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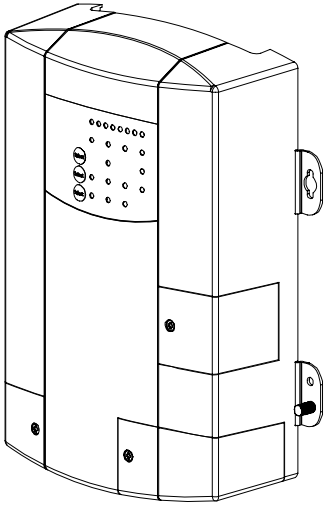

TC1012	10A–12V
TC1512	15A–12V
TC2012	20A–12V
TC3012	30A–12V
TC4012	40A–12V
TC5012	50A–12V
TC6012	60A–12V
TC1524	15A–24V
TC2024	20A–24V
TC3024	30A–24V
TC5024	50A–24V

Owner's Guide

TRUECHARGE™2 Series Battery Charger

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Truecharge™ 2 Series Battery Chargers

Owner's Guide

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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.

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 and operating instructions for the Xantrex™ Truecharge™ 2 Series Battery Chargers.

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

WARNING: 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 operate this product unless it has been installed by a qualified installer in accordance with the Truecharge™ 2 Battery Charger Installation Guide.
3. 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.

4. 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.
5. To avoid a risk of fire and electric shock, make sure that all wiring is in good condition and is not undersized. Do not operate the Truecharge™ 2 Battery Charger with damaged or substandard wiring.
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 including if the fuse cover has been lost, damaged, or 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 input ground and to the DC chassis 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 you read this manual and follow the instructions exactly each time you use the charger.

11. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of any equipment 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 or 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 a ring or metal bracelet or the like to the battery terminal, causing a severe burn.
8. If you need to remove a battery, always remove the negative terminal from the battery first for systems with grounded negative. If it is grounded positive, remove the positive terminal first. Make sure all loads connected to the battery 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. For flooded non-sealed batteries, 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 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.

Contents

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
- nuts and washers
- strain relief clamp for AC input cables
- three crimp connectors for AC wiring

Note: Keep the carton and packing material in case you need to return the Truecharge™ 2 Battery Charger for servicing.

Standard and Protection Features

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

- three[1] full current rated outputs
- battery monitoring functions while in float mode or rest mode
- correct charging voltage for batteries when connected to almost any single phase AC power outlet in the world
- low electromagnetic interference (EMI)
- automatic charge resumption, if required, after AC power interruption
- programmable custom charge settings[2]
- fully discharged battery charging[3]

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

- battery reverse polarity protection via a replaceable output fuse
- AC input out-of-range derating and shutdown
- ambient over temperature derating and 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

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.

- short circuit protection for the BTS and communication connector ports including protection from incorrectly inserting the remote panel communication cable plug into the BTS port and vice versa
- drip-proof rubber boots for DC terminals for added moisture protection
- IP-32 drip protection rating[1]
- locked fan[2] protection

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

- an optional remote panel[3] which can be mounted up to 15 m (50 ft) away for remote control and monitoring.
- an optional battery temperature sensor[4] (BTS) provides battery temperature voltage compensation from 0 to 70 °C (-13 to 158 °F)

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

- battery under temperature charging protection preventing battery charging at -25 °C or below
- battery over temperature charging protection preventing battery charging at 70 °C or higher
- charging voltage compensation based on the temperature of the battery the optional BTS is connected to

1.In two specific installation orientations–see Figure 2-2, “Truecharge™ 2 Battery Charger Mounting Orientations” on page 2–7 of the Installation Guide.
2.A locked fan occurs when the fan’s blades are hindered from turning by objects such as insects or accumulated debris that can obstruct the fan’s operation. The Truecharge™ 2 Battery Charger sounds an alarm if the fan suddenly stops turning. If the fan does not resume turning after a minute, the charger reports a fault and immediately stops charging.
3.Part number: 808-8040-00
4.Part number: 808-0232-01

Truecharge™ 2 Battery Charger

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

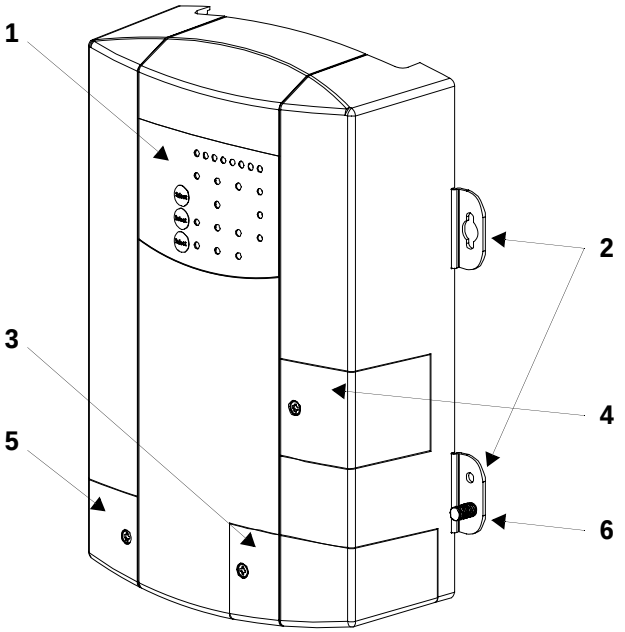


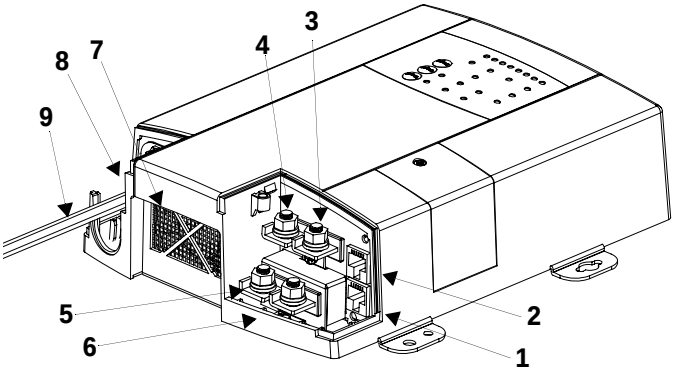
Figure 1-1 Truecharge™ 2 Battery Charger

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 battery polarity installation. **WARNING: Shock hazard** Disconnect the batteries and AC power before opening the fuse access panel.
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)
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)
7	**Air intake vent** - located inside is the fan assembly
8	**AC wiring compartment**
9	**AC pigtail wiring** - line, neutral, and ground input wires

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: To prevent any unintentional changes in the setting, “press and hold” for three seconds any Select panel button to advance and pick the right setting.
To set and cancel an equalization program, “press and hold” for five seconds both the Charger Mode and Battery Temp. Select panel buttons.

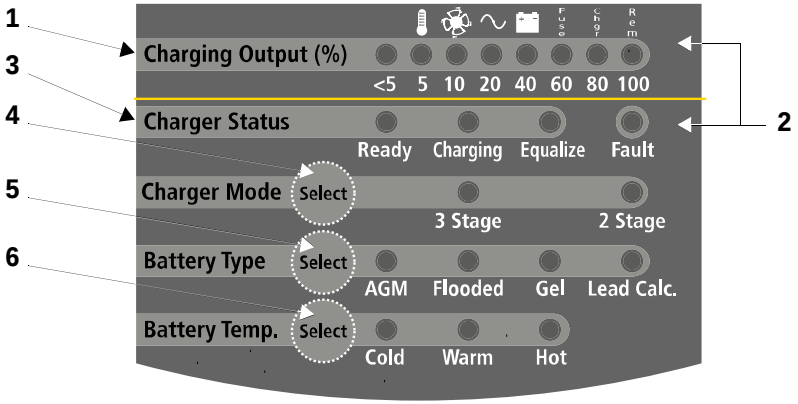


Figure 1-3 Onboard Control and Status Display Panel

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.

However, to temporarily check the status of the connected battery when AC power is not present, press the Status button on the optional remote panel.

Item	Description
1	**Charging Output (%) LEDs** • The LEDs illuminate like a bar graph displaying the present total output charge current as a percentage of the maximum rated charge current. For example, unit model TC4012 has a maximum rated charge current of 40 A so at 60% the charger's current output is 24 A. The numbers below the LEDs represent the percentage values. See Figure 1-4 on page 1–10. **NOTE:** When the maximum Charge Output current is limited via the optional Remote panel, the LEDs will still display the total charge output current as a percentage of the maximum rated charge current and NOT as a percentage of the limited charge current. • One or two LEDs 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 1–10.
2	**Fault LED** 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.
3	**Charger Status LEDs** Displays the current status of the charger. • **Ready** - a solid light indicates batteries are fully charged and the charger is not in float stage. • **Ready and Charging** - solid lights indicate batteries are fully charged and the charger is 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.

Item	Description

4	**Charger Mode Select button**
	• 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.
	  • **Three-stage** - Bulk, Absorption, and Float; default setting
	  • **Two-stage** - Bulk and Absorption only
	• When setting or cancelling an Equalization program: Press and hold for five seconds both the Charger Mode and Battery Temp. Select buttons.

5	**Battery Type Select button** 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. • **AGM** - Absorbent Glass Mat lead-acid battery • **Flooded** - Lead-acid battery; default setting • **GEL** - Gel-type lead-acid battery • **Lead Calc.** - Lead-calcium battery • **Custom** - If a custom battery type has been programmed then all LEDs will illuminate
6	**Battery Temp. Select button** • Press and hold the button for three seconds to select one of three settings. An indicator LED corresponds to each setting. When the optional BTS is not used, this selection changes the charger's output voltage settings to compensate for the battery temperature selected. The Cold setting raises the voltages, and the Hot setting lowers the voltages. **WARNING: Risk of battery damage** Be sure the appropriate setting is selected before charging. For varying conditions, use the Warm setting.

Item	Description
6 continued	• **Cold** - for battery temperature below 5 °C (41 °F); raises the charging voltage to compensate • **Warm** - for battery temperature between 5 and 30 °C (41 and 86 °F); default setting • **Hot** - for battery temperature above 30 °C (86 °F); lowers charging voltage to compensate • When setting or cancelling an Equalization program: Press and hold for five seconds both the Charger Mode and Battery Temp. 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.

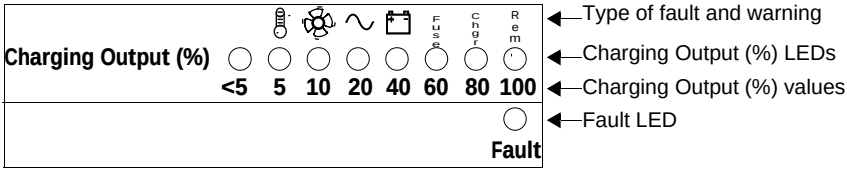


Figure 1-4 Charging Output (%) and Fault LEDs

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 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 1-5.	☀			☀				☀
High Battery Temp fault; >70°C See Figure 1-5.	☀			☀				●
Low Battery Temp warning; <0°C See Figure 1-5.	☀			☀				☀
Low Battery Temp fault; < -25°C See Figure 1-5.	☀			☀				●
AC input out of range Warning; 90–108 V or 255–265 V See “Input Voltage Operating and Derating”.			☀					☀
AC input out of range fault; <85V or >265V			☀					●
AC frequency out of range fault; <45 Hz or >65 Hz			☀					●

☀ Flashing LED ● Solid LED

Table 1-1 Fault and Warning Indicators

Fault or Warning Condition	Temp	Fan	AC	Battery	Fuse	Charger	Remote	Fault
Charger Output over voltage fault; >16.6V				☼				●
High Charger Temp warning; >50°C	☼					☼		☼
High Charger Temp fault; >65°C	☼					☼		●
Locked Fan warning (for ten seconds[a])		☼						☼
Locked Fan fault (after one minute[b])		☼						●
Loss of Remote Connection warning							☼	☼
Reverse Polarity Fuse fault					☼			●
Internal fault						☼		●

☼ Flashing LED ● Solid LED

a.The Truecharge™ 2 Battery Charger sounds an alarm and reports a warning via LED for ten seconds immediately after the fan locks (stops turning).
b. If the fan does not resume turning after a minute of being locked, the charger sounds an alarm, reports a fault via LED, and immediately stops charging.

Input Voltage Operating and Derating

When there is an AC input out of range warning in the lower range between 90–108 Vac, the Truecharge™ 2 Battery Charger derates to 80% of maximum current.

However, when AC input increases above 108 Vac up to 255 Vac, maximum current returns to 100% capacity. Furthermore, the Truecharge™ 2 Battery Charger will continue to operate at 100% of maximum current, even while there is an AC input out of range warning in the upper range between 256–265 Vac.

Battery and Charger Temperature Thresholds

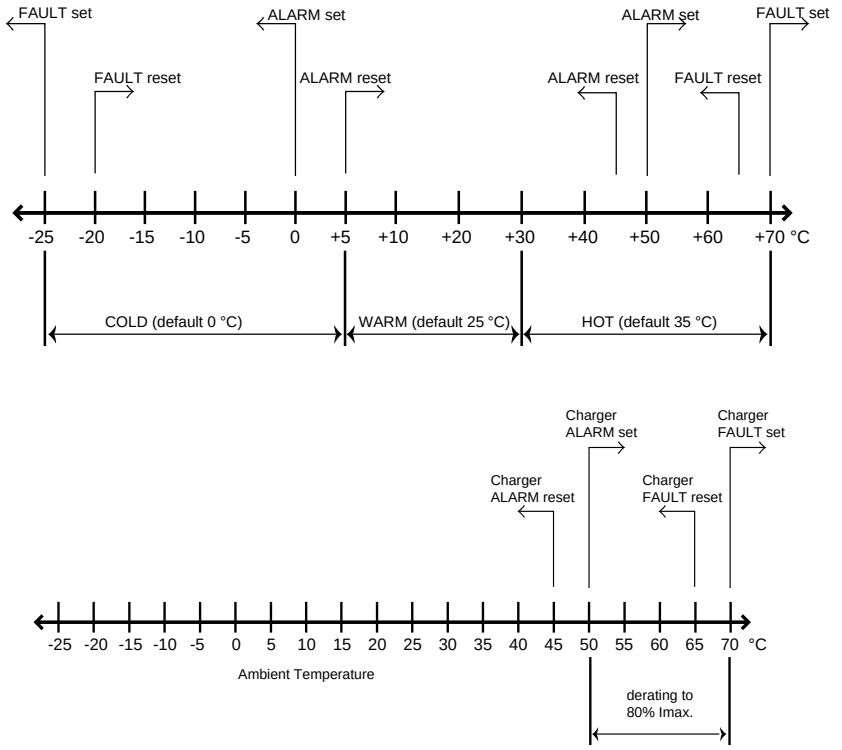


Figure 1-5 Battery and Charger Temperature Thresholds

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.

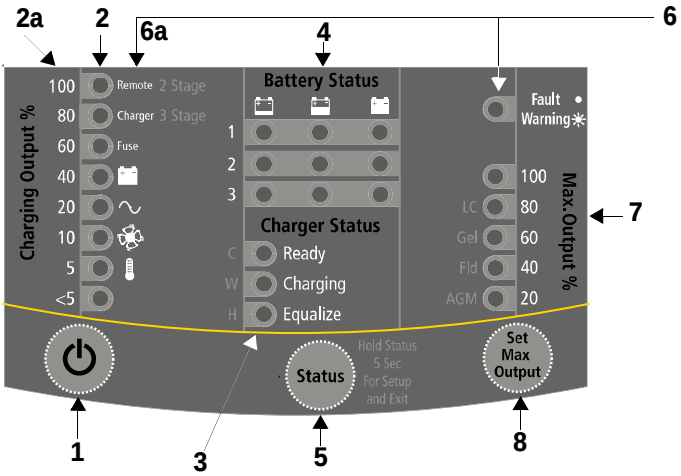


Figure 1-6 Truecharge™ 2 Battery Charger Remote Panel (optional)

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 STANDBY
- Set or cancel an equalization cycle
- Display faults and warnings
- Display basic battery level and settings

Item	Description
1	**ON/STANDBY Button** • 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	**Charging Output (%) LEDs** • The LEDs illuminate like a bar graph displaying the present total output charge current as a percentage of the maximum rated charge current. For example, unit model TC4012 has a maximum rated charge current of 40 A so at 60% the charger's current output is 24 A. The numbers to the left of the LEDs represent the percentage values. See 2a on Figure 1-6 on page 1–14. **NOTE:** When the maximum Charge Output current is limited by pressing the Set Max Output button, the LEDs will still display the total charge output current as a percentage of the maximum rated charge current and NOT as a percentage of the limited charge current. • 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 1-6 on page 1–14.
3	**Charger Status LEDs** Displays the present status of the charger. • **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.

Item	Description
4	**Battery Status LEDs** Displays the present status of each battery (or each battery bank). This feature is available only on the Remote Panel. Each row represents the battery (or battery bank) number designation—**1**, **2**, or **3**. Each column represents Low, Medium, or Full battery capacity. **NOTE:** These levels are measured when the battery is not under charge during the 15-minute charge interruption intervals. The thresholds are: • **Low** if battery voltage is below 11.9 V (23.8 V for 24 Vdc systems) • **Medium** if the voltage is 11.9 to 12.4 V (23.8 to 24.8 V for 24 Vdc systems) • **Full** if the voltage is above 12.4 V (24.8 V for 24 Vdc systems)
5	**Status Button** • Press and hold to enter or exit Setup Mode. • When in Setup Mode: Press to select the **Battery Temperature**: Cold, Warm, or Hot. • When setting or cancelling an Equalization program: Press and hold both the Status and ON/STANDBY buttons.
6	**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.
7	**Max. Output (%) LED** The LED illuminates a solid light corresponding to the Maximum Charger Output % setting.

Item	Description
8	**Set Max Output Button** (see below) • Press to select and limit the maximum rated charge current. For example, the unit model TC4012 has a maximum rated charge current of 40 A. A setting from 100 to 80 by pressing the button once, will have a new limited maximum charge current of 32 A (80% of 40 A). This feature is available only on the Remote Panel. **NOTE:** The maximum rated charge current is the only output current rating affected by this button. All other output current ratings, such as the equalization charge current, will not be affected. • When in Setup Mode: Press to select the **Battery Type**: AGM, Flooded, GEL, Lead-Calcium, and OEM (if charger is programmed for OEM)

Advantages of Current Limiting Feature:

- Gives the user flexibility to custom charge according to the battery manufacturer's instructions.
- Allows batteries with a lower current rating to be charged safely without the need of a new charger.
- Prolongs power consumption and prevents an overload of an AC source such as a generator by drawing less current.

2 Operation

WARNING

The battery charger must be properly installed 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

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.

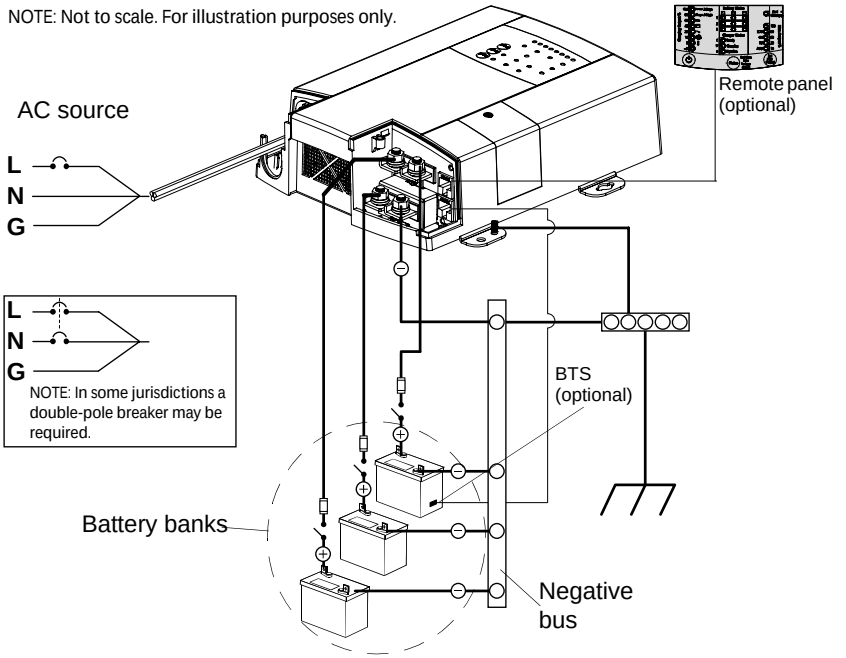


Figure 2-1 Typical Three-Battery Installation

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 Vdc chargers) or 25 V (24 Vdc chargers) for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

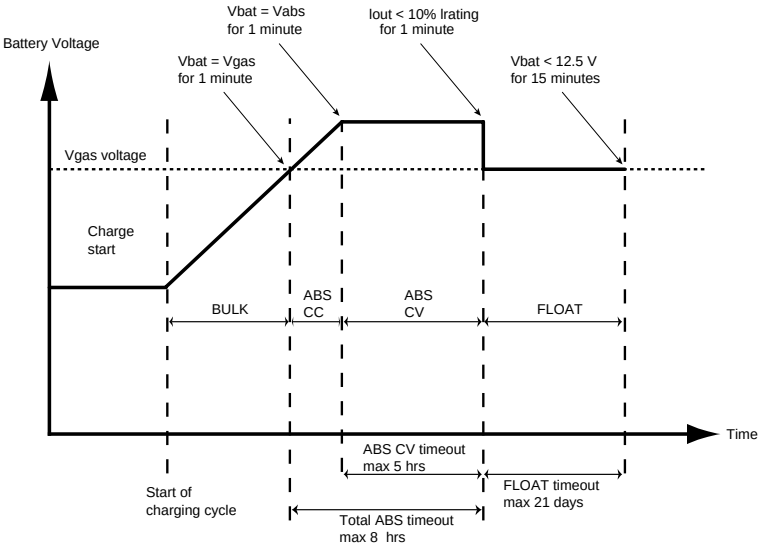


Figure 2-2 Three-Stage Charging Process

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 current to the battery and the charger output drops to 9 V (12 Vdc chargers) or 18V (24 Vdc chargers). In this manner, DC loads draw power supplied by batteries and the charger 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 12.5 V (12 Vdc chargers) or 25 V (24 Vdc chargers) for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

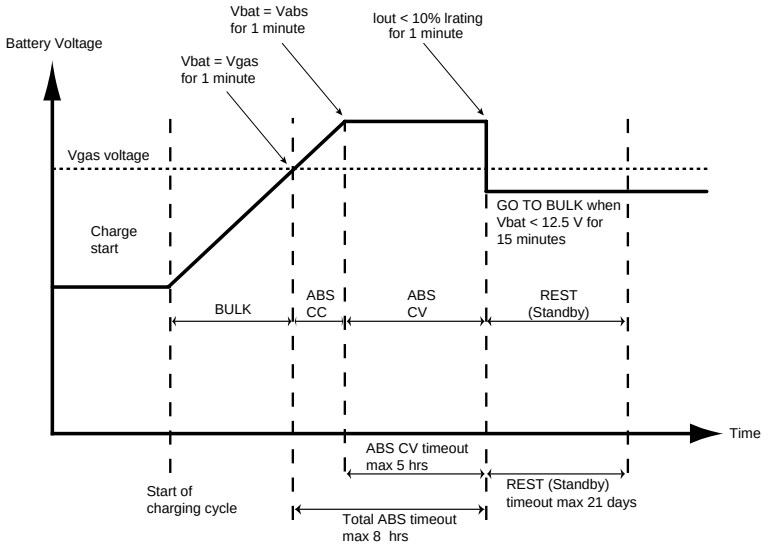


Figure 2-3 Two-Stage Charging Process

Charging Voltage Setpoints

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

Table 2-1 Charging Maximum Voltages for 12 Vdc chargers

Battery Type	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 Vdc chargers

Battery Type	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

Battery Qualification

The Truecharge™ 2 Battery Charger will perform a battery qualification on each application of AC (or DC > 9 V), 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.

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.

Setting the Battery Temperature without a BTS

CAUTION: Battery damage

In the absence of a BTS, setting a battery temperature that is lower than the actual temperature may cause the battery to be slightly overcharged. Consequently, it may damage or reduce the life of the battery or cause a hazard.

Setting the temperature higher than the actual temperature will result in under-charging the battery.

Always be aware of the temperature setting and observe the battery's actual temperature. Adjust the Battery Temperature setting every time charging is done. For varying conditions, use the Warm setting.

Using the Onboard Display Panel

To configure the battery temperature:
NOTE: By default, the Battery Temp. is set to Warm.

1. Press and hold the Battery Temp. Select button for three seconds to advance to the next setting.
2. Select the appropriate battery temperature setting.
   The LEDs will indicate which of the three types is being selected: Warm, Hot, or Cold.

Note: Cold is for battery temperature below 5 °C (41 °F). Warm (default setting) is for battery temperature between 5 and 30 °C (41 and 86 °F). Hot is for battery temperature above 30 °C (86 °F). See “Battery Temperature Compensation Levels” on page 2–8 to see how output voltage is offset by varying the temperature selection.

Using the Remote Panel

To configure the battery temperature:
NOTE: By default, the Battery Temp. is set to Warm.

1. Press and hold the Status button for five seconds to enter the Setup mode.
   Entering the Setup mode will enable you to select the battery temperature setting.
2. Press Status button to select the appropriate battery temperature setting.
   The LEDs will indicate which of the three types is being selected: W(arm), H(ot), or C(old).
3. Press and hold the Status button for five seconds to exit the Setup mode.

Table 2-3 Battery Temperature Compensation Levels

Temperature Selection	Recommended for battery temperature of:	Voltage added for temperature compensation offset from 25 °C	
Cold	below 5 °C (41 °F)	Flooded/PbCa/Gel	0.675
		AGM	0.525
Warm	between 5 and 30 °C (41 and 86 °F)	Flooded/PbCa/Gel	0
		AGM	0
Hot	above 30 °C (86 °F)	Flooded/PbCa/Gel	-0.27
		AGM	-0.21

Operating DC Loads

When the Truecharge™ 2 Battery Charger is operating, DC loads such as fans and lights 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 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 any heavy loads on the batteries beaing charged, by opening disconnect switches or by switching the loads off.
2. Connect the batteries to the charger by closing the DC disconnect switches.
   NOTE: The onboard display LEDs will light up for a second.
3. Ventilate the area around the battery thoroughly during charging.
   Review the charging instructions supplied by the manufacturer of your batteries and follow all safety precautions and the required steps.
4. 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. At this point, changes in Battery Type, Battery Temperature, and/or Charger Mode can then be applied.

   These settings are stored in memory and need not be entered after every initialization.
   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.

5. After charging is completed, reconnect all loads to the battery.

The charger 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
Standby or 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.

Standby mode Or Rest mode. If you selected the two-stage charging mode, the ready indicator LED shows the charger is now in rest mode and is continuously checking battery voltage.

With either charging mode, the Truecharge™ 2 Battery Charger will begin a charging cycle 21 days after the last completed cycle, or when the minimum battery terminal 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 complete 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 ventilators with brushless motors 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 Vdc chargers and 32 V for 24 Vdc 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, wash the affected area immediately with 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. If distilled water is added, batteries must undergo a complete charge cycle.
2. Program or initiate an equalize cycle, if all banks are in either float or rest mode.

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. If the batteries are not fully charged then charging begins immediately. If the batteries are fully charged then charging will go to either standby (two-stage) or float (three-stage).

  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 in all modes including Standby. Even when AC power is removed, if the Truecharge™ 2 Battery Charger is connected to a battery, 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 3–4 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 onboard display 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 by pressing the Status button on the optional remote panel to initialize a view cycle that will show the status of the batteries.

The remote panel LEDs will turn 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. Do not open or disassemble the charger. 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 clean the outside of the case and wiring with a damp cloth. Wear protective gloves, 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, disconnect all AC and DC sources and 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.

To clean battery terminals, follow the recommendations and procedures of the battery manufacturer.

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	Charger	Remote	Fault	Solution
High Battery Temp warning (>50°C)									• Check the batteries. Do not charge a battery that is rated other than 12 V nominal for all 12 Vdc chargers or 24 V nominal for all 24 Vdc chargers. Check that the battery type and temperature settings match the actual battery and its conditions. • Disconnect the Truecharge™ 2 Battery Charger, including all other charging sources such as an alternator or the charger on a generator with an electric start from the battery (or batteries). • Allow the battery (or batteries) to cool to normal operating temperature. If the temperature increases further and a BTS is connected to the warmest battery, 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	Charger	Remote	Fault	Solution
High Battery Temp fault (>70°C)	☀			☀				●	• Check the batteries. Do not charge a battery that is rated other than 12 V nominal for all 12 Vdc chargers or 24 V nominal for all 24 Vdc 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 an alternator or the charger on a generator with an electric start. • Allow the battery (or batteries) to cool to normal operating temperature. See Appendix A, “Specifications”.
Low Battery Temp warning (<0°C)	☀			☀				☀	• 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 and a BTS is connected to the coldest battery, 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)	☀			☀				●	• 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; 90–108 V or 255–265 V			☀					☀	• 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; <85V or >265V			☀					●	• 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”.

☀ 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
High Battery voltage fault (>16.5V)									• Discontinue charging 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)									• 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 (>65°C)									• 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	Charger	Remote	Fault	Solution
Locked Fan warning		☼						☼	• 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. If the fan resumes its operation automatically then the charger will resume charging.
Locked Fan fault		☼						●	• 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. If the fan resumes its operation automatically then the charger will resume charging. • If the fault remains, call Xantrex for support.
Loss of Remote Connection warning							☼	☼	• Reconnect the communication cable to the port. It takes about 15 seconds to re-establish communication.

☼ 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
Reverse Polarity Fuse fault					☀			●	• 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						☀		●	• 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 standby (or 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

WARNING: Shock hazard

The following information is for qualified installers or service personnel only.

To replace the DC Output Fuse:

1. Disconnect all AC and DC sources to the charger and wait five minutes for internal voltage and energy levels to reduce to safe levels.
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.

CAUTION

For continued protection, replace only with Littelfuse® type 257 (or equivalent) with ratings as shown below.

Model	Amperage	Voltage
TC1012	15 A (blue)	32 Vdc
TC1512	25 A (natural)	32 Vdc
TC2012	30 A (green)	32 Vdc
TC3012	40 A (amber)	32 Vdc

Model	Amperage	Voltage
TC4012	2×30 A (green)	32 Vdc
TC5012	2×35 A (blue-green)	32 Vdc
TC6012	2×40 A (amber)	32 Vdc
TC1524	25 A (natural)	32 Vdc
TC2024	30 A (green)	32 Vdc
TC3024	40 A (amber)	32 Vdc
TC5024	2×35 A (blue-green)	32 Vdc

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. Fix the reverse polarity fault which caused the fuse to blow prior to reconnecting all AC and DC sources to the charger.
9. 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	Ensure that power is available at charger AC input and it is within acceptable range.
Defective AC wiring or switches/breakers	Wiring must be inspected and replaced by a qualified installer.

Symptom

The initial power up display test is not performed upon connection of battery or batteries.

Possible Cause	Solution
Truecharge™ 2 Battery Charger does not detect battery for one of following reasons: • 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). In case there is an accompanying fault, check the type of fault from Table 3-1, “Interpreting Fault and Warning Indicators” on page 3–4.

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.	If battery is too hot, allow battery to cool. Improve ventilation or install in cooler location. If the optional remote panel is available, you may reduce the output current using the Set Max Output button. If battery is too cold, allow batteries to warm up. **WARNING: Explosion hazard** Do not charge a frozen battery. Charging a frozen battery is a potential explosion hazard.

Symptom

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

Possible Cause	Solution
Battery has a shorted cell.	Check the battery voltage appoximately one hour after reaching rest stage. **NOTE:** If the charger is functioning properly but the charge cycles fail to bring the resting voltage up above 10 V, then this confirms the battery has a damaged or shorted cell. Replace battery. The battery has reached the end of its useful life and can no longer accept a charge.

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 the end of its useful life.	Replace battery.

Symptom

The Truecharge™ 2 Battery Charger will not perform equalization.

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 3–4.

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

Base Unit Dimensions: L × W × H	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.)
Weight	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)
AC input connections	Three color-coded No. 14 AWG wires (L, N, GND) 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" strain relief (included).
DC output connections	TC1012: Two M6 studs (1 positive and 1 negative) for battery cable ring terminals and one M6 mm DC equipment ground TC1512: Three M6 studs (2 positives and 1 common negative) for battery cable ring terminals and one M6 mm DC equipment ground 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

Electrical Specifications

AC Input Specifications

AC input voltage range	Nominal: 120 Vac, 230 Vac, 240 Vac Full Performance: 104 – 265 Vac ±4 Vac Automatic derating to 80% output: 90 – 108 ±4 Vac
Maximum AC input current	at 104 Vac / at 230 Vac – 20% TC1012: 2.5 A / TC1012: 1.25 A TC1512: 3.5 A / TC1512: 1.9 A TC2012: 4.5 A / TC2012: 2.5 A TC3012: 7.0 A / TC3012: 3.7 A TC4012: 9.0 A / TC4012: 5 A TC5012: 11.5 A / TC5012: 6.2 A TC6012: 13.5 A / TC6012: 7.8 A TC1524: 7.0 A / TC1524: 3.8 A TC2024: 9.0 A / TC2024: 5 A TC3024: 13.5 A / TC3024: 7.5 A TC5024: 22.5 A / TC5024: 12.5 A
Power factor at rated load	≥0.95
Frequency	47 – 63 Hz
Efficiency – peak	12 Vdc units: 77% @ 120 Vac, 80% @ 230 Vac 24 Vdc units: 85% @ 120 Vac, 87% @ 230 Vac
Surge protection	Line-to-neutral surge protector rated at 275 Vac

DC Output 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
DC output voltage range including dead battery charging voltage	12 Vdc units: 0 – 15.5 Vdc 24 Vdc units: 0 – 31 Vdc
Maximum equalization voltage	12 Vdc units: 16 Vdc 24 Vdc units: 32 Vdc
Voltage accuracy (no load)	12 Vdc units: ±0.1 Vdc at 14.4 Vdc @ 25 °C (77 °F) 24 Vdc units: ±0.2 Vdc at 28.8 Vdc @ 25 °C (77 °F)
Nominal battery voltage	12 Vdc units:12 Vdc 24 Vdc units:24 Vdc
Normal operating output range	12 Vdc units: 0 – 16 Vdc 24 Vdc units: 0 – 32 Vdc
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 Vdc units ±0.2 V for 24 Vdc units		12 Vdc units 25 °C (77 °F)	24 Vdc 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
Float voltage: ±0.1 V for 12 Vdc units ±0.2 V for 24 Vdc units		12 Vdc units 25 °C (77 °F)	24 Vdc units 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 dc 24 V units: <20 mA dc		
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).		

Environmental Specifications

Operating range (full performance)	0 – 50 °C (32 – 122 °F)
Current de-rating (above 50 °C ambient temperature)	up to 80% derating Imax 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 replaceable DC output fuses
Over-voltage limits	The Truecharge™ 2 Battery Charger will stop charging if the output voltage is above 16.6 ±0.5 Vdc.
Output current limit	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
Over-temperature	Internal charger temperature is measured. Charger shuts down and restarts as follows: • Shutdown at 70 °C (158 °F) • Restart at 60 °C (140 °F)
Current derating in ambient temperatures	See “Environmental Specifications” on page A–5.
Battery over-temperature protection	Charger shuts down if battery temperature above 70 °C (158 °F) is sensed by the battery temperature sensor.
Battery under-temperature protection	Charger shuts down if battery temperature below –25 °C (–13 °F) is sensed by the battery temperature sensor.

Approvals

Safety	NRTL approved to CSA E60335-2-29, UL1236, including the marine supplement, ignition protection, and UL1564 CE marked for the Low Voltage Directive 2006-95-EC, (complying with EN60335-2-29 Battery Chargers) Designed to IEC60335-2-29 including Australian deviations, ISO 8846: Ignition Protection for Small Craft, ABYC E11 - Alternating Current and Direct Current Electrical Systems on Boats, and ABYC A31 - Battery Chargers and Inverters
EMC	Class B according to FCC Part 15B and Industry Canada ICES-003 CE marked for the EMC Directive 2004-108-EC (complying with EN55014-1, EN55014-2, EN61000-3-2, and EN61000-3-3)

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.

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) +34 93 470 5330 (Europe)
Fax:	1 800 994 7828 (toll free North America) +34 93 473 6093 (Europe)
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 charger 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 _____

_____

_____

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