DIFFERENTIAL AND DRIVELINE

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DESCRIPTION AND OPERATION

FRONT DRIVESHAFTS

Vehicles equipped with either an automatic or manual transmission uses an unequal length driveshaft system (Fig. 1).

Vehicles equipped with automatic transaxles use a solid short interconnecting shaft on the left side. The right side of the vehicle uses a longer solid interconnecting shaft.

The left driveshaft uses a tuned rubber damper weight. When replacing the left driveshaft, be sure the replacement driveshaft has the same damper weight as the original.

Both driveshaft assemblies use the same type of inner and outer joints. The inner joint of both driveshaft assemblies is a tripod joint, and the outer joint of both driveshaft 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 driveshaft length through the jounce and rebound travel of the front suspension.

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 inner tripod joint of both driveshafts is splined into the transaxle side gears. The inner tripod joints are retained in the side gears of the transaxle 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 steel hub nut.

NOTE: This vehicle does not use a rubber lip bearing seal as on past front wheel drive cars, to prevent contamination of the front wheel bearing. It is important though to thoroughly clean the outer C/V joint and the wheel bearing area in the steering knuckle before it is assembled after servicing.

DESCRIPTION AND OPERATION (Continued)

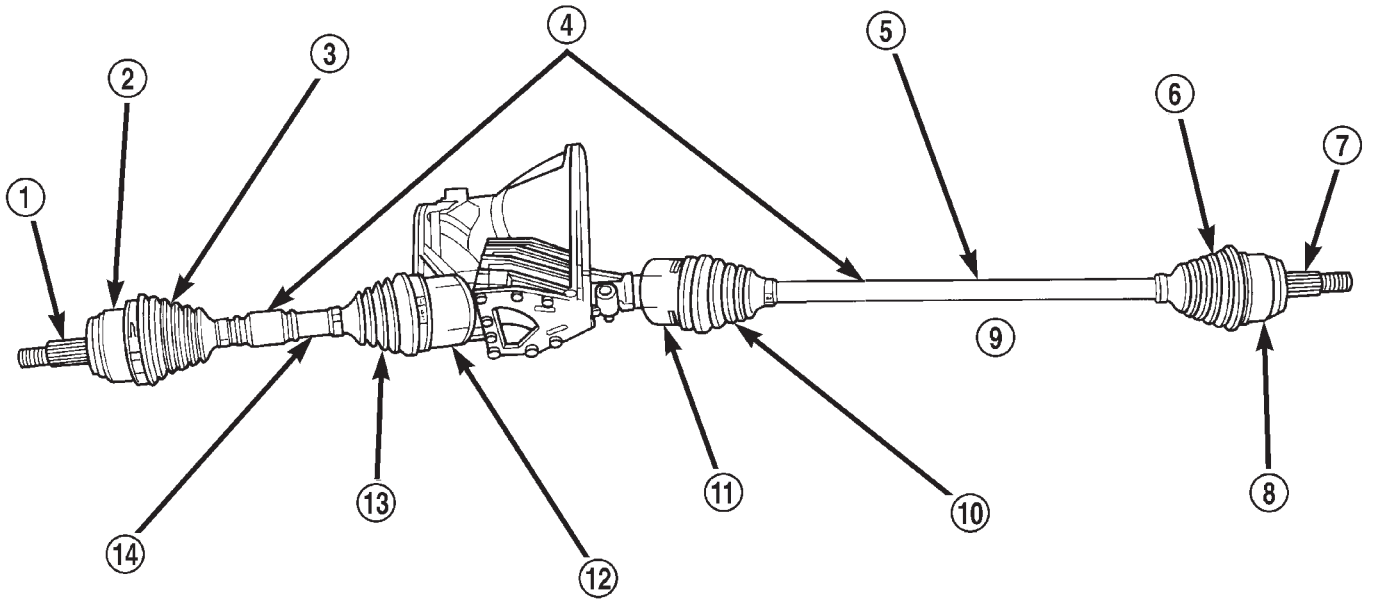

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Fig. 1 Unequal Length Driveshaft System

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

DIAGNOSIS AND TESTING

DRIVESHAFT 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.

(2) A light film of grease may appear on the right inner tripod joint seal boot; this is considered normal and should not require replacement of the seal boot.

NOISE AND/OR VIBRATION IN TURNS

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

(1) Damaged outer C/V or inner tripod joint seal boot or seal boot 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 driveshafts.

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 driveshaft assembly.

(2) A loose or missing clamp on the inner or outer joint of the driveshaft assembly.

(3) A damaged or worn driveshaft C/V joint.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of:

(1) A worn or damaged driveshaft inner tripod joint.

(2) A sticking tripod joint spider assembly (inner tripod joint only).

(3) Improper wheel alignment. See Wheel Alignment in this group for alignment checking and setting procedures and specifications.

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

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

(2) Out of balance front tires or wheels. See Group 22, Wheels And Tires for the required balancing procedure.

DIAGNOSIS AND TESTING (Continued)

(3) Improper tire and/or wheel runout. See Group 22, Wheels And Tires for the required runout checking procedure.

REMOVAL AND INSTALLATION

FRONT DRIVESHAFTS

REMOVAL

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. Refer to Hoisting in the Lubrication And Maintenance section of this manual for the required lifting procedure to be used for this vehicle.

(2) Remove the cotter pin and nut lock (Fig. 2) from the end of the stub axle.

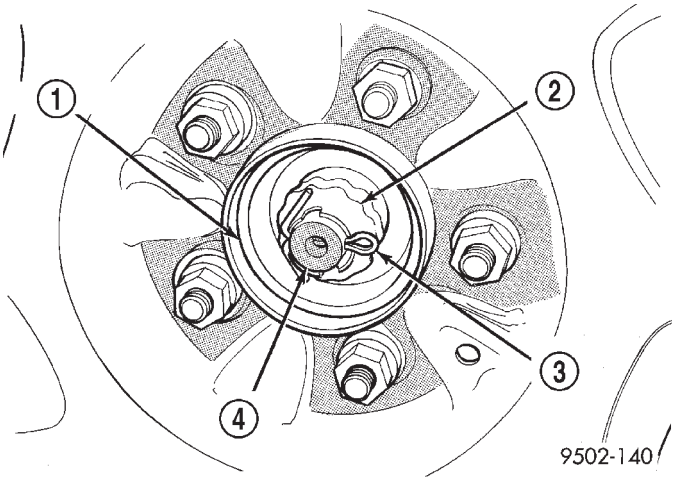

Fig. 2 Hub And Bearing To Stub Axle Retaining Nut

1 – HUB/BEARING
2 – NUT LOCK
3 – COTTER PIN
4 – STUB AXLE

(3) Remove the wheel and tire assembly from the vehicle.

(4) Remove the wave washer (Fig. 3) from the end of the stub axle

CAUTION: Wheel bearing damage will result if after loosening hub nut, vehicle is rolled on the ground or the weight of the vehicle is allowed to be supported by the tires.

(5) With the vehicle's brakes applied to keep hub from turning, **loosen and remove** the stub axle to hub nut.

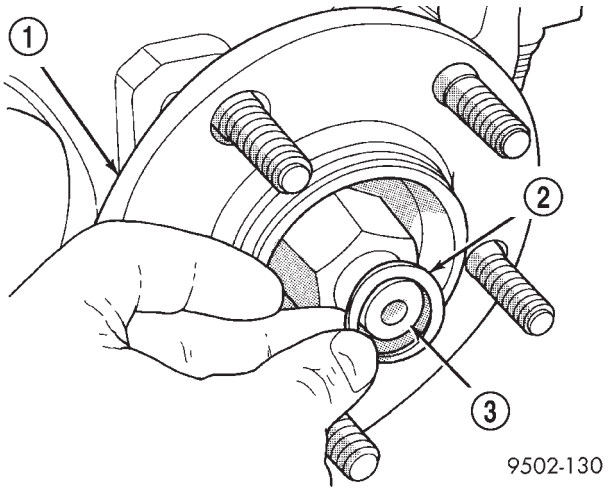

Fig. 3 Wave Washer

1 – HUB/BEARING ASSEMBLY
2 – WAVE WASHER
3 – STUB AXLE

(6) Remove the two front disc brake caliper to steering knuckle attaching bolts (Fig. 4).

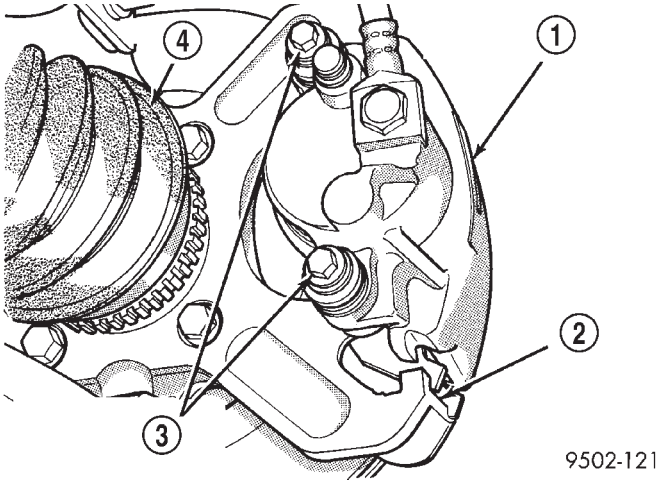

Fig. 4 Front Disc Brake Caliper Attaching Bolts

1 – DISC BRAKE CALIPER ASSEMBLY
2 – STEERING KNUCKLE
3 – DISC BRAKE CALIPER MOUNTING BOLTS
4 – DRIVESHAFT

(7) Remove the disc brake caliper from the steering knuckle. Caliper is removed by first rotating top of caliper away from steering knuckle and then removing bottom of caliper out from under machined abutment on steering knuckle (Fig. 5).

REMOVAL AND INSTALLATION (Continued)

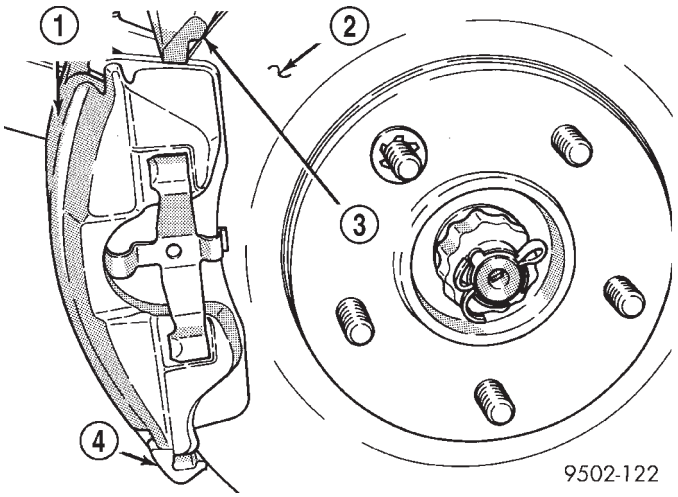

Fig. 5 Brake Caliper Mounting To Steering Knuckle

1 – CALIPER ASSEMBLY
2 – ROTOR
3 – STEERING KNUCKLE
4 – MACHINED ABUTMENT

(8) Support disc brake caliper assembly by using a wire hook and suspending it from the strut assembly (Fig. 6). **Do not allow the brake caliper assembly to hang by the brake flex hose.**

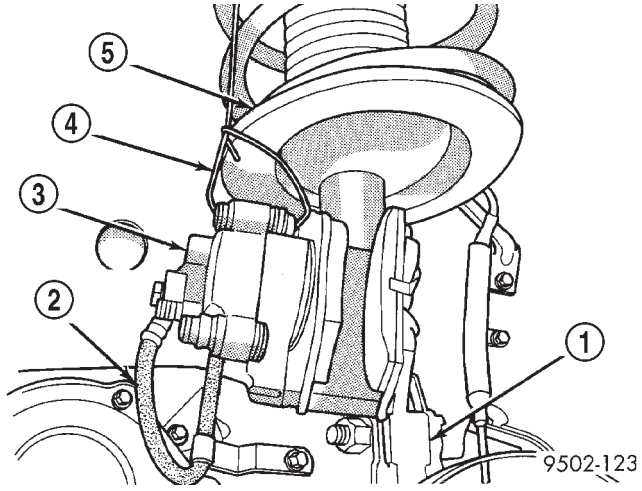

Fig. 6 Correctly Supported Disc Brake Caliper

1 – STEERING KNUCKLE
2 – BRAKE FLEX HOSE
3 – CALIPER ASSEMBLY
4 – WIRE HANGER
5 – STRUT ASSEMBLY

(9) Remove the brake rotor from the hub and bearing assembly (Fig. 7).

(10) Remove nut attaching outer tie rod end to steering knuckle (Fig. 8). **Nut is to be removed from tie rod end using the following procedure, hold tie rod end stud with a 11/32 socket while loosening and removing nut with a wrench.**

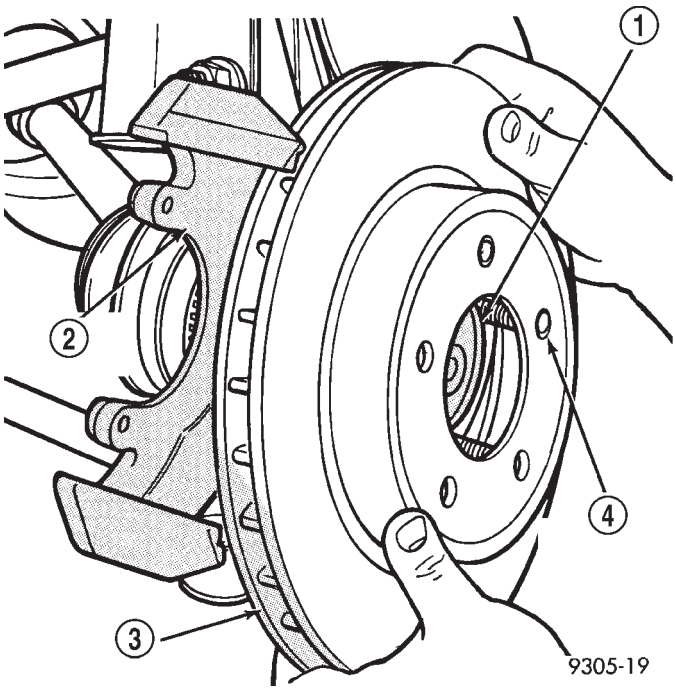

Fig. 7 Remove/Install Brake Rotor

1 – HUB
2 – STEERING KNUCKLE
3 – BRAKING DISC (ROTOR)
4 – WHEEL MOUNTING STUD

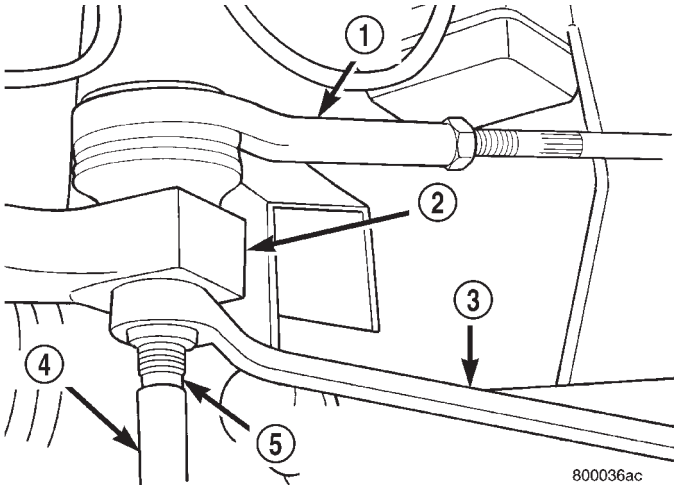

Fig. 8 Removing Tie Rod End Attaching Nut

1 – TIE ROD END
2 – STEERING KNUCKLE
3 – WRENCH
4 – 11/32 SOCKET
5 – TIE ROD END STUD

(11) Remove tie rod end from steering knuckle using Remover, Special Tool MB-991113 (Fig. 9).

(12) Remove the steering knuckle to ball joint stud, clamping nut and bolt (Fig. 10) from the steering knuckle.

REMOVAL AND INSTALLATION (Continued)

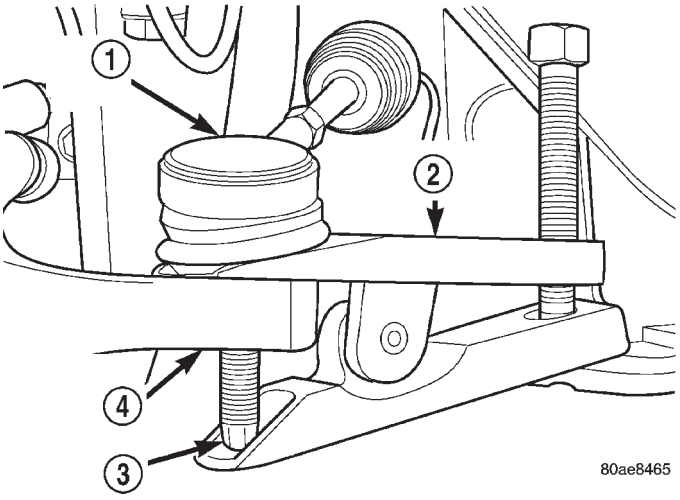

Fig. 9 Tie Rod End Removal From Steering Knuckle Arm

1 – TIE ROD END
2 – SPECIAL TOOL MB-991113
3 – STUD
4 – STEERING KNUCKLE ARM

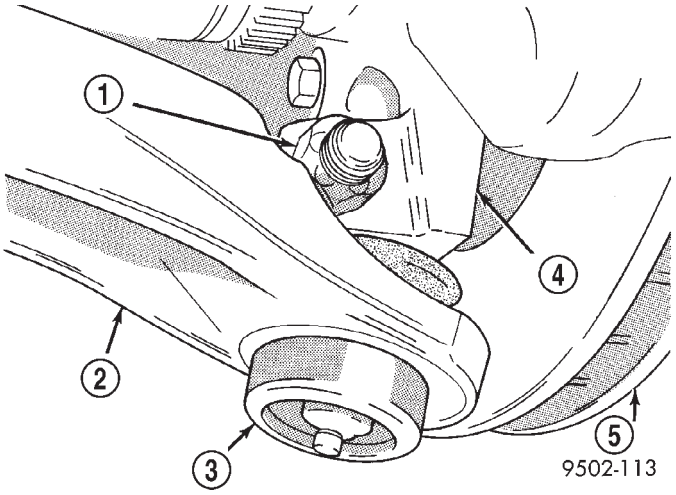

Fig. 10 Control Arm To Steering Knuckle Attachment

1 – CLAMPING NUT/BOLT
2 – LOWER CONTROL ARM
3 – BALL JOINT
4 – STEERING KNUCKLE
5 – ROTOR

(13) Using a pry bar, separate steering knuckle from ball joint stud (Fig. 11). **Note: Use caution when separating ball joint stud from steering knuckle, so ball joint seal does not get cut.**

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow driveshaft to hang by inner C/V joint after removing outer C/V Joint from the hub/bearing assembly in steering knuckle, end of driveshaft must be supported.

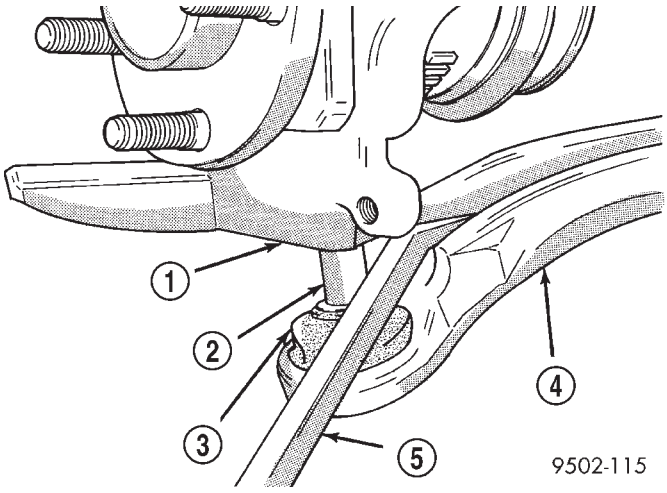

Fig. 11 Separating Ball Joint Stud From Steering Knuckle

1 – STEERING KNUCKLE
2 – BALL JOINT STUD
3 – BALL JOINT SEAL
4 – LOWER CONTROL ARM
5 – PRY BAR

(14) Pull steering knuckle assembly out and away from the outer C/V joint of the driveshaft assembly (Fig. 12).

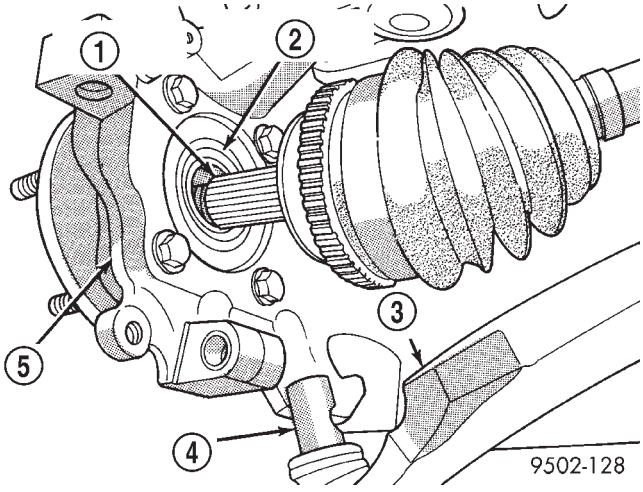

Fig. 12 Steering Knuckle Separation From Driveshaft

1 – DRIVESHAFT STUB AXLE
2 – HUB/BEARING ASSEMBLY
3 – LOWER CONTROL ARM
4 – BALL JOINT
5 – STEERING KNUCKLE

(15) Support the outer end of the driveshaft assembly. Insert a pry bar between inner tripod joint

REMOVAL AND INSTALLATION (Continued)

and transaxle case (Fig. 13). Pry against inner tripod joint, until tripod joint retaining snap ring is disengaged from transaxle side gear.

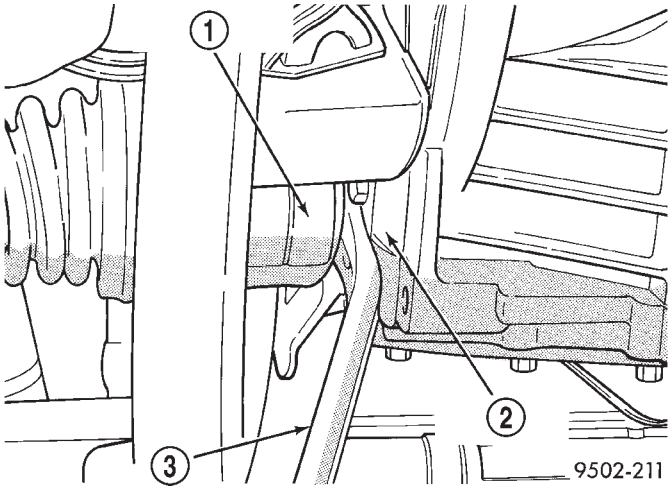

Fig. 13 Disengaging Inner Tripod Joint From Transaxle

1 – INNER TRIPOD JOINT
2 – TRANSAXLE CASE
3 – PRY BAR

(16) Hold inner tripod joint and interconnecting shaft of driveshaft assembly. Remove inner tripod joint from transaxle, by pulling it straight out of transaxle side gear and transaxle oil seal (Fig. 14). **When removing tripod joint, do not let spline or snap ring drag across sealing lip of the transaxle to tripod joint oil seal.**

INSTALLATION

(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 driveshaft assembly by tripod joint and interconnecting shaft, install tripod joint into transaxle side gear as far as possible by hand (Fig. 14).

(3) Grasp inner tripod joint an interconnecting shaft. Forcefully push the tripod joint into side gear of transaxle, until snap ring is engaged with transaxle side gear. **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.**

(4) Clean all debris and moisture out of steering knuckle, in the area were outer C/V joint will be installed into steering knuckle.

(5) Ensure that front of outer C/V joint which fits against the face of the hub and bearing is free of debris and moisture before installing outer C/V joint into hub and bearing assembly (Fig. 15).

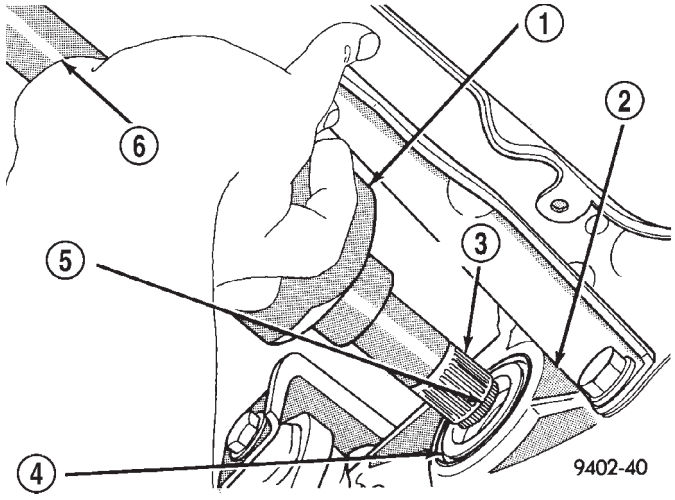

Fig. 14 Tripod Joint Removal from Transaxle

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

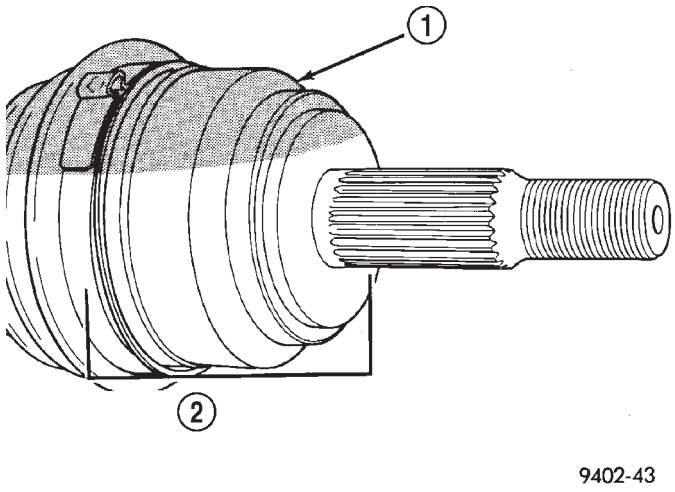

Fig. 15 Outer C/V Joint Inspection

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 drive shaft back into front hub and bearing assembly. Then install steering knuckle onto the stud of the ball joint assembly (Fig. 12).

(7) Install a **new** steering knuckle to ball joint clamping bolt and nut (Fig. 10). Tighten the clamping bolt and nut to a torque of 135 N·m (100 ft. lbs.).

(8) Install tie rod end into steering knuckle. Start attaching nut onto stud of tie rod end. While holding stud of tie rod end stationary using a 11/32 socket, (Fig. 8) tighten tie rod end to steering knuckle