Assembly Instructions

Telegraph Assembly Instructions

Suggested Materials (For each group of students):
1 x large chunk of Styrofoam (approx. 30cm x 30cm x 3cm)
1 x small cube of Styrofoam (approx. 4cm on each side)
2 x D Cells (batteries)
1 x large ferromagnetic (iron containing) nail. Any nail that sticks strongly to a magnet will work.
150 cm of copper wire (use very thin wire)
1 x alligator clip or 30cm piece of wire.
1 x metal tack
2 x paper clip (give students extra as some might break). Simple circuit switches and buttons can be used instead if available.

Construction Steps:

- Starting at the head of the nail and moving down, wrap tight loops of wire around the nail until approximately 3cm of the nail remains uncovered.
    - Do not overlap the wire. It is suggested in this lesson to have 85 loops total but that number can be modified based on the dimensions of the materials. Leave at least 10cm of loose, unwrapped wire at each end.
- Push the unwrapped, sharp end of the nail into the flat face of the Styrofoam block.
- Without connecting the batteries, use the alligator clip or 30cm piece of wire to create a closed series circuit including the wire wrapped around the nail.
- Include a switch in your circuit using one paper clip and the tack.
    - Attach the metal tack to one end of the wire where you want your button.
    - Bend a straight end of the paper clip down and push it in to the Styrofoam to be secured next to the tack.
    - Bend the remainder of the paper clip up so that it remains above the tack unless pushed down by hand to connect to the circuit.
- With the button OPEN, connect the batteries in the circuit.
- Bend the remaining paper clip in an "L" shape with a loop at one end.
- Push the straight end into the top of the Styrofoam block.
- Position the Styrofoam block such that the paper clip loop sits slightly above the head of the nail (this will have to be adjusted to find the perfect distance where the paper clip will move but not stick to the electromagnet).
- ***SAFETY WARNING!!!** – A closed circuit including an electromagnet may get very hot! The circuit should never be left closed for more than a few seconds at a time. Students should be made aware that the circuit components might get hot to the touch.