

# SOLAR<sup>®</sup>

## PRO-LOGIX<sup>™</sup> BATTERY CHARGER

### *User's Manual*



#### **⚠ WARNING**



Failure to follow instructions may cause damage or explosion, always shield eyes. **Read entire instruction manual before use.**

**Warning:** This product contains chemicals, including lead, known to the State of California to cause cancer, birth defects and other reproductive harm. **Wash hands after handling.**

Congratulations! You have just purchased the finest quality battery charger on the market. We have taken numerous measures in our quality control and in our manufacturing processes to ensure that your product arrives in top condition and that it will perform to your satisfaction.

**SOLAR Pro-Logix** battery chargers are designed to provide fast, safe and efficient charging of a wide variety of 12 Volt battery types and sizes. Your **SOLAR Pro-Logix** battery charger can charge standard, deep cycle, gel and AGM style 12 Volt batteries.

**SOLAR Pro-Logix** battery charger features include:

*“Push and Go” One-Touch Control*

*Active Filtering Technology with Charge Control Circuitry (C3)*







*Exclusive Quad-Phase Charging Process*

*AC Input Compensation*

*Temperature Compensation*

Our technologically advanced, microprocessor controlled battery chargers run cooler and more efficiently than standard battery chargers. This results in faster battery charging, lower power consumption and lower operating temperatures for a safer charging process.

## ⚠ WARNING

	<p>Read all instructions completely before using the <b>SOLAR</b> Battery Charger and save them for future reference. Before using the <b>SOLAR</b> Battery Charger to charge a battery, read these instructions, those on the battery and the instruction manual and safety information provided with the product using the battery. Following all instructions and safety procedures will reduce the risk of accident.</p>
	<p>Working around lead-acid batteries may be dangerous. Lead-acid batteries release explosive gases during normal operation and charging. Carefully read and follow these instructions for safe use. Always follow the specific instructions in this manual and on the <b>SOLAR</b> Battery Charger each time you use the <b>SOLAR</b> Battery Charger. All lead-acid batteries produce hydrogen gas which may violently explode in the presence of fire or sparks. <b>Do not smoke, use matches or a cigarette lighter while near batteries.</b> Do not handle the battery while wearing vinyl clothing because static electricity sparks are generated when vinyl clothing is rubbed. Review all cautionary material on the <b>SOLAR</b> Battery Charger and in the engine compartment.</p>
	<p>Always wear eye protection, appropriate protective clothing and other safety equipment when working near lead-acid batteries. Do not touch eyes while working on or around lead-acid batteries.</p>
	<p>Always store clamps away from each other or common conductors. Improper storage of clamps may cause the clamps to come in contact with each other, or a common conductor, which would be hazardous if the charger were plugged into an AC outlet.</p>
	<p>Use extreme care while working within the engine compartment, because moving parts may cause severe injury. Read and follow all safety instructions published in the vehicle's Owner's Manual.</p>
	<p>Batteries being charged with the <b>SOLAR</b> Battery Charger unit likely contain liquid acids which are hazardous if spilled.</p>

# ***IMPORTANT SAFETY INSTRUCTIONS - SAVE FOR FUTURE REFERENCE***

## **Personal Precautions**

Always work in a well ventilated area, lead-acid batteries generate hydrogen gas that is highly combustible.

Someone should always be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes. Protective eyewear must always be worn when working near lead-acid batteries.

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.

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.

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.

*NEVER* attempt to jump start or charge a frozen battery.

## **Important Safety Instructions**

Disconnect charger from AC source prior to connecting or disconnecting the battery.

Your battery charger is designed to charge rechargeable 12 Volt lead-acid batteries only. It is not designed to supply power to an extra-low-voltage electrical system or to charge dry cell batteries. Charging dry cell batteries may cause them to burst and cause injury to persons or damage to property.

Do not attempt to modify the provided connection cables or use other means of connecting to the 12 Volt battery to be charged. Never place the charger directly above or below the battery being charged. Locate the charger as far away from the battery as DC cables permit.

Always operate the battery charger in a well-ventilated environment. Do not operate the battery charger in the vicinity of flammables, such as gasoline, etc. Do not operate the battery charger in areas where fumes or gases may accumulate, such as battery compartments.

Do not operate the battery charger if you, the battery charger or the 12 Volt battery to be charged are wet. Do not expose the battery charger to rain or moisture.

When disconnecting the battery charger from an AC outlet, pull on the plug and *NEVER* on the wire when disconnecting.

*NEVER* attempt to recharge non-rechargeable batteries.

## **OPERATION AND MAINTENANCE**

### **How Your SOLAR Pro-Logix Battery Charger Works**

Your **SOLAR Pro-Logix** battery charger uses an advanced high-frequency conversion technology, which replaces the transformer found in most other battery chargers. This technology enables a compact and portable form of conversion with excellent voltage protection as well as overload and short circuit protection.

Your **SOLAR Pro-Logix** battery charger is designed with built-in microprocessor control designed for use in a 120 Volt AC environment. The charger converts AC power to DC charging currents through switch mode technologies at frequencies between 40 kHz to 60 kHz. All **SOLAR Pro-Logix** battery chargers are fully automatic through all four operating phases and feature "Push and Go" One-Touch Control, such that once the charger is hooked up to the battery and a battery size is chosen, no additional input is needed from the operator.

When your **SOLAR Pro-Logix** battery charger is first connected, the microprocessor will automatically assess the charger/battery connection and then diagnose the battery's condition, starting with a temperature assessment. Then, it will go through battery-voltage diagnostics, lighting one of three warning LEDs if a specific problematic conditions exist: if the battery voltage is below 4.5V, reflects a short circuited connection (clamps touching, etc.), or indicates a reverse polarity connection. If any of these conditions exist, the corresponding LED warning will blink and the charger will not begin the charging process.

Once a 12 Volt battery is properly connected and no problematic condition exists, your **SOLAR Pro-Logix** battery charger will automatically initiate its unique, Quad-Phase charging cycle, utilizing exclusive "Active Filtering Technology" to deliver an ideal charge.

**Phase 1 – Energizing:** The charger will begin with 5 minutes of low Amp charging, during which the microprocessor will automatically diagnose various protection modes of the battery. In this phase, the charger safeguards against high current surging through the battery and calculates the optimal charging rate for the subsequent charging phases. During this phase, the LED corresponding to Phase 1 will blink.

**Note:** During this stage of the operation, if required, the charger will attempt to desulphate the battery plates and prepare the battery for Phase 2 – Charging (the charger diagnoses and performs the desulphation routine automatically if necessary – no input is needed from the operator).

**Phase 2 – Charging:** Upon completion of Phase 1, the charger will automatically commence Phase 2, Charging, during which the charger will apply a fast or bulk charging mode to the battery. Through its constant pulsing current pump, the charger fast charges the battery according to a pre-set voltage, while avoiding over-heating. During this phase, the LED corresponding to Phase 2 will blink.

**Phase 3 – Absorption:** Upon completion of Phase 2, the charger will automatically commence Phase 3, Absorption, during which the charger will slow its charge mode to bring the battery to full charge. This is an important stage in the Quad-Phase process during which the charger verifies that the charging energy has been successfully transferred to the battery before the exercising phase is initiated. During this phase, the LED corresponding to Phase 3 will blink.

**Phase 4 – Exercising:** Finally, upon completion of Phase 3, the charger will automatically commence Phase 4, Exercising, during which the charger will monitor the battery and resume operation if the battery discharges for any reason. This phase keeps the now fully charged battery in an ideal storage condition for immediate service when the battery is needed. This phase will continue until the battery is disconnected from the charger or the AC power supply to the charger is interrupted. During this phase, the LED corresponding to Phase 3 will light solid.

**SOLAR Pro-Logix** chargers are designed for charging & maintaining 12 Volt batteries of the following types:

- Conventional lead-acid*
- Sealed lead-acid/AGM*
- Maintenance-free*
- Gel-cell*
- Deep-cycle*

### Guide to Choosing the Right **SOLAR Pro-Logix** Battery Charger

Each **SOLAR Pro-Logix** battery charger is designed to optimally charge a specific range of battery sizes. Choosing the right charger for your specific needs will be best served by matching the charger that best corresponds to the batteries you plan to charge with the charger, as illustrated in the chart below.

<b>Model No.</b>	<b>Optimal Battery Range</b>	<b>Low Setting Range*</b>	<b>High Setting Range**</b>
<i>PL2208</i>	<i>8Ah – 60Ah</i>	<i>8Ah – 30Ah</i>	<i>30Ah – 60Ah</i>
<i>PL2212</i>	<i>14Ah – 175Ah</i>	<i>14Ah – 60Ah</i>	<i>60Ah – 175Ah</i>
<i>PL2216</i>	<i>25Ah – 200Ah</i>	<i>25Ah – 100Ah</i>	<i>100Ah – 200Ah</i>

Any **SOLAR Pro-Logix** battery charger can be used to charge a battery above the optimal charge range for that charger. The charging will be performed both safely and effectively for the battery – the only variable will be the time it takes for the battery to reach a fully charged state.

Many cranking batteries do not express the battery capacity in Amp Hours. The Amp Hour rating of the battery can be derived if you have the Reserve Capacity. If the battery capacity is rated in Reserve Capacity (in minutes), use the following formula to convert Reserve Capacity to Amp Hours.

$$\frac{\text{Reserve Capacity}}{2} + 15.5 = \text{Amp Hour Rating}$$

If these ratings (Amp Hours or Reserve Capacity in Minutes) are not printed on the battery, contact your local battery supplier for this information.

## **SOLAR Pro-Logix Battery Charger Safety Features**

**Active Filtering Technology:** **SOLAR Pro-Logix** battery chargers utilize Active Filtering Technology, which provides numerous benefits to the charging process: 1.) It initiates a gradual voltage ramp-up during Phase 1, eliminating failed cold starts and high current surge impacts when the battery is at a low voltage level; 2.) When sensing heavy-duty loads which are within the charger's peak output range, the charger will automatically go into a soft-start-mode, ramping up power through gradually increased switching duty cycle, to reduce wear on the battery being charged. 3.) Finally, the charger will automatically compensate for changes in ambient temperature when determining the ideal charge characteristics for the battery being charged.

**AC Voltage Protection:** **SOLAR Pro-Logix** battery chargers are designed to adjust incoming AC voltage to the optimal level, shutting down automatically when the AC input voltage drops below a specific level.

**DC Voltage Protection:** If the charger is connected to a 24 Volt battery or senses reversed polarity, the Completion LED will light up to indicate the FULL charge status. No damage would occur to the charger or battery when this situation occurs.

**Overload Protection:** In the case of the charger being connected to a battery of wrong size / capacity, there is an internal timing control in the charger to automatically shut itself down. It will require restarting the power switch to reset the charger.

**Output Short Circuit Protection:** The charger will immediately shut down the charging circuits when a short circuit is detected. The charger will not restart until this problem has been rectified.

**Reverse Polarity/Bad Battery:** If the output clamps are connected in such a way as to create a reverse polarity situation or if the battery being charged is shorted or damaged, the charger will not send power to the clamps and will cease operation. Either situation is indicated by a corresponding flashing LED warning on the charger's control panel. This condition should not cause any damage to the charger or vehicle. If the battery to be charged is below 4.5 Volts, all three warning LEDs will blink simultaneously. If this condition occurs, disconnect from battery, find and remove drain from battery and reinitiate the charging process.

## **SAFETY INSTRUCTIONS AND PROCEDURES**

Ensure that both the charger and the battery being charged are in good condition before charging. Check that the leads, plugs, sockets and the battery surfaces do not show any signs of wear, deterioration or leakage.

Check that the battery capacity is within the recommended range listed for your charger model. Most batteries have labels that indicate their capacity in Amp Hours (Ahs). Please ensure that the capacity of the item you wish to operate is not more than the rated output of the charger you are using. Larger battery capacity requires longer charging time.

The charger will shut down if it is overloaded as a result of being connected to batteries that are grossly beyond the operating range of the charger. To restart the unit after this automatic shut down, turn the unit OFF. To turn the unit OFF, press the battery size selector button until neither corresponding LED is lit – the unit is now turned OFF.

The charger can get very warm when in use: it must be placed in an environment where it will not cause any damage to articles in its proximity. Ensure the battery charger is located in a well-ventilated place during operation. *NEVER* use a battery charger around or near combustible materials. *NEVER* attempt to charge a frozen battery.

**SOLAR Pro-Logix** battery chargers are designed to synchronize charging characteristics with batteries that are generally in good condition and under three years old. It might not be possible to successfully charge an old or worn out battery.

## Battery Charging Procedure

Follow the steps below for safe, effective battery charging. Prior to charging any battery, thoroughly familiarize yourself with this entire owner's manual and the owner's manual for the battery being charged and/or the vehicle in which the battery to be charged is installed.

1. Initiate your battery connection. The battery charger output clamps are color-coded for your convenience: RED for positive output and black for the negative ground connection. Connect the RED (positive, +) clamp to the positive battery terminal.
2. Connect the BLACK (negative, –) clamp to the negative battery terminal.
3. Ensure that the clamps are in good contact with the battery terminals. This enables a smooth transfer of power from the charger to the connected battery.
4. Plug in the charger's AC power cord to a properly rated power outlet (120 Volts AC).
5. Turn the battery charger ON by selecting the proper battery size for the battery being charged, using the yellow battery size selection button (with a right-facing arrow). The charger must be powered prior to making a battery connection in order to assess and diagnose the battery connection as it is being made. (To turn the unit OFF, press the battery size selector button until neither corresponding LED is lit – the unit is now turned OFF.)
6. Any problematic conditions resulting from the initial battery connection will be noted by flashing LED warning lights in the **Error Warning** area on the charger's control panel.
7. Upon diagnosing a proper battery connection, the charger will automatically initiate and complete the Quad-Phase charging process. Completion of the charging process is indicated by a solidly lit Exercising/Complete LED.
8. After the battery is fully charged, turn off the main AC power switch (to turn the unit OFF, press the battery size selector button until neither corresponding LED is lit – the unit is now turned OFF) and unplug the charger from the AC outlet, remembering to always pull by the plug and not the cord.
9. Finally, disconnect the battery by first disconnecting the BLACK (negative, –) clamp and then the RED (positive, +) clamp.

## **SOLAR Pro-Logix Battery Charger Maintenance**

Although your battery charger features a sealed-unit design and is weather resistant, it is important to store the charger in a clean, dry environment. Do not expose the charger to water or excessive heat.

The battery charger clamps should be returned to their storage position after each use and care should be taken not to damage the clamps or cables in any way. If the charger's clamps or cables show any sign of damage, or the insulation on either the clamps or cables has been compromised in any way, discontinue use of the charger immediately.