Main Topic	Magnetism
Subtopic	Electromagnetic Induction
Learning Level	Middle
Technology Level	Low
Activity Type	Student

Description: Observe the magnetic field created by a loop of current-carrying wire.

Required Equipment	Electric Current & Fields Kit, Genecon
Optional Equipment	

Educational Objectives

- Observe the effect of electric current on the magnetic field in the vicinity of a wire.

Concept Overview

The phenomenon of electromagnetism creates a magnetic field around a current-carrying wire. The invisible magnetic force lines created are oriented about the wire in predictable patterns, which will be examined in this exercise.

Specifically, students will observe that the magnetic field created by a coil of wire is perpendicular to the plane of the coil. They will also see that the field is stronger with more current, and that the field reverses direction when the current reverses.

Since it is impossible to escape the earth's magnetic field in the school lab, there will always be a force causing the compass needle to point north. This force, combined with the field caused by the current, will cause the needle to point to some point between the line of the wires and the perpendicular direction.

Lab Tips

Caution students not to rotate the Genecon too fast. Since they have essentially created a short circuit, too much current could damage the Genecon.

Occasionally, the compass needle will "stick" and not return to its original position. The culprit is residual magnetism, and the problem can be corrected by momentarily reversing the current.

Electric Current & Fields

Name: _____

Class: _____

Goal:

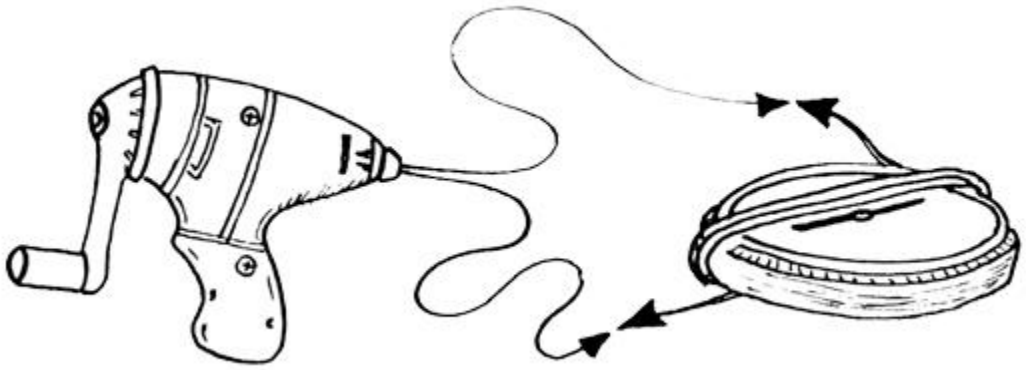
Observe the effect of electric current on the magnetic field near the wire.

Materials:

Electric Current & Fields Kit, Genecon

Procedure:

1. Wrap the wire around the compass as shown, and secure it with some clear tape.



   Turn the wrapped compass until the compass needle is parallel to (in line with) the wire loops.
2. Connect the Genecon to the two leads of the wrapped wire and turn the handle <u>clockwise</u>. Which way does the needle deflect?

3. Change the rate that you rotate the handle (not too fast – you could damage the Genecon with this short circuit). How does the amount of deflection change with a change of rate? Explain.

4. Repeat the experiment, but rotate the Genecon <u>counterclockwise</u>. What is the result?

5. Analog ammeters show current with a needle that rotates like a clock hand on a scale. Suggest how ammeters might be built. Include a diagram.