

SECTION 3B1A

POWER STEERING GEAR UNIT REPAIR

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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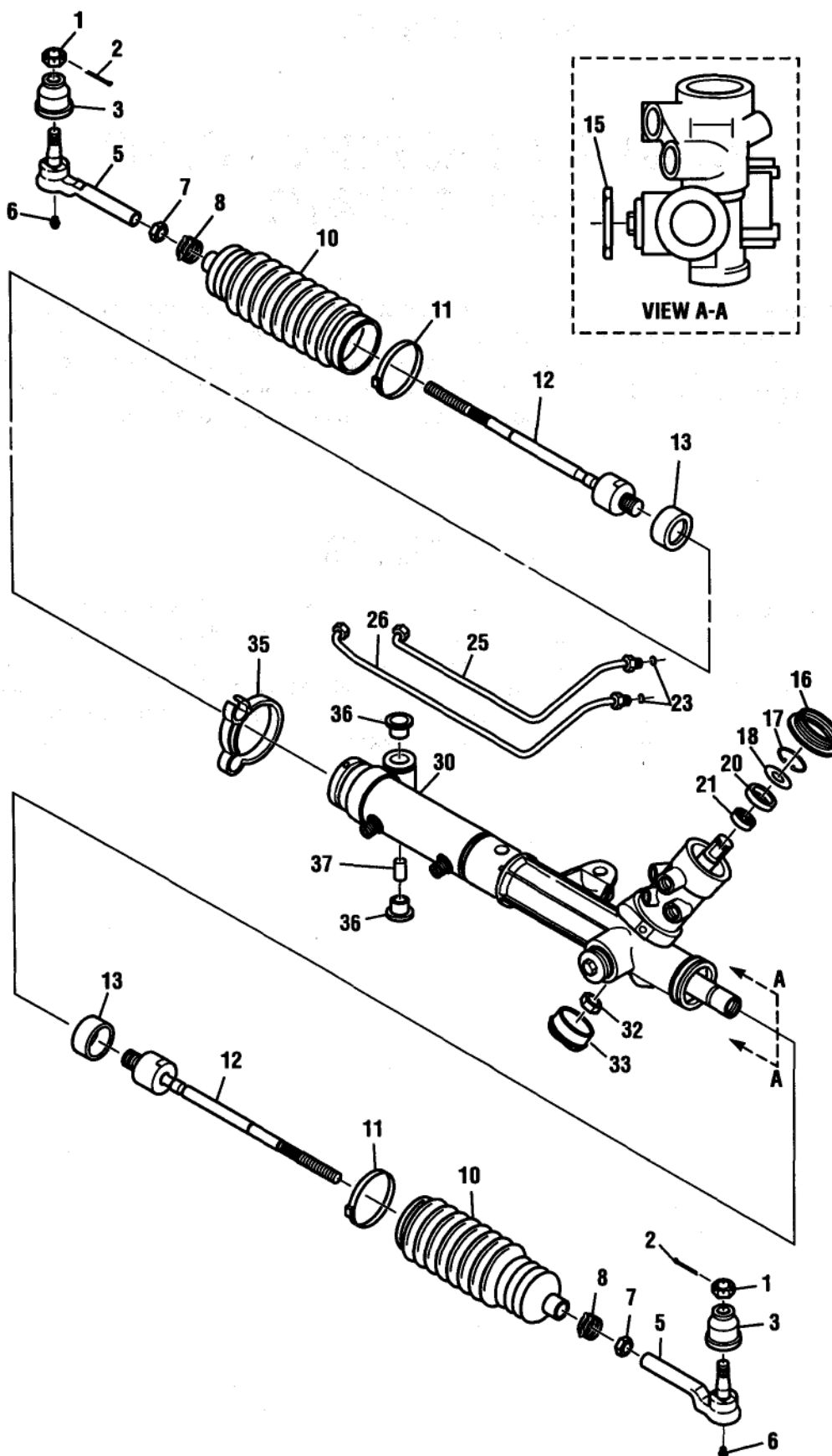


Figure 1 Power Rack and Pinion - End Take Off

Key No.	Part Name
1	NUT, HEXAGON SLOTTED
2	PIN, COTTER
3	SEAL, TIE ROD
5	ROD ASM, OUTER TIE
6	FITTING, LUBE (90 DEG ELBOW)
7	NUT, METRIC HEX (M14 X 1.5)
8	CLAMP, TIE ROD END
10	BOOT, RACK & PINION
11	CLAMP, SEAL RETAINING
12	ROD ASM, INNER TIE
13	RING, SHOCK DAMPENER
15	NUT, ADJUSTER PLUG LOCK
16	ADAPTER, SEAL

Key No.	Part Name
17	RING, RETAINING
18	SEAL, STUB SHAFT DUST
20	SEAL, STUB SHAFT
21	BEARING ANNULUS ASM, NEEDLE
23	SEAL, O-RING (4.50 I.D.)
25	LINE ASM, CYLINDER (RT)
26	LINE ASM, CYLINDER (LT)
30	GEAR ASM, RACK & PINION (PARTIAL)
32	NUT, HEX LOCK
33	COVER, DUST
35	CLIP, PIPE
36	BUSHING, STEERING GEAR
37	SLEEVE, STEERING GEAR BUSHING

Figure 2 Power Rack and Pinion – End Take Off – Legend

OUTER TIE ROD**Figures 1 thru 3**

Tool Required:

J 24319-01 Universal Steering Linkage Puller

**Remove or Disconnect**

1. Cotter pin (2) and hex slotted nut (1) from outer tie rod assembly (5).
2. Loosen hex nut (7).
3. Outer tie rod (5) from steering knuckle with J 24319-01.
4. Outer tie rod (5) from inner tie rod (12).

**Install or Connect**

1. Outer tie rod assembly (5) to inner tie rod (12). Do not tighten hex nut (7).
2. Outer tie rod (5) to steering knuckle, hex slotted nut (1) to outer tie rod stud.

**Tighten**

- Hex slotted nut (1) to 47 N•m (35 lb. ft.).
 - Tighten nut up to 1/6 additional turn, or 70 N•m (52 lb. ft.) maximum, to align cotter pin slot. Do not back off nut for cotter pin insertion.
3. Cotter pin (2) into hole in tie rod stud (5).

**Adjust**

- Toe by turning inner tie rod (12).

**Important**

- Be sure rack and pinion boot (10) is not twisted or puckered during toe adjustment.

**Tighten**

- Hex nut (7) against outer tie rod (5) to 68 N•m (50 lb. ft.).

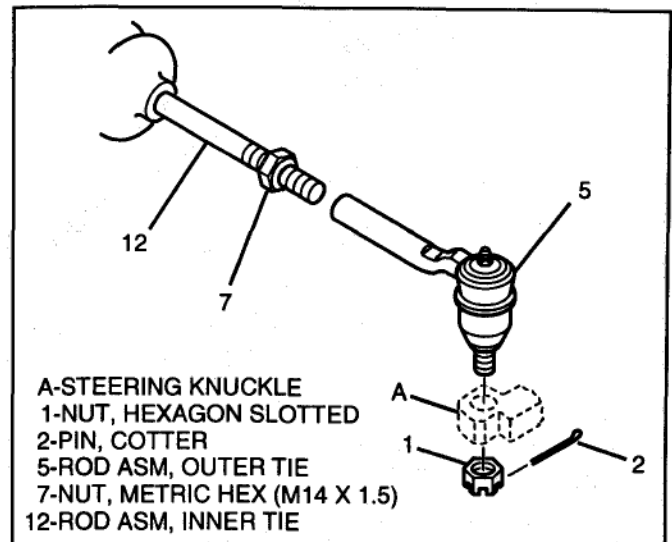


Figure 3 Outer Tie Rod Replacement

RACK BEARING PRELOAD

(on vehicle adjustment)

Figure 15



Adjust

1. Make adjustment with front wheels raised and steering wheel centered. Be sure to check returnability of the steering wheel to center after adjustment.
2. Loosen adjuster plug lock nut (15) and turn adjuster plug clockwise until it bottoms in gear assembly (30), then back off 50° to 70° (approximately one flat).
3. Lock nut (15) to adjuster plug.



Tighten

- Lock nut (15) to 75 N•m (55 lb. ft.) while holding adjuster plug stationary.

RACK & PINION BOOT

Figures 1 thru 6

Tool Required:

J 22610 Service Boot Clamp Installer



Remove or Disconnect

1. Do all steps of OUTER TIE ROD "Remove or Disconnect."
2. Hex nut (7) from inner tie rod assembly (12).
3. Tie rod end clamp (8).
4. Seal retaining clamp (11) with side cutters and discard.
5. Rack and pinion boot (10).

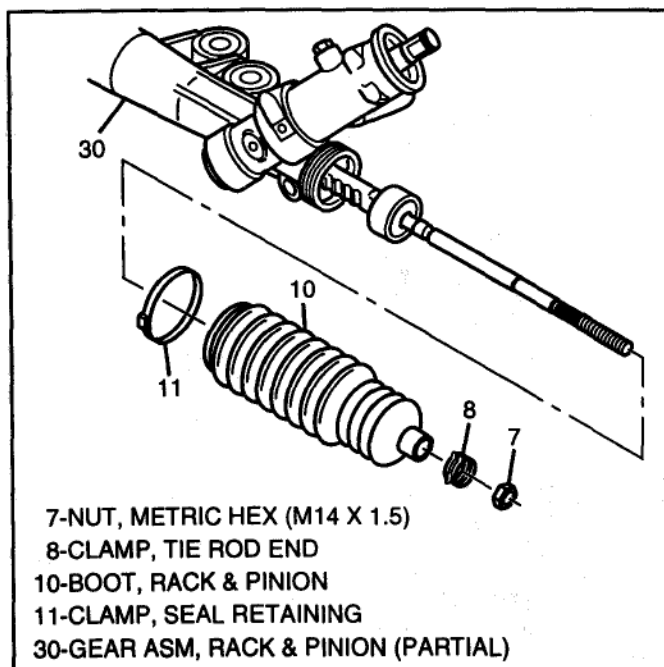


Figure 4 Rack and Pinion Boot Replacement



Install or Connect

1. New seal retaining clamp (11) onto rack and pinion boot (10).
2. Apply grease to inner tie rod (12) and gear assembly (30) prior to boot installation (see Figure 5).
 - Boot (10) onto inner tie rod assembly (12).
3. Boot (10) onto gear assembly (30) until seated in gear assembly groove.



Important

- Boot (10) must not be twisted, puckered or out of shape in any way. If the boot is not shaped properly, adjust by hand before installing seal retaining clamp (11).

4. Seal retaining clamp (11) on boot (10) with tool J 22610 and crimp as shown (see Figure 6).
5. Tie rod end clamp (8) with pliers on boot (10).
6. Hex nut (7) to inner tie rod assembly (12).
7. Do all steps of OUTER TIE ROD "Install or Connect."

INNER TIE ROD

Figures 1 thru 9



Remove or Disconnect

1. Rack and pinion assembly from vehicle (see Section 3B).
2. Do all steps of RACK & PINION BOOT "Remove or Disconnect."
3. Shock dampener (13) from inner tie rod assembly (12) and slide back on rack (see Figure 7).

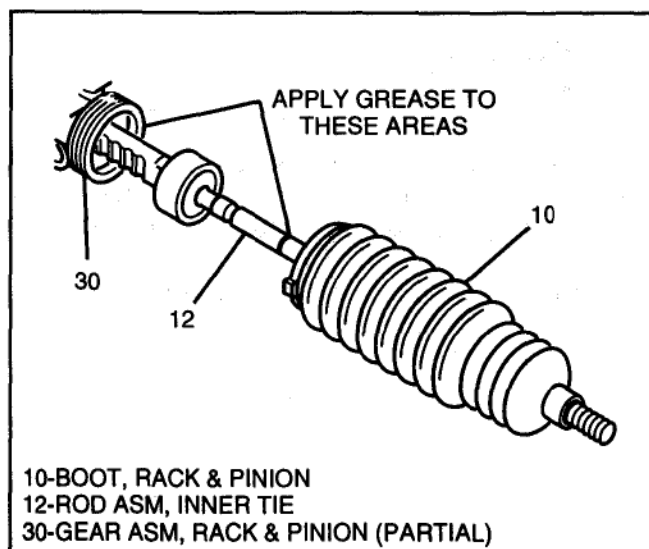


Figure 5 Boot Seal Grease Application

Notice: Steering gear rack must be held stationary during inner tie rod removal to prevent steering gear damage. Use an appropriate size wrench at the rack teeth to hold the rack during inner tie rod removal. For right side inner tie rod removal, it will be necessary to remove the left side boot to access the rack teeth.

4. Inner tie rod assembly (12) from rack assembly as follows: (See Figure 7.)
 - Place a wrench on flat of rack assembly.
 - Place another wrench on flats of inner tie rod housing.
 - Rotate inner tie rod housing counterclockwise until inner tie rod (12) separates from rack.

Install or Connect

1. Remove old Loctite® from threads of rack and inner tie rod.

Important

- Threads must be clean prior to Loctite application. Be sure Loctite® container expiration date has not passed. Do not use too much Loctite®. Use only enough to evenly coat threads.
2. Apply Loctite 262® to inner tie rod threads (see Figure 8).
 3. If shock damper was removed, slide it onto steering gear.

Notice: Steering gear must be held stationary during inner tie rod installation to prevent steering gear damage.

4. Install inner tie rod assembly onto steering gear (see Figure 9).



Tighten

- Inner tie rod (12) to 100 N•m (74 lb. ft.)
5. Slide shock dampener up against inner tie rod assembly.
 6. Do all steps of RACK & PINION BOOT "Install or Connect."
 7. Rack and pinion assembly to vehicle (see Section 3B).

CYLINDER LINE ASSEMBLY and O-RING SEALS

Figures 1 and 2

Tools Required:

12mm Flare Nut Wrench
16mm Flare Nut Wrench



Remove or Disconnect

1. Loosen cylinder line fittings (25) or (26) on cylinder end of gear assembly (30).
2. Loosen fittings on cylinder line assemblies (25) or (26) at valve end of gear assembly (30).
3. Cylinder line assemblies (25) or (26) from rack and pinion gear assembly (30).
4. O-ring seals (23) from valve end of lines (25) or (26) and discard.

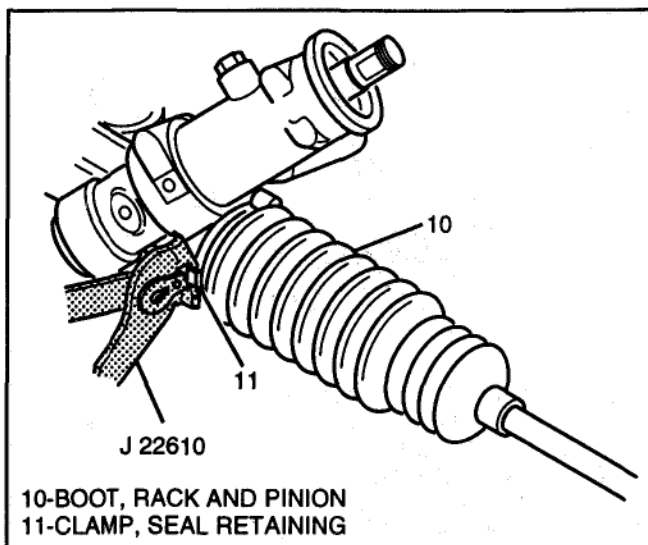


Figure 6 Boot Clamp Installation

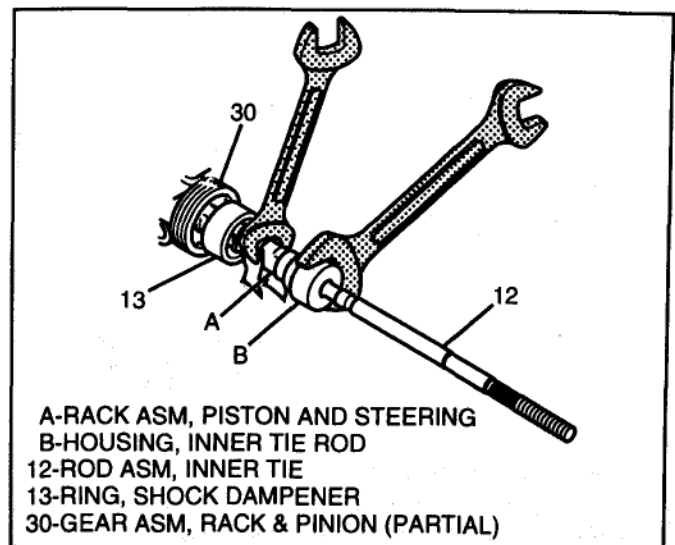


Figure 7 Inner Tie Rod Removal

Install or Connect

Inspect

Lines for:

- Cracks.
- Dents.
- Damage to threads.

Replace as needed.

1. New O-ring seals (23) to valve end of lines (25) or (26).
2. Cylinder line assemblies (25) or (26) to gear assembly (30).

Notice: Carefully align threads on all fittings and finger tighten to avoid stripping and cross-threading.

Tighten

- Valve end fittings to 16.9 N•m (12.5 lb. ft.).
- Cylinder end fittings to 27.0 N•m (20 lb. ft.).

PINION SEAL, DUST SEAL and BEARING ANNULUS ASSEMBLY Figures 1, 2, 10 Thru 15

Tools Required:

- J 29810 Stub Shaft Seal Protector
- 14 mm Crowfoot Wrench

Remove or Disconnect

1. Rack and pinion steering assembly from vehicle (see Section 3B).
2. Adjuster plug lock nut (15) from adjuster plug (see Figure 10).

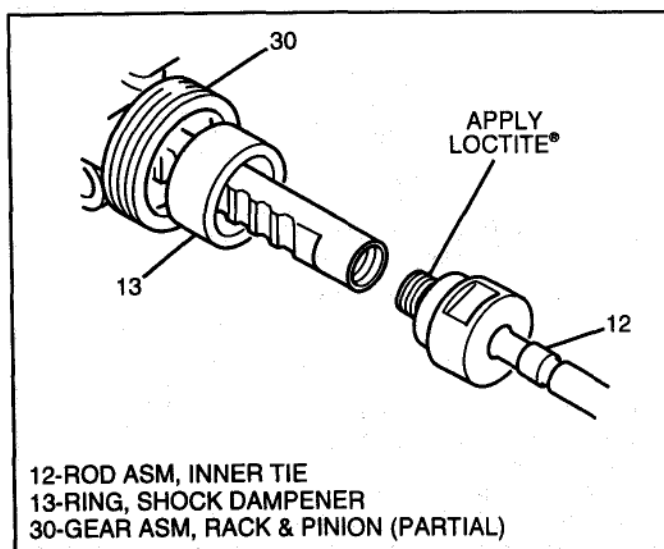


Figure 8 Inner Tie Rod Installation

3. Adjuster plug from gear assembly (30).
4. Adjuster spring and rack bearing.
5. Retaining ring (17) from valve bore of gear assembly (30).
6. Dust cover (33) from bottom of gear assembly (30) (see Figure 11).

Notice: Stub shaft must be held to prevent damage to the pinion teeth.

7. Hex lock nut (32) from lower end of pinion and valve assembly, while holding stub shaft with 14 mm Crowfoot Wrench (see Figure 11).

Notice: DO NOT hammer or pound on pinion and valve assembly. This will cause damage or loosen the drive pin.

Important

- When performing the following procedure, do not remove pinion and valve assembly from gear assembly. Press pinion and valve assembly only far enough to allow removal of bearing annulus and seal. Pinion and valve assembly removal is not required.

8. Use an arbor press (see Figure 12). Press on threaded end of pinion until it is possible to remove stub shaft dust seal (18), stub shaft seal (20), and stub shaft bearing annulus assembly (21) (see Figure 13).

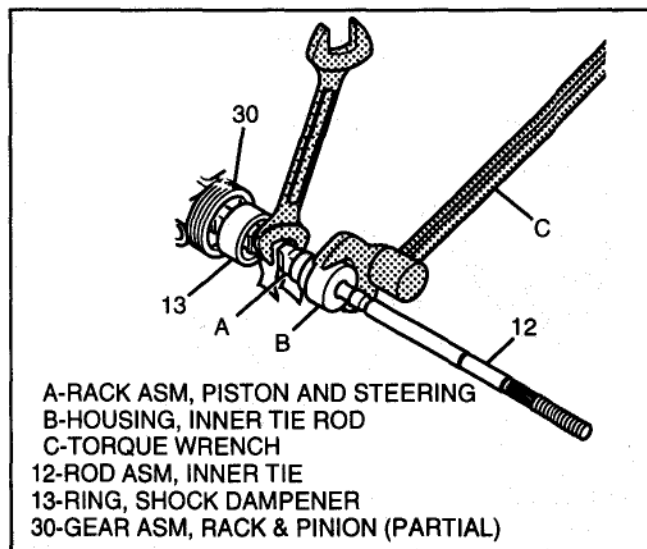


Figure 9 Inner Tie Rod Tightening

Install or Connect

Notice: If the stub shaft is not held, damage to the pinion teeth will occur.

1. Hex lock nut (32) onto pinion, while holding the valve stub shaft.

Tighten

- Hex lock nut (32) to 30 N•m (22 lb. ft.).
2. Dust cover (33) to gear assembly (30).
 3. Stub shaft bearing annulus assembly (21) onto valve stub shaft.
 4. Seal protector J 29810 onto valve stub shaft.
 5. Apply a small quantity of grease between seals (20) and (18).
 - Stub shaft seal (20) and stub shaft dust seal (18) over protector and into gear assembly (30).
 6. Retaining ring (17) into groove in gear assembly (30).
 7. Lubricate stub shaft and dust seal area with grease.
 8. Coat rack bearing, adjuster spring and adjuster plug with lithium base grease and install in gear assembly (30) (see Figure 15).

Adjust

- With rack centered in the gear assembly (30), turn adjuster plug clockwise until it bottoms in the gear assembly, then back off 50° to 70° (approximately one flat). Check rotational torque on pinion. Maximum pinion preload torque is 1.8 N•m (16 lb. in.) (see Figure 15).

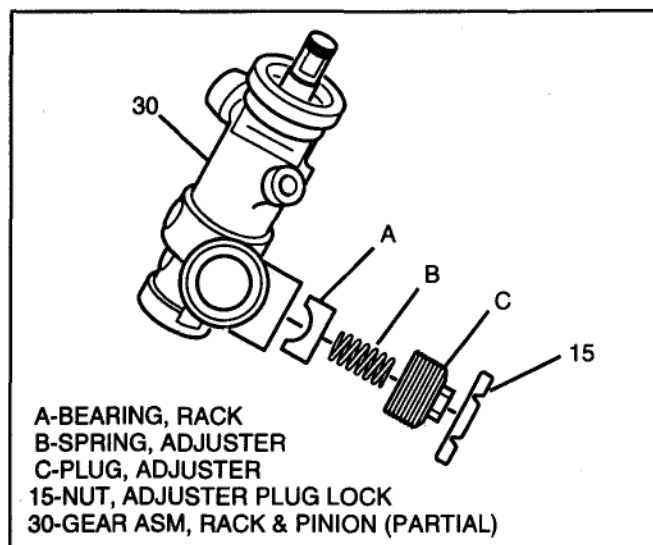


Figure 10 Rack Bearing Removal

9. Lock nut (15) to adjuster plug.

Tighten

- Lock nut (15) to 75 N•m (55 lb. ft.) while holding adjuster plug stationary.

10. Rack and pinion assembly into vehicle.

Important

- Flush and bleed power steering system (hoses, reservoir and cooler lines) with cold climate power steering fluid - GM Part #12345866 16-oz. or 12345867 32-oz. (see flushing and bleeding procedures, Section 3B).

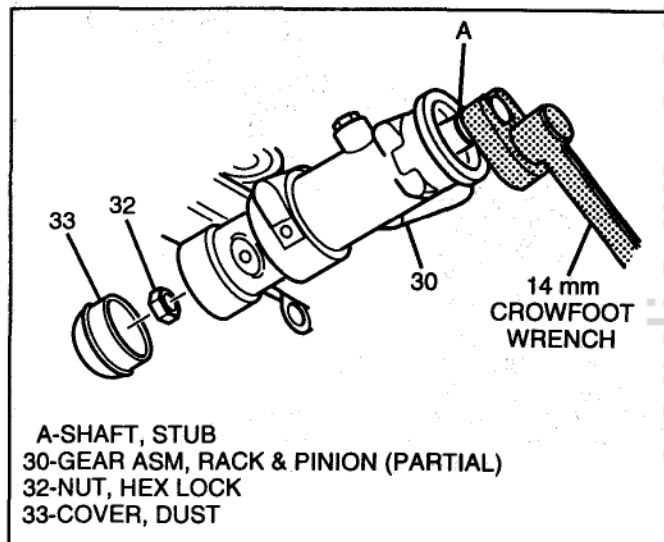


Figure 11 Retaining Ring and Lock Nut Removal

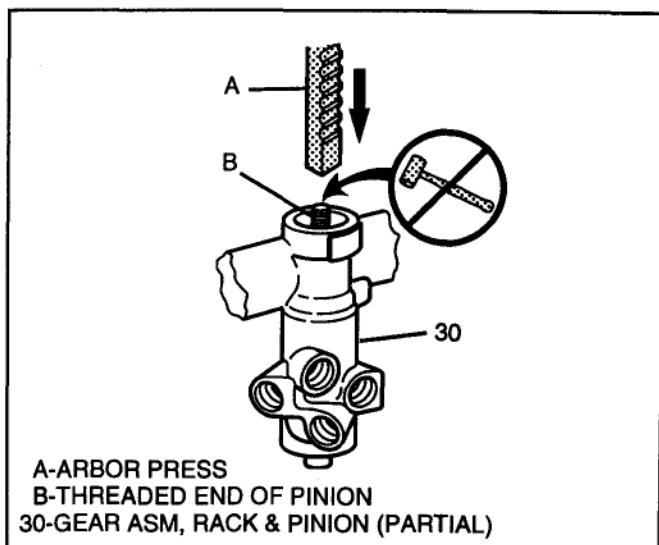


Figure 12 Pressing Pinion

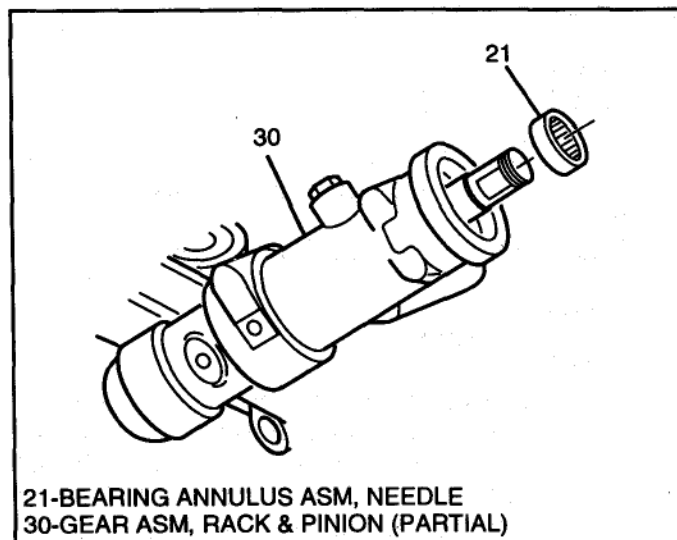


Figure 13 Bearing Annulus Installation

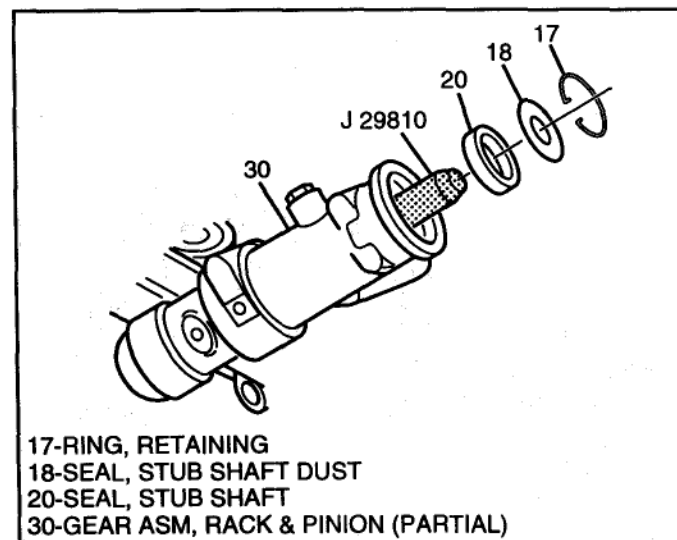


Figure 14 Seal Installation

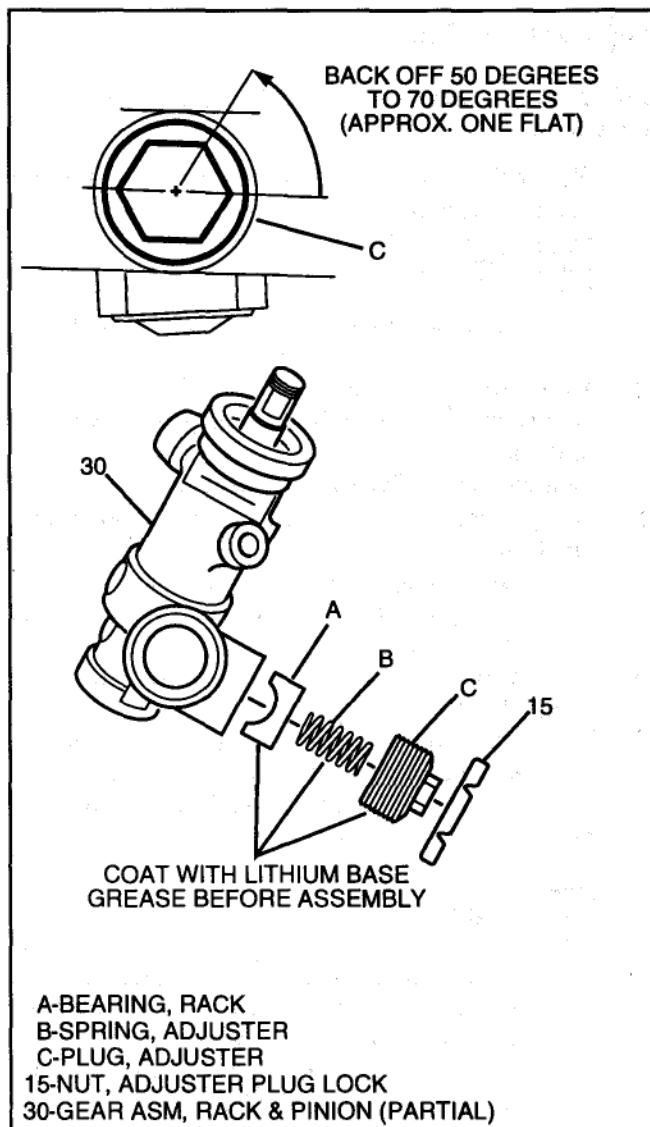


Figure 15 Rack Bearing Installation and Adjustment

SPECIFICATIONS

FLUID CAPACITIES

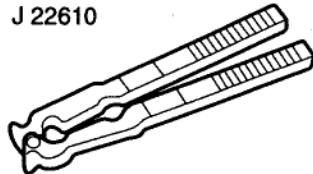
Lubricant	Cold Climate Power Steering Fluid 12345866 (16-oz.) 12345867 (32-oz.)
Capacity Complete System	0.75 liter (1-1/2 pints)

FASTENER TIGHTENING SPECIFICATIONS

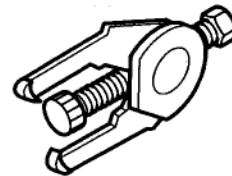
(1)	Hexagon Slotted Nut	47.0 N•m	(35 lb. ft.)
(7)	Hex Nut	68.0 N•m	(50 lb. ft.)
(12)	Inner Tie Rod	100.0 N•m	(74 lb. ft.)
(15)	Lock Nut	75.0 N•m	(55 lb. ft.)
(32)	Hex Lock Nut	30.0 N•m	(22 lb. ft.)
	Pinion Preload	1.8 N•m	(16 lb. in.)
	Valve End Fittings	16.9 N•m	(12.5 lb. ft.)
	Cylinder End Fittings	27.0 N•m	(20 lb. ft.)

SPECIAL TOOLS

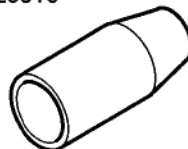
1. J 22610



2. J 24319-01



3. J 29810



1. SERVICE BOOT CLAMP INSTALLER
2. UNIVERSAL STEERING LINKAGE PULLER
3. STUB SHAFT SEAL PROTECTOR

