DIFFERENTIAL & DRIVELINE

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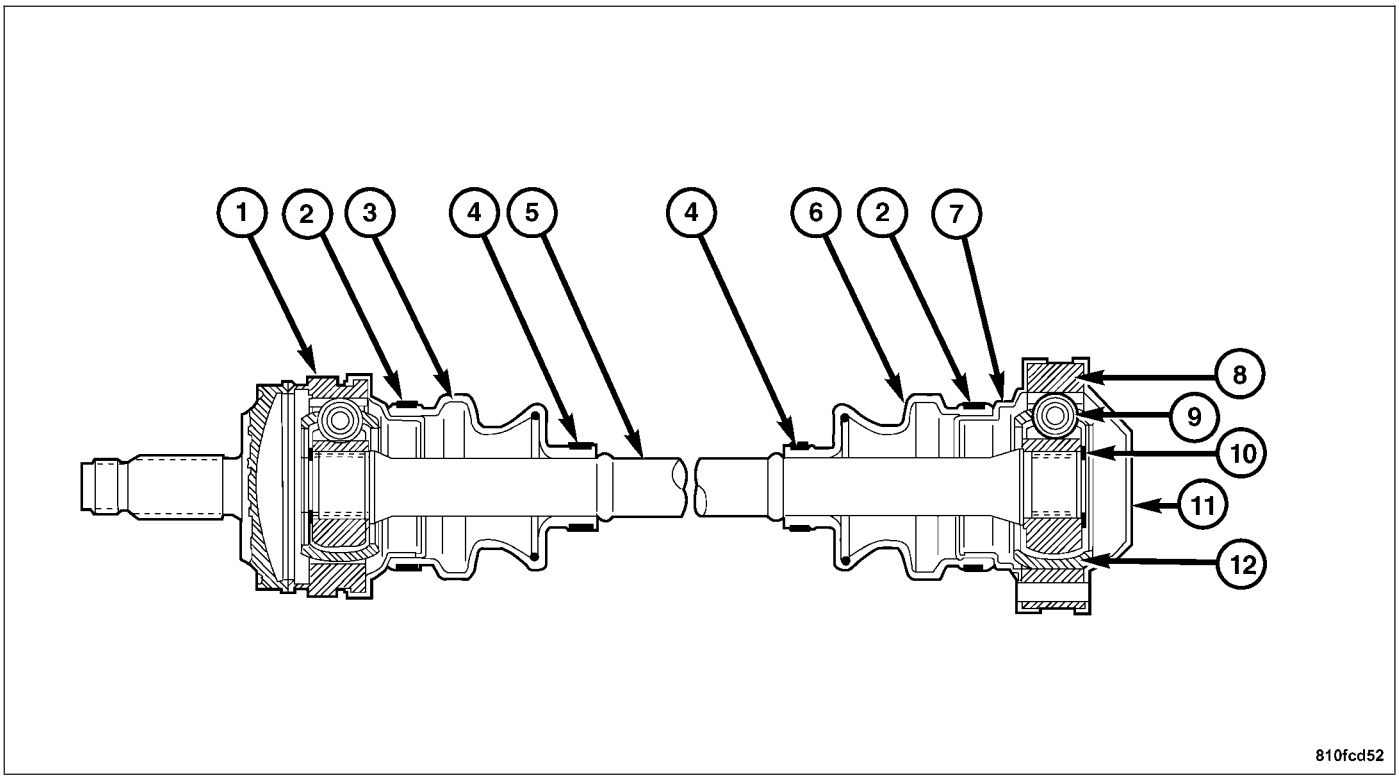
HALFSHAFTS

TABLE OF CONTENTS

HALFSHAFTS

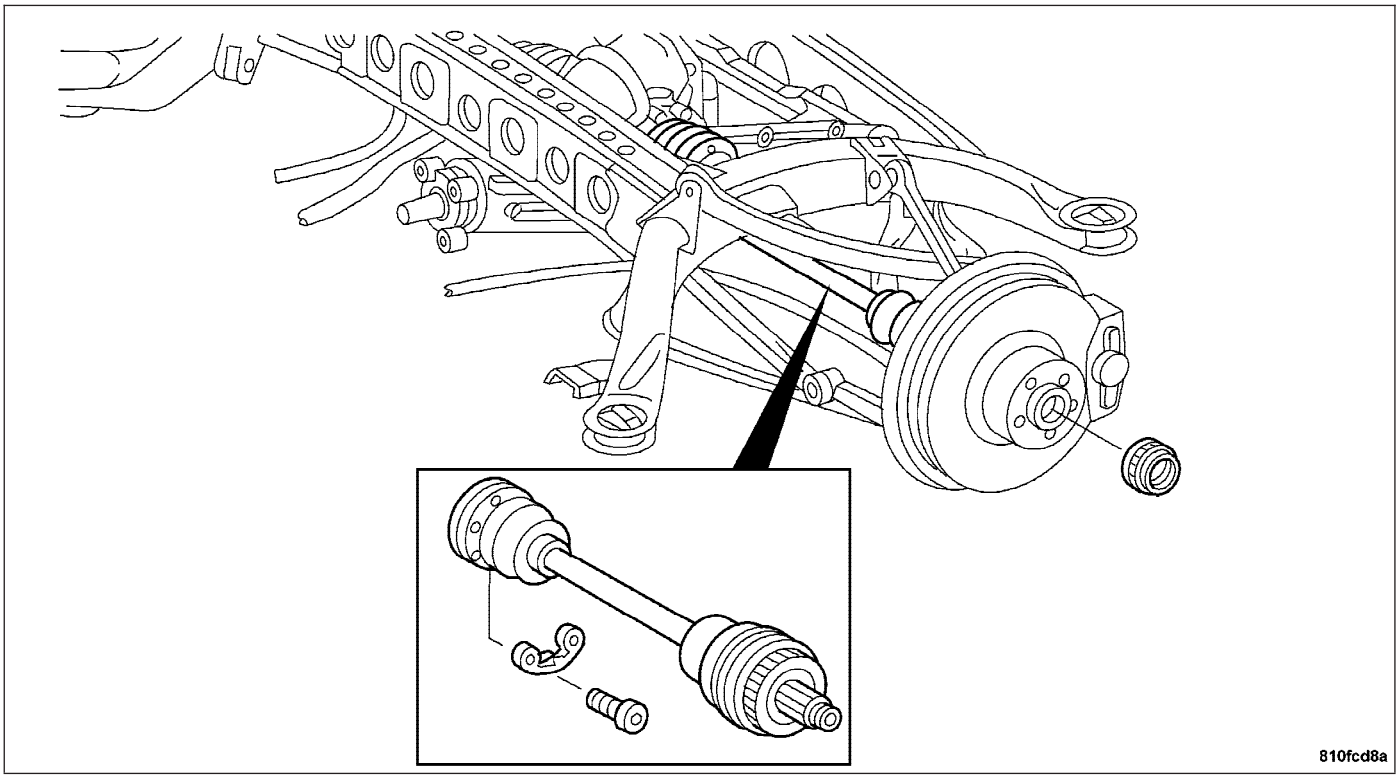
DESCRIPTION



1 - CV JOINT OUTER RACE
2 - RETAINING CLAMP
3 - OUTER BOOT
4 - RETAINING CLAMP
5 - AXLE SHAFT
6 - INNER BOOT
7 - INNER SEAL (INNER SHOWN, OUTER SIMILAR)
8 - JOINT RING (INNER SHOWN, OUTER SIMILAR)
9 - BEARING (INNER SHOWN, OUTER SIMILAR)
10 - CIRCLIP
11 - INNER CV JOINT COVER
12 - OUTER BEARING RETAINER (INNER SHOWN, OUTER SIMILAR)

Articulated halfshafts deliver power from the rear differential to the wheels through constant velocity (CV) joints that minimize vibration.

OPERATION



Halfshaft assemblies are designed to transmit power from the differential to the wheels, while allowing for powertrain and suspension flex.

DIAGNOSIS AND TESTING - DRIVELINE

HALFSHAFT VISUAL INSPECTION

1. Check for grease in the vicinity of the inboard and outboard CV joint. If grease is present, this may be a sign that the inner or outer boots, or the retaining clamps are damaged.
2. A light film of grease may appear on the inner CV boot; this is considered normal and should not require replacement of the boot. All inner CV boots are made of silicone rubber; which will allow weeping of the joint lubricant to pass through the boot while in operation.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise and/or a vibration could be caused by one of the following conditions:

1. Damaged inner or outer CV boots or retaining clamps. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.
2. Noise may also be caused by another component of the vehicle coming in contact with the halfshafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of one of the following conditions:

1. A torn boot on the inner or outer CV joint of the halfshaft assembly.
2. A loose or missing retaining clamp on the inner or outer CV boot of the halfshaft assembly.
3. A damaged or worn halfshaft CV joint.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of:

1. A worn or damaged halfshaft inner joint.
2. A sticking CV joint assembly.
3. Improper wheel alignment.

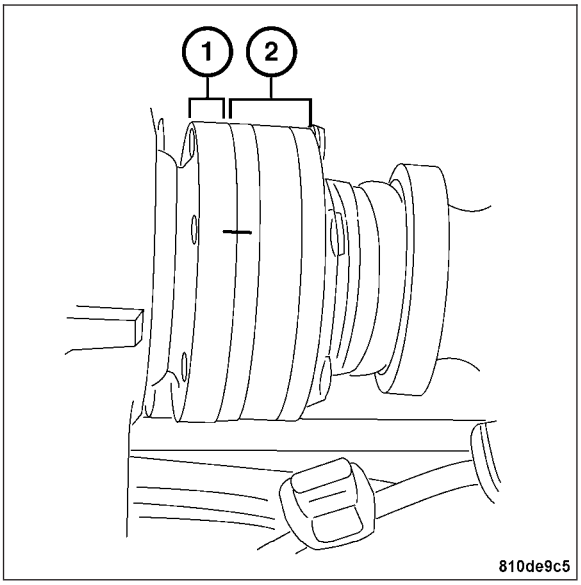
VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

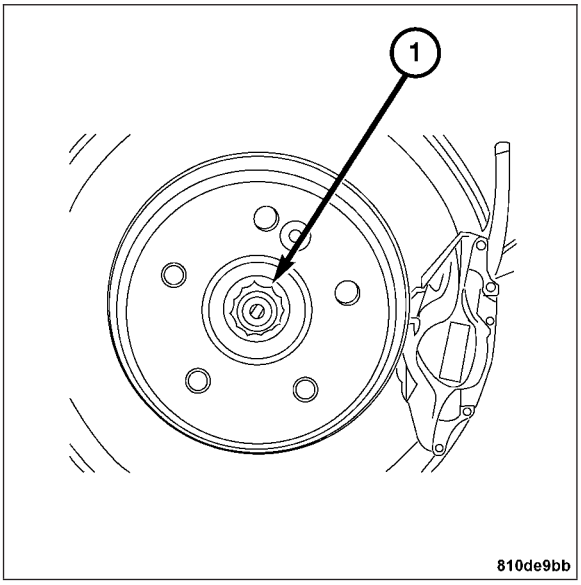
1. Foreign material (mud, snow, etc. packed on the backside of the wheels).
2. Out of balance tires or wheels.
3. Improper tire and/or wheel runout.

REMOVAL

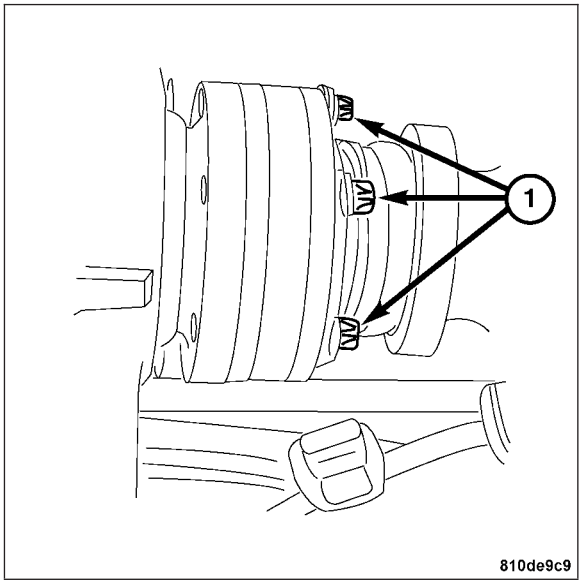
1. Raise and support the vehicle.
2. Remove the rear wheels.
3. Remove the muffler. **Refer to Page 11-10**.
4. Place an index mark across the halfshaft (1) and the differential connecting flange (2) (as shown).



5. Remove the halfshaft outer retaining nut (1).
6. Push the halfshaft outer end through the wheel hub.

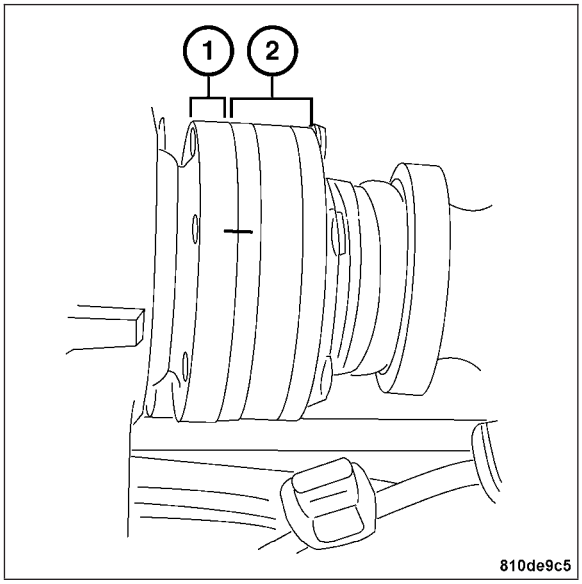


7. Remove the halfshaft retaining bolts and flanges (1).
8. Separate the halfshaft from the differential connecting flange and remove the halfshaft from the vehicle.



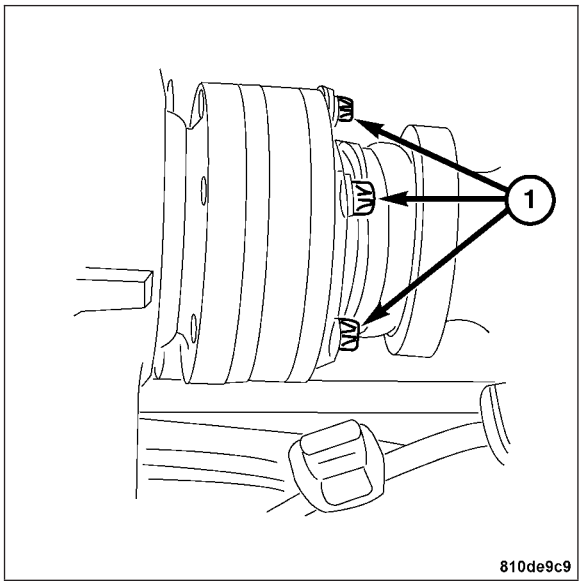
INSTALLATION

1. Insert the halfshaft outer end through the wheel hub.
2. Align the index marks on the differential connecting flange (1) and the halfshaft flange (2).



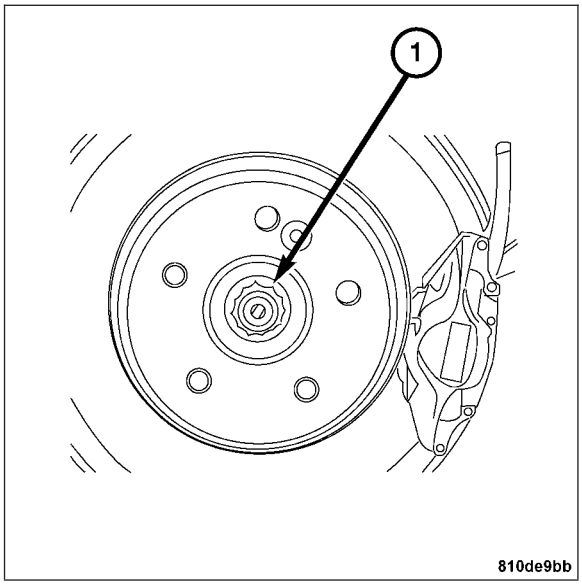
Note: New halfshaft bolts must be used.

3. Lubricate the halfshaft bolts (1) with oil. Install the halfshafts and bolts on the connecting flanges. Tighten the halfshaft bolts to 70 N·m (52 ft. lbs.).



Note: A new halfshaft outer retaining nut must be used.

4. Install the halfshaft outer retaining nut (1). Tighten the nut to 220 N·m (164 ft. lbs.).
5. Install the muffler. **Refer to Page 11-12**.
6. Install the rear wheels. **Refer to Page 22-42**.



SPECIFICATIONS - TORQUE

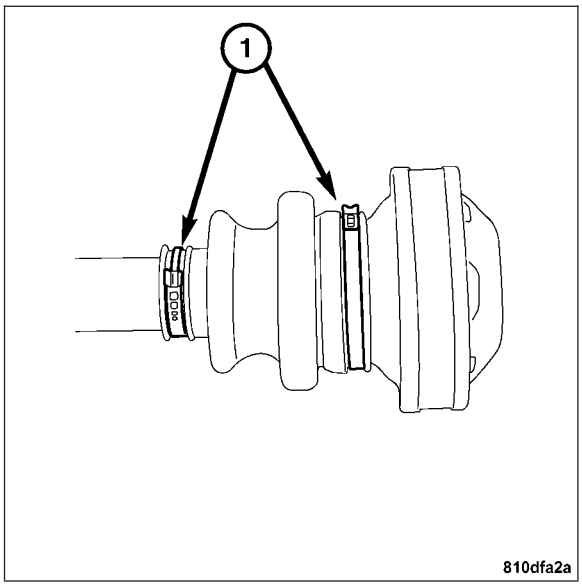
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Halfshaft Outer Retaining Nut	220	164	—
Halfshaft Connecting Flange Bolts	70	52	—

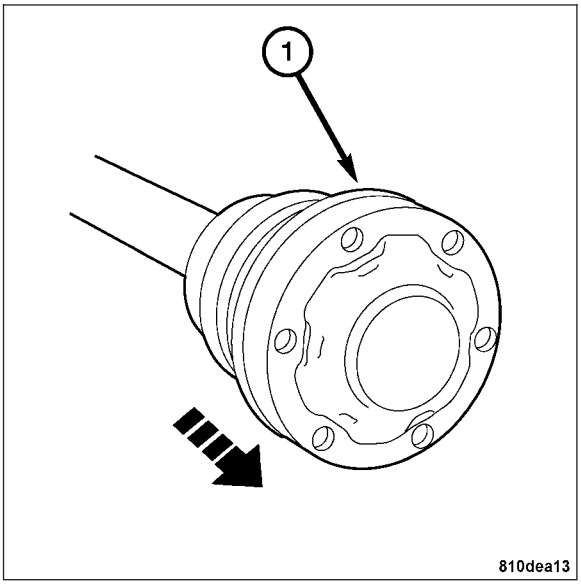
CV BOOT - INNER

REMOVAL

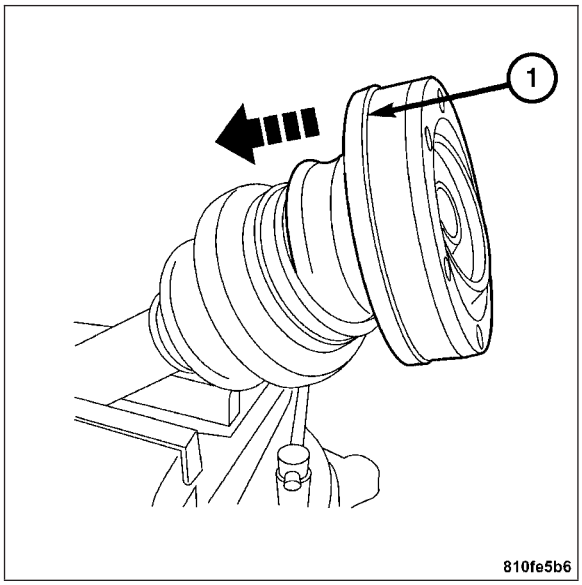
1. Remove the halfshaft from the vehicle. **Refer to Page 3-4**.
2. Remove and discard both inner CV boot retaining clamps (1).



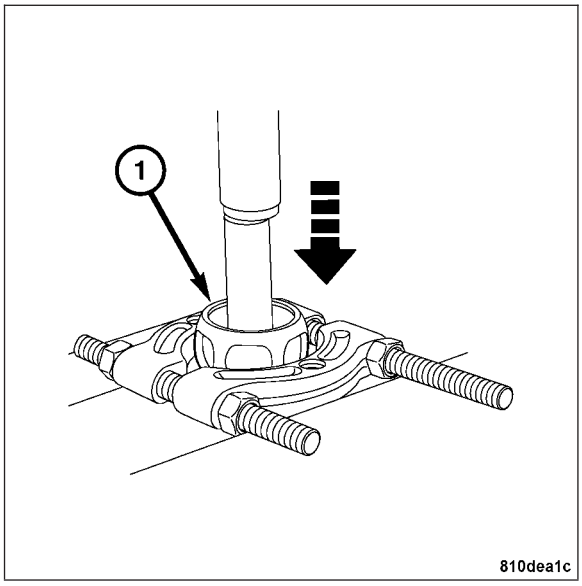
3. Clamp the halfshaft in a vise.
4. Use a suitable tool to remove the inner CV joint cover (1) from the bearing retainer.



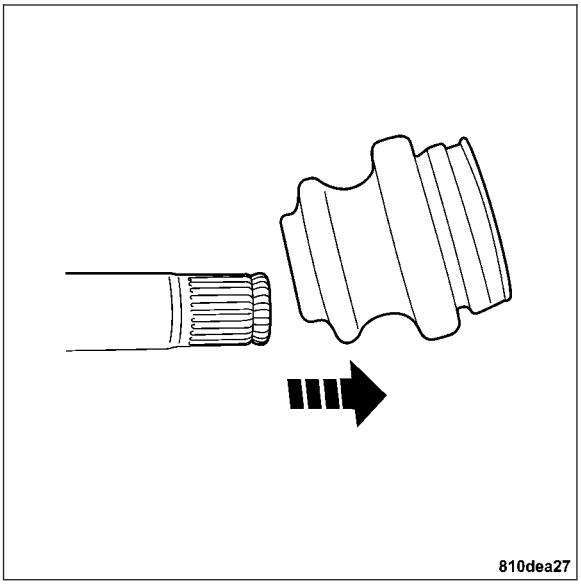
5. Slide the CV boot away from the inner seal (1).
6. Use a suitable tool and remove the inner seal (1) from the bearing retainer.
7. Slide the CV boot, inner seal, and the bearing retainer down the axle shaft away from the inner bearing.
8. Remove the CV joint circlip from the axle shaft.



9. Using a press, remove the CV joint bearing (1) from the axle shaft.

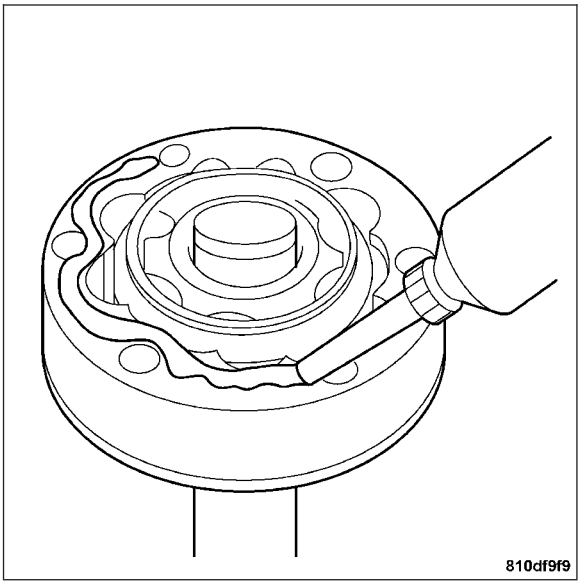


10. Slide the bearing retainer, inner seal, and the inner CV boot off of the axle shaft.

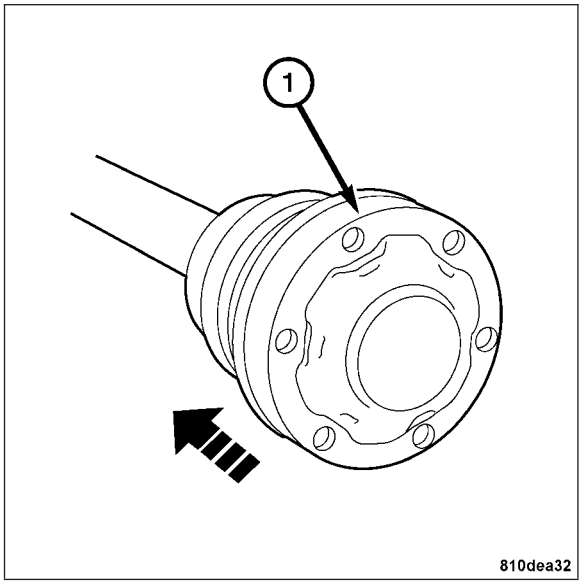


INSTALLATION

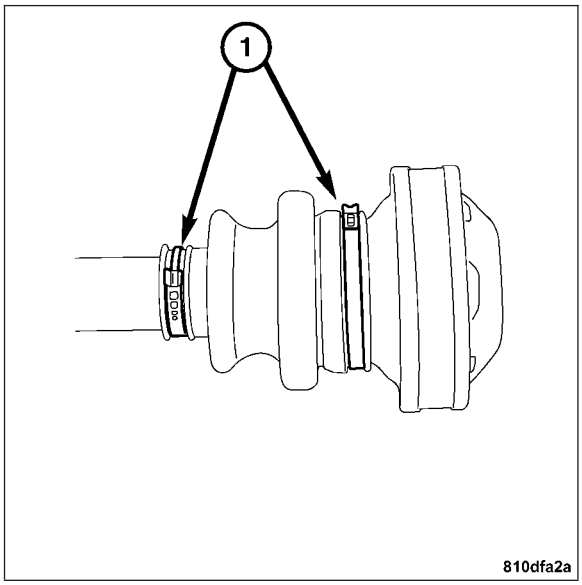
1. Clean and inspect the CV joint for wear and pitting. Replace as required. **Refer to Page 3-16**.
2. Remove any road grime and debris from the axle shaft splines.
3. Before installing the CV boot, cover the shaft splines to protect the CV boot during installation.
4. Slide the inner CV boot on the axle shaft.
5. Remove the protective cover from the axle shaft splines.
6. Install the CV joint bearing to the axle shaft.
7. Install the CV joint circlip to the axle shaft.
8. Pack the bearing cavity with grease supplied in the repair kit.
9. Apply a bead of sealant to the outer sealing surface of the inner CV joint ring (as shown).



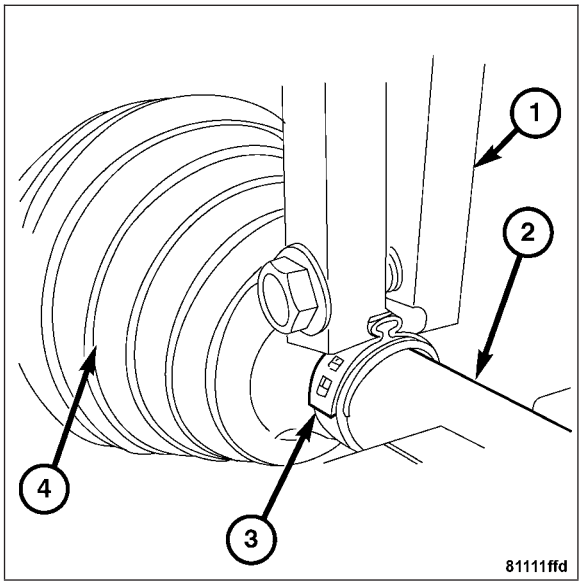
10. Using a mallet, tap on a new inner CV joint cover (1).



11. Install the CV boot into the sealing groove of the inner seal.
12. Position the inner and outer retaining clamps (1) on the CV boot.

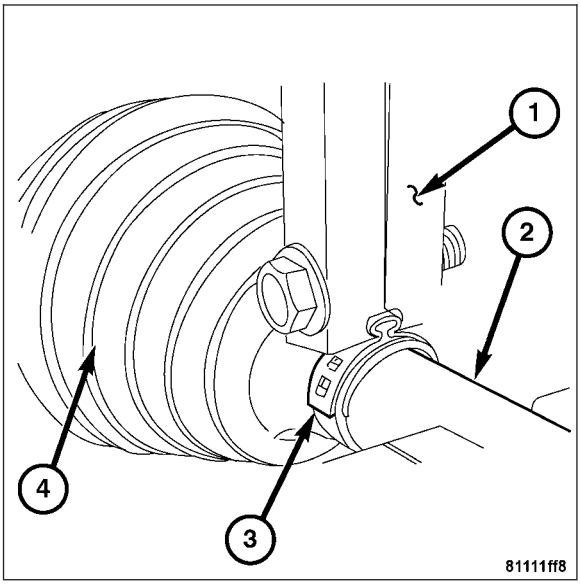


13. Position the crimping tool (1) on the retaining clamp (3).



Note: The jaws of the crimping tool must be closed completely for proper sealing.

14. Crimp the new CV boot retaining clamp (3).
15. Install the halfshaft to the vehicle. **Refer to Page 3-5**.

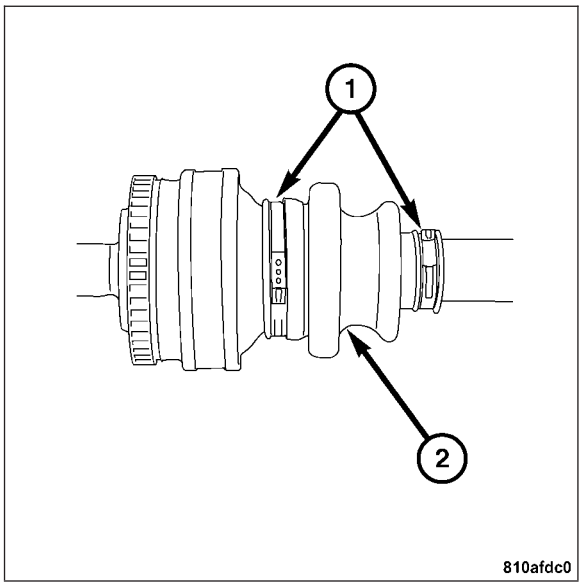


CV BOOT - OUTER

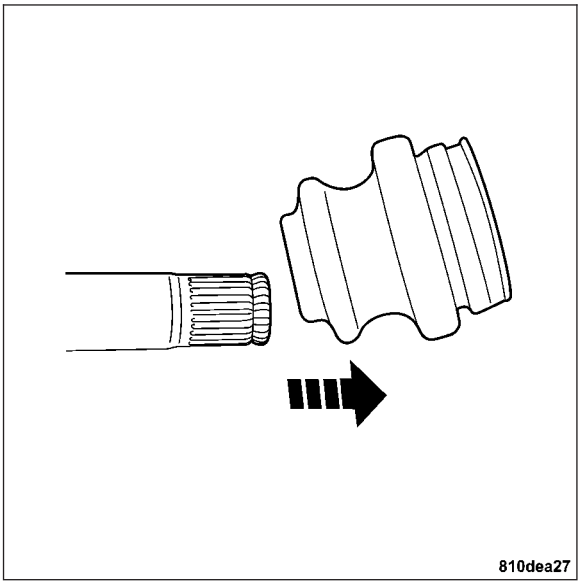
REMOVAL

Note: The outer boot the of the halfshaft can only be replaced after disassembling the inner CV joint.

1. Remove the halfshaft from the vehicle. **Refer to Page 3-4**.
2. Remove the inner CV boot from the halfshaft. **Refer to Page 3-7**.
3. Remove the outer CV boot retaining clamps (1).
4. Remove the outer CV boot (2) from the CV joint inner seal.

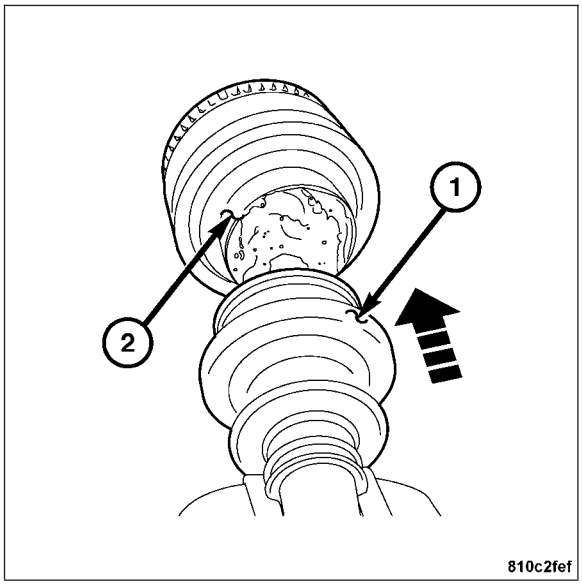


5. Slide the outer CV boot off of the axle shaft.

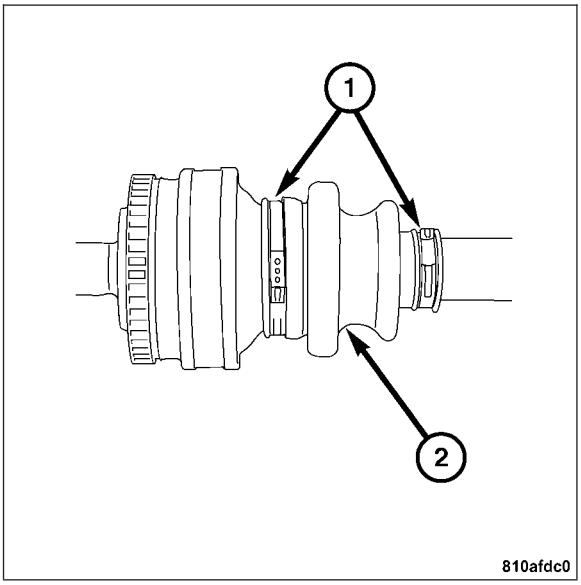


INSTALLATION

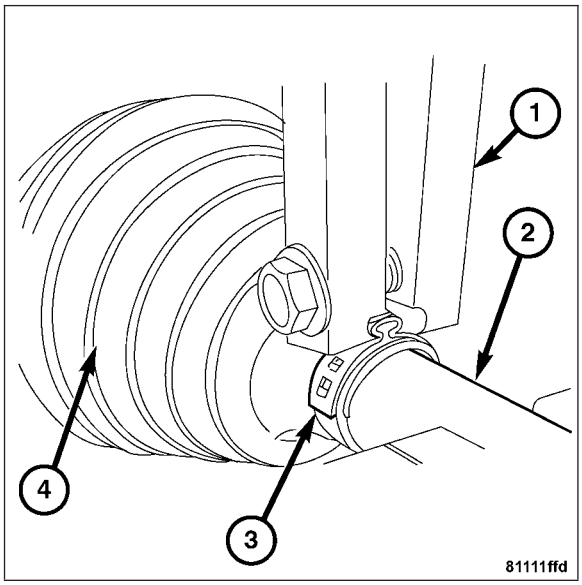
1. Pack the outer CV joint cavity with grease supplied in the repair kit.
2. Install the outer CV (1) boot into the sealing groove (2) of the inner seal.



3. Position the inner and outer retaining clamps (1) on the CV boot (2).

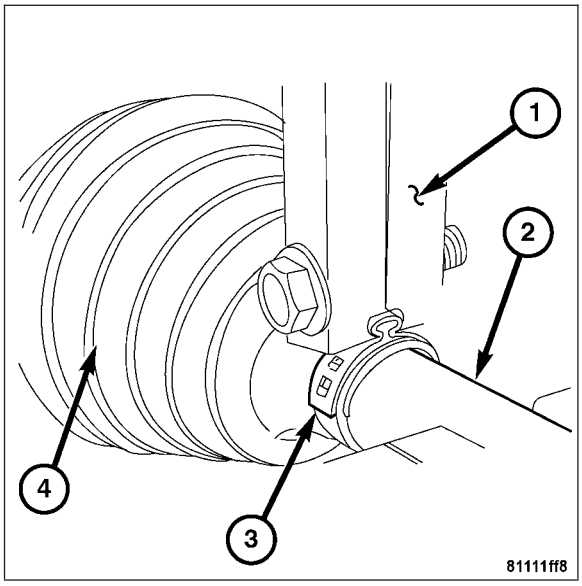


4. Position the crimping tool (1) on the retaining clamp (3).



Note: The jaws of the crimping tool must be closed completely for proper sealing.

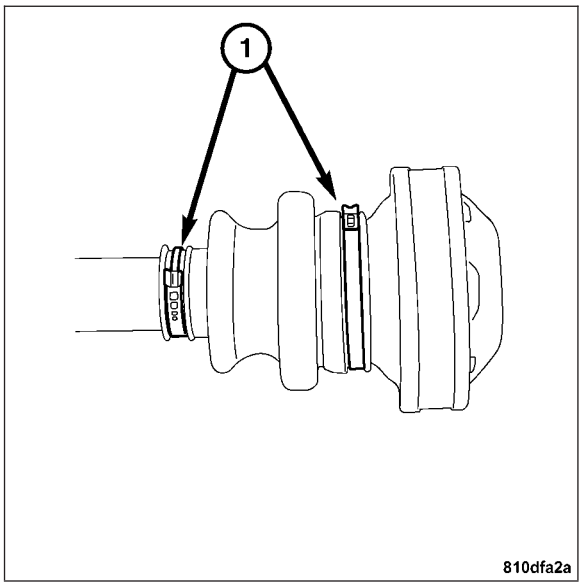
5. Crimp the new CV boot retaining clamp (3).
6. Install the halfshaft (2) to the vehicle. **Refer to Page 3-5**.



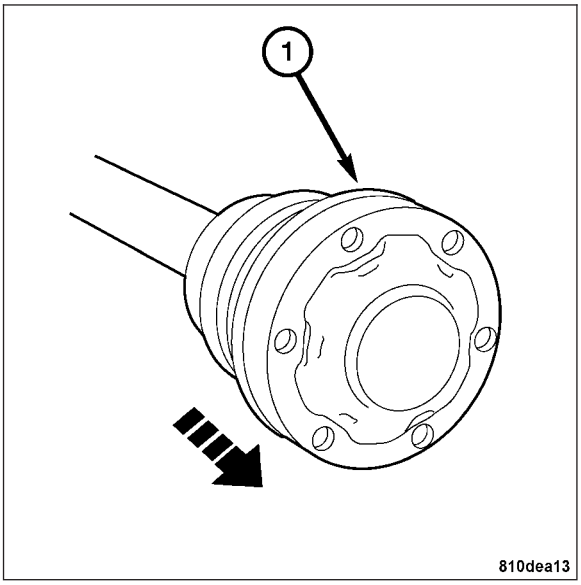
CV JOINT

REMOVAL

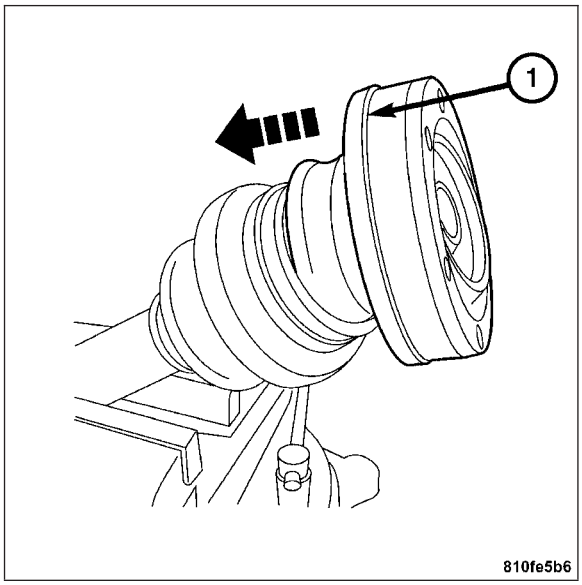
1. Remove the halfshaft from the vehicle. **Refer to Page 3-4**.
2. Remove and discard both inner CV boot retaining clamps (1).



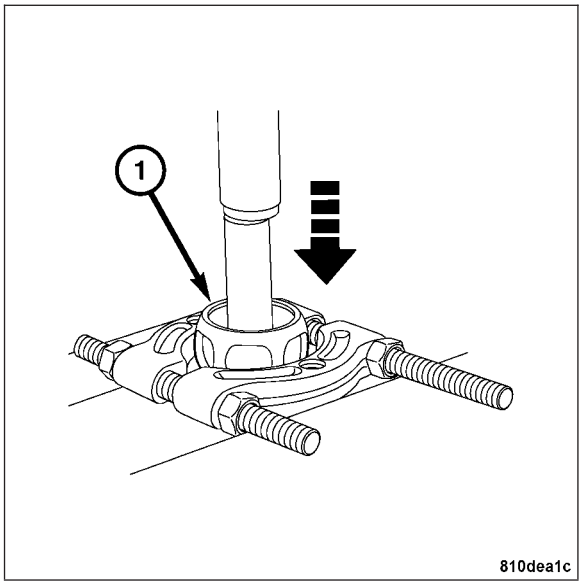
3. Clamp the halfshaft in a vise.
4. Use a suitable tool to remove the inner CV joint cover (1) from the bearing retainer.



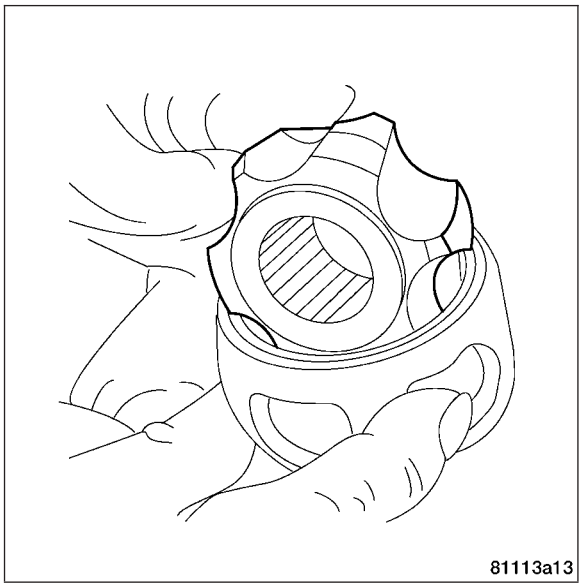
5. Slide the CV boot away from the inner seal (1).
6. Use a suitable tool and remove the inner seal (1) from the bearing retainer.
7. Slide the CV boot, inner seal, and the bearing retainer down the axle shaft away from the inner bearing.
8. Remove the CV joint circlip from the axle shaft.



9. Using a press, remove the CV joint bearing (1) from the axle shaft.

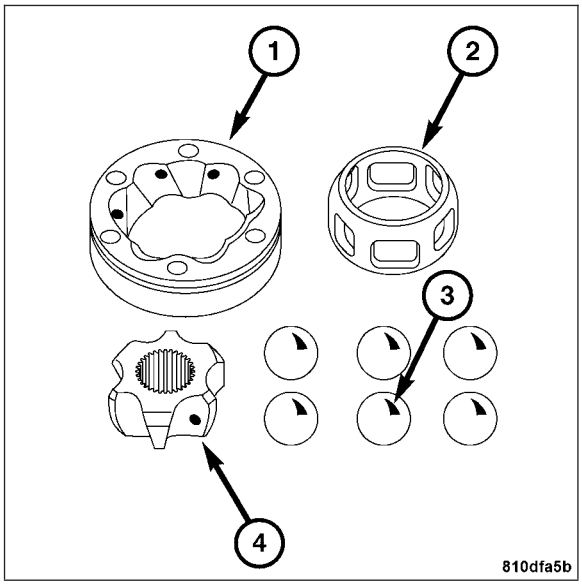


4. Pivot the joint hub 90° relative to the bearing cage and remove it from the assembly.
5. Thoroughly clean all the parts.



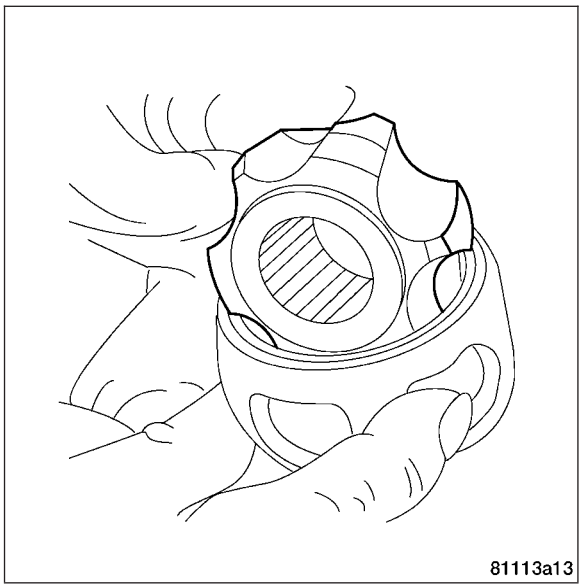
INSPECTION

1. Inspect the roller tracks in the joint ring (1), joint hub (4) and the bearing cage (2). Check the bearing balls (3) themselves for signs of pitting or wear.
2. If these parts are extremely worn, the entire CV joint must be replaced. Smooth areas and tracks caused by the ball bearings are no reason to replace the CV joint.

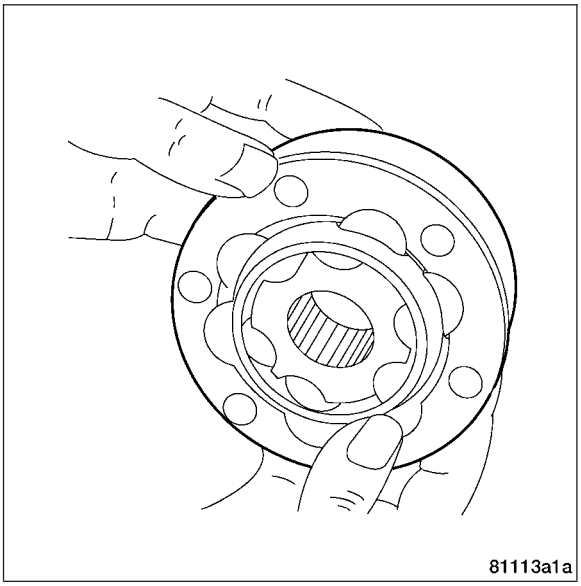


ASSEMBLING

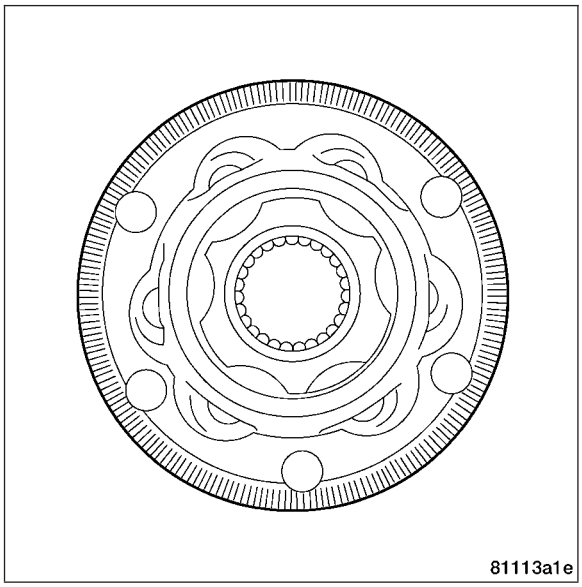
1. Hold the joint hub vertically relative to bearing cage, then guide it into place.



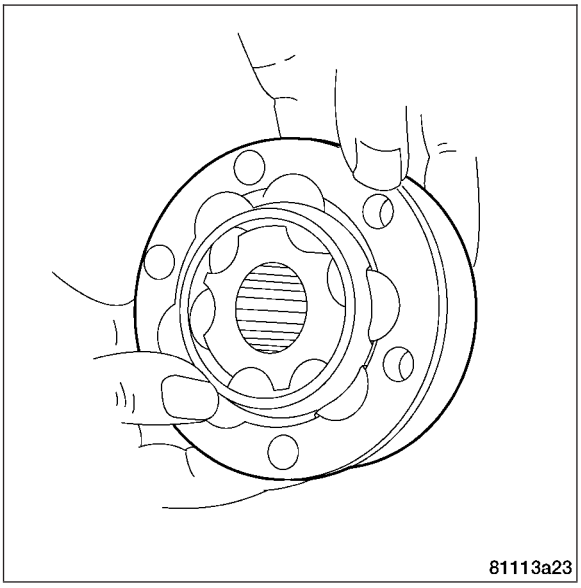
2. Insert one bearing ball, paying attention to the marks on the joint hub and bearing cage.
3. Insert the joint hub with the bearing cage and the bearing ball in the joint ring while ensuring that the markings are properly aligned.



4. If no markings are present when installing the joint ring, ensure that the narrow side of the roller track is always opposite the wide side of the joint hub.



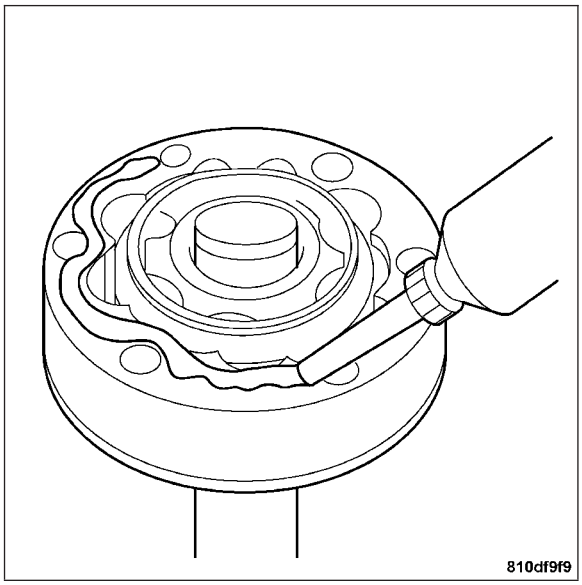
5. Tilt the joint hub out with the bearing cage to allow the bearing balls to be inserted one after the other.



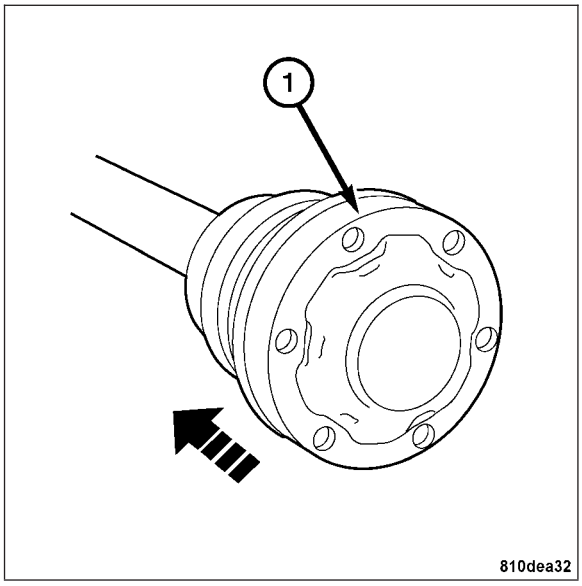
INSTALLATION

1. Before installing the CV boot, cover the shaft splines to protect the CV boot during installation.
2. Slide the inner CV boot on the axle shaft.
3. Remove the protective cover from the axle shaft splines.
4. Install the CV joint bearing to the axle shaft.
5. Install the CV joint circlip to the axle shaft.
6. Pack the bearing cavity with grease supplied in the repair kit.

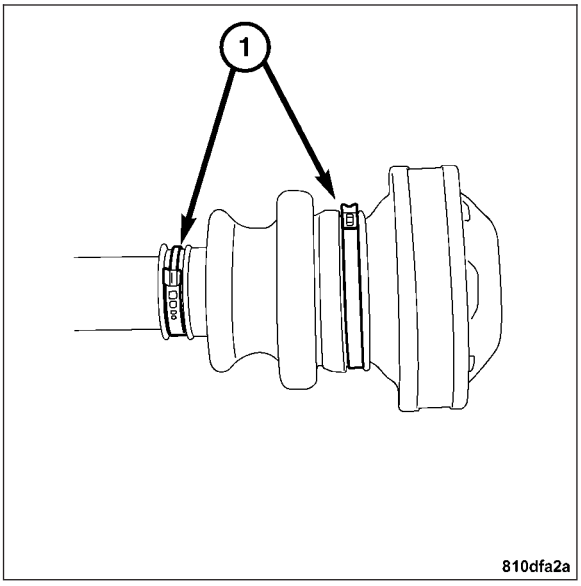
7. Apply a bead of sealant to the outer sealing surface of the inner CV joint ring (as shown).



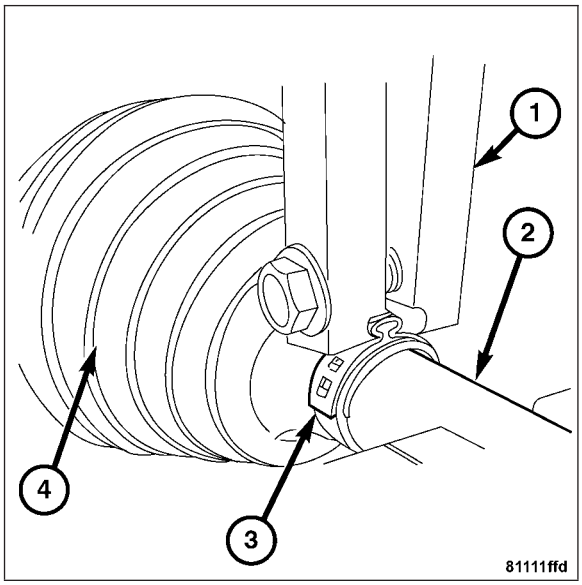
8. Using a mallet, tap on a new inner CV joint cover (1).



9. Install the CV boot into the sealing groove of the inner seal.
10. Position the inner and outer retaining clamps (1) on the CV boot.

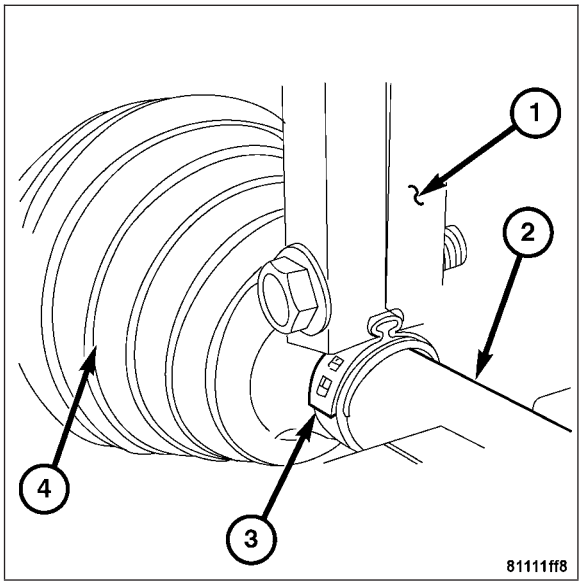


11. Position the crimping tool (1) on the retaining clamp (3).



Note: The jaws of the crimping tool must be closed completely for proper sealing.

12. Crimp the new CV boot retaining clamp (3).
13. Install the halfshaft (2) to the vehicle. **Refer to Page 3-5**.



PROPELLER SHAFT

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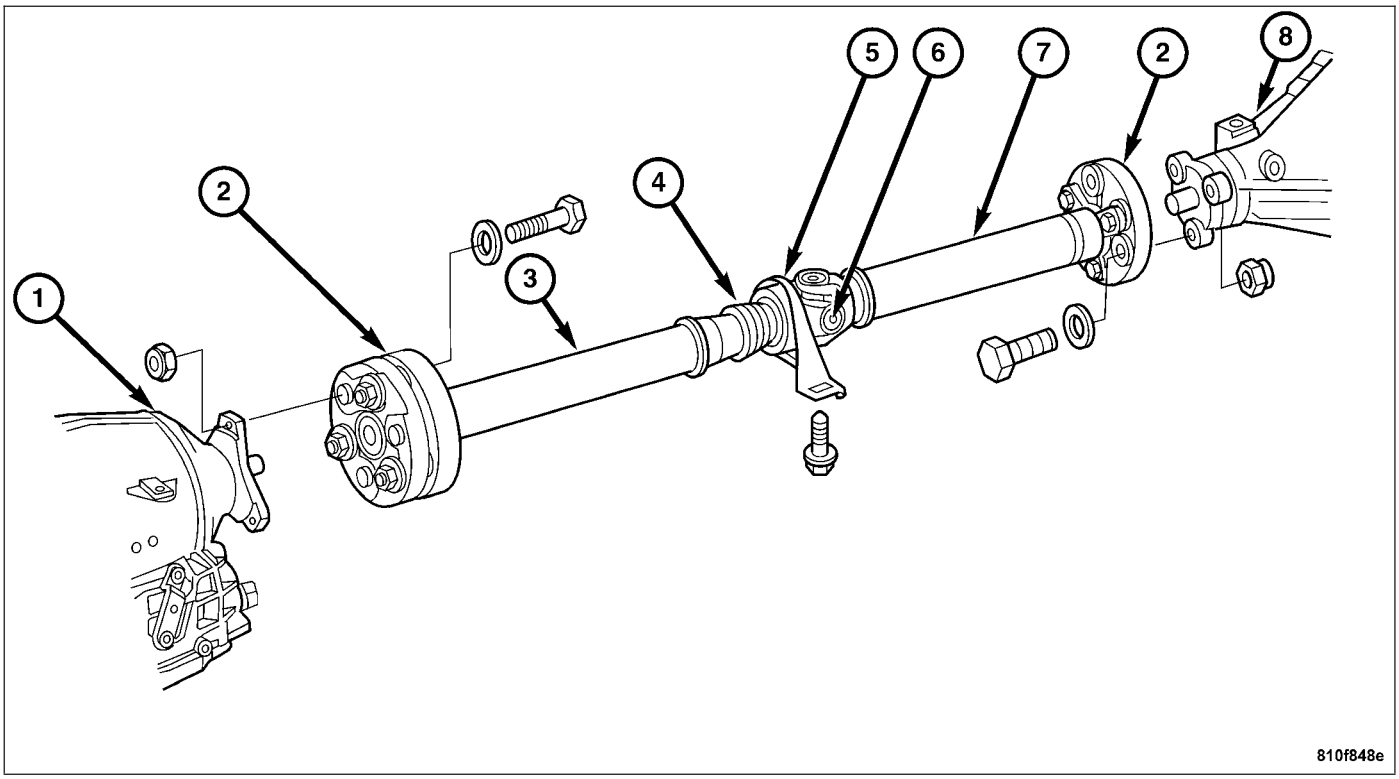
PROPELLER SHAFT

DESCRIPTION



1 - TRANSMISSION
2 - FLEXIBLE DISK
3 - FRONT SECTION
4 - SLIP JOINT
5 - CENTER BEARING
6 - UNIVERSAL JOINT
7 - REAR SECTION
8 - REAR DIFFERENTIAL

A two-piece driveshaft links the transmission and rear axle through two flexible disks and one universal joint to minimize driveline vibrations.

WARNING

Use exact replacement hardware for attaching the propeller shafts. Exact replacement with original Mopar parts will ensure safe operation. The specified torque must always be applied when tightening any fasteners.

CAUTION: Propeller shafts are balanced by the manufacturer. Before undercoating a vehicle, the propeller shaft and universal joints should be covered. This will prevent the undercoating from causing an unbalanced condition and vibration.

CAUTION: Never allow the propeller shaft to drop or hang from universal joint during removal. Suspend the shaft to the vehicles underside with wire to prevent damage to the universal joints.

CAUTION: Protect the machined external surface of the slip yoke from damage after propeller shaft removal. If damaged, the transmission extension seal could be damaged and cause a leak.

DIAGNOSIS AND TESTING - PROPELLER SHAFT

VIBRATION

Tires that are out-of-round, or wheels that are unbalanced, will cause a low frequency vibration.

Brake rotors that are unbalanced will cause a harsh, low frequency vibration.

Driveline vibration can also result from loose or damaged engine mounts.

Propeller shaft vibration increases as the vehicle speed is increased. A vibration that occurs within a specific speed range is not usually caused by a propeller shaft being unbalanced. Defective universal joints, or an incorrect propeller shaft angle, are usually the cause of such a vibration.

DRIVELINE VIBRATION

CONDITION	POSSIBLE CAUSES	CORRECTION
PROPELLER SHAFT NOISE	1. Undercoating or other foreign material on shaft.	1. Clean exterior of shaft and wash with solvent.
	2. Loose or bent U-joint yoke or excessive runout.	2. Install new yoke.
	3. Incorrect driveline angularity.	3. Measure and correct driveline angles.
	4. Worn U-joint bearings.	4. Install new U-joint.
	5. Propeller shaft damaged or out of balance.	5. Install new propeller shaft.
	6. Excessive runout or unbalanced condition.	6. Re-index propeller shaft, test, and evaluate.
	7. Excessive axle yoke deflection.	7. Inspect and replace yoke if necessary.
UNIVERSAL JOINT NOISE	1. Lack of lubrication.	1. Replace U-joints as necessary.

BALANCE

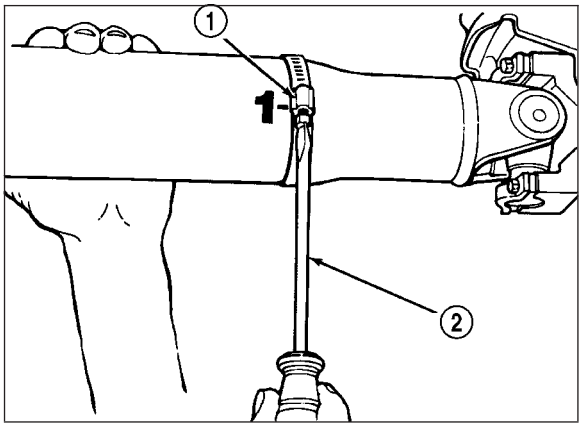
If propeller shaft is suspected of being unbalanced, it can be verified with the following procedure:

1. Raise and support the vehicle.
2. Clean all the foreign material from the propeller shaft and the universal joints.

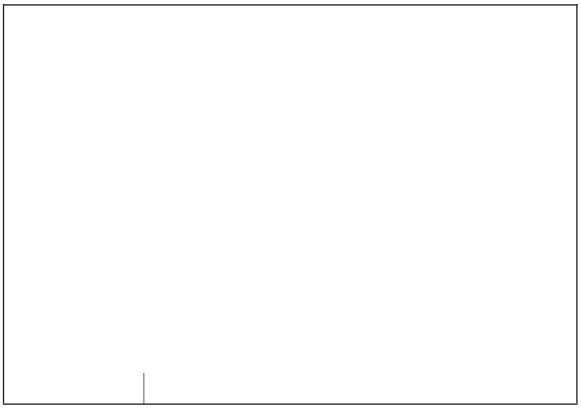
Note: If the propeller shaft is bent, it must be replaced.

3. Inspect the propeller shaft for missing balance weights, broken welds, and bent areas.
4. Inspect the universal joints to ensure that they are not worn, are properly installed, and are correctly aligned with the shaft.
5. Check the universal joint clamp bolts for proper torque.
6. Check the propeller shaft to transmission and differential flange retaining bolts for proper torque.
7. Remove the wheels and tires. Install the wheel mounting studs to retain the brake rotors.
8. Mark and number the propeller shaft six inches from the transmission end at four positions 90° apart.
9. Run and accelerate the vehicle until vibration occurs. Note the intensity and speed the vibration occurred. Stop the engine.

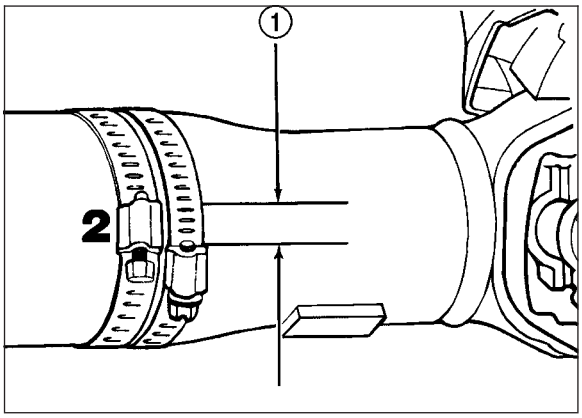
10. Install a screw clamp (1) at position 1.
11. Start the engine and re-check for vibration. If there is little or no change in vibration, move the clamp to one of the other three positions. Repeat the vibration test.
12. If there is no difference in vibration at the other positions, the source of the vibration may not be the propeller shaft.



13. If the vibration decreased, install a second clamp and repeat the test.



14. If the additional clamp causes an additional vibration, separate the clamps 0.5 inch (13 mm.) above and below the mark). Repeat the vibration test.
15. Increase the distance between the clamps and repeat the test until the amount of vibration is at the lowest level. Bend the slack end of the clamps so the screws will not loosen.
16. If the vibration remains unacceptable, apply the same steps to the differential end of the propeller shaft.
17. Install the wheels and tires. **Refer to Page 22-42**.
18. Lower the vehicle.



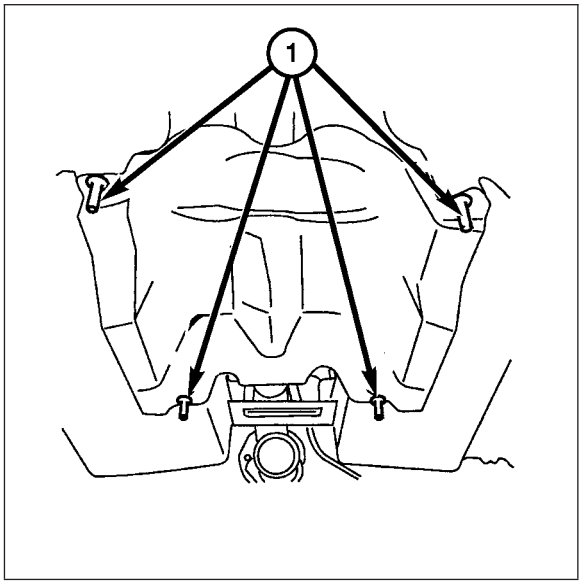
RUNOUT

1. Remove dirt, rust, paint, and undercoating from the propeller shaft surface where the dial indicator will contact the shaft.
2. The dial indicator must be installed perpendicular to the shaft surface.
3. Measure runout at the center and ends of the shaft sufficiently far away from weld areas to ensure that the effects of the weld process will not enter into the measurements.
4. Refer to Runout Specifications chart.
5. If the propeller shaft runout is out of specification, remove the propeller shaft, index the shaft 180°, and re-install the propeller shaft. Measure shaft runout again.
6. If the propeller shaft runout is now within specifications, mark the shaft and yokes for proper orientation.
7. If the propeller shaft runout is not within specifications, verify that the runout of the transmission and axle flanges are within specifications. Correct as necessary and re-measure propeller shaft runout.
8. Replace the propeller shaft if the runout still exceeds the limits.

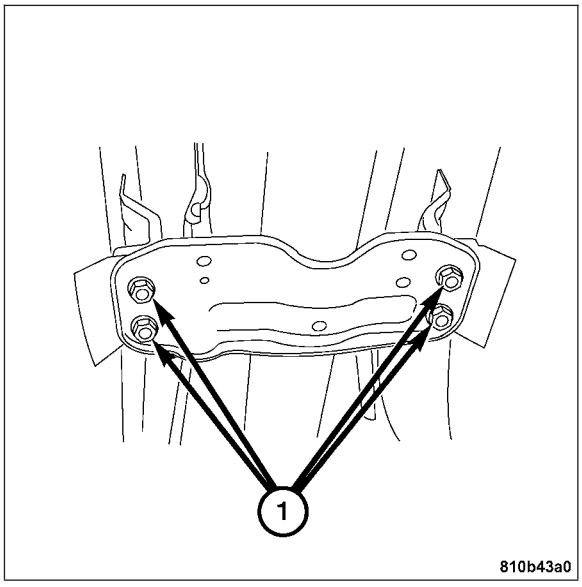
REMOVAL

Note: Mark the location of the front and rear propeller shaft flange to the transmission output flange and the rear axle pinion flange to maintain proper balance of the driveline.

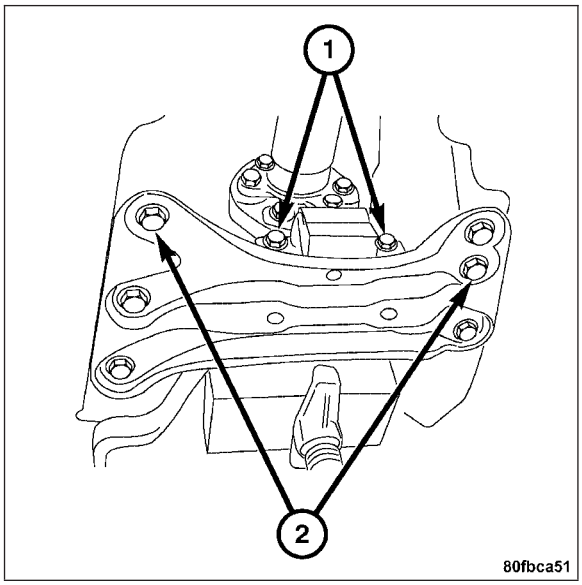
1. Raise and support the vehicle.
2. Remove the exhaust system. **Refer to Page 11-5**.
3. Remove the center exhaust heat shield nuts (1) and the center heat shield.



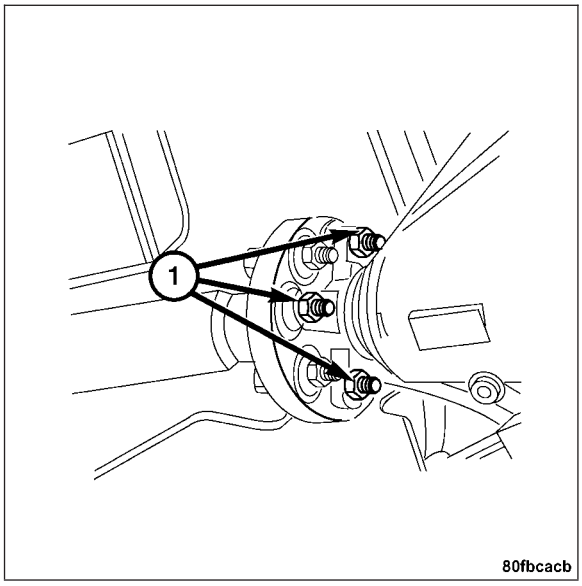
4. Remove the rear transmission tunnel support bracket bolts (1) and the bracket.



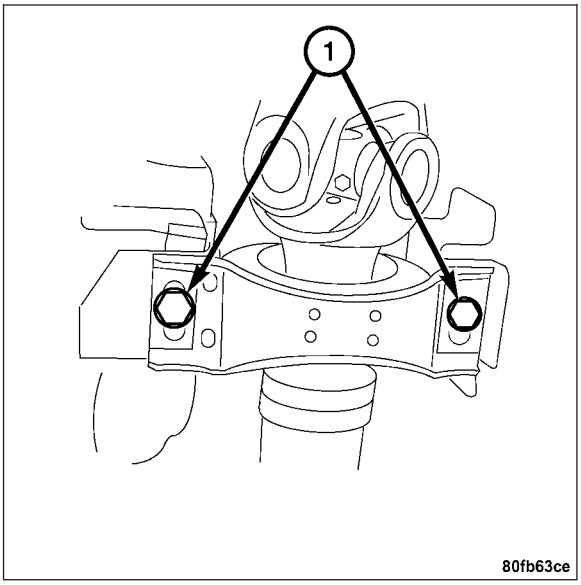
5. Support the transmission with a jack stand.
6. Remove the transmission mount bolts (1).
7. Remove the transmission crossmember bolts (2).
8. Remove the transmission crossmember from the vehicle.



9. Remove the three rear propeller shaft bolts (1) from the rear axle pinion flange.
10. Remove the rear propeller shaft from the rear axle pinion flange.
11. Remove the three front propeller shaft bolts from the transmission output flange.
12. Remove the front propeller shaft from the transmission output flange.



13. Remove the center bearing bracket bolts (1).
14. Carefully remove the propeller shaft from the vehicle.

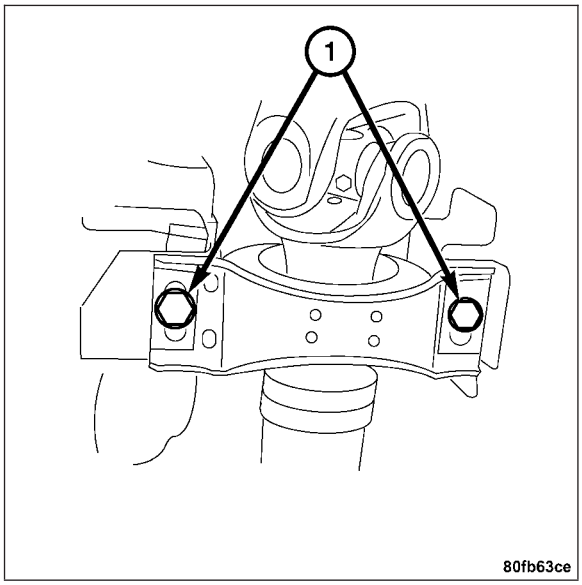


INSTALLATION

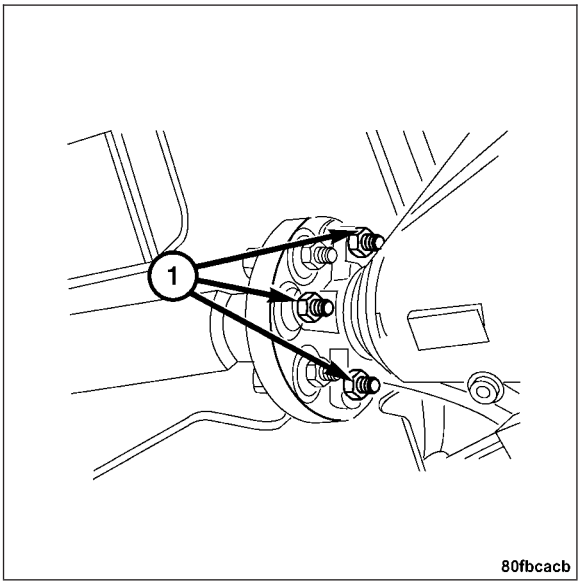
Note: Align the marks of the front and rear propeller shaft flange to the transmission output flange and the rear axle pinion flange. Failure to do so will not maintain the proper balance of the driveline.

Note: All self locking nuts and bolts must be replaced.

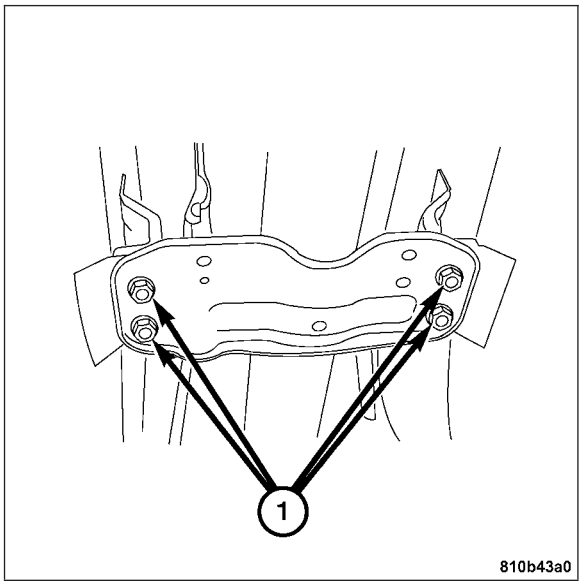
1. Position the propeller shaft in the vehicle.
2. Support the propeller shaft with a jack stand.
3. Align the center bearing bracket and install the bolts (1). Tighten the bolts to 30 N·m (22 ft. lbs.).



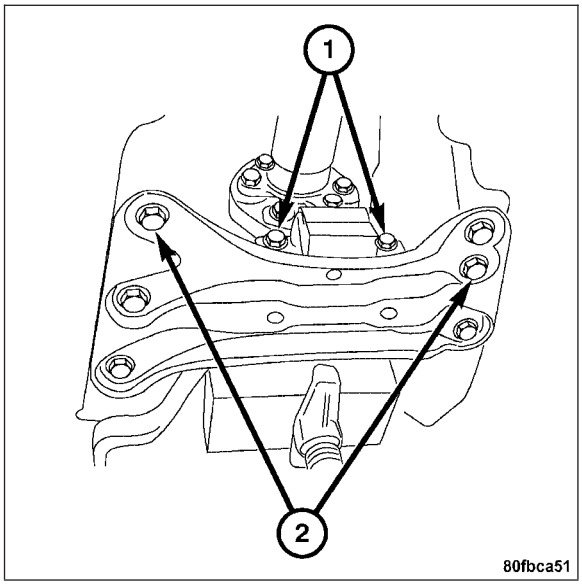
4. Install the rear propeller shaft to the rear axle pinion flange.
5. Install the three rear propeller shaft bolts (1) to the rear axle pinion flange. Tighten the bolts to 60 N·m (44 ft. lbs.).
6. Install the front propeller shaft to the transmission output flange.
7. Install the three front propeller shaft bolts to the transmission output flange. Tighten the bolts to 60 N·m (44 ft. lbs.).



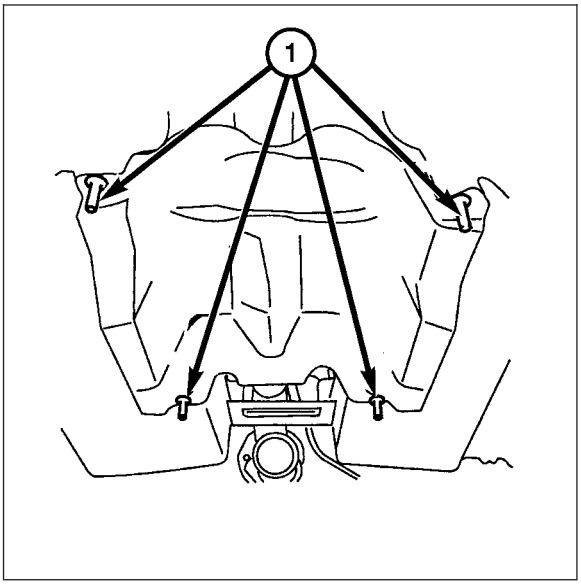
8. Install the transmission tunnel support bracket.
9. Install the transmission tunnel support bracket bolts (1). Tighten the bolts to 20 N·m (15 ft. lbs.).



10. Position the transmission crossmember and transmission mount on the vehicle.
11. Install the transmission mount bolts (1). Tighten the bolts to 45 N·m (33 ft. lbs.).
12. Install the transmission crossmember bolts (2). Tighten the bolts to 45 N·m (33 ft. lbs.).



13. Install the rear exhaust heat shield and nuts (1). Tighten the nuts to 10 N·m (89 in. lbs.).
14. Remove the jack stand supporting the transmission.
15. Install the exhaust system. **Refer to Page 11-7**.
16. Lower the vehicle.



SPECIFICATIONS

SPECIFICATIONS - CENTERING SLEEVES

CENTERING SLEEVE SPECIFICATIONS

DESCRIPTION	In	mm
Automatic Transmission Front Sleeve	1.13	28.8
Automatic Transmission Rear Sleeve	0.98	24.9
Manual Transmission Front Sleeve	1.06	26.8
Manual Transmission Rear Sleeve	1.06	26.9

SPECIFICATION - RUNOUT

Note: Measure front/rear runout approximately 3 inches (76 mm) from the weld seam at each end of the shaft tube for tube lengths over 30 inches. For tube lengths under 30 inches the maximum allowed runout is 0.020 in. (0.50 mm) for the full length of the tube.

RUNOUT SPECIFICATIONS

LOCATION	In.	mm
Front Of Shaft	0.020	0.50
Center Of Shaft	0.025	0.63
Rear Of Shaft	0.020	0.50

SPECIFICATIONS - TORQUE

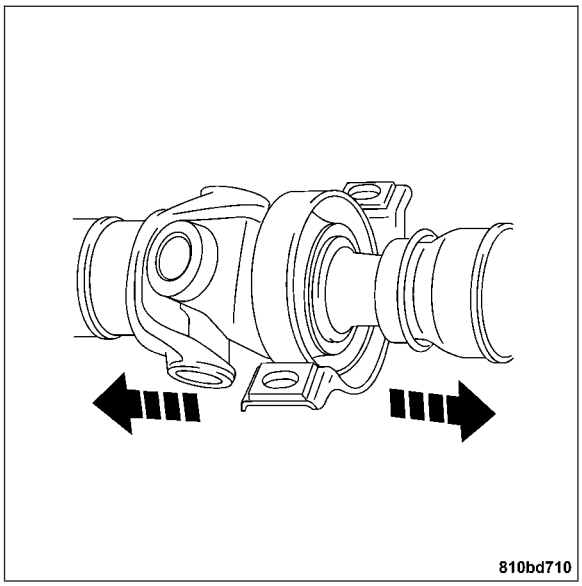
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Center Bearing Bracket Bolts	45	33	—
Heat Shield Nuts	10	—	89
Rear Axle Pinion Flange Bolts	60	44	—
Transmission Crossmember Bolts	45	33	—
Transmission Mount Bolts	45	33	—
Transmission Output Flange Bolts	60	44	—
Transmission Tunnel Support Bracket Bolts	20	15	—

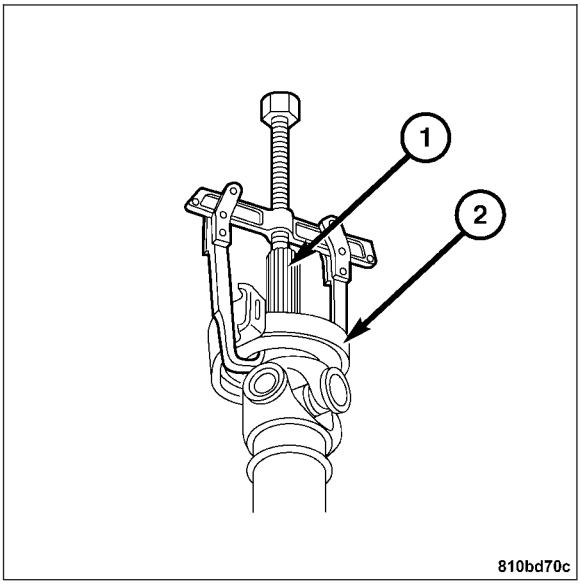
CENTER BEARING

REMOVAL

1. Remove the propeller shaft. **Refer to Page 3-31**.
2. Separate the propeller shaft sections.

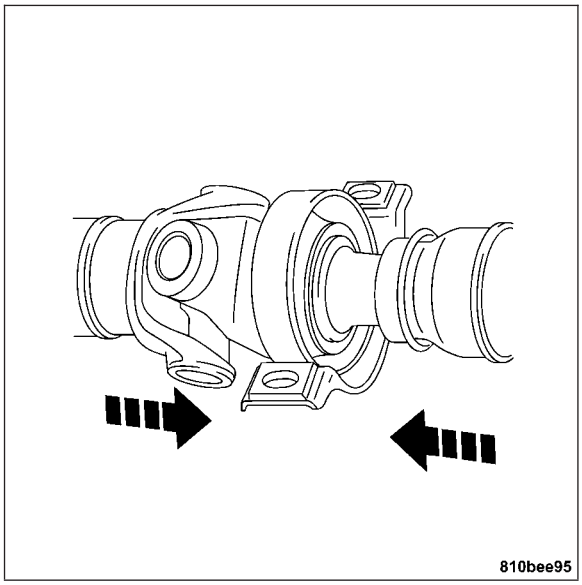


3. Use a jaw puller to remove the rubber mount and the bearing (2) from the propeller shaft (1).



INSTALLATION

1. Press the bearing into the rubber mount.
2. Press the bearing and rubber mount onto the propeller shaft using a shop press and bearing adapter.
3. Grease the propeller shaft splines with Mopar® heavy duty grease.
4. Fit the two propeller shaft sections together.
5. Install the propeller shaft in the vehicle. **Refer to Page 3-28**.

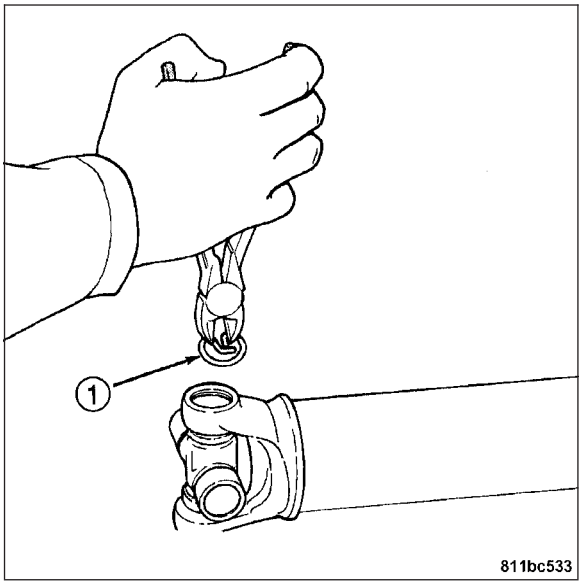


SINGLE CARDAN UNIVERSAL JOINTS

DISASSEMBLY

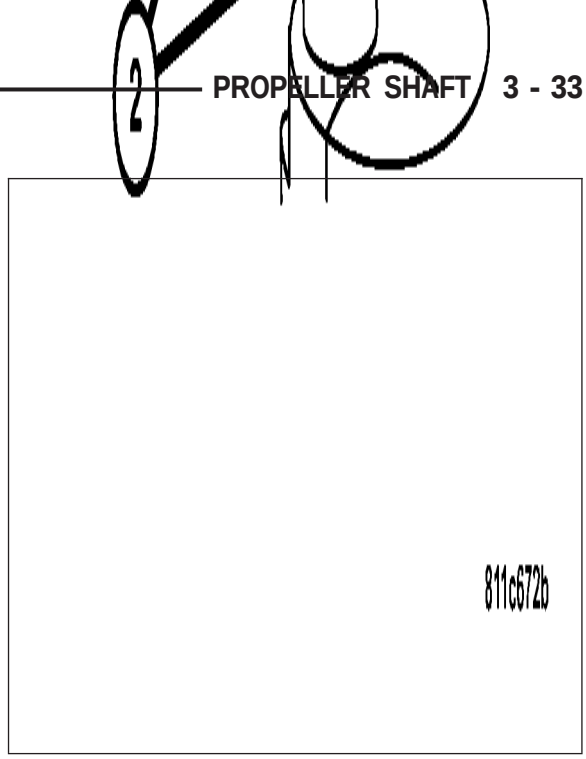
Note: Individual components of cardan universal joints are not serviceable. If worn or leaking, they must be replaced as an assembly.

1. Remove the propeller shaft. **Refer to Page 3-26**.
2. Tap the outside of the bearing cap assembly with a drift to loosen the snap ring.
3. Remove the snap rings (1) from both sides of the yoke.



4. Set the yoke in an arbor press or vise with a socket whose inside diameter is large enough to receive the bearing cap positioned beneath the yoke.
5. Position the yoke with the grease fitting, if equipped, pointing up.

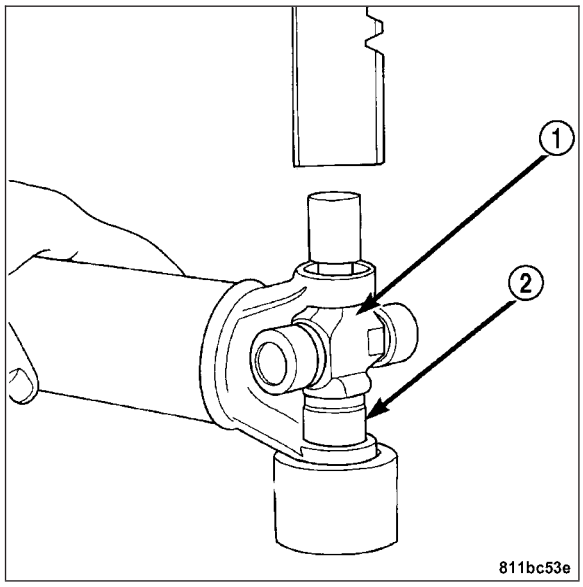
6. Place a socket (2) with an outside diameter smaller than the upper bearing cap on the upper bearing cap and press (1) the cap through the yoke to release the lower bearing cap.



7. If the bearing cap will not pull out of the yoke by hand after pressing, tap the yoke ear near the bearing cap to dislodge the cap.

CAUTION: If the cross or bearing cap are not straight during installation, the bearing cap will score the walls of the yoke bore and damage can occur.

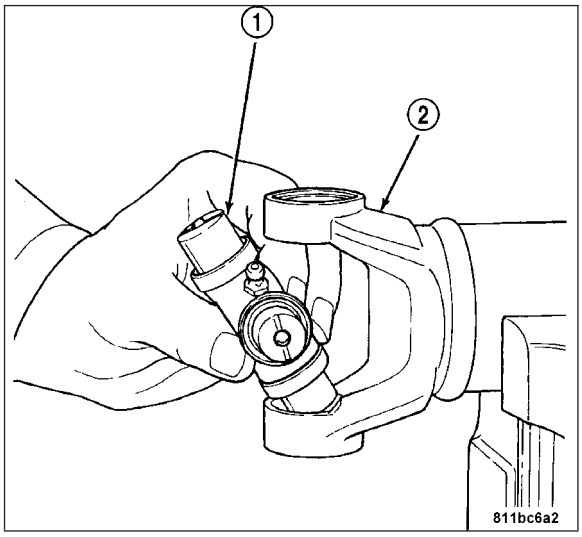
8. To remove the opposite bearing cap, turn the yoke over and straighten the universal joint in the open hole. Then, carefully press the end of the universal joint until the remaining bearing cap can be removed.



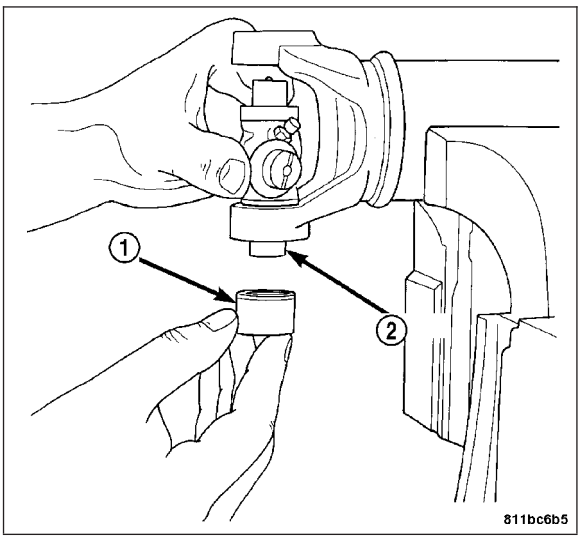
ASSEMBLY

1. Apply Extreme Pressure (EP) N.L.G.I. Grade 1 or 2 grease to the inside of the yoke bores.

2. Position the universal joint (1) in the yoke (2) with its lube fitting, if equipped, pointing up.



3. Place a bearing cap (1) over the trunnion (2) and align the cap with the yoke bore. Keep the needle bearings upright in the bearing cap.



4. Press the bearing cap into the yoke bore enough to clear the snap ring groove.
5. Install a snap ring.

Note: If the joint is stiff or binding, strike the yoke with a soft hammer to seat the needle bearings.

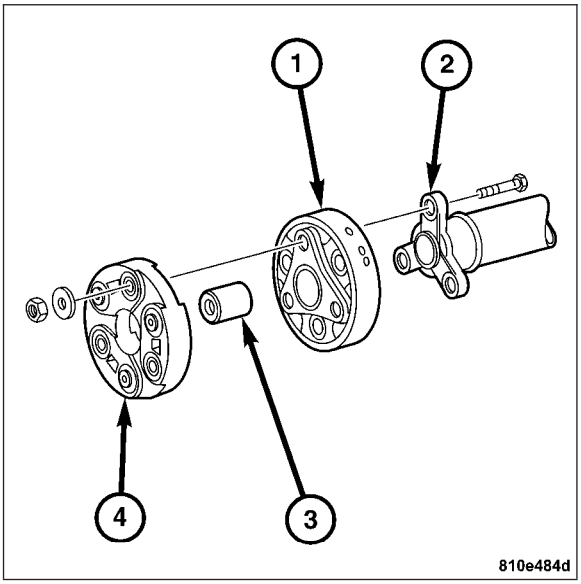
6. Repeat the procedure to install the opposite bearing cap.
7. Add grease to the lube fitting, if equipped.
8. Install the propeller shaft. **Refer to Page 3-28**.

CENTERING AND FITTED SLEEVES

REMOVAL

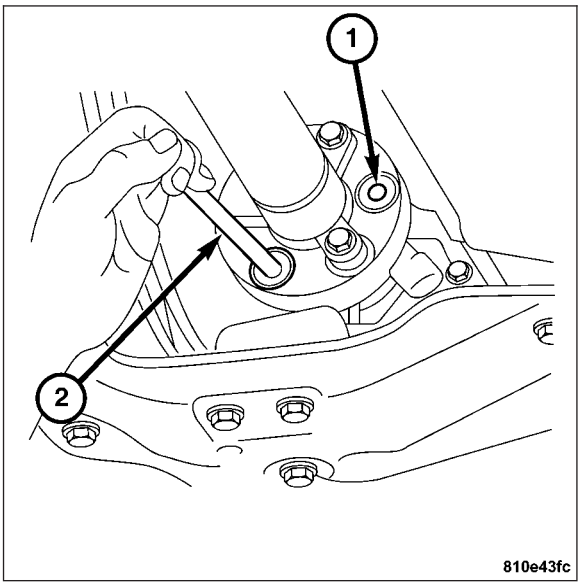
REMOVAL - CENTERING SLEEVES

1. Remove propeller shaft. **Refer to Page 3-26**.
2. Mark flexible disk (4) relative to flange (2).
3. Remove flexible disk (4) from flange (2).
4. Remove the centering sleeve (3). Use a hammer and chisel if necessary.



REMOVAL - FITTED SLEEVES

1. Raise and support the vehicle.
2. Remove the flange bolt and nut.
3. Use a drift punch (2) or extension to loosen the fitted sleeve (1).
4. Remove the fitted sleeve (1).



INSTALLATION

INSTALLATION - CENTERING SLEEVES

1. Inspect centering sleeves and flexible disks for cracks and wear. Replace as required.
2. Fill centering sleeve cavities with heavy duty Mopar grease.
3. Press in new sleeves.
4. Measure sleeve depth from top of sleeve to face of flange.
5. Assemble the flange and flexible disk with the new sleeve as marked.
6. Install the propeller shaft. **Refer to Page 3-28**.

INSTALLATION - FITTED SLEEVES

1. Clean and inspect the flexible disk and flange. Replace any worn or damaged parts.
2. Install the new fitted sleeve or sleeves. Tighten the bolts and nuts to 40 N·m (30 ft. lbs.).
3. Lower the vehicle.

REAR DIFFERENTIAL

TABLE OF CONTENTS

REAR DIFFERENTIAL

DESCRIPTION

The rear axle is equipped with a 3.27:1 ratio for the optimum combination of performance and economy.

OPERATION

The axle receives power from the transmission through the propeller shaft. The propeller shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears. The side gears are splined to the axle shafts.

DIAGNOSIS AND TESTING

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly:

- Check for insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion shaft can also cause a snapping or a knocking noise.

BEARING NOISE

The halfshafts, differential and pinion bearings can all produce noise when worn or damaged. Bearing noise can be either a whining, or a growling sound.

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched because it rotates at a faster rate. Drive the vehicle and load the differential. If bearing noise occurs, the rear pinion bearing is the source of the noise. If the bearing noise is heard during a coast, the front pinion bearing is the source.

Worn or damaged differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing noise. The pitch of differential bearing noise is also constant and varies only with vehicle speed.

Rear wheel hub bearings produce noise and vibration when worn or damaged. The noise generally changes when the bearings are loaded. Road test the vehicle. Turn the vehicle sharply to the left and to the right. This will load the bearings and change the noise level. Where bearing damage is slight, the noise is usually not noticeable at speeds above 30 mph.

LOW SPEED KNOCK

Low speed knock is generally caused by worn universal joints. A worn pinion shaft bore will also cause a low speed knock.

VIBRATION

Vibration at the rear of the vehicle is usually caused by a:

- Damaged propeller shaft.
- Missing propeller shaft balance weight(s).
- Worn or out-of-balance wheels.
- Loose wheel studs.
- Worn U-joint(s).
- Damaged rear wheel hub bearings.
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Damaged halfshafts.

Check for loose or damaged front-end components or engine/transmission mounts. These components can contribute to what appears to be a rear end vibration. Do not overlook engine accessories, brackets and drive belts.

All driveline components should be examined before starting any repair.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear (or the clutch engaged), can be caused by:

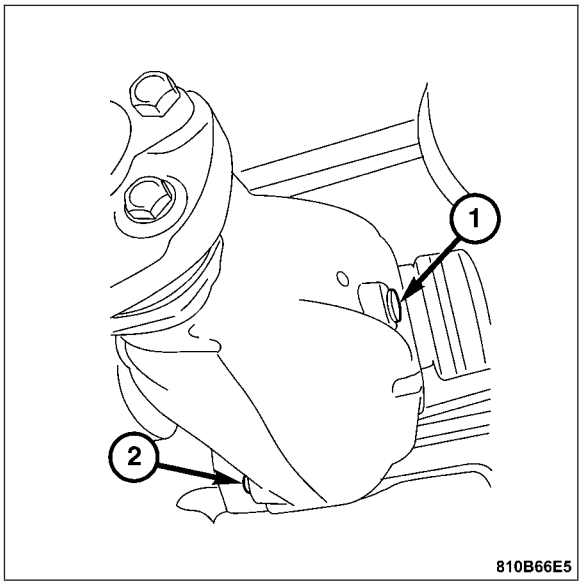
- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission.
- Worn U-joints.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.
- Damaged halfshafts.

The source of a snap or a clunk noise can be determined with the assistance of a helper. Raise and support the vehicle on a hoist with the wheels free to rotate. Instruct the helper to shift the transmission into gear. Listen for the noise, a mechanics stethoscope is helpful in isolating the source of a noise.

DIAGNOSTIC CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
WHEEL NOISE	1. Wheel loose.	1. Tighten loose wheel bolts.
	2. Faulty wheel hub bearing.	2. Replace bearing.
DIFFERENTIAL CRACKED	1. Improper adjustment of the differential bearings.	1. Replace differential.
	2. Excessive ring gear backlash.	2. Replace differential.
	3. Erratic clutch operation.	3. Replace differential.
DIFFERENTIAL GEARS SCORED	1. Insufficient lubrication.	1. Replace differential. Fill differential with the correct fluid type and quantity.
	2. Improper grade of lubricant.	2. Replace differential. Fill differential with the correct fluid type and quantity.
LOSS OF LUBRICANT	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn differential side seals.	2. Replace seals.
	3. Cracked differential housing.	3. Replace as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored yoke.	5. Replace yoke and seal.
	6. Differential cover not properly sealed.	6. Remove, clean, and reseal cover.
AXLE OVERHEATING	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
GEAR TEETH BROKE	1. Overloading.	1. Replace differential.
	2. Erratic clutch operation.	2. Replace differential.
	3. Ice-spotted pavement.	3. Replace differential.
	4. Improper adjustments.	4. Replace differential.
DIFFERENTIAL NOISE	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Replace differential.
	3. Unmatched ring gear and pinion.	3. Replace differential.
	4. Worn teeth on ring gear and/or pinion.	4. Replace differential.
	5. Loose pinion bearings.	5. Replace differential.
	6. Loose differential bearings.	6. Replace differential.
	7. Misaligned or sprung ring gear.	7. Replace differential.

STANDARD PROCEDURE - DRAIN AND REFILL



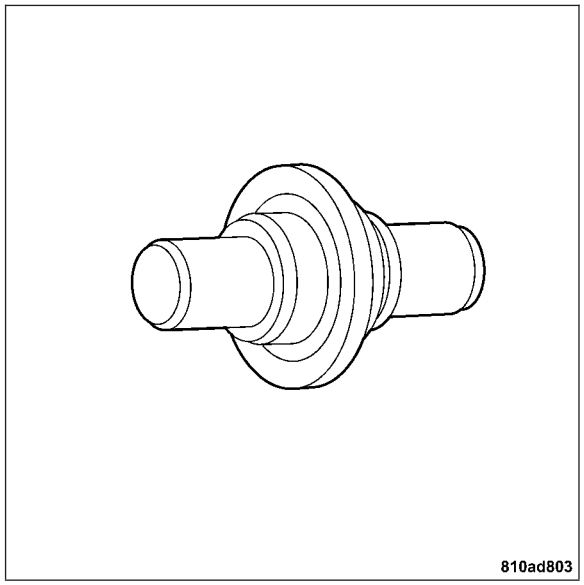
1. Drive the vehicle until the differential lubricant is at the normal operating temperature.
2. Raise and support the vehicle.
3. Remove the differential housing fill plug (1).
4. Position a drain pan under the differential housing drain.
5. Remove the differential housing drain plug (2).
6. Drain the differential housing completely.
7. Install the differential housing drain plug (2). Tighten the drain plug to 50 N·m (37 ft. lbs.).
8. Fill the rear axle to proper specifications.
9. Install the differential housing fill plug (1). Tighten the fill plug to 50 N·m (37 ft. lbs.).

SPECIFICATIONS - TORQUE

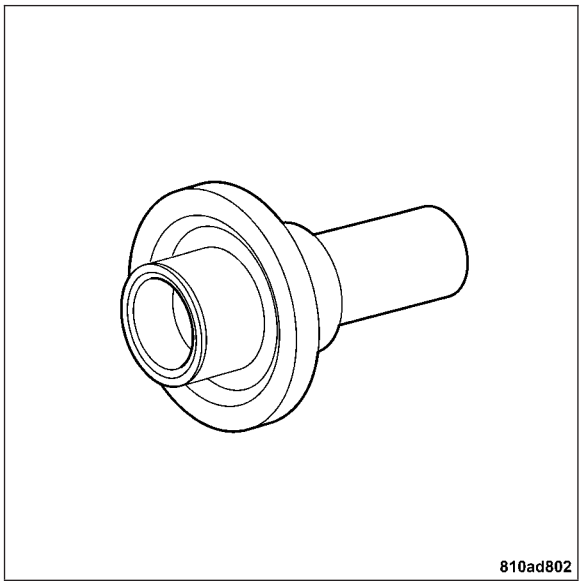
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Differential Housing Cover Bolts	30 + 45°	22 + 45°	—
Differential Housing Front Mounting Bolts	110	82	—
Differential Housing Rear Mounting Bolts	45	33	—
Pinion Shaft Nut	180	133	—

SPECIAL TOOLS



AXLE FLANGE SEAL INSTALLER 9223

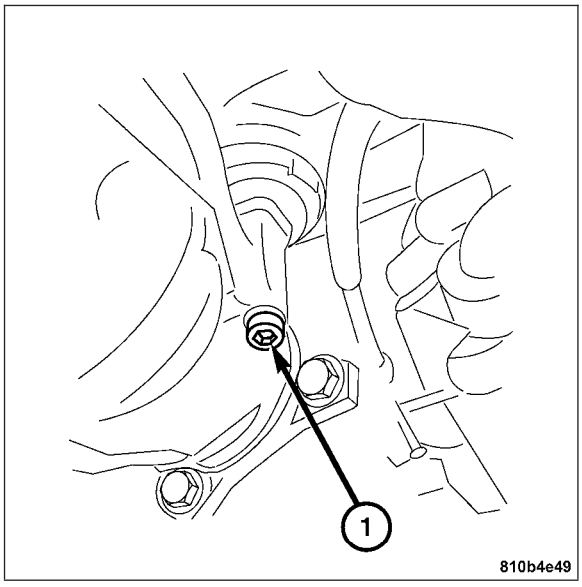


PINION SEAL INSTALLER 9231

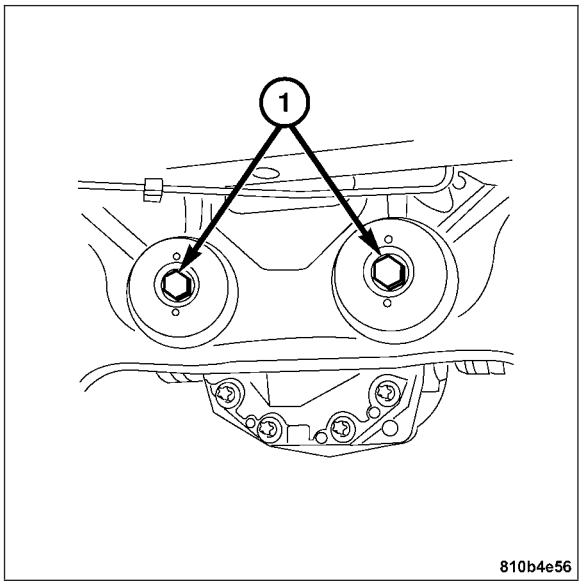
REAR DIFFERENTIAL HOUSING

REMOVAL

1. Raise and support the vehicle.
2. Remove the propeller shaft. **Refer to Page 3-26**.
3. Drain the rear differential housing. **Refer to Page 3-40**.
4. Support the differential housing with a jack.
5. Separate the halfshafts from the differential connecting flanges and tie them to the rear differential carrier. **Refer to Page 3-4**.
6. Remove the differential housing front mounting bolt (1).



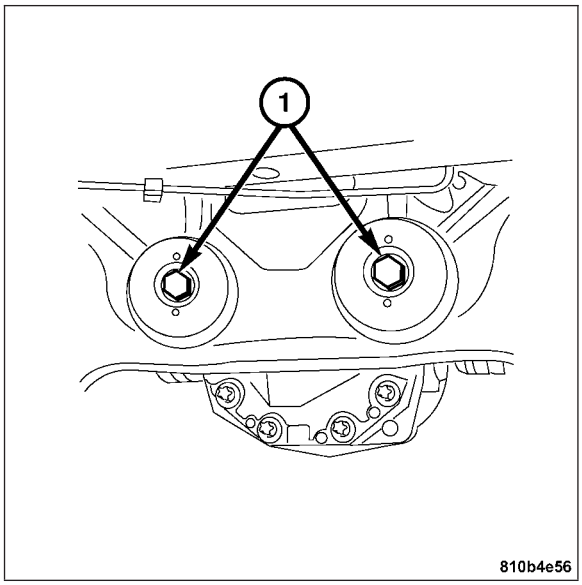
7. Remove the two differential housing rear mounting bolts (1).
8. Remove the differential housing from the vehicle.



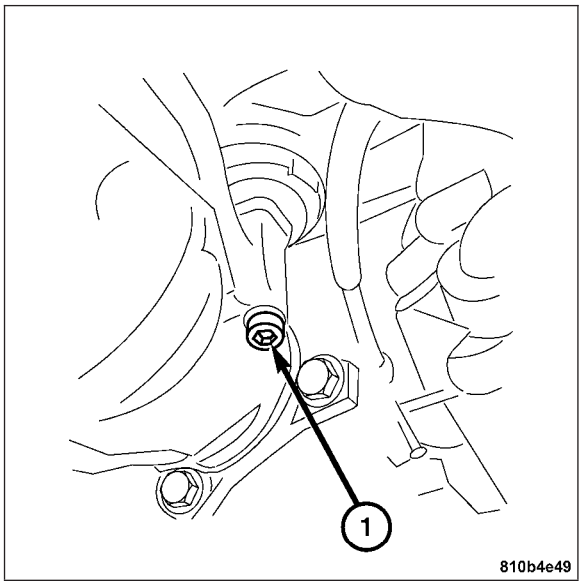
INSTALLATION

Note: Replace the self locking bolts and shims. Lightly oil the bolt at the thread and bolt head contact surfaces.

1. Position the differential housing in the vehicle and support it with a jack.
2. Install the two differential housing rear mounting bolts (1) and washers.



3. Install the differential housing front mounting bolt (1).
4. Tighten the differential housing rear mounting bolts to 110 N·m (82 ft. lbs.).
5. Tighten the differential housing front mounting bolt and nut to 45 N·m (33 ft. lbs.).

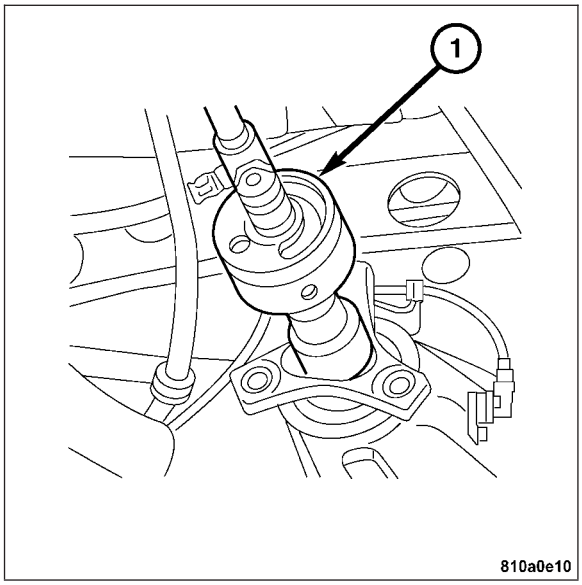


6. Connect the halfshafts to the rear differential connecting flanges. **Refer to Page 3-5**.
7. Remove the differential housing support jack.
8. Install the propeller shaft. **Refer to Page 3-28**.
9. Fill the differential housing to proper specification. **Refer to Page 3-40**.
10. Lower the vehicle.

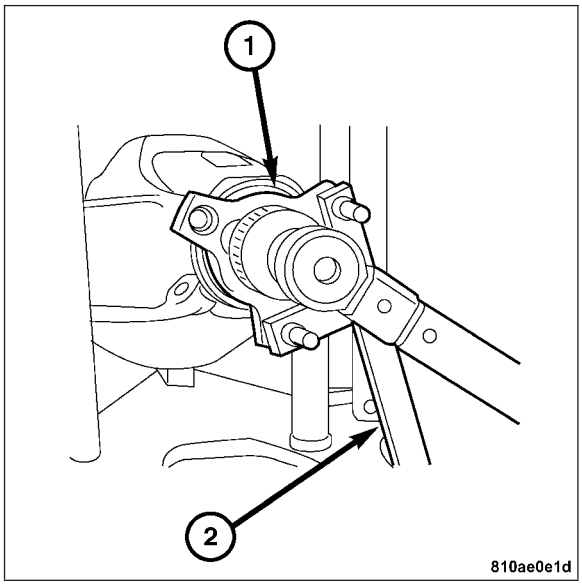
PINION FLANGE SEAL

REMOVAL

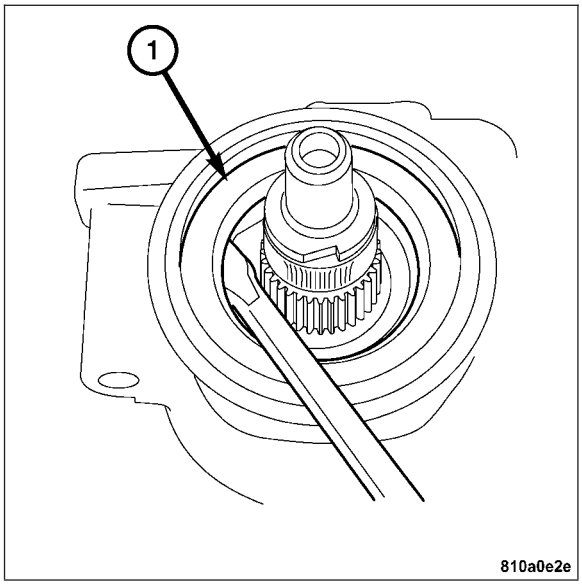
1. Raise and support the vehicle.
2. Drain the differential housing. **Refer to Page 3-40**.
3. Remove the muffler. **Refer to Page 11-10**.
4. Disconnect the propeller shaft from the rear pinion flange and position out of way. **Refer to Page 3-26**.
5. Disconnect the halfshafts at the differential connecting flanges and position them aside. **Refer to Page 3-4**.
6. Use the torque meter (1) to measure resistance to rotation at the pinion flange. Record the amount of friction torque.



7. Using the Special Tool C-3281 Flange Wrench (2) to hold the pinion flange (1).
8. Remove and discard the collared nut.
9. Remove the pinion flange (1).

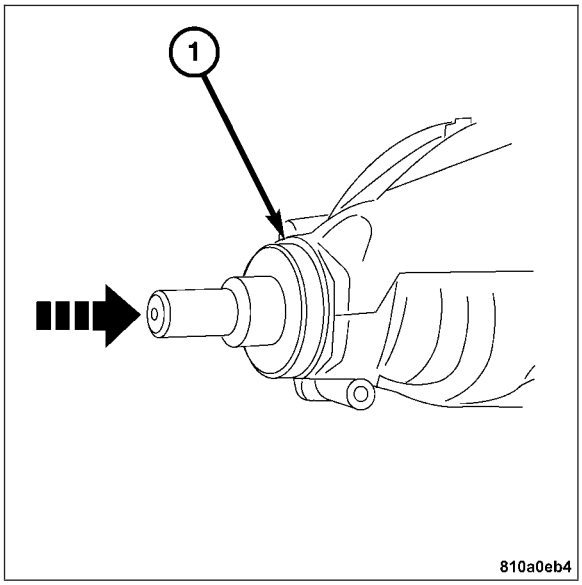


10. Remove the pinion flange seal (1) with a suitable prying tool.

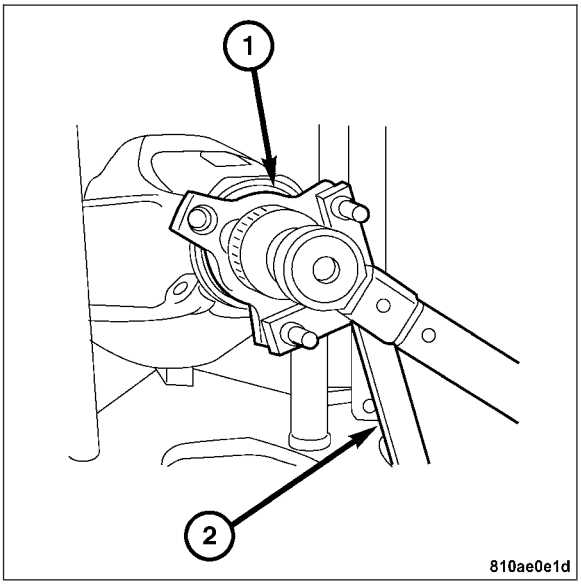


INSTALLATION

1. Remove any burrs or nicks from the seal bore.
2. Drive in a new pinion flange seal (1) using Special Tool 9231 Drift and a mallet.



3. Install the pinion flange.
4. Install a new pinion shaft collared nut. Hold the pinion flange (1) with Special Tool C-3281 Flange Wrench (2). Tighten the nut to 180 N·m (133 ft. lbs.).
5. Check the resistance to rotation torque. If the resistance is less than the previously recorded value, tighten the pinion in 5 N·m (44 in. lbs.) increments until the resistance amount is reached.
6. Connect the halfshafts to the differential connecting flanges. **Refer to Page 3-5**.
7. Install the propeller shaft. **Refer to Page 3-28**.
8. Install the muffler. **Refer to Page 11-12**.
9. Fill the differential housing to specification. **Refer to Page 3-40**.
10. Lower the vehicle.



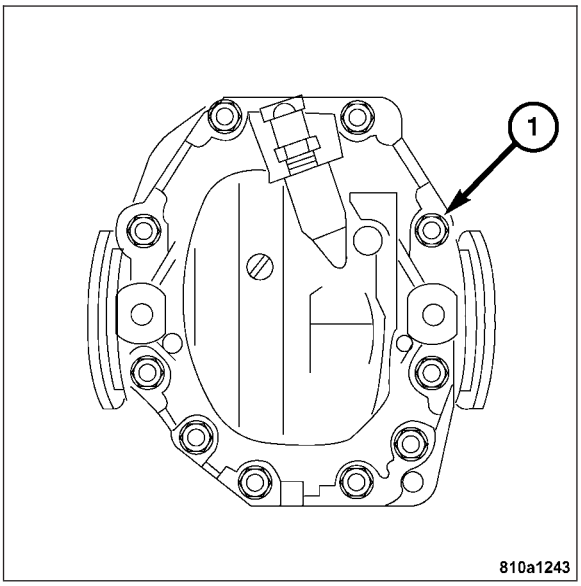
DIFFERENTIAL CONNECTING FLANGE SEAL

REMOVAL

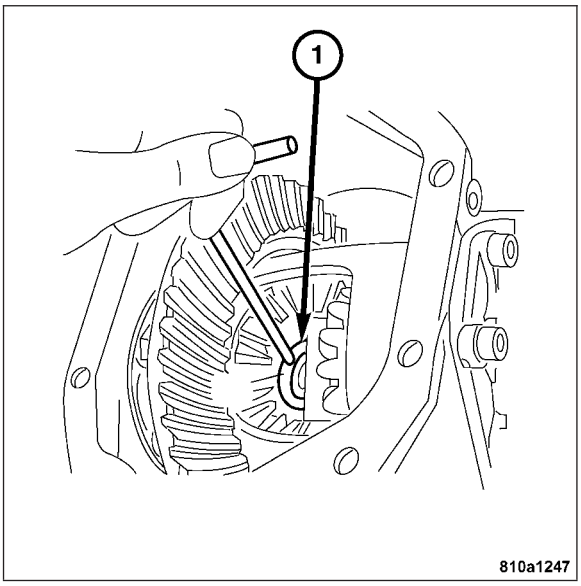
1. Remove the differential housing and place on a suitable work bench. **Refer to Page 3-41**.

Note: If a replacement end cover is fitted, be sure to check whether or not the sealing surface is machined. Use appropriate sealant. Install end cover.

2. Remove the differential housing cover bolts (1) and the cover.

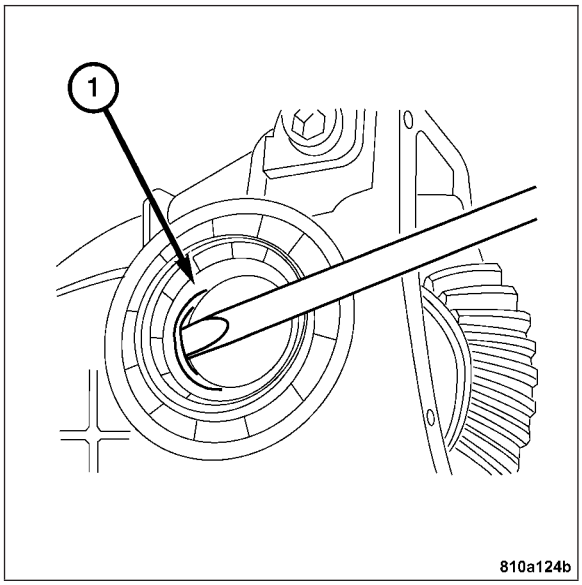


3. Remove the differential connecting flange locking ring (1).
4. Remove the differential connecting flange from the differential housing assembly.
5. Inspect the differential connecting flange for galling or grooving. Replace the differential connecting flange if there are signs of wear.



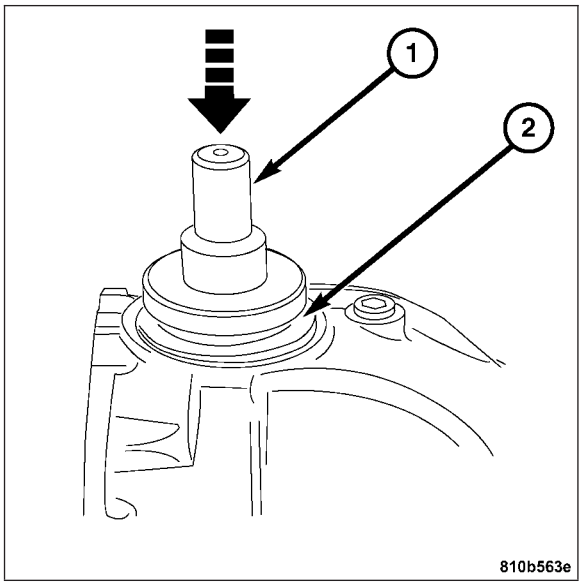
CAUTION: Do not scrape or damage the surface of the seal bore.

6. Remove the differential connecting flange oil seal (1) with a suitable prying tool.

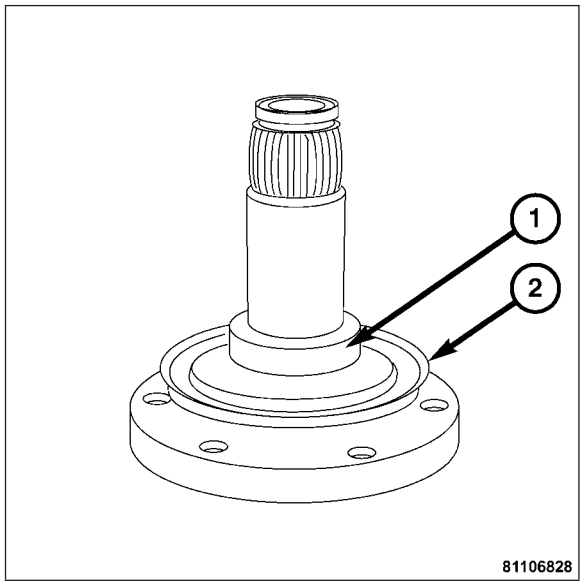


INSTALLATION

1. Using the Special Tool 9223 Drift (1), drive the new differential connecting flange oil seal (2) into the differential housing.
2. Lubricate the seal with hypoid gear oil.



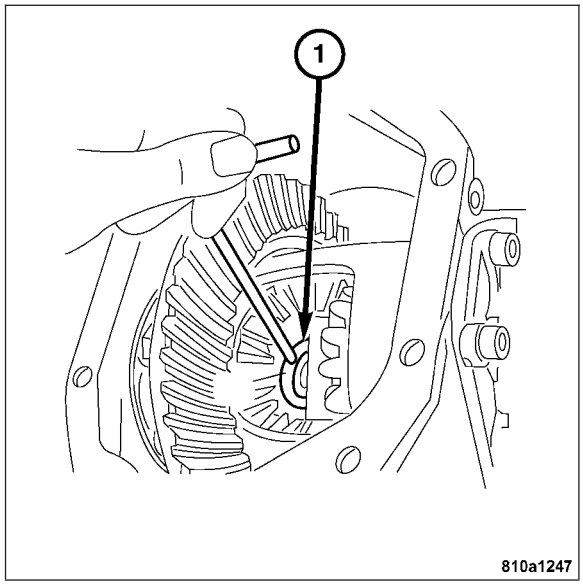
3. Inspect the differential connecting flange sealing surface (1) and dust shield (2). Install the differential connecting flange to the differential housing assembly.



4. Install the differential connecting flange locking ring (1). Check for proper fit.
5. Check axial end play between the differential connecting flange and the differential housing. (.03 mm to .3 mm).

Note: If a replacement cover is fitted, be sure to check whether or not the sealing surface is machined. Use appropriate sealant. Install end cover.

6. Apply a 1.5 mm to 2.0 mm bead of Hylomar sealant to the differential housing cover sealing surface.



7. Install the differential housing cover.
8. Install the differential housing cover bolts (1). Tighten the bolts to 30 N·m (22 ft. lbs.) plus 45°.
9. Install the differential. **Refer to Page 3-42**.
10. Lower the vehicle.