

## 2013 Chevrolet Cruze

2013 DRIVELINE/AXLE Wheel Drive Shafts - Cruze

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#### Wheel Drive Shafts - Cruze

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

#### Fastener Tightening Specifications

| Application                                       | Specification |           |
|---------------------------------------------------|---------------|-----------|
|                                                   | Metric        | English   |
| Front Wheel Drive Intermediate Shaft Bearing Bolt | 22 N.m        | 16 lb ft  |
| Intermediate Shaft Bracket Bolt                   | 58 N.m        | 43 lb ft  |
| Retaining Clamp                                   | 25 N.m        | 18 lb ft  |
| Wheel Drive Shaft Nut (1)                         |               |           |
| • First Pass                                      | 150 N.m       | 111 lb ft |
| • Release                                         | 45 Degrees    |           |
| • Third Pass                                      | 250 N.m       | 184 lb ft |
| 1 = Use NEW Fastener.                             |               |           |

### ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

#### Adhesives, Fluids, Lubricants, and Sealers

| Application                             | Type of Material | GM Part Number |        |
|-----------------------------------------|------------------|----------------|--------|
|                                         |                  | United States  | Canada |
| Wheel Drive Shaft Inner and Outer Joint | Grease           | 1051344        | 993037 |

## DIAGNOSTIC INFORMATION AND PROCEDURES

### SYMPTOMS - WHEEL DRIVE SHAFTS

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

1. Perform the **Vibration Analysis - Road Testing** in order to effectively diagnose the concern.
2. 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

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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**

#### 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, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the outer joint manually. Any binding or impeded movement of the joint 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 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, it may be necessary to remove the wheel drive shaft from the vehicle and manipulate the inner joint manually. Do not allow the joint to separate from the wheel drive shaft bar. Any binding or impeded movement of the joint 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.

If 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 **Symptoms - Vibration Diagnosis and Correction** .

## REPAIR INSTRUCTIONS

### FRONT WHEEL DRIVE INTERMEDIATE SHAFT REPLACEMENT

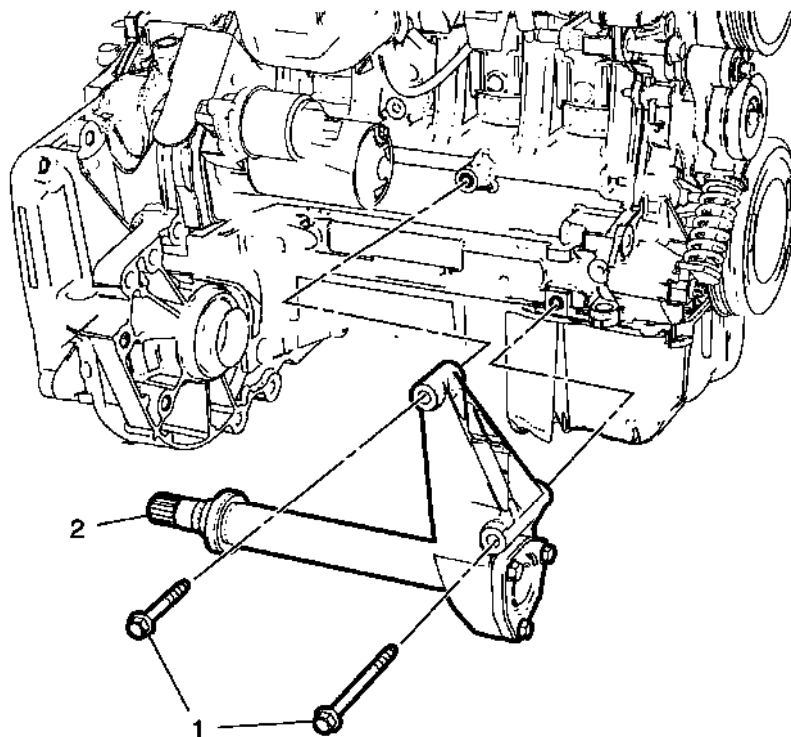


**Fig. 1: Front Wheel Drive Intermediate Shaft**  
Courtesy of GENERAL MOTORS COMPANY

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### Front Wheel Drive Intermediate Shaft Replacement

| Callout                                                                                                                                  | Component Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedures</b><br>Remove the wheel drive shaft. Refer to <b><u>Front Wheel Drive Shaft Replacement - Right Side</u></b> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1                                                                                                                                        | Intermediate Shaft Bracket Bolt (Qty: 3)<br><br><b>CAUTION:</b><br><b>Refer to <u>Fastener Caution</u> .</b><br><br><b>Tighten</b><br>58 N.m (43 lb ft)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2                                                                                                                                        | Front Wheel Drive Intermediate Shaft and Bracket Assembly<br><br><b>Procedure</b><br><br><ol style="list-style-type: none"><li>1. Remove and DISCARD the O-ring. DO NOT re-use, replace with NEW only.</li><li>2. The <b>DT-6332</b> protector must be installed into the differential output shaft seal prior installation the intermediate shaft.</li><li>3. For vehicles with automatic transmission, check transmission fluid level. Refer to <b><u>Transmission Fluid Drain and Fill</u></b> .</li><li>4. For vehicles with manual transmission, check transmission fluid level. Refer to <b><u>Transmission Fluid Drain and Fill</u></b> .</li></ol><br><b>Special Tools</b><br><b>DT-6332</b> Seal Protector<br>For equivalent regional tools, refer to <b><u>Special Tools</u></b> . |

### FRONT WHEEL DRIVE SHAFT REPLACEMENT - LEFT SIDE

#### Special Tools

- **CH-313** Slide Hammer
- **CH-6003** Axle Shaft Remover
- **DT-6332** Seal Protector
- **DT-29794** Axle Shaft Remover Extension
- **CH-49400** Hub Spindle Remover

For equivalent regional tools, refer to **Special Tools**.

#### Removal Procedure

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### 2013 DRIVELINE/AXLE Wheel Drive Shafts - Cruze

**WARNING:** To prevent personal injury and/or component damage, do not allow the weight of the vehicle to load the front wheels, or attempt to operate the vehicle, when the wheel drive shaft(s) or wheel drive shaft nut(s) are removed. To do so may cause the inner bearing race to separate, resulting in damage to brake and suspension components and loss of vehicle control.

**CAUTION:** Wheel drive shaft boots, seals and clamps should be protected from sharp objects any time service is performed on or near the wheel drive shaft(s). Damage to the boot(s), the seal(s) or the clamp(s) may cause lubricant to leak from the joint and lead to increased noise and possible failure of the wheel drive shaft.

1. Raise and suitably 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** .
3. Drain the transmission.
  - For vehicles with manual transmission, refer to **Transmission Fluid Drain and Fill** .
  - For vehicles with automatic transmission, refer to **Transmission Fluid Drain and Fill** .

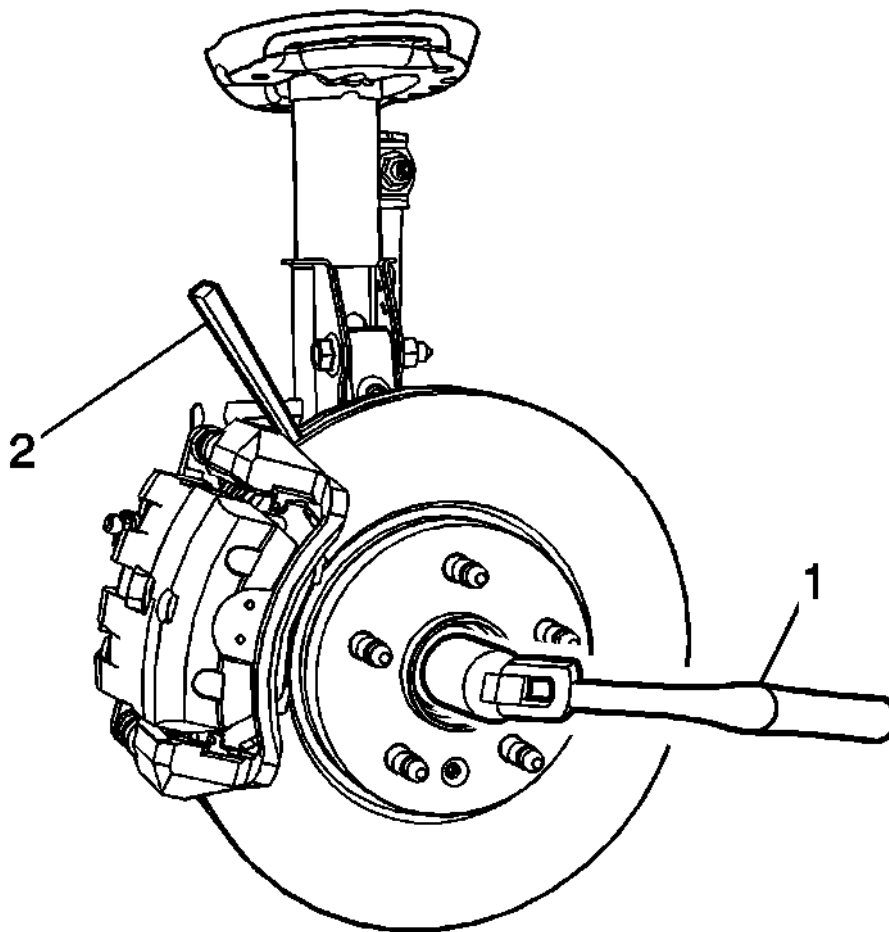


**Fig. 2: Breaker Bar And Punch Or Drift Tools**

Courtesy of GENERAL MOTORS COMPANY

4. Insert a drift or punch (2) in the cooling fins of the brake rotor.
5. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.
6. Using a breaker bar (1), loosen the wheel drive shaft nut.

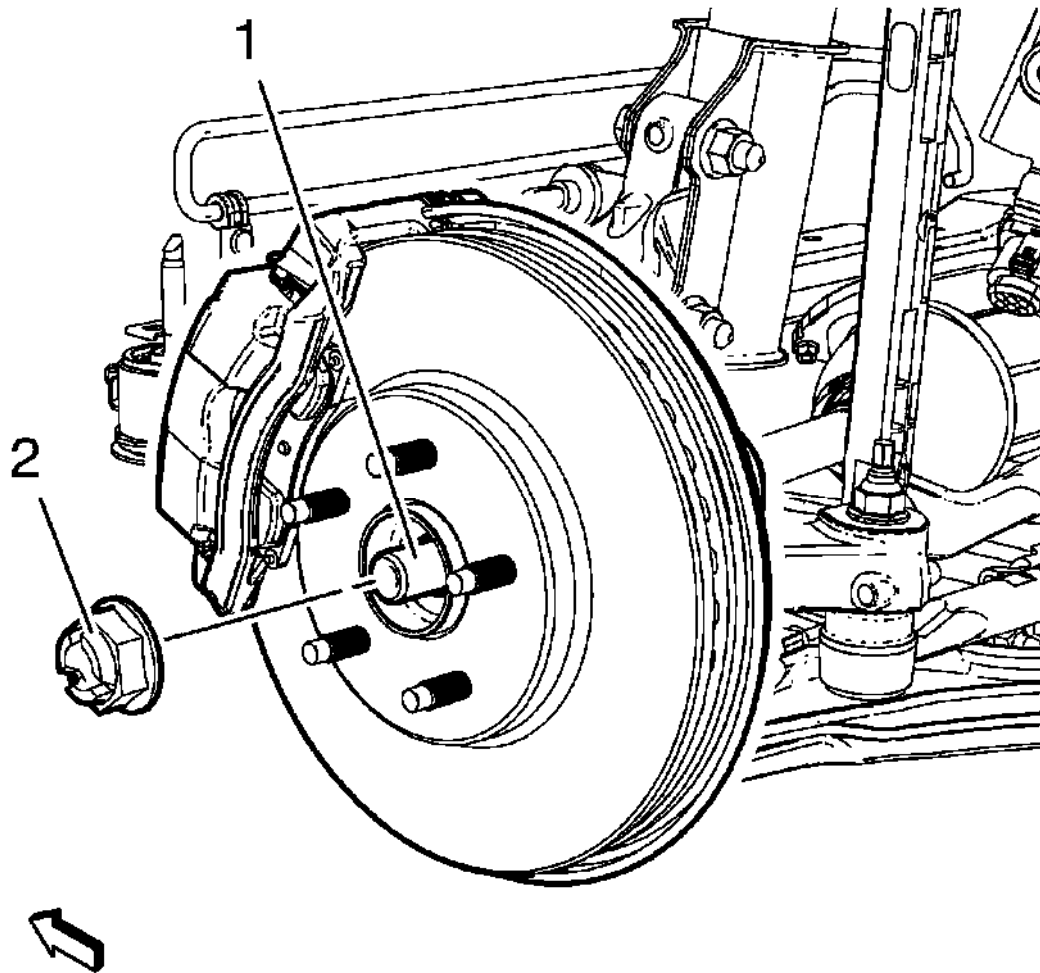


**Fig. 3: Wheel Drive Shaft And Nut**

**Courtesy of GENERAL MOTORS COMPANY**

7. Remove and DISCARD the wheel drive shaft nut (2) from the wheel drive shaft (1).

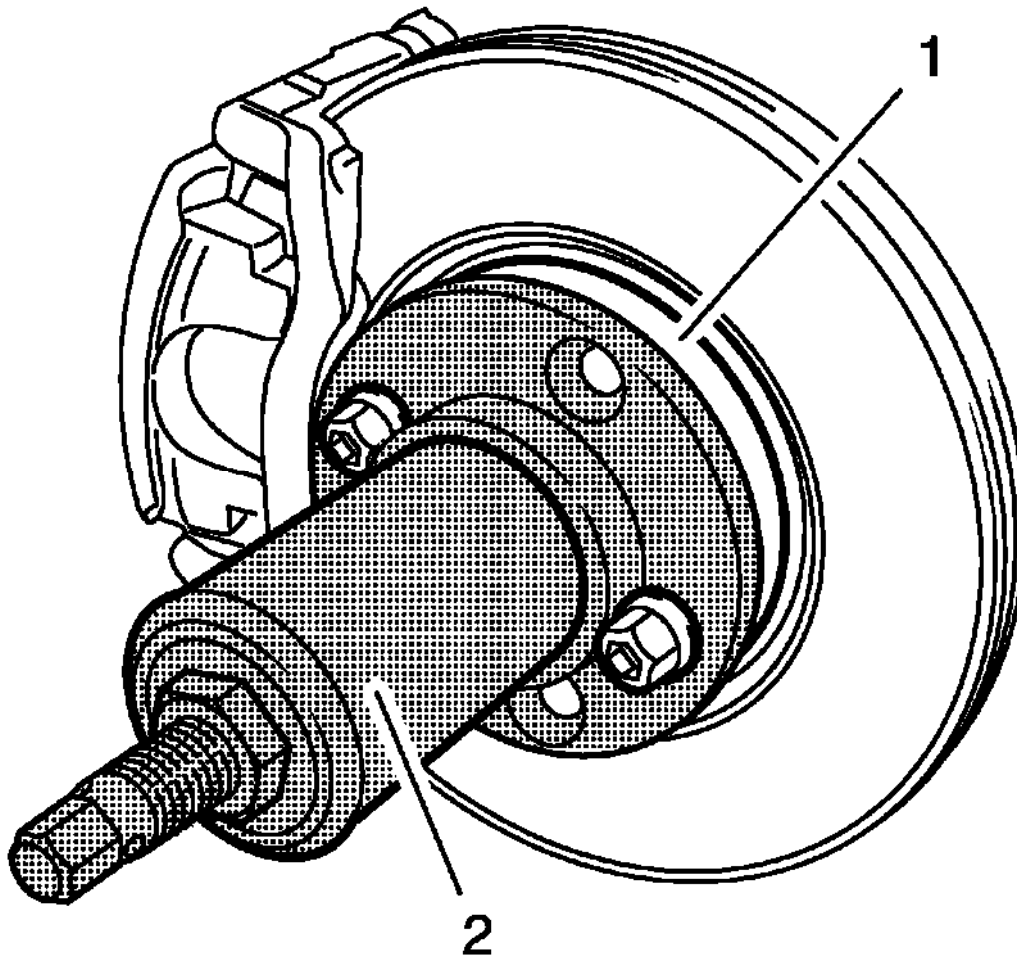


**Fig. 4: Special Tool And Wheel Bearing/Hub Assembly**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Do not hit the end of the wheel drive shaft with a hammer to separate it from the wheel bearing/hub. Damage to the wheel bearing hub and/or wheel drive shaft may result.

8. Using the **CH-49400** remover (2) or equivalent, separate the brake rotor and wheel bearing/hub assembly (1).
9. Remove the outer tie rod assembly from the steering knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .
10. Remove the ball joint from the steering knuckle. Refer to **Lower Control Arm Replacement** .

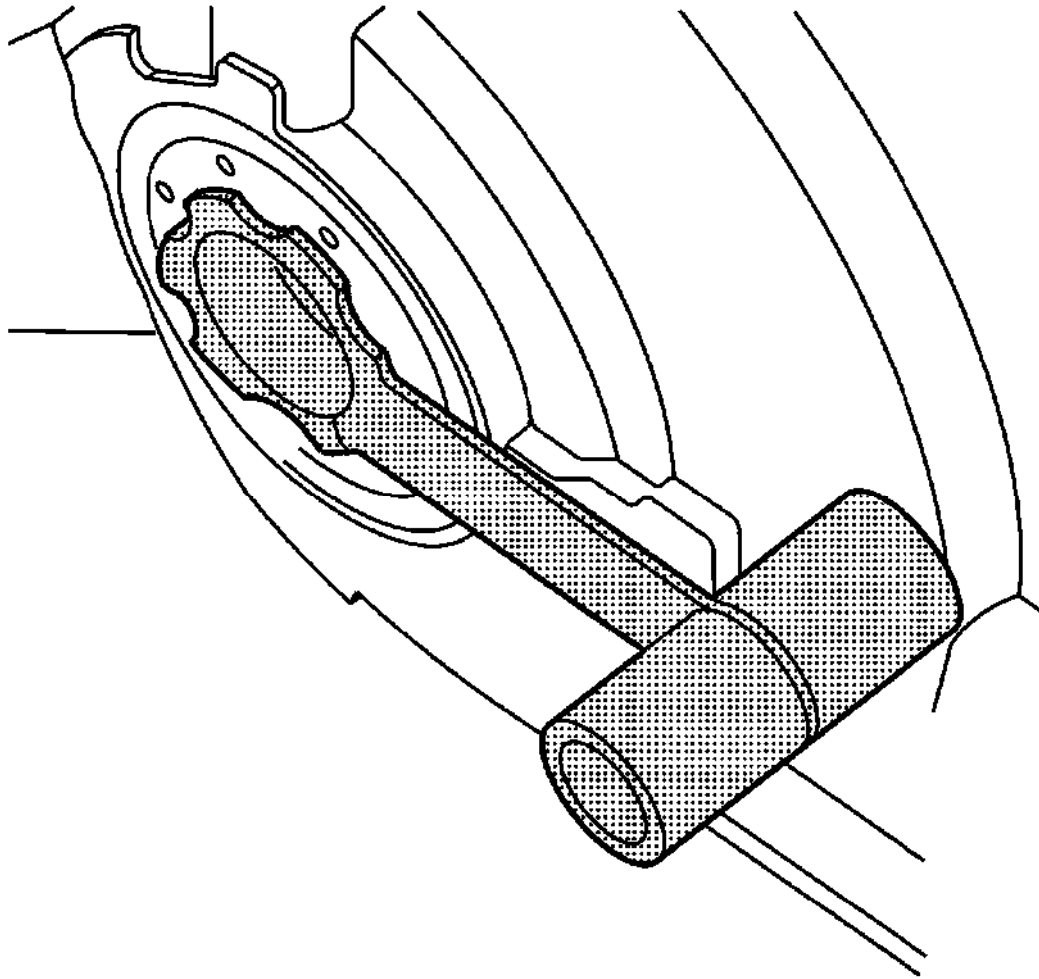


**Fig. 5: Seal Protector**

Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Wheel drive shaft seal protector must be installed into the differential output shaft seal prior to removing and installing the wheel drive shaft. Failure to install the wheel drive shaft seal protector as indicated may cause the splines of the wheel drive shaft to cut the differential output seal.

11. Install the **DT-6332** protector into the differential output shaft seal.

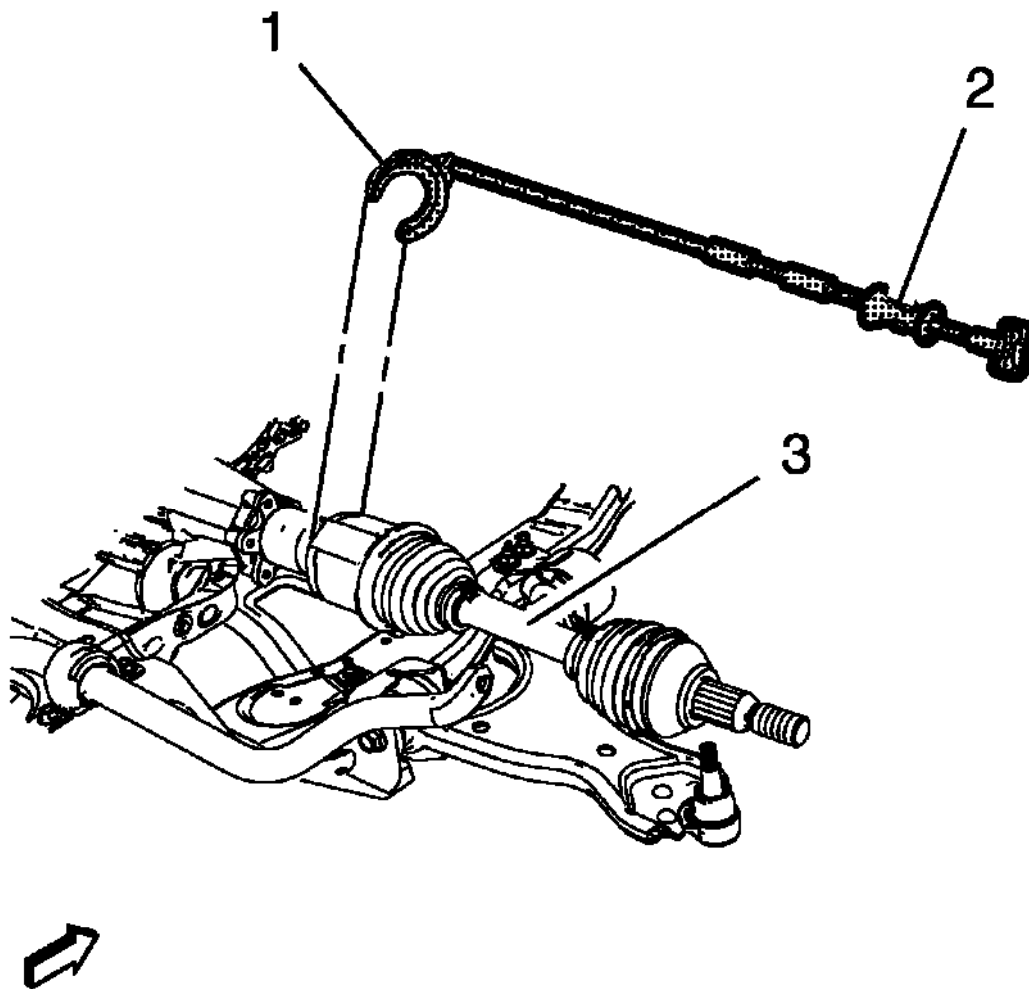


**Fig. 6: Special Tools And Wheel Drive Shaft**

Courtesy of GENERAL MOTORS COMPANY

12. Using the **CH-313** hammer (2) with **CH-6003** remover (1) along with **DT-29794** extension and remove the wheel drive shaft (3) from the vehicle.

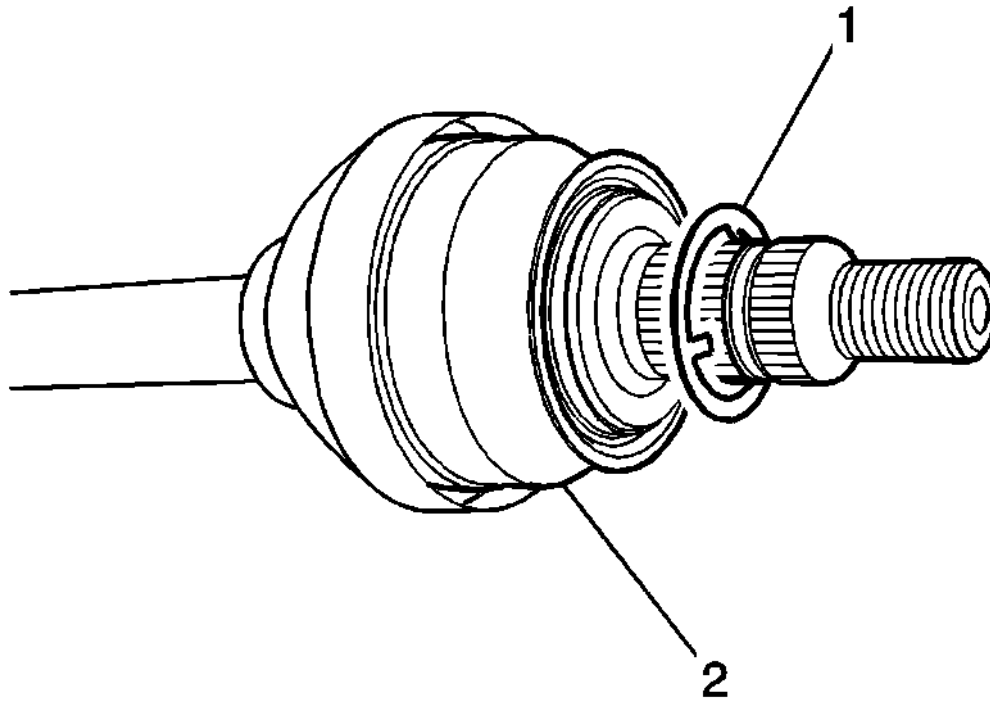


**Fig. 7: Wheel Drive Shaft & Washer**

Courtesy of GENERAL MOTORS COMPANY

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

13. Remove and discard the washer (1) from the wheel drive shaft (2). **DO NOT** re-use the washer, replace with **NEW** only.

**Installation Procedure**

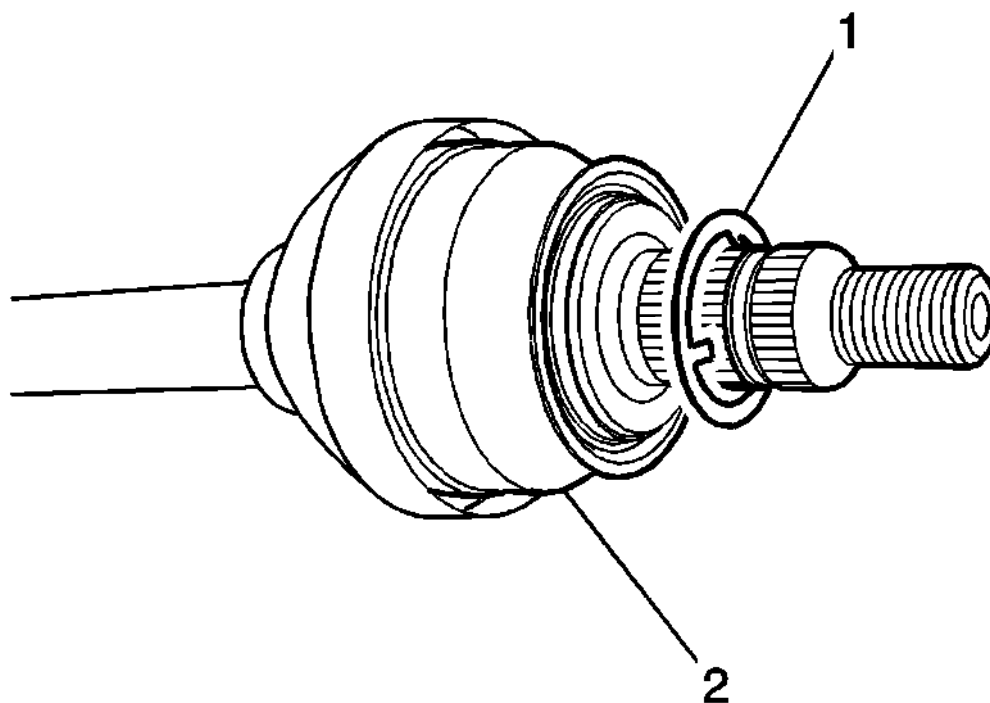


**Fig. 8: Wheel Drive Shaft & Washer**

Courtesy of GENERAL MOTORS COMPANY

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

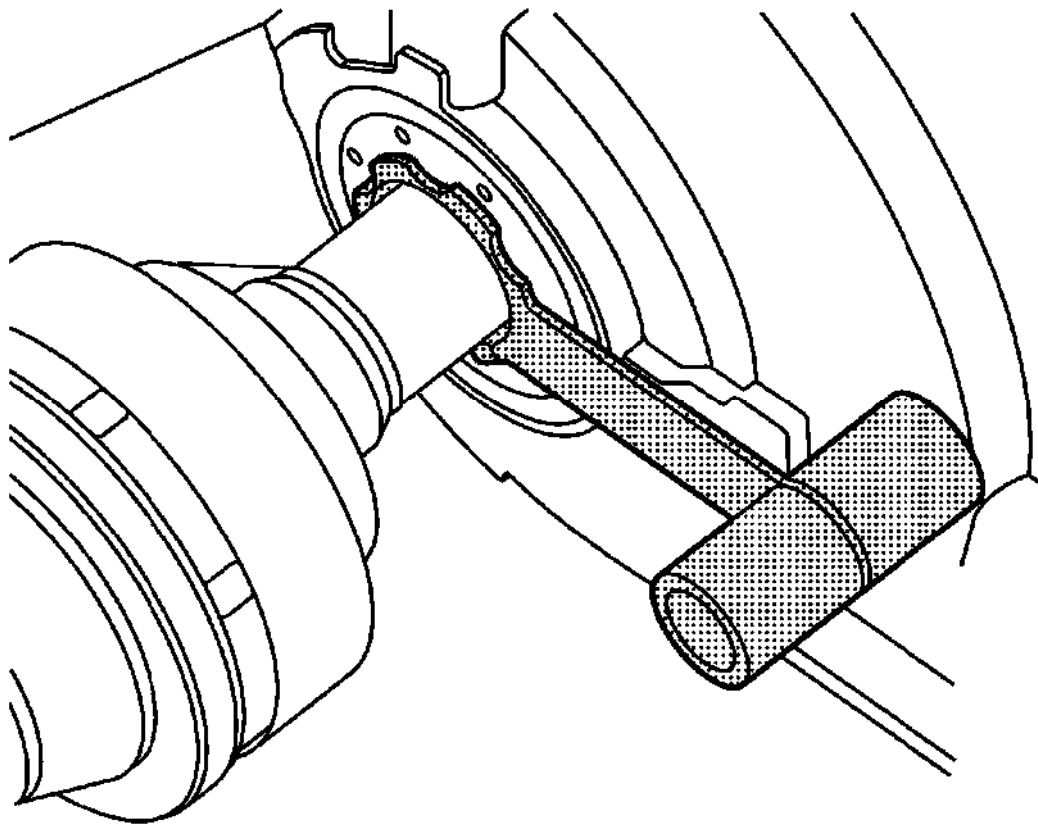


**Fig. 9: Output Shaft Protector Tool**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** In order to prevent lubricant leaks, use care when installing the wheel drive shaft to the differential. Do not damage the oil seal. Replace the oil seal if it becomes nicked, distorted, or otherwise damaged.

2. Carefully install the wheel drive shaft into the differential until the splines are past the **DT-6332** protector.

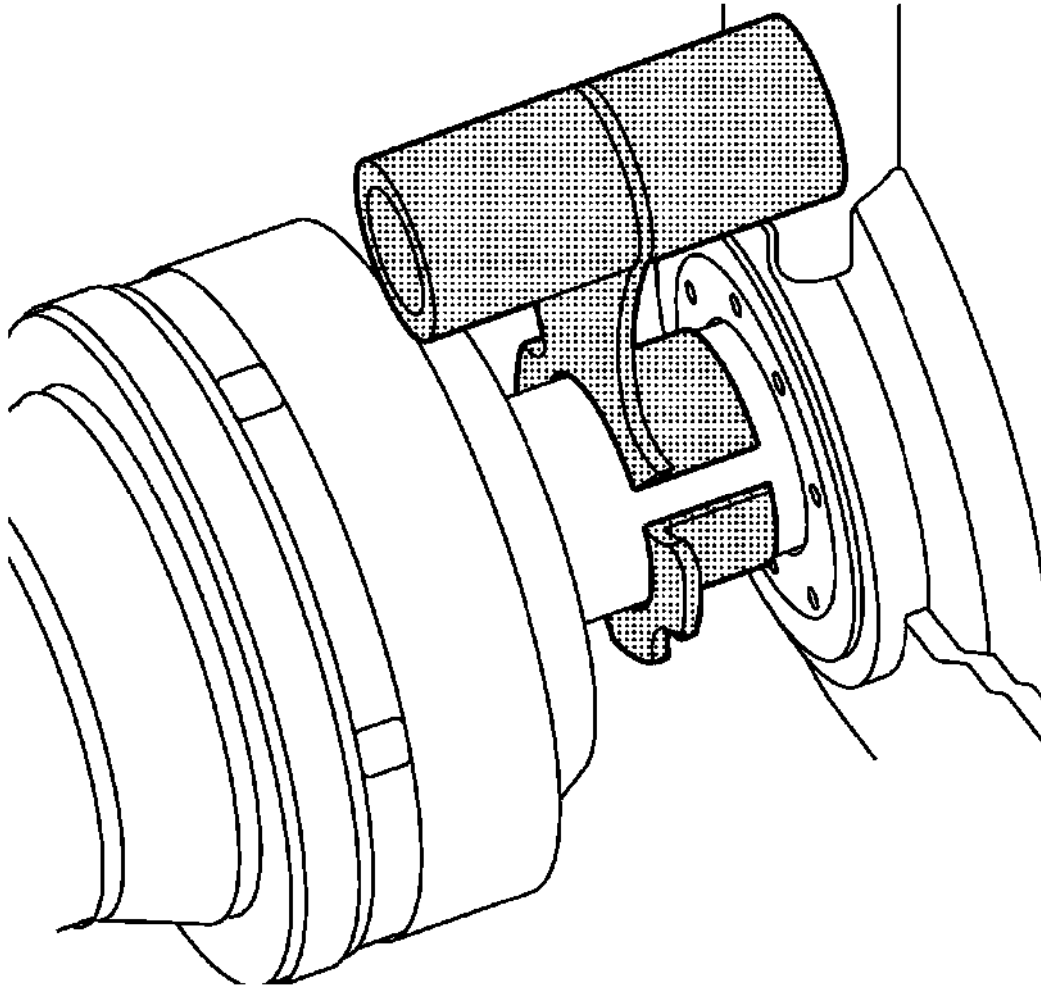


**Fig. 10: Special Output Shaft Protector Tool**  
**Courtesy of GENERAL MOTORS COMPANY**

3. Remove the **DT-6332** protector from the differential output shaft seal.
4. Install the wheel drive shaft into the differential until the retaining ring is fully seated.
5. Confirm that the front wheel drive shaft retaining ring is properly seated by holding the inner housing and pull the inner housing outward
6. Install the front wheel drive shaft into the front wheel bearing/hub.
7. Install the ball joint to the steering knuckle. Refer to **Lower Control Arm Replacement** .
8. Install the outer tie rod assembly at the steering knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

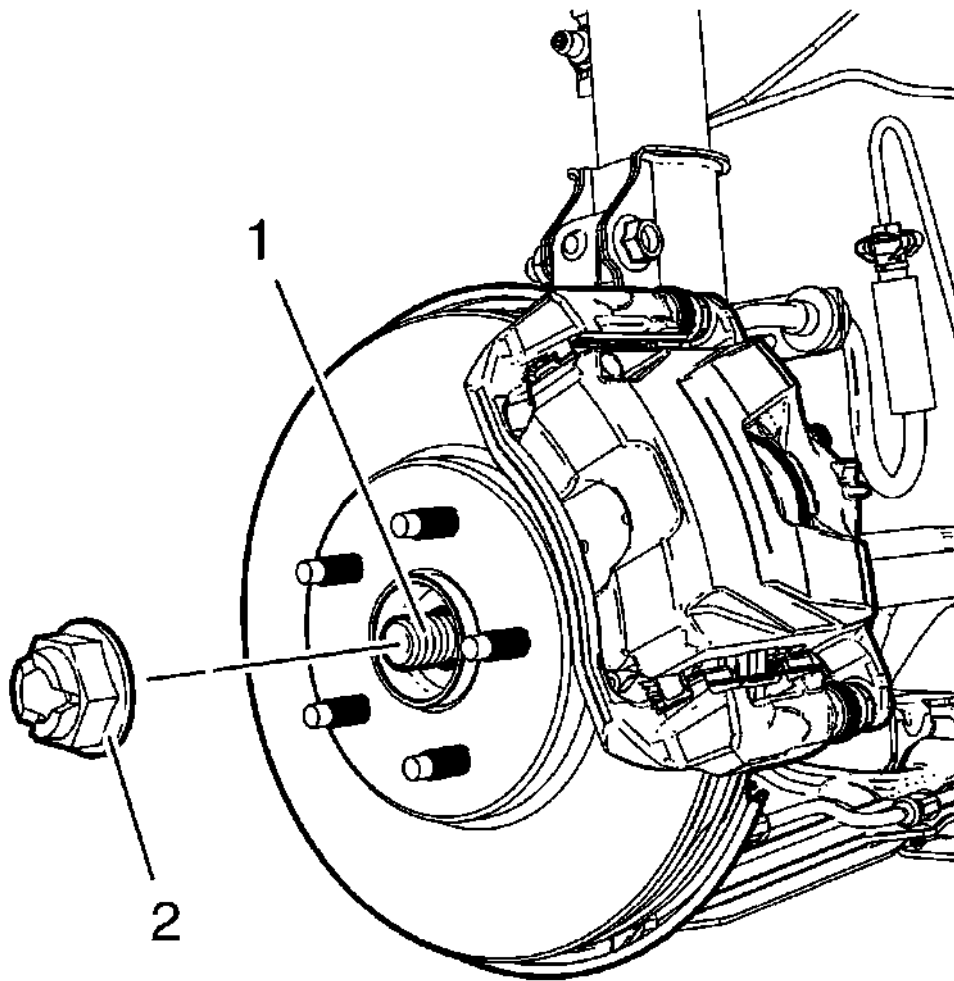


**Fig. 11: Wheel Drive Shaft And Nut**

Courtesy of GENERAL MOTORS COMPANY

**WARNING:** Refer to Torque-to-Yield Fastener Warning .

**CAUTION:** Refer to Fastener Caution .

9. Install the NEW wheel drive shaft nut (2) to the wheel drive shaft (1) tighten in 3 passes.

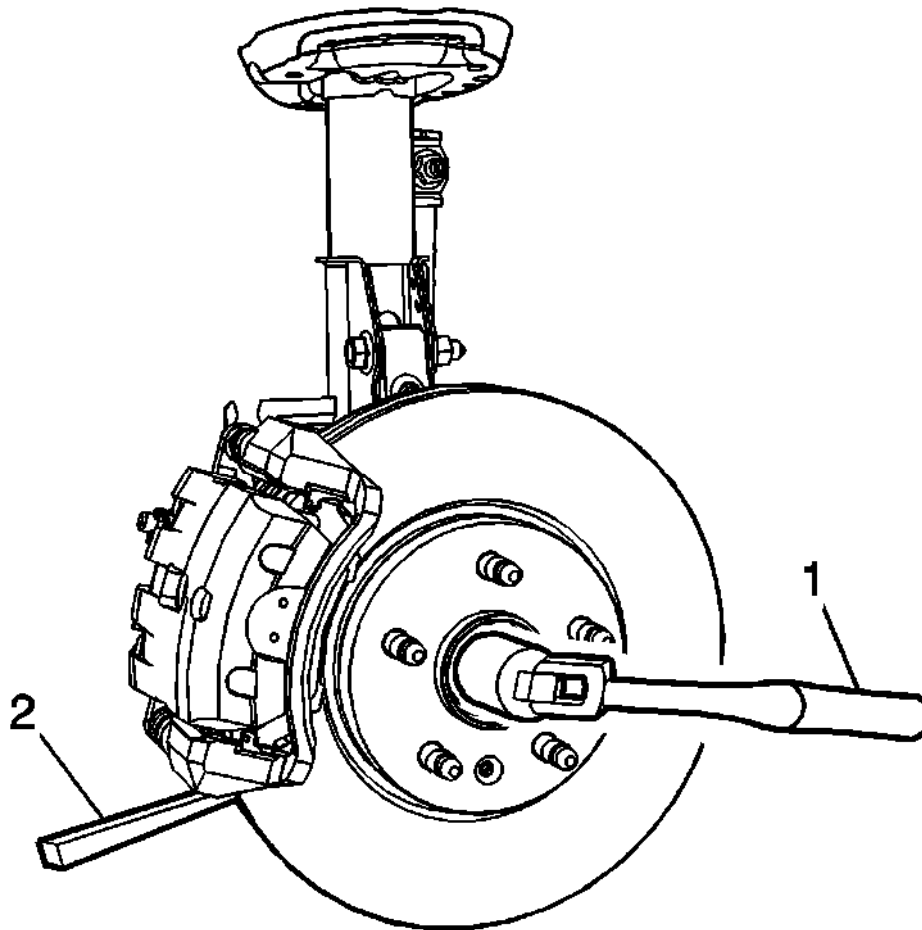


**Fig. 12: Tightening Wheel Drive Shaft Nut**  
 Courtesy of GENERAL MOTORS COMPANY

10. Insert a drift or punch (2) in the cooling fins of the brake rotor.
11. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.
12. Using a torque wrench (1) and the appropriate size socket, tighten the wheel drive shaft nut to 150 N.m (111 lb ft).
13. Release the wheel drive shaft nut (2) trough 45 degrees.
14. Retighten the wheel drive shaft nut (2) to 250 N.m (185 lb ft).
15. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
16. Lower the vehicle.
17. Refill the transmission.
  - For vehicles with manual transmission, refer to **Transmission Fluid Drain and Fill** .
  - For vehicles with automatic transmission, refer to **Transmission Fluid Drain and Fill** .

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#### Special Tools

- **CH-313** Slide Hammer
- **CH-6003** Axle Shaft Remover
- **DT-6332** Seal Protector
- **DT-29794** Axle Shaft Remover Extension
- **CH-49400** Hub Spindle Remover

For equivalent regional tools, refer to **Special Tools**.

#### Removal Procedure

**WARNING:** To prevent personal injury and/or component damage, do not allow the weight of the vehicle to load the front wheels, or attempt to operate the vehicle, when the wheel drive shaft(s) or wheel drive shaft nut(s) are removed. To do so may cause the inner bearing race to separate, resulting in damage to brake and suspension components and loss of vehicle control.

**CAUTION:** Wheel drive shaft boots, seals and clamps should be protected from sharp objects any time service is performed on or near the wheel drive shaft(s). Damage to the boot(s), the seal(s) or the clamp(s) may cause lubricant to leak from the joint and lead to increased noise and possible failure of the wheel drive shaft.

1. Raise and suitably 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** .
3. Drain the transmission.
  - For vehicles with manual transmission, refer to **Transmission Fluid Drain and Fill** .
  - For vehicles with automatic transmission, refer to **Transmission Fluid Drain and Fill** .

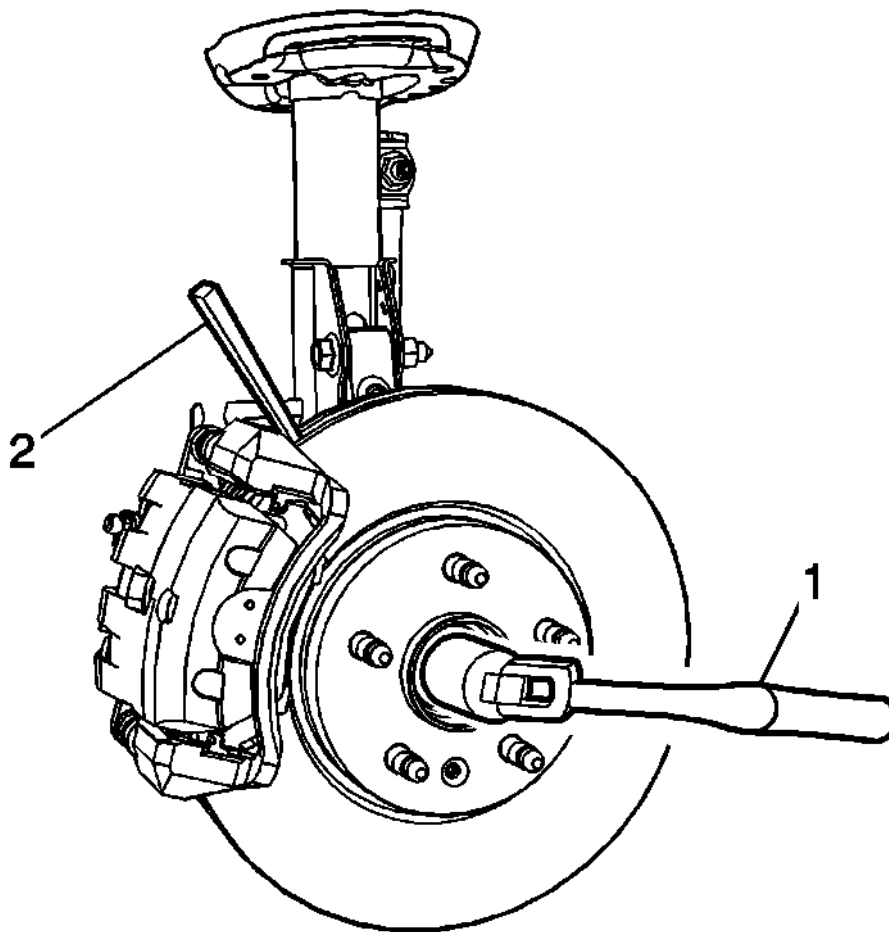


**Fig. 13: Breaker Bar And Punch Or Drift Tools**  
Courtesy of GENERAL MOTORS COMPANY

4. Insert a drift or punch (2) in the cooling fins of the brake rotor.
5. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.
6. Using a breaker bar (1), loosen the wheel drive shaft nut.

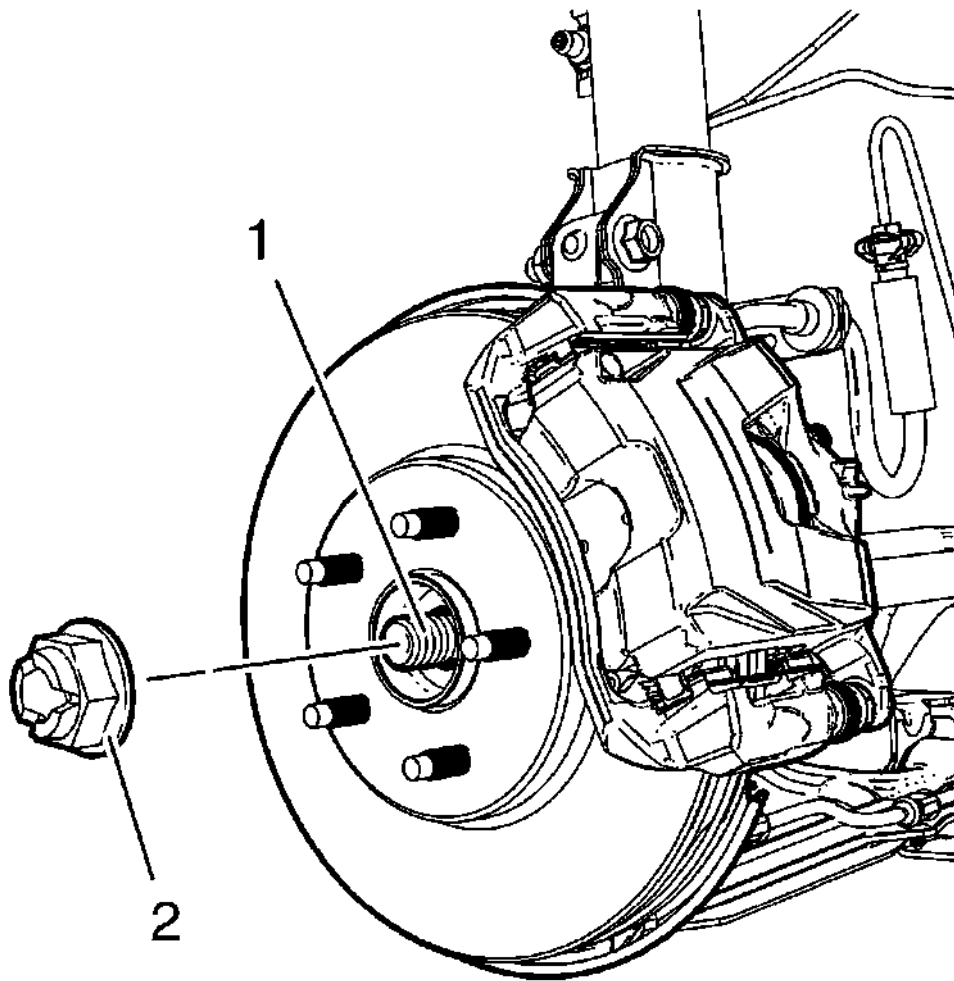


**Fig. 14: Wheel Drive Shaft And Nut**

**Courtesy of GENERAL MOTORS COMPANY**

7. Remove and DISCARD the wheel drive shaft nut (2) from the wheel drive shaft (1).

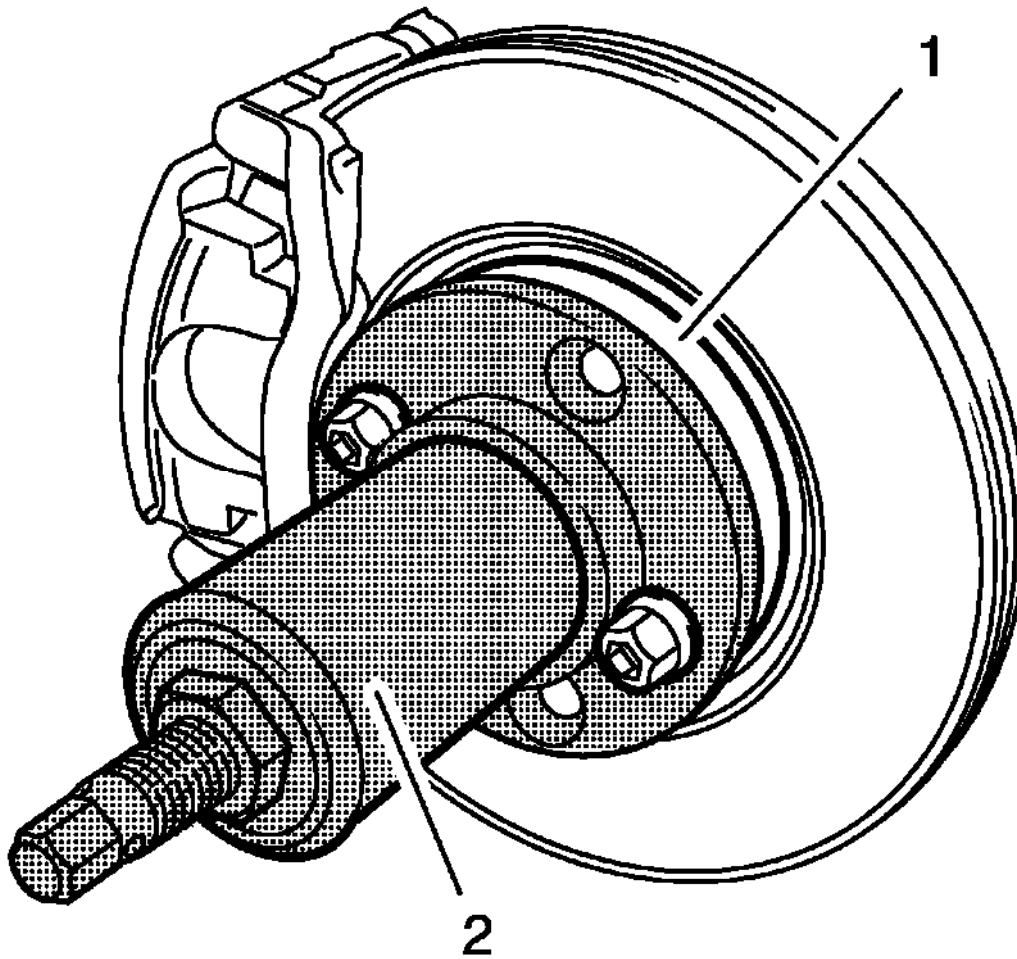


**Fig. 15: Special Tool And Wheel Bearing/Hub Assembly**

Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

**NOTE:** Do not hit the end of the wheel drive shaft with a hammer to separate it from the wheel bearing/hub. Damage to the wheel bearing hub and/or wheel drive shaft may result.

8. Using the **CH-49400** remover (2) or equivalent, separate the brake rotor and wheel bearing/hub assembly (1).

9. Remove the outer tie rod assembly from the steering knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .
10. Remove the ball joint from the steering knuckle. Refer to **Lower Control Arm Replacement** .

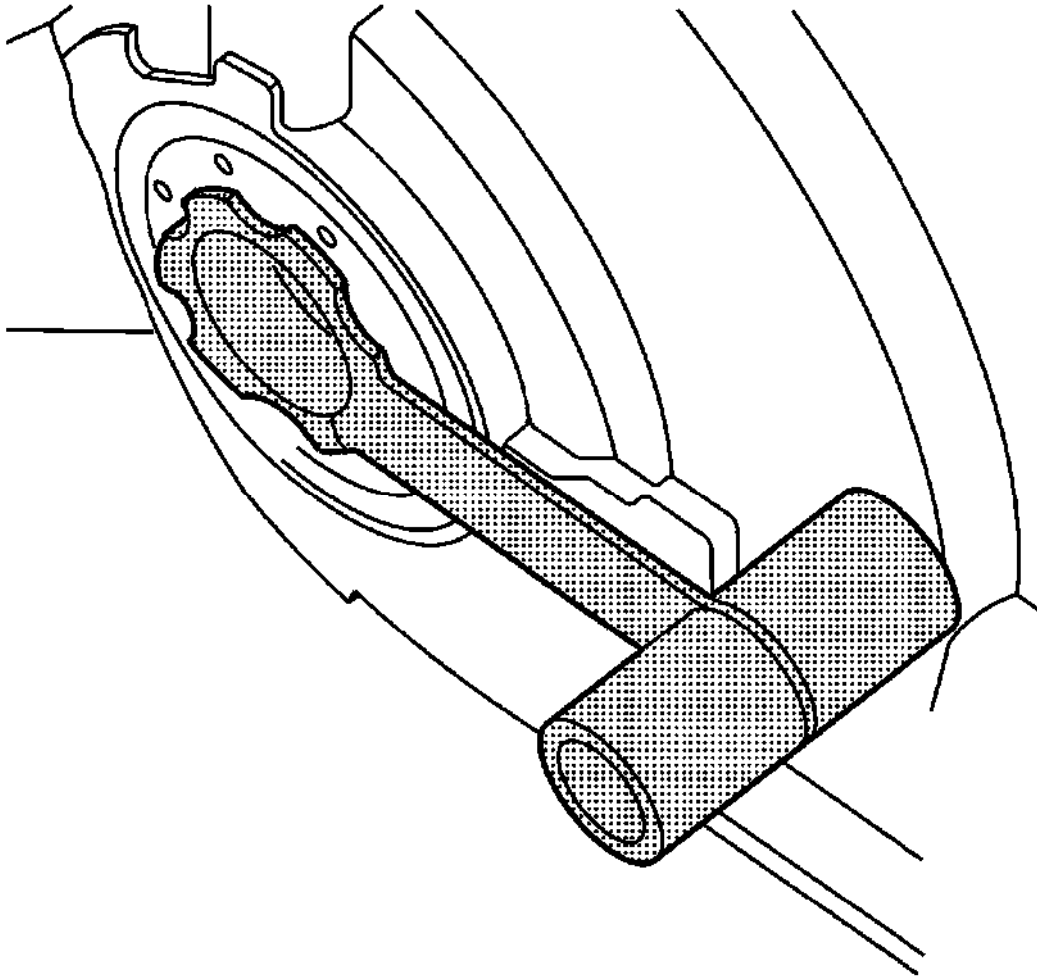


**Fig. 16: Seal Protector**

Courtesy of GENERAL MOTORS COMPANY

**CAUTION:** Wheel drive shaft seal protector must be installed into the differential output shaft seal prior to removing and installing the wheel drive shaft. Failure to install the wheel drive shaft seal protector as indicated may cause the splines of the wheel drive shaft to cut the differential output seal.

11. Install the **DT-6332** protector into the differential output shaft seal.

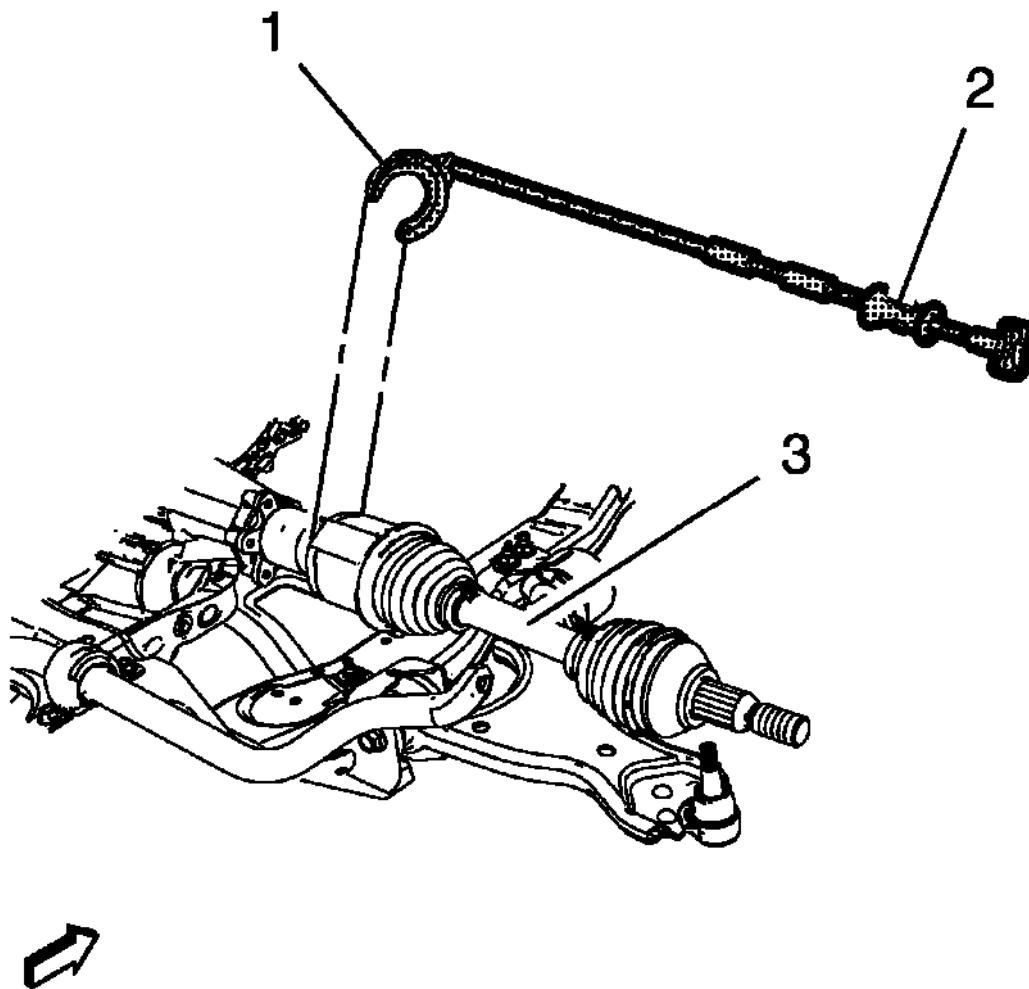


**Fig. 17: Special Tools And Wheel Drive Shaft**  
Courtesy of GENERAL MOTORS COMPANY

12. Using the **CH-313** hammer (2) with **CH-6003** remover (1) along with **DT-29794** extension and remove the wheel drive shaft (3) from the vehicle.

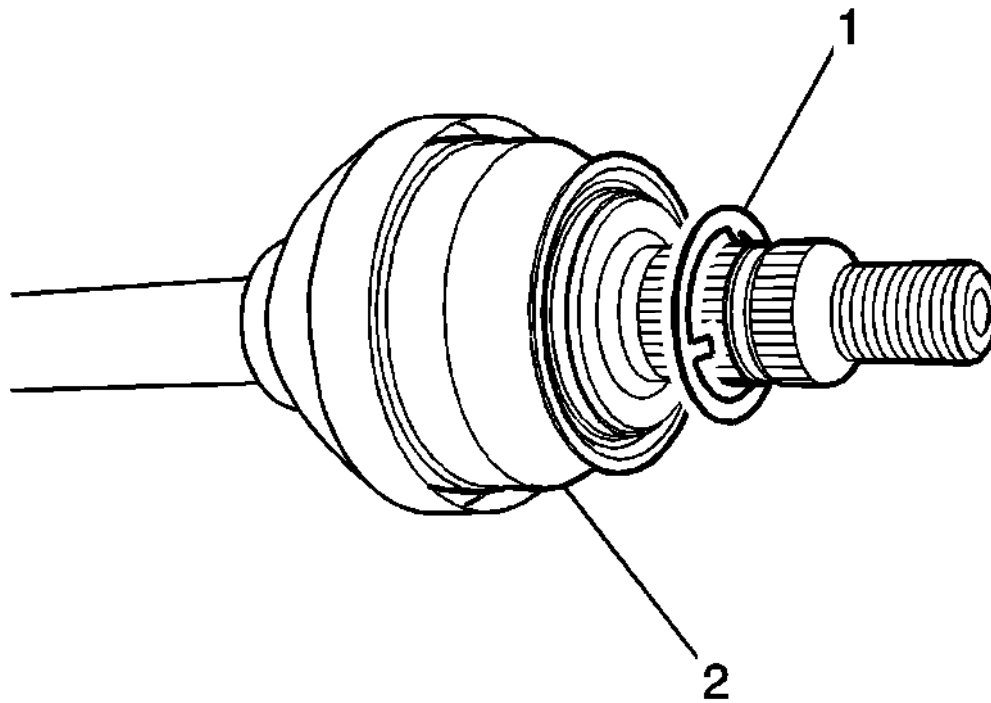


**Fig. 18: Wheel Drive Shaft & Washer**

Courtesy of GENERAL MOTORS COMPANY

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

13. Remove and discard the washer (1) from the wheel drive shaft (2). **DO NOT** re-use the washer, replace with **NEW** only.

**Installation Procedure**

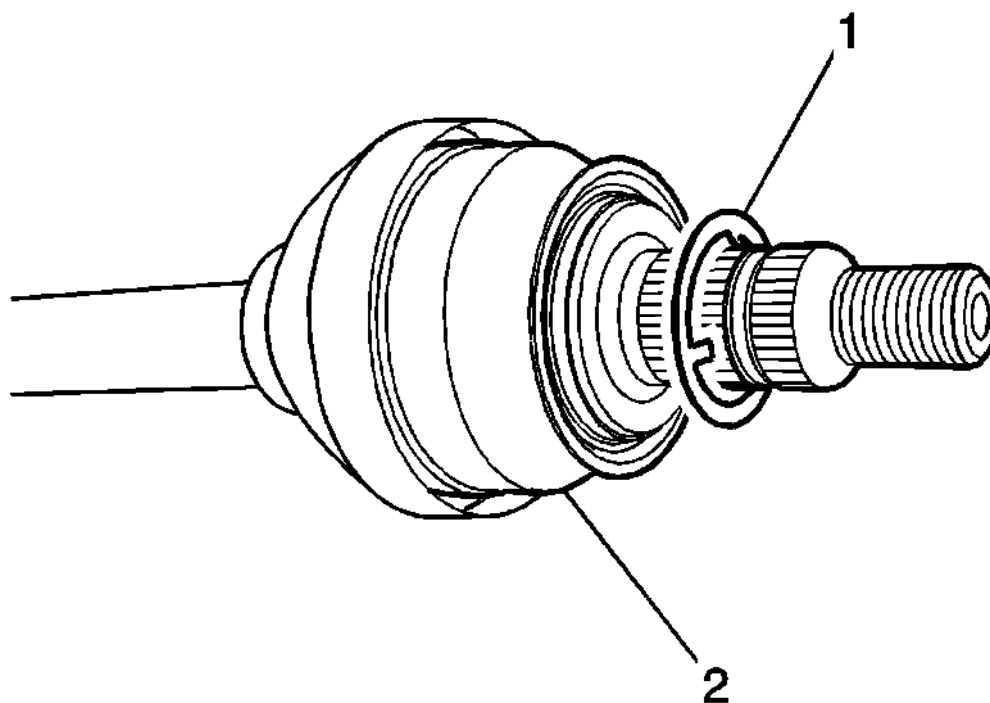


**Fig. 19: Wheel Drive Shaft & Washer**

Courtesy of GENERAL MOTORS COMPANY

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

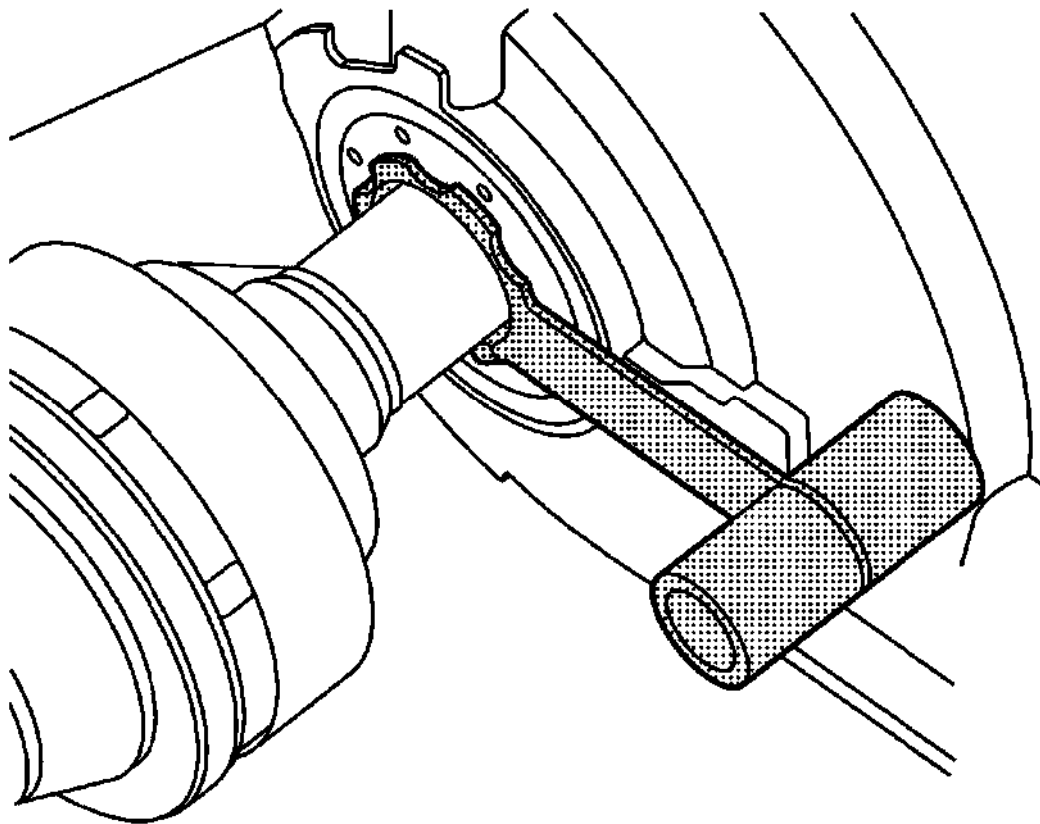


**Fig. 20: Output Shaft Protector Tool**

Courtesy of GENERAL MOTORS COMPANY

**NOTE:** In order to prevent lubricant leaks, use care when installing the wheel drive shaft to the differential. Do not damage the oil seal. Replace the oil seal if it becomes nicked, distorted, or otherwise damaged.

2. Carefully install the wheel drive shaft into the differential until the splines are past the **DT-6332** protector.

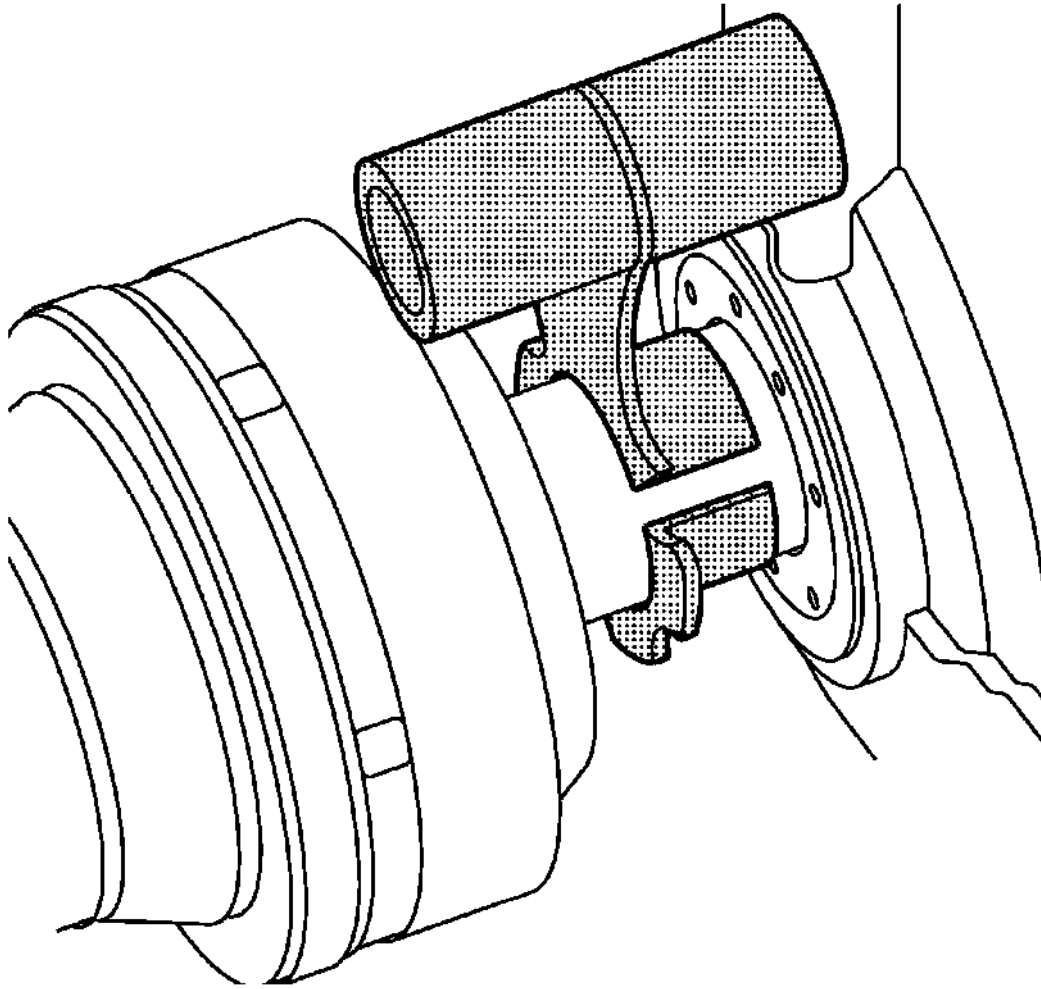


**Fig. 21: Special Output Shaft Protector Tool**  
**Courtesy of GENERAL MOTORS COMPANY**

3. Remove the **DT-6332** protector from the differential output shaft seal.
4. Install the wheel drive shaft into the differential until the retaining ring is fully seated.
5. Confirm that the front wheel drive shaft retaining ring is properly seated by holding the inner housing and pull the inner housing outward.
6. Install the front wheel drive shaft into the front wheel bearing/hub.
7. Install the ball joint to the steering knuckle. Refer to **Lower Control Arm Replacement** .
8. Install the outer tie rod assembly at the steering knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

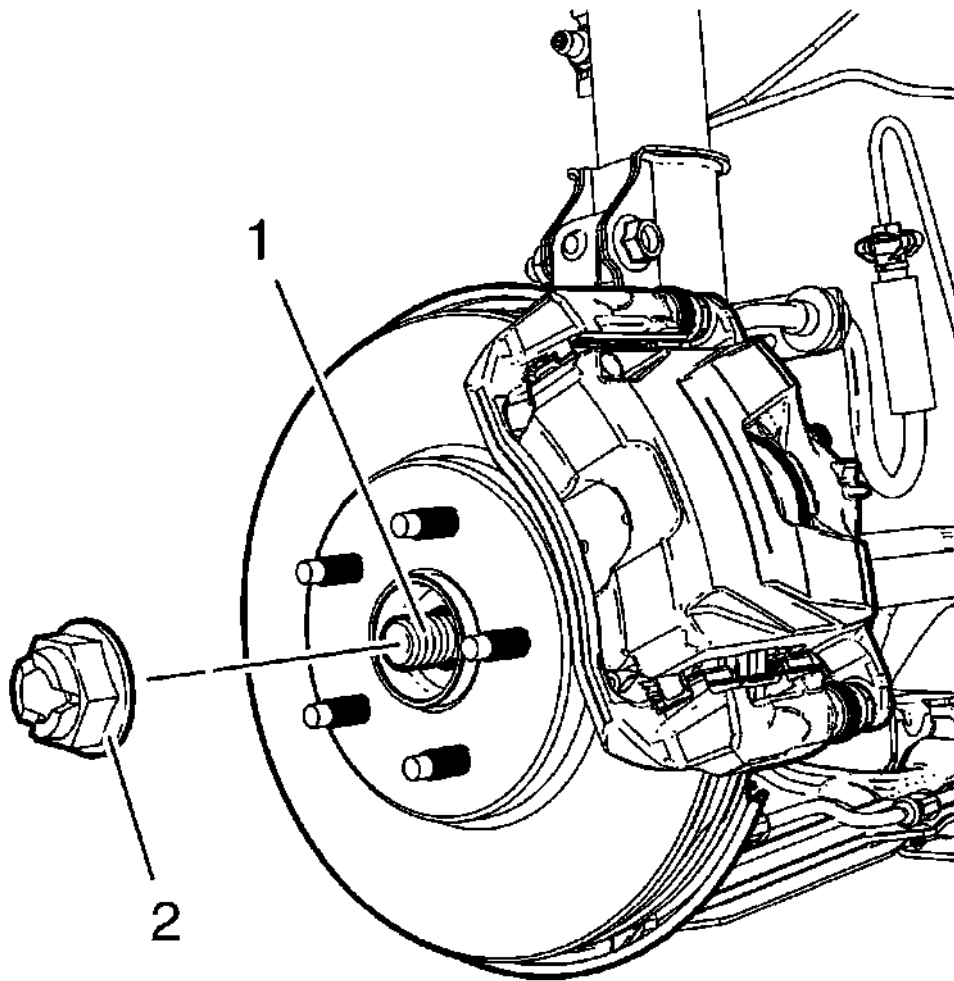


**Fig. 22: Wheel Drive Shaft And Nut**

Courtesy of GENERAL MOTORS COMPANY

**WARNING:** Refer to Torque-to-Yield Fastener Warning .

**CAUTION:** Refer to Fastener Caution .

9. Install the NEW wheel drive shaft nut (2) to the wheel drive shaft (1) tighten in 3 passes.

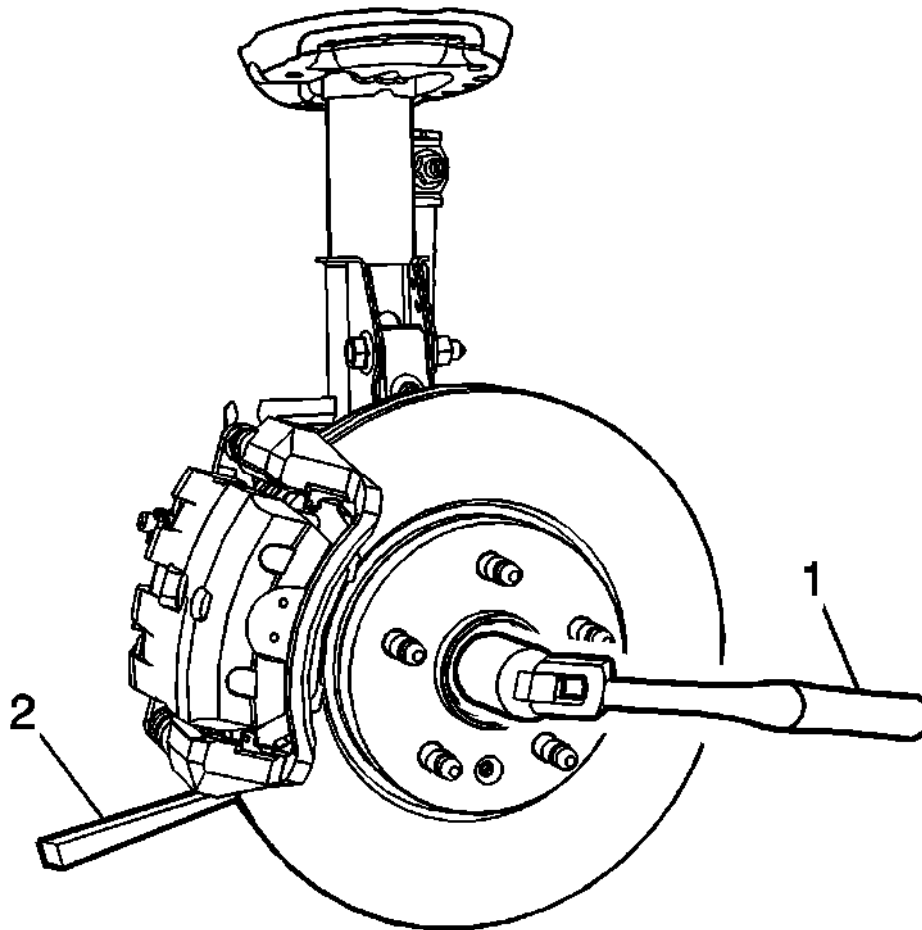


**Fig. 23: Tightening Wheel Drive Shaft Nut**  
Courtesy of GENERAL MOTORS COMPANY

10. Insert a drift or punch (2) in the cooling fins of the brake rotor.
11. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.
12. Using a torque wrench (1) and the appropriate size socket, tighten the wheel drive shaft nut to 150 N.m (111 lb ft).
13. Release the wheel drive shaft nut (2) trough 45 degrees.
14. Retighten the wheel drive shaft nut (2) to 250 N.m (185 lb ft).
15. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
16. Lower the vehicle.
17. Refill the transmission.
  - For vehicles with manual transmission, refer to **Transmission Fluid Drain and Fill** .
  - For vehicles with automatic transmission, refer to **Transmission Fluid Drain and Fill** .

**Special Tools**

- **CH-804** Tensioner
- **GE-396** Snap Ring Pliers

For equivalent regional tools, refer to **Special Tools**.

**Removal Procedure**

1. Remove the left or right wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Left Side**, or **Front Wheel Drive Shaft Replacement - Right Side**

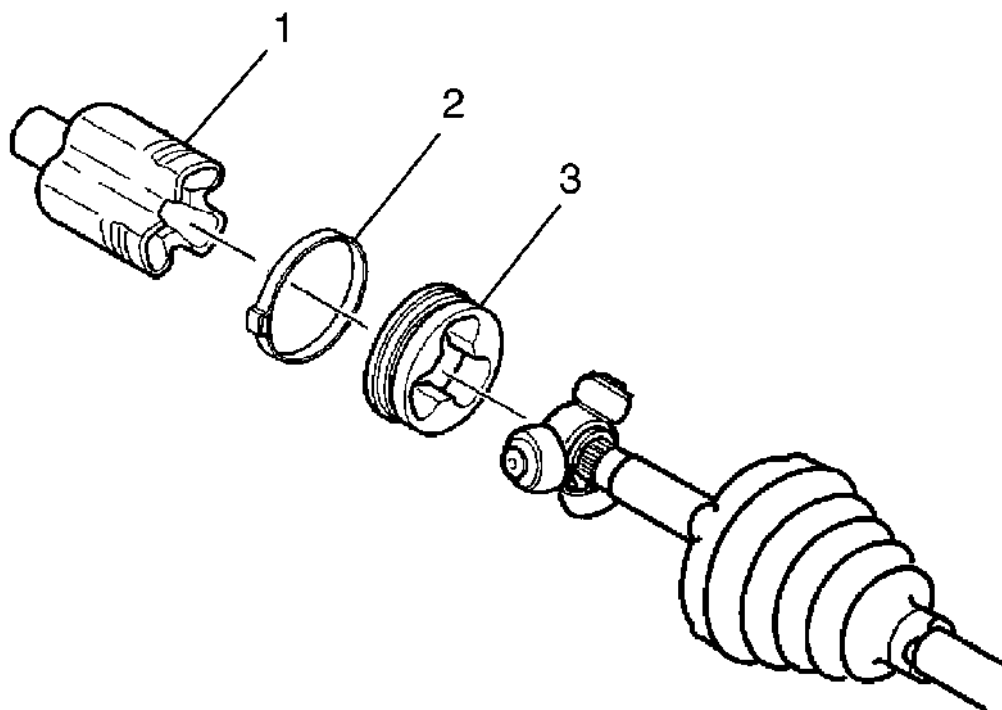


**Fig. 24: Wheel Drive Shaft Inner Joint Components**  
Courtesy of GENERAL MOTORS COMPANY

**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.**

2. If equipped with a small swage ring, use a hand grinder to cut through the swage ring, taking care not to damage the halfshaft bar, in order to remove the swage ring. Otherwise, remove the small seal retaining clamp with a side cutter. Discard the retaining clamp.
3. Remove the large seal retaining clamp (2) from the tripot joint with side cutters. Discard the large seal retaining clamp.
4. Separate the inboard seal from the trilobal tripot bushing (3) at the large diameter.
5. Slide the seal away from the joint along the halfshaft bar.

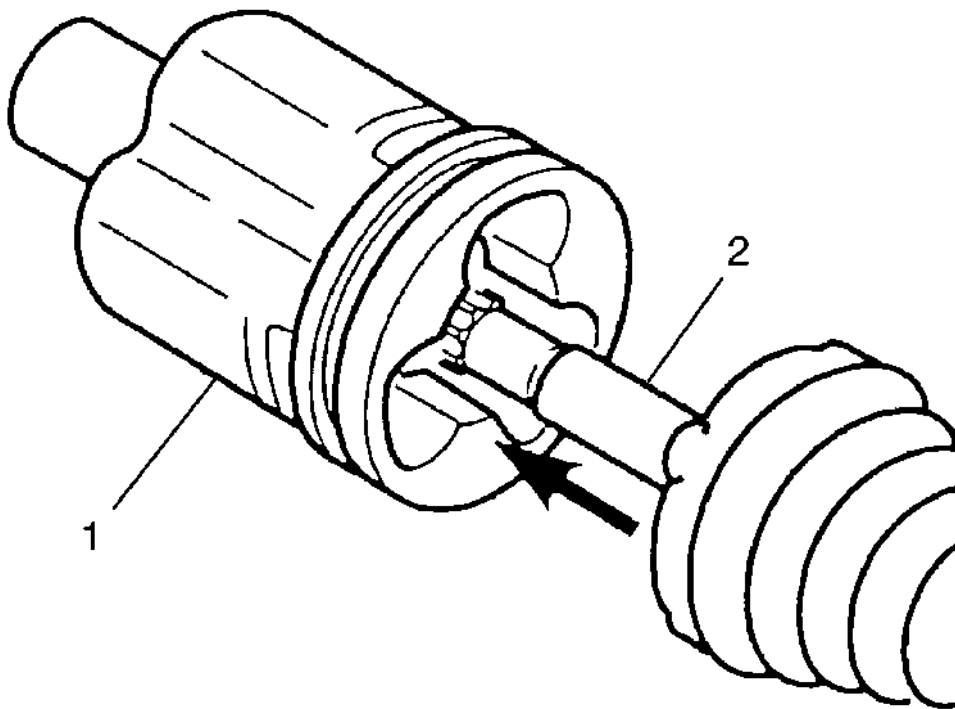


**Fig. 25: View Of Housing, Tripot Joint Spider & Halfshaft Bar**  
Courtesy of GENERAL MOTORS COMPANY

6. Remove the housing (1) from the tripot joint spider and the halfshaft bar (2).

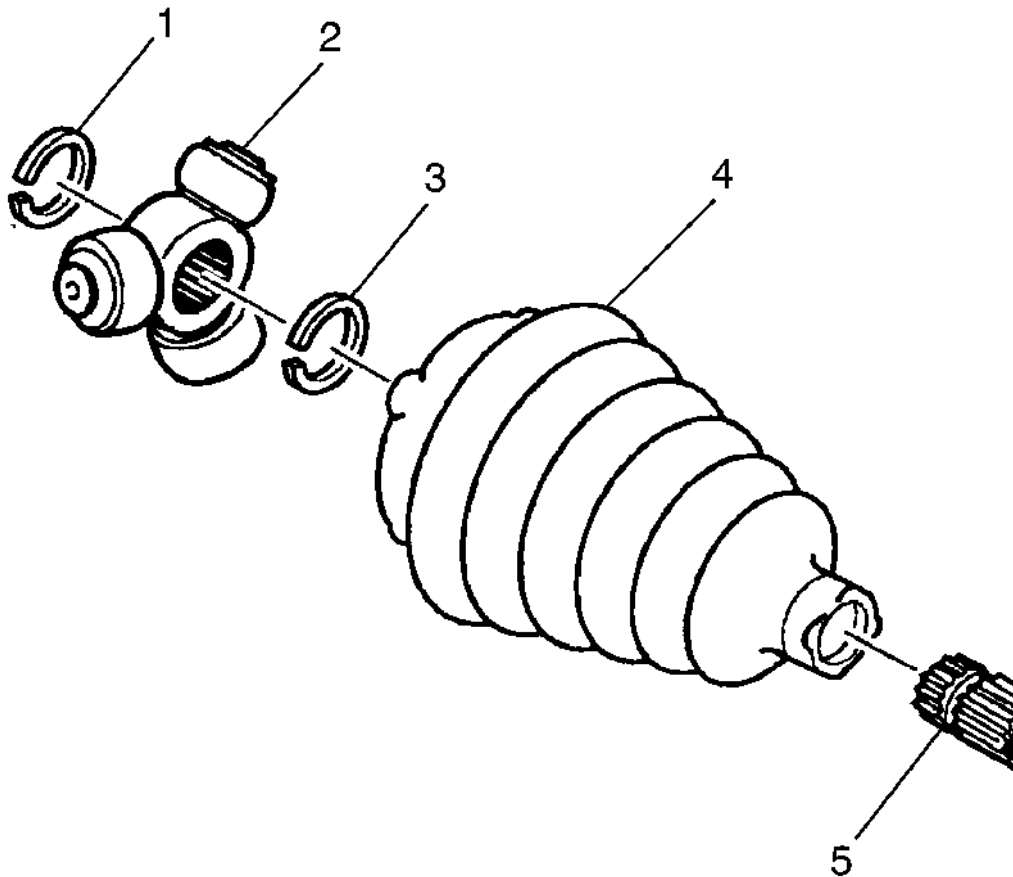


**Fig. 26: View Of Spider Assembly, Rings & Tripot Boot**

Courtesy of GENERAL MOTORS COMPANY

7. Remove the spacer ring (1), spider assembly (2), spacer ring (3) (if equipped) using **GE-396** pliers, and tripot boot (4). DISCARD the boot and rings.
8. Clean the halfshaft bar (5). Use a wire brush in order to remove any rust in the boot mounting area (grooves).
9. Inspect the needle rollers, needle bearings, and trunnion. Check the tripot housing for unusual wear, cracks, or other damage. Replace any damaged parts with the appropriate kit.

#### **Installation Procedure**

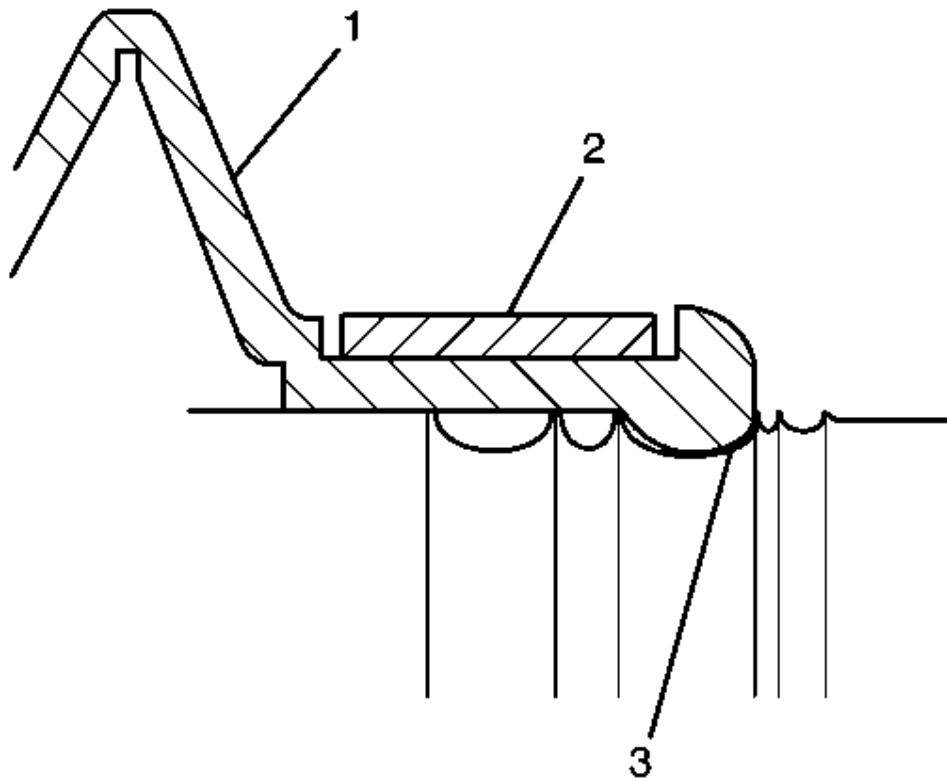


**Fig. 27: View Of Outboard Seal, Seal Groove & Eared Clamp**  
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Place a towel in the vise before inserting the halfshaft.

1. Mount the halfshaft into a vise.
2. Place the new small eared clamp (2) onto the small end of the joint seal (1). Slide the joint seal (1) and the eared clamp (2) onto the halfshaft bar.
3. Position the small end of the joint seal (1) into the joint seal groove (3) on the halfshaft bar.

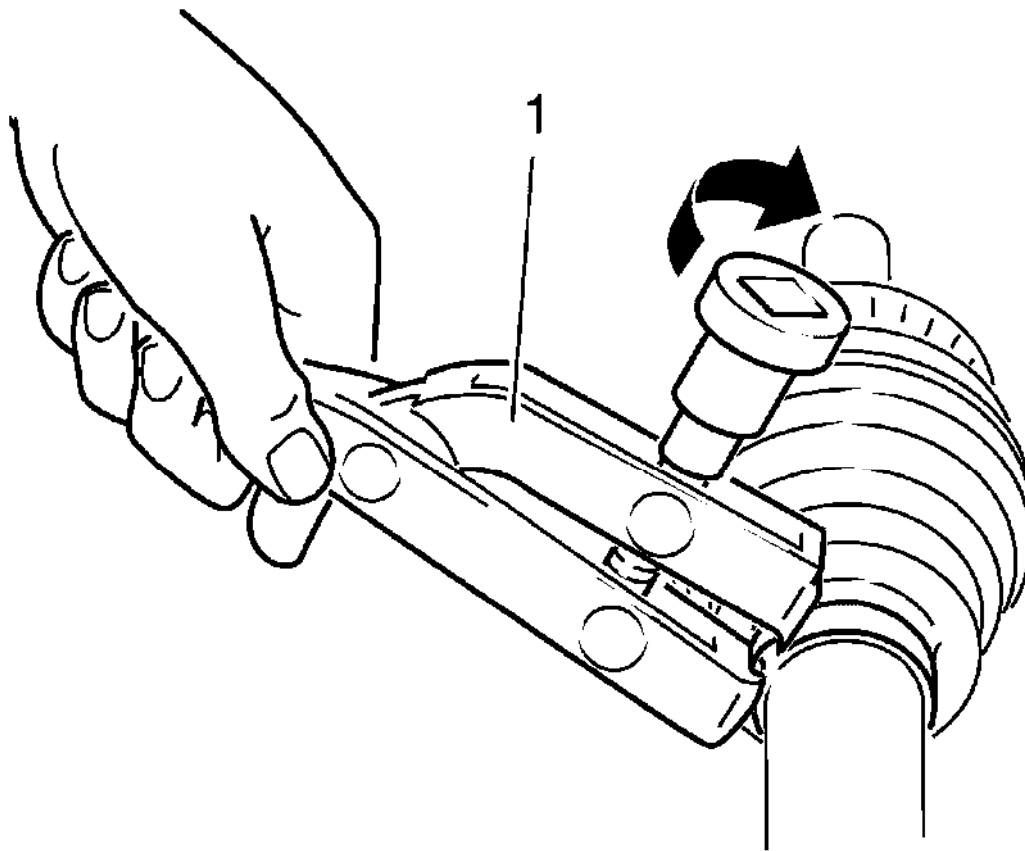


**Fig. 28: Identifying Clamp And Special Tool CH-804**

**Courtesy of GENERAL MOTORS COMPANY**

4. Crimp the eared clamp (1) using the **CH-804** tensioner (1), and a torque wrench. Tighten the eared clamp to 25 N.m (19 lb ft).

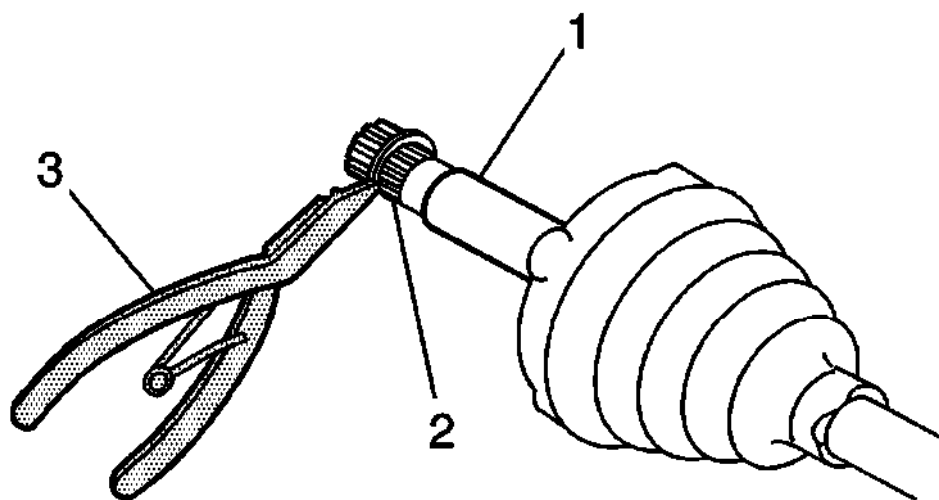


**Fig. 29: View Of Spacer Ring**

**Courtesy of GENERAL MOTORS COMPANY**

5. Install the spacer ring (2) into the groove of the halfshaft bar using

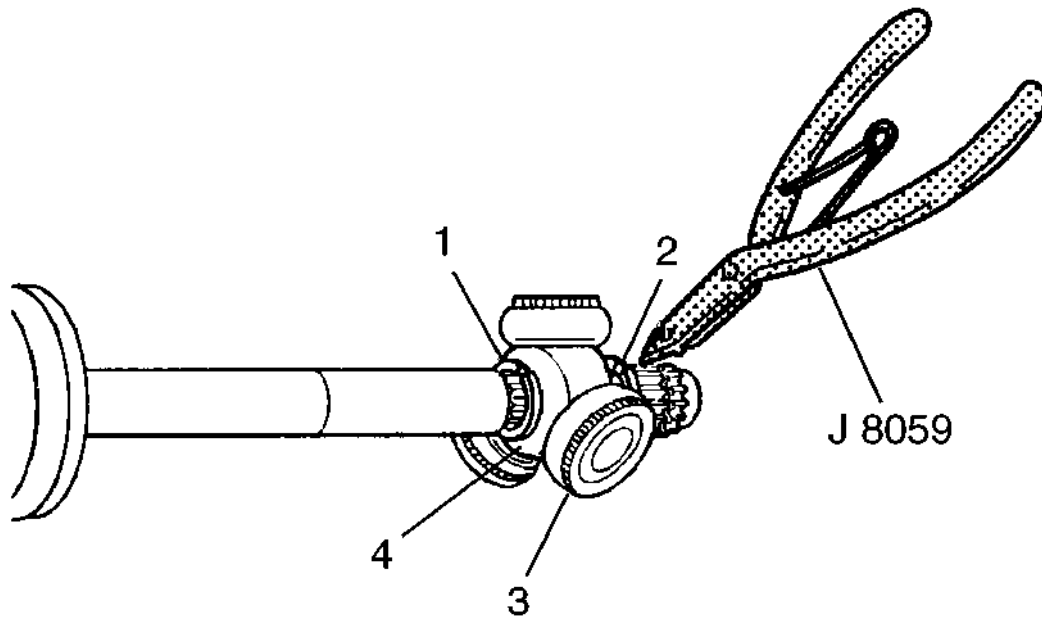


**Fig. 30: Spider Assembly & Spacer Rings**  
Courtesy of GENERAL MOTORS COMPANY

6. Slide the tripot joint spider assembly (4) as far as it will go on the halfshaft bar.
7. Install the spacer ring (2) into the groove of the halfshaft bar, using **GE-396** pliers.

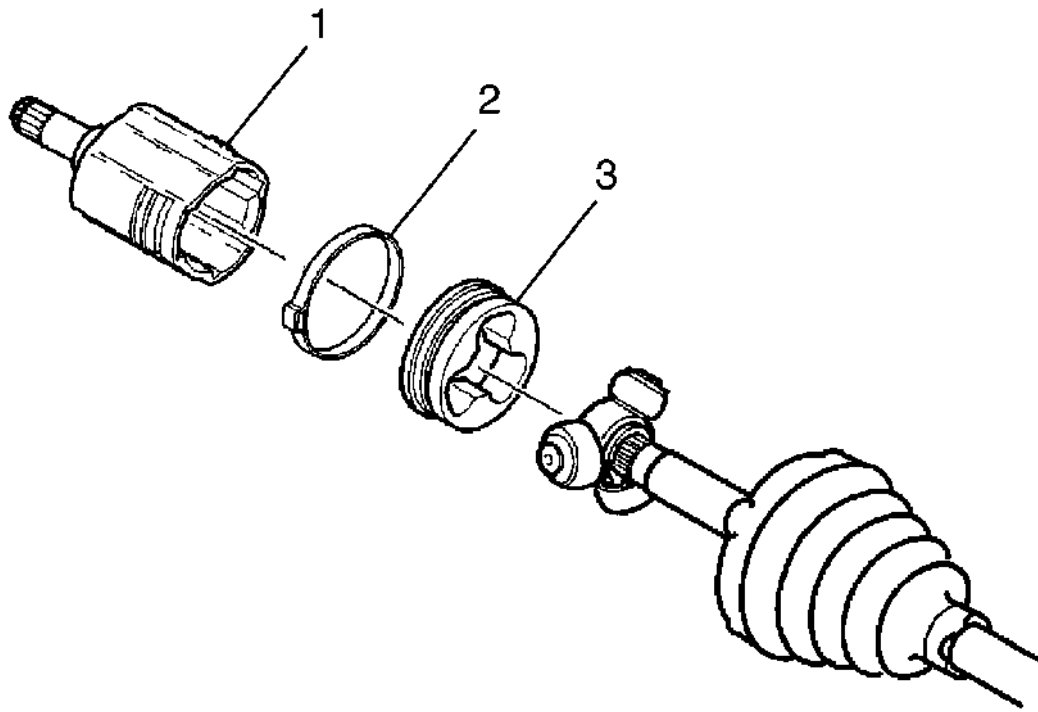


**Fig. 31: Seal Retaining Clamp, Tripot Bushing & Housing**  
Courtesy of GENERAL MOTORS COMPANY

8. Place approximately 150 grams of the lubricant on the boot and the remaining half of the tripod housing. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

**NOTE:** Ensure the trilobal tripot bushing (3) is flush with the face of the housing (1).

9. Install the trilobal tripot bushing (3) to housing (1).
10. Position the larger new seal retaining clamp (2) on the halfshaft inboard seal.
11. Slide the housing (1) over the tripod joint spider assembly on the halfshaft bar.

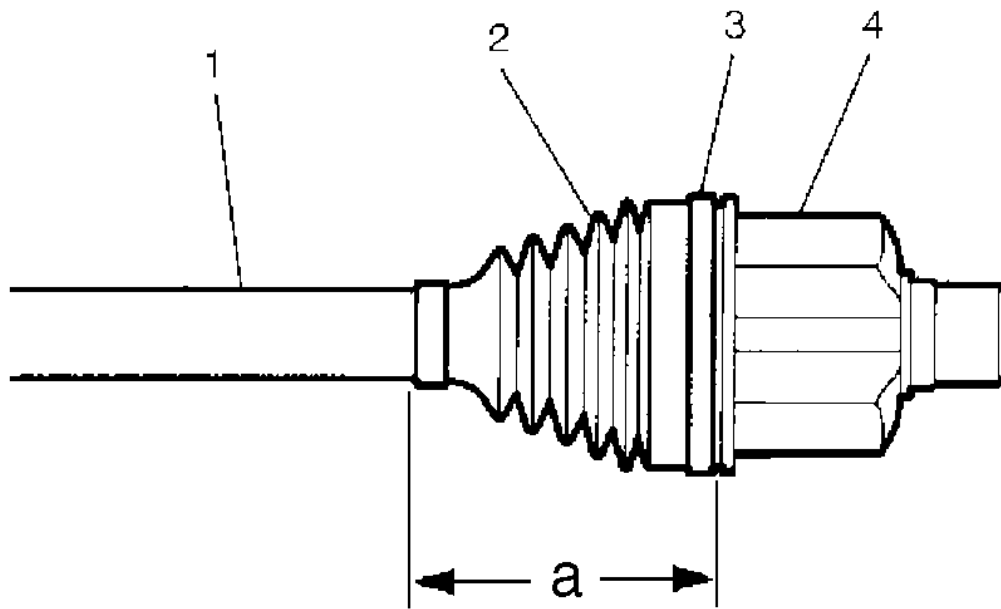


**Fig. 32: Identifying Axle Shaft/CV Joint Assembly Components And Installed Boot Measurement Dimension**

**Courtesy of GENERAL MOTORS COMPANY**

12. Slide the large diameter of the halfshaft inboard seal (2), with larger clamp (3) in place, over the outside of the trilobal tripot bushing and locate the lip of the seal in the groove.
13. Position the joint assembly at the proper vehicle dimension,  $a = 106 \text{ mm (4.00 in)}$ .
14. Carefully insert a thin flat blunt tool, no sharp edges, between the large seal opening and the trilobal tripot bushing in order to equalize the pressure. Remove the tool.

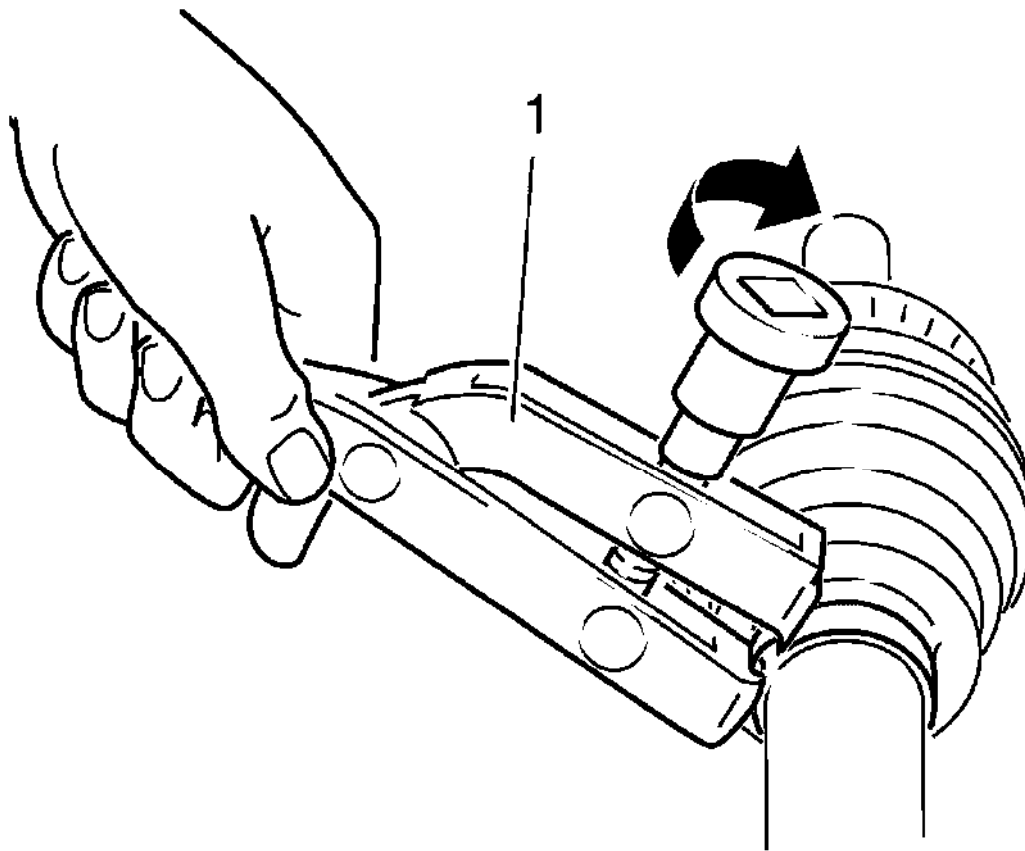


**Fig. 33: Identifying Clamp And Special Tool CH-804**

Courtesy of GENERAL MOTORS COMPANY

15. Crimp the eared clamp (1) using the **CH-804** tensioner (1), and a torque wrench. Tighten the eared clamp to 25 N.m (19 lb ft).
16. Fully stroke the joint several times to disperse the grease.
17. Install the left or right wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Left Side**, or **Front Wheel Drive Shaft Replacement - Right Side**.

## FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

### Special Tools

- **GE-396** Snap Ring Pliers
- **CH-804** Tensioner

For equivalent regional tools, refer to **Special Tools**.

### Removal Procedure

1. Remove the left or right wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Left Side**, or **Front Wheel Drive Shaft Replacement - Right Side**.

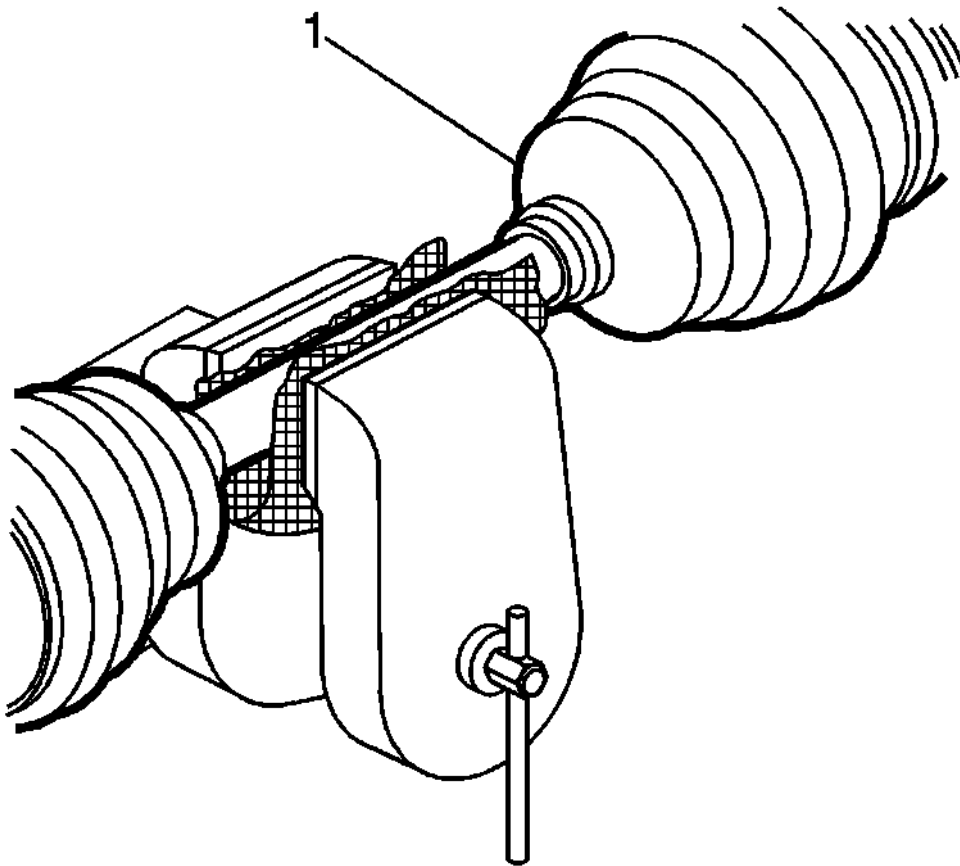


**Fig. 34: View Of Front Wheel Drive Shaft Inner Joint**  
Courtesy of GENERAL MOTORS COMPANY

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

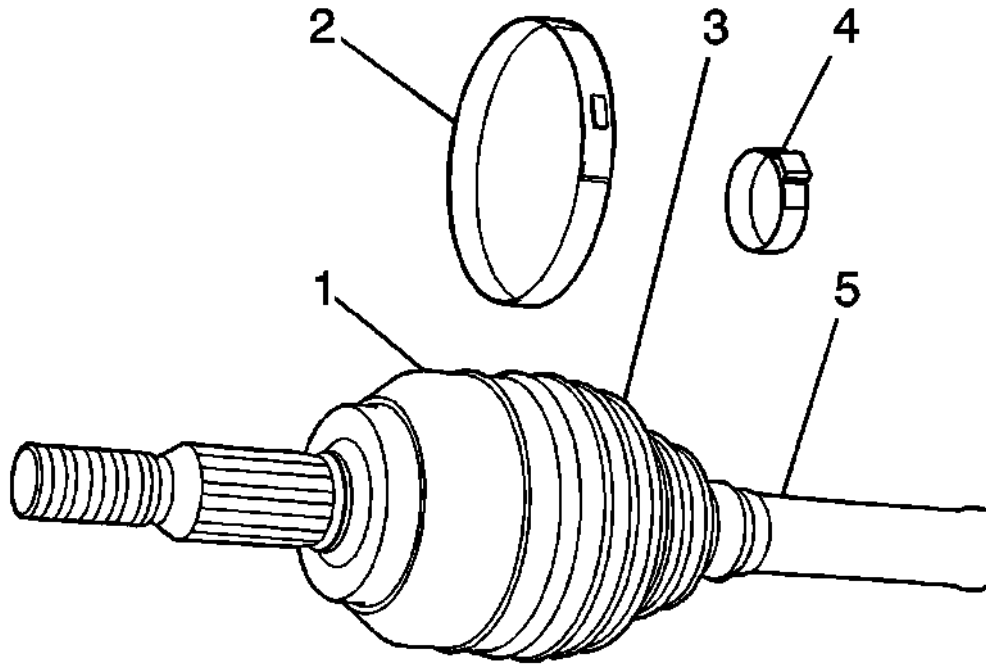


**Fig. 35: Identifying Boot Clamps**

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 and discard the boot clamp (4) from the boot (3) and the wheel drive shaft (5). Replace with NEW clamps.

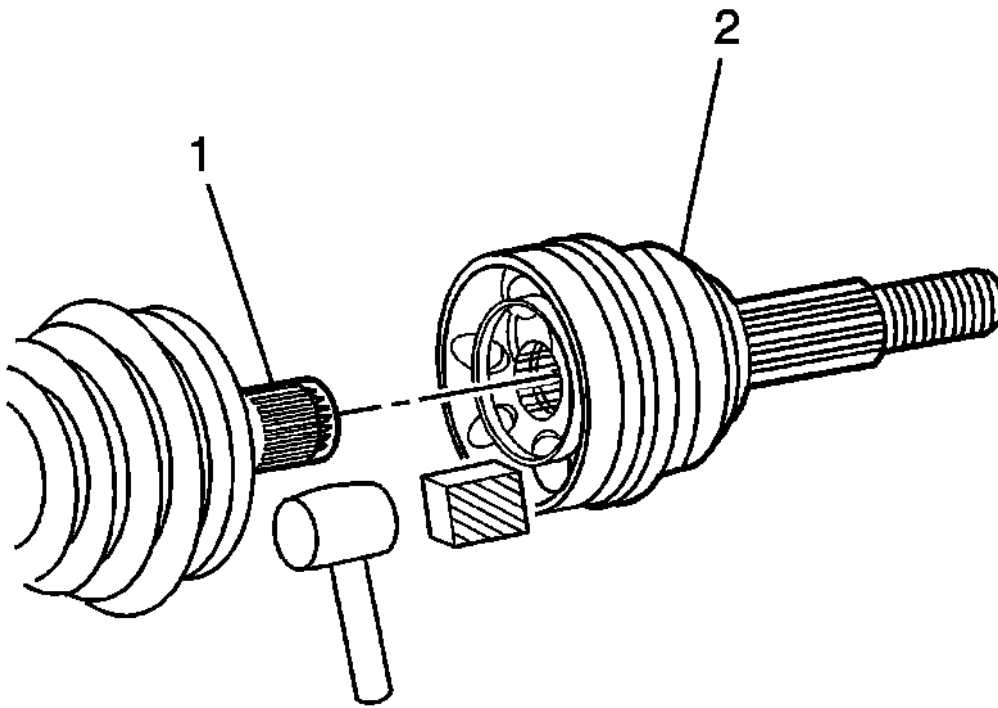


**Fig. 36: Separating CV Joint From Axle Shaft**  
Courtesy of GENERAL MOTORS COMPANY

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

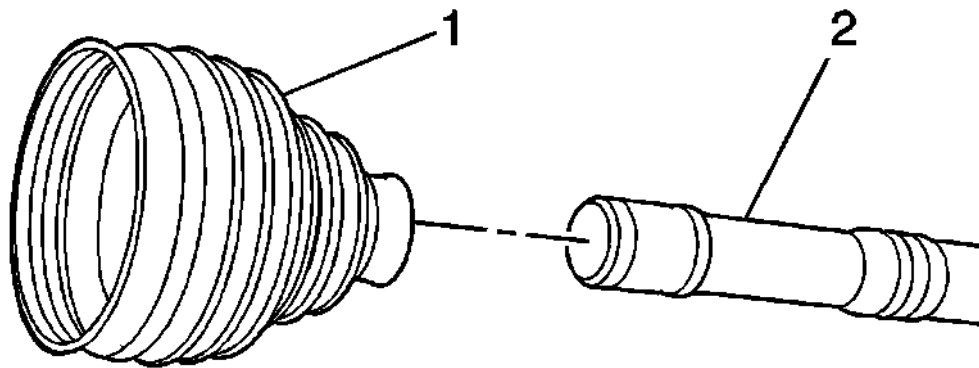


**Fig. 37: Identifying Clamp & Wheel Drive Shaft**  
Courtesy of GENERAL MOTORS COMPANY

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.**

**Installation Procedure**

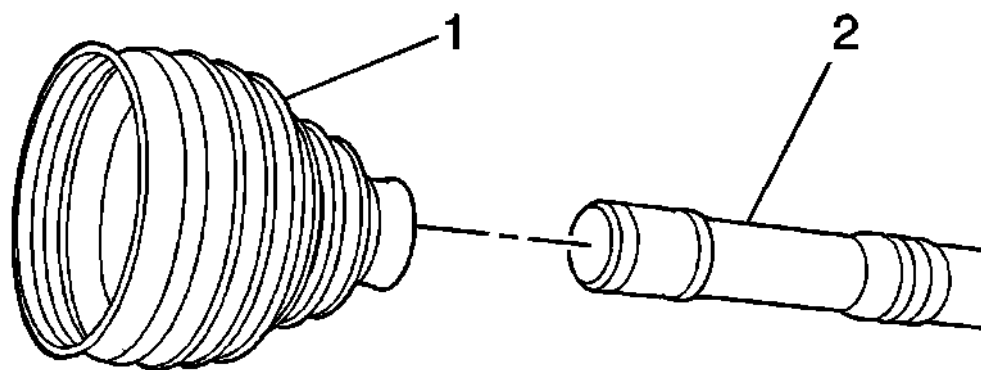


**Fig. 38: Identifying Clamp & Wheel Drive Shaft**  
Courtesy of GENERAL MOTORS COMPANY

**NOTE:** Position the inner boot clamp on the wheel drive shaft prior the boot assemble.

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

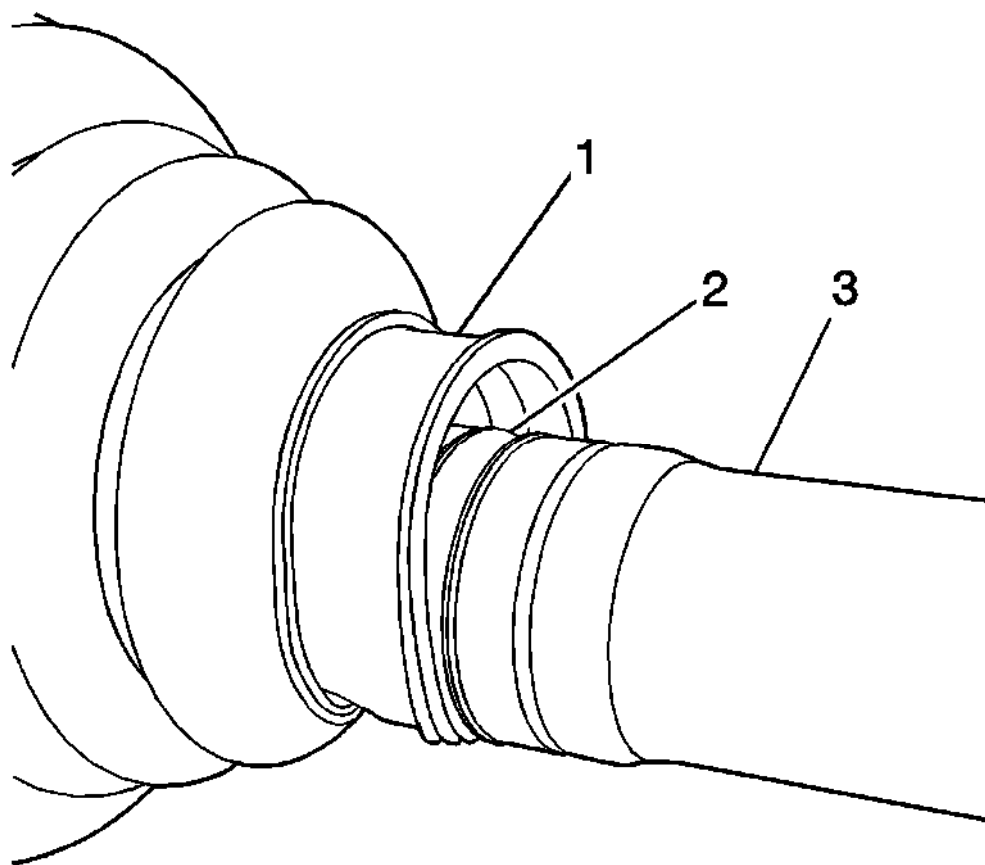


**Fig. 39: Identifying Groove In Wheel Drive Shaft**  
Courtesy of GENERAL MOTORS COMPANY

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

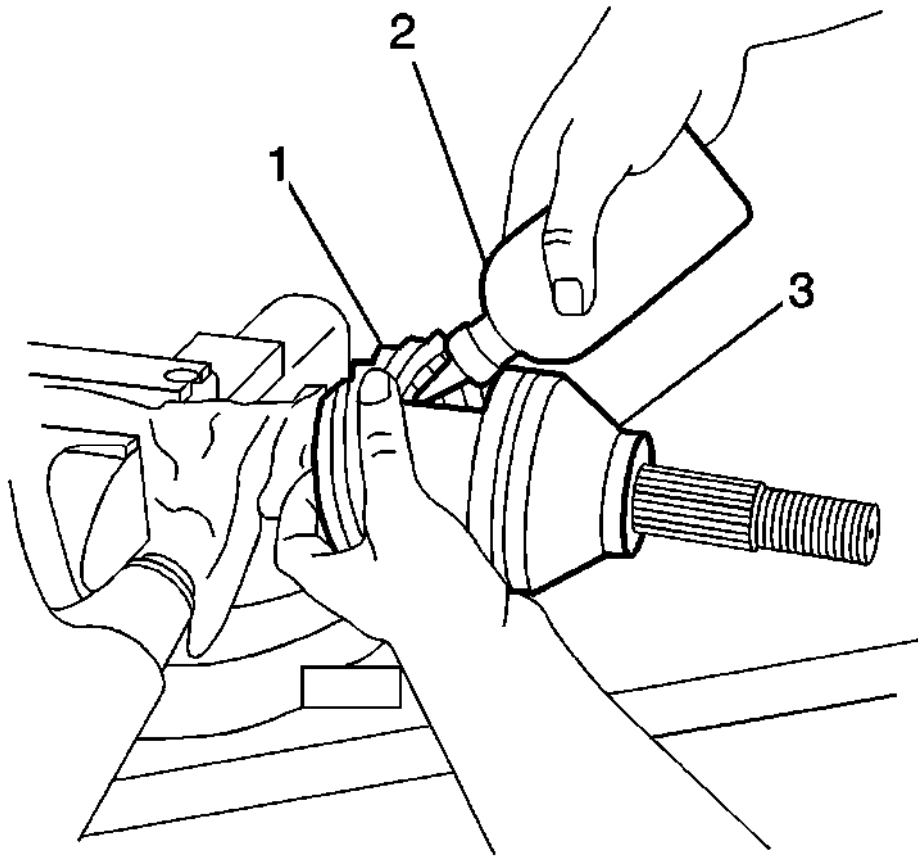


**Fig. 40: Lubricating Boot Of Tripot Housing**  
Courtesy of GENERAL MOTORS COMPANY

3. Place approximately 160 grams of lubricant (2) inside the outboard boot (1) and pack the CV joint (3) with the remaining lubricant. Refer to **Adhesives, Fluids, Lubricants, and Sealers**.

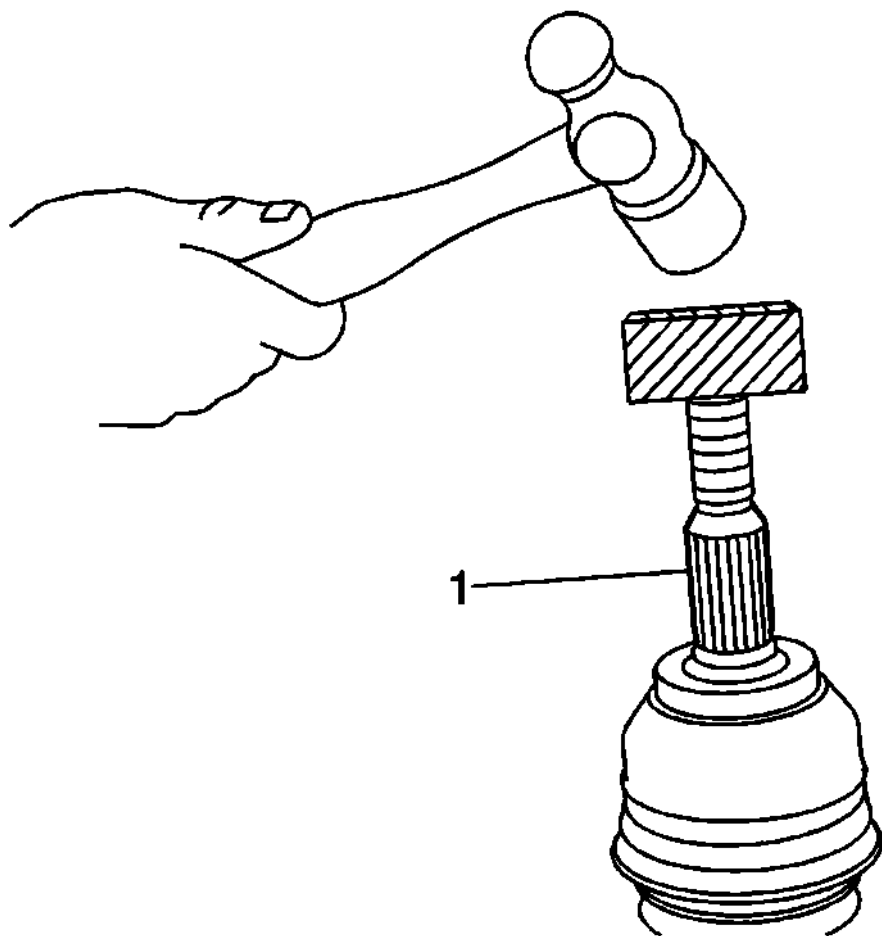


**Fig. 41: Installing CV Joint**

Courtesy of GENERAL MOTORS COMPANY

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

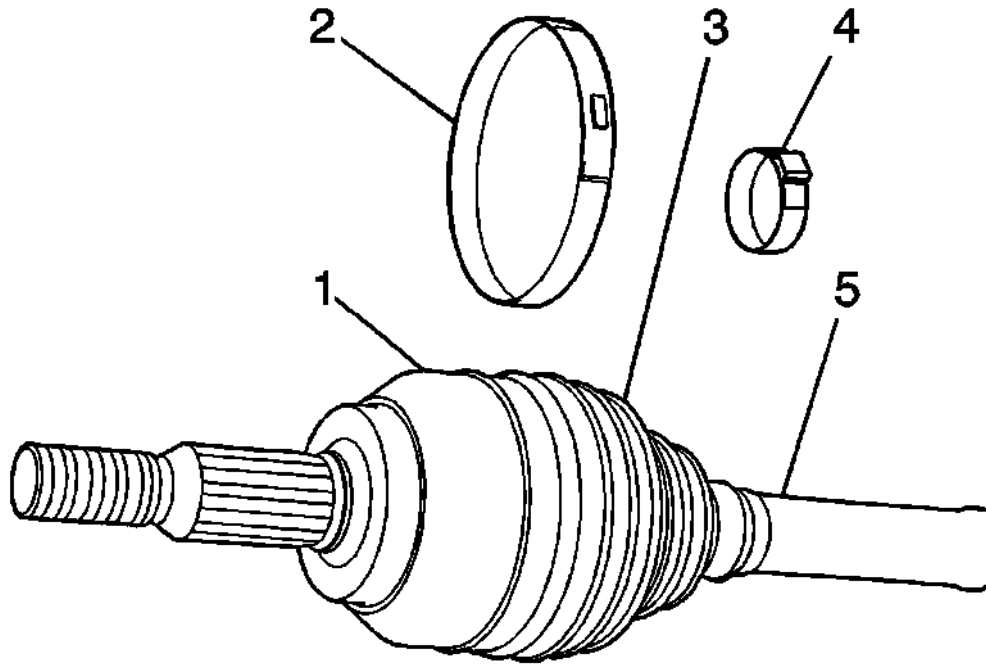


**Fig. 42: Identifying Boot Clamps**

Courtesy of GENERAL MOTORS COMPANY

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).

**CAUTION: Refer to Fastener Caution .**

7. Crimp the eared clamp using the **CH-804** tensioner (1), and a torque wrench. Tighten the eared clamp to 25 N.m (19 lb ft).
8. Remove the wheel drive shaft from the bench vise.
9. Move the CV joint in a circular motion 4 to 5 times to distribute the lubricant.
10. Install the left or right wheel drive shaft, refer to **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.

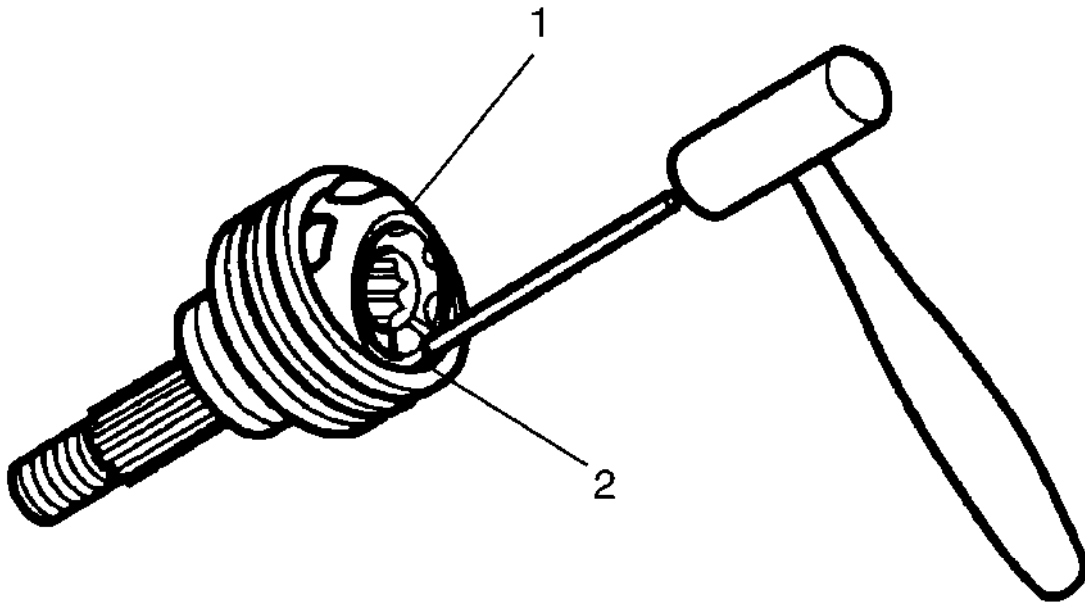


**Fig. 43: Taping Gently On Brass Drift With A Hammer In Order To Tilt Cage**  
Courtesy of GENERAL MOTORS COMPANY

**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 form the cage.

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

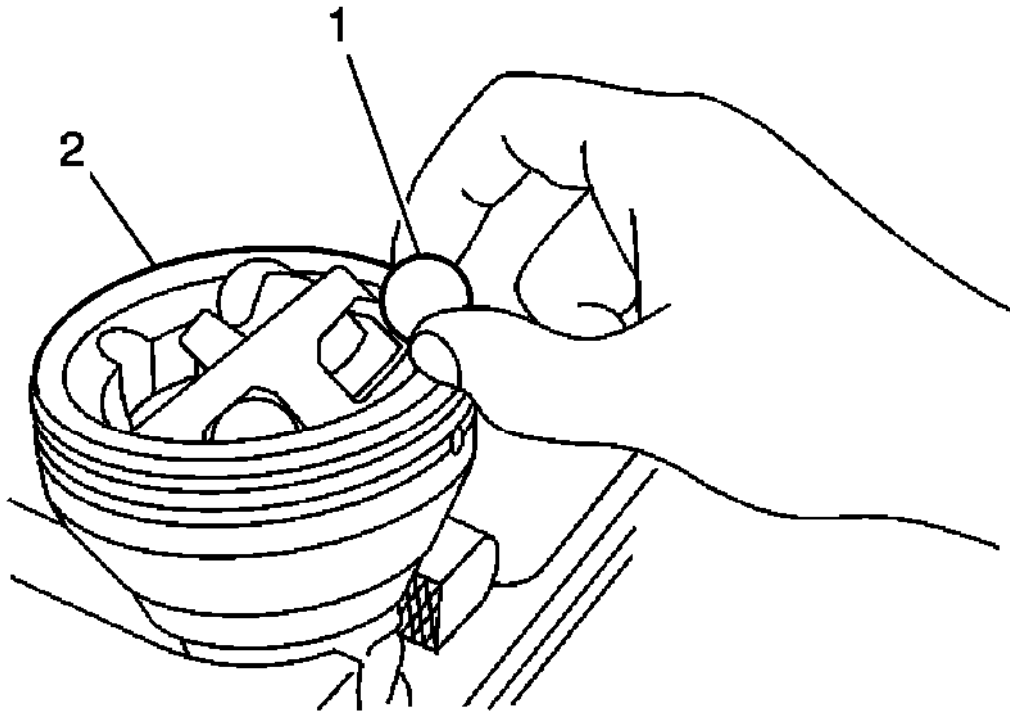


**Fig. 44: Ball Bearing & CV Joint**

Courtesy of GENERAL MOTORS COMPANY

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

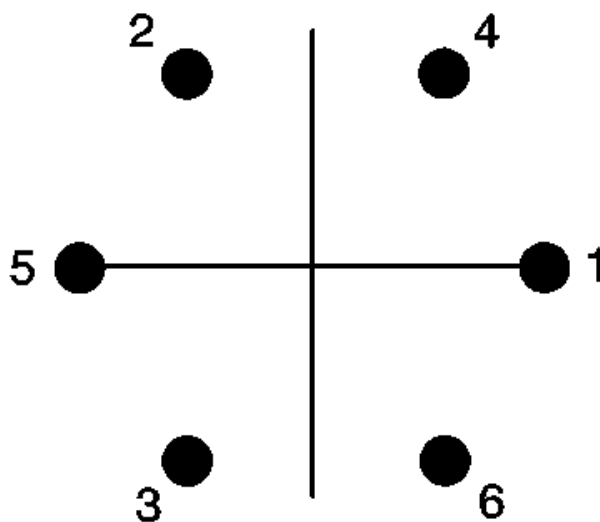


**Fig. 45: View Of Ball Removal/Installation Sequence**  
**Courtesy of GENERAL MOTORS COMPANY**

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

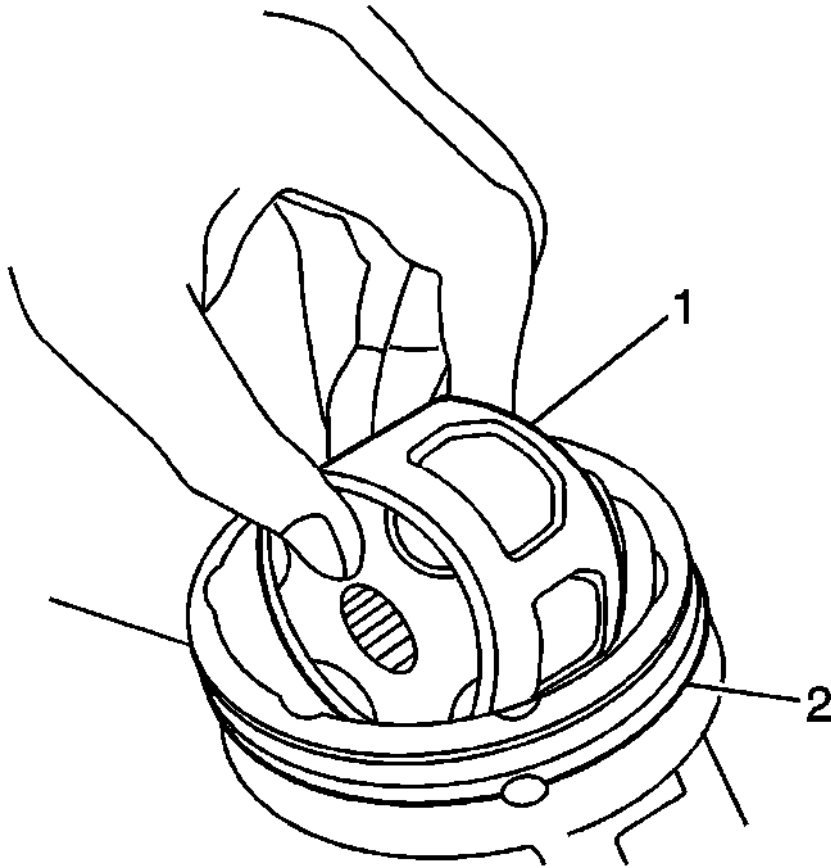


**Fig. 46: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race**  
Courtesy of GENERAL MOTORS COMPANY

**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).

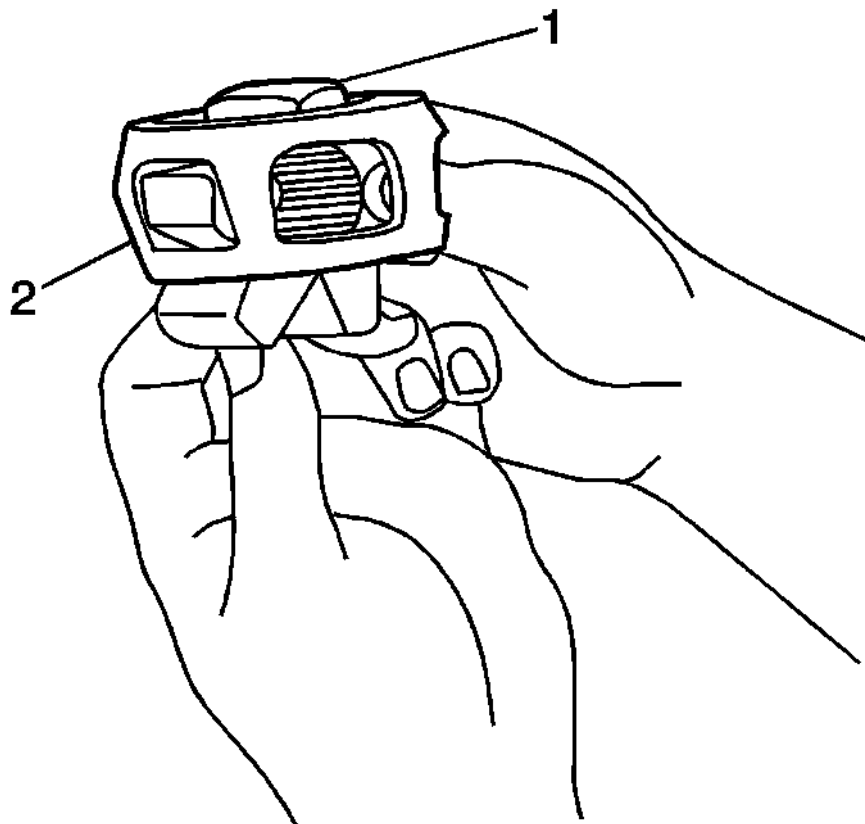


**Fig. 47: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up**  
Courtesy of GENERAL MOTORS COMPANY

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.

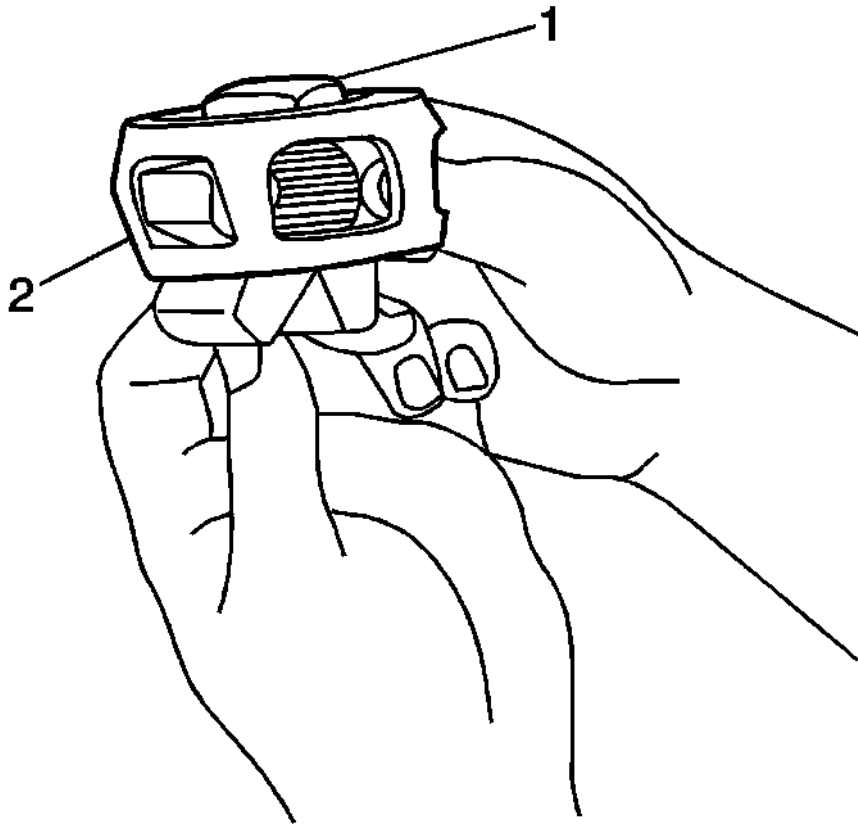
**Assembly Procedure**

**Fig. 48: 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.

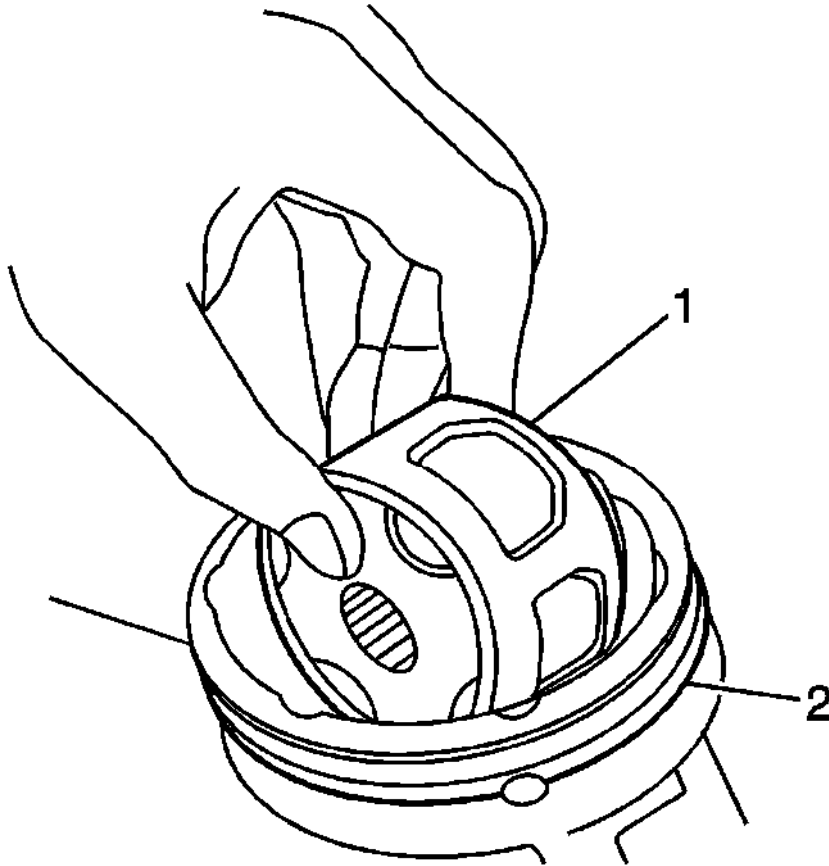


**Fig. 49: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race**  
Courtesy of GENERAL MOTORS COMPANY

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

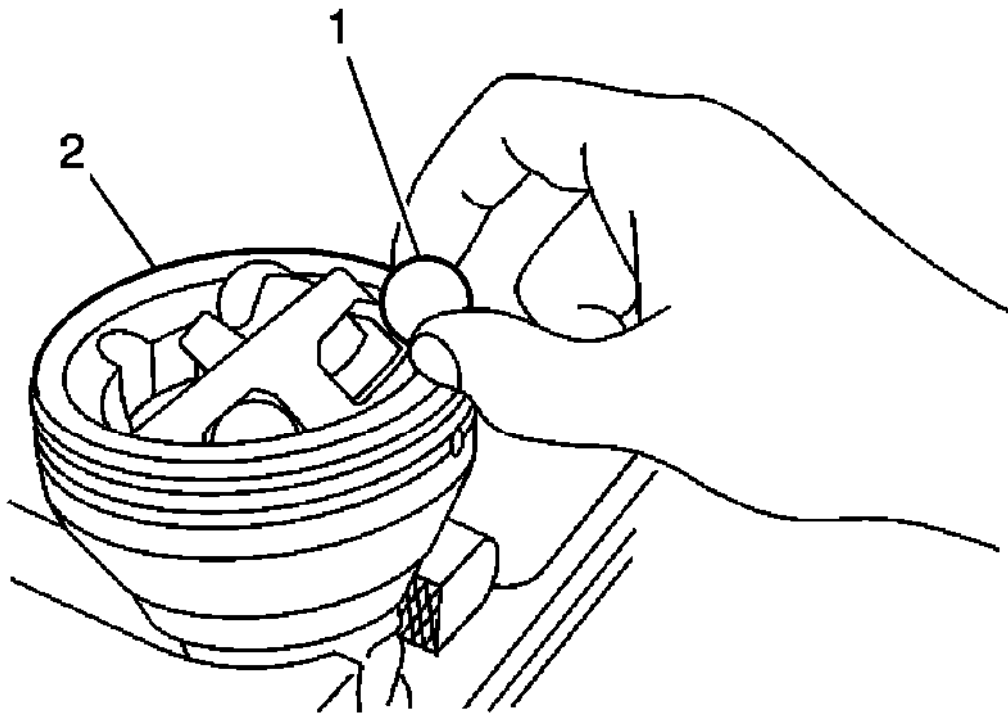


**Fig. 50: Ball Bearing & CV Joint**

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.

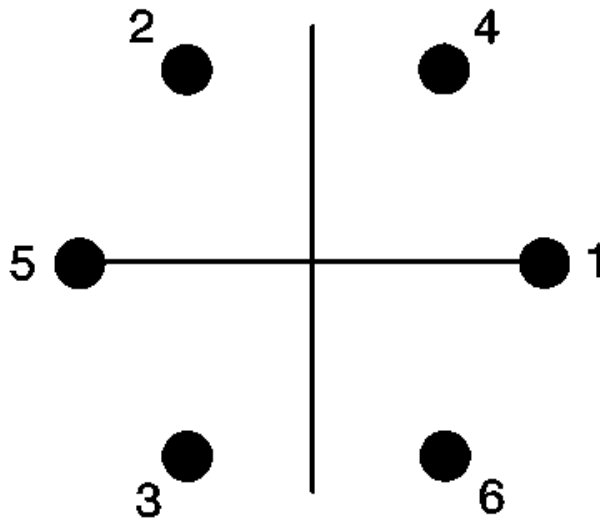


**Fig. 51: View Of Ball Removal/Installation Sequence**  
**Courtesy of GENERAL MOTORS COMPANY**

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**.

## 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 tripot 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 (Seals) And Clamps

The front wheel drive shaft constant velocity joint and the front wheel drive shaft tripot joint boots (seals) 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 (seal) 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 (seal) 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 (seals) from sharp tools and from the sharp edges of the surrounding components.**

**Any damage to the boots (seals) 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 male spline. The right front wheel drive axle uses barrel type snap rings in order to interlock with the transaxle gears.

#### **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.

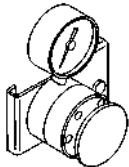
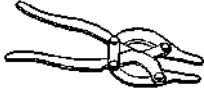
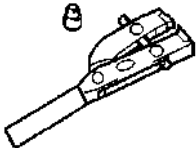
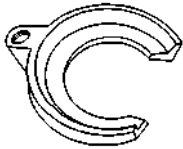
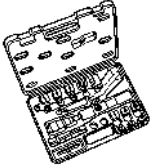
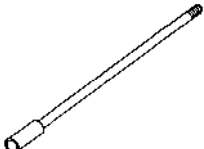
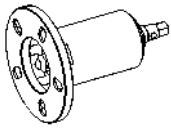
This design prevents end play between the hub bearing and the front wheel drive axle.

## **SPECIAL TOOLS AND EQUIPMENT**

### **SPECIAL TOOLS**

## 2013 Chevrolet Cruze

### 2013 DRIVELINE/AXLE Wheel Drive Shafts - Cruze

| Illustration                                                                        | Tool Number / Description                                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    | GE-313<br>KM-313<br>J-2619-01<br>J-6125-1B<br>Slide Hammer                            |
|    | GE-396<br>GE-8059<br>J-8059<br>Snap Ring Pliers                                       |
|    | CH-804<br>KM-804<br>J-35566<br>J-35910<br>J-42572, or equivalent<br>Boot Clamp Pliers |
|   | CH-6003<br>KM-6003<br>J-42943<br>Axle Shaft Remover                                   |
|  | DT-6332<br>KM-6332<br>J-44396<br>J-44394-A<br>Seal Protector                          |
|  | DT-29794<br>J 29794<br>Axle Shaft Remover Extension                                   |
|  | CH-49400<br>J-42129<br>J-45859<br>Hub Spindle Remover                                 |