

Sunline Coach Company Deep-Cycle Batteries Explained

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We all know that an RV/marine deep-cycle battery "looks" different from its automotive counterpart; most have handles and all have posts that are different. Aside from these physical appearances, however, there are a number of internal differences that separate these two batteries.

The deep-cycle RV/marine battery has a higher density active material than a standard automotive battery. This higher density material enables the plates to withstand the stresses of repetitive cycling without the loss of active material.

The grid alloy in a deep-cycle battery is specially formulated to increase active material adhesion to the grid, thereby providing additional protection against the stresses and abuses of cycling and vibration. The separators and plates of most RV/marine batteries are bonded together with a special hot melt application to provide that extra margin of vibration protection against frequent movement, off-road "bounces," wave pounding, etc. Also, the weight of active material applied to a deep-cycle RV grid is more than that applied to a similar automotive grid.

There are very definite reasons for these internal design differences found between automotive and deep-cycle batteries. As the name implies, a deep-cycle battery is subjected to many various depths of discharge; in some cases a battery may be drained to zero capacity before it is recharged.

During discharge, a battery may be called upon to crank an engine and then provide the power for a refrigerator, lights, fans and an assortment of other small electrical accessories found on RVs. The current required to power most of these electrical devices is low, but continuous. The more active material found in a deep-cycle battery, the longer this equipment can be powered.

An automotive battery, on the other hand, is called upon to give short bursts of power before the alternator of the vehicle takes over. The automotive battery is never discharged more than a few percent under normal conditions. Even the best automotive battery would not last more than 50 deep-cycle charges, and of these 50, only the first 15 or so will recharge to a full 100 percent state of charge.

A perfectly logical question to ask when choosing a deep discharge battery is "how long will it last during a typical day's usage?" To answer this question, one must know the type of equipment to be powered, the current (amps) required to run the equipment and the length of time the equipment is to be used.

Assume the following sets of conditions:

EQUIPMENT	CURRENT		AMP-HOURS
	DRAW (AMPS)	TIME (HOURS)	
Lights	5	5	25
Refrigerator	>8	5	40
Fan	1	5	5
Radio	1	5	5
TOTAL			75 AMP-Hours

For RV/marine batteries rated in reserve capacity, the above calculated amp-hours requirement equates to 125 minutes of reserve capacity (RC),
i.e. $75 \text{ amp-hours} / .60 = 125 \text{ minutes RC}$.

Most Group 24 RV/marine batteries are rated about 125 minutes RC. However, to provide that extra margin of safety when in the woods in your RV, it is recommended that the next larger Group 27M deep-discharge battery be used. Most Group 27M batteries are rated in the neighborhood of 165 minutes RC or about 100-105 amp-hours.

On occasion, the RVer may want more capacity than any one battery type can deliver. If space is of little consequence, two 12-volt deep-discharge RV/marine batteries can be used in parallel so that the capacity is doubled while still maintaining a 12-volt system. To do this, see the accompanying diagram.

In a parallel hookup, the positive post of one battery is connected to the positive post of the second. The positive lead from the equipment to be powered is then hooked up to this second positive post.

The same procedure is then followed for the negative connections, i.e., negative to negative and negative lead from equipment to second negative post.

Battery Maintenance

To insure a long life at full capacity for your deep-discharge battery, several simple rules of maintenance should be followed. First and foremost, the battery should be recharged as soon as possible after a discharge.

A deep discharge will require more top-offs with water than an automotive battery. Any water suitable for drinking is okay, however, distilled water is preferred.

Always keep the water level above the tops of the plates, but never into the splash wells. Keep all cables, connectors, posts and studs free of dirt and corrosion.

Whenever the battery is not in use, store it in as cool a place as possible. If it is to be stored longer than two months, follow these simple steps to insure that you battery will be ready to go when you need it.

First, remove the battery from the vehicle. Brush battery terminals and cable connectors with a wire brush.

This is an opportune time to perform general "house cleaning" in the vicinity of the battery. Sponge this area clean with a neutralizing solution (1/2 box baking soda to 1/2 gallon water) and dry thoroughly.

Next, inspect cables and cable connectors. Cable with frayed or broken insulation should be repaired or replaced.

Replace broken, cracked or pitted cable connectors. Make these simple corrections now; don't put them off until "next time." They may never get done if you wait.

Then, check the electrolyte level in each cell. If levels are low, fill cells to a point just slightly below the split ring splash barrel (about 1/8-inch or so below this point.)

Use distilled or de-ionized water, if available. Never allow the water level to be as high as the splash barrel.

Prior to storage, charge the battery overnight according to charger instructions. Store the battery in a cool, dry place.

The cooler the environment, the slower the self-discharge rate. A temperature range of 40 to 50 degrees Fahrenheit is ideal. Do not store the battery in an unheated building or in areas where temperatures will consistently go below freezing (32 degrees Fahrenheit).

With the aid of a voltmeter or hydrometer, check the state of charge of your battery once every six to eight weeks. If a hydrometer is used for this determination, be sure to temperature correct all readings. (Add .004 points of gravity for every 10 degrees above 80 degrees Fahrenheit; subtract .004 points for every 10 degrees below 80 degrees Fahrenheit.)

As an example, a specific gravity reading taken at 50 degrees Fahrenheit is 1.250. Since 50 degrees is 30 degrees below 80 degrees Fahrenheit, the correction factor is $3 \times .004 = .012$. Therefore, the actual specific gravity at 50 degrees Fahrenheit is $1.250 - .012 = 1.238$.

Refer to the following table to determine state of charge of a battery.

STATE OF CHARGE	SPECIFIC GRAVITY	VOLTAGE	
		12-Volt	6-Volt
100%	1.265	12.7	6.3
75%	1.225	12.4	6.2
50%	1.190	12.2	6.1

When the battery is at a 75 percent state of charge as determined by the chart, charge it overnight according to charger instructions. After the battery comes off charging, wait another day before checking voltage and/or specific gravity. Final 100 percent state of charge readings should be as indicated on the chart.

If this maintenance schedule is followed during the storage period, your deep-cycle RV/marine battery will be roaring to go next time you need it.

Remember, a battery is a perishable commodity. If maintained properly, it will provide years of trouble-free service.