

<b>2003 Isuzu Ascender</b>
2003-04 DRIVE AXLES Axle Shafts - Ascender

## **2003-04 DRIVE AXLES**

### **Axle Shafts - Ascender**

## **DESCRIPTION & OPERATION**

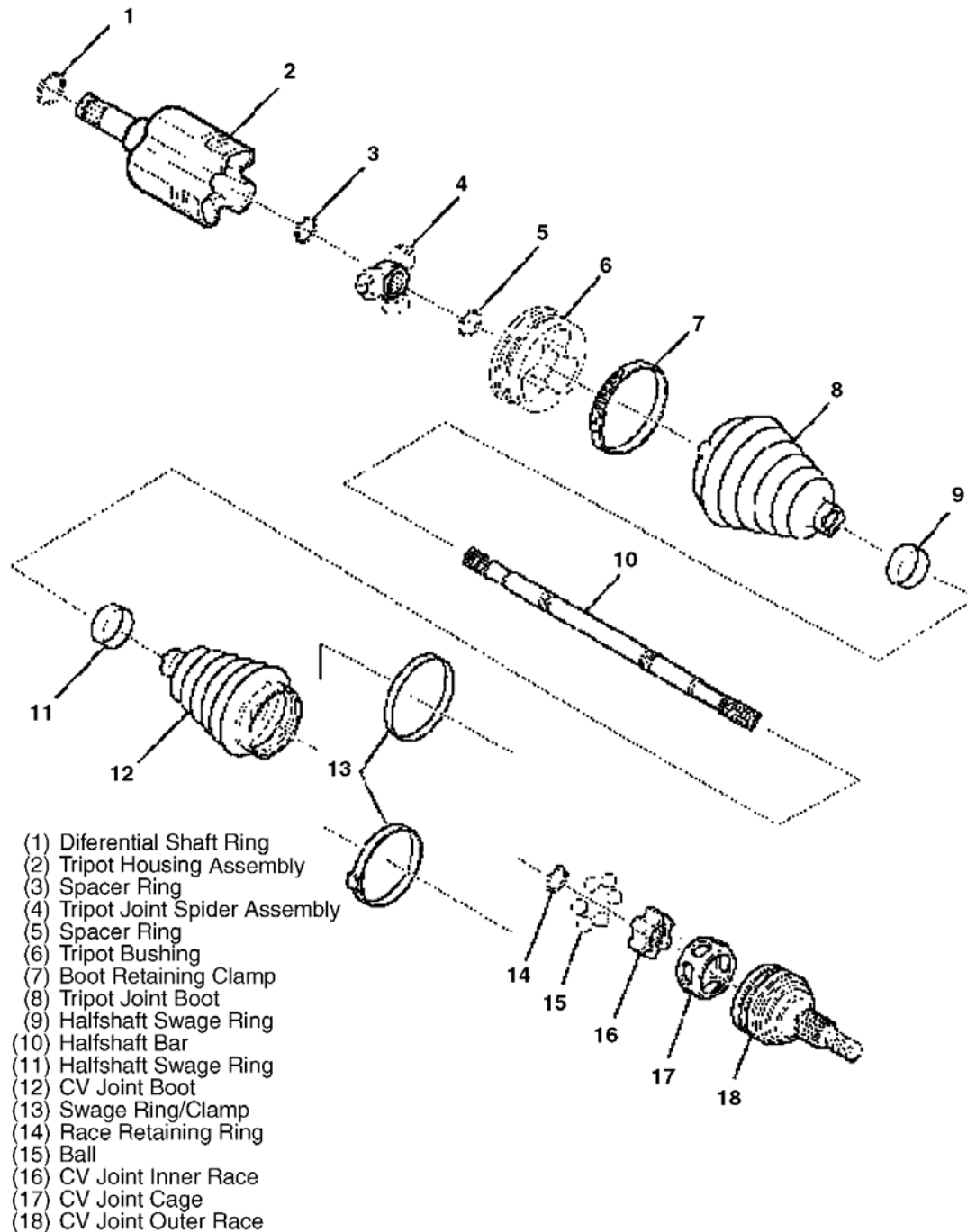
Front wheel shafts are flexible assemblies which consist of the following components. See **Fig. 1** .

- Front wheel axle shaft constant velocity joint (outer joint).
- Front wheel axle shaft tri-pot joint (inner joint).
- The front wheel axle shaft connects the front wheel axle shaft tri-pot joint and the front wheel axle shaft constant velocity joint.
- The front wheel axle shaft tri-pot joint is completely flexible, and moves with an in and out motion.
- The front wheel axle shaft constant velocity joint is flexible but can not move in and out.

The wheel axle shaft is a balanced shaft that transmits rotational force from the front differential to the front wheels when the transfer case is engaged. The wheel axle shaft is mounted to the front differential by bolting the flange of the wheel axle shaft to the flange on the inner output shaft of the front differential. The other end of the wheel axle shaft is splined to fit into and drive the hub assembly when the transfer case is engaged. The tri-pot joint and constant velocity joint on the wheel axle shaft allows the shaft to be flexible to move with the suspension travel of the vehicle.

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**Fig. 1: Exploded View Of Wheel Axle Shaft**  
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## TROUBLE SHOOTING

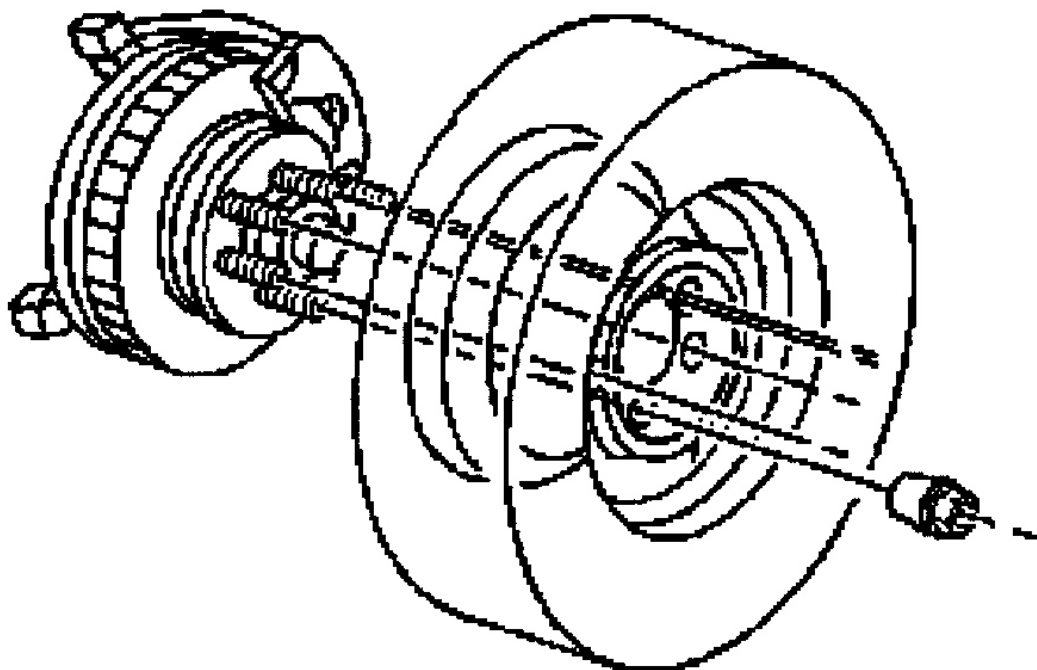
**NOTE:** See DRIVE AXLE NOISE DIAGNOSIS article in GENERAL INFORMATION.

## **REMOVAL, DISASSEMBLY, REASSEMBLY & INSTALLATION**

### **FRONT AXLE SHAFTS**

#### **Removal**

1. Raise the vehicle.
2. Remove the tire and wheel assembly. See **Fig. 2**.
3. Remove the engine protection shield. See **Fig. 3**.
4. Remove the wheel speed sensor wiring harness from the retainers. See **Fig. 4**.
5. Disconnect the wheel speed sensor from the harness. See **Fig. 5**.
6. Remove the retaining bolt for the front brake hose. See **Fig. 6**.
7. Remove the front stabilizer bar link from the lower control arm. See **Fig. 7** and **Fig. 8**.
8. Remove the upper shock module retaining from the shock tower. See **Fig. 9**.
9. Remove the tie rod end from the steering knuckle. See **Fig. 10**.
10. Remove the left and right upper ball joint pinch bolt and nut.
11. Remove the shock module from the shock tower.
12. Remove the steering knuckle from the upper control arm.
13. Remove the front wheel axle from the steering knuckle. See **Fig. 11**.
14. Using mechanics wire or hook, support the front shock module/steering knuckle to the frame. See **Fig. 12**.
15. Disconnect the left side wheel axle shaft from the differential carrier assembly by placing a brass drift against the tri-pot housing. Firmly strike the brass drift outward from the case with a hammer. Strike hard enough to overcome the snap ring pressure holding in the shaft. See **Fig. 13**.
16. Disconnect the right side wheel axle shaft from the clutch fork housing assembly by placing a brass drift against the tri-pot housing. Firmly strike the brass drift outward from the case with a hammer. Strike hard enough to overcome the snap ring pressure holding in the shaft.
17. Pull the wheel axle shaft straight out from the differential carrier assembly or the clutch fork housing assembly.
18. Remove the wheel axle shaft. See **Fig. 13**.

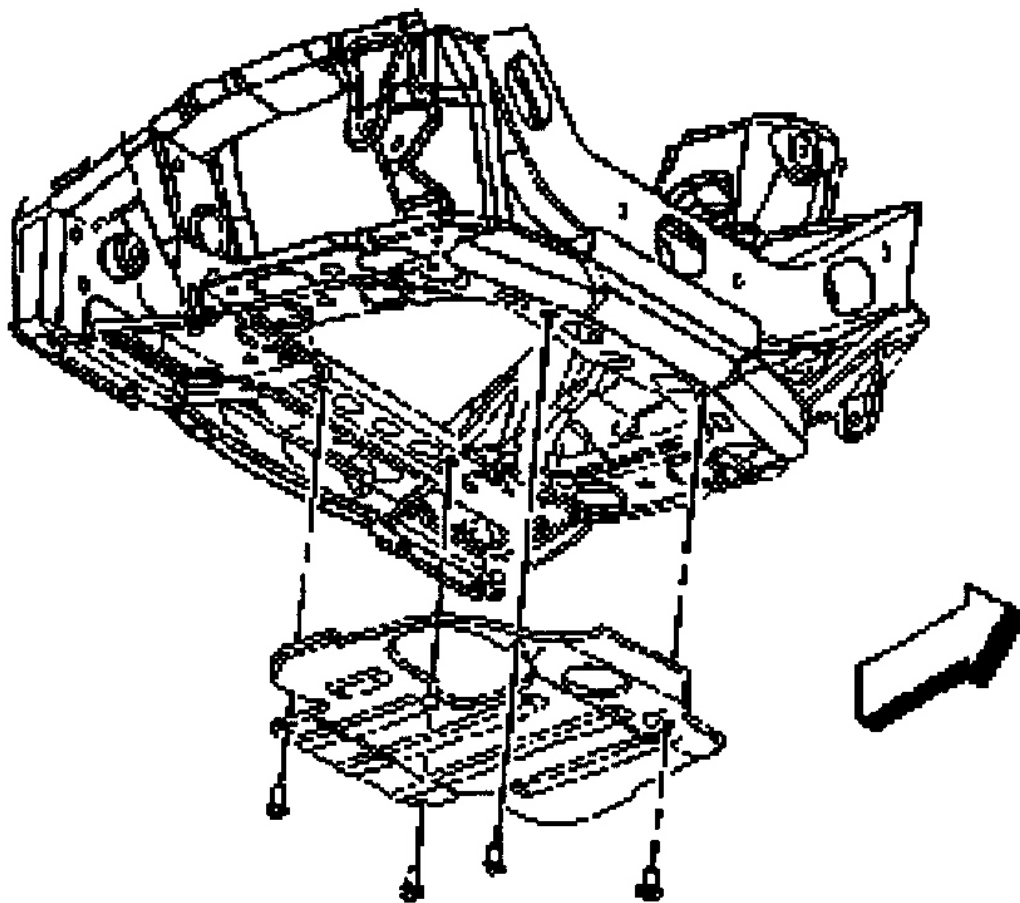


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**Fig. 2: Removing Tire And Wheel Assembly**  
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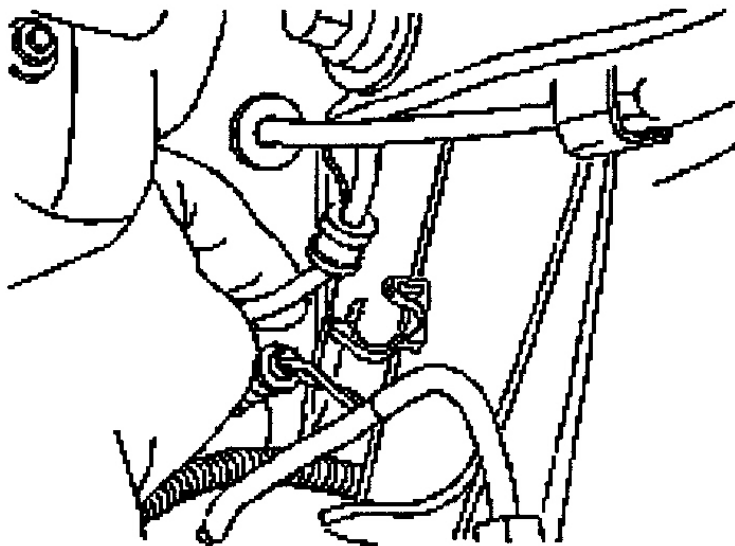
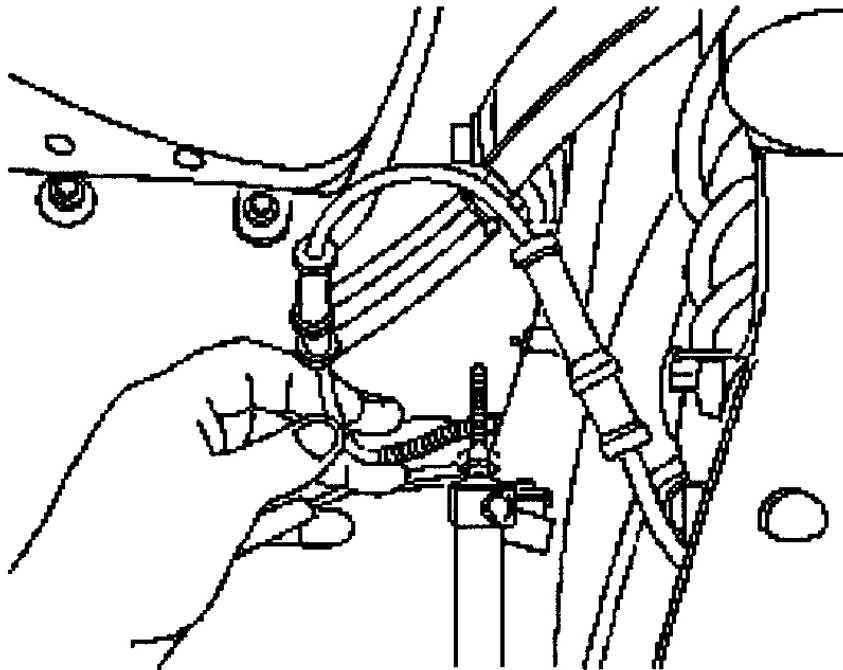
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**Fig. 3: Removing Engine Protection Shield**  
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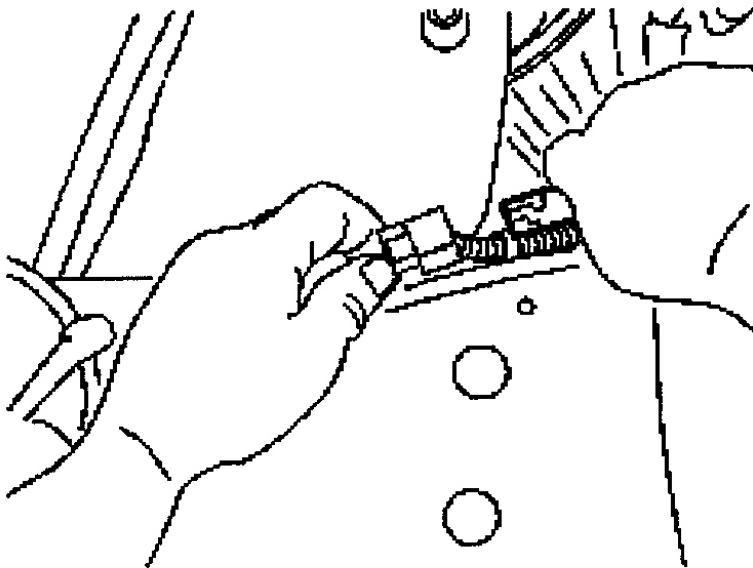
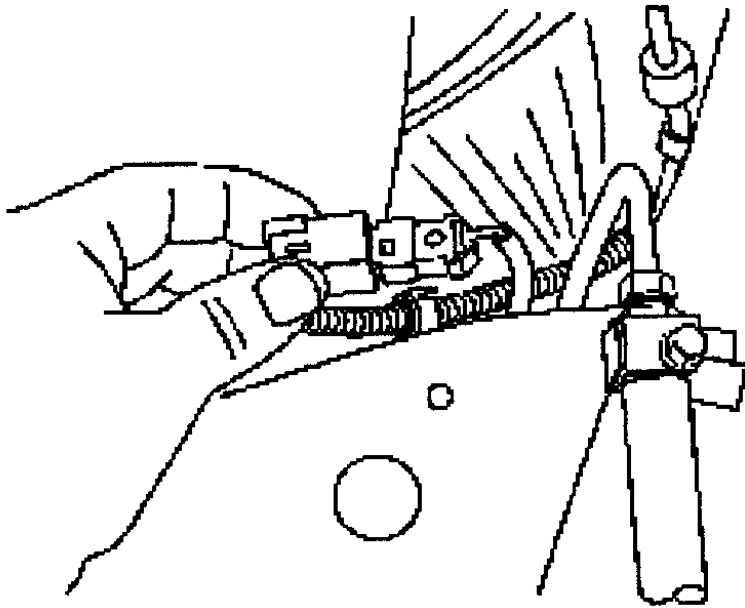


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**Fig. 4: Removing Wheel Speed Sensor Wiring Harness From The Retainers**  
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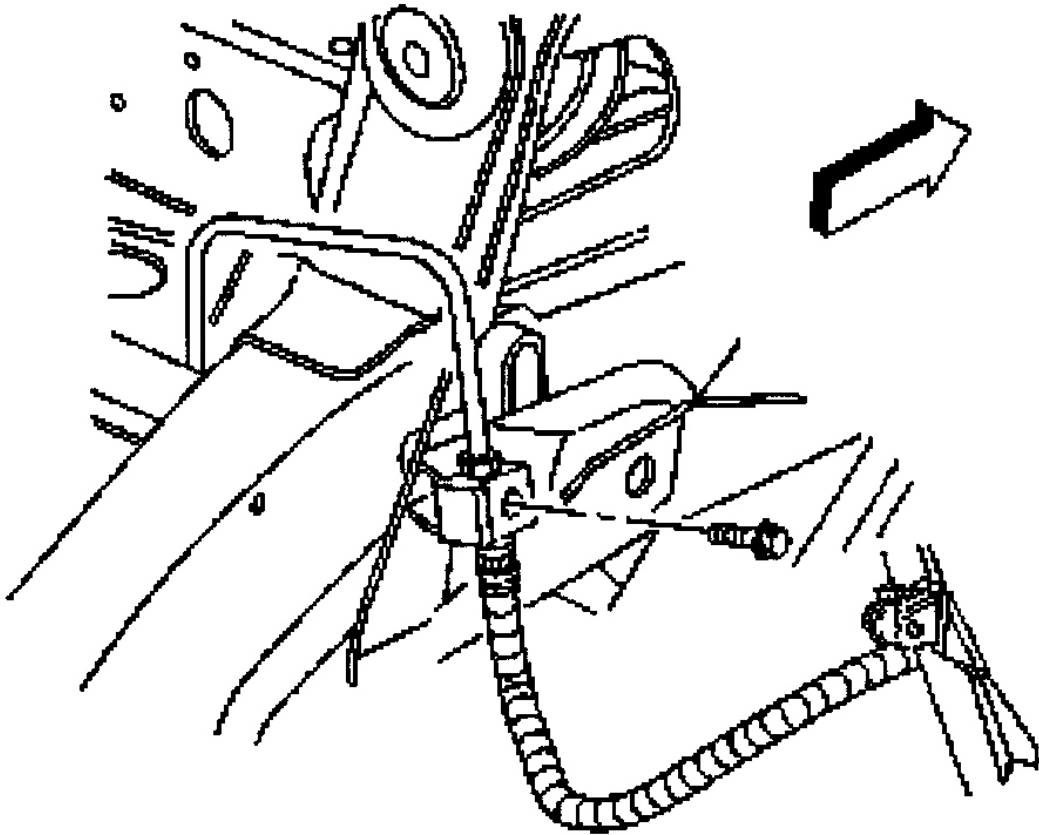


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**Fig. 5: Disconnecting Wheel Speed Sensor From The Harness**  
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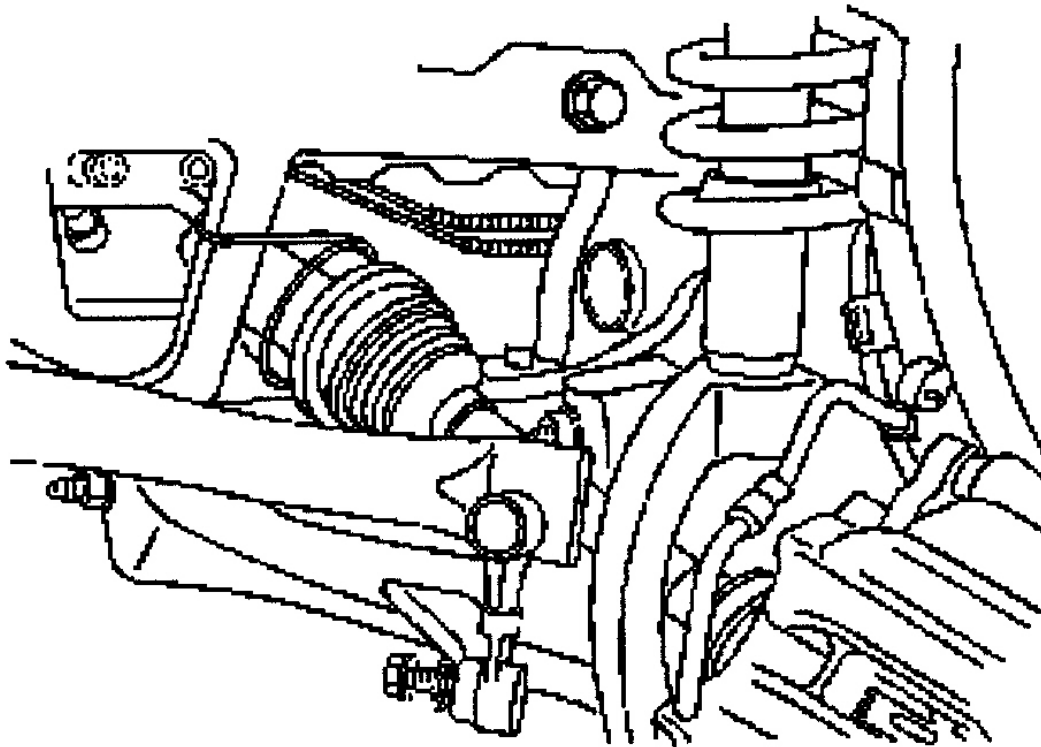


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**Fig. 6: Removing Retaining Bolt For The Front Brake Hose**  
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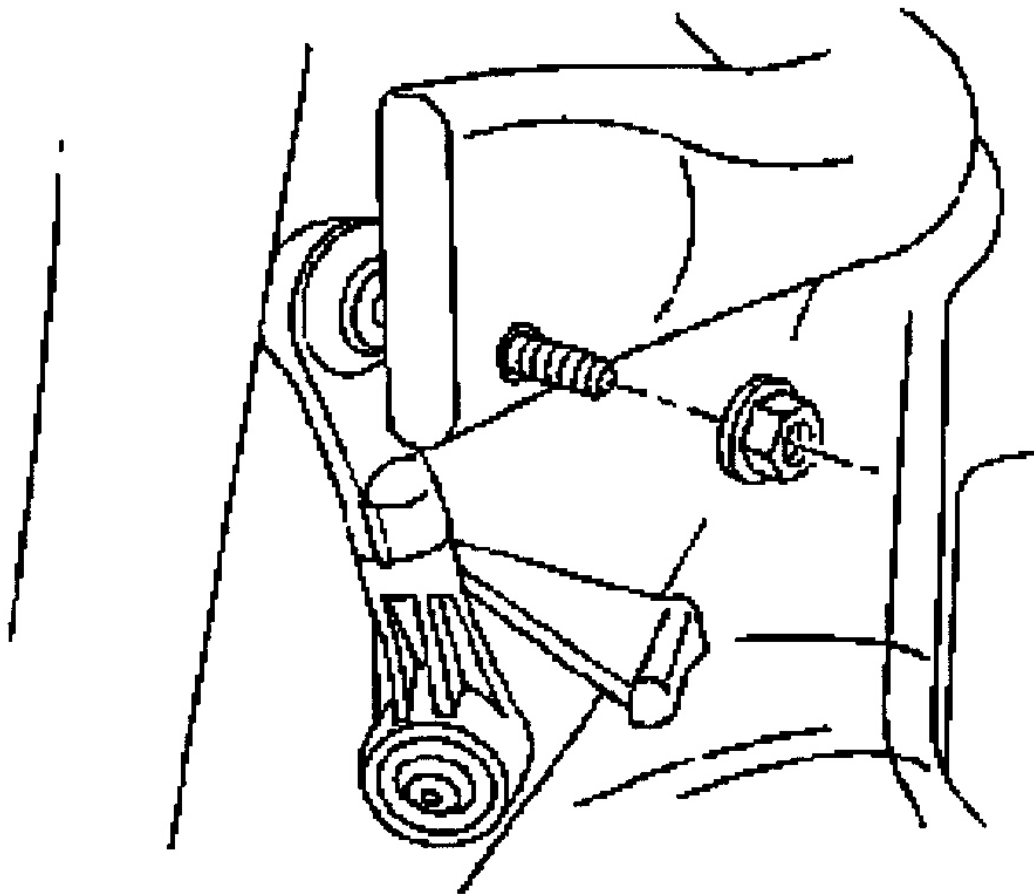
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**Fig. 7: Removing Front Stabilizer Bar Link From The Lower Control Arm**  
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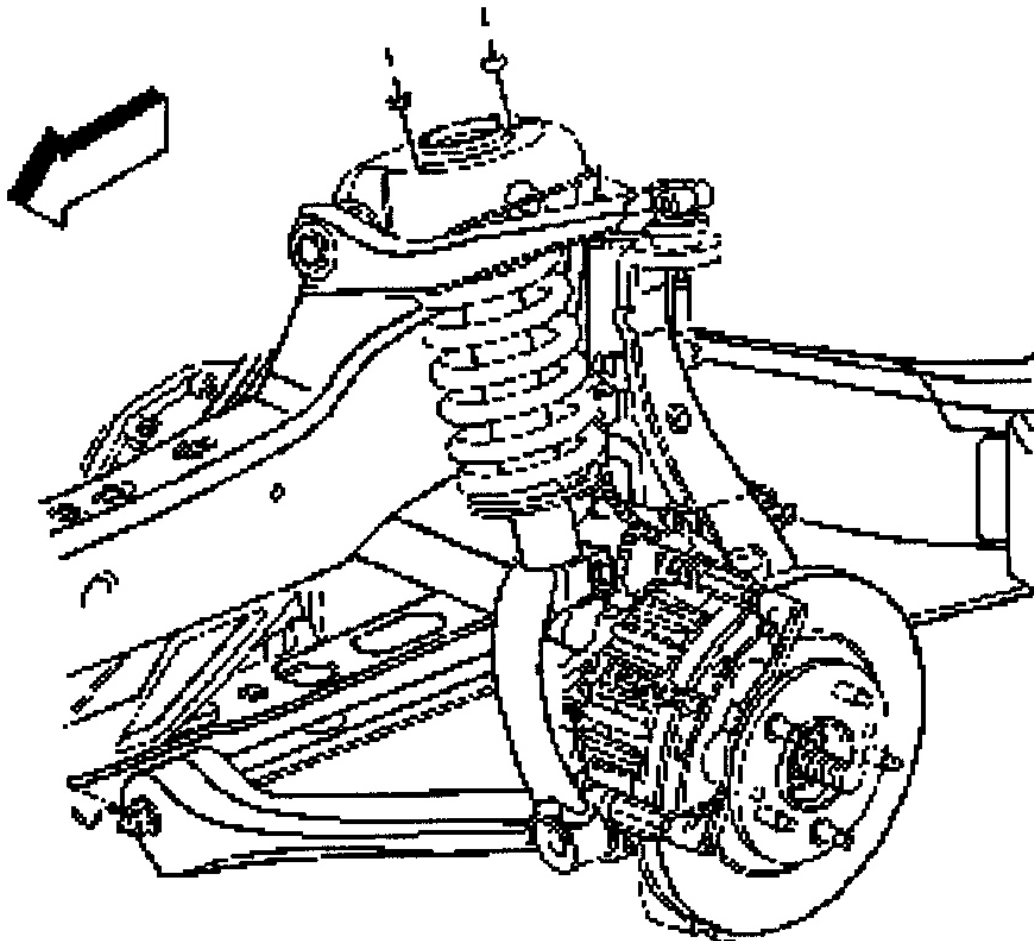


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**Fig. 8: Removing Stabilizer Shaft Link To Stabilizer Shaft Retaining Nut**  
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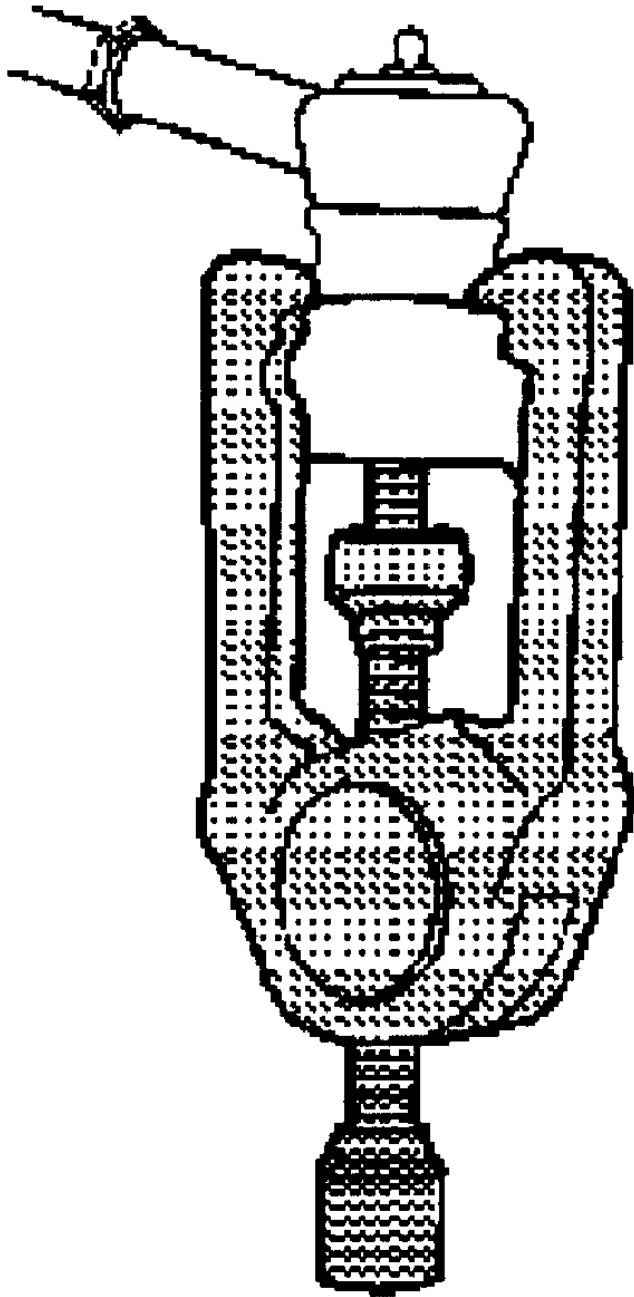


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**Fig. 9: Removing Upper Shock Module Retaining From The Shock Tower**  
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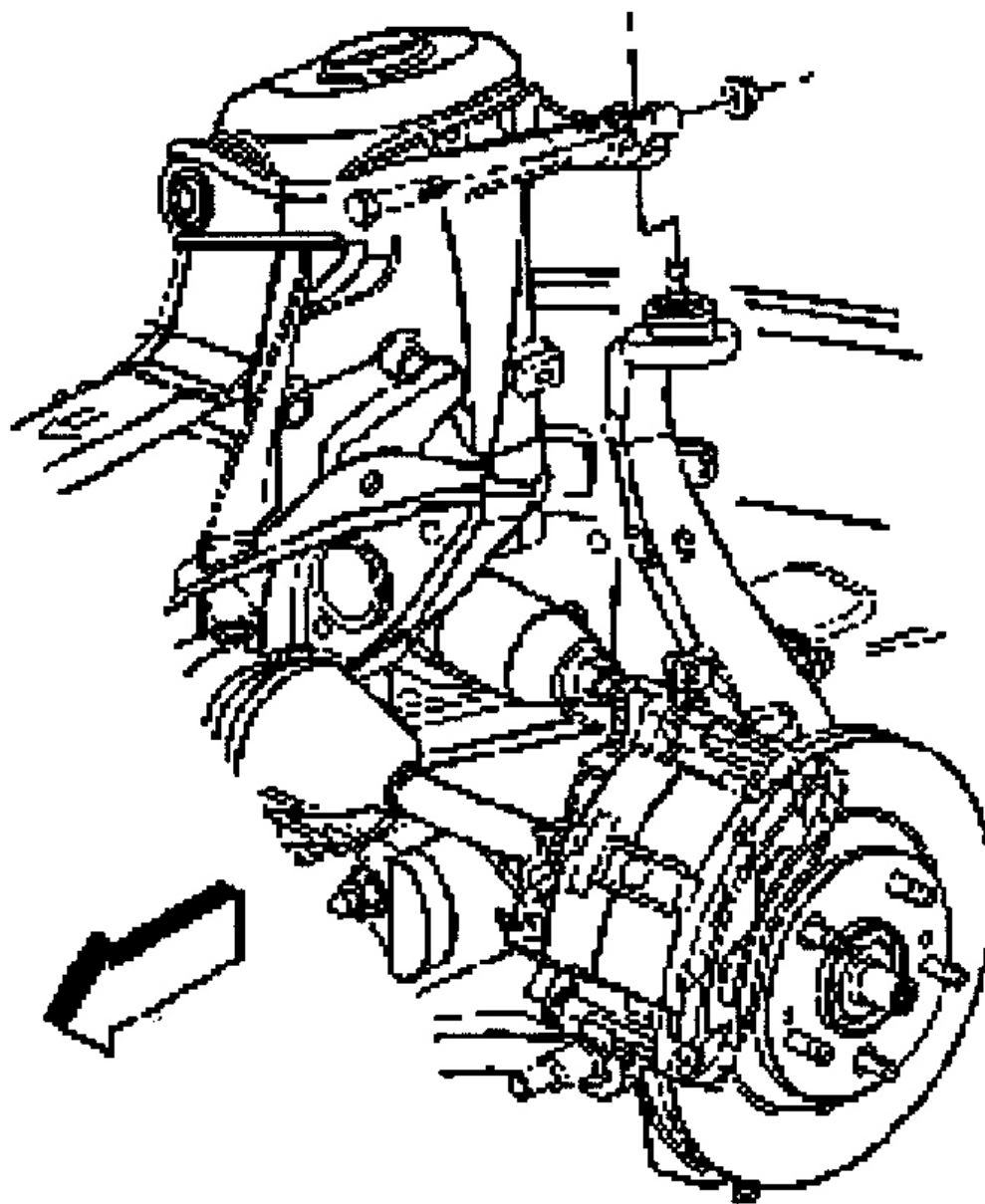


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**Fig. 10: Removing Tie Rod End From The Steering Knuckle**  
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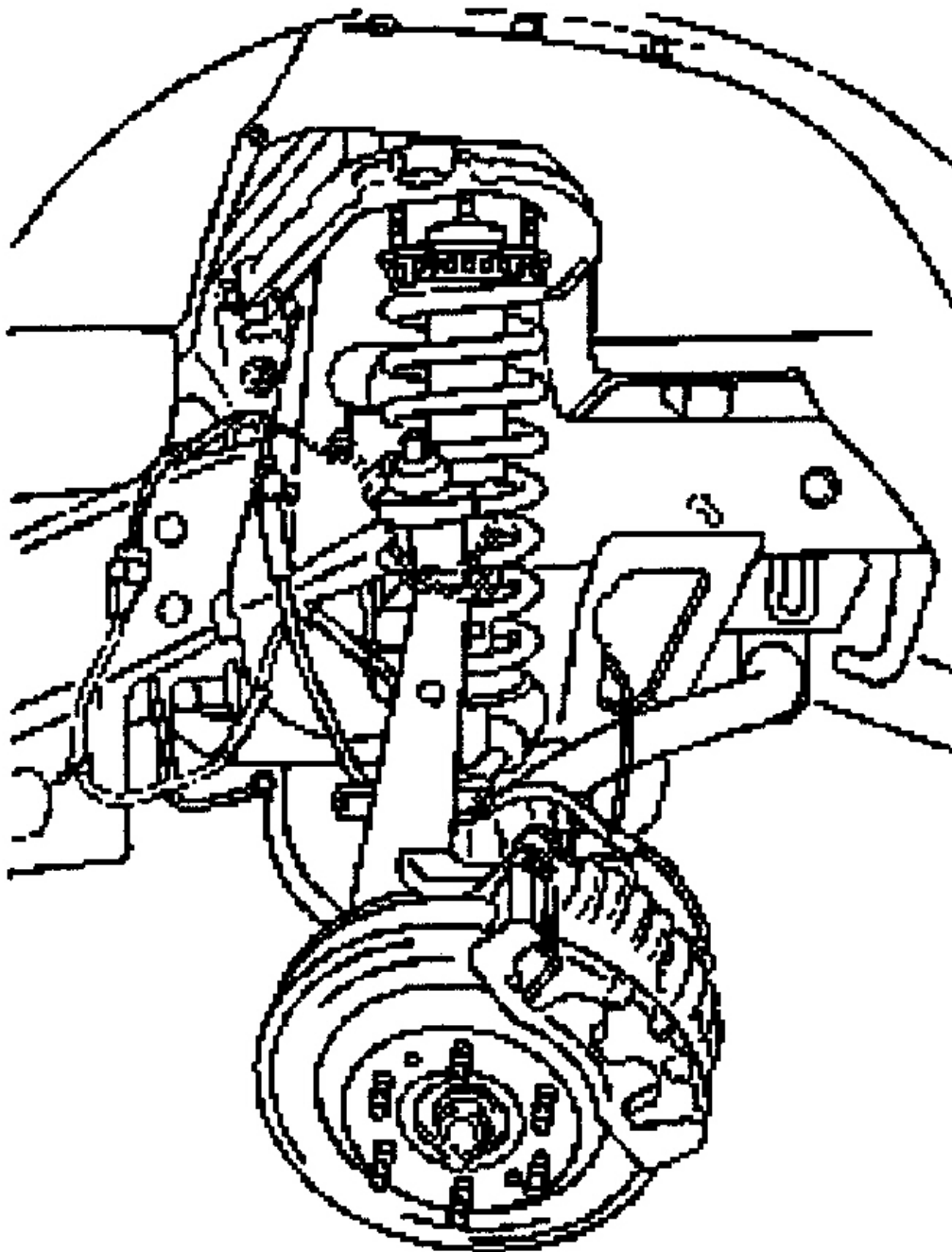


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**Fig. 11: Removing Wheel Axle From The Steering Knuckle**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

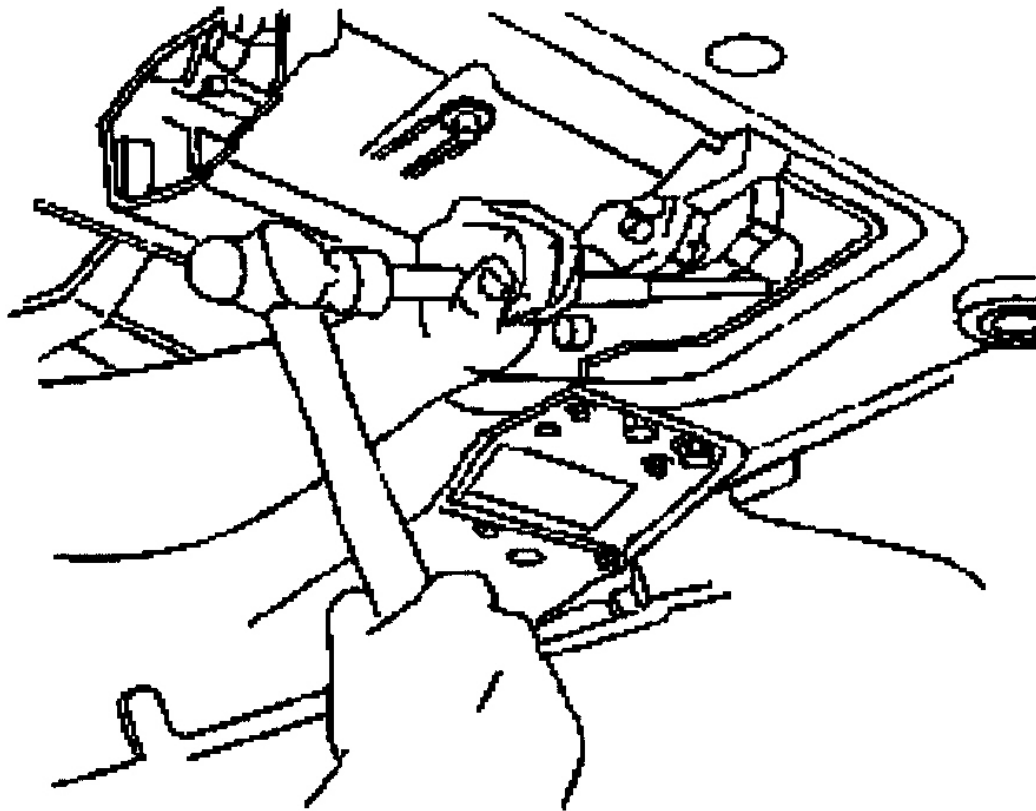
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**Fig. 12: Supporting Front Shock Module Steering Knuckle To The Frame**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 13: Disconnecting Left Side Wheel Axle Shaft From The Differential Carrier Assembly**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

**Diassembly (Inboard Joint)**

**CAUTION: Do not damage the tri-pot housing (1).**

1. Remove the clamp from the boot with a pair of side cutters.
2. Use a hand grinder to cut through the swage ring.
3. Remove the tri-pot housing (1) and the tri-lobal tri-pot bushing (2) from the halfshaft bar (5).
4. Thoroughly degrease the housing (1) and the spider assembly.
5. Discard the tri-pot bushing.
6. Use 320 grit 3m cloth (or equivalent) to remove any evident corrosion in the transmission sealing surface.
7. Allow the housing (1) and the spider assembly to dry. See **Fig. 14** .

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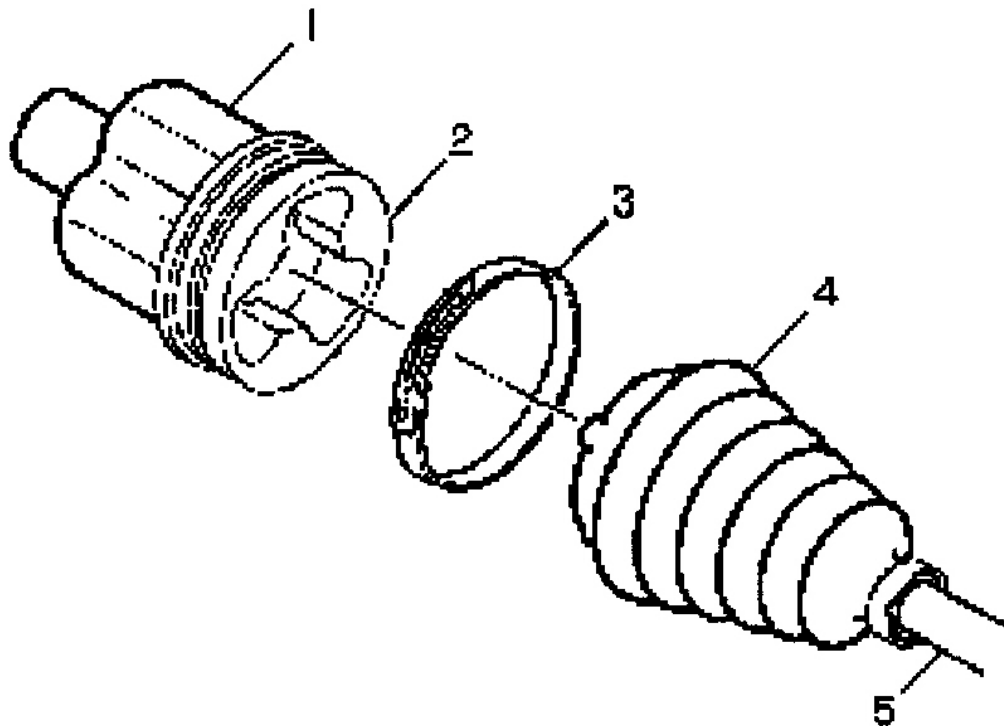
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**NOTE:** Handle the tri-pot spider assembly (1) with care. Tri-pot balls and needle rollers may separate from the spider trunnion if the tri-pot balls and needle rollers are not handled carefully.

8. Compress the tri-pot boot (4) onto the halfshaft bar (3), away from the spider assembly (1). See **Fig. 15**
9. Spread the spacer rings (1), (3) using sanp ring pliers (or equivalent) to remove the spider assembly (2). See **Fig. 16** .
10. Remove the following items:
  - The spacer ring (1)
  - The spider assembly (2)
  - The second spacer ring (3)
  - The tri-pot boot (4)
11. Discard the tri-pot boot and spacer rings.
12. Clean the halfshaft bar. Use a wire brush to remove any rust in the boot mounting area (grooves).
13. Inspect the following items:
  - The needle rollers
  - The needle bearings
  - The trunnion
14. Check the tri-pot housing for unusual wear, cracks, or other damage.
15. Use the appropriate kit to replace any damaged parts.

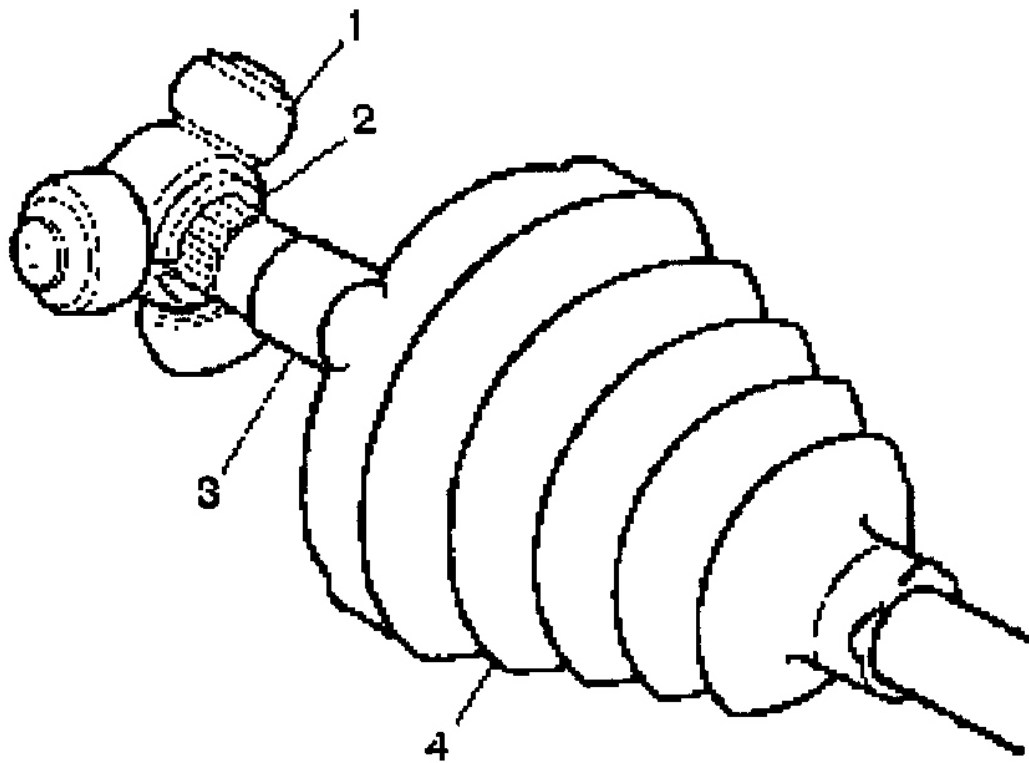
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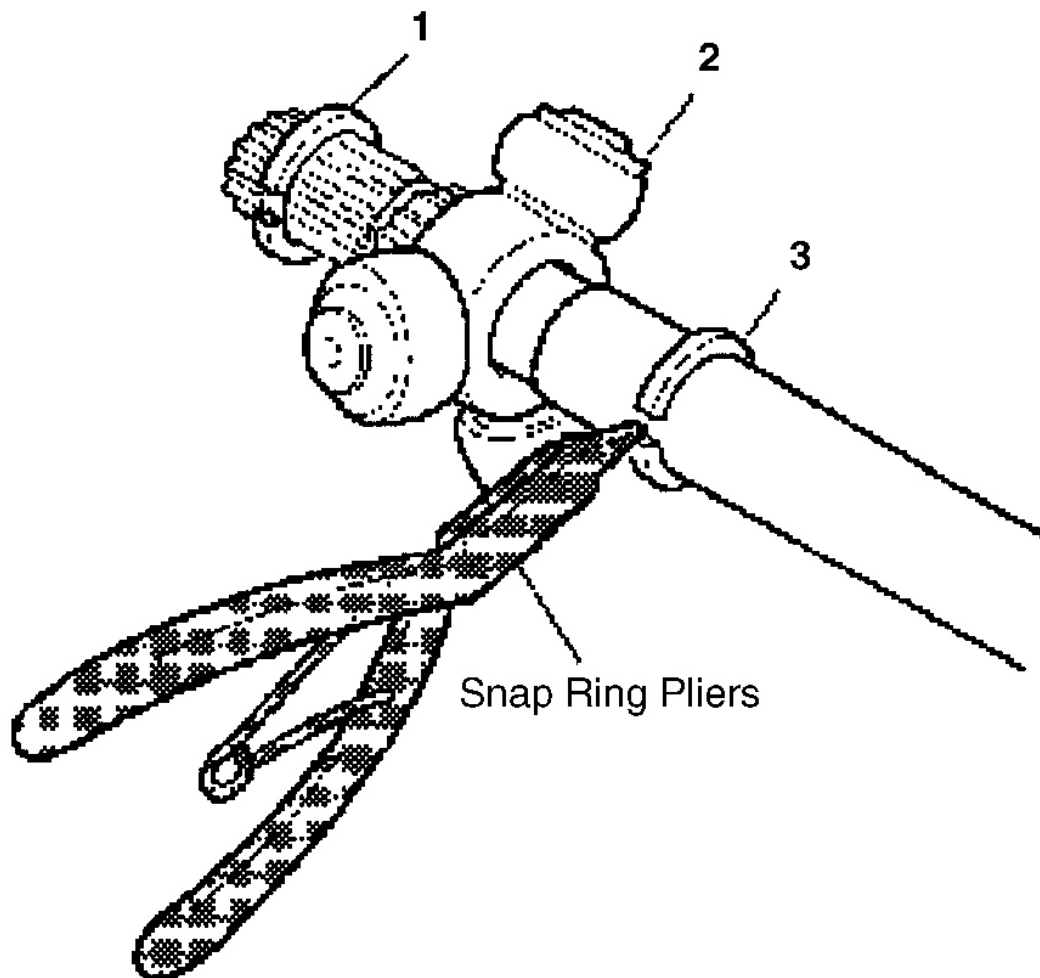
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**Fig. 14: Identifying Tri-pot Housing & Spider Assembly**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 15: Compressing Tri-pot Boot Onto the Halfshaft Bar**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 16: Removing Spider Assembly**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

**Disassembly (Outboard Joint)**

1. Place the halfshaft in a vise.
2. Place protective covers over the vise jaws. See **Fig. 17** .
3. Use a hand grinder to cut through the swage rings (2). Do not damage the outer race.
4. Compress the seal on the halfshaft and away from the CV joint outer race (1).
5. Wipe all grease away from the face of the CV joint. See **Fig. 18** .
6. Find the halfshaft retaining snap ring (3), which is located in the inner race (2).
7. Spread the snap ring ears apart using snap ring pliers (or equivalent).

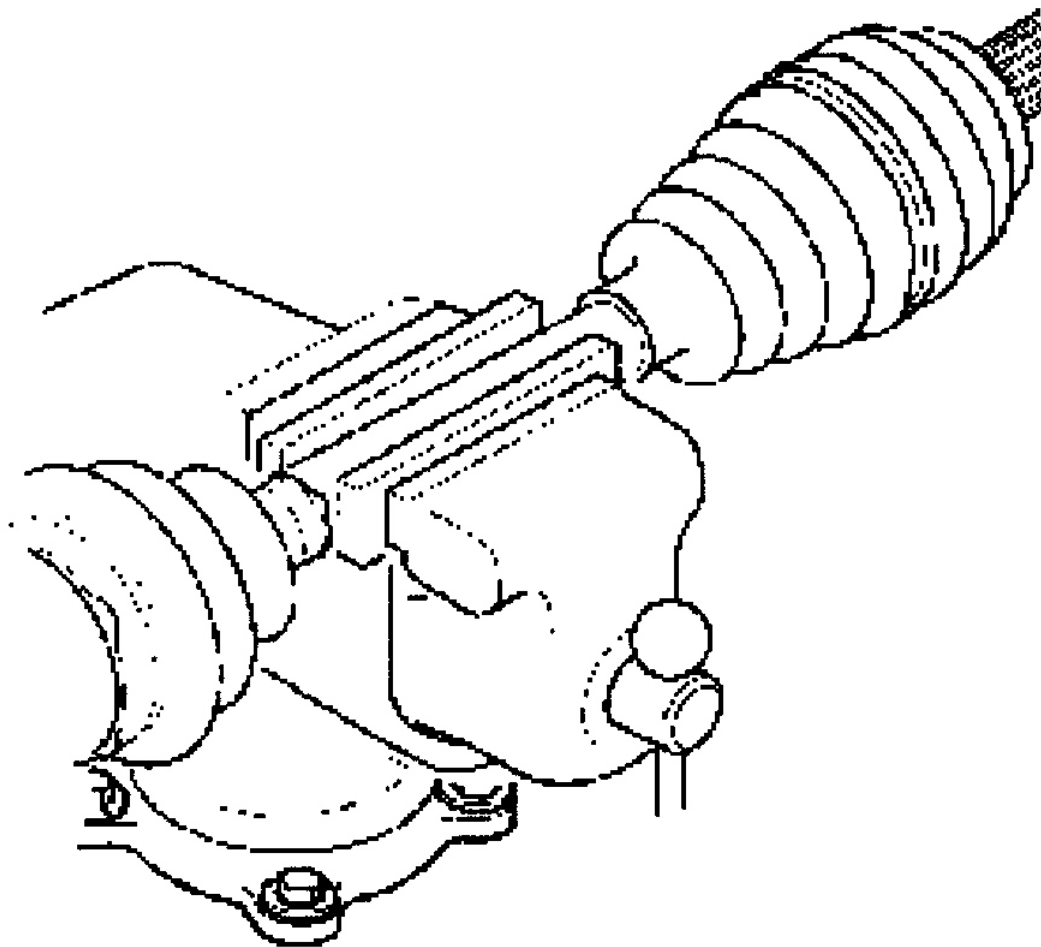
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8. Pull the CV joint from the halfshaft (4).
9. Discard the old seal. See **Fig. 19** .
10. Place a brass drift against the cage (1).
11. Tap gently on the brass drift in order to tilt the cage.
12. Remove the first ball (2) when the cage tilts.
13. Repeat the previous step to remove all of the balls. See **Fig. 20** .
14. Pivot the cage (4) and the inner race 90 degrees to the centerline of the outer race (1). At the same time, align the cage windows (3) with the lands of the outer race (2).
15. Lift out the cage (4) and the inner race. See **Fig. 21** .
16. Remove the inner race (1) from the cage (2) by rotating the inner race (1) upward.
17. Thoroughly degrease all of the CV joint parts.
18. Check the outer CV joint assembly for unusual wear, cracks, or other damage. Replace any damaged parts.
19. Clean the halfshaft bar. Use a wire brush to remove any rust in the seal mounting area (grooves). See **Fig. 22** .

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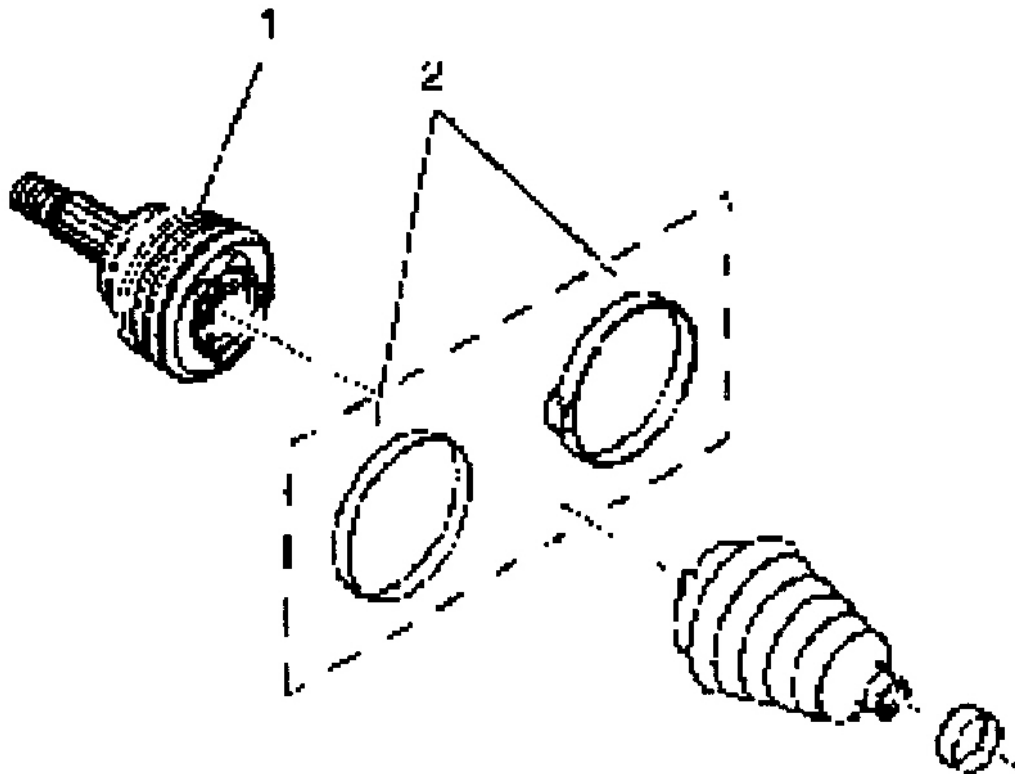


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**Fig. 17: Placing Protective Cover Over The Vise Jaws**  
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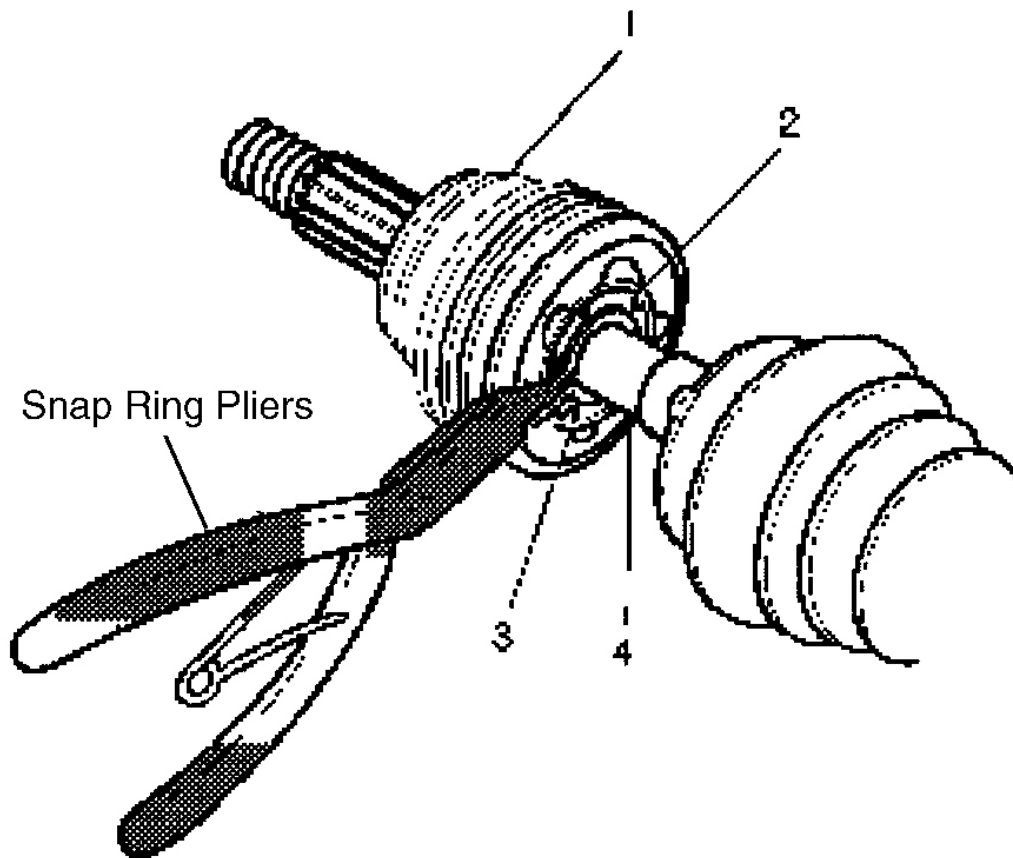


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**Fig. 18: Compressing Seal On The Halfshaft & Away From The CV Joint Outer Race**  
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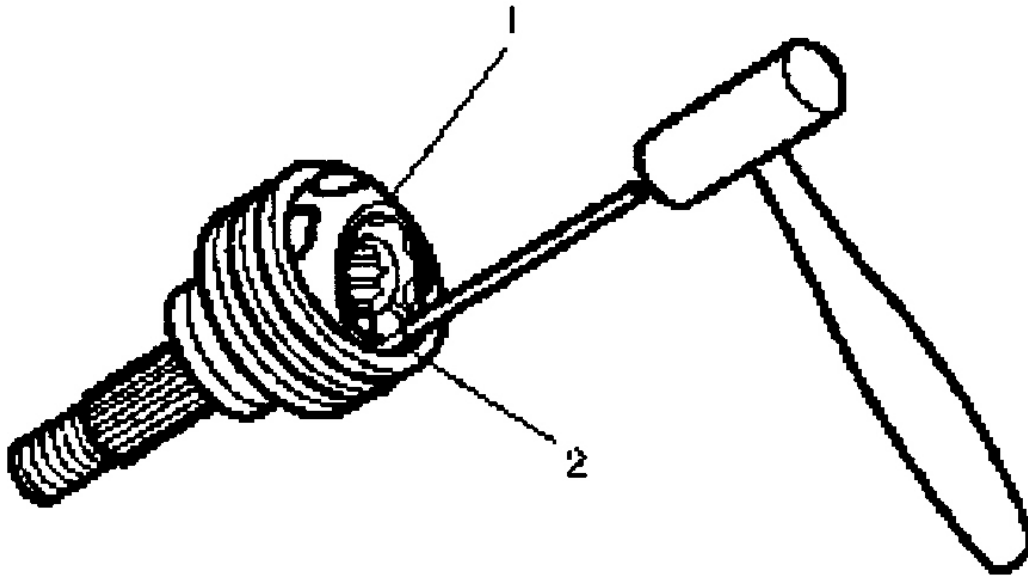


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**Fig. 19: Pulling The CV Joint From The Halfshaft**  
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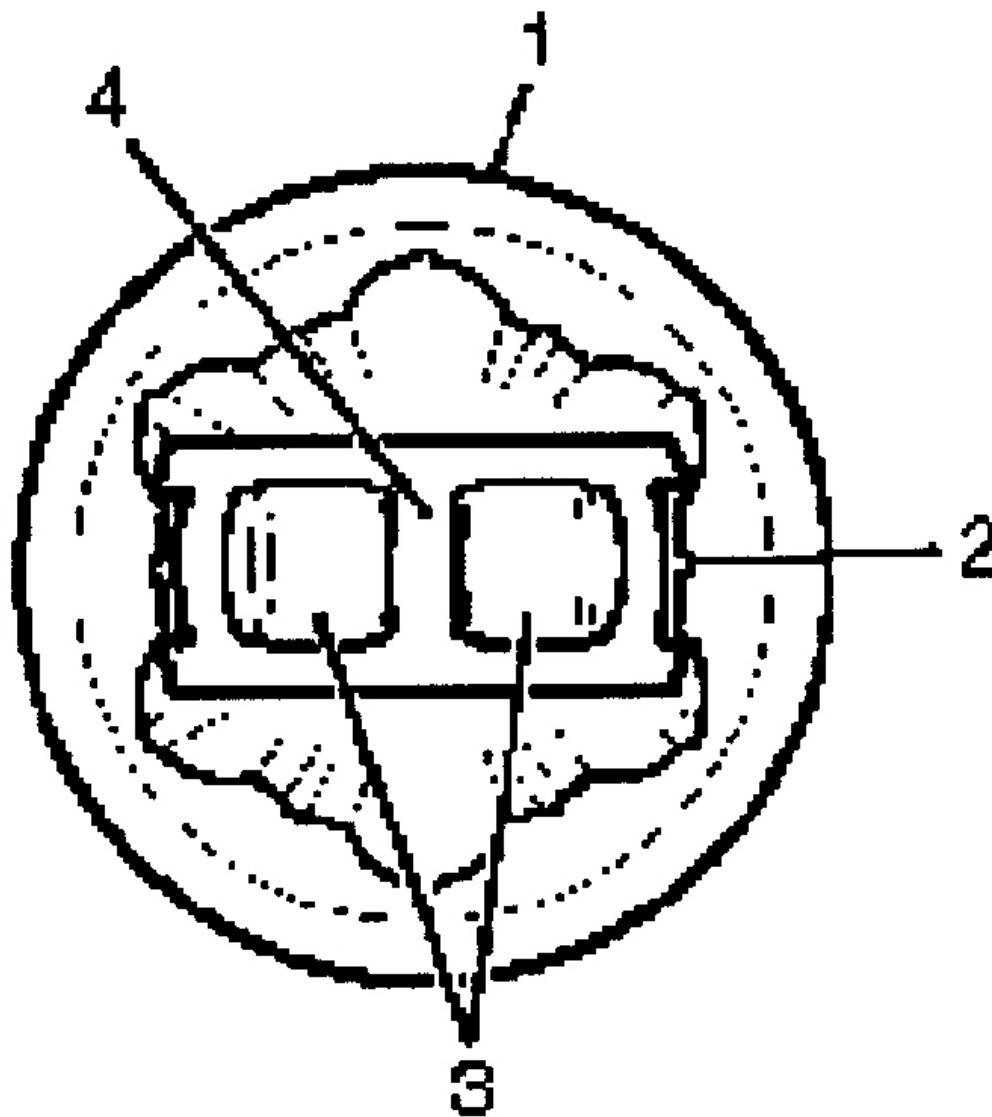
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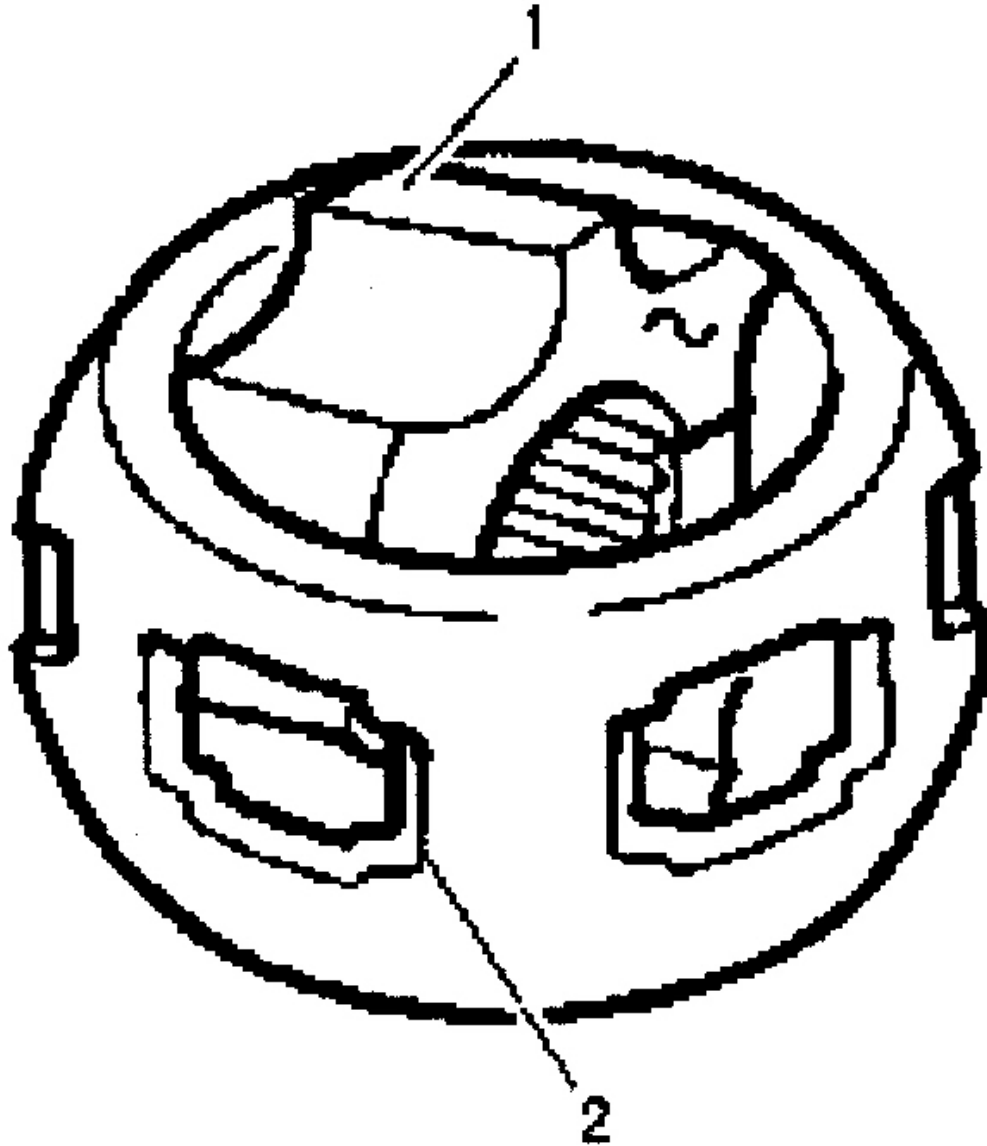
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**Fig. 20: Removing Balls When The Cage Tilts**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 21: Lifting Out The Cage & Inner Race**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 22: Removing Inner Race From The Cage**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

**Reassembly (Inboard Joint)**

1. Position the new swage clamp onto the neck of the boot. Do not swage.

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2. Slide the new small swage clamp (2) and the boot (1) to the proper position (3) on the halfshaft bar. See **Fig. 23**.
3. Position the neck of the boot in the boot groove on the halfshaft bar.
4. In order to swage the swage clamp, position the inboard end (1) of the halfshaft assembly in swage clamp tool. See **Fig. 24**.
5. Align the swage clamp (2) within swage clamp tool. See **Fig. 25**.
6. Place the top half of the swage clamp tool on the bottom half.
7. Check to ensure there are no pinch points on the boot before proceeding.
8. Insert the bolts (2).
9. Tighten the bolts (2) by hand until snug. See **TORQUE SPECIFICATIONS**.
10. Align the following items:
  - The boot
  - The halfshaft bar
  - The swage clamp
11. Loosen the bolts.
12. Separate the dies. See **Fig. 24**.

**NOTE:** If deformities exist in the swage clamp place the swage clamp back into swage clamp tool. Ensure the swage clamp covers the whole swaging area. Re-swage the swage clamp.

13. Check the swage clamp for any "lip" deformities.

**NOTE:** Assemble the joint with the convolute retainer in the correct position. Assemble the joint to meet the specified dimension to avoid boot damage.

14. Install the convolute retainer over the boot capturing four convolutions. See **Fig. 26**.

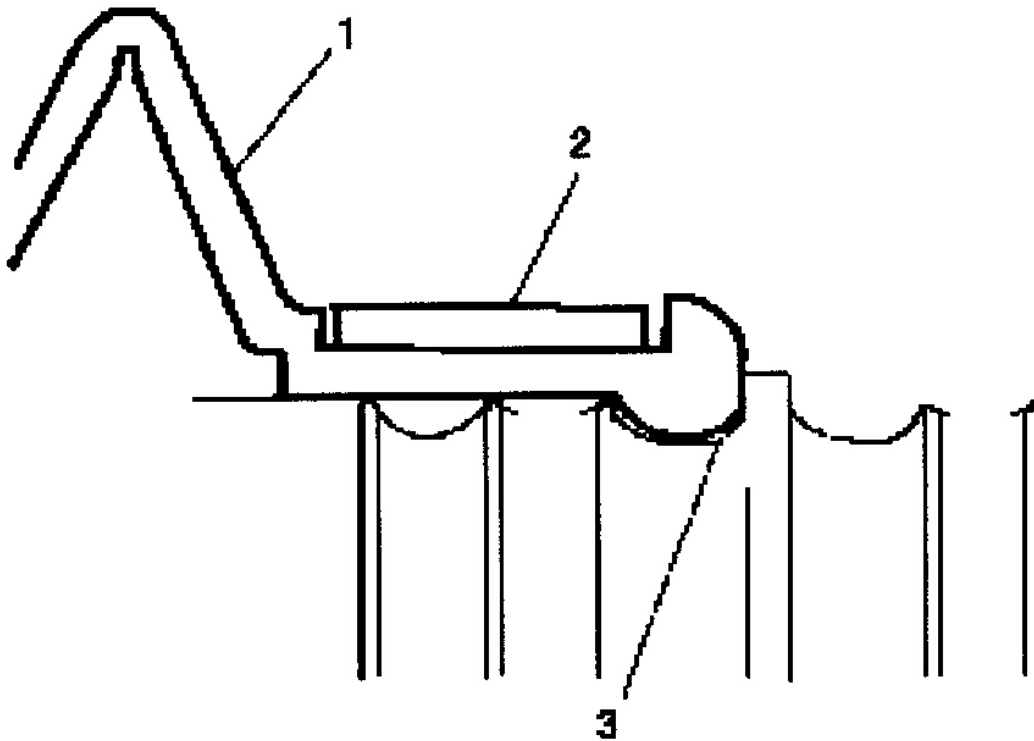
**NOTE:** Ensure that the rings are fully seated

15. Install the spacer ring (2) and spider assembly (1) onto the halfshaft bar (3).
16. Install the other spacer ring in the groove at the end of the halfshaft bar. Ensure that the rings are fully seated. See **Fig. 27**.
17. Pack the boot and housing with the grease supplied in the kit. The amount of grease supplied in this kit has been pre-measured for this application.
18. Place the large retaining clamp (2) on the boot.
19. Place the housing (1) and the new trilobal tri-pot bushing over the spider assembly (3).
20. Install the boot onto the tri-lobal tri-pot bushing. See **Fig. 28**.
21. Check the inboard stroke position. See **Fig. 29**.
  - For male tri-pot housing assembly: dimension a = 11" (280 mm)

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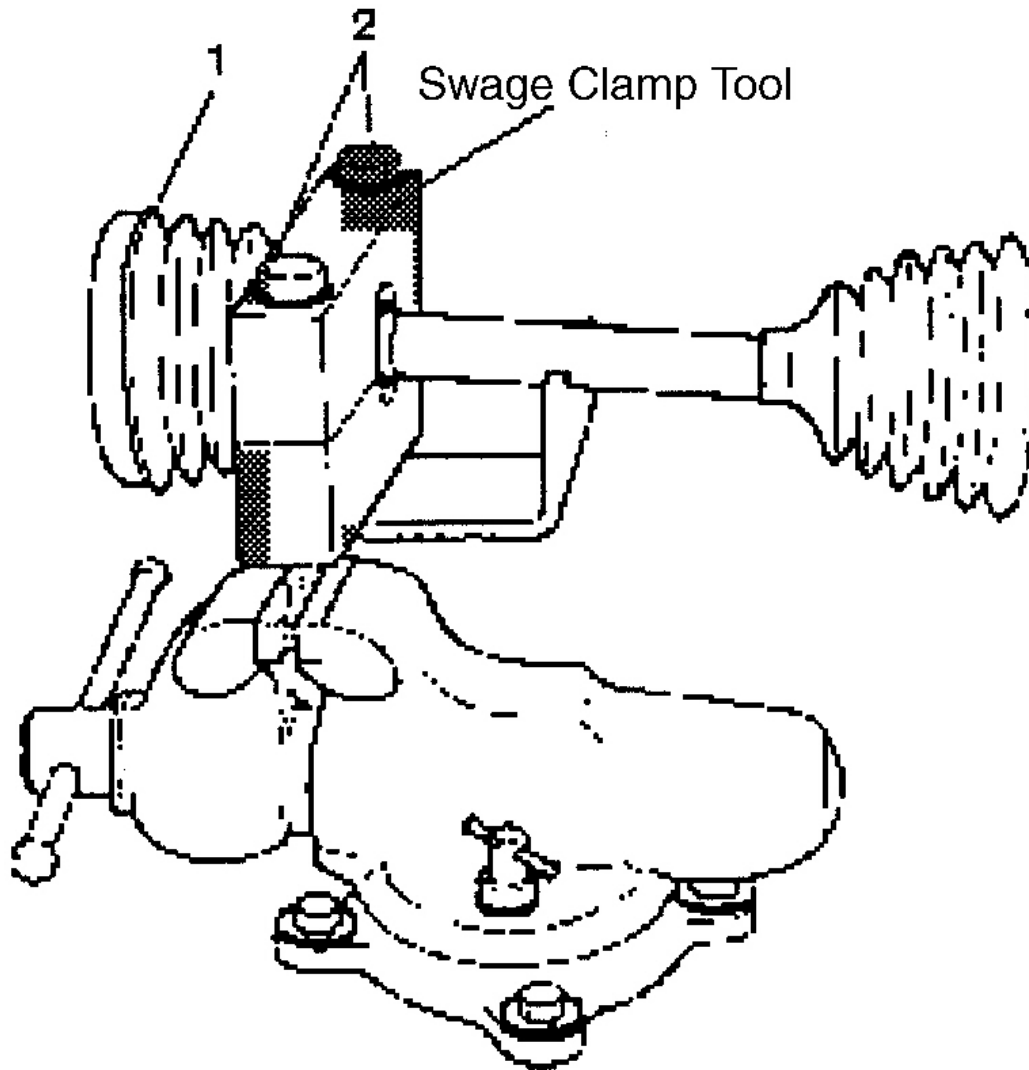
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- For female tri-pot housing assembly: dimension b = 9" (228 m)
22. Secure the large retaining clamp (2) and the boot (3) to the housing (1) using axle seal clamp pliers. See **Fig. 30**.
  23. Remove the convolute retainer from the boot (1). See **Fig. 31**.



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**Fig. 23: Positioning New Small Swage Clamp & Boot On The Halfshaft Bar**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

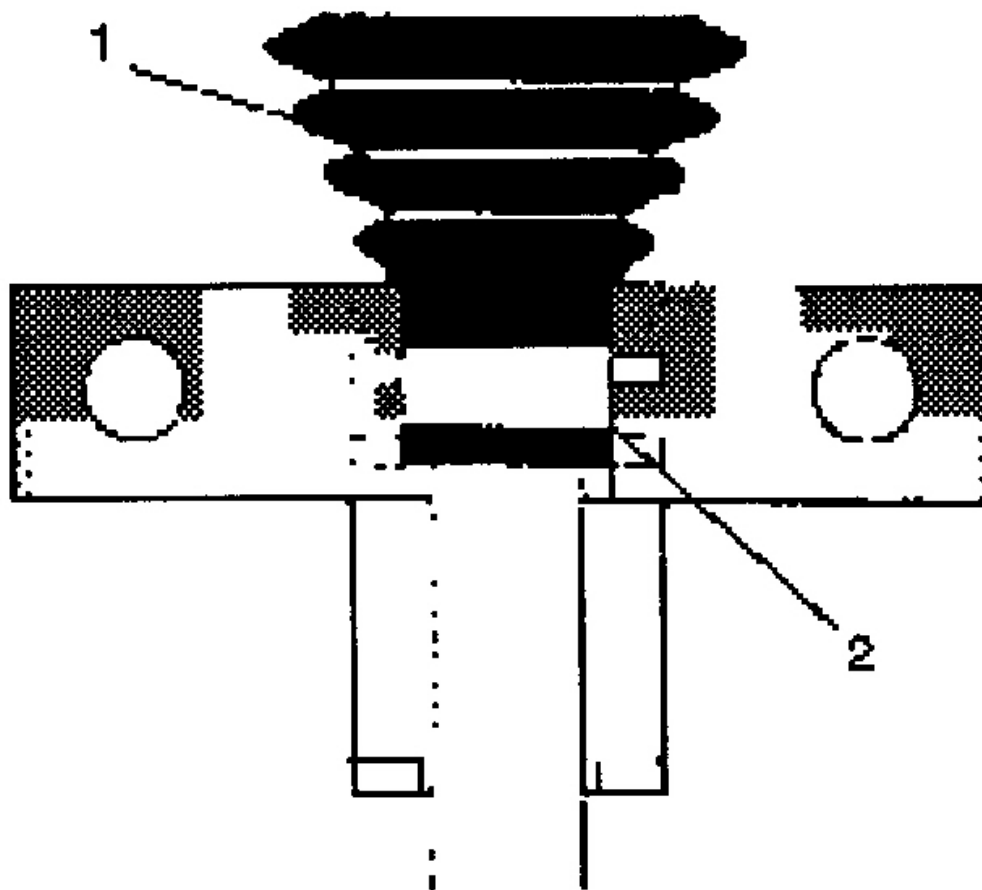


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**Fig. 24: Positioning Inboard End Of The Halfshaft Assembly In Swage Clamp Tool**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

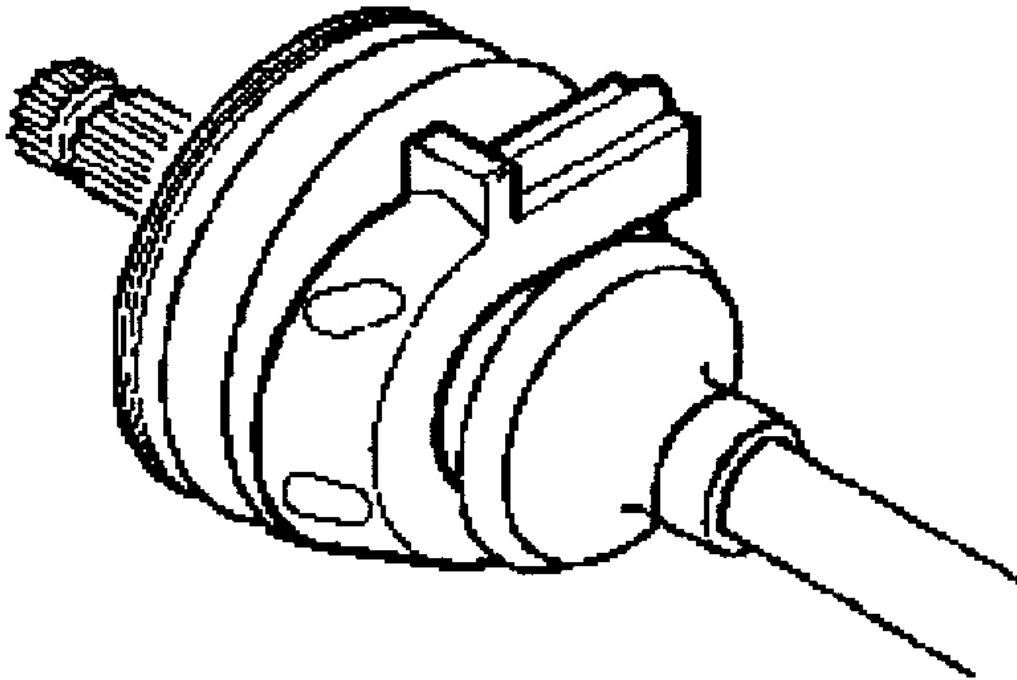
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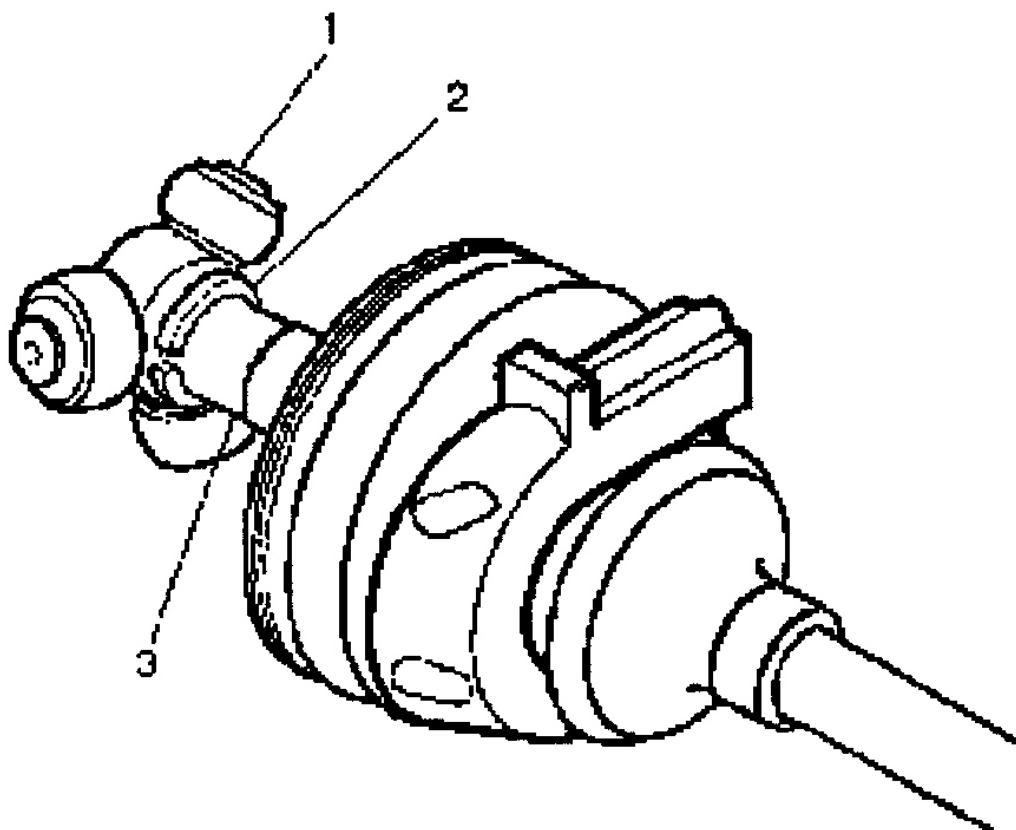
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**Fig. 25: Aligning Swage Clamp Within Swage Clamp Tool**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



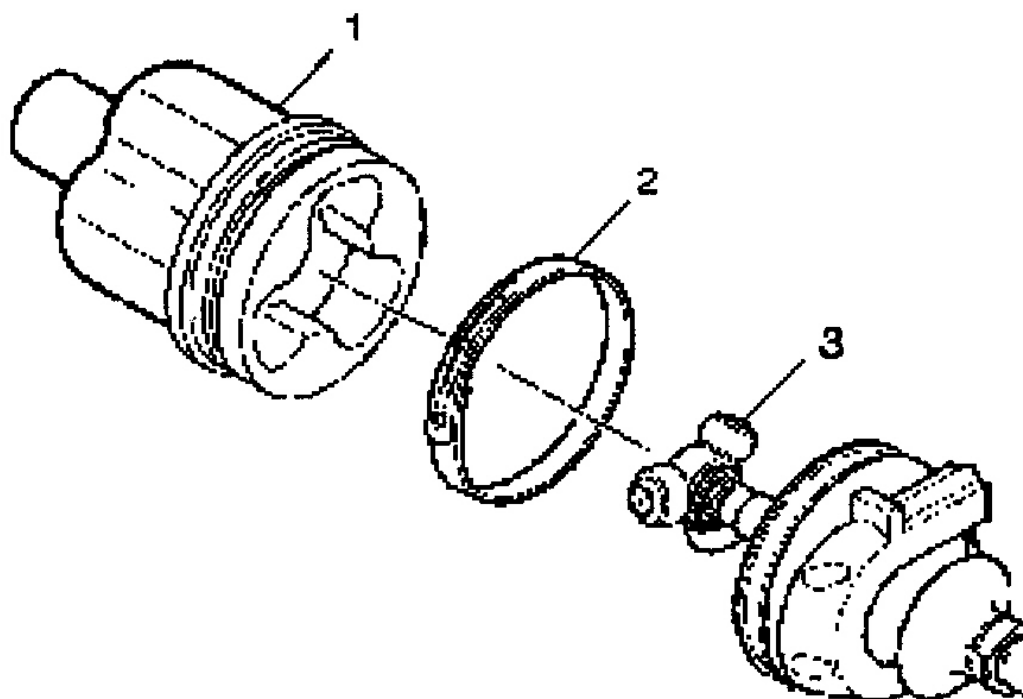
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**Fig. 26: Installing Convolute Retainer Over The Boot**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 27: Installing Spacer Ring In The Groove At The End Of The Halshaft Bar**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

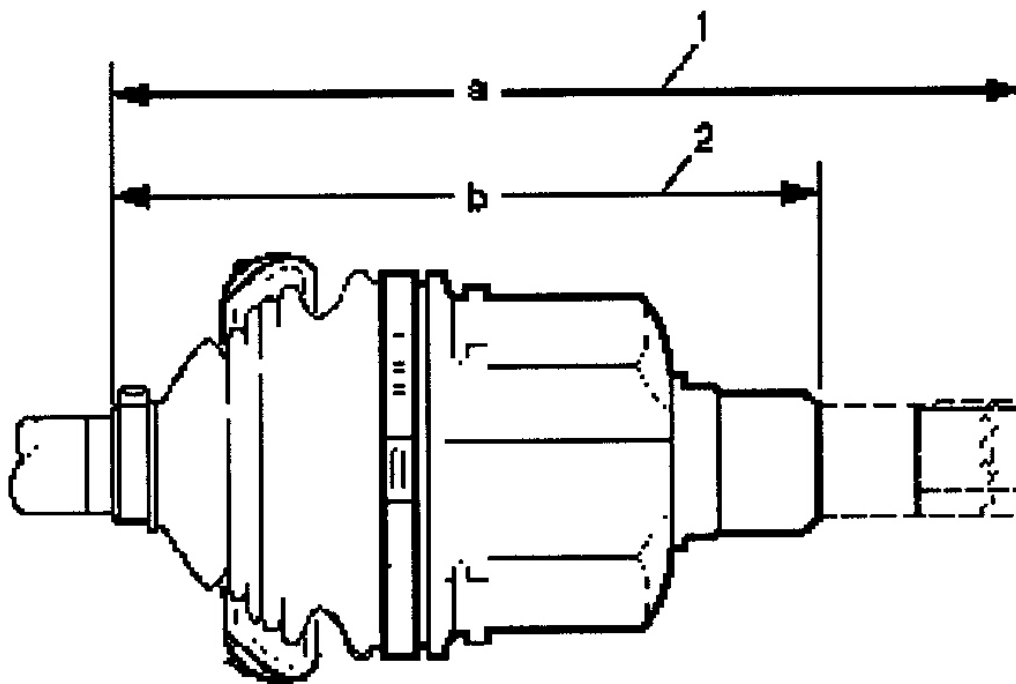


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**Fig. 28: Installing Boot Onto Tri-lobal Tri-pot Housing**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

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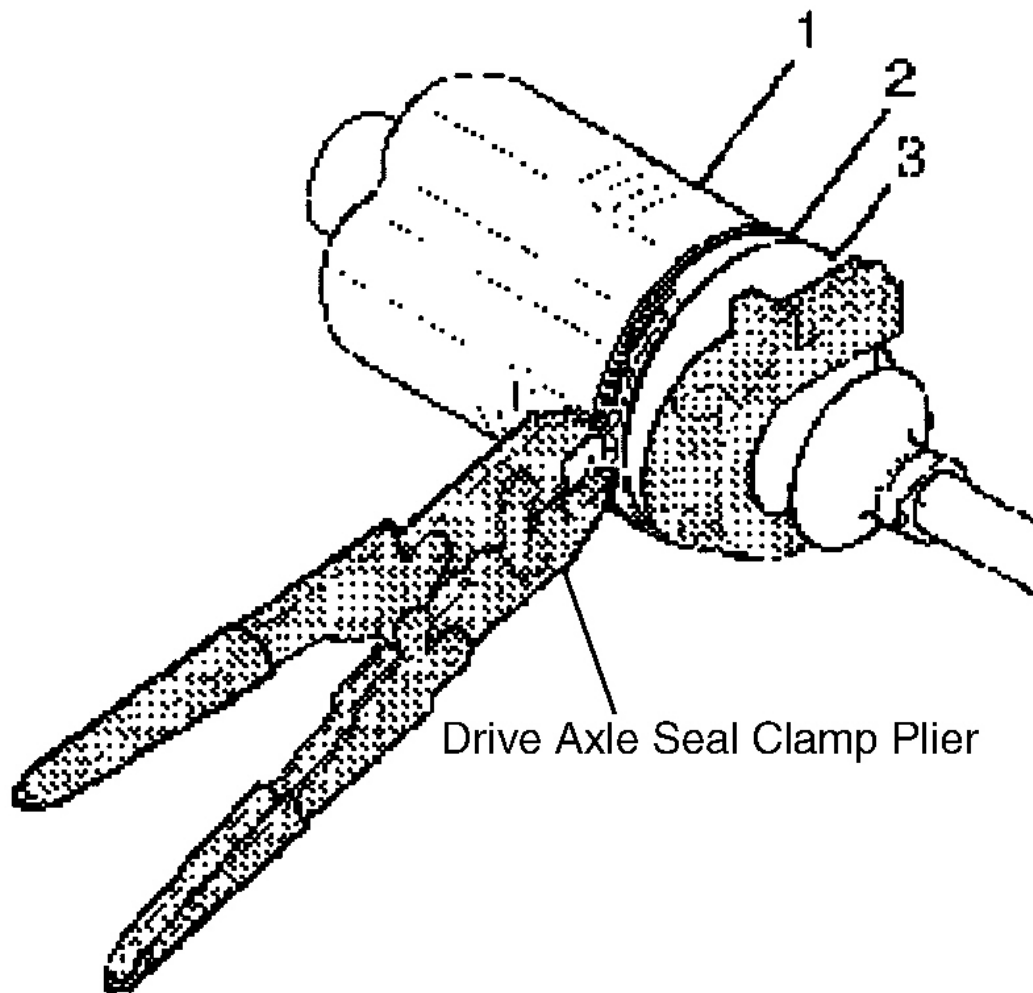


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**Fig. 29: Identifying Inboard Stroke Position Diagram**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

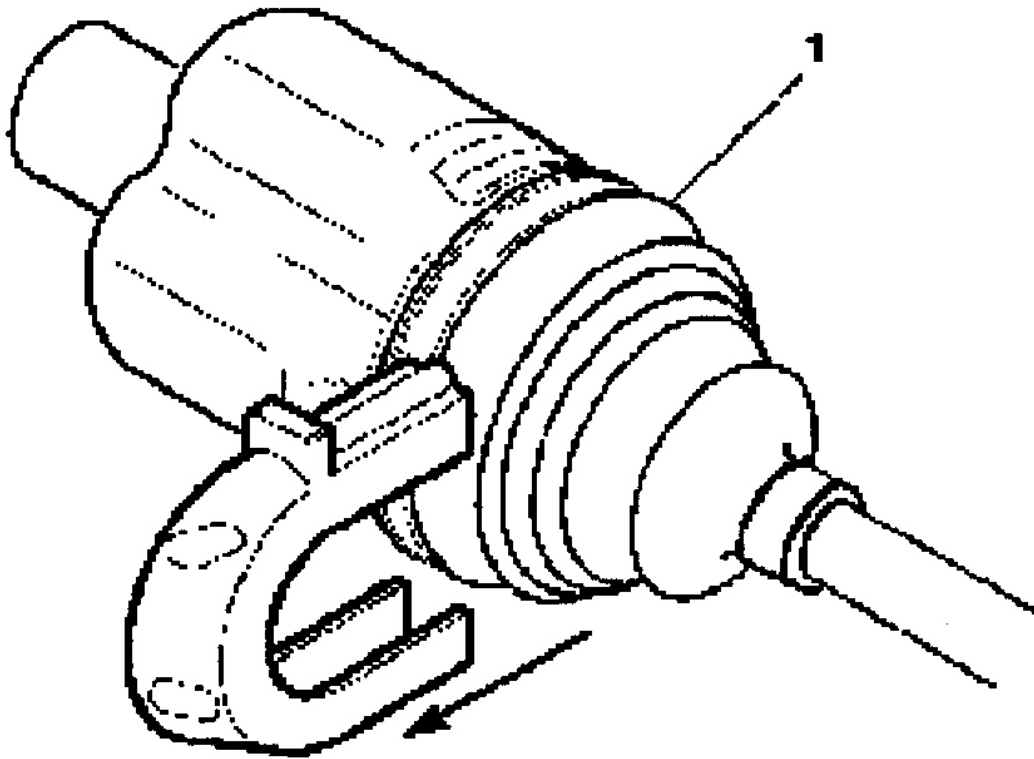
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**Fig. 30: Securing Large Retaining Clamp & The Boot To The Housing**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.



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**Fig. 31: Removing Convolute Retainer From The Boot**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

**Reassembly (Outboard Joint)**

1. Inspect all of the parts for unusual wear, cracks, or other damage.
2. Put a light coat of the recommended grease on the inner and the outer race grooves.
3. Insert the inner race (1) into the cage (2) by rotating the inner race downward.
4. Hold the inner race (1) at 90 degrees to the centerline of the cage. See **Fig. 22** .
5. Align the lands of the inner race (2) with the windows of the cage (3).
6. Rotate the inner race downward to insert the inner race into the cage.
7. Insert the cage (4) and inner race into the outer race (1).
8. Place a brass drift against the cage (1).
9. Tap gently on the brass drift in order to tilt the cage(1).
10. Install the first ball (2) when the cage tilts.
11. Repeat previous step to reinstall all of the balls. See **Fig. 20** .

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12. Pack the CV joint seal and the CV joint assembly with the grease supplied in the kit. The amount of grease supplied in this kit has been pre-measured for this application.
13. Place the new small swage clamp (2) onto the CV joint seal (1).
14. Place the large retaining clamp on the seal (1).
15. Position the small end of the CV joint seal (1) into the joint seal groove (3) on the halfshaft bar. See **Fig. 23**.
16. Position the outboard end of the halfshaft assembly (1) in swage clamp tool. See **Fig. 24**.
17. Align the swage clamp (2) within swage clamp tool. See **Fig. 25**.
18. Place the top half of the swage clamp tool on the bottom half.
19. Check to make sure there are no pinch points on the seal before proceeding with procedures.
20. Insert the bolts (2). Tighten the bolts (2) by hand until snug. See **TORQUE SPECIFICATIONS**.
21. Align the following items:
  - The seal
  - The halfshaft bar
  - The swage clamp
22. Loosen the bolts. See **Fig. 24**.
23. Separate the dies.
24. Check the swage clamp for any "lip" deformities. If the deformities exist, place the swage clamp back into the swage clamp tool.

**NOTE:**        **Ensure that the retaining ring side of the CV joint inner race faces the halfshaft bar (1) before installation.**

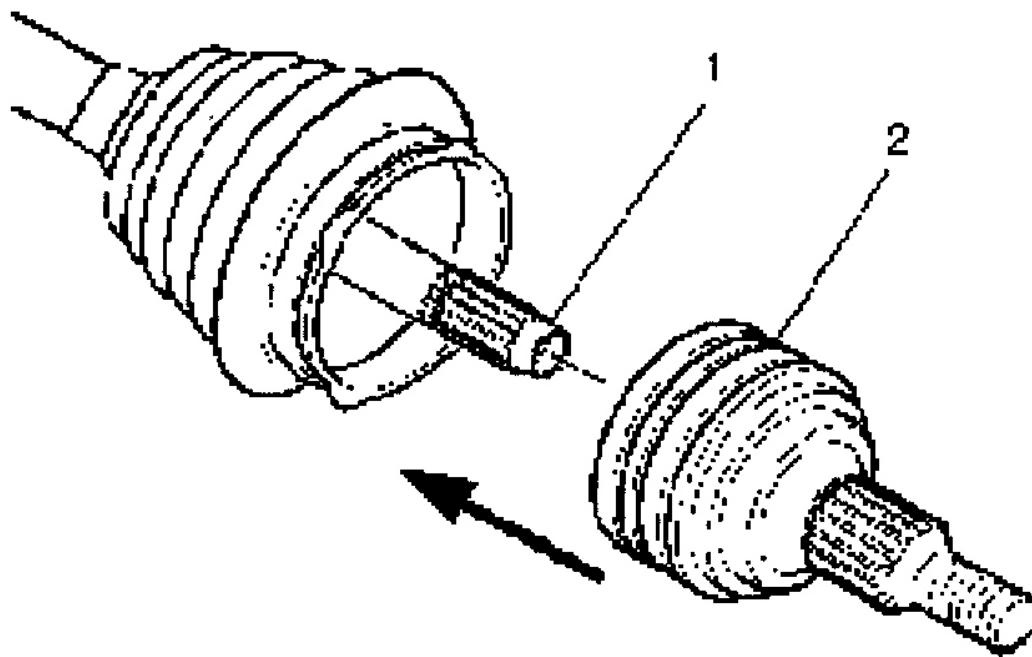
25. Place the retaining snap ring into the CV joint inner race.

**NOTE:**        **The retaining snap ring inside of the inner race engages in the halfshaft bar groove with a click when the CV joint is in the proper position.**

26. Slide the CV joint (2) onto the half-shaft bar (1).
27. Pull on the CV joint (2) to verify engagement. See **Fig. 32**.
28. Slide the large diameter of the CV joint seal (1), with the large retaining ring (2) in place, over the outside edge of the CV joint outer race (3).
29. Position the lip of the CV joint seal (1) into the groove on the CV joint outer race (3).
30. Manipulate the CV joint seal (1) to remove any excess air. See **Fig. 33**. Tighten large retaining clamp to the specifications. See **TORQUE SPECIFICATIONS**.
31. Secure the large retaining clamp (1) to the housing with seal clamp tool (or equivalent), a breaker bar (3), and a torque wrench (2).
32. Check the gap dimension on the clamp ear. See **Fig. 34**.

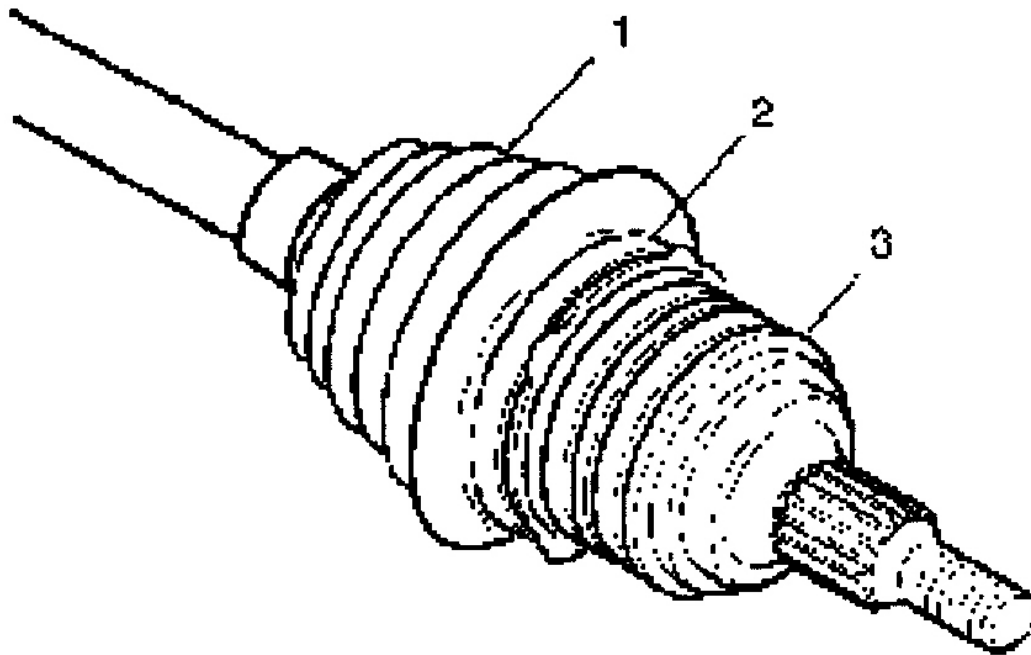
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**Fig. 32: Sliding CV Joint Onto The Half-Shaft Bar**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

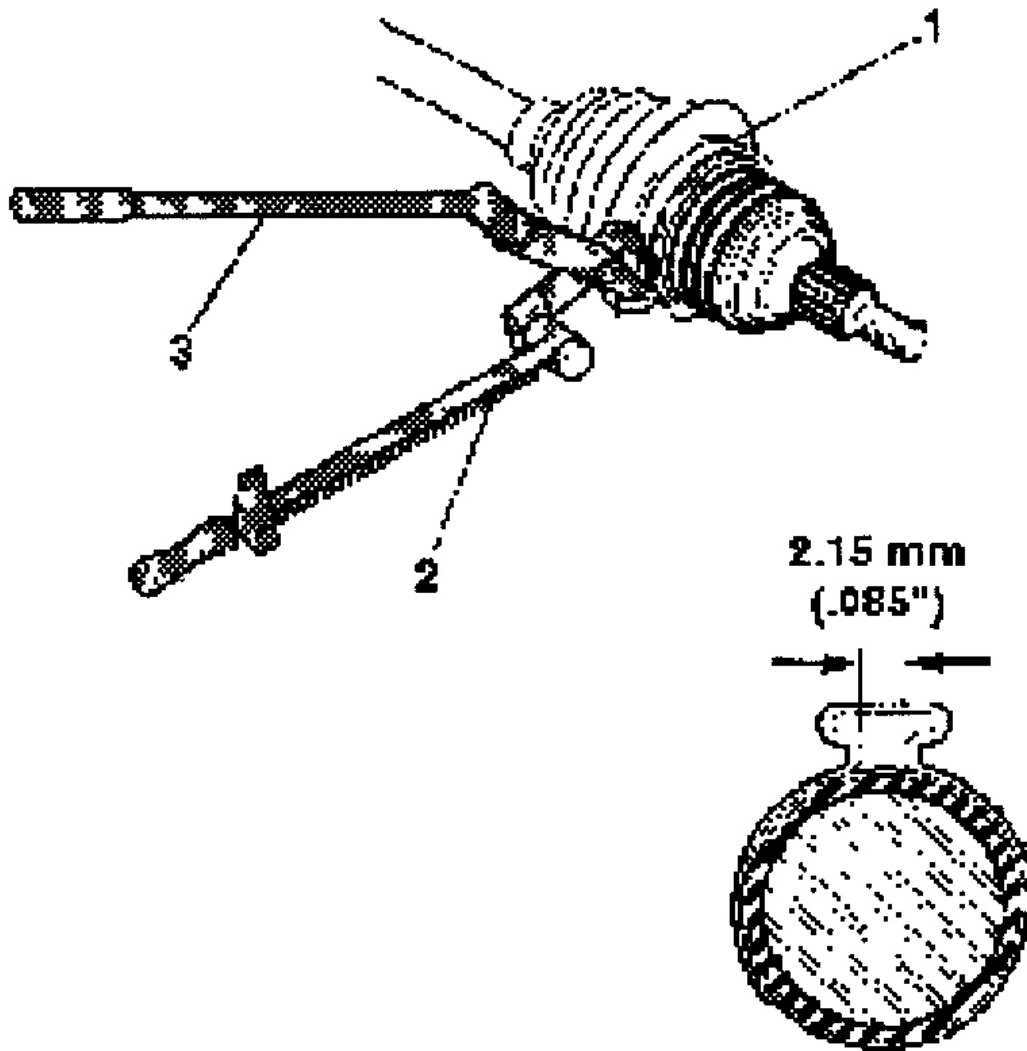


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**Fig. 33: Manipulating CV Joint Seal**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

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**Fig. 34: Checking Gap Dimension On The Clamp Ear**  
Courtesy of ISUZU TRUCK OF AMERICA, INC.

### Installation

1. Install the front wheel axle front differential assembly.
2. Remove the mechanics wire or hook from the front shock module/steering.
3. Install the front wheel axle in the steering knuckle.
4. Position the shock module in the shock tower.
5. Install the shock module into the shock tower.

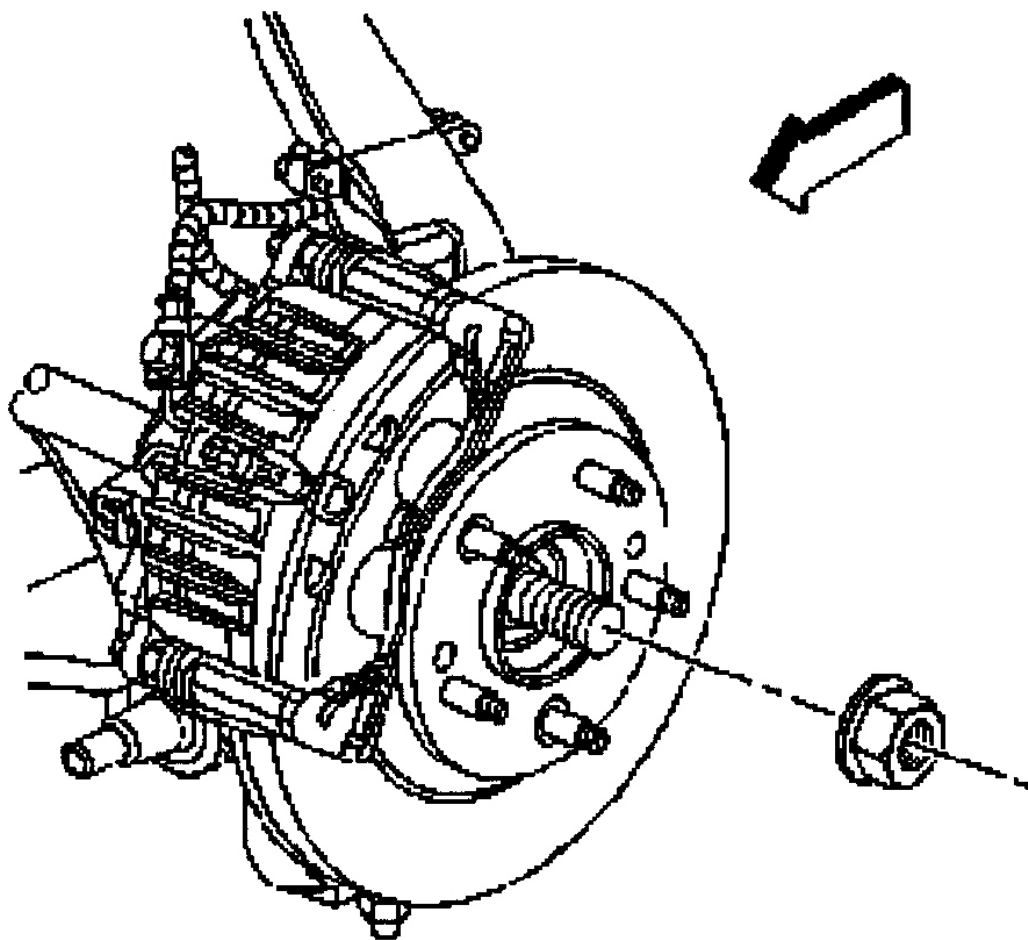
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6. Install the upper ball joint in the upper control arm. See **Fig. 12** .
7. Install the pinch bolt and nut. See **TORQUE SPECIFICATIONS** . See **Fig. 11** .
8. Install the shock module retaining nuts. See **Fig. 9** .
9. Install the new front wheel axle shaft retaining nut. See **Fig. 35** .
10. Install the tie rod end in the steering knuckle. See **Fig. 36** .
11. Install the stabilizer bar link. See **Fig. 7** .
12. Install the front brake hose retaining bolt. See **Fig. 6** .
13. Install the front wheel speed sensor wiring harness in the retainers. See **Fig. 4** .
14. Reconnect the front wheel speed sensors electrical connector. See **Fig. 5** .
15. Install the engine protection shield. See **Fig. 3** .
16. Install the tire and wheel assembly.
17. Lower the vehicle. See **Fig. 2** .

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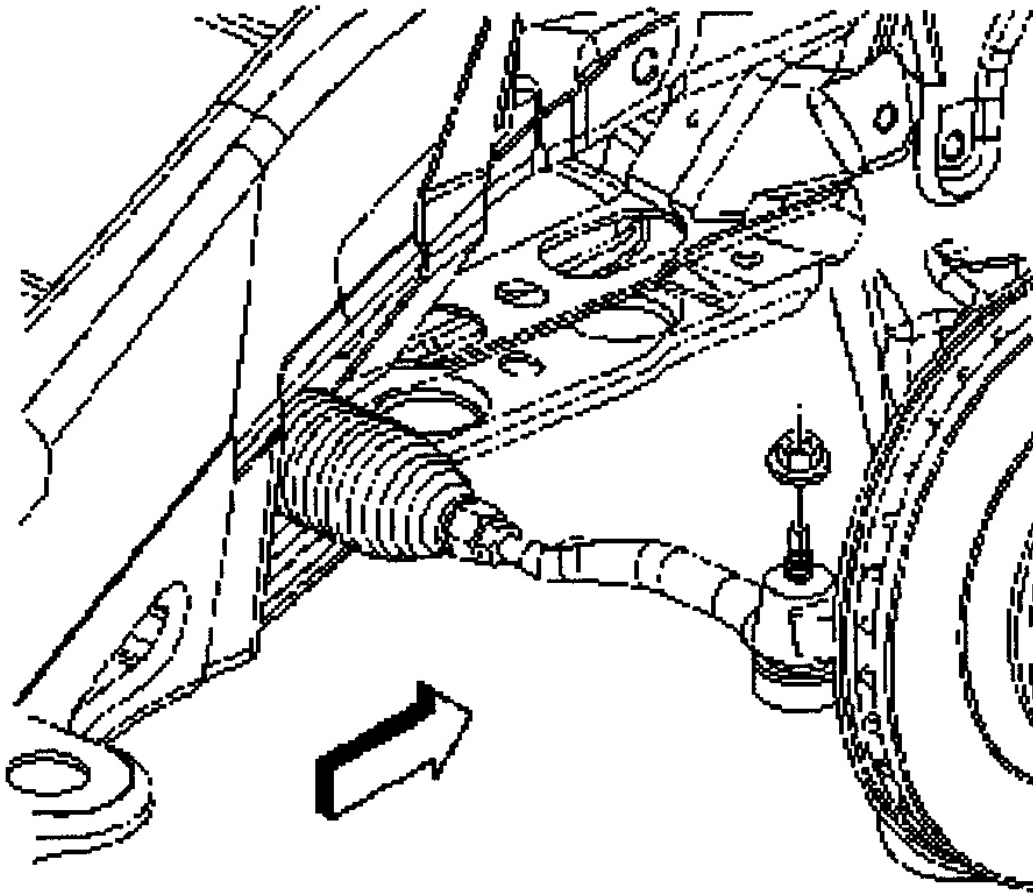


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**Fig. 35: Installing New Front Wheel Axle Shaft Retaining Nut**  
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**Fig. 36: Installing Tie Rod End In The Steering Knuckle**  
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## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Brake Caliper Mounting Bracket Bolt	52 (70)
Large Retaining Clamp	130 (176)
Shock Module Upper Retaining Nut	33 (45)
Swage Clamp Bolt	(1)
Upper Control Arm Pinch Bolt/Nut	30 (40)
Wheel Axle Shaft Boot (Installation)	130 (176)
Wheel Axle Shaft Nut	103 (140)

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	INCH Lbs. (N.m)
Brake Hose Bracket Retaining Bolt	88 (10)
(1) Each bolt 180 degrees at a time, using ratchet wrench. Alternate between each bolt until both sides are bottomed.	