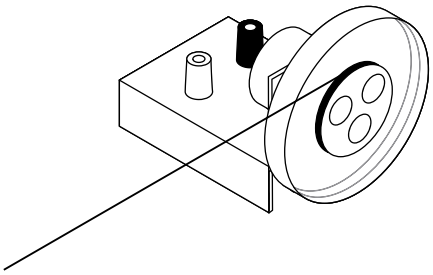
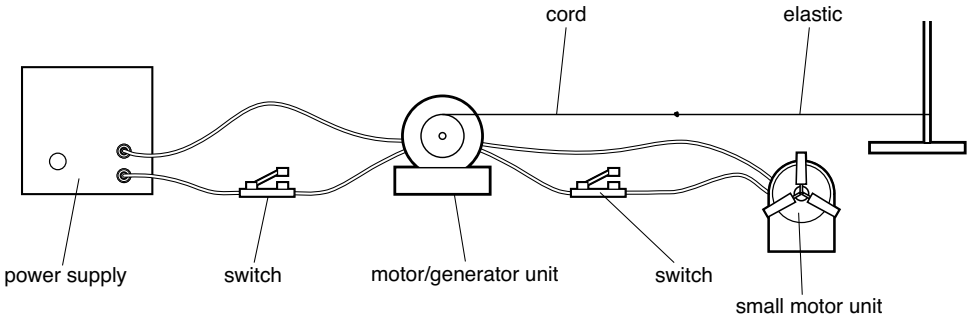
ENERGY STORAGE:
STRETCHING ELASTIC

Objects that are deformed in some way (for example, by stretching, squashing or twisting) can store energy. In this activity, you will be using a motor/generator unit first to stretch a bungee cord and then to create an electrical current. The bungee cord is acting as an *elastic store* of energy.



Task A
Storing and releasing energy in elastic

1. Connect the apparatus as shown in the diagram below. The cord should be about 1 metre long and attached to the *smaller* pulley of the motor/generator unit; the elastic (bungee cord) should also be about 1 metre long and attached to a fixed clamp stand. Set the power supply to 6 V d.c.



2. First, stretch the elastic by pressing the left-hand switch to connect the power supply to the motor/generator unit.

3. When it has reached its maximum extension, then *at the same time* release the left-hand switch and press the right-hand switch.

4. What happens to the small motor?

5. Repeat this procedure, but using a shorter extension of the elastic. Do you notice any difference?

6. How can you explain what happens in terms of energy?

Science Enhancement Programme

ENERGY STORAGE:

STRETCHING ELASTIC

Task B
Measuring the energy stored and released

By using an energymeter, you can estimate the efficiency of the energy transfer by measuring the energy input and output.

7. To measure the energy input, connect an energymeter between the power pack and the motor/generator unit. Set the knob of the energymeter to measure 'energy'.

8. Press the 'start/stop' button on the energymeter to start recording energy, and press the left-hand switch to stretch the elastic. When it has reached its maximum extension, press the 'start/stop' button on the energymeter again to stop recording.

9. Make a note of the energy reading.

10. To measure the energy output, connect the energymeter between the motor/generator unit and the small motor. (To get the current in the right direction, swap the red and black leads going into the energymeter.)

11. After stretching the elastic, press the 'start/stop' button on the energymeter to start recording energy; then press the right-hand switch while the elastic is released.

12. Make a note of the energy reading.

13. What is the energy efficiency of this process?

Task C
Estimating the work done in stretching the elastic

14. The work done when you stretch a piece of elastic is given by the formula: work (J) = force (N) x distance (m).

You can easily measure the distance it stretches; the force however changes as you stretch it. Can you work out a way of estimating the total work done?

15. Use this value, and the values of the energy input and output from Task B to estimate the efficiency of the two steps in the process – stretching and releasing.

Science Enhancement Programme