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# SECTION PS

## POWER STEERING SYSTEM

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# PRECAUTIONS

## PRECAUTIONS

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

AGS000L7

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 harnesses or harness connectors.

### Precautions Necessary for Steering Wheel Rotation After Battery Disconnect

AGS000R7

#### **NOTE:**

- This Procedure is applied only to models with Intelligent Key system and NVIS/IVIS (NISSAN/INFINITI VEHICLE IMMOBILIZER SYSTEM - NATS).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the “LOCK” position.
- Always use CONSULT-II to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NVIS/IVIS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

#### **OPERATION PROCEDURE**

1. Connect both battery cables.

#### **NOTE:**

Supply power using jumper cables if battery is discharged.

2. Use the Intelligent Key or mechanical key to turn the ignition switch to the “ACC” position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the “LOCK” position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-II.

# PRECAUTIONS

## Precautions for Steering System

AGS000CD

- 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.
- 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 or equivalent to hydraulic parts. Petroleum jelly 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.

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# PREPARATION

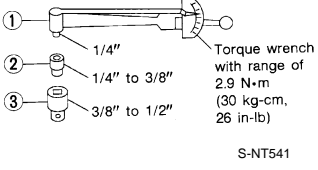
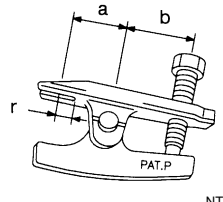
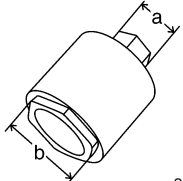
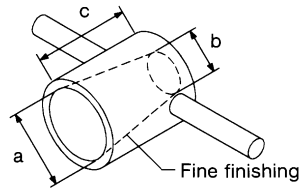
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## PREPARATION

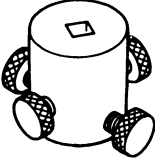
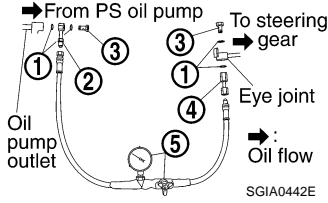
### Special Service Tools (SST)

AGS000CE

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
ST3127S000 (See J-25765-A) Preload gauge 1. GG9103000 (J-25765-A) Torque wrench 2. HT62940000 ( - ) Socket adapter 3. HT62900000 ( - ) Socket adapter	 <p>Inspecting of sliding torque, steering torque, and rotating torque for ball joint</p>
HT72520000 (J-25730-A) Ball joint remover a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: 11.5 mm (0.453 in)	 <p>Removing steering outer socket</p>
KV48104400 (J-46213) Rear cover wrench a: 19 mm (0.75 in) b: 34.9 mm (1.374 in)	 <p>Removing rear cover</p>
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)	 <p>Installing of rack Teflon ring</p>

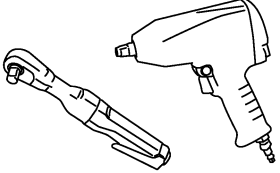
# PREPARATION

Tool number (Kent-Moore No.) Tool name	Description	
KV48103400 (    —    ) Torque adapter	 <p style="text-align: right; font-size: small;">ZZA0824D</p>	Inspecting rotating torque
1. KV48102500-04 (    —    ) Washer 2. KV48102500-01 (    —    ) Eye joint 3. KV48102500-03 (    —    ) Bolt 4. KV48102500-02 (    —    ) Flare Joint 5. KV48103500 (J26357 and J26357-10) Oil pressure gauge	 <p style="text-align: right; font-size: small;">SGIA0442E</p>	Measuring oil pump relief pressure

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## Commercial Service Tools

AGS000CF

Tool name	Description	
Power tool	 <p style="text-align: right; font-size: small;">PBIC0190E</p>	<ul style="list-style-type: none"> <li>● Removing tires</li> <li>● Removing undercover</li> <li>● Removing front exhaust tube</li> <li>● Removing stabilizer assembly</li> <li>● Removing engine mounting insulator</li> <li>● Removing member stay</li> <li>● Removing side splash guard</li> </ul>

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# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

AGS000CG

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

Symptom		Possible cause and suspected parts	Reference page																							
			PS-7	PS-7	PS-22	PS-22	PS-22	PS-7	PS-9	PS-9	EM-13	PS-9	PS-11	PS-15	PS-13	PS-11	PS-15	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 FAX section	NVH in BR section		
STEERING	Noise	Fluid level	x	x	x	x	x	x	x	x	x															
	Shake	Air in hydraulic system																								
	Vibration	Tie-rod ball joint swinging force																								
	Shimmy	Tie-rod ball joint rotating torque																								
	Judder	Tie-rod ball joint end play																								
		Steering fluid leakage																								
		Steering wheel play																								
		Steering gear rack sliding force																								
		Drive belt looseness																								
		Improper steering wheel										x	x	x												
		Improper installation or looseness of tilt lock lever										x	x	x												
		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																								

x: Applicable

# POWER STEERING FLUID

## POWER STEERING FLUID

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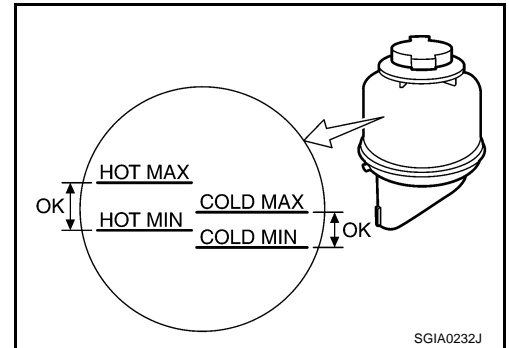
### Checking Fluid Level

AGS000CH

- Stop engine before performing a fluid level check.
- Ensure that fluid level is between the MAX range and MIN range.
- Because 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 the Max range.
- Do not reuse any used power steering fluid.
- Recommended fluid is Genuine NISSAN PSF or equivalent.

### Checking Fluid Leakage

AGS000CI

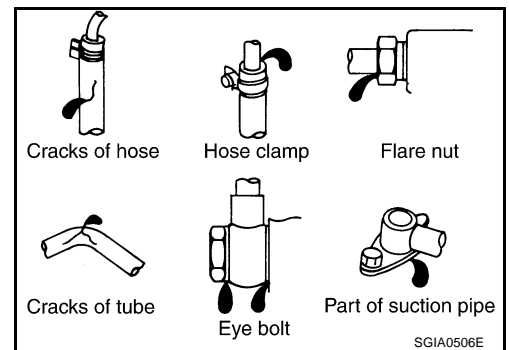
Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine until fluid temperature reaches 50 to 80° C (122 to 176°F) in reservoir tank. Keep engine speed idle.
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 steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)**

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



### Air Bleeding Hydraulic System

AGS000CJ

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

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

#### NOTE:

When vehicle is stationary or while steering wheel is being turned slowly, some noise may be heard from oil pump or gear. This noise is normal and does not affect any system.

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

#### CAUTION:

**Do not allow steering fluid reservoir tank to go below the low-level line. Check tank frequently and add fluid as needed.**

2. Run engine at idle speed. Turn steering wheel fully to the right and then fully to the left, and keep for about three seconds. Then check whether a fluid leakage has occurred.
3. Repeat the 2nd procedure several times at about three seconds intervals.

## POWER STEERING FLUID

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**CAUTION:**

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

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



# STEERING WHEEL

## STEERING WHEEL

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

AGS000CK

- 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.

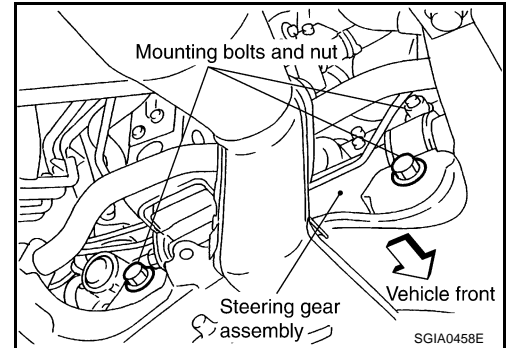
**End play of the axial direction for steering wheel : 0 mm (0 in)**

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

#### Tightening torque

**Bolt: 136 - 162 N·m (14 - 16 kg·m, 101 - 119 ft·lb)**

**Nut: 121.6 - 149.1 N·m (13 - 15, kg·m, 90 - 109 ft·lb)**



### CHECKING STEERING WHEEL PLAY

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

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

### CHECKING NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to [FSU-5, "Wheel Alignment Inspection"](#).
1. Set vehicle to the straight direction, check if steering wheel is in the neutral position.
  2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
  3. If the neutral position cannot adjust in the two teeth of steering gear assembly, loosen tie-rod lock nuts of steering outer sockets, then adjust tie-rods by the same amount in the opposite direction.

### CHECKING STEERING WHEEL TURNING FORCE

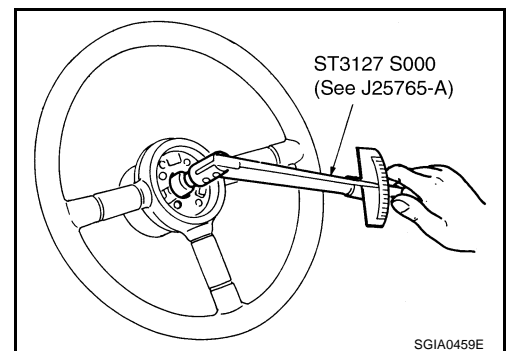
1. Park vehicle on a level and dry surface, set parking brake.
2. Remove driver air bag module from steering wheel. Refer to [SRS-36, "DRIVER AIR BAG MODULE"](#).

3. Start engine at idle, make steering fluid reach to normal operating temperature [50 to 80°C (122 to 176°F)], then check steering wheel turning torque with pre-load gauge (SST).

#### Steering wheel turning force:

**7.45 N·m (0.76 kg·m, 66 in·lb) or less**

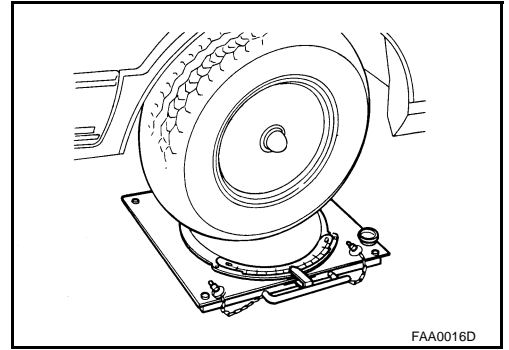
4. If steering wheel turning force is out of specification, check relief hydraulic pressure of oil pump. Refer to [PS-27, "POWER STEERING OIL PUMP"](#).



# STEERING WHEEL

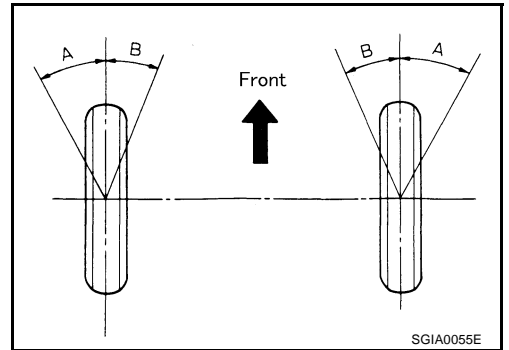
## CHECKING FRONT WHEEL TURNING ANGLE

- Check front wheel turning angle after the toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands so that 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 steering wheel all the way right and left, measure the turning angle.

Inner wheel (Angle: A)	Minimum	34° 30' (34.5°)
	Nominal	38° 00' (38.0°)
	Maximum	39° 00' (39.0°)
Outer wheel (Angle: B)	Nominal	31° 30' (31.5°)



- Any turning angles are not adjustable. If any of steering angles are out of the specification, check if the following parts are worn or damaged.
  - Steering gear
  - Steering column
  - Front suspension componentsIf found that they are worn or damaged, replace them with new ones respectively.

## Removal and Installation

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Refer to [PS-11, "STEERING COLUMN"](#) .

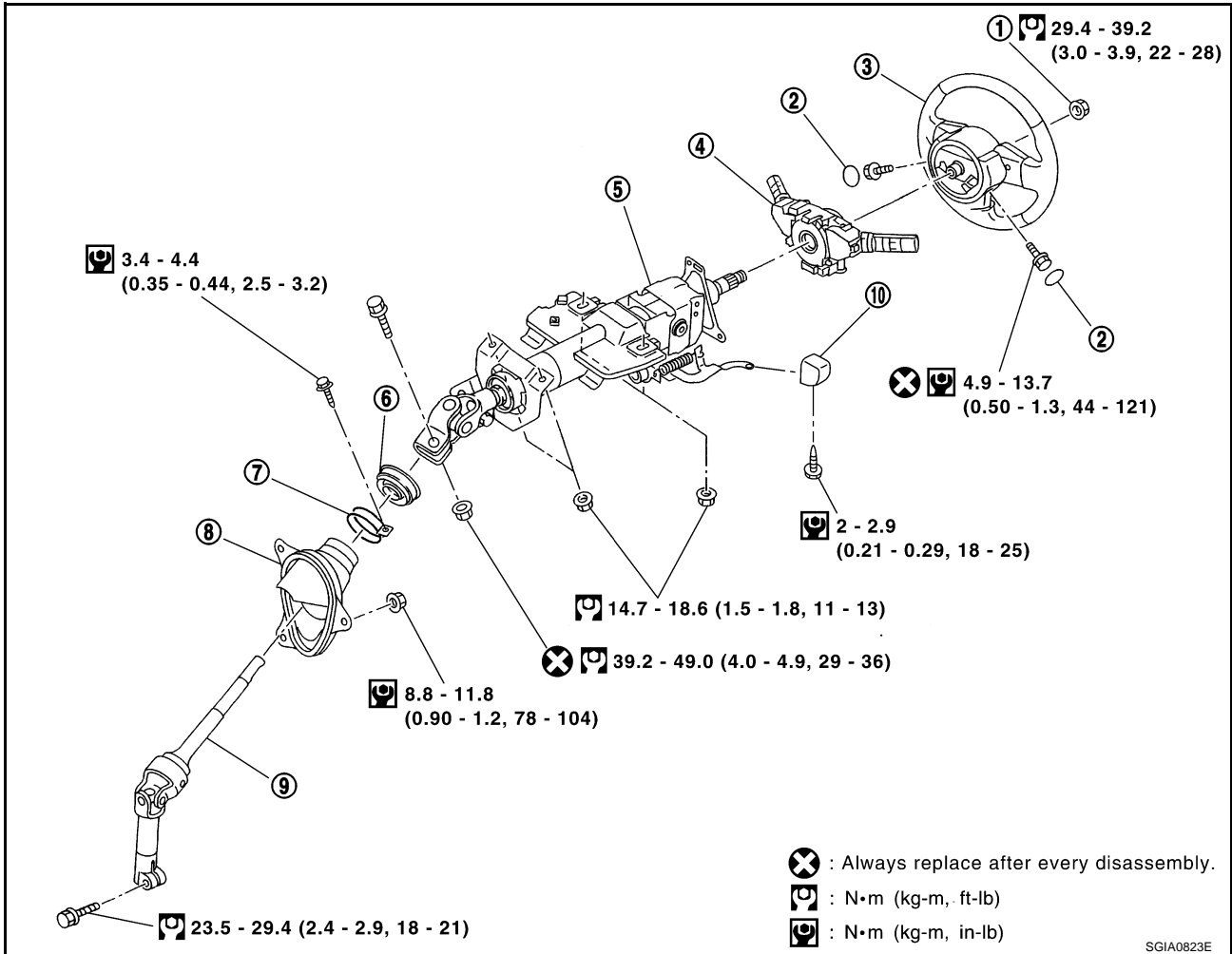
# STEERING COLUMN

## STEERING COLUMN

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### Removal and Installation COMPONENTS

AGS000CM



- |  |                             |                    |
|--|-----------------------------|--------------------|
| 1. Steering wheel lock nut             | 2. Lid                      | 3. Steering wheel  |
| 4. Combination switch and spiral cable | 5. Steering column assembly | 6. Hole cover seal |
| 7. Clamp                               | 8. Hole cover               | 9. Lower joint     |
| 10. Tilt lever knob                    |                             |                    |

### CAUTION:

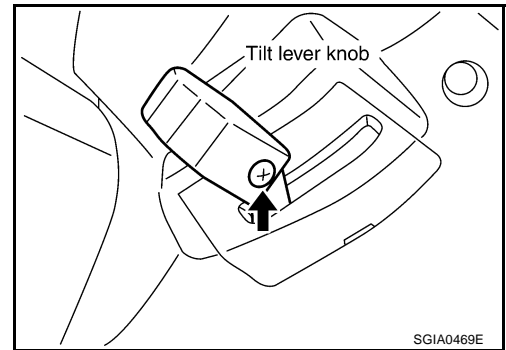
- Care must be taken not to give axial impact to steering column assembly during removal and installation.
- Care must be taken not to move steering gear during removal of steering column assembly.

### REMOVAL

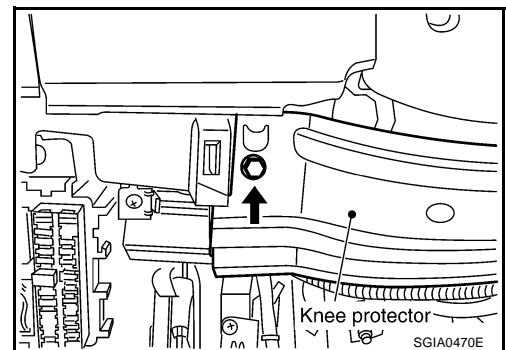
1. Set vehicle to the straight ahead-direction.
2. Remove driver air bag module from steering wheel. Refer to [SRS-36, "DRIVER AIR BAG MODULE"](#).
3. Disconnect steering switch connector, remove steering wheel lock nut, then remove steering wheel. Refer to [SRS-38, "SPIRAL CABLE"](#).

## STEERING COLUMN

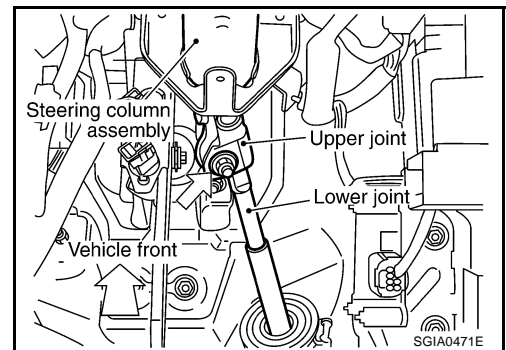
4. Remove fixing screw of tilt lever knob, then remove tilt lever knob from tilt lever.



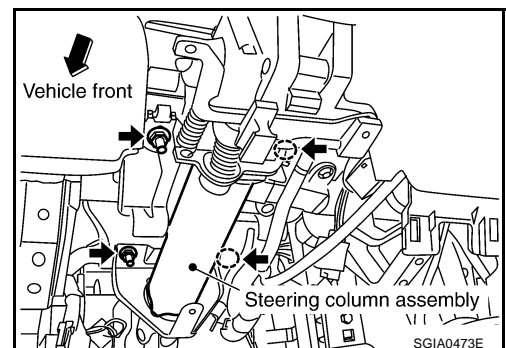
5. Remove instrument driver lower panel. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#).
6. Remove steering column cover and ignition key finisher. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#).
7. Remove NATS antenna amp. Refer to [BL-256, "How to Replace NATS Antenna Amp."](#)
8. Remove fixing screws of knee protector, then remove knee protector from vehicle.



9. Remove combination switch and spiral cable from steering column assembly. Refer to [SRS-38, "SPIRAL CABLE"](#).
10. Disconnect harness connector from each switch on steering column shaft, then separate vehicle side harness from it.
11. Remove lock nut and bolt, then separate lower joint from upper joint.



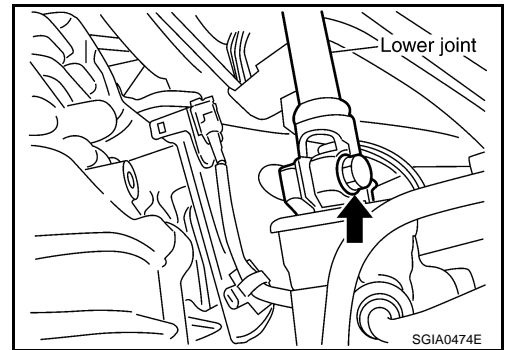
12. Remove fixing nuts from steering member, remove steering column assembly from steering member.



13. Remove hole cover seal and clamp.
14. Remove mounting nuts, then remove hole cover from dash panel.

# STEERING COLUMN

15. Raise vehicle, then remove mounting bolt (lower side) of lower joint and remove lower joint from vehicle.



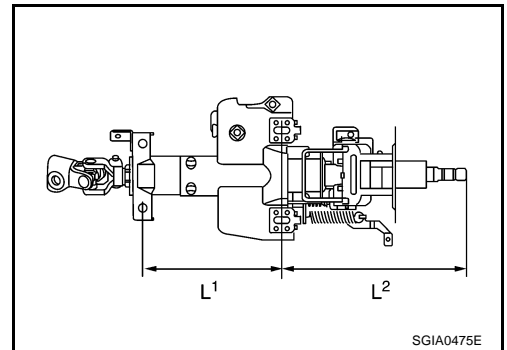
## INSPECTION AFTER REMOVAL

- Check if there is something wrong with jacket tube etc. And then if they are damaged, replace with new one.
- If vehicle is light shocked, check column length "L1" or "L2" as shown in the figure. Then if it is out of the specified value, replace with new one.

### Steering column length

L1: 182 mm (7.17 in)

L2: 242.6 mm (9.55 in)



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

Turning torque : 0 - 0.2 N·m (0 - 0.02 kg·m, 0 - 2 in·lb)

## INSTALLATION

- Refer to [PS-11, "Removal and Installation"](#) for tightening torque. Install in the reverse order of removal.

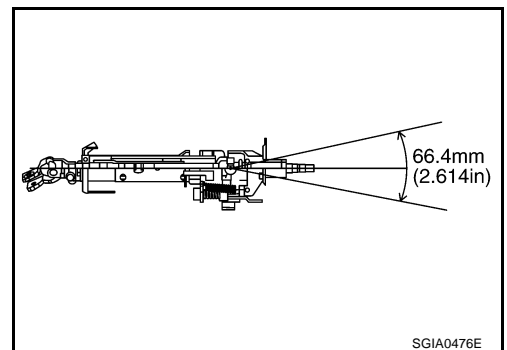
### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

- When installing steering column to steering member, install mounting nut from front side of vehicle.

## INSPECTION AFTER INSTALLATION

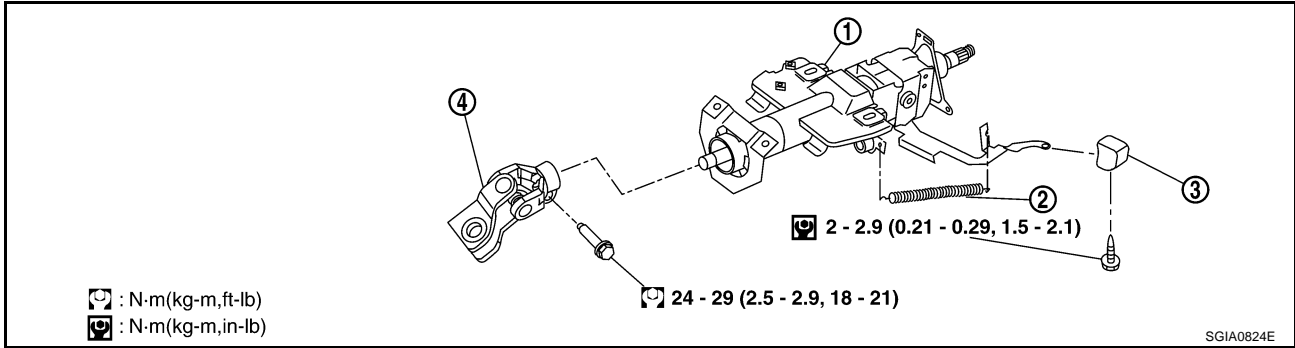
- After installing steering column to vehicle, check tilt device and its operation range. Ranges of operation are shown in the figure.
- Check if steering wheel operation can turn to the end of the left and right smoothly.



# STEERING COLUMN

## Disassembly and Assembly

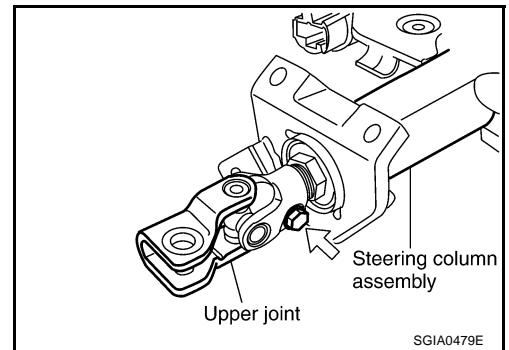
AGS000CN



1. Steering column assembly
2. Spring
3. Tilt lever knob
4. Upper joint

### DISASSEMBLY

1. Remove spring from steering column assembly and tilt lever.
2. Remove fixing bolt of upper joint, then remove upper joint from steering column assembly.



### ASSEMBLY

- Refer to [PS-14, "Disassembly and Assembly"](#) for tightening torque. Install in the reverse order of removal.

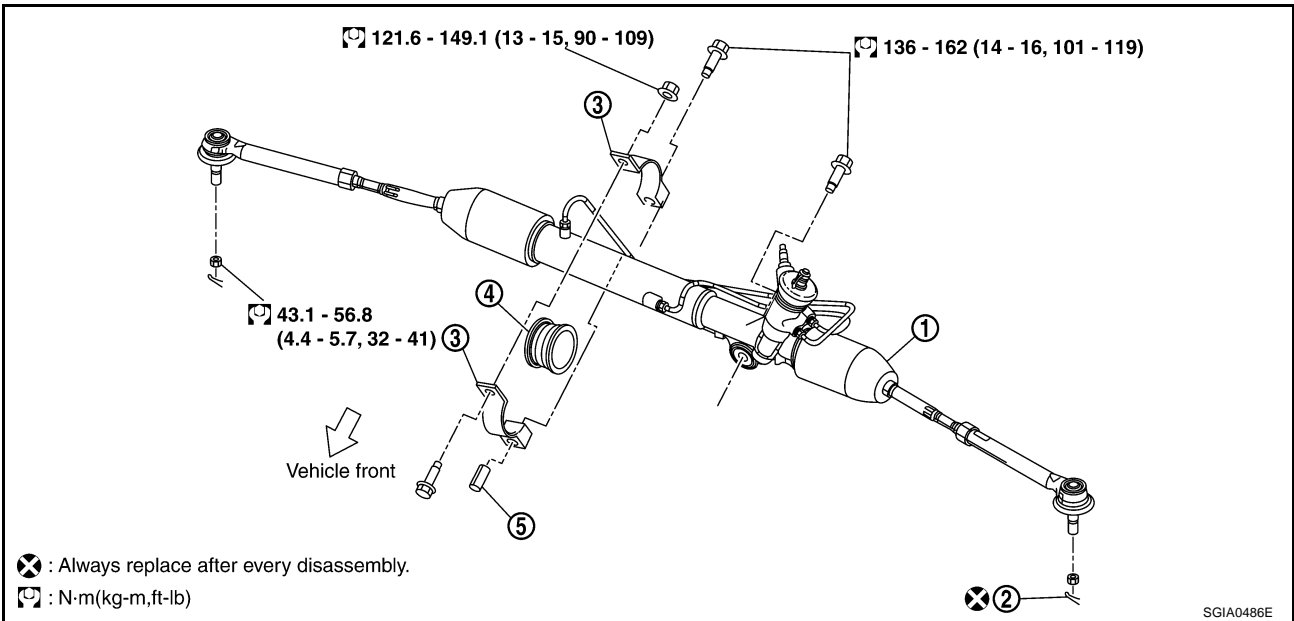
# POWER STEERING GEAR AND LINKAGE

## POWER STEERING GEAR AND LINKAGE

PPF:49001

### Removal and Installation

AGS000CO



- |                            |               |                          |
|----------------------------|---------------|--------------------------|
| 1. Steering gear assembly  | 2. Cotter pin | 3. Rack mounting bracket |
| 4. Rack mounting insulator | 5. Sleeve     |                          |

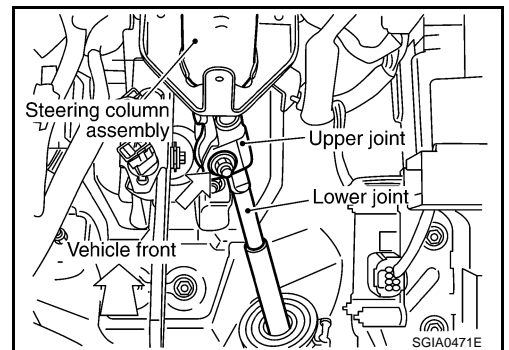
### CAUTION:

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

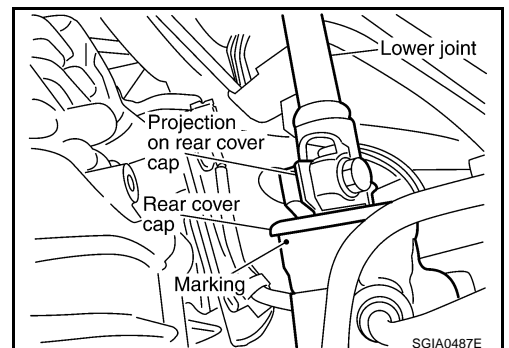
### REMOVAL

#### 2WD

1. Set wheels in the straight-ahead position.
2. Remove lock nut and bolt, then separate lower joint from upper joint.
3. Remove tires from vehicle with power tool.



4. Confirm slit of lower joint fits with the projection on rear cover cap, furthermore marking position on steering gear assembly nearly fits with the projection on rear cover cap.
5. Remove cotter pin at steering knuckle, then loosen mounting nut.

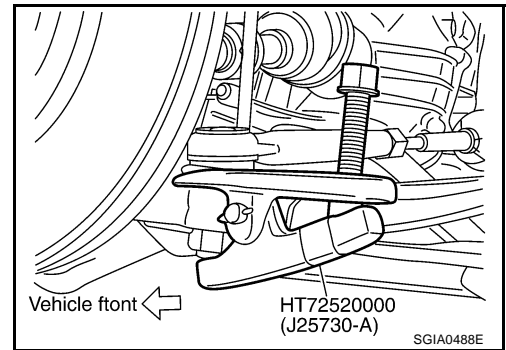


## POWER STEERING GEAR AND LINKAGE

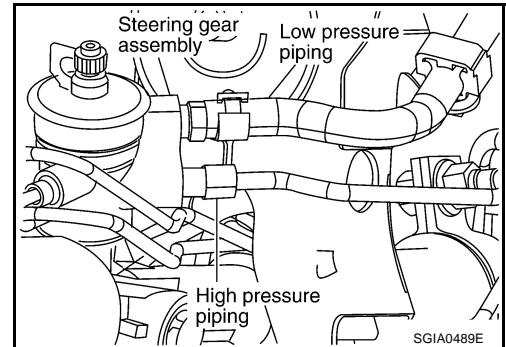
6. Use a ball joint remover (SST) to remove steering outer socket from steering knuckle. Be careful not to damage ball joint boot.

**CAUTION:**

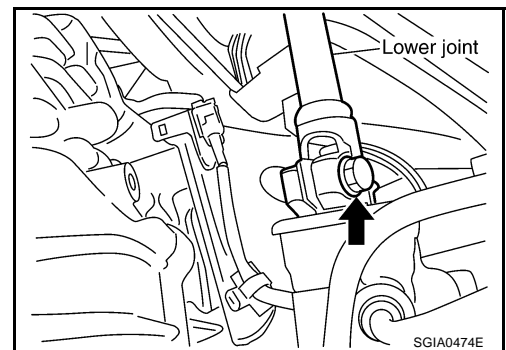
To prevent damage to threads and to prevent ball joint remover (SST) from coming off, and temporarily tighten mounting nut.



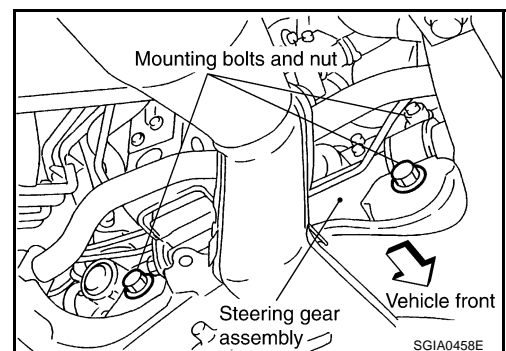
7. Remove oil pipings (high pressure side and low pressure side) from steering gear assembly, then drain fluid from pipings.



8. Remove mounting bolt (lower side) of lower joint.



9. Remove mounting bolts and nut of steering gear assembly, and then remove steering gear assembly, rack mounting bracket, rack mounting insulator and sleeve from vehicle.

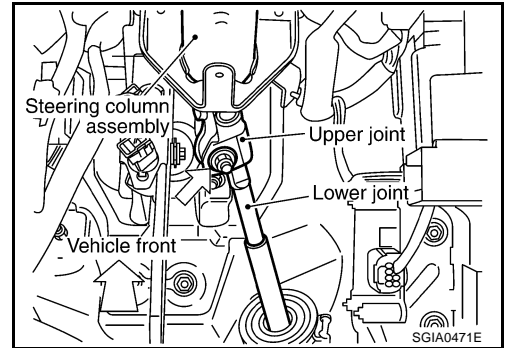




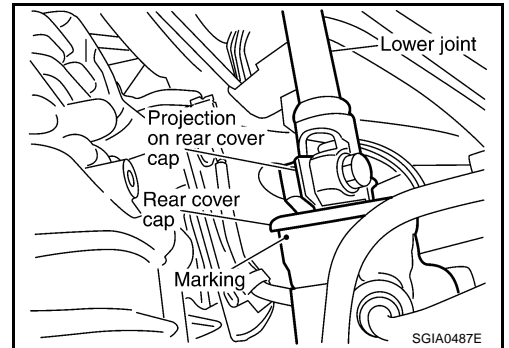
# POWER STEERING GEAR AND LINKAGE

## AWD

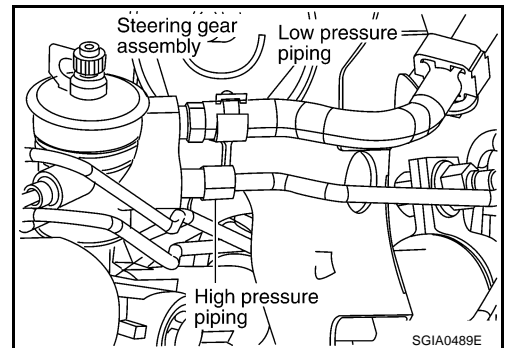
1. Set wheels in the straight-ahead position.
2. Remove lock nut and bolt, then separate lower joint from upper joint.
3. Remove tires from vehicle with power tool.
4. Remove undercover from vehicle with power tool.



5. Confirm slit of lower joint fits with the projection on rear cover cap, furthermore marking position on steering gear assembly nearly fits with the projection on rear cover cap.



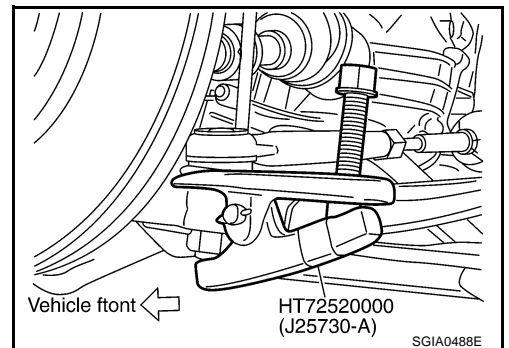
6. Remove oil pipings (high pressure side and low pressure side) from steering gear assembly, then drain fluid from pipings.
7. Remove cotter pin at steering knuckle, then loosen mounting nut.



8. Use a ball joint remover (SST) to remove steering outer socket from steering knuckle. Be careful not to damage ball joint boot.

### CAUTION:

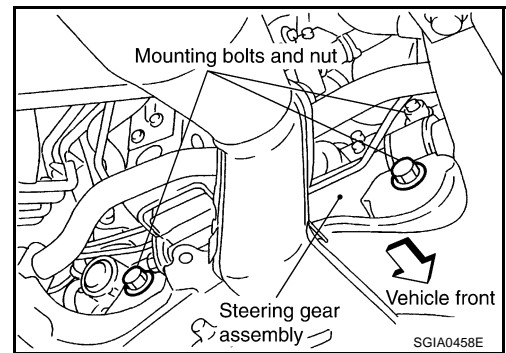
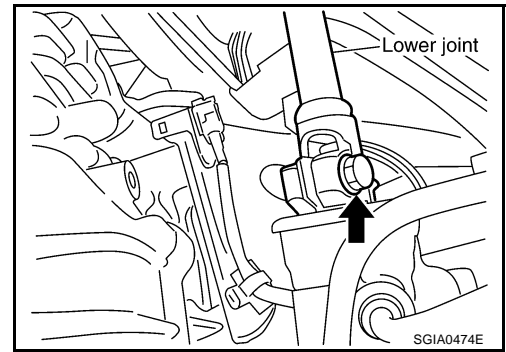
To prevent damage to threads and to prevent ball joint remover (SST) from coming off, and temporarily tighten mounting nut.



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# POWER STEERING GEAR AND LINKAGE

9. Remove mounting bolt (lower side) of lower joint.
10. Remove front exhaust tube with power tool. Refer to [EX-3, "EXHAUST SYSTEM"](#) .
11. Remove rear propeller shaft. Refer to [PR-4, "REAR PROPELLER SHAFT"](#) .
12. Remove mounting nuts on lower position of stabilizer connecting rod with power tool.
13. Remove mounting bolts of stabilizer clamp and hang stabilizer on vehicle with power tool.
14. Remove steering hydraulic piping bracket from front suspension member. Refer to [PS-33, "HYDRAULIC LINE"](#) .
15. Disconnect electrical rear engine mounting actuator harness connector. Refer to [EM-107, "ENGINE ASSEMBLY"](#) .
16. Set jack under engine and front suspension member.
17. Remove mounting bolts of rear engine mounting insulator with power tool. Refer to [EM-107, "ENGINE ASSEMBLY"](#) .
18. Loosen mounting nuts of front suspension member (front side).
19. Remove mounting bolts of member stay (body side) with power tool, then loosen mounting nuts of member stay (front suspension member side).
20. Move jack down slowly (front suspension member side) to remove rear engine mounting insulator from engine and front suspension member.
21. Remove mounting bolts and nut of steering gear assembly, and then remove steering gear assembly, rack mounting bracket, rack mounting insulator and sleeve from vehicle.



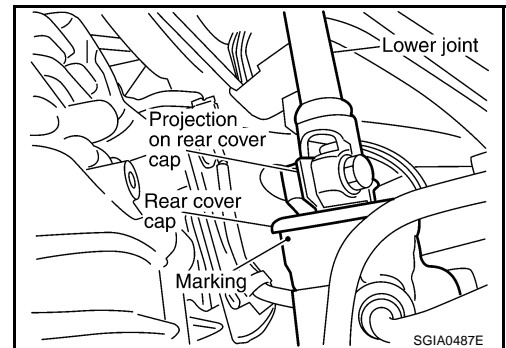
## INSTALLATION

- Refer to [PS-15, "Removal and Installation"](#) for tightening torque. Install in the reverse order of removal.

### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

- When steering wheel is set in the straight ahead direction, confirm slit of lower joint fits with the projection on rear cover cap, furthermore marking position on steering gear assembly nearly fits with the projection on rear cover cap.
- After installation, bleed air from piping. Refer to [PS-7, "Air Bleeding Hydraulic System"](#) .



## INSPECTION AFTER INSTALLATION

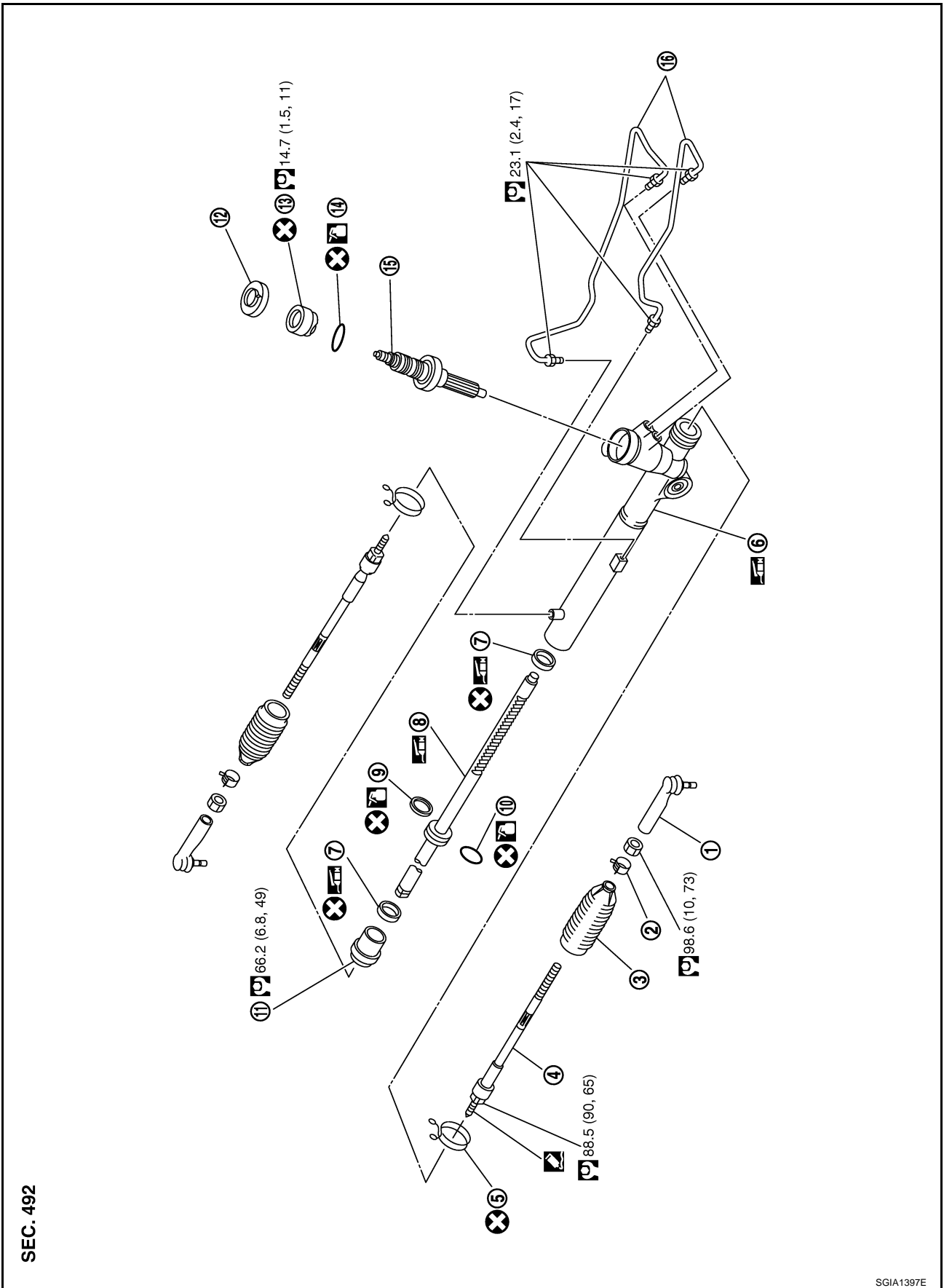
- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.

# POWER STEERING GEAR AND LINKAGE

## Disassembly and Assembly COMPONENTS

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# POWER STEERING GEAR AND LINKAGE

- |                    |                                |                          |
|--------------------|--------------------------------|--------------------------|
| 1. Outer socket    | 2. Boot clamp                  | 3. Boot                  |
| 4. Inner socket    | 5. Boot clamp (stainless wire) | 6. Gear housing assembly |
| 7. Rack oil seal   | 8. Rack assembly               | 9. Rack Teflon ring      |
| 10. O-ring A       | 11. End cover assembly         | 12. Rear cover cap       |
| 13. Rear cover     | 14. O-ring B                   | 15. Sub-gear assembly    |
| 16. Cylinder tubes |                                |                          |

Refer to [GI-10, "Components"](#), and the followings for the symbols in the figure.

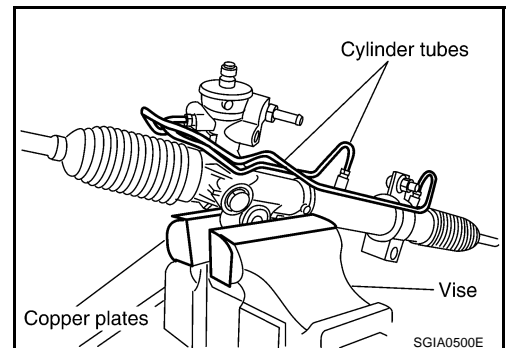
: Apply Thread Locking Sealant, Three Bound TB1111 or equivalent.

: Apply multi-purpose grease.

: Apply Genuine NISSAN PSF or equivalent.

## CAUTION:

- **Secure steering gear assembly 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 steering gear assembly with kerosene. Be careful not to bring any kerosene into contact with the discharge and return port connectors.**

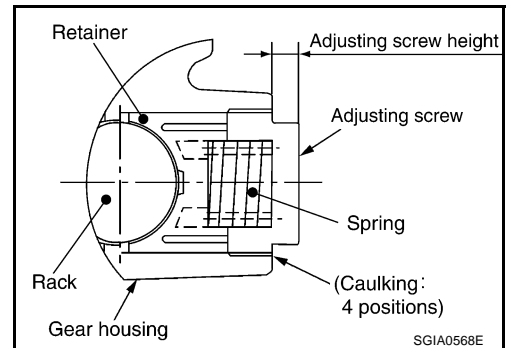


## DISASSEMBLY

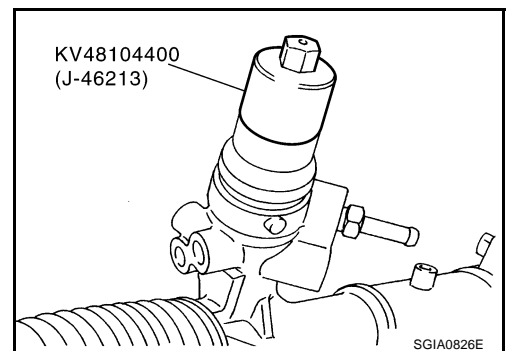
1. Remove cylinder tubes from gear housing assembly.
2. Remove rear cover cap from gear housing assembly.
3. Measure adjusting screw height from gear housing assembly, then loosen adjusting screw.

## CAUTION:

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



4. Use a rear cover wrench (SST) to remove rear cover from sub-gear assembly.



# POWER STEERING GEAR AND LINKAGE

5. Remove O-ring B with a flat-bladed screwdriver, and pull out rear cover.
6. Remove sub-gear assembly from gear housing assembly.

**CAUTION:**

**In order to protect oil seal from any damage, pull sub-gear assembly out straightly.**

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

**CAUTION:**

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

9. Drill out the punch caulking area on cylinder outer rim with a 3 mm (0.12 in) drill bit. [Drill approximately. 1.5 mm (0.059 in) in depth.]

10. Remove end cover assembly with a 45 mm (1.77 in) open head (suitable tool).

**CAUTION:**

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

11. Pull rack assembly with rack oil seal out of gear housing assembly.

**CAUTION:**

**Be careful not to damage cylinder. If it is damaged, replace gear housing assembly. Otherwise, oil leaks may result.**

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

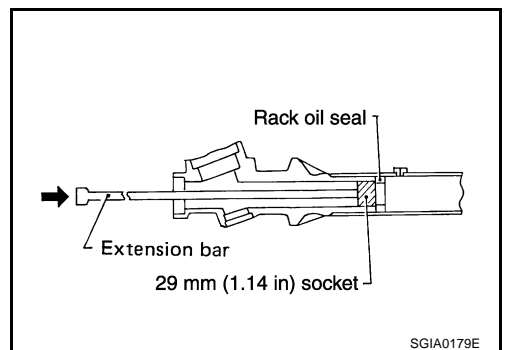
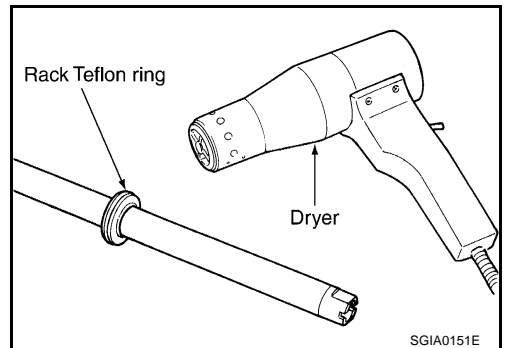
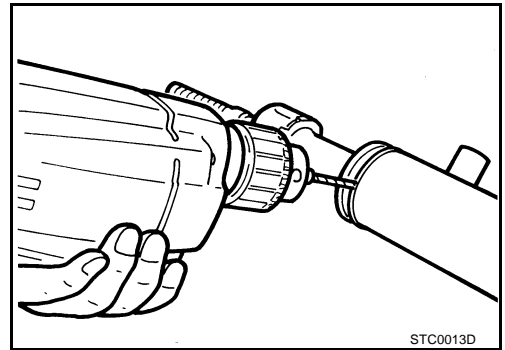
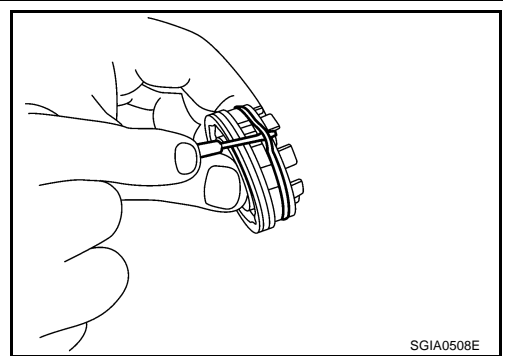
**CAUTION:**

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

13. Use a taped 29 mm (1.14 in) socket and an extension bar. Remove rack oil seal from gear housing assembly.

**CAUTION:**

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



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# POWER STEERING GEAR AND LINKAGE

## INSPECTION AFTER DISASSEMBLY

### Boot

Check boot for cracks and deformation. Replace it, if necessary.

### Rack

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

### Sub-Gear Assembly

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

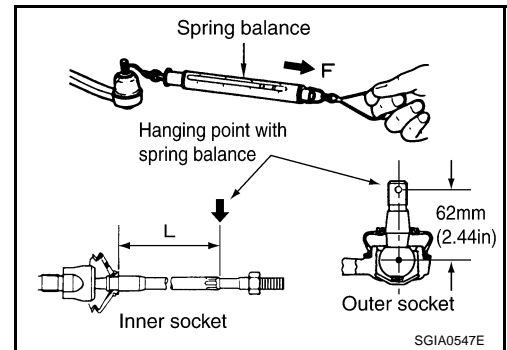
### Gear Housing Assembly

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

### Outer Socket and Inner Socket

#### Swing Torque

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

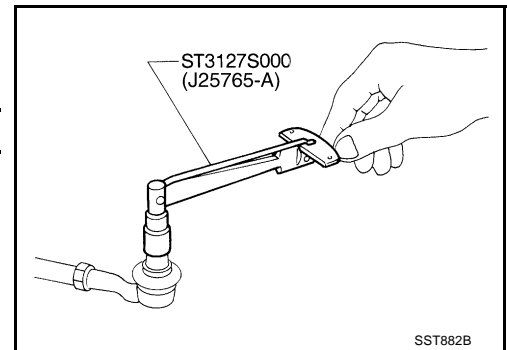


Item	Outer socket	Inner socket
Measuring point	Cotter pin hole of stud	Shown as L: 83.2 mm (3.276 in)
Swing torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)	1.0 - 7.8 N·m (0.11 - 0.79 kg·m, 9 - 69 in·lb)
Measuring value	4.84 - 46.7 N (0.5 - 4.8 kg, 1 - 10 lb)	12.1 - 93.7 N (1.2 - 9.6, kg, 3 - 21 lb)

#### Rotating Torque

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

Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
-----------------	--

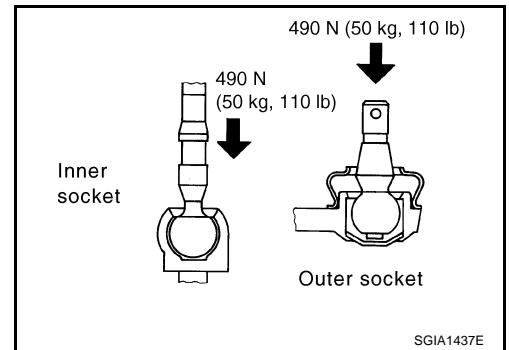


# POWER STEERING GEAR AND LINKAGE

## Axial End Play

- Apply load of 490 N (50 kg, 110 lb) to 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 specified below. If the value is outside the standard, 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

- Apply Nissan PSF or equivalent to O-ring A. Put an O-ring A into rack Teflon ring.

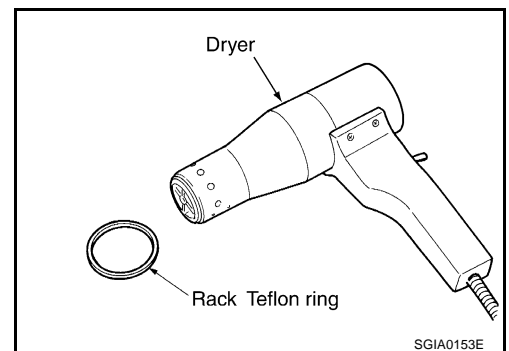
### NOTE:

Do not reuse O-ring A.

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

### NOTE:

Do not reuse rack Teflon ring.



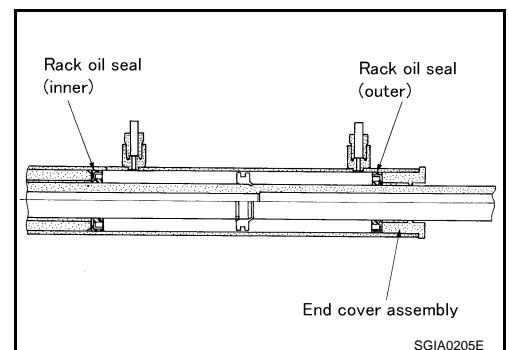
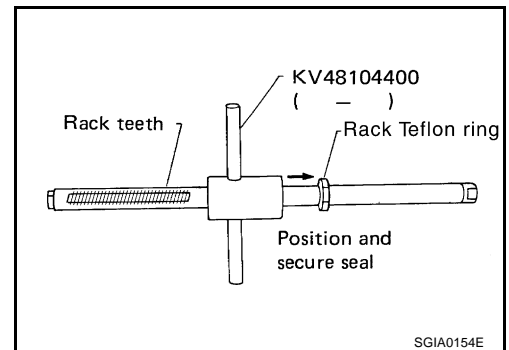
- To fit rack Teflon ring on rack, use rack Teflon ring installation tool (SST) from tooth side. Compress rim of ring with the tool.
- Apply Multi-purpose grease to rack oil seal. Insert rack oil seal, then insert rack assembly to gear housing assembly.

### NOTE:

Do not reuse rack oil seal.

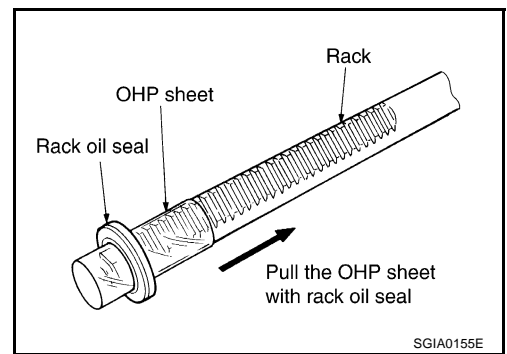
### CAUTION:

- When inserting rack assembly, do not damage retainer sliding part. If it is damaged, replace gear housing assembly.
- When inserting rack assembly, do not damage cylinder inner wall. If it is damaged, it may cause oil leaks. Replace gear housing assembly.
- Attach rack oil seal. Both inner lip and outer lip should face each other.

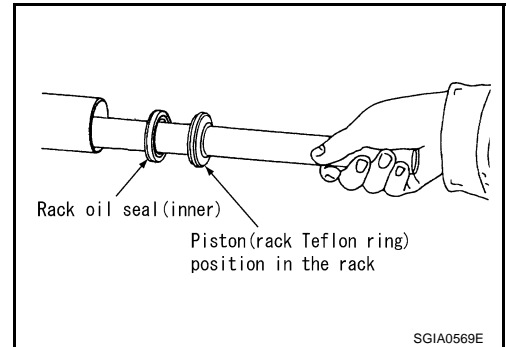


## POWER STEERING GEAR AND LINKAGE

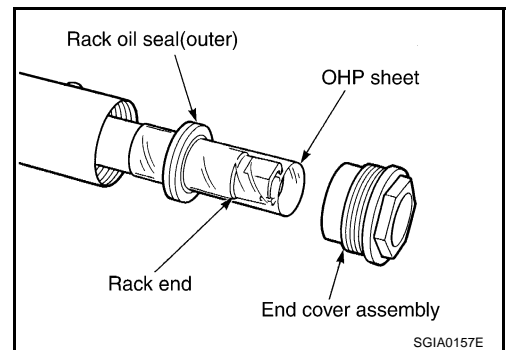
- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approximately. 70 mm (2.76 in) × 100 mm (3.94 in)] around rack tooth. Place oil seal on sheet. Then, pull oil seal along with OHP sheet until they pass the toothed section of rack, then remove it.



- b. Insert rack oil seal (inner) to piston (rack Teflon ring) position and push retainer to adjust screw side with fingers lightly, and then make rack move in gear housing assembly, install rack oil seal (inner) to fit with 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 oil seal on sheet. Pull rack oil seal along with OHP sheet until they pass rack end. Then remove OHP sheet.



- d. Install end cover assembly to rack, move it to gear housing assembly.
5. Using a 45 mm (1.77 in) open head (suitable tool), tighten end cover assembly to the specified torque.

**CAUTION:**

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

6. After tightening end cover assembly, caulk cylinder at one point as shown in the figure using a punch. This will prevent end cover from getting loose.
7. Install sub-gear assembly to gear housing assembly.

**CAUTION:**

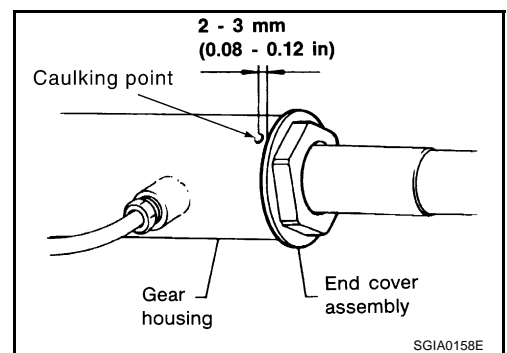
**In order to protect oil seal from any damage, insert sub-gear assembly out straightly.**

8. Apply Nissan PSF or equivalent to O-ring B. Install O-ring B to rear cover.

**NOTE:**

Do not reuse O-ring B.

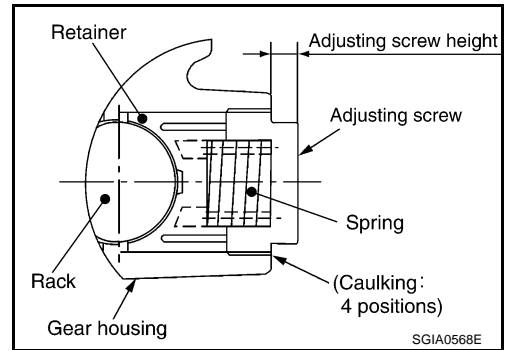
9. Use a rear cover wrench (SST) to install rear cover to gear housing assembly.
10. Confirm projection on rear cover cap nearly fit with marking position on gear housing assembly.



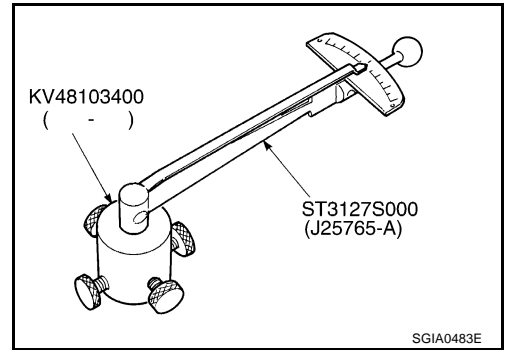


# POWER STEERING GEAR AND LINKAGE

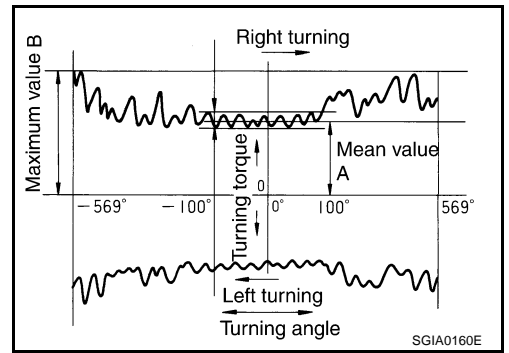
11. Apply thread locking adhesive (Three Bond TB1111B or equivalent. Refer to [GI-47](#) ) to the thread of adjusting screw to the adjusting screw height from gear housing assembly. The adjusting screw height is the same as it was measured in the overhaul in advance.
12. Rotate ten times throughout whole range of rack so that parts fit with each other.



13. Measure pinion rotating torque within from  $-180^\circ$  to  $+180^\circ$ , make preload gauge (SST) and torque adapter (SST) in rack neutral position, then hold preload gauge (SST) at maximum torque.
14. 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  $20^\circ$  to  $40^\circ$ .



15. Measure pinion rotating torque with torque adapter (SST) and preload gauge (SST), then confirm whether their readings are within the specified range. If the readings are not within the specified ranges, readjust screw angle with adjusting screw. Change gear assembly to new one, if the readings are still not within the specified ranges, or the rotating torque of adjusting screw is less than 5 N·m (0.51 kg·m, 44 in·lb).



**Pinion rotating torque:**

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

**Average "A":**

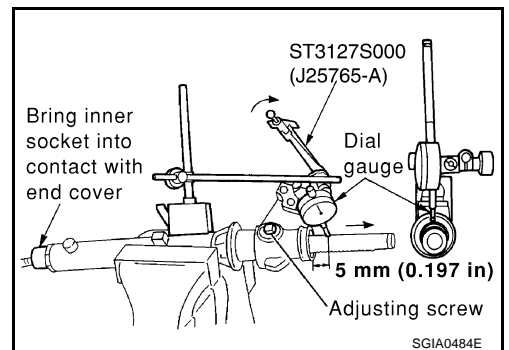
**0.8 - 2.0 N·m (0.09 - 0.20 kg·m, 7 - 17 in·lb)**

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

**Maximum variation "B":**

**2.3 N·m (0.23 kg·m, 20 in·lb)**

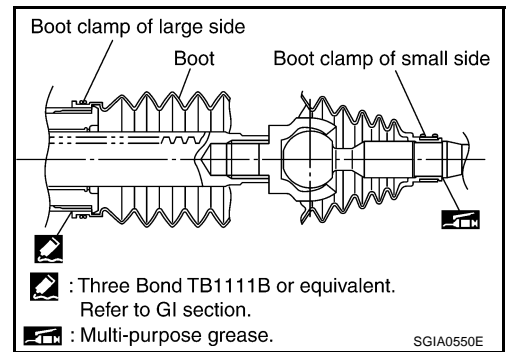
16. Turn pinion fully to the end of the left with inner socket to gear housing assembly.
17. Set dial gauge to rack as shown in the figure. Measure vertical movement of rack when pinion is turned counterclockwise with torque of 19.6 N·m (2.0 kg·m, 14 ft·lb). Check reading is within the specified range.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



Amount of vertical movement with rack	Less than 0.265 mm (0.0104 in)	
Measuring point	Shaft direction of rack	5 mm (0.20 in) away from end of gear housing assembly
	Radius direction of rack	Shaft direction of adjusting screw

# POWER STEERING GEAR AND LINKAGE

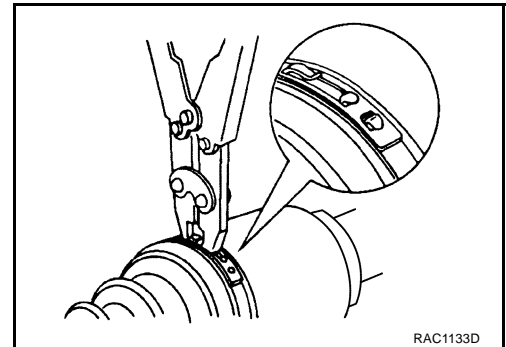
18. Install large-diameter side of boot to gear housing assembly.
19. Install small-diameter side of boot to the mounting groove of inner socket boot.
20. Install boot clamp to the small-diameter side of boot.



21. Lock new larger boot clamp securely with a suitable tool.

**NOTE:**

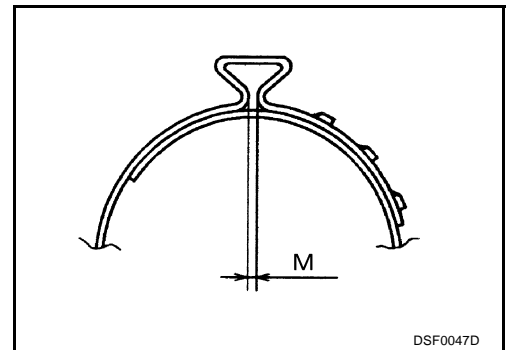
- Do not reuse boot clamp.



- Secure boot band so that dimension "M" as shown in the figure satisfies the following:

**Dimension "M":**

**Max: 3.5 mm (0.138 in)**

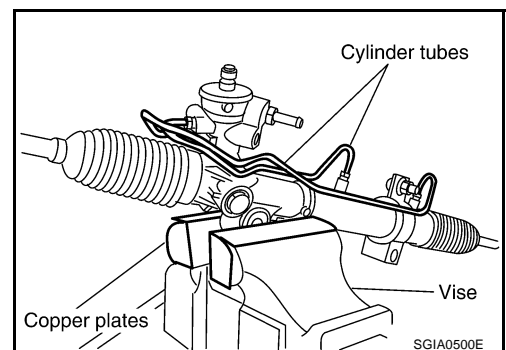


22. Install cylinder tubes to gear housing assembly.

**Tightening torque:**

**19.7 - 26.4 N·m (2.0 - 2.6 kg·m, 15 - 19 in·lb)**

23. Install lock nut and outer socket to inner socket.

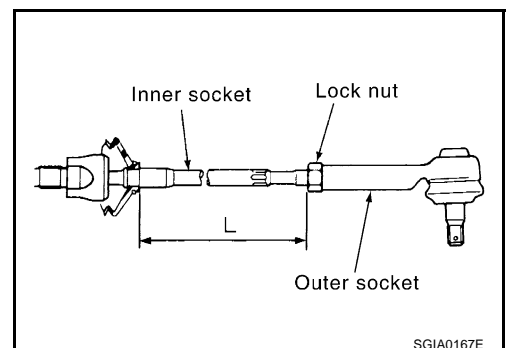


24. Tighten lightly tie-rod in specified length "L", then tighten lock nut at specified torque. Refer to [PS-19, "Disassembly and Assembly"](#). Reconfirm if tie-rod length is within limit of specified length "L".

**Tie-rod length "L" : 147.7 mm (5.81 in)**

**CAUTION:**

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 Inspection and Service CHECKING RELIEF OIL PRESSURE

AGS000CR

#### CAUTION:

Before starting work, confirm belt tension is proper.

1. Connect oil pressure gauge (SST) and oil pressure gauge adapter (SST) between oil pump discharge connector and high pressure hose and 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).

#### CAUTION:

- Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in power steering pump increases to maximum. This will raise fluid temperature excessively.
  - Be careful not to contact hose with belt when engine is started.
3. With engine at idle, close shut-off valve and read the relief oil pressure.

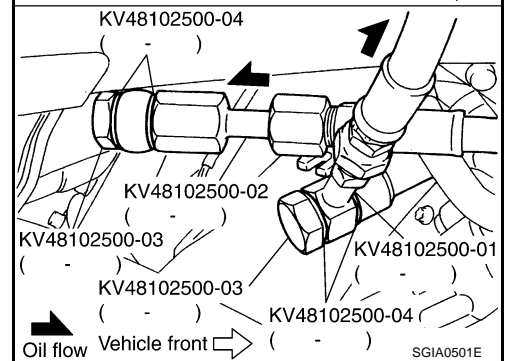
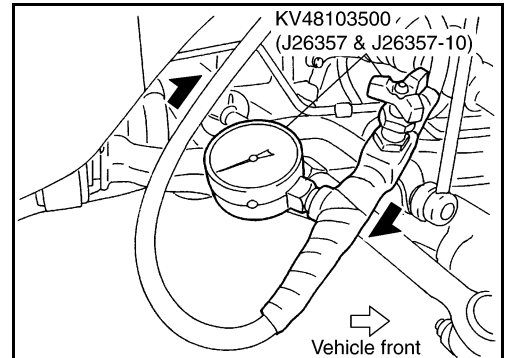
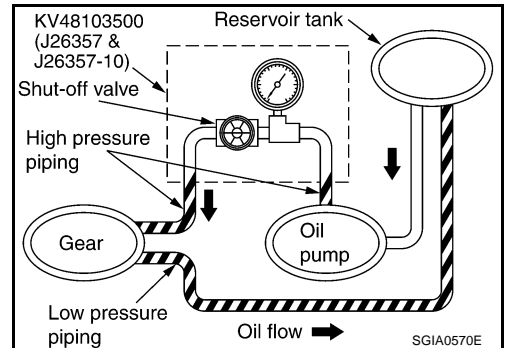
**Oil pump relief pressure:**

**8,500 - 9,300 kpa (86.7 - 94.9 kg/cm<sup>2</sup> , 1,233 - 1,349 psi)**

#### CAUTION:

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

4. After measurement, open shut-off valve slowly.
  - If relief oil pressure is outside the specification, disassemble and repair oil pump. Refer to [PS-28, "Disassembly and Assembly"](#).
5. After inspection, disconnect oil pressure gauge (SST) and oil pressure gauge adapter (SST) from hydraulic circuit, connect oil pump discharge connector and high pressure hose. Add fluid and bleed air from hydraulic circuit thoroughly. Refer to [PS-7, "Air Bleeding Hydraulic System"](#).



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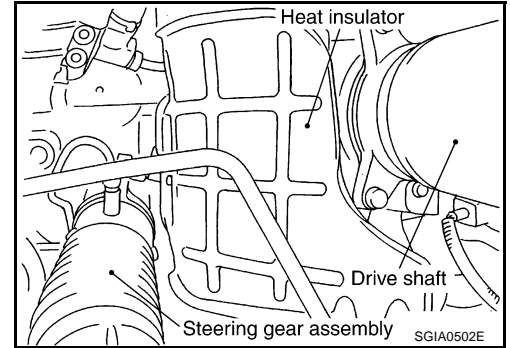
# POWER STEERING OIL PUMP

AGS000CS

## Removal and Installation

### REMOVAL

1. Remove tires with power tool.
2. Remove side splash guard from vehicle with power tool.
3. Remove heat insulator from vehicle.



4. Loosen adjust screw and oil pump fixing bolt, then remove belt from oil pump pulley. Refer to [EM-107, "ENGINE ASSEMBLY"](#).
5. Drain power steering fluid from reservoir tank.
6. Remove piping of high pressure and low pressure (drain fluid from their pipings). Refer to [PS-33, "HYDRAULIC LINE"](#).
7. Remove mounting bolts, then remove power steering pump.

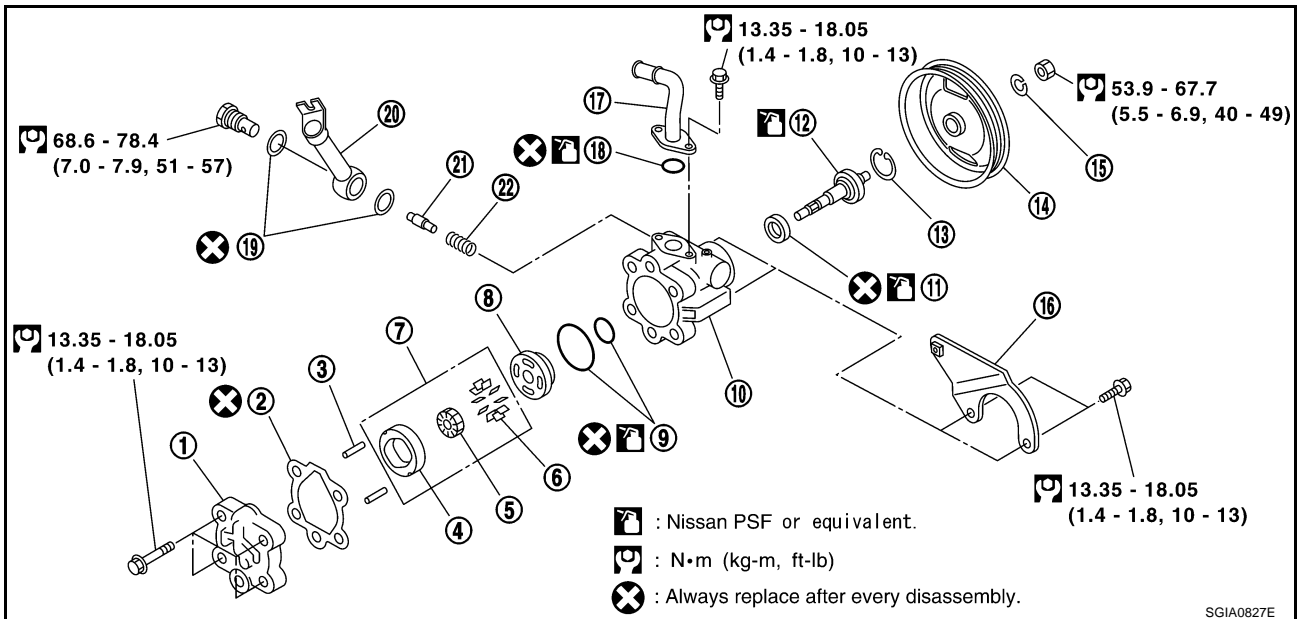
### INSTALLATION

Refer to [PS-33, "HYDRAULIC LINE"](#) for tightening torque. Install in the reverse order of removal.

- After installation, adjust belt tension. Refer to [EM-13, "DRIVE BELTS"](#).
- After installation, bleed air. Refer to [PS-7, "Air Bleeding Hydraulic System"](#).

## Disassembly and Assembly COMPONENTS

AGS000CT



- |                   |                  |                          |
|-------------------|------------------|--------------------------|
| 1. Rear cover     | 2. Gasket        | 3. Lock pin              |
| 4. Cam ring       | 5. Rotor         | 6. Vane                  |
| 7. Cartridge      | 8. Side plate    | 9. O-ring                |
| 10. Body assembly | 11. Oil seal     | 12. Drive shaft assembly |
| 13. Snap ring     | 14. Pulley       | 15. Spring washer        |
| 16. Bracket       | 17. Suction pipe | 18. O-ring               |

# POWER STEERING OIL PUMP

19. Washer  
22. Spring

20. Joint

21. Flow control valve

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## INSPECTION BEFORE DISASSEMBLY

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

- Oil leakage from oil pump
- Deformed or damaged pulley
- Poor performance

## DISASSEMBLY

### NOTE:

Fix oil pump in vise as the occasion demands.

### CAUTION:

**When retaining drive shaft in a vise, always use copper or aluminum plates between vise and shaft.**

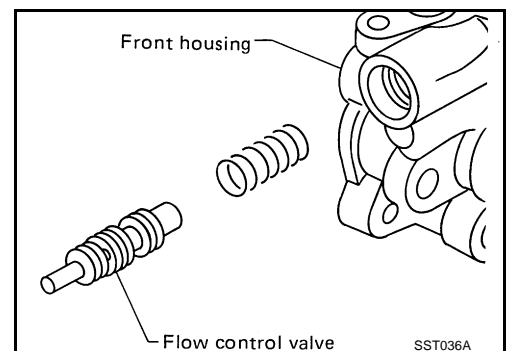
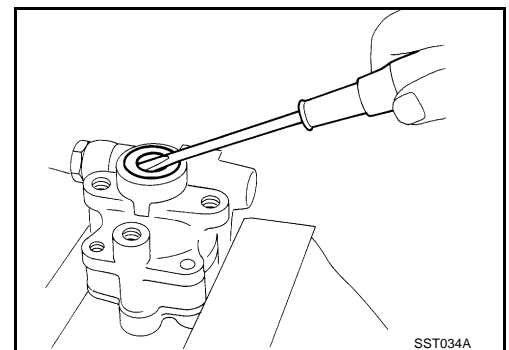
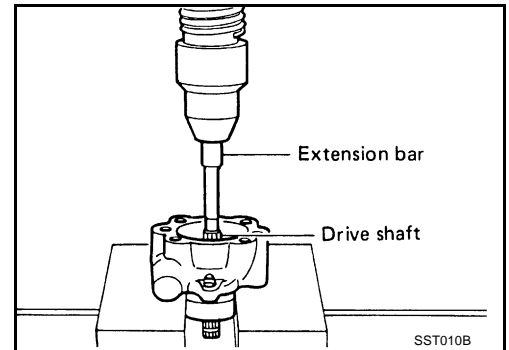
1. Unscrew four rear cover bolts and remove rear cover from body assembly.
2. Remove gasket from body assembly.
3. Remove lock pin, cartridge and side plate from body assembly.
4. Remove pulley from drive shaft.
5. Unscrew mounting bolts of bracket and remove bracket from body assembly.
6. Remove snap ring from drive shaft assembly and press out it.

### CAUTION:

**When removing snap ring, be careful not to damage drive shaft assembly.**

7. Using a screwdriver, remove oil seal for body assembly.
8. Remove O-ring from body assembly.

9. Loosen eye bolt and remove joint and washer, then pull out flow control valve and spring from body assembly.
10. Remove suction pipe from body assembly.
11. Remove O-ring for suction pipe.



# POWER STEERING OIL PUMP

## INSPECTION AFTER DISASSEMBLY

### Body Assembly and Rear Cover Inspection

- Check body assembly and the inside of rear cover for damage. If any damage is found, replace with new part for rear cover, 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.

## ASSEMBLY

### NOTE:

Fix oil pump in vise as vise occasion demands.

### CAUTION:

When retaining drive shaft in a vise, always use copper or aluminum plates between vise and shaft.

1. Apply a coat of Nissan PSF or equivalent to oil seal lip and to the circumference of oil seal. Using proper tool, such as hand press machine, install it to body assembly.

### NOTE:

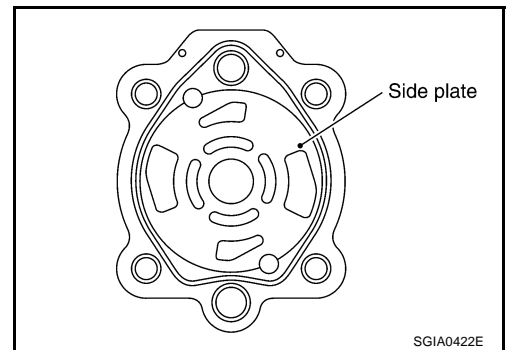
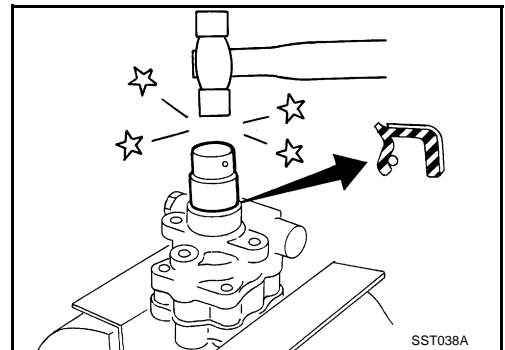
Do not reuse oil seal.

2. Apply a coat of Nissan PSF or equivalent to drive shaft, and press drive shaft assembly into body assembly with suitable tool, then install snap ring.
3. Apply a coat of Nissan PSF or equivalent to O-ring and install O-ring into body assembly.

### NOTE:

Do not reuse O-ring.

4. Install side plate to body assembly.

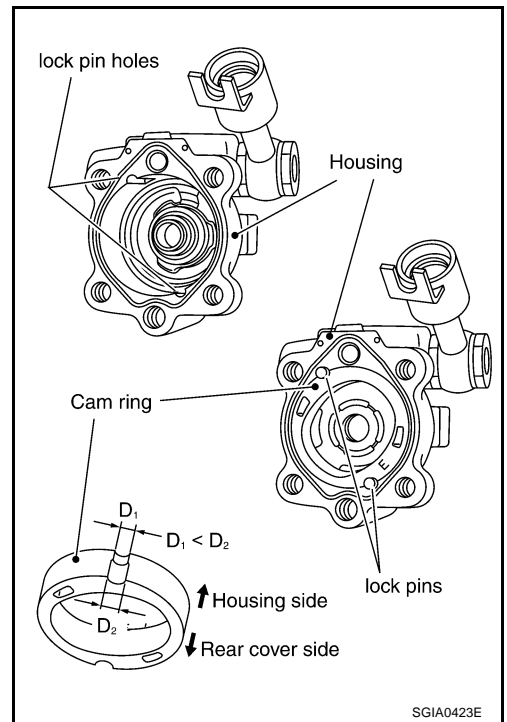


# POWER STEERING OIL PUMP

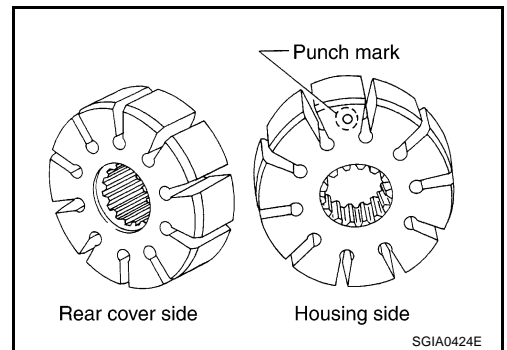
5. Install lock pin into lock pin hole, and install cam-ring as shown in the figure.
  - When installing cam-ring, turn carved face with a letter on it to rear cover.

**CAUTION:**

**Do not confuse the assembling direction of cam ring. If cam ring is installed facing the incorrect direction, it may cause pump operation malfunction.**



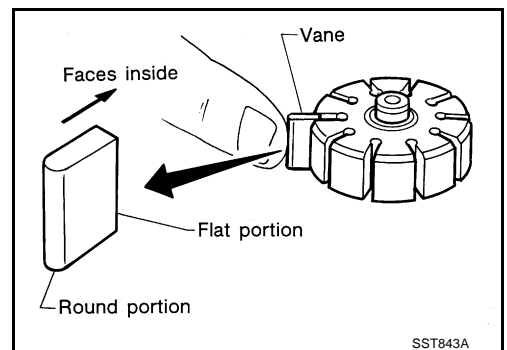
6. Install rotor to body assembly.
  - When installing rotor, turn punch mark face on rotor to body assembly.



7. Install vane to rotor with arc of vane in contact with cam ring.
8. Check if drive shaft assembly turns smoothly.
9. Install gasket to body assembly.

**NOTE:**

Do not reuse gasket.



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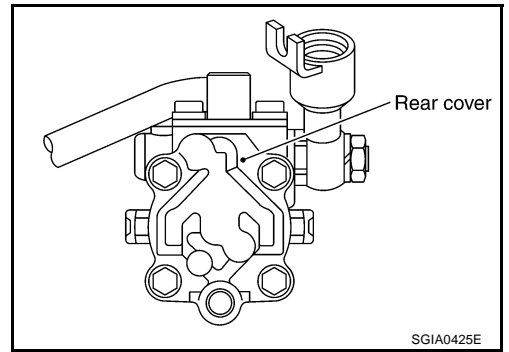
## POWER STEERING OIL PUMP

10. Install rear cover to body assembly and tighten bolts to the specified torque.
11. Install bracket to body assembly, and tighten the two mounting bolts to the specified torque.
12. Install pulley to drive shaft assembly, then tighten lock nut to the specified torque.
13. Install spring, flow control valve, washer, joint and eye bolt to body assembly. Then tighten eye bolt to the specified torque.

**NOTE:**

Do not reuse washer.

14. Apply a coat of Nissan PSF or equivalent to O-ring and Install O-ring to suction pipe.
15. Install suction pipe to body assembly.





# HYDRAULIC LINE

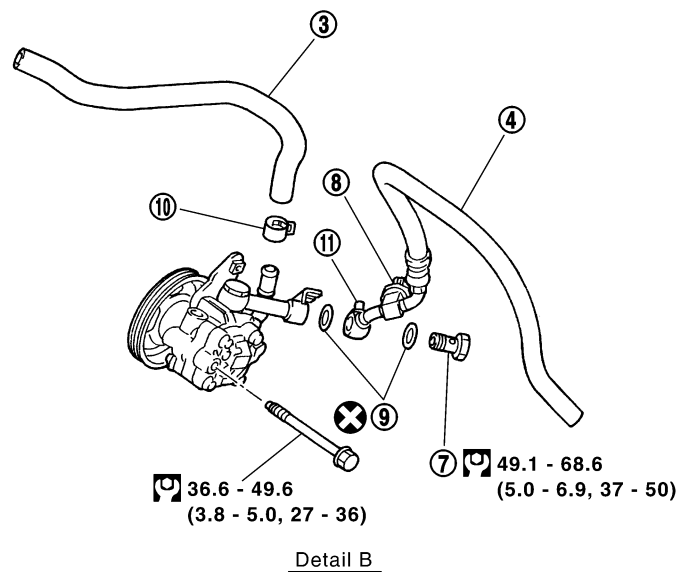
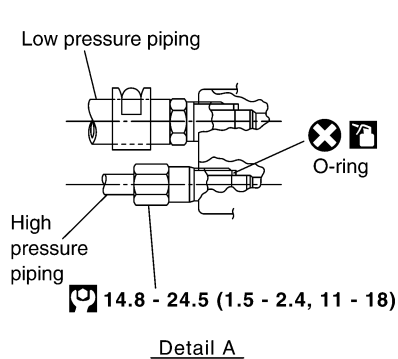
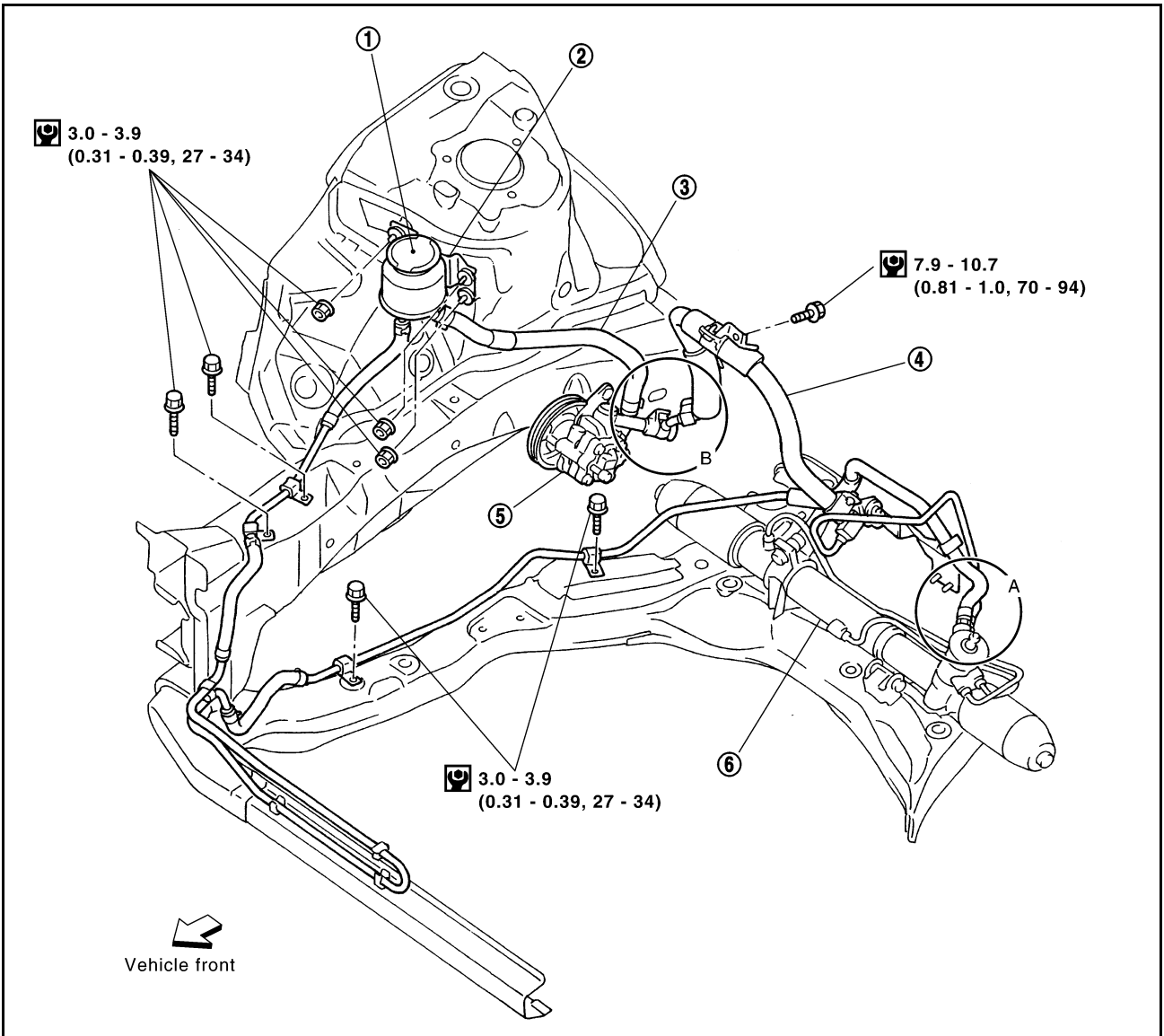
## HYDRAULIC LINE

### Components

PF:49721

AGS000CU

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- : Apply Genuine Nissan PSF or equivalent.
- : N·m (kg-m, ft-lb)
- : N·m (kg-m, in-lb)
- : Always replace after every disassembly.

SGIA0828E

# HYDRAULIC LINE

- |                       |                           |                           |
|-----------------------|---------------------------|---------------------------|
| 1. Reservoir tank     | 2. Reservoir tank bracket | 3. Suction hose           |
| 4. High pressure hose | 5. Oil pump               | 6. Steering gear assembly |
| 7. Eye bolt           | 8. Oil pressure sensor    | 9. Copper washer          |
| 10. Clamp             | 11. Eye joint             |                           |

## Removal and Installation

AGS000F5

- Refer to [PS-33, "Components"](#) for tightening torque. Install in the reverse order of removal.

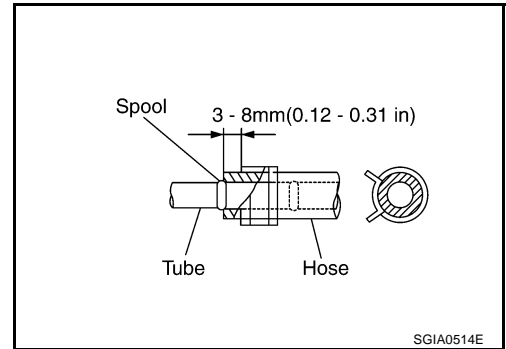
### NOTE:

Refer to component parts location and do not reuse non-reusable parts.

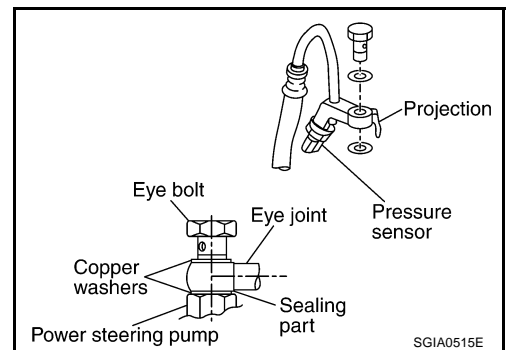
- Ensure that hose touches spool of tube when tube is to be inserted to hose.

### CAUTION:

**Do not apply power steering fluid to the junction surface between tube and hose.**



- To install eye joint, join projection of eye joint into notch of power steering pump, and attach eye joint to power steering pump properly. Then, fully tighten eye bolt by hands, and tighten it to a specified torque.
- Connect harness connector into pressure sensor securely.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Steering Wheel

AGS000CV

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

### Steering Angle

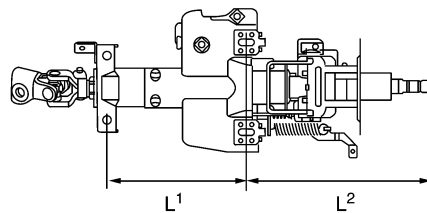
AGS000CW

Inner wheel Degree minute (Decimal degree)	Minimum	34° 30' (34.5°)
	Nominal	38° 00' (38.0°)
	Maximum	39° 00' (39.0°)
Outer wheel Degree minute (Decimal degree)	Nominal	31° 30' (31.50°)

### Steering Column

AGS000CX

Steering column length "L1"	182 mm (7.17 in)
Steering column length "L2"	242.6 mm (9.55 in)

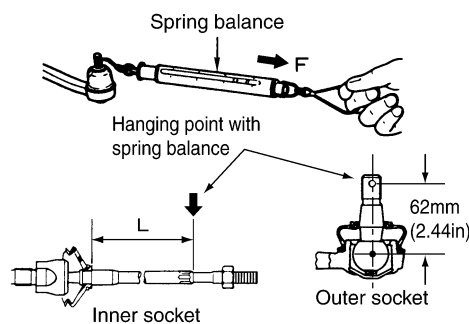


SGIA0475E

### Steering Outer Socket and Inner Socket

AGS000CY

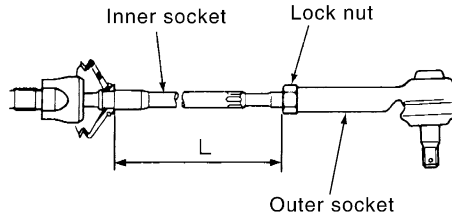
Steering gear type	PR26AM	
Tie-rod outer ball joint	Swinging torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
	Measurement on spring balance ● Measuring point: cotter pin hole of stud	4.84 - 46.7 N (0.5 - 4.8 kg, 1 - 10 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
	Axial end play	0.5 mm (0.020 in) or less
Tie-rod inner ball joint	Swinging torque	1.0 - 7.8 N·m (0.11 - 0.79 kg·m, 9 - 69 in·lb)
	Measurement on spring balance ● Measuring point: L mark see below, L=83.2 mm (3.276 in).	12.1 - 93.7 N (1.2 - 9.6 kg, 3 - 21 lb)
	Axial end play	0.2 mm (0.008 in) or less



SGIA0547E

# SERVICE DATA AND SPECIFICATIONS (SDS)

Tie-rod length "L"	147.7 mm (5.81 in)
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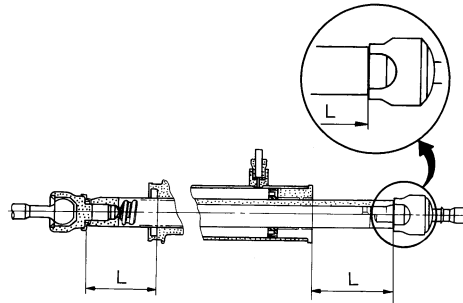


SGIA0167E

## Steering Gear

AGS000CZ

Steering gear model	PR26AM
Rack neutral position, dimension "L" (rack stroke)	71.5 mm (2.815 in)



SGIA0549E

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	215.8 - 274.6 N (22 - 28 kg, 160 - 202 lb) (2WD model) 225.4 - 284.2 N (23 - 28 kg, 167 - 209 lb) (AWD model)
		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

AGS000D0

Oil pump relief hydraulic pressure	8,500 - 9,300 kPa (86.7 - 94.9 kg/cm <sup>2</sup> , 1,233 - 1,349 psi)
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## Steering Fluid

AGS000D1

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