

# Project sheet – **SCORPIO REAR BIKE LAMP**

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## DESCRIPTION

This Project sheet describes how to make a rear lamp mounting for the *SCORPIO CONSTELLATION*. Making up the *SCORPIO CONSTELLATION* also allows you to practice your soldering skills.

For this example of a 3D printed rear lamp – the .stl files are available to teachers upon request (just send us an email).

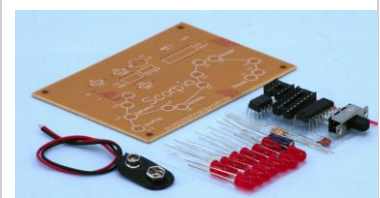


## SECTION 1: COMPONENTS AND TOOLS REQUIRED

### 1.1 COMPONENTS REQUIRED

The following is a list of the components required:

- 1.1.1 The following are available from Scorpio:
  - 1 x *SCORPIO CONSTELLATION* kit
  - 2 x M2x8 Screws (for the small sliding switch – BOLTM2)
  - 8 x M3x8 Bolts
  - 13 x Clear body Red LEDs (LEDSR5) - *these are substituted for the coloured body LEDs supplied as they are much brighter*
  - 1 x 9V Battery



If using the Scorpio supplied .stl files, the following are also available from us – if designing your own lamp, it must take into account the fasteners you will use for your lamp:

- 4 x M6x20 Hex-head bolt
- 4 x M6 Nut

*NOTE: Do not use 1/4" fasteners if using the 3D printer .stl files provided by us.*



1.1.2 The following parts will be made / supplied by the maker:

- 1 x 3D-printed case
- 1 x 3D-printed bracket
- 1 x 3D-printed clamp
- 1 x Clear acrylic or polycarbonate 102mm(h) x 110mm(w) x 3mm (t)



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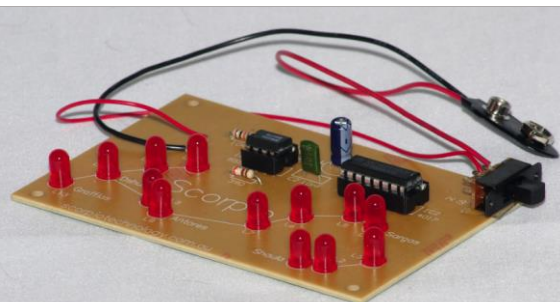
## 1.2 TOOLS REQUIRED

The following tools were used to make the *REAR BIKE LAMP*:

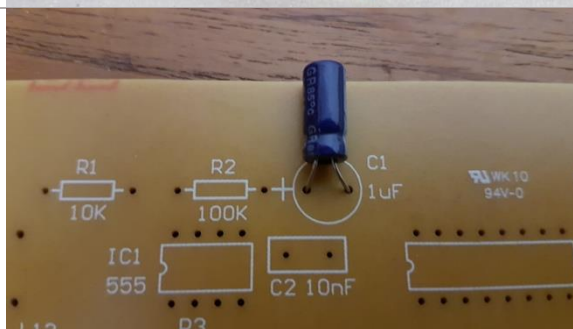
- 3D printer
- Soldering iron & solder
- Wire cutter
- Wire stripper
- 2.5mm drill bit
- M3 Tap (gun or intermediate)
- 10mm spanner
- Screwdriver
- Ruler

## SECTION 2: MAKING AND MODIFYING THE SCORPIO PCB

- Assemble the *SCORPIO CONSTELLATION PCB* as specified in the supplied Teaching unit, incorporating the changes as spelt out below:
  - Substitute the Clear body LEDs for the coloured body LEDs



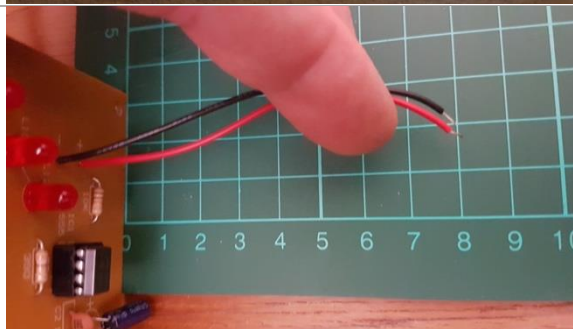
- Solder the electrolytic capacitor and bend it over so that it is flat against the Printed Circuit Board (PCB).



- Solder the battery clip to PCB.
- Carefully insert the ICs to PCB.
- Connect a 9V battery to the clip and check that the LEDs illuminate.



- Cut the clip lead 80mm from the PCB.



- Strip and "tin" the battery clip leads.
- Solder the clip leads to the switch.

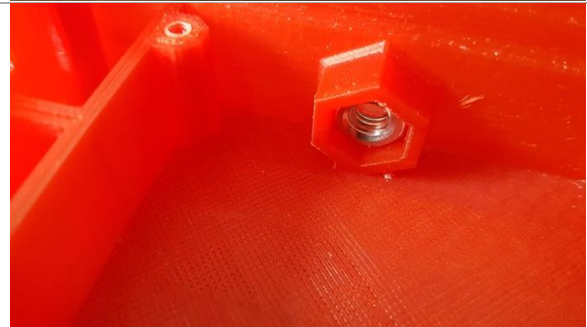


### SECTION 3: 3D PRINTING AND ASSEMBLING THE LAMP

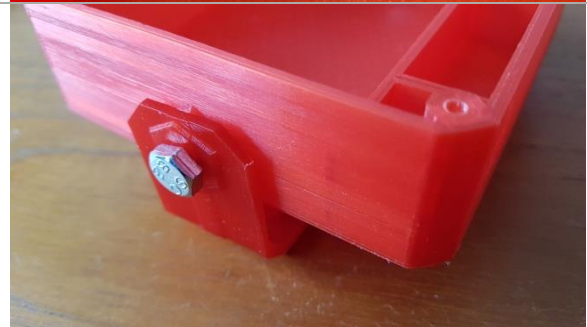
- Print the case using a 3D printer. Use a suitable material and colour (suggested is red PLA).
- Use a 2.5mm drill bit to clean out the 8 holes.
- Tap the holes using an M3 gun tap or intermediate tap.



- Inside the case, insert an M6 nut into the retaining feature (2 places).



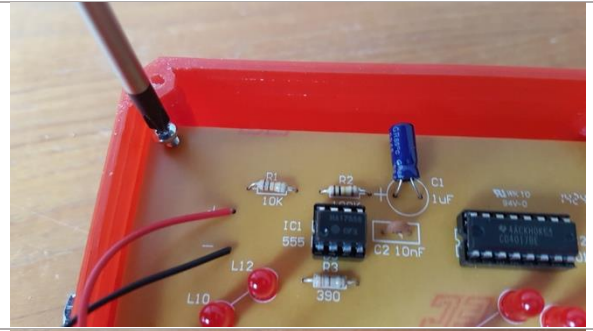
- Attach the bracket to the case using M6x20 hex-head bolt (2 places).



- Attach the switch to the case using M2x8 screws (2 places).



- Attach the PCB to the case using M3x8 screws (4 places).



- Attach the battery to the clip.
- Slide the switch on.
- Check that the LEDs illuminate in sequence.



- Cut a clear cover from 3mm thick acrylic (Perspex) or polycarbonate. The nominal size is 102mm x 110mm.
- Trim the corners and drill the corner holes.
- Attach the cover using M3x8 screws (4 places).



- Into the bracket, insert an M6 nut (2 places).



- Position the assembly to your bicycle.
- Attach the clamp to the bracket using M6x20 Hex-head bolt (2 places).



The completed assembly should look similar to this.

