



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Adam E. Torres	Project Number J1919
Project Title Can You Turn Down the Noise?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to produce two sound waves and switch one 180 degrees out of phase to counter and cancel the other.</p> <p>Methods/Materials I used a circuit board (dual opamp, resistors, capacitors, potentiometers) project box, barbed fitting, vinyl tubing, acrylic pipe, decibel meter, two eight ohm speakers, oscilloscope, four feet of speaker wire, plugs, connectors and two nine volt batteries.</p> <p>Results I was able to produce two audible sine waves at a set frequency and amplitude and by switching one of the sine waves 180 degrees out of phase within the acrylic pipe I was able to produce and measure sound cancellation with a decibel meter.</p> <p>Conclusions/Discussion By creating two sound waves at the same frequency 180 degrees out of phase they completely opposed each other and canceled each other out. Sound has the characteristics of wavelength, frequency, amplitude and velocity in matter. If you can create the opposite wave you can cancel out the original. This can be very useful to cancel out unwanted sound vibration that could be destructive to human hearing, machines and equipment and silent running such as in a submarine bearing noise. There are many useful applications for sound cancellation.</p>	
Summary Statement My project proves that you can cancel sound by producing a second exact sound 180 degrees out of phase.	
Help Received My father helped build the circuit board and borrowed the test equipment from his work.	