

## 45 Watt Solar Panel Kit

68751 Solar Panel Kit

### **⚠ WARNING**

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



When unpacking, make sure that the product is intact and undamaged.  
If any parts are missing or broken, please call 1-800-444-3353 as soon as possible.

Visit our website at: <http://www.harborfreight.com>

Email our tech support at: [tech@harborfreight.com](mailto:tech@harborfreight.com)

## IMPORTANT SAFETY INFORMATION

In this manual, on the labeling, and all other information provided with this product:



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.

### DANGER

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

### WARNING

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

### CAUTION

**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### NOTICE

**NOTICE** is used to address practices not related to personal injury.

### CAUTION

**CAUTION**, without the safety alert symbol, is used to address practices not related to personal injury.



**WARNING** Read all safety warnings and 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.** 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.

## Installation Precautions

1. **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.
2. **Install all sensitive electrical components (including wiring connections, regulator, and battery) inside a weatherproof enclosure to prevent electric shock.**
3. **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.
4. 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.
5. **Do not stand on or otherwise apply pressure to panel.**
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:

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	18	16	14		10
20			14	12	
22-24			12		
30	16	14	10		
40		12	10		8
50			14		
100	12	10	6		4
150	10	8	4		2
200	8	6			

**Minimum Wire Gauge**

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. Wear ANSI-approved safety goggles and heavy-duty work gloves during installation. Do not wear jewelry or metal watches when working near solar panels, wiring or batteries.
17. Handle panel with care. Glass may break or a sharp edge may be exposed during movement.
18. Keep installation area clean and well lit.
19. Install out of reach of children.
20. Keep bystanders out of the area during installation.
21. Do not install when tired or when under the influence of drugs or medication.
22. Use in 12 VDC systems only.

## 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

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 item 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.
7. **WARNING: Handling the cord on this product will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. Wash hands after handling. (California Health & Safety Code § 25249.5, et seq.)**



**SAVE THESE INSTRUCTIONS.**

## Specifications

Rated Output	14.5 V~ / 15 W (per solar panel)
Open Circuit Voltage	23.5 OCV
Adapter Outlets	3,6 and 12 VDC

**Note:** Output will decrease as the panel gets hotter than room temperature (~70° F). Angle, solar intensity, cloud cover and other factors will effect output.

## Installation

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

## Location

1. Locate the Solar Panels (14) 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 south<sup>1</sup> 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°

<sup>1</sup> Angle towards true north if installed in southern hemisphere.

## Solar Panel Frame Assembly

1. First, attach all the components of the frame together. See Figure 1, below.

**NOTE:** Do not fasten connections with hardware yet.

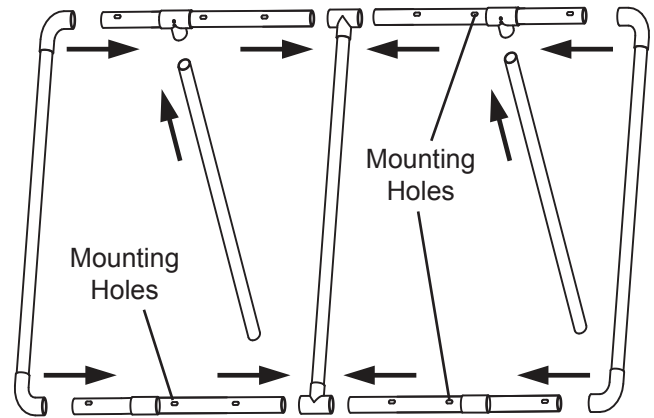


Figure 1

**IMPORTANT:** During assembly, make sure that the solar panel mounting holes along the Top Tubes (2) and Bottom Tubes (8) face OUT from the frame assembly. See Figure 1, above.

2. Attach Corner Connectors (1) to Side Tubes (6). Then use the Fixed Screws (9) and Nuts (10) to fasten the Corner Connectors to the Top Tube. See Figure 2, below.

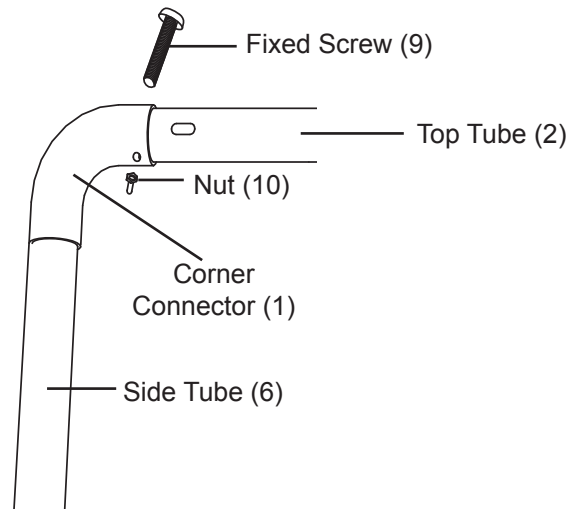


Figure 2

3. Use Fixed Screws and Nuts to fasten the Top Tubes to the Leg Connectors (3) and then the Support Legs (7) to Leg Connectors. See Figure 3, following.

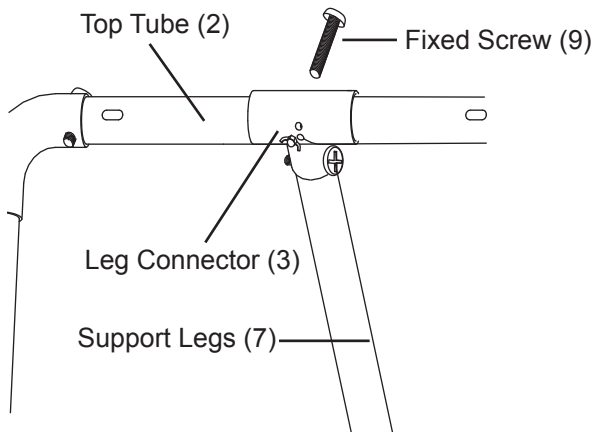


Figure 3

7. Connect end of lead wires coming from Solar Panels (14) to the Splitter Cable (15). See Figure 5, below.

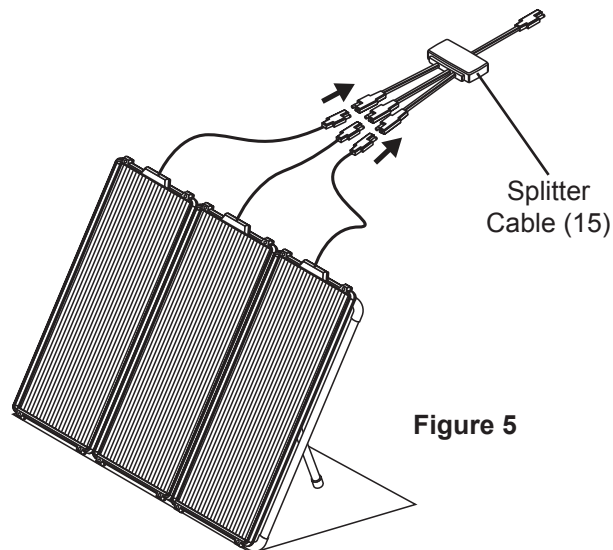


Figure 5

**NOTE:** There are two possible settings for the Leg Connectors to allow for different angles facing the sun. Before securing Leg Supports in place, be sure to adjust Leg Connectors so that both Connectors are set at the same angles. This will help keep the frame balanced.

4. Verify all connections are tightened and that the frame is secure. **WARNING!** Do not install the Solar Panels until the frame is properly assembled and balanced on surface.
5. Determine where you want to position the frame assembly, making sure it is facing south (for maximum sun exposure) with no obstructions in front of it. The Charge Controller (16) must be in a dry, well ventilated location nearby. If necessary, build a small structure that guarantees the unit will stay dry during rain or snow, and, provide enough ventilation to allow the unit to vent and cool properly.
6. Set the Solar Panels onto the frame assembly, aligning the Panels' mounting holes with the mounting holes on the Top and Bottom Tubes. Use the Panel Screws (12) and Nuts to secure the Solar Panels to the frame assembly. See Figure 4, below.

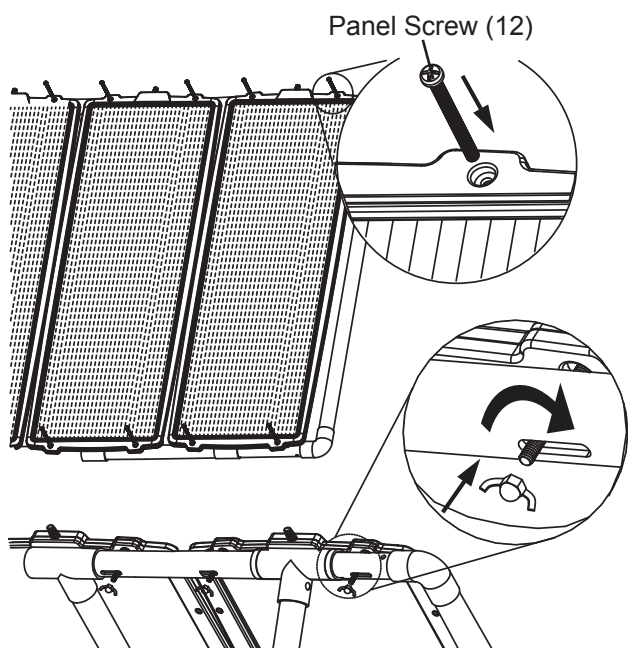


Figure 4

8. Connect the ends of the Battery Clamps to the battery terminals on the back of the Charge Controller. Then attach the Battery Clamps to the battery's terminals. **WARNING!** Be sure to connect all matching polarities. Black (-) is negative and red (+) is positive. See Figure 6, below.

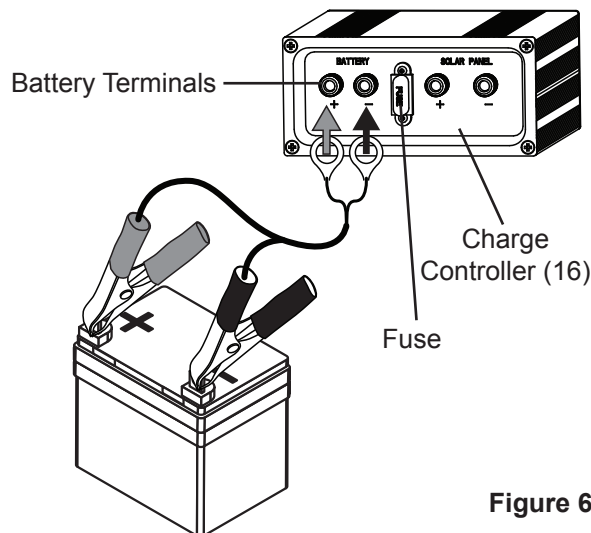


Figure 6

9. Connect Splitter Cable to Extension Cable (20) and then to the Charge Controller. See Figure 7, below.

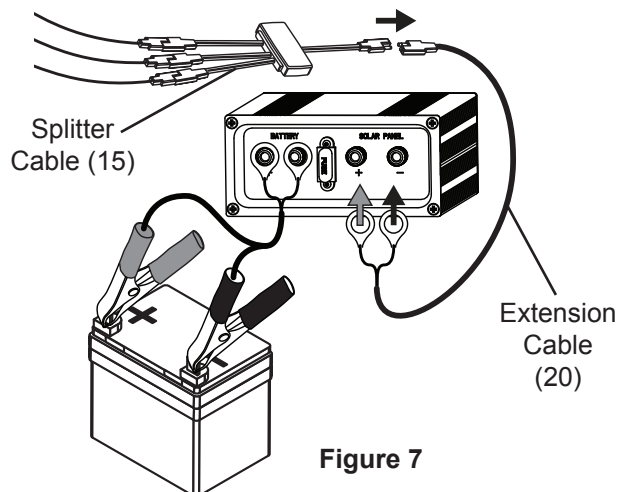


Figure 7



# Wiring

**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.

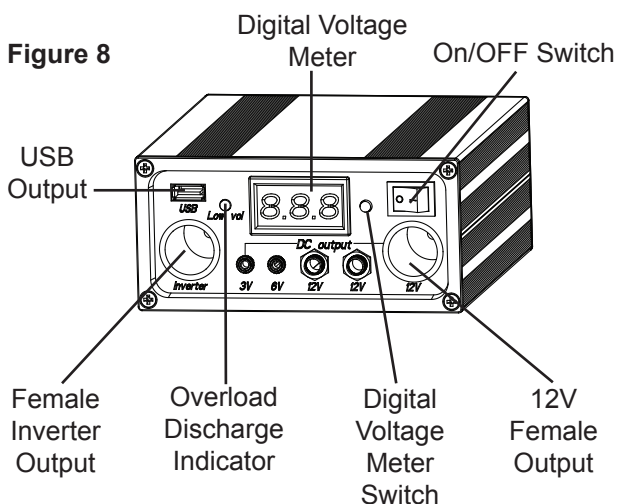
1. Run wires from panels, through weatherproof grommets and into enclosure where charge controller/regulator is located. Use wires of the proper size and rating and use twist connectors (not included) to connect wires.
2. Connect to Charge Controller according to Controller's instructions.
3. Secure 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.

## Operation

**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.

## Recharging a Battery

1. To recharge a 12 volt battery (not included), while paying attention to the proper polarity (black (-) is negative and red (+) is positive), connect the two ring terminals on the Battery Clamp to the Battery Terminals on the back of the Charge Controller. See Figure 8, below.
2. Connect the black clamp to the black or negative (-) terminal on the battery (not included). Finally, connect the red clamp to the red or positive (+) terminal on the battery. Avoid accidental contact of the red and black battery clamps to each other.
3. Turn on the Charge Controller. See the On/Off switch in Figure 8, below. Initially charge for three days.



4. Never leave the battery (not included) unattended while charging. When battery is fully charged, the reading on voltage display will show "13" or above.

**NOTE:** The voltage display will have to be turned on in order to monitor the battery voltage. (Press the Voltage Meter Switch to turn off the Voltage Meter when not monitoring the battery voltage since it consumes energy.) Twelve (12) Volt batteries should charge to 13 Volts for a full charge. To stop charging the battery, turn Power Switch to OFF and disconnect the solar panels from the Charge Controller.

**NOTE:** The Charge Controller provides "overcharge" protection. If the battery voltage is higher than 14.5 V, the regulator will shut off charge from solar panel.

5. The Charge Controller provides the following protection while charging:
  - a. **Over-discharge Protection:** When the electricity level of the battery goes too low (below 11 volts) from product usage, the Charge Controller will automatically shut off the power output to prevent damage to the battery. If this occurs, stop using the battery and charge it until the Voltage display shows 13 volts.
  - b. **Overcharge Protection:** If the electricity level on the battery goes too high (above 14.5 volts) the Charge Controller will automatically shut off power input to prevent damage to the battery.
  - c. **Overload Protection:** If the output current exceeds 4 amps the fuse (see Figure 6) will blow to prevent damage to the controller in the Charge Controller. If this occurs, have a qualified service technician replace the fuse.

**Note:** The On/Off switch of the Charge Controller must be in the "On" position to activate the three protection functions mentioned above.

## Using 12 Volt Lights and Accessories

**Note:** The Charge Controller must be in "ON" position at all times.

6. If the 12V Lights (18) aren't already attached to the sockets on the end of each light wire, gently snap them in.
7. Plug the other end of the 12V Light's wire into either of the 12 Volt DC outlets on the Charge Controller as shown in Figure 9, below.

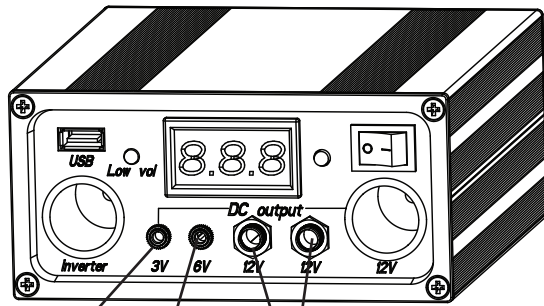


Figure 9

8. To turn on and off the lights, press the switch on the outside of each light socket. **NOTE:** You may plug in the each light into to either 12V DC outlet.

**Note:** This system can also be used to power other small 3V and 6V DC small appliances.

9. Plug the appropriate plug on the Multi Adapter into the appliance. The adapter has 3, 6 and 12 Volt DC plugs.
10. Insert the plug on the other end of the wire attached to the Multi Purpose Adapter into the appropriate DC Outlet on the Charge Controller.
11. Activate your appliance. **CAUTION!** Only on appliance can be used at a time with this adapter and the adapter must be plugged into the same voltage output.
12. When finished, unplug the Multi Adapter wire plug from the Charge Controller and then unplug the Multi Adapter from the appliance.
13. To charge cell phone or other small electronic item, plug the item's power cored into the USB Port on the front of the Charger Controller. See Figure 9.
14. Use the Inverter Output and the 12V Female Output ports to connect the male adapters for 12V accessory items that need to be charged. See Figure 9, above.

## 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

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 4.

## Parts List

Part	Description	Qty.	Part	Description	Qty.
1	Corner Connector	4	11	Back Frame	3
2	Top Tube	2	12	Front Frame	3
3	Leg Connector	2	13	Panel Screws	12
4	Tube Connector	2	14	Solar Panel	3
5	Middle Tube	1	15	3-In-1 Splitter Cable	1
6	Side Tube	2	16	Charge Controller	1
7	Support Leg	2	17	Battery Clamp Cable	1
8	Bottom Tube	2	18	Lighter Cable	1
9	Fixed Screws	12	19	Multi Adapter	1
10	Nut	24	20	Extension Cable	1

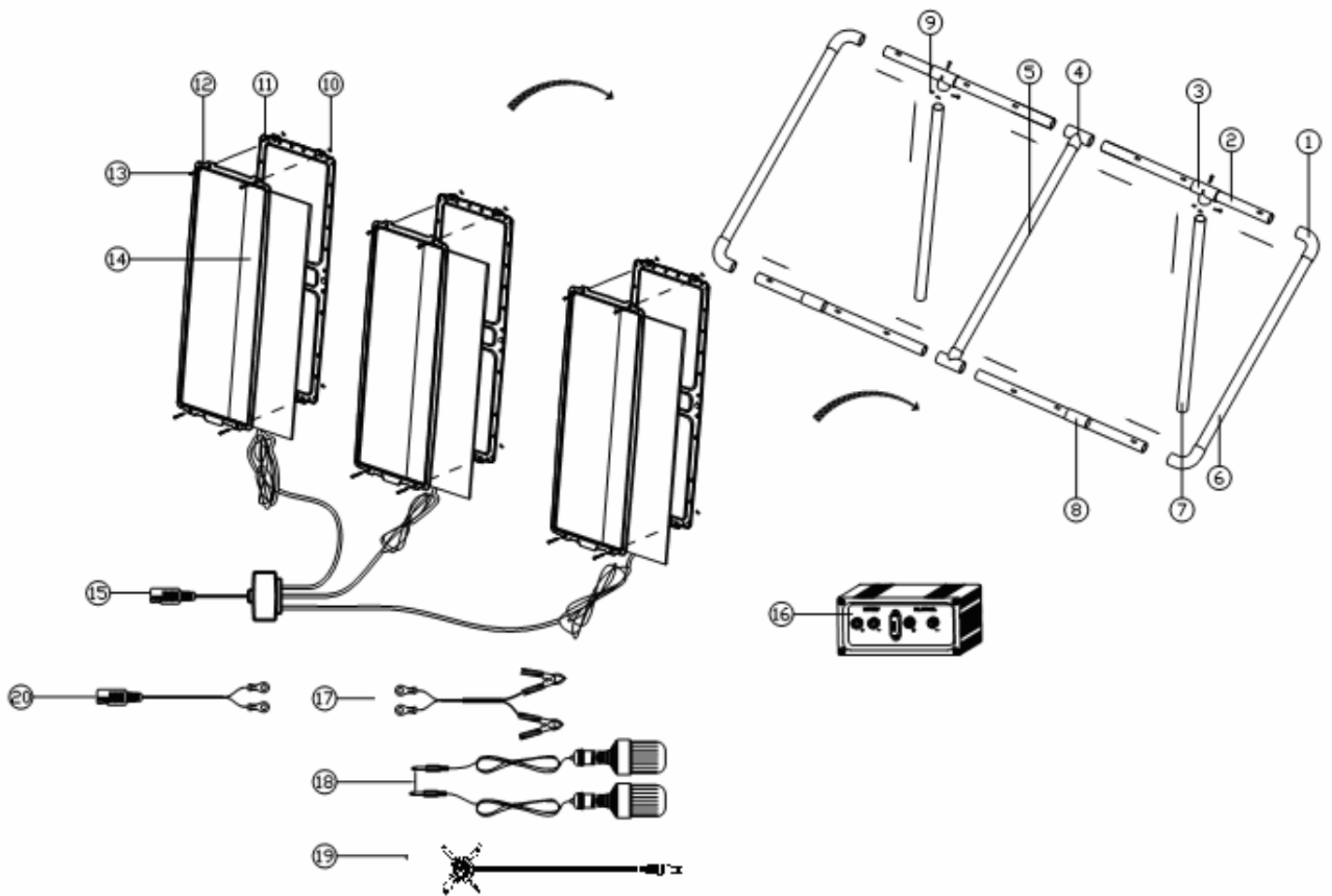
**Record Product's Serial Number Here:** \_\_\_\_\_

**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.



## Assembly Diagram



## 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.

## 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.

**THUNDERBOLT**  
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