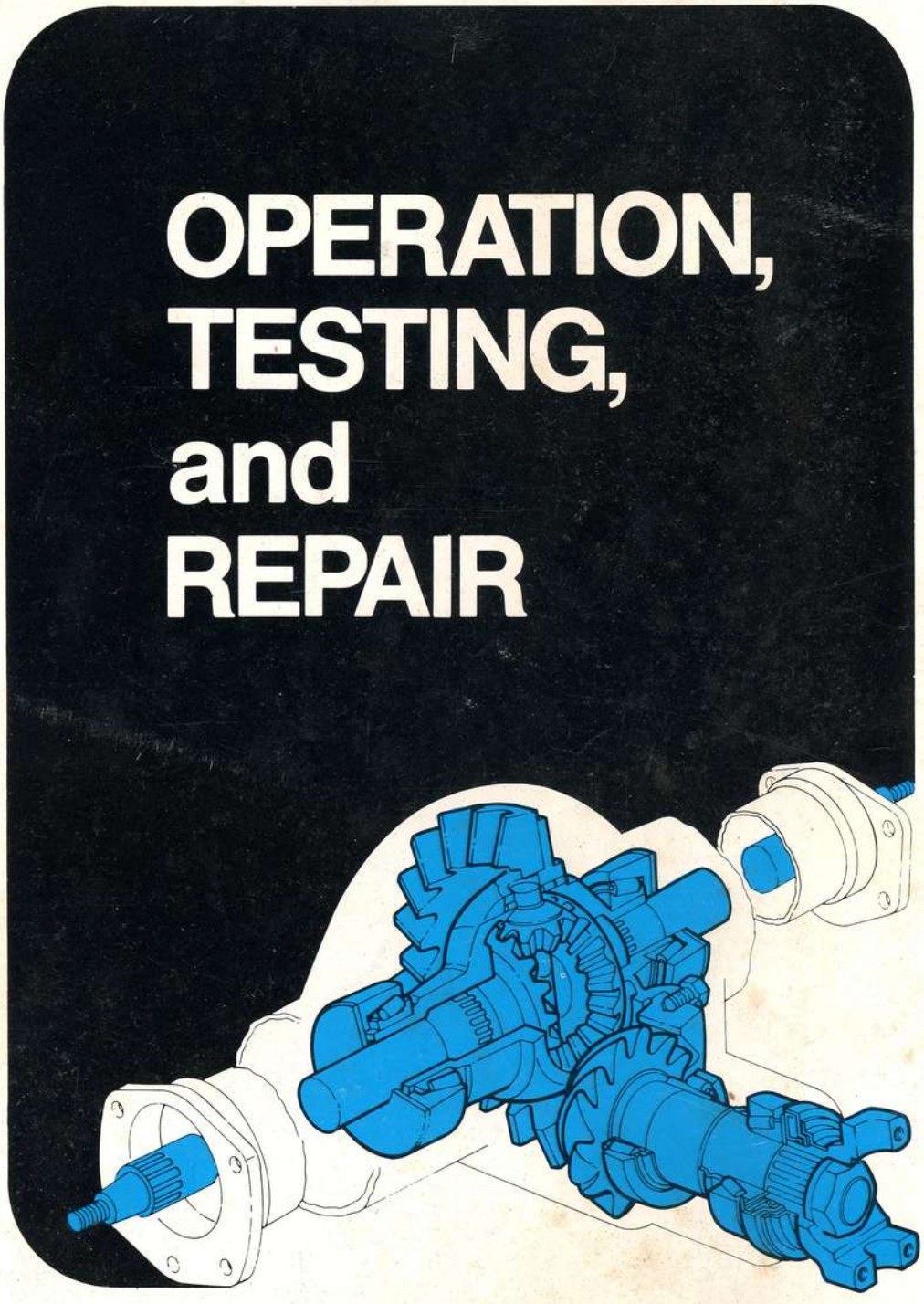
American Motors Sales Corporation

AMC AND JEEP 8¾ REAR AXLE

OPERATION, TESTING, and REPAIR



RELEASE 76-3

FILM REFERENCE BOOK

In-dealership Service Training

AMC AND JEEP 8-7/8 REAR AXLE

OPERATION, TESTING, AND REPAIR

This reference book covers diagnosis and repair procedures for the AMC and Jeep 8⅞ Rear Axle.

Study this book carefully; and keep it for reference when you are called on to service an 8⅞ rear axle. It contains a systematic trouble shooting method that will help you solve problems quickly and accurately. Together with your Technical Service Manual and other AMC and Jeep service publications, it will help you give your customers the best service in the industry.

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INTRODUCTION

8⅞ REAR AXLE CONSTRUCTION

Rear Axle Components

The main components of the AMC and Jeep 8⅞ Rear Axles identified in the illustration are:

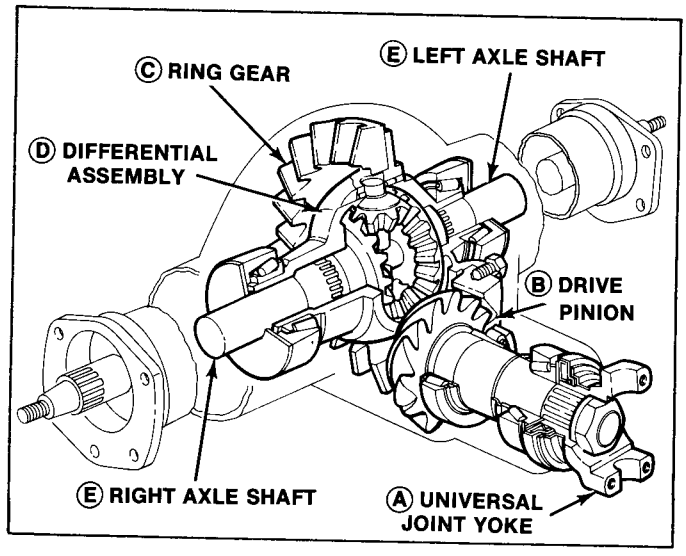
A. **Universal Joint Yoke** — transfers power from the propeller shaft to the drive pinion.

B. **Drive Pinion** — transfers power flow from the rear universal joint yoke to the ring gear.

C. **Ring Gear** — transfers power from the drive pinion to the differential assembly in proportion to the gear ratio of the drive pinion and ring gear.

D. **Differential Assembly** — rotates with the ring gear and allows the axle shafts to rotate at different speeds.

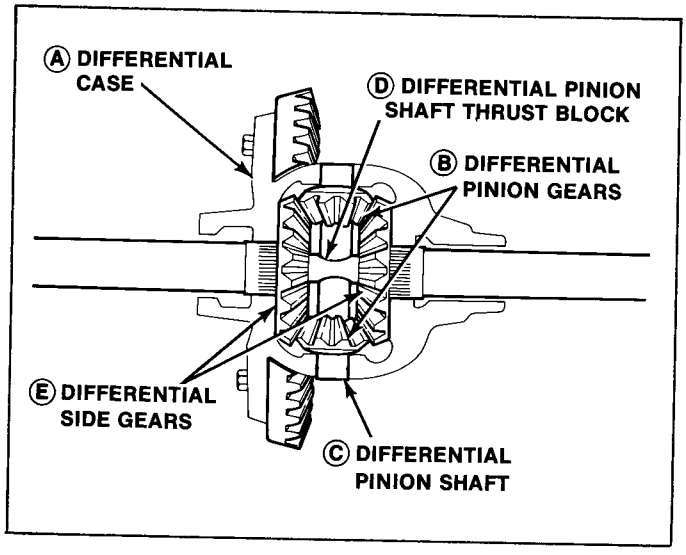
E. **Axle Shafts** — splined to the differential side gears and transfers the power flow to the rear wheels.



Differential Assembly Components

The main components of the differential assembly identified in the illustration are:

A. Differential Case
B. Differential Pinion Gears
C. Differential Pinion Shaft
D. Differential Pinion Shaft Thrust Block
E. Differential Side Gears

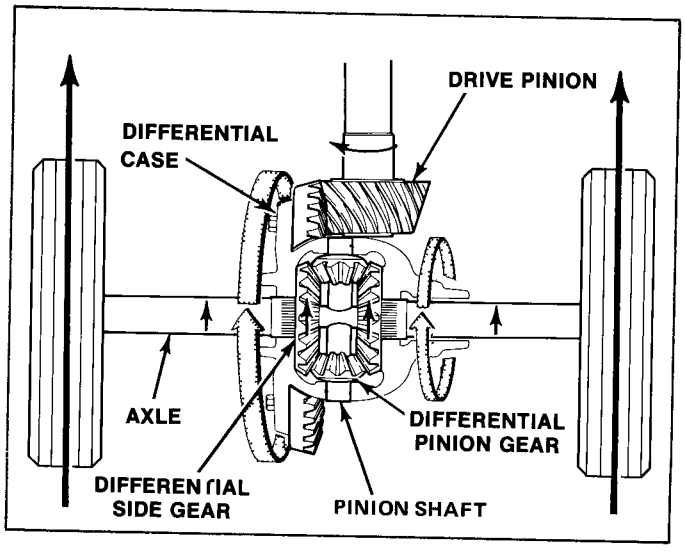


Differential Assembly Operation

The differential is required to compensate for the difference in distances the rear wheels travel when the vehicle turns a corner.

DURING STRAIGHT-AHEAD TRAVEL, the drive pinion turns the ring gear, causing the differential case to rotate. As the differential case rotates, the pinion shaft and differential pinion gears rotate in a circle with the case.

Since the differential side gears mesh with the pinion gears, they also rotate at the same speed as the differential case, causing the rear axle shafts to turn at the same speed.



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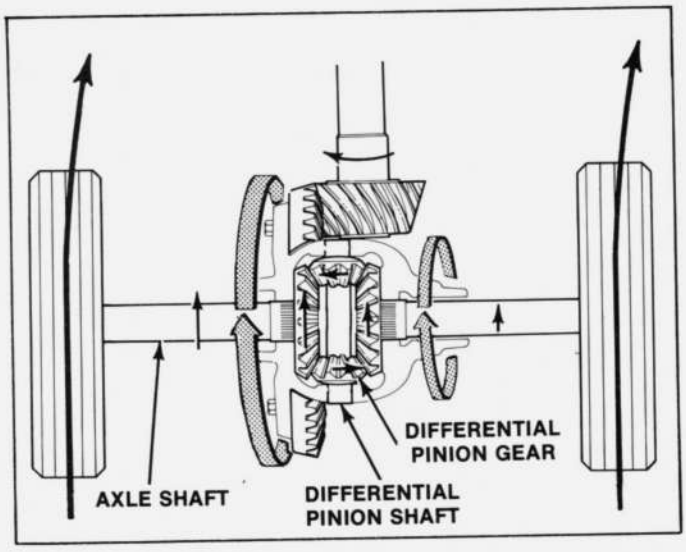
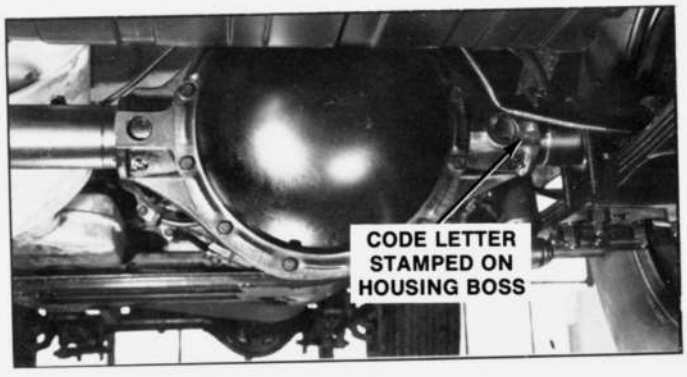


WHEN THE VEHICLE TURNS A CORNER, the outside wheel must travel further than the inside wheel. The drive pinion turns the ring gear and differential case in a circle as before. The differential case turns the differential pinion shaft in its usual circle. But the inner wheel side gear is now turning very slowly so the differential pinions have to rotate on the pinion shaft as they walk around the slower turning differential side gear. As this happens, the pinion gears drive the other side gear at twice their own speed.



AXLE IDENTIFICATION

All 8⅞ axles* will have an identification letter stamped on the axle housing tube boss as shown. This letter identifies the gear ratio of the axle and can be cross-referenced in the chart below.

Axles equipped with a Trak-Lok differential will have a tag attached to one of the housing cover bolts which states that a special lubricant must be used.

AMC AXLE CODES

Letter	Axle Ratio	Pinion/Ring Gear Teeth
A	3.54:1	11/39
B	3.15:1	13/41
C	2.87:1	15/43

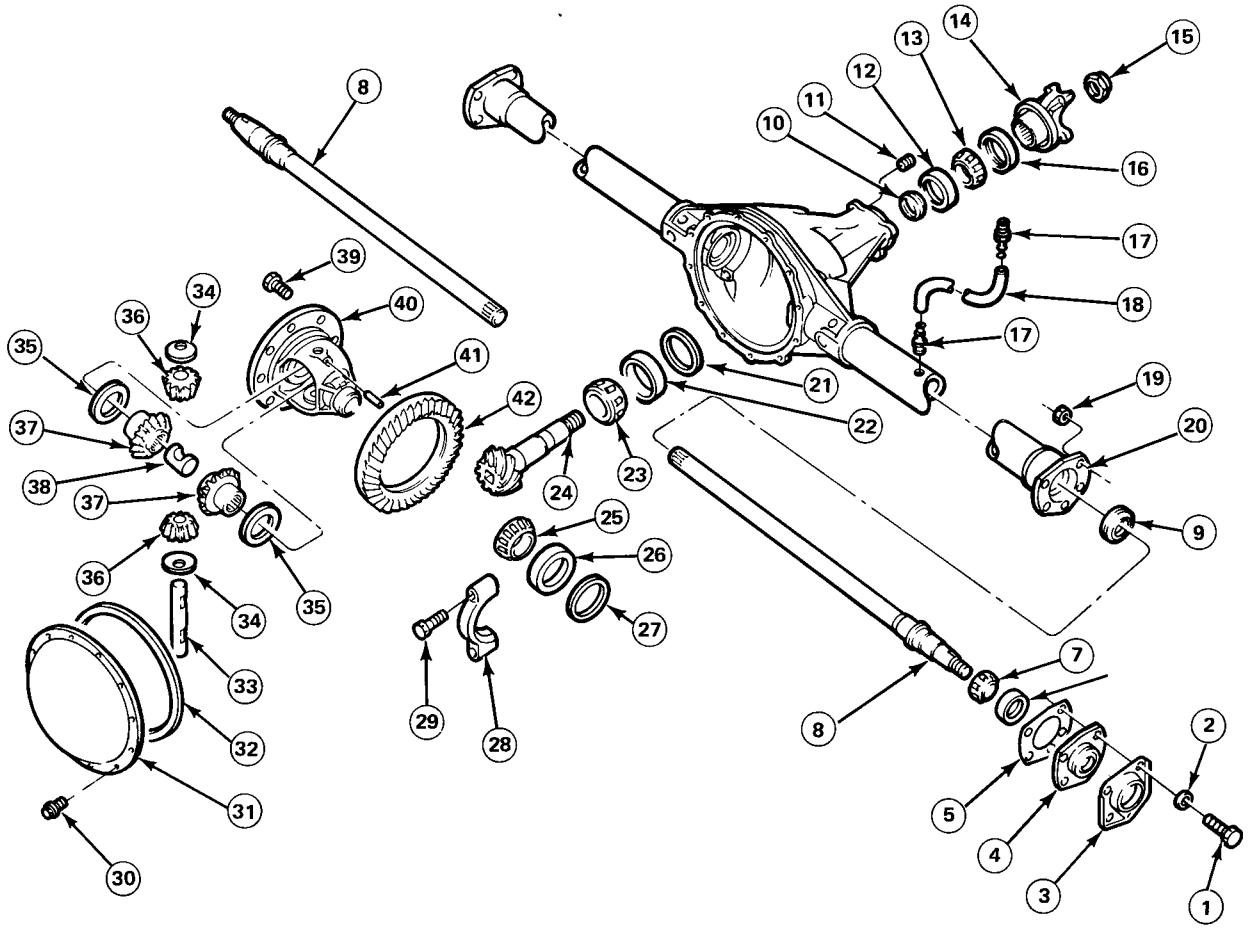
JEEP AXLE CODES

Letter	Axle Ratio	Pinion/Ring Gear Teeth
A	3.54:1	11/39
L	4.09:1	10/41
N (Trak-Lok)	3.54:1	11/39
M (Trak-Lok)	4.09:1	10/41

*Axle size based on outside diameter of ring gear.

INTRODUCTION

8⅞ REAR AXLE EXPLODED VIEW



1. BOLT
2. WASHER
3. AXLE SHAFT OIL SEAL RETAINER
4. AXLE SHAFT OIL SEAL
5. AXLE SHAFT BEARING SHIM
6. AXLE SHAFT BEARING CUP
7. AXLE BEARING
8. AXLE SHAFT
9. AXLE SHAFT INNER OIL SEAL
10. PINION COLLAPSIBLE SPACER
11. FILLER PLUG
12. FRONT PINION BEARING CUP
13. FRONT PINION BEARING
14. UNIVERSAL JOINT YOKE
15. PINION NUT
16. PINION OIL SEAL
17. BREATHER
18. BREATHER HOSE
19. NUT
20. REAR AXLE HOUSING
21. DRIVE PINION DEPTH ADJUSTING SHIM
22. REAR PINION BEARING CUP
23. REAR PINION BEARING
24. DRIVE PINION
25. DIFFERENTIAL BEARING
26. DIFFERENTIAL BEARING CUP
27. DIFFERENTIAL BEARING SHIM
28. DIFFERENTIAL BEARING CAP
29. BOLT
30. BOLT
31. HOUSING COVER
32. HOUSING COVER GASKET
33. DIFFERENTIAL PINION SHAFT
34. DIFFERENTIAL PINION GEAR THRUST WASHER
35. DIFFERENTIAL SIDE GEAR THRUST WASHER
36. DIFFERENTIAL PINION GEAR
37. DIFFERENTIAL SIDE GEAR
38. DIFFERENTIAL PINION SHAFT THRUST BLOCK
39. BOLT
40. DIFFERENTIAL CASE
41. DIFFERENTIAL PINION SHAFT PIN
42. RING GEAR

PRELIMINARY DIAGNOSIS

The actual diagnosis of an axle problem occurs before the teardown. There are a number of steps to go through to be sure the problem is, in fact, an axle problem and to collect specific operating data as clues to what to look for during inspection and teardown.

QUESTIONING THE CUSTOMER

The preliminary diagnosis begins with the service advisor asking the customer the right questions, especially for noise or vibration conditions.

Always ask the customer about:

1. The exact nature of the problem. If it's a noise, what kind? High-pitched, rumble, loud, etc.
2. The driving condition or mode in which the problem occurs.
3. Whether the condition is constant or variable; does a noise increase in pitch with speed, etc.?

This information should be written on the repair order form concisely and completely so the mechanic knows where to start looking for the problem.

ROAD TEST

A road test is a must for any complaint of noise and/or vibration. It is preferable to have the customer demonstrate the problem whenever possible.

Always note the driving mode or operating conditions in which the problem occurs: Drive, Cruise, Coast, or Float. The following chart defines the driving modes if you are not familiar with them. Also, be sure you indicate the miles-per-hour range at which the noise or vibration occurs.

Indicate all road test information clearly on the repair order form so you have an accurate account of the problem.

Axle Drive Modes

Mode	Condition
Drive	Accelerating the vehicle; a definite throttle application to demand torque.
Cruise	Maintaining a constant speed with the throttle applied.
Coast	Decelerating with throttle released.
Float	Controlled deceleration; releasing the throttle continually to prevent either braking or accelerating torque from the engine.

PRELIMINARY DIAGNOSIS

Vibration

Vibration is seldom caused by an axle malfunction. It is more likely caused by an improper universal joint angle, excessive propeller shaft runout, or by the tires. You should also be aware that all vehicles have some vibration and it may be necessary to decide if the vibration is considered to be acceptable when compared to other vehicles.

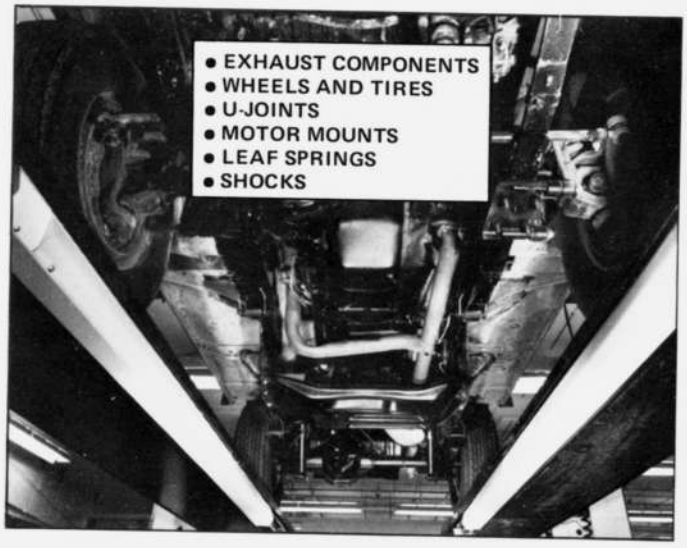
Since some types of tire tread wear or tread patterns may cause objectionable noises, drive on various types of road surfaces and listen for a change in the noise. If the noise varies with the type of surface, the tires may be the cause.

Non-Axle Noise

There are several conditions that sound similar to axle noise and have to be considered during the preliminary diagnosis. The most common are caused by exhaust system components, wheels and tires, U-joints, motor mounts, leaf springs, and the shock absorbers.

1. Exhaust systems always make some noise. During some driving conditions, the pitch of the exhaust may sound like gear whine.
2. Wheels and tires, especially snow tires, can have a high-pitched tread whine similar to gear noise. Radial tires, to some degree, have this characteristic.
3. U-joints, leaf springs, shocks, and motor mounts can also generate noises similar to those caused by rear axle gears or bearings.

All of these items should be inspected after the road test by putting the vehicle on a hoist. Never attempt an axle teardown before all other possible causes are inspected.



Axle Noise

The types of noise you are most likely to encounter in the rear axle and a brief description of them are:

GEAR NOISE is a howling or whining of the ring gear and drive pinion due to improper gear mesh, gear damage, or improper bearing preload. It can occur at various speeds and driving conditions; or it can be continuous.

CHUCKLE is a rattling noise that occurs while decelerating and usually can be heard all the way to a stop. The frequency of the noise varies with the speed of the vehicle. Chuckle is usually caused by a worn differential gear, or tooth damage to the ring gear or drive pinion.

KNOCK is very similar to chuckle, though it may be louder and can occur on acceleration or deceleration.

BEARING WHINE is a high-pitched sound very much like a whistle. Bearing noise will occur at all driving speeds. It may be caused by a damaged drive pinion bearing, or the wheel bearings will make a similar noise if they run completely dry.

BEARING RUMBLE sounds like marbles being tumbled inside a metal container, and may be caused by a damaged wheel bearing. Bearing rumble is lower in pitch than bearing whine because wheel bearings rotate at a much slower speed than the propeller shaft.

DIAGNOSIS AND PROBLEM ANALYSIS

The purpose of the preliminary diagnosis was to verify that there is a condition in the axle that requires correction. Now, it is necessary during the teardown to identify and correct the problem.

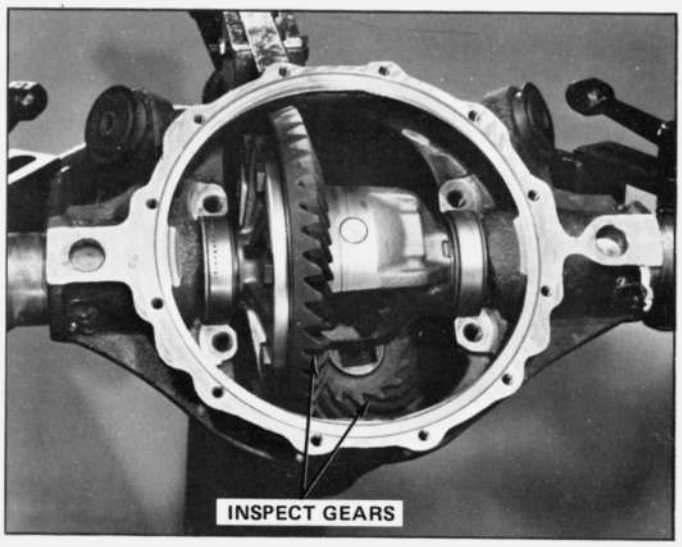
In this section, we will use the road test and preliminary diagnosis data to make a complete diagnosis and correction of the condition.

GEAR NOISE ANALYSIS

When you begin an axle teardown to diagnose and correct gear noise, it is assumed you have completed the on-hoist checks for non-axle noise and have eliminated the tires, trim items, etc., as possible causes.

Inspect Ring and Pinion Gears

To check the ring gear and drive pinion, remove as much lubricant as possible from the gears with a suitable solvent. Wipe the gears dry and inspect the gear teeth for wear, cracks or chipping.



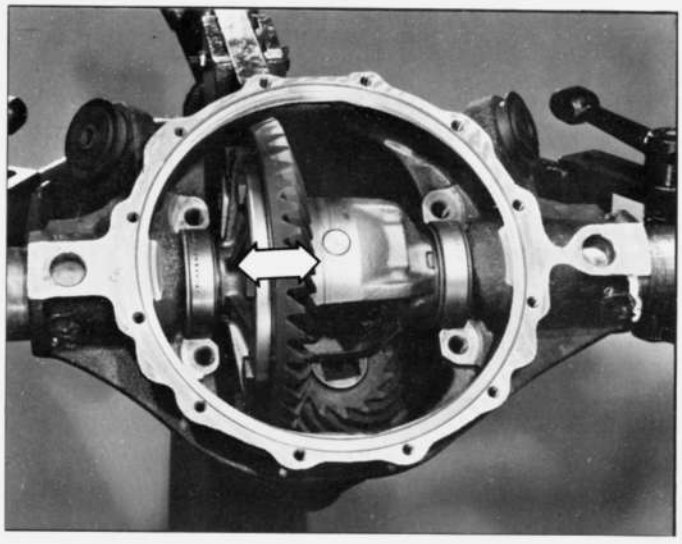
If the ring or pinion gear is badly damaged, it must be replaced. Remember, the ring gear and drive pinion are matched at the factory and must be replaced as a set. Also, if any chipping is noticed on the gears, the housing and differential assembly must be thoroughly cleaned to remove particles that could cause further damage.

Inspect Differential Gears

Rotate the differential assembly and inspect the differential pinion gears, side gears, and the pinion shaft. If any cracks or damage is found, replace the damaged component.

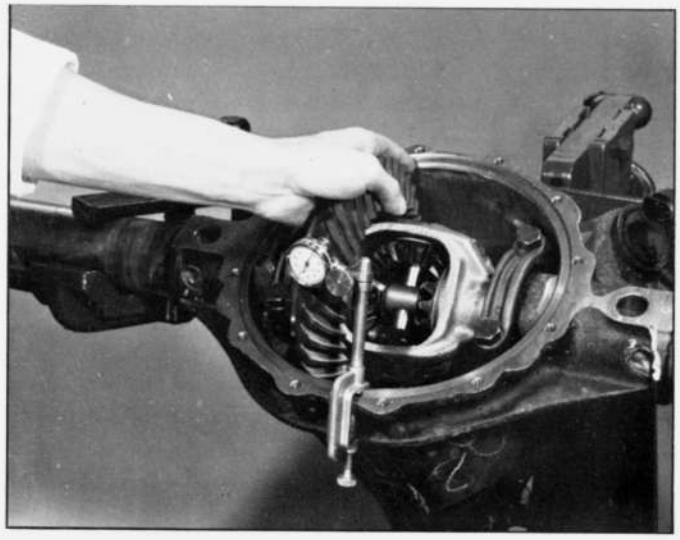
Check Differential Bearing Side Play

Next, try to move the differential case assembly laterally to see if there is any side play. Side play usually indicates that the differential bearings are worn. The cause is usually an improper preload adjustment.



Check Gear Set Backlash

Backlash is the amount of play between the teeth of the ring gear and teeth of the drive pinion. Attach a dial indicator to the housing, so the plunger of the dial contacts the drive side of a tooth on the ring gear as shown. Rock the ring gear and note the reading on the dial. It should be .005-.009 inch, with .008 desired. Always check the backlash at two or three different points around the gear teeth. If the backlash is out of specifications, gear noise will usually be noticed due to improper mesh between the ring gear and drive pinion.

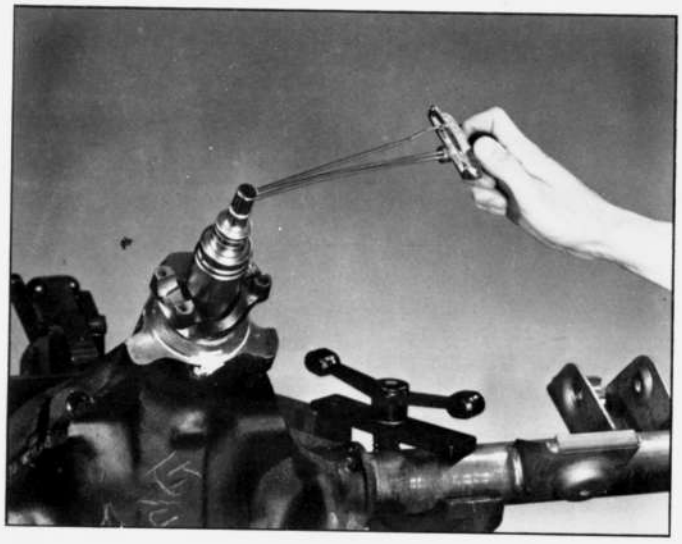


DIAGNOSIS AND PROBLEM ANALYSIS

Check Bearing Preload

Bearing preload is necessary to compensate for expansion due to heat and loads during operation. Without preload, gear noise will be noticed. Both the pinion bearing and differential side bearing preload must be checked to be sure the gears maintain proper contact.

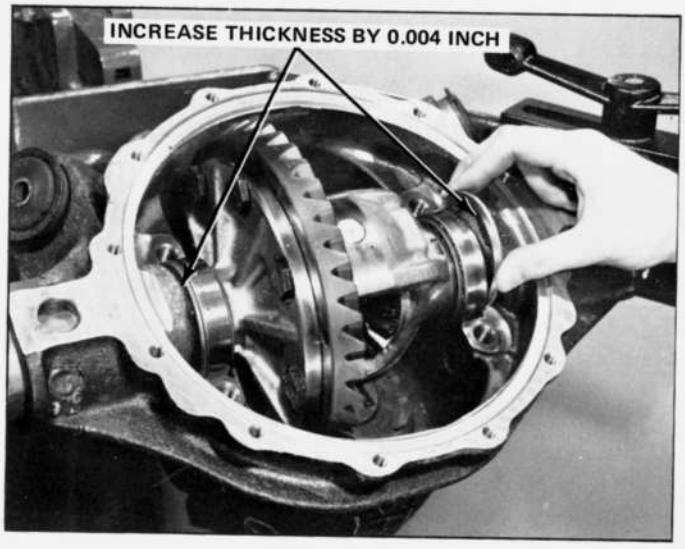
PINION BEARING PRELOAD can be checked by measuring the torque required to turn the pinion with an inch-pound torque wrench on the pinion nut. This reading should be 17-28 inch pounds for the 8⅞ axle if preload is set properly.



NOTE — Differential assembly must be removed to check pinion bearing preload.

Over-preload of the pinion bearings will result in early failure, while under-preload will result in end play, excessive gear wear, and noise. Also, if you overcompress the collapsible spacer while tightening the pinion nut to set the preload, it must be replaced. The purpose of the collapsible spacer is to help maintain the preload.

DIFFERENTIAL BEARING PRELOAD for the 8⅞ rear axle is 0.008 inch. After the side play has been eliminated by selecting the proper shim thickness for each differential side bearing, the bearings are preloaded by adding 0.004 inch thickness to each side shim. This will help maintain proper mesh between the ring gear and drive pinion teeth.



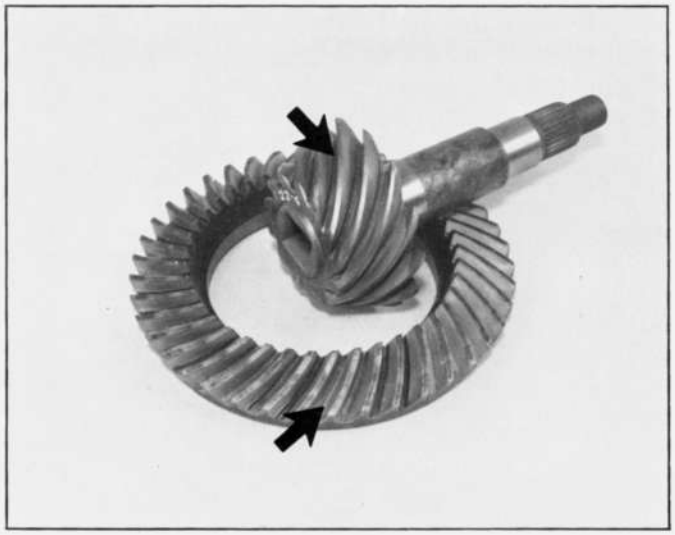
DIAGNOSIS AND PROBLEM ANALYSIS

ANALYSIS OF OTHER NOISES

The other categories of rear axle noise, described in the Preliminary Diagnosis section, have specific causes that can be diagnosed before the actual teardown. The initial clues are the type of noise noticed during the road test and driving mode in which it occurred.

Chuckle Analysis and Correction

When a chuckle-type noise is heard in the coast driving mode, it is usually caused by a worn differential gear, or by damage on the coast side of a tooth on the ring gear or drive pinion.



A small ridge or nick on the edge of a tooth is enough to cause the noise. If any gear damage is noticed during the inspection, replace the gear. In the case of damage to the ring gear or drive pinion teeth, replace the gear set.

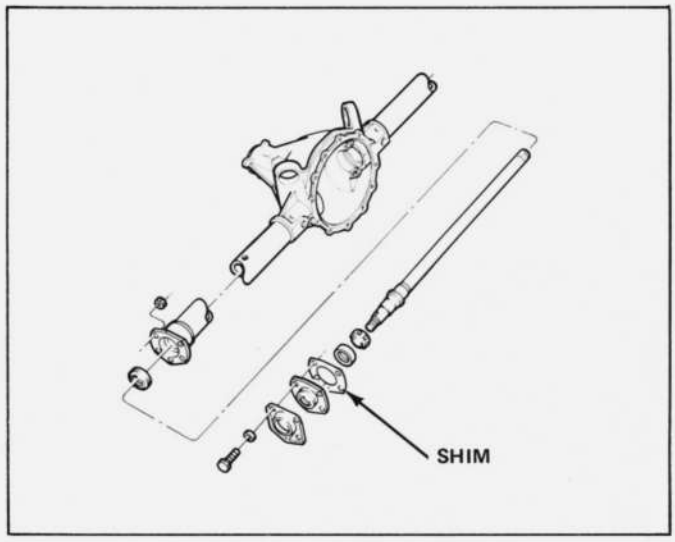
Knock Analysis and Correction

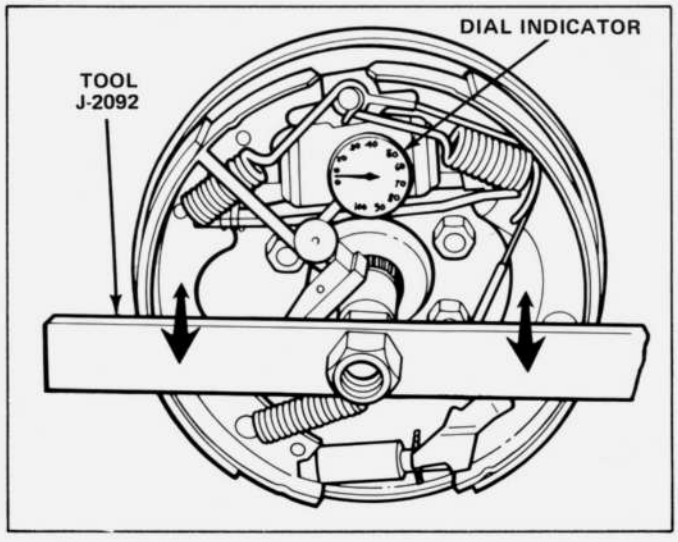
Knock can occur in all driving conditions and can have several different causes. In most cases, you will discover one of the following conditions as the cause.

AXLE SHAFT END PLAY

Excessive end play in the axle shafts is a common cause of knock. End play for the 8⅞ rear axle should be 0.004-0.008 inch, with 0.006 desired. Axle shaft end play is adjusted at the left axle shaft only.

To check the end play, strike each axle shaft with a soft hammer to seat the bearing cups against the support plate. Attach the axle shaft end play tool to the end of the left axle shaft. Mount a dial indicator on the support plate and note the reading while using a push-pull motion on the axle shaft.





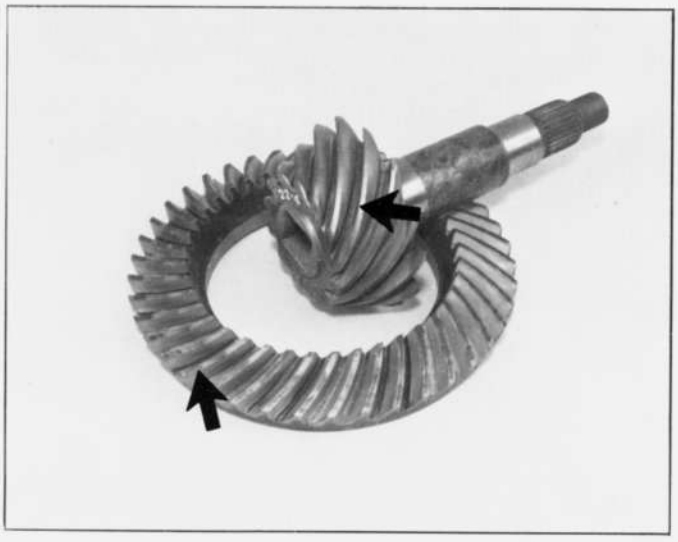
DIAGNOSIS AND PROBLEM ANALYSIS

RING GEAR BOLTS

Occasionally a ring gear attaching bolt will back out slightly and knock against the housing wall. Proper tightening of the bolts will correct this condition.

GEAR TOOTH DAMAGE

Knock is also characteristic of damage to gear teeth on the drive side. This is corrected by replacing the gear set. Remember, the ring gear and drive pinion are matched at the factory and must be replaced as a set.



LOOSE DIFFERENTIAL GEARS

A knocking or clunking noise at a low speed in the coast mode may be caused by loose-fitting differential gears. This condition can be diagnosed during the road test by applying the brakes lightly which usually reduces the noise.

Refer to the 1976 AMC or Jeep Technical Service Manual for disassembly and assembly procedures for the differential.

BEARING NOISE ANALYSIS

As already mentioned in the Preliminary Diagnosis section, rear axle bearing noise is usually constant, and the pitch increases as the vehicle speed increases.

Since the drive pinion rotates faster than the ring gear, the pinion bearings produce a higher pitched sound than the differential bearings. The drive pinion bearings are usually heard at vehicle speeds of 20-30 mph.

The differential side bearings produce a noise lower in pitch because they are turning at the same speed as the wheels. Differential side bearing noise will not vary when the vehicle is turning, or when the brakes are gently applied.

Bearing noise is caused by scoring or damage to the bearing rollers or cups. Remember, the low-pitched rumble from a bad wheel bearing is similar to tire noise. Be sure you don't replace bearings unnecessarily. Damage to bearings or cups is usually visible during axle teardown.

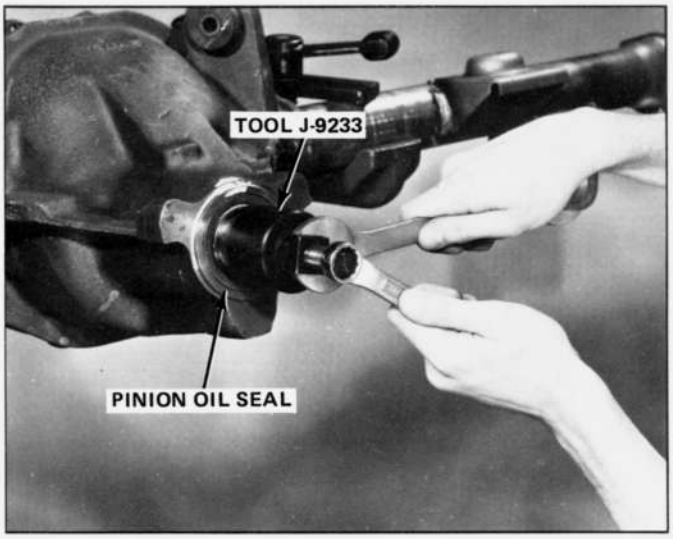
DIAGNOSIS AND PROBLEM ANALYSIS

ANALYSIS OF AXLE LEAKAGE

Many rear axle leaks can be corrected without a complete axle teardown. It is important, though, to clean the area enough to identify the exact source of the leak before attempting any repair procedure.

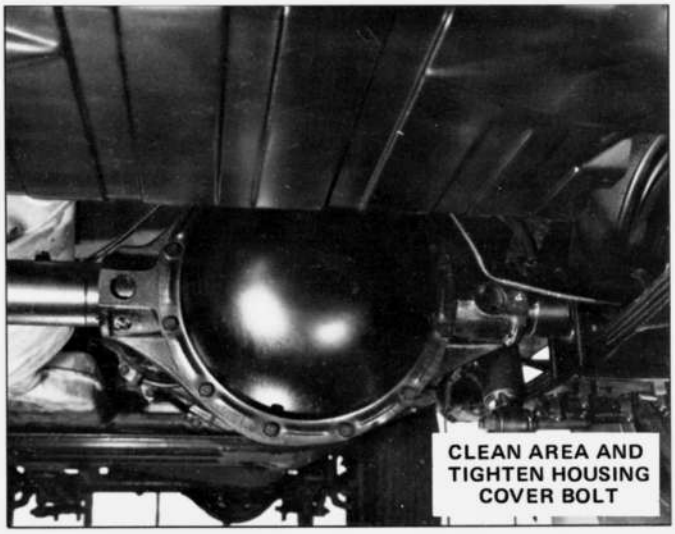
Pinion Oil Seal

Pinion oil seal leaks can be caused by improper seal installation. Inspect the seal for tears or cuts. Any damage to the seal lip will cause distortion and allow leakage around the outer edge of the seal.



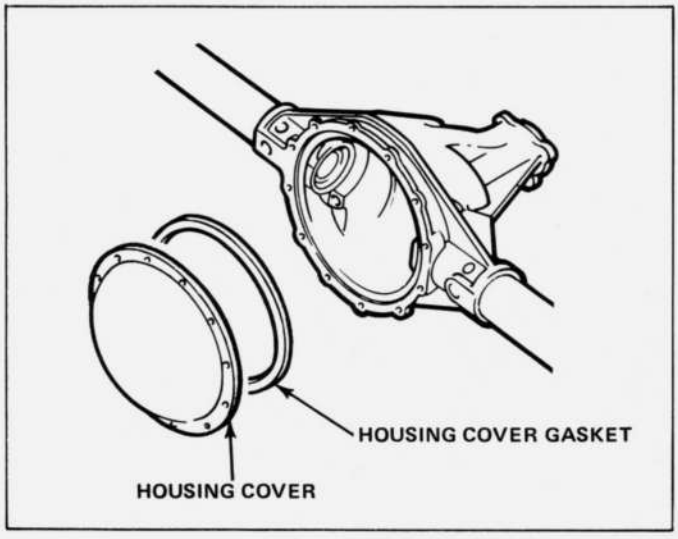
Housing Cover Bolt(s)

If leakage appears around a housing cover bolt, clean the area thoroughly and tighten the bolt to specifications. Be sure to drive the vehicle before assuming that the leak is corrected. The cover gasket could be the cause.



Housing Cover Gasket

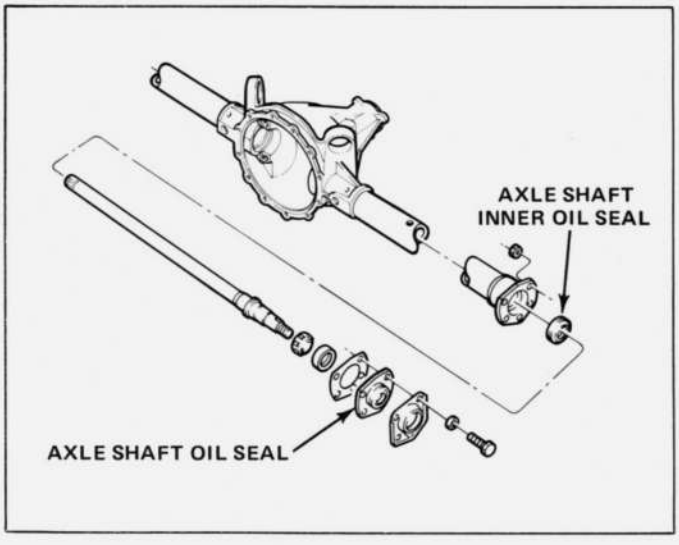
If the housing cover bolts are tightened to specifications and the leak is not corrected, remove the housing cover and inspect the gasket. The gasket material is adequate to properly seal the mating surfaces, if they are undamaged. Inspect the face of the rear axle housing and housing cover for pits or damage before installing a new gasket.



Axle Shaft Oil Seals

Axle shaft seals are susceptible to the same kinds of damage as the pinion oil seal if it is improperly installed. Always clean the seal bore before the seal is installed; and handle the seal carefully to avoid cutting or tearing it.

It is especially important that the inner oil seal is not damaged during removal or installation of the axle shaft or rear axle lubricant leaks can result.

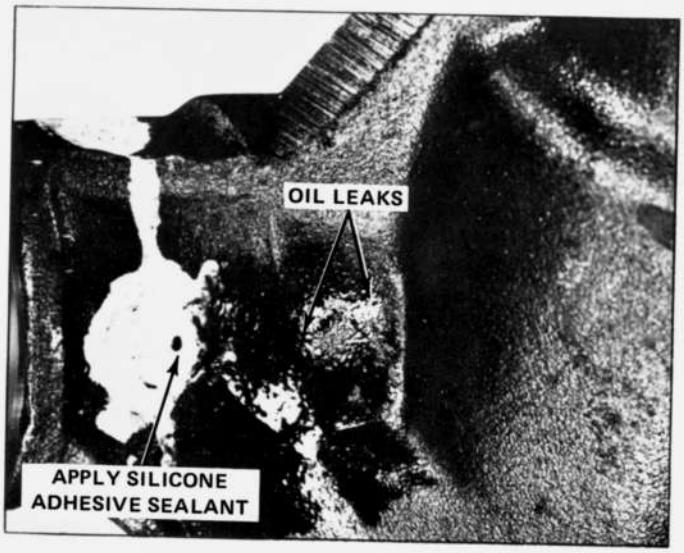


DIAGNOSIS AND PROBLEM ANALYSIS

Casting Porosity

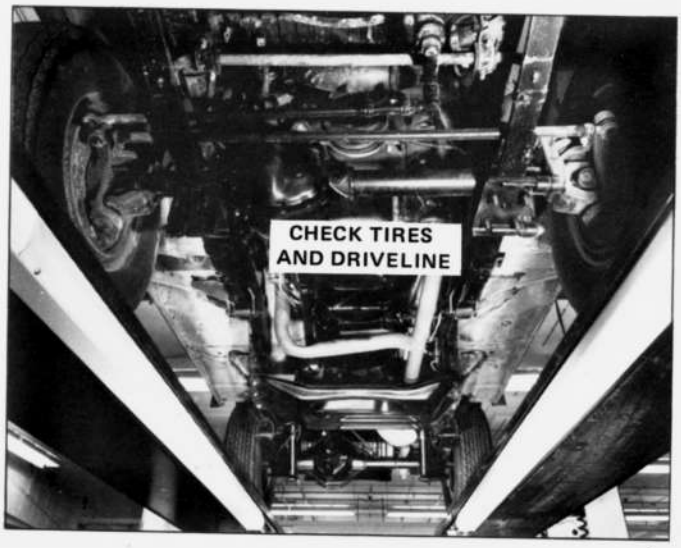
Sometimes you may find lubricant leaking through the housing. Minor rear axle housing leaks may result from pinholes in the axle housing casting or welds. Use the following procedure to repair these leaks.

1. Clean the leak area with AMC Fabric Cleaner or Tar and Road Oil Remover, making sure to remove all undercoating, casting sealer and oil.
2. Dry the area thoroughly with compressed air.
3. Apply silicone adhesive sealant to the leak area using sufficient pressure to force sealant into the pinholes.



VIBRATION ANALYSIS AND CORRECTION

Most vibration problems in the rear end are caused by the tires or the driveline. Vibration is seldom caused by the rear axle. Do not attempt an axle teardown to repair a vibration problem until you have inspected the driveline and tires, or unless you have a clear reason to suspect the rear axle.



Tires

Accurate balancing, proper inflation, or tire rotation will often correct a vibration problem. Also, be sure all of the tires are the same size, type, and have the same load-carrying capacity.

Universal Joint Angle

Universal joints operate at an angle, so the rotation of the universal joint yoke being driven will fluctuate even though the speed of the driving yoke remains constant.

This change in rotation speed is proportional to the operating angle of the universal joint. The greater the angle, the greater the fluctuation. Thus, the operating angles of the two universal joints, on the propeller shaft, must be controlled to minimize driveline vibration.

If you suspect the universal joint angle or propeller shaft angle as the cause of the vibration, refer to the Technical Service Manual for testing and repair procedures.

Universal Joint Damage

In addition to vibration, damage to a universal joint can cause a rumble similar to that caused by gear noise.

Universal joint damage can be caused by overtightening of U-bolts on a previous repair. Another possible cause is seal leakage. Dirt and water may have entered and washed out, or contaminated, the lubricant.

Propeller Shaft Runout

Runout at either end of the propeller shaft is an infrequent but possible cause of vibration. Runout should be measured at both ends of the propeller shaft. Replace the propeller shaft if runout is excessive at the front end. If the front runout is acceptable, measure runout at the rear of the shaft.

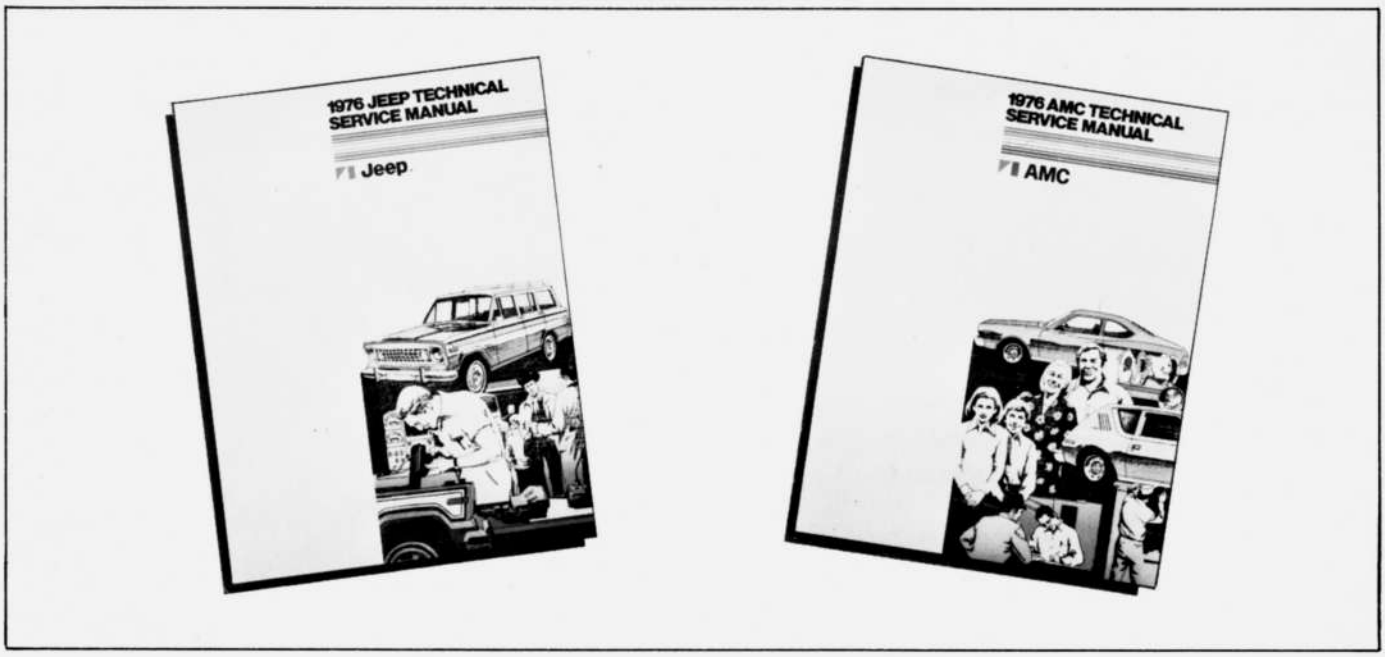
Be sure to clean any paint or undercoating from the propeller shaft around those areas where runout is measured.

Refer to the Technical Service Manual for testing and repair procedures on propeller shaft runout.

ASSEMBLY TIPS

In this section, we cover assembly tips and the use of special service tools used during rear axle repair. Also included are some special cautions to note that bring an extra touch of attention to assembly detail.

Remember to refer to the AMC or Jeep Technical Service Manual for specific assembly and disassembly procedures. Only highlights are covered in this section.

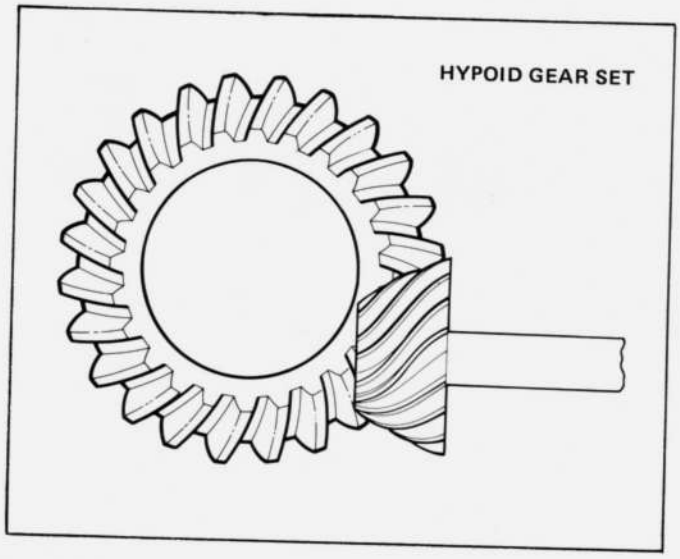


ASSEMBLY TIPS

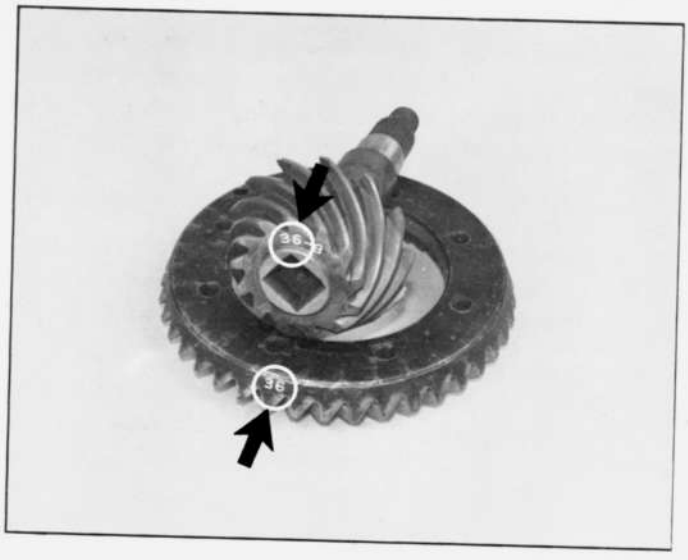
RING AND PINION GEAR SET

The hypoid type ring gear and drive pinion set is used in AMC and Jeep rear axles. This design places the drive pinion below the centerline of the ring gear, which results in lower floor tunnels and lower noise levels.

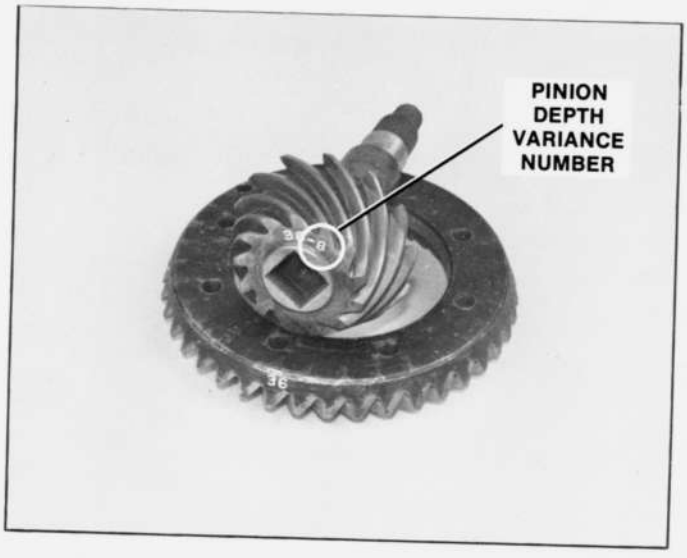
These gears are matched together at the factory and must be replaced as a set if scoring, cracks, or other damage is found during axle teardown.



When installing a new gear set and during axle inspection, always check the numbers etched on the gears. This one or two digit number, appearing on both gears, identifies them as being a matched set. The ring gear will have one number and the drive pinion two numbers, separated by a plus (+) or minus (-) sign. The first number must be the same on both gears. If they are not the same DO NOT USE THE GEARS, THEY ARE NOT A MATCHED SET.

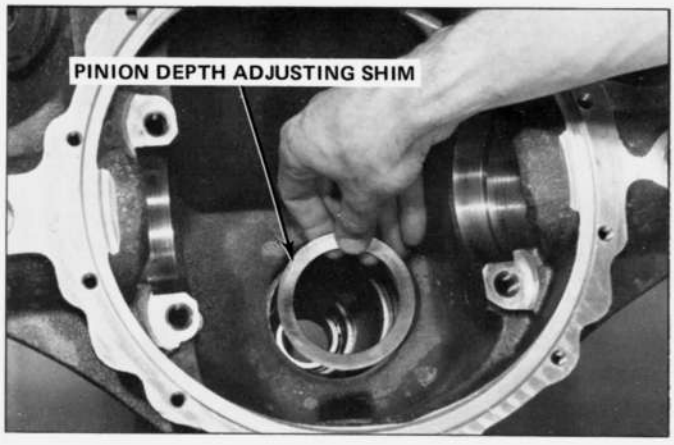


The plus (+) or minus (-) number on the drive pinion indicates the pinion position, in relation to the centerline of the axle shafts, where tooth contact was best and gear operation quietest when the gears were matched at the factory. This number is the pinion depth variance number and is used when figuring the proper pinion depth.



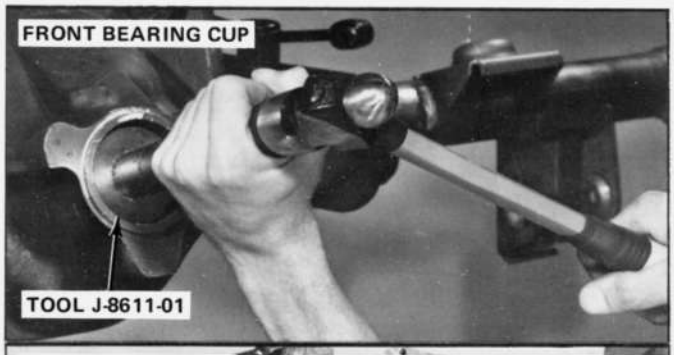
ASSEMBLY TIPS

DRIVE PINION GEAR INSTALLATION

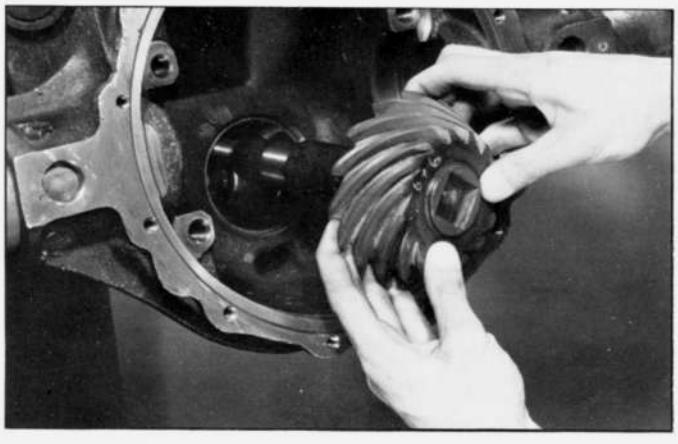


When installing a new drive pinion, use a .100 inch shim as a starting point to make the arithmetic easier.

Always install the shim with the chamfered edge facing the bottom of the bearing cup bore. If the shim is not chamfered, be sure to center it in the bore to prevent misalignment of the bearing cup during installation.



Install the front and rear bearing cups using the driver handle and proper cup installer tool to prevent damage and properly seat the cups in the housing bores.

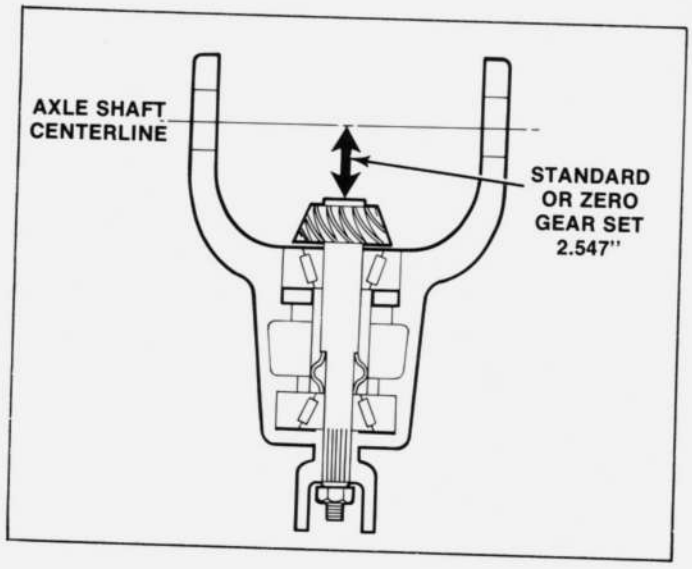


Press the rear bearing onto the drive pinion and install the drive pinion, front bearing and rear yoke. Do not install the new pinion nut or the collapsible spacer at this time. The drive pinion may have to be removed to change the shim thickness when the desired pinion depth is set.

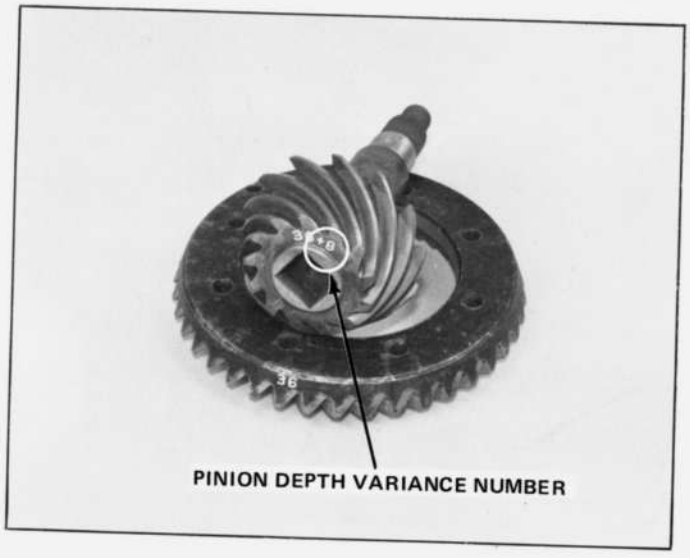
ASSEMBLY TIPS

PINION GEAR DEPTH

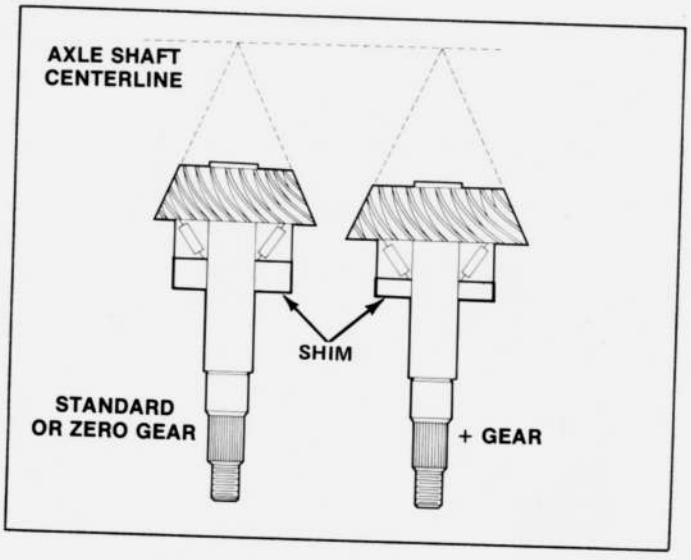
Pinion gear depth is the distance from the rear face of the drive pinion to the centerline of the axle shafts. This distance is 2.547 inches for a "standard" or "zero" gear set. That is, a gear without a plus (+) or minus (-) pinion depth variance number on it.



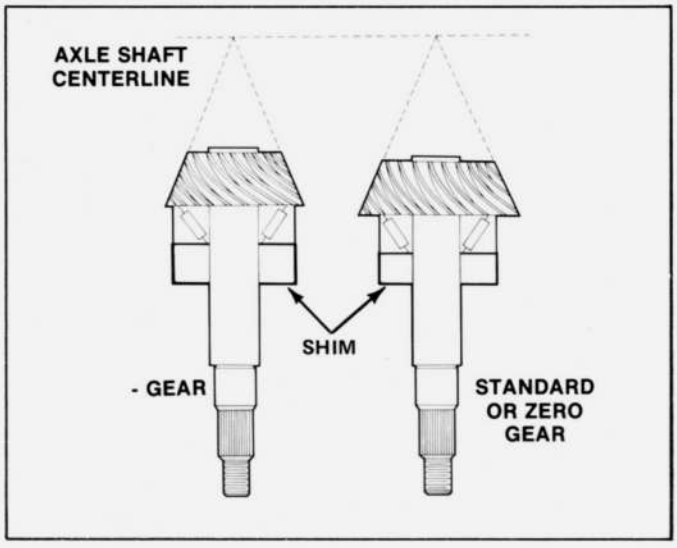
This plus (+) or minus (-) pinion depth variance number indicates the amount, in thousandths of an inch, the gear varied from the "standard" distance for the 8⅞ rear axle of 2.547 inches. For a drive pinion without a plus or minus number etched on it, the desired pinion depth would be 2.547 inches.



When a drive pinion is marked with a plus (+) number, it means the gear will need a shim thinner than that used for the "standard" or "zero" gear. This is because a plus (+) gear indicates it was manufactured larger than the "standard" or "zero" gear and will have to be positioned further from the centerline of the axle shafts than the "standard" gear for the proper pinion depth.

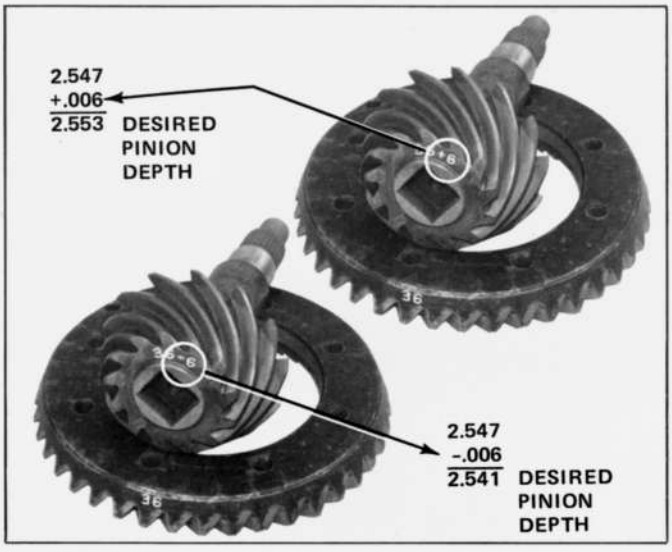


ASSEMBLY TIPS



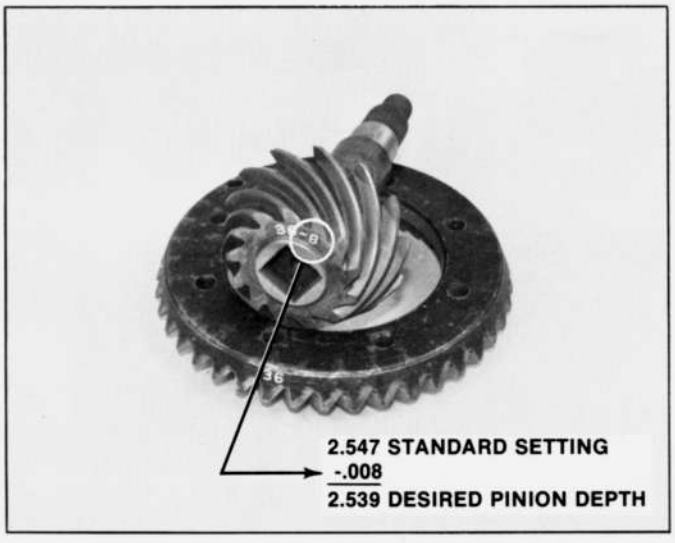
A drive pinion marked with a minus (-) number means the gear was manufactured smaller than the "standard" and will need a shim thicker than that used for the "standard" gear.

NOTE — Service replacement gear sets marked plus (+) or minus (-) 9 or more should not be used. Return any sets with these markings to your Zone Parts Distribution Center.



To figure the proper pinion depth for a plus (+) gear, add the plus (+) number, in thousandths of an inch, on the drive pinion to the standard setting of 2.547.

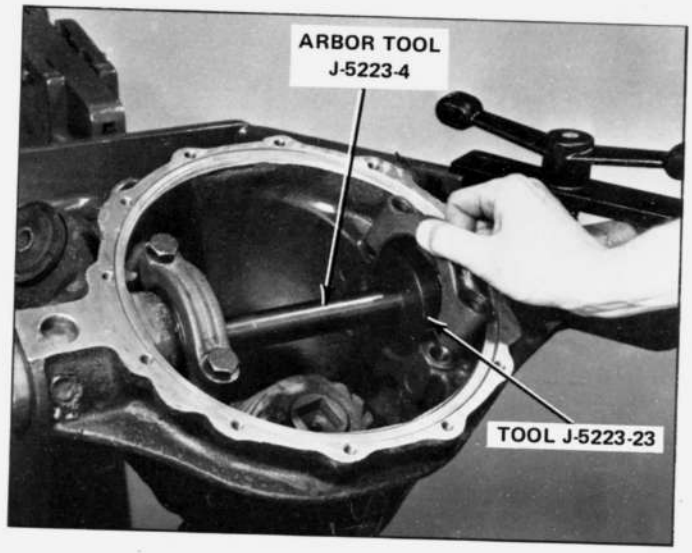
For a minus (-) gear, subtract the minus (-) number from the standard setting. The answer will give you the desired pinion depth for the gear being used.



We will be using 2.539 inches as our desired pinion depth for the procedures that follow. Study the illustration to be sure you understand how to figure the desired pinion depth.

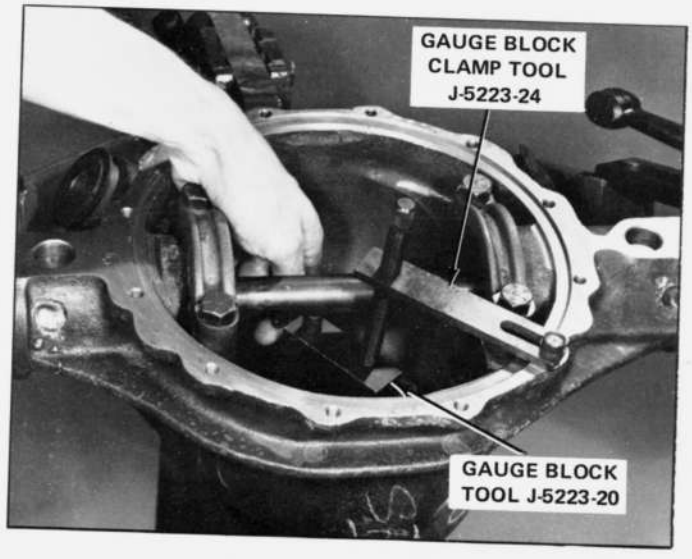
ASSEMBLY TIPS

After figuring the desired pinion depth, record the number (2.539 inches in this case) for reference. Then, position the special 8⅞ axle arbor tool squarely in the housing bores and install the bearing caps and retaining bolts.



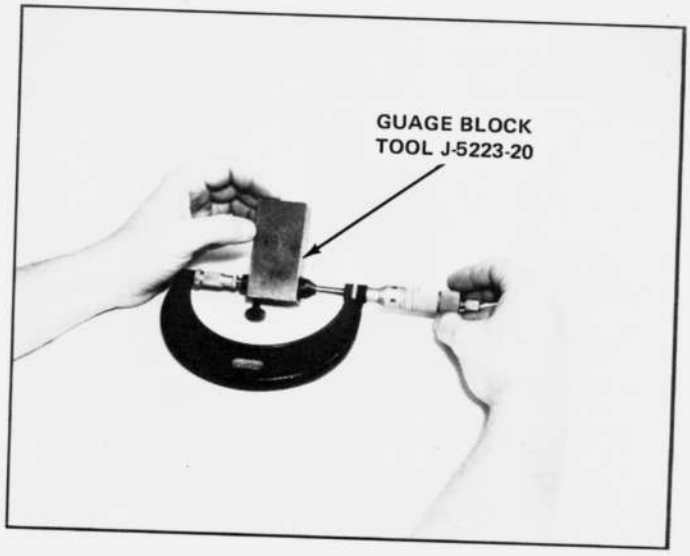
Position the gauge block tool on the rear face of the drive pinion with the spring loaded plunger at the center of the arbor shaft. Be careful not to allow the tool to touch the drive pinion teeth. Secure the gauge block using the gauge block clamp.

Loosen the thumbscrew and allow the spring loaded plunger to contact the arbor at the center of the shaft. Now tighten the thumbscrew to lock the plunger in position.

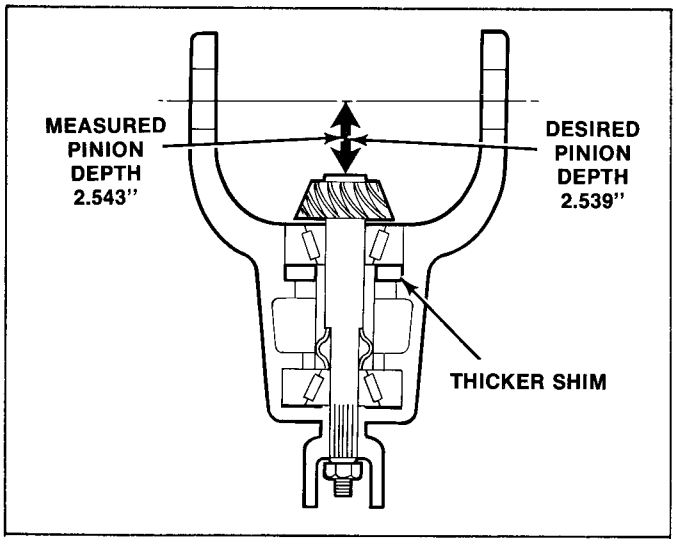


Loosen the clamp and remove the gauge block. Using a micrometer, measure the distance from the base of the gauge block to the tip of the plunger. This measurement is the actual pinion depth of the drive pinion as it sits in the housing.

NOTE — It is a good practice to turn the drive pinion and take two or three readings using the same procedure. Average the readings and use that number to eliminate error.

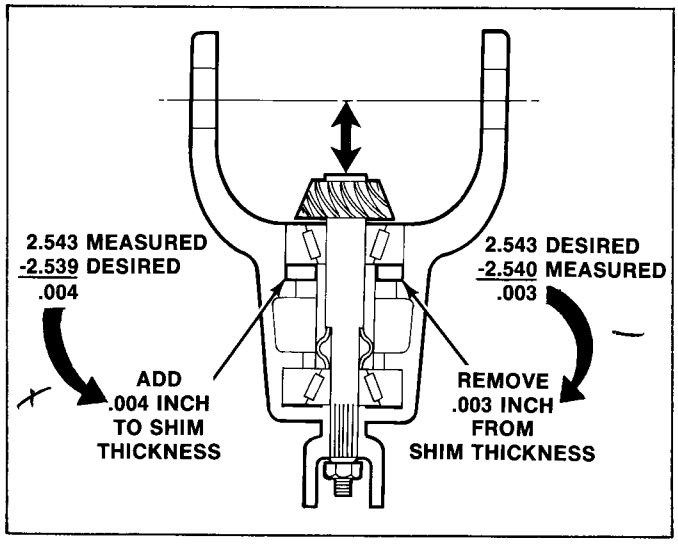


ASSEMBLY TIPS



Let's say our measured pinion depth in this example is 2.543 inches. The desired pinion depth as recorded earlier was 2.539 inches. The measured pinion depth is larger than the desired pinion depth so the shim will have to be thicker to raise the drive pinion up to the desired depth of 2.539 inches.

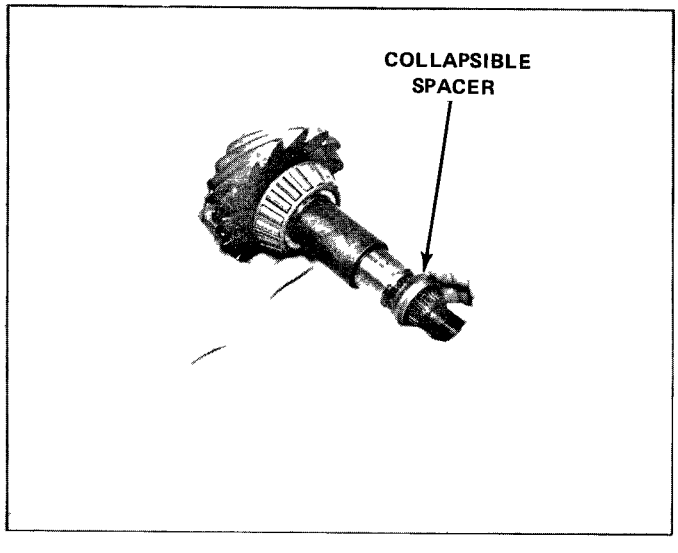
Here is a good way to remember what to do to the shim thickness. If the **measured** pinion depth is **larger than** the **desired** depth, the **shim** will have to be **thicker**. If the **measured** pinion depth is **smaller than** the **desired** pinion depth, the **shim** will have to be **thinner.**



You can remove the drive pinion assembly now and install the proper thickness shim.

If the shim has to be thicker, add the difference between the larger and smaller number, in thousandths of an inch, to the shim thickness.

If the shim should be thinner, subtract the difference between the larger and smaller number, in thousandths of an inch, from the shim thickness.



Now, when you install the drive pinion and pinion bearings, install the new collapsible spacer and new pinion nut.

Then, set the bearing preload by tightening the nut until the torque required to turn the drive pinion is 17-28 inch-pounds as measured with a torque wrench.

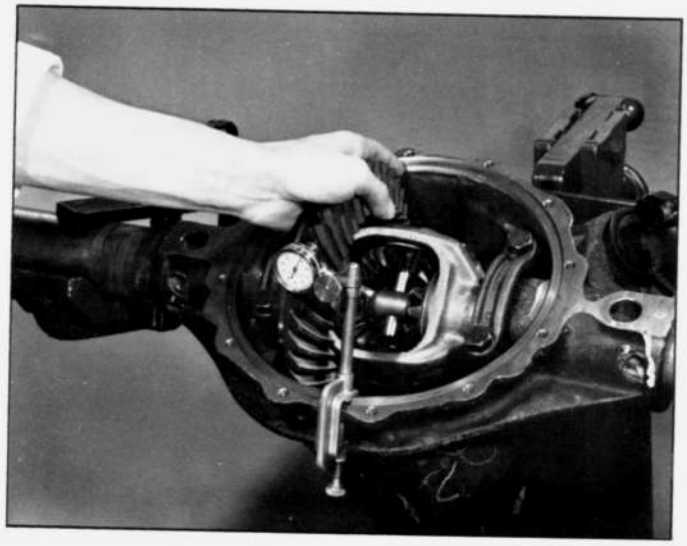
NOTE — Do not over-tighten the pinion nut when setting the preload. This will over-compress the collapsible spacer. If the spacer is over-compressed, it must be replaced.

ASSEMBLY TIPS

RING AND PINION GEAR BACKLASH

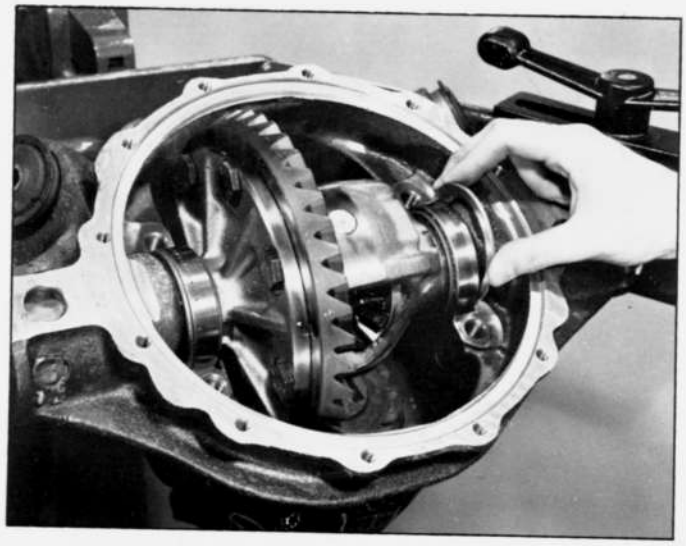
Once the differential assembly is installed in the axle housing and the differential bearing side play eliminated, check the ring gear and drive pinion backlash by attaching a dial indicator from the housing to the drive side of a ring gear tooth at a right angle as shown. Move the ring gear enough to note the total play between the ring gear teeth and teeth on the drive pinion as registered on the dial. A reading of .005-.008 inch is within specifications, with .008 desired.

NOTE — It is a good practice to check the backlash at two or three different areas around the ring gear.



Backlash is increased by installing a thinner shim on the ring gear side and a thicker shim on the opposite side.

To decrease backlash, reverse the procedure but never change the total thickness of shims. That is, if you remove .002 inch thickness from one side shim, you must add the .002 inch to the thickness of the shim on the other side.

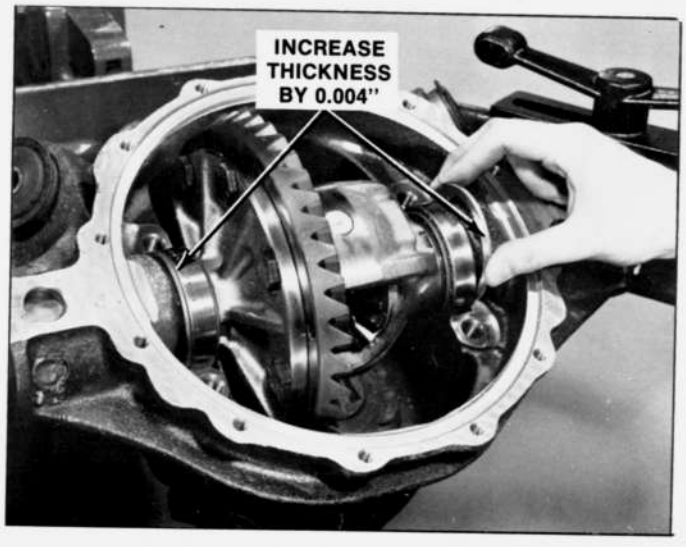


DIFFERENTIAL BEARING PRELOAD

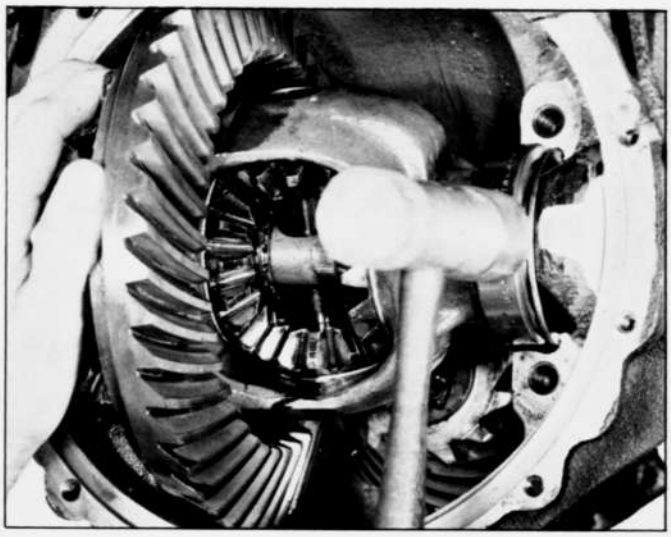
Differential bearing preload is necessary to compensate for heat and loads on the differential bearings.

After the differential bearing side play and gear set backlash are set, preload the differential bearings by increasing the thickness of each side shim by 0.004 inch.

NOTE — Do not hammer the shims into the housing. This will cause damage to the shims and affect the preload adjustment.

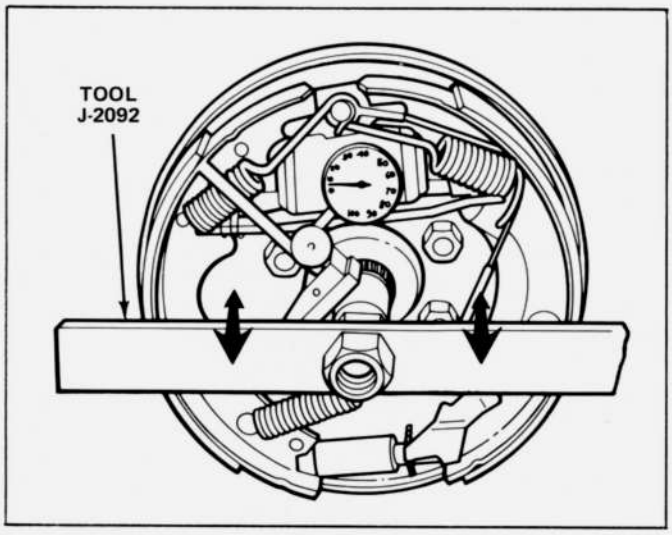


ASSEMBLY TIPS



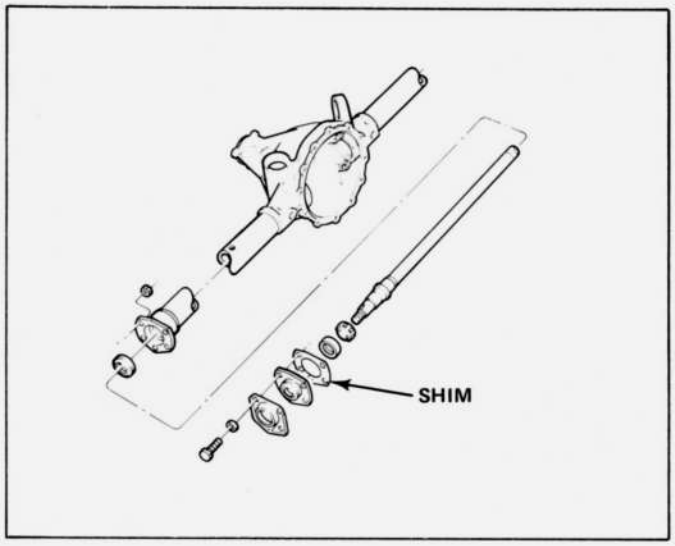
Install the differential bearing shims in the axle housing. Position the bearing cups over the roller bearings and set the differential into the housing so the bearings just start into the axle housing bores. Tip the bearing cups slightly to help start the cups into the bores. Keep the differential assembly square and push it in as far as possible.

Tap the outer edge of the bearing cups with a soft hammer until the assembly is seated in the housing.



AXLE SHAFT END PLAY

Tap each axle shaft firmly with a soft hammer to seat the bearing cups. Attach the end play tool to the end of the left axle shaft, as shown, and mount a dial indicator on the tool. Using a push-pull motion on the axle shaft, check the dial reading. End play should be 0.004-0.008 inch, with 0.006 inch desired.

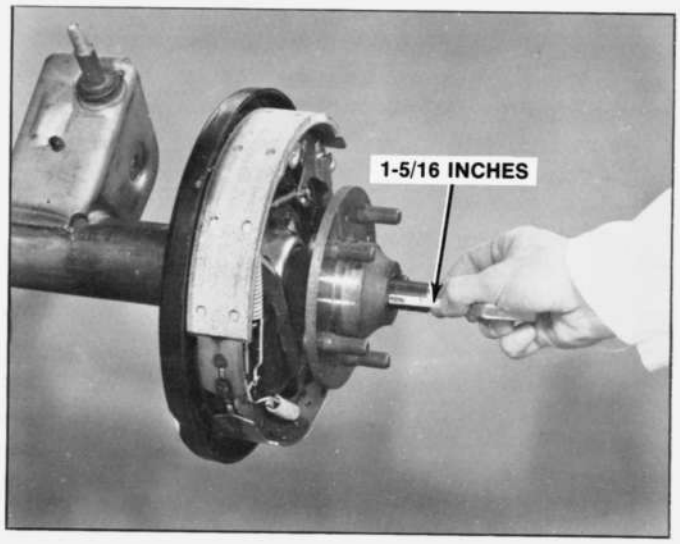


Axle shaft shims on the left side only are used to adjust the end play. Remove or add shims as required to obtain the proper adjustment.

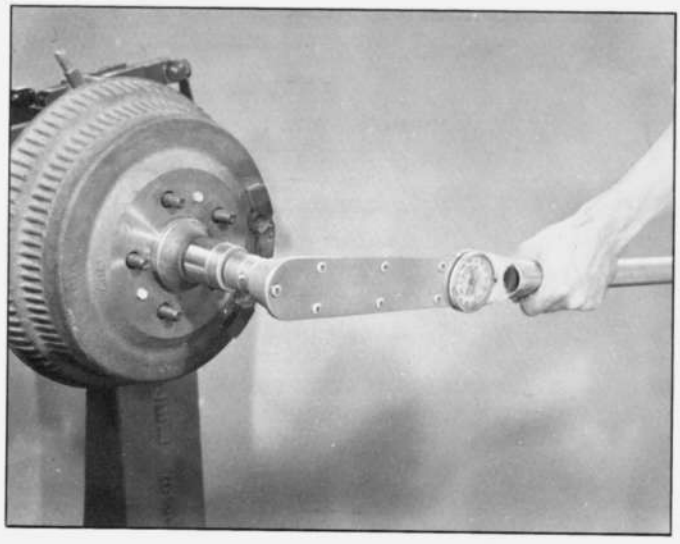
NOTE — Always seal the outside edge of the shims with sealer to prevent water damage to the bearings.

ASSEMBLY TIPS

If a new hub must be installed, position two washers lubricated with grease on the axle shaft, and install the axle shaft nut. Tighten the nut until the distance from the hub to the edge of the axle shaft is 1-5/16 inches. This procedure will properly cut the splines into the axle hub bore.



Now, remove the axle shaft nut and one thrust washer. Install the axle shaft nut and tighten to 250 foot-pounds torque. If the cotter pin hole is not aligned, tighten the nut to the next castellation. Install the cotter key.



Once you complete the rear axle repair, fill the axle with the specified lubricant and road test the vehicle to see that the problem is fully repaired.

EVALUATION QUESTIONNAIRE

WILL YOU HELP US DO A GOOD JOB ON FUTURE SERVICE RELEASES?

Please take a few minutes to answer the questions below. Then cut this page out, fold it so the return address is visible and drop it into the mail. No postage is necessary.

FIELD EVALUATION — SERVICE RELEASE 76-3
8⅞ REAR AXLE OPERATION, TESTING, AND REPAIR

1. How do you rate the **content** of this service release for usefulness to dealership mechanics?

☐ Very useful ☐ Not especially useful
☐ Moderately useful

Comment _____

_____

_____

2. How do you rate the effectiveness of the audio-visual program?

☐ Very effective ☐ Average
☐ Good ☐ Poor

Comment _____

_____

_____

3. How do you rate the usefulness of the booklet as a **teaching** device?

☐ Very effective ☐ Average
☐ Good ☐ Poor

Comment _____

_____

_____

4. How do you rate the usefulness of the booklet as an on-the-job **reference for service diagnosis and repair?**

☐ Excellent ☐ Average
☐ Good ☐ Poor

Comment _____

_____

_____

5. What would you like to see in future service releases?

_____

_____

ATTENTION: SERVICE MANAGER

6. Did everyone in your service department see this film? ☐ Yes ☐ No

6a. How many people attended the training session? _____

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QUIZ — AMC AND JEEP 8⅞ REAR AXLE OPERATION TESTING AND REPAIR

Circle the ONE best answer for each question.

1. Q. On the 8⅞ rear axle, what does the letter stamped on the axle housing tube boss identify
   A. The axle part number
   B. The type of lubricant to use
   C. The axle build date
   D. The axle gear ratio

2. Q. Which of the following is not part of the preliminary diagnosis for a rear axle problem
   A. Road test
   B. Questioning the customer
   C. Rear axle disassembly
   D. On-hoist checks

3. Q. During the road test, you notice a whining noise. This could be caused by
   A. Gear damage
   B. Improper gear mesh
   C. Improper bearing preload
   D. Any of the above

4. Q. Bearing whine is a high-pitched whistle sound which
   A. Will occur at all driving speeds
   B. Will occur at speeds of 30-40 mph
   C. Is caused by improper gear mesh
   D. All of the above

5. Q. A plus (+) pinion depth variance number on the pinion gear indicates
   A. The gear was manufactured larger and will need a thicker shim than a "zero" gear.
   B. The gear is smaller and will need a thicker shim than a "standard" or "zero" gear.
   C. That the desired distance from the rear face of the pinion gear to the centerline of the axle shafts will be more than 2.547 inches.
   D. The gear was manufactured larger and will need a thinner shim than a "standard" or "zero" gear.

6. Q. On ring and pinion gear sets, the first number etched on the gears
   A. Is the pinion depth variance number
   B. Identifies the gears as a matched set
   C. Is the part number for ordering replacement parts
   D. Indicates the gear ratio of the set

7. Q. Which of the following is the "standard" pinion depth setting for an 8⅞ rear axle
   A. 2.539 inches
   B. 2.557 inches
   C. 2.547 inches
   D. 2.574 inches

8. Q. What is the desired pinion depth for a pinion gear marked minus (−) four
   A. 2.542 inches
   B. 2.547 inches
   C. 2.543 inches
   D. 2.545 inches

9. Q. You have a desired pinion depth of 2.545 inches, the measured pinion depth was 2.543 inches, what do you have to do to the pinion shim thickness to obtain the desired pinion depth
   A. Remove .002 inch
   B. Add .008 inch
   C. Add .003 inch
   D. Add .002 inch

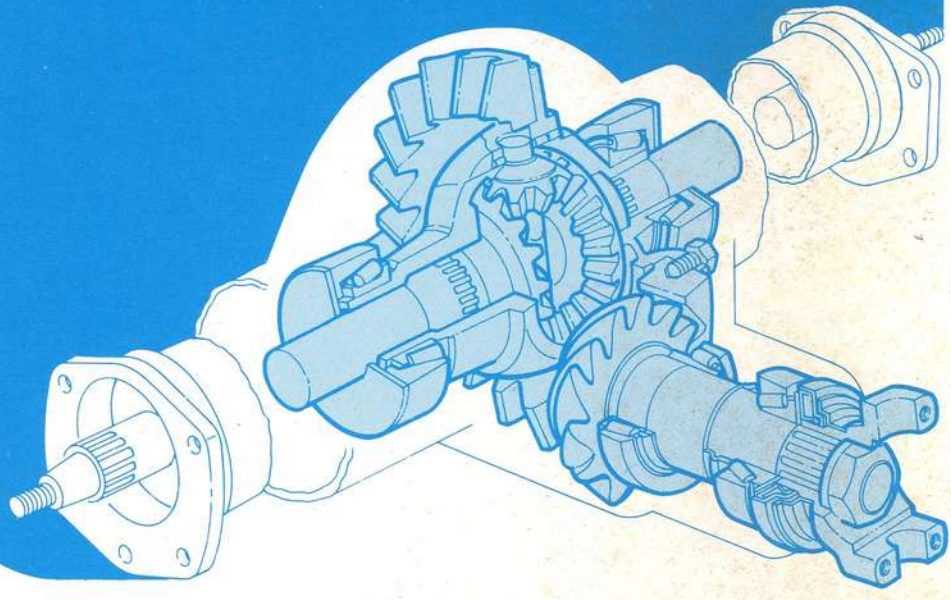
10. Q. Where are the shims for adjusting the axle shaft end play located
    A. Right side only
    B. Left side only
    C. Behind differential side bearings
    D. Behind the rear pinion bearing cup

Litho in U.S.A.

American Motors Sales Corporation

AMC AND JEEP 8¾ REAR AXLE

OPERATION, TESTING, and REPAIR



RELEASE 76-3

MEETING LEADER'S GUIDE

In-dealership Service Training

American Motors Sales Corporation

MEETING LEADER'S GUIDE

TO THE MEETING LEADER . . .
A FOREWORD

This program covers the basic operation, as well as testing and repair procedures for the 8¾ rear axle. It is a program designed for self-study or group instruction.

The program materials in this package include:

- 35mm slidefilm with record or tape cassette for use with DuKane projectors . . . or, 16mm Commpak cartridge for use with LaBelle projectors.
- Meeting Leader's Guide (1)
- Film Reference Booklets (4), including:
  — Quiz on the program content
  — Evaluation questionnaire

The film reference book covers all the material presented in this program. It should be used as a self-study guide and reference when servicing the 8¾ rear axle. Be sure that each mechanic receives a copy; and urge them to study it and keep it for future reference.

Also, AMC is anxious to get your "feedback" on how well these materials do the job they are intended to do. Please ask your mechanics to fill out and return the evaluation questionnaire in the film reference book.

MEETING PREPARATION

A good trainer always knows his material. Before presenting this training program, review the complete package. Familiarize yourself with the film, the film reference book and quiz, and this meeting leader's guide. Your understanding of the training materials is a key to the program's success.

It's a good idea to run a private practice session for yourself to make sure nothing is left out. Answer the questions on the quiz sheet. When the meeting starts, *you* are the man with the answers. Knowing your material makes your role in the training session easy — and helps you hold the interest of your mechanics.

Use the following 10 point check list . . . it will help you to have everything ready in advance of the meeting:

- Adequate space, lighting, and temperature control in meeting room.
- Chairs for everyone (next to a table if possible).
- Paper, pencils and an ash tray for each man.
- LaBelle system — projector plugged into 110V electrical outlet; cartridge in place.
- DuKane system — projector and screen in place; slide-film threaded into projector, focused and set at "black" frame, record or tape cassette in place.
- Film reference books handy for later use.
- Any parts or materials you wish to use in the post-film discussion. For instance:
  — 1976 Technical Service Manual
  — Special Service Tools
  — Micrometer
- Arrange for refreshments — coffee, donuts, etc., if desired.
- Schedule meeting time and place — notify mechanics a few days in advance and again on the day of the meeting.
- Be the first person to arrive at the meeting room — recheck materials and audio-visual set-up . . . then relax, you've set the stage for an efficient meeting.

AMC and JEEP 8¾ REAR AXLE
OPERATION, TESTING and REPAIR

MEETING AGENDA

INTRODUCTION (2 minutes)

Name the subject and mention briefly what is included in the film and film reference book. Tell them how long the meeting will be, how the session will be conducted, and about refreshments, if they will be served after the meeting.

SLIDEFILM (20 minutes)

DISCUSSION (15 minutes)

Pass out the books. Go through the film reference book and discuss the procedures thoroughly. Urge them to follow the book sequence during diagnosis and problem analysis of the axle. Point out the set-up tips and assembly procedures in the reference book and Technical Service Manual. If you wish, demonstrate the procedure for figuring the desired pinion depth.

QUIZ AND DISCUSSION (15 minutes)

Conduct the quiz in the film reference book. Give everyone enough time to answer all 10 questions.

- Ask: "Is everyone finished with the quiz?"
- After all have completed the quiz sheets, announce . . . "Here's how we'll score your quiz sheet. I'll go over the right answers, you mark your quiz sheet. If you have a wrong answer, mark it with the right one. If you think your answer is right, and mine is wrong, let's talk about it in a question and answer session, *after* all the quiz sheet answers are revealed."
- Correct Answers — questions and answers to the quiz are given on the last page of this guide.
- Start a question and answer session. Lead off by asking if everyone agrees with the answers to the quiz.
- Try to draw out questions about the film. If you don't know the answer off hand, check the film reference book. Your technical service manual is a good source too, but don't spend a lot of time "looking." If you don't have the answer at your "fingertips" tell them so. But, also tell them you will find the answer and let them know.

CONCLUSION (2 minutes)

Comment on the importance of using approved procedures in rear axle diagnosis. Urge them to keep the film reference book for reference; and to refer to the Technical Service Manual when necessary.

- Ask them to fill in and mail the evaluation sheet.
- Thank them for their attendance, attention and participation.
- HAVE A GOOD MEETING!

QUESTIONS AND ANSWERS

8⅞ REAR AXLE OPERATION, TESTING AND REPAIR

QUIZ — RELEASE 76-3

1. Q. On the 8⅞ rear axle, what does the letter stamped on the axle housing tube boss identify
   A. The axle part number
   B. The type of lubricant to use
   C. The axle build date
   D. The axle gear ratio
   Answer: D

2. Q. Which of the following is not part of the preliminary diagnosis for a rear axle problem
   A. Road test
   B. Questioning the customer
   C. Rear axle disassembly
   D. On-hoist checks
   Answer: C

3. Q. During the road test, you notice a whining noise. This could be caused by
   A. Gear damage
   B. Improper gear mesh
   C. Improper bearing preload
   D. Any of the above
   Answer: D

4. Q. Bearing whine is a high-pitched whistle sound which
   A. Will occur at all driving speeds
   B. Will occur at speeds of 30-40 mph
   C. Is caused by improper gear mesh
   D. All of the above
   Answer: A

5. Q. A plus (+) pinion depth variance number on the pinion gear indicates
   A. The gear was manufactured larger and will need a thicker shim than a "zero" gear.
   B. The gear is smaller and will need a thicker shim than a "standard" or "zero" gear.
   C. That the desired distance from the rear face of the pinion gear to the centerline of the axle shafts will be more than 2.547 inches.
   D. The gear was manufactured larger and will need a thinner shim than a "standard" or "zero" gear.
   Answer: D

6. Q. On ring and pinion gear sets, the first number etched on the gears
   A. Is the pinion depth variance number
   B. Identifies the gears as a matched set
   C. Is the part number for ordering replacement parts
   D. Indicates the gear ratio of the set
   Answer: B

7. Q. Which of the following is the "standard" pinion depth setting for an 8⅞ rear axle
   A. 2.539 inches
   B. 2.557 inches
   C. 2.547 inches
   D. 2.574 inches
   Answer: C

8. Q. What is the desired pinion depth for a pinion gear marked minus (−) four
   A. 2.542 inches
   B. 2.547 inches
   C. 2.543 inches
   D. 2.545 inches
   Answer: C

9. Q. You have a desired pinion depth of 2.545 inches, the measured pinion depth was 2.543 inches, what do you have to do to the pinion shim thickness to obtain the desired pinion depth
   A. Remove .002 inch
   B. Add .008 inch
   C. Add .003 inch
   D. Add .002 inch
   Answer: A

10. Q. Where are the shims for adjusting the axle shaft end play located
    A. Right side only
    B. Left side only
    C. Behind differential side bearings
    D. Behind the rear pinion bearing cup
    Answer: B