

SUNJACK USB BATTERY CHARGER



Battery charging and battery chargers (for example: [SUNJACK USB BATTERY CHARGER](#)) are often misunderstood – causing batteries to die before their time. This article explains why and how to avoid it. Batteries charge by applying a voltage that is higher than that existing. The greater the voltage difference, the faster and deeper it will charge. That voltage must, however be tightly controlled. If, too high, it damages or wrecks batteries.

Historically, vehicle alternators generated 14.2-14.4 volts. Cheap battery chargers still do.

As the battery charges, its voltage rises towards the charging voltage. The voltage difference between the battery and the charger thus constantly reduces. Charging rate falls accordingly. Battery charging and battery chargers – like filling one tank from another that's much bigger

Charging is like filling a small tank from a huge one (of similar height) via a hose between the bottom of each. The water level in the small tank slowly rises until levels equalise. As with ponds, alternators need not know battery state of charge. The charging battery simply rises in voltage. As it does so, charging tapers off. Eventually, voltages are equal. Charging then ceases.

Many RV batteries charge this way. They take many hours to fully charge. Most never do. Given many days continuously, however, they may even overcharge.

Battery charging and battery chargers – starter batteries

A starter motor draws surprisingly little energy. Following engine starting, the alternator replaces it within two to three minutes. Such charging is crude but cheap and simple. It works well enough for starter batteries, but less so for RV auxiliary batteries. These are limited to slow charging. Few reach full charge.

Constant current charging

Serious battery charging is done at constantly increasing voltage. This maintains a constant rate of charge current throughout 80-90% of the charging cycle. A final stage is usually done at constant voltage. There are variations. All, however, work much as below. Conventional lead acid, gel cell and AGM batteries are similarly charged.

Lithium-ion batteries, however require a different regime. This is described later in this article).

Battery charging and battery chargers – boost stage

The initial 'Boost' stage constantly increases charging voltage as battery voltage rises. Its intent is to keep charging current at the battery's safe maximum. For a lead acid deep cycle battery that's typically 20% of its amp/hour capacity. For large batteries, that limit may be the charger's ability to do so.

Boost typically continues until battery voltage reaches about 14.4 volts. That battery is nevertheless not yet fully charged.

Battery charging and battery chargers – absorption stage

Battery charging is an electro-chemical process. Like many such, it is slow. The charge, in effect, is held within the water/acid electrolyte. At this stage, however, the 'charge' is uneven. It is concentrated in and around the battery's plates. Evenly distributing the charge requires 'absorption'.

Absorption is typically at voltage ensuring charge current is about half that previously. It typically requires two or so hours.