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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”

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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 for Battery Service

NGS000BD

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

### Service Notice or Precautions for Steering System

NGS000BE

- In case of removing steering gear assembly, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment,
- 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 in order on a parts rack.
- 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.
- The following abbreviations are used.
  - EPS: Electronically controlled power steering

# PREPARATION

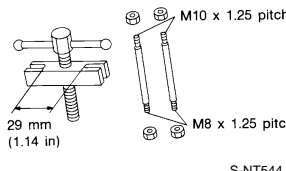
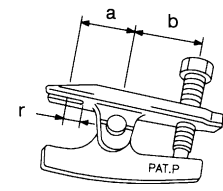
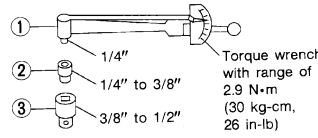
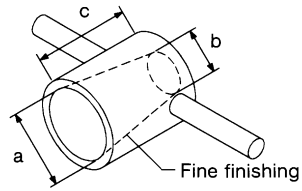
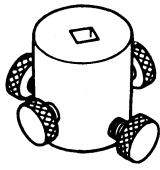
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## PREPARATION

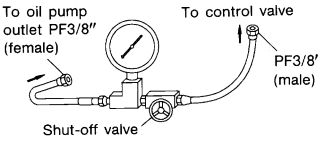
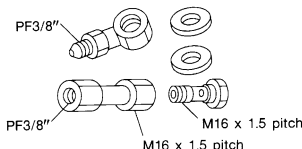
### Special Service Tools

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

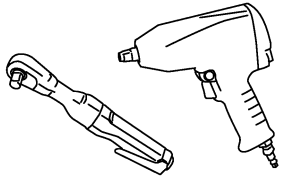
Tool number (Kent - Moore No.) Tool name	Description
ST27180001 (J-25726-A) Steering wheel puller	 <p style="text-align: right;">S-NT544</p>
HT72520000 (J-25730-A) Ball joint remover a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: 11.5 mm (0.453 in)	 <p style="text-align: right;">NT546</p>
ST3127S000 (J-25765-A) Preload gauge 1. GG9103000 (J-25765) Torque wrench 2. HT62940000 ( — ) Socket adapter 3. HT62900000 ( — ) Socket adapter	 <p style="text-align: right;">S-NT541</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 style="text-align: right;">S-NT550</p>
KV48103400 ( — ) Torque adapter	 <p style="text-align: right;">ZZA0824D</p>

# PREPARATION

Tool number (Kent - Moore No.) Tool name	Description	
KV48103500 (J-26357) Pressure gauge	 <p style="text-align: center;">NT547</p>	A B C
KV48102500 (J-33914) Pressure gauge adapter	 <p style="text-align: center;">NT542</p>	D E F

## Commercial Service Tools

NGS0000W

Tool name	Description	
Power tool	 <p style="text-align: center;">PBIC0190E</p>	PS H I J K L M

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

### NVH Troubleshooting Chart

NGS0000X

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-25	PS-25	PS-25	PS-7	PS-9	EM-14	—	PS-15	PS-19	PS-15	PS-13	PS-19	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		
STEERING	Noise	Fluid level	x	x	x	x	x	x	x	x															
	Shake	Air bleeding from hydraulic system																							
	Vibration	Outer socket ball joint swing torque																							
	Shimmy	Outer socket ball joint rotating torque																							
	Judder	Outer socket ball joint end play																							
		Steering fluid leakage																							
		Steering wheel play																							
		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																							
		BRAKE																							

x: Applicable

# POWER STEERING FLUID

## POWER STEERING FLUID

PFP:KLF20

### Checking Fluid Level

NGS0000Y

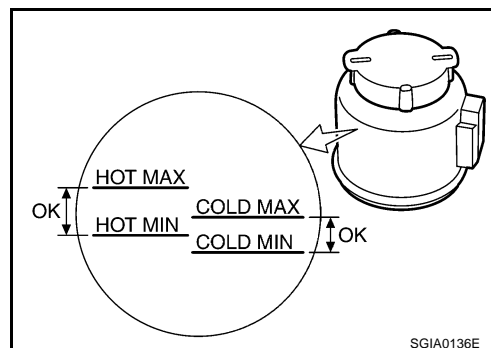
- Stop engine before performing a fluid level check.
- Ensure that fluid level is between the MAX range and MIN level.
- Because fluid level differs within the HOT range and the COLD range, check it carefully.

**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 level.
- Do not reuse any used power steering fluid.
- Recommended fluid is Genuine NISSAN PSF or equivalent.



### Checking Fluid Leakage

NGS0000Z

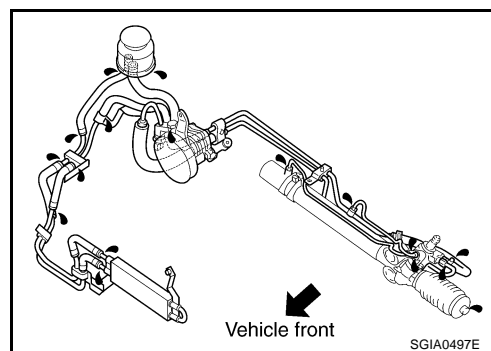
Check the hydraulic piping lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

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 at the connector is noticed, then loosen the flare nut and retighten it.
6. Check steering gear boots for accumulation of fluid indicating a from steering gear.



### Air Bleeding Hydraulic System

NGS00010

Incomplete air bleeding causes the following. 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.

#### CAUTION:

**Do not hold steering wheel in the locked position 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.

## POWER STEERING FLUID

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6. Stop engine, check fluid level.



# STEERING WHEEL

## STEERING WHEEL

PPF:48430

### On-Vehicle Inspection and Service

NGS000AG

#### 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 steering gear assembly are looser not. Refer to [PS-19, "Removal and Installation"](#) .

#### 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 on the outer circumference : 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-6, "Wheel Alignment Inspection"](#) .
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 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

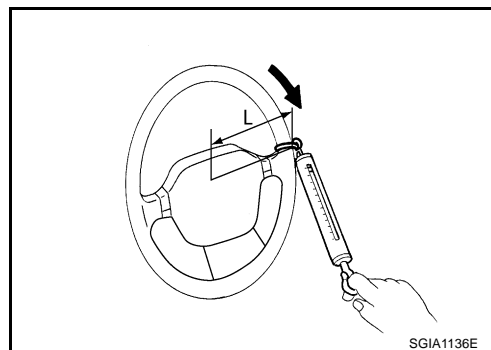
1. Park vehicle on a level and dry surface, set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 50 to 80°C (122 to 176°F).]
4. Check steering wheel turning force when steering wheel has been turned 540° from neutral position.

**Steering wheel turning force: : 7.45 N·m (0.76 kg·m, 66 in·lb)**

#### NOTE:

Multiply the distance (L) from the hook of spring scale to the center of steering wheel by the measurement value with a spring scale.

5. If steering wheel turning force is out of the specification, check rack sliding force and relief hydraulic pressure of oil pump. Regarding relief hydraulic pressure of oil pump, refer to [PS-31, "CHECKING RELIEF OIL PRESSURE"](#) .
  - a. Disconnect lower joint and steering knuckle from steering gear assembly. Refer to [PS-13, "COMPONENTS"](#) , [FAX-4, "Removal and Installation"](#) .
  - b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.

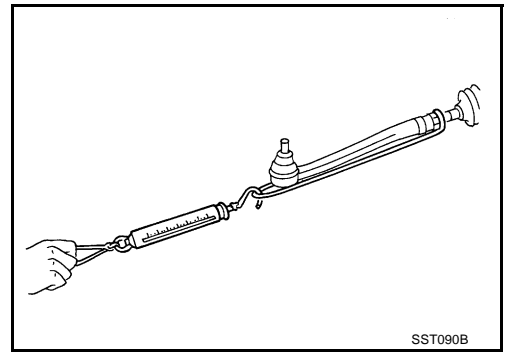


# STEERING WHEEL

- c. While pulling outer socket slowly in  $\pm 11.5$  mm ( $\pm 0.453$  in) range from neutral position, make sure rack sliding force is within specification.

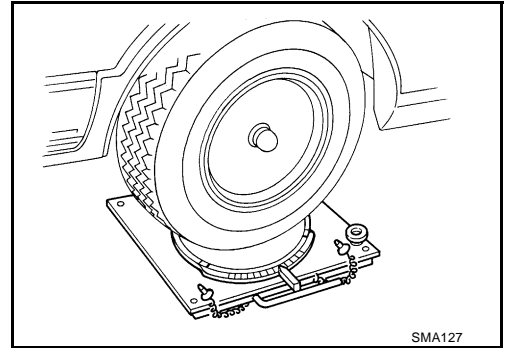
**Rack sliding force:** **171 - 234 N**  
**(17.4 - 23.9 kg, 38 - 53 lb)**

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



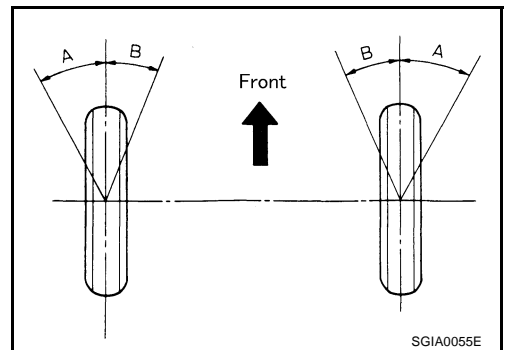
## CHECKING FRONT WHEEL TURNING ANGLE

- Check front wheel turning angle after 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.

<b>Inner wheel (Angle: A)</b>	<b>Minimum</b>	<b>: 35° 45' (35.8°)</b>
	<b>Nominal</b>	<b>: 38° 45' (38.8°)</b>
	<b>Maximum</b>	<b>: 39° 45' (39.8°)</b>
<b>Outer wheel (Angle: B)</b>	<b>Nominal</b>	<b>: 30° 45' (30.8°)</b>



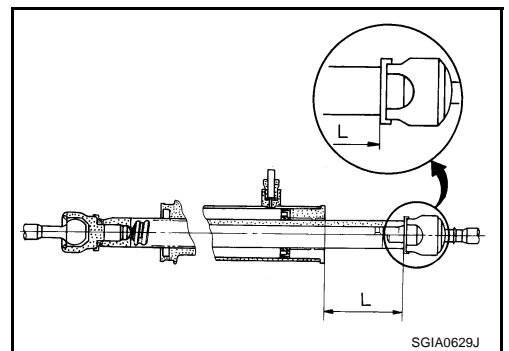
- If it is not within specification, measure rack strokes.

**Rack stroke "L" : 64.5 mm (2.539 in)**

- If rack stroke is out of specification, disassemble steering gear assembly to check rack stroke.
- Any turning angles are not adjustable. If any of steering angles are out of the specification, check if the following parts are wear or damaged.

- Steering gear
- Steering column
- Front suspension components

If found that they are worn or damaged, replace them with new ones respectively.



# STEERING WHEEL

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## Removal and Installation

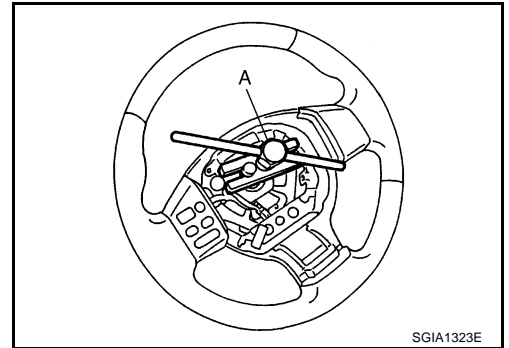
### REMOVAL

#### NOTE:

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

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SRS-42, "Removal and Installation"](#).
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller.

**Tool number A: ST27180001 (J-25726-A)**



### INSTALLATION

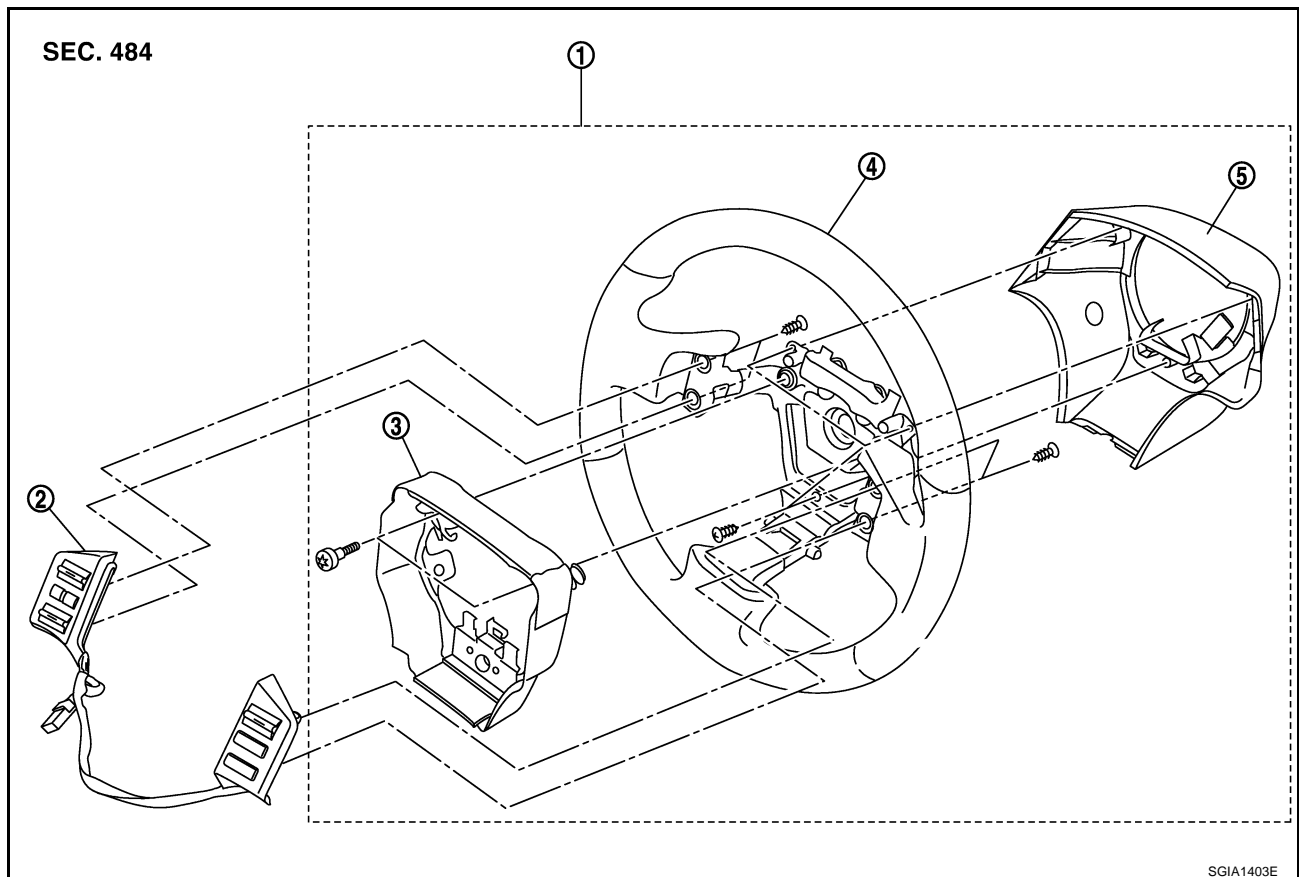
Installation is the reverse order of removal. For tightening torque, refer to [PS-13, "COMPONENTS"](#).

#### NOTE:

Check the spiral cable neutral position after replacing or rotating spiral cable. Refer to [SRS-44, "SPIRAL CABLE"](#).

## Disassembly and Assembly COMPONENTS

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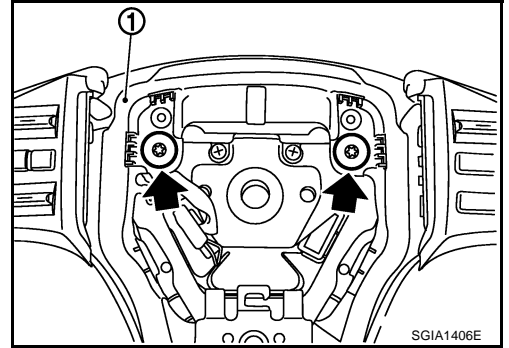
- |                            |  |                    |
|----------------------------|--|--------------------|
| 1. Steering wheel assembly | 2. Steering wheel audio control switch | 3. Horn plate kit* |
| 4. Steering wheel*         | 5. Body cover*                         |                    |

# STEERING WHEEL

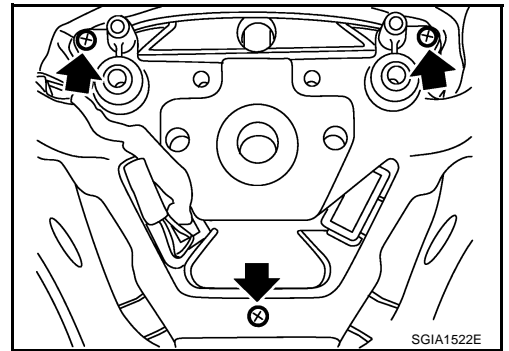
\*: Replace steering wheel assembly because these parts are combined with steering wheel.

## DISASSEMBLY

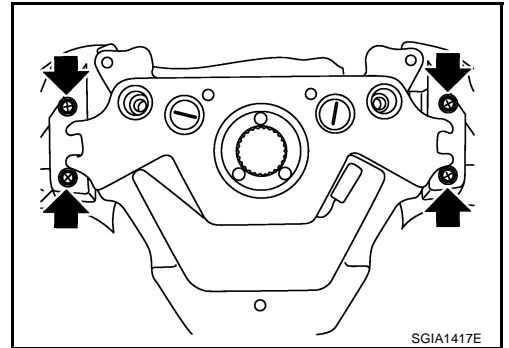
1. Remove the TORX bolts, and then remove horn plate kit (1) from steering wheel.



2. Remove fixing screws of body cover, and then remove body cover from steering wheel.



3. Remove fixing screws of steering wheel audio control switch, and then remove steering wheel audio control switch from steering wheel.



## ASSEMBLY

Note the following, and assembly is in the reverse order of disassembly.

- Before installing body cover, check and adjust the gap between driver air bag module and steering wheel audio control switch with the following procedure.
1. Install steering wheel audio control switch, temporary fix it by screws.
  2. Install driver air bag module after horn plate kit.

### CAUTION:

**Do not pinch harness.**

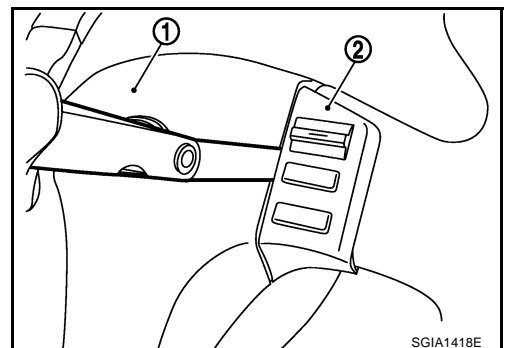
3. Measure the gap between driver air bag module (1) and steering wheel audio control switch (2) by thickness gauge or other tool. If measured gap is out of standard, adjust switch location properly.

**Gap standard : 0.6 - 2.0 mm (0.024 - 0.079 in)**

### NOTE:

Cover the thickness gauge or other tool by tape or something to prevent scratches when measuring the gap.

4. Remove driver air bag module.



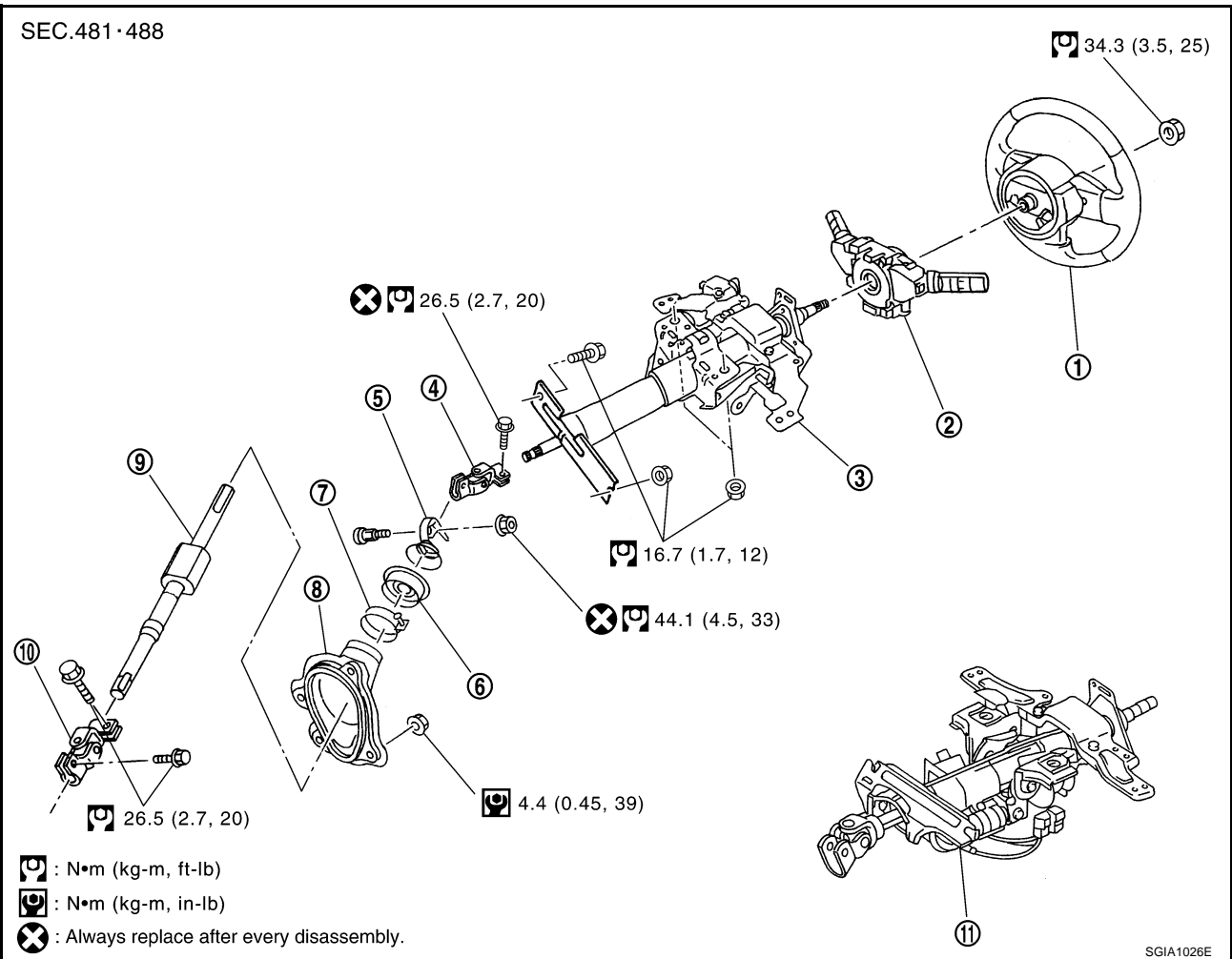
# STEERING COLUMN

## STEERING COLUMN

PFP:48810

### Removal and Installation COMPONENTS

NGS00013



- |                   |  |                             |
|-------------------|--|-----------------------------|
| 1. Steering wheel | 2. Combination switch & spiral cable               | 3. Steering column assembly |
| 4. Upper joint    | 5. Collar  | 6. Hole cover seal          |
| 7. Clamp          | 8. Hole cover                                      | 9. Lower shaft              |
| 10. Lower joint   | 11. Steering column assembly<br>(Electricity type) |                             |

#### CAUTION:

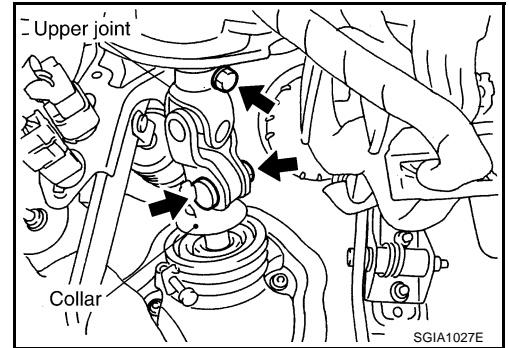
- Do not give axial impact to steering column assembly during removal and installation.
- Do not move steering gear assembly when removing steering column assembly.
- When removing steering column assembly, remove it at the minimum of telescopic.

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# STEERING COLUMN

## REMOVAL OF LOWER JOINT, LOWER SHAFT, HOLE COVER, CLAMP, HOLE COVER SEAL, COLLAR AND UPPER JOINT

1. Set vehicle to the straight-ahead position.
2. Remove fixing bolt and nut of upper joint, then remove upper joint, collar from steering column assembly and lower shaft.
3. Raise vehicle.
4. Remove fixing bolts of lower joint, then remove lower joint from steering gear assembly and lower shaft.
5. Remove lower shaft from vehicle.
6. Lowering vehicle.
7. Loosen clamp, then remove hole cover seal from hole cover.
8. Remove mounting bolts of hole cover, then remove clamp and hole cover from dash panel.



## INSTALLATION OF LOWER JOINT, LOWER SHAFT, HOLE COVER, CLAMP, HOLE COVER SEAL, COLLAR AND UPPER JOINT

- Installation is the reverse order of the removal. For tightening torque, refer to [PS-13, "COMPONENTS"](#) .
- When installing lower joint to steering gear assembly, follow the procedure listed below.
  - Set rack of steering gear assembly in the neutral position.

### NOTE:

- To get the neutral position of rack, turn sub-gear assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.
- Install slit part of lower joint aligning with the projection of rear cover cap. Make sure that the slit part of lower joint is aligned with both the projection of rear cover cap and the marking position of sub-gear assembly.

## REMOVAL OF STEERING COLUMN ASSEMBLY

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SRS-42, "DRIVER AIR BAG MODULE"](#) .
3. Remove steering wheel and steering column cover (upper and lower). Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
4. Remove steering column cover front lower and steering lock escutcheon. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
5. Remove instrument driver lower panel. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
6. Remove combination switch & spiral cable from steering column assembly. Refer to [SRS-44, "SPIRAL CABLE"](#) .
7. Remove knee protector lower. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
8. Remove cluster lid A. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#) .
9. Remove key interlock cable. Refer to [AT-222, "KEY INTERLOCK CABLE"](#) .
10. Disconnect each switch connectors installed to steering column assembly, and then disconnect harness from steering column assembly.
11. Remove fixing bolt and nut of upper joint (upper side).
12. Remove mounting bolts and nut of steering column assembly, then remove steering column assembly from vehicle.

# STEERING COLUMN

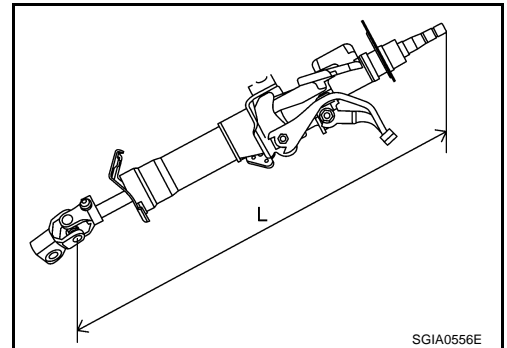
## INSPECTION AFTER REMOVAL OF STEERING COLUMN ASSEMBLY

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

**Steering column length "L" : 548 mm (21.57 in)**

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

**Rotating torque : 0.49 N·m (0.05 kg·m, 4 in·lb)**



## INSTALLATION OF STEERING COLUMN ASSEMBLY

Installation is the reverse order of removal. For tightening torque, refer to [PS-13, "COMPONENTS"](#).

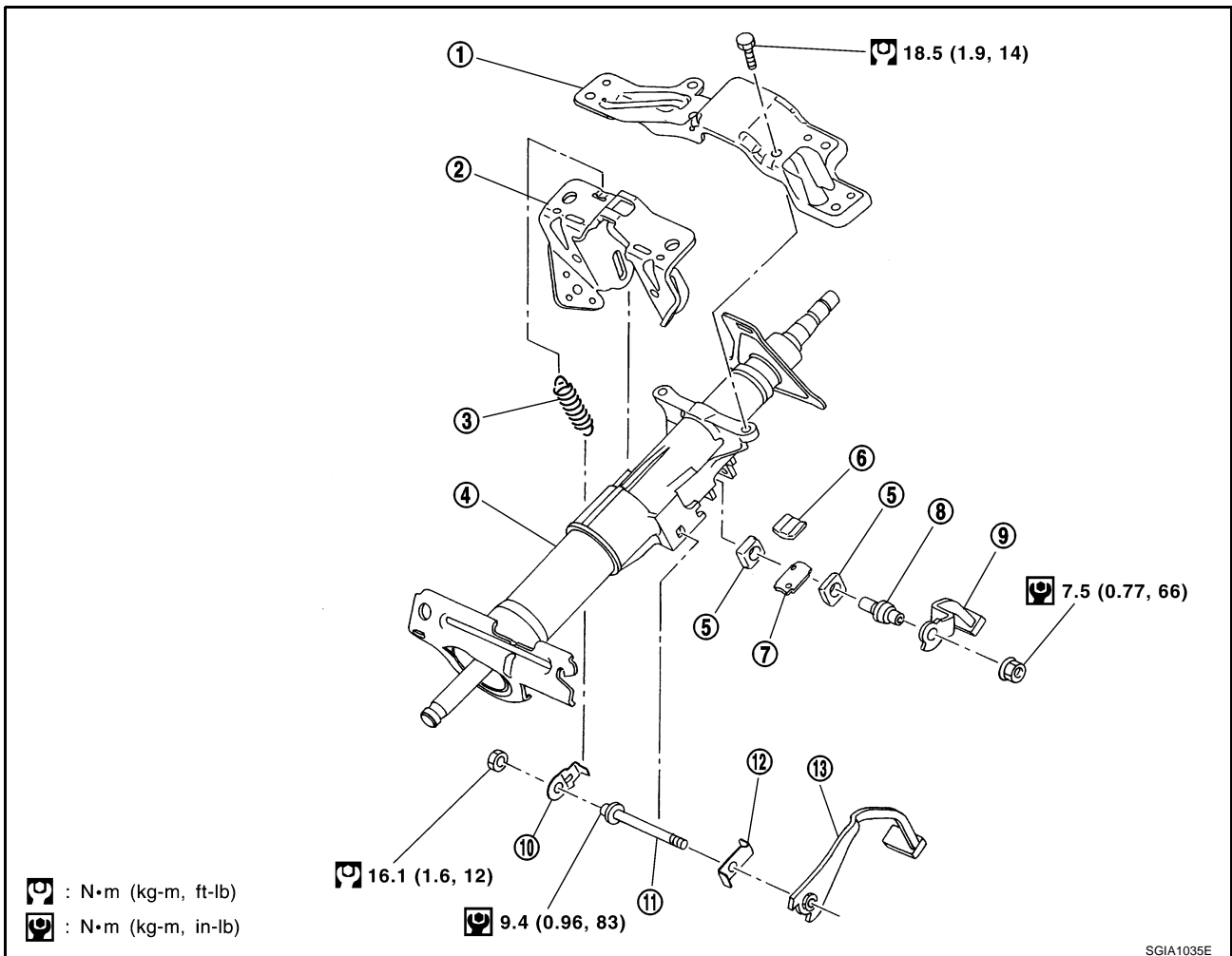
## INSPECTION AFTER INSTALLATION OF STEERING COLUMN ASSEMBLY

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

## Disassembly and Assembly COMPONENTS

NGS00014

PS



SGIA1035E

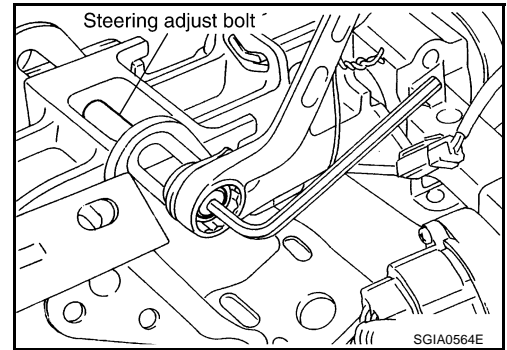
- |                          |                                   |                          |
|--------------------------|-----------------------------------|--------------------------|
| 1. Meter bracket         | 2. Steering column mounting clamp | 3. Spring                |
| 4. Jacket tube assembly  | 5. Lock nut                       | 6. Telescopic lock block |
| 7. Telescopic lock guide | 8. Telescopic lock bolt           | 9. Telescopic lever      |
| 10. Adjust stopper       | 11. Steering adjust bolt          | 12. Tilt lever stopper   |
| 13. Tilt lever           |                                   |                          |

# STEERING COLUMN

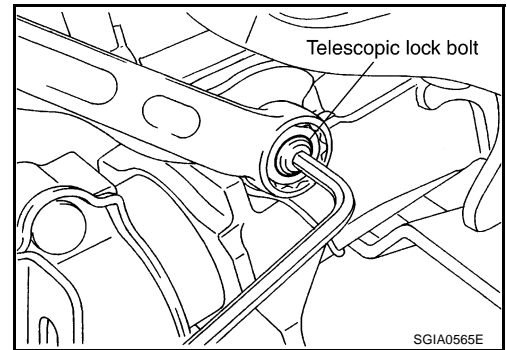
## DISASSEMBLY

Remove all parts from jacket tube assembly.

- When remove tilt lever, perform as shown in the figure.



- When remove telescopic lever, perform as shown in the figure.



## INSPECTION AFTER DISASSEMBLY

Check tilt and telescopic mechanism components for malfunction. Replace if there are.

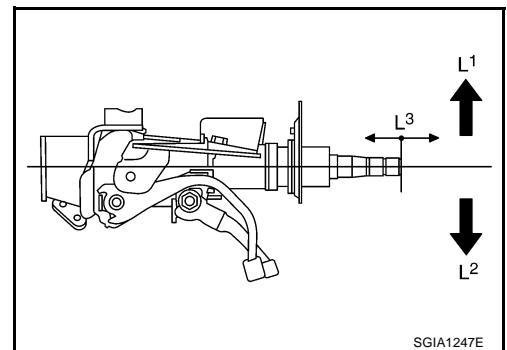
## ASSEMBLY

Assemble is the reverse order of the disassembly. For tightening torque, refer to [PS-15, "COMPONENTS"](#) .

## INSPECTION AFTER ASSEMBLY

Check tilt and telescopic mechanism operating range.

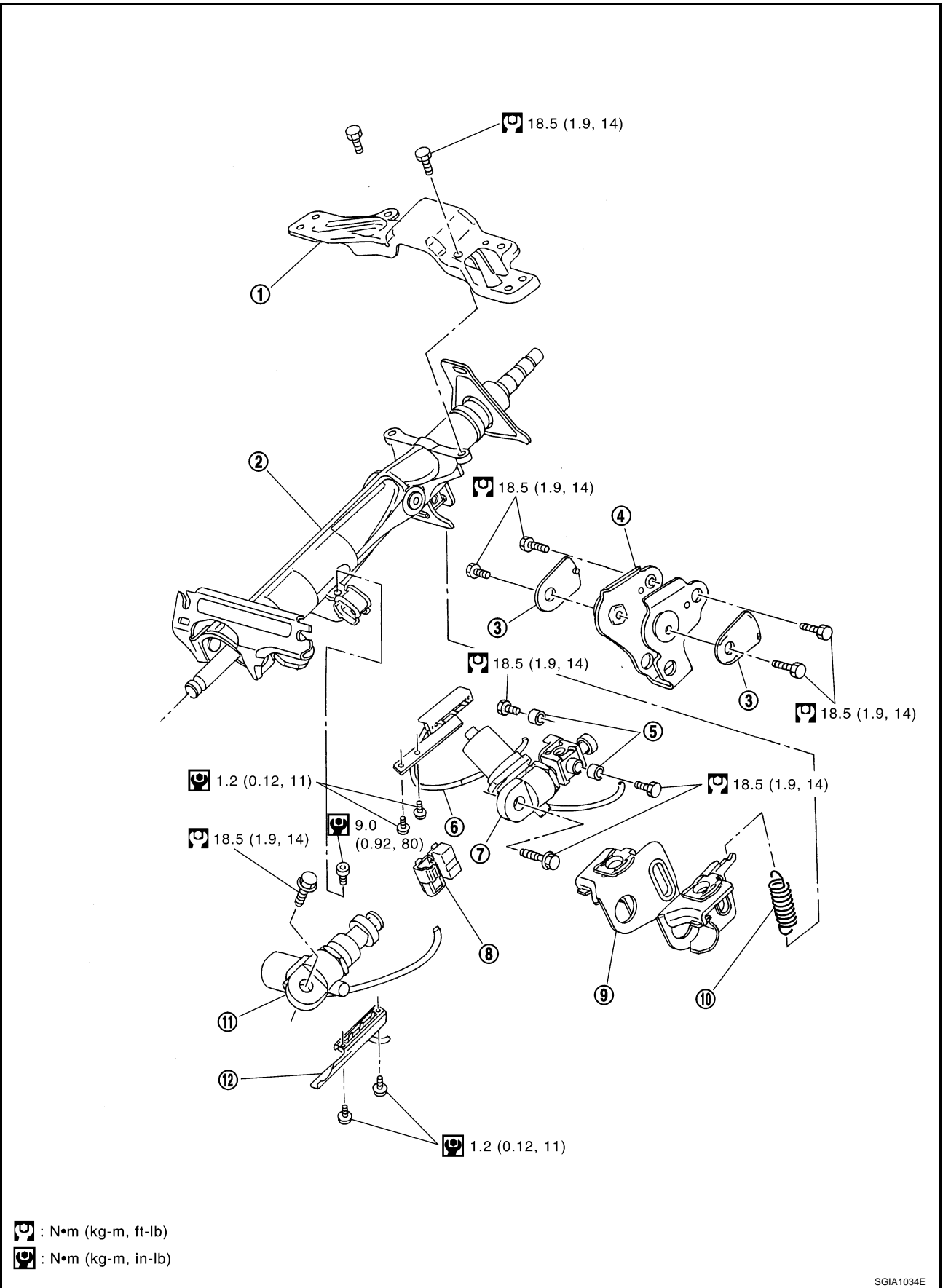
Operating range L <sup>1</sup>	30 mm (1.18 in)
Operating range L <sup>2</sup>	30 mm (1.18 in)
Operating range L <sup>3</sup>	20 mm (0.79 in)





# STEERING COLUMN

## COMPONENTS (ELECTRICITY TYPE)



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

PS

# STEERING COLUMN

- 7. Tilt unit assembly
- 10. Spring

- 8. Connector assembly
- 11. Telescopic unit assembly

- 9. Clamp
- 12. Telescopic sensor assembly

## DISASSEMBLY

Remove parts from jacket tube assembly. Refer to [PS-17, "COMPONENTS \(ELECTRICITY TYPE\)"](#).

## INSPECTION AFTER DISASSEMBLY

Check tilt and telescopic mechanism components for malfunction. Replace if there are.

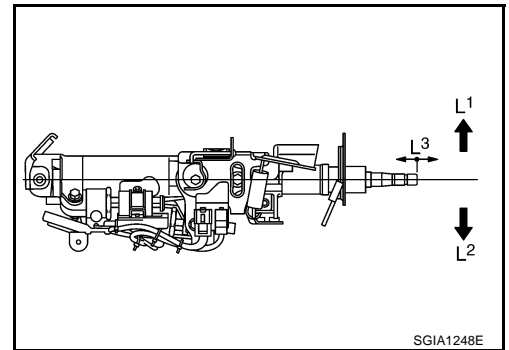
## ASSEMBLY

Assemble is the reverse order of the disassembly. For tightening torque, refer to [PS-17, "COMPONENTS \(ELECTRICITY TYPE\)"](#).

## INSPECTION AFTER ASSEMBLY

Check tilt and telescopic mechanism operating range.

Operating range L <sup>1</sup>	30 mm (1.18 in)
Operating range L <sup>2</sup>	30 mm (1.18 in)
Operating range L <sup>3</sup>	20 mm (0.79 in)



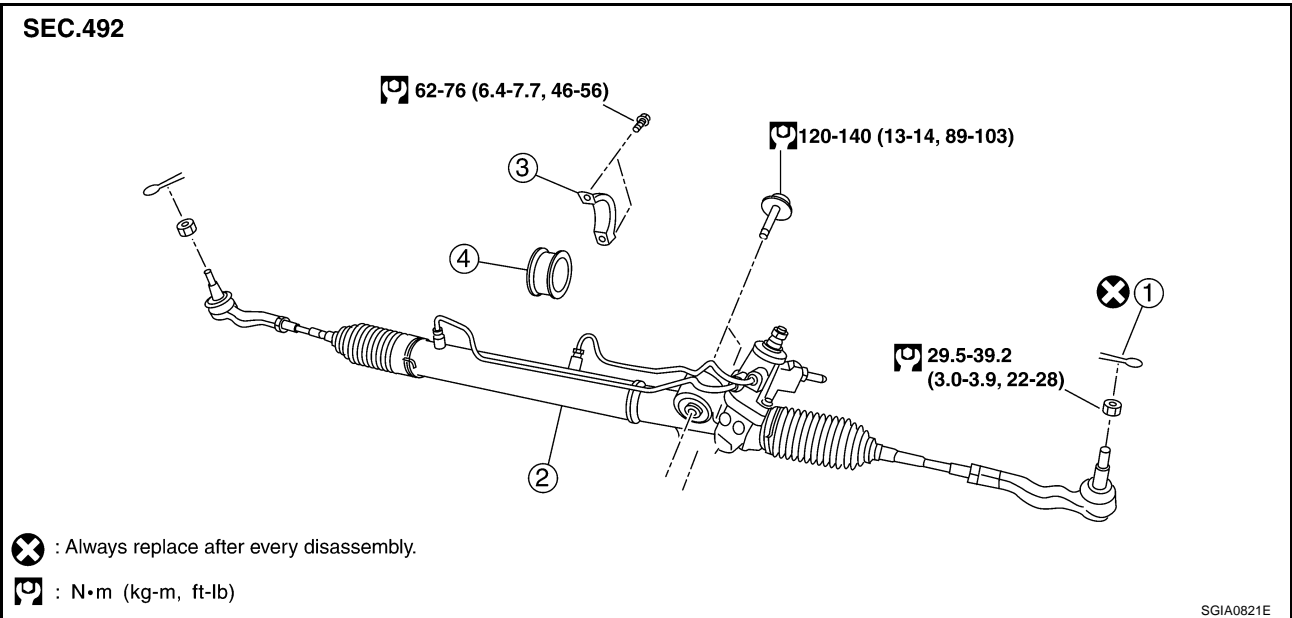
# POWER STEERING GEAR AND LINKAGE

## POWER STEERING GEAR AND LINKAGE

PFP:49001

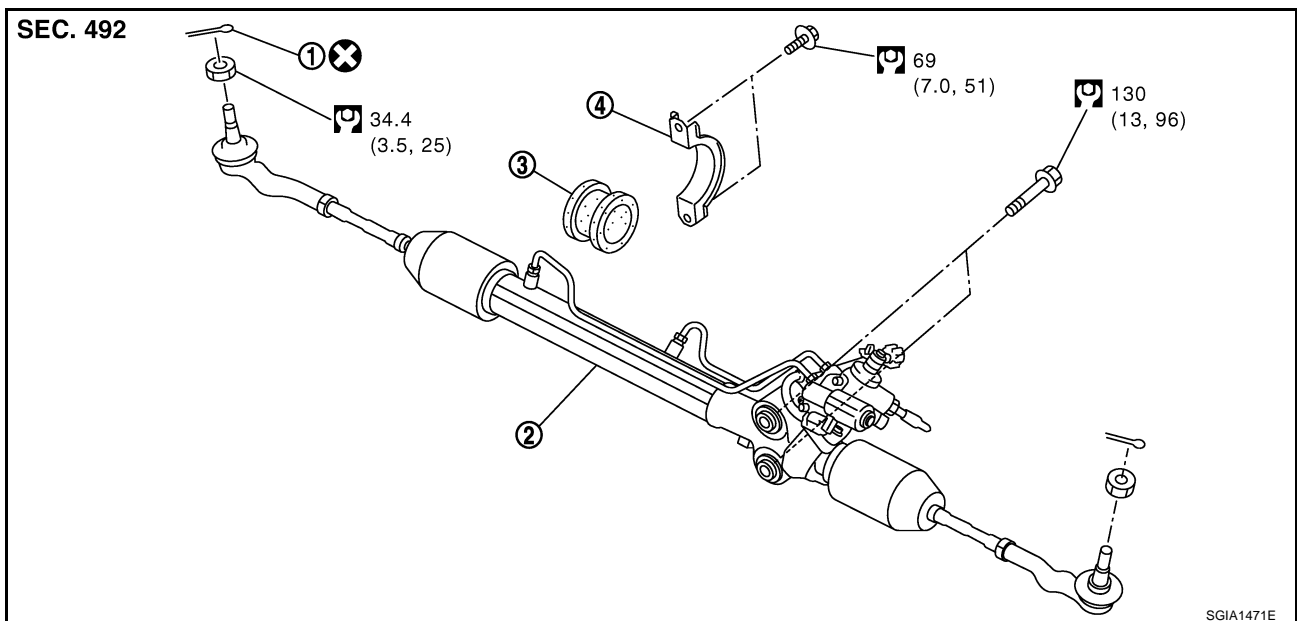
### Removal and Installation COMPONENTS (WITHOUT EPS)

NGS00015



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

### COMPONENTS (WITH EPS)



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

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

#### 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

1. Set wheels in the straight-ahead position.
2. Remove undercover and tires from vehicle with power tool.
3. Remove front crossbar. Refer to [FSU-8, "Components"](#).

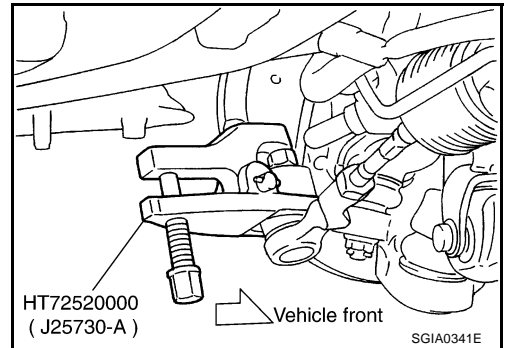
## POWER STEERING GEAR AND LINKAGE

4. Remove cotter pin at steering outer socket, then loosen mounting nut.
5. Use a ball joint remover (SST) to remove steering outer socket from steering knuckle. Be careful not to damage ball joint boot.

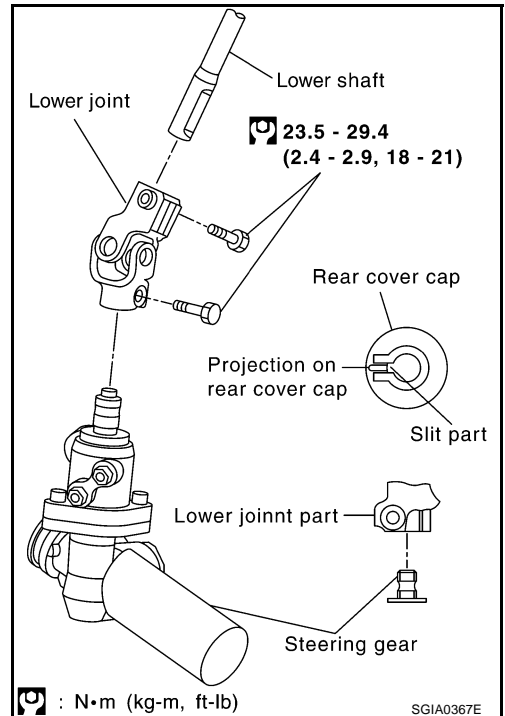
**CAUTION:**

**Tighten temporarily mounting nut to prevent damage to threads and to prevent ball joint remover (SST) from coming off.**

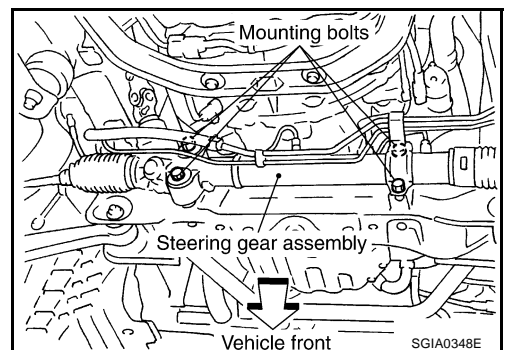
6. Remove oil pipings (high pressure side and low pressure side) from steering gear assembly, then drain fluid from pipings.
7. Remove power steering solenoid valve harness connector (with EPS). Refer to [PS-22, "COMPONENTS"](#).



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



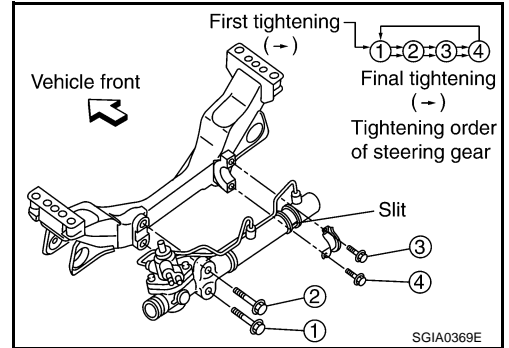
10. Remove the fixing bolt and remove steering gear assembly, rack mounting bracket and insulator from vehicle.



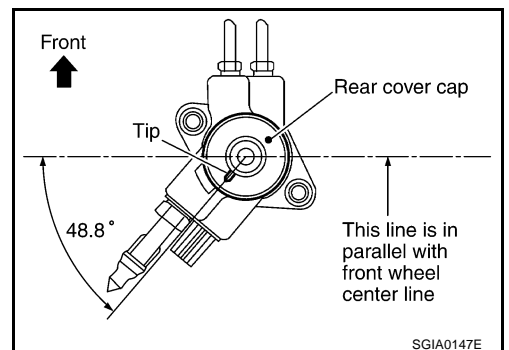
# POWER STEERING GEAR AND LINKAGE

## INSTALLATION

- Refer to [PS-19, "Removal and Installation"](#) for tightening torque. Install in the reverse order of removal.
- After removing/installing or replacing steering components, check wheel alignment. Refer to [FSU-6, "Wheel Alignment Inspection"](#).
- Install steering gear to vehicle, refer to the tightening order shown in the figure.



- 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"](#).



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

# POWER STEERING GEAR

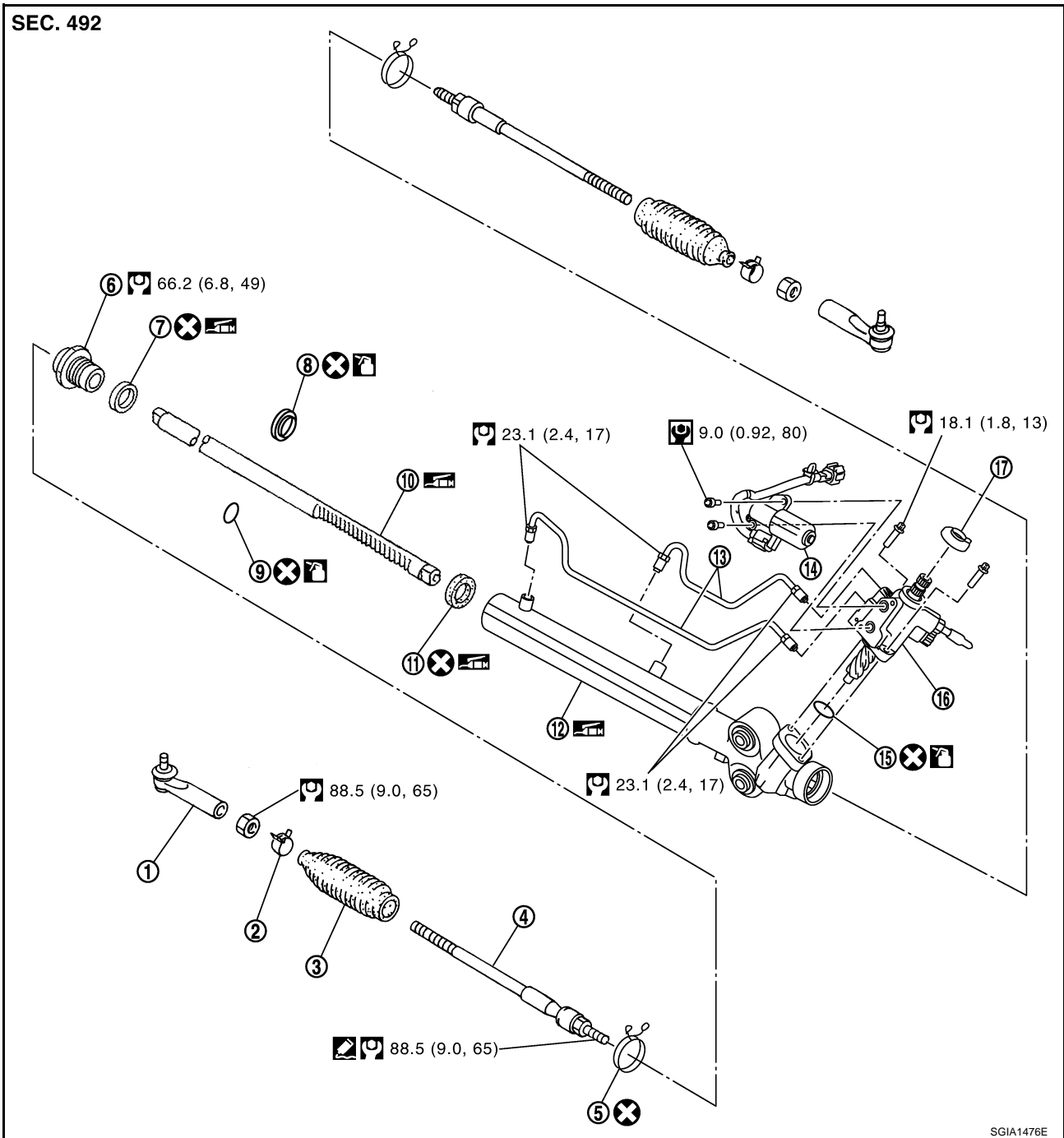
PFP:49001

NGS000BH

## POWER STEERING GEAR

### Disassembly and Assembly COMPONENTS

SEC. 492




SGIA1476E

- |                       |   |                           |
|-----------------------|---|---------------------------|
| 1. Outer socket       | 2. Boot clamp                                   | 3. Boot                   |
| 4. Inner socket       | 5. Boot clamp                                   | 6. End cover assembly     |
| 7. Rack oil seal      | 8. Rack Teflon ring                             | 9. O-ring                 |
| 10. Rack assembly     | 11. Rack oil seal                               | 12. Gear housing assembly |
| 13. Cylinder tubes    | 14. Power steering solenoid valve<br>(with EPS) | 15. O-ring                |
| 16. Gear sub-assembly | 17. Rear cover cap                              |                           |

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

: Apply Genuine Thread Locking Sealant, Three Bound 1111B or equivalent.

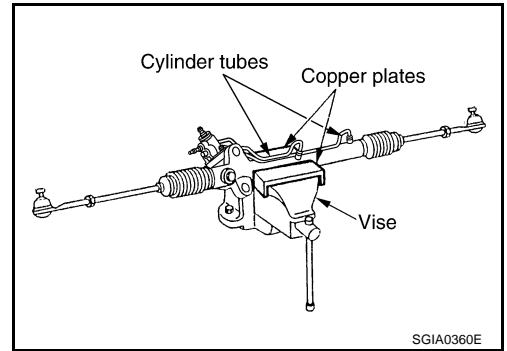
# POWER STEERING GEAR

: 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 fixing bolts of power steering solenoid valve, and then remove power steering solenoid valve from gear-sub assembly (with EPS).
2. Remove cylinder tubes from gear housing assembly.
3. Remove rear cover cap from gear sub-assembly.
4. Measure adjusting screw height from gear housing assembly, then loosen adjusting screw.

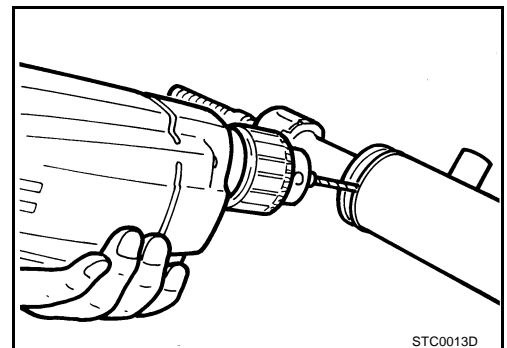
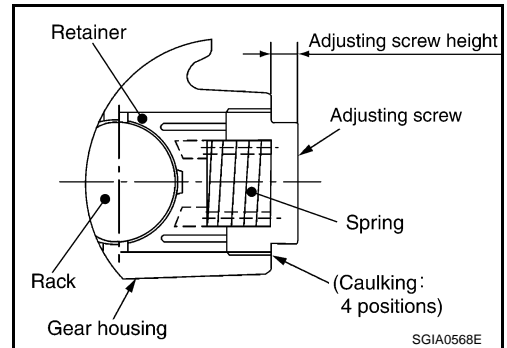
## CAUTION:

- Do not turn adjusting screw more than twice.
  - Replace steering gear assembly when adjusting screw is removed or more than twice.
5. Remove fixing bolts of gear sub-assembly and then remove gear sub-assembly from gear housing assembly.
  6. Remove O-ring from gear housing assembly.
  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 boots.

## CAUTION:

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

9. Drill out the clinching part of cylinder outer rim with a 3 mm (0.12 in) drill in 1.5 mm (0.059 in) depth.



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

# POWER STEERING GEAR

10. Remove end cover assembly with a 42 mm (1.65 in) open head (suitable tool).

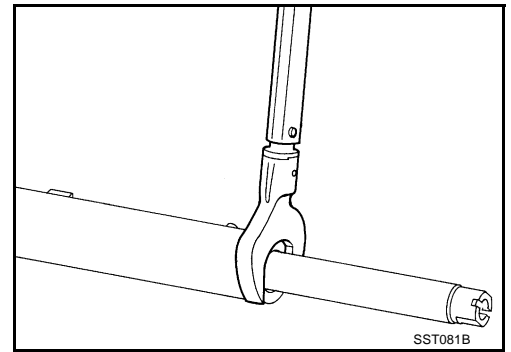
**CAUTION:**

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

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

**CAUTION:**

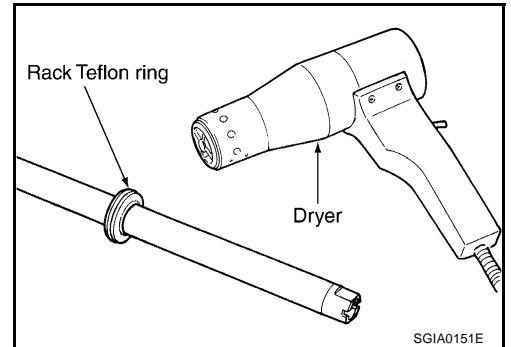
**Be careful not to damage rack. If it is damaged, change to a new one to avoid oil leaks.**



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

**CAUTION:**

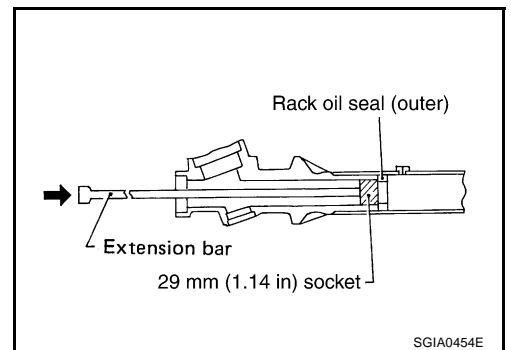
**Be careful not to damage rack. If it is damaged, change to a new one to avoid oil leaks.**



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.**



## INSPECTION AFTER DISASSEMBLY

### Boot

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

### Rack Assembly

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

### Gear Sub-Assembly

- Check pinion gear for damage and wear. Replace it, if necessary.
- Rotate pinion and check for torque variation or rattle. Replace if necessary.

### Gear Housing Assembly

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

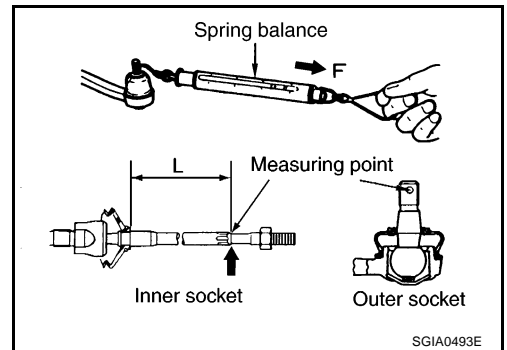


# POWER STEERING GEAR

## 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.



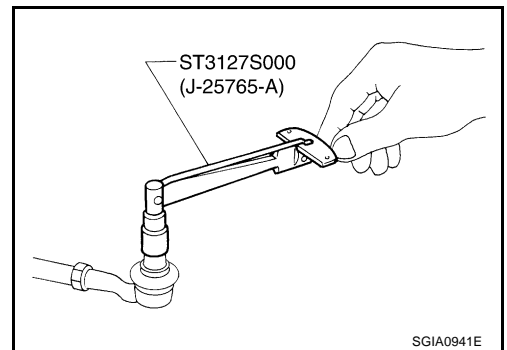
### Specified value

Item	Outer socket	Inner socket
Measuring point	Cotter pin hole of stud	Shown as L: 48.5 mm (1.909 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	4.42 - 42.7 N (0.5 - 4.4 kg, 1 - 10 lb)	10 - 78 N (1 - 8 kg, 2 - 18 lb)

### Rotating torque

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

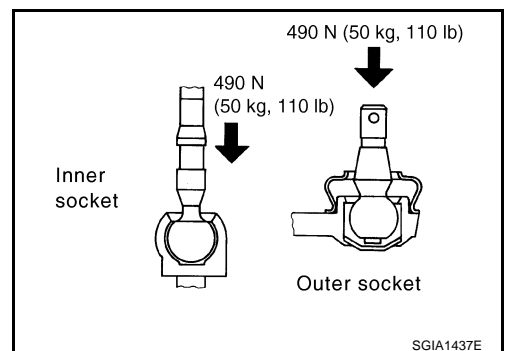
Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
-----------------	--



### 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.

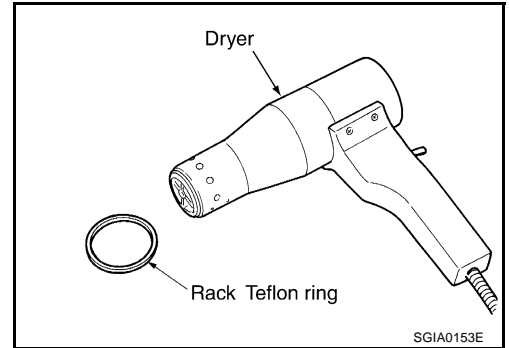
Outer socket	0.5 mm (0.020 in) or less
Inner socket	0.2 mm (0.008 in) or less



# POWER STEERING GEAR

## ASSEMBLY

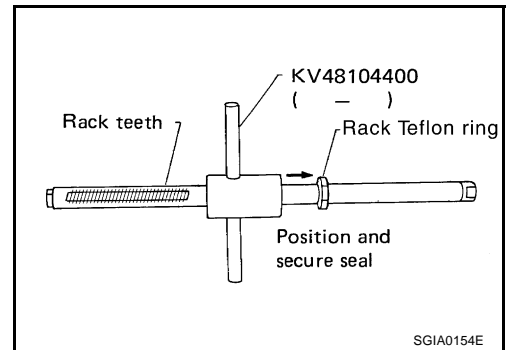
1. Apply Genuine NISSAN PSF or equivalent to O-ring. Put an O-ring into rack Teflon ring.
2. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer. Assemble it to mounting groove of rack.



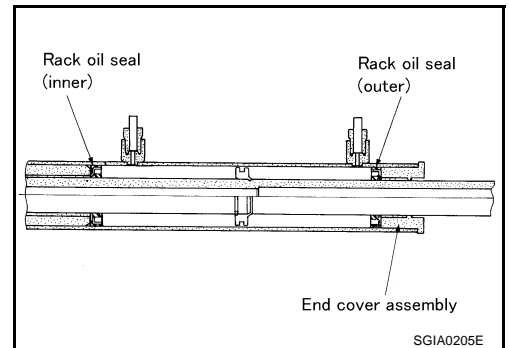
3. To fit rack Teflon ring on rack, use rack Teflon ring installation tool (SST) from tooth side. Compress rim of ring with the tool.
4. Apply Multi-purpose grease or equivalent to rack oil seal. Insert rack to gear housing assembly.

### CAUTION:

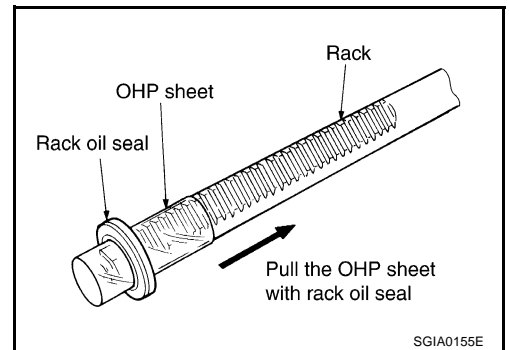
- When inserting rack, do not damage retainer sliding part. If it is damaged, replace gear housing assembly.
- When unstringing rack, do not damage cylinder inner wall. If it is damaged, it may cause oil leaks. Replace gear housing assembly.



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

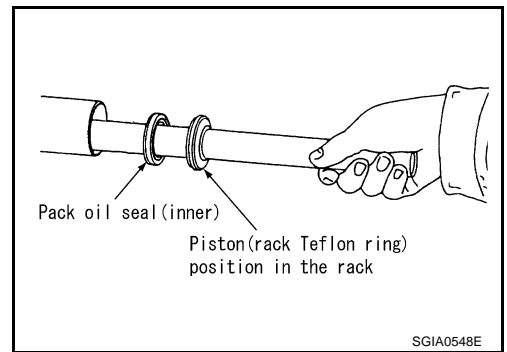


- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approximately. 70 mm (2.76 in) × 100 mm (3.94 in)] around rack tooth. Place oil seal on sheet. Then, pull oil seal along with OHP sheet until they pass the toothed section of rack, then remove it.

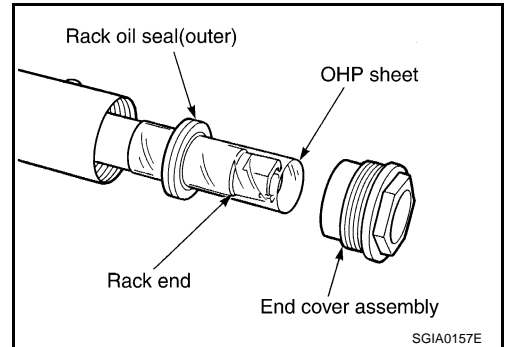


# POWER STEERING GEAR

- 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 in with gear housing assembly.



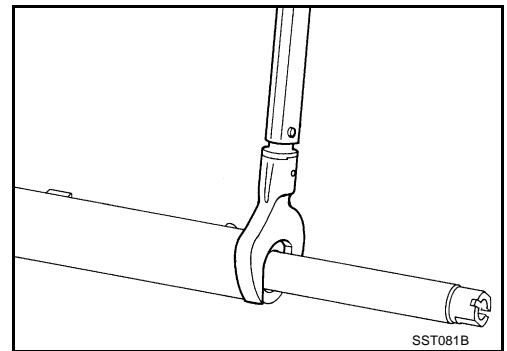
- c. When installing outer rack oil seal, cover the end of rack with an OHP sheet [70 mm (2.76 in) × 100 mm (3.94 in)]. It will avoid damaging rack oil seal. Then place oil seal on sheet. Pull rack oil seal along with OHP sheet until they pass rack end. Then remove OHP sheet.
- d. Install end cover assembly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



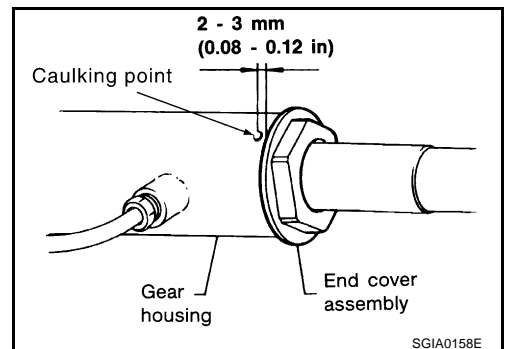
5. Using a 42 mm (1.65 in) open head (suitable tool), tighten end cover assembly at the specified torque.

**CAUTION:**

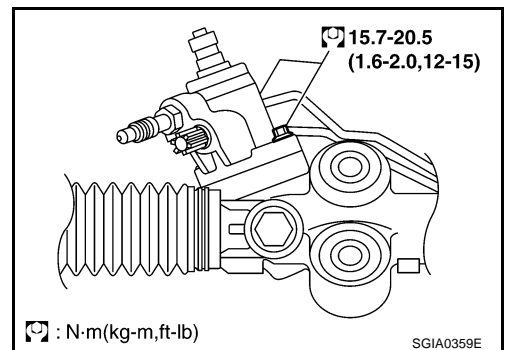
**Do not damage rack surface. If it is damaged, it may cause oil leaks. Replace rack assembly.**



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. Apply Genuine NISSAN PSF or equivalent to O-ring. Install O-ring to gear housing assembly.



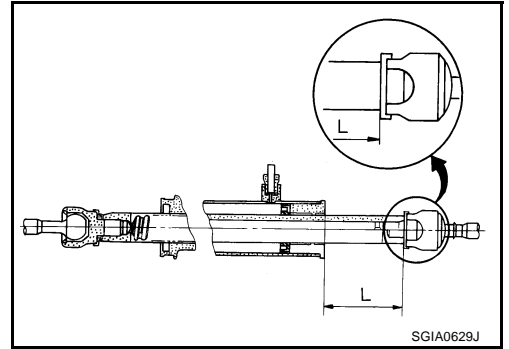
8. Install gear sub-assembly to gear housing assembly.
9. Install power steering solenoid valve to gear sub-assembly (with EPS).



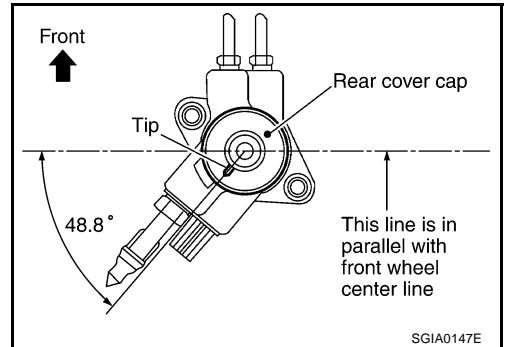
# POWER STEERING GEAR

10. Decide neutral position of rack gear.

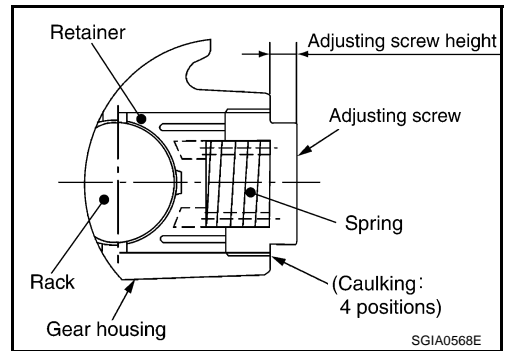
**Rack stroke "L" : 64.5 mm (2.539 in)**



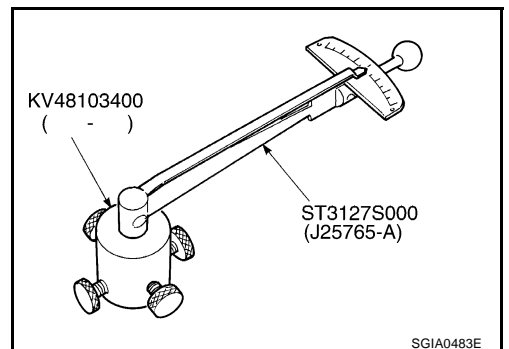
11. Install the projection part (Tip) of rear cover cap to gear sub assembly as shown in the figure.



12. Apply thread locking adhesive (Three Bond TB1111B or equivalent) 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.
13. Rotate pinion ten times whole range of rack so that parts get to fit with each other.

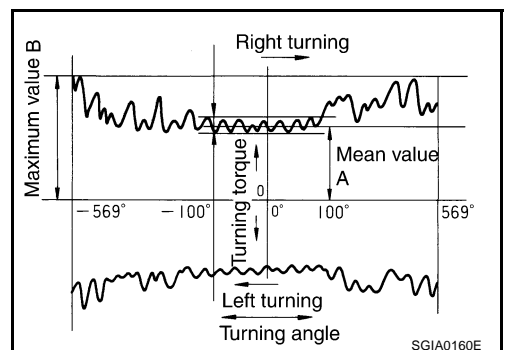


14. Measure pinion rotating torque within from  $-180^\circ$  to  $+180^\circ$  make preload gauge (SST) and torque adapter (SST) in rack neutral position, then hold preload gauge (SST) at maximum torque.
15. After loosening adjusting screw once, tighten it again with torque of 4.9 - 5.9 N·m (0.50 - 0.60 kg·m, 44 - 52 in·lb). After that loosen it within from  $20^\circ$  to  $40^\circ$ .



16. Measure pinion rotating torque within torque adapter (SST) and preload gauge (SST), then confirm whether its reading is within the specified value. If the reading is not within the specified value, readjust screw angle with adjusting screw. Change gear assembly to new one, if the reading is still not within the specified value or the rotating 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":**



# POWER STEERING GEAR

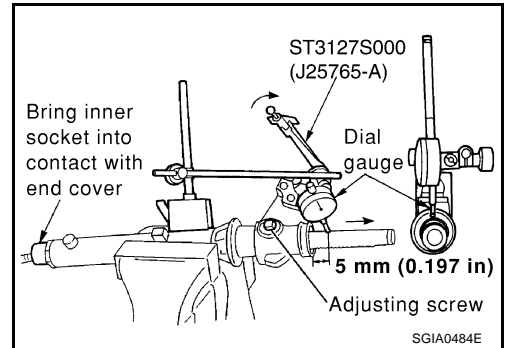
**1.71 - 2.34 N·m (0.18 - 0.23 kg·m, 16 - 20 in·lb)**

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

**Maximum variation "B":**

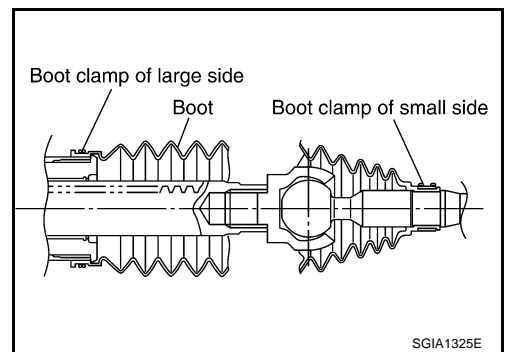
**2.3 N·m (0.23 kg·m, 20 in·lb)**

17. Turn pinion fully to the end of the left with tie-rods to rack.
18. 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 value. If reading is outside of the 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 (0.51kg·m, 44 in·lb), replace steering gear assembly.



Amount of vertical movement with rack	Less than 0.265 mm (0.010 in)	
Measuring point	Axial direction of rack	5 mm (0.20 in) away from end of gear hosing
	Radius direction of rack	Shaft direction of adjusting screw

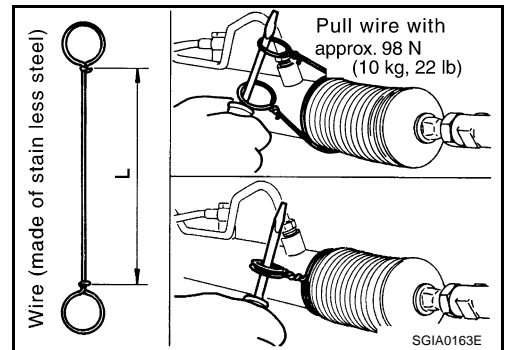
19. Install large-diameter side of boot to gear hosing assembly.
20. Install small-diameter side of boot to the mounting groove of inner socket.
21. Install boot clamp to the small-diameter side of boot.
22. Install boot clamp to the large-diameter side of boot.



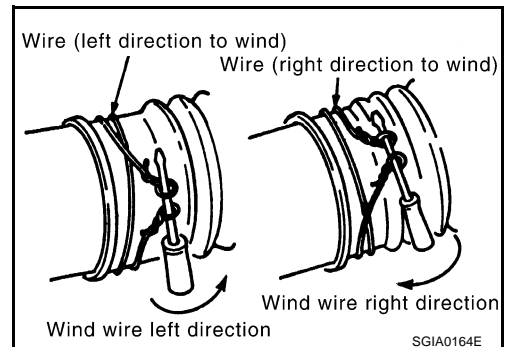
- a. Tighten large-diameter side of RH/LH boot with boot clamp (stainless wire).

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

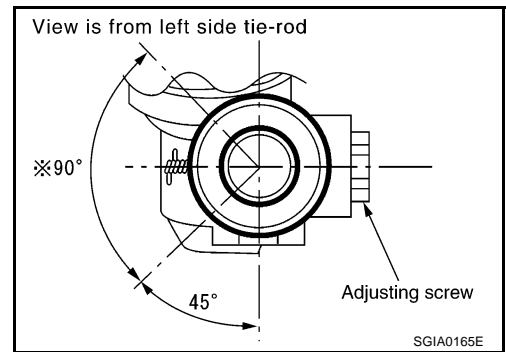


- c. Twist boot clamp as shown in the figure, pay attention to relationship between winding and twisting directions.

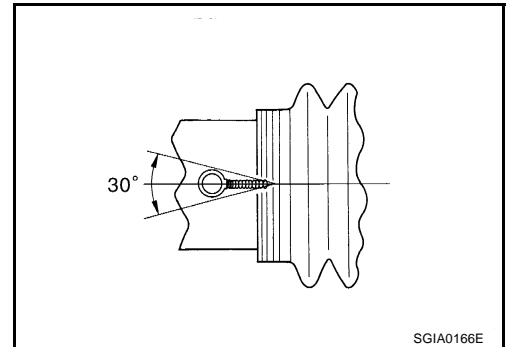


## POWER STEERING GEAR

- d. Confirm the twisted point with clamp faces in the opposite direction to 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.

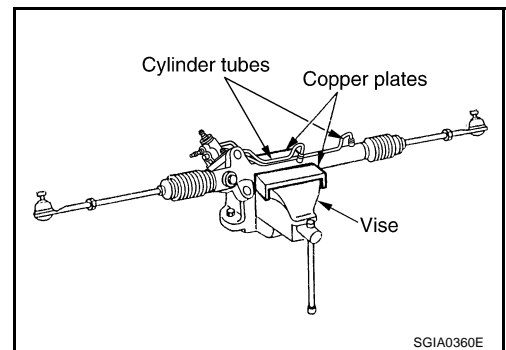


23. Install cylinder-tubes to gear housing assembly.
24. Tighten lightly in specified length "L", then tighten lock nut at specified torque. Refer to [PS-22, "COMPONENTS"](#). Reconfirm if tie-rod length is within limit of specified length "L".

**Inner socket length "L" : 106.3 mm (4.19 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

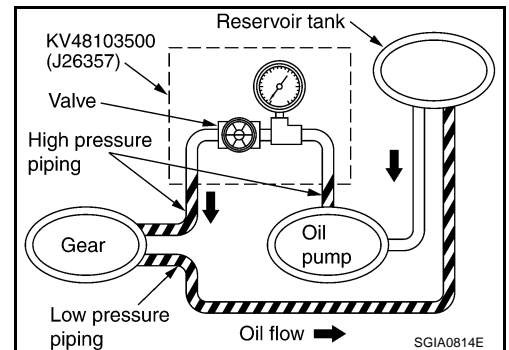
### On-Vehicle Inspection and Service CHECKING RELIEF OIL PRESSURE

NGS00018

#### 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 increase 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.

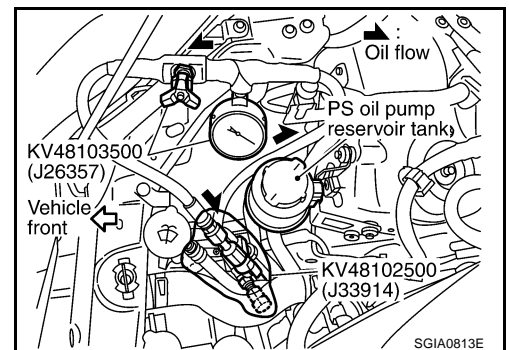
#### Relief oil pressure:

9,600 - 10,200 kPa (97.9 - 104 kg/cm<sup>2</sup> , 1,392 - 1,479 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-32, "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"](#) .



## Removal and Installation

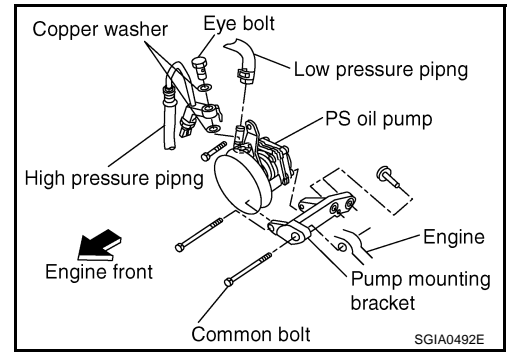
### REMOVAL

NGS00019

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-13, "Removal and Installation"](#) .

# POWER STEERING OIL PUMP

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.
9. Remove bolt then remove power steering pump.



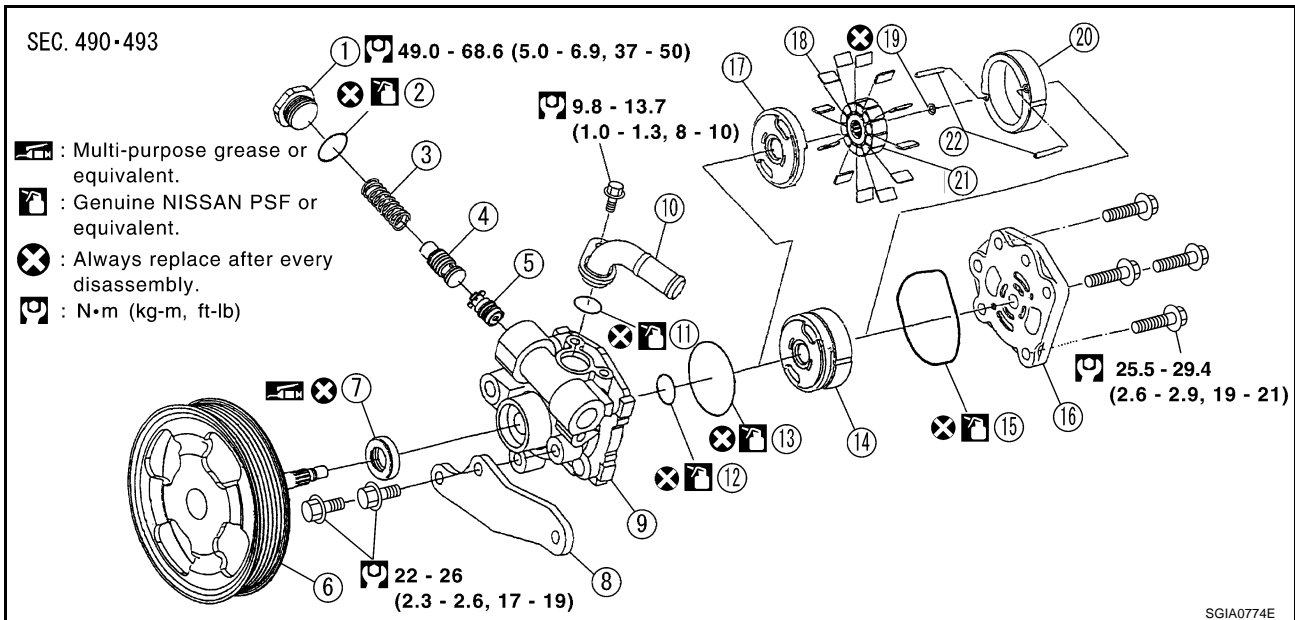
## INSTALLATION

Refer to [PS-36, "HYDRAULIC LINE"](#) for tightening torque. Install in the reverse order of removal.

- After installation, adjust belt tension. Refer to [EM-14, "DRIVE BELTS"](#).
- After installation, bleed air. Refer to [PS-7, "Air Bleeding Hydraulic System"](#) (power steering pump) and [CO-10, "ENGINE COOLANT"](#) (radiator).

## Disassembly and Assembly COMPONENTS

NGS0001A



- |                                |                                |                              |
|--------------------------------|--------------------------------|------------------------------|
| 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                  |                                |                              |

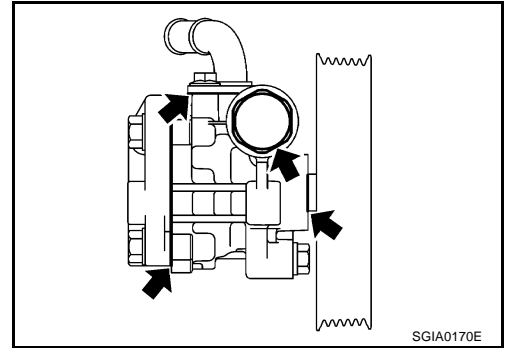


# POWER STEERING OIL PUMP

## 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.

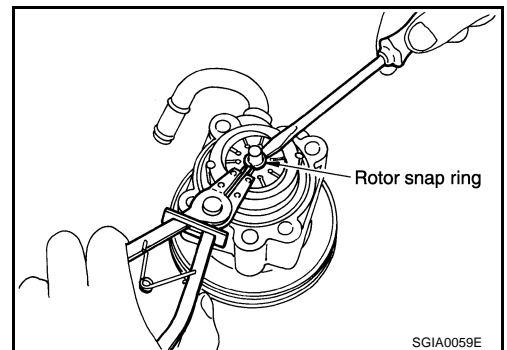
### CAUTION:

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

1. Unscrew two front bracket bolts and remove bracket from body assembly.
2. Unscrew four cover assembly bolts and remove cover assembly from body assembly.
3. Remove O-ring A from body assembly.
4. Remove rotor snap ring with snap ring pliers, and remove shaft kit from body assembly.

### CAUTION:

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

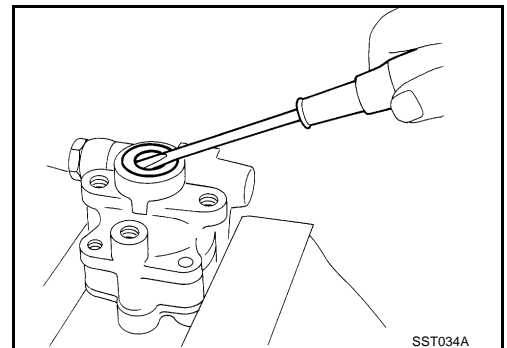


5. Using a screw driver, remove oil seal for body assembly.
6. Remove cam ring, rotor, vane, side plate, O-ring B and O-ring C from body assembly.
7. Remove plug, then remove O-ring D, flow control valve spring, relief valve assembly and flow control valve assembly from body assembly.

### CAUTION:

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

8. Remove fixing bolt of suction connector assembly, then remove suction connector assembly and O-ring E from body assembly.



## 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 vanes 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

## Flow Control Valve Assembly Inspection

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

## ASSEMBLY

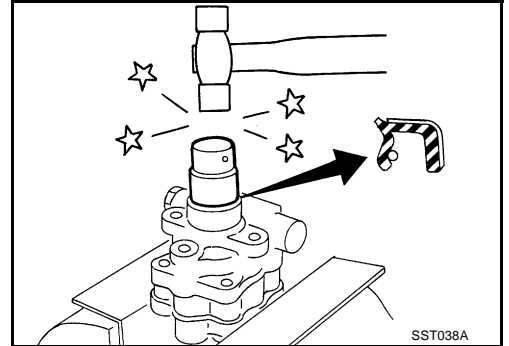
### NOTE:

Fix oil pump in vise as occasion demands.

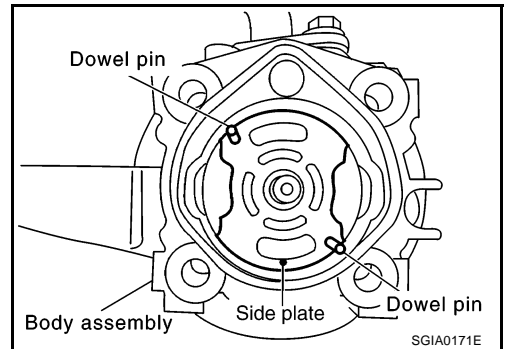
### CAUTION:

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

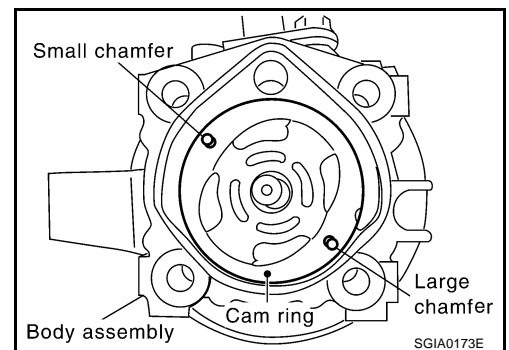
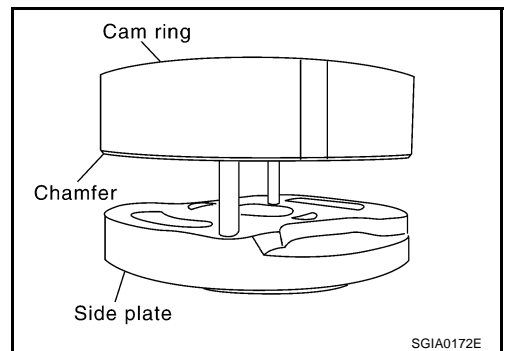
1. Apply a coat of Multi-purpose grease or equivalent to oil seal lip and to the circumference of oil seal. Using proper tool such as hand press machine, install it to the body assembly.
2. Install shaft kit to body assembly.
3. Apply a coat of NISSAN PSF or equivalent to O-ring B and O-ring C, then install O-ring B and O-ring C to body assembly.



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



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



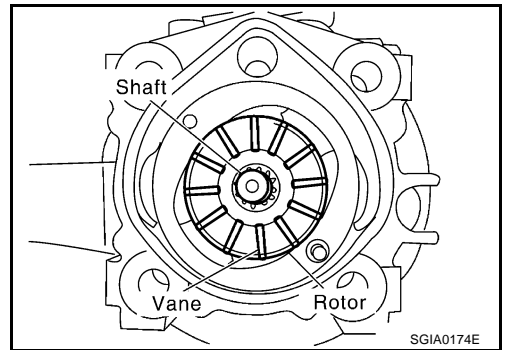
## POWER STEERING OIL PUMP

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

**CAUTION:**

**Be careful not to damage rotor and pulley shaft.**

9. Apply a coat of NISSAN PSF or equivalent to O-ring A, then install O-ring A to body assembly.
10. Attach cover assembly to body assembly and tighten fixing bolts diagonally at the specified torque.
11. Install flow control valve assembly, relief valve assembly and flow control valve spring to body assembly.
12. Apply a coat of NISSAN PSF or equivalent to O-ring D and install to plug, then tighten plug at the specified torque.
13. Apply a coat of NISSAN PSF or equivalent to O-ring E and install O-ring E to suction connector assembly, then install suction connector to body assembly.
14. Install bracket to body assembly, and tighten mounting bolts at the specified torque.



A  
B  
C  
D  
E  
F

PS

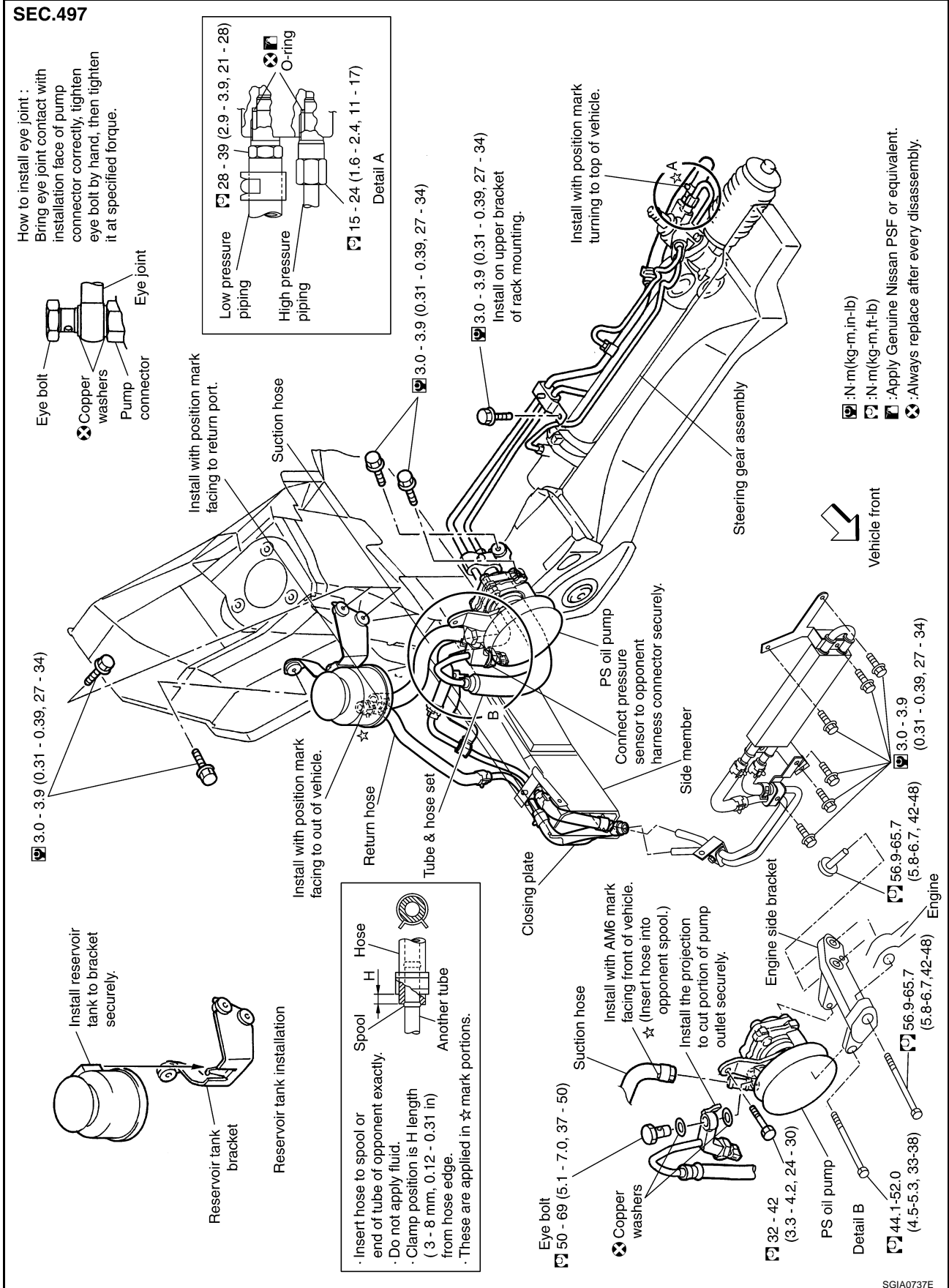
H  
I  
J  
K  
L  
M

## HYDRAULIC LINE

PFP:49721

### Removal and Installation COMPONENTS

NGS0001B



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PPF:00030

### Steering Wheel

NGS0001C

End play of the axle direction for steering wheel	0 mm (0 in)
Steering wheel play on the outer circumference	0 - 35 mm (0 - 1.38 in) or less

### Steering Angle

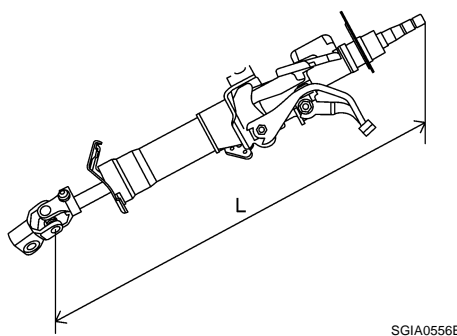
NGS0001D

Inner wheel Degree minute (Decimal degree)	Minimum	35° 45' (35.8°)
	Nominal	38° 45' (38.8°)
	Maximum	39° 45' (39.8°)
Outer wheel Degree minute (Decimal degree)	Nominal	30° 45' (30.8°)

### Steering Column

NGS0001E

Steering column length "L"	548 mm (21.57 in)
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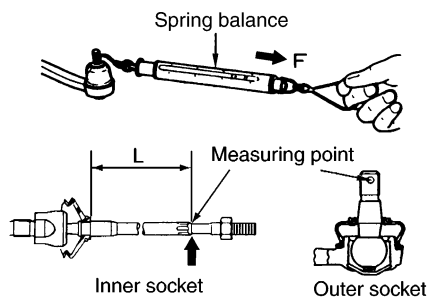


SGIA0556E

### Steering Outer Socket and Inner Socket

NGS0001F

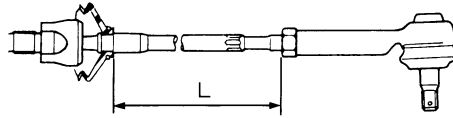
Steering gear type		PR26AF (with EPS)	PR26AD (without EPS)
Outer socket ball joint	Swing torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)	
	Measurement on spring balance · Measuring point: stud cotter pin hole	4.42 - 42.7 N (0.5 - 4.4 kg, 1 - 10 lb)	
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)	
	Axial end play	0.5 mm (0.020 in) or less	
Inner socket 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=48.5 mm (1.91 in)	10 - 78 N (1 - 8 kg, 2 - 18 lb)	
	Axial end play	0.2 mm (0.008 in) or less	



SGIA0493E

# SERVICE DATA AND SPECIFICATIONS (SDS)

Inner socket length "L"	106.3 mm (4.19 in)
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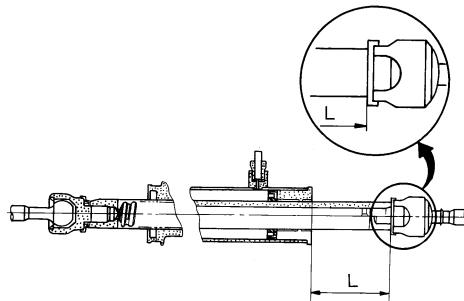


STC1030D

## Steering Gear

NGS0001G

Rack neutral position, dimension "L" (rack stroke)	64.5 mm (2.539 in)
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SGIA0629J

## Oil Pump

NGS0001H

Oil pump relief hydraulic pressure	9,600 - 10,200 kPa (97.9 - 104 kg/cm <sup>2</sup> , 1,392 - 1,479 psi)
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## Steering Fluid

NGS0001I

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