



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Leonel Banuelos; Nicholas Ross</b>	<b>Project Number</b> <b>S0204</b>
<b>Project Title</b> <b>Good Vibrations: A Study of a New Method of Vibration Suppression Using Piezoelectric Patches</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This project was designed to test the effectiveness of the Piezoelectric patch as a suppressor of vibrations by attenuating various combination of hertz and voltages of sine waves. <b>Methods/Materials</b> Materials used were a small-scale model of a plane's ventral fin, a synthesizer/function generator, a power amplifier box, an oscilloscope, and three Piezoelectric patches attached to the fin. Voltages (V) (50, 100, 200, and 300) and hertz (10-50 evens) were sent to the patch acting as the actuator, exciting it, and causing it to produce a vibration. The intensity of the vibration was measured by another patch serving as the sensor. Those readings were the constant and the procedure was done again, but with the third patch being excited in the opposite phase, attenuating the force of the vibration. In total, there were 168 tests: 84 done without attenuation and 84 done with. <b>Results</b> The results were compiled into average percentages of vibration reduction. At 50V, the average percent of reduction was 43.03%. At 100V, the average was 42.96%. At 200V, the average was 41.95%. And at 300V, the average was 41.03%. <b>Conclusions/Discussion</b> Considering the data, the objective was not entirely supported. The results show that at most, the average percentage of vibration reduction was 43.03%, which did not meet the 50% expectations, but it did come close.	
<b>Summary Statement</b> Our project demonstrates the use of the Piezoelectric patch to attenuate vibrations.	
<b>Help Received</b> Lionel Banuelos assisted with technical support, project knowledge, Edwards Test Pilot School for use of their lab and equipment, and Maria Caballero & Roberta Ross for purchasing materials for the construction of the project	