

# Owner's Manual & Safety Instructions

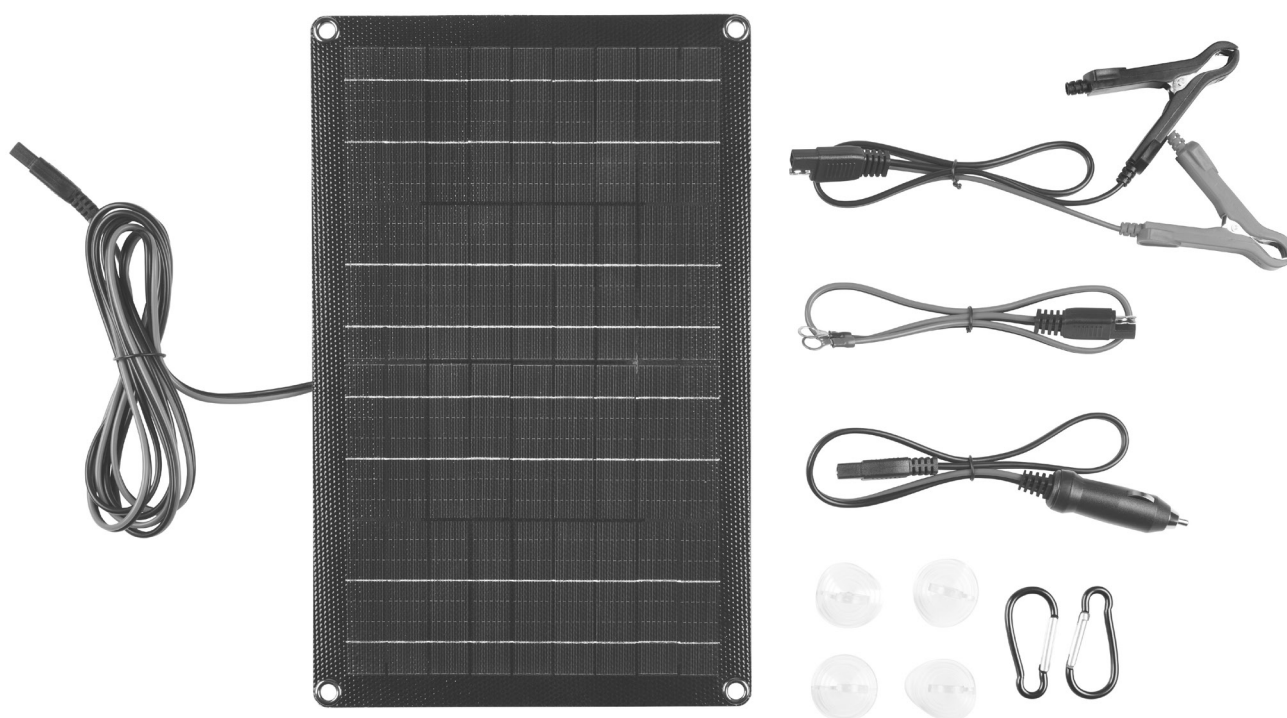
**Save This Manual** Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this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

24a

# THUNDERBOLT™ SOLAR

70830

## 10 WATT SOLAR TRICKLE CHARGER



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

Copyright© 2023 by Harbor Freight Tools®. All rights reserved.  
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.**

## 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.

## Specifications

Rated Output	14.6VDC Max. / 10W
Waterproof Rating	IP65
Open Circuit Voltage	24VDC
Short Circuit Current	530mA
Battery Type	Wet / Gel / SLA / EFB / AGM / Deep Cycle

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

## IMPORTANT SAFETY INFORMATION

### WARNING

**Read all safety warnings, instructions, illustrations and specifications provided with this kit.**

*Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury.*

1. Do not bend, flex or apply pressure to panel.
2. Install only according to these instructions. Improper installation can create hazards.
3. Use as intended only.
4. Use of an attachment not recommended or sold by the Trickle Charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
5. To reduce risk of damage to cable, pull by plug rather than cable when disconnecting Trickle Charger.
6. Do not operate Trickle Charger with damaged cable or plug – replace the cable or plug immediately.
7. Do not operate Trickle Charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
8. Use with 12 volt batteries only.
9. Do not disassemble Trickle Charger; take it to a qualified technician when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
10. To reduce risk of electric shock, disconnect Trickle Charger from battery before attempting any maintenance or cleaning.
11. WARNING – RISK OF EXPLOSIVE GASES.
  - a. WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU USE THE TRICKLE CHARGER.
  - b. To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary marking on these products and on engine.

## 12. PERSONAL PRECAUTIONS

- a. Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- b. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- c. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- d. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
- e. NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- f. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- g. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- h. Do not use battery Trickle Charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- i. NEVER charge a frozen battery.

## 13. PREPARING TO CHARGE

- a. If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- b. Be sure area around battery is well ventilated while battery is being charged.
- c. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d. Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- e. Study all battery manufacturer's specific precautions while charging and recommended rates of charge.
- f. Determine voltage of battery by referring to vehicle owner's manual and make sure it matches output rating of Trickle Charger.
- g. Do not place Trickle Charger or electrical connections on ground or floor.

## 14. TRICKLE CHARGER LOCATION


- a. Locate Trickle Charger as far away from battery as cables permit.
- b. Never place Trickle Charger directly above battery being charged; gases from battery will corrode and damage Trickle Charger.
- c. Never allow battery acid to drip on Trickle Charger when reading electrolyte specific gravity or filling battery.
- d. Do not set a battery on top of Trickle Charger.

## 15. DC CONNECTION PRECAUTIONS

- a. Connect and disconnect DC output clips or ring terminals only when disconnected from Trickle Charger. Never allow clips or ring terminals to touch each other.
- b. Attach clips to battery and chassis as indicated in 16(e), 16 (f), and 17(b) through 17(c).

## 16. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a. Position cables to reduce risk of damage by hood, door, or moving engine part.
- b. Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- c. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- d. Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (e). If positive post is grounded to the chassis, see (f).
- e. For negative-grounded vehicle, connect POSITIVE (RED) clip from Trickle Charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
- f. For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from Trickle Charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block.
- g. When disconnecting Trickle Charger, unplug adapter cable from Trickle Charger, remove clip from vehicle chassis, and then remove clip from battery terminal.

17. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:
  - a. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
  - b. Connect POSITIVE (RED) Trickle Charger clip to POSITIVE (POS, P, +) post of battery.
  - c. Connect NEGATIVE (BLACK) Trickle Charger clip to NEGATIVE (NEG, N, -) post of battery.
  - d. Do not face battery when making final connection.
  - e. When disconnecting Trickle Charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
18.  Wear ANSI-approved splash-resistant safety goggles and heavy-duty rubber work gloves whenever connecting, disconnecting, or working near battery. Battery acid can cause permanent blindness.
19. This product is not a toy. Keep it out of reach of children.
20. Inspect before every use; do not use if parts are loose or damaged.
21. Do not attempt to charge non-rechargeable, damaged, or defective batteries.
22. Do not charge more than one battery at one time.
23. Disconnect Trickle Charger from adapter cable, then disconnect the battery clips when finished.
24. Do not use Trickle Charger while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating Trickle Charger may result in serious personal injury.
25. Charge, store, and maintain batteries according to supplier's instructions.
26. Before moving, service, maintenance, or cleaning, disconnect Solar Trickle Charger from battery.
27. Maintain product labels and nameplates. These carry important safety information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
28. 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.



**SAVE THESE INSTRUCTIONS.**

## Operation



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this document 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.

**Note:** This Solar Trickle Charger is intended **only** to keep a fully charged battery from losing its charge. It will not work to charge a battery that is discharged or damaged.

**Note:** Check battery voltage with a multimeter before use. The Battery **MUST** be fully charged to at least 12 Volts.

## Connection



**A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY follow these instructions exactly.**

### WARNING

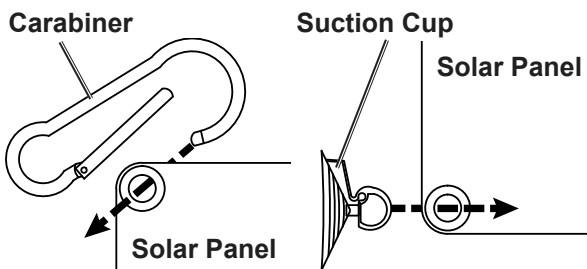
**TO PREVENT SERIOUS INJURY:**



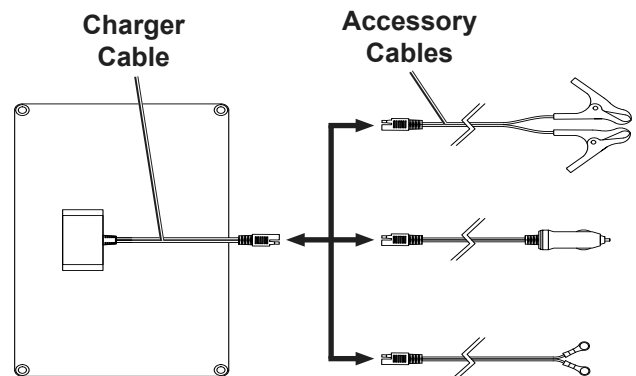
**Wear ANSI-approved splash-resistant safety goggles and heavy-duty rubber work gloves whenever connecting, disconnecting, or working near battery. Battery acid can cause permanent blindness.**

1. Locate/face solar panel toward due south where it will receive full, unobstructed sunlight, especially during midday. For maximum power output, point panel directly at sun.
2. Use included Carabiners or Suction Cups to hang or suspend the solar panel if needed:
  - Pull rear loop of Suction Cup through panel eyelet to secure Suction Cup in place, or
  - Open Carabiner and insert into panel eyelet.
4. Connect desired adapter cable to battery or 12VDC auxiliary power outlet.  
**To attach the battery clip or ring terminal adapter cable to the battery:**
  - a. Connect POSITIVE (RED) battery clip or ring terminal to POSITIVE (POS, P, +) post of battery.
  - b. Connect NEGATIVE (BLACK) battery clip or ring terminal to NEGATIVE (NEG, N, -) post of battery.

**To use 12VDC auxiliary power outlet adapter cable:** Plug cable into vehicle's 12VDC auxiliary power outlet.



3. Confirm battery clip, 12VDC auxiliary power outlet, or ring terminal adapter cable will reach from battery or 12VDC auxiliary power outlet connection to the solar panel.



**WARNING! TO PREVENT SHORT CIRCUIT AND FIRE:** Do not leave battery clips attached indefinitely.

**WARNING! TO PREVENT SERIOUS INJURY:** Do not connect adapter cable battery clips or ring terminals to carburetor, fuel lines, or sheet-metal body parts.

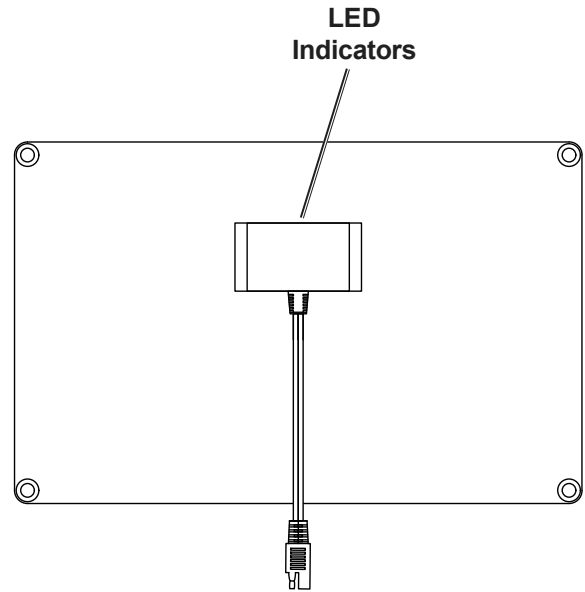
**Note:** Some vehicle make and model 12VDC auxiliary power outlets may not operate with ignition turned off. Use adapter cables to connect directly to the battery in these instances.

5. After connecting to battery, connect adapter cable to Solar Trickle Charger cable.

# LED Functions

1. LED indicators are located on the back of the Solar Trickle Charger:
  - a. A Blue light indicates the solar panel is producing power.
  - b. A Red light indicates the solar panel is charging the battery. The Red light will turn on after the solar panel has been connected to the battery.
  - c. A Green light indicates the battery has been fully charged. When battery reaches maximum capacity, the Red light will turn off to protect against over-charging.

**NOTICE:** Disconnect the Solar Trickle Charger from battery terminals or 12VDC auxiliary power outlet before starting engine. Surges of electricity from the engine may damage the unit.



## After Use

1. Disconnect adapter cable from Solar Trickle Charger cable.
2. If using the battery clip or ring terminal adapter cable, Remove the black clip or ring terminal, then the red clip or ring terminal from battery. If using the 12VDC auxiliary power outlet, unplug the adapter cable.

## Maintenance



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 Trickle Charger and outdoor wiring thoroughly while wearing electrically insulated gloves.
- b. Disconnect Solar Trickle Charger from battery.



**TO PREVENT SERIOUS INJURY FROM ELECTRIC SHOCK:** Do not use damaged connectors. If wiring insulation is damaged or weathered, solar panel is damaged, or housing is opened, have the problem corrected before further use.

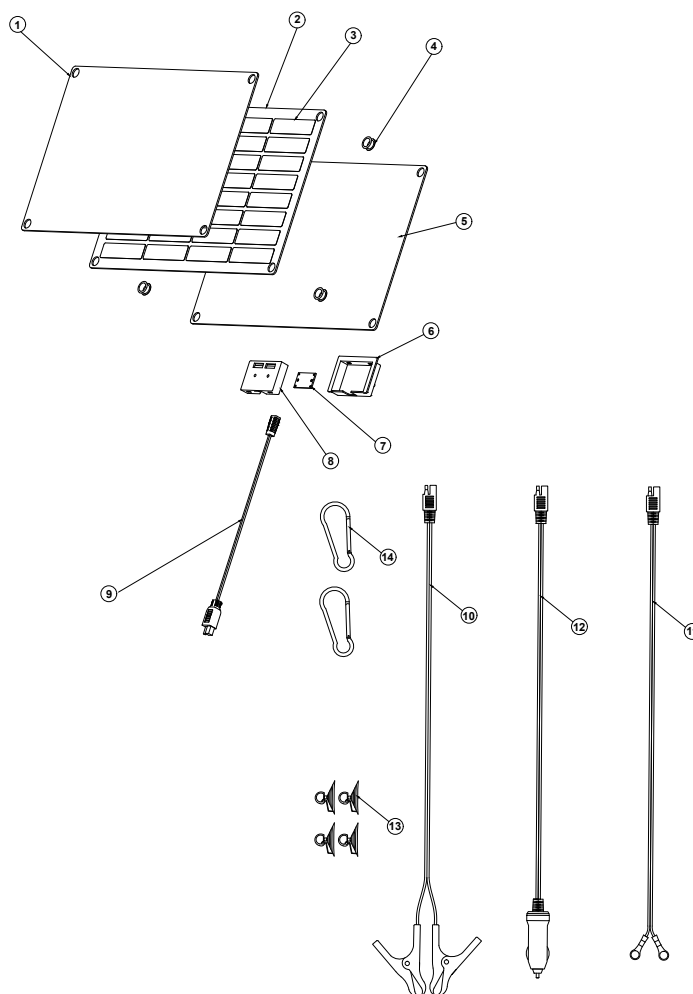
1. **BEFORE EACH USE**, inspect the general condition of the Solar Trickle Charger. Check for:
  - loose hardware,
  - cracked or broken parts,
  - loose or corroded contacts
  - damaged electrical wiring or cable insulation, and
  - any other condition that may affect its safe operation.
2. **AFTER USE**, clean solar panel with a soft brush and damp cloth. Do not clean with stiff brushes or abrasive cleaners.
3. Wipe the Solar Trickle Charger with a clean, dry cloth and store indoors out of reach of children.

## 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.

Part	Description	Qty
1	ETFE Film	1
2	EVA Film	1
3	Solar Cell	1
4	Eyelet	4
5	PCB Board	1
6	Shell Cover	1
7	Circuit Board	1

Part	Description	Qty
8	Shell Bottom	1
9	Cable Lead; SAE	1
10	Cable; SAE To Battery Clips	1
11	Cable; SAE To Ring Terminals	1
12	Cable; SAE To Auxiliary Power Outlet	1
13	Suction Cup	4
14	Carabiner	2



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. Reference UPC 193175515018.

## 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.

**THUNDERBOLT™**  
**SOLAR**

26677 Agoura Road • Calabasas, CA 91302 • 1-888-866-5797