

# SunSaver

## Field Testing Procedures



### Abstract:

The following test procedure was developed for use in field conditions, where no external power sources are available.

**Note:** Due to the fabrication process of the SunSaver controller, the exact damaged component may not be evident. It may only be possible to determine if the unit is functioning properly. However, other factors may be apparent that will assist the technician in determining the cause of the failure.

### **Recommended Tools:**

- Digital multi-meter (frequency and duty cycle measurement are helpful)
- Phillips Screwdriver
- Flat Bladed Screwdriver
- 12V/2A load (type 1156 automotive lamp with socket works well)
- Short length(6 in) of 12AWG solid wire.

### **Caution:**

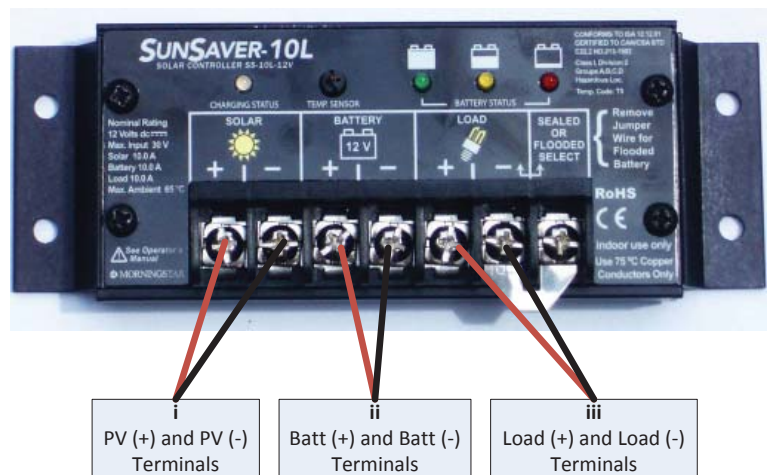
The following outlined procedures assume a basic working knowledge of electrical circuits. Exercise the necessary precautions when dealing with live electrical circuits present in solar energy systems

## **Testing Procedure**

### **Step 1: No Power Applied to SunSaver**

A) With no power applied to the SunSaver, check for short circuits to ground between the following terminals:

- i) PV (+) and PV (-) terminals
- ii) Battery (+) and Battery (-) terminals
- iii) Load (+) and Load (-) terminals



(step 1 cont.)

B) Check the LVD FET (if controller is equipped with LVD) by measuring a diode drop between Battery (+) and Load (+) terminals. If no diode drop is present or if an open circuit is measured, the LVD FET is damaged. If no diode drop is present (short circuit), the unit will still (most likely) regulate the battery voltage properly, however the controller will no longer have LVD capability.

C) Check for continuity between the ground connections on the terminal strip (PV (-), Battery (-), and Load (-).

D) Remove the four screws from the face plate. Bend a small hook in one end of a 12AWG solid wire. Insert the hook into one of the screw holes and pull off the face plate. The face plate may be stuck to the internal potting and may make a cracking sound when removed. This is normal and will not damage the internal circuitry. Inspect for burns, damaged traces, etc.

## **Step 2: Battery Connected to Battery Terminals Only**

 Note: The green “charging” LED should be off.

A) Measure the voltage at the battery terminals.

B) Measure the voltage at the load terminals. The voltage should be the same (+/- 200mV) as the battery voltage. If load voltage is significantly lower than battery voltage, LVD FET’s or the power traces inside the SunSaver are damaged.

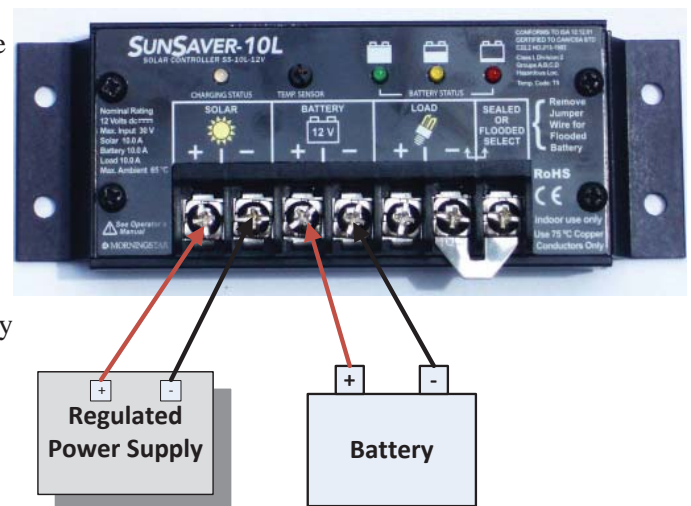
C) Measure the voltage at the Solar (PV) terminals. The voltage should be less than 2.5 Vdc. If green LED is on, or battery voltage is measured at Solar terminals, the input FET’s are damaged and the unit will not regulate battery voltage properly.

## **Step 3: PV and Battery Power Applied to the Controller:**

 Note 1: The green “charging” LED should be lit

A) The voltage across the PV terminals should be the same as the voltage across the Battery terminals if the battery is not fully charged.

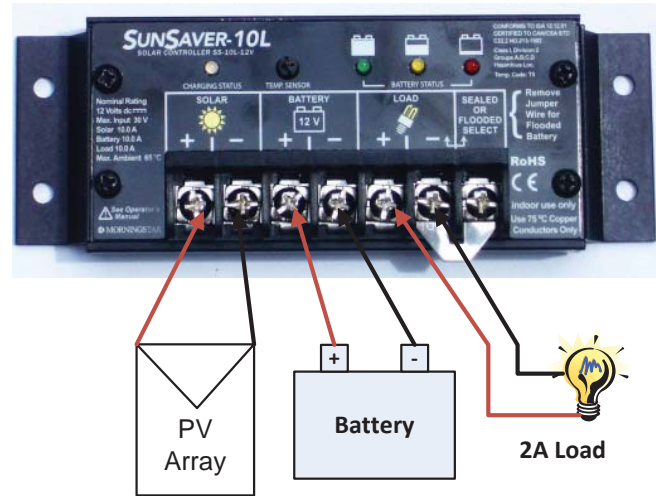
B) If the batteries are charged, there will be a voltage difference between the PV (+) and Battery (+). If your multi-meter has a frequency measuring option, a 300Hz AC signal should be measured between the PV (+) and Battery (+). The duty cycle of this signal can be used to give a rough indication of the battery state of charge. A lower duty cycle indicates a battery with a higher state of charge.



#### **Step 4: PV, Battery, and Small (2A) Load Connected to Controller**

Note 1: A standard automotive brake lamp (type 1156) works well for this test.

A) with the lamp turned On, measure the Load Voltage. It should be within 20-30 mV of the battery voltage. If the Load voltage is more than 0.25V lower than the Battery voltage, the LVD FET's are damaged.



#### **Step 5: SunSaver Installed in the Power System.**

- A) Check the correct operation of the SunSaver based on the above tests.
- B) Check the condition of any fuses that might be in the power path.
- C) Verify the system wiring is correct and intact.
- D) Check all connections and terminals for good electrical contact.



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