# SECTION 16

# STEERING SYSTEM

## CONTENTS

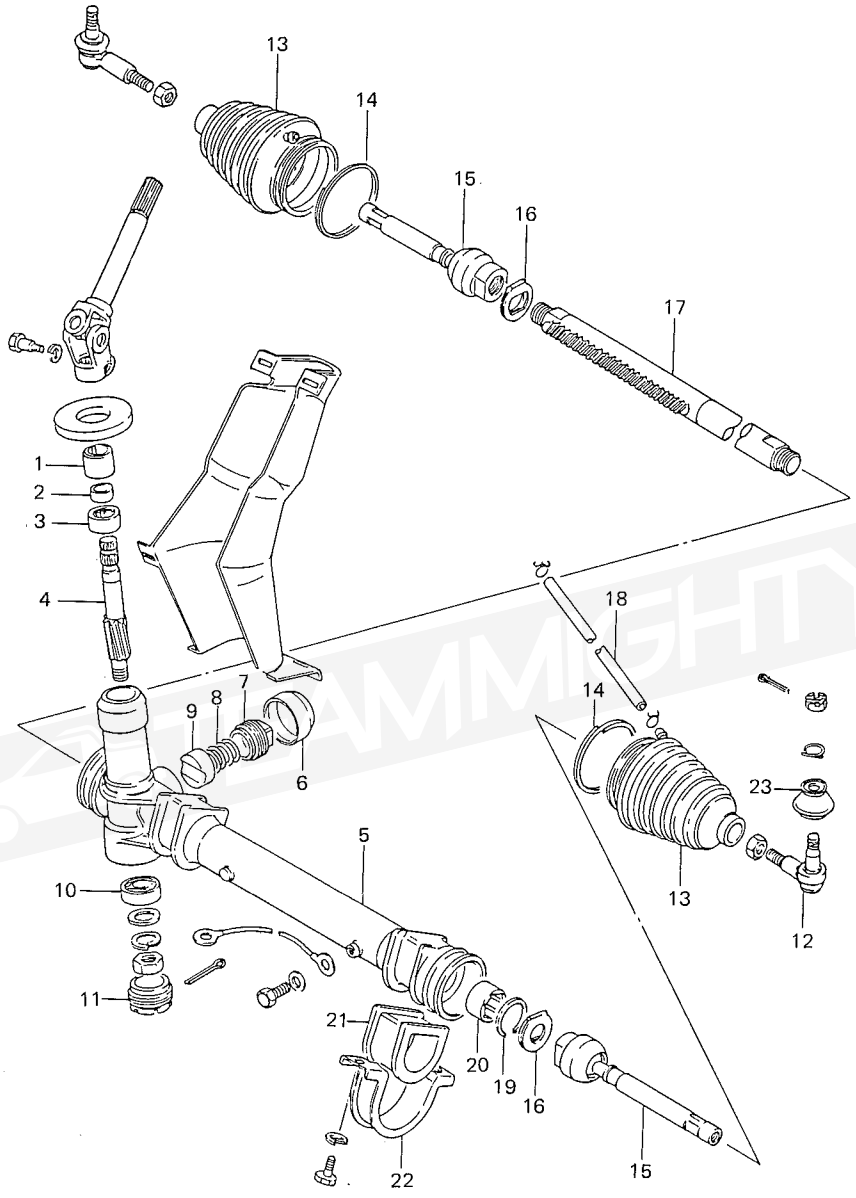




NOTICE:
All steering system fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

## 16-1. GENERAL DESCRIPTION

The steering system is of the rack-and-pinion type with a simple structure as illustrated below, which provides dynamic maneuverability. And two joints installed in the steering shaft offer a large leg space. Steering power is transmitted to the front wheel via the steering wheel, steering shaft, shaft joint, steering pinion shaft, steering rack, steering tie rod pipe, steering tie rod end, and steering knuckle.




1. Steering pinion bush
2. Needle bearing
3. Pinion bearing inner spacer
4. Steering pinion
5. Steering gear case
6. Rubber cap
7. Rack damper screw
8. Plunger spring
9. Steering rack plunger
10. Bearing
11. Pinion bearing plug
12. Tie rod end
13. Rack boot
14. Rack boot wire
15. Tie rod
16. Lock washer
17. Steering rack
18. Hose
19. C ring
20. Rack bush
21. Steering gear case mounting
22. Steering gear case bracket
23. Dust seal

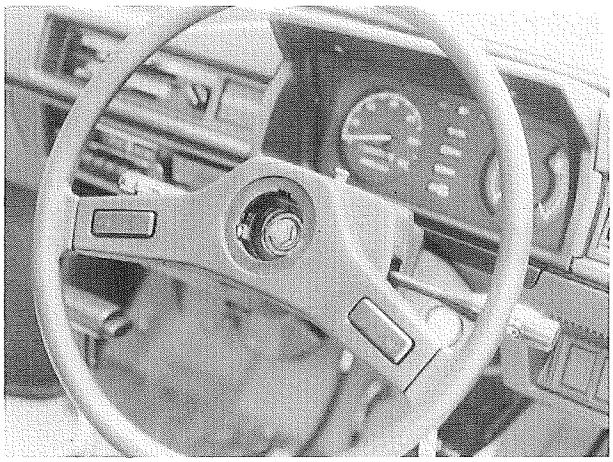
### SPECIFICATIONS AND DATA

| | |
|---|---|
| Steering gear box | Rack and pinion type |
| Gear ratio | 17.5 : 1 |
| Steering angle, inside | 38° (degrees) |
| Steering angle, outside | 32° (degrees) |
| Minimum turning radius | 4.4 m (14.4 ft.) |

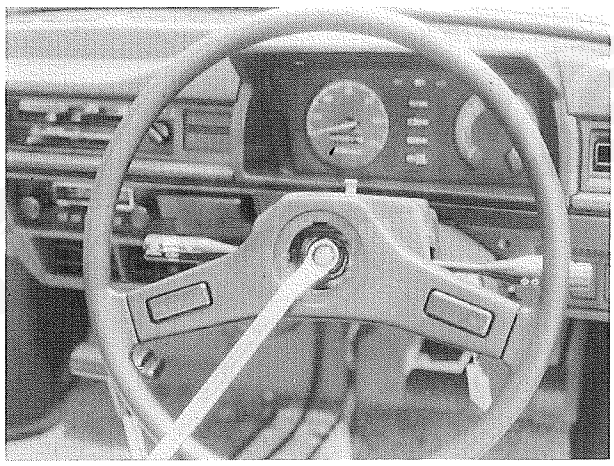
## 16-2. REMOVAL

**Steering handwheel**

1) Remove steering wheel center cap.



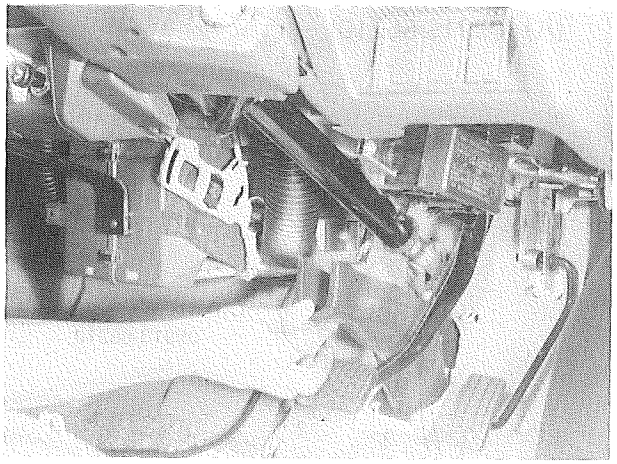
2) Remove steering shaft nut and pull off steering wheel from steering shaft.



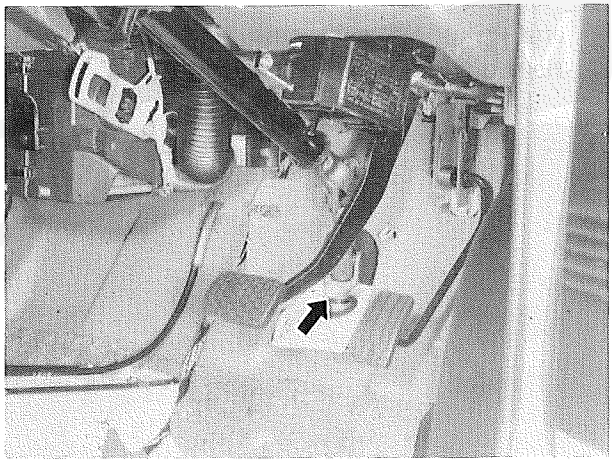
3) Remove steering gear case according to the following procedure.

**Steering gear case**

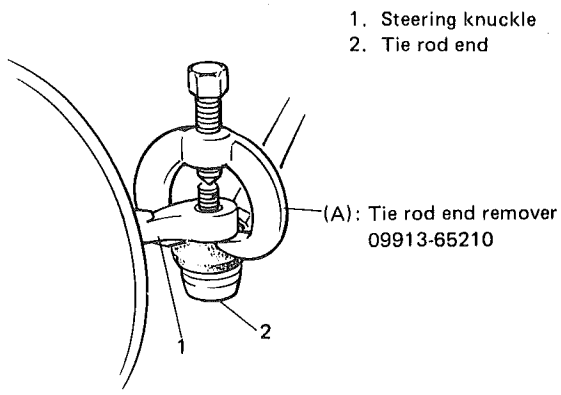
1) Remove steering shaft joint cover.



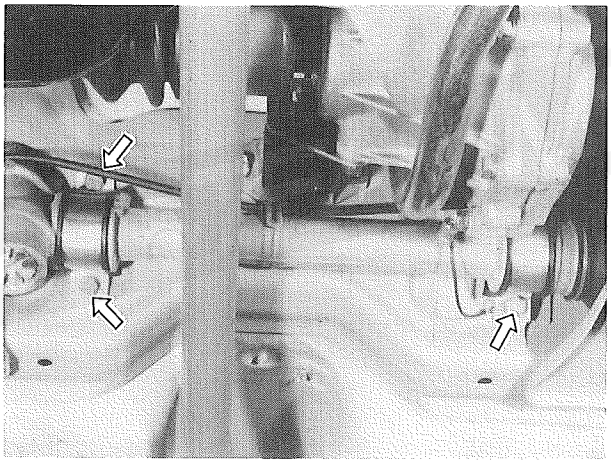
2) Loosen joint bolt securing pinion shaft.



3) Remove nuts fastening tie rod ends to steering knuckle and remove tie rod ends (left & right) from steering knuckle by using special tool (A) (09913-65210).

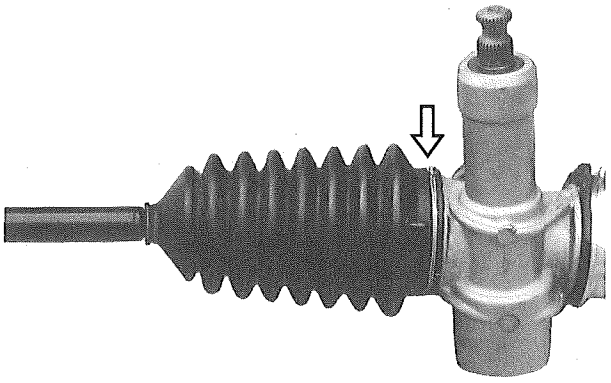



4) Remove steering gear case tightening bolts and take off gear case with tie rods and tie rod ends from car body.

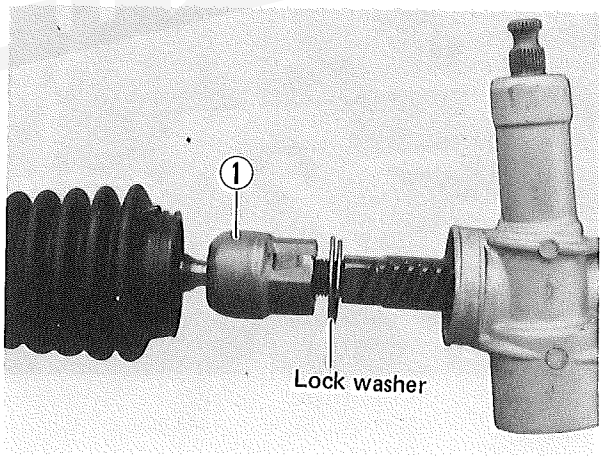


## 16-3. DISASSEMBLY (Steering Gear Case)

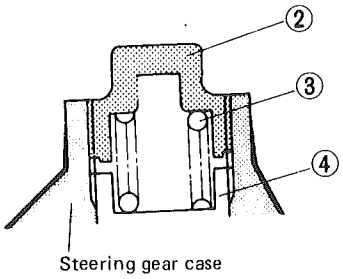
1) Remove wires binding steering rack boots, and disconnect steering rack breather hose.



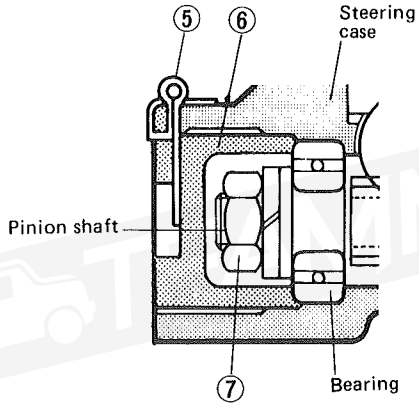
2) Straighten bent lock washer, loosen tie rod ball stud case ① till it is removed from steering rack.



3) Remove steering rack damper screw ② and remove spring ③ and plunger ④.




4) Draw out cotter pin ⑤ from steering pinion case, remove pinion bearing plug ⑥ and nut ⑦ fixing pinion shaft.




5) Remove pinion shaft, and then steering pinion bearing and pinion bush.

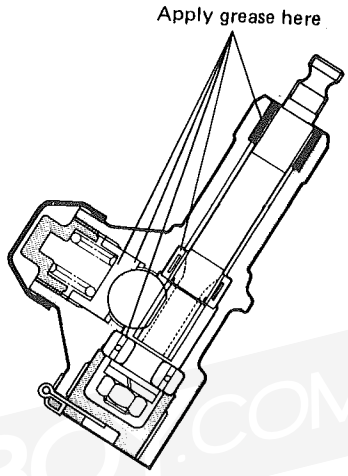
6) Remove steering rack from steering case.

## 16-4. ASSEMBLY (Steering Gear Case)

Reassemble parts by reversing to disassembly procedure, noting the following.

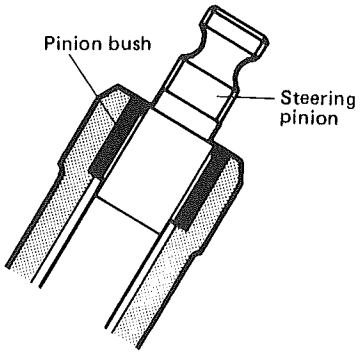
**Bearing and bush**

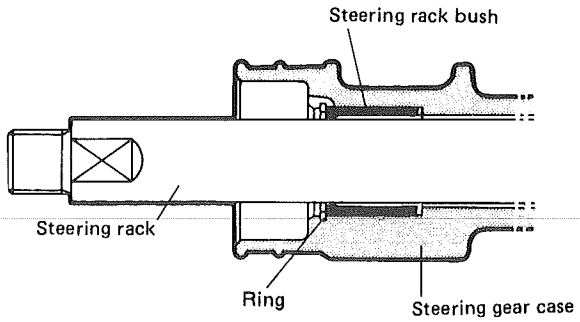
Be sure to apply SUZUKI Super Grease E (99000-25050) to bearings and bushes before fitting them.




**Steering pinion bush and rack bush**

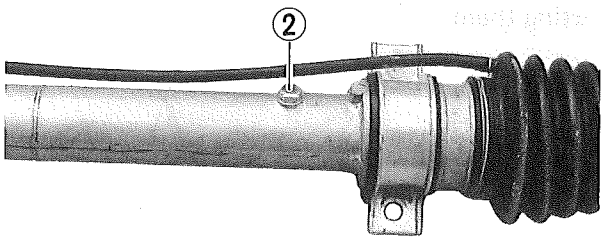
Press in the bush in the direction given below.



**Steering gear case**

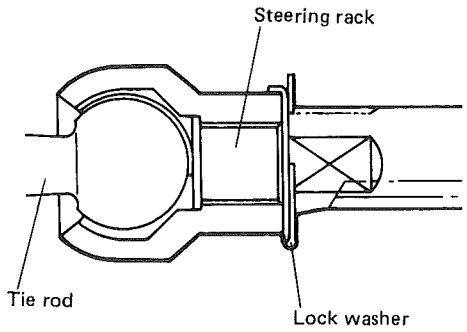
Remove bolt ② and, through its hole, inject SUZUKI Super Grease E (99000-25050) into steering gear case enough to fill up inside of it.




**Steering tie rod**

Install steering tie rod on steering rack and tighten it to the torque specified below. At this time, place washer in such a way that its larger side faces tie rod side and bend it over tie rod to lock it.

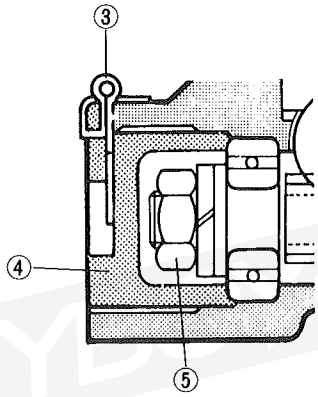
| | |
|---|---|
| Tie rod tightening torque | 70 - 100 N·m<br>(7.0 - 10.0 kg-m)<br>51.0 - 72.0 lb-ft |




**Pinion bearing bush plug**

Pinion bearing bush plug prevents bearing from coming out. After tightening it to specified tightening torque, be sure to fit cotter pin ③.

| Tightening torque specifications | |
|---|---|
| Pinion bearing bush plug ④ | 45 - 80 N·m<br>(4.5 - 8.0 kg-m)<br>32.5 - 57.5 lb-ft |
| Steering pinion securing nut ⑤ | 55 - 80 N.m<br>(5.5 - 8.0 kg-m)<br>40.0 - 57.5 lb-ft |

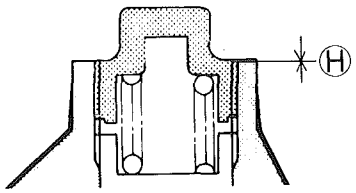


**Steering rack damper screw**

Steering rack damper screw should be adjusted after being tightened. Tighten damper screw so that average working torque of pinion shaft is 0.8 – 1.3 N·m (8 – 13 kg-cm, 0.58 – 0.94 lb-ft) when steering pinion shaft is turned through 0 – 180° with steering rack positioned at the same distance to the right and left of the gear case.

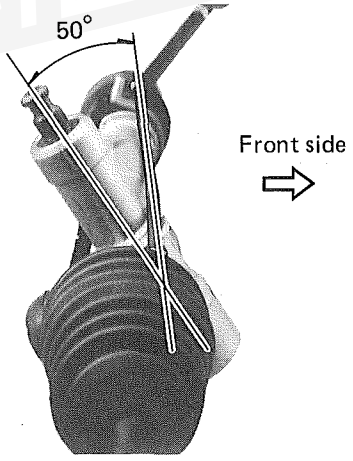
**NOTICE:**

**Height Ⓗ as illustrated below after damper screw is tightened should be less than 0 – 1 mm (0 – 0.04 in.) from gear case face.**




**Steering rack boots**

Fit boots on steering rack in such a way that plug of boots is in the position as shown below.

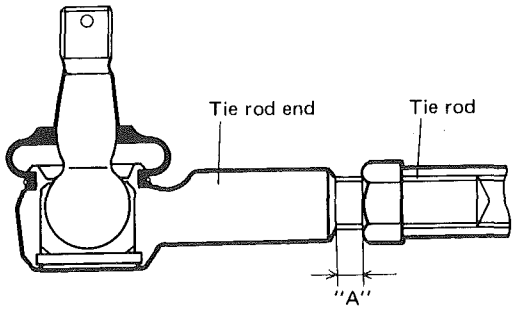



## 16-5. INSTALLATION

**Steering shaft joint**

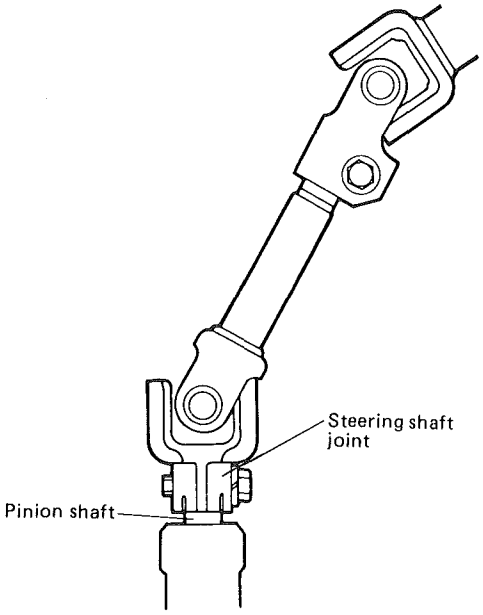
Connecting steering shaft with pinion shaft presupposes following conditions.

- Right and left tie rods are installed in such a way that length "A" of both rod ends is equal.

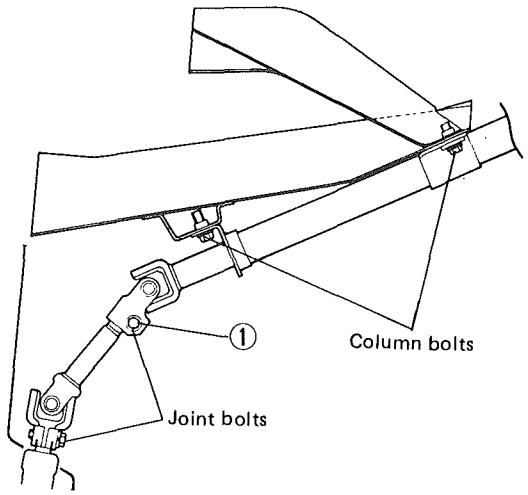



- Right and left tie rod ends are installed in steering knuckles.
- Right and left front wheels (tires) are kept in straight forward position.

After making sure of the above items, install steering shaft joint onto pinion shaft.

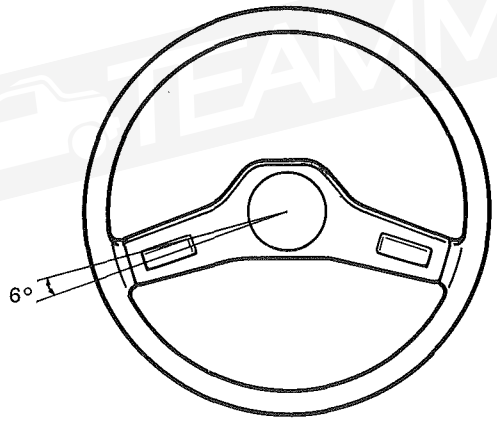


Tighten joint bolt on pinion shaft side, column bolts and then joint bolt ①.




**Steering wheel**

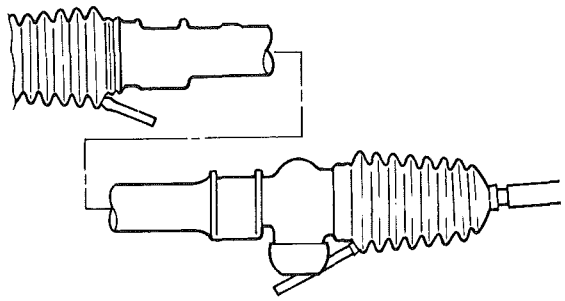
Align front wheels for straight ahead and fit steering wheel on to steering shaft so that steering wheel spoke is horizontal or makes an angle of not more than 6° to the horizontal.




**WARNING:**
**After installing all parts, be sure to inspect and readjust wheel alignment. At the same time, confirm that steering angle is correct.**

**Steering rack boots tube (hose)**

When installing tube, check to be sure that no grease is in it. Also be careful not to dent tube when clamping it.

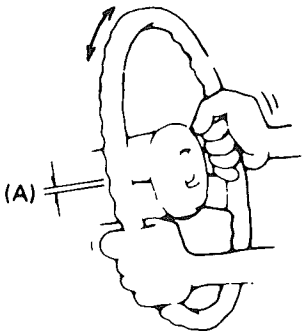


## 16-6. MAINTENANCE SERVICE

**Steering wheel play**

Check steering wheel for play and rattle, holding vehicle in straight forward condition on the ground.

| | |
|---|---|
| Steering wheel play (A) | 0 – 30 mm (0 – 1.2 in.) |

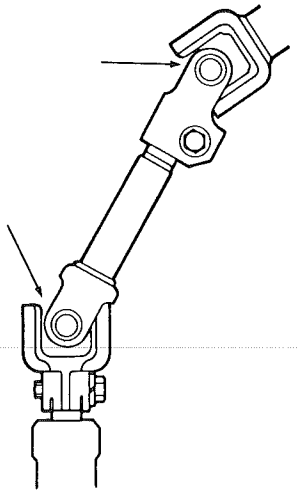



If play is not within specification, inspect for the following. If found defective, replace.

- Wear of tie rod end ball stud (Ball stud should move when more than 2 kg-cm torque is applied.)
- Wear of lower ball joint
- Wear of steering shaft joint
- Wear or breakage of steering pinion or rack gear
- Loosely installed or joined parts

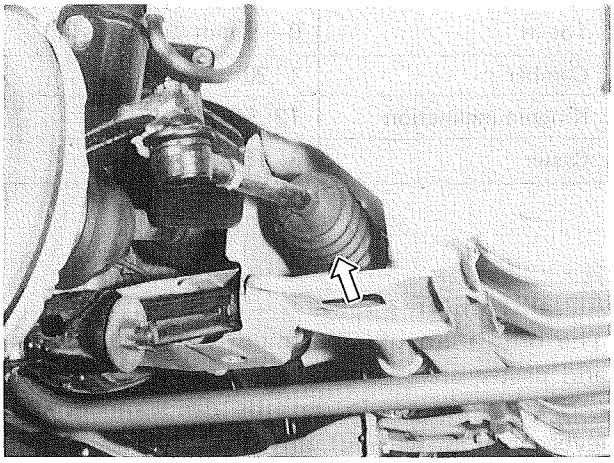
**Steering shaft joint**

Check shaft joint for wear, breakage and other damage and replace if any defect exists.



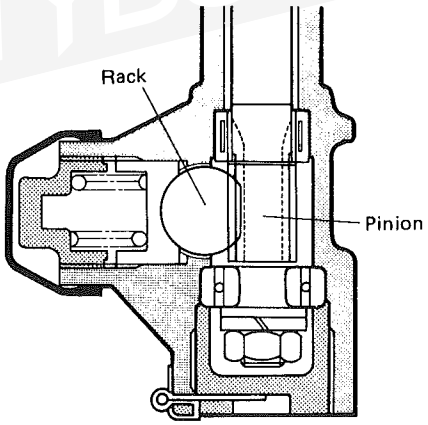
**Steering rack boot**

Check steering rack boot for deterioration, cracks and other damage and replace if defective.



**Steering rack & pinion**

Check rack & pinion tooth surface for wear, breakage and other damage and replace if any defect exists.




**Steering rack plunger and pinion bush**

Check steering rack plunger and pinion bush for wear, breakage and other damage and replace if defective.

## 16-7. FRONT END ALIGNMENT

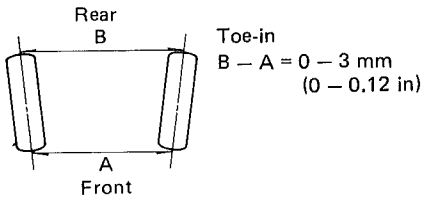
### ALIGNMENT SERVICE DATA

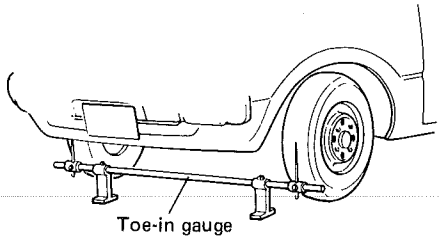
| | |
|---|---|
| Toe-in | 0 – 3 mm (0 – 0.12 in.) |
| Camber | 1° 20′ |
| Kingpin inclination | 12° 50′ |
| Caster | 3° 15′ |

### ADJUSTMENT

The only item of adjustment is toe-in. Camber and caster are given and fixed. Before checking and adjusting toe-in, let the car stand on flat level ground without any load placed aboard and,

1) Check all tires for proper inflation pressures and approximately the same tread wear.
2) Check for loose ball joints. Check tie rod ends; if excessive looseness is noted, it must be corrected before adjusting.
3) Check for run-out of wheels and tires.
4) Check for loose control arms.
5) Check for loose or missing stabilizer bar attachments.
6) Make sure car is level. (Check by using carpenter's level gauge.)
7) Make sure front wheels are set in straightahead driving position.
   Using toe-in gauge, read toe-in and compare the reading against specification (given above).

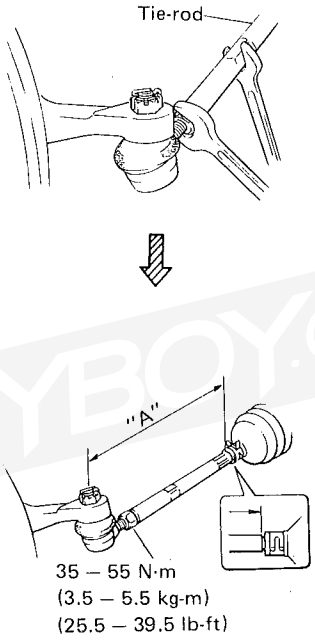



Toe is adjusted by changing tie rod length. Loosen right and left tie rod end lock nuts first and then rotate right and left tie rods by the same amount to align toe-in to specification. In this adjustment, right and left tie rods should become equal in length ("A" in below figure).

Before rotating tie rods, apply grease between tie rods and rack boots so that boots won't be twisted.

After adjustment, tighten lock nuts to specified torque and make sure that rack boots are not twisted.

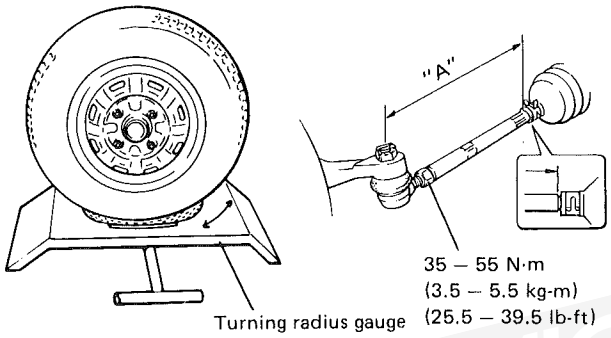


## STEERING ANGLE

| | | |
|---|---|---|
| Steering angle | inside | 38° |
| | outside | 32° |

When tie rod or tie rod end was replaced, check toe and then also steering angle with turning radius gauge.
If steering angle is not correct, check if right and left tie rods are equal in length ("A" in below figure).

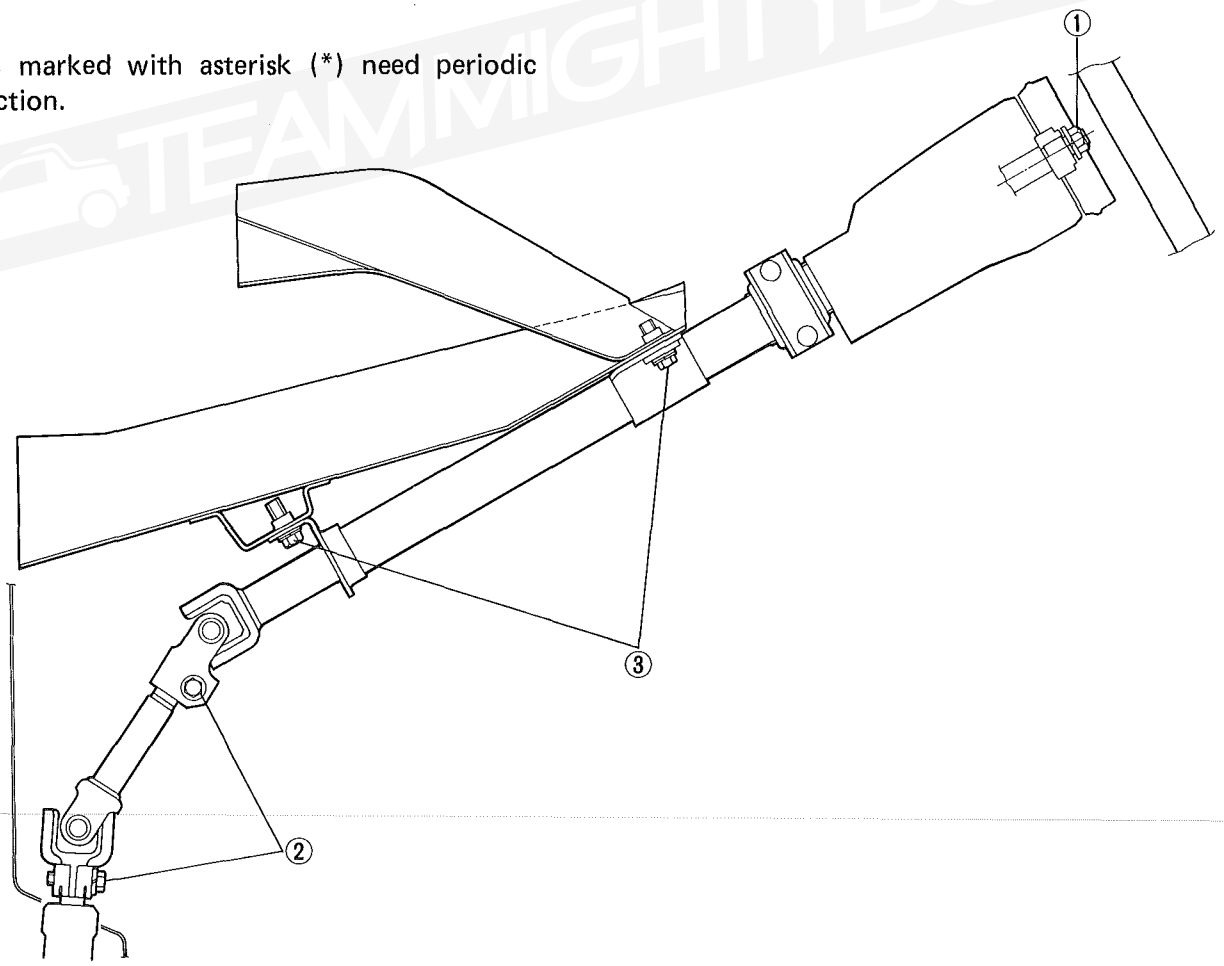
**NOTICE:**
**If tie rod lengths were changed to adjust steering angle, reinspect toe-in.**

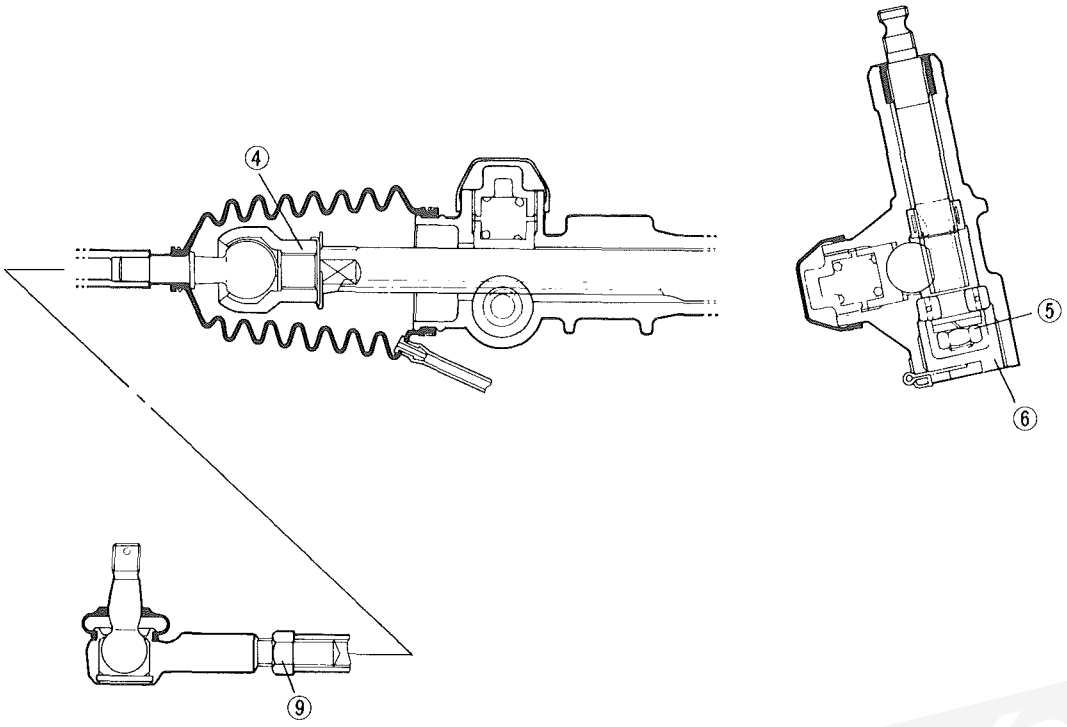


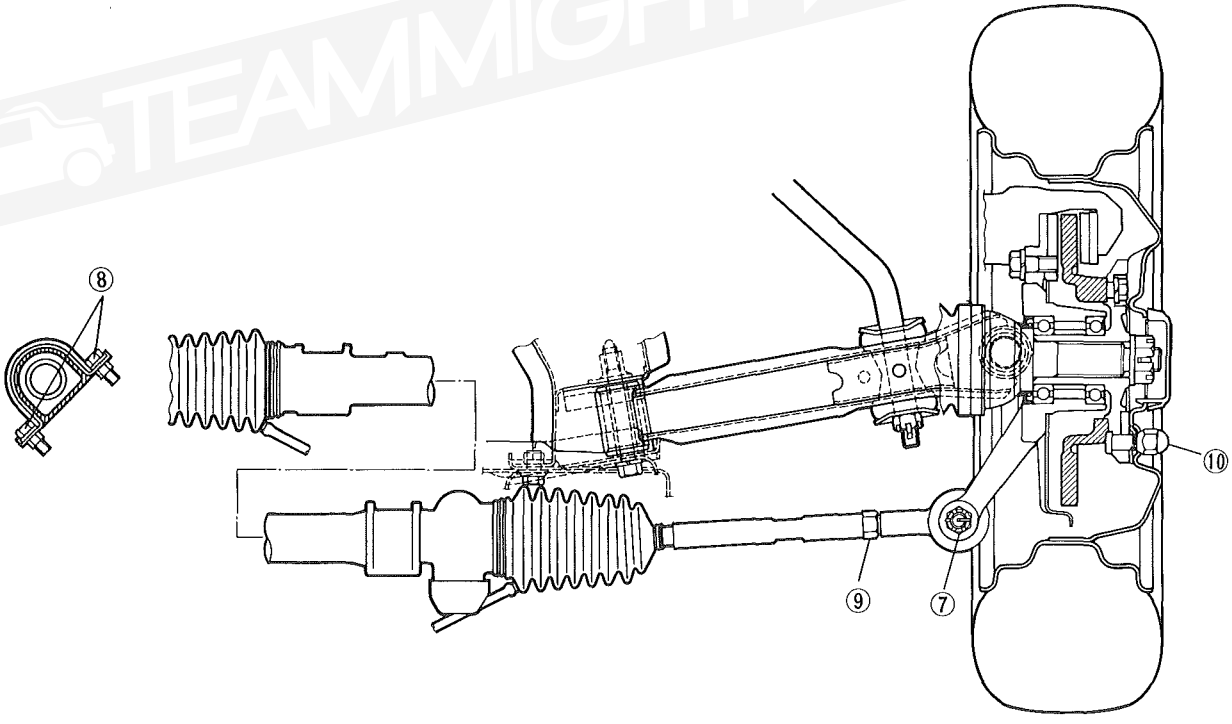
## 16-8. RECOMMENDED TORQUE SPECIFICATION

| | Fastening parts | N·m | kg-m (lb-ft) |
|---|---|---|---|
| ① * | Steering shaft nut | 25 - 40 | 2.5 - 4.0 (18.0 - 28.5) |
| ② * | Steering shaft joint bolt | 20 - 30 | 2.0 - 3.0 (14.5 - 21.5) |
| ③ * | Steering column bolt | 11 - 17 | 1.1 - 1.7 (8.0 - 12.0) |
| ④ | Tie rod ball stud case nut | 70 - 100 | 7.0 - 10.0 (51.0 - 72.0) |
| ⑤ | Steering pinion securing nut | 55 - 80 | 5.5 - 8.0 (40.0 - 57.5) |
| ⑥ | Pinion bearing bush plug | 45 - 80 | 4.5 - 8.0 (32.5 - 57.5) |
| ⑦ * | Tie rod end castle nut | 30 - 55 | 3.0 - 5.5 (22.0 - 39.5) |
| ⑧ * | Steering gear case bolt | 20 - 30 | 2.0 - 3.0 (14.5 - 21.5) |
| ⑨ * | Tie rod end lock nut | 35 - 55 | 3.5 - 5.5 (25.5 - 39.5) |
| ⑩ * | Wheel nuts | 40 - 70 | 4.0 - 7.0 (36.5 - 50.5) |

Items marked with asterisk (*) need periodic inspection.



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