

Electricity and magnetism

Paper speaker

Force between a magnet and an electromagnet

You will need....

- ✓ A piece of card
- ✓ Thin enamelled copper wire
- ✓ A strong magnet (e.g. neodymium)
- ✓ Adhesive tape
- ✓ Audio cable with 3.5 mm plug

Background:

A typical audio speaker is composed of a diaphragm (usually a paper cone), a coil of wire attached to the diaphragm and a separate magnet which is placed near or around the coil.

Follow these steps:

1. Wind about 30 turns of the enamelled copper wire around a pen or small smooth cylinder.
2. Secure the ends (by twisting). Stick the coil to the centre of the card using adhesive tape.
3. Remove the enamel coating from the last two centimetres of the ends of the wire. Connect the wires in the audio lead to the ends of the coil by twisting or soldering.
4. Stick the lead to the card with more adhesive tape.

So what happened?

If the lead is attached to an audio signal source (a headphone socket on a radio or tape player) no sound can be heard from the card until the magnet is brought near it.

What next?

1. Investigate how the sound can be enhanced (using cups, cylinders, boxes etc.).
2. Can the device act as a microphone (generate electricity when exposed to sound)?

