



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) J. Robbie Eaton	Project Number J1506
Project Title What Makes the Best Hearing Aid? Comparing a Tube, Dish, and Horn	
Abstract Objectives/Goals I wanted to know how the sound detection ability of a hearing aid is influenced by its geometrical shape. The goal is to measure and compare the sensitivity of three sound collectors. My hypothesis is that a dish is best. Methods/Materials I tested each type of receiver over most of the audible range (100 Hz to 15kHz) using a condenser microphone (pickup) monitored by an oscilloscope. The sound source is a hi-fi floor speaker driven by a function generator which produces a short wave packet. The burst repetition rate and packet duration was carefully adjusted to avoid reverb and echoes. I found that a noise filter was needed to obtain accurate measurements. Results Contrary to hypothesis, the horn was the best hearing aid, providing a good boost throughout most of the hearing range. The dish was mediocre until the higher frequencies. The tube showed a very peaked response near 240 Hz, but was generally significantly less effective than the other shapes. Conclusions/Discussion Although pro football games use parabolic dishes, a horn is the best shape for a hearing aid to span a wide frequency range.	
Summary Statement I ran experiments to determine which of three shapes makes the best hearing aid; a tube, dish, or horn.	
Help Received My dad helped by recording data that I read to him during the experiment, and provided a circuit diagram for the noise filter. My mom took photos of me conducting the experiment.	