



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Henry D. Alkire	Project Number J0103
Project Title The Effect of a Propeller's Design (Manufacturer) on Its Static Thrust	
Abstract Objectives/Goals I designed this experiment to test the static thrust of three designs of 8x4 model aircraft propellers (figure 1) and determine if there is a difference Methods/Materials Materials: Three 8x4 propellers of different manufacturers' design (GWS, APC, Master Airscrew); E-flite 480 outrunner brushless motor; Spring scale (measures newtons); Coat hanger; 20 amp electronic speed control; 7.2 volt 1000mah Nicd battery; Five thin sticks of wood and one plywood sheet. Methods: Preliminary: The stand was assembled from the wood and coat hangar listed in materials. -Experiment: The motor was then run at full throttle using each of the three propellers. The motor's thrust pulled the stand forward on its pivot point and moved the spring scale. A reading of the motor's thrust was taken on the spring scale after 10 seconds of run time. Each propeller was tested 7 times. The results were graphed and the median thrusts were compared. Results The APC propeller's median thrust was 2.4 newtons, the GWS prop's median thrust was 2.3 newtons, and the Master Air Screw's median thrust was 2.0 newtons. Conclusions/Discussion Conclusion: My hypothesis was disproved, each design generated a different level of static thrust. The APC prop generated the most thrust. Discussion: This test proved that the propeller's design makes a difference in the the props performance. In aircraft flight, higher static thrust means more performance during aerobatics and at low airspeeds. I believe that the APC propeller's wider, but thinner airfoil allowed it to move more air. The fact that it utilized carbon fiber in its construction, may have allowed its manufacturer to design a broader airfoil without gaining in thickness and weight. Ironically, the Gws propeller, which was the only propeller that didn't have an advertising claim, outperformed the Master Airscrew, which had a paragraph of advertising and self promotion. The Gws propeller had a straightforward design with thin, semi-rounded blades. The master airscrew had a thicker square shaped airfoil.	
Summary Statement This project was a test of the static thrust of different designs of 8x4 model propellers	
Help Received Catherine Alkire (parent) helped design board and type. Randy Oliver (science teacher) helped in design of stand Harry Stewart (friend) helped with equipment questions	