



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) William L. Pedrotti	Project Number J0216
Project Title Backyard Ballistics	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Paintball guns have held my interest for a long time. Accuracy and distance are crucial ballistics questions in these games. This project investigated the effect of pressure and barrel lengths on the variables distance and accuracy in the flight of common foam NERF darts.</p> <p>Methods/Materials A custom pneumatic gun was built with interchangeable barrels from PVC pipe. It can be pressurized to a 120 psig with a bicycle pump. Two tests were performed, one of distance, another of accuracy. For the distance measurement, a 45-degree shooting bench was used on a 200-ft outdoor range. Seven pressures from 5 to 80 psig of four trials each were shot for both the 12-inch and 30-inch barrels. In the accuracy measurement, a horizontal bench was used on an indoor 20-ft range, shooting at 6-in diameter targets. Five different pressures between 5 and 30 psig were shot for four darts each with both barrels.</p> <p>Results In the distance measurements, NERF darts traveled from 40 ft to over 200 ft; and varied quite a bit, but showed increasing average distance with pressure and barrel length. The average accuracy was improved from 8.5 inches to 2.5 inches by increasing pressure and barrel length.</p> <p>Conclusions/Discussion On average, longer barrels and higher pressures send a dart further and more accurately, verifying the initial hypotheses. There is a diminishing return to increasing pressure beyond 10-20 psig. The increases in accuracy were small but consistent and were limited by the test method. If you want to be more successful in paintball wars, use high pressure and longer barrels.</p>	
Summary Statement It is a study of the variation of accuracy and distance in the flight of common NERF darts with both barrel pressure and length using a custom built pneumatic gun.	
Help Received The idea for the custom gun came from Mr. Brian Felker. My dad helped me with the taking of the data. My mom and dad helped type sections of the report and poster. My sister helped with poster design.	