

## TOYOTA LAND CRUISER RECIRCULATING BALL

### DESCRIPTION

#### STEERING GEAR

Steering gear mechanism is of the recirculating ball type. Gear mounts off a bracket that is attached to frame.

Adjustment screws are provided for backlash and preload. Initial preload is achieved with shims.

#### STEERING LINKAGE

Steering linkage consists of a Pitman arm, relay rod, tie rod, damper, center arm and drag link.

Tie rod and relay rod are adjustable to correct wheel alignment.

### ADJUSTMENT

**NOTE:** Adjustments are performed during reassembly after overhaul. For adjustments, refer to Overhaul in this article.

### REMOVAL & INSTALLATION

#### STEERING GEAR

##### Removal

1) Scribe mating marks on all steering shaft couplings to aid in reassembly.

2) Remove dust cover, joint cover, relay rod end and pitman arm. Remove intermediate shaft coupling clamp bolt and shaft.

3) Remove steering gear mounting bolts. Remove gear from frame.

##### Installation

To install, reverse removal procedure and tighten all mounting bolts.

Fig. 1: Toyota Land Cruiser Steering Gear

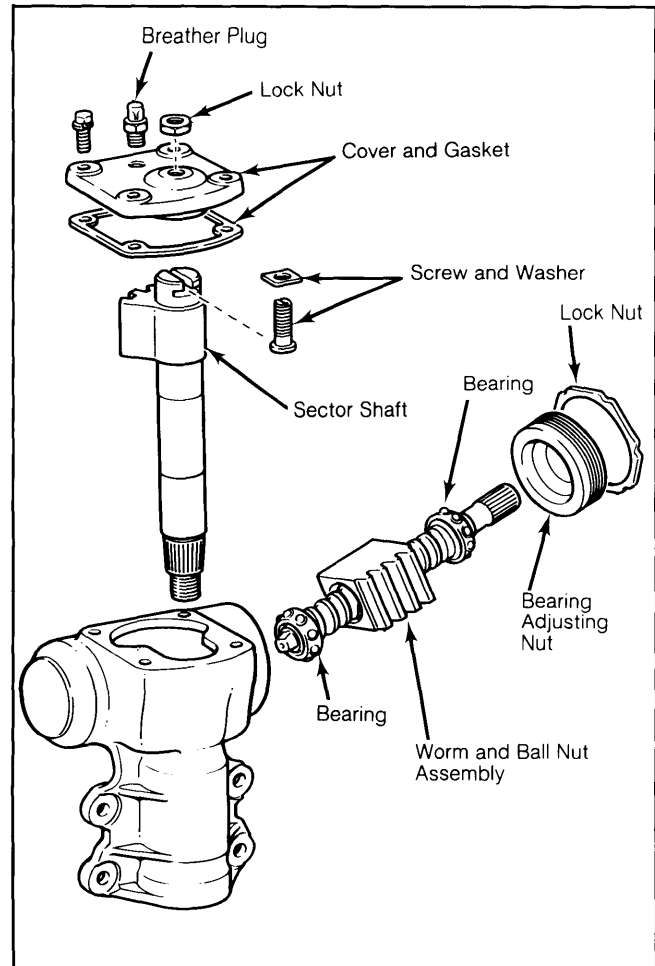
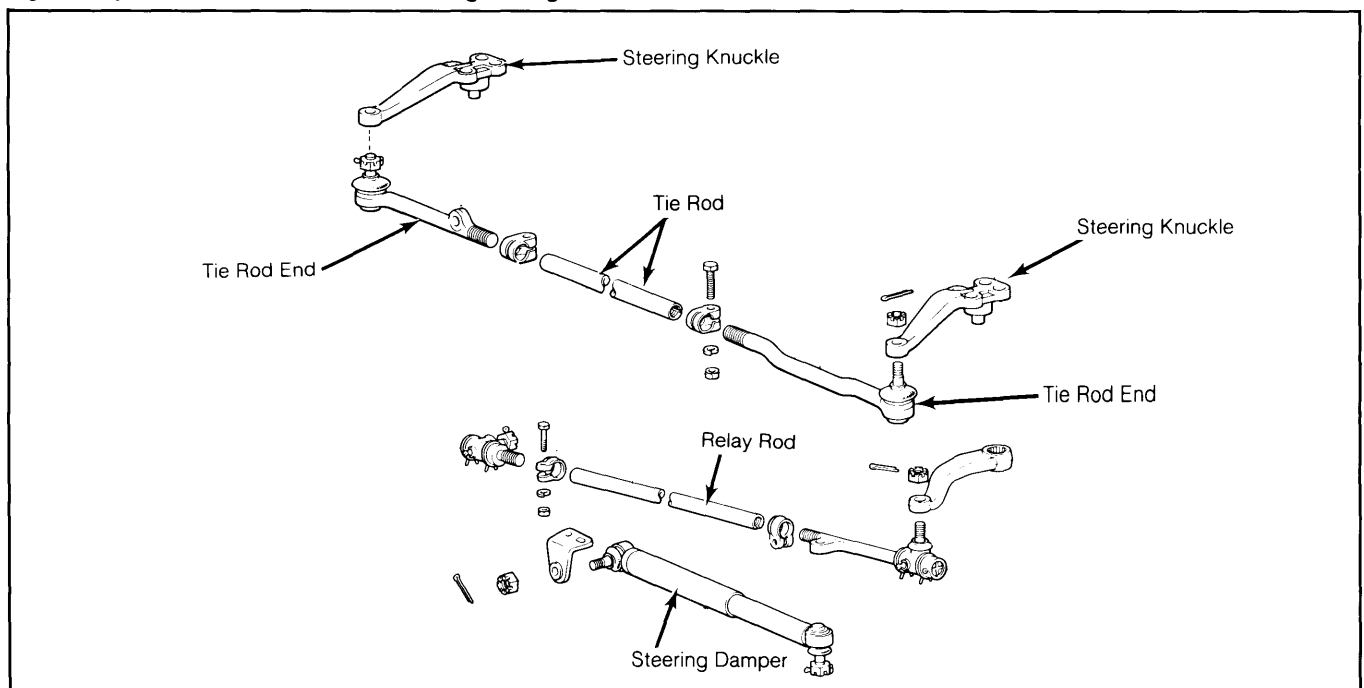


Fig. 2: Toyota Land Cruiser Front Steering Linkage



# Steering Gears & Linkage

## TOYOTA LAND CRUISER RECIRCULATING BALL (Cont.)

### STEERING LINKAGE

#### Removal

1) Raise and support front of vehicle, then remove front wheels. Index mark relative position of pitman arm to sector shaft and remove arm, using puller. Disconnect steering drag link from steering center arm.

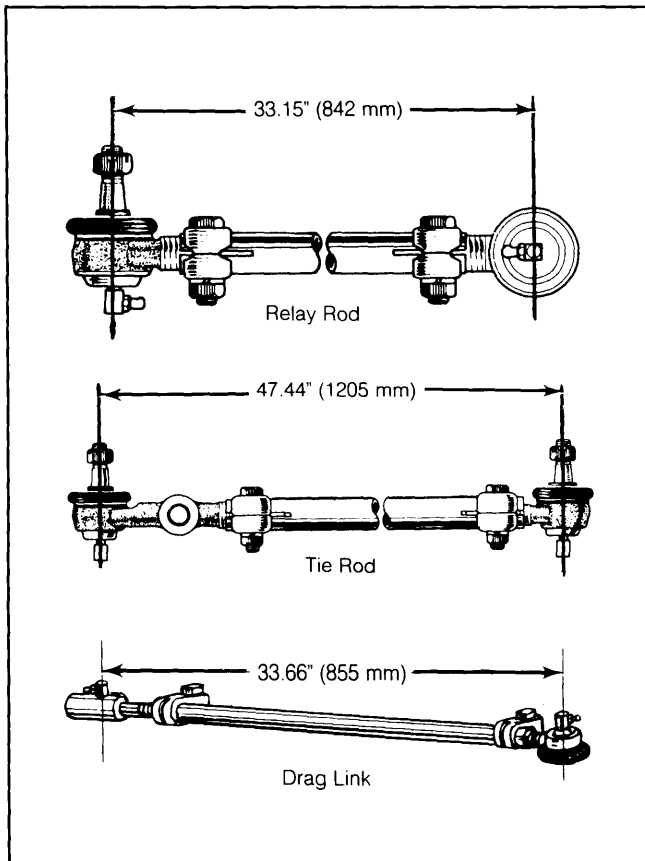
2) Disconnect tie rod ends from both sides. Disconnect relay rod from steering center arm, then remove tie rod assembly with relay arm assembly.

3) Disconnect end of steering damper from bracket on crossmember. Loosen and remove center arm from bracket (with steering damper). Remove steering center arm bracket from frame.

#### Installation

To install, reverse removal procedure and note the following: Adjust tie rod, relay rod and drag link as shown in Fig. 3.

**Fig. 3: Adjustment Lengths for Installation of Tie Rod, Relay Rod and Drag Link**



### OVERHAUL

#### Disassembly

1) Screw in sector shaft adjusting screw to remove the end cover and gasket. Drain gear lubricant, then secure housing in a vise. With sector shaft positioned at rotational center, remove the sector shaft by tapping the bottom end with a plastic hammer.

2) Loosen the lock nut and remove the worm bearing adjusting nut. Take out worm assembly, keeping bearings in sequence. Do not attempt to disassemble worm assembly.

#### Inspection

1) Wash all disassembled parts and inspect for wear or damage; replace as necessary. If inner or outer races are scored or pitted, replace as required.

2) Inspect sector shaft and bushings for wear. If replacement is necessary, use a press to remove and replace bushings.

3) Hone bushings until clearance between bushing and sector shaft is .0004-.0024" (.009-.060 mm). Install new oil seal.

4) Measure sector shaft thrust clearance, then select thrust washer that provides a minimum clearance between sector shaft and adjustment screw of .0020" (.051 mm).

#### Reassembly

1) Install cover with same number of shims that were removed, then tighten bolts.

**NOTE:** When tightening cover bolts, keep checking worm to ensure that it will turn freely.

2) Using a pull scale, measure initial (starting) worm bearing preload for 3.0-5.6 INCH lbs. (.33-.62 N.m). If preload is not within specifications, correct by selecting proper thickness shim(s).

3) Position worm ball nut at center, then insert sector shaft ensuring ball nut and sector mesh together at center. Loosen ball adjusting bolt all the way and install cover.

4) Set worm shaft preload to 6.9-9.5 INCH lbs. (.76-1.0 N.m) with adjusting bolt. Make sure measurement is made with meshing positioned at center.

5) Install pitman arm and check backlash. There should be zero backlash when worm is rotated within 45° to either side. Tighten adjustment screw lock nut and recheck preload.

#### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Gear Box Bracket .....	29-40 (39-54)
Pitman Arm Nut .....	119-141 (162-192)
Sector End Cover Bolts .....	22-32 (30-44)
Worm Bearing Cap .....	22-32 (30-44)