‘PREMATURE BATTERY CAPACITY LOSS’……Sulphation Information for the customer

? In ever increasing instances, the problem of ‘Parasitic Current Loss’ is becoming more prevalent. Parasitic current drains are small current draws from the battery, typically measured in milliamps (MA), that a battery continuously supplies for various reasons while the ignition is switched off. ie;

Retaining memories (radio, stereo and engine management systems etc), security systems (alarms), satellite tracking units, faulty boot and glove box switches and incorrectly wired accessories. Even with all these accessories wired correctly the current draw could still be as high as 130 milliamps (MA) or up to 5 AMPS in some instances (depending on individual equipment current draw). All vehicles, farm equipment, motorcycles or water craft that are fitted with factory supplied or after market fitted accessories, (most) have ‘Parasitic Current Loss’. Any battery, regardless of the size or brand will be affected to some degree by this battery destroying feature of vehicle electronics. Other items that can cause premature capacity loss are loose alternator belts, voltage drop in the charging system, faulty alternators, & substandard dual battery systems (this common problem can be detected by monitoring the battery(s) voltage at the terminals).

Even if the current drain is low, the effect of a continuous current drain will result in significant capacity loss in batteries. Obviously, if the battery voltage is drawn down by powering satellite tracking units or fridges (4X4’s, campers etc.) current draw can be as high as 5 amps. Even if the battery only supports this significant current draw for (repeated) short periods, the battery capacity will drop to a point where, if not recharged and maintained at 100% capacity, sulphation will eventually occur causing capacity loss in the battery (failure on start and/or shorter periods of auxiliary power supply). This capacity loss is not a manufacturing fault or defect, therefore, is not covered by a warranty consideration. It is the responsibility of the battery retailer to recommend an Odyssey battery suitable for the application and to provide the purchaser with information regarding chargers including solar panels, depending on the application of the battery, to ensure the expected long battery life that an Odyssey Battery offers.

Examples of these ‘Parasitic Current Draws’ will help explain this premature battery capacity loss (sulphation) situation clearer to understand. The examples are mostly vehicle based but the points raised are appropriate for other applications.

A fully charged PC680 (ES12V650) Odyssey Battery, subjected to a 100 milliamp current draw, ie; a typical vehicle alarm including accessories, the voltage loss from 100% capacity to 0% capacity (11.38 volts) would take approx. 6 days. So a vehicle parked Sunday night, with an alarm and other electronic current drawing devices, would be 100% discharged (down to 11.38 volts) by the next Saturday night. The high cranking energy that an Odyssey battery provides, in its initial new condition (before sulphation) is able to start vehicles at these low voltages. But at only 17 amp hour capacity, the PC680, is not able to withstand long periods of continuous current draw such as this and soon fails to start the vehicle. The PC680 in examples documented, suffers from capacity loss (sulphation) usually between 9 and 18 months. The PC925 (ES12V800) at 28 amp hour capacity, obviously has the ability to hold higher voltage, longer, if subjected to the same 100 milliamp voltage loss, but will still be 100% discharged in only 10 days. Even if driven weekly, the PC925 would have lost more than 50% capacity in 5 days, resulting in damage (sulphation) to the battery eventually. Typically between 12 to 30 months. If the security is a satellite tracking system, the periods are markedly shorter in both instances.

Larger batteries, from 40 to 70 amp hour rating (storage capacity), can sustain longer periods of low voltage neglect. But eventually these larger batteries will also have a shorter than expected service life if not maintenance charged periodically. These larger batteries start to show signs of sulphation (lower voltage) typically between 24-40 months.

‘Total loss’ (no alternator) race cars/go karts must be supplementary charged, with a suitable charger (between heats, if an MSD ignition is used) and immediately after each days racing regardless of ignition type, to replace all current lost.
Another example will also help to explain how a daily or infrequently (2-3 times a week) driven vehicle can also suffer from a continuous low voltage condition. Regardless of amp hour rating, as stated above. If a vehicle has an alarm or tracking unit activated all night, then driven in congested traffic (low speed) to a place of employment etc, and the security (alarm/tracking) is activated again for all day security, the battery voltage has not increased enough to fully charge the battery. The shorter the distance/time, slow speeds, idling for long periods in heavy traffic, the less opportunity the alternator has to replace this lost voltage. To compound this situation, if stereo systems, head lights, air conditioning, power windows and heater fans are activated, the alternator charging system will not be able to replace all of this extra voltage being asked of from the battery. Within a short period of time, the battery will be forced into this sulphated condition (low capacity) and it will eventually fail on start. The ability of a battery just to START a vehicle is not an indication of that battery’s condition. The voltage that a battery is able to hold is the important consideration. Sulphated batteries always hold lower voltages than batteries that are at 100% capacity. This can be verified by measuring the voltage of a battery approximately 6-8 hours after use, with all parasitic current draw disconnected. An Odyssey battery should be 12.80 volts or more to be considered at full capacity.

In most models of Jet Ski’s that, by design have limited charging systems, have a current draw even when the ignition is switched off (with the battery leads connected). This current draw varies from 7 milliamps to 18 milliamps (depending or not if the lanyard is connected). If the Jet Ski is fitted with an Odyssey PC625 (ES12V700) the battery would take 95 days to be 100% discharged (at the 7 milliamp draw). At the 18 milliamp current draw, the battery will lose 100% capacity in only 37 days (down to 11.80 volts). Ensure that the battery is at full charge, then disconnect the battery leads to avoid this situation.

Water craft also have current draws ie, bilge pumps, fridges, TV’S, electric trolling motors, radios (coast guard, stereos), GPS, fish finders and lights etc (some draw current continuously). The charging system may not replace all the current lost that this equipment consumes (while on the water) and in most instances the voltage of the battery has not been replaced 100% by the time of arrival at the boat ramp/mooring. This will result in a battery that will sulphate and lose capacity in a short period of time. These batteries must be brought to full charge IMMEDIATELY AFTER each use, not just before the next outing. If there is a current draw while in storage, a suitable maintenance charger is required. If there is no current draw, an Odyssey battery fully charged immediately after the last outing (eg, during the off season) is able to hold charge for up to 18 months (at an average temperature of 25C and 12 months at an average 35C), before a ‘top up’ charge is necessary (with an approved charger). The higher the ambient temperature the quicker the self discharge rate. Watercraft left at moorings must also be maintenance charged if ‘on demand’ bilge pumps are connected to the battery power source and radio /stereo /clock memories are active. If so, then there is a permanent and continuous current draw. This current loss MUST be returned to the battery(s). A regulated solar system, approved for AGM ‘Dry Cell’ batteries can be employed or if on mains power, a ‘switch mode’ charging system must be integrated into the boat’s electrical circuit (float voltage must be between 13.5 and 13.8 volts maximum, in a 12 volt system). All times in these examples are approximate. Individual equipment current draw will be varied.

**SULPHATION**

To continue on from the examples above, the end result of this low voltage usage of a battery is called SULPHATION. A ‘Sulphated’ battery is a battery, any brand or size that has been kept in a discharged condition or undercharged to a point where abnormal lead sulphate has formed on the ‘active’ internal lead plates. When this occurs, chemical reactions (charging) within the battery are not able to be successful to 100% of the capacity of the battery, only a part charge occurs. Depending on the length of time the battery has been low in voltage, this sulphated condition will be irreversible. The battery has NOT ‘FAILED’ it has been subjected to abnormal, under charging.. for the majority of its service life.

An Odyssey battery has 12.84 volts, fully charged (approximately). A battery is 100% discharged (‘flat’) at 11.38 volts (approximately). Not ‘0’ VOLTS as commonly thought. A battery that has a voltage of less than 11.38 volts is considered to be in a deep discharged condition. The longer any battery is drawn down to these deep discharged voltages and not IMMEDIATELY re-charged to 100% capacity, will experience a shorter life in service. Battery voltage monitoring is the answer. For help deciding when is the appropriate time to read your batteries ‘rest’ voltage call 1800 550 153.
MAINTAINING BATTERY VOLTAGE

Any vehicle (or equipment) is able to have a fully charged battery ready for service, regardless of the length of time that the vehicle (equipment) was last driven (started), or what voltage loss there is in that vehicle (equipment). The vehicle (equipment) MUST be supplementary charged when not in use. The inconvenience of this situation cannot be avoided. Any brand of battery regardless of size or capacity that is subjected to a ‘Parasitic Current Draw’, must be connected to a ‘switch mode’ voltage regulated maintenance charger to achieve long battery life and to avoid sulphation. Odyssey batteries that have no ‘Parasitic Current Draw’ can be left idle for up to 18 months without being maintenance charged.

These small ‘float voltage’ chargers are different from conventional chargers, in that the charging voltage is monitored by the charger and switches BACK to a ‘maintenance’ or ‘trickle’ voltage once the battery is fully charged. The maximum voltage that goes into the battery is very critical. The voltage must be no more than 14.8 volts, measured at the positive and negative terminals, while the battery is on charge. Once these suitable ‘float’ chargers are connected, they can be left on for long periods of time if needed. These chargers monitor the battery voltage and maintain a constant ‘float/trickle’ voltage, usually between 13.5 and 13.8 volts. To compare, the typical ‘un-restricted’ charger (regardless of AMP RATING) can put more than 14 VOLTS into the battery continuously. Most of these ‘un-restricted’ chargers even on the ‘low’ setting, can charge up to 17 volts. A ‘Dry cell’ battery (Odyssey) will be destroyed (over charged) in a short period of time if left connected to these ‘un-restricted’ chargers, voiding the factory warranty.

The benefit of this supplementary charging is that the value of the purchase of your Odyssey Battery will be realized. If on charge while not in use and taking into account any battery may experience a faulty cell (covered by warranty within warranty period), the average life of an Odyssey battery should be approx, 5-8 years or longer, depending on application. The availability of suitable chargers has increased recently and a few suitable examples are...

2. ‘EPS603’ (2.5 amps) & EPS12V4AMP (4 amp). These float (‘trickle’) charge at 13.6 -13.8 volts. (Ideal) Available from Odyssey Distributors Australia wide.
3. Projector ‘SM1204’ (4 amp). These float (trickle) charge at 13.60 volts (ideal)
   New ‘switch mode’ product offered by Projector and available from most larger battery retailers.
4. Battery Fighter ‘BFA012’ (1.25 amp). These float (‘trickle’) charge at 13.51 volts. Must be the latest available. To achieve the higher float voltage of 13.51 volts. Earlier model Battery Fighters, p/n BFA-012-230 ‘float’ charge at 13.2 volts, not ideal for Odyssey Batteries (possibly too low).

These suitable chargers can have Positive and Negative connections permanently ‘hard wired’ under the solid brass terminals of an Odyssey battery (or into the top of the threaded terminal posts) depending on the part number and application of the Odyssey battery in question. Auto electricians and mechanical workshops are able to install small ‘plug’ fittings which are a neat and secure push-on fit. Close the bonnet and activate the float charger, if the battery is not 100% charged, charging will commence. Once the battery has received 100% charge, then these chargers ‘switch back’ to their programmed float (‘trickle’) charge, maintaining the battery at their nominated, safe (from over charging), voltage.

The situations described above can be alleviated, by being aware and following this charging procedure.

As stated, the perceived problem of having a battery ‘fail’ in service is not necessarily a problem with your battery. An equipment issue is more than likely the cause for the short battery service life that you have been experiencing. The increased equipment levels in modern vehicular transport and the extra features installed in all types of service vehicles has placed a significant burden on electrical systems. The number of and the value placed on battery protected equipment has also increased markedly. Specialty vehicles, water craft, motor cycles, service and farm machinery etc; all demand higher levels of security and/or battery supplied power. Added to this is the propensity of this equipment to be left idle for periods of time, resulting in increased demands on batteries.

These increased demands can be met by your Odyssey Battery. The ability of Odyssey Batteries to be continuously on charge is a design feature not shared by many other battery brands. Combined with a design life of 10 to 12 years and an average service life of 5-8 years or longer, ensures you of excellent value for your Odyssey battery purchase.

For enquiries regarding the above and information for Distributor locations…call 1800 550 153.
And visit our web site on.. www.odysseyfactory.com for additional information and specifications.

(The preceding information and opinions provided have been compiled by Larry McSweeney)