

# 12 Volt Solar Kit: First Edition

User Manual  
[English]

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Thank you for your interest in our products. We encourage use of this product while adhering to all safety precautions and warnings. If you have any questions, do not hesitate to contact us by visiting [onetruegem.com](http://onetruegem.com).

## Safe Use and Warnings

**THIS PRODUCT REQUIRES AT LEAST ONE 12 VOLT STARTER, MARINE OR DEEP CYCLE BATTERY COMPRISED OF GEL, LEAD OR SEALED LEAD ACID TO CHARGE, RECHARGE AND MAINTAIN; IF USING THE SOLAR CONTROLLER'S 12 VOLT LOAD TERMINALS TO POWER ELECTRONICS, ONLY USE 12 VOLT SEALED LEAD ACID OR MARINE BATTERIES, NOT STARTER BATTERIES**

**WHEN USING 12 VOLT BATTERIES (INCLUDING SEALED), ESPECIALLY IN AN INDOORS ENVIRONMENT, THEY MAY EMIT A GAS KNOWN AS HYDROGEN. SINCE THIS GAS MUST BE ABLE TO FREELY ENTER THE ATMOSPHERE, NEVER STORE 12 VOLT BATTERIES IN SEALED CONTAINERS. WHEN POSSIBLE, USE A BATTERY BOX SPECIFICALLY DESIGNED TO CONTAIN 12 VOLT BATTERIES**

**DO NOT SMOKE NEAR THIS PRODUCT AT ANY TIME OR USE THE 12 VOLT AUXILIARY POWER SOCKET FOR SMOKING; DOING SO MAY CAUSE AN EXPLOSION**

**NEVER INSTALL 12 VOLT BATTERIES WHERE SMALL CHILDREN OR ANIMALS CAN ACCESS THEM**

**DO NOT USE ANY PART OF THIS PRODUCT IN AN UNLAWFUL MANNER**

DO NOT USE THE CHARGE CONTROLLER'S BATTERY CHARGING FUNCTIONALITY ON BATTERIES OTHER THAN 12 VOLT GEL, LEAD OR SEALED LEAD ACID

DO NOT ATTEMPT TO CHARGE 6 VOLT BATTERIES WITH THIS PRODUCT

DO NOT PLACE METALS OR TOOLS ON TOP OF 12 VOLT BATTERIES AT ANY TIME

DO NOT CONNECT 12 VOLT VACUUMS, COFFEE MACHINES, HAIR DRYERS, IRONS, HIGH-INTENSITY LIGHTS, HEATED MUGS, TELEVISIONS AND COMPARABLE HIGH-CURRENT 12 VOLT DEVICES TO THE 12 VOLT AUXILIARY POWER SOCKET OR DIRECTLY TO THE SOLAR CHARGE CONTROLLER; ONLY USE DEVICES REQUIRING LESS THAN 10 AMPERES AND WITHIN REASONABLE LIMITS OF A 12 VOLT BATTERY OR BATTERY BANK'S CAPACITY

DO NOT CONNECT THE 12 VOLT AUXILIARY POWER SOCKET DIRECTLY TO SOLAR PANELS; DOING SO MAY PERMANENTLY DAMAGE ALL COMPONENTS

DO NOT LEAVE [12 VOLT] BATTERIES ON VERY COLD OR HOT SURFACES FOR AN EXTENDED PERIOD OF TIME

DO NOT ALLOW THE SOLAR CONTROLLER TO GET WET; IF YOU ACQUIRE AN INVERTER FOR HOUSEHOLD-LIKE VOLTAGE, ONLY USE IT IN AN INDOORS ENVIRONMENT; TO PREVENT ELECTROCUTION OR SERIOUS BODILY HARM, DO NOT ALLOW SMALL CHILDREN OR ANIMALS NEAR AN INVERTER

DO NOT SUBMERSE THIS PRODUCT, IN PART OR WHOLE, IN ANY LIQUID

DO NOT USE POWER MULTIPLIERS WITH THE 12 VOLT AUXILIARY POWER SOCKET OR AN INVERTER CONNECTED TO THIS PRODUCT

DO NOT CONNECT ANY PART OF THIS PRODUCT TO A "GRID-TIE" INVERTER

DO NOT CONNECT 12 VOLT BATTERIES IN SERIES FORMATION TO THIS PRODUCT

DO NOT ALLOW BATTERY CLAMPS OR RING TERMINALS TO TOUCH AT ANY TIME DURING INSTALLATION, MAINTENANCE OR USE

DO NOT USE ABRASIVE CHEMICALS TO CLEAN ANY PART OF THIS PRODUCT OR BATTERIES

DO NOT DISCARD OLD OR WORN 12 VOLT BATTERIES IN TRASH CANS; IN CERTAIN COUNTRIES AND TERRITORIES, SUCH AS THE UNITED STATES, 12 VOLT BATTERIES MAY BE RECYCLED AT THE SAME LOCATION ONE CAN BE PURCHASED FROM

ONETRUEGEM, LLC, ITS MANUFACTURERS AND ASSOCIATES WILL NOT BE HELD RESPONSIBLE FOR PERSONAL INJURY OF ANY KIND AS A RESULT OF USING THIS PRODUCT IN WHOLE OR PART. 12 VOLT GEL, LEAD, SEALED LEAD ACID BATTERIES AND MANY ELECTRONICS, WIRES AND NON-ELECTRICAL PRODUCTS ALIKE MAY HAVE A WARNING SIMILAR TO THE ONE SEEN BELOW IF THEY CONTAIN ANY AMOUNT OF LEAD, SOLD IN OR SHIPPED TO THE STATE OF CALIFORNIA, UNITED STATES AND WILL APPLY TO BATTERIES REQUIRED OF ALL SOLAR KITS:

**CALIFORNIA PROPOSITION 65 WARNING: BATTERY POSTS, TERMINALS AND RELATED ACCESSORIES CONTAIN LEAD AND LEAD COMPOUNDS, CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND REPRODUCTIVE HARM. BATTERIES ALSO CONTAIN OTHER CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. WASH HANDS IMMEDIATELY AFTER HANDLING**

BATTERIES OF ALL TYPES AND SIZES MAY SPARK WHEN CONNECTED. ONLY CONNECT THIS LOW-POWER SYSTEM TO 12 VOLT GEL, LEAD OR SEALED LEAD ACID BATTERIES AND AWAY FROM FLAMMABLE ENVIRONMENTS. DO NOT CONNECT OTHER DEVICES TO A BATTERY WHILE THE SOLAR KIT IS CONNECTED

ALL INDIVIDUALS INVOLVED WITH THE INSTALLATION PROCESS, INCLUDING BYSTANDERS, MUST WEAR SUITABLE PROTECTION SUCH AS GLOVES, GOGGLES AND WORN CLOTHING AS SOME BATTERIES MAY SPILL ELECTROLYTE IF IMPROPERLY HANDLED AND RELEASE HAZARDOUS GASES

12 VOLT BATTERIES USED WITH THIS PRODUCT MUST NOT BE STORED IN SEALED CONTAINERS UNLESS SPECIFICALLY DESIGNED TO ENCASE 12 VOLT BATTERIES; DO NOT REUSE SUCH CONTAINERS FOR ANY OTHER PURPOSE

SOME SOLAR PANELS HAVE FRAMES WITH SHARP EDGES AND MUST BE KEPT AWAY FROM SMALL CHILDREN AND ANIMALS

# SAFETY FOREWORD

When not in use, store your solar system indoors.

The 12 Volt Solar Kit: First Edition **does not** have to be mounted, installed or placed outdoors to use – it can be exclusively used indoors. The system is comprised of materials which may cause unnecessary attention. Before considering permanently mounting outdoors, determine if an insurance provider for your home, apartment or otherwise will replace the system or provide compensation in case of damage or theft.

Manufacturer's, Elemental and Accidental Protection is there when you need it.

Your solar system has a comprehensive 1-Year Warranty which covers almost any type of damage. **If you need help, contact us at [onetruegem.com](http://onetruegem.com)** and explain the problem.

Use any Power Inverter, treat it like ordinary electricity.

The 12 Volt Solar Kit can work with Power Inverters from any country, which produce the same amount of power as traditional electricity from a wall outlet. Do not use an Inverter outdoors or near moist areas or service them yourself; **always use Inverters in an indoors environment** and keep them away from small children and animals. Misuse of an Inverter can cause electrocution, injuries or even death.

Handle your battery with care.

Batteries used by solar systems contain Hydrogen, a gas which is lighter than air and must be allowed to escape into the atmosphere; **don't place 12 Volt batteries in sealed containers**. Only use containers specifically designed for 12 Volt batteries and wear gloves when handling them for an extended period of time. **Do not touch any part of your face while handling 12 Volt batteries**. Wash hands afterwards.

Stay away from flammable environments.

Batteries can burst or explode in flammable areas; refrain from smoking near this Kit or using it in a flammable environment.

Don't use a larger battery when powering electronics.



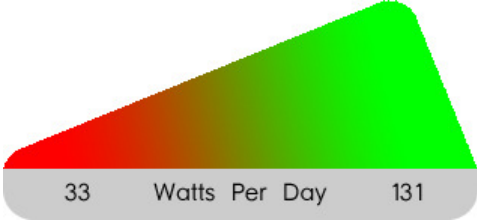


While the 12 Volt Solar Kit: First Edition can charge any 12 Volt battery, when powering electronics, **a 12 Volt 7 Ampere Sealed Lead Acid battery is the maximum battery size which should be used**. Any larger size will indicate a "false positive," whereas the system appears to power more than what it is capable of.

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# Solar System Performance Guide

The following recommendations are based on using this solar system with a Power Inverter to charge small mobile devices; product compatibility is the same whether using the system's 12 Volt Auxiliary Power Socket or in conjunction with a Power Inverter. While it may be used on a daily basis during the day and evening, it should be allowed to fully charge each day; evening performance is based on the system being fully charged.

<p><b>Power Level (Normal Use)</b></p>	<p style="text-align: center;"></p> <p>The 12 Volt Solar Kit: First Edition is a low-power system designed to charge small mobile devices every day for <b>at least 2 hours during the day and at most 2 hours during the evening.</b></p>
<p><b>Battery Charging</b></p> 	<p style="text-align: center;"></p> <p>This system can produce <b>between 33 and 131 Watts Per Day.</b> (Varies depending on the amount of Daylight and Sunlight)</p>
	<p>During sunny and partly cloudy days, the solar system can charge small mobile devices simultaneously or consecutively for <b>at least 2 hours.</b></p> <p>In the evening, it can charge mobile devices simultaneously or consecutively <b>up to 2 hours.</b> This time will vary depending on a device's power requirements.</p>
	<p>During cloudy days (rain, fog or snow), the solar system may not be able to fully recover by the evening, however, it can charge small mobile devices simultaneously or consecutively for <b>at least 15 minutes.</b></p> <p>In the evening, it can charge mobile devices simultaneously or consecutively <b>up to 15 minutes.</b> This time will vary depending on a device's power requirements.</p>

# Alternative System Use

In addition to charging small mobile-centric products, the 12 Volt Solar Kit: First Edition has the ability to power a variety of other electronics; however, **doing so may prohibit daily use, requiring the system to take several days to fully charge.** Some examples include:

## Cordless Telephone Systems (Non-VoIP)

During power failures, the Solar Kit will power a cordless phone system's **base** for several hours, enabling all phones to be used; it can only charge a phone on the system's base, however.

## Laptops, Netbooks and Internet Tablets

Laptops and Netbooks will not inherently work with this system. These items can be powered for about 30 Minutes while using a broadband modem but not daily; printers cannot be used in conjunction with either at any time. Due to the varying nature of Internet Tablets, it may be possible to power them daily in accordance with this Guide for normal use; to safely test the feasibility of doing so, begin by charging it for 1 Hour during the evening and gradually charge it longer up to the system's maximum recommended duration of 2 Hours. If the solar system fully recovers the next day, an Internet Tablet can be charged like other mobile devices.


## Batteries

Up to 4 AA/AAA batteries or a single (small) Lithium rechargeable battery can be regularly charged. AA/AAA cannot be charged daily while a Lithium battery can. It is acceptable to exceed the time recommendations of this Guide for normal use but AA/AAA batteries must use a "rapid" or "quick" charger, not "overnight." **Lithium batteries must only use a normal charger at all times.**

## Charging Batteries in Equipment, Scooters, Wheelchairs and Emergency Backup Systems

For the system's alternate use as a 12 Volt Battery charger, no configuration is necessary. You must, however, take the appropriate steps to properly charge batteries installed in such devices.

- **Wheelchairs and Scooters:** There may be more than one 12 Volt Battery installed in these modes of transportation. **While at least wearing gloves,** each battery must be removed and charged independently. If your mobility unit has spare batteries, test them with this system first.
- **Battery Backup Systems:** These typically use 12 Volt Batteries, including computer and fiber optic backup systems. **Its battery must be completely removed** to be charged.
- **Tools:** Such as lawnmowers or any tool inherently using 12 Volt Batteries don't necessarily need to be removed from where they are installed but **cannot be turned on while charging.**

	Quantity	Item and Description
	1	<b>Two Monocrystalline or Polycrystalline Solar Panels</b> with a Stainless Steel carrying handle and rubber feet for on-the-go, surface-level positioning. Includes removable 10 foot (304cm) weatherproof cable.
	1	<b>12 Volt 10 Ampere Solar Charge Controller</b> with 16 Timer Modes.
	1	<b>Battery Clamps</b> for temporary battery connection. It is pre-installed and includes a replaceable 10 Ampere blade fuse. The Sunlight, weather-resistant, burial-grade battery clamp cable is 10 feet (304cm).
	1	<b>Battery Ring Terminal Cable</b> for permanent battery connection. Includes two, 1-1/4" inch (3cm) Marine-Grade screws, washers and nuts to fit many 12 Volt battery terminals. Its length is 10 feet (304cm).
	1	<b>Magnetic Compass</b> to assist in pointing solar panels in the right direction.
	1	<b>Cleaning Cloth (Random Color)</b> for periodically cleaning solar panels by lightly dampening with tepid water.
	1	<b>12 Volt Auxiliary Power Socket</b> with a 2 foot (60cm) cable for directly powering electronics or using a Power Inverter.
	1	<b>Load Adapter</b> protects electronics connected to the Solar Controller. A 10 Ampere blade fuse is pre-installed.

Note: A small, slot-type screwdriver is required if cables were not pre-installed. Do not remove any protective sheet adhered to the Solar Kit until after reading all instructions.

# First Step: Determine How the Solar System will be Used

Your solar system may be used for two different purposes:

1. Replacement of traditional electricity for charging small mobile devices. Two optional components are necessary for this feature: a 12 Volt 7 Ampere Sealed Lead Acid Battery and a Power Inverter rated up to a maximum of 200 Watts. Mobile devices which have a “Car Adapter” can be plugged directly into the system without a Power Inverter but still requires a battery.
2. Charge and maintain one 12 Volt Gel, Lead or Sealed Lead Acid Battery found in modes of transportation (non-Hybrids and All-Electric only) and electrical equipment. No other hardware or equipment is necessary for this feature.

## Choosing a Power Inverter

Power Inverters convert the system’s 12 Volt energy into the same high voltage electricity found in your home. This system will allow for the use of a Power Inverter rated up to 200 Continuous Watts.

While there are many different brands of Power Inverters, look for these key features when choosing one:

- An Inverter from any country will work. When travelling to different countries, you may use the same Power Inverter wherever you go; however, it’s best to use an Inverter suitable for the country you’re in. The solar system does not require reconfiguration to use a different Power Inverter.
- A good Inverter will have a replaceable fuse.
- If an Inverter *feels heavier* compared to others, it is likely of higher quality.
- Inverters use either **active** (fan) or **passive** (no fan) cooling. While active cooling is preferred, it may be too noisy. On the other hand, passively-cooled Inverters generally produce less power than comparably-priced actively-cooled Inverters.
- This system supports an Inverter with two power outlets for simultaneous charging.



# Find Magnetic North



Using the included compass, stand in the general area you would like to place the solar system while avoiding electronics {which may cause interference} that are in-use.

Place the compass in one hand or on a flat surface while keeping it in a horizontal position. The green tip of the compass needle will point to **Magnetic North**. The other end of the compass needle will point to **Magnetic South**. This direction may change if you use the solar system elsewhere.

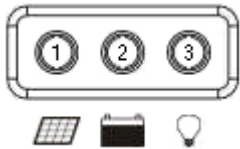
Turn the compass such that North or "N" is aligned with the green tip. This is the general direction of Magnetic North on Earth. The other end is the general direction of Magnetic South.

If you live above the Equator, point the 12 Volt Solar Kit towards **Magnetic South** or below the Equator, **Magnetic North**.

# Setup and Use

For outdoor installation, mount the system so that it is within reach; do not place it on a roof. For indoor use, place the system on a windowsill or comparable area which receives an abundance of Sunlight. Keep the Solar Charge Controller in a dry and cool environment at all times.

Using the included battery clamps, attach the system to a 12 Volt 7 Ampere Sealed Lead Acid Battery. If one is available, place the battery in a battery box and as close to the ground as possible. Fully charge the battery before using the solar system. If a battery does not charge within two days, the solar system requires relocation.



## Solar Controller Status Lights

1. **Status Light 1 (Solar Panel)**
2. **Status Light 2 (Battery)**
3. **Status Light 3 (Power Output/Load)**

**Status Light 2 (Battery) on the Solar Controller** will flash during the daytime when the system is at maximum power and ready for use.

1. Observe the Load Adapter; it has two “tap” terminals, each with a small unscrewable cap. Slightly unscrew each by turning counter-clockwise. Insert the 12 Volt Auxiliary Power Socket into the Load Adapter’s tap terminals; the Positive (+) cable end screws into the Positive tap terminal, Negative (-) to Negative (-). Tighten by turning clock-wise.
2. If your mobile device uses a car adapter, installation is complete; plug in your device and push the Work Mode Button once to turn the system ON.
3. If you’re using a Power Inverter; ensure its power switch, if it has one, is in the OFF position.
4. Push the Work Mode button on the Solar Controller; the digital display should illuminate with the number 6. (with a decimal).
5. Turn the Power Inverter ON. Plug in your device.

Once you are satisfied with the solar system’s placement, remove its protective sheet and plug the solar panel(s) into the Solar Controller.

If your Power Inverter turns off, alarms or otherwise, indicating a fault **during the day**, shield the solar panel from Sunlight or connect more devices to the solar system (if it has two electrical outlets).

When using a Power Inverter and at any time the system’s battery is depleted (i.e., the battery indicator is *red*), turn off and unplug any Power Inverter or any device plugged into the 12 Volt Auxiliary Power Socket. The system will attempt to return to its prior state when its battery has been sufficiently charged and a device left plugged into the system may unexpectedly turn on if not removed.

# Enhanced Setup Instructions

## Choose a Battery Cable

**Battery Clamps** are the most commonly used connectivity cable as it will attach to most 12 Volt Batteries.

**Battery Ring Terminals** are used for long-term battery attachment.

**Do not connect the solar panel until the very last step.**

## Install Battery Cable into Solar Controller

Each battery cable has two ends; one is POSITIVE and the other NEGATIVE. POSITIVE is denoted by the color RED while NEGATIVE is BLACK.

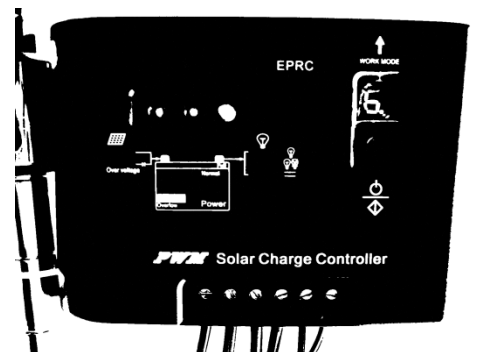
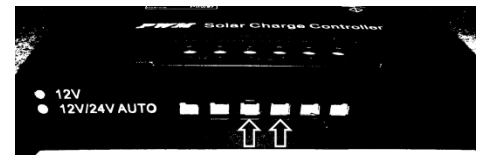
With a small, slot-type screwdriver, find the POSITIVE and NEGATIVE screw terminals in the middle of the Solar Controller which have a battery symbol beneath them.

Ensure the battery screw terminals are open by turning each screw COUNTER-CLOCKWISE or LEFT.

Once the battery screw terminals are open, insert the NEGATIVE cable end into the NEGATIVE battery screw terminal and tighten by turning CLOCKWISE or RIGHT. Do the same with the POSITIVE cable end into the POSITIVE battery screw terminal.

Ensure the cable is properly installed and that no stranded wires hanging outside of the Solar Controller.

Place or mount the Solar Controller upright in a cool, dry location, away from direct Sunlight and moisture. It is not weatherproof and must be kept dry at all times.



## Connect a 12 Volt Battery

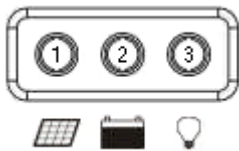
When using the battery clamps or ring terminal cable on a standalone 12 Volt battery (in a mode of transportation, turn its ignition to the "OFF" position), remove pre-existing connections to the battery beginning with the NEGATIVE battery terminal, followed by the POSITIVE battery terminal.

Connect the battery cable from the Solar Controller to the battery while observing polarity; attach the cable end marked NEGATIVE to the NEGATIVE battery terminal first then the cable end marked POSITIVE to the POSITIVE battery terminal last.

In many vehicles, the best way of doing this is to place the Solar Controller, with cables attached, inside and near a window closest to its battery, which must be minimally kept open to allow the Solar Kit's cables to pass through and underneath a vehicle's hood (bonnet) and to its battery.

When disconnecting existing cables to a battery is not possible, the Solar Kit can still be used; you must turn OFF the mode of transportation or equipment the Solar Kit is connected to and DO NOT use it until its battery is in good or fully charged condition. Disconnect the Solar Kit before using the mode of transportation or equipment.

## Observe the Solar Controller



The Solar Controller has three main status lights:

1. **Status Light 1 (Solar Panel)**
2. **Status Light 2 (Battery)**
3. **Status Light 3 (Power Output/Load)**

If properly connected, Status Light 2 (Battery) will show a specific color and display it at all times, indicating the battery's condition.

- GREEN indicates the battery is in good condition
- ORANGE indicates the battery is low
- RED indicates the battery is almost fully discharged and cannot be used
- NO LIGHT indicates the battery is completely dead or improperly connected

The Solar Controller's battery status light may not come on for the following reasons:

1. **A loose or incorrectly installed cable.** Ensure that POSITIVE cable ends only attach to other POSITIVE connections and NEGATIVE to NEGATIVE.
2. **The battery is dead.** If all connections are correct and secure, the Solar Kit can restore a battery even when the Solar Controller shows no active status lights but will take several days of charging. Follow the steps under "Mode 6. Operation" to charge a dead battery.

## Connect the Solar Panel



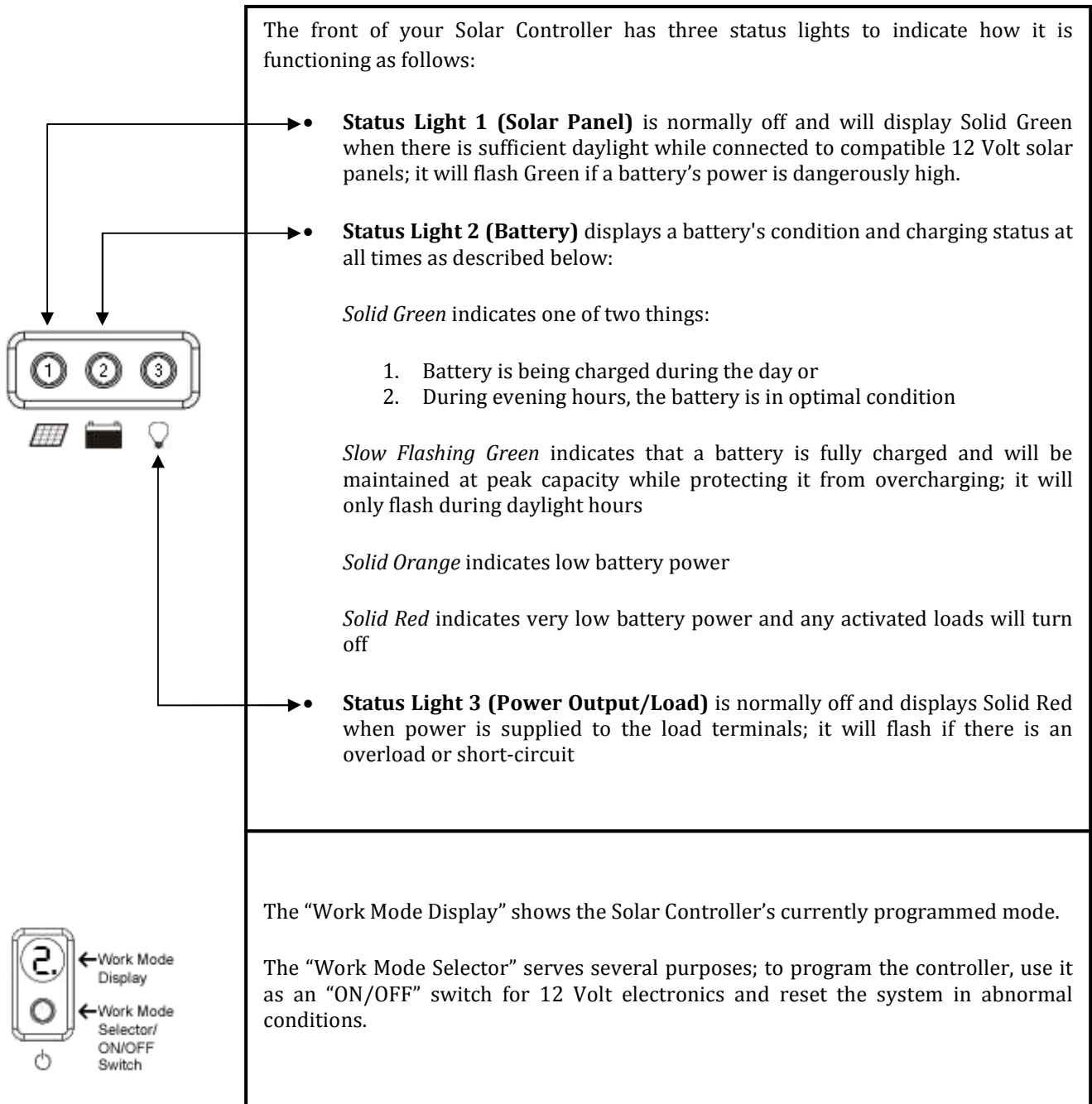
Locate the adapter end of the cable attached to the Solar Panel and plug it into the Solar Controller. You're done!

After plugging in the solar panel, its Solar Controller's three status lights will show how the system is functioning.

- If the system is connected during daylight hours, Status Light 1 (Solar Panel) will show SOLID GREEN and Status Light 2 (Battery) will show the battery's condition as indicated under "Observe the Solar Controller."
- If the system is connected during daylight hours and Status 1 (Solar Panel) quickly flashes with no other active lights, the battery's voltage is too high. Try using another cable or avoid using the Solar Kit for that battery.
- If the system is connected during evening hours or insufficient daylight, only Status Light 2 (Battery) will activate; it will show its condition at all times and cannot be turned off unless the Solar Kit is disconnected.

# The Solar Charge Controller

The included Solar Charge Controller regulates the amount of power received from solar panels and automatically adjusts the amount of power a 12 Volt battery needs. It serves several purposes; if the amount of Sunlight is too strong, it prevents damage to batteries. During the evening or when there is insufficient daylight, it prevents batteries from damaging solar panels. Additionally, a device can be connected to the Charge Controller for 12 Volt output, up to 10 Amperes and be turned on and off from the Controller; this is known as “load” output.



The Solar Controller has a total of 16 different modes (15 Usable, 1 Test Mode). These modes are shown on the Solar Controller's Work Mode Display when the Work Mode Selector is pushed once. The following explains each mode and how to set them.

**0** For Mode 0, Status Light 3 (Power Output/Load) terminals will automatically activate 10 minutes after Sunset/Dusk and deactivate at Sunrise/Dawn.

**1** For Mode 1, Status Light 3 (Power Output/Load) terminals will automatically activate 10 minutes after Sunset/Dusk and turn off after **1 Hour**. The same applies to the following Work Modes and their respective duration.

**2** 2 Hours

**3** 3 Hours

**4** 4 Hours

**5** 5 Hours

**6** 6 Hours

**7** 7 Hours

Note: The following modes operate in the same manner as the aforementioned but are followed by a **decimal**. Notice this change when reading the digital display.

**0.** 8 Hours

**1.** 9 Hours

**2.** 10 Hours

**3.** 11 Hours

**4.** 12 Hours

**5.** 13 Hours

# Programming the Solar Controller

To set a mode, hold down the Work Mode Selector for five seconds and release when the currently programmed mode begins to flash; while flashing, continuously press, not hold, the same button to cycle through modes and stop once the preferred mode appears on the digital display. The mode will flash for ten seconds, save to memory and the display will turn off five seconds later.

Work Modes 0 through 5. (with a decimal) functions after a 10-Minute evaluation of the quantity of light in the area and activate only if there is too little daylight to charge a battery. If a mode is changed while in operation, the Solar Controller will re-evaluate the light in the area for ten minutes and activate the load as necessary.

Work Mode 6., the “ON/OFF” mode, does not have a delay and can be used immediately after being programmed.

Work Mode 7. is a test mode which will activate once the system detects insufficient daylight and turn off when it detects sufficient daylight.

To check the Solar Controller's currently programmed mode, push the Work Mode Selector once and the display will be shown for fifteen seconds. If its mode is set to “ON/OFF,” or Mode 6., the load output will activate; push the Work Mode Selector again to turn it off.

Note: While the Solar Controller's mode will remain indefinitely programmed after a battery is disconnected, it will not function without one.

## Preparation

Do not remove any protective sheet adhered to the Solar Kit until after reading all instructions.

The Solar Kit's Solar Controller is not weatherproof or water-resistant. It must be kept in a cool, dry environment at all times and away from direct Sunlight.

The Solar Kit can be used indoors, preferably on a windowsill which regularly receives an abundance of Sunlight. Be aware that light and heat reflected from solar panels may cause some windows to “sweat.”

12 Volt batteries not installed in electronics or a mode of transportation must be as low to the ground as possible, in a well-ventilated room to avoid injury. **It is strongly recommended that 12 Volt batteries not installed in electronics or a mode of transportation to be placed inside a battery box.** Batteries placed on cold surfaces for an extended amount of time may permanently damage it.

Determine *where* and *how* the Solar Kit will be used and decide whether permanent or temporary fixture is necessary. You may carry the Solar Kit around without mounting it.

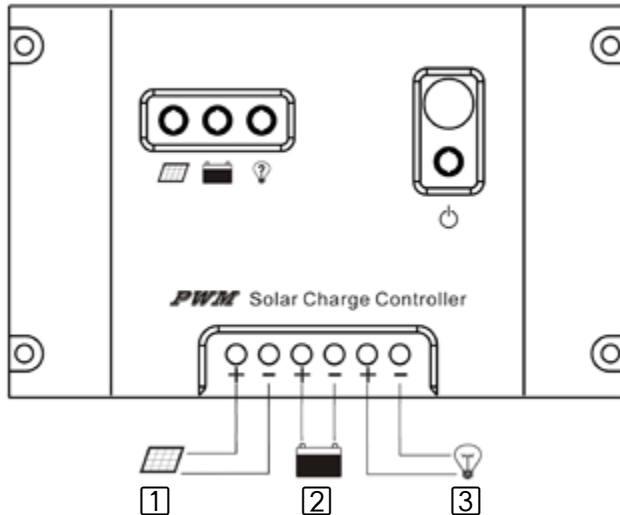
Do not place solar panels behind or in front of objects which will cast shadows on them, hindering operation.



# Tools

- Pliers or scissors should be used to carefully remove cable ties which secure various components of the Solar Kit.
- A small, slot-type screwdriver is necessary to install cables into the Solar Controller. Do not use an electric screwdriver or drill.

# Steps



- 1 The first pair of screw terminals is for solar panel connectivity, identified by a “solar panel” symbol.
- 2 The second pair of screw terminals is the battery connection, identified by a “battery” symbol.
- 3 The last pair of screw terminals is for 12 Volt output, identified by a “light bulb” symbol.

Determine how the battery will connect to the Solar Controller by choosing one of the battery cables. Observe the labeled POSITIVE (+) and NEGATIVE (-) ends of that cable and screw it into the corresponding Solar Controller’s battery connection terminals (the two screws in the middle of the Solar Controller) beginning with the NEGATIVE (-) connection. Retain the other two battery cables for future use.

Note: Modes of transportation in many countries are “NEGATIVELY GROUNDED” where these instructions apply. Contact a local dealer, manufacturer or refer to its instruction manual if you are unsure what type of “grounding” is used. Reverse the following connection and reconnection instructions if it is “POSITIVELY GROUNDED.”

To charge a 12 Volt battery (including standalone) not, disconnect ALL cables attached to it before proceeding by removing the NEGATIVE (BLACK) cable first and POSITIVE (RED) cable last. Install the battery clamp cable for temporary charging or battery ring terminal cable for permanent charging.

Screw that cable end into the Solar Controller’s battery terminals; the end labeled NEGATIVE (-) must be screwed in first and POSITIVE (+) last.

Attach the BLACK battery clamp marked NEGATIVE (-) to the NEGATIVE (-) battery terminal then do the same with the RED battery clamp marked POSITIVE (+) to the POSITIVE (+) battery terminal; follow the

same procedures if using the ring terminals for permanent fixture. The battery will have markings of RED or "+" to indicate POSITIVE and BLACK or "-" to indicate NEGATIVE terminals.

If a battery is not installed in electronics or mode of transportation and a battery box is available, secure the battery inside and strap it closed; do not attempt to place the Solar Controller or any other item inside the battery box. Doing so may cause a "short" or spark which can lead to an explosion.

The Solar Controller's battery indicator (Status Light 2) should activate, indicating one of the following conditions:

- SOLID GREEN: The battery is in optimal condition
- SOLID ORANGE: The battery is low
- SOLID RED: The battery is very low and cannot be used
- NO LIGHT indicates the battery is completely dead or improperly connected

The battery indicator will remain ON at all times and cannot be turned off unless the system is disconnected.

Next, ensure that none of the other lights on the Controller have been activated. If Status Light 3 (Power Output/Load) is RED, push the Work Mode Selector once to turn it off. The digital display will momentarily show its programmed mode and clear shortly afterwards.

Finally, plug the solar panel cable adapter end into the Solar Controller. If installed correctly and in sufficient daylight, Status Light 1 (Solar Panel) will show solid green and Status Light 2 (Battery) will show the battery's condition; when a battery is fully charged, the battery indicator (Status Light 2) will slowly flash green during daylight hours and show solid green all other times.

## Battery Reconnection

While the Solar Kit can indefinitely keep a battery in peak condition, it must be disconnected prior to use. When reconnecting a fully-charged battery to a mode of transportation, connect the POSITIVE (RED) cable first and the NEGATIVE (BLACK) cable last.

# Powering Electronics: Using the Load Adapter

The purpose of the Load Adapter is to safely allow 12 Volt electronics to connect to the system three different ways:

1. Direct connection with bare wires
2. Using the 12 Volt Auxiliary Power Socket
3. Using the 12 Volt Auxiliary Power Socket with an Inverter

The Load Adapter has a 10 Ampere fuse pre-installed. To connect the Load Adapter to the Solar Controller:

Follow the steps to program the Solar Controller's **Work Mode 6. (with a decimal)** to function as an "ON/OFF" switch.

If Status Light 3 (Power Output/Load) is ON or RED, push the Work Mode Selector once to turn it off.



Install the Load Adapter into the Solar Controller's Load Terminals while being careful to observe polarity; the POSITIVE cable end must be screwed into the POSITIVE load screw terminal and NEGATIVE cable end into the NEGATIVE load screw terminal.

Locate the other end of the Load Adapter bearing two small yellow tap connectors attached to a cable. Unscrew the yellow caps of each tap connector by turning COUNTER-CLOCKWISE or LEFT to loosen but not completely remove. Do not unscrew the pre-existing cable attached to the larger caps.

A device which has bare wires can now be connected to the system, including the 12 Volt Auxiliary Power Socket.

Push the Work Mode Selector once to turn it on. Status Light 3 (Power Output/Load) will show RED to indicate that it is functional. If it does not work, ensure that connections are correct, secure and that a working fuse is installed in the Load Adapter.

## Using the 12 Volt Auxiliary Power Socket

Follow the steps to install the Load Adapter.

Insert the NEGATIVE cable end into the Load Adapter's NEGATIVE cap and screw it in by turning CLOCKWISE or RIGHT. Do the same with the POSITIVE cable end into the POSITIVE cap. Plug your device into the Auxiliary Power Socket.

Push the Work Mode Selector once to turn it on. Status Light 3 (Power Output/Load) will show RED to indicate it is functional.

**Turn off the Solar Controller by pushing the same button when it is not in use.**

## Mode 6. Operation

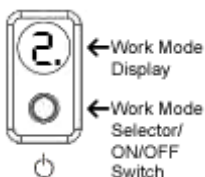
The Solar Controller has multiple modes of operation. One of those modes, known as Mode 6., (the “ON/OFF mode”) applies to charging a 12 Volt battery in any condition; your Solar Controller is already programmed in this mode.

To determine if a battery is dead, connect the system to a battery as instructed in earlier steps using only the battery clamps during daylight hours. After being connected, none of the Solar Controller’s status lights should activate.

Remove the battery clamps. If you notice the Status Lights “flickering,” this means everything was connected properly and the battery is dead. If not, a connection is loose or incorrect.

After observing the Solar Controller’s lights flickering, reattach the battery clamps or ring terminal cable to the battery. If the Status Lights stop flickering, leave the Solar Kit connected for several days to allow it to charge the battery. There is a chance the Solar Kit may not be able to recharge the battery depending on its age and overall condition.

After several days, the Solar Controller’s Status Lights should be active; during daylight hours, Status Light 1 (Solar Panel) will show SOLID GREEN and Status Light 2 (Battery) will show the battery’s condition as indicated under “Observe the Solar Controller.” If not, wait another week to see if the battery’s condition has improved; if not, the battery may be irrecoverable.



When the Solar Controller’s Battery Status Light glows SOLID ORANGE or SOLID GREEN, push the “Work Mode Selector” once. It will show the currently programmed mode on the “Work Mode Display.” This number must be “6.” in order for the system to function exclusively as a battery charger.

If the currently programmed mode is not “6.,” hold down the Work Mode Selector for five seconds and release when the currently programmed mode flashes; while flashing, continuously press, not hold, the same button to cycle through modes until “6.” (with a decimal) appears. When the number stops flashing, programming is complete.

If Status Light 3 (Power Output/Load) is ON (RED), push the Work Mode Selector once to turn it off. The Solar Controller will now operate as a charger, recharger and maintainer. The Work Mode Selector only acts as an “ON/OFF” switch when powering electronics, not charging a battery; to stop the charging feature, disconnect the system from its battery.

# Questions and Troubleshooting

## **My Power Inverter keeps turning off.**

This indicates that the system's battery is at maximum power but the amount of Sunlight is too strong. Do only **one** of the following:

1. Unplug the solar panel(s) from the solar controller
2. Shield the entire solar panel from Sunlight using a dark-colored cloth
3. Plug more devices into the Power Inverter if it has two electrical sockets

## **All three status lights on the Solar Charge Controller are on when they should not be.**

There is a system fault; remove any loads and allow the Charge Controller 30 seconds to recover.

## **Status Light 1 (Solar Panel) quickly flashes.**

This indicates that a mode of transportation's battery is in good condition; however, the Solar Controller has determined the battery voltage may be too high. Try using another battery cable. If all cables unsuccessfully cause Status Light 1 to continue flashing, discontinue use of the Solar Kit as the battery's voltage is too high to be charged.

## **Status Light 1 (Solar Panel) "flickers" when there is no battery attached.**

This is normal when a battery is not connected to the solar system.

## **Status Light 2 (Battery) is off when it is sunny or there is an abundance of daylight.**

There are several solutions to this problem:

- Ensure that battery clamps or rings are properly connected to the correct terminals. The Positive (RED) clamp must connect to a Positive (RED) battery terminal; the Negative (BLACK) clamp must connect to a Negative (BLACK) battery terminal.
- Unscrew cables extending from the rear of the solar panel. Using a volt/multi-meter, measure the open-circuit voltage and confirm it is within the voltage limits found on the rear of a solar panel. If voltage is low or zero and there is sufficient daylight, a panel may require servicing; if voltage is within its stated limits, there may be a loose cable connection.
- Using a volt/multi-meter, measure the solar voltage and the battery voltage at the Solar Controller's terminals. If voltage at the terminals is the same for both (or within a few tenths of volts), then the Controller is charging its battery. On the other hand, if the solar voltage at the Charge Controller terminals is comparable to the open circuit voltage printed on the rear of a solar panel and the battery voltage is low, the Controller is not properly charging and may be damaged.

## **Status Light 2 (Battery) is flashing during evening hours.**

- Fully charged batteries only flash during daylight hours and will be solid green all other times. If this light is flashing during evening hours, push the Work Mode Selector once to correct the display, whether a load is connected or not. If Status Light 3 (Power Output/Load) activates, push the Work Mode Selector again to turn it off.

**Status Light 3 (Power Output/Load) is flashing red (load not operating properly).**

There are several solutions to this problem:

- Check if the load is turned on. If a device connected to the Controller's load terminals has a fuse, ensure that the fuse is in working order.
- Check connections to the load, Charge Controller and battery. If using an extension or elongated cable, use a volt/multi-meter to make sure enough voltage is at the load end.
- If the indicator is flashing and there is no output, check if the device connected to the Solar Controller has short-circuit. If this is the case, disconnect the load, press the Work Mode Selector once and the Controller should operate normally after 10 seconds.
- If the indicator is flashing and there is no output, check if the load is over the Solar Controller's rated power. Reduce the load, press the Work Mode Selector once and the Controller should operate normally after 10 seconds.

**How do I connect the Solar Kit to a mode of transportation?**

Leave the driver's side window (or side closest to the battery) slightly open. The battery cable should extend underneath its hood/bonnet and to the battery. Adverse weather will not affect the battery cable.

Place the Solar Kit on the dashboard with the Solar Controller in an area protecting it from direct Sunlight and moisture.

If it is not possible to connect the Solar Kit to an installed battery, the battery must be removed from the mode of transportation or equipment to be charged.

**Why does Status Light 3 (Power Output/Load) activate when charging a battery installed in a mode of transportation?**

This only happens when a battery is completely dead (where the Solar Controller will show no lights) and once the battery has enough power, the Solar Controller is returned to its factory settings. Follow the "Mode 6. Operation" instructions to reprogram it.

**What type of fuse do I need?**

A 10 Ampere "blade" fuse is installed in two locations; the battery clamps and Load Adapter. A standard size or "mini" blade fuse can be used.

## How do I know if I've blown a fuse?

The system will not work without fuses; this is to ensure safe operation. Take each fuse out of the battery clamps and Load Adapter (if powering a load) and examine them; if the metal wire inside looks burnt or broken, replace the fuse. If you have a multi-meter with continuity testing, that feature may be used to determine if a fuse requires replacement.

If your device causes either fuse to be destroyed, it may require too much energy or the system received an excess amount of energy.

## Solar Kit Maintenance

The following inspections and maintenance tasks are recommended periodically for best performance.

- When performing maintenance requiring cable adjustment, DISCONNECT THE BATTERY FIRST; remove connections on the battery and then from the Solar Controller.
- Always make sure there is no corrosion around battery terminals.
- Make sure solar panels and loads do not exceed the Solar Controller's ratings.
- Tighten all terminals screws. Inspect for loose, broken or burnt wire connections. Be certain no loose wire strands are touching other terminals.
- Set the Work Mode to 6. or 7. to verify manual and automatic load activation (respectively).
- Ensure the Solar Controller is securely mounted or placed upright in a clean environment. Inspect for dirt, debris, insects and corrosion.
- Be sure not to place objects on or around the Controller; air must freely flow around it.
- Avoid placing the Solar Controller in high heat or moist conditions which will affect the Controller's performance or completely damage it.
- Make sure the Solar Controller's Work Mode is set to the desired mode.
- Make sure solar panels connected to the Solar Controller are free of dirt, debris, dust and chemicals.
- Periodically clean solar panels with tepid water; do not use chemicals.

# Warranty Information

**The 12 Volt Solar Kit: First Edition by ONETRUEGEM, LLC is for personal, non-commercial use and has a Manufacturer's, Elemental and Accidental Warranty which expires ONE (1) YEAR from the actual shipment or in-person sale date. This warranty is nontransferable; only the original intended end-user may exercise warranty rights. Manufacturer defects, Elemental or Accidental damage to any part of this product will be repaired or replaced at no charge once ONETRUEGEM, LLC receives the components under distress. Protection against theft or vandalism are not covered.**

This warranty may be used a maximum of one time during the warranty period with no extension to the original warranty or new warranty issuance; this means that if a component is damaged and we repair or replace it, the one-time-use warranty for this product will be exhausted. Our service to customers does not end when a warranty has expired; we may be contacted at any time for assistance.

The following explains the warranty in detail, with examples, written in CAPITAL LETTERS for clarity. ONETRUEGEM, LLC, its manufacturers and associates may appear as "we," "our," or "us" and customers, potential and actual, may be referred to as "you."

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MANUFACTURER DEFECTS INCLUDES AND IS LIMITED TO:

- OPERABILITY FAILURE UNDER NORMAL CONDITIONS
- LOOSE CONNECTIONS WHILE PERFORMING GENERAL MAINTENANCE

ELEMENTAL DAMAGE INCLUDES AND IS LIMITED TO:

- WIND (HURRICANE/TYPHOON, TORNADO, SEVERE WIND-RELATED DAMAGE)
- WATER (FLOODING, TSUNAMIS, SNOW, ICE AND WATER-RELATED DAMAGE)
- EARTH (EROSION, MUDSLIDES, EARTHQUAKES OR DAMAGE DUE TO NATURALLY DISTRESSED GEOGRAPHY)
- FIRE (FIRE CAUSED BY NATURAL WEATHER PATTERNS OR NATURAL DISASTERS ONLY)
- LIGHTNING (DIRECT DAMAGE CAUSED BY LIGHTNING STRIKE)

ACCIDENTAL DAMAGE INCLUDES AND IS LIMITED TO:

- FALLING FROM ANY HEIGHT
- MOISTURE AND CORROSION
- INSECT INFESTATION
- HEAVY WEIGHT/CRUSHING FORCE
- ANIMALS OF ANY SIZE
- MOUNTING HARDWARE MARRING OR OTHERWISE DAMAGING EQUIPMENT



- FAULTY INSTALLATION
- SHORTING FUSES

FOR ALL CUSTOMERS, DOMESTIC AND INTERNATIONAL, WE WILL:

- REPAIR OR REPLACE SOLAR PANEL(S)
- REPAIR OR REPLACE THE SOLAR CHARGE CONTROLLER
- REPAIR OR REPLACE THE 12 VOLT AUXILIARY POWER SOCKET
- REPAIR OR REPLACE ALL APPLICABLE CABLES
- REPAIR OR REPLACE THE ENTIRE PRODUCT
- REPLACE FUSES

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