

Investigating the Magnetic Field of a Toroidal Coil – Technicians' guide

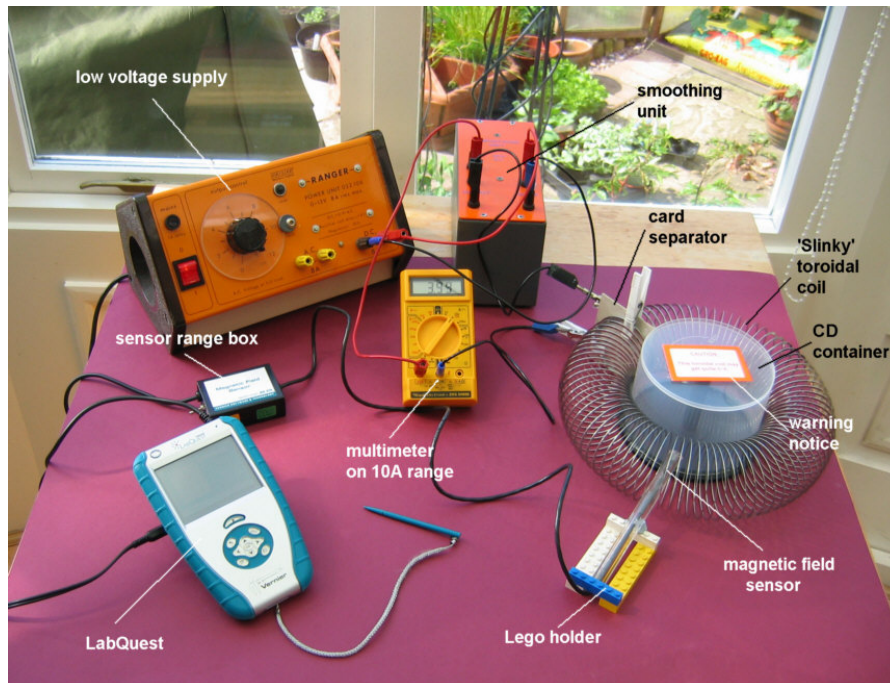


Figure 1 Setup of investigation of the magnetic field of a toroidal coil

Equipment required

Vernier *LabQuest* and power adapter/charger

Magnetic field sensor MG-BTA

d.c. power supply ideally locked so that a current $>4.5\text{A}$ cannot be obtained

smoothing unit (as appropriate)

multimeter or ammeter with 10A d.c. range

2 clothes pegs

piece of cardboard

'Slinky' spring (metal)

5 connecting leads

2 crocodile clips

CD-ROM holder for 50 CDs/DVDs (empty)

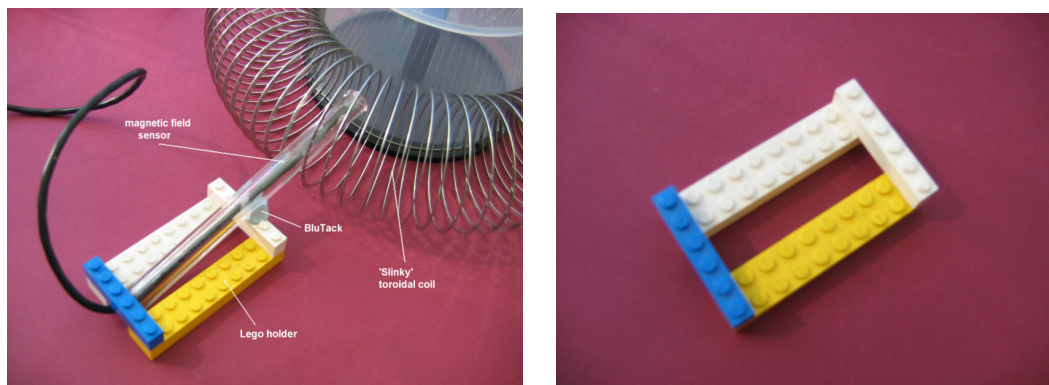
Lego holder to raise magnetic field sensor up to level of centre of toroid*

Blu-Tack™

Warning sign stating '**CAUTION This toroidal coil may get quite hot.** Place on top of the CD container.

* See Figures 2a and b on the following page.

Lego sensor holder



Figures 2a and b Lego holder for the Magnetic Field sensor

Connection of 'Slinky' spring toroid

A piece of cardboard needs to separate the ends of the toroidal coil, secured in place by two clothes pegs as shown in Figure 3.

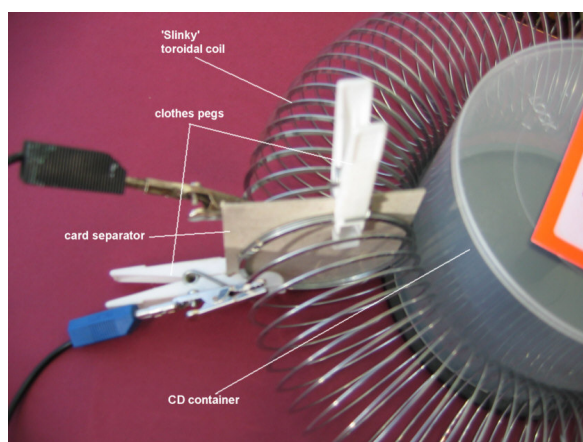


Figure 3 Connection of leads to toroidal coil

Key setup details

Sensor: Magnetic field sensor on LOW range or 6.4mT connected to Channel 1
Multimeter/ammeter on 10A range

Mode: Events with Entry

Take readings at current values of 0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0A

Best-fit curves/lines: Proportionality and Linear