

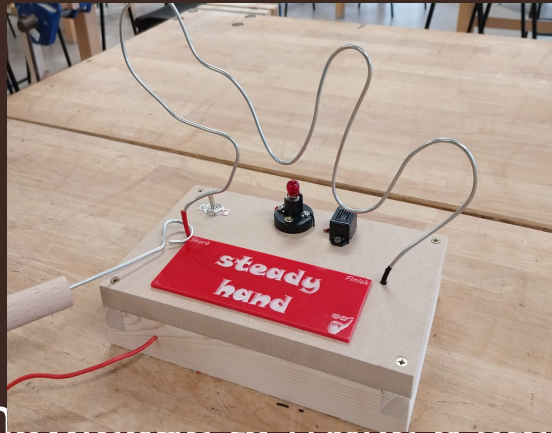
Steady Hand Project

Mr Burke



Objectives and Outcomes

- In this project we will use some woodworking skills we have developed already to make a Half Lap Joint as well as how to drill holes for a screw.
- We will work with different material such as MDF as well as softwood.
- We will learn about simple circuitry and how to solder.
- We will learn about how different materials conduct electricity.



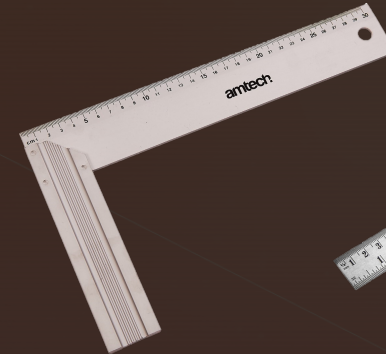
- We will use all this knowledge to make a steady hand machine that has two output devices (a light and a buzzer) and an on/off switch

Making the Box

- First, we will make the box for the steady hand machine before any circuitry.
- Between you and your group you will need:
 - A piece of MDF approximately 18mm x 230mm x 145mm.
 - A beam of softwood approximately 34mm x 18mm x 800mm.

- Tools you will use:

- Marking Gauge
- Tri Square
- Steel Rule
- Tenon Saw
- Bevel Edged Chisel
- Electric Hand Drill



MDF Top

- You will be given a piece of MDF wood for the top of your steady hand machine.
- **MDF: Medium-density fibreboard is an engineered wood product made by breaking down hardwood or softwood residuals into wood fibre, often in a defibrator, combining it with wax and a resin binder, and forming it into panels by applying high temperature and pressure. MDF is generally denser than plywood.**



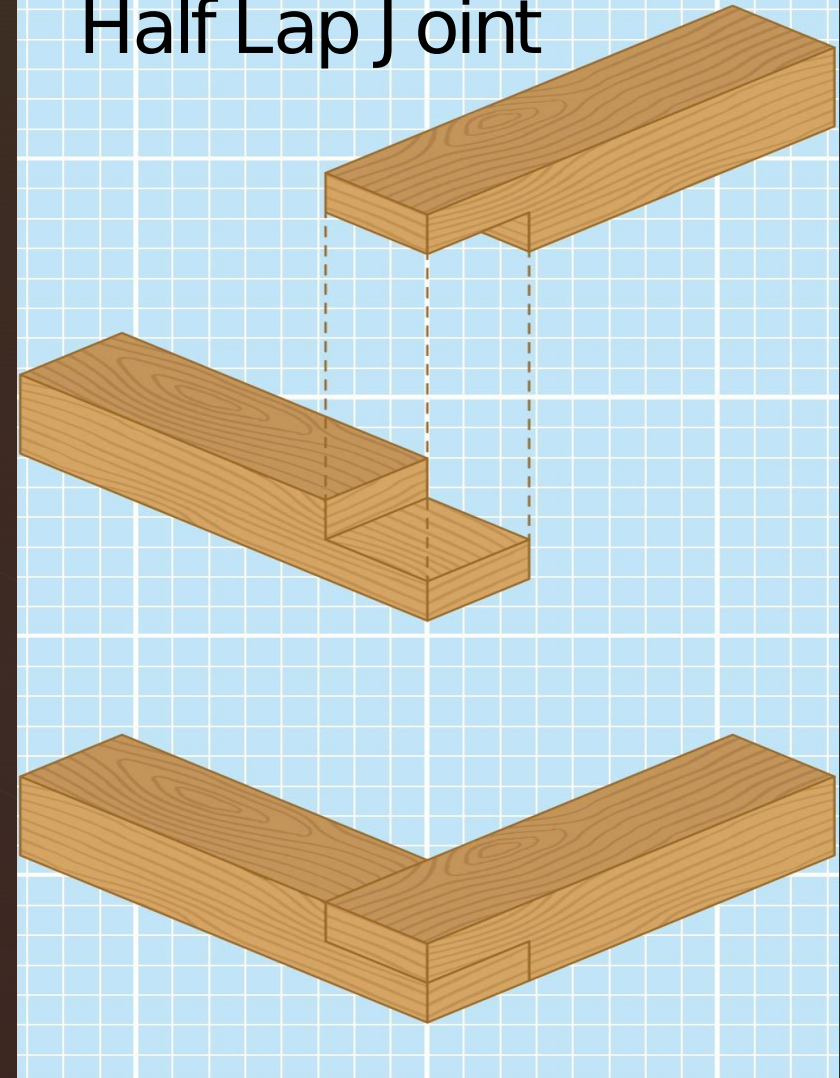
Sides of Box

- With your beam of softwood, you will cut it into four parts with the Tenson Saw.
- Cut your beam to the size required for the MDF top.
- You will use a half lap joint in each corner to make the sides of your box.

Softwood Beam

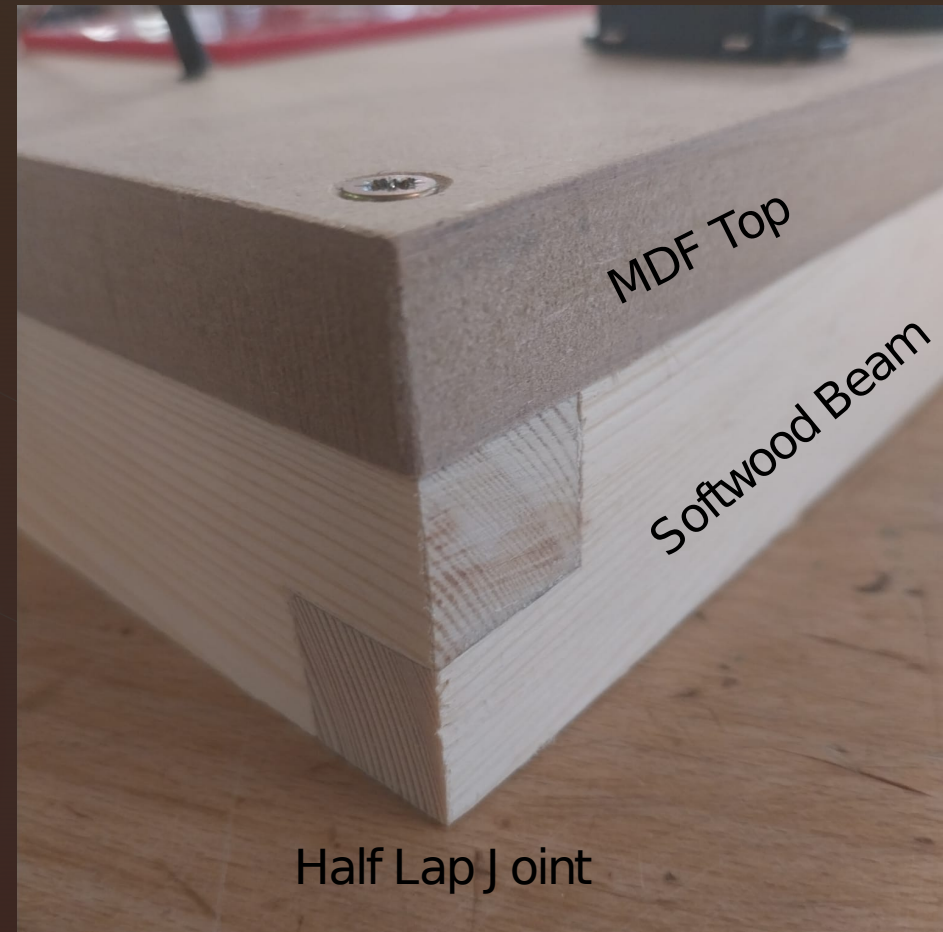


Half Lap Joint



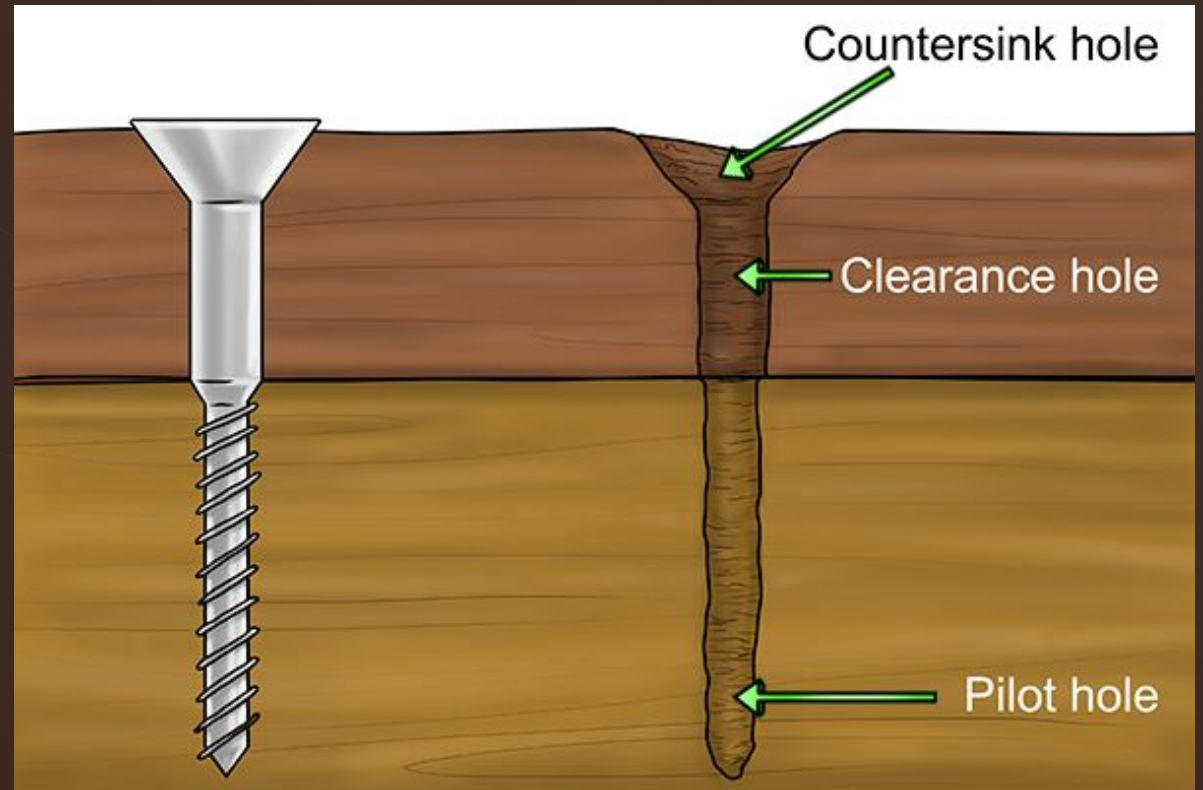
Marking out and cutting

- Use your Marking Gauge, Tri Square and Steel Rule to mark out your half lap joint.
- Use the Tenson Saw to cut your lap joint.
- Use your Chisel to tidy up the joint ensuring that it fits together.
- Do not use sandpaper or a file to tidy up the joint or remove extra material as it will not be accurate and leave a curve.
- You will use PVA glue to attach the parts together.



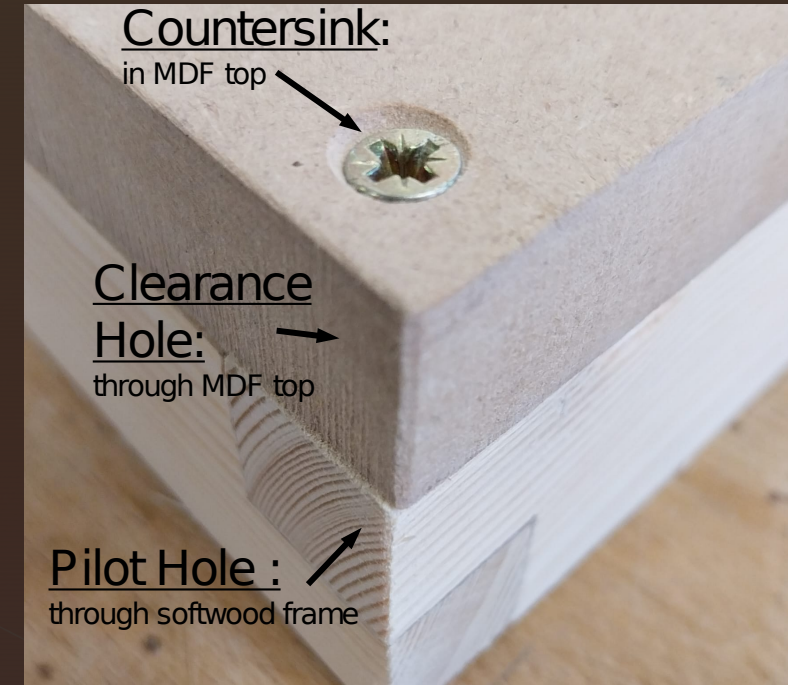
Attaching the Top

- When the sides of your box are joined together to make a frame, you will use mechanical fittings (screws) to attach the MDF top.
- There are three types of holes you must understand and drill:
 - Pilot hole
 - Clearance hole
 - Countersink hole



Attaching the Top, continued

- We will drill a Pilot Hole in the softwood frame that the screw will be able to grab onto and hold. The hole should be small enough so the screw can go into it and grab, but not so big that the screw passes through it.
- We will drill a Clearance Hole in the MDF so the screw may pass through it and grab the softwood frame underneath. This hole should be wide enough for the screw to fit through, but not too big so that the screw can move around.
- As the screw head has a slope on it, we will make what we call a Countersink for the screw to sit in so it flush (level, so it's not sticking up). This should be the width of the top of the screw.



The best way to drill these holes is with the hand drill when the parts are clamped together. You will be able to drill the pilot hole all the way through, then the clearance hold just through the MDF and the counter sink at the top of the MDF.

Making the Circuit

- Between you and your group you will need:
 - A piece of Dowel $\varnothing 30\text{mm} \times 70\text{mm}$
 - Aluminium wire
 - Electrical components including:
 - a switch
 - a light
 - a buzzer
 - battery holder
 - Electrical wire for connecting components



- Tools you will use:
 - Soldering iron
 - Pliers
 - Wire Strippers
 - Electric Hand Drill
 - Chisel
 - Centre Finder



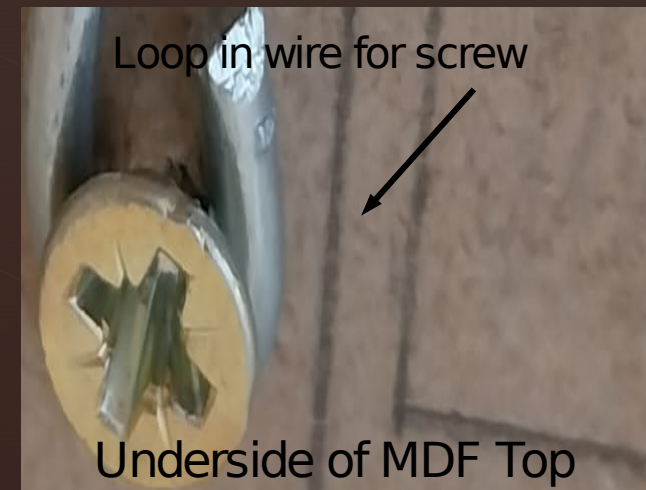
Aluminium wire

- We will use aluminium wire to make the course for the steady hand.
- Aluminium is a metal with a silver white appearance. It has a wide variety of users including in food and drink cans, kitchen utensils and aeroplane components.
- We are using aluminium because of its physical properties which make it ideal for this application:
 - Connectivity - aluminium is a great conductor of electricity
 - Malleable - aluminium is a soft material that can easily be bent into the desired shape
 - Lightweight - Aluminium is lightweight and therefore won't make our steady hand too heavy



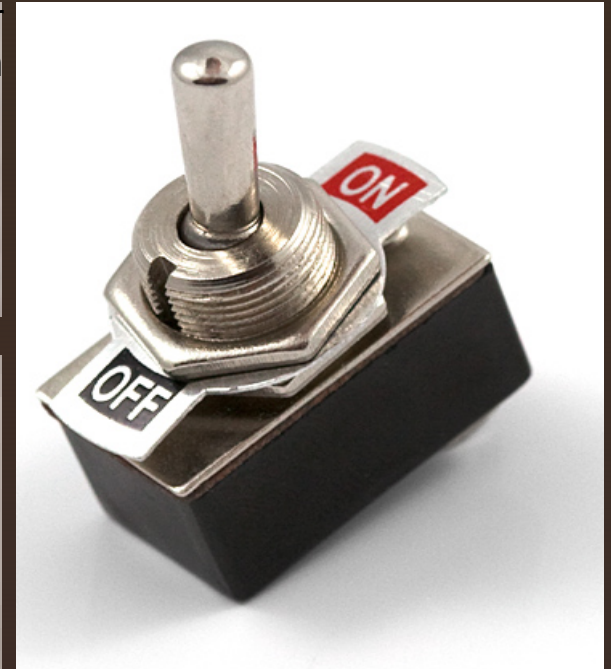
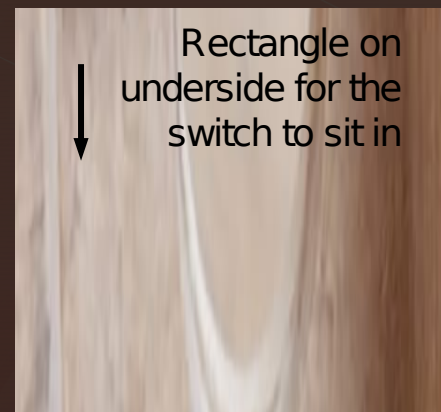
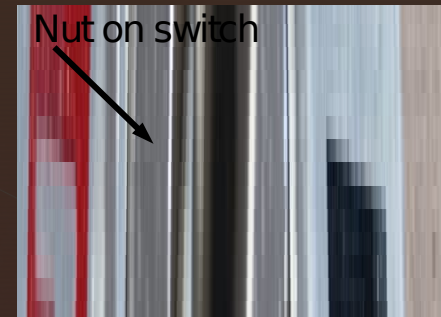
Making the Steady Hand Course

- You will be given a length of aluminium wire.
- Bend the aluminium wire to make the steady hand course.
- You will need to drill two holes in your MDF top for the two ends of your aluminium wire to fit through.
- Use your pliers to bend the aluminium wire into a loop once through the MDF top so that a screw will fit into so you can attach it on the underside of the MDF.



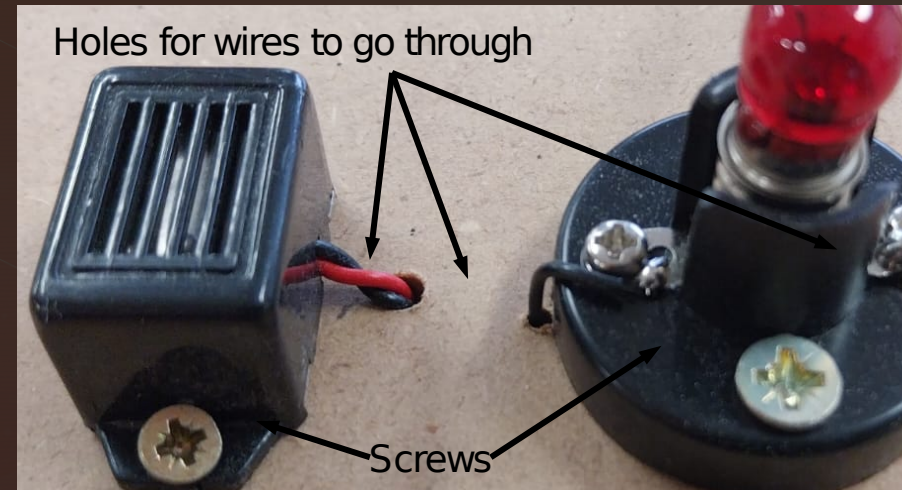
Installing the Switch

- To install the switch in the MDF you will first need to drill a hole equal to the shaft of the switch.
- On the underside of the MDF you will need to chisel out a rectangle for the switch to sit in. The size and depth can be gotten from checking the switch.
- When this is done you will be able to install the switch and hold it in place with the nut.



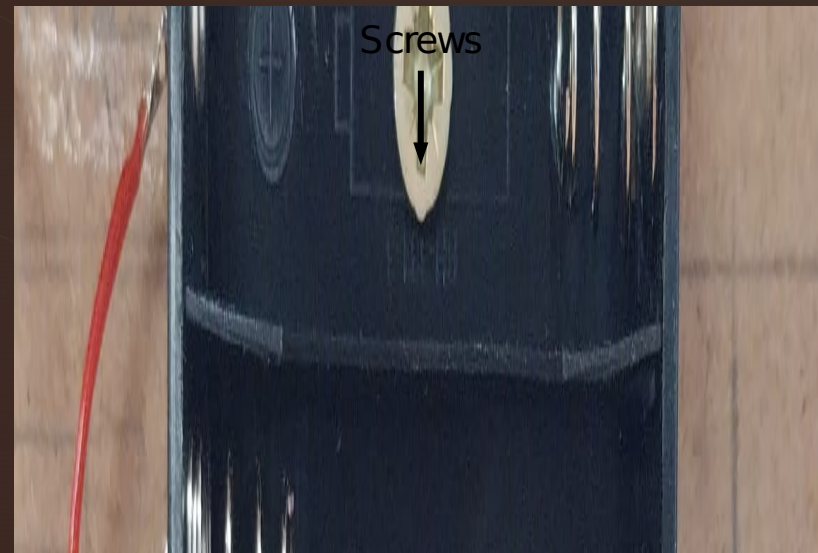
Installing the Buzzer and Light

- You can install the light and the buzzer wherever you want on your MDF top of your steady hand.
- There are holes at the side of the buzzer and the light so it can be screwed down to the MDF to be held in place.
- For the buzzer you will need to drill a hole going through the MDF so its wires may be fed through to the underside.
- For the light you will need to drill a hole at either side of the light for wires to be fed through from the underside.



Installing Battery Pack

- The battery pack is easily installed on the underside of the MDF top using screws through the holes provided.
- Pay attention to where the wires/connectors for the battery pack are in relation to other components and your switch



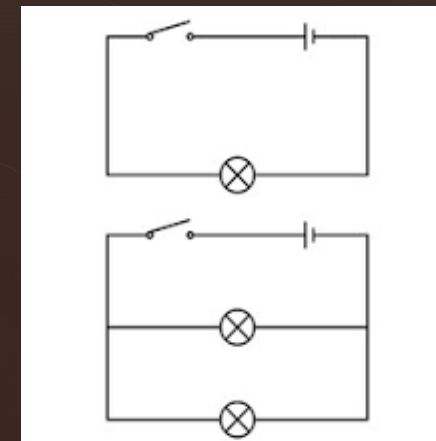
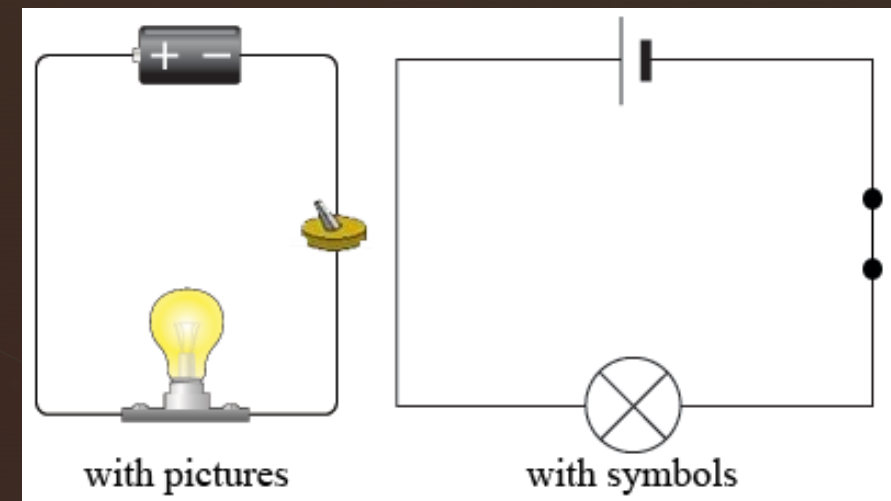
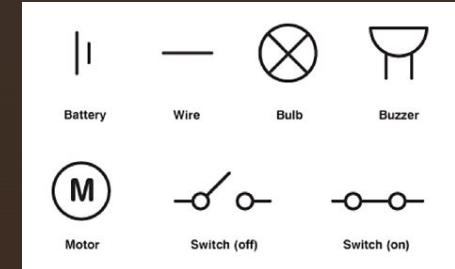
Making the Handle

- For the handle you will need a piece of dowel and a straight length of aluminium wire.
- With your pliers make a small loop at the end of the aluminium wire.
- Find the centre on both sides of the dowel using the Centre Finder.
- On one side only use a Forstner drill bit to make a small hole for the end of the wire with the loop to be able to sit in.
- You will need to drill a hole all the way through the dowel going from both sides as the drill bit will not be long enough to go all the way through from one side.



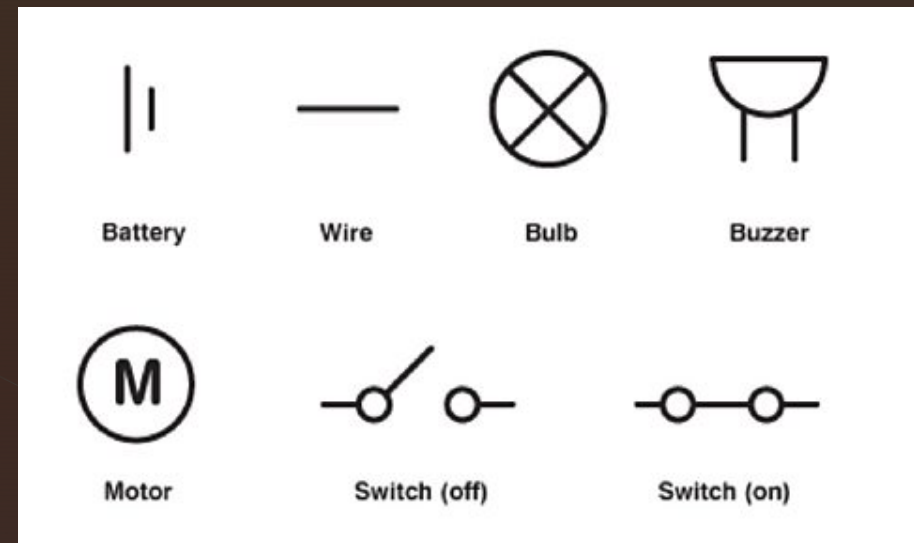
Basic Circuit

- In a basic circuit we use symbols to represent different components. This is something you should be aware of from your science lessons.
- How we wire different components together is also important in our circuit. We have two output components being our buzzer and our light. We can wire these in series or in parallel.



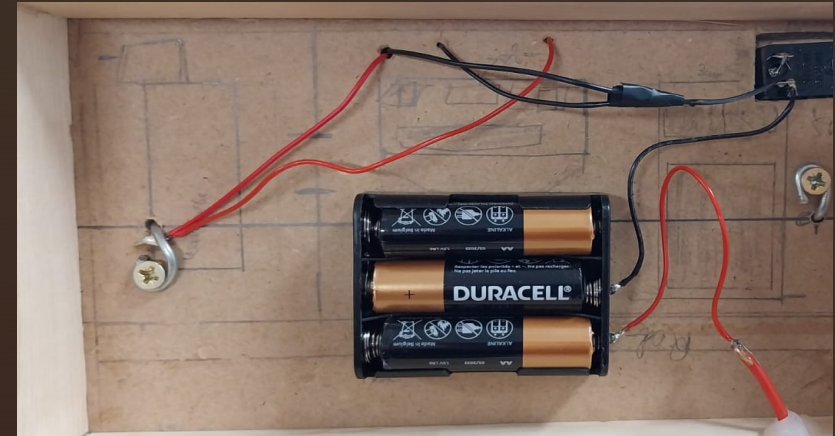
Draw out Your Circuit

- Using the appropriate symbols to draw out your circuit for your steady hand machine



Making your Circuit and Soldering

- When all your components have been installed and you understand how your circuit is going to work it is time to attach it all together and solder it in place.
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- Note that direction of current is important for the buzzer but not for the light. The light and the buzzer should be wired in parallel not series.



Finishing

- If you are finished and everything works you may customise an accessorise your steady hand. You can use the pyrograph, or paint, or laser cut, it is your choice

