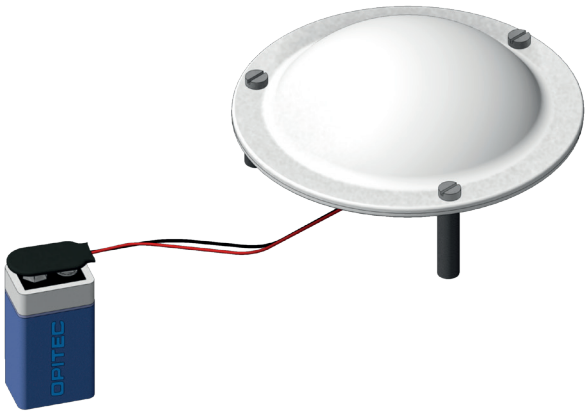
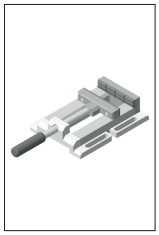
108.960

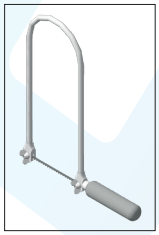
"Theremin" The electronic music UFO

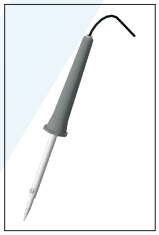


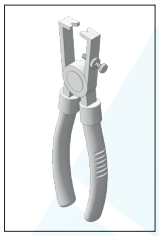
Tools Required:

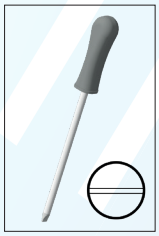

Machine vice


Hot air blower

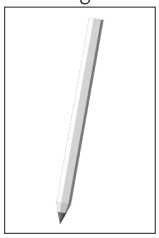

Jig saw

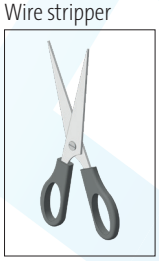

Soldering iron

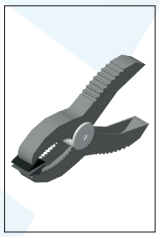

Wire stripper

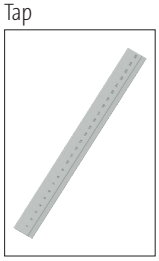

Screwdriver


Tap


Pencil


Scissors

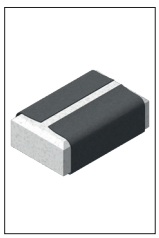

Clamp


Ruler

Drill


Adhesive tape


Compasses


Sandpaper

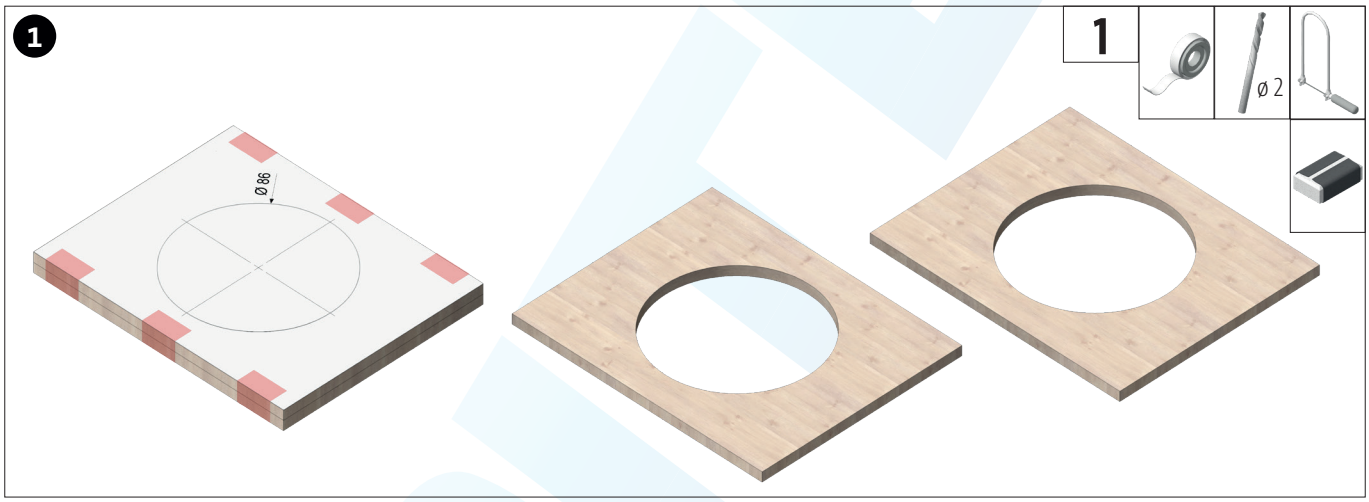
NOTE:

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 Technology.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. Danger of suffocation! Not suitable for children under 36 months. Choking hazard!

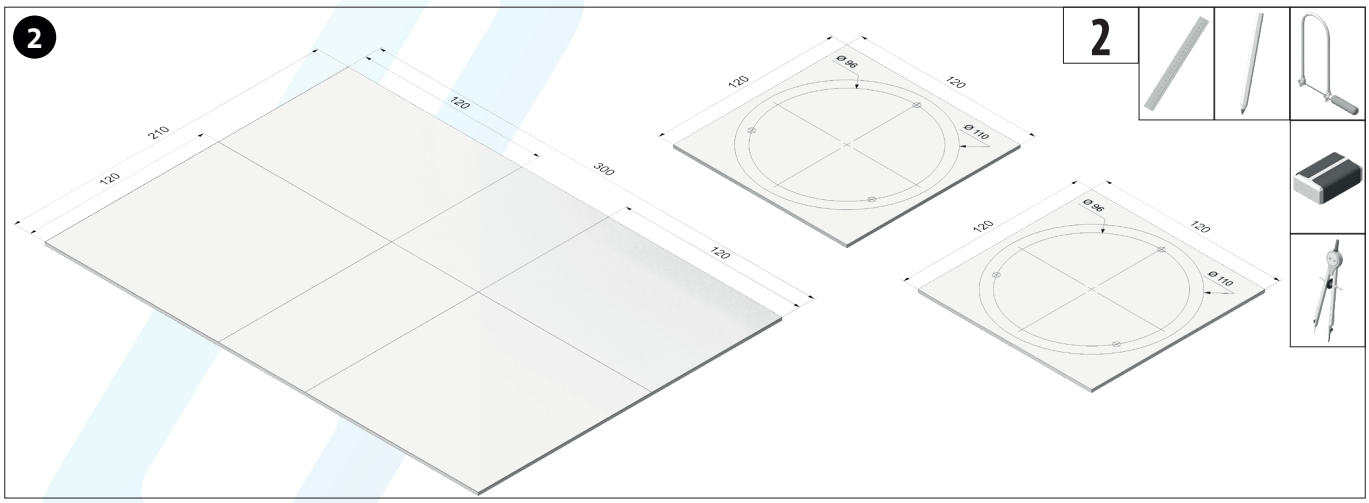
Part List	Quantity	Dimensions (mm)	Description	Part no.
Cottonwood Plywood	2	150x120x5	Shape	1
Polystyrene	1	300x20x2	Housing	2
Spacer rolls	3	30	Legs	3
Cylinder head screws	3	M 4x8		4
Dot grid board		50x50	Circuit Board	5
IC Mount	2	8pole		6
IC NE 555 N	2	8pole		7
Capacitor	2	0.047 uF		8
Resistance blue, silver, black, gold	1	68 Ohm		9
Resistance brown, black, red, gold	1	1 kOhm		10
Photoconductive cell	2			11
Silver wire	1	0,6x500	Conductor tracks	12

OPITEC

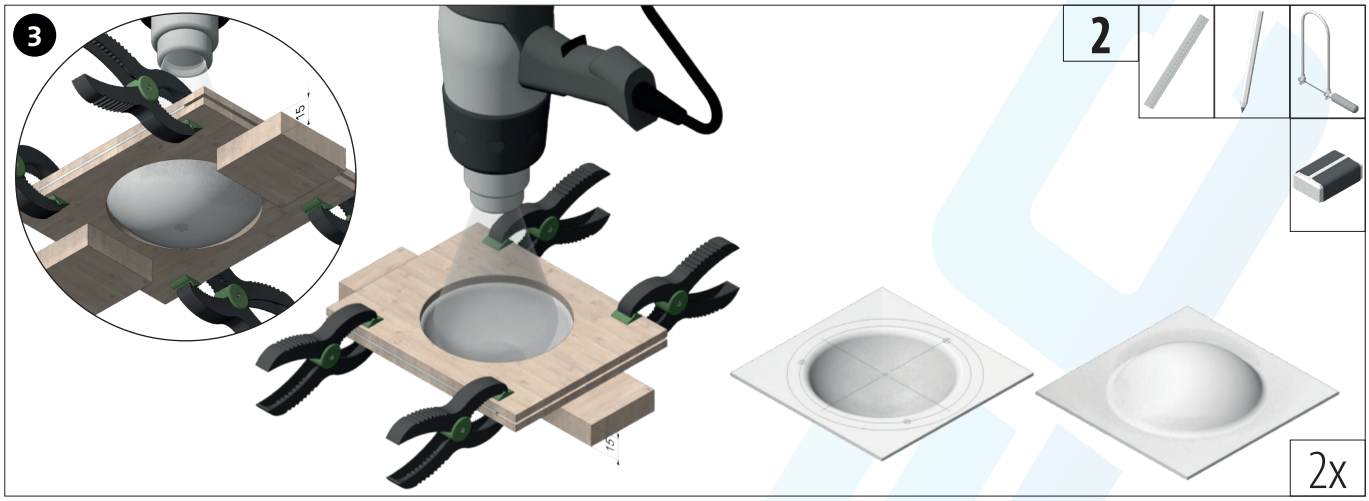
Part List	Quantity	Dimensions (mm)	Description	Part no.
Switching wire black	1	500		13
Electrical wire red	1	500		14
Loudspeaker	1	ø57		15
Battery clip	1			16



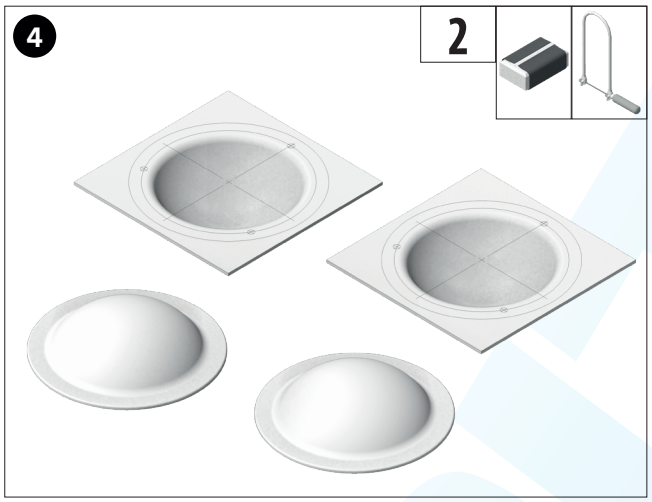
Cut out the template for the thermoforming mould (page 9) and fix it to the two plywood sheets (1) placed on top of each other as shown. Then saw out the ø 86 mm opening and clean the saw cuts.



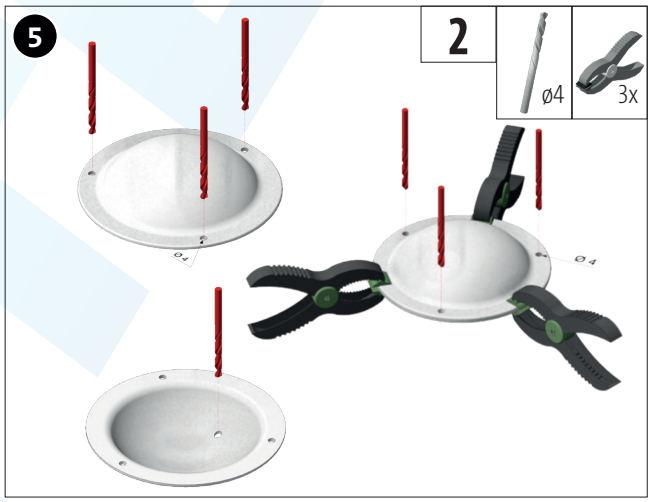
Draw two cut-outs (120x120mm) on the polystyrene sheet (2) and saw them out. Clean the saw cuts. Then mark a circle with ø96mm and a circle with ø110mm on both blanks. Also mark the drill holes according to the template (page 11).



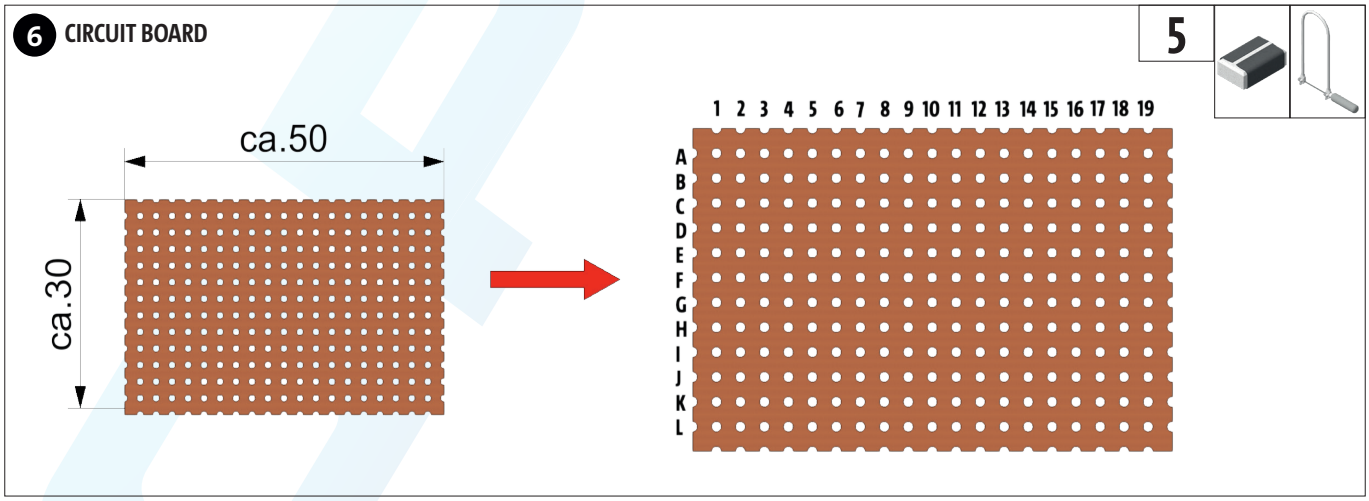
Place a piece of polystyrene (2) exactly between the thermoforming sheets (1) so that the marked circle (86 mm) lies exactly in the cut-out. Secure the panels with clamps so that nothing can slip. Place the whole bundle on a heat-resistant surface. When doing so, underlay the mould so that approx. 15 mm of air remains between the underlay and the thermoforming mould. Wooden blocks or stacked quarters of the wooden waste piece (circular cut-out) are suitable for this. Heat the polystyrene evenly from above in a circular motion using a hot air blower on the second setting. When the material becomes slightly shiny, it curves downwards. Switch off the fan when touching the base and allow the tray to cool down.



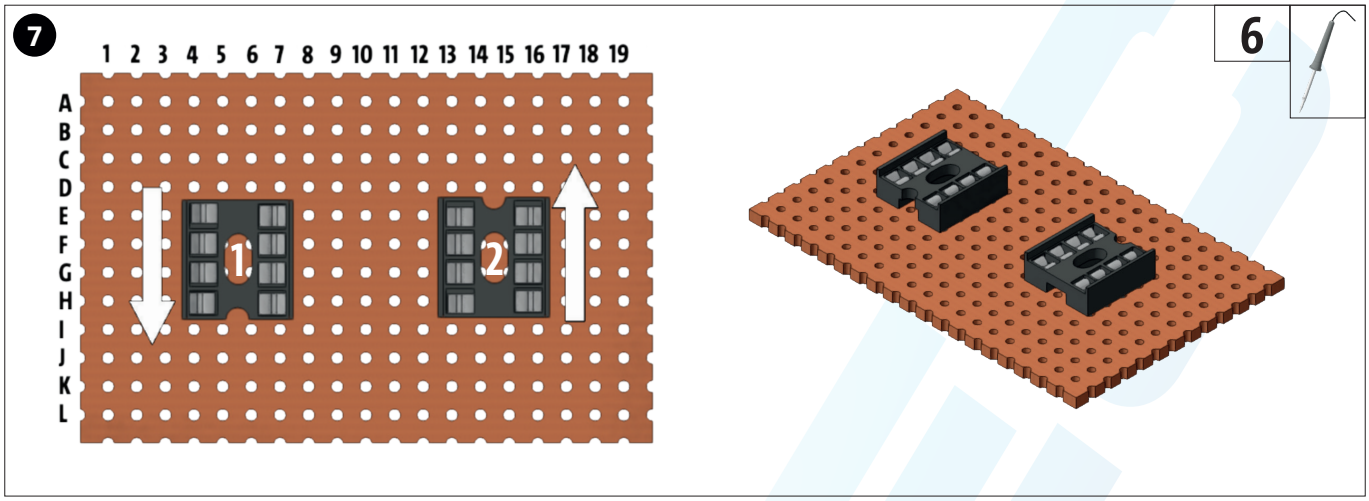
Saw out the two polystyrene shells at the ø110mm marking and clean the saw cuts.



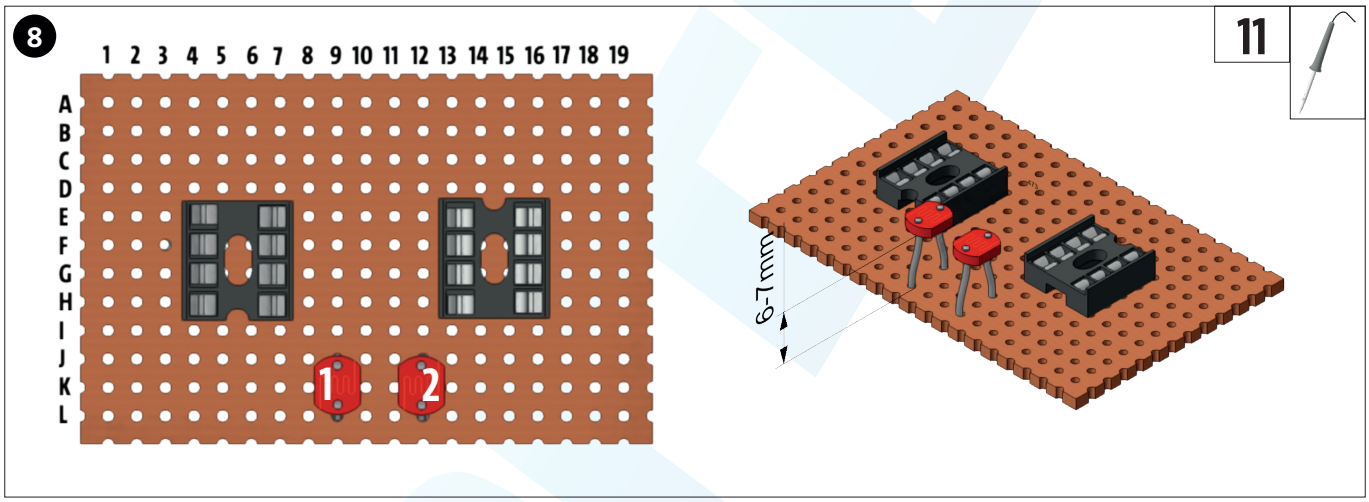
Drill through the holes in a shell. Then place both shells on top of each other so that they are congruent and fix them in place. Drill the holes in the second shell through the existing holes. This ensures that the upper and lower parts fit together exactly after screwing. Drill the ø4mm hole in the lower shell for the cable entry.



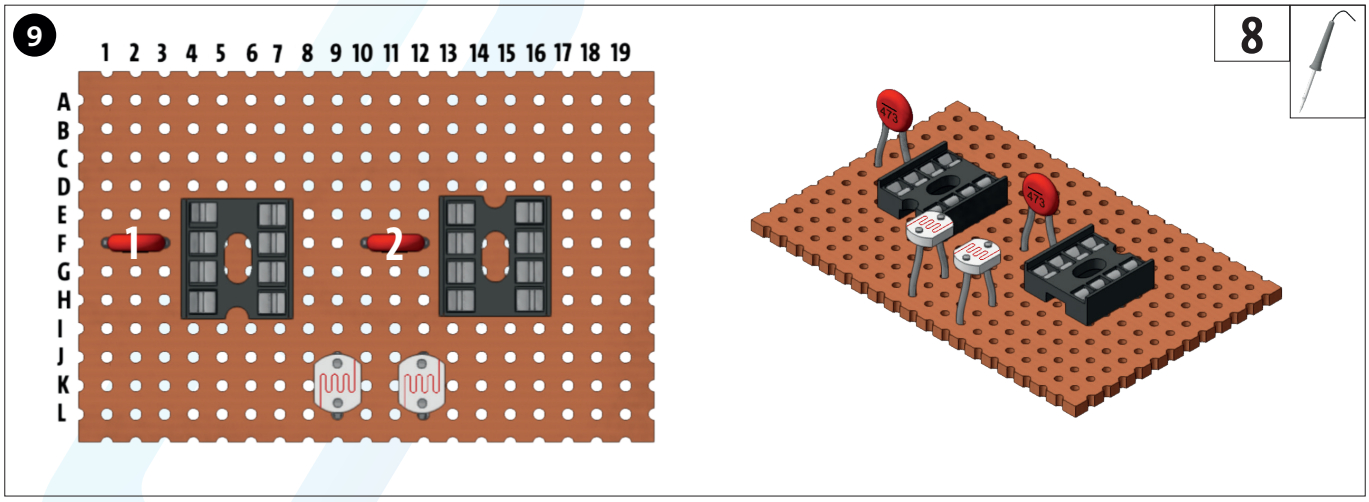
The circuit board (5) has two different sides. The top side, which is only drilled, and the underside, which is provided with copper dots for soldering. Cut the board to max. 12x19 holes using a fretsaw.



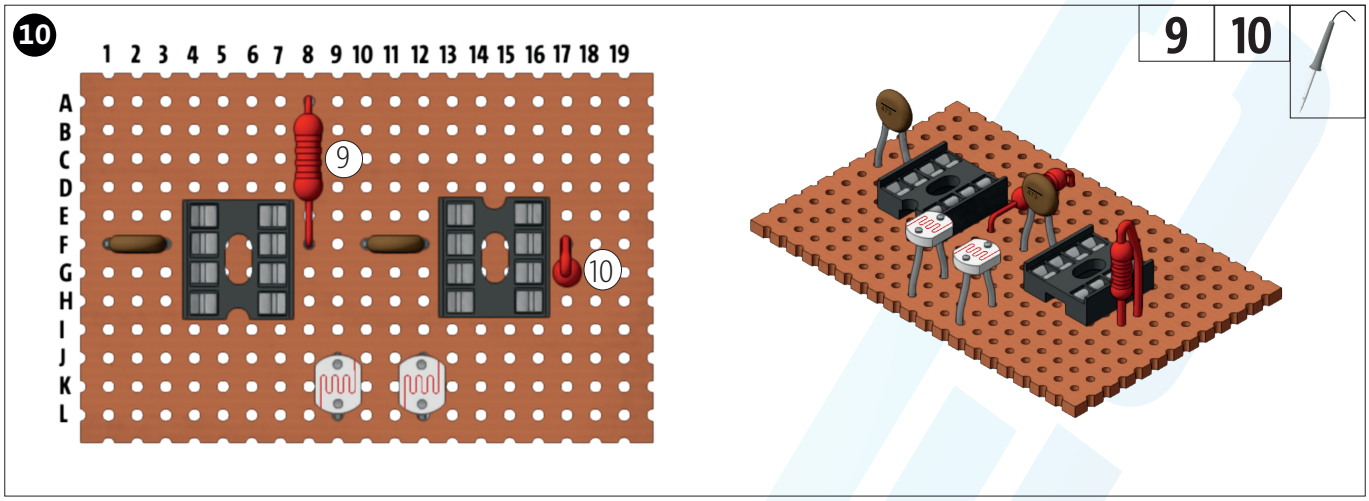
Insert the two IC sockets 1+2 (6) into the top of the circuit board as shown and solder them to the circuit board points from below. IC version 1: Hole E4-H4 + E7-H7
IC version 2: Hole E13-H13 + E16-H16.
Note: It is essential to observe the installation direction (indentation)!



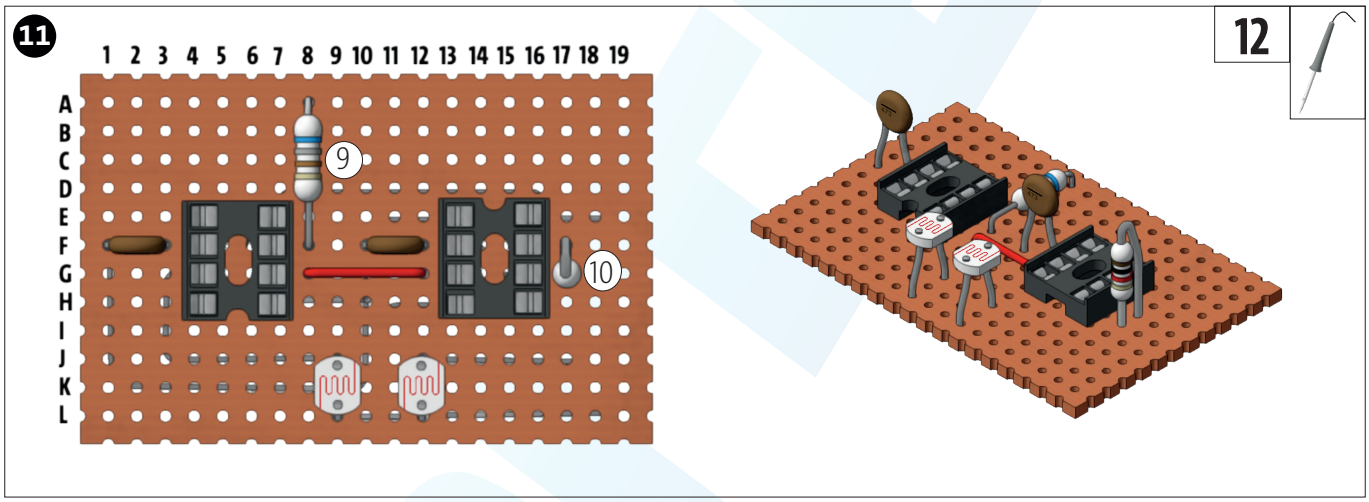
Solder the photoresistors 1+2 (11) at a distance of approx. 6-7mm from the circuit board at holes J9 and L9 (1) and holes J12 and L12 (2).



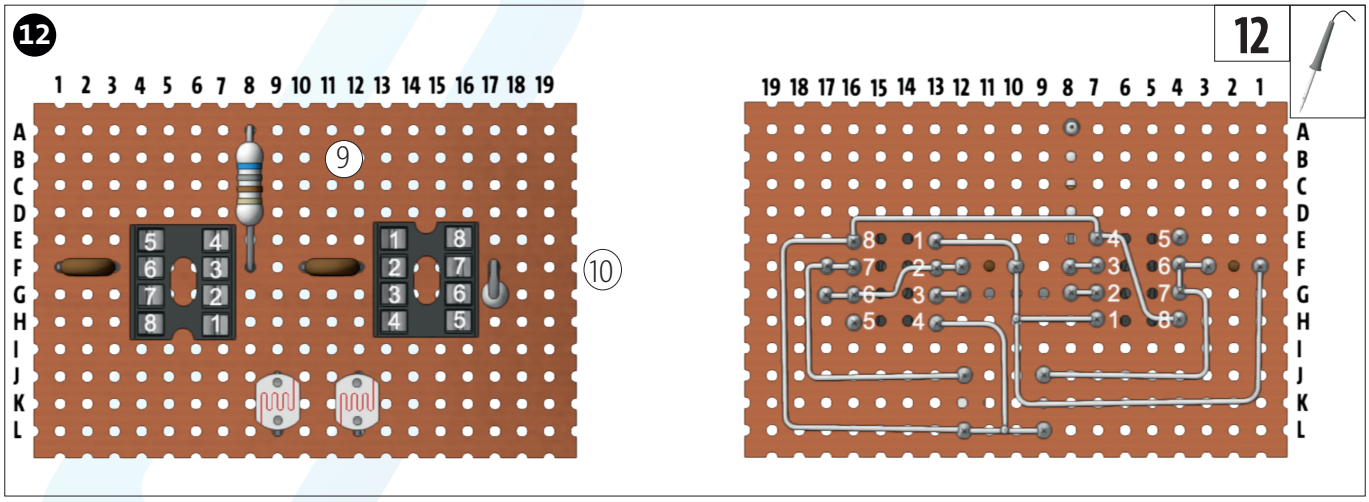
Solder the capacitors (8) at hole F1+F3 (1) and at hole F10+F12.



Solder the resistor (9) between hole A8 and hole F8 as shown. Solder in the resistor (10) at hole F17 and hole G17.

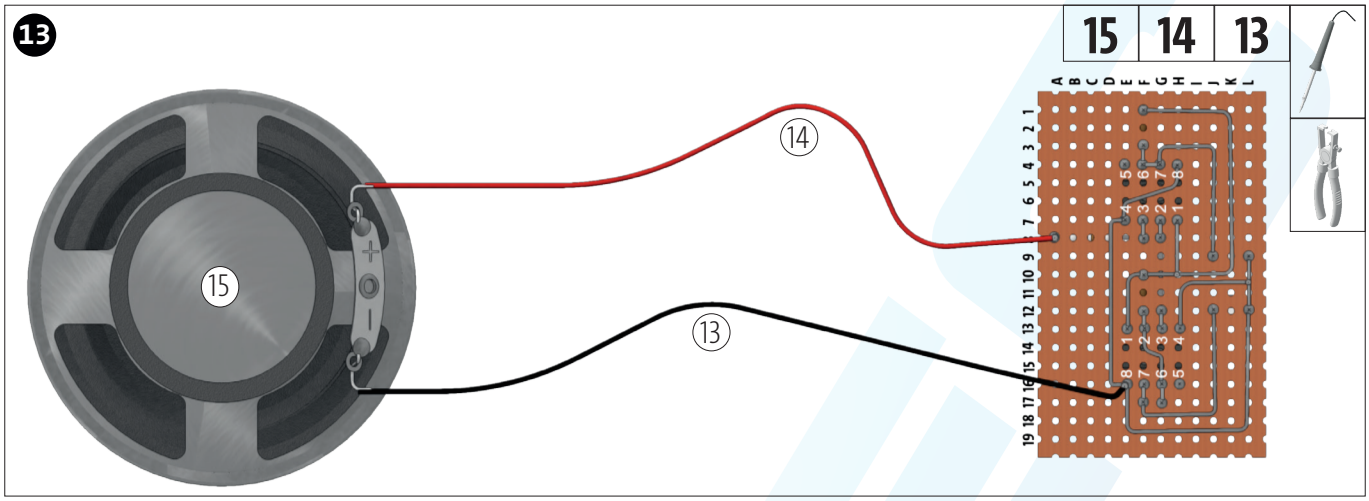


Cut off an approx. 20 mm long piece of the silver wire (12) and solder a wire bridge between hole G8 and G12.



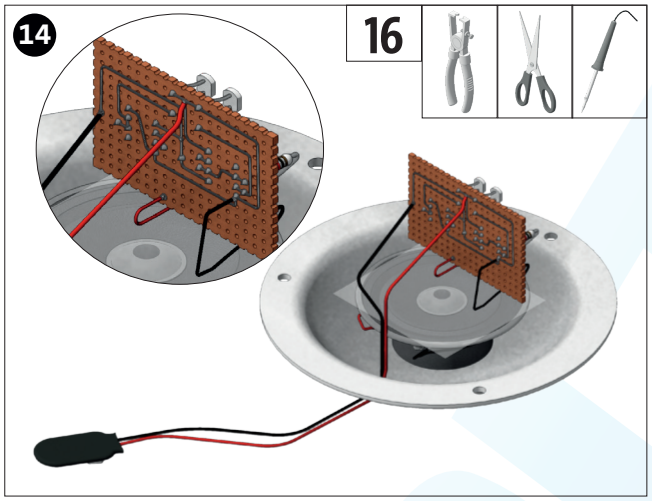
Cut the traces on the back from the silver wire as shown in the illustration on the right, bend them and solder them to the legs of the corresponding components.

13



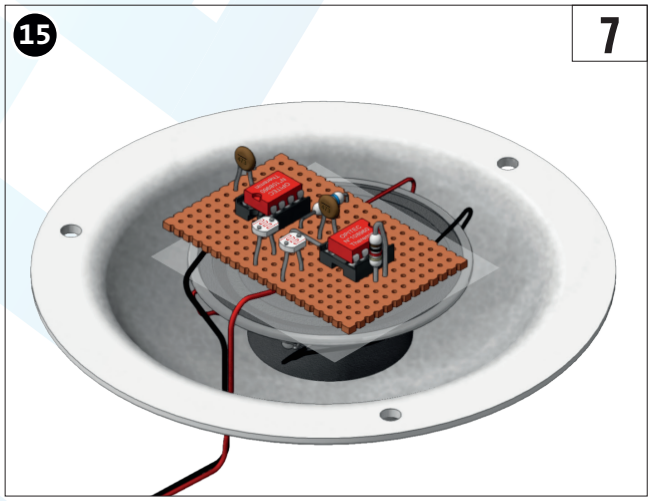
Cut off a piece of 100 mm length from both the stranded wire (13) and the stranded wire (14), strip the insulation at both ends and tin. Solder the red switching wire to the positive pole of the loudspeaker (15). Solder the black switching wire (13) to the negative pole of the loudspeaker (15). Solder the free end of the red switching wire (14) to the soldering point of the resistor (9). (Hole A8). Solder the end of the black switching wire to the soldering point (hole E16).

14



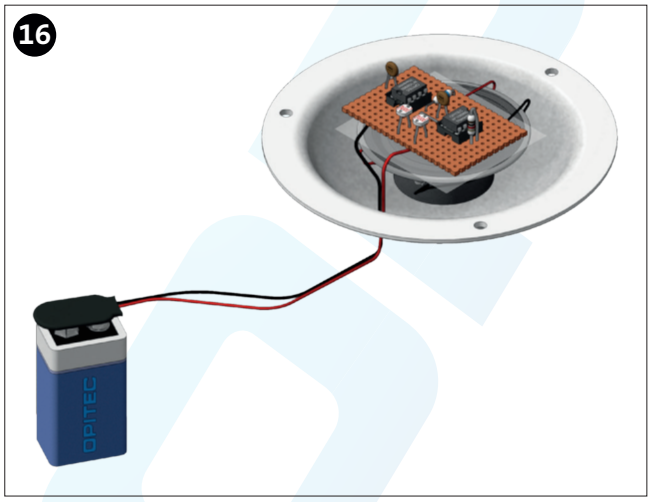
Place the speaker in the lower shell. Then cut a piece the size of the circuit board from the packaging bag and place it on the speaker. Strip the cables of the battery clip (16) and guide them through the hole provided in the lower part. Solder the red cable to the wire bridge between L9 and L12. Solder the black cable to F1.

15



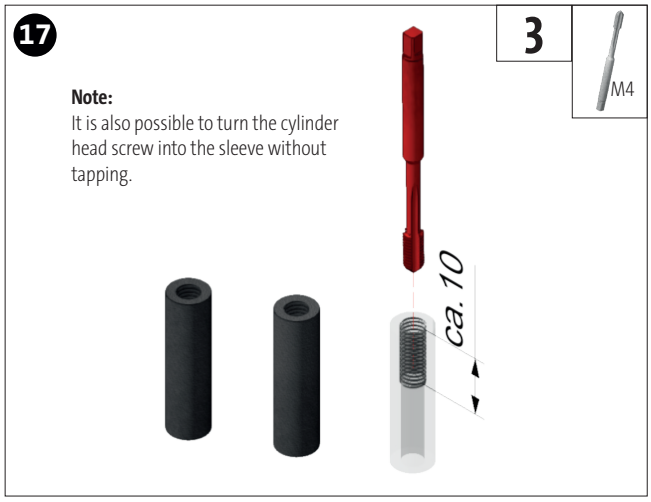
Before inserting the ICs, check all tracks again for unwanted solder bridges and the correct positioning of the individual components. The ICs can then be inserted into the sockets. Note the direction (indentation) here too. Note: All legs must be correctly inserted in the socket.

16

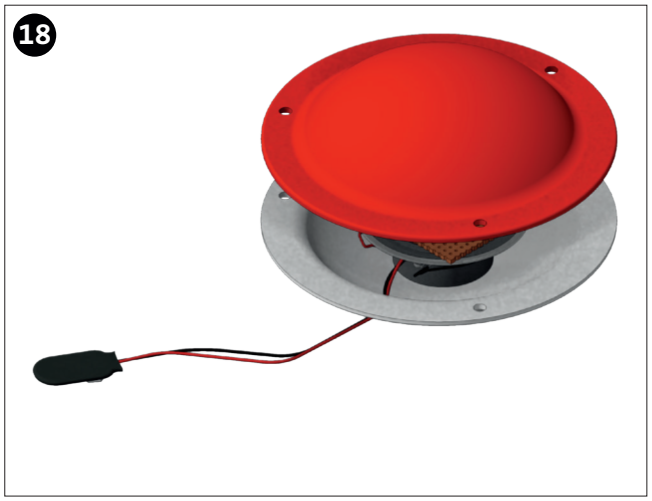


If a full 9V battery is now connected, a sound must be heard immediately from the loudspeaker. If this is not the case, remove the battery immediately and check everything again carefully.

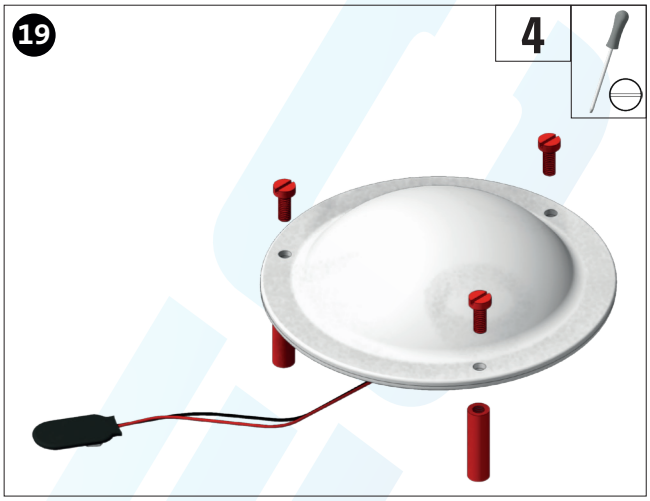
17



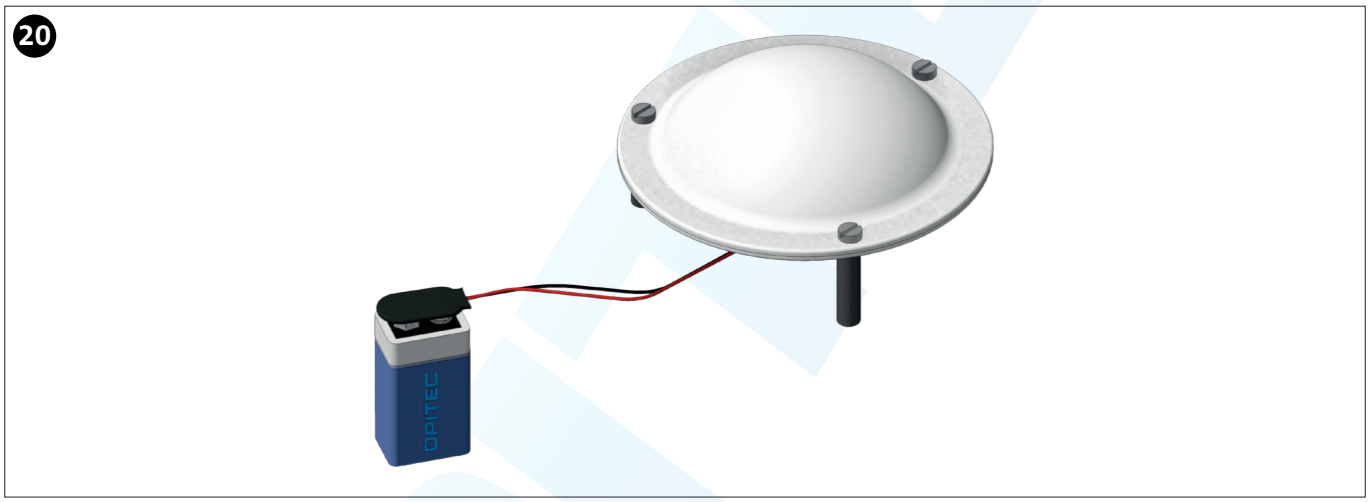
Now use an M4 tap to cut a thread approx. 10 mm deep into the spacer rollers (3) from one side, fix the spacer roller at a 90° angle in a vice and cut the internal thread using a tap wrench with a tap. Caution: Do not overtighten the vice, the rollers could break!



Fit the upper part as shown.

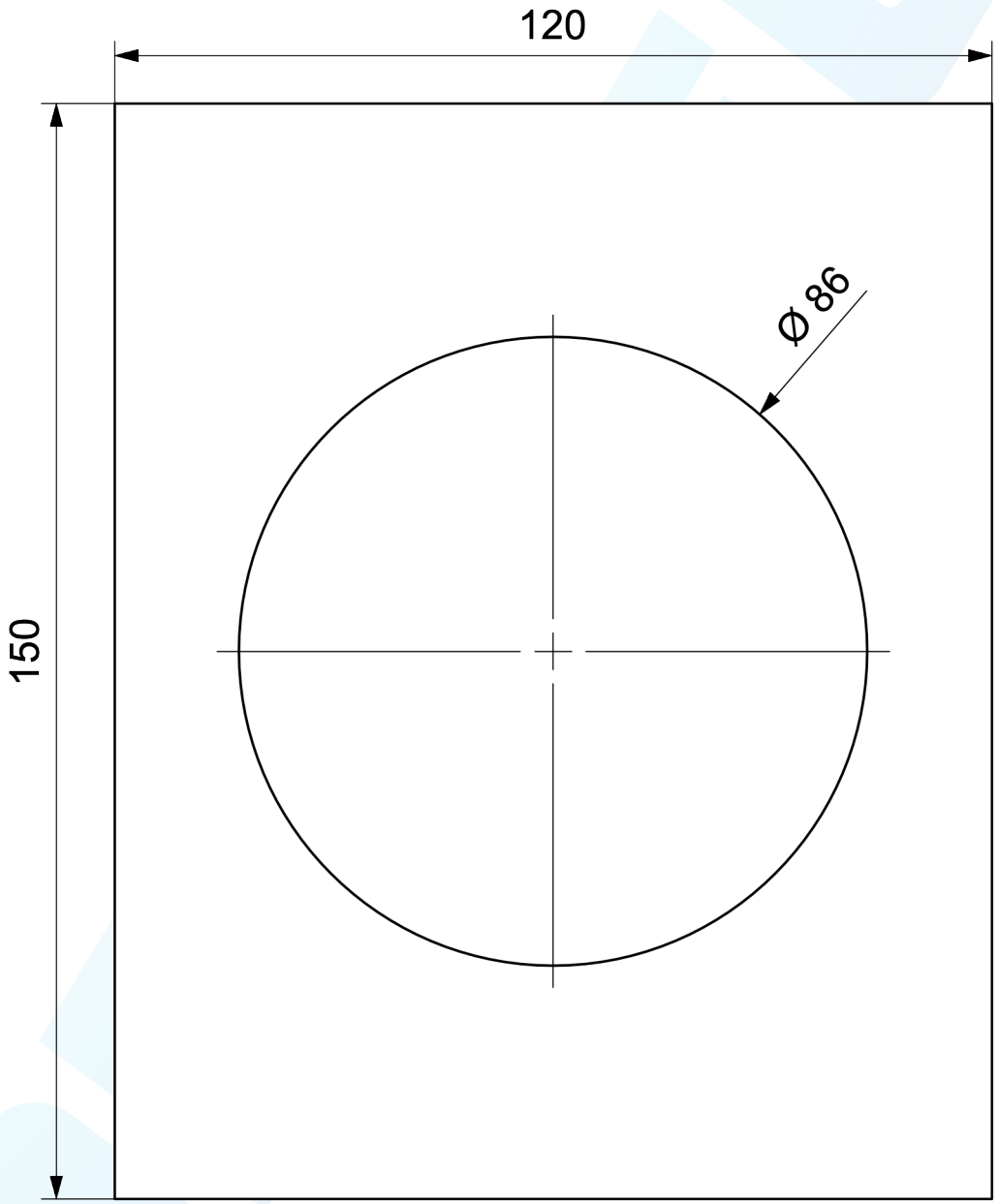


Insert the screws (4) through the holes as shown and screw them into the spacer rollers



Done!

Thermoforming mould template
SCALE 1:1



Thermoforming mould template
SCALE 1:1