



ESSENTIAL INFORMATION

BUILD INSTRUCTIONS
CHECKING YOUR PCB & FAULT-FINDING
MECHANICAL DETAILS
HOW THE KIT WORKS

HARNESS THE POWER OF THE SUN WITH THIS

SOLAR TORCH KIT



Version 1.0

Build Instructions

Before you start, take a look at the Printed Circuit Board (PCB). The components go in the side with the writing on and the solder goes on the side with the tracks and silver pads.

1 PLACE THE RESISTOR

The resistor R1 is 150 Ω . The text on the PCB shows where R1 should go. It doesn't matter which way around the resistor goes into the board.



2 SOLDER THE SCHOTTKY DIODE

Place the BAT41 diode (D1). The text on the PCB shows where D1 should go. The black band on the diode should match the drawing on the PCB to which end the diode goes.



2 PLACE THE SWITCH

The TACT switch is labelled SW1 on the PCB. It does not matter which way round the switch goes. Make sure to push the switch against the PCB.



5 SOLDER THE LED

The LED to be placed in the holes indicated by LED. This component also needs to be fitted the correct way round. The longer leg of the LED should be placed into the '+' hole. This would leave the side of the component with a flat edge to be located into the '-' hole. If you wish to have the LED flat out of the PCB, as in the example, then bend the legs before soldering. The alternative is add wires between the LED and the board. If you do this it is a good idea to use different colour wires for the different legs.



4 SOLDER THE CAPACITORS

The capacitors placements are marked C1 and C2. The 2 capacitors needs to be fitted the correct way. To do this, make sure the negative band on the capacitor that's marked with '-' is placed in the '---' hole on the PCB.



5

SOLDER SOLAR CELL

Thread the solar cell wires through from the solder side of the PCB and insert them into the holes marked +RED and -BLACK. Ensure that the wire colours match the hole description. Do not attach the solar panel to the PCB until after testing as it covers the solder joints.



Checking Your PCB

Check the following before you power up the unit:

Check the bottom of the board to ensure that:

- All holes (except the large mounting holes) are filled with the lead of a component.
- All these leads are soldered.
- Pins next to each other are not soldered together.

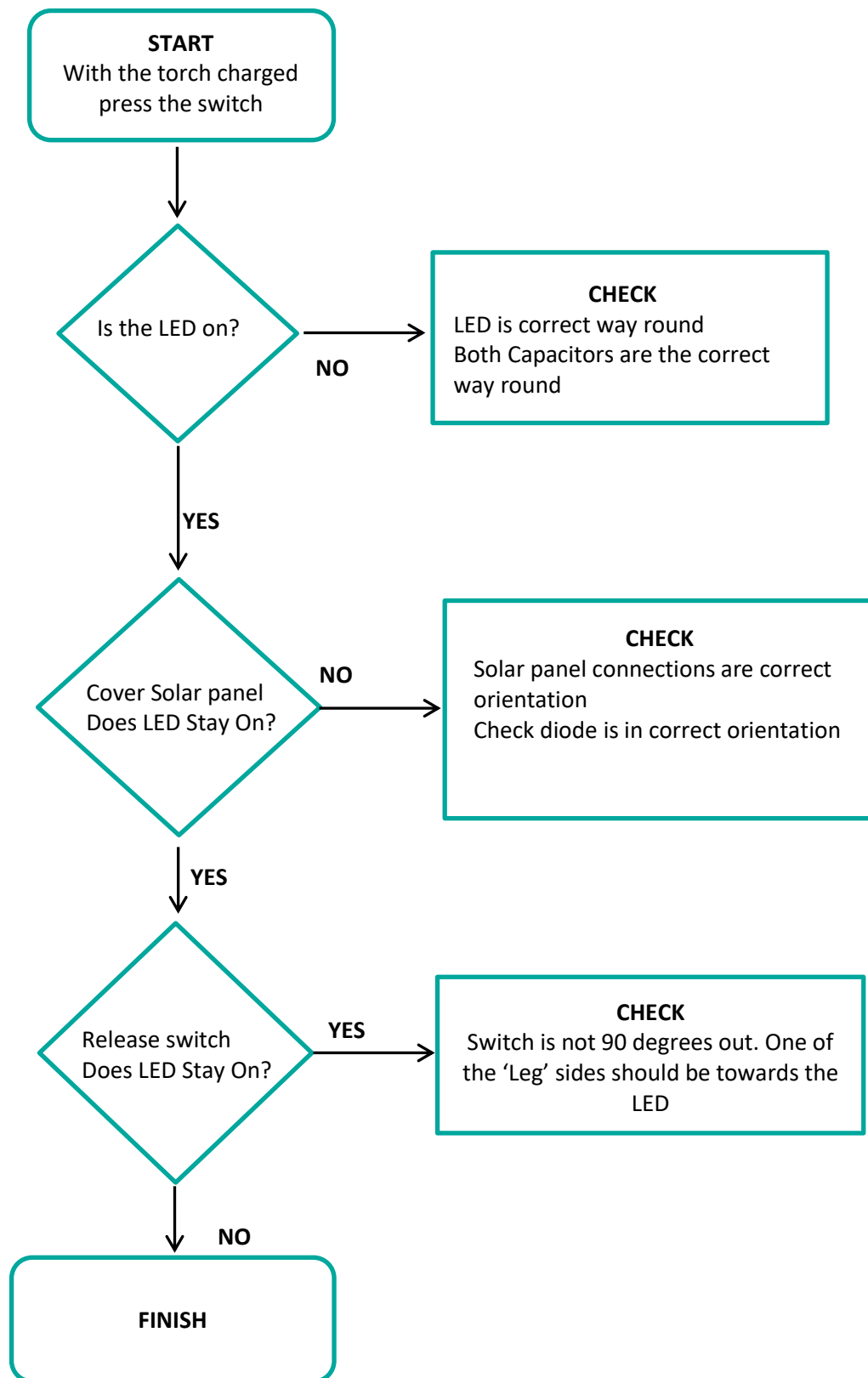
Check the top of the board to ensure that:

- C1 and C2 match the outline on the PCB.
- The resistor bands on R1 are Brown, Green, Brown
- The diode has its band away from the LED end of the PCB
- All flat edge of the LED matches the outline on the PCB
- The solar panel connecting leads are the correct way around.

Charge the Torch by illuminating the solar cell with a bright light for approximately 10 minutes. This should give enough charge to allow testing of the torch. A full charge can take around 30 minutes.

Once your torch has charged and is working you can use the supplied double sided pads to secure the solar panel to the PCB. Place the pads in 2 stacks of 2 to allow clearance for the solder joints.



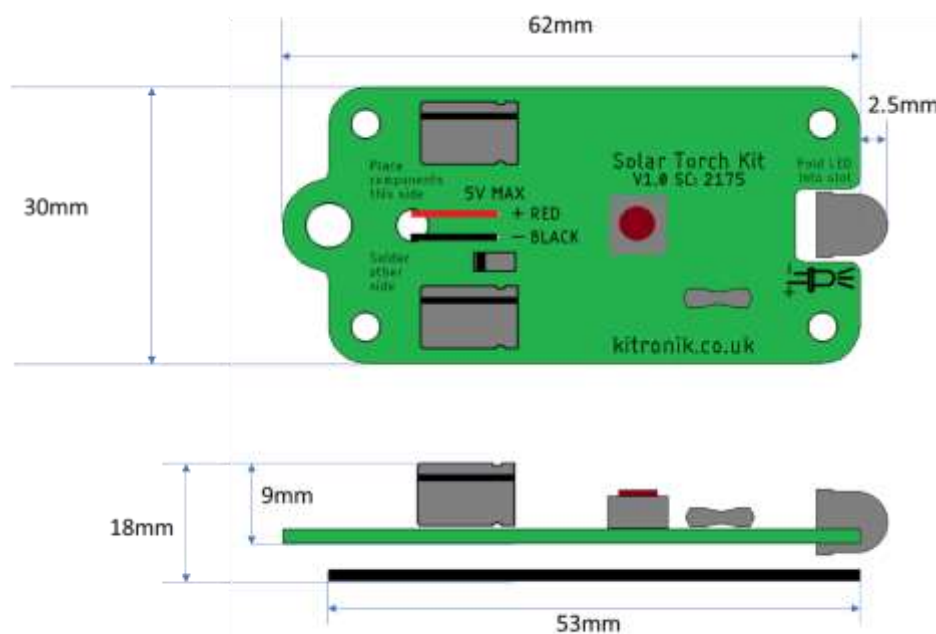


Designing the Enclosure

When you design the enclosure, you will need to consider:

- The size of the PCB (below left).
- Access to the switch
- Height of the components.
- The Solar Cell needs to get light to charge the torch

This technical drawing of the PCB and other components should help you to design your enclosure.

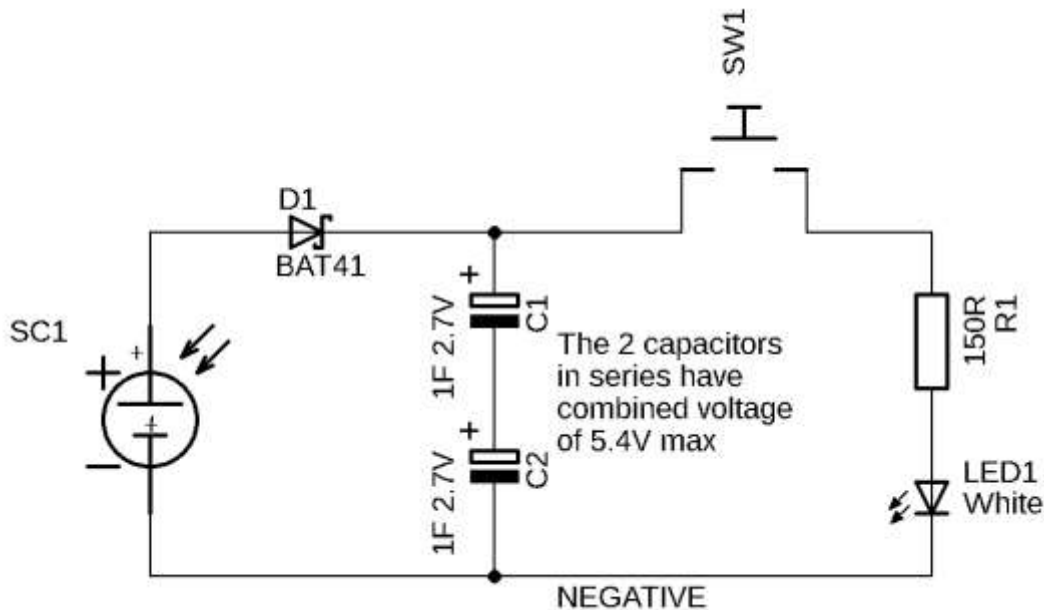


All dimensions are in mm. The PCB has four mounting holes 3.3mm in diameter. The centres of the holes are 4mm from the board edge

| | |
|--|---|
| <p>The diagram illustrates the assembly of the PCB into the enclosure. A hex spacer is placed between the PCB and the enclosure. Two M3 bolts are used to secure the PCB to the enclosure. Labels include: PCB, SPACER, ENCLOSURE, and 2 X M3 BOLTS.</p> | <p>Mounting the PCB to the enclosure</p> <p>The drawing to the left shows how a hex spacer can be used with two bolts to fix the PCB to the enclosure.</p> <p><i>Your PCB has four mounting holes designed to take M3 bolts.</i></p> |
|--|---|



How the Circuit Works



The circuit has 2 distinct sections, an energy storage section – consisting of the capacitors, diode and solar cell, and an energy using section – the LED. The sections are joined by the switch.

When the Solar Cell is illuminated it provides current to charge the 2 capacitors (C1 and C2). The diode D1 prevents the Capacitors discharging back through the Solar Cell. The Solar Cell puts out 5V, so there are 2 capacitors rated at 2.7V each in series. This means the maximum voltage across the pair of capacitors can be up to 5.4V safely.

When the switch is pressed the circuit will use the available energy, either stored in the capacitors, or from the solar cell, to illuminate the LED.



Online Information

Two sets of information can be downloaded from the product page where the kit can also be reordered from. The 'Essential Information' contains all of the information that you need to get started with the kit and the 'Teaching Resources' contains more information on soldering, components used in the kit, educational schemes of work and so on and also includes the essentials. Download from:

www.kitronik.co.uk/2175



This kit is designed and manufactured in the UK by Kitronik

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