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SECTION

PS

POWER STEERING SYSTEM

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# PRECAUTIONS

## PRECAUTIONS

PFP:00001

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

AGS00084

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. 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 harness connectors.

### Precautions for Battery Service

AGS000A9

This vehicle is equipped with the automatic window adjusting function. When a door is opened, the window automatically lowers slightly to avoid contact between the window and the side roof panel. After the door is closed, the window will automatically raise slightly.

On vehicles equipped with the automatic window adjusting function, lower both the driver and front passenger side windows before disconnecting the battery cables. This will prevent interference between the side window and the roof panel when either door is opened/closed.

#### **CAUTION:**

**After the battery cables are disconnected, do not open/close the driver and/or front passenger door with the window in the full up position. The automatic window adjusting function will not work and the side roof panel may be damaged.**

### Precautions for Steering System

AGS0009Q

- Be careful with the following items while at overhaul.
  - 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.
  - Place disassembled parts in order, on a parts rack, for easier and proper assembly.
  - Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
  - Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.
  - Before assembly, apply a coat of recommended Genuine Nissan PSF II or equivalent to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
  - Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.
  - Wash disassembled parts (except rubber parts) with kerosene, dry them by air blowing and paper towels.
- Mark places that fluid is leaked by a white marker to repair.
- Overhaul the oil pump, check damage (scratches, too) for cover assembly, side plates, shaft kit, rotor vanes and flow control valve, replace new one with each part if necessary.

# PREPARATION

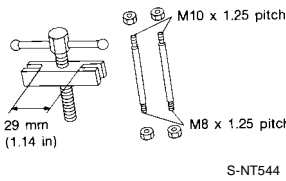
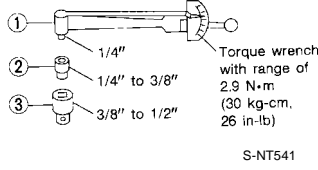
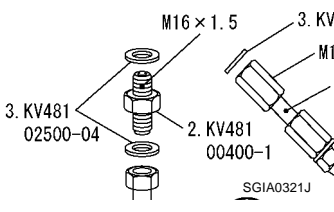
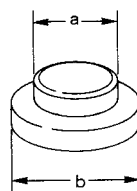
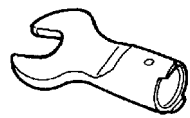
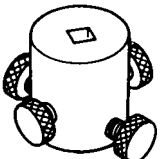
## PREPARATION

PFP:00002

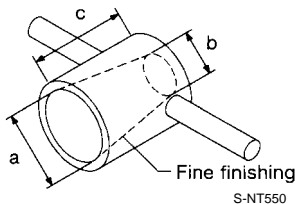
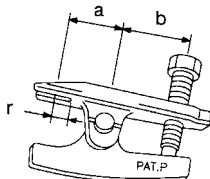
## Special Service Tools

AGS0001V

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

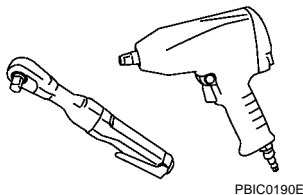
Tool number (Kent-Moore No.) Tool name	Description
ST27180001 (J25726-A) Steering wheel puller 	Removing steering wheel
ST3127S000 (See J25765-A) Preload gauge 1. GG9103000 (J25765-A) Torque wrench 2. HT62940000 ( - ) Socket adapter 3. HT62900000 ( - ) Socket adapter 	Inspecting of sliding torque, steering torque, and rotational torque for ball joint
1. KV48103500 (J26357 and J26357-10) Pressure gauge 2. KV48100400-1 ( - ) Connector 3. KV48102500-04 ( - ) Washer 4. KV48100410 ( - ) Joint 	Measuring oil pump relief pressure
ST35300000 ( - ) Drift a: 45.1 mm (1.78 in) b: 59 mm (2.32 in) 	Installing oil seal of oil seal
KV48104300 Open head 	Removing and installing cylinder end cover
KV48103404 ( - ) Torque adapter 	Inspecting rotational torque

## PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
KV48104400 (     -     ) Teflon ring correcting tool a: 50 mm (1.97 in) dia. b: 36 mm (1.42 in) dia. c: 100 mm (3.94 in)	 Installing of rack Teflon ring
HT72520000 (J25730-A) Ball joint remover a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: 11.5 mm (0.453 in)	 Removing tie-rod ball joint

## Commercial Service Tools

AGS0001W

Tool name	Description
Power tool	 Removing oil pump and road wheels

# NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

AGS0001X

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

Reference page		PS-6	PS-6	PS-23	PS-23	PS-23	PS-6	PS-7	PS-8	EM-13	PS-7	PS-14	PS-17	PS-9	PS-9	PS-17	NVH in PR section	NVH in RFD section	NVH in FAX, RAX, FSU, RSU section	NVH in WT section	NVH in WT section	NVH in RAX section	NVH in BR section
Possible cause and suspected parts		Fluid level	Air in hydraulic system	Tie-rod ball joint swinging force	Tie-rod ball joint sliding torque	Tie-rod ball joint end play	Steering fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	Improper installation or looseness of tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	Propeller shaft	Differential	Axle and suspension	Tires	Road wheel	Drive shaft	Brakes
Symptom	Noise	x	x	x	x	x	x	x	x	x							x	x	x	x	x	x	x
	Shake										x	x	x				x		x	x	x	x	x
	Vibration										x	x	x	x	x		x		x	x		x	
	Shimmy										x	x	x			x			x	x	x		x
	Judder												x			x			x	x	x		x

x: Applicable

# POWER STEERING FLUID

## POWER STEERING FLUID

PFP:KLF20

### Checking Fluid Level

AGS0001Y

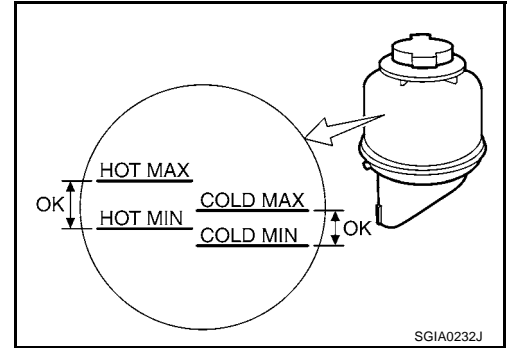
- Stop the engine before performing a fluid level check.
- Ensure that the fluid level is between the MAX range and MIN range.
- Because the fluid level differs within the HOT range and the COLD range, check it carefully.

**HOT** : Fluid temperatures from 50 to 80 °C (122 to 176°F)

**COLD** : Fluid temperatures from 0 to 30°C (32 to 86°F)

#### CAUTION:

- Do not overfill (above the MAX level).
- Do not reuse the drained power steering fluid.
- Recommended fluid is Genuine NISSAN PSF II or equivalent.



SGIA0232J

### Checking Fluid Leakage

AGS0001Z

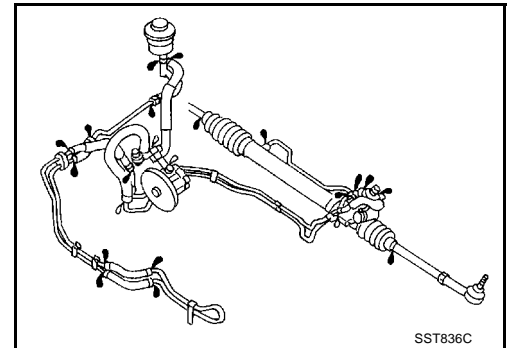
Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine at idle speed or about 1,000 rpm.  
**Make sure that the temperature of fluid in reservoir tank rises to 50 to 80°C (122 to 176°F)**
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds to check fluid leakage.

#### CAUTION:

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

4. If fluid leakage at the connectors is noticed, then loosen the flare nut and retighten it.



SST836C

### Air Bleeding the Hydraulic System

AGS00020

Incomplete air bleeding causes the following to occur. When this happens, bleed the air again.

- Generation of air bubbles in the reservoir tank
- Generation of clicking noise in the oil pump
- Excessive buzzing in the oil pump

#### NOTE:

Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning the steering wheel slowly. This does not affect the performance or durability of the system.

1. Stop the engine, and then turn the steering wheel fully to right and left several times.

#### NOTE:

While air bleeding the Hydraulic System, frequently check the reservoir tank, add additional fluid up to the MAX level, if necessary.

2. Run engine at idle speed, hold steering wheel at each "lock" position for about three seconds.
3. Repeat the 2nd procedure several times at about three seconds intervals.

#### CAUTION:

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

4. Check generation of air bubbles and cloud in the fluid.
5. If the air bubbles and the cloud don't fade, stop the engine, leave air bleeding behind until the air bubbles and the cloud fade. Perform the 2nd and the 3rd procedures again.
6. Stop the engine, check fluid level.

# STEERING WHEEL

## STEERING WHEEL

PFP:48430

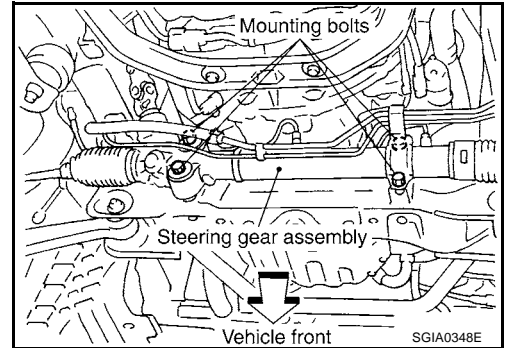
### On-Vehicle Service

AGS00021

Checking condition of installation

- Check installation condition 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.

**End play of the axle direction for steering wheel:**  
**0 mm (0 in)**



- Check if the mounting bolts for the steering gear are loose or not.

**Tightening torque**

**large bolts : 120 - 140 N·m (13 - 14 kg-m, 89 - 103 ft-lb)**

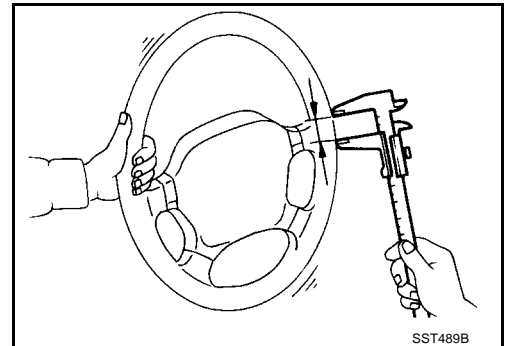
**small bolts : 62 - 76 N·m (6.4 - 7.7 kg-m, 46 - 56 ft-lb)**

### CHECKING STEERING WHEEL PLAY

1. Set the tires to the straight ahead-direction, start the engine, then turn the steering wheel to the left and right lightly, and measure the steering wheel movement on the outer circumference when the steering wheel is turned up to the tires start moving.

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

- It is not within specification, check the following for loose or worn components.
  - Steering gear assembly
  - Steering column
  - Front suspension and axle



### CHECKING NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to [FSU-21, "SERVICE DATA"](#).
1. Set the vehicle to the straight ahead-direction, check if steering wheel is in the neutral position.
  2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
  3. If the neutral position cannot adjust in the two teeth of steering column shaft, loosen tie-rod lock nuts of steering outer sockets, then adjust the tie-rods by the same amount in the opposite direction.

# STEERING WHEEL

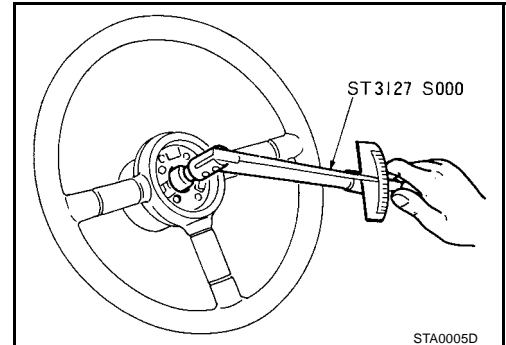
## CHECKING STEERING WHEEL TURNING FORCE

1. Park vehicle on a level in the dry surface, set parking brake.
2. Remove driver air bag module from the steering wheel. Refer to [SRS-38, "DRIVER AIR BAG MODULE"](#).
3. Start the engine at idle, make steering fluid reach to normal operating temperature, then check steering wheel turning torque with the pre-load gauge (special service tool).

### Specified value

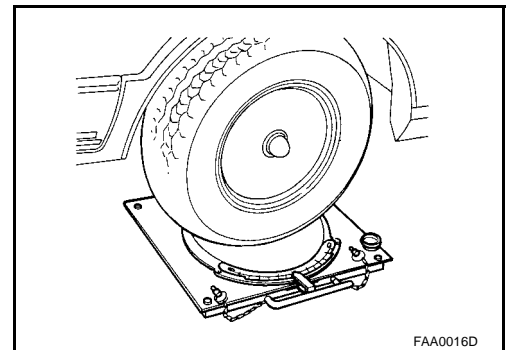
**Turning torque : Less than 7.45 N-m (0.76 kg-m, 66 in-lb)**

4. If steering wheel turning force is out of specification, check relief hydraulic pressure of the oil pump. Refer to [PS-29, "POWER STEERING OIL PUMP"](#).



## CHECKING FRONT WHEEL TURNING ANGLE

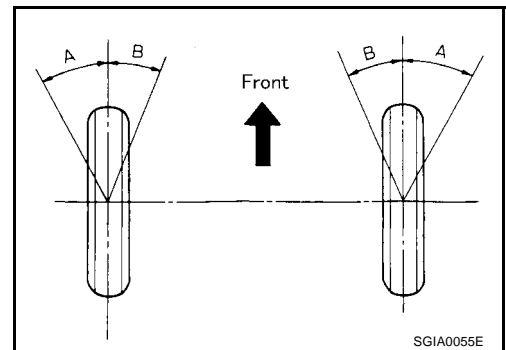
- Check front wheel turning angle after the toe-in inspection. Place the front wheels on turning radius gauges and the rear wheels on stands so that the vehicle can be level. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- Start engine and run at idle, turn the steering wheel all the way right and left, measure the turning angle.

### Turning angle of full turns

Inner wheel (Angle: A)	Minimum	35° 55' (35.9°)
	Nominal	38° 55' (38.9°)
	Maximum	39° 55' (39.9°)
Outer wheel (Angle: B)	Nominal	30° 40' (30.7°)



- If it is not within specification, measure the rack strokes.

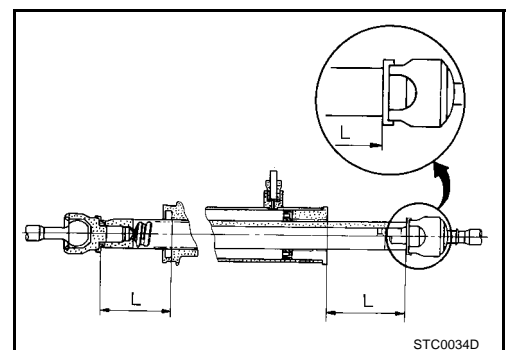
**Rack stroke "L" : 64.5 mm (2.54 in)**

- If the rack stroke is out of specification, disassemble steering gear to check the rack stroke.
- Turning angles are not adjustable. If any of the steering angles is not within specification, check the following components for wear or damage.
  - Steering gear
  - Steering column
  - Front suspension components

If they are damaged, replace with new one respectively.

## Removal and Installation

Refer to [PS-9, "STEERING COLUMN"](#).



AGS00022



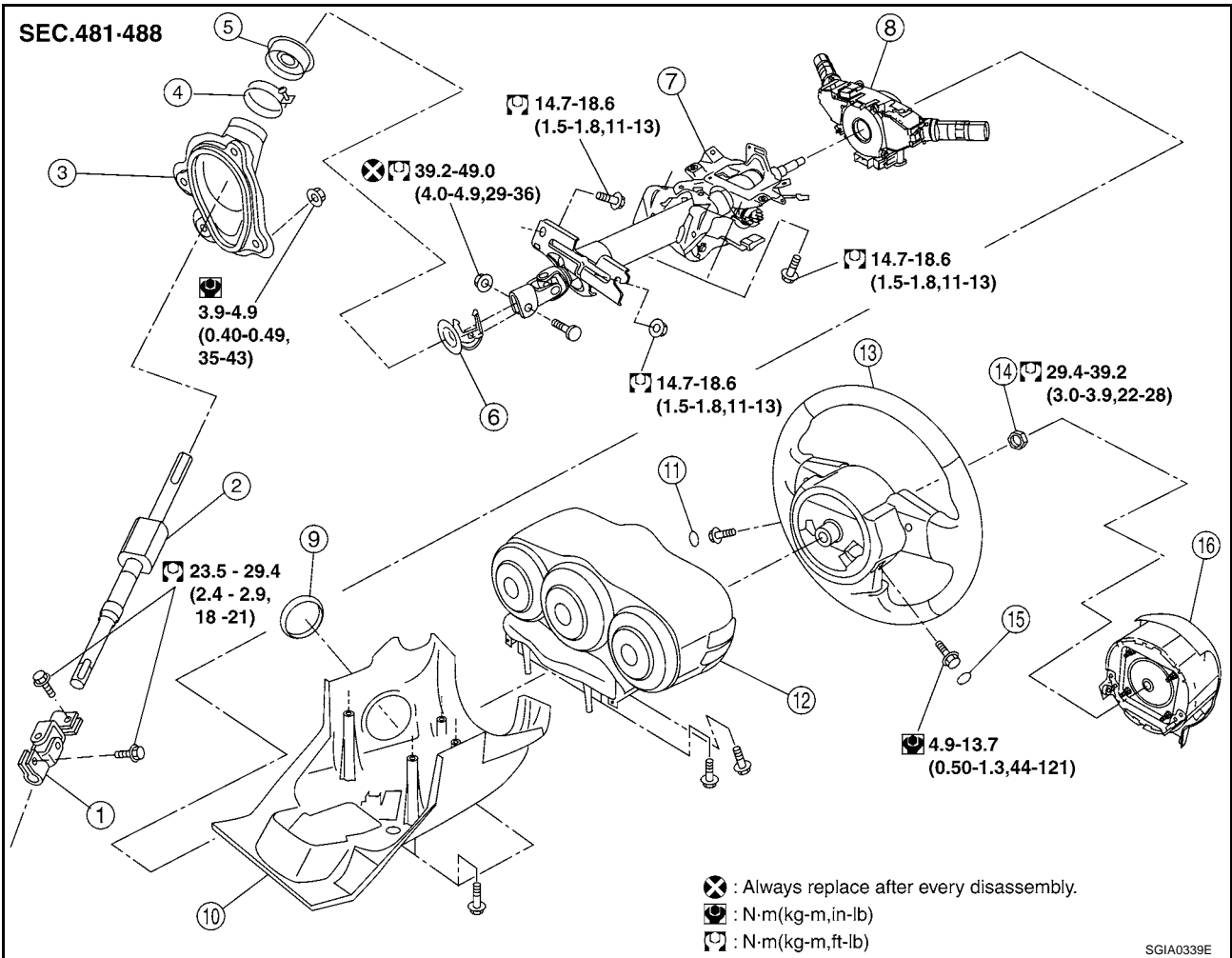
# STEERING COLUMN

## STEERING COLUMN

PFP:48810

## Removal and Installation

AGS00023



- |                             |                                      |  |
|-----------------------------|--------------------------------------|--|
| 1. Lower joint              | 2. Lower shaft                       | 3. Hole cover                              |
| 4. Clamp                    | 5. Hole cover seal                   | 6. Collar                                  |
| 7. Steering column assembly | 8. Combination switch & spiral cable | 9. Escutcheon                              |
| 10. Column lower cover      | 11. Right lid                        | 12. Combination meter & column upper cover |
| 13. Steering wheel          | 14. Steering wheel lock nut          | 15. Left lid                               |
| 16. Driver air bag module   |                                      |  |

### NOTE:

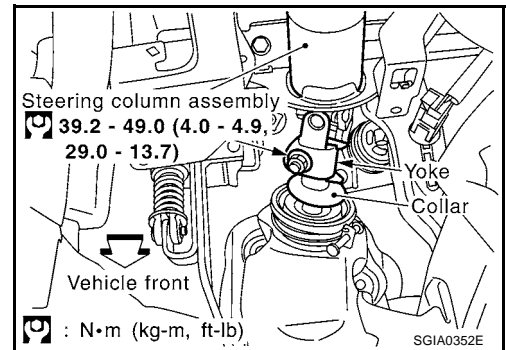
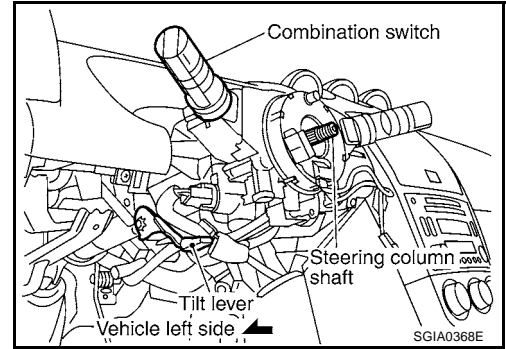
- Care must be taken not to give axial impact to the steering column assembly during removal and installation.
- Care must be taken not to move the steering gear during removal of the steering column assembly.

### REMOVAL

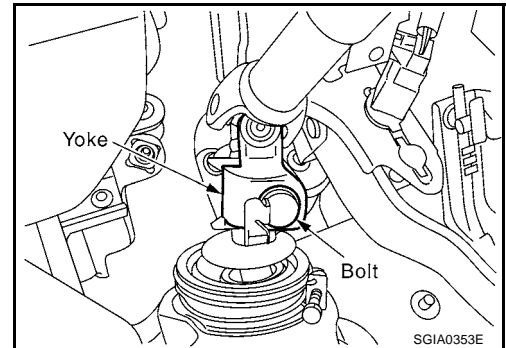
1. Set the vehicle to the straight ahead-direction.
2. Remove driver air bag module. Refer to [SRS-38, "DRIVER AIR BAG MODULE"](#).
3. Disconnect steering switch connector, remove steering wheel lock nut, then remove steering wheel.
4. Remove dash side finisher (driver side). Refer to [IP-12, "Removal and Installation"](#).

# STEERING COLUMN

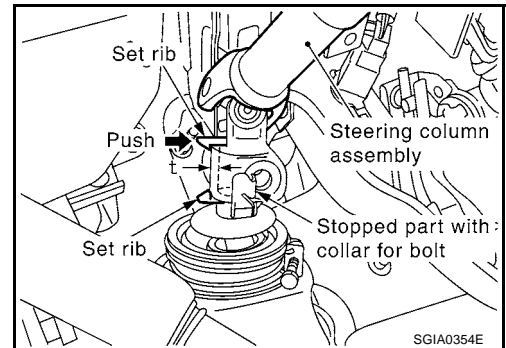
5. Remove instrument lower panel (driver). Refer to [IP-12, "Removal and Installation"](#).
6. Remove steering column lower cover and combination meter (which is connected with the steering column upper cover) from the steering column. Refer to [DI-4, "COMBINATION METERS"](#).
7. Remove spiral cable from the steering column assembly. Refer to [SRS-40, "Removal and Installation"](#).
8. Disconnect the following connector from the steering column.
  - Steering lock harness connector
  - Ignition switch harness connector
  - Key switch harness connector
9. Remove control unit with VDC/TCS/ABS. Refer to [BRC-150, "VDC/TCS/ABS CONTROL UNIT"](#).
10. Disconnect brake switch harness connector.
11. Remove steering column shaft from lower shaft in the following procedure.
  - a. Remove lock nut from yoke.



- b. Turn the steering wheel to the right to appear the head of the bolt.



- c. Remove the fixed part of collar for the bolt to the outside of its head, remove the bolt.
  - d. Remove the set lib of the steering column assembly side from the yoke, push it equal to the thick part of the yoke.

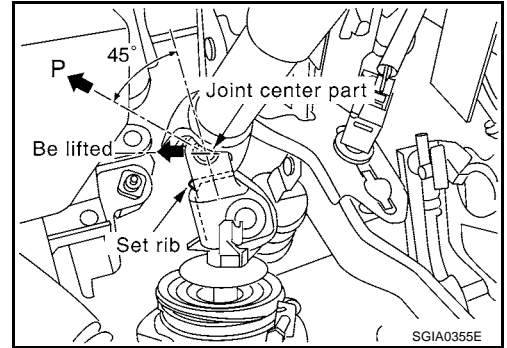


# STEERING COLUMN

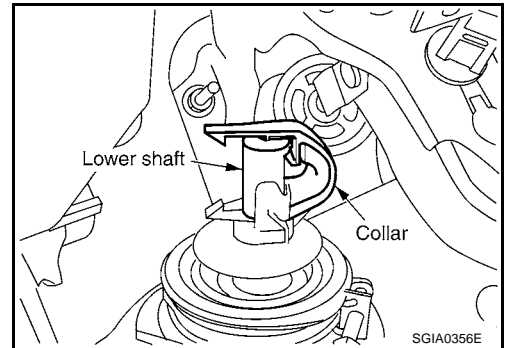
## NOTE:

- Because the collar is set in the lower shaft, if the set lib is pushed (action), the joint center will be lifted in the opposite direction (reaction), and then the set lib will be in squeezed to the thick part of the yoke.

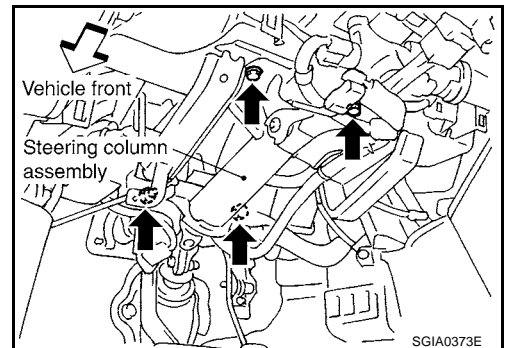
e. The yoke will be removed from the collar, when steering column assembly is lifted about 45° oblique upward.



f. The collar remains on the lower shaft.



12. Remove bolts and nut from the body, remove the steering column assembly from the body.

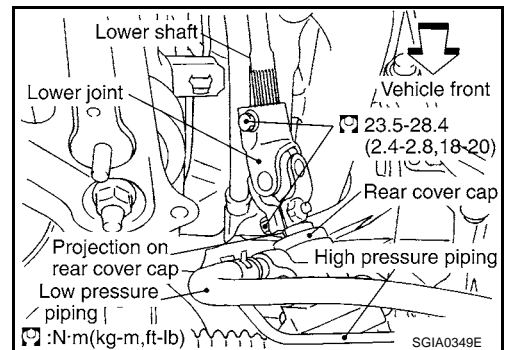


13. Remove collar from lower shaft.

14. Remove hole cover seal from lower shaft.

15. Remove mounting bolts, then remove hole cover from panel.

16. Raise the vehicle, then loosen bolt for lower yoke of lower joint and remove joint together with lower shaft.



# STEERING COLUMN

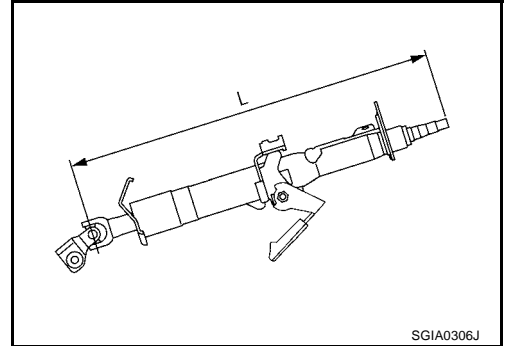
## INSPECTION AFTER REMOVAL

- Check if there is something wrong with the jacket tube and the collar etc. And then if they are damaged, replace with new one.
- If the vehicle is light shocked, check the column length "L" mm (in) as shown in the figure. Then if it is out of the specified value, replace with new one.

### Specified value

#### Steering column length "L":

547 - 549 mm (21.54 - 21.61 in)



- Check the turning torque of the steering column with the preload gauge. If it is out of the specified value, repair it or replace with new one.

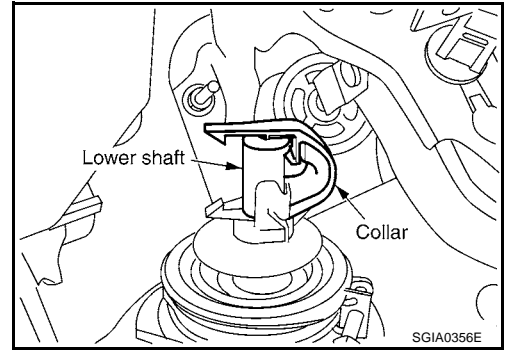
### Specified value

Turning torque : 0 - 0.2 N·m (0 - 0.021 kg-m, 0 - 1 in-lb)

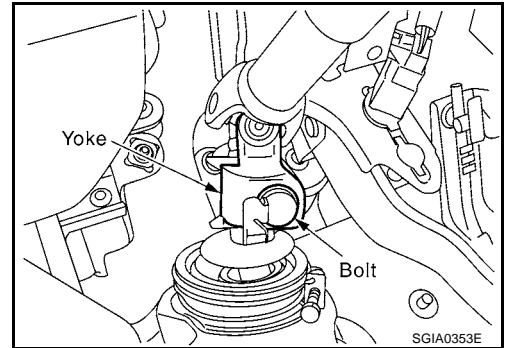
# STEERING COLUMN

## INSTALLATION

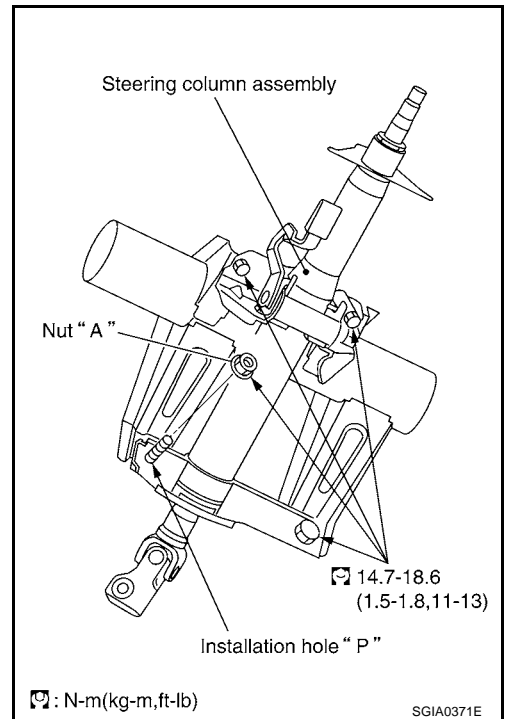
1. Install the collar to the lower shaft.



2. Install the yoke of the column shaft to the collar, tack the bolt and the nut.



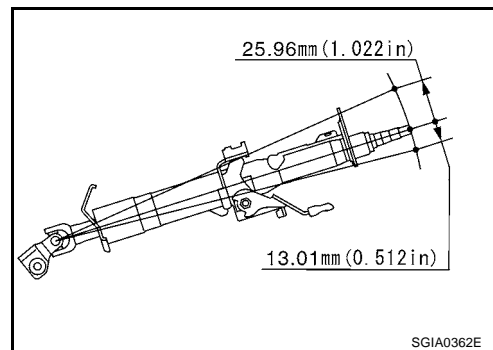
3. Put the column (installation hole "P") on the bolt for the body side and install the nut "A" then tighten it together with the other bolts at the specified torque.
4. Connect the yoke and the collar with the bolt, tighten nut at the specified torque.



# STEERING COLUMN

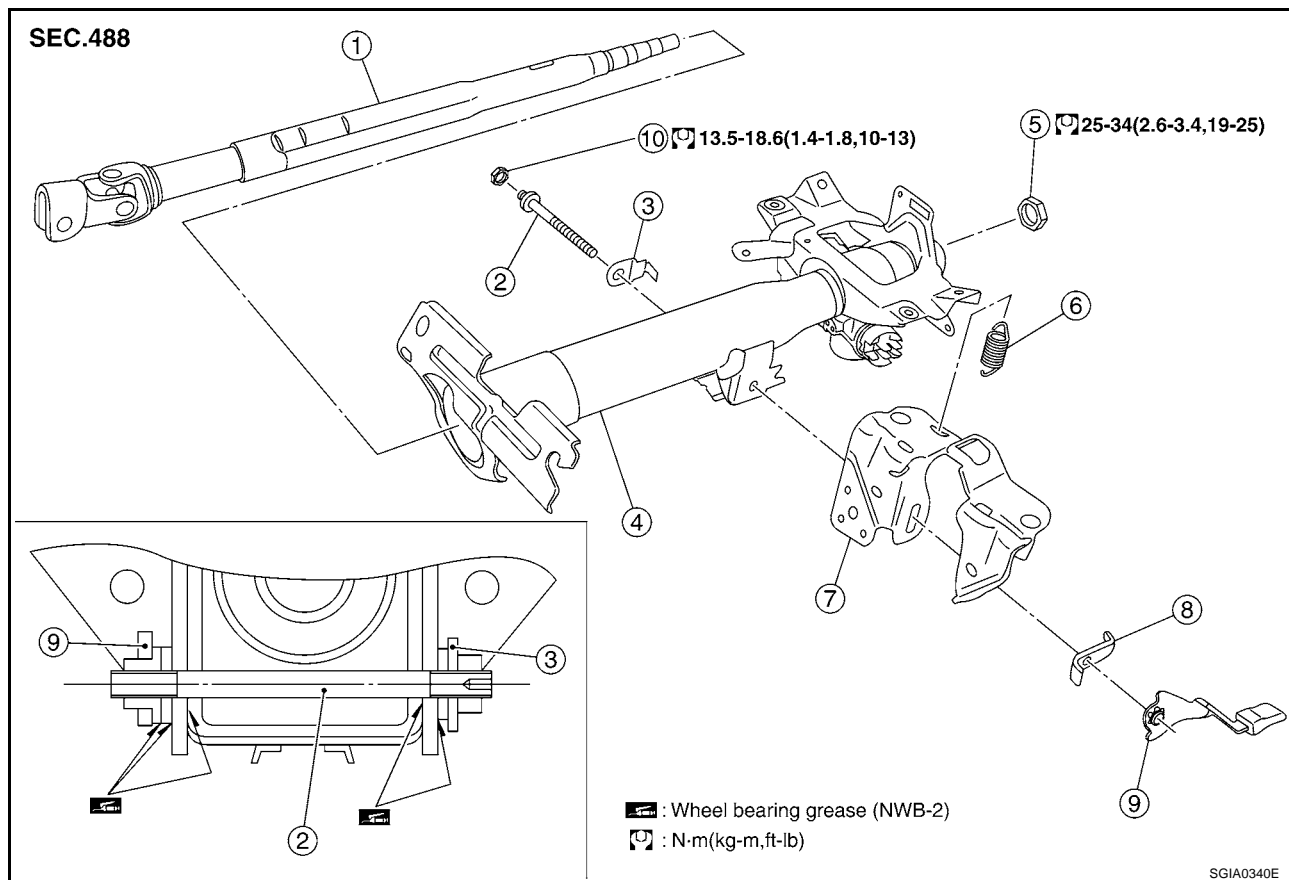
## INSPECTION AFTER INSTALLATION

- After installing the steering column to the vehicle, check the tilt device and its operation range. Ranges of operation are shown in the figure.
- Check if steering operation can turn to the end of the left and right smoothly.



## Disassembly and Assembly

AGS00024

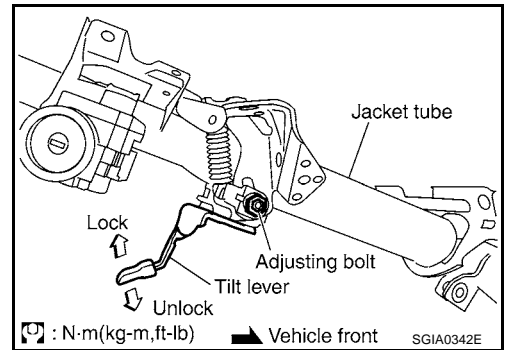


## DISASSEMBLY

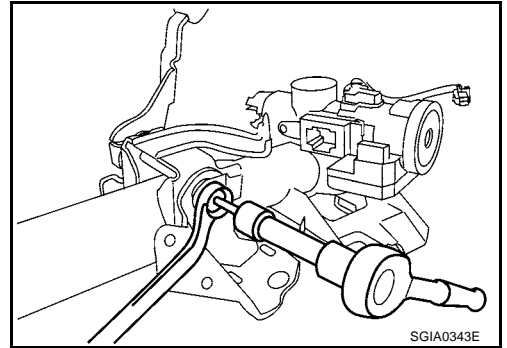
- Remove the steering column shaft from the front side of the jacket tube.
- Remove the tilt device from the jacket tube.
- Remove the lock nut and adjust stopper according to the following procedure.

# STEERING COLUMN

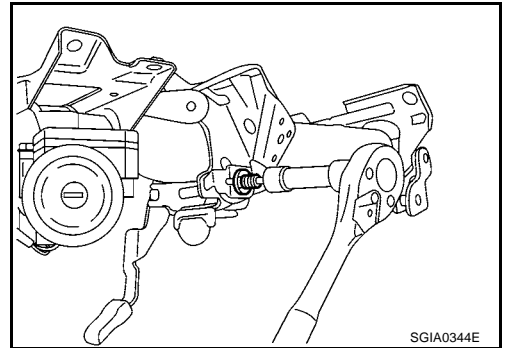
- a. Turn the tilt lever to the unlock side.
- b. Remove the spring.



- c. Lock the adjusting bolt, then remove the lock nut.



- d. Loosen the adjusting bolt, then remove the tilt lever.



## INSPECTION AFTER REMOVAL

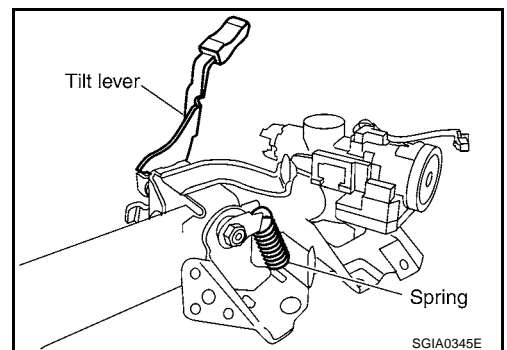
- Check if there is something wrong with the steering column shaft and bearing. And then if they are damaged, replace with new one.
- Check if there is something wrong with the component of the tilt device. And then if it is damaged, replace with new one.

## ASSEMBLY

1. Install the tilt device to the jacket tube. Refer to [PS-14, "Disassembly and Assembly"](#).

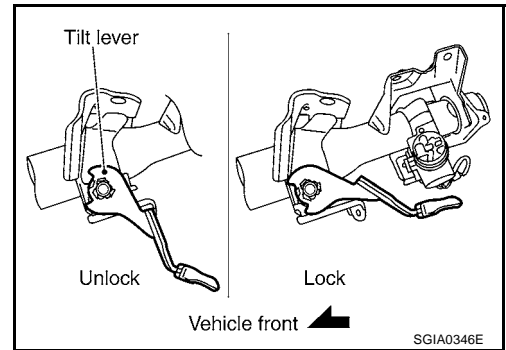
### NOTE:

- Turn the tilt lever to the unlock side while at work to make it easier.
- That can avoid the column shaft's sudden descent when the tilt lever is operated on the vehicle.



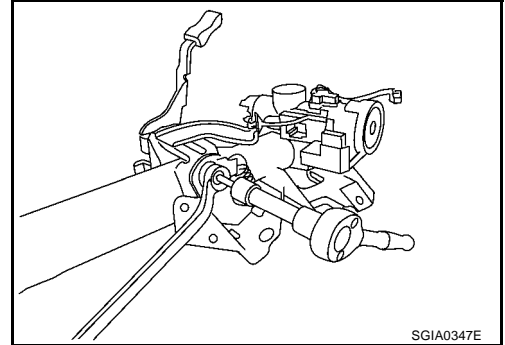
## STEERING COLUMN

- When the tilt lever is in the locked position (operation range is about 40°), tighten lock nut at the specified torque to make the tilt lever locked.



### **Tightening torque:**

**13.5 - 18.6 N·m (1.4 - 1.8 kg-m, 10 - 13 ft-lb)**



- Apply grease to the part shown in the figure of component. Refer to [PS-14, "Disassembly and Assembly"](#).
- Install the steering column shaft to the jacket tube, tighten the lock nut at the specified torque.

**Tightening torque : 25 - 34 N·m (2.6 - 3.4 kg-m, 19 - 25 ft-lb)**

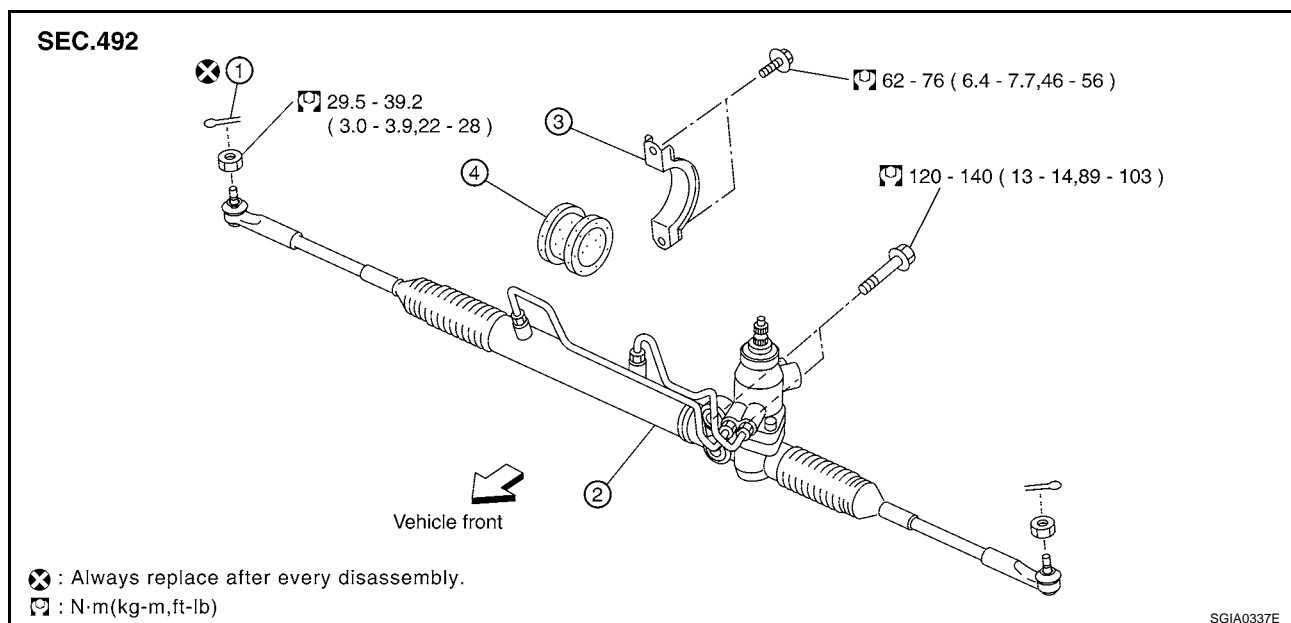


## POWER STEERING GEAR AND LINKAGE

PPF:49001

### Removal and Installation

AGS00025



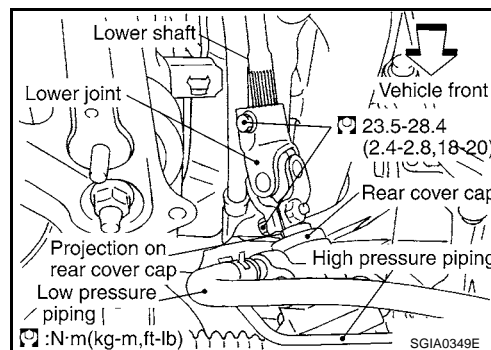
1. Cotter pin
2. Steering gear
3. Rack mounting bracket
4. Rack mounting insulator

#### NOTE:

The spiral cable may snap due to the steering operation if the steering column is separated from the steering gear. Therefore fix the steering wheel with a string to avoid turns.

#### REMOVAL

1. Remove engine undercover and tires from the vehicle with the power tool.
2. Remove the front crossbar. Refer to [FSU-5, "FRONT SUSPENSION ASSEMBLY"](#).
3. When the steering wheel is set to the straight ahead-direction, confirm if the slit part of the lower joints consists with the projection on the rear cover cap and with the steering gear.

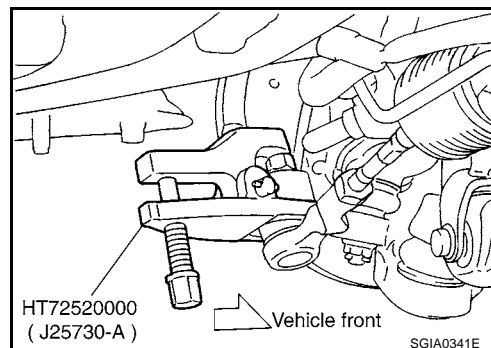


4. Remove the cotter pin, loosen the nut for the outer socket.
5. Using the ball joint remover (SST), remove outer socket from the steering knuckle. Be careful not to damage the boot of the ball joint.

#### NOTE:

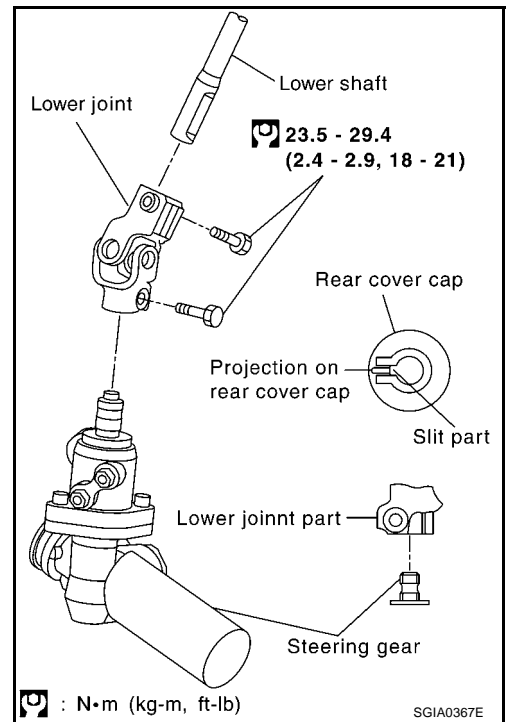
Tack the lock nut to the outer socket bolt because the ball joint remover (SST) may be in danger of removal from the knuckle arm suddenly. And it's to avoid getting damages to the bolt thread of outer socket.

6. Remove oil pipings (high pressure side: inlet connector/low pressure side: return hose) from the steering gear, then drain fluid from the pipings.

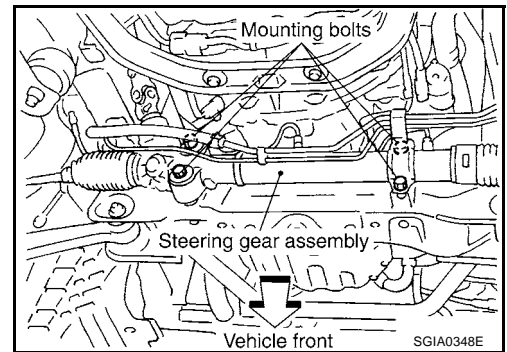


# POWER STEERING GEAR AND LINKAGE

7. Loosen the bolt on the upper yoke of the lower joint and remove the bolt on the lower yoke of the joint, then slide the lower joint into the lower shaft. Separate the steering gear from the lower shaft.
8. Tack the bolt on the upper yoke of the lower joint, fix the lower joint to the lower shaft.

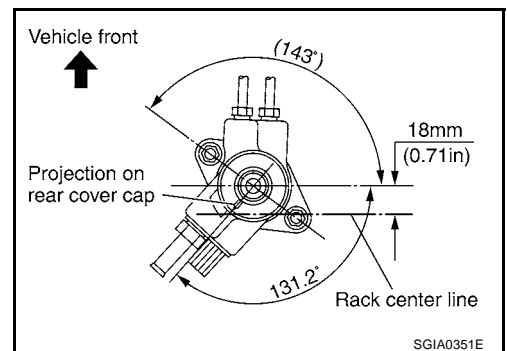


9. Remove the fixing bolt and remove the steering gear assembly, the rack mounting bracket and the insulator from the vehicle.

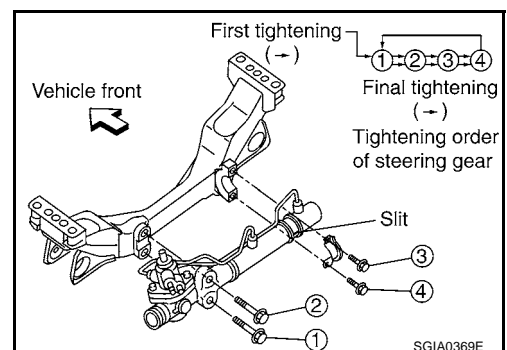


## INSTALLATION

- Install the components in the reverse order of the removal. Refer to [PS-17, "Removal and Installation"](#).



- After installation, bleed air from the piping. Refer to [PS-6, "Air Bleeding the Hydraulic System"](#).
- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
- Confirm if the rear cover cap on the steering gear consists with the steering gear when the front wheels are set in the straight-ahead direction as shown in the figure.



## POWER STEERING GEAR AND LINKAGE

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- Confirm if the slit of the lower yoke of the lower joint consists with the projection on the rear cover cap.

A

B

C

D

E

F

PS

H

I

J

K

L

M

# POWER STEERING GEAR

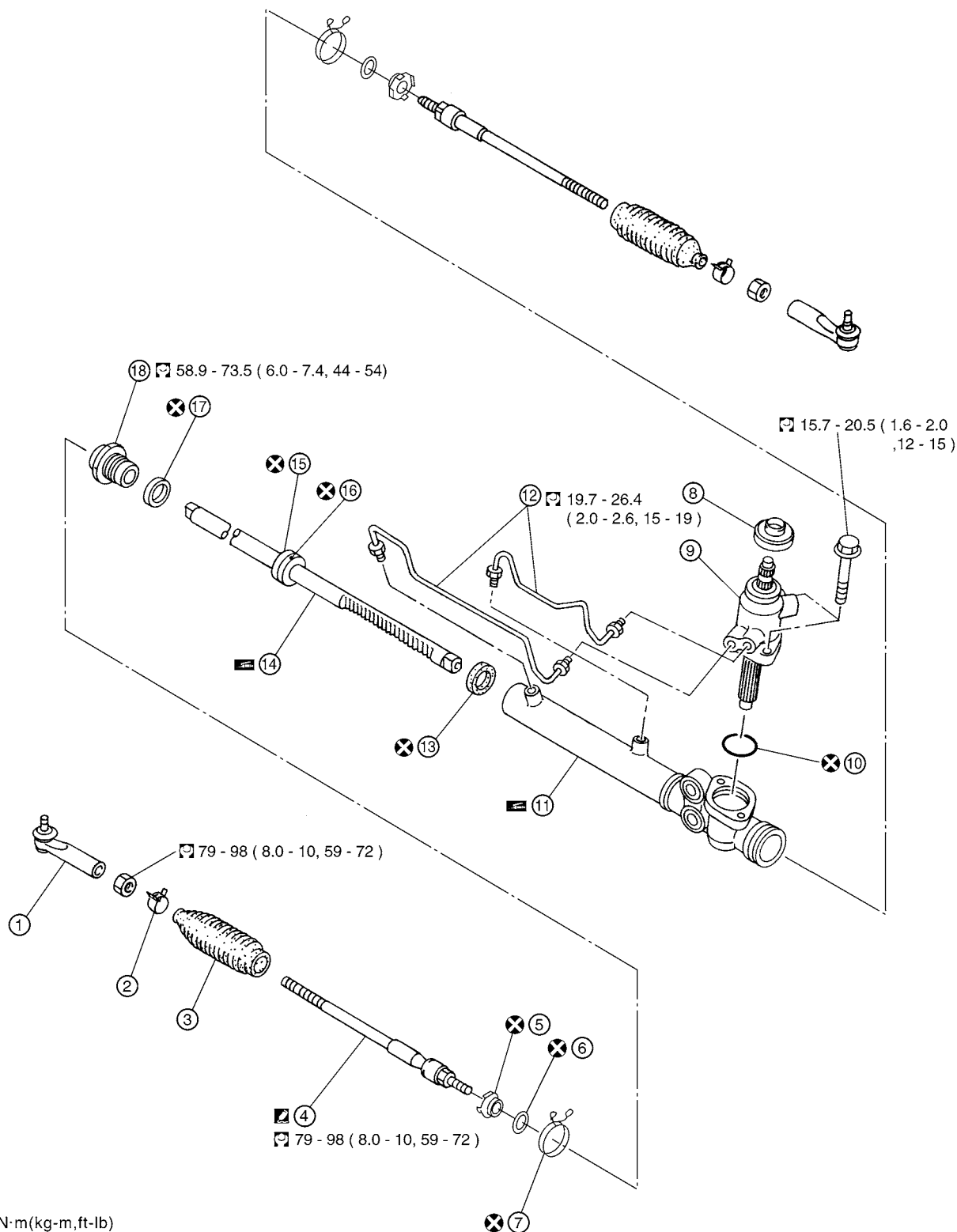
## POWER STEERING GEAR

PFP:49001

### Component

AGS000AA

SEC.492



☐ : N·m(kg-m,ft-lb)

▣ : Three Bond TB1111B

▤ : Nissan MP Special Grease No.2

⊗ : Always replace after every disassembly.

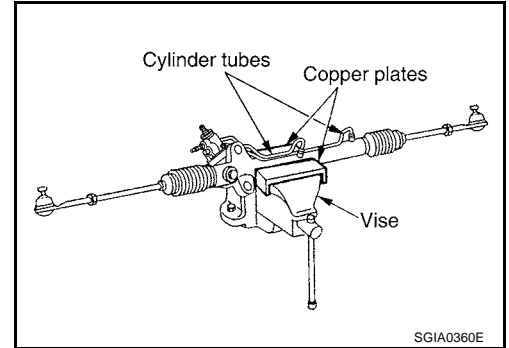
SGIA0338E

# POWER STEERING GEAR

- |                   |                           |                        |
|-------------------|---------------------------|------------------------|
| 1. Outer socket   | 2. Boot clamp             | 3. Boot                |
| 4. Inner socket   | 5. Lock plate             | 6. Spacer ring         |
| 7. Boot clamp     | 8. Rear cover cap         | 9. Gear sub assembly   |
| 10. O-ring        | 11. Gear housing assembly | 12. Cylinder tube      |
| 13. Rack oil seal | 14. Rack                  | 15. Rack Teflon ring   |
| 16. O-ring        | 17. Rack oil seal (outer) | 18. End cover assembly |

## NOTE:

- Secure the steering gear with a vise, using copper plates or something similar to prevent it from being damaged. Do not grip cylinder with a vise.
- Before performing disassembly, clean the power steering gear with kerosene. Be careful not to bring any kerosene into contact with the discharge and return port connectors.



AGS000A8

## Disassembly and Assembly

### DISASSEMBLY

- Remove the cylinder tubes from the gear housing assembly.
- Remove the rear cover cap from the gear sub-assembly.
- Measure projection height of adjusting screw from the gear housing, then loosen the adjusting screw.

## NOTE:

- Do not turn the adjusting screw more than twice.
- Replace the steering gear assembly when adjusting screw is removed or is turned more than twice.

- Remove the bolt of gear sub-assembly and remove the gear sub-assembly from the gear housing assembly.

## NOTE:

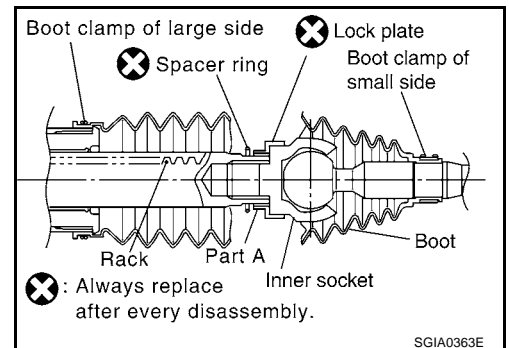
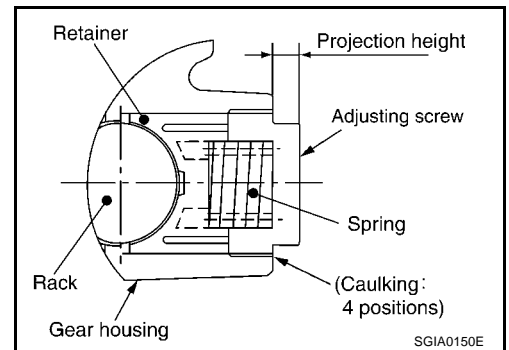
Do not overhaul the gear sub-assembly because it is non overhaul part. If there is something wrong with the gear subassembly, change it to new one.

- Loosen the lock nut, and remove the outer socket.
- Remove the boot clamps of the small diameter side and the large diameter side, then remove the boots.

## NOTE:

On removing boots, be careful not to damage the inner socket and the gear housing assembly. If they are damaged, change them to avoid oil leaks.

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

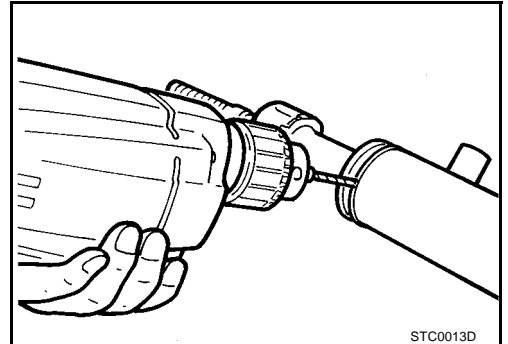


## POWER STEERING GEAR

8. Drill out the punch caulking area on the cylinder outer rim with a 3 mm (0.12 in) drill bit. [Drill for approx. 1.5 mm (0.059 in) in depth.]
9. Remove the end cover with a 42 mm (1.65 in) open head.

**NOTE:**

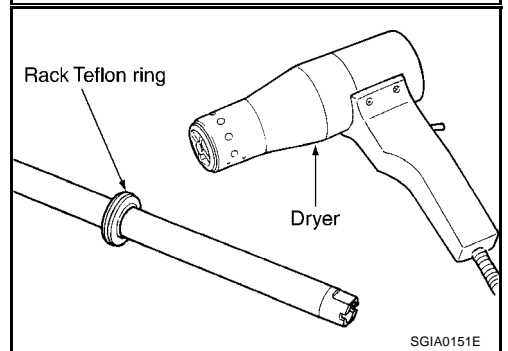
Be careful not to damage the rack. If it is damaged, replace the rack. Otherwise, oil leaks may result.



10. Heat the rack Teflon ring to approx. 40°C (104°F) with a dryer, then remove it and the O-ring from the rack.

**NOTE:**

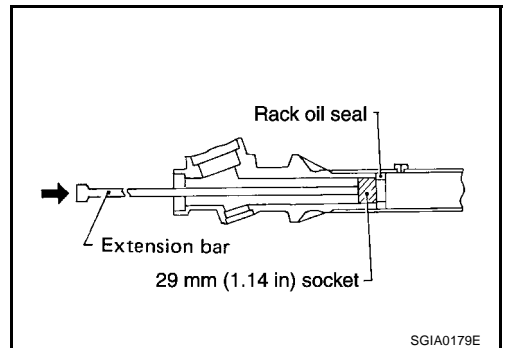
Be careful not to damage the rack. If it is damaged, change to a new one to avoid oil leaks.



11. Pull the rack assembly with the rack oil seal out of the gear housing assembly.
12. Use a taped 29 mm (1.14 in) socket and an extension bar. Push out and remove the center bushing and the rack oil seal together from the gear housing assembly.

**NOTE:**

- Be careful not to damage the gear housing assembly and the cylinder inner wall.
- If it is damaged, the gear housing assembly must be replaced. Otherwise, oil leaks will result.



### INSPECTION AFTER DISASSEMBLY

#### Boot

Check boot for gear, wrinkle and deformation. Replace it, if necessary.

#### Rack

Check rack gear for damage and wear. Replace it, if necessary.

#### Gear Sub-Assembly

- Check pinion gear for damage and wear, and replace if necessary.
- Check bearing while rotating it. Replace bearing if bearing ball race was dent, worn, or damaged.

#### Gear Housing Assembly

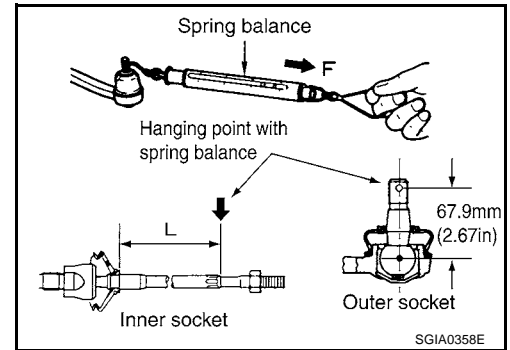
Check gear housing assembly for damage and scratch (inner wall). Replace it, if necessary.

# POWER STEERING GEAR

## Outer Socket and Inner Socket

### 1. Swing Torque

- Hook a spring balance at the point shown in the figure. Confirm if the reading is within the specification. When the ball stud and the inner socket start moving, (it must be within the specification.) If the reading is outside the specification, replace the socket.



### Specified value

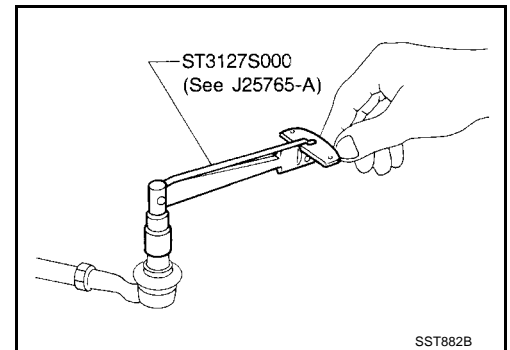
Item	Outer socket	Inner socket
Measuring point	Cotter-pin hole of stud	shown as L: 48.5 mm (1.91 in)
Swing torque	0.30 - 2.90 N·m (0.03 - 0.29 kg-m, 3 - 25 in-lb)	1.0 - 7.8 N·m (0.10 - 0.80 kg-m, 9 - 69 in-lb)
Measuring value	4.42 - 42.7 N (0.45 - 4.4 kg, 1.0 - 9.7 lb)	10 - 78 N (1.1 - 7.9 kg, 2.25 - 17.5 lb)

### 2. Rotating Torque (outer socket only)

- Using a preload gauge (SST), check if reading is within the range specified below. If the value is outside the standard, replace outer sockets.

### Specified value

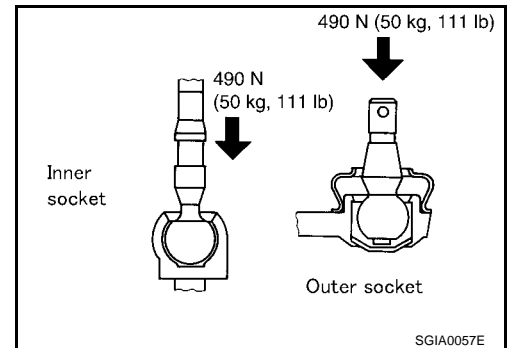
Rotating torque	0.30 - 2.90 N·m (0.03 - 0.29 kg-m, 3 - 25 in-lb)
-----------------	--



### 3. Axial End Play

- Apply load of 490 N (50 kg, 110 lb) to the ball stud axially. Use a dial-gauge to measure the amount of the movement that the stud makes. Check if the reading is within the range specified below. If not, replace outer and inner sockets.

Outer socket	0.5 mm (0.020 in) or less
Inner socket	0.2 mm (0.008 in) or less



## ASSEMBLY

- Put an O-ring into the rack.

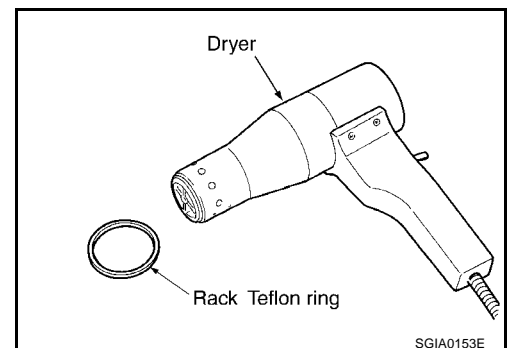
### NOTE:

Do not reuse rack O-ring because it is non-reusable part.

- Heat rack Teflon ring to approximately 40°C (104°F) with a dryer. Assemble it to the rack.

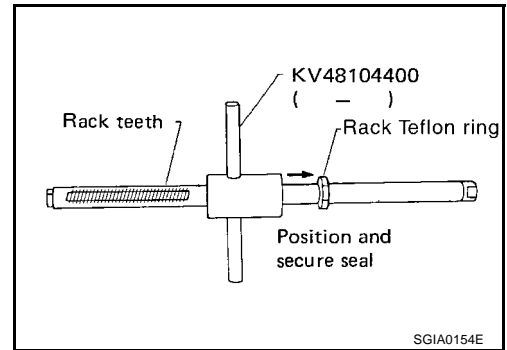
### NOTE:

Do not reuse rack Teflon ring because it is non-reusable part.



## POWER STEERING GEAR

3. To fit Teflon ring on the rack, use Teflon ring installation tool from tooth side. Compress the rim of ring with the tool. Then, put the O-ring on the Teflon ring.

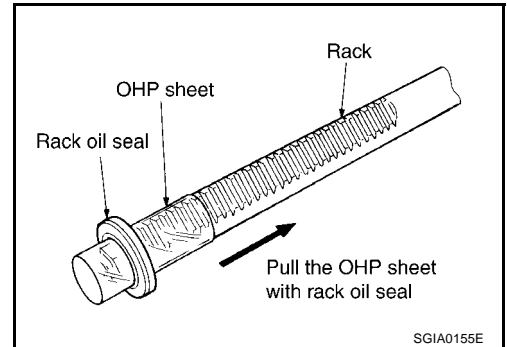


4. Insert rack oil seal.

**NOTE:**

Do not reuse rack oil seal because it is non-reusable part.

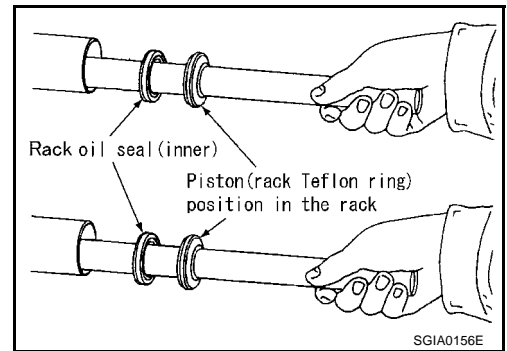
- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approx. 70 mm (2.76 in) × 100 mm (3.94 in)] around the rack tooth. Place oil seal on the sheet. Then, pull the oil seal along with OHP sheet until they pass the toothed section of the rack, then remove it.



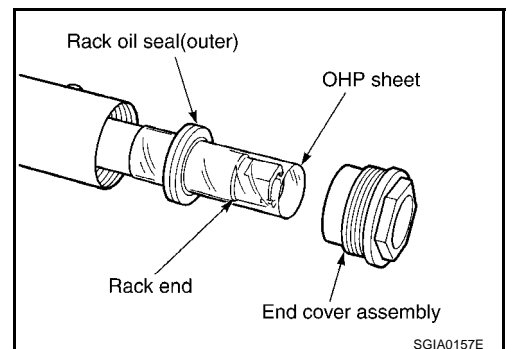
- b. Insert rack oil seal (inner) to the piston (rack Teflon ring) position and push retainer to the adjusting screw side with fingers lightly, and then make the rack move in gear housing assembly, install rack oil seal (inner) to fit in with gear housing.

**CAUTION:**

- When inserting rack assembly, do not damage the retainer sliding part. If it is damaged, replace gear housing assembly.
- When inserting rack assembly, do not damage the cylinder inner wall. If it is damaged, it may cause oil leak. Replace gear housing assembly.



- c. When installing outer rack oil seal, cover the end of rack with an OHP sheet [70 mm (2.76 in) × 100 mm (3.94 in)]. It will avoid damaging rack oil seal. Then place the oil seal on the sheet. Pull the rack oil seal along with the OHP sheet until they pass the rack end. Install rack oil seal in place using end cover assembly. Then remove OHP sheet.

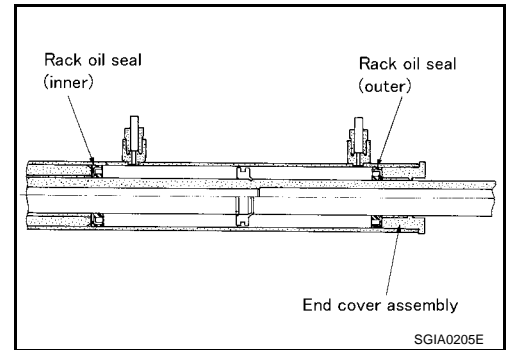


- d. Install end cover, move rack to the gear housing assembly.



# POWER STEERING GEAR

- e. Attach rack oil seal. Both inner lip and outer lip should face each other.



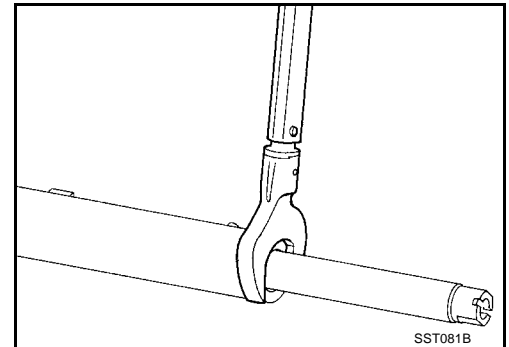
5. Using a 42 mm (1.65 in) open head, tighten end cover assembly at the specified torque.

## Tightening torque:

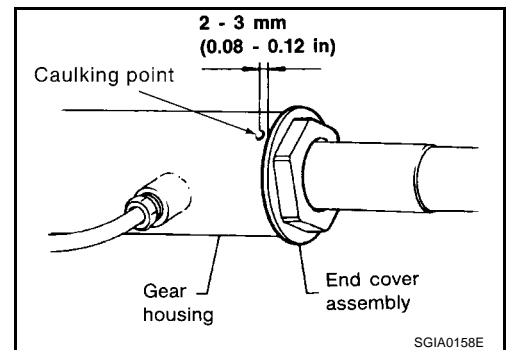
**58.9 - 73.5 N·m (6.0 - 7.4 kg-m, 44 - 54 ft-lb)**

## NOTE:

Do not damage rack surface. If it is damaged, it may cause oil leak. Replace the rack assembly.



6. After tightening the end cover, caulk cylinder at one point as shown in the figure using a punch. This will prevent end cover from getting loose.



7. Assemble an O-ring to the gear housing.

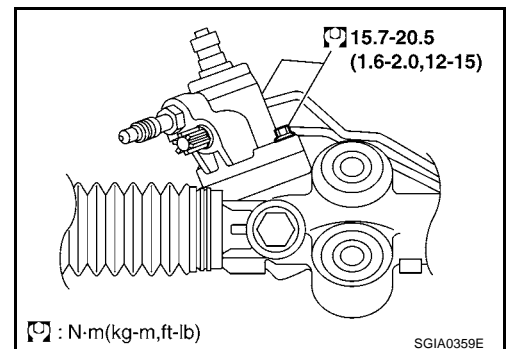
## NOTE:

O-ring is not reusable because it is non-reusable part.

8. Install gear sub-assembly to the gear housing, then tighten bolts at the specified torque.

## Tightening torque:

**15.7 - 20.5 N·m (1.6 - 2.0 kg-m, 12 - 15 ft-lb)**



9. Attach lock plate to the rack.

## NOTE:

Lock plate is not reusable because it is non-reusable part.

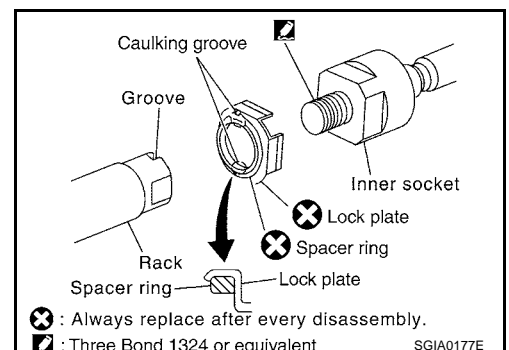
- a. Tack spacer ring to rack.

## NOTE:

Spacer ring is not reusable because it is non-reusable part.

- b. Install lock plate to the inner socket.

- c. Apply thread lock adhesive (Three Bond 1324 or equivalent) to the thread of inner socket. Screw inner socket into the rack and tighten at the specified torque.



# POWER STEERING GEAR

**Tightening torque : 79 - 98 N·m (8.1 - 9.9 kg-m, 59 - 72 ft-lb)**

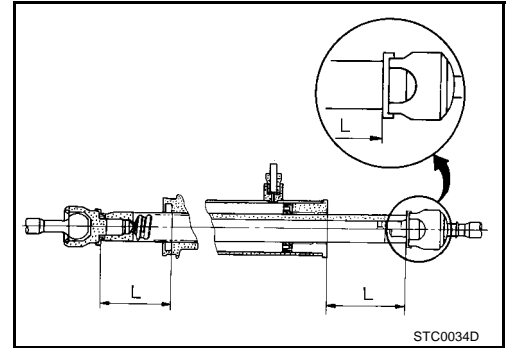
- d. Caulk the lock plate at two points on rack slit.
- e. Install spacer ring to lock plate as shown in the figure.

**NOTE:**

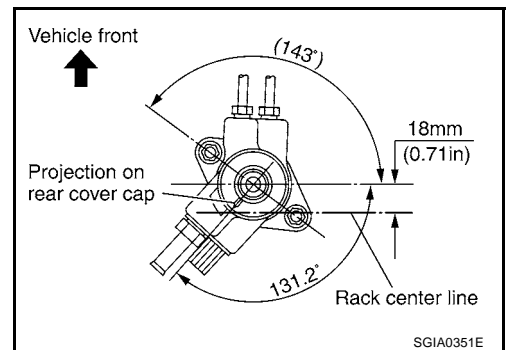
When installing spacer ring, avoid damaging it.

10. Decide neutral position of rack gear.

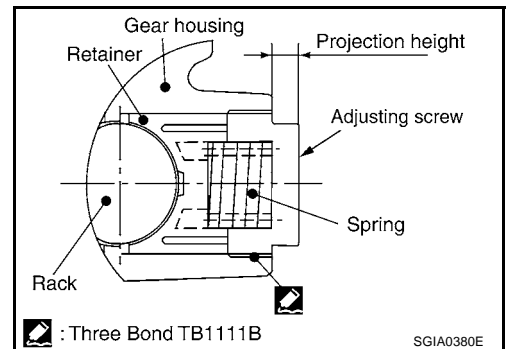
**Rack stroke "L" : 64.5 mm (2.54 in)**



11. Install the projection part (Tip) of rear cover cap to the gear sub-assembly as shown in the figure.

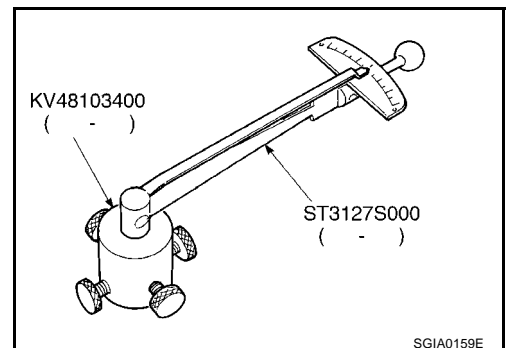


12. Apply thread locking adhesive (Three Bond TB1111B or equivalent) to the thread of adjusting screw, and screw it to the projection height from the gear housing. The projection height is the same as it was measured in the overhaul in advance.



13. Rotate ten times throughout whole range of pinion so that parts fit with each other.

14. Measure pinion rotation torque within from -180° to +180° make preload gauge (SST) turn at the speed of 2 - 3 rpm in the rack neutral position, then hold the preload gauge (SST) at maximum torque.
15. After loosening adjusting screw once, tighten it again with torque of 4.9 - 5.9 N·m (0.50 - 0.60 kg-m, 44 - 52 in-lb). Furthermore loosen it within from 20° to 40°.



# POWER STEERING GEAR

16. Measure pinion rotation torque with preload gauge (SST), then confirm whether its reading is within the specified range. If the reading is not within the specified range, readjust screw angle with adjusting screw. Change gear assembly to new one, if the reading is still not within the specified range or the rotation torque of adjusting screw is less than 5 N·m (0.51 kg·m, 44 in·lb)

## Pinion rotation torque:

**Around neutral position (within  $\pm 100^\circ$ )**

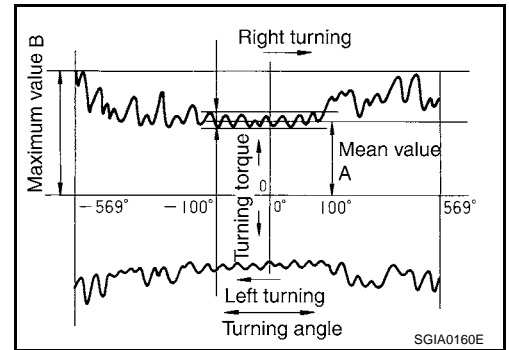
**Average "A":**

**0.8 - 2.0 N·m (0.09 - 0.20 kg·m, 7 - 17 in·lb)**

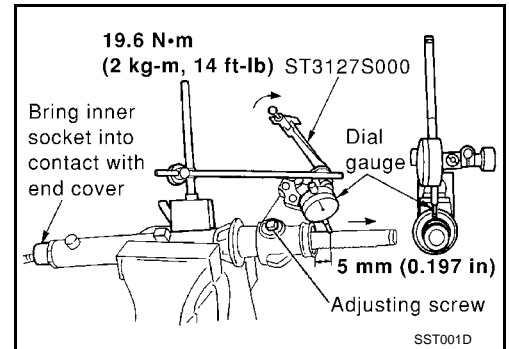
**Other than above (more than  $\pm 100^\circ$ )**

**Maximum variation "B":**

**2.3 N·m (0.23 kg·m, 20 in·lb)**



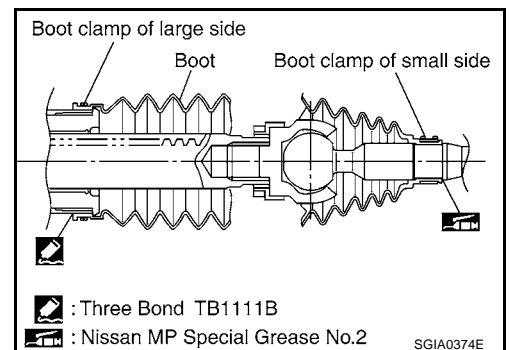
17. Turn pinion fully to the end of the left with the tie-rods to the rack.
18. Set dial gauge to the rack as shown in the figure. Measure vertical movement of rack when pinion is turned counterclockwise with torque of 19.6 N·m (2.0 kg·m, 14 ft·lb). Check reading is within the specified range. If reading is outside of specification, readjust screw angle with the adjusting screw. If reading is still outside of specification, or if the rotation torque of adjusting screw is less than 5 N·m (0.51 kg·m, 44 in·lb), replace steering gear assembly.



## Specified value

Amount of vertical movement with rack	Less than 0.265 mm (0.010 in)	
measuring point	Shaft direction of rack	5 mm (0.197 in) away from end of gear housing
	Radius direction of rack	Shaft direction of adjusting screw

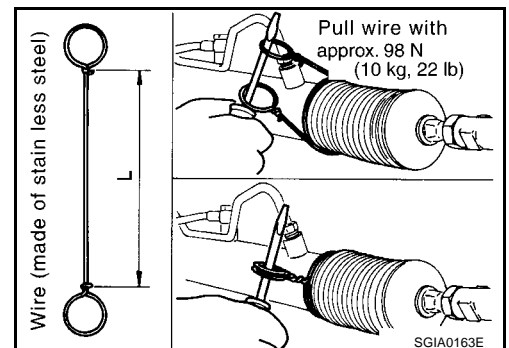
19. Install large-diameter side to the gear housing assembly.
20. Install small-diameter side of boot to the inner socket boot mounting groove.
21. Install boot clamp to the small-diameter side of boot.



22. Install boot clamp to the large-diameter side.
- a. Tighten large-diameter side of RH/LH boot with boot clamp (stainless wire).

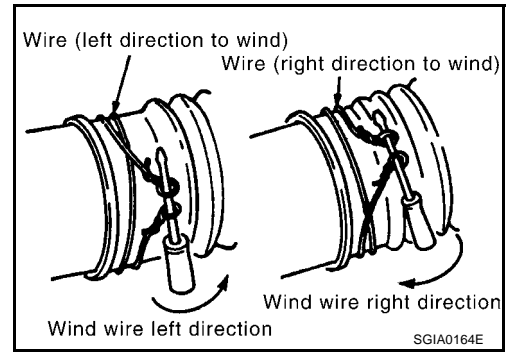
**Wire length "L" : 370 mm (14.567 in)**

- b. After wrapping clamp around boot groove for two turns, insert screwdriver in loop on both ends of wire. Twist 4 to 4.5 turns while pulling with a force of approx. 98 N (10 kg, 22.1 lb).

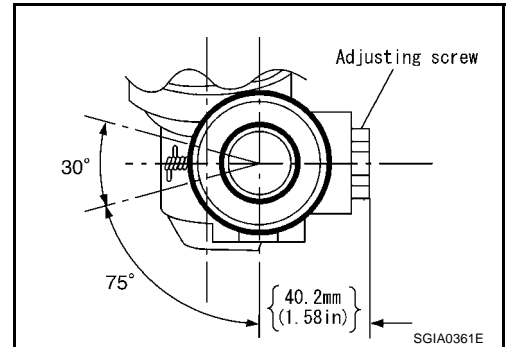


## POWER STEERING GEAR

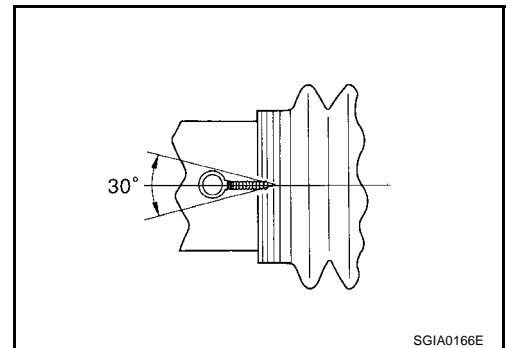
- c. Twist boot clamp as shown in the figure, pay attention to relationship between winding and twisting directions.



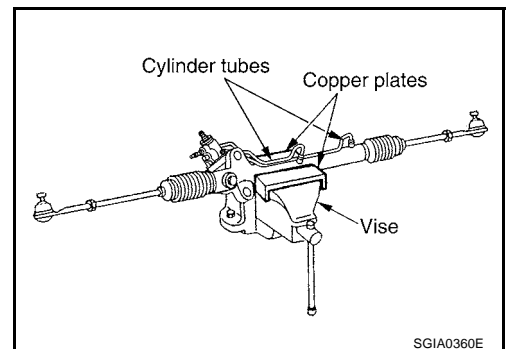
- d. Confirm the twisted point with clamp faces in the opposite direction to the adjusting screw within  $30^\circ$  as shown in the figure.



- e. After twisting wire 4 to 4.5 turns, bend cut end of wire. Cut end of wire should not touch boot. Be sure wire end is at least 5 mm (0.20 in) away from clearance for tube.



23. Install cylinder-tube to the gear housing assembly.

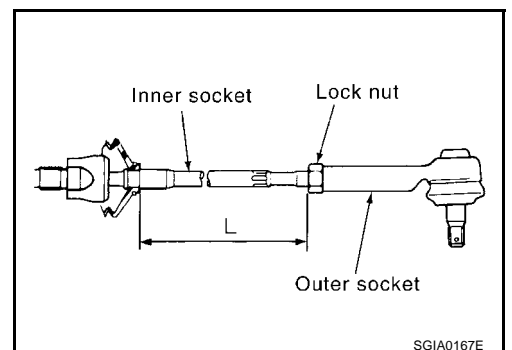


24. Install lock nut and outer socket to inner socket, then tighten the lock nut temporarily until the length of tie-rod reaches to the specified value. On specified tightening torque with lock nut, refer to [PS-21, "Disassembly and Assembly"](#).

**Tie-rod length "L" : 106.3 mm (4.185 in)**

### NOTE:

Perform toe-in adjustment after this procedure. Length achieved after toe-in adjustment is not necessarily value given here.



# POWER STEERING OIL PUMP

## POWER STEERING OIL PUMP

PFP:49110

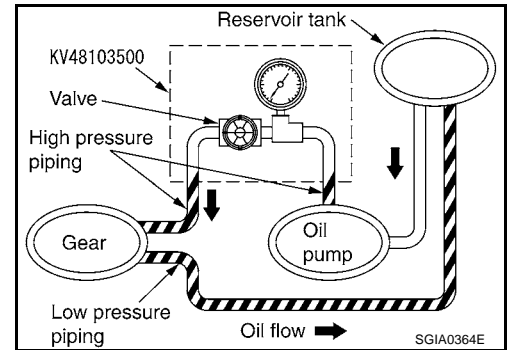
### On-Vehicle Service

AGS00028

#### CHECKING RELIEF OIL PRESSURE

Before starting work, confirm belt tension is proper.

1. Connect oil pressure gauge (SST) and oil pressure gauge adapter (SST) between the oil pump discharge connector and high pressure piping. Then bleed air from the hydraulic circuit.



2. Start engine. Allow engine to run until tank temperature reaches 50 to 80°C (122 to 176°F).

#### **WARNING:**

- Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in the power steering pump increases to the maximum. This will raise fluid temperature abnormally.
- Be careful not to contact hose with belt when engine is started.

3. With engine at idle, close oil pressure gauge valve (SST) and read the relief oil pressure.

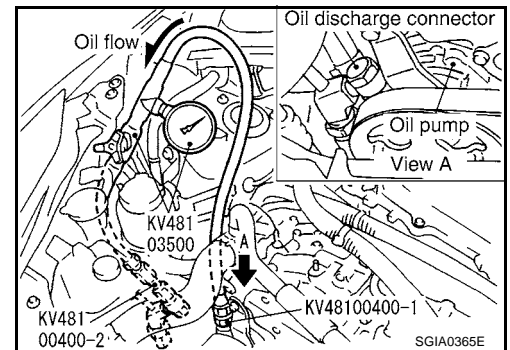
#### **Relief pressure specification:**

**9,600 - 10,200 kPa (98 - 104 kg/cm<sup>2</sup> , 1,390 - 1,480 psi)**

#### **CAUTION:**

**Do not close shut-off valve of pressure gauge for more than 10 seconds.**

4. After measurement, open the valve slowly.
  - If relief pressure is outside the specification, disassemble and service the oil pump. Refer to [PS-30, "Disassembly and Assembly"](#).
5. After inspection, remove oil pressure gauge (special service tool) and oil pressure gauge adapter (special service tool) from the hydraulic circuit, add fluid and bleed air from the hydraulic circuit thoroughly. Refer to [PS-6, "Air Bleeding the Hydraulic System"](#).

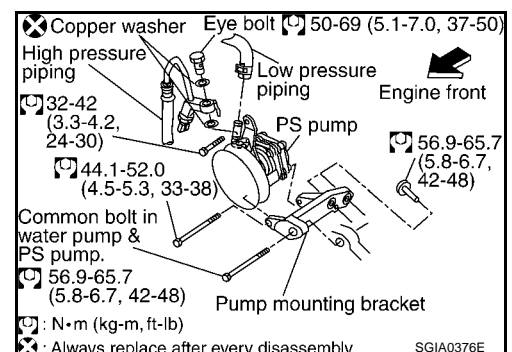


## Removal and Installation

### REMOVAL

AGS00029

1. Remove engine cover.
2. Remove air cleaner box.
3. Drain water from radiator upper tank, then remove radiator upper hose.
4. Remove radiator fan shroud. Refer to [CO-11, "Removal and Installation"](#).
5. Loosen idler pulley, then remove belt.
6. Drain power steering fluid from reservoir tank.
7. Remove piping of high pressure and low pressure (drain fluid from their pipings)
8. Remove bolt common to water pump and power steering pump using power tool.
9. Remove bolt then remove power steering pump using power tool.



# POWER STEERING OIL PUMP

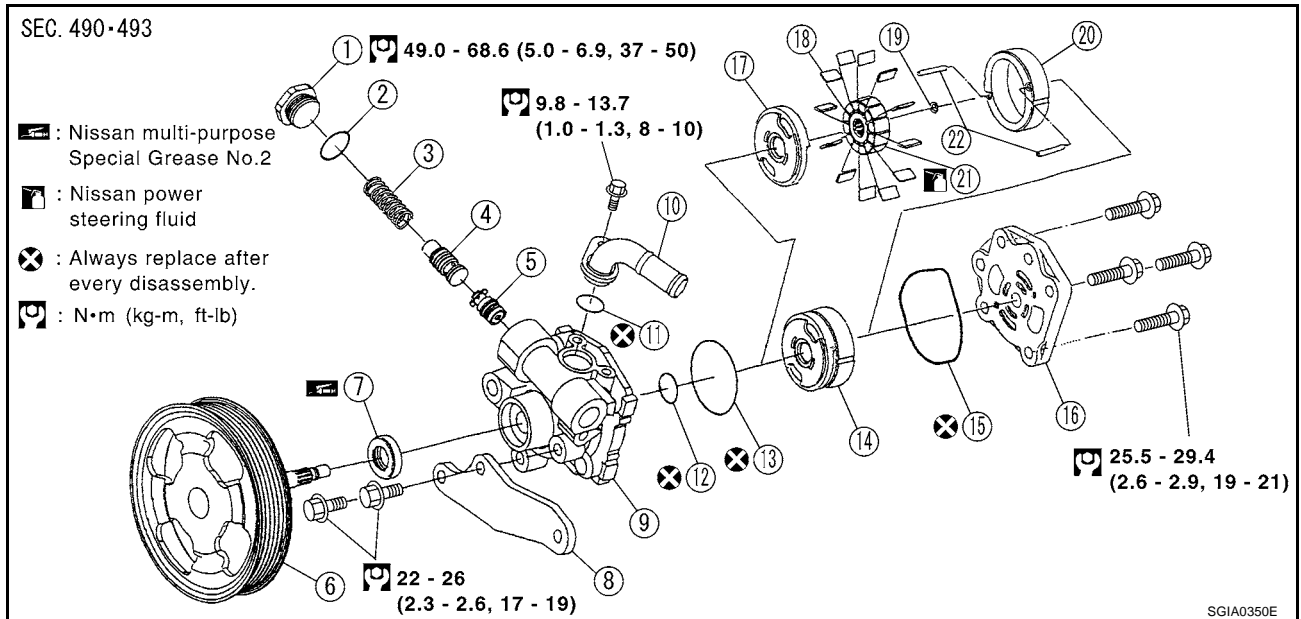
## INSTALLATION

Install the components in the reverse order of removal. Refer to [PS-34, "HYDRAULIC LINE"](#) .

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

## Disassembly and Assembly

AGS0002A

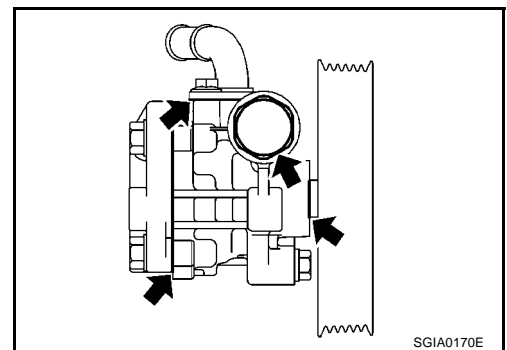


- |                                |                                |                              |
|--------------------------------|--------------------------------|------------------------------|
| 1. Plug                        | 2. O-ring D                    | 3. Flow control valve spring |
| 4. Relief valve assembly       | 5. Flow control valve assembly | 6. Shaft kit                 |
| 7. Oil seal                    | 8. Bracket                     | 9. Body assembly             |
| 10. Suction connector assembly | 11. O-ring E                   | 12. O-ring C                 |
| 13. O-ring B                   | 14. Cartridge assembly         | 15. O-ring A                 |
| 16. Cover assembly             | 17. Side plate                 | 18. Vane                     |
| 19. Rotor snap ring            | 20. Cam ring                   | 21. Rotor                    |
| 22. Dowel pin                  |                                |                              |

## PRE-DISASSEMBLY INSPECTION

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

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



## DISASSEMBLY

1. Secure power steering pump in a vise.

### NOTE:

Be sure to place aluminum plates or something similar between surface of the steering pump and the vise to prevent scratches or damage to the pump surface.

2. Unscrew the two front bracket bolts and remove bracket from body assembly.
3. Unscrew the four cover assembly bolts and remove cover assembly from body assembly.
4. Remove O-ring A from body assembly.

## POWER STEERING OIL PUMP

5. Remove rotor snap ring with snap ring pliers, and remove shaft kit from the body assembly.

**NOTE:**

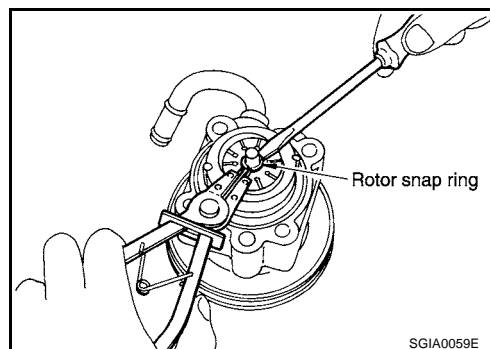
When removing rotor snap ring, be careful not to damage the pulley shaft of the shaft kit.

6. Remove cam ring, rotor, vane, side plate, O-ring B and O-ring C from body assembly.
7. Remove plug, then remove flow control valve spring, relief valve assembly and flow control valve assembly from body assembly.

**NOTE:**

Be careful not to drop and deform the relief valve assembly and the flow control valve assembly.

8. Remove the oil seal from body assembly using the flat-bladed screwdriver.
9. Remove one bolt of the suction connector assembly, then remove the suction connector and O-ring E.



### INSPECTION AFTER DISASSEMBLY

#### Body Assembly and Cover Assembly Inspection

- Check body assembly and cover assembly for damage. If any damage is found, replace with new part for cover assembly, and replace with new power steering pump assembly for body assembly.

#### Cartridge Assembly Inspection

- Check cam ring, side plate, rotor and vane for damage. If any damage is found, replace cartridge assembly with new one.

#### Relief Valve Assembly Inspection

- Check relief valve assembly for damage. If any damage is found, replace it with new one.

# POWER STEERING OIL PUMP

## ASSEMBLY

1. Apply a coat of Nissan MP Special Grease No. 2 to the oil seal lip and to the circumference of the oil seal. Using proper tool such as hand press machine, install it to the body assembly.

**NOTE:**

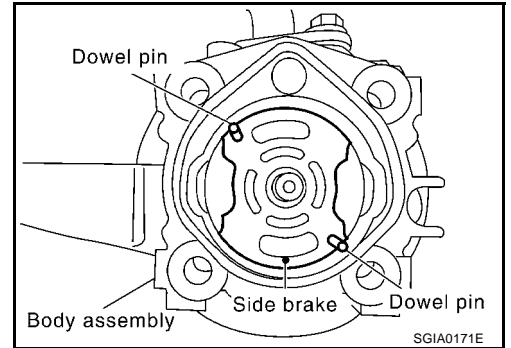
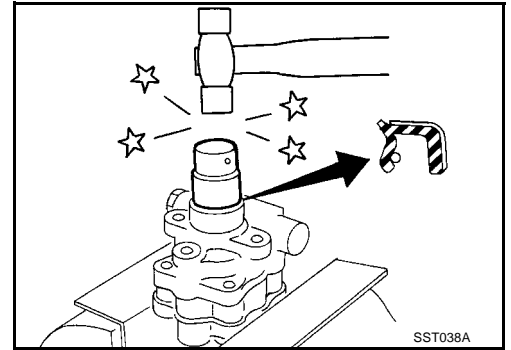
Oil seal is non-reusable part. Never reuse oil seal.

2. Install the shaft kit to the body assembly.
3. Install O-ring B and O-ring C to the body assembly.

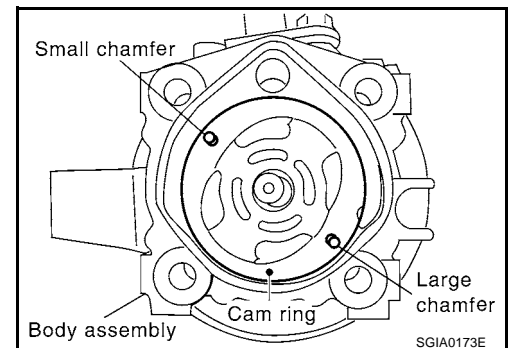
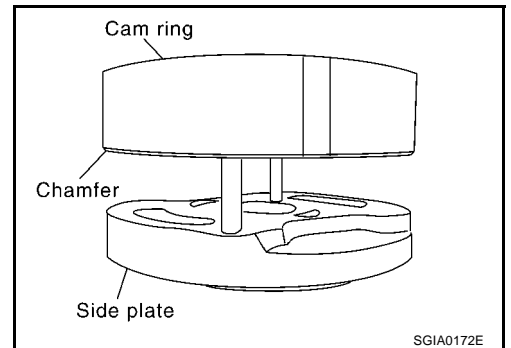
**NOTE:**

O-ring B and O-ring C are non-reusable parts. Never reuse them.

4. Set dowel pin at the illustration position (The position is the same regardless of right or left direction), and install side plate to the body assembly.



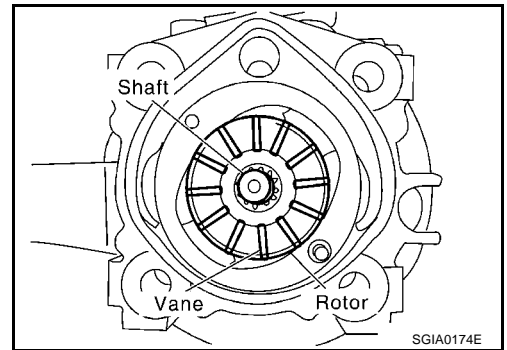
5. Install the cam ring on the side plate as follows;
  - Turn chamfered edge side of cam ring to the side plate as shown in the figure.
  - Position large chamfered side of the cam ring as shown in the figure.





## POWER STEERING OIL PUMP

6. Install the rotor to the shaft of shaft kit (rotor direction is the same regardless of the front and back).
7. Install vane to the rotor (vane direction is the same regardless of inside and outside).



8. Install rotor snap ring to the shaft of shaft kit.

**NOTE:**

- Rotor snap ring is non-reusable part. Never reuse rotor snap ring.
- Be careful not to damage rotor and shaft of shaft kit.
- If rotor is damaged, cartridge assembly must be replaced.

9. Install O-ring A to the body assembly.

**NOTE:**

O-ring A is non-reusable part. Never reuse O-ring A.

10. Apply Nissan PS Fluid or Nissan PS Fluid II or equivalent to the rotor.

11. Fix power steering pump in a vise.

**NOTE:**

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

12. Attach cover assembly to pump assembly and tighten four mounting bolts diagonally at the specified torque.

**NOTE:**

Be careful not to damage the thread, do not use the power tool.

13. Install the flow control valve assembly, the relief valve and flow control valve spring to the body assembly.

14. Install O-ring D to the plug, tighten plug at the specified torque.

**NOTE:**

O-ring D is non-reusable part. Never reuse O-ring D.

15. Install O-ring E to the suction connector assembly, and install the suction connector to the body assembly. Tighten one mounting bolt at the specified torque.

**NOTE:**

O-ring E is non-reusable part. Never reuse O-ring E.

16. Install the bracket to body assembly, and tighten the two mounting bolts at the specified torque.

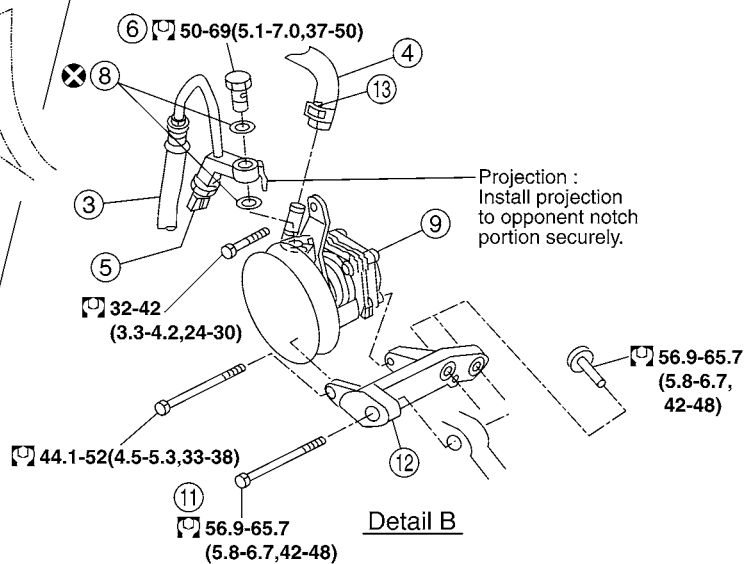
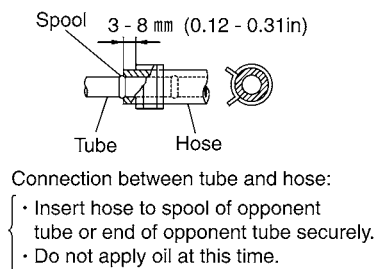
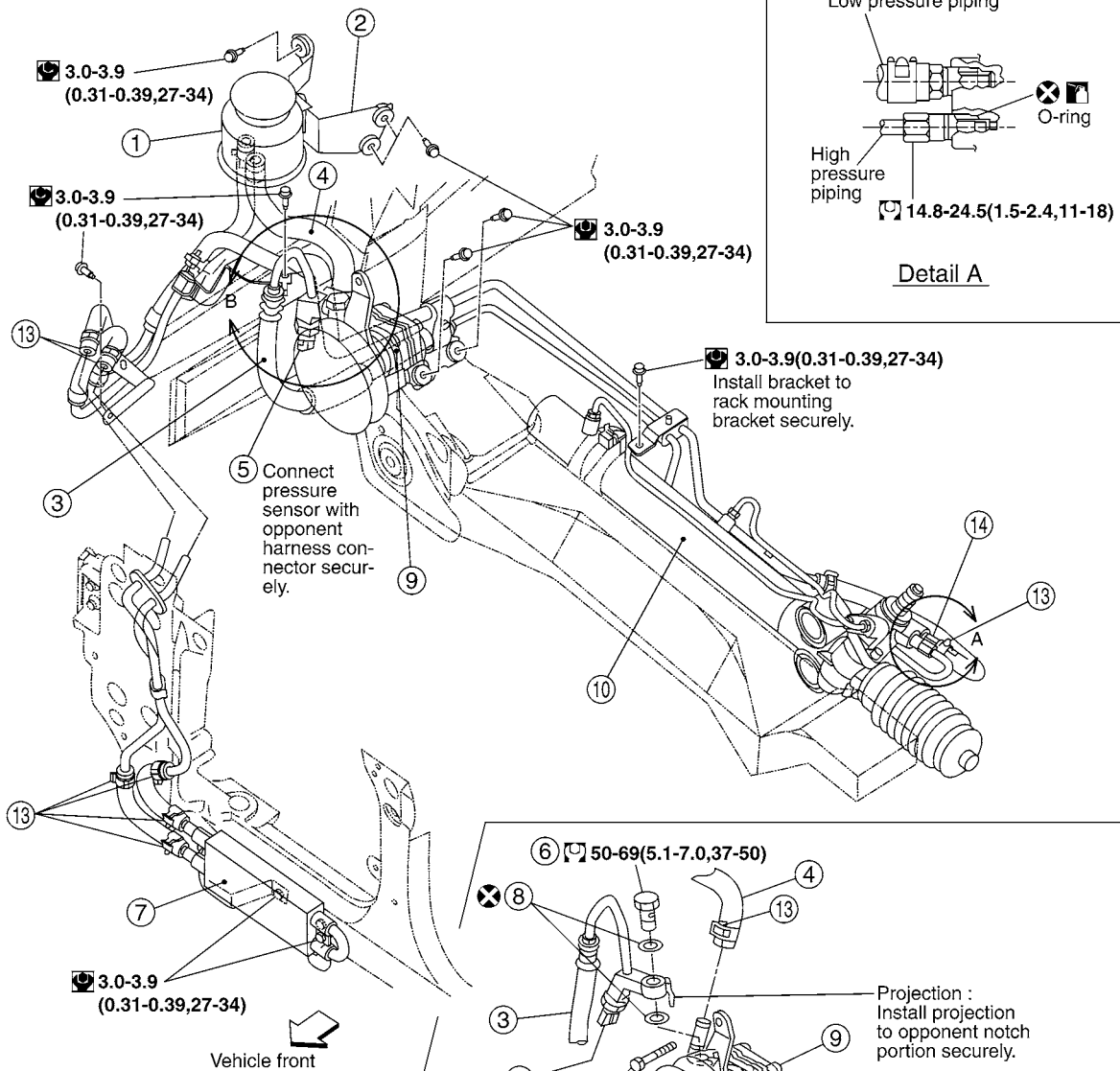
## HYDRAULIC LINE

PFP:49721

## Removal and Installation

AGS0002B

### SEC.497

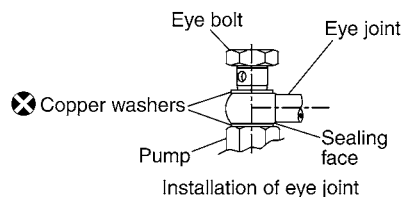


⊠ : Nissan PSF II or equivalent.

⊠ : N·m(kg·m,in·lb)

⊠ : N·m(kg·m,ft·lb)

⊠ : ALWAYS replace after every disassembly.



How to install eye joint :  
Bring eye joint into contact with installation face of pump correctly, tighten eye bolt by hand, then tighten it at specified torque.

SGIA0372E

HYDRAULIC LINE

1. Reservoir tank

4. Suction hose

7. Oil cooler

10. Steering gear assembly

13. Clip

2. Reservoir tank bracket

5. Oil pressure sensor

8. Copper washer

11. Common bolt

3. Hose & tube assembly

6. Eye bolt

9. Power steering oil pump

12. Oil pump bracket

A

B

C

D

E

F

PS

H

I

J

K

L

M

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Steering Wheel

AGS0002C

Steering wheel axial end play	0 mm (0 in)
Steering wheel free play	35 mm (1.38 in) or less

### Steering Angle

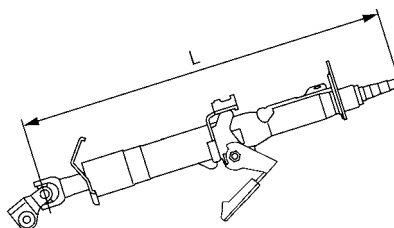
AGS0002D

Tire size	17 and 18 inch tires	
Inner wheel Degree minute (Decimal degree)	Minimum	35°55' (35.9°)
	Nominal	38°55' (38.9°)
	Maximum	39°55' (39.9°)
Outer wheel Degree minute (Decimal degree)	Nominal	30°40' (30.7°)

### Steering Column

AGS0002E

Steering column length "L"	547 - 549 mm (21.54 - 21.61 in)
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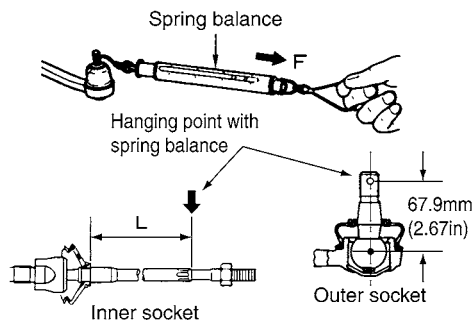


SGIA0306J

### Steering Linkage

AGS0002F

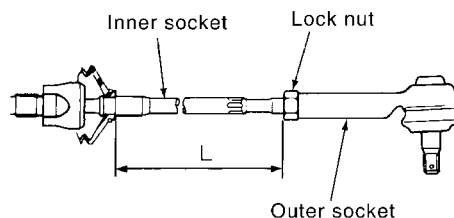
Steering gear type		PR26AD
Tie-rod ball joint outer socket	Swinging torque	0.30 - 2.90 N·m (0.03 - 0.29 kg-m, 3 - 25 in-lb)
	Measurement on spring balance ● Measuring point: stud cotter pin hole	4.42 - 42.7 N (0.45 - 4.4 kg, 1.0 - 9.7 lb)
	Rotating torque	0.30 - 2.90 N·m (0.03 - 0.29 kg-m, 3 - 25 in-lb)
	Axial end play	0.5 mm (0.02 in) or less
Tie-rod ball joint inner socket	Swinging torque	1.0 - 7.8 N·m (0.10 - 0.80 kg-m, 9 - 69 in-lb)
	Measurement on spring balance ● Measuring point: L mark see below, L=48.5 mm (1.91 in).	10 - 78 N (1.1 - 7.9 kg, 2.43 - 17.44 lb)
	Axial end play	0.2 mm (0.08 in) or less



SGIA0358E

# SERVICE DATA AND SPECIFICATIONS (SDS)

Tie-rod length "L"	106.3 mm (4.185 in)
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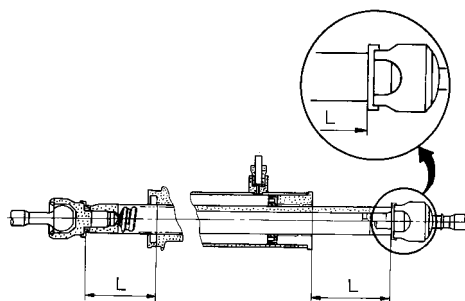


SGIA0167E

## Steering Gear

AGS0002G

Steering gear model	PR26AD
Rack neutral position, dimension "L" (rack stroke)	64.5 mm (2.54 in)



STC0034D

Rack sliding force	At the neutral point: Range within $\pm 11.5$ mm ( $\pm 0.453$ in) from the neutral position (in power ON)	Area average value	147 - 211 N (14.99 - 21.52 kg, 33.1 - 47.52 lb)
		Allowable variation	98 N (10 kg, 22 lb) or less
	Whole area (in power OFF)	Peak value	294 N (30.0 kg, 66 lb) or less
		Allowable variation	147 N (16 kg, 35 lb) or less

## Oil Pump

AGS0002H

Oil pump relief hydraulic pressure	9,600 - 10,200 kPa (98 - 104 kg/cm <sup>2</sup> , 1,390 - 1,480 psi)
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## Steering Fluid

AGS0002I

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