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SECTION PS

POWER STEERING SYSTEM

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PRECAUTIONS

PRECAUTIONS

PPF:00001

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

NGS000F5

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

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

Precautions Necessary for Steering Wheel Rotation After Battery Disconnect

NGS000F6

NOTE:

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

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

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

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

OPERATION PROCEDURE

1. Connect both battery cables.

NOTE:

Supply power using jumper cables if battery is discharged.

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

PRECAUTIONS

Precautions for Steering System

NGS000F7

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

PREPARATION

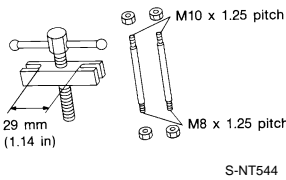
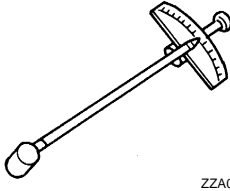
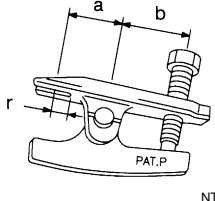
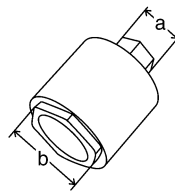
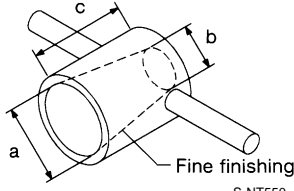
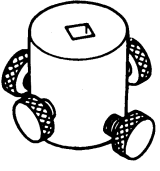
PREPARATION

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Special Service Tools

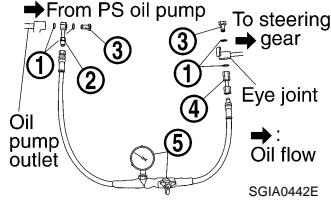
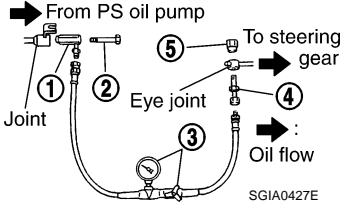
NGS000BQ

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 |
|---|--|
| <p>ST27180001 (J-25726-A)</p>  | <p>Removing steering wheel</p> |
| <p>ST3127S000 (J-25765-A) Preload gauge</p>  | <p>Inspecting of sliding torque, steering torque, and rotating torque for ball joint</p> |
| <p>HT72520000 (J-25730-A) Ball joint remover a: 33 mm (1.3 in) b: 50 mm (1.97 in) r: 11.5 mm (0.45 in)</p>  | <p>Removing steering outer socket</p> |
| <p>KV4810 5400 (J-46213) Rear cover wrench a: 21.6 mm (0.85 in) b: 34.9 mm (1.37 in)</p>  | <p>Removing rear cover</p> |
| <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>  | <p>Installing of rack Teflon ring</p> |
| <p>KV48103400 (—) Torque adapter</p>  | <p>Inspecting rotating torque</p> |

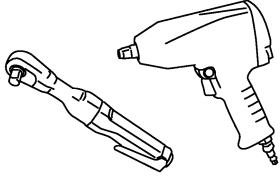
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PREPARATION

| Tool number (Kent-Moore No.) Tool name | Description |
|--|--|
| <p>1. KV48102500-04 (—) Washer</p> <p>2. KV48102500-01 (—) Eye joint</p> <p>3. KV48102500-03 (—) Bolt</p> <p>4. KV48102500-02 (—) Flare Joint</p> <p>5. KV48103500 (J-26357&J-26357-10) Pressure gauge & shut off valve</p> | <p>Measuring oil pump relief pressure (VQ35DE models)</p>  <p style="text-align: right; font-size: small;">SGIA0442E</p> |
| <p>1. KV48105300-4 and 5295262U10 (—) Connector A and O-ring</p> <p>2. KV48105300-3 and 5295262U00 (—) Eye-bolt and O-ring</p> <p>3. KV48103500 (J-26357 and J-26357-10) Pressure gauge and shut-off valve</p> <p>4. KV48105300-1 and 5295262U00 (—) Connector B and O-ring</p> <p>5. KV48105300-2 (—) Nut</p> | <p>Measuring oil pump relief pressure (VK45DE models)</p>  <p style="text-align: right; font-size: small;">SGIA0427E</p> |

Commercial Service Tools

NGS000BR

| Tool name | Description |
|---|---------------------------------|
| <p>Power tool</p>  <p style="text-align: right; font-size: x-small;">PBIC0190E</p> | <p>Loosening bolts and nuts</p> |

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PPF:00003

NVH Troubleshooting Chart

NGS000BS

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

| Symptom | STEERING | Possible cause and suspected parts | | | | | | | | | | | | | Reference page | | | | | | | | | | | |
|-----------|----------|------------------------------------|-------------------------|--|---|----------------------------------|------------------------|---------------------|----------------------------------|----------------------|-------------------------|---|-------------------------------|---------------------------------------|----------------|---|----------------------------|-----------------|--------------|---------------------|-------|------------|-------------|--------|-------|-----------------------------------|
| | | Fluid level | Air in hydraulic system | Outer socket ball joint swinging force | Outer socket ball joint rotating torque | Outer socket ball joint end play | Steering fluid leakage | Steering wheel play | Steering gear rack sliding force | Drive belt looseness | Improper steering wheel | Improper installation or looseness of tilt lock lever | Mounting rubber deterioration | Steering column deformation or damage | | Improper installation or looseness of steering column | Steering linkage looseness | PROPELLER SHAFT | DIFFERENTIAL | AXLE and SUSPENSION | TIRES | ROAD WHEEL | DRIVE SHAFT | BRAKES | | |
| Noise | STEERING | Noise | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | PS-8 | |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | PS-8 |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | PS-24 |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | PS-24 |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | PS-8 |
| Shake | STEERING | Noise | | | | | | | | | | | | | | | | | | | | | | | PS-10 | |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | PS-10 |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | EM-15, EM-174 |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | PS-10 |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | PS-10 |
| Vibration | STEERING | Noise | | | | | | | | | | | | | | | | | | | | | | | | PS-13 |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | PS-13 |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | PS-13 |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | PS-13 |
| Shimmy | STEERING | Noise | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | PS-18 |
| Judder | STEERING | Noise | | | | | | | | | | | | | | | | | | | | | | | | NVH in PR section |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | NVH in RFD section |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | NVH in FAX, RAX, FSU, RSU section |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | NVH in WT section |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | NVH in WT section |
| BRAKES | STEERING | Noise | | | | | | | | | | | | | | | | | | | | | | | | NVH in FAX section |
| | | Shake | | | | | | | | | | | | | | | | | | | | | | | | NVH in WT section |
| | | Vibration | | | | | | | | | | | | | | | | | | | | | | | | NVH in FAX section |
| | | Shimmy | | | | | | | | | | | | | | | | | | | | | | | | NVH in FAX section |
| | | Judder | | | | | | | | | | | | | | | | | | | | | | | | NVH in BR section |

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POWER STEERING FLUID

POWER STEERING FLUID

PFP:KLF20

Checking Fluid Level

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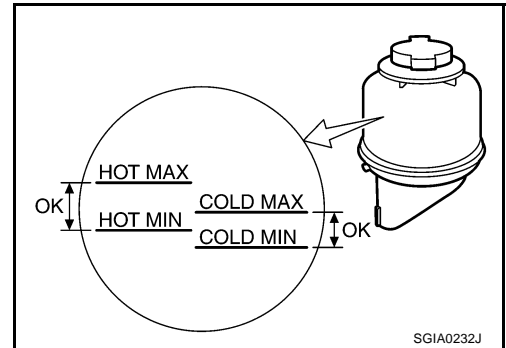
- Stop engine before performing a fluid level check.
- Ensure that fluid level is between the MAX range and MIN level.
- Because fluid level differs within the HOT range and the COLD range, check it carefully.

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.



Checking Fluid Leakage

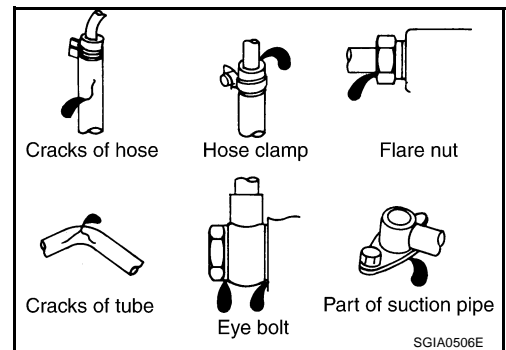
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Check the hydraulic piping lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

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 from oil pump is noticed, check oil pump. Refer to [PS-30. "POWER STEERING OIL PUMP"](#).
6. Check steering gear boots for accumulation of fluid indicating a from steering gear.

Air Bleeding Hydraulic System

NGS000BV

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

6. Stop engine, check fluid level.

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STEERING WHEEL

STEERING WHEEL

PFP:48430

On-Vehicle Inspection and Service

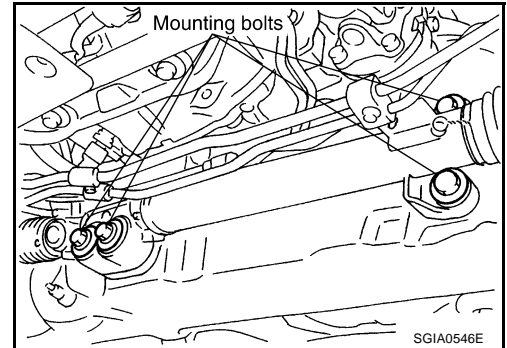
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CHECKING CONDITION OF INSTALLATION

- 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 steering gear assembly are loose or not. Refer to [PS-18, "POWER STEERING GEAR AND LINK-AGE"](#).



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 vehicle to the straight direction, check if steering wheel is in the neutral position.
2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
3. If the neutral position cannot adjust in the two teeth of steering gear assembly, loosen outer socket lock nuts of steering outer sockets, then adjust outer socket 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).]

NOTE:

Tires need to be inflated normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

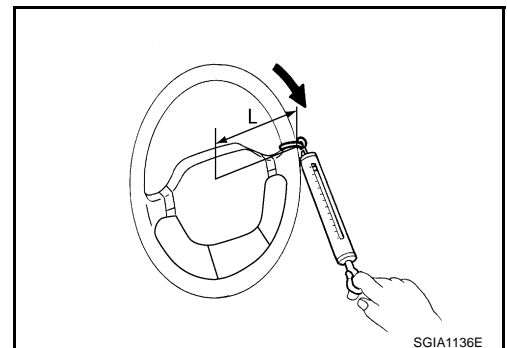
Steering wheel turning force

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

NOTE:

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

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-30, "On-Vehicle Inspection and Service"](#).



- a. Disconnect lower joint and steering knuckle from steering gear assembly. Refer to [PS-13, "COMPONENTS"](#), [FAX-4, "COMPONENTS"](#), [FAX-10, "COMPONENTS"](#).

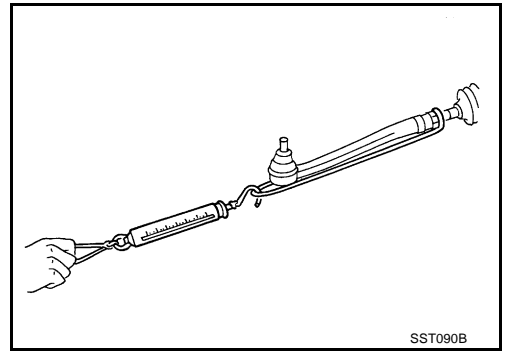
STEERING WHEEL

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

Rack sliding force

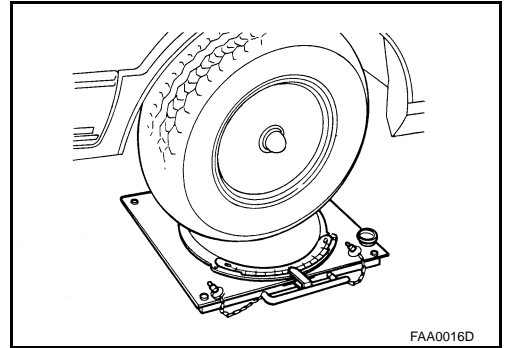
: 147 – 211 N (15 – 21.5 kg, 33 – 47 lb)

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



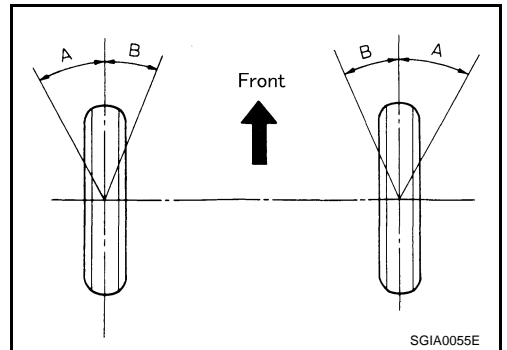
CHECKING FRONT WHEEL TURNING ANGLE

- 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.

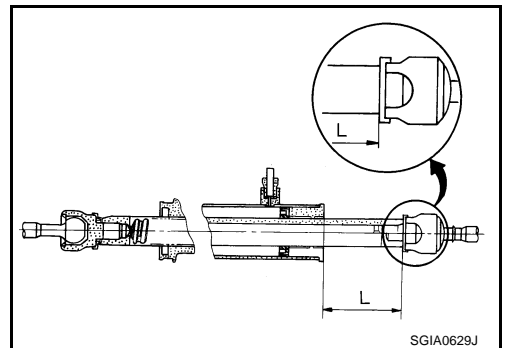
| | | |
|------------------------|---------|----------------|
| Inner wheel (Angle: A) | Minimum | 32°00' (32.0°) |
| | Nominal | 35°00' (35.0°) |
| | Maximum | 36°00' (36.0°) |
| Outer wheel (Angle: B) | | 30°00' (30.0°) |



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

| | |
|---------------|--------------------|
| Rack stroke L | 67.0 mm (2.638 in) |
|---------------|--------------------|

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



STEERING WHEEL

NGS000BX

Removal and Installation

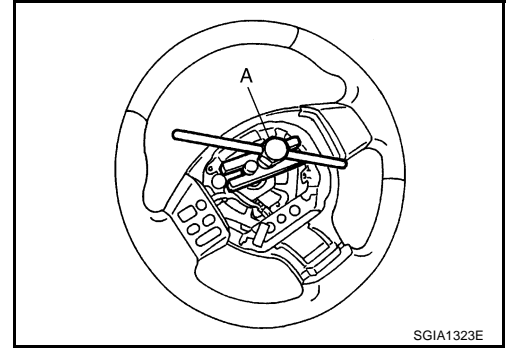
REMOVAL

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 direction.
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 using 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-45, "INSTALLATION"](#) .

CAUTION:

Do not twist spiral cable freely on excessively after it becomes tight (doing so may cause the cable to be turn off).

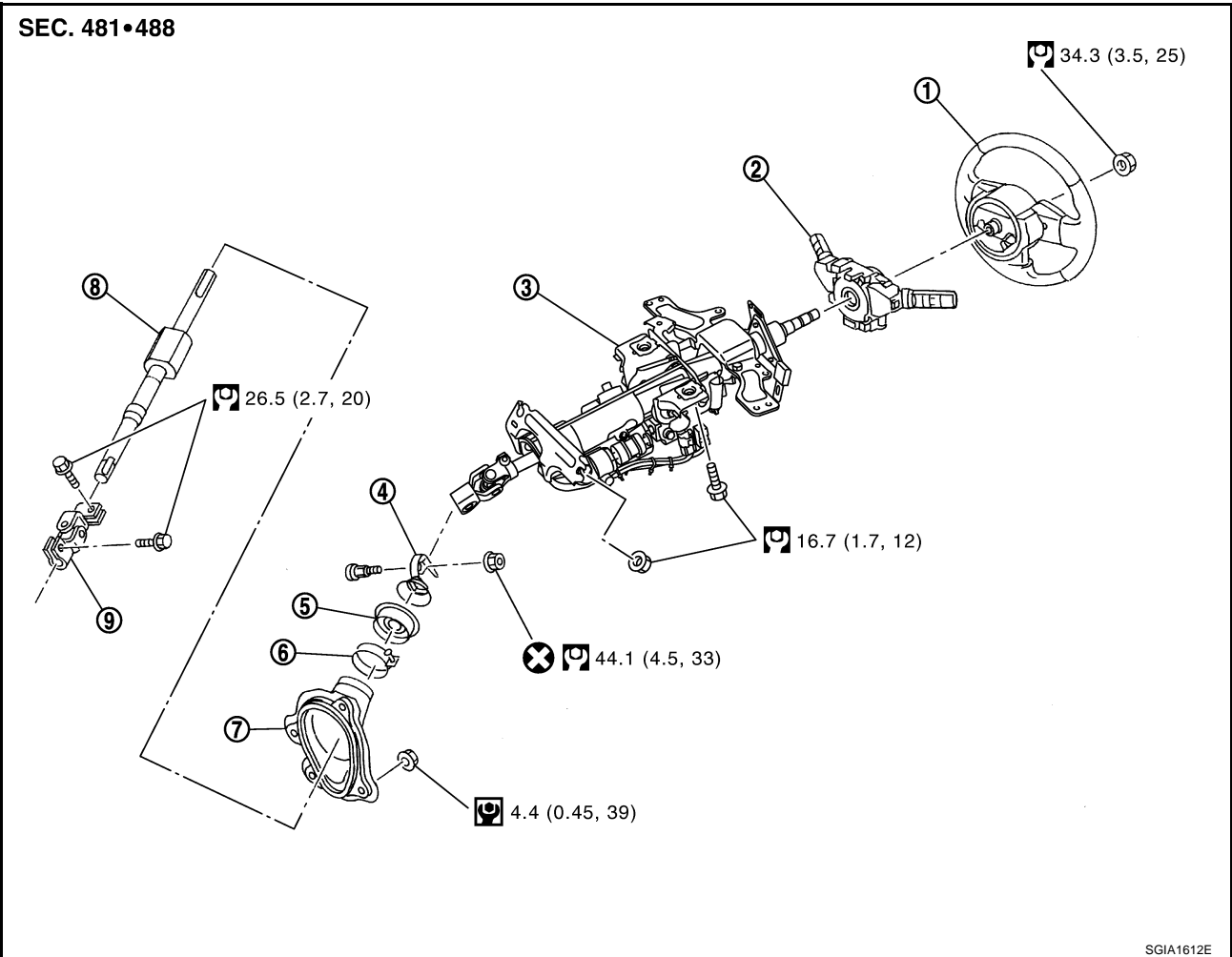
STEERING COLUMN

STEERING COLUMN

PF:48810

Removal and Installation COMPONENTS

NGS000BY



- | | | |
|-------------------|--------------------------------------|-----------------------------|
| 1. Steering wheel | 2. Combination switch & spiral cable | 3. Steering column assembly |
| 4. Collar | 5. Hole cover seal | 6. Clamp |
| 7. Hole cover | 8. Lower shaft | 9. Lower joint |

Refer to [GI-11, "Components"](#), for the symbols in the figure.

CAUTION:

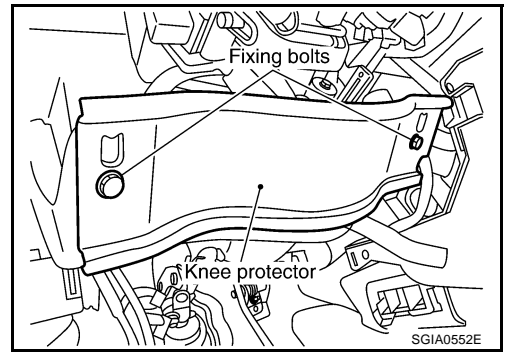
- Care must be taken not to give axial impact to steering column assembly during removal and installation.
- Care must be taken not to move steering gear during removal of steering column assembly.

REMOVAL

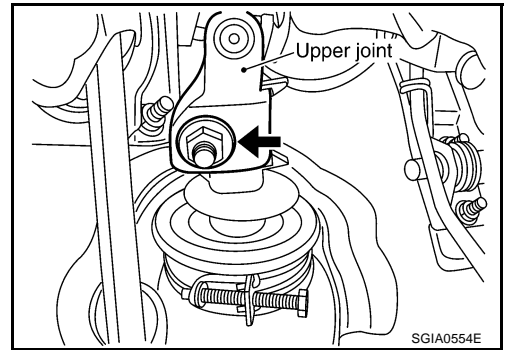
1. Set vehicle to the straight ahead-direction.
2. Remove driver air bag module from steering wheel. Refer to [SRS-42, "DRIVER AIR BAG MODULE"](#).
3. Disconnect steering switch connector, remove steering wheel lock nut, then remove steering wheel. Refer to [SRS-44, "SPIRAL CABLE"](#).
4. Remove steering column cover. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#).
5. Remove combination switch & spiral cable from steering column assembly. Refer to [SRS-44, "SPIRAL CABLE"](#).
6. Remove instrument lower panel (driver side). Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#).
7. Remove combination meter. Refer to [IP-10, "INSTRUMENT PANEL ASSEMBLY"](#).

STEERING COLUMN

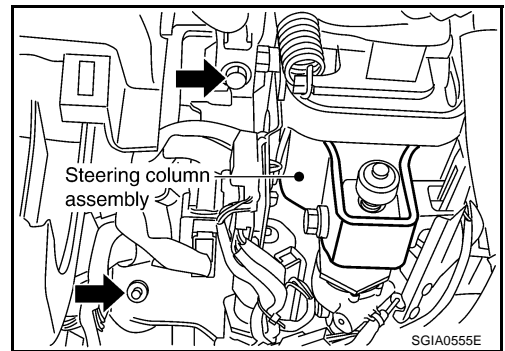
8. Remove fixing bolts of knee protector, then remove knee protector from vehicle.
9. Disconnect harness connector from each switch on steering column shaft, then separate vehicle side harness from it.



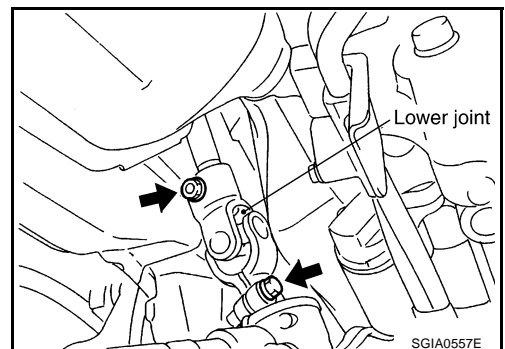
10. Remove lock nut and bolt, then separate lower shaft from upper joint of steering column assembly.



11. Remove fixing bolts and nuts from steering member, remove steering column assembly from steering member.
12. Remove hole cover seal and clamp.
13. Remove mounting nuts, then remove hole cover from panel.



14. Raise vehicle, then remove mounting bolts of lower joint.
15. Remove lower joint and lower shaft from vehicle.



STEERING COLUMN

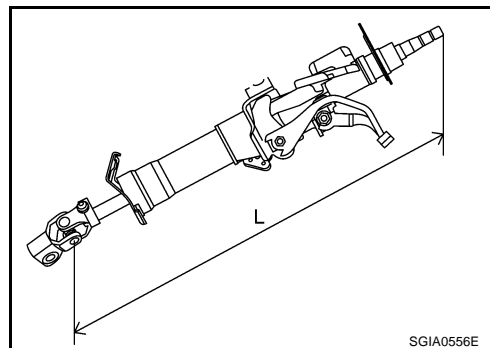
INSPECTION AFTER REMOVAL

- Check if there is something wrong with jacket tube of steering column assembly and collar etc. And then if they are damaged, replace with new one.
- If vehicle has a collision light shocked, check column length “L” as shown in the figure. Then if it is out of the specified value, replace with new one.

Steering column length “L”: 572 mm (22.52 in)

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

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



INSTALLATION

- Refer to [PS-13, "COMPONENTS"](#) for tightening torque. Install in the reverse order of removal.

NOTE:

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

- After removing/installing or replacing steering components, check wheel alignment. Refer to [FSU-6, "Wheel Alignment Inspection"](#).
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to [BRC-6, "Adjustment of Steering Angle Sensor Neutral Position"](#).

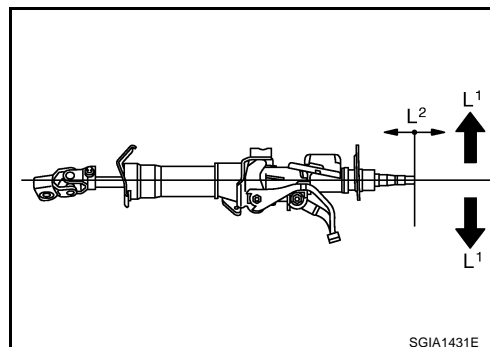
INSPECTION AFTER INSTALLATION

- Check tilt and telescopic mechanism operating range “L¹”, “L²” as shown in the figure.

Tilt operating range “L¹” : 28 - 32 mm (1.1 - 1.26 in)

Telescopic operating range “L²” : 18 - 22 mm (0.71 - 0.87 in)

- Check if steering wheel operation can turn to the end of the left and right smoothly.



STEERING COLUMN

-
- | | | |
|------------------------------|--------------------------------|--------------------------|
| 1. Meter bracket | 2. Jacket tube assembly | 3. Upper joint |
| 4. Spring | 5. Lock nut | 6. Lock block |
| 7. Telescopic lock guide | 8. Bush spacer | 9. Tilt link assembly |
| 10. Cooler | 11. Tilt unit assembly | 12. Tilt sensor assembly |
| 13. Connector assembly | 14. Clamp | 15. Spring |
| 16. Telescopic unit assembly | 17. Telescopic sensor assembly | |

DISASSEMBLY

Disassemble the parts from jacket tube. The parts to be disassembled are shown in the figure.

ASSEMBLY

Refer to [PS-16, "COMPONENTS"](#) for tightening torque. Install in the reverse order of disassembly.

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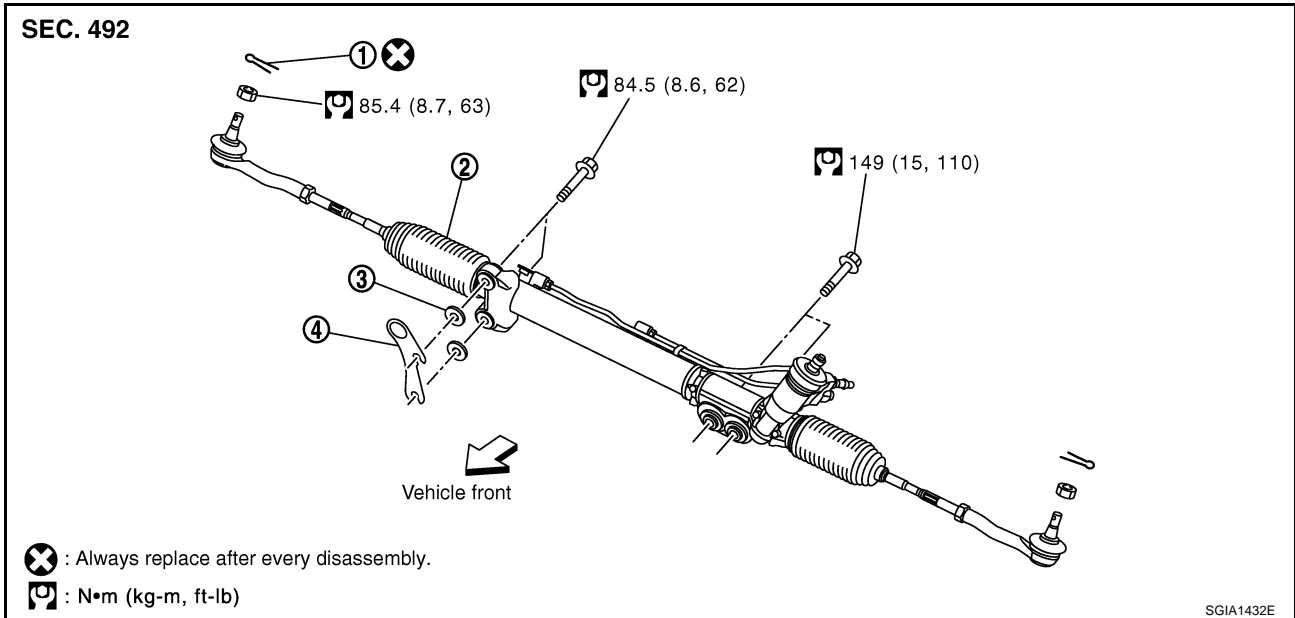
POWER STEERING GEAR AND LINKAGE

PF49001

NGS000C3

POWER STEERING GEAR AND LINKAGE

Removal and Installation COMPONENTS



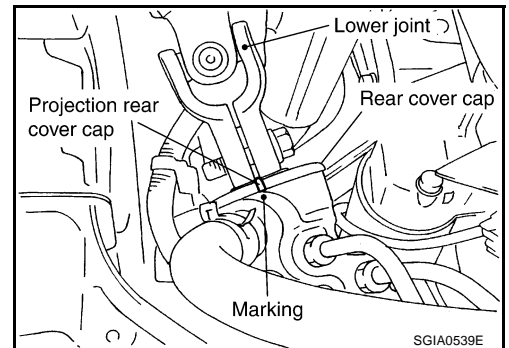
1. Cotter pin
2. Steering gear assembly
3. Washer
4. Clip

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

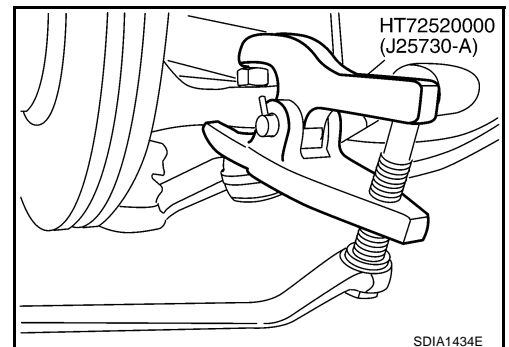
1. Set wheels in the straight-ahead position.
2. Remove tires from vehicle with power tool.
3. Remove undercover with power tool.
4. Confirm slit of lower joint fits with the projection on rear cover cap, furthermore marking position on steering gear assembly nearly fits with the projection on rear cover cap.
5. Remove cotter pin at steering outer socket, then loosen mounting nut.



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

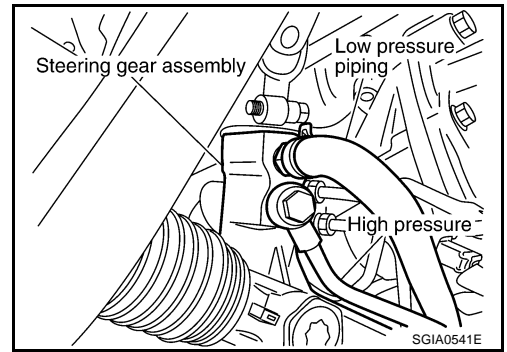
CAUTION:

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

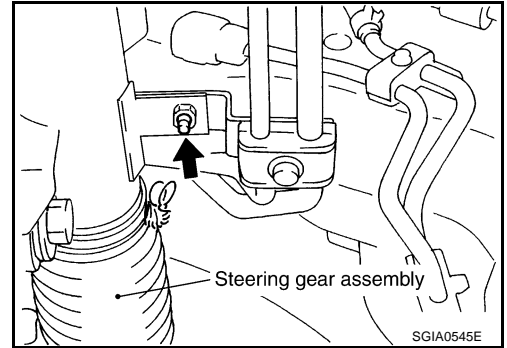


POWER STEERING GEAR AND LINKAGE

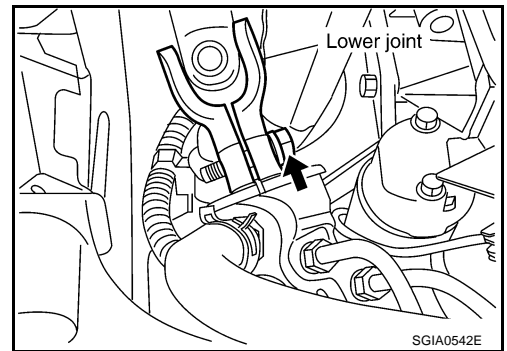
7. Remove oil pipings (high pressure side and low pressure side) from steering gear assembly, then drain fluid from pipings.



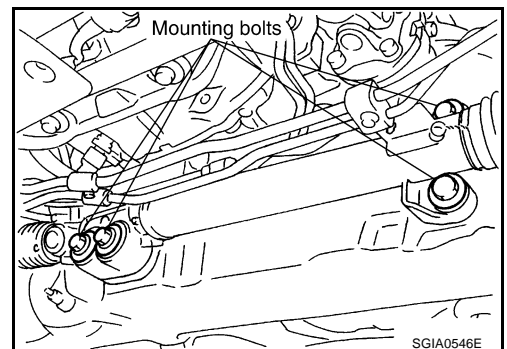
8. Remove mounting bolt of steering hydraulic piping bracket from steering gear assembly.



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



10. Remove mounting bolts of steering gear assembly with power tool, and then remove steering gear assembly from vehicle.



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POWER STEERING GEAR AND LINKAGE

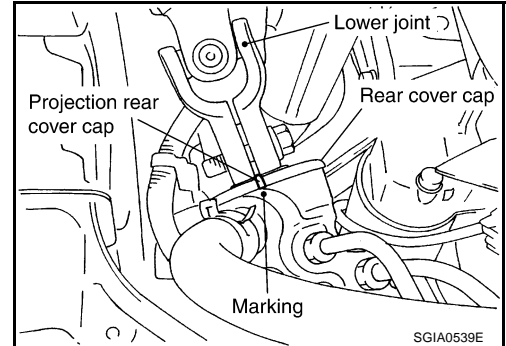
INSTALLATION

- Refer to [PS-18, "Removal and Installation"](#) for tightening torque. Install in the reverse order of removal.

NOTE:

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

- After removing/installing or replacing steering components, check wheel alignment. Refer to [FSU-6, "Wheel Alignment Inspection"](#) .
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to [BRC-6, "Adjustment of Steering Angle Sensor Neutral Position"](#) .
- 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-8, "Air Bleeding Hydraulic System"](#) .



INSPECTION AFTER INSTALLATION

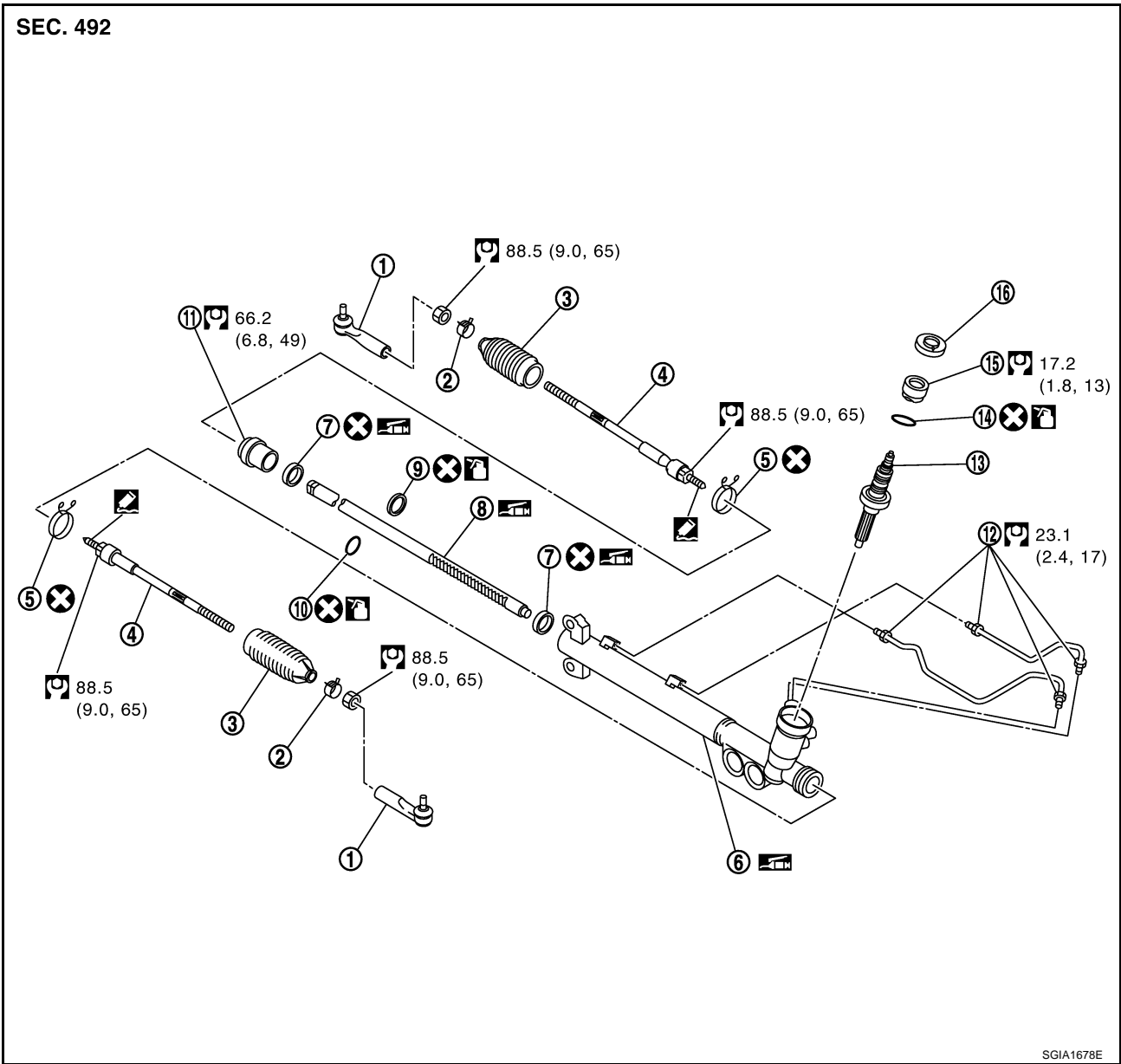
Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.

POWER STEERING GEAR AND LINKAGE

Disassembly and Assembly COMPONENTS

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

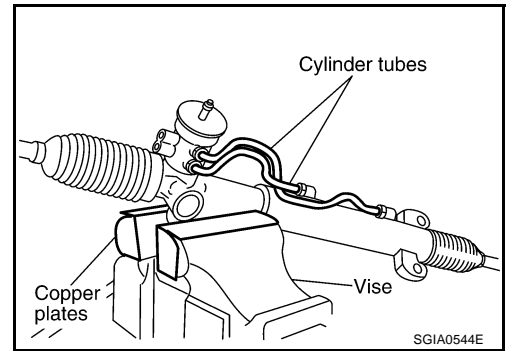
Refer to [GI-11, "Components"](#) and the followings for the symbols in the figure.

- Apply power steering fluid.
- Apply Genuine Liquid Gasket, Three Bond 1111B or equivalent.
- Apply multi-purpose grease.

POWER STEERING GEAR AND LINKAGE

CAUTION:

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

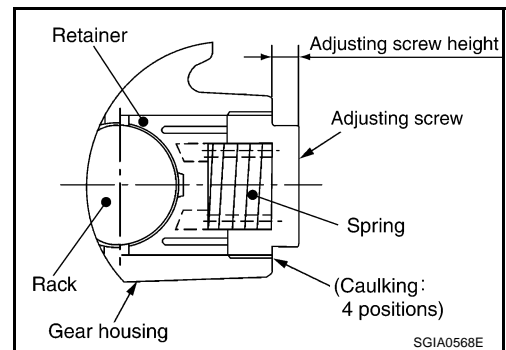


DISASSEMBLY

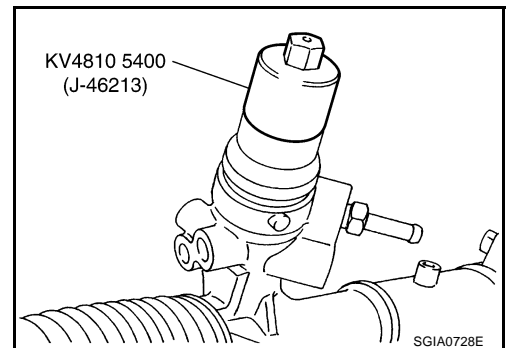
1. Remove cylinder tubes from gear housing assembly.
2. Remove rear cover cap from gear housing assembly.
3. Measure adjusting screw height from gear housing assembly, then loosen adjusting screw.

CAUTION:

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



4. Use a rear cover wrench (SST) to remove rear cover from pinion assembly.



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

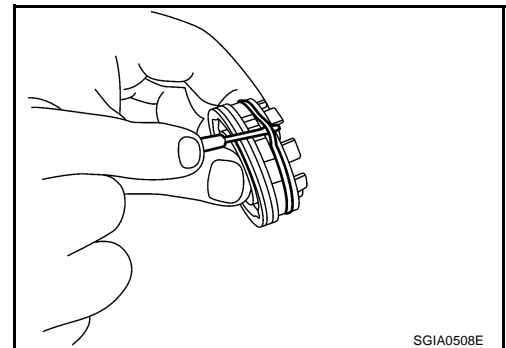
CAUTION:

In order to protect oil seal from any damage, pull pinion assembly out straightly.

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

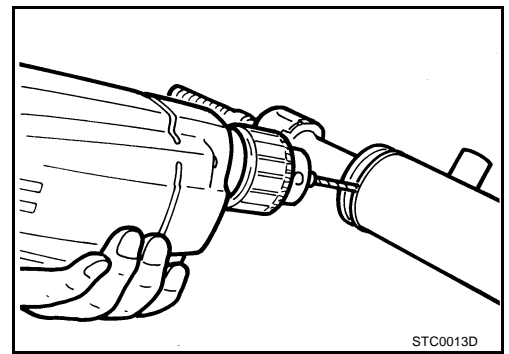
CAUTION:

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



POWER STEERING GEAR AND LINKAGE

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.



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

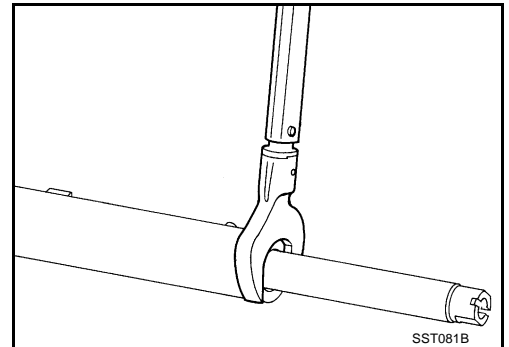
CAUTION:

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

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

CAUTION:

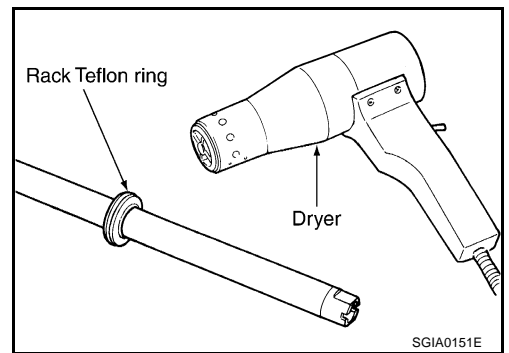
Be careful not to damage cylinder. If it is damaged, replace gear housing assembly. Otherwise, oil leaks may result.



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

CAUTION:

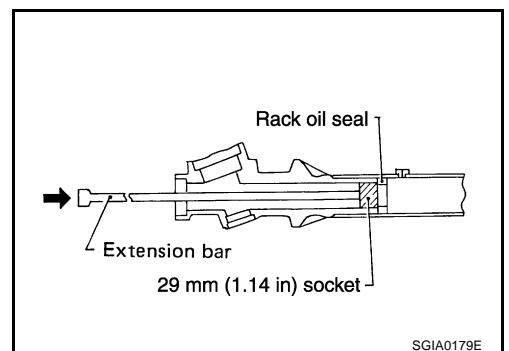
Be careful not to damage rack. If it is damaged, change to a new one to avoid oil leaks.



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

CAUTION:

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



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POWER STEERING GEAR AND LINKAGE

INSPECTION AFTER DISASSEMBLY

Boot

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

Rack

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

Pinion Assembly

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

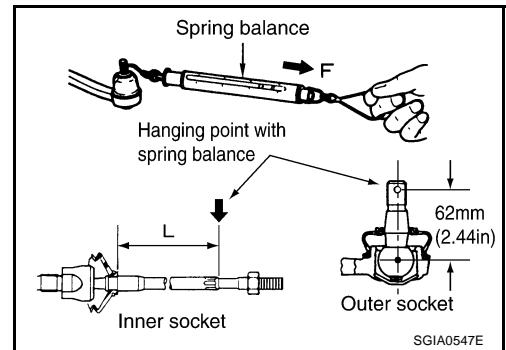
Gear Housing Assembly

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

Outer Socket and Inner Socket

Swing Torque

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

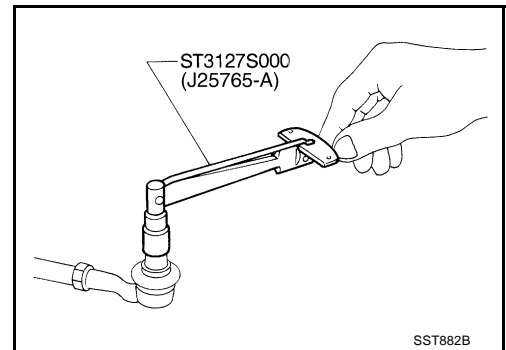


| Item | Outer socket | Inner socket |
|-----------------|--|--|
| Measuring point | Cotter pin hole of stud | Shown as L: 83.2 mm (3.276 in) |
| Swing torque | 0.3 – 2.9 N·m (0.03 – 0.29 kg·m, 3 – 25 in·lb) | 1.0 – 7.8 N·m (0.11 – 0.79 kg·m, 9 – 69 in·lb) |
| Measuring value | 4.84 – 46.7 N (0.5 – 4.8 kg, 1.0 - 10 lb) | 12.1 – 93.7 N (1.2 – 9.6 kg, 3.0 – 21 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) |
|-----------------|--|

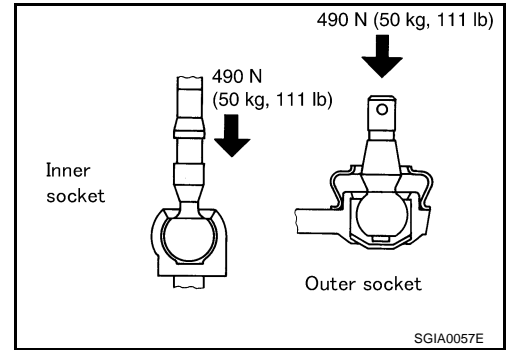


POWER STEERING GEAR AND LINKAGE

Axial End Play

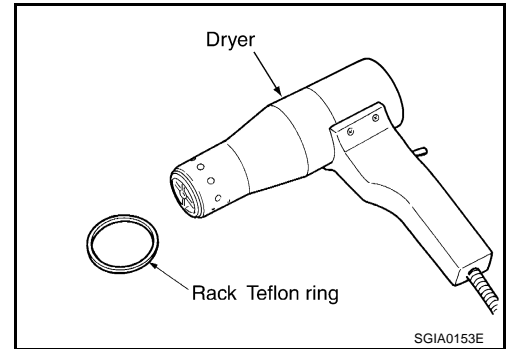
- Apply load of 490 N (50 kg, 110 lb) to ball stud axially. Use a dial gauge to measure the amount of the movement that the stud makes. Check if the reading is within the specified below. If the value is outside the standard, replace outer and inner sockets.

| | |
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| Outer socket | 0.5 mm (0.02 in) or less |
| Inner socket | 0.2 mm (0.01 in) or less |



ASSEMBLY

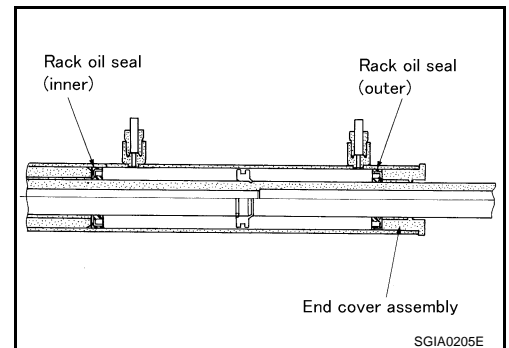
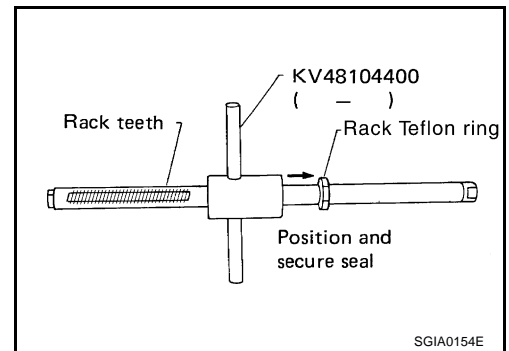
1. Apply recommended fluid to O-ring. Put an O-ring into rack Teflon ring.
2. Heat rack Teflon ring to approximately 40°C (104°F) with a dryer. Assemble it to mounting groove of rack.



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 recommended grease to rack oil seal. Insert rack oil seal, then insert rack assembly to gear housing assembly.

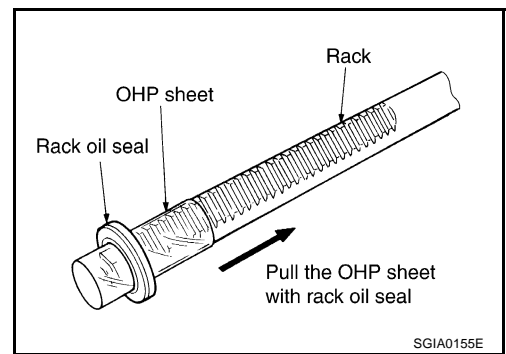
CAUTION:

- 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 leaks. Replace gear housing assembly.
- Attach rack oil seal. Both inner lip and outer lip should face each other.

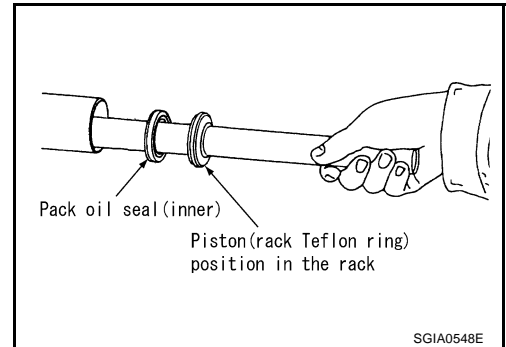


POWER STEERING GEAR AND LINKAGE

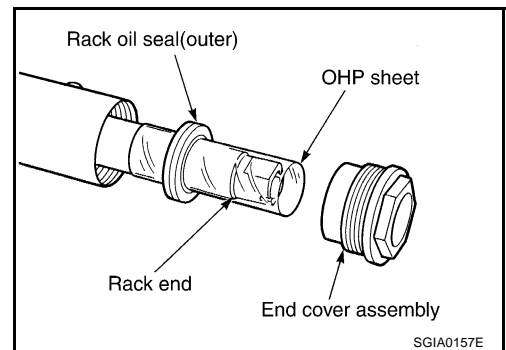
- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approximately. 70 mm (2.76 in) × 100 mm (3.94 in)] around rack tooth. Place oil seal on sheet. Then, pull oil seal along with OHP sheet until they pass the toothed section of rack, then remove it.



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



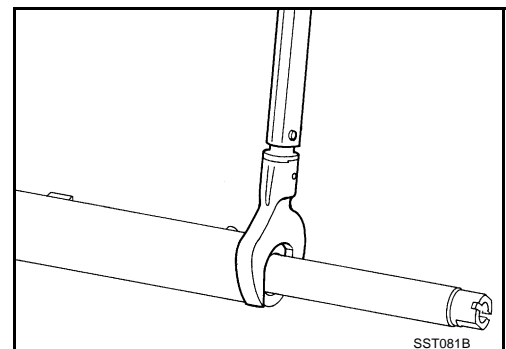
- c. When installing outer rack oil seal, cover the end of rack with an OHP sheet [70 mm (2.76 in) × 100 mm (3.94 in)]. It will avoid damaging rack oil seal. Then place oil seal on sheet. Pull rack oil seal along with OHP sheet until they pass rack end. Then remove OHP sheet.
- d. Install end cover assembly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



5. Using a 45 mm (1.77 in) open head (suitable tool), tighten end cover assembly at the specified torque.

CAUTION:

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



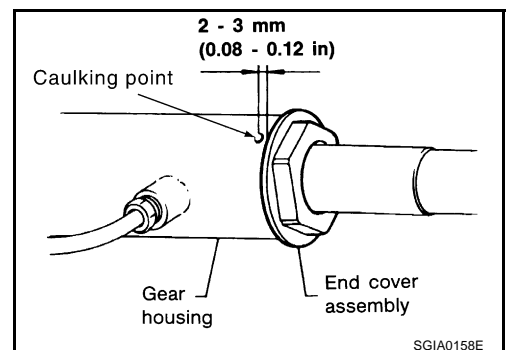
6. After tightening end cover assembly, caulk cylinder at one point as shown in the figure using a punch. This will prevent end cover from getting loose.

7. Install pinion assembly to gear housing assembly.

CAUTION:

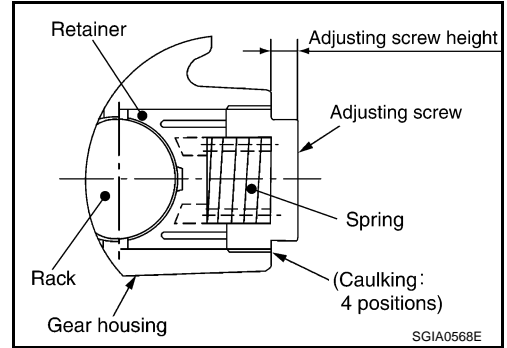
In order to protect oil seal from any damage, insert pinion assembly out straightly.

8. Apply recommended fluid to O-ring. Install O-ring to rear cover.
9. Use a rear cover wrench (SST), install rear cover to gear housing assembly.

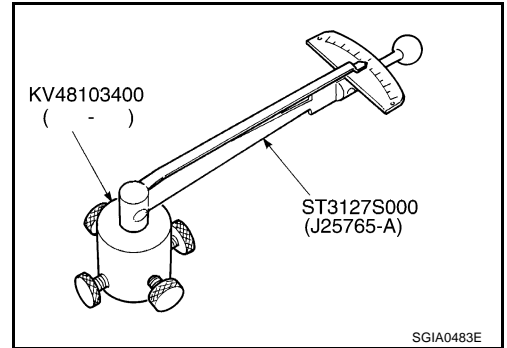


POWER STEERING GEAR AND LINKAGE

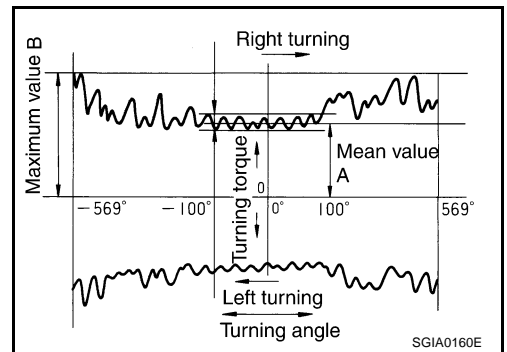
10. Confirm projection on rear cover cap nearly fit with marking position on gear housing assembly.
11. Apply recommended thread locking sealant to the thread (2 turns thread), and then screw in the adjusting screw until it reaches height "H" from gear housing assembly measured before disassembling.
12. Rotate pinion ten times whole range of rack so that parts get to fit with each other.



13. Measure pinion rotating torque within from -180° to $+180^\circ$, make preload gauge (SST) and torque adapter (SST) in rack neutral position, then hold preload gauge (SST) at maximum torque.
14. After loosening adjusting screw once, tighten it again with torque of 5.4 N·m (0.55 kg·m, 48 in·lb). After that loosen it within 20° to 40° .



15. Measure pinion rotating torque with torque adapter (SST) and preload gauge (SST), then confirm whether it's 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 rotating torque:

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

Average "A":

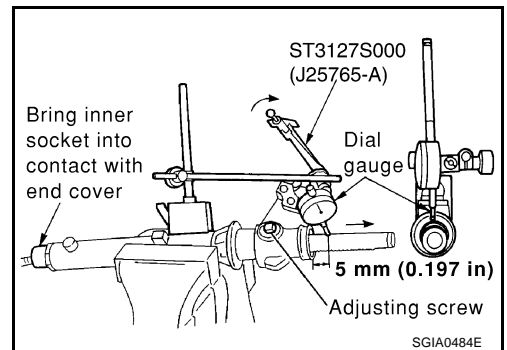
0.8 – 2.0 N·m (0.08 – 0.20 kg·m, 7 – 18 in·lb)

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

Maximum variation "B":

2.3 N·m (0.23 kg·m, 20 in·lb)

16. Turn pinion fully to the end of the left with inner socket to gear housing assembly.
17. Set dial gauge to rack as shown in the figure. Measure vertical movement of rack when pinion is turned counterclockwise with torque of 19.6 N·m (2.0 kg·m, 14 ft·lb). Check reading is within the specified 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 (0.51 kg·m, 44 in·lb), replace steering gear assembly.

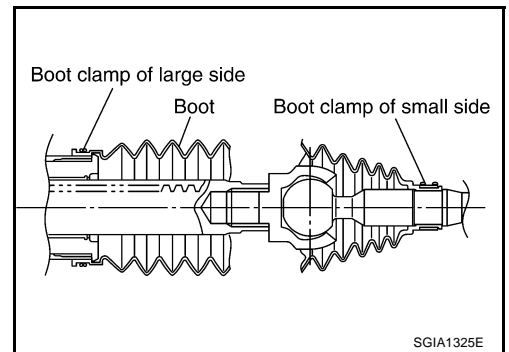


| | |
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| Amount of vertical movement with rack | Less than 0.265 mm (0.01 in) |
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POWER STEERING GEAR AND LINKAGE

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| Measuring point | Axial direction of rack | 5 mm (0.2 in) away from end of gear housing |
| | Radius direction of rack | Shaft direction of adjusting screw |

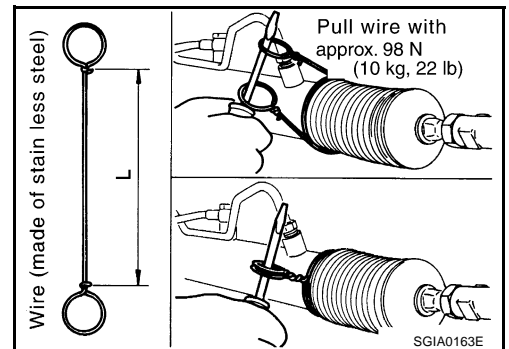
18. Install large-diameter side of boot to gear housing assembly.
19. Install small-diameter side of boot to the mounting groove of inner socket boot.
20. Install boot clamp to the small-diameter side of boot.
21. Install boot clamp to the large-diameter side of boot.



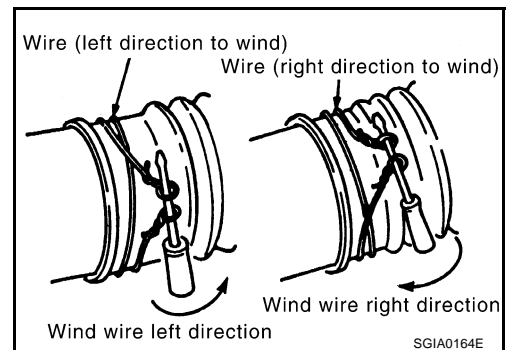
- a. Tighten large-diameter side of RH/LH boot with boot clamp (stainless wire).

Wire length "L" : 390 mm (15.35 in)

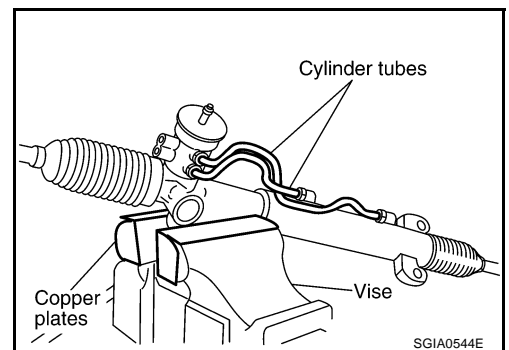
- b. After wrapping clamp around boot groove for two turns, insert screwdriver in loop on both ends of wire. Twist 4 to 4.5 turns while pulling with a force of approx. 98 N (10 kg, 22 lb).



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



22. Install cylinder tubes to gear housing assembly.
23. Install lock nut and outer socket to inner socket.



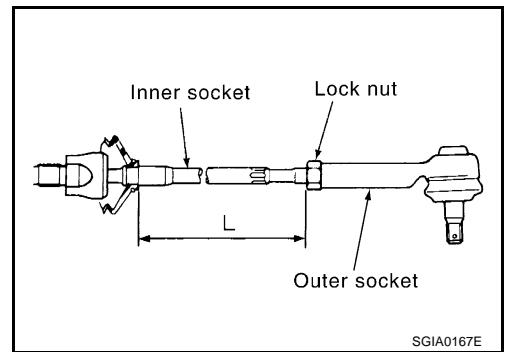
POWER STEERING GEAR AND LINKAGE

24. Tighten lightly inner socket in specified length "L", then tighten lock nut at specified torque. Refer to [PS-21, "Disassembly and Assembly"](#). Reconfirm if inner socket length is within limit of specified length "L".

Inner socket length "L" : 135.2 mm (5.32 in)

CAUTION:

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



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POWER STEERING OIL PUMP

PFP:49110

NGS000C5

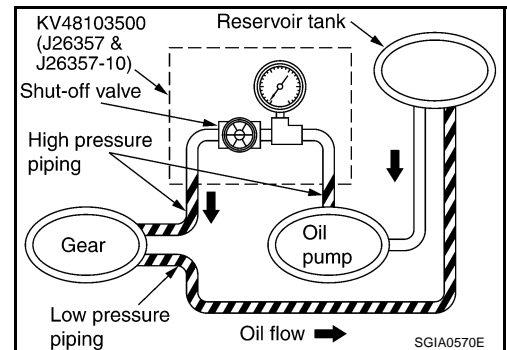
POWER STEERING OIL PUMP

On-Vehicle Inspection and Service CHECKING RELIEF OIL PRESSURE (VQ35DE MODELS)

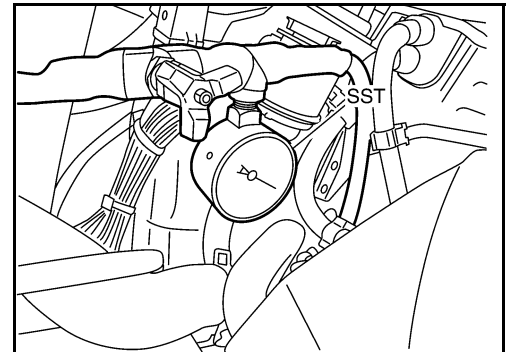
CAUTION:

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.



| SST | | |
|---------------------------|-------------|------------------------------------|
| Pressure gauge | | KV48103500 (J-26357&J-26357-10) |
| Oil pump side | Eye joint | KV48102500-01 (—) |
| | Washer | KV48102500-04 (—) |
| | Bolt | KV48102500-03 (—) |
| High pressure piping side | Flare joint | KV48102500-02 (—) |
| | Washer | KV48102500-04 (—) |
| | Bolt | KV48102500-03 (—) |



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

CAUTION:

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

3. With engine at idle, close shut-off valve and read the relief oil pressure.

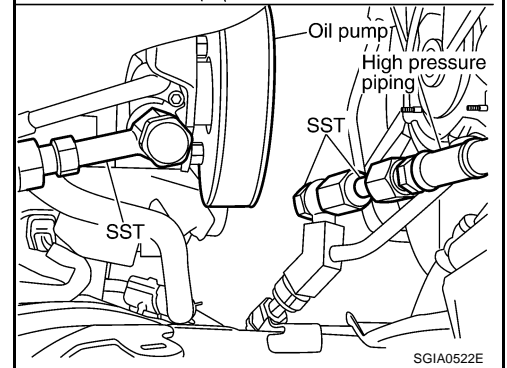
Relief oil pressure

: 9,900 - 10,700 kPa (101 - 109.1 kg/cm² , 1436 - 1552 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-33, "Disassembly and Assembly \(VQ35DE Models\)"](#).
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-8, "Air Bleeding Hydraulic System"](#).



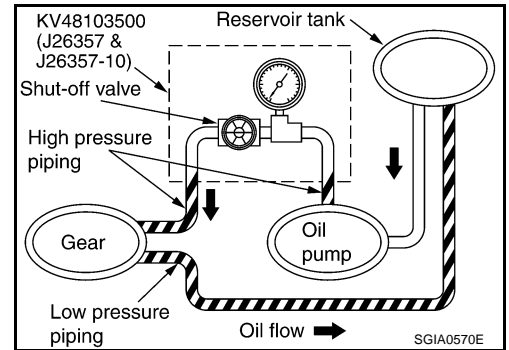
POWER STEERING OIL PUMP

CHECKING RELIEF OIL PRESSURE (VK45DE MODELS)

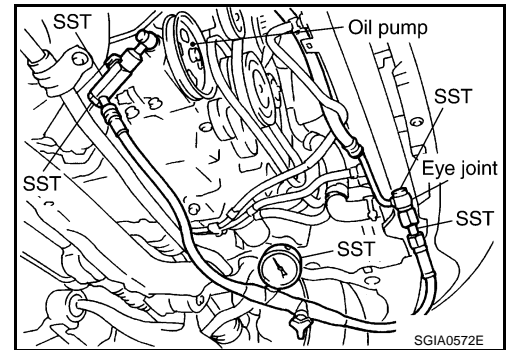
CAUTION:

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.



| SST | | |
|-----------------------------------|------------------------|--------------------------------------|
| Pressure gauge and shut-off valve | | KV48103500 (J26357 and J26357-10) |
| Oil pump side | Connector A and O-ring | KV48105300-4 and 5295262U10 (—) |
| | Eye-bolt and O-ring | KV48105300-3 and 5295262U00 (—) |
| High pressure piping side | Connector B and O-ring | KV48105300-1 and 5295262U00 (—) |
| | Nut | KV48105300-2 (—) |



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

CAUTION:

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

3. With engine at idle, close shut-off valve and read the relief oil pressure.

Relief oil pressure

: 9,900 - 10,700 kPa (101 - 109.1 kg/cm² , 1436 - 1552 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-37, "Disassembly and Assembly \(VK45DE Models\)"](#) .
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-8, "Air Bleeding Hydraulic System"](#) .

POWER STEERING OIL PUMP

Removal and Installation (VQ35DE Models)

NGS000C6

REMOVAL

1. Remove undercover from vehicle with power tool.
2. Loosen belt tensioner adjust screw, then remove belt from oil pump pulley. Refer to [EM-15, "DRIVE BELTS"](#) .
3. Drain power steering fluid from reservoir tank.
4. Remove piping of high pressure and low pressure (drain fluid from their pipings). Refer to [PS-41, "HYDRAULIC LINE"](#) .
5. Remove mounting bolts, then remove power steering pump.

INSTALLATION

Refer to [PS-41, "HYDRAULIC LINE"](#) for tightening torque. Install in the reverse order removal.

- After installation, adjust belt tension. Refer to [EM-15, "DRIVE BELTS"](#) .
- After installation, bleed air. Refer to [PS-8, "Air Bleeding Hydraulic System"](#) .

Removal and Installation (VK45DE Models)

NGS000C7

REMOVAL

1. Remove undercover from vehicle with power tool.
2. Remove power steering oil pump belt from auto tensioner. Refer to [EM-174, "DRIVE BELTS"](#) .
3. Drain power steering fluid from reservoir tank.
4. Remove piping of high pressure and low pressure from power steering oil pump (drain fluid from their pipings). Refer to [PS-41, "HYDRAULIC LINE"](#) .
5. Remove mounting bolts, then remove power steering pump.

INSTALLATION

Refer to [PS-41, "HYDRAULIC LINE"](#) for tightening torque. Install in the reverse order removal.

After installation, bleed air. Refer to [PS-8, "Air Bleeding Hydraulic System"](#) .

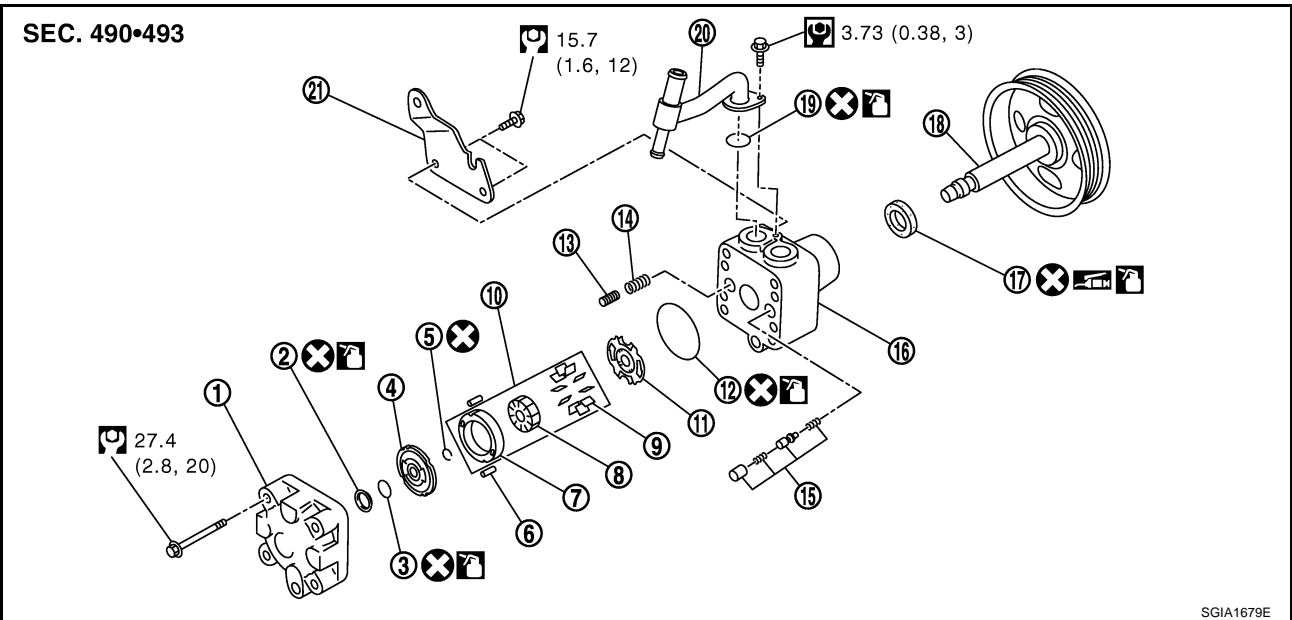
NOTE:

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

POWER STEERING OIL PUMP

Disassembly and Assembly (VQ35DE Models) COMPONENTS

NGS000C8



- | | | |
|--------------------------|----------------------|-----------------------------------|
| 1. Rear cover | 2. Teflon ring | 3. O-ring |
| 4. Rear side plate | 5. Rotor snap ring | 6. Dowel pin |
| 7. Cam ring | 8. Rotor | 9. Vane |
| 10. Cartridge | 11. Front side plate | 12. O-ring |
| 13. Flow control valve A | 14. Spring | 15. Flow control valve B assembly |
| 16. Body assembly | 17. Oil seal | 18. Pulley |
| 19. O-ring | 20. Suction pipe | 21. Bracket |

INSPECTION BEFORE DISASSEMBLY

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

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

DISASSEMBLY

NOTE:

Fix oil pump in vise as the occasion demands.

CAUTION:

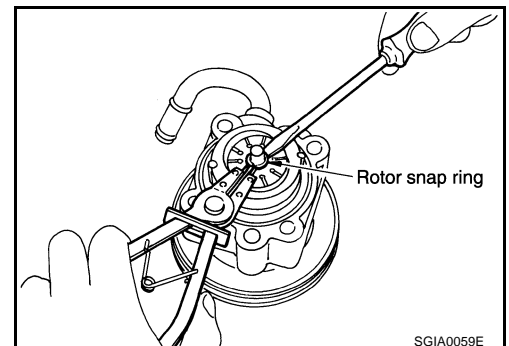
When retaining drive shaft in a vise, always use copper or aluminum plates between vise and shaft.

1. Unscrew four rear cover bolts and remove rear cover from body assembly.
2. Remove rear side plate from cartridge, then remove Teflon ring and O-ring from rear side plate.
3. Remove rotor snap ring with snap ring pliers, and remove pulley from body assembly.

CAUTION:

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

4. Remove oil seal from body assembly.



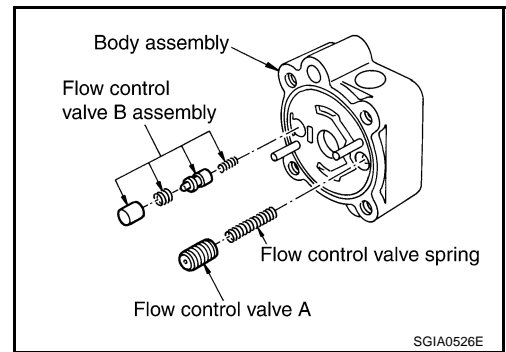
POWER STEERING OIL PUMP

- Remove cam ring, rotor, vane, front side plate, flow control valve A, spring, flow control valve B assembly and O-ring from body assembly.

CAUTION:

Be careful not to drop and deform flow control valve A and flow control valve B assembly.

- Remove suction pipe from body assembly.
- Remove O-ring from suction pipe.
- Remove bracket from body assembly.



INSPECTION AFTER DISASSEMBLY

Body Assembly and Rear Cover Inspection

Check body assembly and rear cover for internal damage. Replace rear cover if it is damaged. Replace oil pump assembly if body assembly is damaged.

Cartridge Assembly Inspection

Check cam ring, rotor and vane for damage. Replace cartridge assembly if necessary.

Side Plate Inspection

Check side plate (front and rear) for damage. Side plate (front and rear) must be replaced as a set if they are damaged.

Flow Control Valve Inspection

Check flow control valve A, flow control valve spring and flow control valve B assembly for damage. Replace if there are.

ASSEMBLY

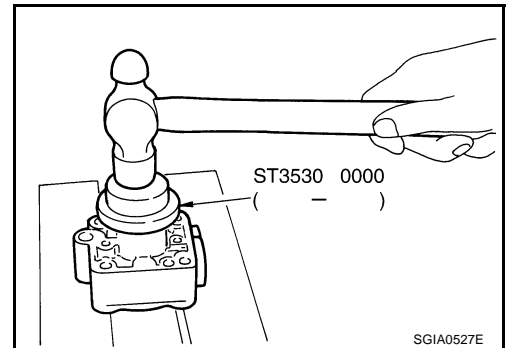
NOTE:

Fix oil pump in vise as occasion demands.

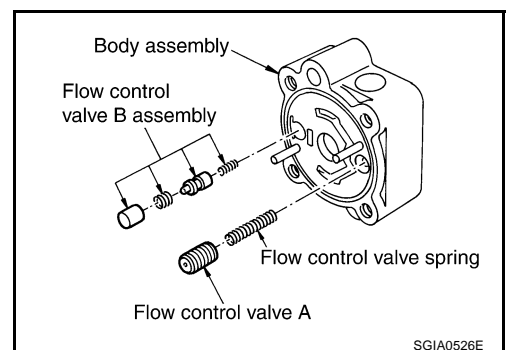
CAUTION:

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

- Apply recommended grease to oil seal lips. Apply recommended fluid to around oil seal, and then install oil seal to body assembly using the drift [SST].
- If dowel pin has been removed, insert it into body assembly by hand. If it cannot be inserted by hand, lightly tap with a hammer.

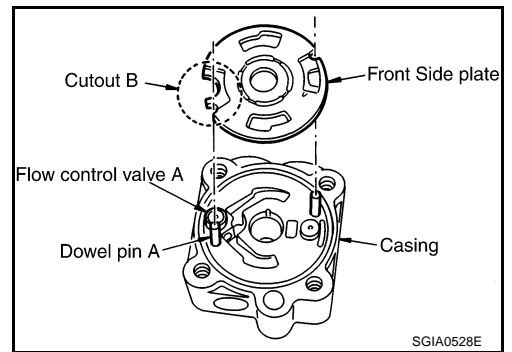


- Install flow control valve A, flow control valve spring and flow control valve B assembly to locations shown in the figure.



POWER STEERING OIL PUMP

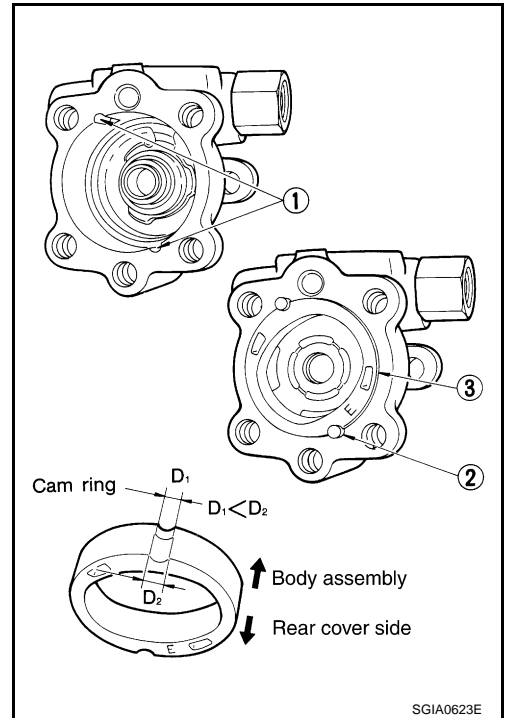
4. Match dowel pin A on flow control valve A, shown in the figure, with cutout B of front side plate and then install front side plate to body assembly.



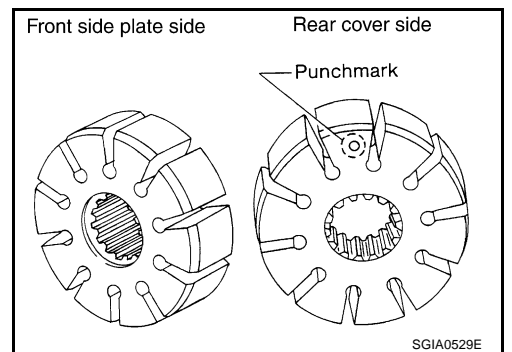
5. Install cam ring onto front side plate with smaller slit of cam ring facing body assembly.
6. Install pulley to body assembly.

CAUTION:

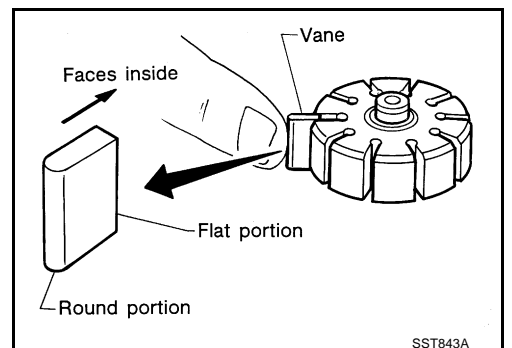
When installing pulley, be careful not to scratch oil seal.



7. Face the side of rotor with punch mark towards rear cover, and attach rotor to pulley shaft.



8. Install vane to rotor with facing the round portion outside.



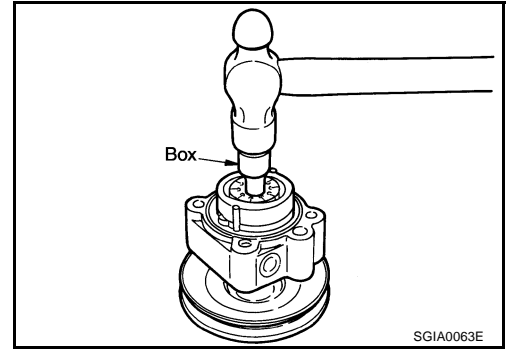
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POWER STEERING OIL PUMP

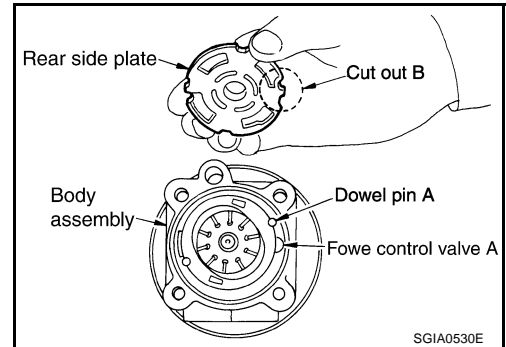
- Using a hammer and a 10 mm (0.39 in) box, install rotor snap ring to slot in pulley shaft.

CAUTION:

Be careful not to damage rotor and pulley shaft.



- Match dowel pin A on flow control valve A, shown in the figure, with cutout B of rear side plate and install rear side plate to cartridge.
- Apply recommended fluid to O-ring and install O-ring into rear side plate.
- Apply recommended fluid to Teflon ring and Install Teflon ring into rear side plate.
- Position rear cover on body assembly and tighten mounting bolts to specified torque.
- Apply recommended fluid to O-ring and install O-ring into suction pipe.
- Install suction pipe into body assembly.
- Install bracket to body assembly and tighten mounting bolts to specified torque.

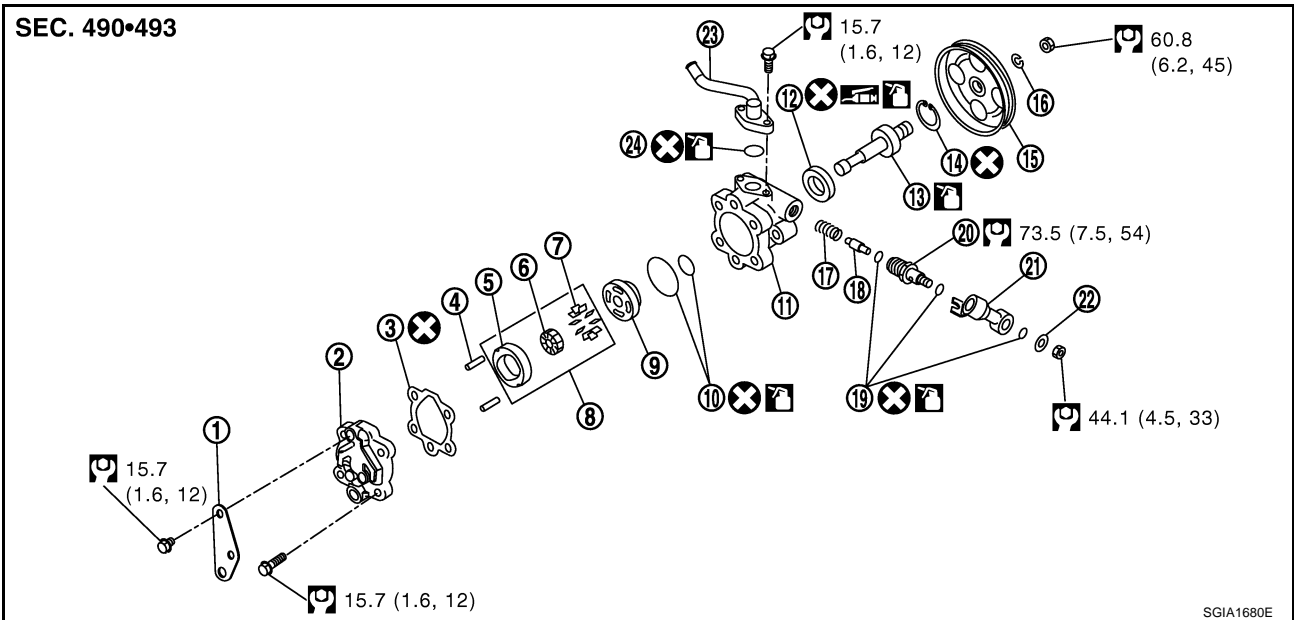


POWER STEERING OIL PUMP

Disassembly and Assembly (VK45DE Models) COMPONENTS

NGS000C9

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- | | | |
|--------------------------|--------------------|------------------------|
| 1. Bracket | 2. Rear cover | 3. Gasket |
| 4. Lock pin | 5. Cam ring | 6. Rotor |
| 7. Vane | 8. Cartridge | 9. Side plate |
| 10. O-ring | 11. Body assembly | 12. Oil seal |
| 13. Drive shaft assembly | 14. Snap ring | 15. Pulley |
| 16. Spring washer | 17. Spring | 18. Flow control valve |
| 19. O-ring | 20. Connector bolt | 21. Joint |
| 22. Washer | 23. Suction pipe | 24. O-ring |

PS

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INSPECTION BEFORE DISASSEMBLY

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

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

DISASSEMBLY

NOTE:

Fix oil pump in vise as the occasion demands.

CAUTION:

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

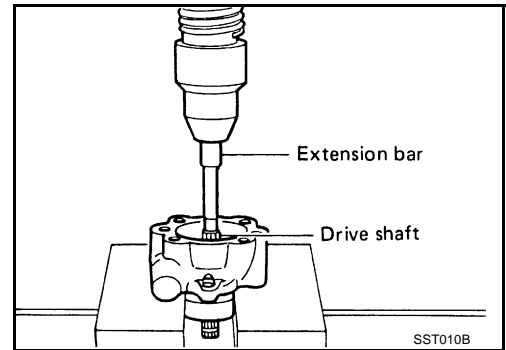
1. Unscrew three bracket bolts and remove bracket from rear cover.
2. Unscrew four rear cover bolts and remove rear cover from body assembly.
3. Remove gasket from body assembly.
4. Remove lock pin, cartridge and side plate from body assembly.
5. Remove pulley from drive shaft assembly.

POWER STEERING OIL PUMP

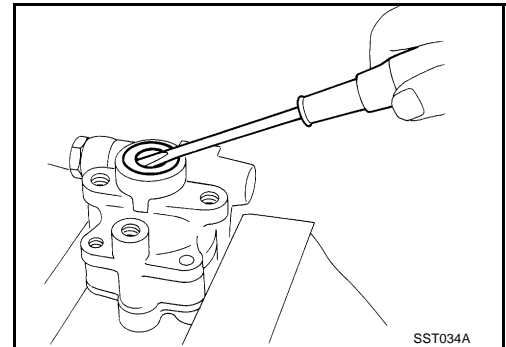
6. Remove snap ring from drive shaft assembly and press out it.

CAUTION:

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



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

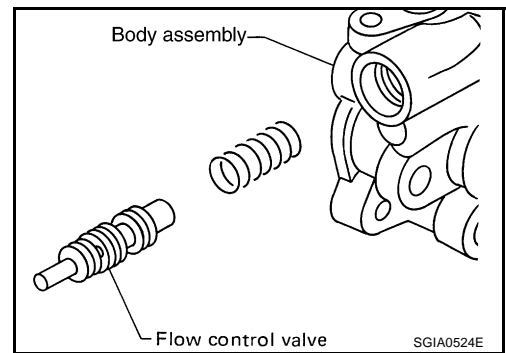


9. Loosen lock nut and remove washer, O-ring, joint then remove connector bolt, O-ring and pull out flow control valve and spring from body assembly.

CAUTION:

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

10. Remove suction pipe from body assembly.
11. Remove O-ring for suction pipe.



INSPECTION AFTER DISASSEMBLY

Body Assembly and Rear Cover Inspection

Check body assembly and rear cover for internal damage. Replace rear cover if it is damaged. Replace oil pump assembly if body assembly is damaged.

Cartridge Assembly Inspection

Check cam ring, rotor and vane for damage. Replace cartridge assembly if there are.

Side Plate Inspection

Check side plate for damage. Replace side plate if there are.

Flow Control Valve Inspection

Check flow control valve and spring for damage. Replace if there are.

POWER STEERING OIL PUMP

ASSEMBLY

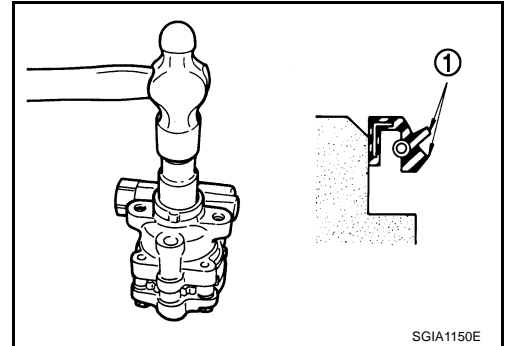
NOTE:

Fix oil pump in vise as vise occasion demands.

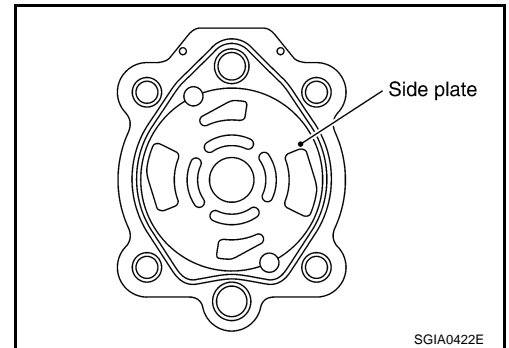
CAUTION:

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

1. Apply recommended grease to oil seal lips (1). Apply recommended fluid to around oil seal, and then install oil seal to body assembly.
2. Apply recommended fluid to drive shaft assembly and press drive shaft assembly into body assembly with suitable tool, then install snap ring.
3. Apply recommended fluid to O-ring and Install O-ring into body assembly.



4. Install side plate to body assembly.

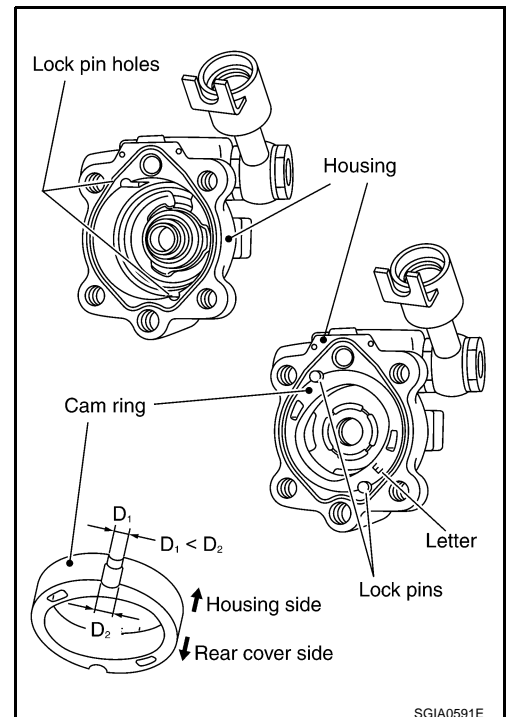


5. Install lock pin into lock pin hole, and install cam-ring as shown in the figure.

- When installing cam-ring, turn carved face with a letter (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.

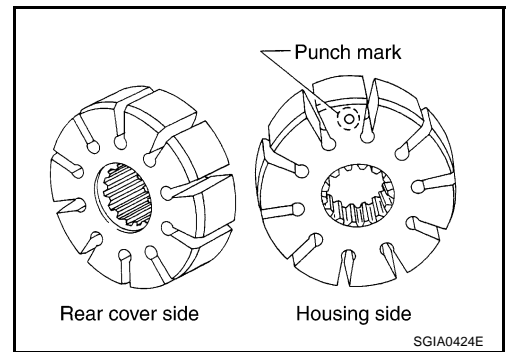


6. Install rotor to body assembly.

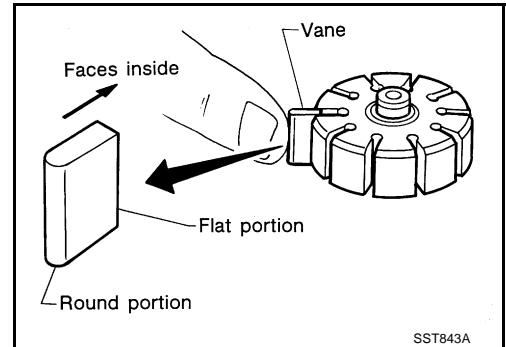
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POWER STEERING OIL PUMP

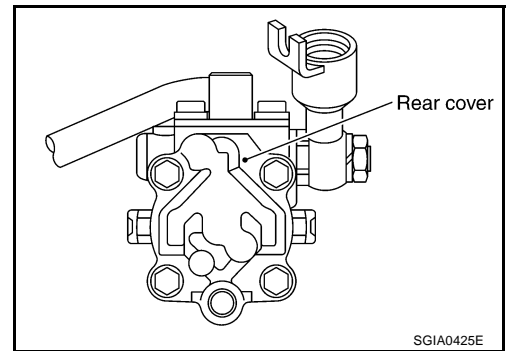
- When installing rotor, turn punch mark face on rotor to body assembly.



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



10. Install rear cover to body assembly and tighten bolts at the specified torque.
11. Install bracket to rear cover and tighten bolts at the specified torque.
12. Install pulley to drive shaft assembly then tighten lock nut at the specified torque.
13. Install spring, flow control valve, O-ring, connector bolt, joint, washer to body assembly. Then tighten lock nut at the specified torque.
14. Apply recommended fluid to O-ring and Install O-ring to suction pipe.
15. Install suction pipe to body assembly.



HYDRAULIC LINE

HYDRAULIC LINE

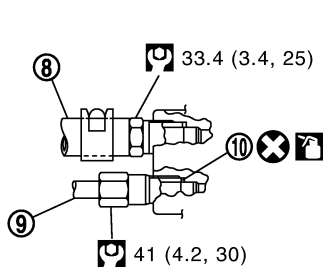
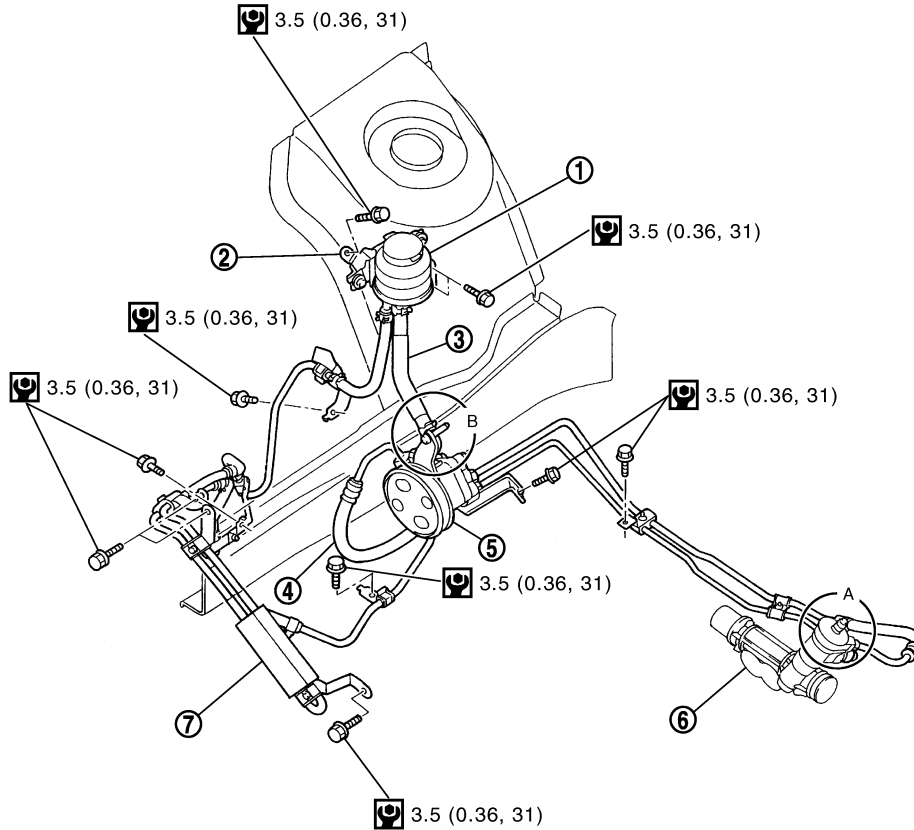
PFP:49721

Components

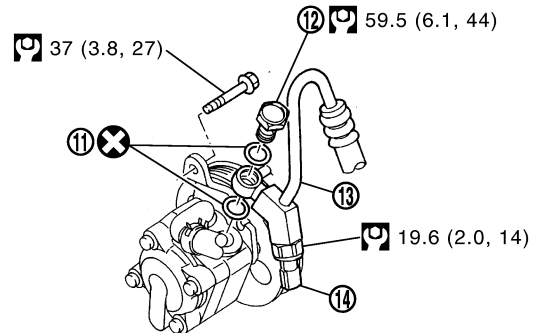
NGS000CA

VQ35DE 2WD MODEL

SEC. 497



A




B

SGIA1681E

- | | | |
|--|----------------------------|---------------------------|
| 1. Reservoir tank | 2. Reservoir tank bracket | 3. Suction hose |
| 4. High pressure hose | 5. Power steering oil pump | 6. Steering gear assembly |
| 7. Oil cooler | 8. Low pressure piping | 9. High pressure piping |
| 10. O-ring | 11. Copper washer | 12. Eye-bolt |
| 13. Eye-joint (assembled to high pressure side hose) | 14. Pressure sensor | |

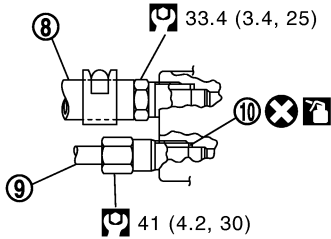
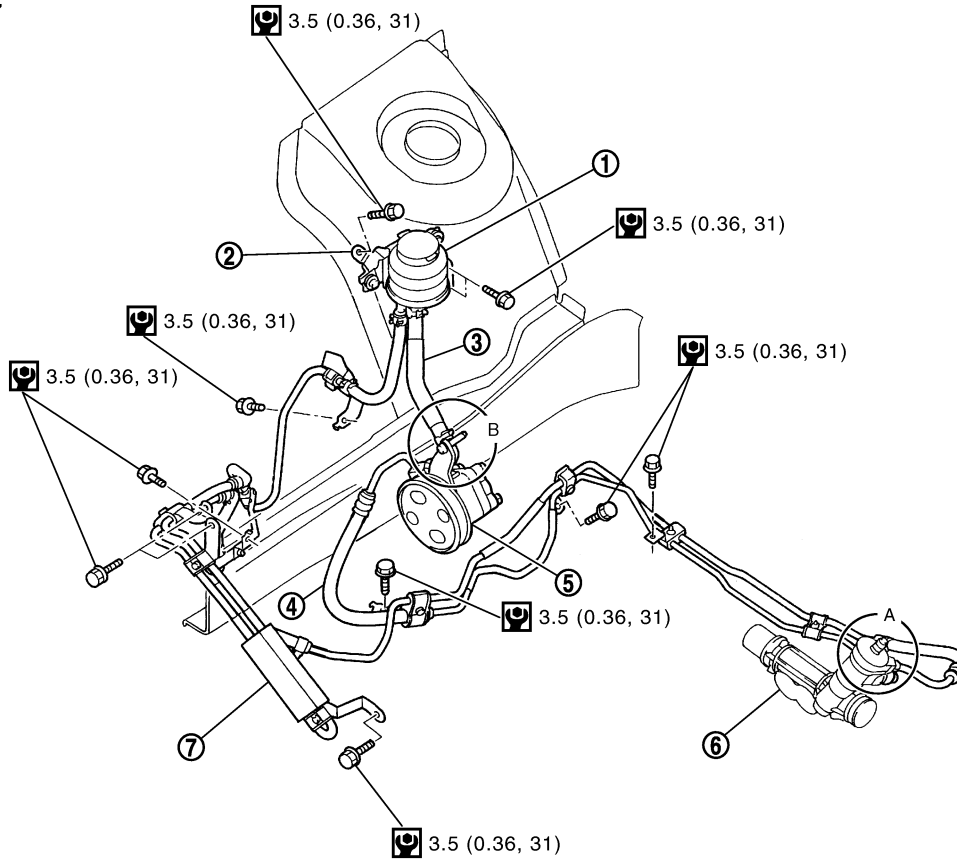
Refer to [GI-11, "Components"](#) and the followings for the symbols in the figure.

 Apply power steering fluid.

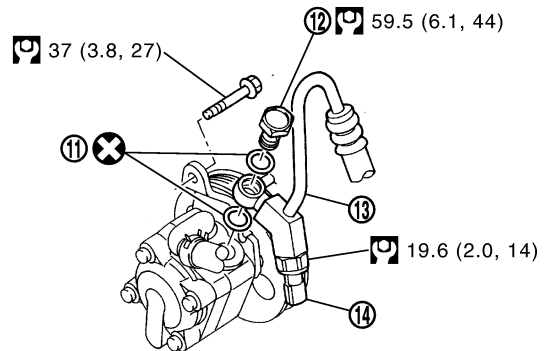
HYDRAULIC LINE

VQ35DE AWD MODEL

SEC. 497



A



B

SGIA1682E

- | | | |
|--|----------------------------|---------------------------|
| 1. Reservoir tank | 2. Reservoir tank bracket | 3. Suction hose |
| 4. High pressure hose | 5. Power steering oil pump | 6. Steering gear assembly |
| 7. Oil cooler | 8. Low pressure piping | 9. High pressure piping |
| 10. O-ring | 11. Copper washer | 12. Eye-bolt |
| 13. Eye-joint (assembled to high pressure side hose) | 14. Pressure sensor | |

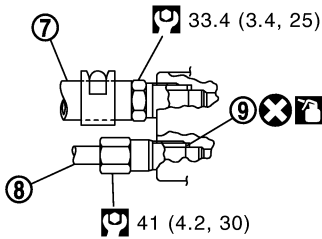
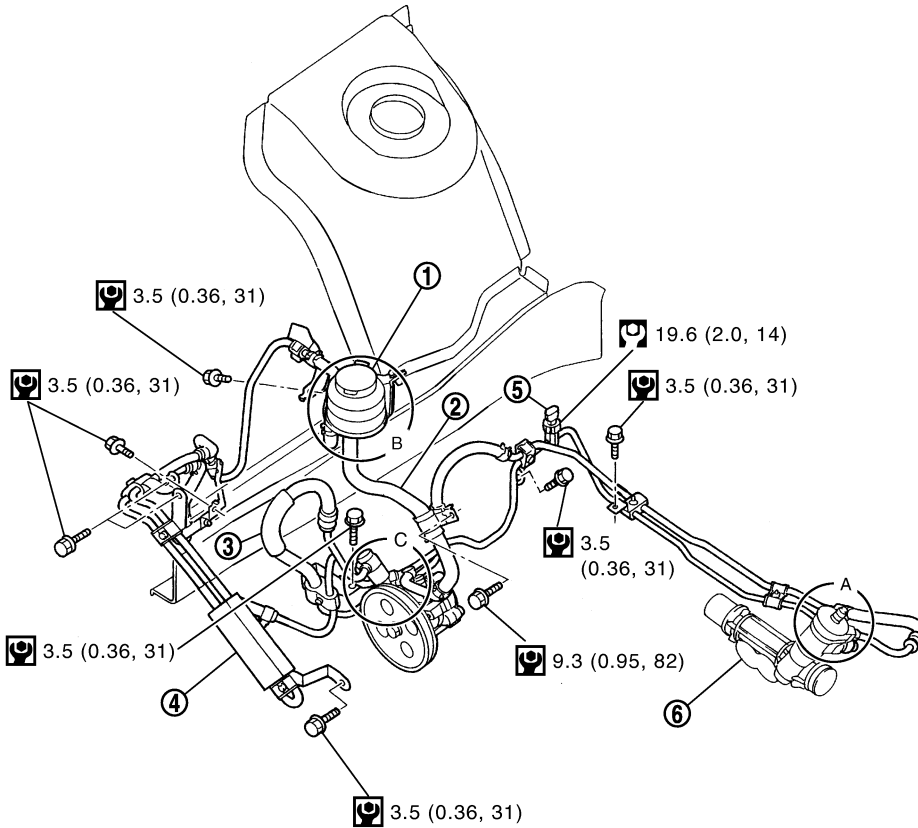
Refer to [GI-11, "Components"](#) and the followings for the symbols in the figure.

: Apply power steering fluid.

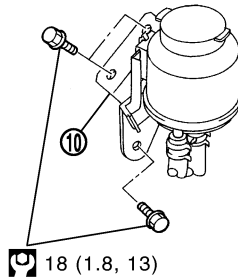
HYDRAULIC LINE

VK45DE AWD MODEL

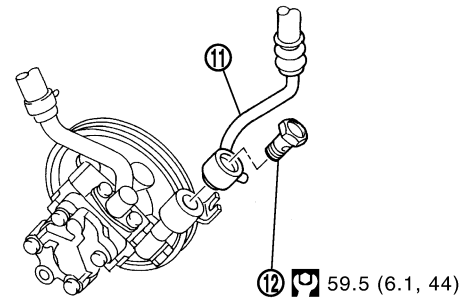
SEC. 497



A




B



C

- | | | |
|----------------------------|--|---------------------------|
| 1. Reservoir tank | 2. Suction hose | 3. High pressure hose |
| 4. Oil cooler | 5. Pressure sensor | 6. Steering gear assembly |
| 7. Low pressure piping | 8. High pressure piping | 9. O-ring |
| 10. Reservoir tack bracket | 11. Eye-joint (assembled to high pressure side hose) | 12. Eye-bolt |

Refer to [GI-11, "Components"](#) and the followings for the symbols in the figure.

: Apply power steering fluid.

A
B
C
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PS
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SGIA1683E

HYDRAULIC LINE

NGS000CB

Removal and Installation

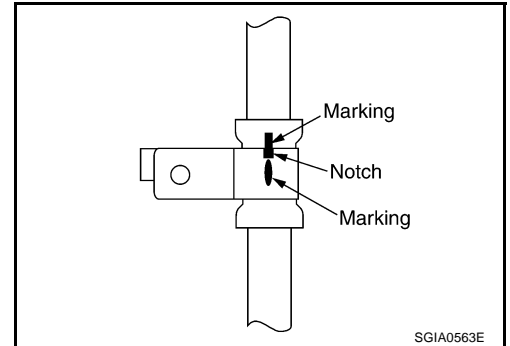
VQ35DE MODELS

- Refer to [PS-41, "Components"](#) for tightening torque. Install in the reverse order of removal.

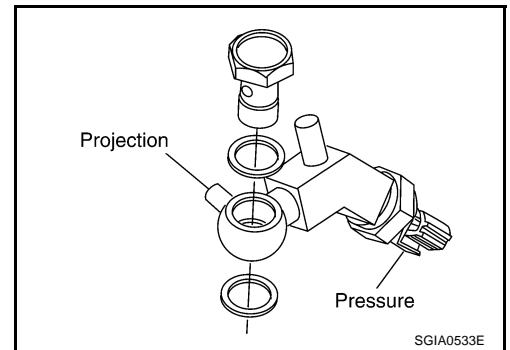
NOTE:

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

- Confirm with mating marking that if it is in phase with hose and clamp, then correct if needs.



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



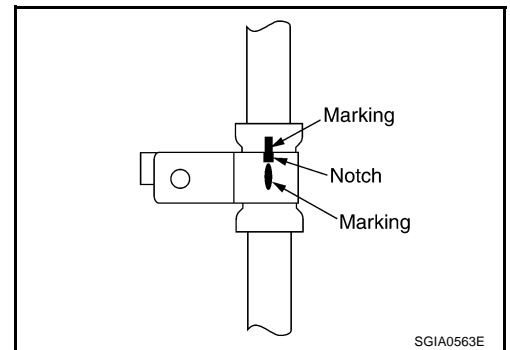
VK45DE MODELS

- Refer to [PS-41, "Components"](#) for tightening torque. Install in the reverse order of removal.

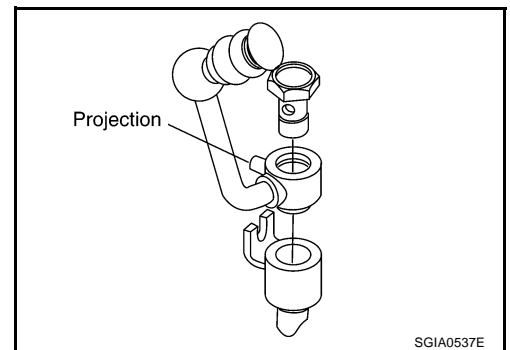
NOTE:

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

- Confirm with mating marking that if it is in phase with hose and clamp, then correct if needs.



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



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

Steering Wheel

NGS000CE

| | |
|---|-------------------------|
| 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) |

Steering Angle

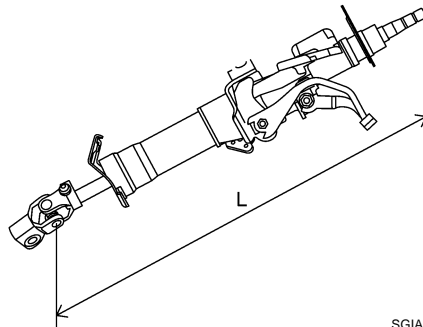
NGS000CF

| | | |
|---|---------|----------------|
| Inner wheel Degree minute (Decimal degree) | Minimum | 32°00' (32.0°) |
| | Nominal | 35°00' (35.0°) |
| | Maximum | 36°00' (36.0°) |
| Outer wheel Degree minute (Decimal degree) | Nominal | 30°00' (30.0°) |

Steering Column

NGS000CG

| | |
|-----------------------------|-------------------|
| Steering column length "L1" | 572 mm (22.52 in) |
|-----------------------------|-------------------|

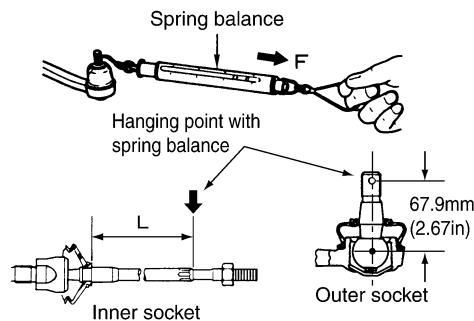


SGIA0556E

Steering Outer Socket and Inner Socket

NGS000CH

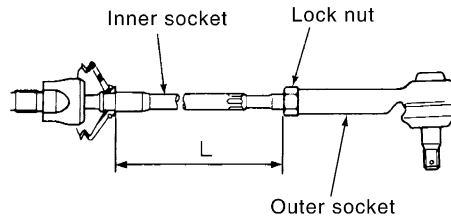
| | | |
|---------------------------------|--|--|
| Steering gear type | PR26AM | |
| Tie-rod ball joint outer socket | Swinging torque | 0.3 – 2.9 N·m (0.03 – 0.29 kg·m, 3 – 25 in-lb) |
| | Measurement on spring balance ● Measuring point: cotter pin hole of stud | 4.84 – 46.7 N (0.5 – 4.8 kg, 1.0 – 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 (0.02 in) or less |
| Tie-rod ball joint inner socket | Swinging torque | 1.0 – 7.8 N·m (0.11 – 0.79 kg·m, 9 – 69 in-lb) |
| | Measurement on spring balance ● Measuring point: L mark see below, L=83.2 mm (3.28 in). | 12.1 – 93.7 N (1.2 – 9.6 kg, 3.0 – 21 lb) |
| | Axial end play | 0.2 mm (0.01 in) or less |



SGIA0358E

SERVICE DATA AND SPECIFICATIONS (SDS)

| | |
|--------------------|--------------------|
| Tie-rod length "L" | 135.2 mm (5.32 in) |
|--------------------|--------------------|

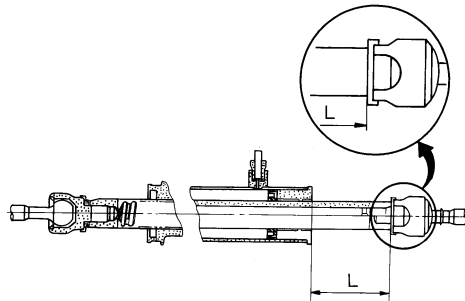


SGIA0167E

Steering Gear

NGS000CI

| | |
|--|-------------------|
| Steering gear model | PR26AM |
| Rack neutral position, dimension "L" (rack stroke) | 67.0 mm (2.64 in) |



SGIA0629J

| | | | |
|--------------------|--|---------------------|--|
| Rack sliding force | At the neutral point: Range within ± 11.5 mm (± 0.453 in) from the neutral position (in power ON) | Area average value | 147 – 211 N (15 – 21.5 kg, 33 – 47 lb) |
| | | Allowable variation | 98 N (10 kg, 22 lb) or less |
| | Whole area (in power OFF) | Peak value | 294 N (30 kg, 66 lb) or less |
| | | Allowable variation | 147 N (15 kg, 33 lb) or less |

Oil Pump

NGS000CJ

| | |
|------------------------------------|---|
| Oil pump relief hydraulic pressure | 9,900 – 10,700 kPa (101 – 109.1 kg/cm ² , 1436 – 1552 psi) |
|------------------------------------|---|

Steering Fluid

NGS000CK

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