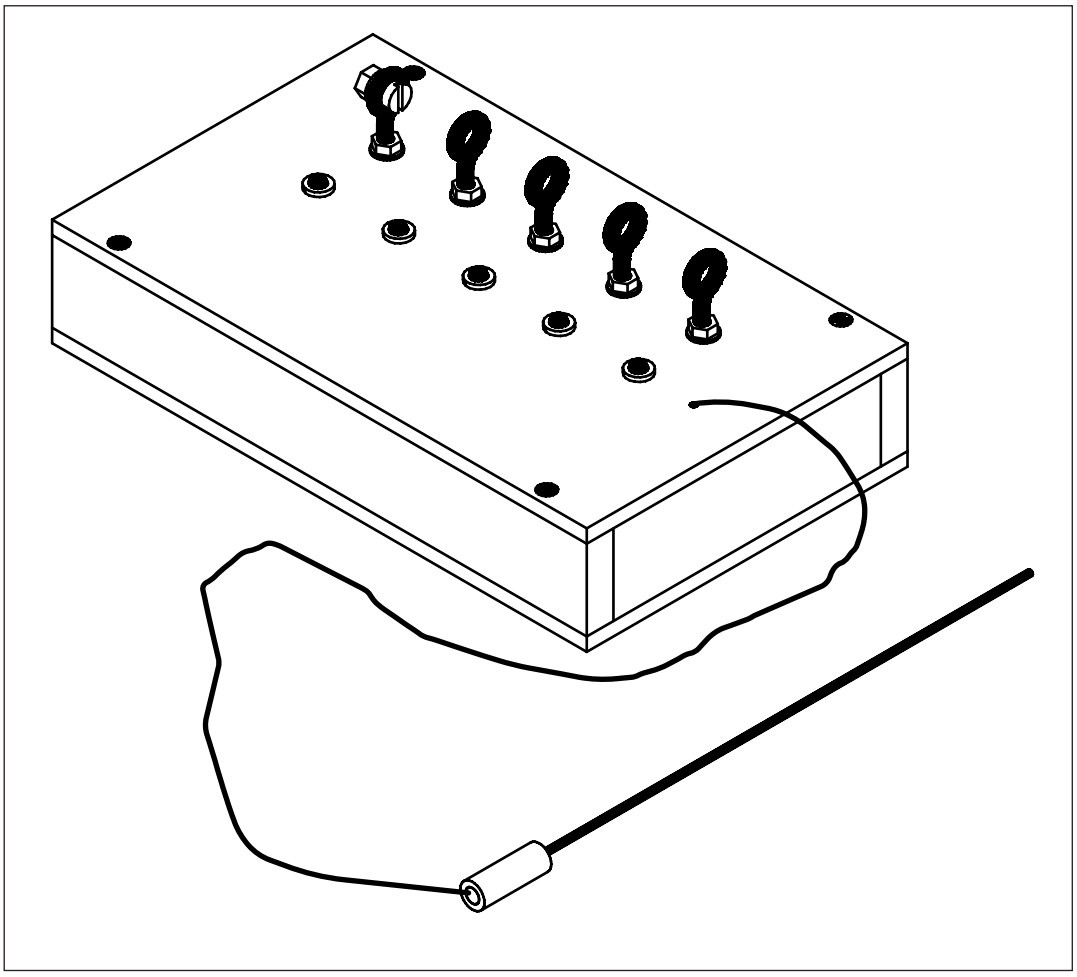
104.014

Steady hand game



Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technolo- gy.These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Dan- ger of suffocation!

1. Product Information:

Article: Electronic game,in construction pack format

Use: In Design Technology,Key Stage 3

2. Material Information:

2.1. Material: Pine (Coniferous) soft wood
Gabun plywood,multi layered

Working: The wood can be sawn, drilled and sanded

Joining: Glue,screws

Finish: Wax (solid or liquid)
Wood varnish (Base/top coat)
Staining (Colour, water soluable - finish with varnish)
Linseed oil

2.2 Electronic Components:

Resistors: Controls the flow of electrons
(Large resistance = little flow; Small resistance=greater flow)
Identified by a colour code 150 Ohms Brown Green Brown

LED: **L**ight **E**mitting **D**iode
Semi-Conductor
Cathode(-) shorter leg, flattened side

Wire Multi strand,insulated wire

3. Tools

Sanding: Use a block and glasspaper for all flat surfaces and loose sheet for individual shapes

Drilling: Use a pillar drill

Note! Remember the safety rules: wear safety glasses, tie long hair back, remove jewellery and wear an apron. Hold the work to be drilled in a machine vice!

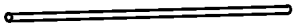
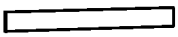
Use the correct size wood drill; only use sharp drills

Clamping: Use good quality clamps to hold the work whilst the glue is drying. Do not overtighten them or they will leave marks

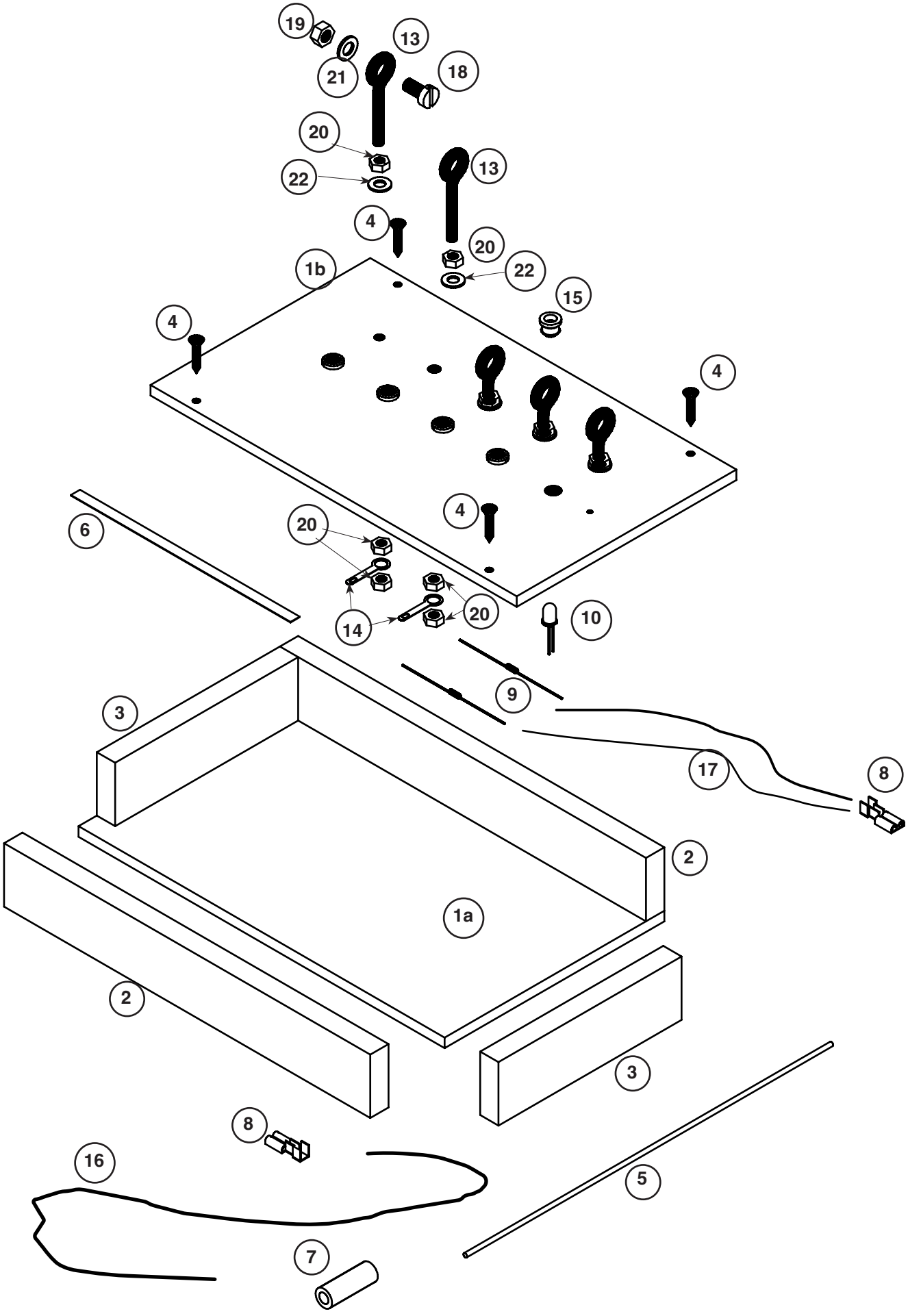
Soldering: Use a 15-30 Watt soldering iron with a fine tip.
When soldering hold the work in a vice or a Helping hands" device so that you have both hands free

Cutting: Use side cutters to remove insulation and trim the resistors etc

4. Parts list:

Part	Material	Quantity	Size	Diagram
Housing	Plywood	2	5 x 120 x 200 mm	 1
	Pine strip	2	10 x 30 x 200 mm	2
	Pine strip	2	10 x 30 x 100 mm	 3
	Chipboard screws	4	3 x 16 mm	 4
Switching	Welding rod	1	2dia x 200 mm	 5
	Copper band	1	5 x 120 mm	 6
	Banana coupling	1		 7
	Spade contact	2	6,3 mm	 8
	Resistor	2	150 Ω	 9
	LED	4	5 mm, red	 10
	LED	1	5 mm, green	 11
	Screw eye	5	M 4 x 20 mm	 13
	Ring connectors	5	M4 x 18 mm	 14
	LED holder	5	5 mm	 15
	Insulated Wire	1	0,14 mm^2/1000 mm	 16
	Insulated Wire	1	0,14 mm^2/500 mm	 17
	Machine screw	1	M5 x 10 mm	 18
	Nuts	1	M5	 19
	Nuts	15	M4	 20
	Washers	1	M5	 21
	Washers	5	M4	 22

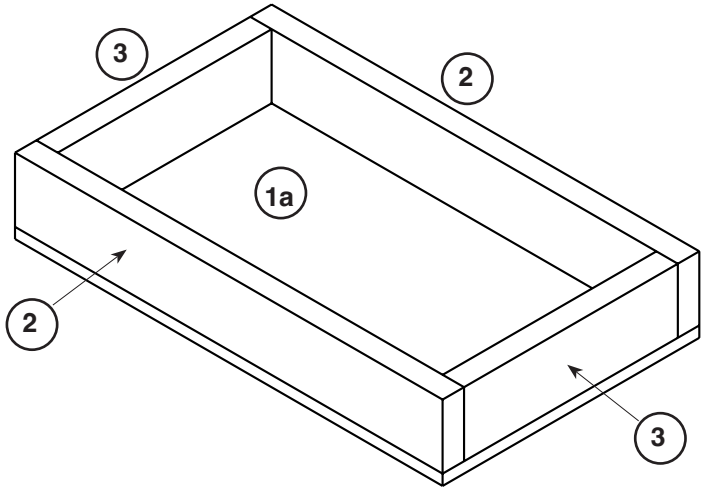
5. Exploded diagram

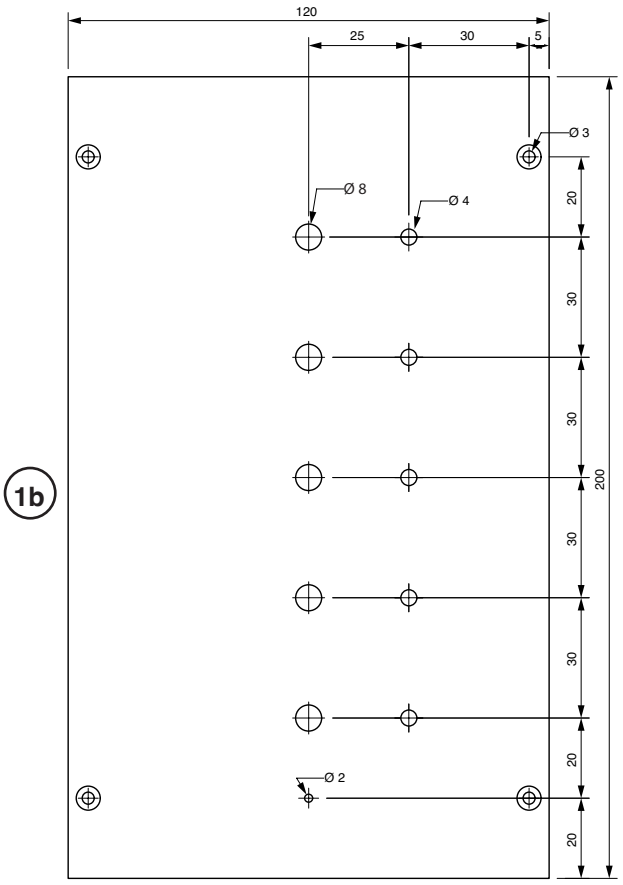


6. Planning overview

6.1 Making the housing

6.1.1 Glue the strips (2/3) around the plywood base (1a) as shown in the diagram

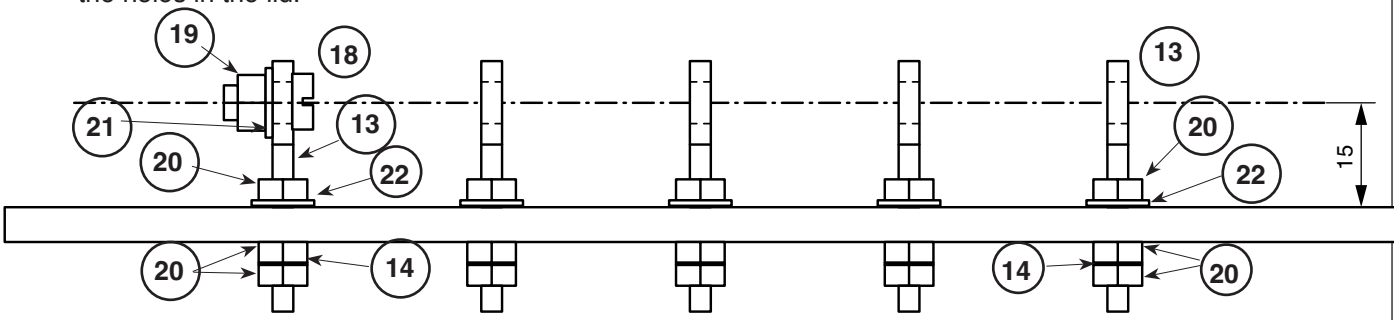




6.1.2 Drill the lid (1b/second plywood sheet) as shown in the diagram (see plan A).
6.1.3 Sand the lid to fit the housing.
6.1.4 Decorate to your own design

6.2. Mountng the screw eyes and LEDs

6.2.1 Screw a 4mm nut (20) tight on to each screw eye (13) Then add a washer and insert the screw eyes through the holes in the lid.



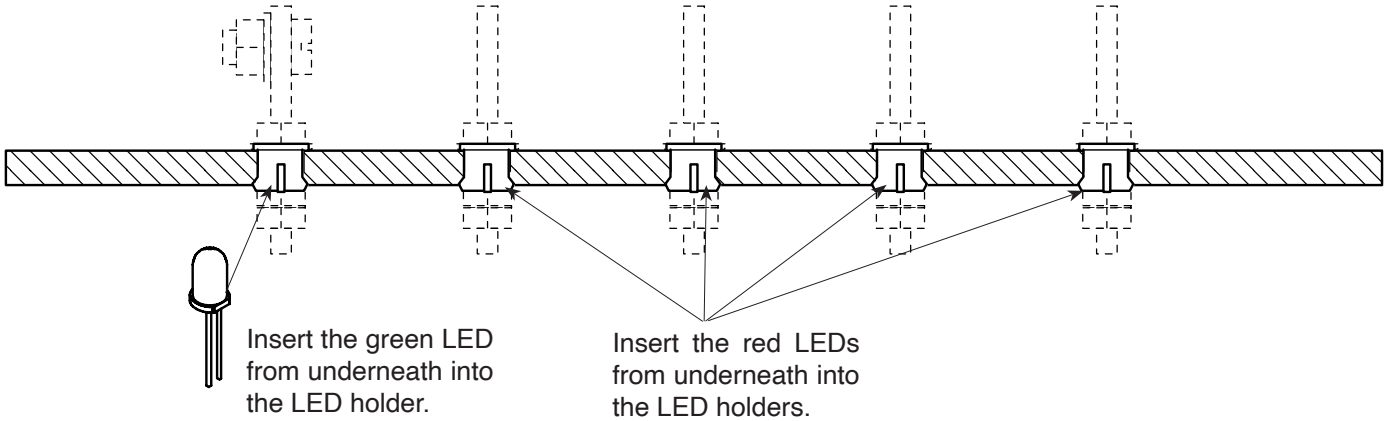
6.2.2 From underneath the lid add a further nut (20) a ring connector (13) and another nut

Note:DO NOT tighten the last nuts (20) at this stage!

6.2.5 Insert the machine screw (18) through the hole in the last screw eye, add a washer and nut. (see above diagram)

6.2.6 Adjust the screw eyes (12/13) so that the middle of the screw eye is about 15mm above the top of the lid

Note: DO NOT tighten the nuts (20) at this stage. The connectors may need to be adjusted before they (nuts) are finally tightened.



6.2.7 Insert the LED holders (15) through the 8mm holes in the lid

6.2.8 Push the green LED (11) into the first holder so that the cathode (flat side) points to the screw eye (13)

6.2.9 Insert the four red LEDs (10) into the remaining holders, again so that the cathode (flat side) points to the screw eyes (12).

Note: Position the green LED, in the correct hole by the last screw eye (13) do not mix it up!

6.3. Constructing the circuit

6.3.1Turn the lid over as shown in the diagram. Turn the ring connectors in the direction of the LED legs and then clamp the connectors tightly between the nuts.

6.3.2 Glue the copper band (6) in place as shown, alongside the red LEDs

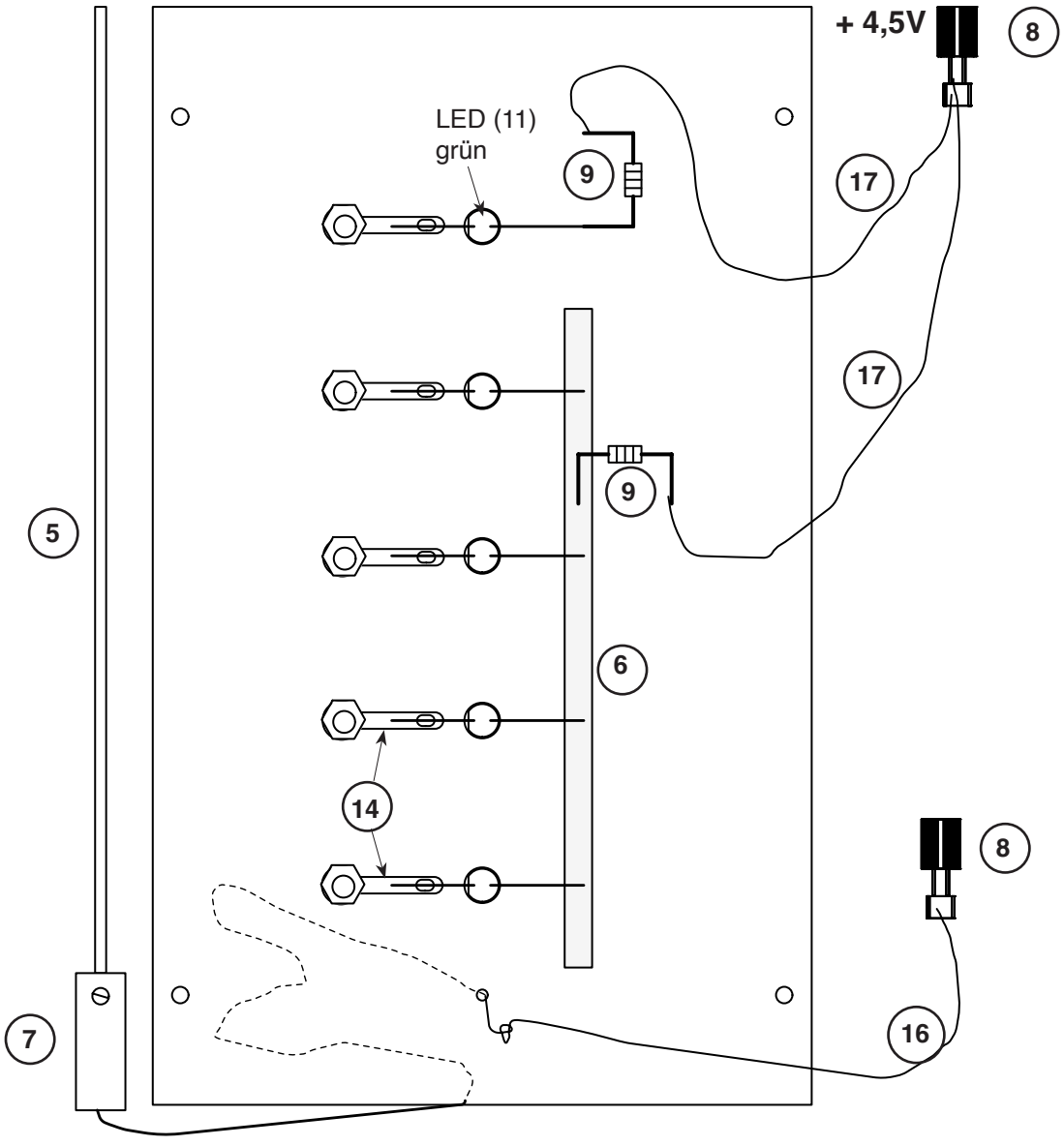
6.3.3 Bend the legs of the LEDs, left (Cathode) and right (Anode) so that they come into contact with a ring connector or the copper strip Solder the cathodes (red+green LEDs) to the connectors and the anodes to the copper strip (Red LEDs only)

6.3.4 Bend the legs on the resistors (9) Solder one leg to the anode on the green LED. Solder the second resistor to the copper band as shown

6.3.5 Cut insulated wire (17) in half, strip and tin the ends of the wires. Solder one end of each wire to the resistors, twist the wires together and solder the other ends to the spade contact (8)

6.3.6 Remove the insulation from the ends of the wire (16) and tin them with solder. Solder one end to the spade contact (8) About 250mm from this connector tie a knot in the wire. Thread the free end of the wire through the 2mm hole in the lid, so that knot holds the remaining wire on the copper band (6) side of the lid

6.3.7 Insert the welding rod (5) in the banana coupling (7) so that about 30mm protrudes on one side. Solder the free end of the wire (16) to this end. Pull the rod so that the joint is hidden in the coupling and then tighten the coupling on the rod



6.4. Testing the circuit.

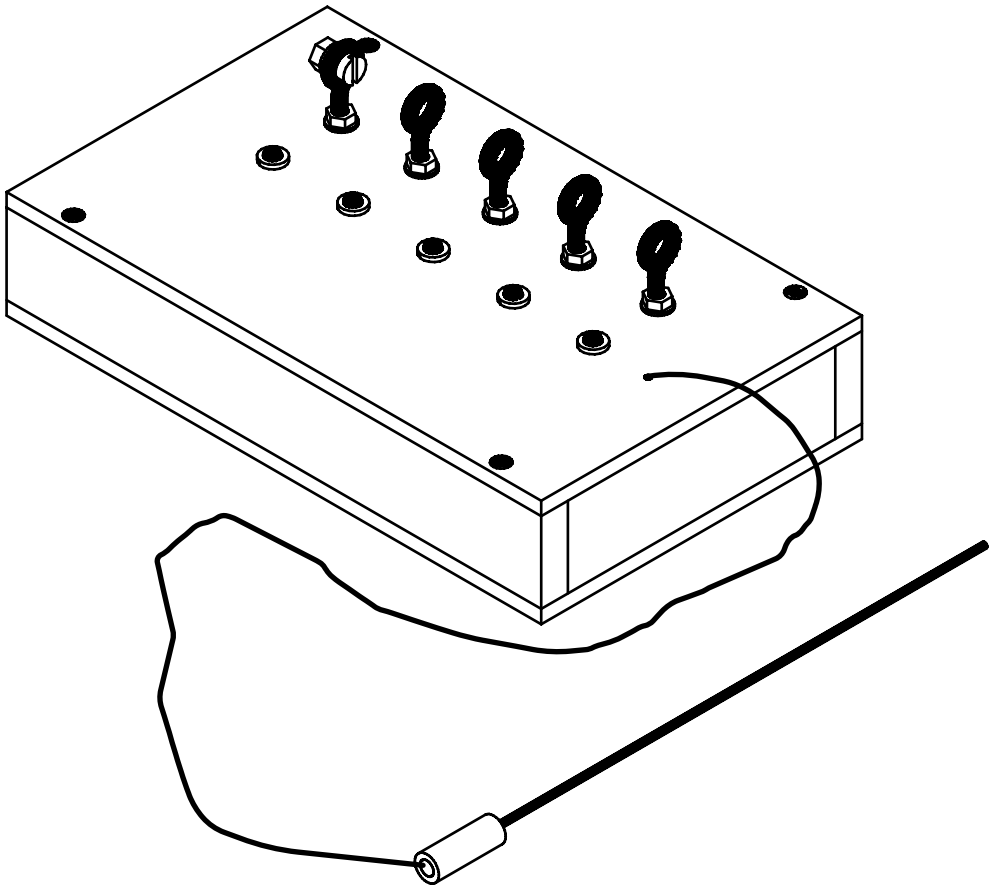
6.4.1 Connect the spade contacts to a 4.5 Volt battery

Note: Watch the polarity!
+ pole wire (17) 0.14mm2
- pole wire (16) 0.75mm2

6.4.2 Touch each screw eye in turn with the welding rod tip to see if the LEDs function

If one LED does not light, check the connections (Anode and Cathode wrong)!

6.4.3 When everthing is working to your satisfaction, screw the lid on the box,



General:

The aim of the game is to touch the target (screwhead,18) with the end of the lance (Welding rod,5) You must not, of course, touch any of the other rings as you thread the lance through the holes. This model uses two separate circuits, which when activated, will light either the red or green LEDs

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