Mighty AUTO PARTS Tech Tip

BATTERIES 191

ELECTRICAL CHALLENGES

A Battery of Facts Must Be Considered

Most vehicle owners think of the battery as a component that starts the engine and serves no other purpose. And most never think about the battery or consider having it tested until the engine fails to start. With today's vehicles, the battery may start the engine perfectly right up until it fails to start without any warning to let the vehicle owner know they have a problem. In addition, a low voltage condition can promote some difficult to diagnose challenges for the technician before a no-start symptom is encountered. Testers are available that can detect a battery that has met its life expectancy and should be replaced. Unfortunately, many shops do not promote battery testing when performing vehicle inspections and this can leave the customer stranded without any warning and paying a service call that may exceed the cost of a new battery.

THE BATTERY SERVES MULTIPLE FUNCTIONS

The purpose of the battery includes the following categories:

1) Provides the electrical energy to start the engine.
2) Provides the necessary current to run the electrical accessories when the engine is not running.
3) Maintains memory for the computers, radio stations, memory seats, etc.
4) Provides the electrical energy to meet the system demands when the electrical load exceeds the output of the alternator.
5) Eliminates alternator output surges to stabilize the electrical system.
6) Prevents current surges and voltage spikes that can create major issues with the vehicle's electronics.

LOW VOLTAGE DISPLAY OR DIMMING LIGHTS

A low voltage display on the instrument panel voltmeter or dimming lights during idle or slow speeds may be a normal characteristic. The symptoms are more pronounced on those applications with added electrical accessories, full operation of all electrical accessories simultaneously, or a marginal battery. During these driving conditions, the alternator cannot keep up with the demand of operating the electrical accessories and maintaining the battery in a full state of charge. The fluctuating voltage or dimming lights is an indication that current is being pulled from the battery. The symptoms are more pronounced on a marginal or partially discharged battery. This makes battery testing one of the most important services you can perform during your vehicle inspections.

CHARGING AND JUMP STARTING

When charging a battery, follow all vehicle manufacturer safety guidelines to prevent damage to the vehicle's electrical system and to prevent personal injury to the technician. Some battery chargers may exceed 20 volts when performing a jump start. Vehicle manufacturers caution against the use of these chargers to jump start, as the voltage can result in damage to the headlamps, electronic modules and other electrical components.

ELECTRICAL DRAIN

Current drain on the battery may be considered a normal characteristic. This is referred to as parasitic current drain and is necessary to keep certain electrical accessory/devices memories alive. The electrical drain is minimal and is usually in the range of 30 ma to a max of 50 ma on vehicles with highly optioned electrical accessories. This drain is an electrical load/draw on the system when the key is in the off position. The minute amount of current drain is not an issue on vehicles that are driven daily and at speeds above 1,000 RPM. It can be an issue on vehicles that remain parked for 3-4 weeks. During this extended lay-up time, the battery may discharge to a level resulting in a no-start condition. In addition, the vehicle may encounter some difficult to diagnose electrical symptoms. When testing for parasitic current drain, be aware that when a battery is initially connected there may be a 9-10 amp draw for a few seconds as the computers and capacitors power up. This is referred to as the initialization period.

Self-discharge of the battery can occur even when the battery is not connected to the vehicle due to internal chemical reactions within the battery. This condition is more pronounced during high ambient temperatures.

The higher the ambient temperature, the higher the self-discharge rate.

IMPROPERLY INSTALLED ACCESSORIES

Improperly installed accessories can promote an excessive discharge rate. When diagnosing a battery that is repeatedly in a state of discharge with an intermittent electrical drain of 4 amps or more, don't rule out an improperly installed power source for the added accessory. When reading the amp draw on the system, it may vary from a few milliamps to 4 amps or more. Chances are the installer of the accessory component has wired into the courtesy lamp circuit for a power source. This can result in the power timer in the BCM continually resetting, causing the intermittent 4 amp current draw. Disconnecting the power source to the recently installed accessory will confirm.

FACTORY SERVICE BULLETINS

It is not uncommon to invest many hours of diagnostic time in an effort to determine the cause of a battery discharge condition. Always check the Factory Service Bulletins before getting too deep into the diagnostics. The information contained can save you a lot of diagnostic time. And the solutions to some of the symptoms are not a diagnostic strategy that we would normally consider taking when making the diagnosis. Considering that, let's review a factory solution to a difficult to diagnose symptom, plus a battery discharge condition:

Headlamps Promote No-Start/No-Crank Condition…
When troubleshooting a 2016-2017 Silverado or GMC Sierra 1500 for a dead battery, no-start/no-crank or engine runs with the ignition switch in the off position and trouble codes P1682 or P129D, GM advises that the condition may be resolved with a headlight inspection. When diagnosing the mentioned symptoms, examine the under hood electrical center fuses F26UA, F31UA, F34UA, F39UA, F40UA and F56UA with the ignition switch in the off position. These fuses should only have power with the ignition switch in the on position. Power on these fuses with the ignition switch in the off position can cause multiple modules to remain awake, resulting in a discharged battery. The symptoms may be intermittent and more pronounced during wet weather conditions.

When troubleshooting these symptoms, GM recommends inspecting the headlamps for water intrusion. If the presence of water is found, disconnect the headlamp electrical connector and re-test. If the condition is resolved, replace the headlamp assembly. If disconnecting the headlamp connector fails to correct the symptom, check the electrical connector for water contamination and repair accordingly.

WHY BATTERIES FAIL

There are several conditions to consider when determining the reason for battery failure. Most just replace the battery and give little if any thought as to why the battery failed. If the battery fails prematurely, a little troubleshooting may prevent another failure. When troubleshooting, much can be learned from the vehicle owner in determining the normal vehicle operating conditions. For example: A vehicle that is continually operated at slow speeds with a high electrical load.

The following conditions contribute to the majority of the battery failures:

1) Sulfation contributes up to 80% of the battery failures. When a battery drops below its full state of charge, especially for extended periods of time, lead sulfate crystals form on the negative plates. The accumulation of deposits reduces the surface of the battery's active material, resulting in a loss of capacity and preventing the battery from becoming fully charged.
2) Cold weather with a thicker oil viscosity promotes excessive amperage draw from the starter, leading to battery failure.
3) A battery in a low state of charge due to an electrical or charging system related problem, such as those previously mentioned, causes premature battery failure.
4) High ambient and high under hood temperatures promote an increased discharge rate and premature battery failure. Reduced air flow around the battery resulting from tight under hood quarters has prompted some vehicle manufacturers to insulate the battery with a wrap to reduce the heat on the battery. The heat causes gassing, resulting in electrolyte loss, plate corrosion and internal shorts.

BATTERY TESTING

Conductance battery testers have become the tester of choice for most shops. It is a quick and easy test to accurately determine the condition of the battery without the battery having to be fully charged before testing. Make battery testing a part of your vehicle inspection. It is profitable for the shop, can save your customer much frustration and can prevent a costly service call. When a battery fails it is seldom at a convenient time and place.

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