

# A Bat Simulator for Testing Bat Detectors

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I built a version of Tony Messina's Enhanced Simple Bat Detector from the descriptions on his web pages. While I was quite happy with being able to hear the ultrasonics that this detector put in the normal human hearing range, I had one small problem. How to get a bat to sit still and emit while I was tweaking and trying new component values and other experiments. A handy ultrasonic emitter is literally at hand. By rubbing the thumb and forefinger together, a very good ultrasonic sound is made. Trying to make exactly the same speed and intensity of rubbing while trying out different parts in the design was a problem.

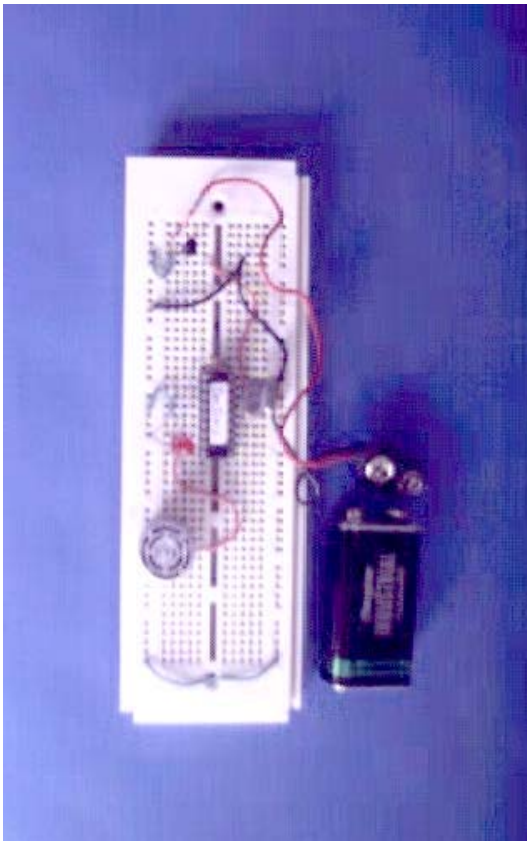
My solution to this problem was to make my own artificial bat! I used a PIC microcontroller and an ultrasonic emitting transducer to simulate the 40kHz tones that bats use. After figuring out the programming to get the 16F84 microcontroller to send the proper ultrasonic signal to the piezo transducer, I kept working. Having the piezo transducer emitting all the time made it difficult to make fine adjustments with a weak signal. The single tone would get lost in the background noise.

The "Bat Simulator with Morse Code Output" was the next logical step. The 40kHz signal is turned on and off using Morse code. The code helps to identify weak signals while testing the bat detectors at long distances. The Morse code on off pattern is quite easily discernible amongst the background noise. The varying distance from the BatSim to the receiver being worked on while still receiving the signal tells me if adjustments (enhancements?) are working or not. I also installed a LED in the output line to let me visually see the output pulses, which works quite well at night. With my version of the Simple Bat Detector I get a reliable signal from the BatSim over 120 feet (about 37 meters) away.

The PIC I used is 16F84. The 16C84 can be used if some lines of code are changed. The PIC oscillator crystal used is 4Mhz. Other crystals could be used but the software delays would be different. The hardware setup for the PIC is: pin 7 (port B1) is the output to the piezo transducer and LED from pin 7 to ground; pin 14 to 5 VDC; pin 4 10K to +5 VDC; pin 5 to ground; 4Mhz crystal across pins 15 & 16; pin 15 & 16 20pF to ground. The PIC is powered by a 5 volt low power regulator running from a nine volt battery. The output piezo transducer I used is a Murata MA40A3S.

Having a reliable signal to test the ultrasonic detectors with has been a great help. The source code for this project is available for non-commercial, personal use.

The BatSim Prototype



## BatSim Schematic

