PH170: Waves and Electromagnetics Laboratory (0-0-2:1)

Laboratory 6

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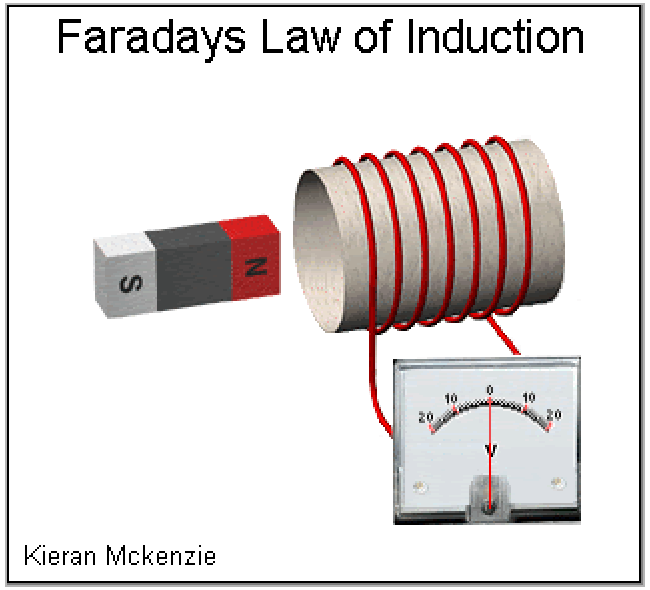
FARADAY'S LAWS OF ELECTROMAGETIC INDUCTION

I Law : Whenever a conductor is placed in a varying magnetic field, an electromotive force is induced. If the conductor circuit is closed, a current is induced, which is called induced current.

II Law : The induced emf in a coil is equal to the rate of change of flux linkage.

$$\varepsilon = -N\frac{\Delta\varphi}{\Delta t}$$

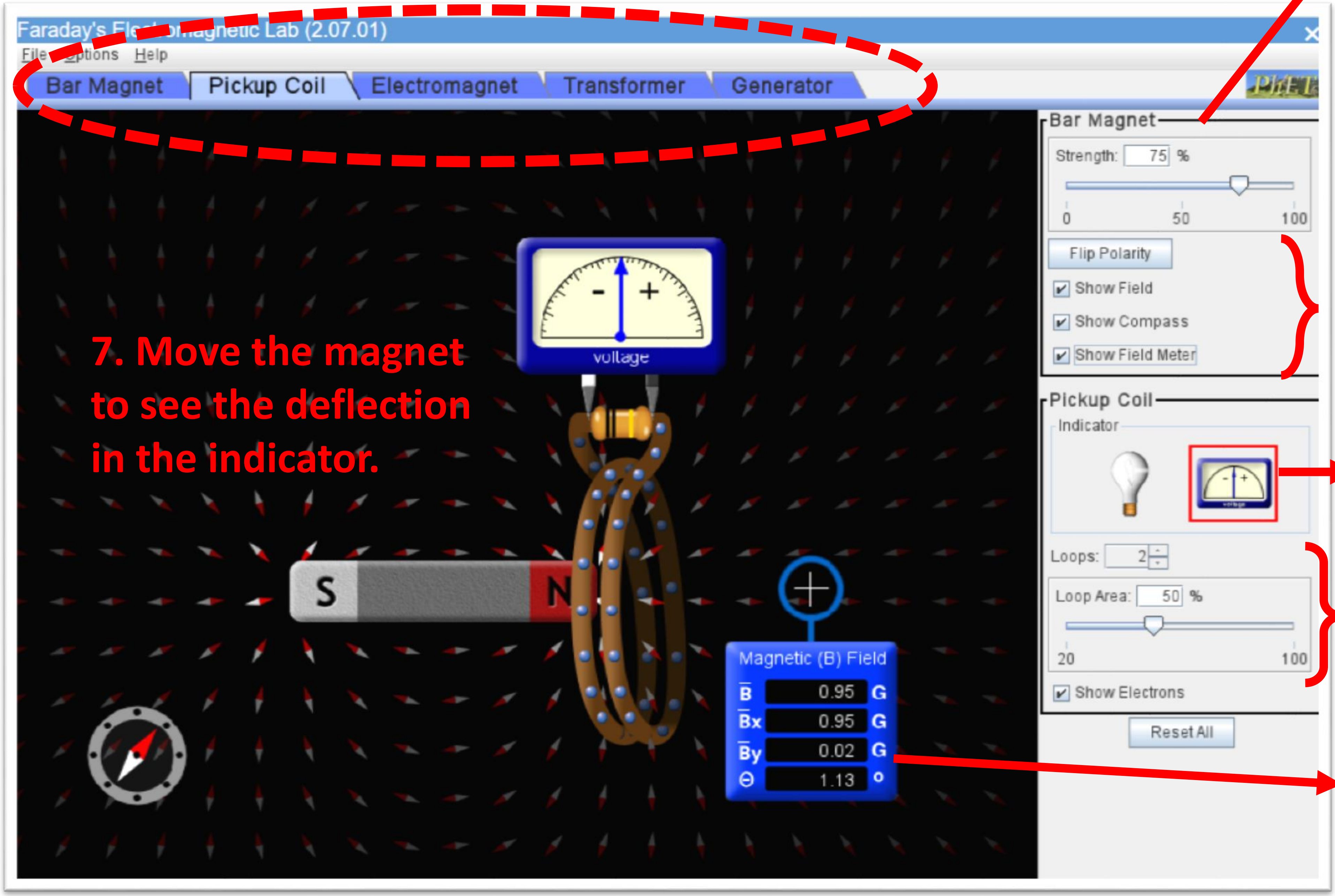
Lenz Law : The polarity of induced emf is such that it tends to produce a current which opposes the change in magnetic flux that produced it.



The Simulator

1. Choose the environment

2. Adjust the strength.



3. Turn on the compass and field meter.

4. Choose indicator.

5. Adjust loop area and number of loops.

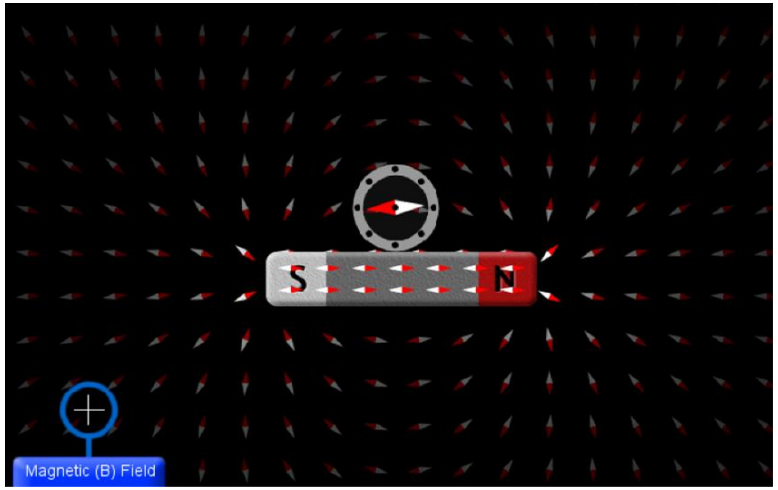
6. Measure magnetic field

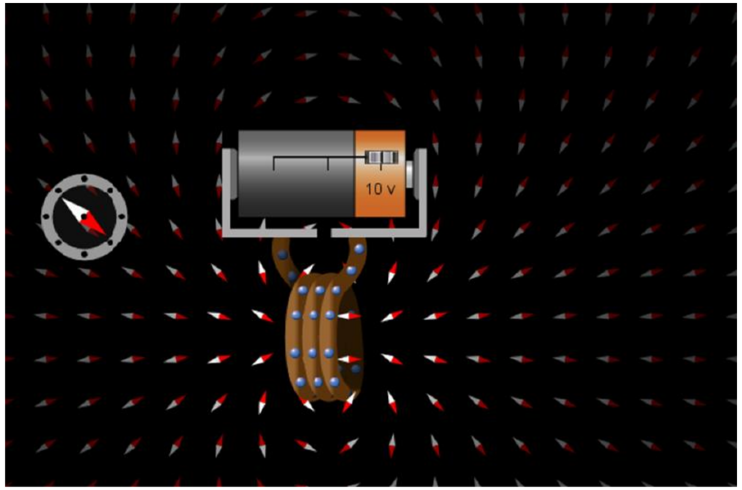
AIM

1. Predict the direction of the magnetic field for different locations around a bar magnet and an electromagnet.
2. Compare and contrast bar magnets and electromagnets.
3. Identify the characteristics of electromagnets that are variable and what effects each variable has on the magnetic field's strength and direction.
4. Relate magnetic field strength to distance quantitatively and qualitatively.
5. Identify equipment and conditions that produce induction.
6. Compare and contrast how both a light bulb and voltmeter can be used to show characteristics of the induced current.
7. Predict how the current will change when the conditions are varied.

Aim 1 : Predict the direction of the magnetic field for different locations around a bar magnet and an electromagnet.

Aim 2 Compare and contrast bar magnets and electromagnets.





Bar Magnet: Direction of magnetic field outside the magnet is north to south and in opposite direction inside.

1. we cannot change the strength of the magnetic field.
2. permanent magnet that needs no power.
3. Polarity cannot be changed.

Electromagnet: The direction of magnetic field is curling around the coil.

1.We can change the strength and direction of the magnetic field in the electromagnet.

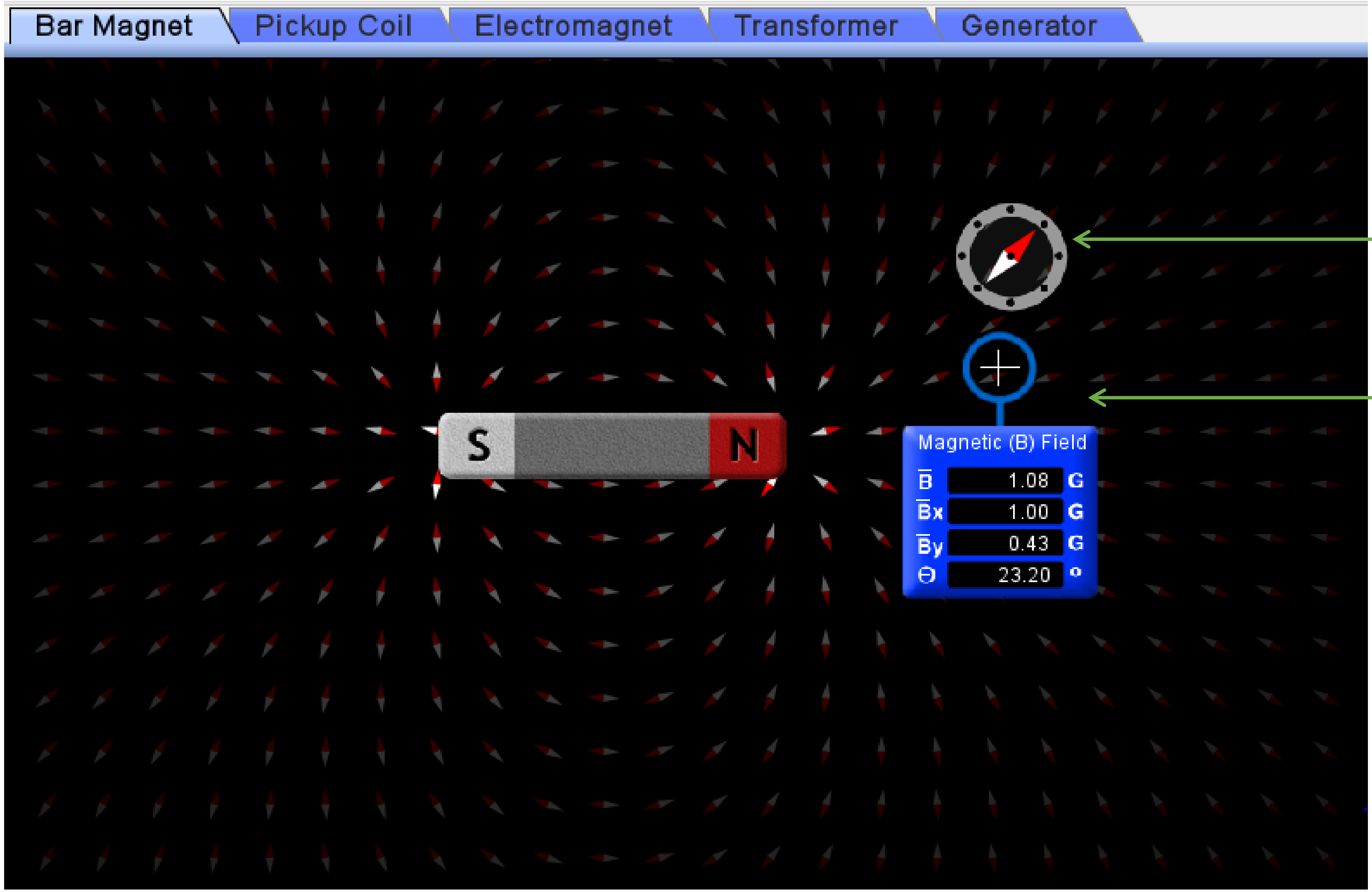
2. electromagnet requires a continuous supply of current to maintain the magnetic field.

3. Polarity can be changed.

LAB-6

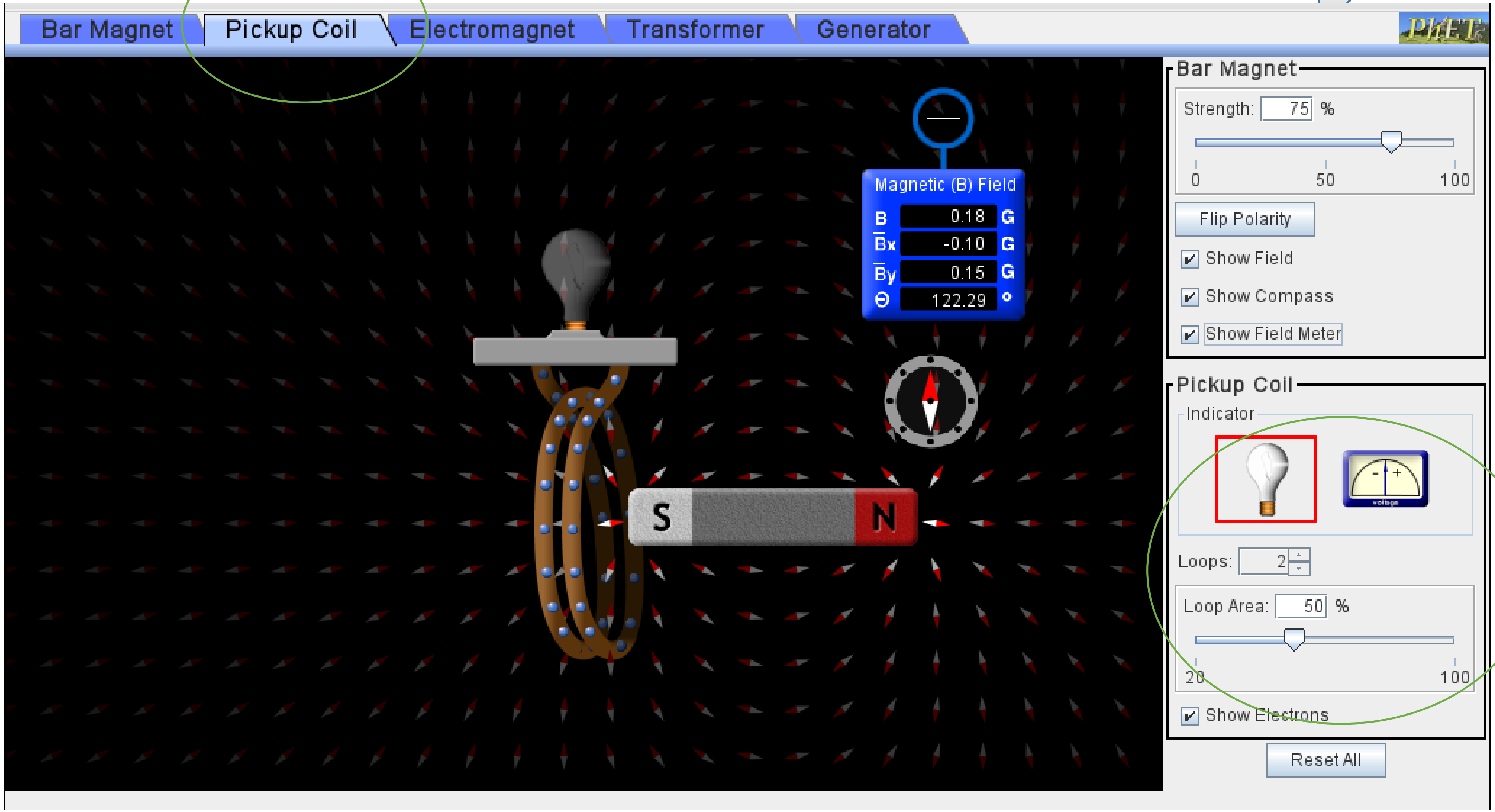
Faraday's Electromagnetic Lab

Step 1: Impact of distance on magnetic field

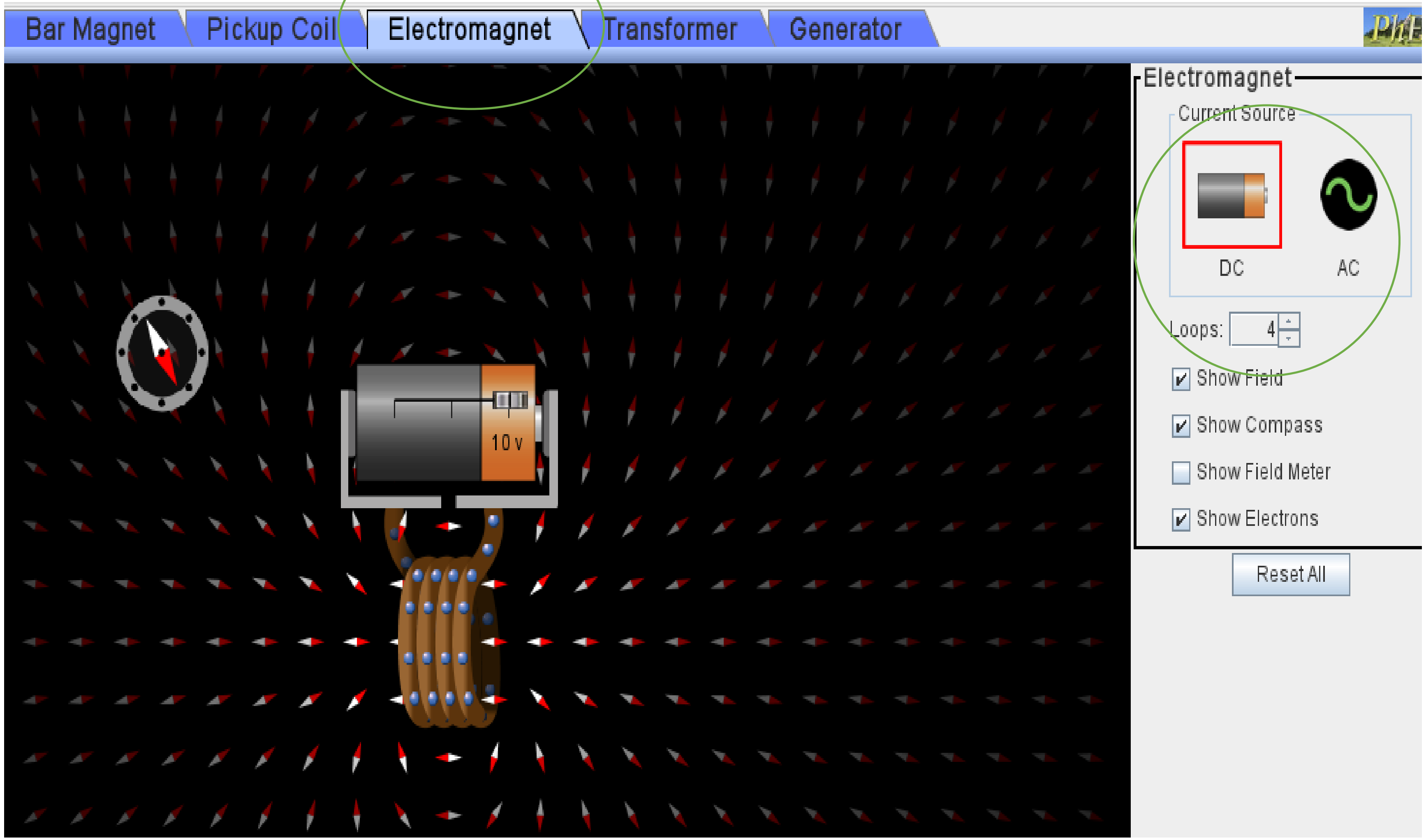


Measuring Instrument

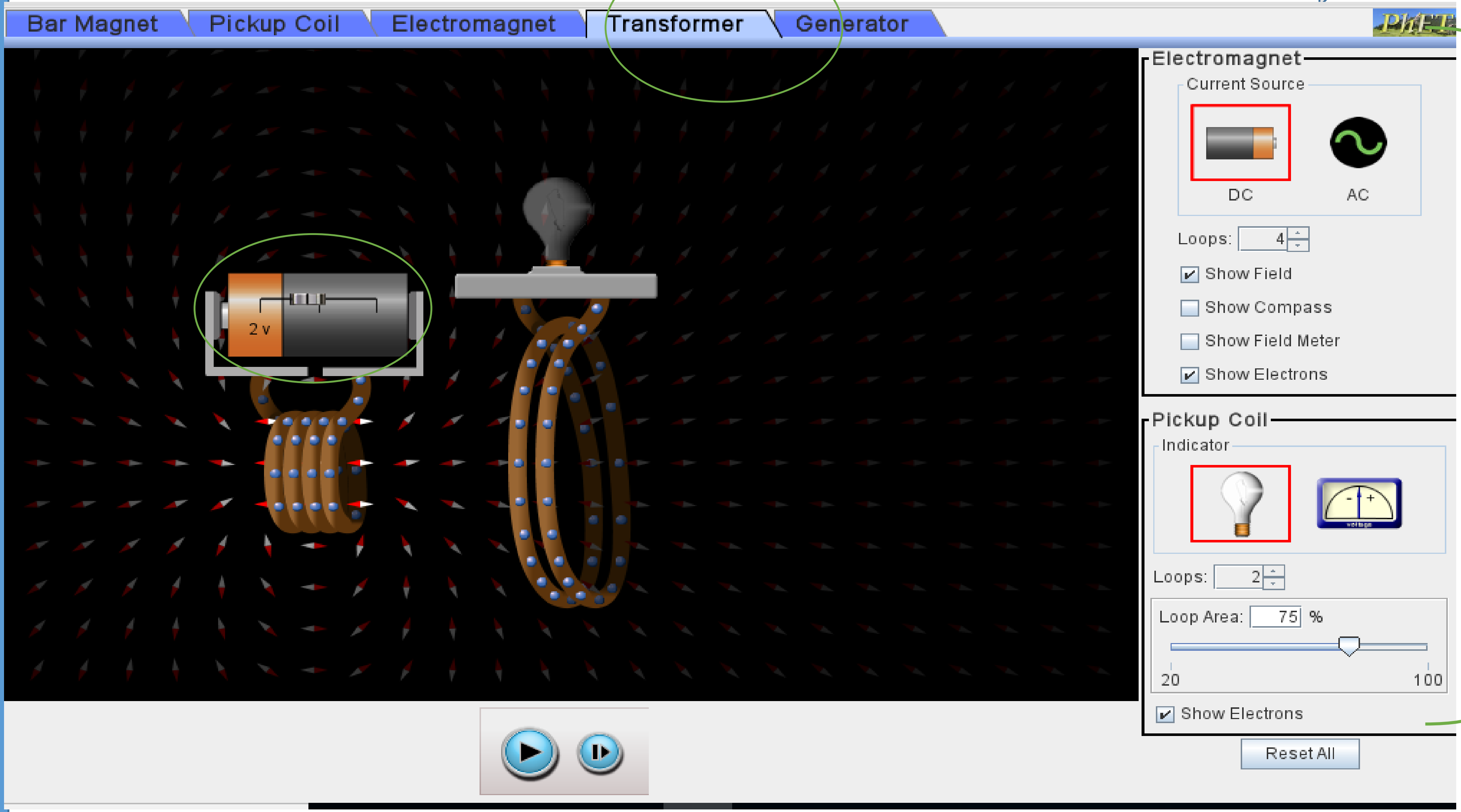
Step 2: 1) How to increase the intensity
2) Effect of no. of turns and area of coil ?



Step 3: Impact of different current source

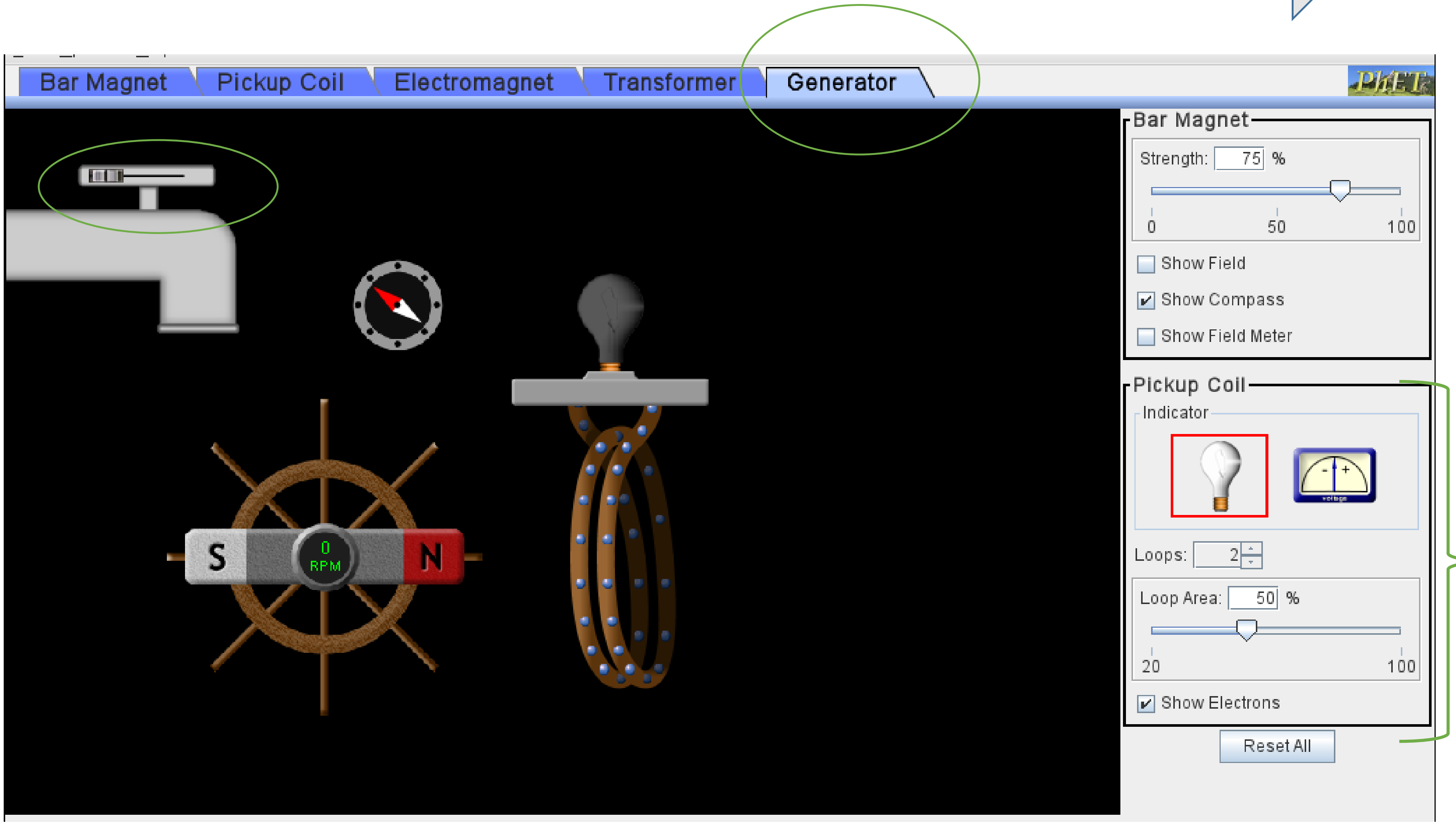


Step 4: Impact of varying the smaller coil



Variable

Step 5: Analysis the effect of rotating magnet



Variable

Thank You