January 1, 2013

Battery Care and Feeding

There has been a lot of discussion on the Cyber Rally about batteries. So on this New Year's Day I thought I would chime in with some additional thoughts about the batteries in our machines.

Any battery whether conventional flooded cell, AGM or gel cell must be properly maintained in order to last. Maintained means that you must protect it from excessive discharge and have it charged while in storage. A dead or very low battery can freeze in cold weather and the case may burst. If you have conventional flooded cell batteries, you must monitor the electrolyte level and add water as required.

If you allow any battery to discharge excessively, you will shorten its life dramatically. In truth, you only get a limited number of charge / discharge cycles. How many is dependent on a number of factors, but the deeper the discharge, the fewer cycles you will get. So only discharge the battery when you need to use it.

Most of us only need to discharge the battery while dry camping and this will present the greatest normal discharge opportunity. By experience we've learned what devices we can use and how to stretch the battery life. Even with two batteries, you can run short unless you conserve. Running until the lights go very dim or out, is not a good strategy. Running the refrigerator on battery is never a good idea, you don't get much cooling for you investment and it's a huge drain on the battery.

The prime advantage of a completely sealed AGM or gel cell battery is that you never have to worry about checking or spilling the electrolyte in the battery. Unfortunately this does nothing to help prevent excessive discharge. It may also be argued that the AGM batteries are less likely to cause corrosion in the vicinity of the battery. For most of us, protecting the batteries from excessive discharge is the major concern.

In the case of the coach deep cycle battery, the risk of excessive discharge can be mitigated by turning off the battery disconnect when the vehicle is not in use. Remember that for most Roadtreks built after about 2006, the Trip-Lite inverter charger is connected directly to the battery. If you turn on the inverter switch, the inverter will run regardless of the state of the disconnect switch. Many Roadtrek owners have run down their coach battery because they did not realize this is the case. A good battery can be expected to self-discharge at a rate of no more than 15% per month. (Unconnected to any loads) So in three months, 60% of the charge would remain and most likely a lot more. Please be aware that separator equipped vehicles have a full time load of about 0.010 amps required by the separator. This will case some drain and shorten the time the battery can be left without charging. The impact of this is likely not felt for many weeks unlike other issues to be discussed below.

The vehicle battery is a different matter. All vehicles draw some current from the vehicle battery when the vehicle is turned off. GM vehicles built in recent years, seem to draw much more current than others. Left unused, the battery many discharge excessively in as little as a week or may be fine for more than 6 weeks. None can be expected to last indefinitely. You must take action to protect the

vehicle battery while in storage. There are no other options. Depending on your vehicle, you might have to take action more often.

There has been a lot of talk about battery chargers and maintainers. In the case of our machines they come from the factory with two battery chargers; the engine alternator and the Trip-Lite inverter charger. Older Roadtreks have a converter which is not designed as a high rate battery charger. It will charge and maintain the battery, but cannot charge it rapidly.

So what to do? If you have a recent vehicle with a battery separator, the simplest solution is to plug it into shore power and the onboard Trip-Lite inverter charger will safely keep both batteries charged. Working properly, this is exactly what it is designed to do. If your batteries are getting over charged, then there is something wrong and it needs to be fixed.

There is another thing to remember, before Roadtrek began installing Trip-Lite inverter chargers, the connection to the charger was directly to the loads in the vehicle. This means that in order for the converter to charge the batteries, you must have the battery switch on. There was a period of a few years when the conversion to Trip-Lite was made that this was still the case. Roadtrek then changed the wiring and connected the Trip-Lite directly to the battery. This was done for two reasons. Most importantly, the Trip-Lite does not function correctly unless it's connected to a battery at all times. Many of you have experienced the "flickering light behavior." The second reason was so that the Trip-Lite could then charge the vehicle battery via the battery separator even if the battery switch was off. So if you have one of these "notch" vehicles, be sure and turn on the battery switch so your batteries will charge when plugged in.

A separate battery changer / maintainer could be used, but it's not necessary. In addition there is another problem. If you have a battery separator, it requires a current of about 1.0 amp to be energized. A battery maintainer might be bit confused by the presence of this current. A normal battery would draw very little current after it has reached full charge. So the charging algorithm won't see what it expects to see. In fact it's possible that the battery maintainer will be unable to deliver the needed current at the proper voltage with the demand of the separator.

If you have an older vehicle with a battery isolator, then the vehicle battery won't be charged when you plug the vehicle into shore power. A battery maintainer connected to the engine battery should compensate for the drain from the vehicle components. The reported current is between 0.012 amps and 0.060 amps. Incidentally, all is not free, the battery separator equipped vehicles may have as much as an additional 0.010 amps to power the separator when it is idle and monitoring the battery voltages.

You could disconnect the engine battery while in storage and if you start out with a good fully charged battery, it will stay charged for months. The downside is that your engine computer will forget all of its "learned" engine parameters and your vehicle may not run efficiently until it's "re-learned" the parameters. Oh and all those station presets on the radio will likely disappear as well.

Keep in mind that there are a lot of things to consider. Much as we would like to just not think about it, the batteries in our machines require care and feeding. In summary, don't kill your batteries through neglect.

If you have any questions or comments, let me know and I will do my best to respond. My plan is to put together a seminar for a future tech rally and I'm working on refining the content.

You might also take a look at the electrical simulator and the accompanying notes.

http://www.metrotrekkers.org/utility/electrical.htm
http://www.metrotrekkers.org/utility/notes.pdf

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