STEERING

STEERING

The steering system consists of the steering gear, steering column, steering wheel and steering linkage.
The steering gear is of a recirculating ball nut type and the steering gear ratio 17.0 to 19.0 : 1. Therefore, this steering gear provides easy steering.

10–A. CHECKING OF STEERING WHEEL PLAY

The standard free play at the outer circumference of the steering wheel is 5 to 20 mm (0.2 to 0.8 in). To check the free play of the steering wheel, place the front wheel straight ahead and turn the steering wheel slowly. The value of the free play is taken when the front wheel begins to move.
If excessive play is found, the following points should be carefully checked, because this could cause steering instability in driving.

1. Fit of the ball joints of the center link and those of the tie rods
2. Looseness of the idler arm bushes
3. Looseness of the wheel bearings
4. Backlash between the sector gear and ball nut

10–B. STEERING GEAR REMOVAL

10–B–1. Removing of Steering Gear (Separate type)

1. Loosen the worm shaft attaching bolt.

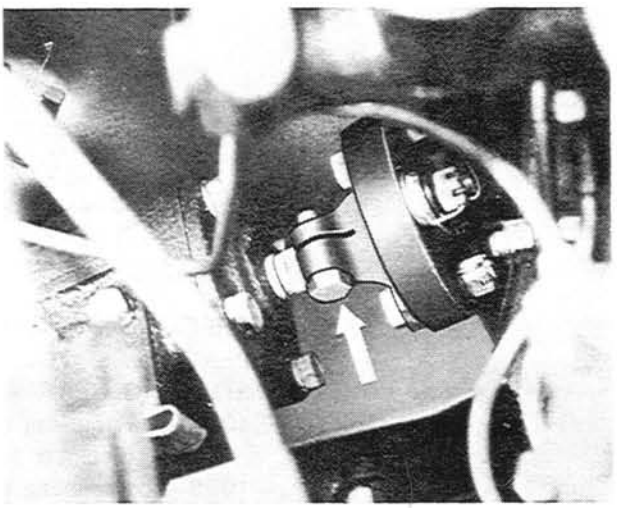


Fig. 10–1 Removing of worm shaft attaching bolt

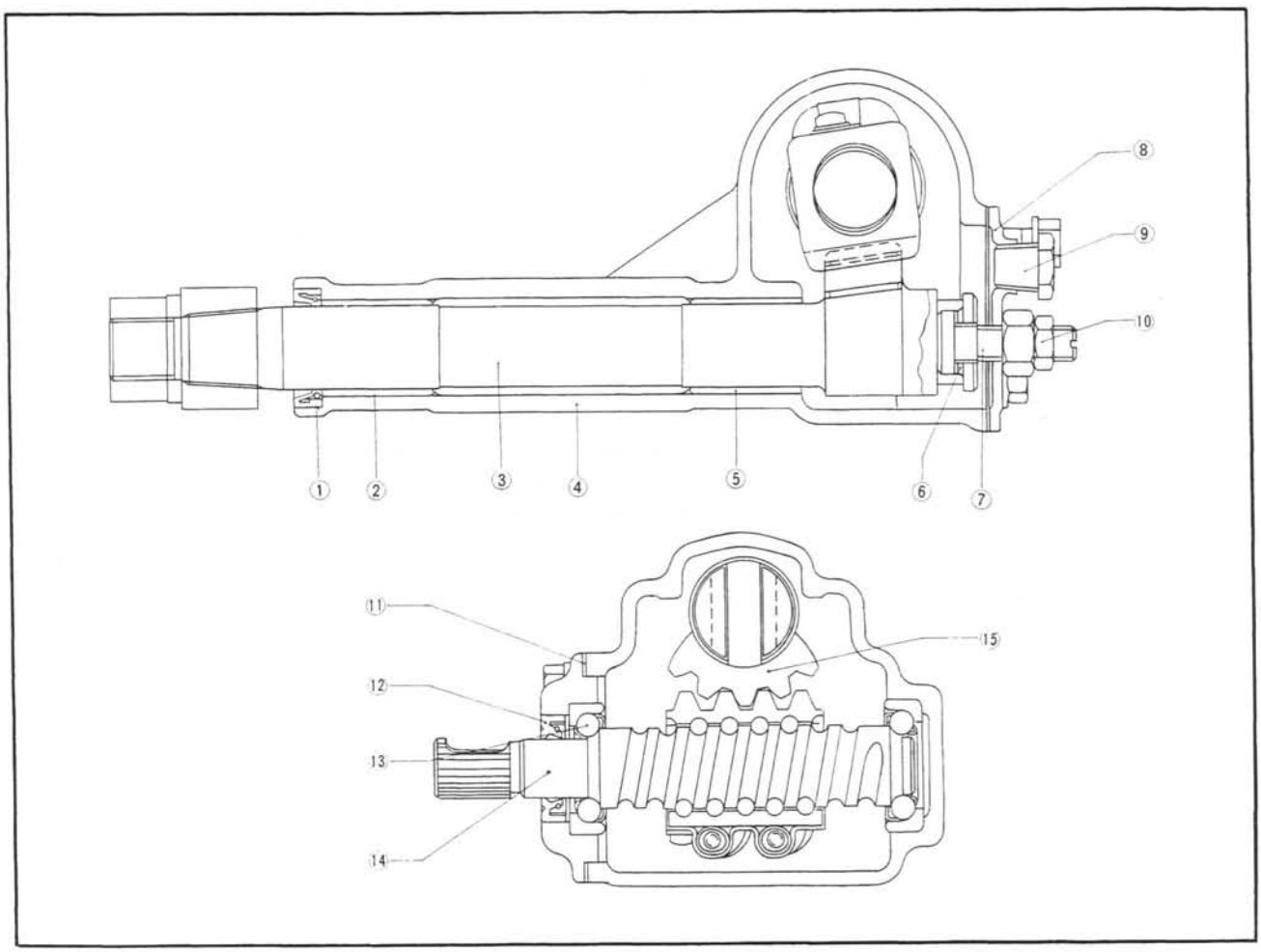


Fig. 10–2 Steering gear

1. Oil seal
2. Bush
3. Sector shaft
4. Housing
5. Bush
6. shim
7. Adjusting screw
8. Side cover
9. Plug
10. Lock nut
11. Shim
12. Oil seal
13. Bearing
14. Warm and ball nut assembly
15. Sector gear

2. Jack up the vehicle and remove the front wheel.
3. Disconnect the center link from the pitman arm by using the **puller** (49 0118 850C).

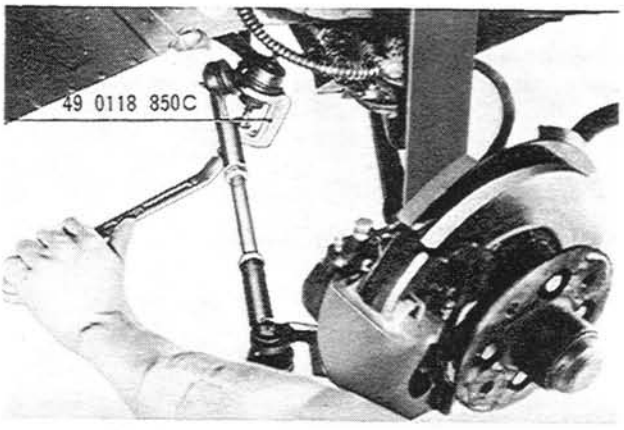


Fig. 10–3 Disconnecting of center link

4. Remove the bolts and nuts holding the steering gear housing to the frame.

Note: Confirm the position of the shim for convenience when readjusting the column shaft alignment.

10–B–2. Removing of Steering Gear (Nonseparate type)
1. Remove the horn cap attaching screws and remove the horn cap.
2. Scribe a line mark on the steering wheel and column shaft.
3. Remove the steering wheel nut, and then remove the steering wheel and the horn lever assembly.
4. Remove the column cover.
5. Remove the combination switch assembly from the column jacket.
6. Remove the steering column support bracket.
7. Jack up the vehicle and remove the front wheel.
8. Disconnect the center link from the pitman arm by using the **puller** (49 0118 850C).
9. Remove the bolts and nuts holding the steering gear housing to the frame.

Note: Confirm the position of the shim for convenience when readjusting the column shaft alignment.

10–C. STEERING GEAR DISASSEMBLY

Before disassembling, thoroughly clean the outside surface of the steering gear houding.
1. Drain oil by removing the filler plug.
2. Hold the steering housing in a vise.
3. Loosen the nut holding the pitman arm and remove the pitman arm with the **puller** (49 0223 695), as shown in Fig. 10–4.
4. Remove the sector shaft adjusting screw lock nut.
5. Remove the side cover attaching bolts, and remove the side cover and gasket by turning the adjusting screw clockwise through the cover.
6. Remove the adjusting screw and shims from the slot at the end of the sector shaft.
7. Carefully remove the sector shaft from the gear housing so as not to damage the bushes and oil seal.

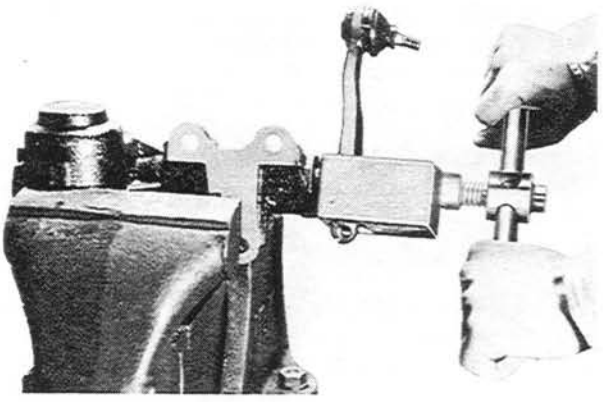


Fig. 10–4 Removing of pitman arm

8. Remove the end cover together with the shims by removing the attaching bolts.
9. Remove the worm shaft and ball nut assembly through the bottom of the gear housing. The worm shaft and ball nut are serviced as an assembly only.

10–D. STEERING GEAR INSPECTION

1. Check operation of the ball nut assembly on the worm shaft. If the ball nut does not travel smoothly and freely on the worm shaft and there is roughness, the ball nut and worm shaft assembly should be replaced.

Note: The worm shaft and ball nut are serviced as an assembly only.

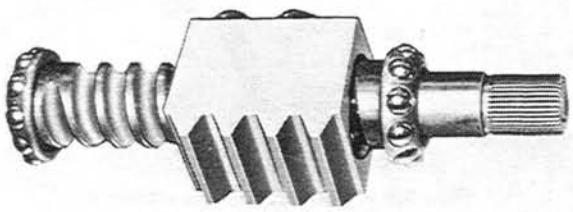


Fig. 10–5 Worm and ball nut assembly

2. Check the worm bearings and cups for wear or any damage. If defective, replace with new ones.
3. Check fit of the sector shaft in the bushes of the housing. If the bushes are worm, replace with new ones.
4. Check the oil seal for wear, flaw or any damage. If there is any possibility of oil leakage, replace the oil seal.

10–E. STEERING GEAR ASSEMBLY

1. Insert the worm shaft and ball nut assembly into the gear housing.
2. Install the end cover with the preload adjusting shims, and adjust the worm bearings preload to **1.0 to 4.0 cm-kg (0.9 to 3.5 in-lb)**, by following the

procedure explained in Par. 10–F–1.

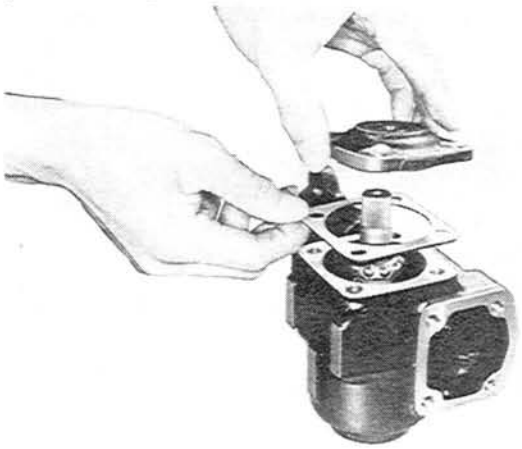


Fig. 10–6 Installing of end cover and shim

3. Install the adjusting screw into the slot at the end of the sector shaft. Check the end clearance with a feeler gauge, and adjust this clearance to be **0.02 to 0.08 mm (0.0008 to 0.0031 in)** by inserting appropriate shims. The shims are available in the following four thicknesses.

1.95 mm (0.077 in)	2.05 mm (0.081 in)
2.00 mm (0.079 in)	2.10 mm (0.083 in)

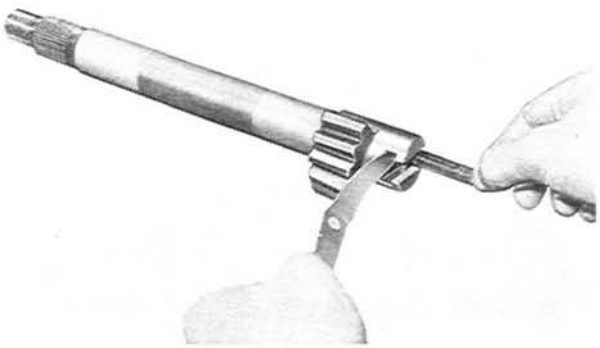


Fig. 10–7 Checking of end clearance

4. Turn the worm shaft and place the rack in the center position of the worm in the gear housing. Insert the sector shaft and adjusting screw into the gear housing, being careful not to damage the bushes and oil seal, and ensuring that the center of the sector gear is aligned with the center of the rack, as shown in Fig. 10–8.

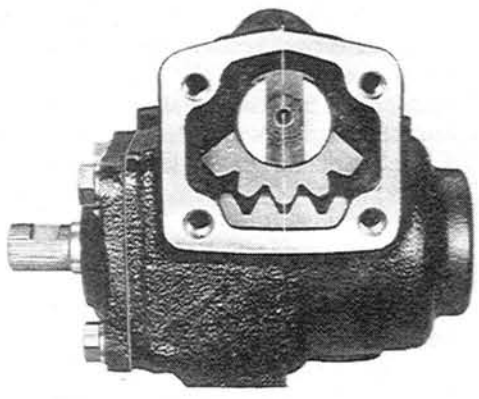


Fig. 10–8 Position of sector gear and rack

5. Install the side cover and the gasket onto the adjusting screw, turning the adjusting screw counterclockwise until it is screwed into proper position.

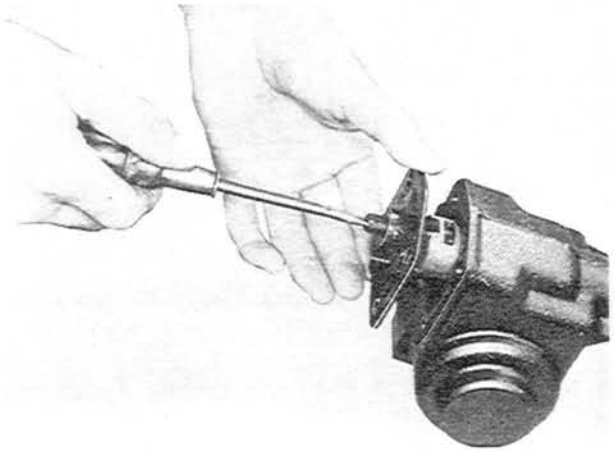


Fig. 10–9 Installing of side cover

6. Install the side cover attaching bolts and tighten the bolts.
7. Adjust the backlash between the sector gear and rack by applying the procedure explained in Par. 10–F–2. After adjusting, tighten the adjusting screw lock nut securely.
8. Install the pitman arm onto the sector shaft, **aligning the identification marks** and tighten the nut. The tightening torque is **15.0 m-kg (110 ft-lb).**

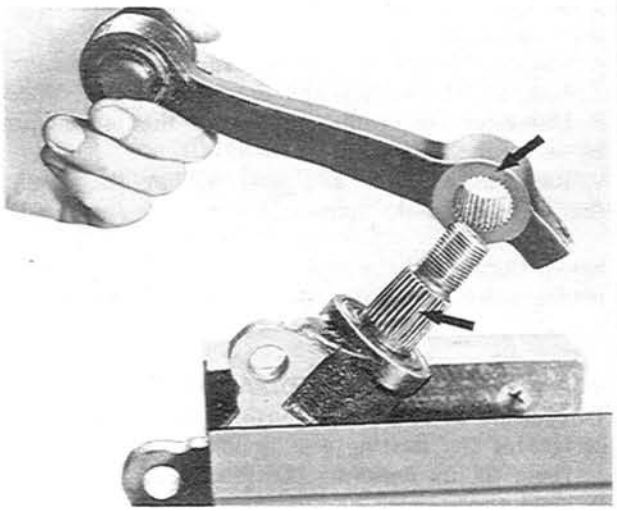


Fig. 10–10 Installing of pitman arm

10–F. STEERING GEAR ADJUSTMENT

10–F–1. Adjusting of Worm Bearing Preload

To adjust the worm bearing preload, remove the steering gear from the vehicle. With a torque wrench, rotate the worm shaft and check the rotating torque. The rotating torque (preload) should be between **6.0 to 8.0 cm-kg (5.2 to 6.9 in-lb).**

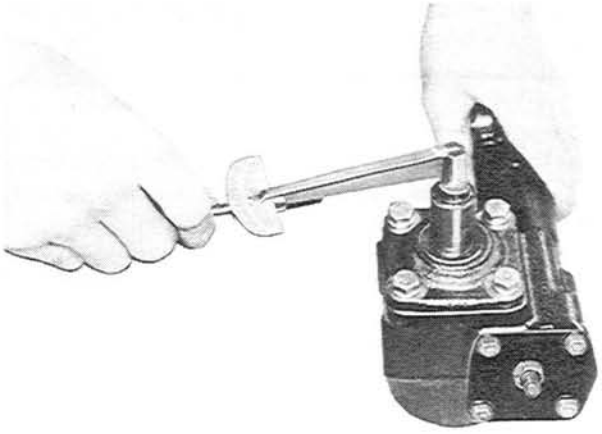


Fig. 10–11 Checking of preload

If the reading is not within limits, adjust the preload as follows:
1. Remove the end cover attaching bolts and the end cover together with the shims.
2. If the preload is **less than 6.0 cm-kg (5.2 in-lb),** reduce the shim, and add the shim if the preload is **more than 8.0 cm-kg (6.9 in-lb).**
The following shims are available:

0.050 mm (0.002 in)	0.100 mm (0.004 in)
0.075 mm (0.003 in)	0.200 mm (0.008 in)

3. Install the end cover and recheck the worm bearing preload.

Note: The preload before installing the sector shaft should be between **1.0 to 4.0 cm-kg (0.9 to 3.5 in-lb).**

10–F–2. Adjusting of Sector Gear and Ball Nut Backlash

The sector shaft adjusting screw, installed in the side cover, raises or lowers the sector shaft to provide proper mesh between the tapered teeth of the sector gear and the rack of the ball nut. This adjustment can be accurately made only after proper worm bearing preload has been established.
Adjust the backlash as follows:
1. Turn the worm shaft gently and stop it at the center position.
2. Loosen the lock nut of the adjusting screw and screw in or out the adjusting screw until the correct adjustment is obtained. The standard backlash is **0 to 0.1 mm (0 to 0.0039 in).** This is equivalent to a movement of about 3 degrees of the worm shaft.
3. After adjusting, tighten the adjusting screw lock nut securely.
4. Rotate the worm shaft and check to ensure that the sector shaft turns 40° smoothly to the right and left.

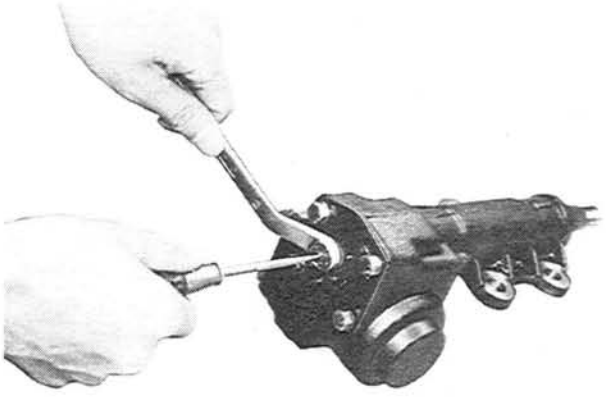


Fig. 10–12 Adjusting of backlash

10–G. STEERING GEAR INSTALLATION

To install the steering gear assembly, reverse the procedure in Par. 10–B. After installing, fill oil up to the level hole.

10–H. STEERING LINKAGE

10–H–1. Checking of Ball Joint

1. Check the dust seal for wear, flaw or any damage. If the dust seal is defective, this will allow entry of water and dust, resulting in ball joint wear.
Replace the dust seal if found defective.
2. The end play of the ball stud is preadjusted at the factory to be from **0 to 0.20 mm (0 to 0.008 in).** If it exceeds **0.5 mm (0.02 in),** replace the ball joint in its assembled form.

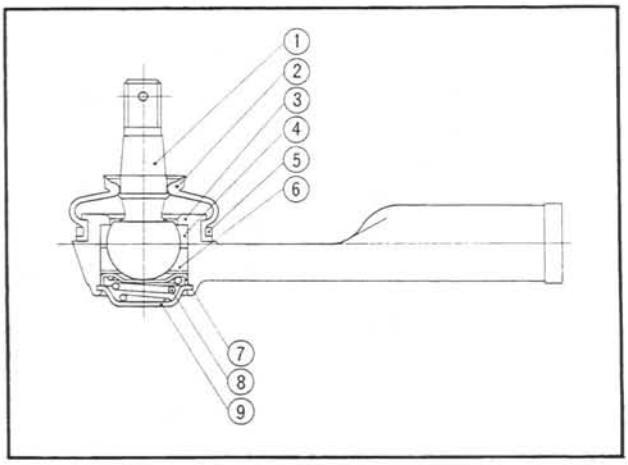


Fig. 10–13 Ball joint

1. Ball stud
2. Dust seal
3. Socket
4. Ball seat
5. Set ring
6. Ball seat
7. Spring seat
8. Spring
9. Cap

10–H–2. Replacing of Idler Arm

After disconnecting the center link from the idler arm, the idler arm can be removed by removing the nut attaching the idler arm to the bracket.
Excessively worn bushes must be replaced. Install the idler arm to the bracket and center link, and tighten the nut to **5.0 m-kg (40 ft-lb).**

10–H–3. Replacing of Pitman Arm

After the center link is removed, the pitman arm can be removed from the sector shaft by removing the nut and by using the **puller** (49 0223 695).

Install the pitman arm onto the sector shaft, aligning the marks of the pitman arm and the sector shaft and tighten the nut. The tightening torque is **15 m-kg (110 ft-lb)**.

10–H–4. Replacing of Tie Rod

The tie rod can be removed from the center link and knuckle arm by removing the ball joint nut and using the **ball joint puller** (49 0118 850C). Install the tie rod to the center link and steering knuckle.

Note: Whenever the tie rods or ball joints are replaced, the toe-in must be reset.

10–H–5. Greasing of Idler Arm

The idler arm requires lubrication only once in two years or every 48,000 km (30,000 miles). Therefore, no greasing is necessary within this period.
When lubricating, remove the plug and temporarily install the grease nipple. Loosen the nut that holds the idler arm to the bracket, and then, feed "Lithium Grease" until new grease appears from the brim of the bush. After greasing, tighten the nut to **5.0 m-kg (40 ft-lb)**. Remove the grease nipple and reinstall the plug.

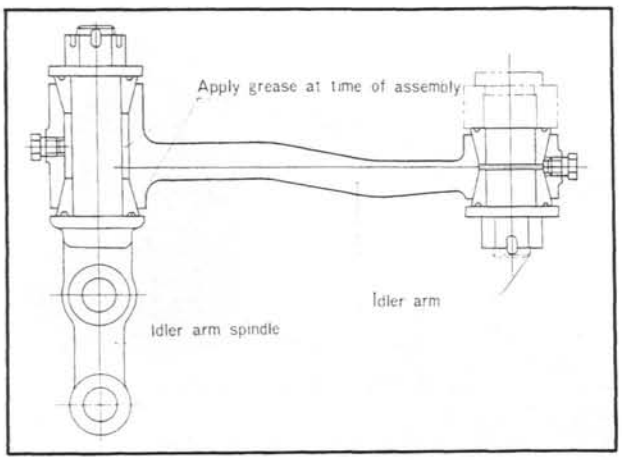


Fig. 10–14 Idler arm

Note: The ball joints for the steering linkage are filled with lithium grease and are completely sealed which require no lubrication service.

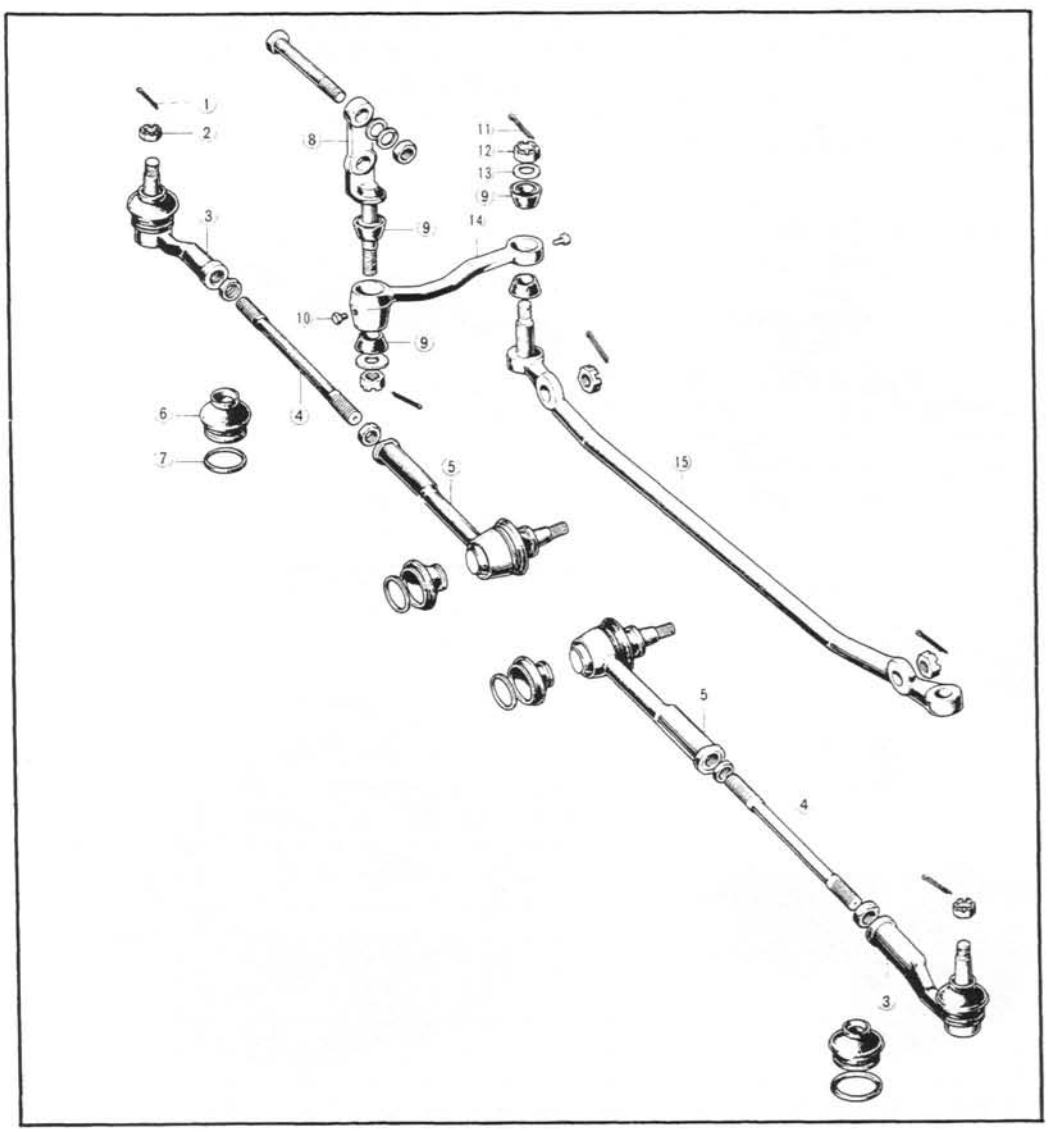


Fig. 10–15

Steering linkage

1. Split pin
2. Nut
3. Ball joint
4. Tie rod
5. Ball joint
6. Dust seal
7. Set ring
8. Spindle
9. Bush
10. Plug
11. Split pin
12. Nut
13. Washer
14. Idler arm
15. Center link

10–I. FRONT WHEEL ALIGNMENT

10–I–1. Inspection before Checking Front Wheel Alignment

Proper alignment of the front wheels must be maintained in order to ensure steering stability and satisfactory tire life. Before checking or correcting the front wheel alignment, the following points which will affect steering should be inspected.

1. Check the tire inflation and bring to recommended pressure.
2. Inspect the front wheel bearing adjustment and correct if necessary.
3. Inspect the wheel and tire run-out and balance.
4. Inspect the ball joints of the front suspension and steering linkage for any excessive looseness.
5. The vehicle must be on level ground and have no luggage or passenger load.

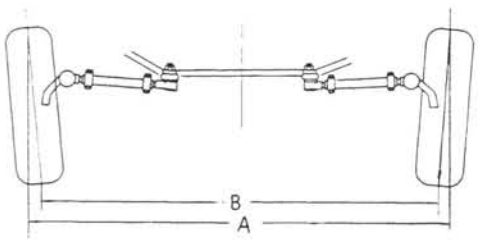
10–I–2. Toe-in

Toe-in is the difference in the distance between the front wheels, measured at the front and at the rear of the tires, the standard toe-in is **–4 to 2 mm (–0.16 to 0.08 in).**

Check and adjust the toe-in as follows:

1. Raise the front end of the vehicle until the wheels clear the ground.
2. Turning the wheels by hand, mark a line in the center of each tire tread by using a scribing block.
3. Measure the distance between the marked lines at the front and rear of the wheels. Both measurements must be taken at equal distances from the ground.

If the distance between the wheels at the rear is greater than that at the front by **–4 to 2 mm (–0.16 to 0.08 in),** it is correct.



A–B=–4 ~ 2 mm (–0. 16~0. 08 in)

Fig. 10–16 Toe–in

If it is found to be incorrect, adjust the toe-in by loosening the lock nuts and turning the tie rods. The tie rods are threaded with right and left hand threads to provide equal adjustment at both wheels.

10–I–3. Camber, Caster and King Pin Inclination

The camber, caster, and king pin inclination are not adjustable.

These are set properly in production, and will not be altered in normal driving unless the vehicle is involved in a serious collision.

Whenever camber caster or king pin inclination is moved out of its specified angle, check all parts of front suspension and body alignment.

If necessary, replace or repair.

10–I–4. Adjusting of Steering Angle

Adjust the steering angle with the adjusting bolts fitted onto the pitman arm and the side frame, so that the front wheels turn **43° inward** and **31° outward.**

SPECIAL TOOLS

49 0118 850C	Ball joint puller
49 0223 695	Pitman arm puller