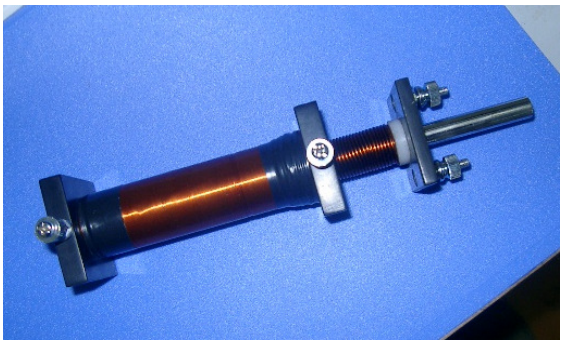
supertek

INSTRUCTION MANUAL

PRIMARY AND SECONDARY COIL (PH50250)

Introduction:



The Economy Primary and Secondary Coils set consists of an outer coil, an inner coil, and a soft iron core. The coils and core may be used to investigate and perform experiments in electro-magnetism, inductive reactance, and transformer coupling. Two way binding posts are used in the coils for convenient connection.

Specifications:

Inner Coil:

150 turns, #18 wire: approx. 1.2mm.
Inductance: 78 ± 22µH.
Resistance: 0.4 ± 0.1Ω.
Capacitance: 142±2pF.
Dimensions: 11cm coil length X 1.8cm coil outside diameter.
Base: 4.5cm X 4.5cm.

Outer Coil:

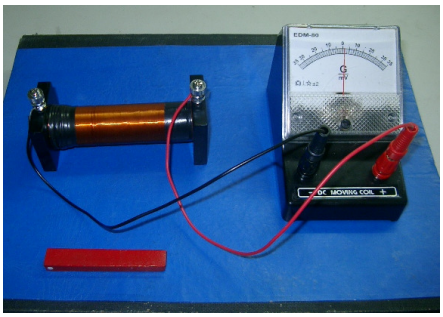
3300 turns, #29 wire: approx. 0.29mm.
Inductance: 63 ±3mH.
Resistance: 97 ±2Ω,
Capacitance: 124 ±2pF.
Dimensions: 10 cm coil length X 3cm coil outside diameter.
Base: 4.5cm X 4.5cm.

Core: 15cm X 1cm.

Caution:

- Hazardous voltage and currents capable of producing injury can be produced by improper use of the Primary and Secondary Coil set. This apparatus should only be used under the supervision of experienced, trained personnel.
- The Primary and Secondary Coils must never be used in a configuration which uses a voltage to be produced in excess of 30V r.m.s. 42.4V peak or 60V d.c. Never connect the Primary and Secondary Coils to the AC power mains.

Electromagnetic Induction Experiment:



Apparatus Required:

1. One Galvanometer.
2. One Outer Coil

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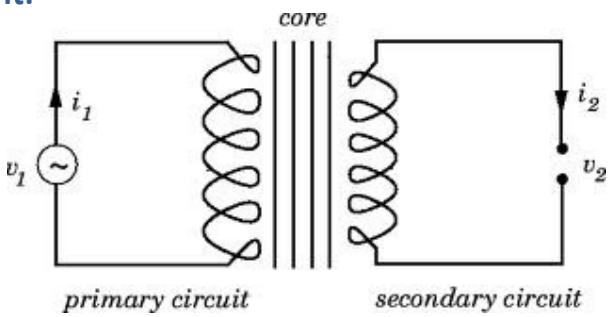
3. Two Connecting Leads.
4. One Permanent Magnet.

Description:

Connect the Galvanometer to the Outer Coil using the two connecting leads as shown in the image.
Now when you move the magnet back and forth through the coil (along the coil's axis), you will notice that the galvanometer needle moves, indicating that a current is induced in the coil. This observation is based on Faraday's law of induction, "The induced electromotive force (EMF) in any closed circuit is equal to the time rate of change of the magnetic flux through the circuit." Notice also that the needle immediately returns to zero when the magnet is not moving. Faraday confirmed that a moving magnetic field is necessary in order for electromagnetic induction to occur.

Transformer Experiment:



Apparatus Required:

1. Outer Coil
2. Inner Coil
3. Soft Core
4. A Low Voltage AC Supply

Description:

Students use a solenoid set - one large with lots of turns and the other small with fewer turns that fits inside the large one. They use an AC supply to investigate the step up and step down situations.
Transformers are used to increase or decrease AC voltages and currents in circuits. The operation of transformers is based on the principal of mutual inductance. Either of the two coils can be used as primary coil and the other as a secondary coil.
Insert the soft core inside the inner coil. Now insert this set inside the outer coil. Connect the low voltage AC supply to either one of the two coils and measure the output voltage across the other coil.
Voltage is determined by the following formula:
V2 = (V1 X Ns)/Np;
Where V1 is the input voltage of the primary coil, V2 is the output voltage of the secondary coil, Np is the number of windings of the primary coil, and Ns is the number of windings in the secondary coil.
If the output voltage of a transformer is greater than the input voltage, it is called a step-up transformer. If the output voltage of a transformer is less than the input voltage it is called a step-down transformer.