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## **GUIDANCE BOOK FOR OPERATIONS AND MAINTENANCE OF SOLAR BATTERY CHARGING STATION**

Implemented by UNITED NATIONS INDUSTRIAL DEVELOPMENT  
ORGANISATION (UNIDO) and MINISTRY OF MINE AND ENERGY

Funded by the Government of France

December 2015

About the project : “Access to Clean Energy for Production Uses in Cambodia”

That the major goal is to increase access to clean energy for production uses in off-grid communities. This project has two major objectives:

1. Support the existing charging stations from diesel engine to solar energy and,
2. Strengthening the capacity of project partners and biomass gasification producer to improve the domestic biomass gasification.

The guidance book was organized by EcoSun Energy Cambodia for this project with checking and editing by the experts from new energy and renewable energy department of the Ministry of Mine and Energy and additional consultation with Centre Kram Ngoy.

Note: Product logo or label in this guide book was not reflected the accreditation by the United Nations Industrial Development Organization except there is a written certification.

Issued: December 2015 for the owners of Solar Battery Charging Stations

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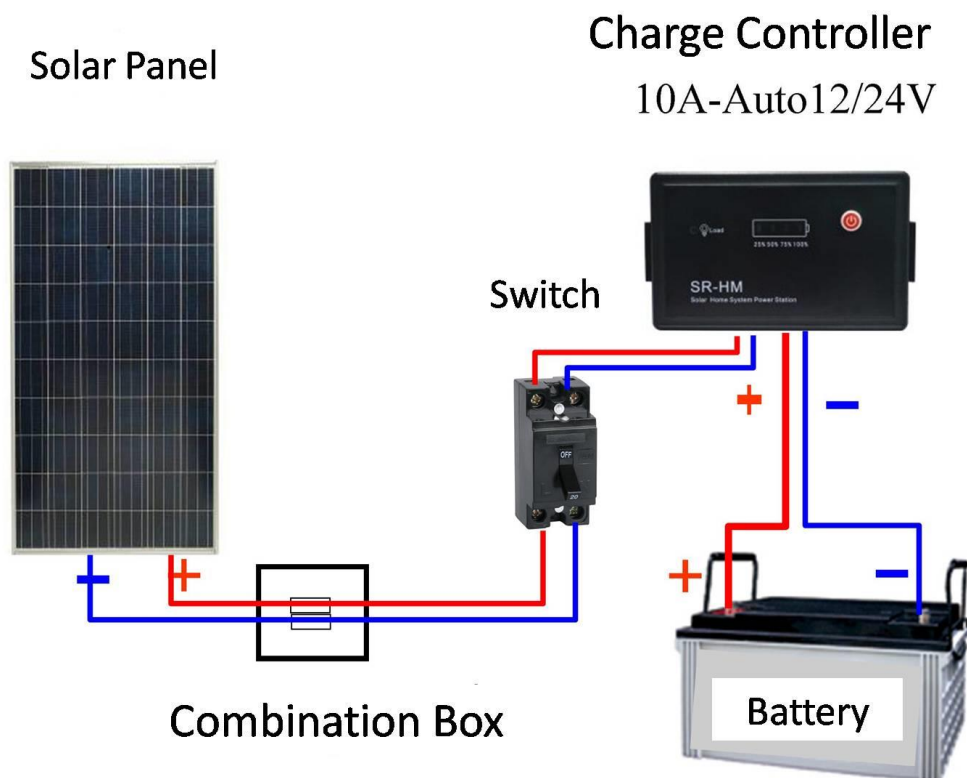
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## 1. Introduction to Solar Energy System

### ❖ Definition

The electrical system operated by solar energy is a completed set of system using sun radiation to generate electricity with a charge controller to charge and consumer power from battery.

Main sections of the system are below:



Note: the owners or users should not move or change any parts of the system and should charge batteries directly from solar panel without charge controller. It may cause problem to solar panel or the system.

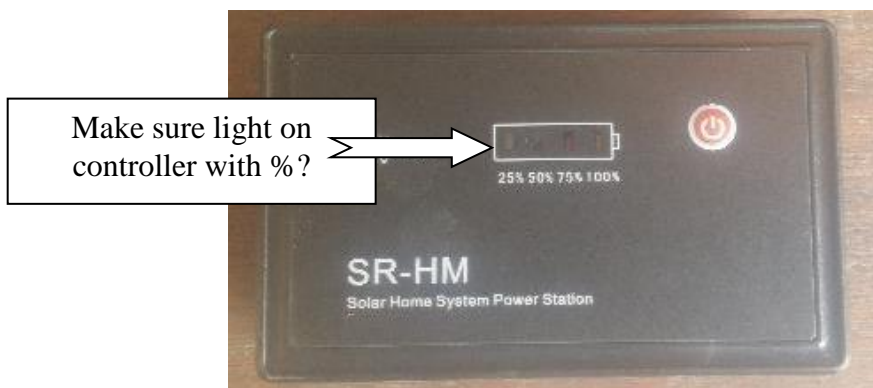
## 2. Operations of Solar Battery Charging Station

The operations need to follow several simple steps below:

1. Firstly, organise batteries orderly under each charge controller, then connect the battery clamp to each battery terminal in the right way, terminal (+) and (-)



2. Read the light displayed on controller, make sure that there is percentage (%) light on the controller. If no light display, please check battery clamp or wire, maybe not connect properly. And if remain problem, please check wire connection again, and please contact technicians for assistance one the last page.



On back side



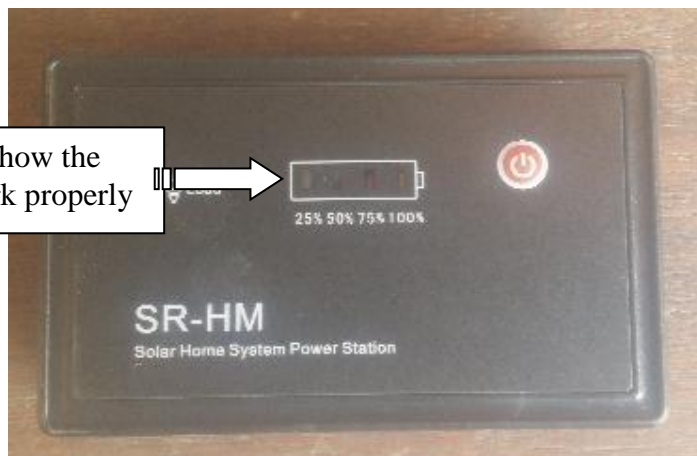
3. Then turn on Switch/breaker to start charging the battery

Turn on  
Switch/breaker to  
charge battery



4. Final checking on the charge controller display if percentage display running forward and backward, it means the system work correctly. If not, then there is problem, please check wire connection again, and please contact technicians for assistance one the last page.

Sign to show the  
system work properly



## 4. Maintenance Service for SBCSs

There is required SBCS's owner to regular maintenance below:

### ❖ Solar Panels and Wire

1. Regular checking and clearing out all obstacles that create shade on panels
2. Clean solar panels with clean water in early morning or late afternoon with soft wet cloths, do not use any soap or detergent to clean solar panel.
3. Make sure no solid materials or rock fallen on solar panel
4. Regular check wire of the whole system, in case cut by mouse/rats
5. Regular restrict the wire connection and other parts of the sytem

### ❖ Charge Controller

1. Clean outside parts of controller regularly
2. Regular checking wire connection on controller, in case there is corrosion
3. Regular restrict the wire connection
4. In case charge controller does not work, it may cause by:
  - a. lightning
  - b. wrong connection on battery terminal (+) and (-)

### ❖ Battery

1. Monitor level of electrolyte (acid) in each battery and added if required, must use glove and mash to protect impact from acid.
2. For battery run out of life, should not charge it
3. Regular dry out the battery terminals and its cap
4. Remove battery cap (for flooded acid battery only) to check inside, in case there is solid materials that caused problem to battery

## 5. Contact information:

If you have followed the above lesson but still cannot solve the problem, please contact technicians below:

Project supplier and installer:

### **Ministry of Mine and Energy**

General Department of Energy

Department of Renewable Energy

Mr. Leang Rithy Phone: 011 959 698

Mr. Yim Sophy Phone: 096 757 3777

### **The company installed the system:**

#### **EcoSun Energy Cambodia:**

Telephone for Battambang Province: 069 234 318, 077 776 818

Phnom Penh Office: 023 6664 666, 012 635 865, 087 776 818