



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Evan M. Gates	Project Number 22668
Project Title The Effects of Spin Stabilization in Amateur Rocketry	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to research the effects of spin stabilization on the altitude of an amateur rocket. The hypothesis was that while spin is beneficial for stabilization purposes, excessive spin could result in a decrease in altitude.</p> <p>Methods/Materials Six Aerotech Airspike rocket kits were used for this project. Five of the rockets included the addition of fin tabs at different angles to induce various amounts of spin. A payload section was also added to house electronics used to record flight data. For recording flight data, a Rocket Data Acquisition System, or RDAS, unit was used. The RDAS is equipped with an altimeter, accelerometer, and six analog-to-digital channels for recording additional data. A photo cell circuit, wired to the RDAS unit, was used to determine roll rate. Each rocket was flown an average of three times to gather data. All flights used an Aerotech Econojet F20-7 rocket motor.</p> <p>Results The data from the flights was recorded on the RDAS unit and then downloaded onto a computer and graphed for analysis. The results proved the hypothesis. The faster a rocket was spinning, the lower the altitude achieved.</p> <p>Conclusions/Discussion The energy taken to spin the rocket decreased the altitude achieved. The final results plotted on a graph as altitude versus roll rate, shows a second order equation. This was found to be caused by the amount of drag produced by the spinning of the fins, with this drag being proportional to the square of the angular velocity.</p>	
Summary Statement This project researched the effects of spinning on the altitude of a rocket, and showed that the altitude decreased proportionally to the square of the roll rate.	
Help Received Mentor helped refine experiment plan; Father supervised construction and launch of rockets; Parents helped format and proofread.	