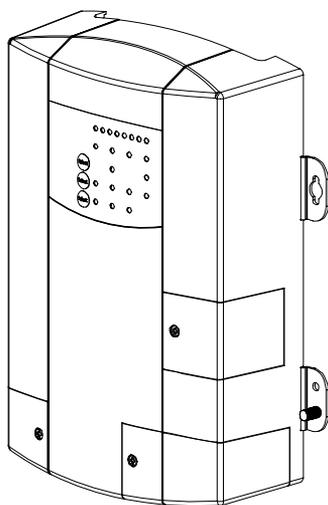


Smart choice for power

xantrex



TC1012	10A-12V
TC1512	15A-12V
TC2012	20A-12V
TC3012	30A-12V
TC4012	40A-12V
TC5012	50A-12V
TC6012	60A-12V
TC1524	15A-24V
TC2024	20A-24V
TC3024	30A-24V
TC5024	50A-24V

Owner's Guide

TRUECHARGE™²

Series Battery Charger

www.xantrex.com

Truecharge™ 2 Series Battery Chargers

Owner's Guide

About Xantrex

Xantrex Technology Inc. is a world-leading supplier of advanced power electronics and controls with products ranging from small mobile units to utility-scale systems for wind, solar, batteries, fuel cells, microturbines, and backup power applications in both grid-connected and stand-alone systems. Xantrex products include inverters, battery chargers, programmable power supplies, and variable speed drives that convert, supply, control, clean, and distribute electrical power.

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About This Guide

Purpose

The purpose of this Owner's Guide is to provide explanations and procedures for operating, maintaining, and troubleshooting the Xantrex™ Truecharge™ 2 Series Battery Charger.

Scope

The Guide provides safety and operating guidelines as well as information about troubleshooting the unit. It does not provide details about particular brands of batteries. Please consult individual battery manufacturers for this information.

Audience

The Guide is intended for users and operators of the Xantrex™ Truecharge™ 2 Series Battery Charger. If a professional installer is used, the installer should be a certified technician or electrician and should use the Truecharge™ 2 Battery Charger Installation Guide (doc. part number: 975-0402-01-01).

Organization

This Guide is organized into three chapters and one appendix.

Chapter 1 describes the standard features of a Truecharge™ 2 Battery Charger, as well as its protection features. It also provides information on the different parts of the Truecharge™ 2 Battery Charger including information on the optional remote panel.

Chapter 2 describes the operating states and provides procedures for charging a battery and performing an equalization.

Chapter 3 contains information and procedures for troubleshooting your Truecharge™ 2 Battery Charger.

Appendix A contains physical, electrical performance, and regulatory approval specifications for the Truecharge™ 2 Battery Charger.

Conventions Used

The following conventions are used in this guide.



WARNING

Warnings identify conditions or practices that could result in personal injury or loss of life.



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or other equipment.

Important: These notes describe things which are important for you to know, but not as serious as a caution or warning.

This Guide contains information for 11 product models of the Xantrex™ Truecharge™ 2 Series Battery Charger.

The 12V models are: TC1012, TC1512, TC2012, TC3012, TC4012, TC5012, and TC6012. When being referred to individually, the product will be referred to by its model name.

The 24V models are: TC1524, TC2024, TC3024, and TC5024. When being referred to individually, the product will be referred to by its model name.

When all models are being referred to, they will be referred to as Truecharge™ 2 Battery Chargers.

Related Information

You can find more information about Xantrex Technology Inc. as well as its products and services at www.xantrex.com

Important Safety Instructions

READ AND SAVE THIS OWNER'S GUIDE FOR FUTURE REFERENCE.

This chapter contains important safety, installation, and operating instructions for the Xantrex™ Truecharge™ 2 Series Battery Chargers.

1. Before installing and using a Truecharge™ 2 Battery Charger, read all instructions and cautionary markings on a Truecharge™ 2 Battery Charger unit, the batteries, and all appropriate sections of this guide.



CAUTION: Risk of injury

To reduce the risk of injury, charge only properly rated (such as 12 V and 24 V) lead-acid (GEL, AGM, Flooded, or lead-calcium) rechargeable batteries. Other battery types may burst, causing personal injury and damage.

-
2. Do not expose the Truecharge™ 2 Battery Charger to rain, snow, spray, or bilge water. To reduce risk of fire hazard, do not cover or obstruct the air intake vent openings. Do not install the Truecharge™ 2 Battery Charger in a zero-clearance compartment. Overheating may result.
 3. This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

4. To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the Truecharge™ 2 Battery Charger with damaged or substandard wiring.
5. The use of any attachments not recommended or sold by Xantrex, may result in risk of fire, electric shock, or injury to persons.
6. Do not operate the Truecharge™ 2 Battery Charger if it has received a sharp blow, been dropped, has cracks or openings in the enclosure (especially when the fuse cover has been damaged and will not close), or otherwise damaged in any other way. If the Truecharge™ 2 Battery Charger is damaged, see the Warranty section.
7. Do not disassemble the Truecharge™ 2 Battery Charger—there are hazardous voltages within. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the Truecharge™ 2 Battery Charger yourself may result in a risk of electrical shock or fire and will void your warranty. Internal capacitors remain charged after all power is disconnected.
8. To reduce the risk of electrical shock, disconnect both AC and DC power from the Truecharge™ 2 Battery Charger before attempting any maintenance or cleaning or working on any circuits connected to the Truecharge™ 2 Battery Charger. Turning off using the on/standby button on the remote panel will not reduce this risk.
9. The Truecharge™ 2 Battery Charger must be provided with equipment-grounding conductors connected to the AC and input ground, and from chassis to the DC ground.

**WARNING: Explosion hazard**

10. Working in the vicinity of lead-acid batteries is dangerous. Batteries generate explosive gases during normal operation. Therefore, it is of utmost importance that each time before servicing the unit in the vicinity of the battery, that you read this manual and follow the instructions exactly.
11. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of any unit you intend to use in the vicinity of the battery. Review cautionary markings on these products and on the engine

Personal Precautions When Working With Batteries

**WARNING: BATTERIES PRESENT RISK OF ELECTRICAL SHOCK, BURN FROM HIGH SHORT-CIRCUIT CURRENT, FIRE OR EXPLOSION FROM VENTED GASES. OBSERVE PROPER PRECAUTIONS.**

1. Have someone within range of your voice or close enough to come to your aid when you work near a lead-acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear proper, non-absorbent gloves, complete eye protection, and clothing protection. Avoid touching your eyes and wiping your forehead while working near batteries.

4. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.
5. Never smoke or allow a spark or flame near the engine or batteries.
6. Use extra caution to reduce the risk of dropping a metal tool on the battery. It could spark or short circuit the battery or other electrical parts and could cause an explosion.
7. Remove all personal metal items, like rings, bracelets, and watches when working with batteries. Batteries can produce a short circuit current high enough to weld metal to skin, causing a severe burn.
8. If you need to remove a battery, always remove the ground terminal from the battery first. Make sure all accessories are off so you don't cause an arc.
9. Never charge a frozen battery.

PREPARING TO CHARGE

10. Make sure the area around the battery is well ventilated.
11. Make sure the voltage of the batteries matches the output voltage of the battery charger.
12. Clean battery terminals. Be careful to keep corrosion from coming into contact with your eyes and skin.
13. Study and follow all of the battery manufacturer's specific precautions, such as removing or not removing cell caps while charging, whether equalization is acceptable for your battery, and recommended rates of charge.
14. Add distilled water in each cell until battery acid reaches the level specified by the battery manufacturer. This helps to purge excessive gas from cells. Do not overfill. For a battery without removable cell caps, carefully follow manufacturer's instructions.

BATTERY CHARGER LOCATION

15. Locate the Truecharge™ 2 Battery Charger unit away from batteries as practical in a well ventilated compartment.
16. Never place the Truecharge™ 2 Battery Charger unit directly above batteries; gases from a battery will corrode and damage the charger
17. Never allow battery acid to drip on the charger when reading gravity, or filling battery.
18. Do not operate the charger in a closed in area, or restrict the ventilation in any way.
19. Do not place a battery on top of the charger.
20. For North American marine installations, external connections to the charger shall comply with the United States Coast Guard Electrical Regulations (33CFR183, Sub Part I).

FCC Information to the User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

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1

Introduction

Chapter 1 describes the standard features of a Truecharge™ 2 Battery Charger, as well as its protection features. It also provides information on the different parts of the Truecharge™ 2 Battery Charger including information on the optional remote panel.

Truecharge™ 2 Battery Charger

The Truecharge™ 2 Battery Charger ships with the following items.

- one Truecharge™ 2 Battery Charger unit
 - installation and operation guides
 - rubber boots for DC terminals
 - ring terminals, nuts, and washers
 - integrated strain relief clamp for AC input cables
-

Standard and Protection Features

The Truecharge™ 2 Battery Charger provides the following standard features:

- three¹ full current rated outputs
- battery monitoring functions while in float mode or rest mode
- correct charging voltage for your batteries when connected to almost any single phase AC power outlet in the world
- low electromagnetic interference (EMI)
- automatic charge resumption after AC power interruption
- programmable custom charge sequence²
- fully discharged battery charging³
- an optional remote panel⁴ which can be mounted up to 15 m (50 ft) away for remote control and monitoring.
- an optional battery temperature sensor⁵ (BTS) provides battery temperature voltage compensation from -25 to 70 °C (-13 to 158 °F)

1. Model TC1012 has one output and model TC1512 has two outputs. All other models have three outputs. Each output (for models with 2 or 3 outputs) can charge different batteries that either have the same chemistry or can tolerate the same charge sequence.

2. The charger can be programmed with custom charge setpoints using PC interface. This programming can only be done using a special configuration tool operated by Xantrex or a designated OEM.

3. The charger can initiate charging a non-damaged but zero voltage battery.

4. Part number: 808-8040-00

5. Part number: 808-0232-01

The Truecharge™ 2 Battery Charger provides the following protection features:

- reverse polarity protection via an output fuse to guard against reverse battery polarity
- AC input out-of-range protection shutdown
- ambient over temperature protection shutdown
- battery over-charging protection
- electronic current limiting provides protection against short circuit conditions on the charger's output
- ignition protected rating, enabling installation in engine spaces
- isolated design
- over temperature and short circuit protection for the BTS and communication connector ports
- drip-proof rubber boots for DC terminals for added moisture protection
- IP-32 drip protection rating¹
- fan lockout protection

The optional Battery Temperature Sensor (BTS) provides these protection features:

- battery under temperature charging protection preventing battery charging at -20 °C or below
- charging current compensation for different battery temperatures

1. In two specific installation orientations—see Truecharge™ 2 Battery Charger Installation Guide (doc. part number: 975-0402-01-01) Battery Charger Mounting Orientations on page 2–7.

Truecharge™ 2 Battery Charger

This section describes the different parts of the Truecharge™ 2 Battery Charger.

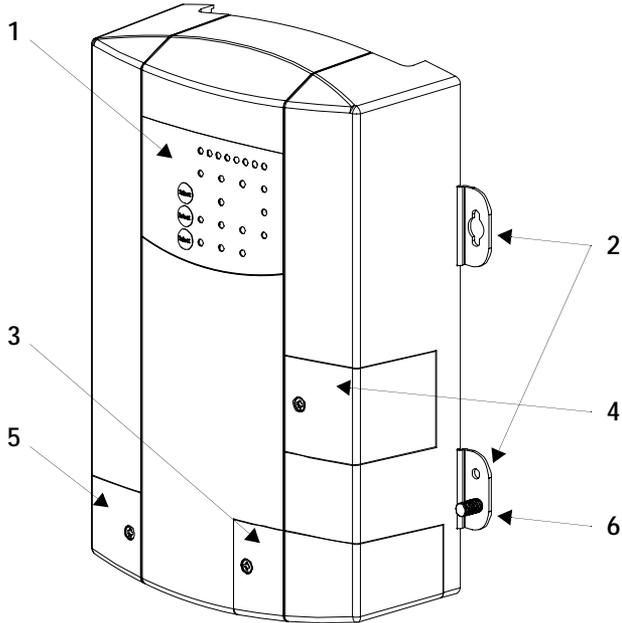


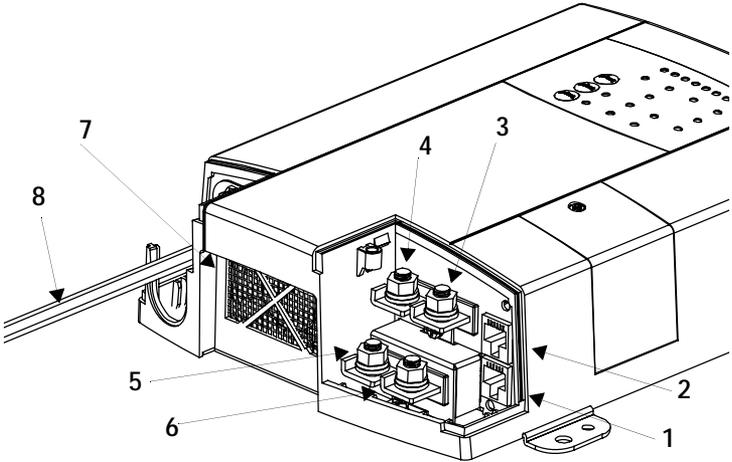
Figure 1-1 Truecharge™ 2 Battery Charger

Item	Description
1	Onboard control and status display panel or simply onboard display (see “Rear Panel” on page 1–6 for more information) for controlling the Truecharge™ 2 Battery Charger settings and for monitoring charger status and charging current.
2	Mounting flanges are used to permanently install the product.
3	DC wiring compartment cover protects the DC terminals, as well as the communication and BTS ports. Remove and replace when installing cables.

Item	Description
4	Fuse access panel cover provides access to the DC fuse in the event of an accidental reverse polarity installation.
5	AC wiring compartment cover provides the installer with easy access to the AC wiring compartment, to allow for a trouble free installation. Remove and replace when installing the product.
6	DC ground stud for connecting the charger's chassis to ground.

Rear Panel

This section describes the parts of the rear panel of the Truecharge™ 2 Battery Charger.



40 A model (TC4012) shown. Other models may vary.

Figure 1-2 Truecharge™ 2 Battery Charger Rear Panel

Item	Description
1	BTS port - battery temperature sensor port
2	Communication port - remote panel port
3	Battery positive (+) for bank 3 (6 mm stud)
4	Battery positive (+) for bank 2 (6 mm stud)
5	Battery positive (+) for bank 1 (6 mm stud) See Important note below.
6	Battery negative (-) , common for all three banks (6 mm stud) (common for both banks in model TC1512) (model TC1012 has a single bank only—one positive terminal and one negative terminal)

Item	Description
7	Air intake vent - located inside is the fan assembly
8	AC wiring - line, neutral, and ground input wires

Important: When installing only a single bank (or one battery) for Truecharge™ 2 Battery Chargers that have multiple outputs, positive bank 1 must be utilized. Bypassing bank 1 and using any of the other banks (bank 2 or bank 3) may render the charger to function improperly.

Onboard Control and Status Display Panel

This section describes the parts of the onboard control and status display panel of the Truecharge™ 2 Battery Charger.

Important: A “press and hold” action on any panel button means that the button must be held down for more than three seconds then released in order to send the instruction. A “press” action on any panel button means that the button must be pressed and released before two seconds have elapsed.

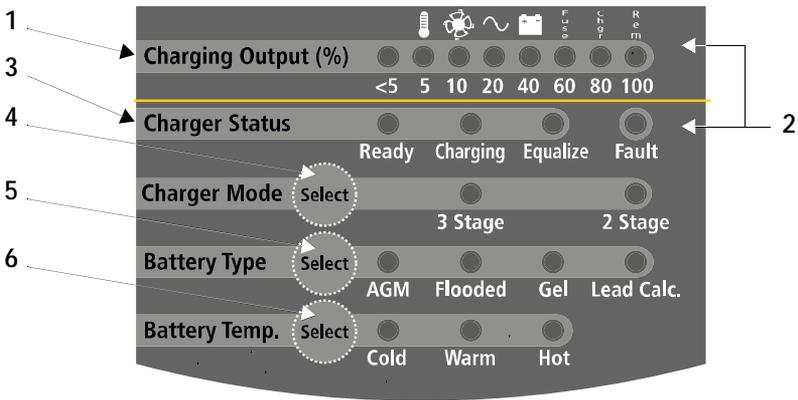


Figure 1-3 Onboard Control and Status Display Panel

To reduce current draw from the connected battery when AC power is not present, the panel’s LED control and status lights are automatically turned off and the buttons are disabled.

Item	Description
1	<p>Charging Output (%) LEDs</p> <ul style="list-style-type: none"> • The LEDs illuminate like a progress bar displaying the present total output charge current as a percentage of the set maximum charge current. The numbers below the LEDs represent the percentage values. See Figure 1-4 on page 1–11. • A single LED may flash intermittently in combination with a solid Fault LED (indicating a fault) or with a flashing Fault LED (indicating a warning). The icons above the LEDs represent the various types of fault and warning conditions. See Figure 1-4 on page 1–11.
2	<p>Fault LED</p> <p>The LED may illuminate a solid light (indicating a fault) or flash intermittently (indicating a warning) in combination with flashing Charging Output (%) LEDs. See Table 1-1, “Fault and Warning Indicators” on page 1–11 for details.</p>
3	<p>Charger Status LEDs</p> <p>Displays the current status of the charger.</p> <ul style="list-style-type: none"> • Ready - a solid light indicates batteries are fully charged and in rest stage. • Ready and Charging - solid lights indicate batteries are fully charged and in float stage. • Charging - a solid light indicates charger is performing a normal charge cycle. • Equalize - a solid light indicates that the charger is performing an equalization cycle. - a flashing light indicates that the equalization cycle will begin after the absorption stage is done.
4	<p>Charger Mode Select button</p> <ul style="list-style-type: none"> • Press and hold the button for three seconds to select either of two settings. An indicator LED corresponds to each setting. Each setting optimizes the charging sequence differently in charging the batteries by stages. <ul style="list-style-type: none"> • Three-stage - Bulk, Absorption, and Float; default setting • Two-stage - Bulk and Absorption only • When setting or cancelling an Equalization program: Press and hold both the Battery Temp. Select and Charger Mode Select buttons.

Item	Description
5	<p data-bbox="192 201 501 228">Battery Type Select button</p> <p data-bbox="192 235 926 326">Press and hold the button for three seconds to select either of five settings. An indicator LED corresponds to each setting. Each setting maximizes charger performance for its corresponding battery type.</p> <ul data-bbox="192 332 926 516" style="list-style-type: none"><li data-bbox="192 332 732 360">• AGM - Absorbent Glass Mat lead-acid battery<li data-bbox="192 367 700 394">• Flooded - Lead-acid battery; default setting<li data-bbox="192 401 589 428">• GEL - Gel-type lead-acid battery<li data-bbox="192 435 604 462">• Lead Calc. - Lead-calcium battery<li data-bbox="192 469 926 516">• Custom - If a custom battery type has been programmed then all LEDs will illuminate
6	<p data-bbox="192 539 514 566">Battery Temp. Select button</p> <ul data-bbox="192 573 937 915" style="list-style-type: none"><li data-bbox="192 573 937 695">• Press and hold the button for three seconds to select one of three settings. An indicator LED corresponds to each setting. Each setting will change the charger's internal threshold to compensate for variance in battery voltage due to a change in temperature.<ul data-bbox="229 701 815 823" style="list-style-type: none"><li data-bbox="229 701 777 729">• Cold - for battery temperature below 5 °C (41 °F)<li data-bbox="229 735 815 792">• Warm - for battery temperature between 5 and 30 °C (41 and 86 °F); default setting<li data-bbox="229 799 777 823">• Hot - for battery temperature above 30 °C (86 °F)<li data-bbox="192 829 908 915">• When setting or cancelling an Equalization program: Press and hold both the Battery Temp. Select and Charger Mode Select buttons.

The Fault LED works in conjunction with the Charging Current (%) LEDs. The icons at the top row above the Charging Current (%) LEDs represent the various types of fault and warning conditions. For example, a temperature warning is represented by a thermometer icon.

The Charging Current (%) LEDs will normally illuminate as a solid progress bar when they are indicating the amount of output charging current. If any of the LEDs start to flash intermittently at the same time that the Fault LED is either solid or flashing, a fault or warning condition is indicated.

Important: A warning condition notifies the user of an impending problem and will not stop the charger from charging, while a fault condition will stop the charger from charging the battery.

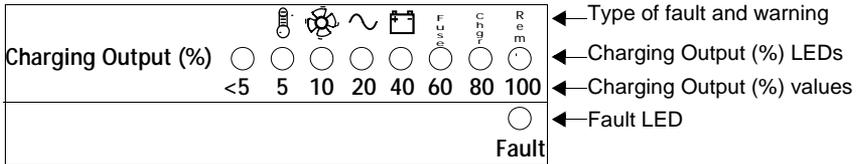


Figure 1-4 Charging Output (%) and Fault LEDs

Table 1-1 on page 1–11 summarizes the various fault conditions that might occur during the operation of the charger. For suggestions in what to do after a fault condition is detected, see Truecharge™ 2 Battery Charger Installation Guide (doc. part number: 975-0402-01-01) on Table 3-1, “Interpreting Fault and Warning Indicators” on page 3–4 in Chapter 3, “Troubleshooting”.

Table 1-1 Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse 	Charger 	Remote 	Fault
High Battery Temp warning (>50°C) See Figure 1-6.								
High Battery Temp fault (>70°C) See Figure 1-6.								
Low Battery Temp warning (<0°C) See Figure 1-6.								



Table 1-1 Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F u s e	Charger C h g r	Remote R e m	Fault 
Low Battery Temp fault (< -25°C) See Figure 1-6.								
AC input out of range Warning (<104V and >90V) or (<264V and >255V) See Figure 1-5.								
AC input out of range fault (<90V or >265V) See Figure 1-5.								
AC frequency out of range fault (<45 Hz or >65 Hz)								
High Battery voltage fault (>16.6V)								
High Charger Temp warning (>50°C)								
High Charger Temp fault (>70°C)								
Locked Fan fault								
Loss of Remote Connection warning								

 Flashing LED  Solid LED

Table 1-1 Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F U S E 	Charger C H G E R 	Remote R E M 	Fault 
Reverse Polarity Fuse fault								
Internal fault								

 Flashing LED  Solid LED

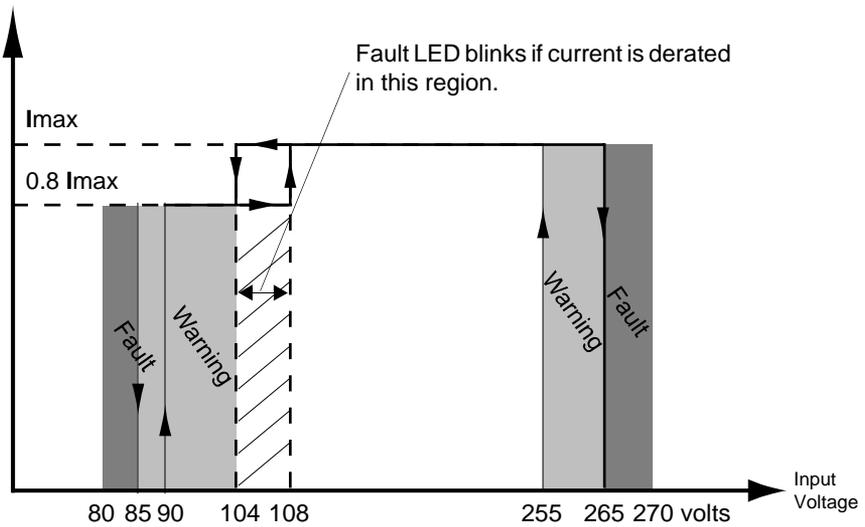


Figure 1-5 Input Voltage Operating and De-rating Curve

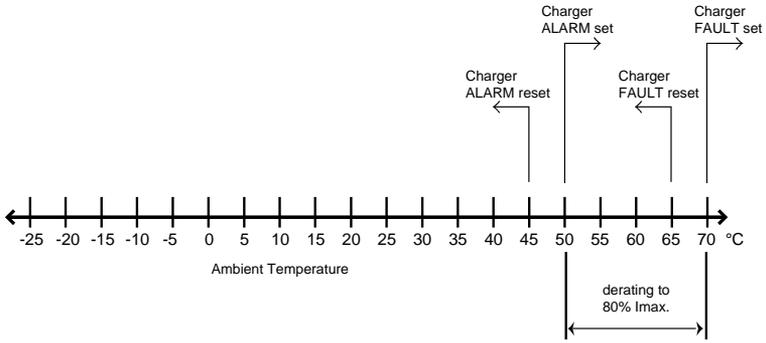


Figure 1-6 Battery and Charger Temperature Thresholds

Remote Panel (Sold Separately)

This section describes the parts of the optional remote panel (Part number: 808-8040-00) of the Truecharge™ 2 Battery Charger. The remote panel can be mounted using a communications cable up to 15 m (50 ft) from the Truecharge™ 2 Battery Charger connected via the communication port for convenience.

Important: A “press and hold” action on any panel button means that the button must be held down for more than three seconds then released in order to send the instruction. A “press” action on any panel button means that the button must be pressed and released before two seconds have elapsed.

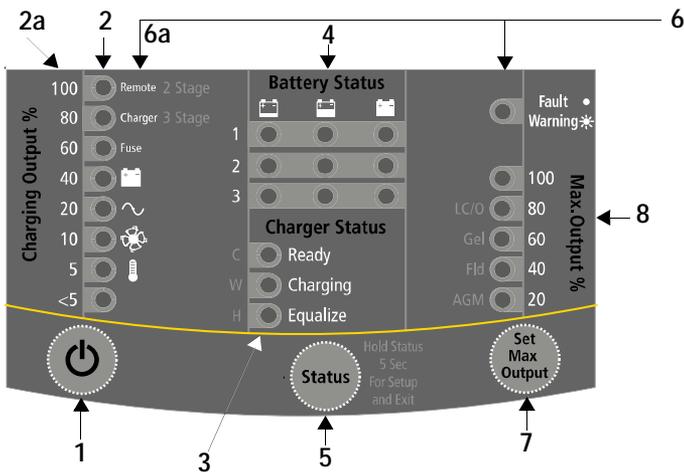


Figure 1-7 Truecharge™ 2 Battery Charger Remote Panel (optional)

The Remote Panel can be used to:

- Program the charger for battery type and temperature
- Set the charger mode (two or three-stage charging)
- Activate and terminate equalization (not allowed for GEL and AGM)

- Limit the maximum charger output current (20, 40, 60, 80, and 100% of charger rating) to lower the current drawn from the generator or AC source
- Set the charger to ON or on STANDBY
- Set or cancel an equalization cycle
- Display faults and warnings
- Display basic battery level and settings

Item	Description
1	<p data-bbox="187 500 418 526">ON/STANDBY Button</p> <ul data-bbox="187 532 934 716" style="list-style-type: none">• Press to enable or disable the charger while AC power is connected.• When in Setup Mode: Press to select the Charger Mode: two or three-stage.• To set or cancel an Equalization program: Press and hold both the Status and ON/STANDBY buttons for more than five seconds.
2	<p data-bbox="187 740 511 766">Charging Output (%) LEDs</p> <ul data-bbox="187 773 938 1118" style="list-style-type: none">• The LEDs illuminate a progress bar displaying the present total output charge current as a percentage of the maximum charge current. The numbers below the LEDs represent the percentage values. See 2a on Figure 1-7 on page 1–15. NOTE: The charger maximum current can be set using the Remote Panel.• An LED may flash intermittently in combination with a solid Fault LED to indicate a fault or with a flashing Fault LED to indicate a warning condition. The icons on the right side of the LEDs represent different types of faults and warnings. See 6a on Figure 1-7 on page 1–15.

Item	Description
3	<p>Charger Status LEDs Displays the present status of the charger.</p> <ul style="list-style-type: none"> • Ready - a solid light indicates that all batteries are fully charged and in rest stage. • Ready and Charging - solid lights indicate that batteries are fully charged and in float stage. • Charging - a solid light indicates that the charger is performing a normal charge cycle. • Equalize - a solid light indicates that the charger is performing an equalization cycle. - a flashing light indicates that the equalization cycle will begin after the absorption stage is done.
4	<p>Battery Status LEDs Displays the present status of each battery (or each battery bank). Each row represents the battery (or battery bank) number designation—1, 2, or 3. Each column represents Low, Medium, or Full battery capacity. NOTE: This feature is available only on the Remote Panel.</p>
5	<p>Status Button</p> <ul style="list-style-type: none"> • Press and hold to enter or exit Setup Mode. • When in Setup Mode: Press to select the Battery Temperature: <u>C</u>old, <u>W</u>arm, or <u>H</u>ot. • When setting or cancelling an Equalization program: Press and hold both the Status and ON/STANDBY buttons.
6	<p>Fault/Warning LED The LED displays a solid light to indicate a fault condition or flashes intermittently in combination with a flashing Charging Output (%) LED to display a warning condition (6a). See Table 1-1, “Fault and Warning Indicators” on page 1–11 for details.</p>
7	<p>Set Max Output Button</p> <ul style="list-style-type: none"> • Press to select the desired maximum charging output current. NOTE: This feature is available only on the Remote Panel. • When in Setup Mode: Press to select the Battery Type: AGM, Flooded, GEL, Lead-Calcium/OEM
8	<p>Max. Output (%) LED The LED illuminates a solid light corresponding to the Maximum Charger Output % setting.</p>

2 Operation



WARNING

The battery charger must be properly installed with in accordance with all local and application-specific codes and ordinances before it is used. For installation instructions, see Truecharge™ 2 Battery Charger Installation Guide (doc. part number: 975-0402-01-01).

Chapter 2 describes the operating states and provides procedures for charging a battery and performing an equalization.

It covers the following:

- “About Truecharge™ 2 Battery Charger” on page 2–2
 - “Charging Batteries” on page 2–8
 - “Equalizing Flooded Batteries” on page 2–10
 - “Transitioning the Truecharge™ 2 Battery Charger to ON, Standby, or Disabled” on page 2–13
 - “Accessing Charger Information” on page 2–14
-

About Truecharge™ 2 Battery Charger

Most Truecharge™ 2 Battery Charger models have three outputs that share the full rated current enabling it to charge three different batteries or battery banks that either have the same chemistry or can tolerate the same charge sequence and thresholds. Model TC1012 has only one output while model TC1512 has two outputs that share the full rated current output. The Truecharge™ 2 Battery Charger can perform either three-stage charging (Bulk, Absorption, and Float) or two-stage charging (Bulk and Absorption).

Important: The battery banks are not galvanically isolated from each other. They share a common negative as shown in the diagram below. The negative bus to chassis connection as shown below may not be suitable in some applications.

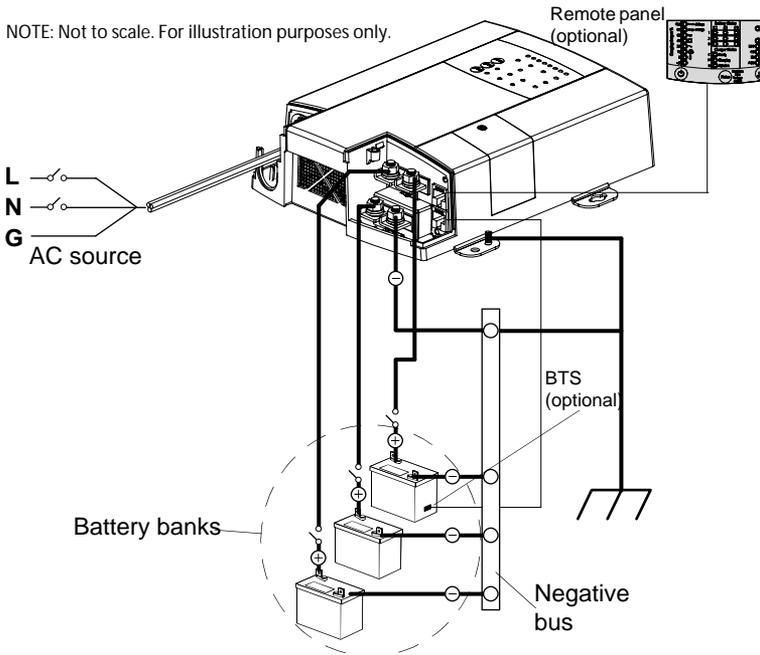


Figure 2-1 Typical Three-Battery Installation

Three-Stage Charging

The three-stage charging mode employs the following sequence: **Bulk**, **Absorption**, and **Float**. During the Bulk stage the batteries are accepting a constant maximum current. In the Absorption stage, the battery voltage is held constant and the current declines. A battery will “gas” (produce hydrogen and oxygen) when its voltage exceeds the “gassing” voltage. Finally, in the Float stage, the charger continues to provide voltage at a lower level to maintain the battery in a fully charged state. If there is no load on the battery, it will typically draw very little current. The charger, however, is able to provide current to its full rating to power auxiliary DC loads on the battery.

The charger will restart the charging cycle in the Bulk stage if the lowest battery voltage of the three banks drops below 12.5 V (12 V chargers) or 25 V (24 V chargers) for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

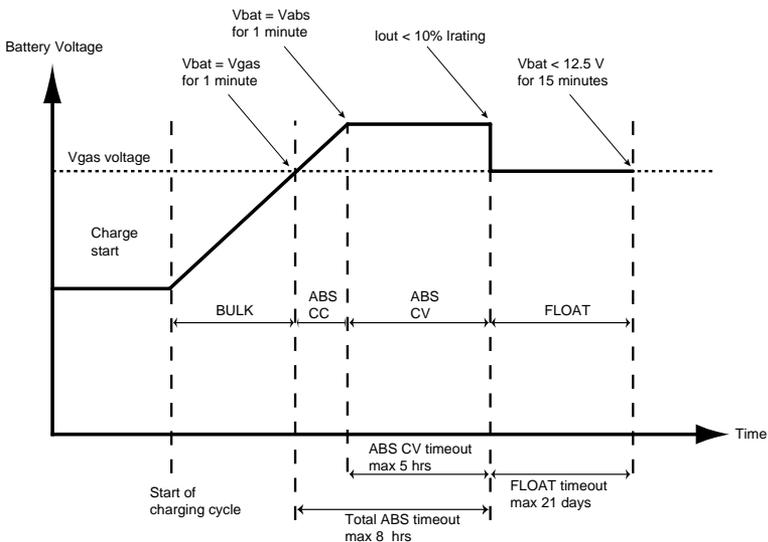


Figure 2-2 Three-Stage Charging Process

Two-Stage Charging

The two-stage charging mode employs the following sequence: **Bulk and Absorption**. It runs similar to the three-stage sequence except that there is no float stage; after the absorption stage the charger stops providing voltage and current to the battery and enters a “rest or standby stage.” Like the three-stage sequence, the charger will restart the charging cycle in the Bulk stage if the lowest battery voltage of the three banks drops below 12.5V (12 V chargers) or 25 V (24 V chargers) for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

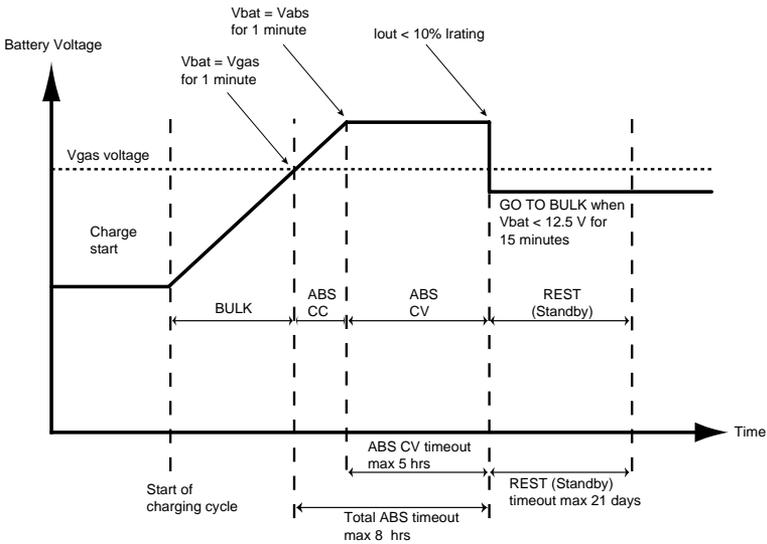


Figure 2-3 Two-Stage Charging Process

Charging Voltage Setpoints

The Truecharge™ 2 Battery Charger charging process enables the battery or battery banks to reach the following voltage setpoints.

Table 2-1 Charging Maximum Voltages for 12 V Chargers

Battery Type	Bulk/ Absorption (Volts)	Float (Volts)	Equalization (Volts)
Flooded	14.4	13.5	16.0
GEL	14.2	13.8	not applicable
AGM	14.3	13.4	not applicable
Lead-Calcium	15.5	13.5	16.0

Table 2-2 Charging Maximum Voltages for 24 V Chargers

Battery Type	Bulk/ Absorption (Volts)	Float (Volts)	Equalization (Volts)
Flooded	28.8	27.0	32.0
GEL	28.4	27.6	not applicable
AGM	28.6	26.8	not applicable
Lead-Calcium	31.0	27.0	32.0

Charging Overview

The Truecharge™ 2 Battery Charger will perform a battery qualification on each application of AC, to determine if battery banks are present and healthy.

To force a battery detection sequence,

1. Turn off AC.
2. Wait approximately 20 seconds or until all lights on the charger or remote have gone out.
3. Turn on AC.
The charger will then perform a battery detection when AC is reapplied

The Truecharge™ 2 Battery Charger charges all banks at the same time but the bank in most need of charging is the one that receives the most charge. For example, if Bank 1 and Bank 2 are both charged, but Bank 1 has a load and Bank 2 does not, then the charger may rarely charge Bank 2.

Measuring Battery Voltage at Charger Terminals

Use a voltmeter that has a stated accuracy of 0.5% or better on DC voltage. Place the probes of the meter directly on the studs or plates of the charger terminals. Do not probe on the wire lugs or other places in the battery wiring system as this will introduce error into the measurement: the charger monitors battery voltage as measured at the charger terminals. Battery voltage should be measured when the battery is resting, i.e., on the second stage of charging.

Temperature Considerations

Xantrex strongly recommends that you purchase and install the optional Battery Temperature Sensor (BTS) to protect your battery and improve charging accuracy. Attach the BTS to the warmest battery.

If no BTS is connected, the charger defaults to the Battery Temp. selection on the onboard display and remote panel.



WARNING: Fire hazard and battery damage

Ensure that the battery temperature setting (Cold, Warm, or Hot) is set to the environment where the battery will be installed. If the temperature is set incorrectly, battery damage, and possible fire may occur because of overcharging.

Important: When the Truecharge™ 2 Battery Charger is operating, fans and lights (DC loads) may vary in speed or intensity. This is normal. The Truecharge™ 2 Battery Charger will not harm any load connected to it as long as there is a battery present on that bank and the load can withstand the maximum voltage of 16 V.

Charging Batteries

Before you start to charge batteries read the “Important Safety Instructions” on page v and follow all safety precautions when working with batteries.

To charge your batteries:

1. If possible, disconnect all loads from the battery, by opening disconnect switches or by switching the loads off.
2. Ventilate the area around the battery thoroughly.
Review the charging instructions supplied by the manufacturer of your batteries and follow all safety precautions and the required steps.
3. Apply AC power to the Truecharge™ 2 Battery Charger by: closing the AC breaker or turning the generator on.
All onboard display indicator LEDs will illuminate for one second (power on test) as the initialization sequence runs. After initialization, the indicator LEDs will display present status and settings.
During charging, the Charging Output (%) LEDs will show the total current being delivered to the battery bank as well as any DC load applied. The charger fan may activate as well.
4. After charging is completed, re-connect all loads to the battery.

See table next.

The batteries can be in one of eight different modes which will be indicated on the onboard display in the Charger Status LEDs:

Mode	Charger Status LED—ON
Bulk	Charging
Absorption	Charging
Rest (two-stage charging)	Ready
Float (three-stage charging)	Ready and Charging
Equalize (in progress)	Equalize (solid light)
Equalize (waiting for absorption to end)	Equalize (flashing)
Fault	Fault ^a (solid light)
Warning	Fault ^a (flashing)

a. In combination with one or more flashing Charging Output % LEDs.

After charging is complete, the Truecharge™ 2 Battery Charger enters into one of these modes:

Float mode When the ready and charging indicator LEDs both illuminate, all batteries are fully charged and ready for use. If you selected the three-stage charging mode, the Truecharge™ 2 Battery Charger is in float mode and will maintain the batteries' charge.

Rest mode Or Standby mode. If you selected the two-stage charging mode, the ready indicator LED shows the charger is now in rest mode and is checking battery voltage and elapsed time since the last charge cycle.

With either charging mode, the Truecharge™ 2 Battery Charger will begin a charging cycle 21 days after the last completed cycle, or when battery voltage drops to below 12.5 V (12 V chargers) or 25 V (24 V chargers) for 15 minutes.

Equalizing Flooded Batteries

About Equalization



CAUTION: Risk of battery damage

The Truecharge™ 2 Battery Charger will only equalize flooded lead-acid or lead-calcium batteries. It does not enter equalization when the battery type is set to sealed lead-acid batteries (GEL or AGM) since they will be damaged by this process. Use the correct settings for your battery types.

In the following conditions the Truecharge™ 2 Battery Charger will not enter equalization mode:

- the battery type is set to GEL or AGM
- any battery is not fully charged (all three battery banks must be charged to float or rest stage before equalization can be activated on any bank)
- there is an active fault on the battery you are trying to charge

Xantrex recommends that you run a normal charge cycle on the batteries before you equalize them.



WARNING: Explosion hazard

During equalization, the battery generates explosive gases. Follow all the battery safety precautions listed in this guide. Ventilate the area around the battery using brushless AC ventilators thoroughly and ensure that there are no sources of flame or sparks in the vicinity.



CAUTION: Risk of battery damage

The Truecharge™ 2 Battery Charger cannot automatically determine when to stop the equalization of a battery. You must monitor the battery specific gravity throughout equalization to determine the end of the equalize cycle. The one hour time-out is intended as a safety feature to require the user to continually re-activate it as necessary after checking batteries manually, but may not be sufficiently short to prevent battery damage.

Performing An Equalization



CAUTION: Risk of equipment damage

Turn off or disconnect all DC loads on the battery during equalization. The voltage applied to the battery during equalization may be above safe levels for some loads but the absolute maximum is 16 V for 12 V chargers and 32 V for 24 V chargers within operational temperature range.

If this level of equalization voltage does not comply with the battery manufacturer's recommendation, **DO NOT EQUALIZE**.



WARNING: Risk of fire, burn, or explosion

Use proper precaution when working with batteries. Wear proper, non-absorbent gloves, complete eye protection, and clothing protection. Avoid touching your eyes and wiping your forehead while working near batteries.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.

To equalize your batteries:

Important: Remember that all connected batteries will undergo the equalization. If only one bank is intended to undergo equalization then the other banks must be disconnected prior to equalization.

1. Check the battery electrolyte level. If necessary, refill with distilled water only. All the cells should have similar electrolyte levels. If the levels are widely different, it will influence the relative concentration of acid, thereby affecting the specific gravity measurements.
2. Verify that all banks are in either float or rest mode before programming or initiating an equalize cycle.

Important: If equalization is programmed prior to float or rest mode, the Equalize LED will flash and equalization will start prior to reaching float or rest mode.

3. Press and hold for five seconds the Charger Mode Select button and Battery Temp Select button at the same time to put the Truecharge™ 2 Battery Charger into equalization mode.
-

Important: The onboard display and remote panel buttons will not allow selection of equalization for AGM and GEL batteries.

When the charger is performing the equalization, the Equalize LED illuminates as a solid light. It will flash intermittently when programmed prior to reaching float or rest mode.

4. Monitor the specific gravity of each cell of the battery during equalization with a battery hydrometer.
-

Note: The equalization cycle is preset to last for one hour. It is not possible to program another equalization cycle when the present cycle has not ended yet.

Carefully check the specific gravity of each cell and repeat the equalization cycle until they all meet the battery manufacturer's specifications for specific gravity or until the specific gravity stabilizes relative to each other for an hour.

The charger automatically exits equalization to float mode or rest mode after one cycle. To manually exit equalization mode early, repeat Step 3.

5. Check the battery electrolyte level. If necessary, refill with distilled water only and repeat a normal charge cycle.

Transitioning the Truecharge™ 2 Battery Charger to ON, Standby, or Disabled

There are two ways to turn ON the Truecharge™ 2 Battery Charger:

- Connect the batteries to the charger (i.e., charger is on standby) then connect AC power at the source (charging begins) or
- Press ON/STANDBY on the remote panel while batteries and AC power are both connected to the charger (from Standby).

The charger begins to charge the batteries from Standby.

There are two ways to put the Truecharge™ 2 Battery Charger in Standby (see Warning below):

- Disconnect AC power at the source (i.e., only the batteries are connected) or
- Press ON/STANDBY on the remote panel while batteries and AC power are both connected to the charger (from ON).

The charger stops charging but continues to monitor the batteries.



WARNING: Shock hazard

The Truecharge™ 2 Battery Charger contains hazardous voltages while in Standby. Even when AC power is removed, if the Truecharge™ 2 Battery Charger is connected to a battery on bank 1, the charger will be energized by the battery. The Truecharge™ 2 Battery Charger is de-energized completely only after all AC and DC sources have been disconnected for five minutes.

There is only ONE way to safely turn the Truecharge™ 2 Battery Charger off (Disable):

- ◆ Disconnect the AC power at the source and disconnect all DC batteries.

This is the only state where the Truecharge™ 2 Battery Charger is completely de-energized.

When the Truecharge™ 2 Battery Charger is disabled, the optional remote panel is inactive.

Accessing Charger Information

The Truecharge™ 2 Battery Charger provides a lot of information about the status of the charger and the batteries.

Reading Remote Panel and Onboard Display LEDs

The remote panel and onboard display panel show what is happening during the charging process and are also helpful in troubleshooting. Refer to Chapter 3, “Interpreting Fault and Warning Indicators” on page 3–5 for information about interpreting the onboard display panel (and the optional remote panel, if installed) indicator LEDs.

Reporting While Charging or Equalizing

After configuring the charger and during charging the remote panel (and the optional remote panel, if installed) will show the following information about the charger and the battery:

- Charging Output Current
- Charger Status
- Battery Status (optional Remote Panel only)

If there is a fault or warning related to one of the banks, the fault or warning information will display in the form of illuminating or flashing Fault indicator LEDs. Charging for all banks will stop and will only resume once the fault condition is cleared.

Reporting Without AC Power or While on Standby

If AC power has been disconnected or if you have used the optional remote panel to place the Truecharge™ 2 Battery Charger on Standby mode, the onboard display (and the optional remote panel, if installed) LEDs will be turned off to conserve battery power. However, present settings and battery status can be viewed momentarily using the procedures below:

From the remote panel:

- ◆ Press the Status button to initialize a view cycle to view the status of the batteries.

The remote panel will turn itself off after 30 seconds of inactivity.

Using A Generator As Source Power

The Truecharge™ 2 Battery Charger can be run from a regular AC power source or from an alternate power source such as a generator. Refer to Appendix A, “Specifications” for AC input current draw to determine the size of generator you need. Many generators provide output voltage that is modified sine wave or modified square wave (MSW) rather than the true sine wave (TSW) that your utility provides.

The Truecharge™ 2 Battery Charger may be used with MSW generators but its lifetime may be reduced somewhat depending on the severity of any peak voltage overshoots, and the severity of waveshape rise times.

3

Troubleshooting

Chapter 3 contains information and procedures for troubleshooting your Truecharge™ 2 Battery Charger.



Care and Maintenance



WARNING: Risk of electric shock

The Truecharge™ 2 Battery Charger contains no user serviceable components. Attempting any kind of service will void your warranty. Contact your dealer or the manufacturer for service information.

The Truecharge™ 2 Battery Charger contains solid-state electronic components that require no maintenance. The best care you can give the charger is to protect it from contact with liquids, spray, or fumes which may cause corrosion and by keeping the air intake vent clean and free from any obstructions.

Disconnect all AC and DC power and using proper gloves clean the outside of the case and wiring with a damp cloth if you suspect it has come in contact with battery fluid, salt water, gasoline or oil, or other corrosive material. Do not operate if the charger contains moisture of any kind.

Periodically, check all DC and AC wiring connections to be sure they have not loosened or deteriorated. Also check all cable clamps to ensure they are tightly fastened.

Loose battery terminals and lugs exposed to open air corrode rapidly. The corrosion appears as a white powder or granular foam on the terminals and any nearby exposed metal parts. If it contacts your skin, it will cause burns unless you rinse it off immediately. Most textiles that are exposed to this corrosive eventually dissolve.

To clean battery terminals:

1. Disconnect all loads and charging sources.
2. Using the appropriate tool, **remove the negative battery cable first** and **re-install it last**.
3. Remove the positive battery cables.



WARNING: Risk of chemical burn

Avoid chemicals coming from the battery to contact with skin. Wear protective clothing like proper gloves and goggles.

4. To remove any stubborn residue, sprinkle baking soda directly on the area, scrub with a wet toothbrush (or other soft-bristle brush), add water as required, and then rinse.
-



CAUTION: Battery damage

Take care not to allow any washing solution to enter the battery filling caps, as any contamination into a cell will chemically damage it.

5. Reconnect the positive battery cable terminals to the battery lugs and tighten.
6. Reconnect the negative battery cable terminals to the battery lugs and tighten.
7. After tightening the cables, evenly coat all the exposed metal surfaces of the battery terminals and lugs with liquid neoprene. If liquid neoprene is not available, use a light coating of anti-corrosion grease or other non-adhesive sealant. Do not let anything come between the mating surfaces of the lugs and terminals.

Indicator LEDs on the Onboard Display Panel and Optional Remote Panel

All indicator LEDs on the Onboard Display panel (and the optional remote panel, if installed) will illuminate for one second when AC (or DC) power is supplied to the Truecharge™ 2 Battery Charger or when the charger is turned on using the ON/STANDBY button on the remote panel. A “power on” test indicates that the charger is now receiving AC power, and all LEDs are functioning.

The Truecharge™ 2 Battery Charger will recover from fault conditions automatically when the cause of the fault or warning has disappeared. In most cases, the charging process should be stopped, allowing either the charger or the battery or both to return within acceptable operating ranges. See Appendix A, “Specifications” for more information on normal operating ranges.

To interrupt or cease the charging process, disconnect the AC power source from the charger. If you have a remote panel, you can put the charger in Standby mode by pressing the ON/STANDBY button to interrupt the charging process.

Table 3-1 Interpreting Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F U S E	Charger C H G E	Remote R E M	Fault 	Solution
High Battery Temp warning (>50°C)									<ul style="list-style-type: none"> • Check the batteries. Do not charge a battery that is rated other than 12 V nominal for all 12 V chargers or 24 V nominal for all 24 V chargers. Check that the battery type and temperature settings match the actual battery and its conditions. • Disconnect the battery (or batteries) to stop charging. • Allow the battery (or batteries) to cool to normal operating temperature. If the temperature increases further, the battery charger will display a fault, and shut down. The battery (or batteries) may become damaged if overheated. See Appendix A, “Specifications”.
 Flashing LED  Solid LED									

Table 3-1 Interpreting Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F U S E	Charger C H G E R	Remote R E M	Fault 	Solution
High Battery Temp fault (>70°C)									<ul style="list-style-type: none"> • Check the batteries. Do not charge a battery that is rated other than 12 V nominal for all 12 V chargers or 24 V nominal for all 24 V chargers. Check that the battery type and temperature settings match the actual battery and its conditions. • Disconnect or turn off other charging sources such as the alternator or the charger on a generator with electric start. • Allow the battery (or batteries) to cool to normal operating temperature. See Appendix A, “Specifications”.
Low Battery Temp warning (<0°C)									<ul style="list-style-type: none"> • Check the batteries. Do not charge a frozen battery. Charging a frozen battery may present a risk of explosion. Check that the battery type and temperature settings match the actual battery. • Allow the battery (or batteries) to warm up to a temperature that is above freezing before charging. If the temperature decreases further, the charger will indicate a fault and shut down. Do not attempt to charge without warming. See Appendix A, “Specifications”.

 Flashing LED  Solid LED

Table 3-1 Interpreting Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse 	Charger 	Remote 	Fault 	Solution
Low Battery Temp fault (< -25°C)									<ul style="list-style-type: none"> • Check the batteries. Do not charge a frozen battery. Charging a frozen battery may present a risk of explosion. Check that the battery type and temperature settings match the actual battery. • Allow the battery (or batteries) to warm up to a temperature that is above freezing before charging. See Appendix A, “Specifications”.
AC input out of range Warning (<104V and >90V) or (<265V and >255V)									<ul style="list-style-type: none"> • Change to a more stable AC power source and check that the voltage and voltage frequency are within acceptable operating range. See Appendix A, “Specifications”.
AC input out of range fault (<90V or >265V)									<ul style="list-style-type: none"> • Check AC connections. Change to a more stable AC power source and check that the voltage and voltage frequency are within acceptable operating range. See Appendix A, “Specifications”. • When using a generator, make sure the RPM is steady between 2700 and 3900 RPM.
 Flashing LED  Solid LED									

Table 3-1 Interpreting Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F U S E	Charger C H G E R	Remote R E M	Fault 	Solution
High Battery voltage fault (>16.6V)									<ul style="list-style-type: none"> Discontinue or disconnect AC power source from supplying power to the charger. Disconnect voltage sensitive DC loads from DC supply to prevent damage. If the DC bus voltage is still measuring high after AC power has been disconnected, call a qualified and certified electrician.
High Charger Temp warning (>50°C)									<ul style="list-style-type: none"> Check that the battery type and temperature settings match the actual battery. Allow the Truecharge™ 2 Battery Charger to cool. Improve ventilation or install in cooler location. If the temperature increases, the Truecharge™ 2 Battery Charger will display a fault and stop functioning. If the optional remote panel is installed, set a lower limit on the output current to cool down the charger.
High Charger Temp fault (>70°C)									<ul style="list-style-type: none"> Check that the battery type and temperature settings match the actual battery. Allow the Truecharge™ 2 Battery Charger to cool while the AC is connected so the fan stays on. Improve ventilation or install the charger in cooler location.

 Flashing LED  Solid LED

Table 3-1 Interpreting Fault and Warning Indicators

Fault or Warning Condition	Temp 	Fan 	AC 	Battery 	Fuse F U S E	Charger C H G E R	Remote R E M	Fault 	Solution
Locked Fan fault									<ul style="list-style-type: none"> • Check for anything impeding the fan located between the DC output terminals and AC wiring cavity. Safely remove any obstructions when the charger is off. • No further action required. The fan will resume its operation automatically and the charger will resume charging after one minute. If the fault remains, call Xantrex for support.
Loss of Remote Connection warning									<ul style="list-style-type: none"> • Reconnect the communication cable to the port. It takes 15 minutes to re-establish communication.
Reverse Polarity Fuse fault									<ul style="list-style-type: none"> • Check for reverse battery polarity (negative connected to negative, positive connected to positive is correct) at battery and charger output terminals. • Disconnect AC and DC sources before replacing the fuse on the charger. See “Replacing the DC Output Fuse” on page 3–11.
Internal fault									<ul style="list-style-type: none"> • Call Xantrex for support.
 Flashing LED  Solid LED									

Table 3-2 Charger Status LED Sequences on the Truecharge™ 2 Battery Charger

Charger Status LED Activity	Charger status
Ready LED illuminates solid	The charger is in rest mode of two-stage charging. All batteries have been fully charged.
Ready and Charging LEDs illuminate solid	The charger is in float mode of three-stage charging. All batteries have been fully charged.
Charging LED illuminates solid	The charger is charging in bulk or absorption mode
Equalize LED flashes	The charger will perform an equalization cycle after the absorption stage.
Equalize LED illuminates solid	The charger is currently implementing an equalization cycle for all batteries.
Fault LED flashes	A warning condition. See “Interpreting Fault and Warning Indicators” on Table 3-1.
Fault LED illuminates solid	A fault condition. See “Interpreting Fault and Warning Indicators” on Table 3-1.

Replacing the DC Output Fuse

To replace the DC Output Fuse:

1. Disconnect all AC and DC sources to the charger.
2. Locate the fuse cover on the charger's top panel (see Figure 1-1, "Truecharge™ 2 Battery Charger" on page 1–4).
3. Loosen the screw on the fuse cover using a Phillips screwdriver.
NOTE: The screw will not separate from the cover.
4. Pull out the blown fuse(s) gently, using the provided fuse puller.
NOTE: The fuse puller is located on the inside of the cover.
5. Install a brand new fuse(s) with same type and rating as the old one.
NOTE: Choose Littlefuse type 257 or equivalent.
6. Replace the fuse cover making sure that it aligns and fits perfectly leaving no space for moisture or small debris to enter the compartment.
7. Tighten the screw on the fuse cover but do not over-tighten.
8. Reconnect all AC and DC sources to the charger.

Troubleshooting

In the event that you have a problem with your Truecharge™ 2 Battery Charger, the following tables will help you to identify the problem and offer possible solutions to the problem.

Symptom

Indicator LEDs do not illuminate when charger is connected to an AC power source.

Possible Cause	Solution
No power at AC source or no battery connected on bank 1	Ensure that power is available at charger AC input and a battery or bank is connected on bank 1.
Defective AC wiring or switches/breakers	Wiring must be inspected and replaced by a qualified technician.

Symptom

Fault indicator LED illuminates. Truecharge™ 2 Battery Charger stops functioning.

Possible Cause	Solution
Truecharge™ 2 Battery Charger does not detect battery for one of following reasons: <ul style="list-style-type: none"> • poor connection • reverse polarity connection (blown fuse) • damaged wiring • open DC breaker or external fuse 	Check quality of battery connection and wires. Ensure correct polarity (negative connected to negative, positive connected to positive). Also, check the type of fault from Table 3-1, “Interpreting Fault and Warning Indicators” on page 3–5.
Truecharge™ 2 Battery Charger internal temperature too hot	Allow the Truecharge™ 2 Battery Charger to cool. Improve ventilation or install in cooler location.

Symptom

Fault indicator LED illuminates. Temp  and Battery  indicator LEDs flash.

Possible Cause	Solution
Battery temperature is either too hot or too cold for safe charging.	<p>If battery is too hot, allow battery to cool. Improve ventilation or install in cooler location.</p> <p>If the optional remote panel is available, you may reduce the output current using the Set Max Output button.</p> <p>If battery is too cold, allow batteries to warm up. WARNING: Do not charge a frozen battery. Charging a frozen battery is a potential explosion hazard.</p>

Symptom

Truecharge™ 2 Battery Charger completes a charging cycle, but the battery voltage seems too low.

Possible Cause	Solution
Battery has a shorted cell.	<p>Check the battery. Verify you are attempting to charge a battery correctly rated at 12 volts nominal (all 12 V chargers) or 24 volts nominal (all 24 V chargers). Re-check the battery voltage with all loads removed and the battery is at rest for about an hour.</p> <p>Replace the battery. The battery has reached its usefulness and can no longer accept a charge.</p>

Symptom

The Truecharge™ 2 Battery Charger appears to be taking too long to charge battery. Ready indicator LED does not illuminate after 24 hours of charging.

Possible Cause	Solution
Battery capacity is too high for the Truecharge™ 2 Battery Charger model.	Use a higher capacity charger.
Load connected to battery is draining charge current so that battery does not recharge.	Disconnect all loads or switch loads off.
Battery has a damaged cell or has reached the end of its useful life.	Replace battery.

Symptom

The Truecharge™ 2 Battery Charger appears to have quickly charged the battery. Ready indicator LED illuminates sooner than expected.

Possible Cause	Solution
Battery capacity is too low for the Truecharge™ 2 Battery Charger model.	Use a lower capacity charger. Using the optional remote panel (if installed), reduce the output current delivered to the smaller battery.
Battery has a damaged cell or has reached its useful life.	Replace battery.

Symptom

The Truecharge™ 2 Battery Charger will not transition to equalization mode.

Possible Cause	Solution
Battery is the wrong type, or set to the wrong type to equalize.	Determine if the battery type is set to GEL or AGM. These battery types cannot be equalized.
Not all batteries are fully charged.	The charger will wait for all batteries to be in float stage of three-stage charging or rest stage of two-stage charging before attempting to equalize (the ready indicator LED will illuminate).
An active fault is present on the bank you are attempting to equalize.	Clear the active fault by disconnecting the AC power source and finding the cause of the fault from Table 3-1, “Interpreting Fault and Warning Indicators” on page 3–5.

A Specifications

Appendix A contains physical, electrical performance, and regulatory approval specifications for the Truecharge™ 2 Battery Charger.

Note: Specifications are subject to change without notice.

Physical Specifications

<p>Base Unit Dimensions: L × W × H</p>	<p>TC1012, TC1512: 200 × 170 × 70mm (7.87 × 6.70 × 2.76 in.) TC2012, TC3012, TC4012: 250 × 170 × 70mm (9.84 × 6.70 × 2.76 in.) TC5012, TC6012: 350 × 170 × 70mm (13.78 × 6.70 × 2.76 in.) TC1524, TC2024: 250 × 170 × 70mm (9.84 × 6.70 × 2.76 in.) TC3024, TC5024: 300 × 210 × 125mm (11.81 × 8.27 × 4.92 in.)</p>
<p>Weight</p>	<p>TC1012, TC1512: 2.0 kg (4.4 lbs) TC2012, TC3012, TC4012: 2.2 kg (4.8 lbs) TC5012, TC6012: 4.5 kg (9.9 lbs) TC1524, TC2024: 2.2 kg (4.8 lbs) TC3024, TC5024: 5.0 kg (11.0 lbs)</p>
<p>AC input connections</p>	<p>Two color-coded No. 14 AWG wires (L, N) and one No. 14 AWG (G) minimum 152 mm (6 in.) long in a separate AC wiring enclosure with 21.3 mm (0.84 in.) hole provision for connection of a ½ inch North American "trade size" cable clamp (included).</p>
<p>DC output connections</p>	<p>TC1012: Two M6 studs (1 positive and 1 common negative) for battery cable ring terminals and one M6 mm DC equipment ground</p> <p>TC1512: Three M6 studs (2 positives and 1 common negative) for battery cable ring terminals and one M6 mm DC equipment ground</p> <p>TC2012, TC3012, TC4012, TC5012, TC6012, TC1524, TC2024, TC3024, TC5024: Four M6 studs (3 positives and 1 common negative) for battery cable ring terminals and one M6 mm DC equipment ground</p>

Electrical Specifications

Number of isolated battery bank outputs	TC1012: 1 output TC1512: 2 separated outputs TC2012, TC3012, TC4012, TC5012, TC6012, TC1524, TC2024, TC3024, TC5024: 3 separated outputs															
Nominal battery voltage	12 V units:12 Vdc 24 V units:24 Vdc															
Normal operating output range	12 V units: 0 – 16 Vdc 24 V units: 0 – 32 Vdc															
Nominal operating AC input voltage	110 – 250 Vac															
Maximum DC output current (total)	TC1012: 10 ±10% A TC1512: 15 ±10% A TC2012: 20 ±10% A TC3012: 30 ±10% A TC4012: 40 ±10% A TC5012: 50 ±10% A TC6012: 60 ±10% A TC1524: 15 ±10% A TC2024: 20 ±10% A TC3024: 30 ±10% A TC5024: 50 ±10% A															
Absorption voltage: ±0.1 V for 12 V units ±0.2 V for 24 V units	<table border="1"> <thead> <tr> <th></th> <th>12 V units 25 °C (77 °F)</th> <th>24 V units 25 °C (77 °F)</th> </tr> </thead> <tbody> <tr> <td>Flooded</td> <td>14.4</td> <td>28.8</td> </tr> <tr> <td>GEL</td> <td>14.2</td> <td>28.4</td> </tr> <tr> <td>AGM</td> <td>14.3</td> <td>28.6</td> </tr> <tr> <td>Lead-calcium</td> <td>15.5</td> <td>31.0</td> </tr> </tbody> </table>		12 V units 25 °C (77 °F)	24 V units 25 °C (77 °F)	Flooded	14.4	28.8	GEL	14.2	28.4	AGM	14.3	28.6	Lead-calcium	15.5	31.0
	12 V units 25 °C (77 °F)	24 V units 25 °C (77 °F)														
Flooded	14.4	28.8														
GEL	14.2	28.4														
AGM	14.3	28.6														
Lead-calcium	15.5	31.0														

Specifications

Float voltage: ±0.1 V for 12 V units ±0.2 V for 24 V units		12 V units	24 V units
		25 °C (77 °F)	25 °C (77 °F)
	Flooded	13.5	27.0
	GEL	13.8	27.6
	AGM	13.4	26.8
	Lead-calcium	13.5	27.0
Equalize mode current	50% rated output ±6%		
Equalize mode— maximum output voltage	12 V units:16 ±0.1 Vdc 24 V units:32 ±0.2 Vdc		
Off-state current draw (without remote installed)	12 V units: <35 mA 24 V units: <20 mA		

AC Input Specifications

AC input voltage range	Nominal: 120 Vac, 230 Vac, 240 Vac Full Performance: 105 – 265 Vac \pm 4 Vac Automatic derating to 80%: 90 – 104 \pm 4 Vac																								
Maximum AC input current	<table> <thead> <tr> <th>at 104 Vac</th> <th>at 208 Vac</th> </tr> </thead> <tbody> <tr> <td>TC1012: 2.5 A</td> <td>TC1012: 1.5 A</td> </tr> <tr> <td>TC1512: 3.5 A</td> <td>TC1512: 2.0 A</td> </tr> <tr> <td>TC2012: 4.5 A</td> <td>TC2012: 2.5 A</td> </tr> <tr> <td>TC3012: 7.0 A</td> <td>TC3012: 3.5 A</td> </tr> <tr> <td>TC4012: 9.0 A</td> <td>TC4012: 4.5 A</td> </tr> <tr> <td>TC5012: 11.5 A</td> <td>TC5012: 5.5 A</td> </tr> <tr> <td>TC6012: 13.5 A</td> <td>TC6012: 6.5 A</td> </tr> <tr> <td>TC1524: 7.0 A</td> <td>TC1524: 3.5 A</td> </tr> <tr> <td>TC2024: 9.0 A</td> <td>TC2024: 4.5 A</td> </tr> <tr> <td>TC3024: 13.5 A</td> <td>TC3024: 7.0 A</td> </tr> <tr> <td>TC5024: 22.5 A</td> <td>TC5024: 11.5 A</td> </tr> </tbody> </table>	at 104 Vac	at 208 Vac	TC1012: 2.5 A	TC1012: 1.5 A	TC1512: 3.5 A	TC1512: 2.0 A	TC2012: 4.5 A	TC2012: 2.5 A	TC3012: 7.0 A	TC3012: 3.5 A	TC4012: 9.0 A	TC4012: 4.5 A	TC5012: 11.5 A	TC5012: 5.5 A	TC6012: 13.5 A	TC6012: 6.5 A	TC1524: 7.0 A	TC1524: 3.5 A	TC2024: 9.0 A	TC2024: 4.5 A	TC3024: 13.5 A	TC3024: 7.0 A	TC5024: 22.5 A	TC5024: 11.5 A
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TC5024: 22.5 A	TC5024: 11.5 A																								
Power factor at rated load	\geq 0.95																								
Frequency	47 – 63 Hz																								
Efficiency – peak	12 V units: 77% @ 120 Vac, 80% @ 230 Vac 24 V units: 85% @ 120 Vac, 87% @ 230 Vac																								
Surge protection	Line-to-neutral surge protector rated at 275 Vac																								

DC Output Specifications

DC output voltage range including dead battery charging voltage	12 V units: 0 – 15.5 Vdc 24 V units: 0 – 31 Vdc
Maximum equalization voltage (no BTS installed)	12 V units: 16 Vdc 24 V units: 32 Vdc
Voltage accuracy (no load)	12 V units: ± 0.1 Vdc at 14.4 Vdc @ 25 °C (77 °F) 24 V units: ± 0.2 Vdc at 28.8 Vdc @ 25 °C (77 °F)
Voltage regulation	Uncompensated load voltage regulation < 0.1Vdc drop from 0 Amps to rated current output at charger output terminals (adds in series with recommended 3% limit for user's battery cable voltage drop).

Temperature Specifications

Nominal ambient	25 °C (77 °F)
Operating range (full performance)	-20 – 50 °C (-4 – 122 °F)
Current de-rating (above 50 °C ambient temperature)	up to 80% derating I _{max} (50 – 65 °C) (122 – 149 °F)
Storage	-40 to 80 °C (-40 to 176 °F)
Humidity	5 – 95%, RH non-condensing

Protection Features

Battery reverse polarity	Protected by a replaceable DC output fuse
Over-voltage limits	The Truecharge™ 2 Battery Charger will stop charging any bank if the output voltage is above 16.6 ± 0.5 Vdc.
Output current limit	TC1012: 10 \pm 10% A TC1512: 15 \pm 10% A TC2012: 20 \pm 10% A TC3012: 30 \pm 10% A TC4012: 40 \pm 10% A TC5012: 50 \pm 10% A TC6012: 60 \pm 10% A TC1524: 15 \pm 10% A TC2024: 20 \pm 10% A TC3024: 30 \pm 10% A TC5024: 50 \pm 10% A
Over-temperature	Internal charger temperature is measured. Charger shuts down and restarts as follows: <ul style="list-style-type: none"> • Shutdown at 70 °C (158 °F) • Restart at 65 °C (149 °F)
Current derating in ambient temperatures	Rated current to 50 °C (122 °F) derating to 80% I _{max} above 50 °C (122 °F)
Battery over-temperature protection	Battery temperature, as sensed by the battery temperature sensor (if installed), results in the charger no longer charging the individual battery or bank at a battery temperature of 70 °C (158 °F).

Approvals

Safety	NRTL approved to CSA E60335-2-29 and UL1236, including the marine supplement, ignition protection, and UL1564 CE marked, complying with Low Voltage Directive 2006-95-EC, complying with EN60335-2-29 Battery Chargers, including Australian deviations ISO 8846: Ignition Protection for Small Craft ABYC E11 - Alternating Current and Direct Current Electrical Systems on Boats ABYC A31 - Battery Chargers and Inverters NFPA70/2008 US NEC for home and RV installation requirements
EMC	FCC Class B CE marked, meeting EMC Directive 2004-108-EC
Other	KKK-A-1822 Rev F - Federal Specification for the Star-of-Life Ambulance

Warranty and Return Information

Warranty

What does this warranty cover and how long does it last? This Limited Warranty is provided by Xantrex Technology Inc. ("Xantrex") and covers defects in workmanship and materials in your Xantrex™ Truecharge™ 2 Series Battery Charger. This Warranty Period lasts for 24 months from the date of purchase at the point of sale to you, the original end user customer, unless otherwise agreed in writing. You will be required to demonstrate proof of purchase to make warranty claims.

This Limited Warranty is transferable to subsequent owners but only for the unexpired portion of the Warranty Period. Subsequent owners also require original proof of purchase as described in "What proof of purchase is required?"

What will Xantrex do? During the Warranty Period Xantrex will, at its option, repair the product (if economically feasible) or replace the defective product free of charge, provided that you notify Xantrex of the product defect within the Warranty Period, and provided that Xantrex through inspection establishes the existence of such a defect and that it is covered by this Limited Warranty.

Xantrex will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Xantrex reserves the right to use parts or products of original or improved design in the repair or replacement. If Xantrex repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Xantrex.

Warranty and Return

Xantrex covers both parts and labor necessary to repair the product, and return shipment to the customer via a Xantrex-selected non-expedited surface freight within the contiguous United States and Canada. Alaska, Hawaii and outside of the United States and Canada are excluded. Contact Xantrex Customer Service for details on freight policy for return shipments from excluded areas.

How do you get service? If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Xantrex directly at:

Telephone: 1 800 670 0707 (toll free North America)
1 408 987 6030 (direct)

Fax: 1 800 994 7828 (toll free North America)

Email: customerservice@xantrex.com

Web: www.xantrex.com

Direct returns may be performed according to the Xantrex Return Material Authorization Policy described in your product manual. For some products, Xantrex maintains a network of regional Authorized Service Centers. Call Xantrex or check our website to see if your product can be repaired at one of these facilities.

What proof of purchase is required? In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Xantrex.

Proof of purchase may be in any one of the following forms:

- The dated purchase receipt from the original purchase of the product at point of sale to the end user; or
- The dated dealer invoice or purchase receipt showing original equipment manufacturer (OEM) status; or
- The dated invoice or purchase receipt showing the product exchanged under warranty.

What does this warranty not cover? Claims are limited to repair and replacement, or if in Xantrex's discretion that is not possible, reimbursement up to the purchase price paid for the product. Xantrex will be liable to you only for direct damages suffered by you and only up to a maximum amount equal to the purchase price of the product.

This Limited Warranty does not warrant uninterrupted or error-free operation of the product or cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and Xantrex will not be responsible for any defect in or damage to:

- a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;

- b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Xantrex product specifications including, but not limited to, high input voltage from generators and lightning strikes;
- c) the product if repairs have been done to it other than by Xantrex or its authorized service centers (hereafter "ASCs");
- d) the product if it is used as a component part of a product expressly warranted by another manufacturer;
- e) component parts or monitoring systems supplied by you or purchased by Xantrex at your direction for incorporation into the product;
- f) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed;
- g) the product if it is located outside of the country where it was purchased; and
- h) any consequential losses that are attributable to the product losing power whether by product malfunction, installation error or misuse.

Disclaimer

Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY XANTREX IN CONNECTION WITH YOUR XANTREX PRODUCT AND IS, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL XANTREX BE LIABLE FOR: (A) ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, LOST REVENUES, FAILURE TO REALIZE EXPECTED SAVINGS, OR OTHER COMMERCIAL OR ECONOMIC LOSSES OF ANY KIND, EVEN IF XANTREX HAS BEEN ADVISED, OR HAD REASON TO KNOW, OF THE POSSIBILITY OF SUCH DAMAGE, (B) ANY LIABILITY ARISING IN TORT, WHETHER OR NOT ARISING OUT OF XANTREX'S NEGLIGENCE, AND ALL LOSSES OR DAMAGES TO ANY PROPERTY OR FOR ANY PERSONAL INJURY OR ECONOMIC LOSS OR DAMAGE CAUSED BY THE CONNECTION OF A PRODUCT TO ANY OTHER DEVICE OR SYSTEM, AND (C) ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

IF YOU ARE A CONSUMER (RATHER THAN A PURCHASER OF THE PRODUCT IN THE COURSE OF A BUSINESS) AND PURCHASED THE PRODUCT IN A MEMBER STATE OF THE EUROPEAN UNION, THIS LIMITED WARRANTY SHALL BE SUBJECT TO YOUR STATUTORY RIGHTS AS A CONSUMER UNDER THE EUROPEAN UNION PRODUCT

WARRANTY DIRECTIVE 1999/44/EC AND AS SUCH DIRECTIVE HAS BEEN IMPLEMENTED IN THE EUROPEAN UNION MEMBER STATE WHERE YOU PURCHASED THE PRODUCT. FURTHER, WHILE THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM EU MEMBER STATE TO EU MEMBER STATE OR, IF YOU DID NOT PURCHASE THE PRODUCT IN AN EU MEMBER STATE, IN THE COUNTRY YOU PURCHASED THE PRODUCT WHICH MAY VARY FROM COUNTRY TO COUNTRY AND JURISDICTION TO JURISDICTION.

Return Material Authorization Policy

For those products that are not being repaired in the field and are being returned to Xantrex, before returning a product directly to Xantrex you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location.

When you contact Xantrex to obtain service, please have your instruction manual ready for reference and be prepared to supply:

- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and/or reason for the return
- A copy of your dated proof of purchase

Record these details on page WA-6.

Return Procedure

Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.

Include the following:

- The RMA number supplied by Xantrex Technology Inc. clearly marked on the outside of the box.
- A return address where the unit can be shipped. Post office boxes are not acceptable.
- A contact telephone number where you can be reached during work hours.
- A brief description of the problem.

Ship the unit prepaid to the address provided by your Xantrex customer service representative.

If you are returning a product from outside of the USA or Canada In addition to the above, you **MUST** include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

If you are returning a product to a Xantrex Authorized Service

Center (ASC) A Xantrex return material authorization (RMA) number is not required. However, you must contact the ASC prior to returning the product or presenting the unit to verify any return procedures that may apply to that particular facility and that the ASC repairs this particular Xantrex product.

Out of Warranty Service

If the warranty period for your product has expired, if the unit was damaged by misuse or incorrect installation, if other conditions of the warranty have not been met, or if no dated proof of purchase is available, your unit may be serviced or replaced for a flat fee.

To return your product for out of warranty service, contact Xantrex Customer Service for a Return Material Authorization (RMA) number and follow the other steps outlined in "Return Procedure" on page WA-4.

Payment options such as credit card or money order will be explained by the Customer Service Representative. In cases where the minimum flat fee does not apply, as with incomplete units or units with excessive damage, an additional fee will be charged. If applicable, you will be contacted by Customer Service once your unit has been received.

Information About Your System

As soon as you open your Xantrex™ Truecharge™ 2 Series Battery Charger package, record the following information and be sure to keep your proof of purchase.

Serial Number _____

Product Number 804-1210, 804-1215, 804-1220, 804-1230,
804-1240, 804-1250, 804-1260, 804-2415,
804-2420, 804-2430, 804-2450

Purchased From _____

Purchase Date _____

If you need to contact Customer Service, please record the following details before calling. This information will help our representatives give you better service.

Type of installation (e.g. RV, truck) _____

Length of time inverter has been installed _____

Battery/battery bank size _____

Battery type (e.g. flooded, sealed gel cell, AGM) _____

DC wiring size and length _____

Alarm sounding? _____

Description of indicators on front panel _____

Appliances operating when problem occurred _____

Description of problem _____

Xantrex Technology Inc.

1 800 670 0707 Tel toll free NA
1 408 987 6030 Tel direct

1 800 994 7828 Fax toll free NA

customerservice@xantrex.com
www.xantrex.com