Typical Battery Problems

A common cause of battery failure is acid stratification. The electrolyte on a stratified battery concentrates on the bottom, causing the upper half of the cell to be acid poor. This effect is similar to a cup of coffee in which the sugar collects on the bottom when the waitress forgets to bring the stirring spoon. Batteries tend to stratify if kept at low charge (below 80%) and never have the opportunity to receive a full charge. Short distance driving while running windshield wiper and electric heaters contributes to this. Acid stratification reduces the overall performance of the battery.

Figure 1: Normal battery
The acid is equally distributed from the top to the bottom in the cell and provides maximum CCA and capacity. This battery provides good performance because the correct acid concentration surrounds the plates.

Figure 2: Stratified battery
The acid concentration is light on top and heavy on the bottom. High acid concentration artificially raises the open circuit voltage. The battery appears fully charged but has a low CCA. Excessive acid concentration induces sulfation on the lower half of the plates.

Allowing the battery to rest for a few days, applying a shaking motion or tipping the unit over tends to correct the problem. A topping charge by which the 12-volt battery is brought up to 16 volts for one to two hours also reverses the acid stratification. The topping charge also reduces sulfation caused by high acid concentration. Careful attention is needed to keep the battery from heating up and losing excessive electrolyte through hydrogen gassing. Always charge the battery in a well-ventilated room. Accumulation of hydrogen gas can lead to an explosion. Hydrogen is odorless and can only be detected with measuring devices.

Why car batteries fail?

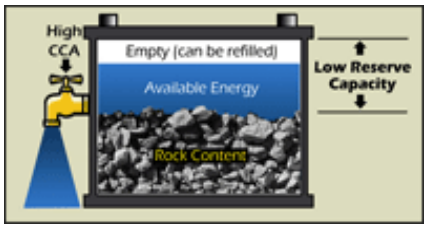
Electrical accessories place a heavy burden on the battery. The extra load often prevents full charge and the battery is replaced as being faulty. A luxury carmaker says that half of all failed warranty batteries have no factory fault. Battery breakdown, perceived or real, has become the largest single complaint by new car owners.

What are typical battery problems?

Conventional testers often cannot determine the cause of a battery failure. Here are examples of deficiencies the detects:

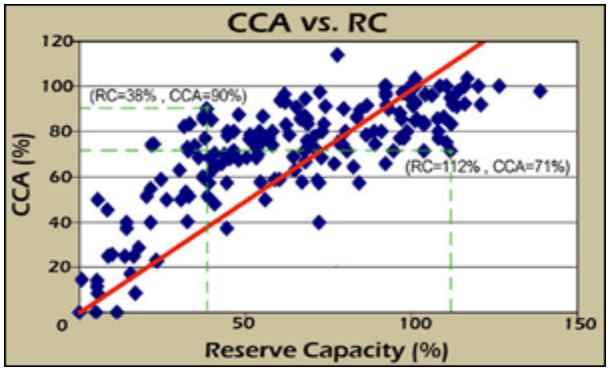
Low Charge
Short-distance driving and heavy electrical load often prevents full charge.
This indicates low charge. Charge recommended.

Low CCA
High capacity but low CCA. Cranking is poor and motor may not start.
This indicates low CCA. Replacement recommended.



Low Capacity
High CCA but low capacity. Good cranking but battery may fail suddenly.
This reveals low capacity. Replacement recommended.

Is there a correlation between CCA & capacity?



This chart illustrates the discrepancy between *CCA* and *capacity* of car batteries. With a correlation of only 55%, CCA cannot be used to estimate capacity.

A good battery needs high CCA and high capacity readings but these attributes reflect differently depending on the application. A high CCA reading assures good battery conductivity and provides strong cranking ability. High CCA goes hand-in-hand with a low internal battery resistance.

Reserve capacity governs the amount of energy the battery can store. A new battery is rated at a nominal capacity of 100%. As the battery ages, the reserve capacity drops and the battery eventually needs replacing when the reserve capacity falls below 70%.

A battery may provide a good CCA reading and start a car well but be low on reserve capacity. This battery would be run down in no time when drawing auxiliary power. The cranking on this battery is good but running on auxiliary power will drain the battery quickly.

A battery with good reserve capacity but low CCA, This battery has a difficult task turning the starter and needs replacing even though it could be used for low load applications. The low CCA of this battery provides poor cranking although the reserve capacity is high.

A fully charged battery should read 12.6 volts. A reading of 12.4 volts equals about a 75% charge and is good enough for further testing. But anything less means the battery is low and needs to be recharged.

Battery Voltage and State of Charge:

State of Charge	Specific Gravity	Voltage	
		12V	**6V**
100%	1.265	12.7	6.3
*75%	1.225	12.4	6.2
50%	1.190	12.2	6.1
25%	1.155	12.0	6.0
Discharged	1.120	11.9	6.0