

Batteries

We use two basic battery types in our RVs:

1. Engine start in a motorhome or tow vehicle (Starter Battery)
2. Coach unit for running 12 volt appliances, lights and various electronic boards (Deep Cycle Battery).

To obtain the best performance and optimum life each of these battery types represents a completely different design. In small boat applications, where there is only room for a single battery, manufacturers have made a compromise design to serve both functions. In our RVs we have both types. Obviously, the best cost/highest performance batteries will be those optimized for the two separate RV functions.

Starter Battery

An engine starter battery provides a very high current for a short time period. For less than 30 seconds, these batteries provide from 400 (car) to over 2000 amps (diesel motorhome). To get these high currents the manufacturers use many thin plates to provide the maximum surface area. Once started, you drive off and immediately start recharging the batteries. Starter batteries are rated in Cold Cranking Amps or CCA, defined as the amount of current that can be supplied at 0 degrees F. Your tow vehicle or motorhome specifications will provide the required CCA rating. If more than about 800 CCA is required then two batteries in parallel will be installed. This function is almost always provided by a Flooded Cell battery, which can be either non-sealed with filler caps or a sealed maintenance free unit. The so called maintenance free battery, where you cannot add water, is fine for this application. Especially since this type of service rarely results in a battery discharge of greater than 10 or 20%. These can only be properly tested with a high current load of several hundreds of amps, which usually means a service shop.

Flooded batteries are low in cost, recharge quickly, require ventilation and periodic maintenance, and self-discharge at 6-7% per month when they are relatively new. As they age the self-discharge rate will increase significantly, which is why, after a few months of sitting idle, your car may not start. You don't have to worry about a charger since your vehicle alternator system has been designed to provide an optimum charging capability.



Deep Cycle Battery

A Deep Cycle battery provides a low current (10 to 100 amps) for a long period of time in order to run appliances, TVs, computers, lights, etc. These are designed with thick plates and thick separators. The heaviest battery usually provides the highest capacity. To maximize life and performance Deep Cycle batteries require sophisticated chargers, usually computer controlled. In this application we are concerned with amp/hours, which we take out of the battery (and have to put back in with some type of charger). Deep Cycle Batteries are rated in amp/hours by measuring the total amount of amps the

battery can deliver for 20 hours before the voltage drops to 10.5 volts. If we turn on a small reading light that needs one amp and run it for 4 hours, we have used up 4 amp/hours. Run your propane furnace at night (with no 110 VAC shore power) and approximately 56 amp/hours (7 amps for the fan times 8 hours) will be gone from the battery vault. If you watched some TV, read a book and took a shower before you went to sleep you will probably have a dead battery in the morning. It will be in what is called a deep cycle (80% of a full charge is gone). If your batteries are not in good shape (perhaps you forgot to check the water level before you left on the trip), you will get very cold about 2:00 or 3:00 in the morning. When you are dry camping (boon dock) in cold weather, you always want to fill the battery vault before you stop for the night or else stay in a campground.

Why are deep cycles so important? Because you only have so many before the battery dies. For a good quality flooded battery this is between 150 to 200 cycles, for an AGM battery it is in the 1500-2000 range (more about AGM later). Always buy a good quality battery since it will give you the longest life and the highest number of deep cycles. A cheap battery can fail after less than 50 deep cycles.

As you probably suspected, engineers can design a specific life into a battery. In fact, a 5 year pro-rated battery can be designed to fail in 4 1/2 years, so you will go back and get the pro-rated allowance in order to apply it to the purchase of a new battery. Forget the 'years prorated' warranties, the spec that counts is the number of 'years for replacement' warranty.

You do not want a flooded (sealed) maintenance free deep cycle battery. They are not truly sealed and have an expansion valve, which permits gases to be vented. When you go into a deep cycle and re-charge the battery, it will get hot and can easily vent water vapor. Since there is no way to add water, after a number of deep cycles, followed by very high charging rates, your battery can die an early death. Keeping the proper water level in a flooded battery is mandatory. The plates must be covered with the proper water level, as defined by the manufacturer. You should use distilled water, so you are not adding any impurities. Do not overfill a battery since it will just boil out and cover everything with a corrosive acid that can ruin the battery as well as the surrounding components. The water level should be checked before every trip, before and after storage of the RV and before/after a deep cycle recovery charge.

If you do not want to worry about water levels and want the ultimate in performance then consider an Absorbed Glass Mat (AGM) battery. This is a sealed unit, which was originally developed for Military Aircraft. It requires essentially no maintenance and no ventilation. It can be mounted in the RV in any position. It can handle well over 1500 deep cycles with a much longer service life. The self discharge rate for AGM is 1-3% per month. They accept much higher currents and can therefore be charged at a much higher rate. AGM batteries can be charged at 40% of the amp/hour capacity of the battery compared to 25% for the flooded type. The same computer controlled chargers designed for a flooded cell will work fine with an AGM battery. AGM batteries will not freeze, however, flooded batteries must be kept charged during the winter months. If you cannot keep a trickle charge on them in the RV, they should be brought into the house, checked for water level and kept charged.

Gel cell batteries used to be an option, because they were much cheaper than AGM and were also sealed. This is no longer true and for several years they have both been about the same price. This leads to the principle disadvantage of the AGM battery, cost. A good quality group 27 size flooded cell will cost between \$60 to \$100, while an AGM

will run from \$175 to \$300. The three to one cost factor is about right for any battery size, which essentially means that you can have three sets of flooded batteries for the cost of one set of AGM's. You will get more years of operation out of the AGM's but not three times as much. If you want more amp/ hour capability than the two batteries supplied with your trailer can provide, any add-on units must usually be installed in the RV. Since you can only have sealed units in the RV, they must be AGMs. All of your batteries must be of the same type and size, so you will also have to replace the factory supplied flooded batteries as well.

The key to long life and best performance start with purchasing good quality batteries that are the largest size you can fit in the compartment. Securely mount them in a vented compartment (flooded type). All batteries should be mounted so that the water levels can be easily checked, the terminals can be kept clean and the connections can be tightened. You should periodically check the terminal connections by removing them, cleaning the terminals and the posts, applying silicon dielectric and retightening. Keep the compartment and batteries clean and acid free to prevent corrosion of the cables and terminals. After you check the battery cables, be sure and do the same cleaning and inspection for all the ground cables to the chassis. For deep cycle batteries try to limit the depth of discharge to 50% or less. If you only discharge to 50% most of the time, your battery will last five times longer. Finally, provide a quality charging system and periodically test the battery condition with a digital voltmeter.