2010 Driveline Axle

Wheel Drive Shafts SRX

S ECIFICATIONS

FASTENER TIG TENING SPECIFICATIONS

Application	Specification	
	Metric	English
ront Wheel Drive haft Nut	2 0 N.m	184 lb ft
Intermediate haft lange astener	22 N.m	16 lb ft
Rear Wheel Drive haft Nut	2 0 N.m	184 lb ft

AD ESIVES FL IDS L RICANTS AND SEALERS

Application	Type of Material	GM Part Num er	Canadian Part Num er
Wheel Drive haft Cap	ealant	88861422	88861422
Wheel Drive haft plines	ubricant	010 1344	993037
Wheel Drive haft olts	Threadlocker	1234 493	109 3488

DIA NOSTIC INFOR ATION AND ROCEDURES

S MPTOMS - W EEL DRIVE S AFTS

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

1. Review the **Symptoms - Vi ration Diagnosis and Correction** .
2. erform the **Vi ration Analysis - Road Testing** in order to effectively diagnose the concern.
3. Review the system operation in order to become familiar with the system function. Refer to **Wheel Drive Shafts Description and Operation**.

Visual Physical Inspection

- Inspect for aftermarket e uipment 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 oint seals, and missing seal clamps.
- Inspect the wheel drive shaft seals for cuts, tears, or other damage which may allow the loss of lubricant

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and the entry of contaminates.

Symptom List

fter performing the isual hysical 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 oints manually. ny binding or otherwise impeded movement of the oints may indicate damage which could contribute to the concern. Refer to the following

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

CLIC NOISE IN T RNS

click noise occurring during turns may be caused by a worn or damaged wheel drive shaft outer oint. This may be more apparent while simultaneously turning and accelerating. This click is caused by wear and or damage to the constant velocity oint bearings and or races. Commonly, this damage or wear is caused by the loss of lubricating grease from the constant velocity oint and the entry of foreign material or contaminates.

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 oint 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 oint manually. ny binding or impeded movement of the oint may indicate damage which could contribute to the concern.

CL N W EN ACCELERATING FROM COAST

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

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 oint manually. Do not allow the oint to separate from the wheel drive shaft bar. ny binding or impeded movement of the oint may indicate damage which could contribute to the concern.

S DDER OR VI RATION D RING ACCELERATION

In order to diagnose a shudder or vibration during acceleration, refer to **Symptoms - Vi ration Diagnosis and Correction** .

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RE AIR INSTRUCTIONS

INTERMEDIATE S AFT REPLACEMENT

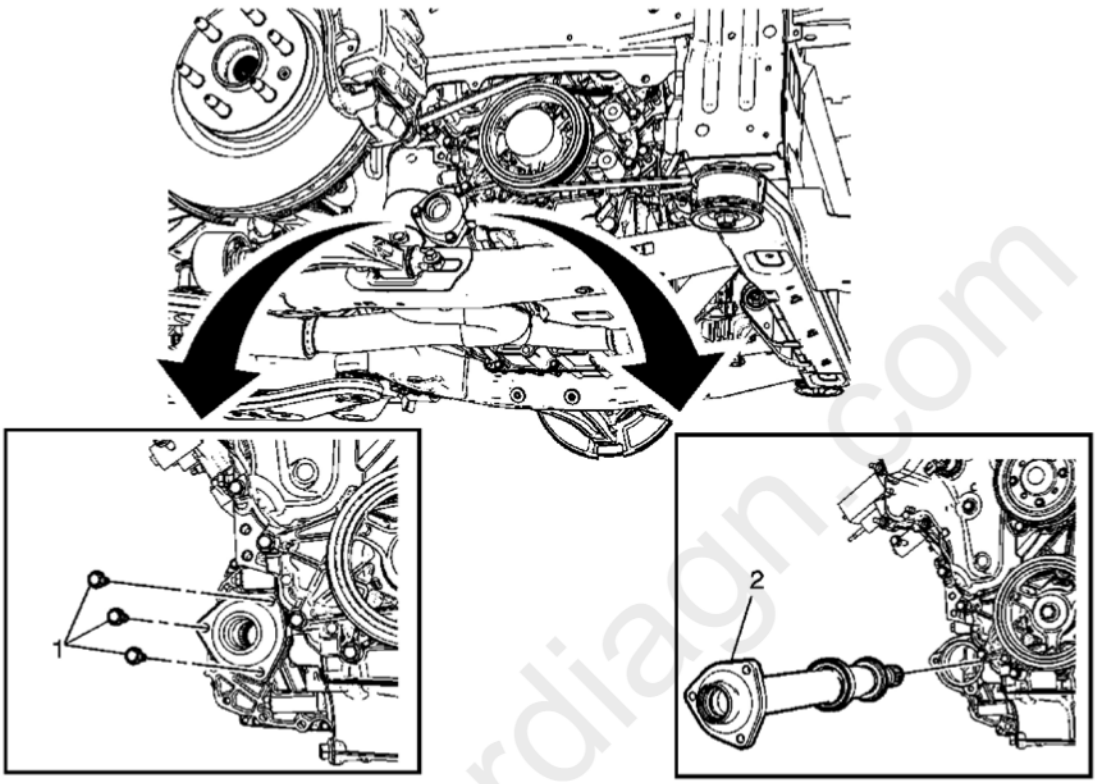


Fig. 1: Identifying Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the right wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side**. 3. Drain the fluid from the transmission. Refer to **Transmission Fluid Replacement** .	
1	Intermediate haft earing Retainer olt (ty 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 22 N.m (16 lb ft)
	Intermediate haft ssembly **Procedure:**

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2	It maybe necessary to maneuver the intermediate shaft in such a manner as to remove it from the support bracket.

FRONT W EEL DRIVE S AFT REPLACEMENT - LEFT SIDE

Special Tools

- **DT 44394-A:** eal rotector
- **J 45859:** xle uller

or e uivalent regional 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** .

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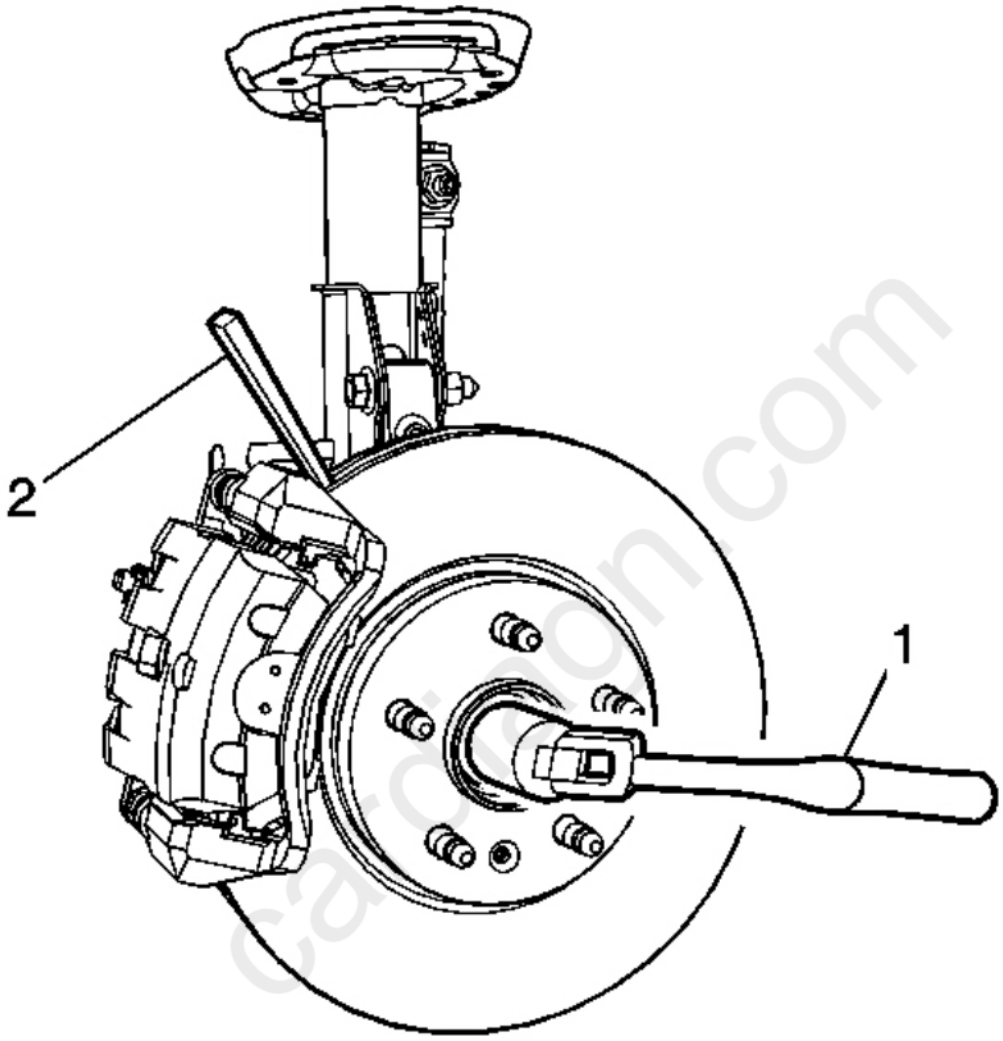


Fig. 2: Illustrating Loosening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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

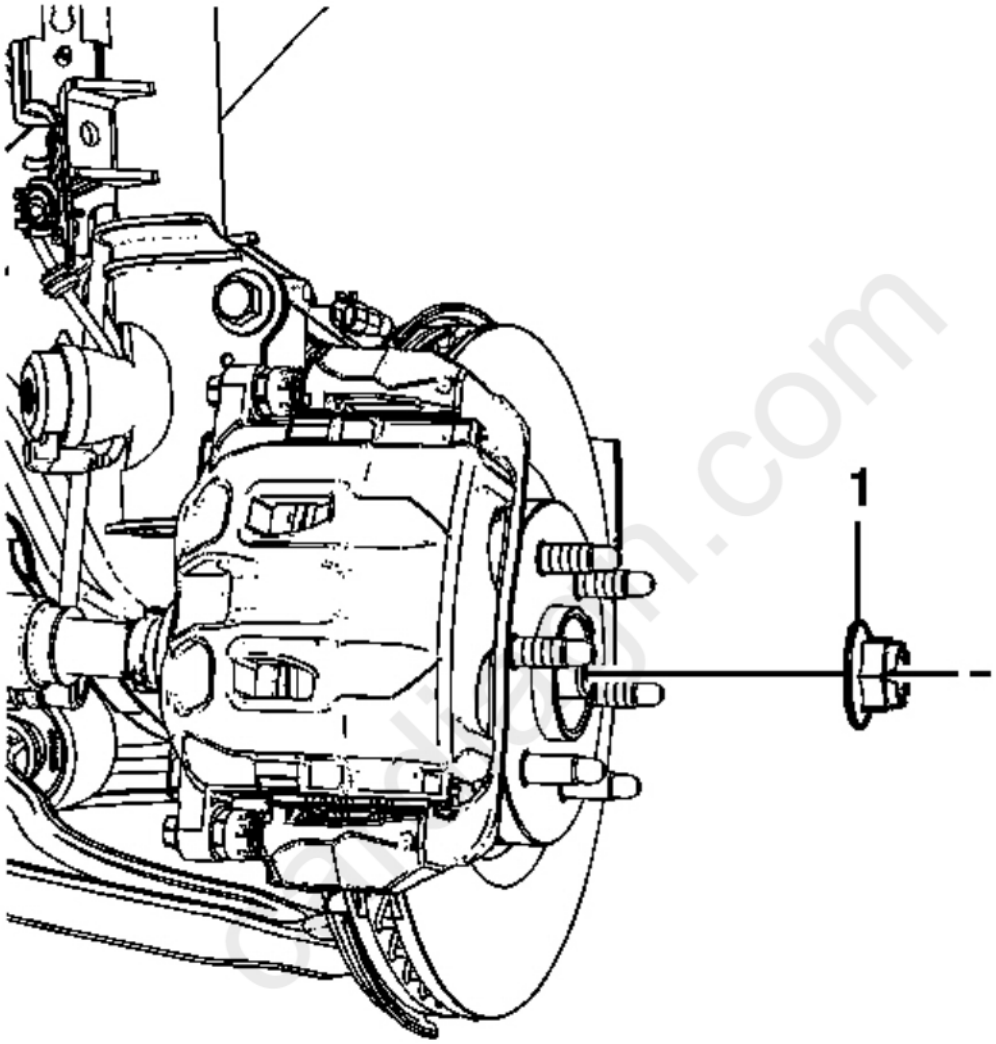


Fig. 3: Identifying Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the wheel drive shaft nut (1).
7. Using the **J-45859:** puller, separate the wheel drive shaft from the knuckle assembly.
8. Remove the lower control arm from the knuckle. Refer to **Lower Control Arm Replacement** .
9. Remove the outer tie rod end from the knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

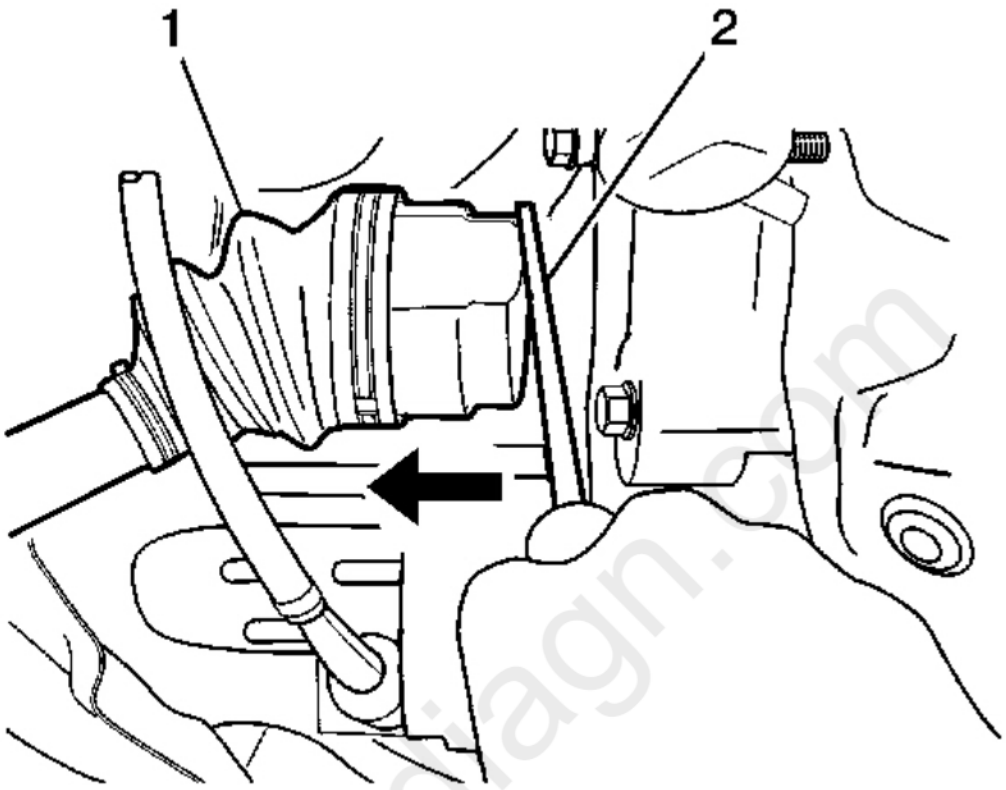


Fig. 4: View Of Wheel Drive Shaft Removal From Differential
Courtesy of GENERAL MOTORS CORP.

10. Using a large flat bladed screw driver, remove the wheel drive shaft from the differential.

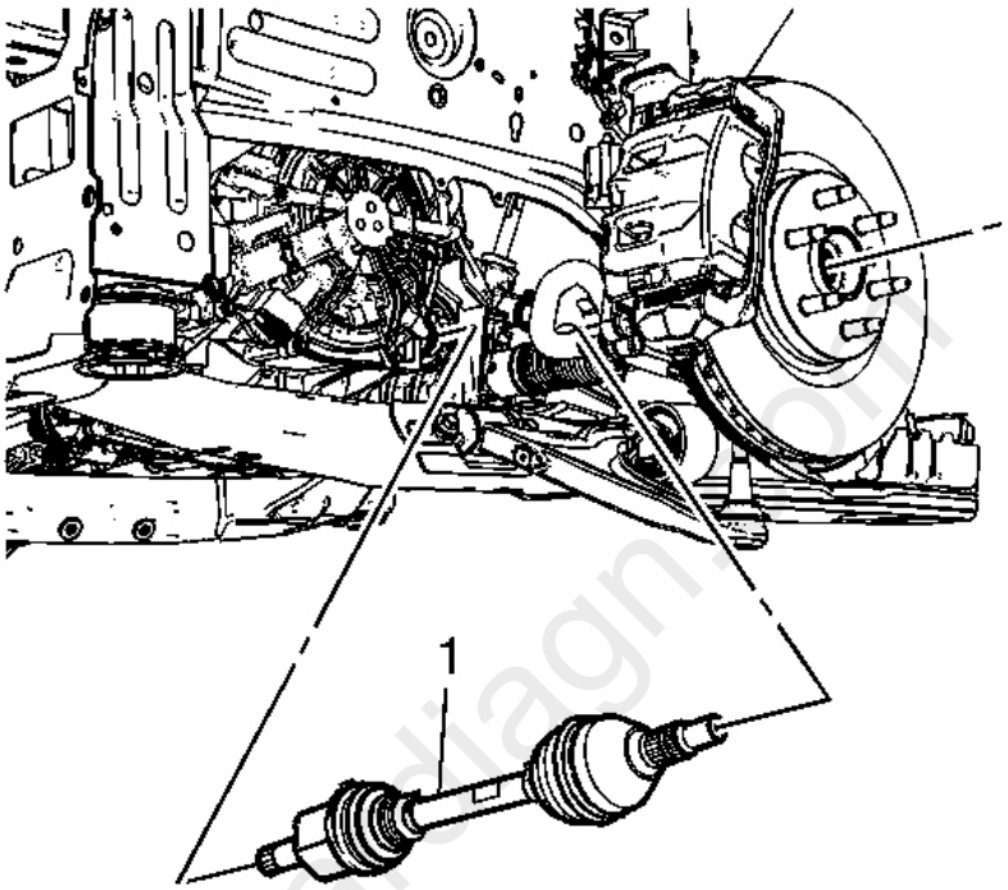


Fig. 5: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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**

NOTE: **The front axle shaft seal must be replaced once the wheel drive shaft has been removed. Replace with NEW only. DO NOT reuse the front shaft axle seal.**

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

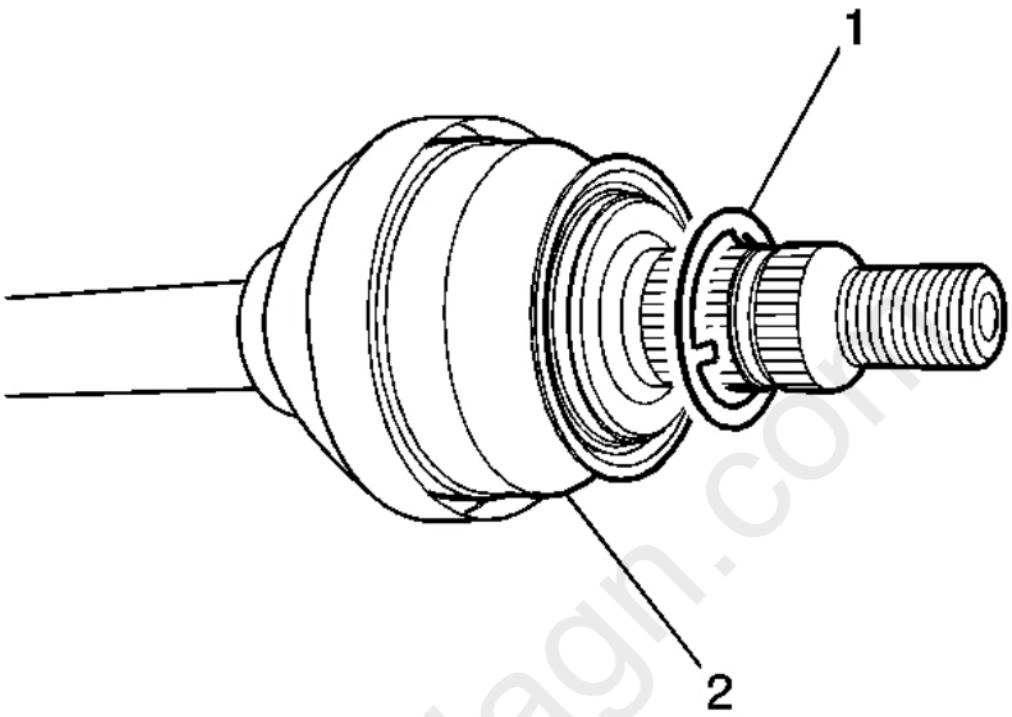


Fig. 6: Identifying Wheel Drive Shaft Washer
Courtesy of GENERAL MOTORS CORP.

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

12. Remove and discard the washer (1) from the wheel drive shaft (2). DO NOT re-use the washer, replace with NEW only.
13. Remove the front axle shaft seal. Refer to **Front Wheel Drive Shaft Seal Replacement - Left Side** .

Installation Procedure

1. Install the NEW front axle shaft seal. Refer to **Front Wheel Drive Shaft Seal Replacement - Left Side** .

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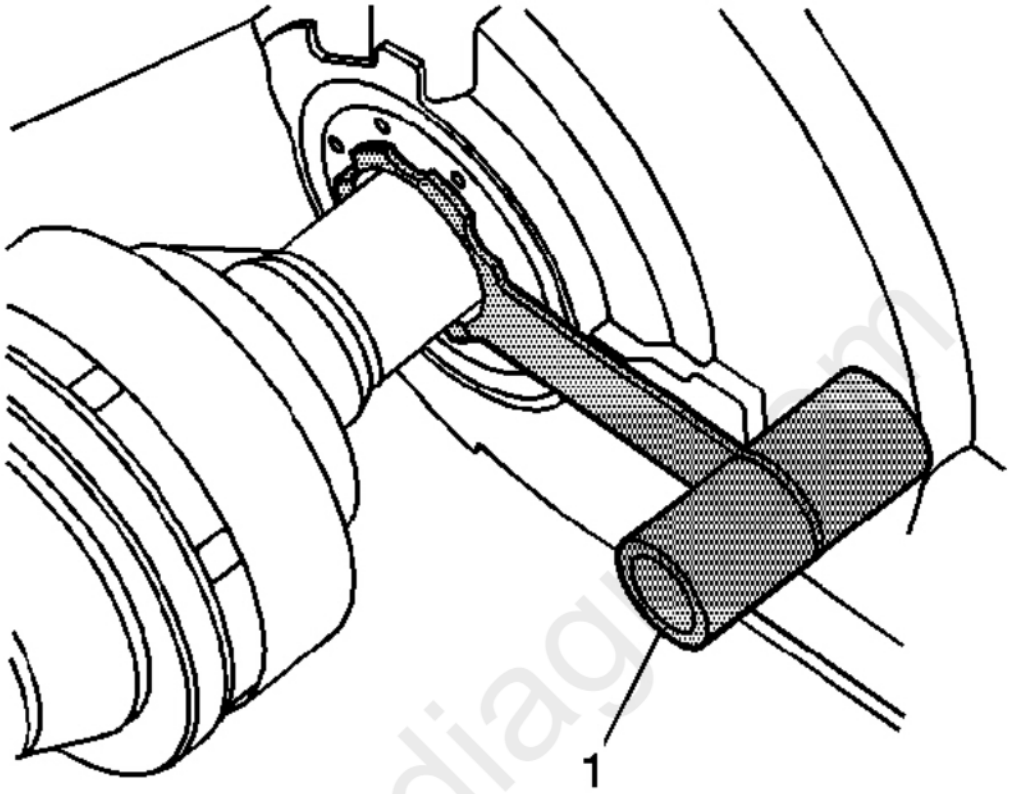


Fig. 7: Identifying Special Tools - J 44394
Courtesy of GENERAL MOTORS CORP.

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.

2. Install the **DT 44394-A:** protector into the differential seal.

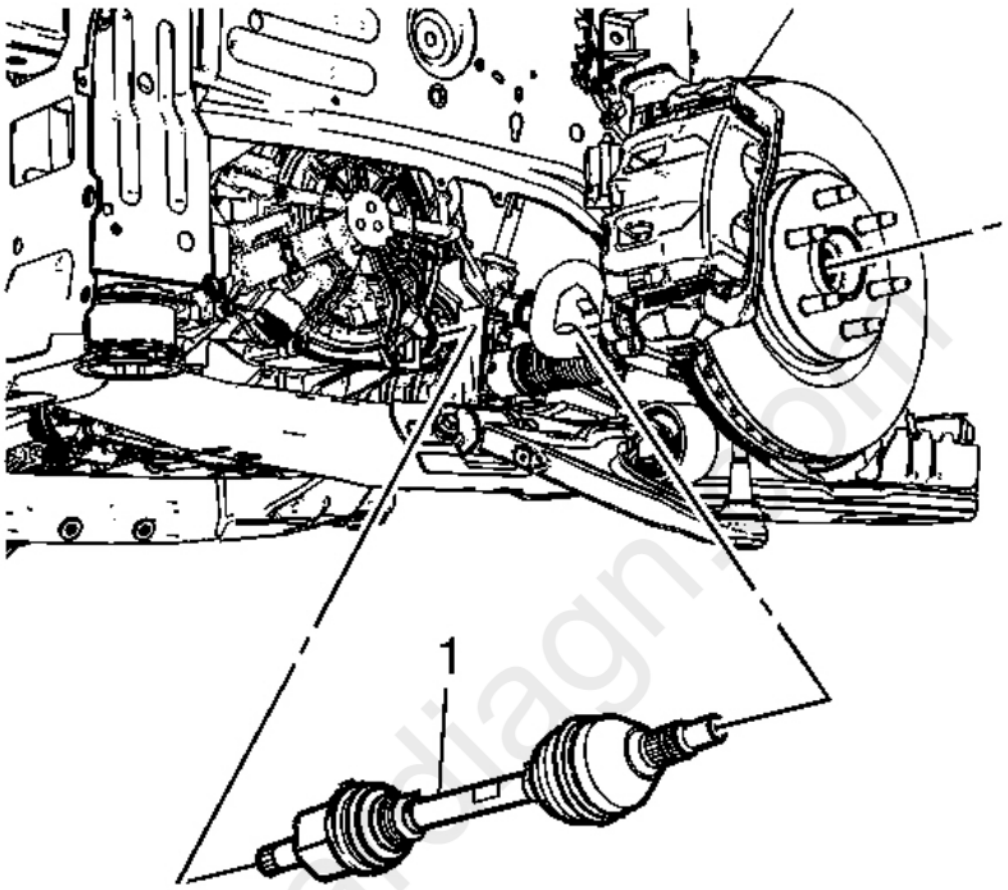


Fig. 8: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

3. Install the wheel drive shaft (1) into the differential.
4. Remove the **DT 44394 A:** protector from the wheel drive shaft.
. Insert the wheel drive shaft in the knuckle.
6. Install the lower control arm in the knuckle. Refer to **Lower Control Arm Replacement** .
7. Install the outer tie rod end in the knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

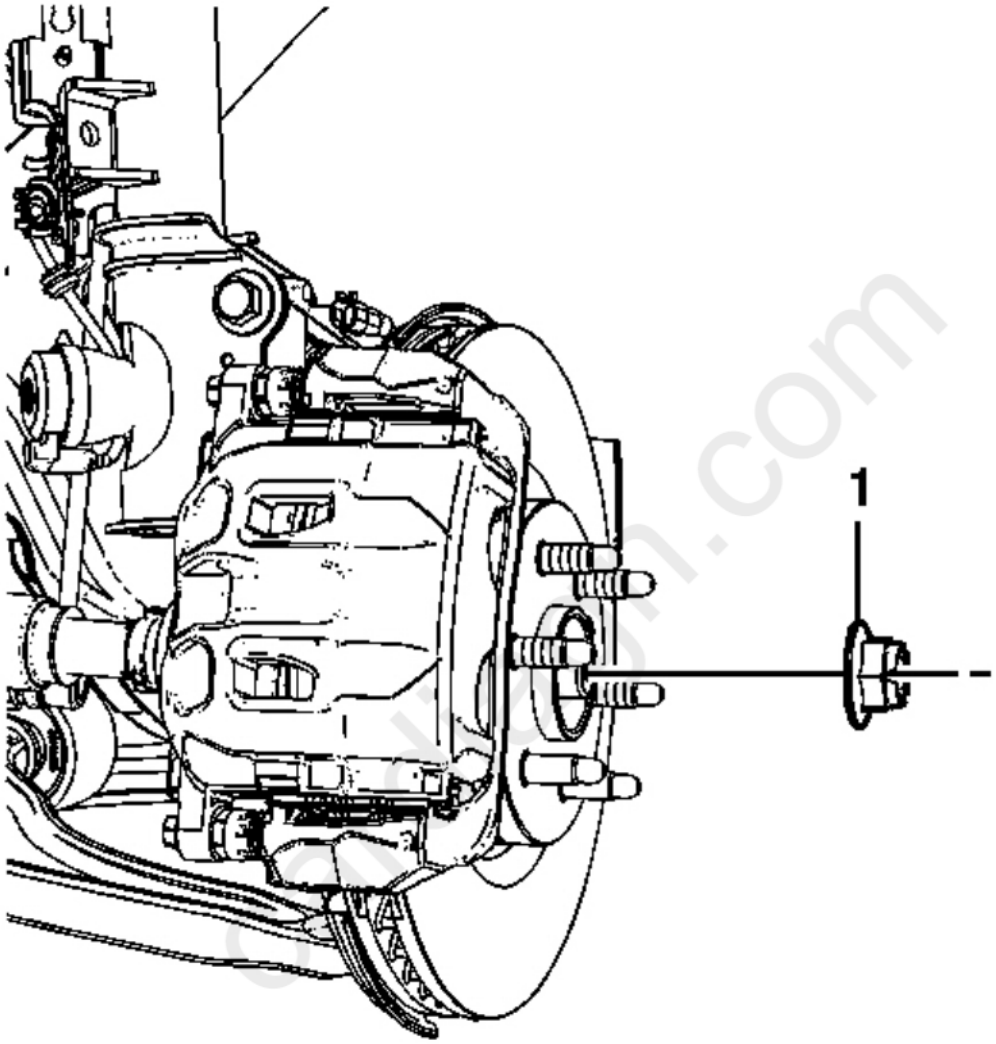


Fig. 9: Identifying Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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

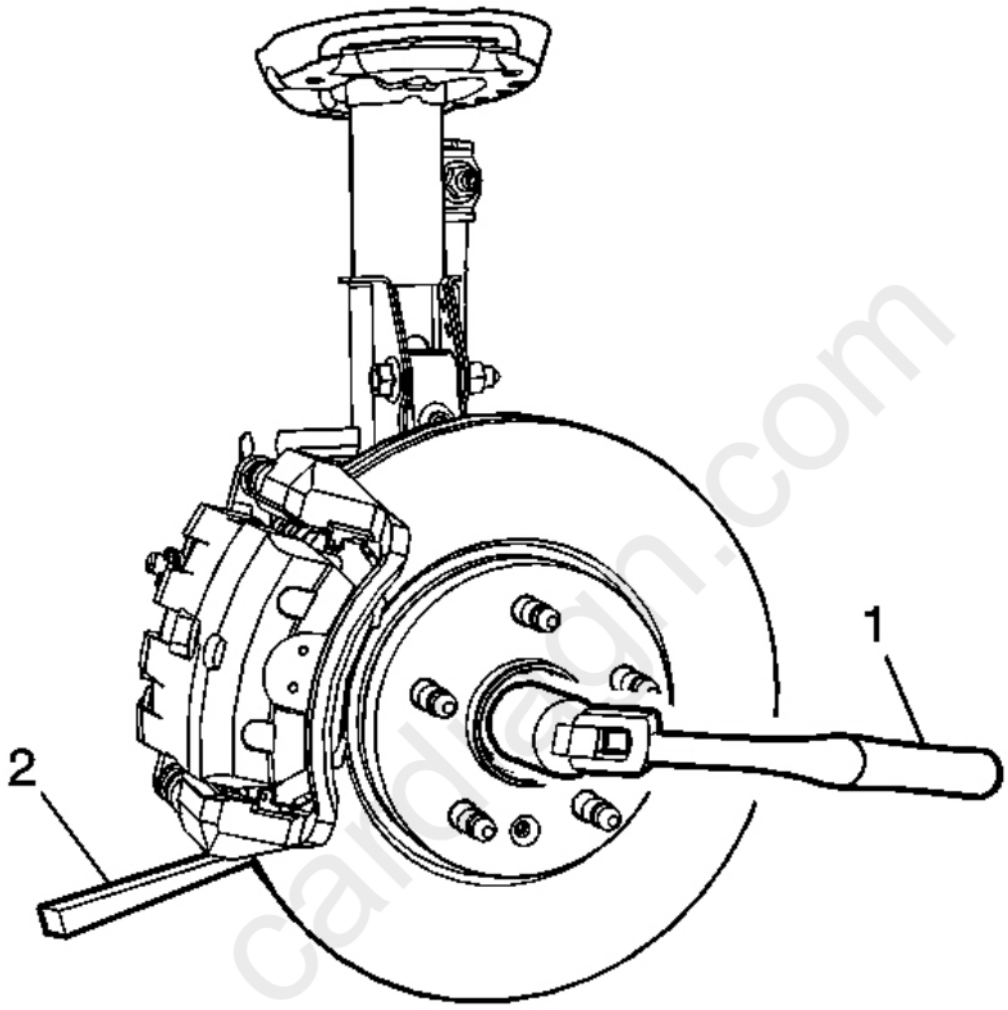


Fig. : Tightening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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 tor ue wrench (1), tighten the wheel drive shaft nut to 2 0 N.m (184 lb ft).
12. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

13. Remove the support and lower the vehicle.

FRONT W EEL DRIVE S AFT REPLACEMENT RIG T SIDE

Special Tools

- **DT 44394 A:** eal rotector
- **J 45859:** xle uller

or e uivalent regional 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** .

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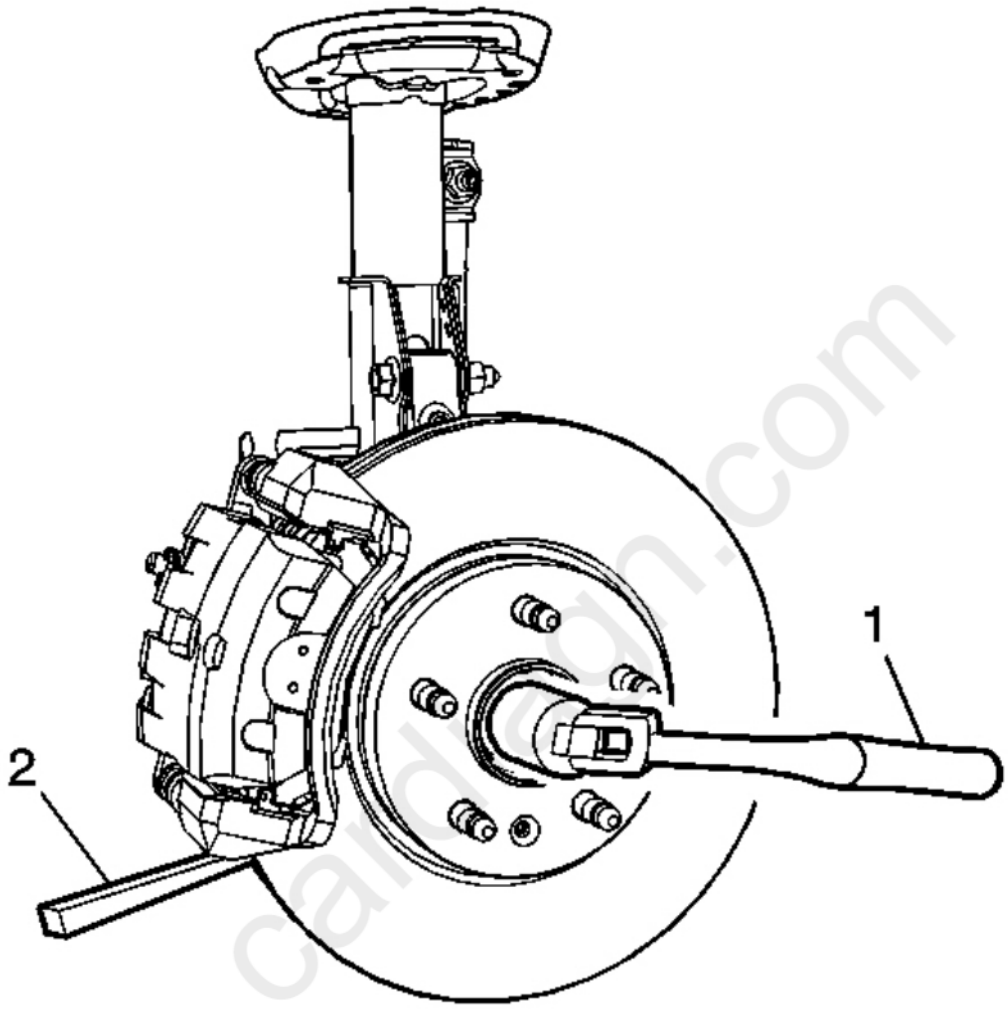


Fig. : Tightening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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

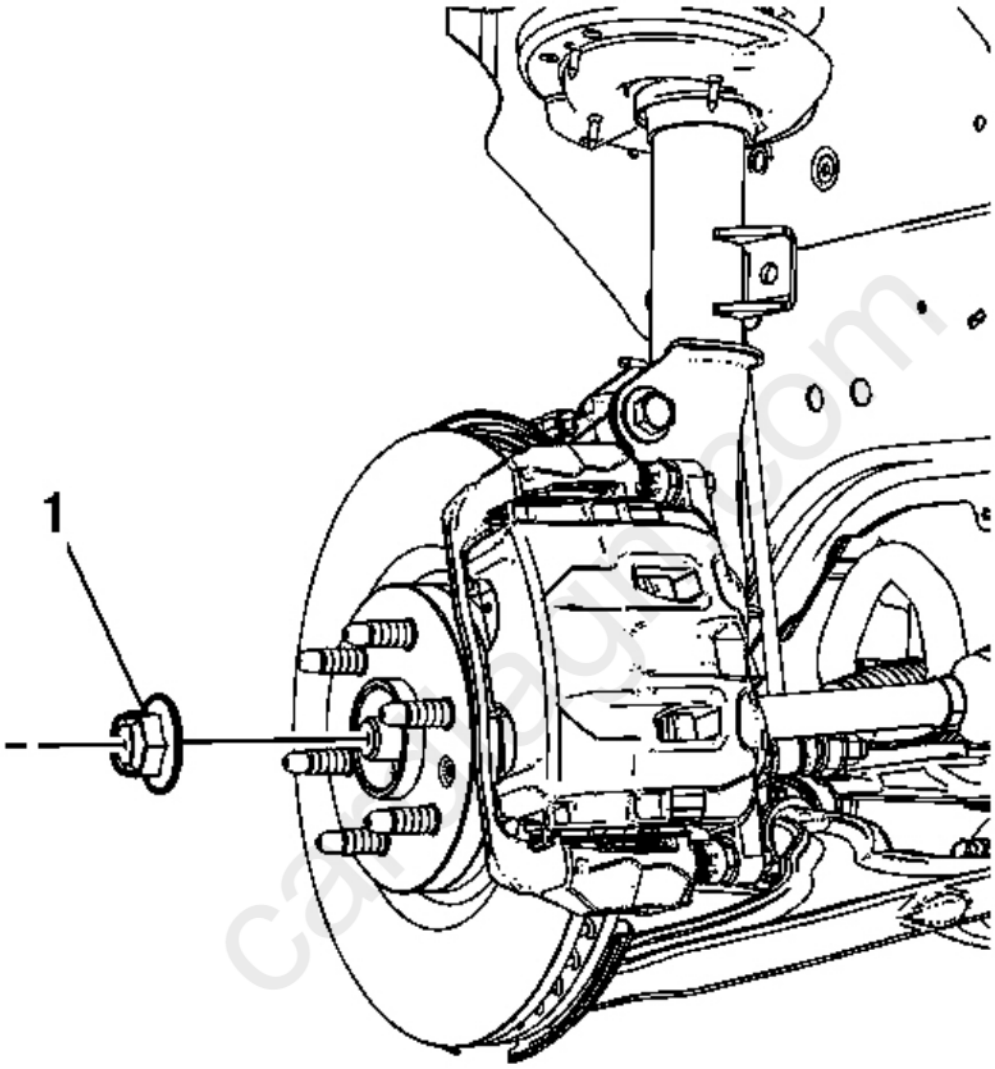


Fig. 12: View Of Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the wheel drive shaft nut (1).
7. Using the **J-45859:** puller, separate the wheel drive shaft from the knuckle assembly.
8. Remove the lower control arm from the knuckle. Refer to **Lower Control Arm Replacement** .
9. Remove the outer tie rod end from the knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

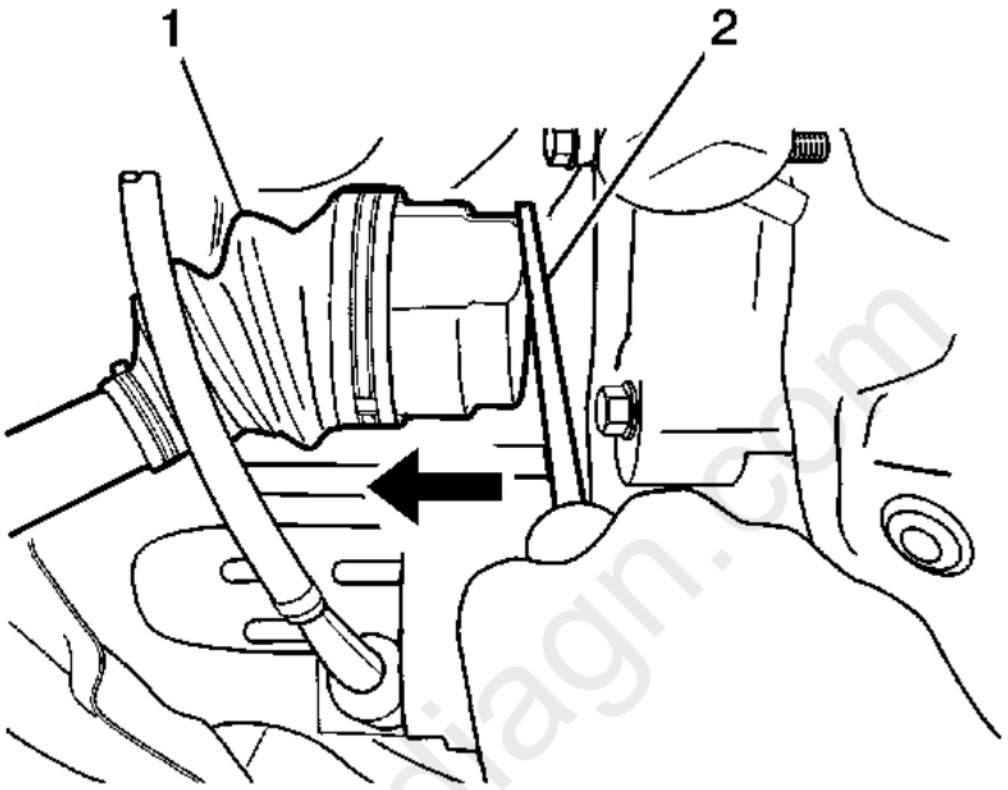


Fig. 13: View Of Wheel Drive Shaft Removal From Differential
Courtesy of GENERAL MOTORS CORP.

10. Using a large flat-bladed screw driver (1), remove the wheel drive shaft (2) from the differential.

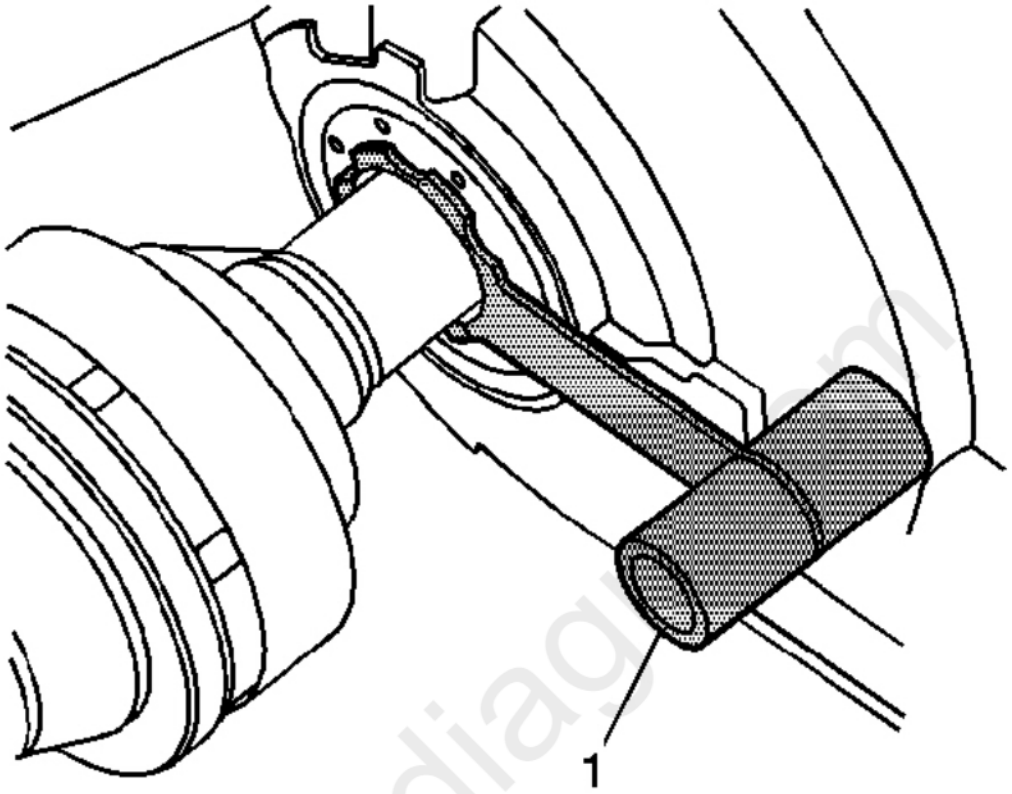


Fig. 14: Identifying Special Tools - J 44394
Courtesy of GENERAL MOTORS CORP.

11. Carefully install the **DT 44394-A:** protector on the wheel drive shaft.

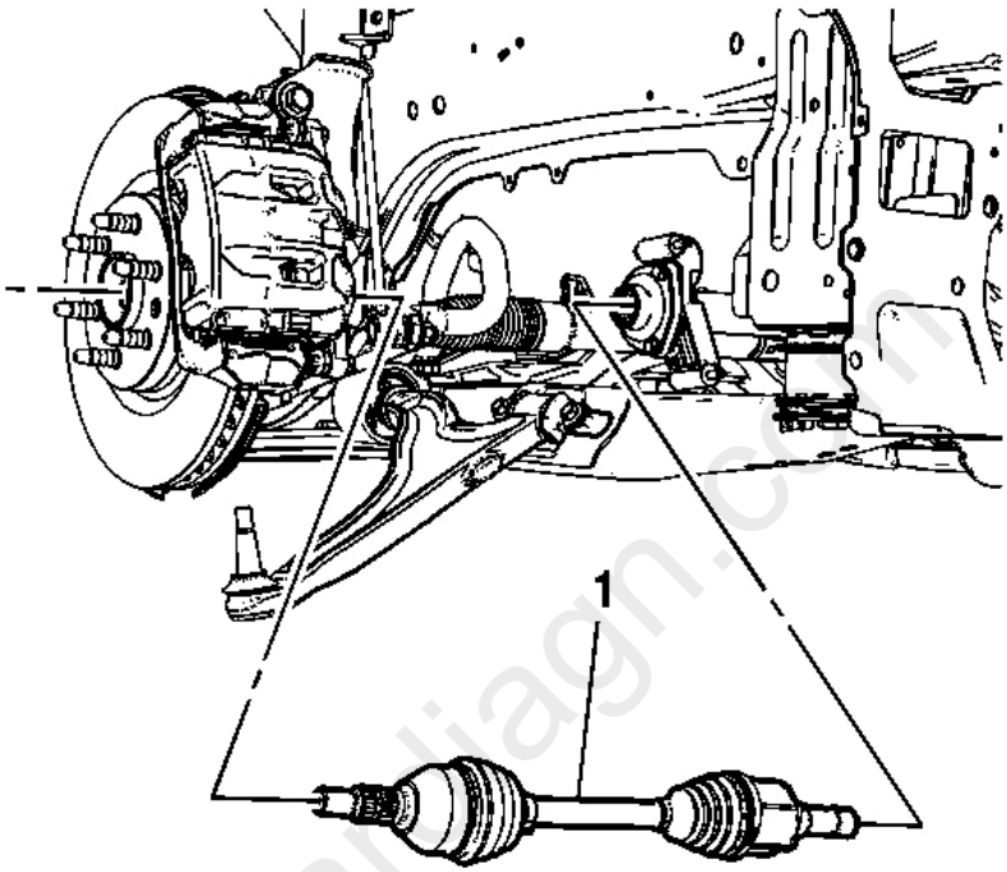


Fig. 15: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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**

NOTE: **The front axle shaft seal must be replaced once the wheel drive shaft has been removed. Replace with NEW only. DO NOT reuse the front axle seal.**

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

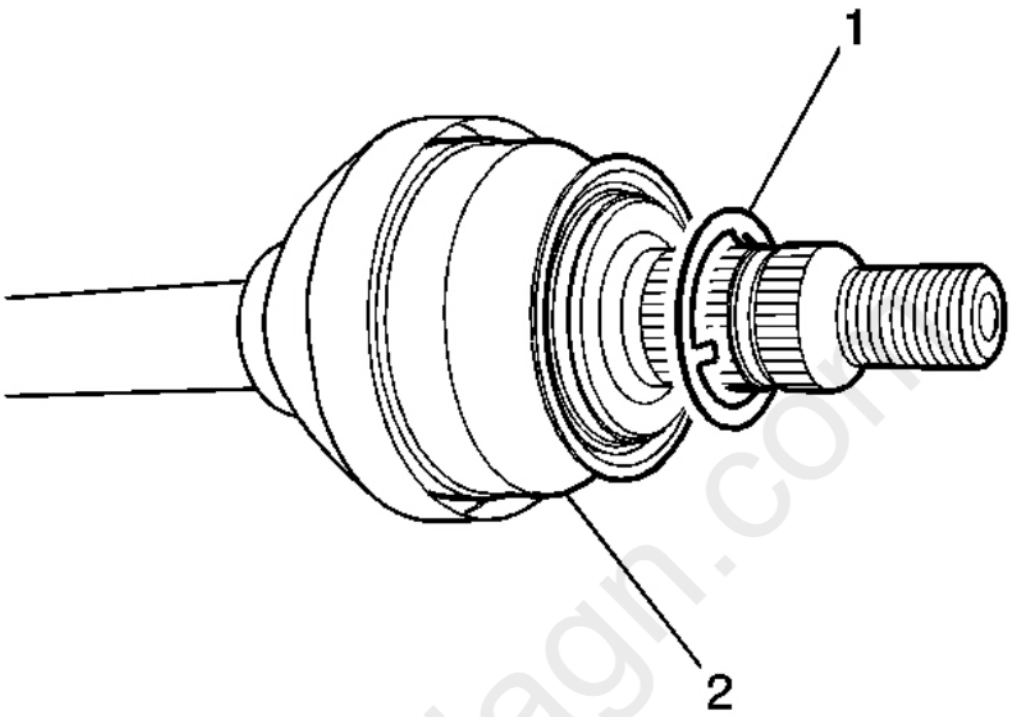


Fig. 16: Identifying Wheel Drive Shaft Washer
Courtesy of GENERAL MOTORS CORP.

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.
14. Remove the front axle shaft seal. Refer to **Front Wheel Drive Shaft Seal Replacement - Right Side** .

Installation Procedure

1. Install the NEW front axle shaft seal. Refer to **Front Wheel Drive Shaft Seal Replacement - Right Side** .

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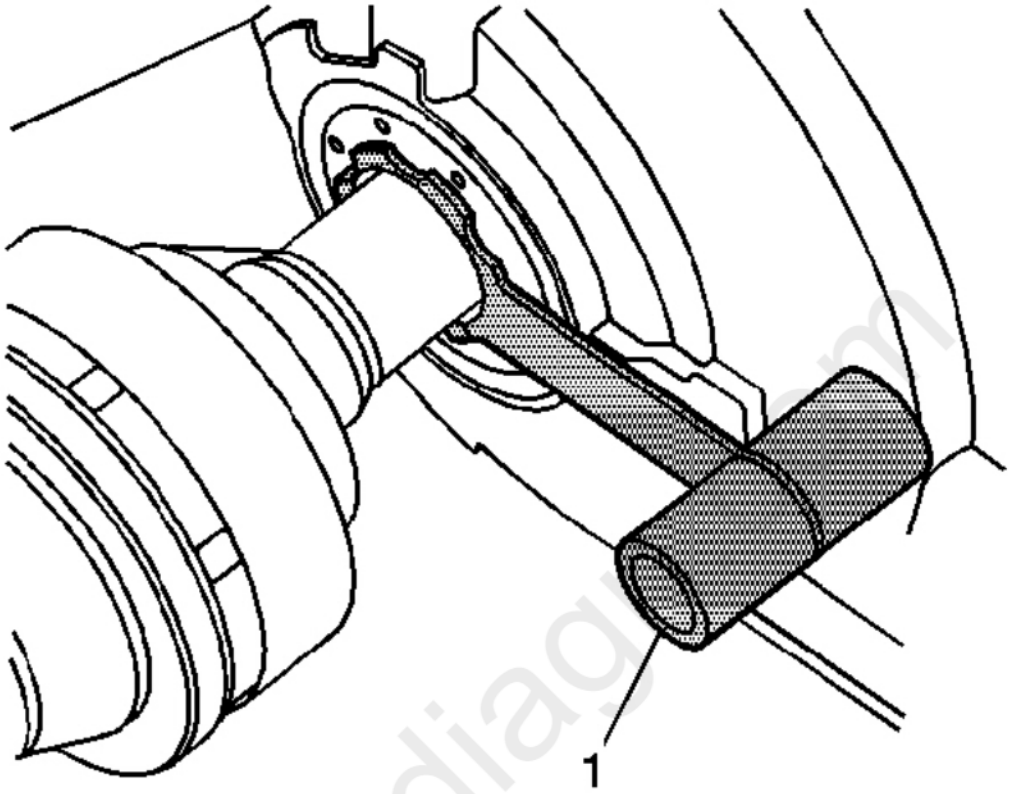


Fig. : Identifying Special Tools J 44394
Courtesy of GENERAL MOTORS CORP.

C TION: heel drive shaft seal protector must be installed into the differential output shaft seal prior to removing and installing the wheel drive shaft. ailure 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.

2. Install the **DT 44394 A:** protector into the differential seal.

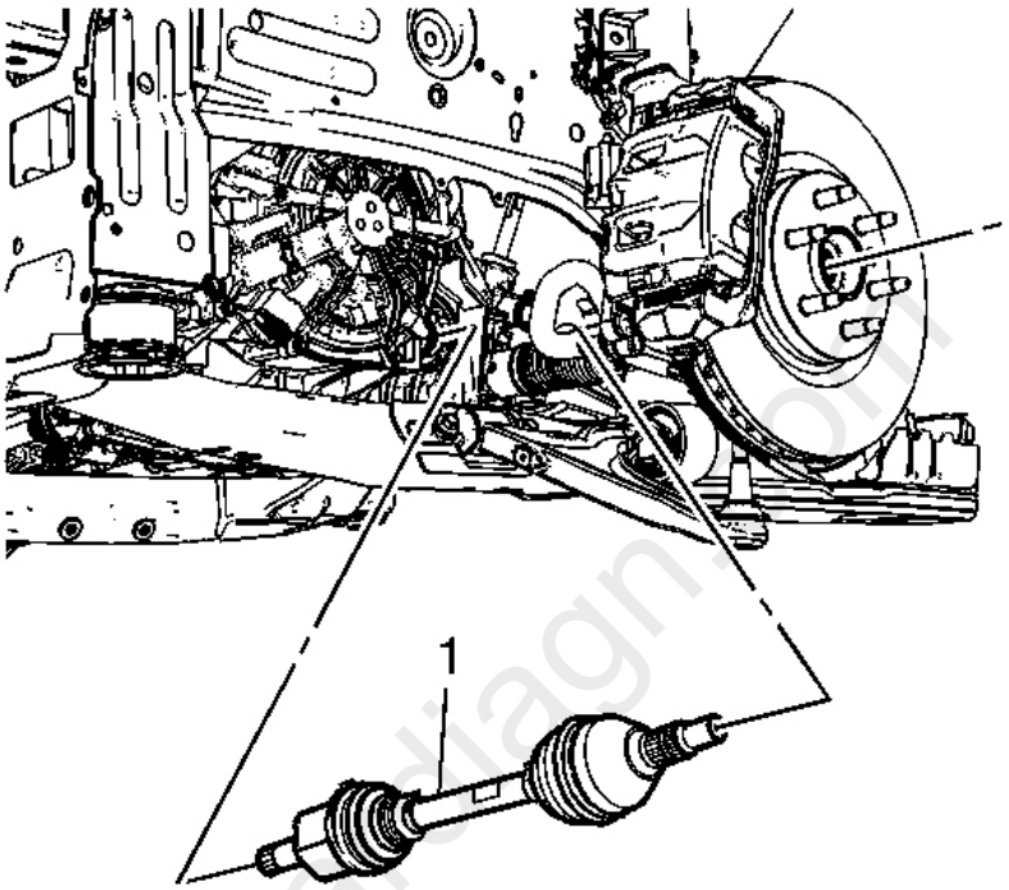


Fig. 8: View Of Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: The following service procedure is for vehicles e uipped with an intermediate shaft.

3. or the right wheel drive shaft, apply a very small amount of grease to the splines of the wheel drive shaft inner oint. Refer to **Adhesives Fluids Lubricants and Sealers**.
4. Install the wheel drive shaft (1) into the differential.
. Remove the **DT 44394 A:** protector from the wheel drive shaft.
6. Insert the wheel drive shaft in the knuckle.
7. Install the lower control arm in the knuckle. Refer to **Lower Control Arm Replacement** .
8. Install the outer tie rod end in the knuckle. Refer to **Steering Linkage Outer Tie Rod Replacement** .

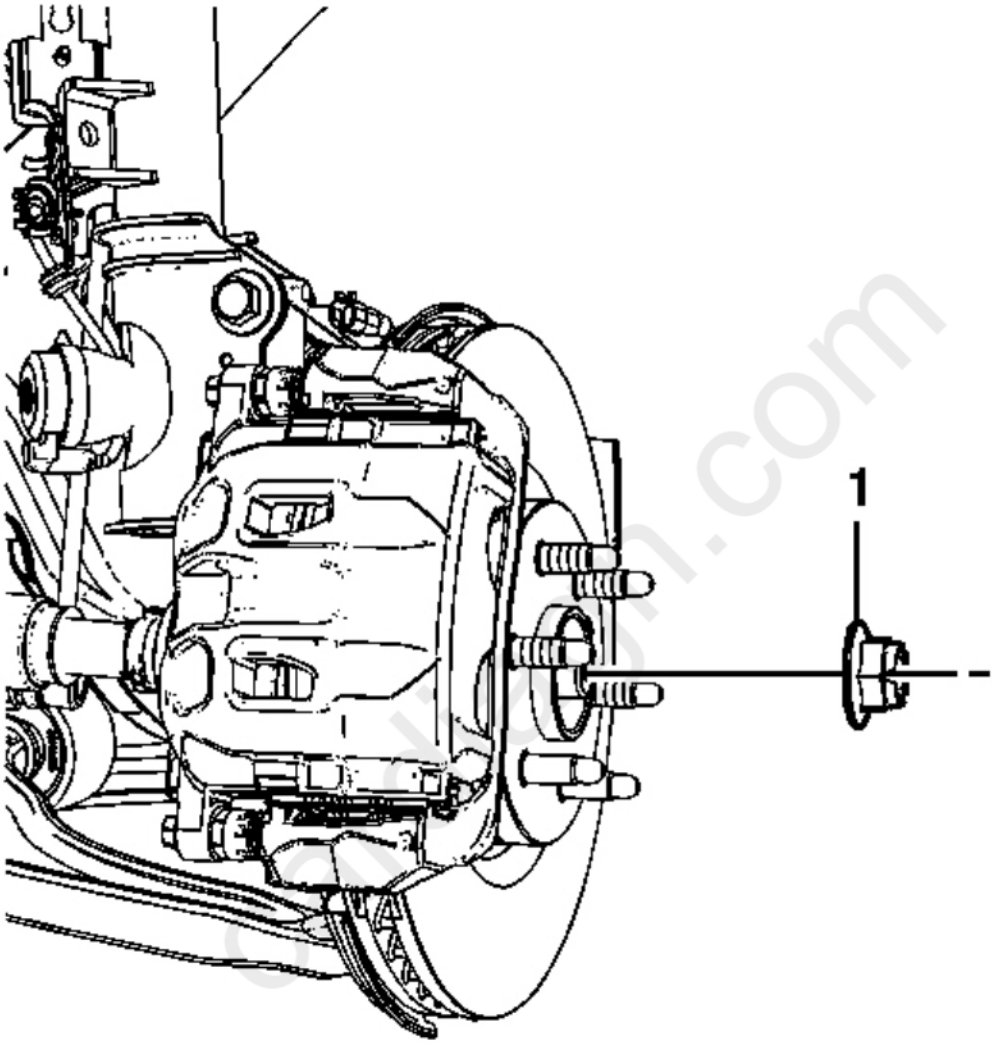


Fig. 9: Identifying Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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

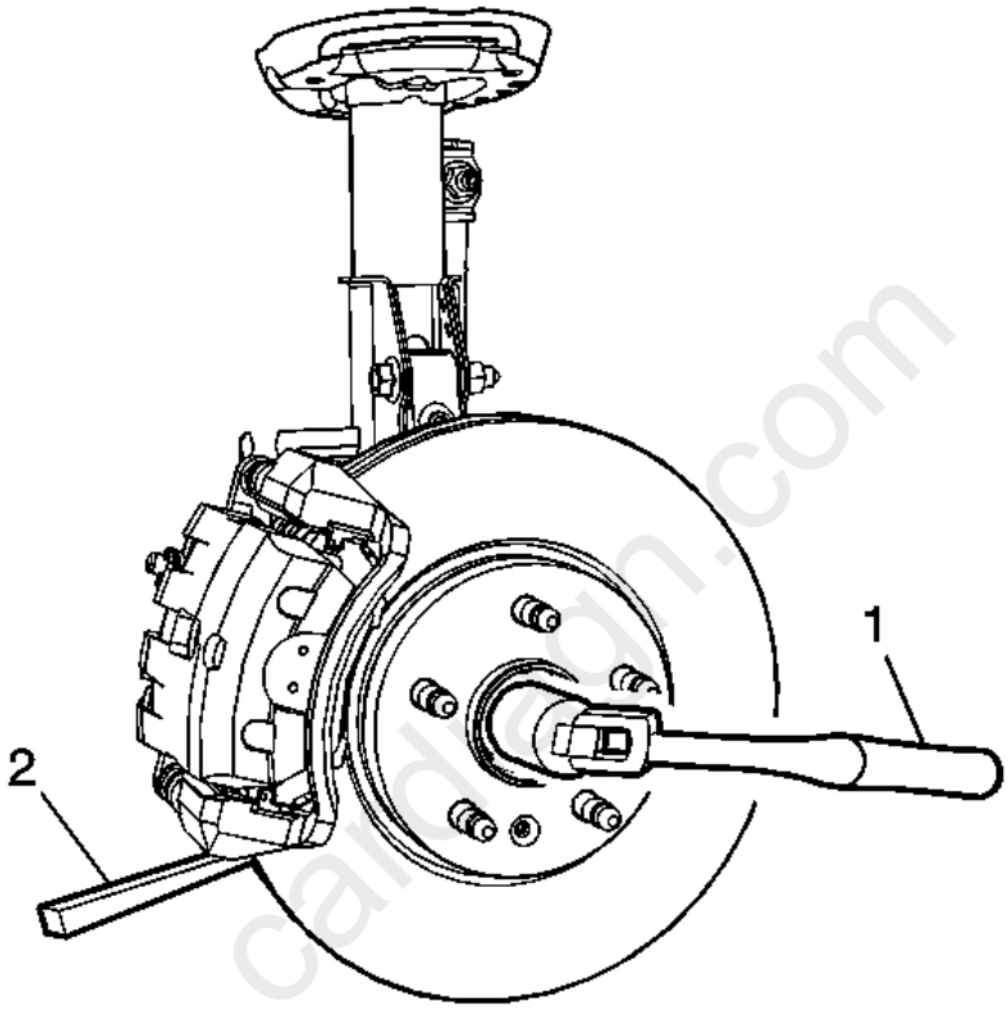


Fig. 2 : Tightening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

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.

C TION: Refer to astener Caution .

12. Using a tor ue wrench (1), tighten the wheel drive shaft nut to 2 0 N.m (184 lb ft).
13. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

14. Remove the support and lower the vehicle.

REAR W EEL DRIVE S AFT REPLACEMENT

Special Tools

J 45859: xle uller

or e uivalent regional 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** .

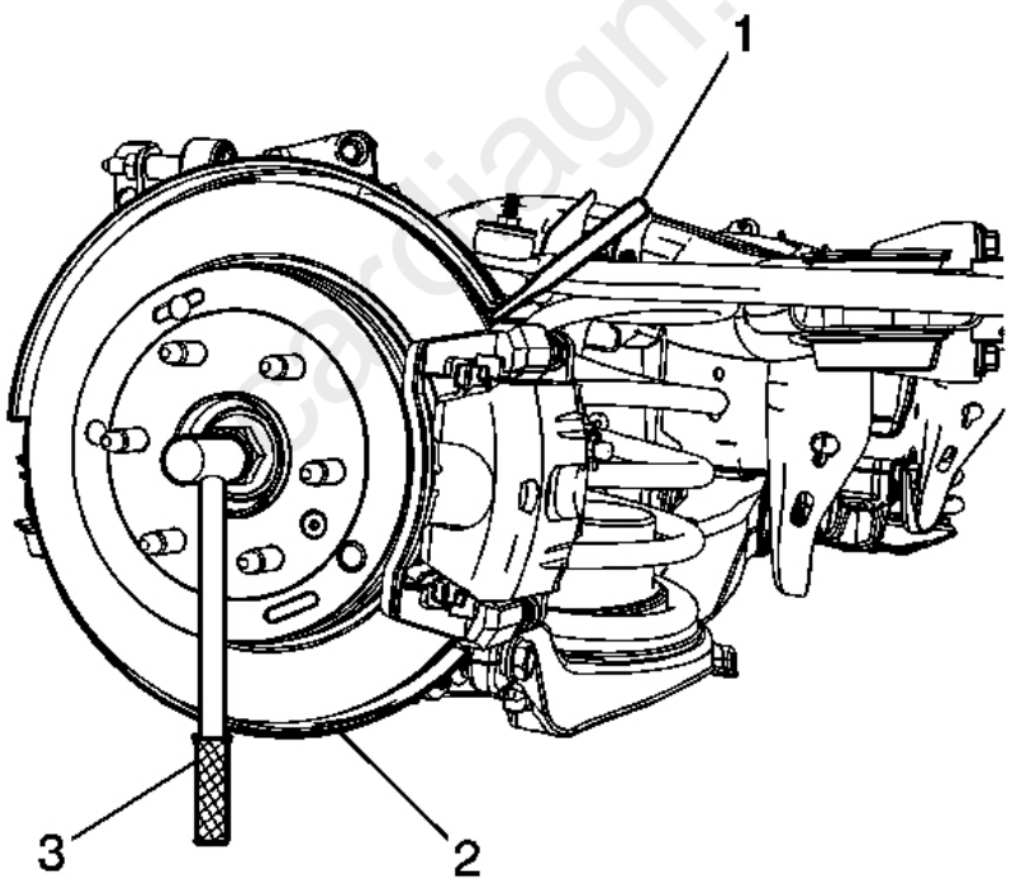


Fig. 2 : View Of Wheel Drive Shaft Nut Removal

Courtesy of GENERAL MOTORS CORP.

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

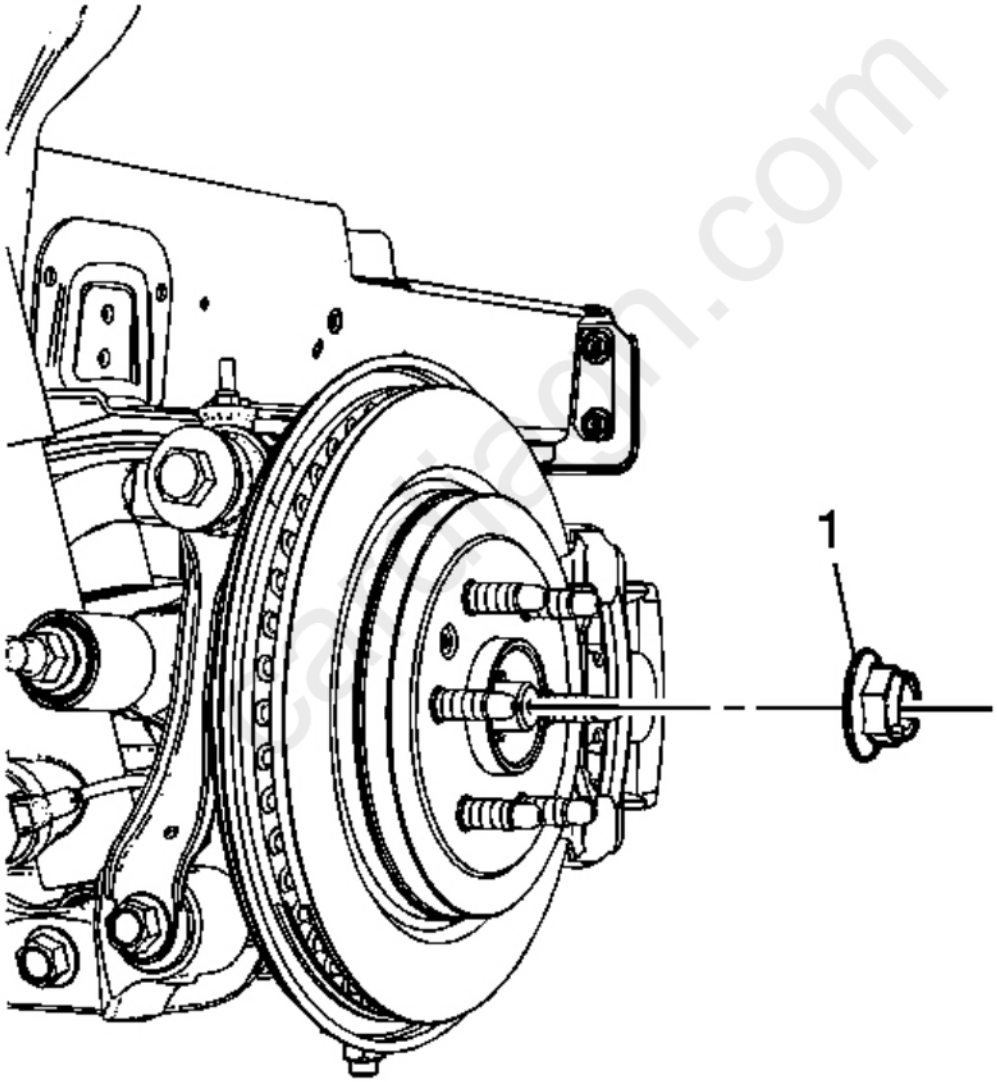


Fig. 22: View Of Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the wheel drive shaft nut (1).
. Using the **J 45859:** puller, separate the wheel drive shaft from the knuckle assembly.
. Remove the knuckle assembly from the vehicle. Refer to **Knuckle Replacement** .

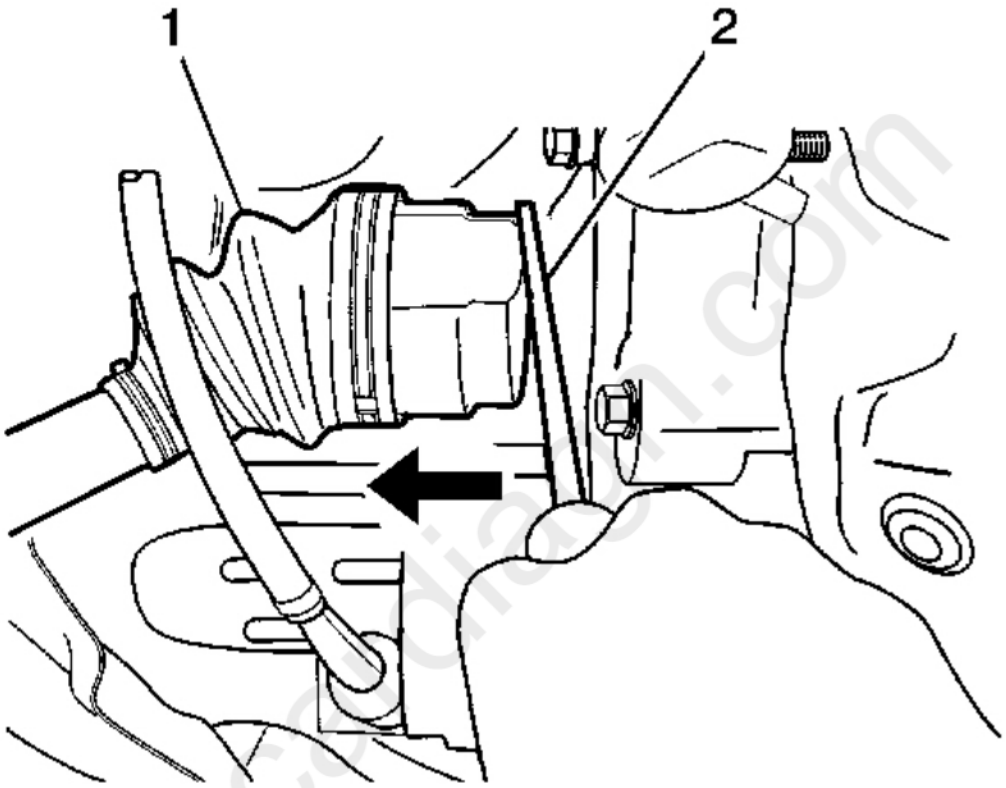


Fig. 23: View Of Wheel Drive Shaft Removal From Differential
Courtesy of GENERAL MOTORS CORP.

. Using a long flat bladed screw driver, remove the wheel drive shaft from the differential.

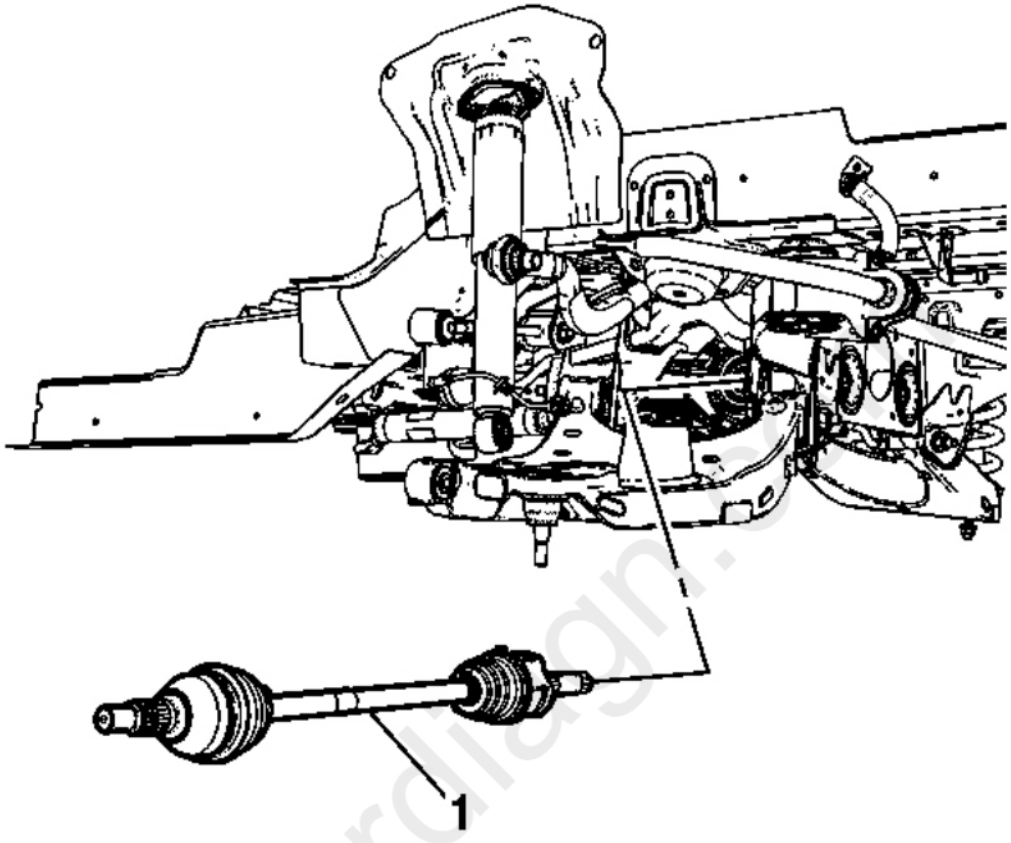


Fig. 24: View Of Wheel Drive Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

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

Installation Procedure

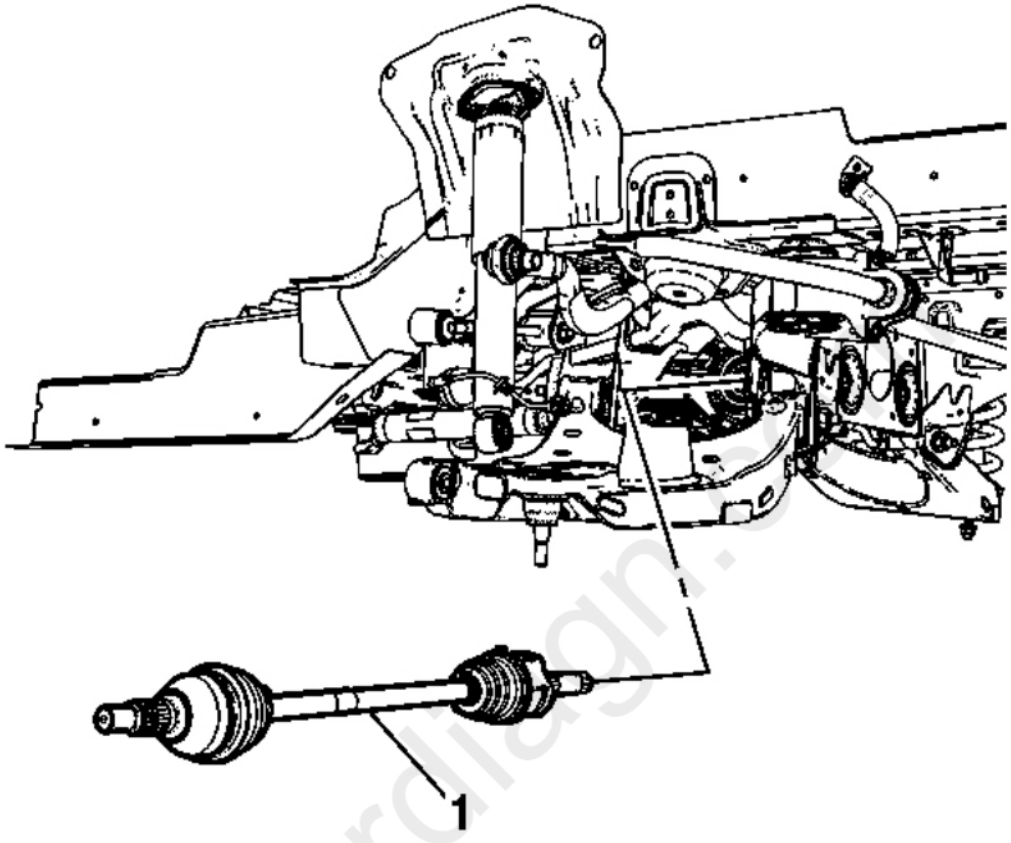


Fig. 25: View Of Wheel Drive Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

1. nstall the rear wheel drive shaft (1) in the rear differential.
2. nstall the knuckle assembly. Refer to **Knuckle Replacement** .

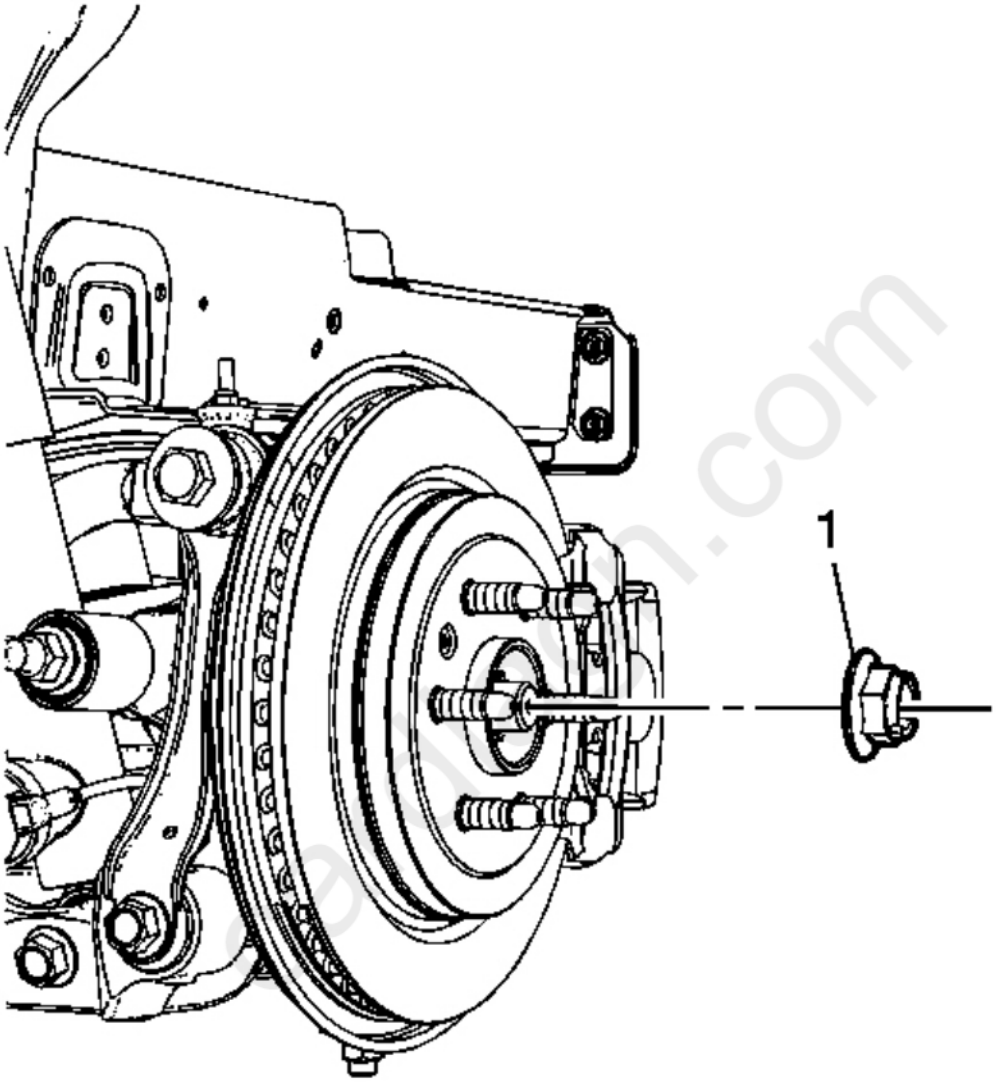


Fig. 26: View Of Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

3. nstall the wheel drive shaft nut (1).

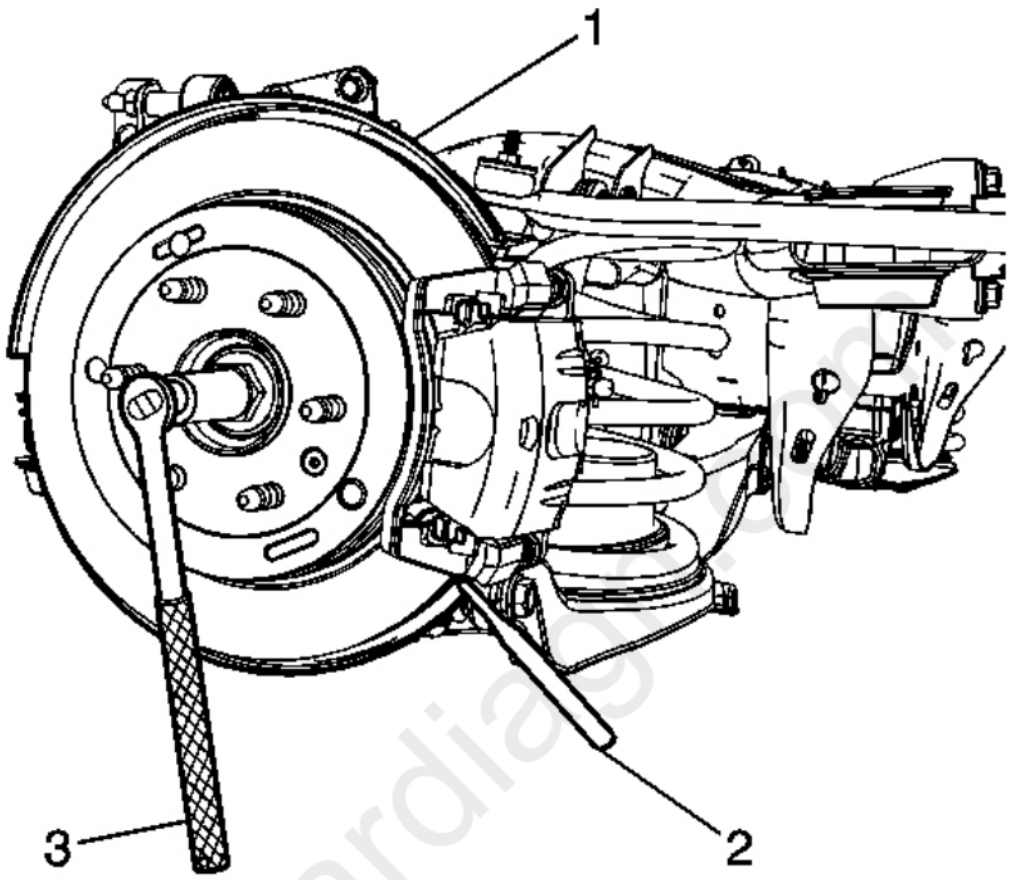


Fig. 2 : Tightening Wheel Drive Shaft Nut
Courtesy of GENERAL MOTORS CORP.

4. nsert a brass drift or punch (2) in the cooling fins of the brake rotor (1).
5. Rotate the brake rotor (1) until the brass drift or punch (2) rest against the brake caliper mounting bracket.

CAUTION: Refer to Fastener Caution .

6. Using a tor ue wrench and the proper si e socket (3), tighten the wheel drive shaft nut to 25 N.m (1 4 lb ft).
. nstall the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
. Remove the supports and lower the vehicle.
. Check the alignment specification and adjust as needed. Refer to **Wheel Alignment Specifications**

FRONT WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

DT 35 1 : rive xle eal Clamp Pliers

or e uivalent regional tools, refer to **Special Tools**.

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.**

Disassemble Procedure

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

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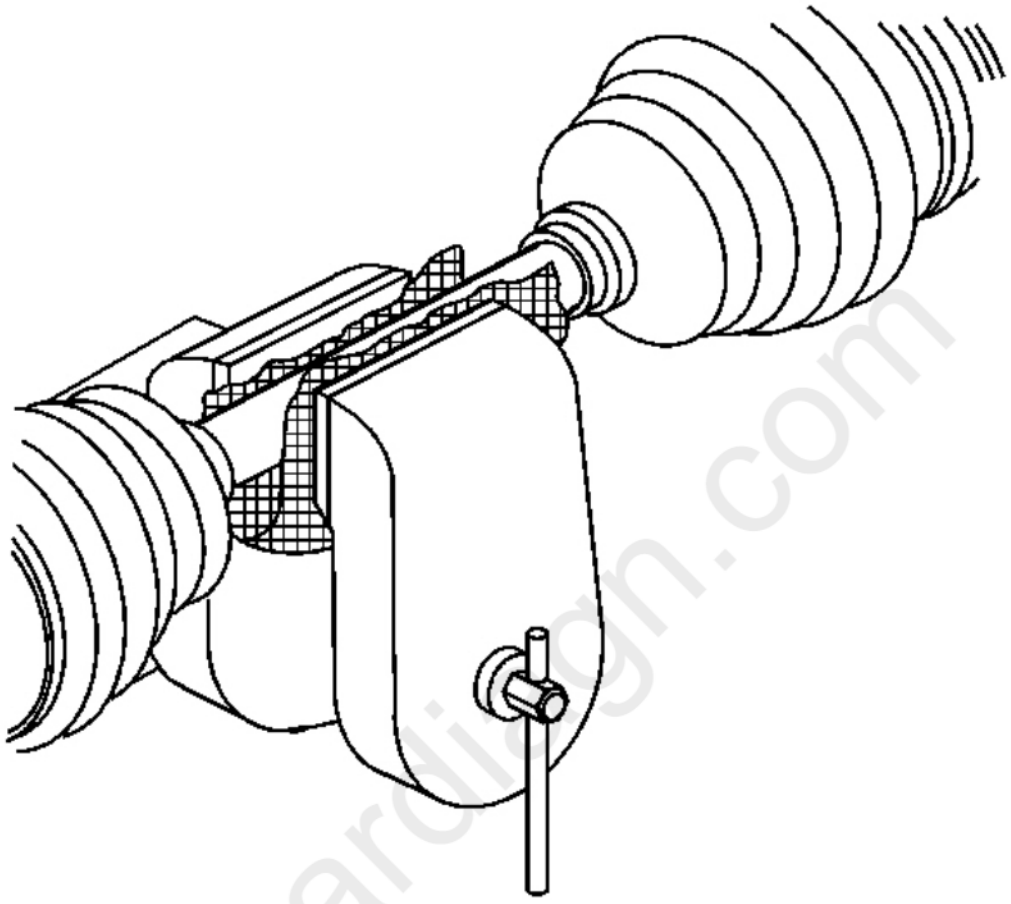


Fig. 2 : View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS CORP.

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

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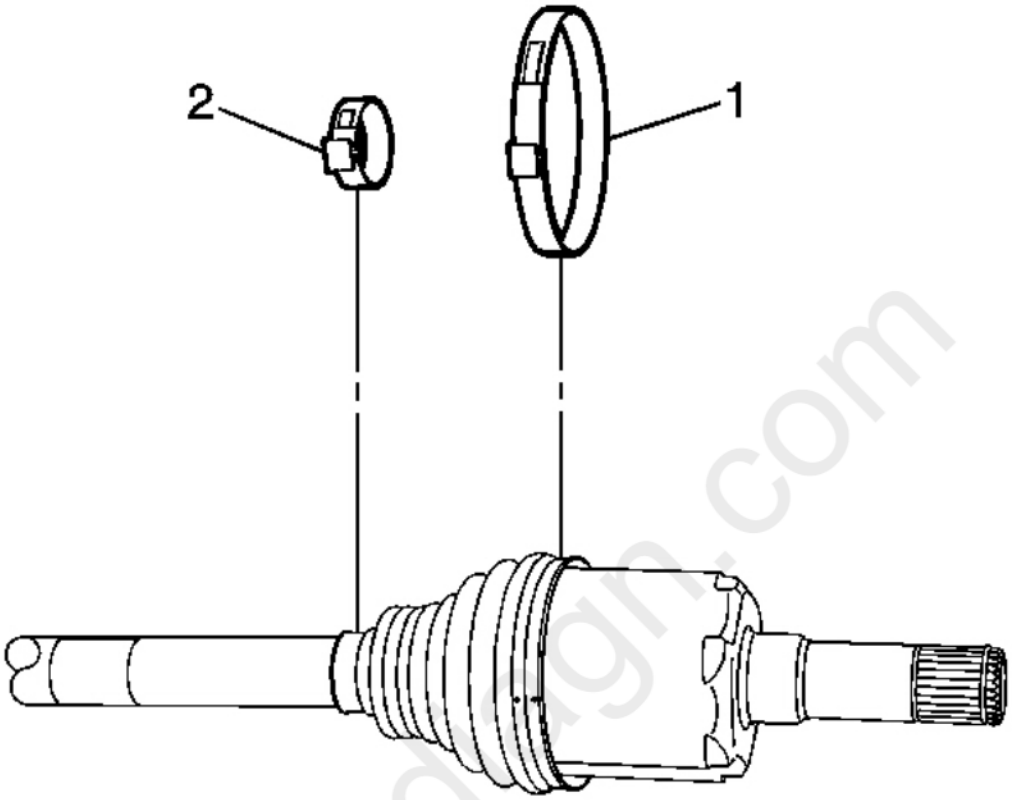


Fig. 2 : View Of Boot Retaining Clamps
Courtesy of GENERAL MOTORS CORP.

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

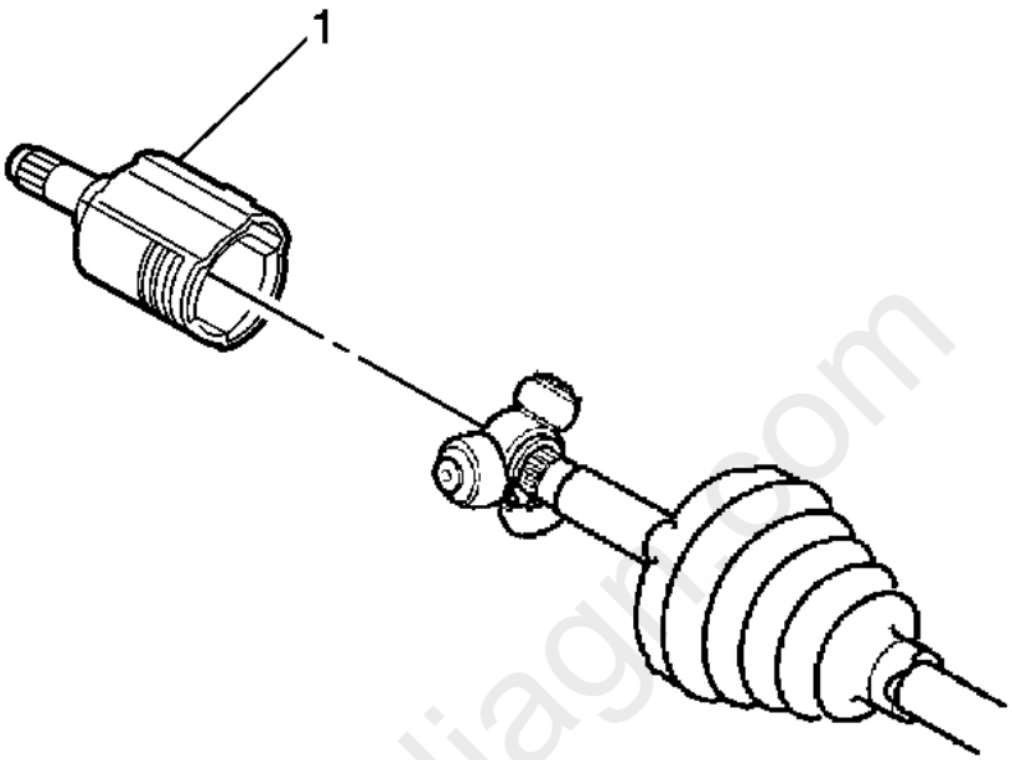


Fig. 3 : Disassembled View Of Tripot Housing & Joint
Courtesy of GENERAL MOTORS CORP.

NOTE: The tripot housing may be staked at the end to prevent removal. The staking will need to be ground down to allow removal.

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

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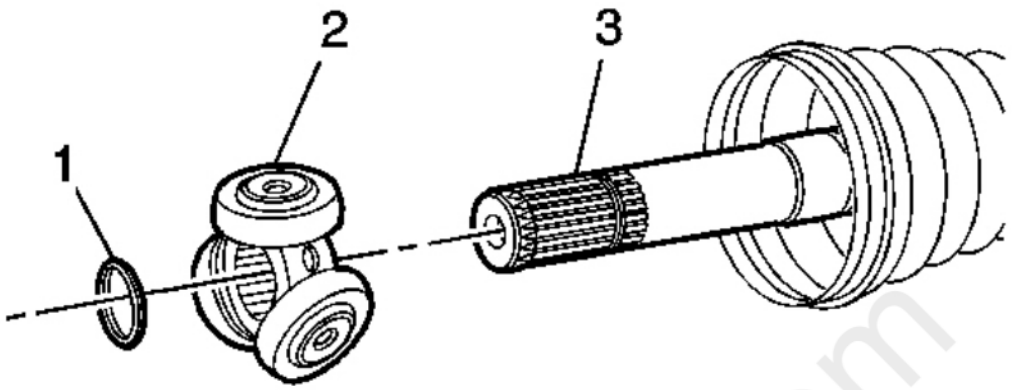


Fig. 31: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

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

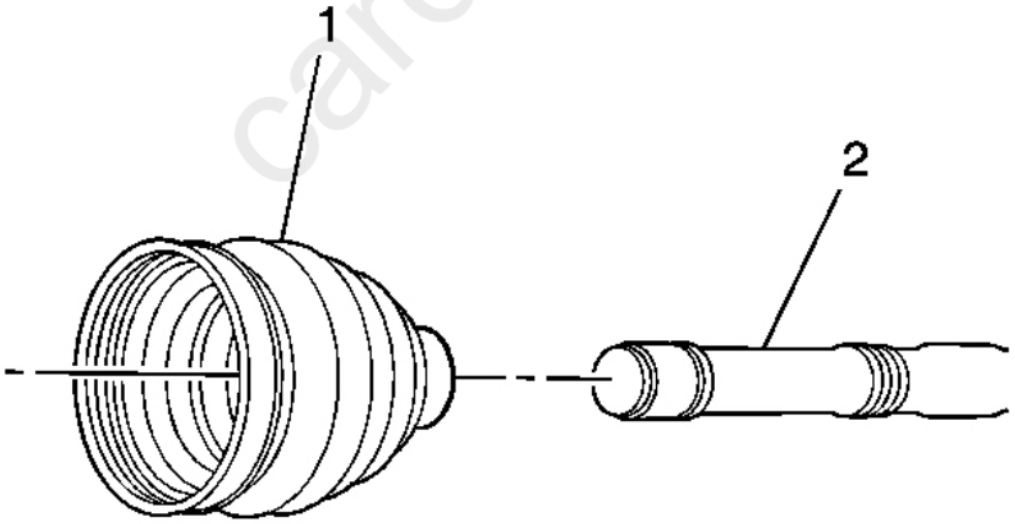


Fig. 32: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

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

Assemble Procedure

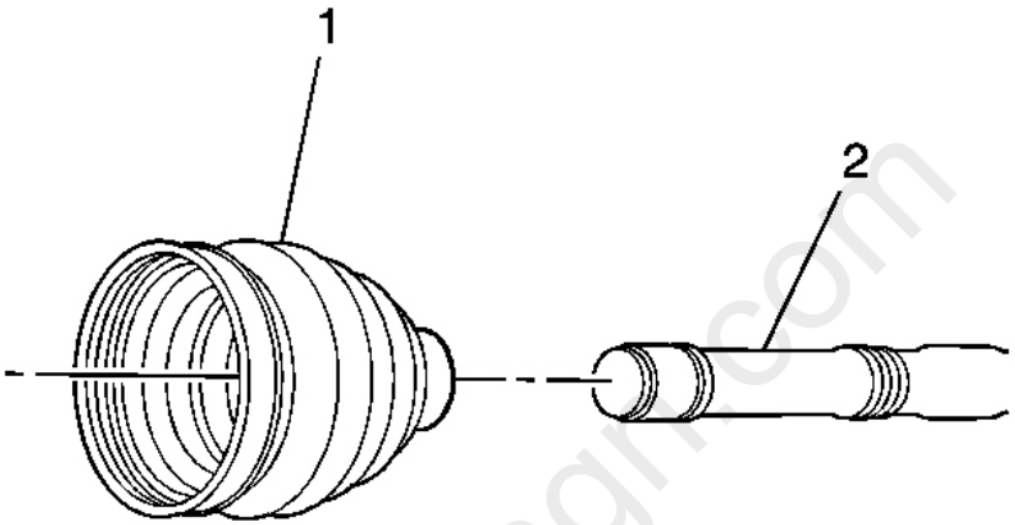


Fig. 33: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

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

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

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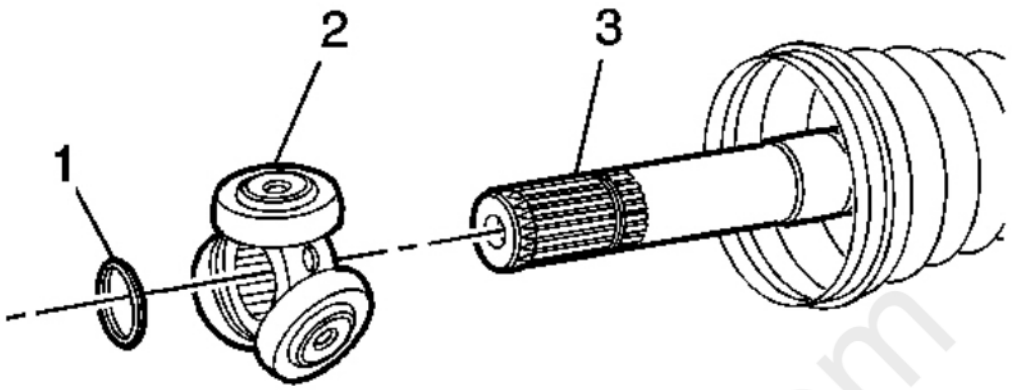


Fig. 34: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

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

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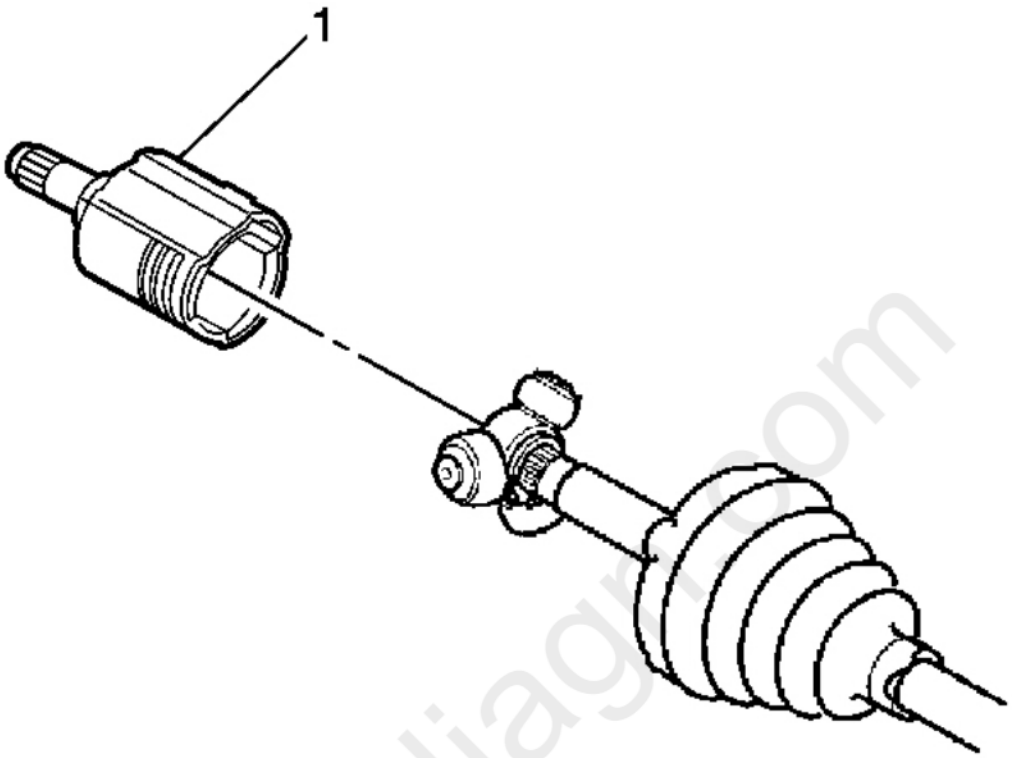


Fig. 35: Disassembled View Of Tripot Housing & Joint
Courtesy of GENERAL MOTORS CORP.

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

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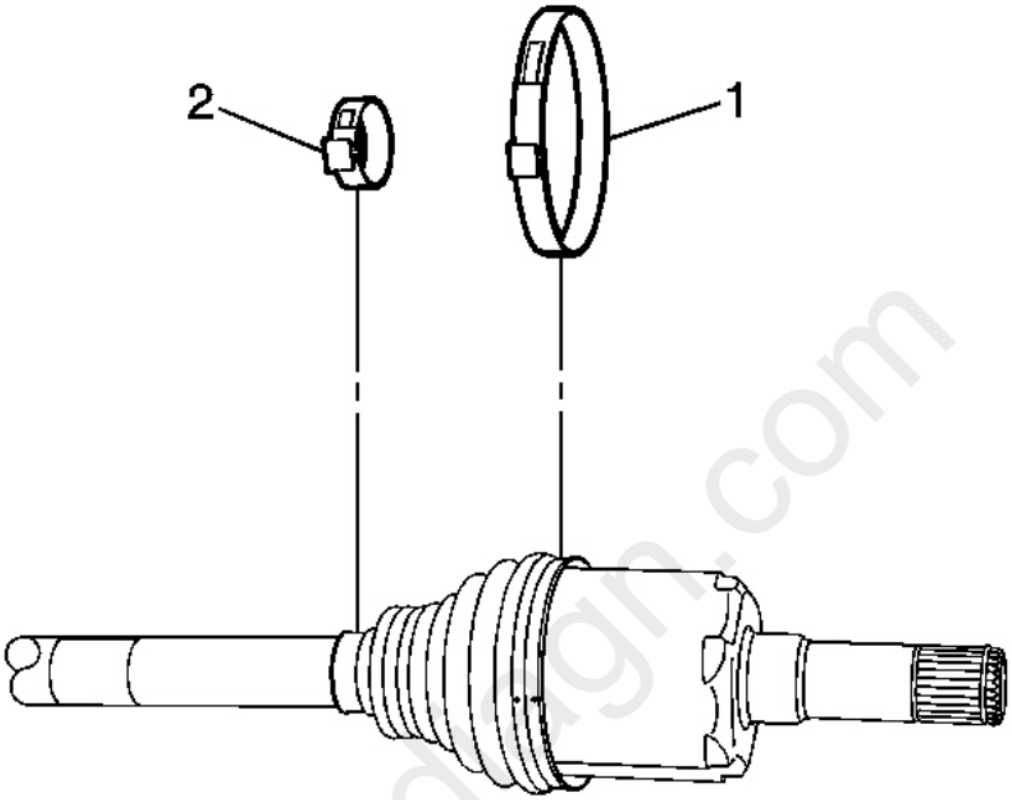
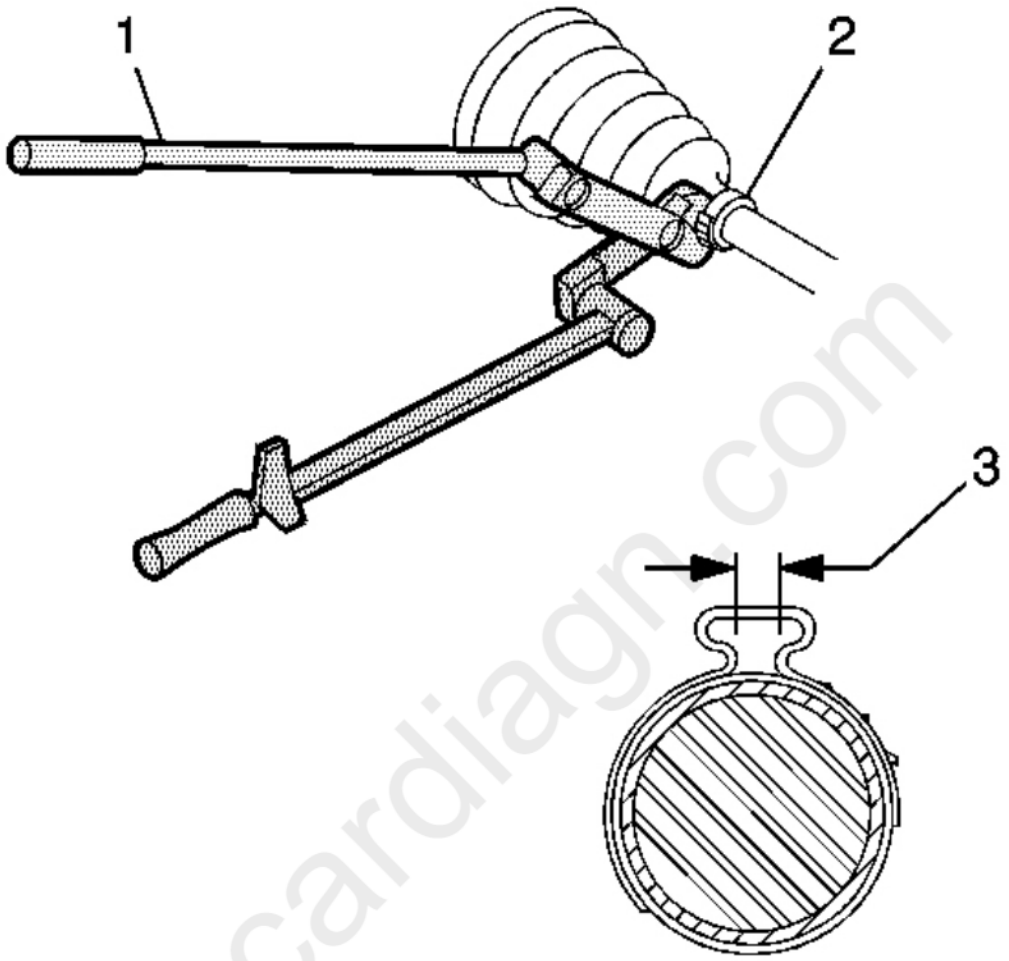


Fig. 36: View Of Boot Retaining Clamps
Courtesy of GENERAL MOTORS CORP.

6. Install the inboard boot clamp (2).
7. Install the outboard boot clamp (1).



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

. Using the **DT 35910:** pliers, breaker bar, tor ue wrench and or ratchet (1), close the boot clamp (2) until the gap (3) measures 2.15 mm (. 5 in).

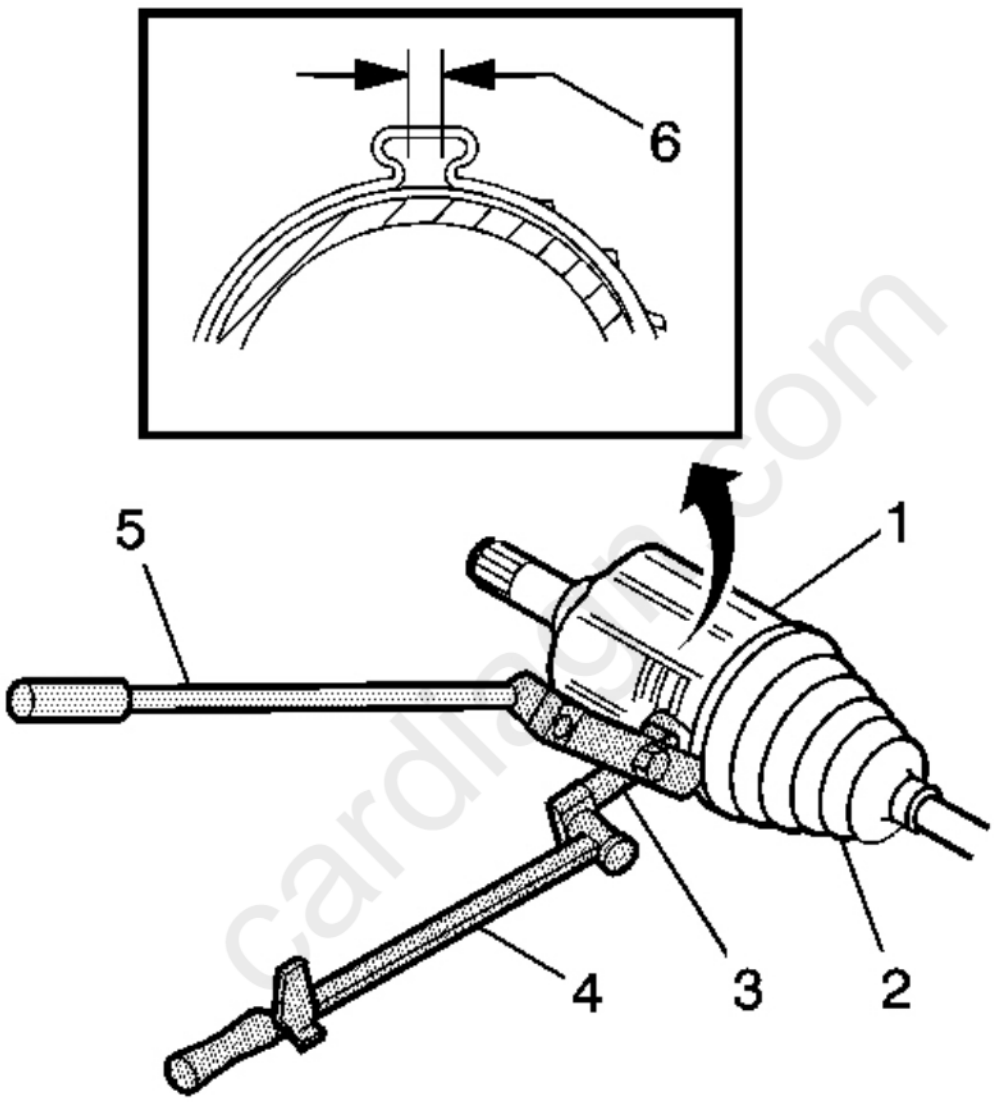


Fig. 38: Measuring Boot Clamp Gap
Courtesy of GENERAL MOTORS CORP.

. Using the **DT 35910:** pliers (3), breaker bar (5), tor ue wrench and or ratchet (4), close the clamp until the gap (6) measures 1. mm (. in).

1 . Rotate the housing in a circular motion to distribute the grease in the tripot joint.

11. nstall the wheel drive shaft to the vehicle.

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

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

REAR WHEEL DRIVE SHAFT INNER JOINT AND BOOT REPLACEMENT

Special Tools

DT 35910: rive xle eal Clamp Pliers

or e uivalent regional tools, refer to **Special Tools**.

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.**

Disassemble Procedure

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

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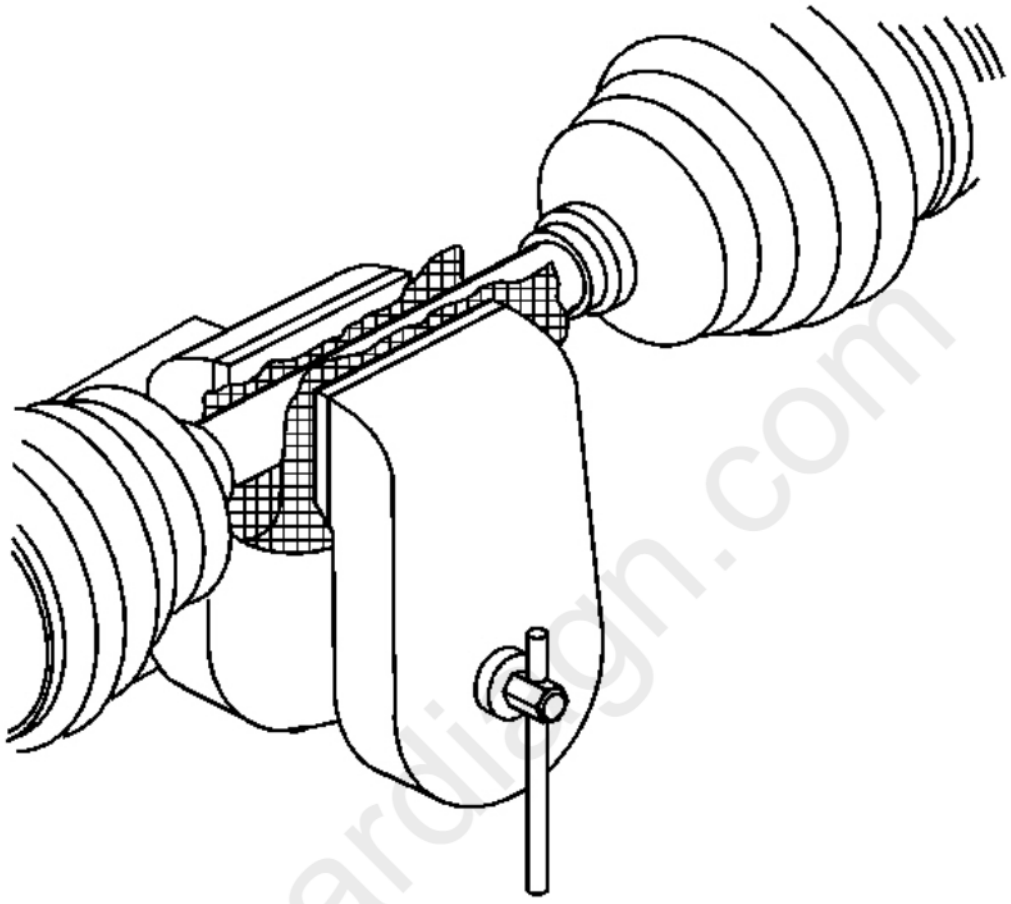


Fig. 39: View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS CORP.

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

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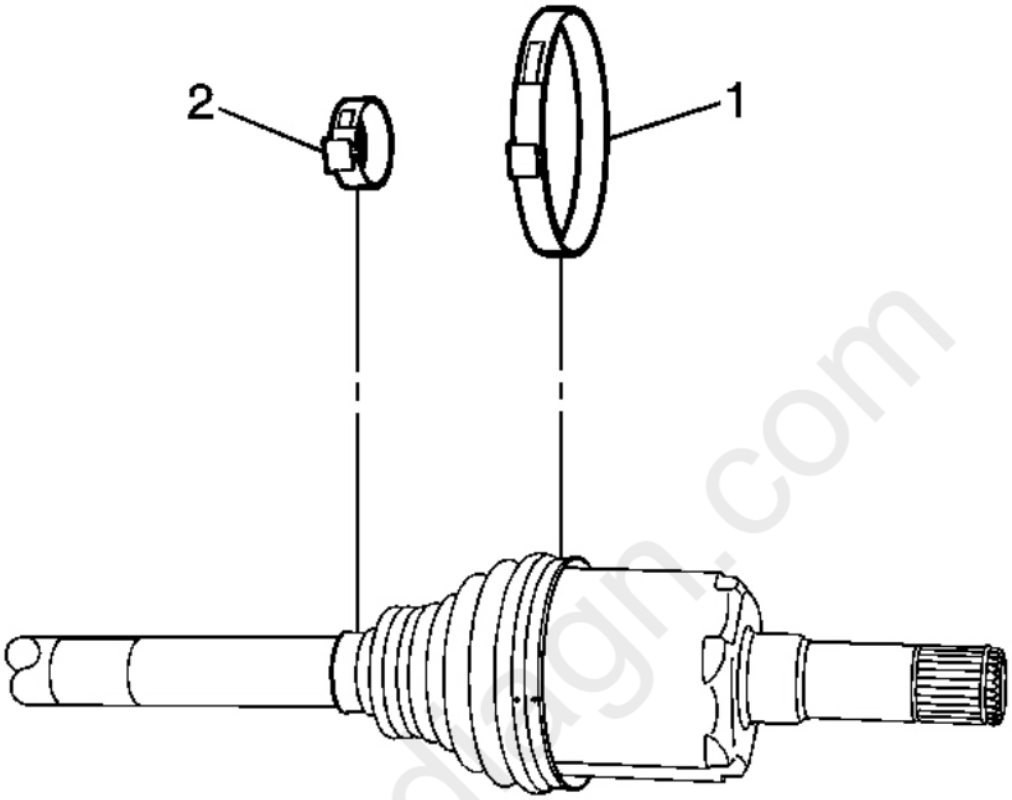


Fig. 40: View Of Boot Retaining Clamps
Courtesy of GENERAL MOTORS CORP.

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

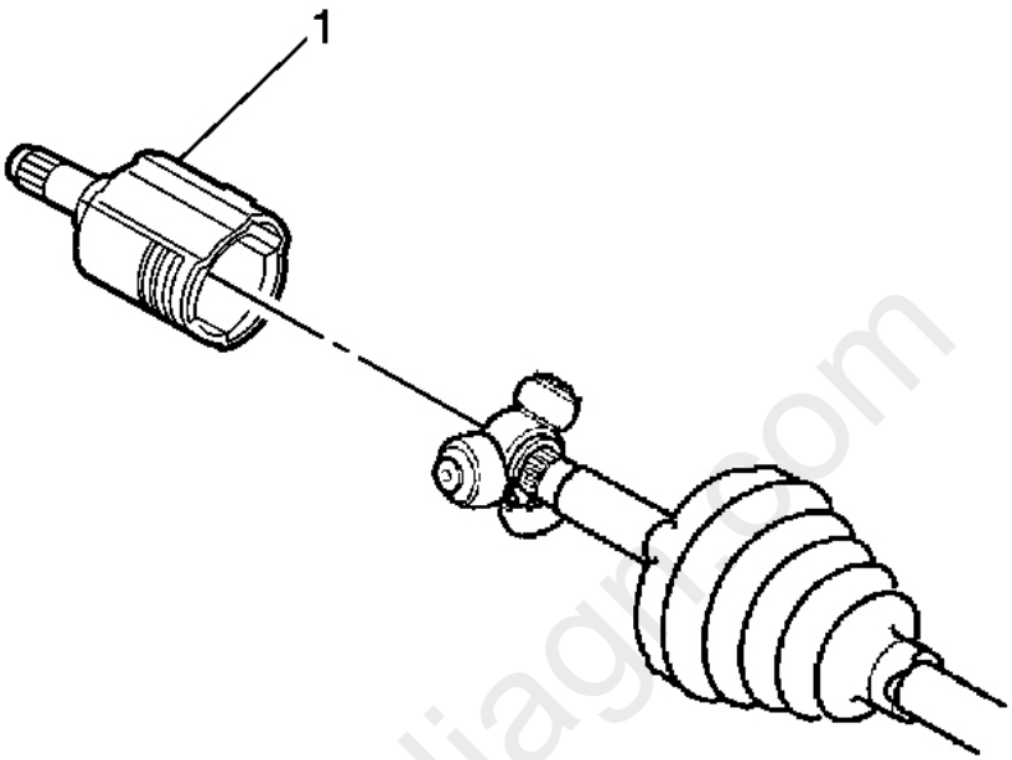


Fig. 41: Disassembled View Of Tripot Housing & Joint
Courtesy of GENERAL MOTORS CORP.

NOTE: The tripot housing may be staked at the end to prevent removal. The staking will need to be ground down to allow removal.

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

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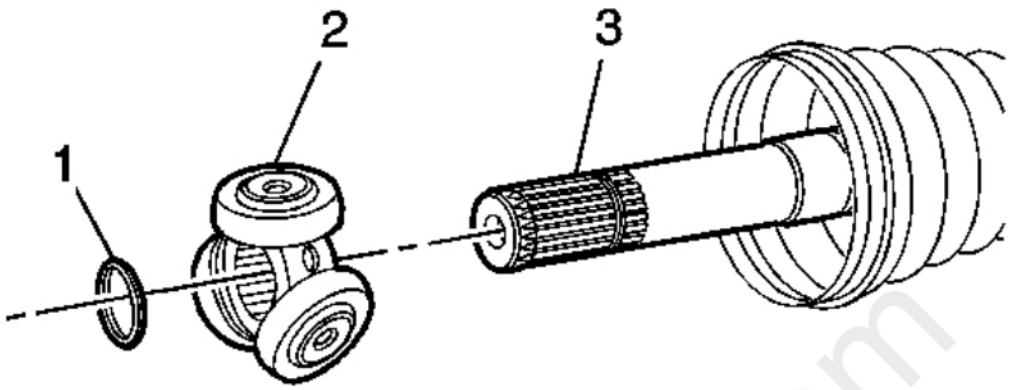


Fig. 42: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

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

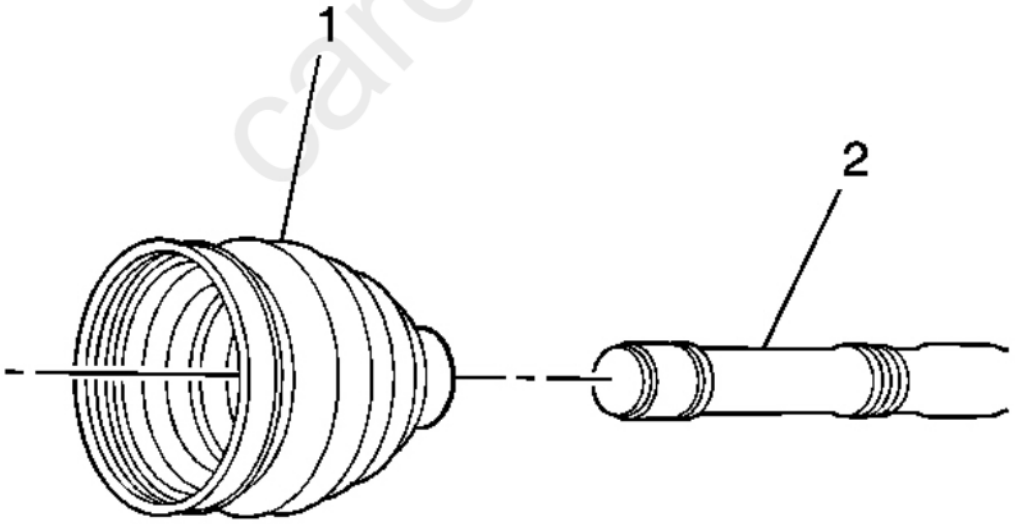


Fig. 43: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

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

Assemble Procedure

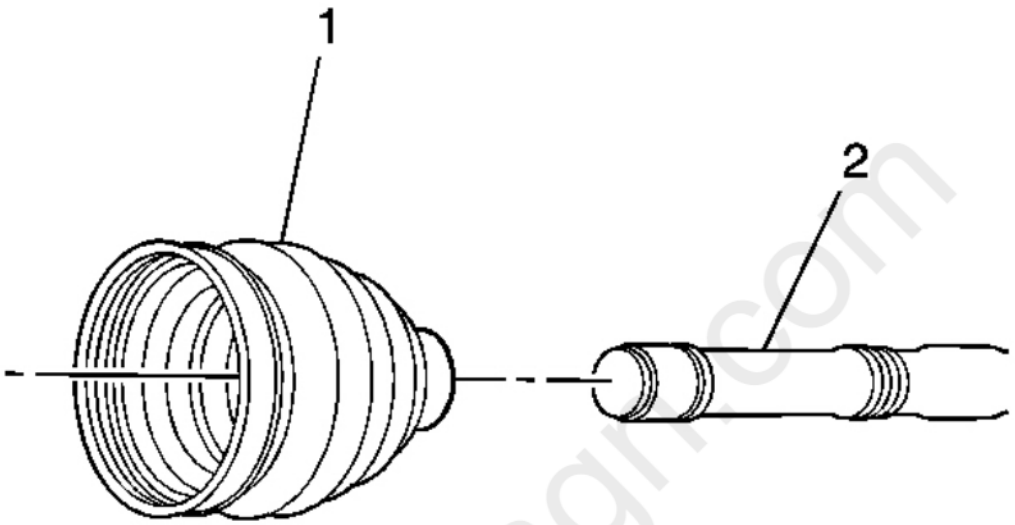


Fig. 44: Identifying Wheel Drive Shaft Boot
Courtesy of GENERAL MOTORS CORP.

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

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

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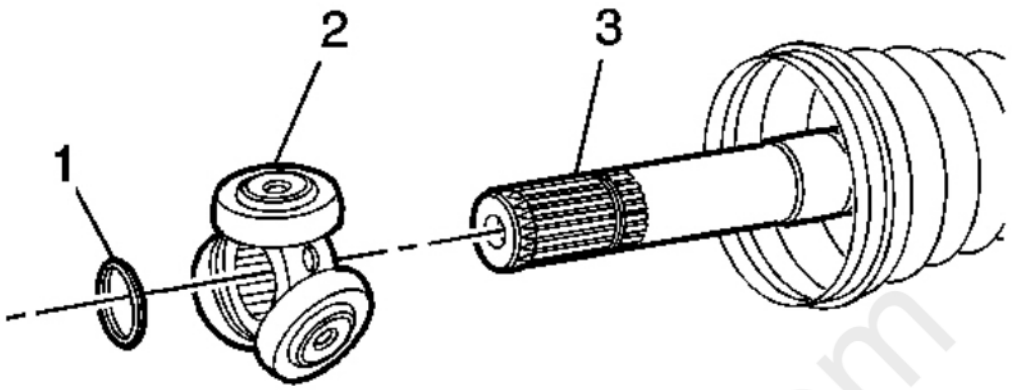


Fig. 45: View Of Wheel Drive Shaft, Tripod Spider And Retaining Clip
Courtesy of GENERAL MOTORS CORP.

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

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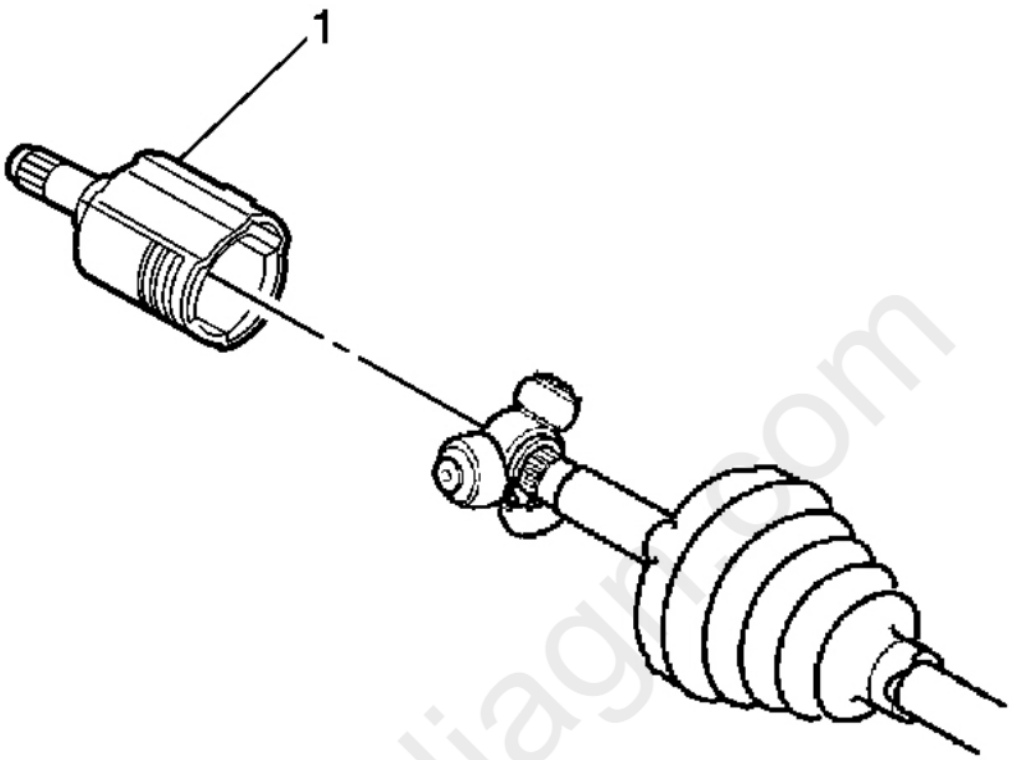


Fig. 46: Disassembled View Of Tripot Housing & Joint
Courtesy of GENERAL MOTORS CORP.

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

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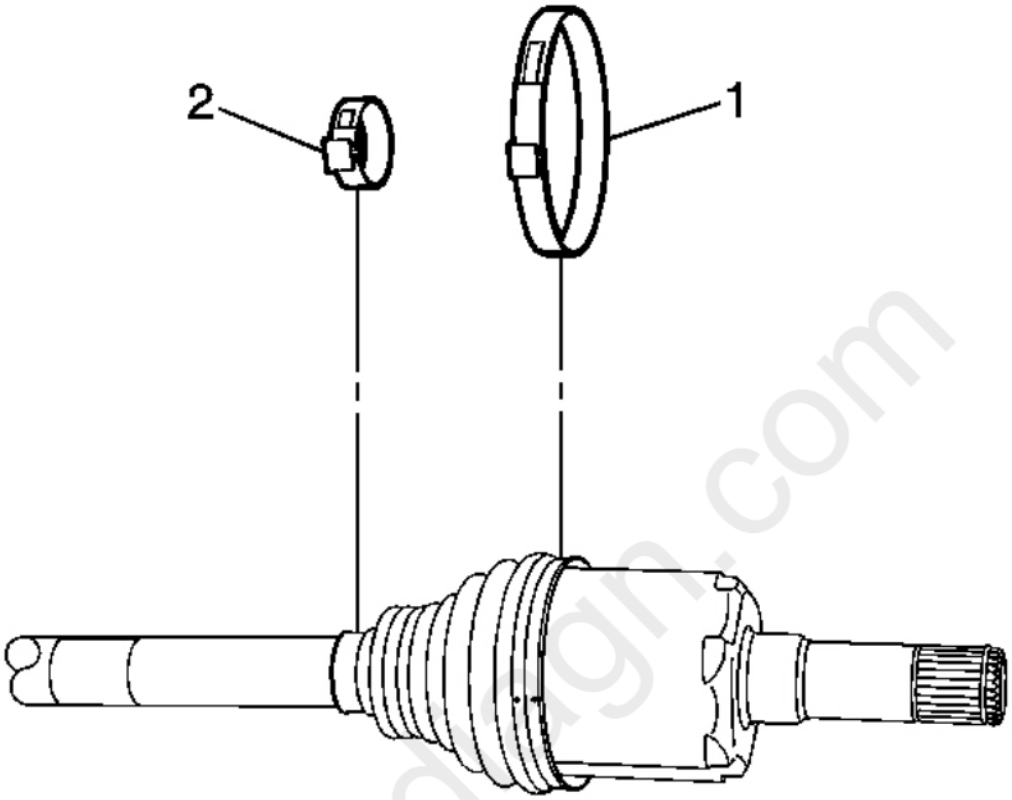
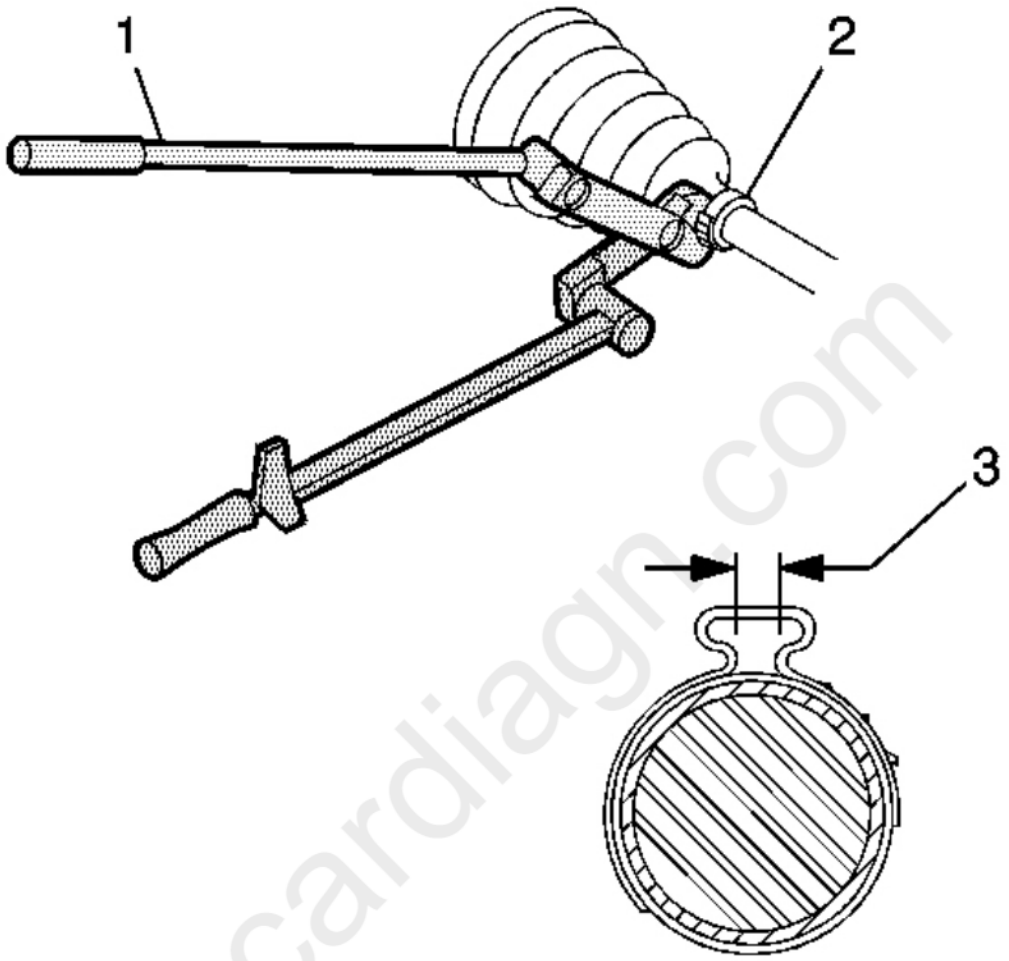


Fig. 47: View Of Boot Retaining Clamps
Courtesy of GENERAL MOTORS CORP.

6. Install the inboard boot clamp (2).
7. Install the outboard boot clamp (1).



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Fig. 48: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

8. Using the **DT 35910:** pliers, breaker bar, tor ue wrench and or ratchet (1), close the boot clamp (2) until the gap (3) measures 2.1 mm (0.08 in).

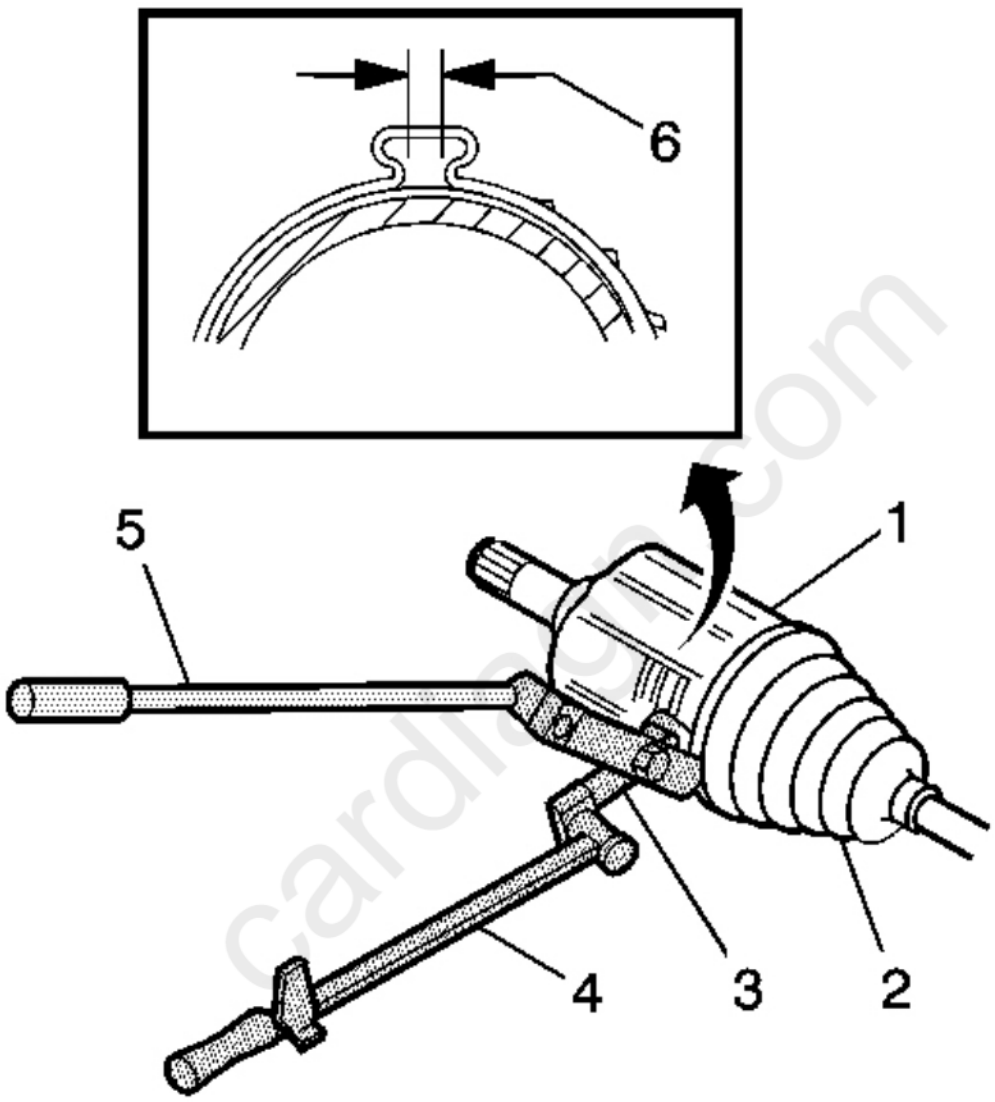


Fig. 49: Measuring Boot Clamp Gap
Courtesy of GENERAL MOTORS CORP.

9. Using the **DT 35910:** pliers (3), breaker bar ( ), tor ue wrench and or ratchet (4), close the clamp until the gap (6) measures 1.9 mm (0.070 in).
10. Rotate the housing in a circular motion to distribute the grease in the tripot oint.
11. Install the wheel drive shaft to the vehicle.
    - or the left wheel drive shaft, refer to **Front Wheel Drive Shaft Replacement - Left Side**.

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

FRONT WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

- **CH 48894:** Wheel Drive haft oot Clamp liers
- **DT 35910:** Drive xle eal Clamp liers

or e uivalent regional tools, refer to **Special Tools**.

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

Disassemble Procedure

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

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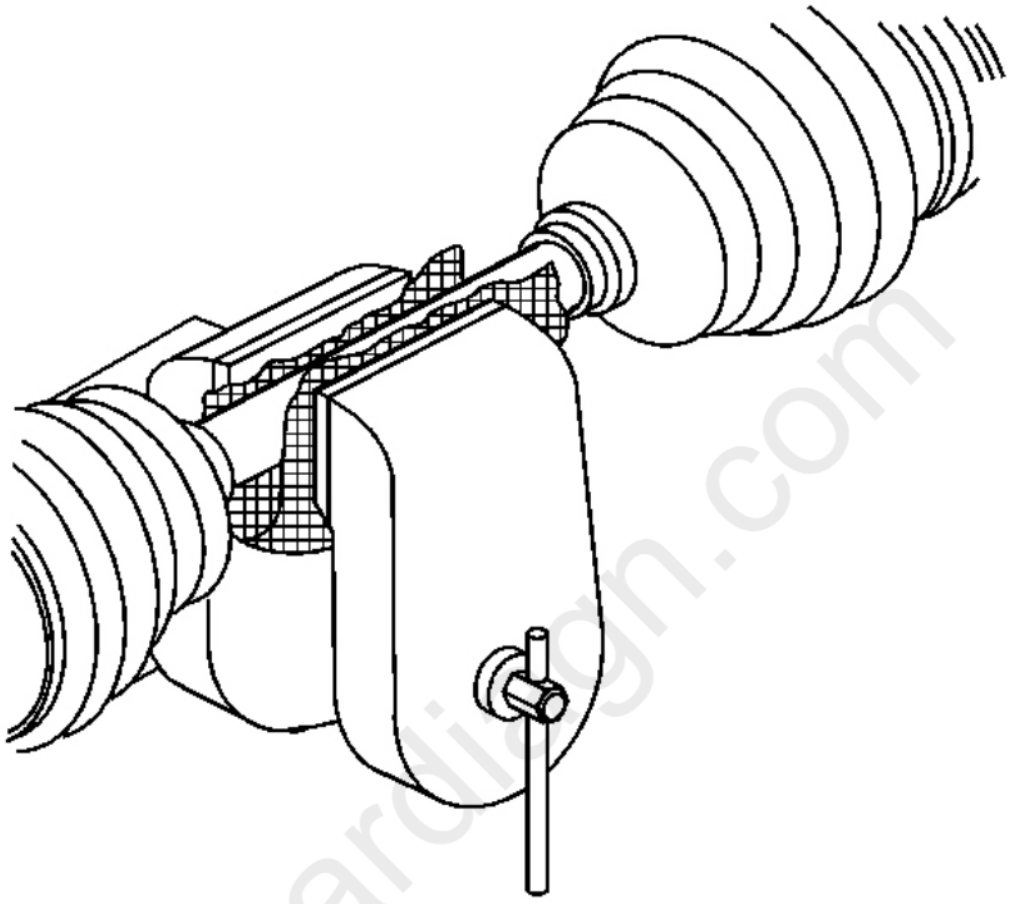


Fig. 50: View Of Front Wheel Drive Shaft Inner Joint
Courtesy of GENERAL MOTORS CORP.

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

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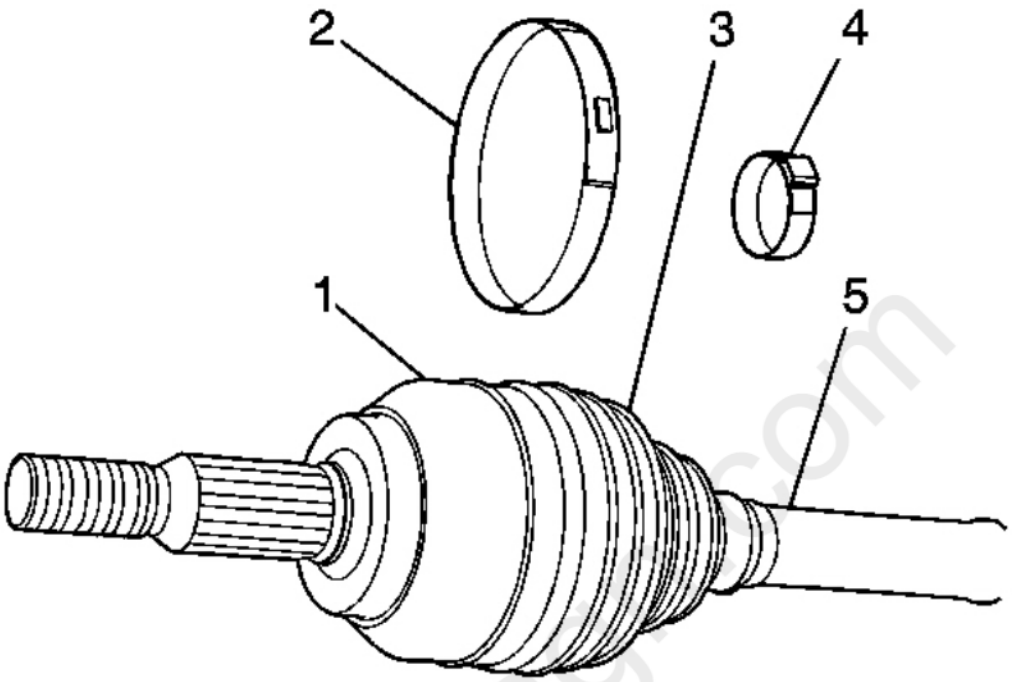


Fig. 51: Identifying Boot Clamp
Courtesy of GENERAL MOTORS CORP.

C T ON: o 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 oint bushing. amage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity oint.

3. Using 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.

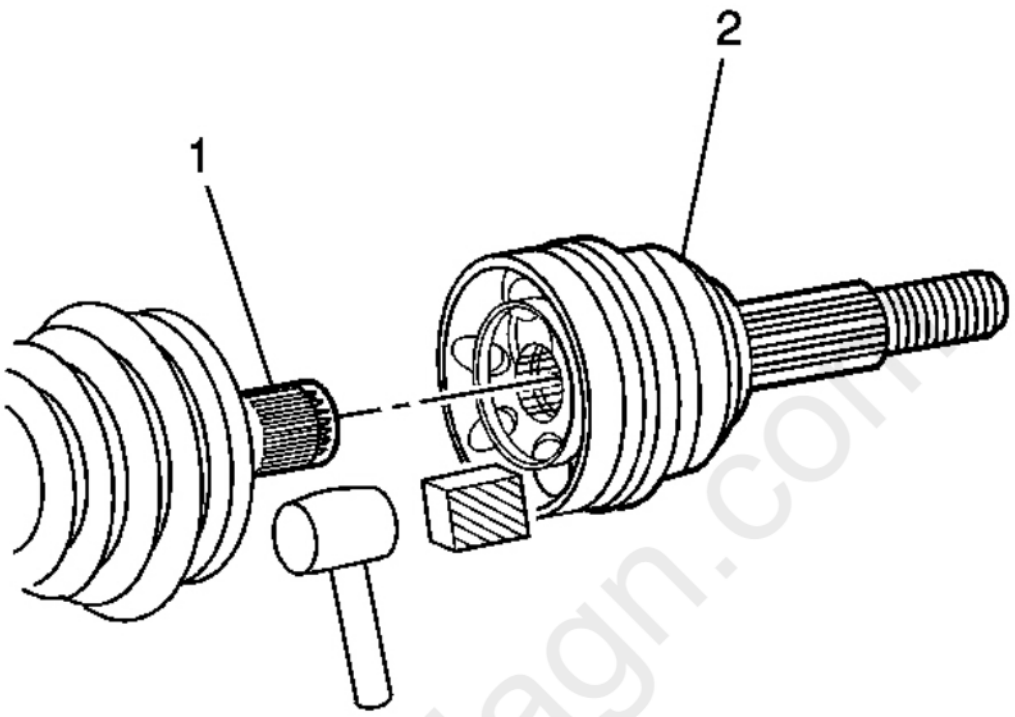


Fig. 5 : Illustrating Separating CV Joint From A le Shaft
Courtesy of GENERAL MOTORS CORP.

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

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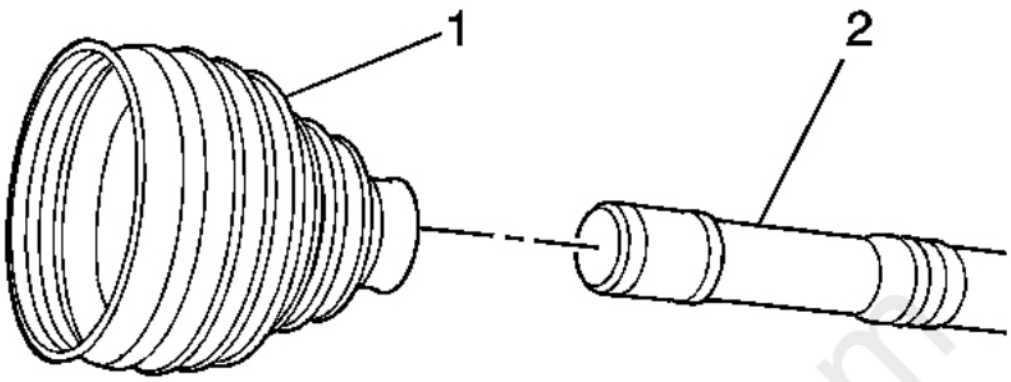


Fig. 53: Identifying Clamp & Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

Assemble Procedure

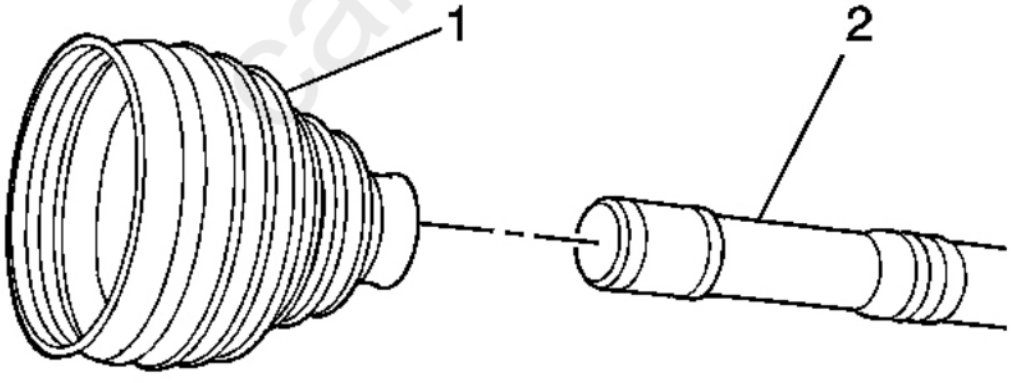


Fig. 54: Identifying Clamp & Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

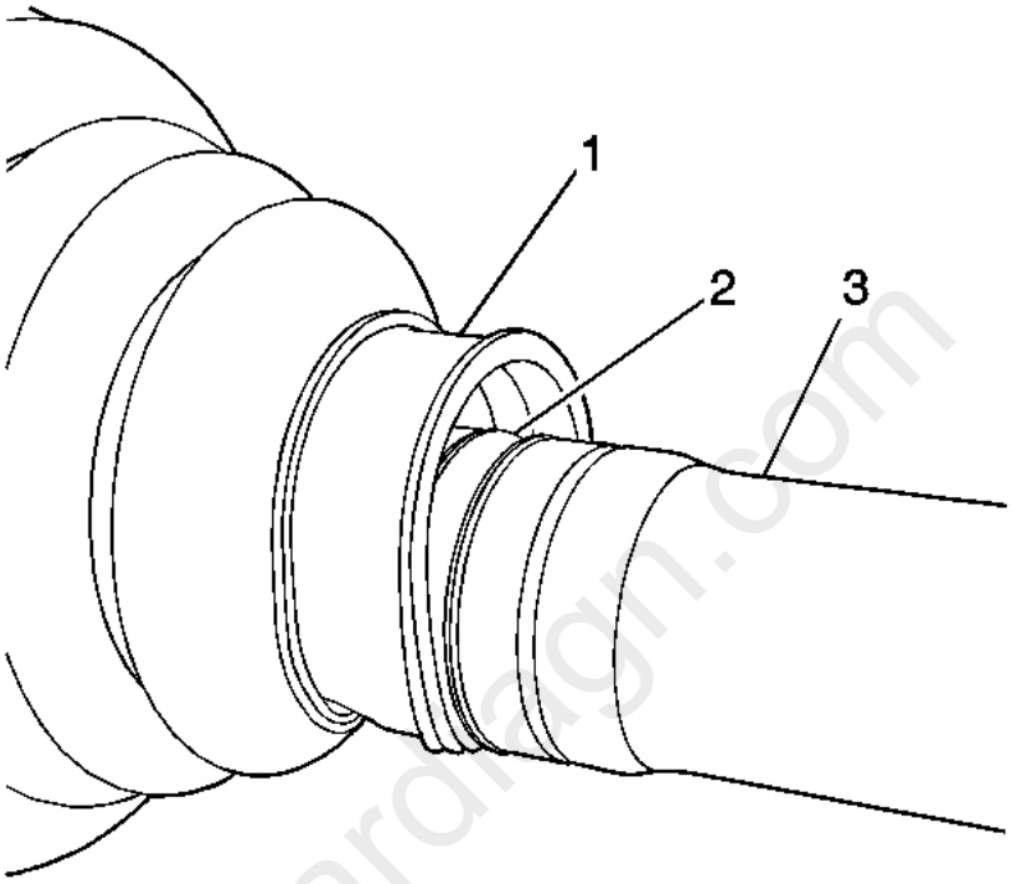


Fig. 55: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

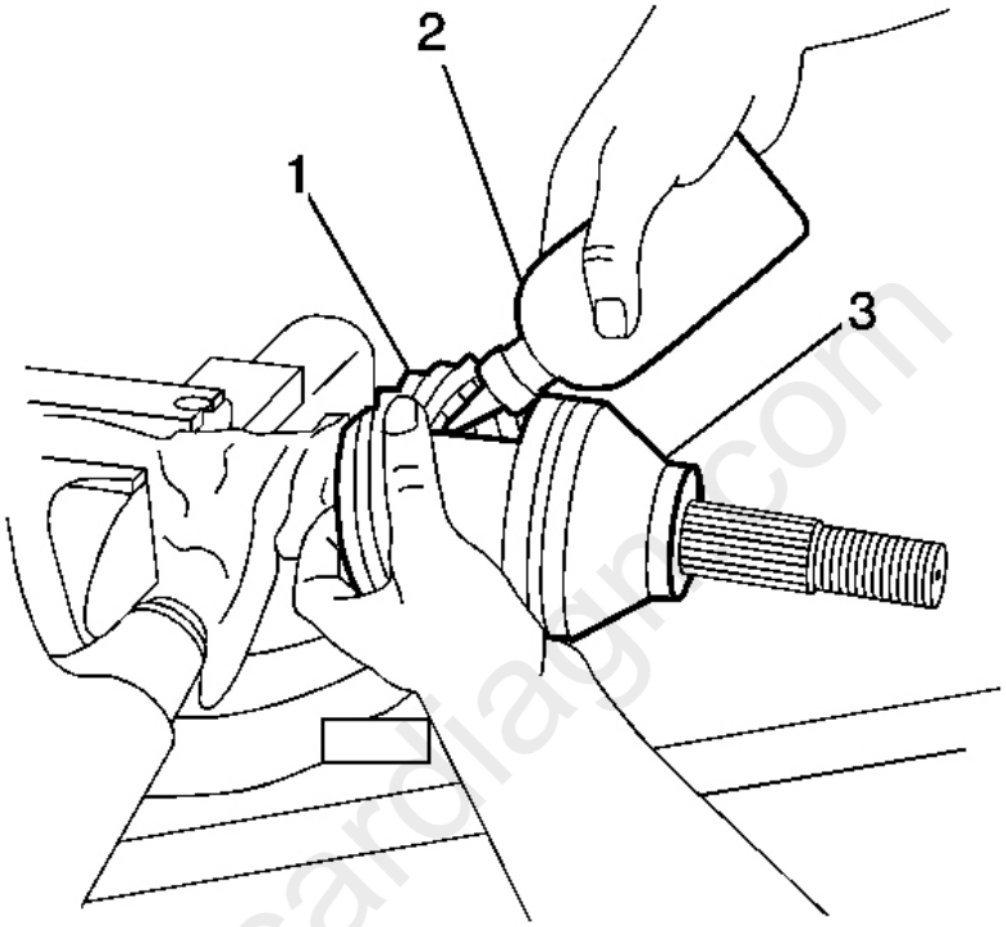


Fig. 56: Lubricating Boot Of Tripot Housing
Courtesy of GENERAL MOTORS CORP.

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

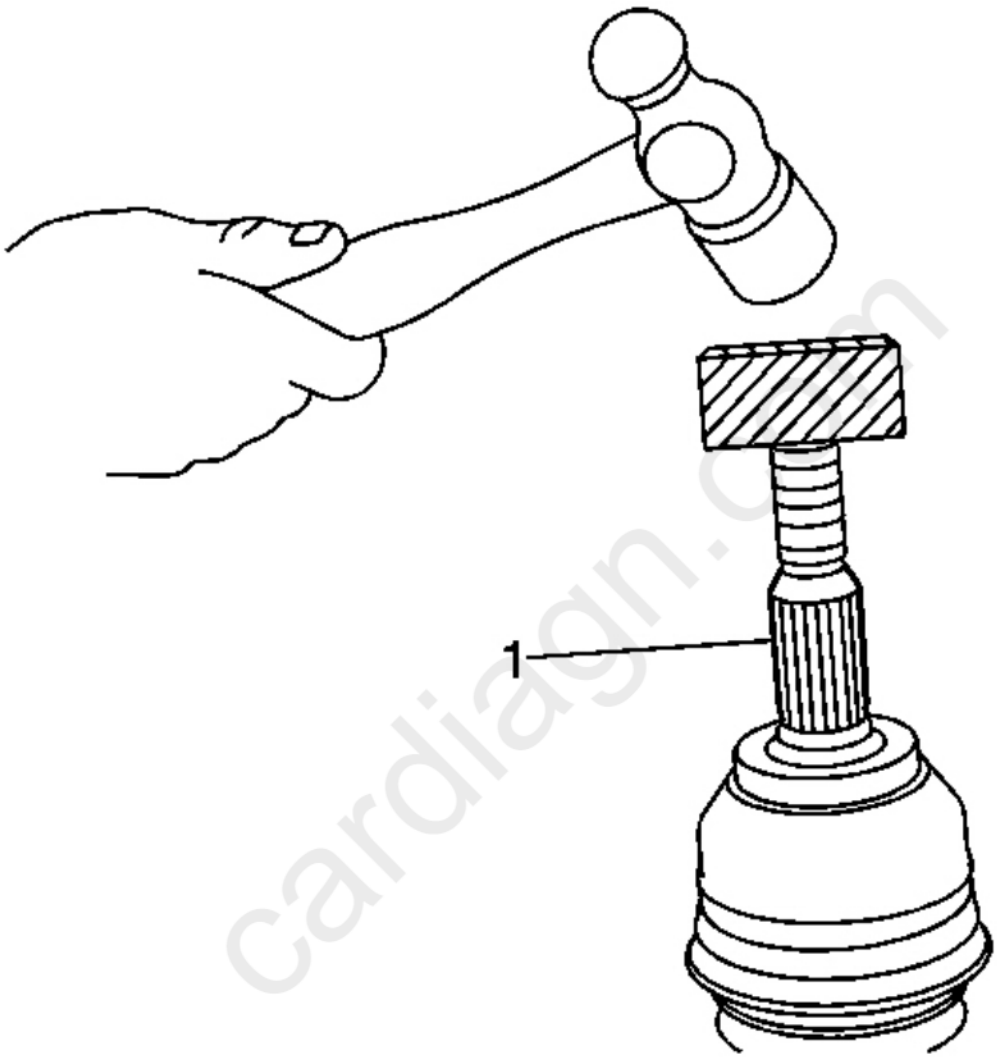


Fig. 57: View Of Installing CV Joint On Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

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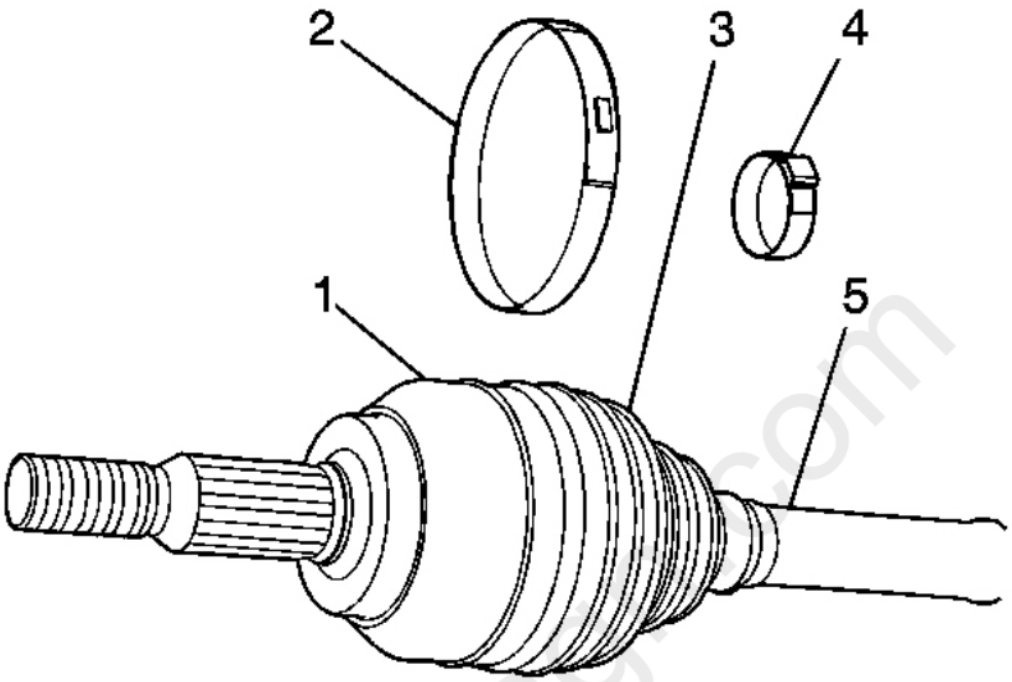


Fig. 58: Identifying Boot Clamp
Courtesy of GENERAL MOTORS CORP.

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

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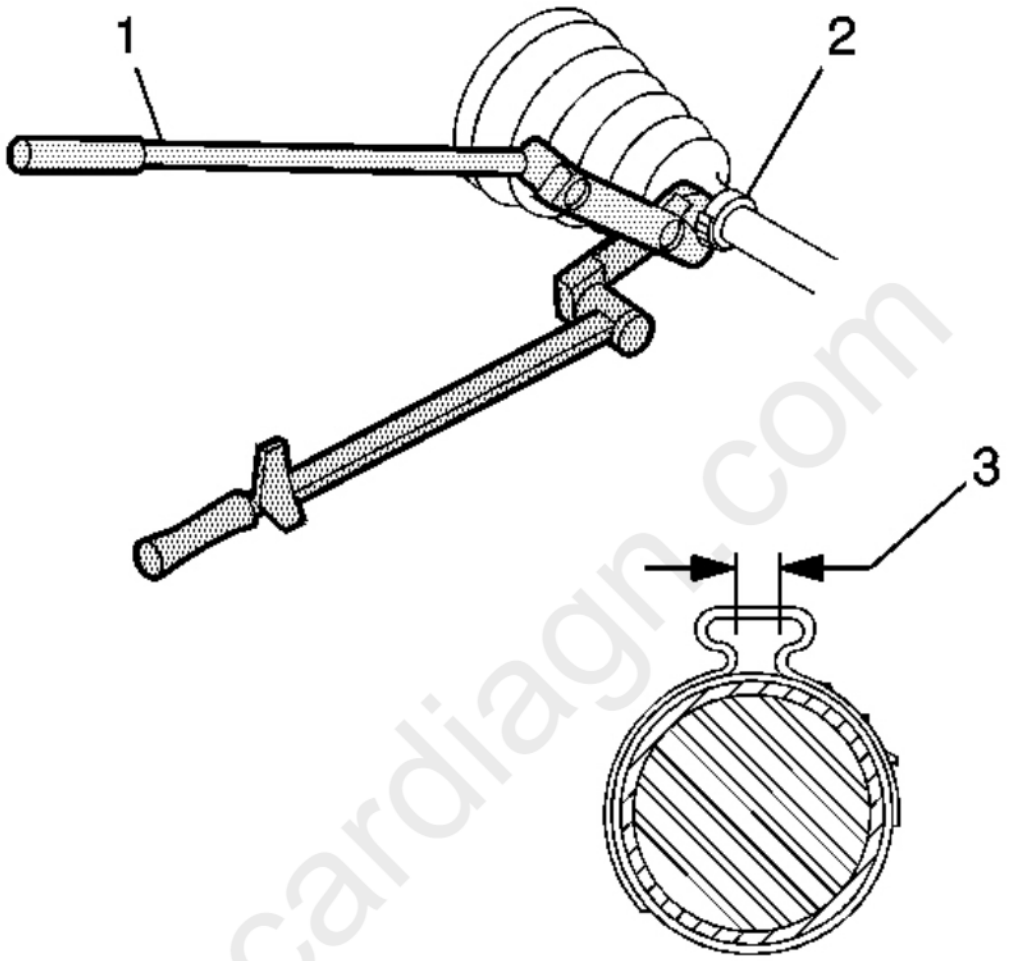


Fig. 59: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

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

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

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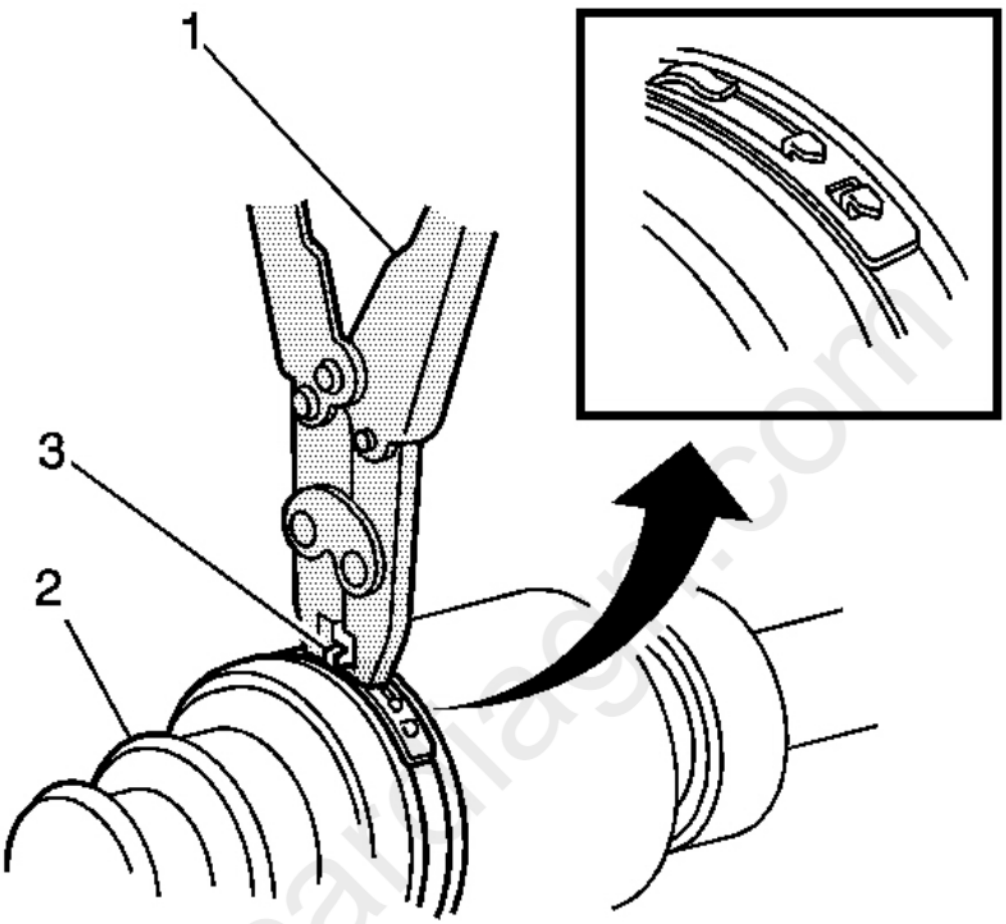


Fig. 60: View Of Latching Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

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

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

REAR WHEEL DRIVE SHAFT OUTER JOINT AND BOOT REPLACEMENT

Special Tools

- **CH 48894:** Drive Axle Boot Clamp Pliers
- **DT 8059:** Snap Ring Pliers
- **DT 35910:** Drive Axle Boot Clamp Pliers

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

Disassemble Procedure

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

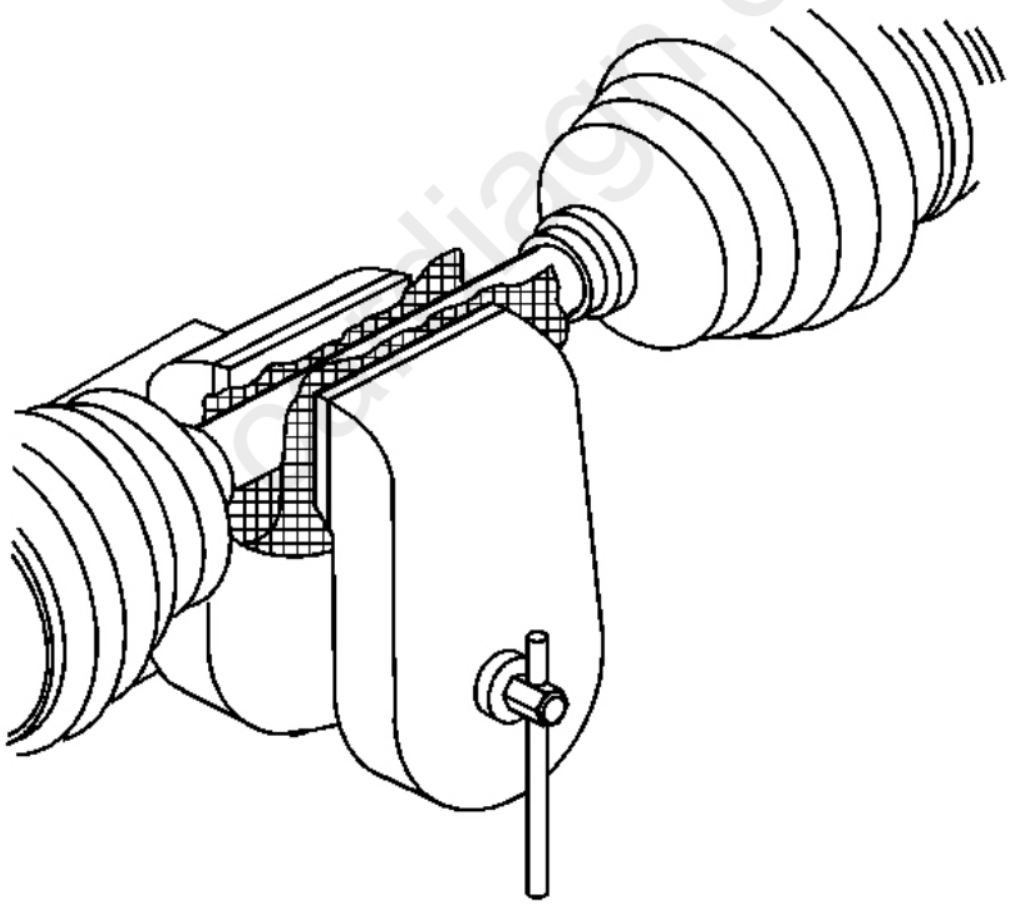


Fig. 61: View Of Front Wheel Drive Shaft Inner Joint

Courtesy of GENERAL MOTORS CORP.

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

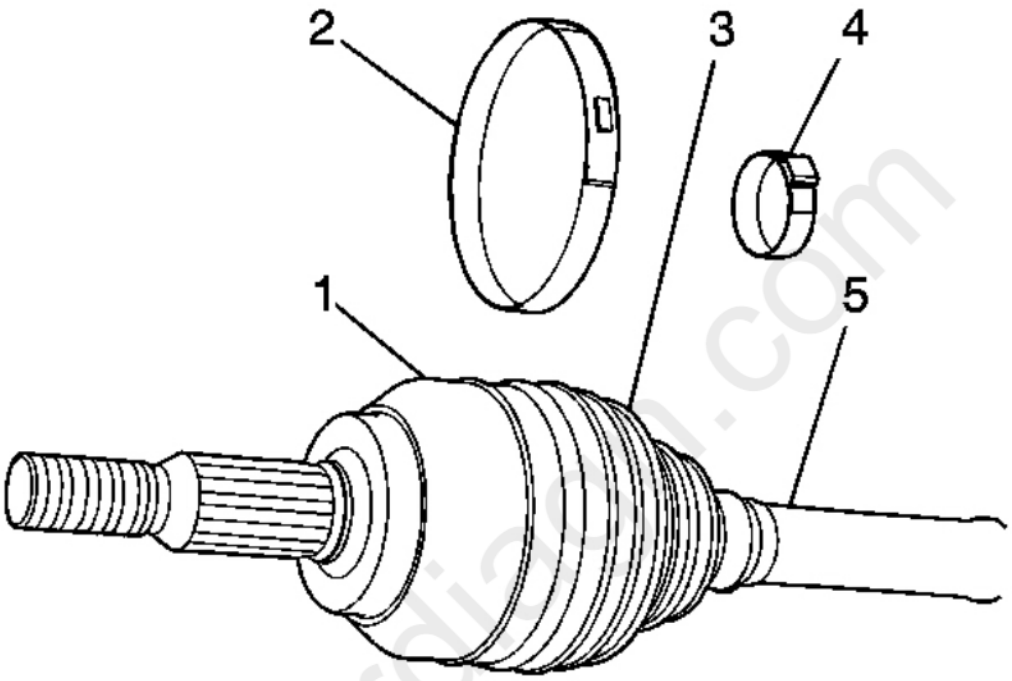


Fig. 62: Identifying Boot Clamp
Courtesy of GENERAL MOTORS CORP.

C T ON: o 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 oint bushing. amage to the sealing surface may lead to water and dirt intrusion and premature wear of the constant velocity oint.

NOTE: The following procedure is for the wheel drive shaft that has the low profile boot clamp. f the wheel drive shaft is e uipped with the ear type boot clamp, proceed to step .

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

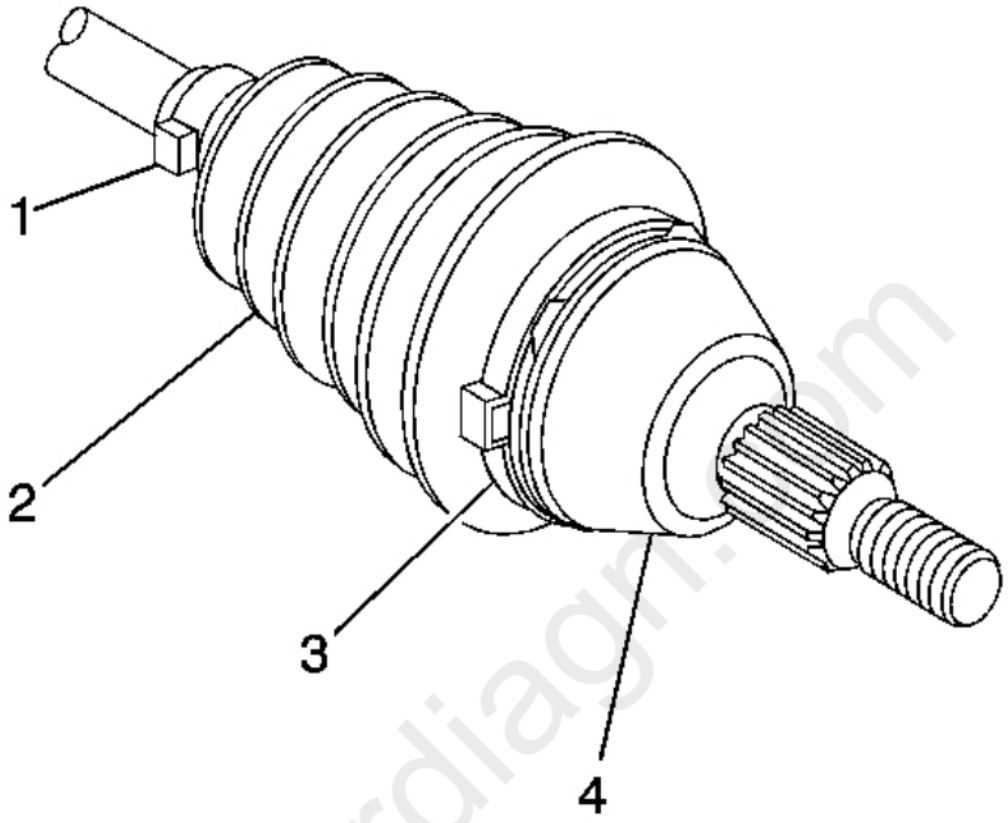


Fig. 6 : Identifying Outer Boot Clamp Inner Boot Clamp CV Joint Boot And CV Joint Housing
Courtesy of GENERAL MOTORS CORP.

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

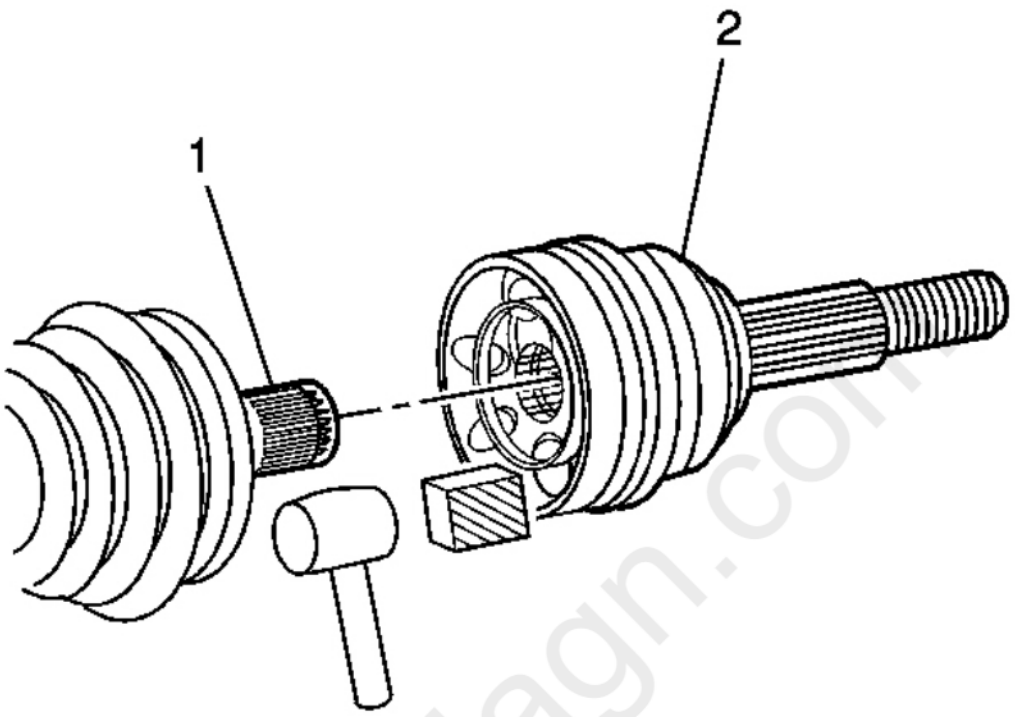


Fig. 6 : Illustrating Separating CV Joint From A le Shaft
Courtesy of GENERAL MOTORS CORP.

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

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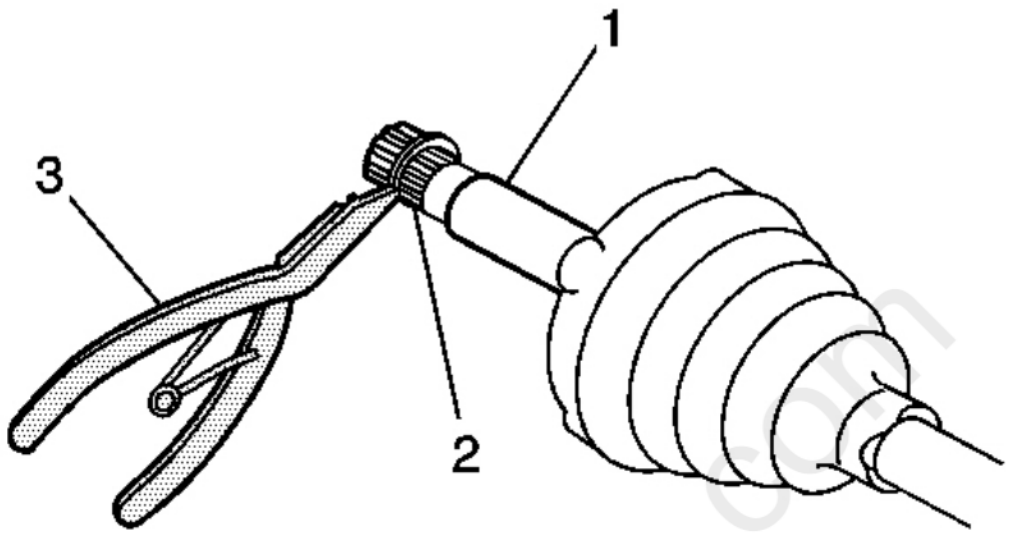


Fig. 65: Identifying Special Tools - J 8059 Installing Spacer Ring
Courtesy of GENERAL MOTORS CORP.

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

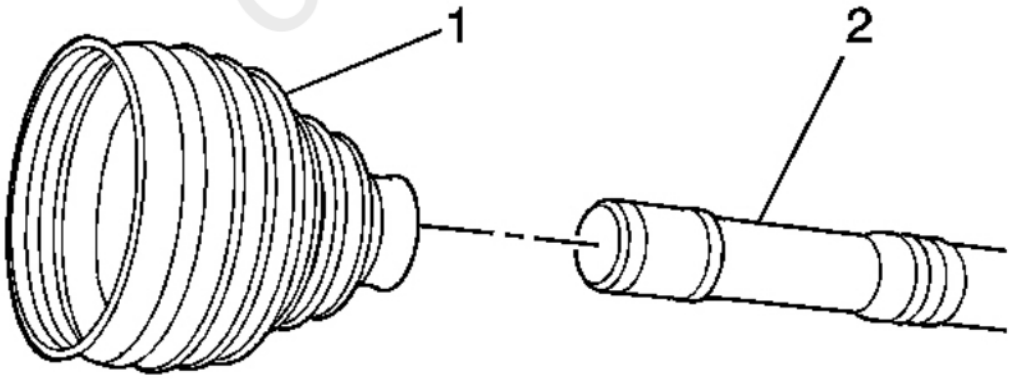


Fig. 66: Identifying Clamp Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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10. Remove the CV joint boot (1) from the wheel drive shaft (2).

Assemble Procedure

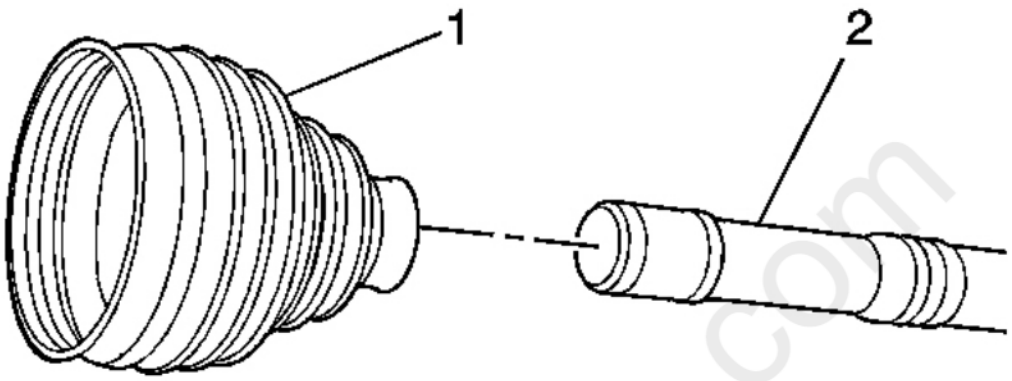


Fig. 67: Identifying Clamp Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

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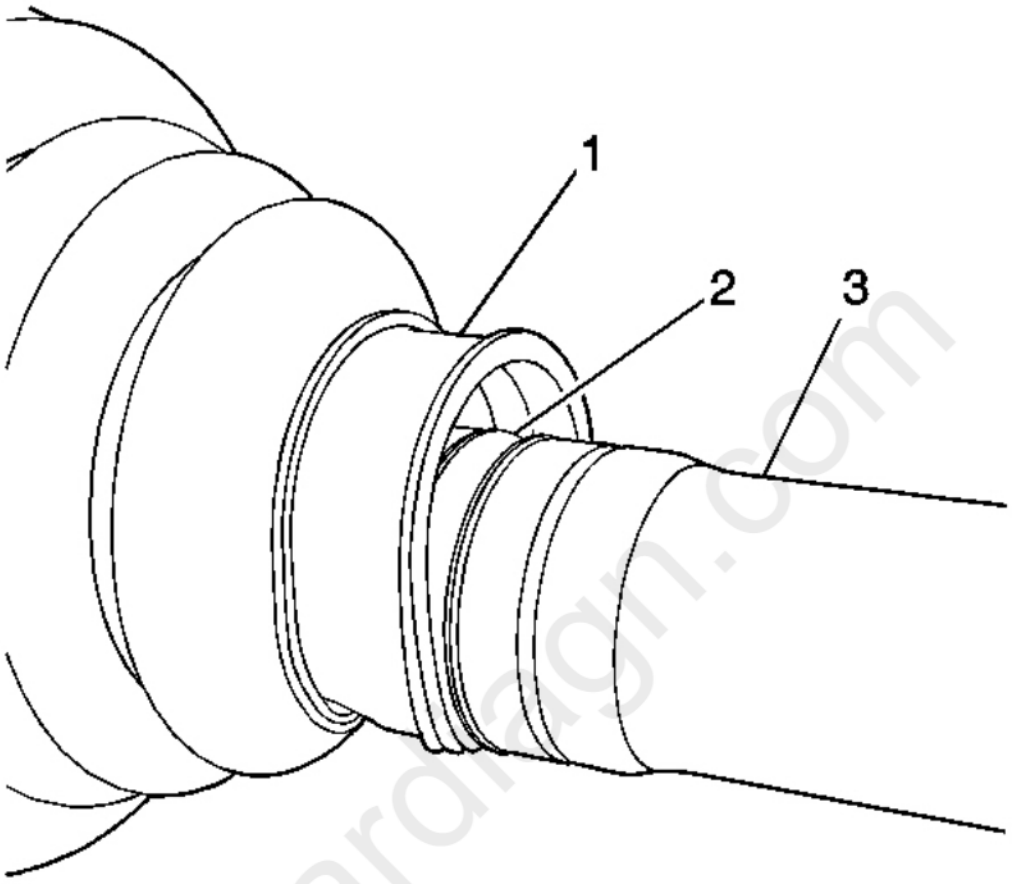


Fig. 68: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

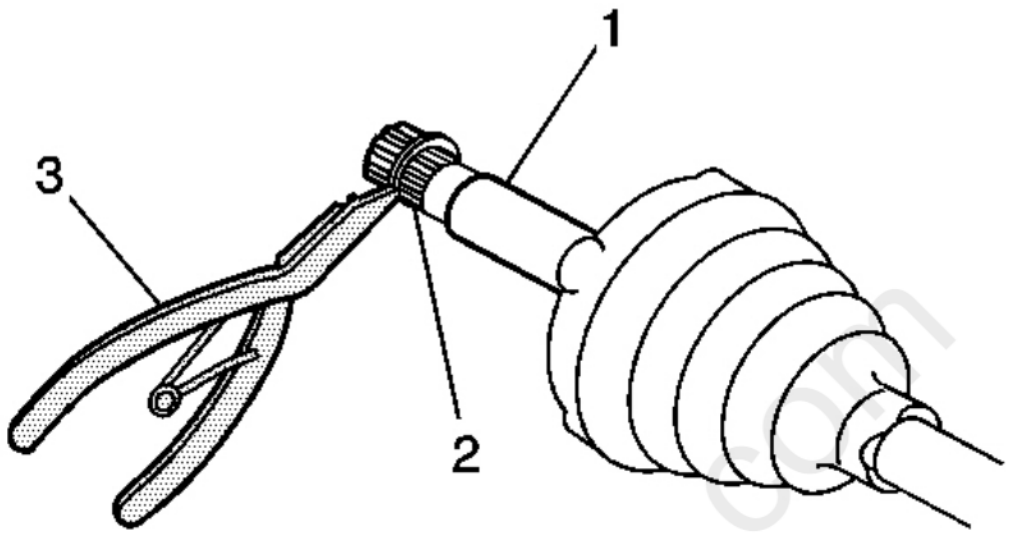


Fig. 69: Identifying Special Tools - J 8059 Installing Spacer Ring
Courtesy of GENERAL MOTORS CORP.

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

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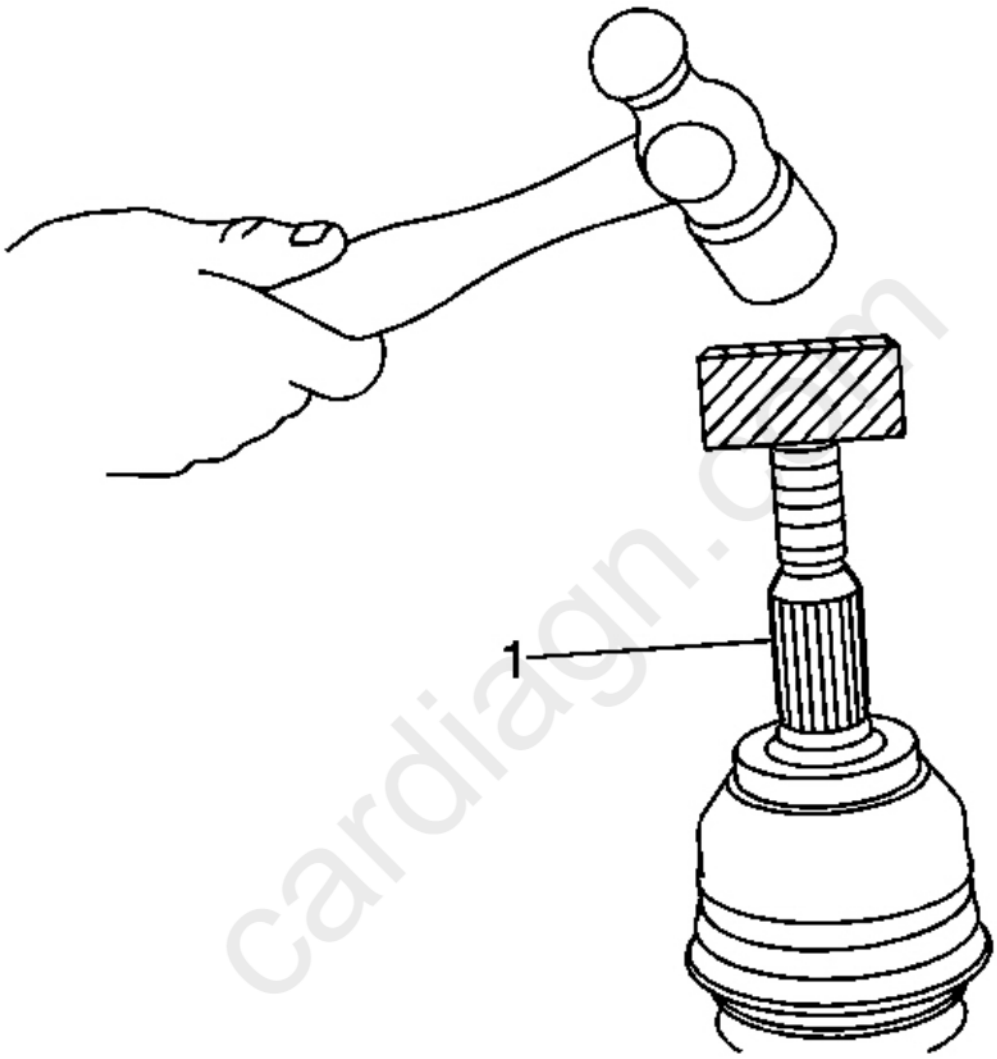


Fig. 70: View Of Installing CV Joint On Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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

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

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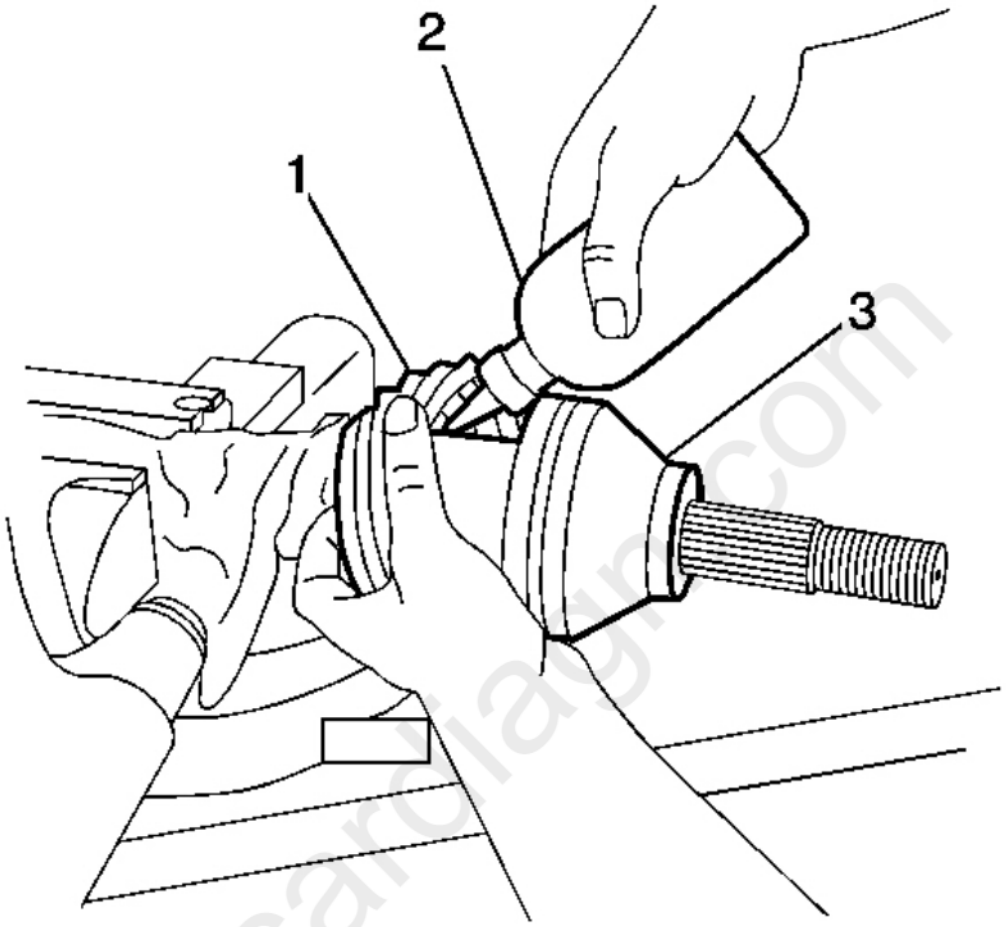


Fig. 71: Lubricating Boot Of Tripot Housing
Courtesy of GENERAL MOTORS CORP.

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

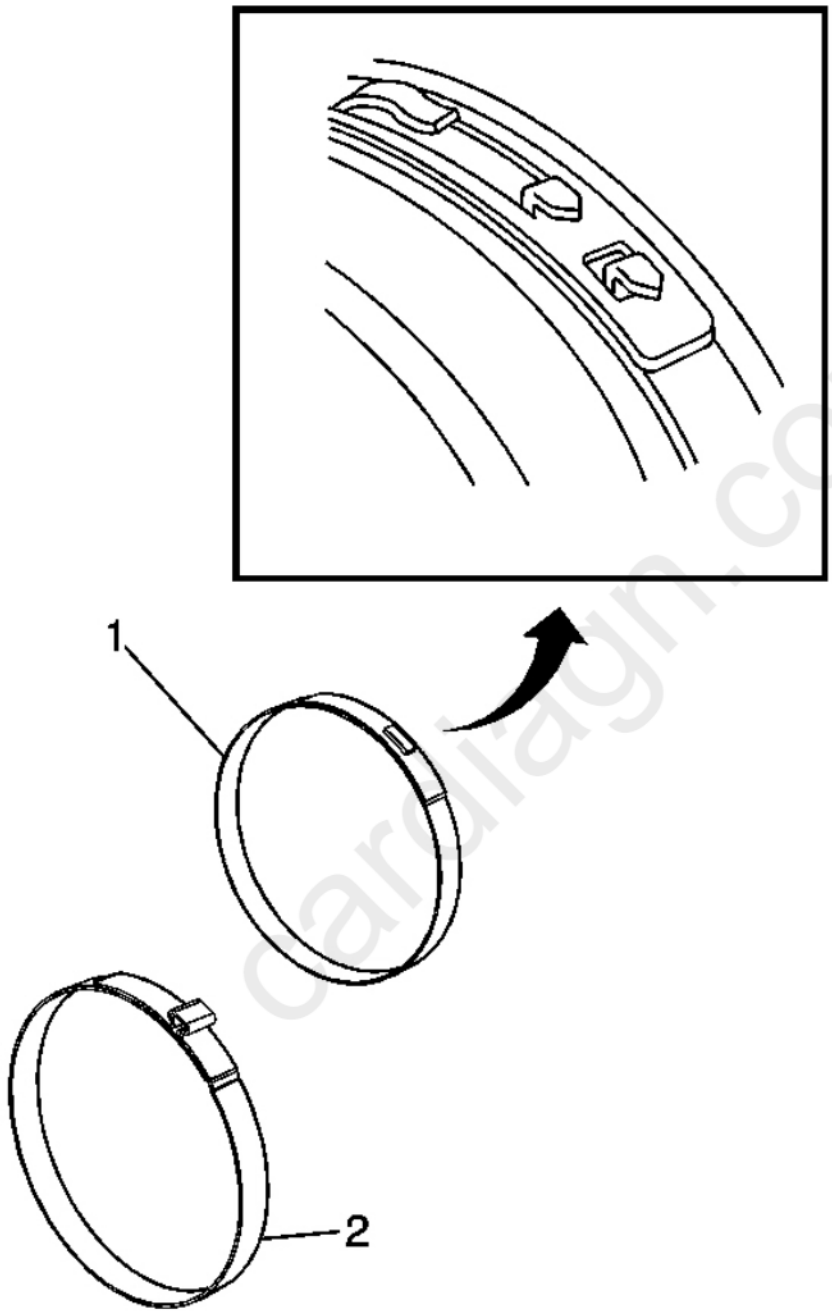
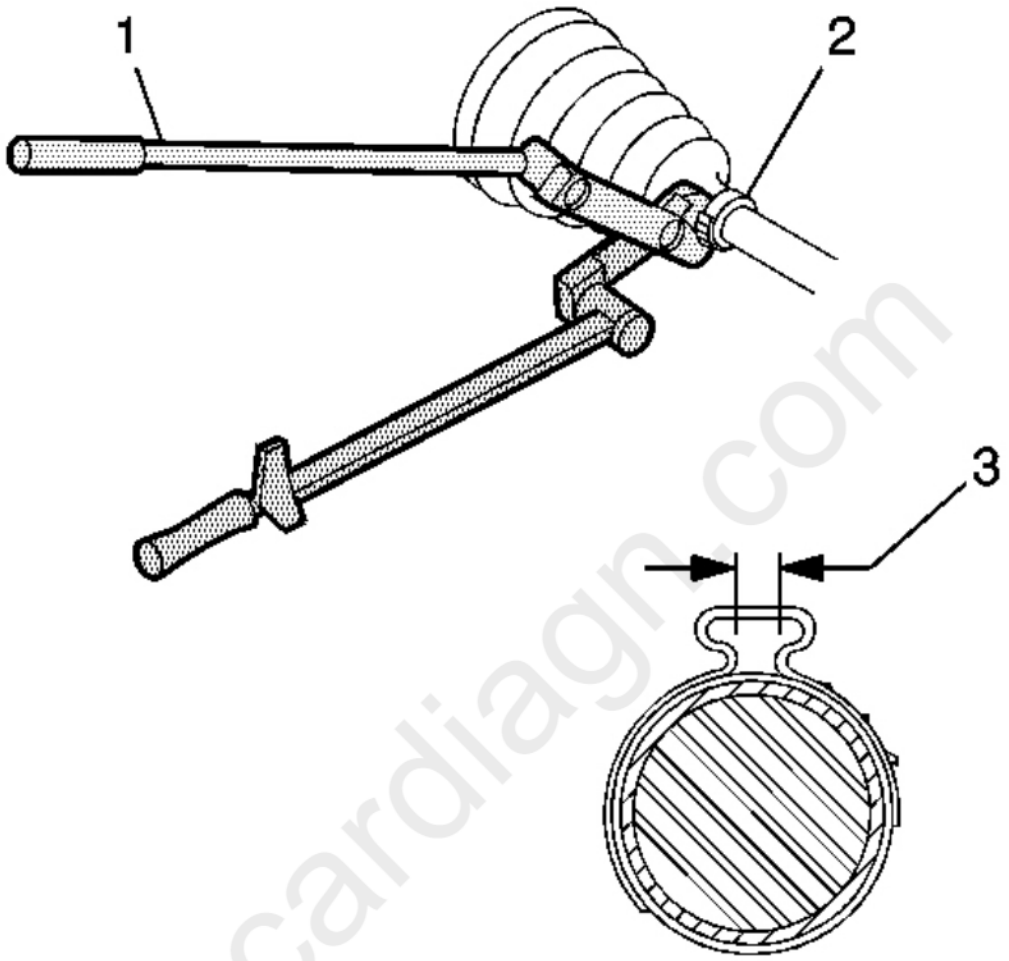


Fig. 72: View Of Ear Type Boot Clamp
Courtesy of GENERAL MOTORS CORP.

7. If working with a wheel drive that has the ear type clamp (2), proceed to step 8. If the wheel drive shaft has the low profile clamp (1), skip step 8 and proceed to step 9.



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Fig. 73: Identifying Pliers Breaker Bar, Torque Wrench, Ratchet & Gap Measurement
Courtesy of GENERAL MOTORS CORP.

NOTE: When measuring the clamp end gap dimension, the gap should not exceed 2.15 mm (0.85 in).

8. Using the **DT 35910:** pliers (1), torque or ratchet wrench and breaker bar, close the boot clamp until the gap (3) measures 2.15 mm (0.85 in).

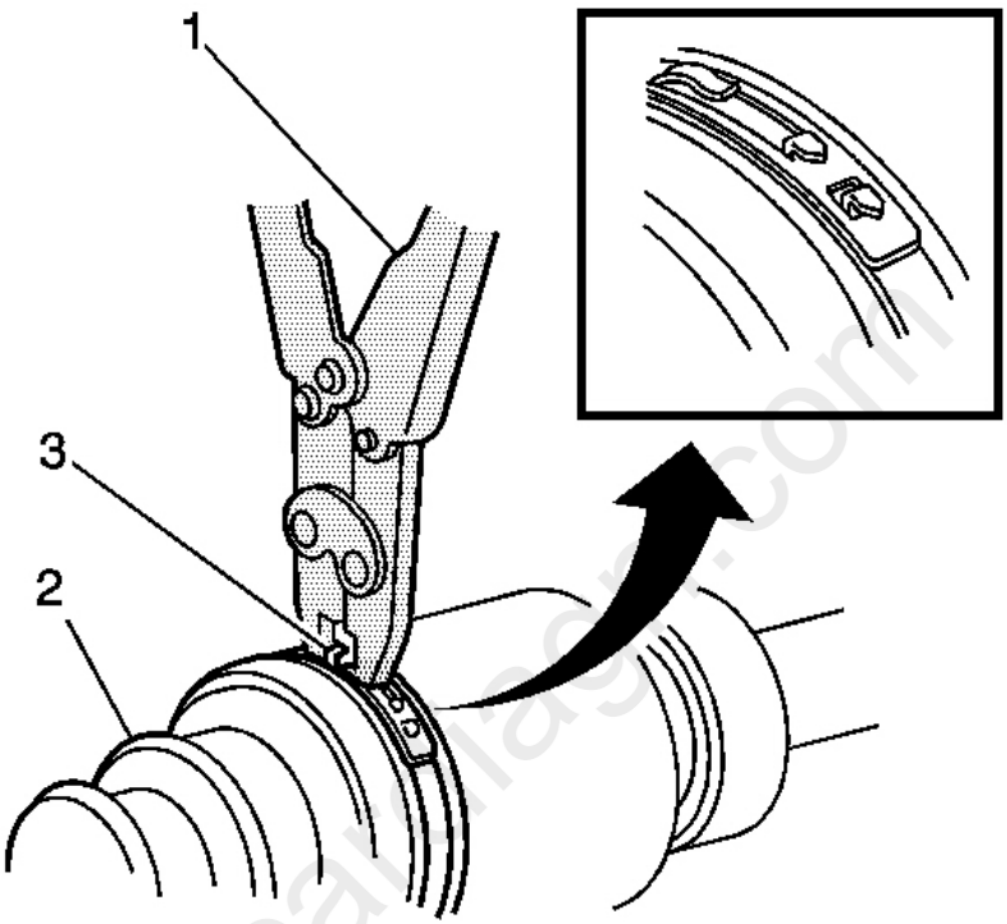


Fig. 74: View Of Latching Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

NOTE: Ensure that the locking tabs on the clamp are fully locked in place.

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

WHEEL DRIVE SHAFT OUTER JOINT INSPECTION

Disassembly Procedure

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

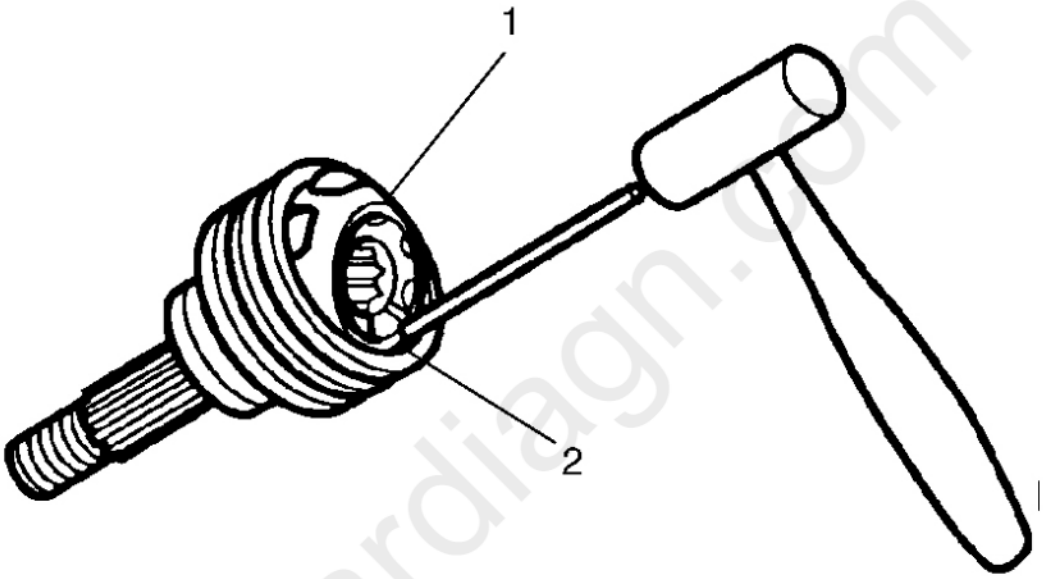


Fig. 75: Illustrating Tapping Gently On Brass Drift With Hammer To Tilt Cage
Courtesy of GENERAL MOTORS CORP.

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

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

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

4. Using a brass drift (2), gentle tap the cage until the ball bearing can be removed from the cage.

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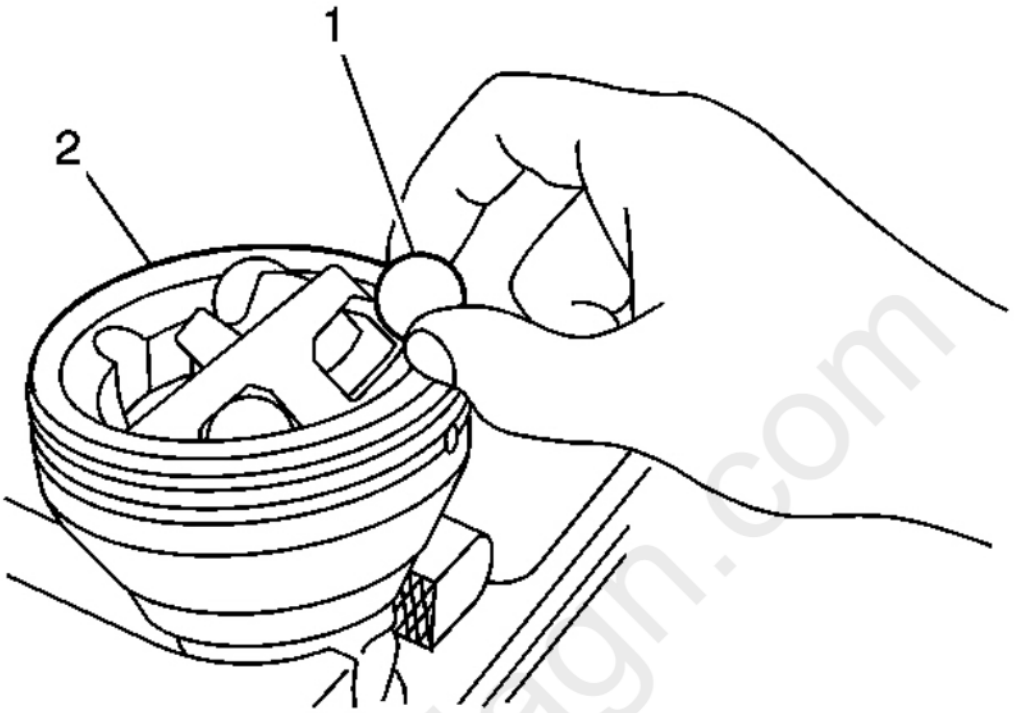


Fig. 76: Identifying Ball, Cage & Inner Race
Courtesy of GENERAL MOTORS CORP.

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

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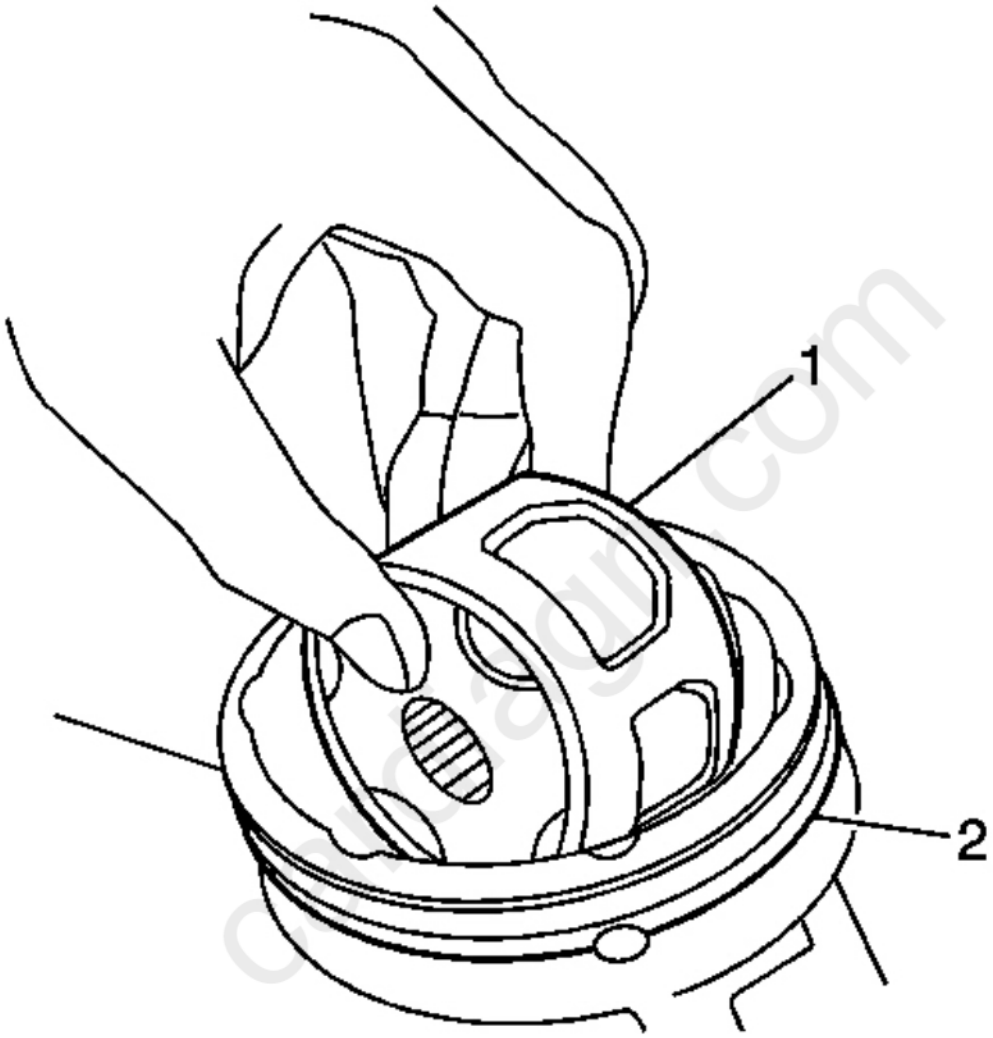
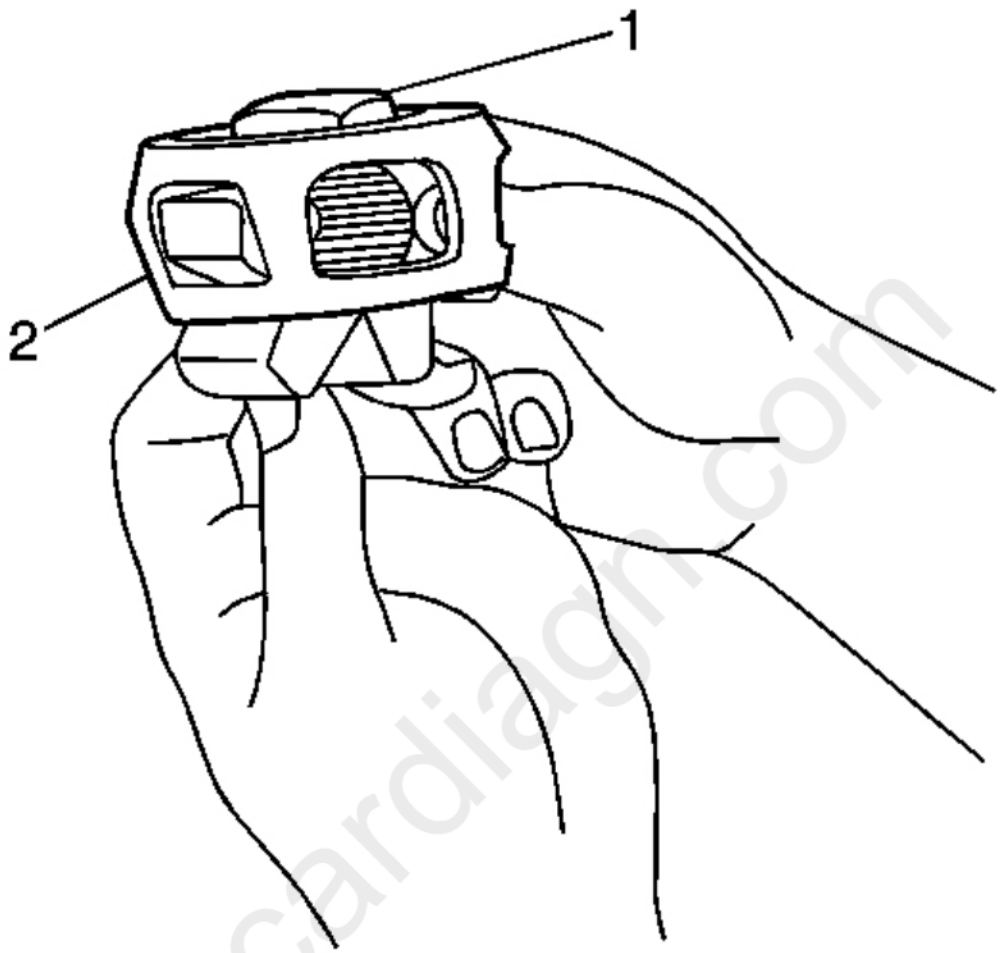


Fig. 77: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS CORP.

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

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



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Fig. 78: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS CORP.

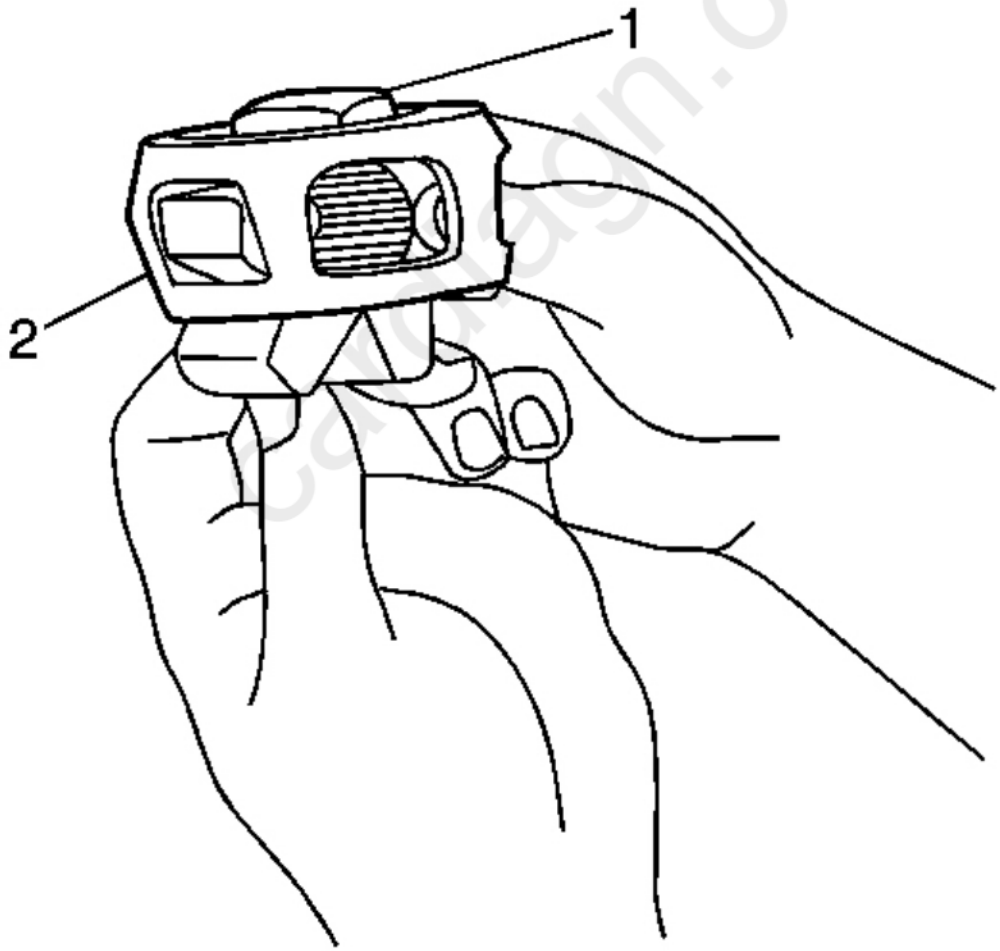
9. Position the cage (2) and the inner race (1) so that the larger radius corners of the cage windows are up.
10. Rotate the inner race (1) 90 degrees to the center line of the cage (2).
11. Align the lands of the inner race (1) with the windows of the cage (2).
12. Move the inner race (1) land into the cage window (2).
13. Rotate the inner race (1) down and remove it from the cage (2).
14. 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 arts of the C oint are NOT SER ICED se aratel . The outer C oint is ser iced as an asse bl .

15. 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



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Fig. 79: Positioning Cage So Larger Radius Corners Of Cage Windows Are Up
Courtesy of GENERAL MOTORS CORP.

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

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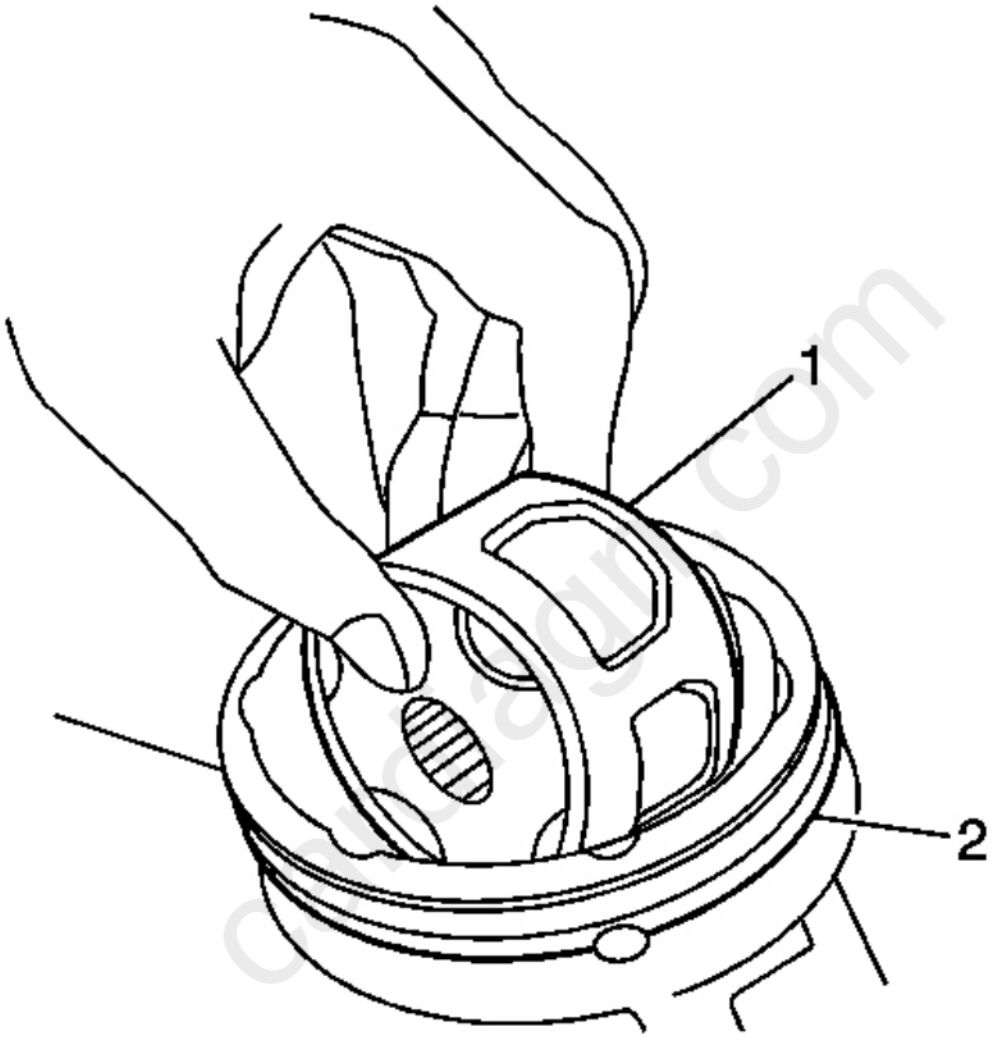


Fig. 80: Positioning Cage & Inner Race 90 Degrees To Centerline Of Outer Race
Courtesy of GENERAL MOTORS CORP.

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

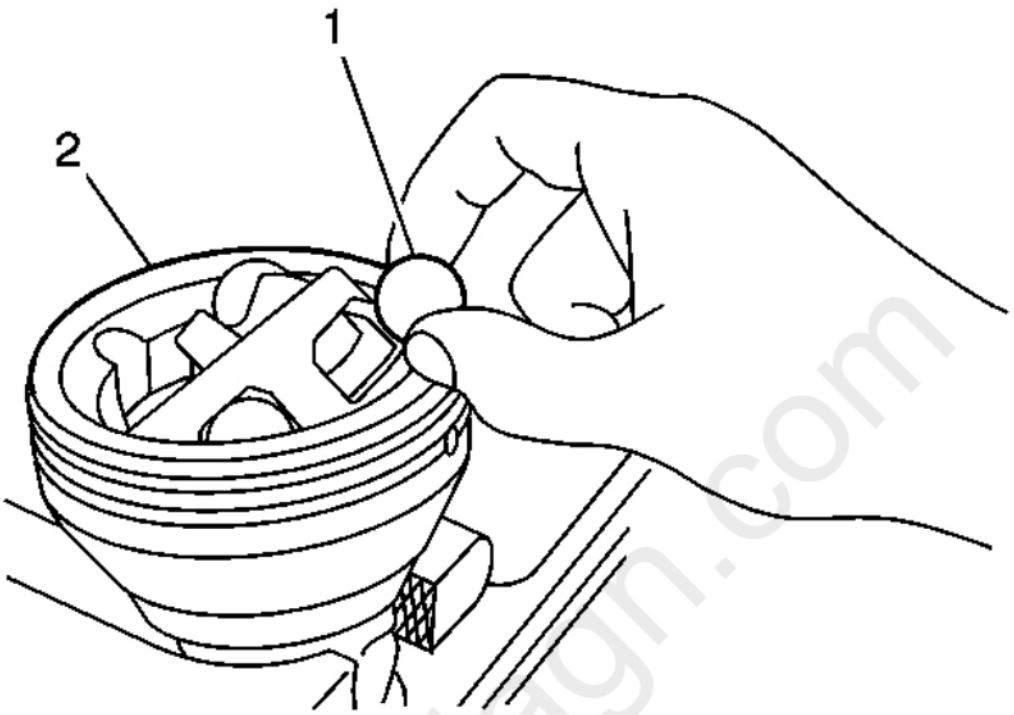


Fig. 81: Identifying Ball, Cage & Inner Race
Courtesy of GENERAL MOTORS CORP.

NOTE: The larger radius corners of the cage windows should be ositioned u and the groo ed surface of the inner race should be isible.

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 the cage window and the inner race ball bearing track for the ball bearing installation.

NOTE: hen erfor ing the following rocedure, the o osing cage (2) window and the inner ball bearing (1) trac 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 ser ice rocedure will ha e to be erfor ed after each ball

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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.

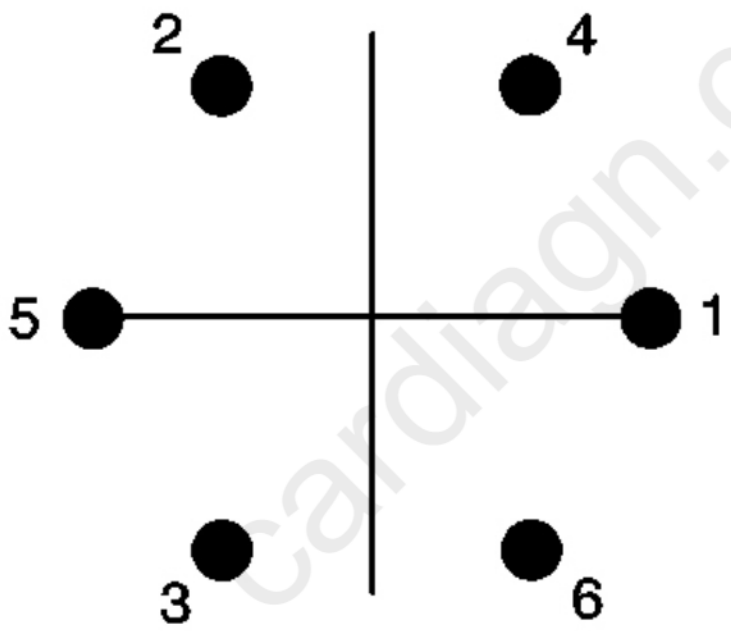


Fig. 82: Identifying Ball Removal/Installation Sequence
Courtesy of GENERAL MOTORS CORP.

20. Install the ball bearings in sequence.
21. Using a plastic hammer, lightly tap the ball bearing into place.
22. Repeat steps 18-21 until all the ball bearings are installed.
23. Install the outer CV joint and boot on the wheel drive shaft.
    - For the front wheel drive shaft, refer to **Front Wheel Drive Shaft Outer Joint and Boot Replacement**.
    - For the rear wheel drive shaft, refer to **Rear Wheel Drive Shaft Outer Joint and Boot**

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Replacement.

WHEEL DRIVE SHAFT INNER JOINT INSPECTION

Inspection Procedure

1. Remove the wheel drive shaft inner joint and boot.
   - For the front wheel drive shaft, refer to **Front Wheel Drive Shaft Inner Joint and Boot Replacement**.
   - For the rear wheel drive shaft, refer to **Rear Wheel Drive Shaft Inner Joint and Boot Replacement**

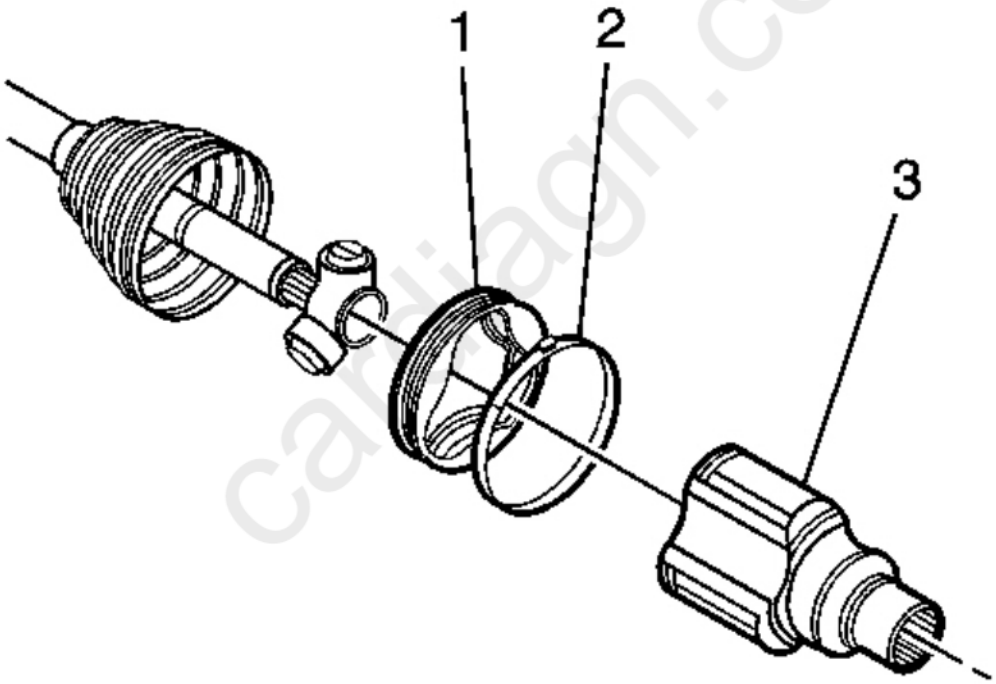


Fig. 83: Identifying Wheel Drive Shaft Inner Joint Inspection Areas
Courtesy of GENERAL MOTORS CORP.

2. Remove the wheel drive shaft tripot bushing (1) from the tripod housing (3).
3. Remove the wheel drive shaft tripot housing (3) from the wheel drive shaft.
4. Remove the wheel drive shaft tripot joint boot bushing (1).
5. Using a suitable cleaner, remove the excess grease from the tripod assembly.

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6. Inspect the following items for damage or excessive wear:
   - The wheel drive shaft tripot boot
   - The wheel drive shaft tripot assembly
   - The wheel drive shaft tripot joint housing
   - The wheel drive shaft tripot 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.
   - For the front wheel drive shaft, refer to **Front Wheel Drive Shaft Inner Joint and Boot Replacement**.
   - For the rear wheel drive shaft, refer to **Rear Wheel Drive Shaft Inner Joint and Boot Replacement**

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

Wheel drive shafts are flexible assemblies consisting of an inner 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 handing, 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

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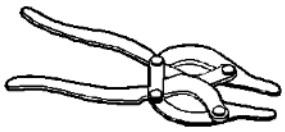
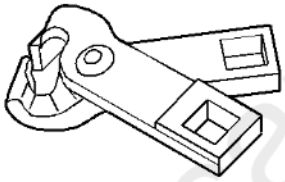
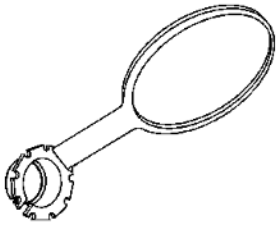
The inner joints are of the tripot or CV-joint design without an over-extension limitation retainer. The inner joints incorporate a male spline which interlocks with the transaxle using snap rings.

Outer Joint

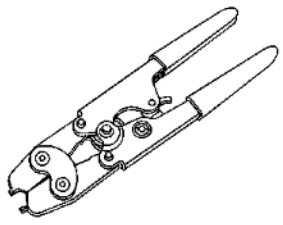
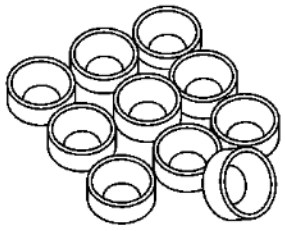
The outer joints are of the Rzeppa, constant velocity joint design. The shaft end which mates with the wheel bearing and hub assembly, incorporates a helical spline to assure a tight, press-type fit. This design assures that no end play will exist between the hub bearing and the drive shaft assembly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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	DT 8059 GE 396 GE 8059 GE 49511 J 8059 Snap Ring Pliers
	DT 35910 CH 804 J 35910 Boot Clamp Pliers
	DT 44394-A KM 6332 J 44394-A SA 91112T Seal Protector
	CH 48894 Boot Clamp Pliers

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