NISAMAX solar lantern construction manual

The following pages show how to assemble the solar lantern from the parts supplied.

If the lantern is hung in full sun for about 8 hours it will provide good light for about 4 hours: after this the lantern gradually dims. If it reaches this dim state then it will take longer for the lantern to charge up to full operating voltage.

For the lantern to charge fully the light must be switched off.

The lantern is built in 7 steps: **first the solar panel is attached to the lid of the housing.**

1.1 Drill a hole in the centre of the housing lid for the leads from the solar panel to come through. The 13/64 inch bit is used for this.

1.2 Use template 1 to mark holes in the short sides of the housing lid. Pass the solar panel leads through the hole in the centre of the lid.

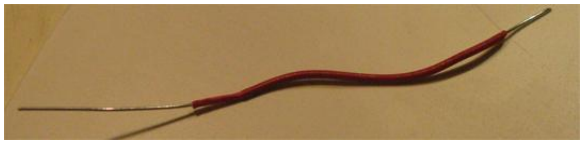
Centre the lid on the solar panel and make sure the sides align as closely as possible. Using a 1/16 inch (or 5/64 inch) bit drill one hole through the lid and the frame of the panel. Do not press to hard when you are drilling through the metal. Use #4 3/8 inch self-tapping screw and fix the lid to the panel at the first corner.

Make sure the alignment is good again and drill the second hole and fix it with a second screw. Repeat for the other two corners.

The result will look like this:-

Step 2 is to place the switch in the housing body.

2.1 Cut two pieces of red wire each 4 inch long. Strip 1¼ inches from one end and ½ inch from the other.

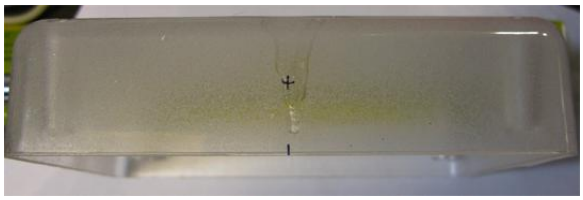


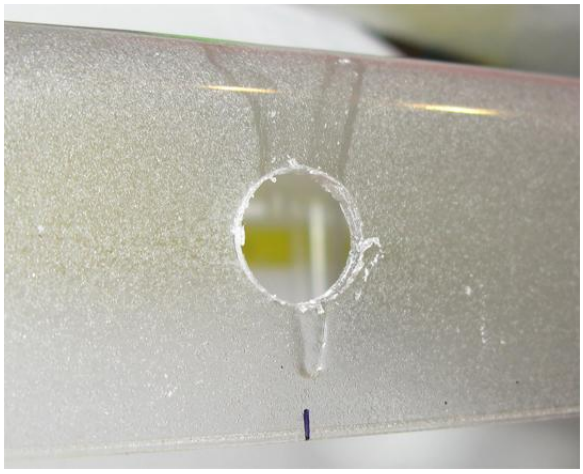
2.2 Take a switch and slightly bend the two legs apart.

2.3 Feed the long end of one wire through the hole in the end of the switch and then wrap the stripped part of the wire round the switch leg tightly. Use the needle nose pliers to help you make sure it is tight. Then do the same to the other leg.

2.4 Cut two piece of narrow shrinkfit, each 1 inch long and slide them over the wires so that they reach as close as possible to the switch and cover the windings. Gently heat the shrinkfit and it will seal the wires onto the switch.

2.5 The housing is about 6 inches long and 1½ inches deep. Make a mark in the centre of one of the long sides. Drill a hole using the 5/64 inch bit and then use the ½ inch bit to make it larger.

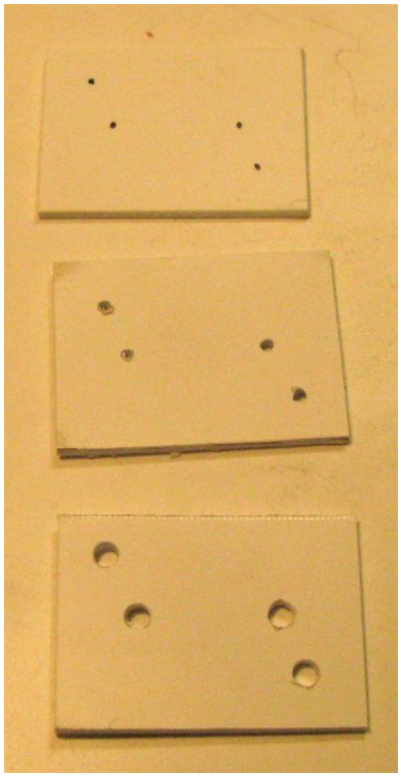




2.6 Take the nut and washer off the switch, pass the wires through the hole form the outside, and then replace the washer and the nut and tighten it onto the panel. Make sure the switch is level as you tighten it.

3. **Step 3 is to build the LED board**

3.1 Cut a piece of plastic the same size as template 2 and mark the 4 holes on it. Drill each hole first with 1/16 inch bit and then with the 1/8 bit.



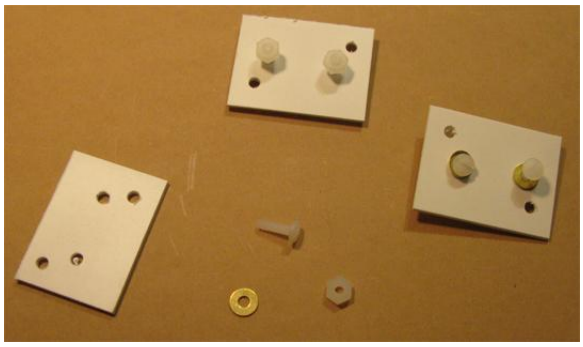
Three stages of LED board manufacture.

3.2 Take a resistor and make a loop in the wire on one side, large enough to pass a nylon screw through it. Make sure the body of the resistor is clear of the head of the screw. Put a brass washer onto the screw to hold the resistor next to the screw head. Pass the screw through one of the centre holes and loosely fasten it with a nylon nut.

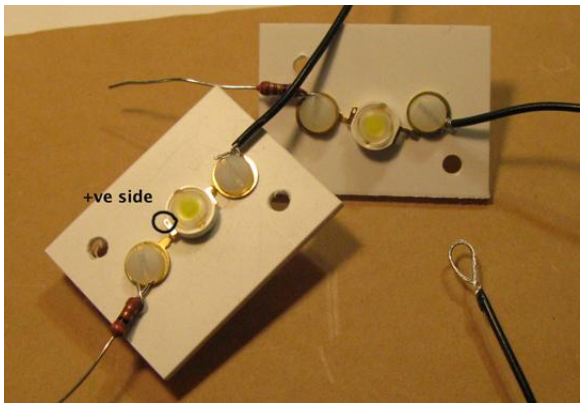
3.3 Take an LED and slide the leg with a hole next to the diode between the washer and the board. Tighten the nylon nut using the nut driver and keep the resistor aligned with the board. To get it finally tight you may need to hold the screw with a small screw driver but always tighten with the nut driver.

3.4 Take a 5 inch piece of black wire and strip 1 inch from one end and ½ inch from the other. Make a loop in the long end and pass a nylon screw and then a base washer as in the previous step and loosely

fasten it with a nylon nut in the other centre hole. The brass washer should come over the other leg of the LED. Tighten this as before.



3.5 Put a battery across the wires and be sure the LED lights up.



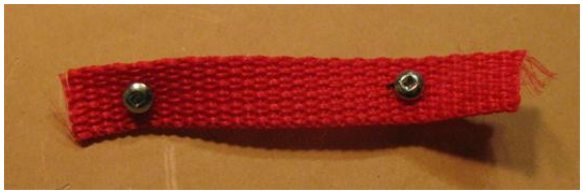
4. **Step 4 is to build a battery pack**

4.1 Cut a piece of the wide shrinkfit tube 6 inch long and slide 3 batteries into it. Make sure the batteries are all pointing in the same direction. Check the voltage: it should be about 3.7 to 4.2 volts.

4.2 Gently heat the shrinkfit to hold the batteries firm making sure they stay in contact. Trim off the spare plastic to show the ends of the battery pack. Again check the voltage.

5. **Now fix the battery to the lid**

5.1 Cut two pieces of webbing 3 inches long. Make two marks 1¾ inches apart and screw two ¼ inch self tapping screws through the webbing.



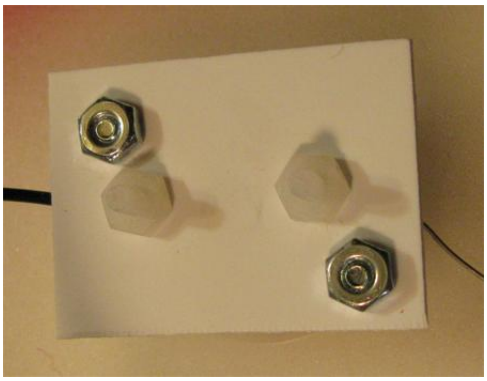
5.2 With template 3 mark 4 holes on one of the long sides of the lid and drill 1/16 holes through the lid.

5.3 Loosely fix one piece of webbing with the screws using the holes just made and fix one end of the other piece. You should be able to slide the battery pack through the loop and then fasten all the screws tightly to hold the battery firmly in place.

6. Now fix the LED board to the housing.

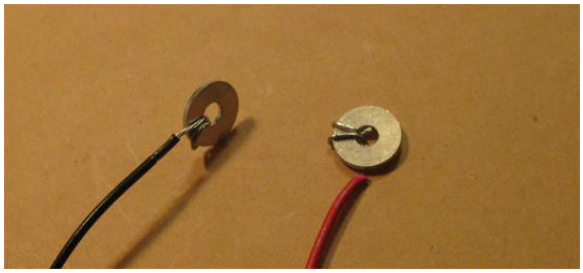
6.1 Position the LED board with the LED facing up over the clear patch in the centre of the outside of the housing. Mark the positions of the two outer holes. Drill the holes first with 1/16 inch bit and then 1/8 inch.

6.2 put a 4/40 ½ inch machine screw (blunt end) through the hole from the outside, put a nylon spacer on it, and then put one corner of the diode board on it making sure the diode board is inside the housing and facing down. Fix this with a metal 4/40 nut. Swing this to one side so that you can do the same for the other corner and then tighten the nuts using a screwdriver from the outside and nut driver inside if needed.



7. **Finally attach the wires.**

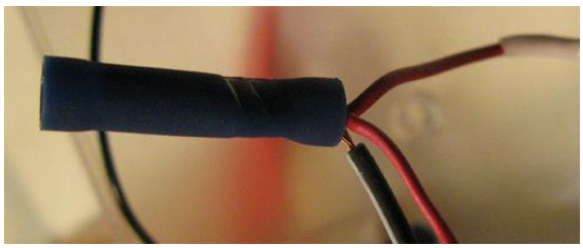
7.1 Make two connectors for the battery each with 6 inches of wire. Strip 1 inch from one end and ½ inch from the other. Take the long end and thread it through an aluminum washer and wrap it round several times.



7.2 Use a red connector to attach the resistor on the LED board to a red wire from the switch.

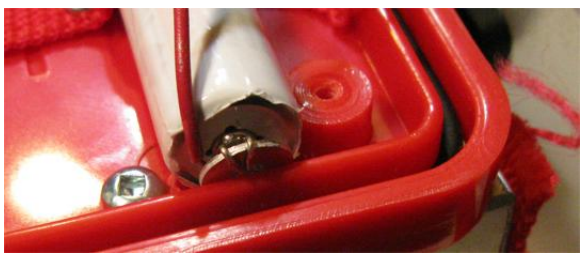
7.3 The solar panel wire needs to be shortened to 10 inches and then the two sides of it stripped apart.

Take the other wire from the switch, the red battery connector and the positive side of the solar panel (marked with a white line on the black plastic) and join them together with a blue connector.



7.4 Take the negative side of the solar panel, the black wire from the LED board and the black battery connector and join them together with a blue connector.

7.5 Put the aluminum washers at the positive and negative end of the battery pack and the Led should light up. You may need to change the switch position. The washers should fit tightly down the sides of the housing and not move once the housing is closed.



8. Completion

8.1 Put the sealing rubber in the lid of the housing and close the lid onto the housing body. Fix this with 4 screws one in each corner.

8.2 Take two long pieces of webbing at least 18 inches long and cot holes about ½ inch from each end. Unscrew the screw from one corner of the solar panel, put a finishing washer on it and put it through the webbing and screw it back into the panel. Repeat at the other corners.

8.3. The lantern is now complete. It should work. Switch it on and shake it to see that all the connections are good.