

DIAGNOSIS AND TESTING - REAR AXLE - 11 1/2 AA

FLUID CHECK

Filling an axle to the bottom of the fill hole may result in an over fill condition. This can cause fluid foaming which will result in inadequate lubrication to the axle components. To check axle fluid, park vehicle on a level surface. Take a piece of wire and make a 90 degree bend two inches from the end of the wire. Insert the wire into the fill plug hole and use it like a dipstick. Remove the wire and measure from the 90 degree bend to the oil level. Refer to specification for the correct measurement.

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly check for:

- Insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side gears and pinions can be checked by turning the vehicle. The side gears are loaded during turns. They usually do not cause noise during straight-ahead driving when the gears are unloaded. A worn pinion shaft can also cause a snapping or a knocking noise.

BEARING NOISE

The axle shaft, differential and pinion bearings can all produce noise when worn or damaged. Bearing noise can be either a whining, or a growling sound.

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched because it rotates at a faster rate. Drive the vehicle and load the differential. If bearing noise occurs, the rear pinion bearing is the source of the noise. If the bearing noise is heard during a coast, the front pinion bearing is the source.

Differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing noise. The pitch of differential bearing noise is also constant and varies only with vehicle speed.

Axle shaft bearings produce noise and vibration when worn or damaged. The noise generally changes when the bearings are loaded. Road test the vehicle. Turn the vehicle sharply to the left and to the right. This will load the bearings and change the noise level. Where axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 mph.

LOW SPEED KNOCK

Low speed knock is generally caused by:

- Worn U-joint(s).
- Worn side gear thrust washers.
- Worn pinion shaft bore.

VIBRATION

Vibration at the rear of the vehicle is usually caused by:

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out-of-balance wheels.
- Loose wheel lug nuts.
- Worn U-joint(s).
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

Check for loose or damaged front-end components or engine/transmission mounts. These components can contribute to what appears to be a rear end vibration. Do not overlook engine accessories, brackets and drive belts.

NOTE: All driveline components should be examined before starting any repair.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear (or the clutch engaged), can be caused by:

- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission/transfer case mounts.
- Worn U-joints.
- Loose spring mounts.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.

The source of a snap or a clunk noise can be determined with the assistance of a helper. Raise the vehicle on a hoist with the wheels free to rotate. Instruct the helper to shift the transmission into gear and listen for the noise. A mechanics stethoscope is helpful in isolating the source of a noise.

DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	<ol style="list-style-type: none"> 1. Wheel loose. 2. Worn wheel bearing. 	<ol style="list-style-type: none"> 1. Tighten loose nuts. 2. Replace bearing.
Axle Shaft Noise	<ol style="list-style-type: none"> 1. Misaligned axle tube. 2. Bent or sprung axle shaft. 	<ol style="list-style-type: none"> 1. Inspect axle tube alignment. Correct as necessary. 2. Inspect and correct as necessary.
Axle Shaft Broke	<ol style="list-style-type: none"> 1. Misaligned axle tube. 2. Vehicle overloaded. 3. Erratic clutch operation. 4. Grabbing clutch. 	<ol style="list-style-type: none"> 1. Replace the broken shaft after correcting tube mis-alignment. 2. Replace broken shaft and avoid excessive weight on vehicle. 3. Replace broken shaft and avoid or correct erratic clutch operation. 4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	<ol style="list-style-type: none"> 1. Improper adjustment of the differential bearings. 2. Excessive ring gear backlash. 3. Vehicle overloaded. 4. Erratic clutch operation. 	<ol style="list-style-type: none"> 1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly. 2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly. 3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight. 4. Replace case and inspect gears and bearings for further damage. Avoid erratic use of clutch.
Differential Gears Scored	<ol style="list-style-type: none"> 1. Insufficient lubrication. 2. Improper grade of lubricant. 3. Excessive spinning of one wheel/ tire. 	<ol style="list-style-type: none"> 1. Replace scored gears. Fill differential with the correct fluid type and quantity. 2. Replace scored gears. Fill differential with the correct fluid type and quantity. 3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	<ol style="list-style-type: none"> 1. Lubricant level too high. 2. Worn axle shaft seals. 3. Cracked differential housing. 	<ol style="list-style-type: none"> 1. Drain lubricant to the correct level. 2. Replace seals. 3. Repair as necessary.

Condition	Possible Causes	Correction
	<ol style="list-style-type: none"> 4. Worn pinion seal. 5. Worn/scored yoke. 6. Axle cover not properly sealed. 	<ol style="list-style-type: none"> 4. Replace seal. 5. Replace yoke and seal. 6. Remove, clean and seal cover.
Axle Overheating	<ol style="list-style-type: none"> 1. Lubricant level low. 2. Improper grade of lubricant. 3. Bearing pre-loads too high. 4. Insufficient ring gear backlash. 	<ol style="list-style-type: none"> 1. Fill differential to correct level. 2. Fill differential with the correct fluid type and quantity. 3. Adjust bearing pre-loads. 4. Adjust ring gear backlash.
Gear Teeth Broke	<ol style="list-style-type: none"> 1. Overloading. 2. Erratic clutch operation. 3. Ice-spotted pavement. 4. Improper adjustments. 	<ol style="list-style-type: none"> 1. Replace gears. Examine other gears and bearings for possible damage. 2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation. 3. Replace gears and examine remaining parts for damage. 4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	<ol style="list-style-type: none"> 1. Insufficient lubricant. 2. Improper ring gear and pinion adjustment. 3. Unmatched ring gear and pinion. 4. Worn teeth on ring gear and pinion. 5. Loose pinion bearings. 6. Loose differential bearings. 7. Ring gear run out. 8. Loose differential bearing cap bolts. 9. Housing not machined properly. 	<ol style="list-style-type: none"> 1. Fill differential with the correct fluid type and quantity. 2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth. 3. Replace gears with a matched ring gear and pinion. 4. Replace ring gear and pinion. 5. Adjust pinion bearing pre-load. 6. Adjust differential bearing pre-load. 7. Measure ring gear run-out. Replace components as necessary. 8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification. 9. Replace housing.