

## Two State Charging Diagram

### STAGE I: CONSTANT CURRENT CHARGING OR BULK CHARGE MODE

Assuming the battery is starting in a discharged state, the charging is operating in constant current mode, where the charger current is maintained at a constant value and the battery voltage is allowed to rise as it is being recharged. Approximately 80% of battery capacity is returned in the constant current region.

### STAGE II: FLOAT OR MAINTAINANCE MODE

Float mode is the final stage of the charging routine. Float mode is where the voltage on the battery is maintained at approximately 2.25 volts per cell, or 27 volts for a 24V battery. This voltage will maintain the full charge condition in the battery without boiling out electrolyte or overcharging the battery.

## CK150-4 OPERATION

The CK150-4 is fully automatic once installed properly. The indicator lights (LEDs) informs the user of the progress of the charging cycle and confirms proper connections.

### CK150-4 LED INDICATORS

The dual color charging mode light indicates the state of charge of the battery. The light will illuminate only when the charger is properly connected to the battery and AC power is applied. Red indicates charging, flashing red/green indicates topping off and green indicates the battery is fully charged.

Max. Charging Current(Bulk Charge): 1A (Battery voltage < 22V)  
 Max. Charging Current(Bulk Charge): 0.75A (Battery voltage > 22V)  
 Topping Off Voltage(Absorption Mode): 28.6-29.4VDC  
 Max. Float Voltage(Float Mode): 26.4-27VDC

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The CK150-4 must be connected to the battery in order for the lights to illuminate. Should no light appear, unplug the unit and recheck battery connections to ensure proper polarity. (The red wire to the positive and the black to the negative.)

Over Temperature: The CK150-4 will reduce its charging current as its case temperature increases to insure proper operation. In the event of a charger over temperature the unit will turn off until it cools off and then restart automatically.

## CT150-4 OPERATION

The fully automatic Chargetek CT150-4 will recharge your battery and then maintain it at a fully charged level until you need it again.

If the charger is left for extended periods of time, it is advisable to check and be certain that the green light is on and the battery voltage is less than 27.2VDC. The green LED indicator light will light indicates the charger is properly plugged in and connected to the battery. The green light will only come on once the unit has been connected to the battery. Should no light appear, unplug the unit and recheck battery connections to ensure proper polarity. (The wire marked red to the positive and the black to the negative.)

Max. Charging Current: 1A (Fast Mode)  
 Max. Float Voltage (Float Mode): 26.4-27VDC

### CT150-4/CK150-4 OVER VOLTAGE PROTECTION (OVP)

If the red light marked Service ever illuminates, the unit should be removed and the factory should be consulted. This light indicates that the internal over-voltage protection shut off has been tripped and the unit will shut down.

### CT150-4/CK150-4 INPUT AC POWER

AC Input Voltage Range: 100-132VAC  
 AC Input Current: 1A rms Maximum

Good battery maintenance procedures dictate that battery fluid levels be checked on a regular basis, especially in high ambient temperatures.

### LIMITED WARRANTY

For two years from date of purchase, Chargetek Inc. will at its discretion repair or replace for the original consumer, free of charge any part or parts found to be defective by Chargetek in workmanship or material. All shipping charges under this warranty must be paid by the consumer. Proof of purchase is required.

There is no other expressed warranty. Implied warranties, including those of merchantability and fitness for a particular purpose are limited to two years from the date of purchase. This is the exclusive remedy and consequential

# CHARGETEK



## CT150-4/CK150-4 INSTALLATION MANUAL

Congratulations and thank you for purchasing the finest battery charger in its class.

The ChargeKeeper (CK150-4) and CT150-4 are a totally waterproof and precisely regulated battery chargers designed to be portable or permanently mounted on almost any type of vehicle including generators, ATVs, RV's, Lawn and Garden Tractors, Snowmobiles, Motorcycles, Personal Watercraft and Boats.

These chargers are rugged, silent and completely automatic. The CT150-4/CK150-4 can deliver over 1 amp to a deeply discharged battery for a long period. The charging routine

is precisely controlled to restore and maintain your battery at full capacity indefinitely.

One outstanding feature of the Chargetek CK150-4 is three state recharging with sophisticated microprocessor control. It insures that the battery is recharged with precision and will be recharged to its full capacity each time as fast as possible while prolonging its life. This advanced design also dramatically reduces the number of components on the control circuit which increases reliability.

Each and every CT150-4/CK150-4 is tested and operated under full load before shipment to ensure superior reliability.

CHARGETEK

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# INSTALLATION

## LOCATION

- ❑ Do not mount directly over or under a battery.
- ❑ Install in an area that is convenient to reach with an extension cord and one where the DC leads to the battery will avoid hot surfaces such as exhaust pipes and moving parts such as fan wheels.
- ❑ Do not mount onto a carpeted, upholstered or varnished surface.
- ❑ Operating ambient temperature is 15 to 130 degrees Fahrenheit. Storage temperature is -20 to 160 degrees Fahrenheit.
- ❑ Pick an area that will provide as much surrounding cooling clearance as possible for maximum efficiency and shortest recharge times. Maintain a 3" clearance around charger and never mount in the vicinity of explosives or pressurized cans.

## MOUNTING

- ❑ Wear safety goggles, gloves and a long sleeve shirt when drilling mounting holes near a battery.
- ❑ In most cases, #10 stainless steel mounting bolts with aircraft nuts or nylocks or #10 screws provide for solid mounting, however, for extreme vibration conditions common in ATV and PWC applications, added security such as crossed shock cords are recommended.

## ELECTRICAL

### DC WIRE CONNECTIONS

- ❑ DC wire connections must be made before plugging in the AC cord.
- ❑ The charger will not operate until DC connections are made.
- ❑ When installing in the bilge and or battery compartment of boats, open hatches and operate bilge blowers if any for ten

minutes to remove any fumes and hydrogen gas. Be certain the area is ventilated for personal health and safety

- ❑ Keep wire routing from the charger to the battery neat and secure by anchoring with cable tie to a solid surface every few inches, not to exceed 18" intervals.
- ❑ Insure that cables have sufficient clearance from any moving parts and from any hot surfaces such as exhaust components.
- ❑ The CT150-4/CK150-4 is current limiting and will protect itself under short circuit conditions. As is true with any device connected to a battery, an in line fuse added to the positive lead of the battery is required and will provide further protection if the DC cord is somehow damaged.
- ❑ Connect the lead set to the battery, red to positive and black to negative. Do not leave the lead set disconnected with AC power applied. All connections should be clean and tight. See installation diagrams.

### AC Wire Connections

#### Note:

The CT150-4/CK150-4 is equipped with a factory installed 6' grounded AC cord. Though hook up is only a matter of plugging this cord into a suitable extension cord, please follow the following precautionary tips.

# SAFETY INSTRUCTIONS

#### CAUTION:

The following are important safety instructions. Save these instructions.

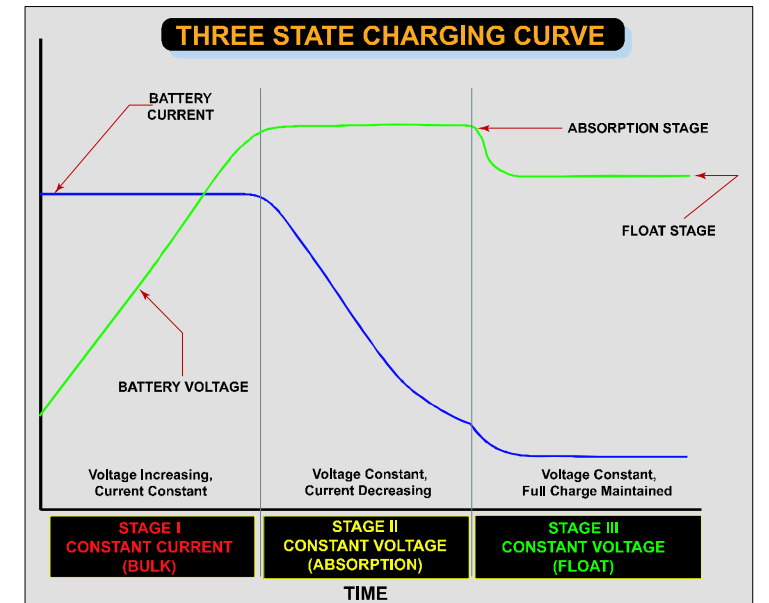
- ❑ Charge only lead acid, (maintenance free or refillable), or "gel-cell" rechargeable batteries. Other types of batteries may burst causing personal injury and damage
- ❑ Never smoke or allow sparks or flame in the vicinity of a battery.
- ❑ Someone should be within range of your voice and close enough to come to your aid when you are working near a battery.
- ❑ Wear eye protection and clothing protection. Avoid touching eyes while working near a battery.
- ❑ Have plenty of fresh water and soap nearby in case battery acid contact's skin, clothing or eyes.
- ❑ If battery acid contact's skin or clothing, wash immediately

with soap and water. If acid enters eyes, immediately flood eyes with running cold water for at least ten minutes and get immediate medical attention.

- ❑ Never operate a charger with a damaged cord or plug. Wearing of AC and DC cords, accidentally nicking or cutting the cords could result in sparking and cause injury.
- ❑ Never operate a charger that has been damaged in any way or try to disassemble. Return to factory when service or replacement is required. Incorrect reassembly may result in a risk of electrical shock or fire.
- ❑ Read and become familiar with all instructions and cautionary markings on chargers, batteries and equipment used. Only adults should install and operate the charger. Children should be kept out of reach of the charger and batteries it is charging.
- ❑ When using an extension cord the CT150-4/CK150-4 requires a quality grounded extension cord of at least 18 awg wire size for cords up to 50' and a minimum of 16 awg for cords up to 150'.
- ❑ Never unplug a cord by pulling on the cord itself. Always grasp the plug when disconnecting the charger.
- ❑ The CT150-4/CK150-4 is waterproof and designed for harsh environments although it is not recommended the unit be operated submerged.
- ❑ Never charge a frozen battery .
- ❑ Study battery manufacturer's precautions such as removing or not removing cell caps while charging.
- ❑ Keep batteries full. Add distilled water in each cell until it reaches levels specified by battery
- ❑ Keep battery terminals clean. Always unplug charger before cleaning and be careful to keep corrosion from coming in contact with eyes.
- ❑ Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short circuit high enough to weld a ring, etc. to metal, causing a severe burn.

## THREE STATE CHARGE CYCLE

The CK150-4 employs a three state charge routine. This is the charging procedure most lead-acid battery manufacturers recommend to return full capacity efficiently and extend battery life. Please refer to the figure Three State Charging Curve diagram.



## Three State Charging Diagram

### STAGE I: CONSTANT CURRENT CHARGING OR BULK CHARGE MODE

Assuming the battery is starting in a discharged state, the charging is operating in constant current mode, where the charger current is maintained at a constant value and the battery voltage is allowed to rise as it is being recharged. Approximately 80% of battery capacity is returned in the constant current region.

### STAGE II: ABSORPTION MODE

When the battery voltage reaches approximately 2.4 volts per cell, or 29.2 volts for a 24V battery, the charger voltage is held constant at this level and the battery current is allowed to reduce. This voltage is maintained until the charging current reduces substantially indicating a full charge. At this point the battery is fully charged.

### STAGE III: FLOAT MODE

Float mode is the final stage of the charging routine. Float mode is where the voltage on the battery is maintained at approximately 2.25 volts per cell, or 27 volts for a 24V battery. This voltage will maintain the full charge condition in the battery without boiling out electrolyte or overcharging the battery.

## TWO STATE CHARGE CYCLE

The CT150-4 employs a two state charge routine. This is the charging procedure most lead-acid battery manufacturers recommend to maintain a battery at full capacity. Please refer to the figure Two State Charging Curve diagram.

