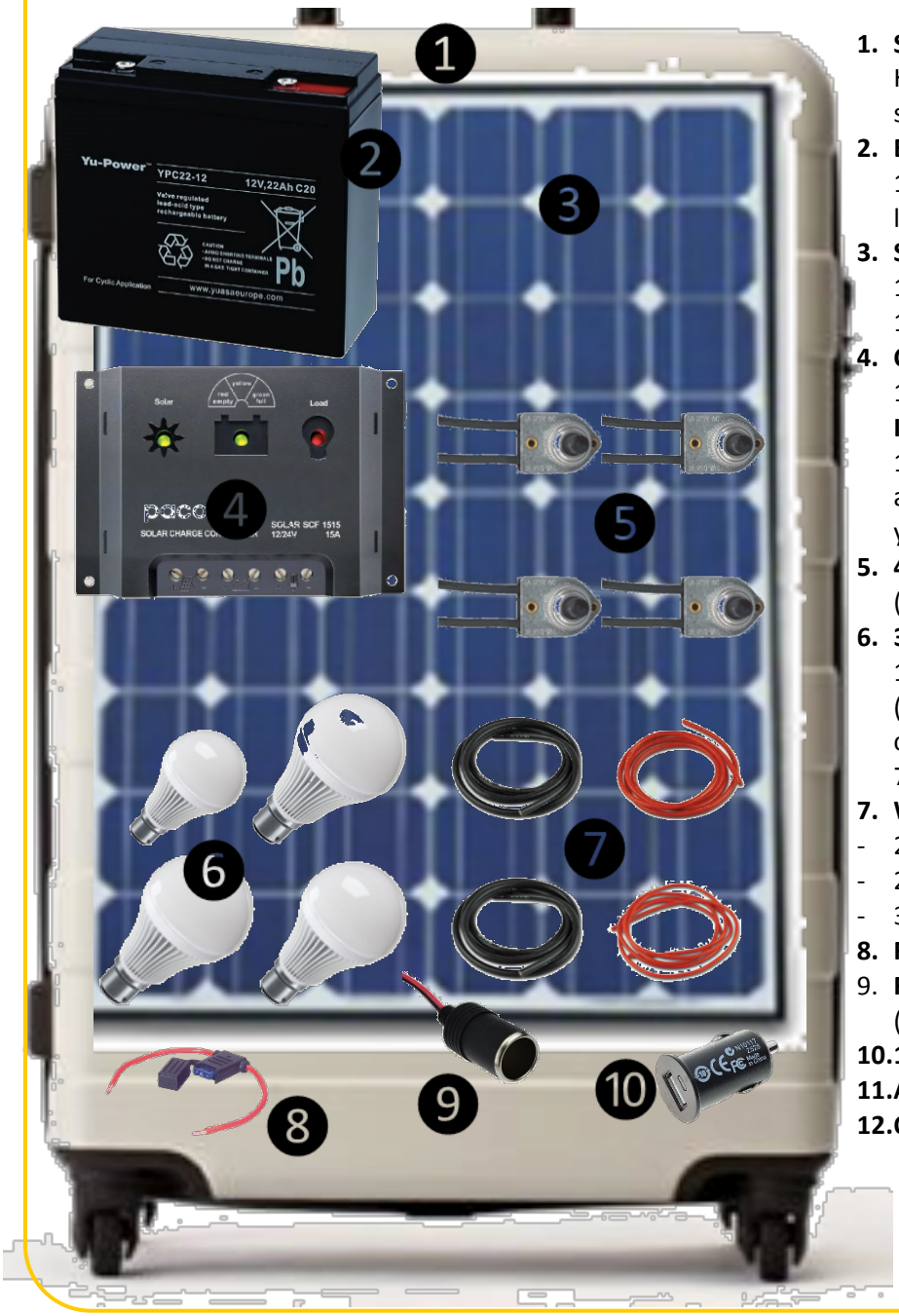
Solar Suitcase Construction Manual

This manual contains information for building a solar suitcase. The solar suitcase has a double function as a mobile source of light and electricity for scout camps in normal times and as emergency unit to provide light and communication in case of disaster. Please note, that this manual cannot replace a full textbook about solar energy and electricity and needs some previous knowledge about electricity safety.

Material list



1. **Suitcase**
   Hard shell with wheels, not too small
2. **Battery**
   12V sealed (‘maintenance free’) lead acid battery, 17-22 Ah
3. **Solar panel**
   12V (i.e. working voltage about 17V) 20W-40W
4. **Charge**
   12V charge controller, 6 or more
   Inverter
   12V to 115V or 230V model according to the power grid in your country, 100W to 300W
5. **4 light switches**
   (Rated at least 1A)
6. **3 or 4 LED lamps**
   12V DC LED lamps and sockets (unless the lamp comes with its cable attached), 3-7W each 3 or
7. **Wires**
   - 2m AWG14 (2.5mm^2)
   - 2x 0.5m AWG12 (4mm^2)
   - 3-5m/lamp AWG18 (0.75mm^2)
8. **Fuse and fuse holder**
9. **Female car cigarette lighter** (multi-) socket
10. **12C USB adapter**
11. **Attachment material**
12. **Optional: a radio**

Let's go! Step by Step

Do not build a 12V solar system unless there is an experienced person knowing about electricity and solar power in the group! The electricity is not lethal, but the power of the battery can be very harmful.

1 THE VERY FIRST THING is to attach the fuse holder into the wire coming from the battery's plus pole. DO NOT INSERT the fuse yet. Attach the plus and minus wire solidly to the battery (using nuts and washers or special connectors). Do not use 'alligator clip style connectors'!

2 Attach the wires coming from the battery to the charge controller at the screw connectors with the 'battery' symbol. (Connect battery plus to the plus symbol of the charge controller).

3 Keep the solar panel face down on the table to not produce electricity yet. Attach the solar panel to the screw connectors at the charge controller with the 'solar panel' symbol.

4 Insert the fuse into the fuse holder at the plus pole of the battery. Check if the charge controller indicates the charge of battery. Put the solar panel into the sun or strong light and check if the 'charge' LED lights.

5 Disconnect the solar panel or put it face down on the table. Prepare wires from the charge controller to the inverter, to the lamps (passing through an Interrupter) and to the female cigarette lighter connectors. All these wires must fit into the Connectors (plus and minus) at the charge controller with the 'lamp' symbol.

6 It is very probable that they do not fit all together into the connector, so you might have to solder connect all pluses and all minuses separately and prepare one plus and one minus wire which connect the connection point to the charge controller. You might use screw terminal wire connectors instead of soldering if you find them.

7 If the inverter does not have its own interrupter to shut it OFF, you need to insert another interrupter into its plus connection from the charge controller. The inverter should only be switched ON if you really need it; it looses too much electricity in its stand-by position. If all wires are connected, review all connections again. Isn't there any inversion of plus and minus?

8 Replace the main fuse and reconnect the solar panel or lift it from the table and put it into the sun.
Check all lamps and the inverter if they function well. In case of problems, refer to section 5.
Secure the connections of the battery with insulating scotch tape so that no blank metal is visible any more. Otherwise any metal object like a screwdriver in your suitcase can induce a spark and set the suitcase on fire!
Prepare a manual for your suitcase and keep it with the corresponding manuals of each device in a transparent folder which you attach inside the suitcase.
Try out your suitcase in open and closed position. Is it comfortable to use? Is there a way for the cables of the panel and the lamps to 'leave' the closed suitcase without being pinched? Cut more openings if needed.