

Batteries and related matters

PART 2

The first part of this article was published in the October issue of *ARVM ONLINE*. We will now discuss the different battery types, charging and battery chargers and other related matters.

MORE DETAILS ON BATTERIES (MOSTLY GEL CELLS and AGM)

Much of the same material applies: All batteries need to be maintained. All batteries need to be kept charged – but not overcharged or undercharged. All need clean connections and good, stout cable and wire of the proper size. NO BATTERY should be routinely deep-cycled. Of most importance, charging needs to be well regulated.

And here's where the difference between gels, AGMs and regular, wet-cell batteries starts to show up seriously.

Wet cell (flooded) batteries

Suspended plates, usually with some form of separators (so plates don't touch each other) are immersed in liquid electrolyte. These may be charged, just as a starter battery, which makes things a lot simpler.

Gel batteries

Plates are suspended in a thick gelled electrolyte that insures stability and eliminates voids or "air pockets" at the plates. Gels are seldom charged to more than 14.1 volts initial (bulk) charge and 13.8 (13.65 is better) as a "float" charge (see later).

AGM (Absorbed Glass Mat) batteries

A dense fibre matting between the plates and a liquid electrolyte provide similar features to gel batteries but are much more rugged since they were designed for use in aircraft and rough terrain vehicles. AGMs (like gels) are very sensitive to overcharge. 14.38 volts is recommended for the initial (bulk) charge and 13.38 as a "float" charge.

PROS & CONS OF BATTERY TYPES

Standard, old-time flooded batteries are cheap (initially). They'll do the job (golf carts or similar better than RV/Marine stuff). See remarks elsewhere. They will vent gas and fluid, but it can be replenished with distilled water. They require a lot of care.

Gells and AGMs can do a better job and last longer, BUT also require special care. They're rather expensive initially (but my six gels are in their tenth year, as good as new, and the cost nets out to less than standard batteries). However, they are

very carefully charged and that requires an expensive charger/regulator. Gels and AGMs don't need a lot of maintenance and cleaning (other than a quick spray and wipe from a household cleaner) UNLESS you do something stupid and overcharge them. They won't spill acid, are very shock resistant, don't pass gas (pun intended) unless seriously overcharged, have a VERY low self-discharge rate (nice when the RV is in storage) and have a very long cycle life.

I've used golf cart batteries, regular batteries and gels. As I'll repeat with more detail elsewhere, golf carts and similar batteries are, all things considered, the best solution. Were I to have to replace my batteries today (they're in the living compartment in a small RV), I'd go with AGM. In a bigger RV, I'd go with golf cart or fork lift batteries.

You should never charge a gel battery to more than 14.1 volts (or to more than the voltage specified by the manufacturer) before the regulator shuts off the charger except for very brief periods. Then, as a battery is "floated" (kept on the charger with a charge applied to keep it up to a reasonable level), it should never exceed 13.8 volts (better, for long life is a maximum of 13.65 volts). Again, though, you don't float the battery permanently. You occasionally bring it up to 14.+ (this is EZ with a solar regulator or better quality battery charger that will perform regulating tasks frequently and automatically. (more later.) AGMs are charged similarly, just with different voltages.

Actually, you'd be foolish to keep (float) any battery at a sustained charge of over 14 volts. You'd just wear it out prematurely and it would be spewing acid all the time, making a mess. But with a regular, wet-cell battery with removable caps, you can add water and clean up the corrosion. With a gel, or any other (really) sealed battery, you can't add water. All you can do is watch the battery deteriorate.

Gel batteries, AGMs (and really sealed wet batteries) batteries do have caps, but don't ever try to remove them. First, you'll violate the warranty. Second, you'll contaminate the inside. When it dies early, the dealer/factory will know you did this and will void the warranty. Also, if you overcharge a gel or AGM battery, the factory can detect that, too. Again, no more warranty. Gel and AGM batteries are expensive.



So why bother with them? If they're expensive and so sensitive? Because they do a superior job in some cases. Venting to outside air isn't needed. (They can vent gas and fluid if you seriously overcharge them or do something catastrophically stupid.) Moot point, because you will take pains to never overcharge them anyway (won't you?). You can keep them inside the RV (or in a basement compartment). They stay clean and need very little service (other than a spray'nwipe with household cleaner and an occasional check for tight connections) and, more importantly, will be temperature consistent (more later). Piling a bunch of batteries on the tongue of a trailer or directly behind the grill of a Class "A" motor home is not a good idea. you just overweigh the front of the thing and end up with a wallowing vehicle. The back bumper is also bad for the same reasons, plus more, as you overweigh and flex the frame and create leaks (if you don't break the frame, hitch or the vehicle skin). These battery mounting schemes also lead to ultra-hot and ultra-cold temperatures.

TEMPERATURE

Temperature is important when charging any kind of batteries. A really hot battery (EZ to achieve if they're sitting out in a cheap, plastic box) will overcharge well before the voltages listed earlier. Keeping batteries "indoors" helps keep them at about an ideal temperature (of about 68 to 77°F). Actually, high temperature only becomes a real problem when the battery is being "floated." A 13.8 volt float can easily become a 14+ a-whole-bunch float at 90°. Temp can also be a winter problem as batteries try to freeze and their amp hour capacity is reduced by over 30%.

MORE ON REGULATING CHARGE

There are only a few RV converter/combination battery chargers that

are worth having (TRUECHARGE CHARGERS ARE GOOD AND RELIABLE). Most do an absolutely lousy job and you haven't the faintest idea what wild voltage (or lack of) is going to your batteries. Some converter/chargers do work. Check yours no matter what kind of battery you use. With the thing operating, and the battery reasonably-well charged, and not much more load on the battery than the TV antenna amplifier and refrigerator brain (RV refrigerators with a circuit board use 12 volts all the time, just to operate the board), put a digital volt meter across the "house" battery terminals. Leave it there awhile and see if it's holding the batteries to around 13.8 volts. (Or is it charging them up to something ridiculous?) (Or is it charging at all?) Some, even fewer, RVs use a separate battery charger (not as part of a converter). Generally, these are pretty good (and expensive). But check them the same way. It's not at all uncommon to find stock RV battery chargers floating batteries at 14.3 volts or higher. The best chargers regulate in two, three or four states. First, anytime there's sufficient demand, they full charge to 14.+ volts (adjustable by you). Second, they revert to a "float" charge of about 13.8 (which in good chargers is adjustable again). Some have a third, "equalizing" stage, automatic or manual, that should also be adjustable. (There are some four-stage chargers also.)

If you want to use gel or AGM batteries, you must have a good, reliable, user-adjustable regulator and charger. The best way to charge batteries is with a solar electric system. (Again, check first and last with "RV Solar Electric" above.) A solar system (if it has a user-adjustable regulator) will let you set the charge cut-off at desired volts. Usually, anytime the solar system achieves that, it will cut off and drop to about 13.1 volts before resuming (some solar regs will back off to a float voltage). This gives the batteries a "rest" and keeps them from overcharging. (And, of course, at night, solar systems don't do anything, so there's a good rest, too.)

For a backup, you can use a generator or commercial power. Make sure your generator (if it has a direct DC 12 volt charging outlet) is set to regulate at proper volts! If it just charges through your converter, you'll have checked that above, but recheck it with the generator running. Do the same with an independent charger. If you're going to buy a big inverter anyway, consider those with a battery charger option. For \$220 additional (or included at no cost), you get a user-adjustable charger that would cost over \$400 as a stand-alone.

AUTOMOTIVE CHARGERS

How about the automotive charger when you're driving? Same drill. Most automotive chargers (alternator and voltage regulator) are factory set for cut off at 14.3 to 14.7 volts. There are user-adjustable, automotive regulators. If you can't easily find one, check with your auto electrician or supplier. Ford products use

external regulators, which makes it easier (and cheaper). Some (like GM) and others use internal regulators (built into the alternator). That's not too swell an idea anyway, they get too hot and wear out. In those cases, you can get a special alternator and external regulator. It can get expensive, but most RVs need a better alternator anyway.

CABLES AND CONNECTIONS

Tying the system together is important. No point spending a lot of money on batteries and chargers and wiring it up with skimpy junk. Large battery cables can be found in good auto stores. Remember that you are connecting up large batteries, not just a small starter battery that you have in your car, so I would suggest you avoid buying cables from high street auto shops. Many of the larger auto/truck electrical suppliers will make up custom battery leads with terminals that match your vehicle. Smaller wiring is also important. You can get it locally, but get the right size. Pay attention to terminal ends and splices. Don't use the cheap clamp-on stuff that RV shops use.

DON'T EXPECT MIRACLES FROM GELS or AGMs!

Gels are expensive, require careful charging, monitoring with a digital meter and protection from extreme temperatures. Most of us who use them are pleased and sure the extra care is worth it. Those who are not satisfied usually abused them or assumed they would work miracles. Confusion abounds with these batteries. They are not "regular" batteries. Amp Hour (AH) ratings of these confuse everybody. Group 27 size only 86AH when almost any RV/Marine battery is 105AH? Yes, BUT RV batteries are usually 25% overrated. There's more to it. There's AH and effective AH. Gels (for example) are fully charged at a resting voltage of 12.9 to 13.1 volts instead of the usual 12.6 volts, thus start to deliver electricity from almost 13 volts, instead of 12.6 and that equals more efficiency. Depending on use, you can get more effective AH from gels than the rating. This does not mean you can draw 250AH from a pair of gels in one day with heavy loads and no recharging. Again, there's no magic or miracles. Also, that difference in voltages means you can't just connect a gel or AGM battery to a regular battery or to sets of golf cart batteries. Nor should you connect regular batteries to golf cart (or similar) battery sets. Mismatch will damage them.

TYPES OF GELS AVAILABLE

Sonnenschein (German) originated the principle and has been selling the battery for many years. East Penn Mfg. bought U.S. rights and is manufacturing and selling them under the DryFit Prevalier or Deka label. These are the best gel-celled batteries you can buy at this time. Johnson Controls (Dynasty) and Exide (among others) are trying to compete, but their batteries are lighter and, as of now, just don't measure up as well. No doubt all this will change.

BATTERIES TO IMPROVE?

The US government's electric car mandate has already resulted in significant improvements in battery technology. It won't be too long until these improvements are on the market. If the batteries you have now are OK, you might want to baby them along, as long as you can. That means make sure your battery charger isn't over or under charging, that you don't deep-cycle them and you maintain them. If you need batteries, you should investigate gels (technically, gelled electrolyte) or AGM.

6 VOLT BATTERIES

Check on 6 volt batteries also. The right 6 volt batteries, golf cart or fork lift, connected in series-parallel to furnish 12 volts are, all things considered, the best battery source for RVs. (More later.)

MORE DETAILS ON BATTERIES AND ASSOCIATED ELECTRIC THINGS

Giant, motive power, truly deep-cycle batteries (as used in industry) are ideal for a fixed residence: but, with their enormous size and weight are not practical in an RV. Similarly, a bank of 2-volt telephone-cells connected in series-parallel (to=12V) can provide a super, long-life power source. Again, though, there would be a space problem and the weight would be well over 600 pounds.

Eliminating these power sources out of necessity, let's also eliminate another bad choice: The typical RV arrangement of one or two automotive-grade batteries in plastic boxes mounted on the tongue of a trailer. Out of sight and out of mind; never serviced; corroding away in freezing cold and broiling sun; generally two inches deep in water; green, cruddy terminals connected to a bunch of multi-colored, go anywhere, frequently shorted wires. The whole mess tied down with a plastic strap and buckle that nobody can operate (so they never do), which is just as well, maybe, because it will break.

Almost as bad is the huge, homemade plywood box that sits on the rear bumper, has most of the same failures and interferes with weight distribution. It puts undue stress on the frame and creates leaks in the roof. At worst, it bends the frame and it cracks the roof and sides (just like car go boxes and motor cycles). You can put some weight on a bumper, but not much. How much depends on the RV, its GVWR and its construction. Frequent articles in RV publications point out the need for strict weight control. The articles do nothing more than point out the rules of basic physics - heed those rules or destroy your RV. Note, for example, that the further the rear end is from the wheels, the less weight you can put on the rear end. Note also that the further the front end is from the wheels, the weight you add to the tongue can drastically increase tongue weight. Too much tongue weight equals a broken hitch.

Part 3 - Battery positioning and maintenance - next month.