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# SECTION PS

## POWER STEERING SYSTEM

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# PRECAUTIONS

## PRECAUTIONS

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

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

#### **WARNING:**

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

### Precautions for Steering System

EGS000LU

- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- For easier and proper assembly, place disassembled parts in order on a parts rack.
- Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.
- Before assembly, apply a coat of recommended Genuine NISSAN PSF or equivalent to hydraulic parts. Petroleum jelly may be applied to O-rings and seals. Do not use any grease.
- Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.

# PREPARATION

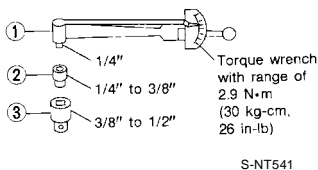
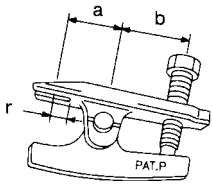
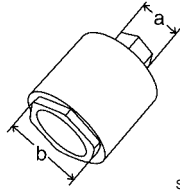
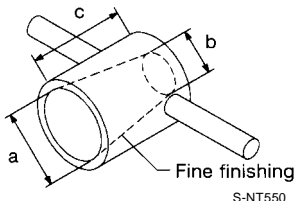
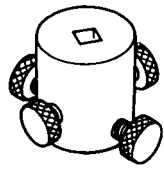
## PREPARATION

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### Special Service Tools (SST)

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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
ST3127 S000 (See J25765-A) Preload gauge 1. GG9103000 (J25765-A) Torque wrench 2. HT62940000 ( — ) Socket adapter 3. HT62900000 ( — ) Socket adapter	 <p>Inspecting of pinion rotating torque and rotational torque for ball joint</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 steering outer socket</p>
— (J-46213) Rear cover wrench a: 21.6 mm (0.850 in) b: 34.9 mm (1.374 in)	 <p>Removing and installing rear cover</p>
KV48104400 ( — ) Teflon ring correcting tool a: 50 mm (1.97 in) dia. b: 36 mm (1.42 in) dia. c: 100 mm (3.94 in)	 <p>Installing of rack Teflon ring</p>
KV48103400 ( — ) Torque adapter	 <p>Inspecting rotational torque</p>

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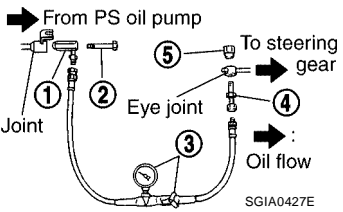
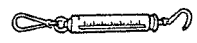
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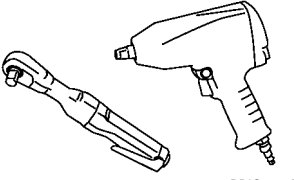
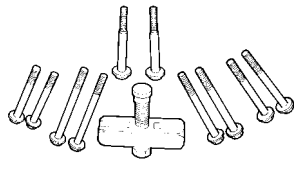
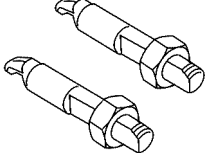
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# PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
<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 (J26357 and J26357-10) 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 style="text-align: center;">Measuring oil pump relief pressure</p>
<p>— (J-44372) Spring gauge</p>	 <p style="text-align: center;">Measuring steering wheel turning force</p> <p style="text-align: center;">LST024</p>

## Commercial Service Tools

EGS000LW

Tool name	Description
<p>Power tool</p>	 <p style="text-align: center;">Removing nuts and bolts</p> <p style="text-align: center;">PBIC0190E</p>
<p>(J-1859A) Steering wheel puller</p>	 <p style="text-align: center;">Removing steering wheel</p> <p style="text-align: center;">LHIA0043E</p>
<p>(J-42578) Steering wheel puller legs</p>	 <p style="text-align: center;">Removing steering wheel</p> <p style="text-align: center;">LHIA0044E</p>

# NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

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

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### NVH Troubleshooting Chart

EGS000LX

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	
			<a href="#">PS-6</a>
		Fluid level	<a href="#">PS-6</a>
		Air in hydraulic system	<a href="#">PS-6</a>
		Outer socket ball joint swinging force	<a href="#">PS-21</a>
		Outer socket ball joint rotating torque	<a href="#">PS-21</a>
		Outer socket ball joint end play	<a href="#">PS-21</a>
		Steering fluid leakage	<a href="#">PS-6</a>
		Steering wheel play	<a href="#">PS-7</a>
		Steering wheel turning force	<a href="#">PS-7</a>
		Drive belt looseness	<a href="#">EM-12</a>
		Improper steering wheel	<a href="#">PS-7</a>
		Improper installation or looseness of tilt lock lever	<a href="#">PS-15</a>
		Mounting rubber deterioration	<a href="#">PS-16</a>
		Steering column deformation or damage	<a href="#">PS-11</a>
		Improper installation or looseness of steering column	<a href="#">PS-13</a>
		Steering linkage looseness	<a href="#">PS-16</a>
		PROPELLER SHAFT	<a href="#">PR-3, "NVH Troubleshooting Chart"</a>
		DIFFERENTIAL	<a href="#">RFD-9, "NVH Troubleshooting Chart"</a>
		AXLE	<a href="#">PR-3, "NVH Troubleshooting Chart"</a>
		SUSPENSION	<a href="#">FSU-4, "NVH Troubleshooting Chart"</a>
		TIRES	<a href="#">WT-3, "NVH Troubleshooting Chart"</a>
		ROAD WHEEL	<a href="#">WT-3, "NVH Troubleshooting Chart"</a>
		DRIVE SHAFT	<a href="#">FAX-4, "NVH Troubleshooting Chart"</a>
		BRAKES	<a href="#">BR-5, "NVH Troubleshooting Chart"</a>

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# POWER STEERING FLUID

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## POWER STEERING FLUID

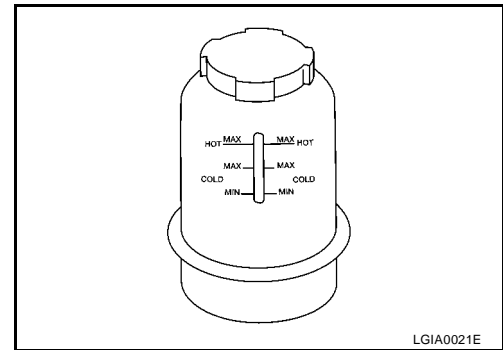
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### Checking Fluid Level

Check fluid level, referring to the scale on reservoir tank.  
Use HOT range for fluid temperatures of 50° – 80°C (122° – 176°F).  
Use COLD range for fluid temperatures of 0° – 30°C (32° – 86°F).

#### CAUTION:

- Do not overfill.
- Do not reuse any used power steering fluid.
- Recommended fluid is Genuine NISSAN PSF or equivalent. Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).



### Checking Fluid Leakage

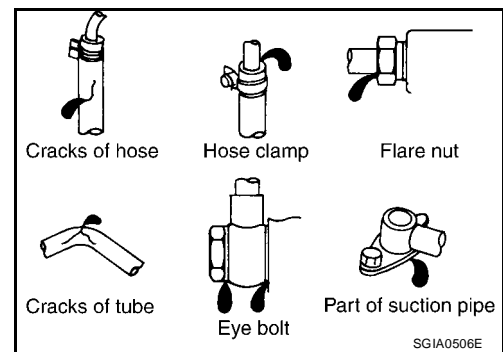
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Check the hydraulic piping lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine until fluid temperature reaches 50° – 80°C (122° – 176°F) in reservoir tank. Keep engine speed idle.
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds to check fluid leakage.

#### CAUTION:

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



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

### Air Bleeding Hydraulic System

EGS000M0

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

- Air bubbles in reservoir tank.
- 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 MIN level line. Check tank frequently and add fluid as needed.**

2. Run engine at idle speed. Turn steering wheel fully right and then fully left, hold for about three seconds. Then check for fluid leakage.
3. Repeat step 2 several times at about three second intervals.

#### CAUTION:

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

4. Check for air bubbles or cloudy fluid.
5. If air bubbles or cloudiness still exists, stop engine, perform steps 2 and 3 again until air bubbles or cloudiness does not exist.
6. Stop engine, check fluid level.

# STEERING WHEEL

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## STEERING WHEEL

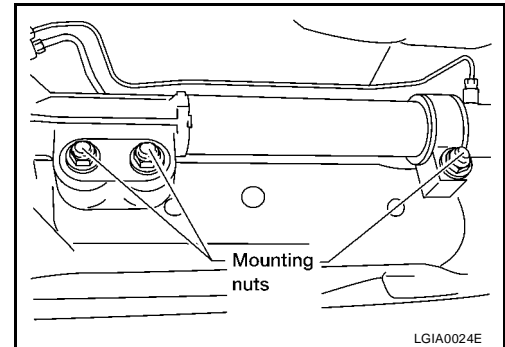
### On-Vehicle Inspection and Service CHECKING CONDITION OF INSTALLATION

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- 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 axial direction for steering wheel : 0 mm (0 in)**

- Check if the mounting nuts for steering gear assembly are loose. Refer to [PS-16, "POWER STEERING GEAR AND LINKAGE"](#).



### CHECKING STEERING WHEEL PLAY

1. Turn tires 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, "Front Wheel Alignment"](#).
1. Turn tires straight ahead, 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 be attained by repositioning the steering wheel two teeth or less on steering stem, loosen tie-rod lock nuts of steering outer sockets, then adjust tie-rods by the same amount in the opposite direction.

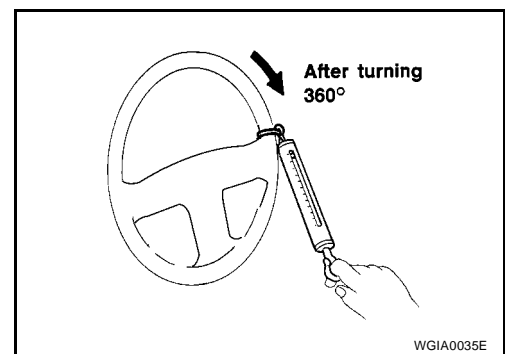
### CHECKING STEERING WHEEL TURNING FORCE

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to operating temperature of 60° – 80°C (140° – 176°F).
4. Tires need to be inflated to specified pressure. Refer to [WT-32, "Tire"](#).
5. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.

**Tool number : J-44372**

**Steering wheel : 39 N (4 kg-f, 9 lb-f) or less  
turning force**

6. If steering wheel turning force is out of specification, inspect steering column. Refer to [PS-11, "INSPECTION AFTER REMOVAL"](#).
7. If steering column meets specification, repair steering gear. Refer to [PS-13, "Disassembly and Assembly"](#).



### CHECKING FRONT WHEEL TURNING ANGLE

When checking front wheel turning angle, refer to [FSU-8, "FRONT WHEEL TURNING ANGLE"](#).

# STEERING WHEEL

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## Removal and Installation

### REMOVAL

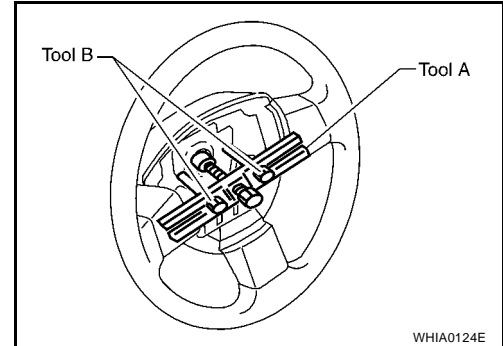
1. Set the front wheels in the straight-ahead position.
2. Remove the driver air bag module. Refer to [SRS-43, "Removal and Installation"](#).
3. Disconnect steering wheel switches.
4. Remove the steering wheel center nut.
5. Remove the steering wheel using Tools.

**Tool number**    **A: J-1859A**  
                          **B: J-42578**

### CAUTION:

**Place a piece of tape across the spiral cable so it will not be rotated out of position.**

6. Inspect the steering wheel near the puller holes for damage. If damaged, replace the steering wheel.
  - Remove steering wheel rear cover and steering wheel switches, if required.

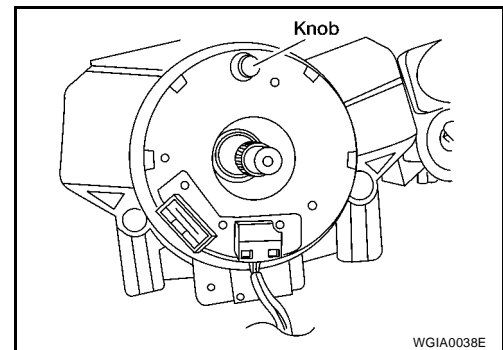


### INSTALLATION

Installation is in the reverse order of removal.

- Align spiral cable correctly when installing steering wheel. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left 2.6 revolutions from the right end position and ending with the knob at the top.

**Steering wheel center nut**    : 34.3 N·m (3.5 kg-m, 25 ft-lb)



### CAUTION:

**The spiral cable may snap due to steering operation if the cable is installed in an improper position. Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.6 turns from the neutral position to both the right and left.)**



# STEERING COLUMN

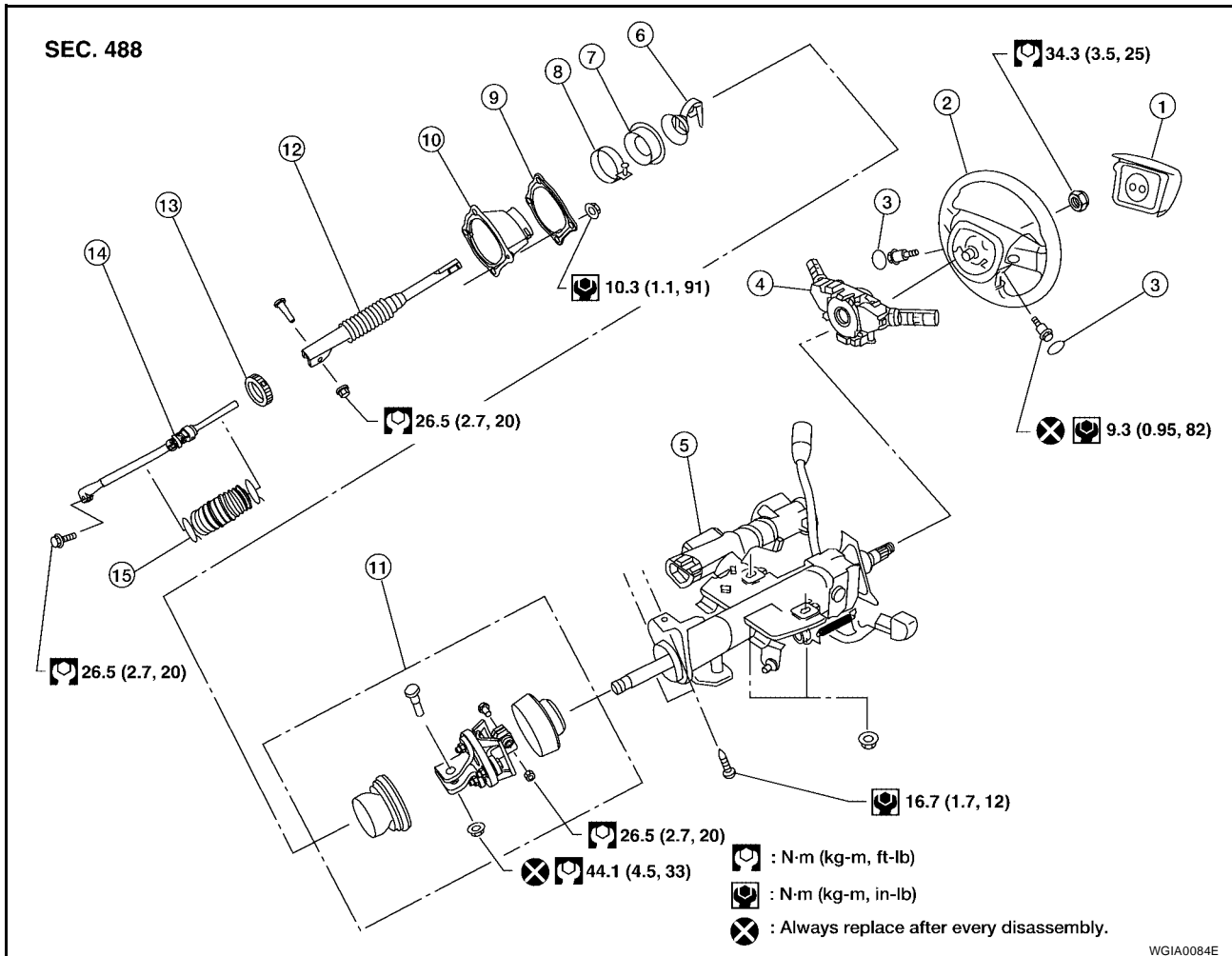
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## STEERING COLUMN

### Removal and Installation

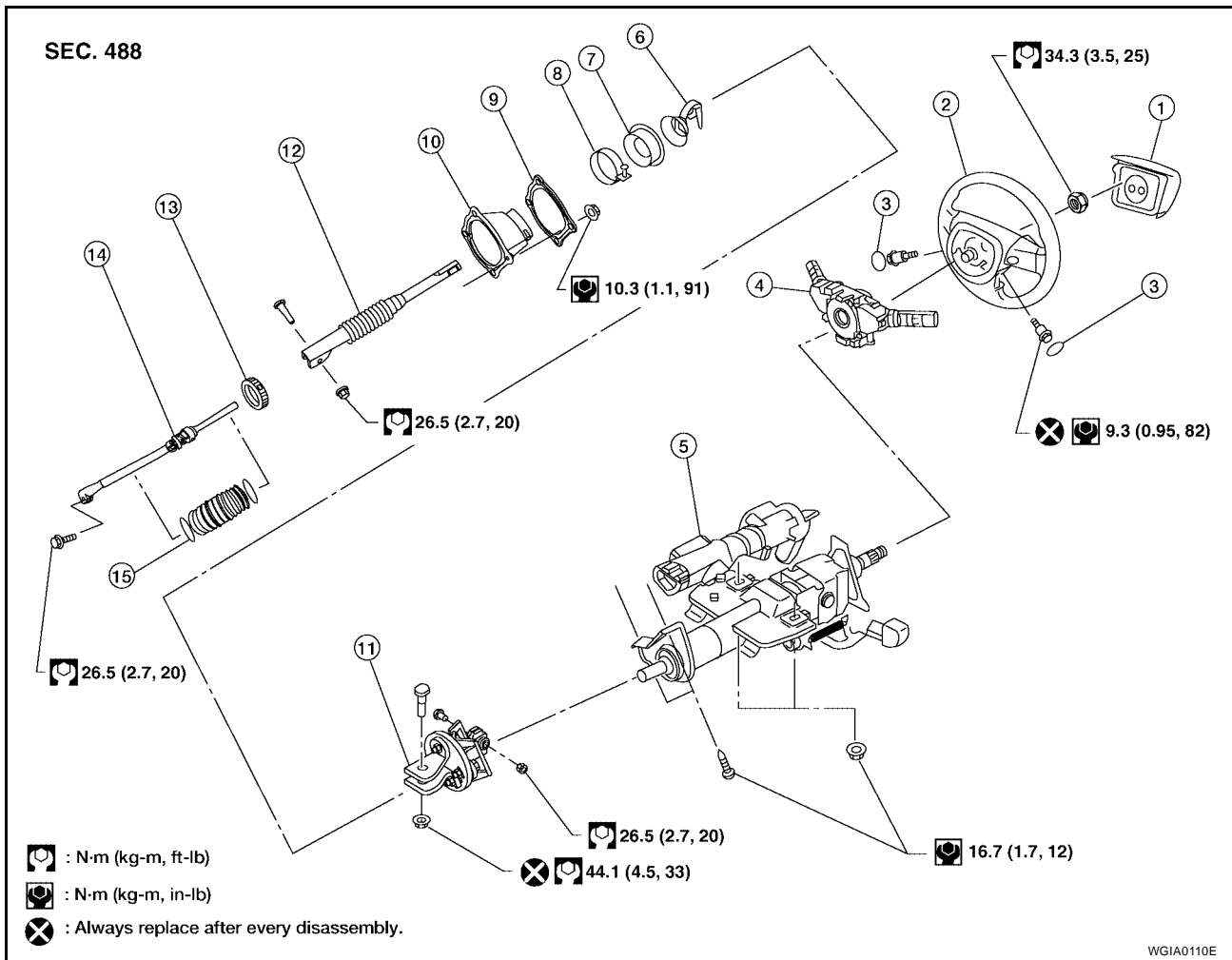
#### Column Shift Model



- |  |                             |                              |
|--|-----------------------------|------------------------------|
| 1. Driver air bag module               | 2. Steering wheel           | 3. Steering wheel side cover |
| 4. Combination switch and spiral cable | 5. Steering column assembly | 6. Collar                    |
| 7. Hole cover seal                     | 8. Clamp                    | 9. Hole cover mounting plate |
| 10. Hole cover                         | 11. Upper joint             | 12. Upper shaft              |
| 13. Boot clamp                         | 14. Lower joint shaft       | 15. Boot and clips (plastic) |

# STEERING COLUMN

## Floor Shift Model

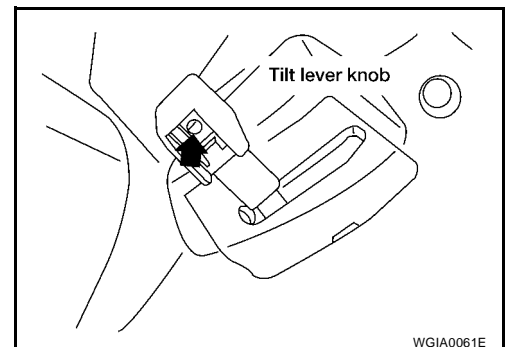


### CAUTION:

- 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.

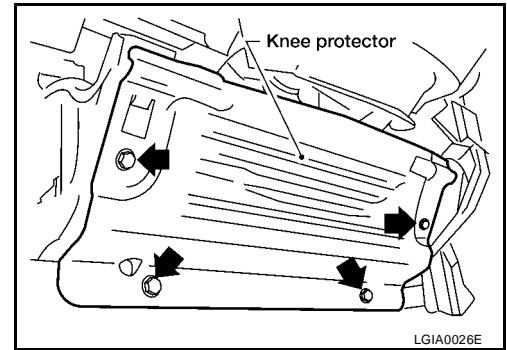
### REMOVAL

1. Remove spiral cable from steering column assembly with combination switches attached. Refer to [SRS-45, "Removal and Installation"](#).
2. Remove tilt lever knob from tilt lever by inserting a suitable tool into slot of tilt lever knob, then depress tab and withdraw tilt lever knob.

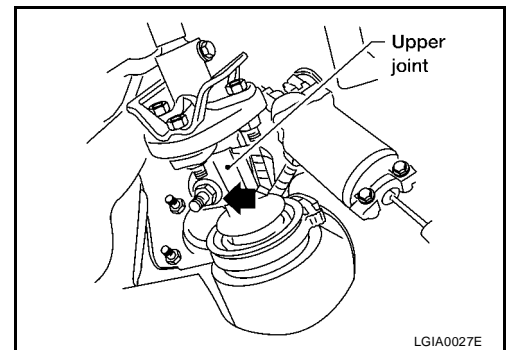


# STEERING COLUMN

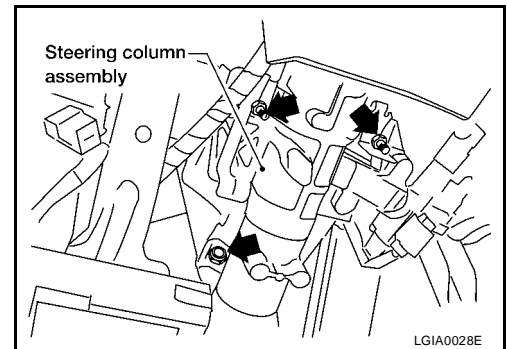
3. Remove lower driver instrument panel. Refer to [IP-13, "LOWER INSTRUMENT PANEL LH"](#).
4. Remove steering column cover and ignition key finisher. Refer to [IP-10, "Removal and Installation"](#).
5. Remove mounting screws of knee protector, then remove knee protector from vehicle.



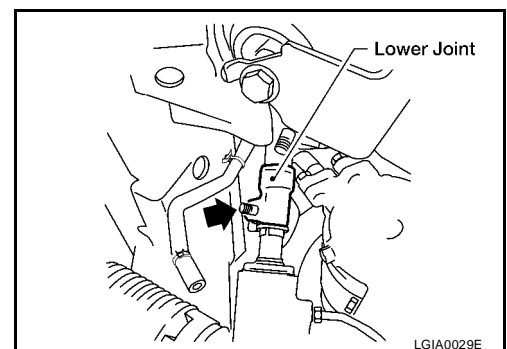
6. On models equipped with column shift, disconnect shift cable from steering column. Refer to [AT-240, "Control Device Removal and Installation"](#).
7. Remove lock nut and bolt, then separate lower joint from upper joint.



8. Remove mounting nuts from steering member, remove steering column assembly from steering member.



9. Remove hole cover seal and clamp.
10. Remove mounting nuts, then remove hole cover from dash panel.
11. Raise vehicle, then remove mounting bolt (lower side) of lower joint and remove lower joint from vehicle.



## INSPECTION AFTER REMOVAL

- Check for damage to steering column jacket tube. If damage is found, replace steering column with new one.

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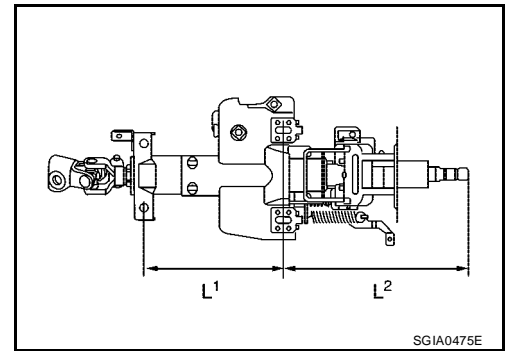
# STEERING COLUMN

- If vehicle has been in a collision, check column length “L<sup>1</sup>” or “L<sup>2</sup>” as shown. If out of specification, replace steering column with new one.

## Steering column length

L<sup>1</sup> : 158 mm (6.22 in)

L<sup>2</sup> : 262 mm (10.31 in)



- Check for proper lubrication, apply grease as necessary.

## INSTALLATION

Installation is in the reverse order of removal.

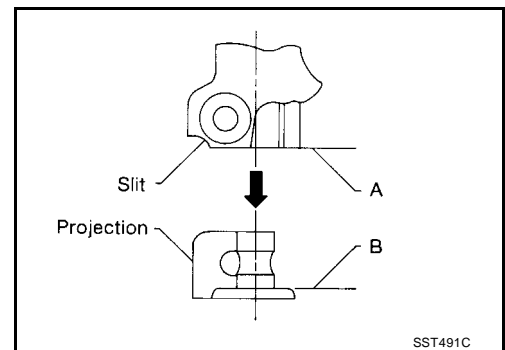
### CAUTION:

**When installing the steering column, finger-tighten all of the lower bracket and joint retaining bolts; then tighten them to specification. Do not apply undue stress to the steering column.**

### NOTE:

Align slit of the coupling joint with projection on dust cover. Insert the joint until surface "A" contacts surface "B".

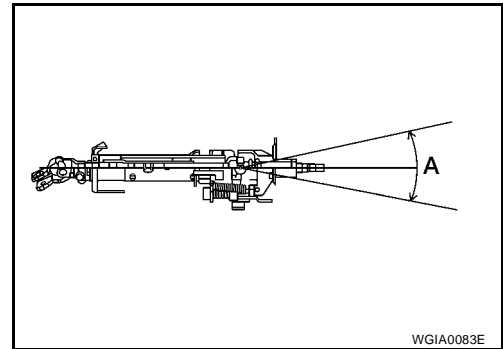
- After installation, turn steering wheel to make sure it moves smoothly. Make sure the number of turns are the same from the straight-forward position to left and right locks. Make sure that the steering wheel is in a neutral position when driving straight ahead.
- When installing steering column to steering member, install mounting nut from front side of vehicle.



# STEERING COLUMN

## INSPECTION AFTER INSTALLATION

- After installing steering column to vehicle, check tilt device and its operation range is as specified.  
**Range "A" : 61.3 mm (2.41 in)**
- Check if steering wheel operation can turn to the end of the left and right stops smoothly.

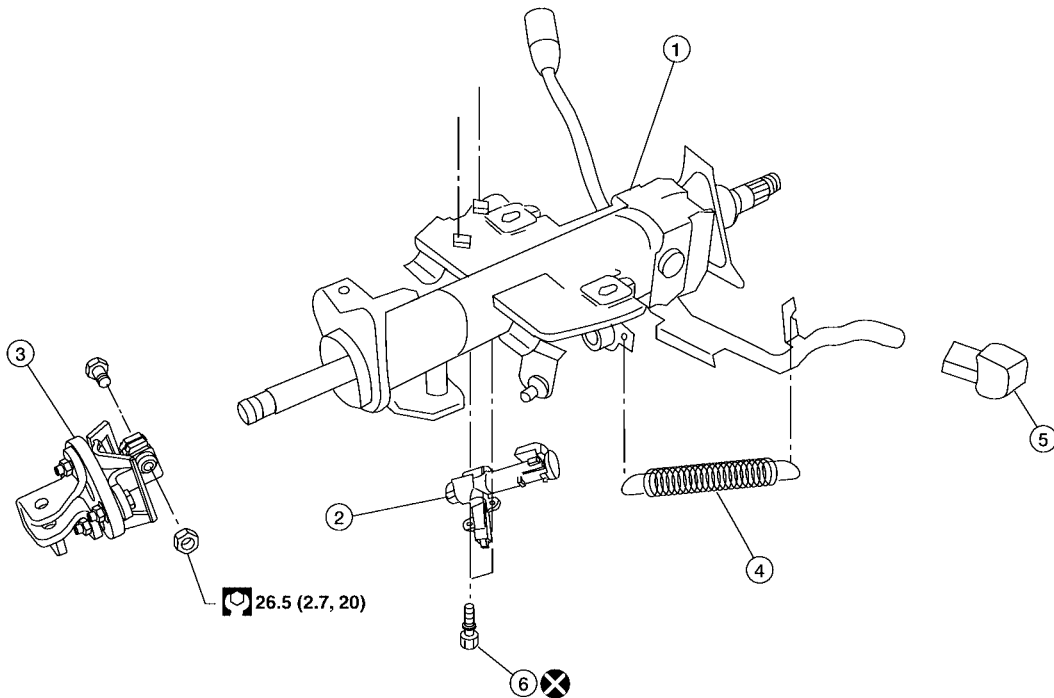


## Disassembly and Assembly

EGS000M4

### Column Shift Model

SEC. 488



: N-m (kg-m, ft-lb)



: Always replace after every disassembly.

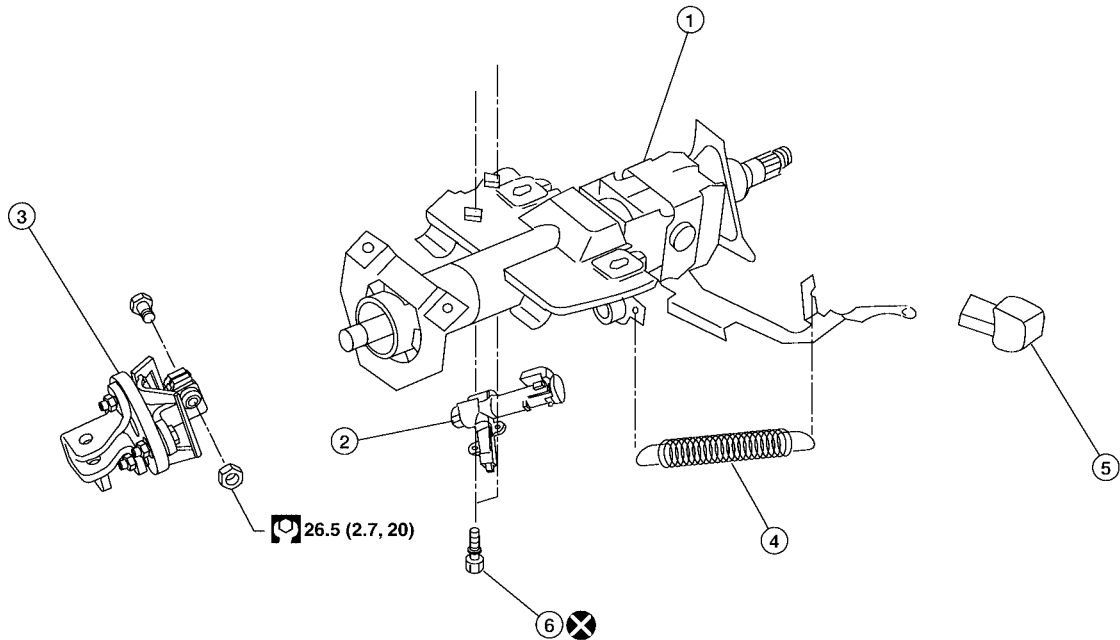
WGIA0085E

- |                             |                    |                     |
|-----------------------------|--------------------|---------------------|
| 1. Steering column assembly | 2. Ignition switch | 3. Upper joint      |
| 4. Spring                   | 5. Tilt lever knob | 6. Self-shear screw |

# STEERING COLUMN

## Floor Shift Model

SEC. 488



: N·m (kg·m, ft·lb)



: Always replace after every disassembly.

WGIA0088E

- |                             |                    |                     |
|-----------------------------|--------------------|---------------------|
| 1. Steering column assembly | 2. Ignition switch | 3. Upper joint      |
| 4. Spring                   | 5. Tilt lever knob | 6. Self-shear screw |

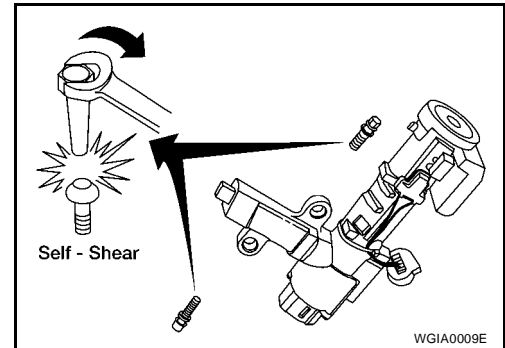
### DISASSEMBLY

1. Remove spring from steering column assembly and tilt lever.
2. Remove mounting bolt from upper joint, then remove upper joint from steering column assembly.
3. Remove ignition switch tamper resistant self-shear type screws with a drill or other appropriate tool.

# STEERING COLUMN

## ASSEMBLY

- Assembly is in the reverse order of disassembly.
- Install new tamper resistant self-shear type screws.



## INSPECTION AFTER ASSEMBLY

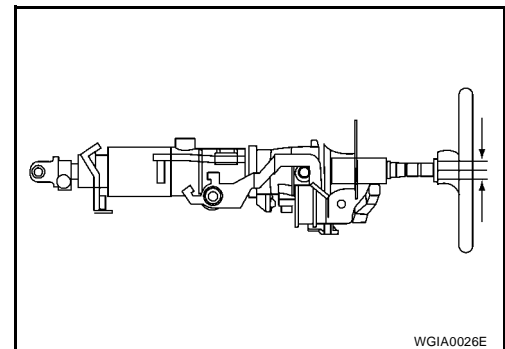
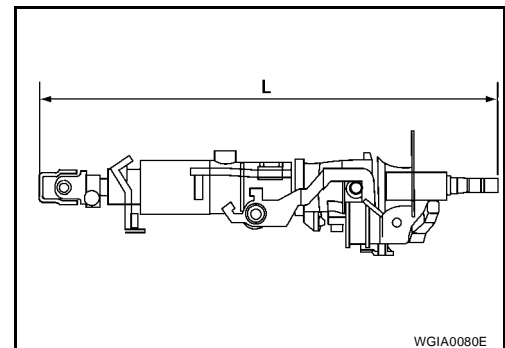
When the steering wheel does not turn smoothly, check the steering column as follows:

1. Check the column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease. Replace the steering column as an assembly, if necessary.
2. Check the column tube for deformation or breakage. Replace the steering column as an assembly, if necessary.
3. If the vehicle has been involved in a collision, or if noise and rattles are heard during a turn, check the length (L) of the column. If out of specification, replace the steering column as an assembly.

**Steering column length (L) : 610 mm (24.02 in)**

4. Check for proper lubrication, apply grease as necessary.
5. Check for wear around the seal edges, replace as necessary.
6. Check for corrosion or pitting around the seal sliding area.
7. Replace the seal and shaft in case of seal edge wear or damage.
8. After installing the steering column, check the tilt mechanism for proper operation.

**Tilt mechanism range : 3° per notch at 5 steps (Manual tilt)**



## CAUTION:

- Do not exert any load or impact in the axial direction immediately before or after column removal.
- After installation, check for smooth steering wheel rotation, without any catches or noise.
- Replace the column if it is depleted of grease, worn, damaged, or if any scratches or coating separation is present on the shaft seal area.
- The lower nut on the upper joint may not be reused.
- During lower joint detachment, insert a tool into the yoke groove to prevent gouging damage.

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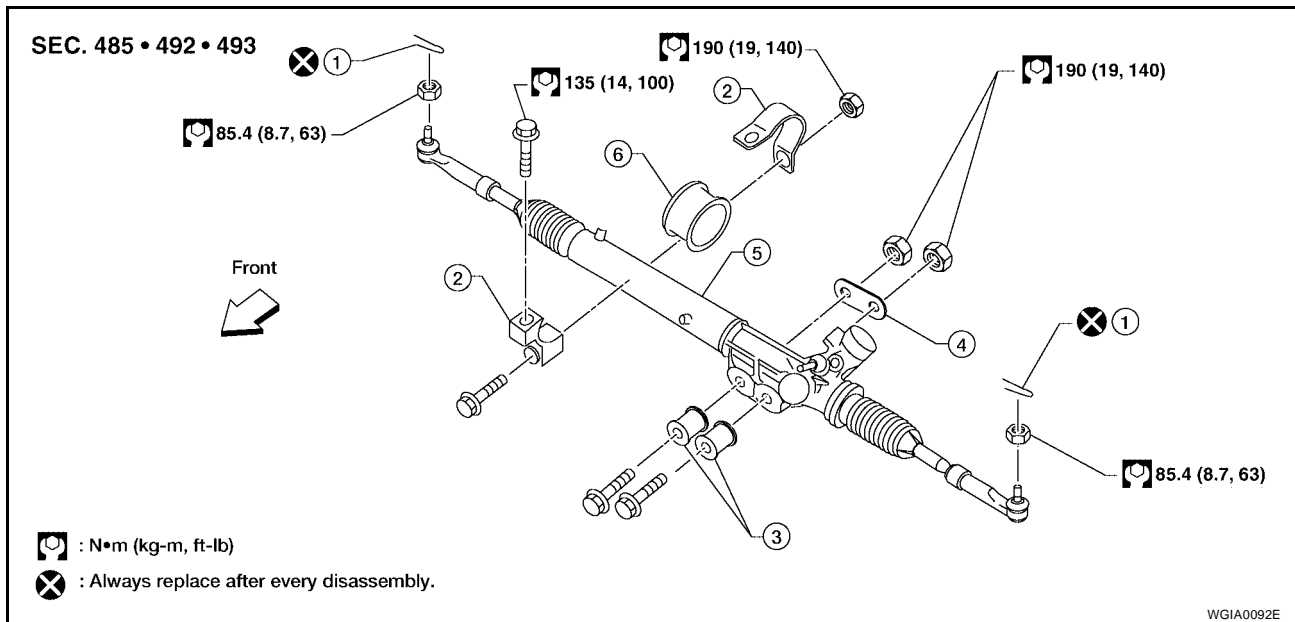
# POWER STEERING GEAR AND LINKAGE

## POWER STEERING GEAR AND LINKAGE

PFP:49001

### Removal and Installation

EGS000M5



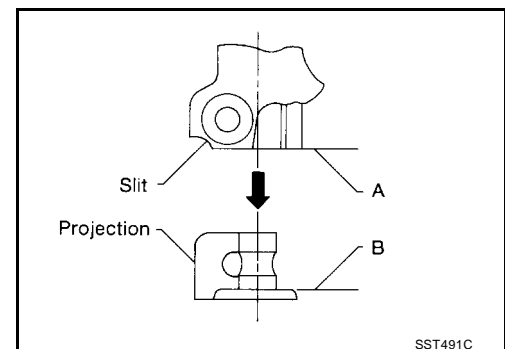
- |               |                           |                       |
|---------------|---------------------------|-----------------------|
| 1. Cotter pin | 2. Mounting bracket       | 3. Bushing            |
| 4. Washer     | 5. Steering gear assembly | 6. Mounting insulator |

#### CAUTION:

Spiral cable may snap due to steering operation if steering column is separated from steering gear assembly. Therefore secure steering wheel to avoid turning.

#### REMOVAL

1. Turn wheels to the straight-ahead position.
2. Remove tires from vehicle using power tool.
3. Remove undercover using power tool.
4. On 4x4 models, remove front final drive, then support drive shafts with wire. Refer to [FFD-12, "Removal and Installation"](#).
5. Make sure slit of lower joint fits with the projection on rear cover cap, while checking that mark on steering gear assembly aligns with mark on rear cover cap.



6. Remove cotter pin at steering outer socket and discard, then loosen mounting nut.



# POWER STEERING GEAR AND LINKAGE

- Remove steering outer socket from steering knuckle using Tool. Be careful not to damage ball joint boot.

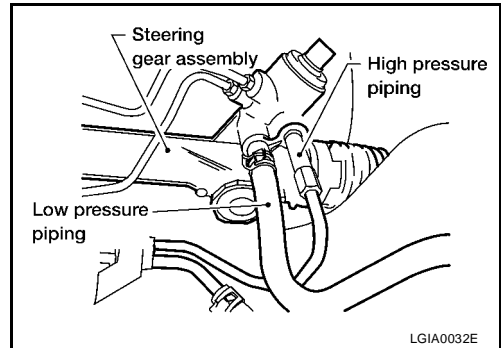
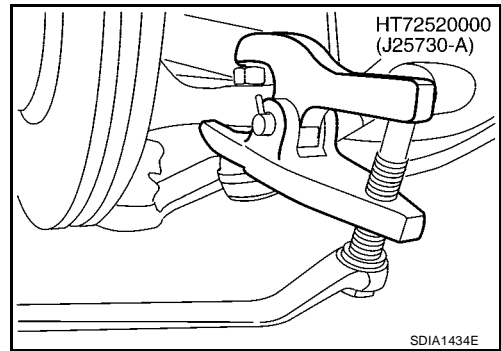
**CAUTION:**

Temporarily tighten mounting nut to prevent damage to threads and to prevent Tool from coming off.

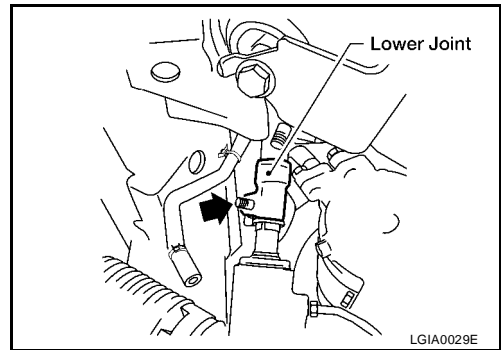
Tool number : HT72520000 (J-25730-A)

- On 4x2 models, remove stabilizer bar mounting bolts and reposition stabilizer bar. Refer to [FSU-11, "STABILIZER BAR"](#).

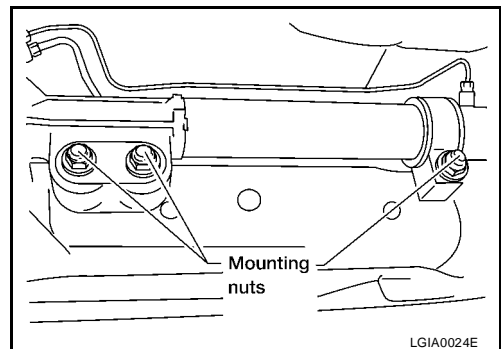
- Remove oil piping (high pressure side and low pressure side) from steering gear assembly, then drain fluid from piping.



- Remove lower joint mounting bolt of lower shaft.



- Remove mounting bolts and nuts of steering gear assembly using power tool, and then remove steering gear assembly from vehicle.



## INSTALLATION

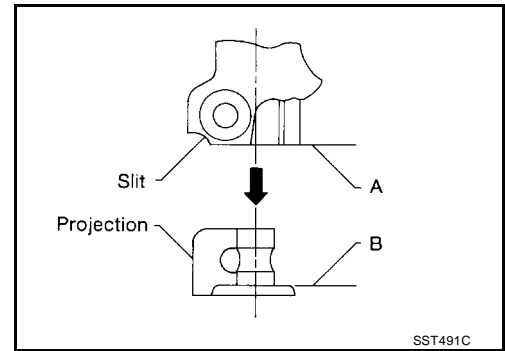
Installation is in the reverse order of removal.

- After removing/installing or replacing steering components, check wheel alignment. Refer to [FSU-6, "Front Wheel Alignment"](#).
- After adjusting wheel alignment, adjust neutral position of steering angle sensor. Refer to [BRC-151, "Adjustment of Steering Angle Sensor Neutral Position"](#).

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# POWER STEERING GEAR AND LINKAGE

- With steering wheel in straight ahead position, make sure slit of lower joint fits with the projection on rear cover cap, while checking that mark on steering gear assembly aligns with mark on rear cover cap



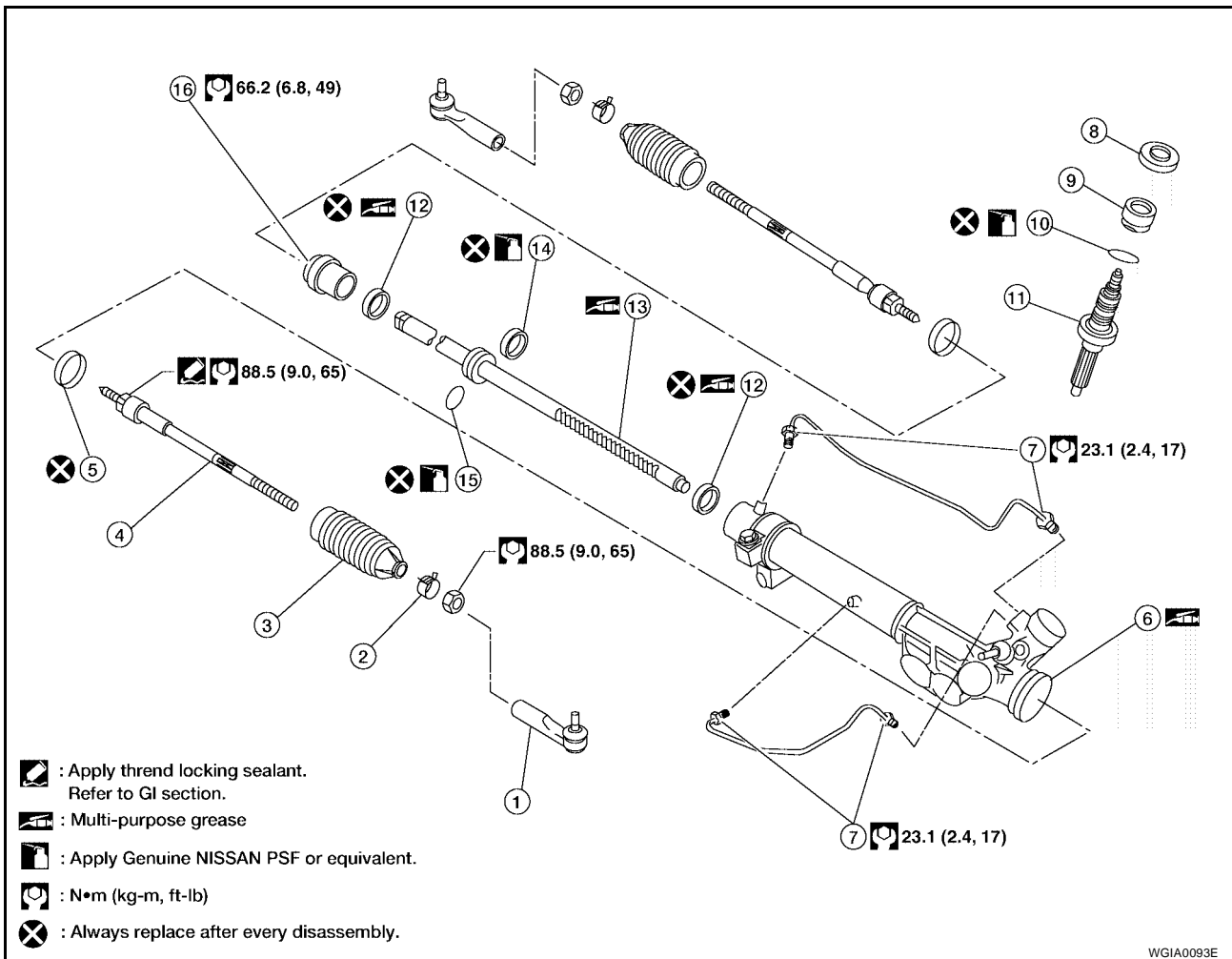
- After installation, bleed the air from the steering hydraulic system. Refer to [PS-6, "Air Bleeding Hydraulic System"](#).

## INSPECTION AFTER INSTALLATION

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

## Disassembly and Assembly

EGS000M6



- : Apply thread locking sealant. Refer to GI section.
- : Multi-purpose grease
- : Apply Genuine NISSAN PSF or equivalent.
- : N•m (kg-m, ft-lb)
- : Always replace after every disassembly.

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

# POWER STEERING GEAR AND LINKAGE

## CAUTION:

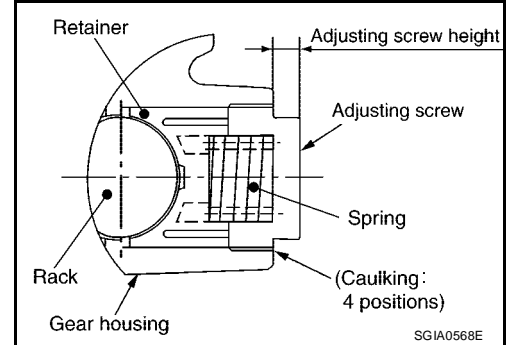
- Secure steering gear assembly with a vise, using copper plates or something similar to prevent it from being damaged. Do not grip cylinder with a vise.
- Before performing disassembly, clean steering gear assembly with kerosene. Be careful not to bring any kerosene into contact with the discharge and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

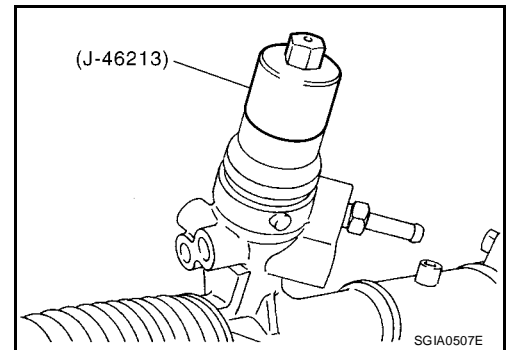
## CAUTION:

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

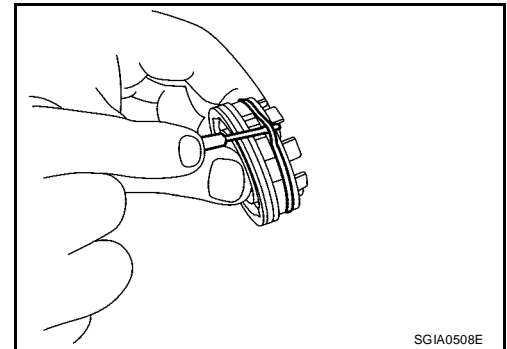


4. Use a Tool to remove rear cover from sub-gear assembly.

Tool number : — (J-46213)



5. Remove O-ring with a flat-bladed screwdriver, and pull out rear cover.



6. Remove sub-gear assembly from gear housing assembly.

## CAUTION:

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

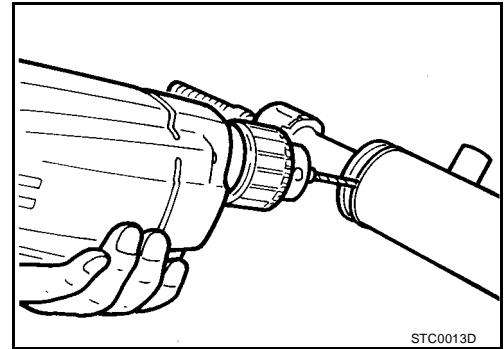
7. Loosen lock nut of outer socket, and remove outer socket.
8. Remove boot clamps of the small diameter side and the large diameter side, then remove boot.

## CAUTION:

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

## POWER STEERING GEAR AND LINKAGE

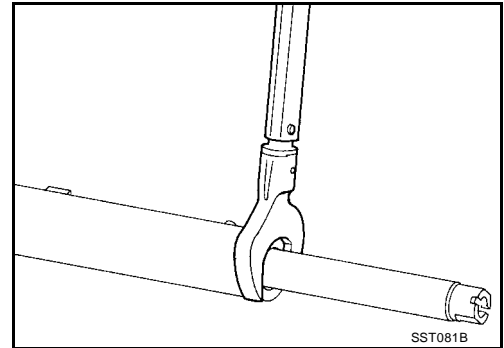
9. Drill out the clinching part of cylinder outer rim with a 3 mm (0.12 in) drill in 1.5 mm (0.059 in) depth.



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

**CAUTION:**

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



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

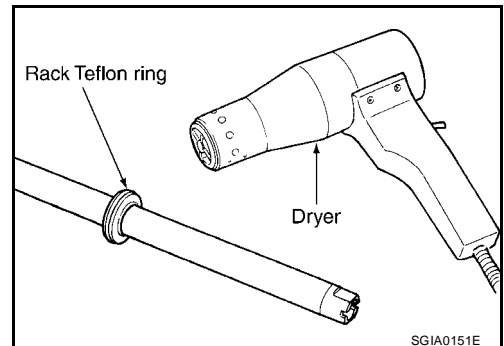
**CAUTION:**

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 assembly.

**CAUTION:**

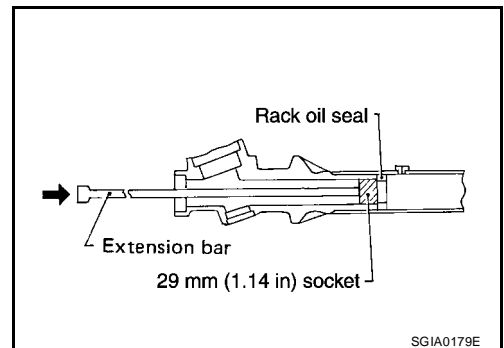
Be careful not to damage rack assembly. If it is damaged, replace with a new one to avoid oil leaks.



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.



# POWER STEERING GEAR AND LINKAGE

## INSPECTION AFTER DISASSEMBLY

### Boot

Check boot for cracks and deformation. Replace if necessary.

### Rack Assembly

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

### Sub-Gear Assembly

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

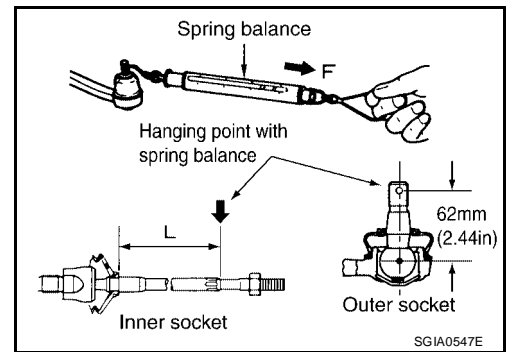
### Gear Housing Assembly

Check gear housing assembly for damage and scratches (inner wall). Replace 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.



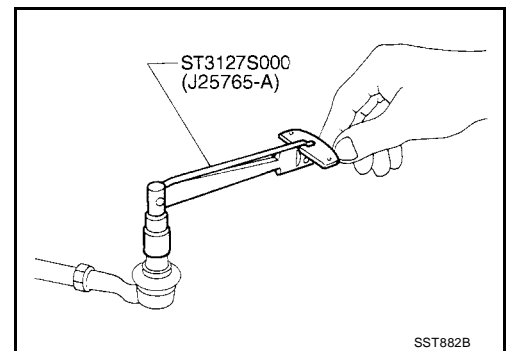
Item	Outer socket	Inner socket
Measuring point	Cotter pin hole of stud	Shown as L: 83.2 mm (3.276 in)
Swing torque	0.3 – 2.9 N·m (0.03 – 0.29 kg·m, 3 – 25 in-lb)	1.0 – 7.8 N·m (0.11 – 0.79 kg·m, 9 – 69 in-lb)
Measuring value	4.84 – 46.7 N (0.50 – 4.7 kg, 4 - 34 lb)	12.1 – 93.7 N (1.3 – 9.5 kg, 9 – 69 lb)

#### Rotating Torque

- Using Tool, check if reading is within the value specified below. If the value is outside the standard, replace outer sockets.

**Tool number : ST3127 S000 (J-25765-A)**

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



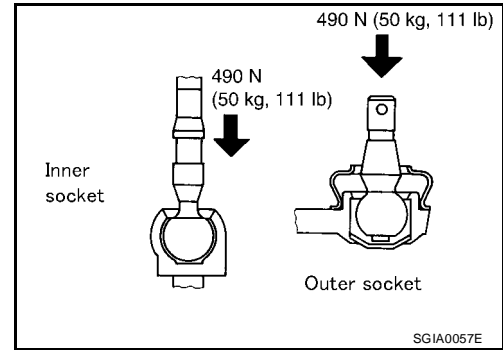
# POWER STEERING GEAR AND LINKAGE

## 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 specification. If the value is outside specification, 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

1. Apply Genuine NISSAN PSF or equivalent to O-ring. Put an O-ring into rack Teflon® ring.
  - Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .

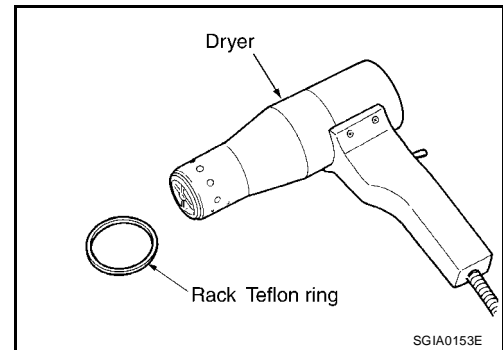
### NOTE:

Do not reuse O-ring.

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

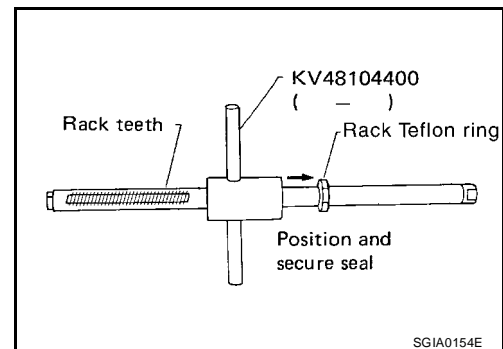
### NOTE:

Do not reuse rack Teflon® ring.



3. To fit rack Teflon® ring on rack, use rack Teflon® ring installation tool from tooth side. Compress rim of ring using Tool.

**Tool number : KV48104400 ( — )**



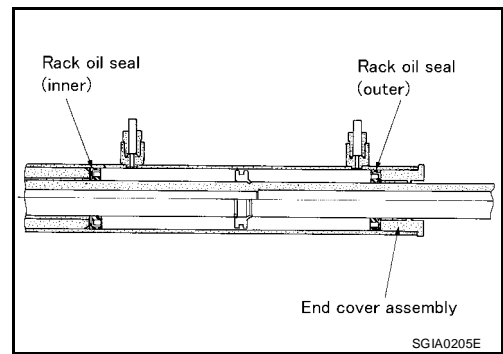
4. Apply multi-purpose grease to rack oil seal. Insert rack oil seal, then insert rack assembly to gear housing assembly. Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .

### CAUTION:

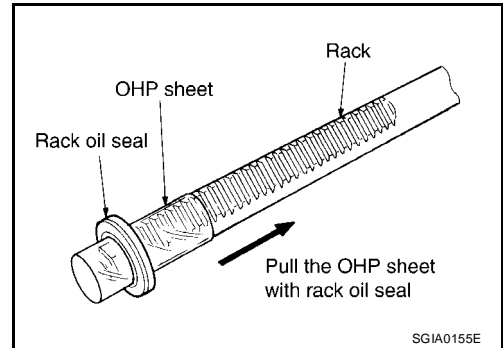
- Do not reuse rack oil seal.
- When inserting rack assembly, do not damage retainer sliding part. If it is damaged, replace gear housing assembly.
- When inserting rack assembly, do not damage cylinder inner wall. If it is damaged, it may cause oil leaks. Replace gear housing assembly.

# POWER STEERING GEAR AND LINKAGE

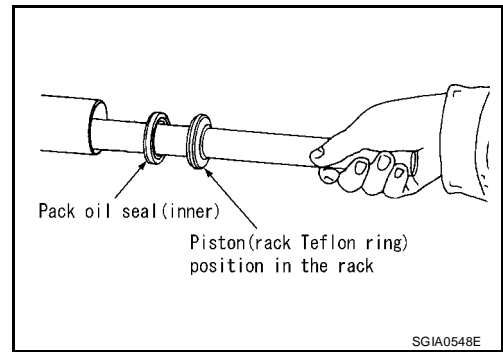
- Attach rack oil seal. Both inner lip and outer lip should face each other.



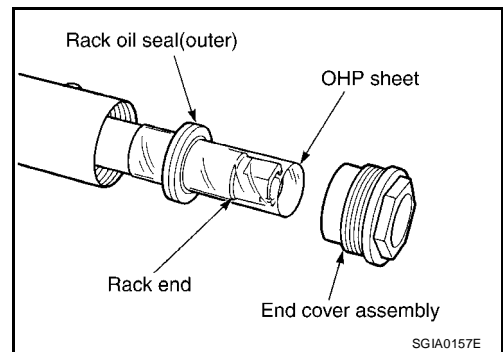
- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in)] around rack teeth. Place oil seal on sheet. Then, pull oil seal along with OHP sheet until they pass the toothed section of rack, then remove sheet.



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



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

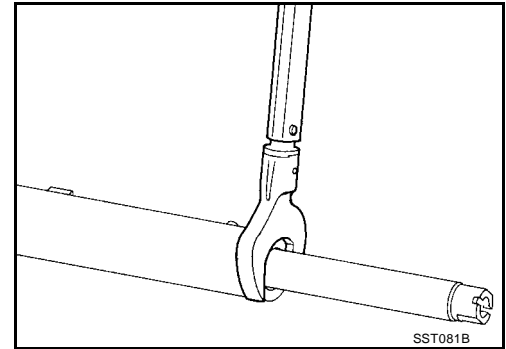
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## POWER STEERING GEAR AND LINKAGE

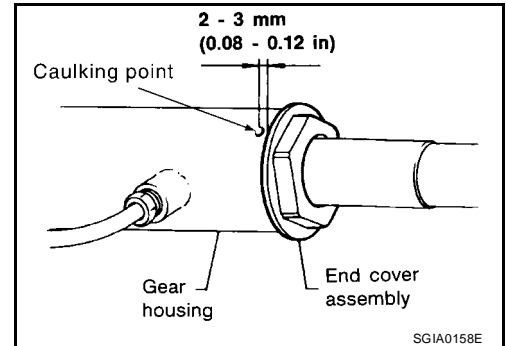
- Using a 45 mm (1.77 in) open head wrench or suitable tool, tighten end cover assembly to specification.

**CAUTION:**

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



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



- Install sub-gear assembly to gear housing assembly.

**CAUTION:**

**Oil seal may be damaged if sub-gear assembly is not installed correctly.**

- Apply Genuine NISSAN PSF or equivalent to O-ring. Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#). Then install O-ring to rear cover.

**NOTE:**

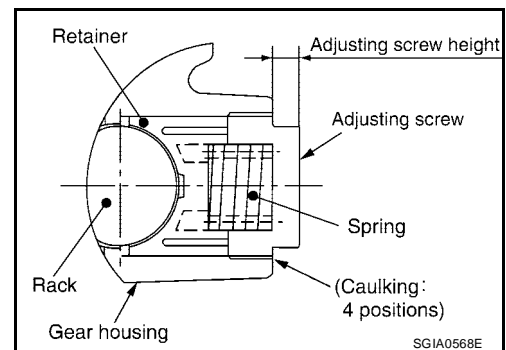
Do not reuse O-ring.

- Install rear cover to gear housing assembly using Tool.

**Tool number : — (J-46213)**

- Make sure projection on rear cover cap aligns with mark on gear housing assembly.

- Apply thread locking sealant (Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#)) to the thread of the adjusting screw. Then set adjusting screw height from gear housing assembly. The adjusting screw height is the same as it was measured previously.



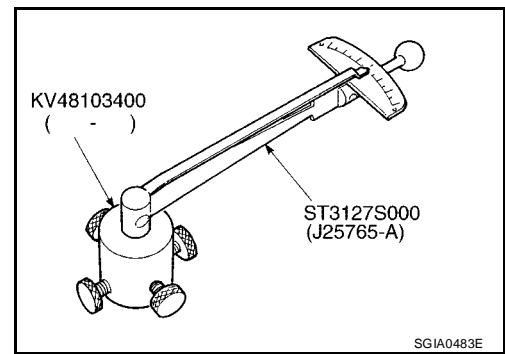
- Rotate pinion ten times through entire rack range to seat gears and to check operation.



# POWER STEERING GEAR AND LINKAGE

13. With steering gear in neutral position, measure pinion rotating torque using Tool from within  $-180^\circ$  to  $+180^\circ$ , while applying and holding maximum torque to pinion gear.

**Tool number : ST3127 S000 (J25765-A),  
KV48103400 ( — )**



14. After loosening adjusting screw once, tighten it again with torque of 5.4 N·m (0.55 kg·m, 48 in-lb). Then loosen it within  $20^\circ - 40^\circ$ .

15. Measure pinion rotating torque using Tool, then confirm whether the reading is within the specified value. If the reading is not within the specified value, readjust screw angle with adjusting screw. 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), replace the steering gear assembly.

**Pinion rotating torque:**

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

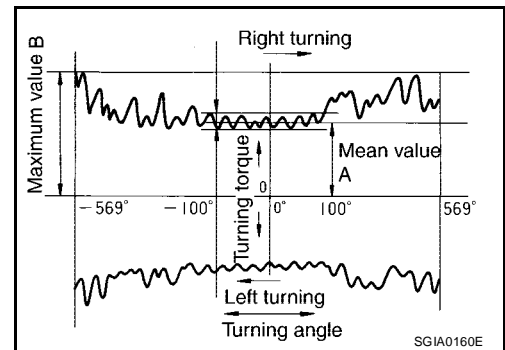
**Average "A":**

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

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

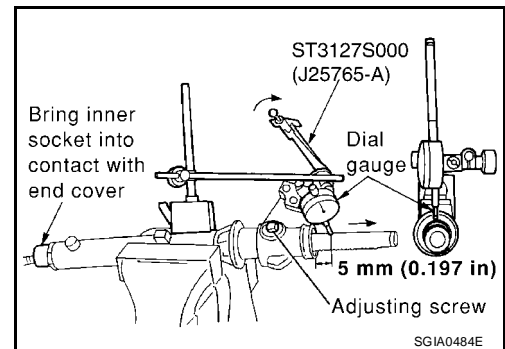
**Maximum variation "B":**

**2.3 N·m (0.23 kg·m, 20 in-lb)**



16. Turn pinion to the full left lock position with inner socket to gear housing assembly.

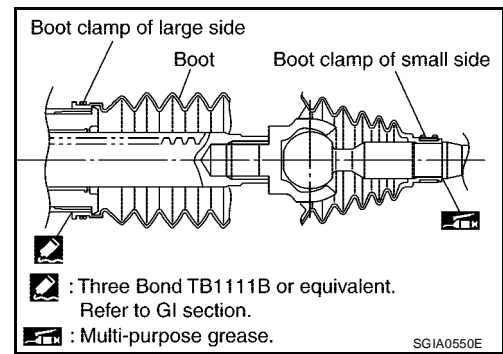
17. Mount dial gauge to rack as shown. Measure vertical movement of rack when pinion is turned counterclockwise with torque of 19.6 N·m (2.0 kg·m, 14 ft-lb). Check if reading is within the specified value. If reading is outside of the specification, readjust screw angle with adjusting screw. If reading 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 the steering gear assembly.



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

## POWER STEERING GEAR AND LINKAGE

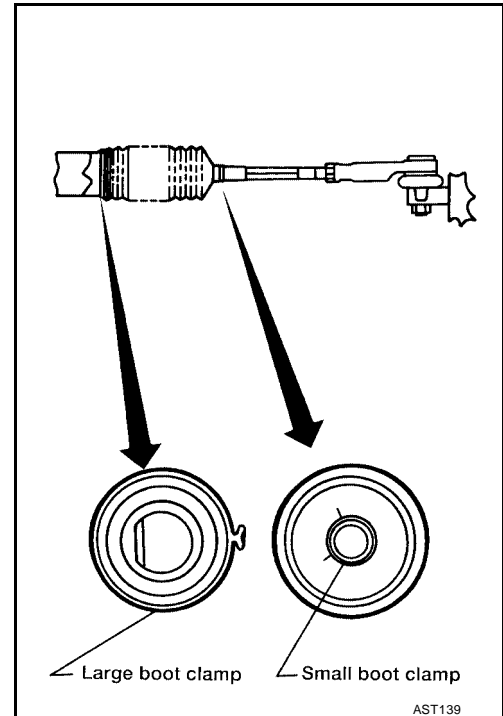
18. Install large-diameter side of boot to gear housing assembly.
19. Install small-diameter side of boot to the mounting groove of inner socket boot.



20. Install boot clamp to the small-diameter side of boot.
21. Install boot clamp to large-diameter side of boot and crimp securely.

**CAUTION:**

Do not reuse the boot clamps.

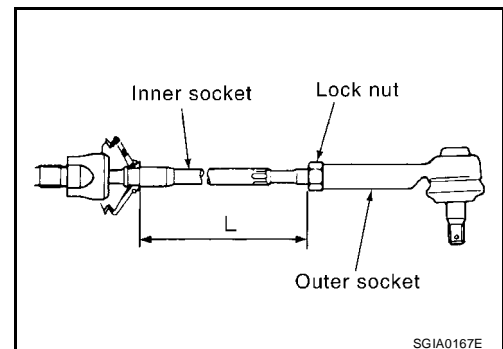


22. Install cylinder tubes to gear housing assembly.
23. Install lock nut and outer socket to inner socket.
24. Tighten lightly tie-rod in specified length "L", then tighten lock nut at specified torque. Refer to [PS-18, "Disassembly and Assembly"](#). Reconfirm if tie-rod length is within limit of specified length "L".

**Inner socket length "L" : 115.2 mm (4.54 in)**

**CAUTION:**

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



# POWER STEERING OIL PUMP

PPF:49110

EGS000M7

## POWER STEERING OIL PUMP

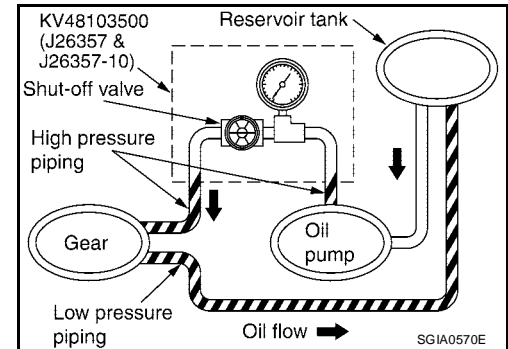
### On-Vehicle Inspection and Service CHECKING RELIEF OIL PRESSURE

#### CAUTION:

Before starting work, confirm belt tension is proper.

1. Connect Tool between oil pump discharge connector and high pressure hose and then bleed air from the hydraulic circuit.

Tool number:		
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 – 80°C (122 – 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 : 9.0 – 9.8 mPa (91.77 – 99.93 kg/cm<sup>2</sup> , 1305.34 – 1421.37 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-18, "Disassembly and Assembly"](#).
5. After inspection, disconnect oil pressure gauge and oil pressure gauge adapter from hydraulic circuit, connect oil pump discharge connector and high pressure hose. Add fluid and bleed air from hydraulic circuit thoroughly. Refer to [PS-6, "Air Bleeding Hydraulic System"](#).

## Removal and Installation

### REMOVAL

1. Drain power steering fluid from reservoir tank.
2. Remove engine room cover. Refer to [EM-11, "Removal and Installation"](#).
3. Remove air duct assembly. Refer to [EM-14, "Removal and Installation"](#).
4. Remove power steering reservoir tank.
5. Remove serpentine drive belt from auto tensioner and power steering pump. Refer to [EM-12, "Removal and Installation"](#).
6. Disconnect pressure sensor electrical connector.
7. Remove high pressure and low pressure piping from power steering oil pump. Refer to [PS-32, "HYDRAULIC LINE"](#).
8. Remove mounting bolts, then remove power steering pump.

### INSTALLATION

Installation is in the reverse order of removal. Refer to [PS-32, "HYDRAULIC LINE"](#) for tightening torque.

- After installation, bleed air. Refer to [PS-6, "Air Bleeding Hydraulic System"](#).

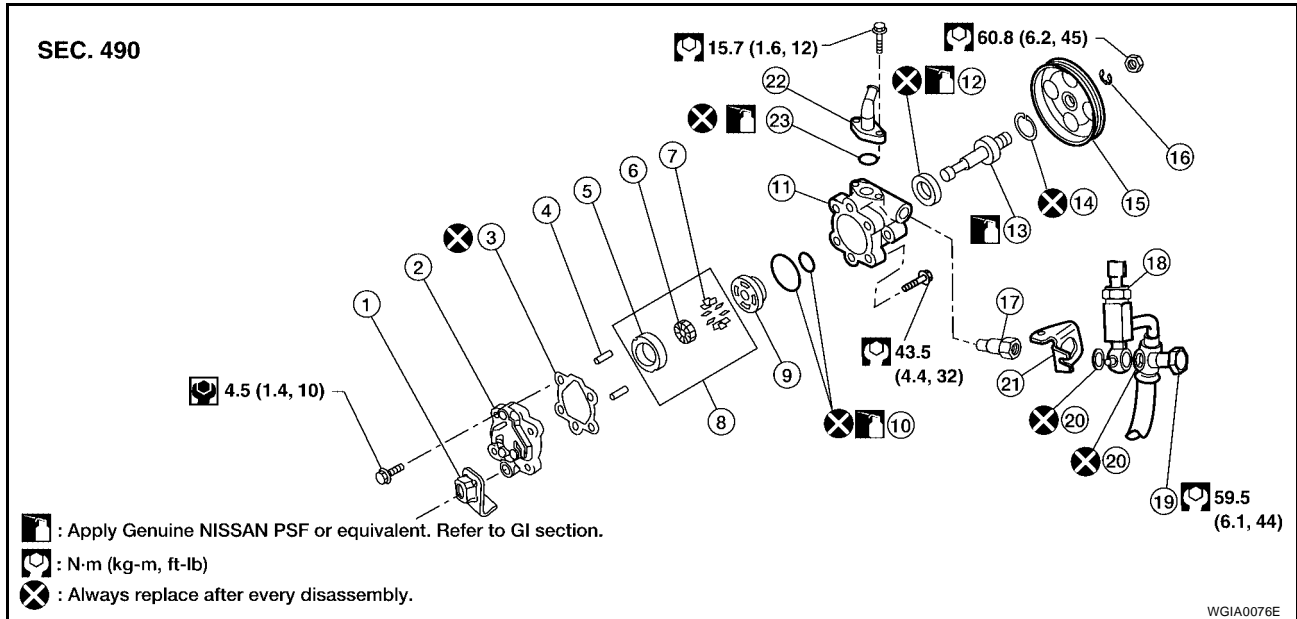
#### NOTE:

Belt tension is automatic and requires no adjustment.

# POWER STEERING OIL PUMP

## Disassembly and Assembly

EGS000M9



- |                          |                        |                     |
|--------------------------|------------------------|---------------------|
| 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. Flow control valve | 18. Pressure sensor |
| 19. Connector bolt       | 20. Copper washer      | 21. Bracket         |
| 22. Suction pipe         | 23. O-ring             |                     |

### 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:

Mount the oil pump in a vise as needed.

#### CAUTION:

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

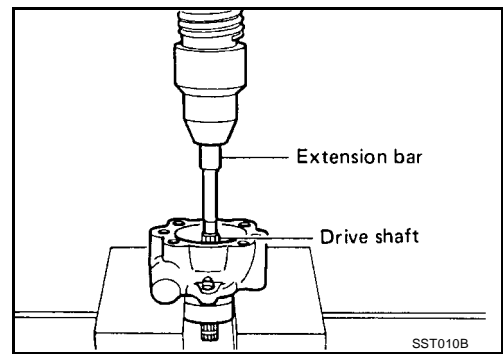
1. Unscrew three bracket bolts and remove bracket from rear cover.
2. Unscrew four rear cover bolts and remove rear cover from body assembly.
3. Remove gasket from body assembly.
4. Remove lock pin, cartridge and side plate from body assembly.
5. Remove pulley from drive shaft assembly.

# POWER STEERING OIL PUMP

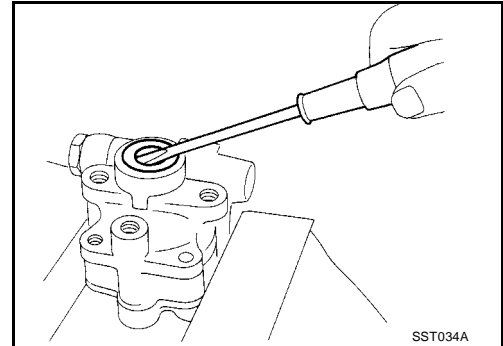
- Remove snap ring from drive shaft assembly, then press out drive shaft assembly.

**CAUTION:**

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



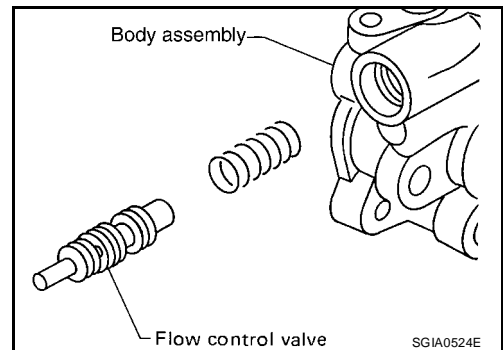
- Using a screwdriver, remove oil seal from body assembly.



- Remove O-ring from body assembly.
- Remove connector bolt, then flow control valve and spring from body assembly.

**CAUTION:**

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



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

## INSPECTION AFTER DISASSEMBLY

### Body Assembly and Rear Cover Inspection

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

### Cartridge Assembly Inspection

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

## ASSEMBLY

**CAUTION:**

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

**NOTE:**

Mount the oil pump in a vise as needed.

- Apply a coat of Genuine NISSAN PSF or equivalent to oil seal lip and to the circumference of oil seal. Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).

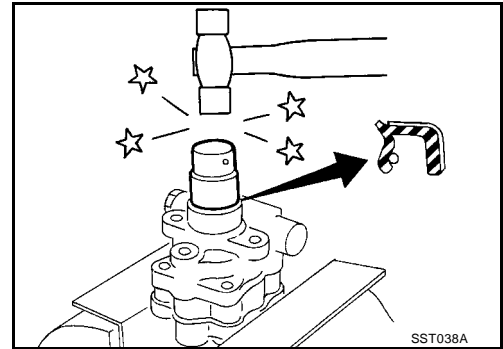
A  
B  
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PS  
H  
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L  
M

## POWER STEERING OIL PUMP

2. Install oil seal to body assembly using suitable tool.

**NOTE:**

Do not reuse oil seal.



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

**NOTE:**

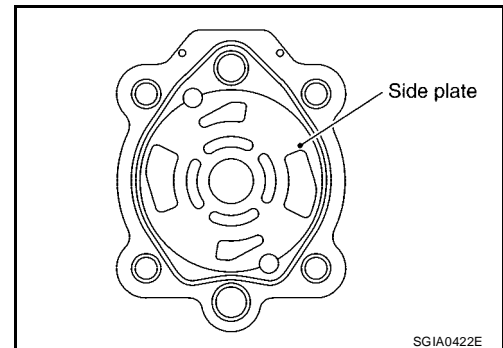
Do not reuse snap ring.

4. Apply a coat of Genuine NISSAN PSF or equivalent to O-ring and install O-ring into body assembly.

**NOTE:**

Do not reuse O-ring.

5. Install side plate to body assembly.

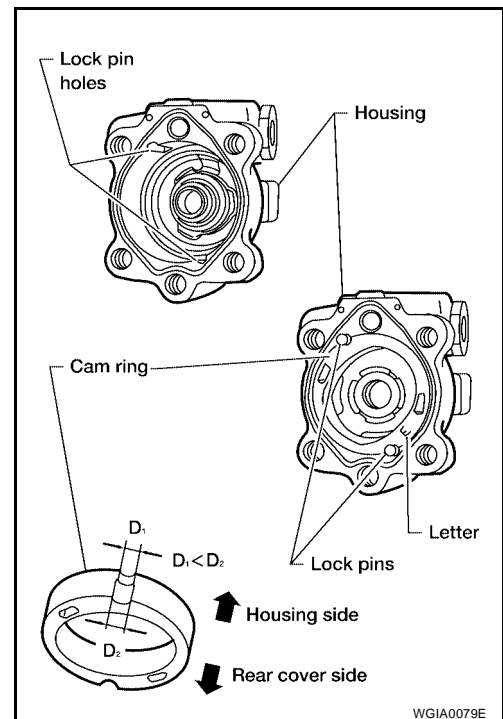


6. Install lock pin into lock pin hole, and install cam-ring as shown.

- When installing cam ring, align letter "E" to rear cover as shown.

**CAUTION:**

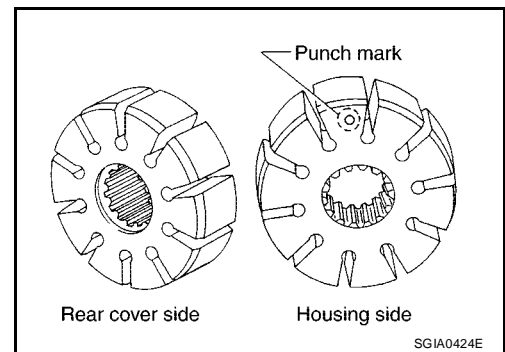
Do not confuse the assembling direction of cam ring. If cam ring is installed facing the incorrect direction, it may cause pump operation malfunction.



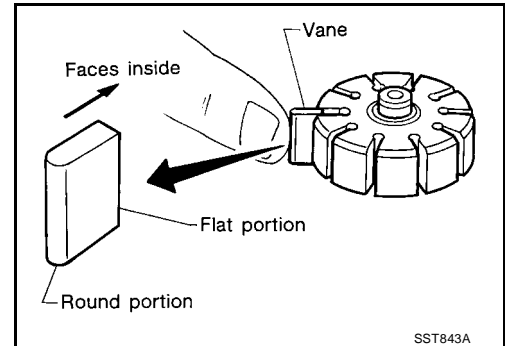
7. Install rotor to body assembly.

## POWER STEERING OIL PUMP

- When installing rotor, the punch mark on the face of the rotor faces the body assembly.



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



9. Check if drive shaft assembly turns smoothly.
10. Install gasket to body assembly.
- NOTE:**  
Do not reuse gasket.
11. Install rear cover to body assembly and tighten bolts to the specified torque.
12. Install bracket to rear cover and tighten bolts at the specified torque.
13. Install pulley to drive shaft assembly then tighten lock nut at the specified torque.
14. Install spring and flow control valve, copper washers, joint and connector bolt to body assembly. Then tighten connector bolt to the specified torque.
- NOTE:**  
Do not reuse O-ring.
15. Apply a coat of Genuine NISSAN PSF or equivalent to O-ring, then install O-ring to suction pipe.
- NOTE:**  
Do not reuse O-ring.
16. Install suction pipe to body assembly.

# HYDRAULIC LINE

PFP:49721

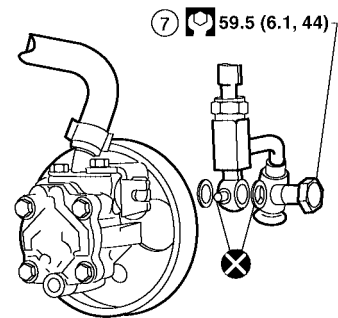
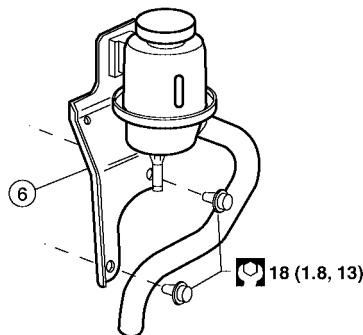
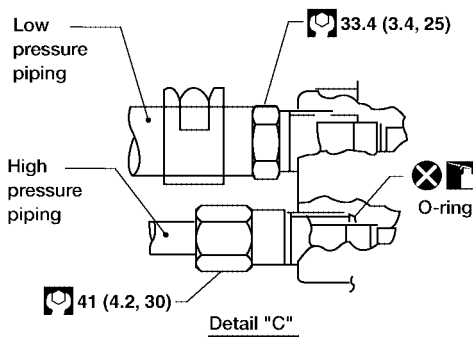
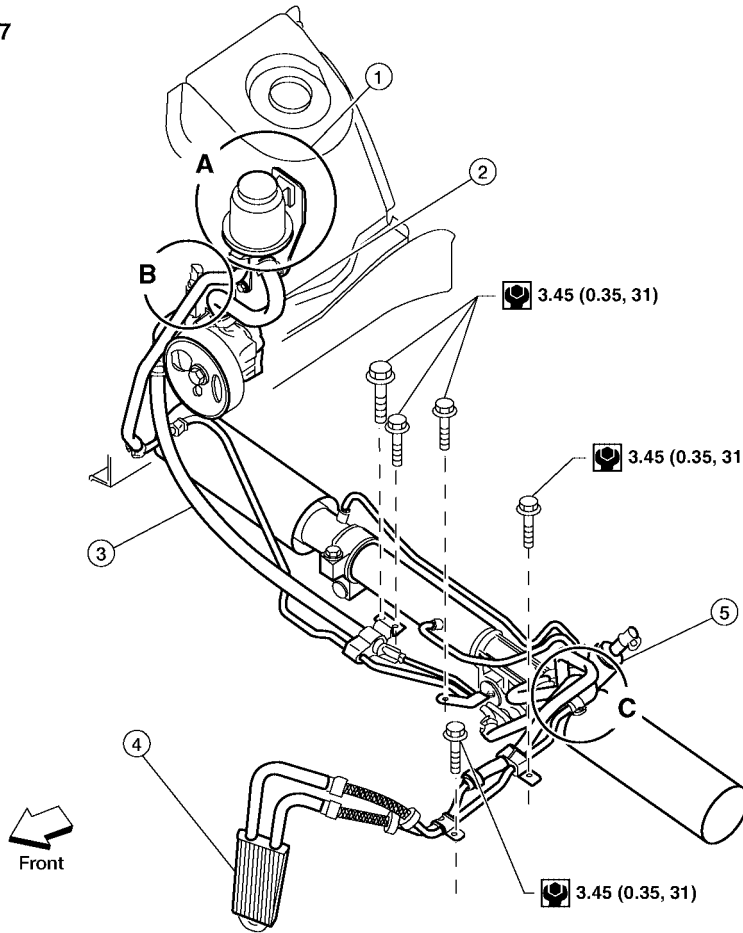
## HYDRAULIC LINE

### Removal and Installation

EGS000MA

Refer to the following illustration for hydraulic line removal.

SEC. 490 • 492 • 497



: Lubricate with engine oil

: N·m (kg·m, ft·lb)

: N·m (kg·m, in·lb)

: Always replace after every disassembly.

Detail "A"

Detail "B"

1. Reservoir tank
2. Suction hose
3. High pressure hose
4. Oil cooler
5. Steering gear assembly
6. Reservoir tank bracket
7. Eye bolt

3. High pressure hose
6. Reservoir tank bracket

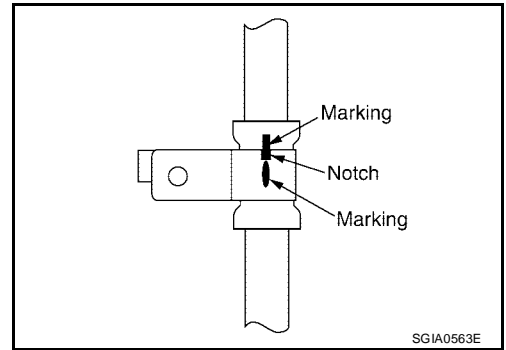
WGIA0111E



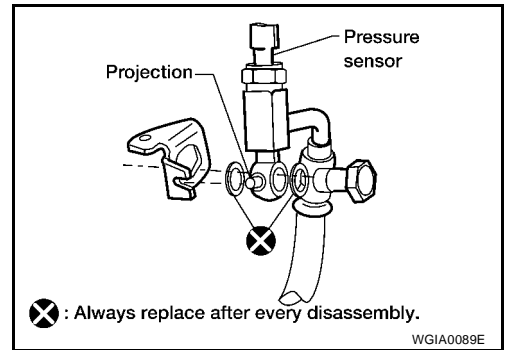
# HYDRAULIC LINE

Installation is in the reverse order of removal.

- Confirm mating marks are aligned with hose and clamp, then correct if needed.



- To install eye joint, align projection of eye joint with notch of power steering pump, and attach eye joint to power steering pump properly. Tighten eye bolt by hand fully, then torque to specification.



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# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

### Steering Wheel

EGS000MB

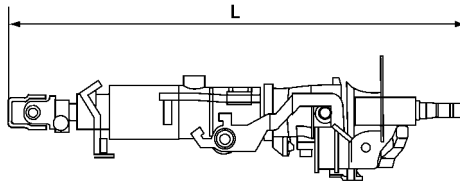
End play of the axial direction for steering wheel	0 mm (0 in)
Steering wheel play on the outer circumference	0 – 35 mm (0 – 1.38 in)
Steering wheel turning force	39 N (4 kg-f, 9 lb-f) or less

### Steering Column

#### Inspection After Assembly

EGS000MD

Unit: mm (in)

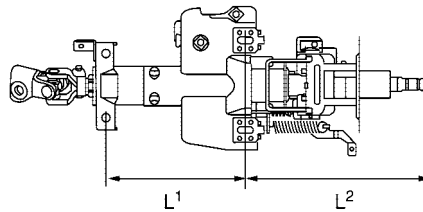


WGIA0080E

Steering column length "L"	610 (24.02)
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#### Inspection After Removal

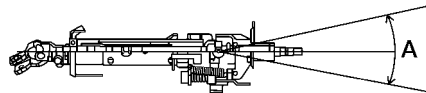
Unit: mm (in)



SGIA0475E

Steering column length "L <sup>1</sup> "	158 (6.22)
Steering column length "L <sup>2</sup> "	262 (10.31)

#### Inspection After Installation



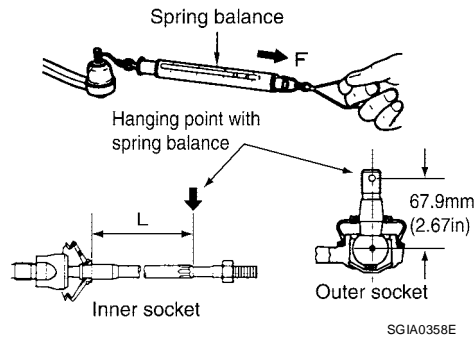
WGIA0083E

Range "A"	61.3 mm (2.41 in)
Tilt mechanism range (Manual tilt)	3° per notch at 5 steps

# SERVICE DATA AND SPECIFICATIONS (SDS)

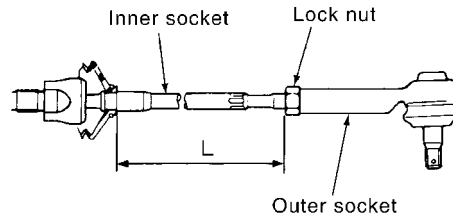
## Steering Outer Socket and Inner Socket

EGS000ME



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 (0.50 – 4.7 kg, 4 – 34 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 (0.11 – 0.79 kg-m, 9 – 69 in-lb)
	Measurement on spring balance ● Measuring point: L mark see above, L=83.2 mm (3.276 in).	12.1 – 93.7 N (1.3 – 9.5 kg, 9 – 69 lb)
	Axial end play	0.2 mm (0.08 in) or less

Unit: mm (in)

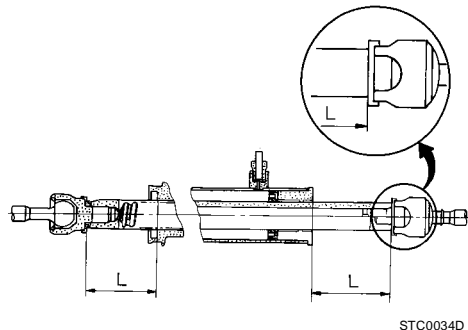


Inner socket length "L"	115.2 (4.54)
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## Steering Gear

EGS000MF

Steering gear model	PR26AM
Rack neutral position, dimension "L" (rack stroke)	85.5 mm (3.36 in)



## SERVICE DATA AND SPECIFICATIONS (SDS)

Steering gear model		PR26AM	
Rack sliding force	At the neutral point: Range within $\pm 11.5$ mm ( $\pm 0.453$ in) from the neutral position (in power ON)	Area average value	147 – 211 N (14.99 – 21.52 kg, 33.1 – 47.52 lb)
		Allowable variation	98 N (10 kg, 22 lb) or less
	Whole area (in power OFF)	Peak value	294 N (30.0 kg, 66 lb) or less
		Allowable variation	147 N (16 kg, 35 lb) or less

### Oil Pump

*EGS000MG*

Relief oil pressure	9.0 – 9.8 mPa (91.77 – 99.93 kg/cm <sup>2</sup> , 1305.34 – 1421.37 psi)
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### Steering Fluid

*EGS000MH*

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