



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Edward J. Kronfli, III	Project Number S1610
Project Title Fight Fire with Sound?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In my project, I wanted to tackle the question: How do you extinguish a fire in space? In electrical or electronic control panels? In an aircraft or a submarine? This is a tricky question as traditional extinguishers do not work in micro-gravity environments, and are messy and they run out. The answer: Sound! I discovered that using sound pressure waves, one can extinguish a sizable flame. I wanted to examine the interactions between sound waves and fire. I wanted to determine which frequency would be most effective in extinguishing a constant flame from a Bunsen burner. This can be used to further study engineering applications for extinguishing fire.</p> <p>Methods/Materials In my quest to extinguish fire with sound, I used a ½ inch Bunsen burner, in front of a 12 inch subwoofer, connected to a variable tone generator. Adjacent to that was a scaled board from which to read data. I had run tests in increments of 10Hz from 120Hz to 10Hz at different distances repetitively. Filming the flame was a camera, with a feed to my computer. This camera provided data as to the vertical deflection of the flame. Using this data, I determined the optimal firefighting frequency.</p> <p>Results Through my testing and research, I have concluded that 40 Hz is the optimal frequency for extinguish a flame width of ½ inch. I have also concluded that the closer the flame is to the sound source, the more powerful the sound wave is, therefore instantly extinguishing the flame. I noticed that the optimal frequency is related to the width of the flame. I also tested higher frequencies, which had no appreciable effect on the flame. The range of 20-40 Hz and 50-70 Hz also deflected the flame then eventually, at certain distances, extinguished it.</p> <p>Conclusions/Discussion The idea of extinguishing fire with sound can be a novel one, however, it is efficient and effective, and has many possible applications in today's world. For instance, installed in every electrical control panel, can be mounted a subwoofer on a dedicated circuit, designed to turn on whenever fire is detected. It can be programmed to alternate the frequency based on the width of the flame. The effectiveness of a certain frequency needs to be in proportion with the width of the flame. With many possible applications, fighting fire with sound is a promising venue, in which sound pressure waves can be used to save an important control center, or an astronaut's life.</p>	
Summary Statement My project is about using sound pressure waves to extinguish fire.	
Help Received Father assisted in wiring of electronics and building of experiment tools.	