

PS

SECTION

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”

EGS0001Z

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. 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 harness connectors.

Caution

EGS00049

- Always follow the warnings and the cautions below in disassembly procedures:
 - Work in a clean, dust-free place. No dust proof device is necessary.
 - Clean outside of unit before disassembly.
 - Clean parts to be disassembled. Be careful not to allow any dirt or other foreign materials to enter or contact with parts.
 - Assemble disassembled parts properly, following order shown in manual. If work has been suspended in the middle of assembly, place a clean cover over parts. This will prevent them from being contaminated.
 - Use paper towels when removing dirt and other foreign materials. Cloth shop towels can leave lint on cleaned parts that might affect operation of parts.
 - Clean disassembled parts (except rubber parts) with kerosene. Drain oil by blowing with air or absorbing with shop papers.
 - Before assembling, apply Nissan power steering fluid to O-rings and seals.
 - Replace gaskets and O-rings with new ones. Be careful not to damage any O-rings, oil seals, and gaskets during assembly.
- If following part is scratched after disassembly of steering pump, replace applicable part: case, rear body, side plate, pulley, rotor, vane, or flow control valve
- Mark source of fluid leak with a white marker for identification.
- Seals and copper washers must not be reused.

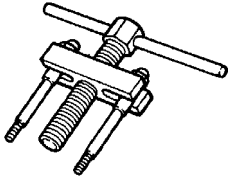
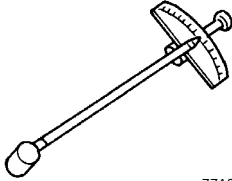
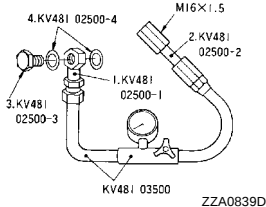
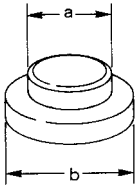
PREPARATION

PREPARATION

PFP:00002

Special Service Tools

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Tool number Tool name	Description
ST27180001 Steering wheel puller  ZZA0819D	Removal of steering wheel
ST3127S000 Preload gauge  ZZA0806D	Steering torque check
KV48103500 Hydraulic pressure gauge KV48102500 Hydraulic pressure gauge adapter 1 KV48102500-01 (I-joint) 2 KV48102500-02 (Flare joint) 3 KV48102500-03 (Bolt) 4 KV48102500-04 (Washer)  ZZA0839D	Measurement oil pump relief pressure
ST35300000 Drift a: 45.1 mm (1.776 in) dia. b: 59.0 mm (5.323 in) dia.  ZZA0881D	Installing drive shaft seal

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PPF:00003

NVH Trouble shooting Chart

EGS000A9

Use the 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
STEERING	Noise	x	Fluid level		PS-5
	Shake		Air in hydraulic system		PS-5
	Vibration		Tie-rod ball joint swinging force		PS-16
	Shimmy		Tie-rod ball joint rotating torque		PS-16
	Judder		Tie-rod ball joint end play		PS-16
		x	Steering gear fluid leakage		PS-5
		x	Steering wheel play		PS-6
		x	Steering gear rack sliding force		-
		x	Drive belt looseness		EM-12.
		x	Improper steering wheel		-
		x	Improper installation or looseness or tilt lock lever		PS-11
		x	Mounting rubber deterioration		-
		x	Steering column deformation or damage		PS-9
		x	Improper installation or looseness of steering column		PS-9
		x	Steering linkage looseness		PS-12
		x	PROPELLER SHAFT		NVH in PR section
		x	DIFFERENTIAL		NVH in RFD section
		x	AXLE AND SUSPENSION		NVH in FAX, RAX, FSU, RSU section
		x	TIRES		NVH in WT section
		x	ROAD WHEEL		NVH in WT section
		x	DRIVE SHAFT		NVH in RAX section
		x	BRAKES		NVH in BR section

x: Applicable

POWER STEERING FLUID

POWER STEERING FLUID

PFP:KLF20

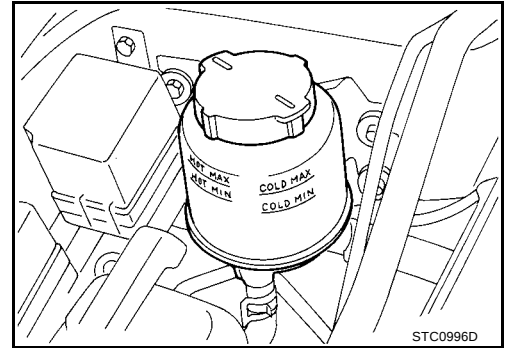
Checking Fluid Level

EGS0004B

- Check the fluid level with the engine OFF.
- Check that fluid level is between MAX and MIN marks on tank. Fluid level should not exceed MAX mark. Excessive fluid will cause fluid to leak from cap.
- Note that fluid level can change depending on temperature of fluid. HIGH and LOW marks are shown on tank to indicate the proper level at high temperature and low temperature respectively.

HOT : Oil temperature 50 to 80°C (122 to 176°F)

COLD : Oil temperature 0 to 30°C (32 to 86°F)



CAUTION:

- Never reuse drained power steering fluid.
- Use DEXRON™ III or equivalent. Never use Nissan Power Steering Fluid Special, Nissan Matic Fluid C, or D.

Checking Fluid Leak

EGS0004C

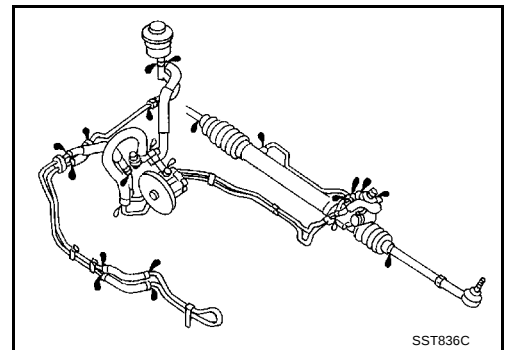
Check hydraulic connections for any leak, crack, damage, looseness, or wear.

1. Run engine until fluid temperature reaches 50 to 80°C (122 to 176°F) in reservoir tank. Keep engine speed at idle.
2. Turn steering wheel several times from stop to stop.
3. Turn the steering wheel clockwise or counter clockwise until it reaches the stop and hold it for five seconds. Check for fluid leak.

CAUTION:

Do not hold steering wheel at stop for 15 seconds or longer. Otherwise, pump may be damaged.

4. If any leak is found on joint, loosen and retighten flair nut. Excessive tightening may damage O-ring, washer, or connector.



Bleeding Hydraulic System

EGS0004D

1. Lift vehicle.
2. Fill tank up to MAX mark. Turn steering wheel several times from stop to stop. Add fluid if fluid level goes down. Repeat this step until there is no fluid decrease and no bubble in tank.
3. Start engine and repeat step above with engine at idle. Continue step until no decrease in fluid happens. If bleeding is not complete, following symptoms can be observed.
 - Bubbles are created in reservoir tank.
 - Rattling noise can be heard from oil pump.
 - Whining noise can be heard from oil pump.

Turn steering wheel slowly or stop vehicle. Sound of fluid movement may be heard from gear valve and pump. This sound has nothing to do with steering performance or durability.

STEERING WHEEL

STEERING WHEEL

PFP:48430

On-Vehicle Inspection and Service PLAY INSPECTION

EGS0004E

1. Turn steering wheel to straight-ahead position. Start engine and lightly turn steering wheel clockwise and counter clockwise until front wheels start moving. Measure travel to starting point on circumference of steering wheel.

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

2. If play is outside specifications, check following parts for proper installation: steering gear assembly, front suspension, axles, and steering column
 - Check steering wheel for vertical, horizontal, or axial play.

Steering wheel axial endplay : 0 mm (0 in)

- Lift vehicle and check steering gear mounting bolts and nuts for looseness.

Tightening torque : 140 - 160 N·m (14.2 - 16.4 kg·m, 103 - 118 ft·lb)

NEUTRAL POSITION INSPECTION

- After the wheel alignment inspection, carry out the neutral position inspection. Refer to [FSU-6, "Wheel Alignment"](#).
 - Before removing steering wheel, check steering gear neutral position.
1. Set vehicle to straight-ahead position, and check that steering wheel is in neutral position.
 2. If it is not in neutral position, remove steering wheel, and install again in properly.
 3. If it is not adjusted within two teeth from center of gear, loosen tie rod lock nut. Then turn it to opposite direction to adjust until amount of left and right becomes equal.

STEERING TORQUE CHECK

1. Stop vehicle on a dry flat paved road and apply parking brake.
2. Start engine and wait until power steering fluid warms up. Using a preload gauge, check rotational torque of steering wheel.

Steering torque:

706 N·cm (72 kg·cm, 62 in·lb) or less

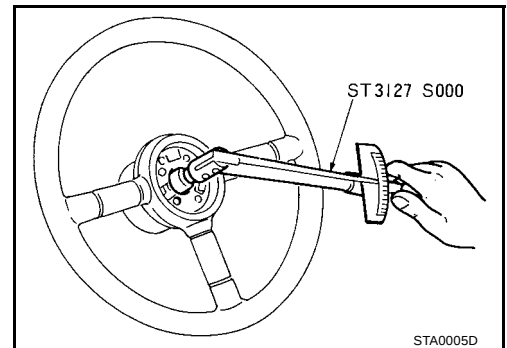
3. If torque is outside specifications, check rack sliding torque and oil pump relief pressure.

Rack sliding torque:

153 - 240 N (15.5 - 24.5 kg, 34.3 - 54.2 lb)

Oil pump relief hydraulic pressure:

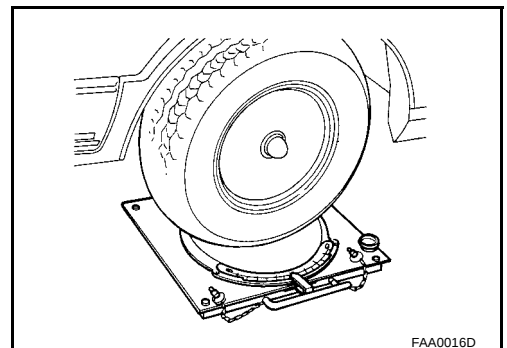
8,140 - 8,728 kPa (81.4 - 87.3 bar, 83 - 89 kg/cm² , 1,180 - 1,266 psi)



STA0005D

STEERING ANGLE INSPECTION

- After toe-in inspection, check steering angle. Place front wheels on turning radius gauges and rear wheels on stands. Level the vehicle. Check maximum inner and outer wheel steering angles for LH and RH road wheels.



FAA0016D

STEERING WHEEL

- Start engine. With engine at idle, turn steering wheel from stop to stop and measure steering angles.

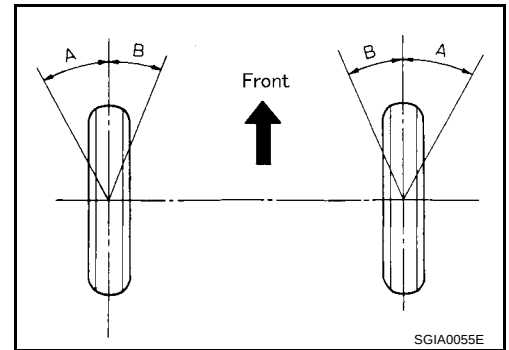
Inner wheel **Minimum** : 36°
 Nominal : 39°
 Maximum : 40°

Outer wheel : 31°

- If angles are outside specification, measure rack stroke.

Rack stroke : 66.5 mm (2.618 in)

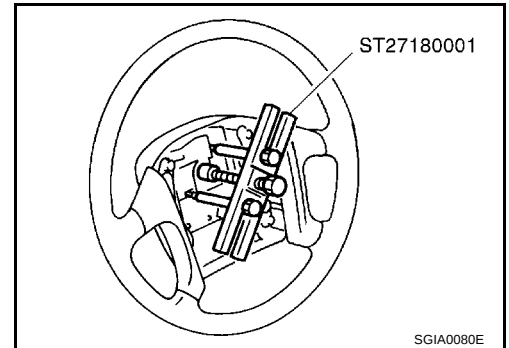
- If rack stroke is outside of specification, disassemble steering gear to check rack stroke.
- Steering angles are not adjustable. If any of steering angles is different from specified value, check steering gear, the column and the front suspension components for wear or damage. If any abnormality exists, replace the malfunctioning parts.



Removal and Installation

REMOVAL

- Remove air bag module. Refer to [SRS-29, "DRIVER AIR BAG MODULE"](#).
- Remove horn connector.
- Remove steering wheel mounting nut and paint mating marks on steering wheel body and top of column shaft.
- Using a steering wheel puller, remove steering wheel.



INSTALLATION

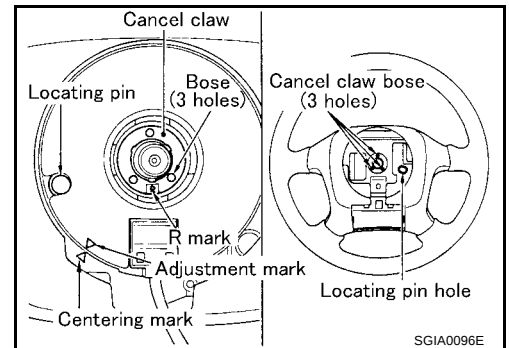
Paying attention to following items, install in the reverse order of removal.

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.
- Neutral position (refer to figure)... Gently turn spiral cable clockwise until it comes to the stop. Then turn it counter clockwise (approximately 3.0 turns) until centering mark is aligned with adjustment mark. (Service part is fixed in neutral position with stopper. It can be installed onto steering wheel without alignment once stopper is removed.)

CAUTION:

- Place steering wheel as follows: Front wheels in straight-ahead position. R mark on the cancel claw faces down. 3 bosses align with 3 holes behind steering wheel assembly. Check that spiral cable is placed in neutral position and that locating pin on the left of the spiral cable is aligned with the locating pinhole behind the steering wheel assembly.
- Do not rotate spiral cable more than necessary. Do not tighten them excessively. (The cable may be torn off.)
- After installation, check system for proper operation by observing air bag warning lamp.
- If air bag indicator indicates any abnormal condition, use self-diagnosis function or CONSULT to reset or cancel memory.



STEERING WHEEL

-
- If air bag warning lamp still shows abnormal condition even after operation above, diagnose system. Repair malfunctioning parts.

STEERING COLUMN

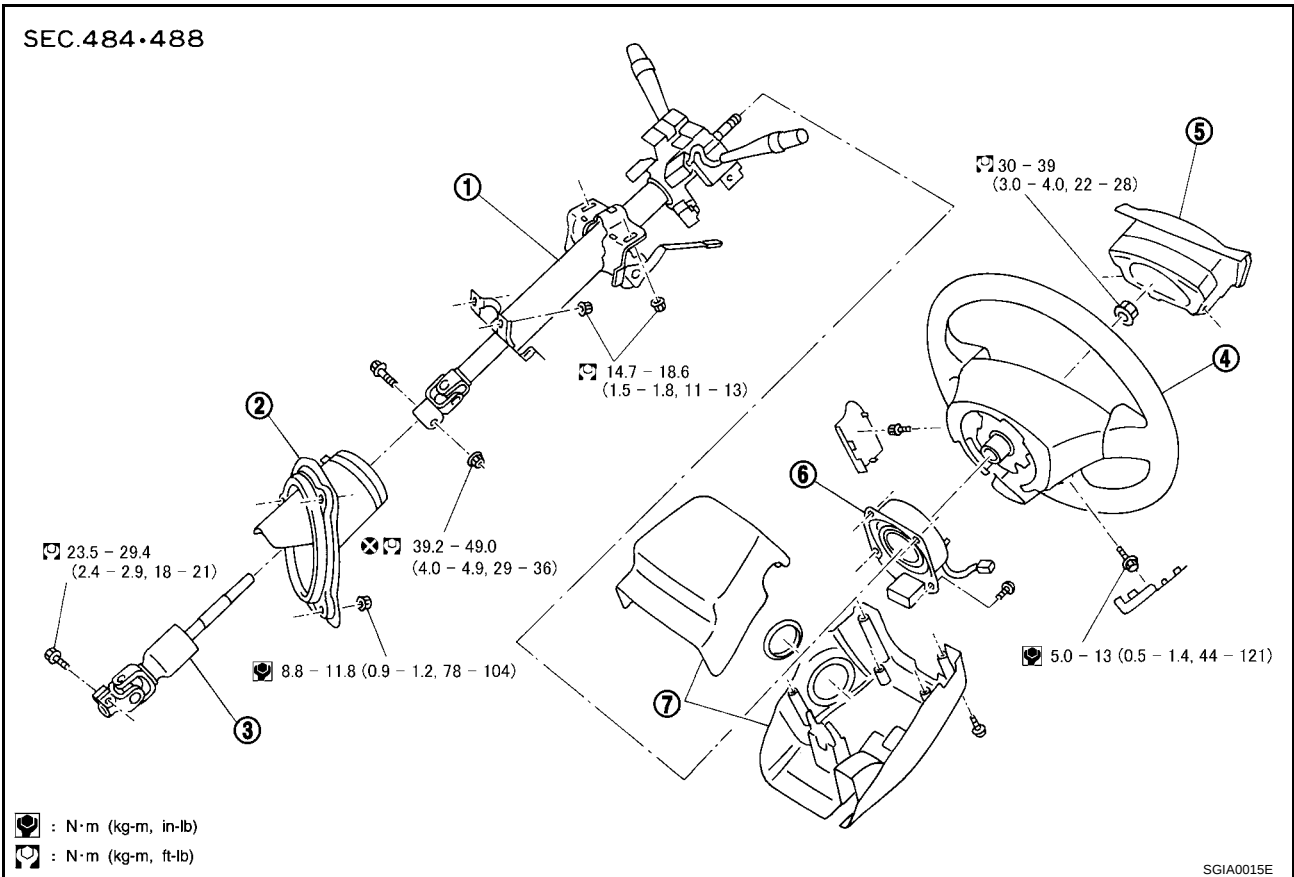
STEERING COLUMN

PFP:48810

Removal and Installation

EGS00094

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- | | | |
|-----------------------------|-------------------|-----------------|
| 1. Steering column assembly | 2. Hole cover | 3. Lower joint |
| 4. Steering wheel | 5. Air bag module | 6. Spiral cable |
| 7. Column cover | | |

CAUTION:

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

REMOVAL OF LOWER JOINT AND HOLE COVER

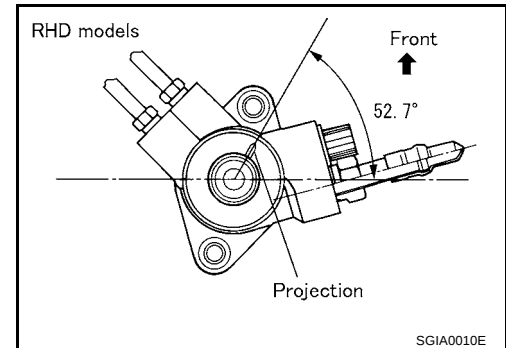
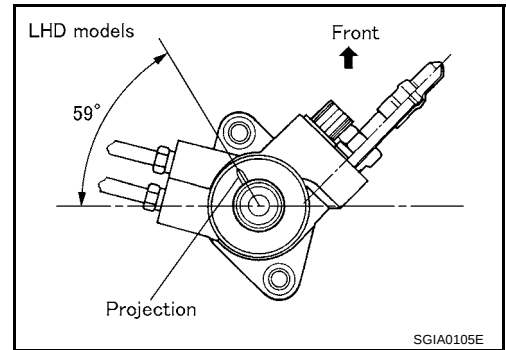
1. Raise vehicle with front wheels in straight-ahead position.
2. Mark lower joint and steering gear with paint for easy installation. Remove pinch bolt from lower side of lower joint.
3. Remove mounting bolt and nut from upper side of lower joint.
4. Remove footrest.
5. Remove hole cover and lower joint from vehicle.
6. Remove clamp and lower seal cover from hole cover.

INSTALLATION OF LOWER JOINT AND HOLE COVER

- Refer to component diagram for tightening torque. Install in the reverse order of removal.

STEERING COLUMN

- Connect lower joint onto steering gear with slot on lower portion of lower joint engaged with guide tip projection. Check guide tip is positioned as shown in the figure.



REMOVAL OF STEERING COLUMN ASSEMBLY

1. Remove steering wheel and column cover. Refer to [PS-7, "REMOVAL"](#) .
2. Remove instrument lower driver panel.
3. Remove spiral cable. Refer to [SRS-33, "Removal and Installation"](#) .
4. Remove hole cover and mounting bolts and nuts on upper portion of lower joint.
5. Remove the key interlock cable from the steering column assembly. Refer to [AT-412, "KEY INTERLOCK CABLE"](#) .
6. Remove clamp and connector from steering column assembly.
7. Remove steering column assembly mounting nut and remove steering column assembly from vehicle.

CAUTION:

Do not deform lower bracket on steering column assembly during removal or installation.

INSTALLING STEERING COLUMN ASSEMBLY

- Installation procedure should be used with steering lock unlocked.
1. Position on steering column assembly, and install steering column assembly to vehicle with mounting nuts.
 2. Attach mounting bolts and nuts on upper portion of lower joint.

CAUTION:

Do not reuse mounting nuts.

3. Connect clamp and connector.
4. Connect key interlock cable to steering column assembly. Refer to [AT-412, "KEY INTERLOCK CABLE"](#)
5. Connect spiral cable. Refer to [SRS-33, "Removal and Installation"](#) .
6. Install instrument lower driver panel.
7. Install steering wheel and column cover. Refer to [PS-7, "INSTALLATION"](#) .

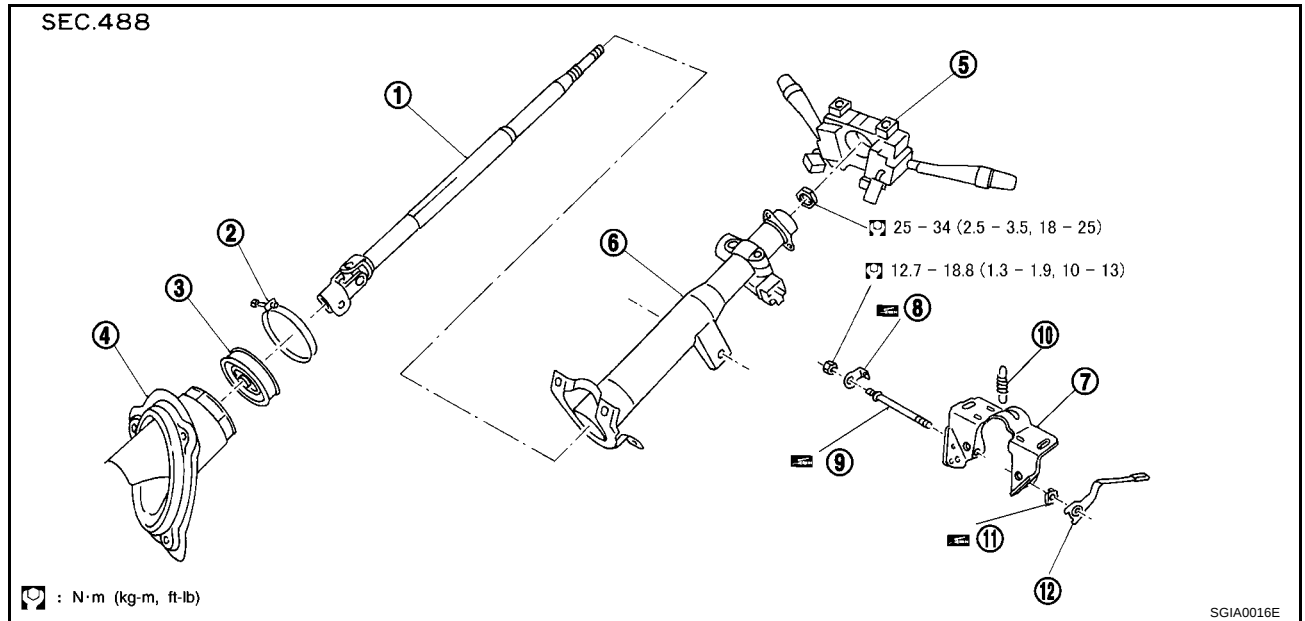
CAUTION:

After installation, turn steering wheel. Be sure it turns smoothly with no disinterred condition, binding, noise or excessive steering effort.

STEERING COLUMN

Disassembly and Assembly

EGS00095



- | | | |
|-------------------|------------------------|-------------------------|
| 1. Column shaft | 2. Clip | 3. Lower seal cover |
| 4. Hole cover | 5. Combination switch | 6. Jacket tube |
| 7. Mount assembly | 8. Adjust stopper | 9. Steering adjust bolt |
| 10. Spring | 11. Tilt lever stopper | 12. Tilt lever |

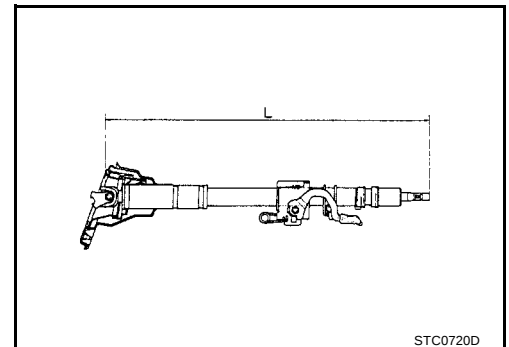
DISASSEMBLY

- Disassembly and assembly procedures should be done with steering lock unlocked.
- Remove combination switch from jacket tube.
 - Remove jacket tube-to-column shaft mounting nut and remove column shaft from jacket tube.
 - Remove spring from mount assembly.
 - Remove mounting nut and adjusting stopper.
 - Remove steering adjusting bolt and remove tilt lever stopper and tilt lever.

INSPECTION AFTER DISASSEMBLY.

- If steering wheel does not turn smoothly, check the following and replace malfunctioning part.
- Check column shaft bearing for damage and other malfunctions. Lubricate with grease or replace column shaft if necessary.
 - Check jacket tube for deformation and cracks, and replace if necessary.
- If vehicle has slightly crashed, measure dimension "L" as shown. If outside standard, replace steering column assembly.

Dimension "L" : 543 mm (21.38 in)



ASSEMBLY

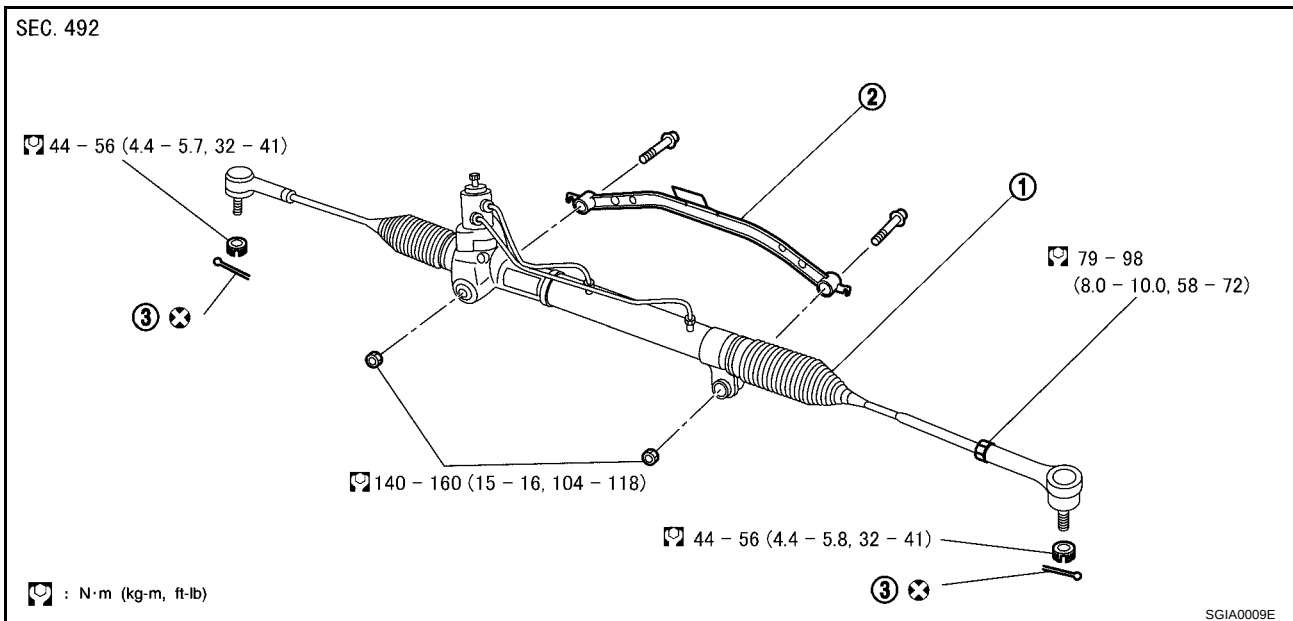
- Refer to component parts drawing for tightening torque and reverse disassembly procedure for assembly.
- After assembling steering column, check tilt mechanism.

POWER STEERING GEAR AND LINKAGE

PFP:49001

Removal and Installation

EGS0004I



1. Power steering gear assembly
2. Power steering tube bracket
3. Cotter pin

REMOVAL

1. Remove cotter pin, and loosen mounting nut. Remove tie rod from steering knuckle with a pitman arm puller.

CAUTION:

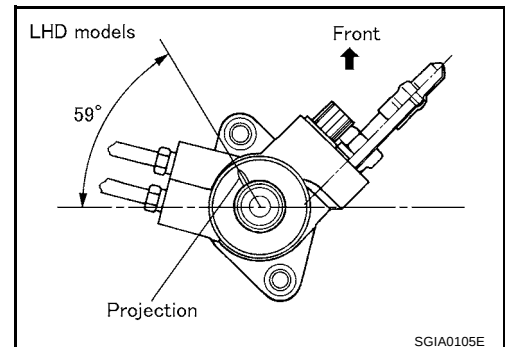
- Be careful not to damage dust boot at ball joint of tie rod.
- Before using pitman arm puller (multi-purpose tool), loosely tighten nut for temporary holding.

2. Mark lower joint and steering gear with paint for easy installation. Remove pinch bolt from gear side of lower joint.
3. Remove high pressure-side tube and low pressure-side hose of hydraulic piping from steering gear.
4. Remove mounting nuts on upper portion of stabilizer connecting rod and stabilizer clamp mounting bolts. Move stabilizer toward vehicle front.
5. Remove steering gear assembly mounting bolts and nuts. Remove power steering tube bracket and steering gear assembly from suspension member.
6. Tilt steering gear to prevent any contact with other parts. Then remove it from right side of vehicle.

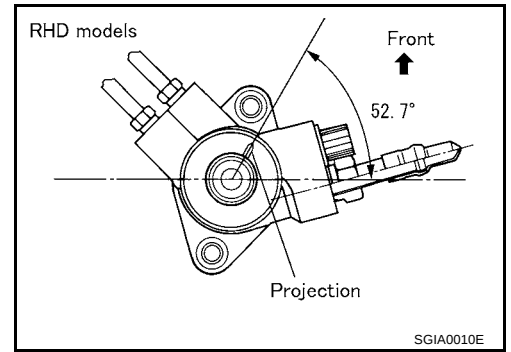
INSTALLATION

Paying attention to following items, install in the reverse order of removal.

- After installation, bleed air. Refer to [PS-5. "Bleeding Hydraulic System"](#).
- Remove mounting bolt and nut from upper portion of lower joint. This will facilitate installation of lower joint to steering gear. Then slide lower joint in place.
- Check lower slit of lower joint is engaged with projection on rear cover cap. Install pinch bolt for lower portion of lower joint. Check steering gear is in straight-ahead position. Also check rear cover is in position shown in figure. Then install lower joint to steering gear.



POWER STEERING GEAR AND LINKAGE

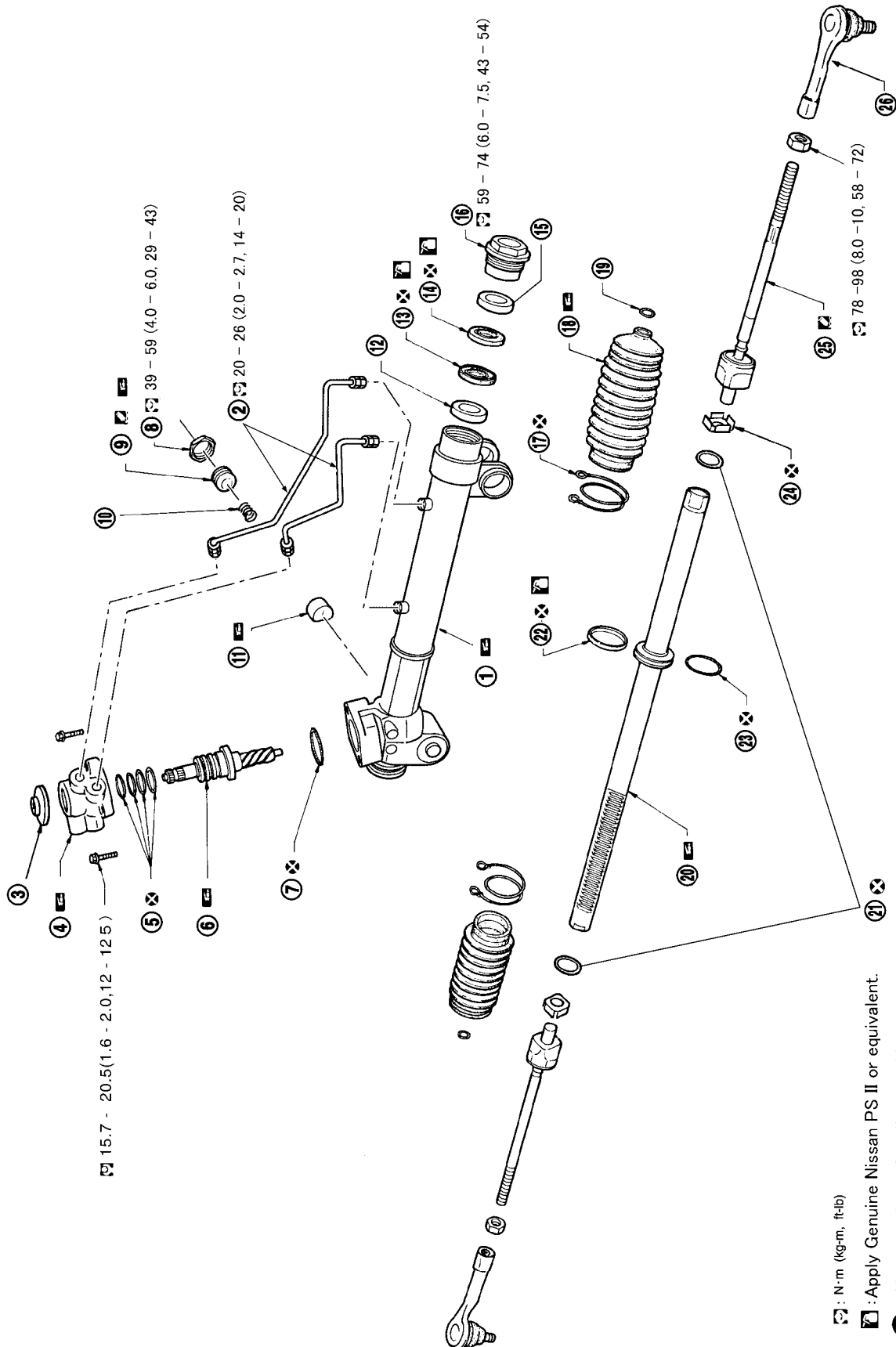


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POWER STEERING GEAR AND LINKAGE

Components MODEL PR24AD

EGS0004J



SEC.492

SGIA0466E

POWER STEERING GEAR AND LINKAGE

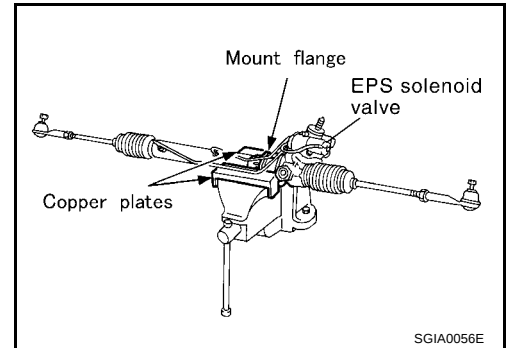
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|---------------------------|---------------------------|--------------------|
| 1. Gear housing assembly | 2. Cylinder tube | 3. Rear cover cap |
| 4. Rear housing assembly | 5. Pinion seal ring | 6. Pinion assembly |
| 7. O ring | 8. Lock nut | 9. Adjusting screw |
| 10. Spring | 11. Retainer | 12. Center bushing |
| 13. Rack oil seal (inner) | 14. Rack oil seal (outer) | 15. Spacer |
| 16. End cover assembly | 17. Boot clamp | 18. Dust boot |
| 19. Boot band | 20. Rack | 21. Spacer ring |
| 22. Rack Teflon ring | 23. O-ring | 24. Lock plate |
| 25. Inner socket | 26. Outer socket | |

Disassembly and Assembly

- To disassemble and assemble power steering gear, fix steering gear mount flange in a vise with copper plates.

CAUTION:

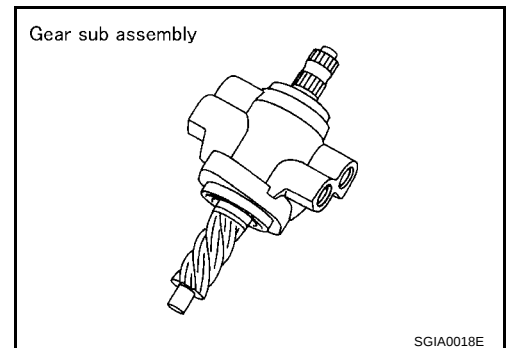
- Clean steering gear with kerosene. Be careful to avoid splashing or applying any kerosene over connector of discharge port or return port.
- Always replace O-rings, oil seals, and copper washes with new ones.



- Loosen and remove adjusting screws and lock nuts.
- Remove rear housing mounting bolts to remove gear sub assembly.

CAUTION:

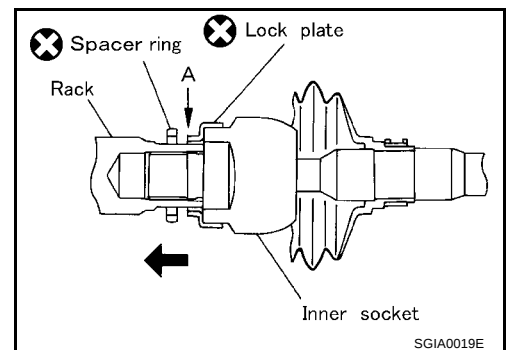
Do not disassemble rear housing and pinion gear assembly.



- Remove tie rod outer socket and boot.
- Remove spacer ring on lock plate. Move it to rack side to expose crimping of lock plate.

CAUTION:

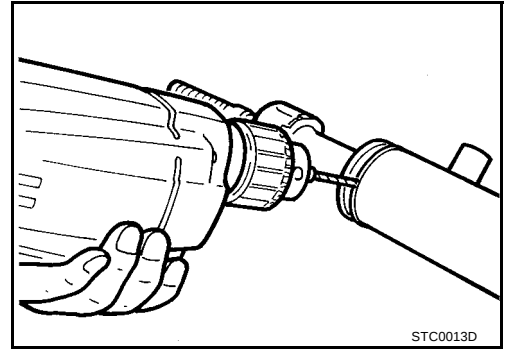
- Do not reuse boot, spacer ring, and lock plate.
- When removing boot, do not damage boot mounting grooves by tool. If it damaged, it may cause oil leak. Replace tie rod inner socket and gear housing assembly.
- When removing lock plate from rack, avoid damaging surface of rack. If damaged, rack assembly must be replaced. Otherwise, oil leaks will result.



- Raise crimping areas (2) (A) of lock plate. Loosen inner socket and remove from rack.

POWER STEERING GEAR AND LINKAGE

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



8. Remove end cover with a 36 mm (1.42 in) open head.

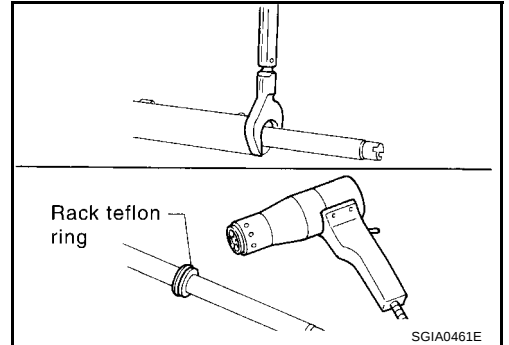
CAUTION:

When removing, avoid damaging surface of rack. If damaged, rack assembly must be replaced. Otherwise, oil leaks will result.

9. Pull rack assembly with rack Teflon ring out of gear housing assembly.

CAUTION:

When pulling out rack assembly, do not damage cylinder inner wall. If it damaged, it may cause oil leak. Replace gear housing assembly.

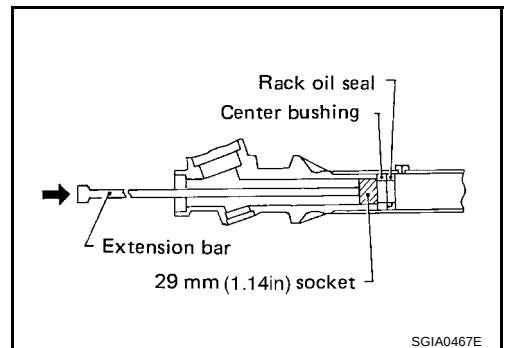


10. Heat Teflon ring to approx. 40°C (104°F) with a hot air blower. Remove it and O-ring from rack. Be careful not to damage rack.

11. Use a taped 29 mm (1.14 in) socket and an extension bar. Push out and remove center bushing and rack oil seal together from gear housing assembly.

CAUTION:

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



INSPECTION AFTER DISASSEMBLY

Boot

Check boot for tear, wrinkle, and deformation. Replace it, if necessary.

Rack

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

Gear subassembly

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

Gear housing cylinder

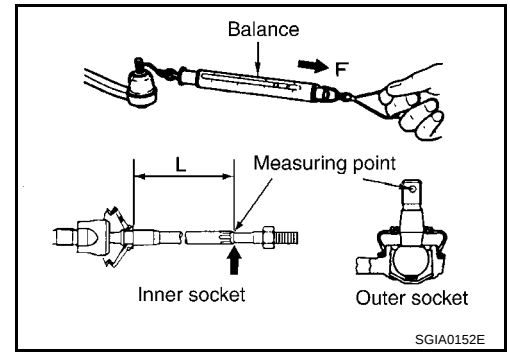
Check gear housing cylinder for damage and scratch (inner wall). Replace it, if necessary.

Tie rod ball joint

1. Swing torque.

POWER STEERING GEAR AND LINKAGE

- Hook spring scale at the position indicated in the figure. Confirm the reading at the moment the ball stud begins moving is within specifications. If the value is outside the standard, replace outer and inner sockets.

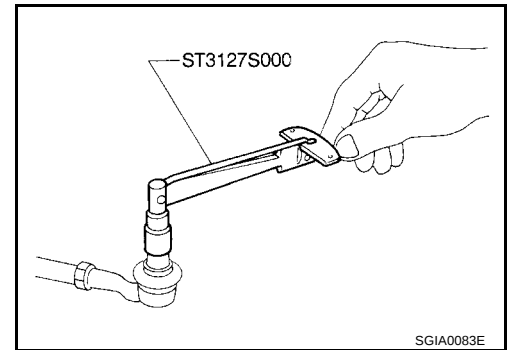


	Outer socket	Inner socket
Oscillating torque [N·m (kg-m, in-lb)]	0.30 - 2.94 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)	1.0 - 7.8 N·m (0.10 - 0.80 kg-m, 9 - 69 in-lb)
Measurement on spring balance [N (kg, lb)]	4.84 - 47.4 N (0.49 - 4.84 kg, 1.08 - 10.7 lb)	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)
Measuring point	Cotter-pin hole of stud	Shown as L:106.2 mm (4.18 in)

2. Sliding torque

- Using a preload gauge, check reading is within range specified below. If the value is outside the standard, replace outer and inner sockets.

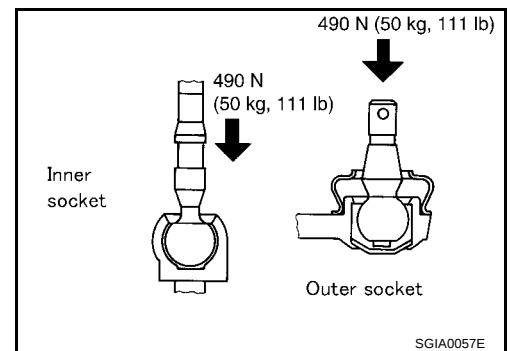
Outer socket	PR24AD
Rotating torque	0.30 - 2.94 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)



3. Axial endplay

- Apply load of 490 N (50 kg, 110.6 lb) to ball stud axially. Measure amount of movement that stud makes by using a dial gauge. Check reading is within range specified below. If not, replace outer and inner sockets.

Outer socket : 0.5 mm (0.02 in) or less
 Inner socket : 0.2 mm (0.008 in) or less



ASSEMBLY

- Always replace O-rings, oil seals, and copper washers with new ones.

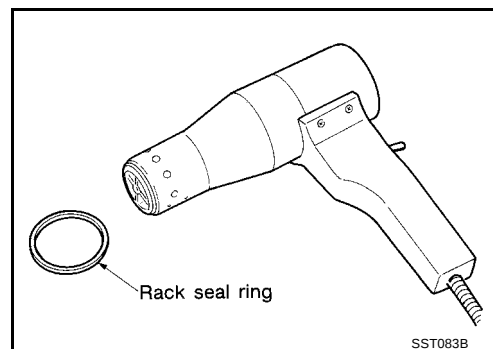
1. Install an O-ring.

CAUTION:

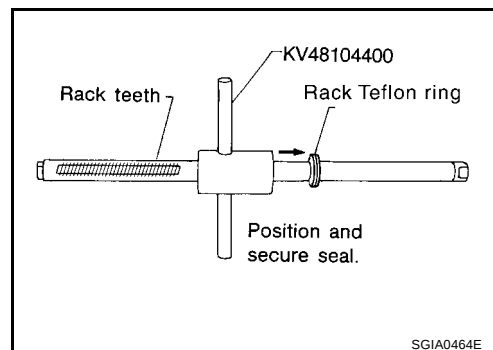
Do not reuse rack Teflon ring and O-ring.

POWER STEERING GEAR AND LINKAGE

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



3. To fit Teflon ring on rack, install Teflon ring correcting tool from tooth side. Compress the rim of ring with the tool. Then, put the O-ring on the Teflon ring.



4. Insert new rack oil seal.

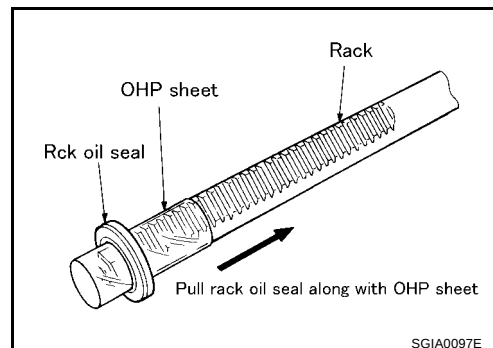
CAUTION:

Rack oil seal is not reusable. Never reuse rack oil.

- a. To avoid damaging inner rack oil seal, wrap an OHP sheet [approx. 70 mm (2.76 in) × 100 mm (3.94 in)] around rack tooth. Place oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass toothed section of rack.
- b. Insert rack assembly into gear housing assembly.

CAUTION:

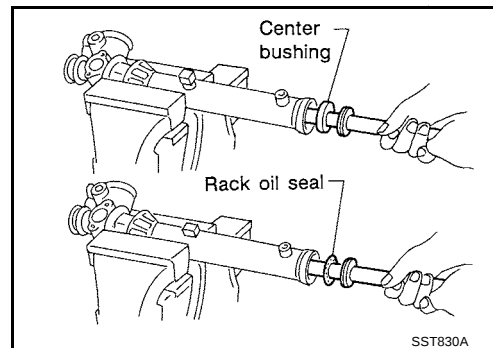
When inserting rack assembly, do not damage cylinder inner wall. If it damaged, it may cause oil leak. Replace gear housing assembly.



- c. Install center bushing and rack oil seal separately.
- d. Press rack piston in to move inner rack oil seal to proper position.

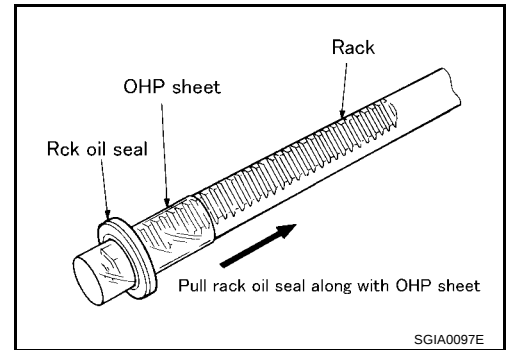
CAUTION:

Move it until it contacts center bushing.

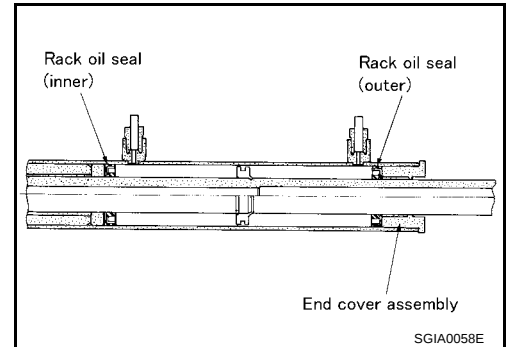


POWER STEERING GEAR AND LINKAGE

- e. When installing outer rack oil seal, cover 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 over sheet. Pull rack oil seal along with OHP sheet until they pass rack end. Install rack oil seal in place using end cover assembly.



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

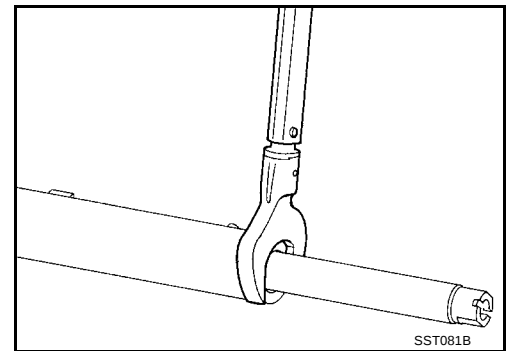


5. Using a 36-mm open head, tighten end cover assembly to specified torque.

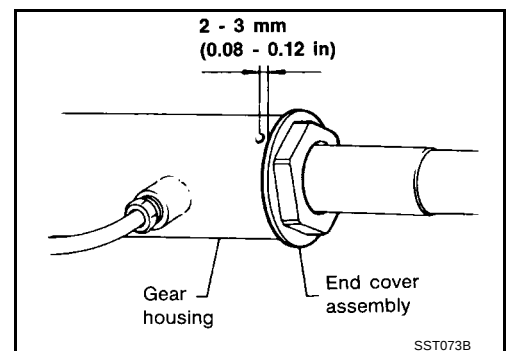
 : 59 - 74 N·m (6.0 - 7.5 kg-m, 43 - 54 ft-lb)

CAUTION:

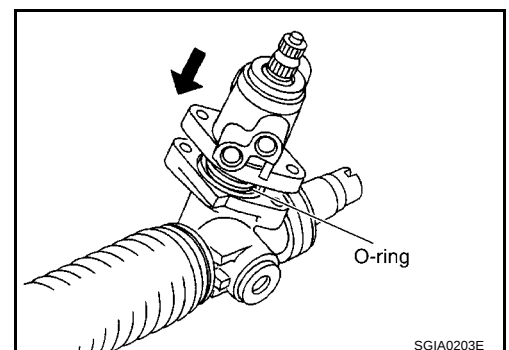
Do not damage rack surface. If it damaged, it may cause oil leak. Replace rack assembly.



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



7. Assemble an O-ring to the gear housing.
8. Install gear sub assembly to gear housing.

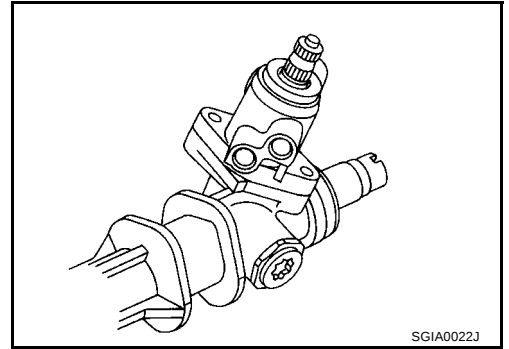


POWER STEERING GEAR AND LINKAGE

9. Install mounting bolts to rear housing. Tighten them to specified torque.



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



11. Attach lock plate.

CAUTION:

The lock plate is not reusable. Never reuse lock plate.

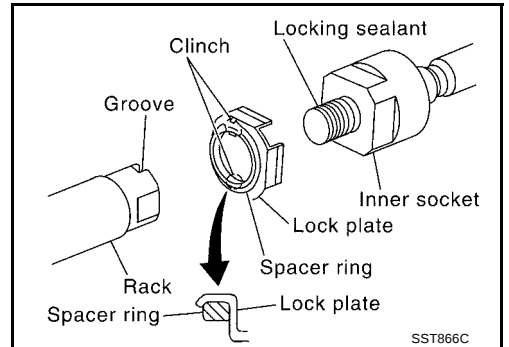
- Position spacer ring to rack.
- Set lock plate to tie rod and inner socket.
- Apply thread lock adhesive (Three Bond 1324 or equivalent) to thread of inner socket. Screw inner socket into rack and tighten to specified torque.
- Crimp lock plate at two points on rack slit.
- Install spacer ring to lock plate as shown in the figure.

CAUTION:

When installing spacer ring, avoid scratching it.

12. Decide neutral position of rack gear.

Rack stroke (L) : 66.5 mm (2.618 in)



- Coat the adjusting screw with locking sealant and screw it in.
- Screw lock nut. Do not tighten lock nut.
- Tighten adjusting screw to following specified torque.

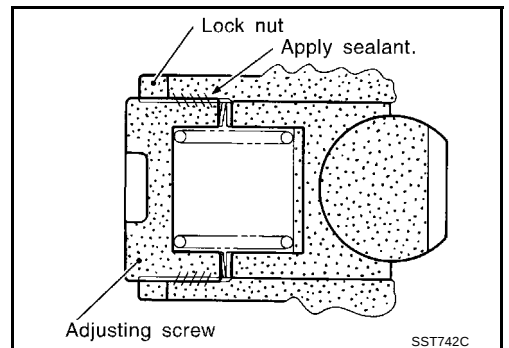
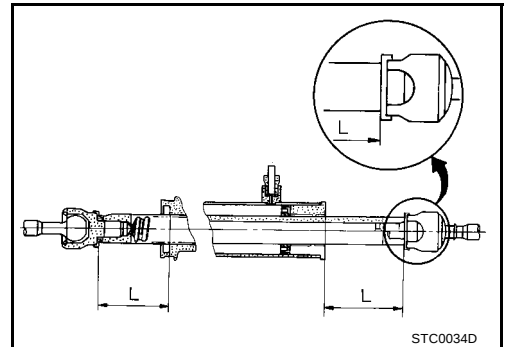


: 4.9 - 5.9 N·m (0.5 - 0.6 kg·m, 44 - 52 in-lb)

- Rotate throughout whole range of pinion so that parts fit with each other.
- Install rear cover cap.
- Install cylinder tube.

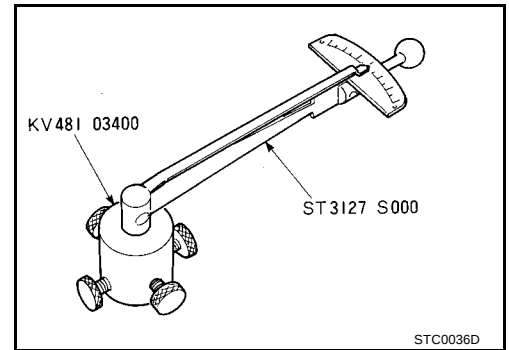


: 20 - 26 N·m (2.0 - 2.7 kg·m, 14 - 20 ft-lb)

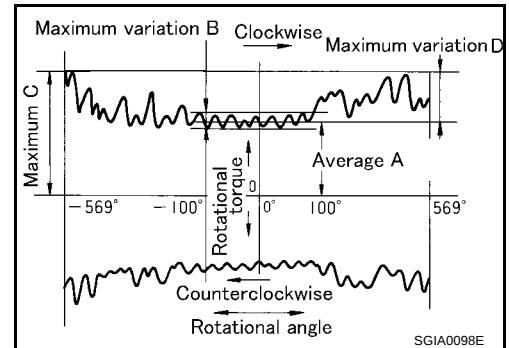


POWER STEERING GEAR AND LINKAGE

19. Use preload gauge. Measure pinion rotation torque within $\pm 180^\circ$ of neutral position of the gear. Stop the gear at the point where highest torque is read.
20. Loosen adjusting screw and retighten to 4.9 - 5.9 N·m (0.50 - 0.60 kg-m, 44 - 52 in-lb), and then loosen by 60 - 80° (140 - 176°F).
21. With adjusting screw held in place, tighten lock nut to 40 - 58 N·m (4.0 - 6.0 kg-m, 29 - 43 ft-lb).



22. Using a preload gauge, measure rotational torque of pinion gear. Check that reading is within range specified. If reading is outside specification, readjust rack. If reading is still outside specification, replace power steering gear.



Rotational torque of pinion gear : Around neutral position [within ± 11.5 mm (0.453 in)]

Average A : 1.67 - 2.25 N·m (0.17 - 0.22 kg-m, 1.3 - 1.6 ft-lb)

Maximum variation B : 0.98 N·m (0.10 kg-m, 1 ft-lb)

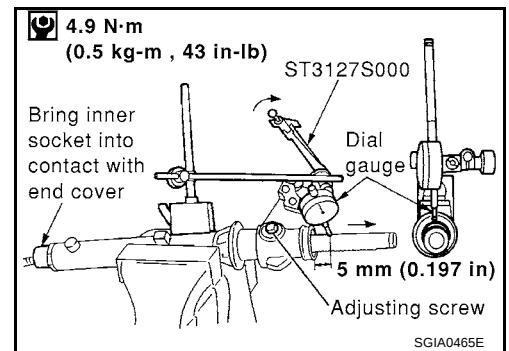
Other than above

Average A : 2.94 N·m (0.30 kg-m, 2 ft-lb)

Maximum variation B : 1.47 N·m (0.15 kg-m, 1 ft-lb)

23. With tie rod gear installed to gear assembly, turn pinion gear fully to left.
24. Set dial gauge as shown in figure. Measure vertical movement of rack when pinion is turned counterclockwise with torque of 4.9 N·m (0.5 kg-m, 43 in-lb). Check reading is within range specified. If reading is outside of specification, readjust rack. If reading is still outside of specification, replace power steering gear.

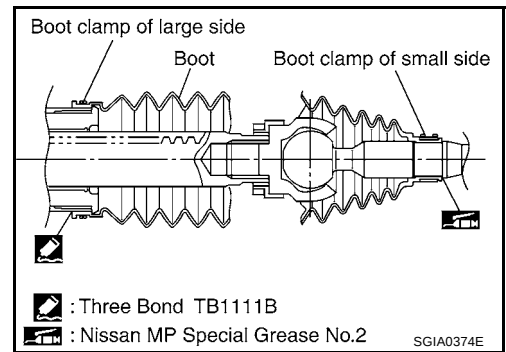
Specification : 0.08 mm (0.0031 in) or less



Measuring point in shown in figure at right.	Rack axle direction	5 mm (0.197 in) from housing vertical surface
	Rack radial direction	Direction of adjusting screw

POWER STEERING GEAR AND LINKAGE

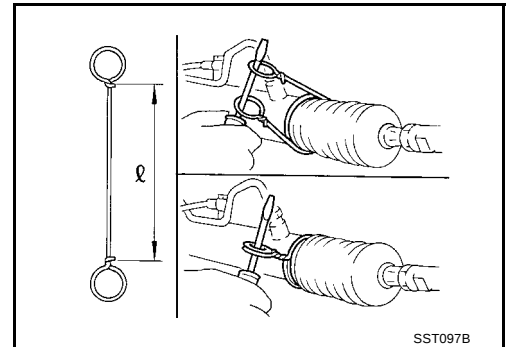
25. Position boot band on large-diameter side before installing it.
26. Install small-diameter side of boot to inner socket boot mounting groove.
27. Install boot band to small-diameter side of boot.



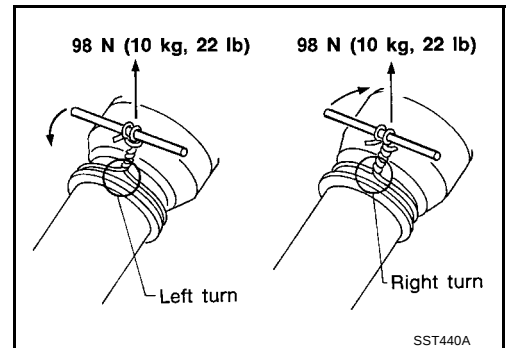
28. Install boot clamp.
 - a. Tighten large-diameter side of RH/LH boot with boot clamp (stainless wire).

Wire length (ℓ) : 370 mm (14.57 in)

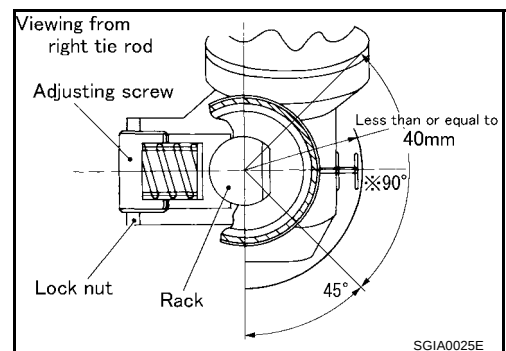
- b. Wrap clamp around boot groove for two turns. Insert screwdrivers in loops on both ends of wire. Twist 4 to 4.5 turns while pulling them with force of approx. 98 N (10 kg, 22.1 lb).



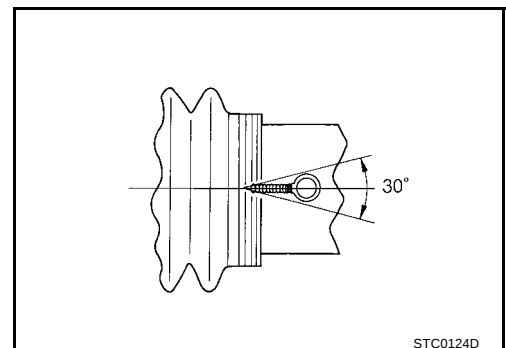
- c. Twist boot clamp as shown. Pay attention to relationship between winding and twisting directions.



- d. Twisted point should face front of vehicle with gear installed on vehicle (to prevent interference with other parts).



- e. After twisting wire 4 to 4.5 turns, bend cut end of wire. Cut end of wire should not touch boot. Be sure wire end is at least 5 mm (0.20 in) away from clearance for tube.



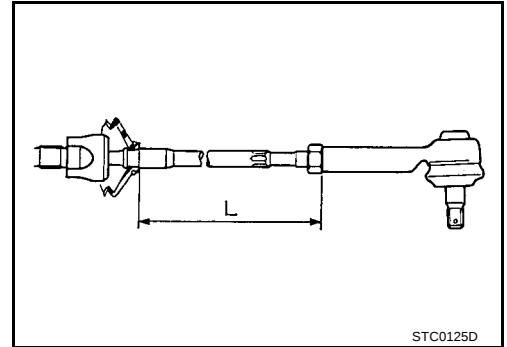
POWER STEERING GEAR AND LINKAGE

29. Connect lock nut and outer socket to inner socket. Temporarily tighten lock nut until length of tie rod is within specification.

Tie rod length (L) : 169.67 mm (6.68 in)

CAUTION:

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



A

B

C

D

E

F

PS

H

I

J

K

L

M

POWER STEERING OIL PUMP

PFP:49110

On-Vehicle Inspection and Service

EGS000AF

OIL PUMP PULLEY HYDRAULIC PRESSURE INSPECTION

Before starting following procedure, check tension of belt.

1. Raise vehicle. Connect oil pressure gauge between oil pump discharge connector and high pressure hose. Then bleed the hydraulic circuit.
2. Start engine. Run engine until oil temperature reaches 50°C - 80°C (122 - 176°F)

CAUTION:

- Leave valve of hydraulic pressure gauge fully open while starting and running engine. If engine is started with valve closed, hydraulic pressure in oil pump goes up. This will relief pressure along with abnormal increase of oil temperature.
 - Care must be taken to keep hose clear of belt and other parts when engine is started.
3. Fully close hydraulic pressure gauge valve with engine at idle. Measure relief pressure.

Relief pressure specification:

8,140 - 8,728 kPa (81.4 - 87.3 bar, 83 - 89 kg/cm² , 1,180 - 1,266 psi)

4. After measurement, open valve slowly.

CAUTION:

Never keep valve closed for 15 seconds or longer.

- If relief pressure is outside specification, disassemble and service oil pump. Refer to [PS-25, "Disassembly and Assembly\(QR20DE and QR25DE engine models\)"](#) .
5. After inspection, remove oil pressure gauge from hydraulic circuit. Add fluid. Be sure to bleed the system completely. Refer to [PS-5, "Bleeding Hydraulic System"](#)

Removal and Installation (QR20DE and QR25DE engine models)

EGS000AG

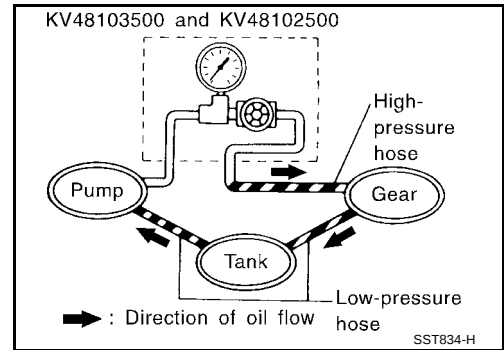
REMOVAL

1. Loosen adjusting screw and oil pump mounting bolt. Then, remove belt.
2. Remove union bolt and hose for oil pump.
3. Remove oil pump bracket attaching bolt.
4. Remove oil pump from vehicle.

INSTALLATION

Paying attention to following items, install in the reverse order of removal.

- After installation, adjust belt tension. Refer to [EM-12, "DRIVE BELTS"](#) .
- After installation, be sure to bleed system. Refer to [PS-5, "Bleeding Hydraulic System"](#) .



POWER STEERING OIL PUMP

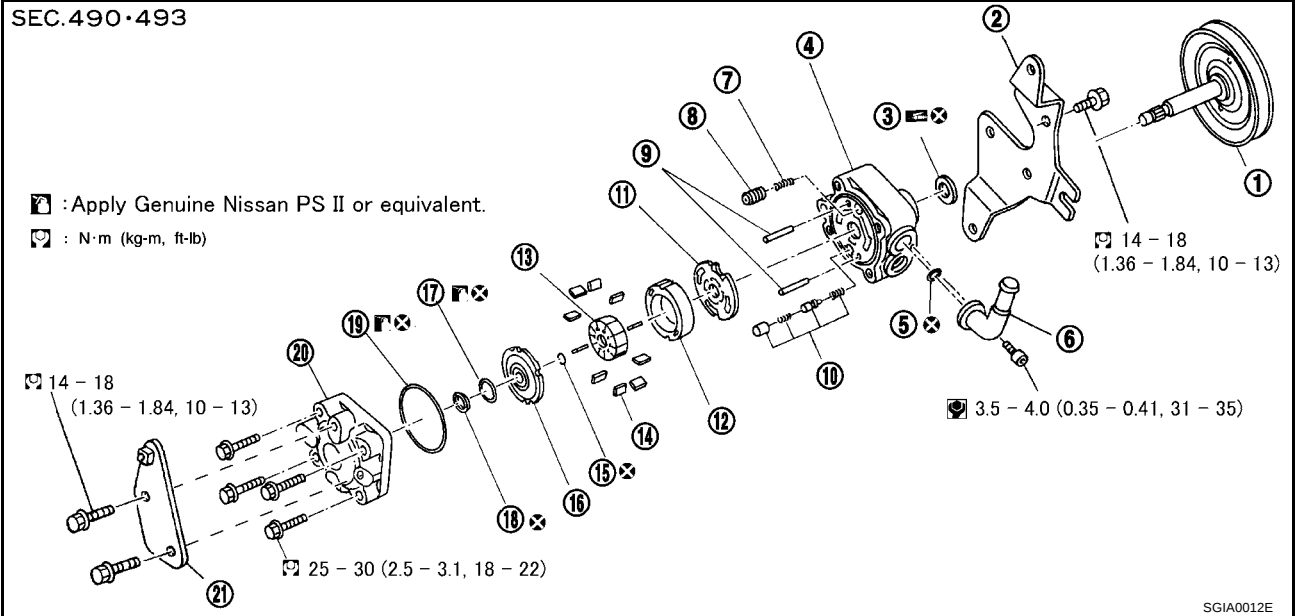
Disassembly and Assembly(QR20DE and QR25DE engine models)

EGS000AH

SEC.490-493

☒ : Apply Genuine Nissan PS II or equivalent.

☑ : N·m (kg-m, ft-lb)



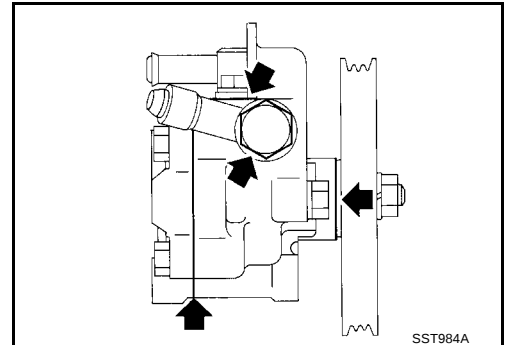
SGIA0012E

- | | | |
|-----------------------------------|---------------------------|---------------------------|
| 1. Pulley | 2. Front bracket | 3. Drive shaft seal |
| 4. Casing | 5. Inlet connector seal | 6. Inlet connector |
| 7. Flow control valve spring | 8. Flow control A valve | 9. Dowel pin |
| 10. Flow control B valve assembly | 11. Side plate (front) | 12. Cartridge |
| 13. Rotor | 14. Vane | 15. Rotor snap ring |
| 16. Side plate (rear) | 17. Side plate inner seal | 18. Side plate outer seal |
| 19. Body seal | 20. Rear body | 21. Rear bracket |

INSPECTION BEFORE DISASSEMBLY

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

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



DISASSEMBLY

1. Fix power steering pump in a vise.

CAUTION:

When fixing pump in a vise, use aluminum plates to protect steering pump mounting surface.

2. Remove rear bracket mounting bolts. Remove rear bracket from rear body.
3. Remove three front bracket attaching bolts and remove front bracket from casing.
4. Remove four rear body attaching bolts and remove rear body from casing.
5. Remove body seal from casing.
6. Remove side plate (rear) from cartridge. Remove side plate inner and outer seals from side plate (rear).

POWER STEERING OIL PUMP

7. Remove rotor snap ring using a snap ring pliers and remove pulley from casing.

CAUTION:

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

8. Remove following parts from casing: cartridge, rotor, vane, side plate (front), flow control valve A, flow control valve spring, and flow control valve B assembly

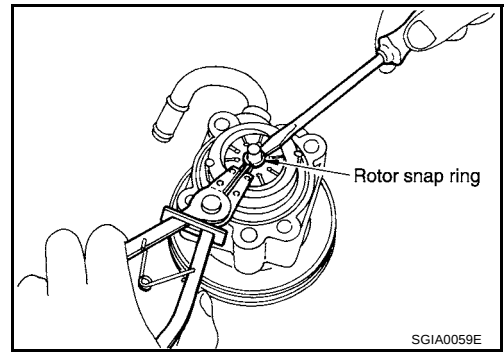
CAUTION:

Do not drop flow control A valve and flow control B valve assembly to floor. If dropped, they may be deformed.

9. Remove inlet connector attaching bolt and remove inlet connector from casing.
10. Remove inlet connector seal from inlet connector.
11. Using a screwdriver or equivalent tool, remove drive shaft seal from casing.

CAUTION:

Be careful not to damage casing surface with screwdriver.



INSPECTION AFTER DISASSEMBLY

Inspecting Casing and Rear Body

- Check casing and rear body for internal damage. If rear body is damaged, replace rear body. If casing is damaged, replace power steering pump assembly.

Cartridge Inspection

- Check cartridge for damage. If damaged, cartridge, rotor, and vane must be replaced as a set.

Inspecting Side Plate

- Check side plates (front and rear) for damage. If damaged, side plates (front and rear) must be replaced as a set.

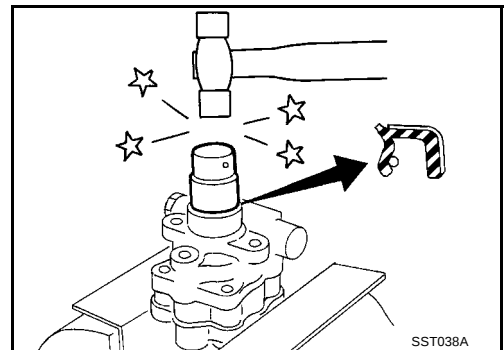
ASSEMBLY

1. Apply multi-purpose grease to lip of drive shaft seal. Using a drift, install drive shaft seal to casing.

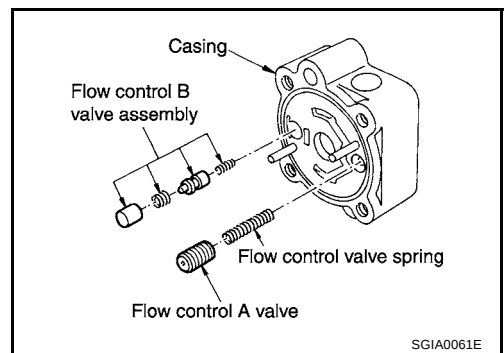
CAUTION:

Drive shaft seal is not reusable. Never reuse drive shaft seal.

2. If removed dowel pin cannot be inserted to casing by hand, tap it with hammer.

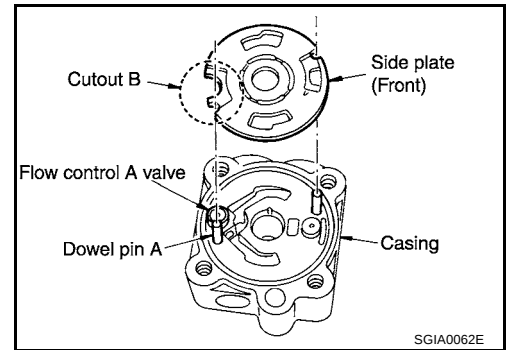


3. Connect flow control valve A, flow control valve spring and flow control valve B assembly as shown.



POWER STEERING OIL PUMP

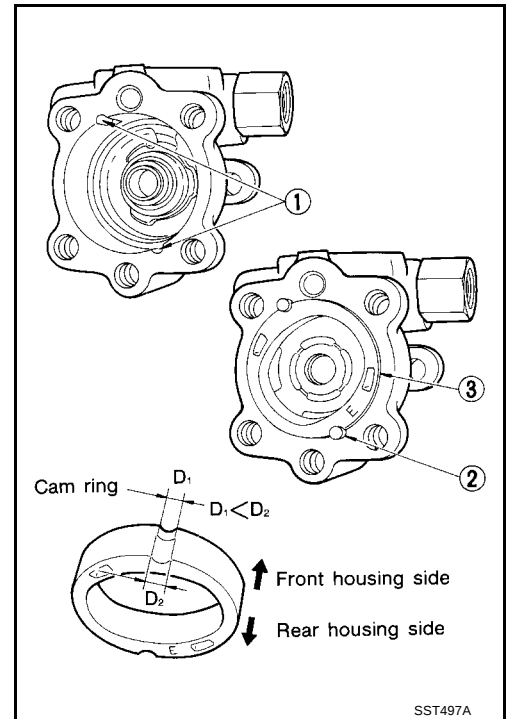
4. Align dowel pin A on flow control valve A with notch B in side plate (front) as shown. Install side plate (front) to casing.



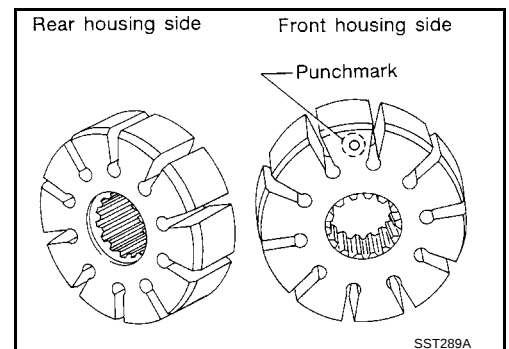
5. Install cartridge onto front side plate with smaller slit of cartridge facing casing.
6. Connect pulley to casing.

CAUTION:

Be careful not to damage drive shaft seal when installing pulley.

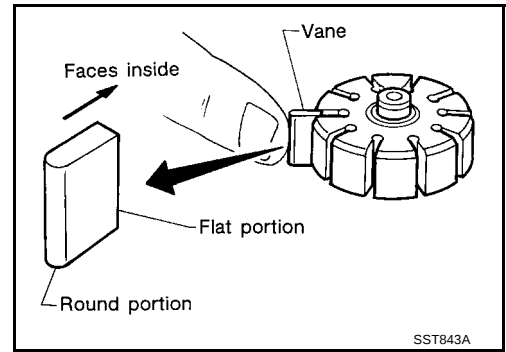


7. Connect rotor to pulley shaft with punch mark on rotor facing casing.



POWER STEERING OIL PUMP

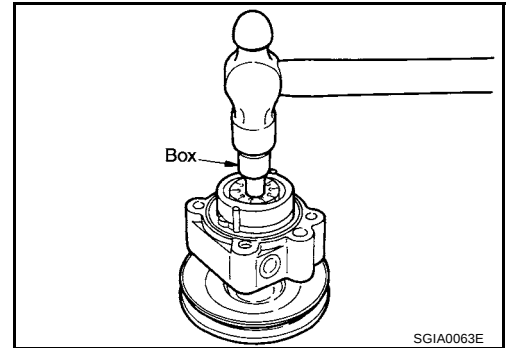
8. Connect vane to rotor with arc of vane in contact with cartridge.



9. Connect rotor snap ring to slit of pulley shaft, using a hammer and a 10-mm socket.

CAUTION:

- Rotor snap ring is not reusable. Never reuse rotor snap ring.
- Be careful not to damage rotor and pulley shaft.
- If rotor is damaged, power steering pump assembly must be replaced.

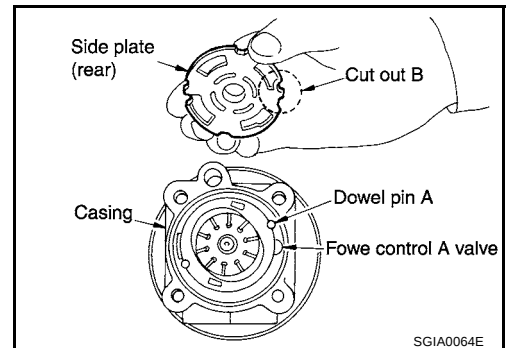


10. Align dowel pin A on flow control valve A with notch B in side plate (rear) as shown. Install side plate (rear) to cartridge.

11. Apply DEXRON™ III or equivalent to body seal. Install it to casing.

CAUTION:

Body seal is not reusable. Never reuse body seal.



12. Apply DEXRON™ III or equivalent to side plate inner and outer seals. Install them to side plate (rear).

CAUTION:

Side plate inner and outer seals are not reusable. Never reuse side plate inner and outer seals.

13. Fix power steering pump in a vise.

CAUTION:

When fixing pump in a vise, use aluminum plates to protect steering pump mounting surface.

14. Attach rear body to casing and tighten four mounting bolts diagonally to specified torque.

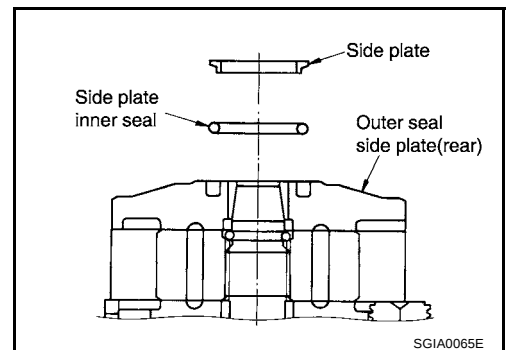
15. Install rear bracket to rear body. Tighten mounting bolts to specified torque.

16. Connect front bracket to casing and tighten mounting bolts (3) to specified torque.

17. Connect inlet connector seal to inlet connector slit. Install inlet connector to casing with attaching bolts.

CAUTION:

Inlet connector seal is not reusable. Never reuse inlet connector seal.

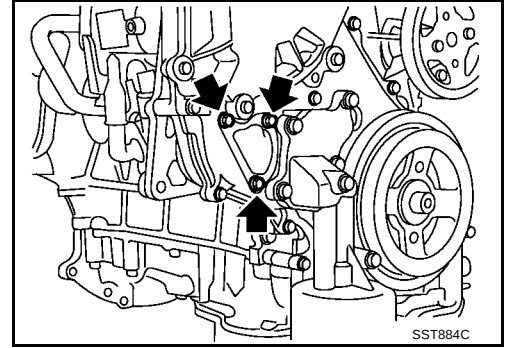


POWER STEERING OIL PUMP

Removal and Installation (YD22DDTi engine model)

EGS000AI

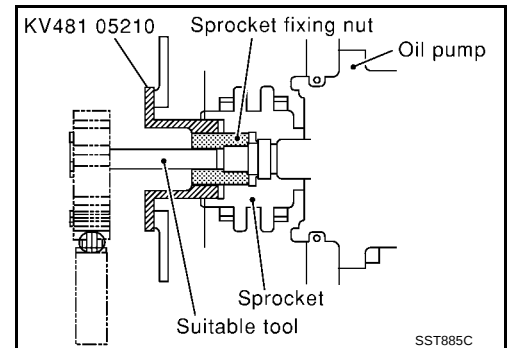
1. Remove chain case cover.



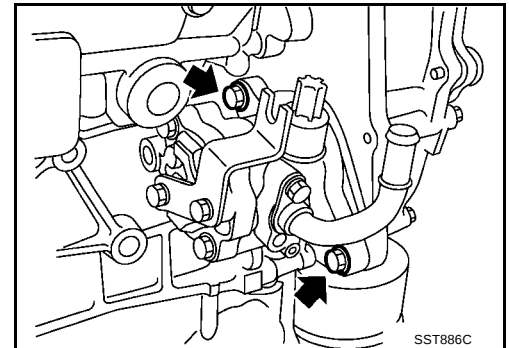
2. Revolving crank pulley, set tool.
3. Fix tool with chain cover fixing bolts.
4. Using suitable tool, remove sprocket fixing nut and washer.

CAUTION:

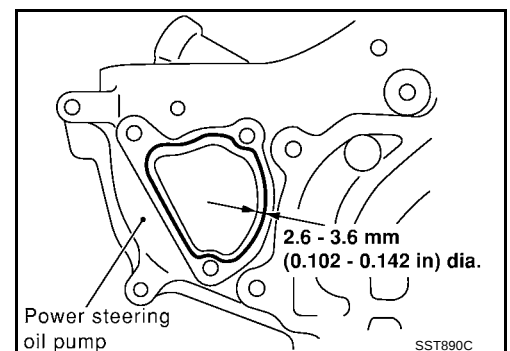
Do not remove Tool while power steering oil pump is removed.



5. Remove power steering pump fixing bolts, then remove it.



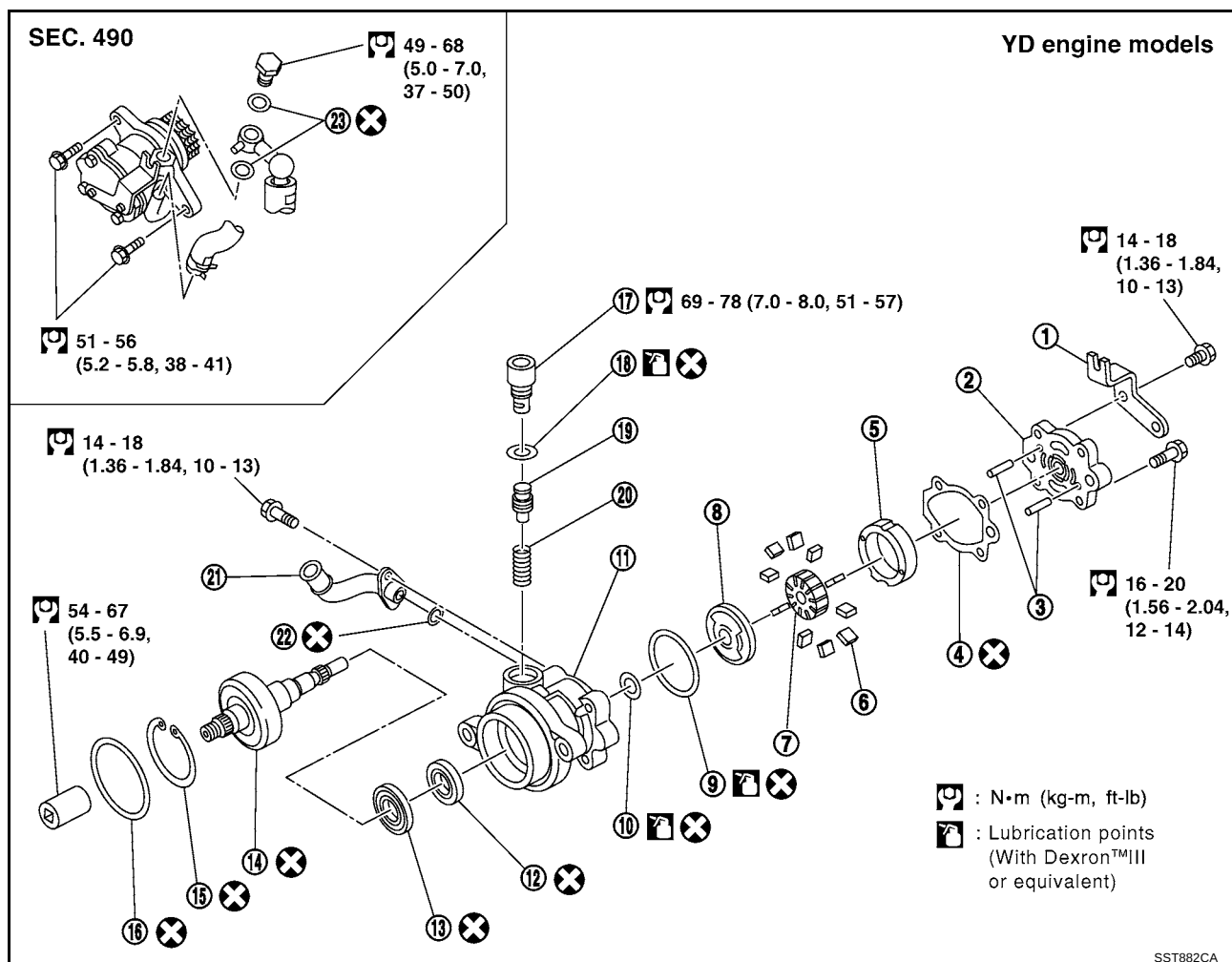
6. Apply Gasket to the installation surface of the engine chain case cover as shown in the figure before installing the chain case cover to the engine.
7. Bleed air after installation. Refer to [PS-5, "Bleeding Hydraulic System"](#)



POWER STEERING OIL PUMP

Disassembly and Assembly (YD22DDTi engine model)

EGS000AJ

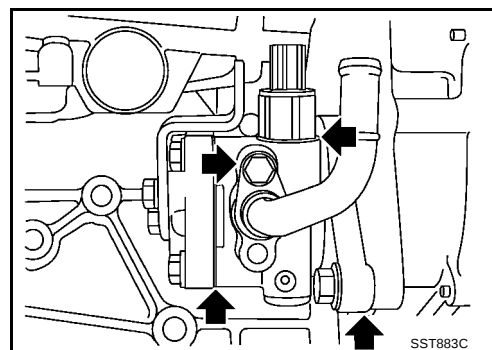


- | | | |
|--------------------------------|-------------------------------|-------------------------------|
| 1. Rear bracket | 2. Rear body | 3. Dowel pin |
| 4. Side plate seal | 5. Cam ring | 6. Vane |
| 7. Rotor | 8. Side plate | 9. O-ring (Outer) |
| 10. O-ring (Inner) | 11. Front body | 12. Drive shaft rear oil seal |
| 13. Drive shaft front oil seal | 14. Drive shaft | 15. Snap ring |
| 16. O-ring | 17. Outlet connector | 18. Connector seal |
| 19. Flow control valve | 20. Flow control valve spring | 21. Inlet connector |
| 22. O-ring | 23. Copper washer | |

INSPECTION BEFORE DISASSEMBLY

Disassemble power steering oil pump only when any of following cases meets.

- If oil leak is found on oil pump.
- Oil pump pulley is deformed or damaged.
- Performance of oil pump is low.

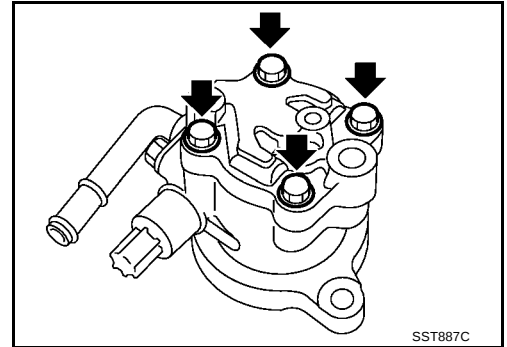


POWER STEERING OIL PUMP

DISASSEMBLY

CAUTION:

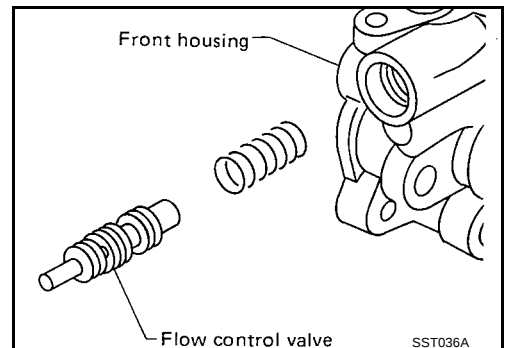
- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
 - Disassemble in as clean a place as possible.
 - Clean your hands before disassembly.
 - Do not use rags; use nylon cloths or paper towels.
 - Follow the procedure and cautions in the Service Manual.
 - When disassembling and reassembling, do not let foreign matter enter or contact the parts.
1. Remove rear bracket and rear body.
 2. Remove side plate seal, cam ring, vane, rotor and side plate.



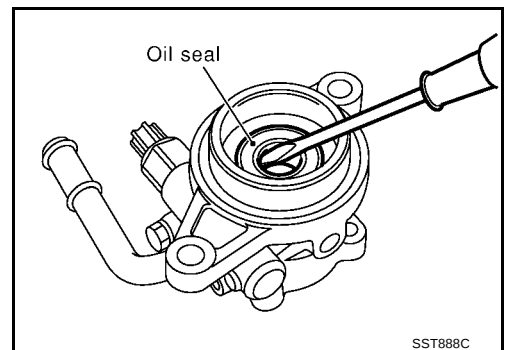
3. Remove out connector and then remove connector seal, flow control valve and flow control valve spring.

CAUTION:

- Be careful not to drop the flow control valve.
- Do not disassemble the flow control valve.



4. Remove oil seal

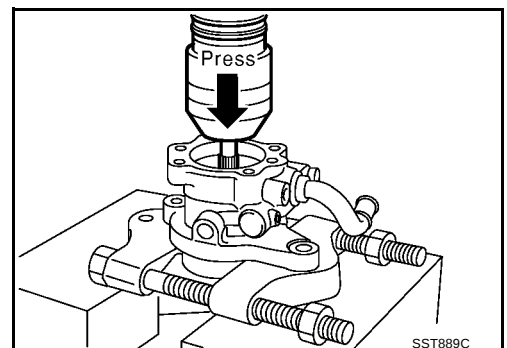


5. Remove snap ring, then draw drive shaft.

CAUTION:

Be careful not to drop drive shaft.

6. Remove inlet connector.



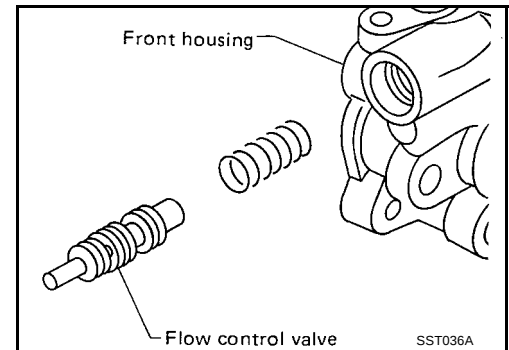
POWER STEERING OIL PUMP

INSPECTION AFTER DISASSEMBLY

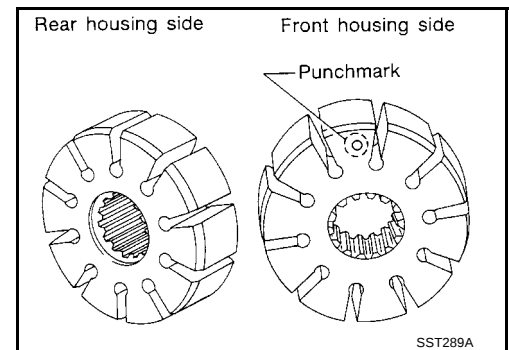
- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration on pulley or pulley shaft is deformed or worn, replace it.

ASSEMBLY

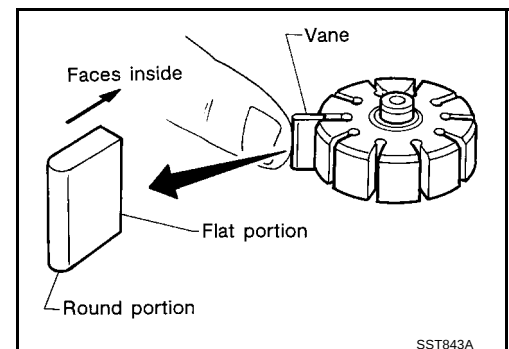
1. Assemble oil pump, noting the following instructions.
 - Make sure O-rings and oil seal are properly installed.
 - Always install new O-rings and oil seal.
 - Be careful of oil seal direction.
 - Cam ring, rotor and vanes must be replaced as a set if necessary.
 - Coat each part with DEXRON™ III or equivalent when assembling.



2. Pay attention to the direction of rotor.



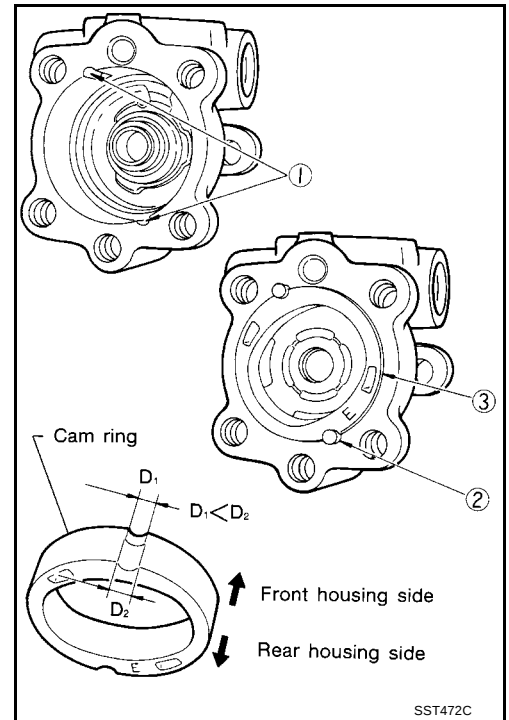
3. When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.



POWER STEERING OIL PUMP

4. Insert pin 2 into pin groove 1 of front housing and front side plate. Then install cam ring 3 as shown at left.

Cam ring : D_1 is less than D_2



A

B

C

D

E

F

PS

H

I

J

K

L

M

HYDRAULIC LINE

PFP:49721

Removal and Installation

EGS00040

1. QR20DE AND QR25DE ENGINE MODELS

SEC. 497

3.0 - 3.9
(0.3 - 0.4, 27 - 34)

Install with blue position mark at the rib of tankside position.

Install with white position mark facing top of vehicle.

For low pressure

View A

View B

For high pressure

Install with white position mark facing vehicle front.

Install plastic clip in hole of side member.

For low pressure 28 - 39 (2.9 - 3.9, 21 - 28)

For high pressure 15 - 24 (1.6 - 2.4, 11 - 17)

O-ring

Detail A

Pressure sensor

Power steering tube bracket

Detail B

3.0 - 3.9
(0.3 - 0.4, 27 - 34)

50 - 70
(5.1 - 7.1, 37 - 51)

Install with position mark facing vehicle rear.

36.3 - 51.9
(3.7 - 5.2, 27 - 38)

Install PS hose junction to pump bracket point exactly.

Copper washer

50~68
(5.1 - 6.9, 37 - 50)

Detail pump parts

: Apply automatic transmission fluid type Nissan power steering fluid II or equivalent.

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

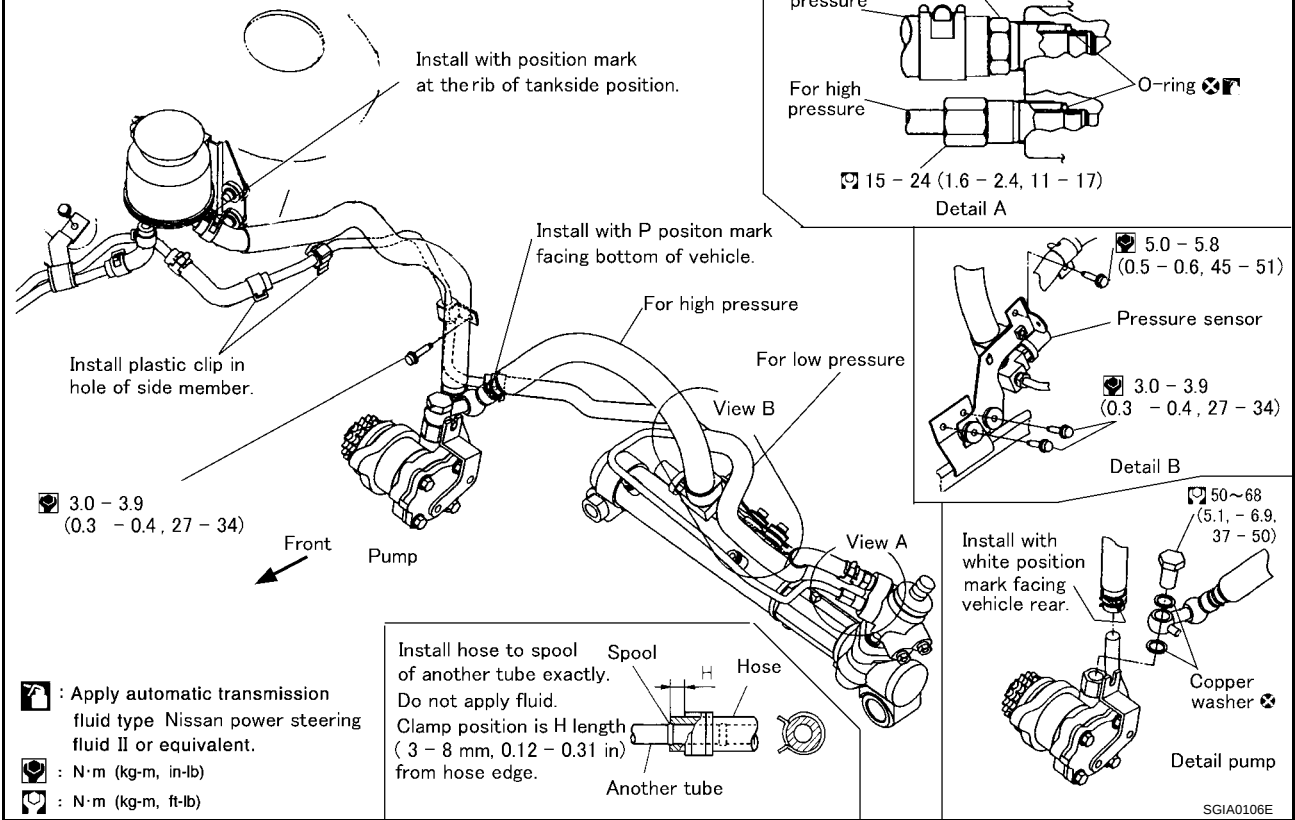
Install hose to spool of another tube exactly. Do not apply fluid. Clamp position is H length (3 - 8 mm, 0.12 - 0.31 in) from hose edge.

SGIA0017E

HYDRAULIC LINE

2. YD22DDTi ENGINE MODEL

SEC. 497



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Wheel

EGS0004P

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

Steering Angle

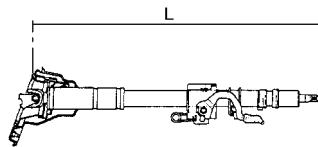
EGS0004Q

Inner wheel	Minimum	36°
	Nominal	39°
	Maximum	40°
Outer wheel		31°

Steering Column

EGS0004R

Steering column length L	543 mm (21.38 in)
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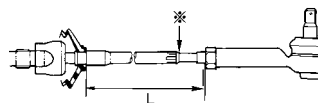


STC1136D

Steering Linkage

EGS0004S

Steering gear type		PR24AD
Tie rod ball joint outer socket	Swing torque	0.30 - 2.94 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Measurement on spring balance (Measuring point: stud bolt hole)	4.84 - 47.4 N (0.49 - 4.84 kg, 1.08 - 10.7 lb)
	Rotating torque	0.30 - 2.94 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Axial endplay	0.5 mm (0.02 in) or less
Tie rod ball joint inner socket	Swing torque	1.0 - 7.8 N·m (0.1 - 0.8 kg-m, 9 - 69 in-lb)
	Measured value of spring scale (measuring point: mark)	5.2 - 41 N (0.53 - 4.1 kg, 1.17 - 9.07 lb)
	Axial endplay	0.2 mm (0.008 in) or less
Tie rod length "L"		169.67 mm (6.68 in)



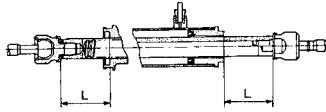
SGIA0462E

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Gear

EGS0004T

Steering gear model	PR24AD
Rack neutral position, dimension (L)	66.5 mm (2.618 in)



SGIA0463E

Retainer adjustment	Adjusting screw lock nut tightening torque		39 - 59 N·m (4.0 - 6.0 kg-m, 29 - 43 ft-lb)
	Primary Adjusting screw tightening torque		4.9 - 5.9 N·m (0.5 - 0.6 kg-m, 44 - 52 in-lb)
	Re-tightening torque after tightened		4.9 - 5.9 N·m (0.5 - 0.6 kg-m, 44 - 52 in-lb)
	Loosen the adjusting screws.		60 - 80°
Rack sliding torque:	Range within ± 11.5 mm from neutral position (Power ON)	Area average value	1.67 - 2.25 N·m (0.17 - 0.22 kg-m, 1.3 - 1.6 ft-lb)
		Allowable variation	0.98 N·m (0.10 kg-m, 1 ft-lb) or less
	Whole area (at power OFF)	Peak value	2.94 N·m (0.30 kg-m, 2 ft-lb) or less
		Allowable variation	1.47 N·m (0.15 kg-m, 1 ft-lb) or less

Oil Pump

EGS0004U

Oil pump relief hydraulic pressure	8,140 - 8,728 (81.4 - 87.3 bar, 83 - 89 kg/cm ² , 1,180 - 1,266 psi)
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Steering Fluid

EGS0004V

Fluid capacity	Approx. 1.0 ℓ (7/8 Imp qt)
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