

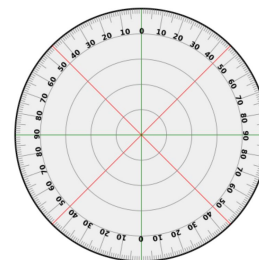
AQA Physics A-level

Required Practical 11

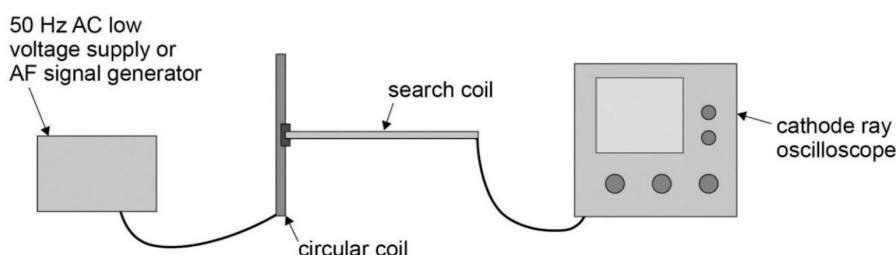
Investigate, using a search coil and oscilloscope, the effect on magnetic flux linkage of varying the angle between a search coil and magnetic field direction



- Equipment:
 - Oscilloscope
 - Large circular coil
 - Stands
 - 50Hz AC supply
 - Protractor card as seen on the right
 - Search coil



- Method:
 - Mount the circular coil vertically with a stand and position the search coil at the centre of the circular coil using another stand. The plane of the search coil should initially be parallel to the plane of the large circular coil. Connect the circular coil to the AC supply and the search coil to the oscilloscope, as shown in the diagram. The protractor card should be placed underneath the two coils.



- Turn on the AC supply. Select suitable voltage sensitivity and time base settings on the oscilloscope and read and record the peak to peak value of the induced AC voltage shown.
- Tilt the search coil so that the angle θ between the plane of the circular coil and the plane of the search coil increases by 10° , measured using the protractor. Repeat the above measurements and increase it by 10° again, doing this up to an angle of 90° .
- Repeat the experiment twice more and find and record the mean value of the induced emf for each θ .
- Graphs and calculations:
 - Find $\cos(\theta)$ for each θ and tabulate this.
 - Plot a graph of the induced emf against $\cos(\theta)$. This should yield a straight line through the origin, showing that the emf induced in the search coil is directly proportional to the cosine of the angle between the search coil and the magnetic field direction.
 - $\varepsilon = BAN\omega\cos(\theta)$ so the induced emf should be directly proportional to $\cos(\theta)$.
- Safety:
 - No notable risks.
- Improvements and notes:
 - Read the angle off the protractor from far above it to reduce parallax error or use a set square to align it with the search coil.

