

SOLAR PANEL / MONO-CRYSTAL

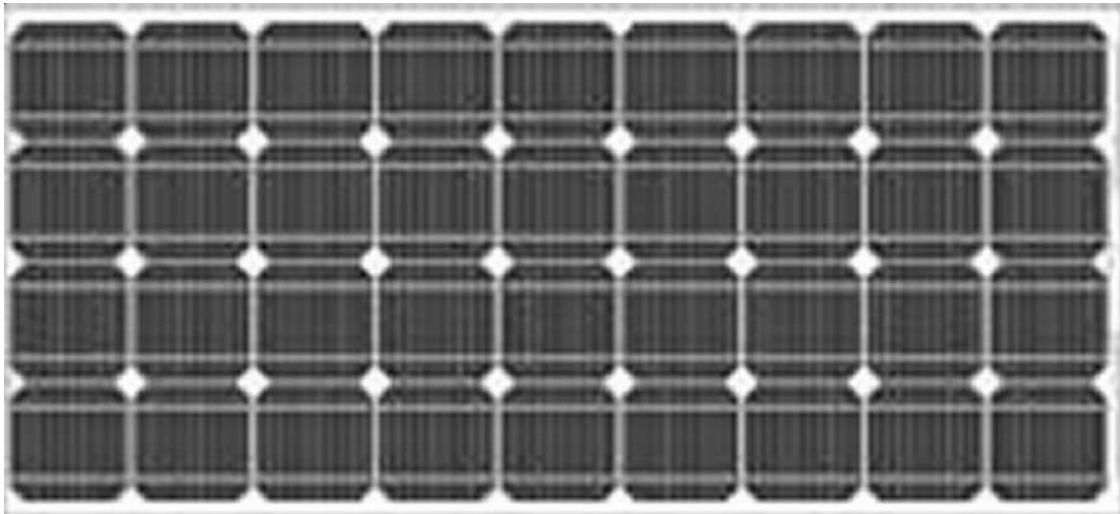
Model 04815 / 12 Watts

Model 91013 / 24 Watts

Model 90860 / 50 Watts

Model 90717 / 100 Watts

INSTALLATION AND OPERATING INFORMATION



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For technical questions please call 1-800-444-3353

SPECIFICATIONS

	04815	91013	90860	90717
Wattage	12 Watts	24 Watts	50 Watts	100 Watts
Panel Dimensions	19.3" x 10.7" x 1.5"	26.5" x 13.6" x 1.5"	38.8" x 17.7" x 1.5"	51.5" x 26.6" x 1.5"
Weight	3.2 lbs.	7.5 lbs.	15.4 lbs.	22.0 lbs.
Rated Current	0.7 AMPs	1.4 AMPs	2.9 AMPs	5.9 AMPs
Rated Voltage	16.5 Volts	17 Volts	17 Volts	17 Volts
Capacity of 12 V Battery Charged in 10 Hours	7.2 AH	15 AH	31 AH	64 AH

SAVE THIS MANUAL

You will need this manual for the safety warnings and precautions, assembly and operating instructions, cleaning, inspection, and maintenance procedures, parts list, assembly and wiring diagrams. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep this manual and invoice in a safe and dry place for future reference.

GENERAL SAFETY WARNINGS AND PRECAUTIONS

1. **KEEP WORK AREA CLEAN AND DRY.** Cluttered, damp or wet work areas invite injuries.
2. **KEEP CHILDREN AWAY FROM WORK AREA.** Do not allow children to handle this product.
3. **STORE IDLE EQUIPMENT.** When not in use, tools and equipment should be stored in a dry location to inhibit rust. Always lock up tools and equipment and keep out of reach of children.
4. **DO NOT USE THIS PRODUCT IF UNDER THE INFLUENCE OF ALCOHOL OR DRUGS.** Read warning labels on prescriptions to determine if your judgment or reflexes are impaired while taking drugs. If there is any doubt, do not attempt to use this product.
5. **DRESS SAFELY.** Non-skid footwear or safety shoes should be used when working with this product. Do not wear loose clothing or jewelry as they can become caught in moving parts. Wear a protective hair covering to prevent long hair from becoming caught in moving parts. If wearing a long-sleeve shirt, roll sleeves up above elbows.

6. **Always wear ANSI approved splash-resistant safety goggles when working with tools and equipment.** If working around batteries also wear acid resistant work gloves. Any spilled acid must be washed off immediately.
7. **INDUSTRIAL APPLICATIONS MUST FOLLOW OSHA REQUIREMENTS.**
8. **DO NOT OVERREACH.** Keep proper footing and balance at all times to prevent tripping, falling, back injury, etcetera.
9. **STAY ALERT.** Watch what you are doing at all times. Use common sense. Do not use this product when you are tired or distracted from the job at hand.
10. **CHECK FOR DAMAGED PARTS.** Before using this product, carefully check that it will operate properly and perform its intended function. Check for damaged parts and any other conditions that may affect the operation of this product. Replace or repair damaged or worn parts immediately.
11. **REPLACEMENT PARTS AND ACCESSORIES.** When servicing, use only identical replacement parts. Only use accessories intended for use with this product. Approved accessories are available from Harbor Freight Tools.
12. **MAINTAIN THIS PRODUCT WITH CARE.** Keep this equipment clean and dry for better and safer performance.
13. **MAINTENANCE:** For your safety, service and maintenance should be performed regularly by a qualified technician.
14. **USE THE RIGHT PRODUCT FOR THE RIGHT JOB.** There are certain applications for which this product was designed. Do not use small equipment, tools or attachments to do the work of larger industrial equipment, tools or attachments. Do not use this product for a purpose for which it was not intended.

SPECIFIC PRODUCT WARNINGS AND PRECAUTIONS

1. **THIS PRODUCT IS INTENDED FOR USE ONLY WITH 12 OR 24 VOLT/DC BATTERY ELECTRICAL SYSTEM. DO NOT USE THIS PRODUCT WITH ANY OTHER ELECTRICAL SOURCE, AS PRODUCT DAMAGE AND/OR PERSONAL INJURY MAY OCCUR.**
2. **DO NOT CROSS ELECTRICAL POLARITY, AS PRODUCT DAMAGE AND/OR PERSONAL INJURY MAY OCCUR. THE RED TERMINAL IN THE JUNCTION BOX IS “POSITIVE”. THE BLACK OR BLUE TERMINAL IS “NEGATIVE”.**
3. **PRIOR TO CONNECTING THE SOLAR PANEL(S) TO A 12 VOLT/DC BATTERY ELECTRICAL SYSTEM, MAKE SURE YOU READ AND UNDERSTAND ALL OPERATING INSTRUCTIONS AND SAFETY PRECAUTIONS AS OUTLINED IN THE 12 VOLT/DC BATTERY ELECTRICAL SYSTEM AND CHARGE CONTROLLER MANUFACTURERS’ PRODUCT MANUAL.**
4. **FOR INCREASED PICKUP OF SOLAR ENERGY, AND TO MINIMIZE THE COLLECTION OF DEBRIS ON THE SOLAR PANEL(S), IT IS RECOMMENDED THAT THE SOLAR PANEL(S) BE INSTALLED ON THE MOUNTING SURFACE AT AN ANGLE. See Figures A and B for details (on page 5.)**
5. **NOTE: Performance of the Solar Panel(s) may vary depending on site location, angle of Solar Panel(s) in relation to the arc of the sun, and available sunlight.**
6. **TO MAINTAIN EFFICIENCY OF THE SOLAR PANEL(S), IT IS RECOMMENDED TO DISCONNECT THEM FROM THE CHARGE CONTROLLER AT NIGHT.**
7. **BEFORE EACH USE, INSPECT THE GENERAL CONDITION OF THE SOLAR PANEL(S).** Check for loose or improper mounting of the Solar Panel(s) onto the mounting surface, loose or damaged cable connections, and any other condition that may affect the safe operation of the Solar Panel(s). In the event any problems occur, disconnect the Solar Panel(s) from the charge controller immediately and have the problem corrected before further use. Do not use damaged equipment.
8. **An appropriate charge controller must be used when charging a battery.** If a charge controller is not used, the battery may be overcharged and leak, causing damage to the battery, personal injury or property damage. Also, if used without an appropriate charge controller, the solar panel may cause the battery to discharge during unlit hours.

UNPACKING

When unpacking, check to make sure all parts shown on the Parts List (page 9) are included. If any parts are missing or broken, please call Harbor Freight Tools at the number shown on the cover of this manual as soon as possible.

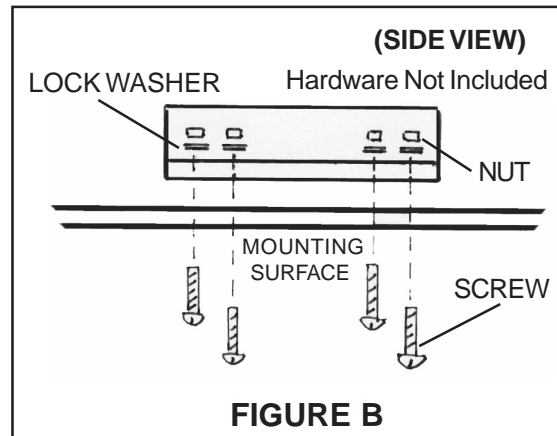
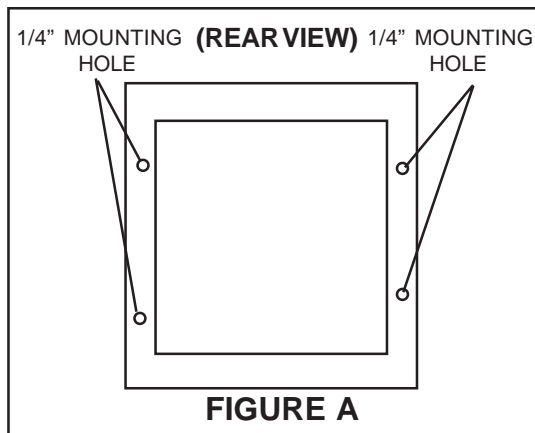
INSTALLATION INSTRUCTIONS

NOTE: All part numbers below refer to the parts shown on the Assembly Diagram (page 10) of this manual.

WARNING: BEFORE drilling pilot holes for any of the following mounting instructions, take care that the location to be drilled in is free from all wires, cables, utility lines, and any other obstructions.

To Mount The Solar Panel Flat On A Surface:

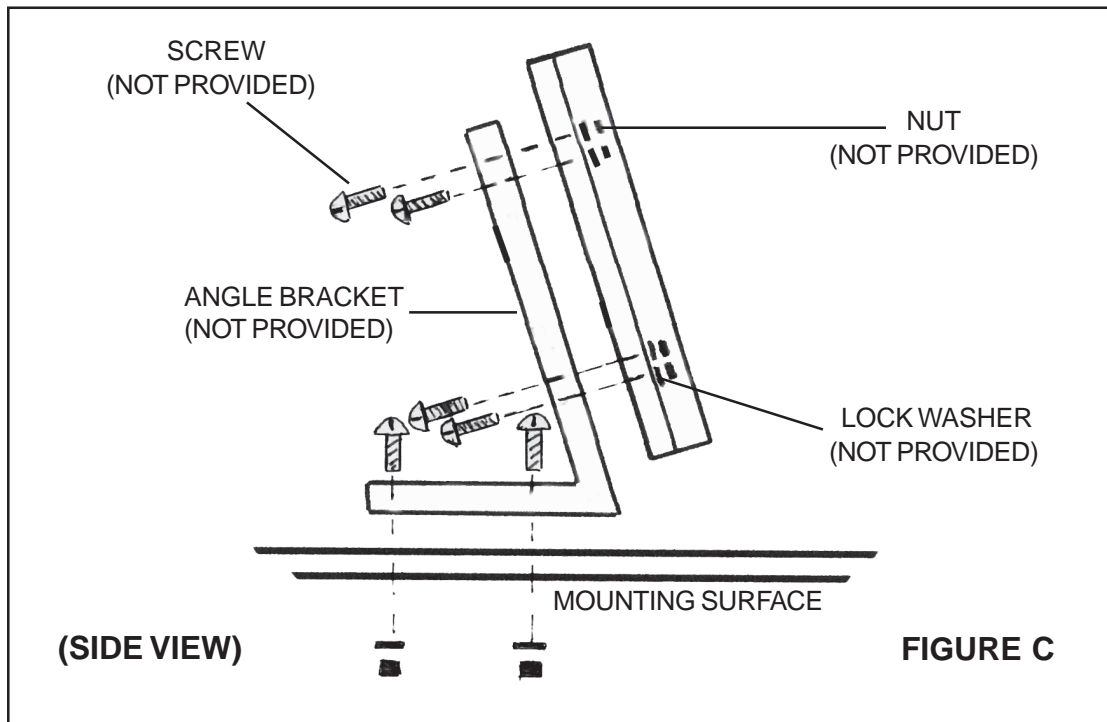
1. Locate the Solar Panel so that it faces the sun the greater part of the day.
2. **Model #04815 and #91013** have four mounting holes located on the back of the Solar Panel. **Models #90860 and #90717** have eight mounting holes on the back of the Solar panel. To secure the Solar Panel, drill four 1/4" holes, appropriately spaced, through the mounting surface, and use four screws, lock-washers, and nuts (not provided). (See Figures A and B.)



To Mount The Solar Panel At An Angle:

1. **NOTE:** For increased pickup of solar energy, and to minimize the collection of debris on the Solar Panel, it is recommended that the Solar Panel be installed on the mounting surface at an angle. (See Figure C, next page.)
2. In order to mount the Solar Panel at an angle, you will need to purchase or fabricate two *angle brackets* from wood or metal (not provided) as shown in Figure C (on page 6). For best results, it is recommended that the angle brackets be approximately 1" wide by 1/2" thick and of appropriate height.

3. To secure the two angle brackets to the mounting surface, drill two 1/4" holes through the base of each angle bracket. Then, drill four 1/4" holes, appropriately spaced, through the mounting surface. Use four screws, lock-washers, and nuts (not provided). (See Figure C.)

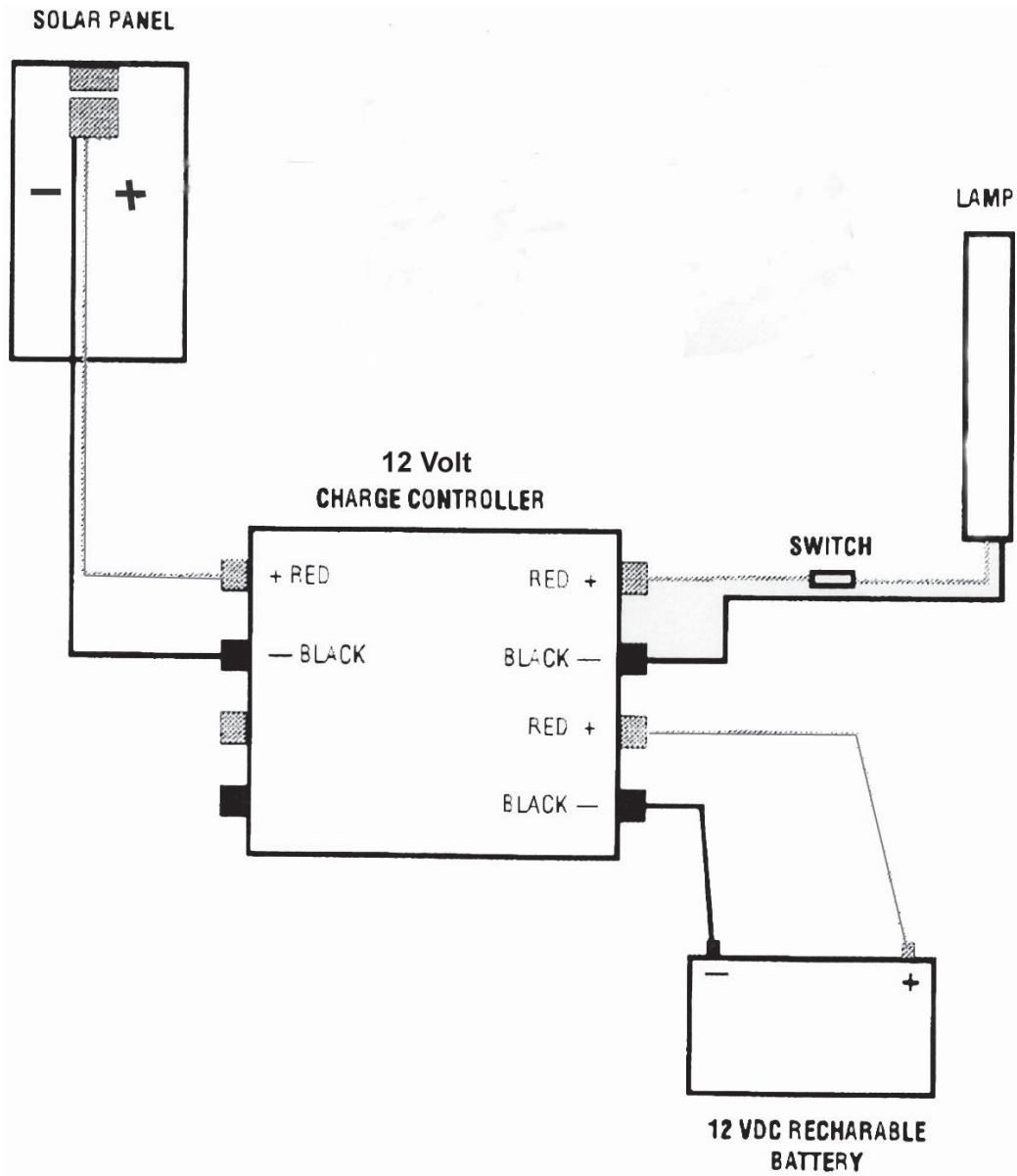


To Connect The Solar Panel To The Charge Controller:

Note: An appropriate charge controller must be used to prevent overcharging, damage to the battery, and other problems-see warning 8 on page 4 for details.

1. **CAUTION:** Do not cross electrical polarity, as product damage and/or personal injury may occur. The Solar Panel junction box contains a terminal strip with two active positions. The terminal with the **RED** lead attached is "**POSITIVE**". The terminal with the **BLACK** or **BLUE** lead attached is "**NEGATIVE**". **WHEN IN DOUBT, TEST WITH A VOLTMETER.**
2. **Typical** connection instructions. ALWAYS refer to the manual for the charge controller that you will use for correct procedures.
 - a. To connect the two leads from one Solar Panel to the charge controller (not provided) to get 12 Volt output, **see Figure D** on page 7.
 - b. To connect the two leads from multiple Solar Panels to the charge controller to get 12 Volt output, **see Figure E** on page 8.
 - c. To connect the two leads from two Solar Panels to the charge controller to get **24 Volt** output, **see Figure F** on page 8.
3. Once the two leads are completely connected to the charge connector, **refer to the "Specifications" section of this manual** to determine the *charging time* required for the specific model of Solar Panel you are using.

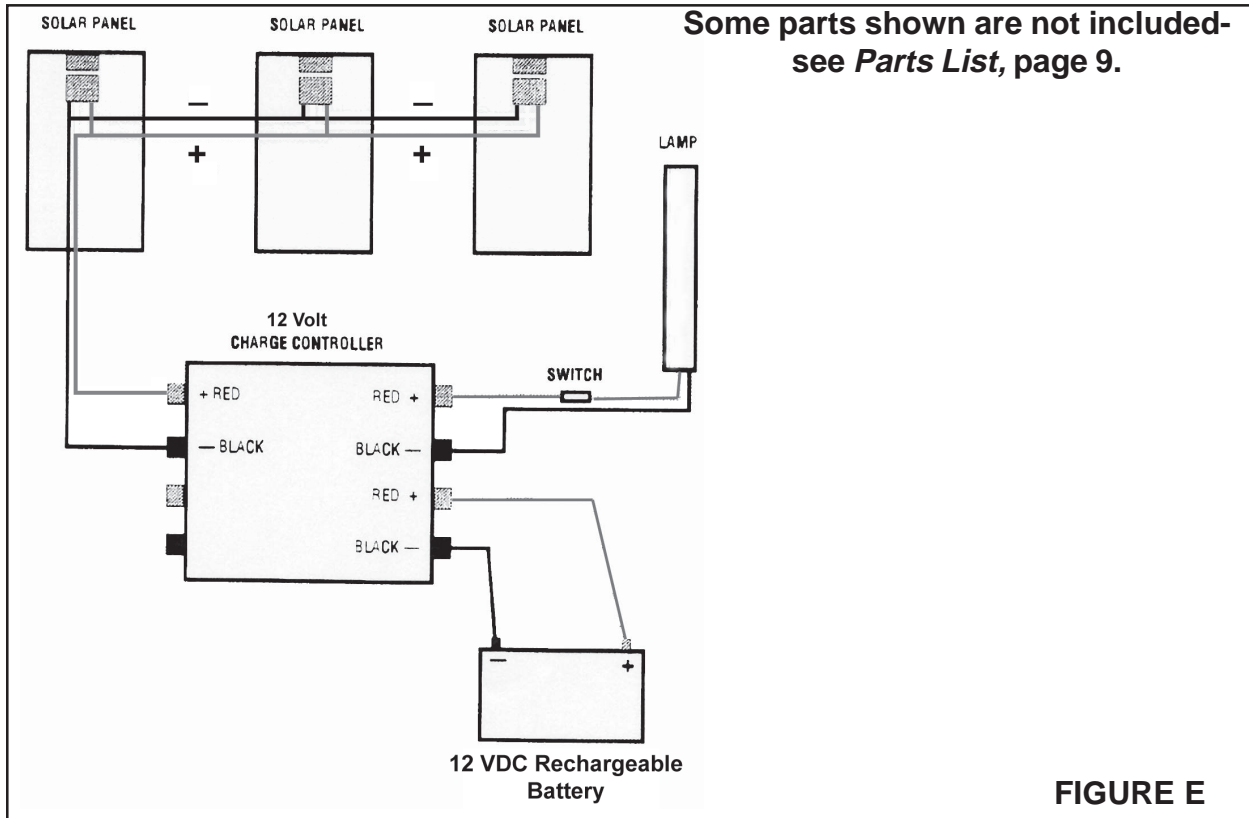
TYPICAL SINGLE SOLAR PANEL CONNECTION (12 VOLT):



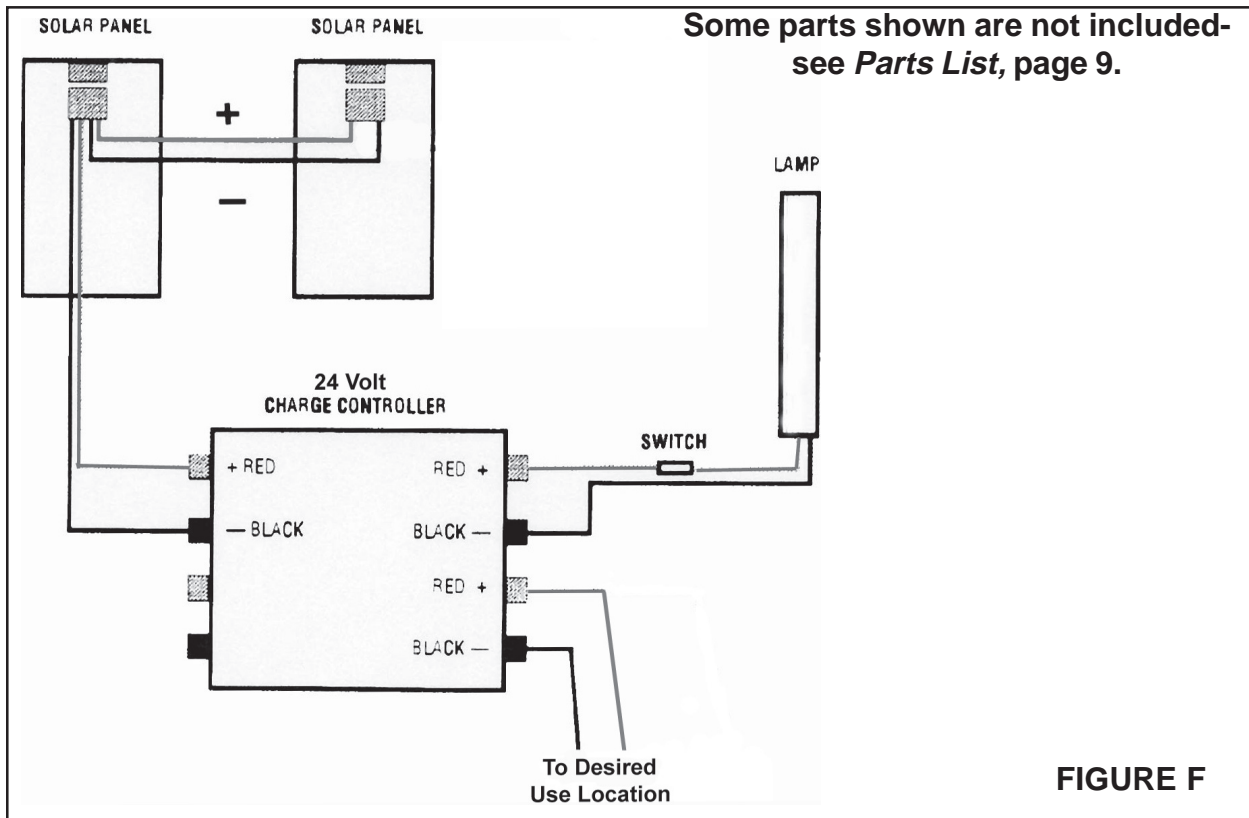
Some parts shown are not included-see *Parts List*, page 9.

FIGURE D

TYPICAL MULTIPLE SOLAR PANEL CONNECTION (12 VOLT):



TYPICAL DUAL SOLAR PANEL CONNECTION (24 VOLT):



CLEANING AND MAINTENANCE

1. **NOTE:** Always disconnect the Solar Panel(s) from the electrical charge controller before performing any cleaning, inspection, or maintenance upon the unit(s).
2. With the Solar Panel(s) disconnected from the charge controller, periodically clean the Solar Panel(s) with mild soap and water.
3. Periodically, check all cable connections.

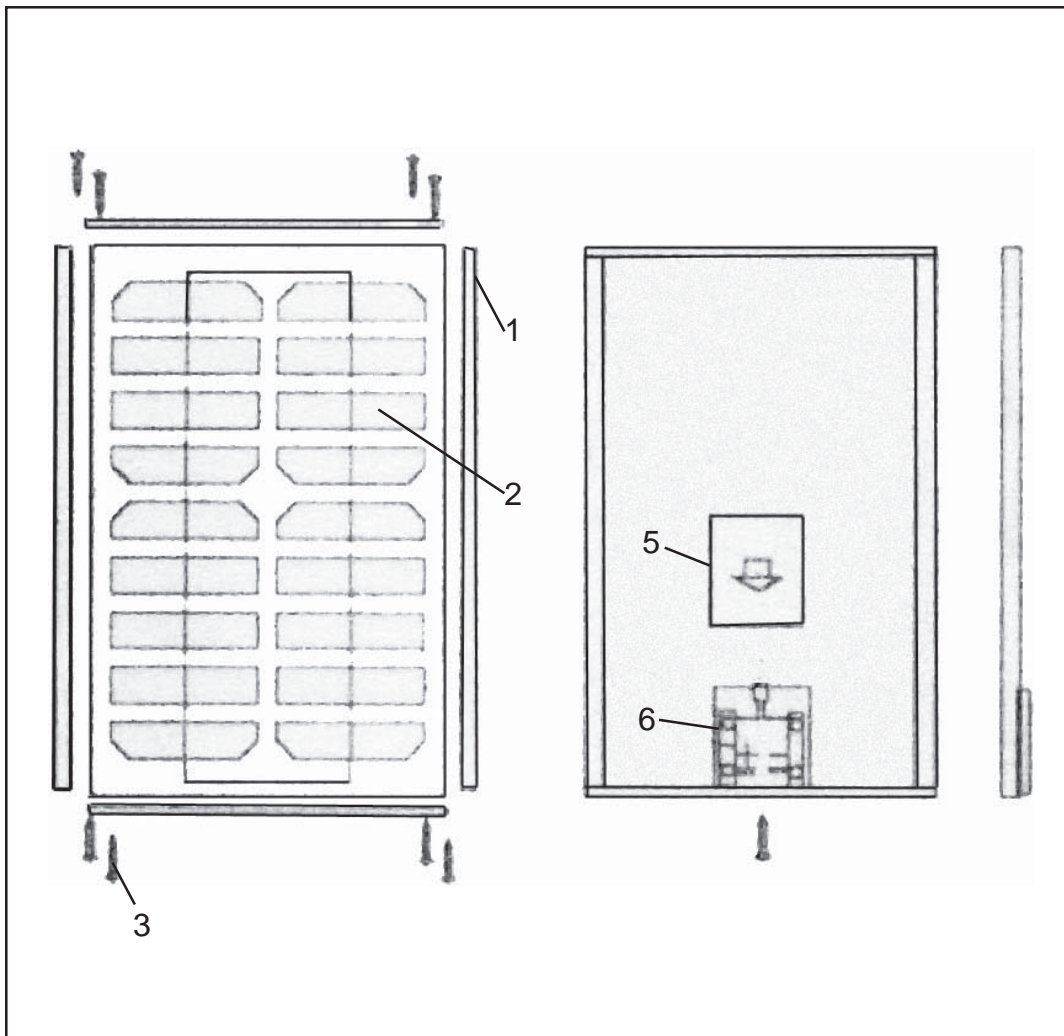
PLEASE READ THE FOLLOWING CAREFULLY

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PARTS LIST

Part	Description
1	Aluminum Frame
2	Solar Cell
3	Screw
4	Alligator Clips (SKU 04815 only, not shown)
5	Back Cover
6	Junction Box

ASSEMBLY DIAGRAM



NOTE: Part 4 -Alligator Clips- are only included with SKU **04815** and are not shown.

NOTE: Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

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