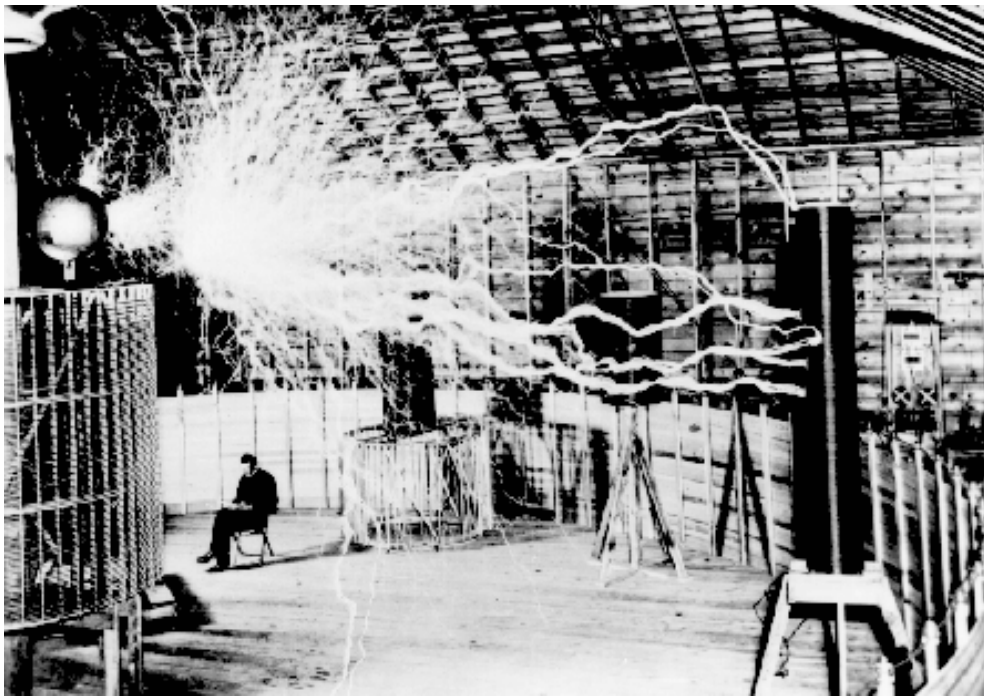


**IDGAF**

**-BF-R-**

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**Abstract:**

We hope to measure altitudes effect on earth's magnetic field, and observe magnetic induction in a coil due to earth's natural magnetic field, compared to the theory of magnetic flux

# I.D.G.A.F.-Analysis

## Purpose:

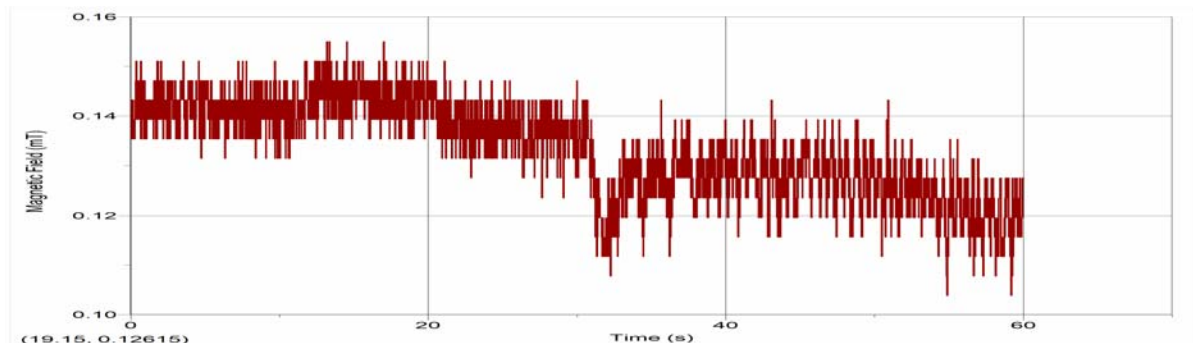
The purpose of this experiment was to measure the effects of earth's magnetic field strength versus altitude, using two different methods for measuring the earth's magnetic field. One was through a device that we were given using magnetic flux. The other we created ourselves using Tesla's theory of EM induction. We were not only testing to measure the earth's magnetic field but also to see if we could create our own device and see how accurately it could measure earth's magnetic field compared to the other device.

## Source and Origin

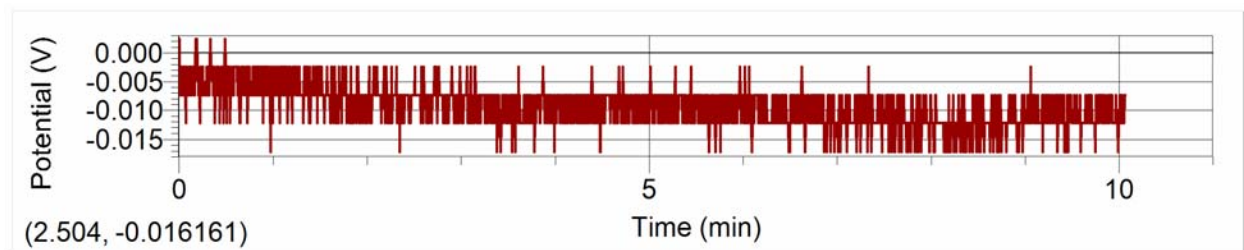
Data came from several sources. One was from a device that measured the earth's magnetic field using fluxuation. The other apparatus we created using several different devices. First we wrapped 300ft of wire around a Styrofoam square and hooked up a pair of voltmeters to that so we could measure the EM induction. We also used a barometer to give us accurate altitude readings, and an accelerometer to measure what forces were acting on the device as it went up so we could tell if there was any movement along the z-axis that was messing up our data. We also used the fluxuation device to measure the magnetic field at the ground so we could have a ground reading to compare our data to.

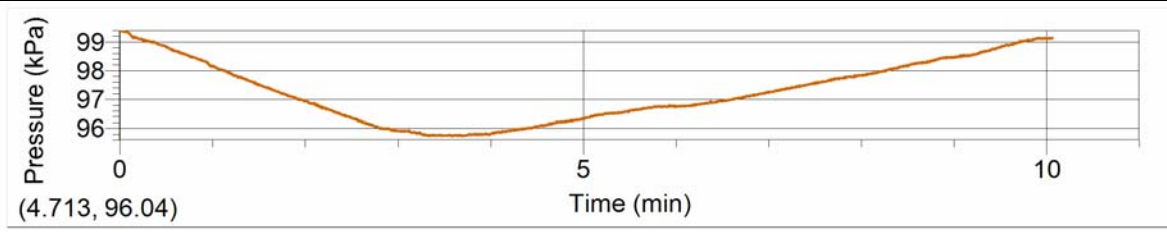
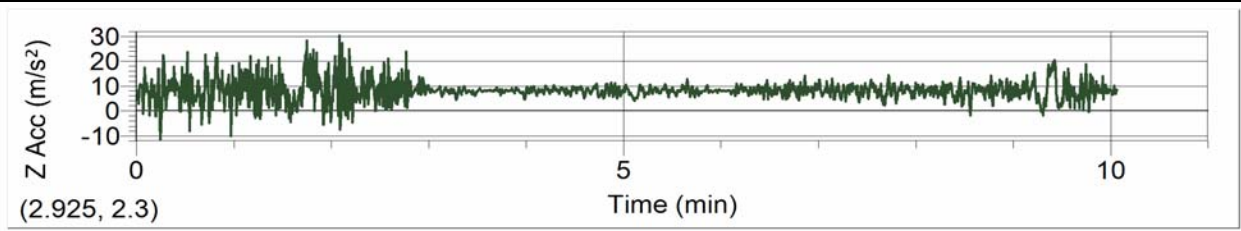
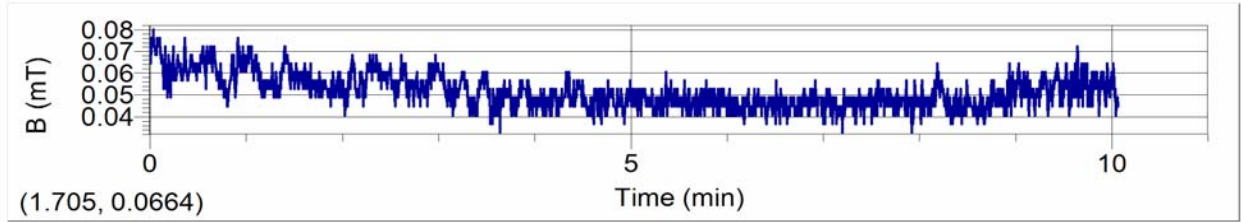
## Data

Ground Test:

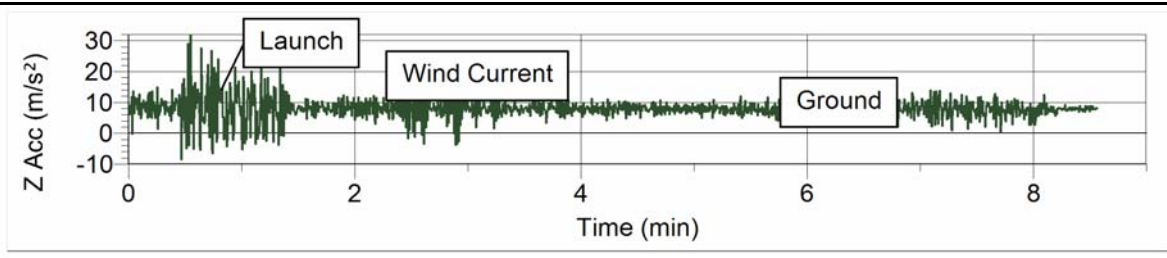
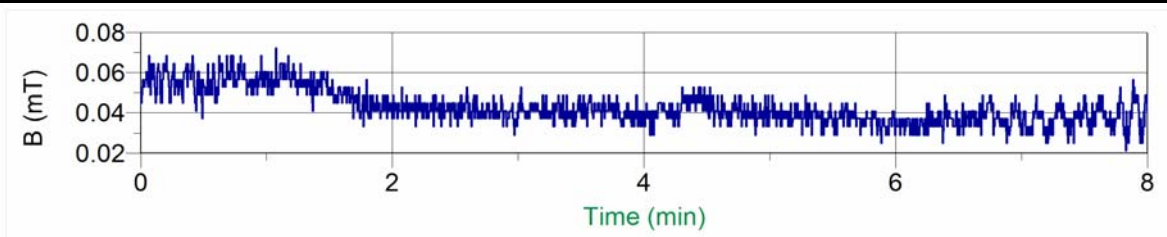
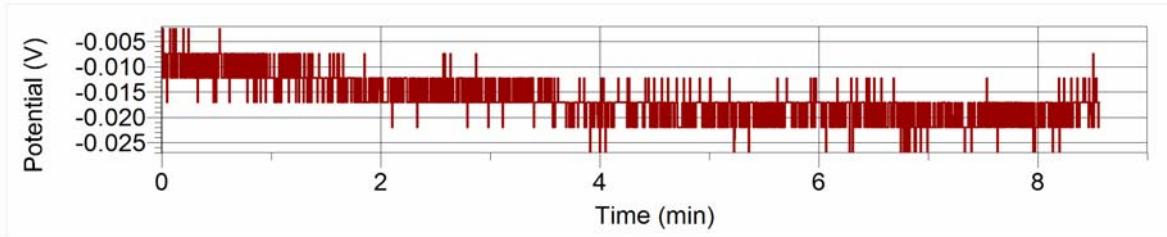


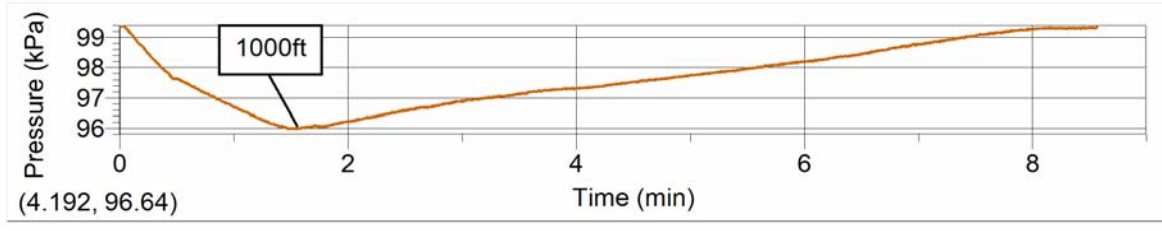
Trial 1:



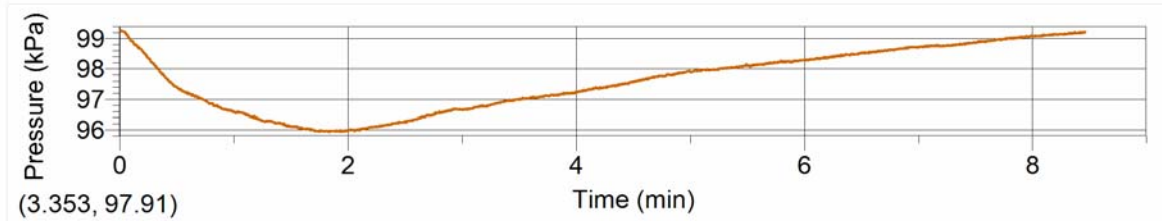
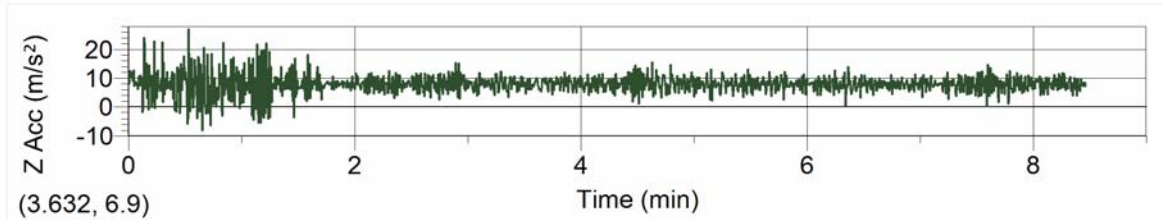
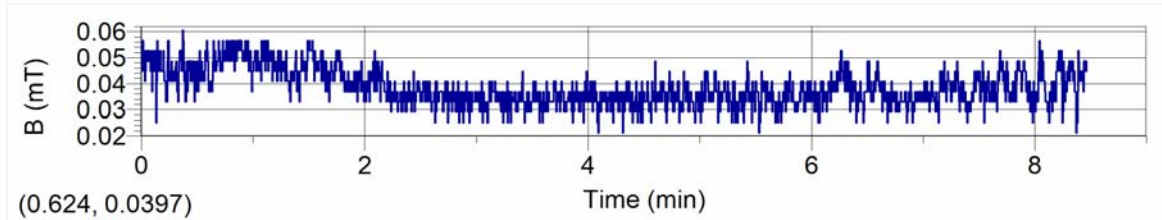
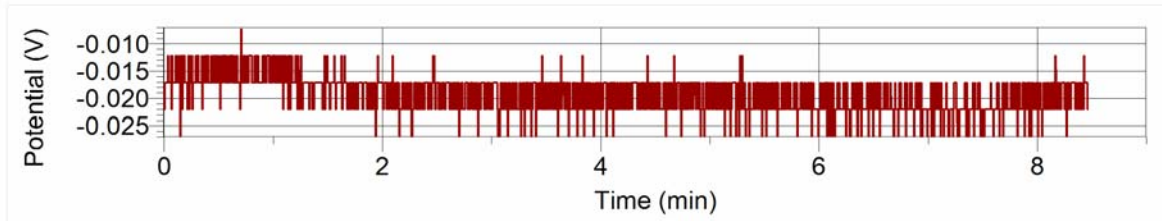


Trial 2:





Trial 3:



### Calculation of % Error

To calculate percent error we used the equation  $B = \epsilon / LV$ , which called for the length of the wire the velocity and the voltage. We used this to calculate what we got for earth's magnetic field and then compared it to  $\sim 5.0 \times 10^{-5}$  Teslas which is the accepted value for earth's magnetic field

### Hypothesis A

Earth's magnetic field strength decreases over altitude.

Test 1: The strength in the magnetic field for both devices should go down as the pressure goes up.

Test 2: The readings for both devices should match the ground readings before and after the test is run.

Test 3: Both devices read the same as the accepted value for our place and time, which we will get from the internet.

Hypothesis A1: Earth's magnetic field decreases over altitude, with varying rates depending on location and time.

Conclusion: From the data we have concluded that the strength of earth's magnetic field does decrease with altitude the amount at which it decreases depends on the time of day and location. Next time we would like to try getting a reading of earth's magnetic field threw out the day so we could see the effect that time has on it. We would also like to perform the same experiment at the same time but at different locations so we could have different readings to compare.

### **Hypothesis B:**

We will be able to create our own apparatus that measures earth's magnetic field using Tesla's theory of EM induction.

Test 1: Both devices increase and decrease proportionally to each other.

Test 2: Our devices measurements match the standard measurements for earth's magnetic field at that time and location.

Test 3: Our device is able to get accurate readings at ground level.

Test 4: Our device gets accurate readings with out constant rotation.

Research: Magnetic field strength for Tobin James at 10:00 am 5/9/09 was 52 mT

Hypothesis B1: If we us Tesla's theory of EM induction then we will be able to get an accurate reading of earth's magnetic field.

Hypothesis B2: Constant rotation is needed for accurate readings when using the theory of EM induction to measure earth's magnetic field.

Conclusion: From the data we see that we were able to get data from our device but with only about 57% accuracy compared to the accepted constant for earth's magnetic field. We would like to redo the same test but this time make it so that our induction device is spinning at a constant rate, because although we were able to get data by just using the movement caused by the balloon. If we could keep the spinning constant the data would be much more accurate and would hopefully have less uncertainty.