FIAT STRADA & X1/9 RACK & PINION

DESCRIPTION

Rack and pinion steering gear is mounted in rubber insulators and attached to body. Gear is attached to steering shaft through universal joints. Adjustments are provided for pinion bearing play and rack yoke free play. At each end of steering rack, tie rods connect steering mechanism to front wheels.

ADJUSTMENT

NOTE – *Adjustments of the pinion bearing and rack yoke are performed during rebuilding. See Overhaul procedure.*

REMOVAL & INSTALLATION

STEERING GEAR

Removal – 1) Center steering wheel and front wheels. Raise and support front of vehicle and remove front wheels. On Strada models, it may be necessary to remove spare tire.

2) Disconnect drive pinion from lower steering column section by detaching universal joint inside vehicle. Using a suitable puller, remove tie rods from steering knuckles.

3) Remove stone shield if necessary. Unbolt and remove steering gear assembly by sliding out from right-hand side of vehicle.

Installation – Set wheels in straight-ahead position, then connect drive pinion to steering column and tighten pinch bolt to 19 ft. lbs. (2.6 mkg). Remount steering gear to body. Connect tie rods to steering knuckle and tighten to 25 ft. lbs. (3.5 mkg).

2) If steering gear has been disassembled, perform pinion and rack adjustments, and replace front wheels. Lower vehicle to ground and turn steering wheel fully to the right. Raise vehicle on left side and loosen clamp on left boot. Fill steering gear with 4.4 ounces lithium-base grease containing molybdenum disulphide.

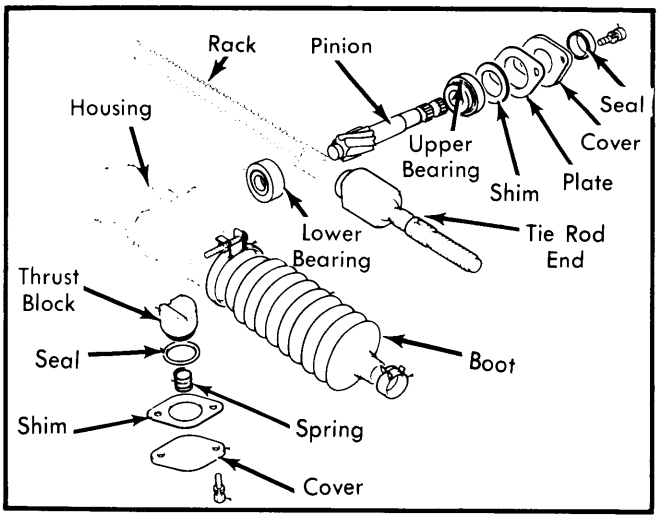

Fig. 1 Exploded View Steering Gear Components

OVERHAUL

Disassembly – 1) With steering gear removed from vehicle, remove rubber boots from steering gear. Disconnect tie rod end ball joints from rack (inner ends of tie rods).

2) Remove cover, shim, spring, seal and thrust block from bottom of housing. Remove cover, seal, plate, shim, upper bearing, and drive pinion from housing. See *Fig. 1*. Slide rack from housing. Remove lower bearing from housing.

Inspection – 1) Clean all metal parts in a suitable degreaser and blow dry. Inspect rack, pinion, upper bearing and housing for wear or damage. Replace entire steering box if damaged.

2) Inspect boots for tears or breaks. Replace if necessary. Inspect bushing, spring, lower bearing and thrust block for wear or damage. Replace if necessary.

3) Check that ball joints are free to move in all directions. They should not fall under their own weight. Replace if worn.

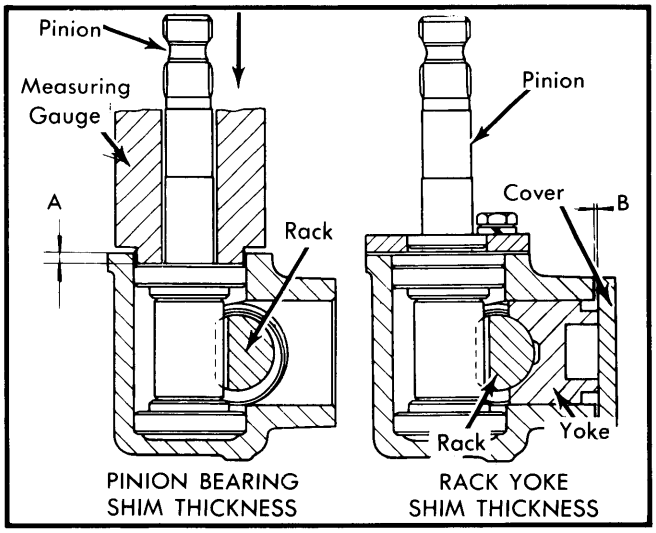

Fig. 2 Measurement of Rack Yoke Shim Thickness and Pinion Bearing Shim Thickness

Reassembly and Adjustment – 1) Coat all bearings and gear surfaces with molybdenum disulphide grease. Reassemble in reverse order of disassembly.

2) Remove cover, plate and seal from drive pinion side of rack housing. Using suitable driver, make sure upper bearing is firmly seated. Measure distance "A" from top of bearing to pinion cover facing. See *Fig. 2*. Add .003±.002" (.078±.053 mm) to dimension "A" and install shims centered on pinion to make up new dimension. Install plate, cover and seal.

3) Center rack in its travel. Remove cover, shims and spring to gain access to rack thrust block. While holding rack thrust block against rack, turn pinion through 180° in both directions. Measure dimension "B" from top of rack thrust block to cover facing. See *Fig. 2*. To "B" add .0035±.0015" (.09±.04 mm). Combine shims to make up new dimension. Install spring, shims and cover.

NOTE – *Lubricate dust boots with silicon spray and be sure they are not twisted after installation.*

FIESTA RACK & PINION

Hatchback

DESCRIPTION

Rack and pinion steering gear is mounted to firewall by rubber-insulated clamps. Pinion shaft is supported by a bushing and a ball bearing, eliminating the need for preload adjustment. Excessive rack play is prevented by a spring loaded slipper that bears against rack. Rubber boots seal ends of gear, and tie rods transfer turning motion to front wheels.

ADJUSTMENT

RACK

1) Mount rack in vise, with padded jaws, with rack slipper bearing cover up. Remove bolts and cover, shims and gasket. Using dial indicator, measure rack slipper deflection as rack is moved from end-to-end (full travel).

2) Assemble shim pack (including gasket) which is .002-.005" (.05-.125 mm) thicker than measurement obtained. Fit shims and gasket to housing and tighten cover bolts to 55-80 INCH lbs. (63.25-92.0 cmkg). Measure pinion turning torque to check adjustment. Torque should measure 5-18 INCH lbs. (5.8-20.8 cmkg).

REMOVAL & INSTALLATION

Removal – 1) Place front wheels in center position. Raise and support vehicle, then remove clamp bolt securing steering shaft to pinion shaft. Remove tie rod outer ball joints from steering arms.

2) Bend lock tabs and remove steering gear bolts and clamps. Remove steering gear from vehicle, then loosen lock nuts and detach tie rod ends from gear.

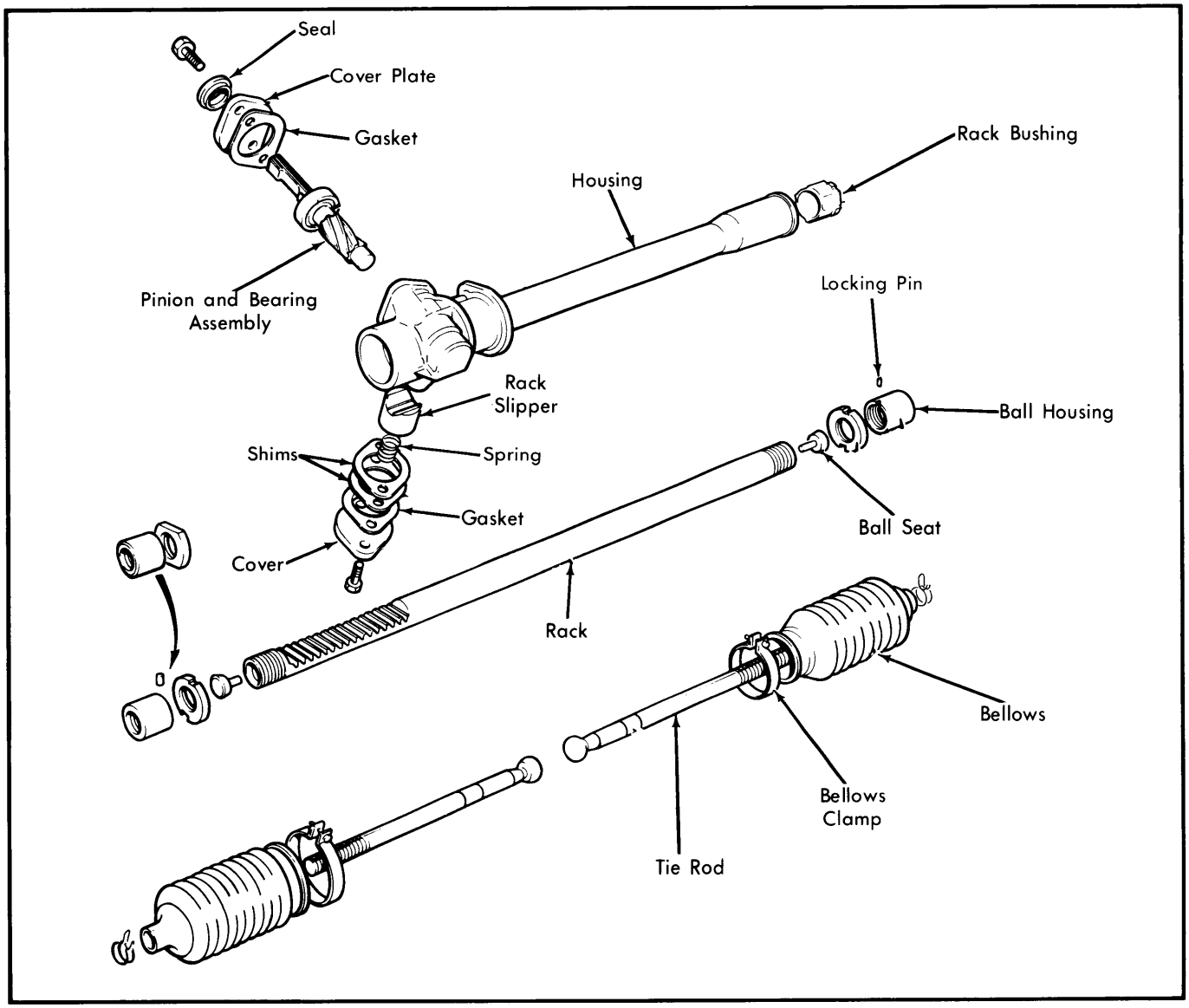

Fig. 1 Exploded View of Fiesta Rack & Pinion Steering Gear

FIESTA RACK & PINION (Cont.)

Installation – To install, reverse removal procedure and install new lock plates and cotter pins. Check wheel alignment and steering wheel position.

OVERHAUL

Disassembly – **1)** Remove bellows and drain fluid lubricant from steering gear, then mount in padded vise. Drill out pins securing tie rod ball joint housings to rack, using 5/32" (4.0 mm) drill bit.

CAUTION – *Do not drill deeper than .4" (9.5 mm).*

2) Separate ball joint housing and lock ring, then remove housings, tie rods and ball seats. Remove rack slipper cover plate, shims, gasket, spring and slipper.

3) Remove pinion bearing cover plate, gasket, and seal. Remove pinion and bearing assembly. If necessary, use suitable tool (T77F-3504-F) and slide hammer to remove pinion bushing. Remove rack from housing.

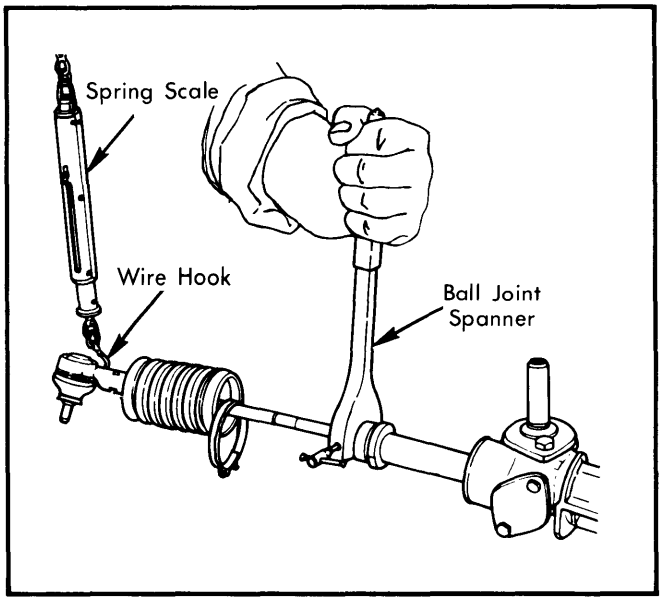

Fig. 2 Checking Tie Rod Effort

Inspection – Clean all parts and inspect for wear. Pinion shaft and bearing are serviced as an assembly and must be replaced if damaged. Rack support bushing at end of housing can be replaced separately if necessary.

Reassembly – **1)** Position rack in housing. With rack centered, insert pinion and bearing assembly. Flat on pinion must face right hand side of vehicle and be at 90° to centerline of rack. Install pinion shaft gasket, cover and seal, applying sealer to bolts. Tighten to specification.

2) Install rack slipper, spring, shims, gasket and cover plate. Select shims as described in *Adjustment* in this article.

3) Grease tie rod ball and seat and assemble on end of rack. Tighten ball seat until effort required to move tie rod is 2.6-5.1 lbs. (1.2-2.3 kg) when measured 1/4" (6.0 mm) from end of rod. See *Fig.* 2.

4) Centerpunch and drill 5/32" hole .4" (9.5 mm) deep at housing and lock nut joint. Install retaining pins and peen metal to lock in place. Grease bellows inner ends and install. Use screw clamps in place of some production wire clamps. Add .2 pt. of fluid grease and tighten clamps.

5) Turn pinion to move rack side to side 5 times. Using torque gauge, measure rotating torque. Effort should be between 5-18 INCH lbs. (5.8-20.8 cmkg). Check adjustment and correct if necessary.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Steering Gear-to-Firewall	33-37 (4.6-5.1)
Tie Rod End-to-Steering Arm	18-22 (2.5-3.0)
Coupling-to-Pinion Clamp	33-37 (4.6-5.1)
Tie Rod End Lock Nut	39-50 (5.4-6.9)
Pinion Bearing Cover Bolts	13-18 (1.7-2.4)
Rack Slipper Cover Bolts	4.5-6.7 (0.6-0.9)
Ball Joint Housing Lock Nut	33-38 (4.6-5.3)