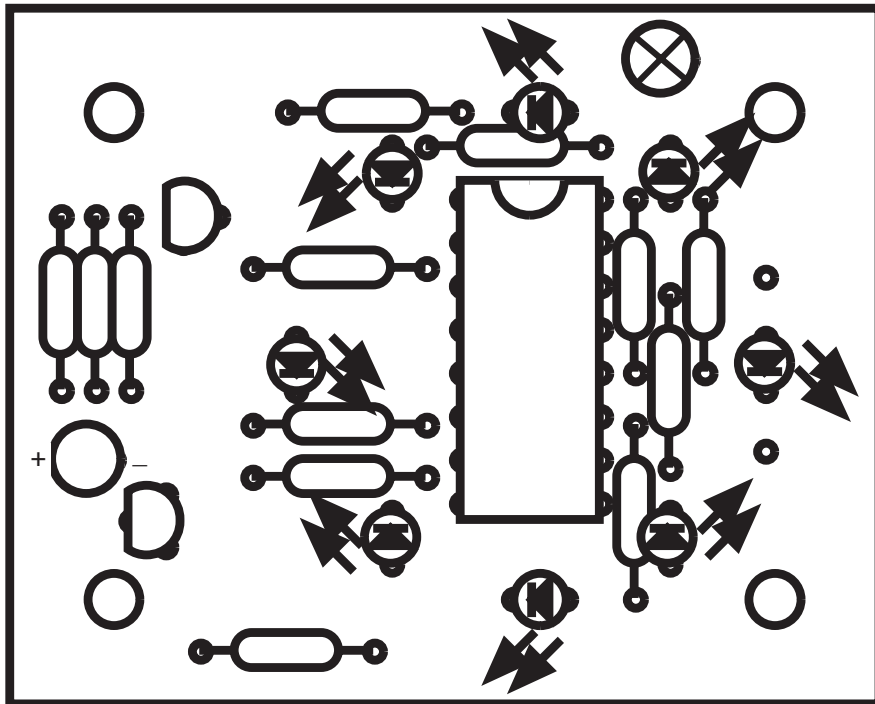


# OPITEC

## 110.198

### 8 Channel Alternating Lights



#### 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 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!

## 1. Product information:

**Article:** Electronic project;

**Suitability:** Key Stage 3/4, Age 12-16 years;

## 2. Material information: **Electronic components and pother parts:**

**Insulated wire:** Multi strand insulated wire (0,14 mm<sup>2</sup>);

**Circuit board:** Epoxy resin glass fibre board with copper tracks  
The base on which the components are soldered;

**LED:** Light Emitting Diode  
Semi Conductor  
Cathode (-) short leg, flat side.  
Anode (+) longer leg.

**IC:** Integrated Circuit  
ICs are separate fully and functioning and have many in built **active** (transistors) and **passive** (diodes, resistance, capacitors) components. The switching elements are fully enclosed. A single IC carry out 2 to over 100000 functions. Take care when you are inserting ICs !!!

**Resistors:** These guide the current (large resistance=low current  
small resistance=larger current flow)  
Resistors are marked with coloured rings:  
510 Ω: Green-brown-brown  
1.8 kΩ: Brown-grey-red  
100 kΩ: Brown -black-yellow  
560 kΩ: Green-blue-yellow

**Capacitor:** Electrolytic type; Stores electrons.  
**Watch the polarity!** (minus pole is clearly marked)

**Soldering pin:** silver plated pins to mount compoments;

**Lamp:** Glass body with filament  
4.5 Volt -6Volt 50 mA

**Transistor:** Semi-conductor (switch, amplifier)  
3 connections: Base (B)  
Emitter (E)  
Collector (C)  
2 types NPN (BC 548: emitter arrow on the symbol points outward)  
PNP (BC 558/557; emitter arrow points inward)

**Working:** Components are mounted on the top of the board and soldered underneath. The protruding component legs can be cut off with snips.;




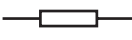

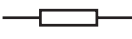



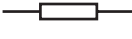








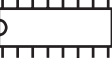




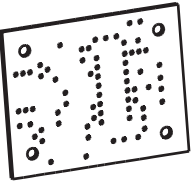
**Attention!** Components can be overheated and damaged  
(excess heat can be diverted by holding the components with pliers when soldering)

**Finish:** The circuit board does not need any further treatment.

## 3. Tools:

**Soldering:** To solder the components to the board a 15-30W soldering iron is necessary. When working on the board hold it in a vice or use a "helping hands tool" so that both hands can be kept free.

#### 4. Parts list:

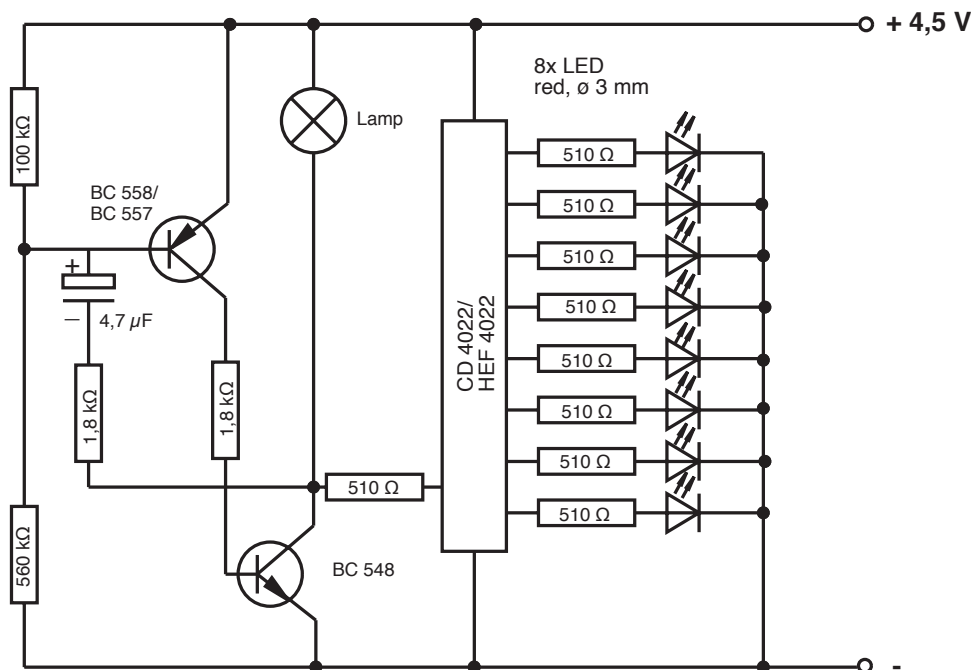
Component	Value/size	Quant.	Drawing / part N°	Symbol
LED	red, ø 3mm	8		
Resistor	510 Ω	9		
Resistor	1,8 kΩ	2		
Resistor	100 kΩ	1		
Resistor	560 kΩ	1		
Capacitor	4,7 μF	1		
Transistor	BC 548 (NPN)	1		
Transistor	BC 558/557 (PNP)	1		
IC Holder	16 pole	1		
IC	4022	1		
Lamp	6 V/ 50 mA	1		
Insulated wire	0,5 m	1		
Soldering pins		2		
Circuit board		1		

#### International resistor colour code

To identify the correct value of the resistors

Colour ring	1st ring	2nd ring	3rd ring/ multiplier	4th ring/ tolerance
Black	0	0	1	Colour:
Brown,	1	1	10	Brown 1%
Red,	2	2	100	Red 2%
Orange,	3	3	1000	Gold 5%
Yellow,	4	4	10000	Silver 10%
Green,	5	5	100000	None 20%
Blue,	6	6	1000000	
Violet,	7	7		
Grey,	8	8		
White,	9	9		
Gold	-	-	0,1	
Silver	-	-	0,01	

## 5. Circuit diagram:



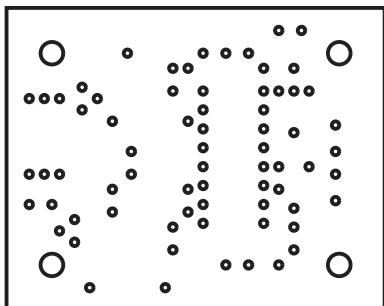
## 6. Circuit description:

Connect the circuit to a 4.5 volt power source ( Take care with the polarity)  
The lamp flashes in time with the Light Emitting Diodes which light in a anti-clockwise direction.

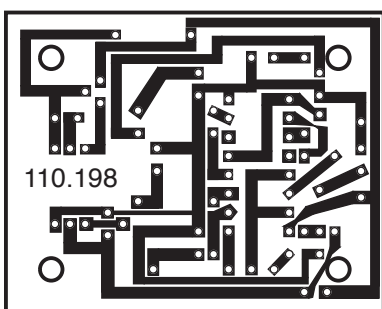
The switching circuit is controlled by the lamp which in turn is governed by the 4.7  $\mu$ F Capacitor. By changing the value of the capacitor from between 1 $\mu$ F- 10 $\mu$ F the input of the 4022 is changed and thus the rate at which the Light Diodes connected to the output 0-7 flash.

The Light Diodes can be incorporated into projects such as a model airport or building etc. by mounting them on remote extension wires.

### Circuit board plan



### Layout (from underneath)



### Circuit component layout

