



# **RX-7**

## *Twin - Turbo* **1993 Factory Service Manual**

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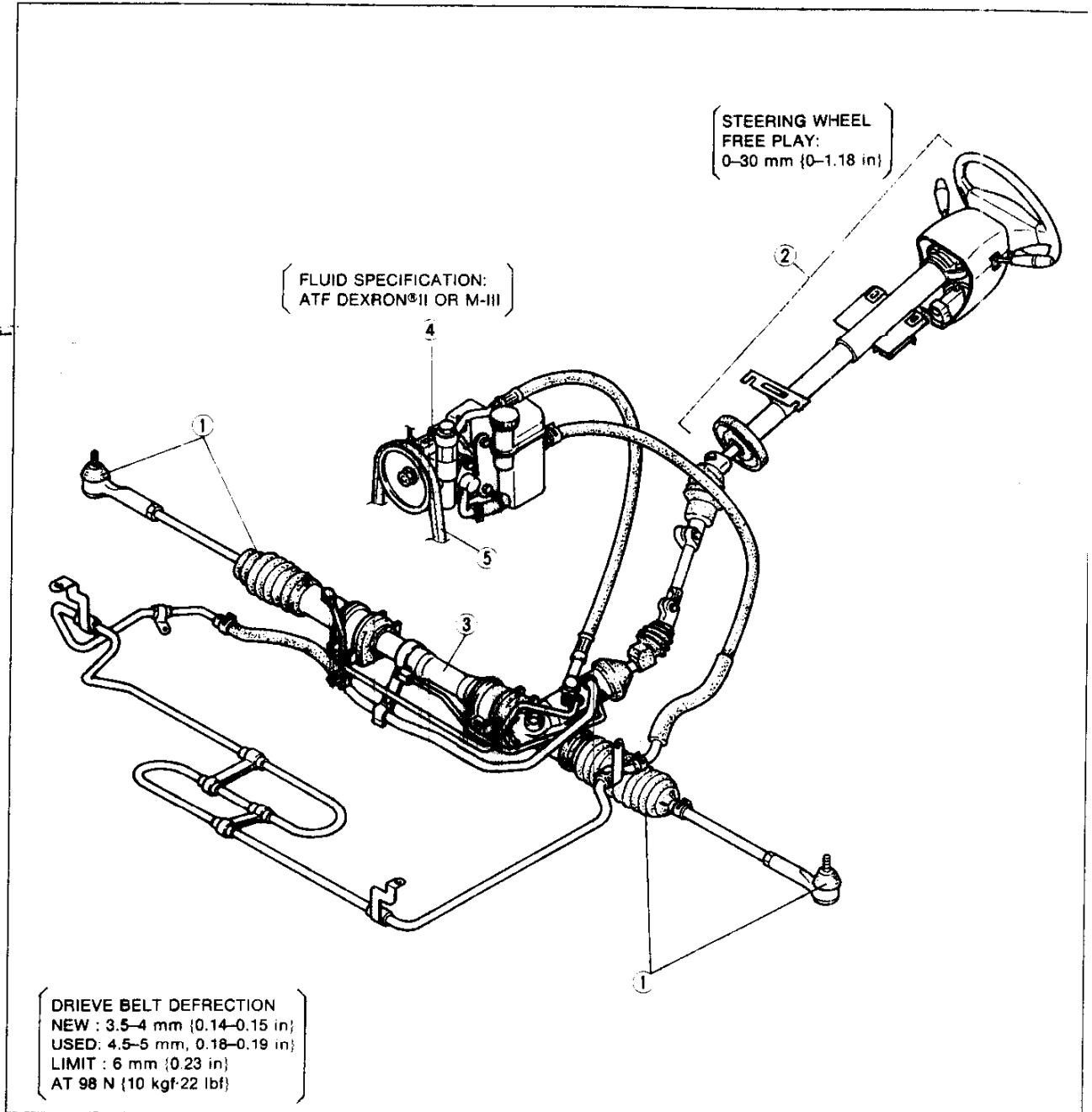
Before beginning any service procedure, refer to 1993 RX-7  
Body Electrical Troubleshooting Manual; see Section S for air bag  
system precautions and J1 for audio anti-theft system precautions.

## STEERING SYSTEM

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OUTLINE

SPECIFICATIONS


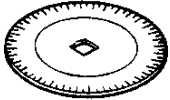

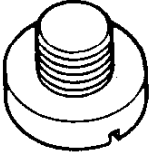
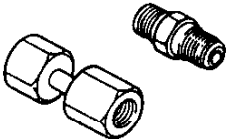
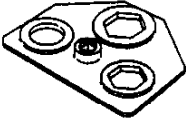

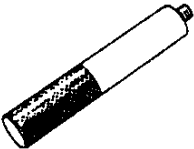
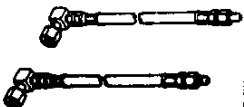
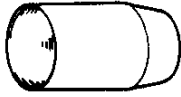
Item		Specifications
Steering wheel	Outer diameter	mm {in}
	Lock-to-lock	turns
Steering shaft	Shaft	Collapsible
Steering gear	Power assist	Engine speed sensing
	Gear	Rack-and-pinion
	Gear ratio	∞ (infinite)
	Rack stroke	mm {in}
	Power steering fluid	ATF Dexron® II or M-III
Fluid capacity	L {US qt, Imp qt}	0.96 {1.01, 0.84}

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ENGINE SPEED SENSING POWER STEERING

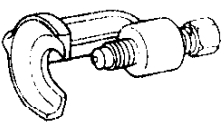
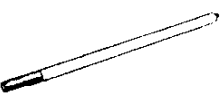
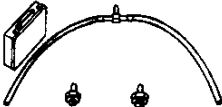


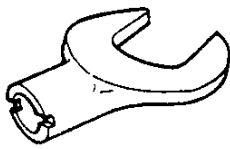
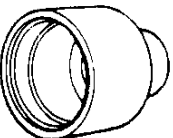

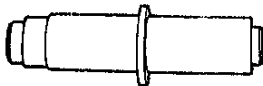

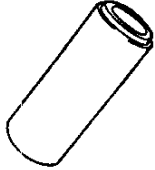

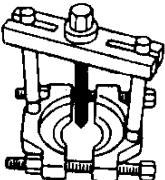

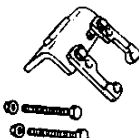
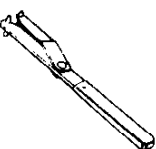
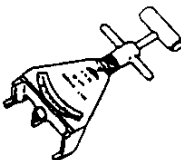
PREPARATION

SST

49 1232 670A Gauge set, power steering 	For inspection of power steering fluid pressure	49 D032 316 Protractor 	For installation of adjusting cover
49 1232 673 Body, valve (Part of 49 1232 670A) 	For inspection of power steering fluid pressure	49 F032 317 Remover, oil seal 	For removal of oil seal and backup washer
49 H032 322 Adapter, power steering gauge 	For inspection of power steering fluid pressure	49 F032 313 Wrench 	For removal of locknut
49 1232 672 Gauge (Part of 49 1232 670A) 	For inspection of power steering fluid pressure	49 F032 305 Handle 	For removal of needle bearing
49 H002 671 Adapter, power steering gauge 	For inspection of power steering fluid pressure	49 F032 310 Protector 	For installation of oil seal

# N

## ENGINE SPEED SENSING POWER STEERING

<p>49 0118 850C Puller, ball joint</p> 	<p>For removal of tie rod end ball joint</p>	<p>49 F032 303 Handle</p> 	<p>For installation of oil seal and backup washer</p>
<p>49 G032 3AI Set, joint hose</p> 	<p>For hermetic inspection of cylinder</p>	<p>49 G032 317 Hose ( Part of 49 G032 3AI )</p> 	<p>For hermetic inspection of cylinder</p>
<p>49 G032 319 Adapter ( Part of 49 G032 3AI )</p> 	<p>For hermetic inspection of cylinder</p>	<p>49 H032 301 Wrench</p> 	<p>For removal of tie rod</p>
<p>49 1243 785 Installer, boot</p> 	<p>For installation of outer ball joint</p>	<p>49 H032 328 Former, seal ring</p> 	<p>For formation of seal ring</p>
<p>49 F032 318 Installer, oil seal and bearing</p> 	<p>For installation of oil seal and bearing</p>	<p>49 F032 304 Body</p> 	<p>For installation of oil seal</p>
<p>49 F032 319 Installer</p> 	<p>For installation of oil seal</p>	<p>49 0180 510B Attachment, preload</p> 	<p>For measurement of pinion preload</p>
<p>49 0710 520 Puller, bearing</p> 	<p>For removal of bearing</p>	<p>49 F032 306A Body</p> 	<p>For removal of needle bearing</p>
<p>49 F032 301 Hanger, power steering pump</p> 	<p>For disassembly / assembly of power steering oil pump</p>	<p>49 W023 585A Adjust Wrench</p> 	<p>For removal / installation of oil pump pulley</p>
<p>49 9200 020 V-ribbed belt tension gauge</p> 	<p>For measurement of drive belt tension</p>		

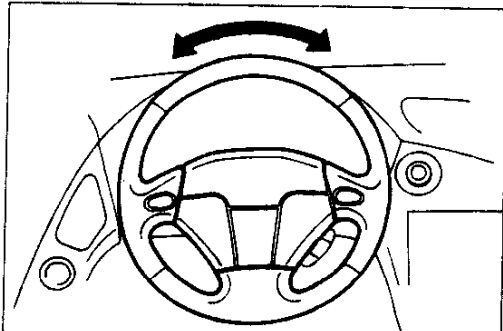
**TROUBLESHOOTING GUIDE**

<b>Problem</b>	<b>Possible cause</b>	<b>Action</b>	<b>Page/section</b>
<b>Steering feels heavy</b>	Poor lubrication, foreign material, or abnormal wear of steering ball joint	lubricate or replace	N- 9
	Stuck or damaged lower arm ball joints	Replace	Section R
	Improper steering pinion preload	Repair or replace	N-26
	Damaged steering gear	Repair or replace	N-16, 18
	Damaged steering shaft joint	Replace	N-12
	Improperly adjusted wheel alignment	Adjust	Section R
	Incorrect tire pressure	Adjust	Section Q
	Loose or damaged oil pump drive belt	Adjust or replace	N-31
	Low fluid level or air in fluid	Add fluid or bleed air	N- 6
	Leakage of fluid	Repair or replace	-
	Insufficient oil pump pressure	Replace	N-28
<b>Steering wheel pulls to one side</b>	Incorrect tire pressure	Adjust	Section Q
	Unevenly worn tires	Replace	Section Q
	Weak front coil spring	Replace	Section R
	Worn or damaged stabilizer and/or suspension bushing	Replace	Section R
	Dragging brake	Repair or adjust	Section P
	Loose lower arm	Tighten or replace	Section R
	Improperly adjusted wheel alignment	Adjust	Section R
<b>General instability while driving</b>	Incorrect tire pressure	Adjust	Section Q
	Damaged or unbalanced wheel	Adjust or replace	Section Q
	Worn or damaged steering joint	Replace	N-12
	Improper steering pinion preload	Repair or replace	N-26
	Weak front coil spring	Replace	Section R
	Worn or damaged stabilizer and/or upper or lower arm bushing	Replace	Section R
	Damaged shock absorber	Replace	Section R
	Improperly adjusted wheel alignment	Adjust	Section R
<b>Shake (steering wheel vibrates up/down)</b>	Excessive tire and/or wheel runout	Replace	Section Q
	Loose lug nuts	Tighten	Section Q
	Unbalanced wheel	Adjust or replace	Section Q
	Cracked or worn engine mount rubber	Replace	Section B
	Cracked or worn transmission mount rubber	Replace	Section K
<b>Shimmy (steering wheel vibrates circumferentially)</b>	Cracked or worn steering gear mount rubber	Replace	N-18
	Loose steering gear mounting bolts	Tighten	N-16
	Stuck or damaged steering ball joint	Replace	N- 9, 18
	Excessive tire and/or wheel runout	Replace	Section Q
	Loose lug nuts	Tighten	Section Q
	Unbalanced wheel	Adjust or replace	Section Q
	Incorrect tire pressure	Adjust	Section Q
	Unevenly worn tires	Replace	Section Q
	Damaged shock absorber	Replace	Section R
	Loose shock absorber mounting bolts	Tighten	Section R
	Stuck or damaged lower arm ball joint	Replace	Section R
	Cracked or worn suspension bushings	Replace	Section R
	Damaged or worn front wheel bearing	Replace	Section M
Improperly adjusted front wheel alignment	Adjust	Section R	
<b>Excessive steering wheel play</b>	Worn steering gear	Repair or replace	N-16, 18
	Worn or damaged steering joints	Replace	N-12
	Worn or damaged lower arm bushing	Replace	Section R
	Loose steering gear mounting bolts	Tighten	N-16
	Worn linkage or tie rod ball joint	Replace	N-18
<b>Poor steering wheel return</b>	Incorrect tire pressure	Adjust	Section Q
	Stuck or damaged steering joints	Replace	N-12
	Improperly adjusted front wheel alignment	Adjust	Section R
	Improper steering pinion preload	Repair or replace	N-26
	Ball joint not operating smoothly	Replace	N-16, 18
	Obstruction near steering column	Repair	N-12

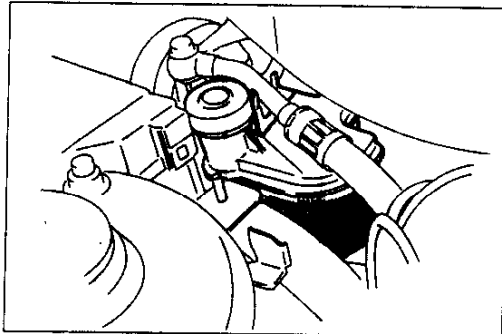
### TROUBLESHOOTING GUIDE (Cont'd)

Problem	Possible cause	Action	Page/Section
<b>Abnormal noise from steering system</b>	Loose oil pump	Tighten	N-28
	Loose steering gear	Tighten	N-16
	Loose oil pump bracket	Tighten	N-28
	Loose or too tight drive belt	Adjust	N-31
	Air in system	Bleed air	N- 6
	Damaged steering gear	Repair or replace	N-16, 18
	Damaged oil pump	Repair or replace	N-28, 29
	Obstruction near steering column	Repair or replace	N-12
	Loose steering linkage	Tighten or replace	N-16
	Worn steering joints	Replace	N-12

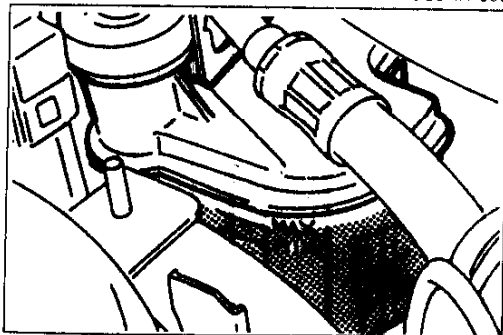
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37U0NX-005



19G0NX-008



19G0NX-009

#### AIR BLEEDING

1. Check the fluid level. (Refer to below.)
2. Jack up the front of the vehicle and support it on safety stands.
3. Turn the steering wheel fully to the left and right several times with the engine not running.
4. Recheck the fluid level. If it has dropped, add fluid.
5. Repeat Steps 2 and 3 until the fluid level stabilizes.
6. Lower the vehicle.
7. Start the engine and let it idle.
8. Turn the steering wheel fully to the left and right several times.
9. Verify that fluid is not foamy and that the fluid level has not dropped.
10. Add fluid if necessary and repeat Steps 6 and 7.

#### POWER STEERING FLUID

##### Inspection

##### Fluid level

Check the power steering fluid level. Add fluid to the specified level, if necessary.

##### Caution

- Use only the specified power steering fluid.

**Fluid specification: ATF Dexron® II or M-III**

## Fluid leakage

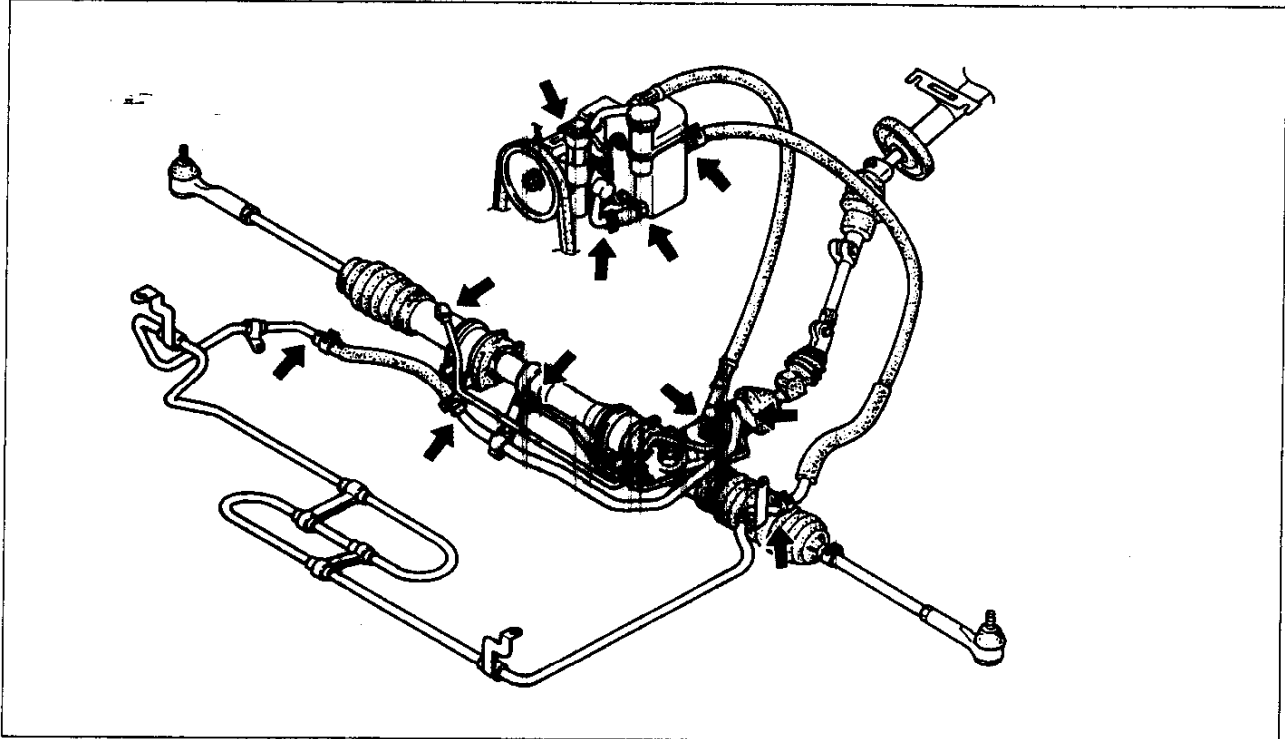
### Caution

- To prevent damage to the steering system, do not keep the steering wheel in the fully turned position for more than 15 seconds.

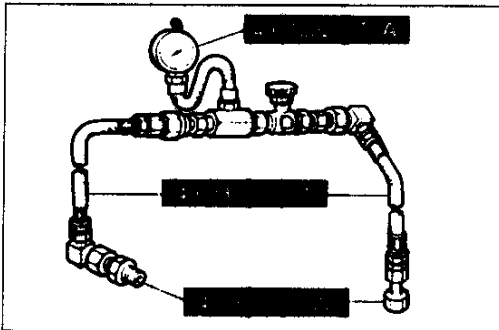
Start the engine and let it idle. Turn and briefly hold the steering wheel fully to the left and right to apply fluid pressure. Check for fluid leakage.

### Note

- The points where fluid leakage may occur are indicated in the figure.



37U0NX-006



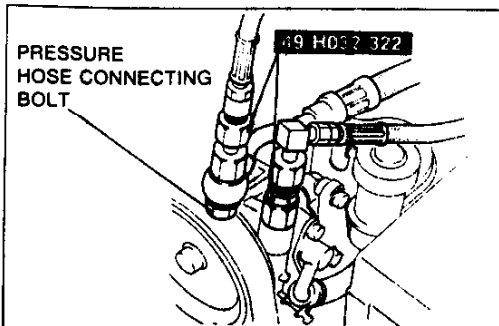
37U0NX-007

### Fluid pressure

1. Assemble the **SST** as shown in the figure.

### Tightening torque:

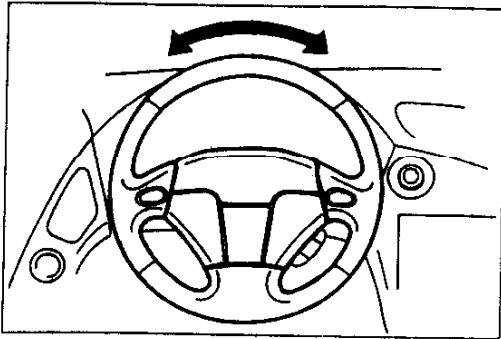
40-49 N·m {4.0-5.0 kgf·m, 29-36 ft·lbf}



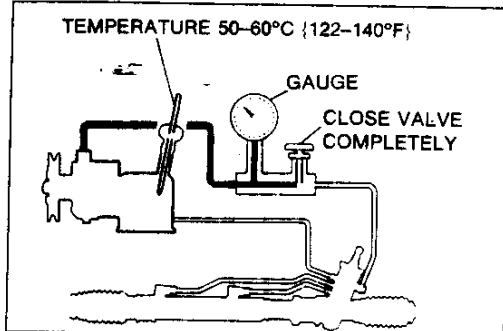
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2. Disconnect the pressure pipe from the oil pump, and connect the **SST**.
3. Bleed the air from the system. (Refer to page N-6.)

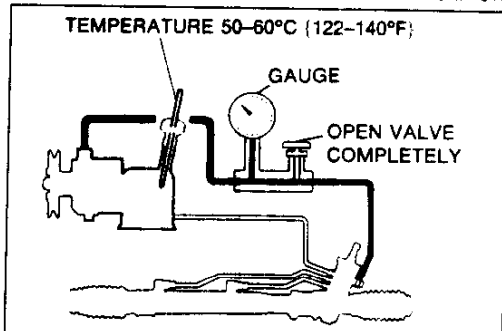




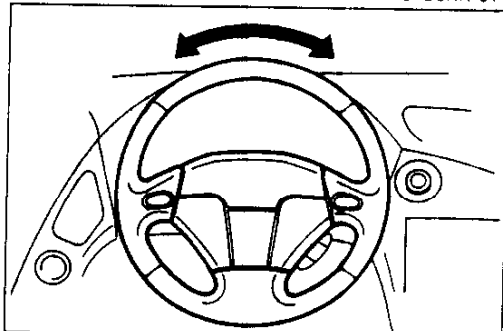
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37U0NX-010



37U0NX-011



37U0NX-012

### Caution

- If the steering wheel is kept in the fully turned position for more than 15 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.

4. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50–60°C {122–144°F}**.

### Caution

- If the valve is left closed for more than 15 seconds, the fluid temperature will increase excessively and adversely affect the oil pump.

5. Close the gauge valve completely. Increase the engine speed to **1,000–1,500 rpm** and measure the fluid pressure generated by the oil pump. If the pressure is not within specification, repair or replace the oil pump assembly. (Refer to page N-28.)

### Oil pump fluid pressure:

**7,620–8,350 kPa {77.7–85.2 kgf/cm<sup>2</sup>, 1,110–1,210 psi}**

6. Open the gauge valve fully and increase the engine speed to **1,000–1,500 rpm**.

### Caution

- If the steering wheel is kept in the fully turned position for more than 15 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.

7. Turn the steering wheel fully to the left and right and measure the fluid pressure generated at the gear housing. If the pressure is not within specification, repair or replace the steering gear assembly.

### Gear housing fluid pressure:

**7,620–8,350 kPa {77.7–85.2 kgf/cm<sup>2</sup>, 1,110–1,210 psi}**

8. Remove the gauge set. Install and tighten the pressure pipe to the specified torque.

### Tightening torque:

**24–35 N·m {2.4–3.6 kgf·m, 18–26 ft·lbf}**

9. Bleed the air from the system. (Refer to page N-6.)

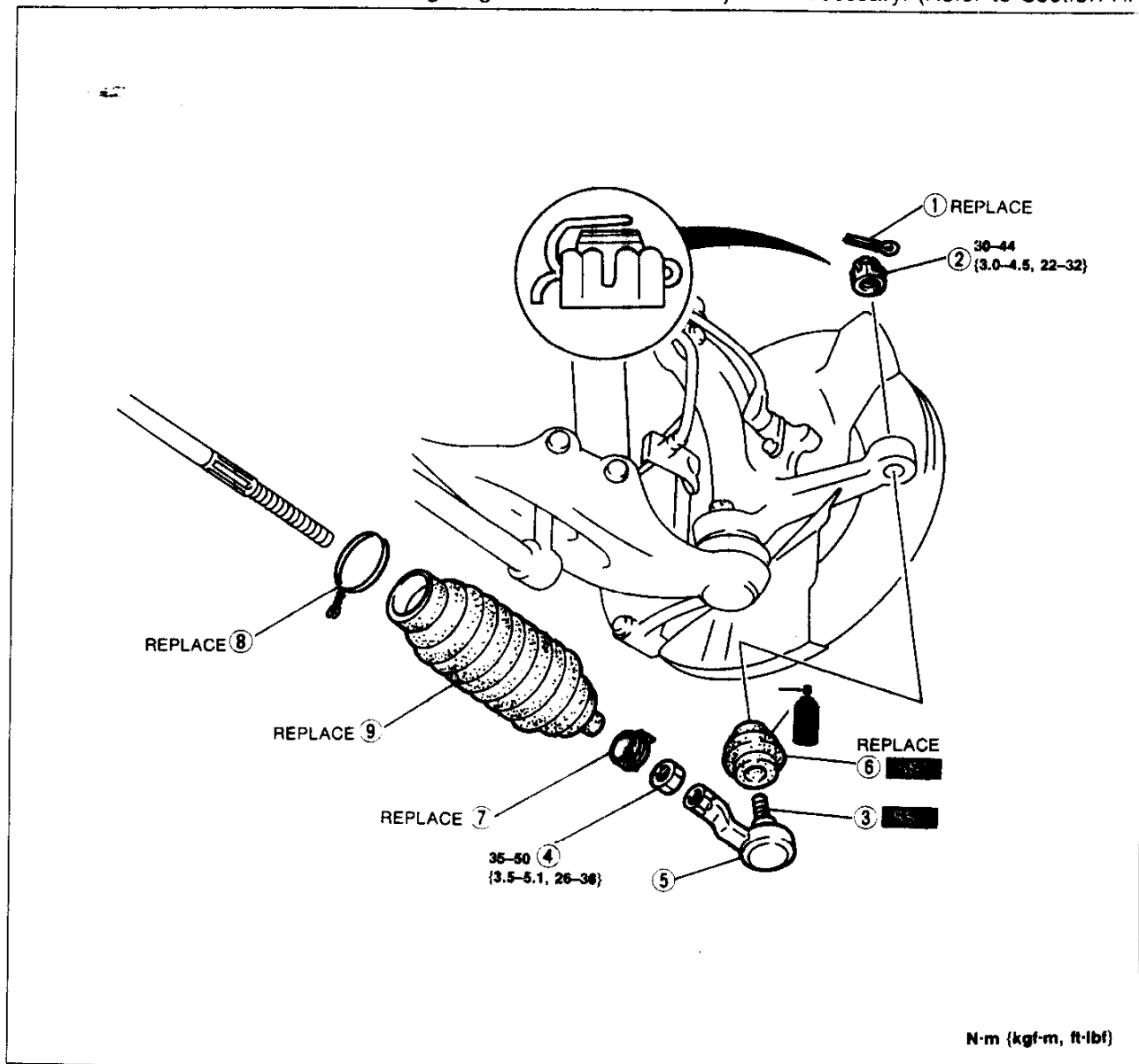
**BOOT**

**Replacement**

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring **Installation Note**.
5. Install the wheel and tire.

**Tightening torque: 89–117 N·m (9–12 kgf·m, 66–86 ft·lbf)**

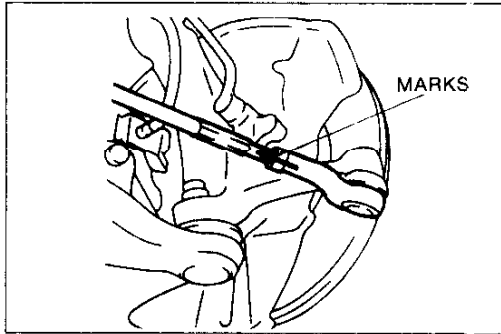
6. After installation, check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)



37U0NX-010

1. Cotter pin
2. Nut
3. Tie rod end ball joint  
Removal Note ..... page N-10
4. Locknut  
Removal Note ..... page N-10
5. Tie rod end

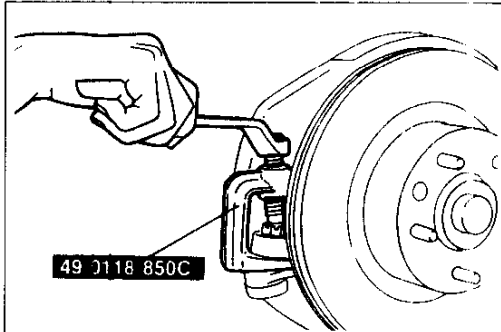
6. Tie rod end boot  
Removal Note ..... page N-10  
Installation Note ..... page N-10
7. Boot clamp
8. Boot wire
9. Steering gear boot  
Removal Note ..... page N-10  
Installation Note ..... page N-10



37U0NX 014

### Removal note Locknut

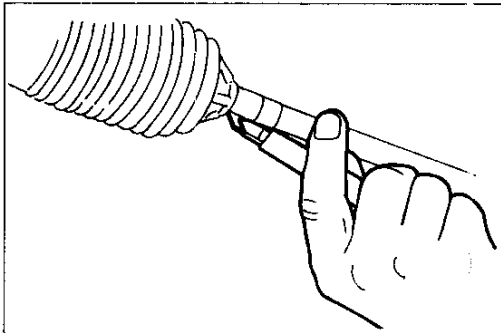
Before loosening the tie rod end locknut, make mark for reference when tightening.



37U0NX 015

### Tie rod end ball joint

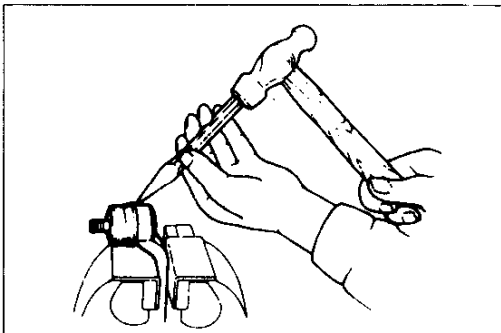
1. Loosen the tie rod end ball joint nut until it is about flush with the end of the stud.
2. With the nut protecting the stud, separate the tie rod end from the steering knuckle by using the **SST**.



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### Steering gear boot

If the steering gear boot is difficult to remove, use a razor knife to cut open the small diameter end.



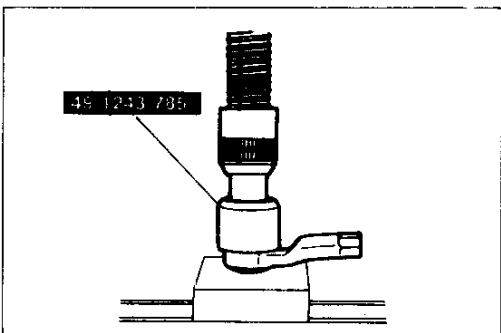
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### Tie rod end boot

#### Caution

- Do not scar the part where the boot attaches to the tie rod end.

1. Secure the tie rod end in a vise.
2. Place a chisel against the boot and hold it at an angle as shown.
3. Remove the boot by tapping it with a hammer.



37U0NX 018

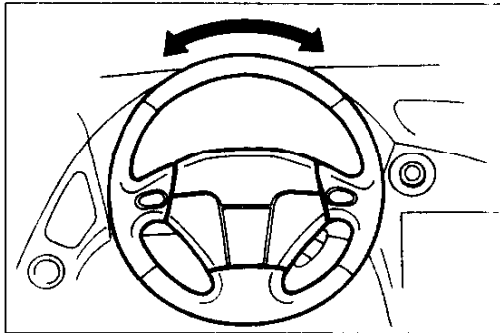
### Installation note

#### Tie rod end boot

1. Wipe away the grease on the ball joint.
2. Put a small amount of grease (lithium base) into the new boot and set it onto the tie rod end.
3. Press the boot onto the tie rod end by using the **SST** and a press.
4. Wipe away any excess grease.

#### Steering gear boot

Verify that the boot is not twisted.



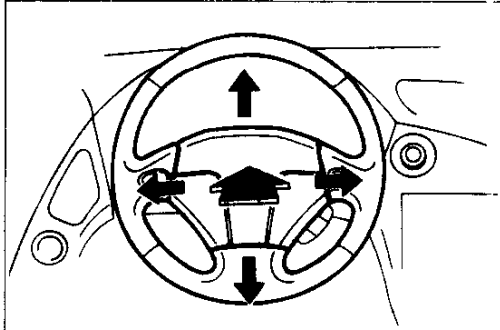
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**STEERING WHEEL AND COLUMN****On-vehicle Inspection****Steering wheel play**

1. With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and verify that the play is within specification.

**Play: 0–30 mm {0–1.18 in}**

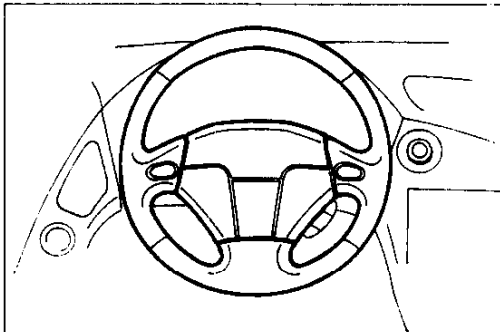
2. If the play exceeds specification, check the steering joints for wear and check the steering gear for excessive backlash. Correct as necessary.



37U0NX-020

**Looseness or play of steering wheel**

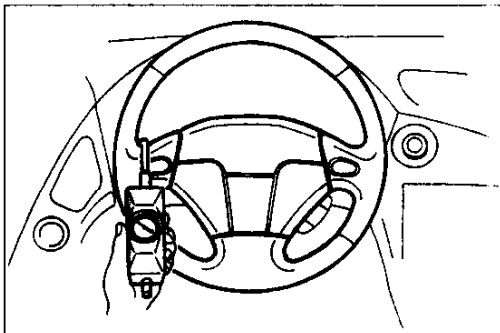
1. Move the steering wheel in the directions of the arrows to check for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.
2. If looseness is noted, inspect for the cause and repair as necessary.



37U0NX-021

**Steering wheel effort**

1. With the vehicle on a hard, level surface, put the wheels in the straight-ahead position.
2. Start the engine and warm the power steering fluid to **50–60°C {122–140°F}**.



37U0NX-022

3. With the engine running at idle, attach a pull scale to the outermost point of the steering wheel spoke. Then, starting with the wheels in the straight-ahead position, measure the effort required to turn the steering wheel to the left and to the right.

**Steering wheel effort:**

**30–38 N {3.0–3.9 kgf, 6.6–8.5 lbf}**

**[during one turn of the steering wheel]**

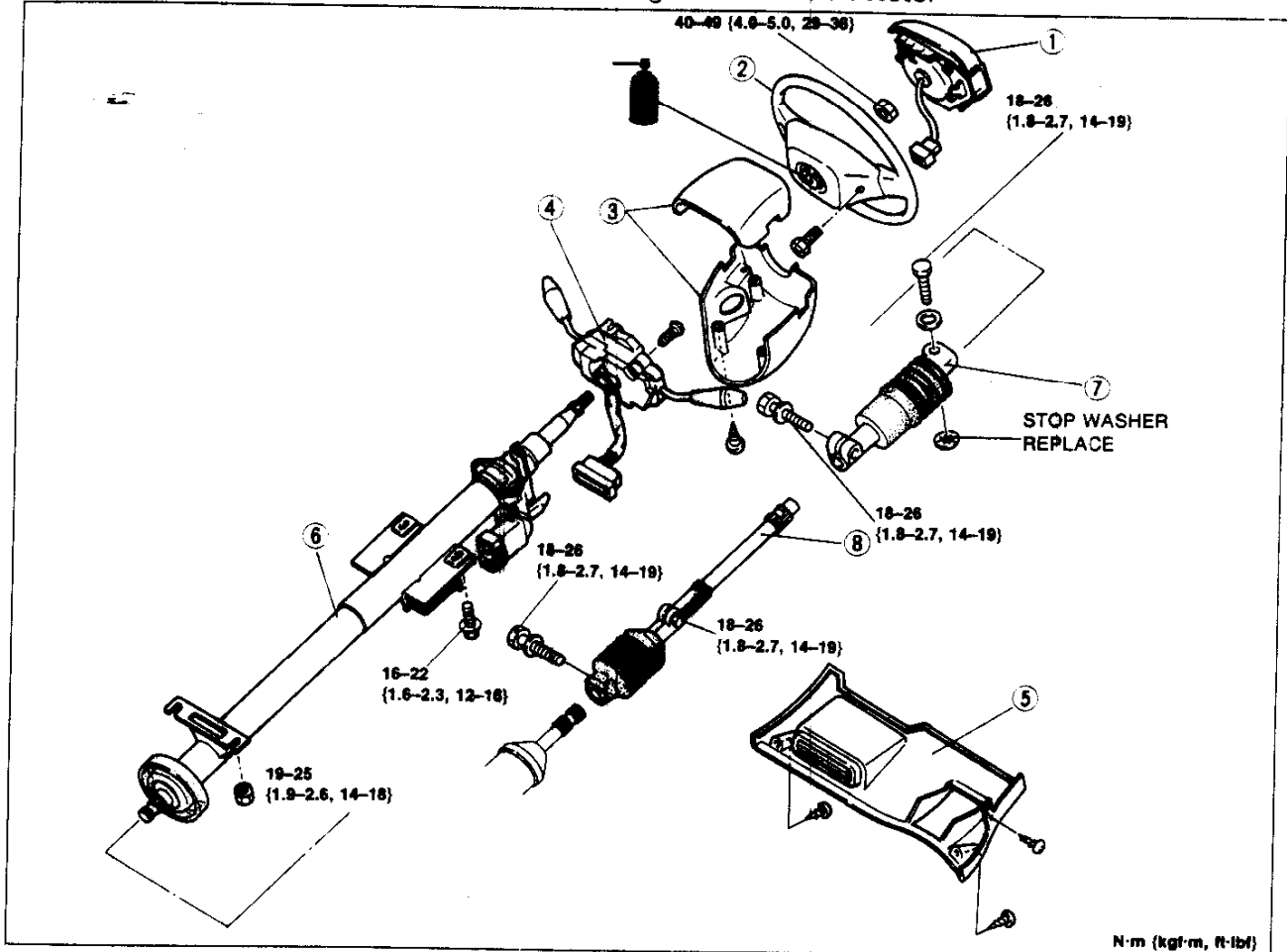
4. If not within specification, check the following: fluid level, air in system, fluid leakage in piping or connections, function of oil pump and gear box, and tire pressures.

### Removal / Inspection / Installation

#### Caution

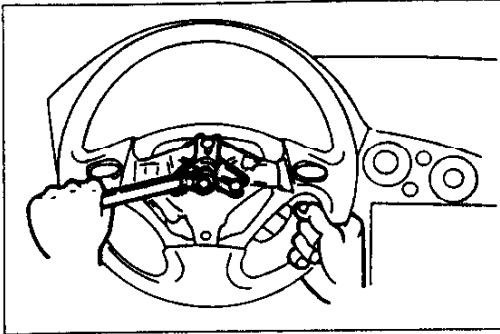
- Refer to the 1993 RX-7 Body Electrical Troubleshooting Manual for removal and installation of the airbag module.
- Adjust the clockspring connector after installing the combination switch. (Refer to the 1993 RX-7 Body Electrical Troubleshooting Manual.)

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.



37U0NX-02

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Air bag module<br/>Service ..... 1993 RX-7 Body Electrical Troubleshooting Manual</li> <li>2. Steering wheel<br/>Removal Note ..... page N-13<br/>Installation Note ..... page N-13</li> <li>3. Column cover</li> <li>4. Combination switch<br/>Service ..... 1993 RX-7 Body Electrical Troubleshooting Manual</li> <li>5. Lower panel</li> </ol> | <ol style="list-style-type: none"> <li>6. Steering shaft assembly<br/>Installation Note ..... page N-13<br/>Disassembly / Inspection / Assembly ..... page N-14<br/>Inspect dust cover for damage</li> <li>7. Steering joint<br/>Installation Note ..... page N-13<br/>Inspect for damage and poor operation<br/>Inspect boot for cracking and tearing</li> <li>8. Intermediate shaft<br/>Installation Note ..... page N-13<br/>Inspect for damage and bending<br/>Inspect boot for cracking and tearing</li> </ol> |
|---|---|

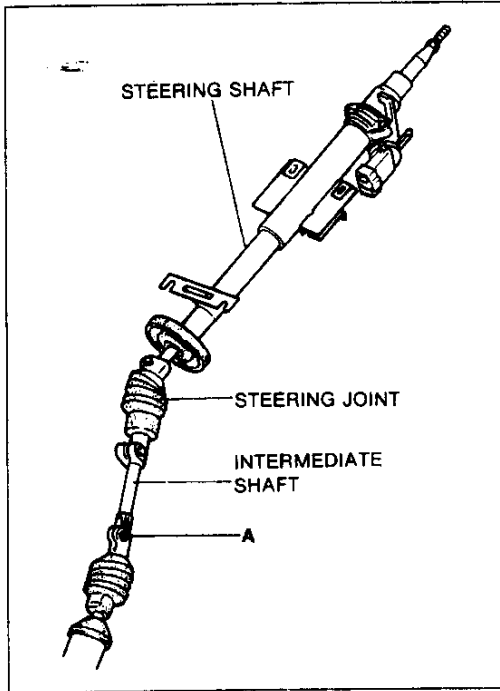


19G0NX-023

## Removal note Steering wheel

### Caution

- Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.
- Remove the steering wheel by using a suitable puller.



37U0NX-024

## Intermediate shaft

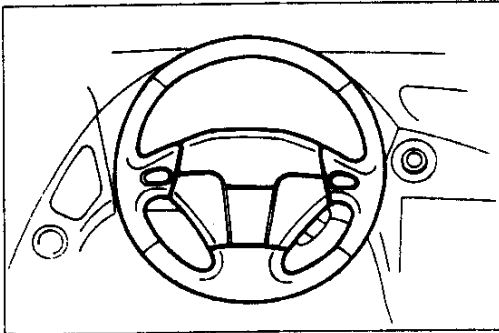
### Caution

- Because bolt A is clamped, it can be loosened, but cannot be removed.

## Installation note

### Steering shaft, steering joint, and intermediate shaft

Assemble the steering shaft, steering joint, and intermediate shaft, then tighten the bolts. Tighten bolt A last.



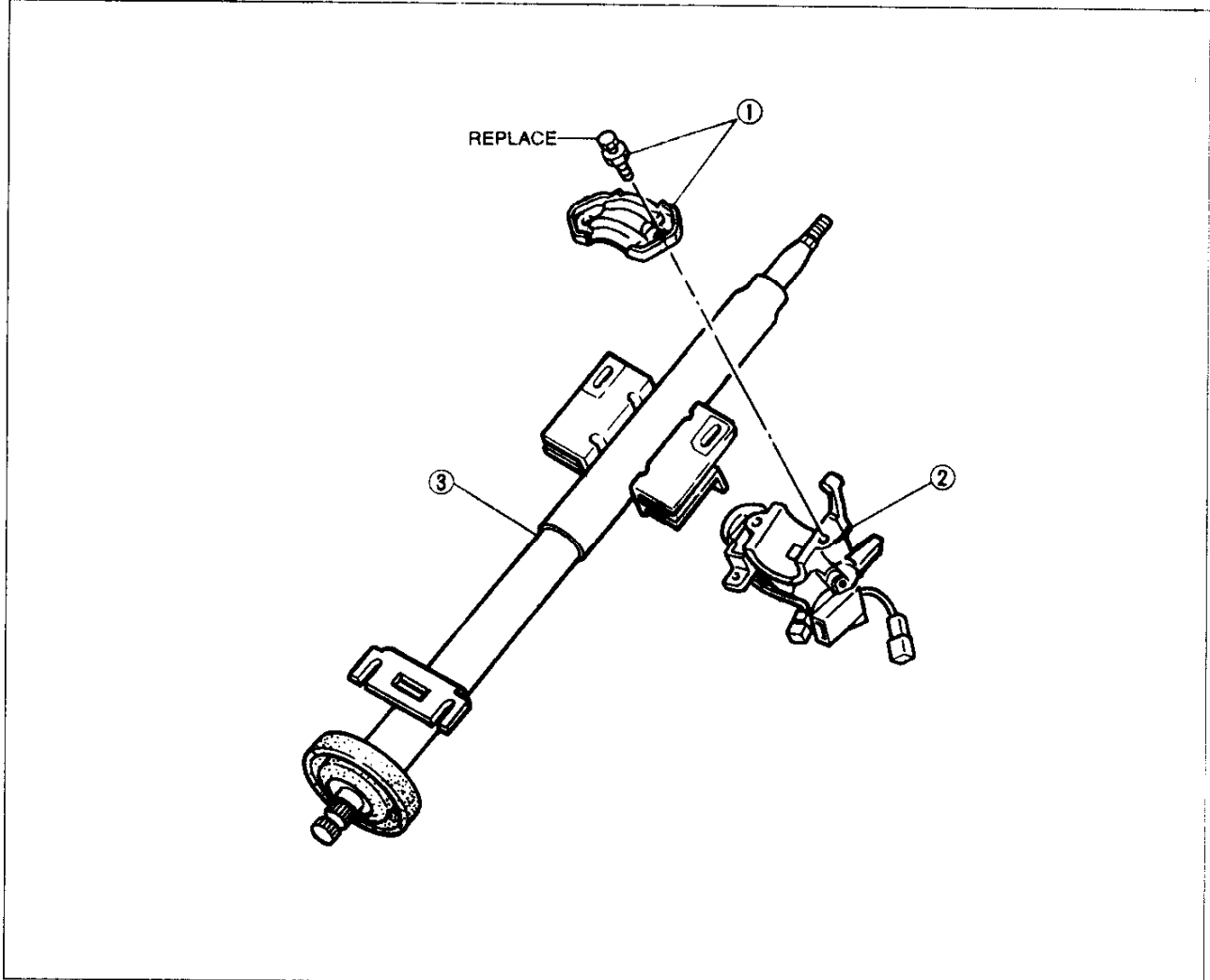
37U0NX-025

## Steering wheel

Install the steering wheel with the wheels in the straight-ahead position.

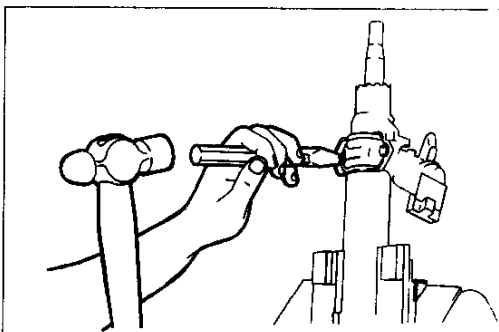
### Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assembly in the reverse order of disassembly, referring to **Assembly Note**.



37U0NX-026

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Steering lock mounting bolts and bracket<br/>Disassembly Note ..... below<br/>Assembly Note ..... page N-15</li> <li>2. Steering lock assembly<br/>Inspection ..... page N-15</li> </ol> | <ol style="list-style-type: none"> <li>3. Steering shaft assembly<br/>Inspection ..... page N-15</li> </ol> |
|--|---|



19G0NX-028

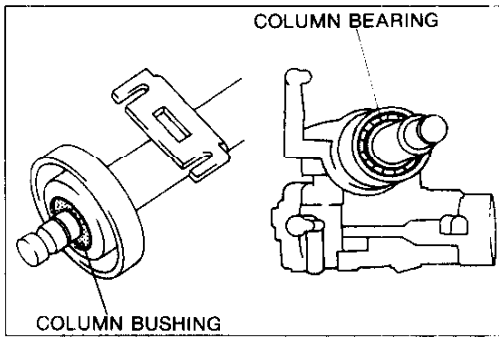
### Disassembly note

#### Steering lock mounting bolts and bracket

#### Caution

- Use protective plates in the jaws of the vise.

1. Secure the steering shaft in a vise.
2. Use a chisel to make a groove in the heads of the steering lock mounting bolts.
3. Remove the bolts by using a screwdriver.
4. Remove the steering lock assembly.

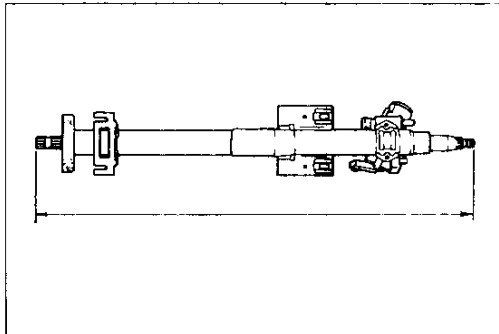


37U0NX-027

**Inspection**  
**Steering shaft assembly**

Check for the following and replace the steering shaft assembly if necessary.

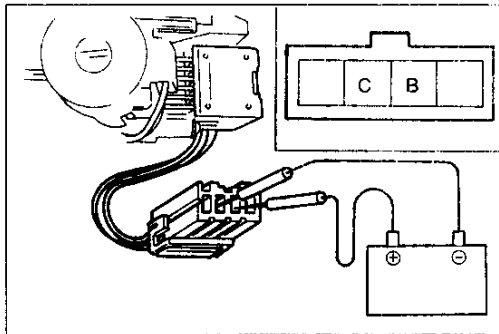
1. Column bearing for damage
2. Column bushing for damage



37U0NX-028

3. Steering shaft length

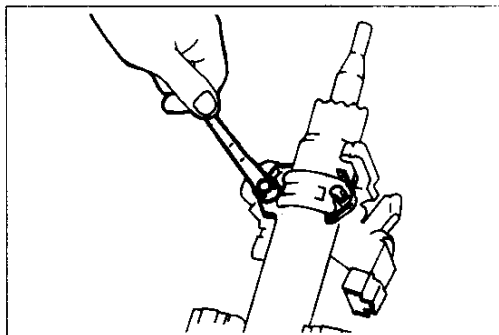
**Length: 779.5–781.5 mm {30.69–30.76 in}**



37U0NX-029

**Steering lock assembly**

1. Insert the ignition key in the key cylinder. Apply battery voltage between terminals B and C.
2. Verify that the solenoid operates.
3. If not as specified replace the key interlock solenoid. (Refer to Section K).



37U0NX-030

**Assembly note**

**Steering lock mounting bolts and bracket**

1. Install the steering lock assembly on the jacket.
2. Verify that the lock operates correctly.
3. Install new steering lock mounting bolts.
4. Tighten each bolt until its head breaks off.



# N

## ENGINE SPEED SENSING POWER STEERING

### STEERING GEAR AND LINKAGE

#### Removal / Installation

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels and tires and the undercover.
3. Remove in the order shown in the figure, referring to **Removal Note**.

#### Note

- Use a container or rags to collect the power steering fluid when disconnecting the pressure hose and return hose.

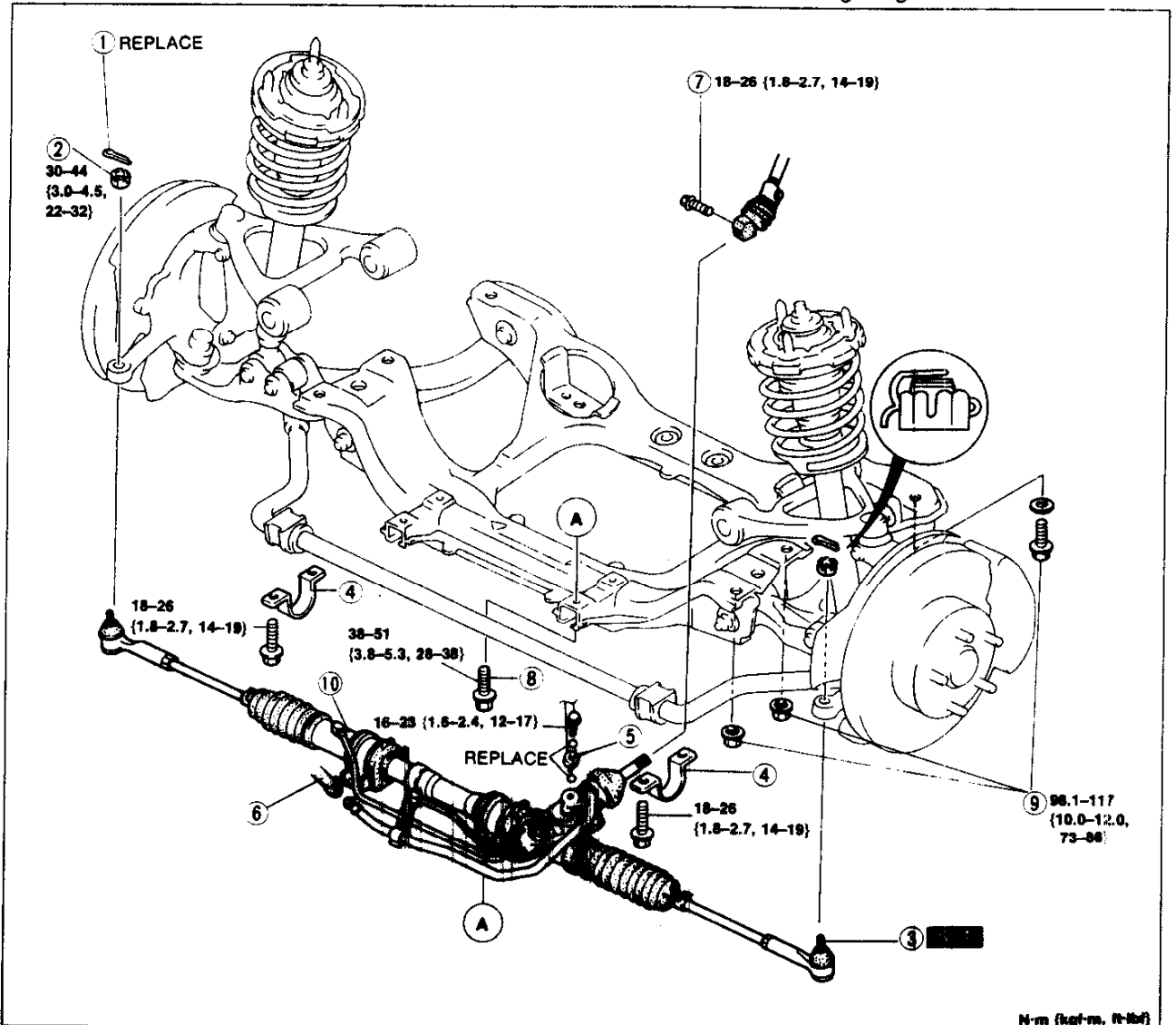
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheels and tires.

**Tightening torque: 89–117 N·m {9–12 kgf·m, 66–86 ft·lb}**

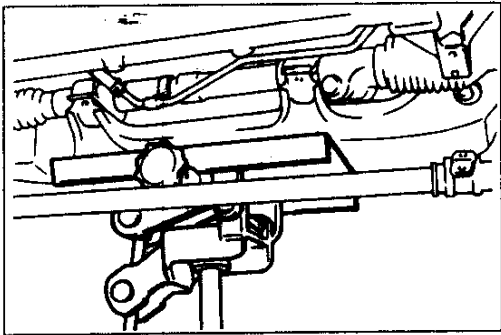
6. Install the undercover.

7. After installation:

- (1) Check for fluid leakage. (Refer to page N-7.)
- (2) Bleed air from the system. (Refer to page N-6.)
- (3) Check, and if necessary adjust, the toe-in and maximum steering angle.



- |   |  |
|---|--|
| 1. Cotter pin   | 7. Bolt (steering joint / pinion shaft)                    |
| 2. Nut  | 8. Mounting bracket bolts<br>Installation Note ..... Below |
| 3. Tie rod end ball joint<br>Removal Note ..... page N-10 | 9. Crossmember nuts and bolts<br>Removal Note ..... Below  |
| 4. Stabilizer bracket                                     | 10. Steering gear and linkage<br>Removal Note ..... Below  |
| 5. Pressure hose<br>Installation Note ..... Below         | Disassembly / Inspection ..... page N-18                   |
| 6. Return hose  | Assembly ..... page N-23                                   |

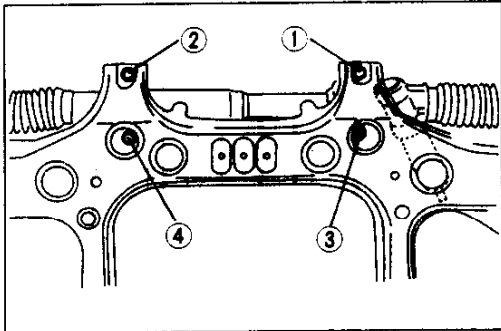


37U0NX-041

### Removal note

#### Crossmember nuts and bolts, steering gear and linkage

1. Support the crossmember with a jack, and remove the crossmember nuts, and bolts.
2. Slowly lower the crossmember and remove the steering gear and linkage.



37U0NX-042

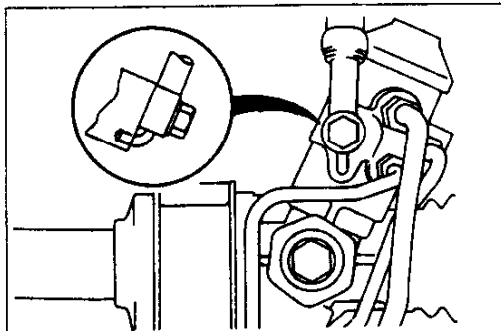
### Installation note

#### Mounting bracket bolts

1. Loosely tighten the bolts 3 and 4.
2. Tighten all of the mounting bracket bolts to the specified torque in the order shown.

#### Tightening torque:

**38-51 N·m {3.8-5.3 kgf-m, 27-38 ft-lbf}**



37U0NX-043

### Pressure hose

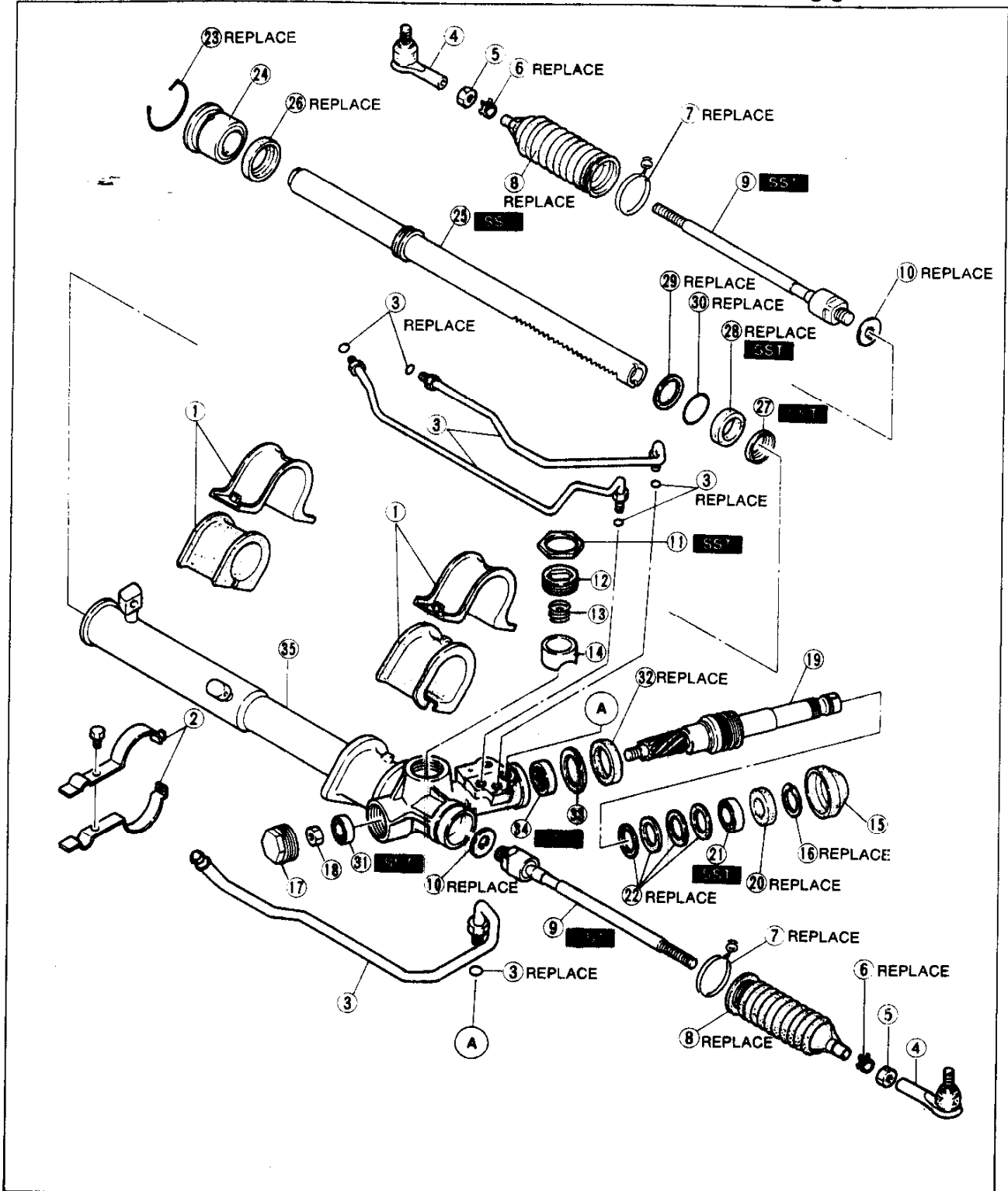
Before assembly, align the pin with the positioning hole.

### Disassembly / Inspection

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.

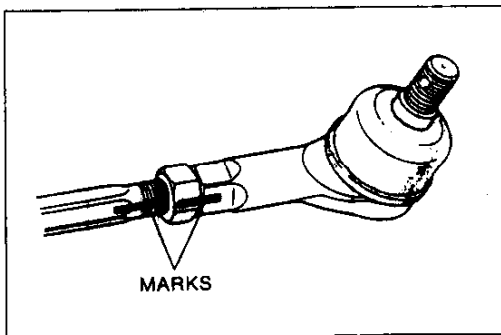
### Caution

- Use protective plates in the jaws of the vise when securing the steering gear.



- 1. Mounting bracket and rubber
- 2. Pipe clamp
- 3. Oil pipe and O-ring  
Inspect for clogging and damage
- 4. Tie rod end  
Inspection ..... page N-22  
Disassembly Note ..... Below
- 5. Locknut (tie rod end)
- 6. Boot clamp
- 7. Boot wire
- 8. Boot  
Disassembly Note ..... Below
- 9. Tie rod  
Inspection ..... page N-22  
Disassembly Note ..... page N-20
- 10. Washer (tie rod)
- 11. Locknut (adjusting cover)  
Disassembly Note ..... page N-20
- 12. Adjusting cover
- 13. Yoke spring  
Inspect for damage
- 14. Support yoke  
Inspect for damage
- 15. Dust cover
- 16. Snap ring
- 17. Housing cover
- 18. Locknut (pinion shaft)
- 19. Pinion shaft assembly  
Inspect teeth for wear and damage  
Inspect valve for clogging,  
damage and wear  
Disassembly Note ..... page N-20
- 20. Oil seal
- 21. Upper bearing  
Inspect for wear and damage  
Disassembly Note ..... page N-20
- 22. Seal ring  
Disassembly Note ..... page N-20
- 23. Clip  
Disassembly Note ..... page N-21
- 24. Rack stop  
Disassembly Note ..... page N-21
- 25. Rack  
Disassembly Note ..... page N-21  
Inspection ..... page N-22
- 26. Oil seal  
Disassembly Note ..... page N-21
- 27. Backup washer  
Disassembly Note ..... page N-21
- 28. Oil seal  
Disassembly Note ..... page N-21
- 29. Seal ring  
Disassembly Note ..... page N-21
- 30. O-ring  
Disassembly Note ..... page N-21
- 31. Lower bearing  
Disassembly Note ..... page N-21  
Inspect for wear and damage
- 32. Oil seal  
Disassembly Note ..... page N-21
- 33. Washer
- 34. Needle bearing  
Disassembly Note ..... page N-22  
Inspect for wear and damage
- 35. Gear housing  
Inspect for damage and cracks

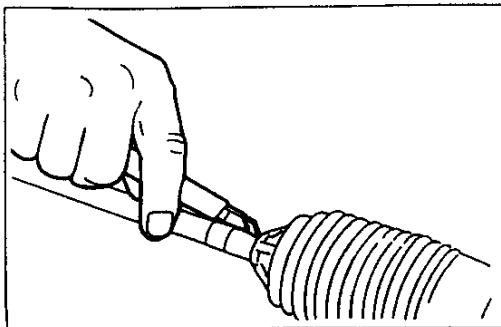
37U0NX-044



37U0NX-045

**Disassembly note**  
**Tie rod end**

Before loosening, mark the tie rod end as shown for reference during installation.



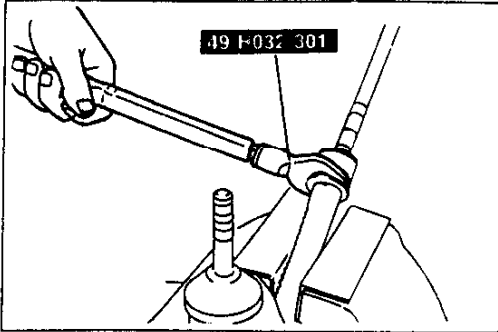
37U0NX-016

**Boot**

If the boot is difficult to remove, use a razor knife to cut open the small diameter end.

# N

## ENGINE SPEED SENSING POWER STEERING



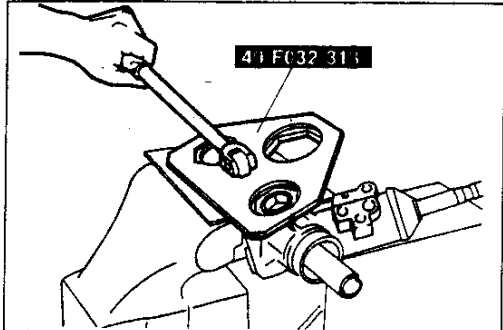
37U0NX-046

### Tie rod

1. Unbend the washer
2. Remove the tie rod by using the **SST**.

#### Caution

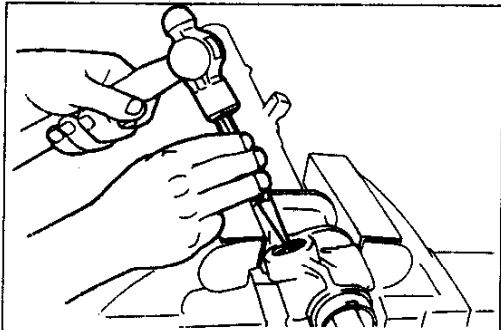
- Use protective plates in the vise when securing the rack teeth.



37U0NX-047

### Locknut

Remove the locknut by using the **SST**.

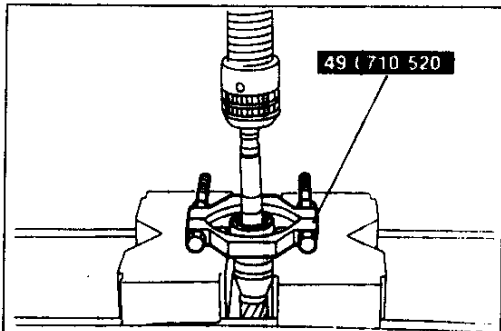


### Pinion shaft assembly

Place a punch on the center of the shaft, and tap lightly with a hammer to remove it.

#### Caution

- Support the pinion shaft assembly to prevent it from falling.

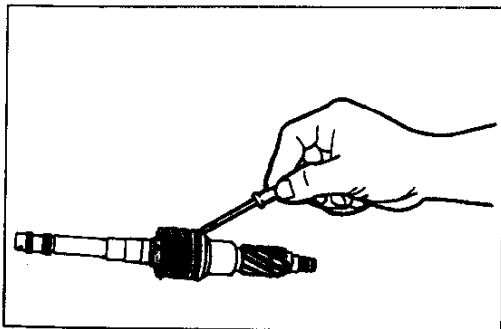


37U0NX-049

### Upper bearing

#### Caution

- Do not remove the upper bearing if not necessary.
- Remove the upper bearing by using the **SST**.

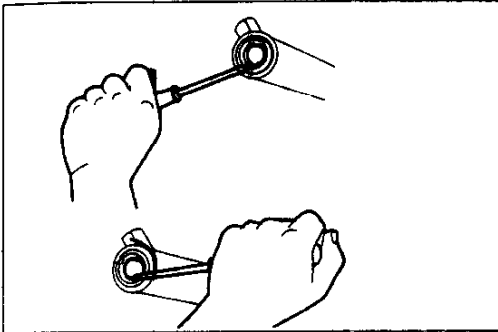


### Seal ring

#### Caution

- Do not damage the pinion shaft ring groove.

Remove the seal ring from the pinion shaft by using a small screwdriver.



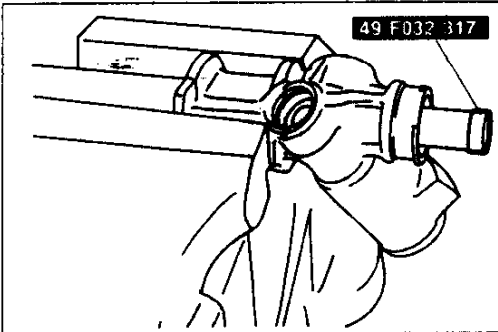
37U0NX-051

### Clip and rack stop

#### Caution

- Do not forcefully turn the rack stop.

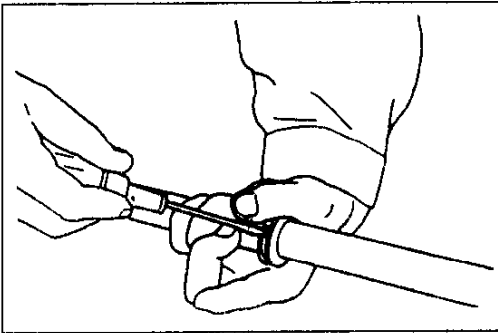
1. Turn the rack stop in the direction easiest to turn until the end of the clip pops out.
2. Turn the rack stop the opposite direction and remove the clip.
3. Remove the rack stop.



37U0NX-052

### Rack, oil seal and backup washer

1. Set the **SST** into the end of the rack.
2. Pull out the rack assembly, with the oil seal and backup washer.



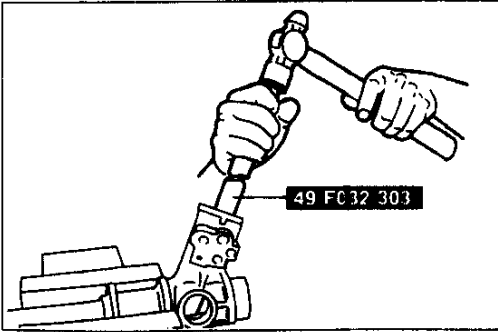
37U0NX-053

### Seal ring and O-ring

#### Caution

- Do not damage the piston groove.

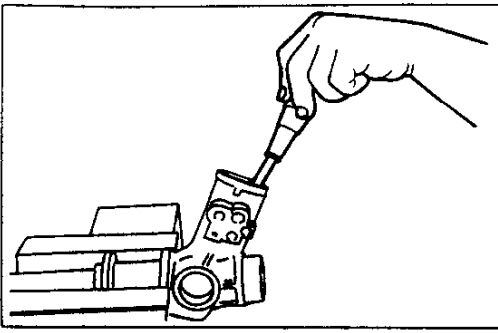
1. Remove the seal ring by using a small screwdriver.
2. Remove the O-ring.



19G0NX-047

### Lower bearing

Drive the lower bearing out of the housing by using the **SST**.



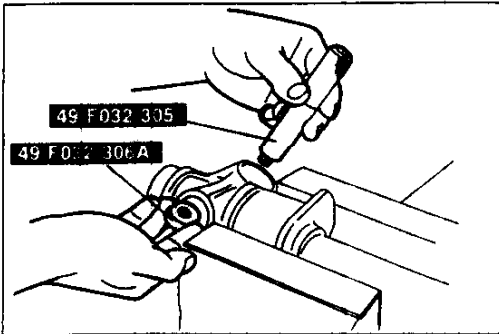
37U0NX-054

### Oil seal

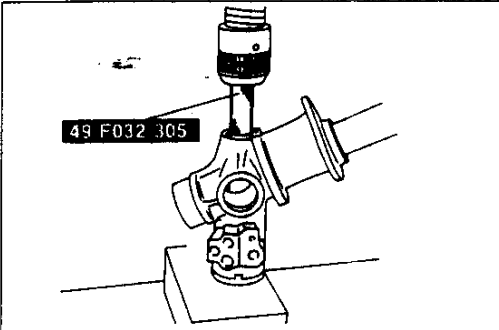
#### Caution

- Do not damage the inside of the valve housing.

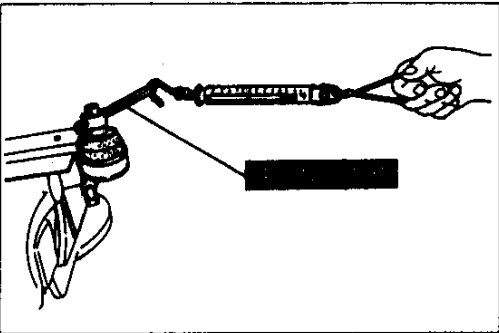
Remove the oil seal by using a screwdriver.



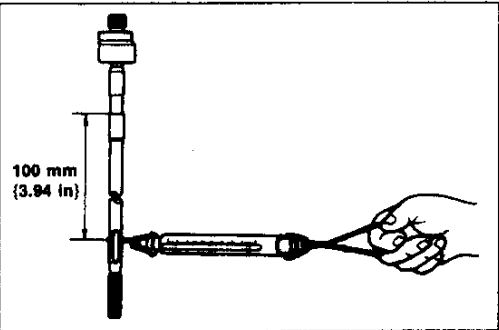
37U0NX-055



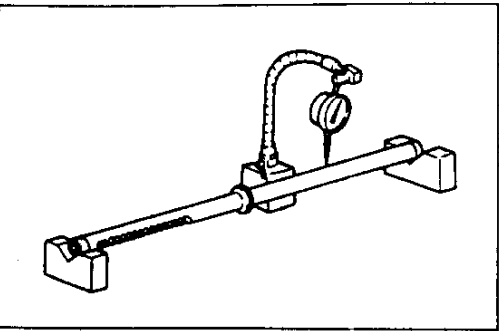
37U0NX-056



37U0NX-057



37U0NX-058



37U0NX-059

### Needle bearing

1. Insert the **SST** (body) through the adjusting cover hole.
2. Set the **SST** (handle) against the **SST** of Step 1.

3. Press out the needle bearing by using **SST**.

### Inspection Tie rod end

1. Inspect the tie rod end for damage and the boot cracks. Replace as necessary.
2. Inspect the ball joint for looseness. Replace the tie rod end if necessary.
3. Shake and rotate the ball joint several times.
4. Measure the rotation torque of the ball joint by using the **SST** and a pull scale.

**Rotation torque: 0.3–2.9 N·m {3–30 kgf·cm, 2.6–26in·lbf}**

**Pull scale reading: 3–29 N {0.3–3kgf, 0.7–6.6 lbf}**

5. If not within specification, replace the tie rod end.

### Tie rod

1. Inspect the tie rod for bending and damage. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie rod necessary.
3. Swing the tie rod several times.
4. Measure the swinging torque by using a pull scale.

**Swinging torque: 0.1–3.4N·m {1–35 kgf·cm, 0.9–30 in·lbf}**

**Pull scale reading: 0.7–21 N {0.07–2.2 kgf, 0.16–4.8 lbf}**

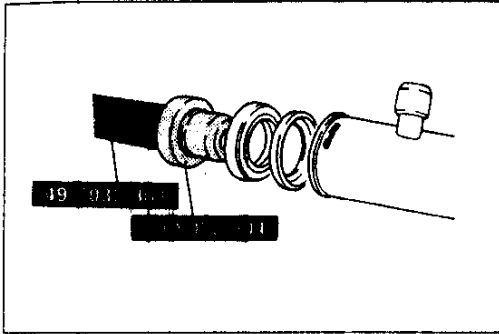
5. If not within specification, replace the tie rod.

### Rack

1. Inspect the rack for cracking, damage and tooth wear. Replace it if necessary.
2. Measure runout of the rack.

**Runout: 0.4 mm {0.016 in} max.**

3. If not within specification, replace the rack.

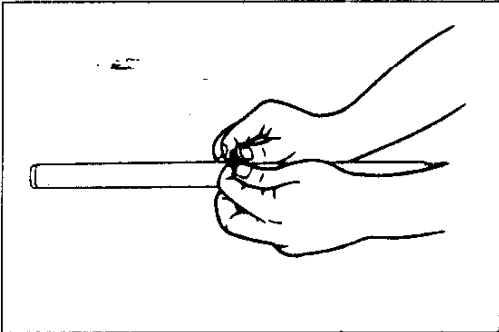


37U0NX-060

**Assembly**

**1. Backup washer and oil seal**

- (1) Apply ATF to the new oil seal.
- (2) Install the backup washer and oil seal by using the **SST**.
- (3) After installing, shake the gear housing and verify that the backup washer does not rattle.
- (4) If it rattles, remove the oil seal and backup washer and reinstall them.



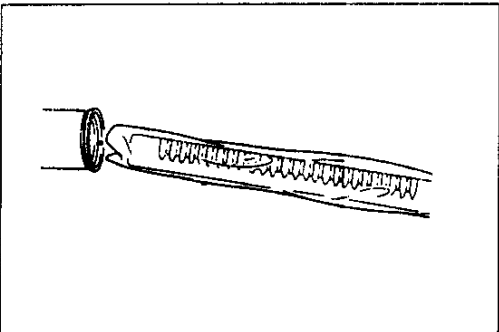
37U0NX-061

**2. Rack**

- (1) Apply ATF to a new O-ring and seal ring.
- (2) Install the O-ring then seal ring in the piston groove.

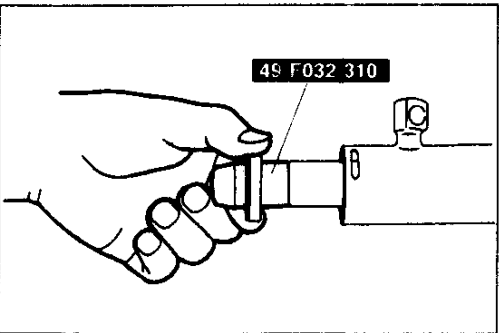
**Caution**

- Do not damage the piston groove.



37U0NX-062

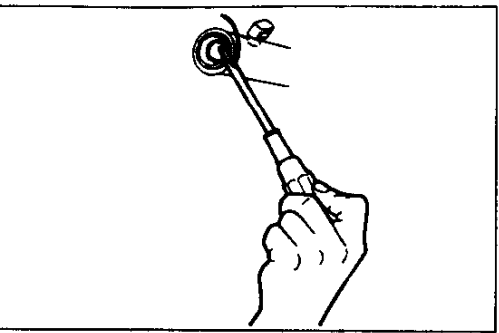
- (3) Apply grease to the friction surface and teeth of the rack.
- (4) Slide the vinyl sleeve supplied in the seal kit over the rack and slide the rack in from the tube side.
- (5) Remove the vinyl sleeve.



37U0NX-063

**3. Oil seal**

- (1) Set the **SST** onto the end of the rack.
- (2) Apply ATF to the new oil seal and slide it onto the and into the rack housing.

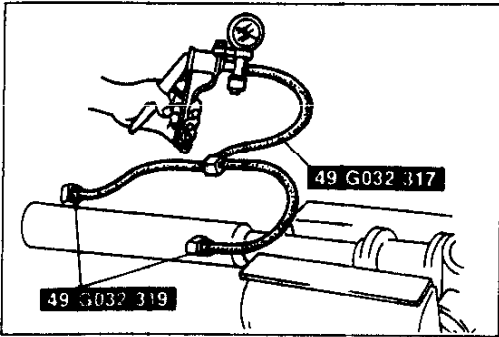


37U0NX-064

**4. Rack stop and clip**

- (1) Turn the rack stop into the housing until the holes of the stop and rack housing are aligned.
- (2) Install the new clip.
- (3) Turn the rack stop until the clip is fully installed (approx. 1.5 turns).

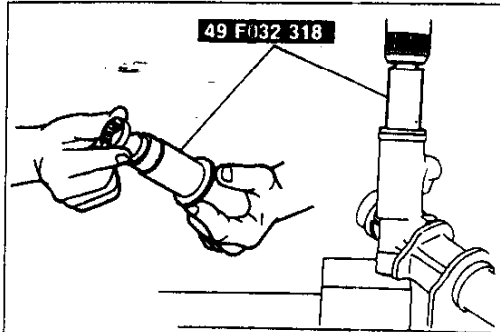




37U0NX-065

### 5. Hermetic inspection of cylinder

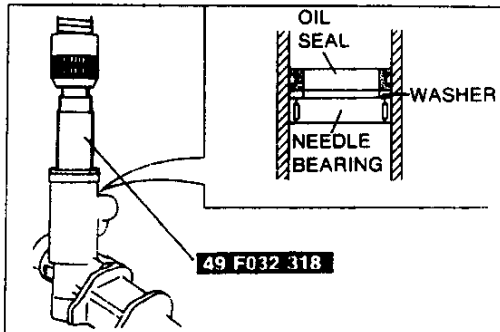
- (1) Connect the **SST** (adapters) to the cylinder housing.
- (2) Connect a vacuum pump to the **SST** (hose) and apply **53.3 KPa {400mmHg}** vacuum.
- (3) Verify that vacuum is held for at least **30 seconds**. If not, replace the oil seals.



37U0NX-066

### 6. Needle bearing

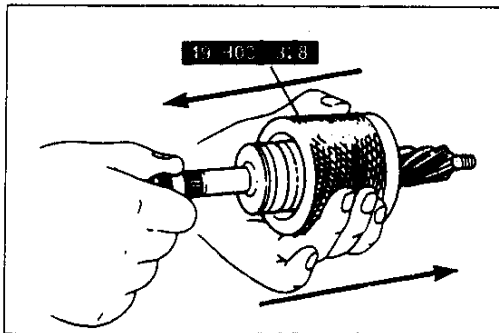
- (1) Press in the needle bearing by using the **SST**.
- (2) Apply grease to the needle bearing.



37U0NX-067

### 7. Washer and oil seal

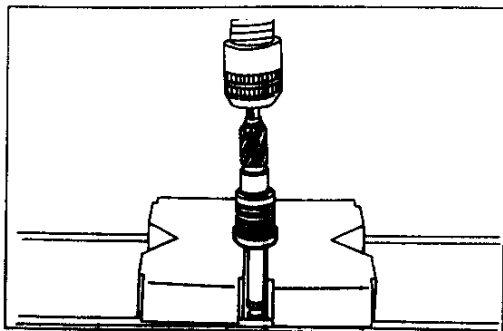
- (1) Install the washer
- (2) Apply ATF to the new oil seal.
- (3) Press in the oil seal by using the **SST**.



37U0NX-068

### 8. Seal ring

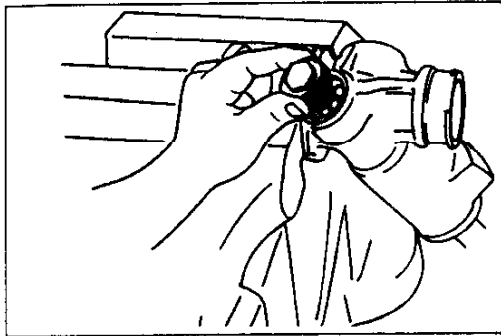
- (1) Apply ATF to the new seal rings.
- (2) Install the seal rings onto the pinion shaft assembly.
- (3) Pass the pinion shaft assembly back and forth through the **SST** to form the seal rings.



37U0NX-069

### 9. Upper bearing

- Press the upper bearing onto the pinion shaft assembly.

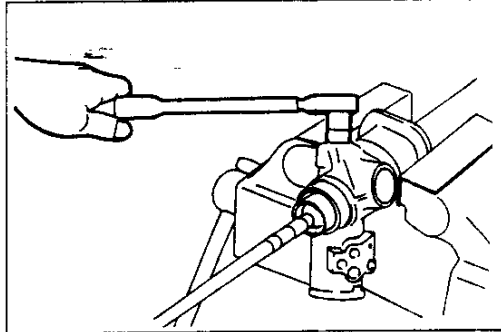


37U0NX-070

**10. Pinion shaft assembly and lower bearing**

- (1) Apply grease to the teeth of the rack.
- (2) Insert the pinion shaft assembly into the gear housing.
- (3) Apply grease to the lower bearing and install it onto the pinion shaft.
- (4) Seat the bearing by installing the housing cover and gradually tightening it until the tightening force suddenly increases.

- (5) Remove the housing cover.



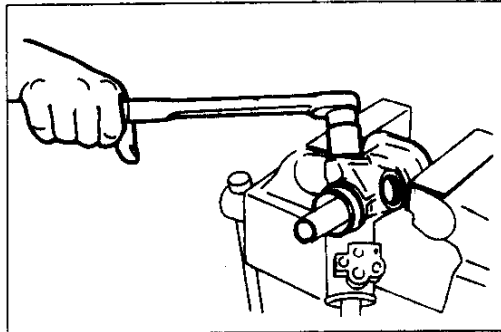
37U0NX-071

**11. Locknut (pinion shaft)**

- (1) Temporarily install the tie rod to hold the rack.
- (2) Tighten the pinion shaft locknut.

**Tightening torque:**

**20–29 N·m {2.0–3.0 kgf·m, 15–21 ft·lbf}**



37U0NX-072

**12. Housing cover**

- (1) Apply sealant to the threads of the housing cover.

**Note**

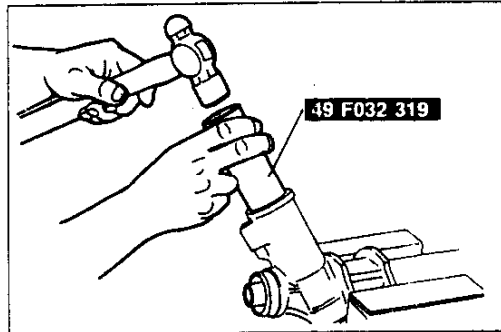
- **Do not use excessive sealant.**

- (2) Install the housing cover.

**Tightening torque:**

**50–69 N·m {5.0–7.0 kgf·m, 36–50 ft·lbf}**

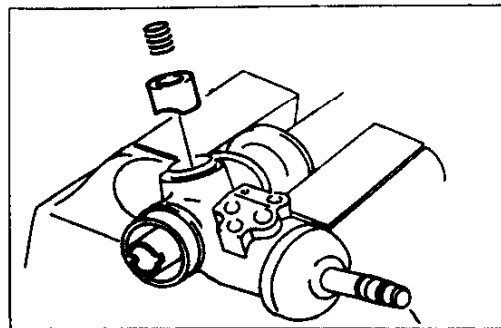
- (3) Stake the housing cover at two points by using a center punch.



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**13. Oil seal (upper pinion shaft)**

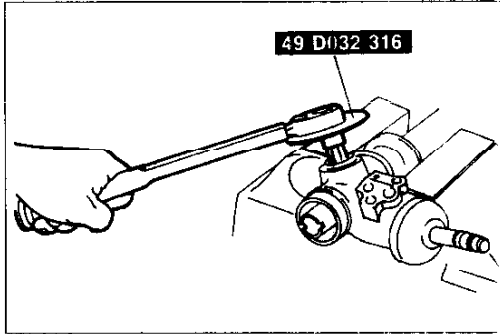
- (1) Install the new oil seal by using the **SST**.
- (2) Install the new snap ring.
- (3) Install the dust cover.



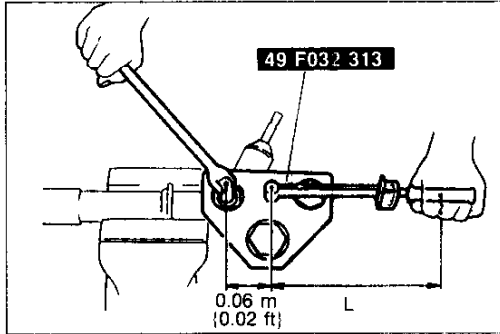
37U0NX-074

**14. Support yoke assembly**

- (1) Apply grease to the friction surface of the support yoke.
- (2) Install the support yoke and the yoke spring.



37U0NX-075



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### 15. Adjusting cover and locknut

- (1) Apply sealant to the threads of the adjusting cover.
- (2) Tighten the adjusting cover to **9.81 N·m {100 kgf·cm, 86.8 in·lbf}**. To obtain good rack-and-pinion engagement, move the rack full stroke ten times, then return the adjusting cover **20–25 degrees**.

#### Note

- **Turning angle is determined by using the SST.**

- (3) Tighten the locknut by using the **SST**.

#### Caution

- **When tightening the locknut with the SST, adjust the below-written tightening torque by using the following formulas. Choose the formula that applies to you.**

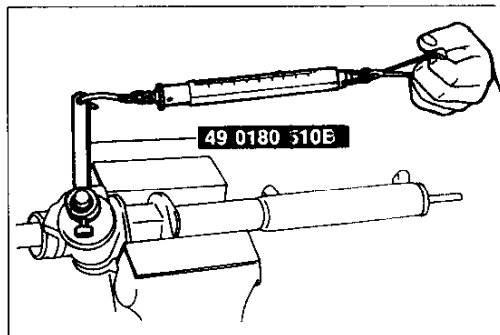
(L = torque wrench length)

N·m	$N \cdot m \times L \div (L + 0.06)$
kgf·m	$kgf \cdot m \times L \div (L + 0.06)$
ft·lbf	$ft \cdot lbf \times L \div (L + 0.02)$

#### Tightening torque:

**50–68 N·m {5.0–7.0 kgf·m, 37–50 ft·lbf}**

- **Do not allow the adjusting cover to turn.**



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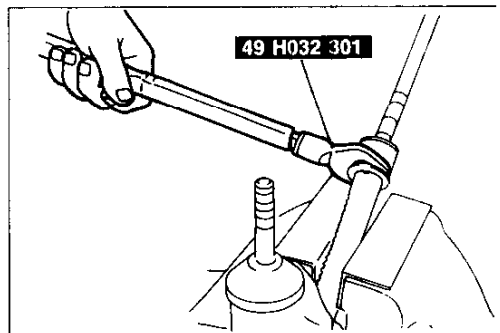
### 16. Measurement of pinion preload

- (1) Attach the **SST** and a pull scale to the pinion shaft.
- (2) Measure the pinion preload. (Center of rack  $\pm 90$  degrees)

**Pinion preload: 1.5 N·m {15 kgf·cm, 13 in·lbf} max.**

**Pull scale reading: 1.5 kg {3.3 lbf} max.**

- (3) If not within specification, repeat Steps 15 (2) and 15 (3).



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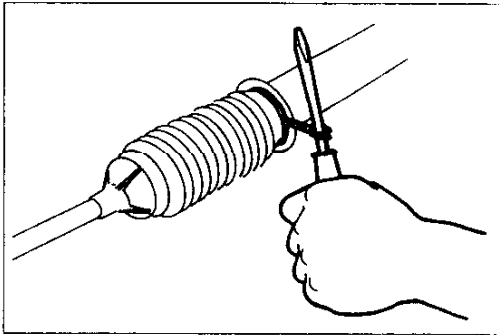
### 17. Tie rod

- (1) Install the tie rod by using **SST**.

#### Tightening torque:

**78–98 N·m {8.0–10.0 kgf·m, 58–72 ft·lbf}**

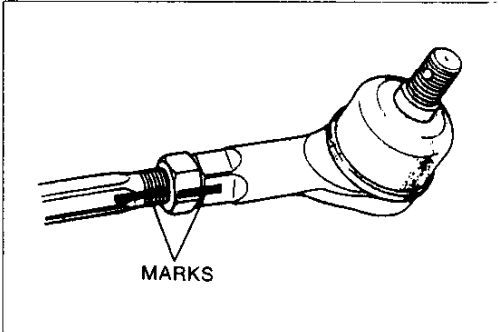
- (2) Bend the new washer at two places to hold the tie rod.



37U0NX 079

**18. Boot**

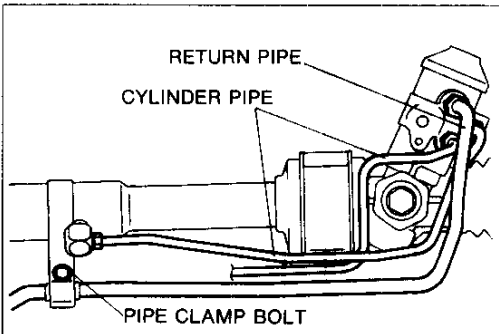
- (1) Apply grease to the inner bore of the small end of the boot.
- (2) Install the boot. Wrap a new boot wire around the large end of the boot two times and then twist it 4–4.5 times. Bend the twisted part toward mounting bracket.
- (3) Install a new boot clamp on the small end of the boot.
- (4) Slide the rack its full stroke and verify that the boot is not twisted.



37U0NX 080

**19. Tie rod end**

Install the tie rod end and align the reference marks.



37U0NX 081

**20. Oil pipe and O-ring**

- (1) Install the new O-rings and the oil pipes.
- (2) Install the pipe clamp.

**Tightening torque**

**Return pipe: 24–29 N·m {2.4–3.0 kgf·m, 17–22 ft·lbf}**

**Cylinder pipe: 9.81–15.6 N·m**

**{100–160 kgf·cm, 86.9–138 in·lbf}**

**Pipe clamp bolt: 5.0–6.8 N·m**

**{50–70 kgf·cm, 44–60 in·lbf}**

**21. Mounting rubber and bracket**

Install the mounting rubber and bracket

### POWER STEERING OIL PUMP

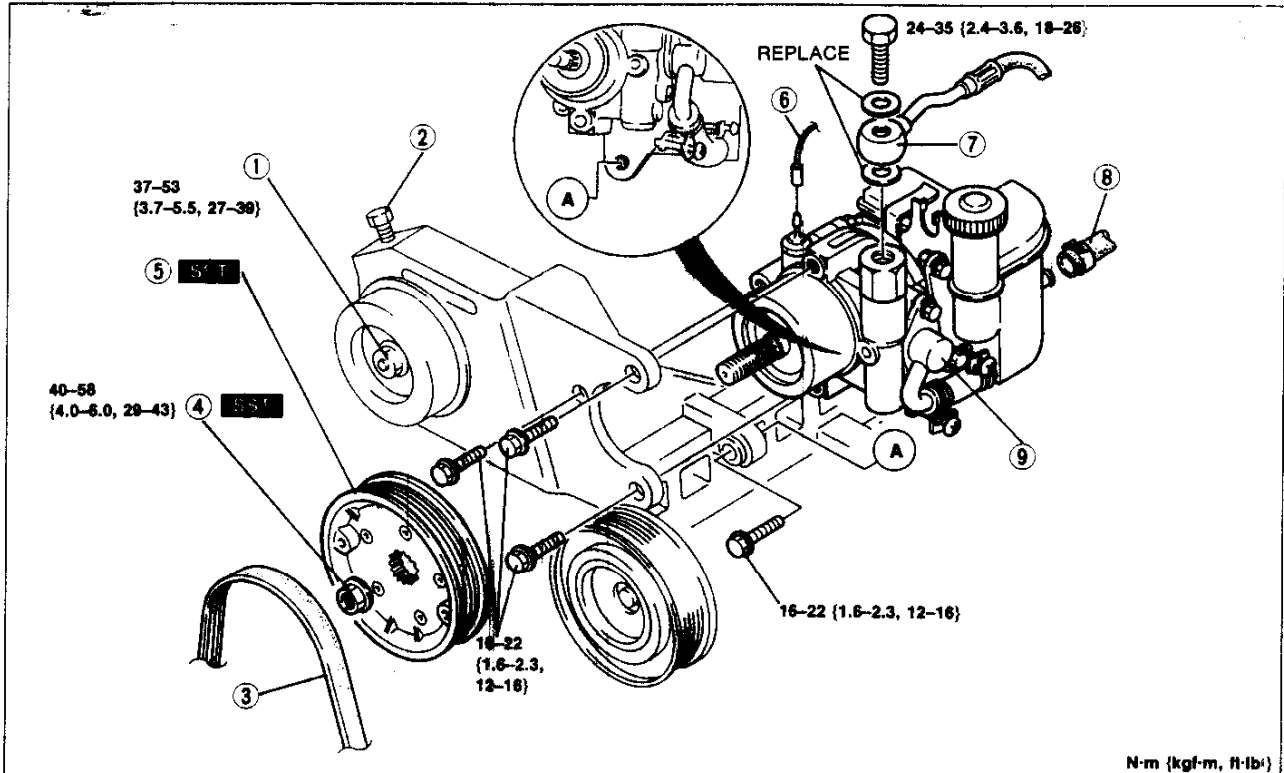
#### Removal / Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.

#### Note

- Use a container or rags to collect the power steering fluid when disconnecting the pressure pipe and return hose.

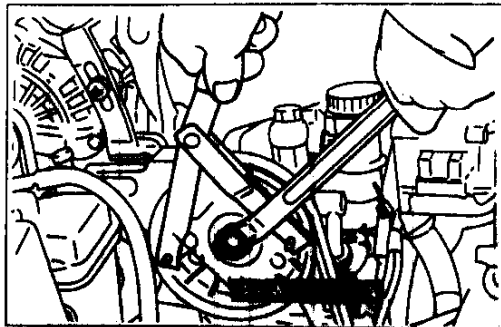
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation:
  - (1) Adjust the belt deflection. (Refer to page N-31.)
  - (2) Check connections for fluid leakage. (Refer to page N-7.)
  - (3) Bleed air from the system. (Refer to page N-6.)



N-m (kgf-m, ft-lb)

37U0NX-032

- |   |                              |
|---|------------------------------|
| 1. Locknut                              | 6. Pressure switch connector |
| 2. Adjusting bolt                       | 7. Pressure hose             |
| 3. Drive belt                           | 8. Return hose               |
| 4. Nut                                  | 9. Power steering oil pump   |
| Removal / Installation Note ..... below | Disassembly / Inspection /   |
| 5. Pulley                               | Assembly ..... page N-29     |
| Removal / Installation Note ..... below |                              |



37U0NX-083

#### Removal / Installation note Nut / Pulley

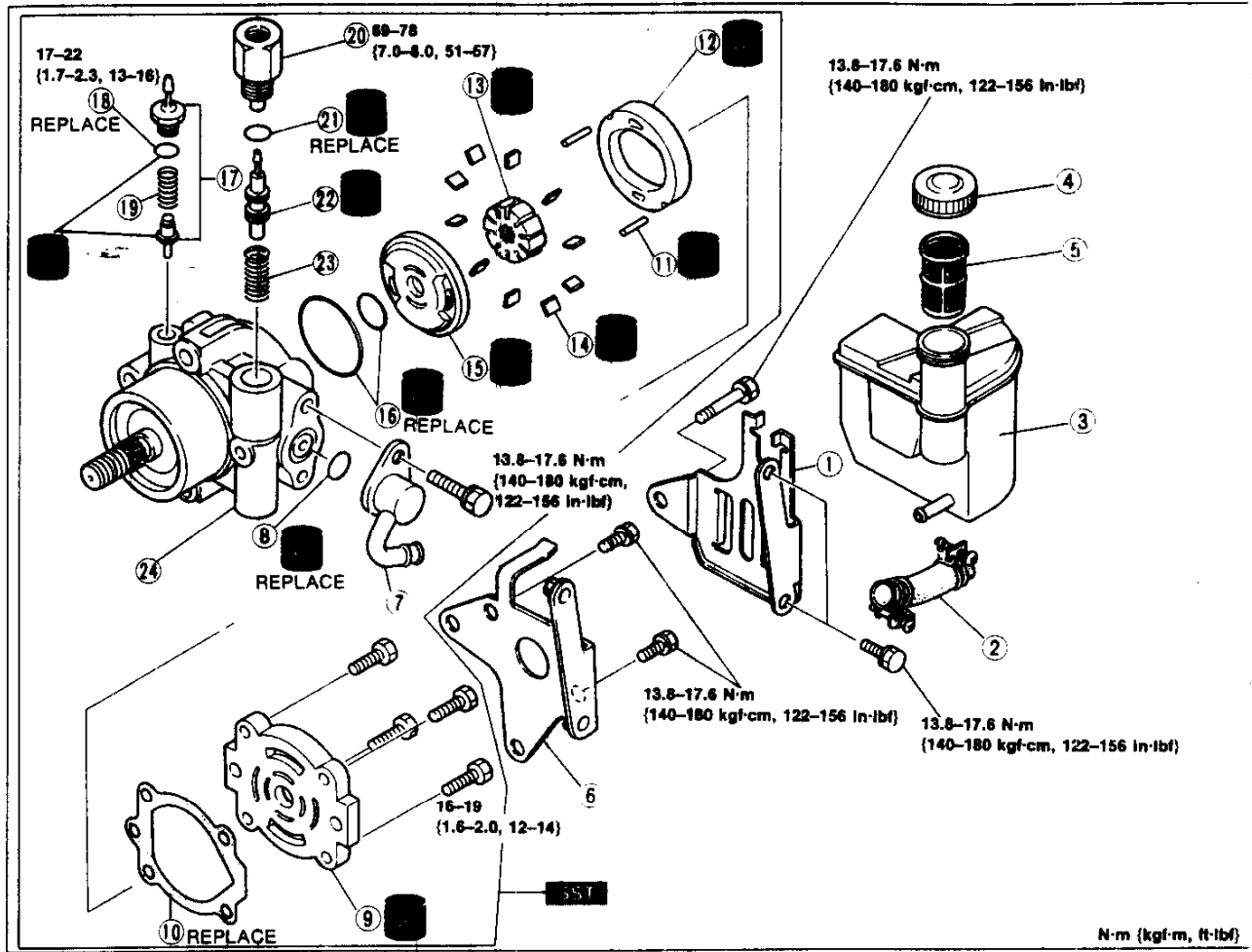
Hold the pulley by using the **SST** and loosen / tighten the nut.

#### Caution

- Do not drop the pulley. Replace it if it is subjected to a strong impact.

**Disassembly / Inspection / Assembly**

1. The following procedure is for replacement of the O-rings only. Replace the oil pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



37U0NX-084

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Bracket</li> <li>2. Suction hose<br/>Inspect for cracks and damage</li> <li>3. Reservoir<br/>Inspect for cracks and damage</li> <li>4. Cap</li> <li>5. Filter<br/>Inspect for clogging</li> <li>6. Bracket</li> <li>7. Suction pipe</li> <li>8. O-ring</li> <li>9. Pump body (rear)<br/>Assembly Note ..... page N-30<br/>Inspect for cracks, wear, and damage</li> <li>10. Gasket</li> <li>11. Pin</li> <li>12. Cam ring<br/>Assembly Note ..... page N-30<br/>Inspect for wear and damage</li> <li>13. Rotor<br/>Inspect for wear and damage</li> </ol> | <ol style="list-style-type: none"> <li>14. Blade<br/>Assembly Note ..... page N-30<br/>Inspect for wear and damage</li> <li>15. Side plate<br/>Inspect for wear and damage</li> <li>16. O-ring</li> <li>17. Pressure switch assembly</li> <li>18. O-ring</li> <li>19. Spring<br/>Inspect for weakness</li> <li>20. Connector</li> <li>21. O-ring</li> <li>22. Control valve<br/>Inspect for clogging, cracks, and damage</li> <li>23. Spring<br/>Inspect for weakness</li> <li>24. Pump body (front)<br/>Inspect for cracks, wear, and damage</li> </ol> |
|---|--|

