

# MAKE-A-MOTOR

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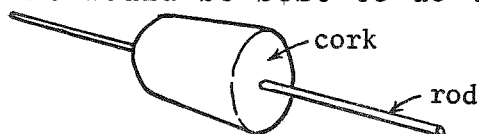
EL-14-1

HERE IS HOW TO MAKE A SIMPLE ELECTRIC MOTOR.

You will need:

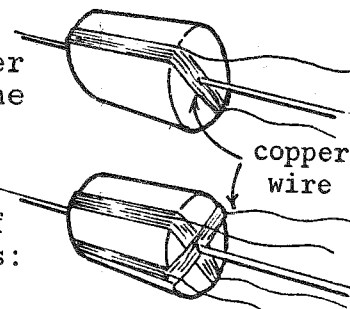
- A metal rod (about 10cm long and 3mm diameter - eg part of a knitting needle.
- A cork.
- Copper wire (about 24 s.w.g.).
- A piece of wood (about 15cm x 10cm x 1cm).
- 2 bar magnets.
- Masking tape.
- A 1½ volt battery.
- 2 paper clips.
- 4 drawing pins.
- Plastic-covered wire.

- 1 → Push the rod through the exact centre of the cork. (Think about how it would be best to do this.)



This cork and axle will form the **ARMATURE** of your motor.

- 2 → Wind about 20 turns of copper wire around the cork.

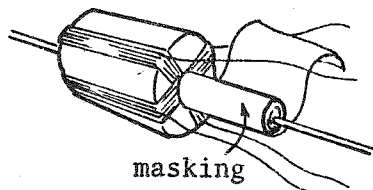


- Then wind a second coil of wire like this:

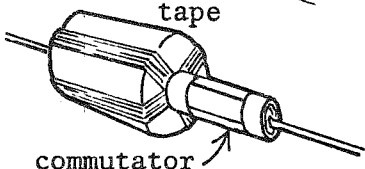
These two **COILS** will act as electromagnets.

- 3 Next you will make a very important part of your motor. It is called the **COMMUTATOR**.

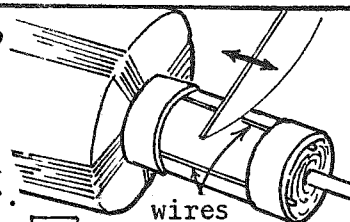
- Use masking tape to make part of the axle thicker.



- Now fix the 4 loose wires in place as shown, with 2 narrow strips of tape.



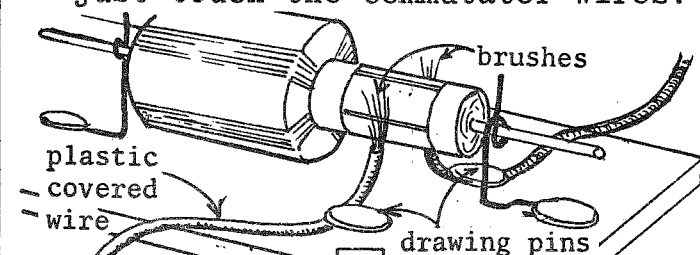
- 4 → Use a knife to scrape the insulating covering off the 4 wires on the commutator.



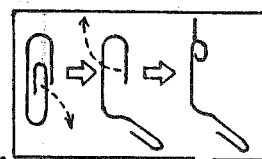
- 5 Your motor is almost finished.

- Use 2 paper clips to fix the armature to a base board. The drawing shows how to do this.

- 6 → Make 2 **BRUSHES** as shown. Attach these to the base board so they just touch the commutator wires.



wooden base



paper clip drawing pin

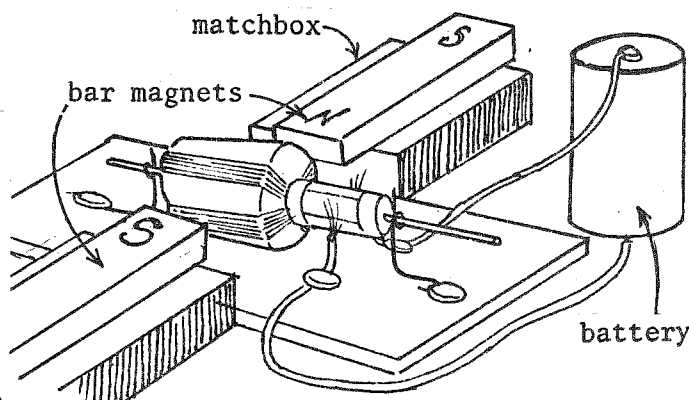
The armature should spin freely.

- 7 You are now ready for a trial run.

- Place the 2 bar magnets in place.
- Join up the wires from the brushes to the battery.
- Give the armature a flick.

**ACTION!!!!**

Your teacher will explain why the motor spins.





# MAKE-A-MOTOR

EL-14-3



CUTLASS ACTIVITY SHEET  
TEACHERS' GUIDE

## AIM OF ACTIVITY SHEET

To give students the opportunity to build a model electric motor.

(AN ADVANCED SHEET)

## OBJECTIVES

After completing this activity sheet, students should be able to:

- build a simple electric motor.
- recall the names of the main components of an electric motor.

## MATERIALS REQUIRED

- These are listed on the activity sheet.

(Note: It may help if students are provided with cork bungs that have had holes drilled through the centre. It is best if a drill press is used for this.)

## RESOURCES

## EXTENSION WORK SUGGESTIONS

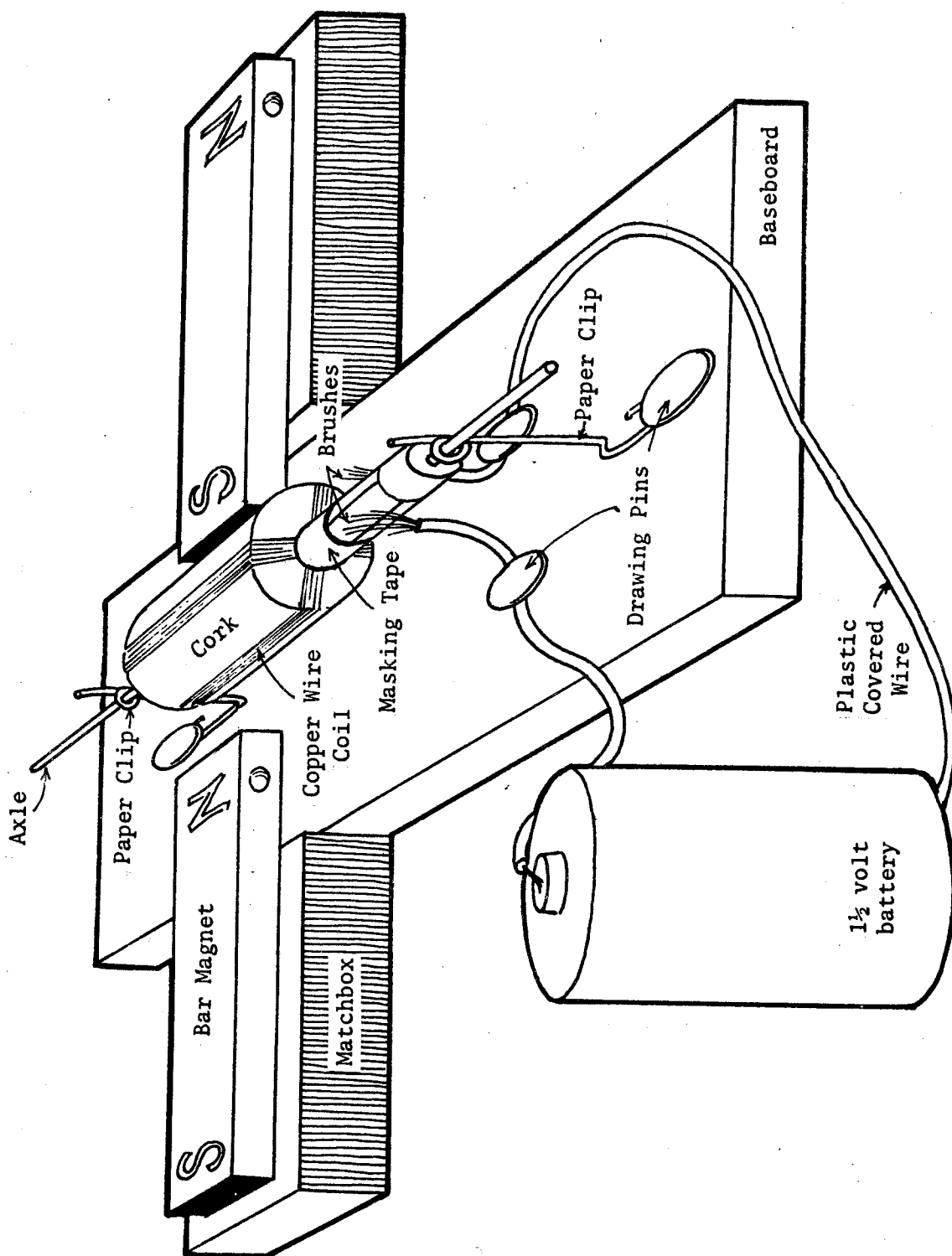
- Pull a real electric motor apart and locate the brushes, commutator etc.
- Students devise methods for determining the power of their motors.
- Students propose and test different methods for increasing the power of their motors.

(These two extension activities can be unstructured. Give them to students in the form of a challenge.)

## ADDITIONAL NOTES

- The motor works well and will run off a single  $1\frac{1}{2}$  volt battery.  
If motor doesn't go - check:::
  - contact between brushes and commutator.
  - insulation properly removed from commutator wires.
  - armature spins freely.
  - battery is not flat.

# make-a-motor



O. H. P. TRANSPARENCY MASTER

