SECTION 4

PROPELLER SHAFT AND AXLES

CONTENTS

SECTION 4A

PROPELLER SHAFT

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

GENERAL DESCRIPTION

PROPELLER SHAFT

Torque is transmitted from the transmission to the rear axle through one or more propeller shafts. The number of propeller shafts vary with the vehicle wheel base and combination of transmission, transfer case, (front drive), and rear axle equipment (figure 1). Propeller shafts have universal joints at each end to accommodate angle variations between the transmission and rear axle, and rear axle position caused by suspension motion. All propeller shafts are the balanced tubular type. The driveline is connected to the transmission with a splined slip joint (normal for a one-piece propeller shaft) (figure 2) or a fixed yoke, normal for a two-piece and three-piece propeller shafts (figure 3). If two or more propeller shafts are used on a vehicle, a center bearing is used. The center bearing is usually located near the rear of the front propeller shaft, and the slip joint is usually at the forward end of the rear propeller shaft.

PHASING

The propeller shaft is designed and built with the yoke lugs (ears) in line with each other. This design produces the smoothest running shaft possible, and is known as "in phase" (figures 1 and 4).

An out of phase propeller shaft can cause vibration. The propeller shaft will generate vibration from speeding up and slowing down each time the universal joint

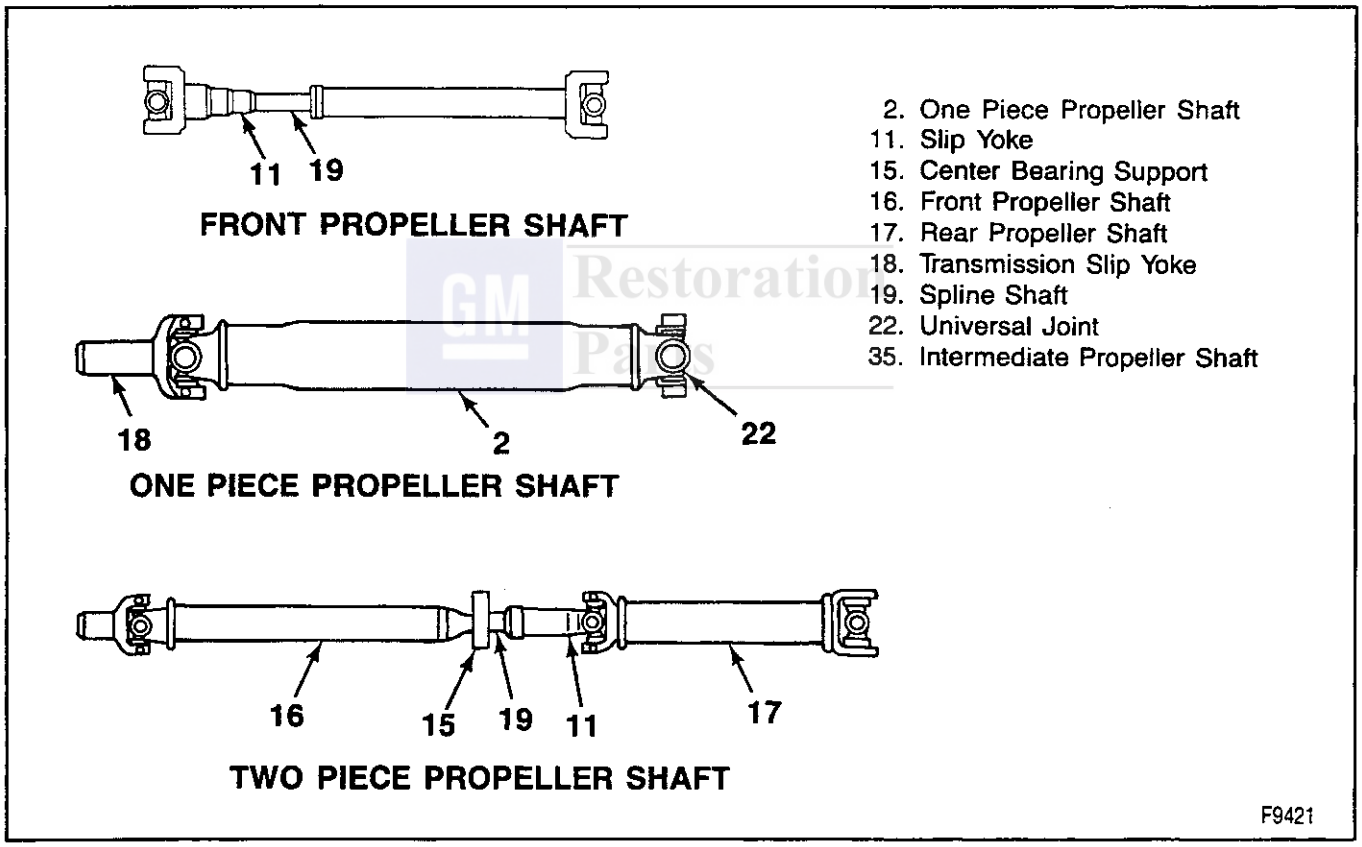


Figure 1—Propeller Shafts

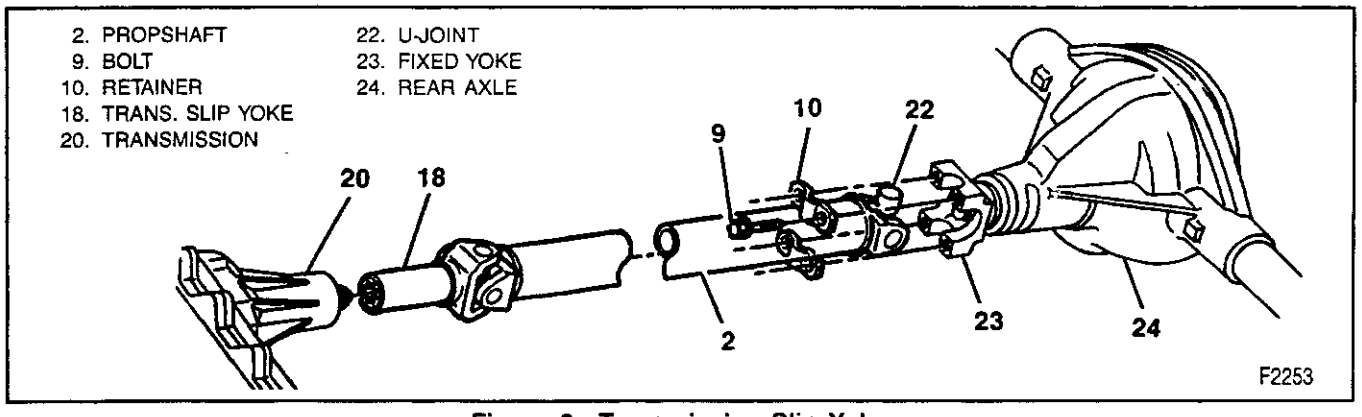


Figure 2—Transmission Slip Yoke

goes around. This vibration would be the same as a person snapping a rope and watching the "wave" reaction flow to the end. An in phase propeller shaft would be similar to two persons snapping a rope at the same time, and watching the "waves" meet and cancel each other out. A total cancellation of vibration produces a smooth flow of power in the driveline. Since phasing of a propeller shaft is between the center universal joints, it is very important to reference mark the front and rear propeller shafts before removal to ensure proper phasing upon reinstallation. Some splined shaft slip yokes are keyed to ensure proper phasing.

CENTER BEARING

Center bearings support the driveline when two or more propeller shafts are used. The center bearing is a ball bearing mounted in a rubber cushion that is attached to a frame crossmember. The bearing is prelubricated and sealed by the manufacturer. The cushion allows vertical motion at the driveline and helps isolate the vehicle from vibration.

UNIVERSAL JOINT

Universal joints (figure 5) are designed to handle the effects of various loadings and rear axle windup during acceleration and braking. Within the designed angle variations, the universal joint will operate efficiently and safely. When the design angle is changed or exceeded, the operational life of the joint may decrease.

The trunnion bearings used in universal joints are the needle roller type. The needle rollers are held in place on the trunnions by round bearing cups. The bearing cups are held in the yokes by either snap rings or injected plastic.

The OEM universal joints are lubricated for life and cannot be lubricated on the vehicle. A service kit which consists of a spider with bearing assemblies and snap rings may be installed if a universal joint becomes worn or noisy. If it becomes necessary to repair a universal joint, the propeller shaft must be removed from the vehicle. Take care to avoid jamming, bending, or over-angulating any parts of the propeller shaft assembly.

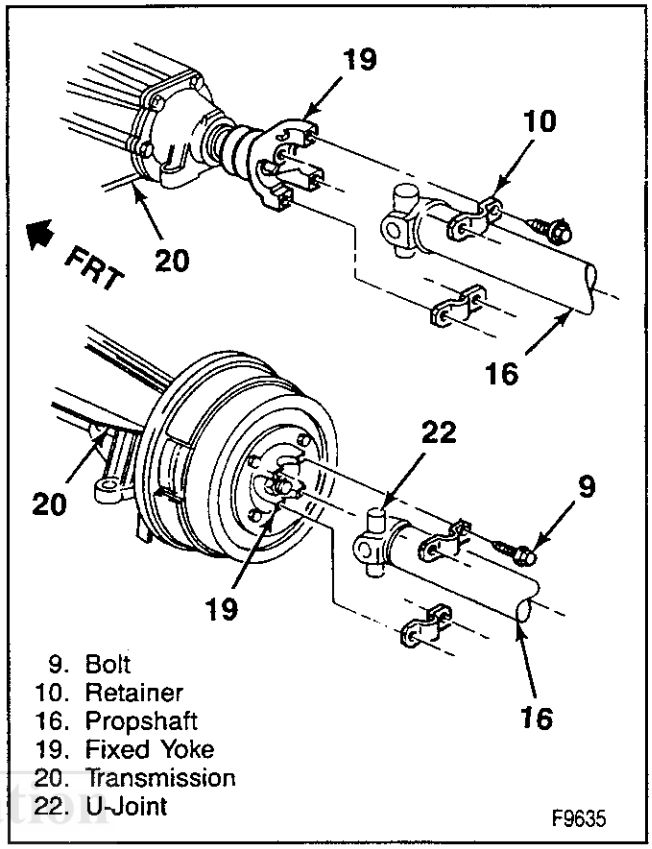


Figure 3—Fixed Yoke Companion Flange

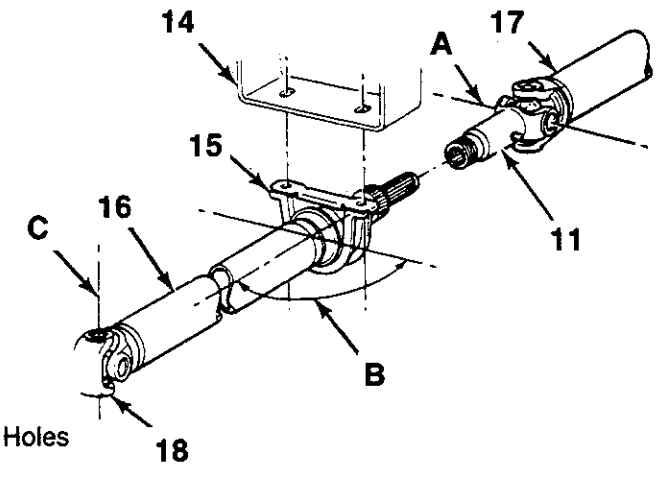
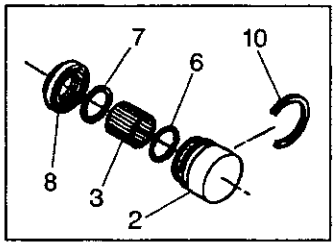
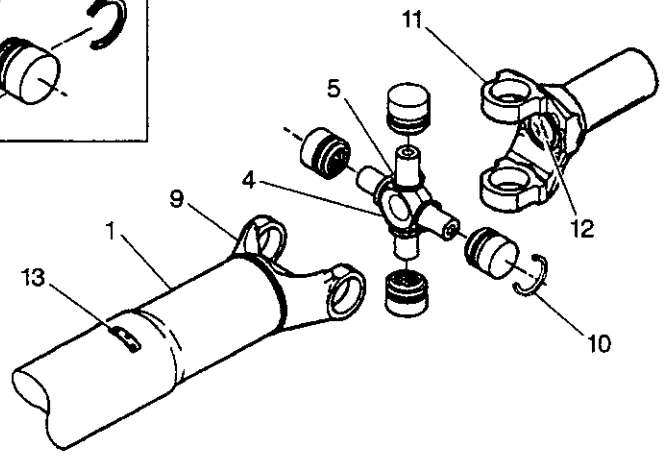


Figure 4—Propeller Shaft Assembly in Phase





1. SHAFT, PROPELLER TUBE
2. CAP, UNIVERSAL JOINT BEARING
3. (NEEDLE BEARING), ROLLER
4. SPIDER, UNIVERSAL JOINT
5. RETAINER, SEAL
6. WASHER, BEARING
7. WASHER, SEAL
8. SEAL, UNIVERSAL JOINT
9. YOKE, WELD
10. RING, RETAINER
11. YOKE, SLIP
12. PLUG, DUST
13. WEIGHT, BALANCE

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Figure 5—Universal Joint Components

DIAGNOSIS OF PROPELLER SHAFT AND UNIVERSAL JOINT

PROBLEM	POSSIBLE CAUSE	CORRECTION
Leak at the Front Slip Yoke. (An Occasional Drop of Lubricant Leaking from the Splined Yoke is Normal and Requires No Attention)	1. Slip yoke barrel burred, nicked, or worn. 2. Defective transmission rear oil seal.	1. Replace the seal. Minor burrs can be smoothed by careful use of crocus cloth or fine stone honing. Replace the yoke if badly burred. 2. Replace the transmission rear oil seal and replenish the transmission oil.
Ping, Snap, or Click in Drive Line (Usually Heard on Initial Load after the Transmission is in Gear; Forward or Reverse)	1. Loose bushing bolts on the rear springs or upper and lower control arms. 2. Loose fixed yoke or companion flange. 3. Worn or damaged universal joints.	1. Tighten the bolts to specified torque. 2. Tighten the bolts and pinion nut to specified torque. 3. Replace universal joints.
Knocking or Clunking Noise in the Driveline when Operating the Vehicle in High Gear or coasting in Neutral at 16 km/h (10 MPH).	1. Worn or damaged universal joint. 2. Side gear hub counterbore in the differential is worn oversize.	1. Replace the worn or damaged universal joint. 2. Replace the differential case and/or the sidegears.

DIAGNOSIS OF PROPELLER SHAFT AND UNIVERSAL JOINT (cont'd)

PROBLEM	POSSIBLE CAUSE	CORRECTION
Roughness or Vibration	1. Bent or dented propeller shaft. 2. Undercoating on propeller shaft. 3. Tire unbalance, 48-80 km/h (30-50 mph). 4. Tight universal joints. 5. Worn universal joints. 6. Bent companion flange or flange with excessive runout. 7. Burrs or gouges on companion flange. Check snap ring locating surfaces on flange yoke. 8. Propeller shaft, parking brake drum, or companion flange is unbalanced. 9. Incorrect rear joint angle. The angle is usually too large when it is a factor. 10. Excessive looseness at the slip spline. 11. Distorted or damaged yokes or flanges. 12. Yokes out of phase on two-piece propshaft system. 13. Driveline vibration at 80 km/h (50 mph).	1. Replace propeller shaft. 2. Clean propeller shaft. 3. Balance or replace as required. 4. On snap ring retainer U-joints, tap the yokes with a hammer to free up. If unable to free up or if joint feels rough, replace joint. 5. Replace. 6. Refer to SECTION 0C. 7. Deburr or replace the companion flange. 8. Check for a missing balance weight on all three components. Rotate the propeller shaft in the companion flange 180 degrees. 9. Check and correct trim height at curb weight. Check and correct joint angle. Refer to SECTION 0C. 10. Replace necessary parts. 11. Install new yokes or flanges. 12. Re-index propeller shaft. 13. Check propeller shaft runout and for missing balance weights. Refer to propeller shaft runout check.
Scraping Noise	Pinion flange, or center bearing rubbing.	Correct the interference.
Roughness Above 56 km/h (35 MPH) Felt and/or Heard	Tires unbalanced or worn.	Balance or replace as required.
Squeak	1. Lack of lubricant. 2. Center bearing.	1. Replace universal joints as required. 2. Replace as required.
Whine or Whistle	Center support bearing.	Replace center support bearing.
Shudder on Acceleration (Low Speed)	1. Loose or missing bolts at the center bearing or flanges. 2. Incorrectly set or excessive joint angle. 3. Worn universal joint. 4. Worn center bearing support cushion.	1. Replace or tighten bolts to specified torque. 2. Shim under the transmission support mount to change the joint angle. #1254001 std. shim. On two piece propshaft, shim center bearing support to reduce center joint angle. 3. Replace. 4. Replace center bearing. NOTE: Some vertical movement is normal.
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ON-VEHICLE SERVICE

PROPELLER SHAFT BALANCE CHECK

Important

- Never vent or fill the propeller shaft with an aerosol foam product. This will cause an excessive imbalance condition.
- Raise the vehicle on a hoist so the wheels can spin.

Important

- In order to get an accurate check it is necessary to lift the vehicle by the axle or suspension to duplicate actual conditions. By doing this the pinion angle will be as close as possible to normal.

Remove or Disconnect (Figure 1)

1. Tire and wheel assemblies and the brake drums.

Inspect

- Propeller shaft, universal joints, and attachments for mud, undercoating, or loose fasteners.

Clean

- Propeller shaft, universal joints, and attachments.

Tighten

- Any loose attachments or fasteners.

CAUTION: Never run the vehicle higher than 89 km/h (55 mph). All persons should stay clear of universal joints and balance weight areas to avoid possible injury. Do not run the vehicle on the hoist for extended periods due to the danger of overheating the transmission or engine.

Measure

- Run the vehicle in gear at the speed where the disturbance peaks; observe the intensity of the disturbance. Refer to SECTION 0C.

CAUTION: Do not apply the brakes with the drums removed. System damage or personal injury may result.

2. Bolts from rear of pinion flange.
3. Retainers.
4. Propeller shaft.
   - Rotate the propeller shaft 180 degrees from the original position.

Install or Connect

1. Propeller shaft.
2. Retainers.

NOTICE: Refer to "Notice" on page 4A-1.

3. Bolts into rear pinion flange.

Tighten

- Bolts to 20 N·m (15 lbs. ft.).
- Determine the position which gives the best balance.

4. Rear drums and wheel and tire.
   - Determine the position which gives the best driveline response by road testing the vehicle for a final check of the propeller shaft balance.
   - If unacceptable balance/vibration, continue with "Propeller Shaft Runout Check" later in this section.

PROPELLER SHAFT RUNOUT CHECK

Noise or vibration at high speed could be caused by a bent propeller shaft. The propeller shaft could have been damaged by rough handling or a collision. Check for propeller shaft straightness.

1. Raise the vehicle on a hoist so the wheels can spin.
2. Attach a dial indicator having a magnetic base to a smooth place on the vehicle underbody.
3. Take dial indicator readings at the propeller shaft check points (figures 6 and 7).

PROPELLER SHAFT	FRONT CHECK	CENTER CHECK	REAR CHECK
One Piece	0.040"	0.050"	0.055"
Aluminum Graphite	0.040"		0.040"
Two Piece Driveshaft:			
With Slip Yoke	0.025"		0.004"*
With Fixed Yoke	0.040"		0.007"*
Two Piece Rear	0.030"†	0.040"	0.040"
Three Piece Driveshaft:			
Full Size Pick-up	0.025"	0.040"	0.040"
Suburban	0.015"	0.010"	0.015"

*NOTE: This measurement must be taken on the ground surface near the spline, with the rear propeller shaft removed.

PROPELLER SHAFT	FRONT CHECK	CENTER CHECK	REAR CHECK
†NOTE: This measurement must be taken with the rear propeller shaft mounted on the front shaft which is within specifications. T2568			

Figure 6—Propeller Shaft Runout Specifications

Important

- Do not attach the dial indicator base at a weld.
- The indicator base must not rock.

4. With the transmission in neutral, hand rotate one wheel or the axle pinion flange or the transmission yoke and take the necessary dial indicator readings on the propeller shaft. Record the readings. On models having a two-piece driveline, measure the rear propeller shaft runout (figure 7).
5. Reference mark the position of the rear propeller shaft yoke to the pinion flange, then remove the rear propeller shaft and measure the front propeller shaft runout on the tube and at the specified location on the splined shaft end (figure 7).
6. If the runout exceeds specification, rotate the propeller shaft 180 degrees at the companion flange and install. Check the runout.
7. If the propeller shaft runout is over specification, check for a damaged companion flange. Refer to SECTION 0C.
8. If the runout is still over specification at one or more check points, replace the propeller shaft after checking for vibration or noise (figure 6).
   - Check the runout on the replacement propeller shaft.

Important

- The splined end of the front propeller shaft is critical to the smooth operation of a two-piece driveline. Be sure the dial indicator readings are accurate.

REAR PROPELLER SHAFT REPLACEMENT (REAR DRIVE)

Remove or Disconnect (Figures 8 and 9)

- Raise vehicle on a hoist.

1. Skid plate if used.
   - Reference mark the propeller shaft to pinion flange connection.
   - Reference mark slip yoke to transmission for proper reassembly
   - For two-piece Saginaw propeller shaft, unscrew threaded cap on center slip yoke. (figure 9).
   - For two-piece Dana propeller shaft, pull the stub shaft out of the slip yoke. (figure 10).

Important

- When servicing driveshafts with the pop on seal, do not remove the seal from the sleeve.

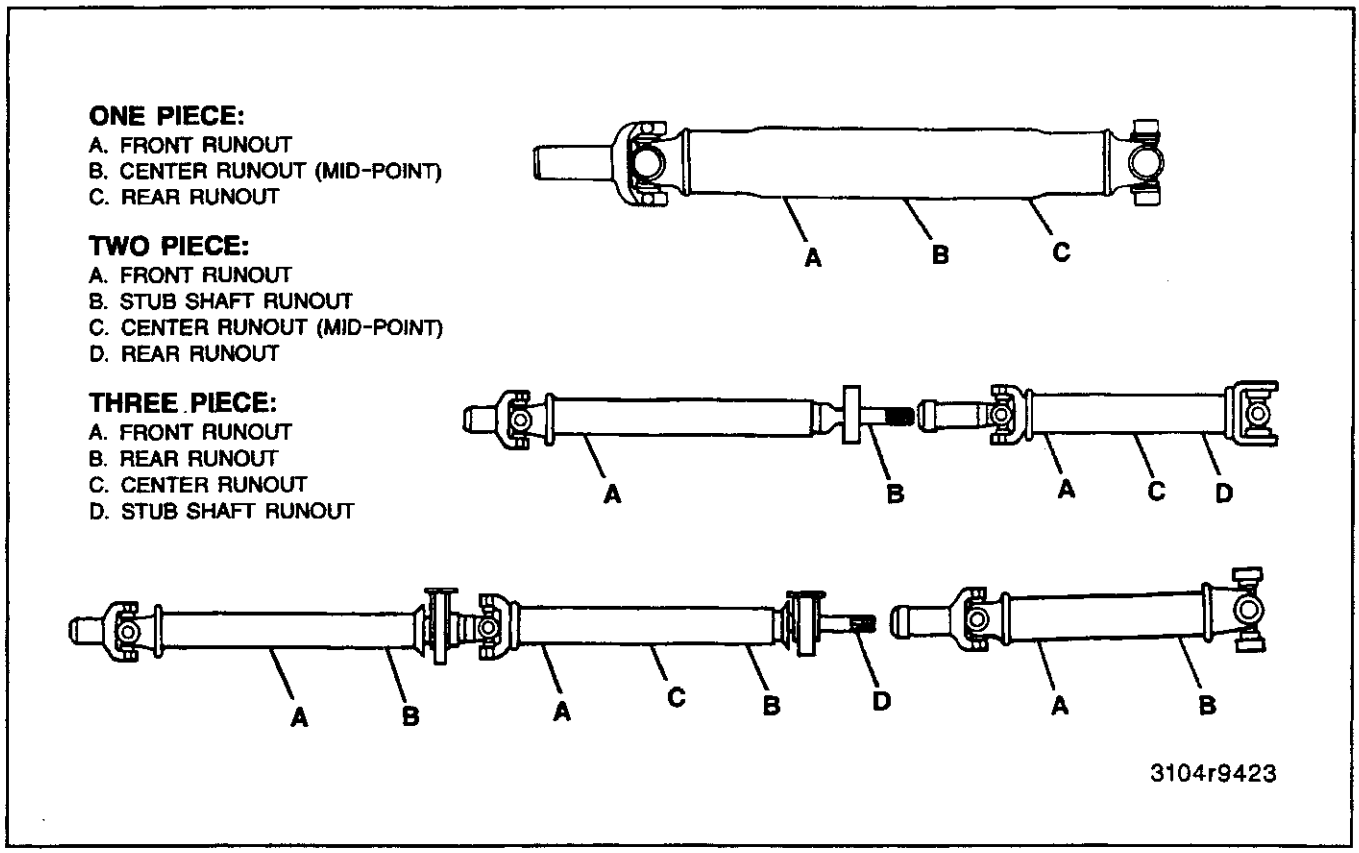

Figure 7—Propeller Shaft Runout Check Points

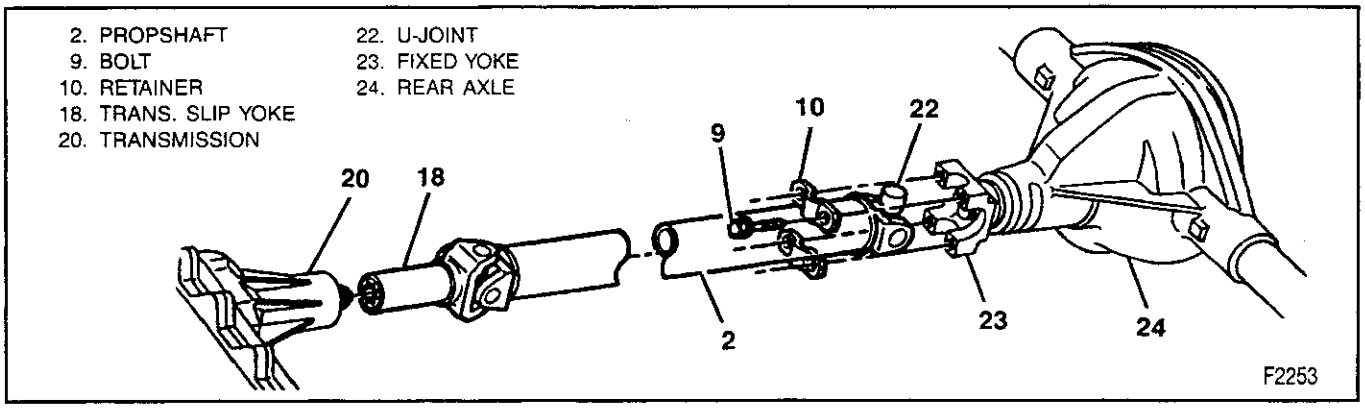

Figure 8—One-Piece Propeller Shaft

Removal of the seal causes damage to the seal lip where it contacts the sleeve yoke. If removal of the seal is necessary, it should be replaced with a new unit.

2. Bolts.
3. Retainers.

Important

- Do not pound on the propeller shaft yoke ears. The injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.

4. Yoke and cross assembly.
   - Tape bearing cups to prevent the loss of bearing rollers
5. Propeller shaft.
   - Slide the propeller shaft forward.
   - Lower the propeller shaft and remove.
   - Do not allow the universal joint to incline greatly; the joint may fracture.
6. Center bearing support.
7. Front propeller shaft.
   - Always support the propeller shaft.
   - Do not allow the universal joint to bend deeply as the universal joint could fracture.
   - Remove the propeller shaft with a rearward movement.

Clean

- All parts with an approved solvent.

Inspect

1. Outer diameter of transmission yoke for burrs. Any burring will damage the transmission seal.
2. For proper installation and uniform seating of bearing cups.
3. Slip yoke splines for wear.
4. For twisted slip yoke splines or possibly the wrong universal joint.
5. Universal joint bearings for wear. Replace as necessary.

Install or Connect

ONE-PIECE PROPELLER SHAFT (Figure 8)

1. Propeller shaft into the transmission.
   - Lubricate slip joint spline with chassis grease.
2. Align the reference marks on the pinion flange and the propeller shaft rear yoke.
3. Yoke and cross assembly onto the fixed yoke.
4. Retainers.

NOTICE: Refer to "Notice" on page 4A-1.

5. Bolts.

Tighten

- Bolt to 20 N·m (15 lbs. ft.).

TWO-PIECE PROPELLER SHAFT (Figure 1)

1. Propeller shaft into the transmission.
   - Be sure the slip joint splines are lubricated.
   - Bottom the propeller shaft yoke in the transmission.
2. Center bearing support.
   - Align the center bearing support 90 degrees to the propeller shaft center lines (figure 4).

NOTICE: Refer to "Notice" on page 4A-1.

3. Center bearing support bolts.

Tighten

- Center bearing support bolts to 35 N·m (25 lbs. ft.).

Important

- Set the transmission yoke ears in a vertical position for proper phasing.
- Locate the bridged tooth (B) on the splined shaft (figure 9).

4. Slip yoke onto the splined shaft.
   - Mate the missing tooth in the yoke with the bridged tooth on the splined shaft (figure 9).
   - Support the propeller shaft.
   - Be sure the slip yoke ears are horizontal.
5. Propeller shaft.
   - Align reference marks.
6. Retainers.

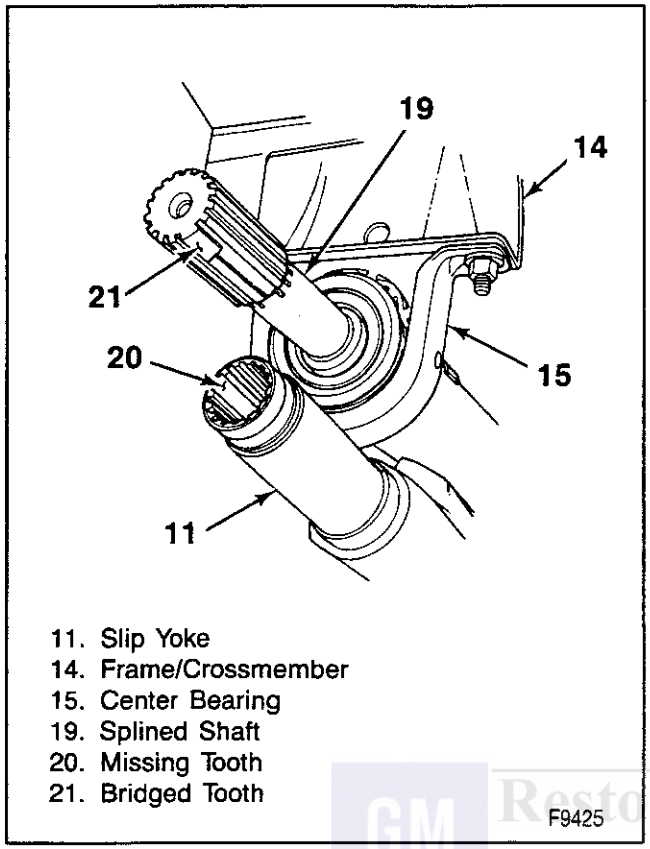

Figure 9—Splined Shaft Indexing (Saginaw)

NOTICE: Refer to "Notice" on page 4A-1.

7. Bolts.

Tighten

- Bolts to 20 N.m (15 lbs. ft.).

8. Skid plate
   - Check for proper joint fit.
- Lubricate the slip yoke.
- Lubricate the center slip joint on two-piece shaft.

THREE-PIECE PROPELLER SHAFT

Remove or Disconnect (Figures 4 and 11).

- Raise the vehicle on a hoist.
- Reference mark the rear propeller shaft to pinion flange connection.
- Support the rear propeller shaft.

1. Bolts from pinion flange.
2. Retainers.
3. Yoke and universal joint assembly from pinion flange

Important

- Do not pound on the original propeller shaft yoke ears. The plastic injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.
- Tape bearing cups onto yoke to prevent the loss of bearing rollers.

4. Rear propeller shaft.
   - Slide the rear propeller shaft forward.
   - Lower the rear propeller shaft and withdraw under the rear axle.
   - Do not allow the universal joint assembly to incline greatly. The joint may fracture.
   - Reference mark the intermediate propeller shaft to front propeller shaft yoke.
   - Support the intermediate propeller shaft.
5. Bolts from front propeller shaft yoke at front center bearing support.
6. Retainers.
7. Nuts from intermediate shaft center bearing support.
8. Bolts and washers.
9. Intermediate propeller shaft center bearing support from hanger.
10. Yoke and universal joint assembly from front propeller shaft rear yoke.

Important

- Do not pound on the original propeller shaft yoke ears. The plastic injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.
- Tape bearing cups onto yoke to prevent the loss of bearing rollers.

11. Intermediate propeller shaft.
    - Reference mark the front propeller shaft to the yoke or parking brake drum.
    - Support the front propeller shaft.
12. Bolts and retainers from yoke.
13. Nuts from front propeller shaft center bearing support.
14. Bolts and washers.
15. Front propeller shaft center bearing support from hanger.
16. Universal joint assembly from transmission yoke.

Important

- Do not pound on the original propeller shaft yoke ears. The plastic injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.
- Tape bearing cups onto yoke to prevent the loss of bearing rollers.

17. Front propeller shaft.

Clean

- All parts with an approved solvent.

Inspect

1. For proper installation and uniform seating of all universal joint bearing cups.
2. Intermediate propeller shaft to rear propeller shaft slip yoke splines for twisting or wear.
3. Inside of rear propeller shaft slip yoke for spline twisting or wear.
4. Front and rear center bearing support rubber insulators for deterioration or separation from the support framework.
5. Propeller shaft assemblies for damage.

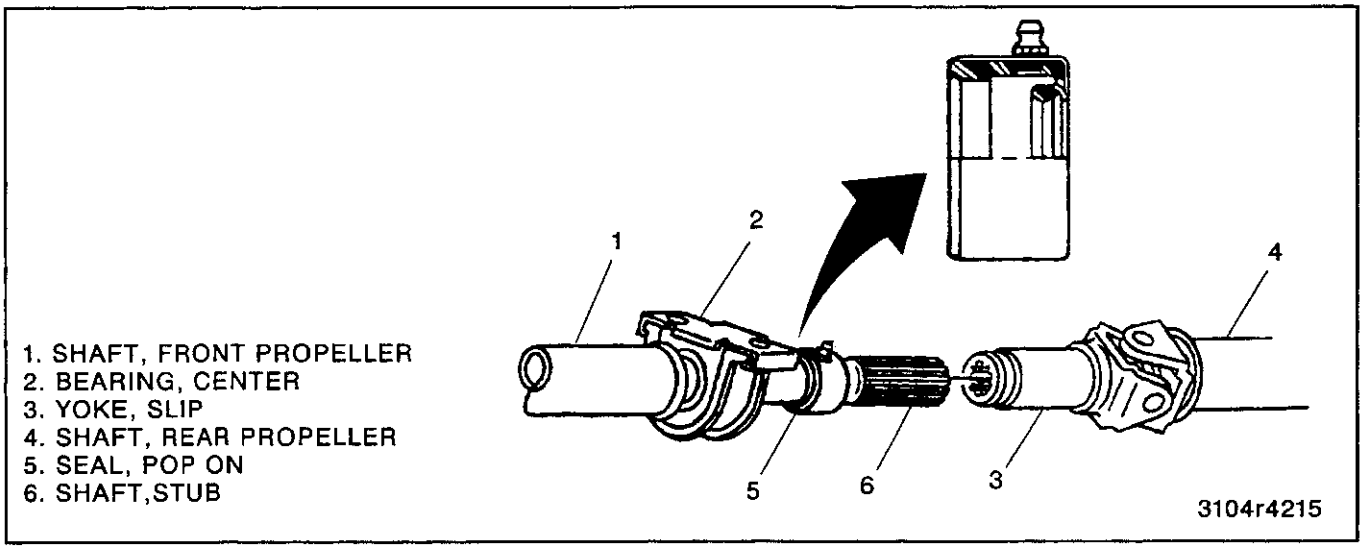

Figure 10—Two-Piece Propeller Shaft (Dana)

Install or Connect (Figure 4 and 11)

NOTICE: For steps 2, 5, 7, 10, and 12, refer to "Notice" on page 4A-1.

1. Front propeller shaft to yoke.
   - Make sure the reference marks are aligned.
   - Support front propeller shaft.
2. Bolts and retainers to yoke.

Tighten

   - Bolts to 20 N·m (15 lbs. ft.) (without transmission mounted drum parking brake).
   - Bolts to 36 N·m (27 lbs. ft.) (with transmission mounted drum parking brake).
3. Front center bearing support to hanger.
   - Align the center bearing support 90 degrees to the propeller shaft center line. Refer to figure 4.
4. Bolt and washers.
5. Nuts.

Tighten

   - Nuts to 35 N·m (26 lbs. ft.). Maintain alignment (figure 11).
6. Intermediate propeller shaft to front propeller shaft yoke.
   - Make sure reference marks are aligned.
   - Support intermediate propeller shaft.
7. Bolts and retainers.

Tighten

   - Bolts to 35 N·m (26 lbs. ft.).
   - Nuts to 35 N·m (26 lbs. ft.).
8. Rear center bearing support to hanger.
   - Align the center bearing support 90 degrees to both the front and intermediate propeller shaft centerlines. (figure 11).
9. Bolts and washers.
10. Nuts.

Tighten

   - Bolts to 35 N·m (26 lbs. ft.). Maintain alignment (figure 11).
   - Support the rear propeller shaft.
11. Rear propeller shaft to rear axle pinion flange.
   - Make sure reference marks are aligned.
12. Bolts and retainers.

Tighten

   - Bolts to 36 N·m (26 lbs. ft.).

CENTER BEARING REPLACEMENT

Remove or Disconnect (Figure 11)

- Raise vehicle and support with safety stands.

1. Rear propeller shaft. Refer to "Propeller Shaft Replacement (Rear Drive)."
2. Front or intermediate propeller shaft.
3. Center bearing.
   - Stand propeller shaft on end in press with center bearing supported by press bars.
   - Press propeller shaft down and off center bearing.

Install or Connect (Figure 4)

1. Center bearing onto propeller shaft.
   - Press center bearing onto shaft using a press.
2. Front or intermediate propeller shaft.

Important

   - Center bearing must be aligned to prevent damage to propeller shaft assembly.
   - When bolting center bearing in place, be sure to keep it perpendicular (90° +/- 1°) to the propeller shaft, (figure 4).
3. Rear propeller shaft. Refer to "Propeller Shaft Replacement (Rear Drive)" in this section.

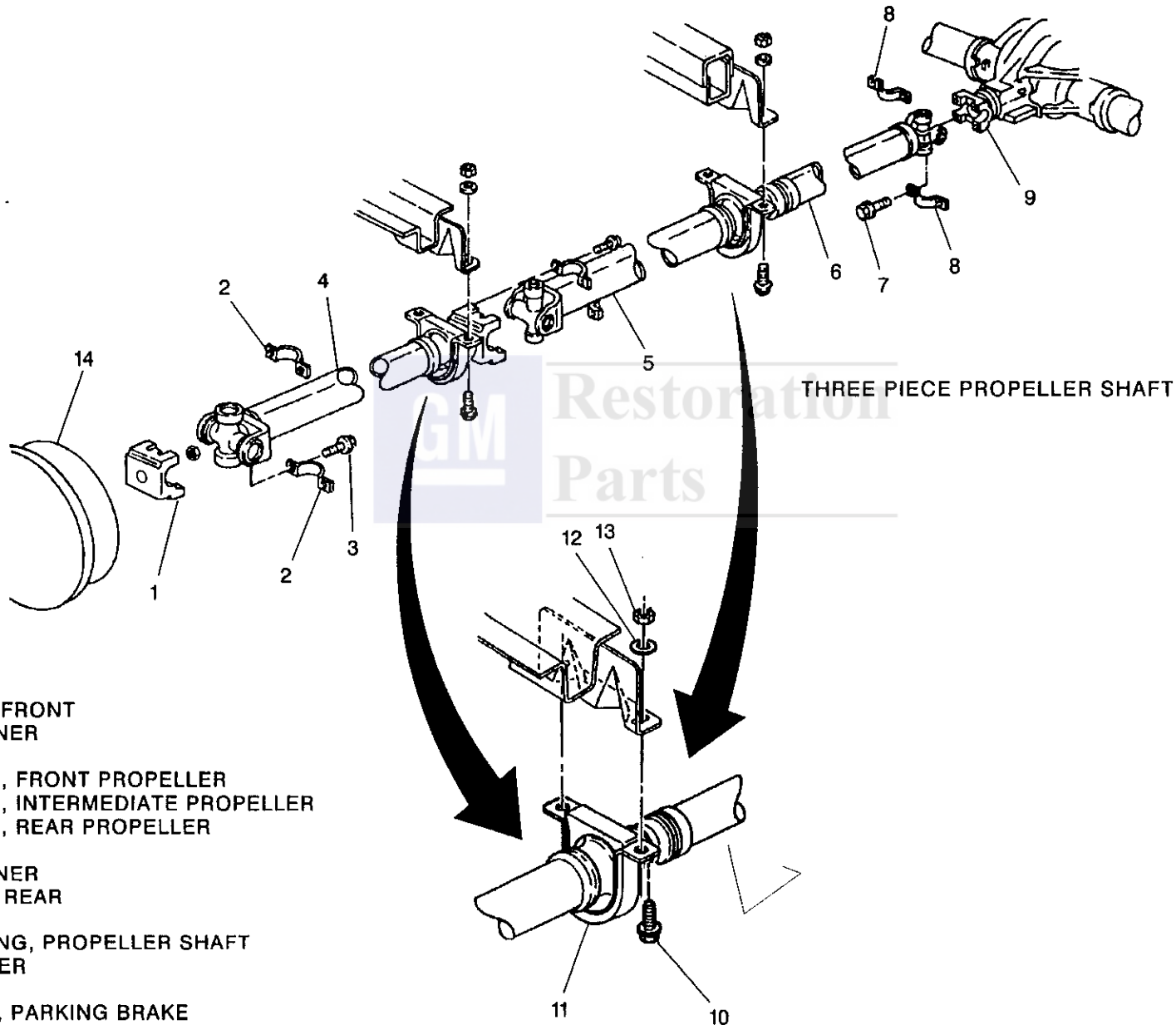

Figure 11—Three-Piece Propeller Shaft

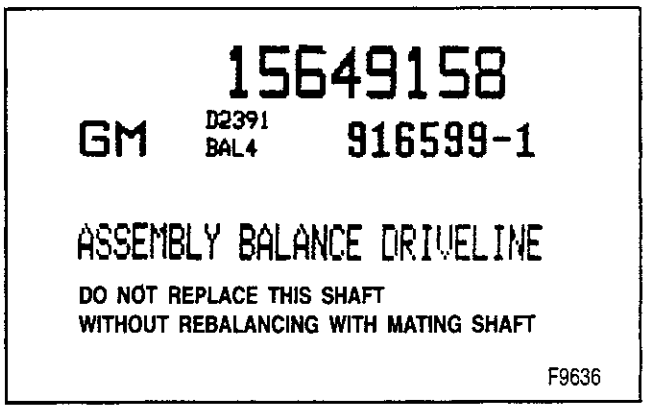

Figure 12—System Balanced Propeller Shaft Assembly Notice

NOTICE: Refer to "Notice" on page 4A-1.

Tighten

- All fasteners to 35 N·m (26 lbs. ft.).

4. Remove safety stands and lower vehicle.

SYSTEM BALANCED PROPELLER SHAFT ASSEMBLY REPLACEMENT

Important

- If one propeller shaft of a system balanced assembly is replaced, the mating shaft must be rebalanced with the replaced shaft. System balanced propeller shafts have a notice affixed to them similar to figure 12.

Remove or Disconnect (Figure 4)

- Raise the vehicle on a hoist.
- Reference mark all propeller shaft related components for reassembly including flanges and yokes.

Important

- Center slip yokes to spline shafts, end yokes, companion flanges, etc. must not be rotated from their original position during reassembly.

1. Bolts and retainers.
2. Propeller shaft.

Inspect

1. Boots for any damage (rips or holes).
   - If boot is damaged it must be discarded. Clamps are not reusable.
2. Dust caps for any damage.
   - If a push on dust cap must be removed it must be replaced.

Clean

- Propeller shaft, universal joints, and attachments with an approved solvent.
- If a boot must be disconnected, remove the clamp at the slip yoke end. Do not reuse the clamp.

Install or Connect

1. Propeller shaft.

NOTICE: Refer to "Notice" on page 4A-1.

2. Bolts and retainers.

Tighten

- Bolts to 20 N·m (15 lbs. ft.).

PROPELLER SHAFT REPLACEMENT (FRONT DRIVE)

Remove or Disconnect (Figure 13)

- Raise the vehicle on a hoist.
- Remove skid plate if used.
- Reference mark the relationship of the propeller shaft to the front axle and the transfer case flange.

1. Bolts and retainers.
2. Slip yoke from the front axle.

Important

- Do not pound on the joint to disconnect.

3. Bolts at the flange.
   - Slide the propeller shaft forward, enough to disengage, then move the propeller shaft rearward.
   - Avoid dropping cap assemblies from the yoke ends.

Clean

- All parts with an approved solvent.

Inspect

- Splines for damage, wear, burrs, and twisting.
- Universal joint bearings for wear.
- Propeller shaft for any evidence of damage.

Install or Connect (Figure 13)

NOTICE: For steps 2 and 4, refer to "Notice" on page 4A-1.

- Extend the propeller shaft to its full length, then compress it about half its stroke.

1. Slip yoke to the front axle yoke.
   - Adjust the propeller shaft length.
   - Support the propeller shaft.
2. Retainers and the bolts to the front axle pinion flange.

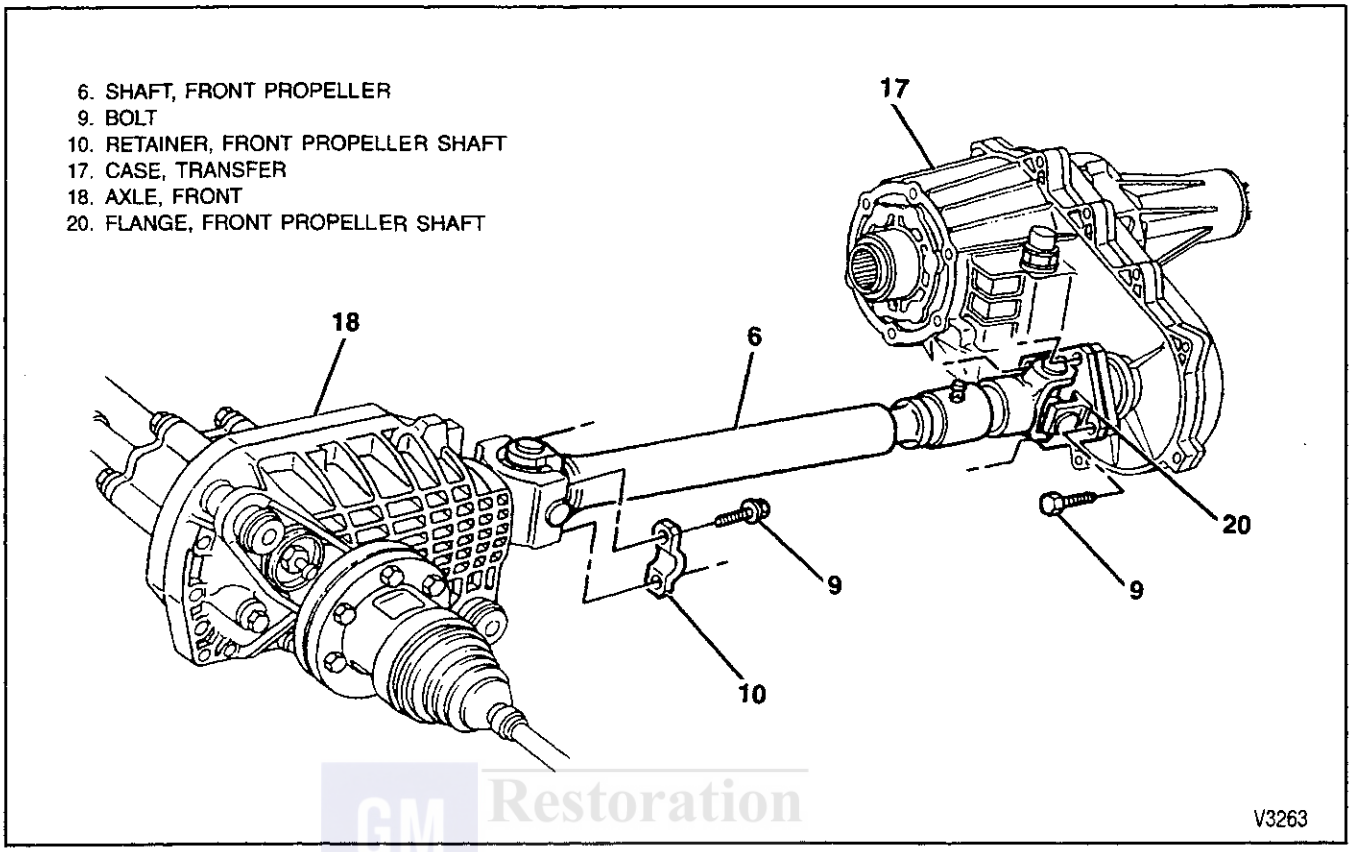

Figure 13—Front Drive Propeller Shaft

Tighten

- Retainer bolts to 20 N·m (15 lbs. ft.).

3. Propeller shaft to the transfer case yoke.
4. Retainer and the bolts to the transfer case yoke.

Tighten

- Retainer bolts to 100 N·m (74 lbs. ft.).

SLIP YOKE SPLINES

Apply chassis lubricant at the slip spline grease fitting until the grease begins to leave through the vent hole.

If the slip spline is dry or corroded, it may be necessary to disconnect the propeller shaft from the vehicle, remove the slip yoke, and wire brush the affected area. Wipe clean before installation. Replace if ground diameter has grooves worn in it from transmission extension housing bushing or seal.

UNIVERSAL JOINTS

NYLON INJECTED RING TYPE

NOTICE: Never clamp propeller shaft tubing in a vise. Clamping could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.

Tools Required:
J 9522-3 Universal Joint Bearing Separator
J 9522-5 Universal Joint Bearing Spacer Remover

- Support the propeller shaft in a line horizontal with the table of a press.
- Mark the propeller shaft as to which end is the transmission end and which end goes to the rear axle.
- Place the universal joint so that the lower ear of the yoke is supported on a 1 1/8-inch socket (figure 14).
- In order to shear the plastic retaining ring on the bearing cup, place J 9522-3 on the open horizontal bearing cups and press the lower bearing cup out of the yoke ear. If the bearing cup is not completely removed, lift the cross and insert tool J 9522-5 between the seal and bearing cup being removed and continue to press it out of the yoke (figure 15).
- Rotate the propeller shaft and press the opposite bearing cup out of the yoke.

Disassemble

- Mark orientation of slip yoke to tube for proper reassembly.

1. The cross from the yoke.
2. Remaining universal joint parts from the yoke.
   - If the front universal joint is being replaced, remove the bearing cups in the slip yoke in the same manner.

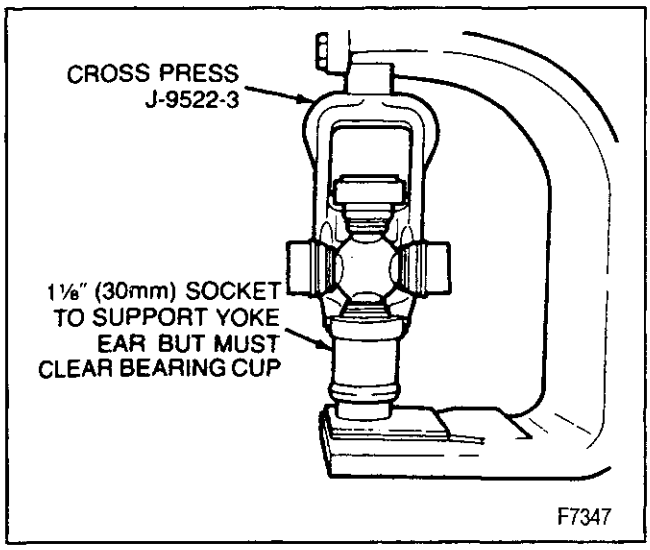

Figure 14—Pressing Out Universal Joint

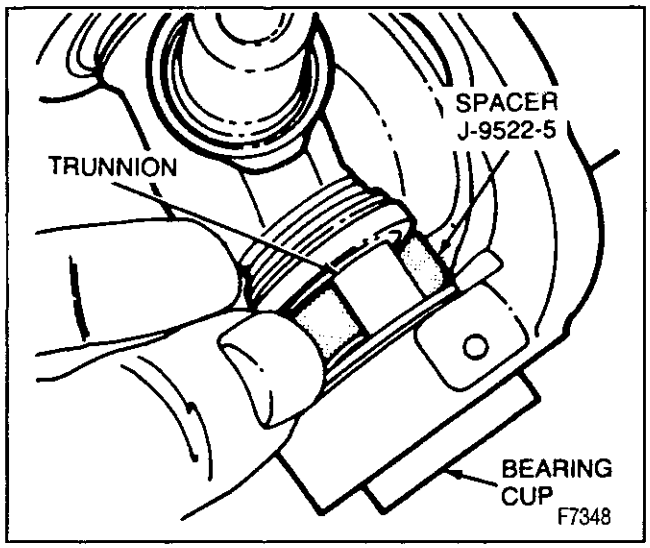

Figure 15—Using Available Spacer

Inspect

1. The retaining ring grooves for plastic.
2. The bearing cup bores in the yoke ears for burrs or imperfections.

Clean

- The remains of the sheared plastic bearing retainers from the grooves in the yoke.
- The sheared plastic may prevent the bearing cups from being pressed into place and thus prevent the bearing retainers from being properly seated.

Assemble

- Remove the bearing cups from the universal joint and use your finger to coat the needle bearings in the bearing cup with a thin layer of chassis grease.

1. One bearing cup part way into one side of the yoke (figure 16).
   - Turn the yoke ear toward the bottom.
2. Cross into the yoke so the trunnion seats freely into the bearing cup.
   - With the trunnion seated in the bearing cup press the bearing cup into the yoke until it is flush with the yoke ear.
3. The opposite bearing cup part way into the yoke ear.
   - Make sure that the trunnions are started straight and true into both bearing cups (figure 17).
   - Press the opposite bearing cup into the yoke ear while working the cross all the time to check for free unbinding movement of the trunnions in the bearing cups.
   - Press the bearing cup into the yoke until the bearing retainer groove clears the inside of the yoke.

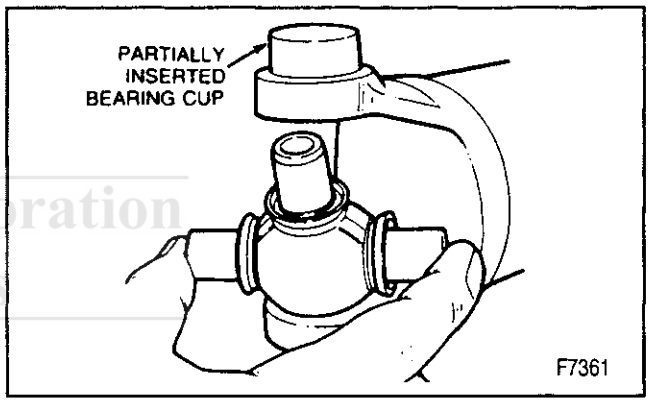

Figure 16—Partially Inserted Bearing Cup

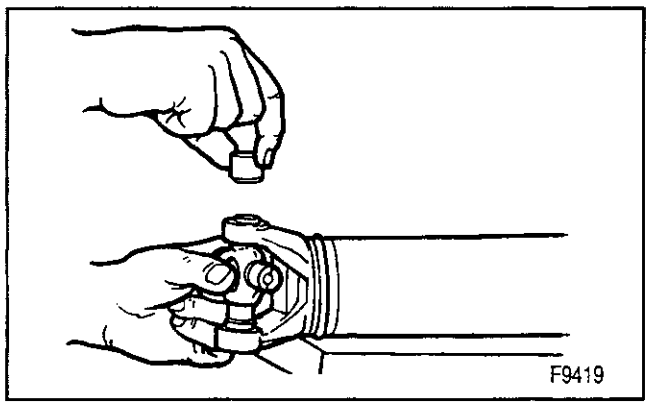

Figure 17—Aligning the Trunnion Between the Bearing Cups

Important

- If there seems to be a hangup or binding, stop pressing, and check the needle bearings for misalignment in the bearing cup.

4. Bearing retainer in the retainer groove (figure 18).
   - Continue to press until both retainers can be snapped into place.
   - If the retainer is difficult to seat, the yoke can be sprung slightly with a firm blow from a dead blow hammer (figure 19).

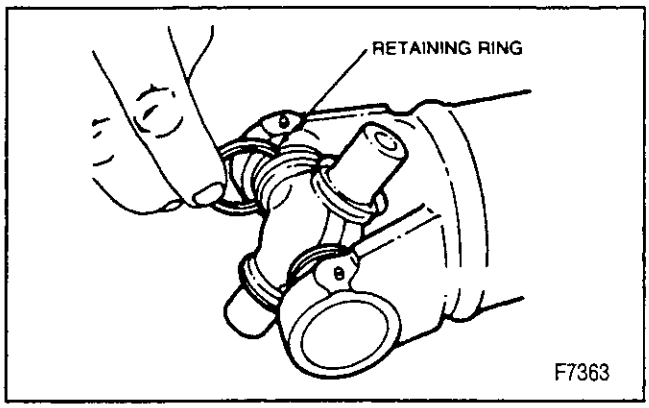

Figure 18—Installing Retaining Ring

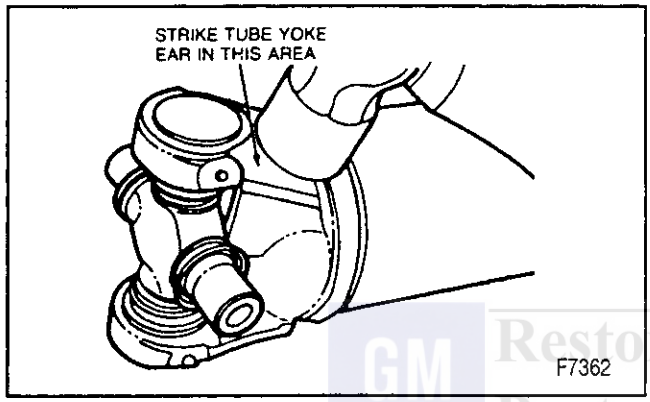

Figure 19—Seating the Universal Joint Snap Ring

- It may be necessary to lubricate the snap ring with a slight amount of chassis grease so it seats in the bearing cup groove.

EXTERNAL SNAP RING TYPE

NOTICE: Never clamp propeller shaft tubing in a vise. Clamping could dent or deform the tube causing an imbalance or unsafe condition. Always clamp on one of the yokes and support the shaft horizontally. Avoid damaging the slip yoke sealing surface. Nicks may damage the bushing or cut the lip seal.

Tools Required:
J 9522-3 Universal Joint Bearing Separator
J 9522-5 Universal Joint Bearing Remover Spacer

- Support the propeller shaft in a line horizontal with the table of a press.
- Mark the propeller shaft to show which end connects to the transmission and which end goes to the rear axle.

Disassemble

1. Snap rings by pinching the ends together with a pair of pliers.
   - If the ring does not readily snap out of the groove in the yoke, tap the end of the bearing cup lightly to relieve the pressure from the ring.
   - Place the universal joint so the lower ear of the yoke is supported on a 1 1/8-inch socket (figure 14).
   - Place J 9522-3 on the open horizontal bearing cups and press the lower bearing cup out of the yoke ear. If the bearing cup is not completely removed, lift the cross and insert tool J 9522-5 between the seal and bearing cup being removed and continue to press it out of the yoke (figure 15).
   - Rotate the propeller shaft and press the opposite bearing cup out of the yoke.

Disassemble

- Mark orientation of slip yoke to tube for proper reassembly.

1. The cross from the yoke.
2. Remaining universal joint parts from the yoke.
   - If the front universal joint is being replaced, remove the bearing cups in the slip yoke in the same manner.

Inspect

- The retaining ring grooves for dirt, corrosion, or pieces of the old ring.
- The bearing cup bores for burrs or imperfections.

Clean

- The retaining ring grooves.
- Corrosion, dirt, rust, or pieces of the old retaining ring may prevent the bearing cups from being pressed into place or prevent the bearing retainers from being properly seated.

Assemble

- Remove the bearing cups from the universal joint and use your finger to coat the needle bearings in the bearing cup with a thin layer of chassis grease.

1. One bearing cup part way into one side of the yoke (figure 16).
   - Turn the yoke ear toward the bottom.
2. Cross into the yoke so that the trunnion seats freely into the bearing cup.
   - With the trunnion seated in the bearing cup press the bearing cup into the yoke until it is flush with the yoke ear (figure 17).
3. The opposite bearing cup part way into the yoke ear.
   - Make sure that the trunnions are started straight and true into both bearing cups.
   - Press the opposite bearing cup into the yoke ear while working the cross all the time to check for free unbinding movement of the trunnions in the bearing cups.
   - Press the bearing cup into the yoke until the bearing cup retainer groove is visible over the top of the bearing cup.

Important

- If there seems to be a hangup or binding, stop pressing, and check the needle bearings for misalignment in the bearing cup.

4. Bearing retainer in the retainer groove (figure 18).
   - Continue to press until both retainers can be snapped into place.
   - If the retainer is difficult to seat, the yoke can be sprung slightly with a firm blow from a dead blow hammer (figure 19).
   - It may be necessary to lubricate the snap ring with a slight amount of chassis grease so it seats in the bearing cup groove.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

APPLICATION	N·m	Lbs. Ft.
One-Piece Propshaft		
Rear Axle Retainer Bolt		
C/K 15-25	20	15
C/K 35	20	15
Two-Piece Propshaft—Front		
Yoke to M40 Transmission	120	90
Transmission Yoke Retainer Bolt	20	15
Transfer Case Yoke Retainer Bolt	20	15
Three-Piece Propshaft		
Front Axle Retainer Bolt		
Intermediate Retainer Bolt		
Rear Axle Retainer Bolt		
C/K 35	35	26
Center Bearing Support		
Crossmember Mounting Nut	35	26
Front Drive Propshaft		
Front Axle Retainer Bolt	20	15
Transfer Case Flange Bolt	100	74

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SPECIAL TOOLS

1.  J 9522-3

2.  J 9522-5

1. "U" Joint Bearing Separator
2. "U" Joint Bearing Spacer Remover (Use with J 9522-3)

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SECTION 4B1

REAR AXLE

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

GENERAL DESCRIPTION

These trucks use various rear axles. The axles can be identified by ring gear size in inches, by manufacturer (corporate or Dana) and by the type of axle shaft used (semi-floating or full-floating). Corporate axles include the 8 1/2, 9 1/2, and 10 1/2-inch ring gear axles. Dana supplies a 9 3/4, 10 1/2, and 11-inch ring-gear axles. The locking differential is supplied by Eaton.

REAR AXLE OPERATION

A basic differential has a set of four gears. Two are side gears and two are pinion gears. Some differentials have more than two pinion gears. Each side gear is splined to an axle shaft; so each axle shaft turns when its side gear rotates.

The pinion gears are mounted on a differential pinion shaft, and the gears are free to rotate on this shaft. The pinion shaft is fitted into a bore in the differential case and is at right angles to the axle shafts.

Power is transmitted through the differential as follows: the drive pinion rotates the ring gear. The ring gear, being bolted to the differential case, rotates the case. The differential pinion, as it rotates with the case, forces the pinion gears against the side gears. When both wheels have equal traction, the pinion gears do not rotate on the pinion shaft because the input force on the pinion gear is equally divided between the two side gears. Therefore, the pinion gears revolve with the pinion shaft, but do not rotate around the shaft itself. The side gears, being splined to the axle shafts and in mesh with the pinion gears, rotate the axle shafts.

If a vehicle were always driven in a straight line, the ring and pinion gears would be sufficient. The axle shaft could then be solidly attached to the ring gear and both driving wheels would turn at equal speed.

However, if it became necessary to turn a corner, the tires would scuff and slide because the outside wheel would travel further than the inside wheel. To prevent tire scuffing and sliding, the differential allows the axle shafts to rotate at different speeds.

When the vehicle turns a corner, the inner wheel turns slower than the outer wheel and slows its rear axle side gear (as the axle shaft is splined to the side gear). The rear axle pinion gears will roll around the slowed rear axle side gear, driving the other rear axle side gear and wheel faster.

LOCKING REAR AXLE

The locking rear differential allows for normal differential function as indicated in the standard rear axle description. Additionally, the locking rear differential uses multi-disc clutch packs and a speed sensitive engagement mechanism that locks both wheels together if one wheel should spin excessively during slow vehicle operation.

Under light loads, the clutch plates alone tend to lock axle shafts to the differential case, and therefore, each other. This is due primarily to the gear separating load developed on the right clutch pack. This induced clutch torque capacity resists motion between the side gear and the rear axle differential case. The differential allows the wheels to turn at different speeds while the axle shafts continue to transmit the driving force. Also, heavier throttle application will cause an axle speed differential, but this starts the full-lock feature of the unit.

Full locking is accomplished through the use of a heavyweight governor mechanism, cam system, and multi-disc clutch packs. The flyweights on the governor mechanism move outward to engage a latching bracket whenever the wheel-to-wheel speed varies by approximately 100 rpm or more. This action retards a cam which, in turn, compresses the multi-disc clutch packs locking both side gears to the case. The 100 rpm wheel-to-wheel speed allows for cornering without differential lockup.

At vehicle speeds above approximately 32 km/h (20 mph), the latching bracket overcomes a spring preload and swings away from the flyweights. At this vehicle speed or greater, the differential is designed to not lock, since added traction is generally not needed.

All axle parts of vehicles equipped with the locking rear axle are interchangeable with those equipped with the conventional rear axle, except for the case assembly.

DIAGNOISIS OF REAR AXLE NOISE

DETERMINING REAR AXLE NOISE

Proper diagnosis is an important part of rear axle repair. In axle work one of the most difficult conditions to diagnose is noise. Locating a broken axle shaft or broken differential gear presents little or no problem, but locating and isolating axle noise can be an entirely different matter.

Any gear-driven unit, especially an automotive drive axle where engine torque multiplication occurs at a 90 degree turn in the drive line, produces a certain amount of noise. Therefore, an interpretation must be made for each vehicle to determine whether the noise is normal or if a problem actually exists. A certain amount of noise must be expected and cannot be eliminated by conventional repairs or adjustment.

Normal axle noise can be described as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, the noise tends to reach a peak at speeds from 60 to 100 km/h (40 to 60 mph) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way indicative of trouble in the axle assembly.

Driveline noises may confuse even the best technician. Vehicle noises coming from tires, transmission, propeller shaft, universal joints, and front or rear wheel bearings are often mistaken for axle noise. Such prac-

tices as raising tire pressure to eliminate tire noise (although this will not silence tread noise of mud and snow tires), or listening for the noise at varying speeds and road surfaces, (drive, float, and coast conditions) will aid in locating the source of alleged axle noises. Every effort should be made to isolate the noise to a specific driveline component instead of making a random guess that could be a costly waste of time.

External Noise—Noise which seems to be coming from the rear axle may actually be produced somewhere else. Determine whether the noise might originate in the tires, road surface, front wheel bearings, engine, or transmission.

Road Noise—Driving on certain road surfaces, such as brick or rough-surfaced concrete, cause noise which may be mistaken for tire or rear axle noise. Driving on a different type of road, such as smooth asphalt or dirt, will quickly show whether the road surface is the cause of noise. Road noise usually is the same in drive or coast.

Tire Noise—Tire noise may easily be mistaken for rear axle noise, even though the noisy tires may be located on the front wheels. Tires worn unevenly, or having surfaces on non-skid divisions worn in saw-tooth fashion, are usually noisy and may produce vibrations which seem to originate elsewhere in the vehicle. This is particularly true with low tire pressure.

Tire Noise Test—Tire noise changes with different road surfaces, but rear axle noise does not. Temporarily inflating all tires to 345 kPa (50 psi) pressure, **for test purposes only**, will materially alter noise caused by tires but will not affect noise caused by the rear axle. Rear axle noise usually stops when coasting at speeds under 30 mph; however, tire noise continues but with lower tone as the vehicle speed is reduced. Rear axle noise usually changes when the tire "pulls" in a forward direction or when the vehicle "coasts" down the road and tire noise remains about the same.

Engine and Transmission Noises—Sometimes a noise which seems to originate in the rear axle is actually caused by the engine or transmission. To determine which unit is actually causing the noise, observe approximate vehicle speeds and conditions under which the noise is most pronounced; then stop the vehicle in a quiet place to avoid interfering noises. With the transmission in neutral, run the engine slowly up and down through the engine speeds corresponding to the vehicle speed at which the noise was most pronounced. If a similar noise is produced with the vehicle standing, it is caused by the engine or transmission and not the rear axle.

Front Wheel Bearing Noise—Loose or rough front wheel bearings will cause noise which may be confused with rear axle noise; however, front wheel bearing noise does not change when comparing "pull" and "coast" conditions. Light application of the brake, while holding the vehicle speed steady, will often cause the wheel bearing noise to diminish, since this takes some weight off of the bearing. Front wheel bearings may be easily checked for noise by jacking up the wheels and spinning them, and also by shaking the wheels to determine if the bearings are excessively loose.

Body Boom Noise or Vibration—Objectional "body boom" noise or vibration at 55-65 mph (90-100 km/h) can be caused by an unbalanced propeller shaft. Excessive looseness at the spline can contribute to this unbalance.

Other items that may also contribute to the noise problem are as follows:

- Undercoating or mud on the shaft, causing unbalance.
- Shaft or companion flange balance weights missing.
- Shaft damage, such as bends, dents, or nicks.
- Rough tires. Switch tires from a known good vehicle to determine a tire fault.

If, after making a comprehensive check of the vehicle, all indications point to the rear axle, further diagnostic steps are necessary to determine the axle components at fault. True rear axle noise generally falls into two categories: gear noise and bearing noise.

Rear Axle Noises—If a careful test of the vehicle shows that the noise is not caused by external items, it is then reasonable to assume that noise is caused by the rear axle assembly. Test the rear axle on a smooth level road to avoid road noise. It is not advisable to test the rear axle for noise by running with the rear wheels jacked up.

Noise in the rear axle assembly may be caused by a faulty propeller shaft, faulty rear wheel bearings, faulty differential or pinion shaft bearings, misalignment between two U-joints, or worn differential side gears and pinions. Noise may also be caused by a mismatched, improperly adjusted, or scored ring and pinion gear set.

Rear Wheel Bearing Noise—A rough rear wheel bearing produces a vibration or growl which continues with the vehicle coasting and the transmission in neutral. A brinelled rear wheel bearing causes a knock or click approximately every two revolutions of the rear wheel, since the bearing rollers do not travel at the same speed as the rear axle and wheel. With the rear wheels jacked up, spin the rear wheels by hand while listening at the hubs for evidence of a rough or brinelled wheel bearing.

Differential Side Gear and Pinion Noise—Differential side gears and pinions seldom cause noise since their movement is relatively slight on straight ahead driving. Noise produced by these gears will be most pronounced on turns.

Pinion bearing failures can be determined by how the bearings rotate at higher speeds as opposed to differential side bearings and axle shaft bearings. Rough or brinelled pinion bearings produce a continuous low-pitched whirring or scraping noise starting at a low speed.

Side bearings produce a constant rough noise pitched lower than pinion bearing noise. Side bearing noise may also fluctuate in the previous rear wheel bearing test.

Gear Noise—There are two basic types of gear noise. The first type is produced by broken, bent, or forcibly damaged gear teeth and is usually quite audible over the entire speed range and presents no particular problem in diagnosis. For example, hypoid gear tooth scoring generally results from the following: insufficient lubricant, improper break-in, incorrect lubricant, insufficient gear backlash, improper ring and pinion gear

alignment, or loss of drive pinion nut torque. The scoring will progressively lead to complete erosion of the gear tooth, or gear tooth pitting and then eventual fracture if the initial scoring condition is not corrected (figure 1).

Other causes of hypoid tooth fracture are extended overloading of the gear set which will produce fatigue fracture, or shock loading which will result in sudden malfunction.

Differential pinion and side gears rarely give trouble. Common causes of differential malfunction are shock loading, extended overloading, and seizure of the differential pinions to the cross shaft resulting from excessive wheel spin and consequent lubrication breakdown. The second type of gear noise pertains to the mesh pattern of the gear teeth. This form of abnormal gear noise can be recognized because it produces a cycling pitch (whine) and will be very pronounced in the speed range at which it occurs, appearing under either "drive," "float," or "coast" conditions. "Drive" is acceleration or heavy pull. "Coast" is allowing the vehicle roll down the road without accelerating and "float" is lightly stepping on the accelerator pedal to keep the vehicle from driving the engine; the vehicle slows down gradually but the engine still pulls slightly. Gear noise tends to peak

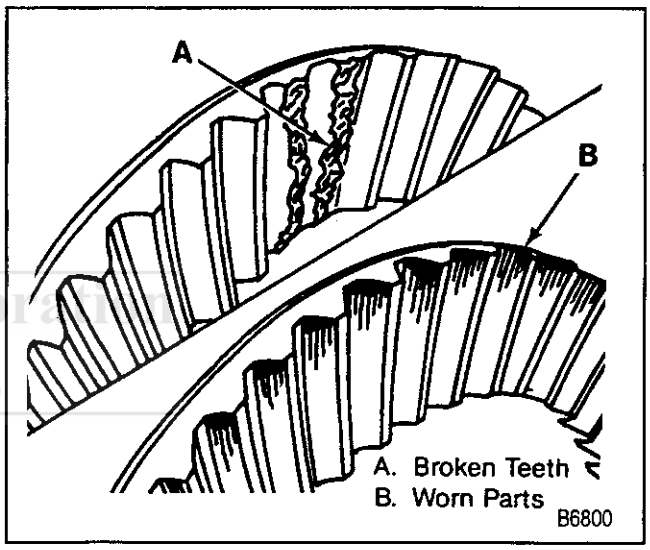


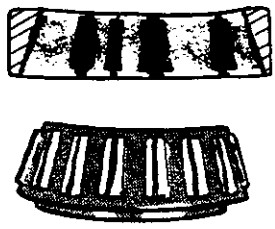
Figure 1—Causes of Gear Noise

in a narrow speed range or ranges and will tend to remain constant in pitch. Bearing noise will vary in pitch with vehicle speeds.

Refer to figures 2 and 3 for bearing diagnosis.

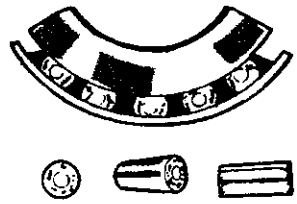
TAPERED ROLLER BEARING DIAGNOSIS

Consider the following factors when diagnosing bearing condition:
1. General condition of all parts during disassembly and inspection.
2. Classify the failure with the aid of the illustrations.
3. Determine the cause.
4. Make all repairs following recommended procedures.



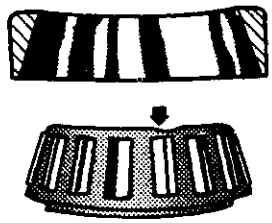
ABRASIVE ROLLER WEAR

Pattern on races and rollers caused by fine abrasives.
Clean all parts and housings, check seals and bearings and replace if leaking, rough or noisy.



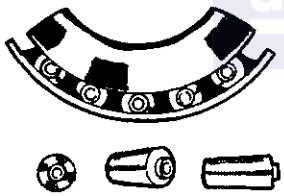
GALLING

Metal smears on roller ends due to overheat, lubricant failure or overload.
Replace bearing, check seals and check for proper lubrication.



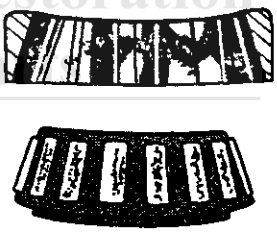
BENT CAGE

Cage damaged due to improper handling or tool usage.
Replace bearing.



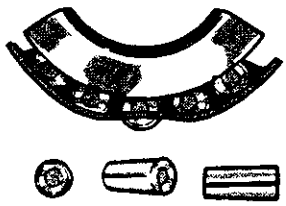
ABRASIVE STEP WEAR

Pattern on roller ends caused by fine abrasives.
Clean all parts and housings, check seals and bearings and replace if leaking, rough or noisy.



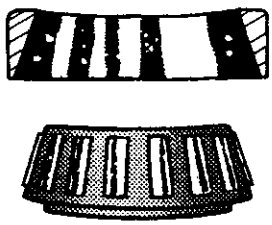
ETCHING

Bearing surfaces appear gray or grayish black in color with related etching away of material usually at roller spacing.
Replace bearings, check seals, and check for proper lubrication.



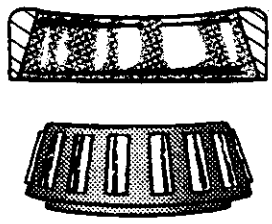
BENT CAGE

Cage damaged due to improper handling or tool usage.
Replace bearing.



INDENTATIONS

Surface depressions on race and rollers caused by hard particles of foriegn material.
Clean all parts and housings. Check seals and replace bearings if rough or noisy.



MISALIGNMENT

Outer race misalignment due to foreign object.
Clean related parts and replace bearing. Make sure races are properly sealed.

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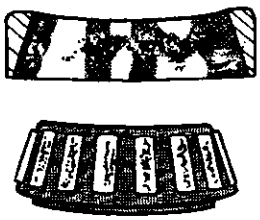
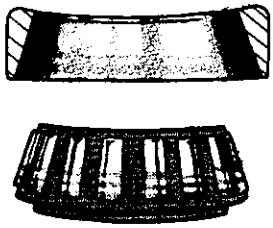
Figure 2—Diagnosis of Tapered Roller Bearings

Diagnosis of Tapered Roller Bearings (con't)



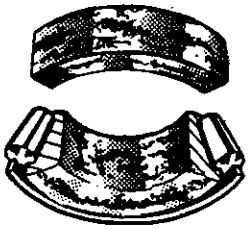
FATIGUE SPALLING

Flaking of surface metal resulting fron fatigue.
Replace bearing, clean all related parts.



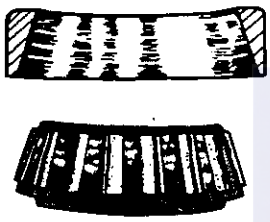
STAIN DISCOLORATION

Discoloration can range fron light brown to black caused by incorrect lubricant or moisture.
Re-use bearings if stains can be removed by light polishing or if no evidence of overheating is observed.
Check seals and related parts for damage.



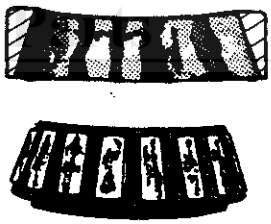
FRETTAGE

Corrosion set up by small relative movement of parts with no lubrication.
Replace bearing. Clean related parts.
Check seals and check for proper lubrication.



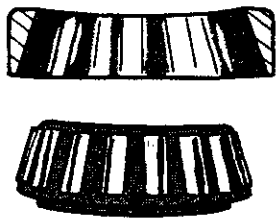
CAGE WEAR

Wear around outside diameter of cage and roller pockets caused by abrasive material and inefficient lubrication.
Clean related parts and housings.
Check seals and replace bearings.



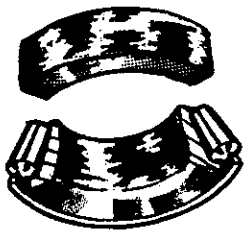
HEAT DISCOLORATION

Heat discoloration can range from faint yellow or dark blue resulting from overload or incorrect lubricant. Excessive heat can cause softening of races or rollers. To check for loss of temper on races or rollers a simple file test may be made. A file drawn over a tempered part will grab and cut metal, whereas, a file drawn over a hard part will glide readily with no metal cutting.
Replace bearings if overheating damage is indicated.
Check seals and other parts.



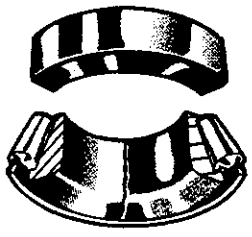
BRINELLING

Surface indentations in raceway caused by rollers either under impact loading or vibration while the bearing is not rotating.
Replace bearing if rough or noisy.



SMEARS

Smearing of metal due to slippage. Slippage can be caused by poor fits, lubrication, overheating, overloads or handling damage.
Replace bearings, clean related parts and check for proper fit and lubrication.



CRACKED INNER RACE

Race cracked due to improper fit, cocking, or poor bearing seats.
Replace bearing and correct bearing seats.

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Figure 3—Diagnosis of Tapered Roller Bearings

ON-VEHICLE SERVICE

SEMI-FLOATING AXLE (8 1/2 AND 9 1/2-INCH RING GEAR)

VENT HOSE REPLACEMENT

The axle vent hose is located on the axle carrier on 8 1/2, 9 1/2, and 10 1/2-inch ring gear axles.

Remove or Disconnect (Figure 4)

1. Vent clamp bolt from the brake bracket.
2. Clamp from the brake bracket.
3. Vent assembly from the hose.
4. Clamp from the hose.
5. Hose clamp bolt from the hose clamp and the brake junction block, (8 1/2 and 9 1/2 inch ring gear axles only).
6. Hose clamp and hose from the axle nipple.
7. Hose clamp from the hose.

Install or Connect (Figure 4)

NOTICE: Refer to "Notice" on page 4B1-1.

1. Hose clamp to the hose.
2. Hose clamp and hose to the axle nipple.
3. Hose clamp bolt to the hose clamp and the brake junction block (8 1/2 and 9 1/2-inch ring gear axles only).
4. Clamp to the hose.
5. Vent assembly to the hose.
6. Clamp to the brake bracket.
7. Vent clamp bolt to the brake bracket.

REAR AXLE ASSEMBLY REPLACEMENT

- Raise the vehicle on a hoist and support the axle assembly with a suitable lifting device.
- For 10 1/2-inch ring gear axles, raise the vehicle and place jack stands under the frame side rails for support.
- Drain the lubricant from the axle housing.

Remove or Disconnect (Figure 4)

1. Propeller shaft. Refer to SECTION 4A.
   - Tie the propeller shaft to a side rail or crossmember.
   - Tape the bearing cups to prevent loss of the needle bearings.
2. Wheel and brake drum or hub and drum assembly. Refer to SECTION 5A2.
3. Parking brake cable from the lever and at the brake backing plate.

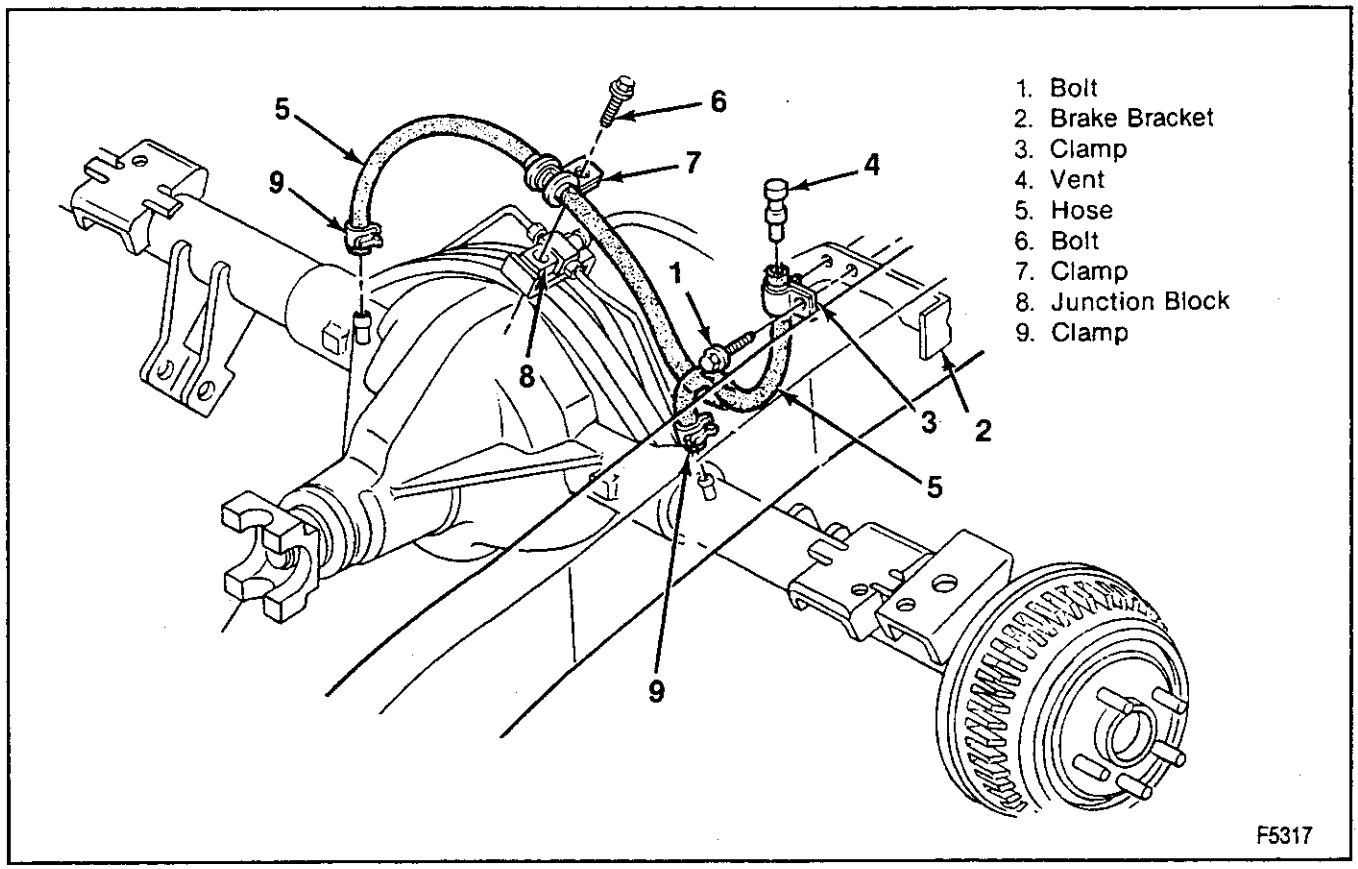


Figure 4—Axle Vent Hose

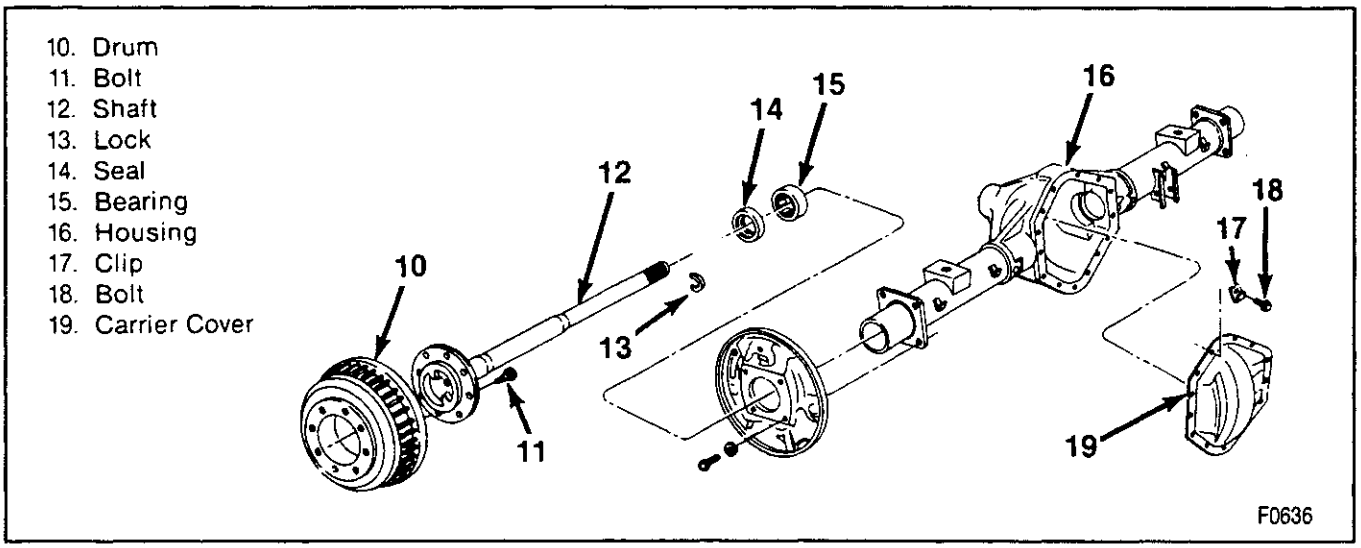


Figure 5—Axle Shaft and Housing Components

4. Hydraulic brake pipes from the connectors.
5. Shock absorbers from the axle brackets.
6. Vent hose from the axle vent fitting.
7. Height sensing and brake proportional valve brackets if used.
   - Support the assembly with a hydraulic floor jack.
8. Nuts and washers from the U-bolts.
9. U-bolts, spring plates, and spacers from the axle assembly.
   - Lower the jack and the axle assembly.

Install or Connect (Figure 4)

1. Axle assembly under the vehicle.
   - Align the axle assembly with the springs.
2. Spacers, spring plates, and U-bolts to the axle assembly.
   - Raise the axle assembly.
3. Washers and nuts to the U-bolts.
   - Thread the nuts on firmly.
   - Adjust alignment of semi-float axles.
4. Height sensing and brake proportional valve linkage (if used).
5. Vent hose to the axle vent fitting (if used).
6. Shock absorbers to the axle brackets.
7. Hydraulic brake pipes to the connectors.
8. Parking brake cable to the lever and the backing plate.
9. Wheel and brake drum or hub and drum assembly.
10. Propeller shaft.

NOTICE: Refer to "Notice" on page 4B1-1.

Tighten

- All fasteners to "Specifications" at the end of this section.

Important

A. Check axle lubricant level at the filler plug hole. Lubricate as needed. Refer to SECTION 0B.
B. Bleed the brake system, check operation, and adjust if necessary. Refer to SECTION 5.
C. Check axle and brake operation.
D. Check for fluid leaks and road test the vehicle.

AXLE SHAFT, OIL SEAL, AND BEARING REPLACEMENT

Tools Required:
J 2619-01 Slide Hammer with Adapter
J 23689 Axle Shaft Bearing Remover (large shaft)
J 29712 Axle Shaft Bearing Remover (9 1/2-inch ring gear)

Remove or Disconnect (Figures 5 through 11)

- Raise the vehicle on a hoist.

1. Wheel and tire assembly.
2. Brake drum.
   - Clean the dirt from around the carrier cover.
3. Carrier cover.
   - Catch the oil in a drain pan.

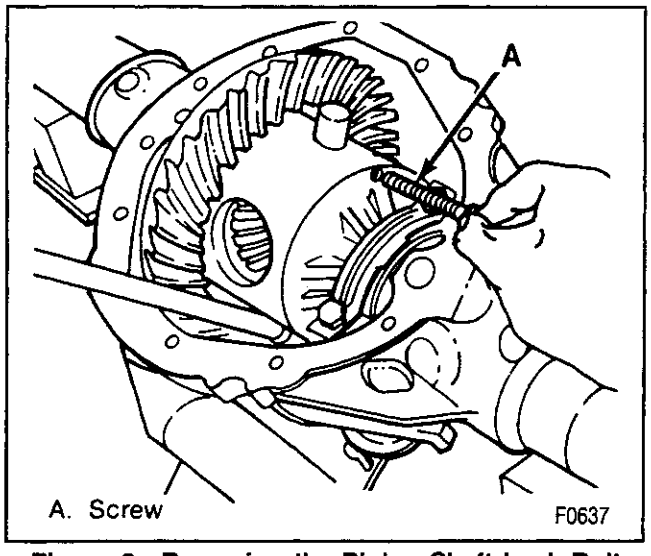


Figure 6—Removing the Pinion Shaft Lock Bolt

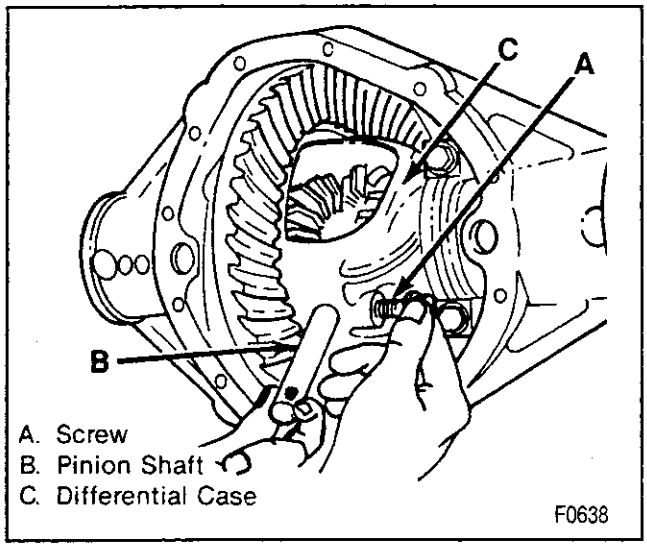


Figure 7—Removing/Installing the Pinion Shaft

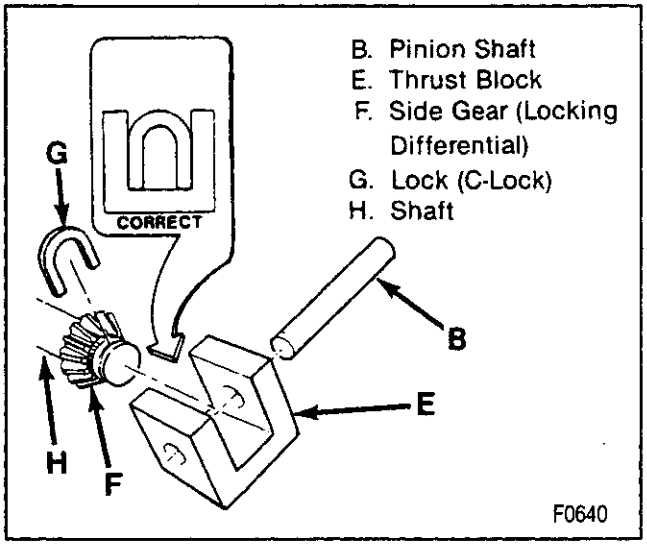


Figure 9—Aligning the Lock

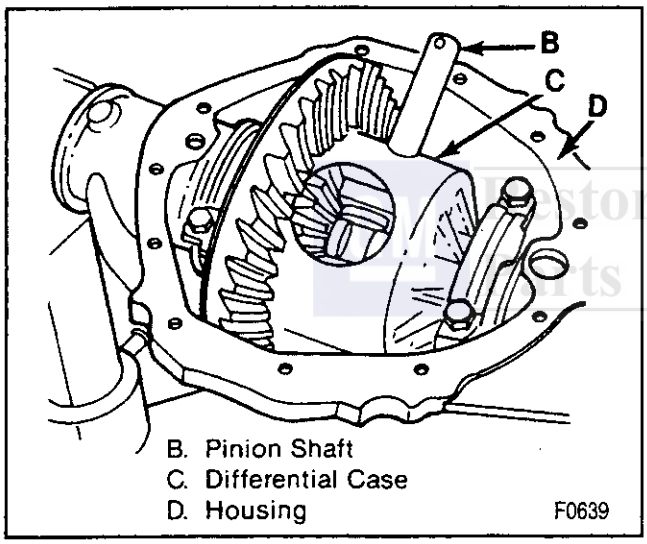


Figure 8—Positioning the Case for Best Clearance

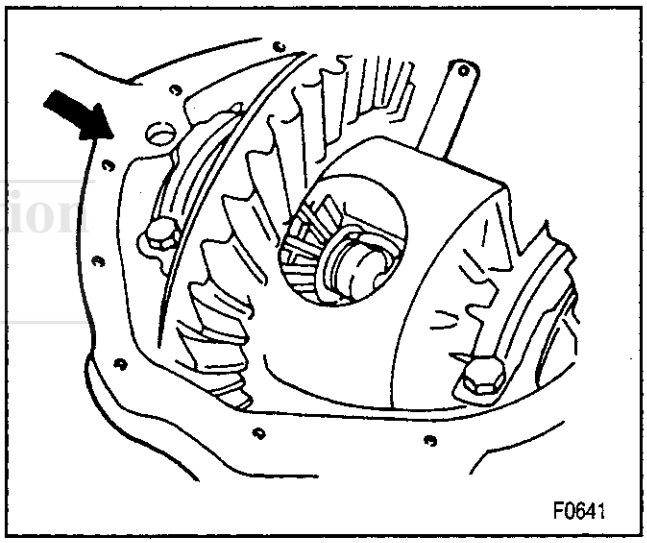


Figure 10—Pushing the Axle Shaft Inward

- Remove gasket material if used.

4. Screw (A).
5. Pinion shaft (B).
   - Remove the shaft from the case on vehicles without a locking differential.
   - With a locking differential, remove the shaft (B) part way, and rotate the case until the pinion shaft touches the housing.
   - Use a screwdriver or similar tool to enter the case and rotate the lock until it aligns with the thrust block.
6. Lock (figure 9).
   - Push the flange of the axle shaft towards the differential. Do not force or hammer the shaft to move the axle shaft (figure 10).
   - Remove the lock from the button end of the axle shaft.
7. Axle shaft.
   - Slide the axle shaft out, being careful not to damage the seal.
8. Seal using J 23689.
9. Bearing.
   A. Use J 23689 for 8 1/2-inch ring gear axle or J 29712 for 9 1/2-inch ring gear to pull the bearing from the axle.
   B. Insert the tool into the axle bore so that it grasps behind the bearing (figure 11). Tighten the nut and washer against the face of the bearing. Pull the bearing out using J 2619-01.

Inspect

- All parts. Replace as necessary.

Install or Connect (Figures 5, 9, 12, and 13)

NOTICE: For steps 6 and 9, refer to "Notice" on page 4B1-1.

Tools Required:
J 8092 Driver Handle
J 21128 Axle Shaft and Pinion Oil Seal Installer
J 23690 Axle Shaft Bearing Installer
J 29709 Axle Shaft Bearing Installer
(9 1/2-inch ring gear)
J 29713 Axle Shaft Seal Installer
(9 1/2-inch ring gear)

- Lubricate the axle cavity between the seal lips and the bearing with wheel bearing lubricant. Refer to SECTION 0B.

1. Bearing.
   - Use J 23690 for the 8 1/2-inch gear axle and J 29709 for the 9 1/2-inch ring gear axle.
   - Bearing into the axle housing until the tool bottoms against the tube. Refer to figure 12.
2. Seal.
   - Use J 21128 for 8 1/2-inch ring gear axle and J 29713 for the 9 1/2-inch ring gear axle.
   - Drive the tool into the bore until the seal bottoms flush with the end of the tube (figure 13).
3. Axle shaft.
   - Be careful not to damage the seal when inserting the axle shaft.
   - Slide the axle shaft into place allowing the splines to engage the differential side gear (F) (figure 9).
4. Lock.
   - Without locking differential:
     — Place the lock on the button end of the axle shaft, then pull the shaft flange outward to seat the lock in the differential side gear.
   - With locking differential:
     A. Keep the pinion shaft partially withdrawn (figure 7).
     B. Place the lock in the position shown in figure 9. Pull the shaft flange outward to seat the lock in the differential side gear.
5. Pinion shaft (figure 6).
   - Align the hole in the pinion shaft with the screw hole in the differential case.

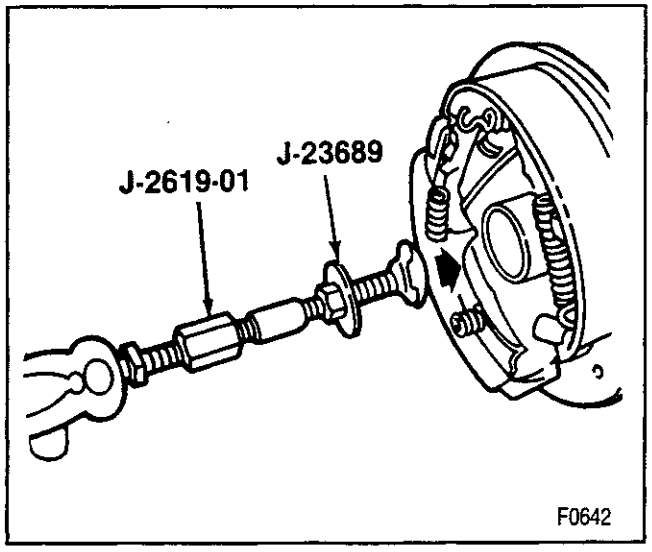


Figure 11—Removing the Bearing and Seal

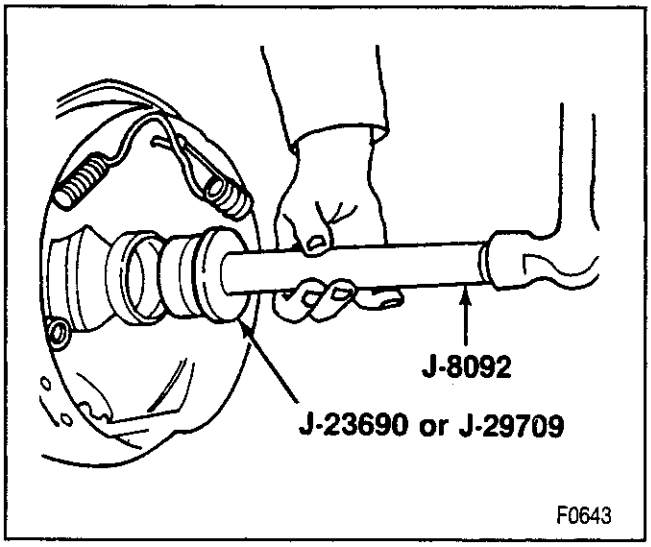


Figure 12—Installing the Wheel Bearing

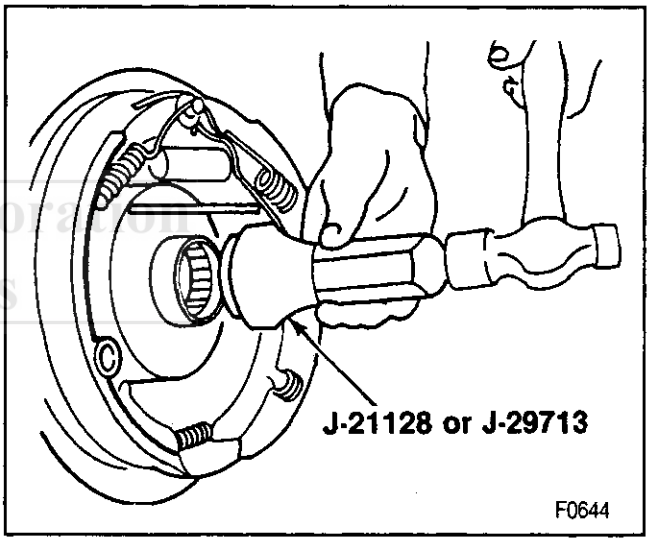


Figure 13—Installing the Seal

Important

- Anytime a differential pinion shaft locking screw is removed, it is important to coat the screw threads with Loctite 242 before reinstalling. These screws are coated with an adhesive which helps to prevent the screw from loosening in the case. When this screw is removed, the adhesive is also removed.

6. Screw (A).

Tighten

- Screw to 36 N·m (27 lbs. ft.).

7. Carrier cover gasket or RTV (if used).
8. Carrier cover.
9. Bolts and clip.

Tighten

- Bolts in a crosswise pattern to 41 N·m (30 lbs. ft.).

10. Brake drum.
11. Wheel and tire assembly.
    - Lower the vehicle.
12. Axle lubricant. Fill to the filler plug hole level. Refer to SECTION 0B.

BRAKE BACKING PLATE REPLACEMENT

- Raise the vehicle on a hoist.

Remove or Disconnect (Figure 5)

1. Wheel, tire, and brake drum.
2. Axle shaft. Refer to "Axle Shaft Replacement."
3. Brake pipe from the wheel cylinder.
4. Brake components from the backing plate. Refer to SECTION 5.
5. Bolts and washers from the axle.
6. Backing plate.

Install or Connect (Figure 5)

1. Backing plate to the axle.
2. Bolts and washers to the plate.
3. Brake components to the backing plate. Refer to SECTION 5.
4. Brake pipe to the wheel cylinder.
    - Refer to SECTION 5 for bleeding and adjustment procedure.
5. Axle shaft. Refer to "Axle Shaft Replacement."
6. Wheel, tire, and brake drum.

WHEEL STUD REPLACEMENT

- Raise the vehicle on a hoist and allow the axle to hang free.

Remove or Disconnect

Tool Required:
J 6627-A Wheel Stud Remover

1. Wheel, tire, and brake drum.
2. Stud from the axle flange using J 6627-A (figure 14).

Install or Connect

1. Stud in the axle flange hole.
    A. Start the new stud into the axle flange hole by pressing firmly with your hand.
    B. Thread on a lug nut with the flat side to the vehicle.
    C. Tighten the lug nut and draw the stud into the rear of the flange.
    D. Thread the lug nut off.
2. Wheel, tire and brake drum.
    - Lower the vehicle.

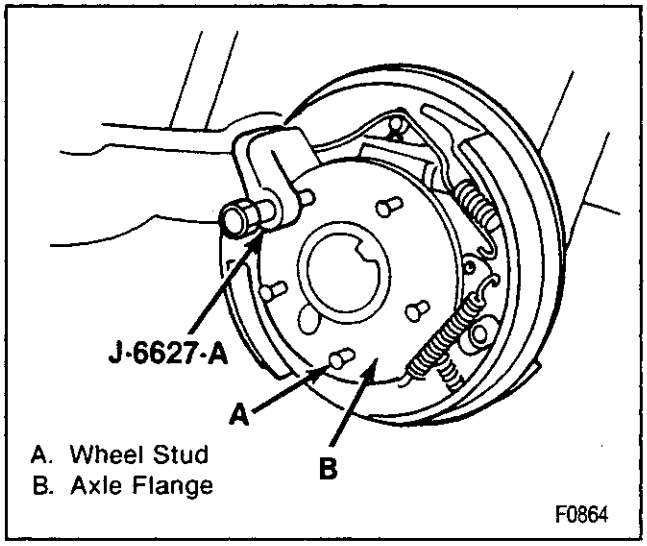


Figure 14—Pressing Out a Wheel Stud

PINION FLANGE AND DUST DEFLECTOR/OIL SEAL REPLACEMENT

Remove or Disconnect (Figures 15 through 18)

Tool Required:
J 8614-01 Companion Flange Holder and Remover

- Raise the vehicle on a hoist.

1. Propeller shaft from the axle.
    - Tie the propeller shaft to a frame rail or crossmember.

Measure

- The torque required to rotate the pinion (figure 15). Record the torque value for later reference.

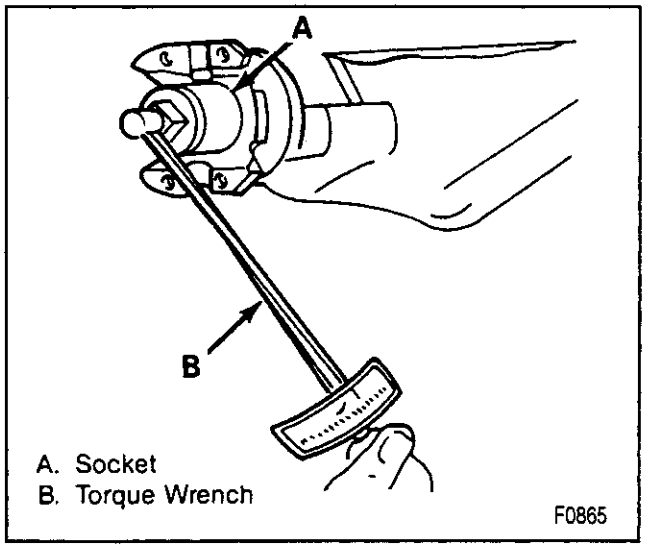


Figure 15—Measuring Pinion Rotating Torque

Important

- Scribe a line on the pinion stem, pinion nut and the companion flange and record the number of exposed threads on the pinion stem. Use the scribed reference and the exposed threads as a reinstallation guide (figure 16).

2. Nut using J 8614-01.
   - Position J 8614-01 on the flange so that the four notches on the tool face the flange (figure 17).
3. Flange using J 8614-01
   - Use the special nut and forcing screw to remove the flange (figure 18).
4. Oil seal using a seal removal tool.

Inspect

- The pinion flange for a smooth oil seal surface, for worn drive splines, damaged ears, and for smoothness of the bearing contact surface. Replace if necessary.

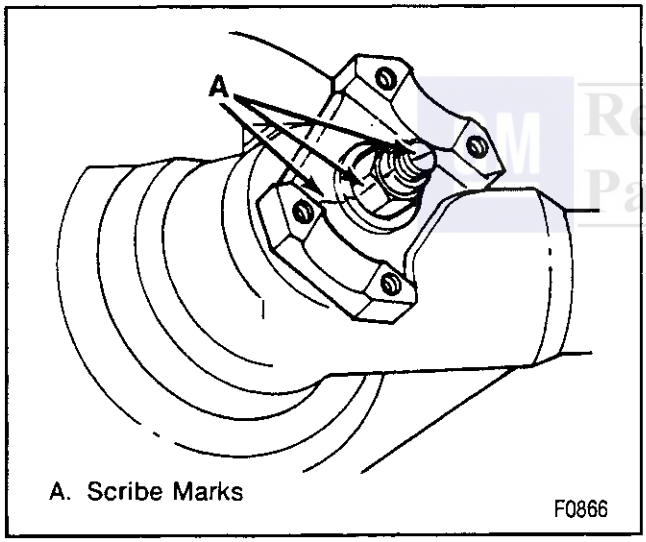


Figure 16—Scribed Marks

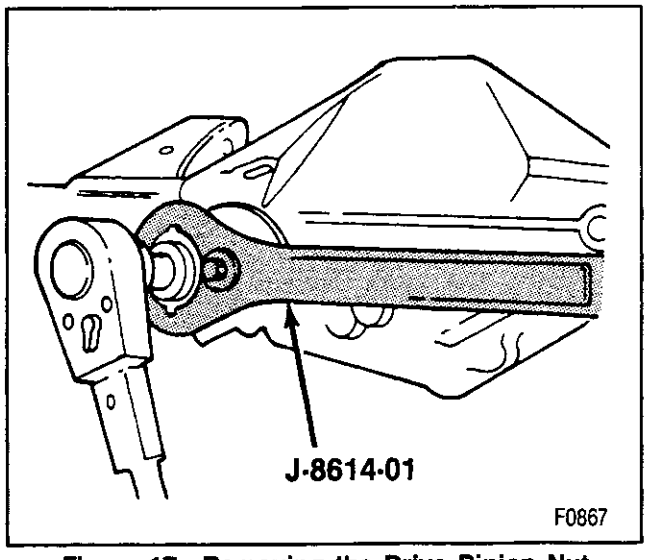


Figure 17—Removing the Drive Pinion Nut

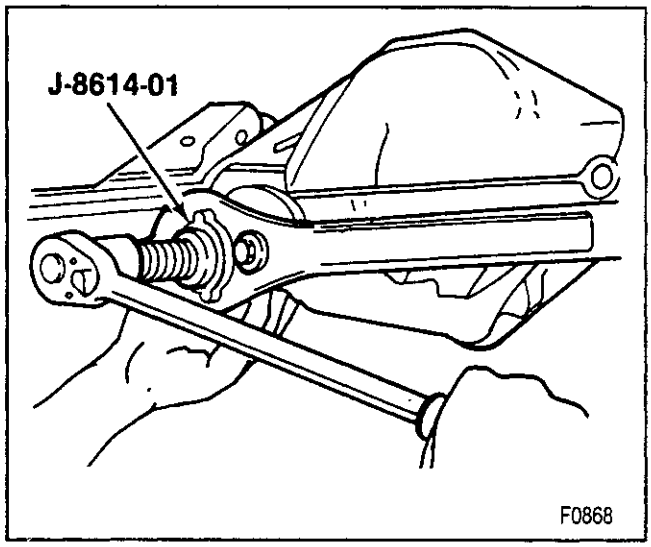


Figure 18—Removing the Drive Pinion Flange

5. Dust deflector.
   - Tap the deflector from the flange if replacement is necessary.
   - Clean up the stake points on the flange.
   - Clean all foreign material from the contact area.

Install or Connect (Figures 19 and 20)

Tools Required:
J 8614-01 Companion Flange Holder and Remover
J 22388 Pinion Oil Seal Installer (9 1/2-inch ring gear)
J 22804-1 Pinion Oil Seal Spacer
J 22836 Pinion Seal Installer (8 1/2-inch ring gear)

1. Dust deflector on the flange.
   - Stake new deflector at three new equally spaced positions. Staking must be such that the seal operating surface is not damaged.
2. Oil seal.
   A. Pack the cavity between the lips of the oil seal with extreme pressure lithium-base lubricant.
   B. Position the oil seal in the bore. Then place J 22804-1 over the oil seal and flat against the seal flange (figure 19).

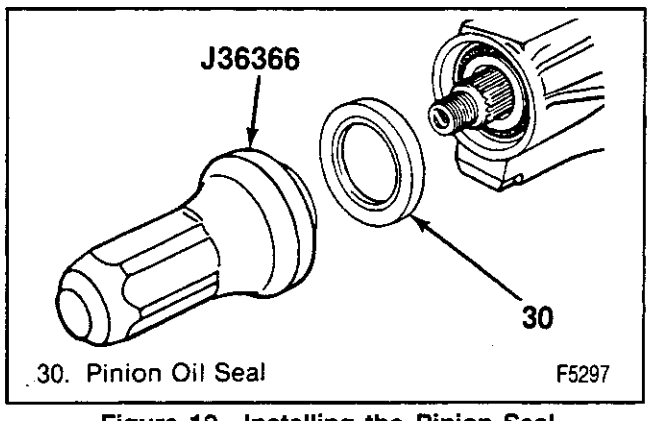


Figure 19—Installing the Pinion Seal

C. Use J 22836 for the 8 1/2-inch ring gear or J 22388 for the 9 1/2-inch ring gear to press the oil seal into the bore.
D. Turn J 22804-1 from installed position 180 degrees to ensure proper installation against the pinion flange.

NOTICE: Refer to "Notice" on page 4B1-1.

3. Flange onto the pinion using J 8614-01 (figure 20).
   • Place washer and nut on the pinion threads and tighten the nut to the original scribed position using the scribe marks and exposed threads as a reference (figure 16).

NOTICE: Do not hammer the pinion flange onto the pinion shaft or the pinion flange may be damaged.

Measure

• The rotating torque of the pinion and compare with the torque recorded earlier (figure 15).

Tighten

• The pinion nut in additional small increments until the torque necessary to rotate the pinion exceeds the original recorded value by 0.35 N·m (3 lbs. in.).

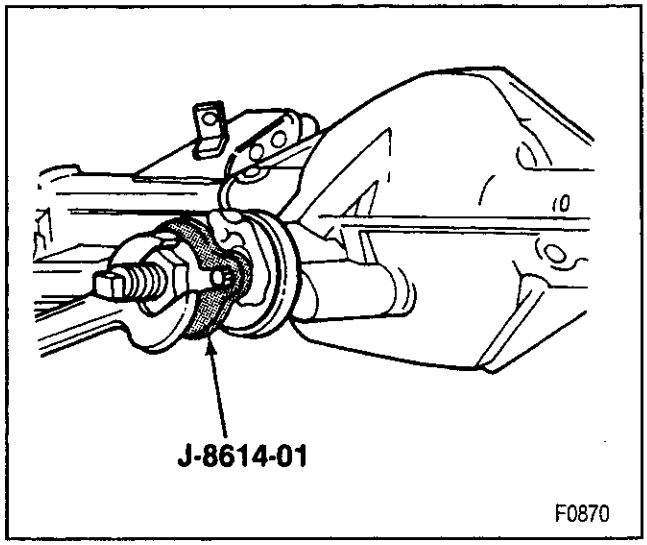


Figure 20—Installing the Pinion Flange

4. Propeller shaft.
   • Lower the vehicle and road test.

FULL-FLOATING AXLE (10 1/2-INCH RING GEAR)

AXLE SHAFT REPLACEMENT

Remove or Disconnect (Figure 21)

1. Bolts.
   • Rap the axle shaft flange lightly with a soft-faced hammer to loosen the shaft.
   • Grip the rib on the axle shaft flange with a locking plier and twist, to start shaft removal.
2. Axle shaft from the tube.

Clean

• Axle shaft flange. Remove old RTV or gasket.
• Outside face of the hub assembly.

Inspect

• All parts and replace as necessary.

Install or Connect

1. Axle shaft with a gasket or RTV applied.
   • Be sure the shaft splines mesh into the differential side gear.
   • Align the axle shaft holes with the hub holes.

NOTICE: Refer to "NOTICE"on page 4B1-1.

2. Bolts.

Tighten

• Bolts to 156 N·m (115 lbs. ft.).

HUB AND DRUM ASSEMBLY REPLACEMENT

Remove or Disconnect (Figure 21)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

• Raise the vehicle until the wheel is free to rotate.
1. Wheel and tire.
2. Axle shaft as outlined earlier in this section.
3. Retaining ring.
4. Key.
5. Adjusting nut.
6. Washer.
7. Hub and drum.

Inspect

• All parts and replace as necessary.

Install or Connect (Figures 21 and 22)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

1. Hub and drum to the tube.
   • Be sure the bearings and the oil seal are positioned properly.
   • Apply a light coat of high melting point EP bearing lubricant to the contact surfaces and the outside of the axle tube.

2. Washer.
   • Place the tang into the keyway.
3. Adjusting nut.

Adjust

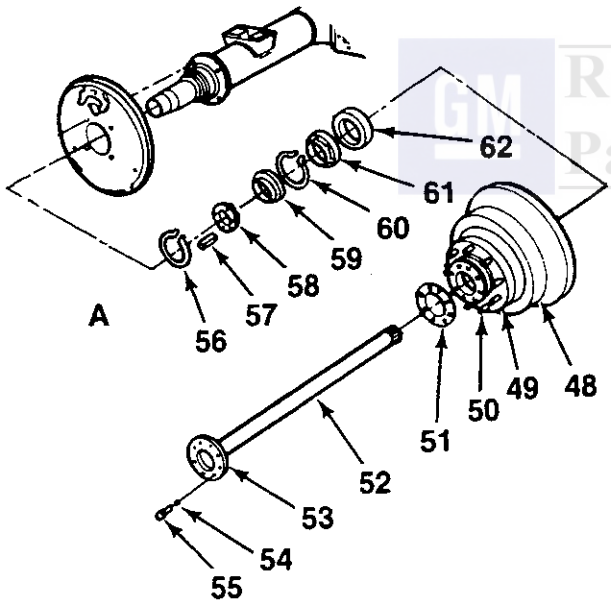
   • Bearing preload. Refer to "Bearing Adjustment."
4. Key.
5. Retaining ring.
6. Axle shaft as described earlier in this section.
7. Wheel and tire.

• Lower the vehicle.

WHEEL BEARING/CUP REPLACEMENT

Remove or Disconnect (Figure 21 and 23)

Tools Required:
J 8092 Driver Handle
J 24426 Outer Wheel Bearing Cup Installer



A. Dana
48. Drum
49. Hub
50. Stud
51. Gasket
52. Shaft
53. Axle Shaft Flange
54. Washer
55. Bolt
56. Retaining Ring
57. Key
58. Adjusting Nut
59. Outer Bearing
60. Retaining Ring
61. Inner Bearing
62. Oil Seal

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Figure 21—Full Floating Axle, Hub, and Drum Assembly Components

• Raise the vehicle until the wheels are free to rotate.
1. Axle shaft as outlined earlier in this section.
2. Hub and drum as outlined earlier in this section.
3. Oil seal.
4. Inner bearing. Use a drift to remove the bearing and cup.
5. Retaining ring.
   • Use snap ring pliers to remove the ring.
6. Outer bearing using J 8092 with J 24426 (figure 23).
   • Drive the bearing and cup from the hub.

Clean

   • Old sealing compound from the oil seal bore in the hub.
   • Bearing assemblies in a solvent using a stiff brush to remove the old lubricant. Dry the bearings with compressed air. Do not spin them.

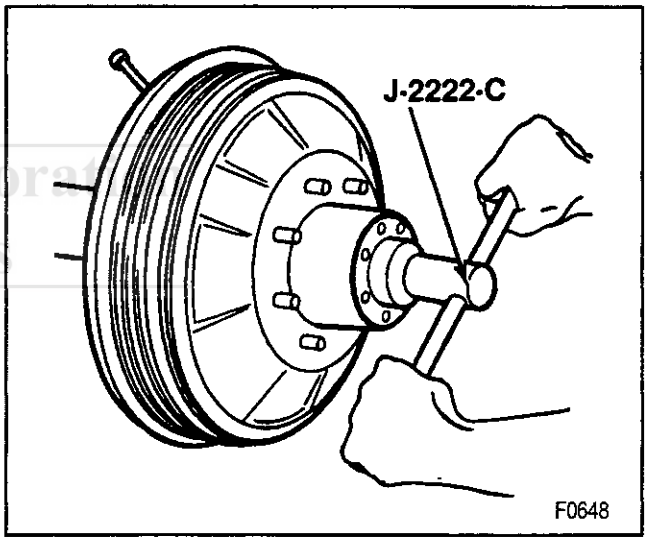


Figure 22—Removing or Installing Bearing Adjusting Nut

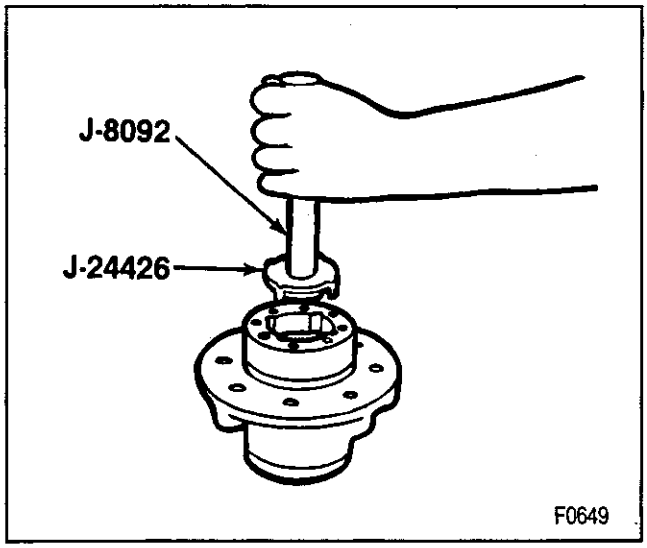


Figure 23—Removing or Installing the Outer Bearing Cup

- Lubricant from the axle housing and inside the hub.
- Gasket material from the hub and axle shaft.

Inspect

- Bearings for wear, chipped edges or other damage. Check for flat or rough spots on the rollers.
- Cups for pits and cracks.
- Replace parts as necessary.

Install or Connect (Figure 23)

Tools Required:
J 8092 Driver Handle
J 8608 Pinion Bearing Cup Installer
J 24426 Outer Wheel Bearing Cup Installer
J 24427 Inner Wheel Bearing Cup Installer
J 24428 Axle Shaft Seal Installer

1. Outer bearing cup into the hub.
   - Drive the cup into the hub using J 8092 and J 8608. Be sure J 8608 is installed upside down on J 8092 so that the chamfer does not contact the bearing cup. Drive the cup beyond the retaining ring groove.
2. Retaining ring into the groove.
   - Drive the cup back onto the retaining ring using J 24426.
3. Inner bearing cup using J 8092 and J 24427.
   - Drive the cup into place until it is seated against the hub shoulder.
4. Inner bearing.
5. New oil seal using J 24428.
6. Hub and drum assembly.
7. Outer bearing.

Adjust

- Bearing preload. Refer to "Bearing Adjustment."

8. Axle shaft.

NON-DEMOUNTABLE TYPE DRUM REPLACEMENT

Construction of this drum and hub assembly does not allow replacement with the hub assembly installed on the vehicle.

Remove or Disconnect

- Raise the vehicle on a hoist and support with suitable safety stands.

1. Hub and drum assembly. Refer to "Hub and Drum Assembly Replacement."
2. Retaining bolts, stud nuts, or wheel studs.
   A. Separate the drum, hub, and oil deflector.
   B. Press the wheel studs out of the drum. Replace parts as necessary.

Install or Connect

1. Drum to the hub.
   - Make certain that the drain holes are in alignment.
2. Oil deflector to the drum.
   - Apply a light coating of sealing compound to the oil deflector contact surface.
3. Retaining bolts, stud nuts, or wheel studs.
   - Press the wheel studs into the drum.

WHEEL BOLT REPLACEMENT

Wheel bolts are serrated and may also be swaged in place; however, replacement procedure remains the same for both types of installation. Press the wheel bolts out of the hub flange, then press new wheel bolts into place, making sure of a tight fit. When replacing all of the wheel bolts, make sure that the hub oil deflector is in position under the wheel bolt heads.

BEARING ADJUSTMENT

Make sure the brakes are fully released and do not drag. Check the wheel bearing play by grasping the tire at the top and pulling and pushing back and forth, or by using a pry bar under the tire. If the wheel bearings are properly adjusted, movement of the brake drum in relation to the brake backing plate will be barely noticeable and the wheel will turn freely. If the movement is excessive, adjust the bearings.

Remove or Disconnect (Figure 21 and 24)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

- Raise the vehicle until the wheel is free to spin.

1. Axle shaft. Refer to "Axle Shaft Replacement."
   - Be sure the keyway, threads, and adjusting nut are clean and free of chips, burrs, and shavings.
2. Retaining ring.

NOTICE: Refer to "Notice" on page 4B1-1.

3. Key.

Tighten

- Adjusting nut to 68 N·m (50 lbs. ft.) while rotating hub and drum assembly (figures 24 and 25).

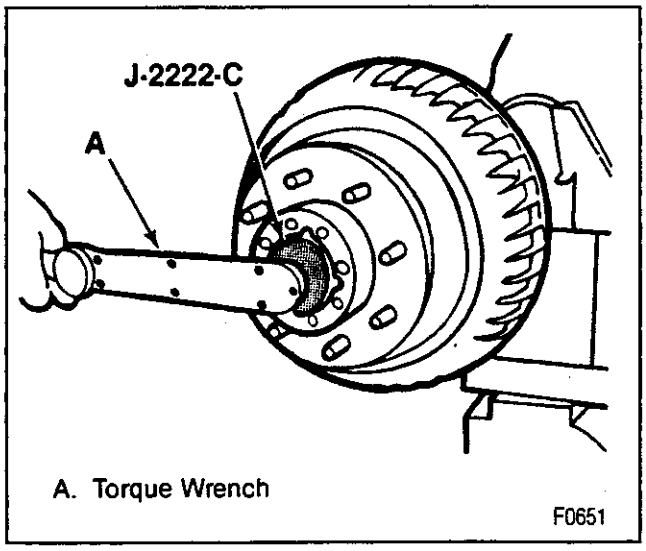


Figure 24—Tightening the Adjusting Nut

- Inner bearing roller assembly must be seated against spindle shoulder.

Adjust

- Nut. If adjusting nut slot is not aligned with keyway, back the nut off until just loose, but not more than one slot of the lock or the axle spindle using J 2222-C. Align the adjusting nut slot with the keyway in the axle spindle.

Install or Connect (Figure 23)

1. Key.
   - Key into the keyway and adjusting nut slot.
2. Retaining ring.
   - Be sure the retaining ring is seated.
3. Axle shaft. Refer to "Axle Shaft Replacement."

PINION OIL SEAL/COMPANION FLANGE REPLACEMENT

The pinion oil seal and the companion flange may be replaced with the carrier assembly installed in the vehicle.

Remove or Disconnect

Tools Required:
J 8614-01 Companion Flange Holder
J 8614-02 Companion Flange Remover

- Raise the vehicle on a hoist and support with safety stands.

1. Propeller shaft. Refer to SECTION 4A.
   - Tie the propeller shaft to a frame rail or crossmember.

Important

- Scribe a line on the pinion shaft, pinion nut, and companion flange to be used as a guide for reinstallation (figure 16).

2. Nut using J 8614-01 (figure 17).
   - Have a drain pan ready to catch the oil.

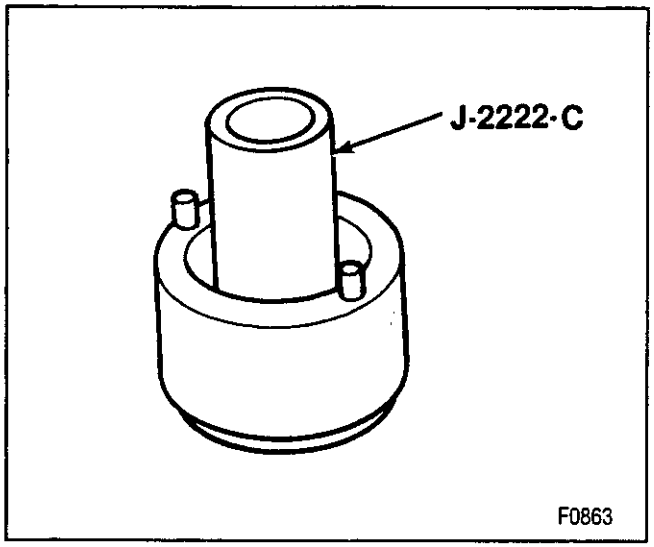


Figure 25—Wheel Bearing Nut Wrench

3. Flange using J 8614-02 (figure 18).
4. Oil seal.
   - Pry the oil seal from the bore. Do not damage the machined surfaces. Thoroughly clean foreign material from the contact area.
   - Replace parts as necessary.

Install or Connect

Tools Required:
J 8614-01 Companion Flange Holder
J 24384 Pinion Oil Seal Installer (Dana 10 1/2-inch ring gear axle).

1. Oil seal into the bore using J 24384.
   - Lubricate the cavity between the new seal lips with a high melting point bearing lubricant.
2. Flange using J 8614-01.
   - Use scribed marks for reinstallation.
3. Nut, using J 8614-01 (figure 17).
   - Use scribe mark as an installation reference.
4. Propeller shaft. Refer to SECTION 4A.

FULL FLOATING AXLE (11-INCH RING GEAR)

The following rear axle procedures apply to vehicles equipped with rear drum or disc brakes. If the model to be serviced has rear disc brakes, refer to SECTION 5B2 for the appropriate brake-related procedures.

AXLE SHAFT REPLACEMENT

Remove or Disconnect (Figures 26 and 27)

1. Bolts. If the vehicle is equipped with rear disc brakes the axle cap must also be removed (figure 27).
   A. Tap the axle shaft lightly with a soft-faced hammer to loosen the gasket.
   B. Grip the rib on the axle shaft with a locking plier and twist to start shaft removal.
2. Axle shaft from the tube.

Clean

- Axle shaft. Remove old RTV or gasket.
- Outside face of the hub assembly.

Inspect

- Shaft for abnormal wear at areas that ride in bearings.
- Shaft to see if it is bent.
- Shaft splines for chips, burrs, cracking, or if they are worn.

Replace if any of the above conditions exist.

Install or Connect (Figures 26 and 27)

1. Axle shaft with gasket (if used) or RTV applied.
   A. Be sure the shaft splines mesh into the differential side gear.

B. Align the axle shaft holes with the hub holes.

NOTICE: Refer to "Notice" on page 4B1-1.

2. Bolts (figures 26 and 27).

Tighten

- Bolts to 203 N·m (150 lbs. ft.).

HUB AND DRUM ASSEMBLY REPLACEMENT

Remove or Disconnect (Figures 27 and 28)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

- Raise the vehicle until the wheel is free to rotate.

1. Tire and wheel assembly.
2. Axle shaft. Refer to "Axle Shaft Replacement."

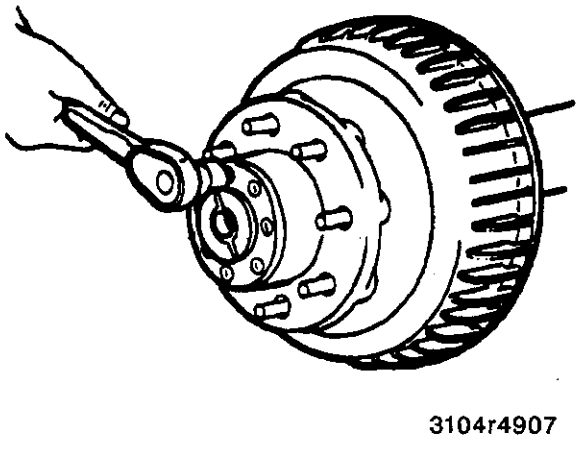


Figure 26—Removing or Installing Flange-to-Hub Bolts

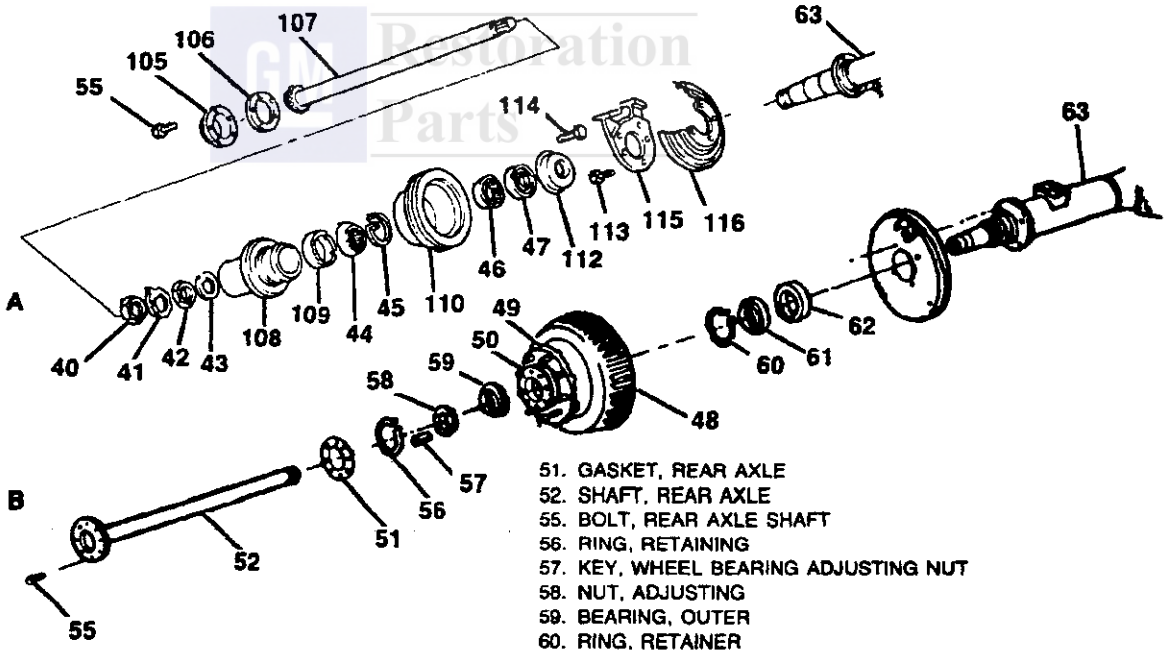


Figure 27—Full-Floating Axle, Wheel End Components

3. Nut using J 2222-C, or retaining ring. Refer to figure 28.
4. Lock or key.
5. Adjusting nut. Refer to figure 28.
6. Washer.
7. Hub and drum, or hub and rotor.

Inspect

- For any worn or damaged parts. Replace any part which appears defective.

Install or Connect (Figures 27 and 28)

NOTICE: For steps 3 and 5, refer to "Notice" on page 4B1-1.

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

1. Hub and drum, or hub and rotor to the tube.
   - Be sure the bearings and the oil seal are positioned properly.
   - Apply a light coat of high melting point EP bearing lubricant to the contact surfaces and the outside of the axle tube. Refer to SECTION 0B.
2. Washer.
   - Engage tang in keyway.
3. Adjusting nut. Refer to figure 28.

Tighten

- Adjusting nut to specifications (at the end of this section) while turning the hub.

4. Lock or key.
   - Bend the tang to the flat of the adjusting nut or insert the key.
5. Nut or retaining ring. Refer to figure 28.

Tighten

- Nut to 88 N·m (65 lbs. ft.).

6. Axle shaft. Refer to "Axle Shaft Replacement".
7. Tire and wheel assembly.
   - Lower the vehicle.

WHEEL BEARING/CUP REPLACEMENT

Remove or Disconnect (Figures 27 and 29)

Tools Required:
J 8092 Drive Handle
J 24426 Outer Wheel Bearing Cup Installer

- Raise the vehicle until the wheels are free to rotate.

1. Axle shaft. Refer to "Axle Shaft Replacement."
2. Hub and drum assembly. Refer to "Hub and Drum Assembly Replacement."
3. Inner bearing and oil seal.
   A. Lay the drum on a flat surface with a shop towel to catch the bearing and seal.
   B. Use a drift to remove the bearing cup and seal.
4. Retaining ring.
   - Use snap ring pliers to remove the ring.

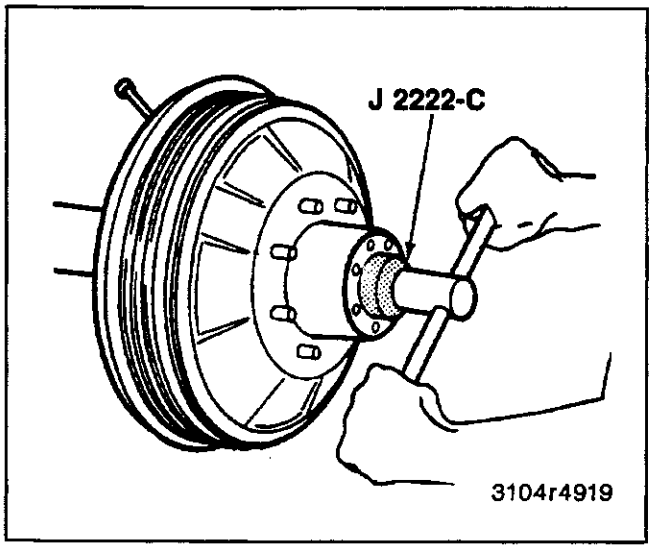


Figure 28—Removing or Installing Bearing Adjusting Nut

5. Outer bearing using J 8092 with J 24426 (figure 29).
   - Drive the bearing and cup from the hub.

Clean

- Old sealing compound from the oil seal bore in the hub.
- Bearing assemblies in a solvent using a stiff brush to remove the old lubricant. Dry the bearings with compressed air. Do not spin them.
- Lubricant from the axle tube and inside the hub.
- Gasket material (if used) from the hub and axle shaft.

Inspect

- Bearings for wear, chipped edges or other damage. Check for flat or rough spots on the rollers. Refer to wheel bearing diagnosis illustrations in this section (figures 2 and 3).
- Cups for pits and cracks.

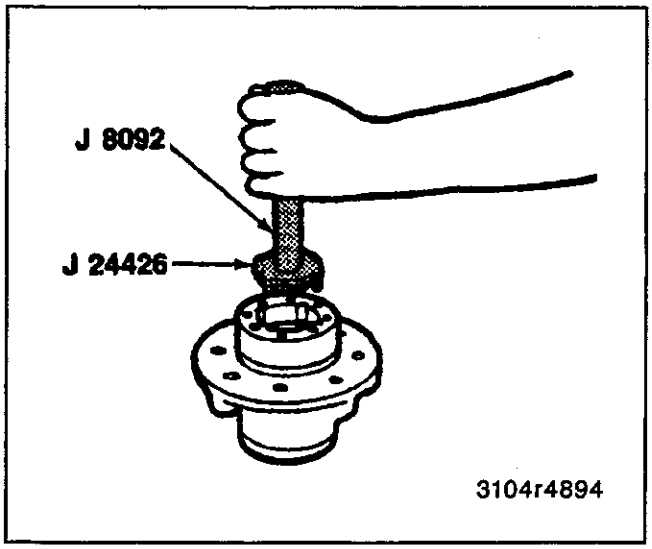


Figure 29—Removing the Outer Bearing and Cup

- Oil seal for wear or roughness. Replace parts as necessary.
- Pack inner and outer bearings with wheel bearing lubricant GM P/N 1051344. Refer to SECTION 0B.

Install or Connect (Figures 27, 30 through 32)

Tools Required:
- J 8092 Driver Handle
- J 8608 Outer Pinion Bearing Cup Installer
- J 24426 Outer Wheel Bearing Cup Installer
- J 24427 Inner Wheel Bearing Cup Installer
- J 39114-A Axle Shaft Seal Installer

1. Outer bearing cup into the hub.
   - Drive the cup into the hub using J 8092 and J 8608 (figure 30). Drive the cup beyond the retaining ring groove.

Important

- Be sure J 8608 is installed upside down on J 8092 so that the chamfer does not contact the bearing cup.

2. Retaining ring into the groove.
   - Drive the cup back onto the retaining ring using J 24426 (figure 31).
3. Inner bearing cup using J 8092 and J 24427 (figure 32).
   - Drive the cup into place until it is seated against the hub shoulder.
4. Inner bearing.
5. New oil seal using J 39114-A (figure 33).
6. Hub and drum.
7. Outer bearing.

Adjust

- Bearing preload. Refer to "Bearing Adjustment."

8. Axle shaft.

NON-DEMOUNTABLE TYPE DRUM REPLACEMENT

Construction of the non-demountable type drum and hub assembly is such that replacement cannot be done with the hub assembly installed on the vehicle.

Remove or Disconnect

- Raise the vehicle.

1. Hub and drum assembly. Refer to "Hub and Drum Assembly Replacement."
2. Retaining bolts, stud nuts or wheel studs.
   - Separate the drum, hub, and oil deflector (if equipped).
   - Press the wheel studs out of the drum. Replace parts as necessary.

Install or Connect

1. Drum to the hub.
   - Make certain the drain holes are aligned.
2. Oil deflector (if equipped) to the drum.
   - Apply a light coating of sealing compound to the oil deflector contact surface.
3. Retaining bolts, stud nuts or wheel studs.
   - Press the wheel studs into the drum.

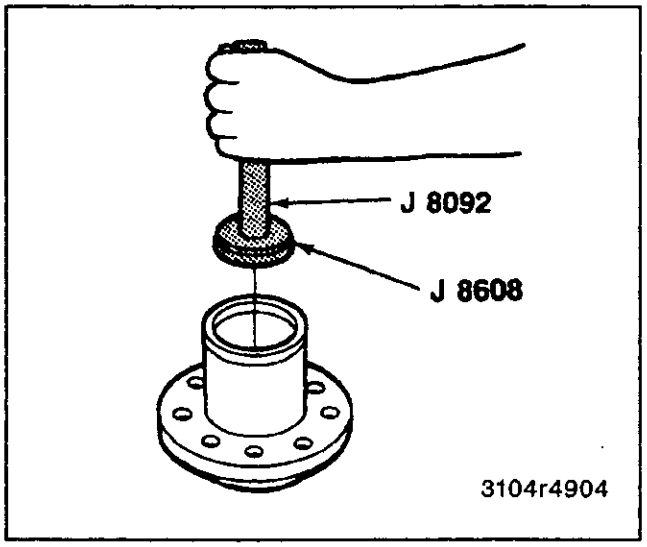


Figure 30—Installing Outer Bearing Cup

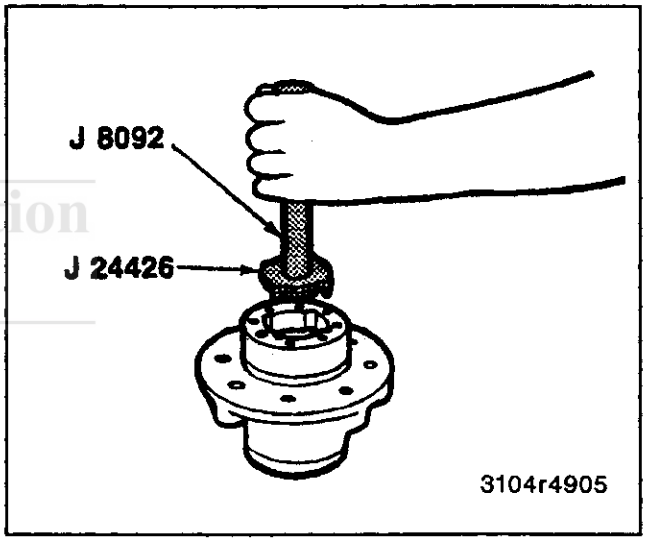


Figure 31—Seating Outer Bearing Cup onto Retaining Ring

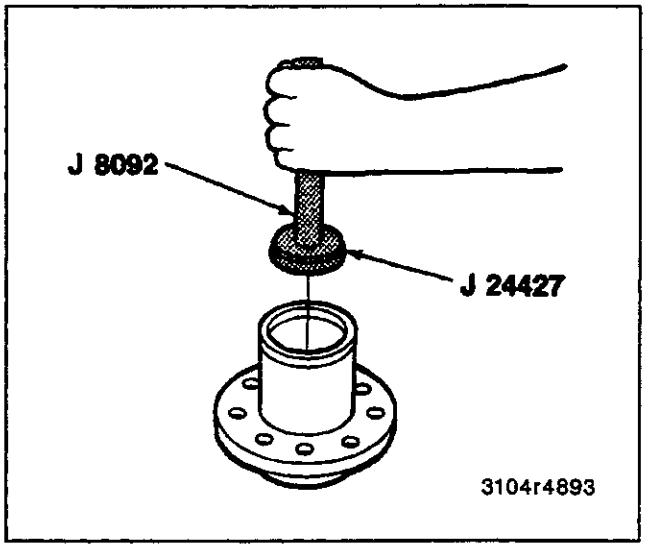


Figure 32—Installing Inner Bearing Cup

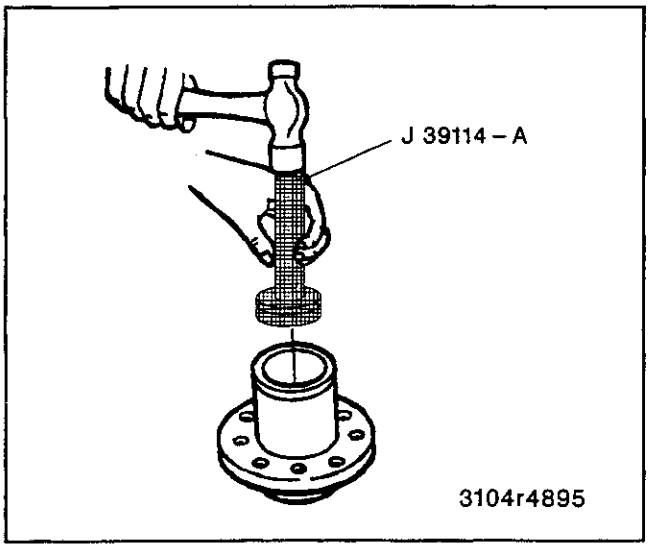


Figure 33—Installing Oil Seal into Hub

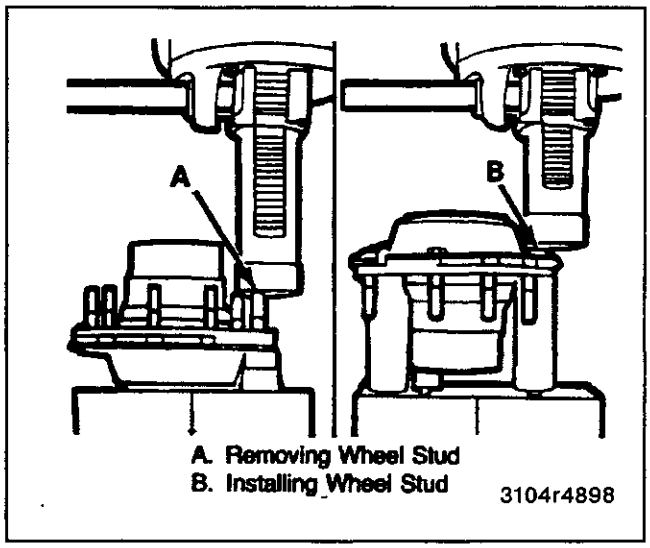


Figure 34—Wheel Stud Replacement

WHEEL STUD REPLACEMENT

Wheel studs are serrated and may also be swaged in place; however, replacement procedure remains the same for both types of installation. Press the wheel studs out of the hub flange, then press new wheel studs into place, making sure of a tight fit. When replacing all of the wheel studs be sure that the hub oil deflector (if equipped) is in position under the wheel stud heads. Refer to figure 34.

WHEEL BEARING ADJUSTMENT

- Make sure the brakes are fully released and do not drag.
- Check the wheel bearing play by grasping the tire at the top and pulling and pushing back and forth, or by using a pry bar under the tire. If the tapered roller bearings are properly adjusted, movement of the brake drum in relation to the brake flange plate will be barely noticeable and the wheel will turn freely. If the movement is excessive, adjust the bearings.

REAR AXLES WITH DRUM BRAKES

Remove or Disconnect (Figure 27)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

- Raise the vehicle until the wheel is free to spin.

1. Axle shaft. Refer to "Axle Shaft Replacement."
   - Be sure the keyway, threads and adjusting nut are clean and free of chips, burrs and shavings.
2. Retaining ring.
3. Rear wheel bearing axle adjusting nut key.

NOTICE: Refer to "Notice" on page 4B1-1.

4. Adjusting nut.

Tighten

- Adjusting nut to 68 N·m (50 lbs. ft.). Tighten with J 2222-C while rotating the hub assembly, making certain the bearing cones are seated and in contact with the spindle shoulder.

Adjust

- Back off the adjusting nut and retighten to 47 N·m (35 lbs. ft.) while hub is rotated.
- Back off the adjusting nut 135 to 150 degrees.

Install or Connect

1. Lock washer.
   - Bend one tang of the retaining washer over a flat of the adjusting nut, 30 degrees minimum.

NOTICE: Refer to "Notice" on page 4B1-1.

2. Outer retaining nut.

Tighten

- Outer retaining nut to 88 N·m (65 lbs. ft.) minimum.

Adjust

- Final bearing adjustment is 0.025 to 0.25 mm (0.001 to 0.010 inch).
- Bend one tang of the retaining washer over a flat of the outer nut, 60 degrees minimum.

3. Wheel bearing grease into bearings.
4. Axle shaft. Refer to "Axle Shaft Replacement."

Install or Connect (Figure 27)

1. Key into adjusting nut slot.
   - If slot is in alignment with keyway in axle spindle, back nut off a slight amount, but not more than one slot, to align key.

2. Snap ring to spindle end. Be sure ring is seated.
3. Axle shaft. Refer to "Axle Shaft Replacement."

REAR AXLES WITH DISC BRAKES

Remove or Disconnect (Figure 27)

Tool Required:
J 2222-C Wheel Bearing Nut Wrench

- Raise the vehicle until the wheel is free to spin.

1. Axle shaft. Refer to "Axle Shaft Replacement."
   - Be sure the keyway, threads and adjusting nut are clean and free of chips, burrs and shavings.
2. Retaining ring.
3. Rear wheel bearing axle adjusting nut key.

NOTICE: Refer to "Notice" on page 4B1-1.

4. Adjusting nut.

Tighten

- Adjusting nut to 68 N·m (50 lbs. ft.). Tighten with J 2222-C while rotating the hub assembly, making certain the bearing cones are seated and in contact with the spindle shoulder.

Adjust

- Back off the adjusting nut and retighten to 47 N·m (35 lbs. ft.) while hub is rotated.
- Back off the adjusting nut 135 to 150 degrees.

Install or Connect

1. Lock washer.
   - Bend one tang of the retaining washer over a flat of the adjusting nut, 30 degrees minimum.

NOTICE: Refer to "Notice" on page 4B1-1.

2. Outer retaining nut.

Tighten

- Outer retaining nut to 88 N·m (65 lbs. ft.) minimum.

Adjust

- Final bearing adjustment is 0.025 to 0.25 mm (0.001 to 0.010 inch).
- Bend one tang of the retaining washer over a flat of the outer nut, 60 degrees minimum.

3. Wheel bearing grease into bearings.
4. Axle shaft. Refer to "Axle Shaft Replacement."

PINION OIL SEAL/PINION FLANGE REPLACEMENT

The pinion oil seal and the pinion flange may be replaced with the carrier assembly installed in the vehicle.

Remove or Disconnect (Figures 22 through 24)

Tool Required:
J 8614-01 Pinion Flange Holder and Remover

- Raise the vehicle.

1. Propeller shaft. Refer to SECTION 4A.

Important

- Scribe a line on the pinion stem, pinion nut and pinion flange to be used as an installation guide (figure 12).

2. Nut using J 8614-01 (figure 23).
3. Flange using J 8614-01 (figure 24).
   - Use the special nut and forcing screw to remove the flange.
4. Oil seal.
   - Pry the oil seal from the bore. Do not damage the machined surfaces.
   - Thoroughly clean foreign material from the contact area.

Inspect

- Oil seal mating surfaces for any burrs which may cause seal failure.
- Flange deflector for any abnormality such as cracking or distortion.

Replace any part which shows any of the above conditions.

Install or Connect (Figure 35)

Tools Required:
J 8614 Pinion Flange Holder and Remover
J 24384 Pinion Oil Seal Installer
(Dana 10 1/2-inch ring gear axle)

1. Oil seal into the bore using J 24384 (figure 36).
   - Lubricate the inside diameter of the new oil seal with extreme pressure lubricant such as GM P/N 9985038.

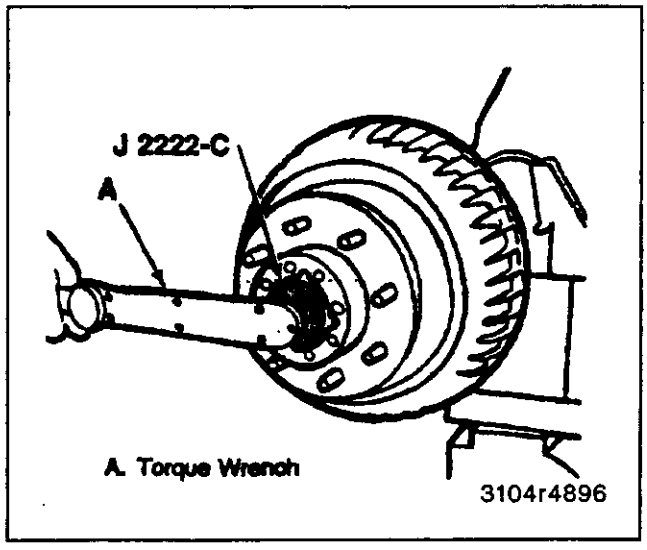


Figure 35—Tightening the Adjusting Nut

- Pack the cavity between the pinion stem, pinion flange and pinion nut washer with a non-hardening sealer such as Permatex® Type A or equivalent.

2. Flange using J 8614 (figure 23).
   - Use marks scribed previously for installation.
3. Nut, using J 8614 (figure 23).
   - Use marks scribed previously for installation.
4. Propeller shaft. Refer to SECTION 4A.

REAR AXLE ASSEMBLY REPLACEMENT

Remove or Disconnect

- Raise the vehicle and place jack stands under the frame side rails for support.
- Drain the lubricant from the axle housing.

1. Propeller shaft. Refer to SECTION 4A.
2. Tire and wheel assembly.
3. Brake drum or hub and drum.
4. Parking brake cable from the lever and at the brake flange plate. Refer to SECTION 5F.
5. Hydraulic brake pipes from the connectors. Refer to SECTION 5.
6. Shock absorbers from the axle brackets.
7. Vent hose from the axle vent fitting.
8. Height-sensing and brake proportioning valve linkage (if equipped).
   - Support the assembly with a hydraulic floor jack.
9. Nuts and washers from the U-bolts.
10. U-bolts, spring plates, and spacers from the axle assembly.
    - Lower the jack and the axle assembly.

Install or Connect

1. Axle assembly under the vehicle.
   - Align the axle assembly with the springs.
2. Spacers, spring plates, and U-bolts to the axle assembly.
   - Raise the axle assembly.
3. Washers and nuts to the U-bolts.
   - Thread the nuts on firmly.
   - Adjust alignment of axle.
4. Height-sensing and brake proportioning valve linkage (if equipped).

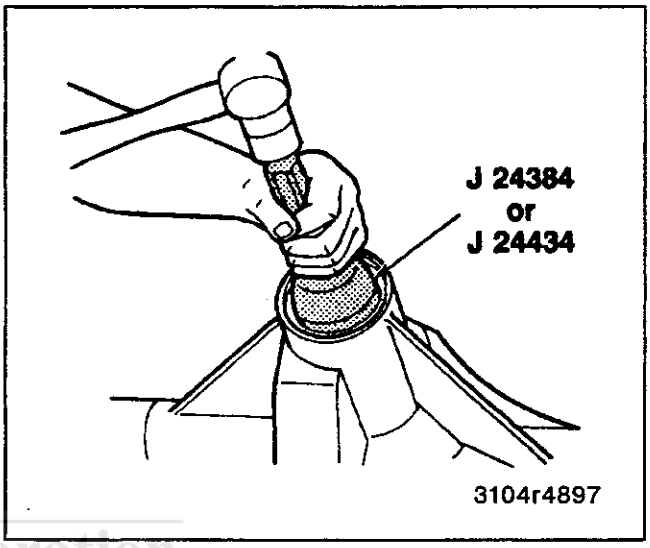


Figure 36—Installing Pinion Oil Seal into Bore

5. Vent hose to the axle vent fitting.
6. Shock absorbers to the axle brackets.
7. Hydraulic brake lines to the connectors. Refer to SECTION 5.
8. Parking brake cable to the lever and the flange plate. Refer to SECTION 5F.
9. Tire and wheel assembly.
10. Brake drum or hub and drum.

NOTICE: Refer to "Notice" on page 4B1-1.

11. Propeller shaft. Refer to SECTION 4A.

Tighten

- All fasteners. Refer to "Specifications" at the rear of this section.

12. Axle lubricant. Fill to the filler plug hole level. Refer to SECTION 0B.

Important

- Bleed the brake system, check operation and adjust if necessary. Refer to SECTION 5A.
- Remove jack stands and lower vehicle.
- Check axle and brake operation.
- Check for fluid leaks and road test the vehicle.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Item	8 1/2" Ring Gear—Semi Floating Axle		9 1/2" Ring Gear—Semi Floating Axle		DANA 9 3/4"—10 1/2" Ring Gear Axle—Full Floating		DANA 11" Ring Gear Axle—Full Floating	
	N·m	Lbs. Ft.	N·m	Lbs. Ft.	N·m	Lbs. Ft.	N·m	Lbs. Ft.
Axle Shaft to Hub Bolts	—	—	—	—	156	115	203	150
Brake Backing Plate	47	35	142	105	142	105	244	180
Carrier Cover	27	20	27	20	47	35	47	35
Filler Plug	34	25	24	18	34	25	34	25
Lock Screw	34	25	34	25	—	—	—	—

LUBRICATION

Item	8 1/2" Ring Gear—Semi Floating Axle		9 1/2" Ring Gear—Semi Floating Axle		DANA 9 3/4"—10 1/2" Ring Gear Axle—Full Floating		DANA 11" Ring Gear Axle—Full Floating	
	Liters	Pints	Liters	Pints	Liters	Pints	Liters	Pints
Capacity	2.0	4.2	2.6	5.5	2.6	5.5	4.0	8.2

WHEEL BEARING ADJUSTMENT VALUES*

Axle Make	Rear Brake Type	Ring Gear Size	Bearing Adjusting Nut Torque (While Rotating Wheel)		Adjusting Nut Back-Off	Outer Locknut Torque	
			N·m	Lbs. Ft.		N·m	Lbs. Ft.
Dana	Drum	9 3/4 and 10 1/2"	68	50	**	—	—
Saginaw	Drum	10 1/2"	68	50	**	—	—
Dana	Disc	10 1/2"	68	50	**	88	65
Dana	Disc/Drum	11"	68	50	***	88	65

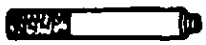
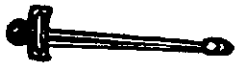
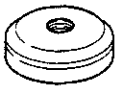
* Resulting end play should be 0.0254 to 0.254 mm (0.001 to 0.010 inch).

** Back off until loose. Rotate nut up against bearing cone shoulder (zero torque).

*** Back off the nut and while rotating the hub tighten to 54 N·m (40 lbs. ft.). Then back off nut 135 to 150 degrees. Final end play 0.025 to 0.25 (0.001 to 0.010 inch).

T2198

SPECIAL TOOLS

1.  J 6627-A
2.  J 8092
3.  J 5853-B
4.  J 8614-01
5.  J 2222-C
6.  J 24426
7.  J 24427
8.  J 8608
9.  J 24384
10.  J 39114 – A
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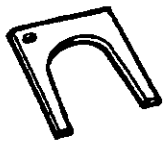
18.  J 22804-1
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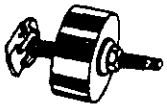
20.  J 29712

1. WHEEL STUD REMOVER
2. DRIVER HANDLE
3. TORQUE WRENCH
4. COMPANION FLANGE HOLDER
5. WHEEL BEARING NUT WRENCH
6. OUTER WHEEL BEARING CUP INSTALLER
7. INNER WHEEL BEARING CUP INSTALLER
8. PINION BEARING CUP INSTALLER
9. DANA PINION SEAL INSTALLER
10. AXLE SHAFT SEAL INSTALLER
11. PINION BEARING CUP INSTALLER
12. AXLE SHAFT BEARING REMOVER (LARGE SHAFT)
13. AXLE SHAFT AND PINION SEAL INSTALLER
14. AXLE SHAFT BEARING INSTALLER
15. AXLE SHAFT BEARING INSTALLER
16. AXLE SHAFT BEARING INSTALLER (9 1/2-INCH)
17. PINION OIL SEAL INSTALLER (9 1/2-INCH)
18. PINION OIL SEAL SPACER
19. PINION SEAL INSTALLER (6 1/2-INCH)
20. AXLE SHAFT BEARING REMOVER (9 1/2-INCH)

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SECTION 4C

FRONT AXLE

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

GENERAL DESCRIPTION

The front axle on four-wheel drive model vehicles has a central disconnect feature that, under most conditions, allows shifting into and out of four-wheel drive when the vehicle is in motion. It is engaged by an electronically-activated thermal actuator.

The thermal actuator contains a coil, fluid, and a plunger. When the coil is heated, the liquid changes to a gas and extends the plunger, which engages the front axle. To disengage, the gas must cool to a liquid.

The axle uses a conventional ring and pinion gear set to transmit the driving force of the engine to the wheels. The differential allows the wheels to turn at different rates of speed while the axle continues to transmit the driving force. This prevents tire scuffing when going around corners and premature wear on internal axle parts. The ring and pinion set and the differential are contained within an aluminum carrier. The axle identification number is located on a tag attached to the right axle tube.

The drive axles are completely flexible assemblies consisting of inner and outer constant velocity (CV) joints protected by thermoplastic boots and connected by an axle shaft.

DIAGNOSIS OF FRONT AXLE

FRONT AXLE NOISE DIAGNOSIS

Any gear-driven unit produces a certain amount of noise that is normal and cannot be eliminated by conventional repairs or adjustment. Slight noise that is heard only at a certain speed or under unusual or remote conditions is acceptable. For example, this noise tends to reach a peak at speeds from 60 to 100 km/h (40 to 60 mph) depending upon road and load conditions, or upon gear ratio and tire size, and does not indicate trouble in the axle assembly.

When an axle is suspected of being noisy, make a thorough test to determine whether the noise originates in the tires, road surface, wheel bearings, engine, transmission, propeller shaft, or axle assembly. Raising tire pressure to eliminate tire noise (although this will not silence tread noise of mud and snow tires) and listening for the noise at varying speeds and road surfaces, on drive, float, and coast conditions will help to locate the source of noise. After selecting 4H to lock the hubs, test in 2H. This removes transfer case whine.

DETERMINING THE TYPE OF NOISE

Road Noise - Some road surfaces, such as brick or rough-surfaced concrete, cause noise which may be mistaken for tire or axle noise. Driving on a different type of road, such as smooth asphalt or dirt, will quickly show whether the road surface is the cause of noise. Road noise usually is the same on drive or coast.

Tire Noise - Tire noise may easily be mistaken for axle noise. Tire noise, however, changes with different road surfaces; axle noise does not. Temporarily inflating all tires to 345 kPa (50 psi) pressure, for test purposes only will materially alter noise caused by tires but will not affect noise caused by the axle. Axle noise usually stops when coasting at speeds under 30 miles per hour; however, tire noise continues with lower tone as the vehicle speed is reduced.

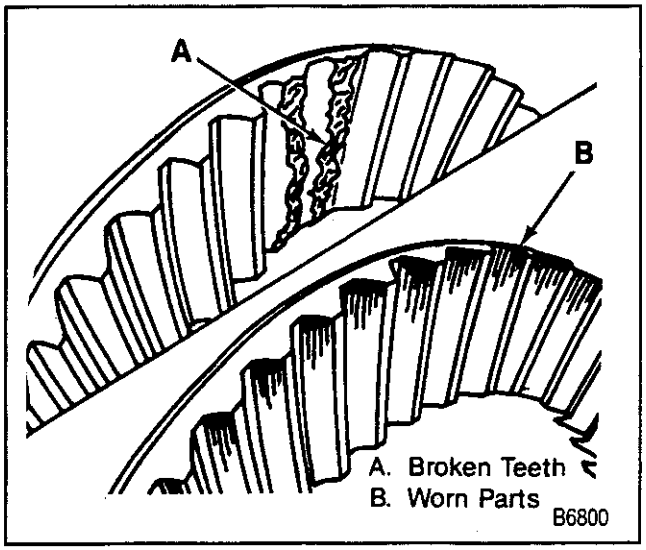


Figure 1—Causes of Gear Noise

Engine and Transmission Noises - To determine which unit is causing the noise, take note of approximate vehicle speeds and conditions under which the noise is most pronounced, then stop the vehicle in a quiet place to stop interfering noises. With the transmission in neutral, run the engine slowly up and down the engine speeds corresponding to the vehicle speed at which the noise was most pronounced. If a similar noise is produced with the vehicle standing still, it is caused by the engine or transmission and not the axle.

Wheel Bearing Noise - A brinelled wheel bearing causes a knock or click approximately every two revolutions of the wheel, since the bearing rollers do not travel at the same speed as the axle and wheel. With the wheels jacked up, spin the wheels by hand while listening at the hubs for evidence of a rough or brinelled wheel bearing or loose bearings.

Gear Noise - There are two basic types of gear noise. The first type is produced by broken, bent, or forcibly damaged gear teeth, is usually quite audible over the entire speed range, and presents no difficulty in diagnosis. For example, hypoid gear tooth scoring generally results from the following: insufficient lubricant, improper break-in, wrong lubricant, insufficient gear backlash, improper ring and pinion alignment, or loss of drive pinion nut torque. The scoring will progressively lead to complete erosion of the gear tooth or gear tooth pitting and then eventual fracture if the initial scoring is not corrected (figure 1). Another cause of hypoid gear fracture is extended overloading of the gear set, which will produce fatigue fracture, or shock loading, and can will result in sudden failure.

Differential pinion and side gears rarely give trouble. Common causes of differential failure are shock loading, extended overloading, and seizure of the differential pinions to the cross shaft resulting from excessive wheel spin and consequent lubrication breakdown.

The second type of gear noise pertains to the mesh pattern of the gear teeth. This form of abnormal gear noise can be recognized because it produces a cycling pitch (whine) and will be very pronounced in the speed range at which it occurs, appearing under either drive, float, or coast conditions. Gear noise tends to peak in a narrow speed range or ranges and will tend to remain constant in pitch. Bearing noise will vary in pitch with vehicle speeds.

DIAGNOSIS OF DRIVE AXLES

PROBLEM	POSSIBLE CAUSE	CORRECTION
Clicking Noise in Turns	Worn or damaged out CV joint.	Replace.
"Clunk" when Accelerating from "Coast"	1. Loose CV joint to output shaft bolts. 2. Damaged inner CV joint.	1. Tighten. 2. Replace.
Shudder or Vibration during Acceleration	1. Excessive CV joint angle. 2. Worn or damaged CV joints. 3. Sticking spider assembly (inner CV joint). 4. Sticking joint assembly (outer CV joint).	1. Repair. 2. Replace. 3. Lubricate or replace. 4. Lubricate or replace.
Vibration at Highway Speeds	1. Out of balance or out of round tires. 2. Front end out of alignment.	1. Balance or replace. 2. Align.
Front Drive Axle Leaks	1. Worn differential output seals. 2. Inspect mating area between axle tube and differential housing. 3. Inspect vent hose connector.	1. Repair seals. 2. Reseal differential housing mating area with RTV sealant. 3. Replace vent hose connector.
		D0012

DIAGNOSIS OF FOUR-WHEEL DRIVE

PROBLEM	POSSIBLE CAUSE	CORRECTION
Four-Wheel Drive Will Not Engage	1. Blown fuse. (A/C-HTR fuse). 2. Feed wire to transfer case switch open. 3. Transfer case switch faulty. 4. Wires to front axle actuator open. 5. Front axle actuator faulty. 6. Axle damaged internally.	1. Replace. 2. Repair open wire. 3. Replace transfer case switch. 4. Repair open wiring. 5. Replace axle actuator. 6. Repair as necessary. Refer to the Light Duty Truck Unit Repair Manual.
Four-Wheel Drive Will Not Disengage	1. Transfer case switch faulty. 2. Front axle actuator faulty. 3. Internal axle damage.	1. Replace switch. 2. Replace actuator. 3. Repair as necessary. Refer to the Light Duty Truck Unit Repair Manual.
Four-Wheel Drive Indicator Light Will Not Turn Off	Front axle switch faulty.	Replace front axle switch.
Four-Wheel Drive Engages But Indicator Light Will Not Come On	1. Bulb burned out. 2. Front axle switch faulty.	1. Replace. 2. Replace the switch.
		D0273

ON-VEHICLE SERVICE

SKID PLATE REPLACEMENT

NOTICE: Refer to "NOTICE" on page 4C-1.

Remove or Disconnect (Figure 2)

1. Screws (116).
2. Skid plate (115).

Install or Connect (Figure 2)

1. Skid plate (115).
2. Screws (116).

Tighten

- Screws to 34 N.m (25 lbs. ft.).

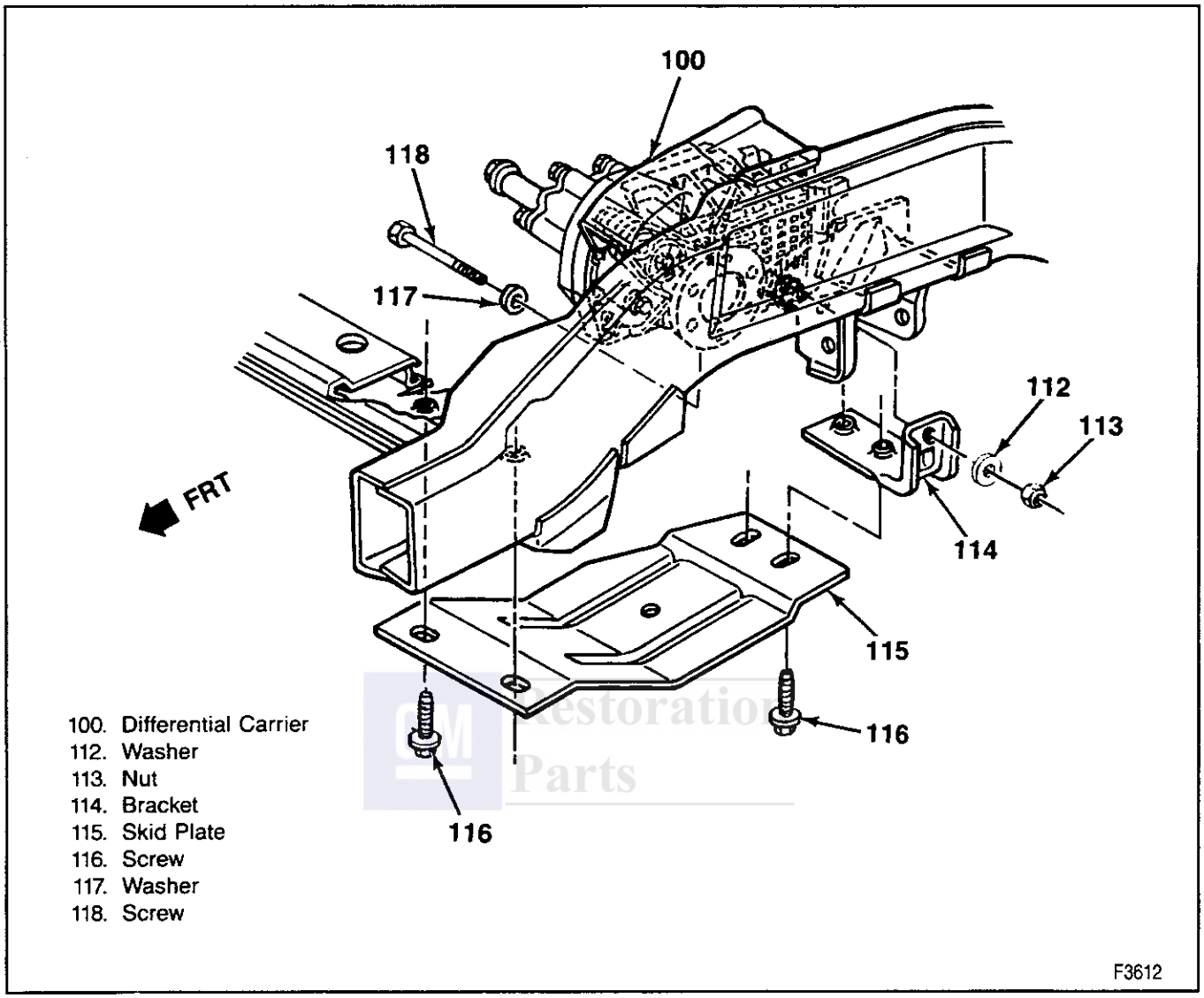


Figure 2—Skid Plate

DRAIN AND FILL

Remove or Disconnect (Figure 3)

1. Skid plate (115), if necessary (figure 2).
2. Fill plug (26).
3. Drain plug (27) and the washer (28).

Install or Connect (Figure 3)

NOTICE: For steps 1 and 2, refer to "Notice" on page 4C-1.

- New lubricant. Refer to "Specifications" in this section.

1. Washer (28) and drain plug (27).

Tighten

- Plug (27) to 33 N·m (24 lbs. ft.).

2. Fill plug (26).

Tighten

- Plug (26) to 33 N·m (24 lbs. ft.).

3. Skid plate (115), if necessary (figure 2).

INDICATOR SWITCH REPLACEMENT

Remove or Disconnect (Figure 3)

1. Skid plate (if equipped).
2. Connector from the indicator switch.
3. Indicator switch (11).

Install or Connect (Figure 3)

1. Indicator switch (11).
   - Coat the switch threads with sealer (GM P/N 1052942) or equivalent.
2. Connector.
3. Skid plate (if equipped).

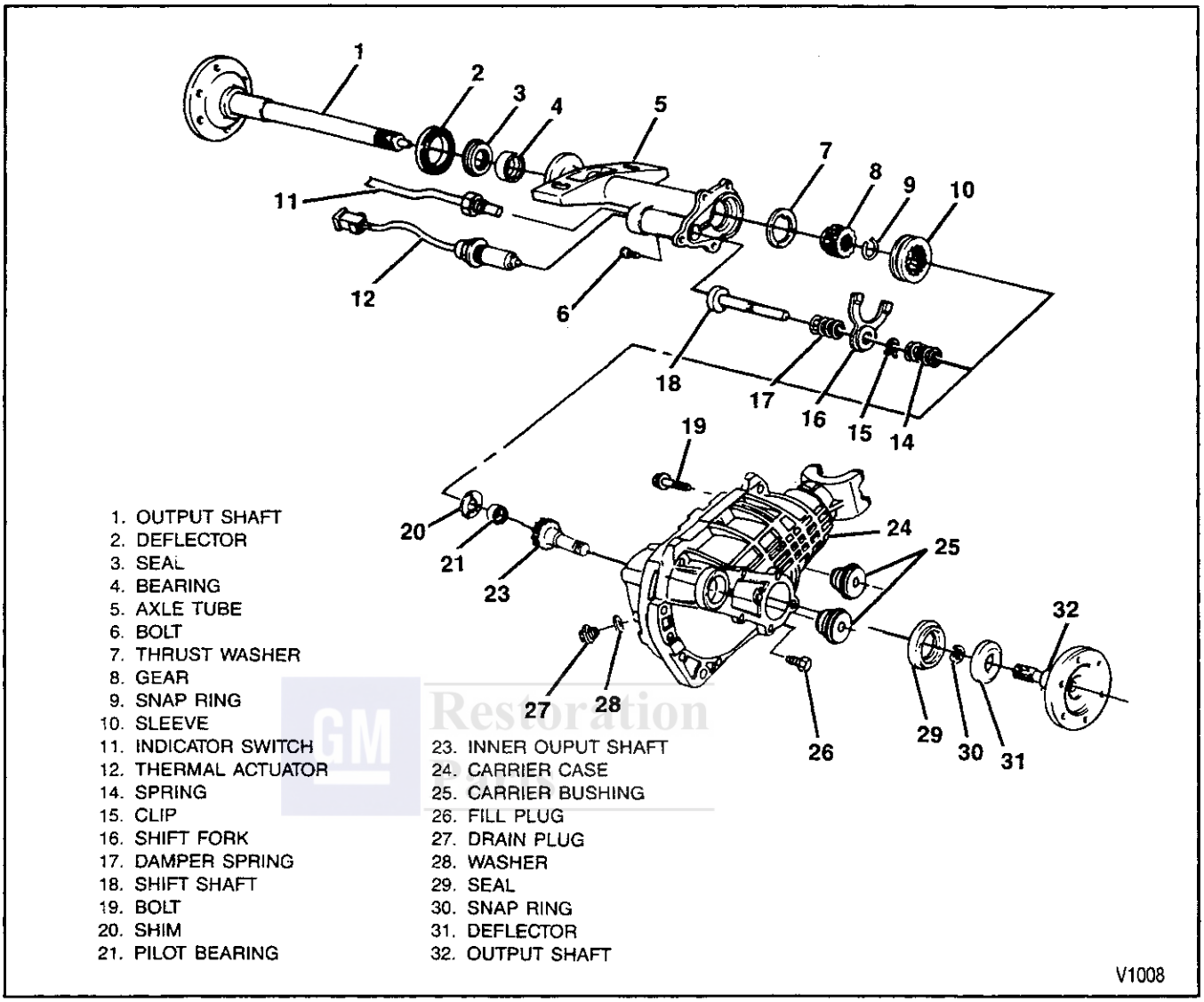


Figure 3—Front Axle Components

THERMAL ACTUATOR REPLACEMENT

Remove or Disconnect (Figure 3)

1. Skid plate (if equipped).
2. Connector from the actuator.
3. Thermal actuator (12).

Install or Connect (Figure 3)

NOTICE: Refer to "Notice" on page 4C-1.

1. Thermal actuator (12).
   - Coat the threads with sealant (GM P/N 1052942) or equivalent.

Tighten

   - Actuator to 22 N.m (16 lbs. ft.).
2. Connector.
3. Skid plate (if equipped).

FRONT AXLE VENT HOSE REPLACEMENT

Remove or Disconnect (Figure 4)

1. Skid plate (if equipped).
2. Clamp (52).
3. Hose (53) from the axle.
4. Bolt (50).
5. Clip (54).
6. Hose (53).

Install or Connect (Figure 4)

1. Hose (53) to the vehicle.
   - Route the same way as when removed.
   - Make sure it is free of kinks and is routed clear of sharp components.
   - Make sure the vent is not plugged.
2. Clip (54).
3. Bolt (50) and clamp (51).

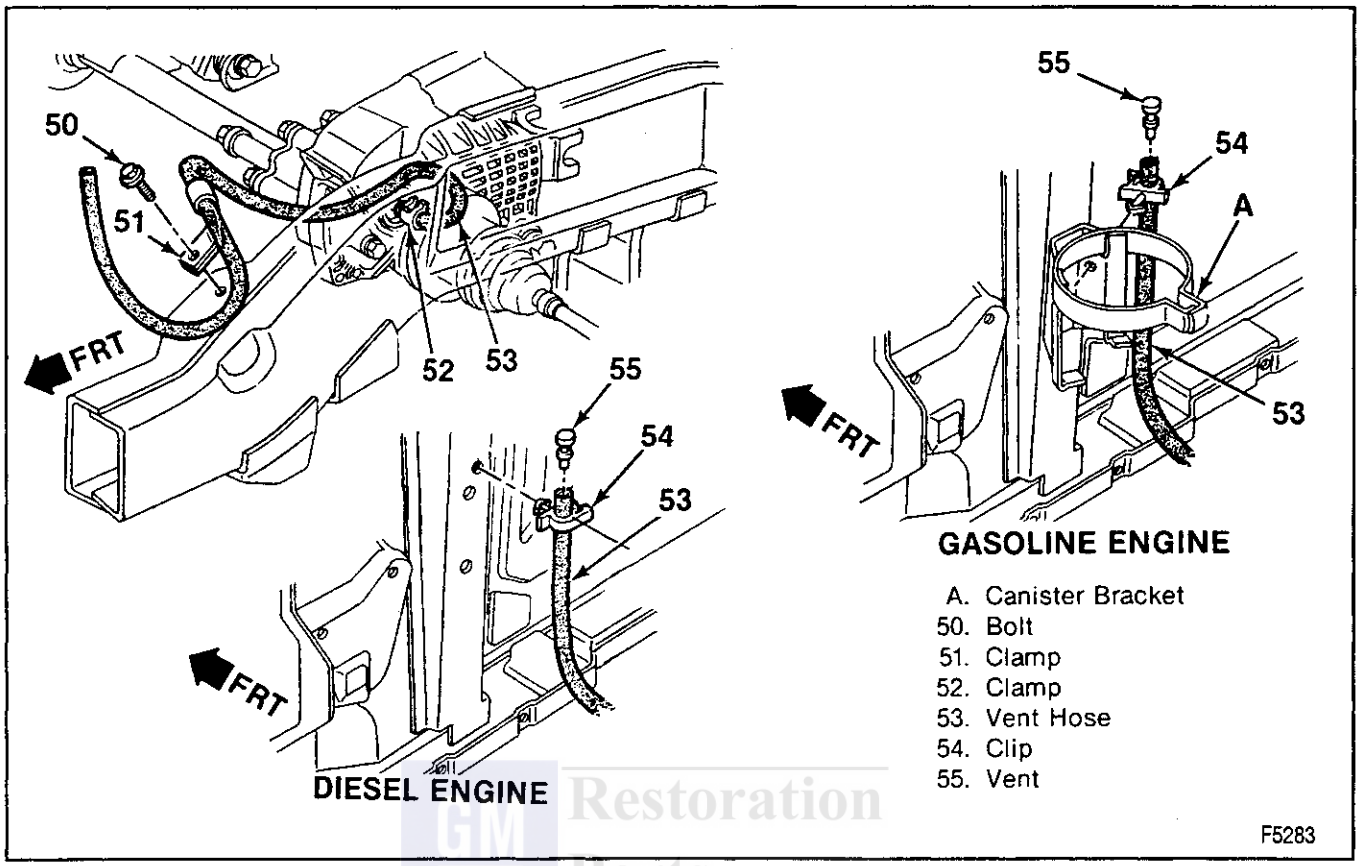


Figure 4—Vent Hose

4. Hose to the axle fitting.
5. Clamp (52).
6. Skid plate (if equipped).

DRIVE AXLE REPLACEMENT

Remove or Disconnect (Figures 5 through 12)

Tools Required:
- J 28733-B Axle Remover
- J 24319-B Steering Linkage Puller
- J 8059 Snap Ring Pliers
- J 35910 Seal Clamp Tool
- J 36605 Front Knuckle Seal Installer

• Raise vehicle and support it with safety stands.

1. Wheel and tire assembly.
   • Insert a drift or large screwdriver through the brake caliper into one of the brake rotor vanes to prevent drive axle from turning (figure 6).
2. Drive axle hub nut (203) and washer (202) (figure 5).
   • Loosen but do not remove at this time 6 bolts (200) securing inboard C/V joint drive flange to the output shaft companion flange (figure 5).

Important

• Be careful when removing inner boot to avoid damaging it.

3. Brake pipe support bracket from upper control arm to allow extra travel of knuckle (figure 7).
4. Cotter pin and nut from outer tie rod.
5. Separate the outer tie rod ball stud from the steering knuckle using J 24319-B (figure 8).

NOTICE: Do not attempt to disengage the joint by driving a wedge-type tool between the joint and the knuckle. This may cause seal damage.

   • Push linkage to opposite side of the vehicle and secure outer tie rod up and out of the way. This will provide the needed clearance to remove the drive axle.

6. Lower shock mounting nut and bolt (figure 9).
   • Collapse the shock absorber and secure if necessary.
7. Stabilizer shaft components as follows (figure 12):
   • Remove stabilizer shaft bushing and bracket.
   • Remove stabilizer shaft bolt, spacer, and bushings at the lower control arm.

Important

• This is required on K2 vehicles with C6P option. (8600 lb GVW rating. Refer to option listing for vehicle). It is also required on K3 vehicles to provide needed clearance for drive axle removal.

8. Position floor stand between the spring seats and the lower control arm ball joint for maximum leverage. The weight of the vehicle is used to relieve the spring tension on the upper control arm.

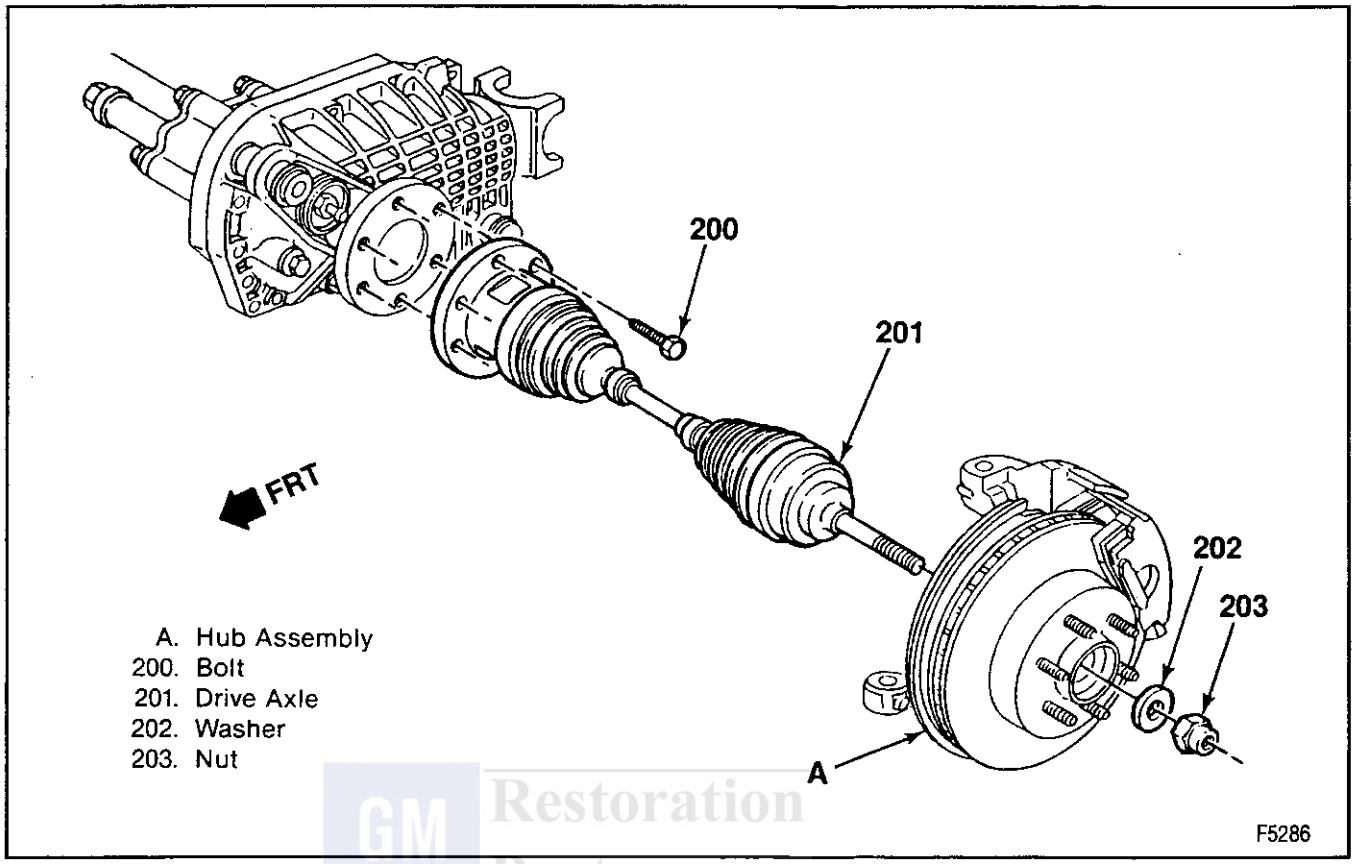


Figure 5—Drive Axle

CAUTION: The floor jack or stand must remain under the control arm spring seat while servicing the drive axle to maintain spring and control arm position. Failure to do so could result in personal injury.

9. Disconnect the cotter pin (138) from the upper control arm ball joint stud.
   - Loosen (do not remove at this time) the stud nut on the upper ball joint stud.
   - Loosen the stud from the knuckle.
10. Remove nut (139) (figure 10).
11. Stud (137) from knuckle (figure 10).
12. Nut (figure 10).

Important

- Cover the shock mounting bracket and the ball stud on the lower control arm with a shop towel to prevent possible drive axle seal damage during removal and installation.

13. Knuckle assembly using J 28733-B (or equivalent) and separate outer C/V joint splined shank from knuckle hub (figure 11).
14. Six bolts from inboard joint flange (figure 5).
    - Support inboard end of drive axle. Move knuckle and hub assembly outward to free splined shank from hub.
15. Drive axle from vehicle.

Important

- Wipe the wheel bearing seal area on the knuckle clean.
- Check the seal for cuts or tears.

16. Lubricate the seal lip.
    - If seal is cut or torn, inspect the wheel bearing for damage and replace the seal.
17. Replace the seal as follows:
    - Pry old seal from knuckle and discard.
    - Lubricate the new seal lip.
    - Use J 36605 to install the seal in the knuckle.

Install or Connect (Figures 5 through 12)

NOTICE: For steps 3, 5, 8, 10, 12, 14, and 15, refer to "Notice" on page 4C-1.

- Prior to drive axle installation, cover the shock mounting bracket, lower control arm ball stud,

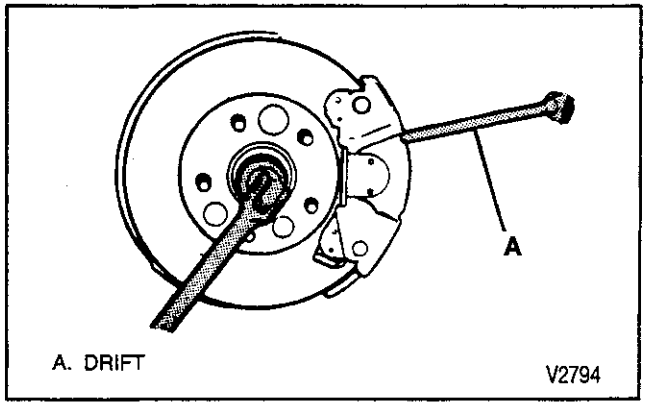


Figure 6—Holding Shaft in Place

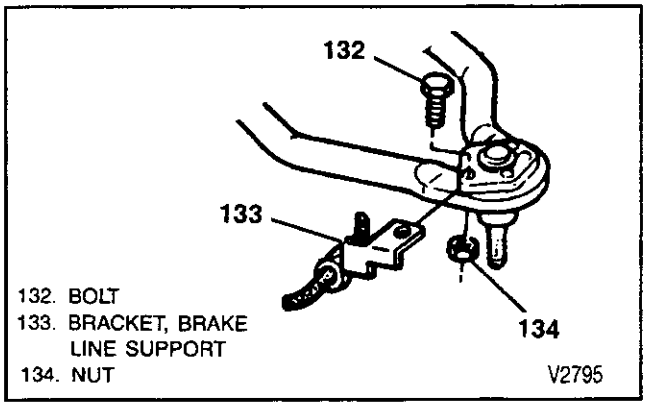


Figure 7—Brake Line Bracket Removal

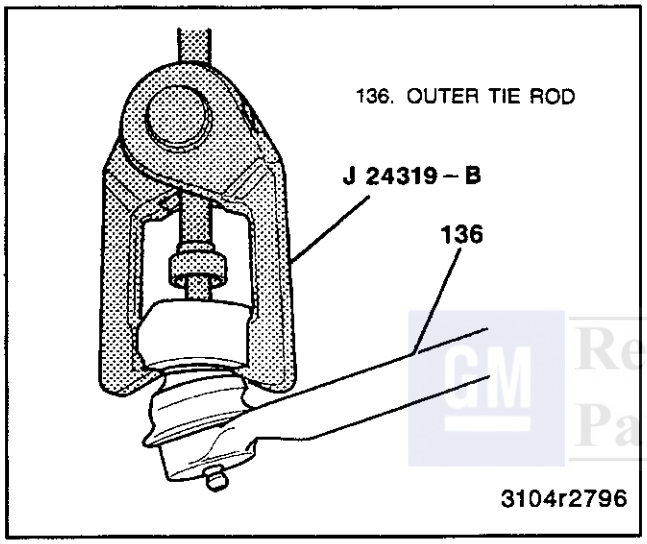


Figure 8—Disconnecting the Tie Rod

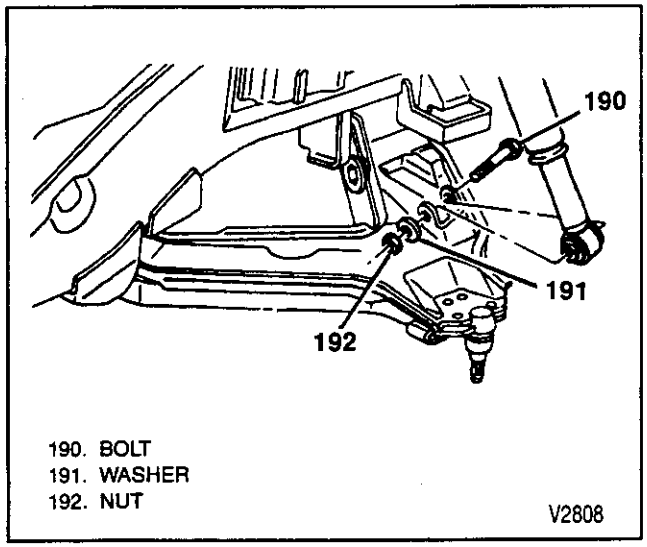


Figure 9—Disconnecting Lower Shock Mount

and all other sharp edges with shop towels so that drive axle seal is not damaged during assembly.

Important

Lubricate the drive axle splines and knuckle with an approved high temperature wheel bearing grease.

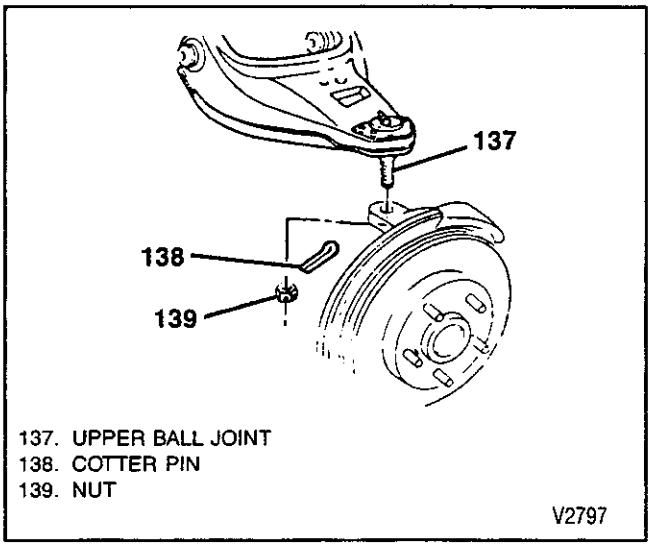


Figure 10—Ball Joint and Knuckle Separation

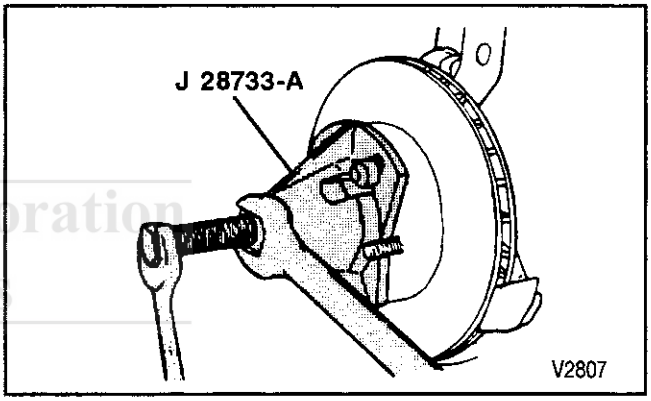


Figure 11—Splined Shank and Knuckle Separation

1. Insert outer C/V joint splined shank into knuckle hub and secure inboard C/V joint flange to companion flange with bolts. Do not tighten.
2. Upper ball joint to the steering knuckle.
3. Stud nut.

Tighten

- Stud nut to 83 N·m (61 lbs. ft.).

4. Cotter pin.
   - Lubricate the upper ball joint until grease appears at the seal.
5. Stabilizer shaft bushing (65) and bracket (64) (figure 12).

Tighten

- Clamp to 33 N·m (24 lbs. ft.).

6. Stabilizer shaft bolt (62), spacer (56), and bushings (65).
   - Remove floor jack or stand from beneath lower control arm.
7. Shock absorber to the lower shock mounting bracket.
8. Shock mounting bolt (190), washer (191), and nut (192) (figure 9).

Tighten

- Nut to 73 N·m (54 lbs. ft.).

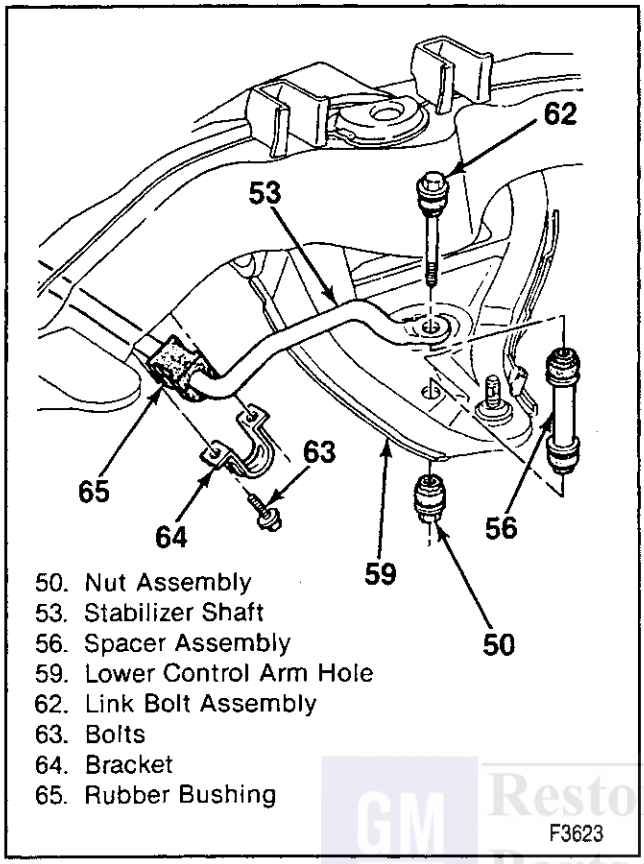


Figure 12—Stabilizer Bar Components

9. Outer tie rod to steering knuckle.
10. Outer tie rod nut.

Tighten

- Nut to 47 N·m (35 lbs. ft.).

Important

- Advance the nut to align the nut slot with the cotter pin hole. Never back the nut off to align the cotter pin hole.

11. Install new cotter pin and spread the ends to secure.
12. Brake pipe support bracket to the upper control arm.

Tighten

- Nut to 17 N·m (13 lbs. ft.).

Important

- Make sure that the brake hose is not twisted or kinked, or damage to the hose could result.

13. Hub nut washer (202) and nut (203). Seat shank splines in hub.
14. Insert a drift through brake caliper to prevent drive axle from turning.

Tighten

- Inboard flange bolts to 80 N·m (60 lbs. ft.).

15. Hub nut.

Tighten

- Hub nut to 245 N·m (180 lbs. ft.).

- Remove drift, install wheels, remove safety stands, and lower the vehicle.

OUTER CV JOINT/BOOT REPLACEMENT

Remove or Disconnect (Figures 13, 14, and 15)

Tools Required:
J 8059 Snap Ring Pliers
J 35910 Seal Clamp Tool
J 36652 Swage Clamp Tool

1. Large swage ring (9) from the C/V joint, using a chisel and discard.

Important

- Do not cut through the seal (12) and damage the sealing surface of C/V outer housing (18) with the chisel.

2. Small seal-retaining clamp (11) on axle shaft with a side cutter, and discard.
   A. Separate the joint seal (12) from the C/V joint race (18) at large diameter and slide the seal away from joint along the axle shaft (13).
   B. Wipe excess grease from face of C/V inner race (16).
   C. Spread the ears on the race retaining ring (14) with J 8059 and remove the C/V joint assembly from the axle shaft (13).
3. Seal (12) from the axle shaft (13).

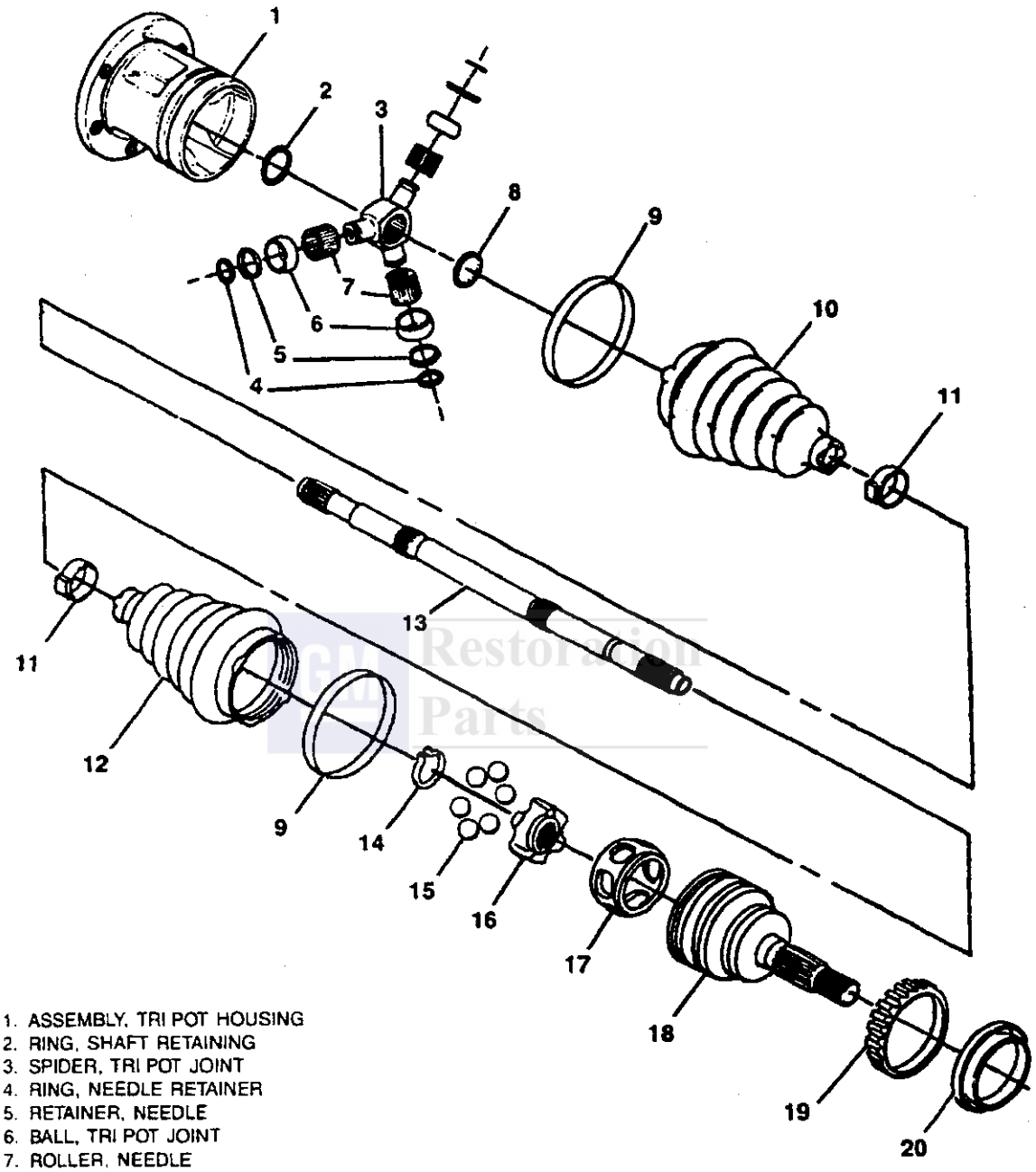
- Grease prior to installing the new seal.

Disassemble (Figures 13, 16 through 18)

1. Use a brass drift and hammer to gently tap on the C/V joint cage (17) until it is tilted enough to remove the first chrome alloy ball (15) (figure 16).
2. Tilt the cage (17) in opposite direction to remove opposing ball (15).

- Repeat this process until all six balls (15) are removed.

3. Position the cage (17) and the inner race (16) 90 degrees to the center line of the outer race (18) and align the cage windows with the lands of the outer race.
4. Separate the cage (17) and the inner race (16) from the outer race (18) (figure 17).
5. Rotate the inner race (16) 90 degrees to the center line of the cage (17) with the lands of the inner race aligned with the windows of the cage (figure 18).
6. Pivot the inner race (16) into the cage (17) window and remove the inner race.



1. ASSEMBLY, TRI POT HOUSING
2. RING, SHAFT RETAINING
3. SPIDER, TRI POT JOINT
4. RING, NEEDLE RETAINER
5. RETAINER, NEEDLE
6. BALL, TRI POT JOINT
7. ROLLER, NEEDLE
8. RING, SPACER
9. RING, SWAGE
10. SEAL, TRI POT JOINT
11. CLAMP, SEAL RETAINING
12. SHAFT, AXLE
13. SEAL, C/V JOINT
14. RING, RACE RETAINING
15. BALL
16. RACE, C/V JOINT INNER
17. CAGE, C/V JOINT
18. RACE, C/V JOINT OUTER
19. RING, SENSOR
20. RING, DEFLECTOR

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Figure 13—Front Drive Axle Components

Assemble (Figures 13 through 19)

Tools Required:
- J 8059 Snap Ring Pliers (or equivalent)
- J 35910 Boot Clamp Tool
- J 36652 Swage Clamp Tool

• Put a light coat of recommended grease on the ball grooves of the inner race (16) and the outer race (18). Refer to SECTION 0B for specified grease.

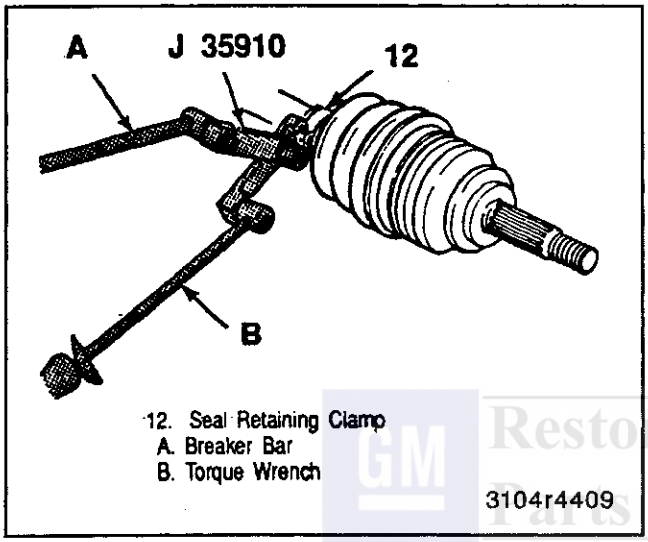

Figure 14—Installing Seal Retaining Clamp

1. Inner race (16) into the cage (17) (figure 18).
   A. Rotate into place. Cage with inner race to the outer race (figure 18).
   B. Align the cage windows with the lands. Pivot the cage into position (figure 17).
   C. Make sure the retaining side of the inner race faces out.
2. Balls (15) (figure 16).
   • Tap on the cage with a brass drift to tilt it enough to install the balls.
3. Small seal-retaining clamp (11) on the neck of the new seal (13). Do not crimp.
   A. Slide the seal (12) onto the axle shaft (13) and position the neck of the seal in the seal groove on the axle shaft.
   B. Crimp the self retaining clamp (11) using J 35910.

Tighten

   • Retaining clamp (12) to 136 N.m (100 lbs. ft.) (figure 14).
   C. Place approximately half of the grease provided inside the seal (12) and repack the C/V with the remaining grease.
4. Swage ring (9).
   A. Pinch by hand slightly to distort into an oval shape and slide onto large diameter of the seal (12).
   B. Push C/V joint onto axle shaft (13) until retaining ring (14) is seated in groove on axle shaft (figure 19).

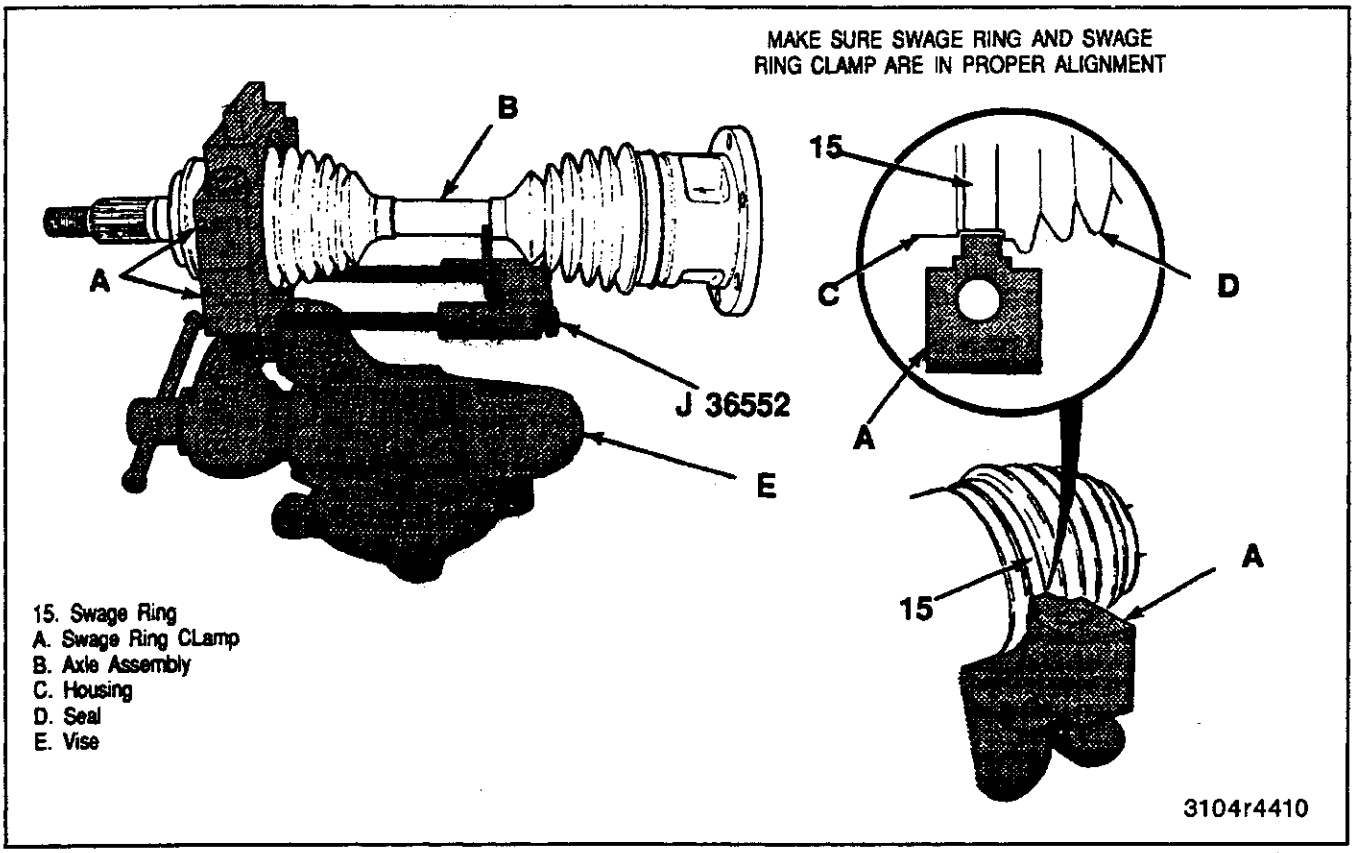

Figure 15—Installing Swage Ring

C. Slide large diameter of the seal (12) with the large swage ring (9) in place over the outside of the C/V joint race (18) and locate the seal lip in the housing groove (figure 15).

Important

- The seal (12) must not be dimpled, stretched or out of shape in any way. If the seal is not shaped correctly, carefully insert a thin flat blunt tool without no sharp edges between the large seal opening and the outer race (18) at maximum clearance of oval ring (9) to release the air. Shape the seal by hand and remove the tool.

D. Refer to the chart in figure 15 and select the correct size swage clamp tool J 36652.

E. Mount the proper size swage clamp tool in the vise and proceed as follows:

1. Position the outboard end of the axle assembly in the tool.
2. Place the top half of the tool on the lower half of the tool and check for proper alignment.
3. Insert the bolts and tighten by hand until snug.

Important

- Make sure the seal (12), housing (18), and swage ring (9) all remain in alignment (figure 15).

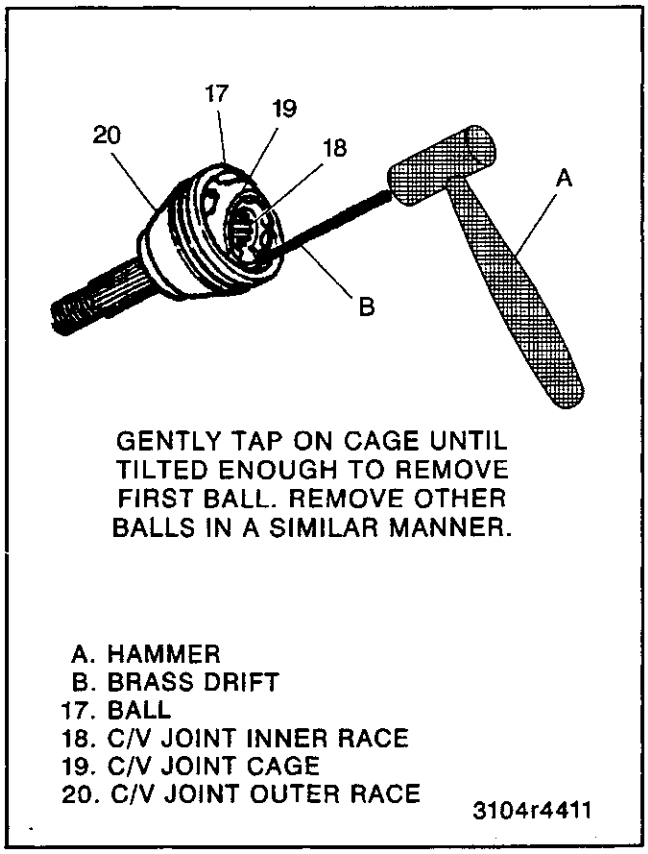

Figure 16—Removing C/V Joint Balls

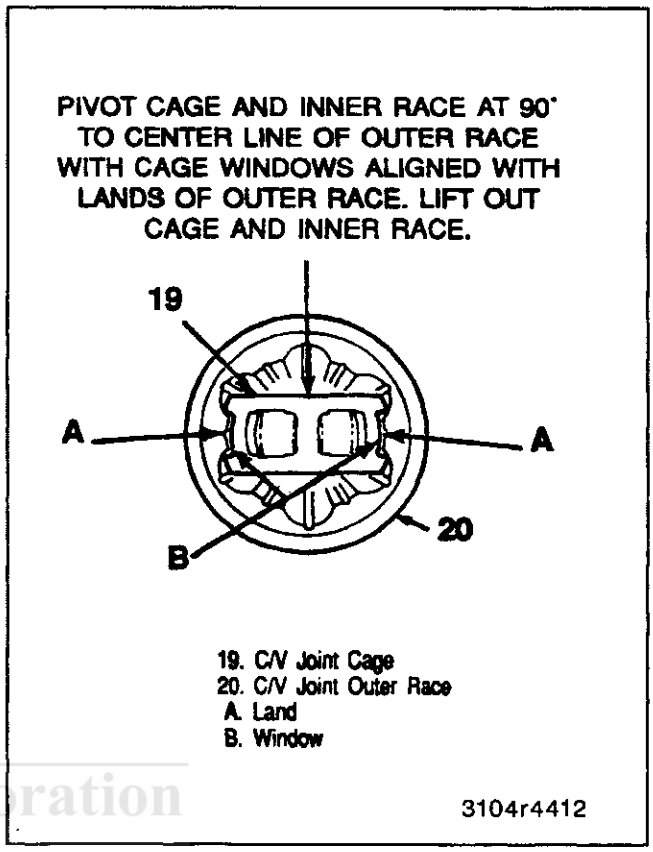

Figure 17—Separating Outer Race and Cage

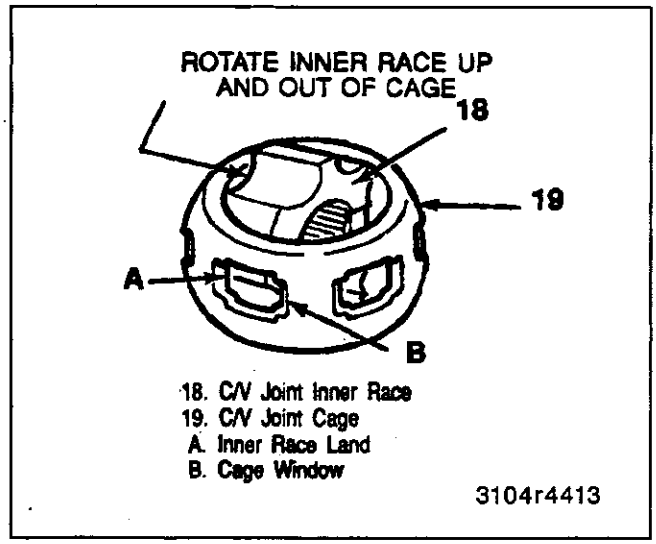

Figure 18—Separating Inner Race and Cage

4. Continue to tighten each bolt 180 degrees at a time alternately until both sides are bottomed.

F. Remove the axle assembly from the tool.

Install or Connect (Figures 13 and 14)

NOTICE: Refer to "Notice" on page 4C-1.

1. Small seal-retaining clamp (11) on the neck of the new seal (13). Do not crimp.

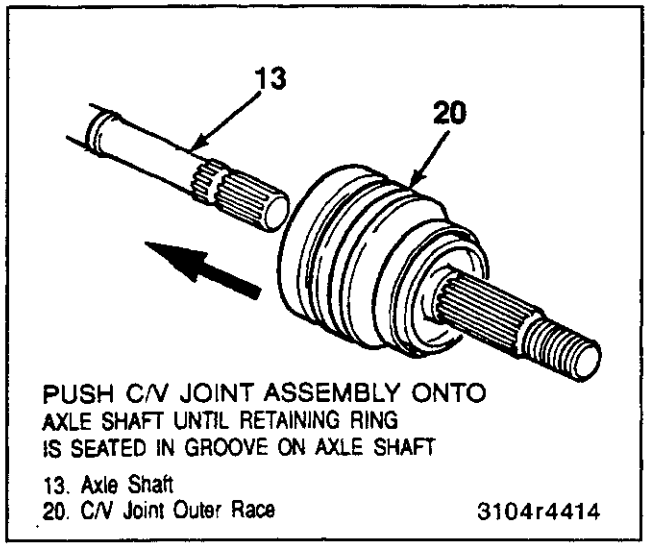

Figure 19—Installing C/V Joint to Axle

A. Slide the seal (12) onto the axle shaft (13) and position the neck of the seal in the seal groove on the axle shaft.
B. Crimp the self-retaining clamp (11) with J 35910 to 136 N·m (100 lbs. ft.) (figure 19).
C. Place approximately half of the grease provided inside the seal (12) and repack the C/V with the remaining grease.

2. Swage ring (9).
   A. Pinch by hand slightly to distort into an oval shape and slide onto large diameter of the seal (12).
   B. Push C/V joint onto axle shaft (13) until retaining ring (14) is seated in groove on axle shaft.
   C. Slide large diameter of the seal (12) with the large swage ring (9) in place over the outside of the C/V joint race (18) and locate the seal lip in the housing groove.

INNER CV JOINT/BOOT (TRIPOT HOUSING) REPLACEMENT

Disassemble (Figures 13 and 22)

Tools Required:
J 8059 Snap Ring Pliers
J 35910 Seal Clamp Tool
J 36652 Swage Clamp Tool

1. Large swage ring (9) from the tripot joint, using a chisel, and discard.

Important

- Do not cut through the seal (10) with the chisel and damage the sealing surface of the tripot outer housing (1).

2. Small seal-retaining clamp (11) from the axle shaft (12) with a side cutter, and discard.
   - Separate seal (10) from the tripot housing (1) at the large diameter and slide the seal away from the joint along the axle shaft (13).
3. Tripot housing (1) from the spider (3) and shaft.
   - Spread the spacer ring (8) with J 8059 and slide the spacer ring and the tripot spider (3) back on the axle shaft (13).
4. Shaft retaining ring (2) from the groove on the axle shaft (13) and slide the spider assembly off the shaft (figure 21).

Important

- Handle the tripot spider assembly with care or the tripot balls and needle rollers may separate from the spider trunions.

5. Remove the spacer ring (8) and the seal (10) from the axle shaft (13).
6. Flush grease from the housing.

Assemble (Figures 13, 14, 20 through 23)

1. Small seal-retaining clamp (11) on the neck of the seal (10).
   - Do not crimp.
2. Slide the seal (10) onto the shaft (13) and position the neck of the seal in the seal groove on the axle shaft.

Tighten

- Crimp seal retaining clamp (12) with J 35910 to 136 N·m (100 lbs. ft.) (figure 14).

3. Spacer ring (8) on the front axle shaft (13) and beyond the second groove as shown in figure 22.
   - Slide the tripot spider assembly against the spacer ring (8) and the shaft (13).

Important

- Be sure that the counterbored face of the tripot spider (3) faces the end of the shaft (13).

4. Shaft retaining ring (2) in the groove of the axle shaft (13) with J 8059.
5. Slide the tripot spider (3) towards the end of the shaft (13) and reseat the spacer ring (8) in the groove on the axle (figure 22).
   A. Place approximately half of the grease provided in the seal (10) and use the remainder to repack the tripot housing (1).
6. Pinch the swage ring (9) by hand slightly to distort it into an oval shape and slide it onto the large diameter of the seal (12).
7. Slide the tripot housing (1) over the tripot spider assembly on the shaft (13) (figure 20).
8. Slide the large diameter of the seal (10) with the large swage ring (9) in place over the outside of the tripot housing (1) and locate the seal lip in the housing groove.
9. Position the tripot assembly at the proper vehicle dimension as shown in figure 23.

Important

- The seal (12) must not be dimpled, stretched or out of shape in any way. If the seal is not shaped correctly, slide the swage ring (9) off the

seal and onto the housing (1). Carefully insert a thin, flat, blunt tool between the seal opening and the housing to release the air. Shape the seal properly by hand and remove the tool. (figure 13).

10. Return the swage ring (9) to position on seal (12).
    - Refer to the chart in figure 15 and select the proper size swage clamp tool J 36652.
11. Mount the swage clamp tool in the vise and proceed as follows:
    A. Position the inboard end of the axle assembly in the tool.
    B. Place the top half of the proper size tool on the lower half of tool and check for proper alignment and dimension (figures 15 and 23).
    C. Insert the bolts and tighten by hand until snug.

Important

- Make sure that the seal, housing, and swage ring (15) all remain in alignment (figure 15).

    D. Continue to tighten each bolt 180 degrees at a time, alternating until both sides are bottomed.
12. Remove the axle assembly from the tool.

SHAFT AND AXLE TUBE ASSEMBLY REPLACEMENT

Remove or Disconnect (Figures 3, 5, 12, and 24)

- Raise the vehicle and support it using safety stands.
- Position a pan under the axle to catch oil.

1. Bolts (63) from the left and right stabilizer brackets (64) (figure 12).
2. Right stabilizer link nut assembly (50), spacer (56), and link bolt assembly (62) (figure 12).
3. Inner tie rod end from relay rod. Refer to SECTION 3B3.

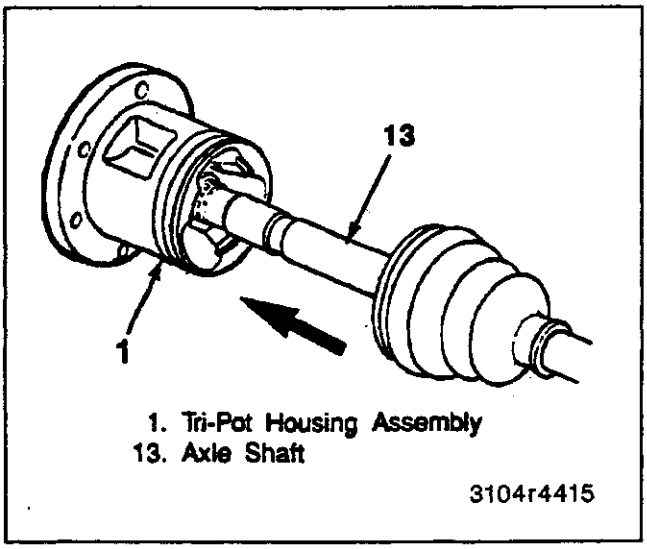

Figure 20—Installing Tripot to Housing

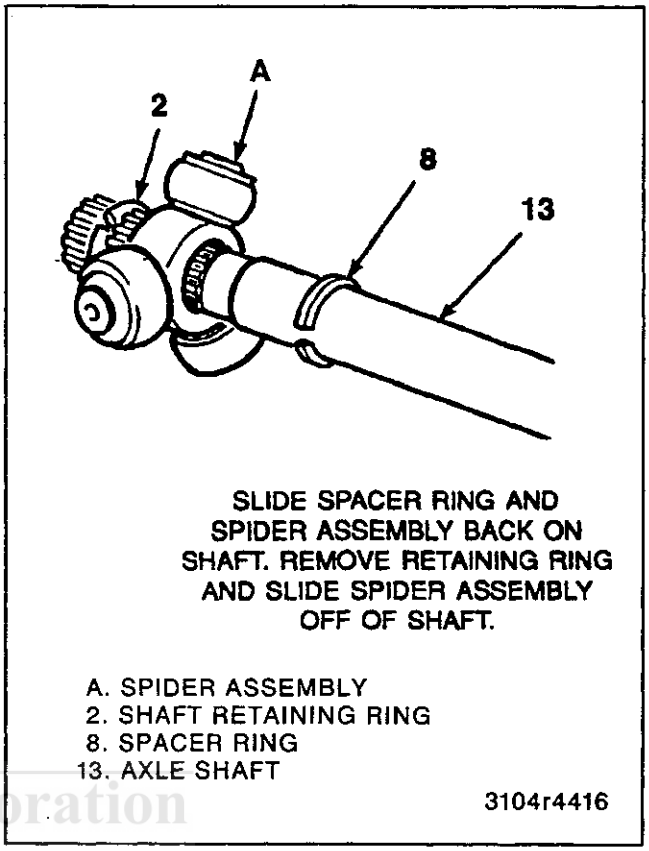

Figure 21—Removing Spider Assembly

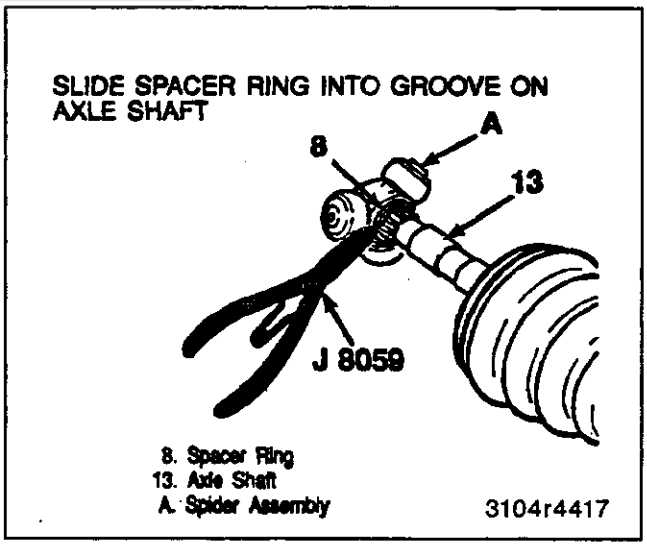

Figure 22—Installing Spider Assembly

4. Axle flange bolts (200) (figure 5).
   - Turn wheel out to loosen the drive axle from the axle tube.
   - Push drive axle toward the front of the truck and tie it out of the way.
5. Actuator connector (12) (figure 3).
6. Indicator light connector (11) (figure 3).
7. Skid plate, if necessary. Refer to "Skid Plate Replacement."
8. Drain plug (27) and washer (28) from the carrier and drain the axle lubricant into a suitable container.

9. Axle mounting nuts (130) and washers (126) (figure 24).
10. Axle tube to carrier bolts (6).
11. Axle tube from carrier.
    - Take care to keep the open end of the tube up.

Disassemble (Figure 3)

Tools Required:
J 29369-1 Bearing Remover (K2 models)
J 29369-2 Bearing Remover (K3 models)

- Hold the axle tube in a vise by the mounting flange.

1. Sleeve (10).
2. Gear (8).
3. Thrust washer (7).
4. Axle shaft (1). Tap out with a soft mallet.
5. Deflector (2). Pry out with a screwdriver.
6. Seal (3). Pry out with a screwdriver.
7. Bearing (4). Use J 29369-1 (K2 models) or J 29369-2 (K3 models) and a slide hammer.

Clean

- Parts in a suitable solvent.
- Gasket surfaces on the axle tube and carrier housing.

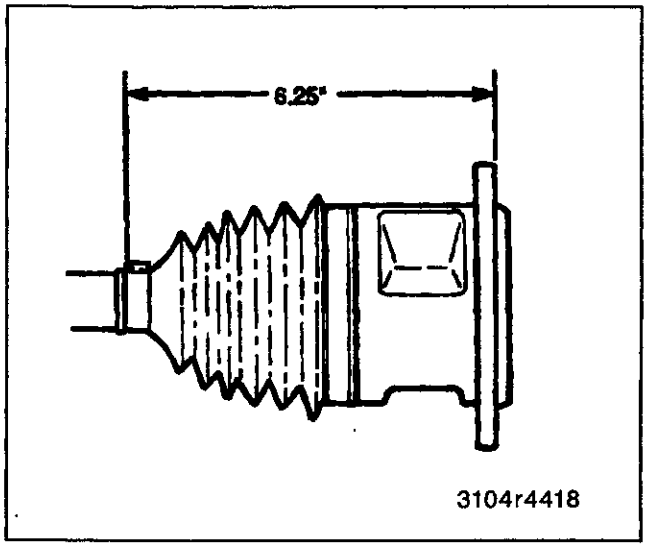

Figure 23—Tripot Seal Installation Measurements

Assemble (Figures 3 and 24)

Tools Required:
J 36609 Bearing Installer
J 36600 Seal Installer (K2 Models)
J 22833 Seal Installer (K3 Models)

1. New bearing (4). Use J 36609. Apply axle lubricant to the bearing.
2. New seal (3). Use J 36600 (K2 models) or J 22833 (K3 models). Coat the seal lips with grease.
3. Deflector (2).

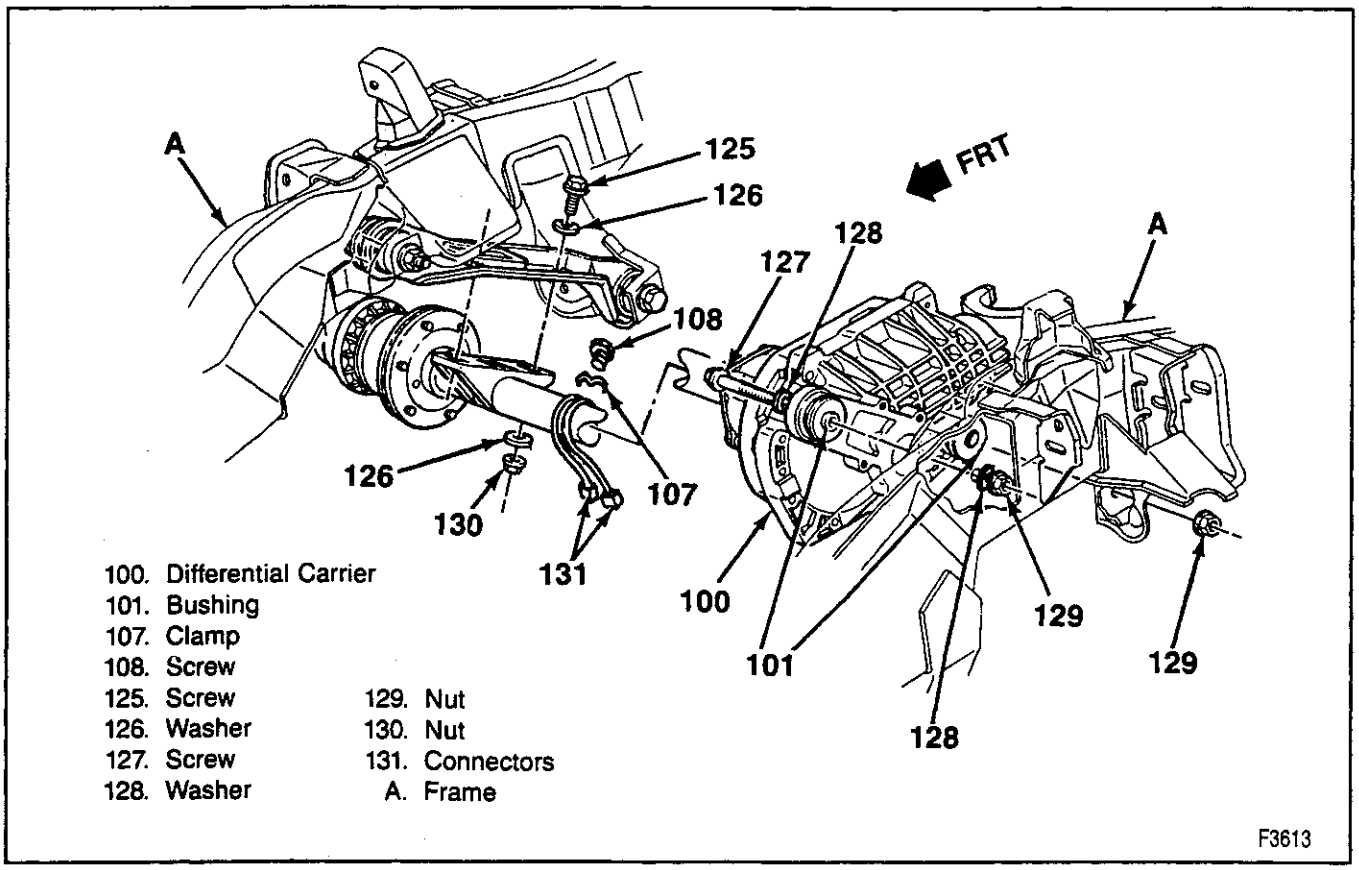

Figure 24—Differential Carrier Mounting

4. Axle shaft (1).
5. Thrust washer (7). Use grease to hold it in place. Make sure the tabs on the washer align with the slot in the axle tube.
6. Gear (8).
7. Sleeve (10).

Install or Connect (Figures 3, 5, 12, and 24)

NOTICE: For steps 2, 4, 5, 7, 8, 11, and 13, refer to "Notice" on page 4C-1.

- Apply sealant (GM P/N 12345739) or equivalent to the carrier sealing surface.

1. Axle tube (5) to carrier (24).
2. Bolts (6).

Tighten

- Bolts to 40 N.m (30 lbs. ft.).

3. Drive shaft to axle shaft.
4. Bolts (200) (figure 5).

Tighten

- Bolts to 80 N.m (59 lbs. ft.).

5. Axle mounting nuts (130) with washers (126) (figure 24).

Tighten

- Nuts (130) to specifications:
  - — K2 models: 100 N.m (75 lbs. ft.).
  - — K3 models: 145 N.m (106 lbs. ft.).

6. Tie rod end to relay rod. Refer to SECTION 3B3.
7. Stabilizer link (62) (figure 12).

Tighten

- Nut to 18 N.m (13 lbs. ft.) until the nuts meet the end of the bolt threads for torque value.

8. Stabilizer bracket to frame nuts (63) (figure 12).

Tighten

- Bolts to 33 N.m (24 lbs. ft.).

9. Actuator connector (12).
10. Indicator connector (11).
11. Drain plug (27) and the washer (26).

Tighten

- Plug to 33 N.m (24 lbs. ft.).

12. New lubricant. Refer to "Specifications."
13. Fill plug (26).

Tighten

- Plug to 33 N.m (24 lbs. ft.).

14. Skid plate, if necessary. Refer to "Skid Plate Replacement."

SHIFT FORK REPLACEMENT

Remove or Disconnect (Figure 3)

1. Shaft and axle tube assembly as outlined earlier in this section.
2. Shift shaft (18), damper spring (17), fork (16), and clip (15) assembly.
3. Spring (14) from the carrier case, taking care not to dislodge the shim (20) from the output shaft.

Install or Connect (Figure 3)

1. Spring (14) into the carrier case.
2. Shift shaft (18), damper spring (17), fork (16), and clip (15) assembly into axle tube.
   - Make sure the clip is fully seated into the groove on the shift lever.
3. Shaft and axle tube assembly.

DIFFERENTIAL PILOT BEARING REPLACEMENT

Remove or Disconnect (Figure 3)

Tool Required:
J 34011 Pilot Bearing Remover
J 33842 Pilot Bearing Installer

1. Shaft and axle tube assembly. Refer to "Shaft and Axle Tube Assembly Replacement."
2. Shim (20).
3. Differential pilot bearing (21). Use J 34011.

Install or Connect (Figure 3)

1. Shim (20).
2. Differential pilot bearing (21). Use J 33842.
   - Lubricate the bearing with axle lubricant.
3. Shaft and tube assembly. Refer to "Shaft and Axle Tube Assembly Replacement."

OUTPUT SHAFT REPLACEMENT

Remove or Disconnect (Figure 3)

- Raise the vehicle. Support with jack stands.
- Place a drain pan under the axle to catch oil.

1. Left drive axle. Refer to "Drive Axle Replacement."
2. Lower carrier mounting bolt.
   - Carefully pry against the lower carrier to provide clearance for output shaft removal. Take care not to damage the carrier case.
3. Output shaft (32). Attach a slide hammer with adapter to the output shaft and pull it from the carrier case. Take care not to damage the case.
4. Deflector (31).
5. Seal (29). Pry out with a screwdriver.

Install or Connect (Figure 3)

Tools Required:
J 36600 Seal Installer (K2 models)
J 22833 Seal Installer (K3 models)

1. New seal (29). Use J 36600 (K2 models) or J 22833 (K3 models). Lubricate the seal lips with grease.
2. Deflector (31).
3. Output shaft (32). Carefully pry against the lower carrier to provide clearance. Take care not to damage the carrier case. Tap the output shaft into place with a soft mallet.

NOTICE: Refer to "Notice" on page 4C-1.

4. Lower carrier mounting bolt, washers, and nut.

Tighten

- Bolts to 110 N·m (80 lbs. ft.).

5. Left drive axle. Refer to "Drive Axle Replacement."
   - Add lubricant as required to the axle. Refer to "Specifications" at the end of this section.

PINION FLANGE, DUST DEFLECTOR, AND OIL SEAL REPLACEMENT

Remove or Disconnect (Figures 25, 26, 27 and 28)

Tool Required:
J 8614-01 Companion Flange Holder and Remover

- Raise the vehicle on a hoist.

1. Propeller shaft from the axle. Refer to SECTION 4A.
   - Tie the propeller shaft to a frame rail or crossmember.

Measure

- The torque required to rotate the pinion. Record the torque value for reassembly (figure 25).

Important

- Scribe a line on the pinion stem, pinion nut and the companion flange and record the number of exposed threads on the pinion stem (figure 26).

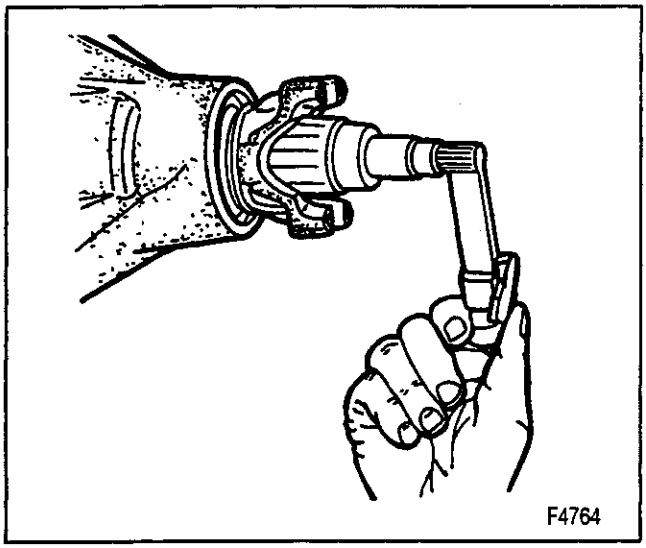

Figure 25—Measuring the Pinion Rotating Torque

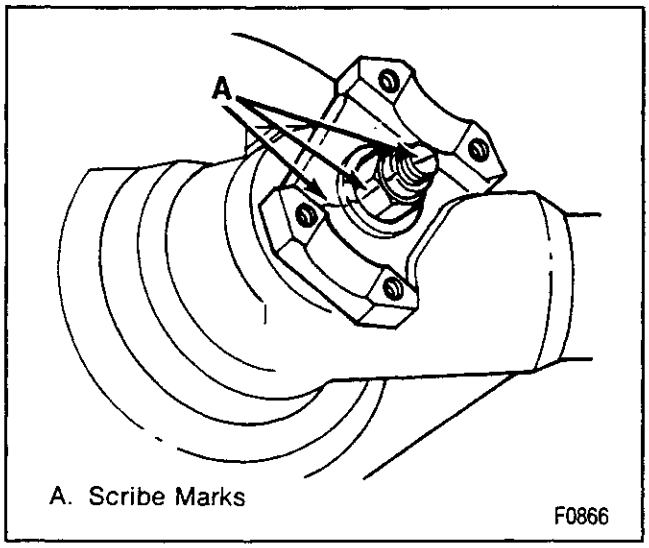

Figure 26—Scribed Marks

2. Nut using J 8614-01 (figure 27).
   - Position J 8614-01 on the flange so that the four notches on the tool face the flange.
3. Flange using J 8614-01 (figure 28).
   - Use the special nut and forcing screw to remove the flange.
4. Oil seal.
   - Carefully pry the seal from the bore. Do not distort or scratch the aluminum case.

Inspect

- The pinion flange for a smooth oil seal surface.

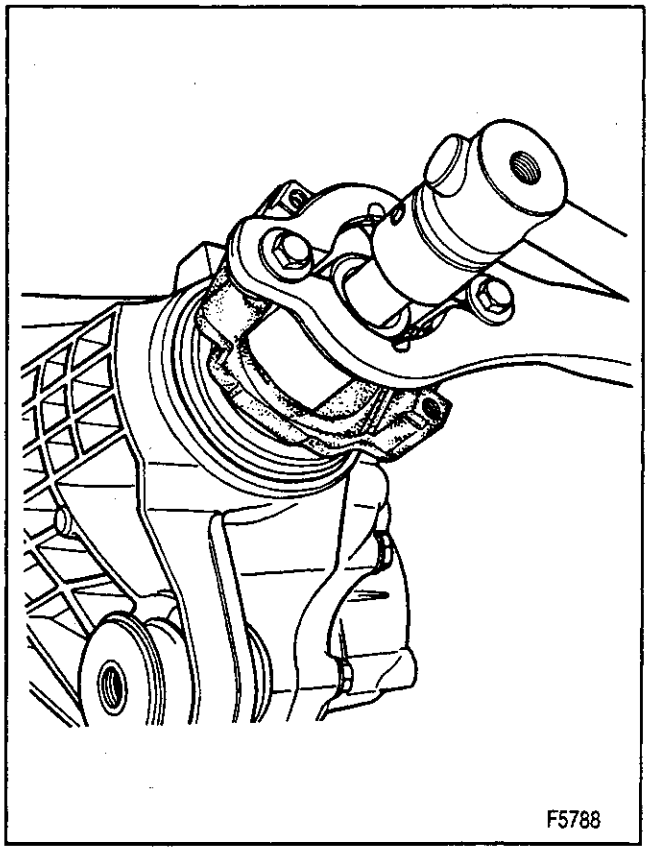

Figure 27—Removing/Installing the Pinion Nut

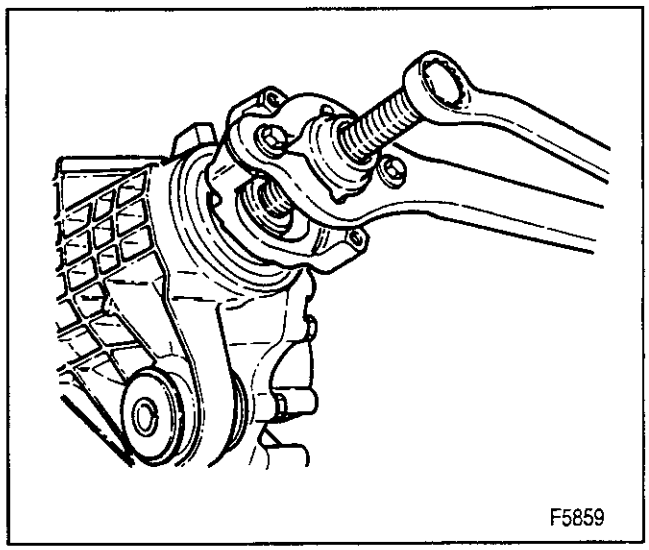

Figure 28—Removing/Installing the Pinion Flange

- The pinion flange for worn drive splines.
- Replace if necessary.

5. Dust deflector.
   - Tap the deflector from the flange.
   - Clean up the stake points on the flange.

Install or Connect (Figures 28 and 29)

Tools Required:
J 8614-01 Companion Flange Holder and Remover
J 36366 Seal Installer

1. Dust deflector on the flange.
   - Stake the new deflector at three new equally spaced positions. Staking must be such that the seal operating surface is not damaged.
2. Oil seal using J 36366 (figure 29).
   - Position the oil seal in the bore, then place J 36366 over the oil seal. Strike J 36366 with a hammer until the seal flange is seated on the axle housing surface. Drive the seal in straight, not at an angle, as this will damage the aluminum housing.

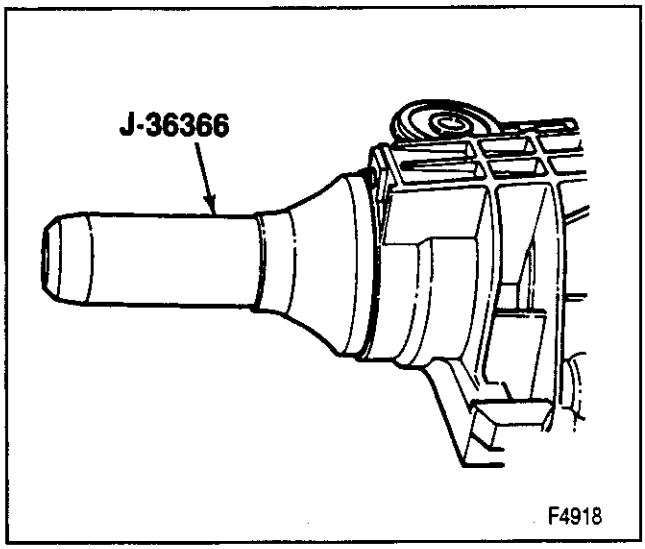

Figure 29—Installing the Pinion Seal

NOTICE: Do not hammer the pinion flange onto the pinion shaft or the pinion flange may be damaged.

3. Flange onto the pinion using J 8614-01 (figure 28).
   - Place the washer and a new nut on the pinion threads and tighten the nut to the original scribed position using the scribe marks and exposed threads as a reference.

Measure

- The rotating torque of the pinion and compare this with the rotating torque recorded earlier.

Tighten

- The pinion nut by small increments until the torque required to rotate the pinion is 0.35 N·m (3 lbs. in.) greater than the original torque.

4. Propeller shaft. Refer to SECTION 4A.
5. Lower the vehicle.

CARRIER REPLACEMENT

Remove or Disconnect (Figure 24)

- Raise the vehicle. Support with jack stands.

1. Skid plate (if equipped).
   - Drain the axle lubricant, if necessary.
2. Front propeller shaft at the carrier yoke. Refer to SECTION 4A. Wire the propeller shaft out of the way.
3. Drive axle bolts at the carrier output shafts. Move the axle shafts out of the way and secure in position.
4. Wiring at the axle.
5. Vent hose at the axle.
6. Screws (125), nuts (130) and washers (126).
7. Carrier lower mounting bolt.
8. Right side inner tie rod end from the relay rod. Refer to SECTION 3B3.
9. Engine oil filter (some models).
10. Attach a transmission jack to the carrier.
11. Upper carrier mounting bolt.
12. Carrier from the vehicle.
    - Refer to the Light Duty Truck Unit Repair Manual for repair information.

Install or Connect (Figures 5 and 24)

NOTICE: For steps 2, 6, 9, and 10, refer to "Notice" on page 4C-1.

1. Carrier to the vehicle.
2. Carrier mounting bolts (127), nuts (129), and washers (128).

Tighten

- Bolts (127) to 110 N·m (80 lbs. ft.).

3. Remove the transmission jack.
4. Engine oil filter (if removed).

5. Tie rod. Refer to SECTION 3B3.
6. Axle tube bolts (125), nuts (130), and washers (126).

Tighten

- Nuts (130) to specifications.
  — K2 models: 100 N·m (75 lbs. ft.).
  — K3 models: 145 N·m (110 lbs. ft.).

7. Vent hose.
8. Wiring.
9. Drive axle (201) to output shaft bolts (200) (figure 5).

Tighten

- Bolts to 80 N·m (60 lbs. ft.).

10. Front propeller shaft to the carrier yoke.

Tighten

- Universal joint clamp bolts to 20 N·m (15 lbs. ft.).
- Fill the carrier with lubricant, if necessary. Refer to "Specifications" in this section.

11. Skid plate (if equipped).
12. Add engine oil, if the oil filter was removed.

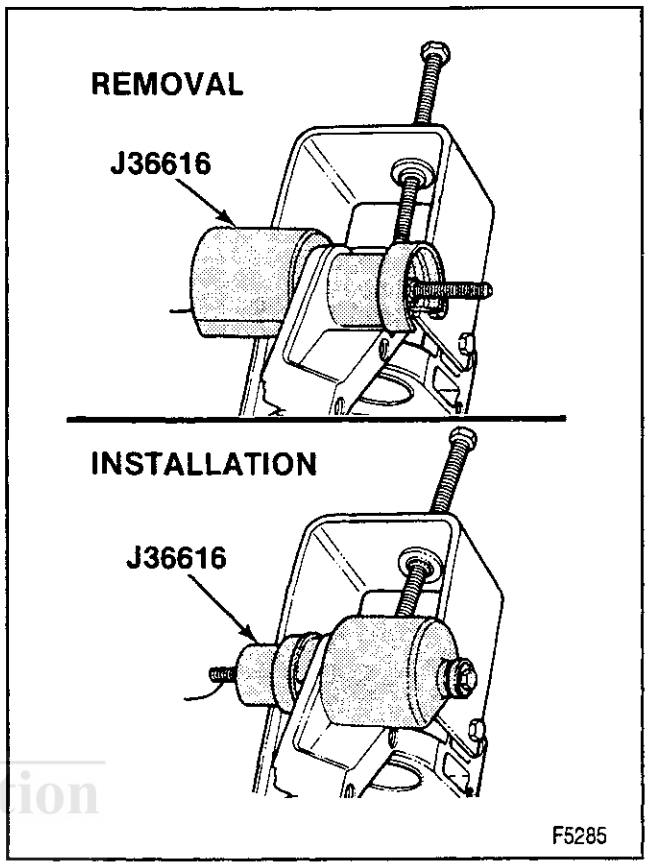

Figure 30—Removing/Installing Carrier Case Bushings

CARRIER CASE BUSHING REPLACEMENT

Remove or Disconnect (Figures 3, 24, and 30)

Tool Required:
J 36616 Bushing Remover and Installer

1. Carrier, as outlined previously. Refer to "Carrier Replacement."
2. Carrier bushing using J 36616 (figure 30).

Install or Connect (Figures 3, 24, and 30)

Tool Required:
J 36616 Bushing Remover and Installer

1. Carrier bushing using J 36616 (figure 30).
2. Carrier, as outlined previously. Refer to "Carrier Replacement."

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

	N·m	Lbs. Ft.
Carrier Frame Screws	22	16
Drive Axle Nut at Front Hub	245	180
Drive Axle Screws	145	110
Engagement Switch	20	15
Plug, Drain and Fill	33	80
Right Side Axle Tube to Frame Nuts		
K2 Models	40	30
K3 Models	100	75
Thermal Actuator	22	16

LUBRICATION

Capacity		
Fill to the level of the filler plug hole.		
K2 Models	1.66L	1.75 Qt.
K3 Models	2.13L	2.25 Qt.
Type Recommended	SAE 80W-90 GL5 Gear Lubricant (SAE 80W GL5 in Canada)	

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SPECIAL TOOLS

1. J 29369-1
2. J 29369-2

3. J 34011

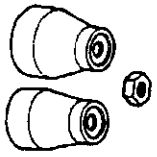
4. J 22833
5. J 36600

6. J 36609

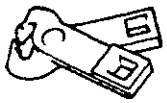
7. J 33842

8. J 36616

9. J 36845



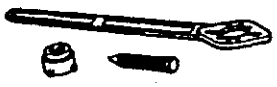
10. J 35910



11. J 36605

12. J 24319-B

13. J 8614-01



14. J 28733-B

15. J 8059

1. AXLE TUBE BEARING REMOVER (K2 MODELS)
2. AXLE TUBE BEARING REMOVER (K3 MODELS)
3. DIFFERENTIAL PILOT BEARING REMOVER
4. AXLE TUBE SEAL INSTALLER (K3 MODELS)
5. AXLE TUBE SEAL INSTALLER (K2 MODELS)
6. AXLE TUBE BEARING INSTALLER
7. DIFFERENTIAL PILOT BEARING INSTALLER
8. CARRIER CASE BEARING INSTALLER
9. DRIVE AXLE BOOT CLAMP PROTECTOR INSTALLER
10. SEAL CLAMP TOOL
11. KNUCKLE SEAL INSTALLER
12. STEERING LINKAGE PULLER
13. PINION FLANGE HOLDER
14. FRONT HUB SPINDLE REMOVER
15. SNAP RING PLIERS

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