

**OPERATION MANUAL**  
**for the**  
**RV-45D**  
**Solar Charge Controller**

Manufactured by:  
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# RV-45D Features

## 1) Pulse Width Modulation “Taper” Charge Strategy

Maintains batteries at the highest state-of-charge with the least amount of battery water consumption.

## 2) Selectable State-of-Charge

Set from 13.2 VDC to 14.6VDC in 0.2 volt increments.

## 3) Selectable “Auto-Equalize”, “Auto-Float” or “Fixed”

“Equalize” for Flooded Lead-Acid Batteries,  
“Float” for Absorbed Glass Mat (AGM) or Gel batteries,  
“Fixed” for single set point PWM charging.

## 4) Battery Temperature Compensation

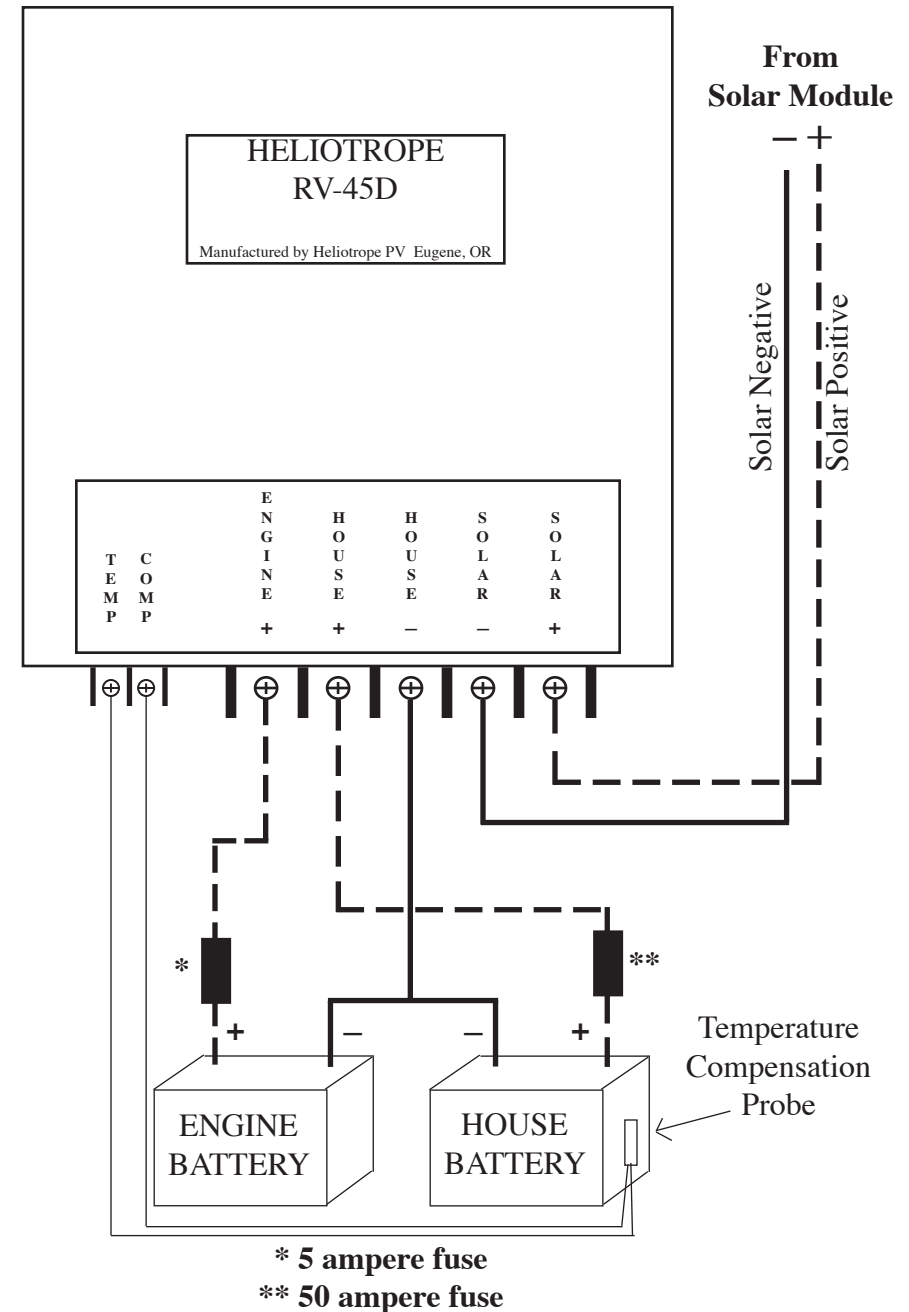
Automatically adjusts charge setpoint with respect to battery temperature to help prevent excess water loss or plate sulfation build-up.

## 5) Dual Battery Bank Charging

Charges both the Engine and House battery banks from the same Solar panels.

(1)

# System Overview



(2)

## Introduction

The RV-45D is a standard 45 amp, 12Volt DC, series type Pulse Width Modulated charge controller that utilizes power MOS FET technology that eliminates relays and subsequent failures associated with them. The RV series type charge controller maintains the exact state-of-charge (SOC) voltage by frequent on and off switching of the photovoltaic source.

It is literally two charge controllers in one, and as such, the RV-45D allocates the charge to both the house and the engine batteries. The “Engine” battery charging circuit is limited to 3 amps with a state-of-charge voltage fixed at 13.4 VDC. Whenever the Engine battery is at a lower voltage than the House batteries, some of the charging current is sent to it.

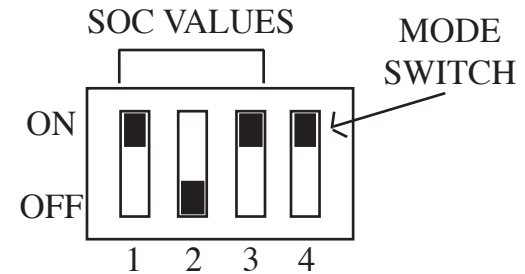
The “House” battery charging circuit can deliver up to 45 amps with a selectable state-of-charge voltage from 13.2 VDC to 14.6 VDC. The Temperature Compensation feature only works on the “House” battery circuit. “Auto-Equalize”, “Auto-Float” and “Fixed” also only affect the “House” battery circuit.

The RV-45D is a fully automatic controller. Basically, after all the settings are made and the controller is installed, it takes care of everything else!

## Field Selectable Options

### A) SETTING DIP SWITCHES

The 4 DIP switches are used to field select SOC (state-of-charge) and MODE. Switches #1, #2, and #3 set the SOC finish voltage and switch #4 turns the MODE on or off.



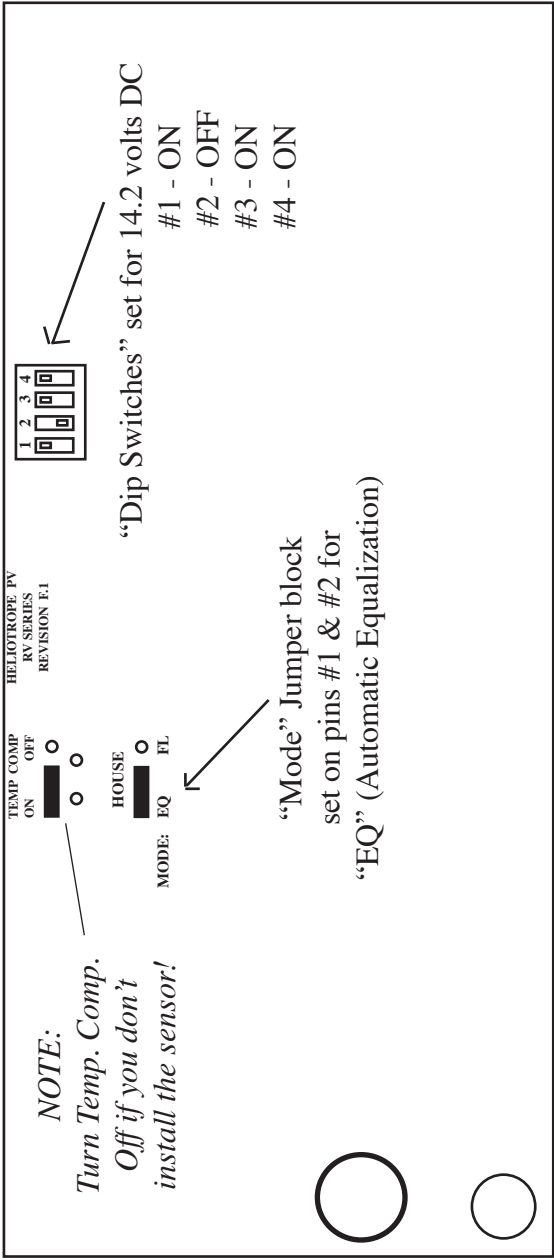
(Refer to FIG. 1 or 2 on pages 5 and 6 for location of DIP SWITCHES on the circuit board)

### B) STATE-OF-CHARGE (SOC) VOLTAGE

The battery state-of-charge voltage is selected with DIP switches #1, #2, and #3. Refer to the following chart to determine correct switch positions for the desired voltage setpoint. Move appropriate switches either ON or OFF according to the chart. SOC voltage may be changed once the RV-45D is connected.

STATE-OF-CHARGE VOLTAGE			
System Voltage	DIP Switch Number		
12 VDC	1	2	3
13.2	OFF	OFF	OFF
13.4	ON	OFF	OFF
13.6	OFF	ON	OFF
13.8	ON	ON	OFF
14.0	OFF	OFF	ON
14.2	ON	OFF	ON
14.4	OFF	ON	ON
14.6	ON	ON	ON

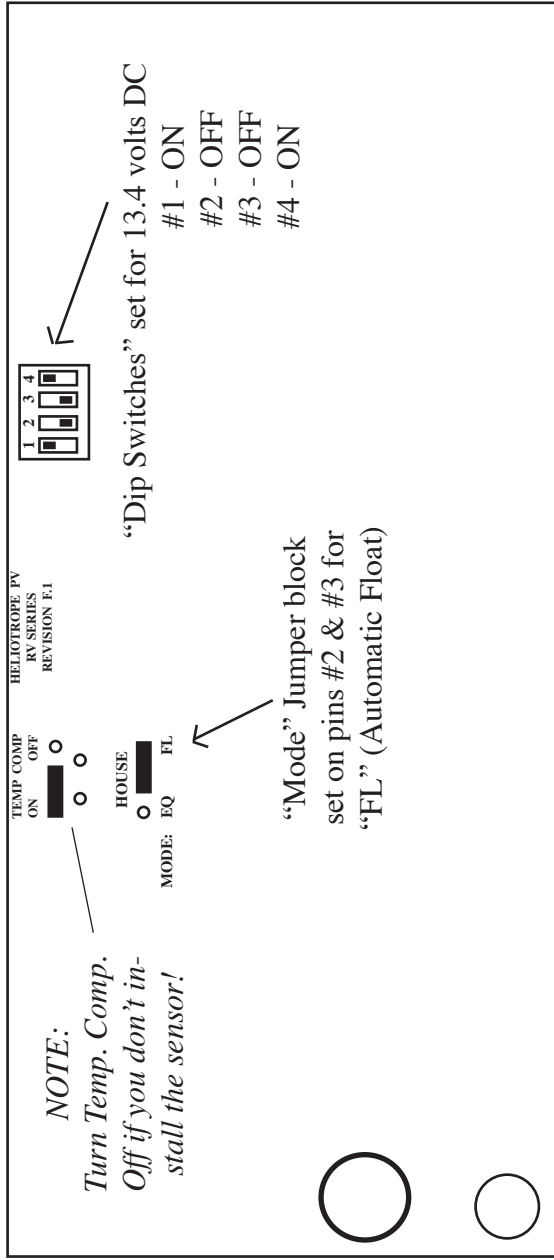
# Recommended Settings for Flooded Lead-Acid Batteries (RV/Marine and “Golf-Cart” type Batteries)



(5)

(FIG. 1) Circuit Board Inside of RV-45D Solar Charge Controller

# Recommended Settings for Sealed Lead-Acid Batteries (Absorbed Glass Mat and Gel Batteries)



(6)

(FIG. 2) Circuit Board Inside of RV-45D Solar Charge Controller

### C) MODE SWITCH

The #4 DIP switch activates or deactivates the MODE function. If you don't want to use the "Auto-Equalization" MODE or the "Auto-Float" MODE, then place this switch in the off position. This locks the SOC voltage setpoint to wherever you set it .

### D) BATTERY TEMPERATURE COMPENSATION

Refer to FIG. 1 or 2 on pages 5 and 6 for location of the "TEMP. COMP." jumper on the circuit board. Move the jumper to the "ON" position only if you are going to extend the temp. comp. sensor to the battery from the RV-45D.

If you choose not to use this feature, be sure to de-activate it by leaving the jumper in the "OFF" position

#### ***NOTE on Temperature Compensation Misuse:***

***If the remote sensor is not installed, make sure the Temp. Comp. Jumper is in the OFF position! Failure to do this WILL result in damage to your battery!***

### E) AUTOMATIC EQUALIZATION

If you have Flooded Lead-Acid, Deep-Cycle Batteries and wish to use this feature then refer to FIG 1 on page 5 to set it up and activate it. The "MODE" jumper must be in the "EQ" position and the #4 (MODE) DIP switch must be in the "ON" position.

### F) AUTOMATIC FLOAT

If you have Sealed, Absorbed Glass Mat or Gel Batteries and wish to use this feature then refer to FIG 2 on page 6 to set it up and activate it. The "MODE" jumper must be in the "FL" position and the #4 (MODE) DIP switch must be in the "ON" position.

## Operation of the RV-45D

### A) WITH AUTOMATIC EQUALIZATION ACTIVATED

As the sun rises, (and the solar panels reach a voltage that is slightly higher than the battery voltage), the RV-45D will deliver all available charging amperage to the batteries. The battery voltage will rise under this influence until it approaches whatever SOC voltage setpoint you have selected.

At this point, the controller will begin to taper off the charging amperage slightly and check to see if the battery is really at the SOC voltage setpoint. After a couple of minutes, the controller will go into its Automatic Equalization cycle.

During this Equalization period, (which only happens once a day after the first time the battery reaches its SOC voltage setpoint), the controller allows full charging amperage to continue to be delivered to the battery for about 30 minutes. This effects a short term "overcharge" during which plate sulfation is driven back into solution and weaker cells are allowed a little extra time to reach full charge.

Depending on how much solar power you have and how many electrical loads you have on, your battery voltage may climb as high as 0.8 volts above the SOC voltage setpoint you have selected. The RV-45D will not allow the voltage to go higher than that.

After this 30 minute Equalization period, the controller will enter its Pulse Width Modulation "Taper" cycle and only deliver whatever amperage it takes to maintain the SOC voltage setpoint. This will hold the batteries at their highest state-of-charge with the least amount of water consumption.

As the sunlight fades and evening approaches, the battery voltage will begin to fall from the SOC voltage setpoint to a lower point that is closer to its "at rest" voltage.

This cycle will be repeated the following morning.

## **B) WITH AUTOMATIC FLOAT ACTIVATED**

As the sun rises, the RV-45D will deliver all available charging amperage to the batteries. The battery voltage will rise under this influence until it reaches a point that is 0.8 volts higher than the SOC voltage setpoint.

The controller will then begin to taper the charge until it reaches a value equal to about 60% of the charging amperage. It will then cut off all charging until the battery voltage falls to the SOC voltage setpoint.

The RV-45D will then operate in its Pulse Width Modulation “Taper” cycle and only deliver whatever amperage the batteries need to maintain the SOC voltage setpoint.

As the sunlight fades and evening approaches, the battery voltage will begin to fall from the SOC voltage setpoint to a lower point that is closer to its “at rest” voltage.

This cycle will be repeated the following morning or at any time the battery voltage falls below the SOC setpoint.

## **C) WITH THE “MODE” DIP SWITCH “OFF”**

As the sun rises, the RV-45D will deliver all available charging amperage to the batteries. The battery voltage will rise under this influence until it approaches whatever SOC voltage setpoint you have selected. At this point, the RV-45D will enter its Pulse Width Modulation “Taper” charge and deliver whatever charging amperage the battery requires to maintain the selected SOC voltage setpoint.

As the sunlight fades and evening approaches, the battery voltage will begin to fall from the SOC voltage setpoint to a lower point that is closer to its “at rest” voltage.

This cycle will be repeated the following morning.

**NOTE: If you are using the Temperature Compensation feature, the setpoint voltage may be slightly higher or lower depending on the battery temperature. This applies to all three modes.**

## **Warranty**

The RV-45D Solar Charge Controller carries a 10 year limited warranty.

- ~ During the first year, repair or replacement of defective merchandise will be made at no charge.
- ~ For years 2 through 5, repair will be made for a service fee not to exceed 25% of the current list price.
- ~ For years 6 through 10, repair will be made for a service fee not to exceed 50% of the current list price.

Ask for a copy of the Warranty for full details

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