OPITEC

1 0 4 . 2 4 9
" W a v e   r i d e r "
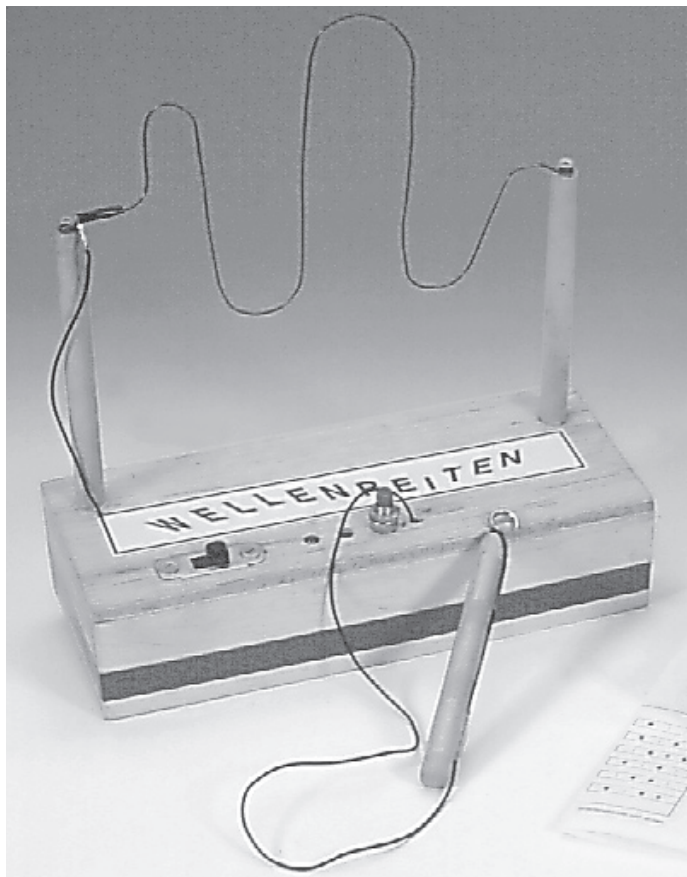
Contents:

1 Ply sheet	5 x 200 x 200 mm
1 Ply sheet	5 x 70 x 70 mm
3 Dowels	ø 10 x 100 mm
1 Ring	15 bis 20 mm
1 Welding rod	ø 1 x 500 mm
2 Wood screws	3 x 15 mm
2 LED	
2 Transistors BC 548/547	
2 Resistors	18 KOhm
2 Resistors	120 Ohm
1 On / off switch	
1 Switch	
Various drawing pins	
Cable	

The rules of the Game.

This game is a mixture of hand and eye co-ordination with the ability to concentrate. The idea is to guide the loop from one end of the wire to the other without touching it. As soon as the main wire to touched an impulse will light the red L.E.D. and the game must be reset.

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 Tech- nolo- 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!

INSTRUCTIONS FOR THE "WAVE RIDER" GAME.

## 1. Building the circuit holder.

Using the plan as a guide cut out the various parts. The complete box can be assembled and glued in one go. Whilst the glue is drying the "wave" can be formed from the wire, and fitted to the two main dowels. Then drill holes in the lid for the various switches and L.E.Ds.

Layout on the plywood

Making the "wave" and guide
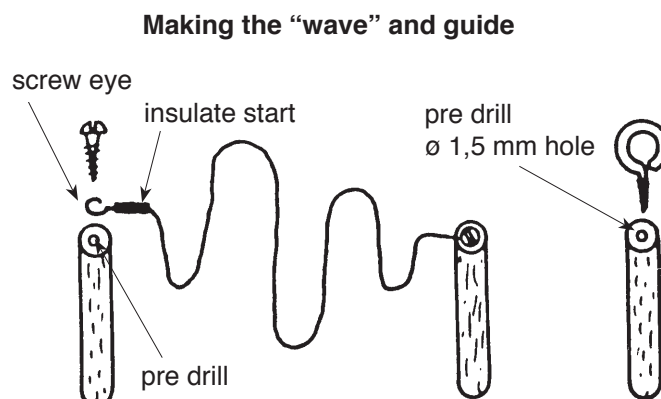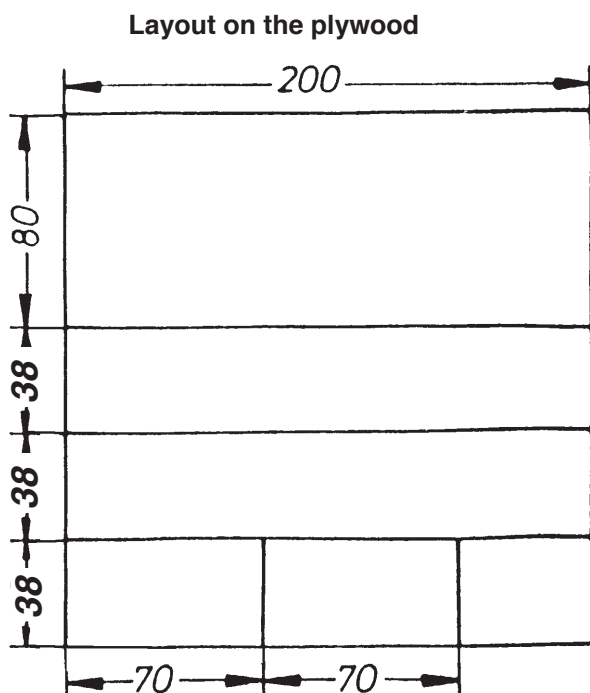
2. Building the circuit.

Before starting to build the circuit make sure that the circuit board will fit into the base - trim if necessary. The first step is to press in drawing pins into the base as shown on the plan overleaf. Once all are in place "tin" the heads with a thin layer of solder.

When the tinning is complete identify the various components and mount them the board. It is better to start with the resistors and add the transistors later. Wire connections can be made at will. The transistors must however be the correct way around otherwise they will be destroyed. The LEDs (light emitting diodes) must also be the correct way around if they are to function.
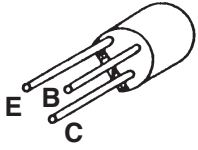
E104249#1
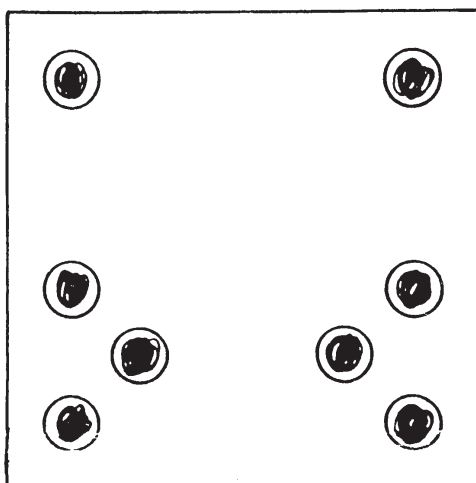
Identifying the components
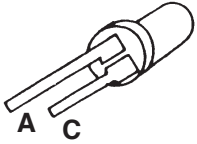
LED
Anode (A) = + lond leg
Catode (C) = - short leg

Transistor
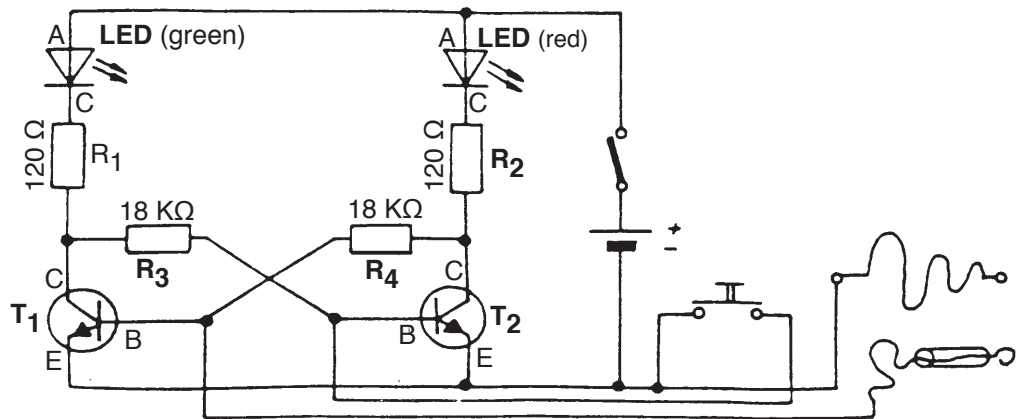Connections (Emitter (E), Base (B) und Collector (C) (be careful that they are correct)

Resistor
colour-code: brown - red - brown = 120 Ω

colour-code: brown - grey - orange = 18 kΩ

Wiring plan

Description of the electronic switch.

The two light emitting diodes show the state of the game. Green - game on, - red - the hand guide has touched the main wire. The two LEDs are connected into the circuit which is an "electronic memory" - a bistable multivibrator. This is one of the most important basic circuits in electronics and is the principle on which a computer operates. The game uses LEDs as the visual signals because they need very little current to make them glow brightly. The transistors act as switches which control the LEDs, and the resistors are in the circuit to protect the transistors and LEDs from excess current flow.

Description of the functioning circuit.

When the battery is connected the green light emitting diode comes on because transistor 1 is switched on by a positive potential at its base. When the wire is touched a negative potential acts an the base of Transistor 1, the transistor is switched off and the light goes out. The base of Transistor 2 is now posititve and the red light emitting diode comes on. This reverses itself again after the re-set button has been pressed.

Soldering the components to the drawing pins

When soldering the components to the board it is important not to overheat them.
The diagram shows the arrangement of the resistors and transistors.
The transistors must be mounted correctly (note-leg arrangement) and the resistors correctly identified.
To solder them in position simply hold the component leg on to the correct drawing pin, apply heat with the soldering iron and introduce the solder.

Note:
Transisors and Light Emitting Diodes are sensitive to polarity and must be mounted correctly.
Wrong connection will destroy them!
Before connecting the battery to the circuit check that everthing has been assembled correctly.

scale 1 : 1
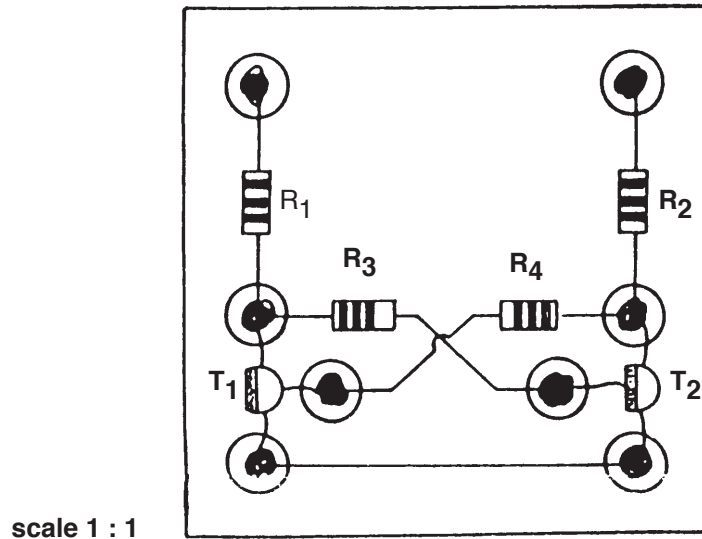
The drawing shows the arrangement of the components.
The different lengths of the wire are shown on the plan.
Use red wire for the plus connection, all the other connections are made with the black (blue) wire.

Tip:
Before soldering remove the insulation from the end of the wire, twist the bared ends together and tin with a layer of solder.
Finally when joining the wire to the battery connections wrap the bare ends several times around the battery terminals.
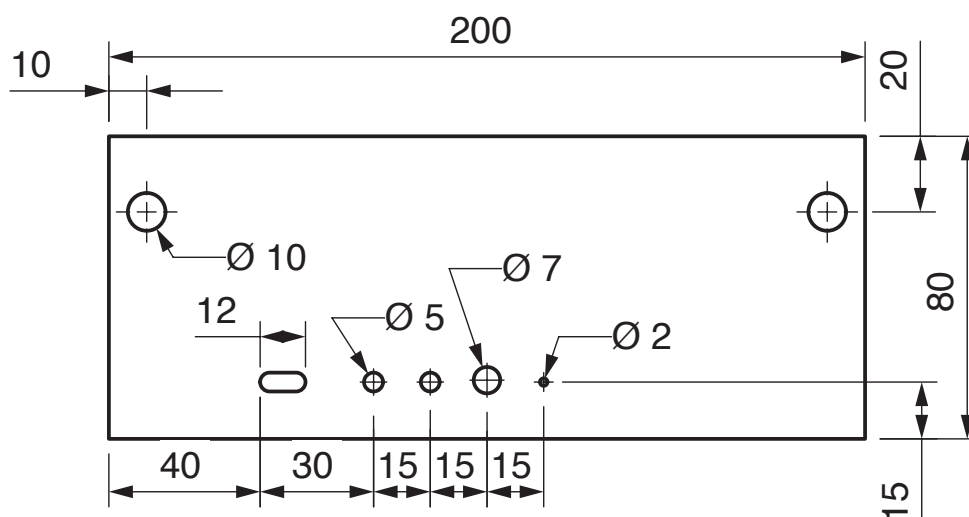
4
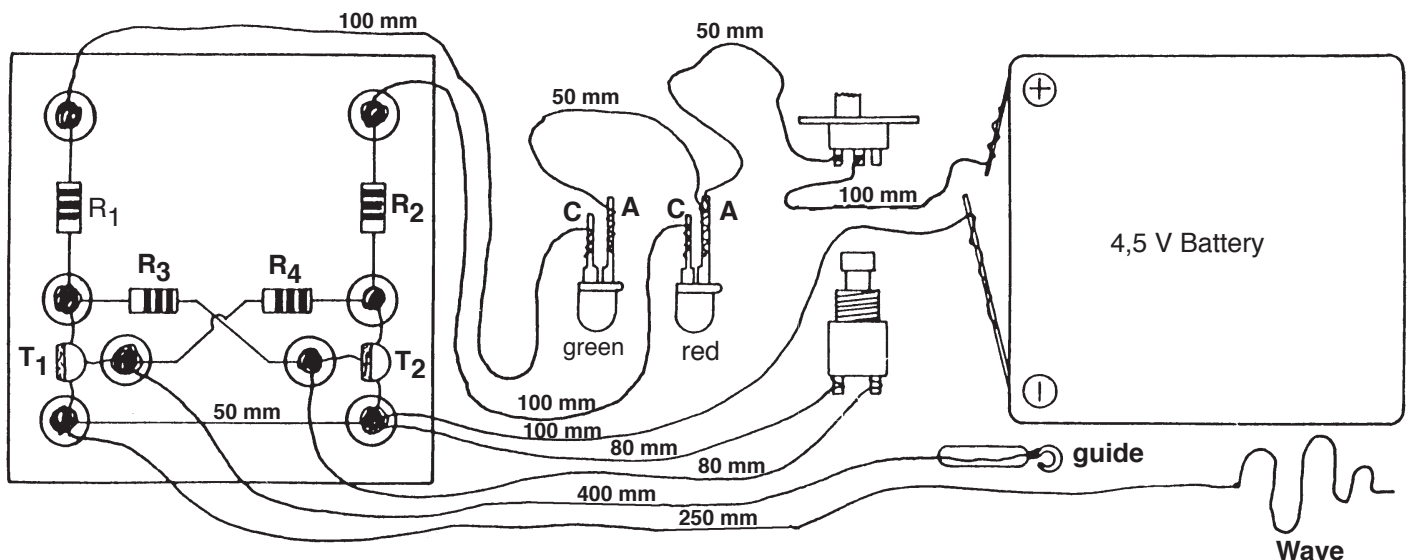
Plan view of the circuit in the box

to switch

4,5 V Battery

to guide

to wave
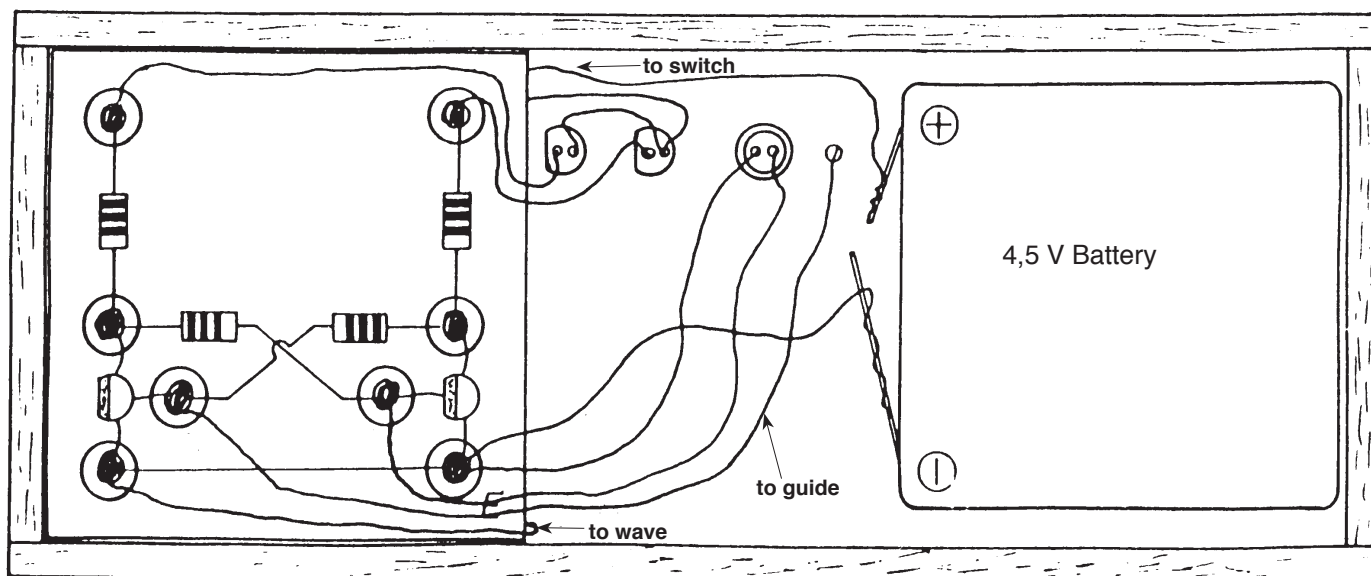
3. Testing the circuit.

The eye on the hand guide must not touch the wire. When the switch is pressed the green LED should glow. As soon as the hand guide eye touches the wire, the green LED will go out and the red one come on. This circuit is very sensitive and the slightest touch should achieve this. To reset return the hand to the insulated rest and press the switch - the green LED will relight.

Layout of the lid

200

10

20

Ø 10

Ø 7

12

Ø 5

Ø 2

40

30

15 | 15 | 15

80

15

scale 1 : 2