



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Philip N. Combiths</b>	<b>Project Number</b> <b>S0705</b>
<b>Project Title</b> <b>Changes in Volt/Strength Proportions in Electromagnets</b>	
<b>Objectives/Goals</b> Problem Statement: Does the proportion of voltage to strength of an electromagnet change as the amount of volts of electricity increases?  Hypothesis: I believe that the proportion of voltage to strength of an electromagnet will begin to lessen as the voltage increases.	
<b>Abstract</b> <b>Methods/Materials</b> Materials: 1 iron Allen wrench; 2 battery holding devices; 2 copper clips; 5 m. insulated aluminum wire; 2 m. non-insulated copper wire; 100g. iron fillings; 1 voltage meter; 1 electronic scale; 1 magnetic field probe  Procedures: A. Construct an electromagnet from an Allen wrench, batteries, and wire. B. Voltage of batteries used was measured. C. Magnetic force of electromagnet was tested with probe. D. Electromagnet was placed over iron fillings for five seconds. E. Electromagnet was moved onto electronic scale and fillings were dropped. F. Fillings were measured. G. Experiment was repeated with a different voltages.	
<b>Results</b> Results: The proportion of voltage to weight got smaller as the voltage increased.	
<b>Conclusions/Discussion</b> Conclusion: My conclusion is that as the voltage increases, the electrons in the wire become crowded and work less efficiently, forcing the increase in the electromagnet's strength to lessen.	
<b>Summary Statement</b> It compares the propotional changes in electromagnet strange with varying voltages.	
<b>Help Received</b> My parents drove me to stores to buy equipment.	