

Manual Steering Gears

CHRYSLER RECIRCULATING BALL

Chrysler Corp. Vans

DESCRIPTION

Steering gear is a recirculating ball type. A ball nut travels up or down on the worm shaft, riding on recirculating balls acting as a screw thread. The worm shaft and ball nut assembly is supported in the gear housing by an adjustable ball thrust type upper and lower bearing.

The lower bearing cup is pressed into the gear housing, and the upper bearing cup is pressed into the worm shaft bearing adjuster. Sector shaft is integral with sector gear. The sector gear meshes with the rack teeth on the recirculating ball nut.

ADJUSTMENT

WORM BEARING PRELOAD

1) Disconnect steering gear arm from sector shaft with tool (C-4150). Remove horn pad from steering wheel. Loosen sector shaft adjusting screws lock nut and back out adjusting screw 2 turns.

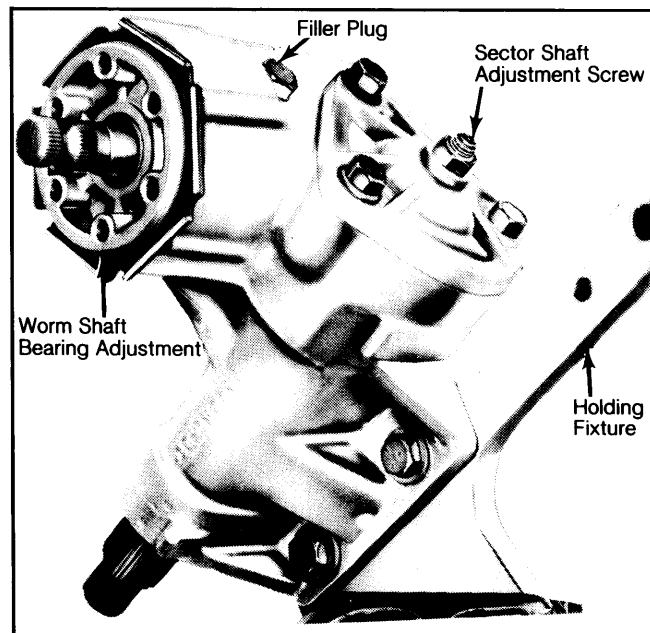
2) Turn steering wheel 2 complete turns from straight ahead position. Place torque wrench tool (C-3380A) on steering shaft nut. Rotate steering shaft at least 1 turn toward straight ahead position, while testing rotating torque with torque wrench.

3) If reading is not within specifications, adjust as follows: Loosen adjuster lock nut. Use adjuster wrench (C-3884) to turn adjuster clockwise to increase preload, or counterclockwise to decrease preload. Hold adjuster from turning and tighten lock nut. Retest worm bearing preload.

BALL NUT RACK & SECTOR MESH

1) With worm bearing preload properly adjusted, turn steering wheel gently from one stop to the other, counting the number of turns. Turn steering back half-way to center position.

Fig. 1: Steering Gear Adjustment Locations



2) Turn sector shaft adjusting screw clockwise to remove all lash between ball nut rack and sector gear teeth, then tighten adjusting screw lock nut. Turn steering wheel about ¼ turn away from center position.

3) With torque wrench tool (C-3380) placed on steering wheel nut, measure torque required to rotate steering wheel through high spot at center position. If reading is not to specifications, readjust sector shaft adjusting screw to obtain proper torque reading.

4) Place front wheels in straight ahead position and with steering gear and steering wheel centered, install steering arm on sector and tighten retaining nut.

REMOVAL & INSTALLATION

NOTE: Steering column must be removed from vehicle before removing steering gear.

Removal

Disconnect negative battery terminal. Remove steering column. From under vehicle remove steering arm retaining nut and lock washer. Remove steering arm with tool (C-4150). Remove steering gear-to-frame retaining nuts and remove gear.

Installation

Position gear on frame and install retaining nuts. Rotate worm shaft by hand and center sector shaft to mid-point of its travel. Align master serrations on sector shaft with splines in steering arm. Install steering arm lock washer and nut and tighten. Install steering column. Connect battery.

OVERHAUL

STEERING GEAR ASSEMBLY

NOTE: Thoroughly clean entire outside surface of steering gear before disassembly to avoid contaminating worm shaft and ball nut assembly with dirt.

Disassembly

1) With gear removed from vehicle, attach gear to holding fixture (C-3323) and place fixture in vise. Loosen sector shaft adjusting screw lock nut and back out screw 2 turns. Remove sector shaft oil seal as described in this article.

2) Position worm shaft in straight ahead position. Remove sector shaft cover bolts and remove sector shaft while sliding arbor tool (C-3786) into housing.

3) Remove lock nut from sector shaft adjusting screw and remove screw. Slide adjustment screw and shim out of slot in end of sector shaft. Loosen worm shaft bearing adjuster lock nut with a soft drift punch and remove lock nut. Hold worm shaft from turning while unscrewing adjuster with wrench from tool set (C-3884). Slide worm shaft adjuster off shaft.

NOTE: Handle adjuster carefully to avoid damaging threads. Be sure that ball nut does not run down to either end of worm shaft as ball guide ends can be damaged.

4) Carefully remove worm and ball nut assembly. Remove sector shaft needle bearing by placing gear

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housing in an arbor press and inserting tool (C-3786) in lower end of housing. Press both bearings through housing.

5) Remove worm shaft oil seal by inserting a blunt punch behind seal and tapping alternately on each side of seal until it is driven out of adjuster. Remove worm shaft spacer and upper bearing cup in same manner, being careful not to cock bearing cup.

6) Remove lower bearing cup by positioning locking head jaws of remover tool (C-3868) behind bearing cup and expanding remover head. Withdraw bearing cup by turning remover screw nut in a clockwise direction while holding center screw.

Cleaning and Inspection

1) Wash all parts in clean solvent and dry with compressed air. Test operation of ball nut assembly on worm shaft. If it does not travel smoothly or there is roughness, assembly must be replaced.

2) Inspect sector shaft for wear and check fit of shaft in housing bearings. DO NOT screw worm shaft adjuster into housing without lubrication, or when threads are dirty or damaged. Replace sector shaft and worm shaft oil seals whenever unit is disassembled.

Reassembly

1) Install sector shaft lower needle bearing by placing bearing on end of tool (C-3786) with adapter ring. Press bearing into housing to 1/2" below end of bore. Install upper needle bearing by placing bearing on tool (C-3786) and pressing bearing into housing bore so it is flush with end of bore surface.

2) Install worm shaft bearing cups, position cups and spacer into adjusting nut and press into place with tool (C-3865). Install worm shaft oil seal in adjuster with metal retainer UP. Drive seal into place with suitable sleeve so seal is slightly below end of bore in adjuster.

3) Lubricate all moving parts with steering gear lubricant. Lubricate on and around oil seal lips. Clamp holding fixture and housing in vise with bearing adjuster UP. Place a thrust bearing in lower cup in housing.

4) Hold ball nut from turning and insert worm shaft and ball nut assembly into housing with end of worm resting in thrust bearing. Place upper thrust bearing on worm shaft. Lubricate threads on adjuster and threads in housing.

5) Place tape over worm shaft splines and slide adjuster assembly over shaft. Thread adjuster into housing, and with tool (C-3884) and splined nut set, tighten adjuster while rotating wormshaft. Loosen adjuster so no bearing preload exists.

6) Adjust worm shaft bearing preload to 1.0-4.5 INCH lbs. (.1-.5 N.m). Tighten bearing adjuster lock nut and retest preload. Pack worm shaft cavities in housing with steering gear lubricant. Slide sector shaft adjusting screw and shim into slot in end of shaft.

7) Check end clearance. Screw must be able to turn with .004" (.10 mm) maximum end play. Use shims if clearance is not within specifications. Start sector shaft and adjuster screw into bearing housing cover. Using a screwdriver through hole in cover, turn screw counterclockwise to pull shaft into cover.

8) Install adjusting screw lock nut, but do not tighten. Rotate worm shaft to centralize ball nut. Place new cover gasket on housing cover. Lubricate sector shaft and sector teeth and carefully install shaft and cover assembly into housing.

9) Ensure that some lash exists between sector shaft teeth and ball nut rack. Install and tighten cover bolts. Position sector shaft seal on sector shaft with lip of seal facing gear housing.

10) Place installing adapter (SP-3828) from tool (C-3880) against seal with short step toward seal. Position nut from tool (C-3880) on sector shaft and turn it down against adapter, pressing seal into housing until step on adapter contacts end of housing. Remove tool.

11) Adjust ball nut rack and sector mesh. See "Adjustment" in this article.

SECTOR SHAFT OIL SEAL REPLACEMENT

NOTE: Sector shaft oil seal can be replaced with steering gear in vehicle or on bench. If replacement is done in vehicle, clean exposed portion of sector shaft before replacing oil seal.

1) Remove steering gear arm retaining nut and lock washer. Remove arm with tool (C-4150).

NOTE: Toolkit (C-3880) must be used to service sector shaft seal. Tool consists of an adapter (SP-3056), half rings (SP-1932), a nut (SP-3610), and installing adapter (SP-3052).

2) Slide threaded adapter over end of sector shaft and install nut portion of tool on shaft. Maintain pressure on adapter with tool nut while screwing adapter into seal until it grips oil seal firmly.

3) Place two half rings and retainer over both portions of tool. Turn tool nut counterclockwise to withdraw seal from housing.

4) To install, place new seal onto splines of sector shaft with lip of seal facing gear housing. Place installing adapter (SP-3052) against seal and press in until a gap of .25" (6mm) exists between adapter and housing.

5) Place nut from tool kit on sector shaft and turn it down against adapter, pressing seal into housing until step on adapter contacts end of housing.

6) Remove tool. Install steering arm, lock washer and retainer nut and tighten.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Sector Shaft Adj. Screw Lock Nut	35 (48)
Steering Arm Retaining Nut	175 (238)
Housing Cover Bolts	25 (34)
Steering Gear-to-Frame Bolts	100 (136)

ADJUSTMENT SPECIFICATIONS

Application	INCH Lbs. (N.m)
Ball Nut Rack & Sector Mesh	
Gear in Vehicle	8.2-11.2 (.9-1.3)
Gear Removed From Vehicle	7.5-11.5 (.8-1.3)
Worm Bearing Preload	1.0-4.5 (.1-.5)