DRIVELINE

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HALF SHAFT

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HALF SHAFT

DESCRIPTION

All Models Except 2.4L Turbo

Vehicles equipped with either an automatic or manual transmission use an unequal-length halfshaft system. The system incorporates two halfshaft assemblies (left and right) that consist of an inner and outer constant velocity (CV) joint and a solid interconnecting shaft (Fig. 1). The right halfshaft is longer than the left due to transaxle packaging and powertrain design.

Halfshafts used on both the right and left sides of the vehicle use a tuned rubber damper weight mounted to the interconnecting shaft (Fig. 1). The damper weight applications vary by which side of the vehicle the halfshaft is located on and the transmission application of the vehicle. When replacing a halfshaft, be sure the replacement halfshaft has the same damper weight as the original.

Both halfshaft assemblies use the same type of inner and outer joints. The inner joint of both halfshaft assemblies is a tripod joint, and the outer joint of both halfshaft assemblies is a Rzeppa joint. Both tripod joints and Rzeppa joints are true constant velocity (C/V) joint assemblies. The inner tripod joint allows for the changes in halfshaft length through the jounce and rebound travel of the front suspension.

2.4L Turbo-Equipped Models

Vehicles equipped with the 2.4L Turbo Engine utilize an equal-length halfshaft system. The system incorporates two halfshaft assemblies (left and right) that consist of an inner and outer constant velocity (CV) joint and a solid interconnecting shaft, and an intermediate shaft/bearing assembly as shown in (Fig. 2).

Both halfshaft assemblies use the same type of inner and outer joints. The inner joint of both halfshaft assemblies is a tripod joint, and the outer joint of both halfshaft assemblies is a Rzeppa joint. Both tripod joints and Rzeppa joints are true constant velocity (C/V) joint assemblies. The inner tripod joint allows for the changes in halfshaft length through the jounce and rebound travel of the front suspension. The outer C/V joint is equipped with a tone

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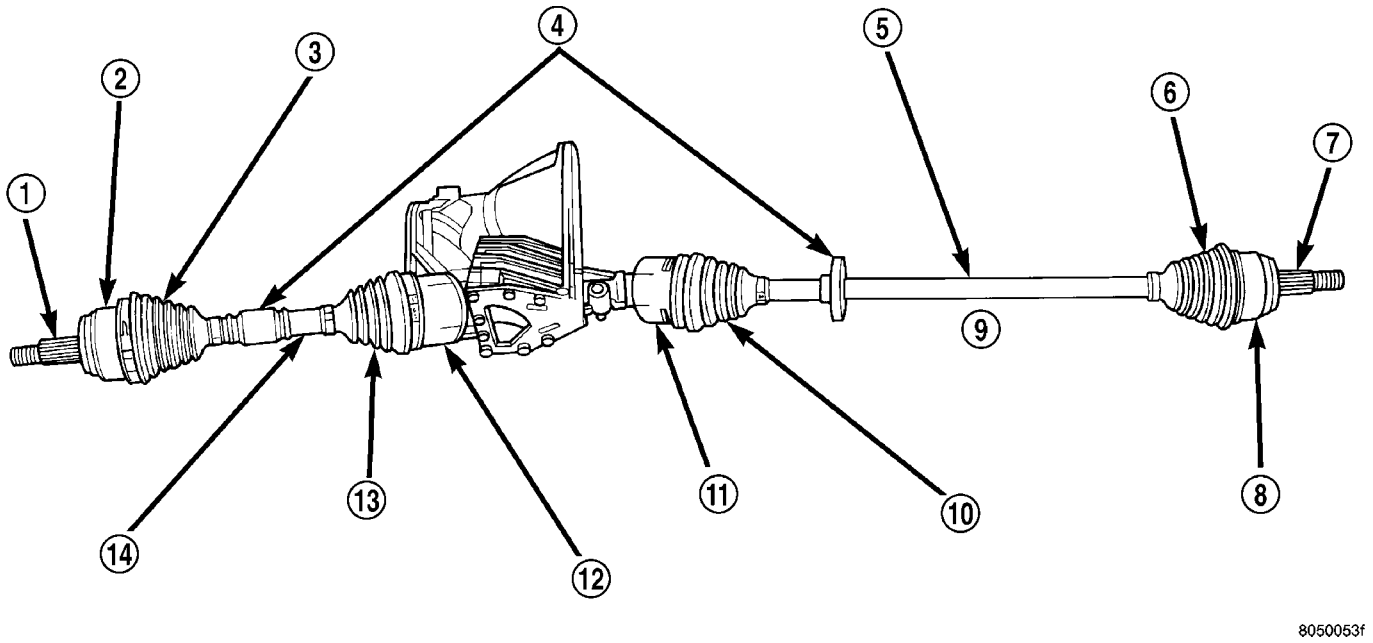

Fig. 1 Unequal Length Halfshaft System

1 - STUB AXLE	8 - OUTER C/V JOINT
2 - OUTER C/V JOINT	9 - RIGHT HALFSHAFT
3 - OUTER C/V JOINT BOOT	10 - INNER TRIPOD JOINT BOOT
4 - TUNED RUBBER DAMPER WEIGHT	11 - INNER TRIPOD JOINT
5 - INTERCONNECTING SHAFT—RIGHT	12 - INNER TRIPOD JOINT
6 - OUTER C/V JOINT BOOT	13 - INNER TRIPOD JOINT BOOT
7 - STUB AXLE	14 - INTERCONNECTING SHAFT—LEFT

wheel used to determine vehicle speed for ABS brake operation.

The left halfshaft inner tripod joint and the intermediate shaft are both splined into the transaxle side gears. The left inner tripod joint is retained using a circlip located on its stub shaft. The intermediate shaft does not utilize a circlip at the inboard end, as the support bearing/bracket assembly provides for shaft retention. The intermediate shaft utilizes a circlip on its outboard end to retain the RH shaft (tripod joint). Both outer C/V joints have a stub shaft that are splined into the wheel hub and retained by a hub nut, nut lock, wave washer and cotter pin.

On vehicles equipped with ABS brakes, the outer C/V joint is equipped with a tone wheel used to determine vehicle speed for ABS brake operation.

The left halfshaft inner tripod joint and the intermediate shaft are both splined into the transaxle side gears. The inner tripod joints are retained using a snap ring located in the stub shaft of the tripod joint. The outer C/V joint has a stub shaft that is splined into the wheel hub and retained by a hub nut, nut lock, wave washer and cotter pin (Fig. 3).

NOTE: This vehicle does not use a rubber–lip bearing seal as on previous front–wheel–drive cars to prevent contamination of the front wheel bearing. On these vehicles, the face of the outer C/V joint fits deeply into the steering knuckle, using a close outer C/V joint–to–steering knuckle fit. This design deters direct water splash on bearing seal while allowing any water that gets in, to run out the bottom of the steering knuckle bearing bore. It is important to thoroughly clean the outer C/V joint and the wheel bearing area in the steering knuckle before it is assembled after servicing.

OPERATION

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

DIAGNOSIS AND TESTING - HALFSHAFT DIAGNOSIS

VEHICLE INSPECTION

(1) Check for grease in the vicinity of the inboard tripod joint and outboard C/V joint; this is a sign of inner or outer joint seal boot or seal boot clamp damage.

NOISE AND/OR VIBRATION IN TURNS

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

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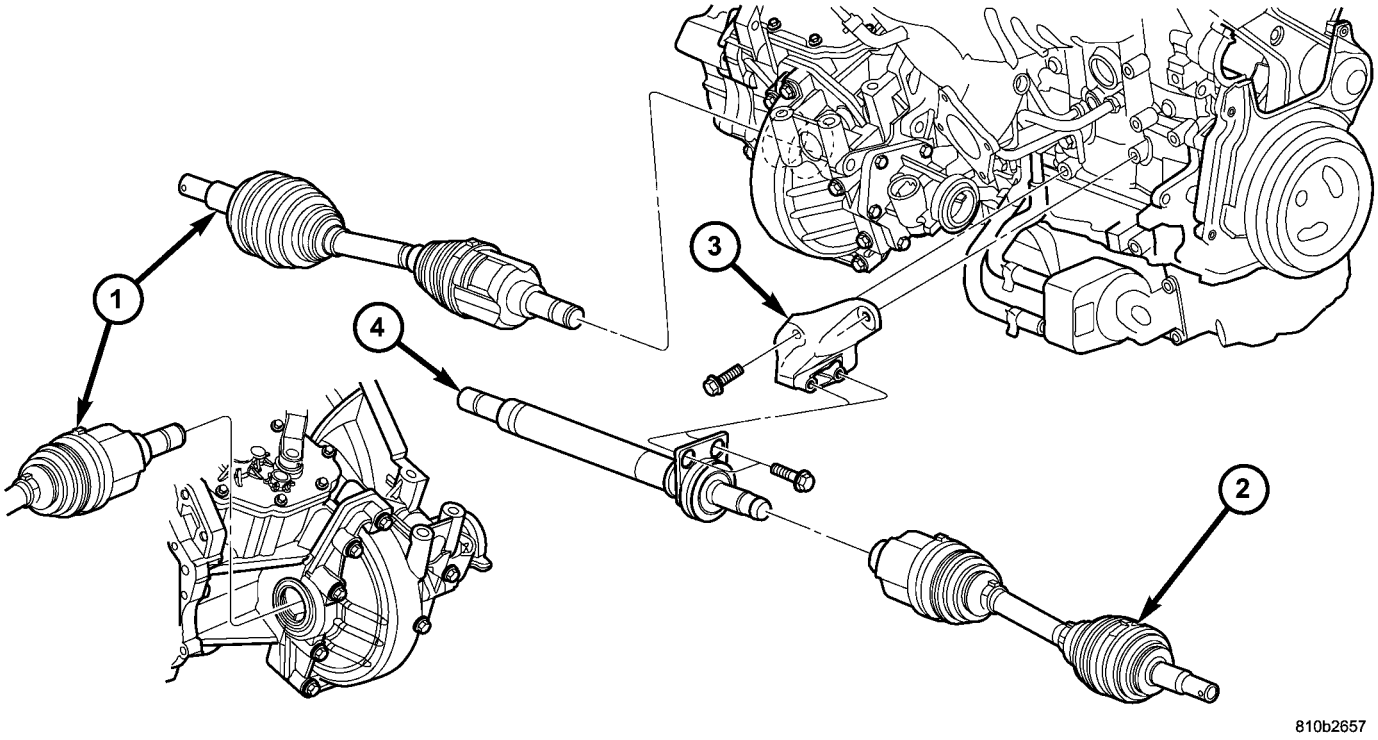


Fig. 2 Halfshaft and Intermediate Shaft—2.4L Turbo Models

1 - HALFSHAFT - LEFT
2 - HALFSHAFT - RIGHT
3 - SUPPORT BRACKET - INTERMEDIATE SHAFT
4 - INTERMEDIATE SHAFT/BEARING ASSEMBLY

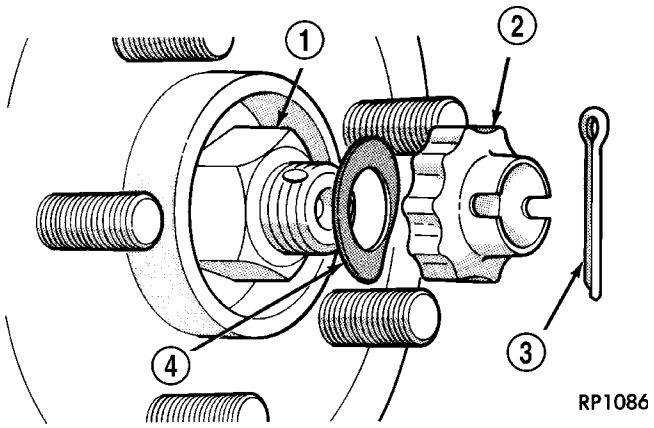


Fig. 3 Driveshaft Retaining Hardware

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(1) Loose hub nut. Using a click-style torque wrench, torque hub nut to 244 N·m (180 ft. lbs.).

(2) Damaged outer C/V or inner tripod joint seal boot or seal boot clamps, which is evident by the presence of grease slung outward from the joint. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

(3) 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 seal boot on the inner or outer joint of the halfshaft assembly, which is evident by the presence of grease slung outward from the joint. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

(2) A loose or missing clamp on the inner or outer joint of the halfshaft assembly. This may be accompanied by the visible loss of grease.

(3) A damaged or worn halfshaft C/V joint. Isolate the noise to one side of the vehicle. Replace only the affected side. Replacing both halfshafts is not necessary.

SHUDDER OR VIBRATION DURING ACCELERATION

(1) A worn or damaged halfshaft inner tripod joint. Isolate the condition to one side of the vehicle.

HALF SHAFT (Continued)

Replace only the affected side. Replacing both halfshafts is not necessary.

(2) A sticking tripod joint spider assembly (inner tripod joint only). Isolate the condition to one side of the vehicle. Replace only the affected side. Replacing both halfshafts is not necessary.

(3) Improper wheel balance.

VIBRATION AT HIGHWAY SPEEDS

(1) Foreign material (mud, etc.) packed on the backside of the wheel(s).

(2) Out of balance front tires or wheels.

(3) Improper tire and/or wheel runout.

REMOVAL

REMOVAL—EXCEPT 2.4L TURBO MODELS

CAUTION: Boot sealing is vital to retain special lubricants and to prevent foreign contaminants from entering the C/V joint. Mishandling, such as allowing the assemblies to dangle unsupported, or pulling or pushing the ends can cut boots or damage C/V joints. During removal and installation procedures, always support both ends of the halfshaft to prevent damage.

CAUTION: The halfshaft, when installed, acts as a bolt and secures the front hub/bearing assembly. If vehicle is to be supported or moved on its wheels with a halfshaft removed, install a PROPER–SIZED BOLT AND NUT through front hub. Tighten bolt and nut to 244 N·m (180 ft. lbs.). This will ensure that the hub bearing cannot loosen.

(1) Disconnect battery negative cable.

(2) Place transaxle in gated park.

(3) Raise vehicle on hoist.

(4) Remove wheel and tire assembly (Fig. 4).

(5) Remove the halfshaft to hub cotter pin, nut lock, wave washer and hub nut (Fig. 5).

(6) If equipped with ABS, disconnect the front wheel speed sensor and secure harness out of the way.

(7) Remove nut and bolt (Fig. 6) retaining ball joint stud into steering knuckle.

CAUTION: Use caution when separating ball joint stud from steering knuckle, so ball joint seal does not get damaged.

(8) Separate ball joint stud from steering knuckle by prying down on lower control arm (Fig. 7).

CAUTION: Care must be taken not to separate the inner C/V joint during this operation. Do not allow halfshaft to hang by inner C/V joint, halfshaft must be supported.

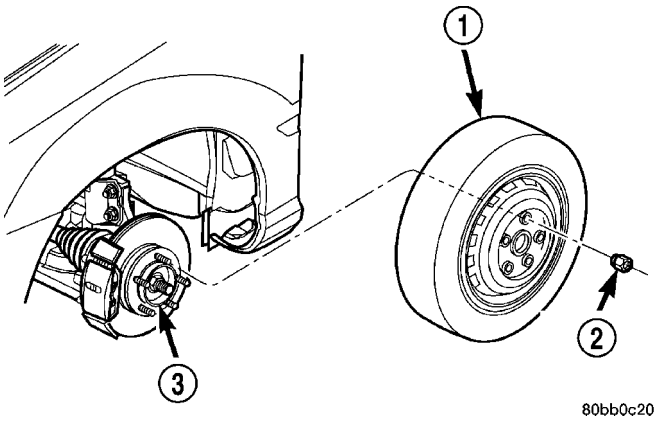


Fig. 4 Wheel and Tire Removal

1 - WHEEL/TIRE ASSY.
2 - LUG NUT (5)
3 - HUB

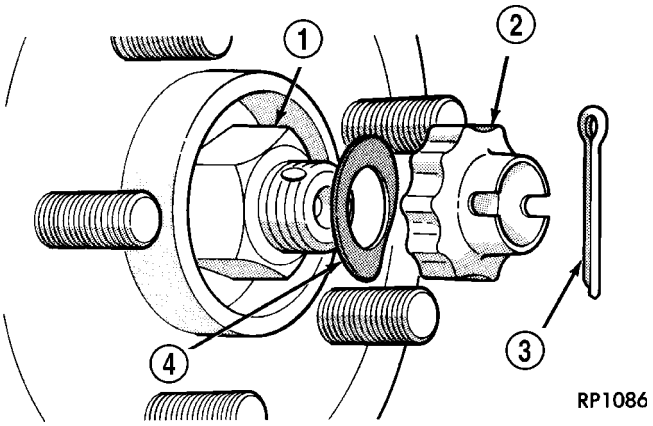


Fig. 5 Halfshaft Retaining Hardware

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(9) Remove halfshaft from steering knuckle by pulling outward on knuckle while pressing in on halfshaft. Support outer end of halfshaft assembly. If difficulty in separating halfshaft from steering knuckle is encountered, use Puller 1026 as shown in (Fig. 8) to separate shaft. **Do not strike shaft with hammer.**

(10) Support outer end of the halfshaft assembly.

CAUTION: Do not pull on interconnecting shaft when removing halfshaft assembly. Inner joint may become separated.

(11) Remove the inner tripod joints from the side gears of the transaxle using a punch to dislodge the inner tripod joint retaining ring from the transaxle side gear. If removing the right side inner tripod

HALF SHAFT (Continued)

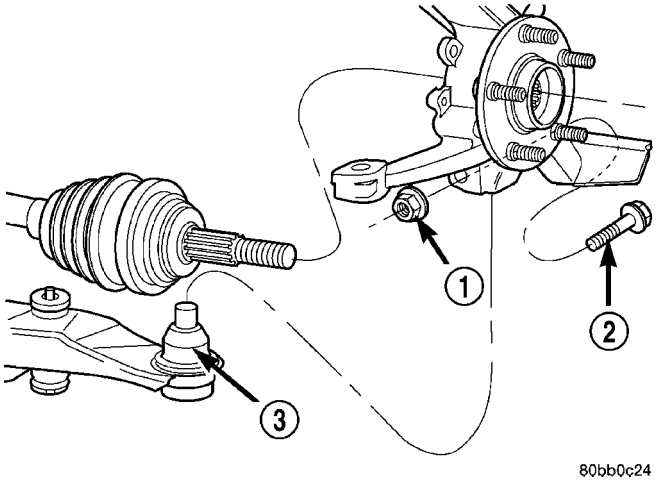


Fig. 6 Steering Knuckle at Lower Control Arm Ball Joint

1 - NUT
2 - BOLT
3 - BALL JOINT

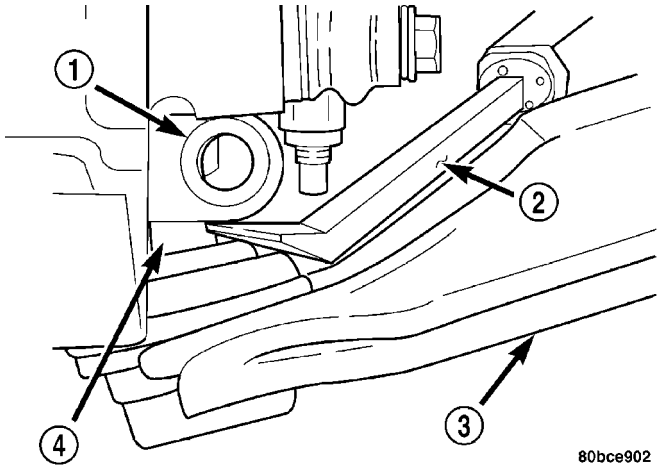


Fig. 7 Separating Lower Control Arm from Steering Knuckle

1 - STEERING KNUCKLE
2 - PRY BAR
3 - LOWER CONTROL ARM
4 - BALL JOINT STUD

joint, position punch against the inner tripod joint (Fig. 9). Strike the punch sharply with a hammer to dislodge the right inner joint from the side gear. If removing the left side inner tripod joint, position the punch in the groove of the inner tripod joint (Fig. 10). Strike the punch sharply with a hammer to dislodge the left inner tripod joint from the side gear.

NOTE: Removal of the inner tripod joints is made easier if you apply outward pressure on the joint as you strike the punch with a hammer.

(12) Hold inner tripod joint and interconnecting shaft of halfshaft assembly (Fig. 11). Remove inner

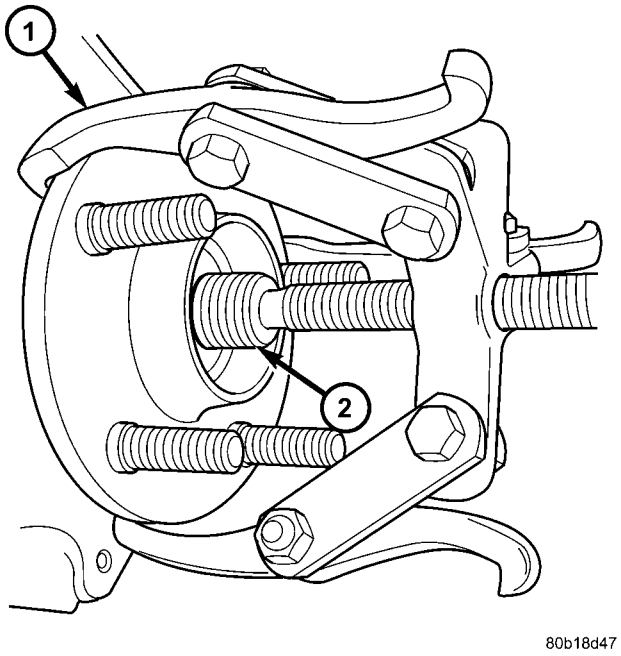


Fig. 8 Separating Halfshaft from Hub/Bearing

1 - PULLER 1026
2 - HALFSHAFT

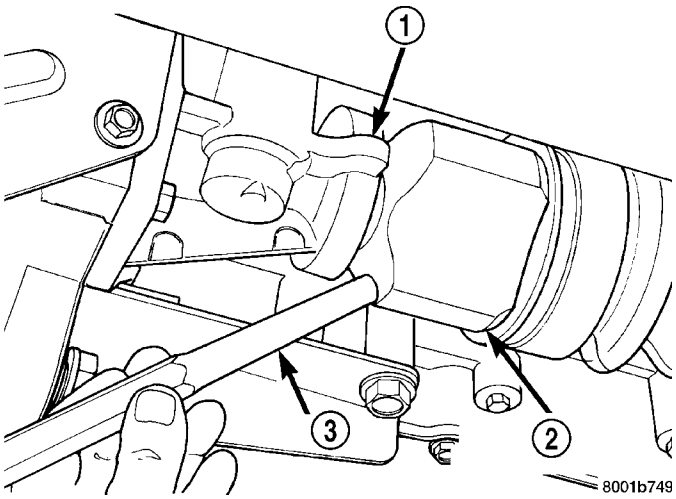


Fig. 9 Disengaging Right Inner Tripod Joint from Transaxle

1 - TRANSAXLE
2 - RIGHT INNER TRIPOD JOINT
3 - PUNCH

tripod joint from transaxle by pulling it straight out of transaxle side gear and transaxle oil seal. **When removing tripod joint, do not let spline or snap ring drag across sealing lip of the transaxle to tripod joint oil seal. When tripod joint is removed from transaxle, some fluid will leak out.**

HALF SHAFT (Continued)

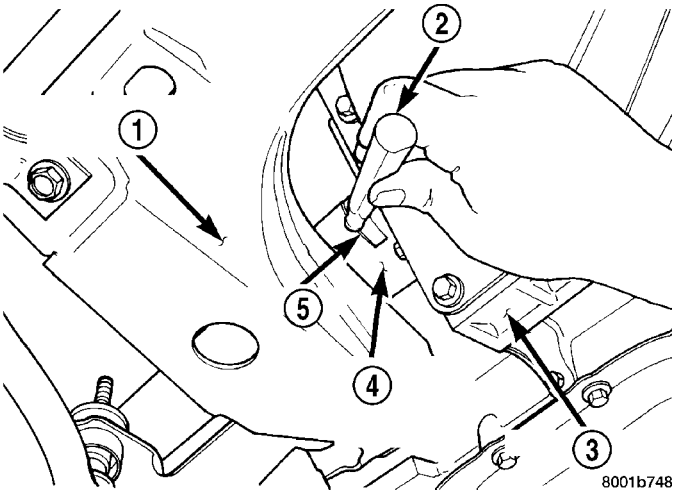


Fig. 10 Disengaging Left Inner Tripod Joint from Transaxle

1 - FRONT SUSPENSION CROSSMEMBER
2 - PUNCH
3 - TRANSAXLE
4 - DRIVESHAFT INNER TRIPOD JOINT
5 - NOTCH

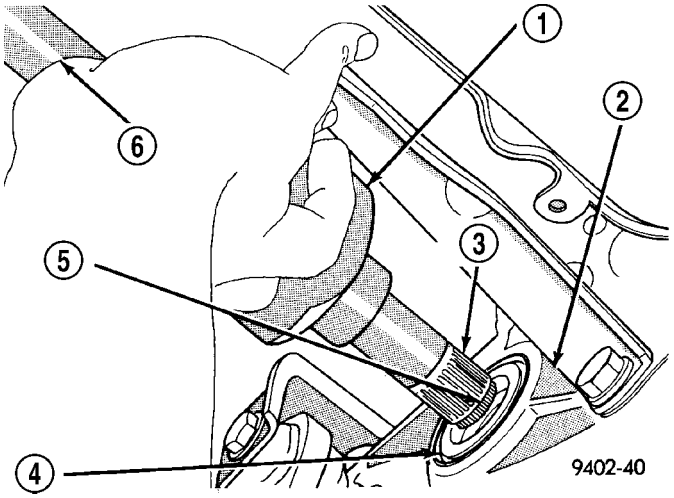


Fig. 11 Tripod Joint Removal from Transaxle

1 - INNER TRIPOD JOINT
2 - TRANSAXLE
3 - SPLINE
4 - OIL SEAL
5 - SNAP RING
6 - INTERCONNECTING SHAFT

CAUTION: The halfshaft, when installed, acts as a bolt and secures the front hub/bearing assembly. If vehicle is to be supported or moved on its wheels with a halfshaft removed, install a PROPER–SIZED BOLT AND NUT through front hub. Tighten bolt and nut to 244 N·m (180 ft. lbs.). This will ensure that the hub bearing cannot loosen.

REMOVAL—2.4L TURBO MODELS

CAUTION: Boot sealing is vital to retain special lubricants and to prevent foreign contaminants from entering the C/V joint. Mishandling, such as allowing the assemblies to dangle unsupported, or pulling or pushing the ends can cut boots or damage C/V joints. During removal and installation procedures, always support both ends of the halfshaft to prevent damage.

CAUTION: The halfshaft, when installed, acts as a bolt and secures the front hub/bearing assembly. If vehicle is to be supported or moved on its wheels with a halfshaft removed, install a PROPER–SIZED BOLT AND NUT through front hub. Tighten bolt and nut to 244 N·m (180 ft. lbs.). This will ensure that the hub bearing cannot loosen.

(1) Disconnect battery negative cable.
(2) Place transaxle in gated park.
(3) Raise vehicle on hoist.
(4) Remove wheel and tire assembly (Fig. 12).

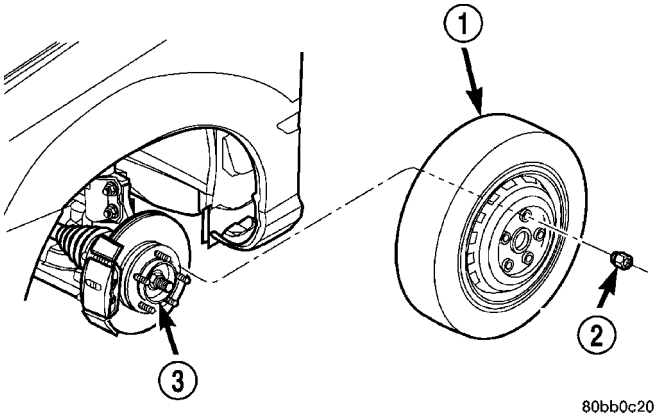


Fig. 12 Wheel and Tire Removal

1 - WHEEL/TIRE ASSY.
2 - LUG NUT (5)
3 - HUB

(5) Remove the cotter pin, nut lock, and spring washer, and hub nut from the end of the outer C/V joint stub axle (Fig. 13).
(6) If equipped with ABS, disconnect the front wheel speed sensor and secure harness out of the way.
(7) Remove nut and bolt (Fig. 14) retaining ball joint stud into steering knuckle.

NOTE: Use caution when separating ball joint stud from steering knuckle, so ball joint seal does not get damaged.

HALF SHAFT (Continued)

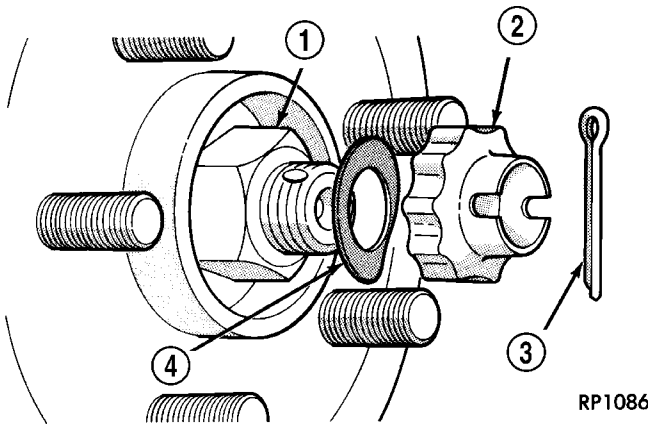


Fig. 13 Halfshaft Retaining Hardware

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

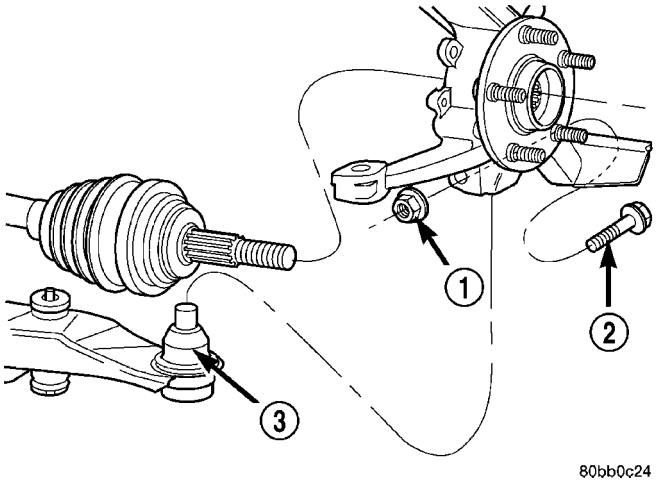


Fig. 14 Steering Knuckle at Lower Control Arm Ball Joint

1 - NUT
2 - BOLT
3 - BALL JOINT

(8) Separate ball joint stud from steering knuckle by prying down on lower control arm (Fig. 15).

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow halfshaft to hang by inner C/V joint, halfshaft must be supported.

(9) Remove halfshaft from steering knuckle by pulling outward on knuckle while pressing in on halfshaft. Support outer end of halfshaft assembly. If difficulty in separating halfshaft from hub is encountered, **do not strike shaft with hammer,** instead use puller 1026 to separate (Fig. 16).

(10) Support outer end of the halfshaft assembly.

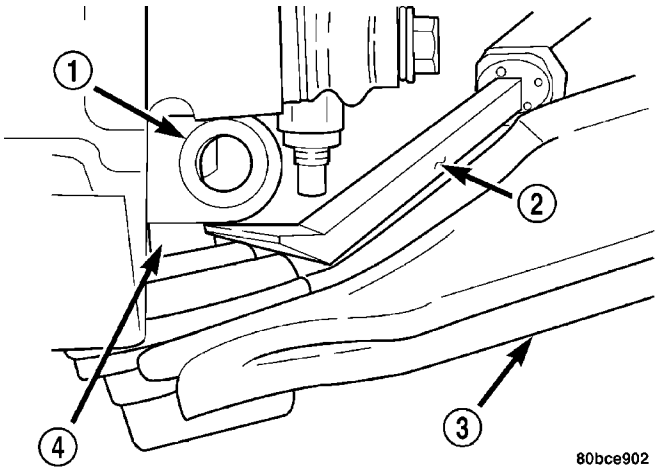


Fig. 15 Separating Lower Control Arm from Steering Knuckle

1 - STEERING KNUCKLE
2 - PRY BAR
3 - LOWER CONTROL ARM
4 - BALL JOINT STUD

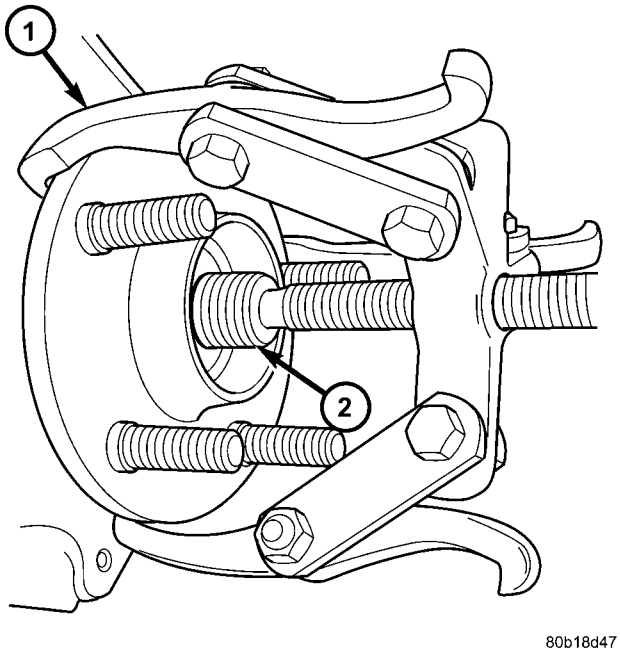


Fig. 16 Separating Halfshaft from Hub/Bearing

1 - PULLER 1026
2 - HALFSHAFT

NOTE: When left halfshaft is removed from transaxle, some fluid may leak out.

NOTE: Removal of the inner tripod joints is made easier if you apply outward pressure on the joint as you strike the punch with a hammer. DO NOT PULL ON INTERCONNECTING SHAFT TO REMOVE, AS THE INNER JOINT WILL BECOME SEPARATED.

HALF SHAFT (Continued)

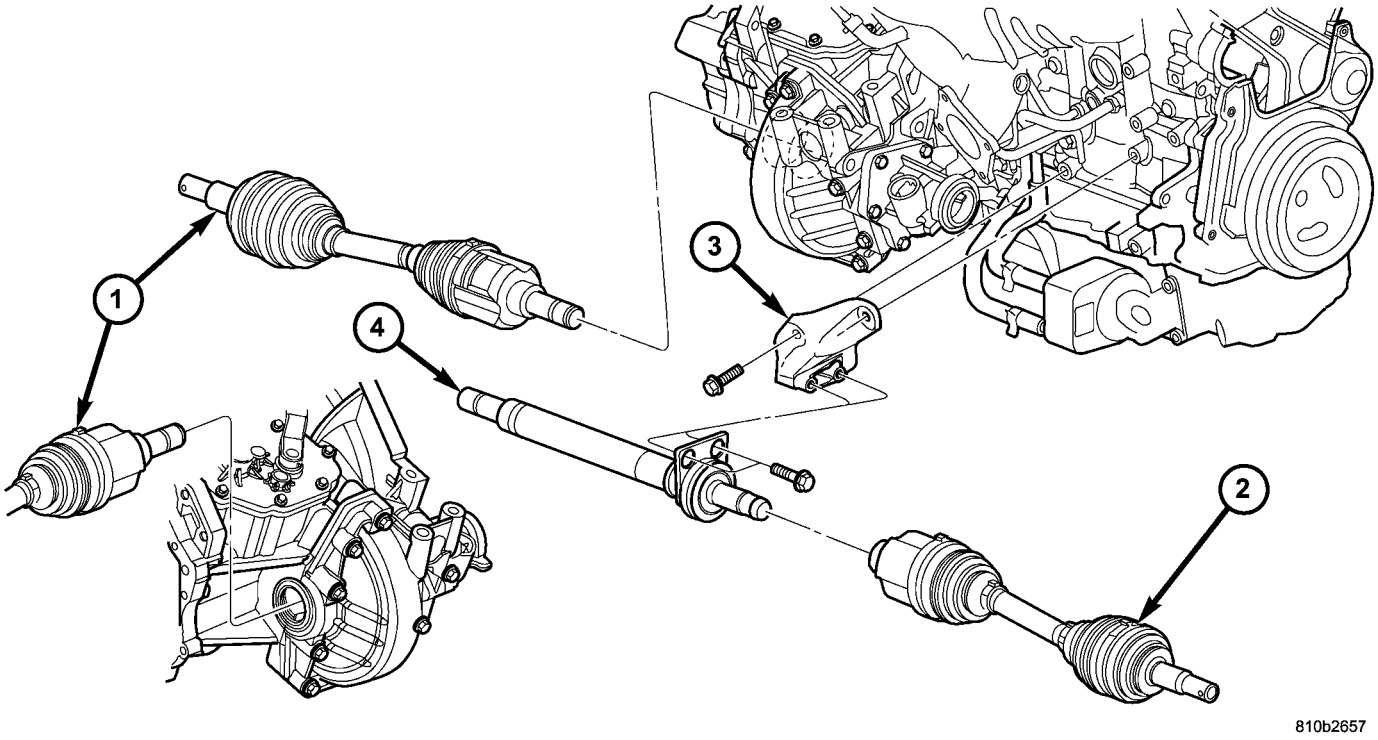


Fig. 17 Halfshaft and Intermediate Shaft—2.4L Turbo Models

1 - HALFSHAFT - LEFT
2 - HALFSHAFT - RIGHT
3 - SUPPORT BRACKET - INTERMEDIATE SHAFT
4 - INTERMEDIATE SHAFT/BEARING ASSEMBLY

(11) Remove halfshaft(s) (Fig. 17). **Left halfshaft:** While applying outward pressure on joint by hand, dislodge inner tripod joint from differential side gear by striking outward with a punch. When removing tripod joint and halfshaft, do not let spline or snap ring drag across axle seal. **Right halfshaft:** Slide inner tripod joint off of intermediate shaft. If difficulty is encountered, dislodge joint from intermediate shaft using punch.

(12) If intermediate shaft is to be removed, remove two (2) intermediate shaft bearing-to-bracket bolts (Fig. 17).

CAUTION: The halfshaft, when installed, acts as a bolt and secures the front hub/bearing assembly. If vehicle is to be supported or moved on its wheels with a halfshaft removed, install a PROPER–SIZED BOLT AND NUT through front hub. Tighten bolt and nut to 244 N·m (180 ft. lbs.). This will ensure that the hub bearing cannot loosen.

INSTALLATION

INSTALLATION—EXCEPT 2.4L TURBO MODELS

CAUTION: Boot sealing is vital to retain special lubricants and to prevent foreign contaminants from entering the C/V joint. Mishandling, such as allowing the assemblies to dangle unsupported, or pulling or pushing the ends can cut boots or damage C/V joints. During removal and installation procedures, always support both ends of the halfshaft to prevent damage.

(1) Thoroughly clean spline and oil seal sealing surface, on tripod joint. Lightly lubricate oil seal sealing surface on tripod joint with fresh clean transmission lubricant.

(2) Holding halfshaft assembly by tripod joint and interconnecting shaft, install tripod joint into transaxle side gear as far as possible by hand.

(3) Carefully align tripod joint with transaxle side gears. Then grasp halfshaft interconnecting shaft and push tripod joint into transaxle side gear until fully seated. **Test that snap ring is fully engaged with side gear by attempting to remove tripod**

HALF SHAFT (Continued)

joint from transaxle by hand. If snap ring is fully engaged with side gear, tripod joint will not be removable by hand.

(4) Clean all debris and moisture out of steering knuckle (Fig. 18).

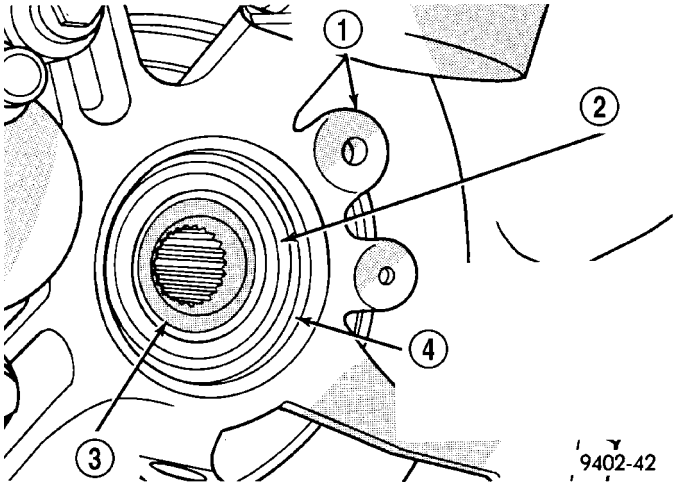


Fig. 18 Steering Knuckle to C/V Joint

1 - STEERING KNUCKLE
2 - WHEEL BEARING
3 - FRONT HUB
4 - THIS AREA OF THE STEERING KNUCKLE IS TO BE FREE OF ALL DEBRIS AND MOISTURE BEFORE INSTALLING DRIVE SHAFT IN STEERING KNUCKLE

(5) Ensure that front of outer C/V joint, which fits into steering knuckle (Fig. 19), is free of debris and moisture before assembling into steering knuckle.

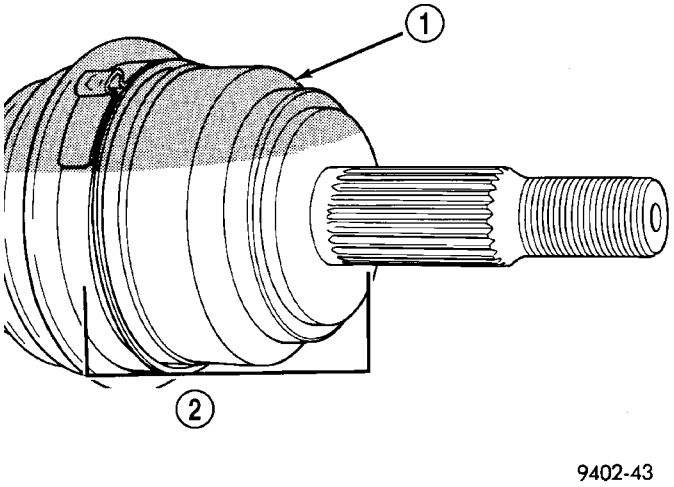


Fig. 19 Outer C/V Joint Inspection

1 - OUTER C/V JOINT
2 - THIS AREA OF OUTER C/V JOINT MUST BE FREE OF ALL DEBRIS AND MOISTURE, BEFORE INSTALLATION INTO STEERING KNUCKLE.

(6) Slide halfshaft back into front hub. Install steering knuckle onto the ball joint stud (Fig. 20).

NOTE: At this point, the outer joint will not seat completely into the front hub. The outer joint will be pulled into hub and seated when the hub nut is installed and torqued.

(7) Install a **NEW** steering knuckle to ball joint stud bolt and nut (Fig. 20). Tighten the nut and bolt to 95 N·m (70 ft. lbs.).

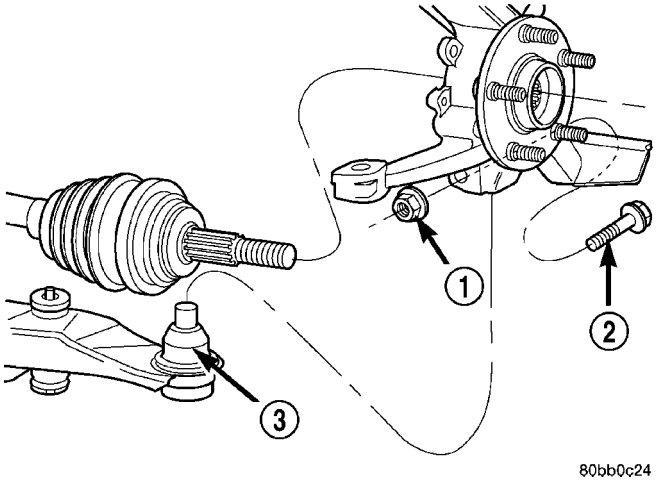


Fig. 20 Driveshaft Installation Into Hub And Steering Knuckle

1 - NUT
2 - BOLT
3 - BALL JOINT

(8) Clean all foreign matter from threads of halfshaft outer stub axle. Install hub nut onto the threads of the stub axle and tighten nut to 244 N·m (180 ft. lbs.) (Fig. 21).

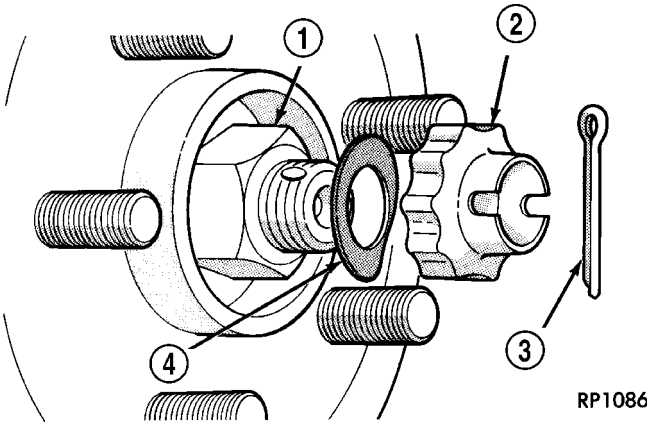


Fig. 21 Halfshaft Retaining Hardware

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(9) Install front wheel and tire assembly. Install front wheel lug nuts (Fig. 22) and tighten to 128 N·m (95 ft. lbs.).

HALF SHAFT (Continued)

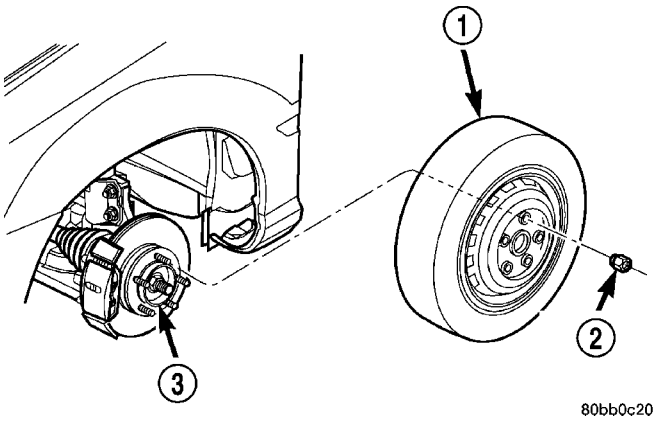


Fig. 22 Wheel and Tire Installation

1 - WHEEL/TIRE ASSY.
2 - LUG NUT (5)
3 - HUB

(10) Check for correct fluid level in transaxle assembly.

(11) Lower vehicle.

(12) Connect battery negative cable.

INSTALLATION—2.4L TURBO MODELS

CAUTION: Boot sealing is vital to retain special lubricants and to prevent foreign contaminants from entering the C/V joint. Mishandling, such as allowing the assemblies to dangle unsupported, or pulling or pushing the ends can cut boots or damage C/V joints. During removal and installation procedures, always support both ends of the halfshaft to prevent damage.

(1) If removed, install intermediate shaft/bearing assembly (Fig. 17). Install and torque bearing-to-bracket bolts to 54 N·m (40 ft. lbs.).

(2) Install halfshaft(s). **Left halfshaft:** Thoroughly clean spline and oil seal sealing surface on left tripod joint. Lightly lubricate oil seal sealing surface on tripod joint with fresh clean transmission lubricant. While holding halfshaft assembly by tripod joint and interconnecting shaft, install tripod joint into transaxle as far as possible by hand. Carefully align tripod joint with transaxle side gears. Then grasp halfshaft interconnecting shaft and push tripod joint into transaxle side gear until fully seated. Test that snap ring is fully engaged with side gear by attempting to remove tripod joint from transaxle by hand. If snap ring is fully engaged with side gear, tripod joint will not be removable by hand. **Right halfshaft:** Thoroughly clean right halfshaft tripod joint spline, as well as intermediate shaft spline. While holding halfshaft assembly by tripod joint and interconnecting shaft, install tripod joint onto intermediate shaft as far as possible by hand.

(3) Clean all debris and moisture out of steering knuckle (Fig. 23).

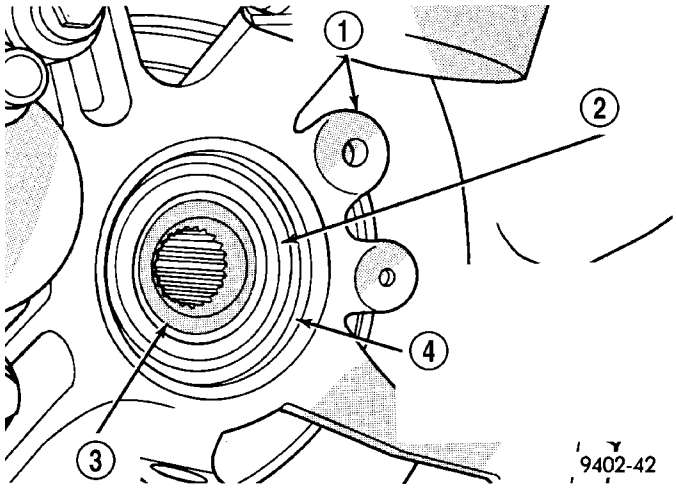


Fig. 23 Steering Knuckle to C/V Joint Sealing Area

1 - STEERING KNUCKLE
2 - WHEEL BEARING
3 - FRONT HUB
4 - THIS AREA OF THE STEERING KNUCKLE IS TO BE FREE OF ALL DEBRIS AND MOISTURE BEFORE INSTALLING HALFSHAFT IN STEERING KNUCKLE

(4) Ensure that front of outer C/V joint, which fits into steering knuckle (Fig. 24), is free of debris and moisture before assembling into steering knuckle.

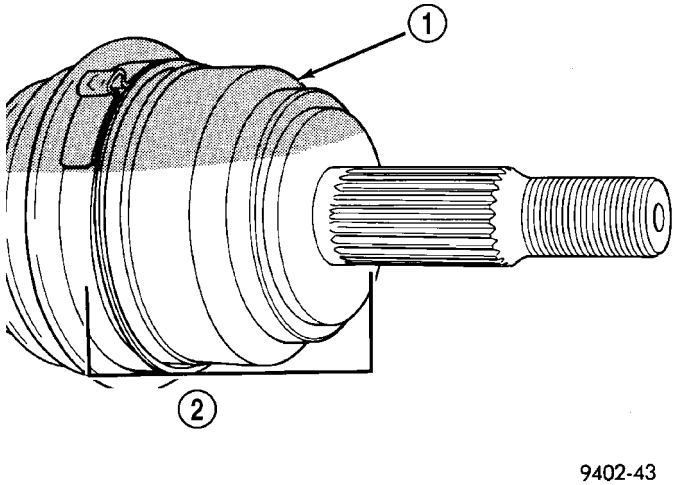


Fig. 24 Outer C/V Joint Inspection

1 - OUTER C/V JOINT
2 - THIS AREA OF OUTER C/V JOINT MUST BE FREE OF ALL DEBRIS AND MOISTURE, BEFORE INSTALLATION INTO STEERING KNUCKLE.

(5) Slide halfshaft back into front hub. Install steering knuckle onto the ball joint stud (Fig. 25).

NOTE: At this point, the outer joint will not seat completely into the front hub. The outer joint will be pulled into hub and seated when the hub nut is installed and torqued.

HALF SHAFT (Continued)

(6) Install a **NEW** steering knuckle to ball joint stud bolt and nut (Fig. 25). Tighten the nut and bolt to 95 N·m (70 ft. lbs.).

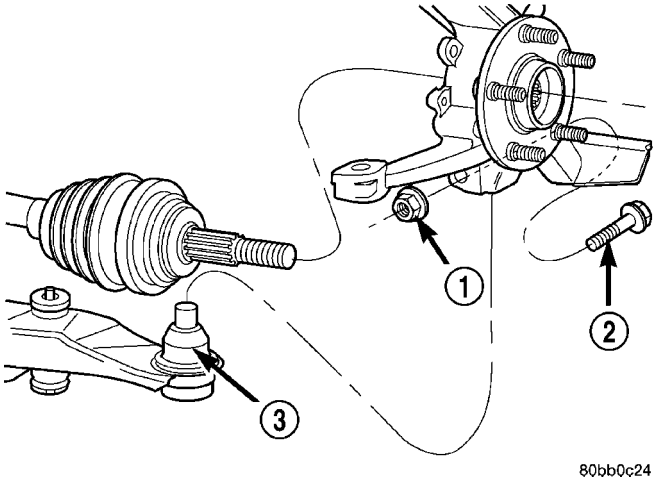


Fig. 25 Halfshaft Installation Into Hub And Knuckle

1 - NUT
2 - BOLT
3 - BALL JOINT

(7) Clean all foreign matter from threads of halfshaft outer stub axle. Install washer and hub nut onto the threads of the stub axle and tighten nut to 244 N·m (180 ft. lbs.) (Fig. 26).

(8) Install spring washer, nut lock, and cotter pin (Fig. 26).

(9) Install front wheel and tire assembly. Install front wheel lug nuts (Fig. 27) and tighten to 128 N·m (100 ft. lbs.).

(10) Check for correct fluid level in transaxle assembly.

(11) Lower vehicle.

(12) Connect battery negative cable.

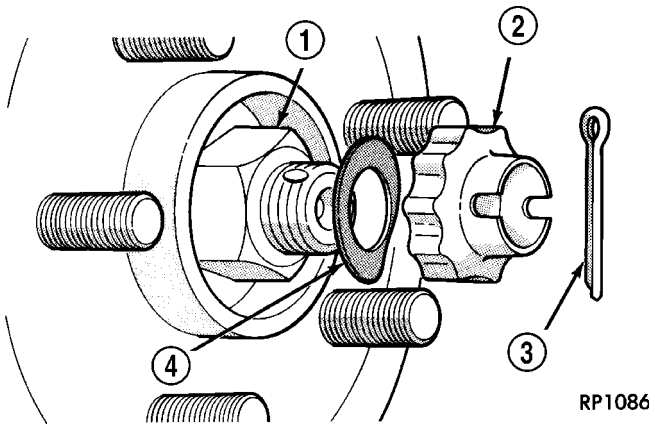


Fig. 26 Halfshaft Retaining Hardware

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

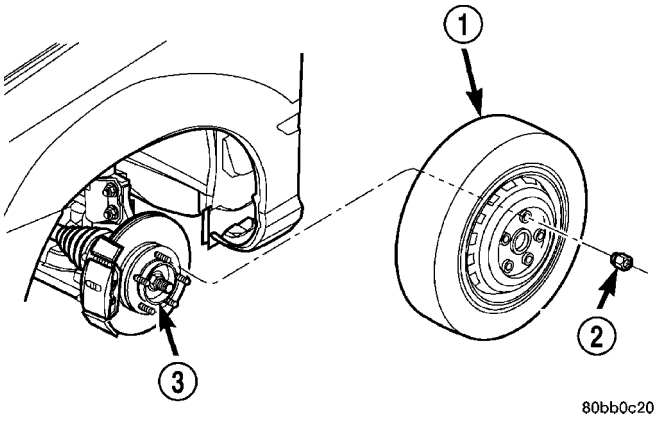


Fig. 27 Wheel and Tire Installation

1 - WHEEL/TIRE ASSY.
2 - LUG NUT (5)
3 - HUB

SPECIFICATIONS - TORQUE

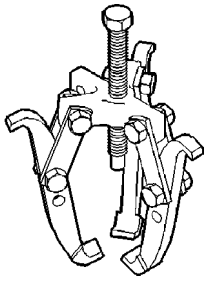
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Intermediate Shaft Bearing-to-Bracket (2.4L Turbo)	28	—	250
Bolt, Intermediate Shaft Bracket-to-Block (2.4L Turbo)	54	40	—
Nut, Driveshaft-to-Hub/ Bearing	244	180	—
Nut, Knuckle-to-Ball Joint Bolt	95	70	—
Nut, Wheel to Hub	128	95	—

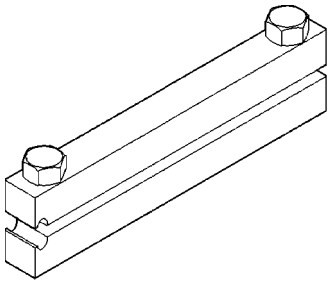
HALF SHAFT (Continued)

SPECIAL TOOLS

HALFSHAFT



Puller 1026



Boot Clamp Installer C-4975A

CV BOOT - INNER

REMOVAL

To remove sealing boot from halfshaft for replacement, the halfshaft assembly must be removed from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

The inner tripod joints use no internal retention in the tripod housing to keep the spider assembly in the housing. Therefore, do not pull on the interconnecting shaft to disengage tripod housing from transmission stub shaft. Removal in this manner will cause damage to the inboard joint sealing boots.

(1) Remove the halfshaft requiring boot replacement from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp that retains inner tripod joint sealing boot to tripod joint housing (Fig. 28) and discard. Then remove small clamp that retains inner tripod joint sealing boot to interconnecting shaft and discard. Remove the sealing boot from the tripod housing and slide it down the interconnecting shaft.

CAUTION: When removing the spider joint from the tripod joint housing, hold the rollers in place on the spider trunions to prevent the rollers and needle bearings from falling away.

(3) Slide the interconnecting shaft and spider assembly out of the tripod joint housing (Fig. 29).

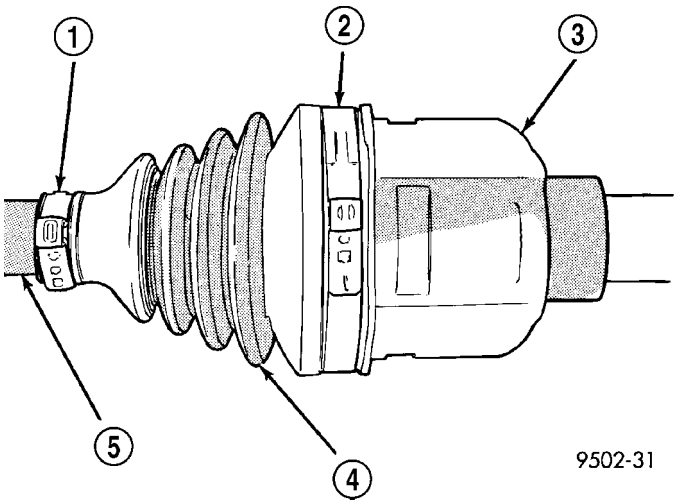


Fig. 28 Inner Tripod Joint Sealing Boot Clamps

1 - SMALL CLAMP
2 - LARGE CLAMP
3 - INNER TRIPOD JOINT
4 - SEALING BOOT
5 - INTERCONNECTING SHAFT

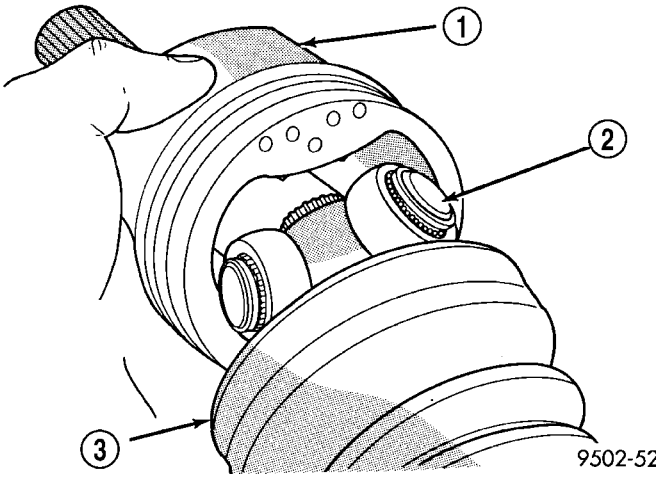


Fig. 29 Spider Assembly Joint Removal from Housing

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(4) Remove snap ring that retains spider assembly to interconnecting shaft (Fig. 30). Remove the spider assembly from interconnecting shaft. If spider assembly will not come off interconnecting shaft by hand, it can be removed by tapping spider assembly with a brass drift (Fig. 31). **Do not hit the outer tripod bearings in an attempt to remove spider assembly from interconnecting shaft.**

(5) Slide sealing boot off interconnecting shaft.

(6) Thoroughly clean and inspect spider assembly, tripod joint housing, and interconnecting shaft for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly**

CV BOOT - INNER (Continued)

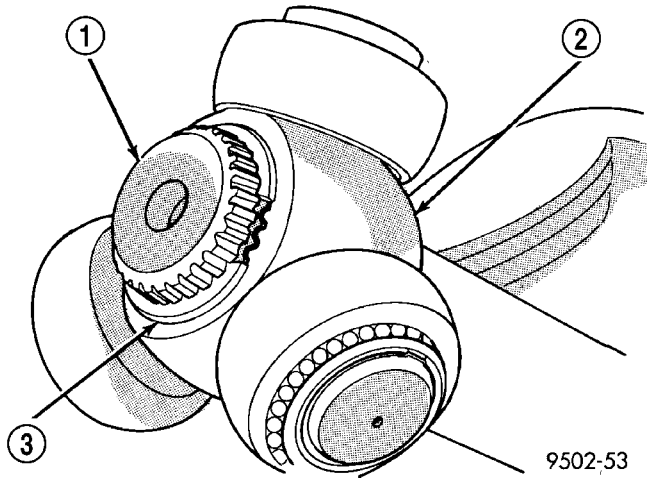


Fig. 30 Spider Assembly Retaining Snap Ring

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP RING

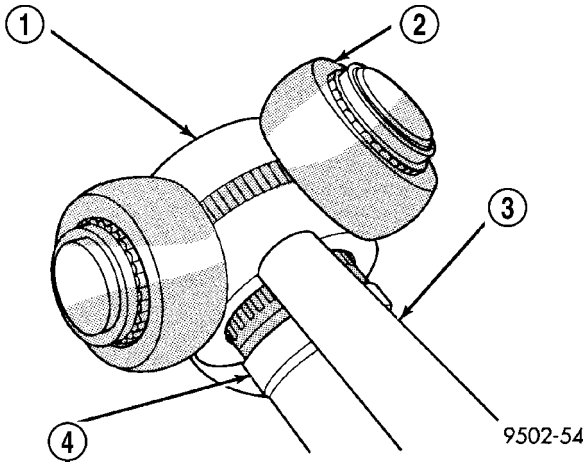


Fig. 31 Spider Assembly Removal from Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - DO NOT HIT SPIDER ASSEMBLY BEARINGS WHEN REMOVING SPIDER ASSEMBLY
3 - BRASS DRIFT
4 - INTERCONNECTING SHAFT

will require replacement. Component parts of these halfshaft assemblies are not serviceable.

INSTALLATION

NOTE: The inner tripod joint sealing boots are made from two different types of material. High-temperature applications (close to exhaust system) use silicone rubber whereas standard temperature applications use Hytrel plastic. The silicone sealing boots are soft and pliable. The Hytrel sealing boots are stiff and rigid. The replacement sealing boot MUST BE the same type of material as the sealing boot that was removed.

(1) Slide inner tripod joint seal boot retaining clamp, onto interconnecting shaft. Then slide the replacement inner tripod joint sealing boot onto interconnecting shaft. **Inner tripod joint seal boot MUST be positioned on interconnecting shaft, so the raised bead on the inside of the seal boot is in groove on interconnecting shaft (Fig. 32).**

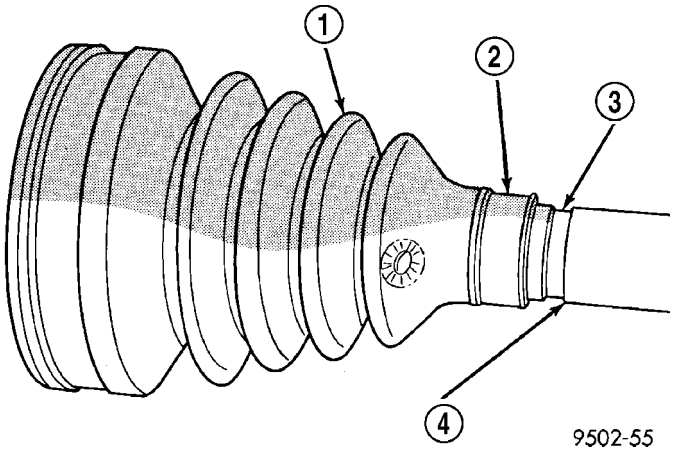


Fig. 32 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(2) Install spider assembly onto interconnecting shaft with chamfer on spider assembly toward interconnecting shaft (Fig. 33). Spider assembly must be installed on interconnecting shaft far enough to fully install spider retaining snap ring. If spider assembly will not fully install on interconnecting shaft by hand, it can be installed by tapping the spider body with a brass drift (Fig. 34). **Do not hit the outer tripod bearings in an attempt to install spider assembly on interconnecting shaft.**

(3) Install the spider assembly to interconnecting shaft retaining snap ring into groove on end of interconnecting shaft (Fig. 35). Be sure the snap ring is fully seated into groove on interconnecting shaft.

(4) Distribute 1/2 the amount of grease provided in the seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into tripod housing. Put the remaining amount into the sealing boot.

(5) Align tripod housing with spider assembly and then slide tripod housing over spider assembly and interconnecting shaft (Fig. 36).

(6) Install inner tripod joint seal boot to interconnecting shaft clamp evenly on sealing boot.

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 37). Tighten nut on crimping

CV BOOT - INNER (Continued)

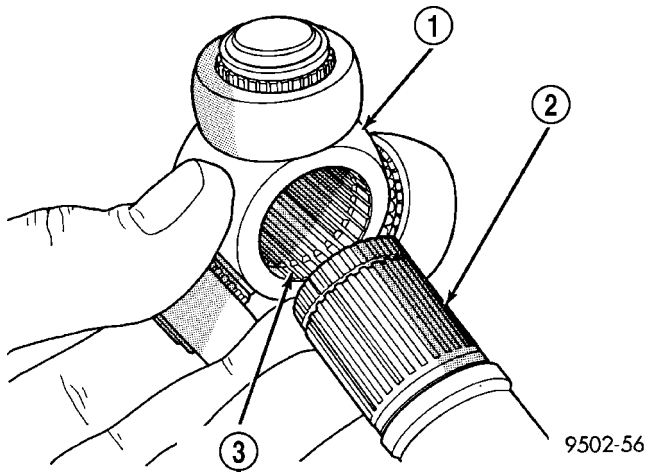


Fig. 33 Spider Assembly Installation on Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - INTERCONNECTING SHAFT
3 - CHAMFER

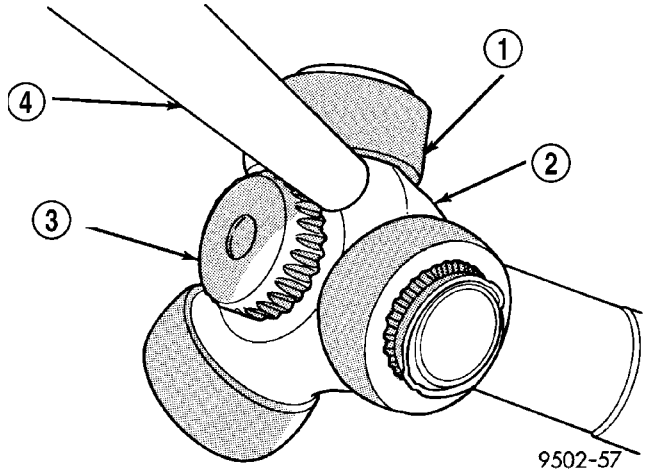


Fig. 34 Installing Spider Assembly On Interconnecting Shaft

1 - DO NOT HIT BEARINGS WHEN INSTALLING THE SPIDER ASSEMBLY
2 - SPIDER ASSEMBLY
3 - INTERCONNECTING SHAFT
4 - BRASS DRIFT

tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 38).

CAUTION: Seal must not be dimpled, stretched, or out–of–shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position sealing boot into the tripod housing retaining groove. Install seal boot retaining clamp evenly on sealing boot.

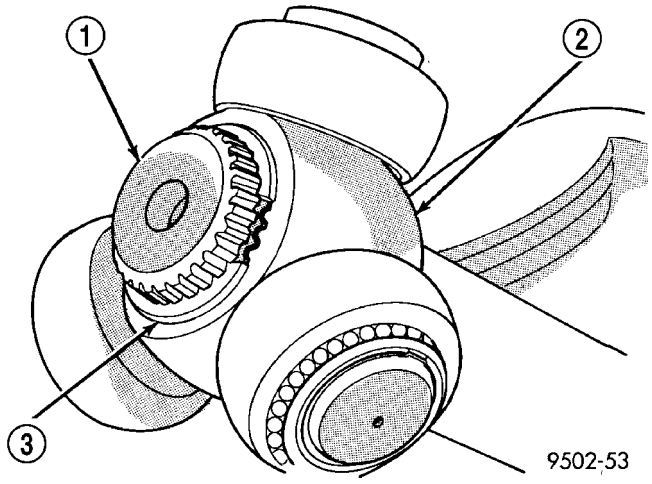


Fig. 35 Spider Assembly Retaining Snap Ring Installed

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP RING

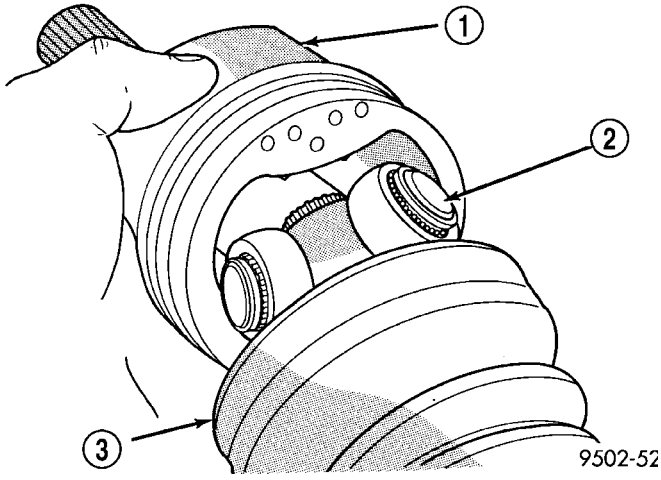


Fig. 36 Installing Tripod Housing on Spider Assembly

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

CAUTION: The following positioning procedure determines the correct air pressure inside the inner tripod joint assembly prior to clamping the sealing boot to inner tripod joint housing. If this procedure is not done prior to clamping sealing boot to tripod joint housing, boot durability can be adversely affected.

CAUTION: When venting the inner tripod joint assembly, use care so inner tripod sealing boot does not get punctured or, in any other way, damaged. If sealing boot is punctured or damaged while being vented, the sealing boot can not be used.

CV BOOT - INNER (Continued)

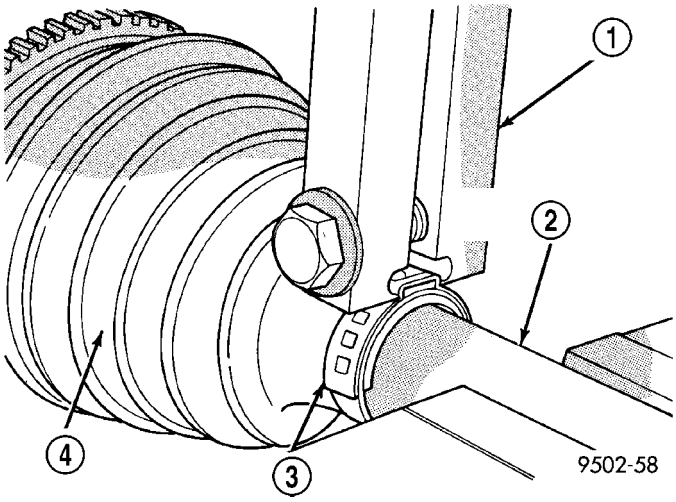


Fig. 37 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

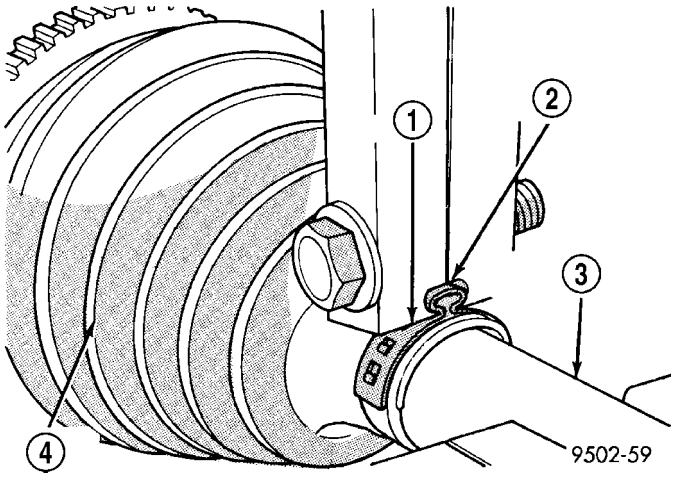


Fig. 38 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

(9) Insert a trim stick between the tripod joint and the sealing boot to vent inner tripod joint assembly (Fig. 39). **When inserting trim stick between tripod housing and sealing boot, ensure trim stick is held flat and firmly against the tripod housing. If this is not done, damage to the sealing boot can occur.** If inner tripod joint has a Hytrel (hard plastic) sealing boot, be sure trim stick is inserted between soft rubber insert and tripod housing, and not the hard plastic sealing boot and soft rubber insert.

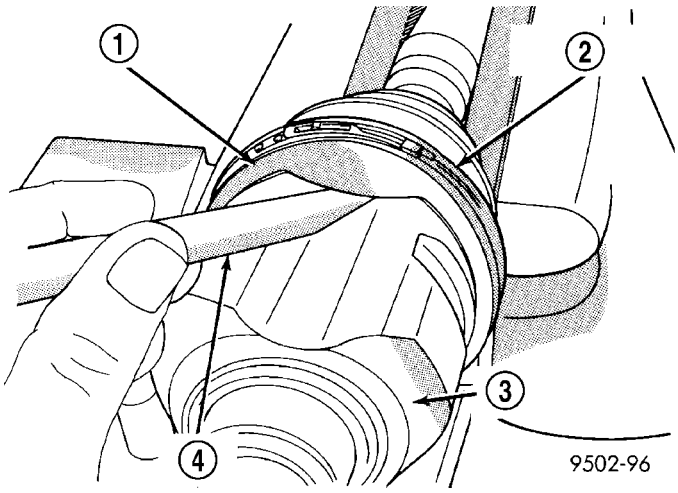


Fig. 39 Trim Stick Inserted for Venting Tripod Joint

1 - INNER TRIPOD JOINT SEALING BOOT
2 - SEALING BOOT CLAMP
3 - INNER TRIPOD JOINT HOUSING
4 - TRIM STICK

(10) With trim stick inserted between sealing boot and tripod joint housing, position inner tripod joint on halfshaft until correct sealing boot edge to edge length is obtained for type of sealing boot material being used (Fig. 40) (Fig. 41). Then remove the trim stick.

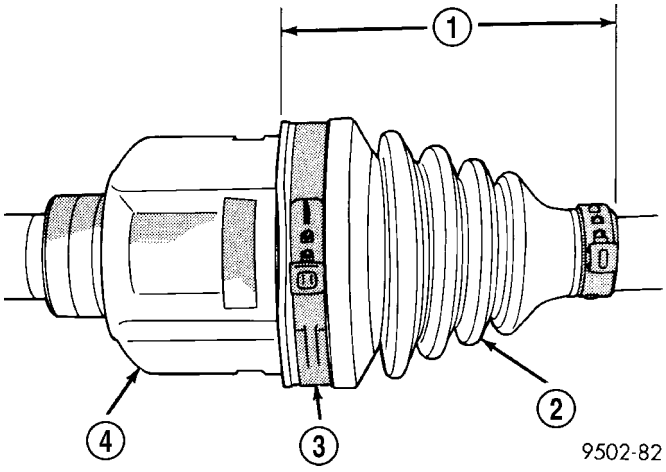


Fig. 40 Sealing Boot End to End Length with Hytrel Boot

1 - 107 MILLIMETERS
2 - HYTREL SEALING BOOT
3 - SEALING BOOT CLAMP
4 - INNER TRIPOD JOINT

(11) Clamp tripod joint sealing boot to tripod joint using required procedure for type of boot clamp application. If seal boot uses crimp type boot clamp, clamp sealing boot onto tripod housing using crimper, Special Tool C-4975-A. Place crimping tool C-4975-A over bridge of clamp (Fig. 42). Tighten nut on crimp-

CV BOOT - INNER (Continued)

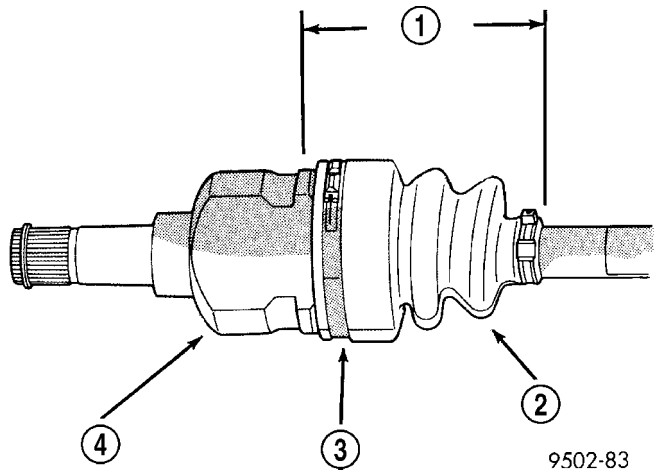


Fig. 41 Sealing Boot End to End Length with Silicone Boot

1 - 105 MILLIMETERS
2 - SILICONE SEALING BOOT
3 - CLAMP
4 - INNER TRIPOD JOINT

ing tool C-4975-A until jaws on tool are closed completely together, face–to–face (Fig. 43).

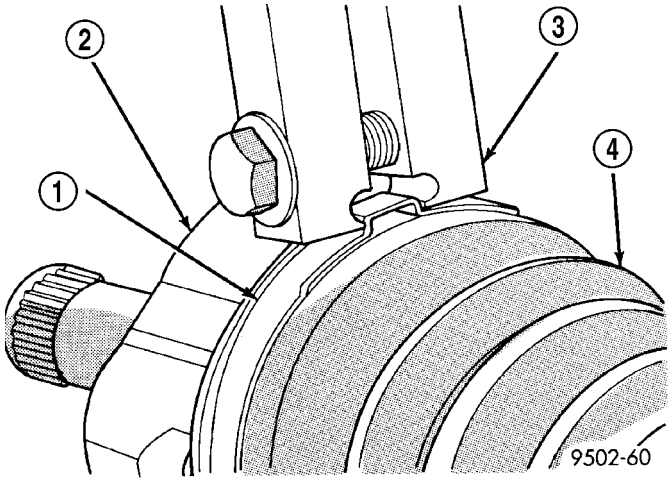


Fig. 42 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

(12) If seal boot uses low profile latching type boot clamp, clamp sealing boot onto tripod housing using clamp locking tool, Snap-On® YA3050 (or an equivalent). Place prongs of clamp locking tool in the holes of the clamp (Fig. 44). Squeeze tool together until top band of clamp is latched behind the two tabs on lower band of clamp (Fig. 45).

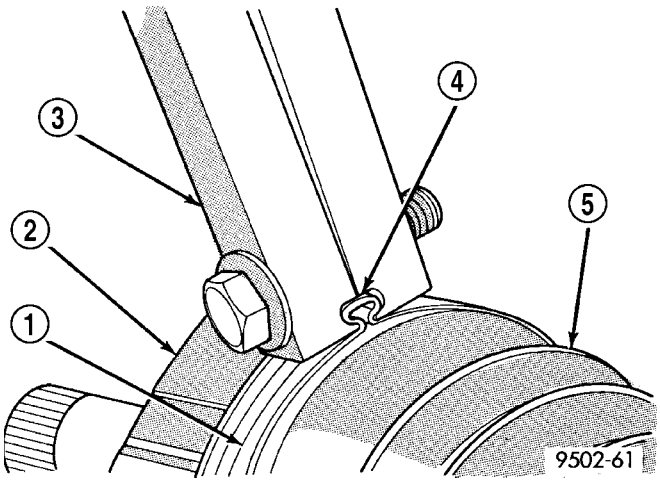


Fig. 43 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

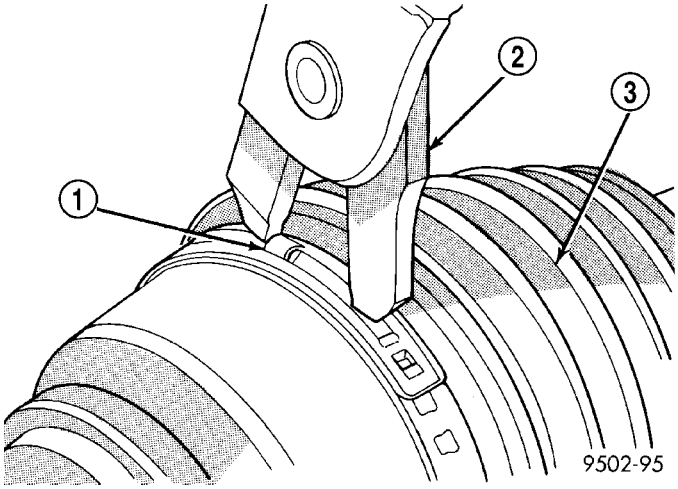


Fig. 44 Clamping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - SPECIAL TOOL YA3050
3 - SEALING BOOT

CV BOOT - INNER (Continued)

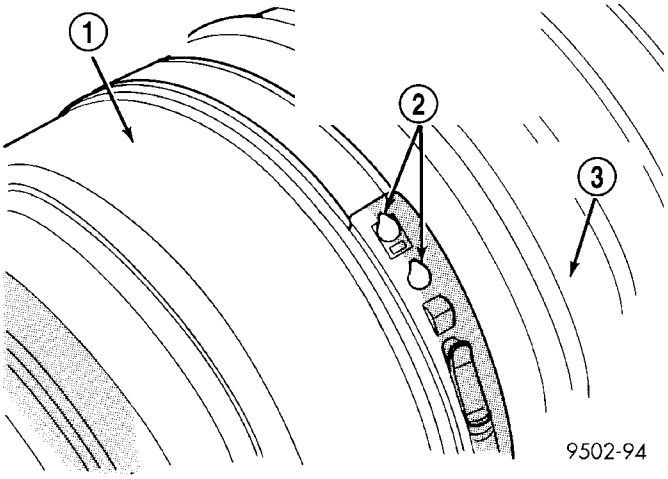


Fig. 45 Sealing Boot Clamp Correctly Installed

1 - INNER TRIPOD JOINT HOUSING
2 - TOP BAND OF CLAMP MUST BE RETAINED BY TABS AS SHOWN HERE TO CORRECTLY LATCH BOOT CLAMP
3 - SEALING BOOT

(13) Install the halfshaft requiring boot replacement back on the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

CV BOOT - OUTER

REMOVAL

(1) Remove halfshaft assembly requiring boot replacement from vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp retaining C/V joint sealing boot to C/V joint housing (Fig. 46) and discard. Remove small clamp that retains outer C/V joint sealing boot to interconnecting shaft and discard. Remove sealing boot from outer C/V joint housing and slide it down interconnecting shaft.

(3) Wipe away grease to expose outer C/V joint and interconnecting shaft.

(4) Remove outer C/V joint from interconnecting shaft using the following procedure: Support interconnecting shaft in a vise equipped with protective caps on jaws of vise to prevent damage to interconnecting shaft. Then, using a soft–faced hammer, sharply hit the end of the C/V joint housing to dislodge housing from internal circlip on interconnecting shaft (Fig. 47). Then slide outer C/V joint off end of interconnecting shaft, joint may have to be tapped off shaft using a **soft–faced** hammer.

(5) Remove large circlip (Fig. 48) from the interconnecting shaft before attempting to remove outer C/V joint sealing boot.

(6) Slide sealing boot off interconnecting shaft.

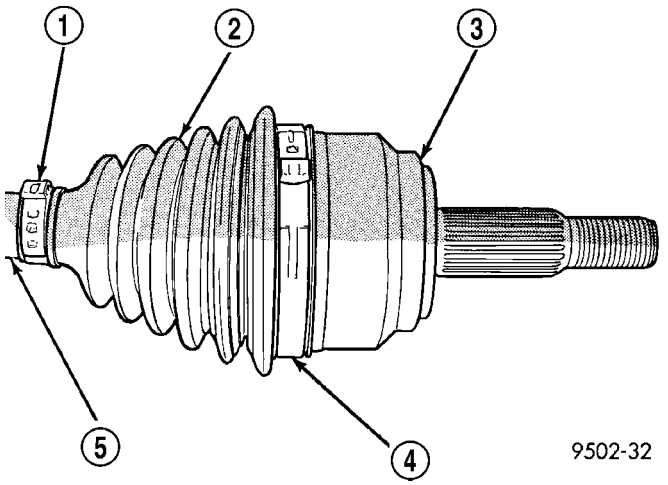


Fig. 46 Outer C/V Joint Seal Boot Clamps

1 - SMALL CLAMP
2 - SEALING BOOT
3 - OUTER C/V JOINT HOUSING
4 - LARGE CLAMP
5 - INTERCONNECTING SHAFT

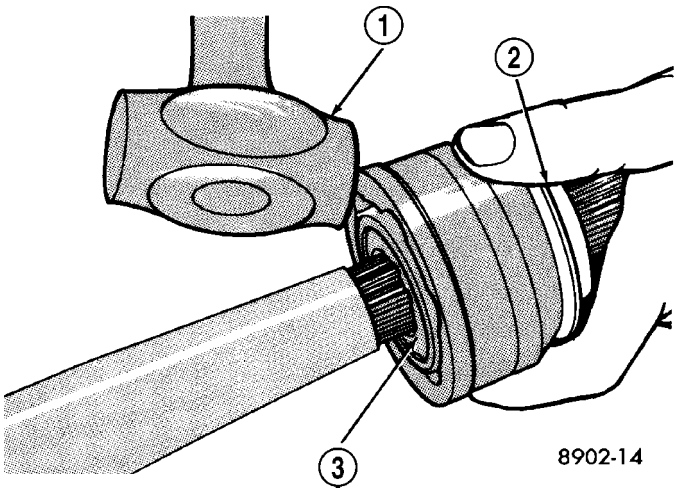


Fig. 47 Outer C/V Joint Removal from Interconnecting Shaft

1 - SOFT HAMMER (TAP INNER RACE ONLY)
2 - WEAR SLEEVE
3 - CIRCLIP (OUTER END OF SHAFT)

(7) Thoroughly clean and inspect outer C/V joint assembly and interconnecting joint for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of these halfshaft assemblies are not serviceable.**

CV BOOT - OUTER (Continued)

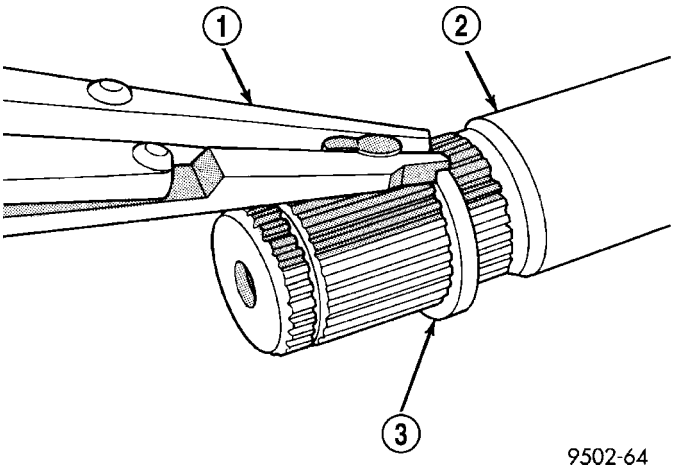


Fig. 48 Circlip Removal from Interconnecting Shaft

1 - SNAP RING PLIERS
2 - INTERCONNECTING SHAFT
3 - CIRCLIP

INSTALLATION

(1) Slide new sealing boot to interconnecting shaft retaining clamp onto interconnecting shaft. Slide the outer C/V joint assembly sealing boot onto the interconnecting shaft (Fig. 49). **Seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the seal boot is in groove on interconnecting shaft.**

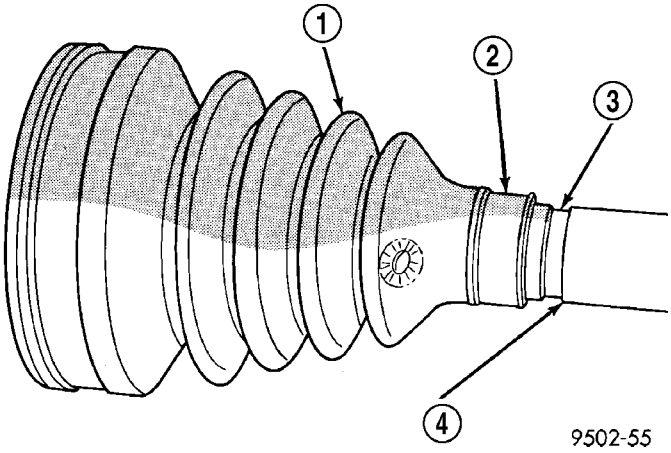


Fig. 49 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(2) Align splines on interconnecting shaft with splines on cross of outer C/V joint assembly and start outer C/V joint onto interconnecting shaft.

(3) Install outer C/V joint assembly onto interconnecting shaft by using a **soft–faced** hammer and tapping end of stub axle (with hub nut installed) until outer C/V joint is fully seated on interconnecting shaft (Fig. 50).

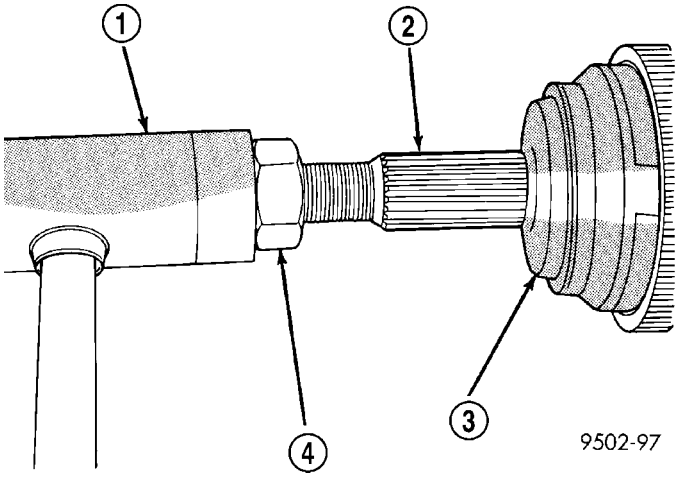


Fig. 50 Outer C/V Joint Installation on Interconnecting

1 - SOFT FACED HAMMER
2 - STUB AXLE
3 - OUTER C/V JOINT
4 - HUB NUT

(4) Outer C/V joint assembly must be installed on interconnecting shaft until cross of outer C/V joint assembly is seated against circlip on interconnecting shaft (Fig. 51).

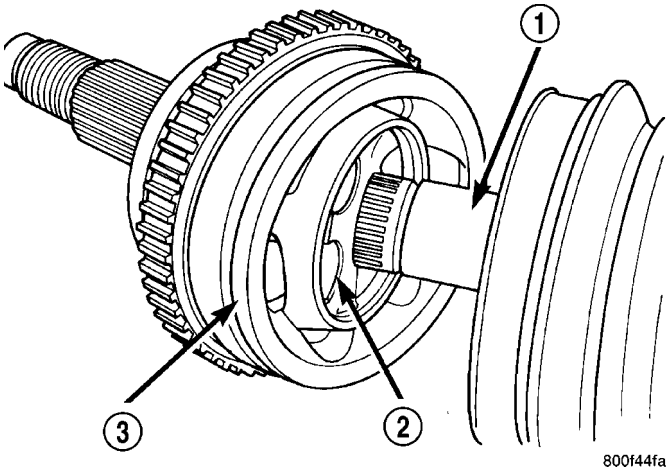


Fig. 51 Outer C/V Joint Correctly Installed on Interconnecting Shaft

1 - INTERCONNECTING SHAFT
2 - CROSS
3 - OUTER C/V JOINT ASSEMBLY

CV BOOT - OUTER (Continued)

(5) Distribute 1/2 the amount of grease provided in seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into outer C/V joint assembly housing. Put the remaining amount into the sealing boot.

(6) Install outer C/V joint sealing boot to interconnecting shaft clamp evenly on sealing boot.

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 52). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 53).

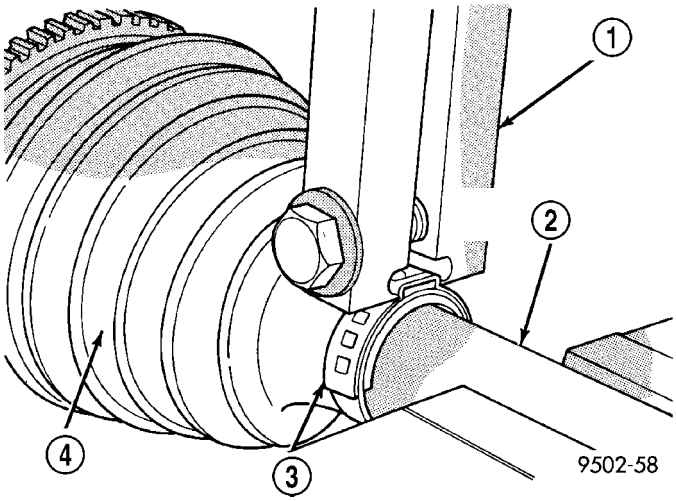


Fig. 52 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

CAUTION: Seal must not be dimpled, stretched, or out–of–shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position outer C/V joint sealing boot into its retaining groove on outer C/V joint housing. Install sealing boot to outer C/V joint retaining clamp evenly on sealing boot.

(9) Clamp sealing boot onto outer C/V joint housing using Crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 54). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 55).

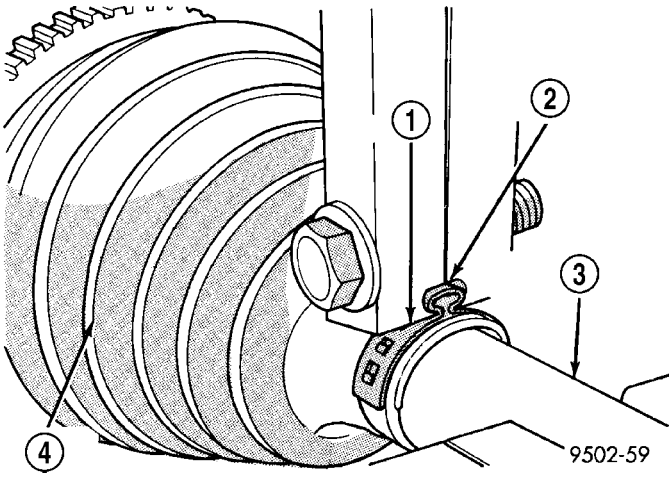


Fig. 53 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

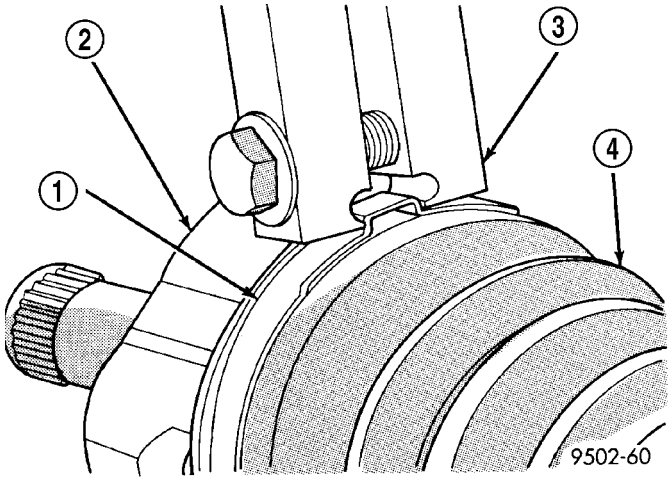


Fig. 54 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

CV BOOT - OUTER (Continued)

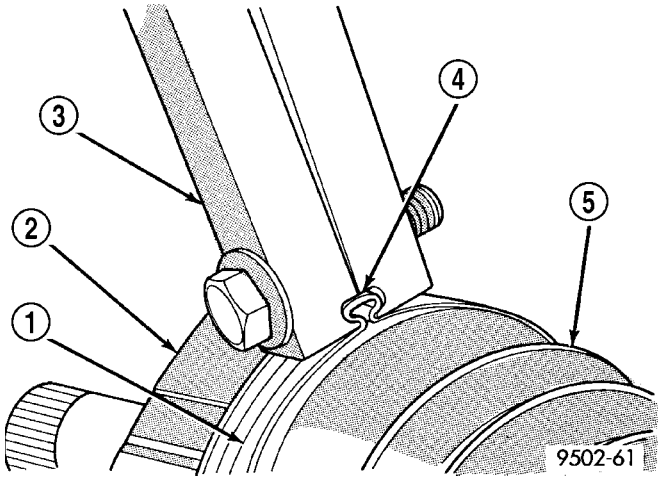


Fig. 55 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

(10) Install the halfshaft requiring boot replacement back on the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

INTERMEDIATE SHAFT

TABLE OF CONTENTS

INTERMEDIATE SHAFT

REMOVAL

NOTE: The intermediate shaft support bearing is not serviced separately. Bearing replacement requires shaft assembly replacement.

(1) Remove passenger side halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove two (2) intermediate shaft bearing-to-bracket bolts (Fig. 1).

(3) Slide intermediate shaft/bearing assembly out of transaxle (Fig. 1).

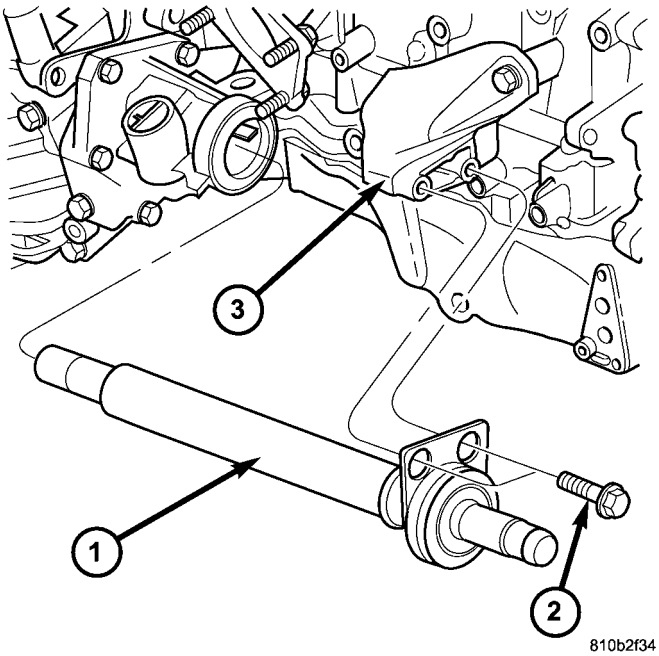


Fig. 1 Intermediate Shaft/Bearing Assembly—2.4L Turbo Models

1 - INTERMEDIATE SHAFT/BEARING ASSEMBLY
2 - BOLT (2)
3 - SUPPORT BRACKET

(4) Inspect transaxle output seal and replace as necessary.

(5) If necessary to remove support bracket, remove two (2) support bracket-to-engine block bolts and remove bracket (Fig. 2).

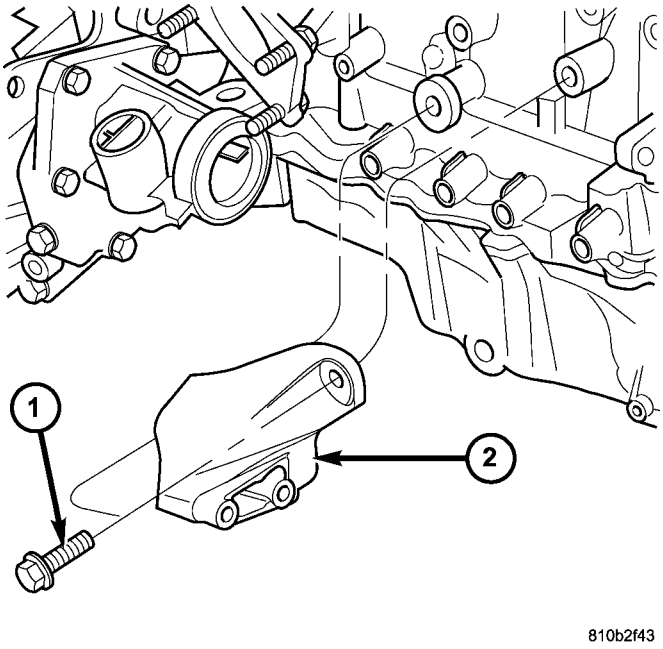


Fig. 2 Intermediate Shaft Support Bracket—2.4L Turbo Models

1 - BOLT (2)
2 - SUPPORT BRACKET

INSTALLATION

NOTE: The intermediate shaft support bearing is not serviced separately. Bearing replacement requires shaft assembly replacement.

(1) If support bracket was removed, install support bracket into position. Install two (2) support bracket-to-engine block bolts and torque to 54 N·m (40 ft. lbs.) (Fig. 2).

(2) Install intermediate shaft into position (Fig. 1). Install two (2) intermediate shaft bearing-to-support bracket bolts and torque to 28 N·m (250 in. lbs.).

(3) Install passenger side halfshaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION).