

3.5A smarter battery charger

— TEST · CHARGE · REPAIR · MAINTAIN —



Battery Charger User Guide

MODEL: IC-3500

Revision: AB Issue Date: April 2017 Manual No.: 0-IC35000417



DANGER



Please read and understand all important safety and operating instructions before using this charger. In addition, please read and follow all battery and vehicle manufacturer's instructions and cautionary markings. Failure to follow the instructions may result in ELECTRICAL SHOCK, EXPLOSION, or FIRE, which may result in SERIOUS INJURY, DEATH, DAMAGE TO DEVICE or PROPERTY. Do not discard this information.

This Operating Manual has been designed to instruct you on the correct use and operation of your product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

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Ashland, VA 23005 (888) 241.8498
www.smartechproducts.com

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What's Included

- IC-3500 Battery Charger
- Battery Clamp Connectors
- Eyelet Terminal Connectors
- 12V Cigarette Lighter Male Connector
- Fuse (Extra) & Screws
- User Guide



RISK OF EXPLOSIVE GASES

WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU USE THE CHARGER.

To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment intended to be used in vicinity of battery. Review cautionary marking on these products and on engine.

SAFETY PRECAUTIONS FOR WORKING IN THE VICINITY OF LEAD ACID BATTERIES

- 1) Batteries generate explosive gases during normal operation. Use in well-ventilated area.
- 2) Consider having someone close enough or within the range of your voice to come to your aid when you work near a battery.
- 3) **DO NOT** smoke, strike a match, or cause a spark in vicinity of battery or engine. Avoid explosive gas, flames and sparks.
- 4) Remove all personal jewelry, such as rings, bracelets, necklaces, and watches while working with a vehicle battery. These items may produce a short-circuit that may cause severe burns.
- 5) Be extra cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short-circuit a battery or other electrical hardware which may cause an explosion or fire.
- 6) Wear complete eye protection, hand and clothing protection. Avoid touching eyes while working near a battery.

- 7) Study all battery manufacturer's specific precautions such as removing or not removing cell caps when charging and recommended rates of charge.
- 8) Clean battery terminals before connecting the charger. Be careful to keep corrosion from coming in contact with eyes.
- 9) For battery installed in a vehicle, first connect charger output lead (red) to positive (+) terminal on the battery. Second, connect the negative charger lead (black, -) to the vehicle's chassis (away from the battery). DO NOT connect to the carburetor or fuel lines. Disconnect the negative lead (black, -) from the chassis first.
- 10) When it is necessary to remove a battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off in order to prevent an arc.
- 11) It is not intended to supply power to an extra-low-voltage electrical system or to charge dry-cell batteries. Charging dry-cell batteries may burst and cause injury to persons and property.
- 12) **NEVER** attempt to charge a frozen, damaged, leaking or non-rechargeable battery.
- 13) If battery electrolyte contacts skin or clothing, wash immediately with soap and water. If electrolyte enters eye, immediately flood eye with running clean cold water for at least 15 minutes and get medical attention immediately. If electrolyte is taken internally, drink large quantities of water or milk; do NOT induce vomiting and get prompt medical attention. Neutralize with baking soda any electrolyte that spills on a vehicle or in the work area; after neutralizing, rinse contaminated area clean with water.

SAFETY PRECAUTIONS FOR USING THE CHARGER

- 1) **DO NOT** place the charger in the engine compartment or near moving parts or near the battery; place as far away from them as DC cables permit. Never place a charger directly above a battery being charged; gases or fluids from battery will corrode and damage charger.
- 2) This product employs parts, such as switches and relays, that tend to produce arcs or sparks and therefore, if used in a garage, locate in a room or enclosure provided for the purpose or not less than

18 inches above the floor. Do not install on or over combustible surfaces. Do not cover the charger while charging.

- 3) **DO NOT** operate this unit in or around water.
- 4) Connect and disconnect DC output only after removing AC cord from electric outlet.
- 5) Use of an attachment not recommended or sold by the manufacturer may result in a risk of fire, electric shock or injury to persons.
- 6) **DO NOT** overcharge batteries by selecting the wrong charge mode.
- 7) To reduce the risk of damage to electric plug and cord, pull by the plug rather than the cord when disconnecting charger.
- 8) **Pursuant to California Proposition 65**, this product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.
- 9) To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning.
- 10) Operate with caution if the charger has received direct hit of force or been dropped. Have it checked and repaired if damaged.
- 11) Need repair or replacement if any protective AC and DC cable insulation, charging clamps, DC fuse holders and/or ring terminals have been damaged.
- 12) Any repair must be carried out by the manufacturer or an authorized repair agent in order to avoid danger.
- 13) The use of an extension cord is not recommended. If you must use an extension cord, follow these guidelines:
Pins on plug of extension cord must be the same number, size, and shape as those of plug on charger.
Ensure that the extension cord is properly wired and in good electrical condition.
Wire size must be large enough for the AC ampere rating of charger, as specified:

Up to 50 feet in length use **18 AWG** extension cord.

50 to 100 feet in length use **16 AWG** extension cord.

100 to 150 feet in length use **14 AWG** extension cord.

FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE (USING THE BATTERY CLAMP CONNECTORS)

- 1) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than the NEGATIVE (NEG, N, -) post.
- 2) Identify if you have a negative or positive grounded vehicle. This can be done by identifying which battery post (NEGATIVE OR POSITIVE) is connected to the chassis.
- 3) For a negative grounded vehicle: connect the RED POSITIVE cable clamp first to the positive post of the battery, then connect the BLACK NEGATIVE cable clamp to the vehicle's chassis. Do not connect the black negative cable clamp to metal fuel lines or anywhere in proximity of the carburetor or the battery itself. Connect to a heavy gauge metal part of the frame or engine block.
- 4) For a positive grounded vehicle: connect the BLACK NEGATIVE cable clamp first to the negative post of the battery, then connect the RED POSITIVE cable clamp to the vehicle's chassis. Do not connect the red positive cable clamp to metal fuel lines or anywhere in proximity of the carburetor or the battery itself. Connect to a heavy gauge metal part of the frame or engine block.
- 5) Connect charger AC supply cord to electric outlet.
- 6) When charging is completed, disconnect AC power, remove clamp from vehicle chassis, and then remove clamp from battery terminal.

FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE (USING THE 12V CIGARETTE LIGHTER MALE CONNECTOR)

- 1) Open the vehicle hood. Keep the battery and engine well ventilated.
- 2) Connect the end of the 12V Cigarette Lighter Plug to the charger.
- 3) Insert the 12V Cigarette Lighter Male Connector into the vehicle's 12V outlet.
- 4) Route the charger's power cord through the vehicle's open window.
- 5) Plug the charger power cord into a wall outlet.
- 6) If the vehicle's ignition key has to be on in order for the 12V outlet to supply / receive power, turn the key, without starting the engine.

FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE

- 1) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than the NEGATIVE (NEG, N, -) post.
- 2) Connect the RED POSITIVE cable clamp or ring terminal to the POSITIVE post of battery.
- 3) Position yourself as far away from the battery as possible – then connect the BLACK NEGATIVE charger cable clamp or ring terminal to NEGATIVE post of battery.
- 4) Connect charger AC supply cord to electric outlet.
- 5) When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while standing as far away from the battery as possible.
- 6) A marine (boat) battery must be removed and charged on shore. To charge it on board would require equipment specially designed for marine use.

ABOUT THE CHARGER

- 1) This charger is designed for charging all types of 12V lead-acid and 12V lithium-ion batteries, including WET (Flooded), GEL, MF (Maintenance-Free), EFB (Enhanced Flooded Battery), AGM (Absorbed Glass Mat), and LIB (Lithium Ion) batteries. It is suitable for charging battery capacities from 2 to 120 Amp-Hours and maintaining all battery sizes.
- 2) The built-in intelligent microprocessor makes charging faster, easier and safer to use.
- 3) This charger has safety features, including spark proof, protection for reverse polarity, short circuit, overcurrent, overcharge and overheat.
- 4) It has auto-memory, which returns to last selected mode when restarted (except Standby Mode).
- 5) When battery level indicator turns to 100% solid Green LED, it will automatically switch from full charge to maintenance status to maintain batteries during prolonged periods of storage without overcharging or damaging the battery.

- 6) This charger has four external holes for mounting. Mount the charger in a desired location with equipped self-drill screws. It is important to keep in mind the distance to the battery. The DC cable length from the charger, with either the battery clamp or ring terminal, is approximately 75 inches (1900mm).
- 7) Following is the charger's technical specification:

| | |
|---------------------|---|
| AC Input | 120VAC, 60Hz, 1A |
| AC Working Input | 85-135VAC, 50-60Hz; Variable Power, 60W Max. |
| DC Output | 12VDC, 3.5A; 6VDC, 3.5A |
| Start Voltage | > 1V |
| Battery Chemistries | WET, GEL, MF, EFB, AGM & LIB |
| Battery Capacity | 2-120Ah (12V), 2-120Ah (6V), Maintains All Battery Sizes |
| Ambient Temperature | 0°C ~ +40°C |
| Housing Protection | IP54 |
| Charger Type | 8 step, Smart Charger |

APPROXIMATE CHARGING TIMES

Different battery capacity and residual voltage would affect the charging time. The following data is only for reference (when discharge 12V lead-acid battery to 9V, with 5A discharge current).

| Battery Size/Ah | Approx. Time to Charge in Hours (12V) | |
|-----------------|---------------------------------------|-------------|
| 20 | 5H @ 14.4V | 7H @ 14.7V |
| 40 | 8H @ 14.6V | 11H @ 14.9V |
| 60 | 9H @ 14.4V | 12H @ 14.7V |
| 75 | 14H @ 14.5V | 17H @ 14.7V |
| 100 | 16H @ 14.4V | 20H @ 14.7V |

MODES

The charger has eight (8) modes. Some charge modes must be held for three (3) seconds and/or pressed to enter the mode. Do not operate the charger until you confirm the appropriate charge mode for your battery.

| Mode | Battery Size (Ah) | Explanation |
|---|-------------------|--|
| Standby | — | Not charging or providing any power (Green LED) |
| 12V NORM | 2-120 | Charging 12V WET/GEL/MF/EFB batteries (Green LED) |
| 12V COLD/AGM | 2-120 | Charging 12V batteries below 10° C (50° F) or 12V AGM battery (Green LED) |
| 12V SMALL NORM | 2-40 | Charging 12V WET/GEL/MF/EFB batteries of small battery size (Green LED) |
| 12V SMALL COLD/AGM | 2-40 | Charging 12V batteries below 10° C (50° F) or 12V AGM battery of small battery size (Green LED) |
| 6V NORM (Hold Mode button for 3 seconds to enter) | 2-120 | Charging 6V WET/GEL/MF/EFB batteries (Blue LED) |
| 12V LITHIUM (Hold & Press) | 2-120 | Charging 12V lithium-ion batteries only, including LiFePO4 (White LED) |
| 12V REPAIR (Hold & Press) | 2-120 | An advanced battery recovery mode for repairing old, idle, stratified or sulfated batteries. REPAIR Yellow LED + Green LED (12V) |

The “Hold and/or Press” modes are advanced charging modes that require your full attention before selecting.

Using 6V NORM (Hold)

This mode is designed for 6V lead-acid batteries only. Consult the battery manufacturer before using this mode as some batteries are unsuitable for charging.

Using 12V LITHIUM (Hold & Press)

This mode is designed for 12V lithium-ion batteries only, including LiFePO₄. Some lithium-ion batteries may be unsuitable for charging. Consult the battery manufacturer before charging. When fully charged, this type of battery has the voltage of 14.4V, which differs from lead-acid batteries.

Using 12V REPAIR (Hold & Press)





This mode is for LEAD-ACID batteries only. It is an advanced battery recovery mode for repairing old, idle, stratified or sulfated batteries. NOT all batteries can be recovered. For optimal results, take the battery through a full charge cycle, bringing the battery to full charge, before using this mode. When this mode is chosen, do remember press Mode button for choosing appropriate 12V Mode(s). One REPAIR cycle can take up to eight (8) hours to complete the recovery process and will enter to charge (8 steps charging cycle) when completed. This mode uses a high charging voltage and may cause some water loss in WET (flooded) cell batteries. Plus, some batteries and electronics may be sensitive to high charging voltages. To minimize risks, disconnect the battery from the vehicle before using this mode.

CHARGING STEPS



- STEP 1: DIAGNOSIS** (Checks the battery's initial condition, including voltage, state-of-charge and health, to determine if the battery is stable before charging)
- STEP 2: DESULPHATION** (If battery voltage is too low, the charger automatically generates a pulsing current to remove sulphate and lift battery voltage, up to 5 hours)
- STEP 3: ANALYZE** (Checks the battery again to determine if the voltage is suitable to begin the charging process)
- STEP 4: SOFT START** (Begins the charging process with gentle, constant current)
- STEP 5: BULK** (Charges with constant maximum current until battery voltage and capacity reach 80%)
- STEP 6: ABSORPTION** (Utilizing multi-layered charging profiles this step fully recaptures capacity and optimizes the battery for increased run time and performance)
- STEP 7: ANALYZE** (Tests if the battery can hold the charge)
- STEP 8: MAINTENANCE** (Continuously monitors the battery, and intelligently adapts charging current to the variable battery voltage)

CHARGE LEVEL EXPLANATION

| LED | Explanation |
|--|---|
| <p>25%</p> <p>25% 50% 75% 100%</p>  | <p>The 25% Charge Red LED will slowly flash when the battery level is less than 25%. When 25% is reached, the LED will be solid.</p> |
| <p>50%</p> <p>25% 50% 75% 100%</p>  | <p>The 50% Charge Red LED will slowly flash when the battery level is less than 50%. When 50% is reached, the LED will be solid.</p> |
| <p>75%</p> <p>25% 50% 75% 100%</p>  | <p>The 75% Charge Red LED will slowly flash when the battery level is less than 75%. When 75% is reached, the LED will be solid.</p> |
| <p>100%</p> <p>25% 50% 75% 100%</p>  | <p>The 100% Charge Green LED will slowly flash when the battery level is less than 100%. When 100% is reached, the 100% Charge LED will be solid. The 25%, 50% and 75% Charge LEDs will turn off.</p> |

NOTICE: following situation indicates that battery need to be replaced, although there is no abnormal result LED communication.

After full charging cycle and with 100% of battery level indicator, use this battery to start matched vehicle's engine. If engine cannot be activated (exclude the problem of vehicle itself), it indicates this battery has declined storage capacity and need to be replaced or try REPAIR Mode for recovery (Hold & Press Mode button to enter REPAIR Mode).

WARNING/COMMUNICATION LIGHTS

| LIGHT(S) CONDITION | CAUSE(S) | SOLUTION(S) |
|--|---|--|
| Solid Red Warning! LED | Reverse Polarity | Exchange the red and black clamps or ring terminals to the correct battery posts |
| Flashing Red Warning! LED | 1) Open-circuit 2) Dirty Battery Posts 3) Dead Battery 4) Output Short Circuit | 1) Connect the red and black clamps or ring terminals to the battery posts 2) Clean the battery posts 3) Replace the battery with a new one immediately 4) Disconnect red and black terminals |
| Slow flashing Red Warning! LED + Corresponding charging mode LED | Charging in 6V Mode(s) for 12V battery | Please do manually press Mode button to choose correct charge mode. CAUTION: If you choose 12V Mode(s) for 6V battery, the 6V battery will be damaged! |
| Quick flashing Red Warning! LED + Corresponding charging mode LED | Battery cannot store electric charge during charging process | Replace the battery with a new one immediately |

| LIGHT(S) CONDITION | CAUSE(S) | SOLUTION(S) |
|--|---|---|
| Only charging mode LED is on, and four battery level indicator LEDs are all off | Overheat protection | Current reduces when temperature in charger is too high. After cooling down, charge will begin |
| Solid yellow REPAIR LED + 12V corresponding charge mode LED | In 12V REPAIR mode | ----- |
| Only corresponding charging mode LED + Four battery level indicator LEDs are all OFF | In Desulphation Process | ----- |
| Red Warning! LED light flashes 2x stop for 3secs, 2x stop for 3 secs... | Battery cannot be recovered through Desulphation Process or Battery cannot be recovered through Repair Mode | 1) Replace with a new battery 2) If battery cannot be recovered through Desulphation Process, try REPAIR Mode for recovery |
| Flashing Yellow Warning! LED (ONLY for 12V lead-acid batteries) | Heavily Corroded Battery (voltage is less than 3V), need REPAIR Mode | Replace with a new battery or press Mode button to try REPAIR Mode (up to 8 hours) |



6V/12V

6V/12V COMPATIBILITY

Charge fully drained lead-acid batteries up to 120Ah



DESIGNED FOR SAFETY

Reverse polarity, short circuit, open circuit, spark proof, overheat, overcurrent & overcharge



VARIABLE INPUT COMPENSATION

100% full charge even with varying A/C input voltages



FAULT PROTECTION

Automatically shuts "off" if charger remains in Bulk charge mode for an extended period of time



AUTO-MEMORY

Returns to last selected mode when restarted



HF/HE SWITCH MODE DESIGN

High-frequency, high-efficiency inverter



INTERCHANGEABLE CONNECTORS

Interchangeable connectors for easy accessory changes



FULLY INTERACTIVE

Automatically adjusts itself to changing current needs



RAPID CHARGING TECHNOLOGY

Charges batteries 2X faster than traditional linear chargers



MULTIPLE BATTERY CHEMISTRY

Safely charges 6/12V Wet, Gel, MF, EFB & AGM lead acid batteries and 12V Lithium Ion batteries



COLD/AGM MODE

Optimized charge mode for cold weather or AGM batteries

LIMITED WARRANTY

Effective April 15, 2017. Replaces all undated warranties and all warranties dated before April 15, 2017

Repair/Replacement Warranty

Smartech Products warrants to the original purchaser that the mechanical and electrical components will be free of defects in material and workmanship for a period of five (5) years from the original date of purchase. This product is intended for household use only. Transportation charges on product submitted for repair or replacement under this warranty are the sole responsibility of the purchaser. This workmanship for a period of warranty only applies to the original purchaser and is not transferable.

Do not return the unit to the place of purchase.

Contact Smartech Products' Customer Service and Smartech Products will troubleshoot any issue via phone or e-mail. If the problem is not corrected by this method, Smartech Products will, at its option, authorize evaluation, repair or replacement of the defective part or component at a Smartech Products' Service Center. Smartech Products will provide you with a case number for warranty service. Please keep it for future reference. Repairs or replacements without prior authorization, or at an unauthorized repair facility, will not be covered.

Warranty Exclusions

This warranty does not cover the following repairs and equipment:

Normal Wear

This warranty does not cover repair when normal use has exhausted the life of a part or the equipment as a whole

Installation and Use

This warranty will not apply to parts and/or labor if this product is deemed to have been misused, neglected, involved in an accident, abused, modified, installed improperly or connected incorrectly to any electrical component.

LIMITED Warranty (continued)

Other Exclusions

This warranty excludes:

- Merchandise sold as reconditioned, used as rental equipment, or floor/display models sold without packaging and/or missing parts or components.
- Repair and transportation costs of merchandise determined not to be defective.
- Cosmetic defects such as paint, decals, etc.
- Failures due to acts of God and other forces of nature beyond the manufacturer's control.
- Problems caused by parts that are not original parts.

Limits of Implied Warranty and Consequential Damage

Smartech Products disclaims any obligation to cover any loss of time, use of this product, freight, or any incidental or consequential claim by anyone from using this product. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

A unit provided as an exchange will be subject to the warranty of the original unit. The length of the warranty governing the exchanged unit will remain calculated by reference to the purchase date of the original unit.

This warranty gives you certain legal rights which may change from state to state. Your state may also have other rights you may be entitled to that are not listed within this warranty.

Some states do not allow the exclusion, so it may not apply to you.

Contact us at:

Smartech Products' Customer Service

Ashland, VA 23005

(888)241-8498

customerservice@smartechproducts.com

