

SECTION 3B1

STEERING LINKAGE

The following "Notice" applies to one or more steps in the assembly procedure of components in this portion of this manual as indicated at appropriate locations by the terminology "See NOTICE on page 3B1-1 of this section."

Notice: All steering linkage fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Torque values must be used as specified during reassembly to ensure proper retention of all parts.

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DESCRIPTION

The steering linkage consists of the pitman arm drag link, steering arms, and tie rod.

The pitman arm is attached to the steering gear with a nut and spring washer.

The drag link connects the pitman arm and left steering arm. It is not adjustable for length. The drag link is rebuildable, having seats and balls which can be replaced when worn.

The left steering arm, which is located on the left side, bolts directly to the steering knuckle. The steering arms are a taper fit in the knuckles, and each is retained by a single nut.

The tie rod connects the left and right steering arms. The tie rod ends are threaded into the tie rod tube, and are locked by two nuts. The tie rod ends are replaced as a unit.

The overall condition of the steering linkage affects steering performance. If parts are bent, damaged, worn, or poorly lubricated, improper and possibly dangerous steering action will result.

Whenever any steering linkage components are repaired or replaced, it is recommended that steering geometry and front end alignment be checked as described in FRONT END ALIGNMENT (SEC. 3A) of this manual.

DIAGNOSIS OF STEERING LINKAGE

Refer to POWER STEERING (SEC. 3B3) in this manual.

STEERING LINKAGE ON-VEHICLE SERVICE

MAINTENANCE

The following service should be performed at regular intervals, as specified in MAINTENANCE AND LUBRICATION (SEC. 0B) in this manual.

1. Check the pitman arm nut for tightness.
2. Lubricate the steering linkage with chassis lubricant as specified in MAINTENANCE AND LUBRICATION (SEC. 0B) in this manual.
3. Inspect for any loose, missing or damaged parts. Check for deteriorated drag link or tie rod end seals, loose fasteners, etc.
4. If excessive looseness is found in the steering linkage, investigate the cause. Replace any questionable parts.
5. Damaged or broken steering linkage components must always be replaced. NEVER attempt to repair these parts by welding.

PITMAN ARM REPLACEMENT

↔ Remove or Disconnect (Figures 1, 2 and 3)

Tool Required:

J-26813-B Steering Linkage Puller, or equivalent.

1. Cotter pin (17).
2. Adjusting plug (6), spring (7) and seat (8).
3. Drag link (10) from the pitman arm (2).
4. Nut (4) and split washer (3).
- Mark the pitman arm (2) and pitman shaft (1), so the pitman arm can be returned to its original position at assembly (figure 2).
5. Pitman arm (2), using J-26813-B tool, or equivalent (figure 3).

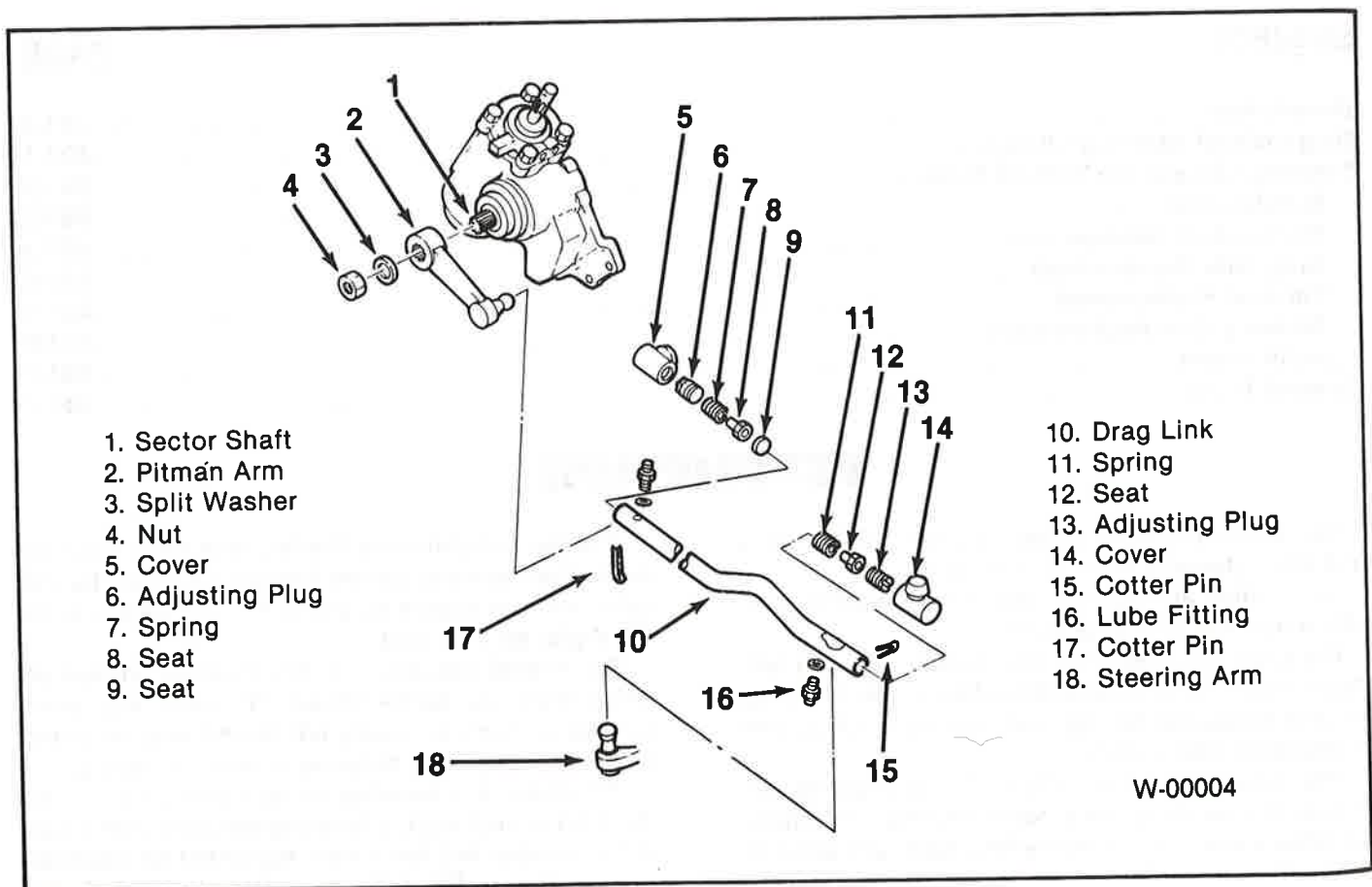


Figure 1. Drag Link and Related Parts

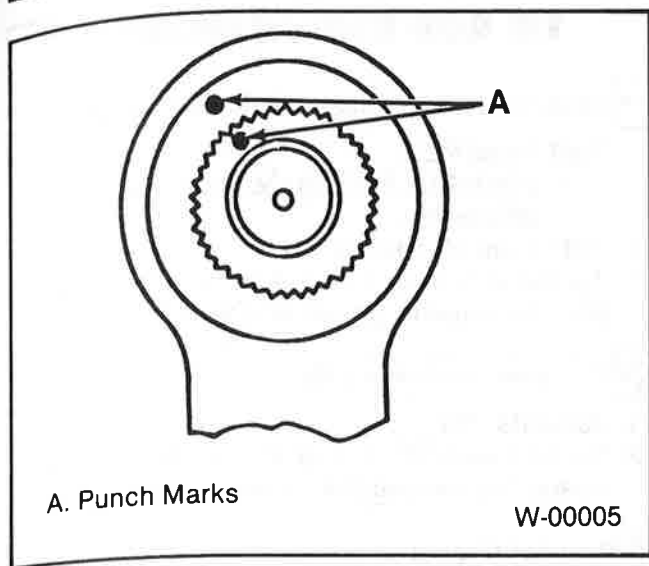


Figure 2. Marking Pitman Arm

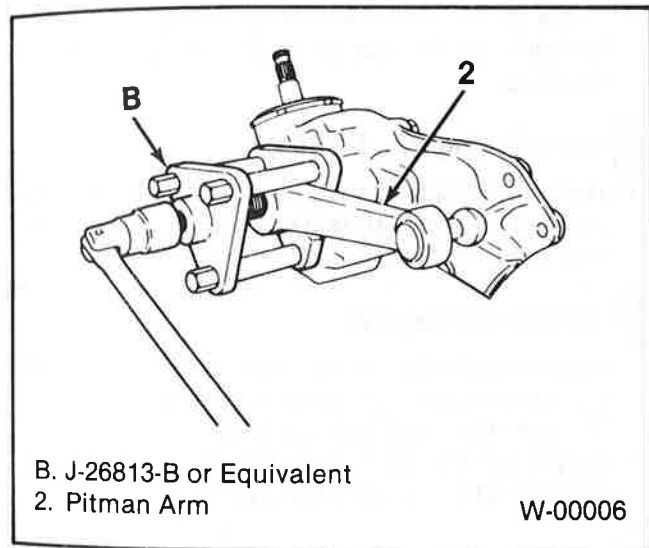


Figure 3. Removing Pitman Arm

Install or Connect (Figure 1)

1. Pitman arm (2) to the sector shaft (1). Align the marks made during removal.
2. Split washer (3) and nut (4)

Notice: See "Notice" on page 3B1-1 of this section.

Tighten

- Nut (4) to 208 N•m (155 ft. lbs.).
3. Drag link (10) with the seat (9) and cover (5) to the pitman arm (2).
 4. Seat (8) and adjusting plug (6).

Adjust

- Adjusting plug (6).
 - Tighten the adjuster plug fully.
 - Back the adjuster plug out one-half turn.
5. A new cotter pin (17) of the correct size.

DRAG LINK REPLACEMENT

Remove or Disconnect (Figure 1)

1. Cotter pins (15 and 17).
2. Adjusting plugs (6 and 13).
3. Spring and seat (7 and 8)
4. Drag link (10).
5. Seats (9 and 12).
6. Spring (11).
7. Covers (5 and 14).

Inspect (Figure 1)

- Seats (8, 9 and 12) for wear, scoring, etc.
- Covers (5 and 14) for cracking or damage.
- Drag link (10) for bending or damage.

Measure (Figures 1, 4, and 5)

1. Ball stud (18) and the ball stud on the pitman arm (2) diameter, using a micrometer (figure 4). If worn smaller than 26.5 mm (1.04 inches), they should be replaced. If the pitman arm ball stud is worn, the pitman arm (2) must be replaced.
2. Springs (7 and 11) free length. Replace the springs if shorter than 29.5 mm (1.16 inches).
3. Springs (7 and 11) tension. Using a spring scale (figure 5). The production tension is 157 kg (346 lbs.) at 27.5 mm (1.08 inches) length. Replace the spring if the tension is less than 130 kg (287 lbs.) at 27.5 mm (1.08 inches) length.

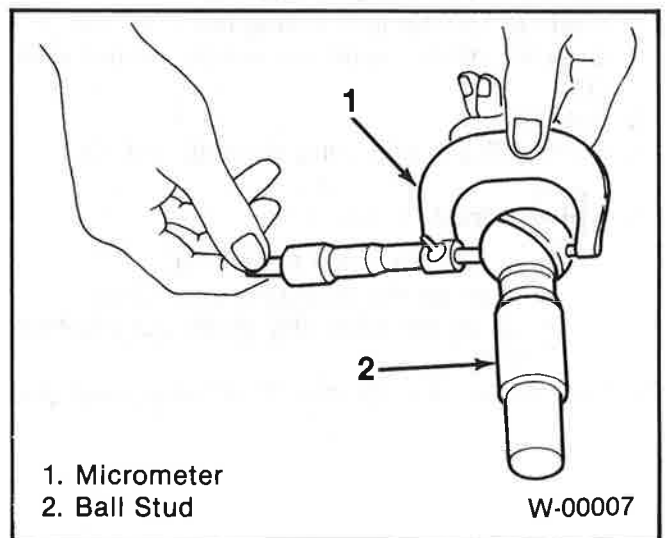


Figure 4. Measuring Ball Stud

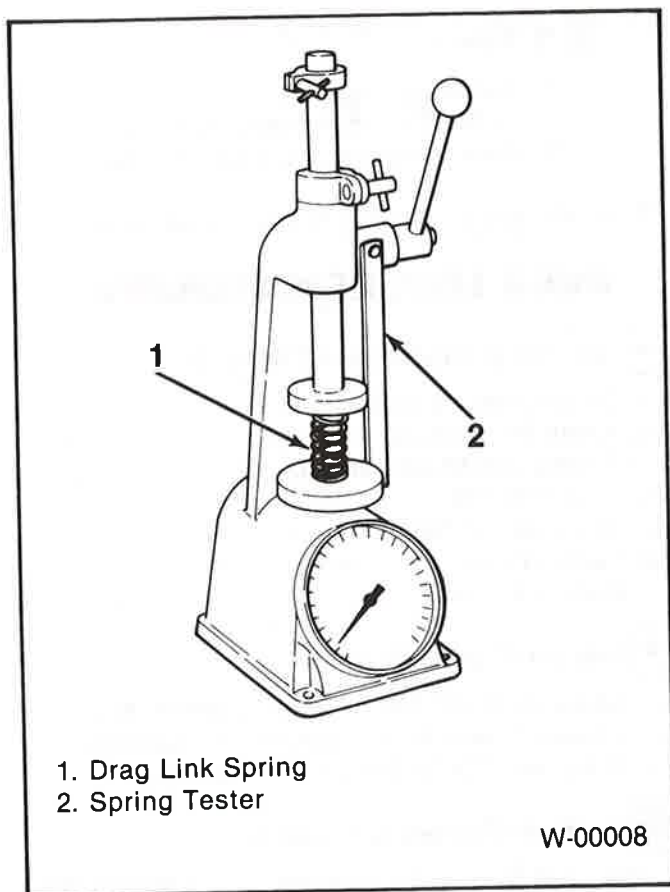


Figure 5. Measuring Spring Tension

BALL STUD REPLACEMENT

The pitman arm and steering arm ball studs cannot be removed. Replace the pitman arm or the steering arm if the ball studs are worn.

Install or Connect (Figure 1)

1. Covers (5 and 14) to the drag link (10).
2. Spring (11) to the drag link (10).
3. Seats (9 and 12) to the drag link (10).
4. Drag link (10) to the pitman arm (2) and ball stud (18).
5. Seat (8).
6. Spring (7) and adjusting plugs (6 and 13).

Adjust

- Adjusting plugs (6 and 13).
 - Tighten the adjusting plugs fully.
 - Back the adjusting plugs out one-half turn.
7. New cotter pins (15 and 17) of the correct size.

TIE ROD REPLACEMENT

Remove or Disconnect (Figures 6 and 7)

Tool Required:
J-24319-01 Tie Rod Remover, or equivalent.

1. Cotter pin (4) and nut (5).
2. Tie rod assembly from the lower steering arm (2). Use suitable tie rod end tool.

Disassemble (Figure 6)

1. Jamnuts (10).
2. Tie rod ends (7). Count the number of turns needed to remove the tie rod ends.

Inspect (Figure 6)

1. Tie rod tube (9) for bending, or damaged threads.
2. Seals (6) for deterioration or damage.
3. Threads on tie rod ends (7) for stripping or damage.

Measure (Figures 1 and 4)

- Ball stud (18) ball outside diameter (figure 1). Replace the ball studs if worn smaller than 26.5 mm (1.04 inches).

Assemble (Figure 6)

1. Apply grease to the tie rod tube (9) threads (if the tie rod ends (7) were removed).
2. Tie rod ends (7) to the rod tube (9) (if removed).
3. Screw on the tie rod assembly (9) the same number of turns as when removed.

Install or Connect (Figure 6)

1. Tie rod assembly to the lower steering arms (2).
2. New nuts (5).

Notice: See "Notice" on page 3B1-1 of this section.

Tighten

- Nuts (5) to 117 N•m (86 ft. lbs.), then install the cotter pins.

Adjust

- Toe in Refer to FRONT END ALIGNMENT (SEC. 3A) in this manual.

Tighten

- Nuts (10) to 108 N•m (80 ft. lbs.).

STEERING ARM REPLACEMENT

LEFT STEERING ARM

↔ Remove or Disconnect (Figures 7 and 8)

1. Drag link, as outlined previously in this section.
2. Tie rod, cotter pin (11) and nut (9). Remove left end of tie rod assembly from left steering knuckle. Use removal tool, if necessary, and discard.
3. Nut (7).
4. Left steering arm (3) from knuckle (5).

🔍 Inspect

Steering arm (3) for damage.

↔ Install or Connect (Figure 8)

Notice: For steps 1 and 3, see "Notice" on page 3B1-1 of this section.

1. Left steering arm (3) and nut (7) to knuckle (5).

🔧 Tighten

- Nut (7). Torque to 429 N•m (320 ft. lbs.).

2. Install Tie rod end (15) and seal (13) onto steering arm.

3. Install Nut (9).

🔧 Tighten

- Nut (9) to 117 N•m (86 ft. lbs.). Install cotter pin.

4. Drag link, as outlined previously in this section.

RIGHT STEERING ARM

↔ Remove or Disconnect (Figures 7 and 8)

Tool Required:

J-24319-01 Steering Linkage Puller, or equivalent.

1. Cotter pin (12) and nut (10).
2. Tire rod end (16) from the right steering arm (4). Use tool J-24319-01, or equivalent (figure 7).
3. Nut (8).
4. Right steering arm (4).
 - a. Tap on the threaded end of the steering arm with a hammer until it is loose.
 - b. Remove the nut (8) and discard.
 - d. Remove the steering arm.

🔍 Inspect

- Steering arm (4) for damage.

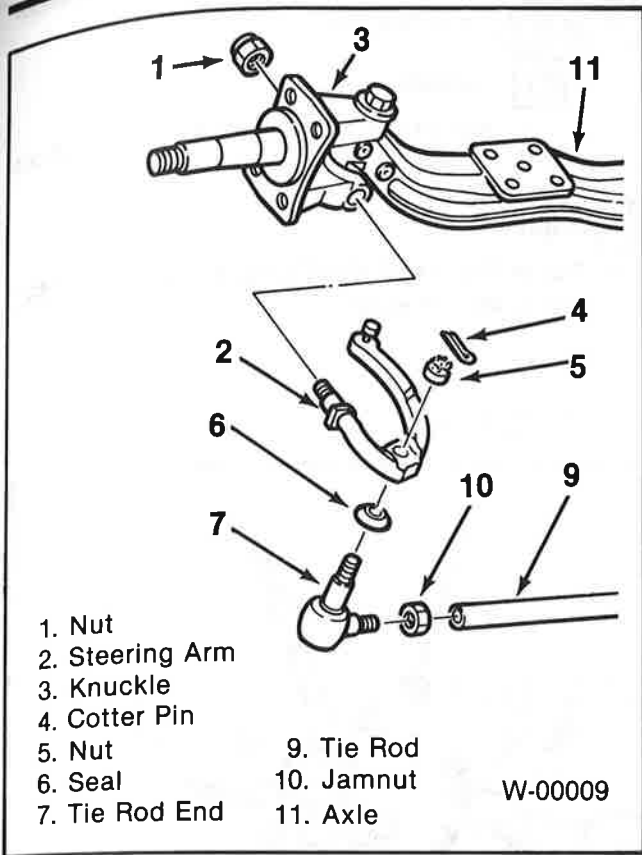


Figure 6. Tie Rod and Related Parts.

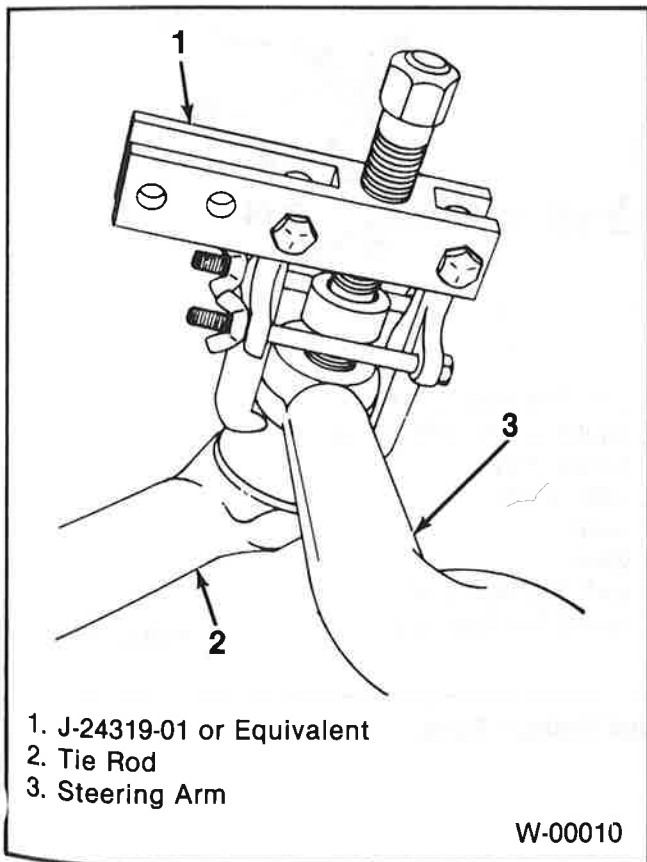


Figure 7. Removing Tie Rod End

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Install or Connect (Figure 8)

Notice: See "Notice" on page 3B1-1 of this section for steps 2 and 4.

1. Right steering arm (4) to the steering knuckle (6).
2. Nut (8).

Tighten

- Nut (8) to 429 N•m (320 ft. lbs.).

3. Tie rod end assembly to the right steering arm (4).

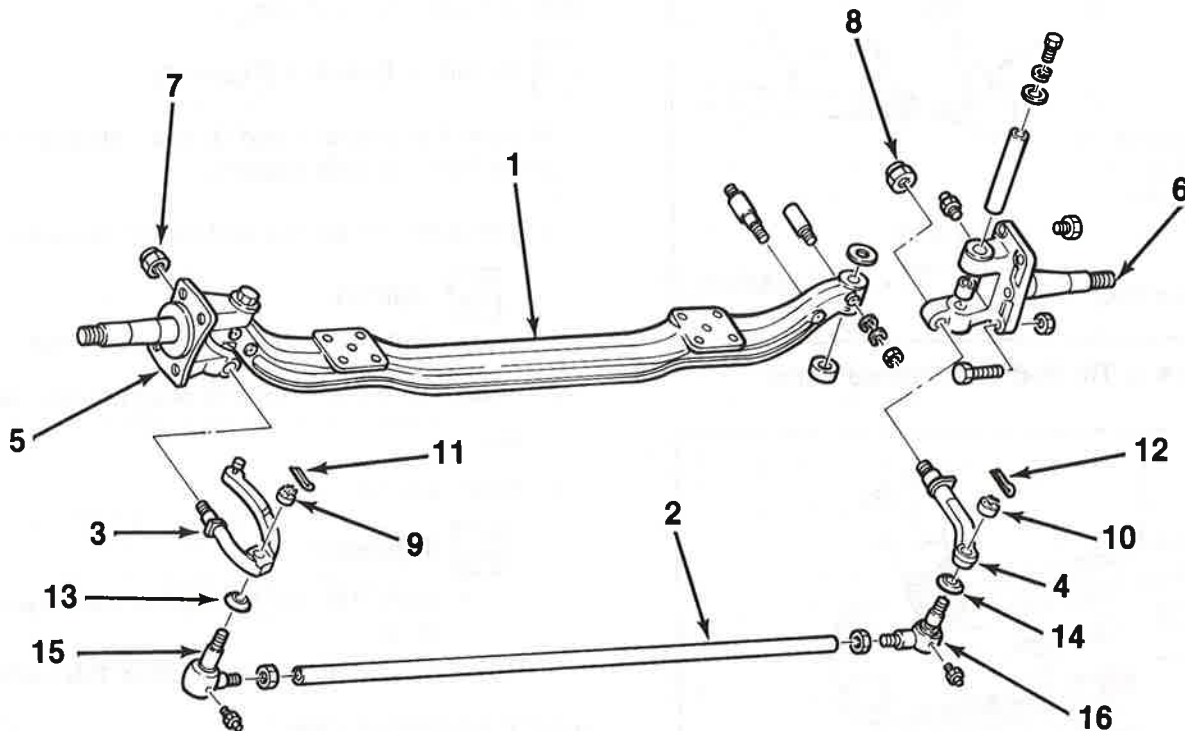
4. Seal (14) and nut (10).

Tighten

- Nut (10) to 117 N•m (86 ft. lbs.). Install cotter pin.

Adjust

- Toe in. Refer to FRONT END ALIGNMENT (SEC. 3A) in this manual.



1. Axle
2. Tie Rod
3. Left Steering Arm
4. Right Steering Arm
5. Left Steering Knuckle (Spindle)
6. Right Steering Knuckle (Spindle)
7. Left Steering Arm Nut
8. Right Steering Arm Nut

9. Left Tie Rod End Nut
10. Right Tie Rod End Nut
11. Cotter Key
12. Cotter Key
13. Seal
14. Seal
15. Left Tie Rod End
16. Right Tie Rod End

W-00011

Figure 8. Steering Arms and Related Parts

SPECIFICATIONS

STEERING LINKAGE TORQUES

Pitman Arm Nut	208 N•m (155 ft. lbs.)
Tie Rod Tube Jam Nuts	108 N•m (80 ft. lbs.)
Tie Rod End Nuts	117 N•m (86 ft. lbs.)
Steering Arm Nuts	429 N•m (320 ft. lbs.)

ADJUSTING PLUG ADJUSTMENT

Drag Link Adjusting Plugs	1. Tighten plug fully. 2. Back out one-half turn. 3. Install a new cotter pin of the correct size.
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BALL STUD BALL DIAMETER

Drag Link Ball Stud	
Production	27.0 mm (1.06")
Service Limit	26.5 mm (1.04")

DRAG LINK SPRINGS

Production Tension	200 kg (440 lbs.) at 27.5 mm (1.08") length
Service Limit	165 kg (363 lbs.) at 27.5 mm (1.08") length
Free Length Service Limit	29.5 mm (1.16") length

SPECIAL TOOLS

- J-26813-B Pitman Arm Puller, or equivalent
- J-24319-01 Tie Rod Remover, or equivalent