

# PS

## SECTION

### POWER STEERING SYSTEM

## CONTENTS

<b>PRECAUTIONS</b>	3	INSPECTION AFTER INSTALLATION	13
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	3	Disassembly and Assembly	14
Precautions for Steering System	3	COMPONENT	14
<b>PREPARATION</b>	4	DISASSEMBLY	14
Special Service Tools [SST]	4	INSPECTION AFTER DISASSEMBLY	14
<b>NOISE, VIBRATION AND HARSHNESS (NVH)</b>		ASSEMBLY	14
<b>TROUBLESHOOTING</b>	5	INSPECTION AFTER ASSEMBLY	15
NVH Trouble shooting Chart	5	<b>POWER STEERING GEAR AND LINKAGE</b>	16
<b>POWER STEERING FLUID</b>	6	Removal and Installation	16
Checking Fluid Level	6	COMPONENT	16
Checking Fluid Leakage	6	REMOVAL	16
Air Bleeding Hydraulic System	6	INSTALLATION	17
<b>STEERING WHEEL</b>	8	Disassembly and Assembly	18
On-Vehicle Inspection and Service	8	COMPONENT	18
CHECKING CONDITION OF INSTALLATION	8	DISASSEMBLY	19
CHECKING STEERING WHEEL PLAY	8	INSPECTION AFTER DISASSEMBLY	20
CHECKING NEUTRAL POSITION STEERING WHEEL	8	ASSEMBLY	22
CHECKING STEERING WHEEL TURNING FORCE	8	<b>POWER STEERING OIL PUMP</b>	27
CHECKING FRONT WHEEL TURNING ANGLE	9	On-Vehicle Inspection and Service	27
Removal and Installation	10	OIL PUMP PULLEY HYDRAULIC PRESSURE	
REMOVAL	10	INSPECTION	27
INSTALLATION	10	Removal and Installation (QR20DE and QR25DE	
<b>STEERING COLUMN</b>	11	Engine Models)	27
Removal and Installation	11	REMOVAL	27
COMPONENT	11	INSTALLATION	27
REMOVAL OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL	11	Disassembly and Assembly (QR20DE and QR25DE	
INSTALLATION OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL	12	Engine Models)	28
REMOVAL OF STEERING COLUMN ASSEMBLY	12	INSPECTION BEFORE DISASSEMBLY	28
INSPECTION AFTER REMOVAL	13	DISASSEMBLY	28
INSTALLATION OF STEERING COLUMN ASSEMBLY	13	INSPECTION AFTER DISASSEMBLY	29

---

<b>HYDRAULIC LINE .....</b>	<b>37</b>	Steering Column .....	45
Component .....	37	Steering Outer Socket and Inner Socket .....	45
REMOVAL AND INSTALLATION .....	44	Steering Gear .....	46
<b>SERVICE DATA AND SPECIFICATIONS (SDS) ....</b>	<b>45</b>	Oil Pump .....	46
Steering Wheel .....	45	Steering Fluid .....	46
Steering Angle .....	45		

# PRECAUTIONS

## PRECAUTIONS

PFP:00001

### Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

BGS0000Y

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

#### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

### Precautions for Steering System

BGS0000Z

- In case of removing steering gear assembly, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment.
- Observe the following precautions when disassembling.
  - Before disassembly, thoroughly clean the outside of the unit.
  - Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
  - For easier and proper assembly, place disassembled parts in order on a parts rack.
  - Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
  - Do not reuse non-reusable parts.
  - Before assembling, apply the specified grease to the directed parts.

# PREPARATION

## PREPARATION

PFP:00002

### Special Service Tools [SST]

BGS00010

Tool number Tool name	Description
<p>ST3127S000 Preload gauge 1. GG9103000 Torque wrench 2. HT62940000 Socket adapter 3. HT62900000 Socket adapter</p> <p>1/4" 1/4" to 3/8" 3/8" to 1/2"</p> <p>Torque wrench with range of 2.9 N·m (30 kg·cm, 26 in·lb)</p> <p>S-NT541</p>	Inspecting of steering wheel rotating torque and rotating torque for ball joint
<p>ST27180001 Steering wheel puller</p> <p>29 mm (1.14 in) M10 x 1.25 pitch M8 x 1.25 pitch</p> <p>S-NT544</p>	Removing steering wheel
<p>KV489Q0020 Teflon ring correcting tool a: 50 mm (1.97 in) dia. b: 36 mm (1.42 in) dia. C: 100 mm (3.94 in)</p> <p>a b C: 100 mm (3.94 in) Fine finishing</p> <p>S-NT550</p>	Installing rack Teflon ring
<p>KV48103400 Preload adapter</p> <p>ZZA0824D</p>	Inspecting rotating torque
<p>KV48103500 Oil pressure gauge KV48102500 Hydraulic pressure gauge adapter 1. KV48102500-01 Eye joint 2. KV48102500-02 Flare joint 3. KV48102500-03 Bolt 4. KV48102500-04 Washer</p> <p>4.KV481 02500-4 3.KV481 02500-3 1.KV481 02500-1 2.KV481 02500-2 KV481 03500</p> <p>ZZA0839D</p>	Measuring oil pump relief pressure
<p>KV48105210 Sprocket holder</p> <p>ZZA1191D</p>	Removing power steering oil pump

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Trouble shooting Chart

BGS00011

Use chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page

Possible cause and SUSPECTED PARTS

Symptom	STEERING	Noise	x	Fluid level	<u>PS-6</u>
		Shake	x	Air in hydraulic system	<u>PS-6</u>
		Vibration	x	Outer socket ball joint swinging force	<u>PS-21</u>
			x	Outer socket ball joint rotating torque	<u>PS-21</u>
			x	Outer socket ball joint end play	<u>PS-21</u>
			x	Steering fluid leakage	<u>PS-6</u>
			x	Steering wheel play	<u>PS-8</u>
			x	Steering gear rack sliding force	<u>PS-8</u>
			x	Drive belt looseness	<u>EM-13,EM-139</u>
			x	Improper steering wheel	<u>PS-8</u>
			x	Improper installation or looseness or tilt lock lever	<u>PS-14</u>
			x	Mounting rubber deterioration	<u>PS-16</u>
			x	Steering column deformation or damage	<u>PS-13</u>
			x	Improper installation or looseness of steering column	<u>PS-11</u>
			x	Steering linkage looseness	<u>PS-18</u>
			x	PROPELLER SHAFT	NVH in PR section
			x	DIFFERENTIAL	NVH in RFD section
			x	AXLE AND SUSPENSION	NVH in FAX, RAX, FSU, RSU section
			x	TYRES	NVH in WT section
			x	ROAD WHEEL	NVH in WT section
			x	DRIVE SHAFT	NVH in FAX section
			x	BRAKES	NVH in BR section

x: Applicable

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
PS

# POWER STEERING FLUID

## POWER STEERING FLUID

PFP:KLF20

### Checking Fluid Level

BGS00012

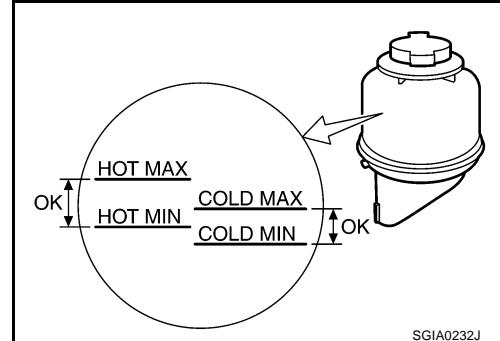
- Check fluid level with engine stopped.
- Make sure that fluid level is between MIN and MAX.
- Fluid levels at HOT and COLD are different. Do not confuse them.

**HOT** : Fluid temperature 50 - 80 °C (122 - 176°F)

**COLD** : Fluid temperature 0 - 30°C (32 - 86°F)

#### CAUTION:

- The fluid level should not exceed the MAX line. Excessive fluid will cause fluid leakage from the cap.
- Do not reuse drained power steering fluid.
- Recommended fluid is Type DEXRON™ III or equivalent.



SGIA0232J

### Checking Fluid Leakage

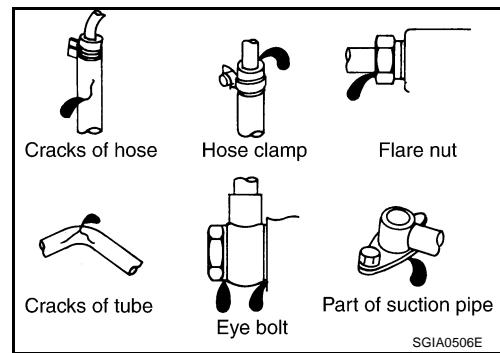
BGS00013

Check hydraulic connections for fluid leakage, cracks, damage, looseness, or wear.

- Run engine until the fluid temperature reaches 50 to 80° C (122 to 176°F) in reservoir tank, and keep engine speed idle.
- Turn steering wheel several times from full left stop to full right stop.
- Hold steering wheel at each lock position for five seconds and carefully, check for fluid leakage.

#### CAUTION:

**Do not hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)**



SGIA0506E

- If fluid leakage at connections is noticed, then loosen flare nut and then retighten. Do not overtighten connector as this can damage O-ring, washer and connector.
- If fluid leakage from oil pump is noticed, check oil pump. Refer to [PS-27, "POWER STEERING OIL PUMP"](#).
- Check steering gear boots for accumulation of fluid indicating from steering gear.

### Air Bleeding Hydraulic System

BGS00014

If air bleeding is not complete, the following symptoms can be observed.

- Bubbles are created in reservoir tank.
- Clicking noise can be heard from oil pump.
- Excessive buzzing in the oil pump.

#### NOTE:

Fluid noise may occur in the steering gear or oil pump. This does not affect performance or durability of the system.

- Turn steering wheel several times from full left stop to full right stop with engine off.

#### CAUTION:

**Turn steering wheel while filling reservoir tank with fluid so as not to lower fluid level below the MIN line.**

- Start engine and hold steering wheel at each lock position for 3 seconds at idle to check for fluid leakage.
- Repeat step 2 above several times at approximately 3 second intervals.

#### CAUTION:

**Do not hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)**

- Check fluid for bubbles and while contamination.

## POWER STEERING FLUID

---

- 5. Stop engine if bubbles and white contamination do not drain out. Perform steps 2 and 3 above after waiting until bubbles and white contamination drain out.
- 6. Stop the engine, and then check fluid level.

A

B

C

D

E

F

PS

H

I

J

K

L

M

## STEERING WHEEL

PFP:48430

### On-Vehicle Inspection and Service CHECKING CONDITION OF INSTALLATION

BGS00015

- Check installation conditions of steering gear assembly, front suspension, axle and steering column.
- Check if movement exists when steering wheel is moved up and down, to the left and right and to the axial direction.

**Steering wheel axial end play : 0 mm (0 in)**

- Check steering gear assembly mounting bolts and nut for looseness. Refer to [PS-16, "COMPONENT"](#).

### CHECKING STEERING WHEEL PLAY

- Turn steering wheel so that front wheels come to the straight-ahead position. Start engine and lightly turn steering wheel to the left and right until front wheels start to move. Measure steering wheel movement on the outer circumference.

**Steering wheel play : 0 - 35 mm (0 - 1.38 in)**

- When the measurement value is outside the standard value, check backlash for each joint of steering column and installation condition of steering gear assembly.

### CHECKING NEUTRAL POSITION STEERING WHEEL

- Make sure that steering gear assembly, steering column and steering wheel are installed in the correct position.
- Perform neutral position inspection after wheel alignment. Refer to [FSU-6, "Wheel Alignment"](#).
- Set vehicle to the straight-ahead position and confirm steering wheel is in the neutral position.
- Loosen outer socket lock nut and turn inner socket to left and right equally to make fine adjustments if steering wheel is not in the neutral position.

### CHECKING STEERING WHEEL TURNING FORCE

- Park vehicle on a level and dry surface, set parking brake.
- Start engine.
- Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 50 to 80°C (122 to 176°F).]
- Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

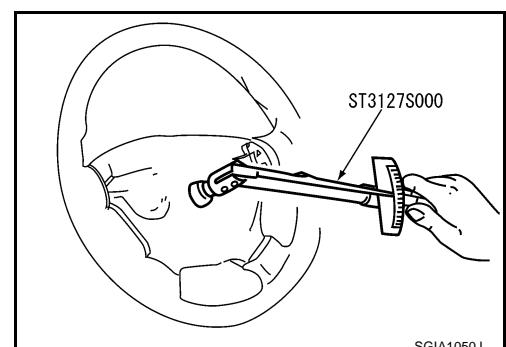
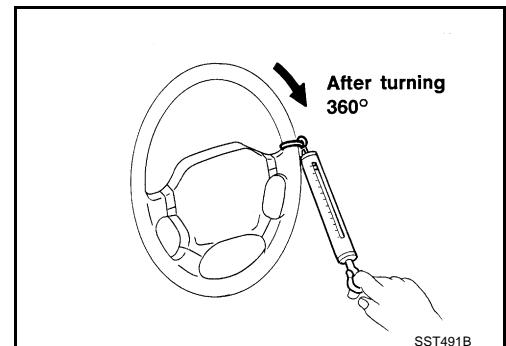
**Steering wheel : 36 N (3.7 kg, 8.2 lb) or less  
turning force**

#### NOTE:

- Multiply the distance (L) from the hook of spring scale to the center of steering wheel by the measurement value with a spring scale.
- Perform the following manner when the guideline value is hard to be measured.
  - Park vehicle on a level and dry surface, set parking brake.
  - Remove driver air bag module. Refer to [SRS-29, "DRIVER AIR BAG MODULE"](#).
  - Start engine at idle, then check steering wheel turning force with pre-load gauge [SST].

**Steering wheel : 706 N·cm (72 kg-cm, 62 in-lb)  
turning force**

- If steering wheel turning force is out of the specification, check rack sliding force and relief hydraulic pressure of oil pump. Regarding relief hydraulic pressure of oil pump, refer to [PS-27, "OIL PUMP PULLEY HYDRAULIC PRESSURE INSPECTION"](#).
- Disconnect lower shaft and steering knuckle from steering gear assembly. Refer to [FAX-7, "Removal and Installation"](#), [PS-11, "COMPONENT"](#).

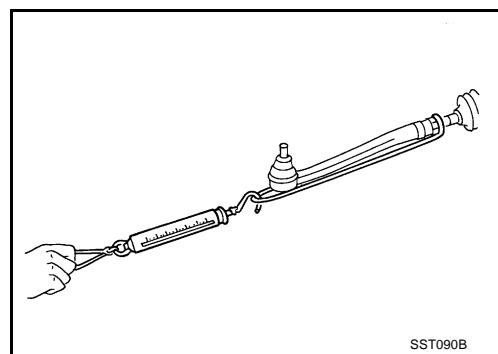


## STEERING WHEEL

- b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
- c. While pulling outer socket slowly in  $\pm 11.5$  mm ( $\pm 0.453$  in) range from neutral position, make sure rack sliding force is within specification.

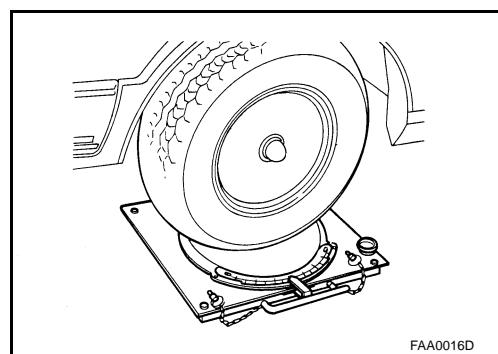
**Rack sliding force:** **226 - 284 N**  
**(23.1 - 29 kg, 51 - 64 lb)**

- d. If rack sliding force is not within specification, overhaul steering gear assembly.



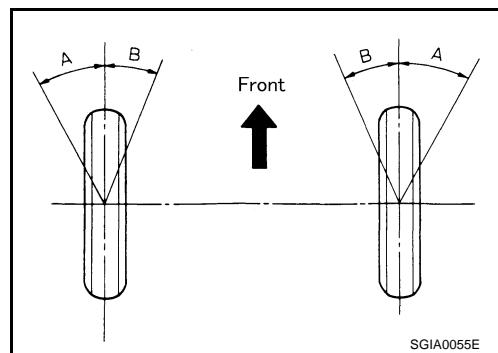
### CHECKING FRONT WHEEL TURNING ANGLE

- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- With the engine at idle, turn steering wheel from full left stop to full right stop and measure the turning angles.

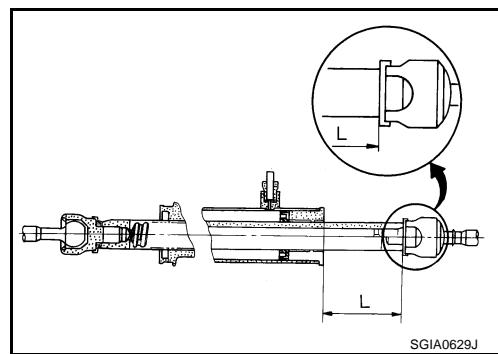
	Minimum	36° 00' (36.0°)
Inner wheel (Angle: A)	Nominal	39° 00' (39.0°)
Outer wheel (Angle: B)	Maximum	40° 00' (40.0°)



- Measure rack stroke if angles are outside the specified value.

**Rack stroke "L" : 66.5 mm (2.618 in)**

- Disassemble steering gear assembly to check the cause that rack stroke is outside of the standard.
- Steering angles are not adjustable. Check steering gear assembly, steering column assembly and front suspension components for wear or damage if any of the turning angles are different from the specified value. Replace any of them, if any non-standard condition exists.



## Removal and Installation

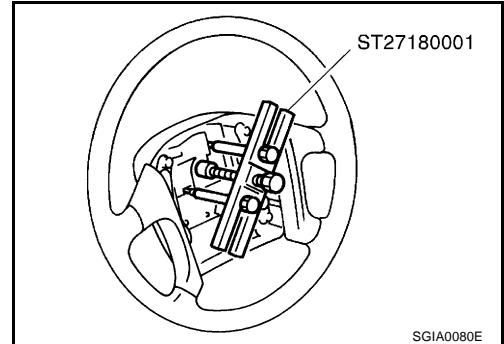
### REMOVAL

BGS00016

#### NOTE:

When reconnecting spiral cable, fix cable with a tape so that fixing case and rotating part keep aligned. This will omit neutral position alignment procedure during spiral cable installation.

1. Set vehicle to the straight-ahead direction.
2. Remove driver air bag module. Refer to [SRS-29, "DRIVER AIR BAG MODULE"](#) .
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller [SST].



### INSTALLATION

Note the following, and installation is in the reverse order of removal.

- When installing the steering wheel, tighten lock nut to the specified torque.

**Steering wheel lock nut : 34.3 N·m (3.5 kg·m, 25 in-lb)**

#### CAUTION:

Check the spiral cable neutral position after replacing or rotating spiral cable. Refer to [SRS-33, "INSTALLATION"](#) .

# STEERING COLUMN

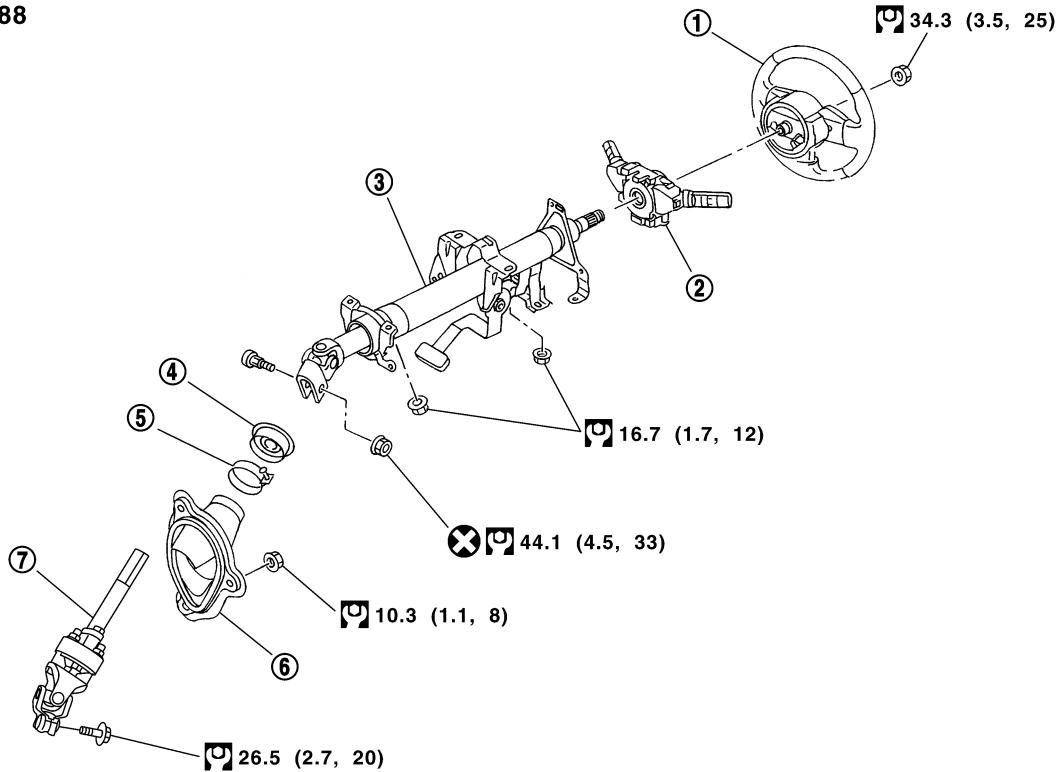
## STEERING COLUMN

PFP:48810

### Removal and Installation COMPONENT

BGS00017

SEC.481-488



: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

SGIA0903E

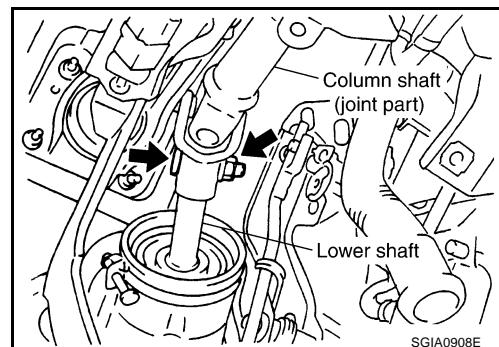
1. Steering wheel
2. Combination switch & spiral cable
3. Steering column assembly
4. Hole cover seal
5. Clamp
6. Hole cover
7. Lower shaft

#### CAUTION:

- Do not give axial impact to steering column assembly during removal and installation.
- Do not move steering gear assembly when removing steering column assembly.

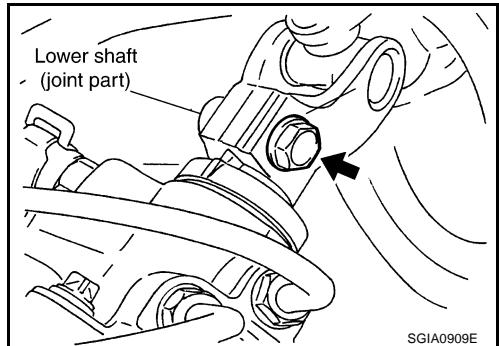
#### REMOVAL OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL

1. Set vehicle to the straight-ahead position.
2. Remove fixing bolt and nut between column shaft (joint part) and lower shaft (upper side), and then separate lower shaft from column shaft (joint part).
3. Raise vehicle.



# STEERING COLUMN

4. Remove fixing bolt of lower shaft (joint part), and then remove lower shaft from vehicle.
5. Lowering vehicle.
6. Loosen clamp, and then remove hole cover seal from hole cover.
7. Remove clamp and hole cover from dash panel.



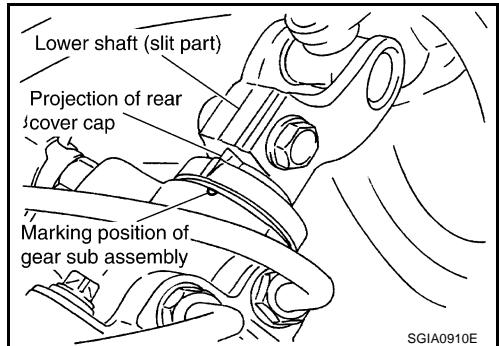
## INSTALLATION OF LOWER SHAFT, HOLE COVER, CLAMP AND HOLE COVER SEAL

- Installation in the reverse order of the removal. For tightening torque, refer to [PS-11, "COMPONENT"](#) .
- When installing lower shaft to steering gear assembly, follow the procedure listed below.
- Set rack of steering gear in the neutral position.

### NOTE:

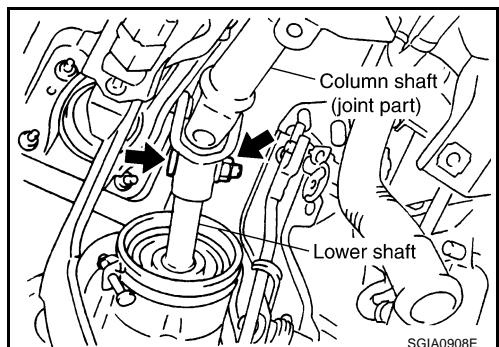
To get the neutral position of rack, turn gear sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.

- Align rear cover cap projection with the projection of gear sub assembly.
- Install slit part of lower shaft aligning with the projection of rear cover cap. Make sure that the slit part of lower shaft is aligned with both the projection of rear cover cap and the marking position of gear sub assembly.



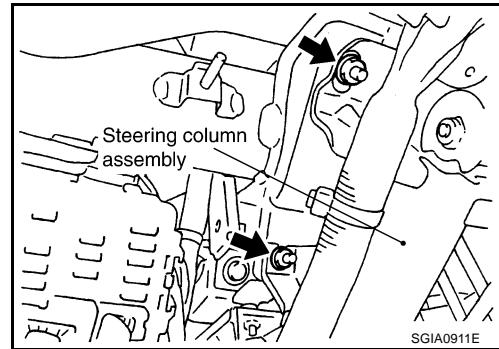
## REMOVAL OF STEERING COLUMN ASSEMBLY

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SRS-29, "DRIVER AIR BAG MODULE"](#) .
3. Remove steering wheel. Refer to [PS-10, "Removal and Installation"](#) .
4. Remove steering column cover (upper and lower), steering lock escutcheon and instrument driver lower panel. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
5. Remove combination switch & spiral cable from steering column assembly. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
6. Disconnect each switch connectors installed to steering column assembly, and then disconnect harness from steering column assembly.
7. Remove key interlock cable from steering column assembly. Refer to [AT-394, "KEY INTERLOCK CABLE"](#) .
8. Remove fixing bolt and nut between column shaft (joint part) and lower shaft (upper side), and then separate lower shaft from column shaft (joint part).



# STEERING COLUMN

9. Remove steering column assembly mounting nuts, then remove steering column assembly from vehicle.



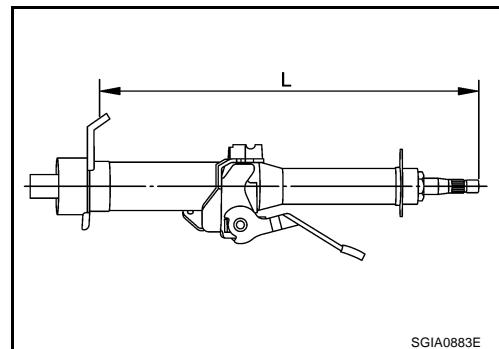
## INSPECTION AFTER REMOVAL

- Check each part of steering column assembly and lower shaft for damage or other malfunctions. Replace if there are.
- Measure the length "L" as shown in the figure if vehicle has been involved in a minor collision. Replace steering column assembly if outside the standard.

**Steering column length "L" : 405.3 mm (15.96 in)**

- Measure steering column rotating torque using preload gauge. Replace steering column assembly if outside the standard.

**Rotating torque**      **0 - 0.2 N·m**  
**(0 - 0.021 kg·m, 0 - 1 in·lb)**



## INSTALLATION OF STEERING COLUMN ASSEMBLY

Installation is the reverse order of removal. For tightening torque, refer to [PS-11, "COMPONENT"](#) .

## INSPECTION AFTER INSTALLATION

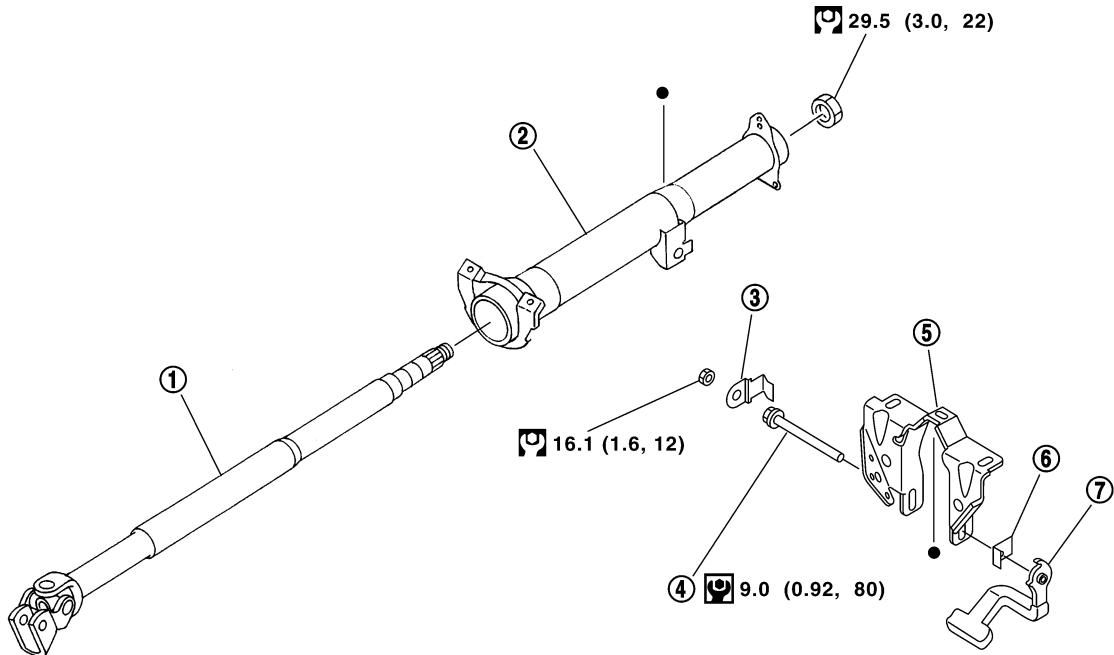
Make sure that steering wheel operates smoothly by turning several times from full left stop to full right stop.

# STEERING COLUMN

## Disassembly and Assembly COMPONENT

BGS00018

SEC.488



: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

SGIA0904E

1. Column shaft
2. Jacket tube
3. Adjusting stopper
4. Adjusting bolt
5. Column mounting bracket
6. Tilt lever stopper
7. Tilt lever

### DISASSEMBLY

1. Remove the lock nut (for securing column shaft), and then remove column shaft from jacket tube.
2. Secure adjusting bolt, then remove lock nut (for securing tilt lever) and adjusting stopper.
3. Loosen adjusting bolt, and then remove tilt lever and tilt lever stopper.
4. Remove adjusting bolt and column mounting bracket from jacket tube.

### INSPECTION AFTER DISASSEMBLY

- Check jacket tube and column shaft for deformation or damage. Replace if there are.
- Check tilt mechanism components for malfunction. Replace if there are.

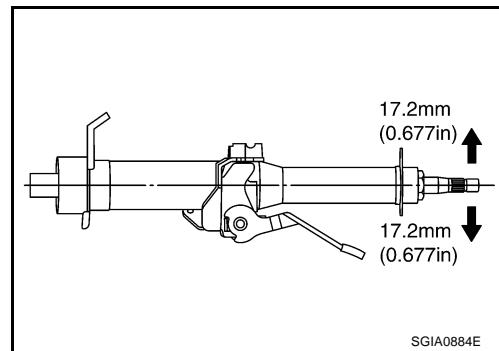
### ASSEMBLY

- Assemble in the reverse order of the disassembly. For tightening torque, refer to [PS-14, "COMPONENT"](#) .
- Tighten lock nut (for securing tilt lever) to the specified torque so that tilt lever locks when tilt lever turns from unlock to lock. Refer to [PS-14, "COMPONENT"](#) .

# STEERING COLUMN

## INSPECTION AFTER ASSEMBLY

Check tilt mechanism operating range.



A  
B  
C  
D

E

F

PS

H

I

J

K

L

M

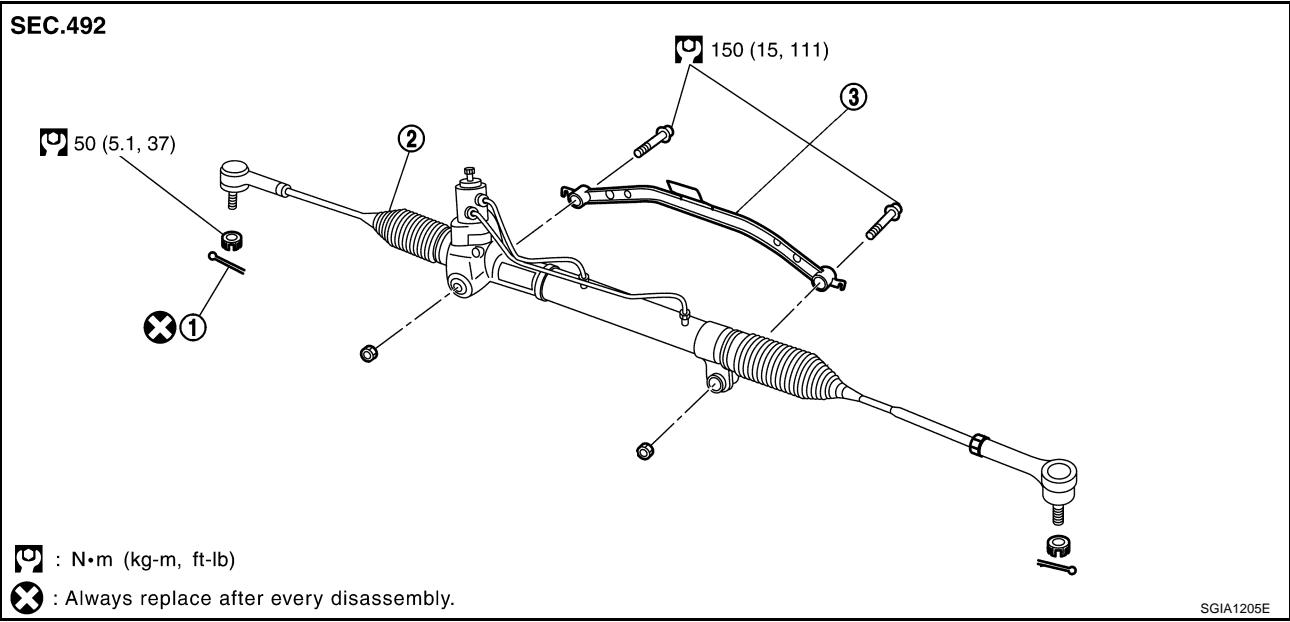
# POWER STEERING GEAR AND LINKAGE

## POWER STEERING GEAR AND LINKAGE

PFP:49001

### Removal and Installation COMPONENT

BGS00019

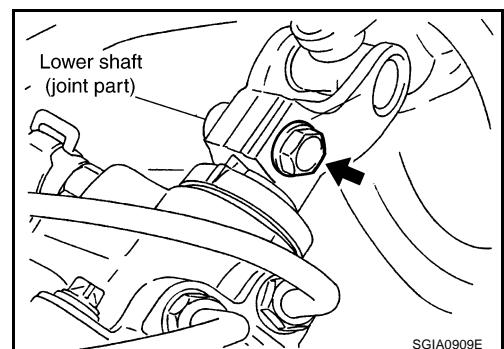


#### CAUTION:

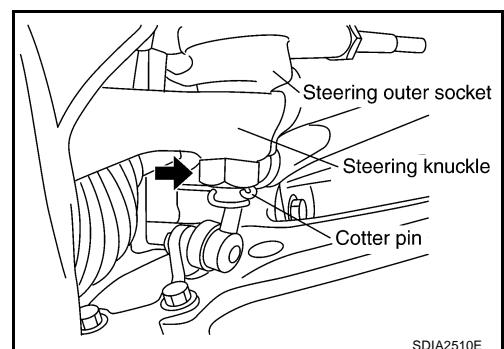
Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Be sure to secure steering wheel using string to avoid turning.

#### REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove tyres from vehicle.
3. Remove stabilizer bar. Refer to [FSU-11, "Removal and Installation"](#).
4. Remove fixing bolt of lower shaft (joint part), and then separate lower shaft from steering gear assembly.



5. Remove cotter pin, and then loosen nut.

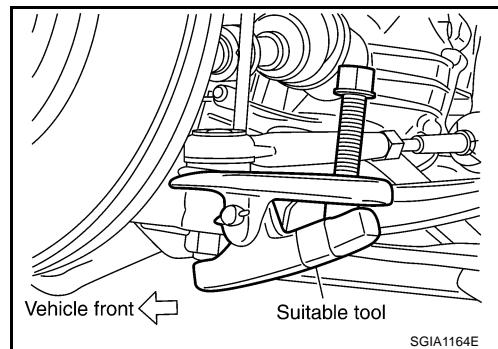


# POWER STEERING GEAR AND LINKAGE

6. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using the ball joint remover (suitable tool).

**CAUTION:**

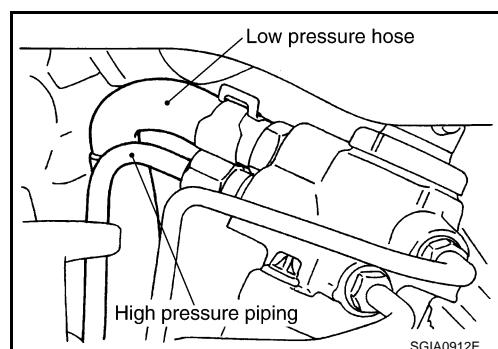
Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover (suitable tool) from suddenly coming off.



7. Remove high-pressure piping and low-pressure hose of hydraulic piping, and then drain power steering fluid. Refer to [PS-37, "HYDRAULIC LINE"](#).

8. Remove the power steering tube bracket mounting bolts and nuts, and then remove power steering tube bracket from steering gear assembly.

9. Tilt steering gear assembly to prevent any contact with other parts and then remove it from right side of vehicle.



## INSTALLATION

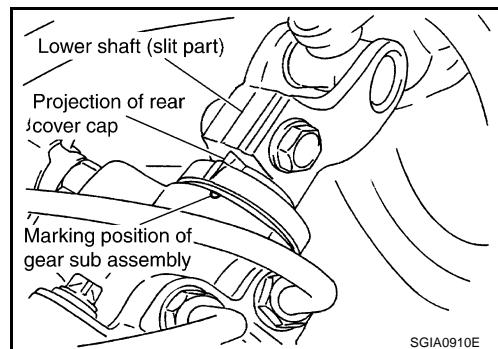
Installation in the reverse order of the removal. For tightening torque, refer to [PS-16, "COMPONENT"](#).

- When installing lower shaft to steering gear, follow the procedure listed below.
- Set rack of steering gear in the neutral position.

**NOTE:**

To get the neutral position of rack, turn gear sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.

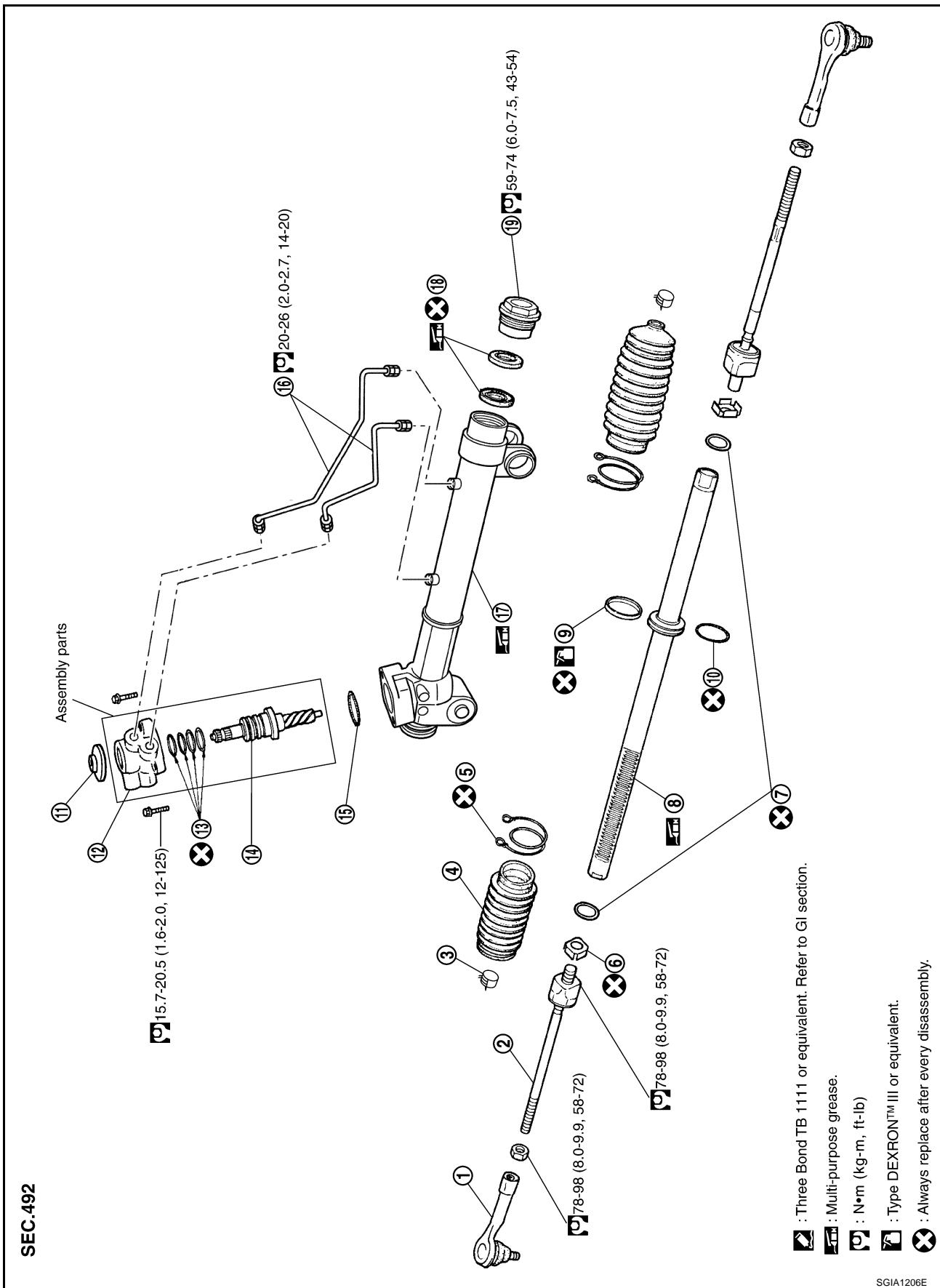
- Align rear cover cap projection with the projection of gear sub assembly.
- Align slit part of lower shaft with the projection of rear cover cap. And then install it onto rear cover cap of steering gear assembly. Make sure that the slit part of lower shaft is aligned with both the projection of rear cover cap and the marking position of gear sub assembly.
- After installation, bleed air from the steering hydraulic system. Refer to [PS-6, "Air Bleeding Hydraulic System"](#).
- Perform final tightening of nuts and bolts on each part under unladen conditions with tyres on level ground when removing steering gear assembly. Check wheel alignment. Refer to [FSU-6, "Wheel Alignment"](#).
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to [BRC-47, "Adjustment of Steering Angle Sensor Neutral Position"](#).



## POWER STEERING GEAR AND LINKAGE

## Disassembly and Assembly COMPONENT

*BGS0001A*



 : Three Bond TB 1111 or equivalent. Refer to GI section.

 : Multi-purpose grease.

• : N•m (kg-m, ft-lb)

 : Type DEXRON™ III or equivalent.

**✗** : Always replace after every disassembly.

# POWER STEERING GEAR AND LINKAGE

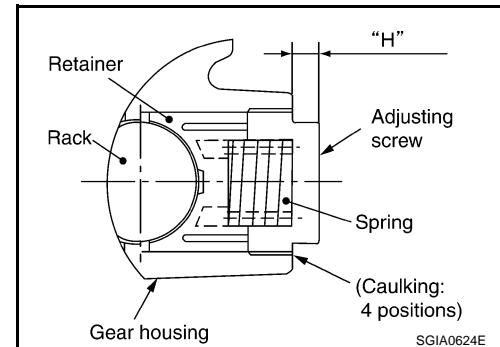
1. Outer socket	2. Inner socket	3. Boot clamp
4. Boot	5. Boot clamp	6. Lock plate
7. Spacer	8. Rack assembly	9. Rack Teflon ring
10. O-ring A	11. Rear cover cap	12. Rear housing assembly
13. O-ring B	14. Pinion assembly	15. O-ring C
16. Cylinder tubes	17. Gear housing assembly	18. Rack oil seal
19. End cover assembly		

## DISASSEMBLY

1. Remove cylinder tubes from gear housing assembly.
2. Remove rear cover cap from gear sub assembly.
3. Measure adjusting screw height "H", and loosen adjusting screw.

**CAUTION:**

- Do not loosen adjusting screw 2 turns or more.
- Replace steering gear assembly if adjusting screw is loosened 2 turns or more and it is removed.

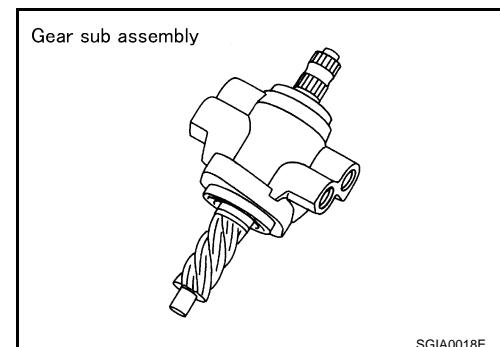


4. Remove mounting bolts of gear sub assembly, then remove gear sub assembly from gear housing assembly.

**CAUTION:**

Do not overhaul gear sub assembly because it is non over-haul part. If there is something wrong with gear sub-assembly, change it to new one.

5. Remove O-ring C from gear housing assembly.
6. Loosen outer socket lock nut, and remove outer socket.

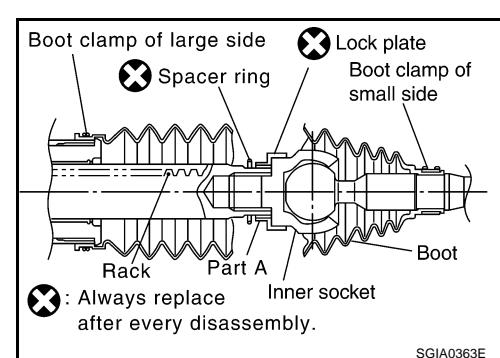


7. Remove boot clamp on the small and big ends, and remove boot.

**CAUTION:**

Do not damage inner socket and gear housing assembly when removing boot. Inner socket and gear housing assembly must be replaced if inner socket and gear housing assembly are damaged because it may cause foreign material interfusion.

8. Move spacer ring to rack assembly side, raise caulking part (at two points of part A) of lock plate and loosen inner socket, then remove inner socket from rack assembly.

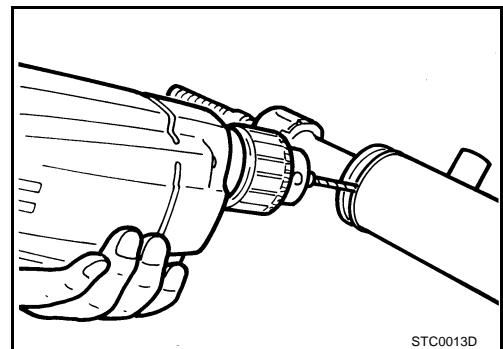


**CAUTION:**

When removing lock plate, be careful not to damage the surface of rack assembly. If damaged rack assembly surface will cause oil leak. Therefore, if the rack assembly surface is damaged, replace rack assembly.

# POWER STEERING GEAR AND LINKAGE

9. Drill out the punch crimping part of gear housing assembly outer rim with a 3 mm (0.12 in) drill bit. [Drill for approximately 1.5 mm (0.059 in) depth.]



10. Remove end cover assembly with a 36 mm (1.42 in) open head (suitable tool).

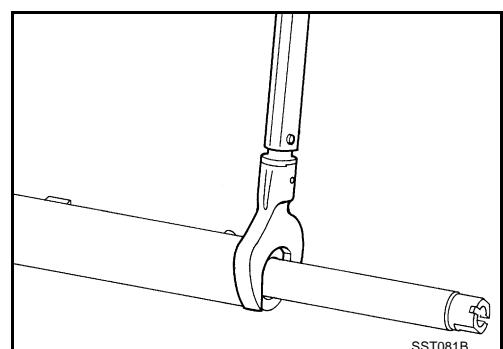
**CAUTION:**

**Do not damage rack assembly surface when removing. Rack assembly must be replaced if damaged because it may cause oil leakage.**

11. Pull rack assembly together with rack oil seal out from gear housing assembly.

**CAUTION:**

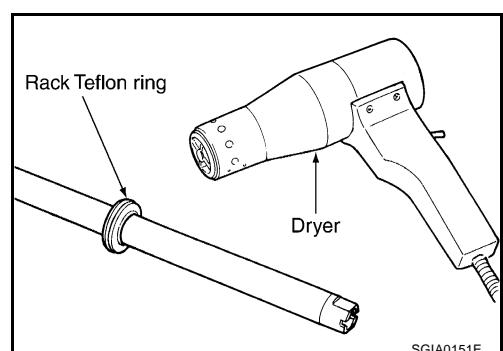
**Do not damage cylinder inner wall when removing rack assembly. Gear housing assembly must be replaced if damaged because it may cause oil leakage.**



12. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer, and remove rack Teflon ring and O-ring A from rack assembly.

**CAUTION:**

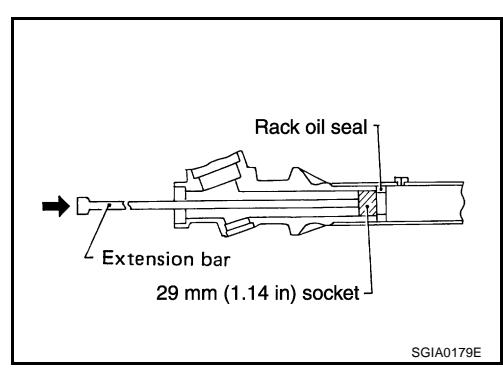
**Do not damage rack assembly. Rack assembly must be replaced if damaged because it may cause oil leakage.**



13. Push rack oil seal inside with a 29 mm (1.14 in) socket and an extension bar to push out rack oil seal from gear housing assembly.

**CAUTION:**

**Do not damage gear housing assembly and cylinder inner wall. Gear housing assembly must be replaced if damaged because it may cause oil leakage.**



## INSPECTION AFTER DISASSEMBLY

### Boot

Check boot for cracks. Replace if there are.

### Rack Assembly

Check rack assembly for damage or wear. Replace if there are.

### Gear Sub Assembly

- Check pinion gear for damage or wear. Replace if there are.
- Rotate pinion and check for torque variation or rattle. Replace if there are.

# POWER STEERING GEAR AND LINKAGE

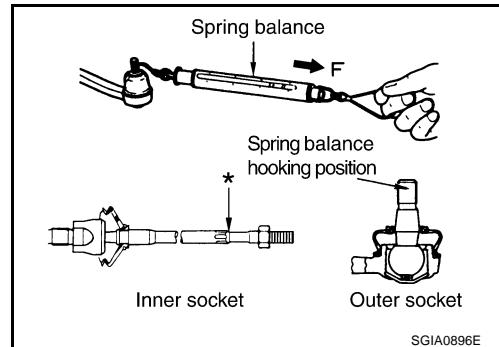
## Gear Housing Assembly

Check gear housing assembly for damage and scratches (inner wall). Replace if there are.

## Outer Socket and Inner Socket

### 1. Swinging torque

- Hook a spring balance at the point shown in the figure and pull the spring balance. Make sure that the spring balance reads the specified value when ball stud and inner socket start to move. Replace outer socket and steering gear assembly if they are outside the standard.

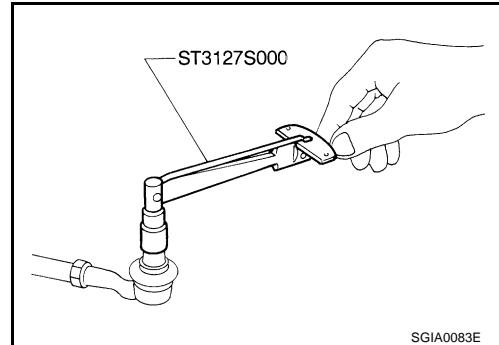


Items	Outer socket	Inner socket
Measuring point of spring balance	Stud cotter pin mounting hole	Measuring point at * mark shown in the figure
Swinging torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3.0 - 25 in-lb)	1.0 - 7.8 N·m (0.10 - 0.80 kg·m, 9.0 - 69 in-lb)
Spring balance measurement	4.84 - 47.4 N (0.49 - 4.84 kg, 1.08 - 10.7 lb)	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)

### 2. Rotating Torque

- Make sure that the reading is within the following specified range using the preload gauge [SST]. Replace outer socket if the reading is outside the specified value.

Outer socket rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3.0 - 25 in-lb)
------------------------------	---

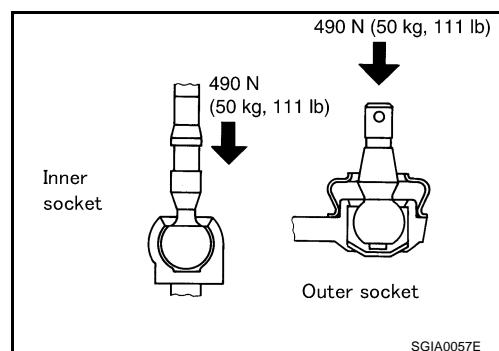


### 3. Axial end play

- Apply an axial load of 490 N (50 kg, 111 lb) to ball stud using a dial indicator. Measure amount of stud movement, and then make sure that the value is within the following specified range. Replace outer socket and steering gear assembly if the measured value is outside the standard.

Outer socket : 0.5 mm (0.02 in) or less

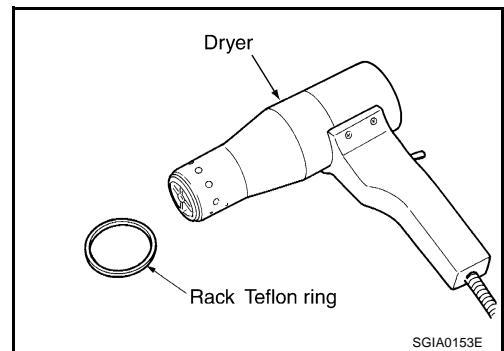
Inner socket : 0.2 mm (0.008 in) or less



# POWER STEERING GEAR AND LINKAGE

## ASSEMBLY

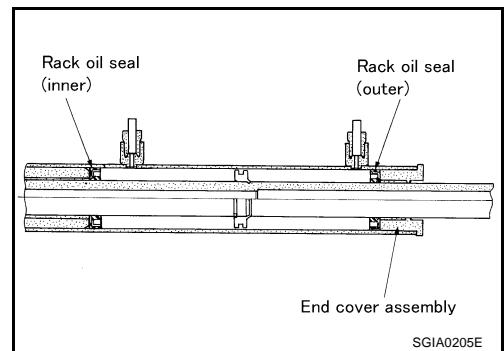
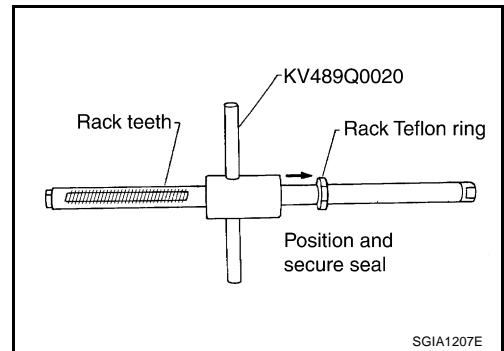
1. Apply Type DEXRON™ III or equivalent to O-ring A. Put an O-ring A into rack Teflon ring.
2. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer. Assemble it to mounting groove of rack assembly.



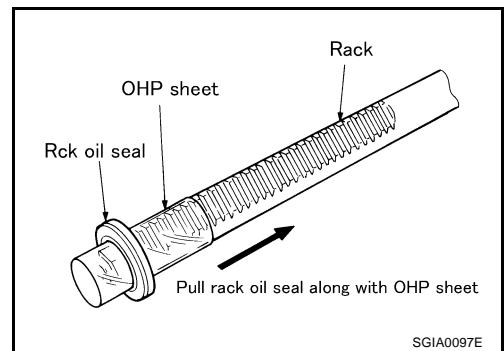
3. Install the Teflon ring correcting tool [SST] from tooth side of rack to fit rack Teflon ring on rack. Compress the ring with tool.
4. Apply multi-purpose grease to rack oil seal and install rack oil seal, and then assemble rack assembly to gear housing assembly.

### CAUTION:

- Do not damage retainer sliding surface by rack assembly. Replace gear housing assembly if damaged.
- Do not damage gear housing assembly inner wall by rack assembly. Gear housing assembly must be replaced if damaged because it may cause oil leakage.
- Install rack oil seal in a direction so that the lip of inner oil seal and the lip of outer oil seal face each other.

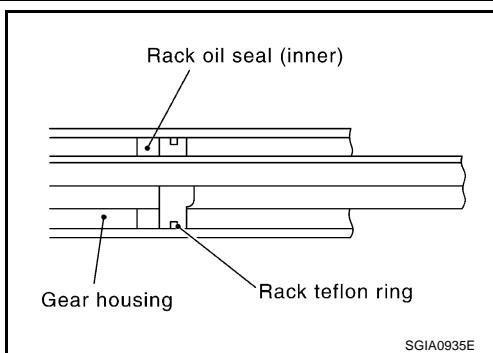


- a. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in).] Around rack assembly teeth to avoid damaging rack oil seal (inner). Install rack oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass rack assembly teeth, and remove OHP sheet.



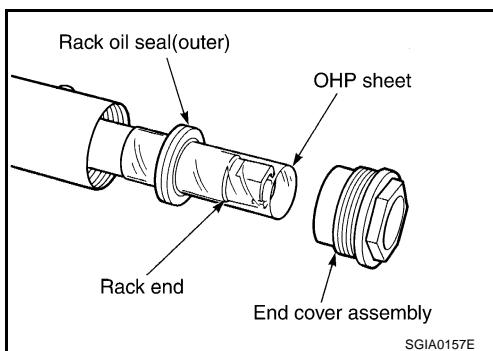
## POWER STEERING GEAR AND LINKAGE

b. Insert rack oil seal (inner) into rack assembly piston (rack Teflon ring). Push retainer to adjusting screw side by hand, and move the rack assembly inside the gear housing assembly so that the rack oil seal (inner) can be pressed against the gear housing assembly.



c. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in).] Around the edge to avoid damaging rack oil seal (outer). Install rack oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass rack edge, and remove OHP sheet.

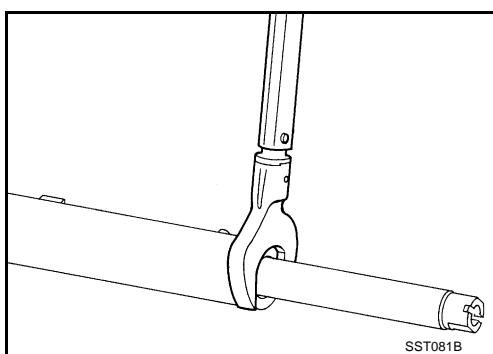
d. Install end cover assembly to rack edge, and move rack assembly until it contacts with gear housing assembly.



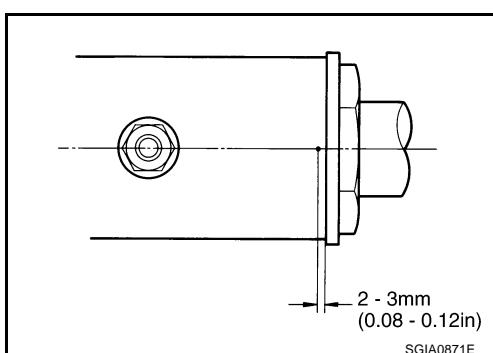
5. Tighten end cover assembly to specified torque using a 36 mm (1.42 in) open head (suitable tool).

**CAUTION:**

**Do not damage rack assembly. Replace it if damaged because it may cause oil leakage.**

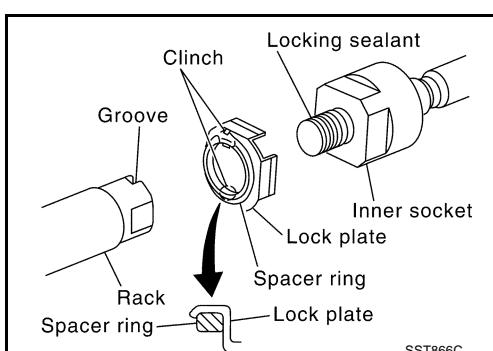


6. Crimp gear housing assembly at one point using a punch as shown in the figure so as to prevent end cover assembly from getting loose after tightening end cover assembly.



7. Apply Type DEXRON™ III or equivalent to O-ring C, and then install O-ring C to gear housing assembly.

8. Install gear sub assembly to gear housing assembly.



9. Install inner socket to rack assembly according to the instructions.

- Attach spacer ring to rack assembly.
- Install lock plate to inner socket.
- Apply locking sealant (Three Bond TB1111 or equivalent) to the thread of inner socket. Screw inner socket into rack assembly and tighten at the specified torque.
- Clinch lock plate at two points on rack groove.
- Install spacer ring to lock plate as shown in the figure.

# POWER STEERING GEAR AND LINKAGE

## CAUTION:

When installing spacer ring, avoid damaging it.

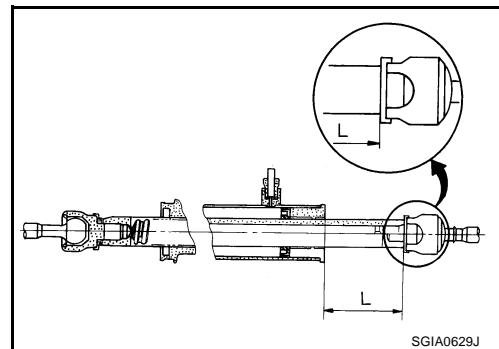
- Decide on the neutral position for the rack.

**Rack stroke "L" : 66.5 mm (2.618 in)**

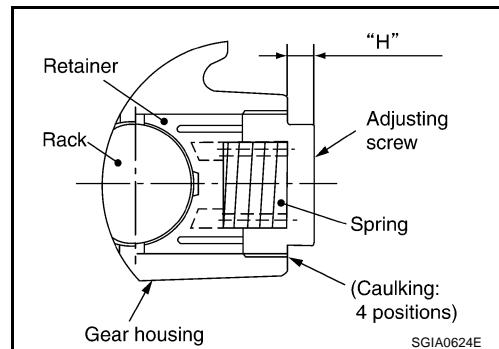
- Install rear cover cap to gear sub assembly.

## CAUTION:

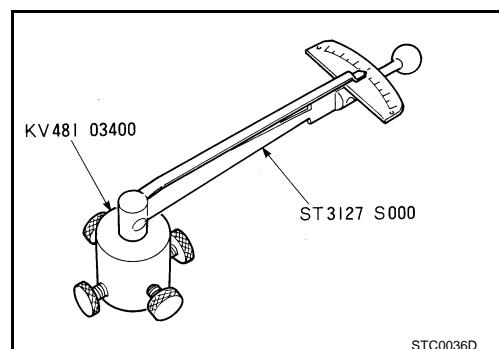
Make sure that the projection of rear cover cap is aligned with the marking position of gear housing assembly.



- Apply a coat of Three Bond TB1111 or equivalent to the thread (2 turns thread), and then screw in the adjusting screw until it reaches height "H" from gear housing assembly measured before disassembling.
- Move rack 10 strokes throughout the full stroke so that the parts can fit with each other.



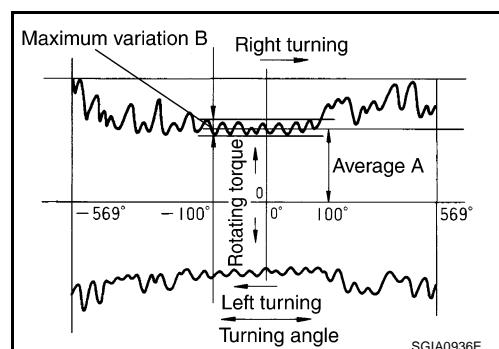
- Measure pinion rotating torque within  $\pm 180^\circ$  of neutral position of the rack using the preload gauge [SST] and preload adapter [SST]. Stop the gear at the point where highest torque is read.
- Loosen adjusting screw and retighten to 5.4 N·m (0.55 kg·m, 48 in-lb), and then loosen by 20 to 40°.



- Measure pinion rotating torque using the steering gear preload adapter [SST] and preload gauge [SST] to make sure that the measured value is within the standard. Readjust if the value is outside the standard. Replace gear assembly if the value is outside the standard after readjusting or adjusting screw rotating torque is 5 N·m (0.51 kg·m, 44 in-lb) or less.

## Pinion rotating torque standard

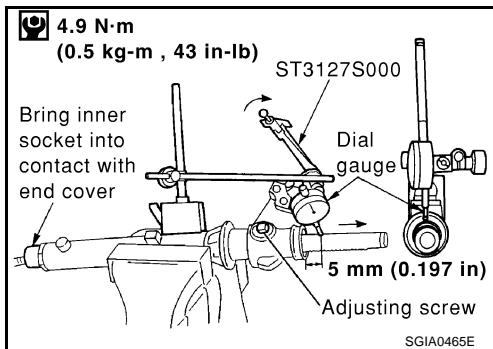
<b>Around neutral position (Within <math>\pm 100^\circ</math>) Average A</b>	<b>1.67 – 2.25 N·m (0.17 – 0.22 kg·m, 1.3 – 1.6 ft-lb)</b>
<b>Maximum variation B</b>	<b>0.98 N·m (0.10 kg·m, 1 ft-lb)</b>



- Apply a coat of Three Bond TB1111 or equivalent to inner socket and turn pinion fully to left with inner socket installed to gear housing assembly.

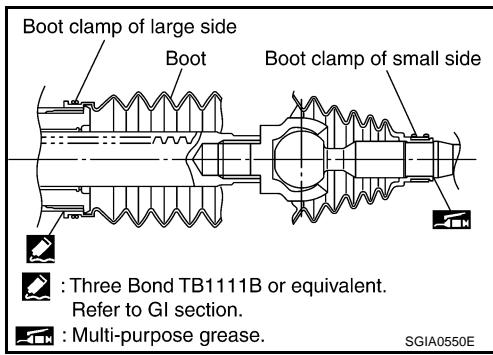
# POWER STEERING GEAR AND LINKAGE

18. Set dial gauge as shown in the figure. Measure vertical movement of rack assembly when pinion is turned clockwise with torque of 4.9 N·m (0.5 kg-m, 43 in-lb). Readjust adjusting screw angle if the measured value is outside the standard. Replace gear assembly if the measured value is still outside the standard or adjusting screw rotating torque is 4.9 N·m (0.5 kg-m, 43 in-lb) or less.



Vertical movement of rack	0.265 mm (0.0104 in) or less	
Measuring point	Rack axial direction	5 mm (0.197 in) from housing end surface
	Rack radial direction	Axial direction of the adjusting screw

19. Install large end of boot to gear housing assembly.  
 20. Install small end of boot to inner socket boot mounting groove.  
 21. Install boot clamp to boot small end.



22. Install large side of boot clamp.

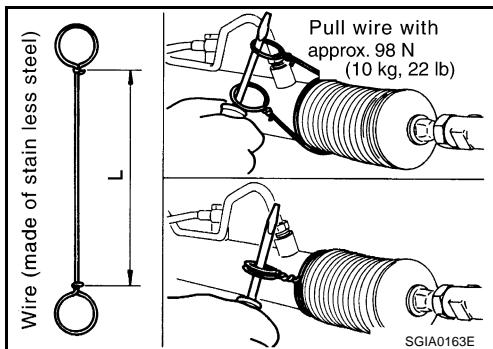
**NOTE:**

Do not reuse large side of boot clamp.

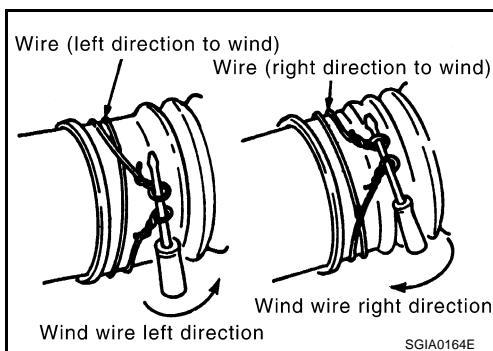
- Tighten large side of boot with boot clamp (stainless wire).

**Wire length "L" : 370 mm (14.57 in)**

- Wrap clamp around boot groove for two turns. Insert a flat-bladed screwdriver in loops on both ends of wire. Twist 4 to 4.5 turns while pulling them with force of approximately 98 N (10 kg, 22 lb).

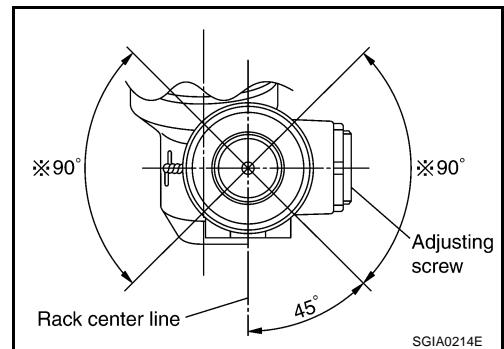


- Twist boot clamp as shown. Pay attention to relationship between winding and twisting directions.



## POWER STEERING GEAR AND LINKAGE

- Twisted point of clamp is in the opposite side of adjusting screw as shown in the figure (to prevent contact with other parts).

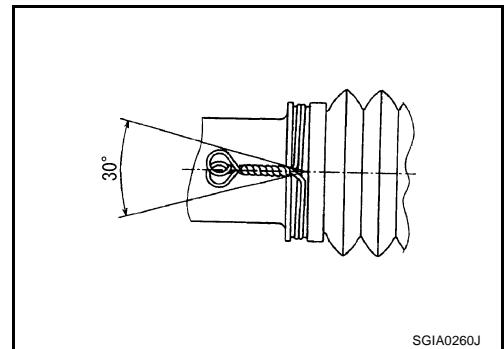


- Bent cut end of the wire toward rack axial as shown in the figure after twisting the wire 4 to 4.5 turns so that cut end does not contact with boot.

**CAUTION:**

**Keep gap from cylinder tube 5 mm (0.20 in) or more.**

- Install cylinder tube to gear housing assembly.

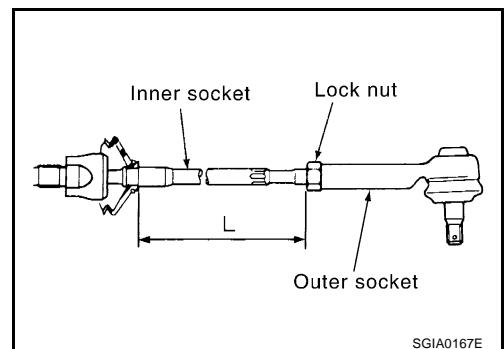


- Adjust inner socket to standard length "L", and then tighten lock nut to the specified torque. Refer to [PS-18, "COMPONENT"](#). Check length of inner socket "L" again after tightening lock nut. Make sure that the length is the standard.

**Inner socket length "L" 169.67 mm (6.68 in)**

**CAUTION:**

**Adjust toe-in after this procedure. Length achieved after toe-in adjustment is not necessary the above value.**



## POWER STEERING OIL PUMP

PFP:49110

## On-Vehicle Inspection and Service

## OIL PUMP PULLEY HYDRAULIC PRESSURE INSPECTION

BGS0001B

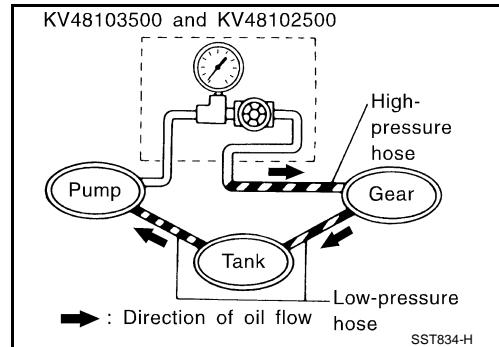
Before starting following procedure, check tension of belt.

1. Raise vehicle. Connect oil pressure gauge between oil pump discharge connector and high pressure hose. Then bleed the hydraulic circuit.
2. Start engine. Run engine until oil temperature reaches 50°C - 80°C (122 - 176°F).

**CAUTION:**

- Leave valve of hydraulic pressure gauge fully open while starting and running engine. If engine is started with valve closed, hydraulic pressure in oil pump goes up. This will relief pressure along with abnormal increase of oil temperature.
- Care must be taken to keep hose clear of belt and other parts when engine is started.

3. Fully close hydraulic pressure gauge valve with engine at idle. Measure relief pressure.

**Relief oil pressure**

Except YD22DDTi models : 8,000 - 8,800 kPa (81.60 - 89.76 kg/cm<sup>2</sup> , 1,160 - 1,276 psi)

YD22DDTi models : 8,500 - 9,300 kpa (98 - 104 kg/cm<sup>2</sup> , 1,390 - 1,480 psi)

4. After measurement, open valve slowly.

**CAUTION:**

Never keep valve closed for 10 seconds or longer.

- If relief pressure is outside specification, disassemble and service oil pump. Refer to [PS-28, "Disassembly and Assembly\(QR20DE and QR25DE Engine Models\)"](#) , [PS-33, "Disassembly and Assembly \(YD22DDTi Engine Model\)"](#) .

5. After inspection, remove oil pressure gauge from hydraulic circuit. Add fluid. Be sure to bleed the system completely. Refer to [PS-6, "Air Bleeding Hydraulic System"](#) .

## Removal and Installation (QR20DE and QR25DE Engine Models)

BGS0001C

**REMOVAL**

1. Loosen adjusting screw and oil pump mounting bolt. Then, remove belt.
2. Remove union bolt and hose for oil pump.
3. Remove oil pump bracket attaching bolt.
4. Remove oil pump from vehicle.

**INSTALLATION**

Paying attention to following items, install in the reverse order of removal.

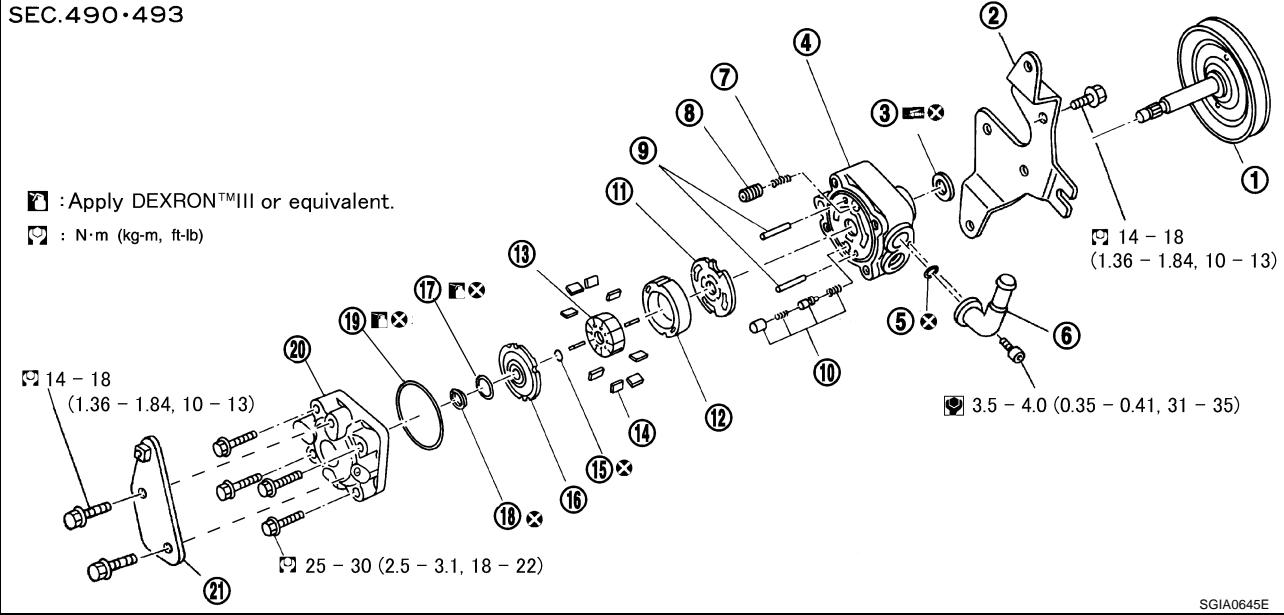
- After installation, adjust belt tension. Refer to [EM-13, "DRIVE BELTS"](#) .
- After installation, be sure to bleed system. Refer to [PS-6, "Air Bleeding Hydraulic System"](#) .

# POWER STEERING OIL PUMP

## Disassembly and Assembly(QR20DE and QR25DE Engine Models)

BGS0001D

SEC.490-493



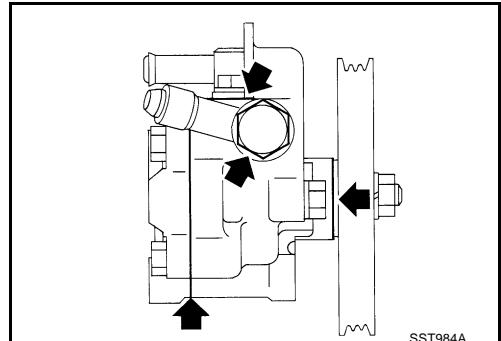
SGIA0645E

1. Pulley	2. Front bracket	3. Drive shaft seal
4. Casing	5. Inlet connector seal	6. Inlet connector
7. Flow control valve spring	8. Flow control A valve	9. Dowel pin
10. Flow control B valve assembly	11. Side plate (front)	12. Cartridge
13. Rotor	14. Vane	15. Rotor snap ring
16. Side plate (rear)	17. Side plate inner seal	18. Side plate outer seal
19. Body seal	20. Rear body	21. Rear bracket

### INSPECTION BEFORE DISASSEMBLY

Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure
- Deformed or damaged pulley
- Poor performance



### DISASSEMBLY

1. Fix power steering pump in a vise.

#### CAUTION:

When fixing pump in a vise, use aluminum plates to protect steering pump mounting surface.

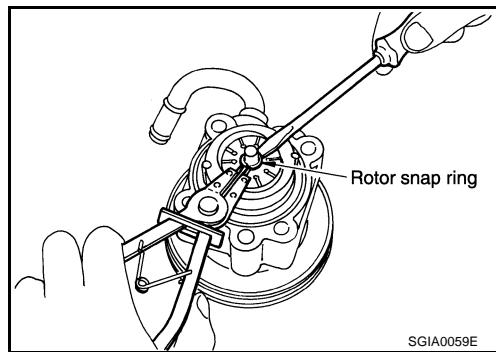
2. Remove rear bracket mounting bolts. Remove rear bracket from rear body.
3. Remove three front bracket attaching bolts and remove front bracket from casing.
4. Remove four rear body attaching bolts and remove rear body from casing.
5. Remove body seal from casing.
6. Remove side plate (rear) from cartridge. Remove side plate inner and outer seals from side plate (rear).

# POWER STEERING OIL PUMP

7. Remove rotor snap ring using a snap ring pliers and remove pulley from casing.

**CAUTION:**

When removing rotor snap ring, be careful not to damage pulley shaft.



8. Remove following parts from casing: cartridge, rotor, vane, side plate (front), flow control valve A, flow control valve spring, and flow control valve B assembly

**CAUTION:**

Do not drop flow control A valve and flow control B valve assembly to floor. If dropped, they may be deformed.

9. Remove inlet connector attaching bolt and remove inlet connector from casing.

10. Remove inlet connector seal from inlet connector.

11. Using a screwdriver or equivalent tool, remove drive shaft seal from casing.

**CAUTION:**

Be careful not to damage casing surface with screwdriver.

## INSPECTION AFTER DISASSEMBLY

### Inspecting Casing and Rear Body

- Check casing and rear body for internal damage. If rear body is damaged, replace rear body. If casing is damaged, replace power steering pump assembly.

PS

### Cartridge Inspection

- Check cartridge for damage. If damaged, cartridge, rotor, and vane must be replaced as a set.

H

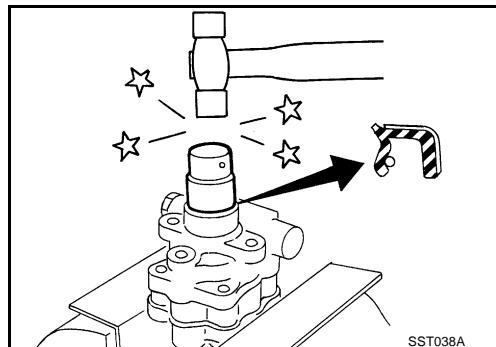
### Inspecting Side Plate

- Check side plates (front and rear) for damage. If damaged, side plates (front and rear) must be replaced as a set.

I

## ASSEMBLY

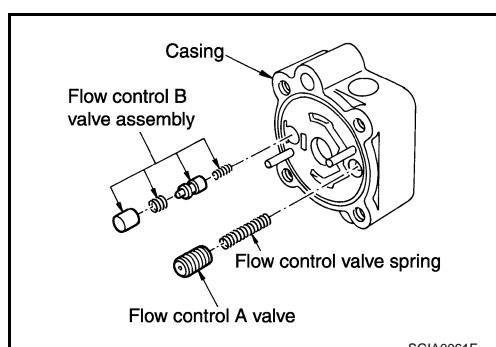
1. Apply multi-purpose grease to lip of drive shaft seal. Using a drift, install drive shaft seal to casing.



**CAUTION:**

Drive shaft seal is not reusable. Never reuse drive shaft seal.

2. If removed dowel pin cannot be inserted to casing by hand, tap it with hammer.



3. Connect flow control valve A, flow control valve spring and flow control valve B assembly as shown.

J

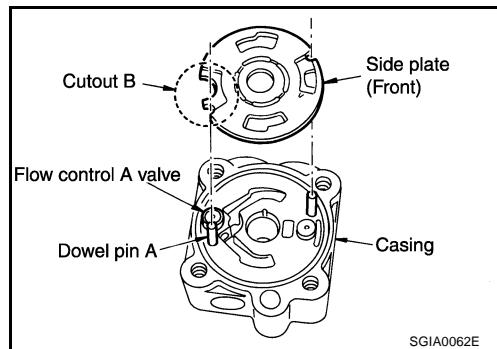
K

L

M

## POWER STEERING OIL PUMP

4. Align dowel pin A on flow control valve A with notch B in side plate (front) as shown. Install side plate (front) to casing.

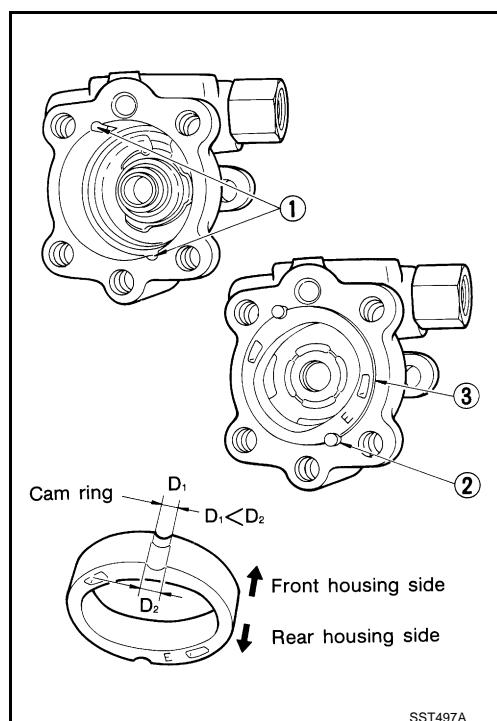


5. Install cartridge onto front side plate with smaller slit of cartridge facing casing.

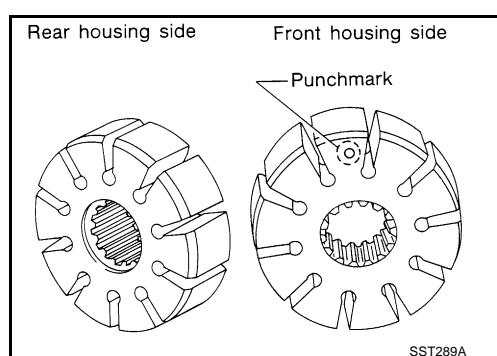
6. Connect pulley to casing.

**CAUTION:**

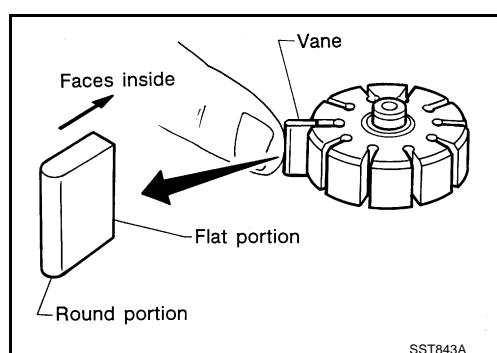
Be careful not to damage drive shaft seal when installing pulley.



7. Connect rotor to pulley shaft with punch mark on rotor facing casing.



8. Connect vane to rotor with arc of vane in contact with cartridge.

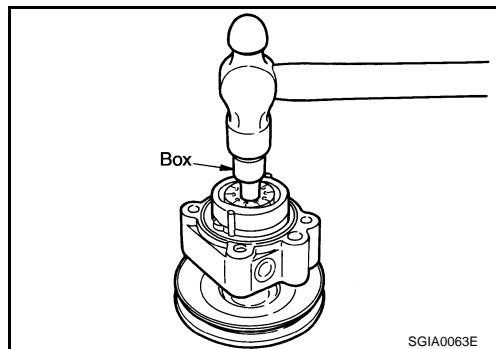


## POWER STEERING OIL PUMP

9. Connect rotor snap ring to slit of pulley shaft, using a hammer and a 10-mm socket.

**CAUTION:**

- Rotor snap ring is not reusable. Never reuse rotor snap ring.
- Be careful not to damage rotor and pulley shaft.
- If rotor is damaged, power steering pump assembly must be replaced.

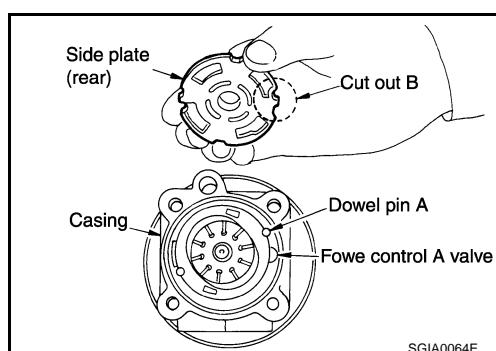


10. Align dowel pin A on flow control valve A with notch B in side plate (rear) as shown. Install side plate (rear) to cartridge.

11. Apply DEXRON™ III or equivalent to body seal. Install it to casing.

**CAUTION:**

Body seal is not reusable. Never reuse body seal.



12. Apply DEXRON™ III or equivalent to side plate inner and outer seals. Install them to side plate (rear).

**CAUTION:**

Side plate inner and outer seals are not reusable. Never reuse side plate inner and outer seals.

13. Fix power steering pump in a vise.

**CAUTION:**

When fixing pump in a vise, use aluminum plates to protect steering pump mounting surface.

14. Attach rear body to casing and tighten four mounting bolts diagonally to specified torque.

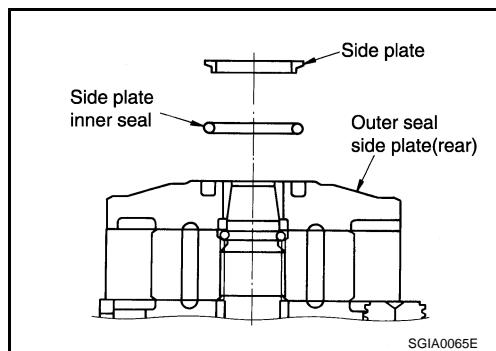
15. Install rear bracket to rear body. Tighten mounting bolts to specified torque.

16. Connect front bracket to casing and tighten mounting bolts (3) to specified torque.

17. Connect inlet connector seal to inlet connector slit. Install inlet connector to casing with attaching bolts.

**CAUTION:**

Inlet connector seal is not reusable. Never reuse inlet connector seal.

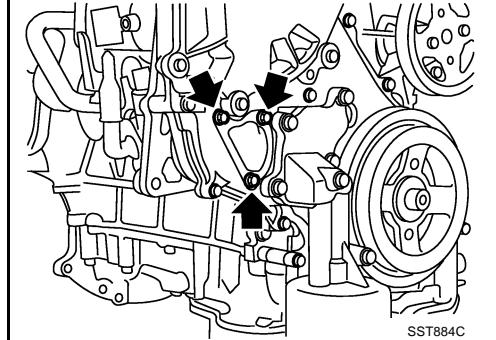


# POWER STEERING OIL PUMP

## Removal and Installation (YD22DDTi Engine Model)

BGS0001E

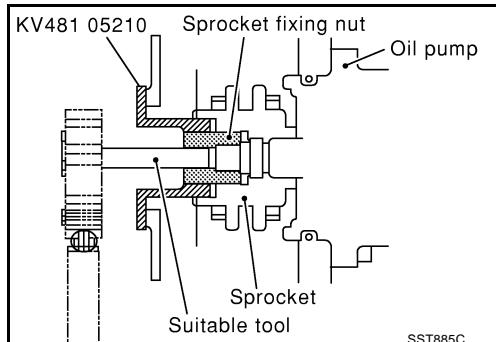
1. Remove chain case cover.



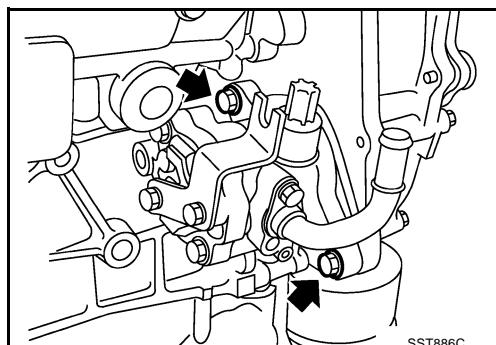
2. Revolving crank pulley, set sprocket holder [SST].
3. Fix sprocket holder [SST] with chain cover fixing bolts.
4. Using suitable tool, remove sprocket fixing nut and washer.

**CAUTION:**

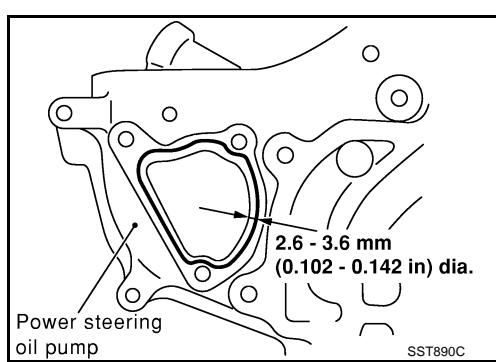
Do not remove Tool while power steering oil pump is removed.



5. Remove power steering pump fixing bolts, then remove it.



6. Apply Gasket to the installation surface of the engine chain case cover as shown in the figure before installing the chain case cover to the engine.
7. Bleed air after installation. Refer to [PS-6, "Air Bleeding Hydraulic System"](#).

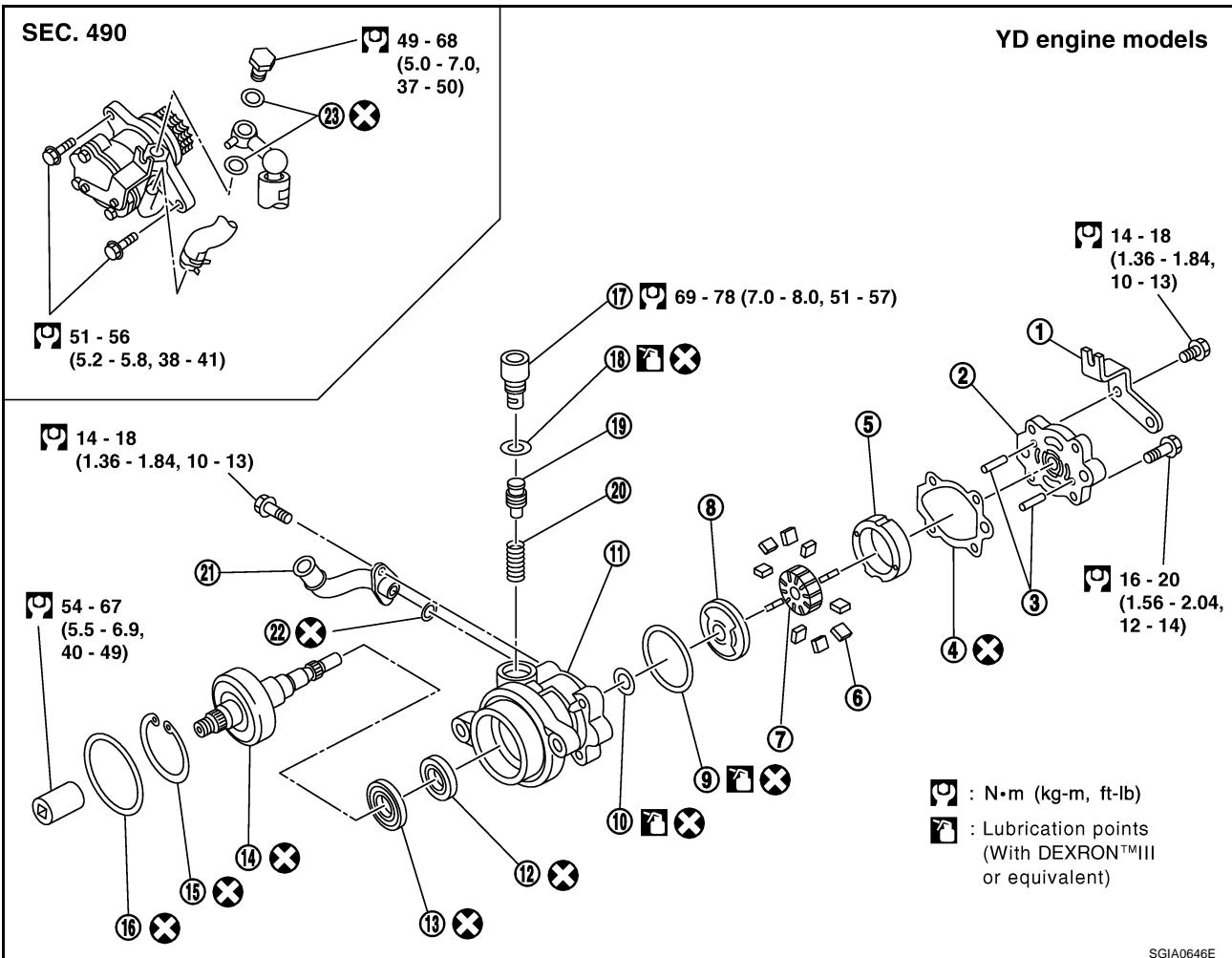


# POWER STEERING OIL PUMP

## Disassembly and Assembly (YD22DDTi Engine Model)

BGS0001F

A  
B  
C  
D  
E  
F  
PS  
H  
I  
J  
K  
L  
M

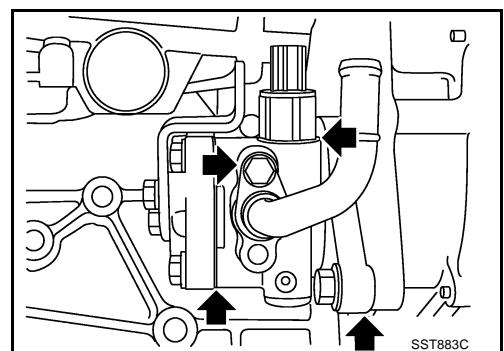


1. Rear bracket	2. Rear body	3. Dowel pin
4. Side plate seal	5. Cam ring	6. Vane
7. Rotor	8. Side plate	9. O-ring (Outer)
10. O-ring (Inner)	11. Front body	12. Drive shaft rear oil seal
13. Drive shaft front oil seal	14. Drive shaft	15. Snap ring
16. O-ring	17. Outlet connector	18. Connector seal
19. Flow control valve	20. Flow control valve spring	21. Inlet connector
22. O-ring	23. Copper washer	

### INSPECTION BEFORE DISASSEMBLY

Disassemble power steering oil pump only when any of following cases meets.

- If oil leak is found on oil pump.
- Oil pump pulley is deformed or damaged.
- Performance of oil pump is low.



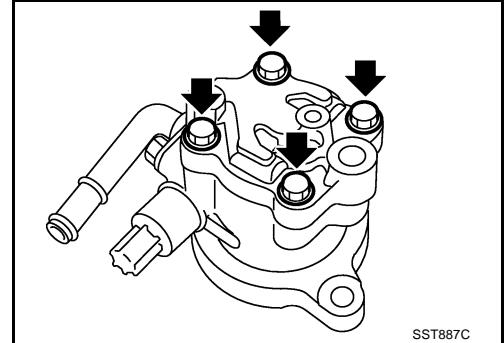
# POWER STEERING OIL PUMP

## DISASSEMBLY

### CAUTION:

- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
- Disassemble in as clean a place as possible.
- Clean your hands before disassembly.
- Do not use rags; use nylon cloths or paper towels.
- Follow the procedure and cautions in the Service Manual.
- When disassembling and reassembling, do not let foreign matter enter or contact the parts.

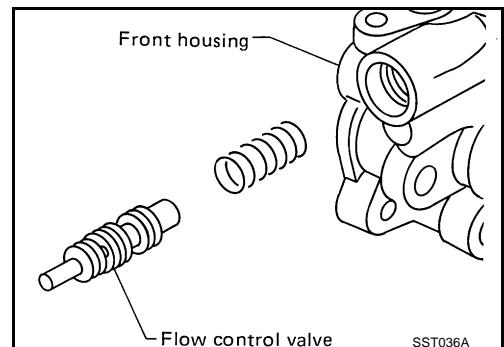
1. Remove rear bracket and rear body.
2. Remove side plate seal, cam ring, vane, rotor and side plate.



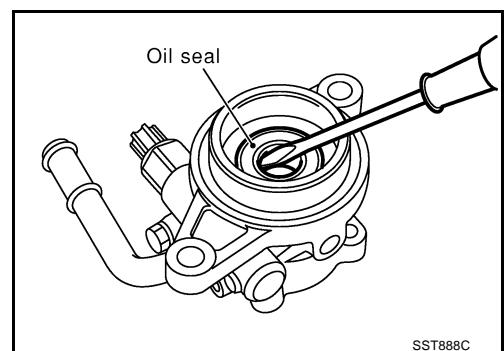
3. Remove out connector and then remove connector seal, flow control valve and flow control valve spring.

### CAUTION:

- Be careful not to drop the flow control valve.
- Do not disassemble the flow control valve.



4. Remove oil seal

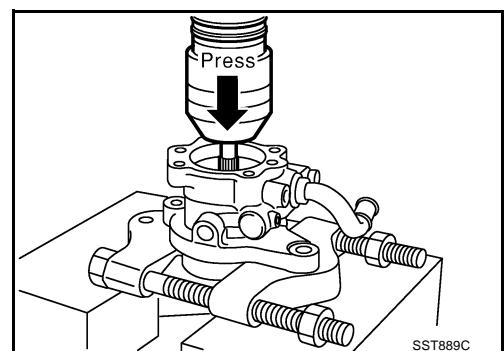


5. Remove snap ring, then draw drive shaft.

### CAUTION:

- Be careful not to drop drive shaft.

6. Remove inlet connector.



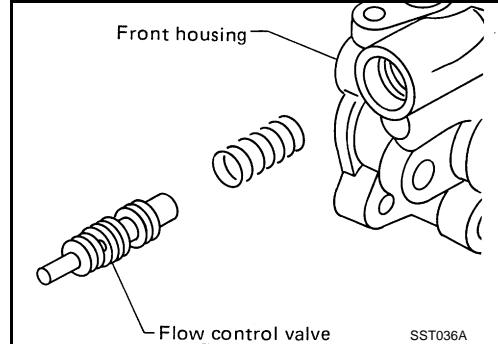
# POWER STEERING OIL PUMP

## INSPECTION AFTER DISASSEMBLY

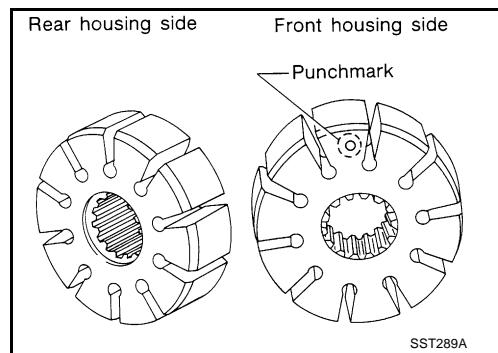
- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration on pulley or pulley shaft is deformed or worn, replace it.

## ASSEMBLY

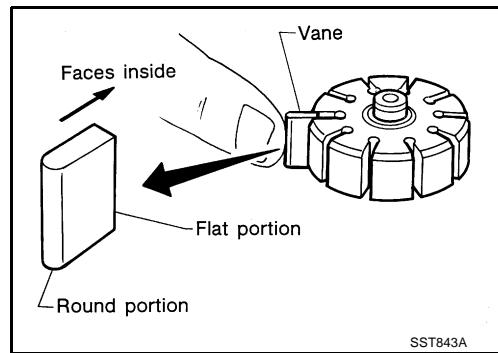
1. Assemble oil pump, noting the following instructions.
  - Make sure O-rings and oil seal are properly installed.
  - Always install new O-rings and oil seal.
  - Be careful of oil seal direction.
  - Cam ring, rotor and vanes must be replaced as a set if necessary.
  - Coat each part with DEXRON™ III or equivalent when assembling.



2. Pay attention to the direction of rotor.



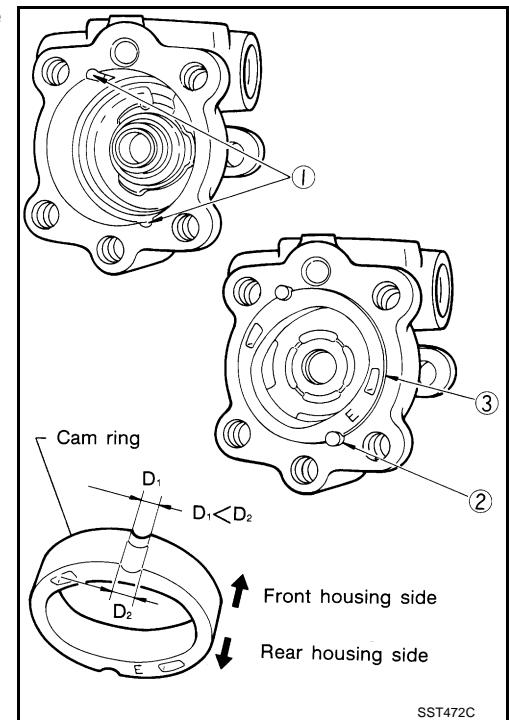
3. When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.



## POWER STEERING OIL PUMP

4. Insert pin 2 into pin groove 1 of front housing and front side plate. Then install cam ring 3 as shown at left.

**Cam ring :  $D_1$  is less than  $D_2$**



SST472C

# HYDRAULIC LINE

## HYDRAULIC LINE

PFP:49721

### Component

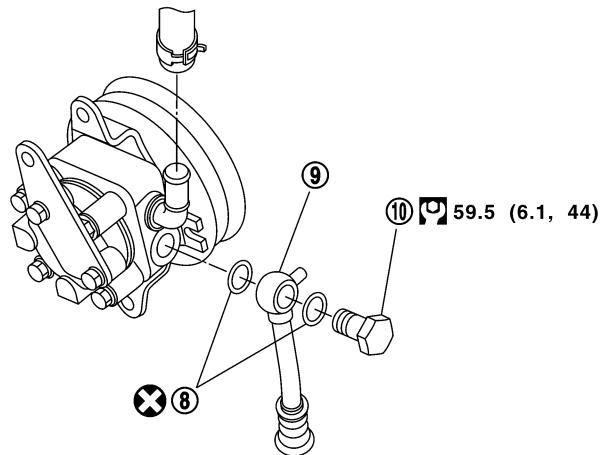
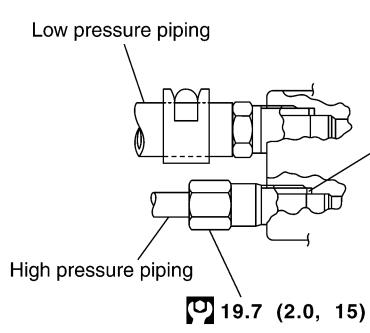
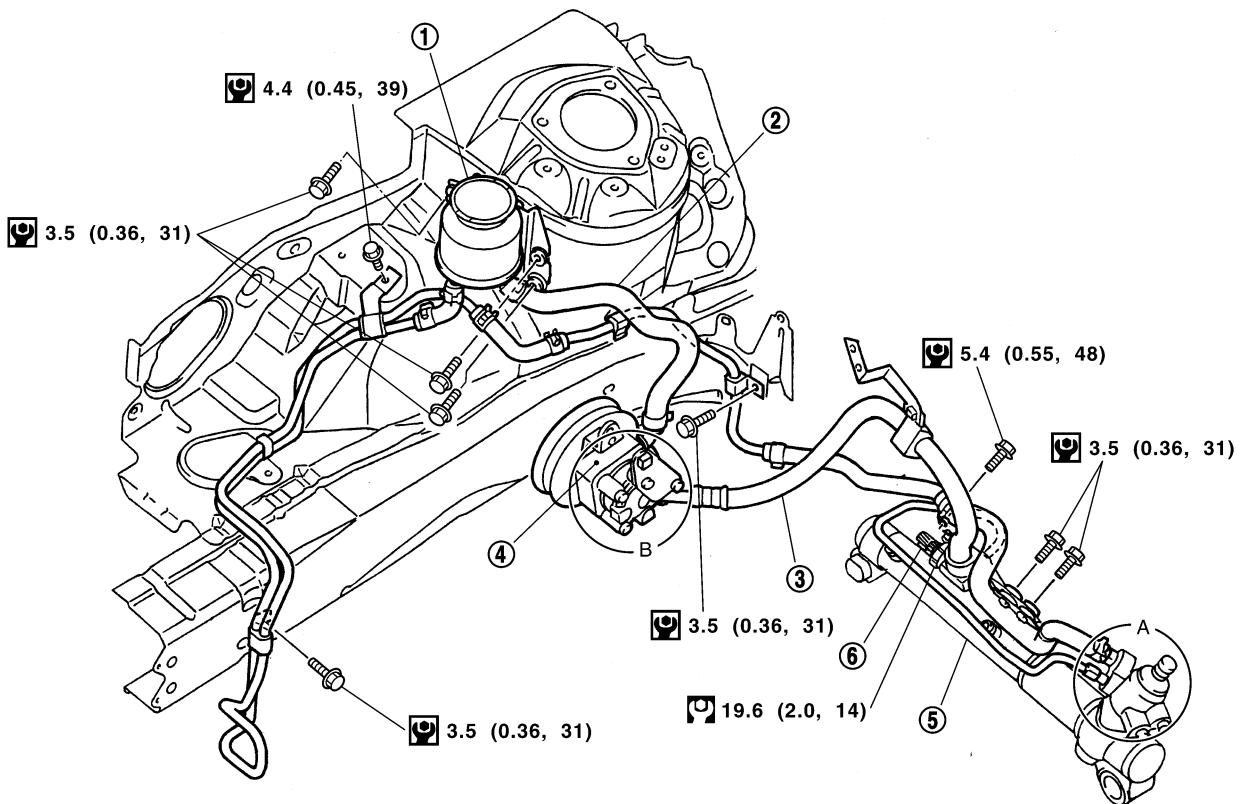
BGS0001G

#### CAUTION:

Securely insert harness connector to pressure sensor.

#### QR20DE LH MODEL

SEC.497



■ : DEXRON™ III or equivalent.

● : N·m (kg·m, ft-lb)

◎ : N·m (kg·m, in-lb)

✖ : Always replace after every disassembly.

SGIA0944E

## HYDRAULIC LINE

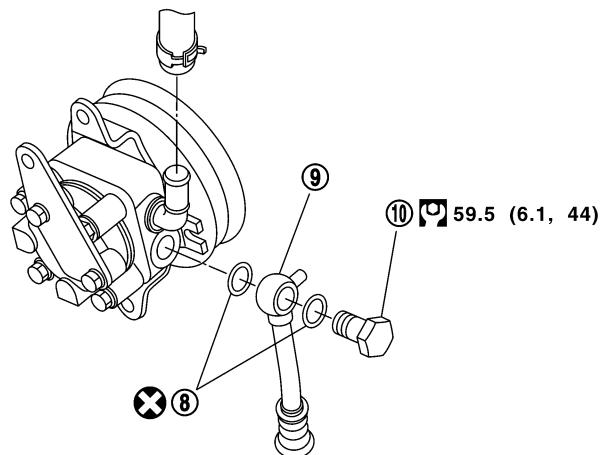
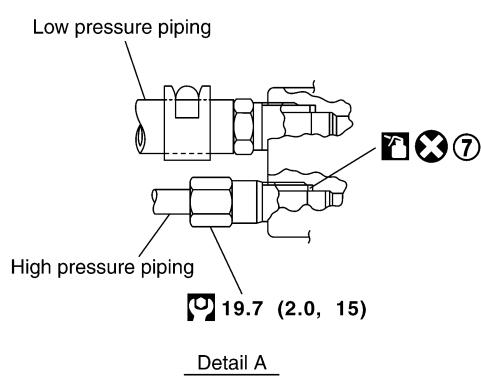
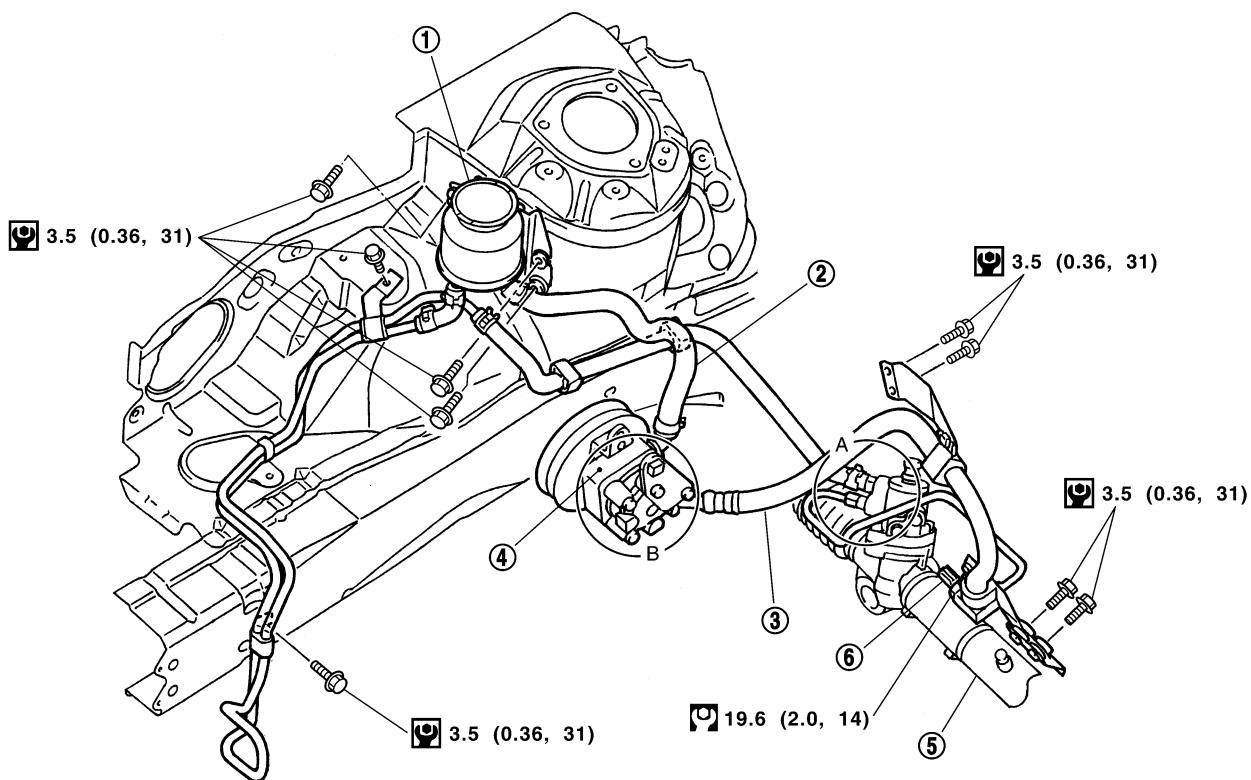
---

1. Reservoir tank
2. Suction hose
3. High-pressure hose
4. Oil pump assembly
5. Steering gear assembly
6. Pressure sensor
7. O-ring
8. Copper washer
9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt

# HYDRAULIC LINE

## QR20DE RH MODEL

SEC.497



: DEXRON™ III or equivalent.

: N·m (kg·m, ft-lb)

: N·m (kg·m, in-lb)

: Always replace after every disassembly.

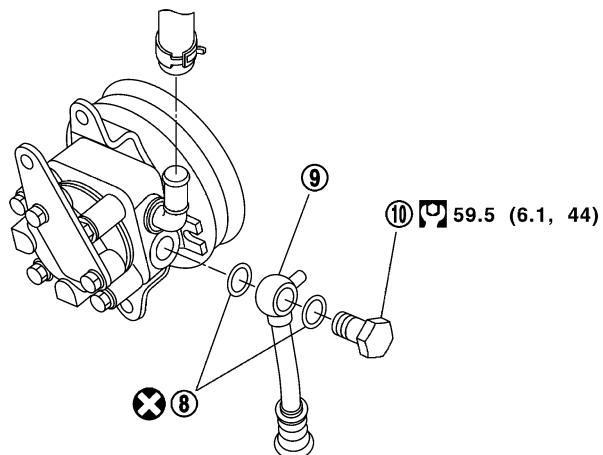
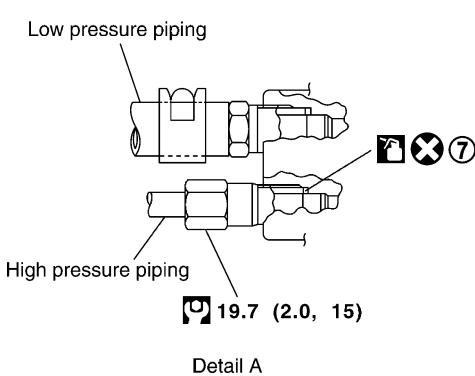
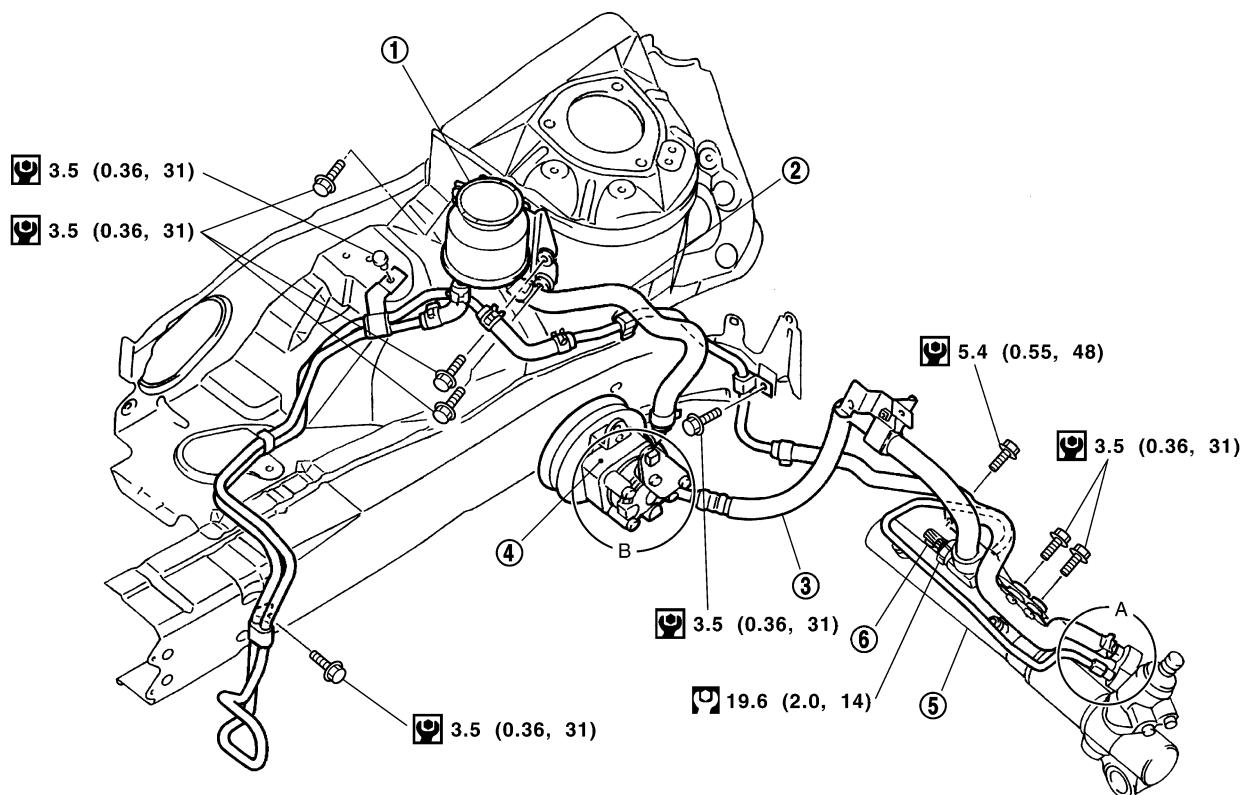
SGIA0945E

1. Reservoir tank	2. Suction hose	3. High-pressure hose
4. Oil pump assembly	5. Steering gear assembly	6. Pressure sensor
7. O-ring	8. Copper washer	9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt		

# HYDRAULIC LINE

## QR25DE LH MODEL

### SEC.497



: DEXRON™III or equivalent.

: N·m (kg·m, ft-lb)

: N·m (kg·m, in-lb)

: Always replace after every disassembly.

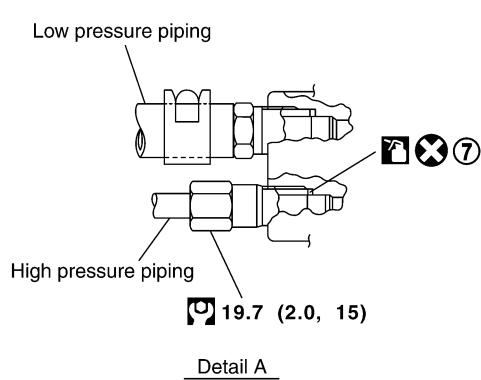
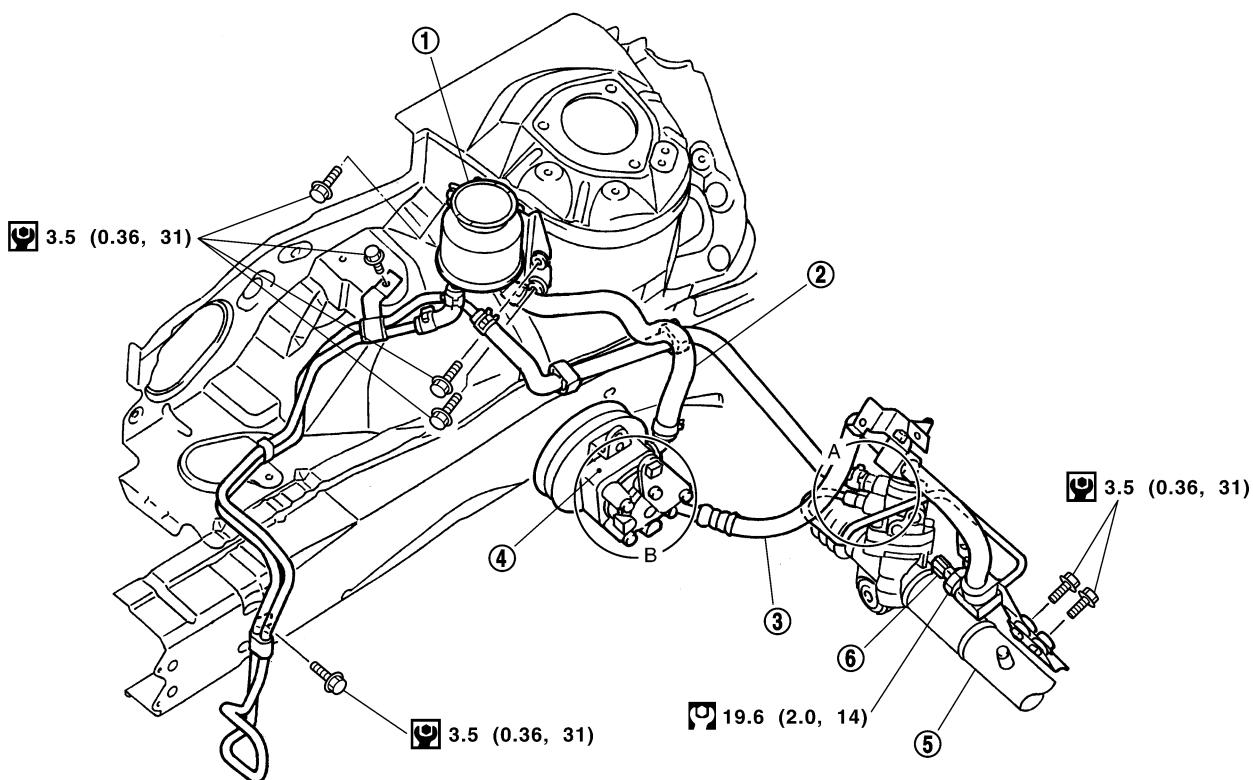
SGIA0946E

1. Reservoir tank	2. Suction hose	3. High-pressure hose
4. Oil pump assembly	5. Steering gear assembly	6. Pressure sensor
7. O-ring	8. Copper washer	9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt		

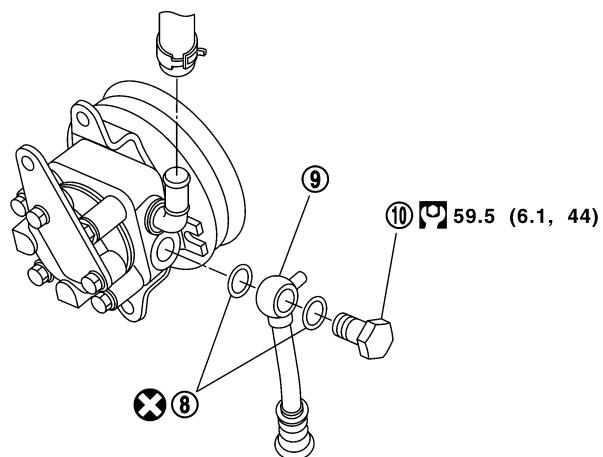
# HYDRAULIC LINE

## QR25DE RH MODEL

SEC.497



Detail A



Detail B

: DEXRON™ III or equivalent.

: N·m (kg·m, ft-lb)

: N·m (kg·m, in-lb)

: Always replace after every disassembly.

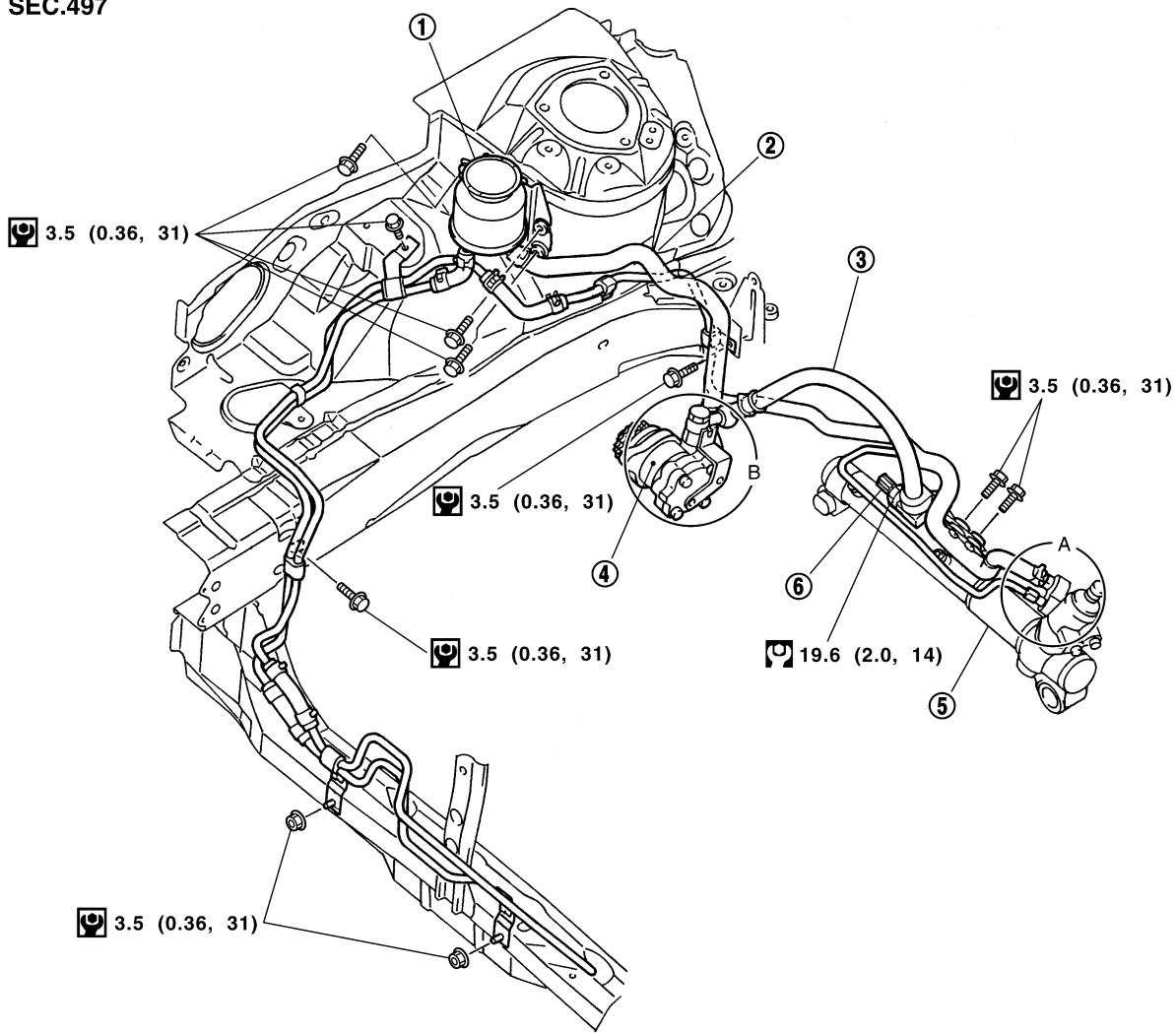
SGIA0947E

1. Reservoir tank	2. Suction hose	3. High-pressure hose
4. Oil pump assembly	5. Steering gear assembly	6. Pressure sensor
7. O-ring	8. Copper washer	9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt		

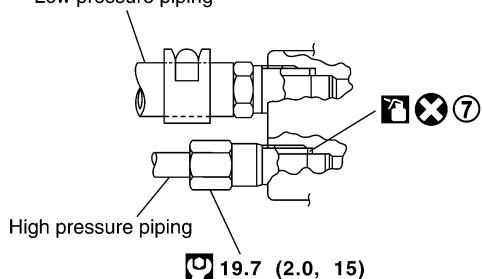
# HYDRAULIC LINE

## YD22DDTi LH MODEL

SEC.497

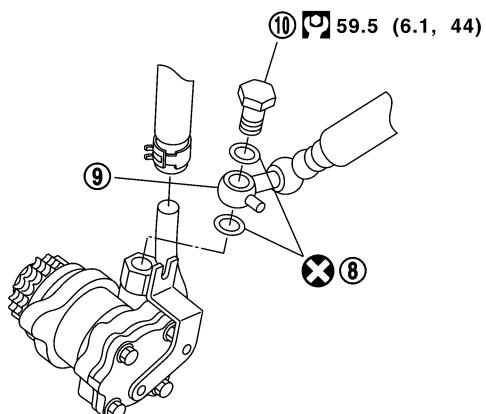


Low pressure piping



Detail A

- ▣ : DEXRON™ III or equivalent.
- ▣ : N·m (kg·m, ft-lb)
- ▣ : N·m (kg·m, in-lb)
- ✗ : Always replace after every disassembly.



Detail B

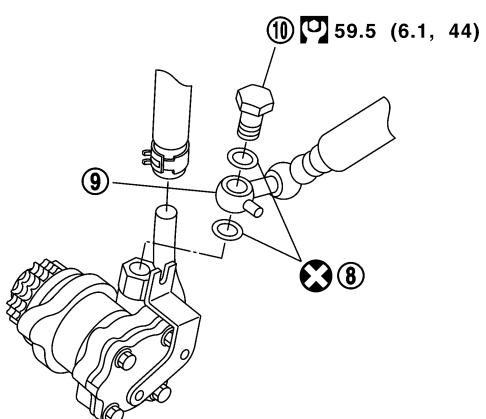
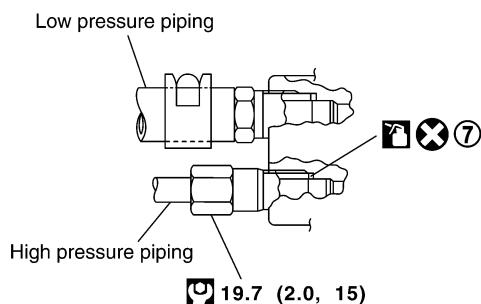
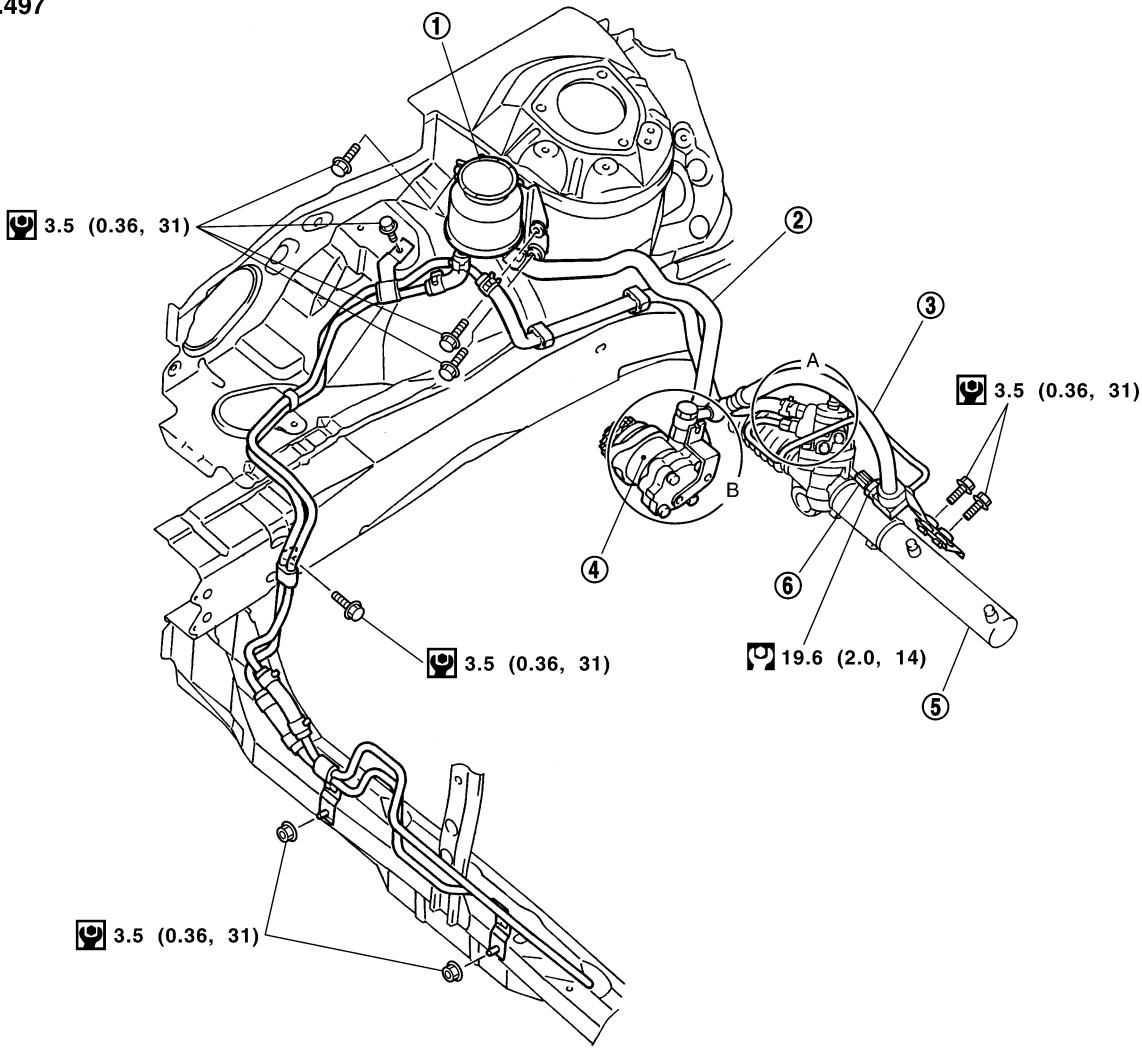
SGIA0948E

1. Reservoir tank
2. Suction hose
3. High pressure hose
4. Oil pump assembly
5. Steering gear assembly
6. Pressure sensor
7. O-ring
8. Copper washer
9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt

# HYDRAULIC LINE

## YD22DDTi RH MODEL

SEC.497



Detail A

Detail B

- : DEXRON™ III or equivalent.
- : N·m (kg-m, ft-lb)
- : N·m (kg-m, in-lb)
- : Always replace after every disassembly.

SGIA0949E

1. Reservoir tank
2. Suction hose
3. High pressure hose
4. Oil pump assembly
5. Steering gear assembly
6. Pressure sensor
7. O-ring
8. Copper washer
9. Eye-joint (assembled to high-pressure side hose)
10. Eye-bolt

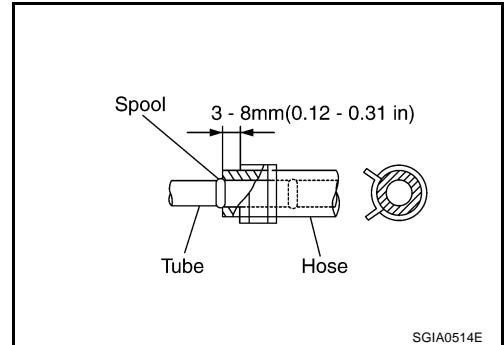
# HYDRAULIC LINE

## REMOVAL AND INSTALLATION

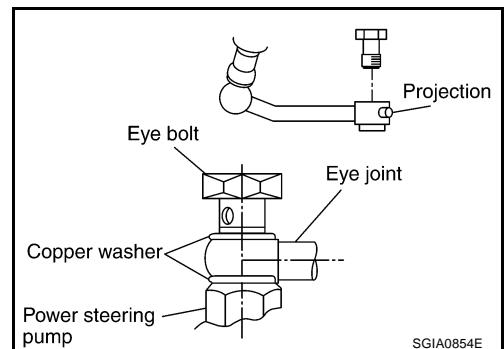
- Insert hose securely until contacts tube spool.

**CAUTION:**

Do not apply fluid.



- Install eye-bolt with eye-joint (assembled to high-pressure hose) protrusion facing with pump side cutout, and then tighten it to the specified torque after tightening by hand.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Steering Wheel

BGS0001H

Steering wheel axial end play	0 mm (0 in)
Steering wheel play	0 - 35 mm (0 - 1.38 in)

### Steering Angle

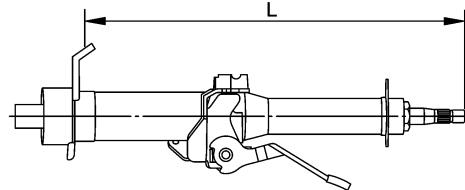
BGS0001I

Inner wheel Degree minute (Decimal degree)	Minimum	36° 00' (36.0°)
	Nominal	39° 00' (39.0°)
	Maximum	40° 00' (40.0°)
Outer wheel Degree minute (Decimal degree)		31° 00' (31.0°)

### Steering Column

BGS0001J

Steering column length "L"	405.3 mm (15.96 in)
----------------------------	---------------------

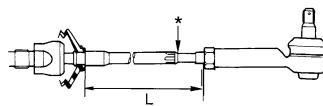


SGIA0883E

### Steering Outer Socket and Inner Socket

BGS0001K

	Steering gear type	PR24AD
Outer socket	Swing torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3.0 - 25 in-lb)
	Measurement on spring balance Measuring point: cotter pin hole of stud	4.84 - 47.4 N (0.49 - 4.84 kg, 1.08 - 10.7 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3.0 - 25 in-lb)
	Axial endplay	0.5 mm (0.02 in) or less
Inner socket	Swing torque	1.0 - 7.8 N·m (0.10 - 0.80 kg·m, 9.0 - 69 in-lb)
	● Measurement on spring balance ● Measuring point at* mark shown in the figure	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)
	Axial endplay	0.2 mm (0.008 in) or less
Inner socket length "L"		169.67 mm (6.68 in)



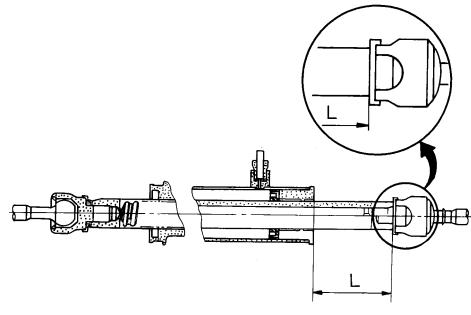
SGIA0950E

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Steering Gear

BGS0001L

Steering gear model	PR24AD
Rack neutral position, dimension "L" (rack stroke)	66.5 mm (2.618 in)



SGIA0629J

## Oil Pump

BGS0001M

Oil pump relief hydraulic pressure

Except YD22DDTi models	8,000 - 8,800 kPa (81.60 - 89.76 kg/cm <sup>2</sup> , 1,160 - 1,276 psi)
YD22DDTi models	8,500 - 9,300 kPa (98 - 104 kg/cm <sup>2</sup> , 1,390 - 1,480 psi)

## Steering Fluid

BGS0001N

Fluid capacity	Approx. 1.0 ℥ (1-1/8 US qt, 7/8 Imp qt)
----------------	---