

Technical Note

Truecharge 10

512-0050-01-01 Rev 1

TrueCharge 10 Charging Algorithm

The Truecharge charging algorithm has four modes:

Bulk

When the TC first enters a charge cycle, the “bulk” mode provides a constant current of 20 A (ex. TC20) to bring the battery back up to 80% capacity in the shortest length of time. The TC moves from Bulk to Absorption mode when the charger output/battery voltage reaches absorption/gassing voltage (typically 14.4 V dependent on battery type switch setting and temperature). The bulk charge current is reduced slowly as the battery voltage reaches about 97% of the absorption voltage, therefore your instrument panel’s ammeter may read a slightly lower charge current before the battery voltage actually reaches the absorption/gassing voltage. The TC will stop charging for up to 20 seconds in 15-minute intervals to recalibrate and test the battery condition.

Absorption

Absorption mode holds the battery voltage constant (typically 14.4 V +/- 0.1 V) while allowing the battery to absorb the remaining 20% of its capacity. During absorption the battery actually determines the charge current, the charge current reduces as the battery continues to move closer to the fully charged state. When the current reduces to only 3 A (TC20), the TC continues to charge for one additional hour, then considers the battery fully charged and moves to the float mode. If your TC is set to Gel the charger will go into float mode immediately.

If you happen to have a DC load turned on (ex. 5 ADC cabin light, or fridge) the charger will attempt to provide the necessary current for the light as well. Therefore the charger current may not drop to 3 A. The TC will automatically go into float mode after six hours to ensure the batteries are not held at the higher gassing voltage of 14.4.

Float

Float mode is a maintenance charge where the TC has fully charged the battery and now holds the battery voltage at 13.5 V (dependent on switch settings) to help ensure the battery does not self-discharge. This constant voltage state also helps reduce the rate of sulfation. During float the typical charge current will be 1–3 A and is dependent on the battery capacity, and condition. If additional DC loads (ex. 5 ADC cabin light, or fridge) are turned on the TC will provide up to 20 A (TC20) of current to maintain the float voltage (13.5 V). If the total draw is more than 20 A, the charger output current will remain at its maximum and the battery system voltage will fall until the battery supplies the excess current. If the battery voltage drops to 12.5 V for at least 15 minutes the charger will go into the regular charge cycle. The TC will recharge the battery once the loads are turned off.

If the boat is docked without significant DC current use, the TC will restart a regular charge cycle after three weeks (provided the TC is connected to AC power).

If AC power to the charger is interrupted for up to 60 seconds only the charger will resume its charging mode. If AC power to the TC is interrupted for more than 60 seconds the charger will reset and go into the regular charge cycle when reconnected to AC.

Equalization

Equalization is a controlled overcharge intended to dissolve any recently accumulated sulfation on the battery plates, regaining more of the battery's original capacity. When the small recessed button is pressed the TC first completes a regular charge cycle to establish a charge state reference point. The TC then charges at 5 A (TC20) raising the battery voltage to maximum 15.5 V. The operator is then to test the battery cells' specific gravity every hour, and take the charger out of equalize mode when the cells are no longer equalizing. If the operator does not take the charger out of Equalize the TC will exit Equalize and go into float mode after six hours.

Truecharge algorithm suitability

If your Truecharge battery charger is operating normally, but the battery specific gravity does not reach 1.250:

- a) Delco brand batteries require Float and Absorption voltages approximately 1 V higher than normal lead acid flooded type batteries. The Truecharge presently is not designed to automatically charge these batteries to full capacity without performing a manual "equalize charge".
- b) Trojan brand batteries will recharge to approximately 90 to 95% of full capacity. This results in approximately 5–10% reduction in battery capacity, but perhaps longer life. Battery "life expectancy" may be slightly compromised when every possible amp hour of a battery capacity is achieved through extensive charging.
- c) Interstate batteries, as with most others, require an "initial" equalization charge (15.5 V) at the time of sale to the end user. This is in order to recharge the battery after it has been sitting discharged on the dealer's shelf at time-of-sale to the customer. After proper initial charge, the TC algorithm is ideal.

Over discharged batteries

The TC10/1 bank portable charger with its anti-spark feature will not immediately begin a bulk charge if battery voltage is less than approximately 3 V. Instead, this TC10/1 bank model will pulse charge current into the battery until terminal voltage rises above this point. If the battery is recoverable, it will begin normal charging within eight hours of being connected. If the battery does not charge within eight hours, it is likely beyond recovery and should be replaced.

The TC20/40, intended for permanent installation, will begin charging in bulk mode regardless of the battery terminal voltage.

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Contact information:

Phone: 1-800-670-0707 (toll-free in North America)

Phone: 1-604-422-2777 (outside North America)

Fax: 1-604-420-2145 (outside North America)

Email: CustomerService@xantrex.com

Web: www.xantrex.com