

The Many Benefits of Caring For Your Battery

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There are primary and secondary benefits from caring for your battery.

The primary benefits are obviously:

- Longer battery life.
- The car always starts after storage.

The lesser-known secondary benefits are:

- Avoid alternator failure. The alternator was not designed to operate at full output for more than 20 minutes or so. The alternator can be damaged if it is used to charge a fully discharged battery. The LT5 engine configuration presents an especially harsh thermal environment for the alternator because it locates it in a pocket under the plenum that has reduced airflow. The alternator should not be used to charge the battery after the car has been in storage. The alternator is likely to fail if it is used to charge a battery with a dead cell.
- Avoid CCM false system errors after a discharged battery event. This is where the speedometer display flashes "SYS". It can be caused by a slow rise in system voltage. The car's electrical systems are designed to respond to the fast rise in system voltage that occurs when a fully charged battery is connected. Correct system initialization may not occur if the system voltage rises very slowly. This can happen if the battery voltage is less than about eight volts and a typical 10 to 25 ampere battery charger is connected. A healthy battery with low internal resistance will rise to 12 volts or so over a few minutes. The slow voltage rise can cause hysteresis in an initialization circuit that affects its normal operation. The proper procedure is to disconnect the battery from the car. Charge the battery. Then connect the fully charged battery to the car.
- Avoid starter replacement. The starter's performance is dependant on the battery's condition. A good starter requires a certain amount of current to operate. It can be difficult to distinguish between a bad battery and a bad starter.
- Avoid the dangers of a jump-start. A jump-start always has the risk of a reversed cable connection. Reversal of the system voltage on a car can damage electronic devices anywhere in the car.
- Avoid the danger of a high powered battery charger. A high powered battery charger can elevate the car's system voltage beyond the 16 volts that is a typical maximum for car electronics. If the battery is going to be charged with a high power charger, it should be disconnected from the car before charging it.

Starting Batteries are Damaged by Deep Discharges

A starting battery should never be fully discharged. Several deep discharges lasting several days can shorten the life of a starting battery by about 25%. Special deep discharge batteries are available for lighting and boat trolling motor applications. Battery manufacturers do not recommend using a deep discharge battery for high current cranking.

It's Easy To Avoid All of These problems If You Do Two Things

1. Connect a Battery Tender or other "float mode" battery care device. If a Battery Tender is connected every time the car is parked for more than one week you will never have a weak battery.
2. Replace the battery every five years.

The Battery Tender Is Not An Ordinary Battery Charger

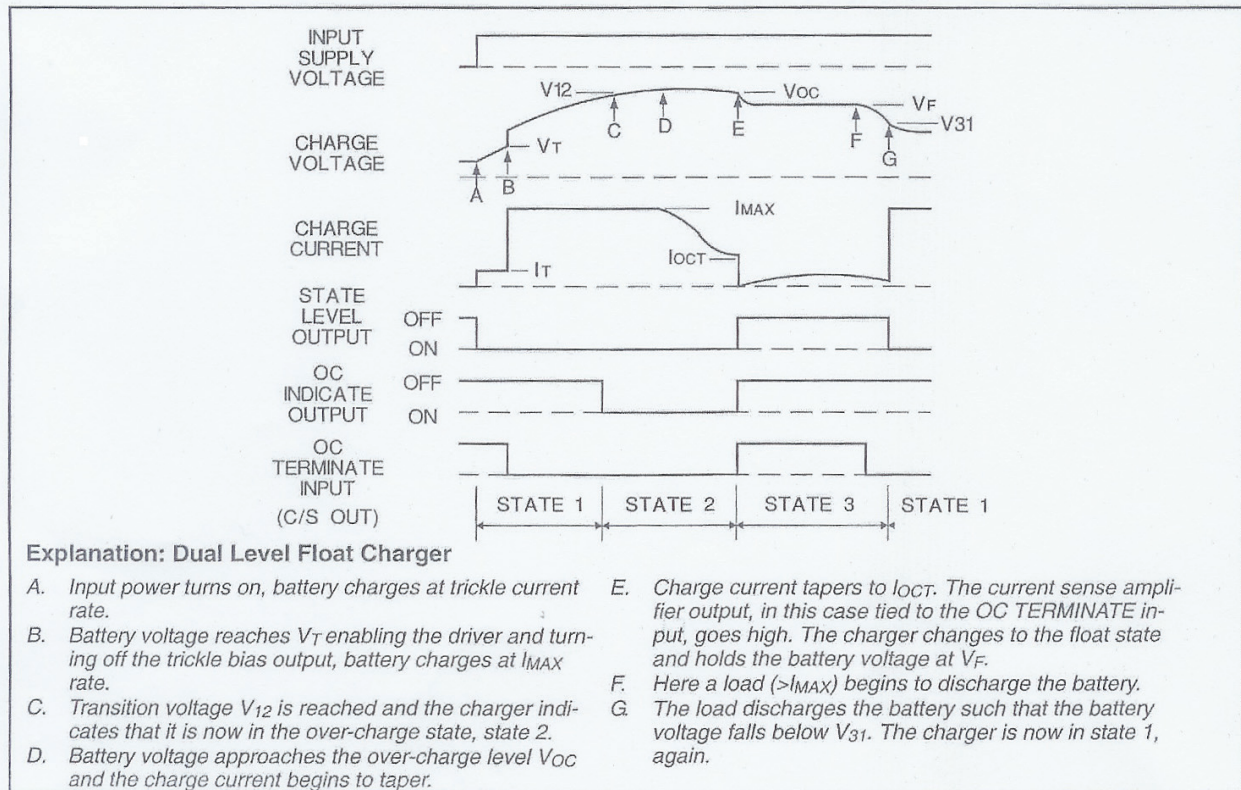
The Battery Tender cares for a battery. The heart of the original Battery Tender is a microcircuit that was designed by the Unitrod Corporation in cooperation with battery manufacturers. The microcircuit is currently manufactured by Texas Instruments as part number TI3906. The 3906 has three phases for the charging process.

1. Bulk charge. It charges the battery with high current until it is 80% charged. At this point the battery causes the charging current to taper. Simple battery chargers either stop as the current tapers, or they never stop charging. Stopping at 80% will not return the full capacity of the battery. If charging continues past the 100% capacity point the battery can be damaged by overcharging. A trickle charger damages a battery due to endless charging that causes dehydration and grid corrosion.
2. Tapered current charge after 80% of capacity has been restored. The microcircuit senses the battery's taper in current load and reduces the charge rate as the battery approaches 100% charge capacity.
3. Float charge. The charging current is greatly reduced until only enough current is supplied to maintain the ideal storage voltage on the battery. This is 13.2 volts at 70 degrees F. The Tender supplies current to offset the self-discharge current in the battery and the parasitic current draw from the car. The 3906 has an ambient temperature monitor that adjusts the float voltage with respect to a battery's ambient temperature characteristics.

TI states that a battery that is not used and stored in a float state can have an eight to ten year life span (Reference B page 3-80). Large commercial battery back-up systems utilize the 3906 or a similar microcircuit to care for large battery plants. A large computer facility might have a \$5000 battery bank for a power back-up system. They use the 3906 to protect their investment.

The newest version of the Tender uses a newer version of the 3906 microcircuit with a new part number.

Voltage, Current and Time Relationship Chart for the 3906



Note how the current is controlled between the 80% charged point at D and the 100% charged point at E. This and the float state are the heart of what the Battery Tender provides.

Tips On The Use Of a Battery Tender

- Read the user's guide.
- The Tender must be connected as follows. It must be powered off for about one minute. Connect it to the battery. Plug the AC plug in while observing the green and red lamps on the Tender. Observe that the green lamp blinks and the red lamp stays on steady. If this procedure is not followed the Tender may not charge or float the battery. Troubleshooting tips are included in the Battery Tender user's guide.
- If the red lamp is blinking there is a problem. Investigate why. The number one cause is a poor connection to the battery.
- The tender has dead cell overcharge protection. It will not charge a battery with less than 10 volts. If the battery is nearly dead, disconnect it from the car. Jump the battery with a fully charged battery. Connect the Battery Tender. Without disturbing the Battery Tender connections to the dead battery remove the jumper cables.

A Simple Battery Capacity Test

Let the car sit overnight. Then turn the headlamps on for five minutes. Turn the headlamps off. If the engine will not start, the battery desperately needs to be replaced.

Closing Statement

After all of this technical discussion, all that you need to remember is to use a Battery Tender. The Deltron Corporation manufactures the Battery Tender. Support our favorite museum, the Corvette Museum. www.corvettemuseum.com In the store click on “Auto & Essentials”. The cost is \$59.95.

References:

A. Unitrode application note U-104.

<http://focus.ti.com/lit/ds/symlink/uc3906.pdf>

B. Texas Instruments application note UC2906/UC3906.

<http://focus.ti.com/lit/ds/slus186c/slus186c.pdf>

C. Deltron Corporation

<http://www.batterytender.com/>