TOYOTA (EXC. COROLLA & LAND CRUISER) RECIRCULATING BALL

Celica
Corona
Hi Lux Pickup

NOTE — Corona Mark II uses only power steering gear. See Toyota Corona Mark II Power Steering under STEERING GEARS & LINKAGE in this section.

DESCRIPTION

STEERING GEAR

Steering gear is of recirculating ball type with a variable gear ratio. Several loose ball bearings circulate in two divided sections within grooves of worm and nut. Turing motion of worm moves ball nut axially on shaft, thereby turning the sector shaft and pitman arm.

STEERING LINKAGE

Linkage consists of idler arm, center relay rod, two adjustable tie rods, and two steering knuckles. The connection between each component is through ball joints. The linkage assembly is joined to the steering gear at the pitman arm.

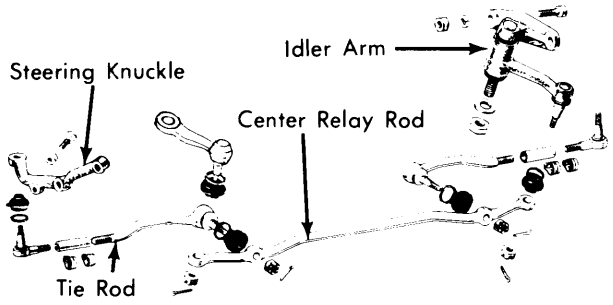

Fig. 1 Toyota Steering Linkage with Bushings and Retainers (Typical Illustration)

ADJUSTMENT

See Overhaul procedures in this article.

REMOVAL & INSTALLATION

STEERING GEAR

Removal (Celica & Hi Lux) — Remove bolt attaching coupling yoke to worm shaft. Using a suitable puller (09610-20011, Celica, or 09628-62010, Hi-Lux), detach pitman arm from sector shaft. Unbolt gear housing from frame and remove from vehicle.

Removal (Corona) — Remove air cleaner for access, then remove coupling pinch bolt and two rubber disc through bolts (as viewed from pinch bolt side, the two bolts which have nuts directly against the rubber disc). Using a suitable puller (09611-20014), disconnect pitman arm from center relay rod. Unbolt gear from frame and remove from vehicle.

Installation (All Models) — Reverse removal procedure, aligning worm shaft cut portion with flexible coupling yoke.

STEERING LINKAGE

Removal — Using a suitable puller (09628-62010, Hi-Lux, or 09610-20011, Celica & Corona), disconnect pitman arm from sector shaft. Remove idler arm support from vehicle frame. Detach tie rod ends from steering knuckles, using a suitable puller (09611-20014, Hi-Lux & Corona, or 09611-20013, Celica). Remove steering linkage assembly from vehicle.

Installation — Connect tie ends to steering knuckles and torque retaining nuts to specification. Install pitman to sector shaft (ensure correct positioning of aligning marks as illustrated). Tighten nut to specified torque. Place idler arm support on frame and tighten retaining bolts to specification. Adjust toe-in.

OVERHAUL

STEERING GEAR

Disassembly — On Corona, use a suitable puller (09610-20011) to remove pitman arm from sector shaft. On all models, loosen sector shaft adjusting screw lock nut. Remove bolts attaching end cover plate, then remove plate and sector shaft. Drain oil from housing. Unscrew worm bearing adjusting screw lock nut, using a suitable wrench (09617-22020, Hi-Lux & Corona, or 09617-22020, Celica). Remove worm bearing adjusting screw, using a suitable tool (09616-30011, Hi-Lux & Corona, or 09616-22010, Celica). Extract worm assembly with bearing. *NOTE — Do not disassemble ball nut from worm. If recirculating ball assembly has defective components, replace assembly.*

Inspection — Check all components for wear or damage and replace as necessary. Check sector shaft-to-bushing clearance: it must not exceed .0020" (.05 mm). If clearance is exceeded, replace bushing or shaft.

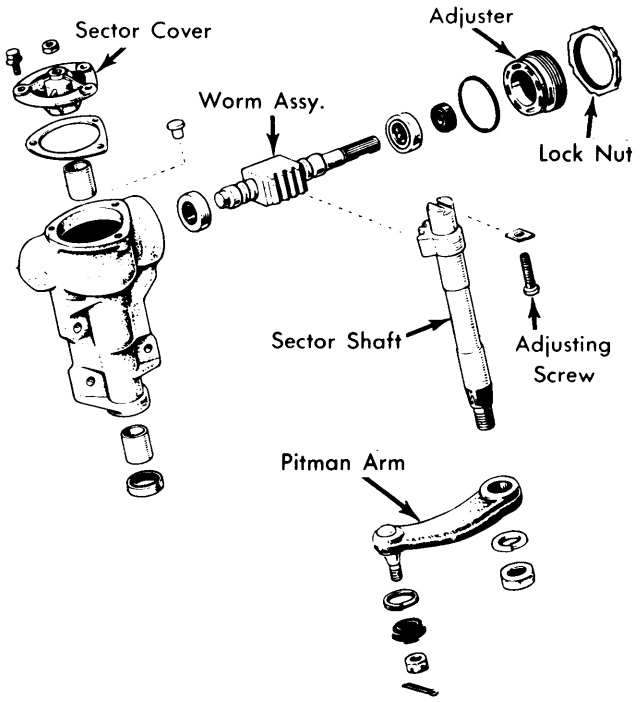

Fig. 2 Exploded View of Recirculating Ball Type Steering

TOYOTA (EXC. COROLLA & LAND CRUISER) RECIRCULATING BALL (Cont.)

Assembly & Adjustment – 1) Lubricate all bearings and sliding portions of gear assembly. Install worm into gear housing, then install adjusting screw and lock nut. Check worm bearing preload: Wind a cord around worm shaft and attach a pull-scale to end of cord. Pull required to turn worm shaft should be within given specifications. Turn adjusting screw as required to bring preload within limits.

Initial Worm Bearing Preload

Celica	8.2-10.3 lbs. (3.5-5 kg)
Corona	8.8-13.2 lbs. (4-6 kg)
Hi-Lux	6.6-13.2 lbs. (3-6 kg)

2) Install adjusting screw and thrust washer onto sector shaft and measure thrust clearance (between head of adjusting screw and bottom of "T" slot). Maximum satisfactory clearance is as specified. If clearance limit is exceeded, replace thrust washer with one of suitable size, to bring clearance into limits.

Adjusting Screw-to-Shaft Clearance

Exc. Hi-Lux	.0035" (.09 mm)
Hi-Lux	.0020" (.05 mm)

3) Install sector shaft to end cover and install assembly (with gasket) into gear housing. *NOTE – Ensure ball nut is at center travel before inserting sector shaft. Loosen adjusting screw completely, prior to shaft insertion.* After sector shaft cover is bolted into place, repeat worm bearing preload test as previously described, using sector shaft adjusting screw to obtain specified preload:

Final Worm Bearing Preload

Celica & Corona	17.6-24.2 lbs. (8-11 kg)
Hi-Lux	15.4-24.2 lbs. (7-11 kg)

4) Install pitman arm (aligning mating marks); attach a dial gauge to measure pitman arm backlash. Backlash, as measured at pitman arm outer end, should not exceed 5° from either side of center. After checking, tighten adjusting screw lock nut securely.

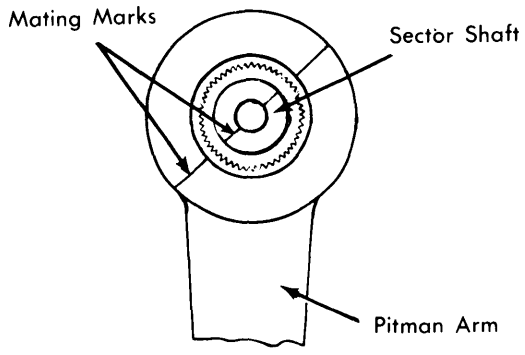

Fig. 3 Aligning Pitman Arm to Sector Shaft

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Steering Gear-to-Frame	
Celica & Hi-Lux	25-36 (3.5-5.0)
Corona	36-50 (5.0-6.9)
Pitman Arm-to-Sector Shaft	
Celica	72-101 (9.9-14.0)
Corona	80-101 (11.0-14.0)
Hi-Lux	79-90 (10.9-12.4)
Worm Adjusting Screw Lock Nut	
All Models	58-72 (8.0-9.9)
Sector Shaft End Cover	
All Models	11-16 (1.5-2.2)
Sector Adjusting Screw Lock Nut	
Celica	18-24 (2.5-3.3)
Corona	①
Hi-Lux	14-22 (1.9-3.0)
Coupling Yoke-to-Worm Shaft	
Celica & Hi-Lux	14-22 (1.9-3.0)
Corona	①
Relay Rod-to-Idler Arm	
Celica & Corona	36-51 (5.0-7.0)
Hi-Lux	54-80 (7.5-11.1)
Tie Rod-to-Steering Knuckle	
Celica & Corona	36-51 (5.0-7.0)
Hi-Lux	36-65 (5.0-9.0)

① – No specific torque given; tighten until preload is obtained as indicated under Overhaul in this article.