CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

R. Pat Capulong

Project Number

S0903

Project Title

The Effect of Distance between Two Inductively Coupled Windings on the Current Induced across the Secondary Winding

Abstract

Objectives/Goals

This experiment explored the question: "What is the effect of distance in millimeters (mm) between two inductively coupled windings on the current in milliamperes (mA) induced across the secondary winding?" It was conducted to determine the potential and limit of inductive charging.

Methods/Materials

The hypothesis was, "If the secondary winding is placed 2 mm, 4 mm, 6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 16 mm, 18 mm, and 20 mm away from the primary winding, then the electrical current of secondary winding will be less than 3 mA." To test the hypothesis, an oscillator with a primary winding of coil and a resonator with a secondary winding was built. The primary winding was kept stationary and the secondary winding was distanced 25 various measurements at which the current of the secondary winding was measured ten times. The control group consisted of the aforementioned apparatus, but the windings were kept tangent and then measured for current.

Results

The results of this experiment showed that 0 mm distance yielded the most current, 1.42 mA, and that 50 mm yielded the least current, 0.01 mA. A major pattern noted was an inverse relationship between the distance between the windings and the current of the secondary winding.

Conclusions/Discussion

In conclusion, the data observed supported the hypothesis, although the miniscule amperage readings were not anticipated.

Summary Statement

This experiment was conducted to explore the potential and limits of inductive charging, a method of wireless power, by constructing an apparatus that wirelessly transmits energy through an electromagnetic field.

Help Received

Lateef Kajouke obtained materials; Neighbor Gregory Stiles provided tools and safety lessons; Dutch hobbyist Ko Tilman helped create schematic.