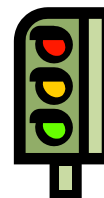


Design and Technology



Objective

- To make a working traffic light, using LED's

Requirements

- This task is to be done in groups of two or three.
- The circuit is to be mounted on a thin plank of soft wood, approximately 20cm x 30cm x 0,5cm
- The circuit switch is to be made up of a wooden clothes peg and four drawing pins
- Some materials will be provided by the school. All other materials should be at school when required.

Skills and Knowledge Required for this Task

- Electric Circuits
- Battery Cells
- Soldering
- General Woodwork

Materials Supplied by the School

- Battery case for 2 x AA batteries
- Screws
- Soldering wire
- Copper wire (for the circuit)
- LED's in red, orange and green (one of each for each group)
- Drawing pins

Equipment

- Saws
- Sandpaper
- Awls
- Screwdrivers
- Scissors
- Pliers

Help and Instructions

During this process there will be learning steps and doing steps. Please pay close attention to these.

Learn to

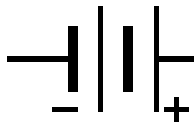
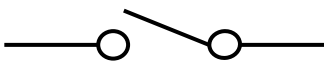
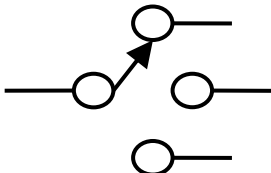
1. Draw an electric circuit diagram - see Appendix A

Do

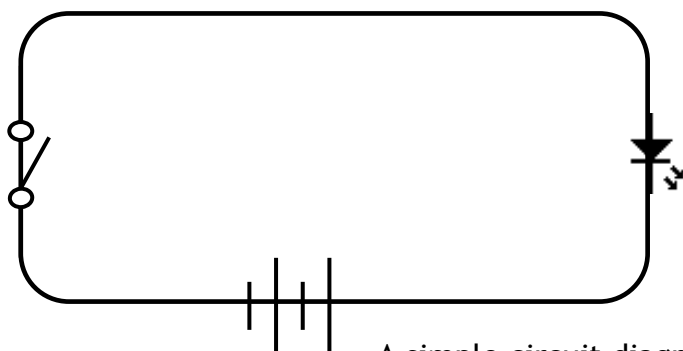
1. Design an electrical circuit for traffic light - with diagrams
2. Design layout of electrical circuit and traffic light stand
3. Draw design of electrical circuit on the wooden board
4. Practice soldering
5. Make a three-way electric switch - see Appendix B
6. Solder the electric components together - to be done in class when all necessary steps are completed

Appendix A - Drawing an electric circuit diagram

Electricity flows from one point to another. It travels along a path. To show this path we can draw an electric circuit. There are certain symbols used to show the different components of an electric circuit. The symbols are internationally recognised so that language does not need to be used to explain them. That means that even people who don't speak the same language can understand what the circuit diagram is saying.

	Wire
	2 Cell battery
	Open switch
	3-way rotary switch
	Light Emitting Diode

Example of a circuit diagram:

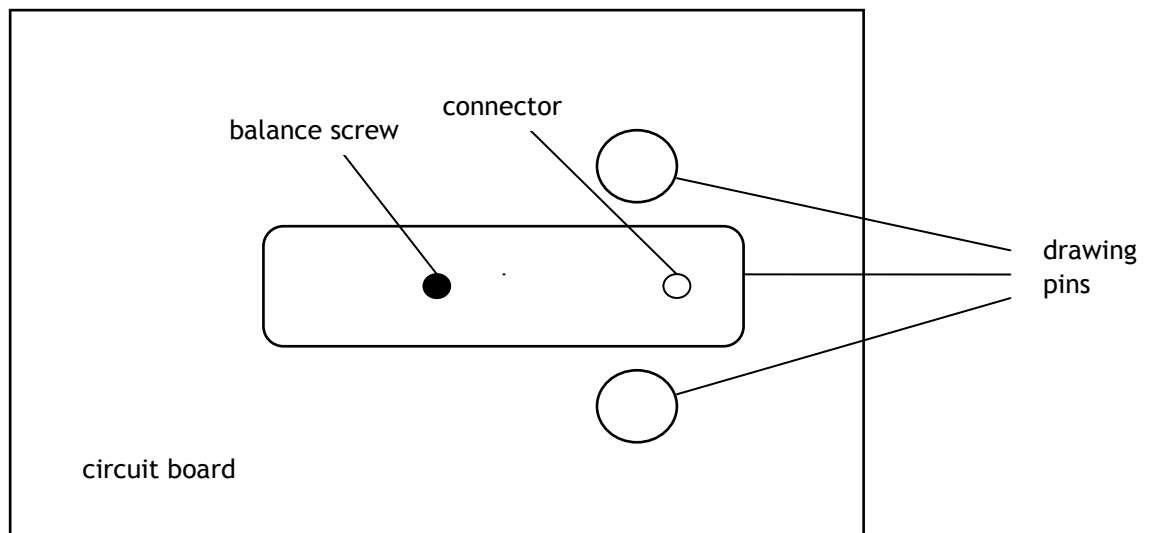


A simple circuit diagram

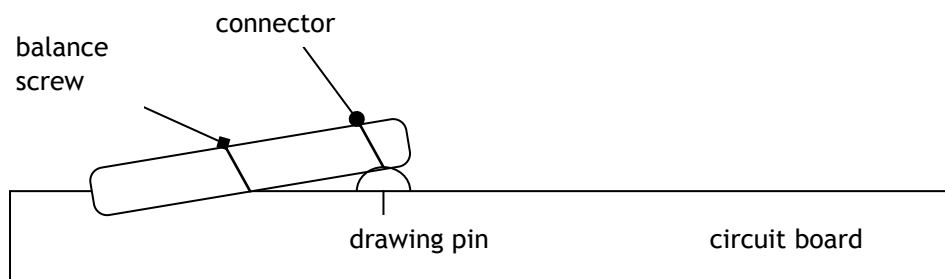
Appendix B - Making a three-way electric switch

By pressing on the clothes peg, it can be swivelled across the three drawing pins to make three different contacts. The peg is to be secured to the circuit board with a screw. A drawing pin is placed under the one end of the peg, on the circuit board, and the two other pins to either side but still in reach of the swivelled peg. A fourth drawing pin is placed on the underside of the peg to make contact with the drawing pins on the circuit board. A hole is made through the peg to make contact with the drawing pin on its underside. Wire and soldering are used to make a connection between the pin on the underside and the rest of the circuit.

Top view of switch

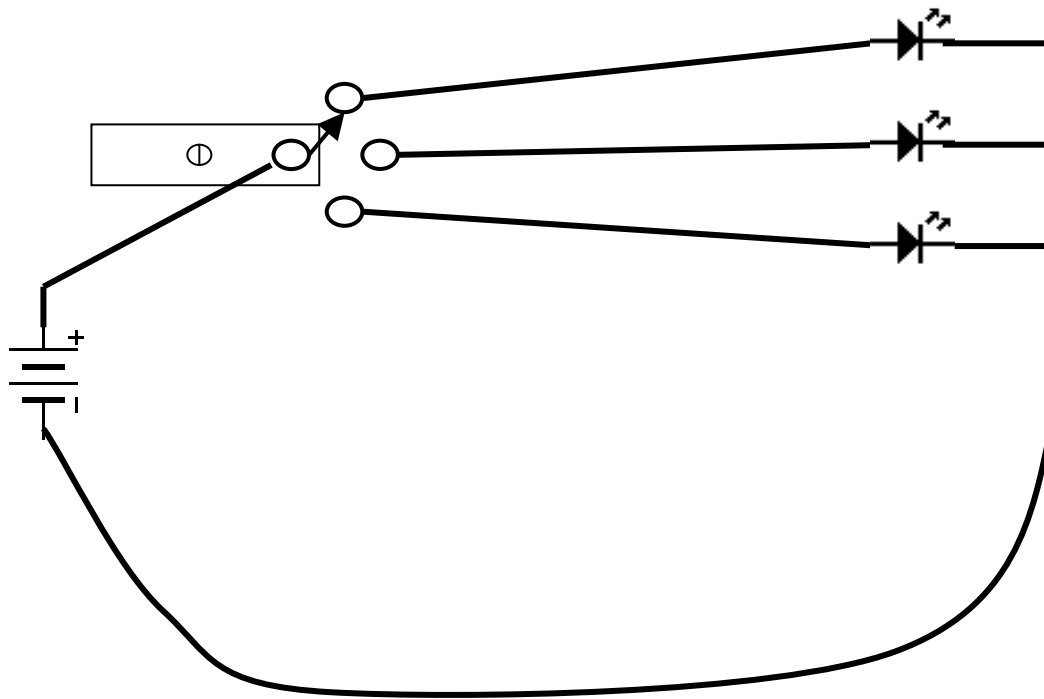


Side view of switch



Circuit Diagram

LED Traffic Light



Order of Assembly

1. Draw all the components on the board. Pay special attention to the 3-way switch because the distances of the drawing pins need to be correct otherwise a connection will not be made.
2. Using Presstik and sticky tape place all the components on the board.
3. Measure the lengths of wire and allow for some leeway because the wire is very fragile and can break easily.
4. Strip about 1,5 cm on each end of wire. Using sticky tape, place the cut and stripped pieces of wire on the board.
5. Start on the 3-way switch by soldering wire to all the drawing pins. Be careful to get the twisted wire as close to the head of the pin as possible.
6. Finish the 3-way switch by separating the wooden peg and removing the metal clip. Push one drawing pin onto the underside of the peg and push the other three drawing pins into their place. Screw down the peg. Your switch (peg) should be able to swivel through all three positions.
7. Attach the three LED lights to the necessary wire. Remember that LED's only allow electricity to flow in one direction so make sure you place the LED's the correct way round.
8. To make the T-bar connection from the LED's back to the battery cell, you will need to strip more than 1,5cm. Strip what you need and then solder the T-bar connection.
9. Now the tricky part. Solder the battery cell to their connecting wires. Again make sure you solder it in the right way round because electricity only flows from + to -. Be very careful when soldering because the hot solder may melt the plastic of the battery cell. Once the soldering has cooled then screw the battery cell to the board and put the batteries into the holder.
10. Test your circuit.