

2006 Chevrolet HHR LT

2006 Driveline/Axle Wheel Drive Shafts - HHR

2006 Driveline/Axle

Wheel Drive Shafts - HHR

SPECIFICATIONS

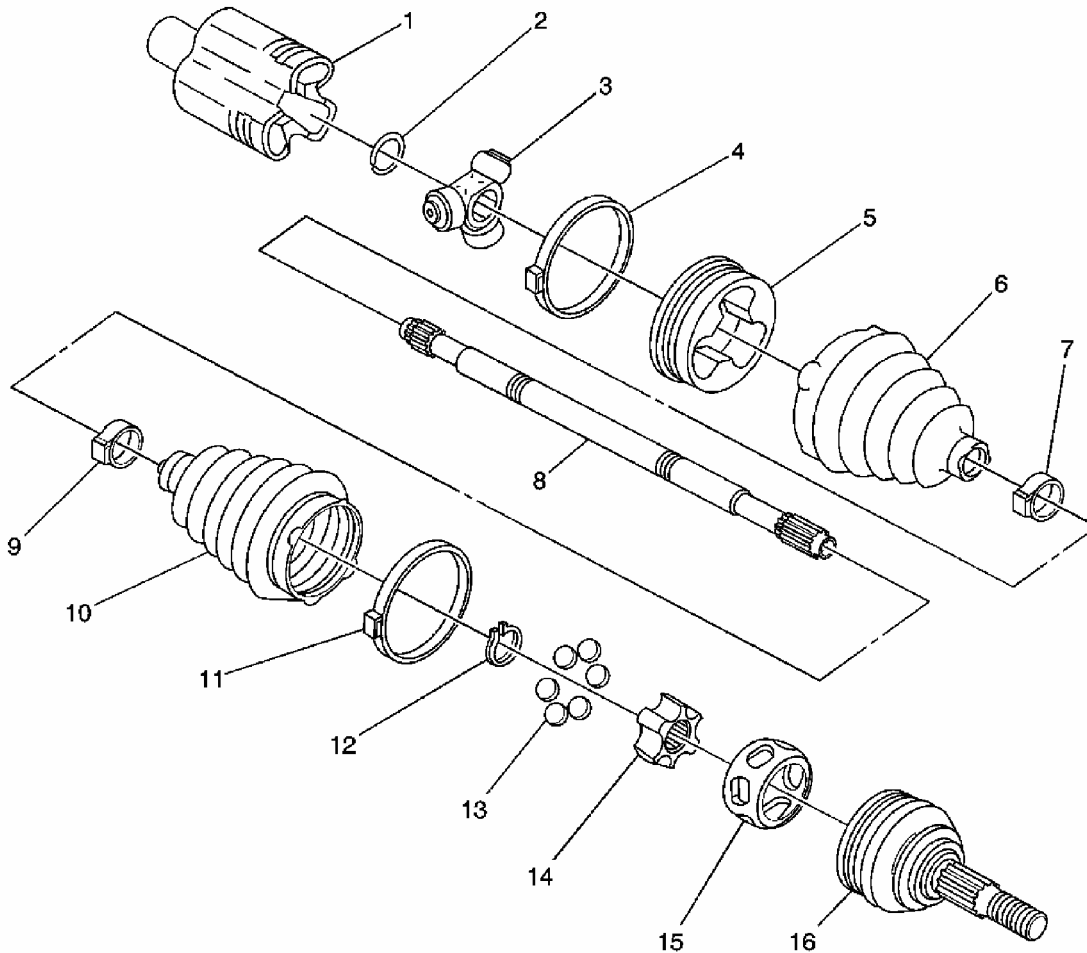
FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Intermediate Drive Shaft Bracket-to-Engine Block Bolts	50 N.m	37 lb ft
Wheel Drive Shaft Nut	210 N.m	155 lb ft

COMPONENT LOCATOR

WHEEL DRIVE SHAFTS DISASSEMBLED VIEWS



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

Callouts For Fig. 1

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

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - WHEEL DRIVE SHAFTS

Begin the wheel drive shaft system diagnosis with the **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction. The use of the Diagnostic Starting Point will help determine if the concern is wheel drive shaft related. When instructed to exit the Vibration Diagnosis and Correction diagnostic procedures, return to the Diagnostic Starting Point - Wheel Drive Shafts and proceed to **Wheel Drive Shafts Description and Operation** in order to become familiar with the design and function of the wheel drive shaft system. Reviewing the Description and Operation information will also help determine if the condition is a potential operating characteristic or not.

SYMPTOMS - WHEEL DRIVE SHAFTS

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

1. Review the **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction.

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

Visual/Physical Inspection

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

Symptom List

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

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

CLICK NOISE IN TURNS

A 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 **Diagnostic Starting Point - Vibration Diagnosis and Correction** in Vibration Diagnosis and Correction.

REPAIR INSTRUCTIONS

WHEEL DRIVE SHAFT REPLACEMENT

Tools Required

- **J 45341** Rear Wheel Drive Shaft Removal Tool. See **Special Tools**.
- **J-2619-A** Slide Hammer

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- **J 44394** Axle Seal Protector. See Special Tools.

Removal Procedure

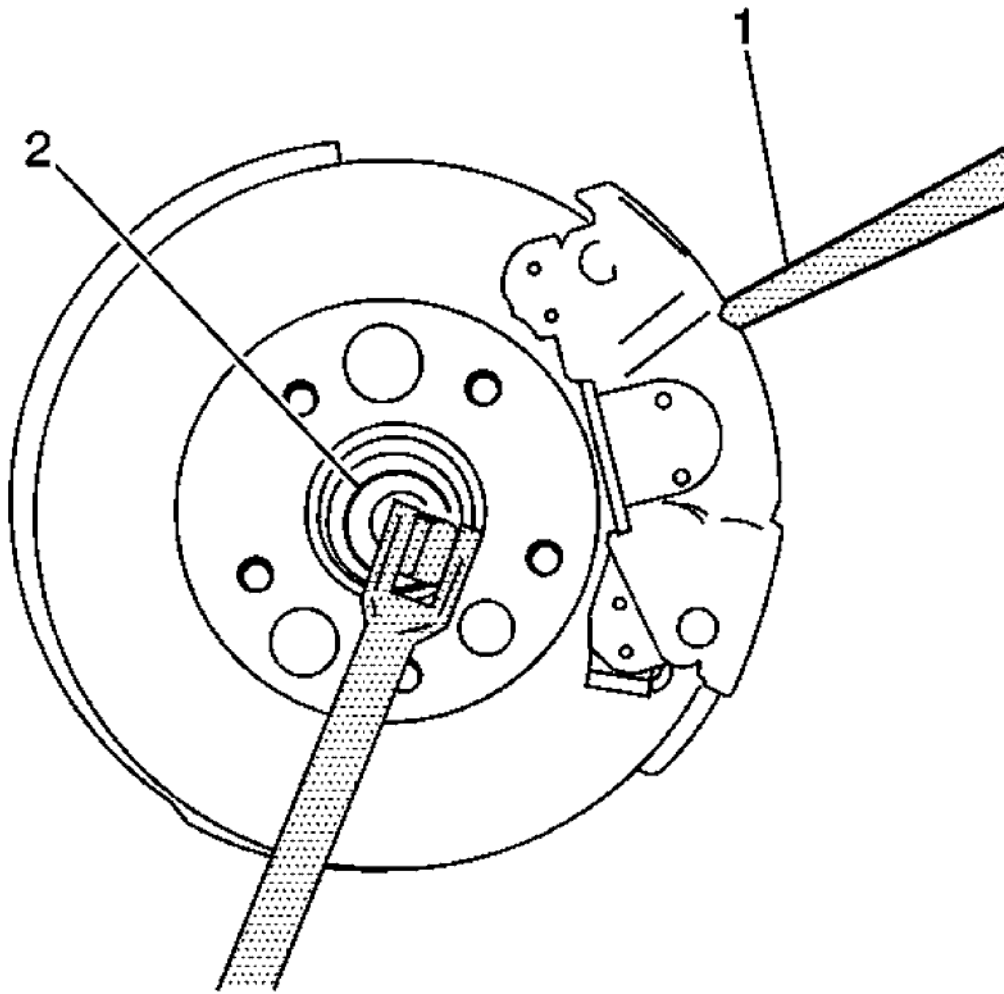


Fig. 2: Preventing Rotor Turning Using Drift Or Punch
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
2. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation in Tires and Wheels.
3. Remove the wheel drive shaft nut. Insert a drift (1) or a flat-bladed tool into the caliper and the rotor to prevent the rotor from turning.

4. Carefully loosen the wheel drive shaft splines from the wheel bearing/hub assembly using a wood block and a hammer. The nut can be partially reinstalled to protect the threads.

IMPORTANT: Be sure that the wheel speed sensor wiring harness is repositioned away from the ball joint after disconnecting the electrical connector from the sensor.

5. Disconnect the ball joint from the steering knuckle. Refer to Lower Control Arm Replacement in Front Suspension.
6. Separate the wheel drive shaft from the wheel bearing/hub assembly, then support the shaft assembly.

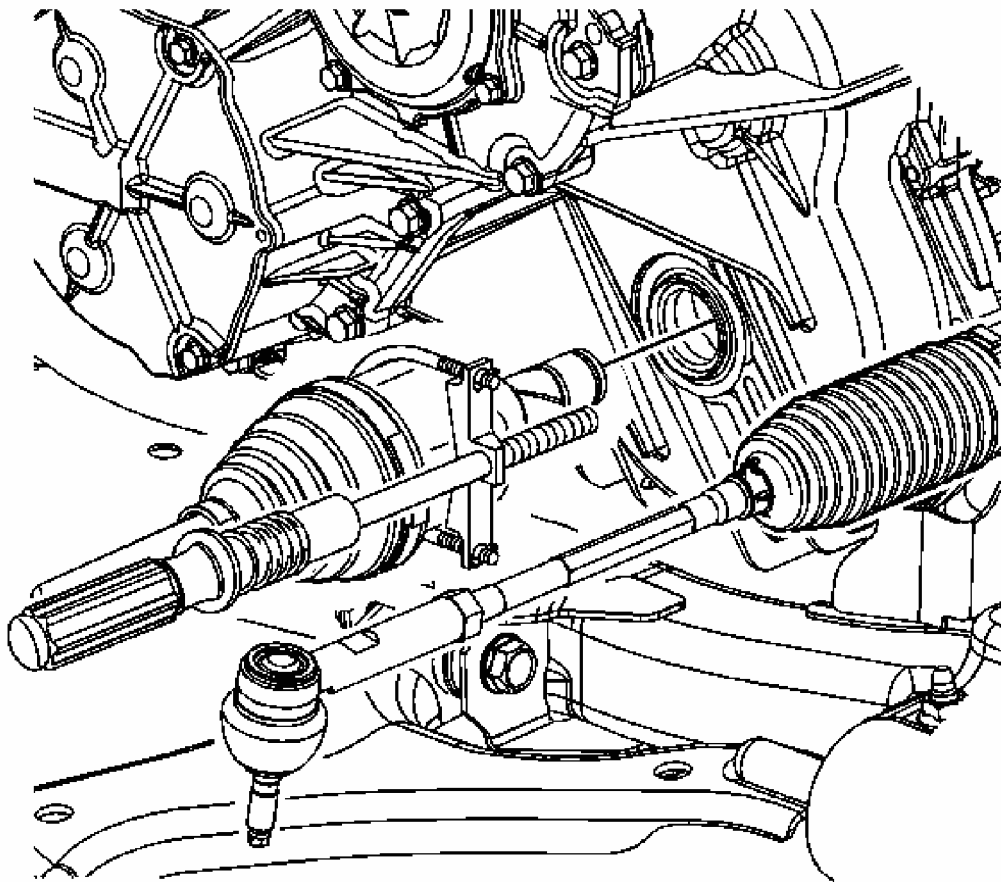


Fig. 3: Removing Wheel Drive Shaft
Courtesy of GENERAL MOTORS CORP.

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7. Assemble the **J 45341** and the **J-2619-A** to the wheel drive shaft inner tripod housing assembly.
8. Using the **J 45341** and the **J-2619-A** , separate the wheel drive shaft from the transaxle, then remove the shaft assembly.
9. Inspect the transaxle output shaft seal for damage and/or contamination and replace if necessary. Refer to **Right Hand Axle Seal Removal** for the 4T40-E/4T45-E transmission in Unit Repair, or **Front Wheel Drive Shaft Oil Seal Replacement** in Manual Transmission - M86 Getrag.

Installation Procedure

1. Install the **J 44394** into the transaxle output shaft seal. See **Special Tools**.

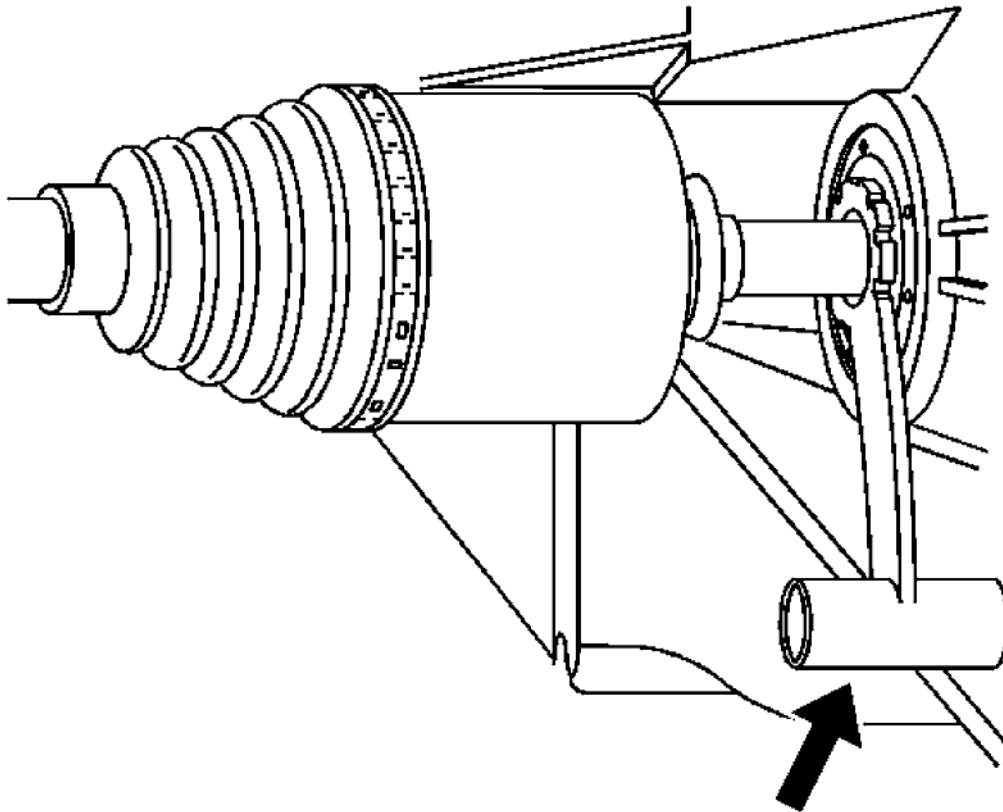


Fig. 4: Installing Wheel Drive Shaft Into Transaxle Through J 44394
Courtesy of GENERAL MOTORS CORP.

2. Install the wheel drive shaft into the transaxle until the drive shaft splines are past the seal, remove the **J 44394** , then fully install the drive shaft. See **Special Tools**.

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3. Verify that the wheel drive shaft is properly engaged:
 - Grasp the inner tripod housing and pull the inner housing outward. Do NOT pull on the wheel drive axle shaft.
 - The wheel drive shaft will remain firmly in place when properly engaged.

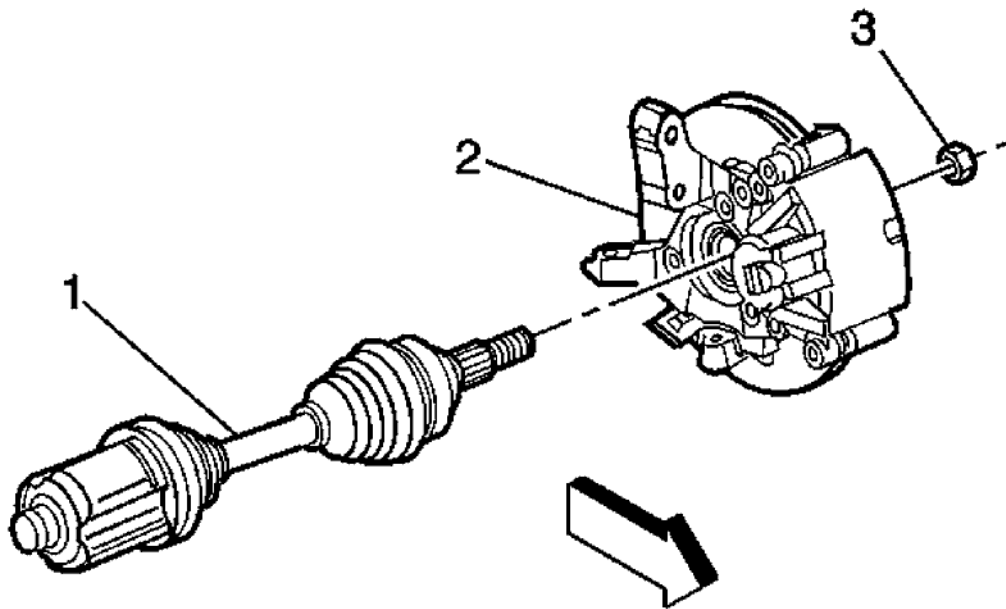


Fig. 5: Installing Wheel Drive Shaft To Hub & Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

4. Install the wheel drive shaft (1) to the wheel bearing/hub assembly.
5. Connect the ball joint to the steering knuckle. Refer to **Lower Control Arm Replacement** in Front Suspension.

NOTE: Refer to **Fastener Notice** in Cautions and Notices.

6. Install the wheel drive shaft nut (3) to the wheel drive shaft assembly (1).

Tighten: Tighten the nut to 210 N.m (155 lb ft).

7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
8. Lower the vehicle.

9. Inspect the transaxle fluid level.

WHEEL DRIVE SHAFT INNER JOINT AND SEAL REPLACEMENT

Tools Required

J 35910 Drive Axle Seal Clamp Pliers. See **Special Tools**.

Disassembly Procedure

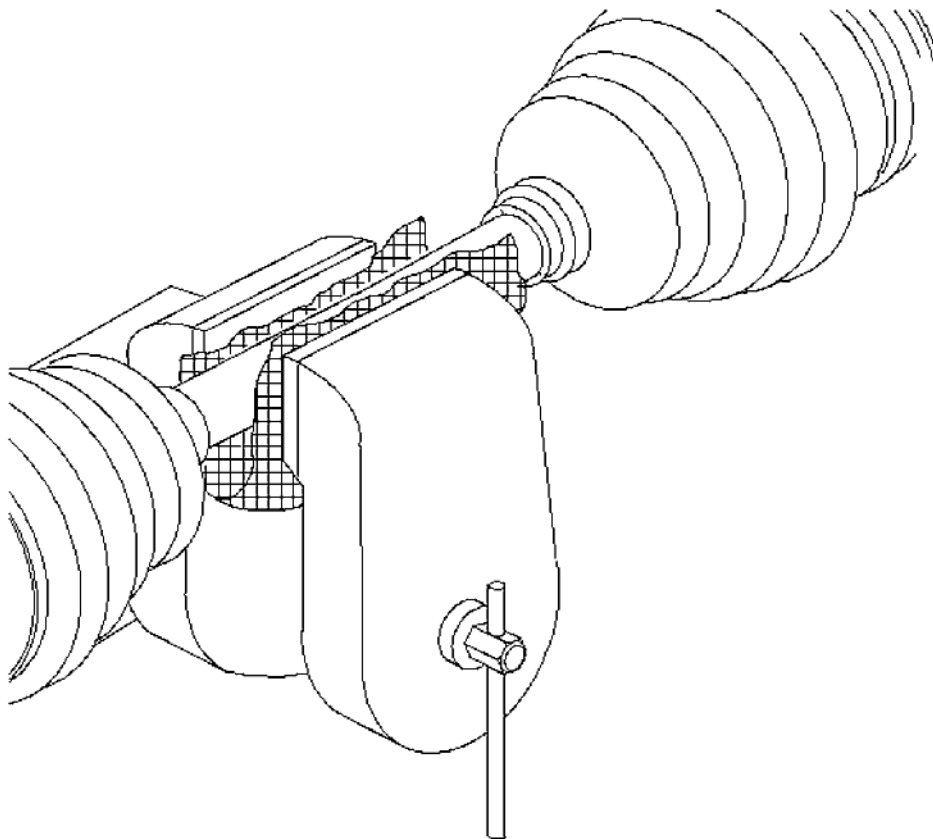


Fig. 6: Clamping Drive Axle Shaft In Vice
Courtesy of GENERAL MOTORS CORP.

1. Position wheel drive shaft bar in a soft jawed vise and clamp securely.
2. Using side cutters, remove and discard the small seal clamp.

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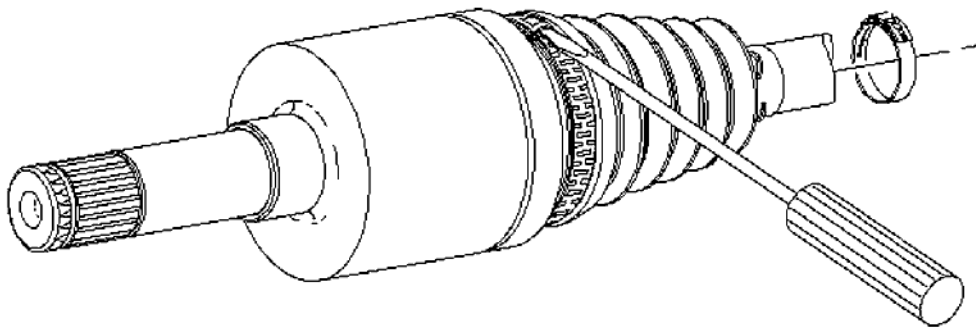


Fig. 7: Removing Large Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

3. Remove large seal retaining clamp using a flat-bladed tool and discard the clamp.

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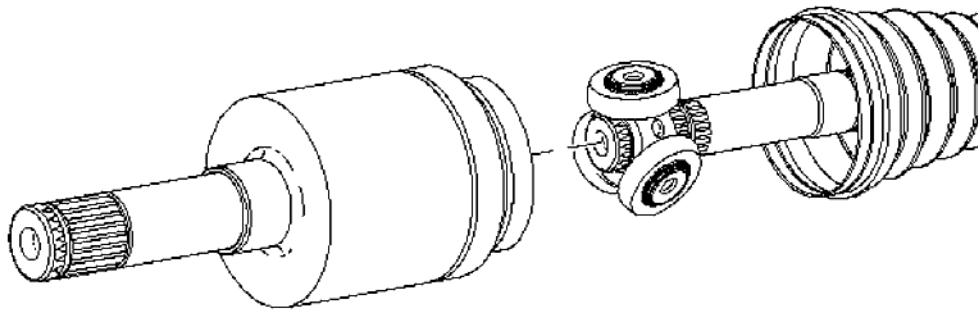


Fig. 8: Separating Boot From Tripot Housing At Large Diameter End
Courtesy of GENERAL MOTORS CORP.

4. Separate the seal from the tripot housing at the large diameter and slide the seal away from the joint along the axle shaft.
5. Wipe the excess grease from the face of the tripot spider and the inside of the tripot housing.
6. Remove the tripot housing from the spider and shaft.

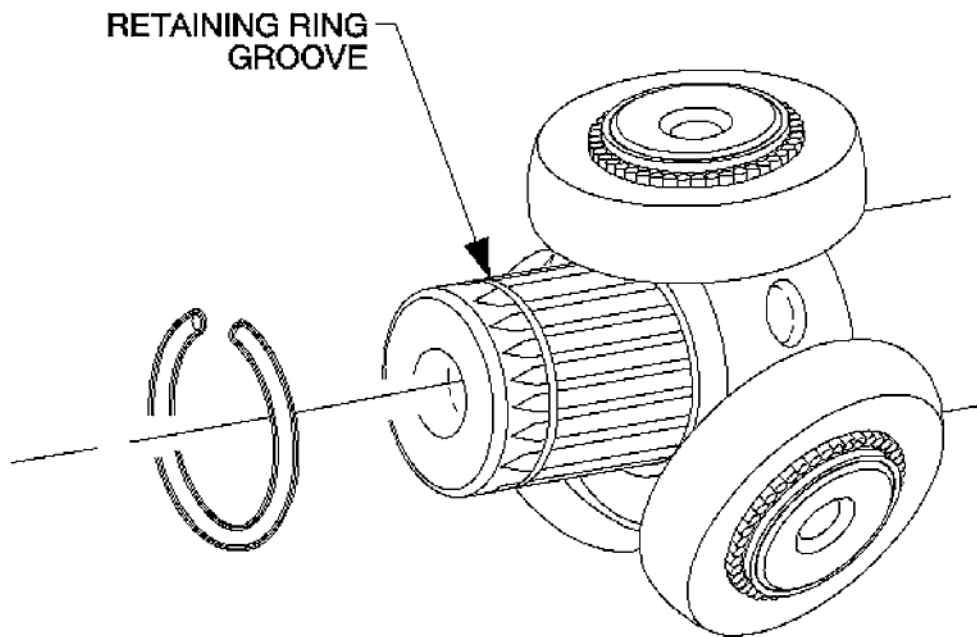


Fig. 9: Removing & Installing Spider Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the retaining ring from the groove on the wheel drive shaft bar and remove the spider assembly.
8. Remove the seal from the wheel drive shaft bar.
9. Thoroughly clean all parts with a suitable solvent, removing all traces of grease and contaminants.
10. Dry all parts with compressed air.
11. Inspect the tripot joint components for unusual wear, cracks, and other damage. Replace any damaged components.

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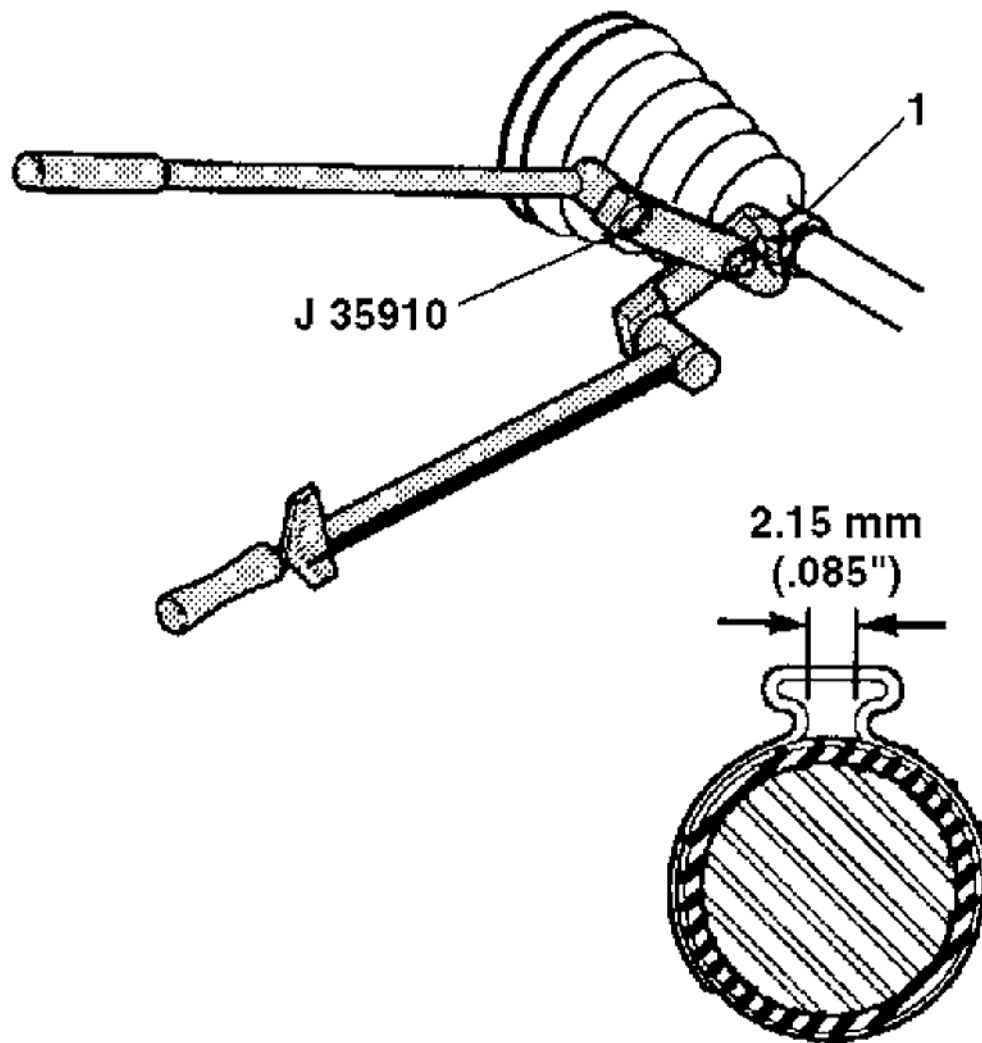


Fig. 10: View Of CV Joint Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

1. Install the small seal clamp to the seal. Do not crimp the clamp.
2. Slide the inner seal onto the wheel drive shaft bar and locate the lip of the seal groove on the wheel drive shaft bar.

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

3. Using the **J 35910** , crimp the small seal clamp. See Special Tools.

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4. Measure the clamp gap width.

Specification: Clamp gap width should not exceed 2.15 mm (0.85 in).

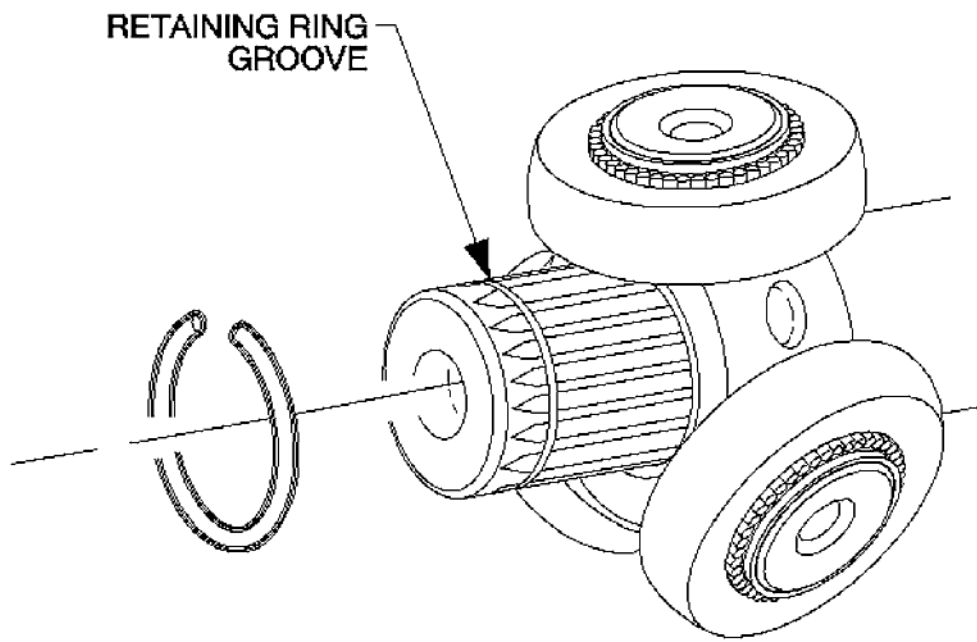


Fig. 11: Removing & Installing Spider Assembly
Courtesy of GENERAL MOTORS CORP.

5. Install the tripot spider assembly to the wheel drive shaft bar, until seated against shoulder.
6. Install the retaining ring in the groove of the wheel drive shaft bar with suitable pliers.
7. Place approximately half of the grease in the kit to the seal and place the remainder in the tripot housing.

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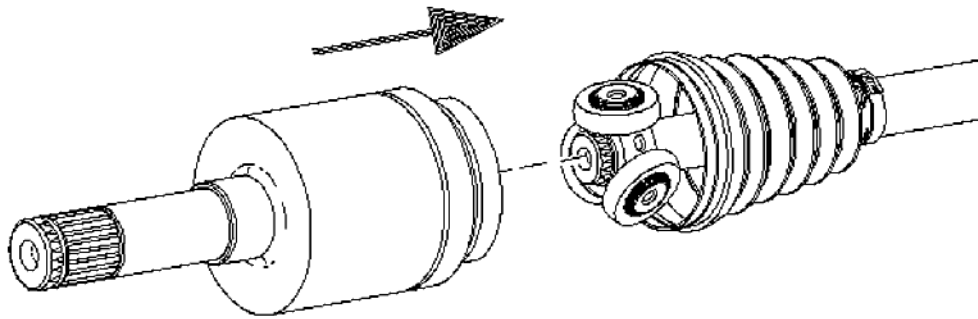


Fig. 12: Sliding Tripot Housing Over Tripot Spider Assembly On Shaft
Courtesy of GENERAL MOTORS CORP.

8. Install the large clamp over the large diameter of the seal.
9. Install the tripot housing to the tripot spider assembly on the wheel drive shaft bar.
10. Slide the large diameter of the seal over the outside of the tripot housing and position the lip of the seal in the housing groove.

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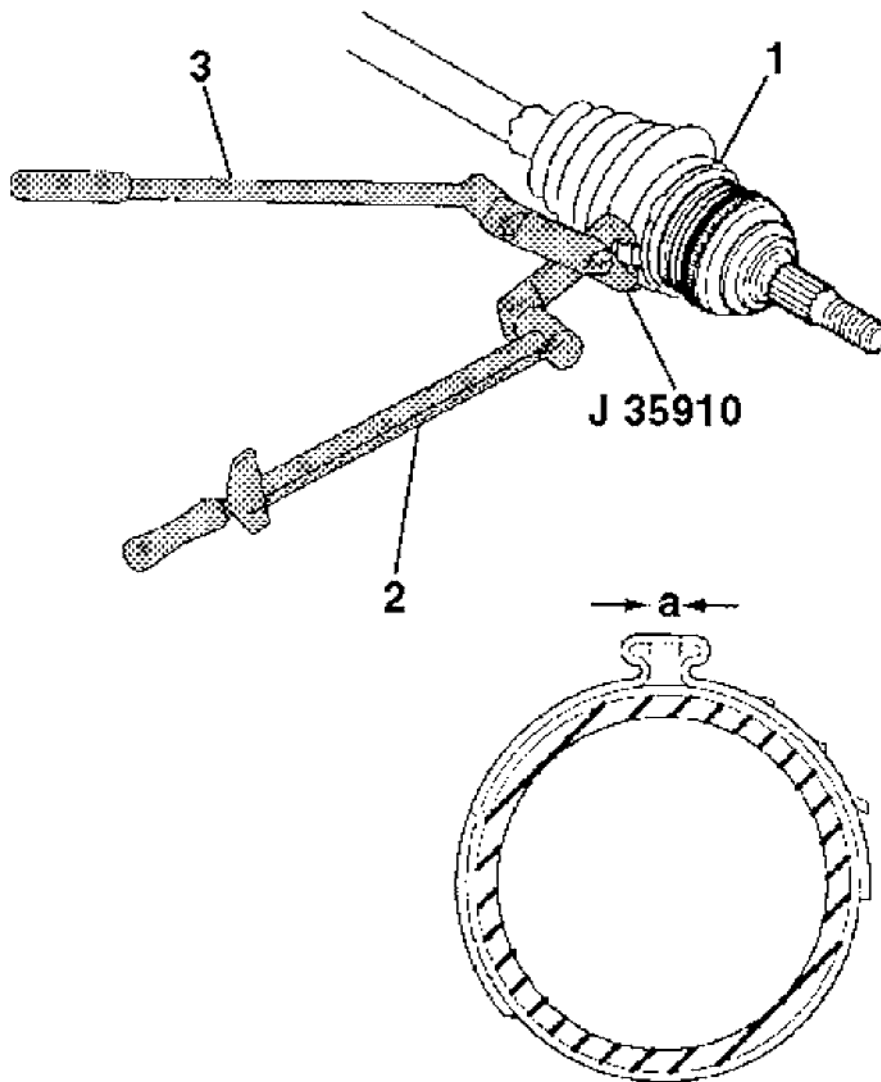


Fig. 13: Crimping Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

11. Place the large seal retaining clamp around the seal and close using **J 35910** . See **Special Tools**.
12. Inspect the gap dimension on the clamp ear. Continue tightening until the gap dimension is reached.

Specification: Dimension equals 1.9 mm (5/64 in).

13. Rotate the housing in a circular motion to distribute the grease in the tripod joint.

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WHEEL DRIVE SHAFT OUTER JOINT AND SEAL REPLACEMENT

Tools Required

J 35910 Drive Axle Seal Clamp Pliers. See Special Tools.

Disassembly Procedure

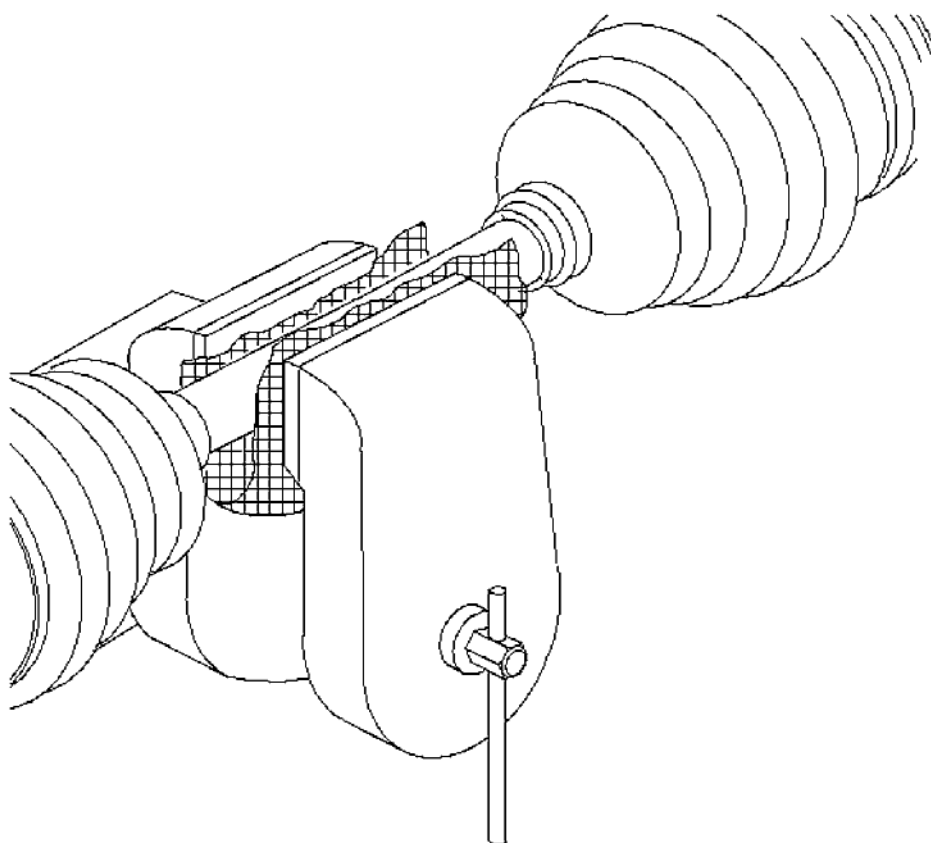


Fig. 14: Clamping Drive Axle Shaft In Vice
Courtesy of GENERAL MOTORS CORP.

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

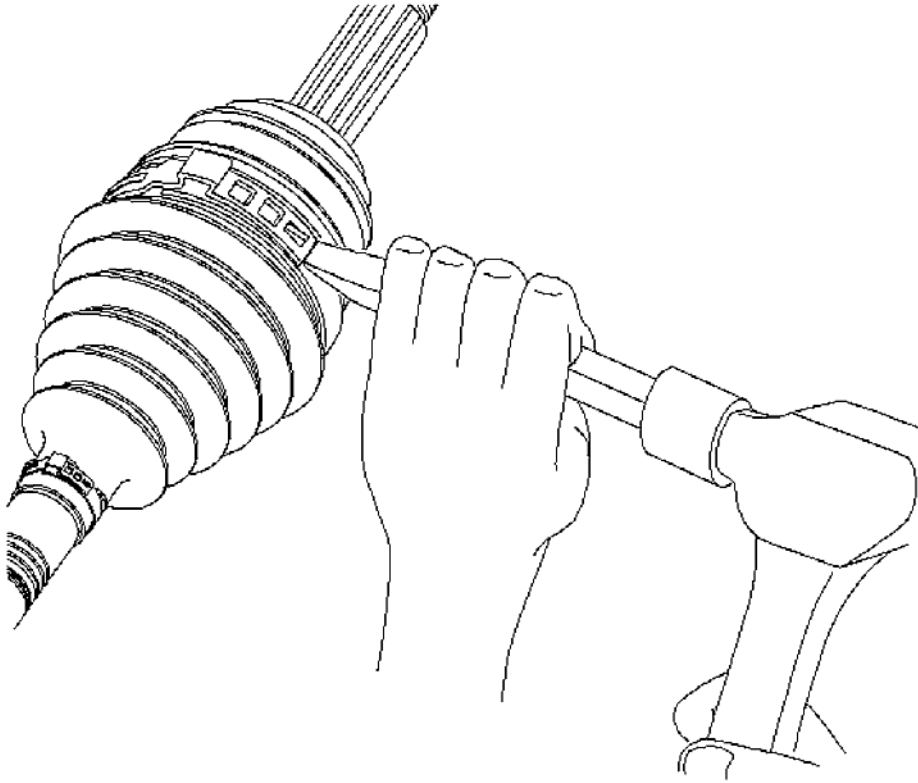


Fig. 15: Using Hammer & Chisel To Disengage Outer Band From Inner Band At Retainer Peg On Large & Small Boot Clamps
Courtesy of GENERAL MOTORS CORP.

2. Use a flat-bladed tool and disengage the retaining tabs of the large seal clamp.
3. Discard the clamp.
4. Remove the small seal clamp using side cutters and discard the clamp.
5. Separate the constant velocity (CV) joint boot from the CV joint race at the large diameter.
6. Slide the boot away from the joint along the wheel drive shaft bar.
7. Wipe the excess grease from the face of the CV inner race.

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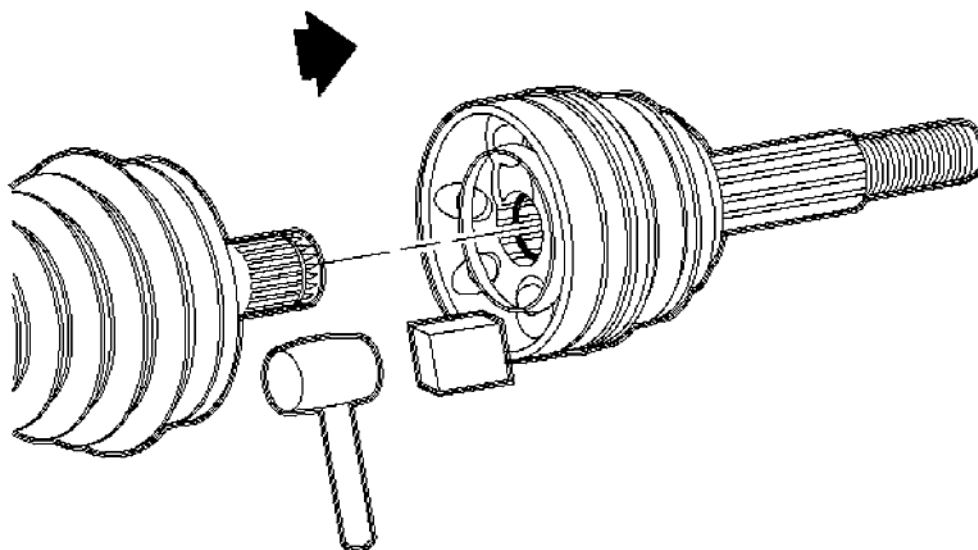


Fig. 16: Separating CV Joint From Axle Shaft
Courtesy of GENERAL MOTORS CORP.

8. Place a block of wood against the CV joint outer race and carefully tap on the CV joint to remove it from the wheel drive shaft bar.
9. Remove the seal from the wheel drive shaft bar.
10. Remove the CV joint retaining ring from the wheel drive shaft bar.

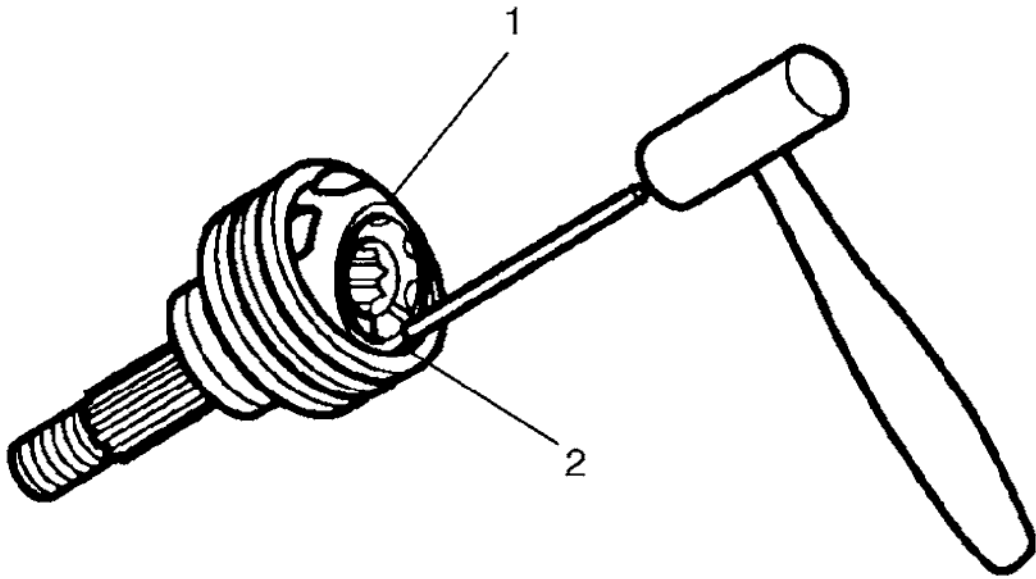


Fig. 17: Taping Gently On Brass Drift With A Hammer In Order To Tilt Cage
Courtesy of GENERAL MOTORS CORP.

11. Place a brass drift against the CV joint inner race (1).
12. Tap gently on the brass drift with a hammer in order to tilt the joint race.
13. Remove the first bearing roller (2) when the CV race tilts.
14. Tilt the CV joint inner race in the opposite direction to remove the opposing bearing roller.
15. Repeat the process to remove all 6 of the bearing rollers.

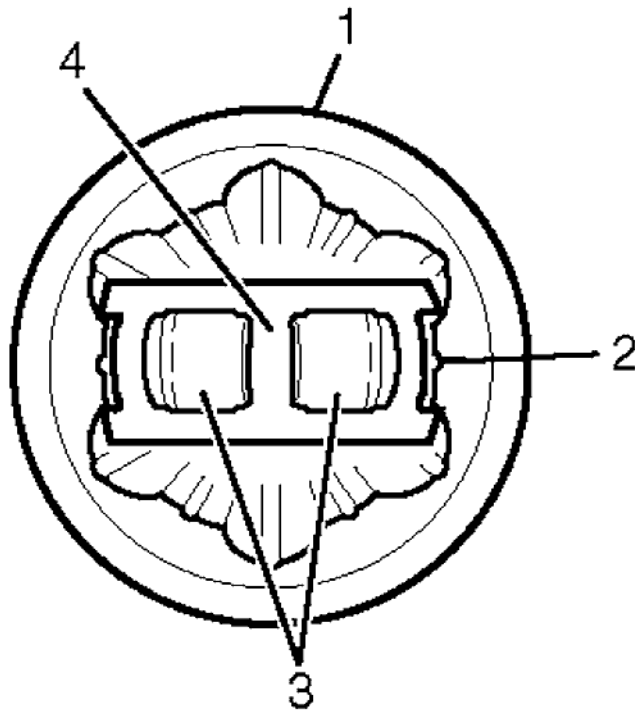


Fig. 18: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage
Courtesy of GENERAL MOTORS CORP.

16. Pivot the CV joint cage (4) and the inner race 90 degrees to the centerline of the outer race (2). At the same time, align the cage windows (3) with the lands of the outer race.
17. Lift out the cage (4) and the inner race.

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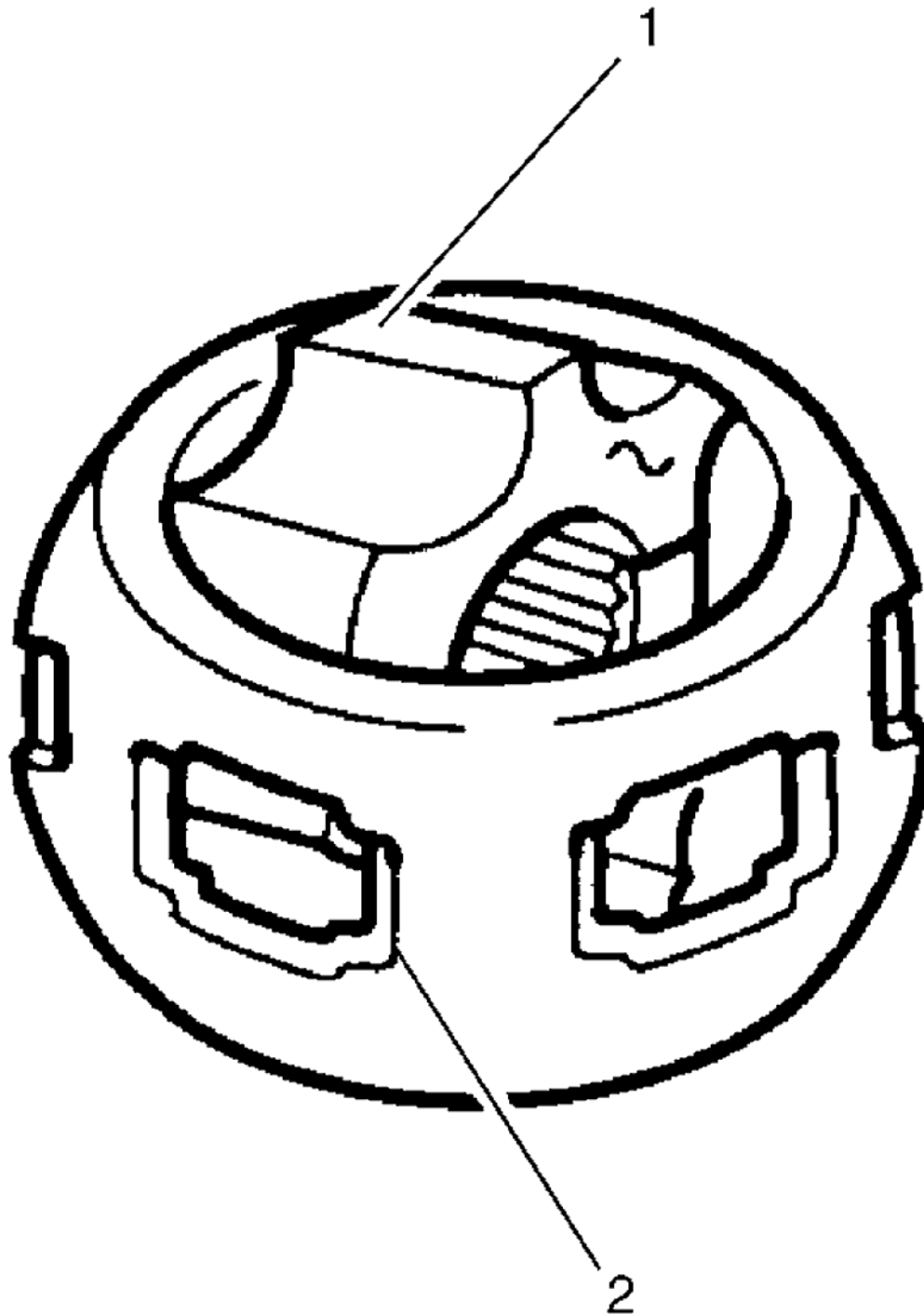


Fig. 19: View Of Inner Race & Cage
Courtesy of GENERAL MOTORS CORP.

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18. Remove the inner race (1) from the cage (2) by rotating the inner race upward.
19. Clean the following items thoroughly with a suitable solvent. Remove all traces of grease and contaminants.
 - The inner and outer race assemblies.
 - The CV joint cage.
 - The bearing rollers.
20. Dry all the parts with compressed air.
21. Inspect the CV joint assembly for the following:
 - Unusual wear
 - Cracks
 - Damage
22. Replace any damaged parts.
23. Clean the wheel drive shaft bar. Use a wire brush to remove any rust in the seal mounting grooves.

Installation Procedure

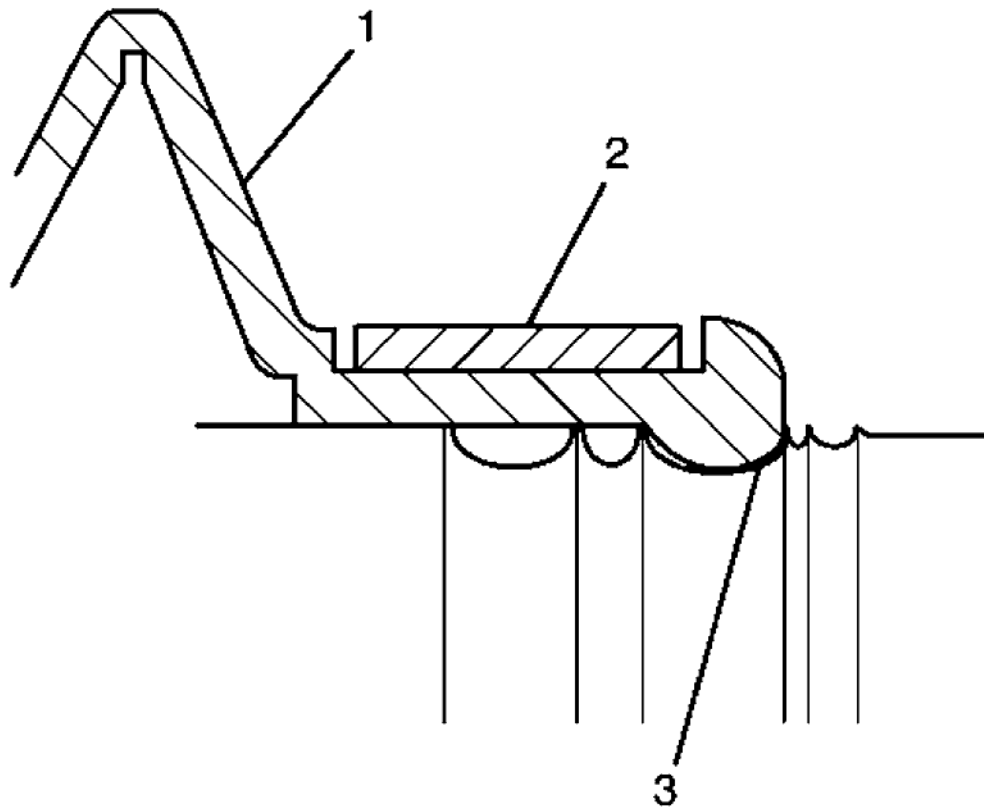


Fig. 20: Installing Seal Clamp On Neck Of Seal
Courtesy of GENERAL MOTORS CORP.

1. Install the new small seal clamp (2) on the neck of the outboard seal (1). Do not clamp.
2. Slide the outboard seal onto the wheel drive shaft bar and position the neck of the outboard seal in the seal groove on the bar. The largest groove below the sight groove on the wheel drive shaft bar is the seal groove seal (3).

IMPORTANT: Ensure that the seal clamp is properly positioned around the entire circumference of the seal.

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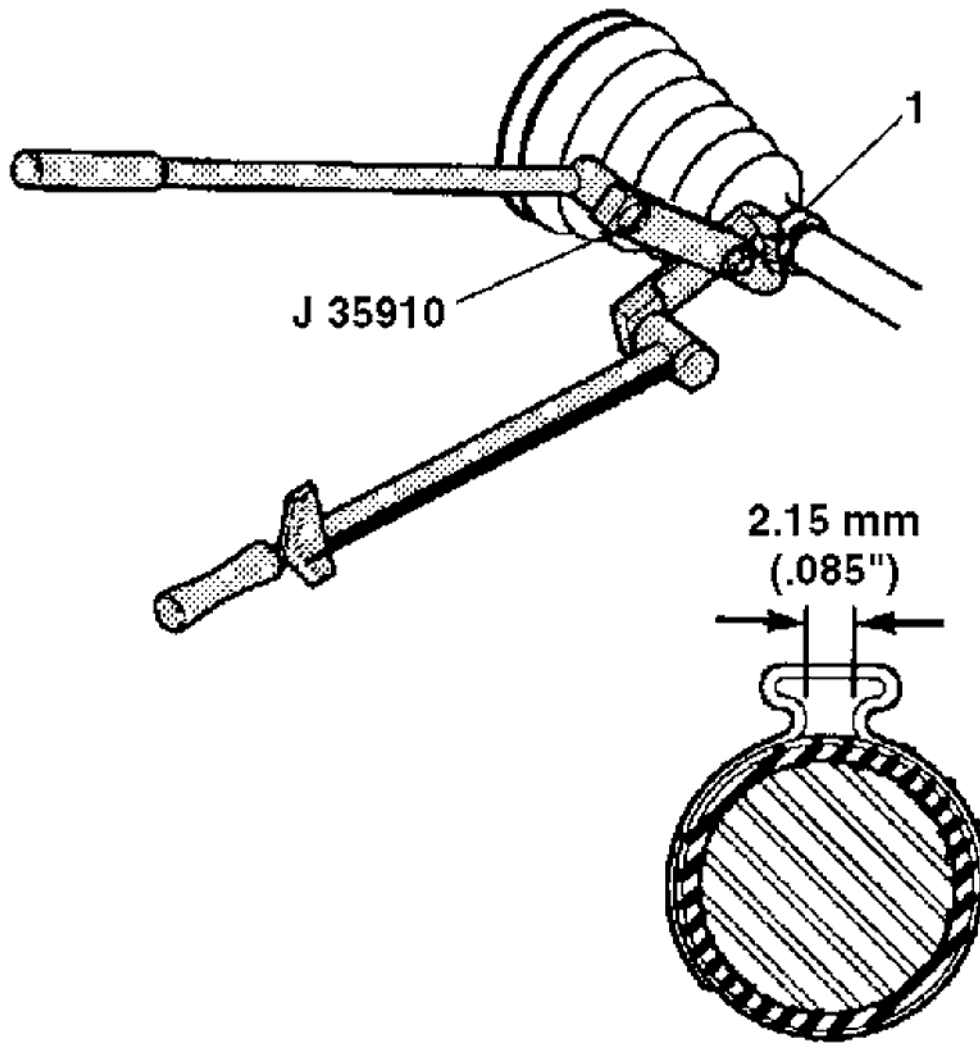


Fig. 21: View Of CV Joint Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

3. Crimp the seal clamp using the J 35910 . See **Special Tools**.
4. Measure the clamp end gap dimension. The gap should not exceed 2.15 mm (0.85 in).

Specification: The gap should not exceed 2.15 mm (0.85 in).

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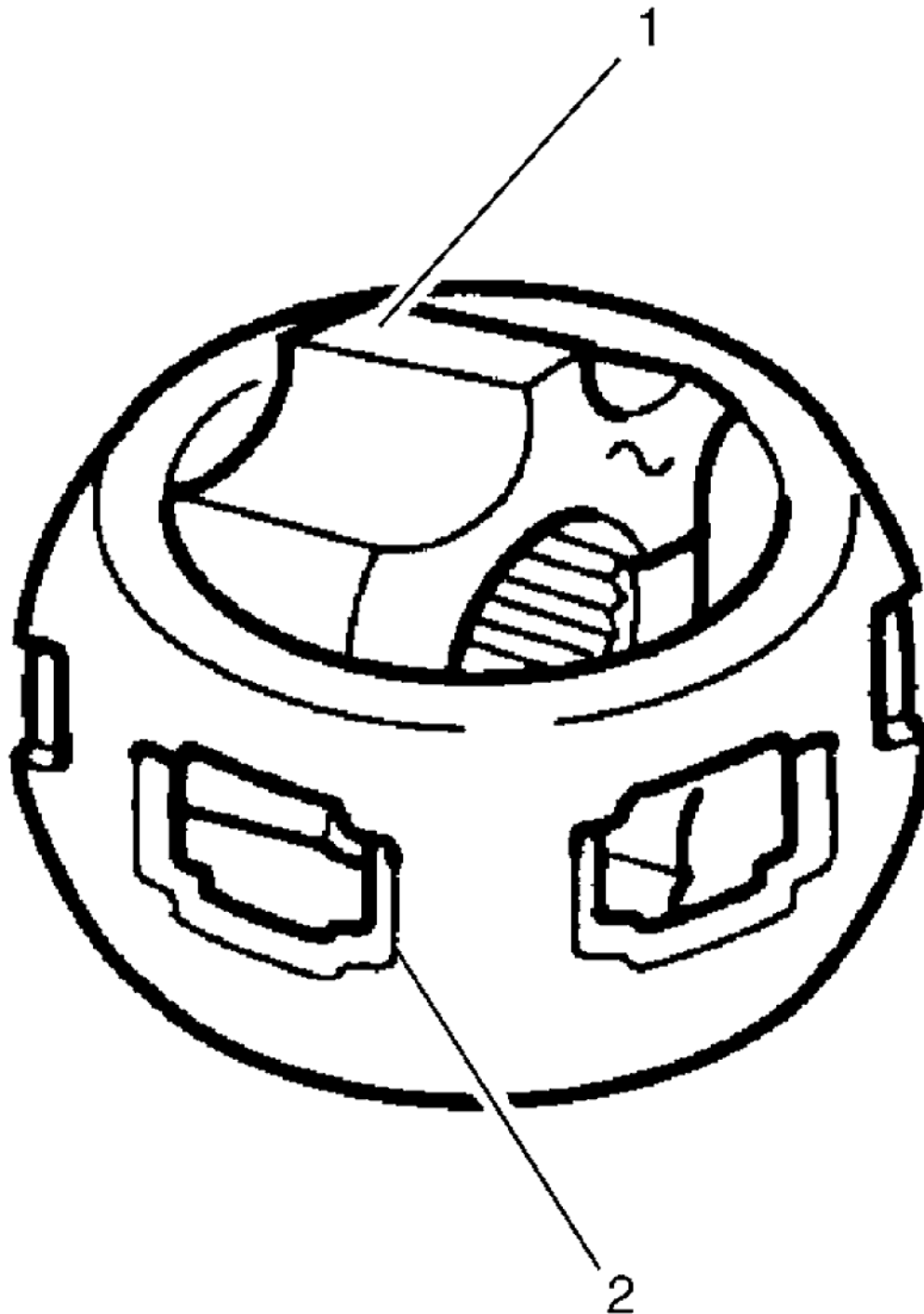


Fig. 22: View Of Inner Race & Cage
Courtesy of GENERAL MOTORS CORP.

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5. Put a light coat of grease from the service kit on the bearing roller grooves of the inner race and outer race.
6. Hold the inner race 90 degrees to centerline of cage with the lands of the inner race (1) aligned with the windows of the cage (2) and insert the inner race into the cage.

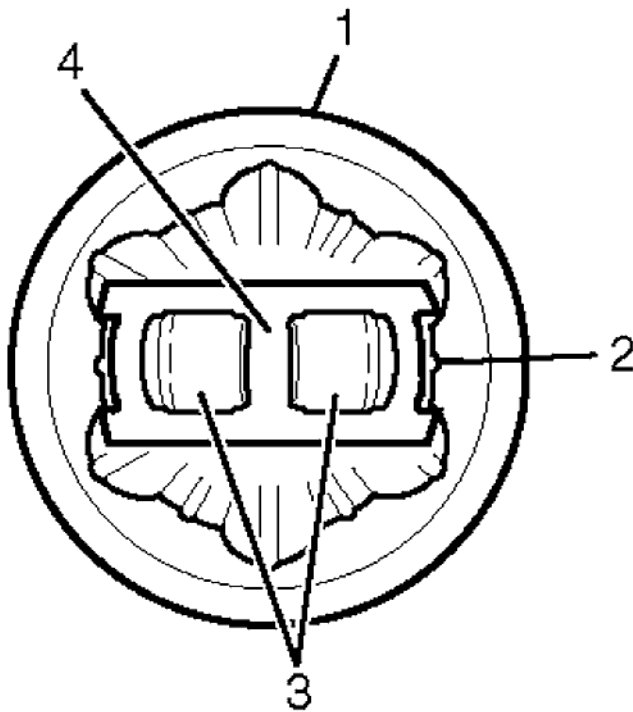


Fig. 23: View Of Outer Race, Inner Race, Cage Window & CV Joint Cage
Courtesy of GENERAL MOTORS CORP.

7. Hold the cage and inner race 90 degrees to the center line of the outer race (1) and align the cage windows (3) with the lands of the outer race.

IMPORTANT: Be sure that the retaining ring side of the inner race faces the wheel drive shaft bar.

8. Place the cage and the inner race into the outer race.
9. Insert the first bearing roller, then tilt the cage in the opposite direction to insert the opposing bearing roller.
10. Repeat this process until all 6 bearing rollers are in place.
11. Install the CV joint retaining ring to the wheel drive shaft bar.

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12. Place approximately half the grease from the service kit inside the outboard seal and pack the CV joint with the remaining grease.

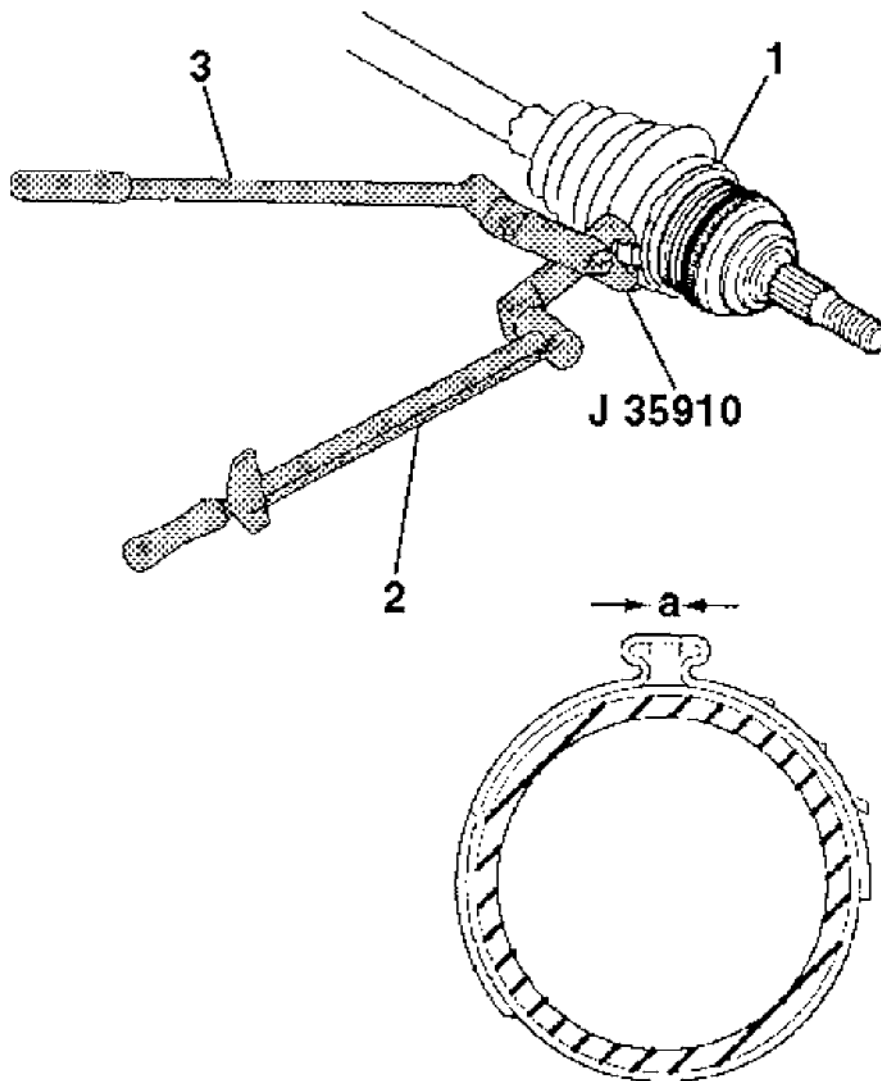


Fig. 24: Crimping Seal Retaining Clamp
Courtesy of GENERAL MOTORS CORP.

13. Place a block of wood against the CV joint spindle and tap on the block of wood until the CV joint inner race engages the retaining ring.
14. Slide the large diameter of the seal over the outside of the CV race and locate the lip of the seal in the housing groove.

15. Install the large seal retaining clamp over the seal and close using the **J 35910** . See **Special Tools**.
16. Inspect the gap dimension on the clamp ear. Continue tightening until the gap dimension is reached.

Specification: Dimension equals 1.9 mm (5/64 in).
17. Remove the wheel drive shaft from the bench vise.
18. Distribute the grease within the outer CV joint by rotating the joint in a circular motion four to five times.

DESCRIPTION AND OPERATION

WHEEL DRIVE SHAFTS DESCRIPTION AND OPERATION

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

Seal and Clamp

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

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

The function of the clamps is as follows:

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

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

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Inner Joint

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

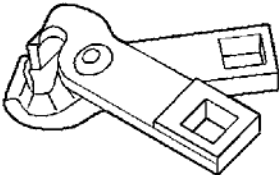
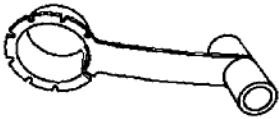
Outer Joint

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/ Description
	J 2619-01 Slide Hammer
	J 35910 Drive Axle Seal Clamp Pliers
	J 44394 Seal Protector
	J 45341 Rear Wheel Drive Shaft Removal Tool

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