

## **Are batteries dangerous, how should I handle them correctly?**

Batteries are only dangerous if handled incorrectly and proper maintenance is not followed.

The hydrogen gas that batteries make when charging is very explosive. We have seen instances of batteries blowing up and drenching everything in sulphuric acid and sending jagged pieces of the poly propylene case up to 20 metres away. It only takes a small spark, flame or burning cigarette to set off a dangerous explosion. Therefore ignition sources must be kept well away at all times.

Extreme caution must be taken to avoid spilling or splashing electrolyte (battery fluid) as it can destroy clothing and burn the skin. Care should be taken when lifting and carrying batteries. If excessive pressure is placed on the end walls of the battery it could cause electrolyte to seep (or even squirt) through the vents

It is highly recommended to wear safety goggles and even a face shield when working near batteries. Never lean over the battery during charging, testing or "jump starting" operations. If acid does get into your eyes you must flush out with water immediately.

Take care to ensure tools or other metallic objects do not fall across the terminal or any adjacent metallic part of the vehicle.

When doing electrical work on vehicles it is best to disconnect the ground (earth) cable. Just remember that you are messing with corrosive acid, explosive gases and electrical current.

Batteries are also very heavy, ensure correct lifting procedures are used when moving or installing batteries.

## **Where can I recycle my battery?**

As a member of the ABIA (Australian Battery Industry Association) we are responsible for the collection of scrap batteries, so you can drop your batteries off to us and we will send them off to be recycled. Never put them in with your household waste.

Batteries are recycled by grinding them, neutralizing the acid and separating the plastics from the lead. The recovered materials are used in a variety of applications including new batteries.

## **How do I install my battery?**

It is advisable to always check the replacement battery against the existing one to ensure that size, hold down, terminal configuration, cranking capacity and bonnet clearance are suitable for the application.

- It is best to use some form of battery backup device if possible. We use a small battery with a cigarette lighter plug attached which inserts into the vehicles cigarette lighter socket and keeps power to the cars computer so it does not reset.
- Ensure all accessories are switched off in the vehicle.
- Remove the negative (-) terminal first.
- Remove the positive (+) terminal and battery hold down.
- Inspect the battery tray for corrosion. If necessary clean using baking soda (the baking soda neutralises the acid) and water, then rinse with clean water.
- Place the new battery in the tray and ensure it is level.
- It is good practice to clean the inside of the terminal with a wire brush and remove any other corrosion.
- Replace the battery hold down and ensure the battery is secure.

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# **CHALLENGE**



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- Replace the positive terminal and tighten.
- Replace the negative terminal and tighten. The negative terminal should always be replaced last.
- Never over tighten or hammer terminal onto the battery as this can damage the posts.
- Some form of corrosion protection over the terminals is a good idea, we use a spray designed to reduce corrosion, but grease or petroleum jelly also works fine.

## **How do I jump start my vehicle?**

Jump starting can cause serious injury, if you are unsure of what you are doing call roadside assistance of someone experienced for help.

- Read your owner's manual, some car manufacturers don't allow jump starting, also sometimes the battery is not under the bonnet but there will usually be jump start terminals under the bonnet.
1. Turn the ignition in both cars to "off"
  2. Connect the red (positive) cable to the dead cars positive battery post.
  3. Connect the other end of the red (positive) cable to the live cars positive battery post.
  4. Connect one end of the black (negative) cable to the live cars negative battery post.
  5. Locate an unpainted metal part of the dead cars engine. The engine manifold is a good position. Connect the unused end of the black (negative) cable to this location.
  6. Start the good cars engine.
  7. Start the dead cars engine. If it doesn't crank wait for 2-3 minutes and try again.
  8. If it still doesn't crank check all connections.
  9. As soon as the dead car starts you can disconnect the cables, you should disconnect in the reverse order.

## **How long should my battery last?**

This is a difficult one to answer because it depends on numerous factors. The main factors are how often the vehicle is being used, how well it is charged, how well it is maintained, high temperatures and the application. Battery life has become shorter as energy requirements in modern vehicles have increased.

A battery prefers to be used regularly or regularly charged. Many modern vehicles have a constant drain even when the ignition is off which will flatten the battery and shorten the life if the vehicle is not being used regularly. Vehicles now days have a lot more electrical accessories fitted which puts added strain on the battery.

Another factor that is becoming more important is locking your car. Modern vehicles, especially luxury cars have many computers and accessories still running when the key is removed, they don't go to "sleep" until the car is locked. So even if you car is in a locked garage it is good practice to lock your car to improve battery life.

## **What is a "Calcium" battery?**

A Calcium battery is a still a lead acid battery; they are usually sealed maintenance free. Calcium replaces antimony in the plates of the battery to give it some advantages including improved resistance to corrosion, no excessive gassing, less water usage and lower self discharge. Silver is another additive used by some manufacturers, the addition of silver enables the battery to be more resilient to high temperatures.

Calcium batteries require a higher charge voltage than conventional batteries. If used in a deep cycle situation it is advisable to use a charger designed for calcium batteries or has a calcium charging mode to get the maximum life out of the battery.

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## **What is a marine battery?**

Our marine batteries are designed to run small electrical loads and are “hybrid” batteries. They also have extra resistance to vibration and a dual terminal for adding extra accessories.

## **What is the difference between wet cell, AGM and Gel batteries?**

They are all variations of the lead acid battery.

The wet cell comes in two types; serviceable and maintenance free. Both are filled with electrolyte and are basically the same. Serviceable batteries have removable caps so the electrolyte can and should be checked regularly, they are easier to test as you can check the specific gravity with a hydrometer of every cell. Maintenance free batteries are sealed for life and the water level does not need to be maintained, they are usually calcium batteries. They also have a built in hydrometer giving some indication of the charge in one cell.

AGM and Gel batteries are both types of Valve Regulated Lead Acid (VRLA).

AGM batteries are similar to wet batteries, except the electrolyte is being held in the glass mats, as opposed to freely flooding the plates. For more benefits see our Fullriver Product Advantages. A gel batteries electrolyte is gel like and immobile.

There is some common confusion regarding AGM batteries because different manufactures call them by different names they are also known as “dry cell”, “sealed lead acid” and “non spillable”, usually when consumers ask for a gel cell they mean AGM . Gel cells are still being sold but AGM batteries are replacing them in most applications.

When being recharged AGM and Gel cell batteries require different voltages than conventional batteries. If using the batteries in a deep cycle situation you must have a charger designed for AGM or Gel batteries. For a one off recharge a normal charger will do the job but the battery must not overheat so it should be closely monitored.

## **How is a deep cycle battery different to a car (starter) battery?**

There are basically two types of lead acid batteries Starter (engine cranking) and Deep Cycle (Caravans, dual batteries). The starter battery is designed to deliver quick bursts of energy so generally has more plates in order to have a larger surface area that provides a high electric current for a short period of time. The plates are thinner and have different material composition. The deep cycle battery has less instant energy but greater long term energy delivery. Deep cycle batteries have thicker plates and can survive a number of discharge cycles.

We do not recommend using starter batteries for deep cycle applications because the plates are more prone to warping and shedding active material, this will reduce the life of the battery or possibly have a catastrophic failure i.e. a sudden death due to a shorted cell.

You can also get “hybrid” batteries which fall between starting and deep cycle batteries.

## **Can I start my engine with a deep cycle battery?**

Yes you can, but it is not recommended to put a deep cycle in a predominantly starting application and an allowance should be made for their lower cranking amps. Deep cycle batteries don't have the burst of energy like a starter battery, so for the same size battery they will not provide as many cranking amps as a regular starter battery.

## **Can I store my battery on concrete?**

Yes you can store your batteries on a concrete floor!!!

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There is some history from a long time ago with the old hard rubber cases that were somewhat porous, when stored on concrete an electrical current could be conducted through the container and the moist concrete floor permitted the current to find an electrical ground. Today's battery cases are polypropylene so it no longer applies.

The fact is that all batteries self discharge while they are sitting on the shelf or concrete. Self discharge is a phenomenon in batteries in which internal chemical reactions reduce the stored charge of the battery without an connection between the terminals. How fast self discharge occurs is dependent on the type of battery (calcium and AGM have lower self discharge than conventional batteries) and the ambient temperature (batteries discharge quicker in higher temperatures)

## **What are CCA?**

Cold cranking amperes (CCA) is an international standard for measuring the performance of a battery. CCA measures the cranking capacity of a battery at a temperature of  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ). To get technical the rating is defined as the number of amperes a lead-acid battery at  $-18^{\circ}\text{C}$  can deliver for 30 seconds and maintain at least 1.2 volts per cell (7.2 volts for a 12 volt battery).

## **What is the difference between CCA, CA, MCA and HCA?**

They are all measuring the cranking amperes of the battery but at different temperatures. A lead-acid battery will perform better at room temperature than in freezing temperatures.

Cold cranking amperes (CCA) is measured at  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ).

Cranking amperes (CA) is the same as Marine cranking amperes (MCA) is measured at  $0^{\circ}\text{C}$  ( $31^{\circ}\text{F}$ ).

Hot cranking amperes (HCA) is measured at  $26.7^{\circ}\text{C}$  ( $80^{\circ}\text{F}$ ).

For example a battery rating 600CCA would be roughly 750CA (MCA) and 900HCA.

CCA is predominantly used in Australia to compare batteries. The only real problem is when consumers are comparing CCA rating between batteries some manufacturers are more conservative in their ratings.

## **What does RC (Reserve Capacity) mean?**

Rated in minutes it is the length of time a new fully charged battery at  $27^{\circ}\text{C}$  will discharge 25 amps until the battery drops below 10.5 volts.

## **What does AH(Amp Hour) mean?**

An amp hour (AH) is a rating usually found on deep cycle batteries. If a battery is rated at 100AH it should deliver 5 amps per hour for 20 hours.

Peukert's Law expresses the fact that the capacity available from a battery varies according to how rapidly it is discharged. A battery discharged at high rate will give fewer amperes than one discharged more slowly.

## **When is my 12 volt battery is deemed flat?**

A battery is like a piggy bank, if you keep taking out and putting nothing back you soon have nothing. The voltage should only be read when the engine is off and no loads are connected, the battery has to rest for at least 12 hours to remove the surface charge (or turning on your high beam for about 1 minute will remove the surface charge).

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State of Charge	Battery Voltage	Specific Gravity
100%	12.65	1.265
75%	12.45	1.225
50%	12.25	1.190
25%	12.05	1.155
0%	11.90	1.120

## What is Sulfation?

Sulfation generally starts when the battery voltage is below 12.4 volts. It is a build up that occurs when the sulphur molecules in the electrolyte (sulphuric battery acid) become so deeply discharged that they begin to coat the battery plates. Before long the plates become so coated the battery will no longer be able to be recharged or deliver current. The causes of sulfation are numerous, some examples are:

- Batteries sit too long between charges, as little as 24 hours before damage can be done.
- Battery is not used regularly and has no maintenance charger.
- Low electrolyte level, battery plates exposed to air will sulphate.
- Parasitic drain in the vehicle is constantly flattening the battery.

Alas there are many maintenance chargers on the market, just plug the charger into the mains power and attach to your battery, this will prolong the battery life considerably and can be left on permanently without damaging the battery. If there is no access to mains power another option is to use a solar trickle charger.

## What is the best way to maintain a battery?

Cable connections need to be cleaned and tightened as battery problems are often caused by dirty and loose connections. Don't forget to check the earth cable, this can be the last thing that is checked but the easiest to fix.

If the battery has removable caps it is best to check the water at **least** every 6 months and more often as the battery ages. Distilled water is best as all the impurities have been removed and there is nothing left that could contaminate your cells. Don't over fill battery cells especially in warmer weather because the natural fluid expansion in hot weather can push excess electrolytes from the battery and will make an awful mess.

To prevent corrosion on the terminals ensure the terminals are clean and have a good connection, a covering of grease or a battery terminal protection spray will help. If you continue to have problems try felt washers and cover them with petroleum jelly or even a bead of silicon sealer around the base of the post. The corrosion is caused by acid creeping in between the case and the terminal post and also excessive gassing, batteries are getting better and we don't see as much corrosion anymore.

## How do I charge my battery?

Vehicle alternators are a very basic battery charger, they can recharge you vehicle battery if it is not deeply discharged. If your battery is deeply discharged it is highly recommended to recharge on an automatic or "smart" charger. These chargers have multiple stages of charging and some offer different modes depending on the type of battery you are charging. Wet, Calcium, AGM and Gel batteries all like different voltages check with the battery supplier for more info on suggested charge voltages.

Before charging check the electrolyte levels and top up with distilled water if necessary. Connect the charger leads to the battery terminals red positive lead to the positive terminal and the black negative lead to the negative

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terminal, make sure they are on the correct terminals it is possible for the charger to reverse charge the battery if hooked up incorrectly. Only turn on the charger once it is connected to the battery. Never touch the charger leads when the charger is on and turn the charger OFF before disconnecting the leads.

Batteries should be monitored whilst on charge, if the battery is faulty there is a good chance the charger will not switch off and the battery will overheat and be overcharged. If the battery has a faulty cell the charger will continue to charge the battery until a predetermined voltage in the charger is reached. If the battery has a faulty cell the charger cannot reach this voltage and will continue to charge until it is manually switched off. You must be very careful when handling the battery in this state as a large amount hydrogen gas would be around the battery and any spark can set off an explosion.

## **Why can't I charge my battery?**

A problem can arise when your battery is extremely discharged, say a light is left on in the vehicle and the battery voltage drops below 7 volts. Some chargers will not charge a battery when the voltage is that low and you will have to take it to a professional to charge it for you. Chargers are getting better and there are some on the market that will start at 3 or even 0 volts. The problem is that the battery has developed an extremely high internal resistance (caused by sulfation) and the charger is not strong enough to push current through the battery.

## **How do I test my battery?**

Without the right testing equipment it can be very difficult to test a battery. The easiest method is to measure the specific gravity by using a hydrometer and to measure the voltage using a digital multimeter, if you test a lot of batteries you may need to buy a good load tester.

First you must fully charge the battery, see chart above. Check the battery voltage after removing any surface charge, it should read above 12.65 volts for a fully charged battery, if your battery is measuring 10.5 volts after charging it typically indicates a shorted or faulty cell. If you can check every cell in the battery with a hydrometer, the cell readings should all be the same, a fully charged cell reads 1.265 - 1.280, if there is more than 0.05 points different it indicates a faulty battery. Readings below 1.225 indicate the battery needs to be charged before load testing.

If the battery is sealed it should have a built in hydrometer telling the charge of one cell, you may get a good reading in that cell but the problem may be in one of the other cells.

Once the battery is charged you need to use a load tester. A good load tester is very expensive so it may be better to get a professional to test it.

## **Why does a battery explode?**

A lead acid battery when overcharged will produce hydrogen gas. If the ventilation is inadequate a flammable concentration of hydrogen gas may remain in the cell or in the battery enclosure. Any spark can cause the hydrogen explosion, which will damage the battery and its surroundings.

## **How do I know how old my battery is?**

Most batteries have a date of manufacture code on them. The month is indicated by a letter "A" for January, "B" for February and so on and a number "9" for 2009, "0" for 2010 etc. Remember that the freshness of a new battery is very important try not to get a battery that has been sitting on a shelf for over 6 months.

## **Battery Do's**

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- Think safety first; wear safety goggles and gloves when charging batteries.
- Do regular inspection and maintenance, especially in hot weather.
- Do recharge batteries immediately after discharge.
- Fully charge a battery before it goes into storage.

## **Battery Don'ts**

- Never add new electrolyte (battery acid), use distilled water.
- Don't use unregulated high output battery charges to charge batteries, **especially** AGM and Gel batteries.
- Don't put your equipment or toys (jet skis, vintage cars etc) into storage without some form of maintenance charger.
- Don't disconnect battery cables while the engine is running (your battery acts as a filter).
- Don't put off recharging your batteries.
- Don't add tap water, as it may contain minerals that may contaminate the electrolyte.
- Don't discharge the battery any deeper than you possibly have to.
- Don't let a battery get hot to the touch and boil violently when charging.
- Don't mix size and type of batteries.

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