THAT'S THE BRAKES

Inherent By Design or Installer Error?

If your specialty is brake repair, you are in a position to quickly document a pattern failure vehicle. The symptoms may include brake noise, excessive pedal effort, spongy pedal feel, long pedal stroke, pedal pulsation, or premature friction wear. With numerous vehicles of the same body type encountering the same customer complaints, it is almost certain you have identified a problem system. Consult with a dealer tech or one of your colleagues. If they are experiencing the same problems, at least you can be certain that it is not something that you are introducing or failing to do in your repair procedures.

GM's N BODY PLATFORM

Since the W body GM saga that plagued the industry with complaints of hard pedal effort and premature disc pad wear, we have not encountered a system with as many customer complaints. That is, until the GM N body was introduced. The applications include 1997-2001 Malibu, Cutlass, Alero and Grand Am vehicles. The braking system for the mentioned applications has encountered modifications, including friction formulation changes and a new rotor design for pulsating symptoms and premature friction wear. Often an attempt to correct one symptom, such as a formulation change to improve pedal feel or increase friction life, results in trading one condition for another. And this platform has certainly encountered its fair share of problems, some due to the mentioned modifications. While some of the conditions are due to the system design and modifications to correct certain symptoms, some premature and uneven wear conditions may be due to installation procedures, such as the disc pads being incorrectly installed in the caliper bracket. ***Were you aware that the pads could be incorrectly installed and that the inboard pads have a right and left side?*** The conditions and illustrations offered later will better define how the pads can be incorrectly installed.

TWEAKING FORMULAS

When brake performance problems arise, most assume that the friction formulation is the cause of the condition. Immediately some start switching friction formulations or suppliers, trying to eliminate the customer's complaint. If switching formulations would correct the conditions, then our job would be simple. Put a few chemists together and our problems would be solved. Unfortunately, the problem is much deeper than that. When brake engineers are given the assignment of formulating a friction for a given platform, they face many challenges. Some of these include: ***stringent government regulations and technical issues, friction stability and coefficiency, maintaining vehicle control during braking, extreme operating temperatures, pedal effort requirements, friction and rotor wear, resistance to moisture, noise level, and required stopping distance.*** It is impossible to achieve all that in one single formulation. Concessions must be made, as improvements in one area can affect another. Adjusting a formulation to improve on pedal feel or noise may reduce the life of the friction. Another consideration is multiple drivers of the same vehicle, each with their own driving habits and physical size, which directly affect pedal effort concerns and wear characteristics. Obviously, a 250 lb. person would not have the same pedal effort concern as that of a 120 lb. person.

CORRECT PAD INSTALLATION

Were the disc pads correctly installed? The GM service manuals and some independent aftermarket manuals ***incorrectly*** reflect that the disc pad with the wear indicator should be positioned on the outboard side of the caliper (see illustration 1).

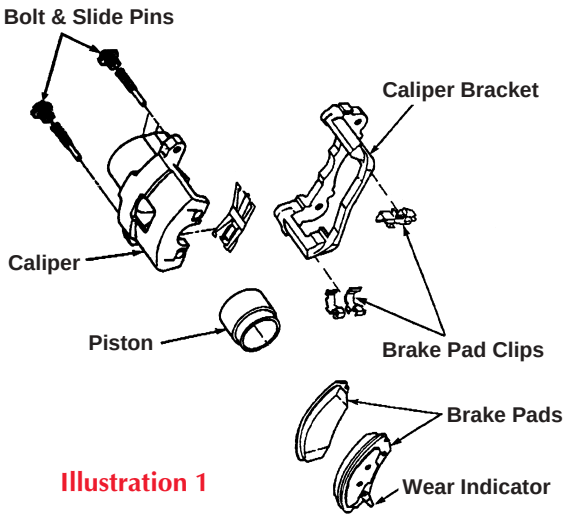


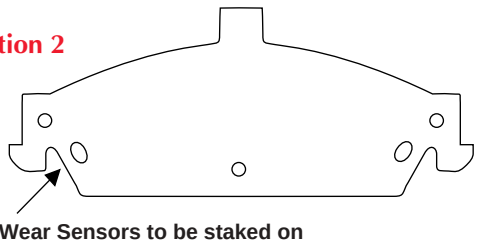
Illustration 1

The above illustration from a service manual incorrectly reflects that the disc pad with the wear indicator is positioned on the outboard side of the caliper. When mounted correctly, the pad with the wear indicator is positioned on the inboard side next to the piston.

The pad with the wear indicator should be positioned on the ***inboard side,*** next to the piston. When the pads are correctly installed, the wear indicator on the inboard pad will be pointed upward. This establishes a right and left side inboard pad. Some precautions have been taken to prevent an incorrect installation, such as a longer tab on the center of the disc pad plate on the inboard pad. However, on some applications the tab length is not sufficient enough to prevent an improper installation, especially if the center anti-rattle clip is left off during a pad installation.

If the disc pad with the wear indicator is positioned on the outboard side of the caliper, premature and tapered pad wear is certain. In this position, the skirt of the caliper will make contact with the D-shaped lugs on the pad plate, in which the wear sensors are staked onto the pads (see illustration 2). In addition to unequal pressure, a binding condition can occur with the caliper and caliper bracket. This prevents freedom of caliper movement on pedal release, keeping the pads against the rotor. GM has advised that improperly installed pads can result in premature wear and wheel binding or total lock-up, when the space saver spare tire and wheel is installed.

Illustration 2



D-Lugs for Wear Sensors to be staked on

PEDAL PULSATION

Pedal pulsation on the mentioned applications is as common as premature pad wear. The rotors get machined or replaced and in a few thousand miles return with the same pulsating condition. While a friction formulation change and improved rotor design has been made to circumvent this condition, many of the problems are due to the service procedures being performed in the repair shops. The correct lug nut tightening procedure is a known fact, but many continue to use an air impact without a torque limiting device. A five pound variance on a single lug nut can promote warpage. Those vehicles will return with a pedal pulsating condition. It may be immediate, or occur in 3,000–7,000 miles.

Prior to removing the rotor, mark the rotor-to-wheel lug position for re-assembly. Thoroughly clean the rotor-to-hub mounting surfaces, prior to installation. Torque the lug nuts to spec in a star pattern and check the rotor runout. The rotor runout should be checked on the car and not on the brake lathe. If the runout exceeds the limits, index the rotor one lug position, re-torque and recheck the runout. Performing this procedure can often bring a .007 to .010 inch runout back into spec. Remember, a warped hub can warp a new rotor and that may be the reason those new rotors are developing a pulsation within a few thousand miles. While excessive runout can cause an immediate pulsation, a minimal runout condition may not result in a pulsation until the vehicle has been driven for three to seven thousand miles following the brake service. This is due to a thickness variation occurring in the rotor, due to the disc pads wiping the rotor. Thickness variations as minimal as .0005 inch can create a pulsation.

The vehicles mentioned in this bulletin will frequent the repair shops for brake service. Good communication with the vehicle owner can save you and the customer a lot of frustration, especially since you are up against some conditions that were inherent in the system.

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TECHNICAL SERVICES