Wheel Bearings

• Proper care of wheel bearings is an essential part of servicing brakes and suspensions

• Wheel bearings that are not properly serviced will fail sooner than necessary

  • A wheel bearing failure may lead to...

  ! BIG TROUBLE !
Poorly adjusted wheel bearing
Roller Wheel Bearings

Cylindrical or Roller wheel bearings have cylinder shaped rollers

Cylindrical or Roller bearings will not control Thrust loads

They are found on rear drive axles
Ball bearings are also found on some axles or hubs and will control thrust loads.
Radial & Thrust (or Axial) Loading

Rotating axles are subjected to Radial and Axial / Thrust forces
Semi-floating axle bearings

The weight of the Radial load is directly upon the drive axle shaft
Full Floating Axle Bearings ride on a Spindle – not the axle shaft (used in 1-ton and heavier trucks)
Full Floating Axle Bearings use Tapered Roller Bearings that require careful adjustment procedures after inspecting or replacing brakes.
For light trucks and automobiles, Adjustable Tapered Wheel Bearings are often found on the Non-driving axle.

...Front wheels for rear wheel drive

...Rear wheels for front wheel drive
Tapered Wheel Bearings require careful adjustment if the hub is removed.

Tapered wheel bearings should be cleaned, inspected and re-packed every time brakes are replaced.
Tapered Wheel Bearings

The tapered roller bearings require careful adjustment to control radial and axial (thrust) loads.
Tapered Wheel Bearings should be cleaned, re-packed and properly adjusted with every brake job.

Always replace seals and locking pins when re-packing wheel bearings.
When removing the caliper DO NOT allow it to hang by the brake hose. This can damage the inside of the hose!

Always replace grease seal EVERY time it is removed from the hub

Always use new cotter pin
Static vs Dynamic Seals

Static seals are for non-moving components (like a head gasket or oil pan gasket)

Dynamic Seals are for moving parts like bearings

Always replace any seal that has been removed –

Especially dynamic seals (they wear out!)

The Grease Seal for wheel bearings is a dynamic seal
Wheel Bearing Service

Wheel bearings must have...

... the proper adjustment ...

... the proper lubricant ...

...and kept CLEAN
Wheel Bearing Service

• Each wheel bearings will become “Wear Mated” to it’s inner and outer race

• When cleaning and repacking bearings make sure each bearing stays with the original outer race

• If you replace a bearing be sure to install a new race

• Pack one side at a time to avoid switching bearings and races.
Bearing End Play / Pre-load

Bearing adjustment will call for either pre-load or end play

End play can be measured with a dial indicator

A bearing adjusted with Pre-load will have zero end-play

Most adjustable tapered wheel bearing adjustment procedures will result in a small end-play.

End play will typically measure 0.001” to 0.005”
When should you service wheel bearings?

• Repack at every brake job.

• Inspect if hub is removed

• Carefully adjust if hub is removed
Inspect and repack wheel bearings

- Always use new race with new bearing
- Keep bearing matched to race if repacking
- Always use a new seal if old one is removed
- Do not mix grease, clean out all old grease (Soaps in different greases are not compatible)
- Do not pack hub or grease cap with grease
Chassis & Wheel Bearing Grease

Grease is a combination of lubricating oil and a thickening agent to hold oil in place (called SOAP).

Grease must be able to ....
  ...Reduce Friction to control heat
  ...Reduce wear on moving parts
  ...Transfer (dissipate) Heat
  ...Protect metal from corrosion
Chassis & Wheel Bearing Grease

• “Soap” is used to hold the lubricating oil in the grease
• Lithium Soap is common
• Aluminum, Barium and Sodium Soaps are also used

• Soaps are not compatible and greases should not be mixed or they will fail to lubricate!

• Always remove ALL old bearing grease when repacking a bearing

• Inexperienced technicians make a mistake if they fail to clean out all grease from the bearing hub!
Chassis & Wheel Bearing Grease

- National Lubricating Grease Institute (NLGI)
- Classifies grease for application and quality
- “L” rated grease is used for vehicle chassis parts
- LA = lowest quality.
- LB = highest quality designed for infrequent lubrication
- “G” rated grease is for wheel bearings
- GA = Mild duty  GB = Moderate duty  GC = Severe duty
- Always use grease rated GC for any vehicle wheel bearing
Grease is rated for Thickness or Viscosity.

Most wheel bearing grease will be NLGI Grade 2.

<table>
<thead>
<tr>
<th>NLGI Grade</th>
<th>Worked penetration after 60 Strokes at 25°C (0.1 mm)</th>
<th>Appearance</th>
<th>Consistency food analog</th>
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<tbody>
<tr>
<td>000</td>
<td>445-475</td>
<td>fluid</td>
<td>cooking oil</td>
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<tr>
<td>00</td>
<td>400-430</td>
<td>fluid</td>
<td>applesauce</td>
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<tr>
<td>0</td>
<td>355-385</td>
<td>very soft</td>
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<td>1</td>
<td>310-340</td>
<td>soft</td>
<td>tomato paste</td>
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<td><strong>2</strong></td>
<td><strong>265-295</strong></td>
<td><strong>moderately soft</strong></td>
<td><strong>peanut butter</strong></td>
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<td>3</td>
<td>220-250</td>
<td>semi-fluid</td>
<td>vegetable shortening</td>
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<td>5</td>
<td>130-160</td>
<td>hard</td>
<td>smooth pate</td>
</tr>
<tr>
<td>6</td>
<td>85-115</td>
<td>very hard</td>
<td>cheddar cheese spread</td>
</tr>
</tbody>
</table>
Chassis & Wheel Bearing Grease

• Ensure grease is rated GC (or GC-LB) for wheel bearings!

• **GC** is for severe service wheel bearing,
  **LB** is Chassis lube for Suspension

• **GC-LB** Grease can be used for BOTH chassis and wheel bearings.
Inspect and repack wheel bearings

Remove **ALL** old grease including the hub

Clean thoroughly with solvent

Dry with compressed air...

DO **NOT** spin bearings with air.....

....This may cause bearing to fly apart

Flush away **ALL** traces of solvent with brake clean
Rinse with alcohol or brake clean after blowing off solvent!

• The grease must be able to stick to the bearing rollers to be effective.

• Failing to remove all traces of solvent may cause early wheel bearing failure

• If not repacking bearing immediately coat with oil and wrap in paper

• Dirt is #1 enemy of bearings
Fully pack the bearing
Notice how you can tell if the bearing is fully packed!
Do not over-pack Hub with grease

• Will cause grease to be forced past seal

• This will contaminate brake linings with grease

• It is common for inexperienced technicians to use too much wheel bearing grease in the hub
No need to pack the hub with grease. Just coat the outer races with fresh-clean grease.

It is important to remove ALL old grease from the hub to avoid any incompatible soaps or grease additives found in the new wheel bearing grease.
Adjust bearing end play or pre load

• Look up specifications

• Do not adjust all bearing the same

• Always use a new cotter key
  (use the thickest cotter pin that will fit)
Loose Wheel Bearings

• Insufficient bearing preload can cause disc brakes to “Knock Back”

• Knock Back can cause low brake pedal and may cause brake pull

• Loose bearings will cause grease seal to fail allowing grease on brake pads

• May lead to broken spindle
Tight Wheel Bearing

• Too much bearing preload will overheat

• May cause bearing to seize on spindle

• May cause race to spin in hub

• May cause wheel and hub to fly off vehicle

With tapered wheel bearings a little too loose is better than a little too tight!
R & R Sealed Wheel Bearings

• Many wheel bearings are sealed and must be replaced when they wear

• Use procedures specified by manufacturer when replacing

• Insure proper support of steering knuckle or spindle when pressing
Important to press on proper race
R & R Sealed Wheel Bearings

The first time you use a new type of press to replace sealed wheel bearings get checked out by your instructor or a more experienced technician!

Improper use of the press or bearing installation tool can damage components or cause improper pre-load on sealed bearing.

Bearing failure can-will occur from improper replacement procedures and may cause injury to the vehicle and occupants!
Bearing Noise

• Failing bearings get noisy and may be hard to locate

• Swerving left or right will change the load on bearings, and change the sound

• Swerving left will increase load on right

• With tapered wheel bearings cleaning and inspection may be the only way to confirm
Bearing Service

• Any time you service a wheel bearing you are responsible for the future safety of that vehicle

• Improper procedures, adjustments, or lubrication may lead to brake failure

• Improper service may cause the wheel to fly off the vehicle
Bearing Service

• Always look up vehicle specifications when servicing or adjusting wheel bearings

• If you are not sure ASK QUESTIONS!