



Tech Tip

DIFFERENTIAL SERVICE, TIRES, BRAKE FLUID, POWER STEERING PUMPS 162

SERVICE SOLUTIONS

For Some Common But Often Elusive Symptoms

DIFFERENTIAL FLUID SERVICES

Rear axle differential service is the most commonly overlooked service by the vehicle owner and the technician. It is out-of-sight and out-of-mind. Most vehicle owners are not aware of the need to change the fluid in the differential, and for some reason technicians seldom bring it to the customer's attention.

Vehicle manufacturers post differential lube service requirements based upon the level of service in which the vehicle is operated. For example a $\frac{3}{4}$ to 1 ton truck may call for a rear axle service every 15K miles, while a $\frac{1}{2}$ ton vehicle may have a recommended service interval of every 30K miles. While the industry standard is every 30K miles, required service intervals may vary from one vehicle manufacturer to another.

Neglected differential service may result in rear axle shudder or a binding sensation during turning on vehicles equipped with a limited slip differential. On those applications, a friction modifier is required to prevent a sticking, binding or grabbing of the clutches. On vehicles fitted with this style differential, a low fluid level requires a complete system drain, new fluid and friction modifier installed. Just topping off the low fluid level is not acceptable, as this affects the ratio of lubricant to friction modifier, resulting in sticking or binding symptoms. Further, just adding a friction modifier to a differential that already contains some capacity of the modifier, can be detrimental to the seals and lubricant performance.

DRIVELINE SHUDDER OR BINDING DURING TURNS

You may or may not have any desire to be in the tire business. It doesn't matter...taking the responsibility of maintaining a customer's vehicle puts you in contact with the tires. Tire rotations and pressure checks are imperative in maintaining favorable wear characteristics of the tires from front to rear. Wear patterns and tread depths should be a part of your inspection process, as the circumference of the tires can be in direct relation to the wear patterns.

Tire circumference is especially a concern on 4 wheel drive and all wheel drive (AWD) vehicles. A variation in tire circumference as minimal as $\frac{1}{2}$ inch from front to rear or side

to side can result in a shudder or binding condition during a turn, or prevent disengagement of the 4 wheel drive unit due to transfer case loading. This is especially a problem with electric shift transfer cases. Measure the outer circumference of all four tires with a flexible measuring tape and compare the dimensions.

In addition to tire wear, tire pressure variations can promote the same circumference variations, promoting the same shudder and binding symptoms. Mixing brands of tires on the same vehicle is not recommended as tread designs may vary the tire circumference, even though they are stamped as the same size.

Transfer Case Failures...Chrysler has encountered many transfer case failures on the AWD Town & Country, Caravan and Voyager vehicles. Initially, Chrysler suspected design issues with the power transfer unit (PTU). Eventually, it was determined that the high failure rate of the PTU was due to variations in the tire circumference from front-to-rear, which resulted in extreme heat build-up in the PTU due to a continuous difference in rotation speeds and torque transfer between the front and rear drive components. It was determined that the failures had been due to lack of tire maintenance and tire rotations. At a cost of \$1,200 for a PTU that will not be covered by warranty, the vehicle owner will want to give more attention to tire maintenance and tire rotations. As shop owners and technicians, it is our responsibility to make the customer aware of the complications and failures that can result due to improper tire maintenance. A little extra service and explanation to the vehicle owner as to what you are doing can do wonders in cementing a good customer relationship. This sends the message that you are taking a personal interest in their vehicle and trying to eliminate unnecessary repairs.

Nitrogen Fill...The use of nitrogen for tire inflation is becoming more widely used, making for a good service to provide to the customer. In the past, few tire shops offered the service, which made it impractical for use as a tire inflator, as adding compressed air during routine tire pressure checks would negate the benefits of a nitrogen fill.

The use of nitrogen for tire inflation was pioneered by the racing industry, as it offered some benefits in controlling tire pressures due to the absence of moisture.

Nitrogen molecules are larger than oxygen molecules, which prevents a pressure loss due to seepage through the tire casing/rubber. Long term, nitrogen can prevent degradation of the rubber due to the decrease in oxygen content. A reduction in the oxidation of tire components is another benefit. These benefits are based on a pure nitrogen fill and no top-offs with compressed air.

Some shops charge for a nitrogen fill while others provide the service for free, or build it into the cost of the tire. Offering free nitrogen pressure checks is a good way of getting the customer back into the shop on a routine basis. In providing that service, you have more opportunities to sell other products and services.

BRAKE FLUID TOP-OFFS

Many lube shops and repair shops offer fluid “top-offs” when performing lube services. While providing this service may promote good customer relations, adding fluid to the brake master cylinder is not recommended without performing a thorough inspection. Basically, there are two reasons for a low fluid level in the master cylinder. One is due to a leak in the system and the second is worn friction. When the friction wears, the fluid level in the master cylinder drops, as it is filling that void created by the increased piston travel.

Contaminated Fluid...The condition of the brake fluid cannot be determined by the color of the fluid. The discoloration of the fluid is often the result of the additives in the fluid dissolving the dye in the seals. The hygroscopic action of the brake fluid creates a moisture problem for the system. The moisture can enter the system through the hoses, seals, master cylinder cover, etc. The system can absorb 2% of its volume annually. A DOT 3 rated fluid with a 3% moisture accumulation will encounter a 25% drop in the boiling point. With a 3% moisture accumulation, normal braking may not be affected. The problem comes with heat. The braking system may encounter pedal fade during aggressive braking conditions, as the moisture laden fluid vaporizes from the intense heat, resulting in pedal fade or a total loss of pedal. Further, the moisture promotes corrosion in the system, which can cause damage to some expensive components, especially if the vehicle is fitted with an anti-lock braking system (ABS). Brake fluid contains corrosion inhibitors that become depleted due to the moisture in the system. Within a 36 month period 91% of the corrosion inhibitors in the fluid are often lost. When this occurs, corrosion of the components is certain.

In the past, field testing of the fluid has been limited to a moisture test. Some new technology named FASCAR (Fluid Analysis by Stimulation of Copper Alpha Reactions) has made field testing for contamination possible. By the time the system fails a moisture test, some major damage may have already occurred due to corrosion. This test is

explained in Tech Tip #136 — *BRAKE FLUID FACTS...It May Be Time for a Complete System Flush*. The Tech Tip covers a lot of facts concerning brake fluid that you may have never considered. Mileage has nothing to do with the age of the fluid. Fluid in a vehicle with 10K miles on the odometer may have aged more than a like vehicle with 30K miles. Braking habits, pulling or hauling heavy loads, extreme braking temperatures, and mountainous driving all affect the condition of the fluid and the breakdown of the corrosion inhibitors.

Fluid maintenance is imperative. It is your responsibility to recommend the service to the customer. Unlike an oil change, they don't know to ask for a brake system flush.

POWER STEERING PUMP FAILURES

GM advises that a high number of power steering pumps returned under warranty receive a “No Trouble Found” when processed by quality control.

According to the study the following situations create most of the alleged returns:

- 1) Improper pulley installation.
- 2) Reuse of the old o-rings.
- 3) Non-compatible power steering fluid.
- 4) Improper or failure to flush the system.

To reduce the complaints and warranty...consider the following:

- 1) Low pressure from the pump may be due to contaminated fluid, resulting in the pressure relief valve becoming non-functional.
- 2) Flush the system thoroughly to remove any deposits that could cause premature failure of the new pump.
- 3) Make certain the proper tools are used to remove and install the P/S pump pulley.
- 4) The pulley must be in proper alignment when installed to prevent bearing failure.
- 5) Once the pump is installed, laser alignment of the pulley to insure precise belt alignment may be necessary to prevent belt noise.
- 6) Make certain a new o-ring lubricated with P/S fluid is used to seal the reservoir cover and the control o-ring is in the proper groove position and not covering the pressure by-pass hole.
- 7) Properly bleed the system to purge any air, thereby eliminating noises or erratic operation.

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