

Owner's Manual & Safety Instructions

Save This Manual Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

19f

THUNDERBOLT
MAGNUM™ **solar**

63585

100 WATT solar panel kit



Visit our website at: <http://www.harborfreight.com>
Email our technical support at: productsupport@harborfreight.com

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools. Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein. Tools required for assembly and service may not be included.

⚠ WARNING

Read this material before using this product.
Failure to do so can result in serious injury.
SAVE THIS MANUAL.

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WARNING SYMBOLS AND DEFINITIONS

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Addresses practices not related to personal injury.

IMPORTANT SAFETY INSTRUCTIONS

WARNING

Read all safety warnings and all instructions.

Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

READ ALL INSTRUCTIONS

Installation Precautions

- Exercise special caution if working on roof or another high location.** Keep proper footing and balance at all times. Follow ladder supplier's precautions whenever working near or on a ladder.
- Install all sensitive electrical components (including wiring connections, regulator, and battery) inside a weatherproof enclosure to prevent electric shock.**
- Do not wire multiple panels in series.** If you need to connect two or more solar panels together, this work must be done by a qualified electrician unless they are connected through a regulator.
- This solar panel kit is not designed for tie-in to a grid. Only a licensed electrician and a licensed building contractor can safely design and implement a grid tie-in system. Any grid tie-in system must meet all applicable building and electrical codes, and must meet standards established by the area power company. Improper grid tie-in can result in electrocution, fire, and other serious personal injury and property damage. An incorrectly installed grid tie-in system can cause feedback voltage, resulting in electrocution of electrical utility workers.
- Do not stand on or otherwise apply pressure to panel.**

Installation Precautions (cont'd)

6. Handle solar panel with care, edges may be sharp.
7. Do not focus light on panel.
8. Install components with enough space to allow proper cooling.
9. This product may occasionally produce more current and/or voltage than its rated output. Increase output ratings by 25% when determining component required voltage and amperage ratings. Refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 percent derating) which may apply.
10. Panel must be connected using UL listed outdoor rated wire of the correct thickness (gauge) for the amperage rating and length (see warning number 9 also). Follow the guidelines in the chart below:
11. Install an appropriate charge controller/regulator to regulate output and prevent damage. Do not attach panel to battery or power grid without proper regulator, inverter, and/or charge controller.
12. Install and use according to applicable National Electrical Code (NEC) standards.
13. This panel is not rated for use as fire-resistant roofing. If installing on a roof, install only over a fire resistant roof covering rated for the application.
14. Verify that installation surface has no hidden utility lines before drilling or driving screws.
15. Install only according to these instructions. Improper installation can create hazards.
16. Handle panel with care. Glass may break or a sharp edge may be exposed during movement.
17. Keep installation area clean and well lit.
18. Install out of reach of children.
19. Keep bystanders out of the area during installation.
20. Do not install when tired or when under the influence of drugs or medication.
21. Use in 12 VDC systems only.
22. The warnings, precautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

Current in Amps	Maximum Length						
	5'	10'	15'	20'	25'		
0-5	18						
6-7	18				16		
8	18			16			
10	18		16				
11-12			16		14		
15			14		12		
18			14		12		
20	18	16				14	12
22-24							
30	16	14	10				
40		12	10		8		
50	14		10				
100	12	10	6		4		
150	10	8	4		2		
200	8	6					
	Minimum Wire Gauge						

Battery Precautions

1. Wear splash-resistant ANSI-approved safety goggles and electrically insulated gloves while working near batteries.
2. Use an appropriate charge controller whenever connected to battery.
3. Charge, store, and maintain batteries according to supplier's instructions.

Service Precautions

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1. **Before service, maintenance, or cleaning:**
 - a. **Dry solar panels and outdoor wiring thoroughly while wearing electrically insulated gloves.**
 - b. **Cover all solar panels with an opaque cover, such as a blanket.**
 - c. **Disconnect all solar panels.**
 - d. **Disconnect all batteries.**
2. **Do not service during rain, fog, or any other wet/humid weather.**
3. **Do not stand on or otherwise apply pressure to panel.**
4. Do not allow children to play with or near this or electrical components.
5. Inspect at least monthly; do not use if damaged, parts are loose, water is found inside the housing, electrical insulation is cracked or damaged, or connections are loose.
6. Maintain product labels and nameplates. These carry important safety information. If unreadable or missing, contact Harbor Freight Tools for a replacement.



SAVE THESE INSTRUCTIONS.

SETUP

OPERATION

MAINTENANCE

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Specifications

Rated Output	18 VDC / 25 W (per solar panel)
Open Circuit Voltage	23.6 OCV

Note: Performance will vary depending on temperature, brightness and time of sun exposure. Summer production will be higher than in the winter. Bright sunny days will generate higher output than cloudy days.

Set Up Instructions



Read the **ENTIRE IMPORTANT SAFETY INSTRUCTIONS** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

!WARNING

TO PREVENT SERIOUS INJURY FROM ACCIDENTAL OPERATION:

Make sure that the Power Switch/Trigger is in the off-position and unplug the tool from its electrical outlet before performing any procedure in this section.

Note: For additional information regarding the parts listed in the following pages, refer to the Assembly Diagram near the end of this manual.

Installation

Location

1. Locate the Solar Panels (12) where they will receive full, unobstructed sunlight, especially during midday. Nearby trees or tall plants will drop debris, requiring the panels to be cleaned more frequently.
2. The setup location for the Solar Panel Kit must be inaccessible to children to prevent electric shock. Build a childproof enclosure if needed.
3. Install the charge controller/regulator and batteries in a weatherproof enclosure with proper ventilation.

Mounting

1. Select a mounting location for the Solar Panel Kit. The Solar Panels should face the Sun, and not be blocked by shadows. The location should allow the Panels to be protected from accidental damage. The location should be flat, stable and able to support the weight of the Solar Panel Kit's accessories. Before assembly, be sure that all accessory cables reach their connection points without placing any stress on the wiring.
2. Angle face of Solar Panel Frame toward true south¹ according to chart that follows:

Latitude	Solar Panel Angle
0-4°	10°
5-20°	Latitude + 5°
21-45°	Latitude + 10°
46-64°	Latitude + 15°
65° or more	80°

¹ Angle towards true north if installed in southern hemisphere.

Assembly

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1. Place two panels side-by-side on a flat surface. **Do not drop the panels or allow anyone to lean or step on them.**
2. Insert Screws (6) into the innermost mounting holes of first two solar panels. See Figure A.

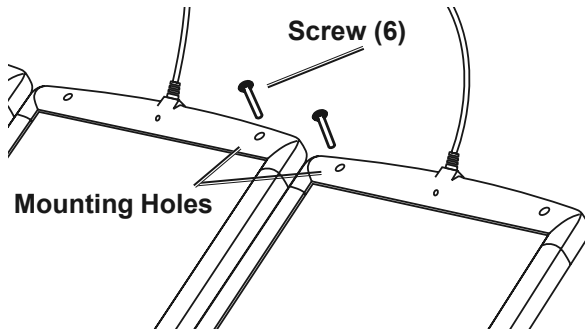


Figure A

3. Use Wing Nuts (9) to fasten the Connection Brace (7) onto the top back ends of solar panels. See Figure B.

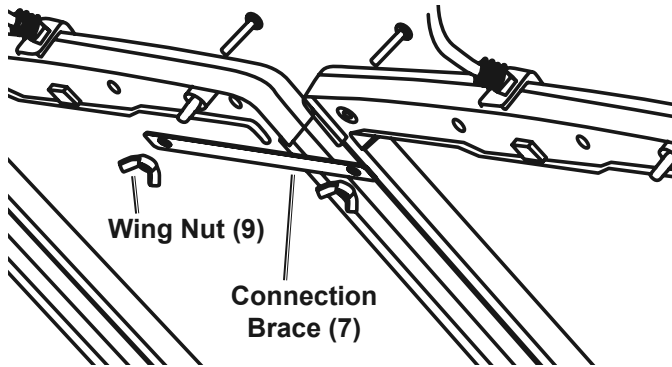


Figure B

4. Repeat for the bottom ends of panels. Insert Screws into mounting holes along the bottom end and fasten Connection Brace onto the back using Wing Nuts. See Figure C.

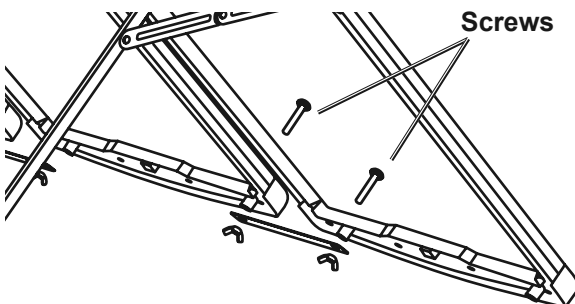


Figure C

5. Repeat Steps 1-4 for the other two solar panels. See Figure D.

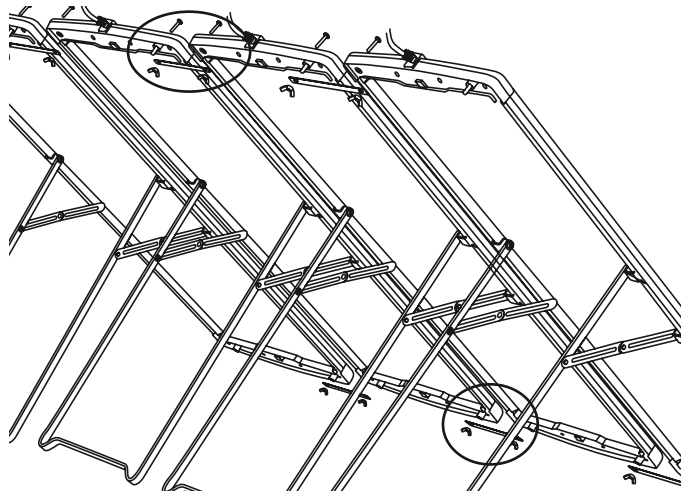


Figure D

6. The Mounting Stands on each panel come pre-assembled. After panel assembly, stand panels upright and pull each Mounting Stand out to locked position. See Figure E.

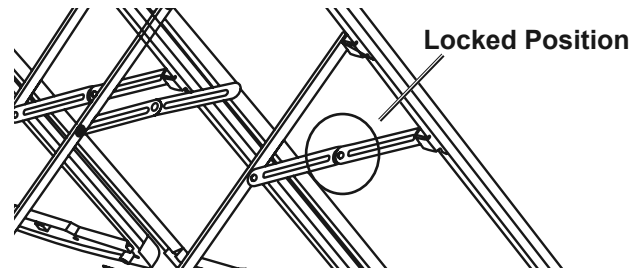


Figure E

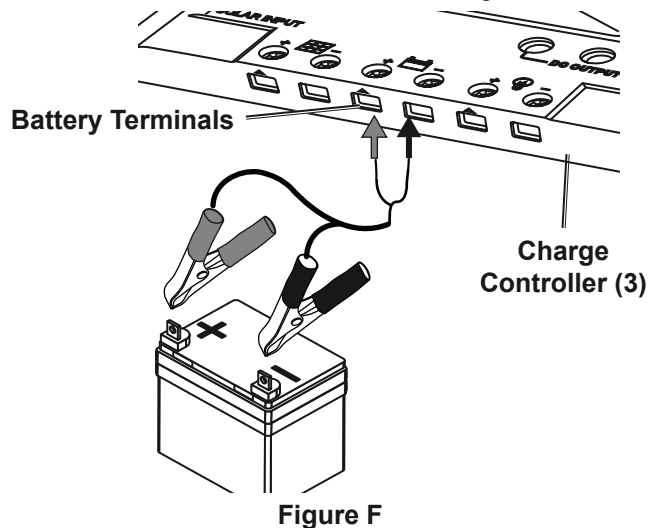
SETUP

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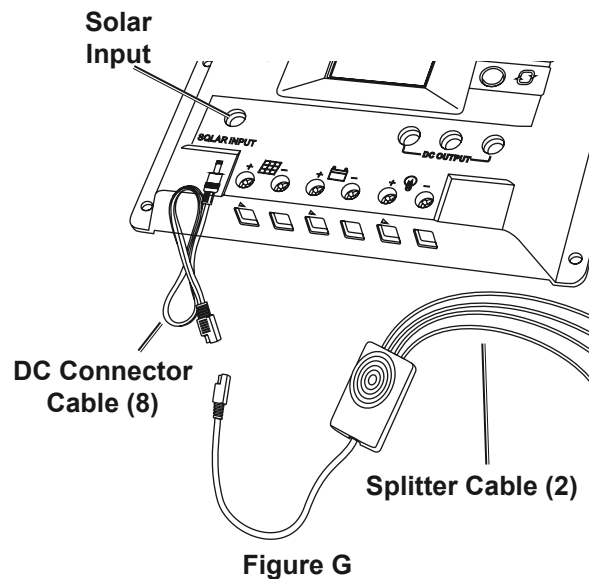
MAINTENANCE

7. Connect the wires of the Battery Clamps to the battery terminals on the bottom of the Charge Controller (3).
8. Attach the Battery Clamps to the battery's terminals. (Battery not included.)

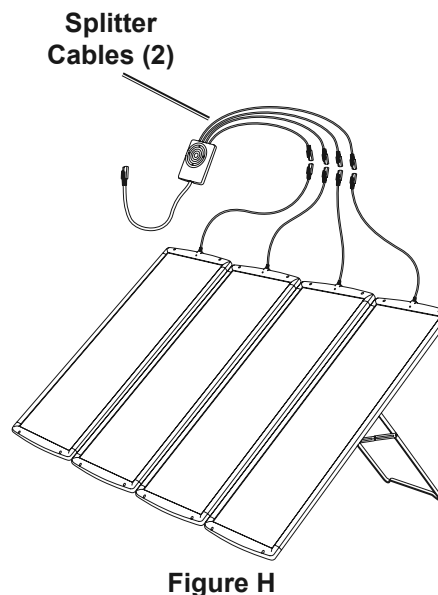
WARNING! Connect red connector to positive (+). Connect black connector to negative (-). Unit will not function with reverse connection. See Figure F.



9. Connect Splitter Cable to the DC connector cable (8). Plug DC cable into Solar Input jack on the Controller. See Figure G.



10. Connect end of lead wires coming from the Solar Panels (1) to the Splitter Cable (2). See Figure H.



Note: Only a licensed electrician and a licensed building contractor can safely design and implement a grid tie-in system. Any grid tie-in system must meet all applicable building and electrical codes, and must meet standards established by the area power company.

1. Run wires from panels, through weatherproof grommets and into enclosure where power inverter is located. Use wires of the proper size and rating and use twist connectors (not included) to connect wires.
2. Connect battery to power inverter according to inverter's instructions. **WARNING!** Inverter must be properly rated and designed for this type of connection and power supply.
3. Secure all connections using terminals, or solder all wire splices to ensure good connections.
4. Weatherproof all connections and route the wire in a way that it will not be torn loose from the panel.

Operating Instructions



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Note: Performance of the Solar Panels will vary dependent on site location, angle of the panels in relation to the arc of the sun, and available sunlight.

Charge Controller Settings

NOTICE: CONTROLLER MUST BE CONNECTED TO A CHARGED 12V LEAD-ACID BATTERY TO POWER THE DISPLAY.

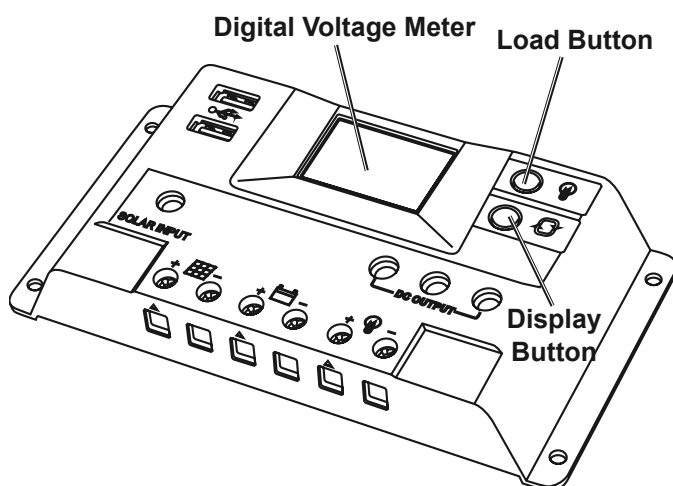
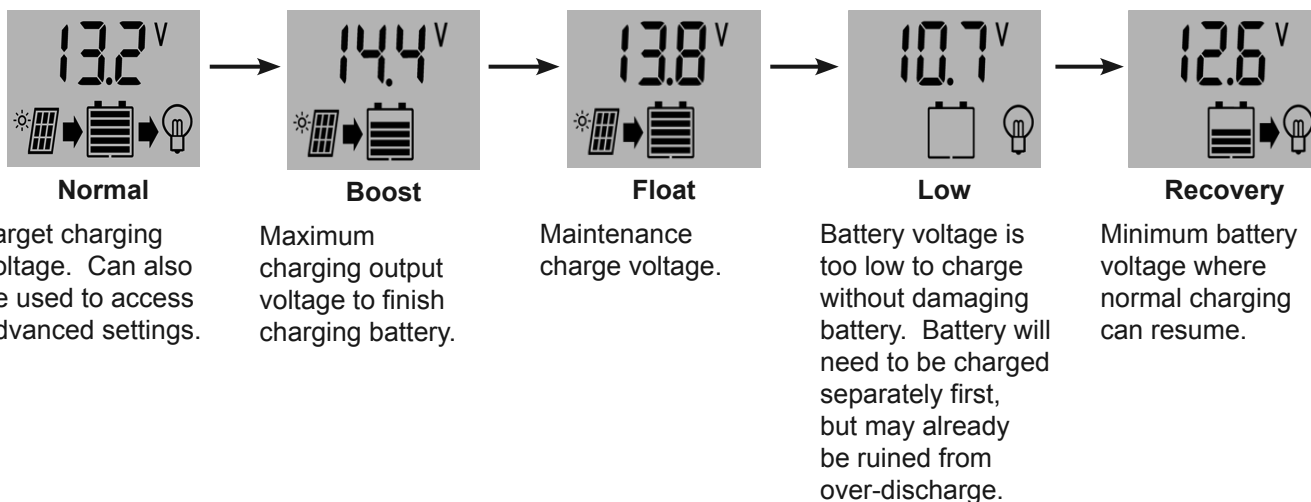


Figure 1

1. Press the Load Button to toggle the 12V output on/off.

2. Press the Display Button to cycle the Display between the 5 different settings shown below.
3. Each of the below settings can be set manually by the user. To do this:
 - a. Press and hold the Display Button while the setting is shown until the voltage display starts blinking.
 - b. While the Display is blinking:
 - Press the Display Button to increase setting.
 - Press the Load Button to decrease setting.
 - c. When setting is complete, press and hold the Display Button until the voltage Display stops blinking. The set value will be saved by the controller.
 - d. Press Display button again to cycle to next setting.



Note: User can also cycle through and set the special parameters for Battery Type, Temperature Ratio, and Output Duration.

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- When Digital Voltage Meter is in Normal mode, press and hold the Display button until Battery Type display appears, as shown below.



Battery Type

- Press and hold Display button until Battery Type display starts blinking, then press Display button to toggle down through each battery type. Use Load button to toggle back up.

Note: The different battery types are User Mode (USr), Sealed, (SLd), Flooded (FLd), and Gel (GEL).

- When desired Battery Type is found, press and hold Display button until display stops blinking. The set value will be saved by the controller.
- Press Display button once to cycle to Temperature Ratio display, as shown below.



Temperature Ratio

Note: A reading of -4 indicates -4mV/cell/°C.

- Press and hold Display button until display starts blinking, then press either Display button to increase setting or Load button to decrease.
- When finished, press and hold Display button until display stops blinking. The set value will be saved by the controller.

- Press Display button once to cycle to Output Duration display, as shown below.



Output Duration

Note: 15h indicates 15 hours before the output automatically shuts off.

- Press and hold Display button until display starts blinking, then press either Display button to increase setting or Load button to decrease.
- When finished, press and hold Display button until display stops blinking. The set value will be saved by the controller.
- Let the controller sit for about five seconds and it will return back to **Normal** mode.

Note: The user may see the following Error Codes when voltage limits are reached:

E11: Low-voltage protection; battery voltage is below 10.5-10.8V. Controller will shut off and enter low-voltage protection state.

E12: High-voltage protection; battery voltage is above 16.1V. Controller will stop input and enter overvoltage protection state.

E13: Overload protection; indicates the occurrence of overcurrent. Controller will stop output and enter overload protection state.

E14: System short-circuit protection.

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Using 12 Volt Lights and Accessories

NOTICE: CONTROLLER MUST BE CONNECTED TO A CHARGED 12V LEAD-ACID BATTERY TO POWER THE DISPLAY.

1. Press the Load Button to toggle the 12V output on/off.
2. Plug the end of the LED Light's cable into one of the 12V DC outlets on the Charge Controller as shown in Figure J.
3. Connect a DC adapter cable (not included) to the appliance.
4. Insert the plug on the other end of the cable into one of the 12V DC Outlets on the Charge Controller.
5. Activate your appliance.

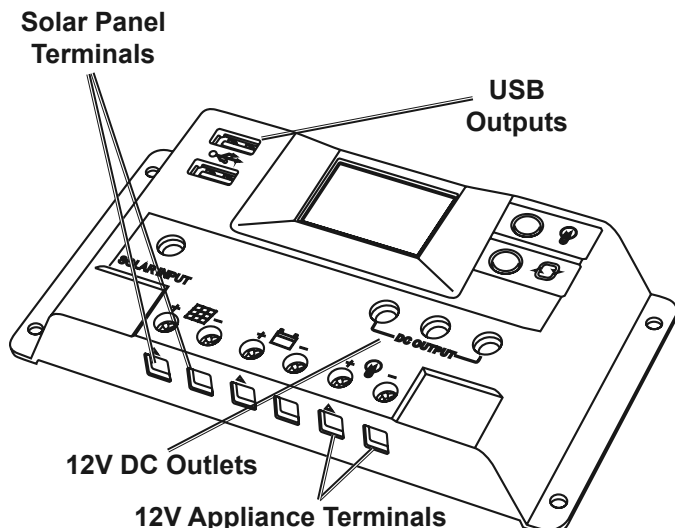


Figure J

NOTICE: Only use one appliance at a time with this Charge Controller.

6. When finished, unplug the DC adapter cable (not included) from the Charge Controller and then unplug the cable from the appliance.
7. To charge a cell phone or other small electronic item, plug the item's power cord into the USB Port on the front of the Charge Controller.

Note: Solar panels, lights, and accessories can be hardwired onto the terminals on the bottom of the charge controller instead of using the included plugs. See Figure J.

NOTICE: To prevent damage to the controller, carefully keep conductors from touching each other.

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Maintenance and Servicing



Procedures not specifically explained in this manual must be performed only by a qualified technician.

⚠ WARNING

TO PREVENT SERIOUS INJURY FROM ELECTRIC SHOCK:

Before service, maintenance or cleaning:

- a. Dry solar panels and outdoor wiring thoroughly while wearing electrically insulated gloves.
- b. Cover solar panels with an opaque cover.
- c. Disconnect all solar panels and batteries.



TO PREVENT SERIOUS INJURY FROM ELECTRIC SHOCK OR CUTS:

Do not use damaged solar panel.

If wiring insulation is damaged or weathered, glass is cracked, or housing is opened, have the problem corrected before further use.

Note: It is normal to see up to 20% degradation in amorphous silicon solar panel performance within the first 6 months before the amorphous coating stabilizes.

Cleaning, Maintenance, and Lubrication

Clean and inspect the Solar Kit system MONTHLY, or more frequently to maintain peak efficiency.

1. Wear electrically insulated gloves and ANSI-approved safety goggles. Dry solar panels and outdoor wiring thoroughly.
2. Cover solar panels with opaque cover.
3. Disconnect all solar panels and batteries.
4. Clean solar panels one at a time with mild, non-abrasive cleanser and soft cloth and paper towels. Do not clean with brushes or abrasive cleaners.
5. Inspect general condition of Solar Kit system (panels, batteries, controllers, and mounting). Check for loose hardware, wiring insulation damage or weathering, cracked glass, open housing, cracked or broken parts, loose or corroded contacts, and any other condition that may affect its safe operation.
6. Maintain batteries according to supplier's instructions.

Adjustment

To increase efficiency:

1. **In the Winter**, increase the panels' angle by 10°.
2. **In the Summer**, decrease the angle by up to 10°.
3. **In Spring and Fall**, keep the angle recommended on page 5.

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

SAFETY

SETUP

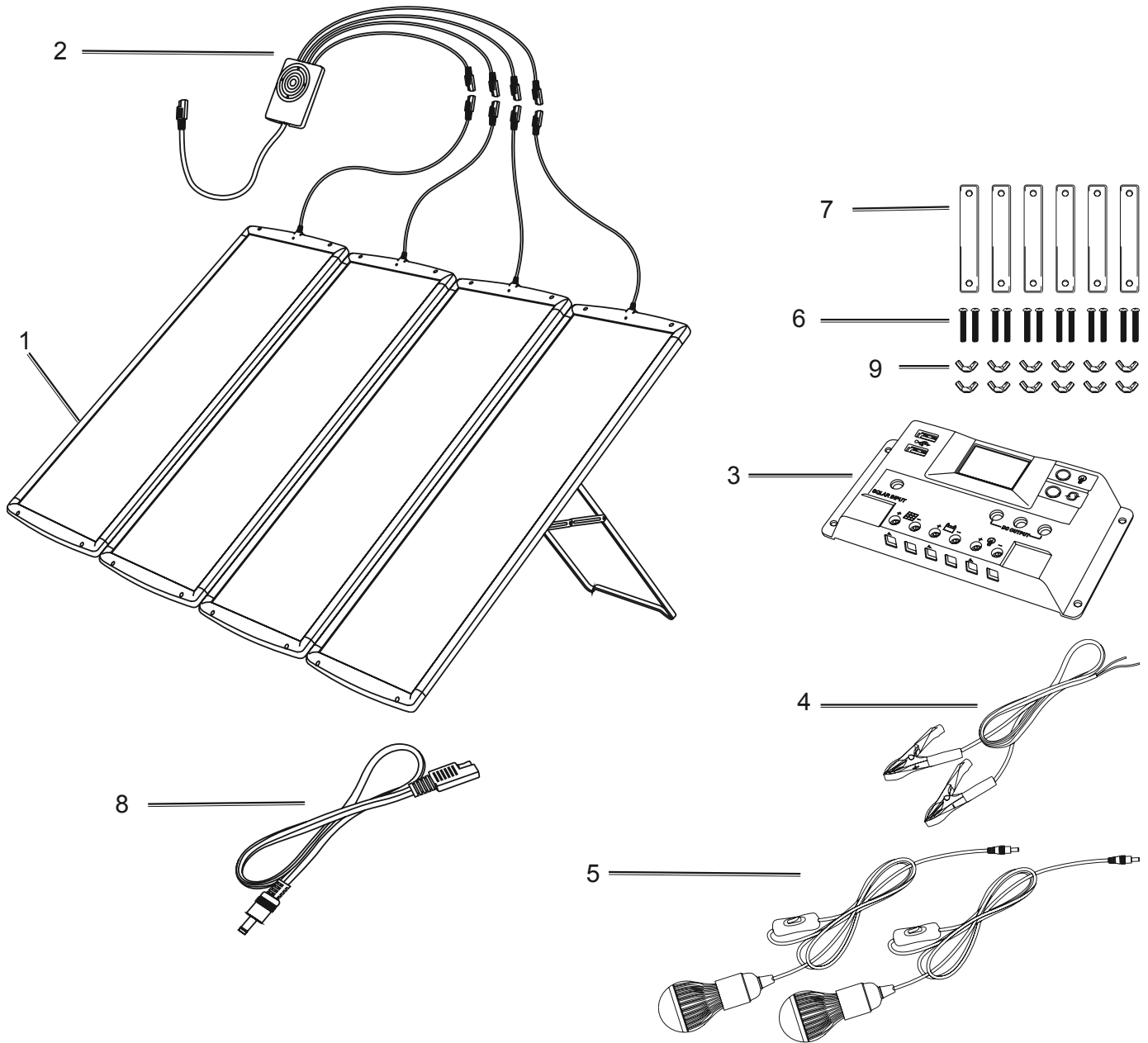
OPERATION

MAINTENANCE

Parts List and Diagram

Part	Description	Qty
1	Solar Panel	4
2	4-in-1 Splitter Cable	1
3	Charge Controller	1
4	Battery Clamp Cable	1
5	LED Light	2

Part	Description	Qty
6	Screw	6
7	Connection Brace	6
8	DC Connector & J-plug	1
9	Wing Nut	6



Record Product's Serial Number Here: _____

Note: If product has no serial number, record month and year of purchase instead.

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

SAFETY

SETUP

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Limited 90 Day Warranty

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.



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