

2010 DRIVELINE/AXLE

Wheel Drive Shafts - Equinox & Terrain

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Front Lower Stabilizer Bar Link Nut	65 N.m	48 lb ft
Front Outer Tie Rod Stud Nut	50 N.m	37 lb ft
Front Wheel Drive Shaft Spindle Nut	205 N.m	151 lb ft
Intermediate Drive Shaft-to-Bracket Bolts	30 N.m	22 lb ft
Intermediate Drive Shaft Support Bracket Mounting Bolts - L61	35 N.m	26 lb ft
Intermediate Drive Shaft Support Bracket Mounting Bolts - L66	50 N.m	37 lb ft
J-44015 Steering Linkage Installer	40 N.m	30 lb ft
Lower Ball Joint Stud Nut	40 N.m	30 lb ft
Rear Lower Control Arm-to-Suspension Knuckle Bolt and Nut	110 N.m	81 lb ft
Rear Lower Jounce Bumper Nut	63 N.m	46 lb ft
Rear Shock Absorber Lower Mounting Bolt	110 N.m	81 lb ft
Rear Stabilizer Link-to-Control Arm Nut	15 N.m	11 lb ft
Rear Wheel Drive Shaft Spindle Nut	205 N.m	151 lb ft

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number
Wheel Drive Shaft	Grease	1051344 (Canadian P/N 993037)

COMPONENT LOCATOR

WHEEL DRIVE SHAFTS DISASSEMBLED VIEWS

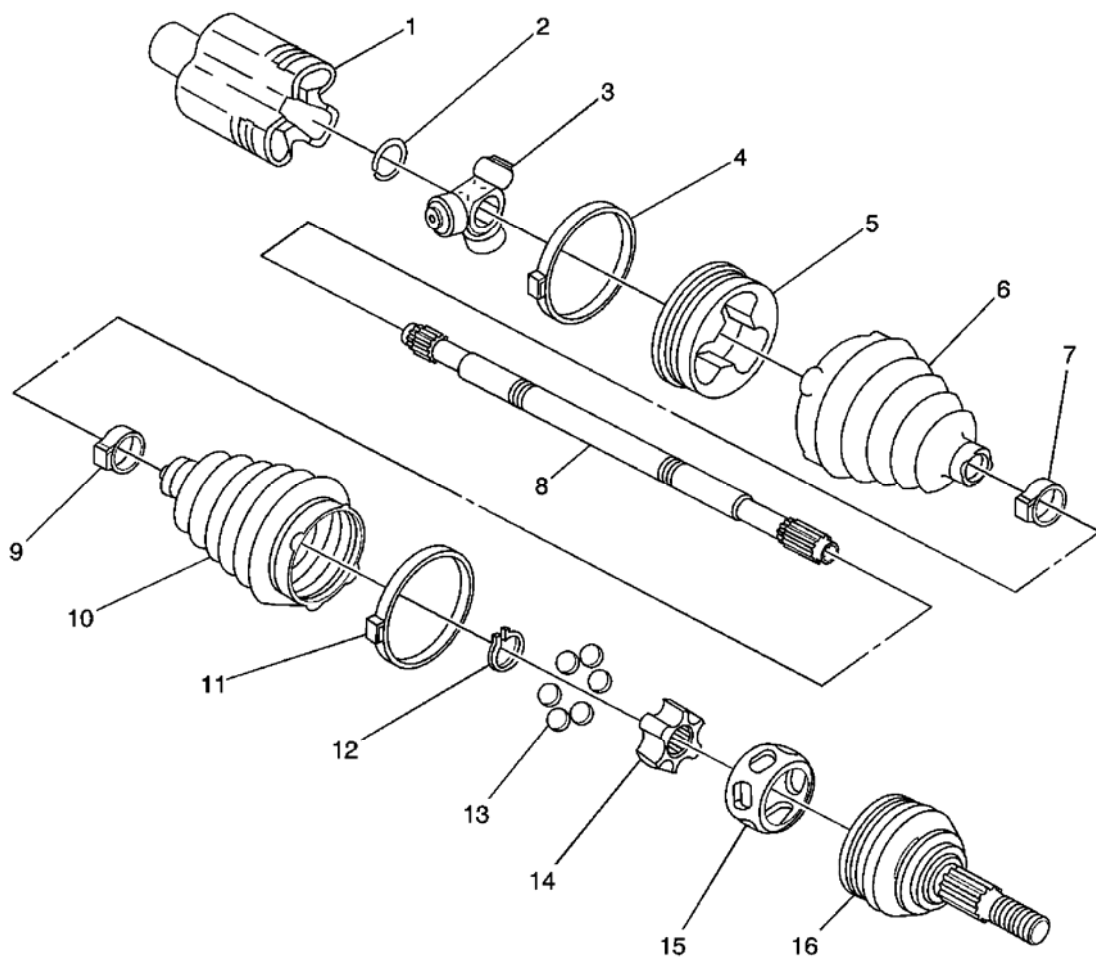


Fig. 1: Tripot Design Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Retainer and Housing Assembly
2	Retaining Ring
3	Tripot Joint Spider Assembly
4	Boot Retaining Clamp
5	Tripot Trilobal Bushing
6	Inboard Boot
7	Boot Retaining Clamp
8	Axle Shaft
9	Boot Retaining Clamp
10	Outboard Boot
11	Boot Retaining Clamp
12	Race Retaining Ring
13	Chrome Alloy Ball

14	CV Joint Inner Race
15	CV Joint Cage
16	CV Joint Outer Race

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - WHEEL DRIVE SHAFTS

IMPORTANT: Complete the following steps prior to beginning the wheel drive shaft diagnosis.

1. Review the **Diagnostic Starting Point - Vehicle** .
2. Perform the **Vibration Analysis - Road Testing** in order to effectively diagnose the concern.
3. Review the system operation in order to become familiar with the system function. Refer to **Wheel Drive Shafts Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket equipment and modifications which could affect the operation of the wheel drive shafts or other rotating components.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Thoroughly inspect the entire wheel drive shaft for visible damage, leaking joint seals, and missing seal clamps.
- Inspect the wheel drive shaft seals for cuts, tears, or other damage which may allow the loss of lubricant and the entry of contaminants.

Symptom List

After performing the Visual/Physical Inspection and no visual signs of damage or other interference impairing the wheel drive shaft function is apparent, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the joints manually. Any binding or otherwise impeded movement of the joints may indicate damage which could contribute to the concern. Refer to the following:

- **Click Noise In Turns**
- **Clunk When Accelerating from Coast**
- **Clunk Noise When Accelerating During Turns**
- **Shudder or Vibration During Acceleration**

CLICK NOISE IN TURNS

A constant velocity joint which is worn or damaged may cause a click noise during turns. This may be more apparent while simultaneously turning and accelerating. This click is caused by wear and/or damage to the constant velocity joint bearings and/or races. Commonly, this damage or wear is caused by the loss of

lubricating grease from the constant velocity joint and the entry of foreign material or contaminants.

Carefully inspect the wheel drive shaft seals for cuts, tears or other damage which may allow the lubricating grease to escape. The loss of this grease will cause damage to the wheel drive shaft constant velocity joint in a very short period of time.

After the inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the inner and outer joints manually. Any binding or impeded movement of the joints may indicate damage which could contribute to the concern.

CLUNK WHEN ACCELERATING FROM COAST

A clunk noise occurring when accelerating from coast or a standing start may be caused by a worn or damaged wheel drive shaft cross groove joint. The common cause of wheel drive shaft cross groove damage is the loss of lubricating grease and/or the presence of foreign material and contaminants in the joint. This usually occurs as a result of a torn or damaged cross groove joint seal.

Carefully inspect the wheel drive shaft seal for cuts, tears or other damage that may allow the loss of the lubricating grease and/or the entry of contaminants.

After inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the joint manually. Do not allow the joint to separate from the wheel drive shaft bar. Any binding or impeded movement of the joints may indicate damage which could contribute to the concern.

CLUNK NOISE WHEN ACCELERATING DURING TURNS

A clunk noise that occurs while accelerating during turns may be caused by wear and/or damage to the inboard and the outboard joints in combination. The loss of lubricant and/or the presence of contaminants can cause damage to the internal components of the joints.

Carefully inspect the joint seals for cuts, tears or other damage. Joint seals that are damaged may allow lubricant leakage and the entry of contaminants.

After inspection reveals no visual evidence of wear or damage, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the joints manually. Do not allow the joints to separate from the wheel drive shaft bar. Any binding or impeded movement of the joints may indicate damage which could contribute to the concern.

SHUDDER OR VIBRATION DURING ACCELERATION

In order to diagnose a shudder or vibration during acceleration, refer to **Diagnostic Starting Point - Vehicle** .

REPAIR INSTRUCTIONS

FRONT WHEEL DRIVE INTERMEDIATE SHAFT REPLACEMENT

Special Tools

- **J 2619-01:** Slide Hammer
- **J 44467:** Output Shaft Assembly Remover and Installer

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
2. Remove the wheel drive shaft assembly. Refer to **Front Wheel Drive Shaft Replacement**.

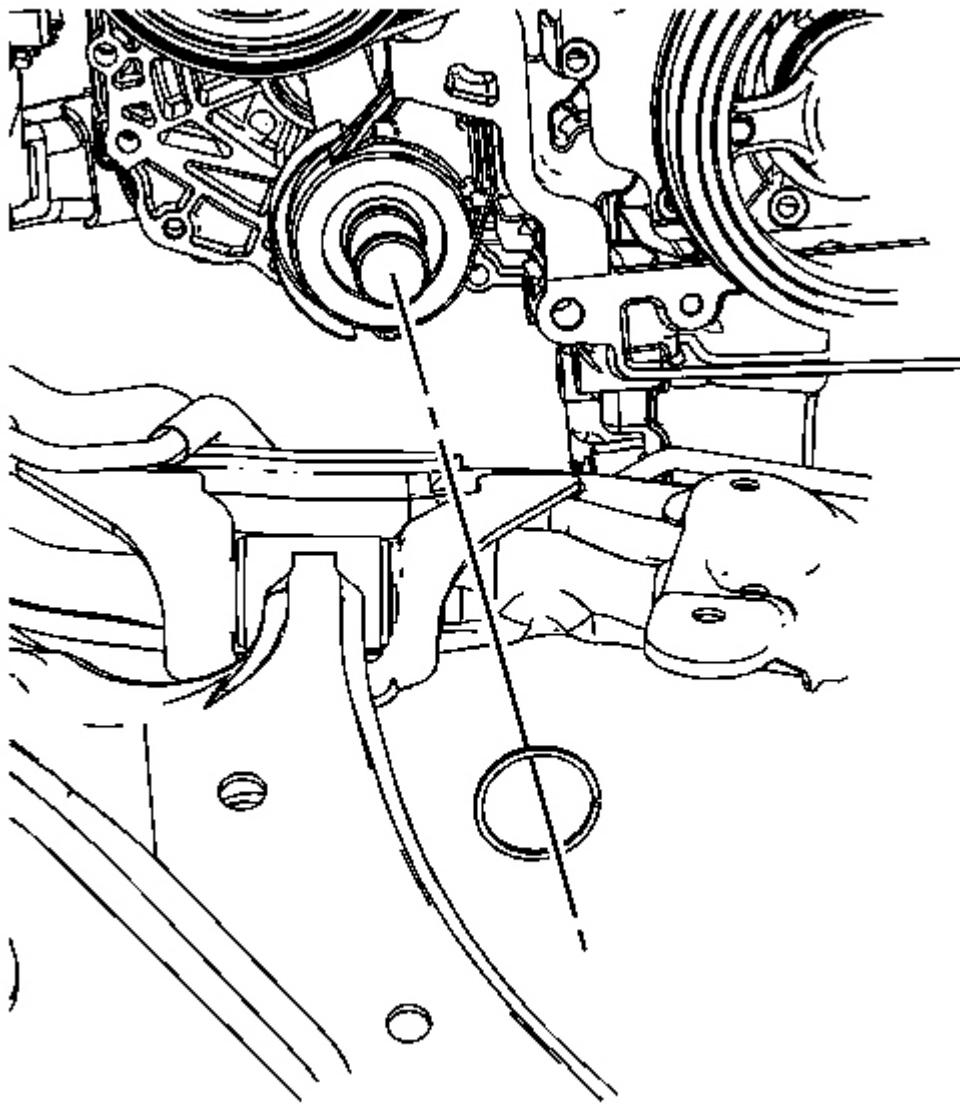


Fig. 2: View Of Wheel Drive Shaft Clip
Courtesy of GENERAL MOTORS CORP.

NOTE: Remove the retaining ring. DO NOT re-use the retaining ring discard. Use NEW only.

3. Remove the retaining clip for the wheel drive shaft.

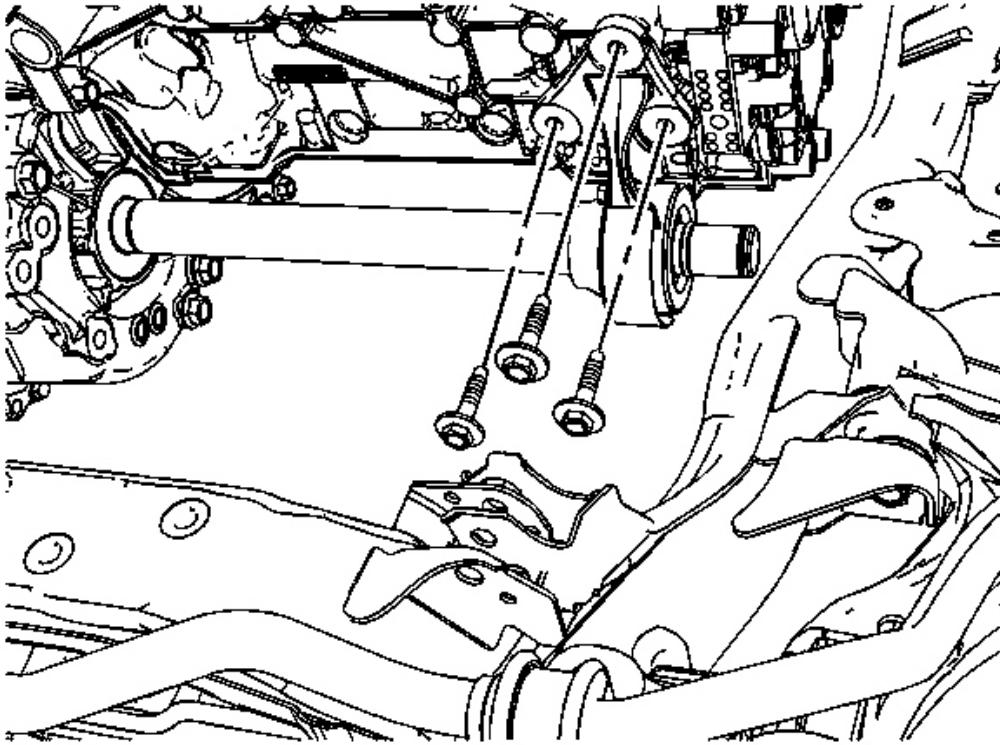


Fig. 3: Identifying Intermediate Shaft Support Bracket Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the mounting bolts for the intermediate shaft support bracket.
5. Support the wheel drive shaft.

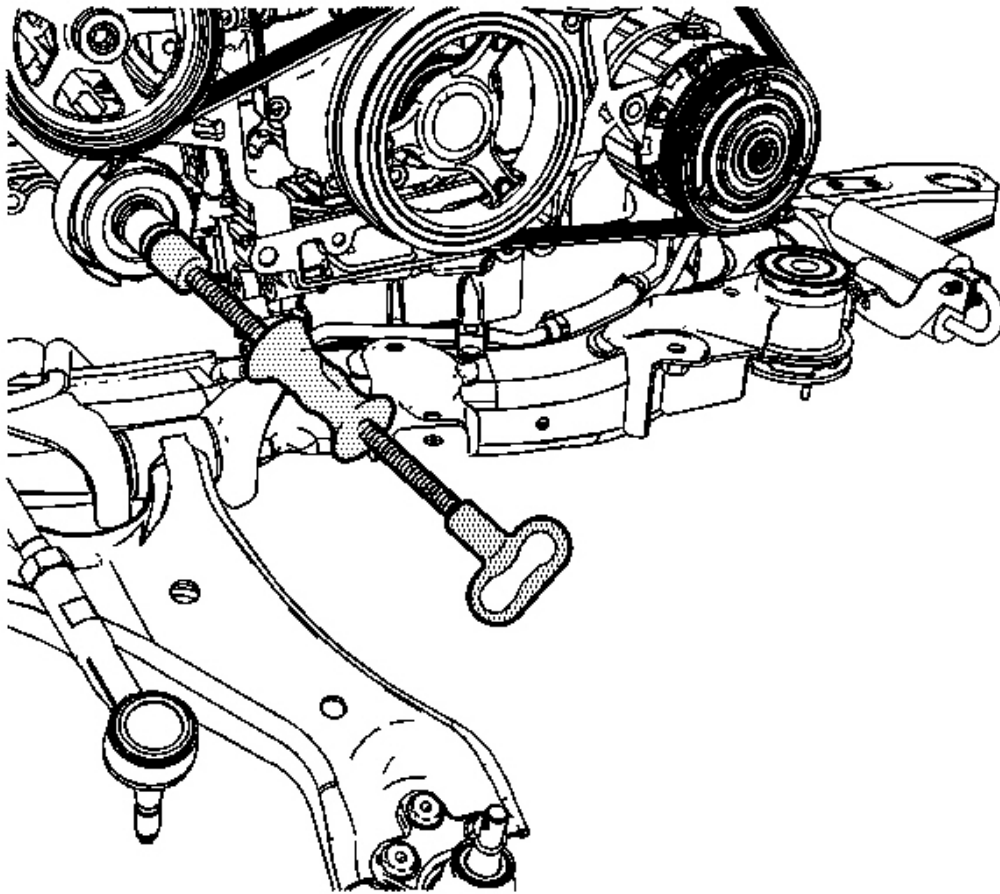


Fig. 4: Disengaging Intermediate Drive Shaft From Transaxle
Courtesy of GENERAL MOTORS CORP.

6. Using the **J 2619-01**: hammer and the **J 44467**: remover and installer, remove the wheel drive shaft from the transmission.

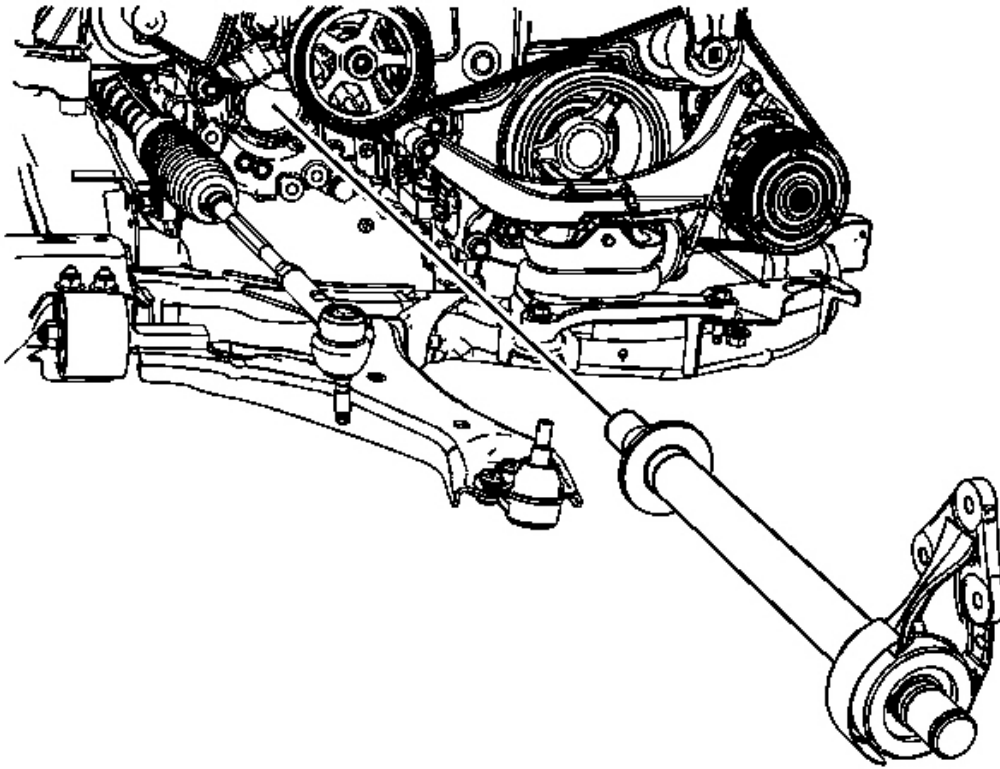


Fig. 5: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

7. Remove the wheel drive shaft from the vehicle.

Installation Procedure

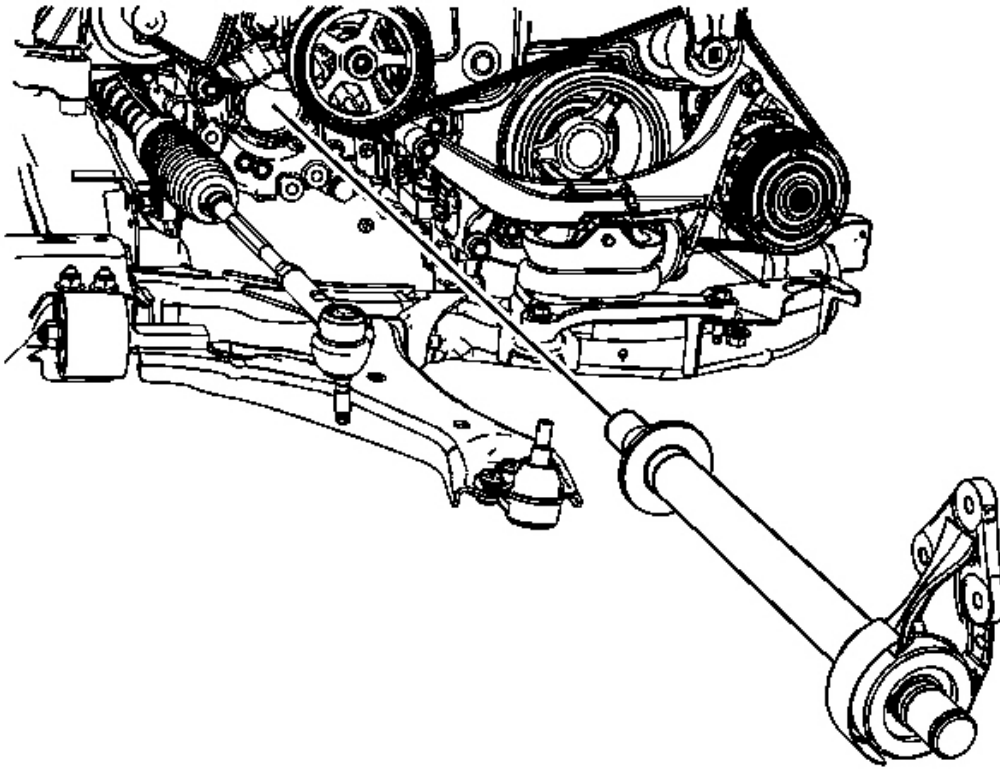


Fig. 6: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

1. Install the intermediate shaft in the transmission.
2. Move the intermediate shaft back and forth to ensure that the intermediate shaft is properly seated.

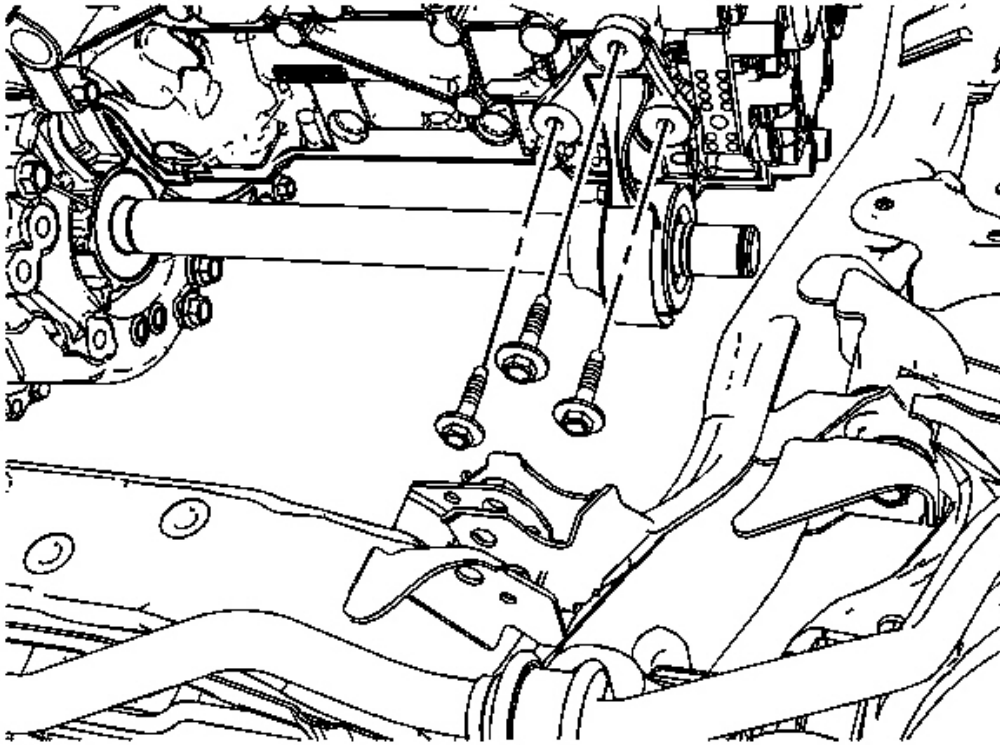


Fig. 7: Identifying Intermediate Shaft Support Bracket Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

3. Hand tighten the mounting bolts for the intermediate shaft mounting bracket.

CAUTION: Refer to Fastener Caution .

4. Tighten the intermediate shaft mounting bolts to 35 N.m (26 lb ft).

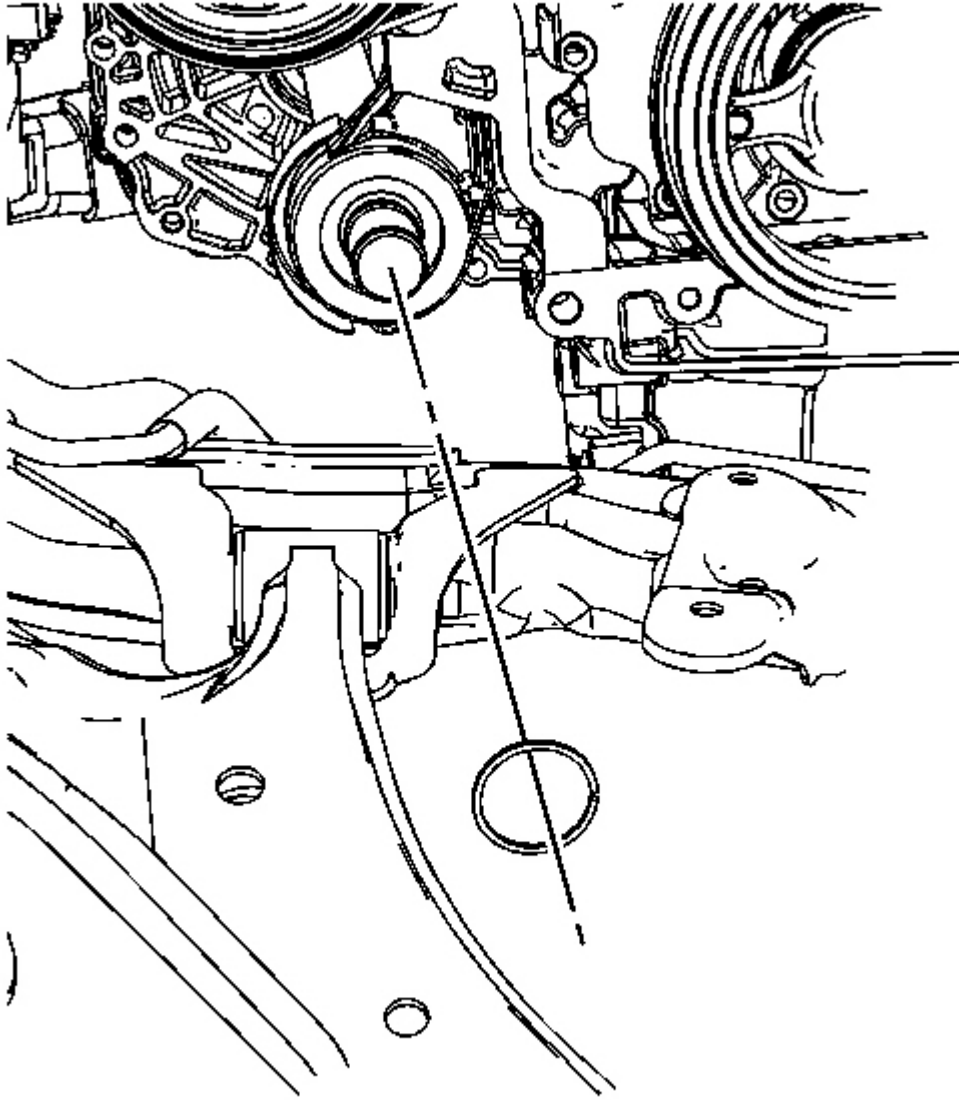


Fig. 8: View Of Wheel Drive Shaft Clip
Courtesy of GENERAL MOTORS CORP.

5. Install the NEW intermediate shaft retaining.
6. Install the wheel drive shaft assembly. Refer to **Front Wheel Drive Shaft Replacement**.
7. Remove the support and lower the vehicle.

FRONT WHEEL DRIVE SHAFT REPLACEMENT

Special Tools

- **J 2619-01:** Slide Hammer
- **J 42128:** Hub Puller
- **J 44394-A:** A Seal Protector
- **J 45341:** Rear Wheel Drive Shaft Removal Tools

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

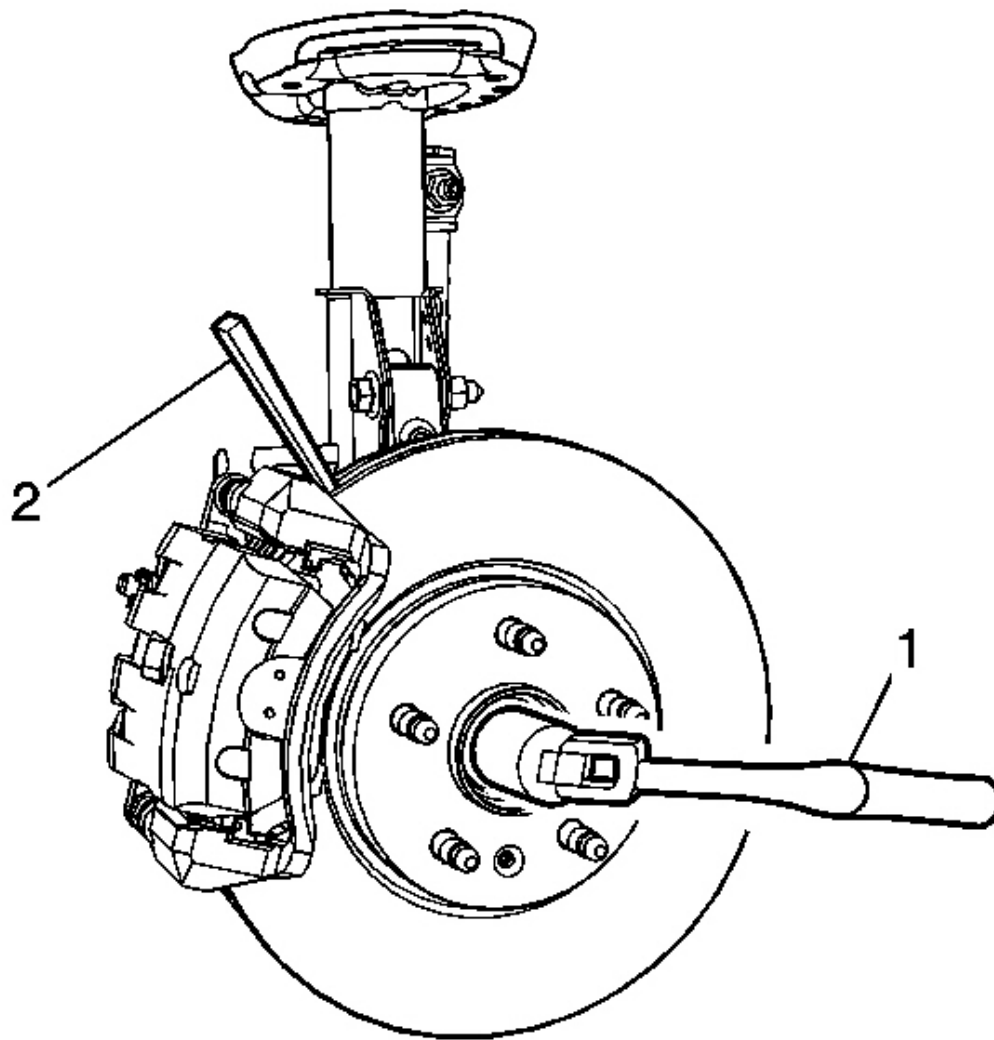


Fig. 9: Loosening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

3. Insert a punch or a drift (2) in the cooling fins of the brake rotor.
4. Rotate the brake rotor until it rest against the brake caliper mounting bracket.
5. Using a breaker bar and the proper size socket (1), loosen the wheel drive shaft nut.

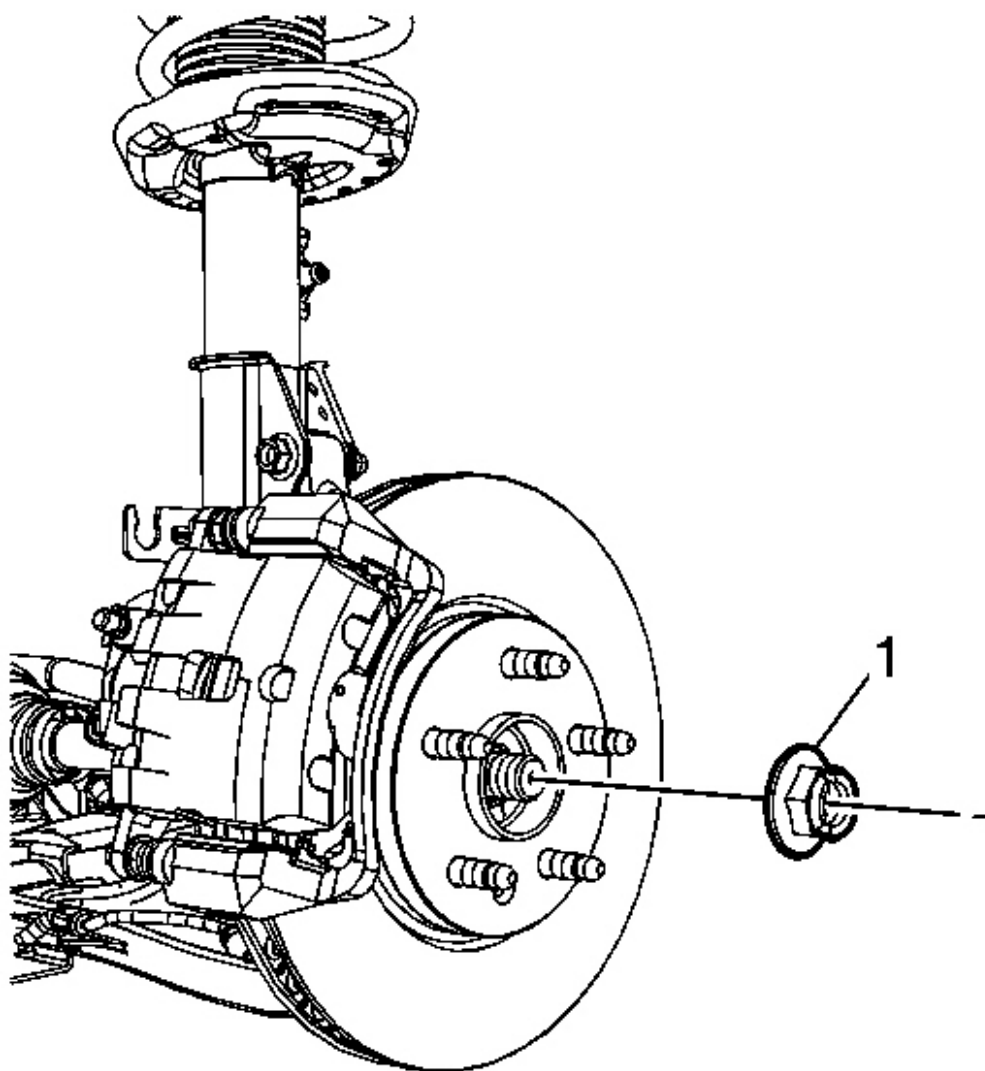


Fig. 10: Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the wheel drive shaft nut (1) and discard.
7. Using the **J 42128**: puller, separate the wheel drive shaft from the wheel hub.
8. Separate the stabilizer link from the lower control arm. Refer to **Stabilizer Shaft Link Replacement** .
9. Separate the outer tie rod end from the knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .
10. Separate the lower control arm from the knuckle. Refer to **Lower Control Arm Replacement** .

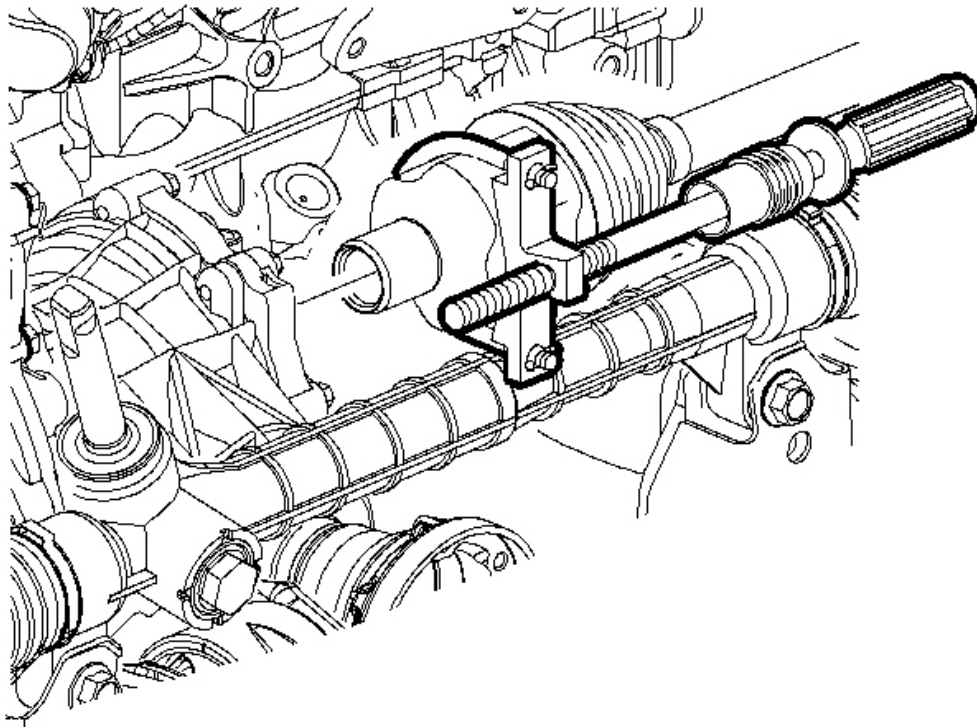


Fig. 11: Disengaging Wheel Drive Shaft From The Transmission or Power Takeoff Unit (PTU)
Courtesy of GENERAL MOTORS CORP.

11. Using the **J 2619-01**: hammer and the **J 45341**: tool, remove the wheel drive shaft from the vehicle.

Installation Procedure

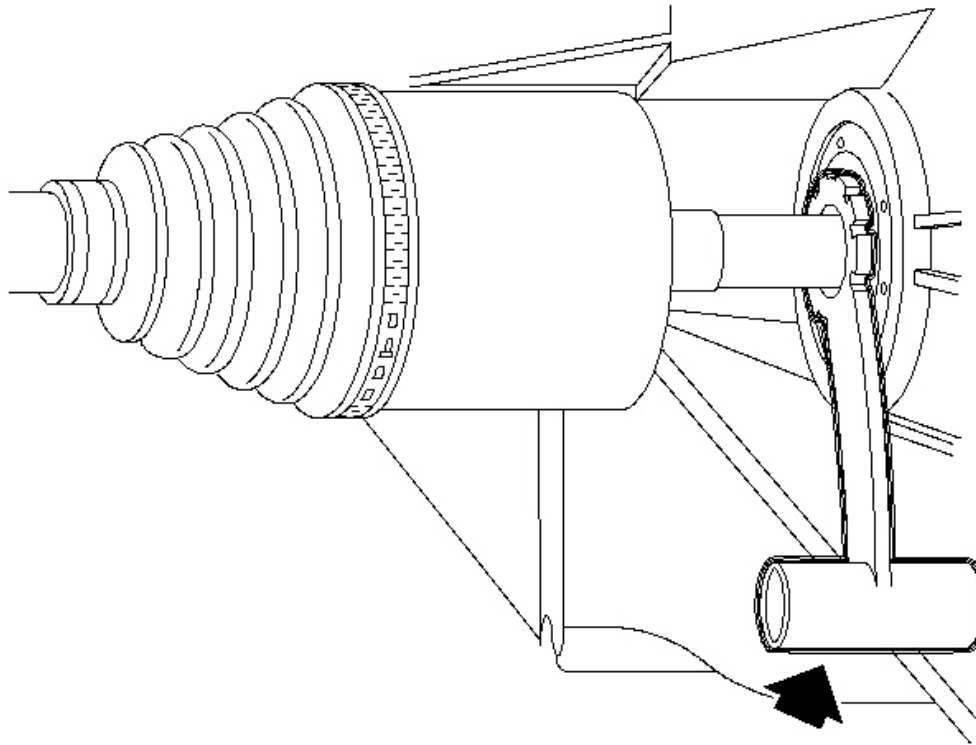


Fig. 12: Installing SA91112T On The Wheel Drive Shaft Oil Seal
Courtesy of GENERAL MOTORS CORP.

1. Insert the **J 44394-A**: protector into the transmission.

NOTE: **The following service procedure is for vehicles equipped with an intermediate shaft.**

2. For the right wheel drive shaft, apply a very small amount of grease to the splines of the wheel drive shaft inner joint. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.
3. Install the wheel drive shaft until the splines pass the oil seal.
4. Remove the **J 44394-A**: protector from the oil seal.

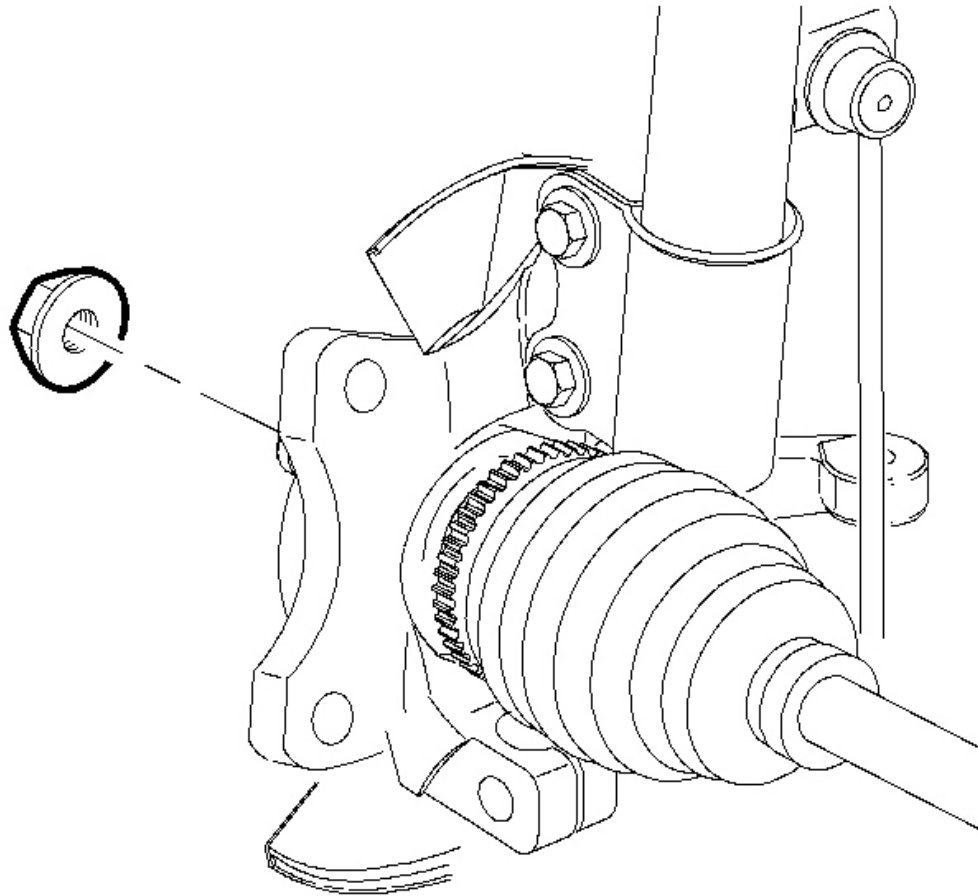


Fig. 13: Inserting Constant Velocity (CV) Joint Spindle On The Wheel Hub/Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

5. Install the wheel drive shaft in the knuckle.
6. Hand install a new wheel drive shaft spindle nut.
7. Install the lower ball to the steering knuckle. Refer to **Lower Control Arm Replacement** .
8. Install the lower link to the stabilizer bar. Refer to **Stabilizer Shaft Link Replacement** .
9. Install the tie rod end to the steering knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

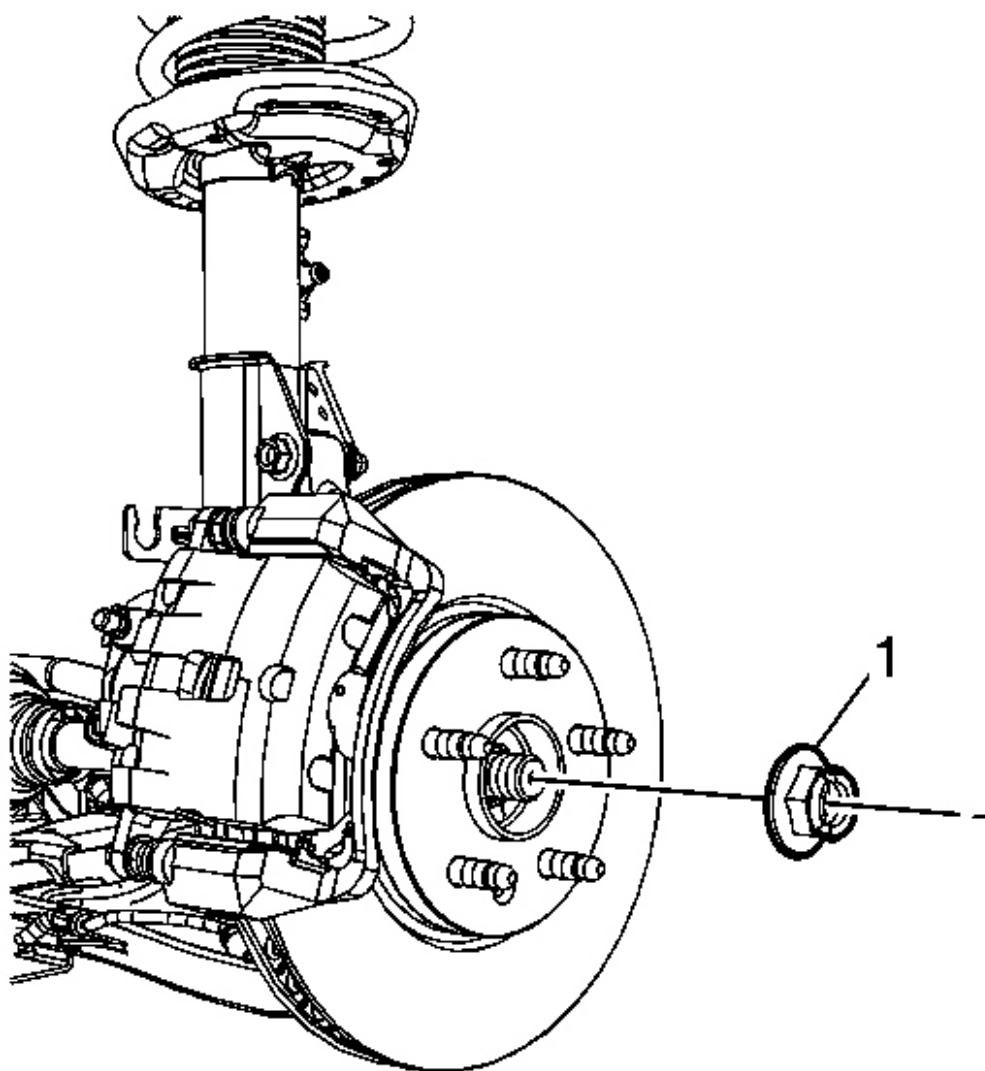


Fig. 14: Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

10. Hand start the wheel drive shaft nut (1).

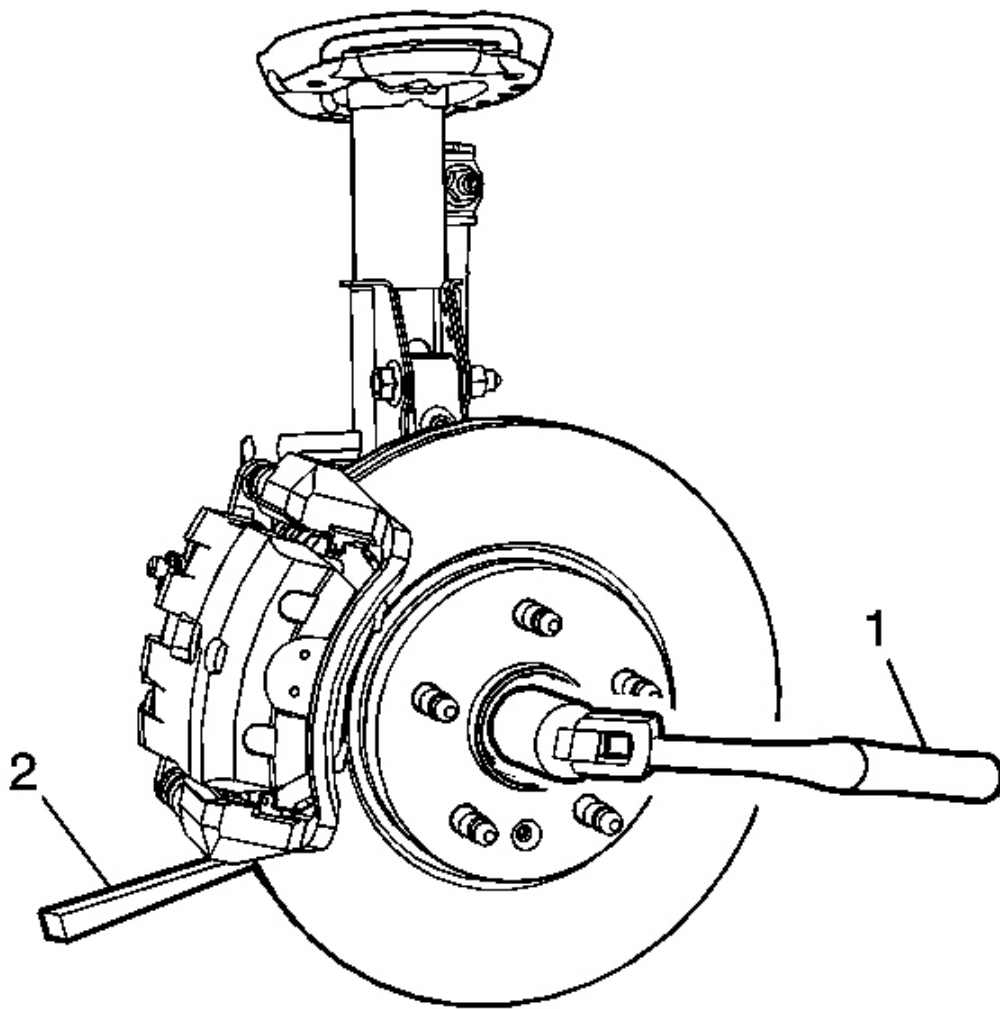


Fig. 15: Tightening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

11. Insert a drift or punch (2) in the brake rotor cooling fins.
12. Rotate the brake rotor until it rest against the brake caliper mounting bracket.

CAUTION: Refer to Fastener Caution .

13. Using a torque wrench and the proper size socket (1), tighten the wheel drive shaft nut to 205 N.m (151 lb ft).

14. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
15. Lower the vehicle.
16. Inspect the transmission fluid level.
 - For the 6T/30, 6T/40, or the 6T/45, refer to **Transmission Fluid Level and Condition Check** .
 - For the 6T/70 or the 6T/75, refer to **Transmission Fluid Level and Condition Check** .

REAR WHEEL DRIVE SHAFT REPLACEMENT

Special Tools

J 42129 Wheel Hub Remover. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

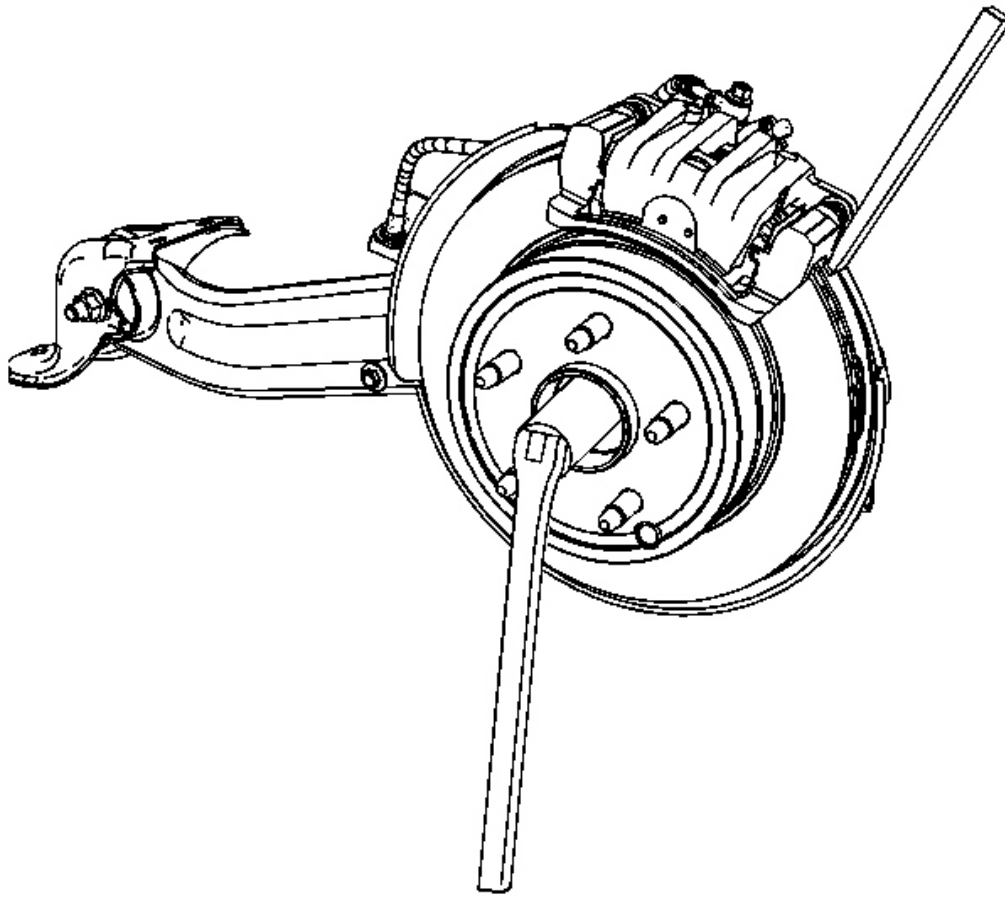


Fig. 16: Loosening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

NOTE: **DO NOT** remove the drift or punch from the brake rotor.

3. Insert a drift or punch into the rotor and against the brake caliper mounting bracket.
4. Using the appropriate tool, loosen the wheel drive shaft nut.

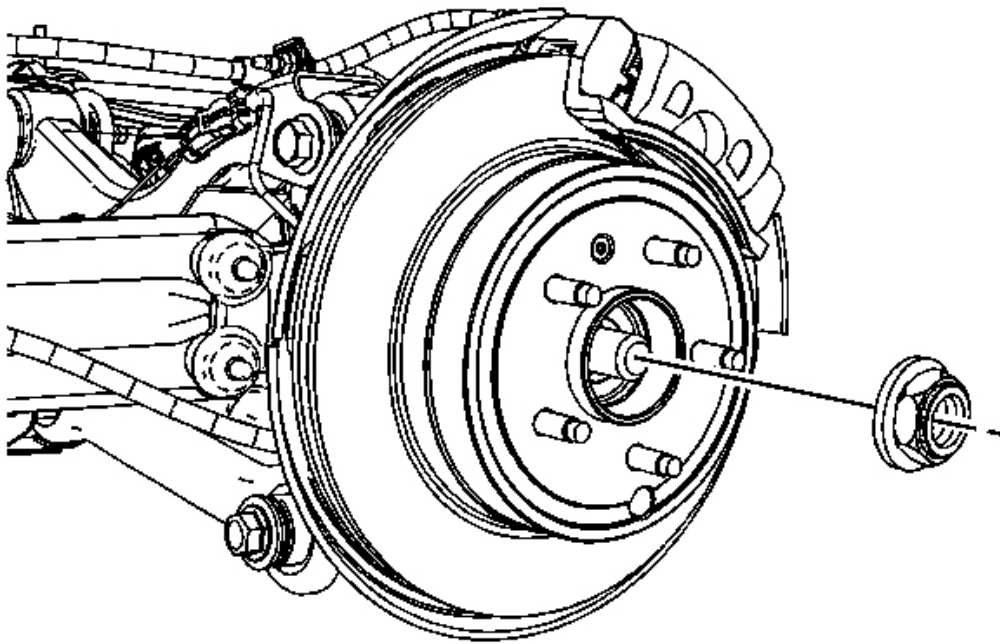


Fig. 17: View Of Wheel Drive Shaft Spindle Nut
Courtesy of GENERAL MOTORS CORP.

NOTE: **DO NOT** re-use the wheel drive shaft spindle nut. Replace with **NEW**.

5. Remove and discard the wheel drive shaft nut.

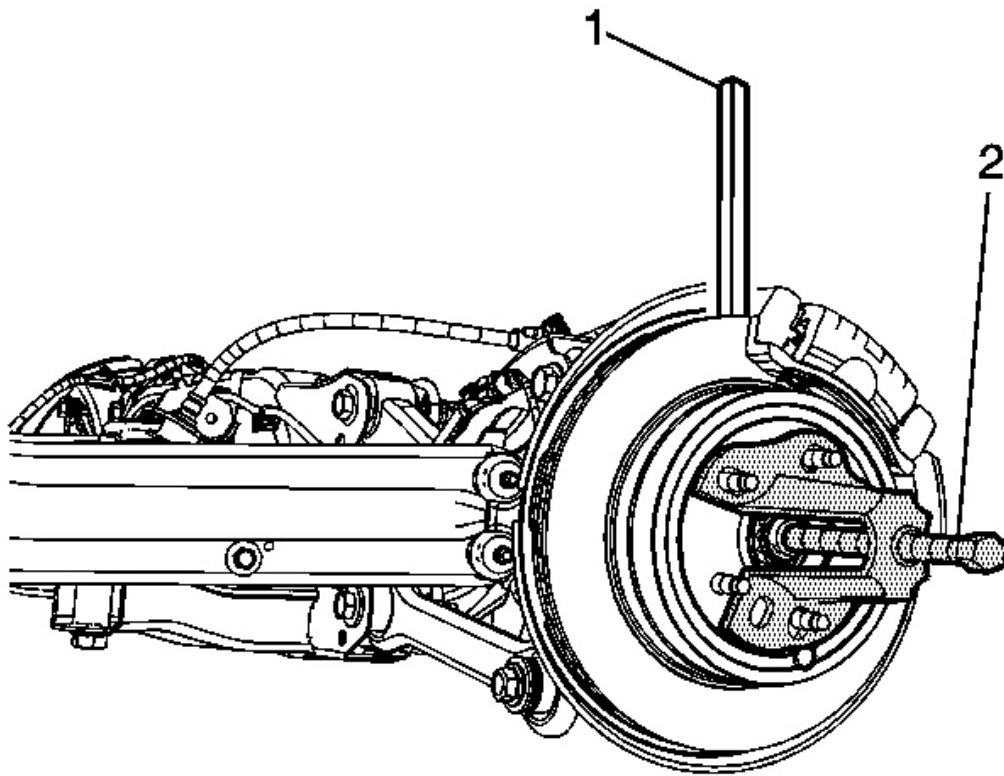


Fig. 18: Disengaging Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

6. Rotate the brake rotor until the drift or punch (1) is against the brake caliper mounting bracket.
7. Using the **J 42129** (2), disengage the wheel drive shaft from the wheel hub/bearing. See **Special Tools**.
8. Remove the rear suspension knuckle. Refer to **Knuckle Replacement** .

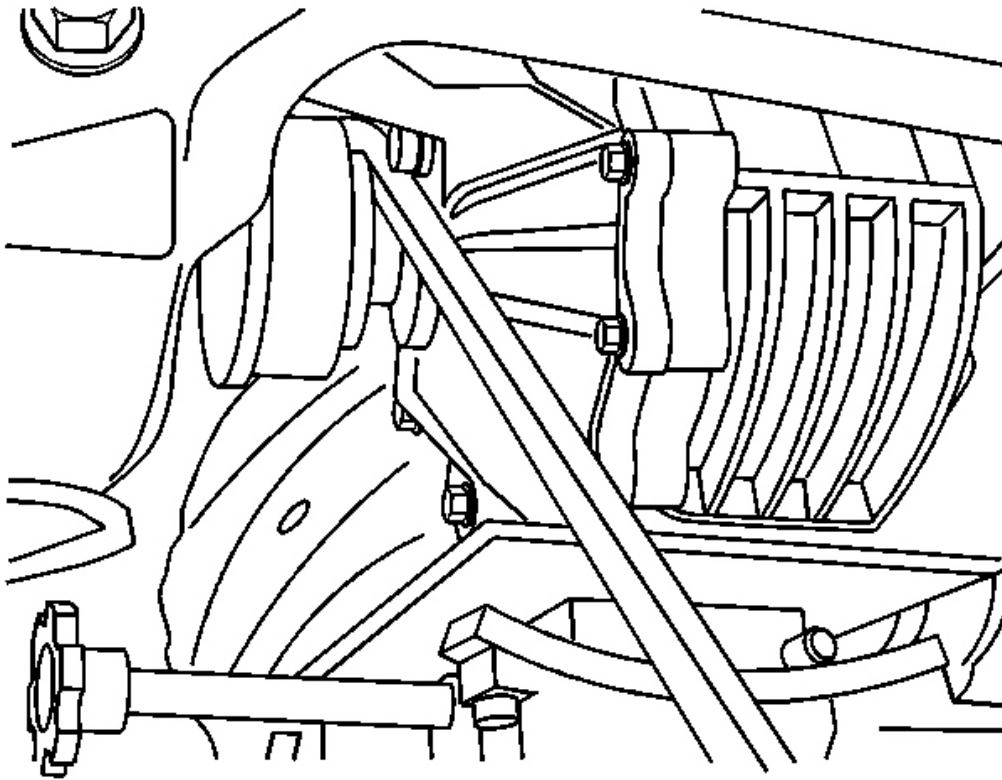


Fig. 19: Releasing Wheel Drive Shaft From Rear Differential
Courtesy of GENERAL MOTORS CORP.

9. Using a suitable tool, carefully release the wheel drive shaft from the rear differential carrier.

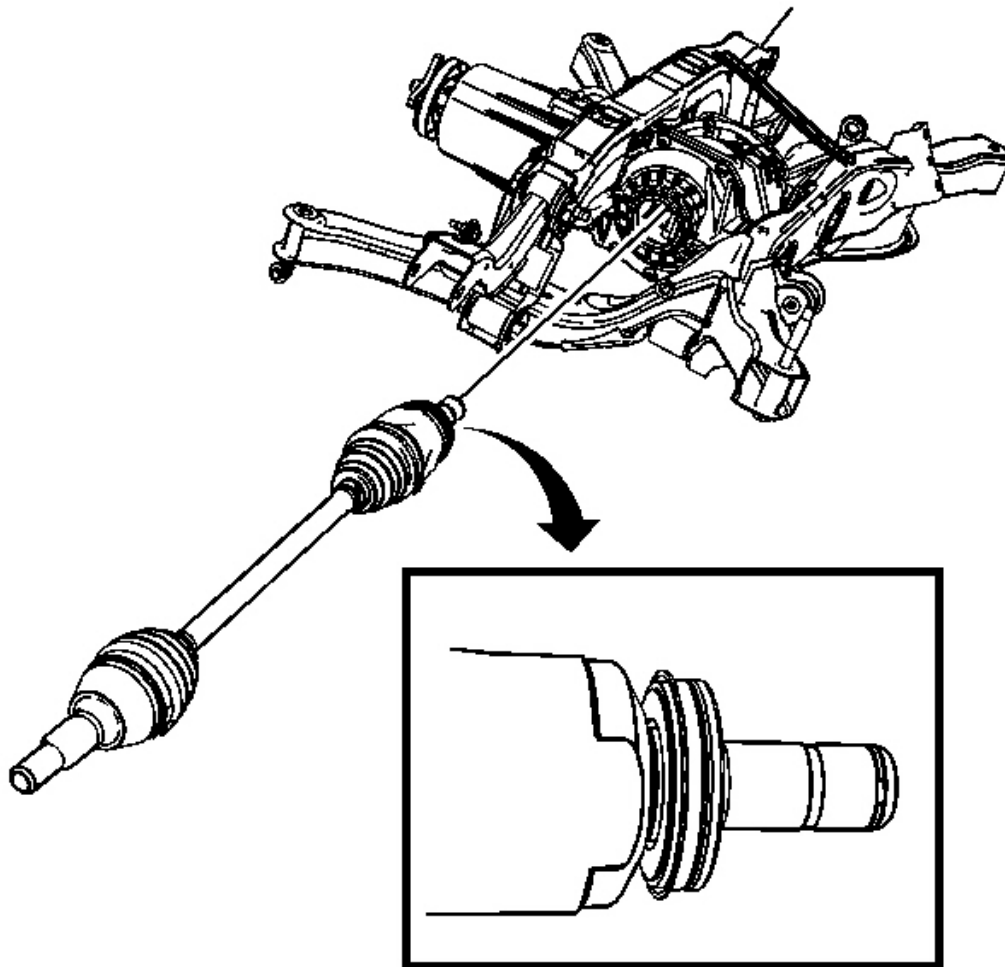


Fig. 20: View Of Wheel Drive Shaft

Courtesy of GENERAL MOTORS CORP.

NOTE: Because of the design of the inner seal wheel drive shaft seal, the seal will be removed at the same time the wheel drive shaft is. Replace the seal, DO NOT re-use the seal.

10. Remove the wheel drive shaft from the vehicle.
11. Remove the wheel drive seal.

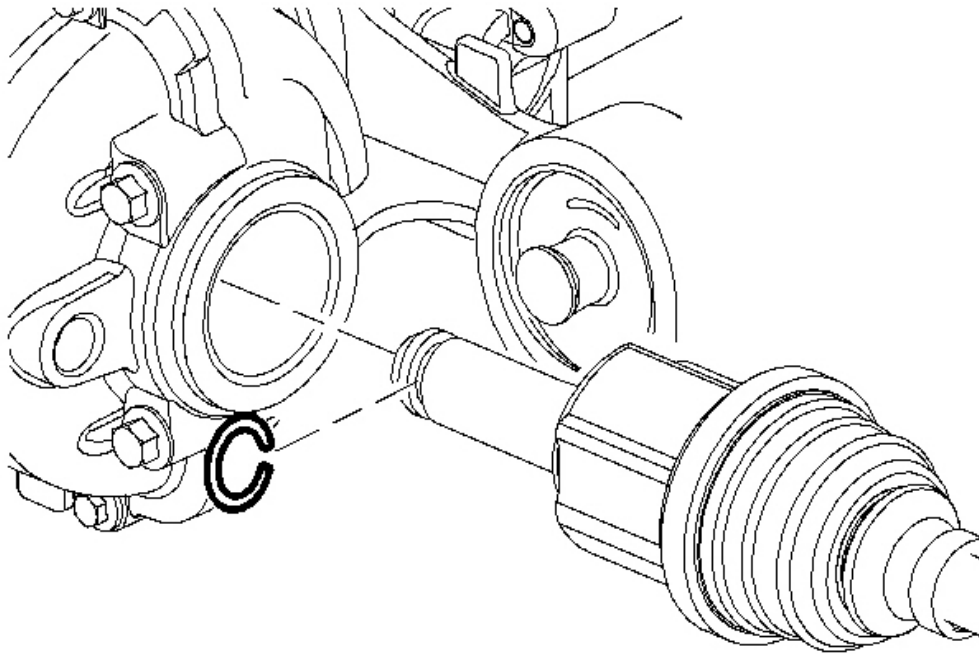


Fig. 21: Removing/Installing Wheel Drive Shaft Retaining Ring
Courtesy of GENERAL MOTORS CORP.

NOTE: DO NOT re-use the retaining clip, replace with new.

12. Remove the retaining ring from the tripod.

Installation Procedure

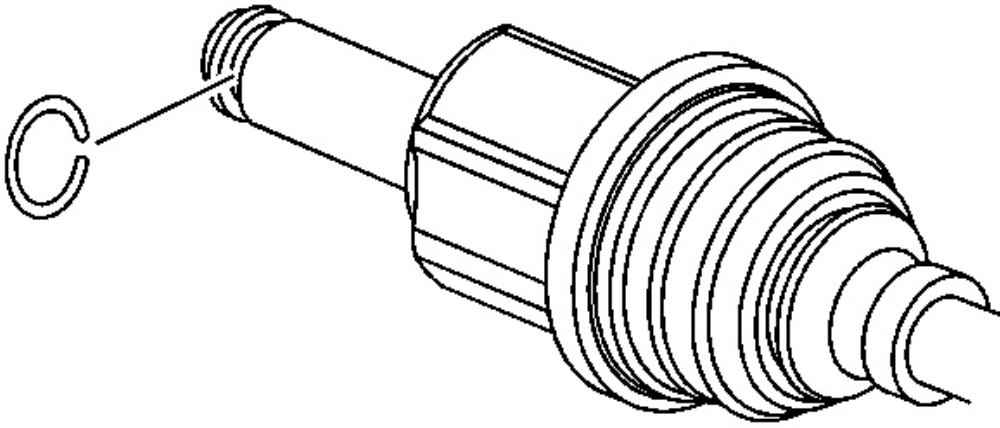


Fig. 22: Identifying Retaining Ring
Courtesy of GENERAL MOTORS CORP.

1. Install the new retaining clip on the tripod.
2. Install the new wheel drive shaft seal.
 - For the left side, refer to **Rear Axle Shaft Seal Replacement - Left Side** .
 - For the right side, refer to **Rear Axle Shaft Seal Replacement - Right Side** .

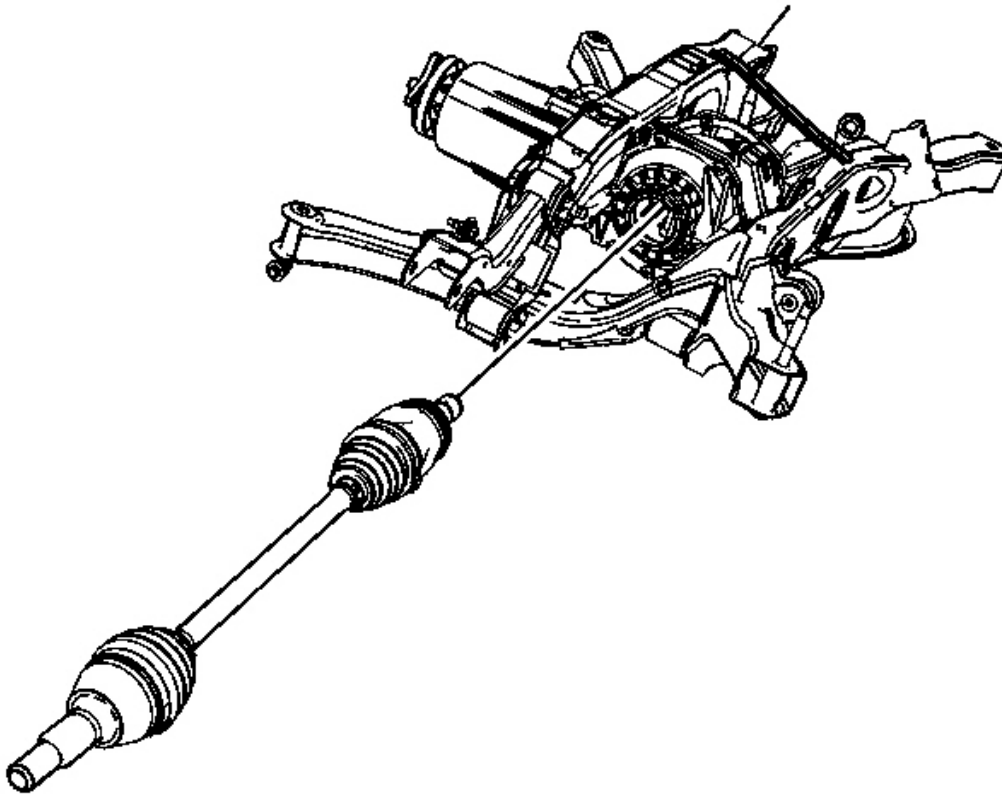


Fig. 23: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: When installing the wheel drive shaft, you will notice a slight resistance. This is the wheel drive shaft seal. A snap or click should be heard when the wheel drive shaft is fully seated.

3. Install the wheel drive shaft.
4. Install the rear suspension knuckle. Refer to **Knuckle Replacement** .

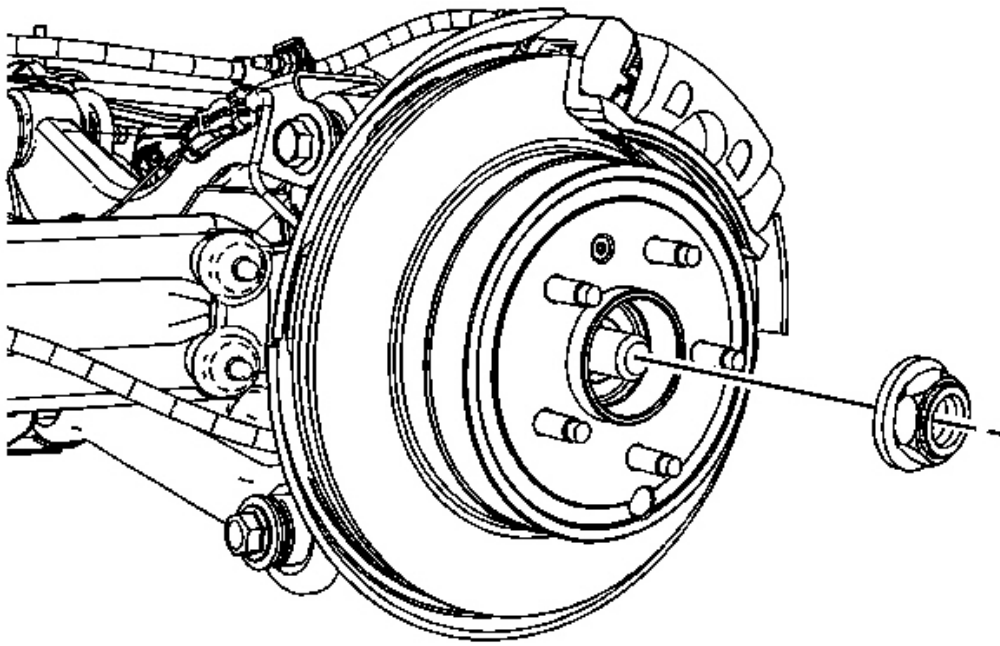


Fig. 24: View Of Wheel Drive Shaft Spindle Nut
Courtesy of GENERAL MOTORS CORP.

5. Hand install a new wheel drive shaft nut.

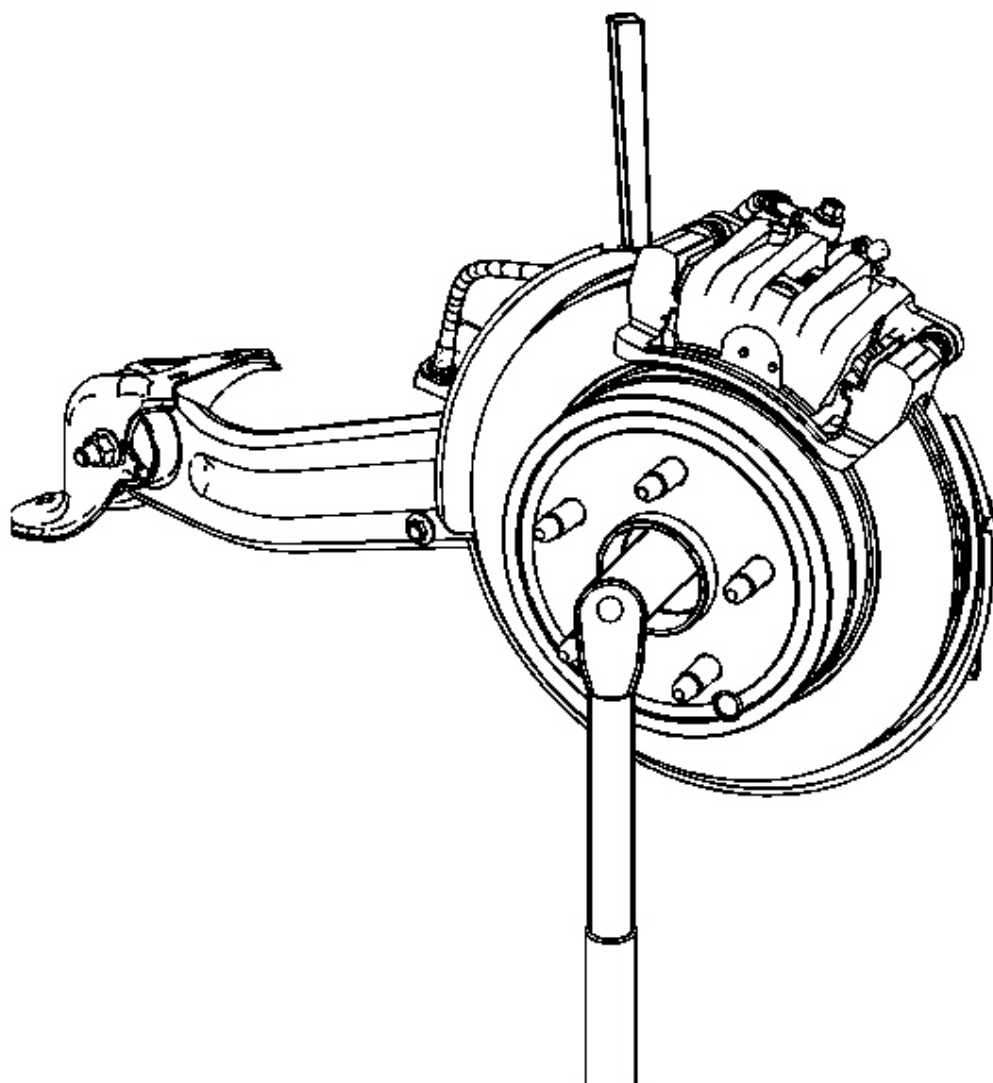


Fig. 25: Inserting Drift Into Rotor & Against Brake Caliper Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

6. Insert a drift or punch into the rotor and against the brake caliper mounting bracket.

CAUTION: Refer to Fastener Caution .

7. Tighten the wheel drive shaft nut.

Tighten: Tighten the nut to 205 N.m (151 lb ft).

8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
9. Remove the support and lower the vehicle.

FRONT WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

J 35910: Drive Axle Seal Clamp Pliers

NOTE: **The tripot assembly and the internal parts for the tripot assembly are not service. If the tripot assembly is found to have excessive wear or damaged, replace the wheel drive shaft as an assembly.**

Disassemble Procedure

1. Remove the wheel drive shaft from the vehicle. Refer to **Front Wheel Drive Shaft Replacement**.

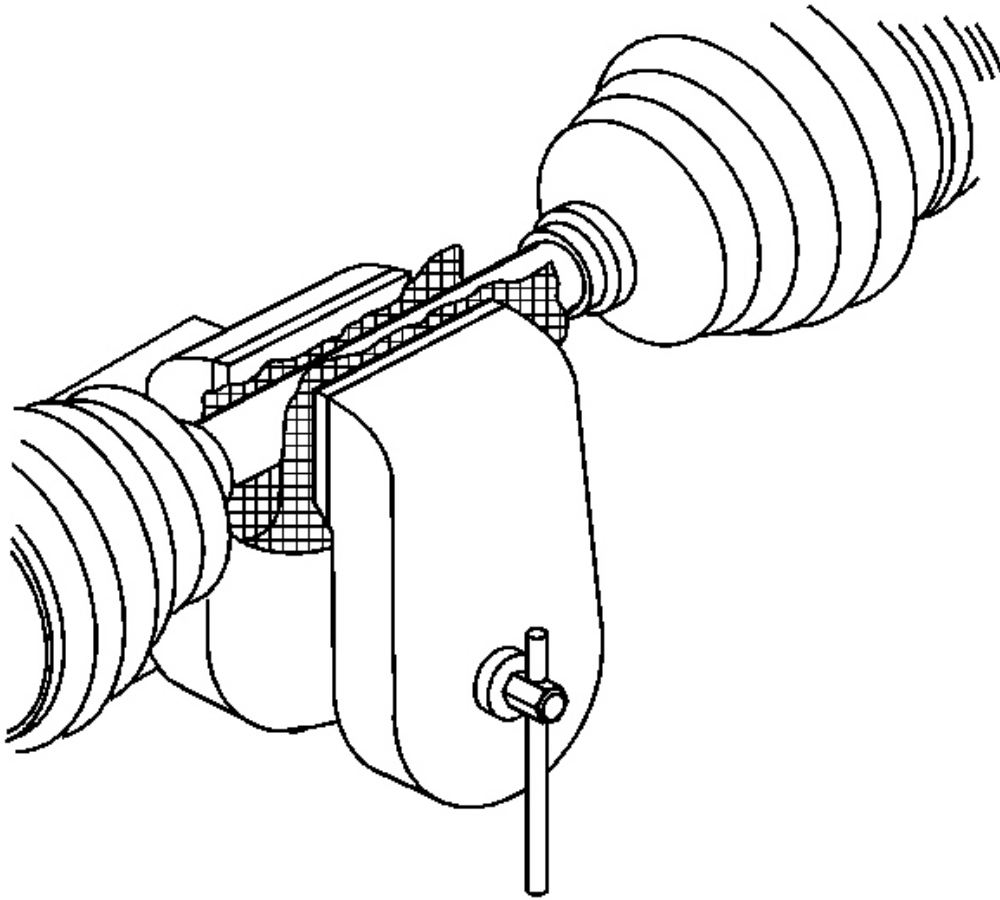


Fig. 26: Positioning Wheel Drive Shaft Bar In Vise
Courtesy of GENERAL MOTORS CORP.

2. Position wheel drive shaft bar in a soft jawed vise and clamp securely.

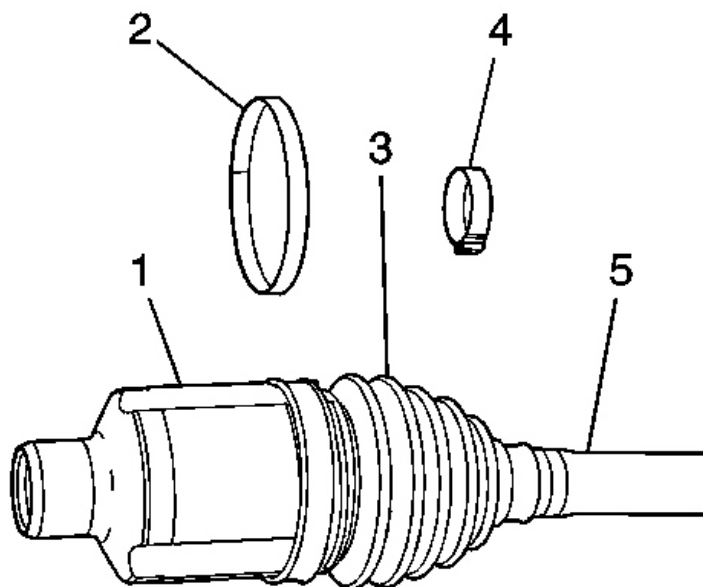
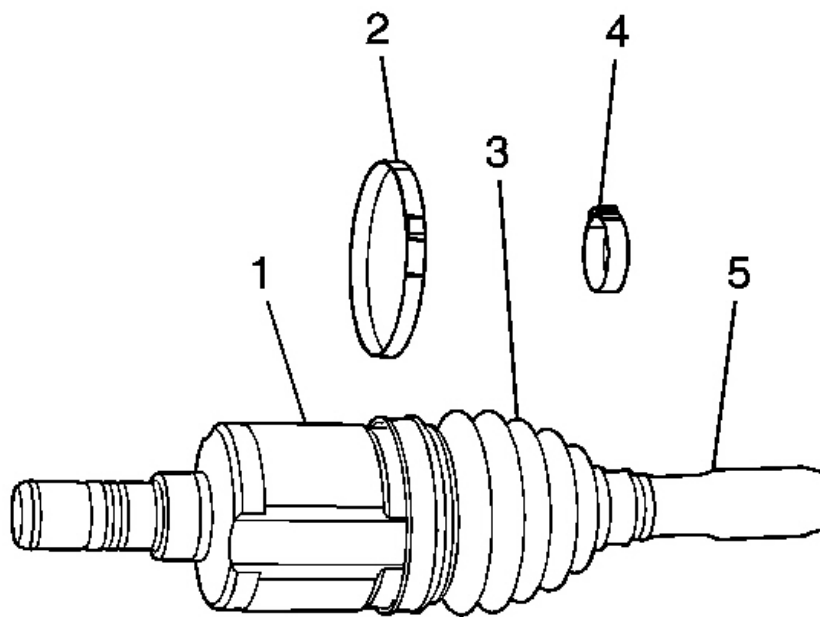


Fig. 27: View Of Wheel Drive Shaft Components
Courtesy of GENERAL MOTORS CORP.

3. Using a flat-bladed tool, remove boot retaining clamp (2) from the boot (3) for the tripod housing (1).

4. Using side cutters, remove the boot clamp (4) from the boot (3) for the wheel drive shaft (5).

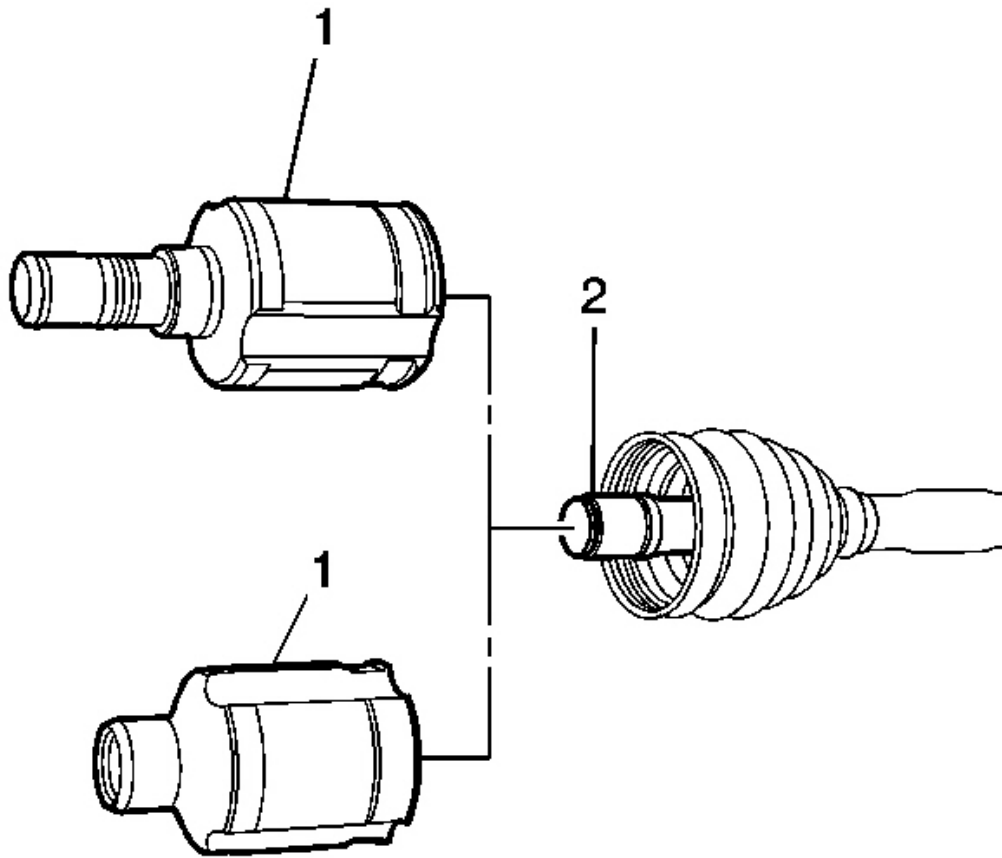


Fig. 28: Identifying Wheel Drive Shaft And Tripod Housing
Courtesy of GENERAL MOTORS CORP.

5. Remove the tripod housing (1) from the wheel drive shaft (2).

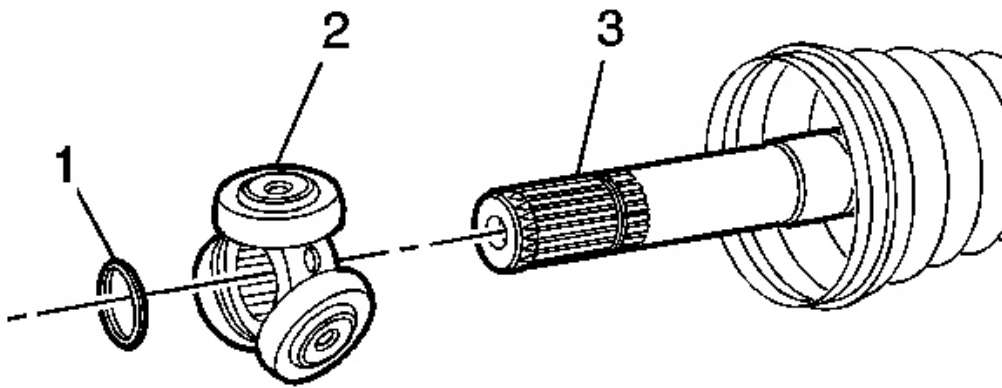


Fig. 29: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

6. Remove the retaining clip (1) and the tripod spider (2) from the wheel drive shaft (3).

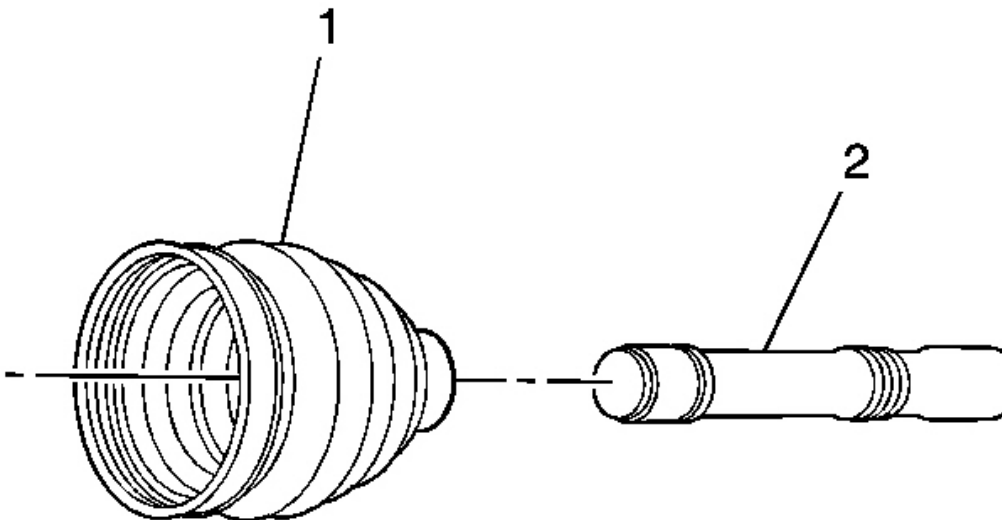


Fig. 30: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

7. Remove the boot (1) from the wheel drive shaft (2).
8. Inspect the wheel drive shaft inner joint for damage and excessive wear. Refer to **Wheel Drive Shaft Inner Joint Inspection**.

Assemble Procedure

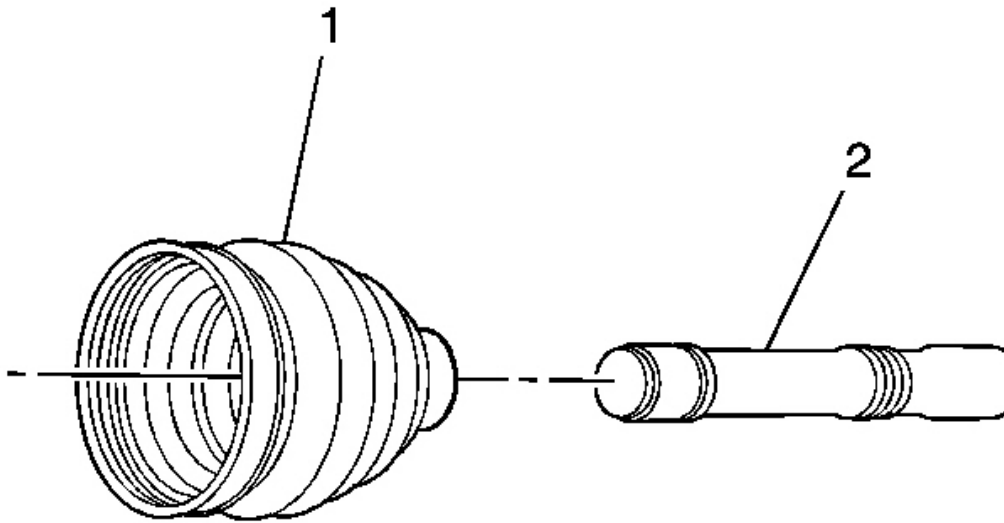


Fig. 31: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

NOTE: Ensure the seal clamp is positioned correctly in the seal groove.

1. Position the boot (1) on the wheel drive shaft (2).

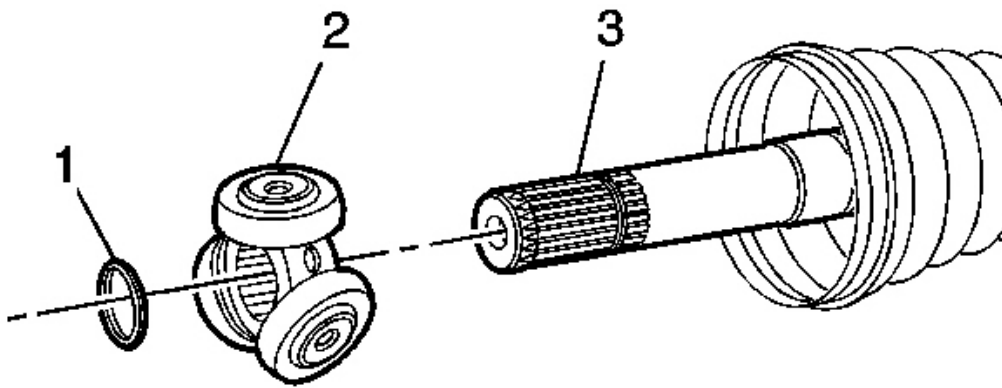


Fig. 32: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

2. Install the tripod spider assembly (2) to the wheel drive shaft (3), until seated against shoulder.
3. Install the retaining ring (1) in the wheel drive shaft.
4. Place approximately half of the grease in the kit to the seal and place the remainder in the tripod housing.

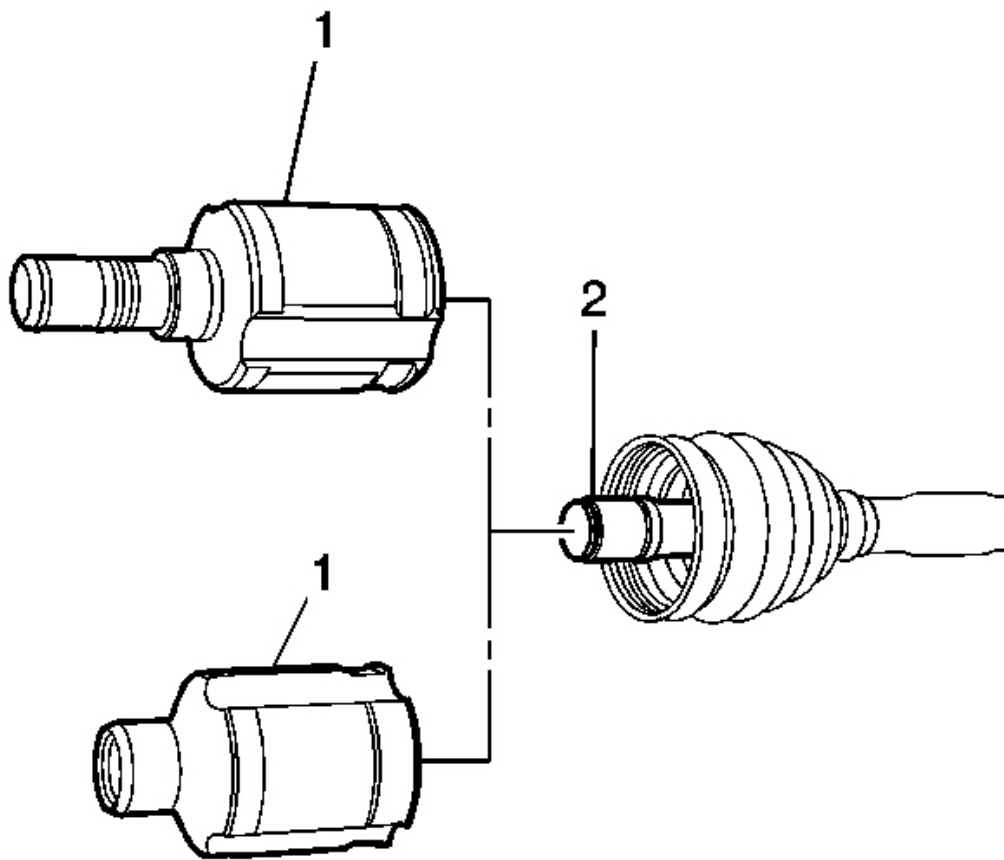


Fig. 33: Identifying Wheel Drive Shaft And Tripod Housing
Courtesy of GENERAL MOTORS CORP.

5. Install the tripod housing (1) on the wheel drive shaft (2).

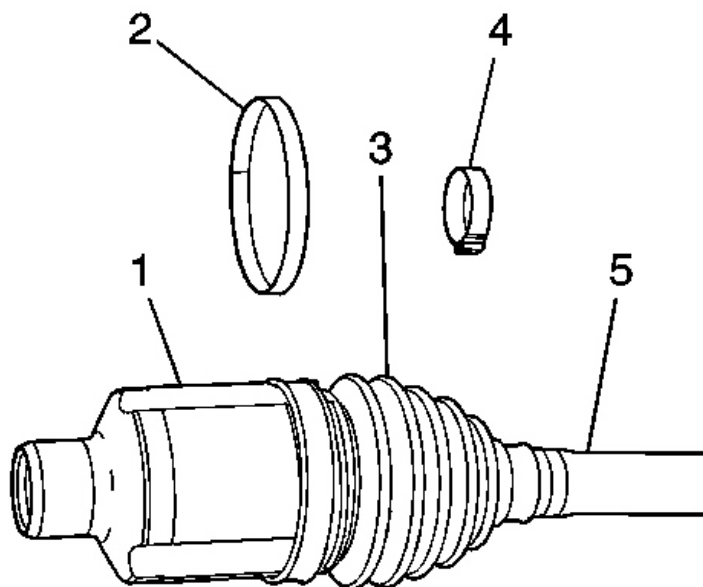
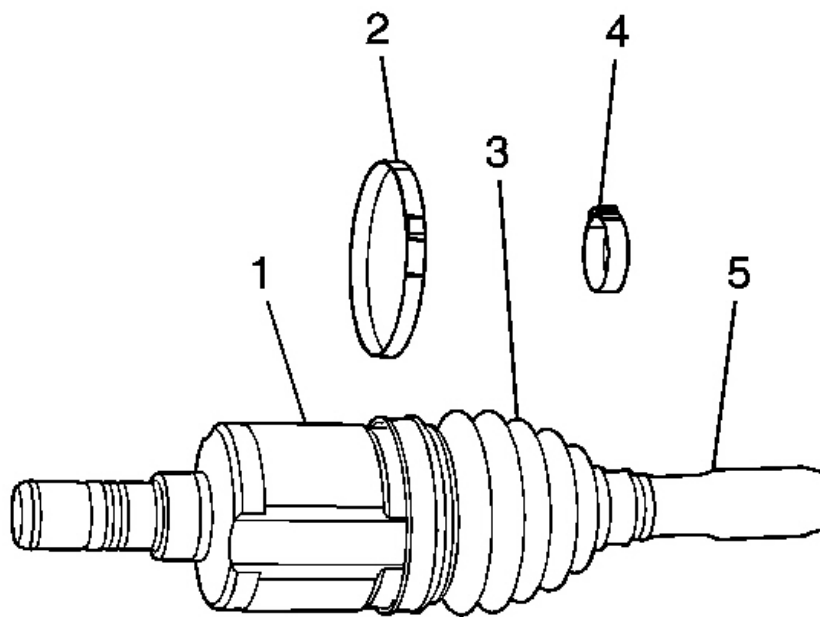


Fig. 34: View Of Wheel Drive Shaft Components
Courtesy of GENERAL MOTORS CORP.

6. Install the boot clamp (2) on the boot (3) for the tripod housing (1).

7. Install the boot clamp (4) on the boot (3) for the wheel drive (5).

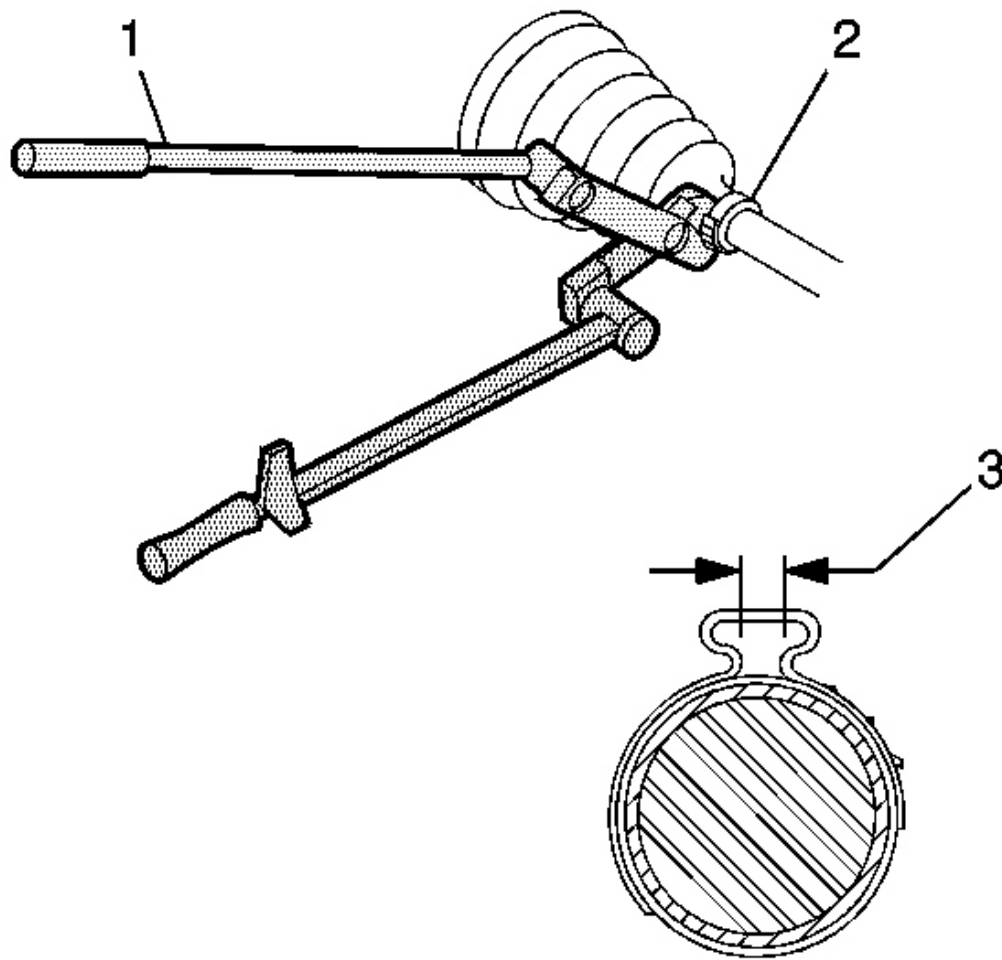


Fig. 35: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

8. Using the **J 35910**: pliers breaker bar, torque wrench and or ratchet (1), close the boot clamp (2) until the gap (3) measures 2.15 mm (0.085 in).

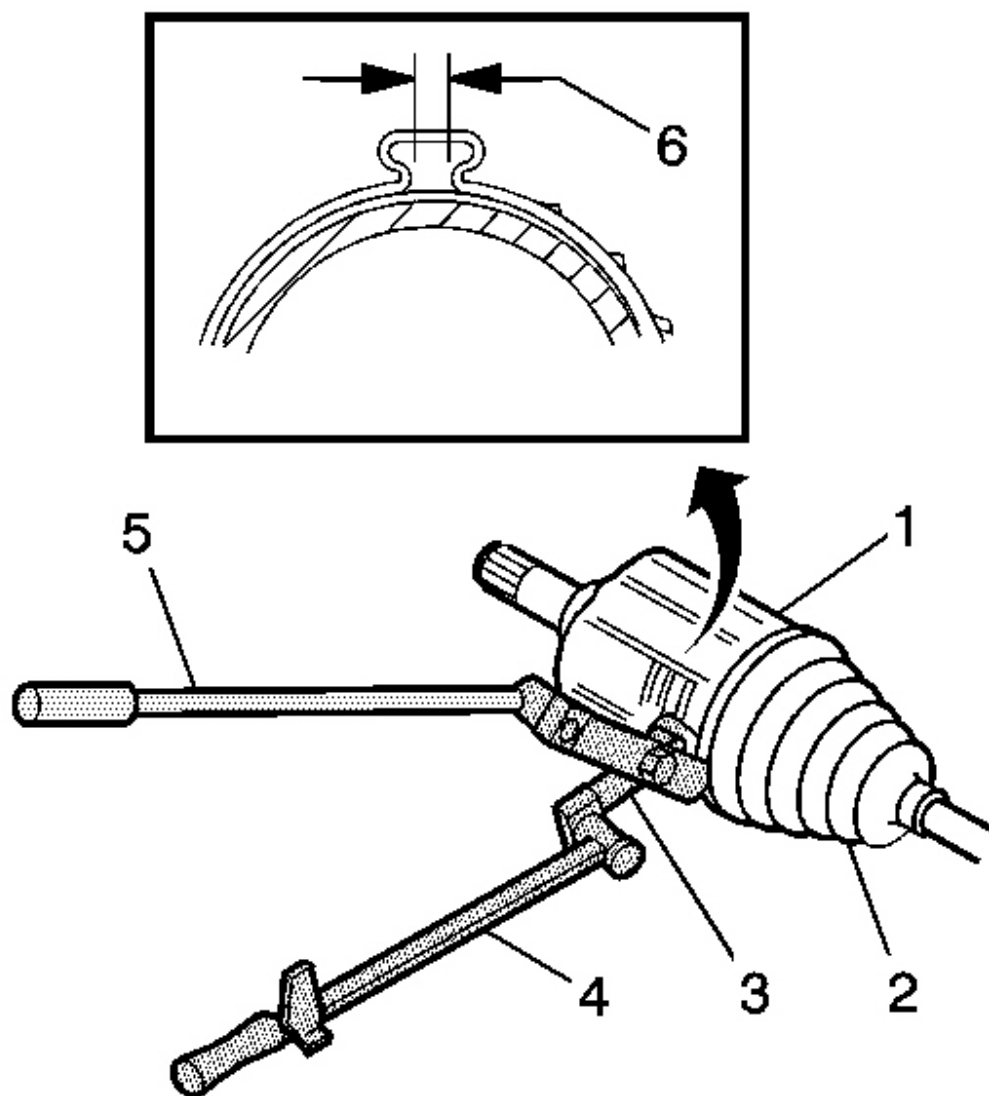


Fig. 36: Measuring Boot Clamp Gap
Courtesy of GENERAL MOTORS CORP.

9. Using the **J 35910**: pliers (3), breaker bar (5), torque wrench and or ratchet (4), close the clamp until the gap (6) measures 1.9 mm (0.070 in).
10. Rotate the housing in a circular motion to distribute the grease in the tripot joint.
11. Install the wheel drive shaft from the vehicle. Refer to **Front Wheel Drive Shaft Replacement**.

REAR WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

- **J 8059:** Snap Ring Pliers
- **J 35910:** Drive Axle Boot Clamp Pliers

NOTE: **The inner Constant Velocity Joint is not serviced separately. If the CV joint is found to have excessive wear or damaged, replace the wheel drive shaft as an assembly.**

Disassemble Procedure

1. Remove the wheel drive shaft. Refer to **Rear Wheel Drive Shaft Replacement**.
2. Remove the outer CV joint and boot. Refer to **Rear Wheel Drive Shaft Outer Joint and Boot Replacement**.

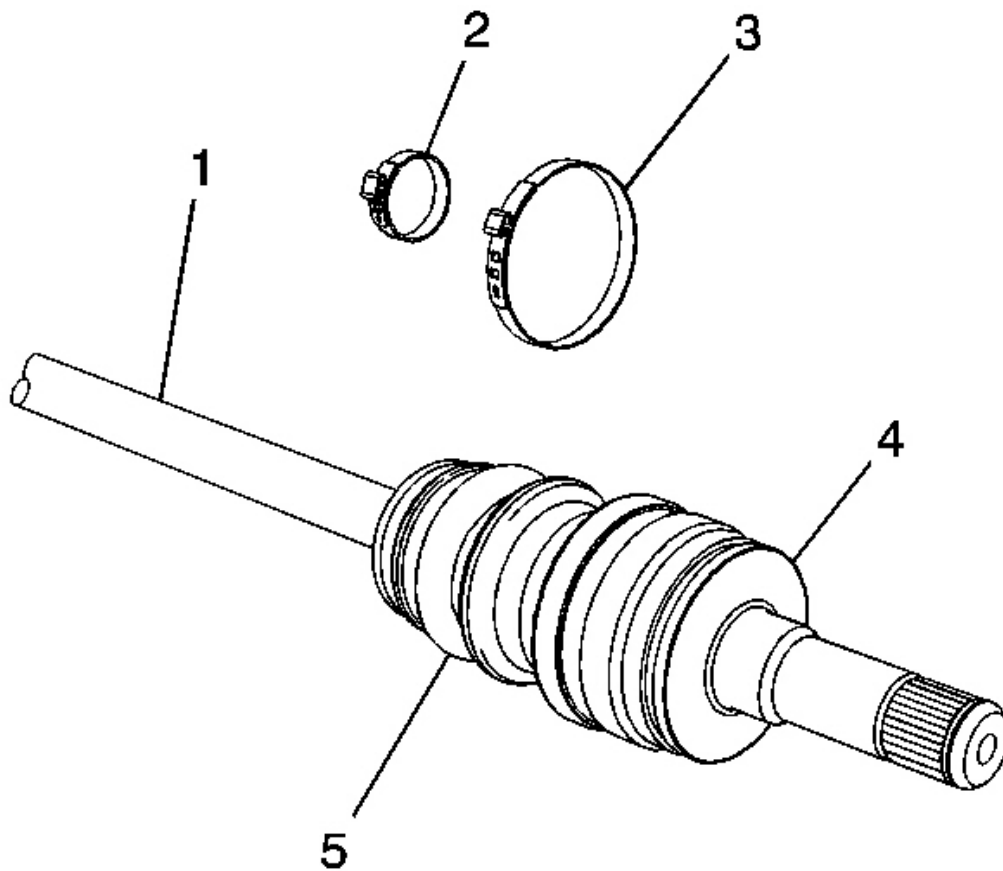


Fig. 37: Identifying Outer Boot Clamp And Inner Boot Clamp At CV Joint
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not cut through the wheel drive shaft inboard or outboard boot during service. Cutting through the boot may damage the sealing surface of the housing and the tripot or the constant velocity joint bushing. Damage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity joint.

3. Using the appropriate tool, remove and discard the outer boot clamp (3) and the inner boot clamp (2) from the CV joint (4).

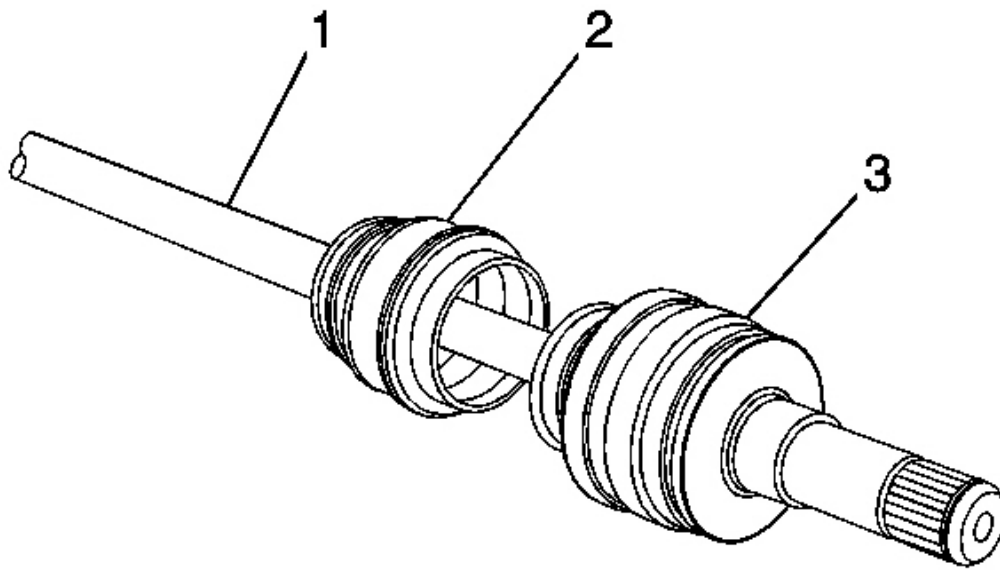


Fig. 38: Identifying CV Joint Boot, CV Joint And Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: If the boot is damaged and either the lubricant is gone, water or other foreign material are found in the CV joint, replace the wheel drive shaft as an assembly.

4. Remove the CV joint boot (2) from the CV joint (3) and the wheel drive shaft (1).
5. Using the appropriate cleaner, remove the lubricant from the CV joint and the wheel drive shaft.

Assemble Procedure

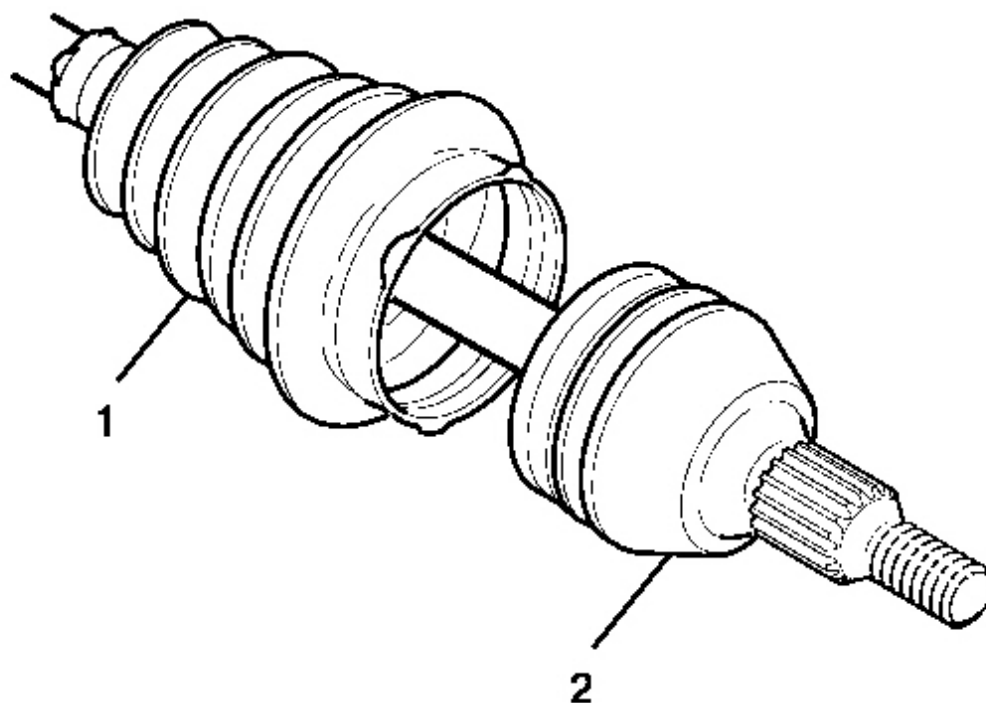


Fig. 39: View Of Outer Seal & C/V Joint
Courtesy of GENERAL MOTORS CORP.

1. Install the CV joint boot and clamp (1) on the wheel drive shaft and CV joint housing (2).

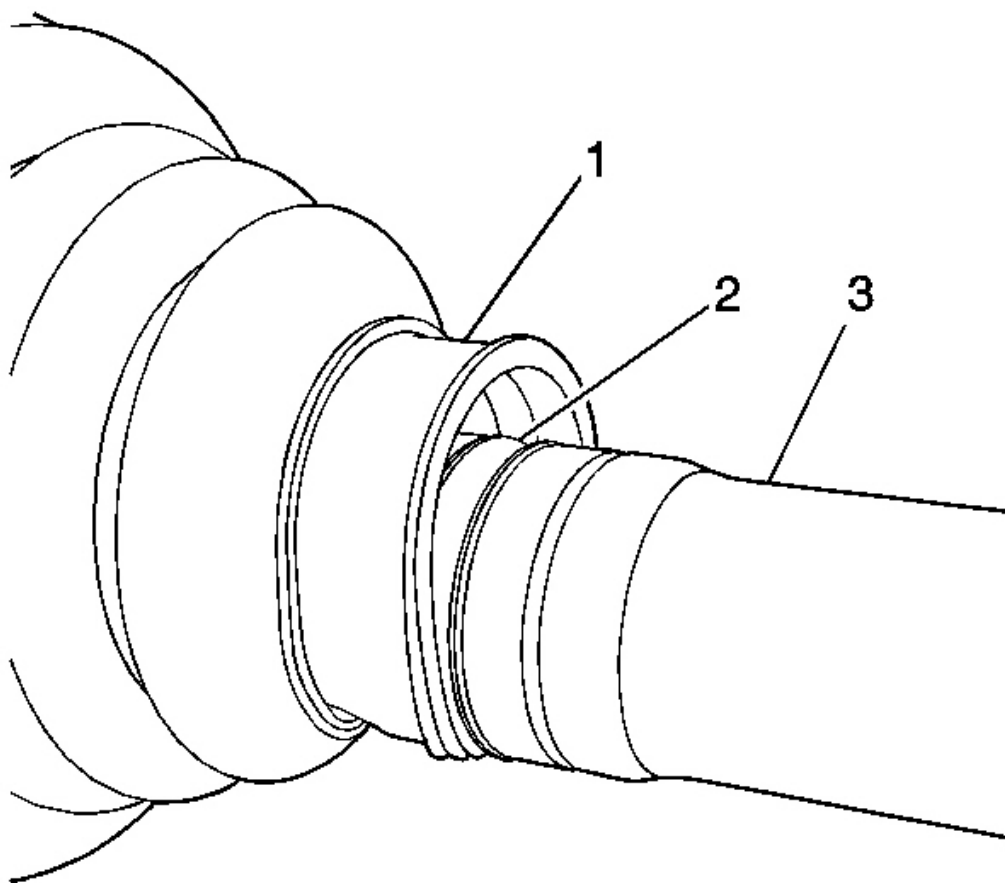


Fig. 40: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

2. Ensure that the CV joint boot (1) is properly seated in the groove (2) in the wheel drive shaft (3).

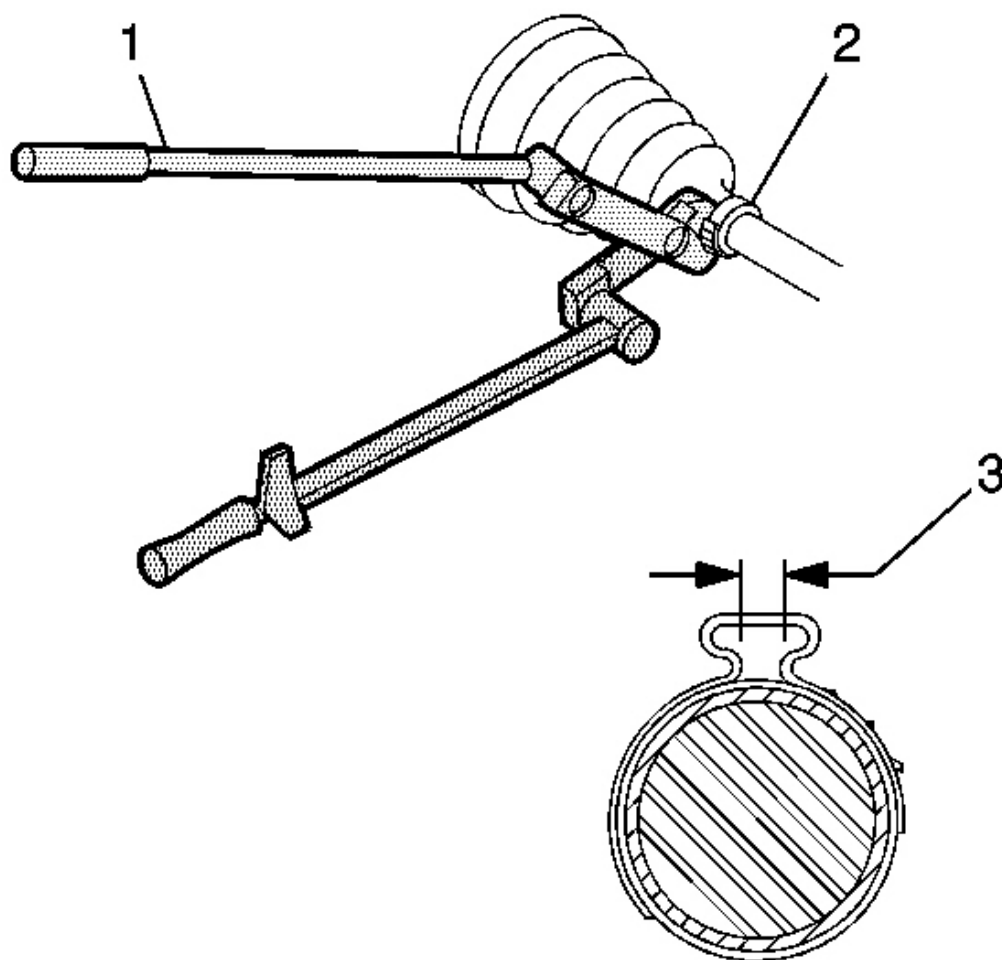


Fig. 41: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

3. Using the J 42572: pliers, breaker bar, torque wrench and or ratchet (1), close the clamp (2) until the gap (3) measures 2.15 mm (0.085 in).

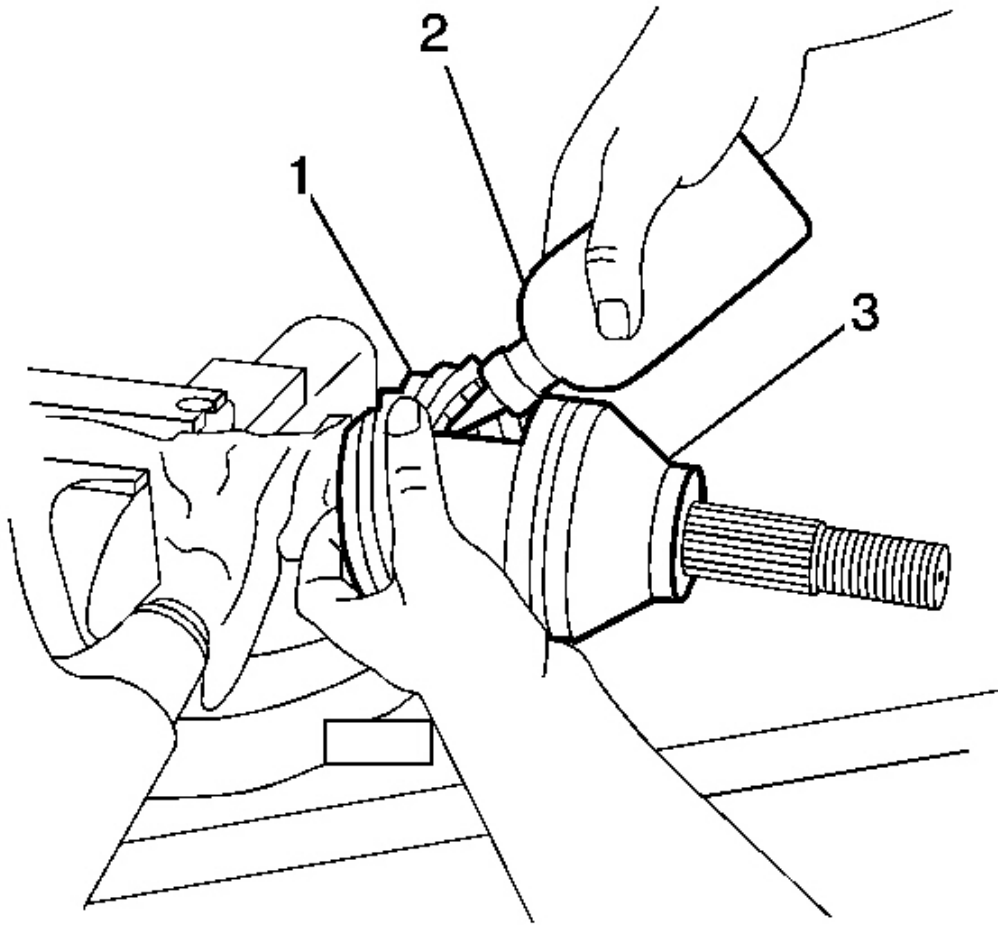


Fig. 42: Lubricating CV Joint Boot
Courtesy of GENERAL MOTORS CORP.

4. Place approximately half of the lubricant (1) in the CV joint boot (2) and the other half in the CV joint (3).
5. Install the CV joint boot and clamp (2) CV joint housing (1).

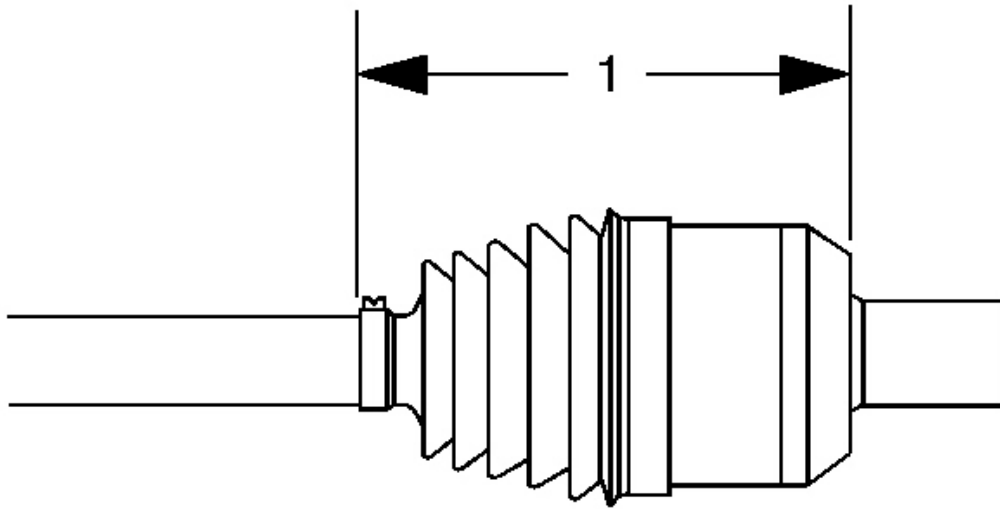


Fig. 43: Measuring Distance Between Seal Edges - Rear
Courtesy of GENERAL MOTORS CORP.

6. The measured distance (1) between the boot edges should be 88.6 mm (3.50 in).

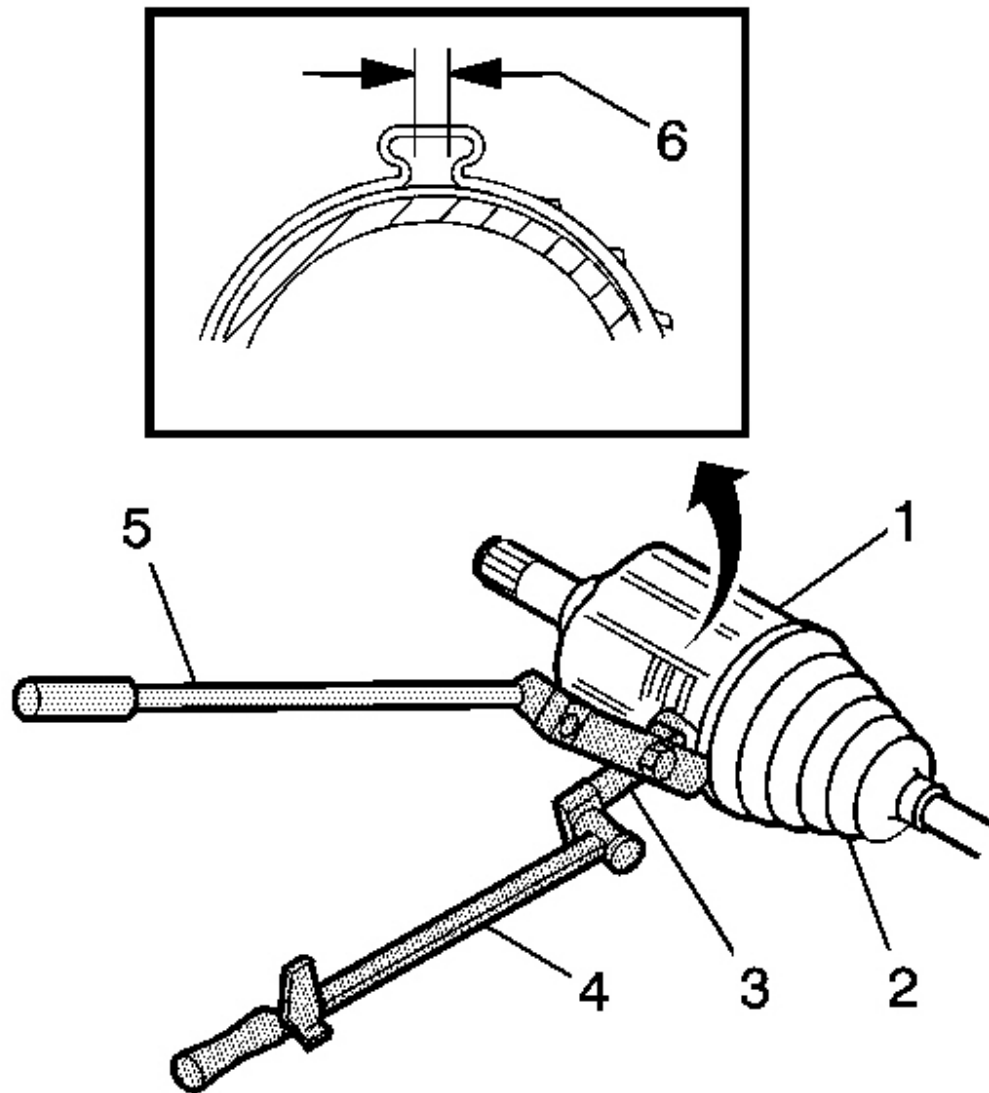


Fig. 44: Measuring Boot Clamp Gap
Courtesy of GENERAL MOTORS CORP.

7. Using the J 42572: pliers (3), breaker bar (5) and a torque or racket wrench (4), close the clamp until the gap measures 1.90 mm (0.070 in).
8. Move the CV joint in a circular motion to distribute the lubricant inside the cv joint housing.
9. Clean any remaining lubricant from the outside of the CV joint.
10. Install the outer CV joint and boot. Refer to **Rear Wheel Drive Shaft Outer Joint and Boot**

Replacement.

11. Install the wheel drive shaft. Refer to **Rear Wheel Drive Shaft Replacement**.

FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

- **CH 48894:** Wheel Drive Shaft Boot Clamp Pliers
- **J 35910:** Drive Axle Seal Clamp Pliers

NOTE: **The outer Constant Velocity Joint is not service separately. If the CV joint is found to have excessive wear or damage, replace the wheel drive shaft as an assembly.**

Disassemble Procedure

1. Remove the wheel drive shaft from the vehicle. Refer to **Front Wheel Drive Shaft Replacement**

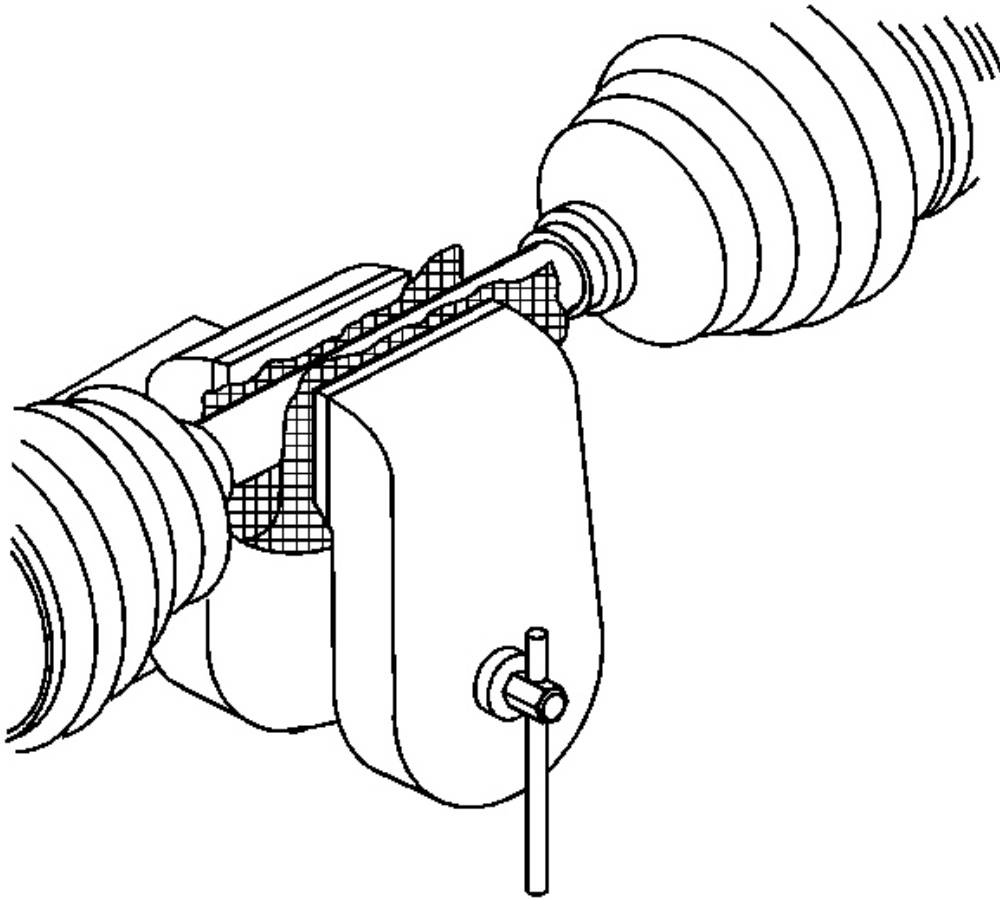


Fig. 45: Positioning Wheel Drive Shaft Bar In Vise
Courtesy of GENERAL MOTORS CORP.

2. Clamp the drive axle shaft in a soft jawed vice.

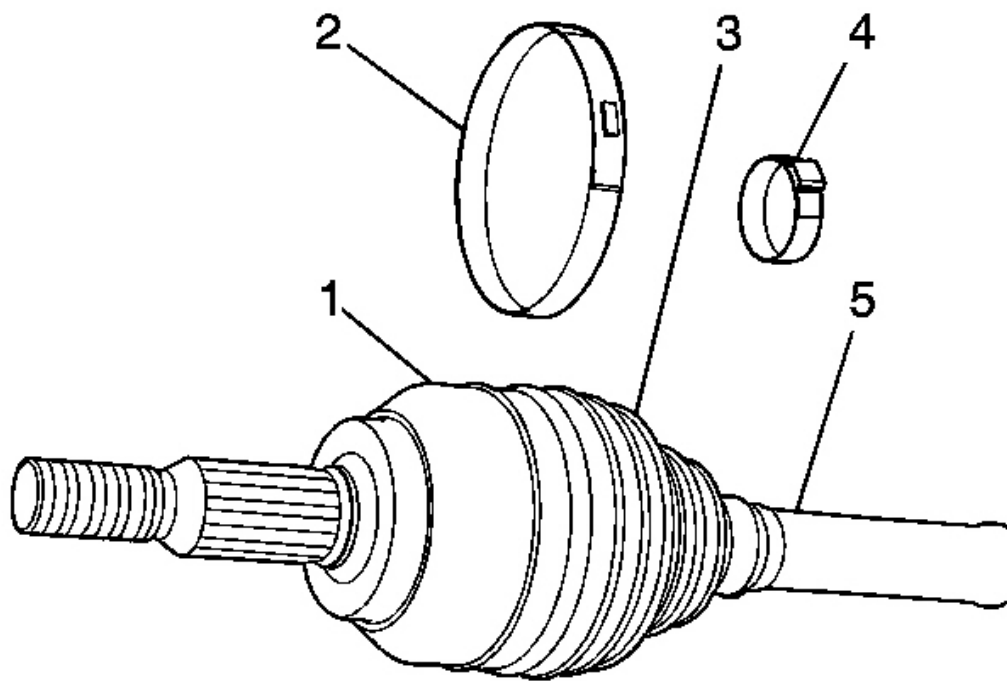


Fig. 46: Identifying Boot Clamp

Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not cut through the wheel drive shaft inboard or outboard boot during service. Cutting through the boot may damage the sealing surface of the housing and the tripot or the constant velocity joint bushing. Damage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity joint.

3. Use a flat-bladed tool, remove the boot clamp (2) from the constant velocity (CV) joint (1) and the boot (3).
4. Using a pair of side cutters, remove and discard the boot clamp (4) from the boot (3) and the wheel drive shaft (5). Replace with NEW clamps.

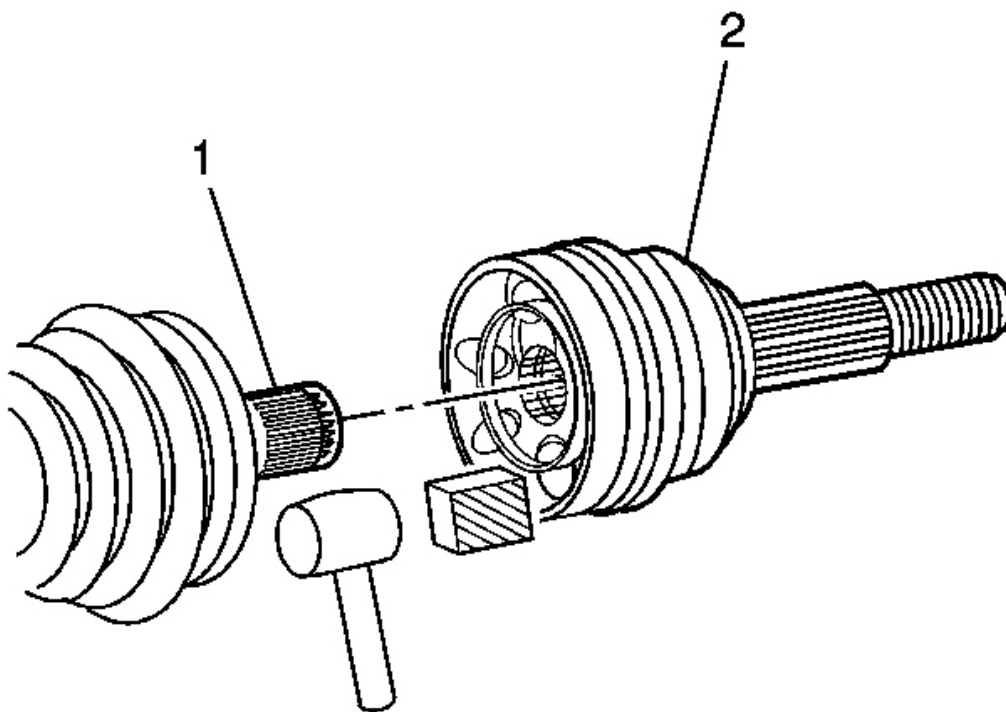


Fig. 47: Separating CV Joint From Axle Shaft
Courtesy of GENERAL MOTORS CORP.

5. Using a block of wood and a hammer, remove the CV joint (2) from the wheel drive shaft (1).

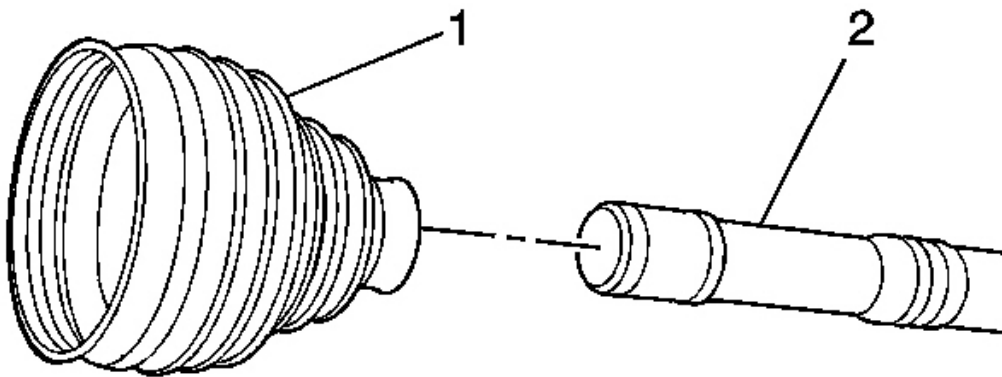


Fig. 48: Identifying Boot
Courtesy of GENERAL MOTORS CORP.

6. Remove the boot (1) from the wheel drive shaft (2).
7. Inspect the outer CV joint for damage and wear. Refer to **Wheel Drive Shaft Outer Joint Inspection**.

Assemble Procedure

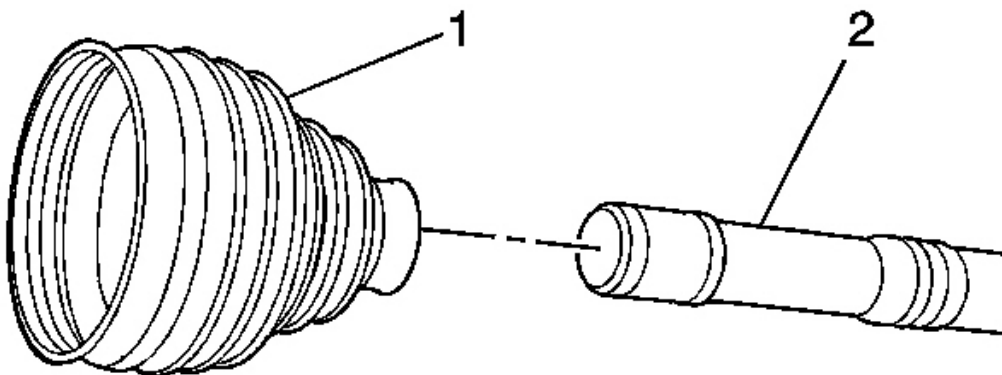


Fig. 49: Identifying Boot
Courtesy of GENERAL MOTORS CORP.

1. Position the boot (1) on the wheel drive shaft (2).

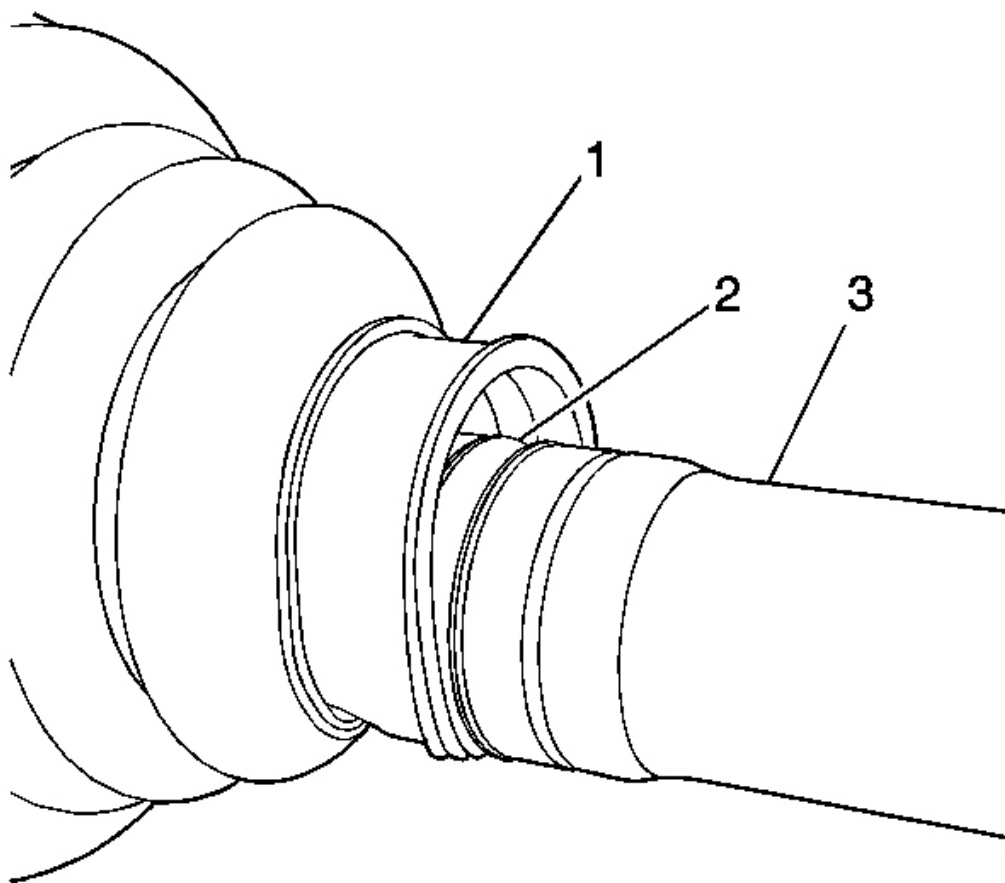


Fig. 50: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

2. Ensure that the boot (1) is properly seated in the groove (2) in the wheel drive shaft (3).

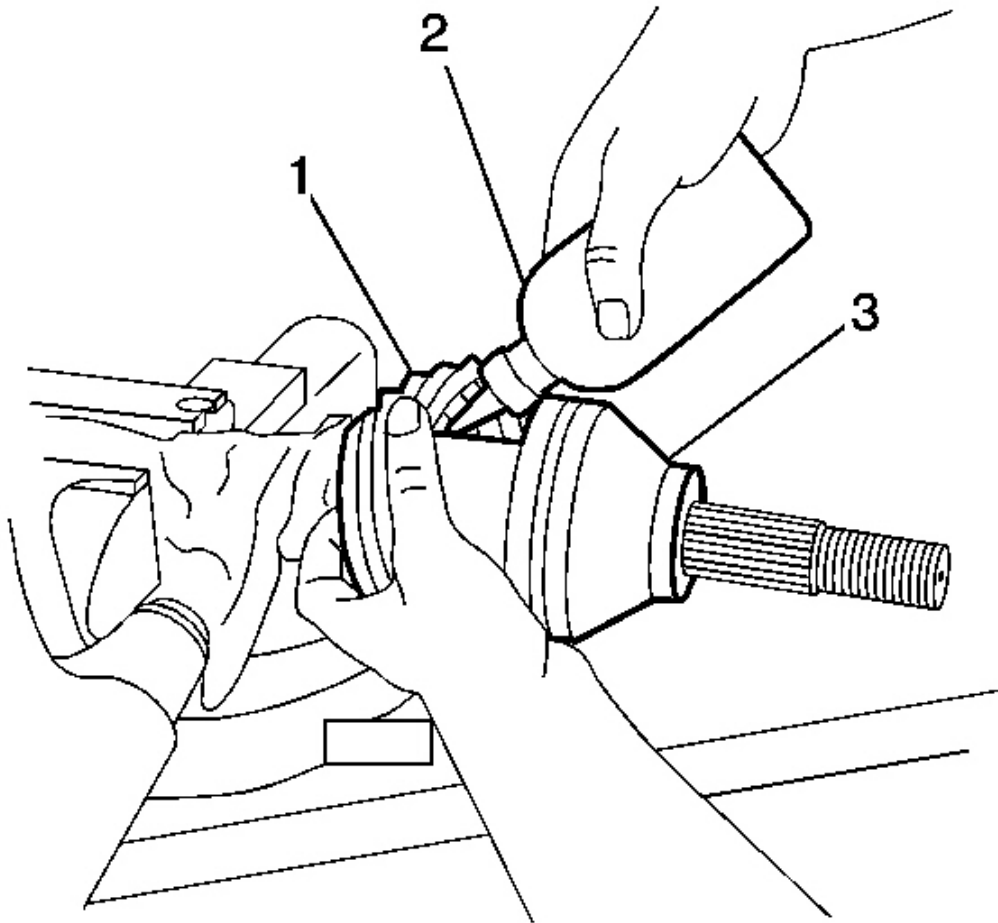


Fig. 51: Lubricating CV Joint Boot
Courtesy of GENERAL MOTORS CORP.

3. Place approximately half the lubricant (2) inside the CV joint boot (1) and the other half in the CV joint (3).

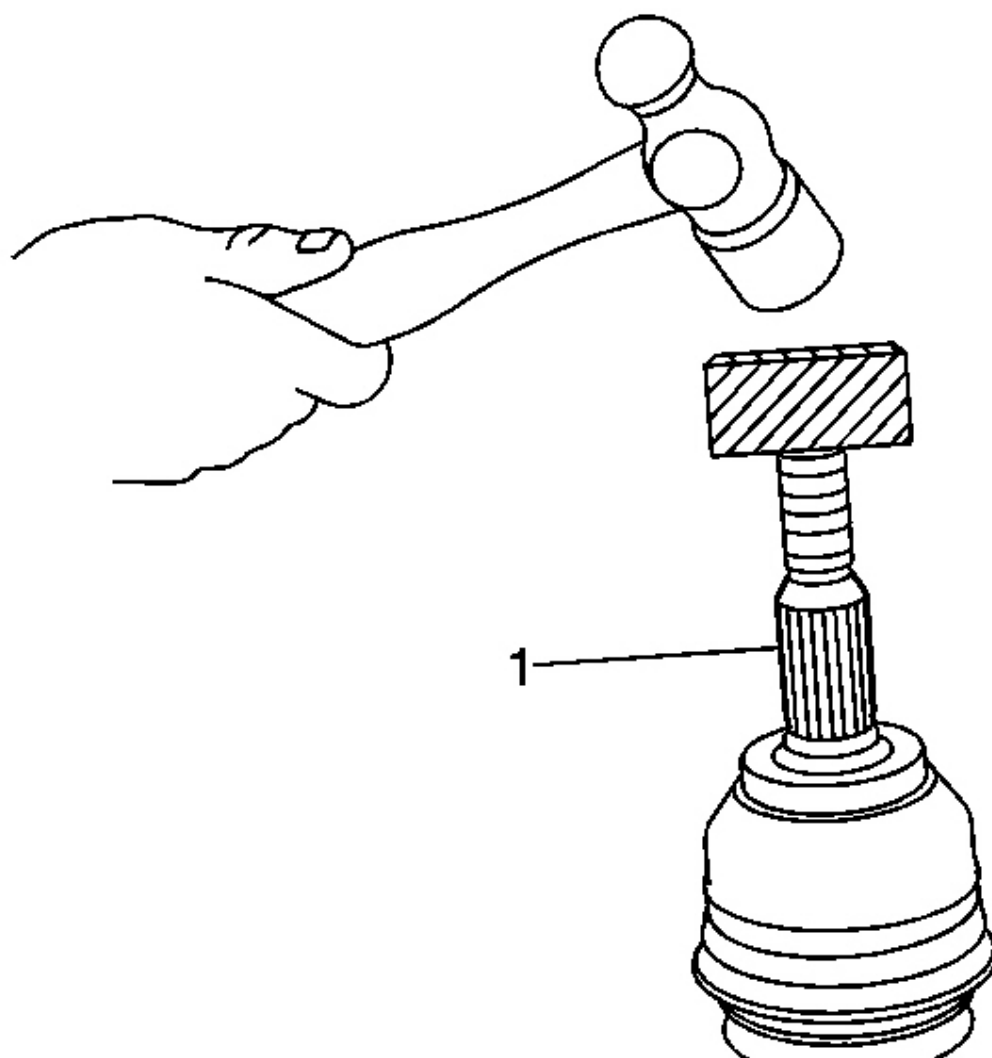


Fig. 52: Installing CV Joint
Courtesy of GENERAL MOTORS CORP.

4. Using a block of wood and a hammer, install the CV joint on the wheel drive shaft (1).

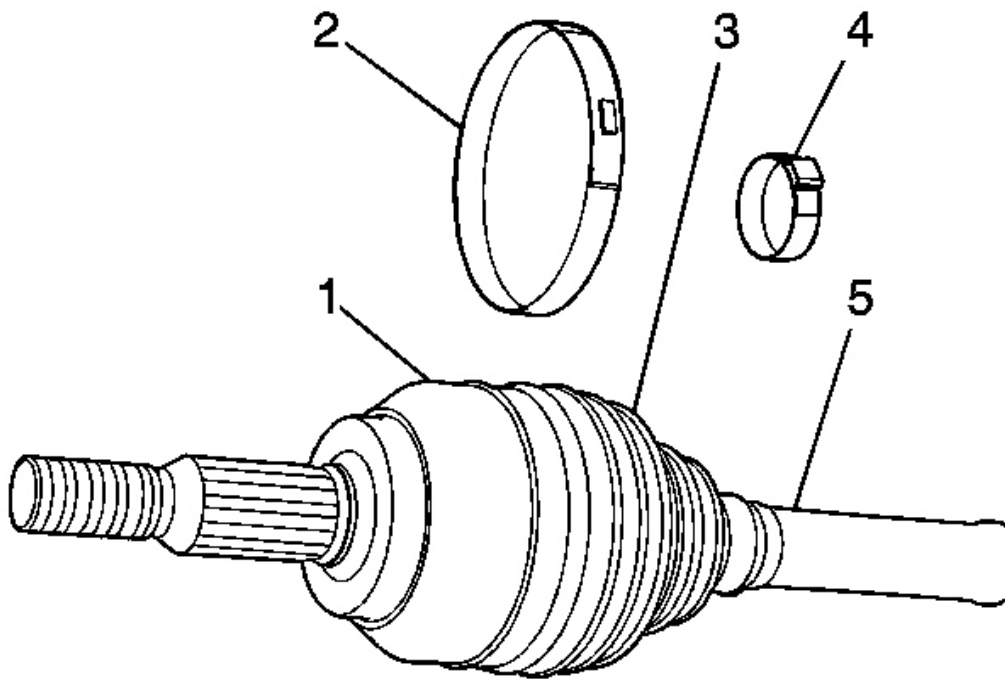


Fig. 53: Identifying Boot Clamp
Courtesy of GENERAL MOTORS CORP.

5. Install the boot clamp (4) on the boot (3) and the wheel drive shaft (5).
6. Install the boot clamp (2) on the boot (3) and the CV joint housing (1).

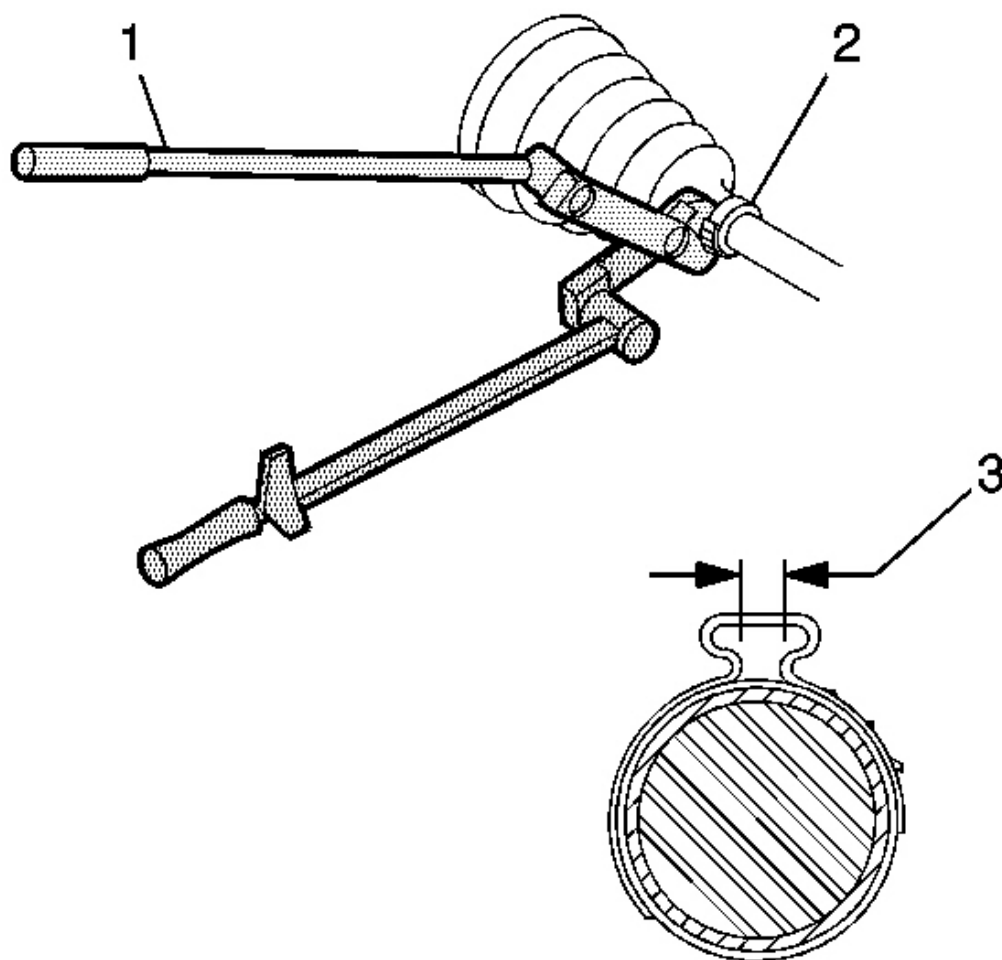


Fig. 54: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

NOTE: Ensure that the boot clamp is properly positioned around the entire circumference of the boot.

7. Using the J 35910: pliers (1), close the clamp (2) until the gap (3) measures 2.15 mm (0.85 in).

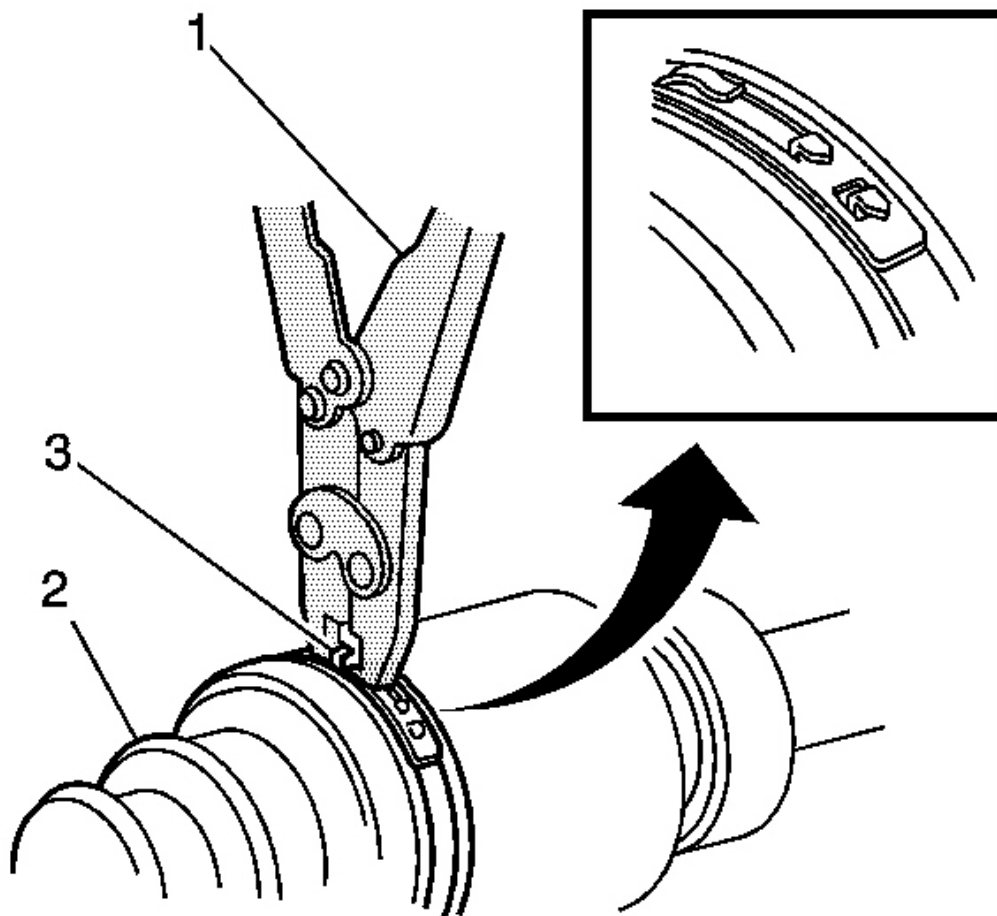


Fig. 55: Latching Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

NOTE: Ensure that the boot clamp is properly positioned around the entire circumference of the boot.

8. Using the **CH 48894**: pliers (1), close the boot clamp (3).
9. Remove the wheel drive shaft from the bench vise.
10. Move the CV joint in a circular motion 4 to 5 times to distribute the lubricant.
11. Install the wheel drive shaft in the vehicle. Refer to **Front Wheel Drive Shaft Replacement**.

REAR WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

- **J 8059:** Snap Ring Pliers
- **J 35910:** Drive Axle Boot Clamp Pliers

NOTE: The outer Constant Velocity Joint is not serviced separately. If the CV joint is found to have excessive wear or damaged, replace the wheel drive shaft as an assembly.

Disassemble Procedure

1. Remove the wheel drive shaft from the vehicle. Refer to **Rear Wheel Drive Shaft Replacement**.

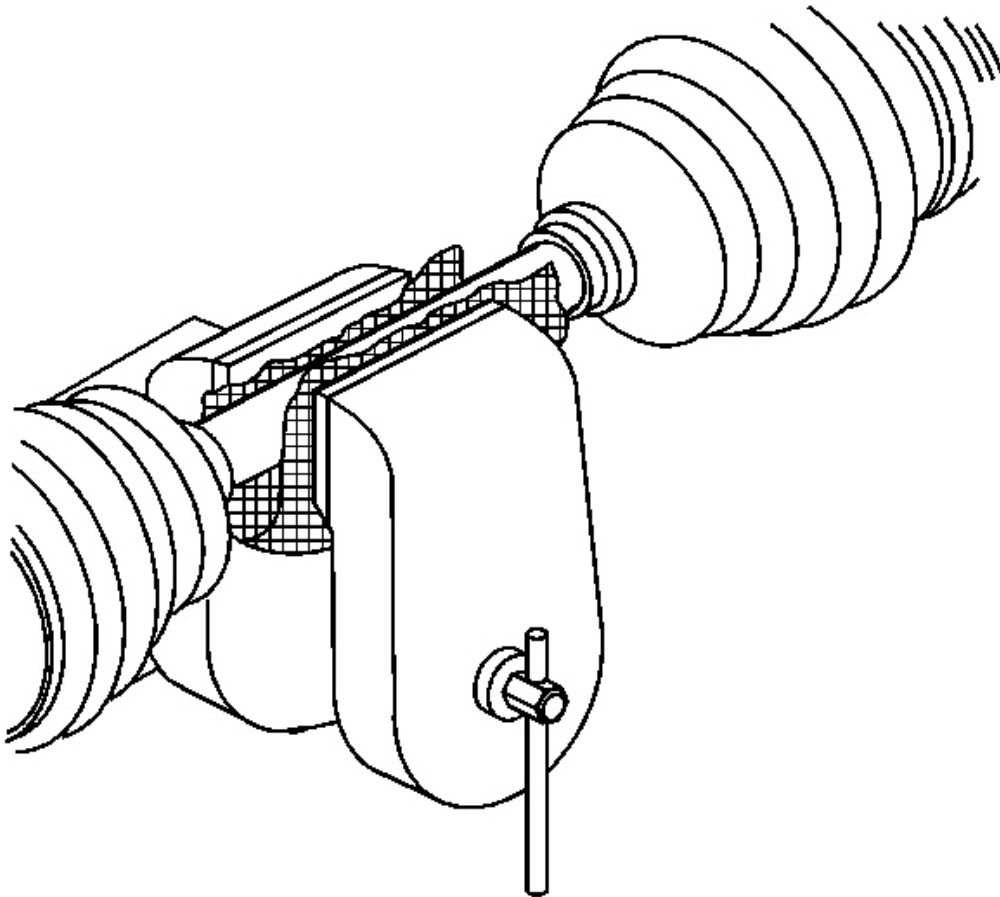


Fig. 56: Clamping Drive Axle Shaft In Vice
Courtesy of GENERAL MOTORS CORP.

2. Install the wheel drive axle shaft in a soft jawed vice.

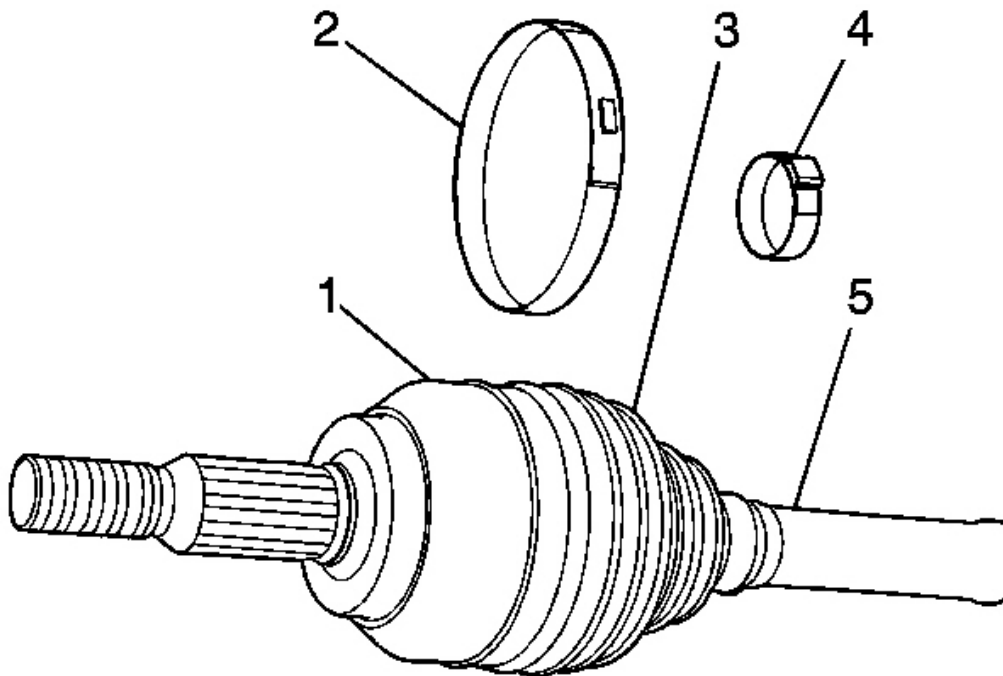


Fig. 57: Identifying Boot Clamp
Courtesy of GENERAL MOTORS CORP.

CAUTION: Do not cut through the wheel drive shaft inboard or outboard boot during service. Cutting through the boot may damage the sealing surface of the housing and the tripot or the constant velocity joint bushing. Damage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity joint.

NOTE: The following proceed is for the wheel drive shaft that have the low profile boot clamp. If the wheel drive shaft is equipped with the ear type boot clamp, proceed to step 6.

3. Using the appropriate tool, remove and discard the outer boot clamp (2) from the CV joint boot (3).
4. Using a pair of side cutters, remove and discard the inner boot clamp (4) from the CV joint boot (3).
5. Remove the cv joint boot (3) from the CV joint housing (1).

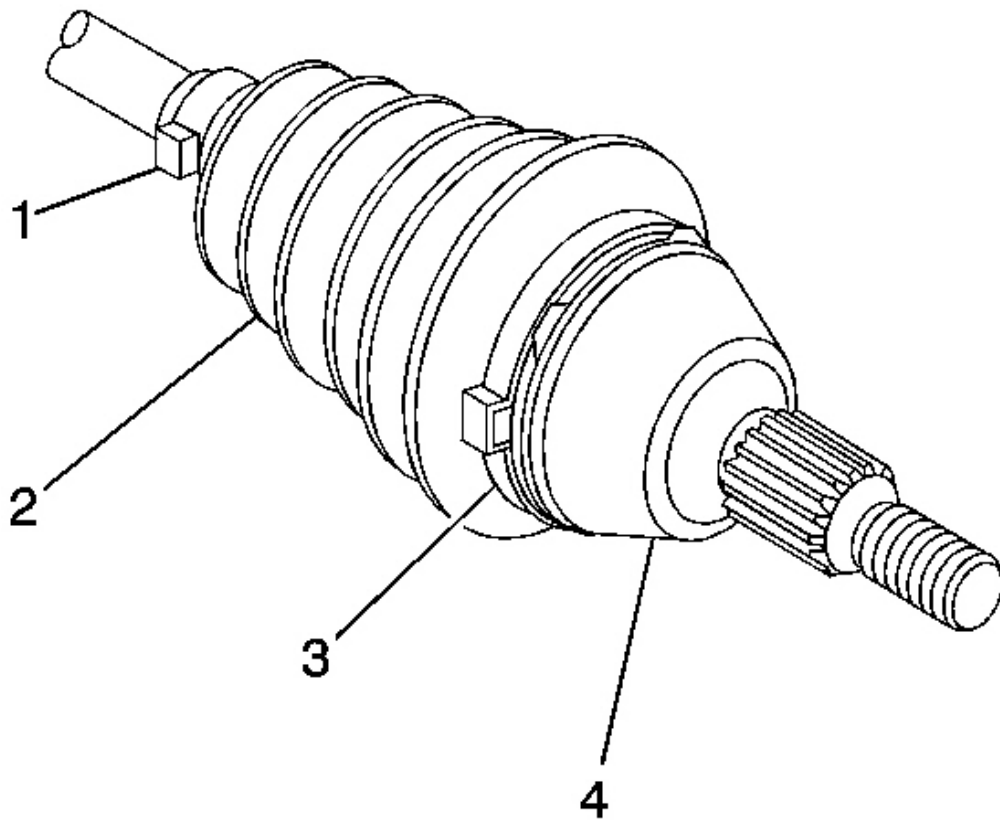


Fig. 58: Identifying Outer Boot Clamp, Inner Boot Clamp, CV Joint Boot And CV Joint Housing
Courtesy of GENERAL MOTORS CORP.

6. Using a pair of side cutters, remove and discard the outer boot clamp (3) and the inner boot clamp (1).
7. Remove the CV joint boot (2) from the CV joint housing (4).

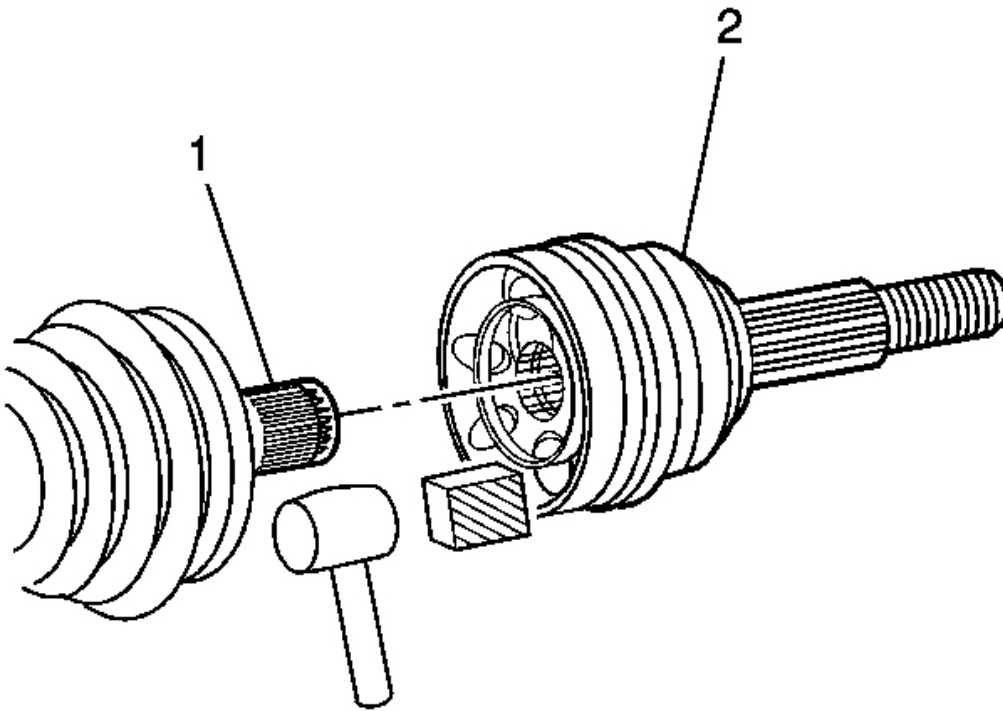


Fig. 59: Separating CV Joint From Axle Shaft
Courtesy of GENERAL MOTORS CORP.

8. Using a hammer and a block of wood, remove the CV joint (2) from the wheel drive shaft (1).

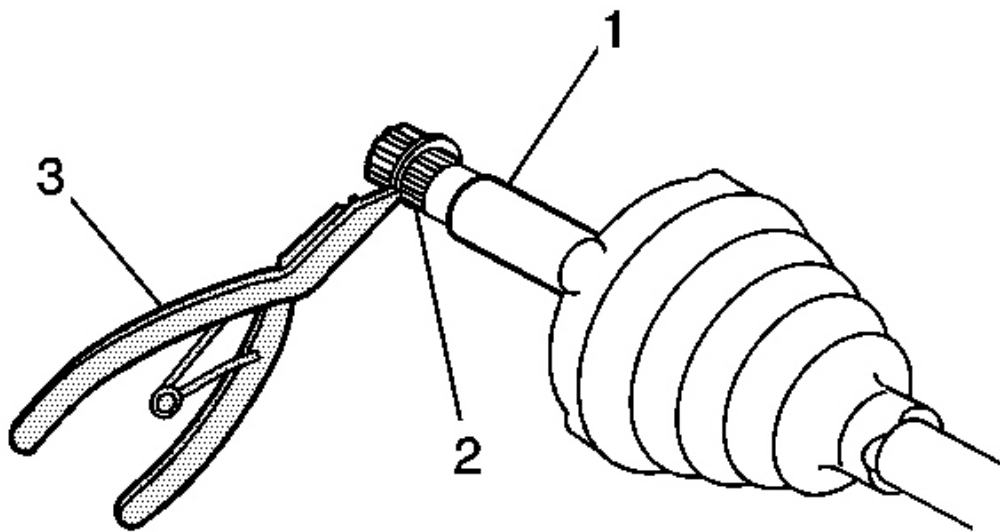


Fig. 60: Removing/Installing Retaining Ring
Courtesy of GENERAL MOTORS CORP.

9. Using the J 8059: pliers, remove the retaining ring (2) from the wheel drive shaft.

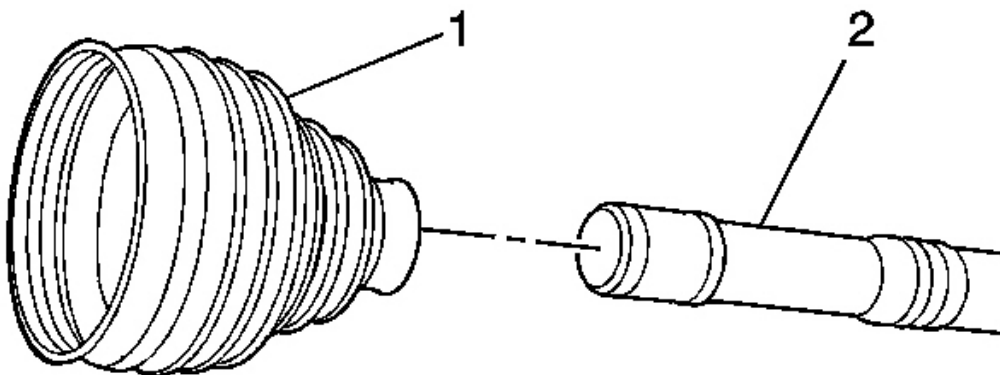


Fig. 61: Identifying Boot
Courtesy of GENERAL MOTORS CORP.

10. Remove the CV joint boot (1) from the wheel drive shaft (2).
11. If the CV joint is found to be without any lubricant, have water or any other contaminates in it. Replace the CV joint.

Assemble Procedure

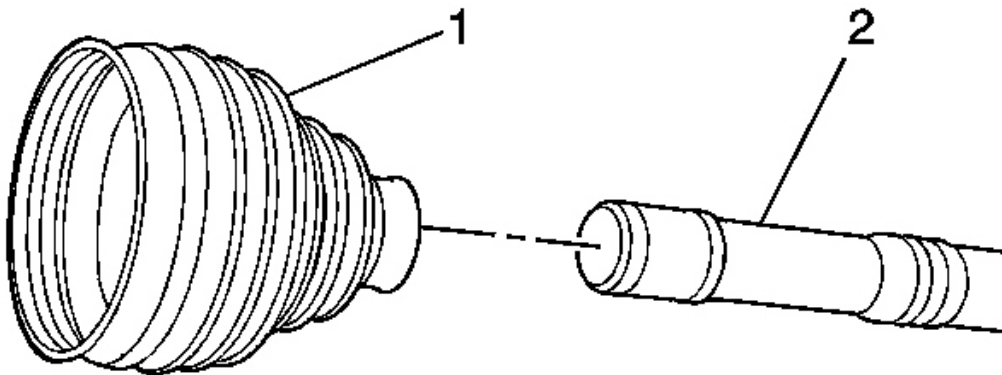


Fig. 62: Identifying Boot

Courtesy of GENERAL MOTORS CORP.

1. Position the boot and the clamp (1) on the wheel drive shaft (2), DO NOT crimp.

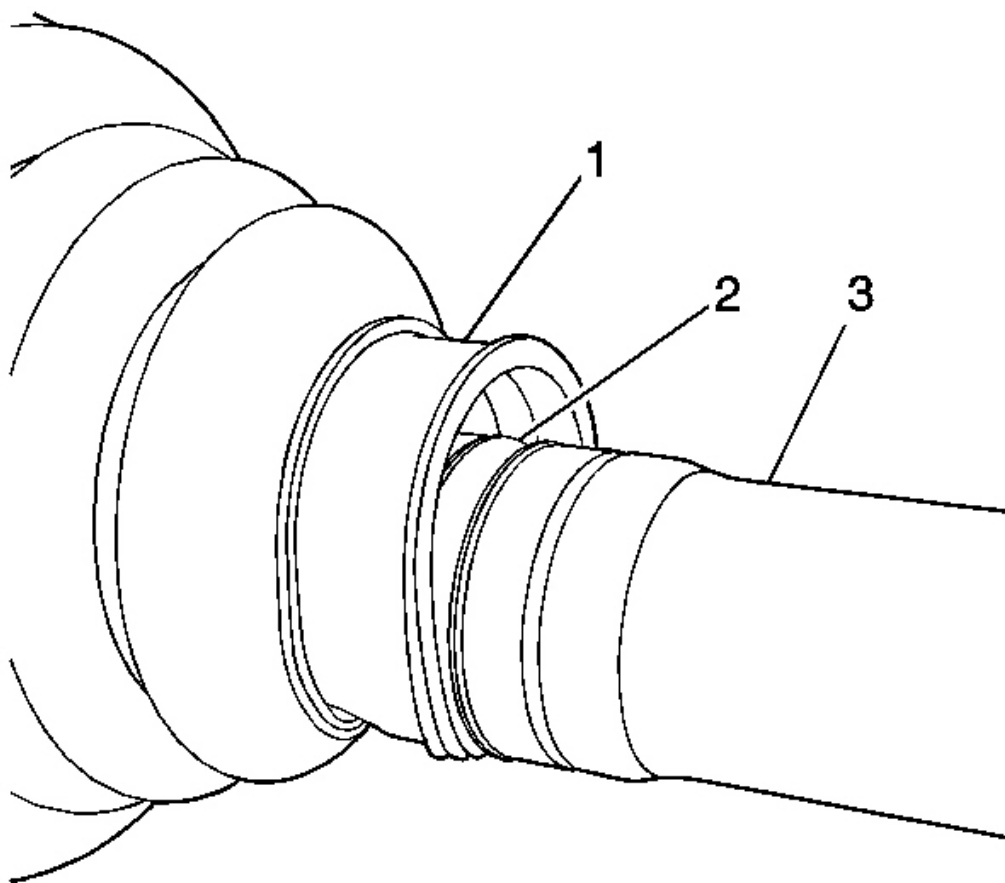


Fig. 63: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

2. Ensure that the boot (1) is properly seated in the groove (2) in the wheel drive shaft (3).

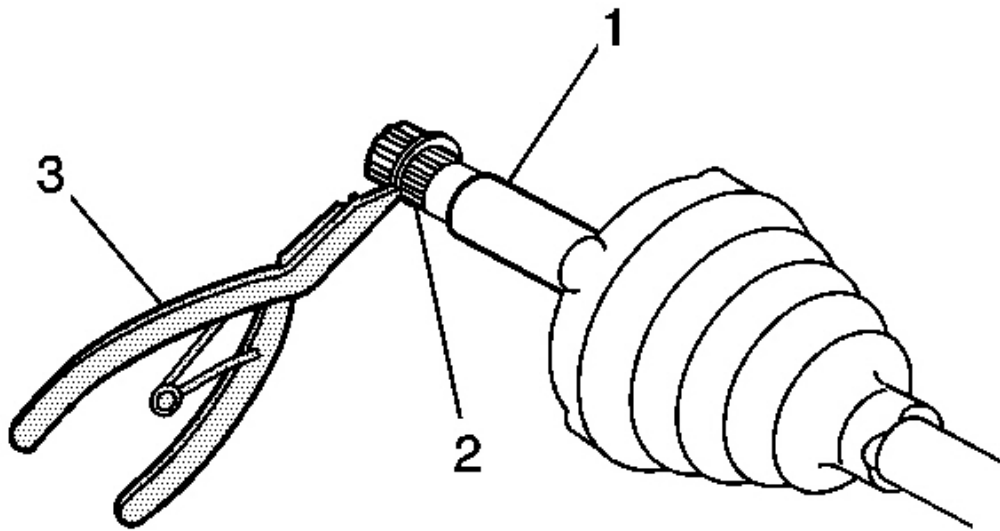


Fig. 64: Removing/Installing Retaining Ring
Courtesy of GENERAL MOTORS CORP.

3. Using the **J 8059**: pliers, install the retaining ring (2) on the wheel drive shaft (1).

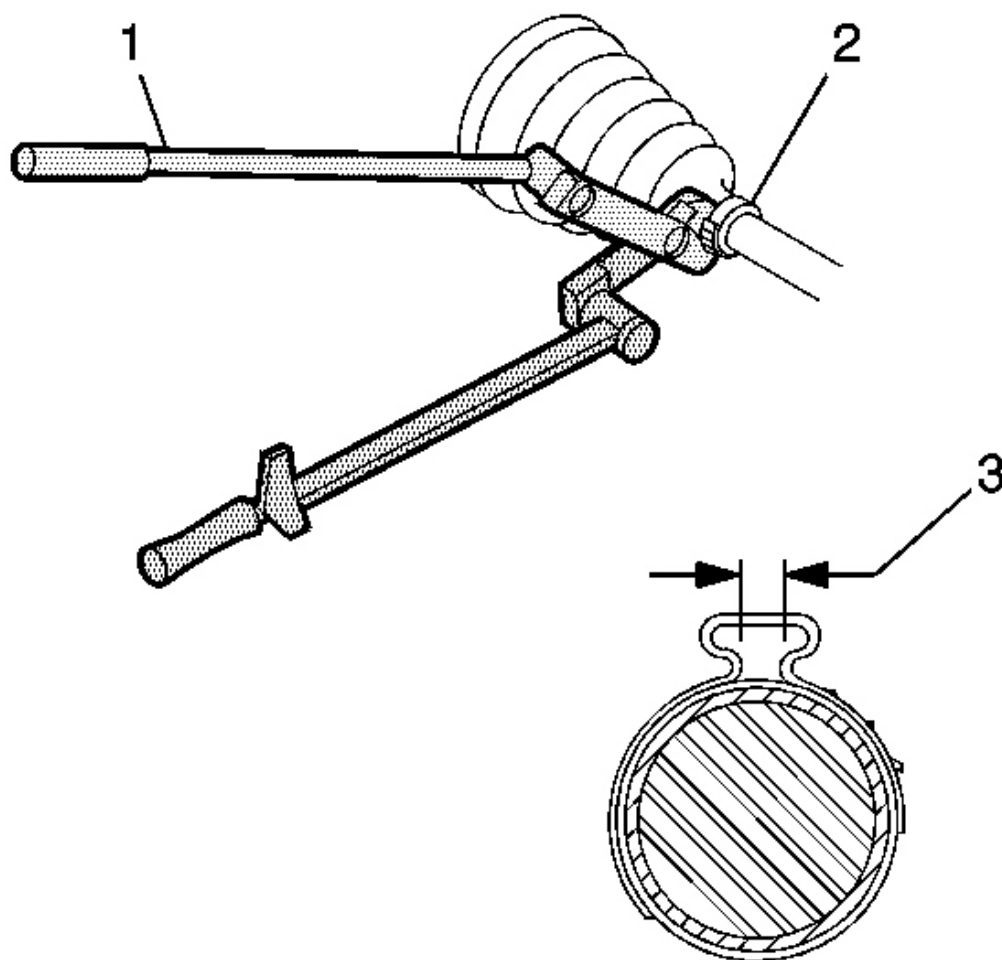


Fig. 65: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

4. Using the J 35910: pliers (1), close the boot clamp (2) until the gap (3) measures 2.15 mm (0.085 in).

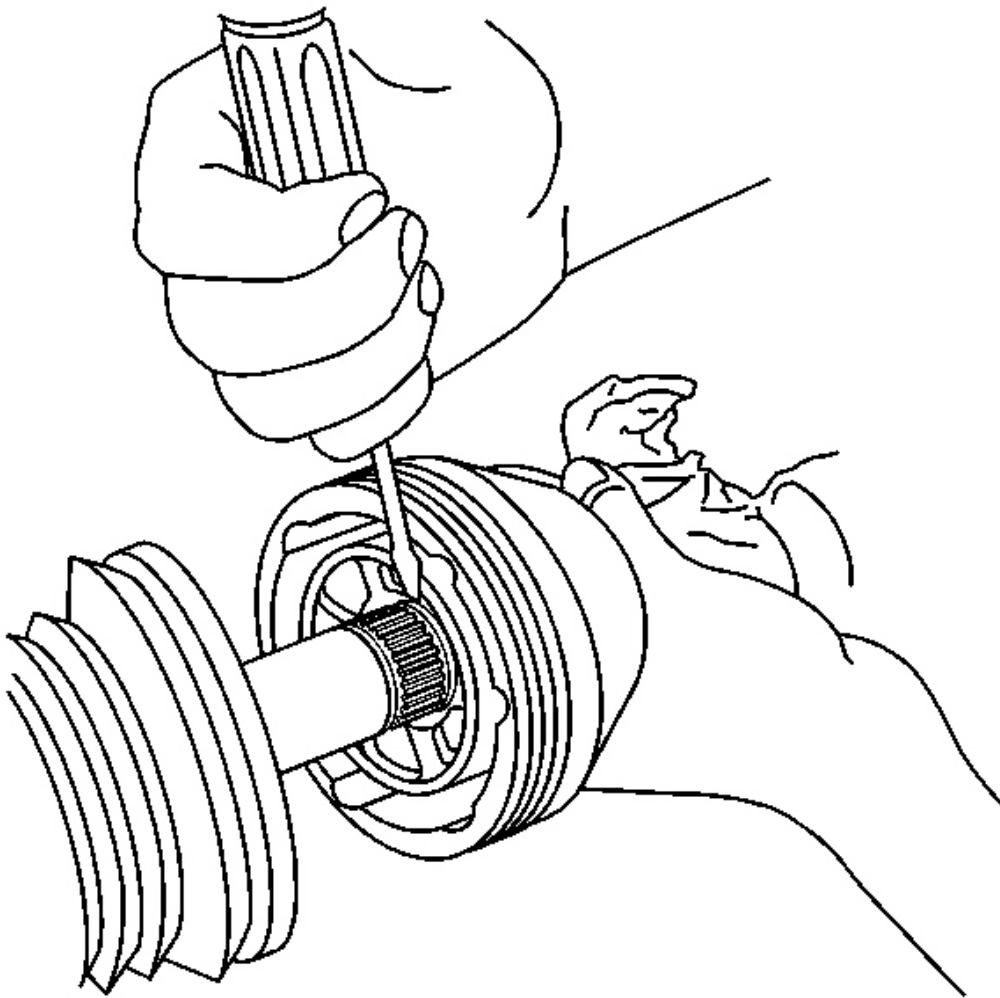


Fig. 66: View Of Axle Shaft Retaining Ring
Courtesy of GENERAL MOTORS CORP.

5. Using a small flat bladed screwdriver, compress the retaining ring into the groove in the wheel drive shaft to allow installation of the inner CV joint on the wheel drive shaft.

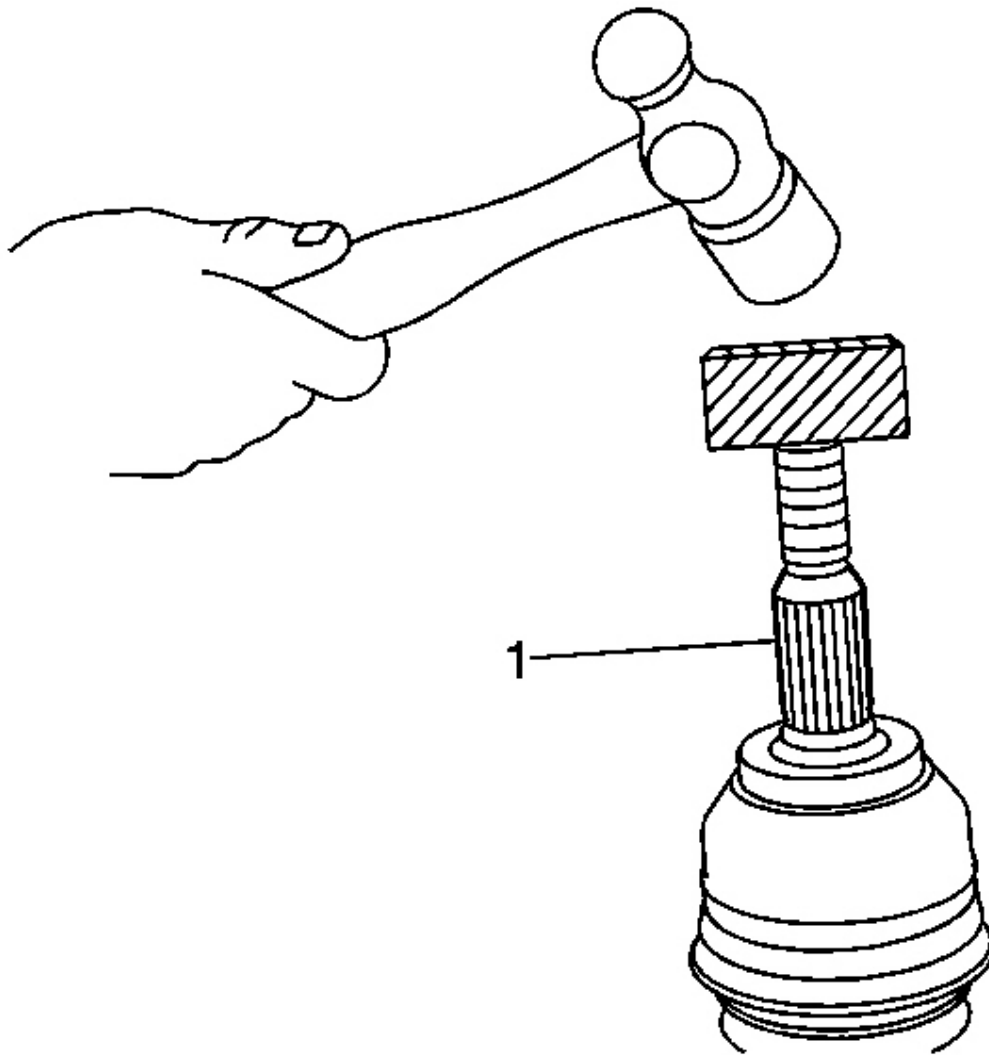


Fig. 67: Installing CV Joint
Courtesy of GENERAL MOTORS CORP.

NOTE: The CV joint should just touch the inner retaining ring.

6. Using a block of wood and a hammer, install the CV joint on the wheel drive shaft (1).

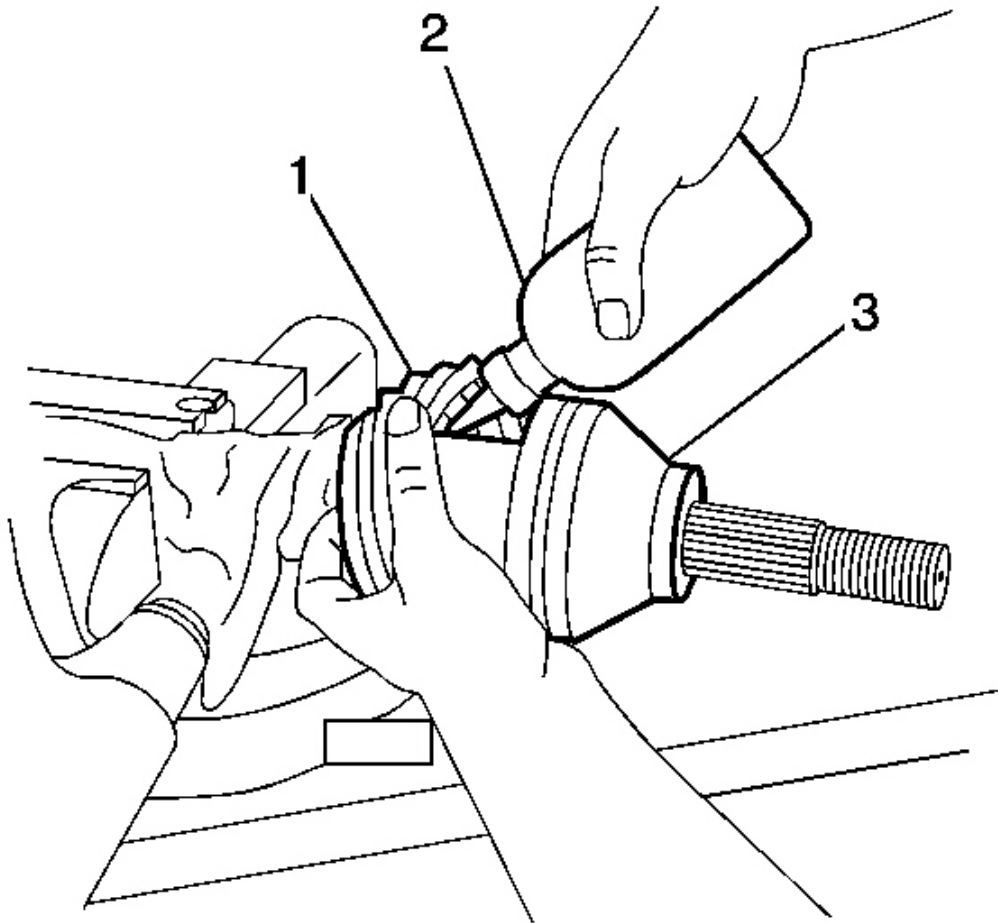


Fig. 68: Lubricating CV Joint Boot
Courtesy of GENERAL MOTORS CORP.

7. Place approximately half of the lubricant (2) inside the CV boot (1) and other half in the CV joint (3).
8. Remove any excess lubricant on the CV joint housing or the boot.

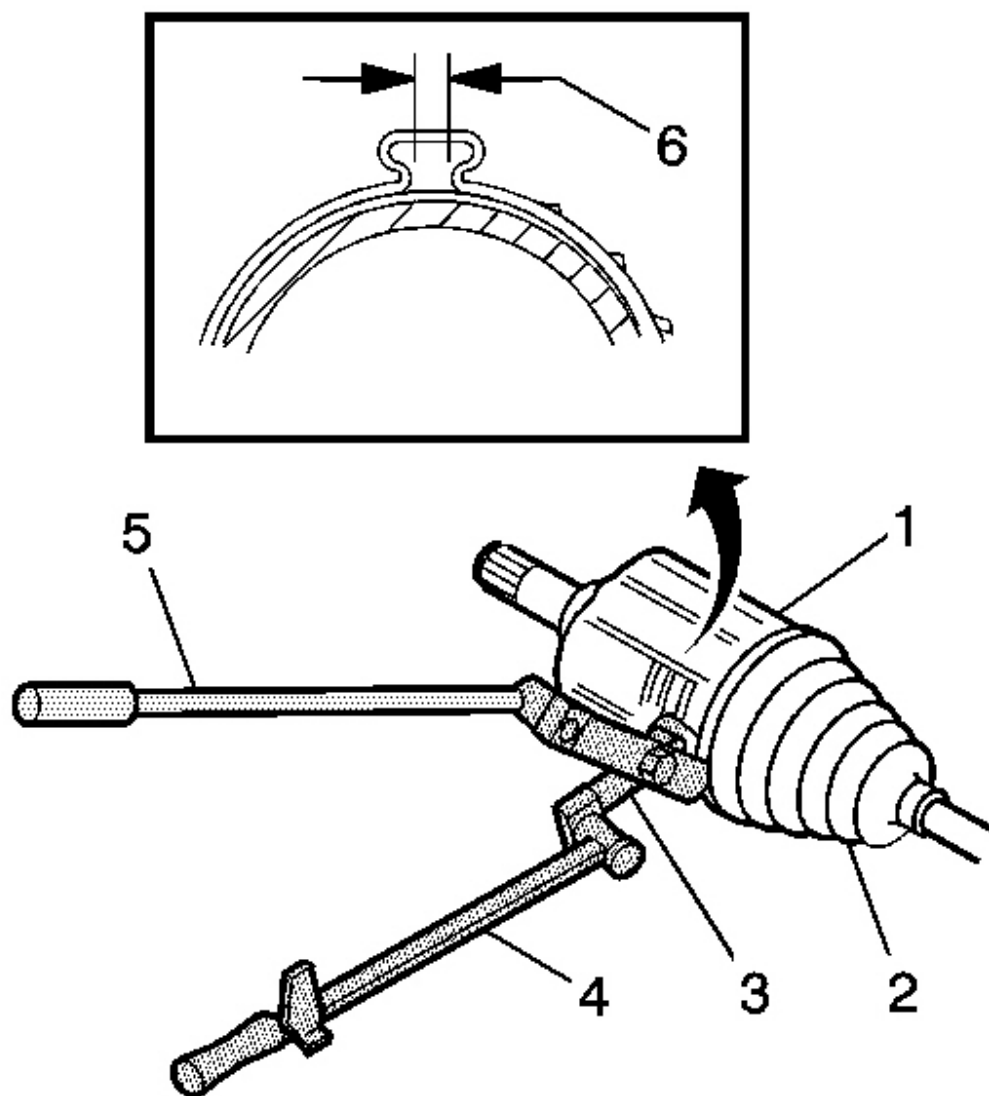


Fig. 69: Measuring Boot Clamp Gap
Courtesy of GENERAL MOTORS CORP.

9. Using the **J 35910**: pliers (3), torque or ratchet wrench (4) and breaker bar (5), close the boot clamp until the gap (6) measures 1.9 mm (0.070 in).
10. Move the CV joint in a circular motion 4 to 5 times to distribute the lubricant.
11. Remove the wheel drive shaft from the vise.
12. Install the wheel drive shaft. Refer to **Rear Wheel Drive Shaft Replacement**.

WHEEL DRIVE SHAFT OUTER JOINT INSPECTION

Disassembly Procedure

1. Remove the outer constant velocity (CV) joint and boot from the wheel drive shaft. Refer to **Front Wheel Drive Shaft Outer Joint and Boot Replacement**.
2. Remove any lubricant from the CV joint.

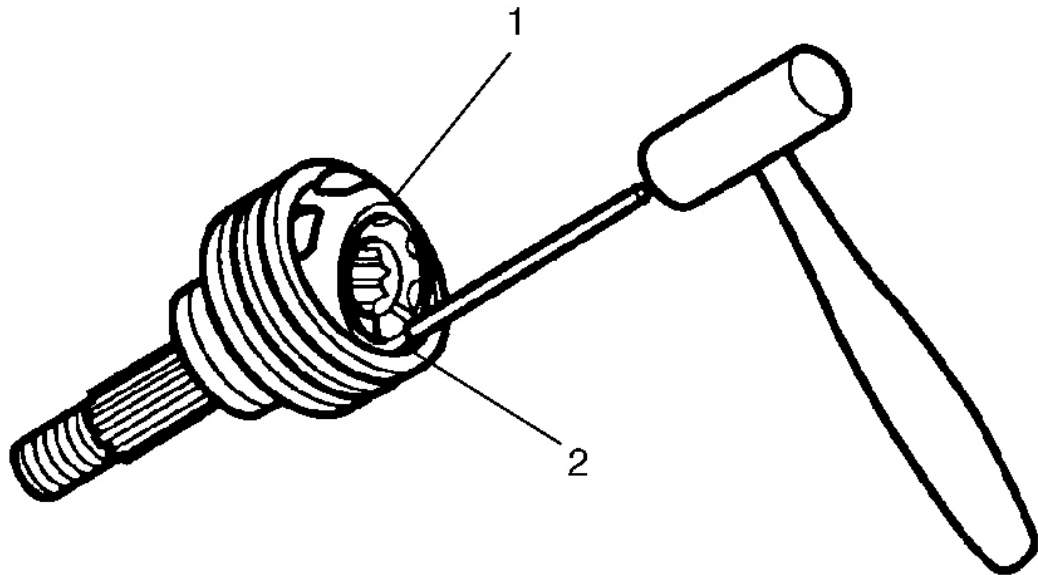


Fig. 70: Tilting Cage

Courtesy of GENERAL MOTORS CORP.

NOTE: Position the cage and the inner race so they are level.

3. Install the outer CV joint assembly in a soft jawed vise.

NOTE: The following procedure will have to be repeated until all the ball bearing are removed from the cage.

4. Using a brass drift (1), gentle tap the cage until the ball bearing can be removed from the cage.

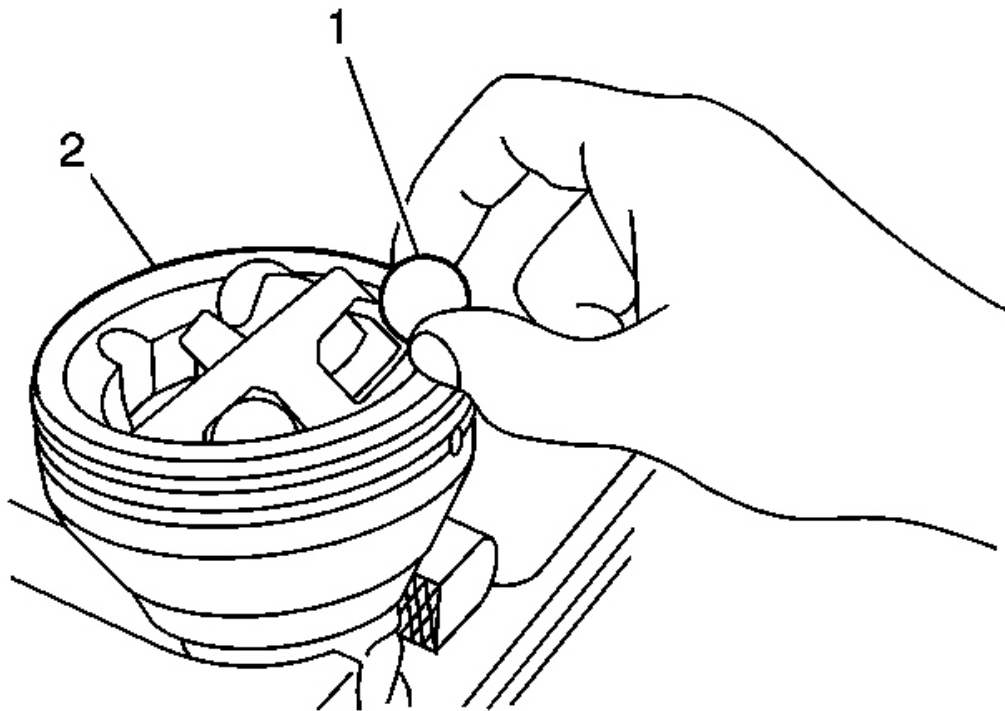


Fig. 71: Removing/Installing Ball Bearings From CV Joint
Courtesy of GENERAL MOTORS CORP.

5. Using a small screwdriver, remove the ball bearings (1) from the CV joint (2).

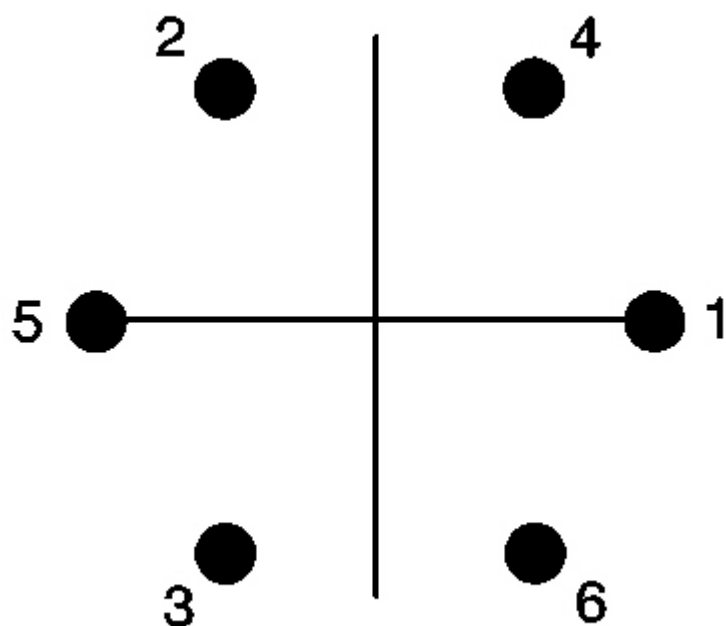


Fig. 72: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS CORP.

6. Remove the ball bearings from the CV joint in sequence.

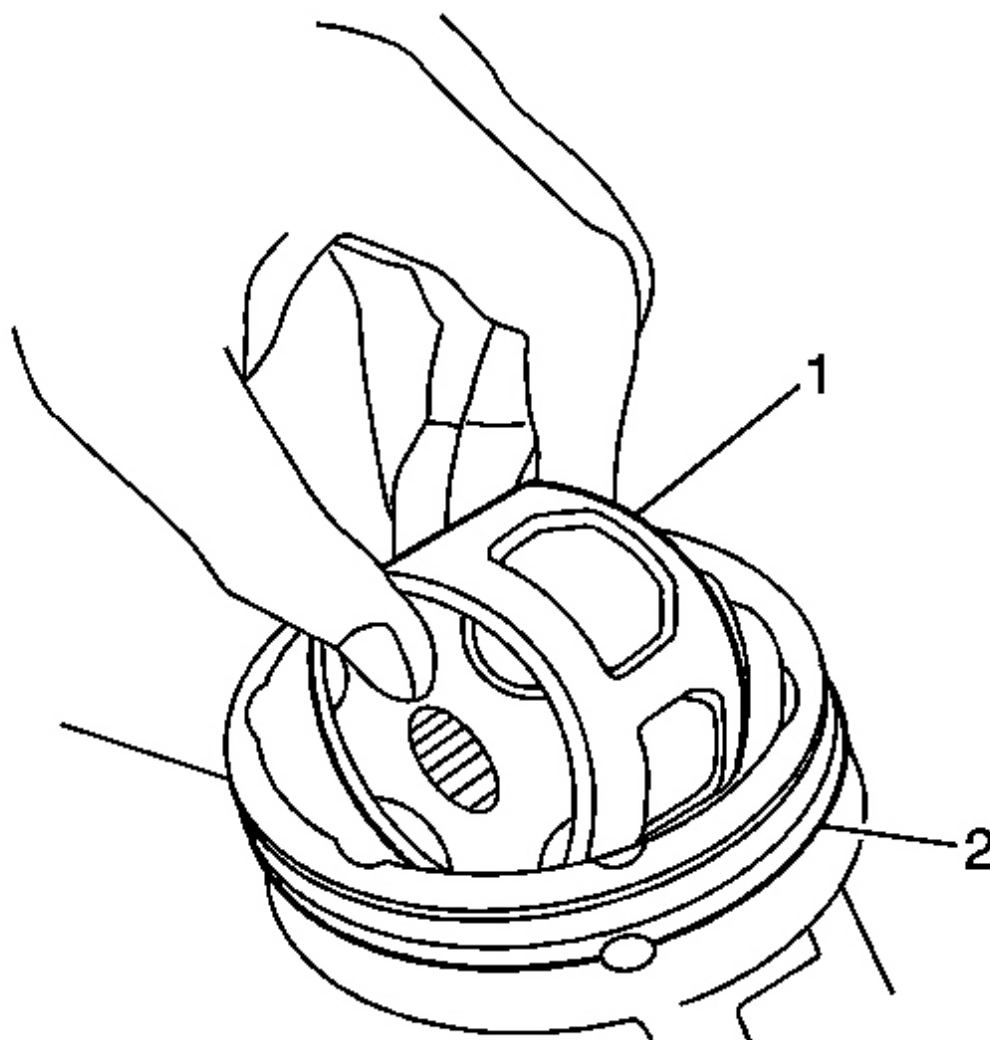


Fig. 73: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS CORP.

NOTE: Position the cage so that the larger radius corners of the cage windows are facing up.

7. Position the cage (1) at a 90 degrees to the centerline of the outer race (2).
8. Align the cage windows with the lands of the outer race (2).
9. Lift and remove the cage (1) and the inner race from the outer race (2).

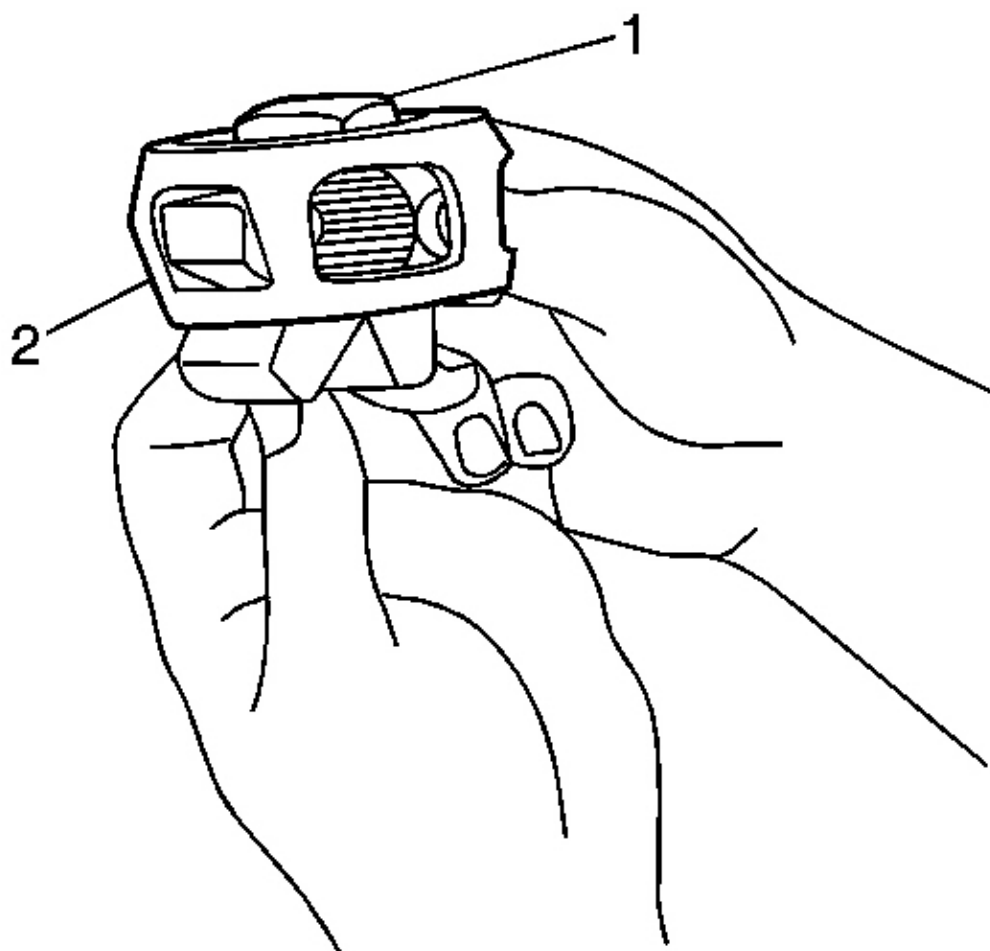


Fig. 74: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS CORP.

10. Position the cage (2) and the inner race (1) so that the larger radius corners of the cage windows are up.
11. Rotate the inner race (1) 90 degrees to the center line of the cage (2).
12. Align the lands of the inner race (1) with the windows of the cage (2).
13. Move the inner race (1) land into the cage window (2).
14. Rotate the inner race (1) down and remove it from the cage (2).
15. Clean the following items thoroughly with the proper cleaning solvent:
 - The inner race
 - The outer race

- The cage
- The ball bearings
- The exposed end of the wheel drive shaft

NOTE: **The internal parts of the CV joint are NOT SERVICED separately. The outer CV joint is serviced as an assembly.**

16. If any of the above items are found to have excessive wear or are damaged, replace the outer CV joint as an assembly.

Assembly Procedure

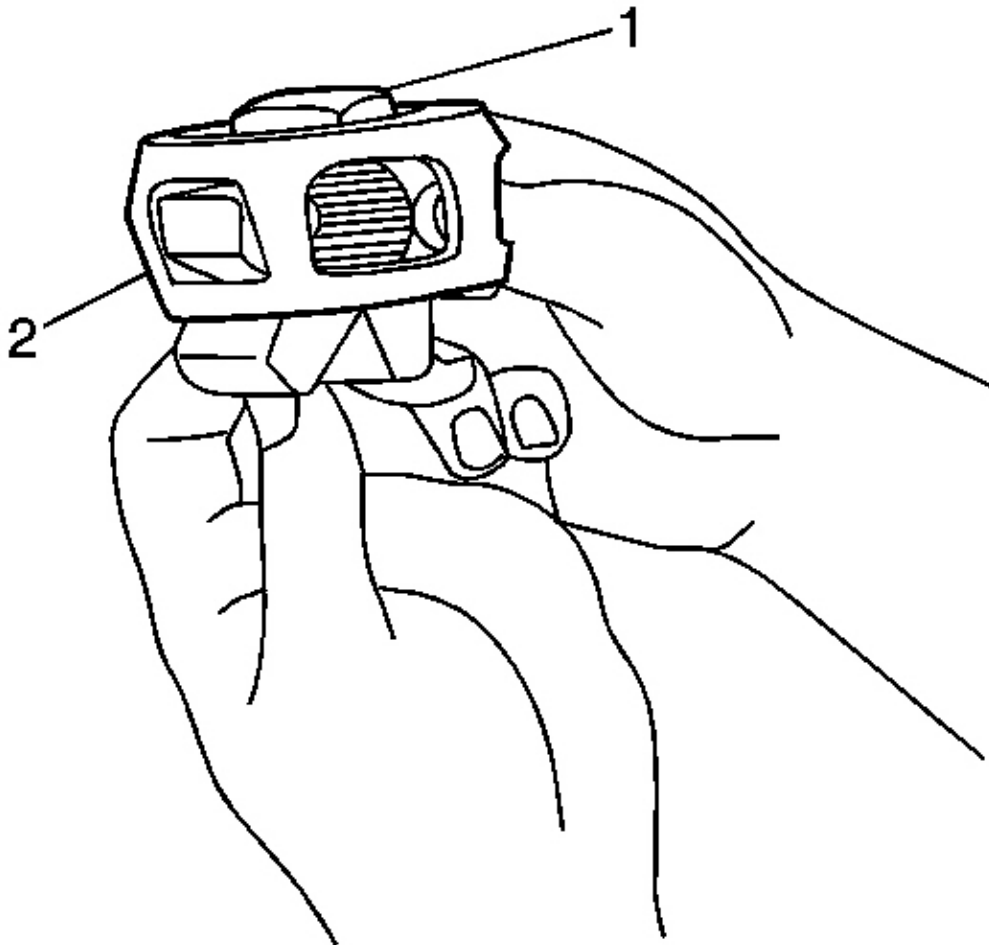


Fig. 75: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS CORP.

1. Position the cage (2) so that the larger radius corners of the cage windows are up.
2. Position the inner race (1) 90 degrees to the centerline of the cage (2).
3. Insert the inner race (1) through the bottom of the cage (2).
4. Align the lands of the inner race (1) with the windows of the cage (2).
5. Move the inner race (1) land into the cage window (2).
6. Rotate the inner race (1) down and remove it from the cage (2).
7. Rotate the inner race (1) within the cage (2) so that the grooved surface of the inner race (1) is facing up.
8. Align the inner race (1) ball bearing tracks with the cage (2) windows.

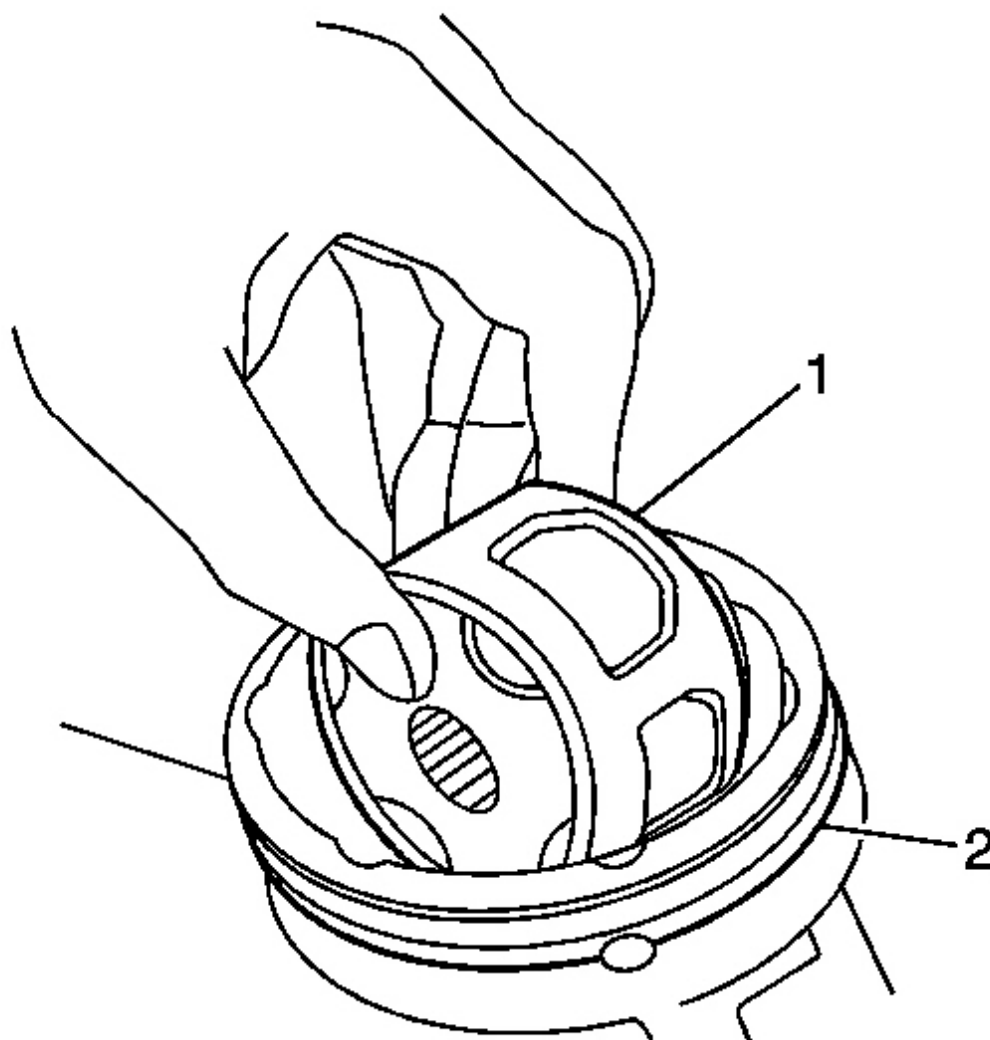


Fig. 76: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS CORP.

9. Wrap a clean shop towel around the CV joint outer race splined shaft.
10. Place the outer race (2) vertically in a bench vise.
11. Position the cage (1) and the inner race at a 90 degrees to the centerline of the outer race (2).
12. With the inner race and the cage (1) assembly in a vertical position, insert the cage and the inner race into the outer race (2).

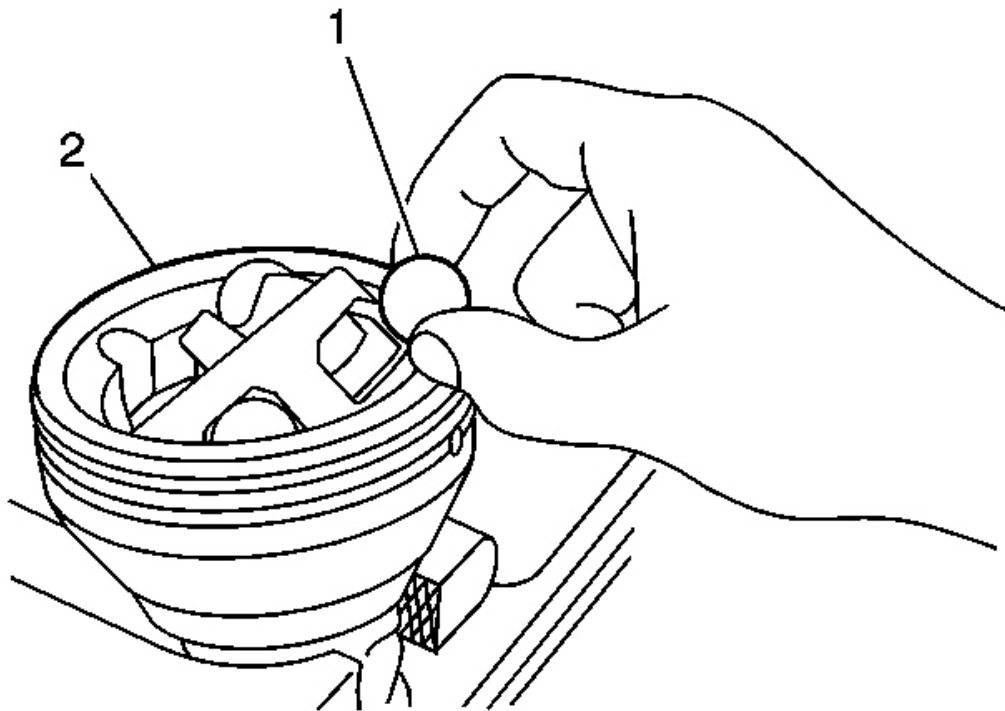


Fig. 77: Removing/Installing Ball Bearings From CV Joint
Courtesy of GENERAL MOTORS CORP.

NOTE: The larger radius corners of the cage windows should be positioned up and the grooved surface of the inner race should be visible.

13. Position the cage (2) and the inner race so that they are level in the vise.
14. Rotate the appropriate component(s), and align the cage windows and the inner race ball bearing (1) tracks with the outer race ball bearing tracks.
15. Position a cage window and the inner race ball bearing track for the ball bearing installation.

NOTE: When performing the following procedure, the opposing cage (2) window and the inner ball bearing (1) track will be accessible for the ball bearing installation.

16. Press down on the cage following one of the outer race ball bearing (1) tracks.
17. Install the ball bearing through the cage window onto the inner race ball bearing (1) track.

NOTE: The following service procedure will have to be performed after each ball

bearing (1) has been installed.

18. After the first ball bearing (1) has been installed, use a brass drift and a hammer and gently tap the cage in order to drive the cage and the inner race down completely in the outer race.

NOTE: **After the ball bearing (1) has been installed, there should be NO GAP between the ball bearing and the inner race.**

19. Position the cage and the inner race so that they are level.
20. Using a plastic hammer, lightly tap the ball bearing (1) into place.

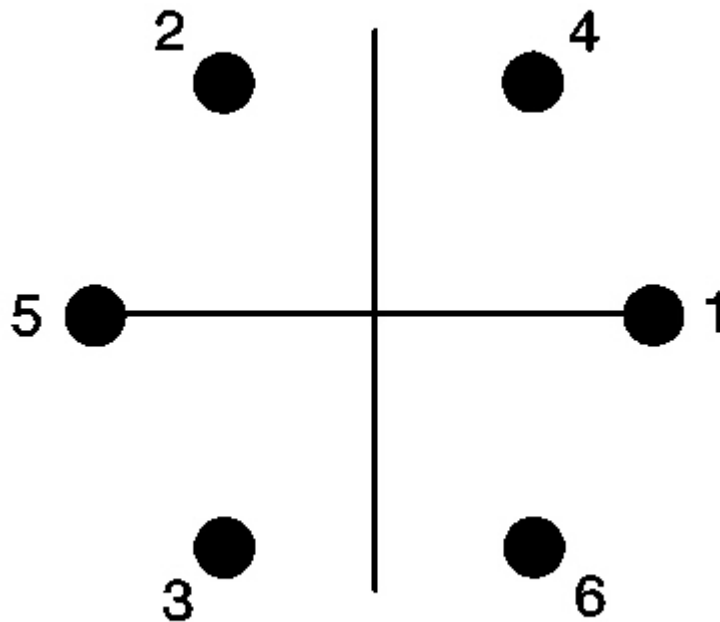


Fig. 78: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS CORP.

21. Install the ball bearings in sequence.
22. Repeat steps 18 thru 20 until all the ball bearings are installed.
23. Install the outer CV joint and boot on the wheel drive shaft. Refer to **Front Wheel Drive Shaft Outer Joint and Boot Replacement**.

WHEEL DRIVE SHAFT INNER JOINT INSPECTION

Inspection Procedure

1. Remove the front wheel drive shaft inner joint and boot. Refer to **Front Wheel Drive Shaft Inner Joint and Boot Replacement**.

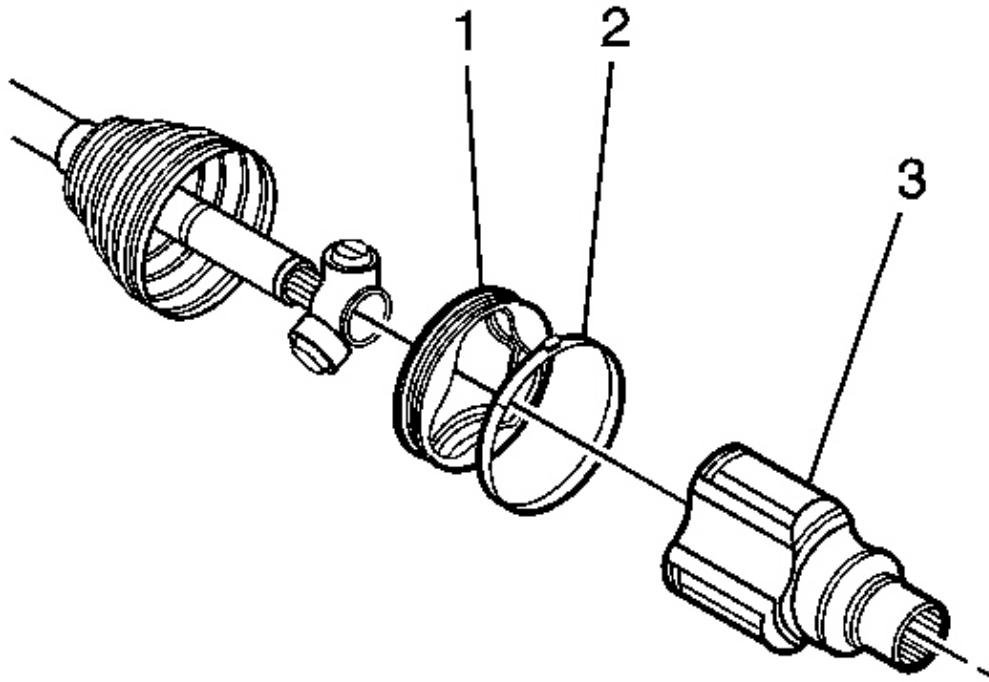


Fig. 79: Identifying Wheel Drive Shaft Inner Joint Inspection Areas
Courtesy of GENERAL MOTORS CORP.

2. Remove the wheel drive shaft tripod bushing (1) from the tripod housing (3).
3. Remove the wheel drive shaft tripod housing (3) from the wheel drive shaft.
4. Remove the wheel drive shaft tripod joint boot bushing (1).
5. Using a suitable cleaner, remove the excess grease from the tripod assembly.
6. Inspect the following items for damage or excessive wear:
 - The wheel drive shaft tripod boot
 - The wheel drive shaft tripod assembly
 - The wheel drive shaft tripod joint housing
 - The wheel drive shaft tripod joint bushing
 - The wheel drive shaft

7. If any of the internal parts are found to be excessively worn or damaged, replace the wheel drive shaft inner joint and boot. Refer to **Front Wheel Drive Shaft Inner Joint and Boot Replacement**.

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Wheel drive shafts are flexible assemblies consisting of an inner tripot joint and an outer constant velocity joint connected by an axle shaft. The inner joint is completely flexible, and can plunge in and out. The outer joint is also flexible, but cannot plunge in and out. These drive axles are used to transmit rotational force from the transaxle to the front tire and wheel assemblies.

Seal and Clamp

The wheel drive shafts use inboard and outboard joint seals made of thermoplastic material, and clamps made of stainless steel. The functions of the seals are as follows:

- The seals protect the internal parts of the inboard and outboard joints.
 - They protect the joint lubricating grease from surrounding detrimental atmospheric conditions; such as extreme temperatures, ozone gas, etc.
 - They protect the joint lubricating grease from foreign materials; such as stones, dirt, water, salt, etc.
- The seals facilitate angular and axial movement of the inboard joint.
- The seals facilitate angular movement of the outboard joint.

The function of the clamps is as follows:

Provide a leak proof connection at both the housing and the axle shaft for the inboard and outboard joints.

The thermoplastic material performs well against normal handling, operational wear and conditions. This material however, is not strong enough to withstand abusive handling or damage due to objects such as sharp tools or the sharp edge of any other surrounding component on the vehicle.

Inner Joint

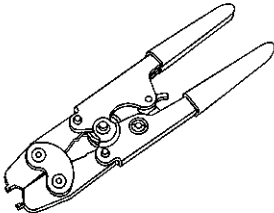
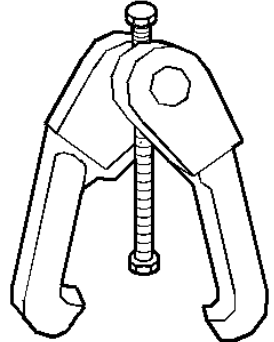
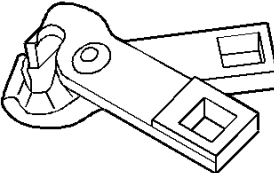
The inner joints are of the tripot design without an over-extension limitation retainer. The inner joints incorporate a male spline which interlocks with the transaxle using snap rings.

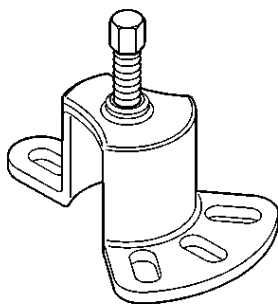
Outer Joint

The outer joints are of the Rzeppa, constant velocity joint design. The shaft end which mates with the wheel bearing and hub assembly, incorporates a helical spline to assure a tight, press-type fit. This design assures that no end play will exist between the hub bearing and the drive shaft assembly for added durability and reduced bearing noise.

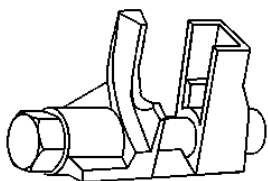
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

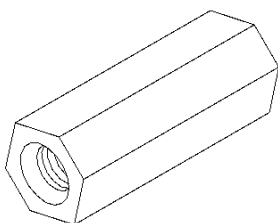
Illustration	Tool Number/ Description
	CH 48894 Wheel Drive Shaft Clamping Pliers
	J 2619-01 Slide Hammer
	J 24319-B Steering Linkage and Tie Rod Puller
	J 35910 Drive Axle Seal Clamp Pliers



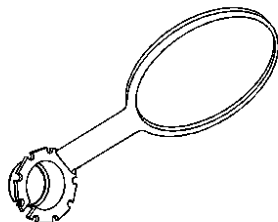
J 42128
Wheel Hub Puller



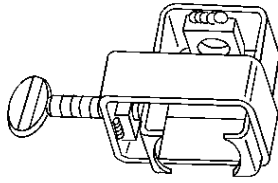
J 43828
Ball Joint Separator



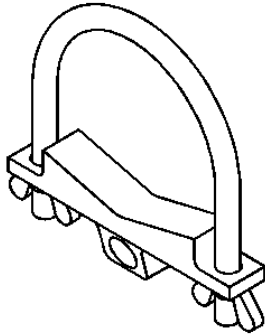
J 44015
Steering Linkage Installer



J 44394-A
Axle Seal Protector



Output Shaft Assembly Remover and Installer



J 45341
Rear Wheel Drive Shaft Removal Tool