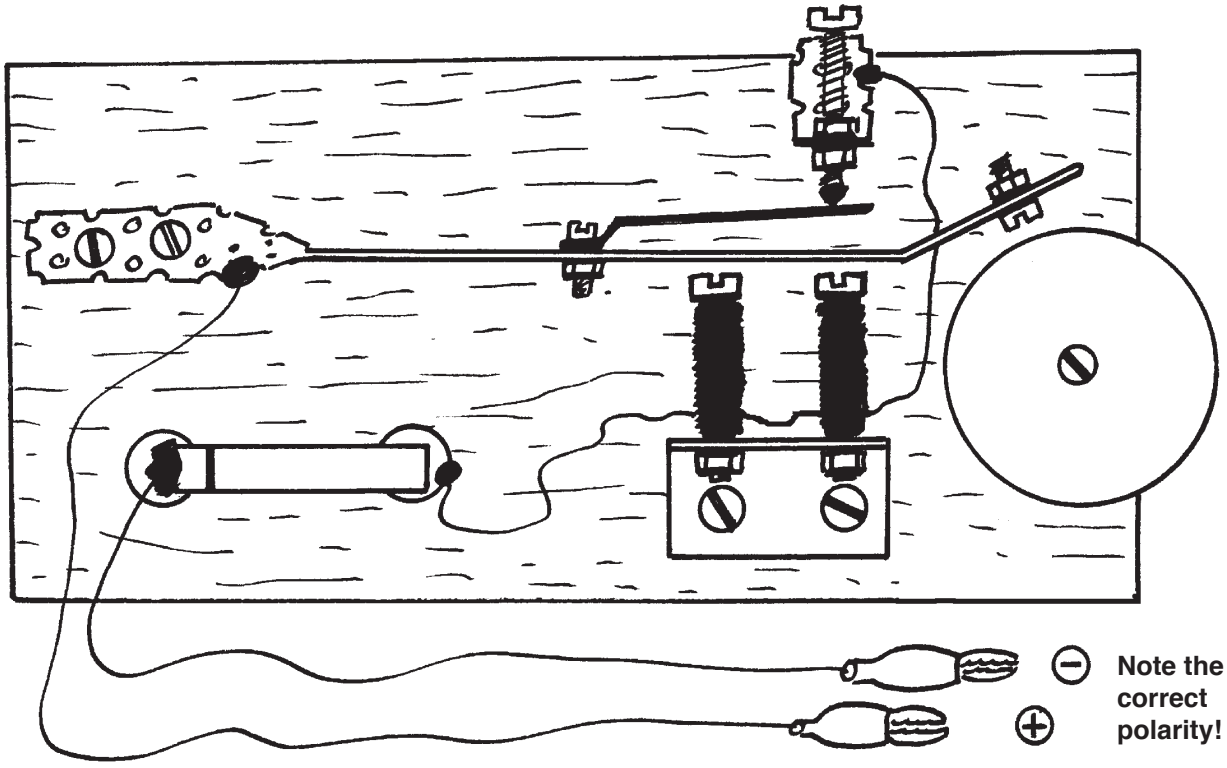
105.129

Door Bell



Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technolo- gy. These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Dan- ger of suffocation!

INFORMATION FOR TEACHERS

The instructions show how a differentiated approach can be taken to complete this project.
You have the possibility of showing the pupils the finished solution or working through the various problems.

1. MAKING THE SWITCH

This can be left to the pupils own design or can simply be copied from
the diagram:- a metal strip and two drawing pins.

2. PROBLEMS WITH OXIDISATION on the contacts.

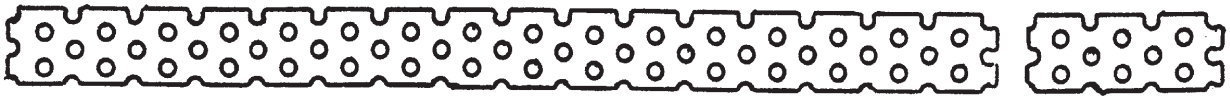
To overcome this problem, make sure the contact screw is made to a point (see diagram above) then it will act as a self cleaning system, due to the vibration during operation.
It is also necessary to ensure that the battery polarity is correct.
The 'Scientific' flow of the electrons is from minus to plus. If the electrons from the contact screw flow into the switch, then the oxidisation problems are less.

PARTS LIST

1 base	15 x 150 x 150 mm
1 pine strip	10 x 10 x 150 mm
1 bell	
1 strip metal	0,7 x 10 x 165 mm
1 bronze strip pre-bent and drilled	
1 metre enamelled copper wire	0,3 x 8000 mm
1 wire with 2 croc clips	
4 nuts	M4
4 nuts	M3
1 distamce piece	20 mm
1 holed metal	30 mm
2 cheese head screws	4 x 20 mm
1 cheese head screw	3 x 20 mm
2 cheese head screws	3 x 8 mm
1 self tapping screw	3 x 30 mm
5 self tapping screws	3 x 10 mm

CONSTRUCTION DETAILS

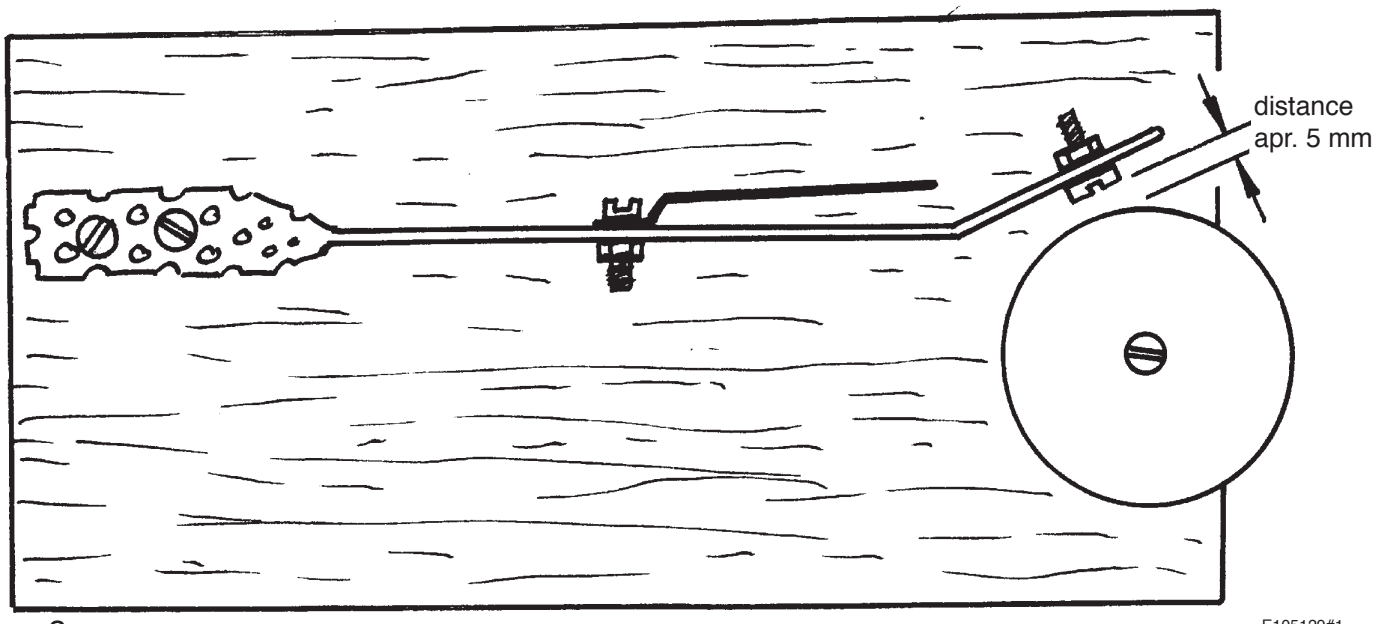
saw the long holed metal strip in tow parts as shown in the diagram.



using pliers, shape the longer part as shown, this will form the ‘hammer’

the ‘hammer’ must now be bent further on the end as shown, insert one of the set screws as the head of the ‘hammer’ and add the sprung bronze strip as shown.

The completed ‘hammer’ can now be mounted on the base board.
The following should be noted:-
A small distance piece must be inserted under the bell, so that it is free from the base. Between the head of the’hammer’ and the bell should be a 5mm gap.



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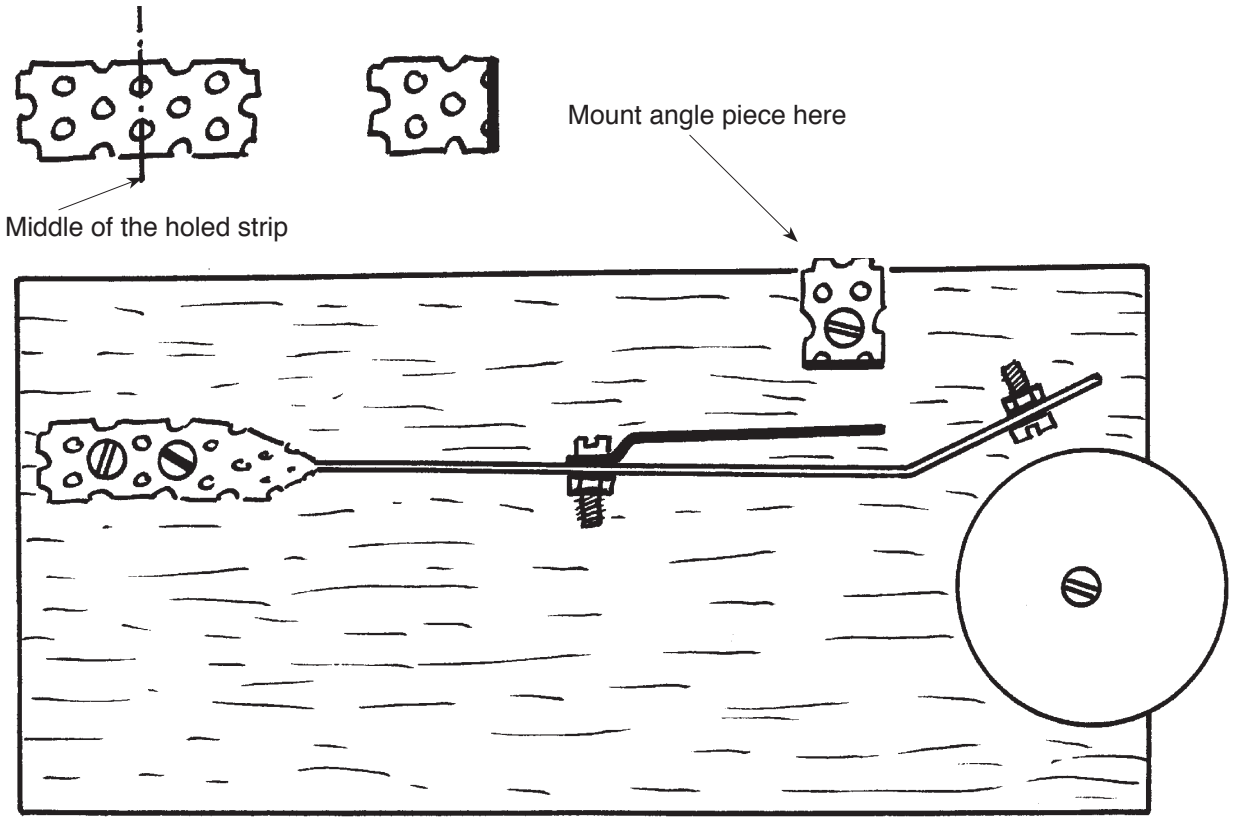
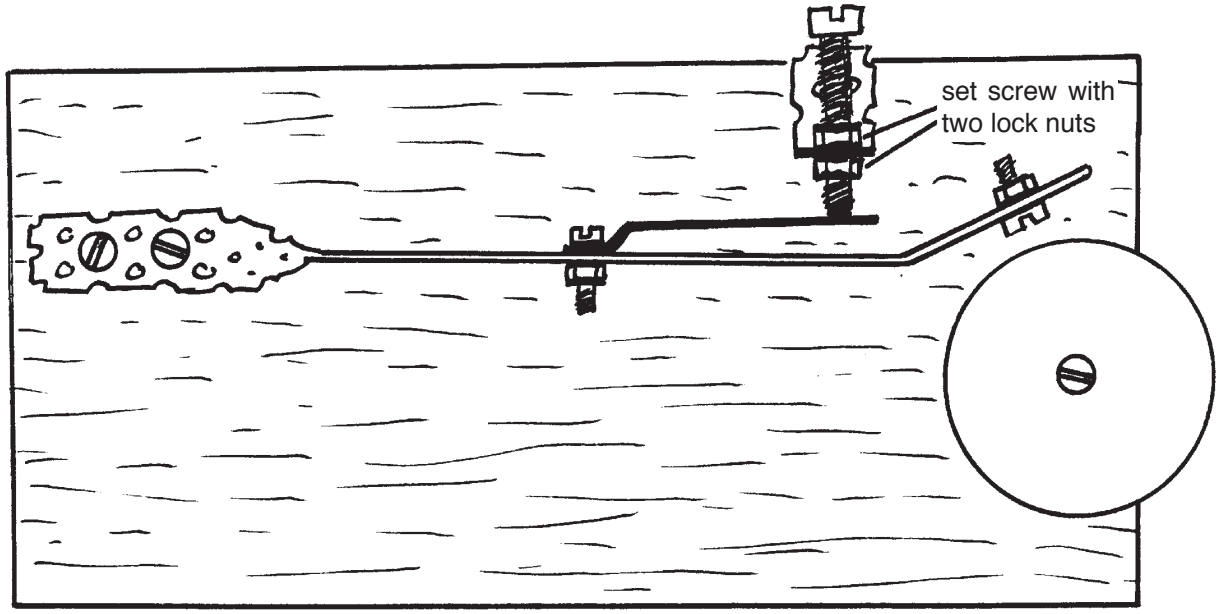
Next construct the contact breaker.
Using the remainder of the holed strip metal, bend it into a rightangle as shown and mount it onto the base board in the correct position. (see diagram)

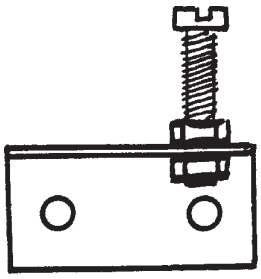


The 3mm long set screw is mounted in the angle piece as shown and locked in position with two nuts, so that it just touches the sprung bronze strip.

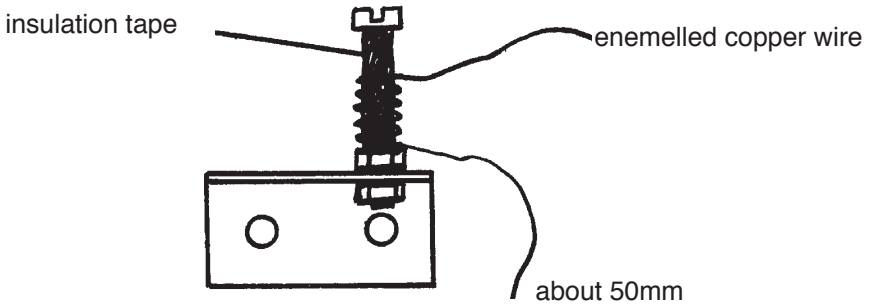
finished contact breaker



Making the ELECTROMAGNET
Using a 4 mm set screw and lock nuts, insert it into the holed right angled strip (30mm) shown on page 3.



Cover the thread of the set screw with a layer of sellotape or insulation tape, to protect the copper wire from any sharp edges.
Leaving an end of 50mm, wrap the enamelled copper wire 200 times around the screw. (see diagram)

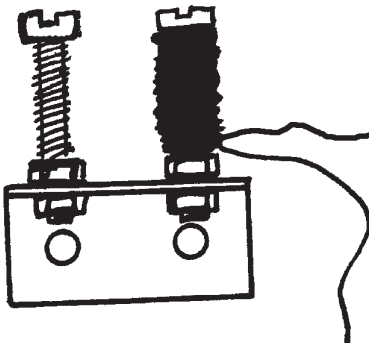


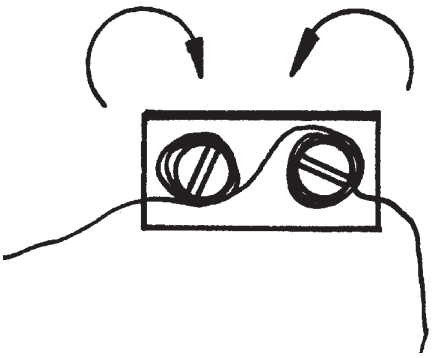
Now add a second set screw and fix it like the first one with two lock nuts. The enamelled copper wire must now continue to be wound on to the second set screw.

IMPORTANT: the second windings must be wound on, in the OPPOSITE DIRECTION to the first, otherwise the magnet will pull against itself.

plan view

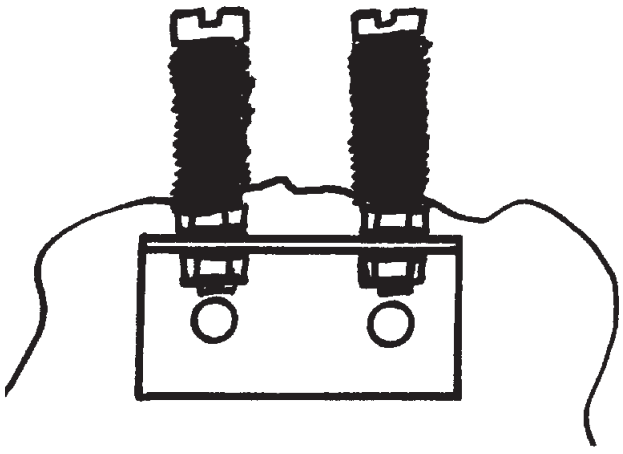
the second winding must be opposite to the first



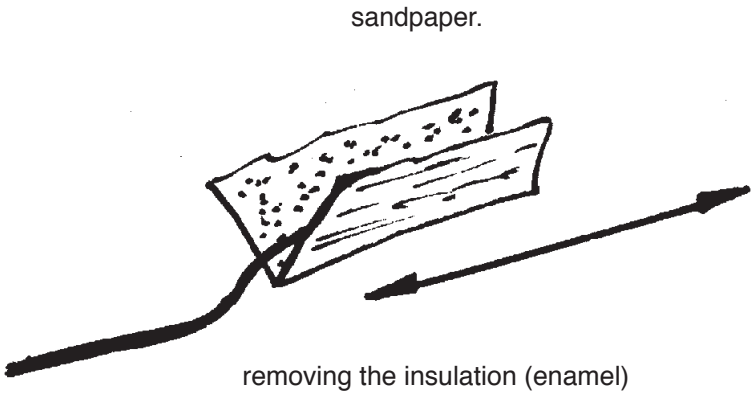


The finished ELECTROMAGNET can now be mounted to the base board in the position shown.

ELECTROMAGNET

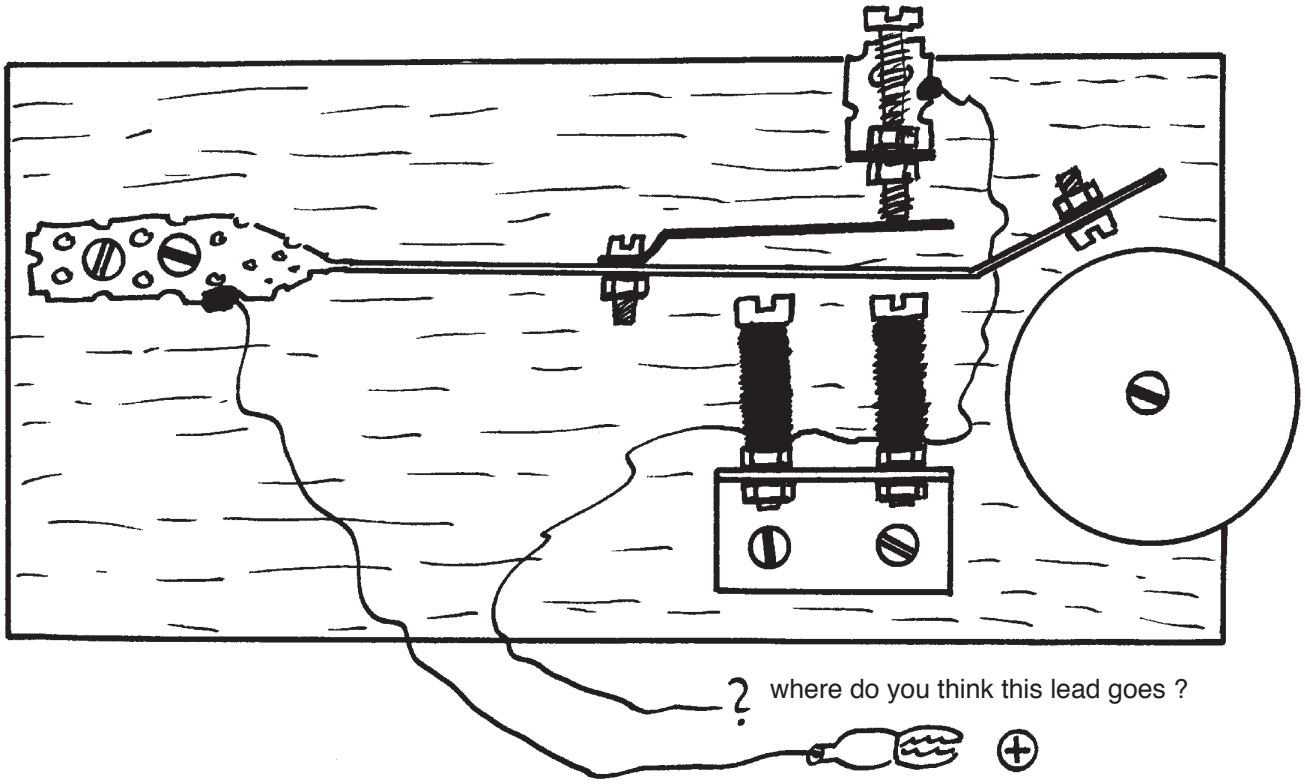


Making the electrical connections.
Firstly remove the insulating enamel from the end of the copper wire with a small piece of sandpaper as shown in the diagram.



removing the insulation (enamel)
from the copper wire with sandpaper.

Connect one end of the windings under the holed right angled metal strip, or even better make a soldered connection.
On the flat end of the 'hammer' connect a wire with a crocodile clip.
The completed circuit should look like the diagram.



When you think everything is correct, ask your teacher to check it over.

All that is left now, is to construct a switch. Here you can ask your teacher for ideas or better still design your own solution. (see front page of instructions)
Now for the exciting moment when you test your work, if you have made every thing correct, it should function first time. The loudness can be adjusted by altering the length contact breaker screw. When in operation you can see it sparking at this point. This causes the bronze strip to oxidise. This in turn forms an insulative layer and hinders the function of the bell. This can happen in a relatively short space of time. Your teacher will help you solve this problem or maybe you can come up with your own ideas, using your knowledge of science.