

# STEERING GEAR - MANUAL

1988 Jeep Cherokee

1988 STEERING  
Jeep Manual Steering Gears  
Koyo & Saginaw Recirculating Ball

Cherokee, Comanche, Wrangler

## DESCRIPTION

Jeep uses the Saginaw steering gear unit. Different models are used. The Model 525 uses 3 bolts in the side cover while the Model 535 uses 4 bolts.

Steering gears are a recirculating ball-type. Proper engagement between sector and ball nut is obtained by adjusting screw. Worm bearing adjuster can be turned to provide proper preloading of upper and lower bearings.

## TROUBLE SHOOTING

Refer to TROUBLE SHOOTING - BASIC PROCEDURES article in the GENERAL TROUBLE SHOOTING section.

## ADJUSTMENTS

NOTE: Adjust worm bearing preload prior to performing meshload adjustment. If steering gear is removed, install INCH lb. torque wrench on worm shaft to check preload adjustments.

## WORM BEARING PRELOAD

1) Place reference mark on pitman arm and sector shaft. Remove pitman arm retaining nut. Using puller, remove pitman arm from sector shaft.

2) Disconnect pitman arm from ball stud or sector shaft.

3) Remove horn pad. Turn steering wheel slowly against one stop then back 1/2 turn. Place an INCH-lb. torque wrench with a maximum reading of 50 INCH lbs. (6 N.m) on steering wheel nut.

4) Measure amount of torque (preload) required to rotate steering wheel at a constant speed for approximately 1 1/2 turns on Ford Motor Co. models or 90 degree arc on all others.

5) Note preload. Adjust preload if not within specification. See WORM BEARING PRELOAD table. Adjust preload by loosening lock nut (if not previously loosened) and rotating worm bearing adjuster to obtain correct preload.

6) Once correct preload is obtained, tighten lock nut to specification. Perform meshload adjustment once correct preload is obtained.

## WORM BEARING PRELOAD TABLE

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Application	INCH Lbs. (N.m)
Cherokee, Comanche & Wrangler .....	5-8 (.6-.9)

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## MESHLOAD ADJUSTMENT

1) Rotate steering wheel from stop-to-stop, noting the number of revolutions. Rotate steering wheel back to the center position.

2) Ensure sector shaft cover bolts are tightened to specification. Using an INCH lb. torque wrench, measure highest torque required to rotate steering wheel back and forth through the center position. Meshload must be adjusted if not within specification. See the MESHLOAD SPECIFICATIONS table.

#### MESHLOAD SPECIFICATIONS TABLE

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Application	INCH Lbs. (N.m)
Cherokee, Comanche & Wrangler .....	(1) 4-10 (.5-1.1)
(1) - In excess of worm bearing preload. Maximum preload is 18 INCH lbs. (2.0 N.m) on Jeep models or 16 INCH lbs. (1.8 N.m) on all others.	

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3) Loosen sector shaft adjuster screw lock nut. Adjust sector shaft adjuster screw to obtain correct reading. Tighten lock nut to specification while holding adjusting screw.

4) Reverse removal procedures for components removed. Ensure reference mark is aligned on pitman arm and sector shaft. Tighten pitman arm retaining nut to specification. On Jeep models, stake pitman arm retaining nut in 2 places.

## REMOVAL & INSTALLATION

### STEERING GEAR

**CAUTION:** All steering component fasteners are made of special quality materials. Replacement fasteners must be of same part number or equivalent. Tighten all fasteners to proper torque. Install new cotter pin where used.

#### Removal

1) Disconnect negative battery cable. Set front wheels in straight-ahead position. Note position of steering wheel. Remove flexible coupling shield retaining screw (if equipped).

2) Remove flexible coupling-to-steering worm shaft flange bolts or lower universal joint pinch bolt. Remove sector shaft nut and washer. Place reference mark in relation of pitman arm-to-sector shaft. Using Puller (J-6632-01), remove pitman arm. Remove steering gear-to-frame bolts. Remove steering gear.

#### Installation

1) Install flexible coupling on worm shaft. Align flat on coupling with flat on worm shaft. Push coupling on shaft until shaft touches shoulder. Install pinch bolt. Pinch bolt must pass through shaft undercut.

2) To install remaining components, reverse removal procedure. Align reference mark on pitman arm and sector shaft. Ensure splines are properly aligned. Tighten bolts to specification. On Jeep models, stake sector shaft nut in 2 areas.

### SECTOR SHAFT SEAL

**NOTE:** On some models, sector shaft seal may be replaced without removing steering box. It may be necessary to remove steering gear to gain access to remove sector shaft seal.

#### Removal & Installation

1) Place steering gear at center of travel. Remove sector

shaft nut. Place reference mark in relation of pitman arm-to-sector shaft. Using puller, remove pitman arm.

2) Remove sector shaft cover retaining bolts. Lift sector shaft and cover from housing. Using a screwdriver, pry sector shaft seal from housing. Use care not to damage housing area. Note direction of seal installation.

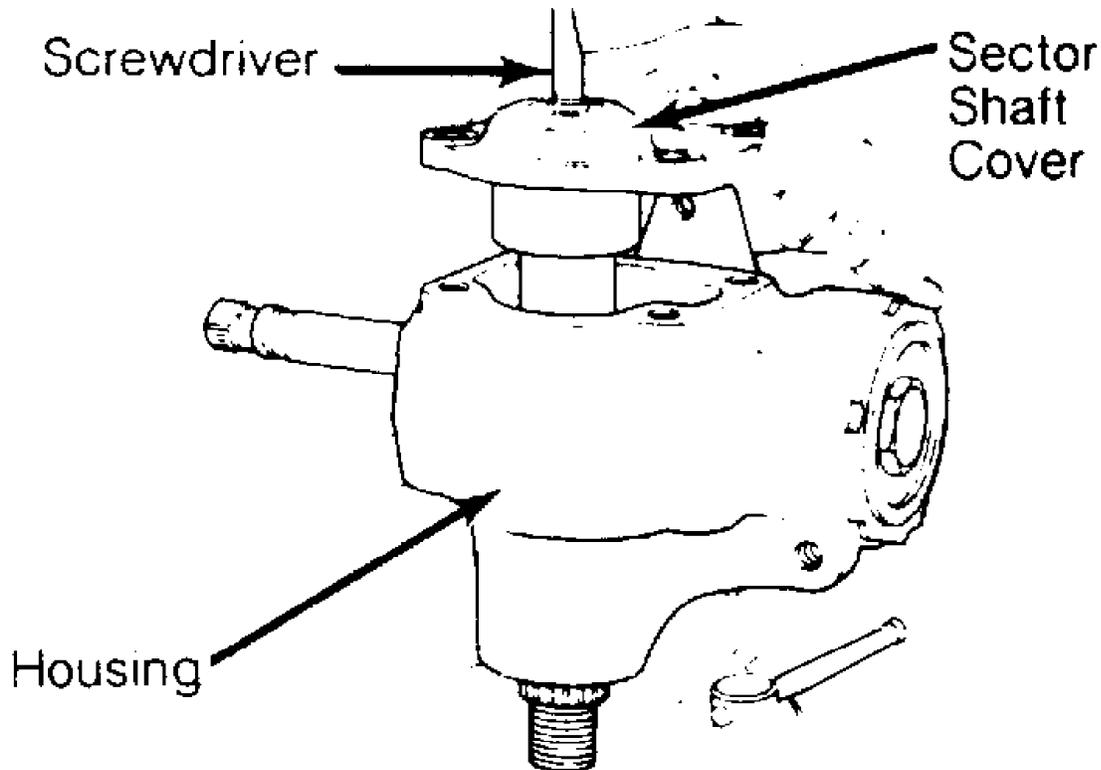
3) Loosen sector shaft adjusting screw lock nut. Rotate adjusting screw clockwise and remove cover from sector shaft. Inspect gear lubricant for contamination. Steering gear must be overhauled if contamination exists.

4) Lubricate new sector shaft seal with steering gear lubricant. Position seal in housing bore. Using proper sized socket, tap seal into housing until it bottoms.

5) Install sector shaft so center tooth of sector shaft enters center tooth of ball nut. Fill housing with lubricant. Install new sector shaft cover gasket on gear housing (if equipped). Apply a thin bead of sealant to sector shaft cover on models which do not use a gasket.

6) Using a screwdriver through the center hole, align adjusting screw and install cover on sector shaft. See Fig. 1. Turn adjusting screw counterclockwise until screw bottoms, then back off 1/4 turn.

7) Coat cover bolts with non-hardening sealant. On all models, install cover retaining bolts. Tighten to specification. Install sector shaft lock nut. Perform adjustments on steering box. See ADJUSTMENTS in this article.



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Fig. 1: Installing Sector Shaft Cover

**OVERHAUL**

## STEERING GEAR

### Disassembly

1) Place steering gear in a holding fixture. Worm shaft should be centered in steering gear. Remove sector shaft cover bolts. Remove sector shaft and cover from housing.

2) Remove sector shaft adjusting screw lock nut. Rotate adjusting screw clockwise to remove cover from shaft. DO NOT lose shim located on adjusting screw.

3) Loosen worm bearing adjuster lock nut. Remove worm bearing adjuster and worm shaft lower bearing. Remove worm shaft and ball nut assembly from housing. Remove upper bearing.

CAUTION: DO NOT allow ball nut to rotate down worm shaft as ball guides may be damaged.

4) If ball nut fails to rotate smoothly on worm shaft, disassembly is required. Remove ball guide clamp and guides. Rotate worm shaft in both directions to remove balls. Note and record number of balls in each circuit area of the ball nut.

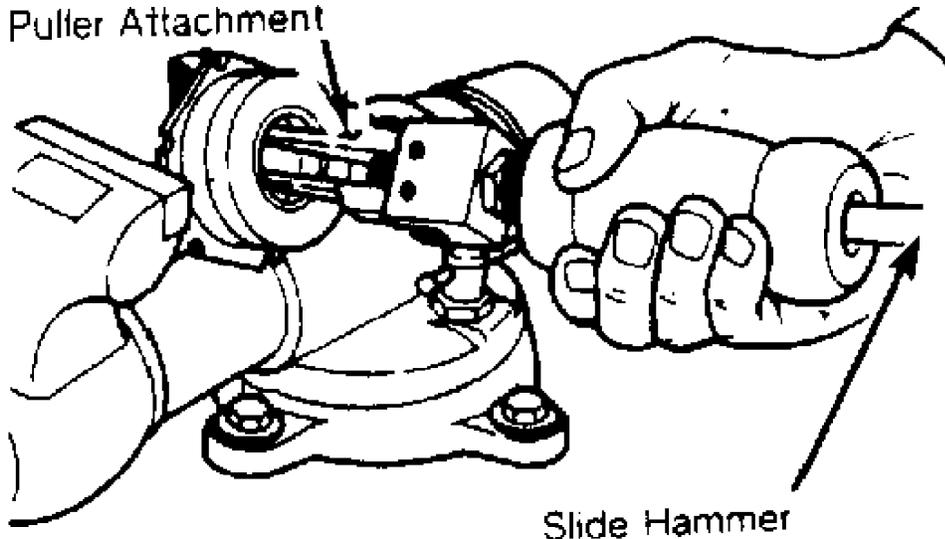
5) Note direction of ball nut on worm shaft prior to removal. Remove ball nut from worm shaft.

CAUTION: Note and record number of balls removed from each circuit of ball nut during disassembly. Determine location of ball nut on worm shaft prior to removal. Ball nut must be installed on worm shaft with shallow teeth in proper direction.

6) Use slide hammer and puller attachment to remove worm bearing adjuster bearing cup. See Fig. 2. Using a bearing driver or socket, remove bearing cup from housing.

7) Remove bearings from housing. Pry out all seals from housing. Note direction of seals.

Puller Attachment



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Fig. 2: Removing Worm Adjuster Bearing Cup

### Cleaning & Inspection

1) Clean components with solvent and dry with compressed air. Inspect bearings and races for signs of wear. Inspect ball nut and

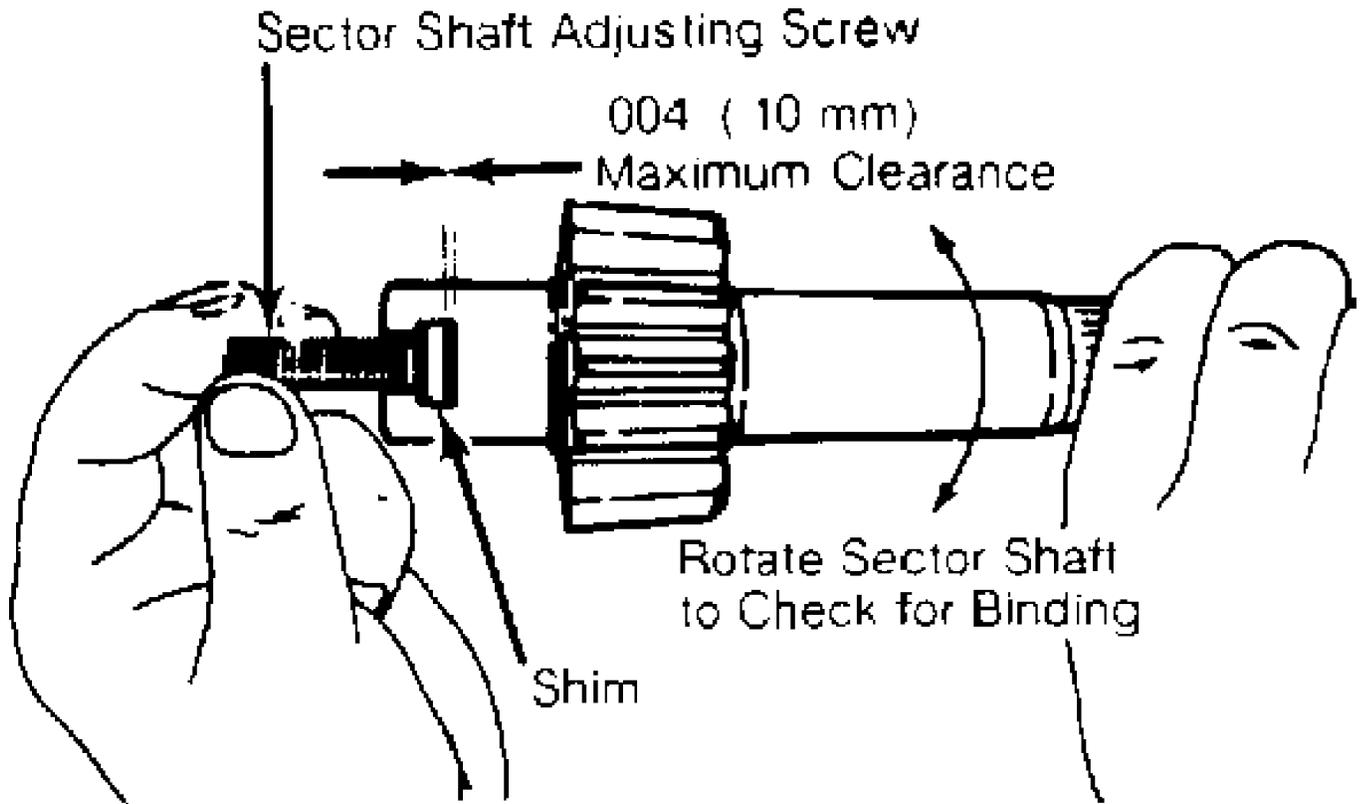
worm shaft for wear or pitting.

2) Inspect sector shaft fit at side cover bushing assembly (if equipped). Bushing is replaceable.

3) Inspect housing for cracks or damage. Inspect bearings for damage. Inspect sector gear teeth for chipping or excessive wear. Replace components as necessary.

#### Reassembly

1) Install sector shaft adjusting screw and shim in sector shaft. Using feeler gauge, measure clearance between adjusting screw and bottom of sector shaft "T" slot. See Fig. 3.



## 30302

Fig. 3: Checking Sector Shaft "T" Slot Clearance

2) Different thickness shims should be used if clearance is not within specification. See ADJUSTING SCREW CLEARANCE SPECIFICATIONS table.

#### ADJUSTING SCREW CLEARANCE SPECIFICATIONS TABLE

Application	In. (mm)
Cherokee, Comanche & Wrangler .....	.002 (.05)

3) Once correct shim is determined, install shim and adjusting screw. Hold sector adjuster screw while turning sector shaft. If sector shaft does not turn freely, increase clearance by

replacing shims as necessary.

4) Install ball nut on worm shaft. Ensure ball nut is installed so shallow end of teeth are to the left as viewed from steering wheel end of worm shaft. Align grooves in worm and nut by sighting through ball guide holes.

5) There are 2 types of ball guides used. One type contains a hole in the middle, while the other does not. If ball guides contain the middle hole, install ball guides in the ball nut.

6) Divide balls into 2 equal groups. Insert each group into a ball guide, while slowly turning worm shaft away from the hole. Repeat procedure for remaining circuit.

7) On guides with no holes, separate guide halves and fill each one half of each circuit with balls. Install remaining guide half. Hold guides and plug ends with grease to prevent the balls from falling out.

8) Fill each circuit of ball nut with half of remaining balls in one circuit, and half in other. DO NOT turn worm shaft while installing. It may be necessary to use small punch to aid in ball installation. Install ball guides. On both types, install ball guide clamp.

9) To install, reverse removal procedure. Lubricate all seals, bearings and sector shaft prior to installation. Coat worm bearing adjuster, sector shaft adjuster screw and sector shaft cover bolts with non-hardening sealant prior to installation.

10) Screw worm bearing adjuster down until nearly all end play has been removed. Lubricate steering gear by rotating worm shaft until ball nut is at end of its travel.

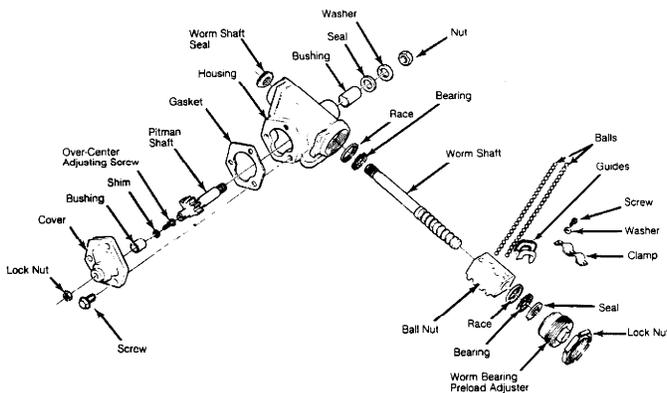
11) Pack as much grease as possible into steering gear housing without losing it out sector shaft opening. Rotate ball nut to other end of its travel and pack more grease into housing.

12) Rotate ball nut until it is in center of its travel. Insert sector shaft assembly, containing adjusting screw and shim into housing. Center tooth of sector gear must engage center rack tooth space in ball nut.

13) Pack housing with grease. Apply a thin bead of sealant to sector shaft cover on models which do not use gasket. Install cover and gasket on housing. Engage sector adjuster screw with tapped hole in center of sector cover by turning screw counterclockwise.

14) Turn adjusting screw until sector cover is flush with housing. Install sector cover bolts but do not tighten unless there is a lash between sector shaft and worm shaft.

15) Tighten sector cover bolts to specification. Adjust steering gear preload and meshload. See ADJUSTMENTS in this article.



30304  
Fig. 4: Exploded View of Saginaw Model 525 Steering Gear (Typical)

## TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

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Application	Ft. Lbs. (N.m)
Adjuster Screw Lock Nut .....	25 (34)
Flex Coupling Pinch Bolt .....	45 (61)
Sector Shaft Nut .....	185 (252)
Sector Cover Bolt .....	32 (43)
Steering Gear-to-Frame Bolt .....	75 (102)
Worm Bearing Adjuster Lock Nut .....	50 (68)

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