

# Electromagnetic Induction and Transformers

by John Holdsworth

## Experiment Overview

To examine and observe the magnetic field in a solenoid and the consequent coupling of a time varying electromagnetic field between primary and secondary coils of a transformer.

Section 1 of your paper will be based on the responses to the headings below. However, it may be appropriate in the paper for you to re-arrange or omit some of this information.

## Learning Experience

We believe the experiment is a good learning experience for students as they measure the uniformity of a field produced in a coil, thus seeing for themselves how useful the structure of an inductor is. Additionally, the time varying electromagnetic flux generated in a primary coil may be coupled out of phase with a secondary coil thus demonstrating clearly and significantly the results of Faraday's Law of electromagnetic induction and clearly showing the basis of transformer operation.

## Aims and Objectives

- To use a spreadsheet in calculations of experimental data.
- To demonstrate the concept of flux-linkage and its application to two closely coupled coils.
- To illustrate Faraday's Law

## Level of Experiment

First year physics, second semester.

## Keyword Descriptions of the Experiment

### **Specific Descriptors**

Biot Savart Law, electromagnetic induction, Faraday's Law

## Course Context

The course context is the examination of electromagnetism.

## Prerequisite Knowledge and Skills

Knowledge and skill requirements are to know Excel spreadsheeting and the ability to configure simple circuits. Use of an oscilloscope.

## Time Required to Complete

**Prior to Lab:** 30 minutes

**In Laboratory:** 3 hours

**After Laboratory:** 0

## Experiment History

Long term experiment within Physics