# Sensors and Alarms 1

This section supports the National Curriculum Design and Technology at Key Stage 3 and provides an easy introduction to the use of sensors.

This part introduces the idea of things being controlled by sensors. Streetlights switch on when it gets dark and switch off again when it gets light. Some cars have windscreen wipers that switch on when it starts raining and switch off when it stops. Washing machine doors will not open while the machine is switched on.
These are all examples where sensors are used to control what happens.

Start by building this circuit.
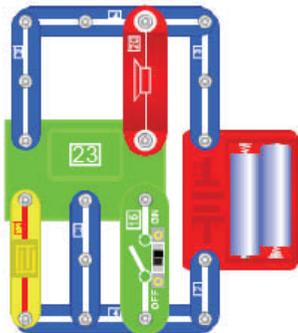
Experiment 1.
All the circuits are based on the space war sound module, part number 23. This module contains a pre-programmed chip having many different space war sounds. You can listen to these sounds by switching switch 15 on and off a few times.

To keep noise levels down, the loudspeaker could be replaced with the red light emitting diode (LED) (17). The LED will only work when the positive end (+) is connected to the positive end of the battery, in this case, via the top blue 4 connector.

Experiment 2. *Using the touch sensor.*
Remove the switch 15. Place your finger on the touch sensor 12, the alarm will sound, remove your finger and the alarm will stop The touch sensor works when both parts of the sensor are connected together. Your finger makes contact with both parts of the touch plate. Try using other things like a paper clip, a drop of water, a piece of wood or plastic or a piece of tinfoil.

Experiment 3. *Using the reed relay 13*.
The reed relay is a sensor controlled by a magnet. Connect the reed relay 13 in place of the switch 15, bring the magnet close to the reed relay and the alarm will sound. Remove the magnet and the alarm will stop. Inside the switch are two strips of steel that do not touch each other. The magnet causes the two steel strips to touch so that electricity will flow.

Experiment 4. *Using the light sensor 16*.
Replace the reed relay 13 with the light sensor 16. Point the light sensor at a bright light and the alarm will sound.
Put you finger over the sensor, the alarm will stop.
The light sensor contains a light sensitive resistor which has a low resistance in bright light and a high resistance in the dark. When the resistance is low, electricity can flow through the sensor. When the resistance is high, electricity will not be able to flow.

Sensors and Alarms 2

Having found out how sensors work, this next section shows you how to use the circuits to alert you to any change detected by the circuit.
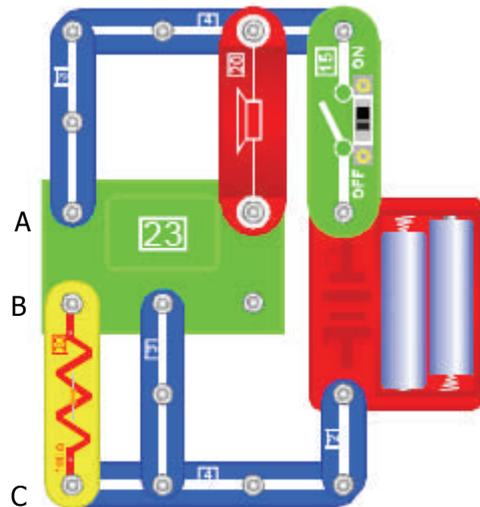
Start by building the circuit below.

Experiment 5. *Protecting your bicycle*.
Connect a long thin wire to terminal A, pass the wire through your bicycle wheel and connect the other end to terminal B. Switch on using switch 15.
If your bicycle is removed, the wire will be broken and the alarm will sound.
The best way to connect the wire to the terminals is to make a small loop in the end of the wire, put the loop on a terminal and clip the connector on top of it.

Experiment 6. *Protecting doors or windows*.
Fix the reed relay on the door or window frame, using double-sided adhesive tape or other means. Connect the terminals of the reed relay with thin wire to terminals A and B. Fix the magnet on the door close enough to the reed relay to make the contacts touch. Switch on switch 15.
If the door or window is opened, the reed relay contacts will open and the will alarm sound.

Experiment 7. *An automatic rain detector*.
Remove the resistor 30. Connect the touch sensor 12, to the terminals B and C, using thin wire. Switch on and hang the touch sensor out of a window. If it starts to rain, the touch sensor will get wet and the alarm will sound.

Use terminals A and B when contact has to be broken to make the alarm sound.

Use terminals B and C when contact has to be made to make the alarm sound.