

MAKING ROTOR UNITS AND ACCESSORIES

In this activity students compare the thrust forces produced by different propellers. For each pair of students you will need to construct a rotor unit, a rotor adaptor and cut out discs of thick aluminium foil.

EQUIPMENT REQUIRED FOR EACH PAIR/GROUP OF STUDENTS

- A motor
- Three or more toy propellers with different designs
- A switched battery box
- Propeller adapter (collet version)
- Two nuts
- Solder
- Double-sided sticky tape and pads
- A top-pan balance capable of reading to 0.1g or better
- Disposable aluminium baking tray
- Rubber band



The motor, battery box and propellers required for this activity can be sourced at low cost from a number of online suppliers (see below for suggestions).

A MM10 motor is ideal for making the rotor unit. It has a 2mm motor shaft, flat sides that make it easy to mount onto a battery box and is the type of motor commonly found in school science departments. You will need

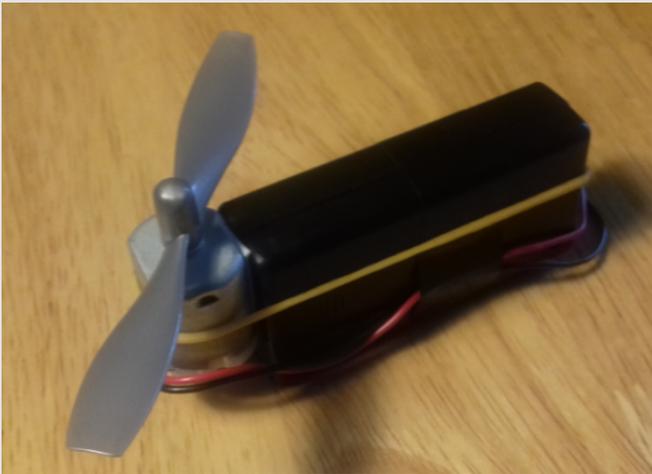
to source at least three plastic propellers of different number of blades and/or blade lengths that match the size of the motor shaft.

The following instructions are based on the recommended equipment shown above and listed below. If you use other equipment adapt the instructions as required.

Recommended equipment	Suggested online supplier (supplier code)
Motor MM10	Mindsets Online (EW2-008)
Switched battery box	Mindsets Online (EC1-035)
Mini Propeller	Mindsets Online (131-001)
6" 2 blade propeller	Mindsets Online (CP2-001)
5" 3 blade propeller	Mindsets Online (CP2-002)
Propeller Adapter to fit 2mm shaft (collet version)	Pyramid models (AC402)

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MAKING THE ROTOR UNIT



1. Cut a piece of the sticky tab to the same size as the flat side of the motor and stick it onto the flat side that has no electrical contacts.
2. Stick the motor to the short end of the battery box so that the top of the motor is level with the top of the battery box
3. Put two AA cells into the battery box and then touch the two wires to the contacts on the motor. Looking down on the motor, the shaft should rotate in an anticlockwise direction. If it rotates clockwise reverse the two wires. Make a note of which terminal the red wire goes to and then solder both wires in place.
4. Attach the dangling battery box wires to the side of the battery box that does not have the switch and use a rubber band around motor and battery box to help hold the motor in position.
5. Push the smallest propeller on to the shaft and switch on the battery box to check everything works.

MAKING THE ROTOR ADAPTOR



1. Take the dome off the propeller adaptor shaft and add one or two nuts to act as spacers.
2. Wrap tape around the collet and nut(s) only. Trim any excess tape
3. Put the dome back on the adaptor shaft

MAKING THE ROTOR ADAPTOR

1. Draw two 8 cm diameter discs on a disposable baking tray and cut them out.
2. Locate the centre of the disc. Place the centre of the disc on

a cork/some blu-tack and poke a small hole through the centre using the tip of a pen.