ASSEMBLER's MANUAL

ASSEMBLY PROCESS

1. First of all take out the listed (below) components per Solar Urja Lamp **(SoUL)** as the quantity mentioned, out from the bunch of components which came packed individually/homogeneously.

(a) **Base Cover (Top)** for mounting the PCB - (1 No.)
(b) **Base (Bottom)** for holding the two rechargeable pencil batteries - (1 No.)
(c) **LED Reflector** for mounting the LED - (1 No.)
(d) **LED Cap** for covering the backside of LED - (1 No.)
(e) **LED Face (Transparent)** for covering the face of LED - (1 No.)
(f) **Two Wires (Red & Black) of length 42 cm** for connecting the LED to the PCB - (1 No.)
(g) **Gooseneck Metal Tube** for enclosing the wires and it is also acting as a neck/stand between the LED panel and the PCB Panel - (1 No.)
(h) **PCB** for the functionality of the SoUL - (1 No.)
(i) **Two pencil Batteries enclosed as one unit** for energy storage - (1 No.)
(j) **LED Strip** for lighting - (1 No.)
(k) **Screws (4 different types)** for fastening the parts of SoUL - (7 Nos.)
(l) **Solar Panel** for charging the SoUL - (1 No.)
(m) **Operation Manual** for beneficiary understanding of usage - (1 No.)
(n) **Product Code No. Sticker (Duplicates)** for tracking - (1 No.)
(o) **Glue** for affixing - (Bulk)

2. **Examine each and every component per SoUL first for Physical Damage, and then for Technical Faults** that might have happened during transit from Vendors to the Assembly point, and while manufacturing at the Vendor side respectively. So first refer to the **PHYSICAL TEST** and then to the **TECHNICAL TEST (for the components who cleared the PHYSICAL TEST)** after this ASSEMBLY PROCESS part of the Assembler's Manual. Steps to be carried out are:

(i) If any Physical Damage/Technical Fault is found in any of the components then kindly keep those components aside, repack them individually/homogeneously and hand-it-over to the District Officer at your place who will dispatch it to the IIT Bombay address.
(NOTE: Don't continue with the assembling process using the transit time damaged components/faulty manufactured components, otherwise it would be considered that the damage/fault occurred while assembling only and hence no replacement would be given.)
(ii) If NO Damage is found then continue with the next step, i.e. Assembling.

3. **Gluing Stuff:** Now place the **Base Cover (Top)** on the workbench in such a manner that the Gooseneck fitting portion comes to the upper side. Choose any one end of the **Gooseneck**, pour 1-2 drops of Tuff Bond glue on it such that at least 1 cm portion of the tube (from the end) is glued. Then insert this end into the Gooseneck portion of the **Base Cover** and hold it there for

3-8 secs to fix it. Now place this **Base Cover & Gooseneck attachment** on the workbench in such a manner that the **Gooseneck** lies (touches throughout or hold it parallely 1 cm high) on the workbench. Pour 1-2 drops of tuffbond glue on the bare (uncovered) end of the **Gooseneck** such that at least 1 cm portion of it (from the end) is glued. Now insert this end into the Gooseneck portion of the **LED Cap** and hold it there for 3-8 secs to fix it.

4. **Wiring Stuff:** Insert the **Two Wires (Red & Black)** in the **Gooseneck** metal tube from either of the sides i.e. either from Gooseneck portion of the **Base Cover** or of the **LED Cap**, such that on both the sides the wire would be sufficiently available to connect it comfortably to the **LED Strip** at one side and to the **PCB** at the other side.

5. **Soldering Gooseneck Wires to LED Strip:** Now place the **LED Strip** on the workbench in such a way that the LED would be facing upwards and the soldering points would be towards yourself. For professional identification of the polarity in the **LED Strip**, search for the side containing a **tiny Black Dot** inside the LED; the Soldering Point on that side is of Positive Polarity. Solder the **Red wire** to the positive point (Right side of yours, as per the positioning) and **Black wire** to the negative point (Left side of yours, as per the positioning) of the **LED strip**.

6. **Lamp Head Readiness & Tagging 1st of 2 Code Nos.:** Mount the **LED Strip** to the **LED Reflector** using two **Screws (2x6.5 mm, Star Pattern, Curved Head, Silver Colour)**, in such a manner that the LED would be facing outward through the hole in the **LED Reflector**. Affix 1 of the 2 same **Product Code Number Sticker** at the inner side of the **LED Cap**. Now cover the circuitry side (back) & the LED side (front) of the **LED Reflector** by the **LED Cap** & the **LED Face (Transparent)** respectively. Then tighten them together using a single **Screw (2x9.5 mm, Star Pattern, Flat Head, Silver Colour)**. Hence the Lamp Head is ready to use.

7. **Soldering Gooseneck Wires & Battery Wires to PCB:** Now place the **PCB** on the workbench in such a way that the side with Switch & the Bi-Coloured LED on it would be facing upwards. Now refer to the markings on the other side to identify the Polarity of the Soldering Points for both **Battery** & **LED Strip**. Solder the **Red & Black wires** of both **Gooseneck** and **Battery** to the respective positive & negative points of the PCB.

8. **Lamp Base Readiness & Tagging 2nd of 2 Code Nos.:** Mount the **PCB** to **Base Cover (Top)** using two **Screws (2x6.5 mm, Star Pattern, Curved Head, Silver Colour)**, in such a manner that the Switch, Bi-Coloured LED & the Female socket (to attach the Male socket of the **Solar Panel**) will be aligned to their respective openings in the **Base Cover**. Place the **Battery** (two pencil batteries enclosed as one unit) in the passage present in **Base (Bottom)** for better fitting. Now enclose the **PCB** mounted in the **Base Cover** with the **Base**. Then tighten them together using two **Screws (2x13 mm, Star Pattern, Flat Head, Black Colour)**. Hence the Lamp Base is ready to use.

9. **Working:** Now keep the **SoUL** on the workbench & switch it on; you will get a glare of Bright White Light in front of you.

10. **Packaging:** Wrap the Lamp Head & the Lamp Base in the respective plastic packets provided. Now put the **SoUL** & the **Solar Panel** in a box and seal it for delivering it to the beneficiaries.

PHYSICAL TEST

1. Visually inspect all the components taken out from the bunch for Assembling (Refer to the list of components in point 1 of Assembling Process).
2. Check for the following irregularities in a kit:
   - ➔ Crack in the SoUL components.
   - ➔ Finishing of the SoUL components are not good.
   - ➔ No/Improper/Detached Soldering in the PCB.
   - ➔ Loose Switch & Socket in the PCB.
   - ➔ Improper/Detached Soldering of the Wires to the Battery.
   - ➔ Presence of Duplicates of each Product Code No.

TECHNICAL TEST

- **BATTERY TESTING**

The multimeter is set to 'DCV' at mode 20 and the black pin is connected to 'COM' and the red pin to 'VΩ' to measure the battery voltage. Now the probes of the multimeter are connected to the battery wires and the voltage reading is noted down. If the battery voltage is above 2 V, the battery can be used for assembling purpose. Usually it should be around 2.5 V, pointing to the fact that the Battery is partially charged from the vendor side itself.

- **LED**

Keeping the pin locations as it is, the multimeter regulator is now turned towards 'Ω' at mode  . The probes are made to touch the poles of LED. If the LED doesn't glow, interchange the poles. Even then, the LED is not working, then we can conclude that the LED is faulty.

- **PCB**

First we test the charge indicator/LED. The black probe of the multimeter is made to touch the middle leg of the charge indicator. Red probe is connected one after another to the left and right legs. If charge indicator glows with red and green lights one after another, the PCB charge indicator is OK.

Solder the Battery to the PCB. Now solder the other end of the wire (with a connector) to the LED and connect it to the PCB through the connector. Now press the on/off switch. Once the LED glows with dim light and press the switch again, so that the LED glows with a bright light. In case the LED is not glowing, we can conclude that the PCB is faulty as prior to this we

already tested the working of the LED. Now de-solder the wire from the LED, to make the wire to pass through the Gooseneck of the Lamp for assembling.

- **SOLAR PANEL**

Keeping the multimeter pins in the same position, turn the regulator towards ’DCV’ at mode 20, the probes are connected to the pin of the solar panel. Keep the solar panel facing direct sunlight. The multimeter should show a voltage of around 5.5 V when there is good sunlight. If the multimeter reading is very low, then the panel is faulty.

Now, turn the multimeter regulator towards ‘DCA’ at mode 20A and connect the red pin of the multimeter to ‘mA’. Connect the probes of the multimeter to the solar panel like before and the current is noted down. If the current under sunlight is not shown as the value nearer to the rating given on the backside of the panel, we can assume that the panel is faulty.