

# SERVICE MANUAL

## *Datsun*

MODEL 510 SERIES  
CHASSIS and BODY



## SECTION ST

### STEERING

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## STEERING

### DESCRIPTION

The steering system consist of recirculating ball type gear box and parallelogram linkage.

These systems give good response, light handling and utmost durability. Moreover, the steering linkage equipped with torsion rubber system idler arm which absorbs the wheel shock.

The lubricant of gear box should be checked every 10,000 km (6,000 mile) and topped up with

recommended oil as necessary.

The lubrication of steering linkage should be greased up with wheel bearing grease every 10,000 km (6,000 mile).

As all the service procedures of the steering lock system are described in the BODY ELECTRICAL SECTION of this manual, no instruction is given here.

### STEERING GEAR

#### CONTENTS

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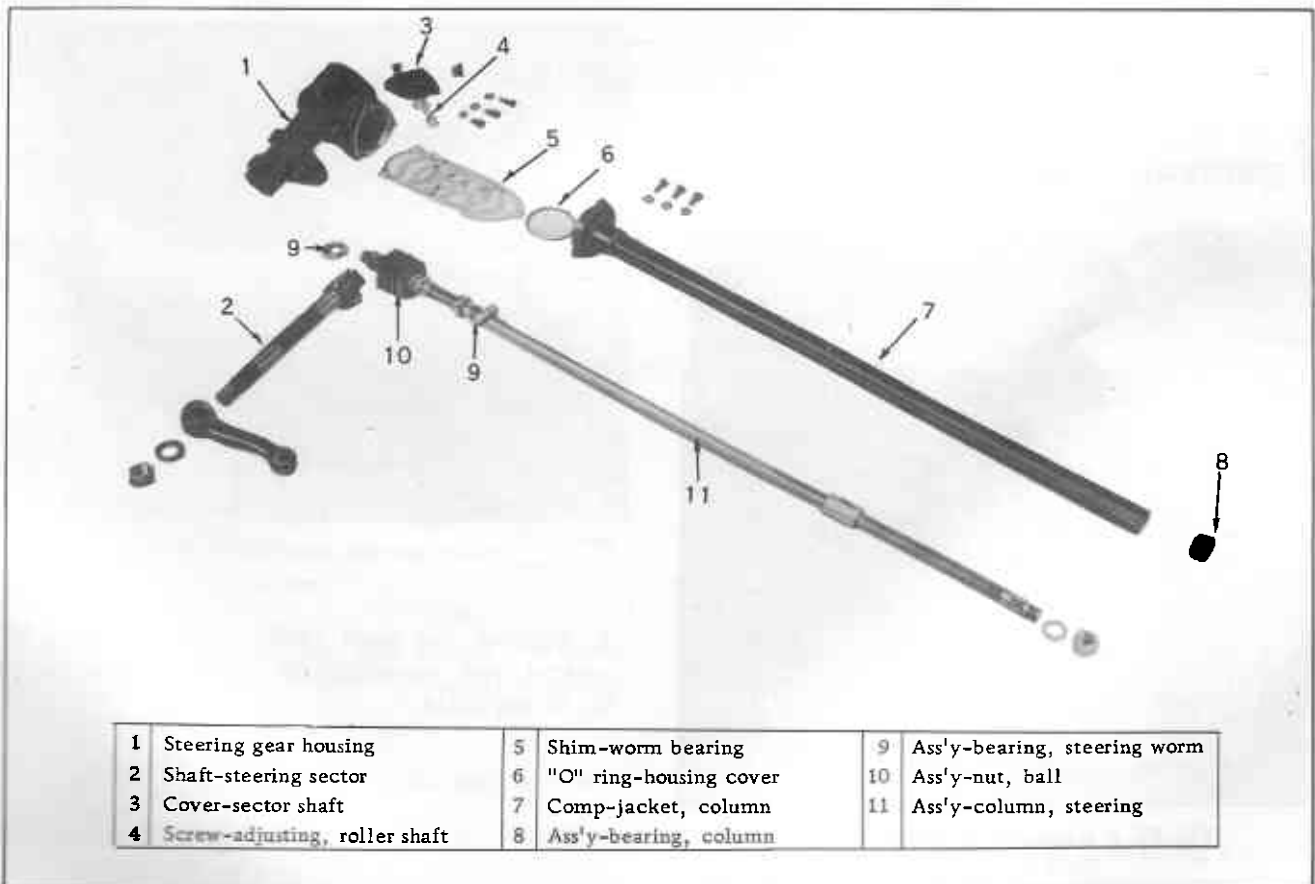
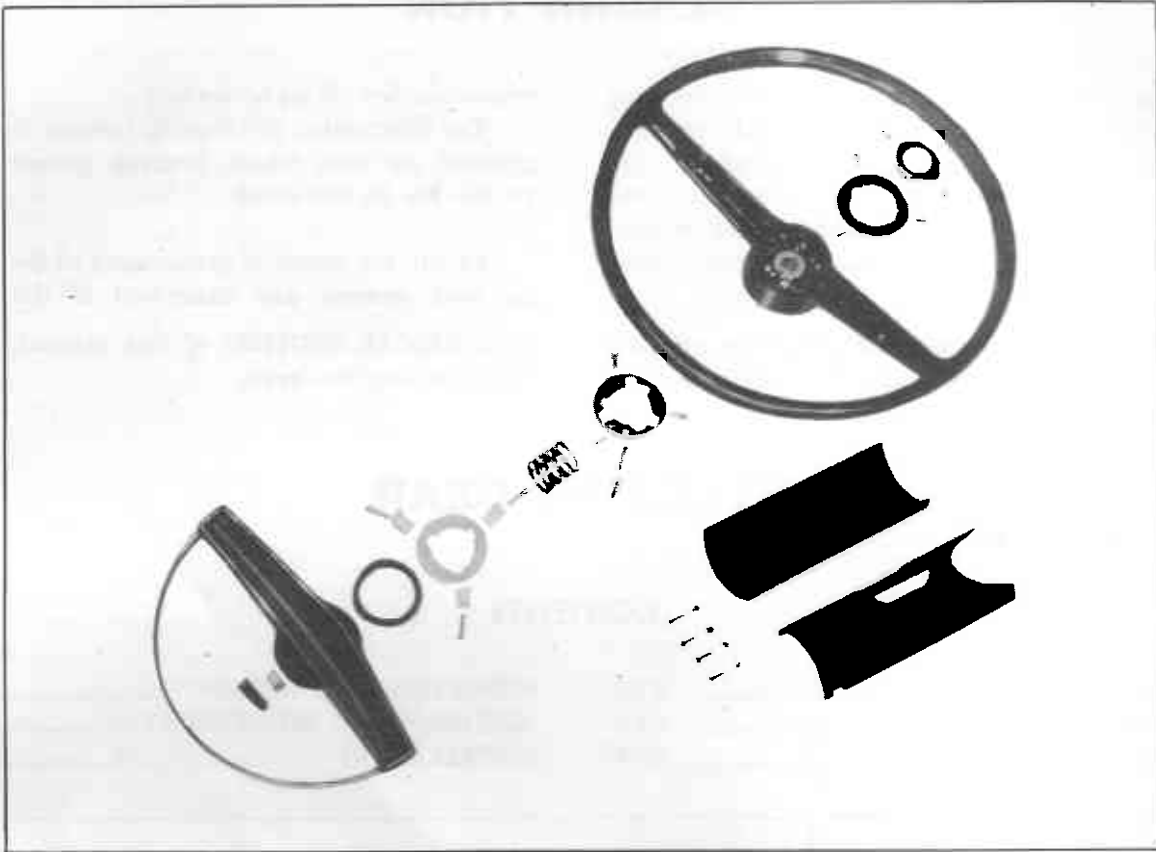


Fig. ST-1 Steering gear components

## CHASSIS



*Fig. ST-2 Steering wheel*

### REMOVAL

1. Remove the horn ring first and then remove the steering wheel by means of a special tool Steering Wheel Puller (ST46430000) after removing the steering wheel nut.

**Note:** The horn ring is easily removed by pressing and turning it leftward.



*Fig. ST-3 Removing steering wheel lock nut*

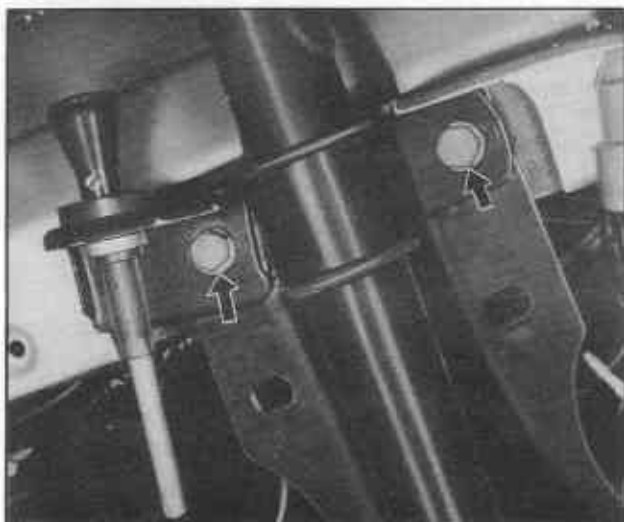
2. Remove the steering column shell.

3. Remove the turn signal and lighting switch complete.

4. Remove the hand lever assembly from the control rod assembly by means of unscrewing the fixing bolts.

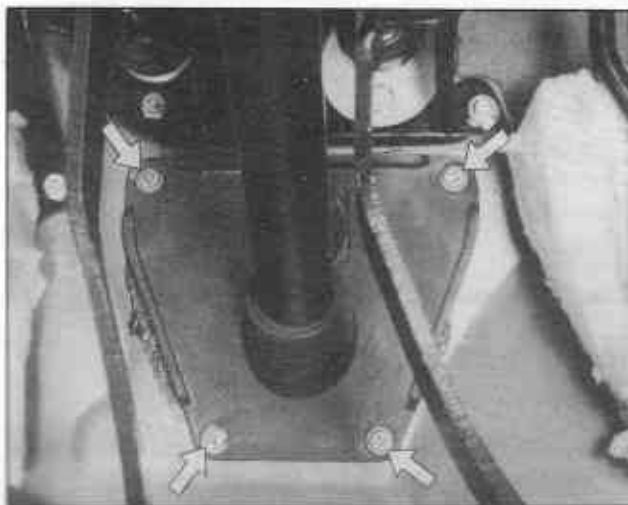
5. Screw out the two fixing bolts securing the steering column to the instrument panel.

## STEERING



*Fig. ST-4 Installation steering column upper side*

6. Screw out the four bolts securing the steering column hole cover to the dash board.

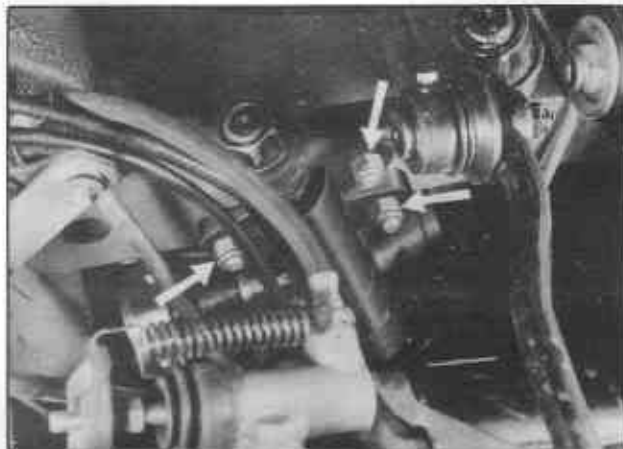


*Fig. ST-5 Installation steering column hole cover*

7. Remove the shift rod and select rod from change lever and select lever by means of taking off the cotter pin of trunnion.

8. Disconnect the junction of the gear arm and cross rod.

9. Screw out three bolts fixing steering gear housing to body.



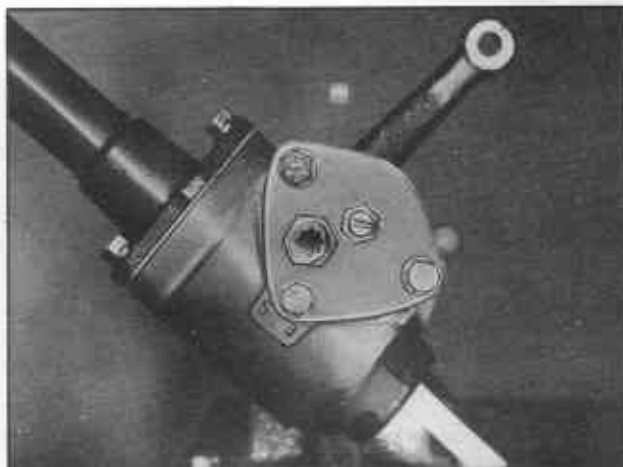
*Fig. ST-6 Installation steering gear assembly*

10. Pull the steering gear and transmission control toward the engine room.

11. Remove the transmission control from the steering gear assembly as outlined under "Transmission control".

### DISASSEMBLY

1. Install the steering gear assembly on to Steering Gear Box Attachment (ST49110000).



*Fig. ST-7 Holding steering gear assembly*

2. Remove the steering gear arm fixing nut and pull out the gear arm by using the Steering Gear Arm Puller (ST46440000).

## CHASSIS

3. Remove the drain plug and drain the oil from the steering gear housing.

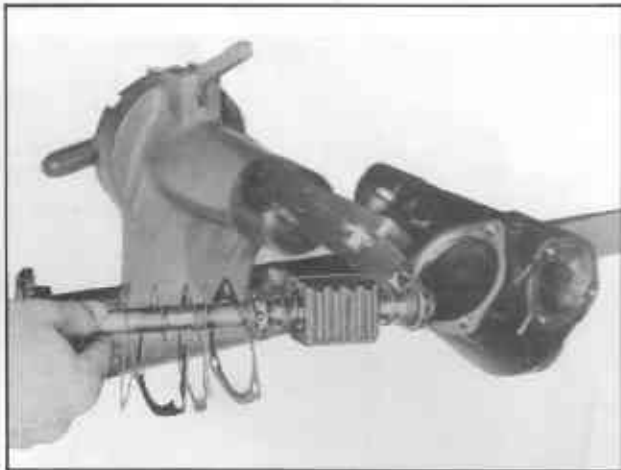
4. Loosen the adjusting screw nut and turn sector shaft adjusting screw a few turns counter-clockwise.

Remove three sector shaft cover fixing bolts and then pull the sector shaft cover with sector shaft from the gear housing.



*Fig. ST-8 Removing sector shaft cover*

5. Screw out three fixing bolts securing the column jacket to the gear housing and pull out the main column jacket assembly from the gear housing.



*Fig. ST-9 Removing main column jacket assembly*

**Note:** Take care that the ball nut does not run down to either end of the worm. Damage will be done to the ends of the ball guides if the nut is allowed to rotate until stopped at the end of the worm.

6. Pull out the column assembly from the column jacket.

7. Remove the sector shaft oil seal.

**Note:** The sector shaft needle bearings are press-fitted on the gear housing.

8. Take out the rear bearing outer race from the column jacket using a puller.

9. Take out the bearing inner races of the front and rear worm bearing.

10. Remove the column shaft bearing.

### Ball nut assembly

If the ball nut assembly or column is defective, column assembly replacement is recommended, because assembly and adjustment of the column assembly are very difficult.

However, for purposes of reference, disassembly, assembly and adjustment are as follows.

#### Disassembly

1. Remove the clamp of the ball guide tube and draw the ball guide tube out of ball nut.

2. Turn the nut upside down and rotate the column back and forth until all 36 balls have dropped out of ball nut. With the balls removed, the nut can be pulled endwise off the column.

**Note:** Take care not to lose the balls and make sure total 58 balls (1/4 in. dia.).

#### Inspection

Check ball guide tubes for damage at the ends where they pick up the balls from the herical path. Any damaged guide tubes should be replaced.

#### Assembly and adjustment

1. Assemble the ball nut on the worm with the ball guide hole up.

2. Drop 18 balls into each of two holes on the same side of ball nut.

Turn the column gradually away from hole being filled. Continue until all 36 balls are installed.

## STEERING

**Note:** In cases where the balls are stopped by the end of the column, hold down these balls already dropped into the ball nut with the blunt end of a clean rod or punch and turn the column in the reverse direction a few turns.

The filling of the circuit can then be continued. It may be necessary to work the column back and forth, holding the balls down first in one hole then the other, to close up the space between the balls and fill the circuit completely and solidly.

3. Place remaining 22 balls in halves of ball guide tubes, 11 each of two halves.

4. Close this half of guide tube with the other half. Hold the two halves together and plug each open end with vaseline so balls will not drop out while installing.

5. Push the guide tubes into the guide holes of the ball nut and check the clearance between the ball nut and the guide tubes.

The clearance should be 0.7 to 1.7 mm

(0.2756 to 0.6693 in.) and improper clearance should be corrected.

6. Assemble the ball guide tube clamp to the ball nut.

## INSPECTION AND REPAIR

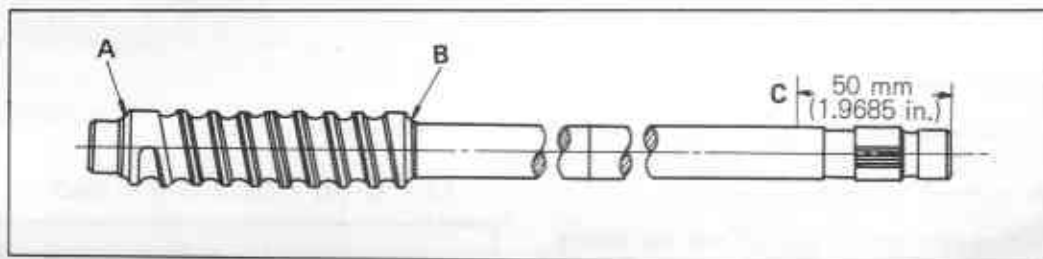
1. Check an axial clearance between the steel balls and ball nut and if the clearance is more than 0.08 mm (0.0031 in.), replacement should be made as a complete unit.

2. Inspect gear teeth of sector shaft and ball nut for wear or damage, if there is any signs of damage it should be replaced.

3. Inspect bearings for wear or chip, replace bearings which are not in perfect condition.

4. Check column for bent or damaged shaft. The deflection should be less than 0.2 mm (0.0079 in.) at C when supported at A and B.

5. Inspect the serration of sector shaft and column for wear.



*Fig. ST-10 Measurement of defective of column shaft*

# CHASSIS

## ASSEMBLY AND ADJUSTMENT

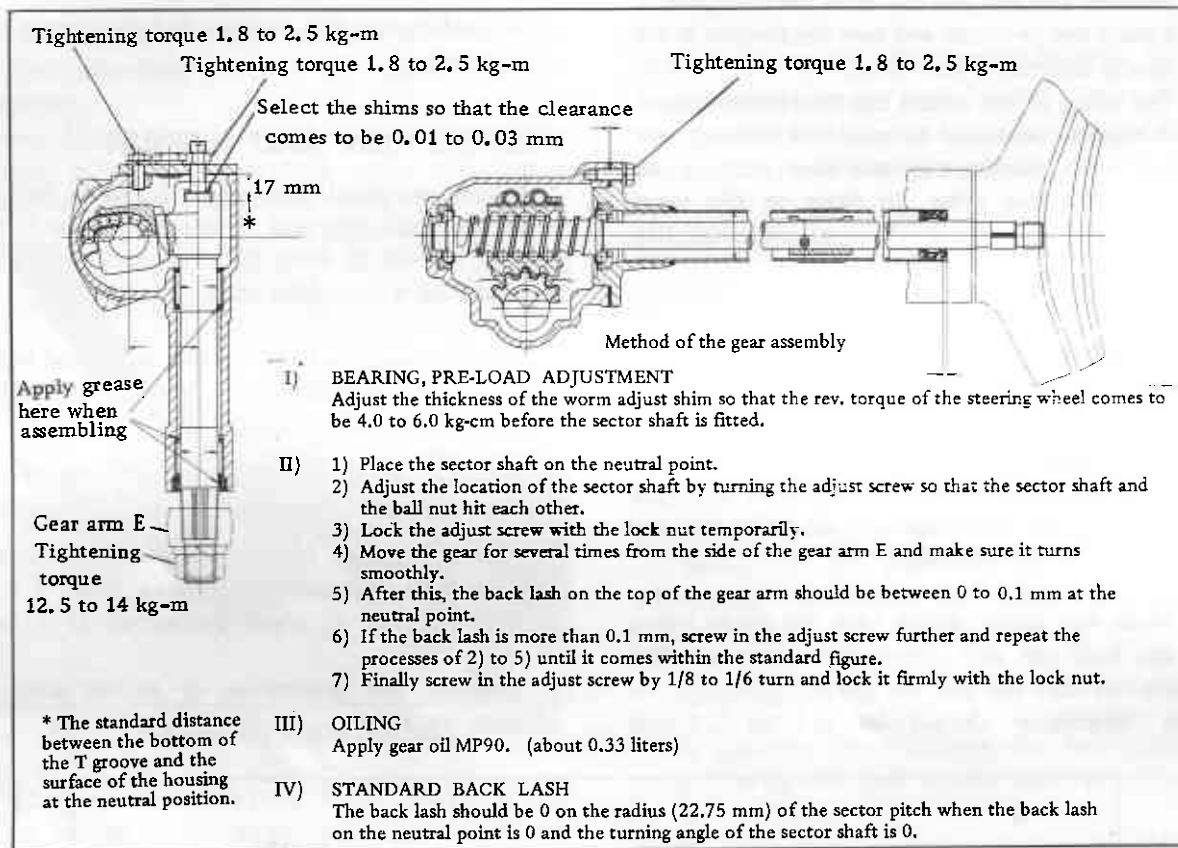


Fig. ST-11 Sectional view of steering gear

1. Press in oil seal into the housing.

**Note:** Apply chassis grease the oil seal lip before assembling.

2. Insert the column assembly into the column jacket complete and install them with worm bearing shims and "O" ring to the gear housing by means of three flange fixing bolts.

Tightening torque is 1.8 to 2.5 kg-m (13.0 to 18.1 ft-lb).

3. If replacement of column bearing assembly is necessary, a new bearing assembly should be filled with bearing grease and then cemented to the column.

4. Adjust the preload of the worm bearing by selecting the thickness of the worm bearing shim (Four kinds 0.05 to 0.762 mm, 0.0020 to 0.0300 in.) so that the initial turning torque of the column assembly is 4.0 to 6.0 kg-cm (55.5

to 83.3 in-oz) without sector shaft.



Fig. ST-12 Measuring initial turning torque

**Note:** Apply oil on the worm bearings. The turning torque (wheel in motion) should be 200 to 450

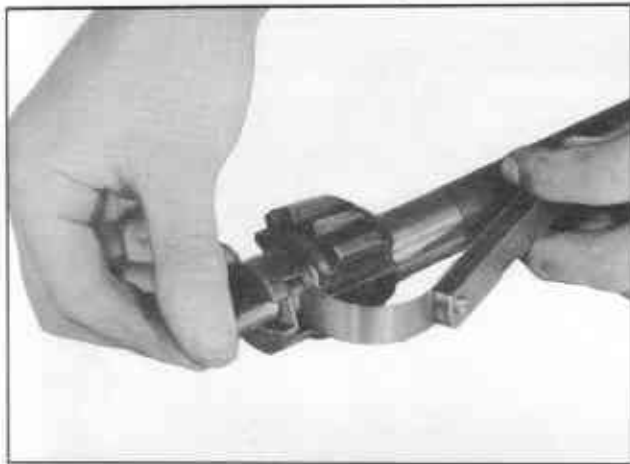
## STEERING

grams (7.0 to 15.9 oz.) at 20 cm (7.874 in.) radius of the steering wheel. As to the standard number of worm bearing shims, refer to the following table.

0.762 mm (0.0300 in.)	1 piece
0.254 mm (0.0100 in.)	2 pieces
0.127 mm (0.0050 in.)	1 piece
0.050 mm (0.0020 in.)	1 piece

5. Sector shaft lash adjuster end clearance. Assemble lash adjuster with shim in the slot of the sector shaft end. Check clearance which should be between 0.01 to 0.03 mm (0.0004 to 0.0012 in.).

To obtain this clearance six various thickness shims are available, 1.45 to 1.57 mm (0.0571 to 0.0618 in.).



*Fig. ST-13 Checking lash adjuster end clearance*

6. Assemble the sector shaft into the gear housing.

(1) Rotate worm column by hand until ball nut is in center of its travel, so that the center tooth of sector shaft enters into the center tooth space of ball nut.

(2) With new gasket in place, push the sector shaft cover with sector shaft in place. After making sure there is some lash between the rack and sector teeth, tighten side cover bolts.

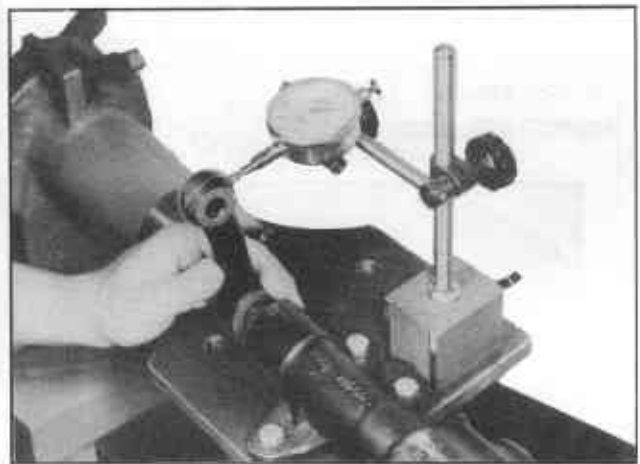
**Note:** Apply oil on the sector shaft.

(3) Lock the adjust screw with the adjusting screw nut temporarily.

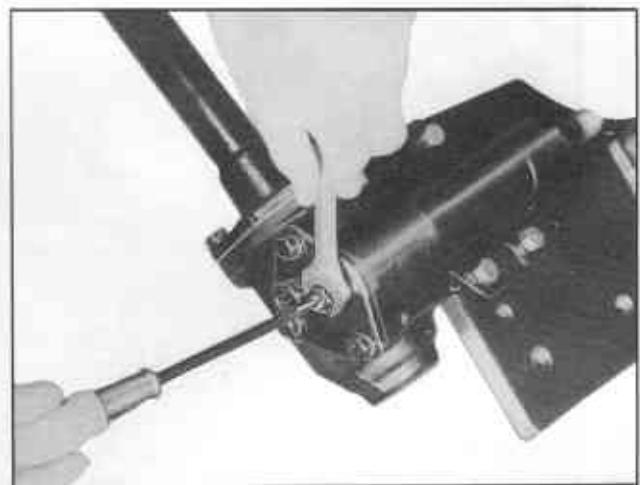
(4) Move the sector shaft for several times from the side of the gear arm and make sure it turns smoothly.

(5) Connect the gear arm to the sector shaft. At fitting gear arm, the aligning mark of gear arm and sector shaft should be match center.

(6) Adjust the backlash at the neutral point by screwing the adjusting screw so that the movement of the gear arm top end (radius 215 mm) will be within 0 to 0.1 mm (0 to 0.0039 in.).



*Fig. ST-14 Checking backlash*



*Fig. ST-15 Adjusting backlash*

(7) Finally screw in the adjusting screw 1/8 to 1/6 turn and lock it firmly with the lock nut.

7. Fill gear oil MP 90 [about 0.33 liter (0.697 U. S. pts/0.581 U. K. pts)] into assembly through filler hole and install a filler plug.



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## CHASSIS

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### INSTALLATION

Installation can be accomplished in the reverse order of removal, paying attention to the following points.

1. Check if the steering wheel moves smoothly or not.

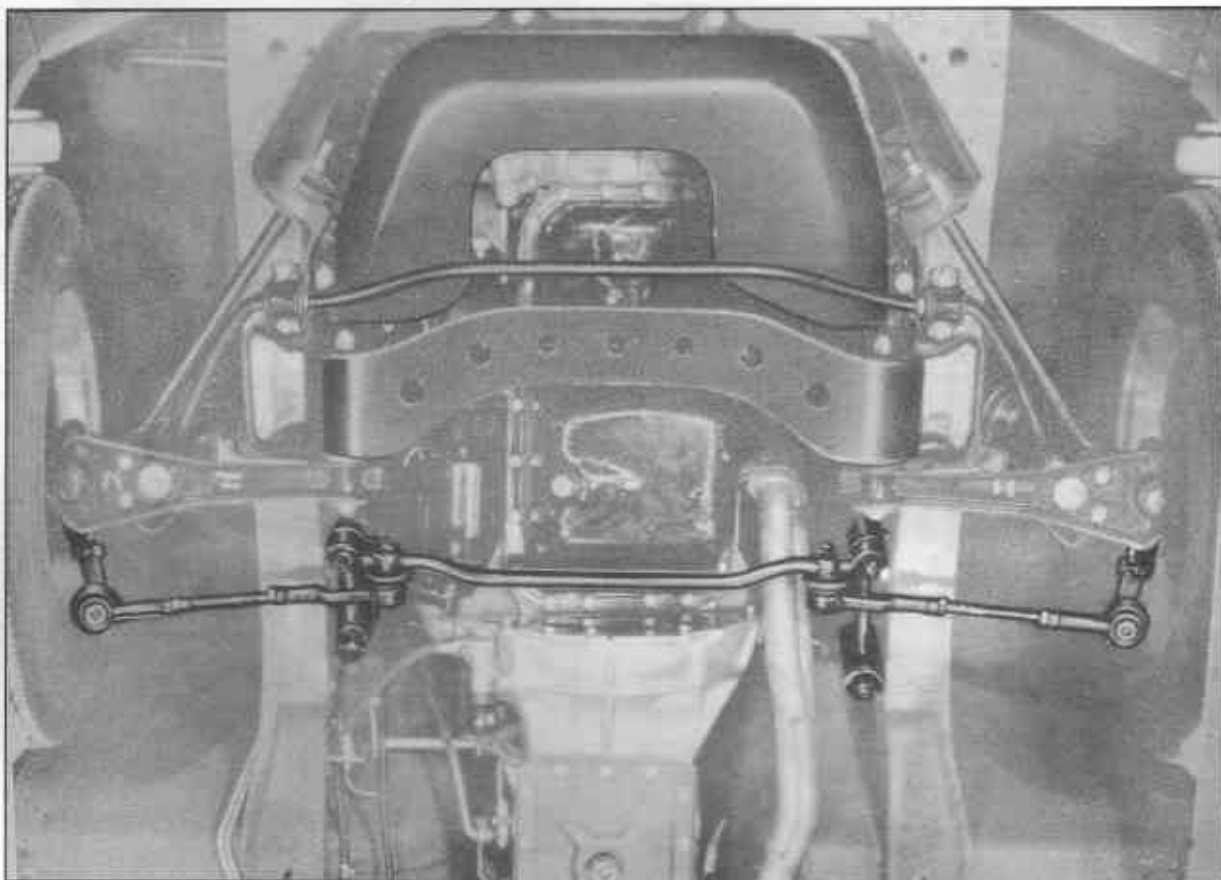
2. Check the alignment of the steering wheel.

3. Free travel of steering wheel should be 25 to 30 mm (0.9843 to 0.1811 in.).

## STEERING LINKAGE

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DISASSEMBLY .....	ST- 9	INSTALLATION .....	ST-10
INSPECTION AND REPAIR .....	ST- 9	ADJUSTMENT .....	ST-10



*Fig. ST-16 Front bottom view of steering linkage on vehicle*

### REMOVAL

1. Jack up the front of vehicle and support by the stands.

2. Remove cotter pins and castellated nuts which fasten side rod ball studs to knuckle arms.

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3. Free the ball studs from knuckle arms by backing up boss with a large hammer or dolly and striking opposite side with hammer.

4. Remove ball studs of cross rod from the gear arm and idler assembly by using same procedure as described in step 3, and then the cross rod and side rods can be removed as assembly.

5. Remove the idler assembly from the side member by taking off two fixing bolts.

### DISASSEMBLY

1. Disconnect both side rods from the cross rod, using same procedure as described in "Removal".

2. To remove the socket from the side rods, loosen clamp bolts and unscrew the socket assembly.

3. Remove the idler arm nut and disassemble the idler assembly.

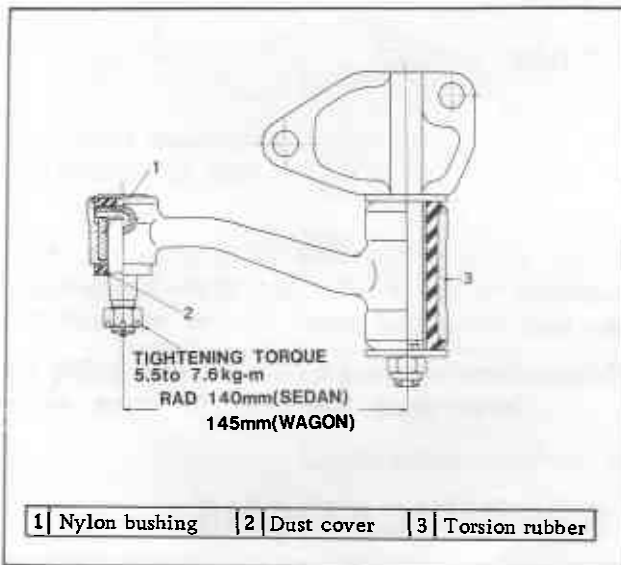


Fig. ST-17 Sectional view of idler arm

### INSPECTION AND REPAIR

1. Check the idler rubber bushing for damage, wear and play, and replace bushing if necessary.

2. Check the cross rod and side rods for damage, bend and crack, and replace them if necessary.

3. Check each ball joints for play due to lack of spring action of the push spring or a damaged ball stud.

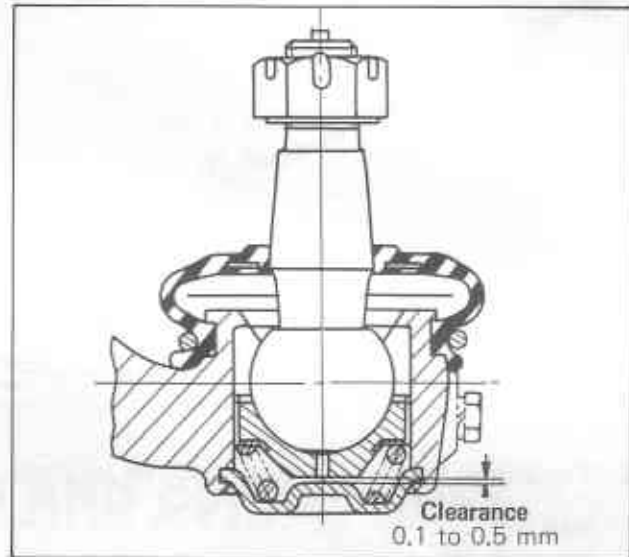


Fig. ST-18 Sectional view of ball stud  
(side rod)

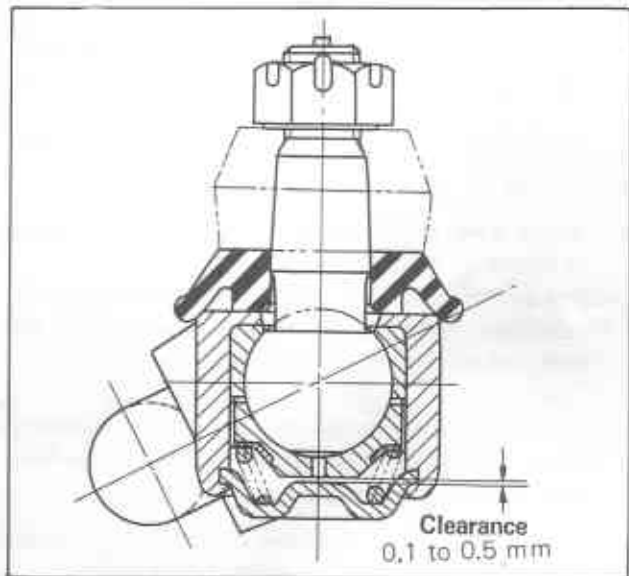


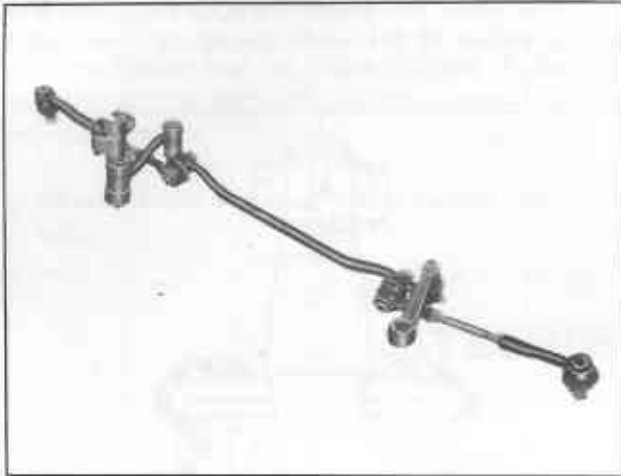
Fig. ST-19 Sectional view of ball stud  
(cross rod)

If any abnormal condition is experienced, replace as a complete unit, as they can not be disassembled.

### ASSEMBLY

Assembly can be accomplished in the reverse order of disassembly, paying attention to the following points.

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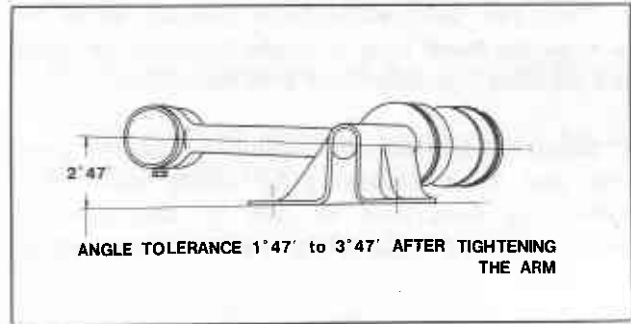
*Fig. ST-20 Steering linkage*

1. Tightening torque for nuts shall be adopted.

Ball stud nut	5.5 to 7.6 (39.8 to 55.0)
kg-m (ft-lb)	
Gear arm nut	12.5 to 14.0 (90 to 101)
kg-m (ft-lb)	
Idler arm nut	5.5 to 7.6 (39.8 to 55.0)
kg-m (ft-lb)	

2. Assembly of the idler assembly is accomplished as follows.

- (1) Apply soap water on the outer circumference of bushing.  
Press bushing into the idler arm carefully until the bushing protrudes equally at the both sides.
- (2) Fit idler arm body in the rubber bushing.  
Keep the idler arm center line to be parallel line against the chassis center line.



*Fig. ST-21 Idler body and idler arm adjustment*

### INSTALLATION

Installation can be accomplished in the reverse order of removal, paying attention to the following points.

1. Set the length of both side rods to 309.5 mm (12.185 in.). It should be done between the ball stud centers.
2. Check wheel alignment, and if necessary adjust it.

### ADJUSTMENT

1. Toe-in  
The procedure of toe-in adjustment is outlined in section "FRONT AXLE AND SUSPENSION".
2. Steering angle  
Under the specified load (4 passengers), it is adjusted by the stopper bolt of the knuckle arm so that the inner wheel has an angle of 38°.

**Note:** Specified steering angle of wheel is 38° for inner wheel and 32.4° for outer wheel.

## SERVICE DATA AND SPECIFICATIONS

Type .....	Recirculating ball type
Gear ratio .....	15.0 : 1
Steering wheel diameter    mm (in.) .....	405 (15.9)
Oil capacity                    ℓ (U. S. pts/U. K. pts) .....	0.33 (0.697/0.581)
Steering angle    inner wheel .....	38°
outer wheel .....	32.4°
Play steering wheel        mm (in.) .....	25 to 30 (0.9843 to 1.1811)
Standard thickness of worm bearing shims            mm (in.) .....	1.5 (0.0591)

## STEERING

Initial turning torque of column assembly			
	kg-cm (in-oz)	.....	4.0 to 6.0 (55.5 to 83.3)
Clearance of adjusting screw to sector shaft			
	mm (in.)	.....	0.01 to 0.03 (0.0004 to 0.0012)
Length of side rod			
	mm (in.)	.....	309.5 (12.185)
<b>Tightening torque</b>			
Flange fixing bolts	kg-m (ft-lb)	.....	1.8 to 2.5 (13.0 to 18.1)
Ball stud nut	kg-m (ft-lb)	.....	5.5 to 7.6 (39.8 to 55.0)
Gear arm nut	kg-m (ft-lb)	.....	12.5 to 14.0 (90 to 101)
Idler arm nut	kg-m (ft-lb)	.....	5.5 to 7.6 (39.8 to 55.0)
Adjusting screw nut	kg-m (ft-lb)	.....	1.8 to 2.5 (13.0 to 18.1)
Gear housing fixing bolts			
	kg-m (ft-lb)	.....	10 (72.3)
Idler arm fixing bolts	kg-m (ft-lb)	.....	4.4 to 6.1 (31.8 to 44.1)

## TROUBLE DIAGNOSES AND CORRECTIONS

Troubles	Possible causes	Remedies
Heavy steering	Low tire pressure.	Inflate tires to recommended pressure.
	Incorrect front wheel alignment.	Adjust to specifications.
	Lack of lubrications.	Lubricate steering gear and ball joints or replace worn ball joint.
	Firm sticking of the ball joint and strut bearing.	Replace.
	Improper adjustment and damage of steering gear housing.	Adjust or replace according to instructions.
Loose steering	Hard locking of column bearing.	Lubricate with bearing grease.
	Incorrect front wheel bearing adjustment.	Adjust or replace as required.
	Loose steering linkage connections.	Inspect, replace worn parts, if any, and tighten nuts with recommended torque.
	Loose steering gear housing mounting.	Tighten mounting bolts to proper torque.
Pull to one side	Incorrect adjustment of ball not to sector shaft.	Adjust according to instructions.
	Incorrect tire pressure.	Inflate to recommended pressure.
	Incorrect front wheel alignment.	Inspect and correct front wheel alignment.
	Incorrect front wheel bearing adjustment.	Adjust bearings according to instructions.

