



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Mitchell T. Maas	Project Number S0908
Project Title Electromagnetic Propulsion: Phase III	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Will redesigning the 1000 turn Electromagnetic coil into two 500 turn Electromagnetic Coils optimize the launch distance of the rocket. If so, what percentage of change will occur between Phase II data and Phase III data.</p> <p>Methods/Materials Methods: Redesign the existing Phase II Electromagnetic Launcher utilizing the existing 1000 turn coil, and split it into two 500 turn coils, with dual permanent magnet stacks. Build new coil winding machine to unwind and rewind redesigned coils. Test: Test the redesigned dual coil launcher from one to four capacitors and compare the launch distance data with the Phase II data. Materials: Use existing magnet wire (29 ga.) to build two coils, modify existing 1# wood and masking tape. 1# wood coil winding base and 5/8# square wood for winding spindle. Plastic spool for winding wire.</p> <p>Results I redesigned the launcher utilizing only the existing coil material to create two 500 turn electromagnets. I tested the new dual coil launcher using the same test methodology as in Phase II. I had predicted 10% improvement in launch efficiency, and I actually achieved 35% improvement at the maximum distance. The results clearly showed that I had utilized all the stored energy in a much more efficient method than in Phase II. I was clearly impressed that just by optimizing the existing launcher design, I could achieve a 35% improvement.</p> <p>Conclusions/Discussion My hypothesis was correct. I had predicted that the redesign of the 1000 turn launch coil into two 500 turn coils would make the rocket more efficient. It was more efficient, but not by the 10% I had predicted, but 35%. I was impressed that the energy stored was utilized fully, as evidence by the graphs showing launch distance.</p>	
Summary Statement Optimizing my existing electromagnetic launcher, utilizing the same materials and developing a coil winding machine.	
Help Received Father helped me unwind the existing coil, and counted the number of turns for the two 500 turn coils, using my new winding machine. He also helped me verify the launch distance readings. My mom also helped verify the launch distance readings. Mr. James Edman supported and reviewed my new schematic	