



# Experiment 5 Instruction

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Record the amplitude ->  
record the  $V_{pp}$

# Introduction & Tips

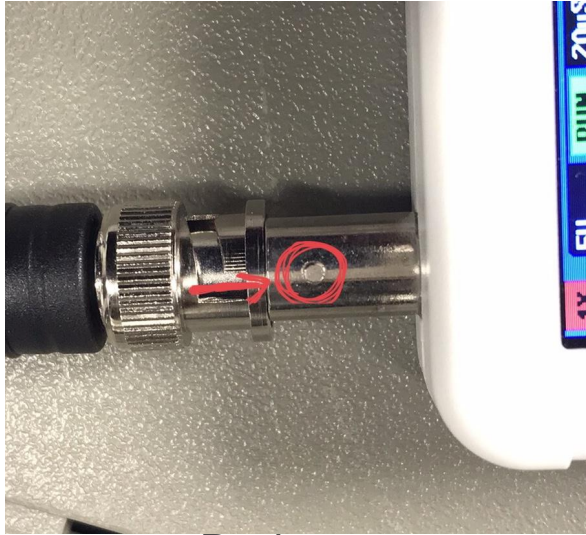
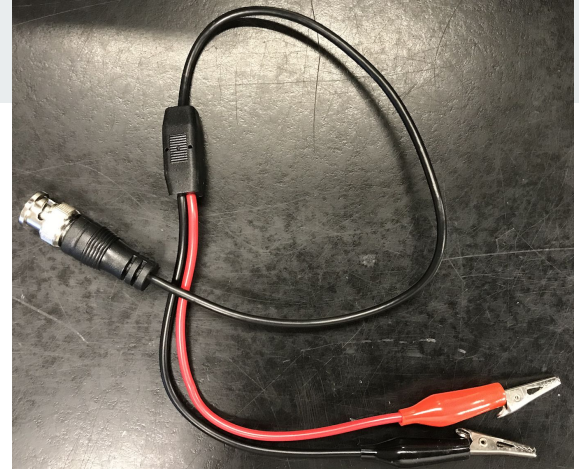
- **About:** In this lab, you need to study magnetic field
- **Tips:**
  - Read the lab manual and this instruction together to figure out how to do the lab
  - You are required to take photos, don't forget that
  - Keep your disc magnet FAR AWAY from your laptop, smartphone, credit card, iPad, etc.



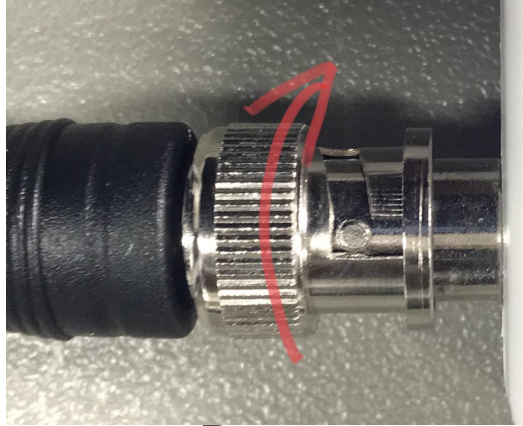
Hope it helps

# Preparation

- Connect Wave generator and Oscilloscope:



Push



Rotate



Done

# Preparation

- **Oscilloscope:** You will use it from Part D to Part K

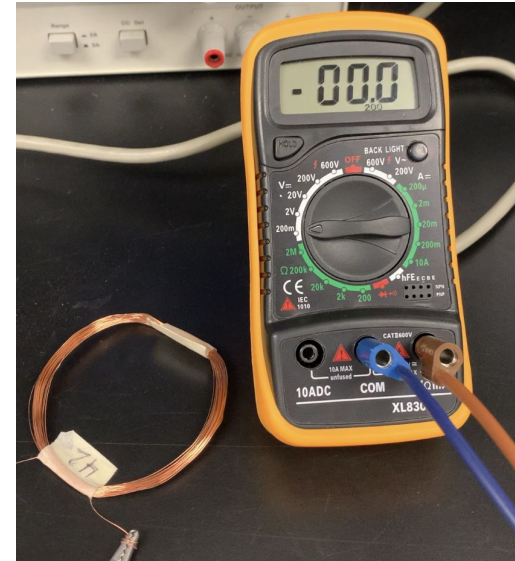


## Task A - Part A, B, C in the Report

- **Study the Induced Current** : Faraday's law tells us that a changing magnetic field will produce electric field. In this part you need to
  - Connect coil with DMM (200 mV jack)
  - Place or move your magnet and write down the number of DMM
  - Follow the instruction of Part A to C on lab manual

$$\mathcal{E} = -\frac{\partial \Phi}{\partial t}$$

Faraday's Law



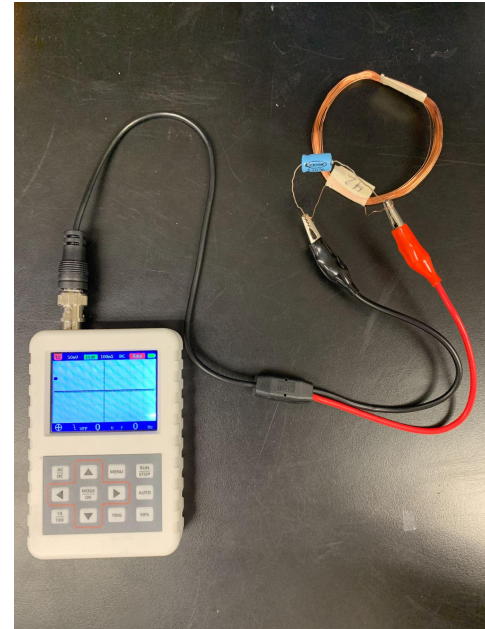
Connect to DMM

## Task B - Part D, E in the Report

- **Study the Induced Current** : Faraday's law tells us that a changing magnetic field will produce electric field. In this part you need to
  - Connect coil with oscilloscope (50 mV, 100 ms) and a capacitor  $47 \mu\text{F}$  in parallel
  - Flip your magnet and see the wave pattern in your scope
  - Take photo of wave patterns for part D (will be some irregular pattern)

$$\mathcal{E} = -\frac{\partial \Phi}{\partial t}$$

Faraday's Law

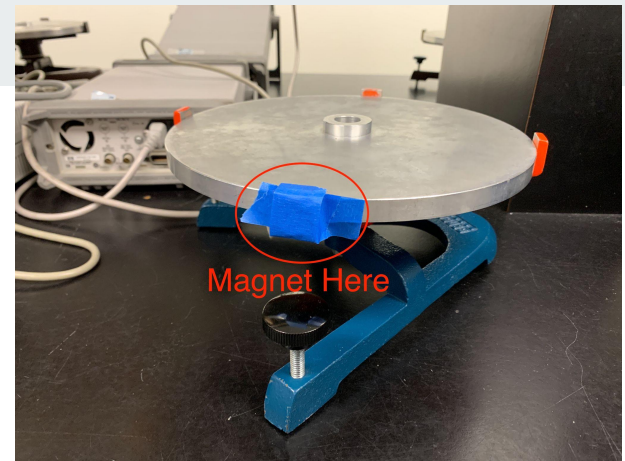


Connect to DMM

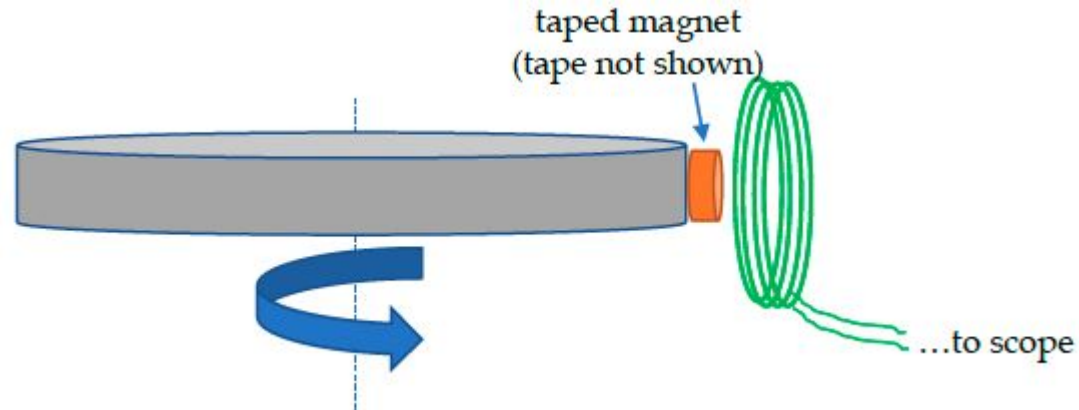


## Task B - Part D, E in the Report

- **Study the Induced Current with Turntable:**  
Tape your disc magnet on the turntable and put your coil near the disk, give the turntable spin and put the coil near the turntable, see the wave pattern on your oscilloscope, take a photo of wave pattern

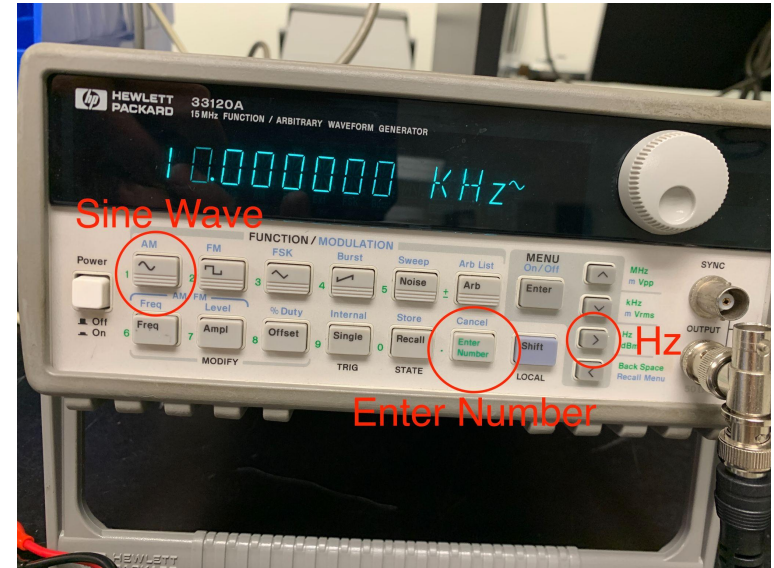


Turntable



## Task C - Part F, G in the Report

- Study the AC magnetic field:  
Measure the magnetic field produced by AC current
- To set sine wave with  $f=10,000$  Hz,
  - First, press “sine”
  - Then, press “Enter Number”, then enter “10000” and press “Hz”

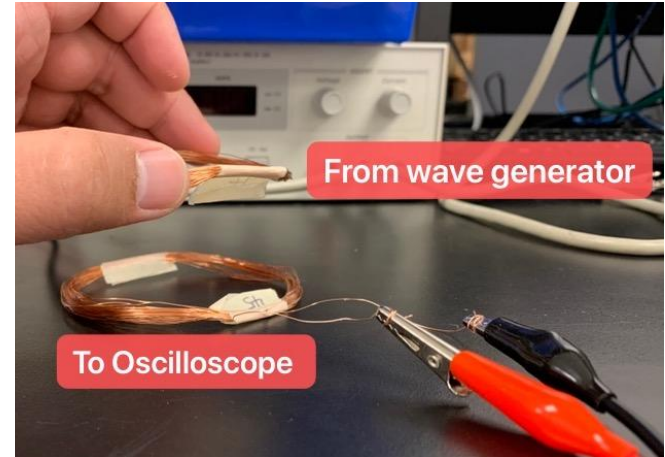


Set sine wave



## Task C - Part F, G in the Report

- Study the AC magnetic field:  
Measure the magnetic field produced  
by AC current



Don't forget the OUTPUT button

Use a paper or cardboard between two coils  
would be better

## Task D - Part H, I, J, K in the Report

- **Study the Toroidal Coil:** Take photo of the wave pattern and record the amplitude of
  - Small coil
  - Big coil



Connection when you measure  
big coil

## Task D - Part H, I, J, K in the Report

- **Study the Toroidal Coil:** Take photo of the wave pattern and record the amplitude of
  - Small coil
  - Big coil

Calculate the ratio below. In this case we generate sine wave at for example, 10,000 Hz.

The ratio: 
$$\frac{V_{\text{out}}}{V_{\text{in}}} = \frac{N_{\text{out}}}{N_{\text{in}}}$$



Connection when you measure big coil

## Task D - Part H, I, J, K in the Report

- Study the Toroidal Coil: Use square wave ( $f=10,000\text{ Hz}$ ) and see what happen in the big coil (take photo)

