

2017 DRIVELINE/AXLE

Wheel Drive Shafts - Encore, Trax

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	
CV Boot Clamp	
Front Wheel Drive Intermediate Shaft Bearing Retainer Ring	
Front Wheel Drive Intermediate Shaft O-Ring	
Front Wheel Drive Intermediate Shaft Retaining Ring	
Wheel Drive Shaft Retaining Ring	
Wheel Drive Shaft Washer	

Single Use Threaded Fastener/Component Tightening Specifications

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	Specification
	Metric (English)
Wheel Drive Shaft Nut	
First Pass:	50 N.m (37 lb ft)
Final Pass:	60 degrees

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Front Wheel Drive Intermediate Shaft Bolt	58 N.m (43 lb ft)
Front Wheel Drive Intermediate Shaft Flange Bolt	22 N.m (16 lb ft)
Rear Wheel Drive Shaft Bolt	58 N.m (43 lb ft)

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - WHEEL DRIVE SHAFTS

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

1. Review the [Vibration Diagnosis, Starting Point, and Correction](#).
2. Perform the [Vibration Analysis - Road Testing \(EL-38792-A Electronic Vibration Analyzer\)](#), [Vibration Analysis - Road Testing \(CH-51450-NVH Oscilloscope\)](#) in order to effectively diagnose the concern.

3. Review the system operation in order to become familiar with the system function. [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 click noise occurring during turns may be caused by a worn or damaged wheel drive shaft outer joint. 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.

If inspection reveals no visual evidence of wear or damage, inspect the wheel drive shaft. Refer to [Wheel Drive Shaft Outer Joint Inspection](#).

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 inner joint. The common cause of wheel drive shaft inner joint 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 inner 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.

If inspection reveals no visual evidence of wear or damage, inspect the wheel drive shaft. Refer to [Wheel Drive Shaft Inner Joint Inspection](#).

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.

If inspection reveals no visual evidence of wear or damage, inspect the wheel drive shaft inner and outer joints. [Wheel Drive Shaft Outer Joint Inspection](#), or [Wheel Drive Shaft Inner Joint Inspection](#)

SHUDDER OR VIBRATION DURING ACCELERATION

In order to diagnose a shudder or vibration during acceleration, refer to [Vibration Diagnosis, Starting Point, and Correction](#) .

REPAIR INSTRUCTIONS

FRONT WHEEL DRIVE INTERMEDIATE SHAFT REPLACEMENT (LE2 WITH MNH)

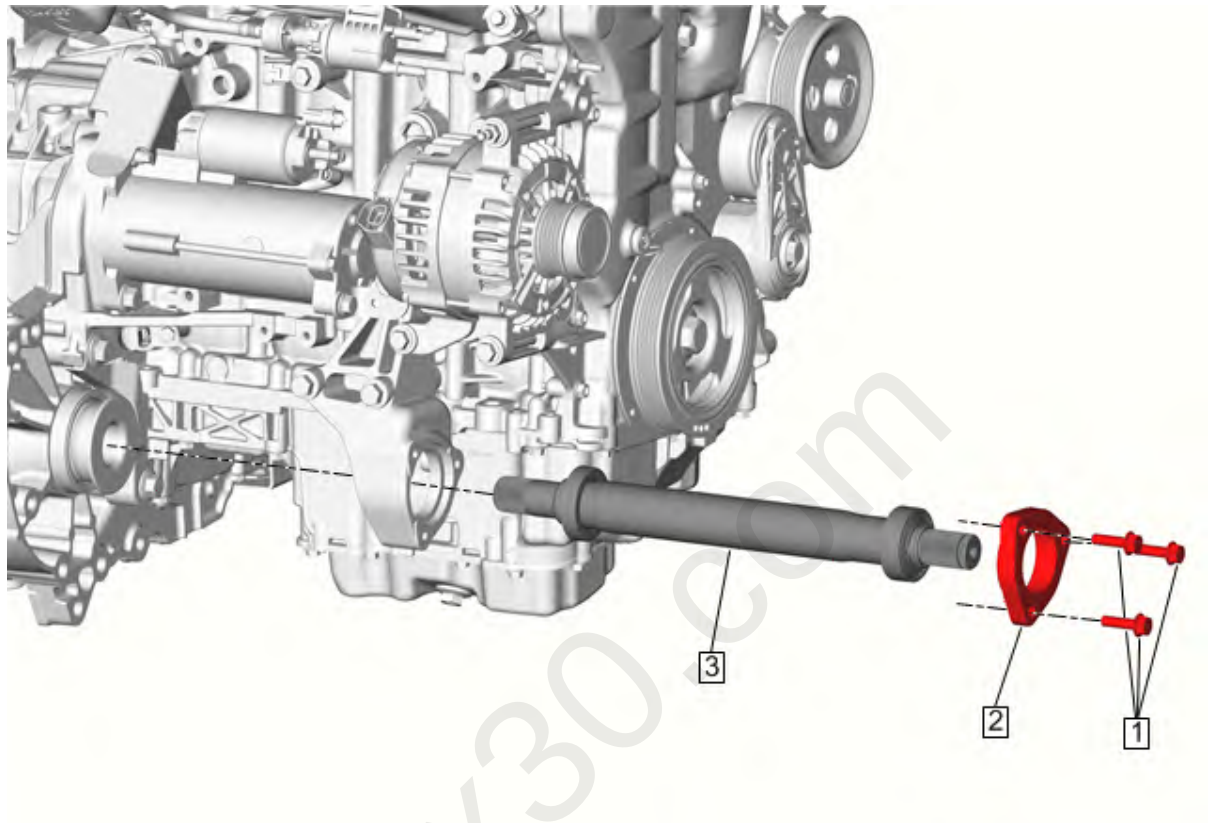


Fig. 1: Front Wheel Drive Intermediate Shaft (LE2 with MNH).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Front Wheel Drive Shaft Replacement - Right Side</u>	
1	Front Wheel Drive Intermediate Shaft Bearing Retainer - Bolt (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> Tighten 22 N.m (16 lb ft)
2	Front Wheel Drive Intermediate Shaft Bearing Retainer
3	Front Wheel Drive Intermediate Shaft

FRONT WHEEL DRIVE INTERMEDIATE SHAFT REPLACEMENT (LUV WITH MR5)

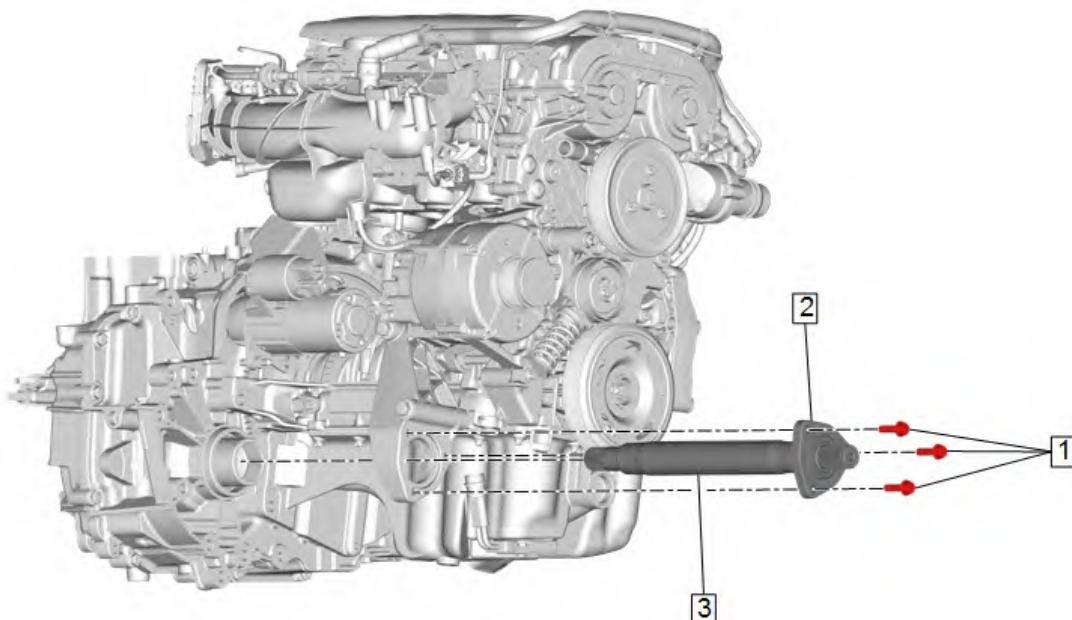


Fig. 2: Front Wheel Drive Intermediate Shaft (LUV with MR5).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the right front wheel drive shaft. <u>Front Wheel Drive Shaft Replacement - Right Side</u>	
1	Front Wheel Drive Intermediate Shaft Bolts (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten the bolts: Tighten 22 N.m (16 lb ft)
2	Front Wheel Drive Intermediate Shaft Bearing Retainer
3	Front Wheel Drive Intermediate Shaft

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BRACKET REPLACEMENT (LE2 WITH MNH, AWD)

Removal Procedure

1. Raise and support the vehicle. **Lifting and Jacking the Vehicle**
2. Remove **Front Wheel Drive Intermediate Shaft Replacement (LE2 with MNH)**.

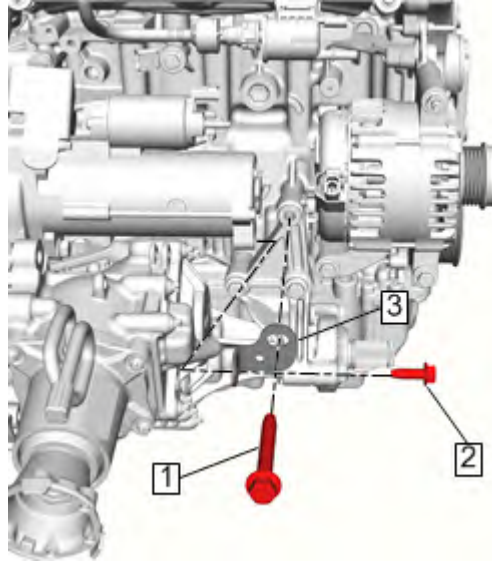


Fig. 3: Starter Bracket

Courtesy of GENERAL MOTORS COMPANY

3. Remove Starter bracket bolt (2)
4. Remove Intermediate Shaft Bracket Bolt (1)
5. Remove the starter bracket (3)

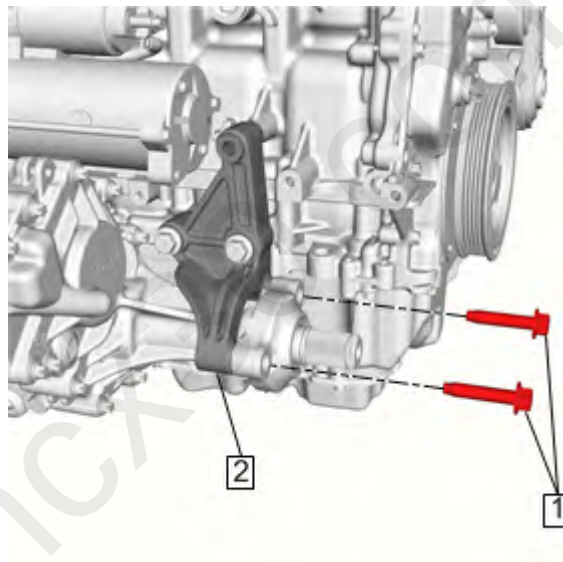


Fig. 4: Intermediate Shaft Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

6. Remove Intermediate Shaft Bracket Bolt (1)

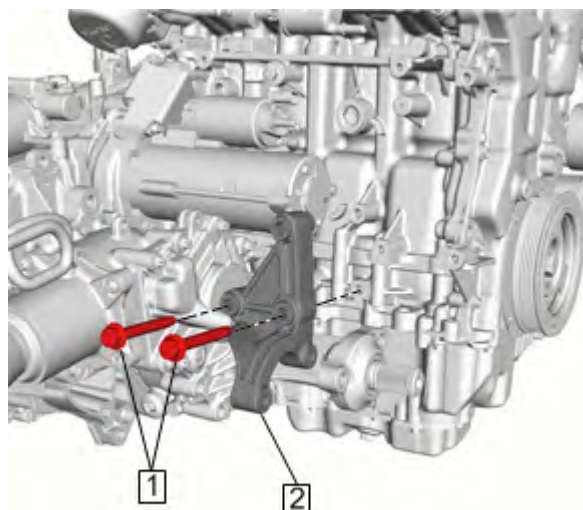


Fig. 5: Intermediate Shaft Bracket
Courtesy of GENERAL MOTORS COMPANY

7. Remove Intermediate Shaft Bracket Bolt (1)
8. Remove Intermediate Shaft Bracket (2)

Installation Procedure

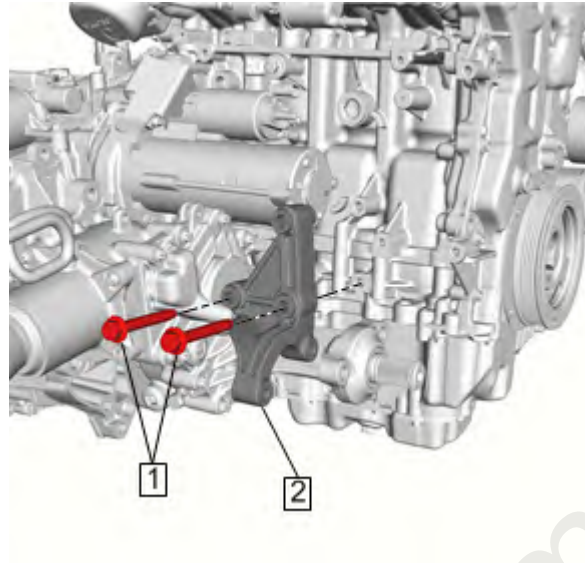


Fig. 6: Intermediate Shaft Bracket
Courtesy of GENERAL MOTORS COMPANY

1. Install Intermediate Shaft Bracket (2)

CAUTION: Refer to **Fastener Caution** .

2. Install Intermediate Shaft Bracket Bolt (1) and tighten 58 N.m (43 lb ft)

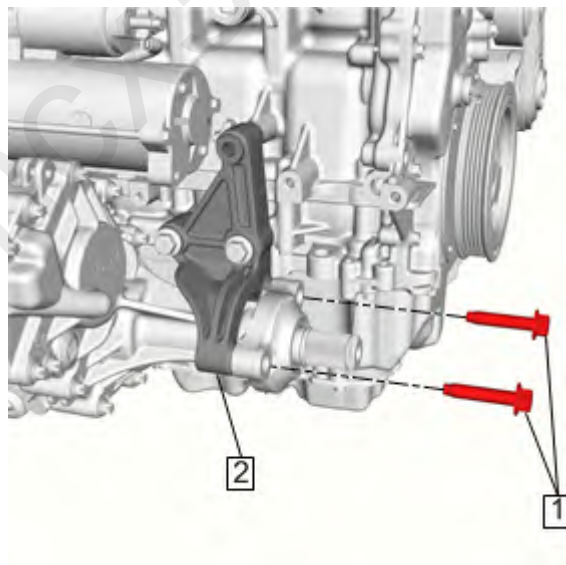


Fig. 7: Intermediate Shaft Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install Intermediate Shaft Bracket Bolt (1) and tighten 58 N.m (43 lb ft)

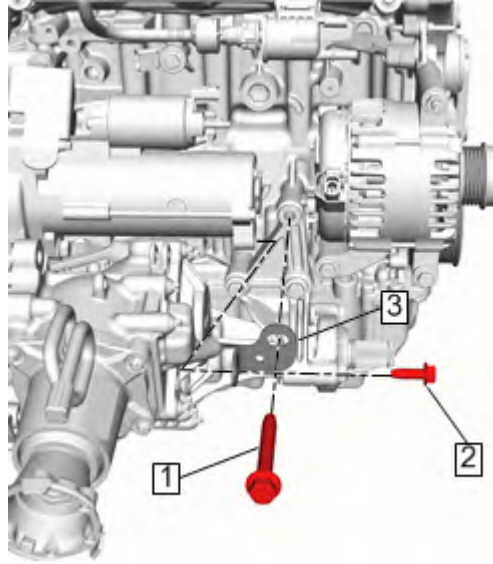


Fig. 8: Starter Bracket

Courtesy of GENERAL MOTORS COMPANY

4. Install the starter bracket. (3)
5. Install Intermediate Shaft Bracket Bolt (2) and tighten 58 N.m (43 lb ft)
6. Install Starter bracket bolt (1) and tighten 22 N.m (16 lb ft)
7. Install **Front Wheel Drive Intermediate Shaft Replacement (LE2 with MNH)**
8. Lower the vehicle. **Lifting and Jacking the Vehicle**

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BRACKET REPLACEMENT (LE2 WITH MNH, FWD)

Removal Procedure

1. Raise and support the vehicle. **Lifting and Jacking the Vehicle**
2. Remove Front Wheel Drive Shaft@Right Side **Front Wheel Drive Shaft Replacement - Right Side**

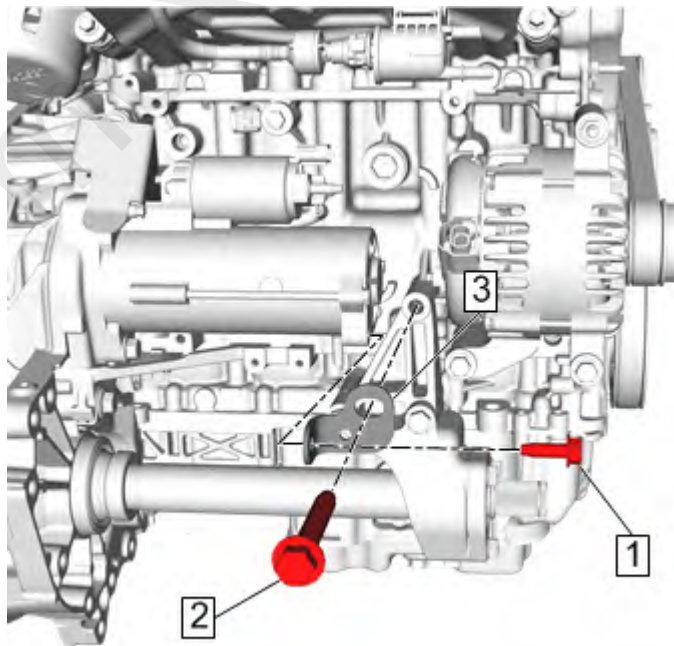


Fig. 9: Starter Bracket

Courtesy of GENERAL MOTORS COMPANY

3. Remove Starter bracket bolt (1)
4. Remove Intermediate Shaft Bracket Bolt (2)
5. Remove the starter bracket.(3)

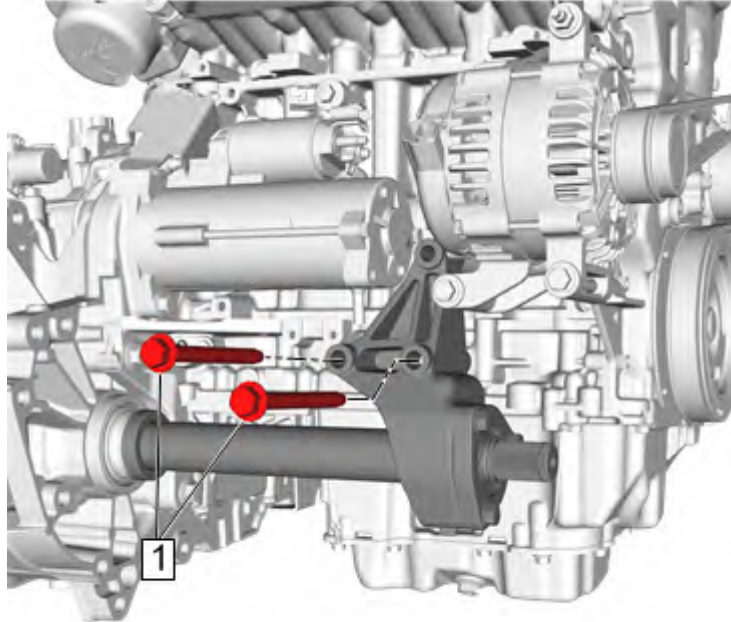


Fig. 10: Intermediate Shaft Bracket Bolt
 Courtesy of GENERAL MOTORS COMPANY

6. Remove Intermediate Shaft Bracket Bolt (1)

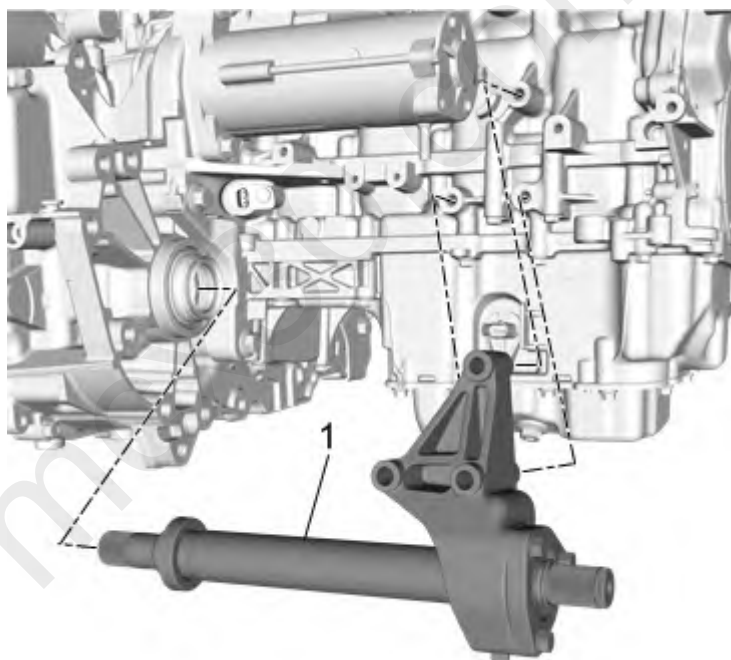


Fig. 11: Intermediate Shaft and Bracket
 Courtesy of GENERAL MOTORS COMPANY

7. Remove Intermediate Shaft and Bracket (1)

Installation Procedure

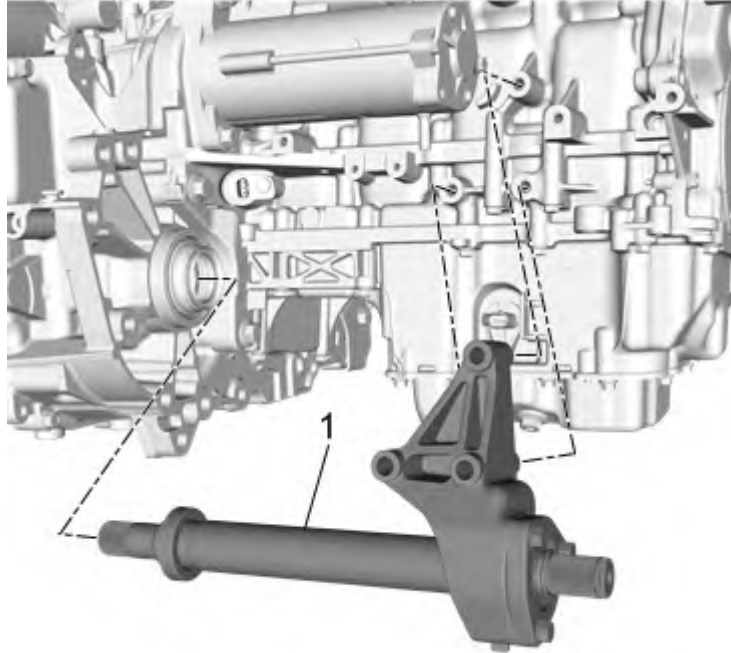


Fig. 12: Intermediate Shaft and Bracket

Courtesy of GENERAL MOTORS COMPANY

1. Install Intermediate Shaft and Bracket (1)

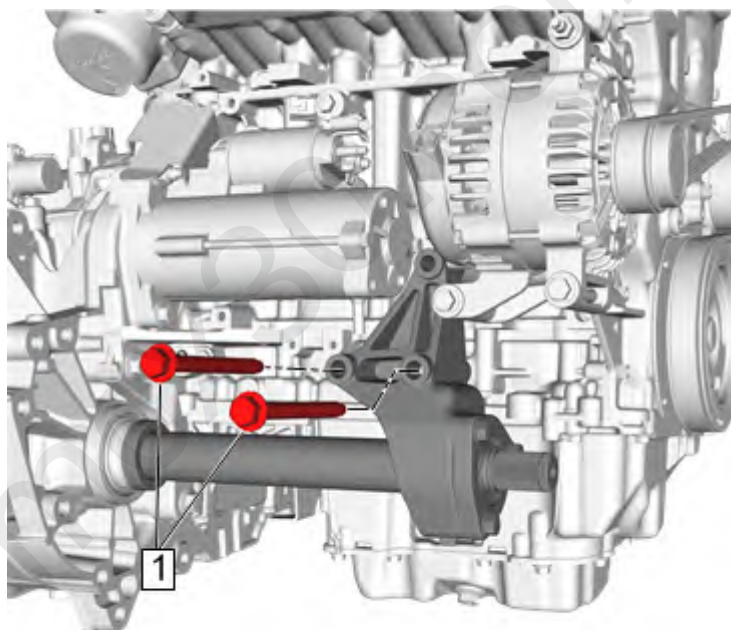


Fig. 13: Intermediate Shaft Bracket Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

2. Install Intermediate Shaft Bracket Bolt (1) and tighten 58 N.m (43 lb ft)

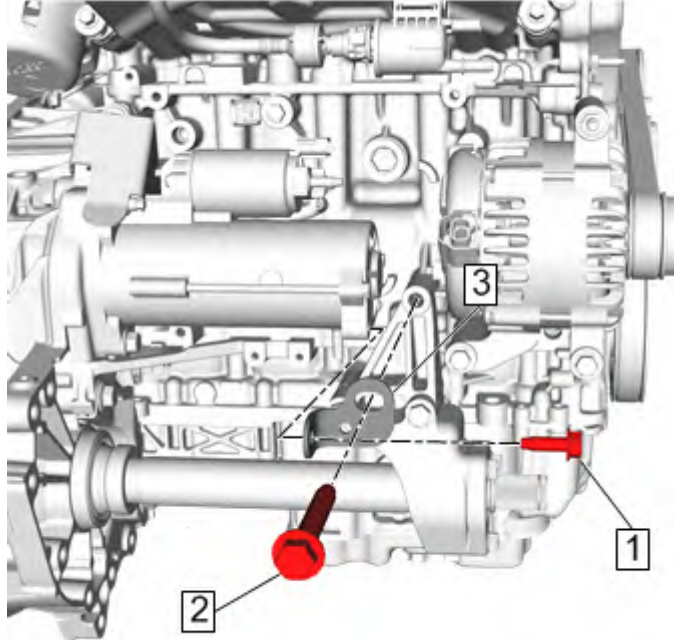


Fig. 14: Starter Bracket

Courtesy of GENERAL MOTORS COMPANY

3. Install the starter bracket.(3)
4. Install Intermediate Shaft Bracket Bolt (2) and tighten 58 N.m (43 lb ft)
5. Install Starter bracket bolt (1) and tighten 22 N.m (16 lb ft)
6. Install Front Wheel Drive Shaft@Right Side [Front Wheel Drive Shaft Replacement - Right Side](#)
7. Lower the vehicle. [Lifting and Jacking the Vehicle](#)

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BRACKET REPLACEMENT (LUV WITH MR5)

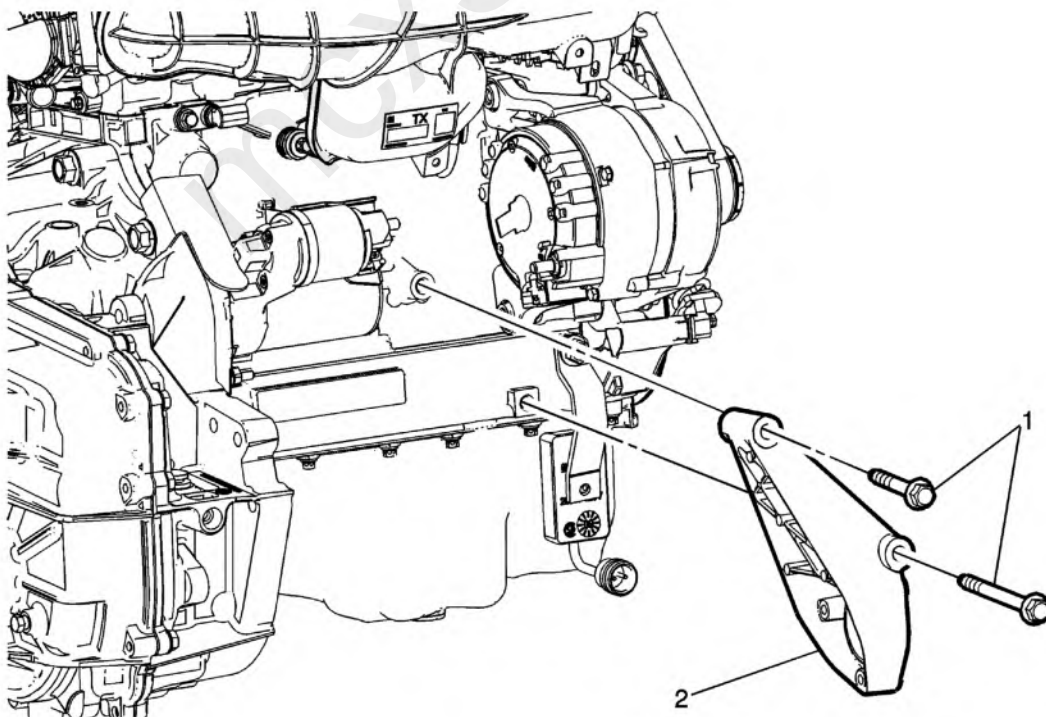


Fig. 15: Front Wheel Drive Intermediate Shaft Bracket (LUV with MH8 or MH5)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
Preliminary Procedure Remove the front wheel drive intermediate shaft. Refer to Front Wheel Drive Intermediate Shaft Replacement (LUV with MR5) .	
1	Front Wheel Drive Shaft Bracket Fasteners (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 58 N.m (43 lb ft)
2	Front Wheel Drive Intermediate Shaft Bracket

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BEARING REPLACEMENT (LUV WITH MH8 OR MH5)

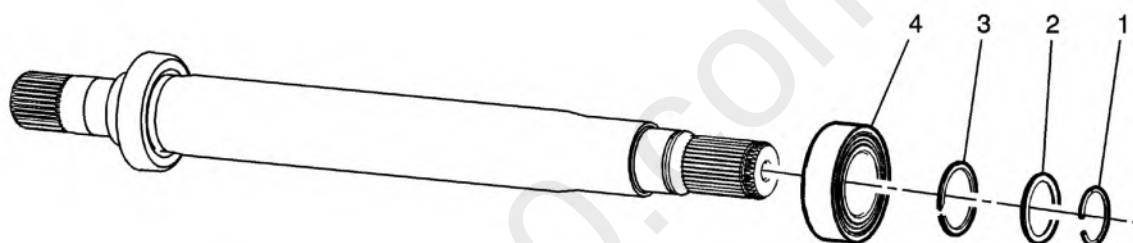


Fig. 16: Front Wheel Drive Intermediate Shaft Bearing (LUV with MH8 or MH5)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front wheel drive intermediate shaft. Refer to Front Wheel Drive Intermediate Shaft Replacement (LUV with MR5) .	
1	Front Wheel Drive Shaft Retainer Procedure Remove and discard, replace with NEW only.
2	Front Wheel Drive Shaft Seal
3	Front Wheel Drive Intermediate Shaft Bearing Retainer
4	Front Wheel Drive Intermediate Shaft Bearing Procedure Using a hydraulic press and appropriate adaptors, press the bearing off of the front wheel drive intermediate shaft.

FRONT WHEEL DRIVE SHAFT REPLACEMENT - LEFT SIDE

Special Tools

- **DT-51504** Seal Protector
- **J-45859** Hub Spindle Remover

Equivalent regional tools: [Special Tools](#)

Removal Procedure

1. Remove the left front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
2. Remove the front compartment front center insulator, if equipped. [Front Compartment Front Center Insulator Replacement](#)

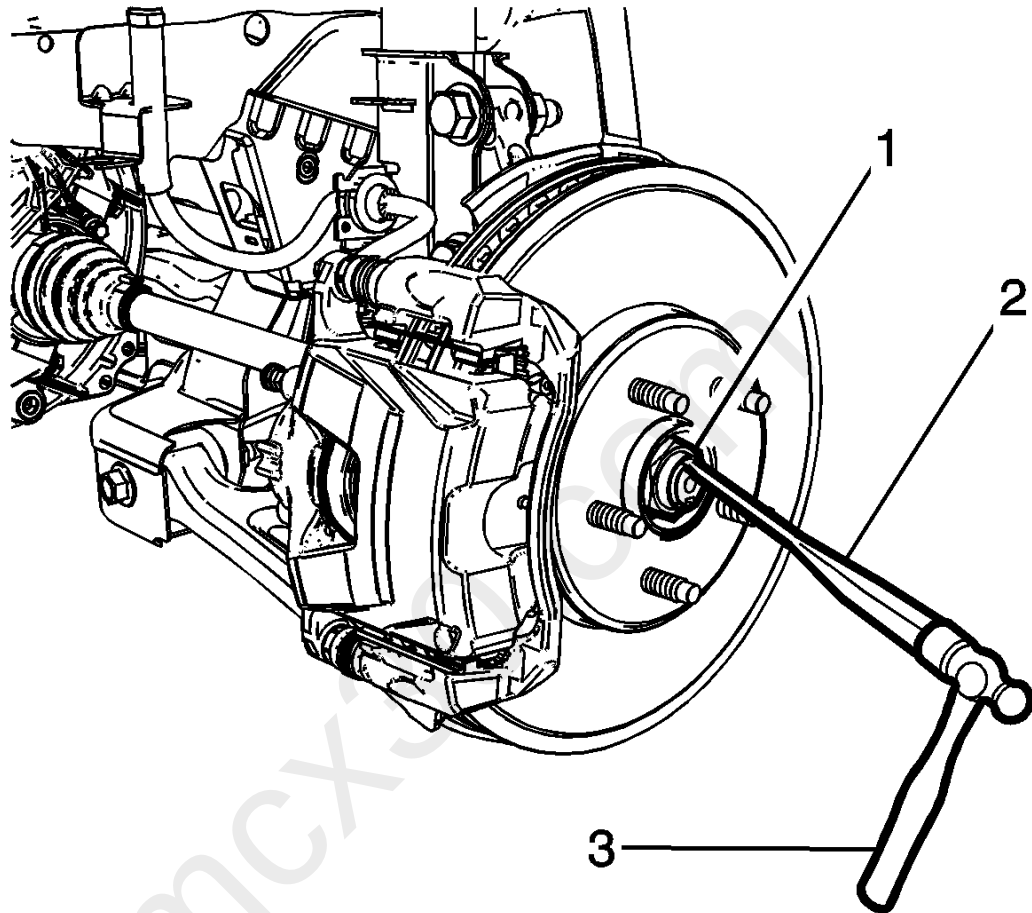


Fig. 17: Removing Stake From Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS COMPANY

3. Using a suitable tool (2) and a hammer (3), remove the stake from the wheel drive shaft nut (1).
4. With the aid of an assistant holding the brake pedal down, use a breaker bar and the proper size socket to loosen the wheel drive shaft nut.

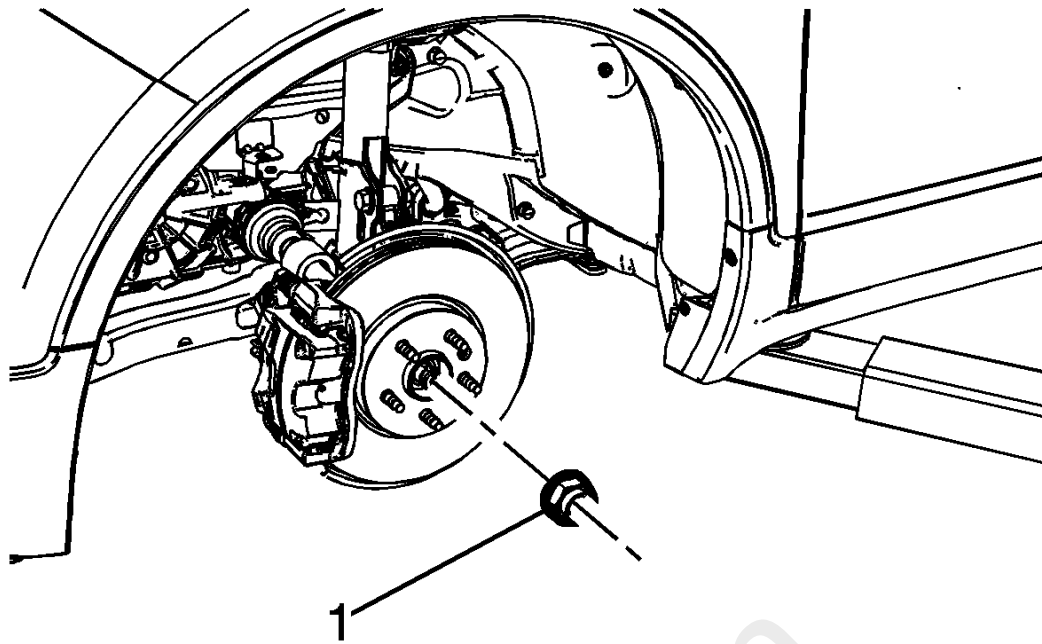


Fig. 18: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove and DISCARD the wheel drive shaft nut (1).
6. Remove and relocate the front brake caliper assembly. [Front Brake Caliper Replacement](#)

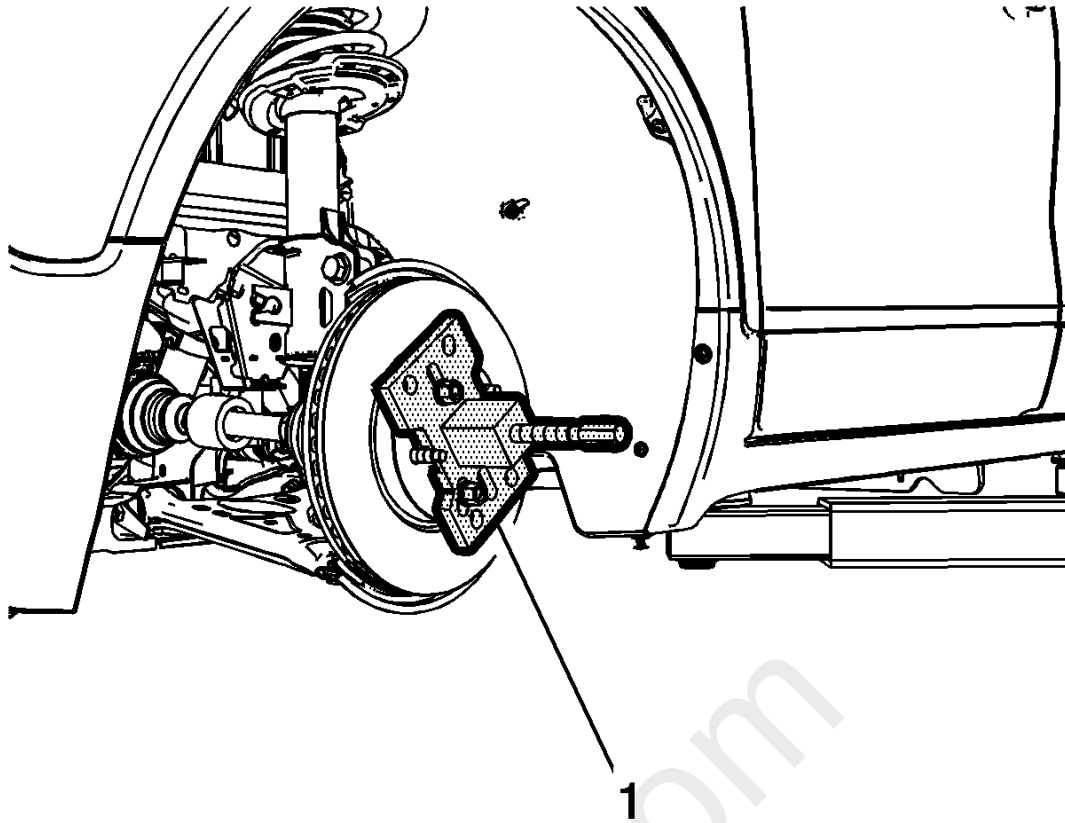


Fig. 19: Wheel Drive Shaft Removal Tool

Courtesy of GENERAL MOTORS COMPANY

7. Using the **J-45859** remover (1), separate the wheel drive shaft from the front wheel bearing/hub assembly.
8. Remove the stabilizer shaft link from the front strut. [Stabilizer Shaft Link Replacement](#)
9. Remove the outer tie rod end from the steering knuckle. [Steering Linkage Outer Tie Rod Replacement](#)
10. Remove the lower control arm bolt from the steering knuckle. [Lower Control Arm Replacement](#)

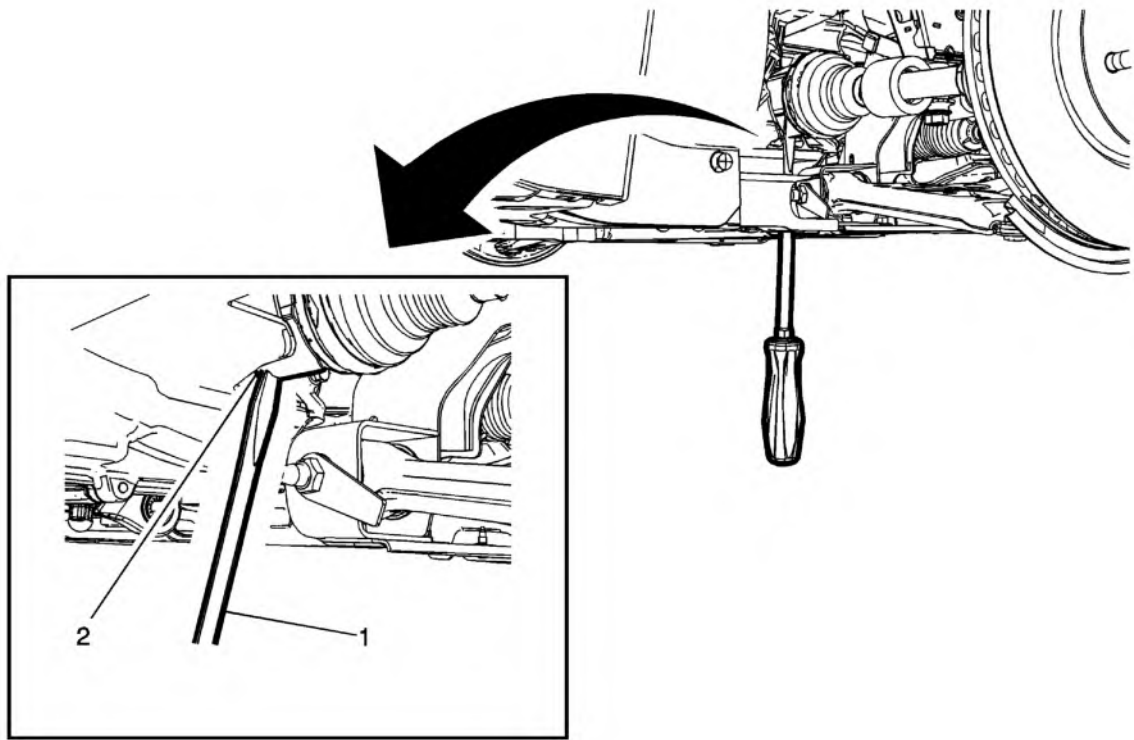


Fig. 20: Positioning Screw Driver Against Tripot Housing
 Courtesy of GENERAL MOTORS COMPANY

11. Use a suitable flat bladed tool (1) to dislodge the wheel drive shaft (2) from the transmission.

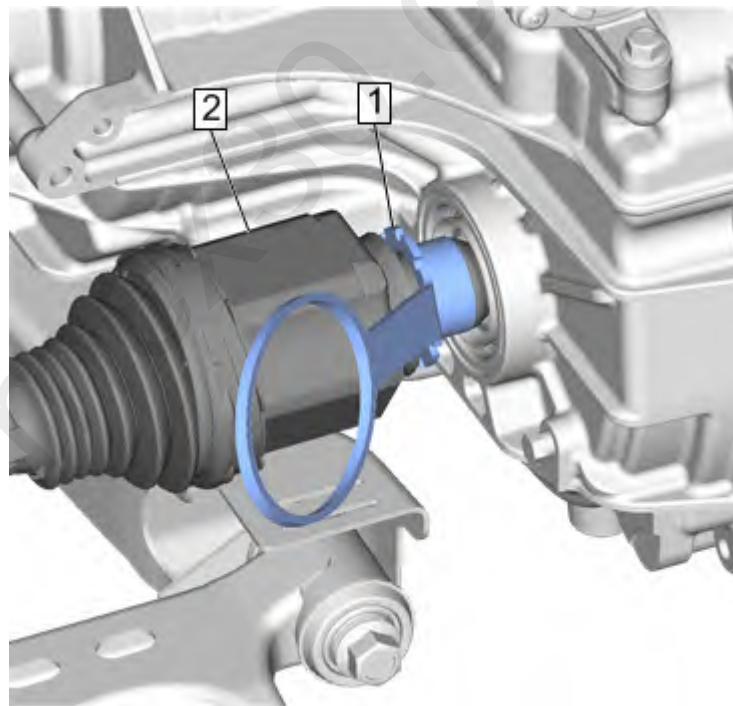


Fig. 21: Seal Protector
 Courtesy of GENERAL MOTORS COMPANY

CAUTION: DT-51504 must be installed into the differential output shaft seal prior to removing and installing the wheel drive shaft. Failure to install the DT-51504 as indicated may cause the splines of the wheel drive shaft to damage the differential output seal

12. Remove the wheel drive shaft enough so the **DT-51504** Seal Protector (1) can be installed over the inboard CV joint (2).
13. Slide the **DT-51504** Seal Protector into the transmission.

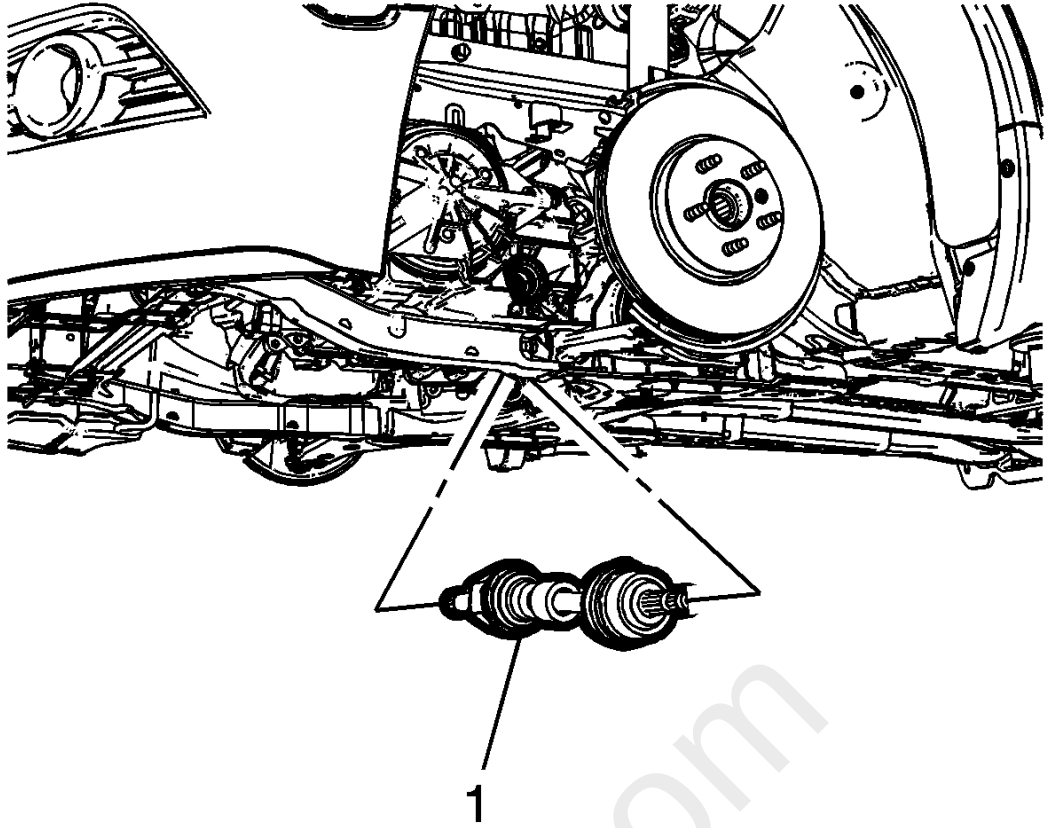


Fig. 22: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

14. Remove the wheel drive shaft (1) from the vehicle.

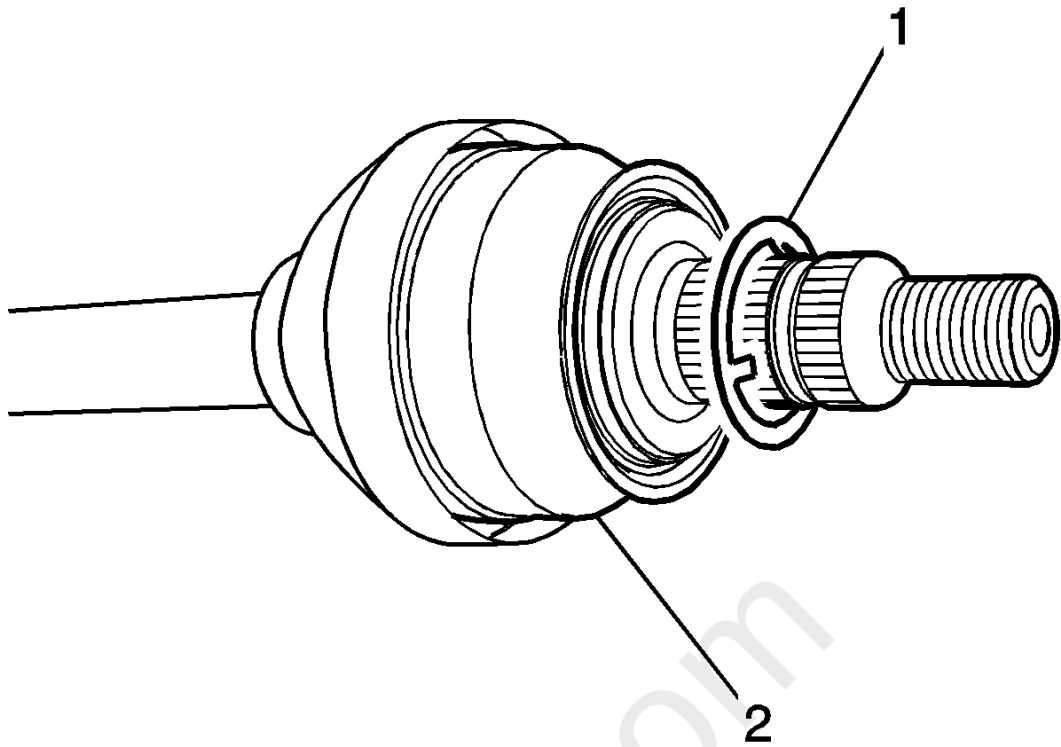


Fig. 23: Wheel Drive Shaft & Washer
Courtesy of GENERAL MOTORS COMPANY

NOTE: If there is no washer on the wheel drive shaft, install a NEW washer.

15. Remove and DISCARD the washer (1) from the wheel drive shaft (2).



Fig. 24: Wheel Drive Shaft Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

16. Remove and DISCARD the wheel drive shaft retaining ring (1).



Fig. 25: Wheel Drive Shaft Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW wheel drive shaft retaining ring (1).

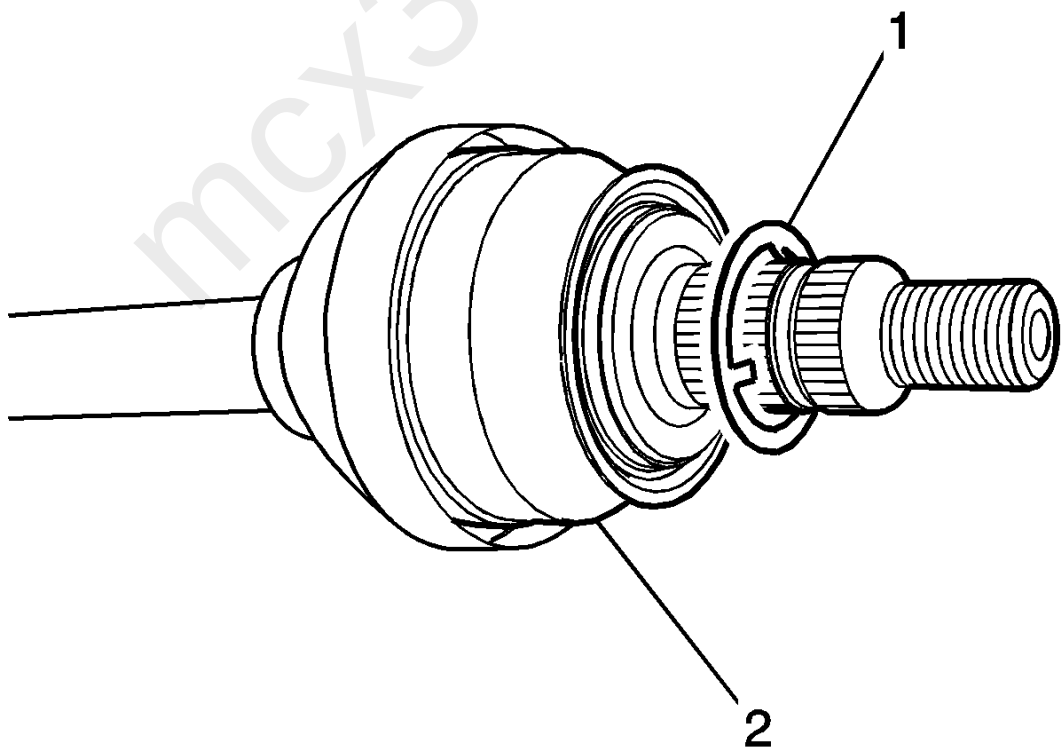


Fig. 26: Wheel Drive Shaft & Washer
Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW washer (1) onto the wheel drive shaft (2).

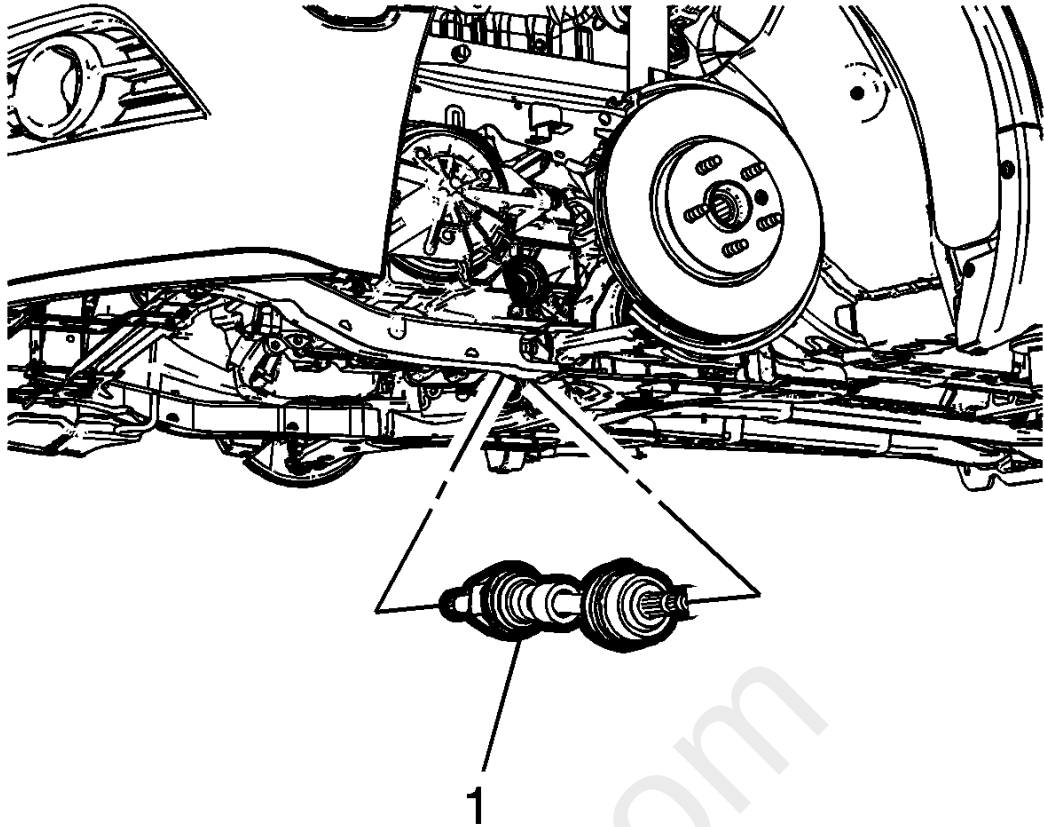


Fig. 27: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

3. Install the wheel drive shaft (1).

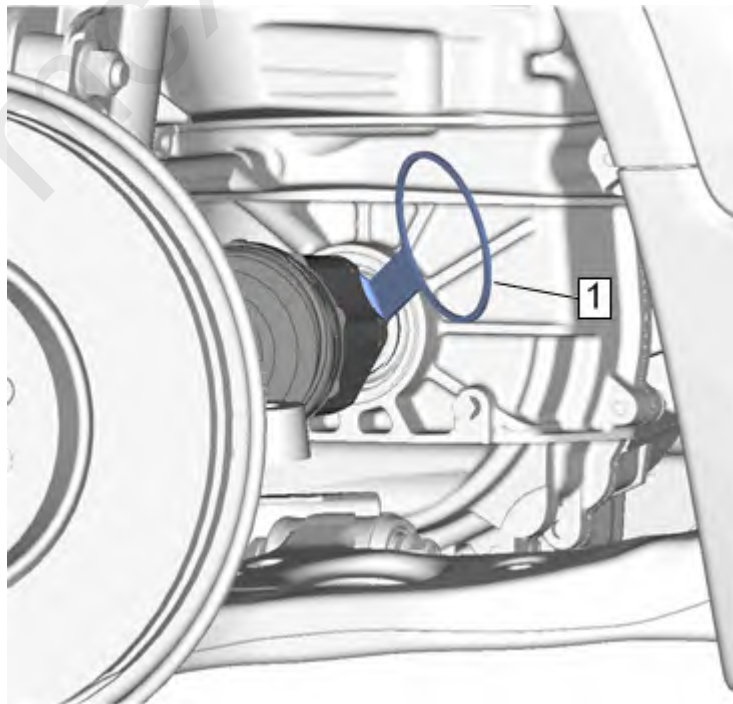


Fig. 28: Seal Protector

Courtesy of GENERAL MOTORS COMPANY

CAUTION: DT-51504 must be installed into the differential output shaft seal prior to removing and installing the wheel drive shaft. Failure to install the

DT-51504 as indicated may cause the splines of the wheel drive shaft to damage the differential output seal

- Carefully install the wheel drive shaft into the transmission until the splines are past the **DT-51504** Seal Protector (1).

NOTE: Ensure that the wheel drive shaft is fully seated in the transmission.

- Install the wheel drive shaft until the wheel drive shaft splines are past the axle seal.
- Remove the **DT-51504** Seal Protector from the wheel drive shaft.
- Install the wheel drive shaft to the front wheel hub/bearing.
- Install the lower control arm ball joint bolt to the steering knuckle. [Lower Control Arm Replacement](#)
- Install the stabilizer shaft link to the front strut. [Stabilizer Shaft Link Replacement](#)
- Install the outer tie rod to the steering knuckle. [Steering Linkage Outer Tie Rod Replacement](#)
- Install the front brake caliper assembly. [Front Brake Caliper Replacement](#)

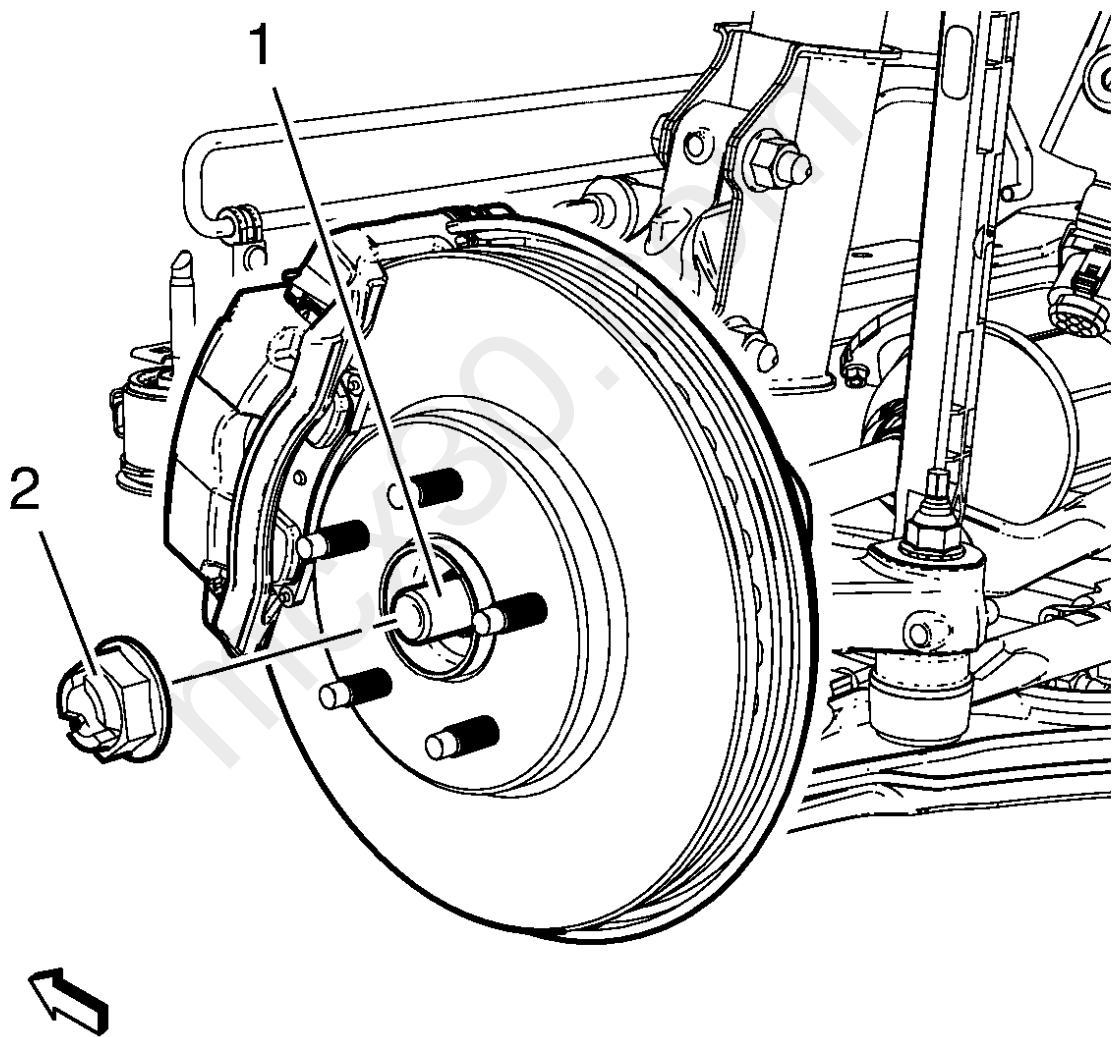


Fig. 29: Wheel Drive Shaft And Nut

Courtesy of GENERAL MOTORS COMPANY

- Install the NEW wheel drive shaft nut (2) to the wheel drive shaft spindle (1).

CAUTION: Refer to [Fastener Caution](#) .

- With the aid of an assistant holding the brake pedal down, use a breaker bar and the proper size socket to tighten the wheel drive shaft nut.

Tighten

- First Pass 50 N.m (37 lb ft)
- Final Pass plus 60 degrees

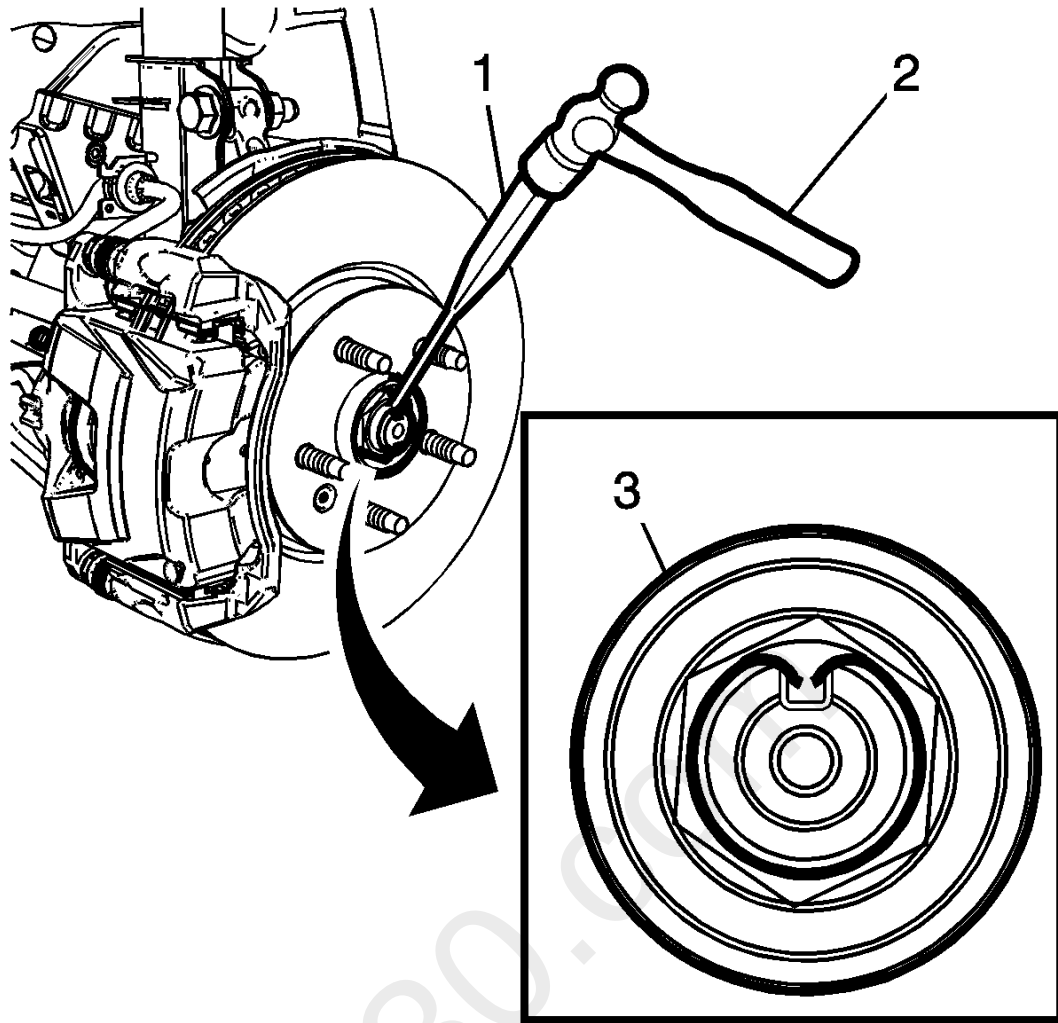


Fig. 30: Splitting Center Of Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

NOTE: Evenly split the center of the wheel drive shaft nut (3) and ensure that it is fully staked. Each side of the stake should be in contact and approximately 45 degrees to each side of the slot in the wheel drive shaft.

14. Using the punch (1) and the hammer (2), stake the wheel drive shaft nut (3) collar into the slot on the wheel drive shaft.

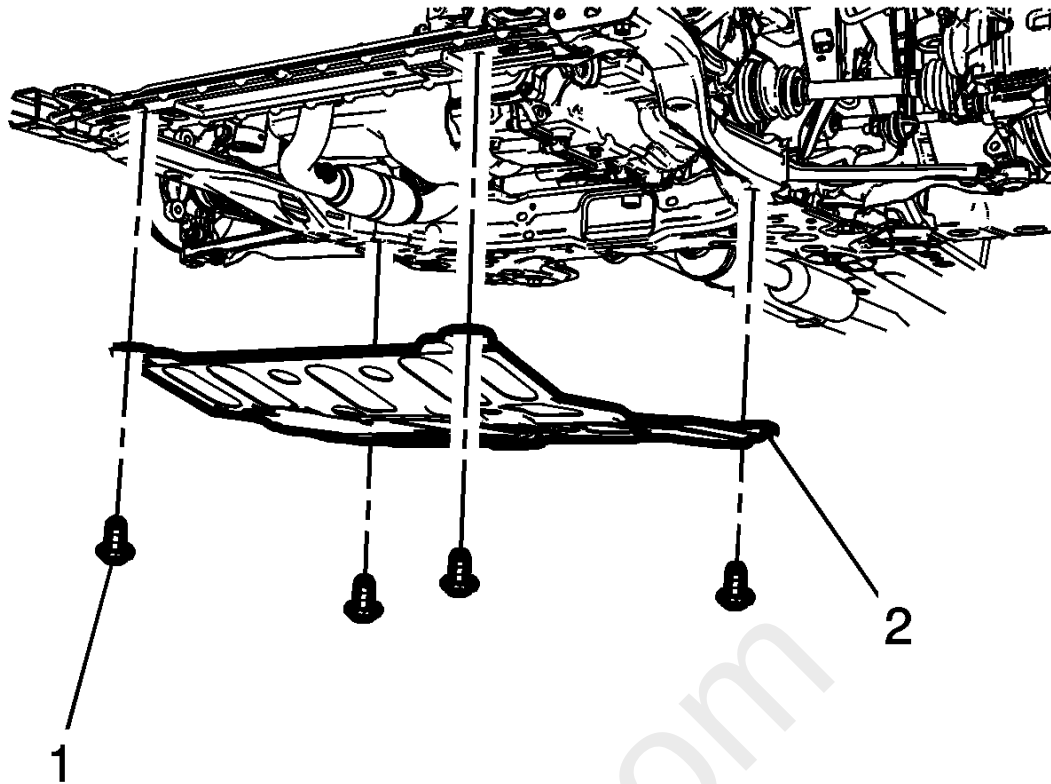


Fig. 31: Front Suspension Skid Plate & Bolts

Courtesy of GENERAL MOTORS COMPANY

15. Install the front suspension skid plate (2).
16. Install the front compartment front center insulator, if equipped. [Front Compartment Front Center Insulator Replacement](#)
17. Install the tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

FRONT WHEEL DRIVE SHAFT REPLACEMENT - RIGHT SIDE

Special Tools

- CH-49376 Holding Wrench
- CH-49400 Hub Spindle Remover
- EN-956-1 Extension

Equivalent regional tools: [Special Tools](#)

Removal Procedure

1. Remove the right front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
2. Remove Front Compartment Insulator - [Front Compartment Front Center Insulator Replacement](#)

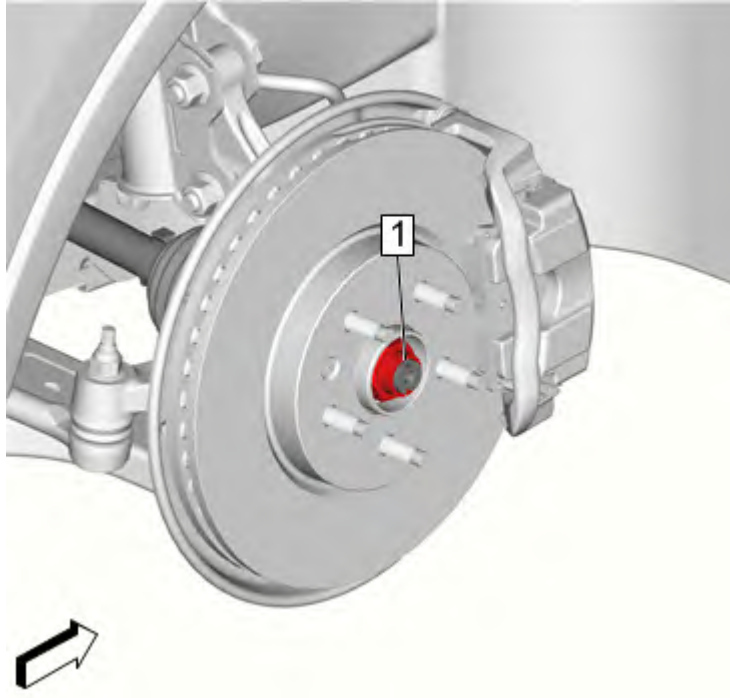


Fig. 32: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Make sure that the wheel drive shaft nut is fully un-staked to avoid damage to the wheel drive shaft threads during the removal of the wheel drive shaft nut. Failure to follow these instructions could result in wheel, nut, and/or stud damage.

3. Using a suitable tool and a hammer, remove the stake from the wheel drive shaft nut (1).

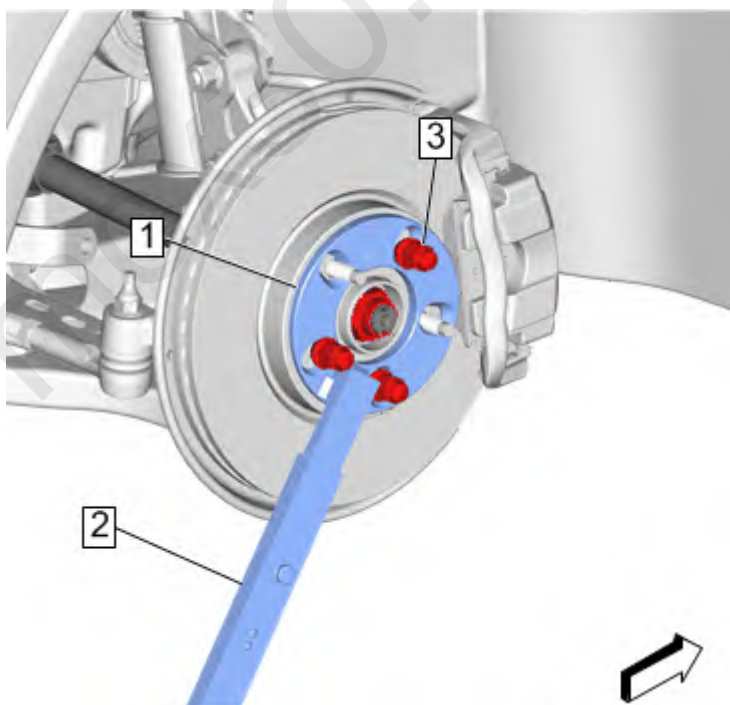


Fig. 33: Wrench And Extension

Courtesy of GENERAL MOTORS COMPANY

4. Install the **CH-49376** wrench (1) and the **EN-956-1** extension (2) to the hub using the wheel nuts (3).

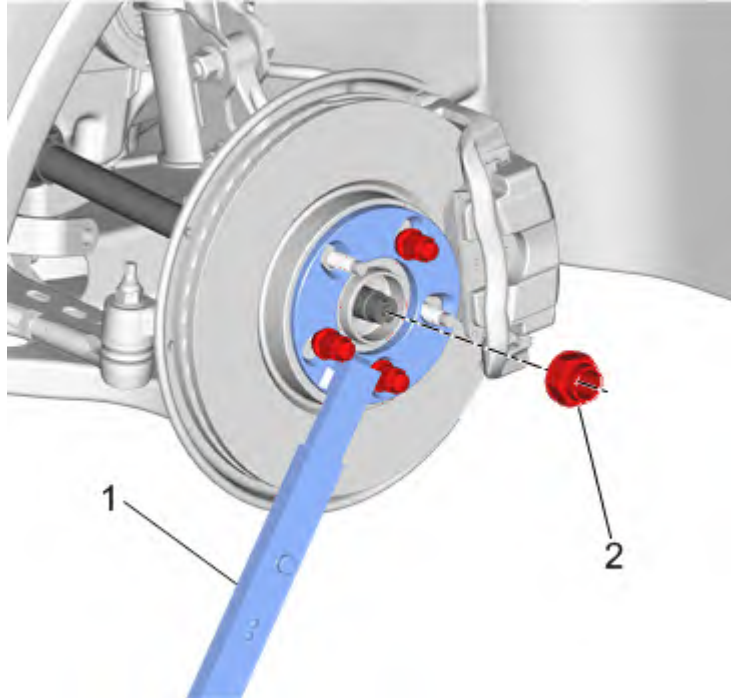


Fig. 34: Holding Wheel Hub

Courtesy of GENERAL MOTORS COMPANY

5. Hold the wheel hub using the **CH-49376** wrench (1) and remove the wheel drive shaft nut (2). DISCARD the nut.
6. Separate Stabilizer Shaft Link@ Front Suspension Strut - [Stabilizer Shaft Link Replacement](#)
7. Separate Steering Linkage Outer Tie Rod@Steering Knuckle - [Steering Linkage Outer Tie Rod Replacement](#)
8. Separate Lower Control Arm@Steering Knuckle - [Lower Control Arm Replacement](#)

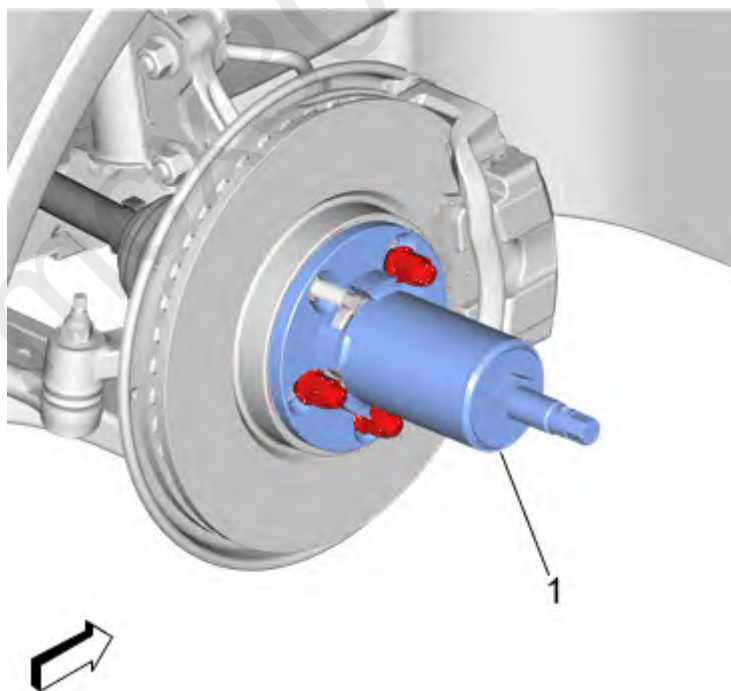


Fig. 35: Wheel Drive Shaft Separator

Courtesy of GENERAL MOTORS COMPANY

9. Using the **DT-49400** remover (1), separate the wheel drive shaft from the front wheel bearing/hub.

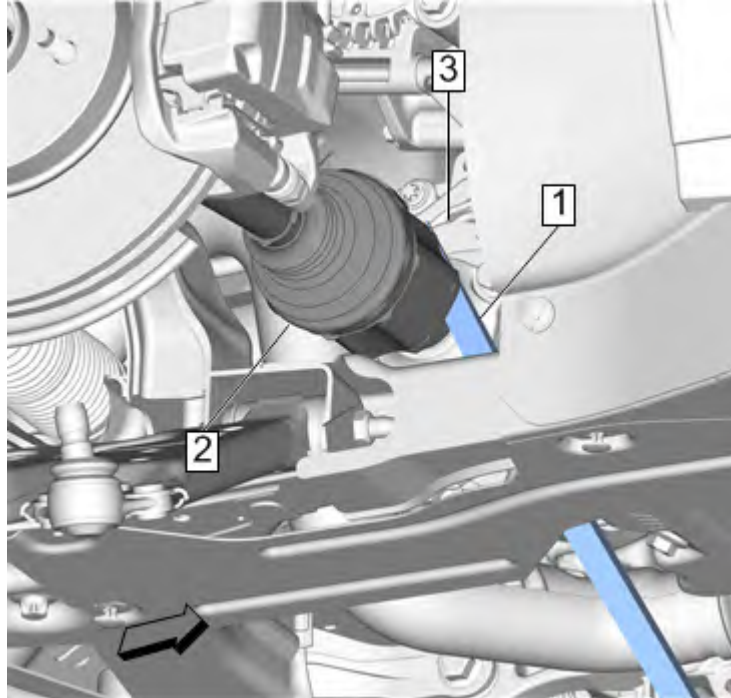


Fig. 36: Separating Wheel Drive Shaft From Intermediate Shaft Or Power Transfer Unit
Courtesy of GENERAL MOTORS COMPANY

10. Using a suitable flat bladed tool (1), separate the wheel drive shaft (2) from the intermediate shaft or power transfer unit (3).

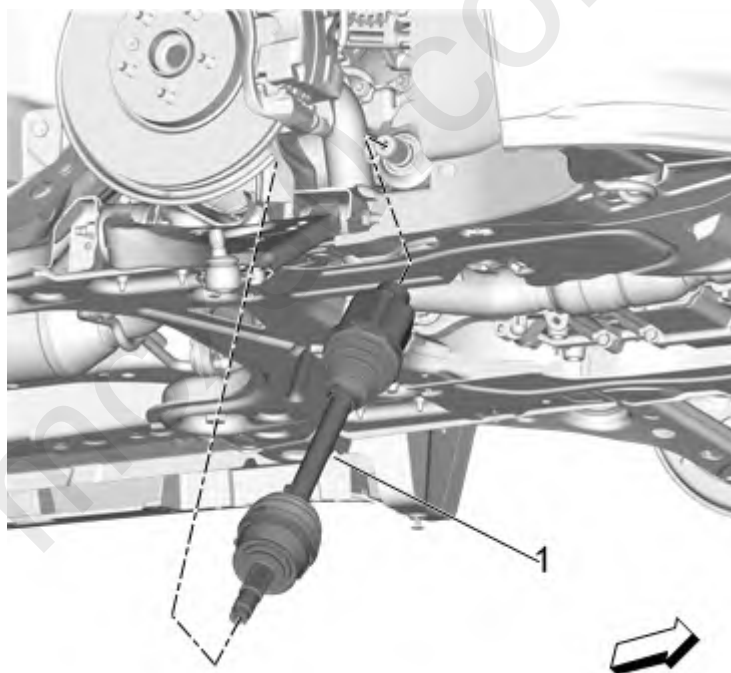


Fig. 37: Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

11. Remove Wheel Drive Shaft (1)

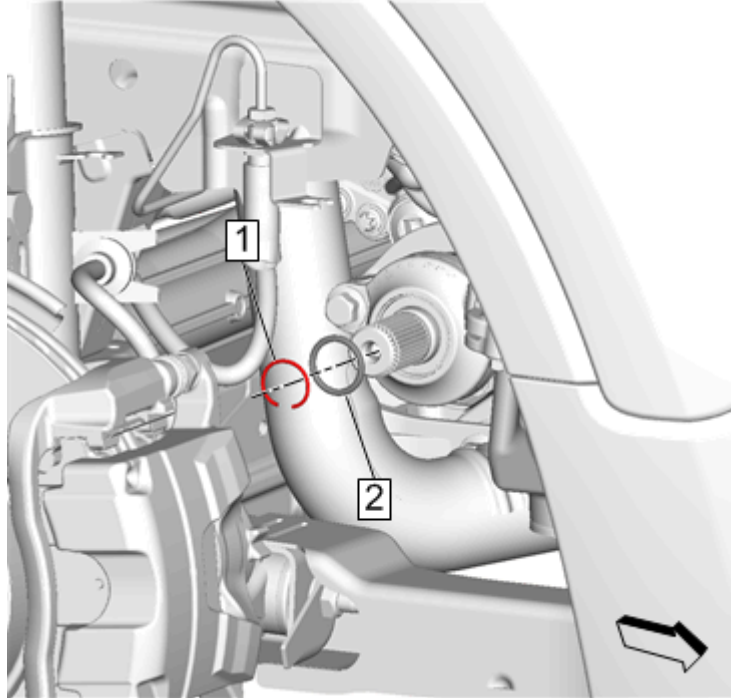


Fig. 38: Retaining Ring And O-Ring

Courtesy of GENERAL MOTORS COMPANY

12. Remove Retaining Ring (1) @Power Transfer Unit and DISCARD
13. Remove O-Ring (2) @Power Transfer Unit and DISCARD

Installation Procedure

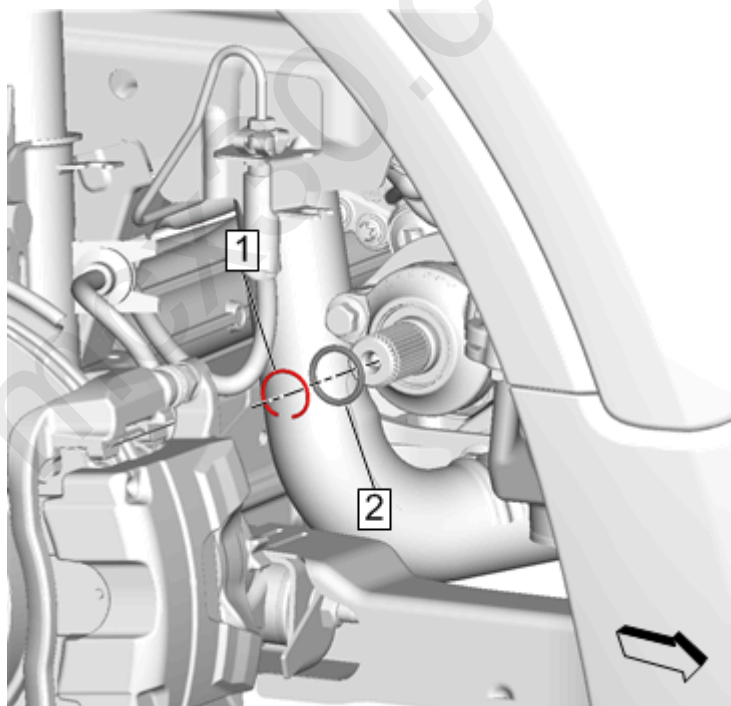


Fig. 39: Retaining Ring And O-Ring

Courtesy of GENERAL MOTORS COMPANY

1. Install A New O-Ring (2) @Power Transfer Unit.
2. Install a NEW Retaining Ring (1) @Power Transfer Unit.

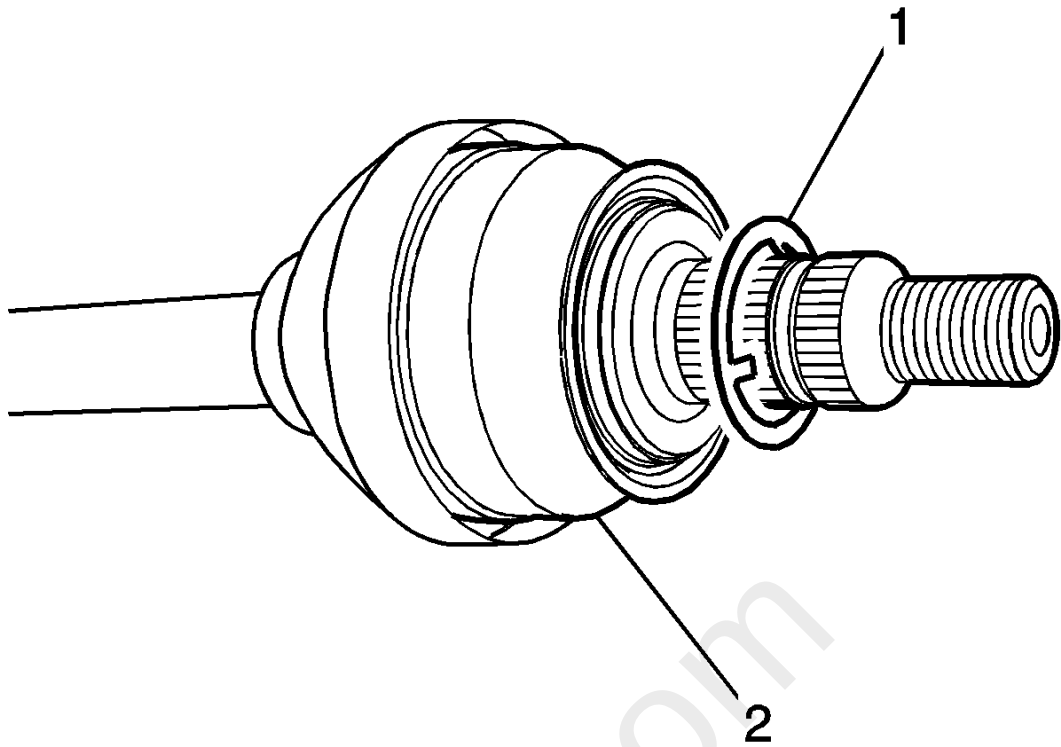


Fig. 40: Wheel Drive Shaft & Washer

Courtesy of GENERAL MOTORS COMPANY

NOTE: If there is not a washer on the wheel drive shaft, install a **NEW** washer.

3. Remove and discard the washer (1) from the wheel drive shaft (2). Install a **NEW** washer. Do **NOT** reuse the old washer.

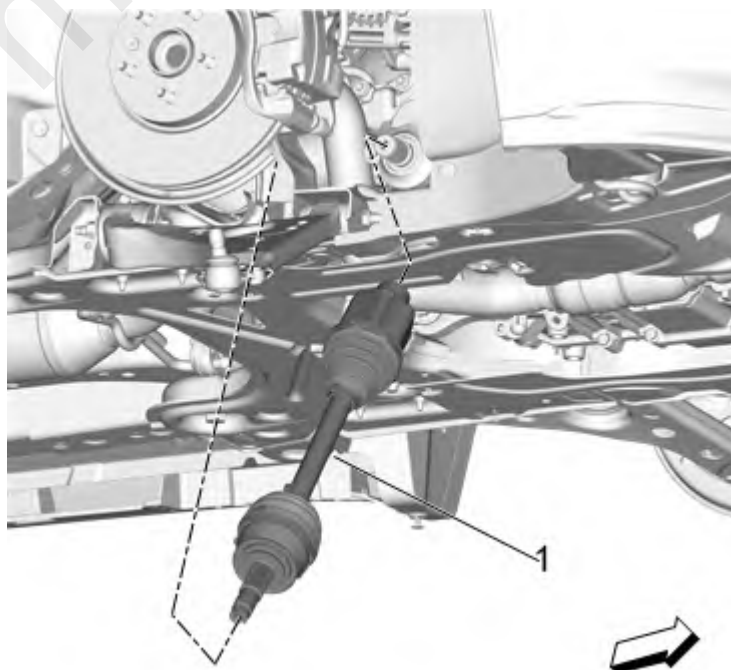


Fig. 41: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

4. Install Wheel Drive Shaft (1)
5. Install the wheel drive shaft until it is fully seated on the intermediate shaft or the power transfer unit.
6. Install the wheel drive shaft to the front wheel hub/bearing.
7. Install Lower Control Arm@Steering Knuckle - [Lower Control Arm Replacement](#)
8. Install Stabilizer Shaft Link@ Front Suspension Strut- [Stabilizer Shaft Link Replacement](#)
9. Install Steering Linkage Outer Tie Rod@Steering Knuckle - [Steering Linkage Outer Tie Rod Replacement](#)

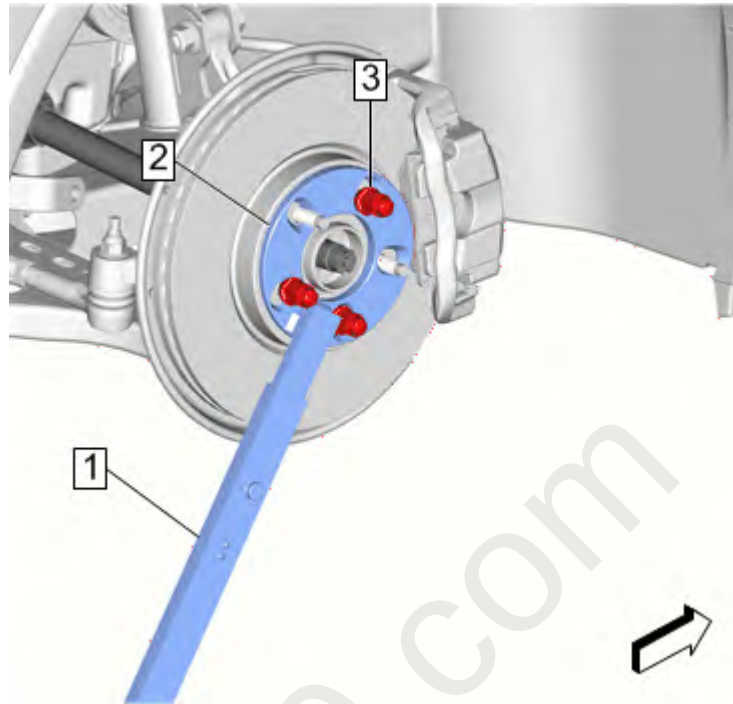


Fig. 42: Wrench Installed

Courtesy of GENERAL MOTORS COMPANY

10. Install the **CH-49376** wrench (2) and the **EN-956-1** extension (1) to the hub using the wheel nuts (3).

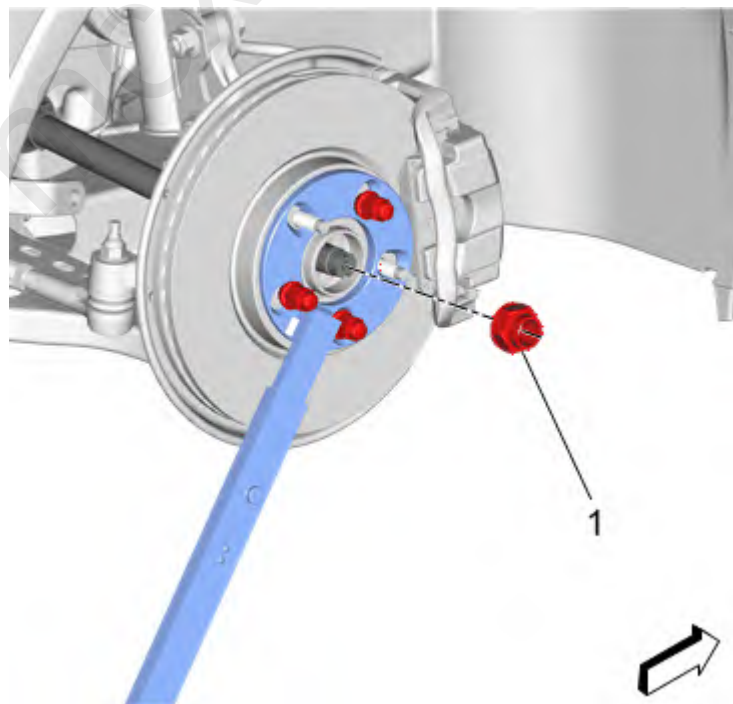


Fig. 43: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

11. Install a New Wheel Drive Shaft Nut (1)

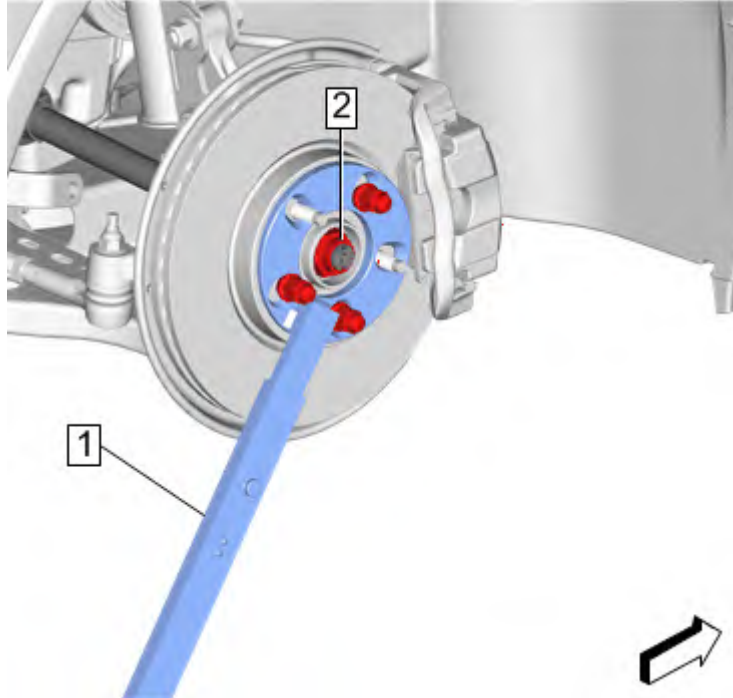


Fig. 44: Wrench And Nut

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

12. Hold the wheel hub using the **CH-49376** wrench (1) and tighten the wheel drive shaft nut (2).

Tighten

1. First Pass: 50 N.m (37 lb ft)
 2. Final Pass: 60 degrees
13. Remove the **CH-49376** wrench and the **EN-956-1** extension from the wheel hub.

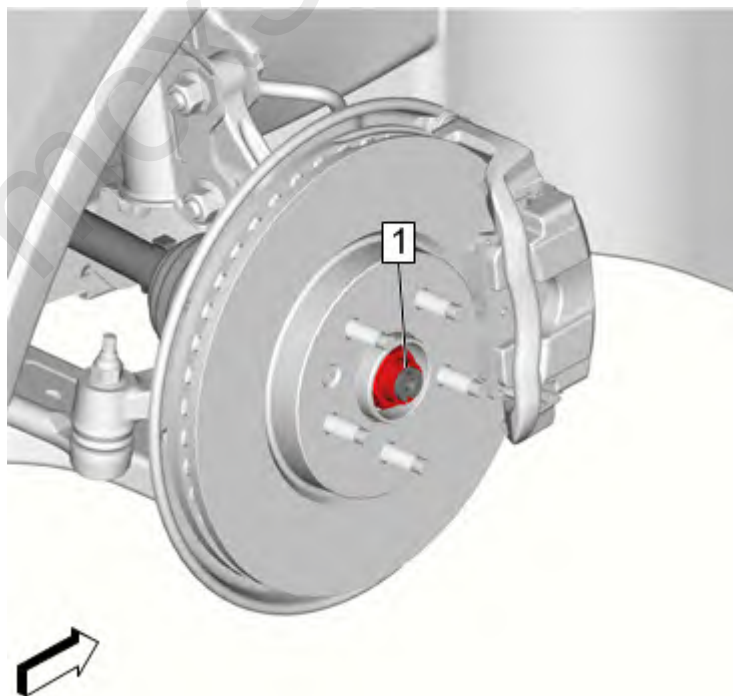


Fig. 45: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

NOTE: Evenly split the center of the wheel drive shaft nut (1) and ensure that it is fully staked. Each side of the stake should be in contact and approximately 45 degrees to each side of the slot in the wheel drive shaft.

14. Using a punch and a hammer, stake the wheel drive shaft nut (1) collar into the slot on the wheel drive shaft.
15. Install Front Compartment Insulator - [Front Compartment Front Center Insulator Replacement](#)
16. Install the right front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

REAR WHEEL DRIVE SHAFT REPLACEMENT

Special Tools

CH-45859 Axle Remover

For regional equivalent tools, refer to [Special 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](#) .

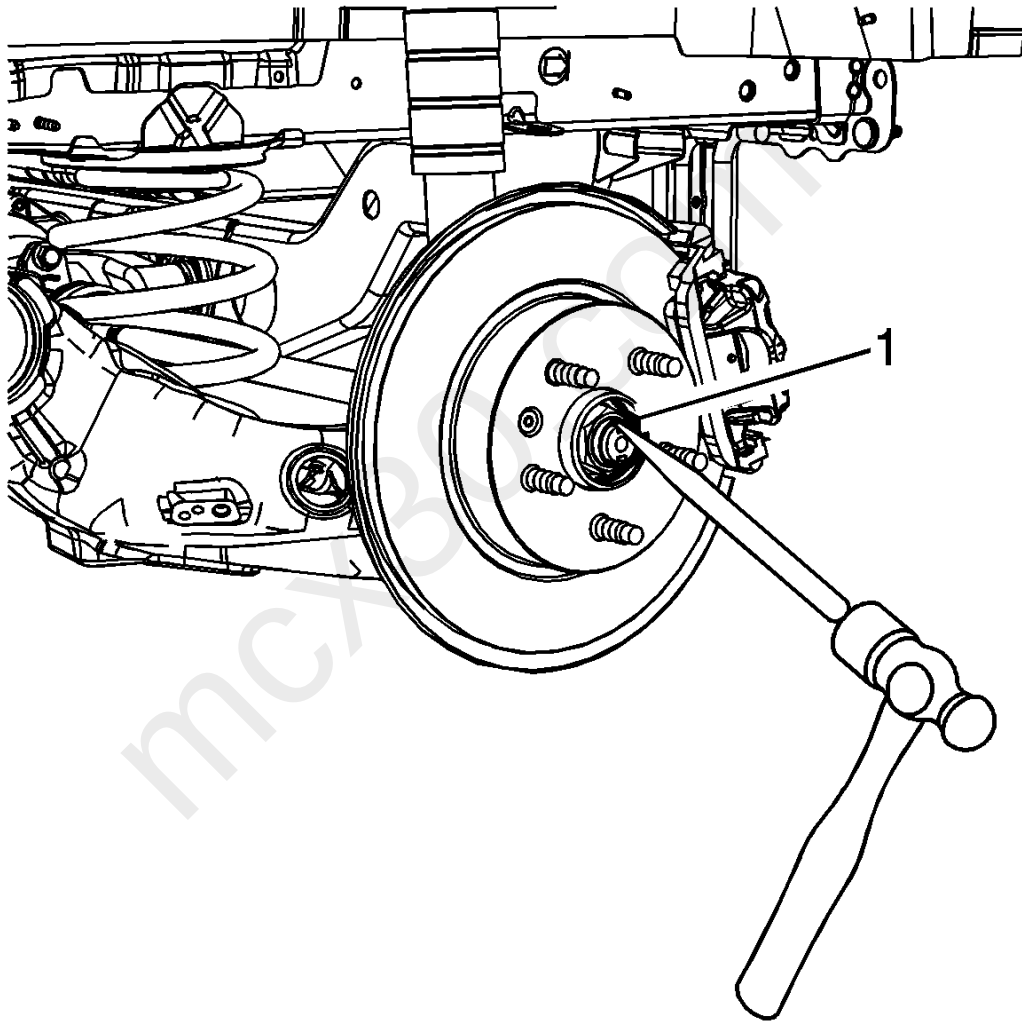


Fig. 46: Removing Stake From Rear Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

3. Using a hammer and a punch, remove the stake (1) from the rear wheel drive shaft.
4. With the aid of an assistant, apply the brakes.

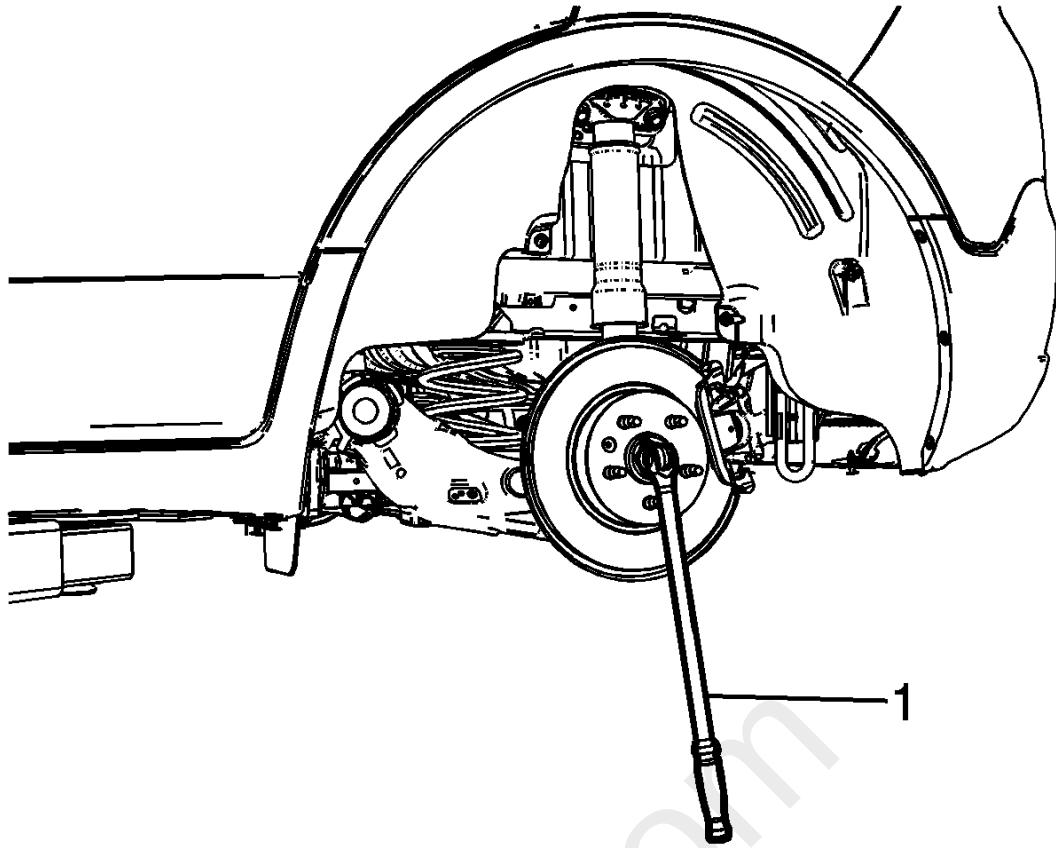


Fig. 47: Loosening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Make sure that the wheel drive shaft nut is fully un-staked to avoid damage to the wheel drive shaft threads during the removal of the wheel drive shaft nut. Failure to follow these instructions could result in wheel, nut, and/or stud damage.

5. Using a breaker bar and the proper size socket (1), loosen the wheel drive shaft nut.
6. Remove and relocate the rear brake caliper assembly. Refer to [Rear Brake Caliper Replacement](#)

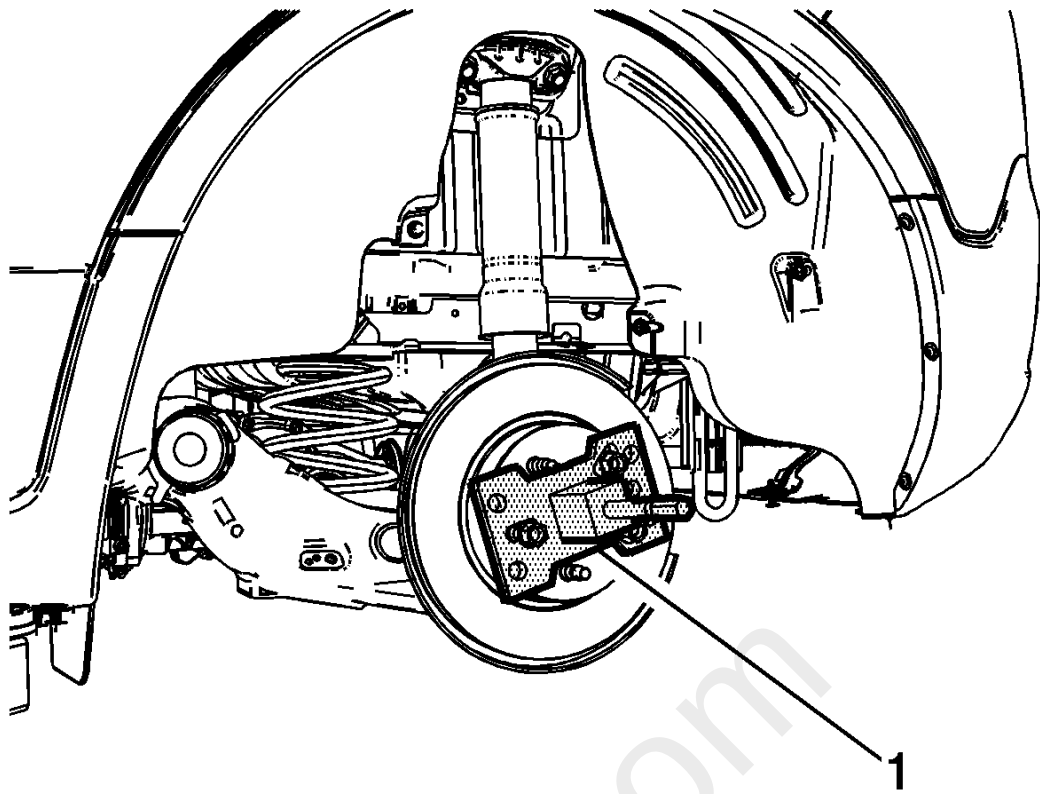


Fig. 48: Separating Wheel Drive Shaft From Wheel Bearing/Hub

Courtesy of GENERAL MOTORS COMPANY

7. Using the **CH-45859** remover (1), separate the wheel drive shaft from the wheel bearing/hub assembly.

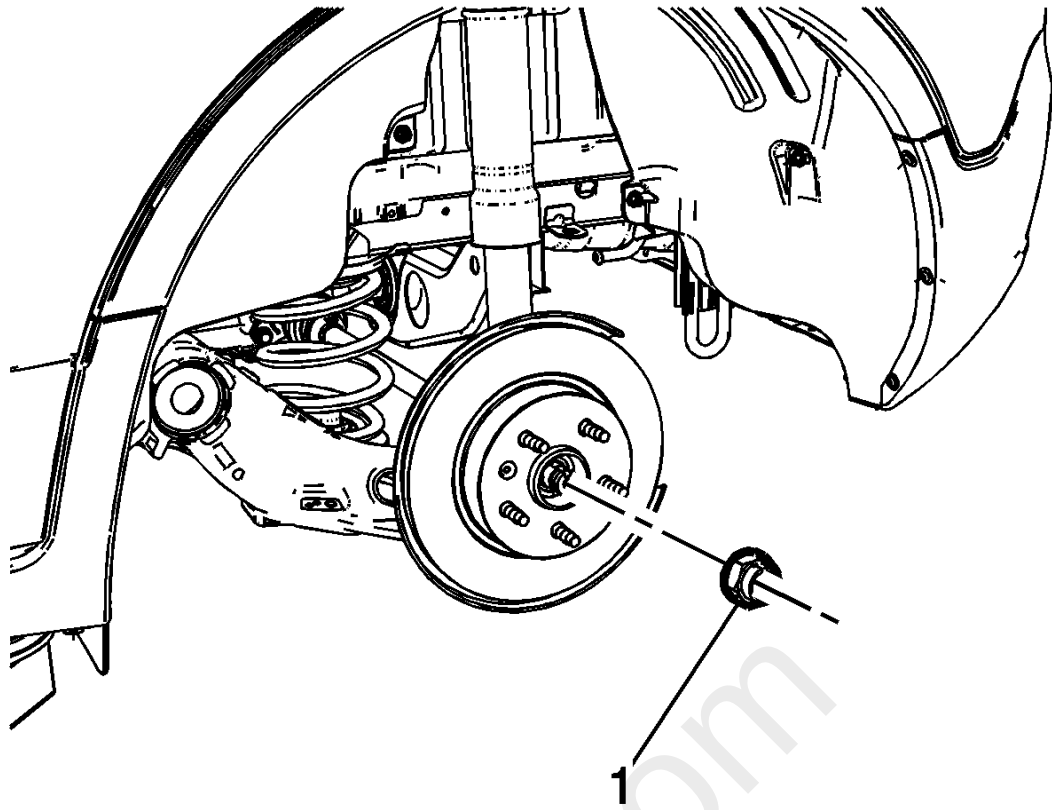


Fig. 49: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

8. Remove and discard the wheel drive shaft nut (1) from the wheel drive shaft. Replace with NEW nut only.

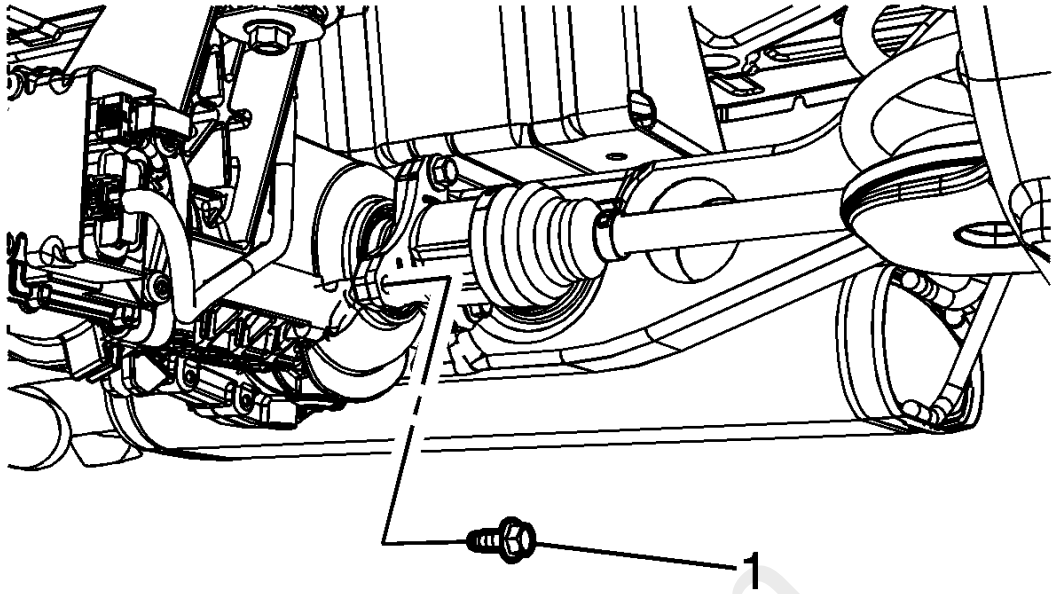


Fig. 50: Wheel Drive Shaft Bolts

Courtesy of GENERAL MOTORS COMPANY

9. Remove the 3 wheel drive shaft bolts (1).

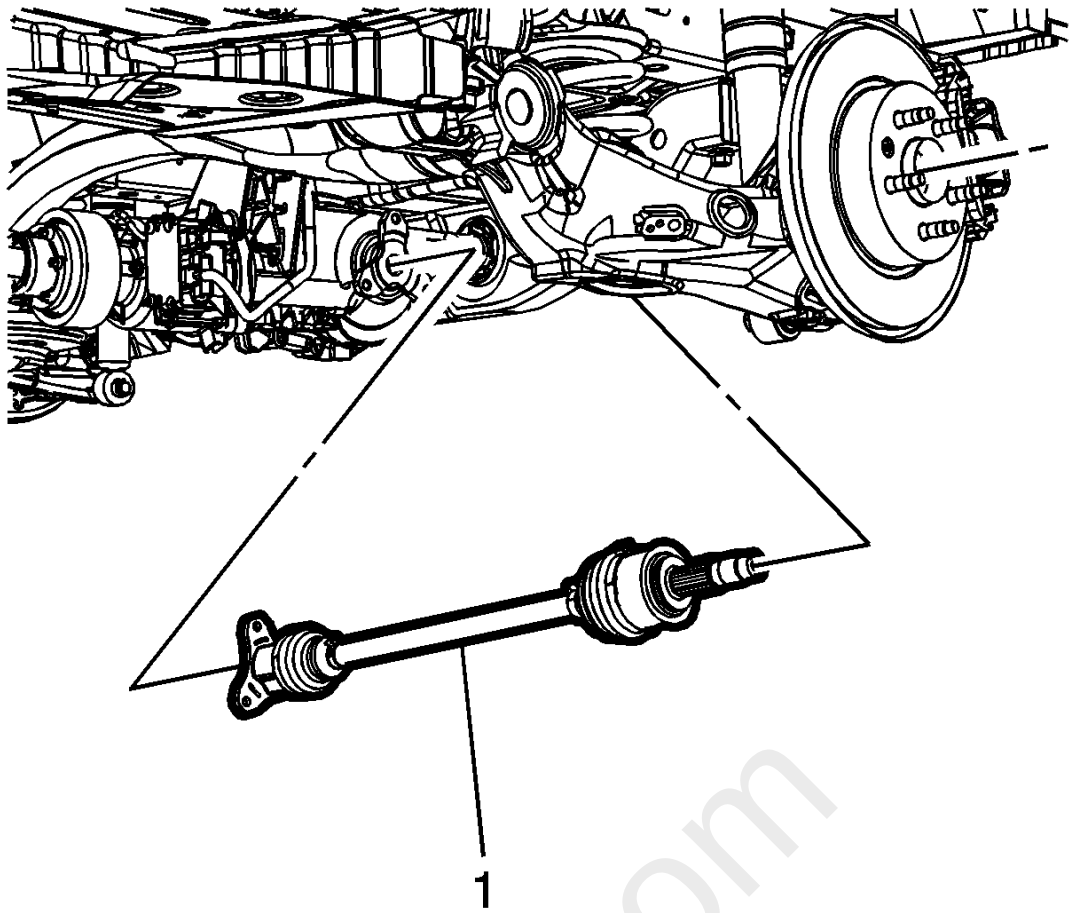


Fig. 51: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

10. Remove the wheel drive shaft (1).

Installation Procedure

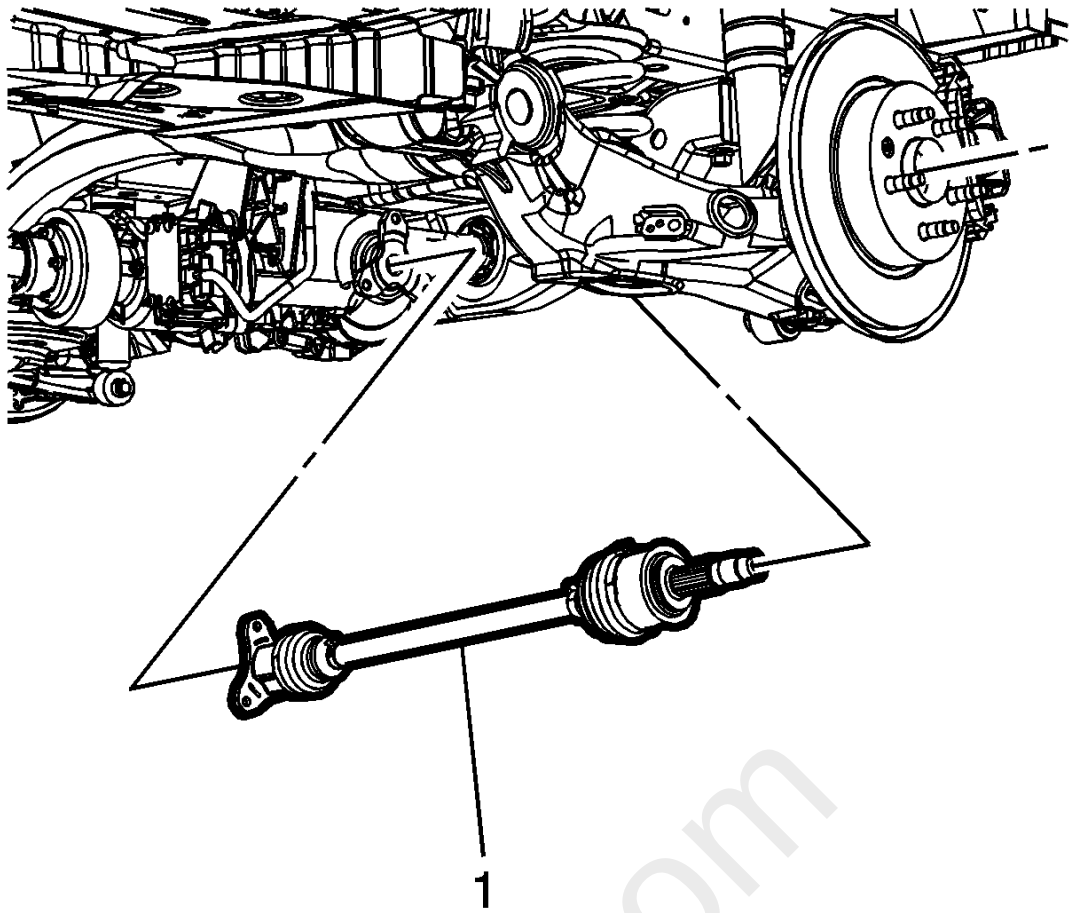


Fig. 52: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

1. Position the wheel drive shaft (1) in the vehicle.

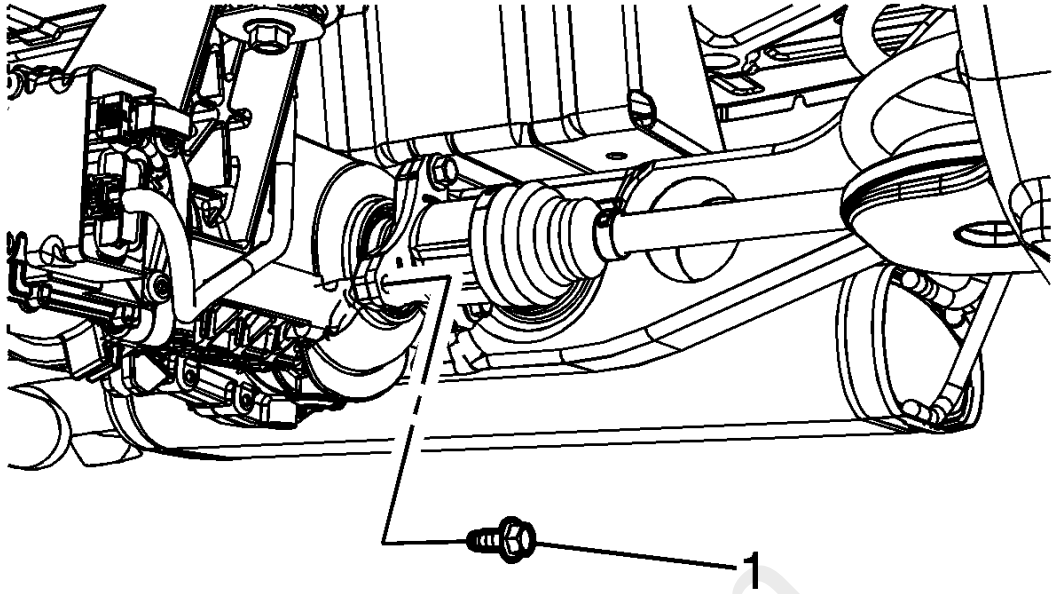


Fig. 53: Wheel Drive Shaft Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install and tighten the 3 wheel drive shaft bolts (1) to 58 N.m (43 lb ft)

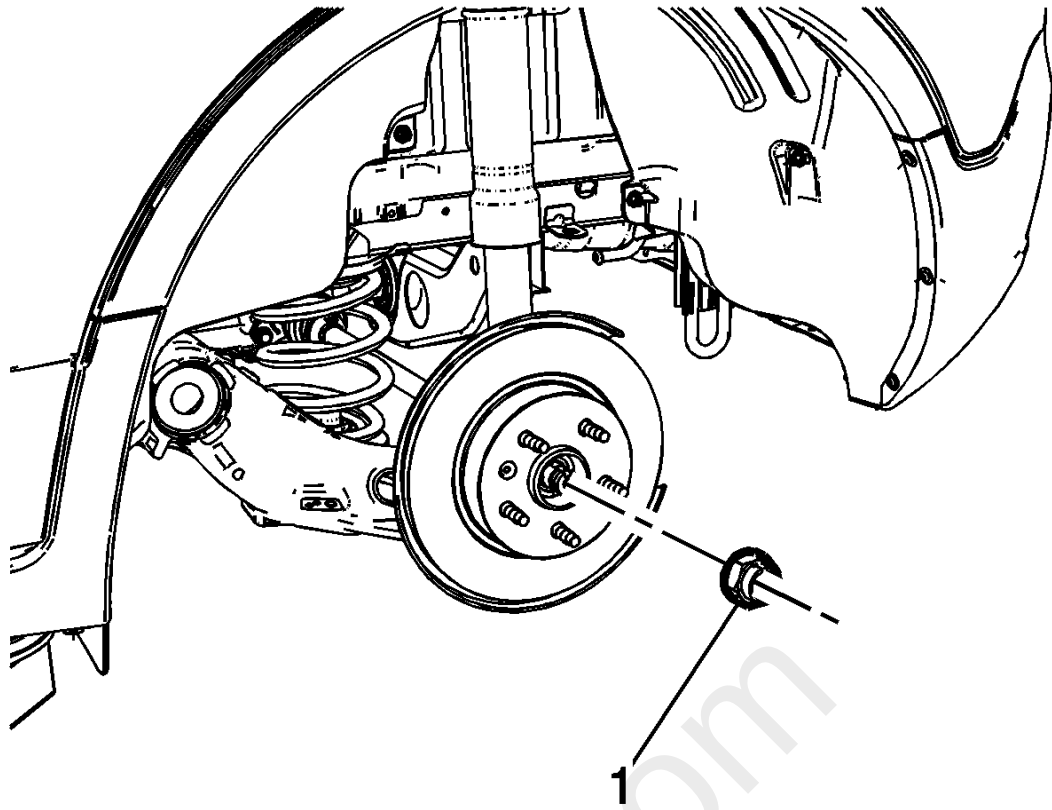


Fig. 54: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

3. Install the wheel drive shaft nut (1).
4. Install the rear brake caliper assembly. Refer to [Rear Brake Caliper Replacement](#)
5. With the aid of an assistant, apply the brakes

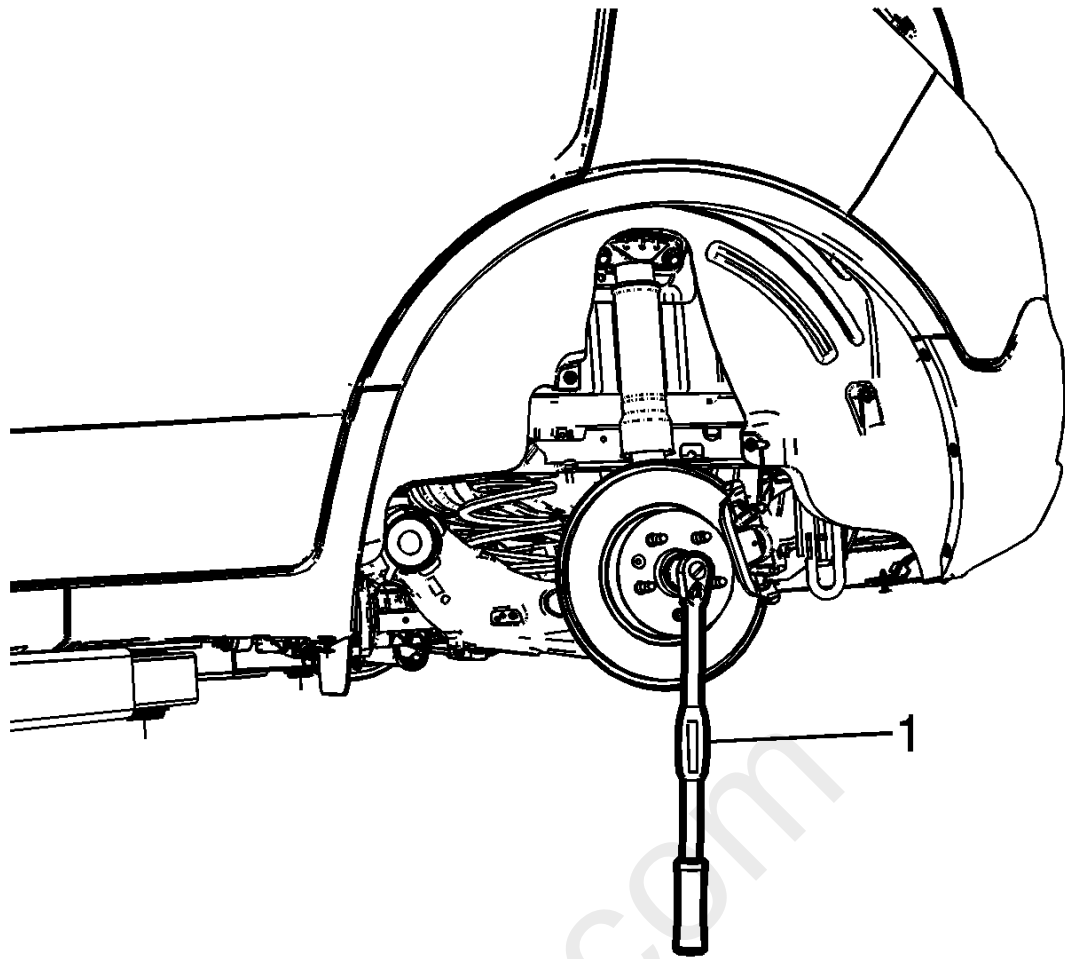


Fig. 55: Torque Wrench And Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS COMPANY

6. Using the proper size socket and torque wrench (1), tighten the wheel drive shaft nut to:
- First Pass 50 N.m (37 lb ft)
 - Final Pass plus 60 degrees

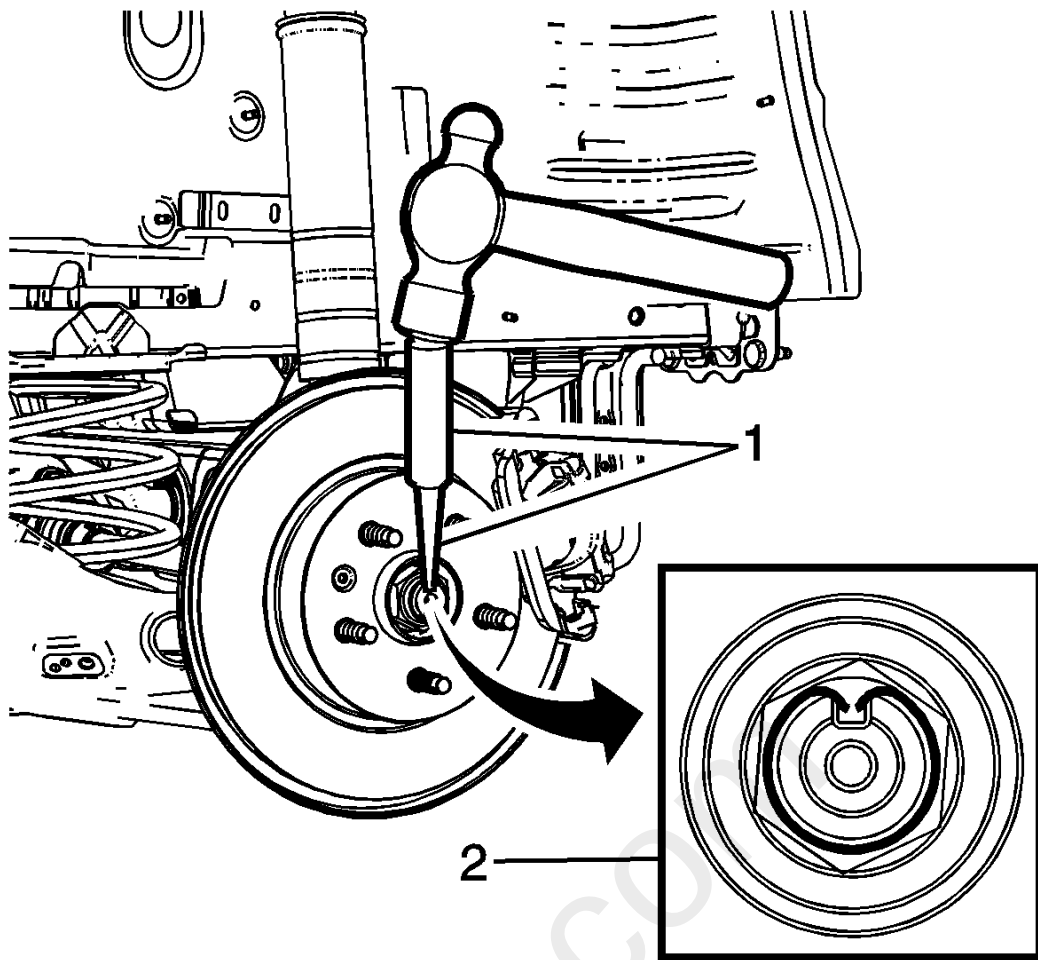


Fig. 56: Splitting Center Of Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: Evenly split the center of the wheel drive shaft nut (2) and ensure that it is fully staked. Each side of the stake should be in contact and approximately 45 degrees to each side of the slot in the wheel drive shaft.

7. Using the punch (1) and hammer, stake the wheel drive shaft nut (2) collar into the slot on the wheel drive shaft.
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 35566** Earless Seal Clamp Tool
- **J 42572** Drive Shaft Seal Clamp Pliers

Disassemble Procedure

1. Remove the wheel drive shaft.
 - For the left front wheel drive shaft, refer to [Front Wheel Drive Shaft Replacement - Left Side](#).
 - For the right front wheel drive shaft, refer to [Front Wheel Drive Shaft Replacement - Right Side](#).

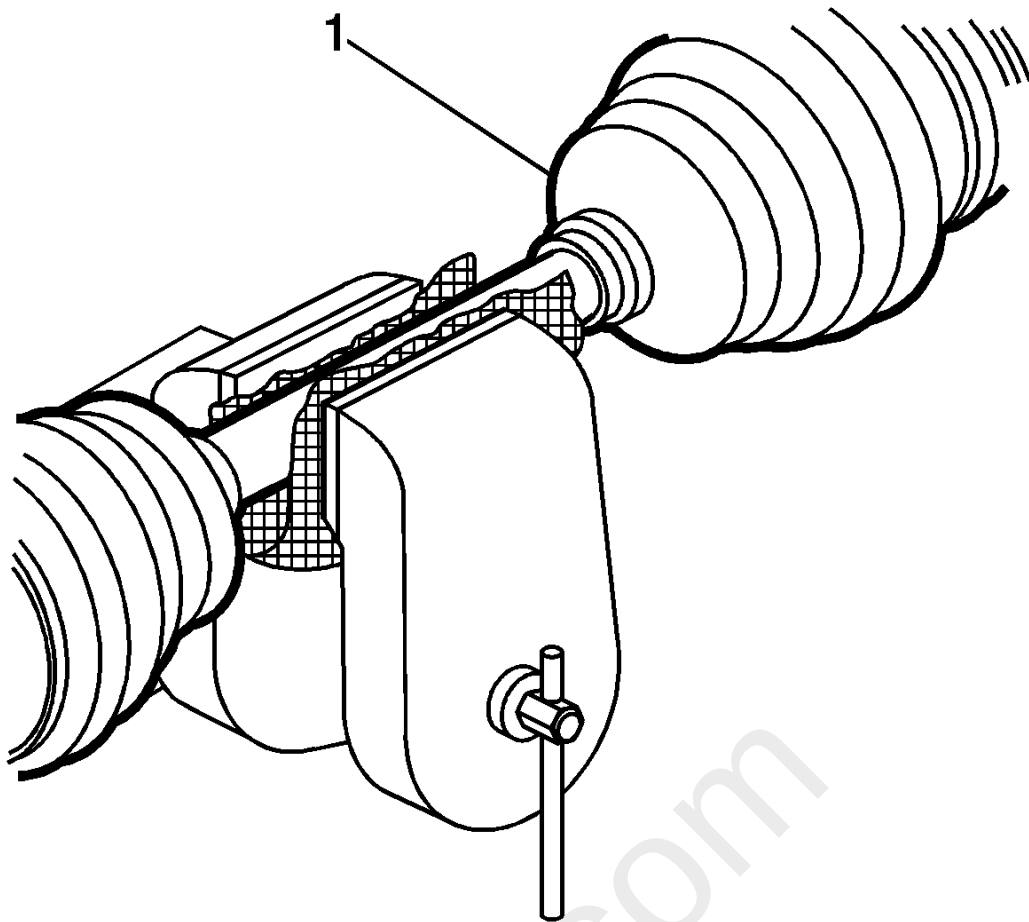


Fig. 57: View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS COMPANY

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

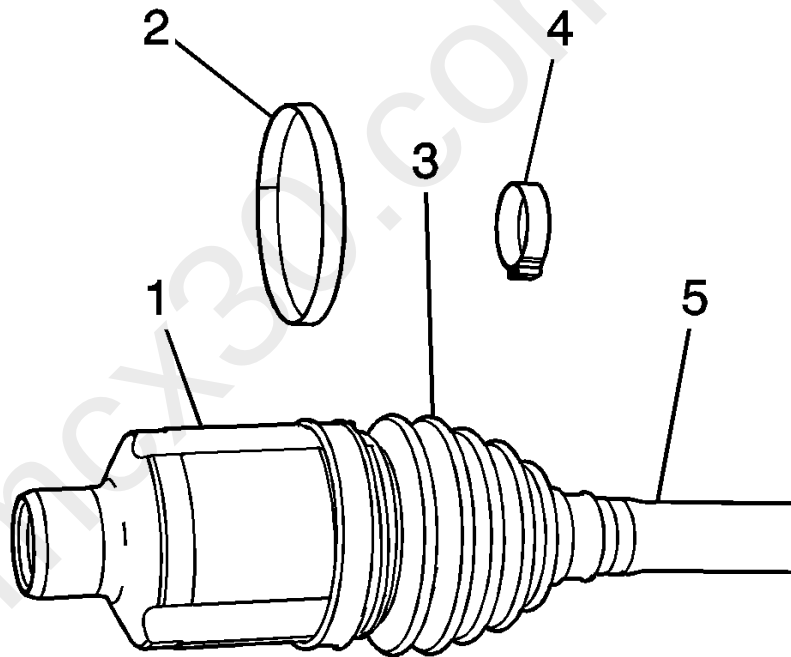
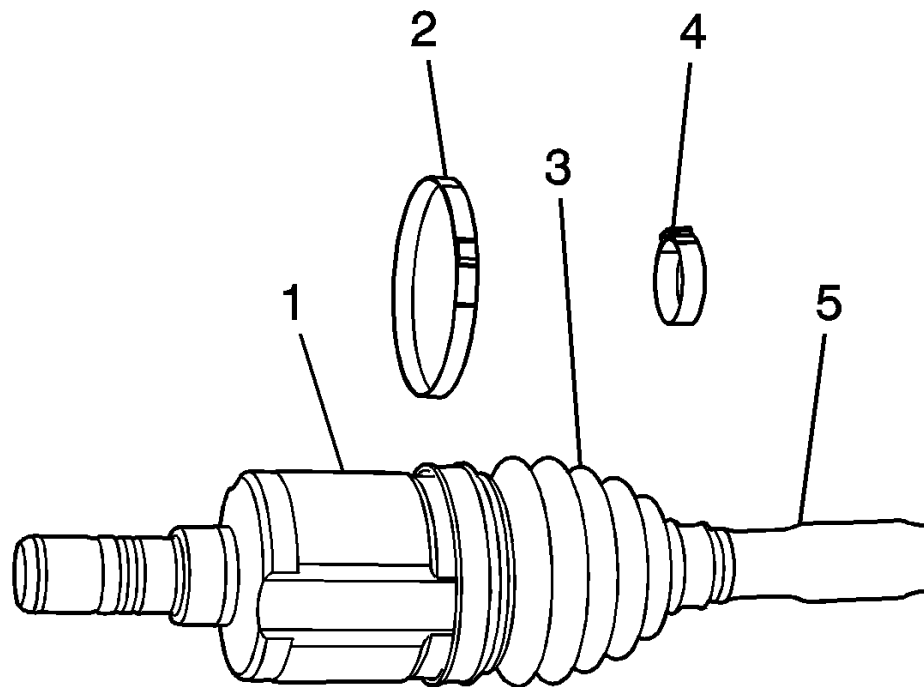


Fig. 58: View Of Wheel Drive Shaft Components
Courtesy of GENERAL MOTORS COMPANY

3. Using a flat-bladed tool, remove boot retaining clamp (2) from the boot (3) for the tripot housing (1).
4. Using side cutters, remove the boot clamp (4) from the boot (3) for the wheel drive shaft (5).

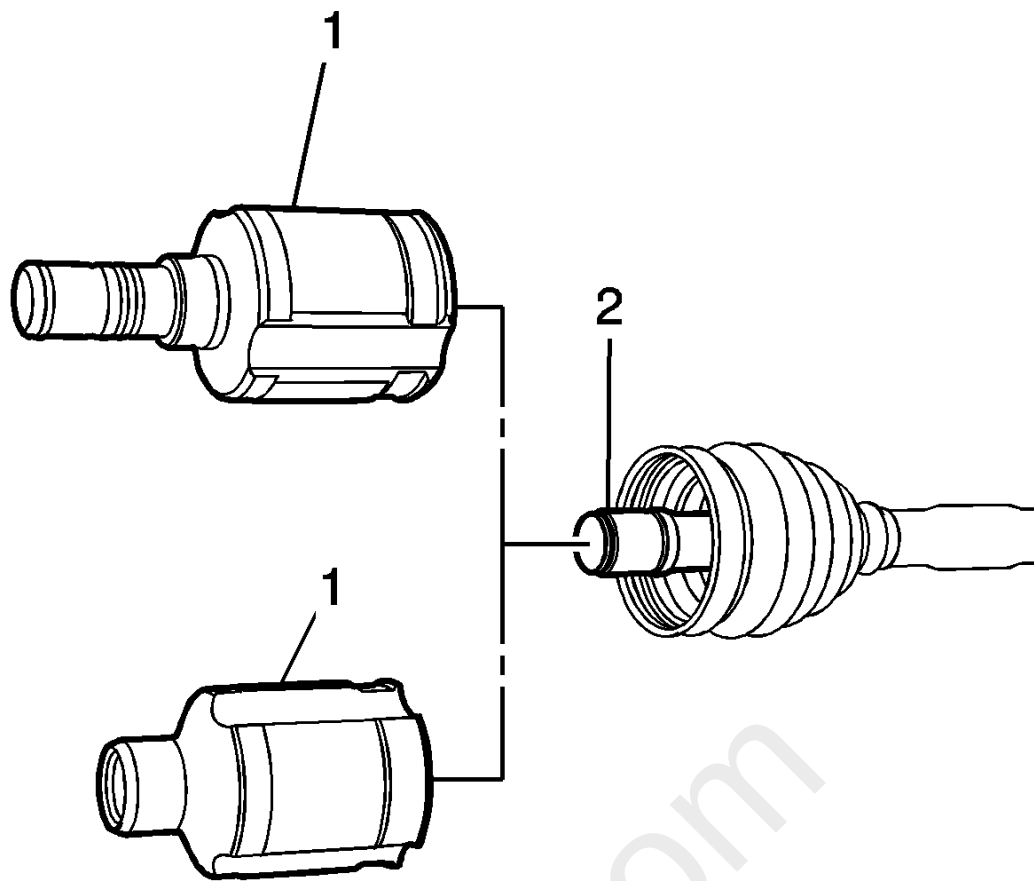


Fig. 59: Identifying Wheel Drive Shaft And Tripod Housing
Courtesy of GENERAL MOTORS COMPANY

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

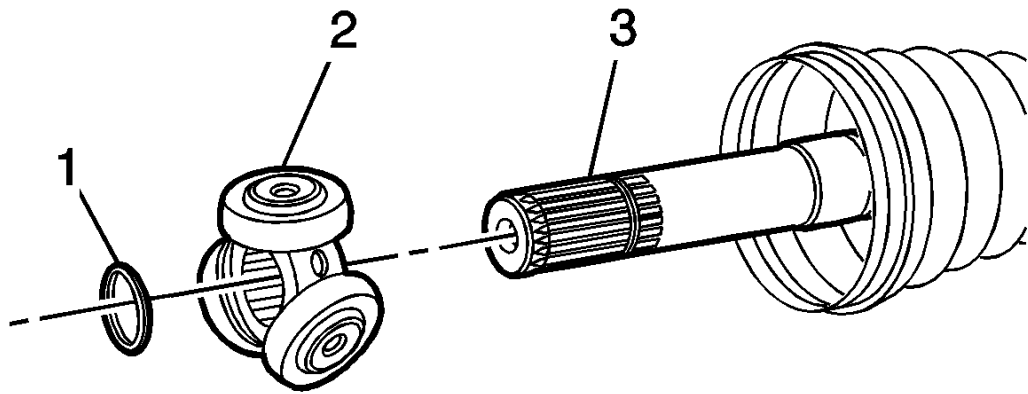


Fig. 60: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

6. Using the appropriate tool, remove the retaining clip (1) and the tripod spider (2) from the wheel drive shaft (3).

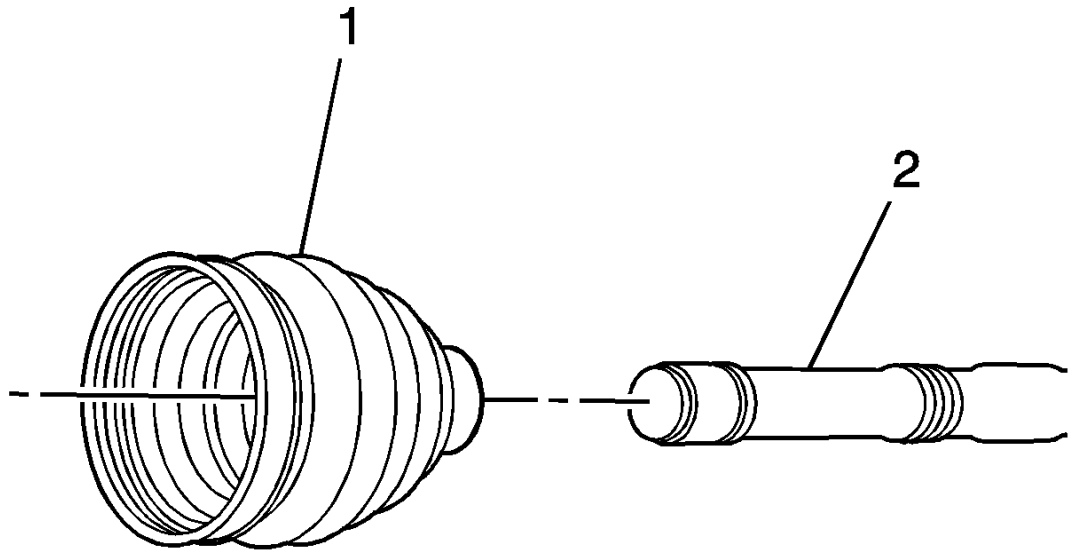


Fig. 61: Identifying Wheel Drive Shaft Boot

Courtesy of GENERAL MOTORS COMPANY

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

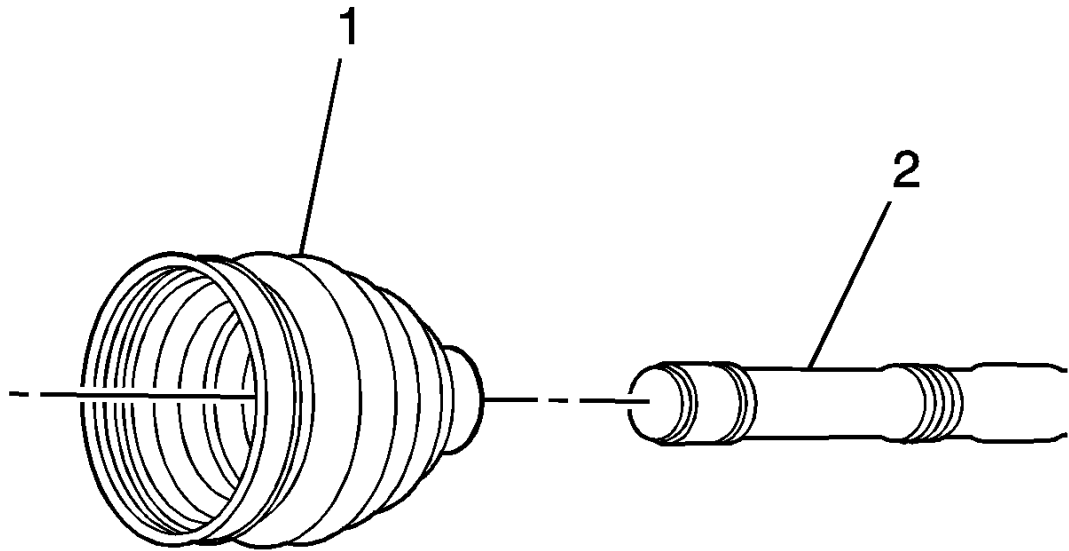


Fig. 62: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS COMPANY

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

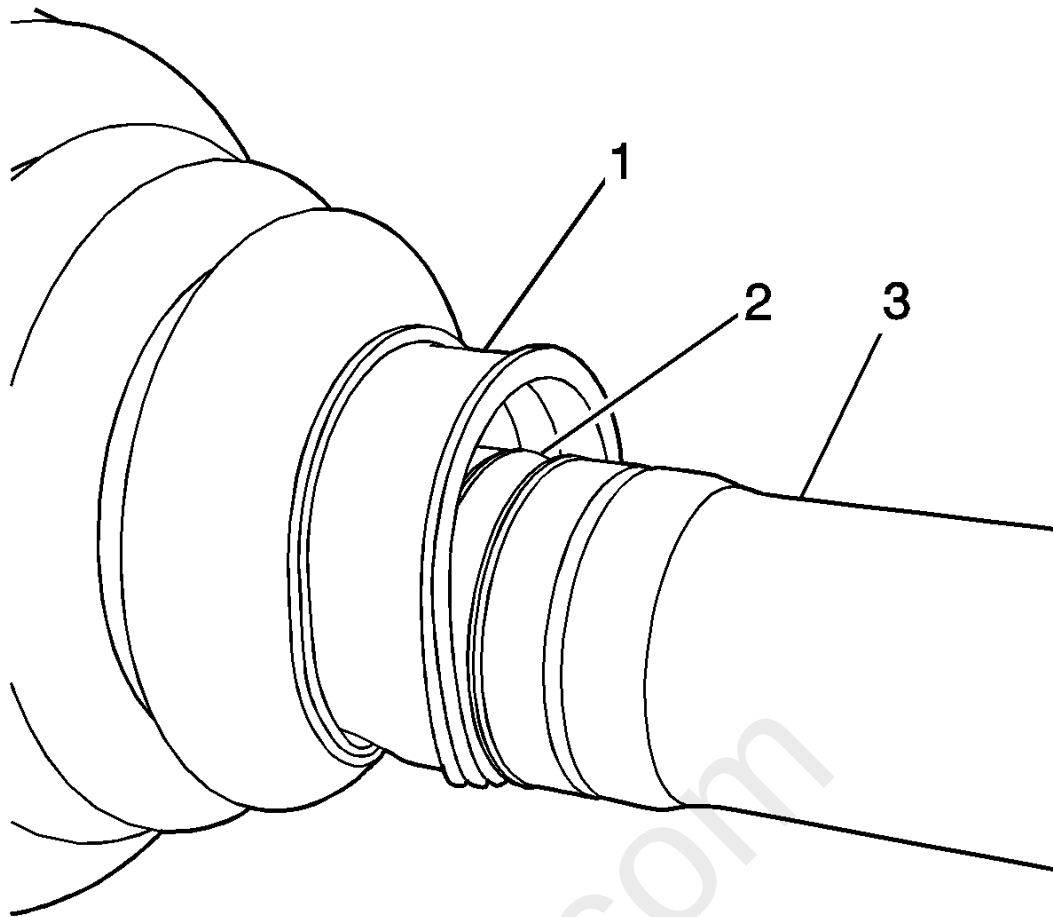


Fig. 63: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

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

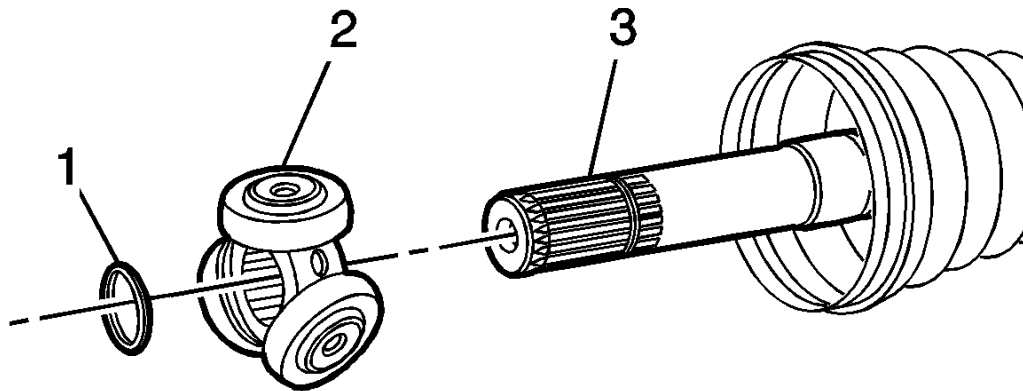


Fig. 64: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

3. Install the tripod spider assembly (2) to the wheel drive shaft (3), until seated against shoulder.
4. Using the appropriate tool, install the retaining ring (1) in the wheel drive shaft.
5. Using the **J 42572** clamp tool, breaker bar and a ratchet wrench (1), close the boot clamp until the gap (3) measures 1.0 mm (0.040 in).

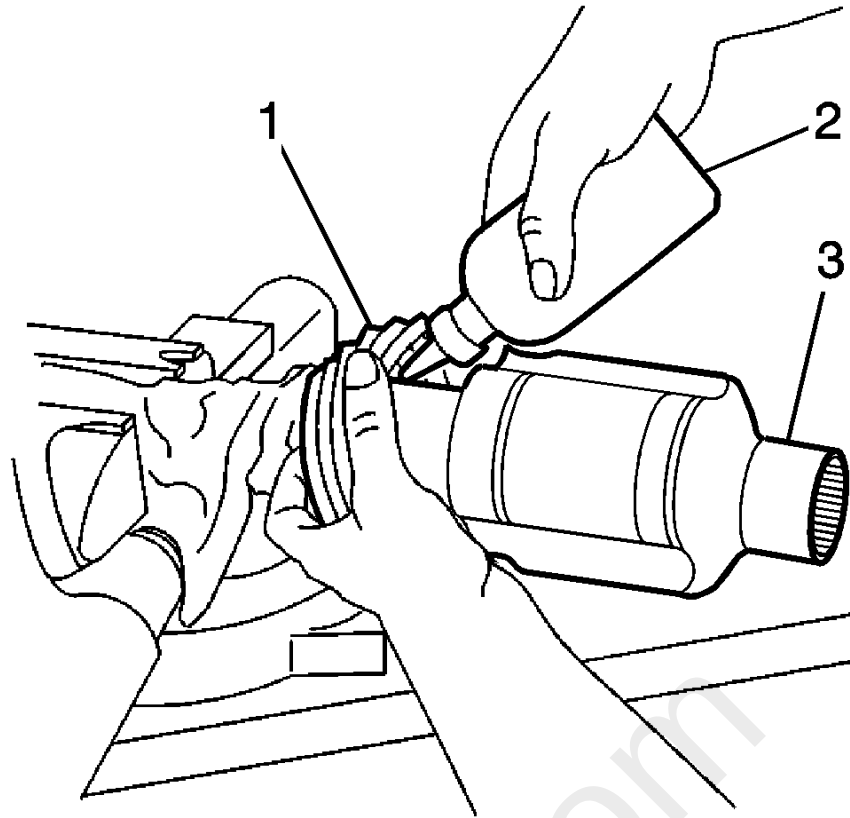


Fig. 65: Applying Lubricant Into Boot and Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

6. Place approximately half of the lubricant (2) in the boot (1) and the remaining lubricant in the in the tripot housing (3).

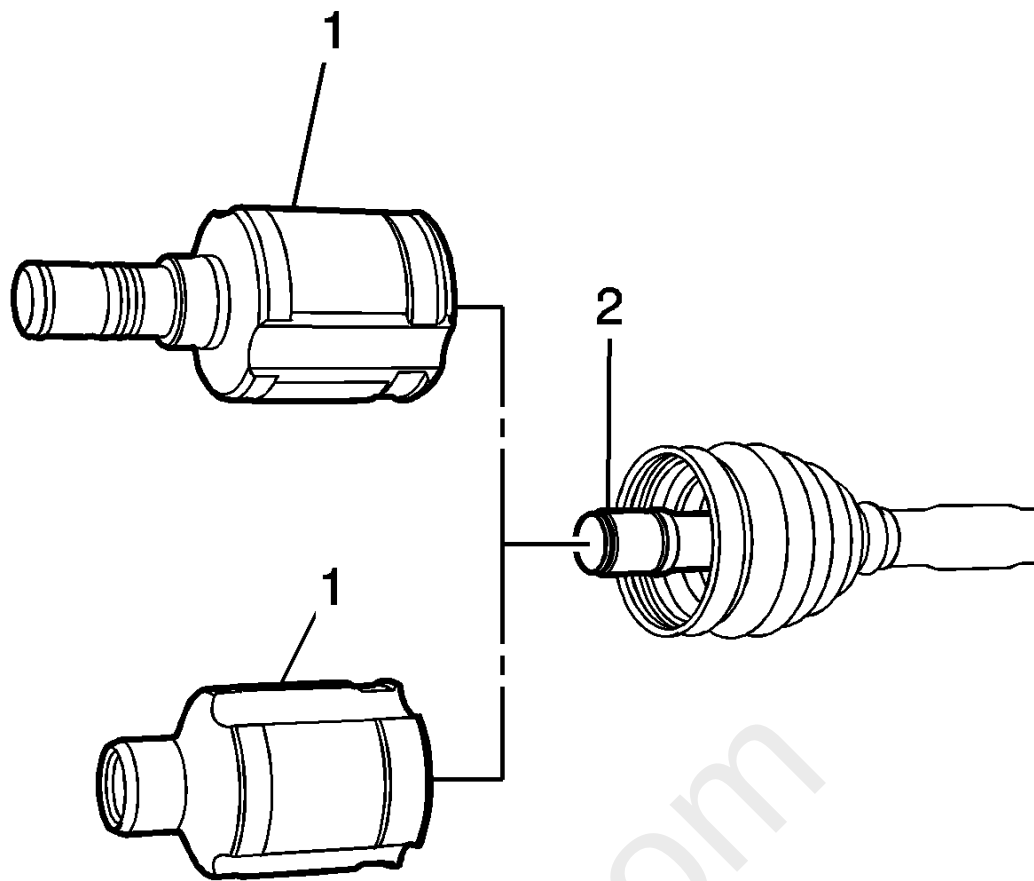


Fig. 66: Identifying Wheel Drive Shaft And Tripod Housing
Courtesy of GENERAL MOTORS COMPANY

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

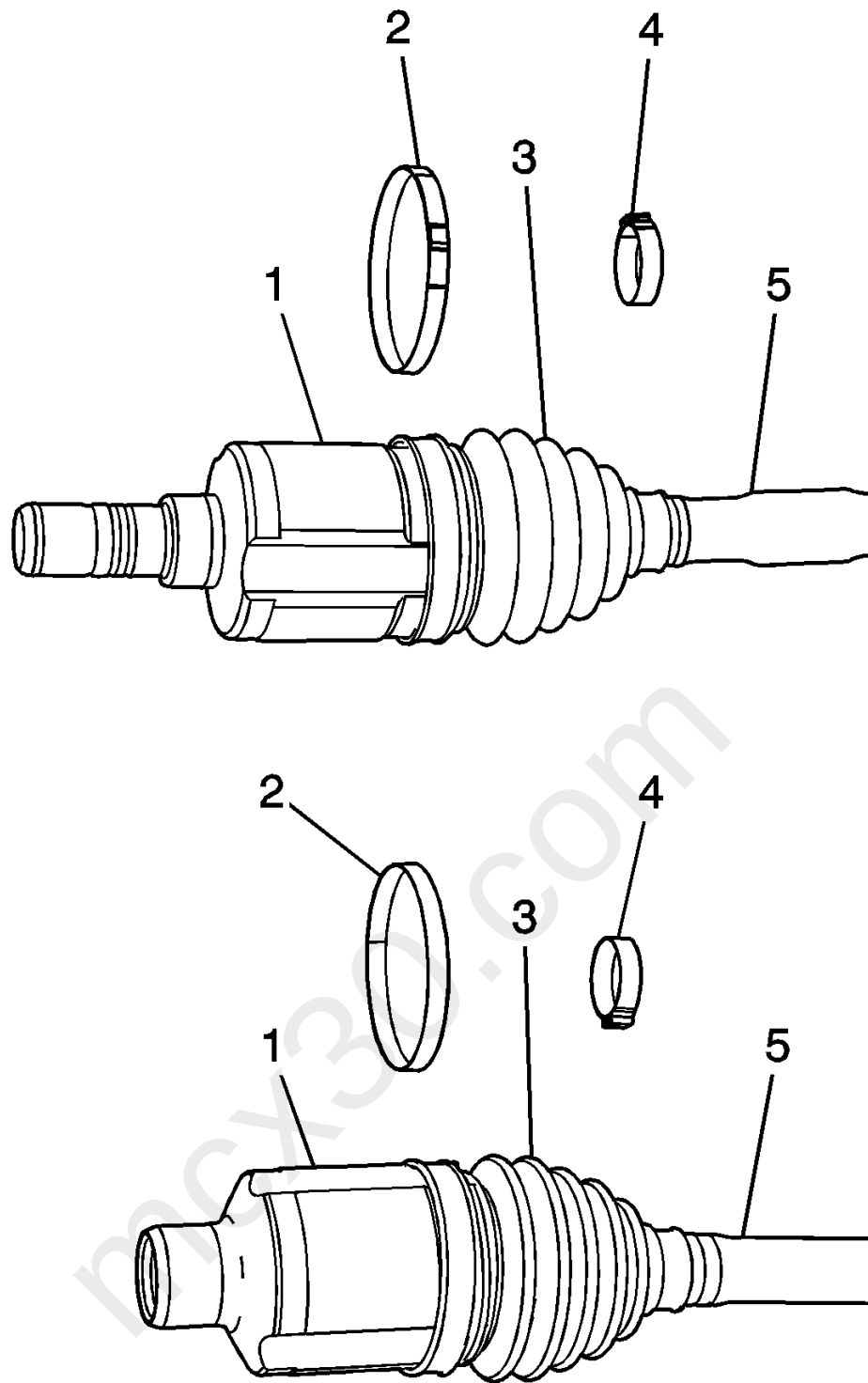


Fig. 67: View Of Wheel Drive Shaft Components
Courtesy of GENERAL MOTORS COMPANY

8. Install the boot clamp (2) on the boot (3) for the tripot housing (1).
9. Install the boot clamp (4) on the boot (3) for the wheel drive (5).

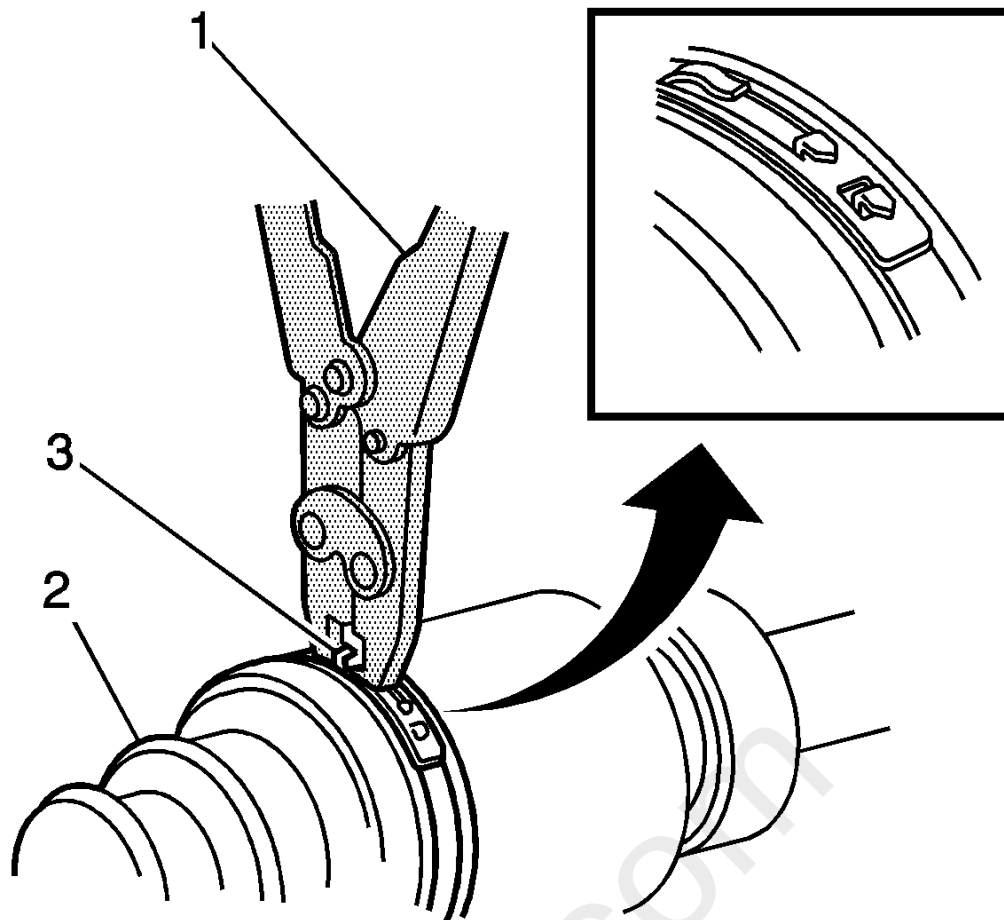


Fig. 68: Latching Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS COMPANY

10. Using the **J 35566** clamp tool (1), close the and lock boot clamp (3).
11. Remove any excess lubricant from the wheel drive shaft.
12. Move the tripot housing assembly in a manner in order to distribute the lubricant in the tripot joint.
13. Install the wheel drive shaft.
 - For the left front wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Left Side**.
 - For the right front wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Right Side**.

FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

J 42572 Drive Axle Seal Clamp Pliers

Disassemble Procedure

1. Remove the front wheel drive shaft. **Front Wheel Drive Shaft Replacement - Left Side**, or **Front Wheel Drive Shaft Replacement - Right Side**

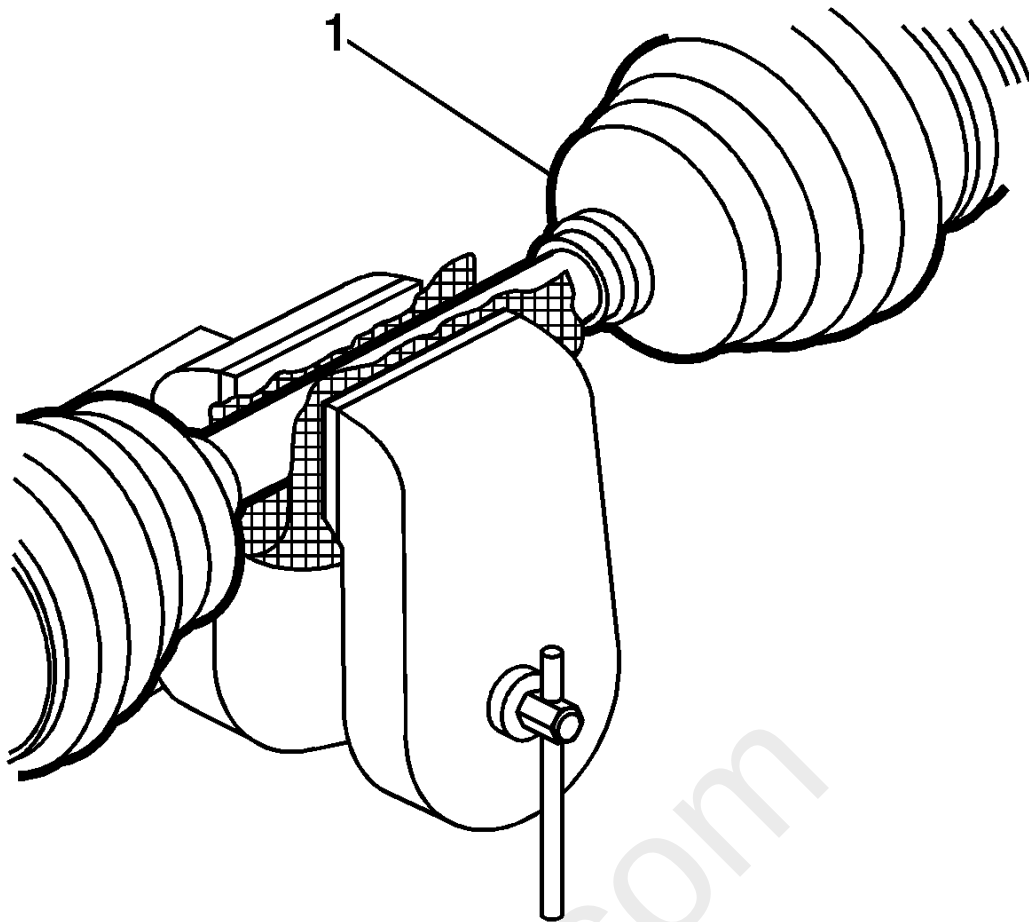


Fig. 69: View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS COMPANY

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

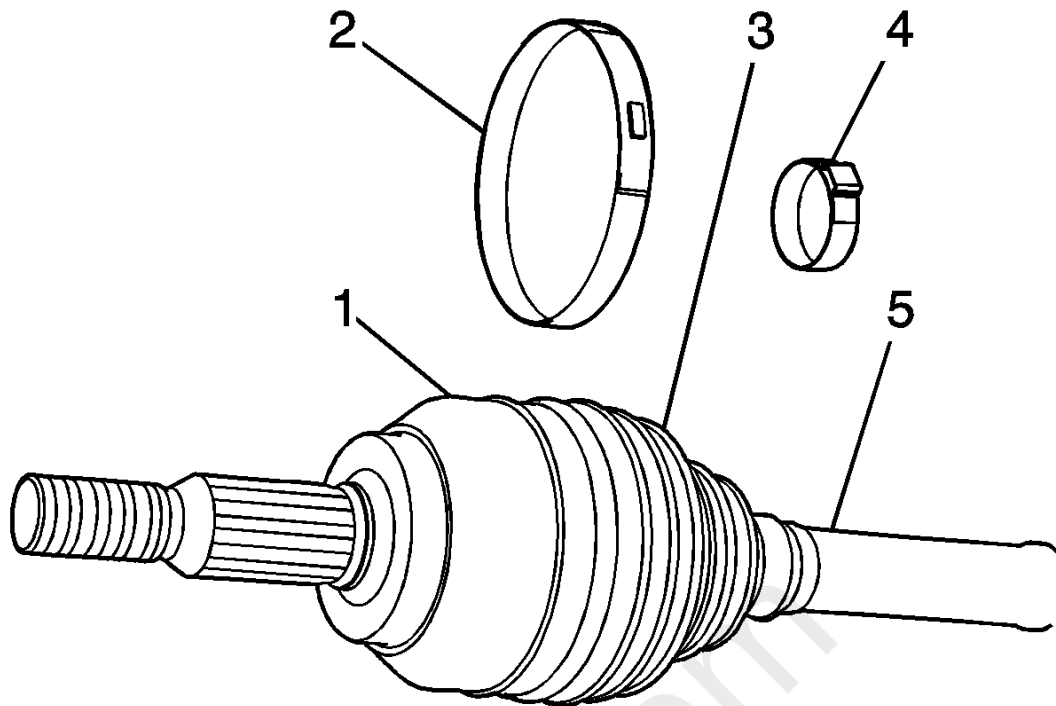


Fig. 70: Identifying Boot Clamps

Courtesy of GENERAL MOTORS COMPANY

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 the boot clamp (4) from the boot (3) and the wheel drive shaft (5).
5. Discard the boot clamps (2) and (4). Use NEW clamps only.

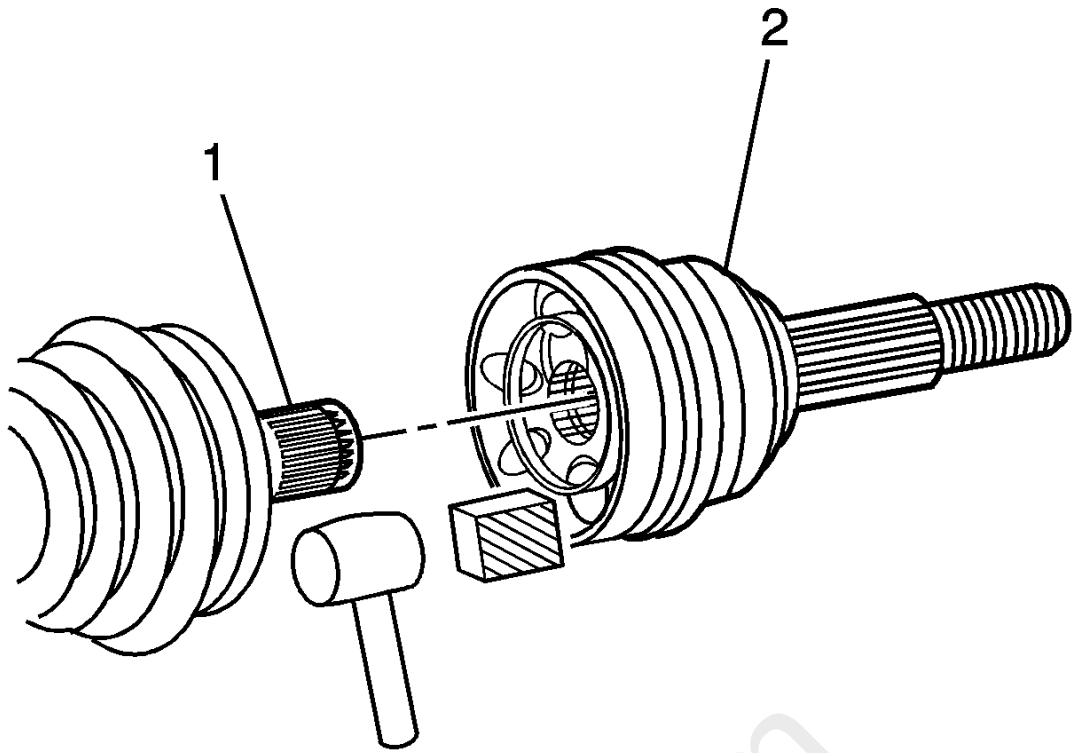


Fig. 71: Separating CV Joint From Axle Shaft
Courtesy of GENERAL MOTORS COMPANY

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

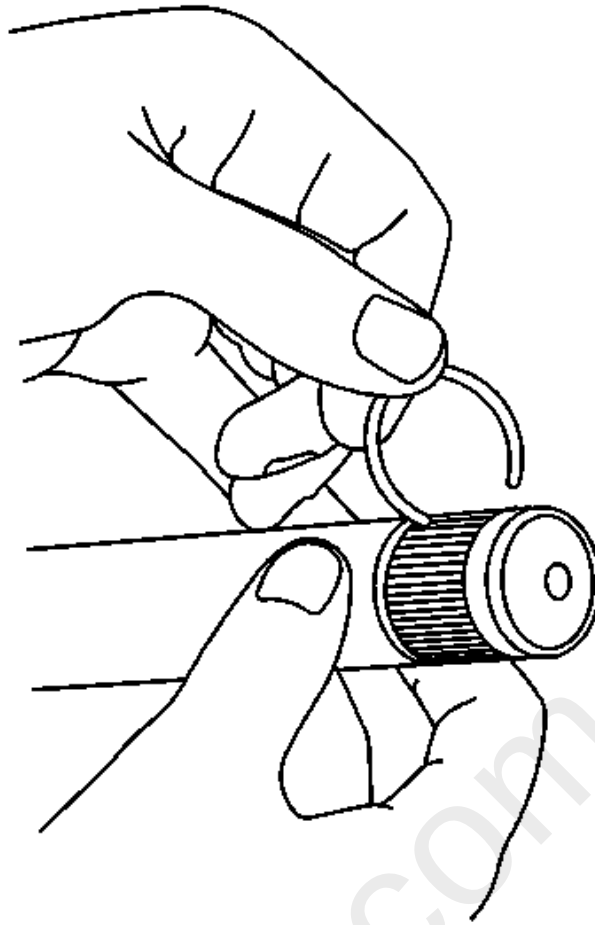


Fig. 72: View Of Axle Shaft Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

7. Using the appropriate tool, remove and discard the retaining clip.

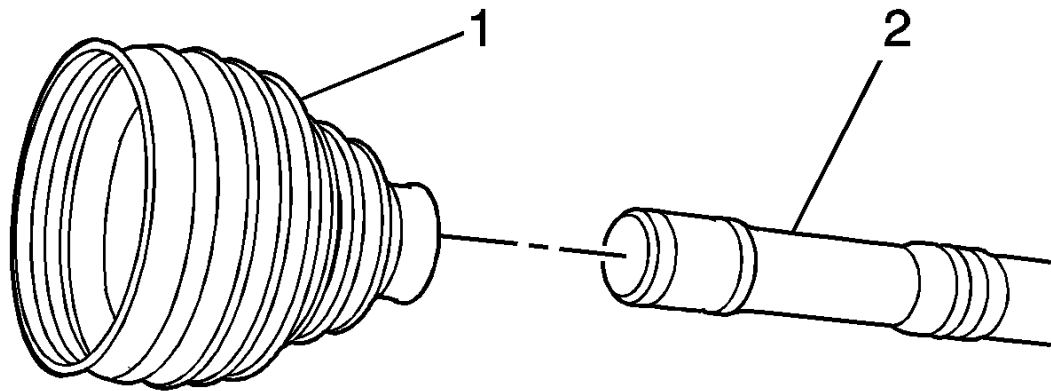


Fig. 73: Identifying Clamp & Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

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

Assemble Procedure

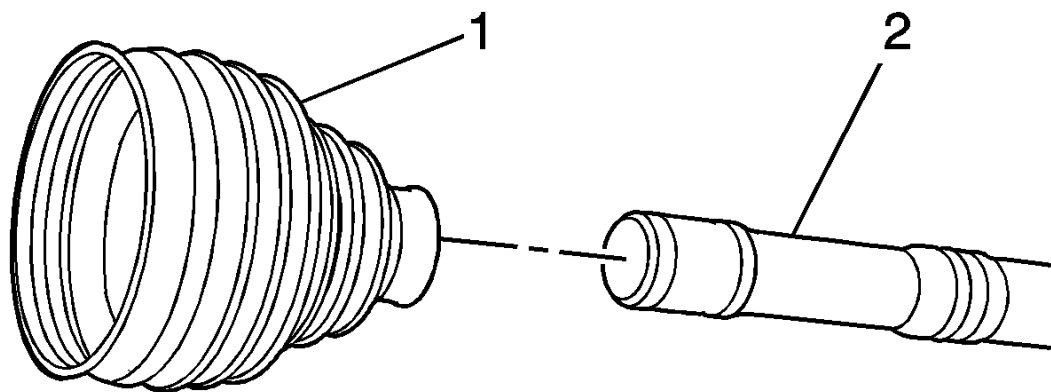


Fig. 74: Identifying Clamp & Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

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

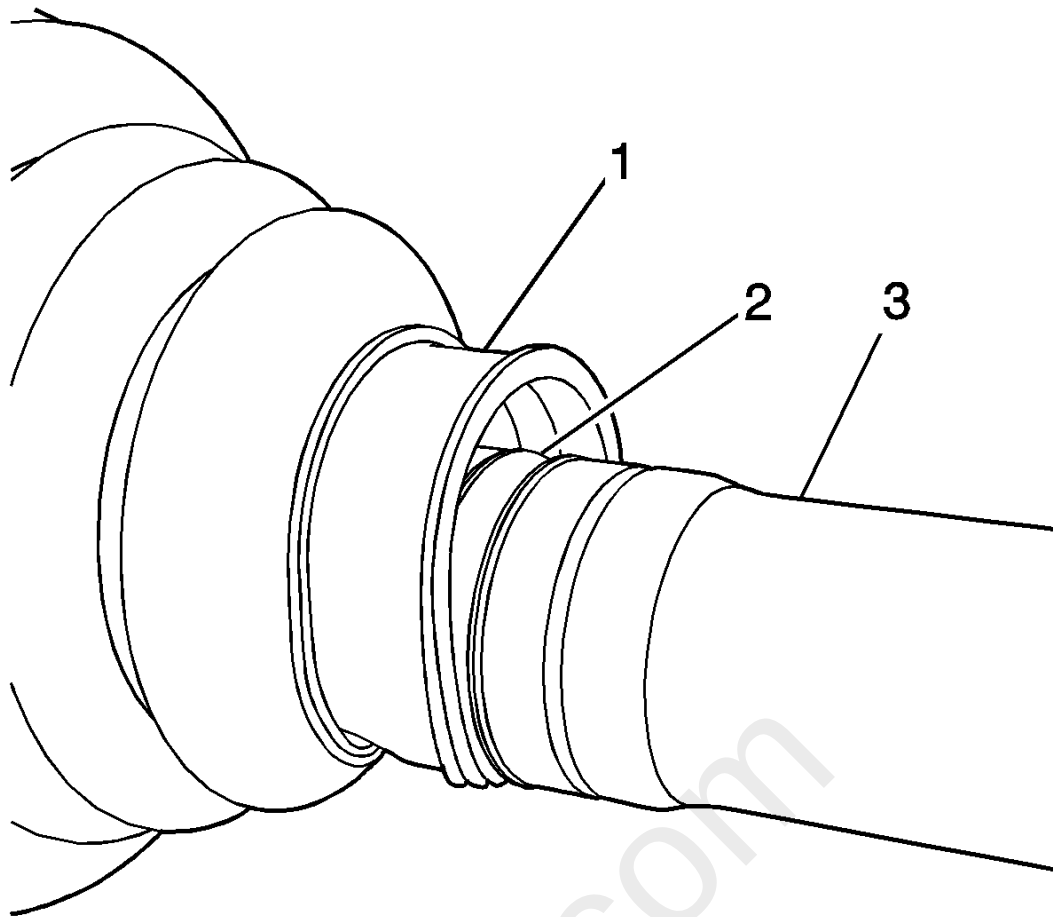


Fig. 75: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

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

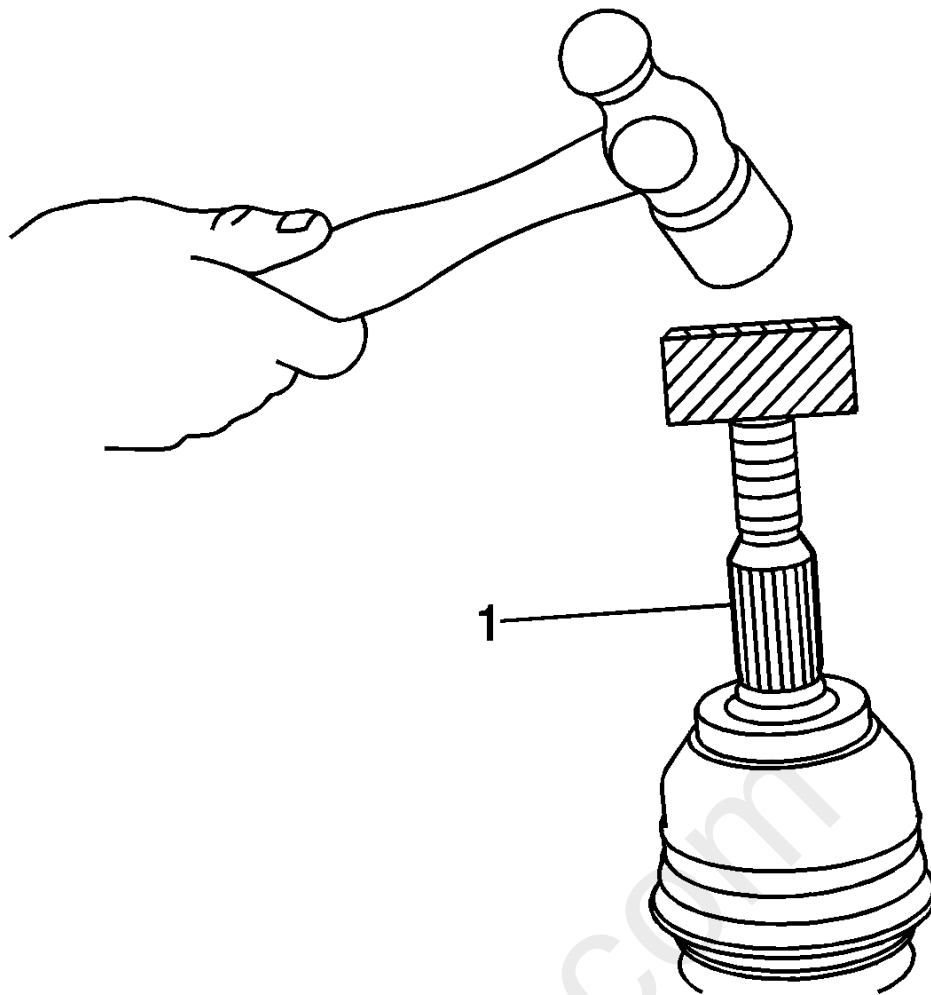


Fig. 76: Installing CV Joint

Courtesy of GENERAL MOTORS COMPANY

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

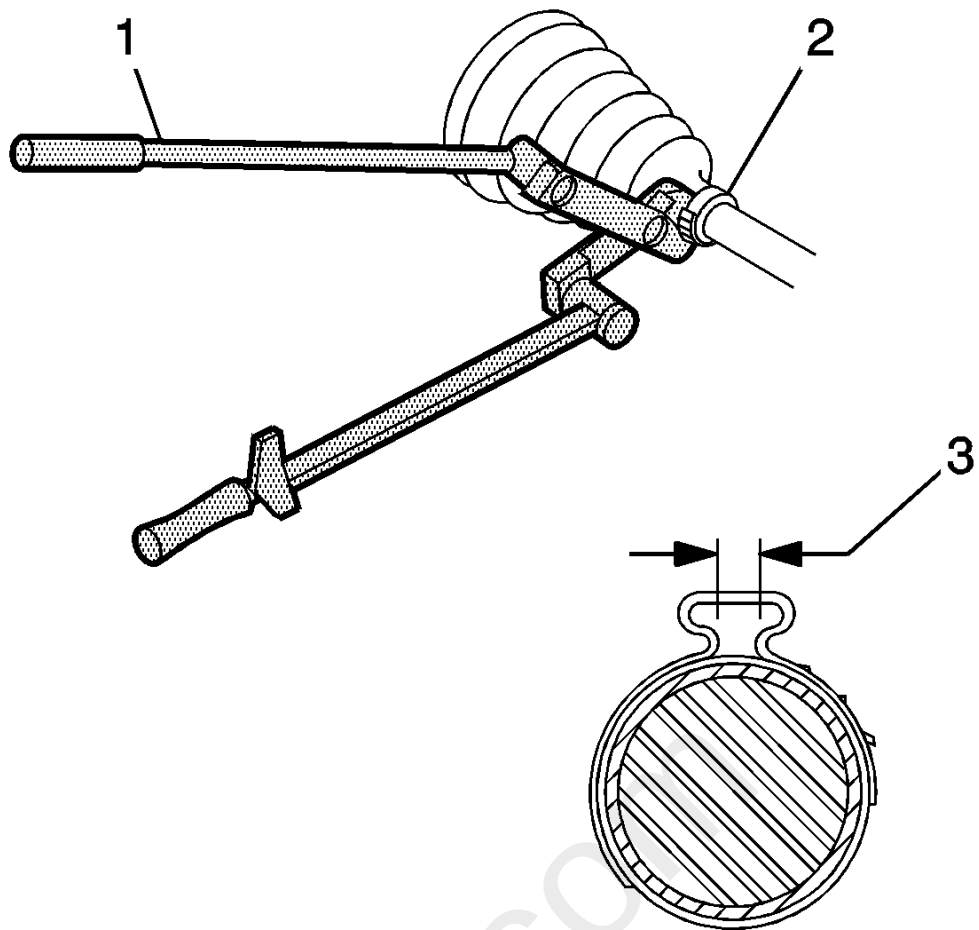


Fig. 77: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure that the gap measurement does not exceed 1.0 mm (0.040 in).

4. Using the **J 42572** pliers (1), close the boot clamp (2) until the gap (3) in the clamp measure 1.0 mm (0.040 in).

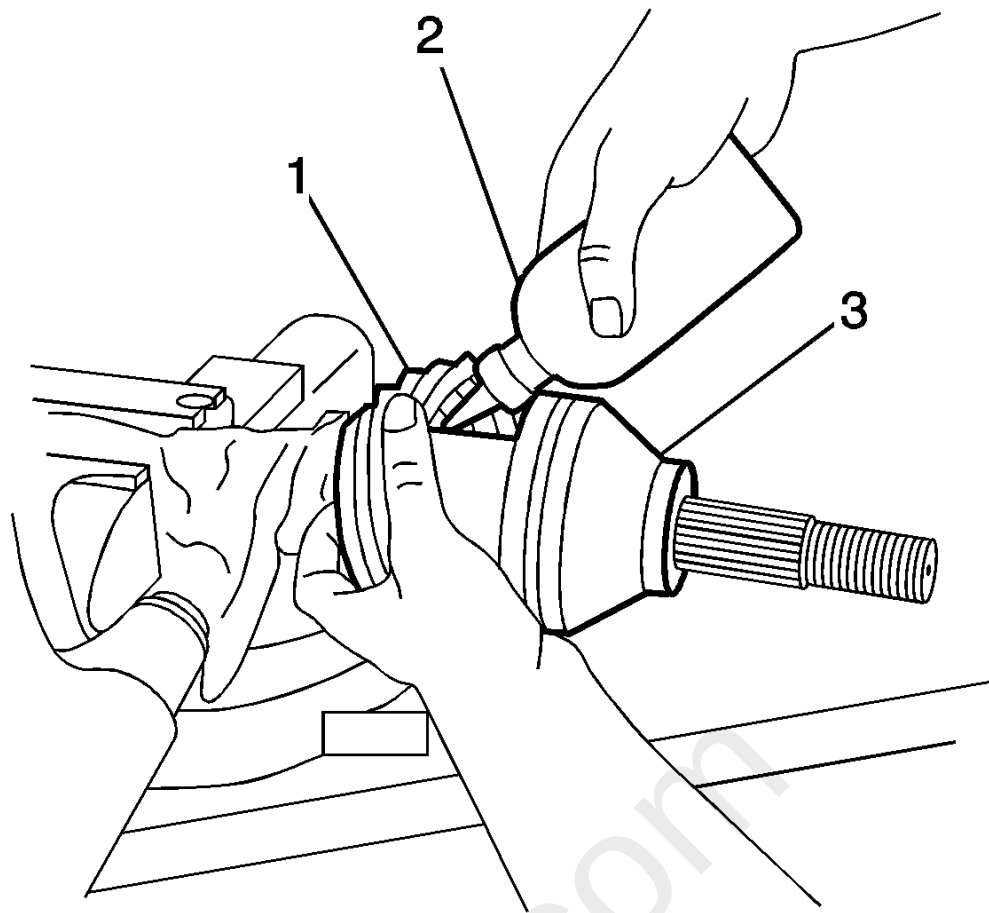


Fig. 78: Lubricating Boot Of Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

5. Place approximately half the lubricant (2) in the boot (1) and the remaining half in the CV joint housing (3).

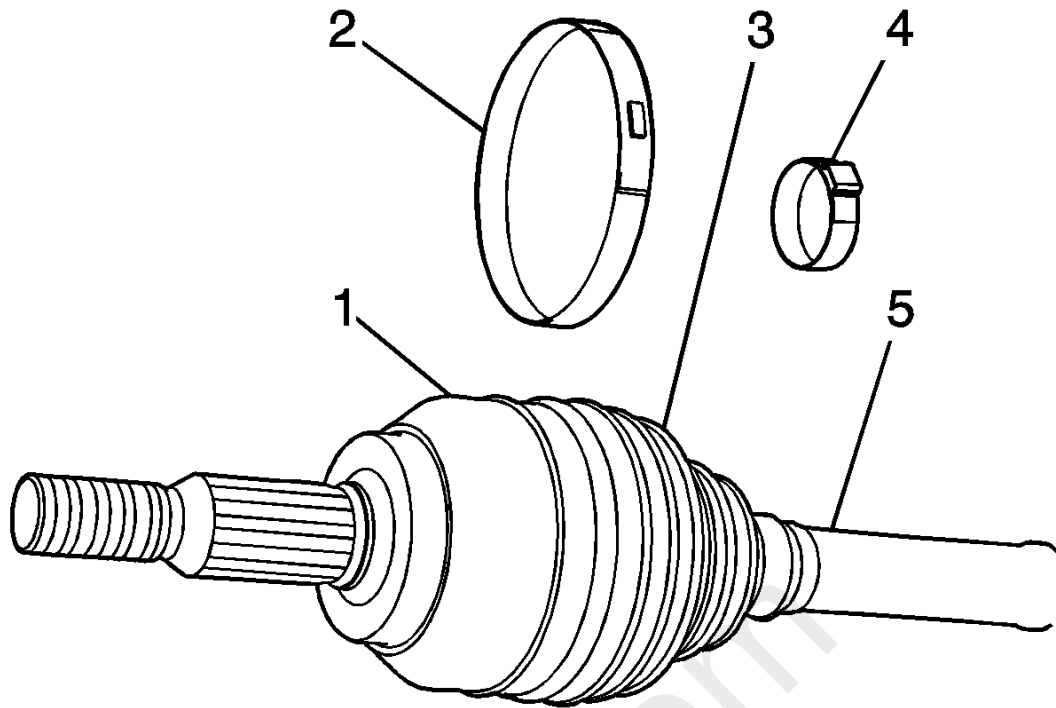


Fig. 79: Identifying Boot Clamps

Courtesy of GENERAL MOTORS COMPANY

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

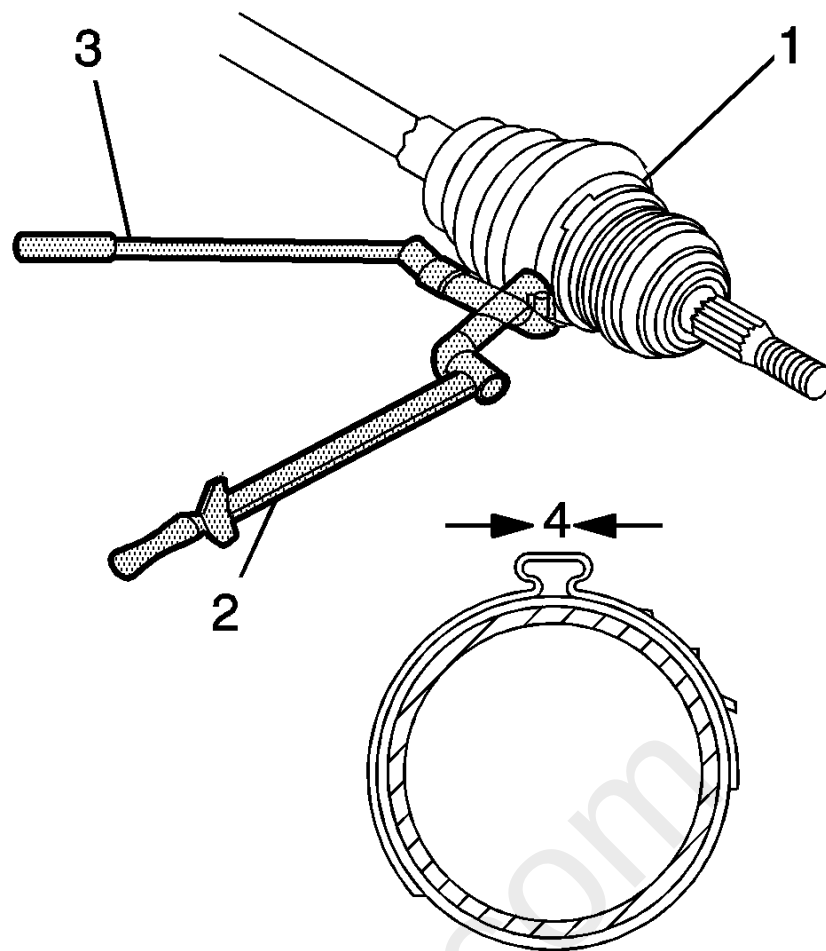


Fig. 80: Crimping Seal Retaining Clamp
 Courtesy of GENERAL MOTORS COMPANY

NOTE: Ensure the boot clamp is securely closed and seated properly on the boot.

8. Using the **J 42572** pliers (3) and a ratchet wrench (2), close the boot clamp (1) until the gap (4) measures 1.0 mm (0.040 in)..
9. Move the CV joint in a circular motion four to five times to the distribute the lubricant within the CV joint.
10. Remove the wheel drive shaft from the bench vise.
11. Remove any excess lubricant from the wheel drive shaft.
12. Install the front wheel drive shaft. **Front Wheel Drive Shaft Replacement - Left Side**, or **Front Wheel Drive Shaft Replacement - Right Side**

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.

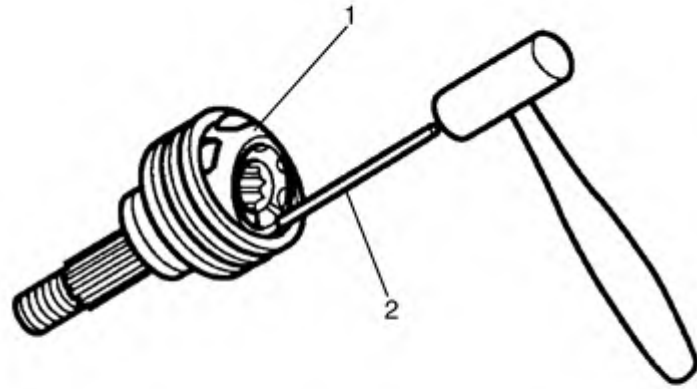


Fig. 81: Tapping Gently On Brass Drift With A Hammer In Order To Tilt Cage
Courtesy of GENERAL MOTORS COMPANY

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 (2) until the ball bearing can be removed from the cage (2).

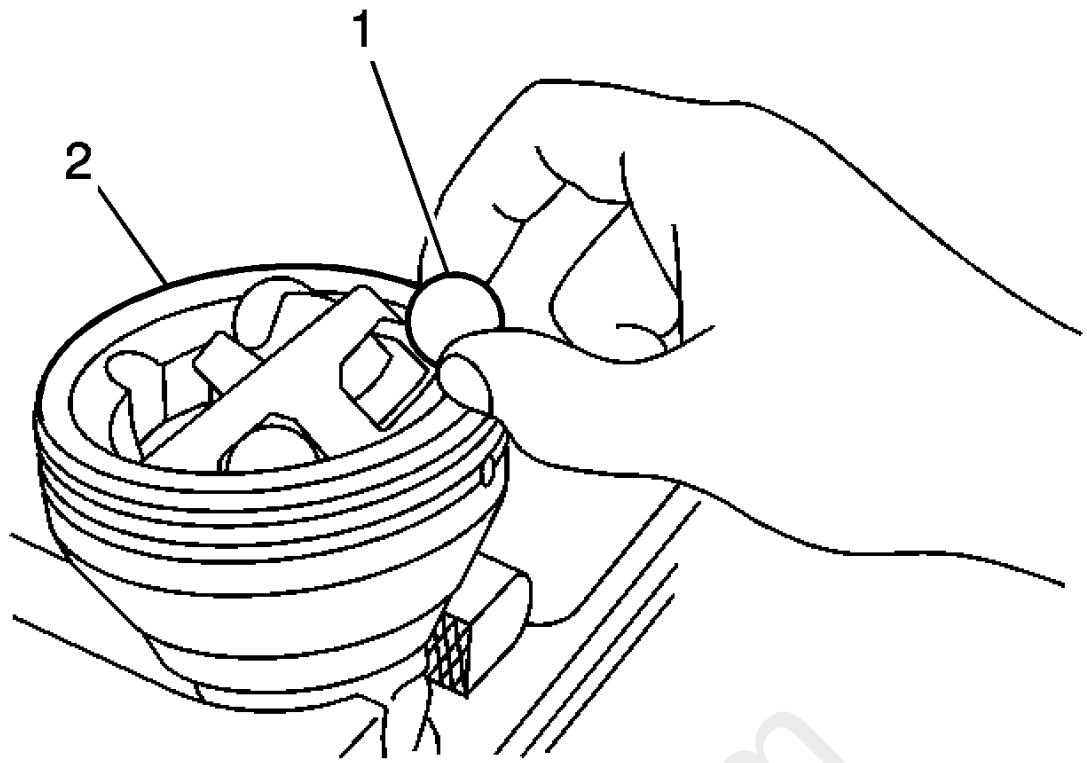


Fig. 82: Removing/Install Ball From Cage & Inner Race
Courtesy of GENERAL MOTORS COMPANY

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

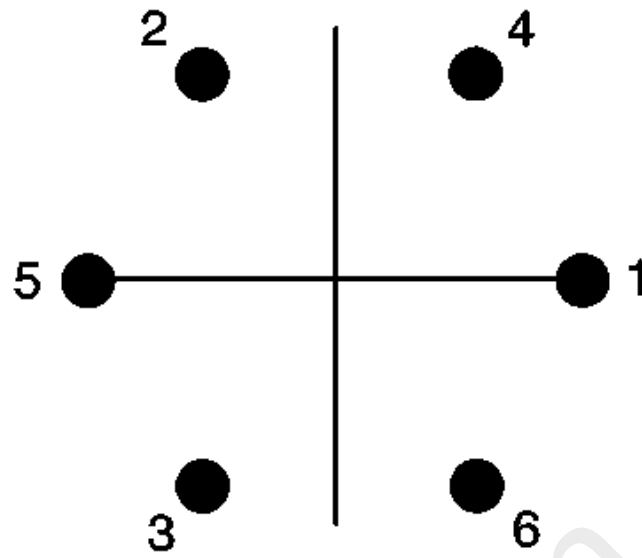


Fig. 83: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS COMPANY

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

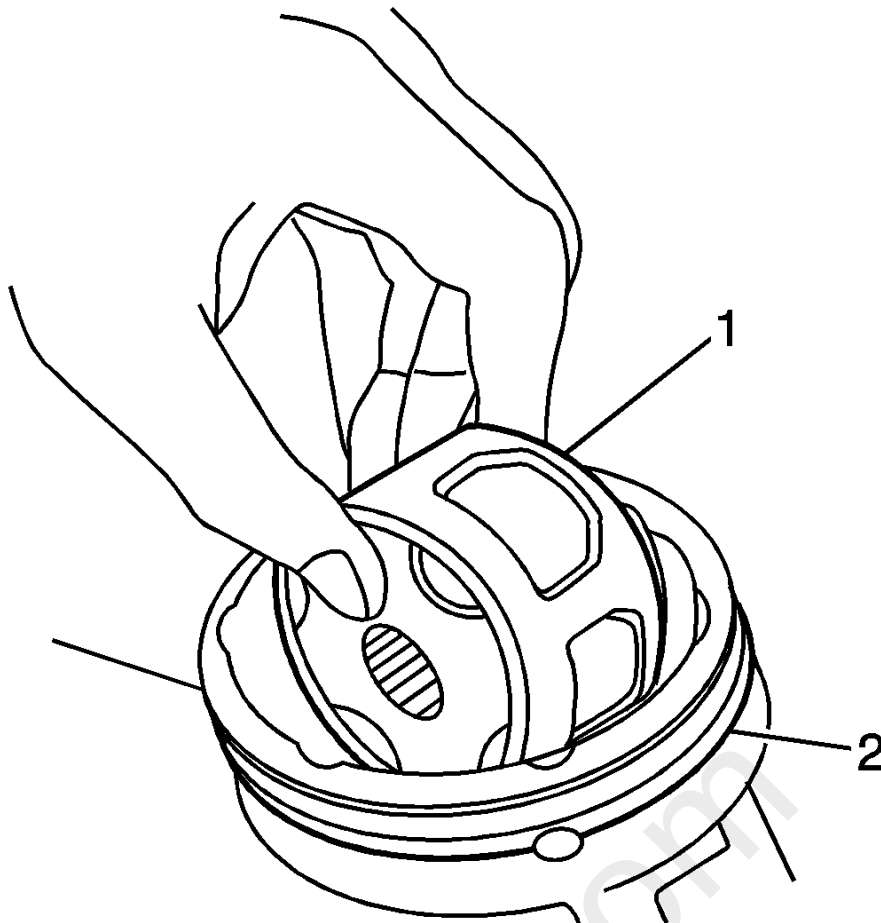


Fig. 84: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS COMPANY

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).

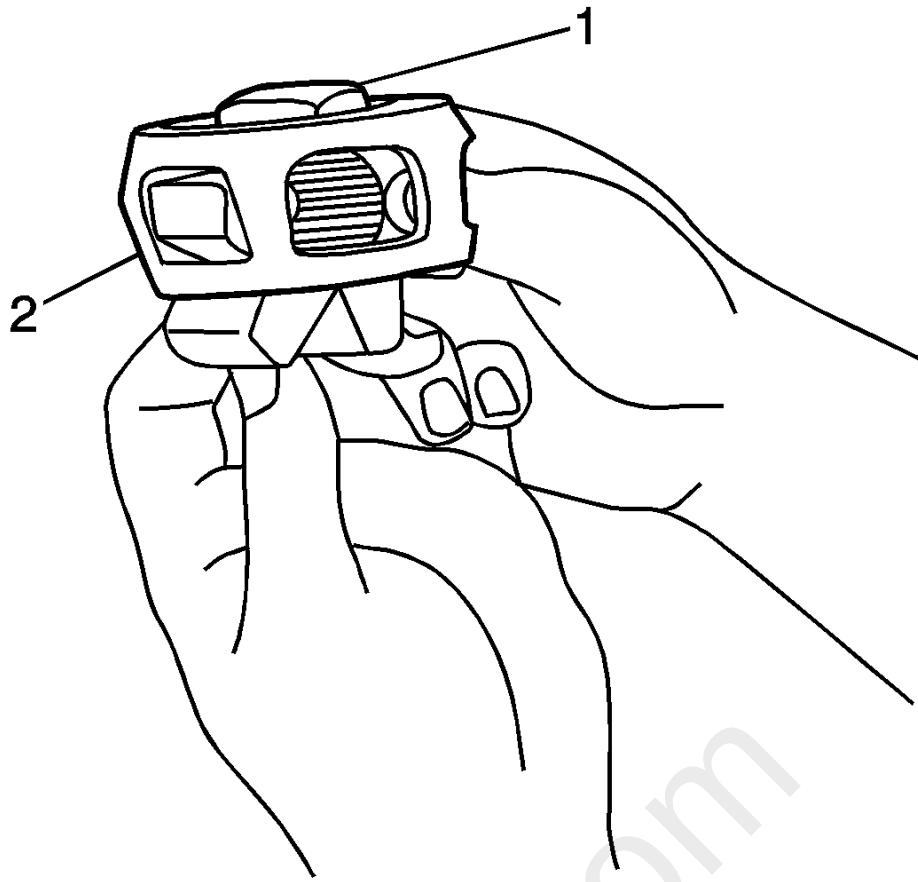


Fig. 85: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS COMPANY

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

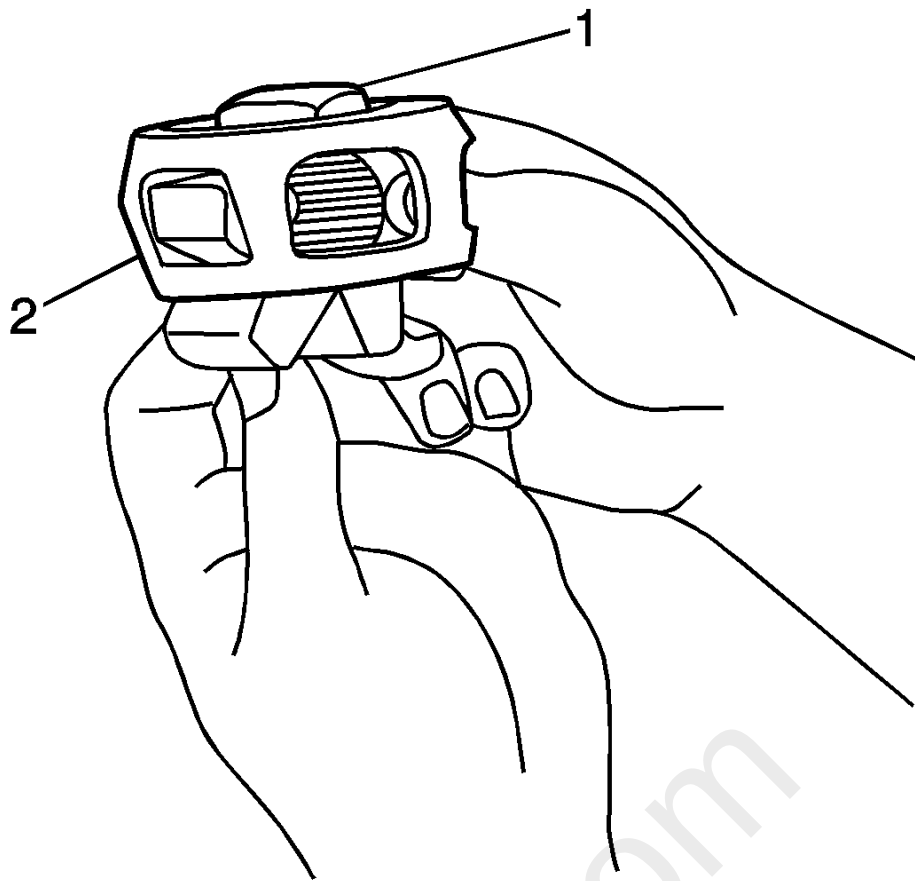


Fig. 86: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS COMPANY

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.

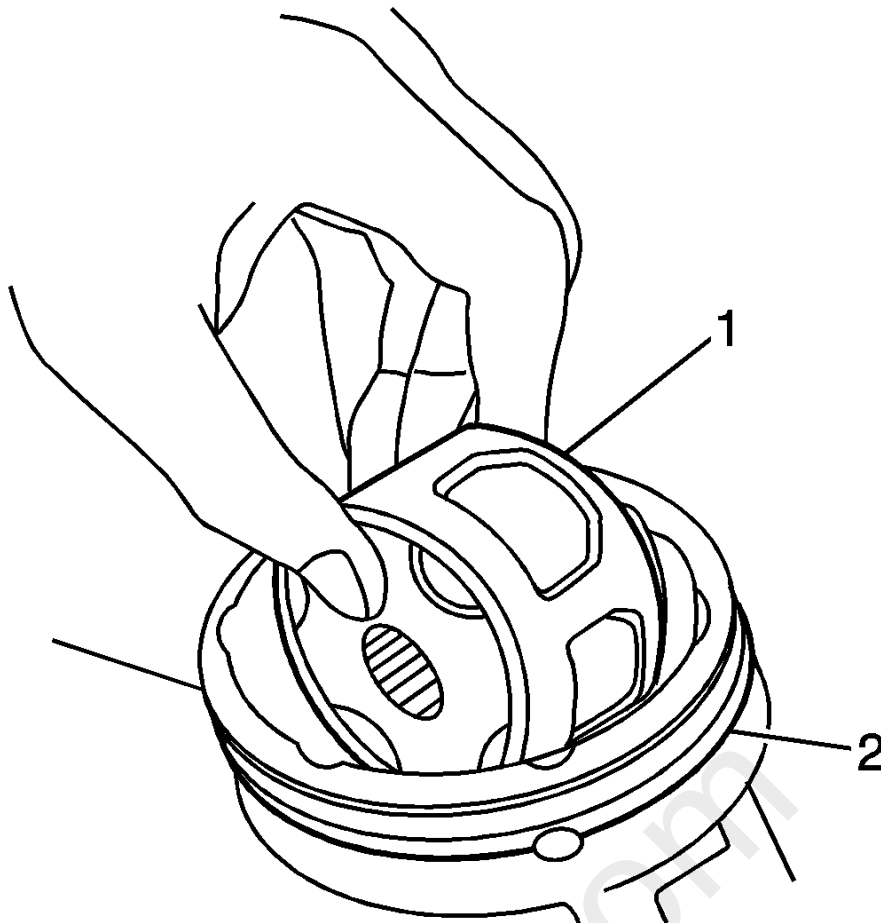


Fig. 87: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS COMPANY

9. Wrap a clean shop towel around the CV joint outer race spined 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).

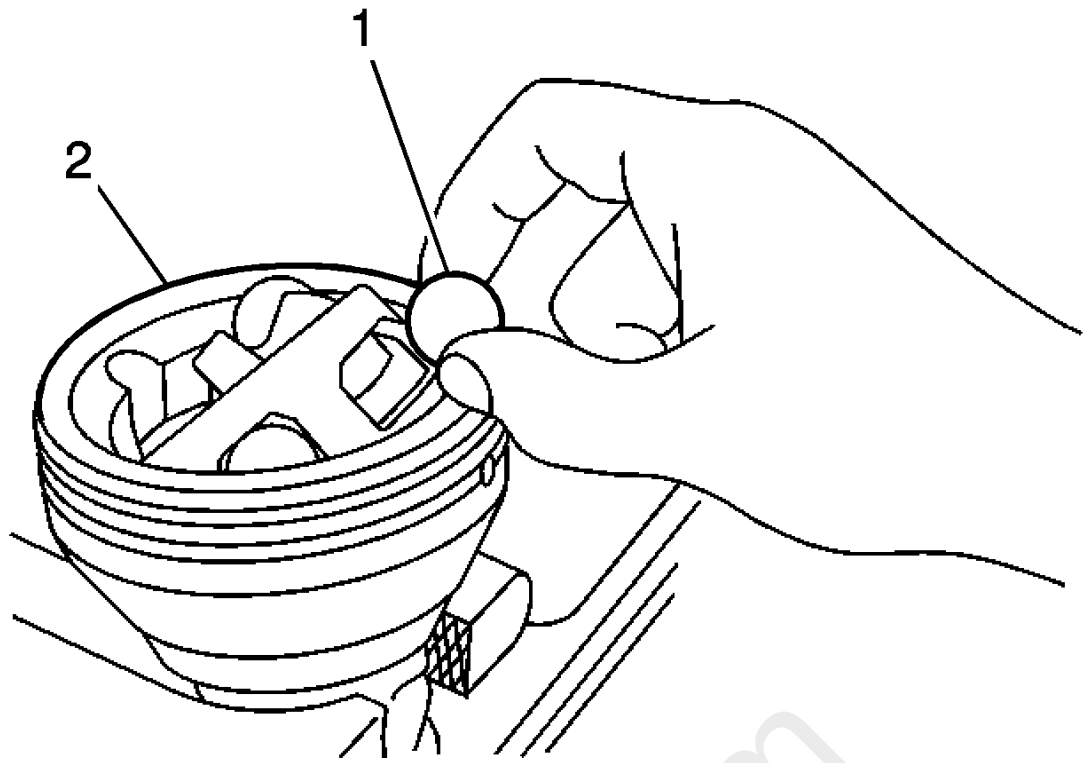


Fig. 88: Removing/Install Ball From Cage & Inner Race
Courtesy of GENERAL MOTORS COMPANY

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.

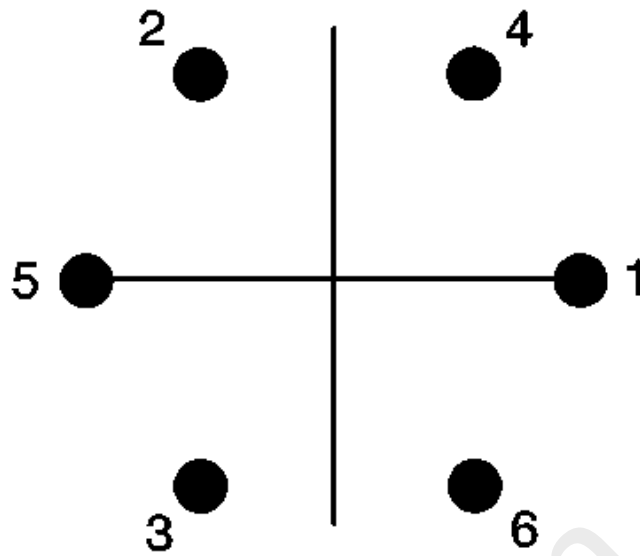


Fig. 89: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS COMPANY

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. [Front Wheel Drive Shaft Inner Joint and Boot Replacement](#).

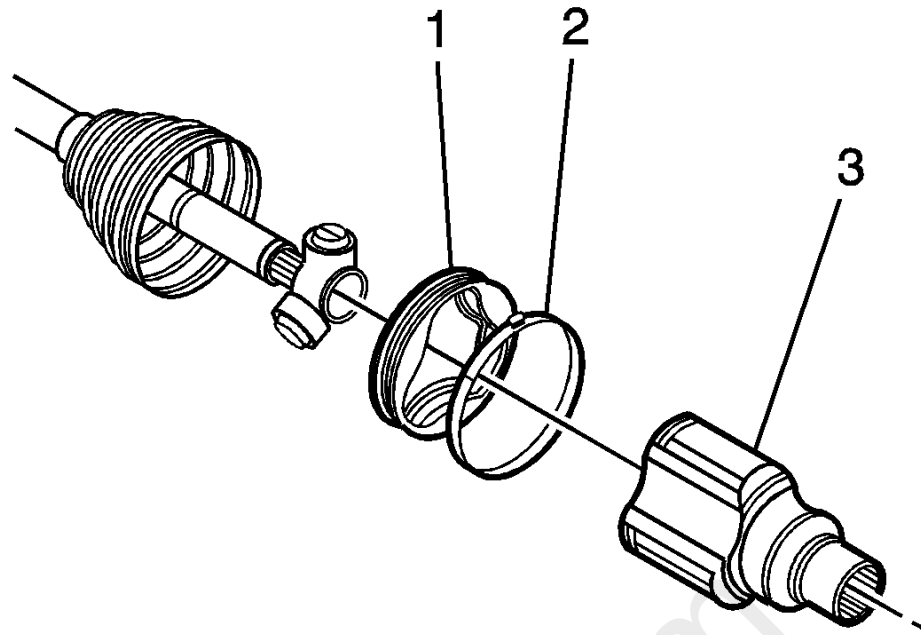


Fig. 90: Identifying Wheel Drive Shaft Inner Joint Inspection Areas
 Courtesy of GENERAL MOTORS COMPANY

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. **Front Wheel Drive Shaft Inner Joint and Boot Replacement.**

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Front wheel drive axles are flexible assemblies.

Front wheel drive axles consist of the following components:

- A front wheel drive shaft tripod joint (inner joint)
- A front wheel drive shaft constant velocity joint (outer joint)
- A front wheel drive shaft

The front wheel drive shaft connects the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joint.

The front wheel drive shaft tripot joint is completely flexible. The front wheel drive shaft tripot joint can move in and out.

The front wheel drive shaft constant velocity joint is flexible, but the front wheel drive shaft constant velocity joint cannot move in and out.

Boots And Clamps

The front wheel drive shaft constant velocity joint and the front wheel drive shaft tripot joint boots in the front wheel drive axle are made of a thermoplastic material.

The clamps in the front wheel drive axle are made of stainless steel.

The boot provides the following functions:

- Protection of the internal parts of the front wheel drive shaft constant velocity joint and the front wheel drive shaft tripot joint

The boot protects the grease from the following sources of damage:

- Harmful atmospheric conditions, such as extreme temperatures or ozone gas
- Foreign material, such as dirt or water
- Allows angular movement and the axial movement of the front wheel drive shaft tripot joint
- Allows angular movement of the front wheel drive shaft constant velocity joint

NOTE: **Protect the boots from sharp tools and from the sharp edges of the surrounding components. Any damage to the boots or the clamps will result in leakage. Leakage will allow water to leak into the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joints. Leakage will also allow grease to leak out of the front wheel drive shaft tripot joints and the front wheel drive shaft constant velocity joints. Leakage may cause noisy front wheel drive axle operation and eventual failure of the internal components.**

The clamps provide a leak proof connection for the front wheel drive shaft tripot joint and the front wheel drive shaft constant velocity joint at the following locations:

- The housing
- The front wheel drive shaft

The thermoplastic material performs well under normal conditions and normal operation. However, the material is not strong enough to withstand the following conditions:

- Abusive handling
- Damage from sharp objects, such as sharp tools or any sharp edges of the surrounding components in the vehicle

Front Wheel Drive Shaft Tripot Joint (Inner Joint)

The front wheel drive shaft tri-pot joint is made with the tripot design without an over-extension limitation retainer.

The joint is constructed as follows for vehicles that are equipped with an automatic transmission:

- The left front wheel drive axle has a female spline. The female spline installs over a stub shaft that protrudes from the transaxle.
- The right front wheel drive axle has a female spline. The right front wheel drive axle uses barrel type snap rings in order to interlock with the intermediate shaft.

Front Wheel Drive Shaft Constant Velocity Joint (Outer Joint)

The front wheel drive shaft constant velocity joint is made with the Rzeppa joint design.

The shaft end (which mates with the knuckle/hub) has a helical spline. The helical spline ensures a tight, press-type fit.

This design prevents end play between the hub bearing and the front wheel drive axle.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

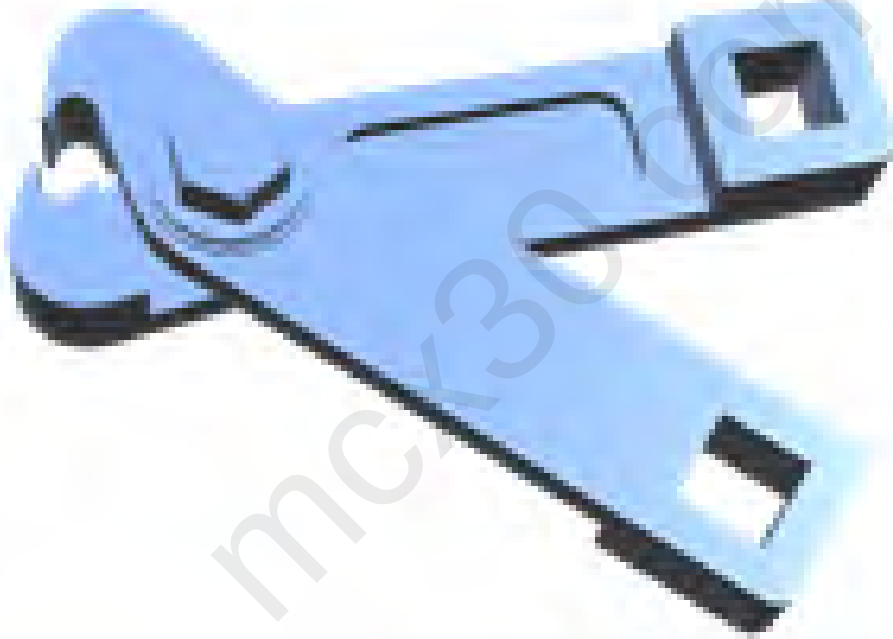
Illustration	Tool Number / Description
	DT-35910 CH-8904 J-35910 Drive Axle Boot Clamp Pliers

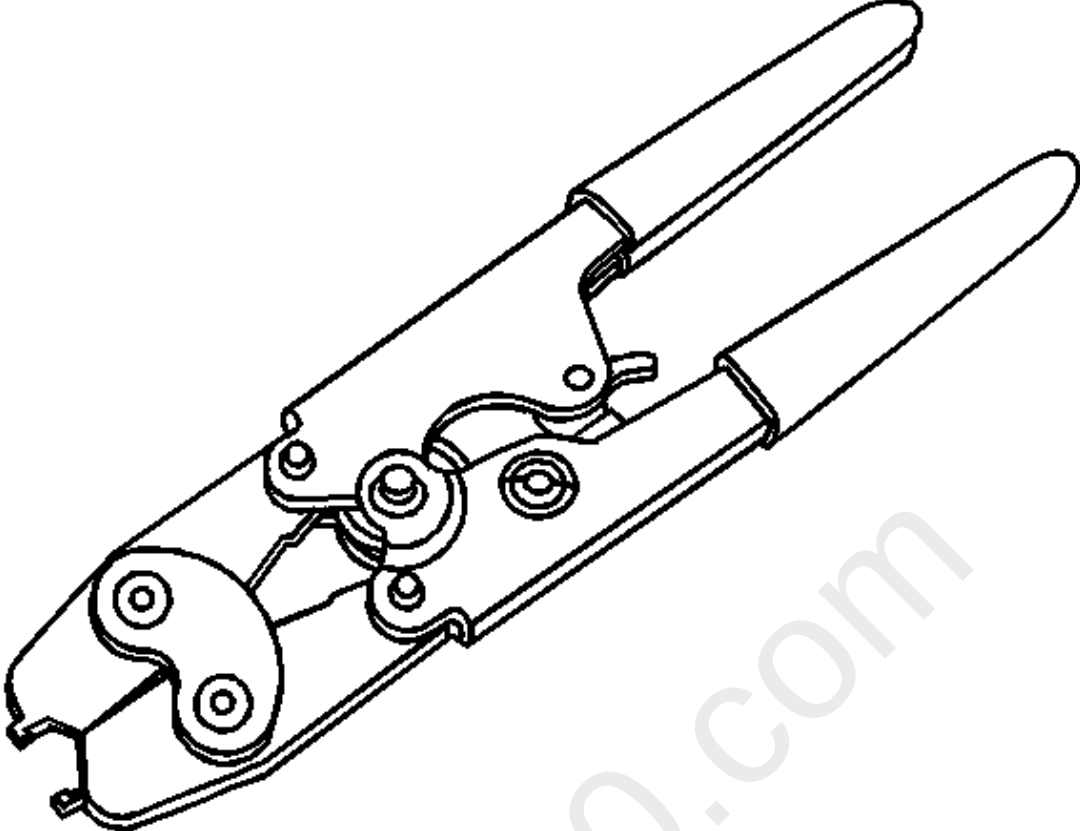
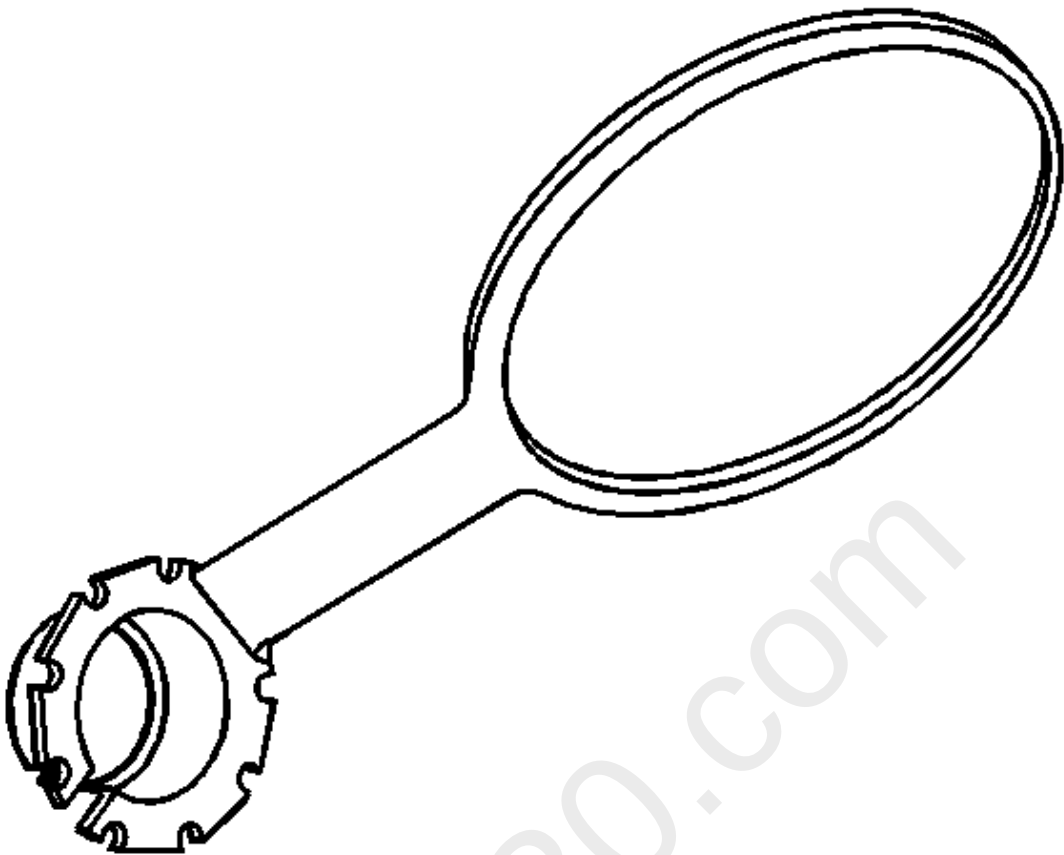
Illustration	Tool Number / Description
	CH-48894 DT-50185 J-35910 Wheel Drive Shaft Boot Clamp pliers

Illustration	Tool Number / Description
	DT-6332 DT-44394- A DT-49613 J-46332 KM-6332 Seal Protector

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Illustration	Tool Number / Description
	CH-49400 DT-45859 DT-50188 J-45859 Axle Remover