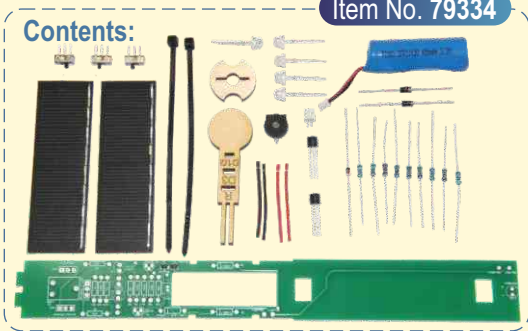SOL-EXPERT *group*

PET Bottle Solar Lamp
Soldering and DIY kit - pimp your PET bottle!

Item No. **79334**

Contents:

Important:
When buying the PET bottle, ensure the neck is at least 28 mm wide!

You will also need:
Soldering iron, solder, tweezers, pen, hot glue gun, side cutters

We recommend:
Assembly and soldering should be supervised by an experienced person!

! SAFETY NOTES !

- Read the full instructions before use and keep in a safe location for future reference. They contain important information.
- We assume no liability for personal injury or property damage due to improper handling or failure to observe the safety notes! This will void the warranty/guarantee.
- In schools, training facilities, DIY rooms and workshops, using soldering irons and accessories must be supervised by a trained, responsible person.
- If the rechargeable battery is defective, always replace with a new equivalent rechargeable battery (LiFePO 400mAh).
- This kit is only intended to be battery powered.
  Never connect the kit to the 230 V mains!
  Absolute danger to life!
- The soldering iron, the solder and the soldered parts become very hot. Be very careful!
- Never allow children to use a soldering iron or soldering accessories unsupervised! They are not toys. Using a soldering iron must be diligently supervised by an adult experienced in soldering.
- Always use a soldering mat when soldering! It prevents parts and the PCB from slipping.
- We recommend using a soldering iron holder to set the soldering iron down safely during use.
- **SOLDERING TIP:** A round or matte solder point is a poor solder point and must be touched up. If necessary, extend the soldering time or the soldering temperature and use new solder for electronic work.

PLEASE NOTE!

- Save the company address - Not suitable for children under 3 years! - Contains small parts!
- The soldering kit is not a toy and is suitable for soldering novices.
- Do not modify any part of the product! Any other use not specified in the instructions is prohibited and will damage the product. It can further result in hazards such as short-circuit, electric shock, fire, etc.
- The power source and the tools and soldering equipment required for assembly are not included.
- The safety notes and instructions for use of the power source used must be observed.

ENVIRONMENTAL NOTES

General: Please return electronic parts to certified disposal companies after use. These will ensure the parts are disposed of in compliance with the law. This is good for the environment and your part in actively protecting the environment. **Battery ordinance:** You have purchased a battery-powered product from us. The rechargeable battery has a limited life and must therefore be replaced at some point. Used batteries do not belong in household rubbish. Consumers are required by law to return batteries to a suitable collection point. Used batteries contain valuable raw materials which can be recycled. You can also return your used rechargeable battery to us: SOL-EXPERT group, Mehlisstrasse 19, 88225 Baindt, Germany. You can purchase new rechargeable batteries for this product directly from us.

How the solar-powered PET bottle lamp works

With this cool soldering kit you can turn a standard PET bottle (min. neck width 28 mm) into a great solar lamp. The solar cell charges the rechargeable battery in this kit during the day. When it starts to get dark, the lamp automatically switches on and stays on all night - depending on the battery level. It uses a total of 4 white and one rainbow (multicolour) LEDs.

You can optionally switch off 2 of the LEDs so the lamp stays on longer in winter or in continued poor weather. Using the detailed instructions, the various parts such as resistors, LEDs, switches, etc. are soldered to the PCB step by step. Once the PCB is fully assembled and installed in a PET bottle, you will have a cool, fully functional solar lamp.

PET bottles:

The oceans are full of them and the piles of rubbish keep growing. Not recycling PET bottles is a big problem for the environment and for humans and animals too. It's time to break new, innovative ground.

This solar bottle lamp is one small step in this direction. Reusing one of the many PET bottles to build this solar lamp is your active and creative part in protecting the environment!

Parts list: check, sort and tick		✓
Qty.	**Part**	**Value / Designation**
1 ✓	PCB	79332
1 ☐	Resistor (R8)	5.1 Ohm
1 ☐	Resistor (R2)	20 Ohm
1 ☐	Resistor (R1)	47 Ohm
1 ☐	Resistor (R10)	1K Ohm
1 ☐	Resistor (R7)	20K Ohm
4 ☐	Resistor (R3/R4/R5/R6)	100K Ohm
2 ☐	Diode (D1/D2)	1N5817
1 ☐	Diode (D3)	3V3 500 mA
4 ☐	LED 5 mm (LED2 - LED5)	soft white
1 ☐	Potentiometer (P1)	100K Ohm
2 ☐	Transistor (T1/T3)	BC337
3 ☐	Switch (SW1/SW2/SW3)	SS12D01
2 ☐	Red cable	3.5 cm
2 ☐	Black cable	3.5 cm
1 ☐	JST socket (J1)	2-pin
2 ☐	Solar cell 4V/60 mA	mono
1 ☐	LiFePO4 rechargeable battery	400 mAh
2 ☐	Cable tie	black
1 ☐	Bending tool	Wood
1 ☐	Cap adapter	Wood
1 ☐	Rainbow LED 5 mm (LED1)	Multicolour

**See how to solder correctly (QR code):**

1 Laser cut wood bending tool

To ensure the **resistors and diodes** fit in the middle between the eyelets, the connection wires on the parts must be bent at just the right position.

To help we this we designed a simple yet functional **bending tool**. Simply place the parts in the respective opening (R = resistor / D1 / D2 = black diode /
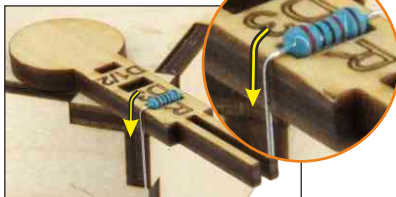
D3 = red diode), then bend the wires down straight along the wooden edge. The part will now fit perfectly between the eyelets. It's much easier to bend all resistors and the diode now to have them ready for the next steps.

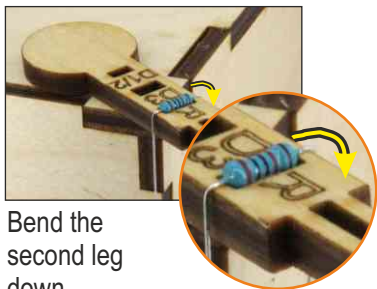|	
Resistor before bending	Bent
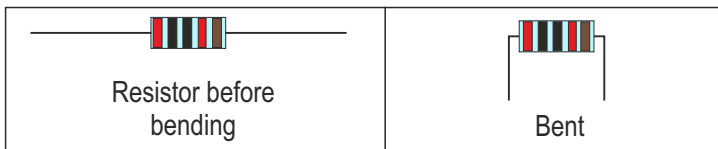
Now bend the resistors and diodes as shown in the following steps:
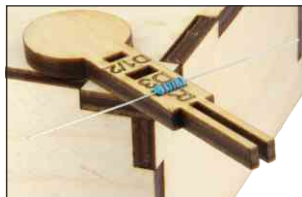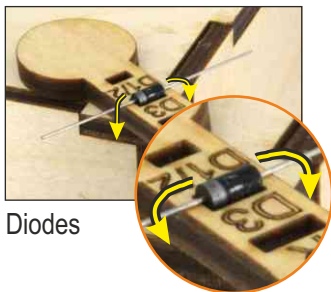
Insert resistor

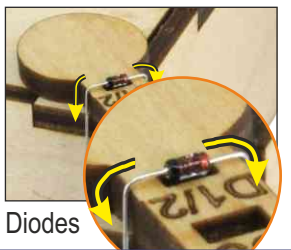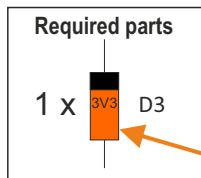Bend one leg down

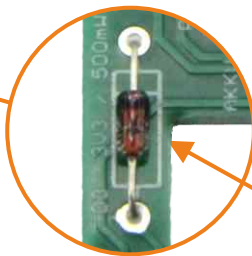Bend the second leg down

Diodes

Diodes

Important: Ensure the individual parts are always resting on the PCB before soldering them in place!

A **Solder diode D3.** Note the polarity (direction) - polarity shown on the PCB!

Required parts

1 x 3V3 D3

Ensure the part is properly seated on the PCB before soldering in place!

B **Trim excess wires.**

Once soldered in place, use side cutters to trim the excess wire at the back to approx. 2 mm.

C **Solder 9 resistors in place, noting the ratings.** The polarity is not important with the resistor. Trim excess wires after soldering

Required parts
Pay attention to colours!

1 x — 20 Ohm — R2   1 x — 1K Ohm — R10

1 x — 47 Ohm — R1   1 x — 20K Ohm — R7

1 x — 5.1 Ohm — R8

4 x — 100K Ohm — R3 / R4 / R5 / R6

47 Ohm

1K Ohm

5.1 Ohm

20K Ohm

20 Ohm

100K Ohm

Ensure the part is properly seated on the PCB before soldering in place!

D **Solder diode D1 and D2.** Note the polarity (direction), polarity shown on the PCB!

Required parts

2 x 1N5817 D1/D2

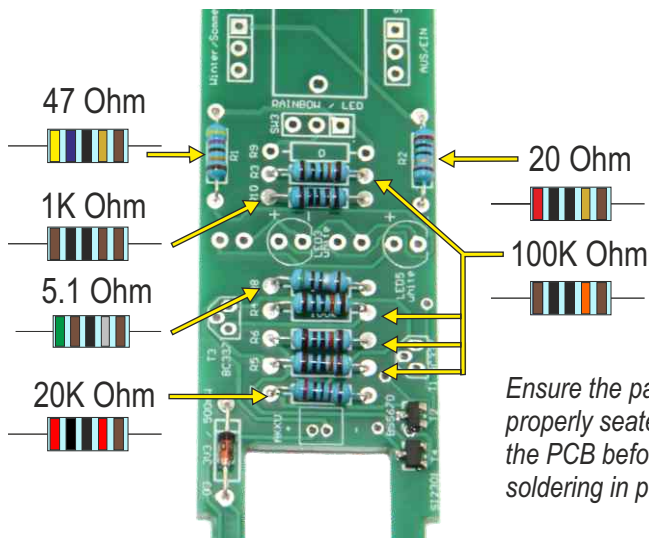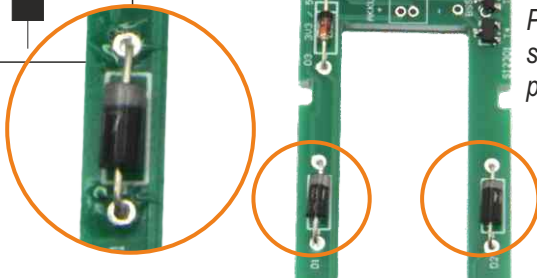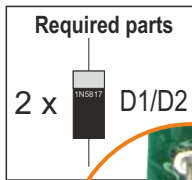*Ensure the part is properly seated on the PCB before soldering in place!*

E **Solder socket J1 for the battery.** Note the polarity! The socket has a notch. It must be facing to the left as shown in image "B". Otherwie the socket will extend beyond the PCB.

Required parts

1 x J1

Ensure the part is properly seated on the PCB before soldering in place!

Bild B
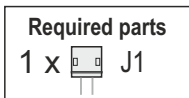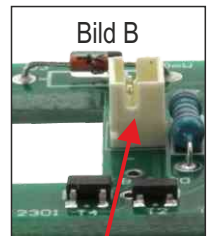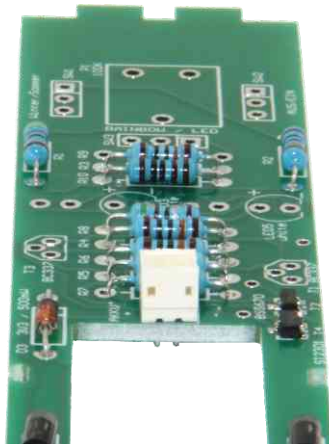
IMPORTANT!
Notch (cut-out) on the left, in this location

F **Solder potentimeter P1 and switches SW1/SW2/SW3.**
Trim excess legs.
The polarity is not important.

Required parts

1 x P1

3 x SW1/SW2/SW3
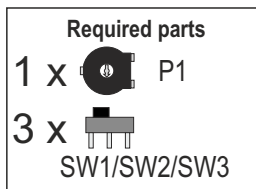
Ensure the part is properly seated on the PCB before soldering in place!
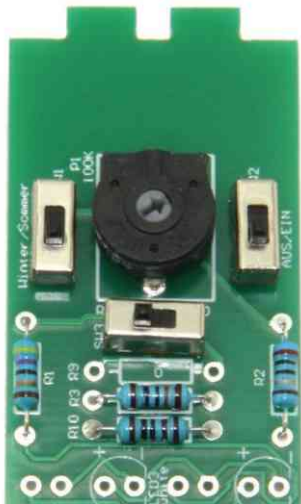
G **Solder transistors T1 & T3.** Note the polarity (1)! Bend the middle leg of the transistor slightly back (2). Solder in place and trim excess legs.

Required parts

BC337

2 x

T1 / T3

1

Transistor top view

flat side → ← rounded side

2

Transistor side view

flat side → ← rounded side

bend middle leg to the back

Rounded side

The black body of the transistor is approx. 2 - 3 mm from the PCB surface.

Flat side

Flat side
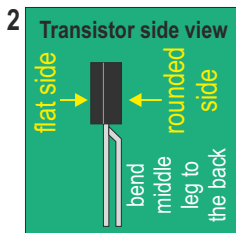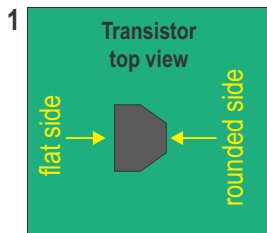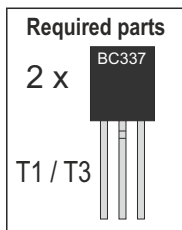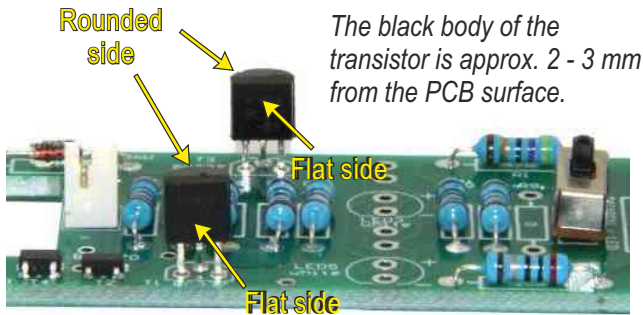
H **Install and solder LED5 (yellow dot in the middle of the LED lens) 4 mm from the PCB.** Note the polarity! The bending tool is also used as a spacer here. Thread the LED into the bending tool (image A) and push the legs of the LED through the eyelets. Be sure to note the polarity of the LED. The longer leg is always "+".

Required parts

1 x

LED5

– +

The LED must have a yellow dot in the middle viewed from above!

In addition, the shape of the LED is marked on the PCB. After checking the polarity again, turn over the PCB with the LED in it and place it on the sodering mat, LED first. Now solder both contacts and pull the bending tool out from under the LED and trim the excess legs.

①
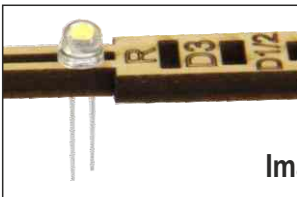
Image A
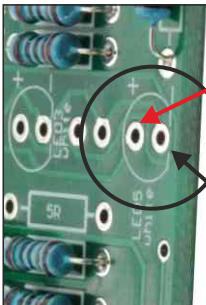
② Insert long "+" leg here

Insert short "-" leg here

③
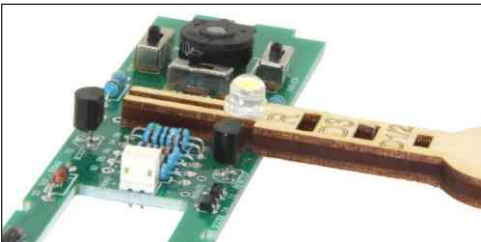
④

Result

I **Install and solder LED2 (yellow dot in the middle of the LED lens) to the <u>back</u> of the PCB 4 mm from the PCB.** Same as step H.

Required parts

1 x

LED2

LED must have a yellow dot in the middle viewed from above!

− +

1

Insert short leg "-" here
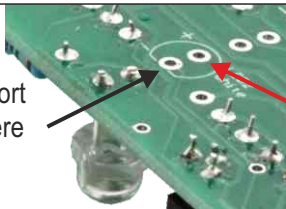
Insert long leg "+" here

! *You must turn the PCB to install LED 2.*

2
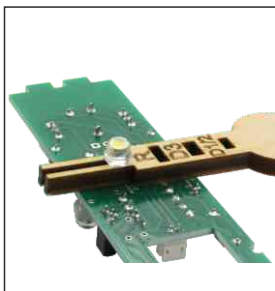
3

Result

J **Now solder LED3 and LED4 (both with yellow dot in the middle of the LED lens).** LED3 goes in the front, LED4 is the last for the back.

Required parts

LED3   LED4

LED must have a yellow dot in the middle viewed from above!

− **+**   − **+**
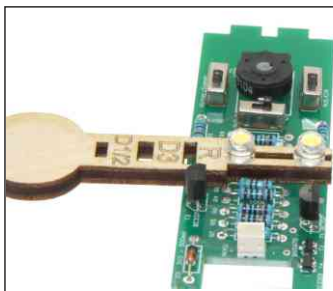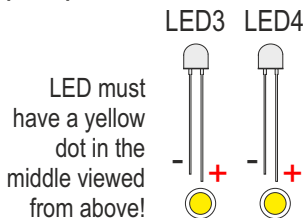
LED3 in front
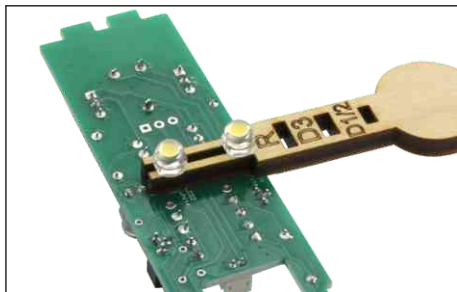
LED4 in back

K **Now solder LED1 (rainbow) to the PCB.** Use the spacer again. LED1 is fitted from the front. Note the correct polarity. Long leg "+", short leg "-". This LED does not have a yellow dot in the middle. After soldering, bend LED1 downward.

Required parts

1 x

LED1
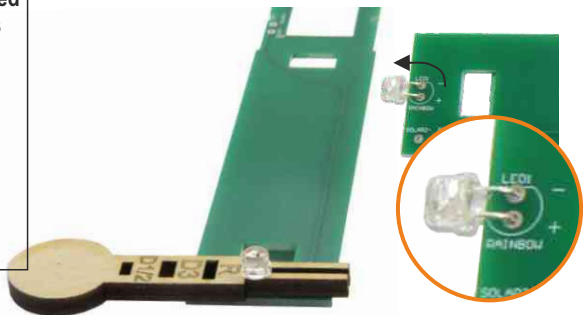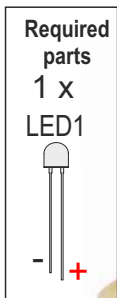
L **Tin cables:** The four cables, red and black, are only tinned on **one side. The other side stays untinned.** The cable jacket is already scored, Simply pull the jacket off at both ends. To tin, heat the wires with the soldering iron and add soldering tin until all wires are covered with solder.

Required parts

2 x ━━━

2 x ━━━
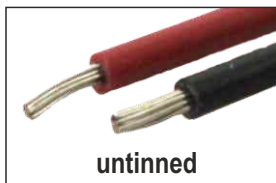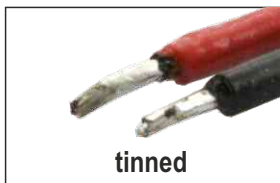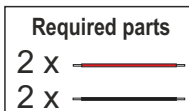
tinned

untinned

M **Solder the cables to the solar cells.**
First presolder the contacts for the solar cell (i.e. apply some solder to both solder contacts), then solder the two tinned cable ends to the contacts. **Attention: red cable to "+" and black cable to "-"**, the loose cable ends pointing toward the middle of the solar cell.

Required parts
2 x
2 x
2 x
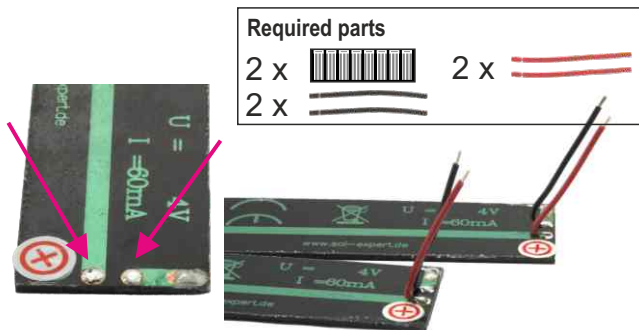
N Insert the cables for one solar cell through the top cut-out (yellow marking) and place the solar cell on the back of the PCB.

①
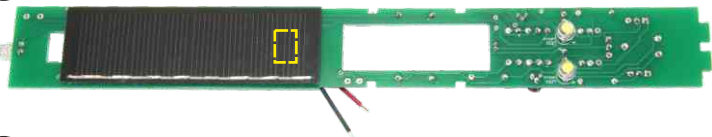
② Turn over the PCB with solar cell. Now insert the black cable through the eyelet "Solar1-" and solder from the other side of the PCB.

③ Now comes the red cable. Use eyelet "Solar1+".

④ When gluing the solar cell in place, ensure: 1. the solder contacs for the solar cell are visible in cut-out "1".
2. Cut-out "2" stays almost completely open.

Solder contacts visible

Cut-out "2"   Cut-out „1"
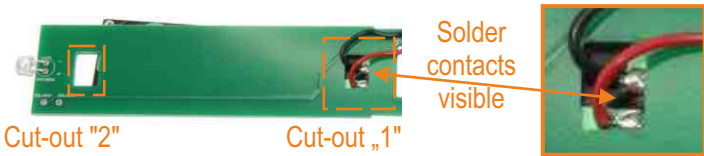
⑤ Raise the solar cell and apply hot glue to the PCB (yellow area) and lower the solar cell down again. Hold the solar cell down until the glue has cooled down.

1. Raise solar cell

2. Apply hot glue

3. Lower solar cell and secure until the glue has cooled down.
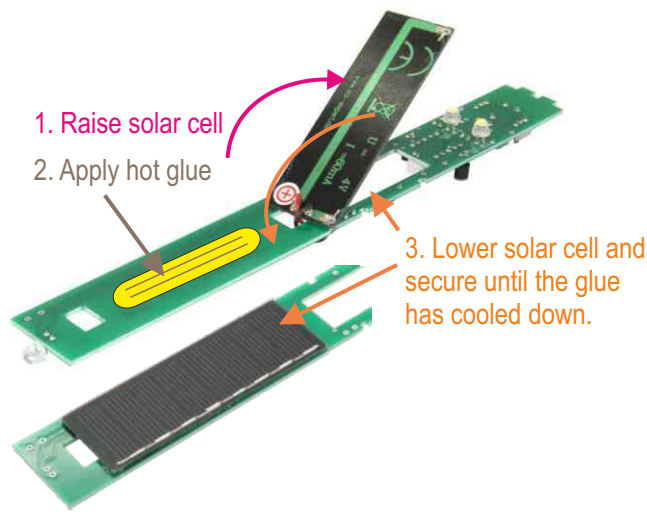
⑥ Insert the cables of the remaining solar cell through the bottom cut-out (yellow marking). Solder the red cable to eyelet Solar2+, the black cable to Solar2-.
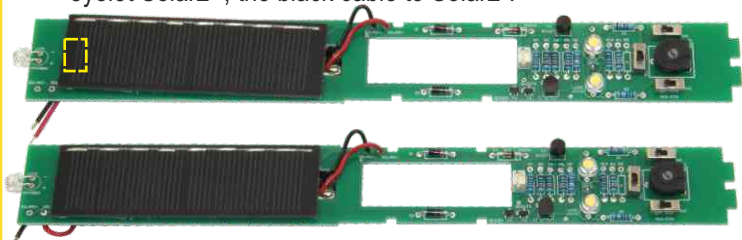
⑦ Raise the solar cell, apply hot glue to the PCB (yellow area) and lower the solar cell. Hold the solar cell down until the glue has cooled down.The solder points for the solar cell must again be inside the cut-out.

Result

Apply hot glue

O Now install the battery

Connect the plug to the socket, slide the battery into the cut-out and secure with 2 cable ties.
Then trim the ends of the cable ties with a side cutter.
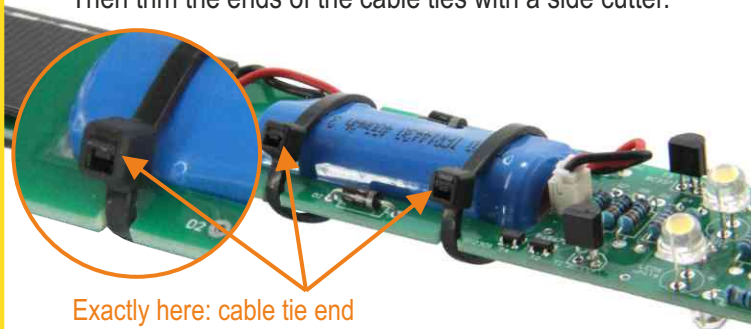
Exactly here: cable tie end

P TEST RUN:

You have now soldered everything that was necessary and are now ready for the first test run. Set the SW2 switch to "ON" and the SW1 switch to "SUMMER" and turn the potentiometer to approx. "5 o'clock". Then you only need to make sure the solar cell is not recei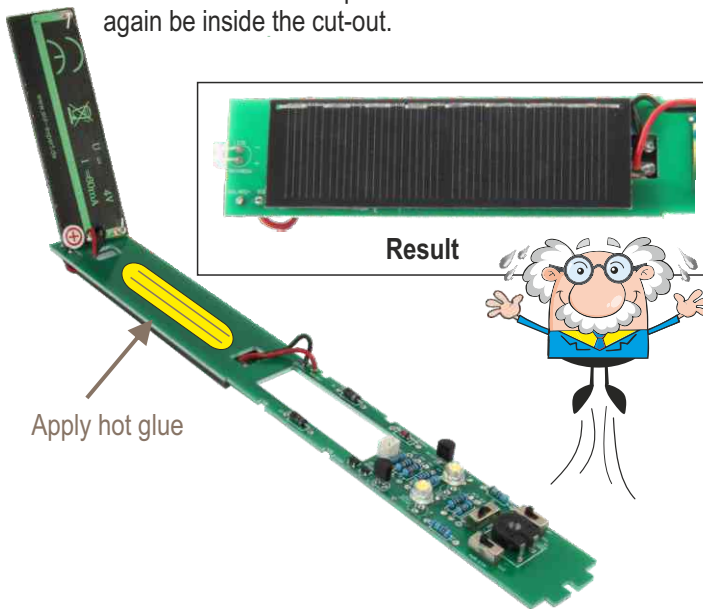ving any daylight. After all, the solar cell also serves as a photoelectric switch. Meaning the lamp only comes on when it's dark.
Cover the solar cell or go into a dark room to test the lamp. Use the SW3 switch to change between white and multi-colour LED.

Set this switch to "SUMMER"

Set the potentiometer to approx. "5 o'clock"

Set this switch to "ON"

Colour selection

- **Lamp comes on? EXCELLENT JOB** ✔
- **If it doesn't come on, check the solder points and verify all parts are soldered the correct way around. (see Troubleshooting p. 24)**
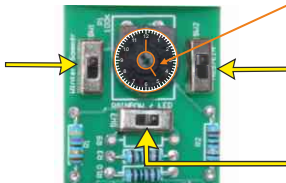
③ **Now glue the PCB into the bottle**

A <u>**Important note:**</u> Glue must not run onto this red area. If it does, you will need to carefully pick out the glue or the bottle will not close.

B Use the hot glue gun to add two little glue dots.

C Then push the cover adapter into the glue dots (preferably with tweezers). Centre the cap adapter on the cap.

D You can now **carefully fill the empty space around the cap adapter (pink area) with hot glue.** Except the "**Red zone**" in image "A". Also keep glue away from the orange area.
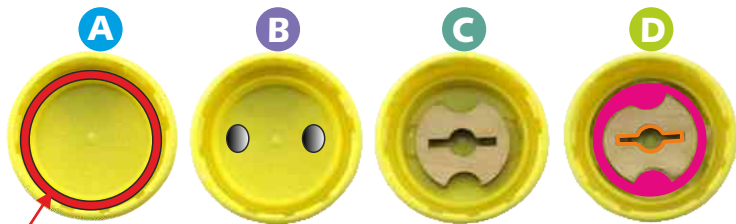
"Red zone": no glue allowed!

E Now slide the finished PCB into the cap adapter.

F Ensure the PCB is upright in the cap adapter.

G Now first carefully apply hot glue between the PCB and the cap adapter from one side.
No glue in "red zone"!

H Then from the other side. Don't forget: the **"red zone"** is off limits for glue.
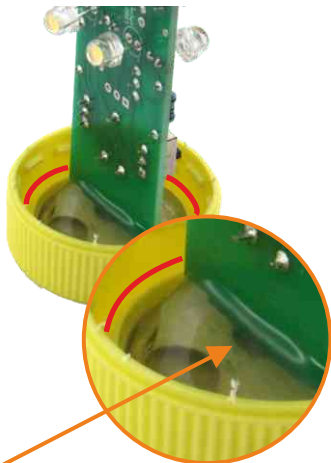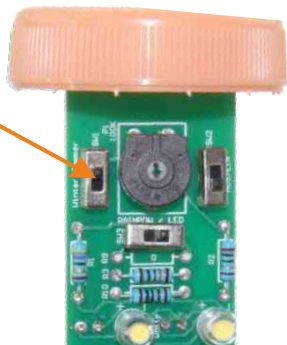
Apply glue here

INSTRUCTIONS FOR USE:

Set SW1 to either winter or summer mode.
In "summer mode", all 4 LEDs will light up. In "winter mode" only 2 will light up, but the lamp will stay on longer as it draws less power from the battery.

Choose white or multi-colour LED?
You can use the SW3 switch to switch between white and colour change.

The **potentiometer** is used to set at which light setting the lamp automatically comes on at dusk. Use a small screwdriver **to set the potentiometer to about "5 o'clock"** for the correct setting.
If you believe the brightness of the LED is getting weaker when inserting the PCB in the bottle, turn the potentiometer clockwise to approx. 6 o'clock.
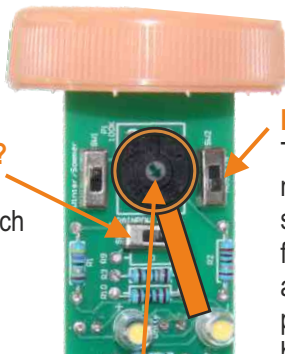
Lamp on switch.
This switch will normally always be set to "ON". However, following assembly or after long periods of poor weather the battery may not be charged sufficiently. The LEDs will then start not to come on. In this case, set the switch to "OFF" and set the lamp in the sun.
The automatic mechanism is now disabled and the battery can charge. After a few sunny days the battery is fully charged again. Now switch back to "ON".

No LEDs come on:
Check all solder points for short-circuits. Specifically check the transistors, as the legs are close together and solder can easily come in between solder points.

A single LED does not light up:
Check the solder points of the LEDs. Did you install the LEDs the correct way around? Since the legs have already been trimmed, you can determine the polarity by the inside of the LED. Inside the LED are a large and a small contact. The large one is "-".

+ **-**
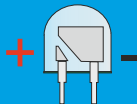
TIP:
Add some gravel or other material to the bottle to keep it from blowing away in the wind.
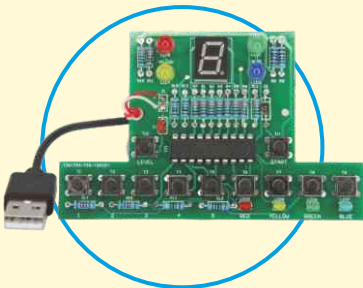
Other cool kits

"TrainYourBrain" Soldering Kit
The "TYB" PCB kit is a soldering kit ideal for anybody who likes to use a soldering iron or soldering station. TYB improves memory and concentration by memorising and repeating number sequences with different combinations and speeds.
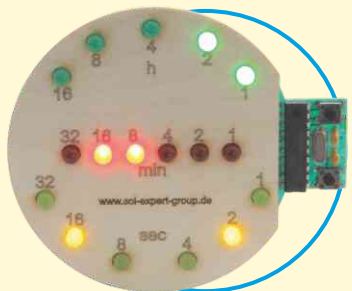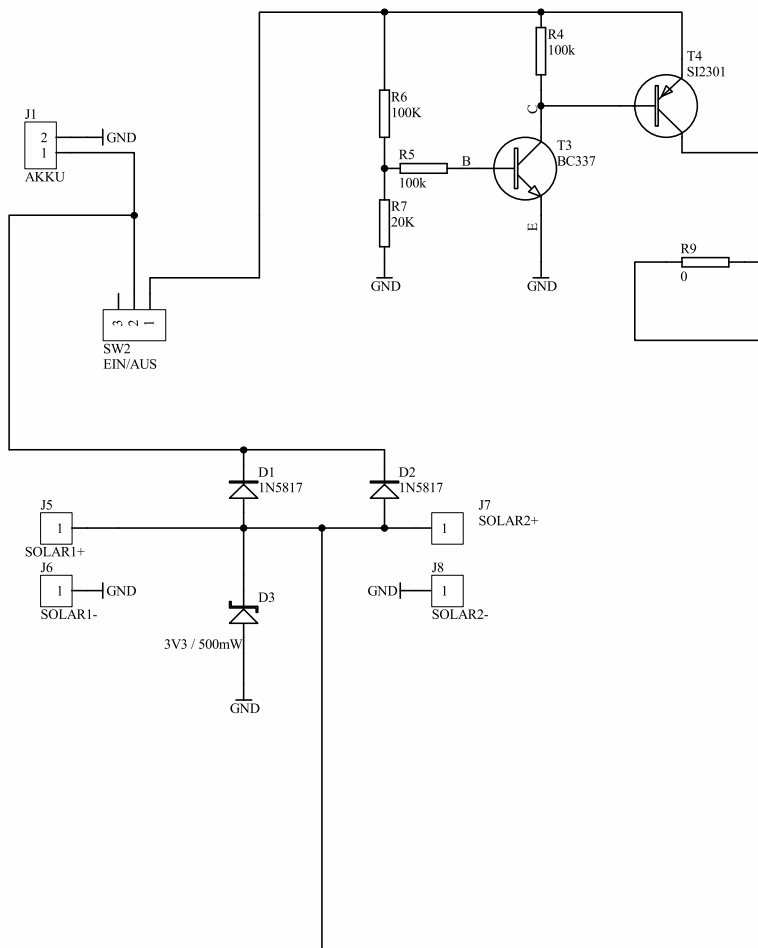Item No.: 79300 - Price: 12.95 €
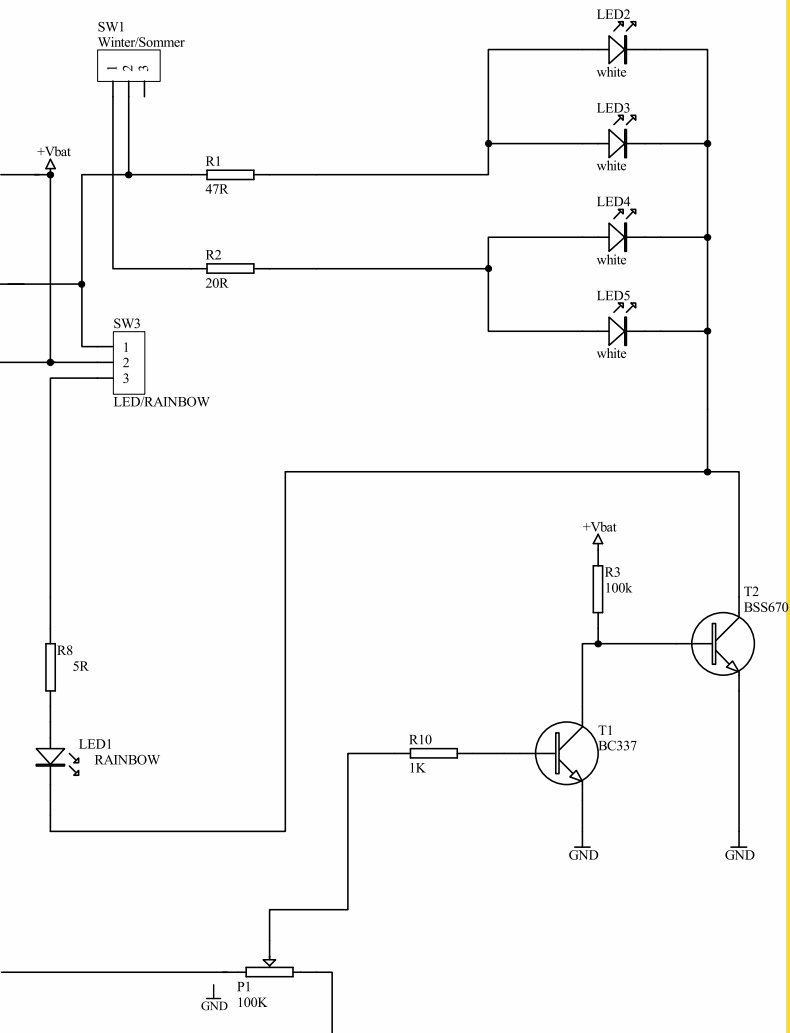
Binary Block Soldering Kit
The "binary clock" PCB kit has over 40 clock parts to solder onto the PCB. A programmed microprocessor allows displaying the time in "binary" using LEDs. It has rows of LEDs to indicate the hours/minute and second. The actual time can be set with buttons.
Item No.: 76334 - Price: 9.99 €

WIRING DIAGRAM:

SW1
Winter/Sommer

LED2
white

LED3
white

LED4
white

LED5
white

+Vbat

R1
47R

R2
20R

SW3
1
2
3
LED/RAINBOW

+Vbat

R3
100k

T2
BSS670

R8
5R

R10
1K

T1
BC337

LED1
RAINBOW

GND

GND

GND

P1
100K

Hier geht es zur Anleitung:

https://www.sol-expert-group.de/Rund-ums-Loeten/Pfiffige-Loetbausaetze/PET-Flaschen-Solarlampe-Loet-und-Bastelbausatz::1302.html?language=de

Click here for the instructions:

https://www.sol-expert-group.de/All-about-soldering/Smart-kits-for-soldering/PET-bottles-Solar-Lamp-Soldering-and-craft-kit::1302.html?language=en

Cliquez ici pour les instructions:

https://www.sol-expert-group.de/Autour-de-la-soudure/Kits-astucieux-pour-la-soudure/Les-bouteilles-en-PET-lampe-solaire-Kit-de-soudure-et-dartisanat::1302.html?language=fr

Klik hier voor de instructies:

https://www.sol-expert-group.de/Rond-solderen/Clever-kits-voor-het-solderen/PET-fles-zonnelamp-soldeer-en-knutselpakket::1302.html?language=nl

Art.Nr.: **79334**

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