

2017 DRIVELINE/AXLE
Wheel Drive Shafts - Impala

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	
Front 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)
Front Wheel Drive Shaft Nut	
• First Pass:	150 N.m (111 lb ft)
• Second Pass:	loosen 45 degrees
• Final Pass:	250 N.m (185 lb ft)

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 Bracket Bolt (LCV with MHG)	58 N.m (43 lb ft)
Front Wheel Drive Intermediate Shaft Bracket Bolt (LFX with M7W)	22 N.m (16 lb ft)
Front Wheel Drive Intermediate Shaft Flange Bolt	22N.m (16 lb ft)

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Application	Type of Material	GM Part Number
Wheel Drive Shaft Inner CV Joint Spline	High Temperature Grease	12345996 (Canadian P/N 10953501)
Wheel Drive Shaft Inner and Outer Joint	Grease	1051344 (Canadian P/N 993037)
Wheel Drive Shaft	Threadlocker	89021297 (Canadian P/N 10953488)

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - WHEEL DRIVE SHAFTS

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

1. Review the [Symptoms - Vibration Diagnosis 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. Refer to [Wheel Drive Shafts Description and Operation](#).

Visual/Physical Inspection

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

Symptom List

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

- [Click Noise In Turns](#)
- [Clunk When Accelerating from Coast](#)
- [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, 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 (LFX WITH M7W)

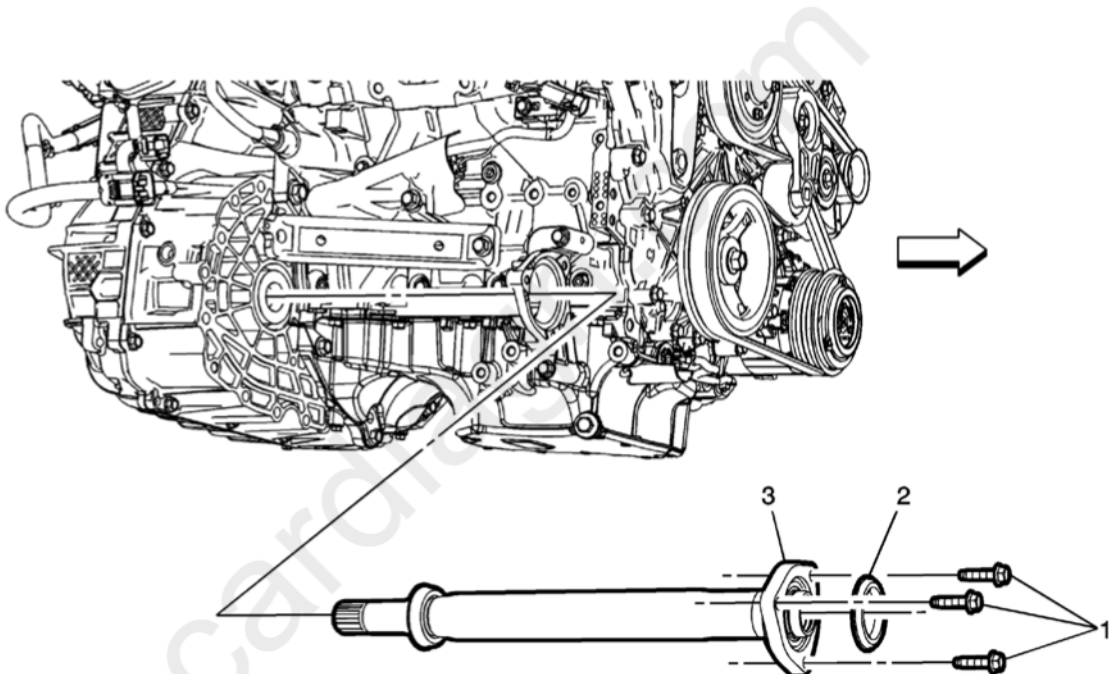


Fig. 1: Front Wheel Drive Intermediate Shaft (LFX with M7W)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove the right front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Right Side .	
1	Front Wheel Drive Intermediate Shaft Flange Bolt (Qty: 3) CAUTION: Refer to Fastener Caution Tighten 22 N.m (16 lb ft)
2	Front Wheel Drive Intermediate Shaft Seal

Callout	Component Name
3	Front Wheel Drive Intermediate Shaft 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. Procedure 1. Insert intermediate shaft into the transaxle until seated. 2. Refill transmission fluid, refer to Transmission Fluid Drain and Fill , or Transmission Fluid Level and Condition Check . NOTE: If servicing the wheel drive shaft, the DT-51504 protector can remain in place until after the wheel drive shaft has been serviced. Special Tools DT-51504 Seal Protector For regional equivalent tools, refer to Special Tools.

FRONT WHEEL DRIVE INTERMEDIATE SHAFT REPLACEMENT (LCV WITH MHG)

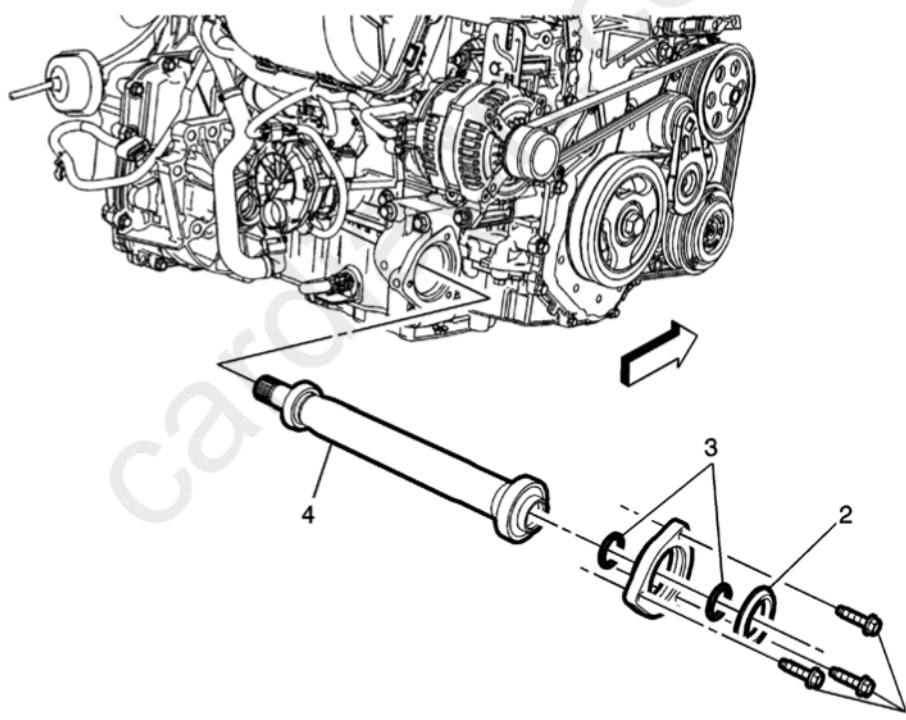


Fig. 2: Front Wheel Drive Intermediate Shaft (LCV with MHG)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure	
Remove the right front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Right Side .	

Callout	Component Name
1	Front Wheel Drive Intermediate Shaft Flange Bolt (Qty: 3) CAUTION: Refer to Fastener Caution Tighten 22 N.m (16 lb ft)
2	Front Wheel Drive Intermediate Shaft Seal
3	Retaining Ring (Qty: 2)
4	Front Wheel Drive Intermediate Shaft 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. Procedure 1. Insert intermediate shaft into the transaxle until seated. 2. Refill transmission fluid, refer to Transmission Fluid Drain and Fill , or Transmission Fluid Level and Condition Check NOTE: If servicing the wheel drive shaft, the DT-51504 protector can remain in place until after the wheel drive shaft has been serviced. Special Tools DT-51504 Seal Protector For regional equivalent tools, refer to Special Tools.

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BRACKET REPLACEMENT (LCV WITH MHG)

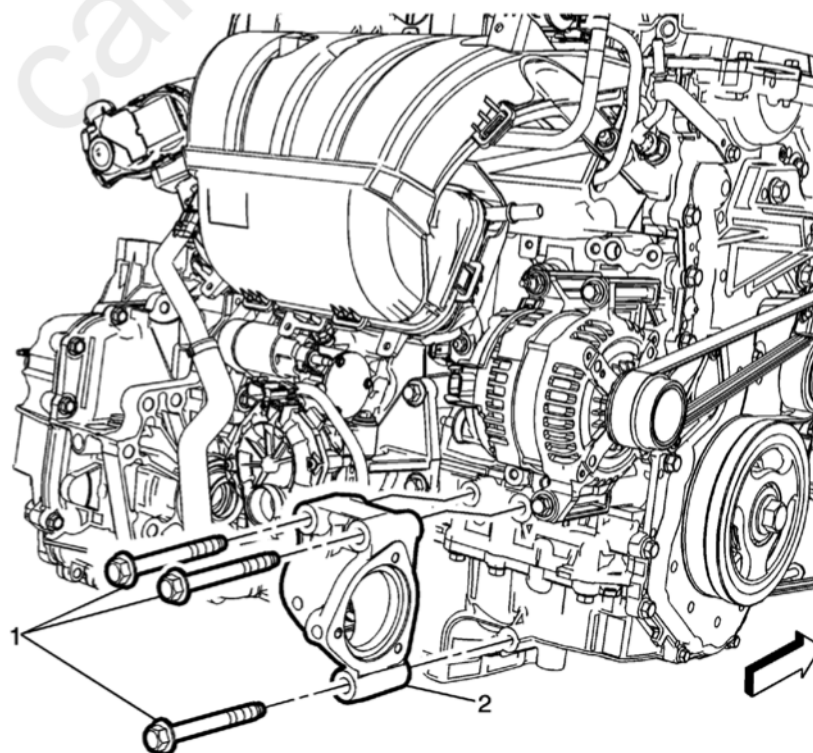


Fig. 3: Front Wheel Drive Intermediate Shaft Bracket (LCV with MHG)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the intermediate shaft. Refer to Front Wheel Drive Intermediate Shaft Replacement (LCV with MHG) .	
1	Front Wheel Drive Intermediate Shaft Bracket Bolts (Qty: 3) CAUTION: Refer to Fastener Caution . Tighten 58 N.m (43 lb ft)
2	Front Wheel Drive Intermediate Shaft Bracket

FRONT WHEEL DRIVE INTERMEDIATE SHAFT BRACKET REPLACEMENT (LFX WITH M7W)

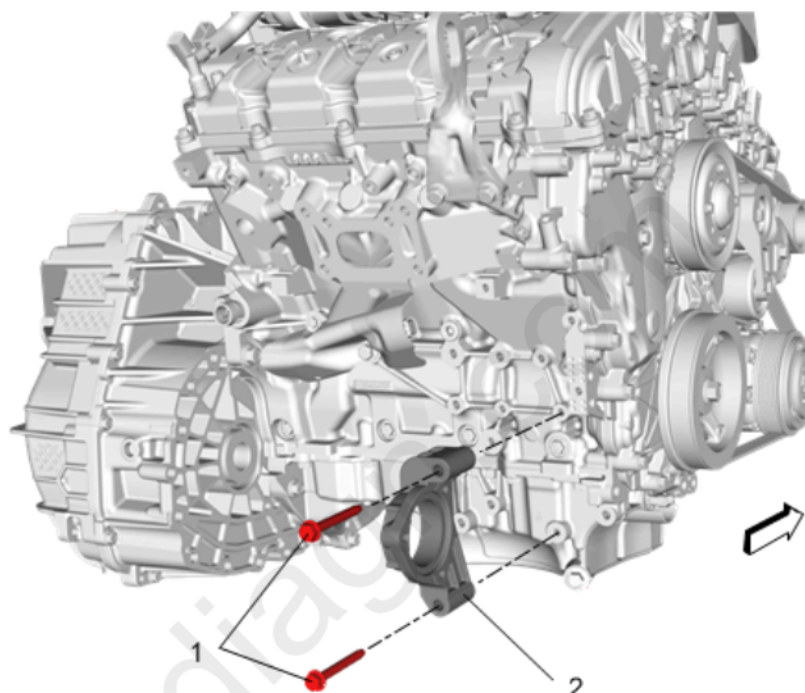


Fig. 4: Front Wheel Drive Intermediate Shaft Bracket (LFR or LFX with M7W)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary 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 . 3. Remove the front wheel drive intermediate shaft assembly. Refer to Front Wheel Drive Intermediate Shaft Replacement (LFX with M7W) .	
1	Front Wheel Drive Intermediate Shaft Bracket Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 22 N.m (16 lb ft)
2	Front Wheel Drive Intermediate Shaft Bracket

Special Tools

- **DT-51504** Seal Protector
- **J-45859** Axle Remover

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

Removal Procedure

1. Remove the tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

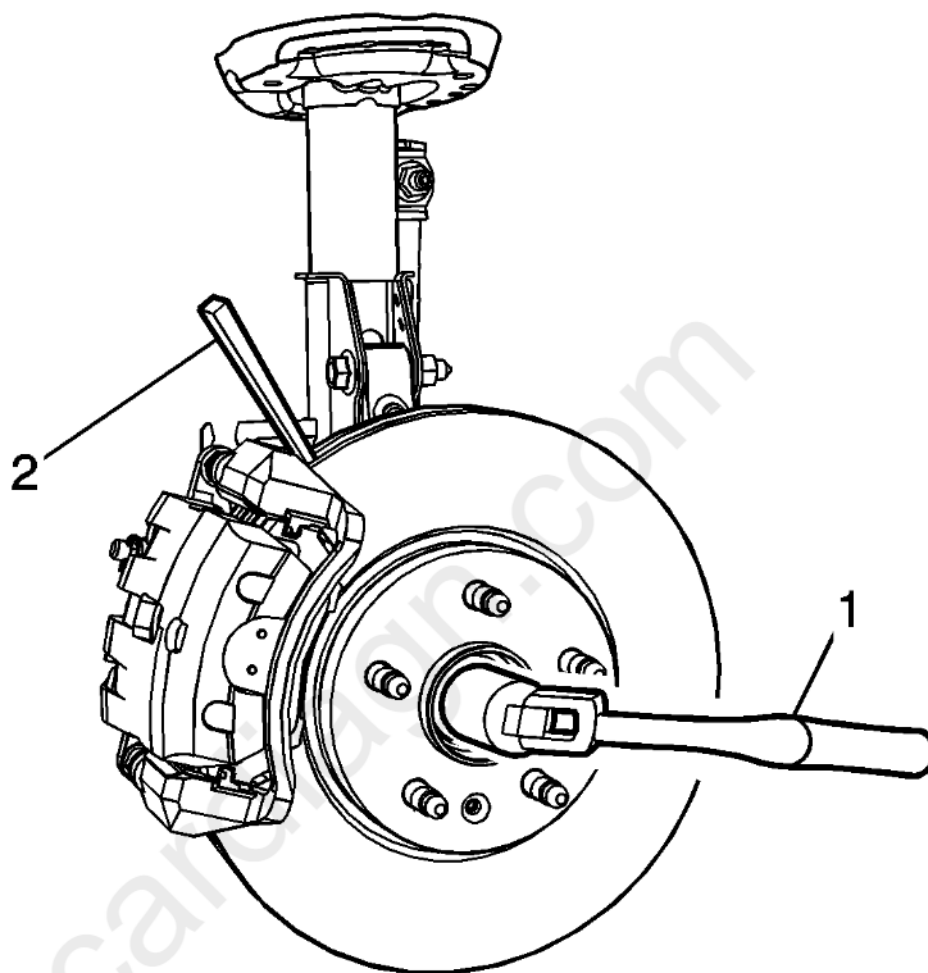


Fig. 5: Holding Brake Rotor With Drift Or Punch

Courtesy of GENERAL MOTORS COMPANY

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

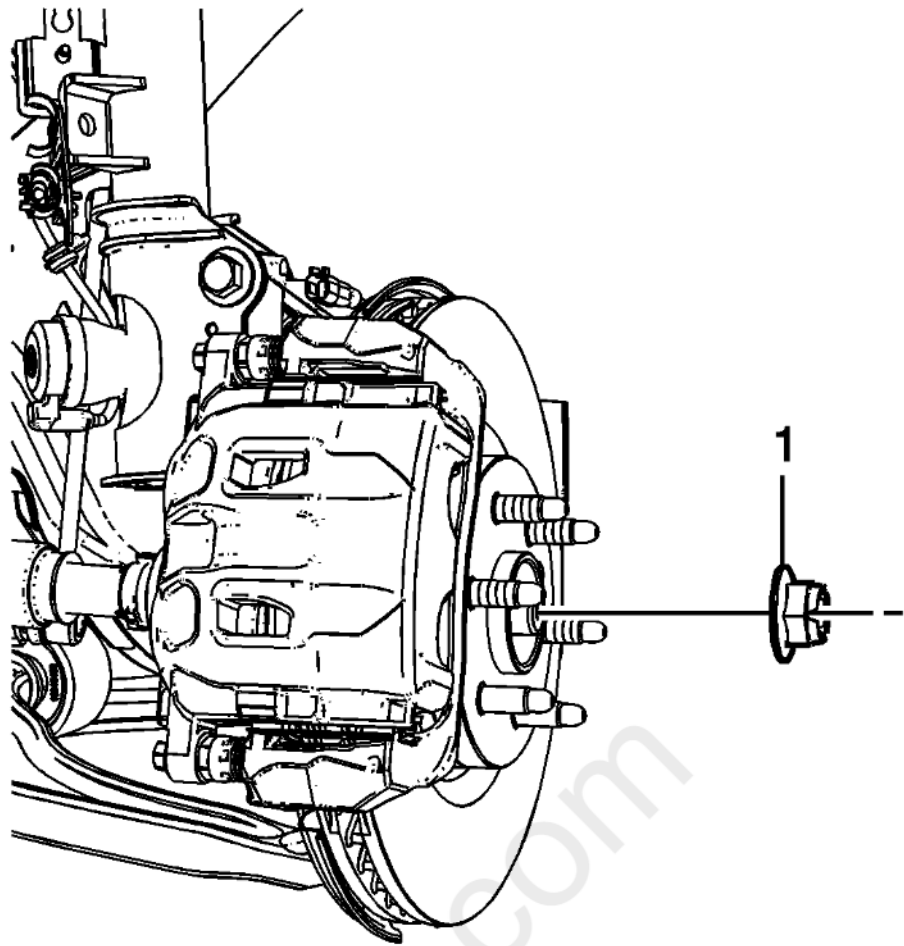


Fig. 6: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove the wheel drive shaft nut (1).

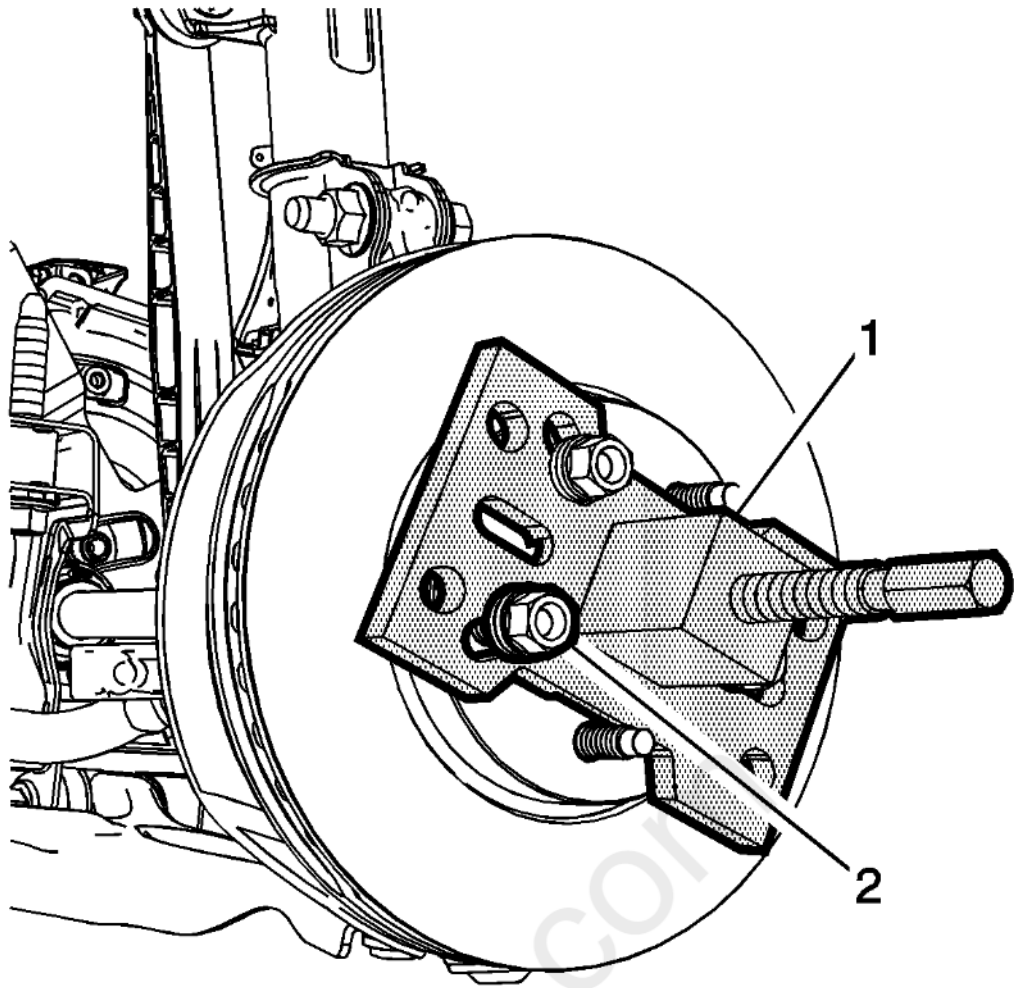


Fig. 7: Wheel Lug Nuts & Axle Remover

Courtesy of GENERAL MOTORS COMPANY

NOTE: Install the lug nuts (2) in reverse with washers, so the flat part of the wheel nuts are facing the washers.

6. Using **J-45859** Axle Remover (1), separate the wheel drive shaft from the knuckle.
7. Remove the lower control arm from the knuckle. [Lower Control Arm Replacement](#)
8. Remove the outer tie rod end from the knuckle. [Steering Linkage Outer Tie Rod Replacement](#)

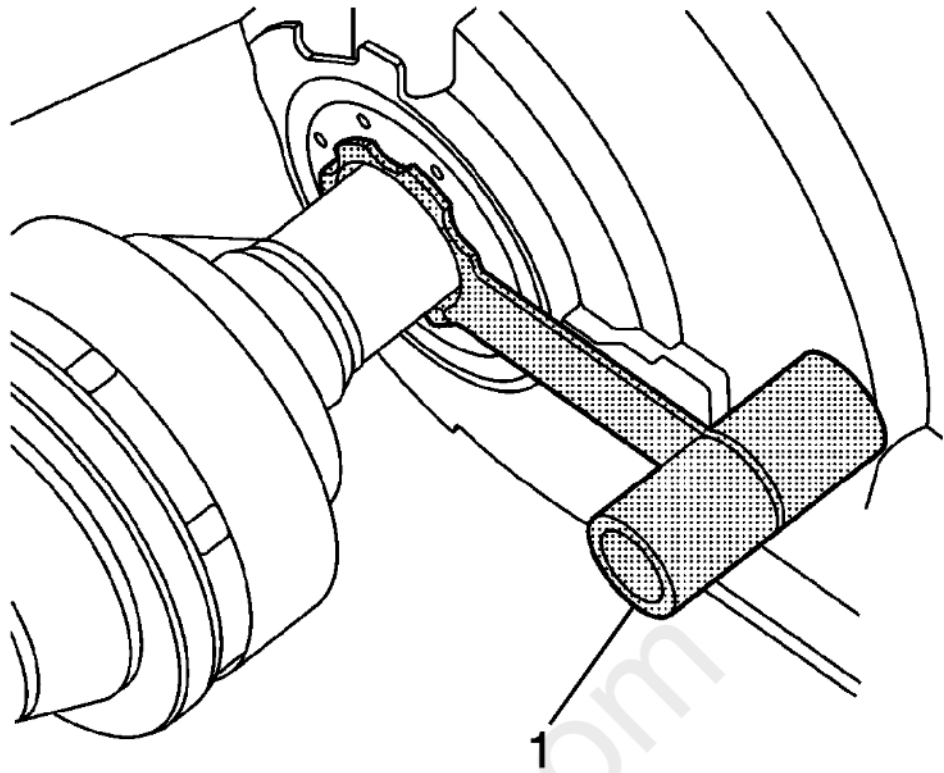


Fig. 8: Protector Tool

Courtesy of GENERAL MOTORS COMPANY

NOTE: May have to slide wheel drive shaft out board just enough to gain access to install seal protector.

9. Carefully install the **DT-51504** protector (1) over the front wheel drive shaft and slide into the transmission.

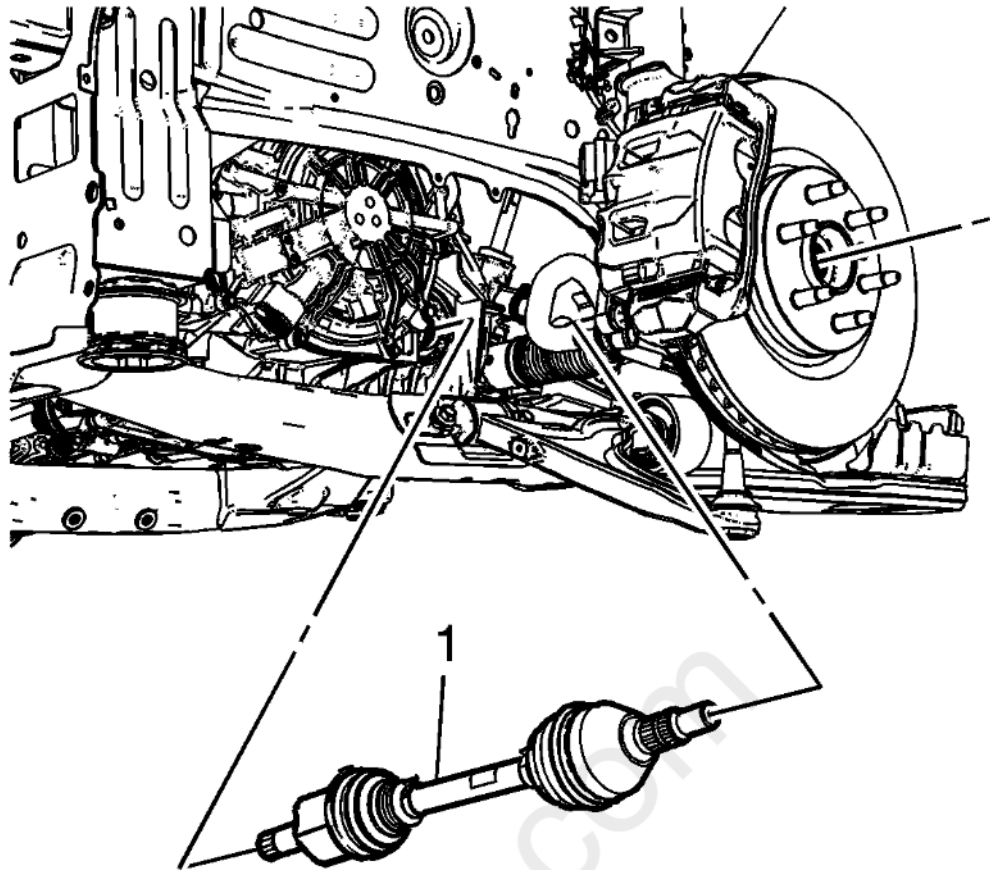


Fig. 9: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- It may be necessary to have an assistant hold the knuckle assembly while removing the wheel drive shaft.
- If removing the wheel drive shaft to service other suspension or driveline components, use care when removing or installing the wheel drive shaft so as not to damage the wheel drive shaft boots

10. Using an appropriate tool, remove the wheel drive shaft (1) from the vehicle.

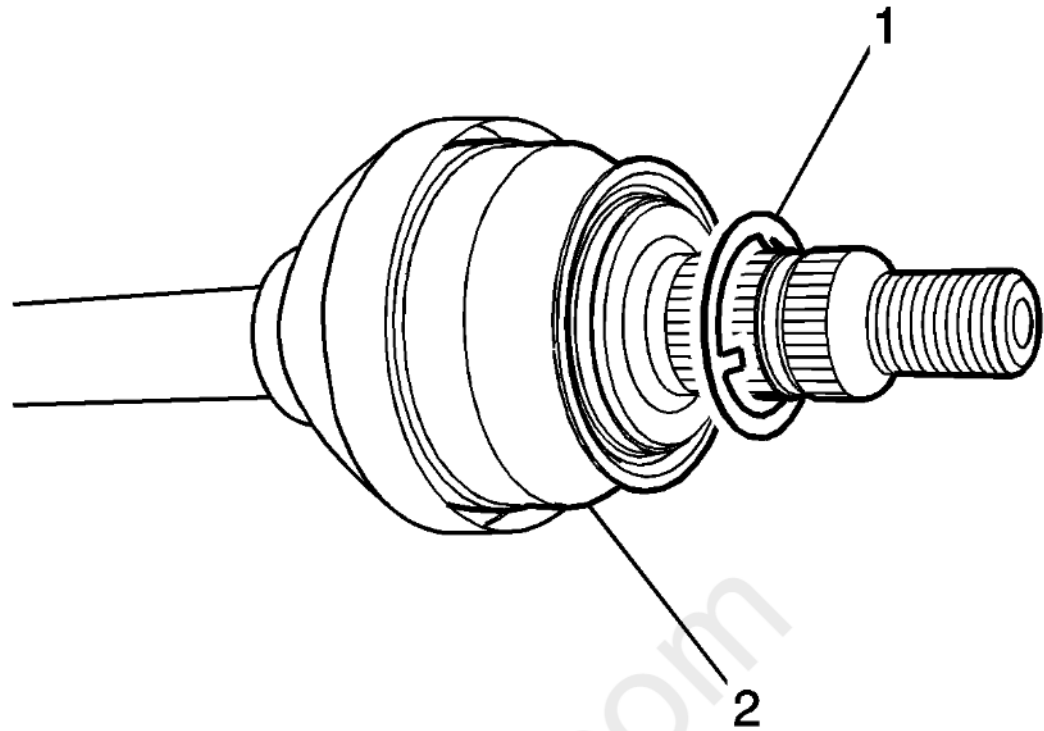


Fig. 10: Wheel Drive Shaft & Washer

Courtesy of GENERAL MOTORS COMPANY

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

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

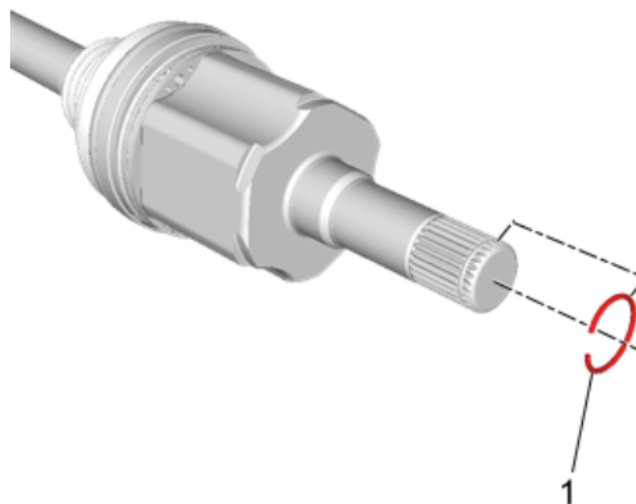


Fig. 11: Wheel Drive Shaft Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

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

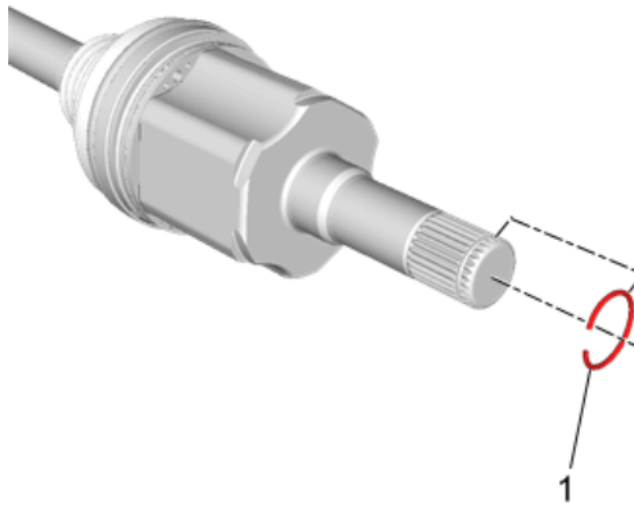


Fig. 12: Wheel Drive Shaft Retaining Ring
Courtesy of GENERAL MOTORS COMPANY

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

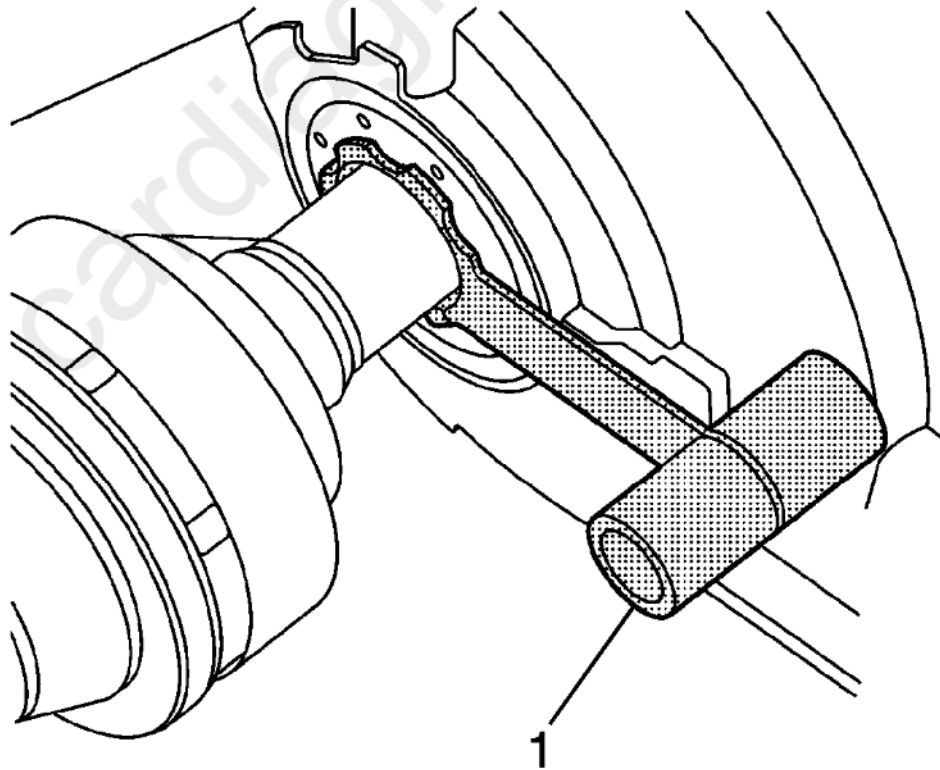


Fig. 13: Protector Tool
Courtesy of GENERAL MOTORS COMPANY

2. Insert the **DT-51504** protector (1) into the transmission.

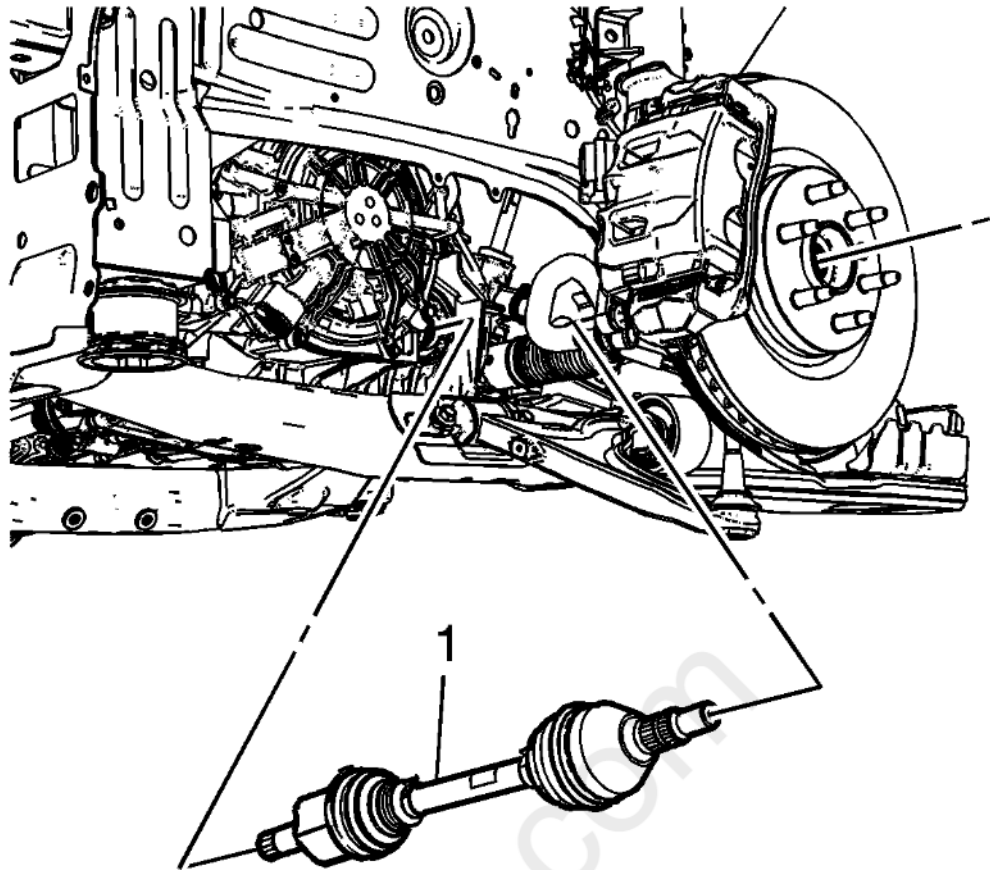


Fig. 14: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

3. Position the wheel drive shaft (1) in the vehicle.
4. Remove the **DT-51504** protector from the oil seal.
5. Insert the wheel drive shaft in the knuckle.
6. Install the lower control arm in the knuckle. [Lower Control Arm Replacement](#)
7. Install the outer tie rod end in the knuckle. [Steering Linkage Outer Tie Rod Replacement](#)

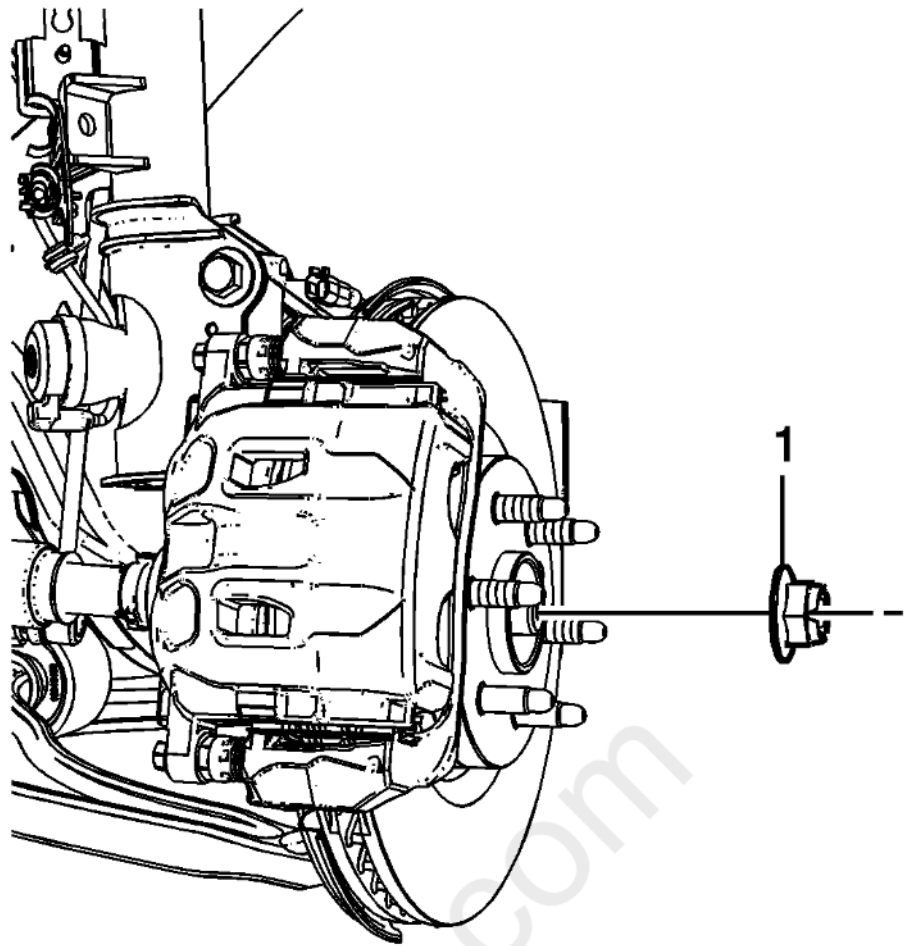


Fig. 15: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

8. Install the wheel drive shaft nut (1).

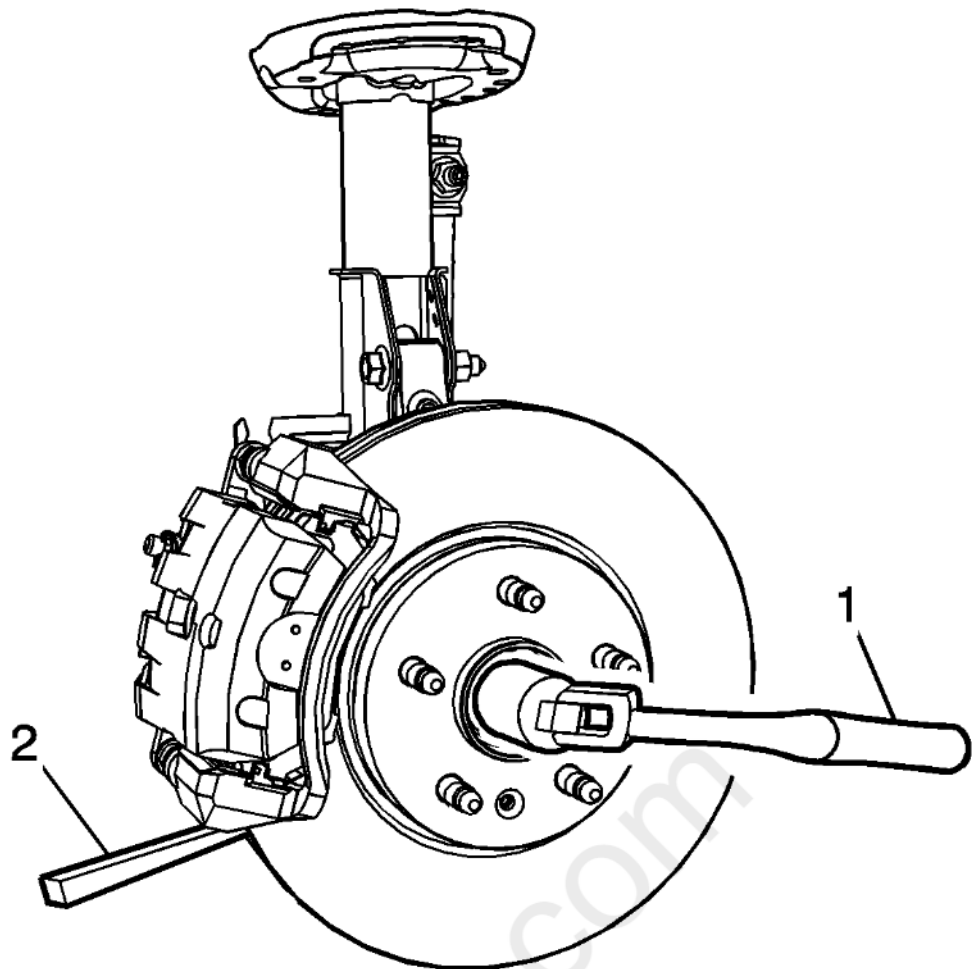


Fig. 16: Holding Brake Rotor From Rotating With Drift Or Punch
Courtesy of GENERAL MOTORS COMPANY

9. Insert a drift or punch (2) in the cooling fins of the brake rotor.
10. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.

CAUTION: Fastener Caution

11. Using a torque wrench (1), tighten the wheel drive shaft nut to:
 - First Pass: 150 N.m (111 lb ft)
 - Second Pass: loosen 45 degrees
 - Final Pass: re-tighten to 250 N.m (184 lb ft)
12. Install the tire and wheel assembly. Tire and Wheel Removal and Installation

FRONT WHEEL DRIVE SHAFT REPLACEMENT - RIGHT SIDE

Special Tools

- J-45859 Wheel Hub Remover

Equivalent regional tools: Special Tools.

Removal Procedure

1. Remove the right front tire and wheel assembly. Tire and Wheel Removal and Installation

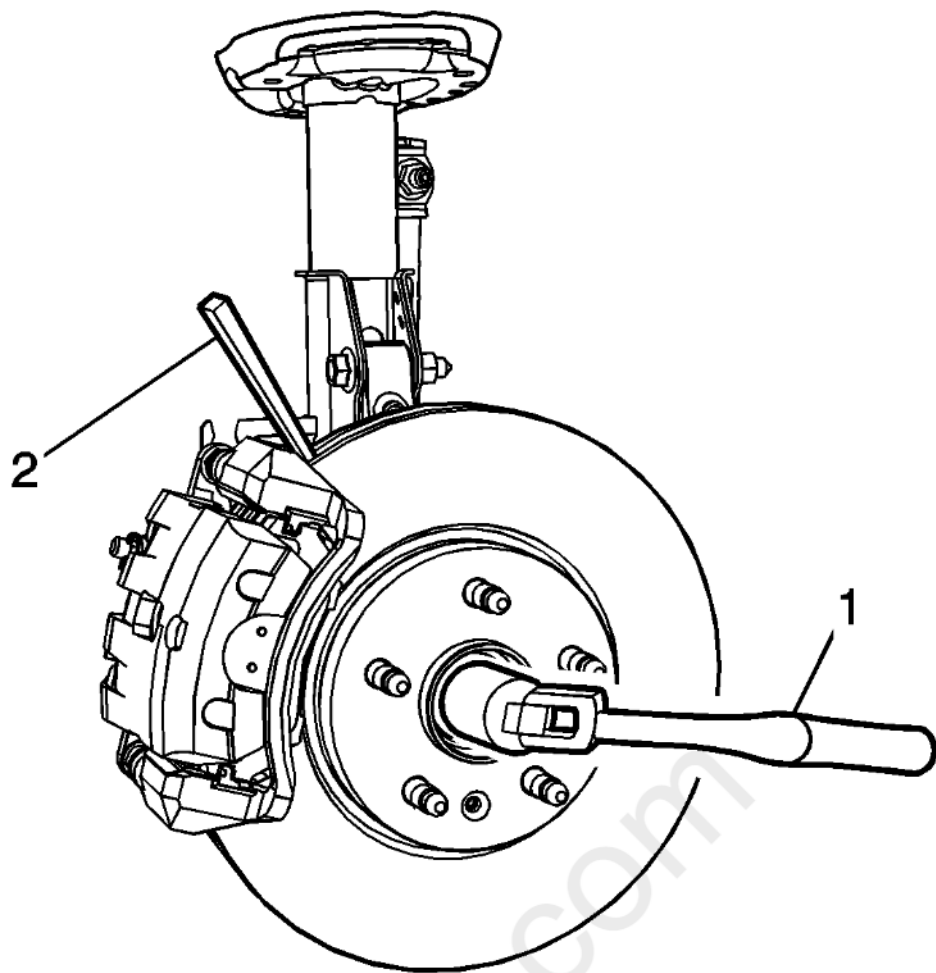


Fig. 17: Holding Brake Rotor With Drift Or Punch

Courtesy of GENERAL MOTORS COMPANY

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

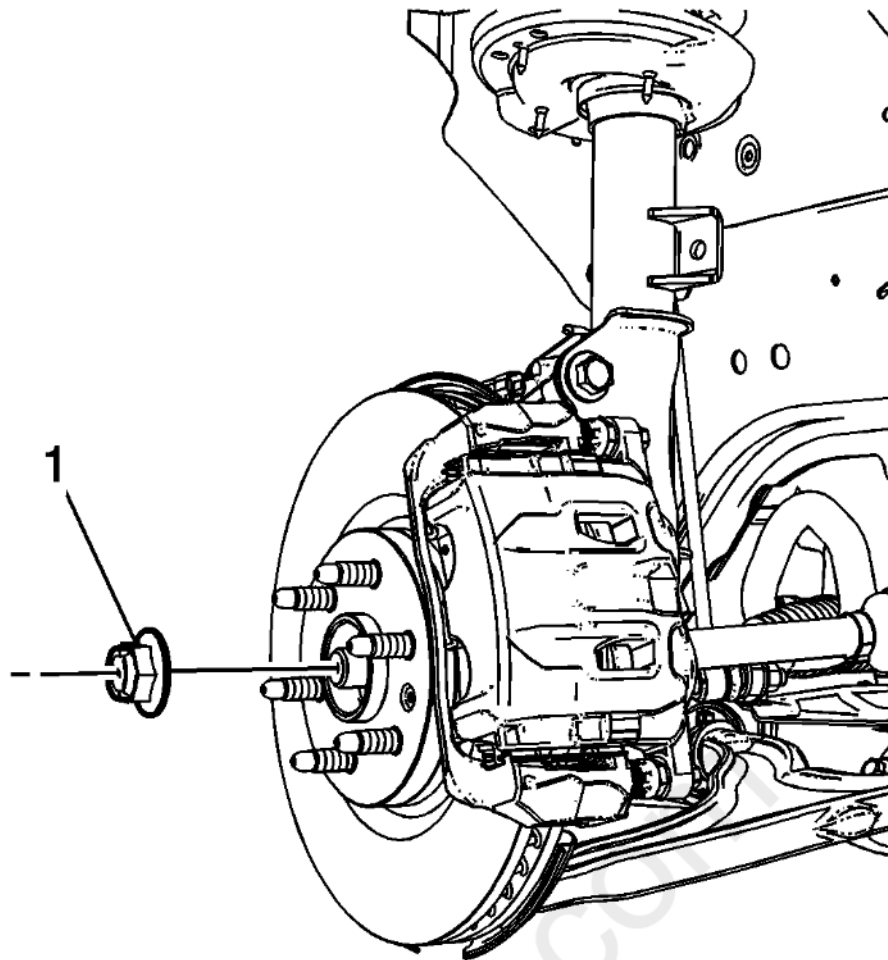


Fig. 18: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

5. Remove the wheel drive shaft nut (1).

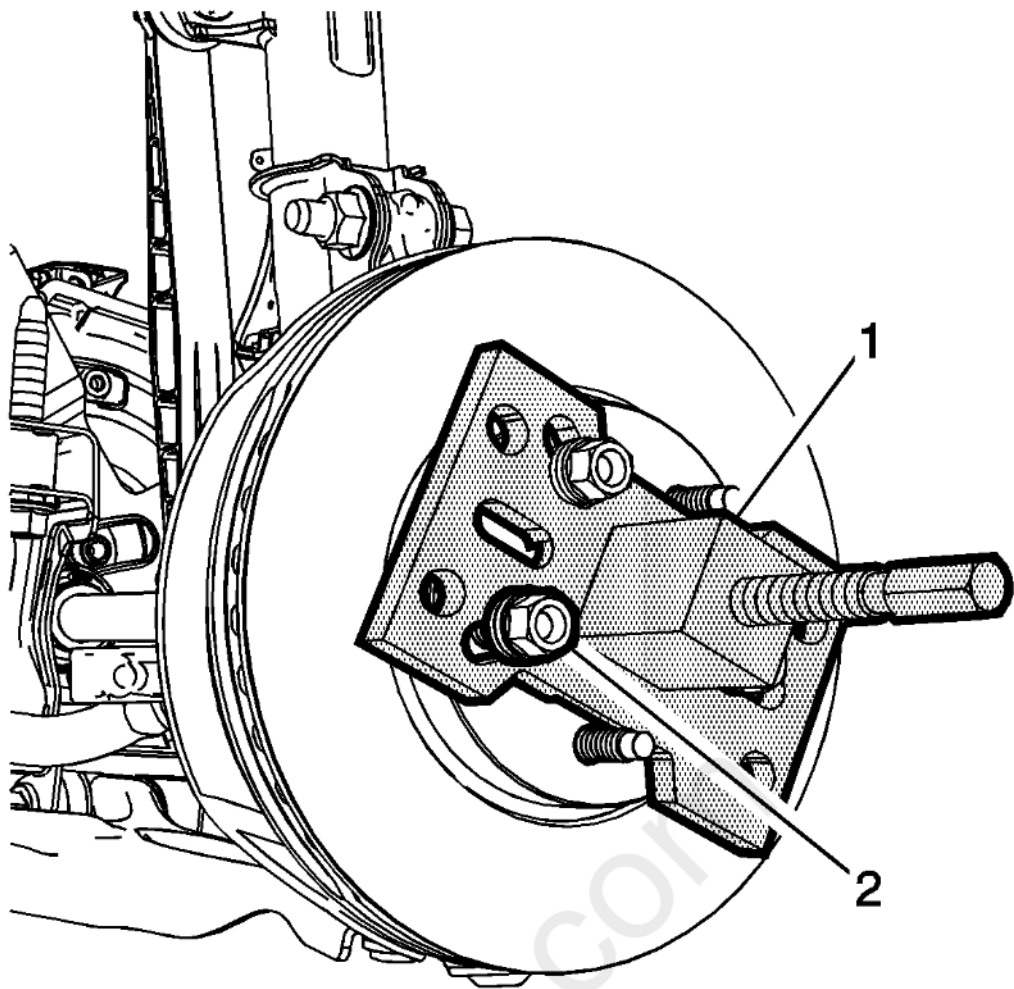


Fig. 19: Wheel Lug Nuts & Axle Remover

Courtesy of GENERAL MOTORS COMPANY

NOTE: Reverse the wheel lug nuts and washers so the flat part of the wheel nut is facing the washers.

6. Using **J-45859** Axle remover (1) remove the axle from the hub.
7. Remove the lower control arm from the knuckle. [Lower Control Arm Replacement](#)
8. Remove the outer tie rod end from the knuckle. [Steering Linkage Outer Tie Rod Replacement](#)

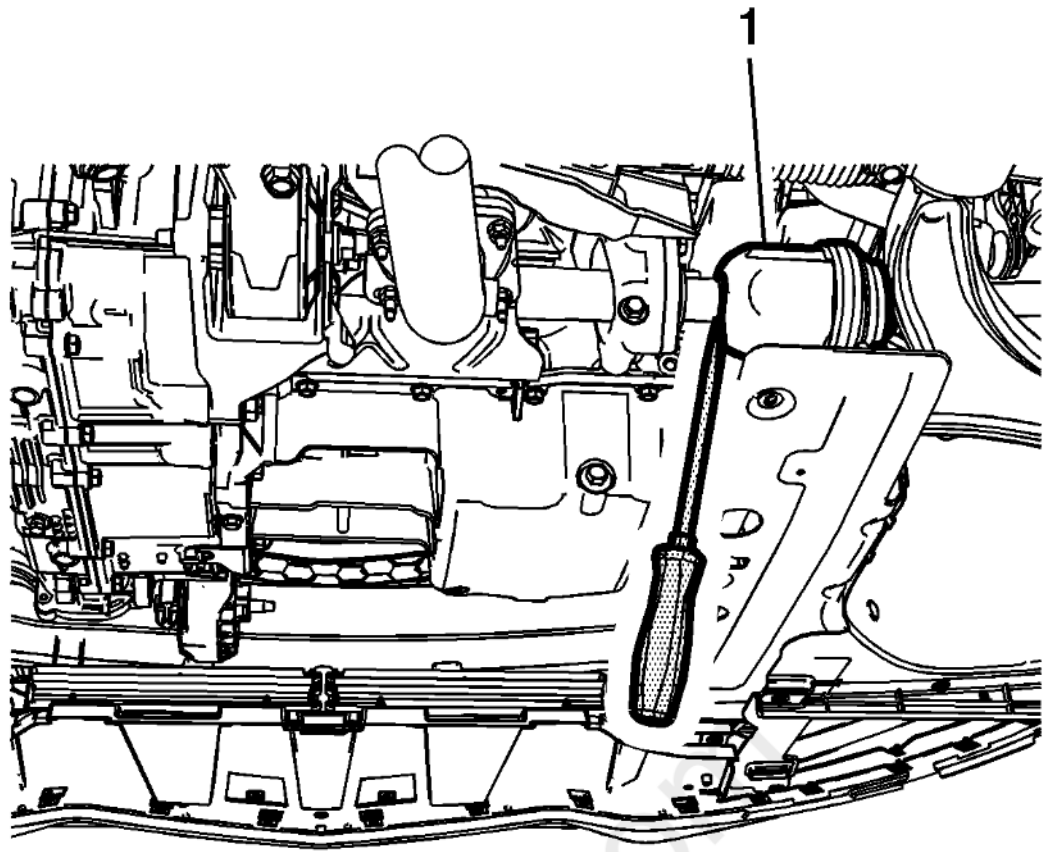


Fig. 20: Knuckle Assembly Puller

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- It may be necessary to have an assistant hold the knuckle assembly while removing the wheel drive shaft.
- If removing the wheel drive shaft to service other suspension or driveline components, use care when removing or installing the wheel drive shaft so as not to damage the wheel drive shaft boots.

9. Using a suitable flat bladed tool, remove the wheel drive shaft (1) from the intermediate shaft.

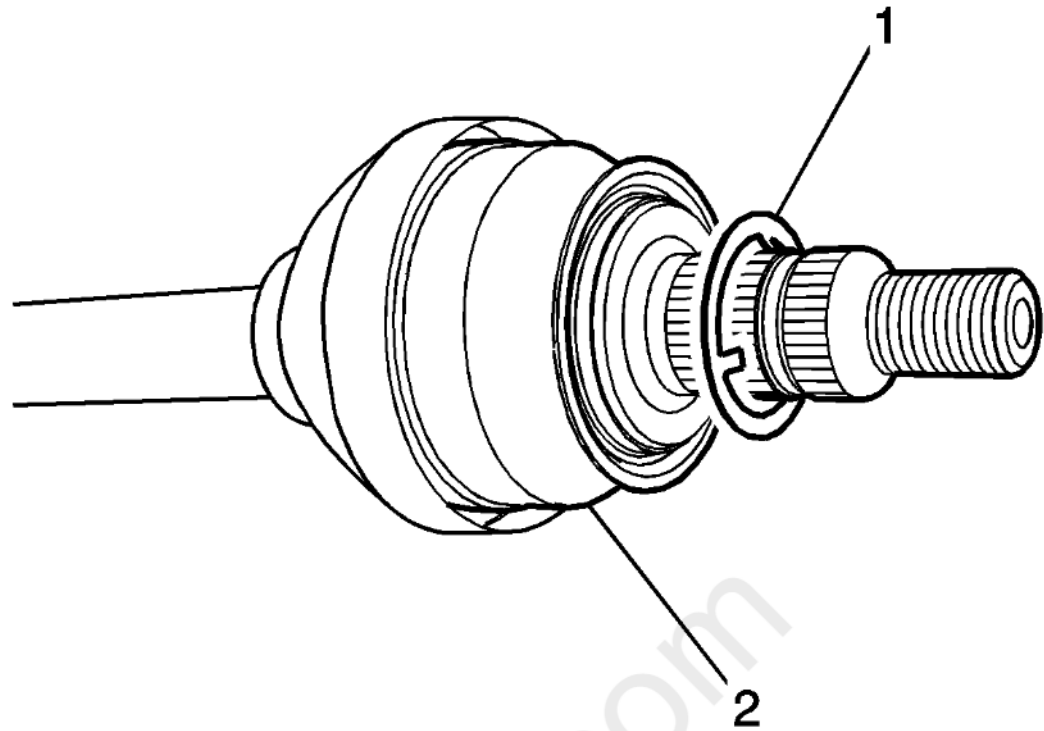


Fig. 21: Wheel Drive Shaft & Washer

Courtesy of GENERAL MOTORS COMPANY

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

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

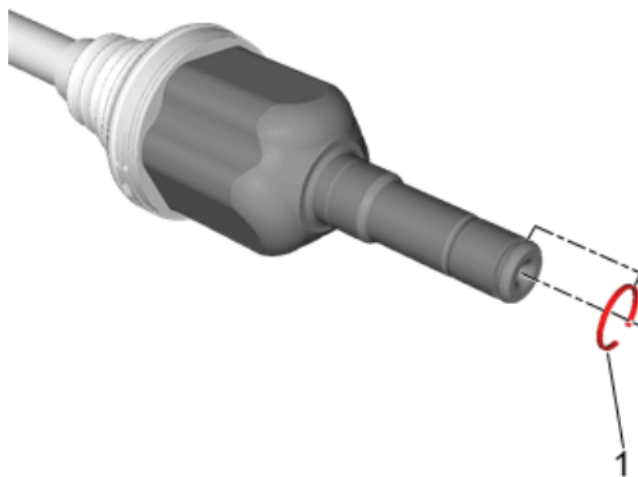


Fig. 22: Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

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

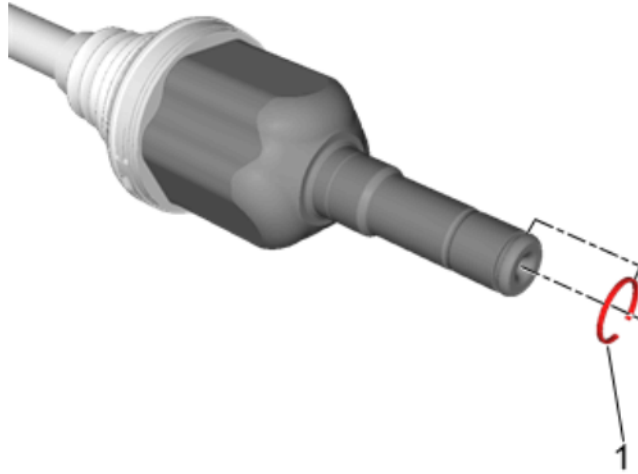


Fig. 23: Retaining Ring

Courtesy of GENERAL MOTORS COMPANY

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

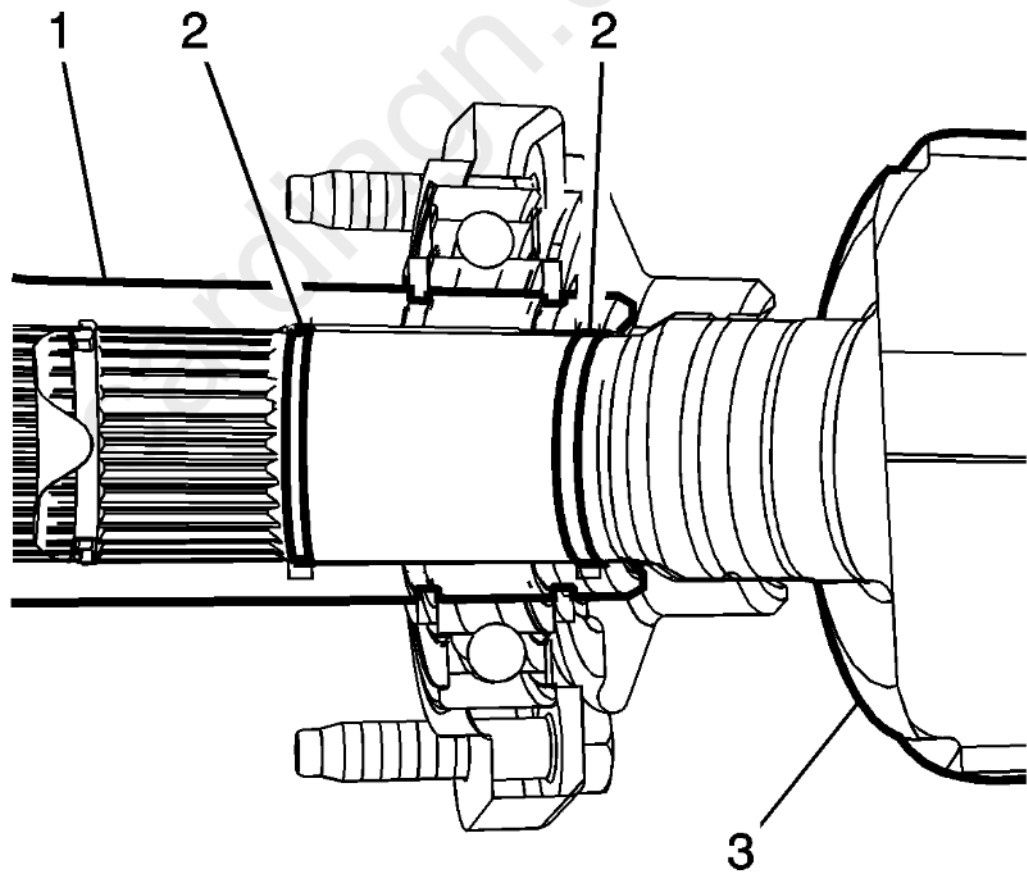


Fig. 24: Intermediate Shaft, Wheel Drive Shaft & O-Rings

Courtesy of GENERAL MOTORS COMPANY

2. If removing or replacing the drive shaft, replace the O-rings (2).

3. Apply a very small amount of grease to the splines of the wheel drive shaft inner joint. [Adhesives, Fluids, Lubricants, and Sealers](#)

4. Install the wheel drive shaft (3) into the intermediate shaft (1) until fully seated.

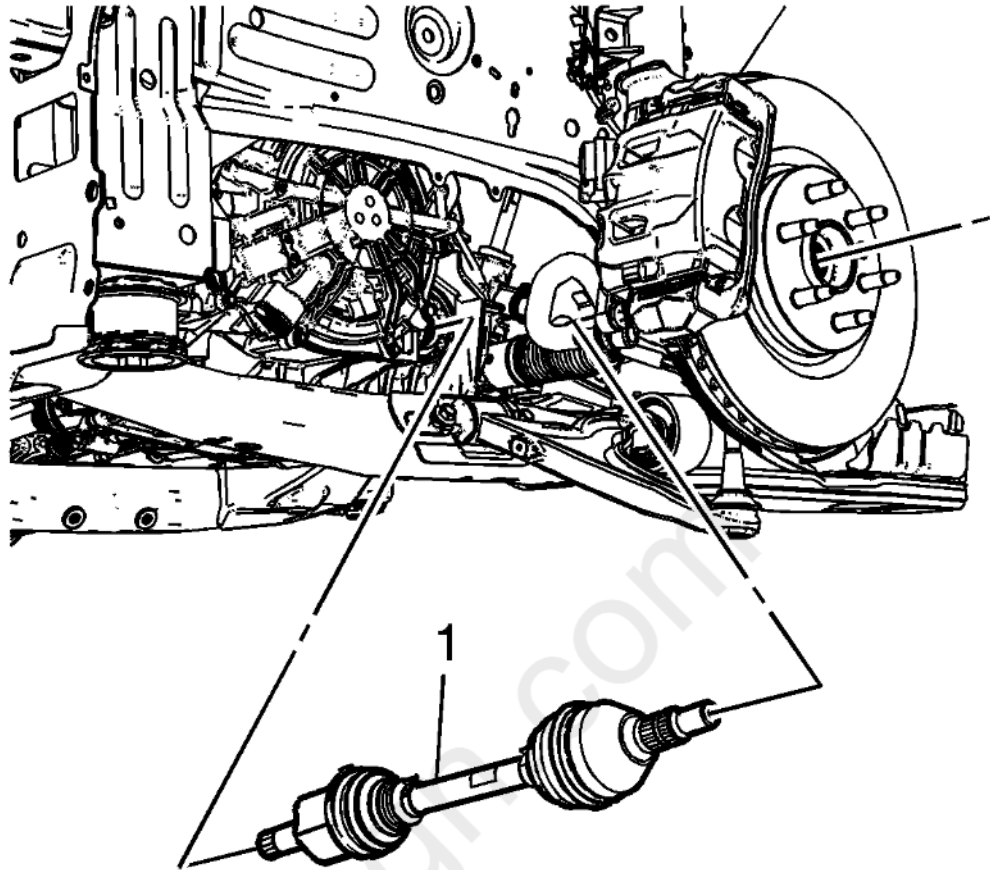


Fig. 25: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

5. Insert the wheel drive shaft (1) in the front wheel bearing/hub.

6. Install the lower control arm in the knuckle. [Lower Control Arm Replacement](#)

7. Install the outer tie rod end in the knuckle. [Steering Linkage Outer Tie Rod Replacement](#)

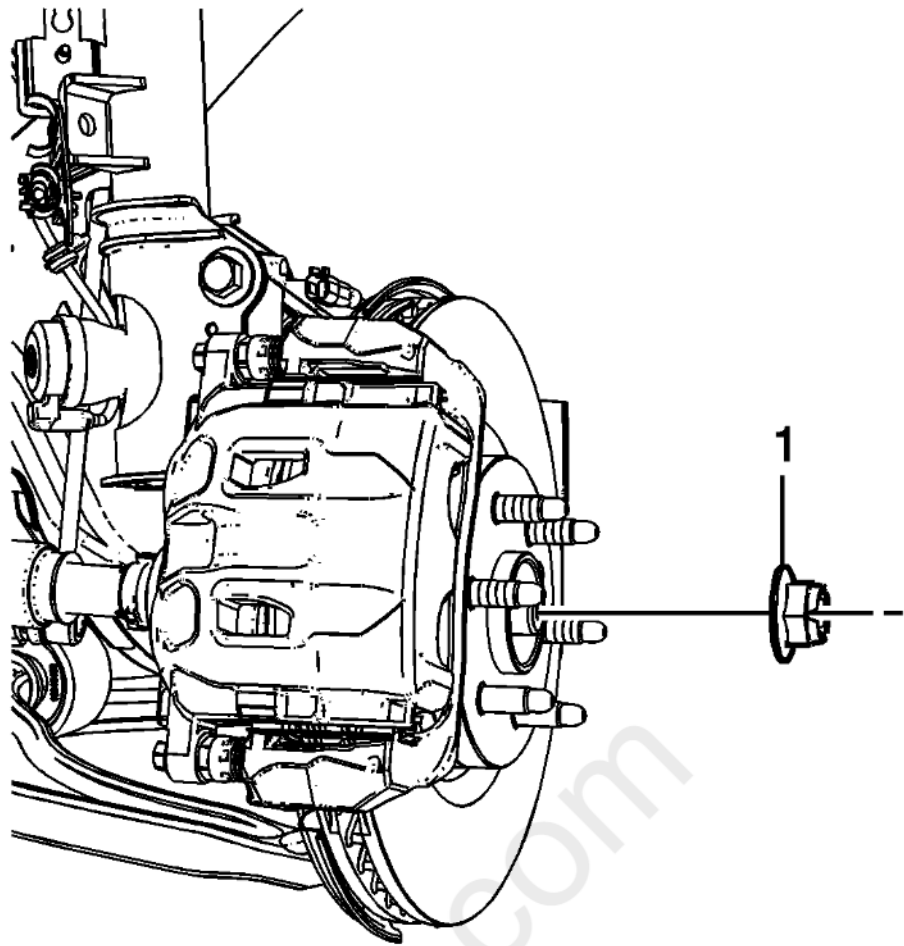


Fig. 26: Wheel Drive Shaft Nut

Courtesy of GENERAL MOTORS COMPANY

8. Install the wheel drive shaft nut (1).

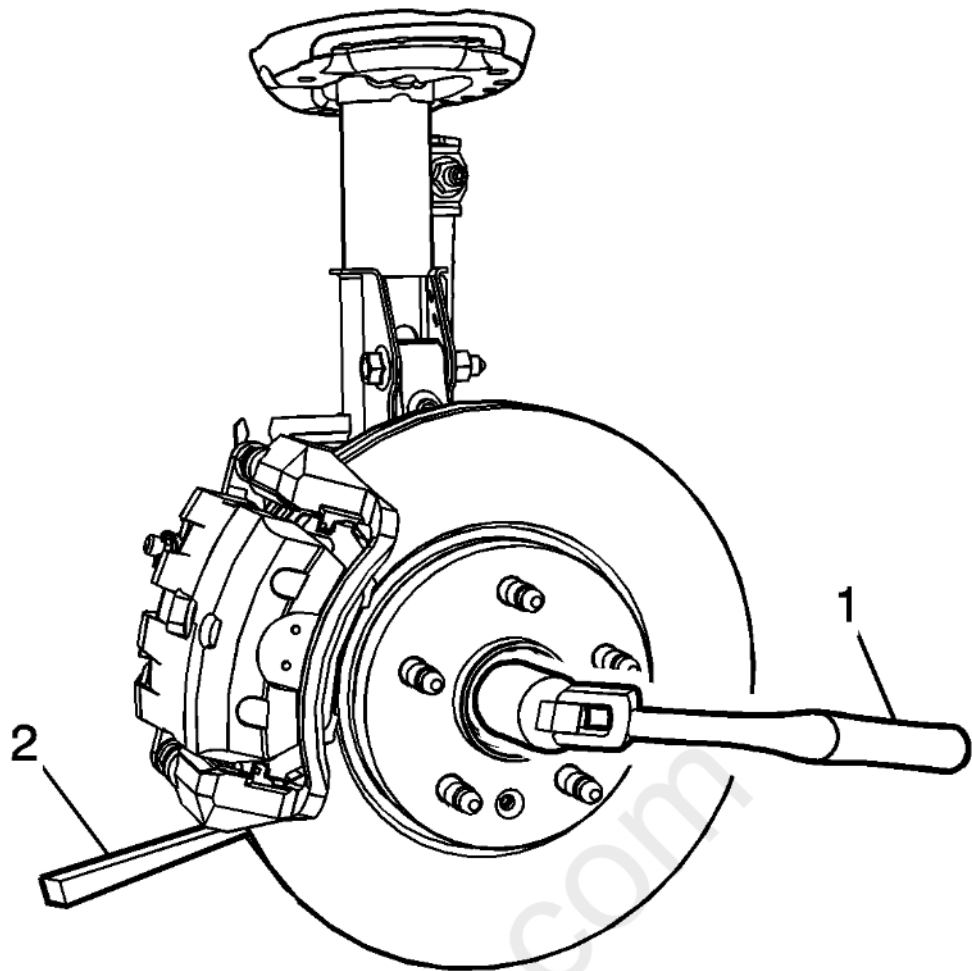


Fig. 27: Holding Brake Rotor From Rotating With Drift Or Punch
 Courtesy of GENERAL MOTORS COMPANY

9. Insert a drift or punch (2) in the cooling fins of the brake rotor.
10. Rotate the brake rotor until the drift or punch contacts the brake caliper mounting bracket.

CAUTION: Refer to **Fastener Caution** .

11. Using a torque wrench (1), tighten the wheel drive shaft nut to :
 - First Pass: 150 N.m (111 lb ft)
 - Second Pass: loosen 45 degrees
 - Final Pass: re-tighten to 250 N.m (184 lb ft)
12. Install the right front tire and wheel assembly. **Tire and Wheel Removal and Installation**

FRONT WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

DT 35910 Drive Axle Seal Clamp Pliers

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

Disassemble Procedure

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

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

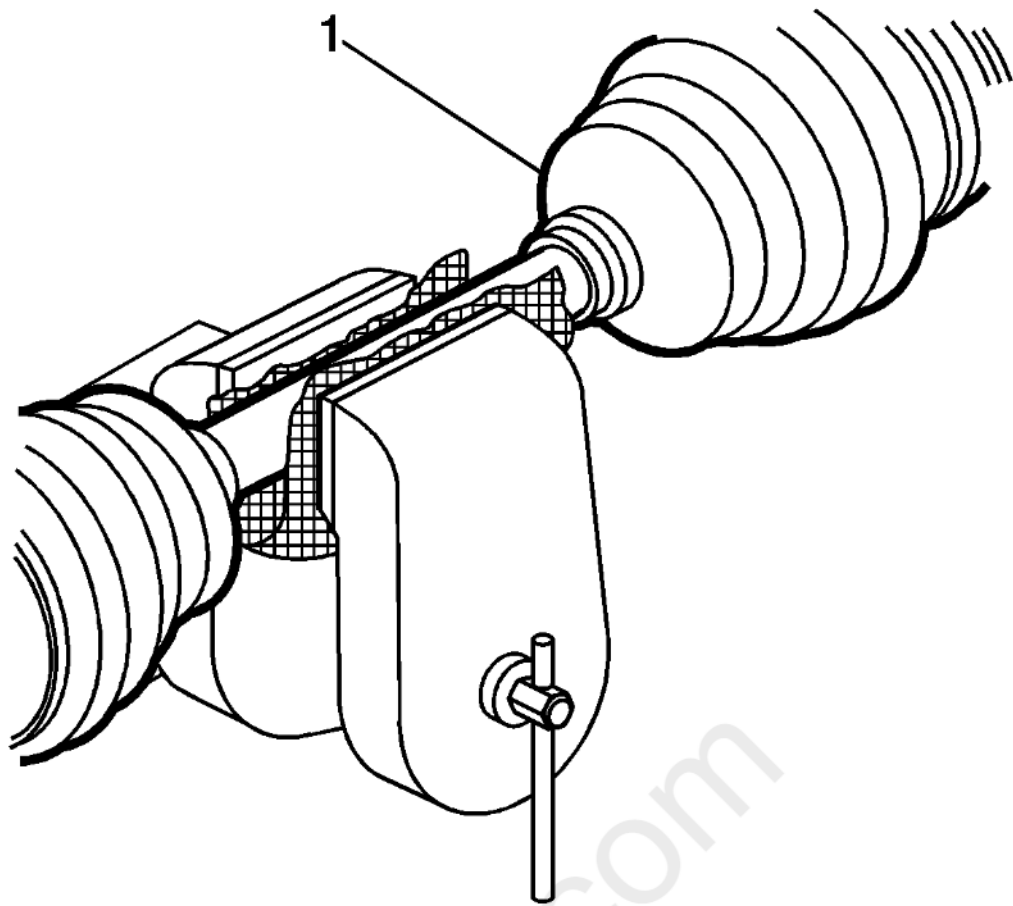


Fig. 28: View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS COMPANY

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

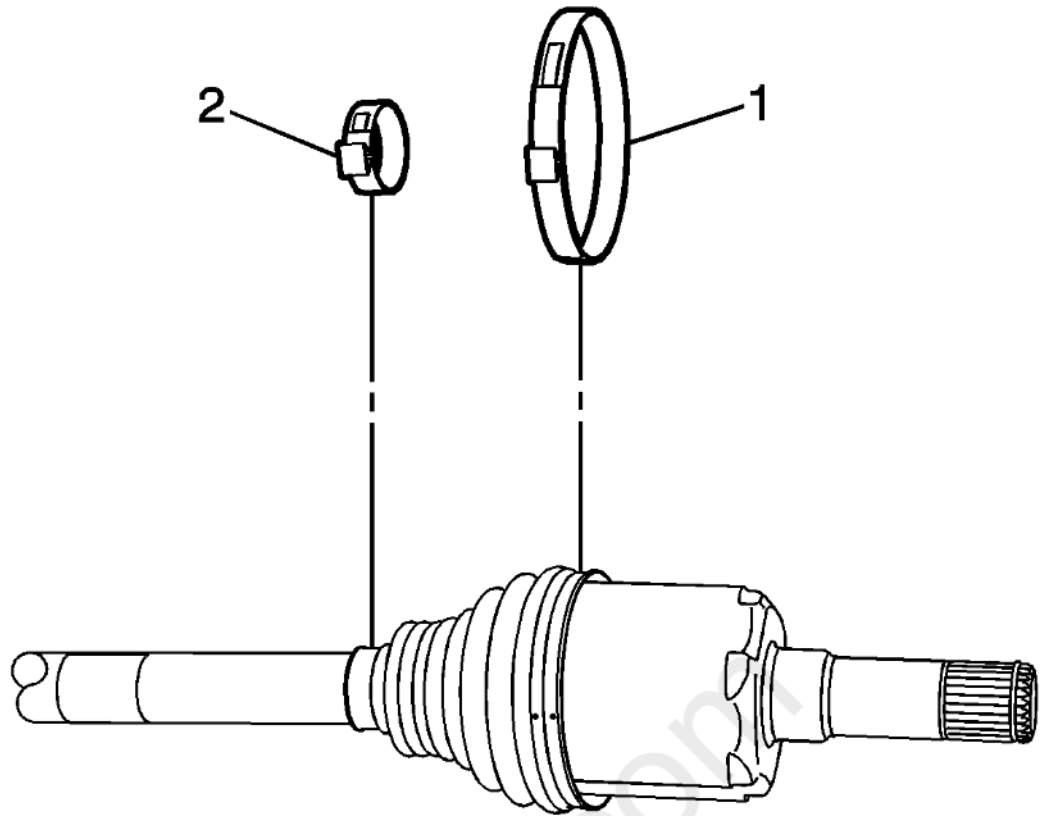


Fig. 29: View Of Boot Retaining Clamps
Courtesy of GENERAL MOTORS COMPANY

3. Using a flat-bladed tool, remove the boot clamp (2).
4. Using side cutters, remove the boot clamp (1).

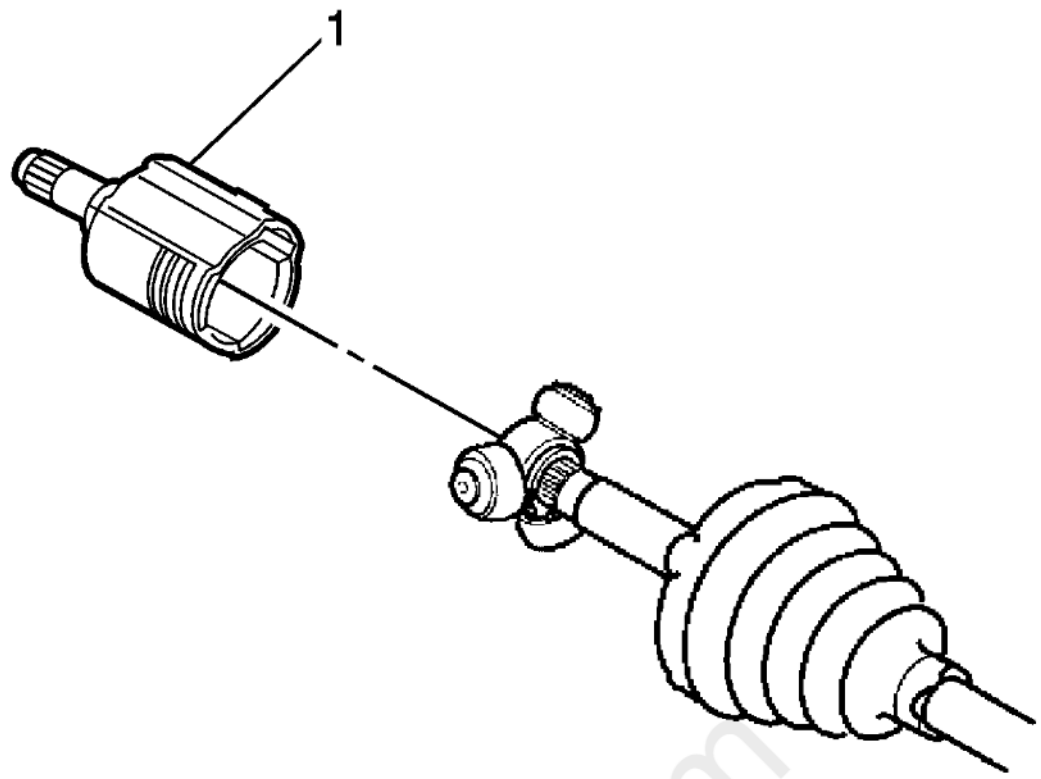


Fig. 30: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

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

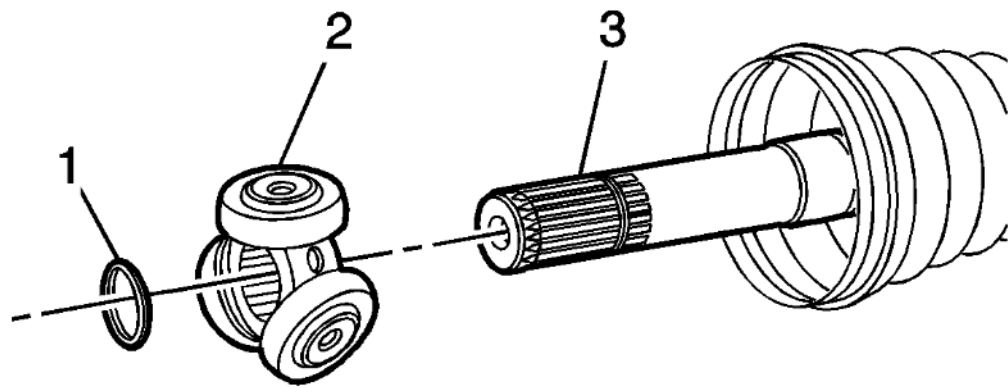


Fig. 31: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS COMPANY

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

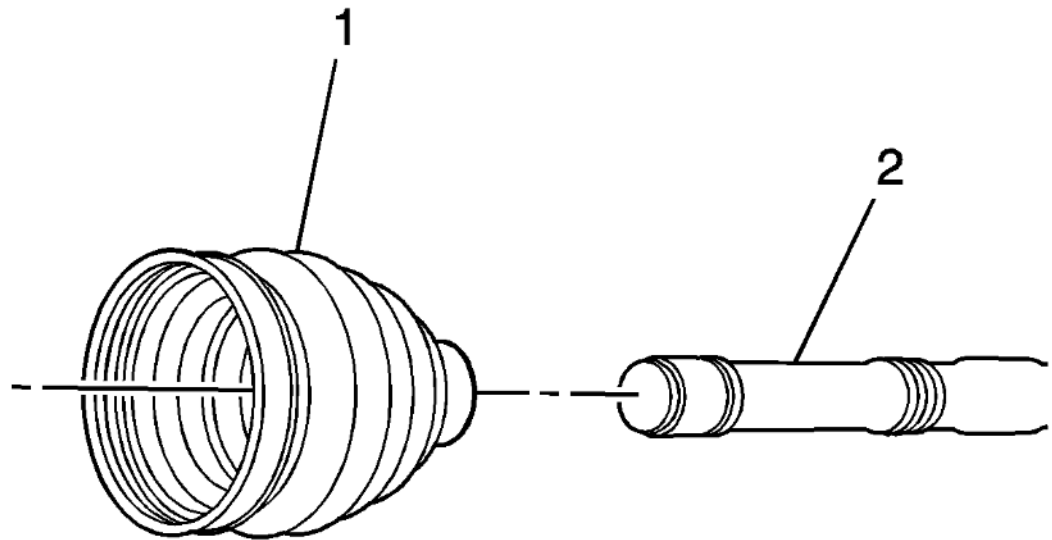


Fig. 32: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS COMPANY

7. Remove the boot (1) from the wheel drive shaft (2).

Assemble Procedure

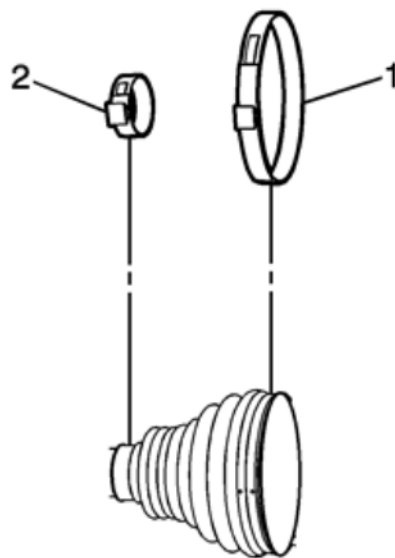


Fig. 33: Inboard And Outboard Boot Clamp
Courtesy of GENERAL MOTORS COMPANY

1. Loosely install the inboard boot clamp (2) to the boot.

2. Loosely install the outboard boot clamp (1) to the boot.

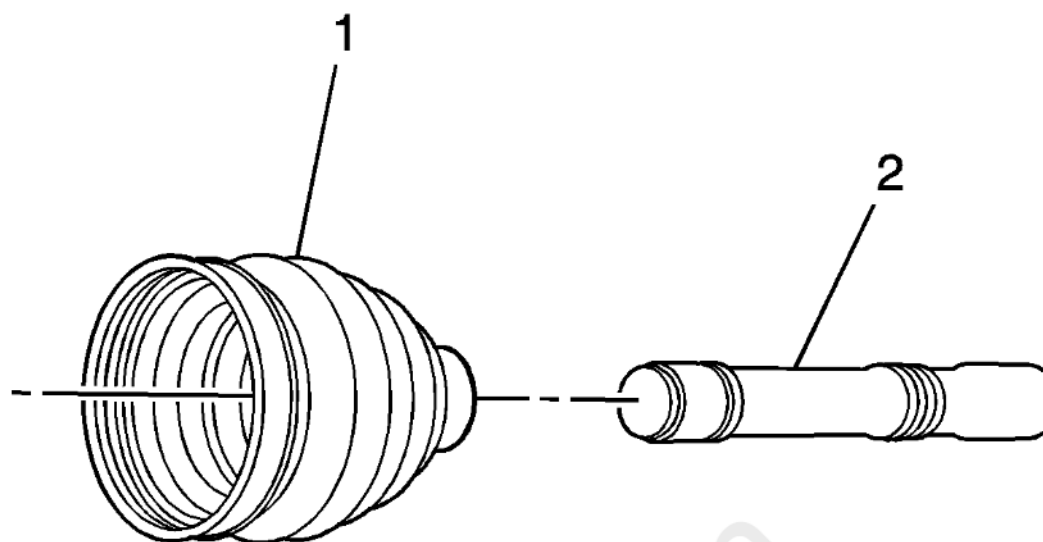


Fig. 34: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS COMPANY

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

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

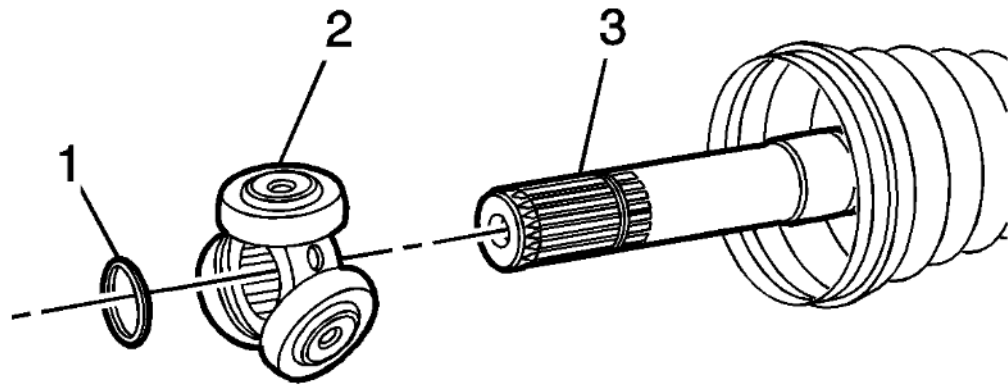


Fig. 35: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip

Courtesy of GENERAL MOTORS COMPANY

4. Install the tripod spider assembly (2) to the wheel drive shaft (3), until seated against the shoulder.
5. Install the retaining ring (1) in the wheel drive shaft (3).

NOTE: The boot kit does not come with wheel drive shaft grease.

6. Pack the tripod joint with wheel drive shaft grease and place the remainder of the grease into the tripod housing. **Adhesives, Fluids, Lubricants, and Sealers**

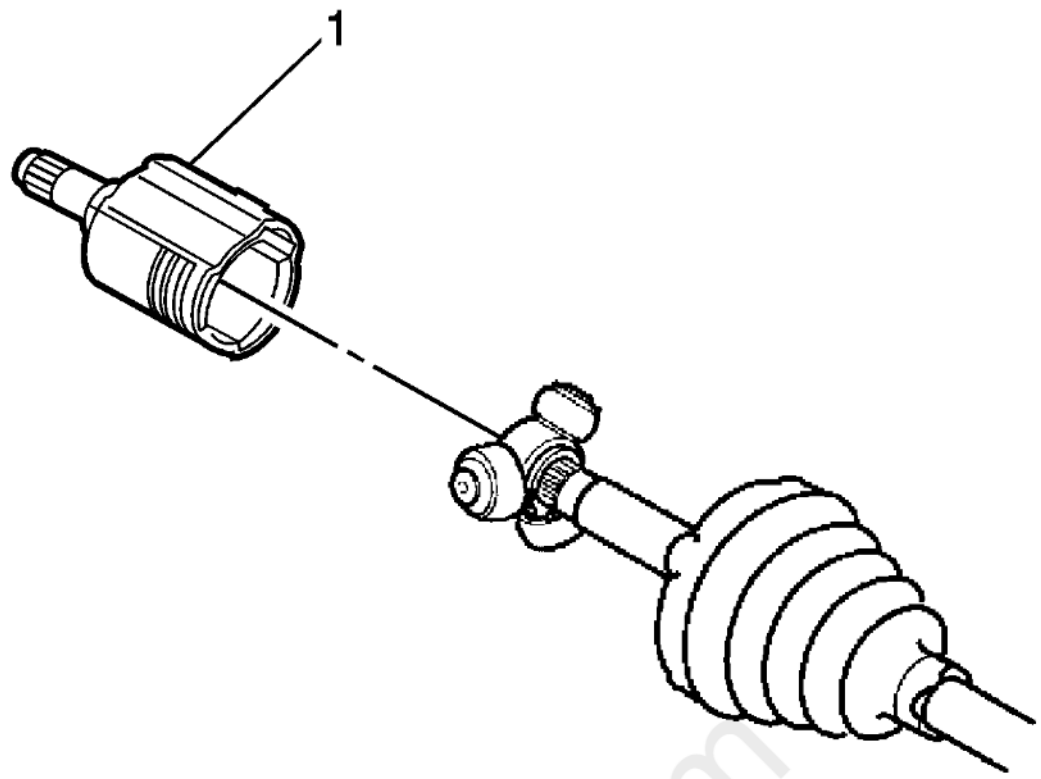


Fig. 36: Tripot Housing

Courtesy of GENERAL MOTORS COMPANY

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

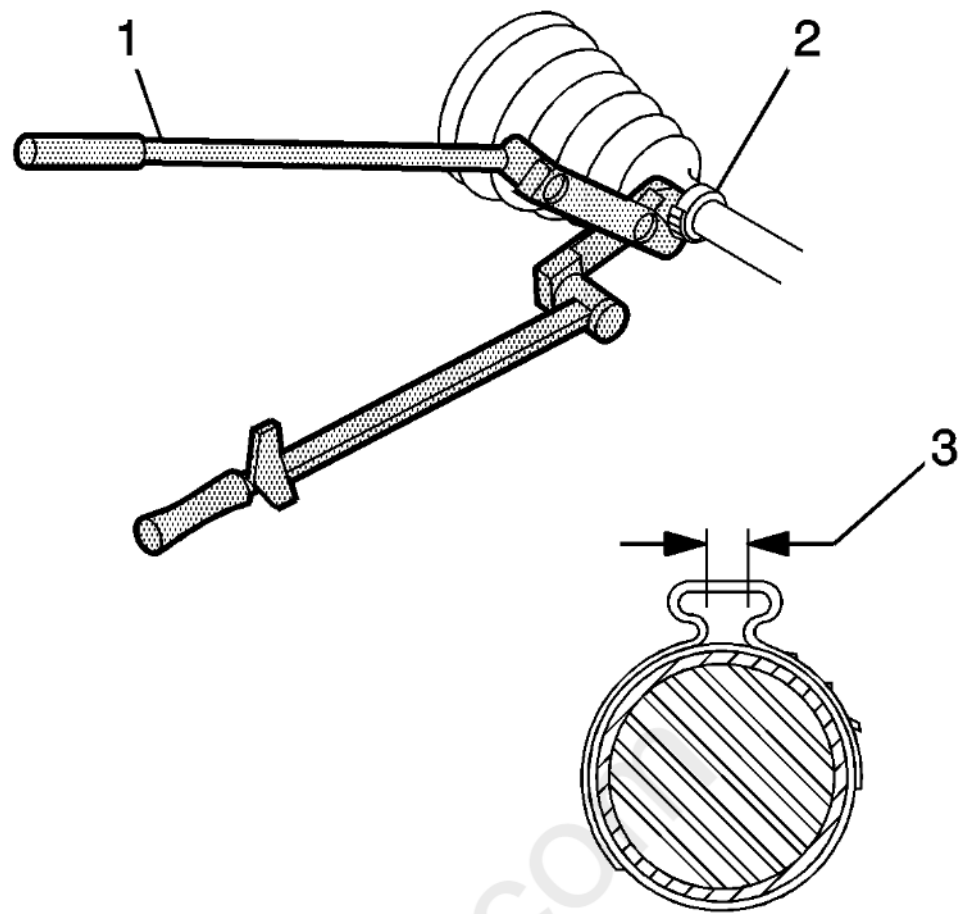


Fig. 37: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS COMPANY

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

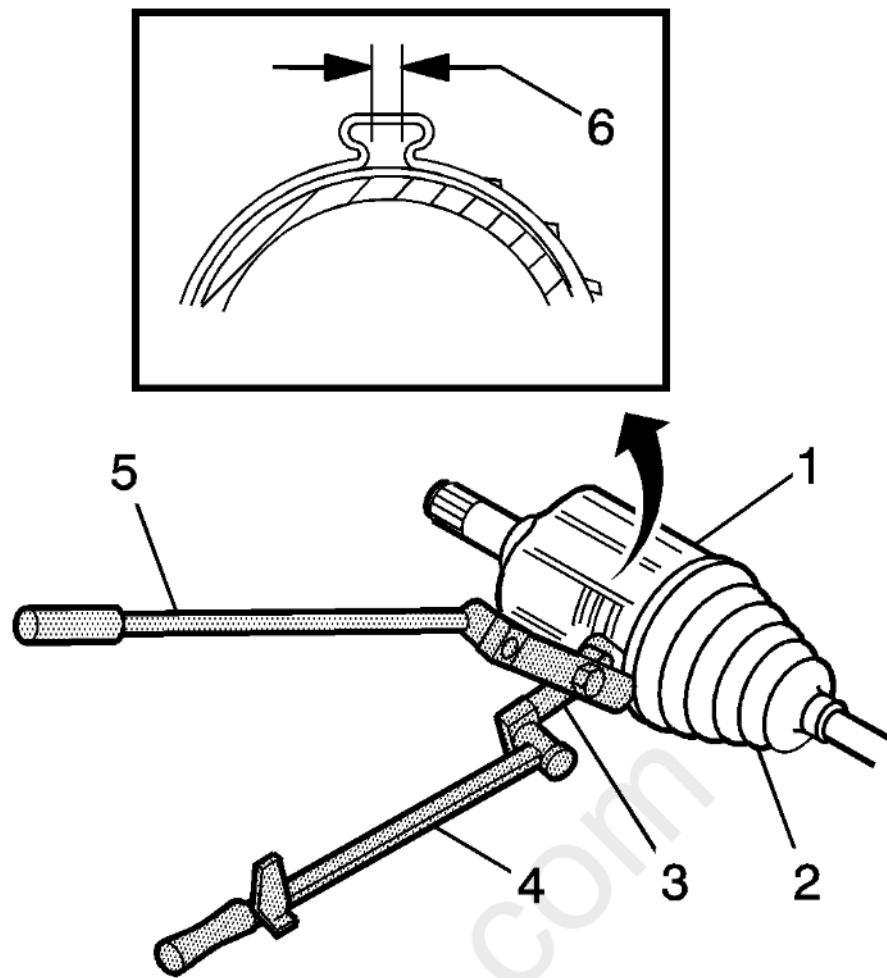


Fig. 38: Measuring Boot Clamp Gap

Courtesy of GENERAL MOTORS COMPANY

9. Using the **DT 35910** pliers (3) with a ratchet wrench and a breaker bar (5), close the clamp until the gap (6) measures 1.9 mm (0.070 in).
10. Rotate the housing in a circular motion to distribute the grease in the tripot joint.
11. Install the wheel drive shaft to the vehicle. 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

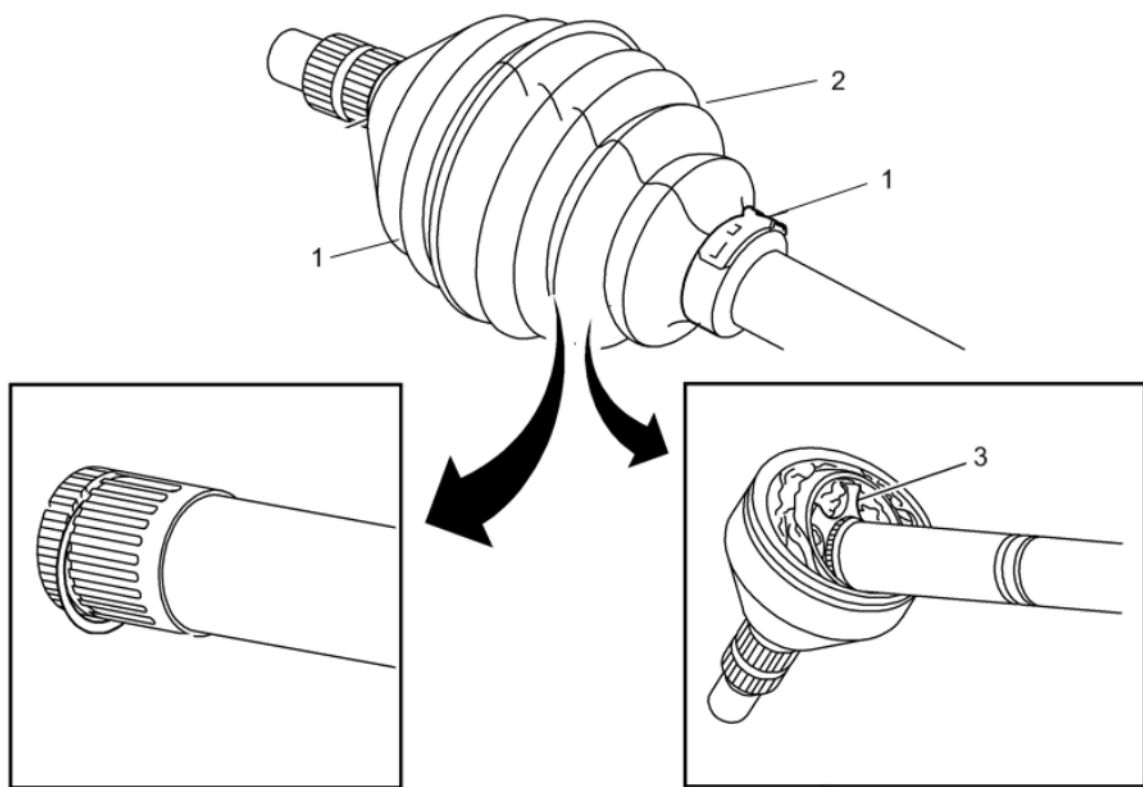


Fig. 39: Front Wheel Drive Shaft Outer Joint and Boot

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
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. Preliminary Procedures 1. Remove the tire and wheel. Tire and Wheel Removal and Installation . 2. Remove the wheel drive shaft from the vehicle. Front Wheel Drive Shaft Replacement - Left Side, or Front Wheel Drive Shaft Replacement - Right Side.	
1	Front Wheel Drive Shaft Boot Clamp (Qty: 2) Procedure 1. Using an appropriate tool, remove the front wheel drive shaft boot clamps from the front wheel drive shaft outer joint boot. 2. Ensure that the front wheel drive shaft outer joint boot is engaged to the grooves of the front wheel drive shaft and the front wheel drive shaft constant velocity outer joint. 3. Using the CH-22610 Keystone Clamp Pliers, crimp both front wheel drive shaft boot clamps. Special Tools CH-22610 Keystone Clamp Pliers For equivalent regional tools, refer to Special Tools.

Callout	Component Name
2	Front Wheel Drive Shaft Outer Joint Boot
3	Front Wheel Drive Shaft Constant Velocity Outer Joint WARNING: Refer to Eye Protection Warning . Procedure 1. Remove the front wheel drive shaft constant velocity outer joint using a brass drift and a hammer while tapping on the inner race until released. 2. Remove and discard the front wheel drive shaft outer joint boot. 3. Remove and discard the front wheel drive shaft retaining rings, replace with NEW retaining rings. 4. Loosely install the front wheel drive shaft boot clamps to the front wheel drive shaft outer joint boot prior to installing to the front wheel drive shaft and the front wheel drive shaft constant velocity outer joint. 5. Install the front wheel drive shaft outer joint boot to the front wheel drive shaft. 6. Clean and inspect the front wheel drive shaft constant velocity outer joint. Wheel Drive Shaft Outer Joint Inspection 7. Pack the front wheel drive shaft constant velocity outer joint with wheel drive shaft joint grease and place the remaining grease into the front wheel drive shaft outer joint boot. Adhesives, Fluids, Lubricants, and Sealers NOTE: The front wheel drive shaft outer joint boot kit does not come with wheel drive shaft joint grease.

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.

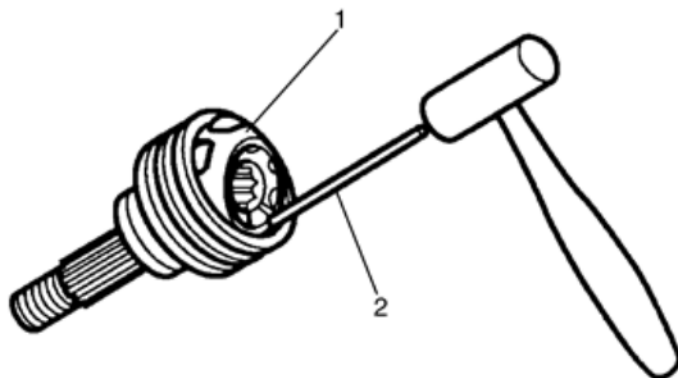


Fig. 40: Tapping Gently On Brass Drift With A Hammer In Order To Tilt Cage
Courtesy of GENERAL MOTORS COMPANY

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 form the cage.

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

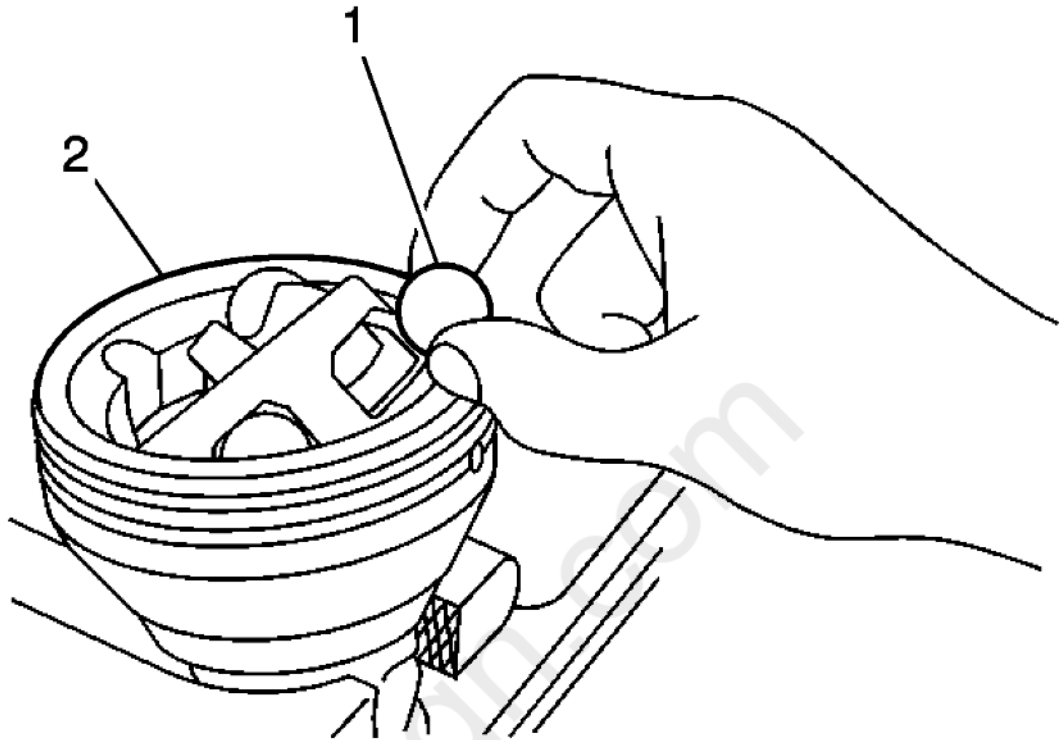


Fig. 41: Removing/Install Ball From Cage & Inner Race
Courtesy of GENERAL MOTORS COMPANY

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

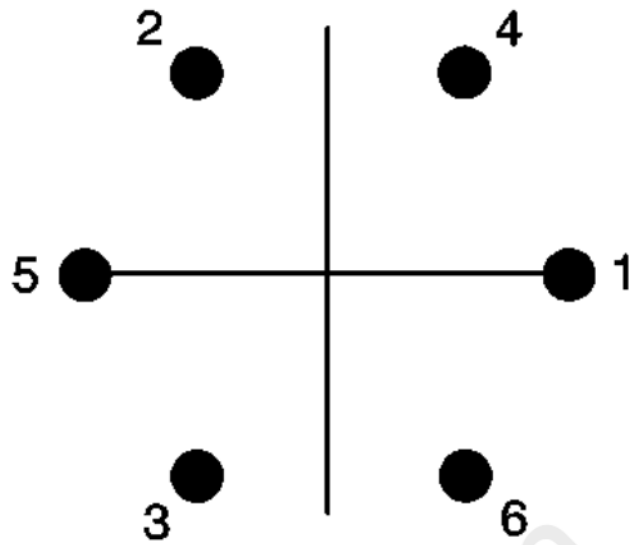


Fig. 42: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS COMPANY

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

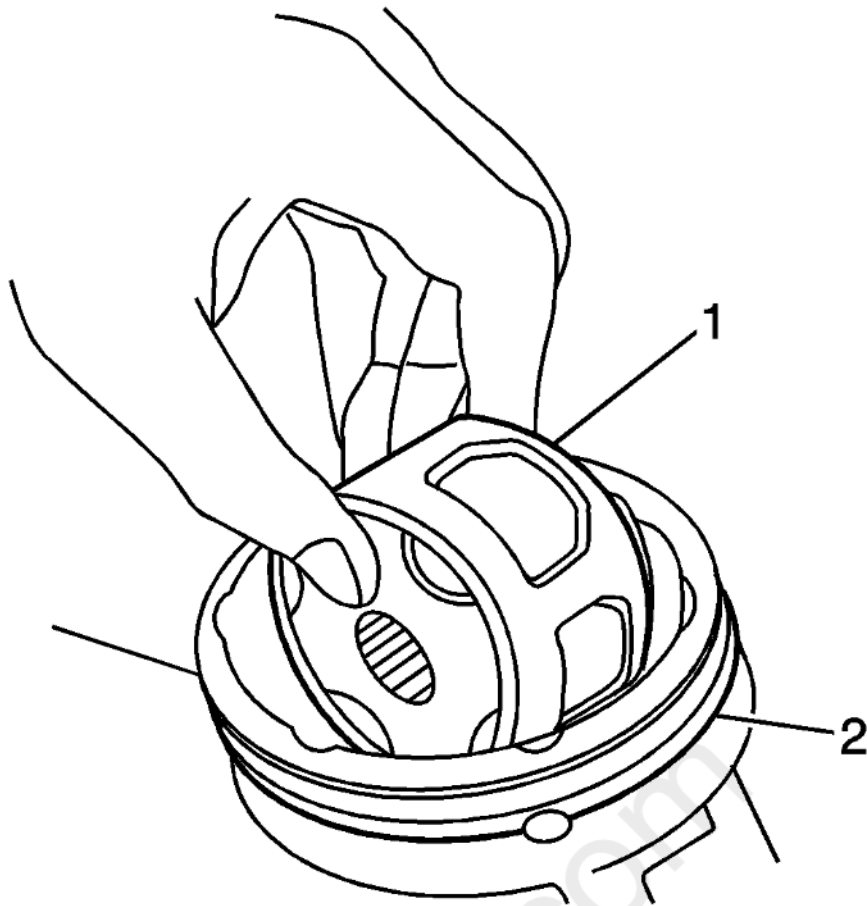


Fig. 43: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS COMPANY

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).

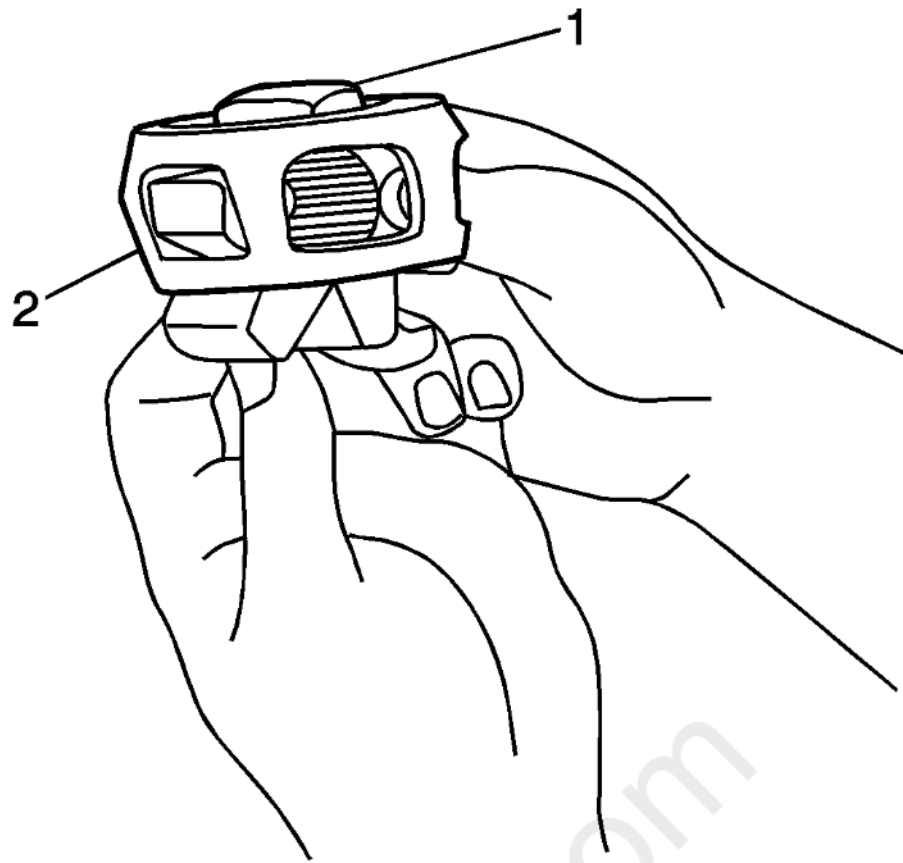


Fig. 44: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS COMPANY

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

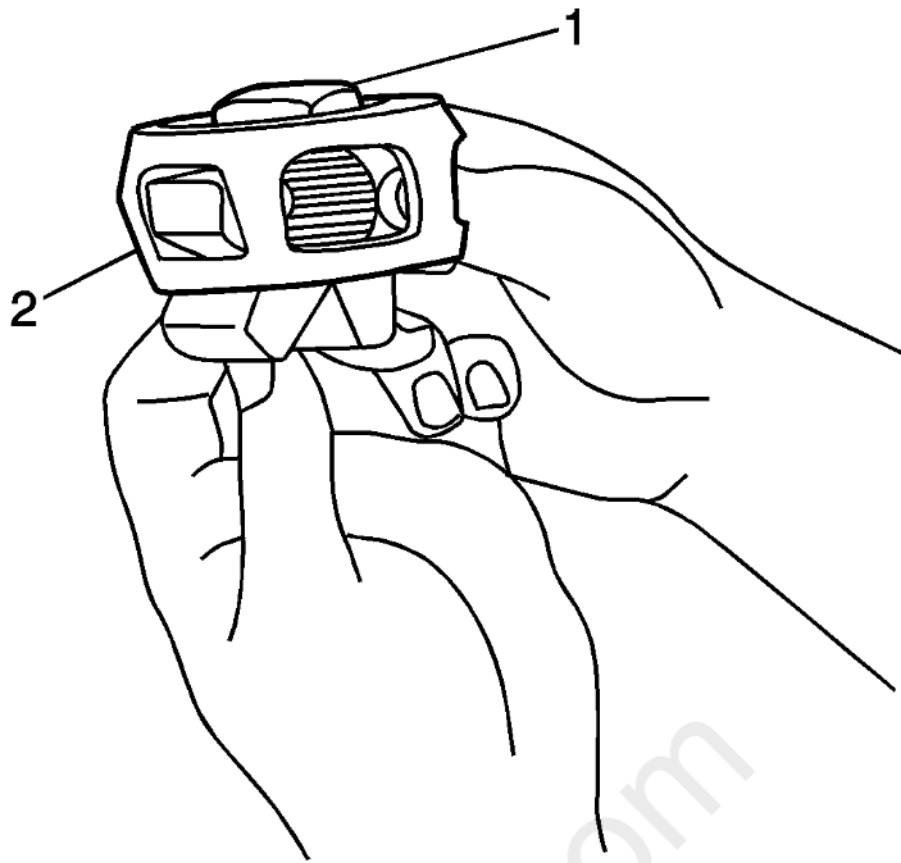


Fig. 45: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS COMPANY

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.

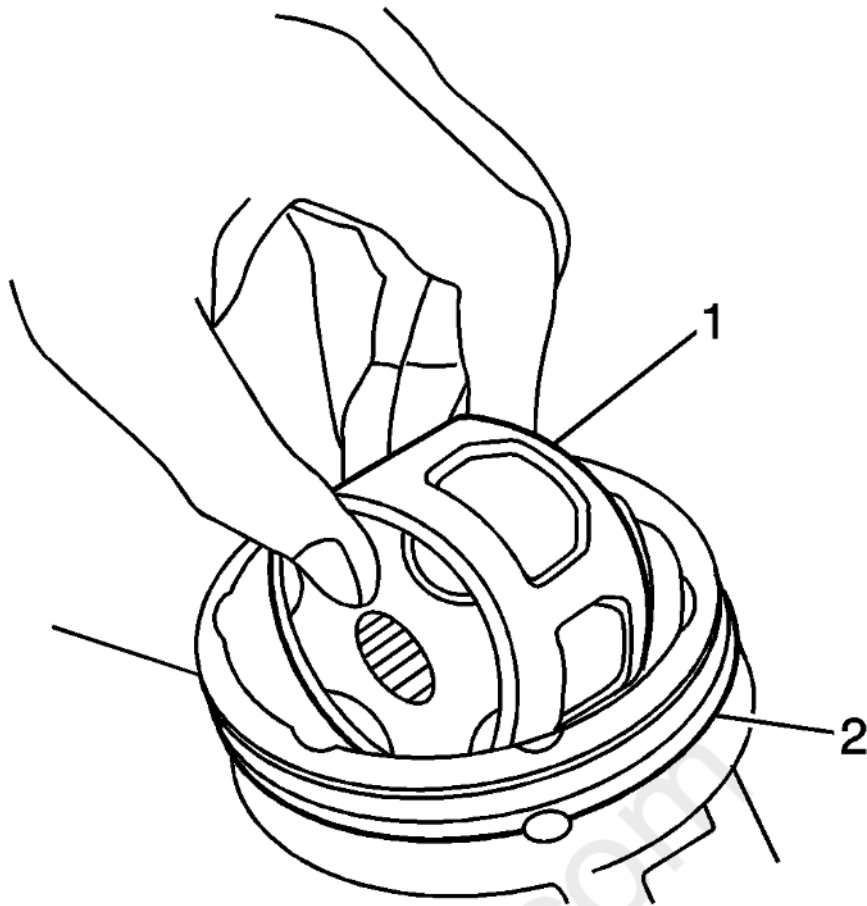


Fig. 46: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS COMPANY

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).

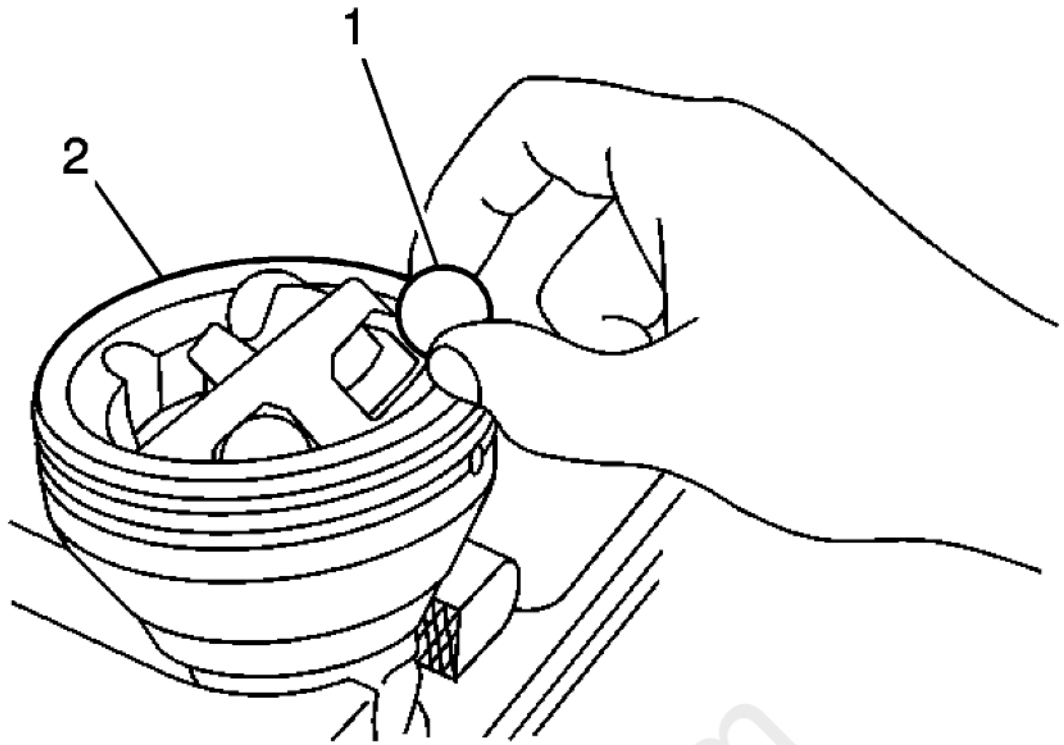


Fig. 47: Removing/Install Ball From Cage & Inner Race
Courtesy of GENERAL MOTORS COMPANY

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.

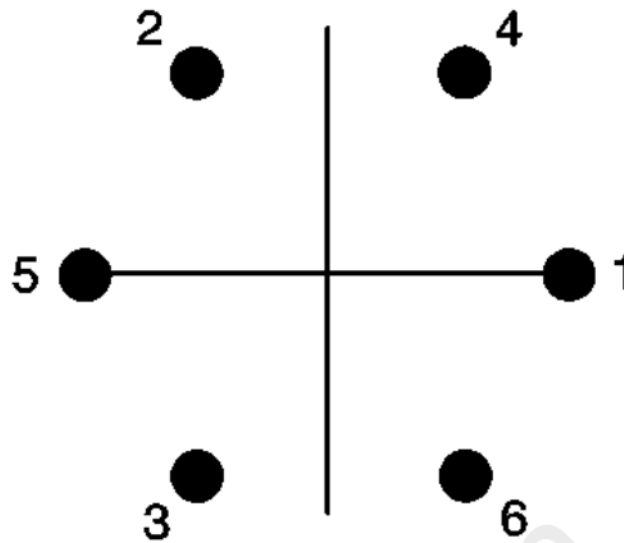


Fig. 48: View Of Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS COMPANY

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

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

Seal and Clamp

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

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

The function of the clamps is as follows:

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

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

Inner Joint

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

Outer Joint

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

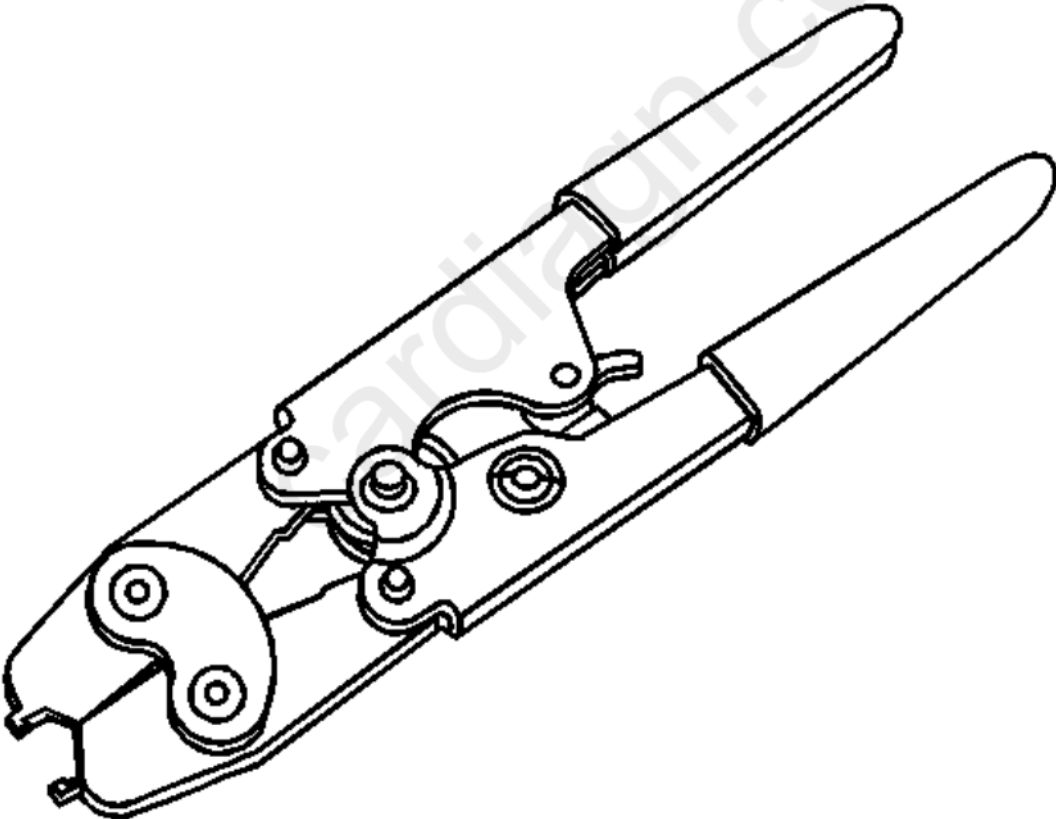
Illustration	Tool Number/Description
	CH-804 CH-48894 DT-35910 DT-50185 J-35910 MKM-804 Wheel Drive Shaft Boot Clamp Pliers

Illustration	Tool Number/Description
	CH-22610 KM-J 22610 Keystone Clamp Pliers

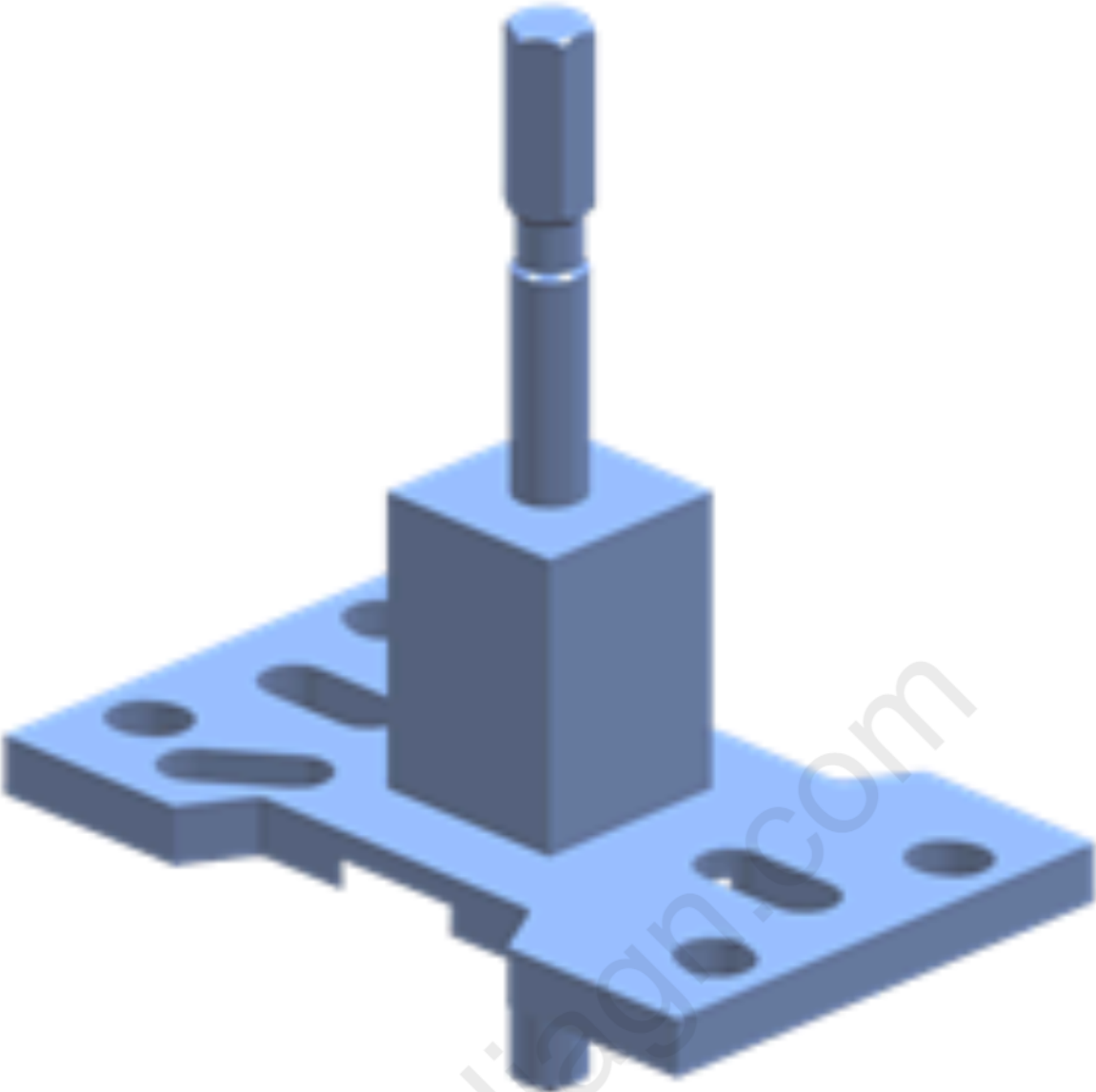
Illustration	Tool Number/Description
	J-45859 Axle Remover

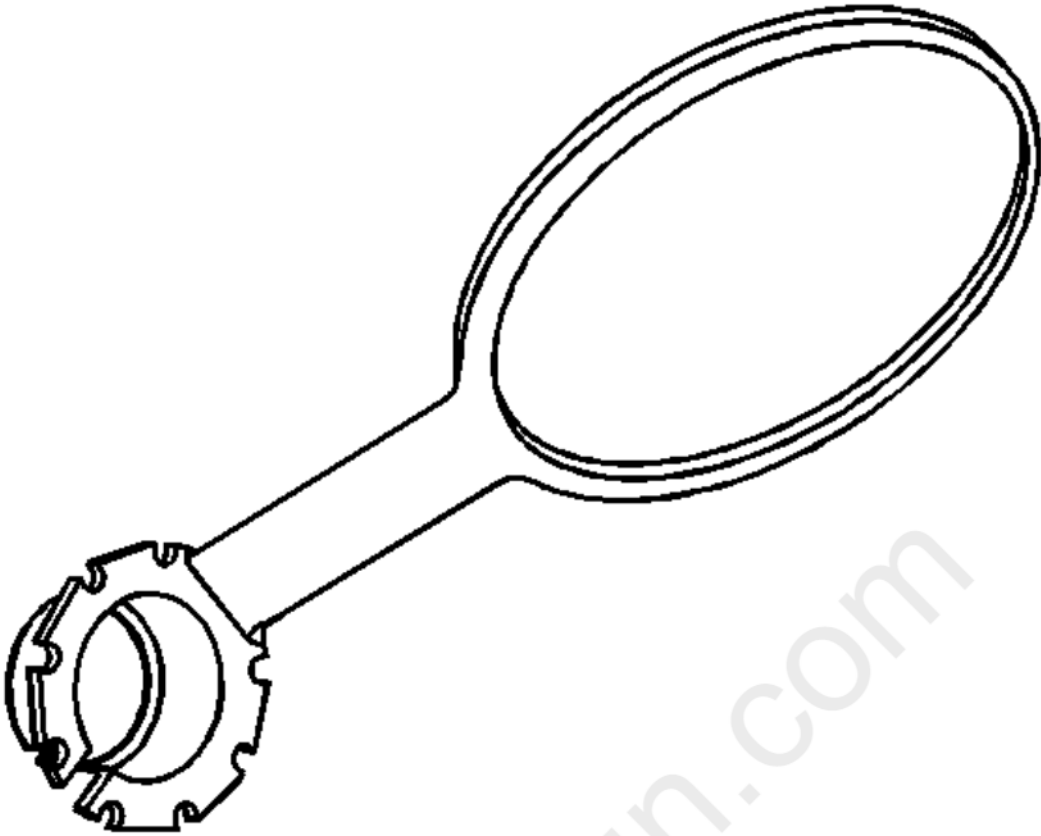
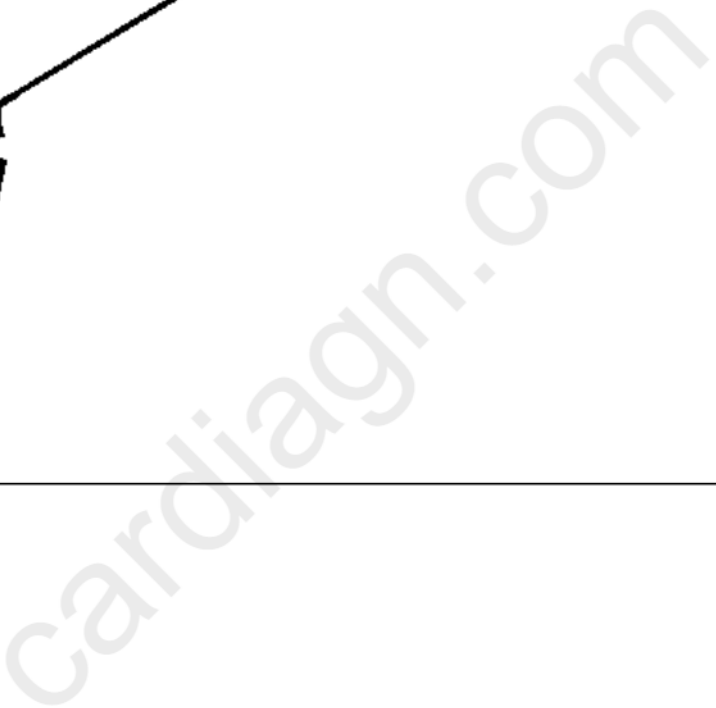
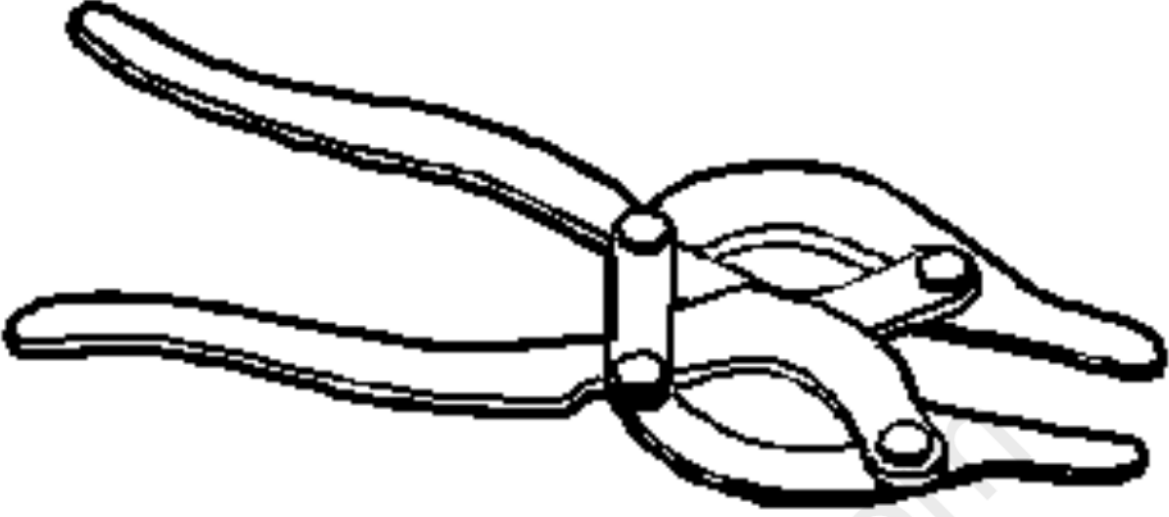
Illustration	Tool Number/Description
	DT-51504 Seal Protector
	DT-8059 J-8059 Snap Ring Pliers

Illustration	Tool Number/Description
 A line drawing of a medical instrument, likely a hemostat or forceps. It features two long, curved jaws that taper to pointed tips. The jaws are connected at the base by a central locking mechanism consisting of a cylindrical handle with two small circular knobs or buttons on its sides. The instrument is shown in a slightly open position. A faint watermark 'cardiagn.com' is visible diagonally across the lower half of the illustration.	