

BATTERY EQUALIZATION

A PROCESS TO MAXIMISE THE LIFE OF LEAD-ACID BATTERIES

Battery equalization is a vital, but often misunderstood and overlooked part of motorhome-battery maintenance. Very few motorhome owners know about it, and most don't have a charger to go through with the equalization process when they should. This lack of information and equipment has surely led to premature lead acid battery failure and the added expense of battery replacement.

Equalization is a process whereby the charging voltage is raised to more than 16 volts while the amperage is limited to not more than 5 percent of the amp hour capacity of the batteries. Only lead acid batteries, such as golf-cart batteries, should be equalized. "Maintenance free" batteries cannot be equalized.

Equalizing your lead-acid batteries provides several benefits. First, as your batteries are cycled (charged and discharged), sulphate begins to accumulate on the interior battery plates. After a period of time, this accumulation can affect a battery's ability to reach its full charge potential. When you equalize your batteries, the accumulation of sulphate is transferred off the plates and back into the electrolyte, leaving all of the plates exposed, and thus allowing the battery to reach its maximum charge potential.

Another problem with cycling batteries is the development of dissimilar cell voltages. Dissimilar voltage among cells results when repeated charge and-discharge cycling of the batteries occurs. This difference between cells increases the inefficiency of the battery. Equalization renders the individual cells up to the same voltage. A third problem facing lead-acid batteries is a tendency for their electrolyte to separate into water and acid. Equalization, through the gassing action of the charge process, serves to mix the water and acid.

How often to equalize your batteries varies with the manufacturer, and can range from once a month to twice annually, depending on the number of discharge cycles your batteries have experienced for the period. A leading battery supplier recommends equalizing only when "low or wide-ranging specific gravities (+-.015) are detected after fully charging a battery." Consult your specific battery manufacturer for guidelines on when to equalize.

Now that we've explained the benefits of equalization, let's take a step-by-step approach to completing the process. Before you begin, make sure to read and understand your charger manual and all information supplied by your battery manufacturer. Many motorhomes today incorporate battery chargers within their inverters. These systems provide three distinct stages of battery charging: bulk, acceptance and float. Under normal

circumstances, the user doesn't know the charge stage of his/her batteries. Rather, the system controls when the batteries pass from one stage of charge to another, with one notable exception: the equalization charge.

The process outlined here will be similar for most applications, but specifics, such as dipswitch settings, individual battery temperature settings, and timing of the equalization process, may be different for your individual batteries and charger.

During battery equalization, safety is the most important consideration. Because the voltage will exceed 16 volts, all electronic equipment and ideally all 12-volt coach loads should be turned off. The electrolyte will gas, necessitating that you be present during the entire equalization process.

**BATTERY EQUALIZATION
MAXIMISES THE LIFE OF
LEAD ACID BATTERIES
BUT THE PROCESS
SHOULD ONLY BE
CARRIED BY SOMEONE
WHO IS AWARE OF THE
POSSIBLE
DANGERS INVOLVED**

Some chargers program the equalization cycle for up to eight hours, but it rarely takes that long. Make sure you use both hand and eye protection to prevent contact with any electrolyte. During equalization, the batteries will emit a large amount of explosive hydrogen gas, necessitating a well ventilated area and protective clothing (and glasses). If your batteries are in a lower compartment, leave the door open during the entire equalization process. Ensure that no sparks or fire of any kind are near the area during equalization.

If possible, disconnect the main power feed line from the batteries to the coach before starting the equalization cycle. Make sure the ends are temporarily wrapped with electrical tape to prevent shorting. Because the batteries will be brought to a voltage in excess of 16 volts, physically disconnecting the main power feed from the batteries to the coach ensures that no damage will occur to sensitive 12-volt DC circuit boards in the coach.

Do not assume that just because the breakers are off, all 12-volt DC power to the coach is eliminated. Many motorhomes have constant, or "phantom," loads directly connected to the batteries, including clocks, carbon-monoxide detectors, audio systems, etc. By physically disconnecting the main power feed from

the batteries to the motorhome, you eliminate any possibility of damage to these "phantom" loads.

Bear in mind that you will have no battery power to the coach for up to eight hours. This means no refrigeration for most motorhome owners. Even though your refrigerator may be in the LP-gas mode, electronics in the refrigerator require 12-volt DC power for operation.

Make sure the battery posts are clean and the cells are topped off with distilled water. Be careful not to overfill the cells. Leave room for the solution to gas without spillage. Prior to replacing the battery caps, inspect the breather holes in the caps to ensure no blockage exists; then securely replace the caps on the batteries and wipe off any spilled distilled water. Place towels around the batteries, both between the batteries and around the exterior. This will ensure capture of any spillage that might result from the electrolyte being gassed.

Set thermometer and charger controls to EQUALIZATION. Place the thermometer or thermometer sensor on the side of one of the batteries to be equalized; note the temperature. Set your individual charger to the EQUALIZATION mode. There are a number of converter/charger and inverter/charger models available that provide equalization cycles. Also, the better solar-panel regulators have provisions for equalization. Follow the instructions for your individual equipment for setting equalization in motion.

Monitor battery temperature as the equalization charge proceeds, and watch for excessive spillage of electrolyte onto the surface of the batteries. As you observe the batteries and monitor the temperature, watch for any abnormal gassing or rapid ejection of electrolyte from the battery caps or temperatures in excess of 110 degrees F. This could indicate a shorted cell within the battery. Should this occur, terminate the equalization process by removing power to the charger. The suspect battery should be removed after allowing for a cool-down, and inspected by a qualified technician.

Some battery manufacturers recommend taking specific-gravity readings every hour during the equalization charge. Although this involves more work, you will know for sure that the equalization process is complete when the specific-gravity reading no longer rises during the gassing stage. Because of the problems associated with taking specific-gravity readings from so many cells, most motorhome owners rely on voltage growth or the predetermined timing of the equalization charge built into most chargers. When voltage stops growing, equalization is usually complete.

Following this process, you may notice that the capacity of your batteries has increased, resulting in more run time between charges. Additionally, you have performed important preventive maintenance on your batteries, ensuring maximum service life in your motorhome.