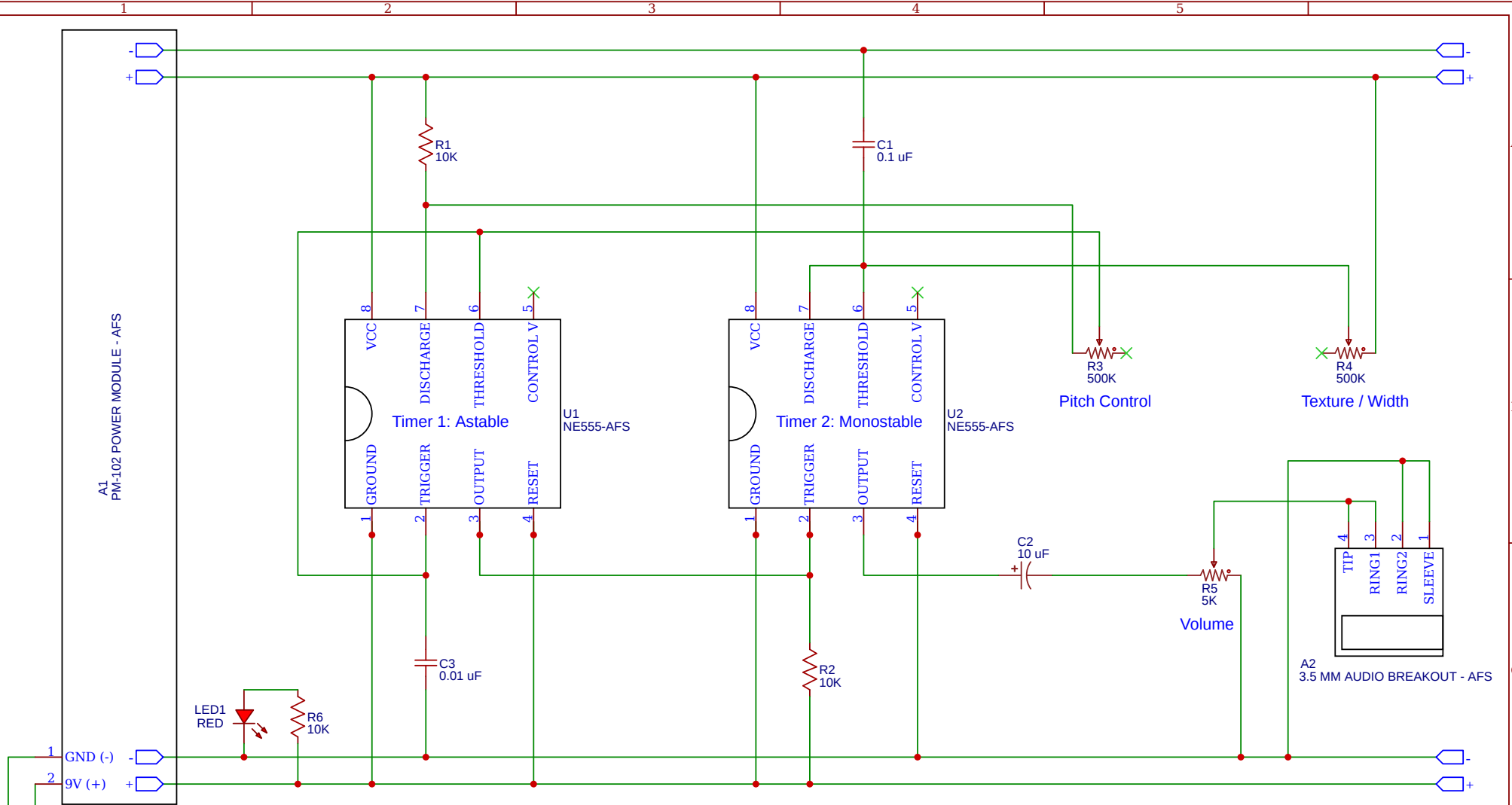
How Does It Work?

The first timer is configured to produce a regular square wave form. This is known as an oscillator (or "astable multivibrator"). The left potentiometer controls the frequency of the first timer.

The second timer is configured to delay a fixed amount after producing an output. The right potentiometer controls the length of the delay. This is known as a "monostable multivibrator".

The first timer triggers the second timer. If the second timer is in its delay state, it ignores the trigger. This means the second timer reduces the frequency by even ratios, depending on the number of triggers it ignores.

These even ratios (1:1, 2:1, 3:2, 4:3, etc) are analogous to intervals in music (unison, octave, fifth, fourth, third). When we turn the second potentiometer we hear these intervals.



Part Identification	
10K resistor	brown, black, black, red, brown
500K potentiometer	504
5K potentiometer	502
0.01 uF capacitor	103
0.1 uF capacitor	104
10 uF capacitor	10 uF

- Important Notes:
- 1. Make sure the small notch on the NE555 IC case is on the left.
 - 2. Make sure (-) lead on 10 uF capacitor is connected to 5K potentiometer.
 - 3. Lines intersecting with a dot are electrically connected. No dot, no connection.

Visit wildwoodsoundworks.com for more information.

This design is based on the Stepped-Tone Generator by Forrest Mims.

NOTE: Schematics diagrams are usually drawn with inputs on the left, outputs on the right, power at the top and ground at the bottom. This one is rearranged so that it's easier to lay out on a breadboard.

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