Battery registration – is it necessary?

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I recently had the pleasure of inviting some fellow TaT subscribers into my workshop for a 'play day' and the topic of battery registration came up.

European marques have strictly instructed this process to be carried out via a suitable scan tool with every battery replacement for more than 15 years now. With the procedure becoming common even for the cheapest of modern econoboxes, I thought it was high time to get to the bottom of what the process does and the hotly debated question – is it necessary?

Lead-acid battery

Improvements to regular old flooded-cell batteries, which required regular water top ups, were initially made by replacing the antimony used to strengthen the lead plates with familiar sounding materials such as calcium or silver. These were first referred to as 'maintenance-free' batteries.

These batteries have benefits such as reduced outgassing, corrosion and self-discharge, and prefer a higher than traditional charge rate – about 14.4-14.8V – to reach full capacity.

The Achilles heel of calcium batteries is their intense dislike of deep-cycle discharge, more so even than traditional flooded cells.

Staying in the lead-acid battery family, a unit enjoying rapid growth due to the harsh environment of auto start/stop equipped vehicles is the absorbed glass mat (AGM) battery, also referred to as valve-regulated lead acid (VRLA) or a lead battery with a pressure-relief valve.

The earlier flooded-type batteries are simply not robust enough for auto start/stop and repeated cycling causes a sharp capacity fade after only two years of use.

With AGM technology, the sulfuric acid is absorbed by a very fine fiberglass mat, making the battery spill proof. Compared to flooded-cell batteries, AGM batteries have very low internal resistance, can charge five times faster, are capable of delivering high current on demand and offer a relatively long service life, even when deep cycled.

AGM batteries, however, are also sensitive to overcharging. A burst charge of 14.4V or higher is OK but the float charge should be reduced to about 13.5V (northern-state temperatures may require less). Regular charging systems for flooded lead-acid batteries often have a fixed-float voltage setting of 14.4V and a direct replacement with an AGM unit could result in the battery being overcharged on long drives.

1 Ford's intelligent battery sensor: This is mounted on the negative battery terminal and precisely measures voltage, current and temperature.

AGM and other 'sealed' batteries such as gel batteries do not like heat and should be installed away from the engine compartment. Manufacturers recommend halting charge if the battery core reaches 49°C. High charge rates and temperatures result in outgassing (overpowering the pressure-relief valve), which will dry out and kill the battery.

Registration vs programming

Battery registration is utilised by many brands now but I will speak mainly about BMW, which has been doing it for more than a decade. There are generally two service options, battery registration and battery programming/coding.

The service function 'register battery replacement' should be run every time a battery is replaced using a suitable scan tool. This completes the following operations:

- **Stored battery statistics (battery charge level, current, voltage, temperature) are deleted.**
- **Battery capacity is set to 80 per cent.**
- **Current odometer reading is stored, along with readings of previous battery replacements.**

This registration function is advised when carrying out a professional battery installation. Many vehicles will not clear cluster warning messages and low-voltage or battery fault codes until it has been completed. Or, as BMW Technical Training says: 'If the battery change is not registered, the power management will not function properly, with the result that check-control messages may be displayed and functions limited by individual electrical consumers being switched off or having their power consumption reduced.'

I always recommend carrying this process out and charging the customer for it. However, my research suggests there is no real-world evidence behind rumoured alternator and electrical damage from the failure to register batteries. The dynamic nature of 'smart' charging systems means the system is quite capable of adapting its strategy to the 'mysterious' new battery when an identical new unit is fitted.

Any charging adjustments based on age would be in millivolts, which would have a negligable effect on long-term battery life. Indeed, once a weak battery has been detected, many systems will refuse to retract error messages and operate some systems until battery registration is completed.

Battery programming

The second, and I believe most important, aspect of this topic is battery programming or coding.

If a different battery has been fitted, the car needs to know the specifications of this new battery to modify its charging algorithm.

For example, a 2006 BMW E90 330i provides the following choices when programming a battery: 90Ah AGM, 90Ah, 80Ah AGM, 80Ah, 70Ah AGM, 70Ah, 55Ah, 46Ah.

2 G Scan's battery register: Both factory and many aftermarket scan tools have battery-registration capabilities.

Let's suppose our high-spec model came with, and is programmed for, a 90Ah AGM battery but the customer wants to save money by fitting a 55Ah lead-calcium battery. Aside from real capacity issues, we know the car is going to use an AGM-based charging strategy that will be terrible for a lead-calcium battery. On the flipside, perhaps the customer is doing less driving now and an upgrade to an AGM better suited to lots of downtime is preferable. The charge strategy needs to know this to avoid overcharging. Both situations will result in drastically reduced battery life if not accompanied by proper programming.

3 Ross Tech battery coding: Although physically capable, many Australian-sold batteries are not available for selection when coding in a new battery.

Brands such as VW call for a specific code to be entered. If your physically correct aftermarket battery does not have a manufacturer-recognised code printed on it, your best bet is to match up and enter a code with the same chemistry and specifications as the battery you are installing. Of course, this is not ideal.

If a battery is staying with the same chemistry but the Ah rating is changing – though I always recommend to reprogram the correct rating in – physically going up in Ah (capacity) should be a non-issue. If the system wants to maintain the battery at about 80 per cent state of charge (SOC), and then put energy in, the result will be that when it puts energy in there is the capacity to put even more in.

If a smaller battery was installed, the logic should still work out based upon the SOC, but the conditions may be such that it causes overcharge conditions or puts too much energy in too quickly.

Australian specific

Many Australian batteries will not provide an Ah rating but instead a reserve capacity (RC). Although they are separate measurements, they are very similar in nature and there are many handy formulae for calculating the Ah to be coded for your replacement battery. I find 'RC/2.4=Ah' to be the easiest. Of course, having the right tool and battery for the job is always going to be best but in a pinch – which can often happen in this wide and wonderful country of ours – the main things to remember are:

- **The battery being installed must be the same chemistry that is programmed into the vehicle.**
- **Install a battery as close to the programmed Ah rating as possible – if forced, only go up in capacity.**

4 VW battery code: In VWs the 10-digit serial number is often preceded by the battery vendor code VA0, making the 10-digit serial number on this battery 360315F0B7.


5 Plug-into battery: They may be smart but they don't quite talk by themselves yet.

Reference table

- ***CCA (cold-cranking amps)*** *- Represents the amperage capacity a fully charged battery can deliver at minus 18°C for 30 seconds before the voltage of the battery falls below 7.2V.*
- ***Ah (ampere hour)*** *- Derived from discharging a fully charged battery at a constant amp draw without the voltage of the battery falling below 10.5V. The constant amp draw is multiplied by the length of the test to come up with the amp-hour rating.*
- ***RC (reserve capacity)*** *- Reserve capacity is expressed in minutes and relates to the amount of time a fully charged battery can maintain a constant draw of 25 amps at 27°C before the voltage falls below 10.5V.*
- ***State of charge (SOC)*** *- A percentage estimate of how full the battery is.*
- ***Sulfate*** *- Deposits formed on the plates of the battery as the electrolyte gives up its sulfuric acid. Excessive deep cycling of a battery can cause a hardening of this deposit and make it impossible to return sulfate to the electrolyte. A sulfated battery is one that has these hardened deposits on the plates and cannot be recharged to full capacity.*