

Subject: Diagnosing and Measuring Rotor Run-out.

Vehicle Involved: All vehicles with hub-less rotors.

Condition: Pedal pulsation after brake service.

Repair Procedure:

Brake pedal pulsation can occur from 1 to 7,000 miles after inadequate brake service has been performed. Variables can extend the distance from 10,000 to 12,000 miles before pulsation is evident.

Lateral rotor run-out specifications are easily referenced in the Disc and Drum Brake Specifications Guide. When was the last time you checked rotor run-out after cleaning the hubs and properly installing a new rotor to the hub? Tired of comebacks? Read on.

Brake pedal pulsation occurring after brake service may be caused by many variables. These include but are not limited to: driver habits (two footed driving), friction materials, rotor metallurgy, technician error, and worn, binding or bent parts.

1. What are the causes of lateral rotor run-out?
 - Lathe arbor bent or adapters w/excessive run-out
 - Stacked tolerances
 - Hub run-out
 - Rust or burr on hub
 - Hub bent
 - Rust or burr on rotor hat
 - Unitized wheel bearing, excessive play
 - Over tightening of lug nuts with impact gun and socket
 - Rust shower, (particles caught between hub and rotor) from impact gun and socket
 - Rotor cooling fins packed with rust, mud. (no heat dissipation)
 - Environmental concerns (salt belt, mining)
 - Two footed driving (excessive heat, warping)
 - Rear brakes not working, not serviced.

2. What are the effects of excessive lateral rotor run-out? With

excessive run-out, the rotor wobbles as it turns (Fig.1). Uneven rotor wear occurs with the brakes not applied causing rotor thickness variation. Thickness variation causes:

- Brake pedal pulsation
- Dissatisfied customers
- Comebacks

3. How do I check rotor run-out? (Fig.2)

- Inspect unitized hub and bearing for excessive play
- Clean hubs and rotor hat
- Install conical cones/washers
- Torque lug nuts in sequence
- Secure dial indicator

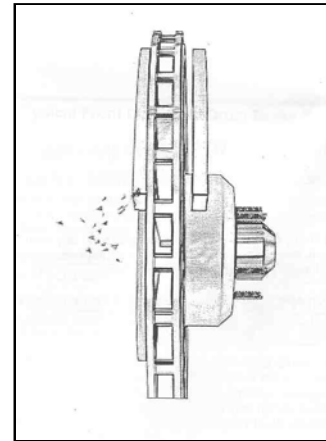


Fig.1

4. How do I correct rotor lateral run-out? If the vehicle you are working on is comeback, ask the customer questions...if for any reason tires have been removed, start by re-tightening the lug nuts in sequence to the proper torque value. Excessive run-out may require additional procedures. On the car brake lathes offer many benefits with vehicles utilizing “trapped rotors”, however anyone of the following procedures will reduce lateral rotor run-out.

- Cleans hub and rotor of rust and burrs
- **Index rotor to hub***
- Torque lug nuts in sequence
- Replace hubs with excessive run-out
- On the car lathe
- Brake alignment shims



Fig.2

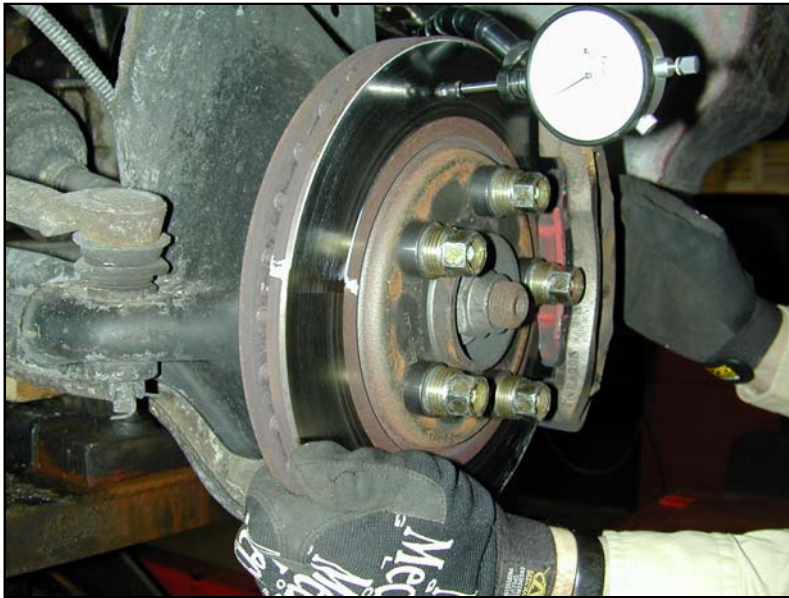


Fig. 3

A new rotor or a good resurfaced rotor placed on a hub that has run-out may cause a comeback. With a little extra care and time, a technician can index the rotor to hub. This process is very easy, and in most cases the run-out specification can be attained.

Index Rotor To Hub

* Begin the process by cleaning the hub and rotor of rust and burrs. Identify one of the wheel studs with a yellow marker, torque the rotor to the hub and check run-out. If the run-out is out of specification, remove the lug nuts and move the rotor one-wheel stud to the right. Torque the lug nuts and re-check rotor run-out. Repeat this sequence until the least amount of run-out is attained. Fig.3

Because of the complexity of friction materials used in many of today's platforms, proper brake service requires strict adherence to run-out limits. For an example the 2002 Oldsmobile Aurora is originally equipped with Non-Ferrous Ceramic brake pads front and rear. The run-out limit specification for the front and rear rotors is .002. It is critical that technicians check and correct lateral rotor run-out.

There are many methods for attaining the proper run-out specification. Depending on the severity of the problem, and the availability of resources at your facility, these methods need to be considered.

