



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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| Name(s) L. Austen Bradley | Project Number J0702 |
| Project Title Jumping Through Hoops | |
| Objectives/Goals Mass drivers move objects with electromagnetism. My project was designed to determine the relationship between voltage sent to electromagnetic coils and the frequency of coil energizing required to move metallic objects of different weights. I predicted that increasing the coil voltage and pulsing the energy faster would cause faster object movement. | |
| Abstract | |
| Methods/Materials My mass driver uses coils of wire wrapped around a plastic straw and the coils are energized sequentially by a homemade distributor. Electricity flows to the coils when hacksaw wipers on a rotating CD disk make contact with guitar string brushes. For my experiment the disk turned at a set speed or frequency and the coil voltage was independently varied to cause movement of a metal rod in the straw. I used rods of three different weights. | |
| Results Voltage required to cause movement of a metal rod varied as an exponential function with frequency. With heavier rods, more voltage was required to cause movement and the relationship between coil voltage and frequency of coil energizing became more linear. | |
| Conclusions/Discussion My experiment showed that a mass driver is able to pull or push a mass through a tube using electromagnetic force. The greater the object's weight, the more voltage is required for movement at a given frequency. My experiment implies that to move objects quickly using electromagnetism higher frequencies and more energy are required as the object's weight increases. | |
| Summary Statement My project involves moving a metal rod in a plastic straw using electromagnetism and varying the voltage and frequency of energy pulsing. | |
| Help Received My father helped me build the distributor and wire the project. My science teacher, Mr. Long, guided and encouraged me. My mother helped me to assemble the project board. | |