# CALIFORNIA STATE SCIENCE FAIR
## 2009 PROJECT SUMMARY

**Name(s)**
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**Project Number**
**J0903**

**Project Title**
## Portable Antennas

**Abstract**

**Objectives/Goals**
My goal to test and select the antenna which represents the best compromise of volume, mass, ease-of-construction, ease-of-erection, and gain when used in portable operation with a backpack HF transceiver.

**Methods/Materials**
1. Select four antennas for the project, i.e. a ground plane, an end-fed wire with a counterpoise, a ½-wavelength dipole, and a 1-wavelength loop.
2. Fabricate and test 1/10 scale models
3. Fabricate full-scale antennas. Evaluate ease-of-construction.
4. Pack the antennas for weighing and measuring the volume.
5. Erect the antennas and evaluate for ease-of-erection. Measure SWR to calculate correction for SWR and feedline losses.
6. Test the antennas for gain relative to the 1/2 wave dipole.
7. Average the data collected in step 6 to determine relative antenna gain.
8. Do final analysis for best compromise.

**Results**
The end-fed wire was the easiest to set up but it preformed the worst. The loop was the best preforming, but it was the hardest to set up. The dipole and the ground plane had the same performance but the ground plane only had one wire that needs to be hung. There was a lot of wire when it came to volume so I had to make a few choices. They where all pretty simple to build but the end fed wire did not have to be cut to any certain length.

**Conclusions/Discussion**
After all of the data I collected, I found out that the end-fed wire with a counterpoise was the easiest to set up, but it also had a 15 db. loss over the dipole which we used as our reference antenna. I also figured out that the loop had a 2.5 db. gain over the dipole, and that the dipole and the ground plane had the exact same gain. I concluded that the dipole best met my criteria.

**Summary Statement**
My goal to test and select the antenna which represents the best compromise of volume, mass, ease-of-construction, ease-of-erection, and gain when used in portable operation with a backpack HF transceiver.

**Help Received**
My teacher and fellow students helped erect and test my antennas; Used playground at Granite Bay Montessori school