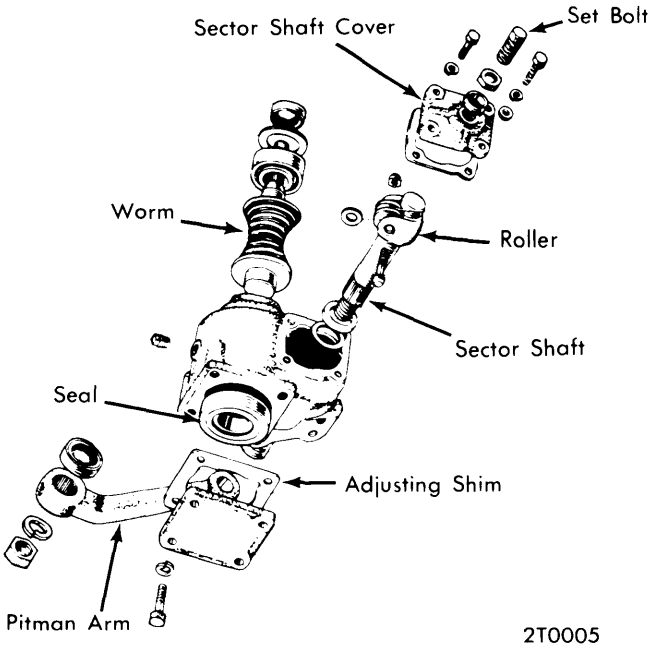
TOYOTA LAND CRUISER WORM & ROLLER

FJ40
FJ55

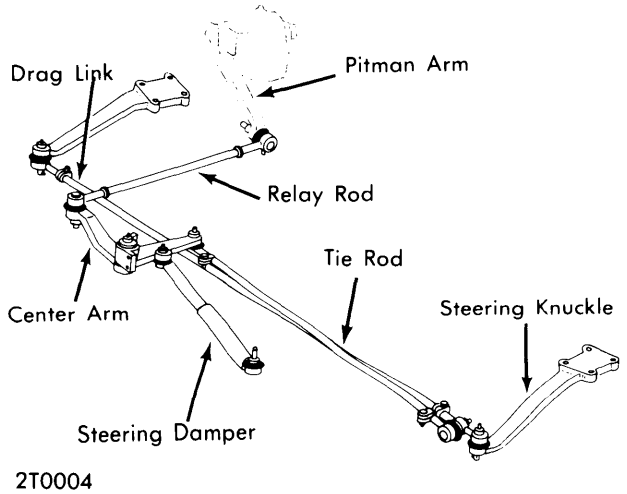
DESCRIPTION

STEERING GEAR

Steering gear mechanism is of the worm and roller type with a gear ratio of 21:1. Gear housing is a unit-constructed housing. The gear housing is attached to the frame by a mounting bracket. Worm and sector roller tooth backlash is controlled by adjusting shims and a set bolt on the sector shaft end cover.



WORM & ROLLER GEAR – LAND CRUISER



STEERING LINKAGE – LAND CRUISER

STEERING LINKAGE

Linkage consists of pitman arm, drag link assembly, steering center arm, relay rod, tie rod, two steering knuckles, and steering damper. The length of the relay rod and tie rod is variable to allow adjustment of front end alignment.

ADJUSTMENT

WORM ADJUSTMENT (END PLAY)

FJ40 – Centerlines of steering worm and sector roller are in proper alignment if steering wheel has same amount of play when turned in either direction from center. If there is a difference of play, adjust by increasing or decreasing number of front bearing adjusting shims.

WORM BEARING PRELOAD

FJ40 – Adjust preload of worm bearing using cap packings. Place one packing and tighten cap as required. Attach steering wheel temporarily (if removed). Apply pull-scale to wheel. Pull required to keep wheel turning slowly should be approximately .88 lbs. (.4 kg). If preload is excessive, increase thickness of packing. If preload is too light, decrease packing.

STEERING WHEEL PLAY ADJUSTMENT

FJ40 – Steering wheel play can be adjusted by increasing or decreasing number of sector adjusting shims. Decreasing shims will move roller closer to the worm to form a tighter mesh. To adjust, install steeting wheel (if removed), hold sector roller shaft with hand, and turn steering wheel in both directions. Point on steering wheel where roller shaft is felt to begin turning is the starting point. Adjustments should be made until there is approximately 1" (25 mm) of play in the steering wheel.

ROLLER AXIAL PLAY ADJUSTMENT

Adjust axial play by turning sector thrust adjusting screw. Loosen lock nut and tighten screw until steering shaft feels heavy to turn, then loosen screw ¼ - ½ turn and tighten lock nut.

NOTE – FJ55 model adjustments are made during gear reassembly procedures. See Overhaul in this article.

REMOVAL & INSTALLATION

STEERING GEAR

Removal, FJ40 – 1) Remove horn button, contact spring, and other related parts from steering wheel. Pull steering wheel from shaft. Disconnect horn button wire connection at side of mast jacket.

2) Remove mast jacket lower clamp. Detach turn signal switch assembly. Remove mast jacket hole cover. Remove carburetor and oil cleaner.

3) Disconnect gear shifting rod and gear selecting rod at end of levers. Remove control shaft lower bracket clamp. Remove control shift lever, control select lever, and control shaft lower bracket. Also remove control shaft low speed lever. Pull control shaft out toward driver's seat.

4) Using suitable puller, remove pitman arm from roller shaft. Remove steering gear box bracket cap, then lift gear box and mast jacket assembly out through engine compartment.

Installation, FJ40 – To install, reverse removal procedure.

TOYOTA LAND CRUISER WORM & ROLLER (Cont.)

Removal, FJ55 – Raise and support front of vehicle. Remove front wheels. Unbolt steering worm yokes from worm and steering main shaft. Remove intermediate steering shaft. Mark position of pitman arm to sector shaft, then remove arm. Unbolt steering gear housing from bracket.

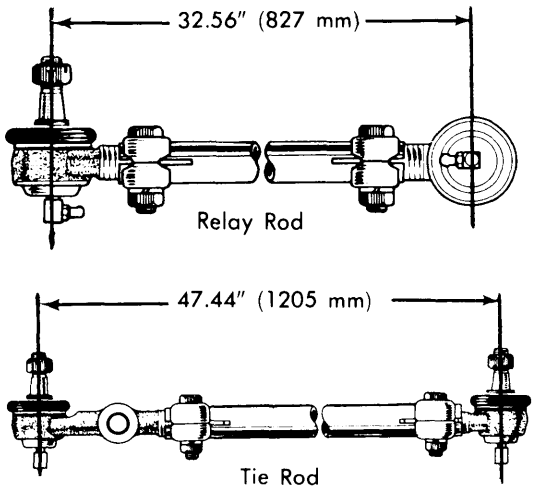
Installation, FJ55 – To install, reverse removal procedure.

STEERING LINKAGE

Removal – 1) Raise and support front of vehicle. Remove front wheels. Mark relative position of pitman arm to sector shaft and remove arm, using suitable puller (09610-55010). Disconnect steering drag link from steering center arm.

2) Disconnect tie rod ends from both sides of tie rod. Disconnect steering relay rod end from steering center arm, then remove tie rod assembly with relay rod assembly. Disconnect end of steering damper from bracket on crossmember. Loosen and remove center arm from bracket (with steering damper). Remove engine stone shield and remove steering center arm bracket from frame.

Installation – Install in reverse of removal procedure, adjusting relay rod and tie rod to specifications shown in illustration.



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ADJUSTING RELAY ROD & TIE ROD

OVERHAUL

STEERING GEAR

Disassembly, FJ40 – 1) Drain oil from gear box. Place assembly in padded vise and loosen bolt holding lower clamp on mast jacket and pull mast jacket from steering shaft.

2) Slacken sector thrust screw, then remove sector shaft end cover and withdraw sector shaft assembly. Take care not to lose sector adjusting shims, as they must be installed in original manner to retain proper lash adjustment.

3) Remove steering worm bearing cap with worm rear bearing cap packings. Check number of adjusting packings so that preload can be easily reset on assembly.

4) Tap end of steering main shaft with wooden hammer and remove steering main shaft worm gear assembly, with worm rear taper roller bearing and front taper roller bearing cone. Using suitable bearing puller (09612-65010), remove worm front bearing cup with adjusting shims. To remove front and rear bearing cones from worm gear, use suitable cone remover (09613-30010).

5) Remove worm gear from main shaft by pressing with mandrel. Removing sector shaft bushing and oil seal may be delayed until thorough examination of steering components is completed. If necessary to replace these, drive out bushing and seal with a drift.

Disassembly, FJ55 – Drain gear lubricant, then secure gear housing in vise. Remove sector shaft end cover and gasket from gear housing. Tap end of sector shaft lightly with a mallet and drive sector shaft assembly out of gear housing. *CAUTION – Adjusting shims and plate are installed on the sector shaft, thus care should be taken not to lose shims during removal.* Remove gear housing end cover and gasket. Tap end of steering worm shaft with mallet and drive out worm and bearings.

Inspection – Thoroughly clean all components in solvent. Check all parts for any sign of wear, cracks, or damage, and replace as necessary. Inspect sector shaft bushing for proper clearance between bushing and shaft. If clearance is more than .08" (.2 mm), replace bushing.

Reassembly & Adjustment – 1) *NOTE – During reassembly, it may be necessary to refer to Adjustment for various procedures to be preformed as gear is reassembled.* Install worm front roller bearing cup with adjusting shims, as originally removed. Install main shaft assembly with bearing cones attached. Install rear bearing cup. Position rear bearing cap packings as removed, and attach worm bearing cap.

2) Fit sector adjusting shims and adjusting plate to sector shaft and install sector assembly to gear box. Install sector shaft end cover. Install mast jacket "O" ring and attach mast jacket to gear box and tighten with mast jacket lower clamp.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Sector Adjusting Screw Lock Nut	37-60 (5.1-8.3)
Sector End Cover Bolts	10-16 (1.4-2.2)
Worm Bearing Cap	10-16 (1.4-2.2)
Gear Box Bracket	75-90 (10.4-12.4)
Pitman Arm Nut	120-140 (16.6-19.5)