

BATTERY MANAGEMENT

The Challenges of a Smart System

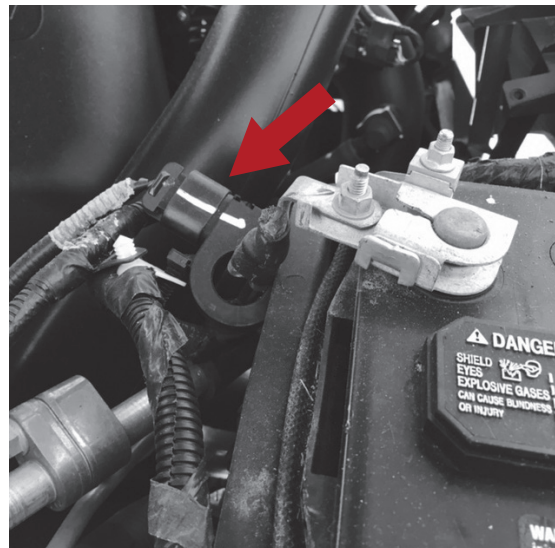
Do you know all there is to know concerning a battery replacement? Most assume they do, but later they may realize they should have done some research. Technology changes the way we must perform some services and troubleshoot some systems.

Based on the application, battery replacement is becoming a technical procedure that may require a skill level above the average do-it-yourselfer with some basic tools. Instead, the service may require some specialty tools. Have you heard of battery registration following a battery replacement? On some applications, it may require the use of a scan tool to register the battery, once installed in the vehicle. If the battery exchange is not performed properly, the battery life may be cut short due to overcharging or you may encounter some electrical issues that are difficult to pinpoint.

A defective or discharged battery can set off a sequence of electrical issues that would be very difficult to pinpoint without a complete understanding of how the electrical system functions and should be tested. Countless hours can be wasted searching for a solution to an electrical problem, only to determine later the system was functioning as it was designed. Failed electrical circuits may be the result of load-shedding (dropping electrical circuits) to maintain the battery capacity at a determined level. It is a smart system.

FORD'S BATTERY MANAGEMENT SYSTEM

Ford F150s and other applications may be equipped with a Battery Management System (BMS) designed to monitor the condition of the battery and to take action to preserve and extend the life of the battery. If the vehicle is equipped with this system, current sensors will be located on the positive and negative battery cables (see illustration). The positive battery cable contains a generator current sensor and



the negative cable is fitted with a battery current sensor.

To preserve the battery, the system monitors the condition of the battery and may disable certain electrical systems when an excessive electrical drain is detected. Systems that could be disabled may include: heated and cooled seats, heated steering wheel, rear defrost, ac/heater fan, audio system, navigation, etc. If the system disables these accessories, a message usually appears to reflect that this action has been taken to protect the battery. It does not indicate a problem with the mentioned accessories or recommend a battery replacement.

Accessory devices added to the vehicle should not be attached to the negative post of the battery, as it can cause an inaccurate measurement of the state of charge of the battery. Also, when charging the battery, attach the negative cable of the charger to a good engine ground instead of the negative post of the battery. This allows the BMS sensor to accurately measure the battery state of charge.

When a battery replacement is required or a battery charged with an auxiliary charger, the BMS should be reset. Many vehicles are equipped with a similar system designed to automatically adjust the charge rate of the alternator based on the age and sulfation of the battery. When a new battery is installed it must be registered with the system to prevent the new battery from being overcharged. This reset/registration procedure can be performed with some scan tools or a battery reset tool available from tool suppliers such as OTC or Midtronics. Other tool companies may offer the same. On the mentioned Ford system, if this service is not performed, the BMS requires 8 hours of sleep time with the key in the off position and the doors must remain closed. This allows the BMS time to relearn the battery state of charge. Until that time the BMS may keep the mentioned electrical systems disabled.

GM'S REGULATED VOLTAGE CONTROL

It is not uncommon to receive customer complaints of voltmeter readings varying from 12–15 volts. Based on observing a previous vehicle with a stable 14 volt reading on the voltmeter, they assume a 12 volt reading is an indication of a charging system related condition or a defective battery. We have seen a lot of batteries and alternators replaced in a futile attempt to resolve the low voltage reading. The 12 volt reading may be a normal characteristic for the system.

Starting in 2005 GM introduced a Regulated Voltage Control System (RVC) on certain vehicles such as light duty and full size pickups and SUVs. The RVC system controls the alternator output based on the electrical demands of the system. The system monitors the battery and electrical demands. During periods of low demand, the volt meter may reflect 12 volts and up to 15 volts during peak electrical demand. This means of voltage control is designed to increase battery life by preventing overcharging and to improve fuel economy. Two different systems are used:

- 1) Integrated systems use a current sensor like that illustrated in the Ford system. It provides the Body Control Module (BCM) with the charging/discharging rates. The BCM communicates this information with the ECM/PCM which controls the generator output.
- 2) The second system is a Stand Alone system that uses a control module mounted on the negative battery cable. The current sensor is built internally in the module, which controls the generator output.

A quick test can verify that the system is functioning normally. To keep the RVC system in the charge mode, simply turn on the headlights or depress the tow/haul switch. If the voltage increases from the 12 volts displayed on the volt meter to 14 volts or more, the system is functioning properly.

LOOSE CONNECTIONS PROMOTE INCREASED RESISTANCE

Loose or corroded battery cables/connections can cause an increase in resistance and a voltage loss. When these conditions occur, electrical systems fail or behave erratically and failure messages may appear on the instrument cluster. Good technicians know the importance of clean and tight battery cable connections. Be certain to make this a part of your battery maintenance and routine inspection.

GM has issued a TSB #14311B (illustrated in ALLDATA) concerning an insufficient crimp at the negative battery

cable terminal connector on 2011–2015 Chevrolet Cruze vehicles.

A letter was sent to the owners of these vehicles to make them aware that over time the internal resistance could increase, resulting in electrical systems not receiving adequate current. With this condition present, the following systems may be affected: the Radio/HVAC display may turn off and on, the Antilock Brake System, Service Traction System, Service Stabilitrac and Steering messages may come on and off; the turn signal may not be heard; Battery Saver Active and Service Steering may display in the Driver Information Center (DIC); the interior and exterior lighting may flicker; power steering assist may be lost, with a greater effort to turn the steering wheel.

GM is providing the owners of these vehicles with protection for the mentioned condition for 10 years from the date the vehicle was put into service or 120K miles, whichever occurs first. The repairs will be performed at no cost to the vehicle owner. The repair procedure illustrated in the mentioned service bulletin is a 14 page step-by-step procedure.

LOW VOLTAGE

It is not uncommon for a vehicle to have a low voltage display, dimming lights during stop conditions, slow cranking or no start symptoms when a vehicle is driven repeatedly at slow speed conditions or when a vehicle is not driven frequently. Accessories added to the vehicle further complicate the described conditions. Slow speed or stop and go driving with high electrical usage will result in the battery having to supplement the electrical demands and a discharge condition. The charging system on vehicles driven at speeds that exceed 1000 RPM will usually keep up with the electrical demands and keep the battery in a full state of charge.

Problems always arise on vehicles that are parked for extended periods of time. Parasitic current drains will usually result in a no start condition in a 30 day period, some sooner.

Do your homework before you condemn a battery or the vehicle's charging system. The problems encountered by the vehicle owner may be a normal characteristic due to the conditions the vehicle is being driven in or a lack of usage at an RPM that is suitable to keep the battery in a full state of charge.

Most important of all, make battery inspections/testing a part of your routine maintenance.

LARRY HAMMER, Technical Services
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MIGHTY: THE PMPROS

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