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SECTION PS

POWER STEERING SYSTEM

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PRECAUTIONS

PRECAUTIONS

PFP:00001

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

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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 Steering System

AGS000BU

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

PREPARATION

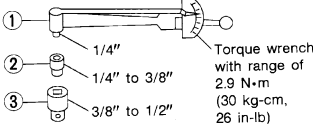
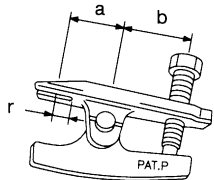
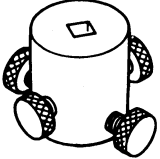
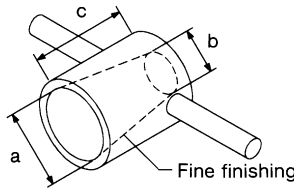
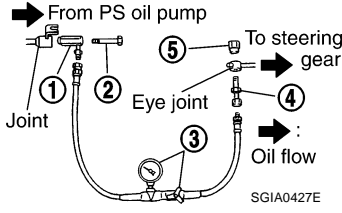
PREPARATION

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Special Service Tools

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

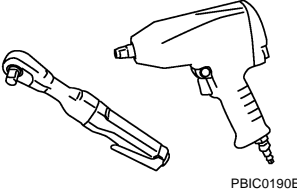
Tool number (Kent-Moore No.) Tool name	Description
ST3127S000 (J25765-A) Preload gauge 1. GG9103000 (J25765-A) Torque wrench 2. HT629400000 (-) Socket adapter 3. HT629000000 (-) Socket adapter	 <p>Inspecting of sliding torque, steering torque, and rotating torque for ball joint</p> <p>S-NT541</p>
HT72520000 (J25730-A) Ball joint remover a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: 11.5 mm (0.453 in)	 <p>Removing tie-rod ball joint</p> <p>NT546</p>
KV48103400 (-) Steering gear preload adapter	 <p>Inspecting rotational torque for steering gear</p> <p>ZZA0824D</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> <p>S-NT550</p>
1. KV48105300-4 & 5295262U10 (-) Connector A & O-ring 2. KV48105300-3 & 5295262U00 (-) Eye-bolt & O-ring 3. KV48103500 (J26357 & J26357-10) Pressure gauge & shut-off valve 4. KV48105300-1 & 5295262U00 (-) Connector B & O-ring 5. KV48105300-2 (-) Nut	 <p>Measuring oil pump relief pressure</p> <p>SGIA0427E</p>

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PREPARATION

Commercial Service Tools

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Tool name	Description
<p data-bbox="172 357 284 383">Power tool</p>  <p data-bbox="837 463 909 485">PBIC0190E</p>	<p data-bbox="991 344 1382 400">Removing steering gear assembly and road wheels</p>

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

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NVH Troubleshooting Chart

AGS00088

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															
	Noise	Shake	Vibration	Shimmy	Judder	Fluid level	Air in hydraulic system	Tie-rod ball joint swinging force	Tie-rod ball joint rotating torque	Tie-rod ball joint end play	Steering gear fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	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					x	x	x	x	x	x	x	x	x															PS-6
																													PS-6
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																													PS-7
																													EM-12
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																													PS-15
																													PS-11
																													PS-9
																													PS-13
																													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

x: Applicable

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POWER STEERING FLUID

POWER STEERING FLUID

PFP:KLF20

Checking Fluid Level

AGS000BV

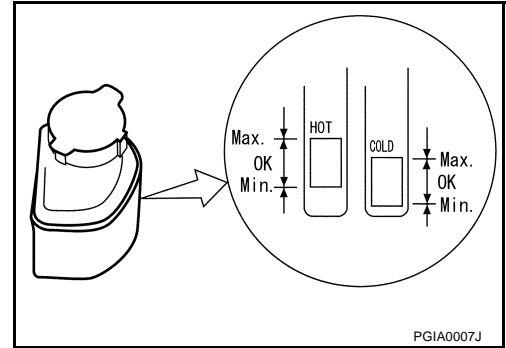
- Stop engine before performing a fluid level check.
- Ensure that the fluid level is between the MAX range and MIN range.
- Because the fluid level differs within the HOT range and the COLD range, check it carefully.

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

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

CAUTION:

- Do not overfill (above the MAX level) because it is cause of leaks from the cap portion.
- Do not reuse the drained power steering fluid.
- Recommended fluid is Genuine NISSAN PSF or equivalent. Do not use NISSAN PSF special and special and NISSAN matic fluid.



Checking Fluid Leakage

AGS000BV

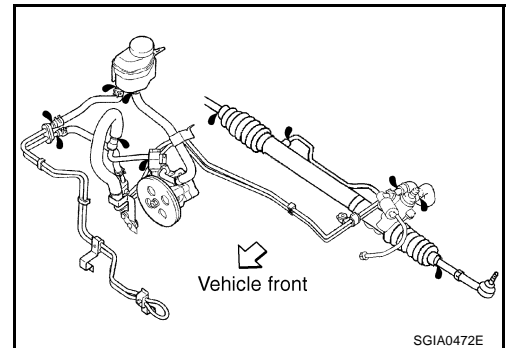
Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

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

CAUTION:

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

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



Air Bleeding from Hydraulic System

AGS000BX

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

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

NOTE:

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

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

NOTE:

While bleeding air from the hydraulic system, frequently check reservoir tank, add additional fluid up to the MAX level, if necessary.

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

CAUTION:

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

4. Check generation of air bubbles and cloud in the fluid.
5. If the air bubbles and the cloud do not fade, stop engine, leave air bleeding behind until the 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 Service

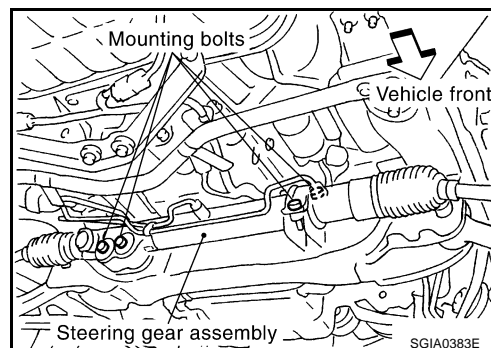
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- Checking condition of installation
Check installation condition of steering gear assembly, front suspension, axle and steering column.
- Check if movement exists when steering wheel is moved up and down, to the left and right and to the axial direction.

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

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

Tightening torque:
135 - 164 N·m (14 - 16 kg·m, 100 - 120 ft·lb)

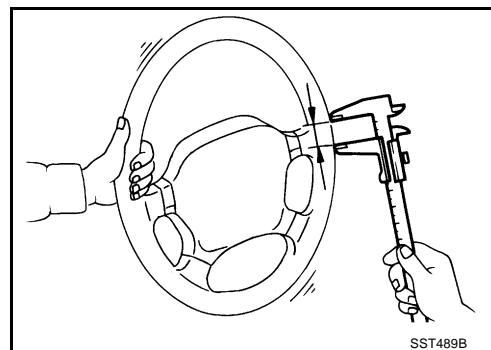


CHECKING STEERING WHEEL PLAY

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

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

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



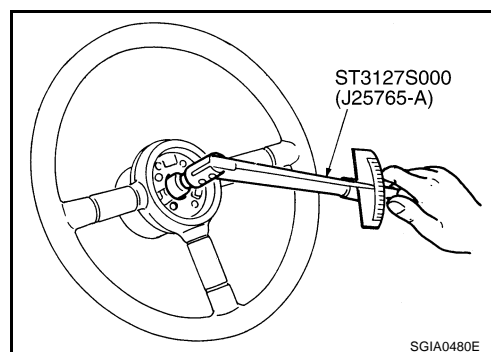
CHECKING NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to [FSU-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 the steering wheel and reinstall it correctly.
 3. If the neutral position cannot adjust in the two teeth of steering column shaft, loosen tie-rod lock nuts of steering outer sockets, then adjust the tie-rods by the same amount in the opposite direction.

CHECKING STEERING WHEEL TURNING TORQUE

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

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

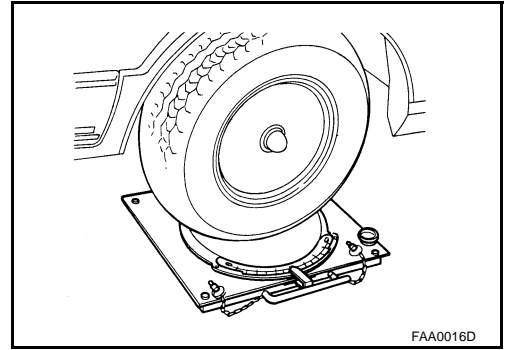


4. If steering wheel turning force is out of specification, check relief hydraulic pressure of the oil pump. Refer to [PS-7, "On-Vehicle Service"](#).

STEERING WHEEL

CHECKING FRONT WHEEL TURNING ANGLE

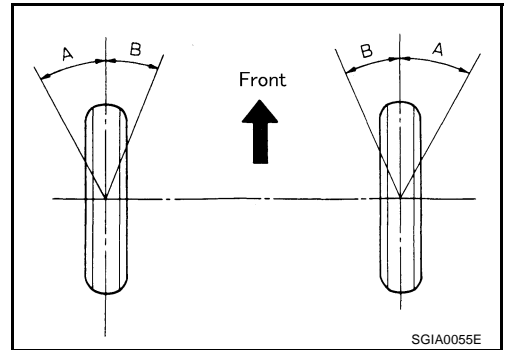
- Check front wheel turning angle after the toe-in inspection. Place the front wheels on turning radius gauges and the rear wheels on stands so that the vehicle can be level. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



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

Turning angle at full turns

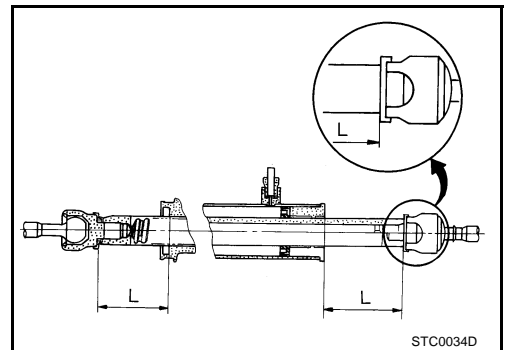
Inner wheel (Angle: A)	Minimum	30°55' (30.92°)
	Nominal	33°55' (33.92°)
	Maximum	34°55' (34.92°)
Outer wheel (Angle: B)	Nominal	28°45' (28.75°)



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

Rack stroke "L" : 60 mm (2.36 in)

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



Removal and Installation

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

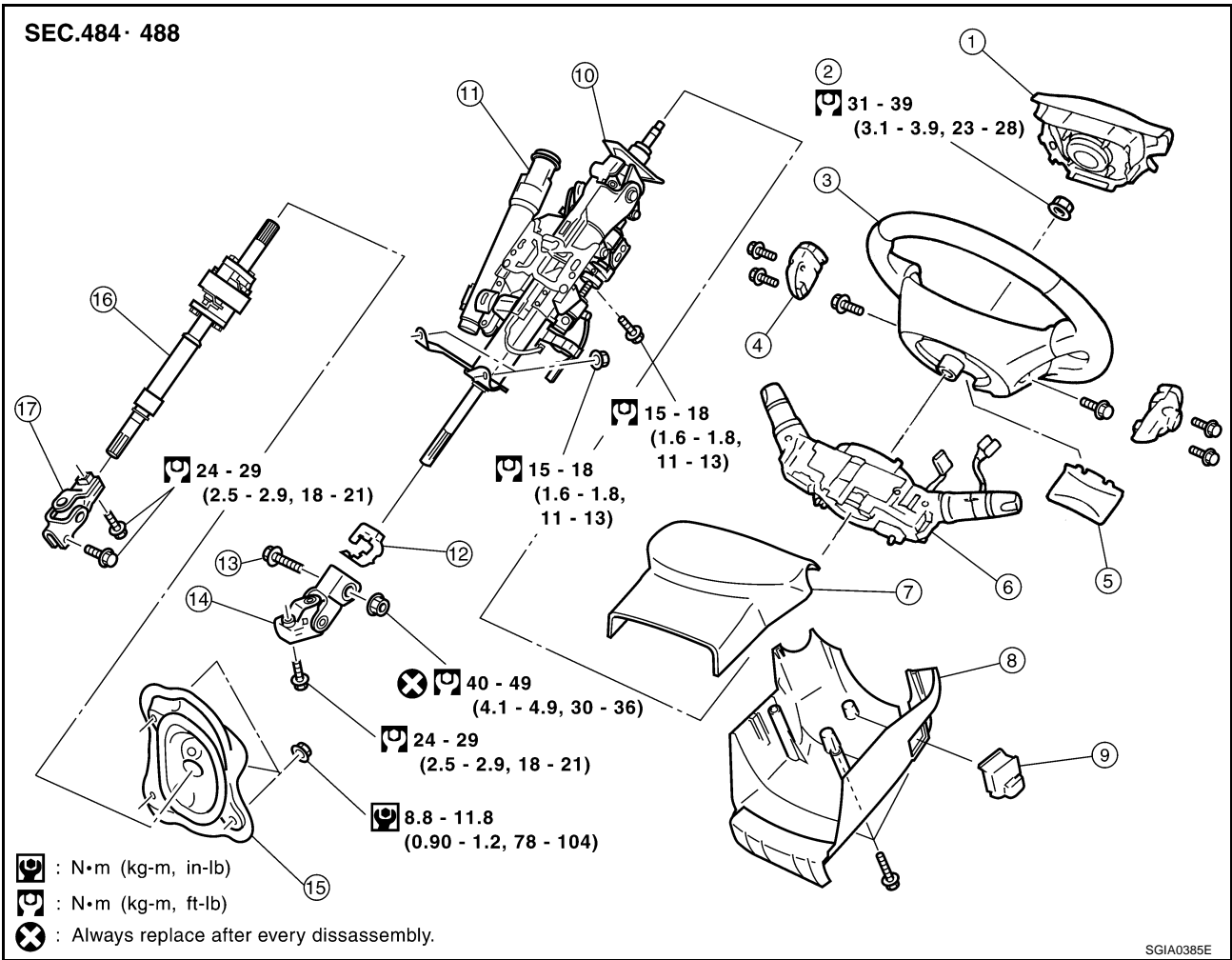
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STEERING COLUMN

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STEERING COLUMN Removal and Installation



- | | | |
|------------------------------|----------------------------|--------------------------------------|
| 1. Driver air bag module | 2. Steering wheel lock nut | 3. Steering wheel |
| 4. Steering wheel switch | 5. Lower lid | 6. Combination switch & spiral cable |
| 7. Column upper cover | 8. Column lower cover | 9. Tilt switch |
| 10. Steering column assembly | 11. Ignition switch | 12. Collar |
| 13. Special bolt | 14. Upper joint | 15. Hole cover |
| 16. Lower shaft | 17. Lower joint | |

NOTE:

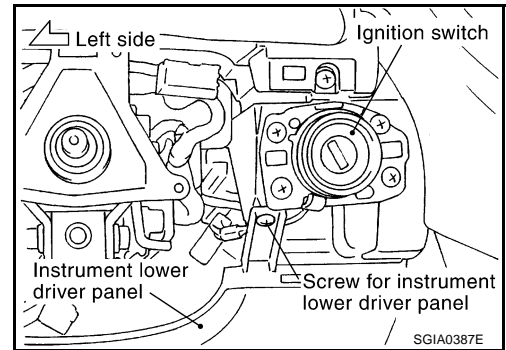
- Care must be taken not to give axial impact to steering column assembly during removal and installation.
- Care must be taken not to move steering gear during removal of steering column assembly.

REMOVAL

1. Set vehicle to straight-ahead direction.
2. Remove driver air bag module. Refer to [SRS-38, "DRIVER AIR BAG MODULE"](#).
3. Remove steering upper and lower covers.
4. Remove combination switch & spiral cable. Refer to [SRS-40, "SPIRAL CABLE"](#).
5. Remove hood opener.

STEERING COLUMN

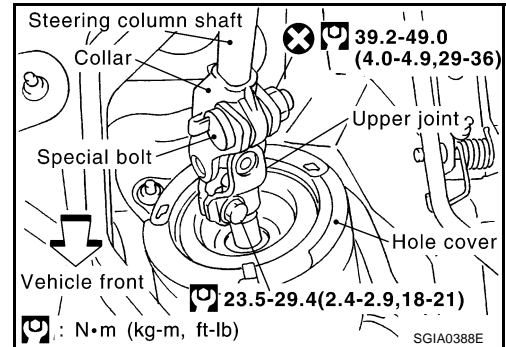
6. Remove cover of ignition switch.
7. Remove screw for the instrument lower driver panel as shown in the figure.
8. Disconnect the TCS OFF switch harness connector, data link connector for CONSULT-II.
9. Disconnect steering lock harness connector from steering column.



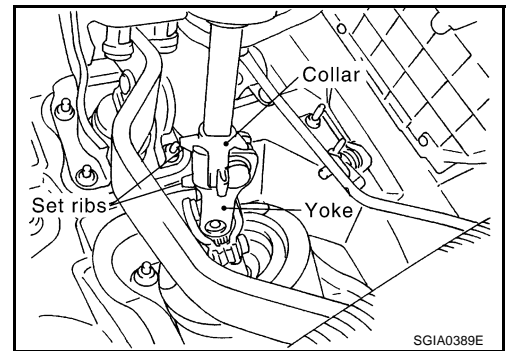
10. Remove knee protector lower. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#)
11. Separate steering column shaft from upper joint in the following procedure.
 - a. Loosen nut of special bolt for the lower yoke of upper joint.

NOTE:

Do not reuse nut for special bolt.



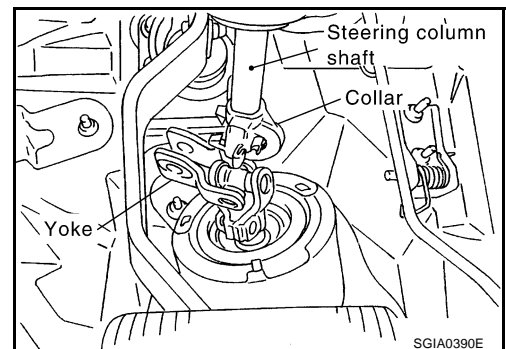
- b. Turn steering wheel to the left to appear set ribs of collar.
 - c. Fix steering wheel with a string in order not to turn then, remove special bolt and nut.



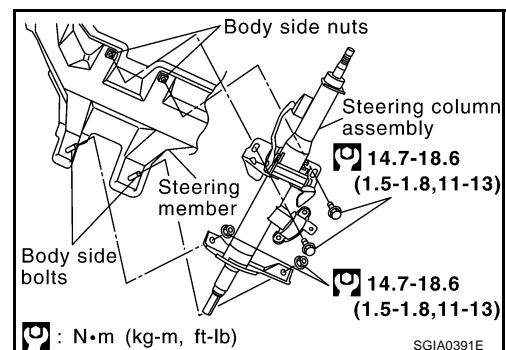
- d. Expand the set ribs outside of yoke lightly, then disengage them from yoke.
 - e. Raise yoke to separate from collar. As a result, steering column shaft separates from upper joint.

CAUTION:

Be careful to handle collar because it is easily broken.

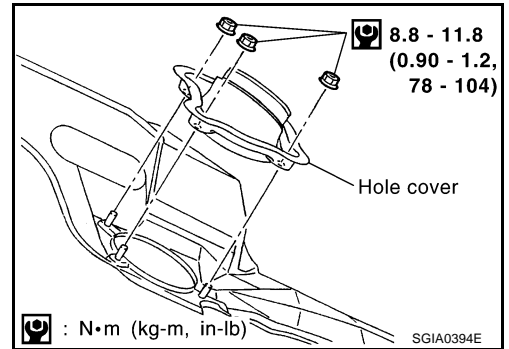


12. Remove mounting bolts and nuts from steering column assembly, then remove it from the vehicle.



STEERING COLUMN

13. Remove mounting bolts, remove hole cover.



INSPECTION AFTER REMOVAL

Check if there is something wrong with jacket tube and collar. Then if they are damaged, replace with new one respectively.

- If vehicle is involved in a light collision, check dimension "L" as shown in the figure. If it is not within specification, replace steering column as an assembly.

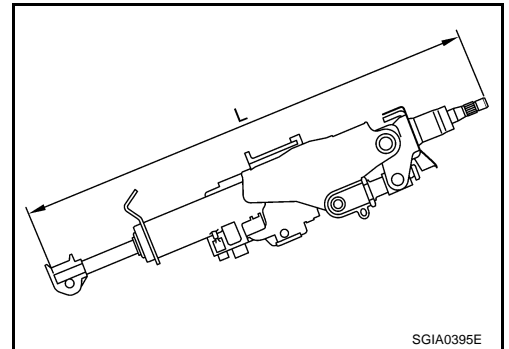
Steering column length "L":

613 - 615 mm (24.13 - 24.21 in)

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

Turning torque:

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



INSTALLATION

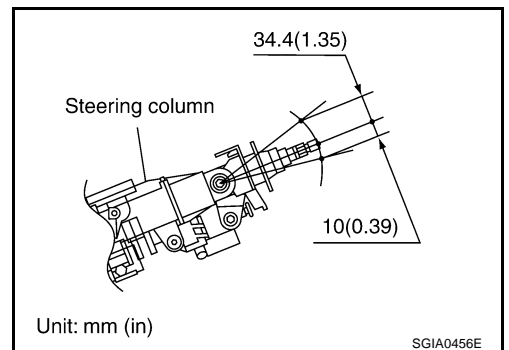
- Install steering column in the reverse order of removal.

NOTE:

When yoke of upper joint and collar are connected with special bolt, use the new nut because it is non-reusable part.

INSPECTION AFTER REMOVAL

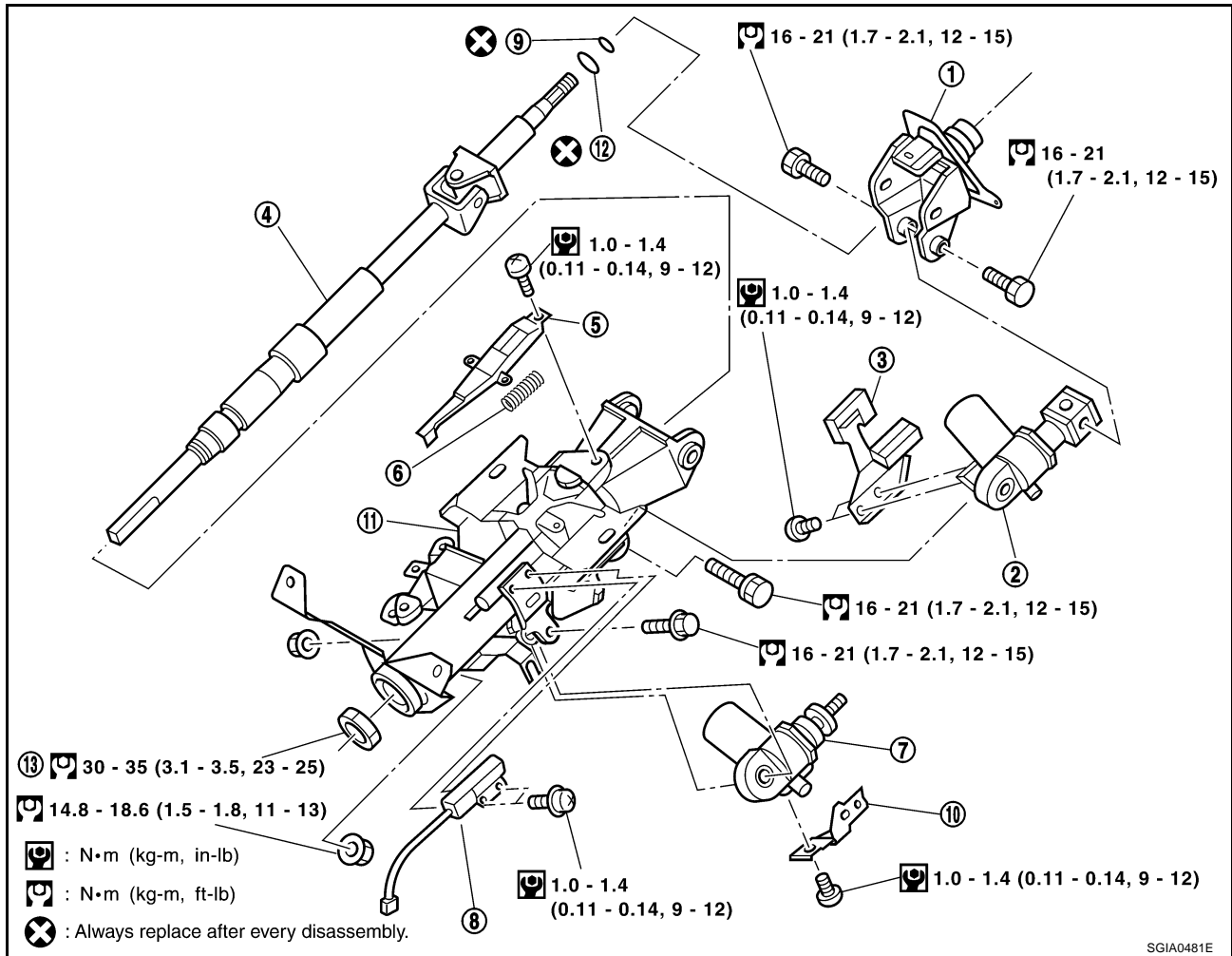
- After installing steering column in vehicle, check tilt mechanism operation.



STEERING COLUMN

Disassembly and Assembly

AGS0008F



SGIA0481E

DISASSEMBLY

1. Pull out steering column upper shaft from jacket tube assembly.
2. Remove tilt motor and sensor from jacket tube assembly.
3. Remove telescopic motor and sensor from jacket tube assembly.
4. Remove snap ring and O-ring from steering column upper shaft, then remove upper jacket tube.
5. Remove the mounting nuts, and remove steering column upper shaft from jacket tube assembly.

INSPECTION AFTER REMOVAL

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

ASSEMBLY

- Install steering column in the reverse order of removal.

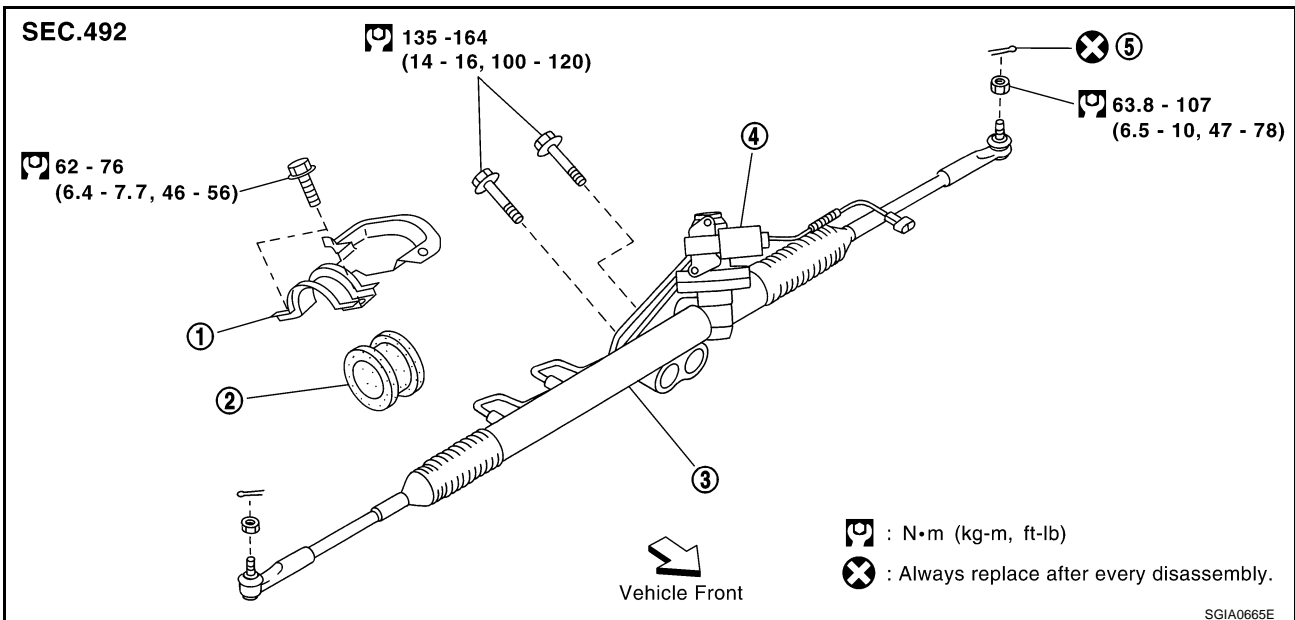
POWER STEERING GEAR AND LINKAGE

POWER STEERING GEAR AND LINKAGE

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Removal and Installation

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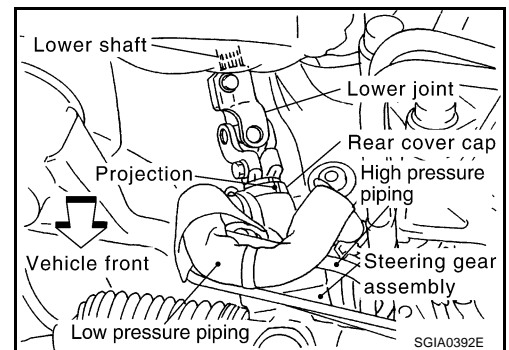
- | | | |
|--------------------------|----------------------------|---------------------------|
| 1. Rack mounting bracket | 2. Rack mounting insulator | 3. Steering gear assembly |
| 4. EPS solenoid valve | 5. Cotter pin | |

NOTE:

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

REMOVAL

1. Remove engine undercover.
2. Remove tires with power tool.
3. When steering wheel is set to straight ahead direction, confirm if slit part of lower joints consists with projection on rear cover cap and steering gear.
4. Remove cotter pin, loosen nut for outer socket.

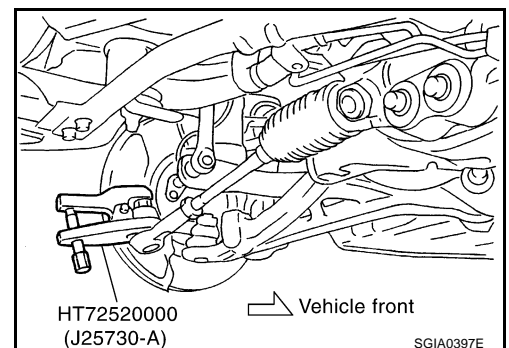


5. Using ball joint remover (special service tool), remove outer socket from steering knuckle. Be careful not to damage boot of ball joint.

NOTE:

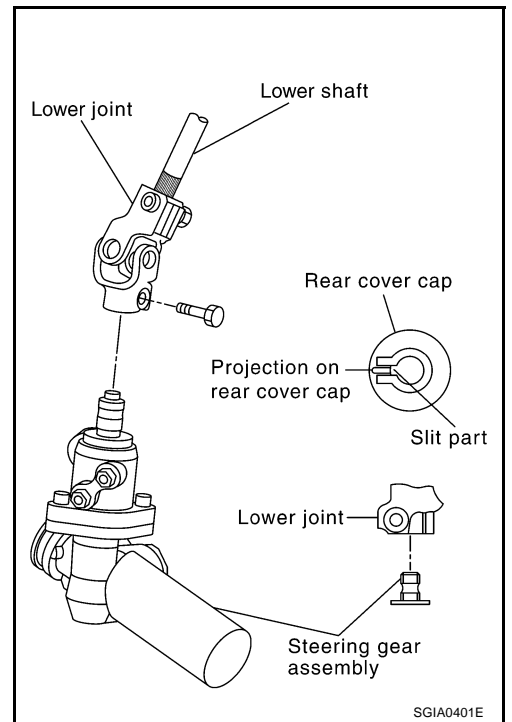
To prevent damage to threads of outer socket and ball joint remover (special service tool) from coming off, tighten temporarily mounting nut.

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

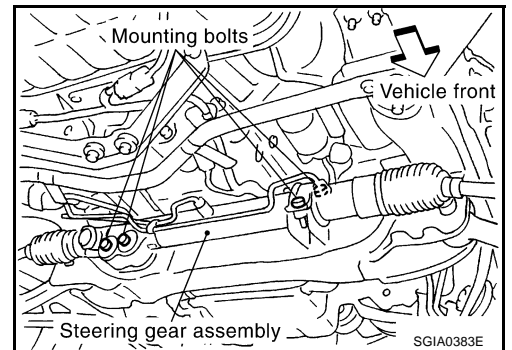


POWER STEERING GEAR AND LINKAGE

- Loosen bolt on upper yoke of lower joint and remove bolt on lower yoke of lower joint, then slide lower joint up to lower shaft. Separate steering gear from lower shaft.
- Tack bolt on upper yoke of lower joint, fix lower joint to shaft. This step is easily with connecting steering gear assembly for lower joint in installation.



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

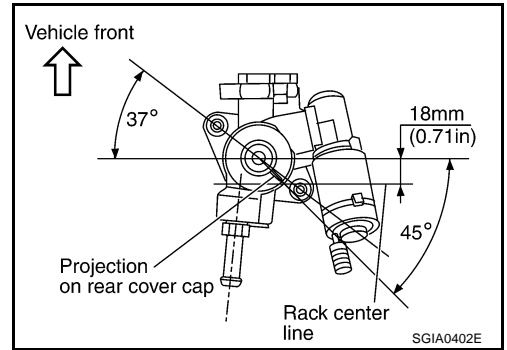


POWER STEERING GEAR AND LINKAGE

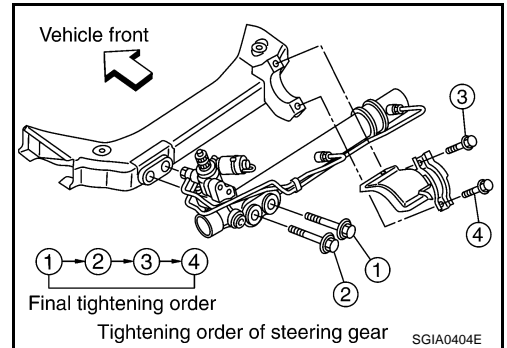
INSTALLATION

In following items with care, install components in reverse order of removal. Refer to [PS-13, "Removal and Installation"](#) .

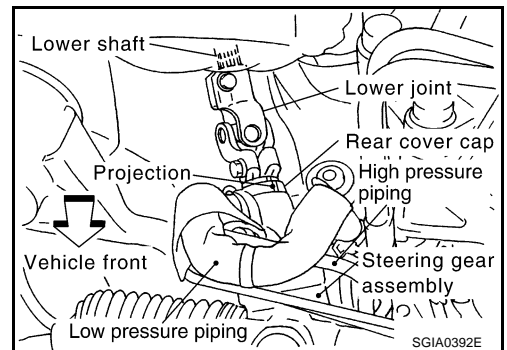
- Confirm rear cover cap on steering gear consists with steering gear when front wheels are set in straight ahead direction as shown in figure.



- Tighten steering gear assembly as shown in figure.



- Confirm if slit of lower yoke of lower joint fits with projection on rear cover cap.
- After installation, bleed air from piping. Refer to [PS-6, "Air Bleeding from Hydraulic System"](#) .



INSPECTION AFTER INSTALLATION

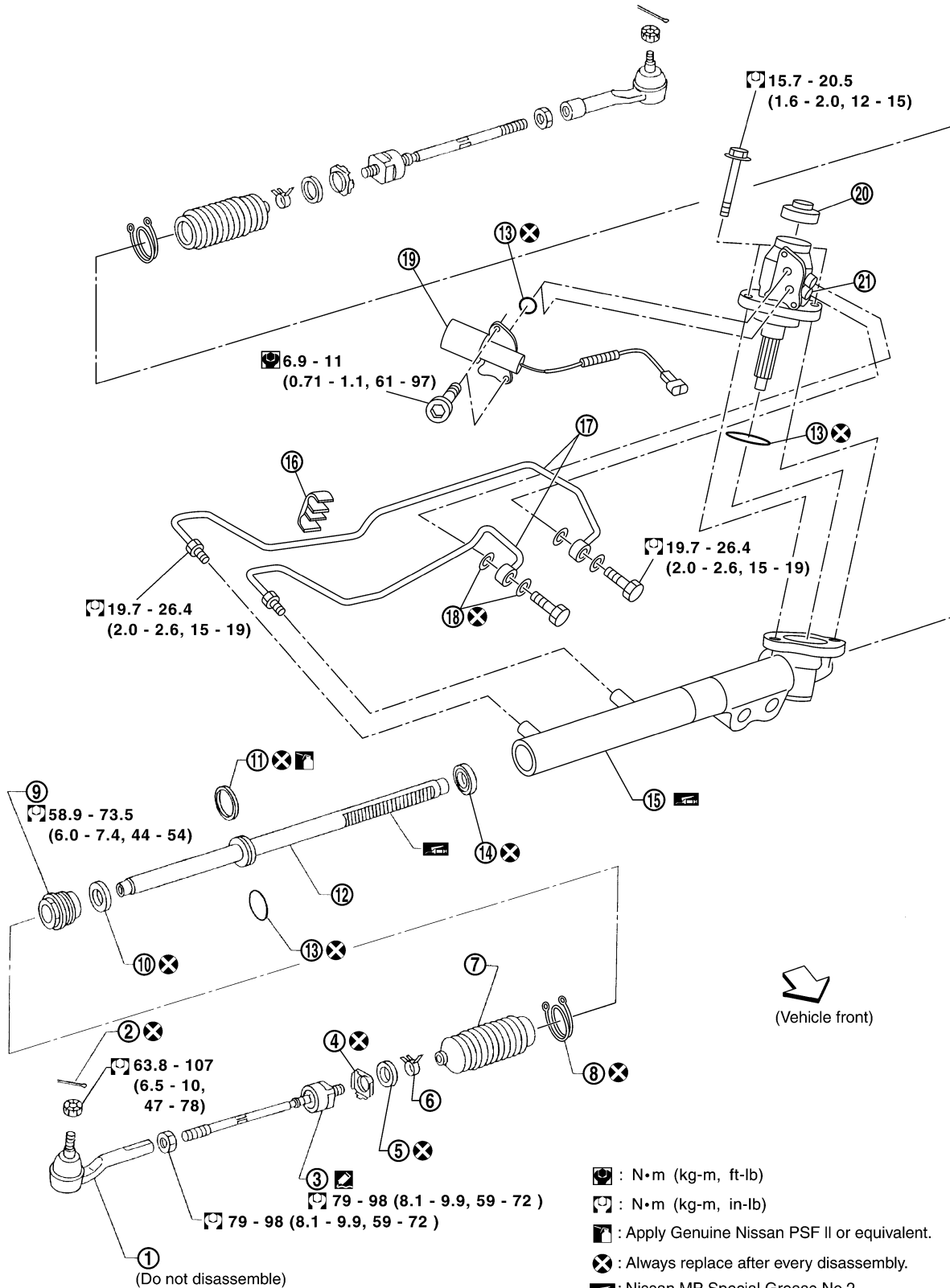
- Check if steering wheel turns smoothly when it is turned several times fully to end of left and right.

POWER STEERING GEAR AND LINKAGE

Disassembly and Assembly

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SEC.492



- : N•m (kg-m, ft-lb)
- : N•m (kg-m, in-lb)
- : Apply Genuine Nissan PSF II or equivalent.
- : Always replace after every disassembly.
- : Nissan MP Special Grease No.2
- : Three Bond 1324 or equivalent

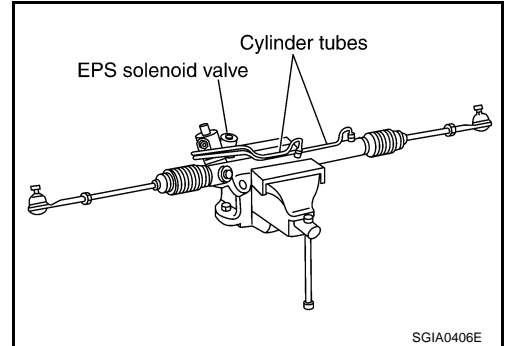
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POWER STEERING GEAR AND LINKAGE

- | | | |
|---------------------------|---------------------------|-----------------------|
| 1. Outer socket | 2. Cotter pin | 3. Inner socket |
| 4. Lock plate | 5. Spacer ring | 6. Boot clamp |
| 7. Boot | 8. Boot clamp (wire) | 9. End cover assembly |
| 10. Rack oil seal (outer) | 11. Rack Teflon ring | 12. Rack assembly |
| 13. O-ring | 14. Rack oil seal (inner) | 15. Gear housing |
| 16. Clip | 17. Cylinder tubes | 18. Copper washer |
| 19. EPS solenoid valve | 20. Rear cover cap | 21. Sub-gear assembly |

NOTE:

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



DISASSEMBLY

1. Remove EPS solenoid valve assembly.
2. Remove O-ring from gear housing assembly.
3. Remove cylinder tubes from gear housing assembly.
4. Remove rear cover cap from sub-gear assembly.
5. Measure projection height of adjusting screw from gear housing, then loosen adjusting screw.

NOTE:

- Do not attempt to disassemble EPS solenoid valve.
 - Do not turn adjusting screw more than twice.
 - Replace steering gear assembly when adjusting screw is removed or is turned more than twice.
6. Remove bolts of sub-gear assembly and remove sub-gear assembly from gear housing assembly.

NOTE:

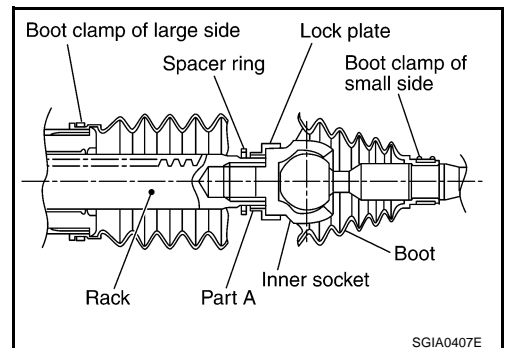
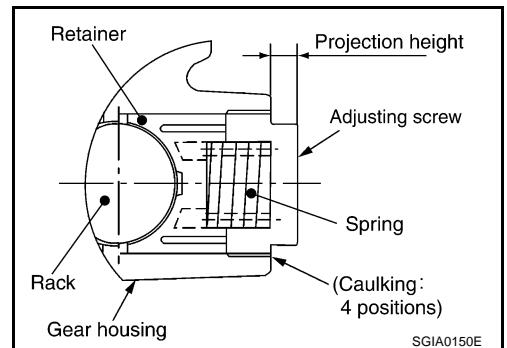
Do not overhaul sub-gear assembly because it is non-overhaul part. If there is something wrong with sub-gear assembly, replace with new one.

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

NOTE:

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

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



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POWER STEERING GEAR AND LINKAGE

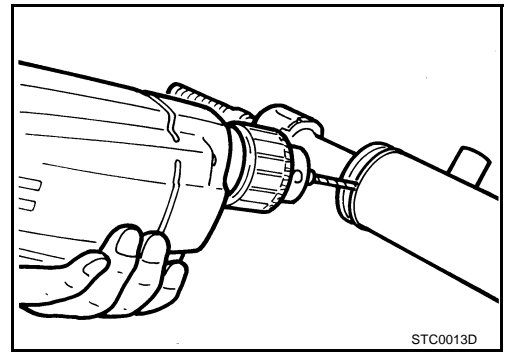
10. Drill out the punch caulking area on cylinder outer rim with a 3 mm (0.12 in) drill bit. [Drill for approx. 1.5 mm (0.059 in) in depth.]

11. Remove end cover with a 42 mm (1.65 in) open head (special service tool).

NOTE:

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

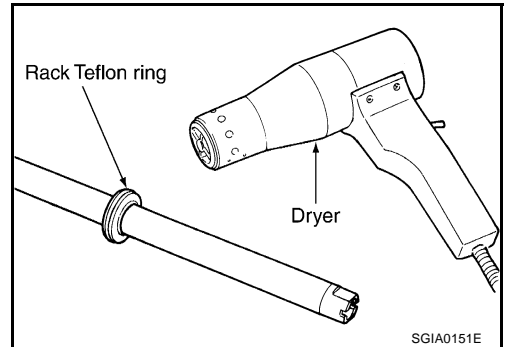
12. Pull rack assembly with rack oil seal out of gear housing assembly.



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

NOTE:

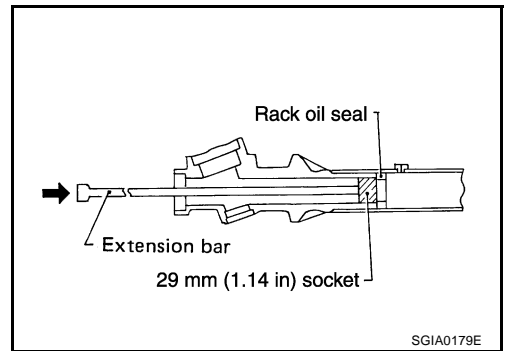
Be careful not to damage rack. If it is damaged, replace with new one to avoid oil leaks.



14. Use a taped 29 mm (1.14 in) socket and an extension bar, push out and remove rack oil seal together from gear housing assembly.

NOTE:

- 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 gear, wrinkle and deformation. Replace it, if necessary.

Rack

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

Sub-Gear Assembly

- Check pinion gear for damage and wear, if damage is found, replace with a new sub-gear assembly.
- Check bearing while at rotating with noise, and then check bearing ball race with dent, worn, or damaged. If any damage is found, replace with a new sub-gear assembly.

Gear Housing Assembly

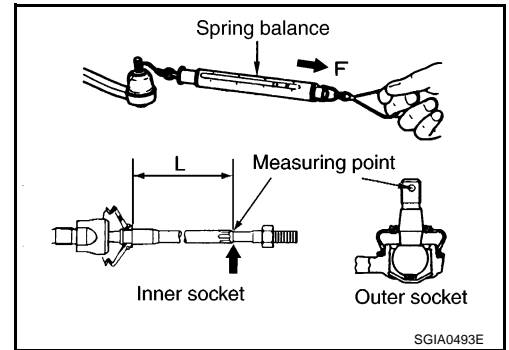
Check gear housing assembly for damage and scratch (inner wall). Replace it, if necessary.

POWER STEERING GEAR AND LINKAGE

Outer Socket and Inner Socket

1. Swing Torque

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



Specified value

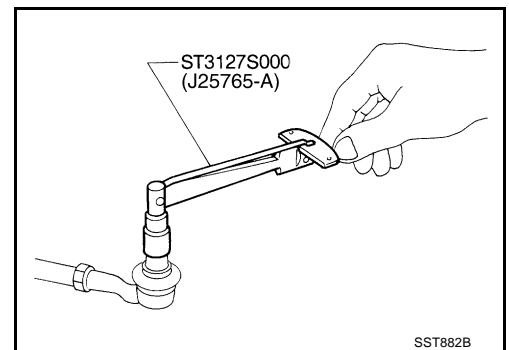
Item	Outer socket	Inner socket
Measuring point	Cotter pin hole of stud	Shown as L: 60.5 mm (2.38 in)
Swing torque	0.3 - 2.9 N-m (0.03 - 0.29 kg-m, 3 - 25 in-lb)	1.0 - 7.8 N-m (0.10 - 0.80 kg-m, 9 - 69 in-lb)
Measuring value	4.42 - 42.7 N (0.45 - 4.4 kg, 1.0 - 9.7 lb)	10 - 78 N (1.1 - 7.9 kg, 2.25 - 17.5 lb)

2. Rotating Torque (outer socket only)

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

Specified value

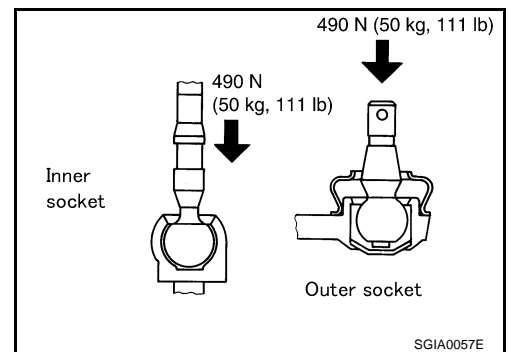
Rotating torque	0.3 - 2.9 N-m (0.03 - 0.29 kg-m, 3 - 25 in-lb)
-----------------	--



3. Axial End Play

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

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



ASSEMBLY

- Put an O-ring into rack.

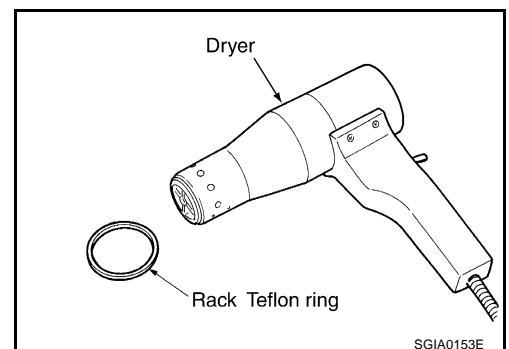
NOTE:

Do not reuse rack O-ring.

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

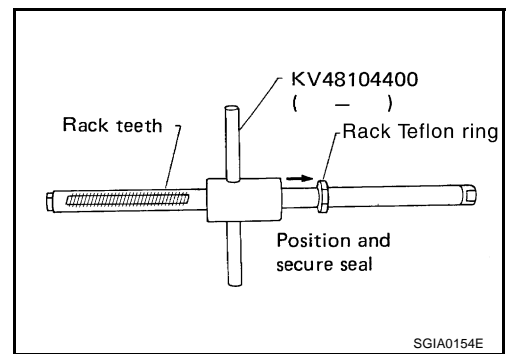
NOTE:

Do not reuse rack Teflon ring.



POWER STEERING GEAR AND LINKAGE

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

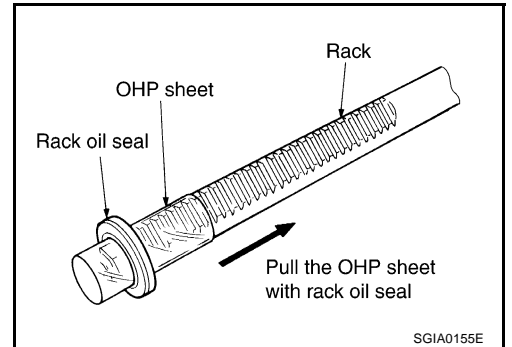


4. Insert rack oil seal.

NOTE:

Do not reuse rack oil seal.

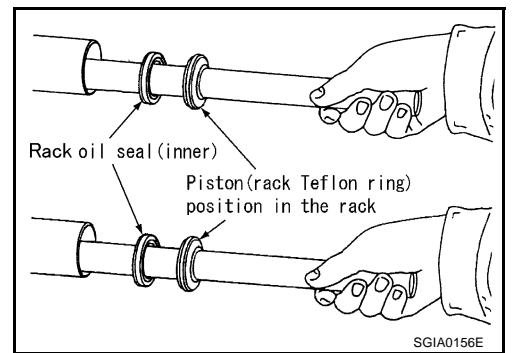
- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approx. 70 mm (2.76 in) × 100 mm (3.94 in)] around rack tooth. Place oil seal on sheet. Then, pull oil seal along with OHP sheet until they pass the toothed section of rack, then remove it.



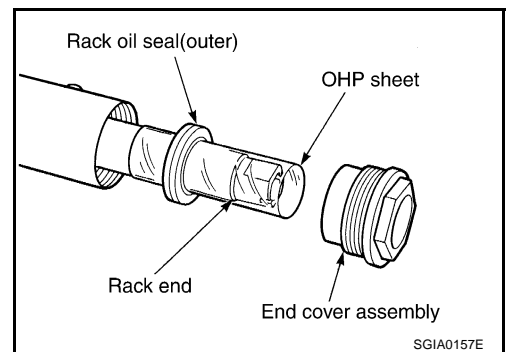
- b. Insert rack oil seal (inner) to piston (rack Teflon ring) position and push retainer to adjusting screw side with fingers lightly, and then make rack move in gear housing assembly, install rack oil seal (inner) to fit in with gear housing assembly.

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 leak. Replace gear housing assembly.

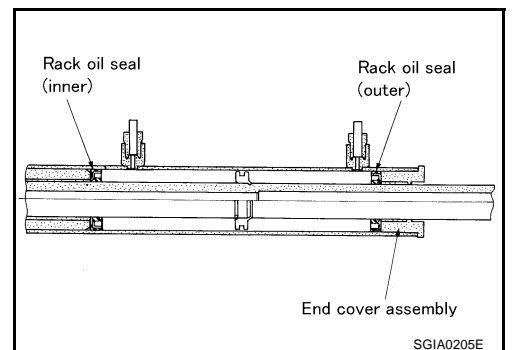


- c. When installing outer rack oil seal, end cover of rack with an OHP sheet [70 mm (2.76 in) × 100 mm (3.94 in)]. It will avoid damaging rack oil seal. Then place oil seal on sheet. Pull rack oil seal along with OHP sheet until they pass the rack end. Install rack oil seal in place using end cover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



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

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



POWER STEERING GEAR AND LINKAGE

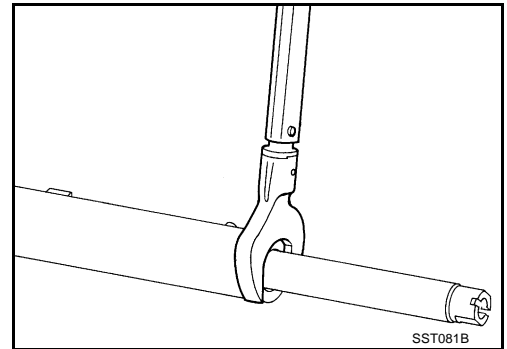
5. Using a 42 mm (1.65 in) open head (suitable tool), tighten end cover assembly at the specified torque.

Tightening torque:

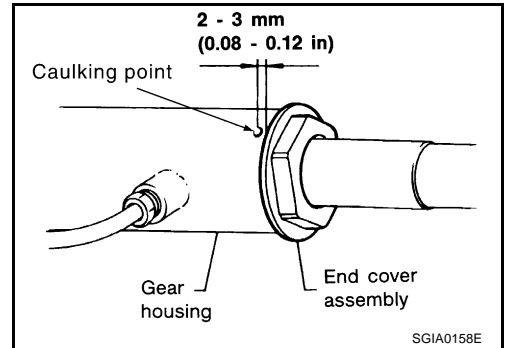
58.9 - 73.5 N-m (6.0 - 7.4 kg-m, 44 - 54 ft-lb)

NOTE:

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



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



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

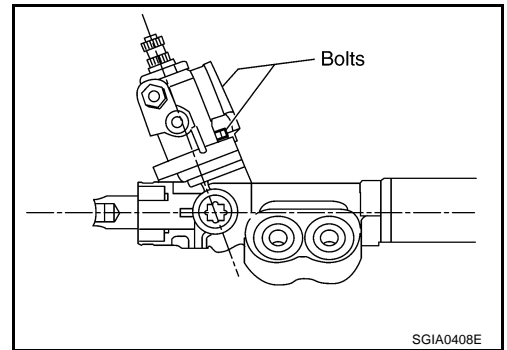
NOTE:

Do not reuse O-ring.

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

Tightening torque:

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



9. Attach lock plate to rack.

NOTE:

Do not reuse lock plate.

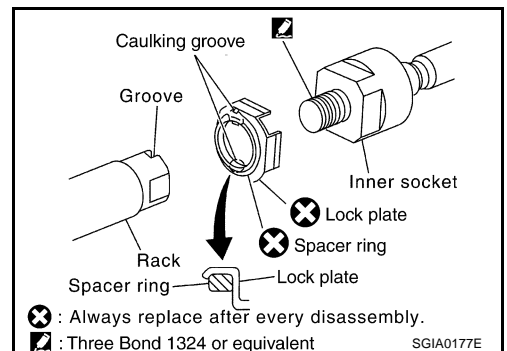
- a. Tack spacer ring to rack.

NOTE:

Do not reuse spacer ring.

- b. Install lock plate to inner socket.

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



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

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

NOTE:

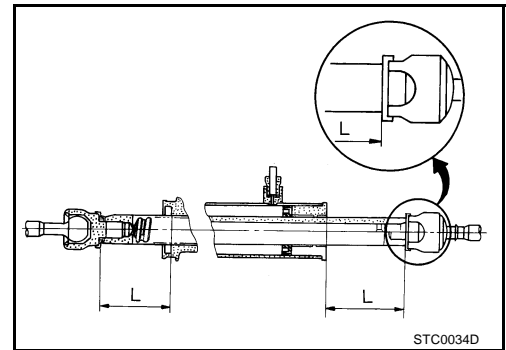
When installing spacer ring, avoid damaging it.

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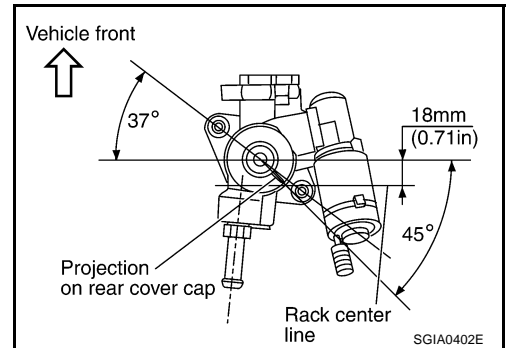
POWER STEERING GEAR AND LINKAGE

10. Decide neutral position of rack gear.

Rack stroke "L" : 60mm (2.36 in)

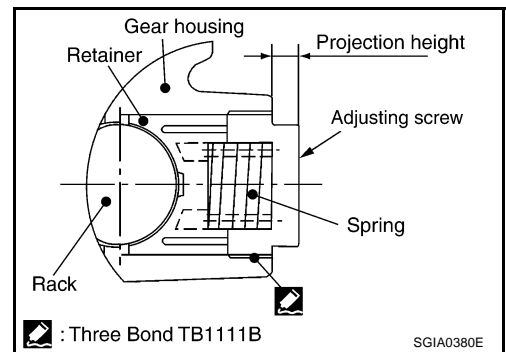


11. Install the projection part (Tip) of rear cover cap to sub-gear assembly as shown in the figure.



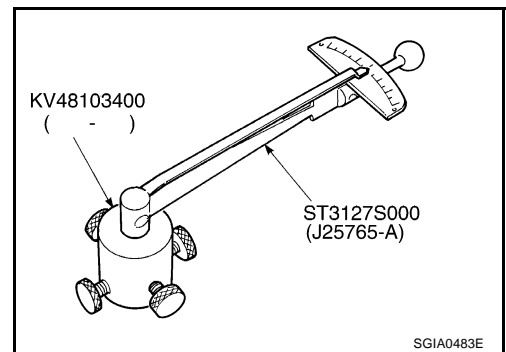
12. Apply thread locking adhesive (Three Bond TB1111B or equivalent) to the thread of adjusting screw, and screw it to the projection height from gear housing assembly. The projection height is the same as it was measured in the overhaul in advance.

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



14. Measure pinion rotation torque within from -180° to $+180^\circ$ make preload gauge (special service tool) turn at the speed of 2 - 3 rpm in the rack neutral position, then hold preload gauge (special service tool) at maximum torque.

15. After loosening adjusting screw once, tighten it again with torque of 4.9 - 5.9 N·m (0.50 - 0.60 kg·m, 44 - 52 in·lb). Furthermore loosen it within from 20° to 40° .



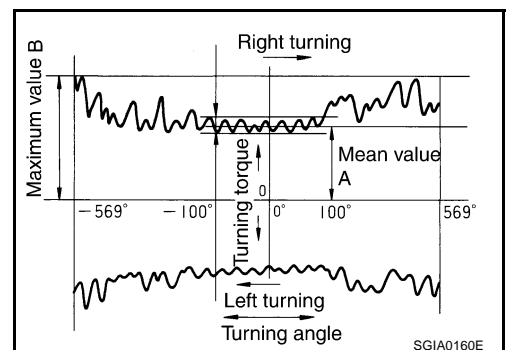
16. Measure pinion rotation torque with preload gauge (special service tool), then confirm whether its reading is within specified range. If reading is not within specified range, readjust screw angle with adjusting screw. Replace gear assembly with new one, if reading is still not within specified range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

Pinion rotation torque:

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

Average "A":

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



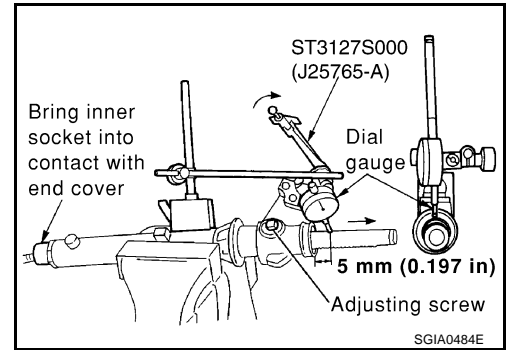
POWER STEERING GEAR AND LINKAGE

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

Maximum variation "B":

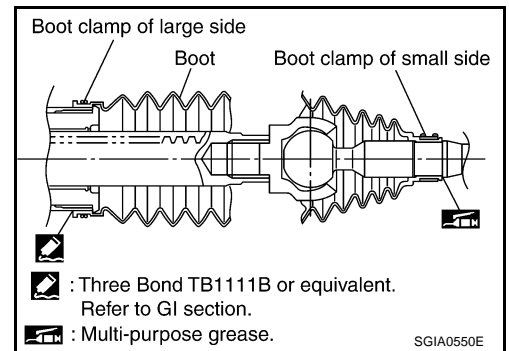
2.3 N·m (0.23 kg·m, 20 in·lb)

17. Turn pinion fully to end of 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 specified range. If reading is outside of specification, readjust screw angle with adjusting screw. If reading is still outside of specification, or if the rotation torque of adjusting screw is less than 5 N·m (0.51 kg·m, 44 in·lb), replace steering gear assembly.



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

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



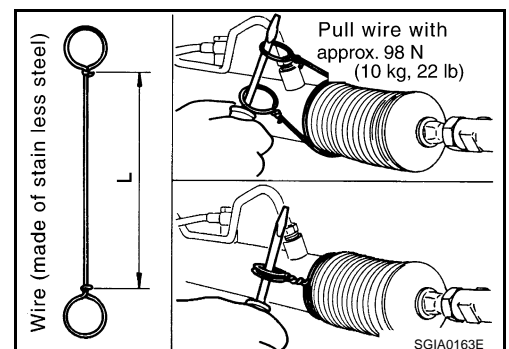
22. Install boot clamp to boot of the large-diameter side.
 - a. Twist boot clamp (stainless steel) of the large diameter side for LH/RH boots.

Wire length "L"

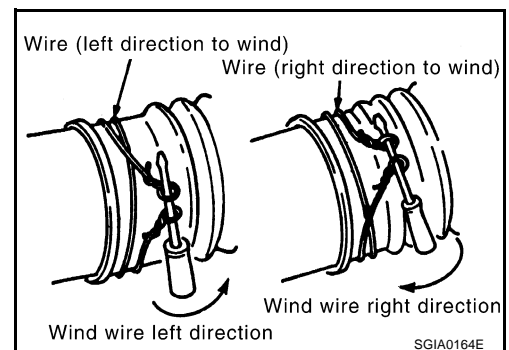
LH (sub-gear assembly side) : 390 mm (15.35 in)

RH (end cover assembly side) : 410 mm (16.14 in)

- b. After twisting 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).

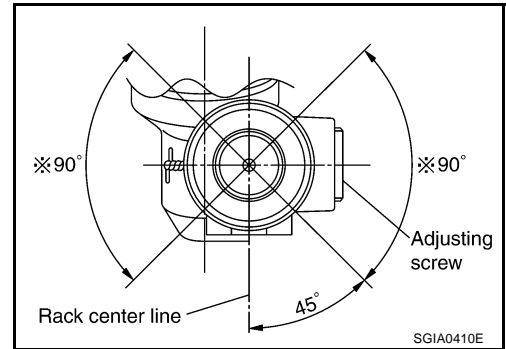


- c. Twist boot clamp as shown in the figure, pay attention to relationship between winding and twisting directions.

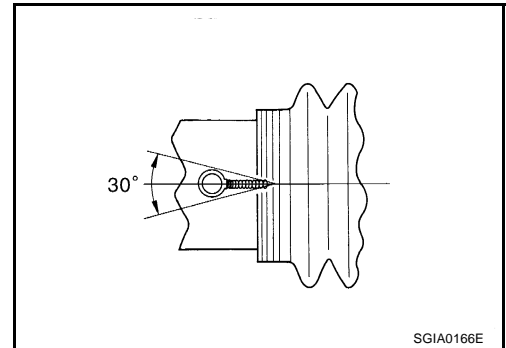


POWER STEERING GEAR AND LINKAGE

- d. Bend the twisted wire to radius direction of rack, then confirm the twisted point with clamp faces in the opposite direction to adjusting screw within 90° 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 new O-ring to sub-gear assembly and install EPS solenoid valve to it, then tighten bolts at specified torque.

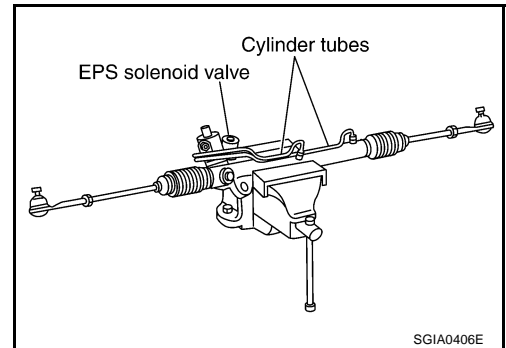
Tightening torque:

6.9 - 11 N·m (0.71 - 1.1 kg·m, 61 - 97 in·lb)

24. Install cylinder-tubes to gear housing assembly. Tighten flared nuts at specified torque.

Tightening torque:

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

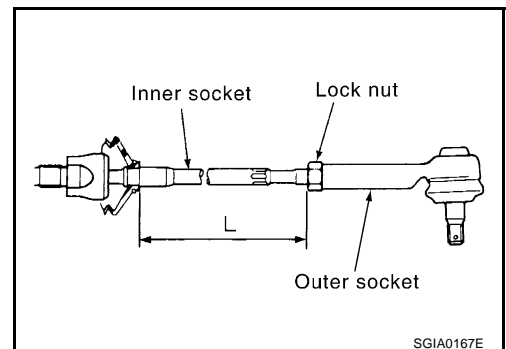


25. Install lock nut and outer socket to inner socket, then tighten lock nut temporarily until length of tie-rod reaches to specified value. On specified tightening torque with lock nut, refer to [PS-16, "Disassembly and Assembly"](#).

Tie-rod length "L" : 160 mm (6.30 in)

NOTE:

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



POWER STEERING OIL PUMP

POWER STEERING OIL PUMP

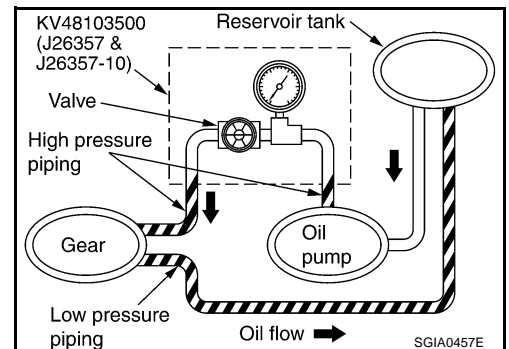
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On-Vehicle Service CHECKING RELIEF OIL PRESSURE

AGS0008K

Before starting work, confirm belt tension is proper.

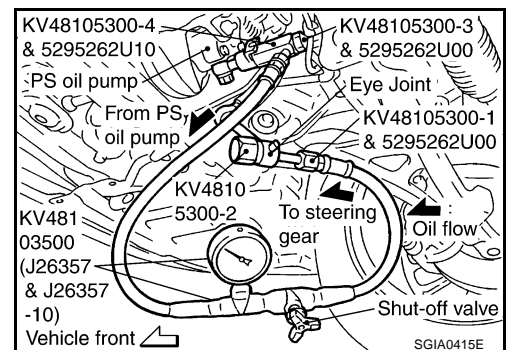
1. Connect oil pressure gauge (special service tool) and oil pressure gauge adapter (special service tool) between oil pump discharge connector and high pressure hose and then bleed air from the hydraulic circuit.



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

WARNING:

- 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 oil pressure gauge valve (special service tool) and read the relief oil pressure.

Relief pressure specification:

8,000 - 8,800 kPa (82 - 90 kg/cm² , 1,138 - 1,280 psi)

CAUTION:

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

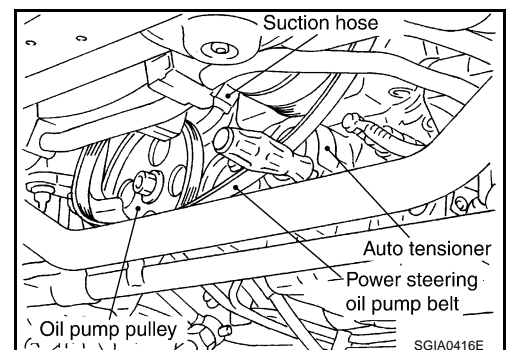
4. After measurement, open valve slowly.
 - If relief pressure is outside the specification, disassemble and service oil pump. Refer to [PS-26, "Disassembly and Assembly"](#).
5. After inspection, remove oil pressure gauge (special service tool) and oil pressure gauge adapter (special service tool) from the hydraulic circuit, add fluid and bleed air from the hydraulic circuit thoroughly. Refer to [PS-6, "Air Bleeding from Hydraulic System"](#).

Removal and Installation

REMOVAL

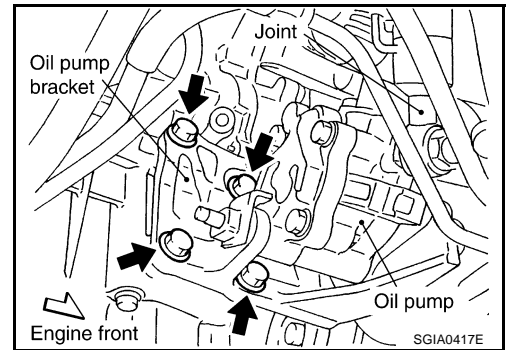
AGS000D3

1. Remove undercover.
2. Remove power steering oil pump belt from auto tensioner. Refer to [EM-12, "DRIVE BELTS"](#).
3. Loosen hose clamp from suction hose and remove suction hose from power steering pump, then drain fluid. Refer to [PS-31, "HYDRAULIC LINE"](#).



POWER STEERING OIL PUMP

4. Remove joint, then drain fluid. Refer to [PS-31, "HYDRAULIC LINE"](#) .
5. Remove oil pump together with oil pump bracket. Refer to [PS-31, "HYDRAULIC LINE"](#) .



INSTALLATION

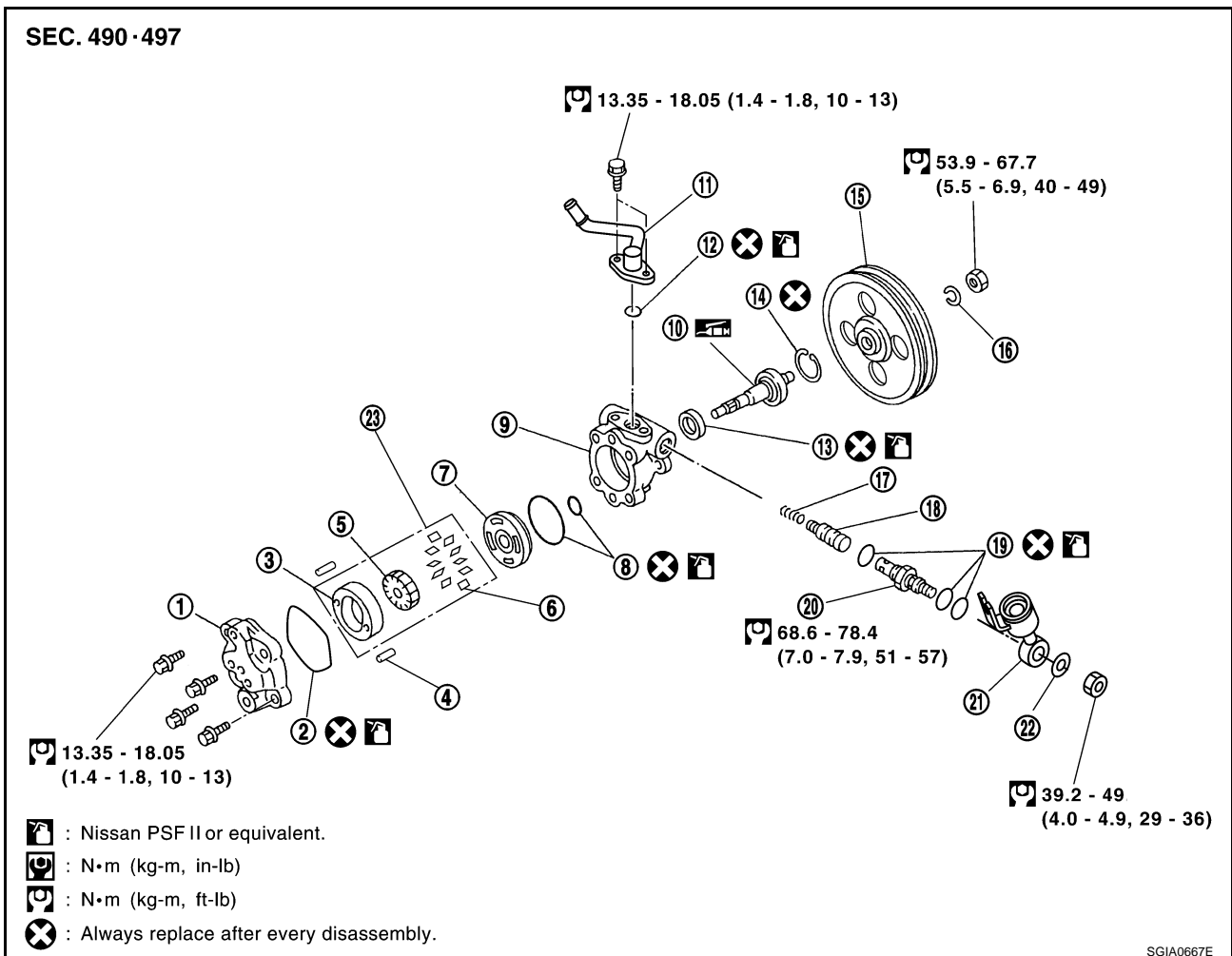
Install oil pump with reverse order of the removal. After installation, bleed air. Refer to [PS-6, "Air Bleeding from Hydraulic System"](#) .

NOTE:

Adjustment of belt tension is no necessary because engine of this model equips auto tensioner.

Disassembly and Assembly

AGS0008M



SGIA0667E

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

POWER STEERING OIL PUMP

19. O-ring

20. Connector bolt

21. Joint

22. Spring washer

23. Cartridge

A

PRE-DISASSEMBLY INSPECTION

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

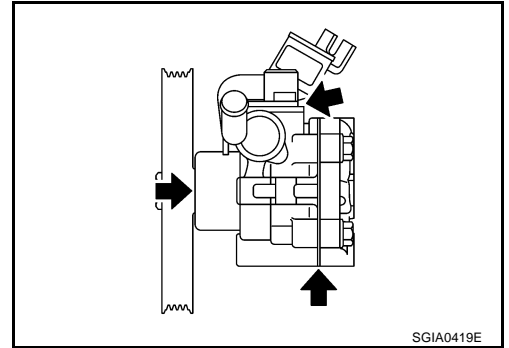
- Oil leak from any point shown in the figure
- Deformed or damaged pulley
- Poor performance

B

C

D

E



DISASSEMBLY

NOTE:

Fix oil pump in vise as the occasion demands.

CAUTION:

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

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

F

PS

CAUTION:

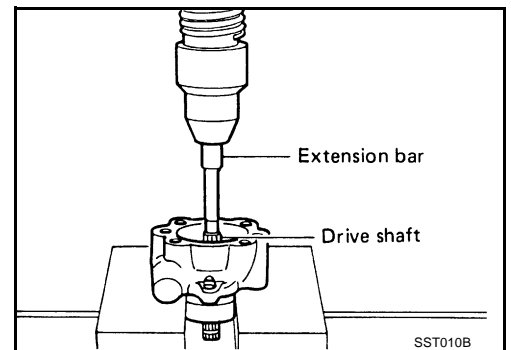
When removing snap ring, be careful not to damage drive shaft assembly.

H

I

J

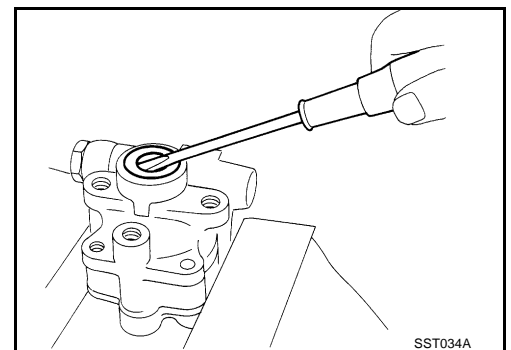
K



L

6. Using a screwdriver, remove oil seal from housing.
7. Remove O-ring from housing.

M



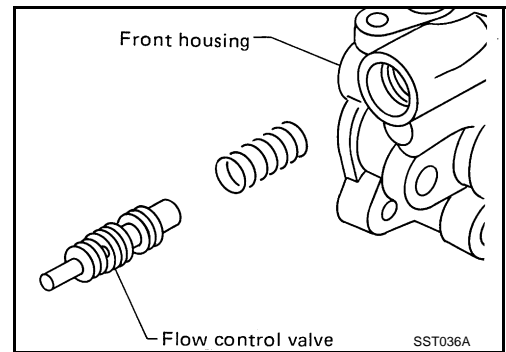
POWER STEERING OIL PUMP

- Loosen lock nut and remove washer, joint then remove connector bolt, O-ring and pull out flow control valve and spring from housing.

CAUTION:

Be careful not to drop and deform flow control valve.

- Remove suction pipe from housing
- Remove O-ring from housing.



INSPECTION AFTER DISASSEMBLY

Housing and Rear cover Inspection

- Check housing 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 housing

Cartridge Assembly Inspection

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

ASSEMBLY

NOTE:

Fix oil pump in vise as vise occasion demands.

CAUTION:

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

- Apply a coat of Genuine 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 housing.

NOTE:

Do not reuse oil seal.

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

NOTE:

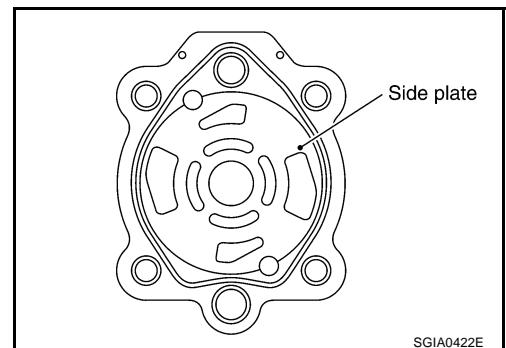
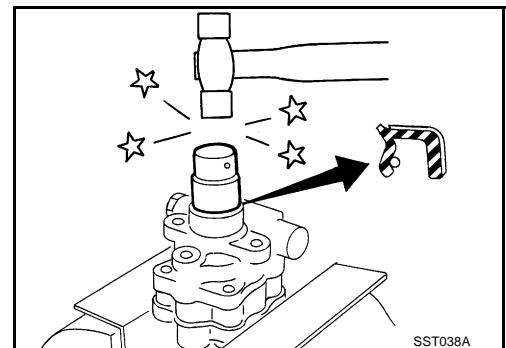
Do not reuse snap ring.

- Apply a coat of Genuine Nissan PSF or equivalent to O-ring and install O-ring into housing.

NOTE:

Do not reuse O-ring.

- Install side plate to housing.



POWER STEERING OIL PUMP

5. Install lock pin into lock pin hole, and install cam-ring as shown in the figure.

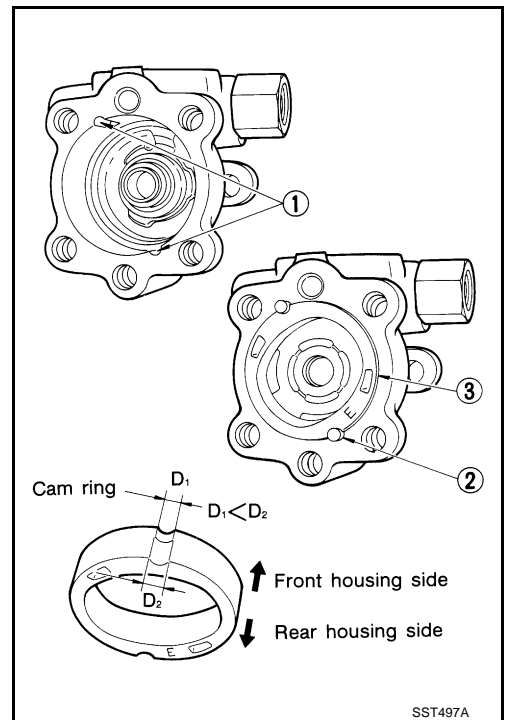
NOTE:

Do not reuse oil O-ring.

- When installing cam-ring, turn carved face with a letter (E) of it to rear cover.

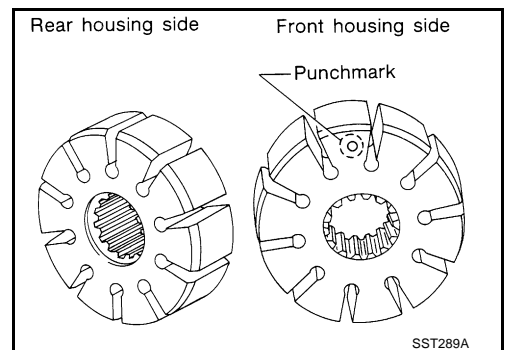
CAUTION:

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 housing.

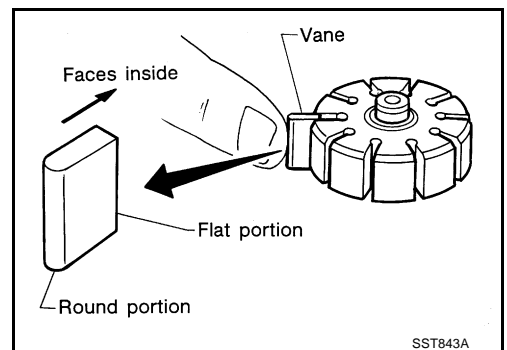
- When installing rotor, turn punch mark face on rotor to housing.



7. Install vane to rotor with facing the round portion outside.
 8. Check if drive shaft assembly turns smoothly.
 9. Install gasket to housing.

NOTE:

Do not reuse gasket.



A
B
C
D
E
F
PS
H
I
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L
M

POWER STEERING OIL PUMP

10. Install rear cover to housing and tighten bolts at the specified torque.
11. Install pulley to drive shaft assembly then tighten lock nut at the specified torque.
12. Install spring, flow control valve, O-ring, connector bolt, joint, washer to housing. Then tighten lock nut at the specified torque.

NOTE:

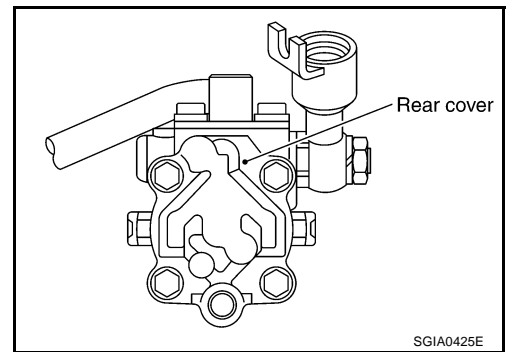
Do not reuse O-ring.

13. Apply a coat of Nissan PSF or equivalent to O-ring and install O-ring to housing.

NOTE:

Do not reuse O-ring.

14. Install suction pipe to housing.



HYDRAULIC LINE

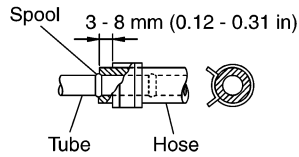
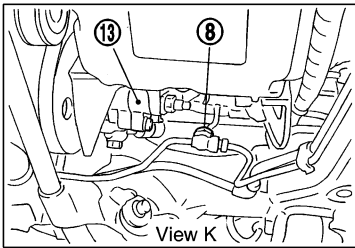
HYDRAULIC LINE

PF:49721

Removal and Installation

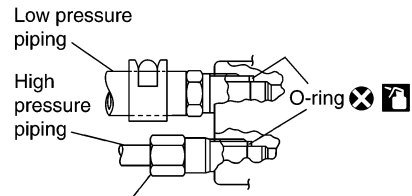
AGS000C5

SEC.497



Connection between tube and hose.

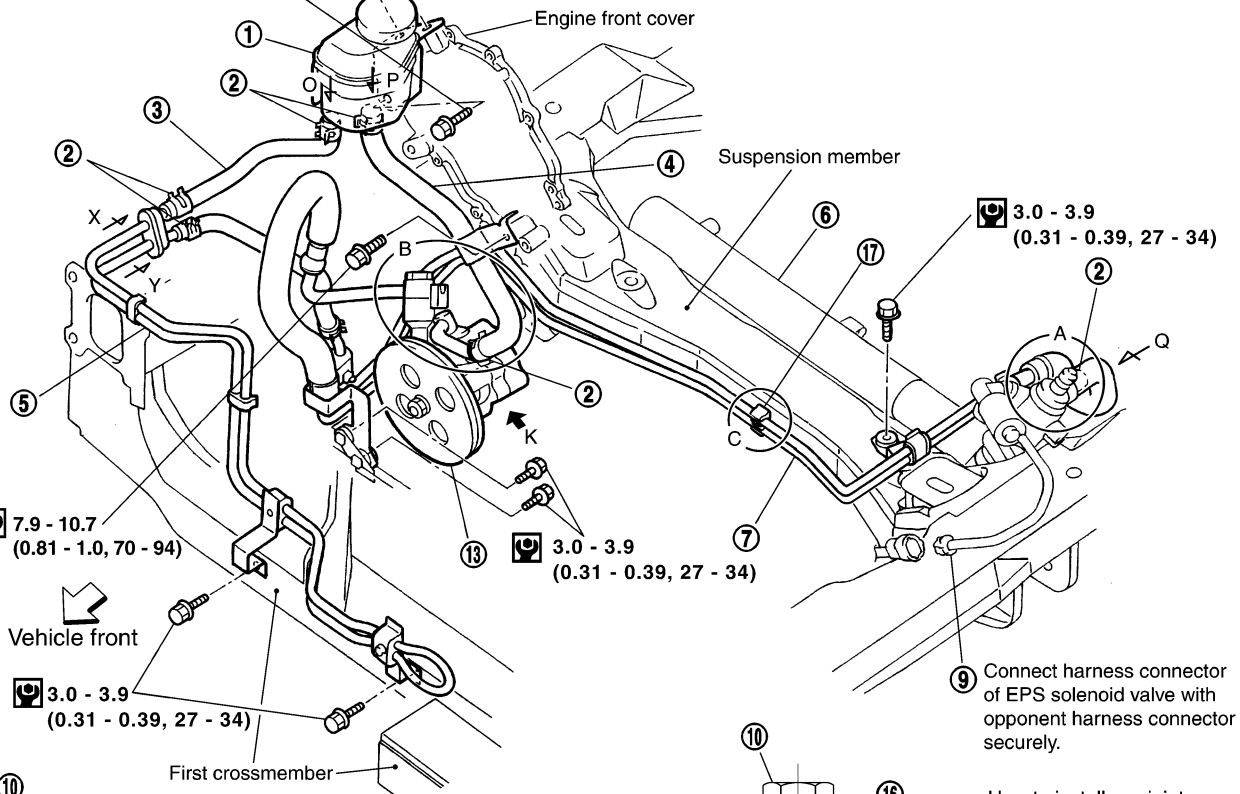
- Insert hose to spool of opponent tube (arrow portion with X, Y & Z).
- Insert hose at end of opponent tube (arrow portion with O, P & Q).



14.8 - 24.5 (1.5 - 2.4, 11 - 18)

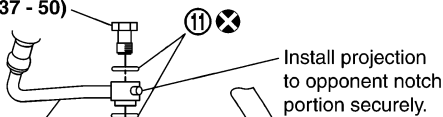
Detail A

16 - 20 (1.7 - 2.0, 12 - 14)



10

50 - 69
(5.1 - 7.0, 37 - 50)



56.9 - 65.7
(5.8 - 6.7, 42 - 48)

30 - 40
(3.1 - 4.0, 23 - 29)

44.1 - 51.9
(4.5 - 5.2, 33 - 38)

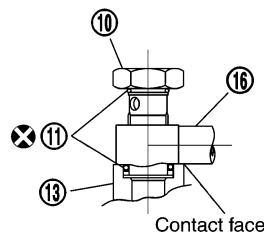
Detail B-1

⊗ : Apply Nissan PSF II or equivalent.

⊗ : N·m (kg-m, in-lb)

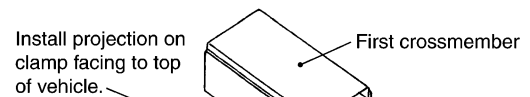
⊗ : N·m (kg-m, ft-lb)

⊗ : Always replace after every disassembly.



Detail B-2

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



Detail C

SGIA0668E

HYDRAULIC LINE

- | | | |
|-----------------------------|-------------------------|--|
| 1. Reservoir tank | 2. Clamp | 3. Return hose |
| 4. Suction hose | 5. Tube assembly | 6. Steering gear assembly |
| 7. Hose and tube set | 8. Oil pressure sensor | 9. Harness connector
(EPS solenoid valve) |
| 10. Eye bolt | 11. O-ring | 12. Harness connector
(Pressure sensor) |
| 13. Power steering oil pump | 14. Nut | 15. Oil pump bracket |
| 16. Eye joint | 17. Hose and tube clamp | |

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PPF:00030

Steering Wheel

AGS00080

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

Steering Angle

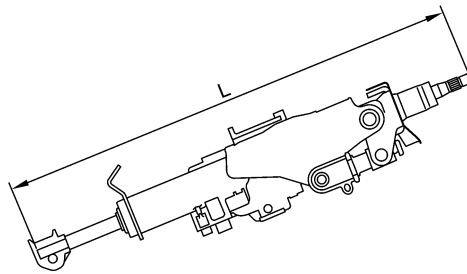
AGS0008P

Inner wheel Degree minute (Decimal degree)	Minimum	30°55' (30.92°)
	Nominal	33°55' (33.92°)
	Maximum	34°55' (34.92°)
Outer wheel Degree minute (Decimal degree)	Nominal	28°45' (28.75°)

Steering Column

AGS0008Q

Steering column length "L"	613 - 615 mm (24.13 - 24.21 in)
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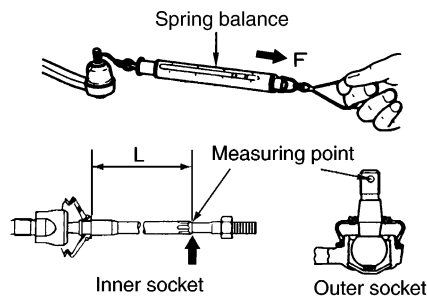


SGIA0395E

Steering Linkage

AGS0008R

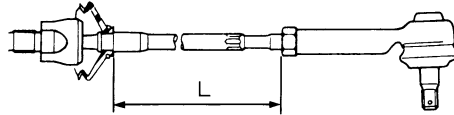
Steering gear type	PR26AD	
Tie-rod ball joint outer socket	Swing torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
	Measurement on spring balance ● Measuring point: stud cutter pin hole	4.42 - 42.7 N (0.45 - 4.4 kg, 1.0 - 9.7 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg·m, 3 - 25 in·lb)
	Axial end play	0.5 mm (0.020 in) or less
Tie-rod ball joint inner socket	Swinging torque	1.0 - 7.8 N·m (0.10 - 0.80 kg·m, 9 - 69 in·lb)
	Measurement on spring balance ● Measuring point: L mark (see below) L = 60.5 mm (2.38 in)	10 - 78 N (1.1 - 7.9 kg, 2.25 - 17.5 in)
	Axial end play	0.2 mm (0.008 in) or less



SGIA0493E

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering gear type	PR26AD
Tie-rod length "L"	160 mm (6.30 in)

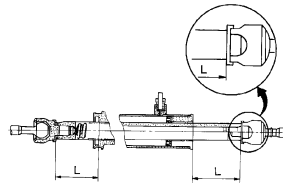


STC1030D

Steering Gear

AGS0006S

Steering gear model	PR26AD
Rack neutral position, dimension "L" (rack stroke)	60 mm (2.36 in)



SGIA0231E

Rack sliding torque	At the neutral point: Range within ± 11.5 mm (± 0.453 in) from the neutral position (in power ON)	Area average value	235 - 284 N (24 - 29 kg, 53 - 64 lb)
		Allowable variation	58.8 N (6 kg, 13.2 lb) or less
	Whole area (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

AGS0008T

Oil pump relief hydraulic pressure	8,000 - 8,800 kPa (82 - 90 kg/cm ² , 1,138 - 1,280 psi)
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Steering Fluid

AGS0008U

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