



# Tech Tip

SUSPENSION 194

## VEHICLE MODIFICATIONS They Can Create Diagnostic Challenges

Vehicle modifications can create some interesting challenges for a technician. The first step in the diagnostic process is a discussion with the vehicle owner, and if possible, have them accompany you on a road test. Always perform the basic diagnostic steps first. Determine if any modifications have been made to the vehicle. With today's technology and vehicle design it is not uncommon to introduce a problem with the addition of an accessory or device. Let's consider some examples that can lead to some difficult and elusive symptoms.

### BATTERY DRAIN

Following the installation of an electrical accessory, the customer encountered a battery discharge condition. A discussion with the vehicle owner led the technician to a quick discovery of the cause of the battery drain condition.

The installer of the accessory had tapped into the courtesy lamp circuit for a power source. This resulted in the power timer in the Body Control Module continually resetting, causing an intermittent 4 amp current draw. Disconnecting the power source confirmed the diagnosis.

### PREMATURE BALL JOINT FAILURE

Enhancing the cosmetics of a vehicle can come with a cost of some suspension components. Some of these added components may include taller and wider tires, off-set wheels and suspension kits to level or increase the ride height of the vehicle. With these modifications, it is not uncommon for the vehicle to encounter upper ball joint wear-out in 30k miles or less.

Upper ball joint complaints usually come in the form of knocking sounds from the suspension, especially on rough road surface conditions. Be aware of these accelerated wear conditions and communicate these symptoms to the customer. If not, you may be doing the repair job over at the expense of the shop. Keep these suspension enhancements in mind when making your diagnosis.

### DRIVELINE NOISE AND VIBRATION

Driveline noise and vibration complaints may occur due to modifications such as lowering or raising the body

and suspension. Taller and wider tires may promote the same complaints.

Driveshaft and u-joint angles are affected when suspension modifications are made, putting stress on the components, resulting in premature wear or vibration complaints. The use of drop spindles or other lowering devices can have a direct effect on the angles of the u-joints, promoting premature wear and vibrations, which can be felt throughout the body and frame. Initially, the symptoms may not be present, but in time, wear on the stressed components will result in vibration complaints.

The taller and wider tires are more aggressive, resulting in a load on the driveline, in addition to promoting noise and vibration when driven at highway speeds.

Accessory devices such as running boards, bicycle or ski racks, brush guard grilles, emergency lighting, etc. can affect the air flow around the vehicle, promoting annoying noises. Steps or running boards mounted rigid to the frame or cab without insulation can transfer noises and create vibrations in the passenger compartment. It may be necessary to remove some of these accessories to pinpoint the source of the noise or vibration.

Diagnosing these types of complaints with the mentioned vehicle modifications can be difficult and a hard sell when trying to get the customer to return the vehicle to the original vehicle manufacturer's specifications.

If the vehicle is under warranty, the vehicle manufacturer will usually not perform warranty repairs for suspension related noises or vibrations until the vehicle is returned to factory specs.

### VEHICLE PULLS RIGHT OR LEFT

While taller and wider tires can pose premature ball joint failure...low aspect ratio tires create some major issues for the tire and alignment technician trying to satisfy a complaint of steering pull or wander. The vehicle manufacturer states that these symptoms are a normal characteristic of these tire sizes. For GM the vehicles affected include: Cadillac ATS, CTS, Camaro, Corvette and Chevy SS. The alignment technician is often caught between a condition that he cannot resolve and a customer who is convinced that his vehicle has alignment issues.

GM offers the following advice: Some customers may comment about their vehicle pulling left or right depending on road conditions. Some complain that their vehicle does not track properly or it has the tendency to wander based on road surface conditions. The vehicle may follow grooves or inconsistencies in the road surface to the extent it must be steered with additional force to overcome these characteristics. Vehicles equipped with low aspect ratio and wide tires tend to be more sensitive to this condition.

Verify that all tire pressures are set to the specification listed on the vehicle's tire placard and there is no evidence of uneven tire wear. Increasing the tire pressure above the recommended spec may stiffen the sidewall and further aggravate the symptom. Make certain the tires or suspension settings have not been modified from production settings. While wheel alignment is often thought to be a contributing factor, it is not recommended for the condition.

## **FLASHING LIGHTS**

Numerous customer complaints involving a flashing Traction Control Light, ABS Message, Service StabiliTrak or Service Steering Message have been documented. Often, we encounter a customer complaint of one of the previously mentioned messages right after a custom set of wheels or larger size tires have been installed on the vehicle. When the technician advises the customer the tire and wheel selection is the likely cause, they are not usually receptive to giving up these enhancements. GM offers the following information:

### ***Traction Control Light Flashes***

Owners of passenger cars and trucks may comment that under hard acceleration at higher speeds, the traction control light may flash. ABS lamp illumination may occur or they may have handling or brake related concerns. The symptoms may be present after a new set of tires has been installed on the vehicle. GM states that these symptoms may be caused by tires that do not meet the same tread wear, traction or temperature ratings.

GM's recommendation is to insure that the correct original type tires have been installed. The correct type tire and size will be documented via the VIN number. The GM dealer can access this information via a fitment guide on a web site or on their Tire Hotline 877-728-4737. It is imperative that the same type tire be installed, such as summer or all season, the original size, and with the same or higher load and speed rating.

### ***ABS Message, Service Traction, Service StabiliTrak or Service Steering Message***

GM states that the customer may comment on the following conditions:

The ABS, Service Traction Control System, and/or Service StabiliTrak lights being illuminated. During a scan for electronic brake control module (EBCM) diagnostic codes, the technician may identify diagnostic codes C0035-C0040, COO45-C0050 with symptom bytes 18, 5A, OF. Vehicles affected include 2007-2017 applications reflected in GM Service Bulletin PIC5428G.

Vehicles equipped with Electronic Power Steering may reflect a Service Steering Message displayed, and customer complaints of a heavier steering sensation at slow speeds or static steering maneuvers. When this occurs, it will be accompanied with the Power Steering Control Module setting DTC U0415. This is a normal default action with the loss of a Wheel Speed Sensor signal.

A brief intermittent noise such as a click, ratchet, grind, or ABS pump motor noise may be heard from inside the vehicle at parking lot speeds.

A flashing Traction Control or StabiliTrak Lamp at slow speeds may occur.

The latter two conditions may occur with no reported EBCM, ABS or Stability DTCs set. These conditions may be caused by single or multiple pieces of ferrous metallic debris stuck to the wheel speed sensor magnetic encoder ring. The magnetic ring is now a part of the inboard hub bearing assembly.

Newer vehicles are equipped with a different type of wheel speed sensor encoder ring or tone wheel. The assembly includes a magnetized nitrile rubber ring consisting of multiple North and South Pole pairs surrounding the outer circumference. When the magnetic encoder ring rotates past the wheel speed sensor head, it generates a sine wave in the wheel speed sensor. The wheel speed sensor converts an analog signal to a digital square wave and then provides this signal to the EBCM. The EBCM uses this signal to calculate wheel speed. Inspect the encoder ring for the presence of any debris, which can affect the sensor signal. A clean-up of the encoder ring may return the assembly to service without the replacement of the hub bearing assembly or wheel speed sensor. GM cautions not to use a magnetic tool to remove the debris, as an external magnet can damage the encoder. The debris should be removed with a soft bristle brush. If this procedure is not successful, wash the encoder ring with a mild detergent and dry with a shop cloth. On some applications, it may be necessary to remove the hub bearing assembly to thoroughly clean the encoder ring.

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