

STEERING SYSTEM

SECTION ST

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PRECAUTIONS AND PREPARATION

Precaution

SRS Airbag • Pretensioner Seatbelt

WARNING:

- To install/remove the SRS airbag, pretensioner seatbelt system related components and harness, turn the ignition switch “OFF”, disconnect the battery terminals and wait over 3 minutes. (This is to discharge all the remaining electricity in the airbag sensor unit’s auxiliary power circuit.)
- Do not use air impact or electrical tools when installing/removing the components.
- Do not use any hand-held tools for harness used in SRS airbag and pretensioner seatbelt systems. Be careful with the harness not to tangle with or interfere with other components.
- Do not use any electrical test equipments such as circuit tester when inspecting the SRS airbag and pretensioner seatbelt circuit while installed unless the Service Manual instructs to do so. (The weak current in the tester can cause the SRS airbag to operate.)
- Do not insert any foreign materials such as a screwdriver in the airbag module and pretensioner seatbelt connector in order to prevent unintended operation due to static electricity.
- The harnesses used in SRS airbag and pretensioner are covered with yellow insulation for easy identification.
- Refer to “RS Restraint System” in this Service Manual for safe airbag system service information.

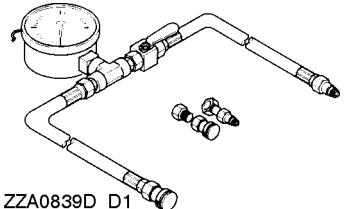
Caution

- The power steering gear should not be disassembled.
- Follow the cautions below before disassembly.
 - Perform in a garage or dust free location although a anti-dust equipment is not required.
 - Clean the unit exterior before disassembly.
 - Keep the disassembling location clean and be careful not to let foreign particles enter into the components.
 - Securely install the disassembled component in order. If stopped, cover with a clean cover.
 - Use a paper towel instead of conventional cloth towel. The cloth towel has waste threads that can damage the components if entered.
 - Clean the disassembled components (except for the rubber components) with white kerosene and wipe out all oil by air blowing or cleaning with a paper towel.
 - Apply Genuine NISSAN PSF or equivalent on the O-ring or seal before assembly.
 - Replace the gasket and O-ring with new. Be careful not to damage the O-ring, seal and gasket during installation.
- Disassemble the steering pump. Replace the casing, rear body, side plate, pulley, rotor, vane and flow control valve if damaged (including scratches).
- Mark the fluid leaking location with a white marker.
- Do not reuse the seals and copper washers.

PRECAUTIONS AND PREPARATION

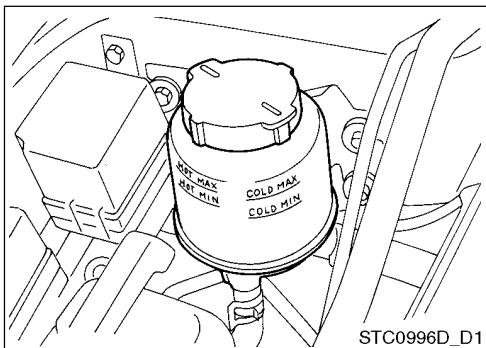
Preparation

Special Service Tools

Item	Description	
KV48103500 Pressure gauge		Measuring wheel pump relief pressure
KV48102500 Pressure gauge adapter		
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POWER STEERING FLUID

Power Steering Fluid



Oil Level Inspection

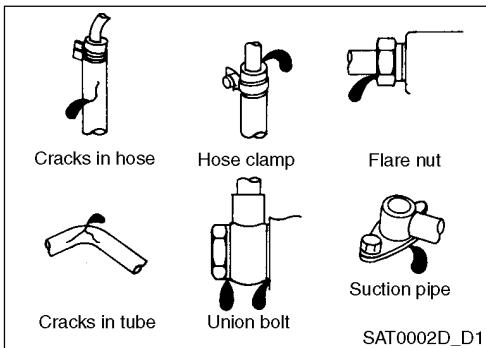
- Inspect while engine stopped.
- Check if the oil level is in between the MAX and MIN marks on the tank. Be careful not to add too much fluid (over the MAX level) to prevent leakage occurrence at the cap.
- Fluid level is different according to HOT and COLD conditions.

HOT: Fluid temperature 50 - 80°C

COLD: Fluid temperature 0 - 30°C

CAUTION:

- **Never reuse the drained power steering fluid.**
- **Always use a designated Genuine NISSAN PSF or equivalent.**



Leakage Inspection

Inspect the fluid pressure system mounts for any leakage, cracks, damages, loose connections or come off.

1. Run the engine at idle until the reservoir tank fluid temperature reaches 50 - 80°C.
2. Rotate the steering wheel left to right several times.
3. Rotate the steering wheel to the right end (or left end) and remain for 5 seconds. Then inspect for leakage.

CAUTION:

- **Do not remain the steering wheel rotated right or left end for more than 15 seconds (The pump may be damaged).**

4. When leakage is present at the joint, release the flare nut and tighten again. If over tightened, O-ring, washer and connector may be damaged.

Air Bleeding

1. Lift up the vehicle.
2. Fill the fluid into the tank. Rotate the steering wheel to the left and right ends several times and add fluid if the level goes down. Repeat the procedure until oil decrease or air bubble does not occur.
3. Start the engine. Repeat the above procedure during idle until fluid decrease or air bubble does not occur.
If air bleeding is imperfect, the following occurs:
 - Air bubble forms in the reservoir tank.
 - A stone-hitting noise occurs from the oil pump.
 - Idle noise present from the oil pump.

Sometimes oil noises are present in the gear valve and pump during steering or gentle steering. However, this noise does not affect the steering performance.

STEERING WHEEL

Steering Wheel

On-Vehicle Inspection and Service

FREE PLAY INSPECTION

1. Start the engine after turning the tire straight ahead. Measure the steering wheel travel by rotating the steering wheel lightly to the left and right until the tire starts to move. GI

Steering wheel free play standard: 0 - 35 mm

2. If the measured value is out of the standard, inspect the installation condition of the steering gear assembly, front suspension, axle and steering column. EM

- Inspect for any rattles when moving the steering wheel up, down, left and right in the axial direction. LC

Steering wheel axial endplay: 0 mm

- Inspect if the steering gear's mounting bolts and nuts are loose while the vehicle is lifted. EC

Tightening torque

Left mounting bolt: 9.90 - 12.0 kgf·m

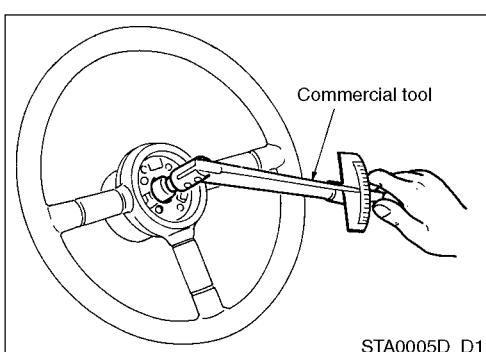
Right mounting bolt: 50 - 70 N·m (5.1 - 7.1 kgf·m)

Right mounting nut: 24.5 - 29.4 N·m (2.5 - 3.0 kgf·m) AC

NEUTRAL POSITION INSPECTION

- Perform the neutral position inspection after the wheel alignment inspection. AV
- Check if the steering gear is at neutral when steering wheel is removed. EL

1. Position the vehicle straight and inspect if the steering wheel is at neutral position. WH
2. If not, remove the steering wheel and install again correctly. CL
3. If the steering wheel cannot be adjusted in between the gear center and second gear tooth, then loosen the tie rod lock nut and adjust by rotating to the opposite direction until the left and right tie rod becomes the same. MT



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STEERING TORQUE INSPECTION

1. Park the vehicle on a dry and level ground and apply the parking brake. AT
2. Start the engine and inspect the steering wheel turning torque while the power steering fluid is hot using a free load gage (commercial tool). FA

Torque: Less than 72 kgf·cm

3. If out of the standard value, inspect the rack sliding force and relief pressure of oil pump. RA

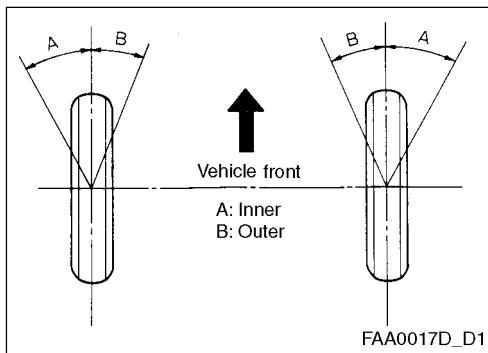
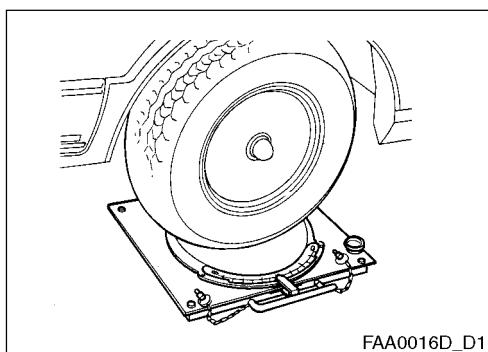
Rack sliding force: Less than 15.5 - 24.5 kgf

Oil pump relief pressure: $8.8^{+0.4}_{-0.2}$ MPa (90^{+4}_{-2} kg/cm²) BR

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STEERING WHEEL



STEERING ANGLE INSPECTION

- Perform the steering angle inspection after finishing the tow-in inspection. Keep the vehicle leveled by placing the front wheel on the turning radius gage and the rear wheels on the support with the same height with the turning radius gage. Inspect the maximum turning angle between the left and right inner wheels and the maximum turning angle between the left and right outer wheels.
- Temporarily start the engine and measure the steering angle by rotating the steering wheel to the left and right ends during idle.

Inner wheel	With 175 - size tire	37°	QG engine series	
	With 185 - size tire			
Outer wheel	With 175 - size tire	31°		
	With 185 - size tire			

- If the measured value is out of the standard, then measure the rack stroke.

	Rack stroke	Engine model
With 175 - size tire	65.0 mm	QG15DE engine
With 185 - size tire	65.0 mm	QG15DE engine

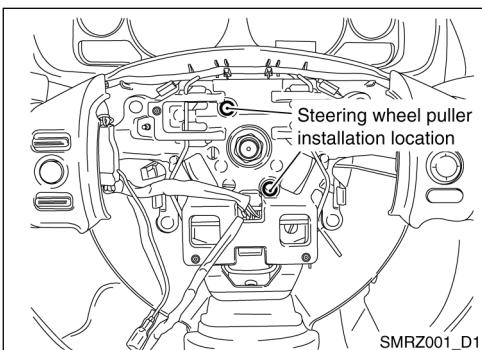
- If the rack stroke is out of the standard value, disassemble the steering gear and inspect the rack stroke. Refer to "Removal • Installation" (ST-11).
- The steering angle cannot be adjusted. When the steering angle is out of the standard value, inspect the steering gear, column and front suspension for any wear and damages and replace if defective.

Removal • Installation

REMOVAL

1. Remove the airbag module. Refer to (RS-12).
2. Remove the horn connector.
3. Remove the steering wheel mounting nuts and put a alignment mark on the steering wheel assembly and column shaft head with a paint.

STEERING WHEEL



4. Remove the steering wheel using a steering wheel puller (commercial tool).

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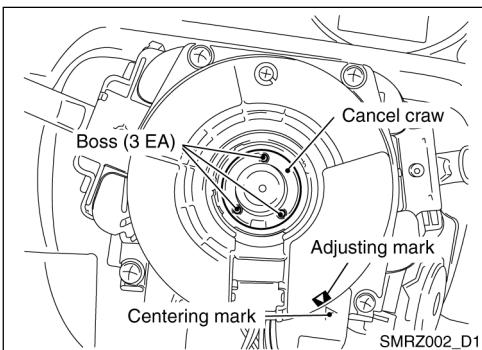
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INSTALLATION

Install in the reverse order of removal by cautioning as below.

REFERENCE:

- When reusing the spiral cable, you can skip the neutral position adjustment work if holding the spiral cable's mounting case and turning section with a tape.
- Neutral position (See illustration): Rotate the spiral cable to the right until getting tight and rotate in reverse direction (approx. 3 turns) to align the centering mark and adjust mark. (The spare parts are secured with a stopper while adjusted in neutral. So just install on the steering wheel after removing the stopper.)

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CAUTION:

- While front wheels aligned straight, install the steering wheel by placing the cancel craw R mark downwards and aligning the 3 boss locations and the steering wheel assembly's rear 3 holes for steering wheel installation. Also, check if the spiral cable is at neutral position and install the steering wheel while the spiral cable locate pin in the left matches with the steering wheel assembly's behind locate hole.
- Do not turn the spiral cable unnecessarily. Also do not rotate excessively over its resistance (Cable may be damaged).
- After installation, check the normal operation of the system using airbag warning light.
- If the airbag warning light indicates defective, delete the stored memory using CONSULT-II.
- If airbag warning light is still on after the above procedure, diagnose the system and repair the defective part.

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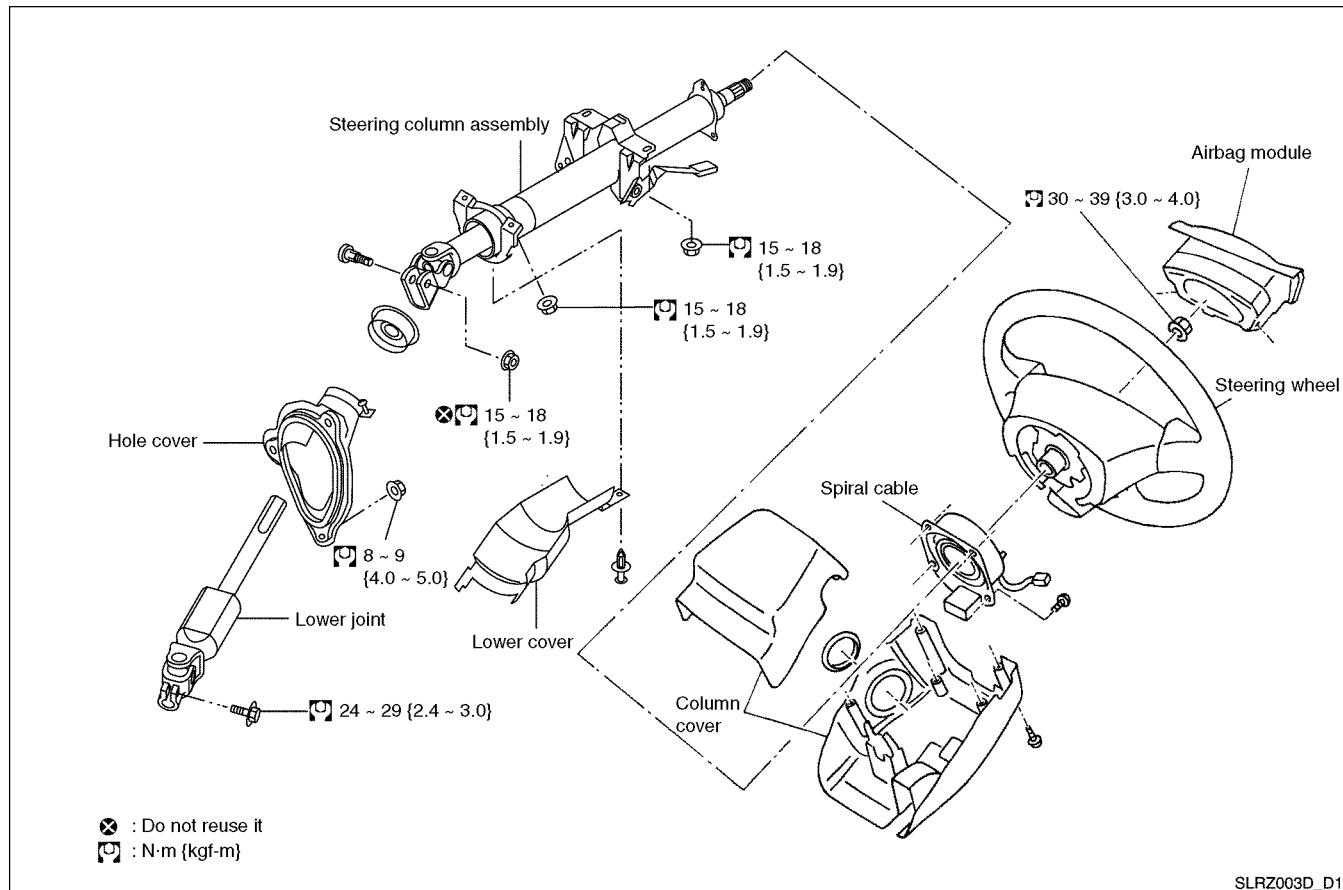
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STEERING COLUMN

Steering Column

Removal • Installation



CAUTION:

- Be careful not to exert any impact to the steering column assembly perpendicularly during removal/installation.

ROD JOINT AND HOLE COVER REMOVAL

1. Lift up the vehicle in the straight ahead position.
2. Put the alignment mark on the lower joint and steering gear with paint and remove the pin bolt under the lower joint.
3. Remove the lower cover on the upper lower joint, mounting bolts and nuts.
4. Remove the hole cover and lower joint from the vehicle.
5. Remove the clamp and lower seal cover from the hole cover.

LOWER JOINT AND HOLE COVER INSTALLATION

- Refer to the components diagram for tightening torque and install in the reverse order of removal.
- When installing the lower joint to the steering gear, check if the guide chip is in the pictured location and install it by adjusting the lower joint bottom's curved position (slit) with the guide chip protrusion.

STEERING COLUMN ASSEMBLY REMOVAL

1. Remove the steering wheel and column cover. Refer to "Removal • Installation" (ST-8).
2. Remove the instrument lower driver panel.
3. Remove the spiral cable. Refer to "Spiral Cable" (RS-13).

STEERING COLUMN

4. Remove the lower cover, mounting bolts and nuts from upper lower joint.
5. Remove the clamp and connector from the steering column assembly.
6. Remove the steering column assembly mounting nut and remove the steering column assembly from the vehicle.

GI

CAUTION:

- Do not deform the steering column assembly lower bracket during removal.

EM

STEERING COLUMN ASSEMBLY INSTALLATION

LC

- Perform installation while the steering lock is released.
- 1. Insert the upper of the lower joint to the steering column assembly and install the steering column assembly to the vehicle using mounting nuts.
- 2. Install the lower cover, mounting bolts and nuts on the upper of the lower joint.

FE

CAUTION:

- The mounting nut cannot be reused. Do not reuse.

RS

3. Install the clamp and connector.
4. Install the spiral cable. Refer to "Spiral Cable" (RS-13).
5. Install the instrument lower driver panel.
6. Install the steering wheel and column cover. Refer to "Removal • Installation" (ST-8).

AV

CAUTION:

- After installation, rotate the steering wheel and inspect if the steering wheel is rotating smoothly without any twisting, clogging, noises or too much steering efforts.

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Disassembly • Assembly

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DISASSEMBLY

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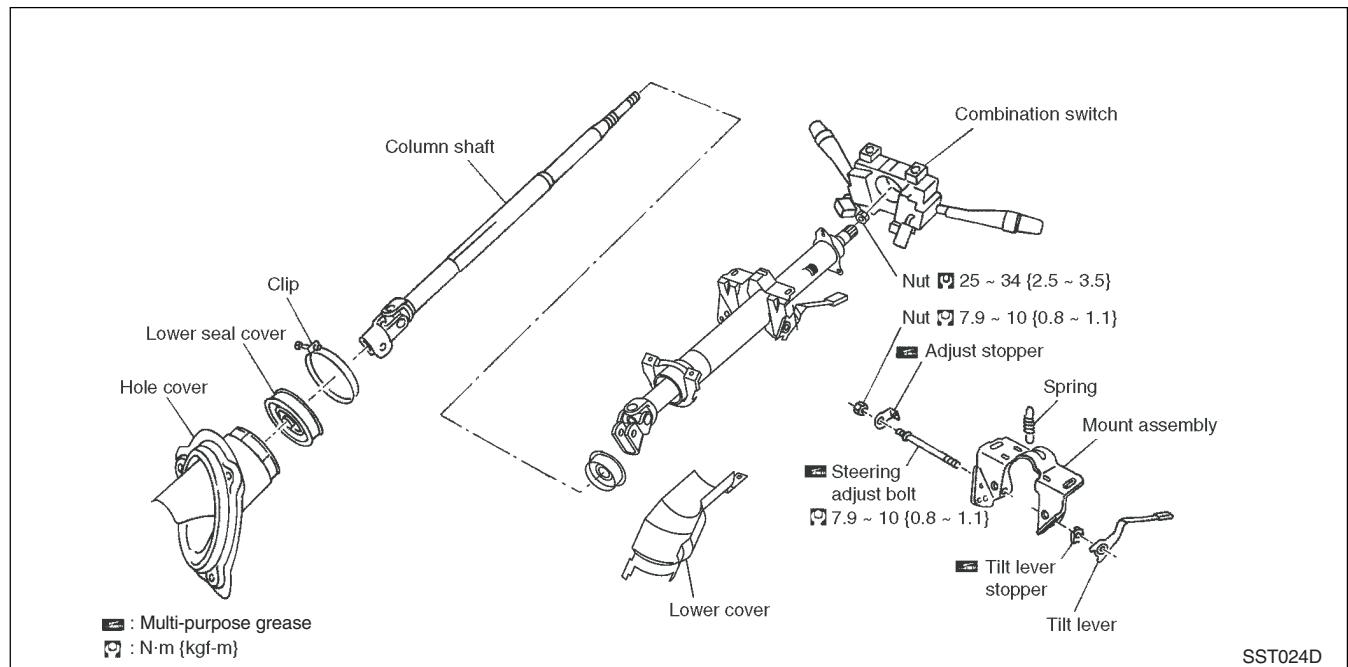
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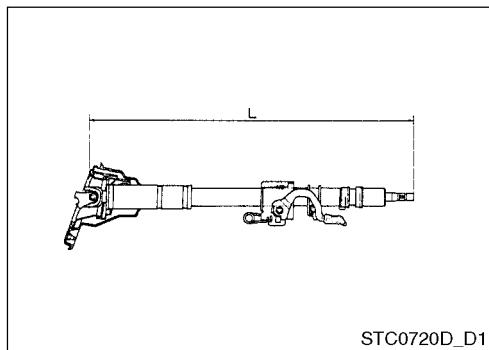
- Perform the disassembly and assembly after releasing the steering lock.

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1. Remove the combination switch from the jacket tube.

STEERING COLUMN

2. Remove the mounting nut from the jacket tube and column shaft and remove the column shaft from the jacket tube.
3. Remove the spring from the mount assembly.
4. Remove the mounting nut and adjust stopper.
5. Remove the steering adjust bolt and remove the tilt lever stopper and tilt lever.



INSPECTION AFTER DISASSEMBLY

- If the steering wheel does not rotate properly, then replace the defective component as follows.
 1. Inspect the column shaft bearing for any damages or defects. If defective, apply the grease or replace the column shaft if necessary.
 2. Inspect the jacket tube for any deformation or damages and replace if defective.
- If minor shock was exerted to the vehicle, inspect the length L as shown in the illustration. If out of the standard value, replace the steering column as an assembly.

Length L: 543 mm

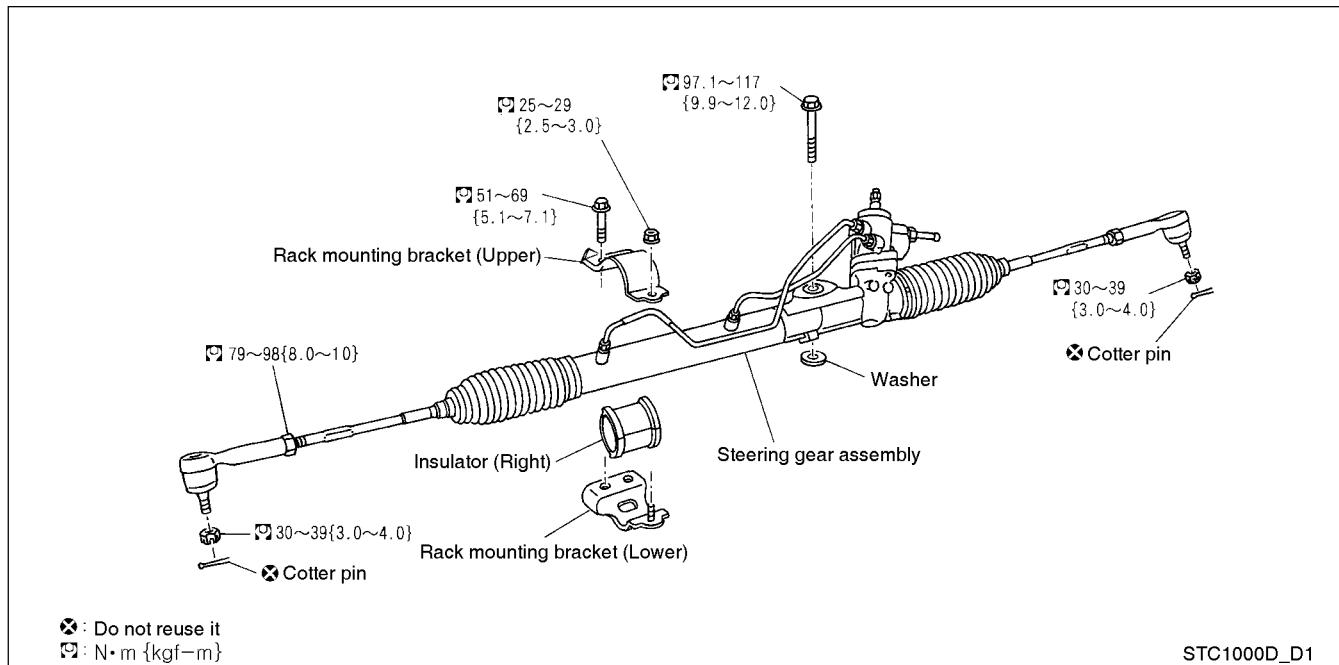
ASSEMBLY

- Refer to the components diagram for tightening torque and assemble in the reverse order of disassembly.
- After assembling the steering column and inspect the tilting device.

POWER STEERING GEAR

Power Steering Gear

Removal • Installation



REMOVAL

1. Remove the cutter pin, release the mounting nuts and then remove the tie rod from the steering knuckle using a pitman arm puller (commercial tool).

CAUTION:

- Be careful not to damage the dust boots on the tie rod ball joint.
- Lightly insert the nut when using the pitman arm puller (commercial tool).

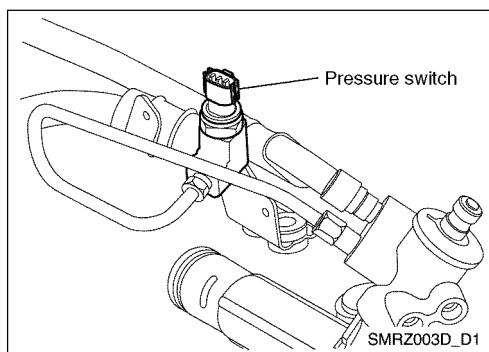
2. Put the alignment mark on the lower joint and steering gear with paint and remove the pinch bolt from lower joint gear side.
3. Remove the high pressure tube and low pressure hose from the steering gear.
4. Remove the upper mounting nut from the stabilizer connecting rod and mounting bolt from the stabilizer clamp and move the stabilizer towards the vehicle front.
5. Remove the steering gear assembly mounting bolts and nuts and remove the insulator (left), lower and upper mounting brackets from the steering gear assembly.
6. Remove the steering gear from the vehicle by changing the direction from the right side of the vehicle.

INSTALLATION

Install in the reverse order of removal by cautioning as below.

- Perform air bleeding after installation. Refer to "Air Bleeding" (ST-4).
- When installing the insulator (left), face the slit portion towards the front.
- When it is hard to install the lower joint to the steering gear, remove the lower cover, clip, mounting bolt and nuts from upper of the lower joint and install the lower joint by pushing it in.

POWER STEERING GEAR

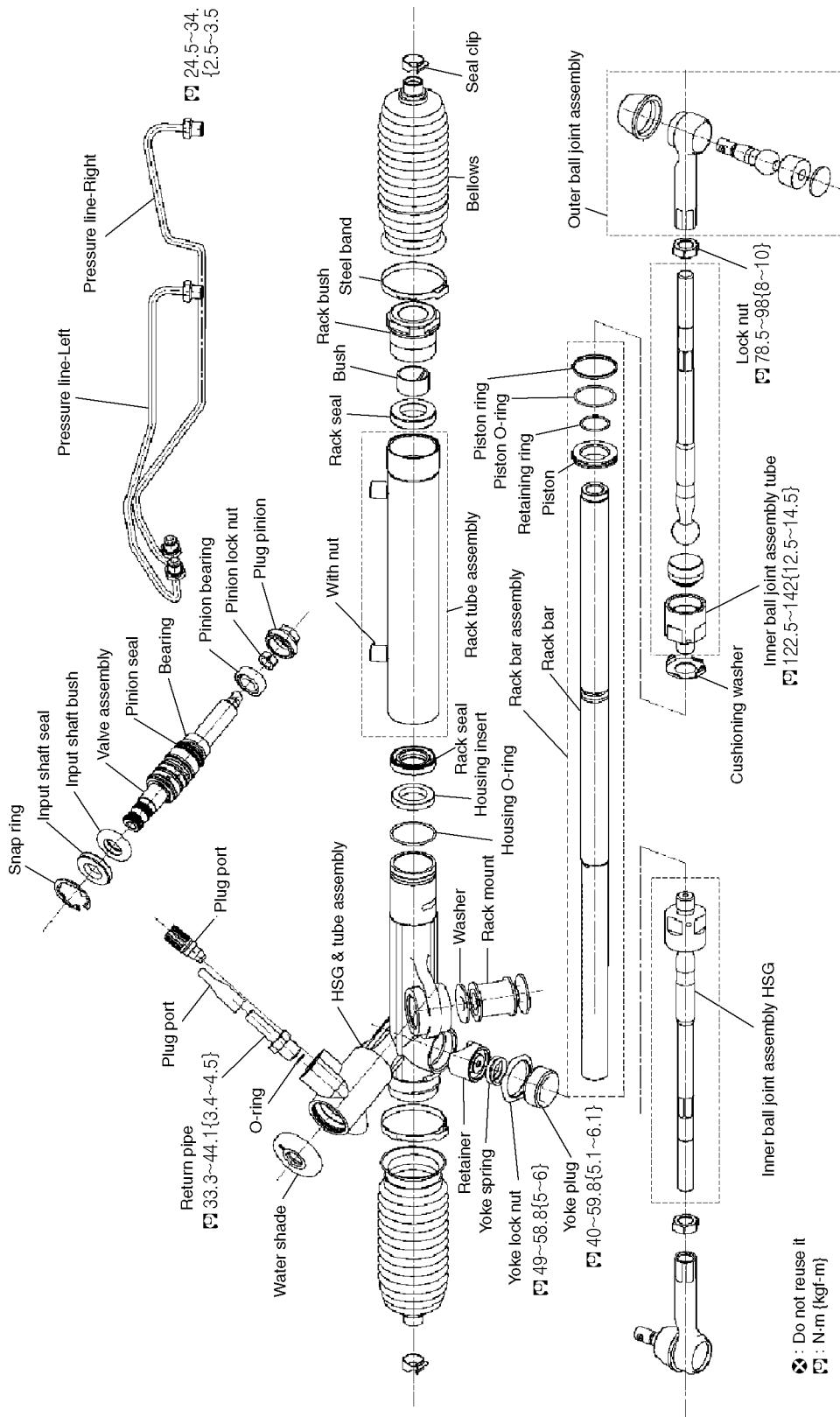


Air Switch

- During steering, it intakes auxiliary air to perform the RPM compensation according to initial steering amount.

POWER STEERING GEAR

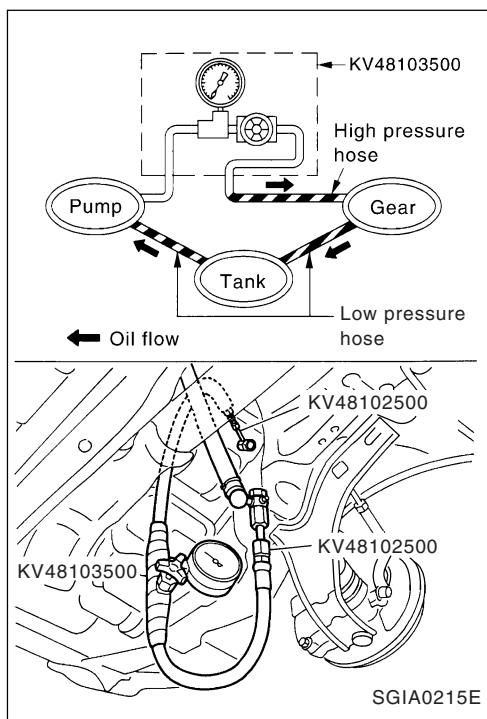
Components Diagram



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POWER STEERING OIL PUMP

Power Steering Oil Pump



On-Vehicle Inspection and Service

OIL PUMP RELIEF OIL PRESSURE INSPECTION

Check the belt tension before inspection.

1. Lift up the vehicle and bleed air from the hydraulic line after installing the oil pressure meter (special tool) to oil pump outlet connector and high pressure hose.
2. Start the engine. Run the engine until the reservoir fluid temperature rises to 50 - 60°C.

CAUTION:

- Open all oil pressure meter valves (special tool) during warming up. When the engine is started by closing all valves, the pressure in the oil pump increases up to the relief pressure and causing the oil temperature rise abnormally.
- Be careful to not touch the belt with the hose when starting the engine.

3. Open all oil pressure meter valves during idle and measure the relief oil pressure.

Relief oil pressure: $8.8^{+0.4}_{-0.2}$ MPa (90^{+4}_{-2} kgf/cm²)

4. Open the valve slowly after measurement.

CAUTION:

- Never close the valve for more than 15 seconds.

- When the relief oil pressure is out of the standard value, disassemble the oil pump. Refer to "Disassembly • Assembly" (ST-15).

5. Remove the oil pressure meter from the hydraulic circuit after inspection. Add fluid and perform air bleeding. Refer to "Air Bleeding" (ST-4).

Removal • Installation

REMOVAL

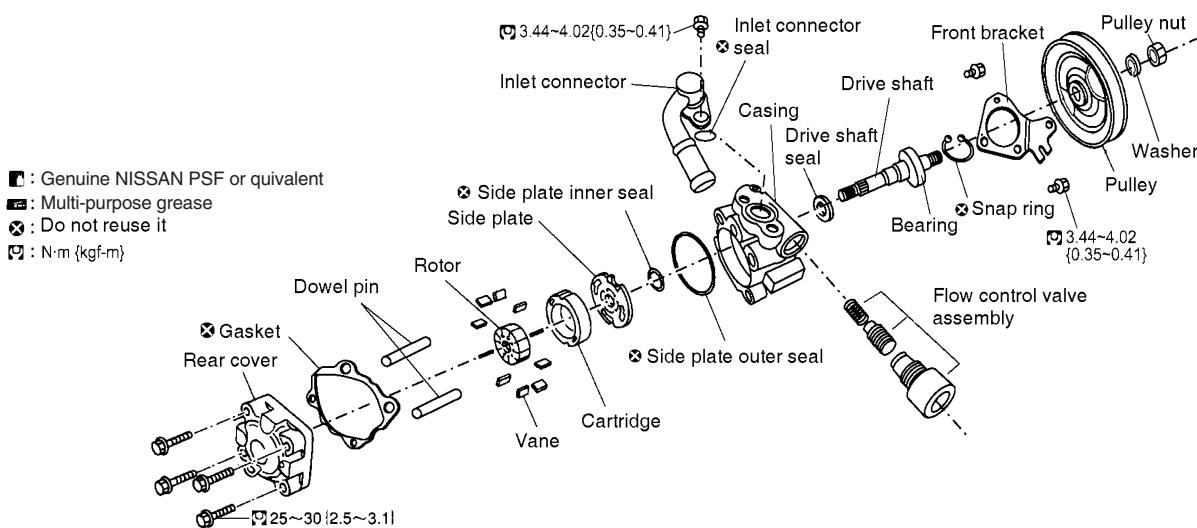
1. Loosen the adjustment screw and oil pump mounting bolts and remove the belt.
2. Remove the union bolt and hose from the oil pump.
3. Remove the oil pump bracket installation bolt.
4. Remove the oil pump from the vehicle.

INSTALLATION

Install in the reverse order of removal by cautioning as below.

- Adjust the belt tension after installation.
- Always perform air bleeding after installation. Refer to "Air Bleeding" (ST-4).

Disassembly • Assembly



SST025D

INSPECTION BEFORE DISASSEMBLY

Disassemble the power steering oil pump only in the following conditions.

- When there is oil leakage from the oil pump.
- When pulley is deformed or damaged.
- When performance goes down.

DISASSEMBLY

1. Secure the power steering pump to the vise.

CAUTION:

- Use an aluminum plate to prevent from damaging the steering pump mounting surfaces.

2. Remove the rear cover mounting bolts (4 EA) and remove the rear cover from the casing.

3. Remove the rear cover gasket.

CAUTION:

- The rear cover gasket cannot be reused. Do not reuse.

4. Remove the dowel pin, rotor, vane, cartridge, side plate, side plate outer seal, side plate inner seal, flow control valve and flow control valve spring assembly from the casing.

CAUTION:

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

5. Remove the inlet connector mounting bolt (2 EA) and remove the inlet connector from the casing.

6. Remove the inlet connector seal from the inlet connector.

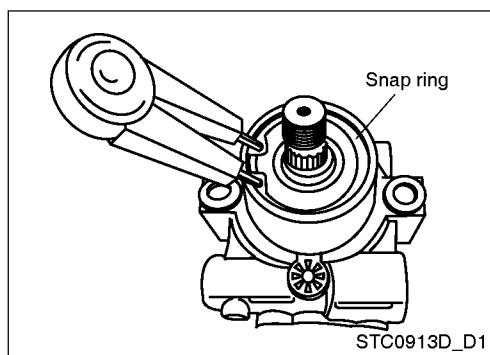
CAUTION:

- The inlet connector seal cannot be reused. Do not reuse.

7. Remove the pulley mounting nut and remove the pulley from the drive shaft.

8. Remove the front bracket mounting bolts (2 EA) and remove the front bracket from the casing.

9. Remove the snap ring using a snap ring pliers.



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POWER STEERING OIL PUMP

- 10 Remove the drive shaft and bearing from the case.
11. Remove the drive shaft seal from the case using a screwdriver.

CAUTION:

- **The drive shaft seal cannot be reused. Do not reuse. Be careful not to damage the drive shaft seal during installation.**

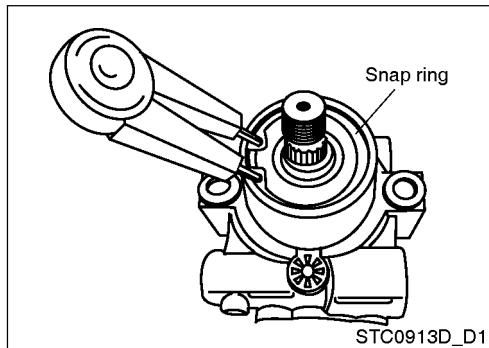
ASSEMBLY

1. Apply multi-purpose grease on the drive shaft surface and install the drive shaft seal to the casing using a drift (commercial tool).

CAUTION:

- **The drive shaft seal cannot be reused. Do not reuse. Be careful not to damage the drive shaft seal during installation.**

2. Apply multi-purpose grease on the bearing surface and install the drive shaft assembly by tapping with a rubber hammer.
3. Install the snap ring to the casing using a snap ring pliers.



CAUTION:

- **The snap ring cannot be reused. Do not reuse.**

4. Install the front bracket and tighten the mounting bolts (2 EA) to the specified torque.
5. Install the pulley to the drive shaft and tighten the mounting bolt to the specified torque.
6. Insert the inlet connector seal into the flow control valve, flow control valve spring assembly and inlet connector and install them to the casing.

CAUTION:

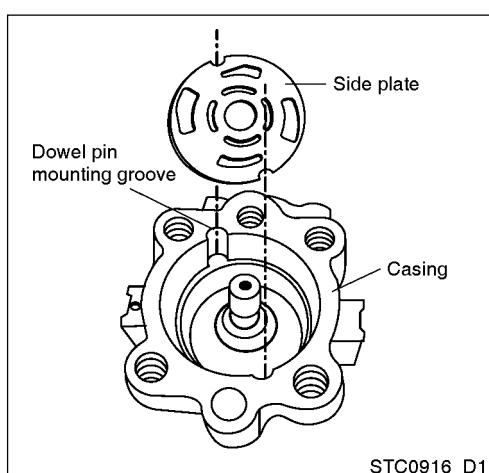
- **The inlet connector seal cannot be reused. Do not reuse.**

7. Install the side plate outer seal and side plate inner seal casing.

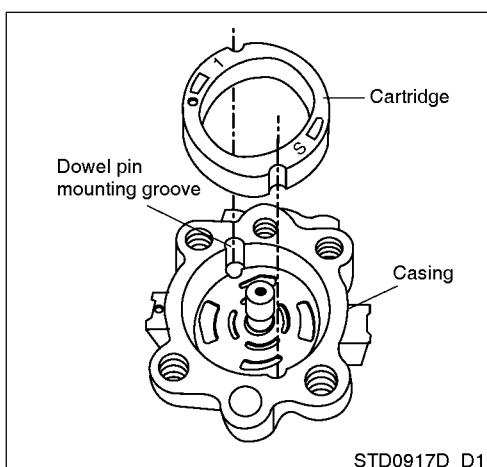
CAUTION:

- **The side plate outer seal and side plate inner seal cannot be reused. Do not reuse.**

8. Install the side plate to the casing by aligning the side plate end to the dowel pin mounting groove inside the casing.

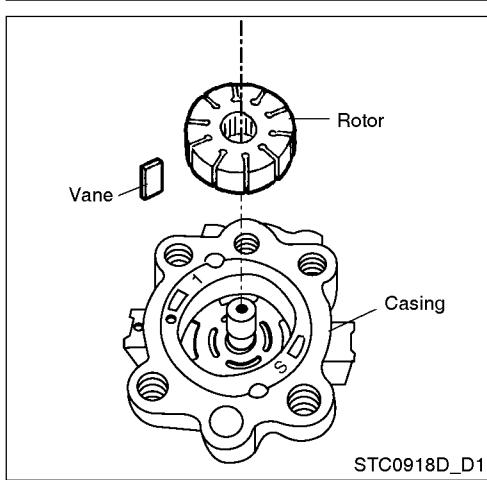


POWER STEERING OIL PUMP



9. Install cartridge end to the casing by aligning the end with the dowel pin mounting groove so that the stamped portion faces upwards.

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10. Install the rotor to the drive shaft.
11. Install the vane to the rotor.

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RS

12. After installing the rear cover gasket, install the rear cover with dowel pin and tighten the mounting bolts (4 EA) to the specified torque diagonally.

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CAUTION:

● The rear cover gasket cannot be reused. Do not reuse.

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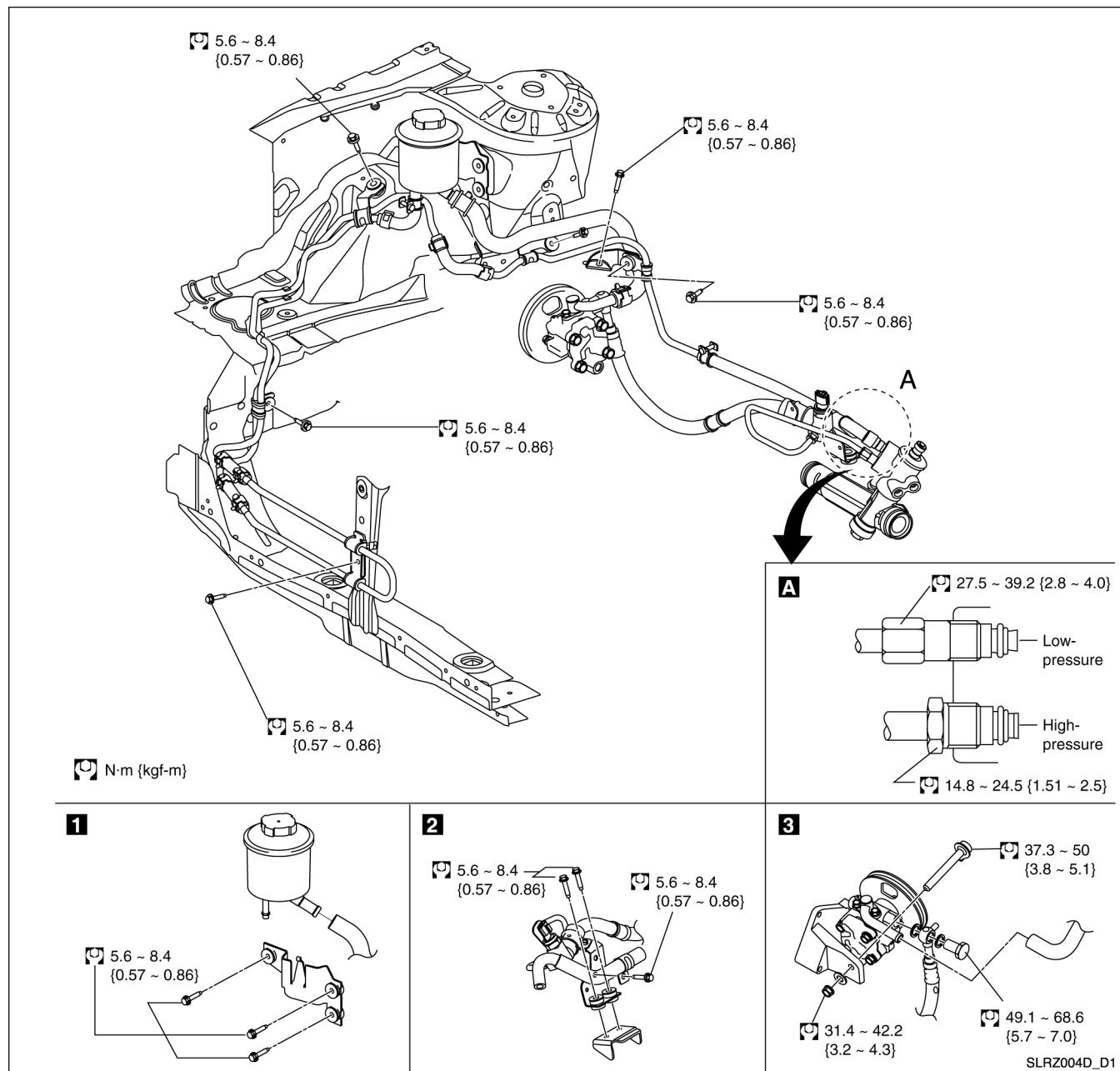
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HYDRAULIC LINE

Hydraulic Line

Removal • Installation



SERVICE DATA

Service Data

Steering Wheel

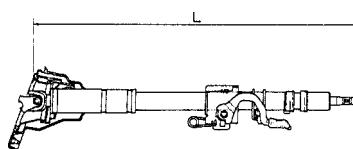
Steering wheel axial endplay	(mm)	0	
Steering wheel freeplay	(mm)	0 - 35	GI

Steering Angle

Engine model	Drive type	Tire size	Inner	Outer
QG16DE	Front wheel drive	175/70 R14	37° +1 -3	31.0°
		185/65 R14		

Steering Column

Steering column length "L"	543 mm	AC
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Steering Connection

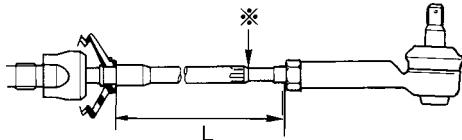
Steering gear type		Rack and pinion	MT
Tie rod ball joint outer socket	Turning torque	N•m (kgf-m)	0.39 - 2.84 (0.04 - 0.29)
	Spring scale measured value (Measuring point: Stud bolt hole)	(kg)	0.88 - 6.37
	Swing force	N•m (kgf-m)	0.29 - 2.84 (0.03 - 0.29)
	Axle endplay	(mm)	0
Tie rod ball joint inner socket	Turning torque	N•m (kgf-m)	0.78 - 7.74 (0.08 - 0.79)
	Spring scale measured value (Measuring point: * marked)	(kg)	0.60 - 5.70
	Axle endplay	(mm)	0

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SERVICE DATA

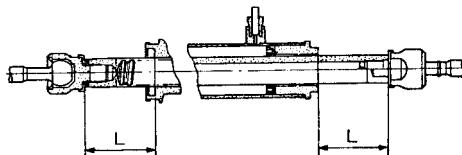
Steering gear type	Rack and pinion	
Tie rod length "L" (mm)		171 ± 1.5



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Steering Gear

Steering gear type	Rack and pinion	
Rack neutral location "L"(mm)		65.0



STC0101D_D1

Steering gear type		Rack and pinion
Retainer adjustment	Screw lock nut tightening torque	N•m (kgf-m)
	Initial tightening torque	N•m (kgf-m)
	Second tightening torque after initial tightening	N•m (kgf-m)
	Adjust screw loosening (Angle)	(°)
Rack sliding force	± 11.5 m from the neutral position (Power ON)	Area average value (kg)
		Fluctuation (kg)
	All area (Power OFF)	Maximum (kg)
		Fluctuation (kg)

Oil Pump

Oil pump relief pressure (MPa (kgf/cm ²))	With QG series engine	8.8 ^{+0.4} _{-0.2} (90 ⁺⁴ ₋₂)
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Steering Fluid

Capacity	Approx. 1.1 L
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SERVICE DATA

Tightening Torque

Unit: N•m (kgf-m)

Steering wheel nut		3.0 - 4.0 (0.3-0.4)	GI
Steering gear - Suspension member		Left mounting bolt: 9.90 - 12.0 (1.0-1.2) Right mounting bolt: 5.1 - 7.1 (0.52-0.72) Right mounting nut: 2.5 - 3.0 (0.25-0.30)	EM
Steering gear - Steering column		2.4 - 3.0 (0.24-0.3)	LC
Outer socket - Steering knuckle		3.0 - 4.0 (0.3-0.41)	EC
Tie rod lock nut		8.0 - 10 (0.81-1.02)	
Oil pump mounting bolt		3.2 - 4.3 (0.33-0.44)	FE
Hydraulic tube (High pressure) - Oil pump		5.0 - 7.0 (0.51-0.71)	
Hydraulic tube - Steering gear	High pressure	1.5 - 2.5 (0.15-0.25)	RS
	Low pressure	3.4 - 4.5 (0.35-0.46)	
			AC
			AV
			EL
			WH
			CL
			MT
			AT
			FA
			RA
			BR
			ST
			BT

