



# TECH TIP

ELECTRICAL 223

## **ELECTRICAL TIPS** *For Difficult to Diagnose Symptoms*

**C**onsider the following electrical tips when diagnosing those elusive symptoms that seem to defy the normal diagnostic procedures.

### **BATTERY DRAIN**

Parasitic current drain is a normal characteristic, as this electrical drain is necessary to keep electrical accessories/devices memories alive. On a highly optioned vehicle a current drain in the range of 30-50 milliamps (mA) should be considered normal. This electrical drain is measured with the ignition switch in the off position. This amount of current drain is not an issue with vehicles driven daily at speeds above 1000 RPM. It can be an issue with vehicles that remain parked for 3-4 weeks resulting in a no-start condition, often accompanied with a no fob detected message. Low voltage conditions may result in some electrical issues that are difficult to diagnose, as modules stop communicating, resulting in some anomalies within the vehicle's electrical system. When testing for parasitic current drain, be aware that when the battery is initially connected there may be a 9-10 amp current draw for a few seconds as the computers and capacitors power-up, which is referred to as the initialization period.

Computers must power-down or enter what is referred to as the sleep mode to prevent battery discharge. Never leave the fob within 25 feet of the vehicle when parked, as its presence can prevent the computers from entering the sleep mode. Pay special attention to any add-on electrical accessories, which can influence other systems or components if wired improperly. For example: Getting a power source at the courtesy lamp circuit may result in the BCM continuously resetting. The BCM may remain awake resulting in an amp draw rising to 4 amps and then dropping to a low milliamp reading momentarily. This cycle may continually repeat itself, resulting in a discharged battery.

### **DEAD BATTERY / 250 MILLIAMP CURRENT DRAW**

GM identifies a potential 250 mA current draw and a dead battery on 2019–2022 Chevrolet and GMC trucks equipped with the Auto Start/Stop feature. These vehicles are identified with an RPO KL9, which refers to being equipped with the Automatic Stop/Start System. On these applications, the system shuts the engine off when the brake pedal is depressed and the vehicle is at a complete stop. The engine restarts when the brake pedal is released and the accelerator pedal is pressed.

Some customers complain of a no-crank condition due to a discharged battery. When performing a parasitic drain test, a current draw of approximately 250 mA may be present. GM advises that removing BCM fuses F45DR and F49DR may eliminate the current draw. The source of the current draw may be due to the addition of an aftermarket "Autostop Eliminator," which renders the Start/Stop system inoperative. GM states the current draw is due to the device being installed in line with the Auto Start/Stop switch (S171L or S171R).

The current drain chart illustrated references mA current drains and days required to reduce the battery to a 50 percent state of charge. This chart (Courtesy of GM) is based on a 690 cold cranking amperage battery with a 110-minute reserve capacity and the battery at 80 percent state of charge:

<u>Current Drain</u>	<u>Days</u>
25 mA	33
50 mA	16.5
75 mA	11
100 mA	8.25
250 mA	3.3
500 mA	1.65
750 mA	1

Be familiar with the addition of any electrical accessories when diagnosing conditions that promote excessive parasitic current drain. Question the customer concerning these accessory devices or accessories that may have been removed from the vehicle prior to the vehicle being brought in for repair. Diagnostic hours can be wasted looking for a solution to a problem that has been removed from the vehicle.

Accessory devices to bypass the Start/Stop feature have gained popularity, as many vehicles require depressing a button to disable the system with each initial start. This can be frustrating for the vehicle owner who would like to disable the feature permanently with the press of a button. A recent customer demanded the system be disabled after a starter motor failure occurred on her BMW X5. A message in her instrument cluster reflected that her vehicle was encountering starting issues. The DME (Digital Motor Electronics) logs every engine start. If the system includes Auto Start-Stop, the starter encounters more start cycles. The system uses an algorithm to estimate the life span of the starter based on the total number of starts. When the starter draws too much current or the life cycle of the starter is exceeded, the system will set a fault code, and a warning will be illustrated in the instrument cluster. At this point the technician can follow a test sequence to determine the health of the starter.

The dealership performed the diagnostics, which led to replacing the starter motor. Total cost of the replacement including the diagnostic fee, parts and labor was almost \$2000.

## **ASSEMBLY LINE DATA LINK**

The ALDL connector allows access to the computer system for diagnostic purposes. In addition, some companies utilize the ALDL connector for other purposes such as fleet monitoring, fuel economy, required service /maintenance intervals, performance enhancement, etc.

A part of the diagnostic process should include an evaluation of any accessories, electrical devices, performance enhancements or fleet monitoring devices that plug into the ALDL connector, as they may influence the vehicle's electronics. Any attachment to the connector may result in driveability issues with the engine or transmission, erratic or false gauge readings, Service

Engine Soon lamp illumination, trouble codes stored, TPMS lamp illumination, battery discharge due to BUS or LAN traffic remaining active, etc. Before diving too deep into the diagnostics, question the customer concerning any accessory items that may have been disconnected/ removed prior to the vehicle being brought in for repair.

## **ELECTRICAL CONNECTIONS**

The integrity of the wiring, terminals and electrical connections must be considered when troubleshooting electrical components. Intermittent and hard failures are often corrected simply by disconnecting and reconnecting harness connectors or performing a terminal clean-up. It can be difficult to determine the integrity of an electrical connector and its mating terminals without using a compatible terminal as a gauge tool or the proper test tool. Many electrical components, including modules and computers, are being replaced due to connection related issues.

Recently we were troubleshooting a performance issue on a Corvette. A failure to communicate message was displayed on the scan tool, when attached. Securing a second scan tool revealed the same message. The lack of communication was identified as a poor electrical connection at the BCM, which is located on the passenger side floorboard.

Poor connections can result in terminal fretting due to micro-movement between terminals and their mating connector due to engine vibrations/movement of a harness. This condition results in wearing down the protective coatings of the terminals, promoting corrosion or oxidation, resulting in poor electrical connections. Evidence of terminal fretting is usually reflected by smudges or a discoloration of the terminals. The addition of an electrical connector grease may prevent a recurrence.

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