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SECTION **ST**

STEERING SYSTEM

D

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000008461702

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 AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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 WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Battery Service

INFOID:0000000008461703

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

Service Notice or Precautions for Steering System

INFOID:0000000008461704

- In case of removing steering gear assembly, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment.
- Observe the following precautions when disassembling.
 - Before disassembly, thoroughly clean the outside of the unit.
 - Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
 - For easier and proper assembly, place disassembled parts in order on a parts rack.
 - Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
 - Never reuse non-reusable parts.
 - Before assembling, apply the specified grease to the directed parts.

PREPARATION

< PREPARATION >

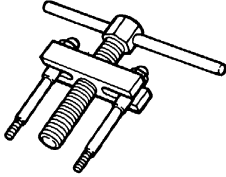
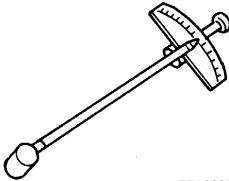
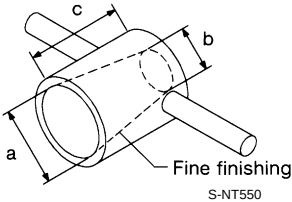
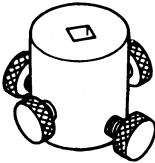
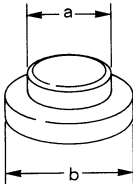
PREPARATION

PREPARATION

Special Service Tools

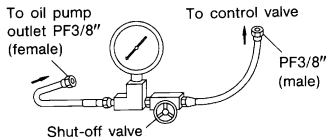
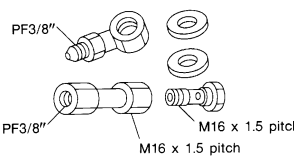
INFOID:000000008461705

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
ST27180001 (J-25726-A) Steering wheel puller	 ZZA0819D	Removing steering wheel
ST3127S000 (J-25765-A) Preload gauge	 ZZA0806D	• Measuring steering wheel turning torque • Measuring steering column rotating torque • Measuring ball joint rotating torque • Measuring pinion rotating torque
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)	 S-NT550	Installing rack Teflon ring
KV48103400 (—) Preload adapter	 ZZA0824D	Measuring rotating torque
ST35300000 (—) Drift a: 45.1 mm (1.776 in) dia. b: 59.0 mm (2.323 in) dia.	 ZZA0881D	Installing oil pump oil seal

PREPARATION

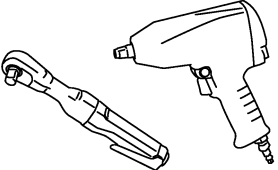
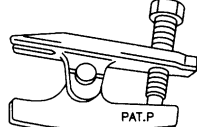
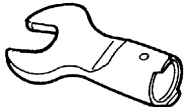
< PREPARATION >

Tool number (Kent-Moore No.) Tool name	Description	A
KV48103500 (J-26357) Oil pressure gauge	Measuring oil pump relief pressure	B
 S-NT547		C
KV48102500 (J-33914) Oil pressure gauge adapter	Measuring oil pump relief pressure	D
 S-NT542		E
		F

Commercial Service Tools

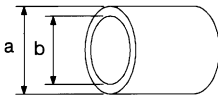
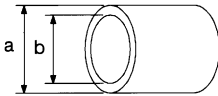
INFOID:0000000008461706

ST

Tool name	Description	
Power tool	Loosening bolts and nuts	H
 PBIC0190E		I
Ball joint remover	Removing steering outer socket	J
 S-NT146		K
Open head	Tightening end cover assembly	L
 ZZA0822D		M
		N
		O
		P

PREPARATION

< PREPARATION >

Tool name	Description
Drift a: 15 mm (0.59 in) dia. b: 10 mm (0.39 in) dia.  S-NT474	Installing rotor snap ring
Drift a: 36 mm (1.42 in) dia. b: 20 mm (0.79 in) dia.  S-NT474	Installing oil pump oil seal

COMPONENT PARTS

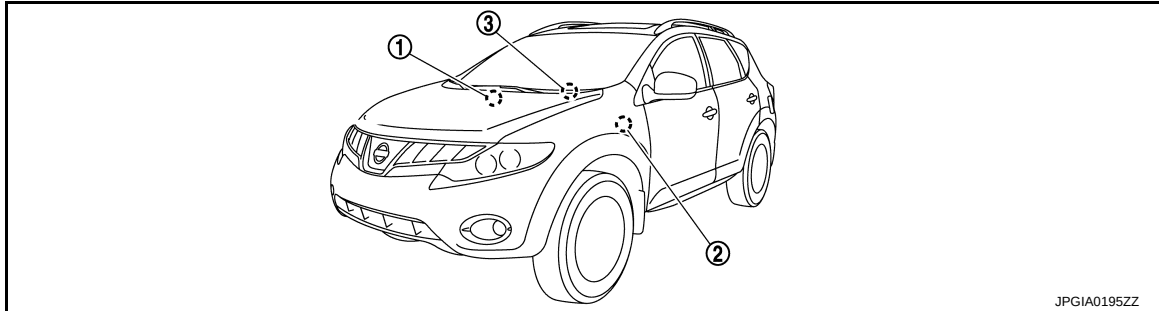
< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location (Heated Steering Wheel)

INFOID:0000000008461707



1. Heated steering wheel relay
Refer to [PG-41, "Main Harness"](#).
2. Heated steering wheel switch
3. Heated steering wheel

Component Description (Heated Steering Wheel)

INFOID:0000000008461708

Part name		Reference/Function
Heated steering wheel	Heating element	Refer to ST-7, "Heated Steering Wheel" .
	Thermostat	
Heated steering wheel relay		Refer to ST-7, "Heated Steering Wheel Relay" .
Heated steering wheel switch	Timer	Refer to ST-7, "Heated Steering Wheel Switch" .

Heated Steering Wheel

INFOID:0000000008461709

The heated steering wheel is activated by the power supply from the heated steering wheel relay. Furthermore, the heated steering wheel incorporates a heating element and a thermostat to control heated steering wheel temperatures.

- Heating element: Heat is generated by the passage of an electric current.
- Thermostat: ON/OFF operation of power supply at a certain temperature.

Heated Steering Wheel Switch

INFOID:0000000008461710

- Controls the heated steering wheel relay and operates the heated steering wheel system.
The heated steering wheel switch incorporates a timer and turns OFF the heated steering wheel relay when operating time reaches a certain time.
- Timer: ON/OFF operation of the heated steering wheel relay at a certain time.
- Turns the indicator lamp ON when the system is activated.

Heated Steering Wheel Relay

INFOID:0000000008461711

Operates the heated steering system with the control signal from the heated steering wheel switch.

SYSTEM

< SYSTEM DESCRIPTION >

SYSTEM

System Description (Heated Steering Wheel)

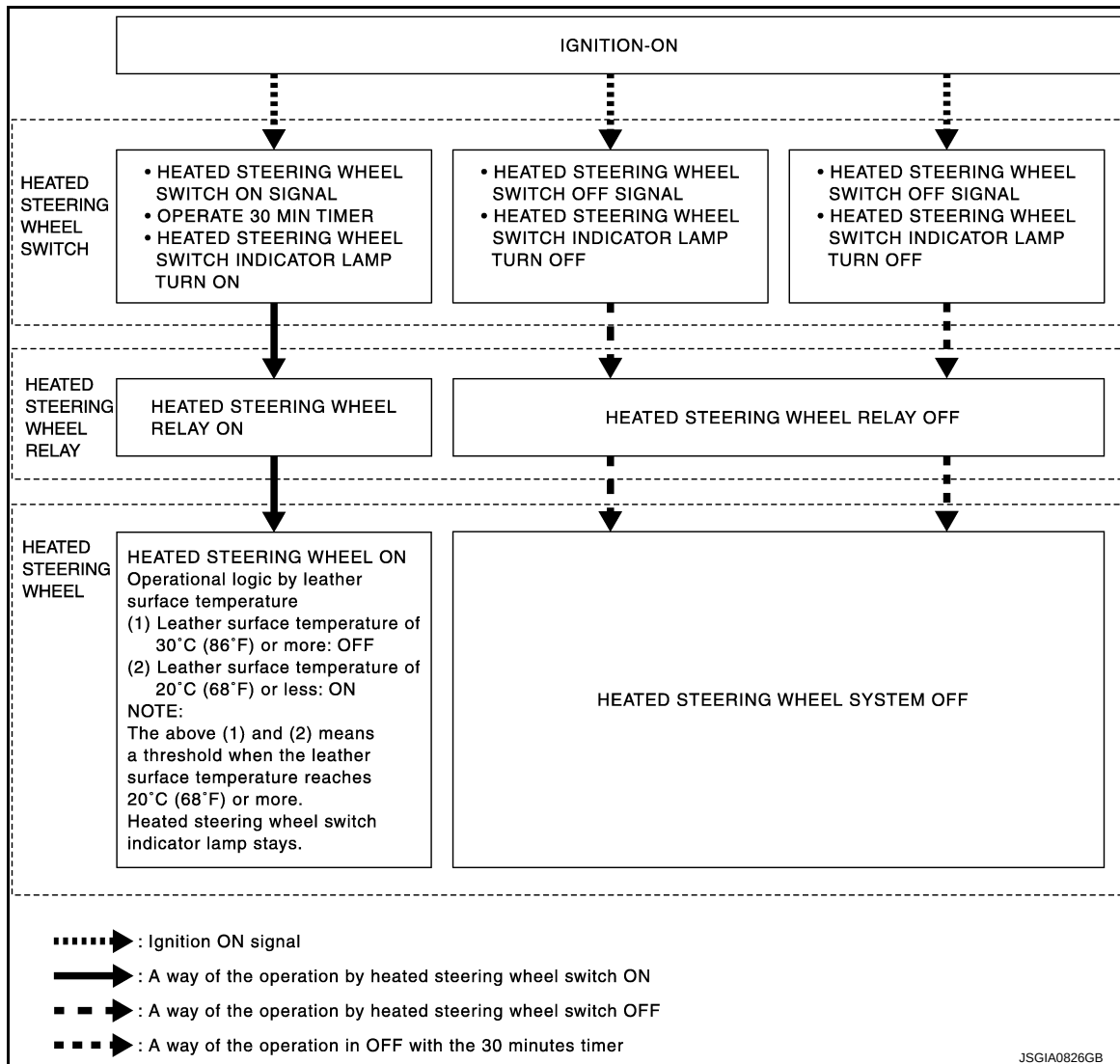
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The heated steering wheel switch controls the heated steering wheel relay. When the heated steering wheel switch is turned on, the heated steering wheel relay is energized and the heated steering wheel system will operate. The heated steering wheel system will turn off when the heated steering wheel temperature reaches approximately 30°C (86°F). Heated steering wheel system operation can also be canceled by pressing the heated steering wheel switch again. In addition, the heated steering wheel switch incorporates a timer and turns OFF the heated steering wheel relay to exit the heated steering wheel system when the operating time reaches a certain time.

NOTE:

If the surface temperature of the steering wheel is below 20°C (68°F), the system will heat the steering wheel and cycle off and on to maintain a temperature above 20°C (68°F). The indicator lamp will remain on as long as the system is on. Push the switch again to turn the heated steering wheel system off manually. The indicator lamp will go off.

SYSTEM DIAGRAM



HEATED STEERING WHEEL

< WIRING DIAGRAM >

WIRING DIAGRAM

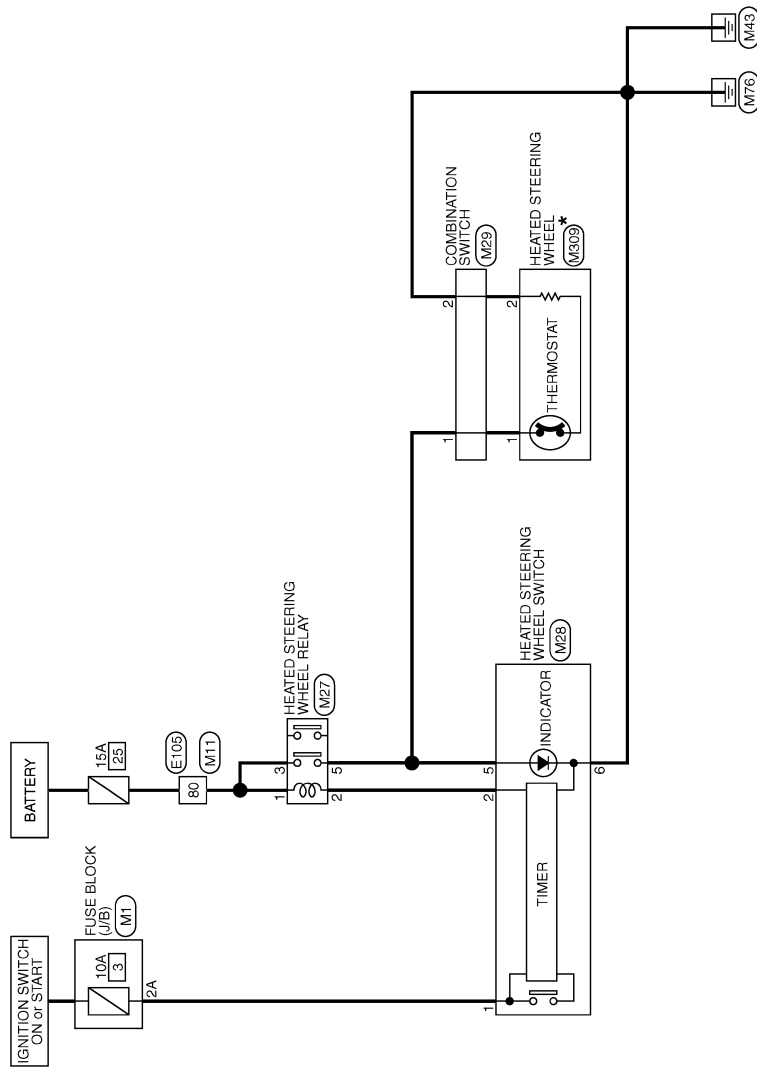
HEATED STEERING WHEEL

Wiring Diagram

INFOID:000000008461713

For connector terminal arrangements, harness layouts, and alphabets in a  (option abbreviation; if not described in wiring diagram), refer to [GI-12. "Connector Information"](#).

HEATED STEERING WHEEL



* : This connector is not shown in "Harness Layout".

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

WorkFlow (Heated Steering Wheel)

INFOID:000000008461714

DETAILED FLOW

1.OBTAIN INFORMATION ABOUT SYMPTOM

Interview the customer to obtain the malfunction information (conditions and environment when the malfunction occurred) as much as possible when the customer brings the vehicle in.

>> GO TO 2.

2.REPRODUCE THE MALFUNCTION INFORMATION

Check the malfunction on the vehicle that the customer describes.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 3.

3.IDENTIFY THE MALFUNCTIONING SYSTEM WITH "SYMPTOM DIAGNOSIS"

Use "Symptom diagnosis" from the symptom inspection result in step 2 and then identify where to start performing the diagnosis based on possible causes and symptoms.

>> GO TO 4.

4.IDENTIFY THE MALFUNCTIONING PARTS WITH "COMPONENT DIAGNOSIS"

Perform the diagnosis with "Component diagnosis" of the applicable system.

>> GO TO 5.

5.REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the specified malfunctioning parts.

>> GO TO 6.

6.FINAL CHECK

Check that malfunctions are not reproduced when obtaining the malfunction information from the customer, referring to the symptom inspection result in step 2.

Are the malfunctions corrected?

YES >> INSPECTION END
NO >> GO TO 2.

STEERING WHEEL

< BASIC INSPECTION >

STEERING WHEEL

Inspection

INFOID:000000008461715

NEUTRAL POSITION STEERING WHEEL

1. Check that steering gear assembly, steering column assembly and steering wheel are installed in the correct position.
2. Check wheel alignment within specification. Refer to [FSU-7, "Inspection"](#).
3. Set the vehicle to the straight-ahead position and confirm steering wheel is in the neutral position.
 - Loosen outer socket lock nut and turn inner socket to left and right equally to make fine adjustments if steering wheel is not in the neutral position.

CAUTION:

If the adjustment is performed by using the inner socket, check wheel alignment after the adjustment. Refer to [FSU-7, "Inspection"](#).

STEERING WHEEL TURNING FORCE

1. Park the vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated normal pressure. Refer to [WT-50, "Tire Air Pressure"](#).
3. Start the engine.
4. Bring power steering fluid up to adequate operating temperature.

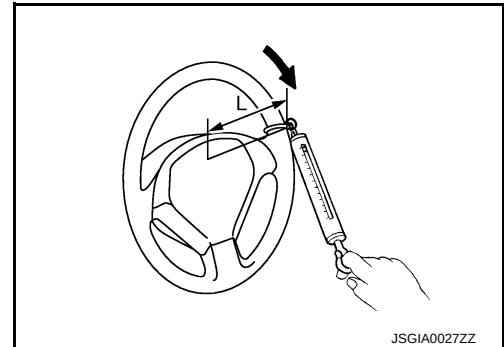
Fluid temperature : 50 – 80°C (122 – 176°F)

5. Check steering wheel turning force when steering wheel has been turned 540° from neutral position.

Standard

Steering wheel turning force : Refer to [ST-56, "Steering Wheel Turning Force"](#).

6. If steering wheel turning force is out of the specification, check rack sliding force and relief hydraulic pressure of oil pump. Regarding relief hydraulic pressure of oil pump, refer to [ST-51, "Inspection"](#).



RACK SLIDING FORCE

1. Disconnect lower joint and steering knuckle from steering gear assembly. Refer to [ST-34, "Exploded View"](#).
2. Start and run the engine at idle to make sure steering fluid has reached normal operating temperature.

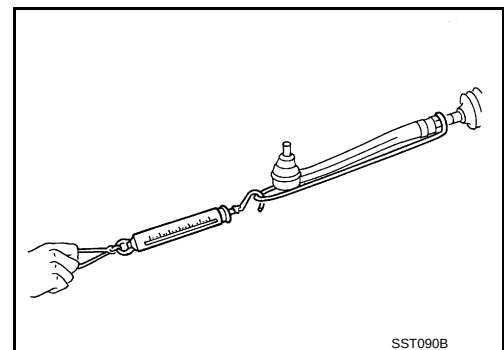
Fluid temperature : 50 – 80°C (122 – 176°F)

3. While pulling outer socket slowly in ± 11.5 mm (± 0.453 in) range from neutral position, make sure rack sliding force is within specification.

Standard

Rack sliding force : Refer to [ST-57, "Rack Sliding Force"](#).

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



FRONT WHEEL TURNING ANGLE

1. Perform toe-in inspection. Refer to [FSU-7, "Inspection"](#).

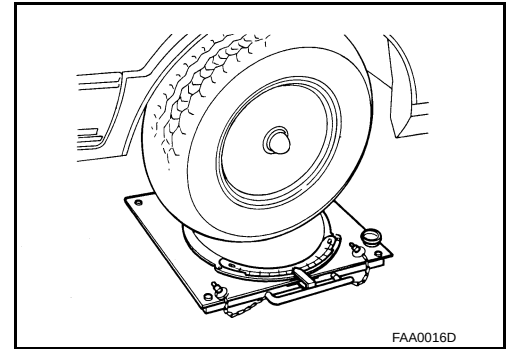
CAUTION:

Perform front wheel turning angle inspection, after toe-in inspection.

STEERING WHEEL

< BASIC INSPECTION >

2. Place front wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
3. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.

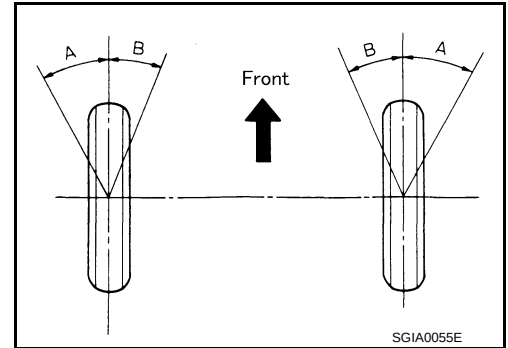


- With the engine at idle, turn steering wheel from full left stop to full right stop and measure the turning angles.

Standard

Inner wheel (Angle: A) : Refer to [ST-56, "Steering Angle"](#).

Outer wheel (Angle: B) : Refer to [ST-56, "Steering Angle"](#).

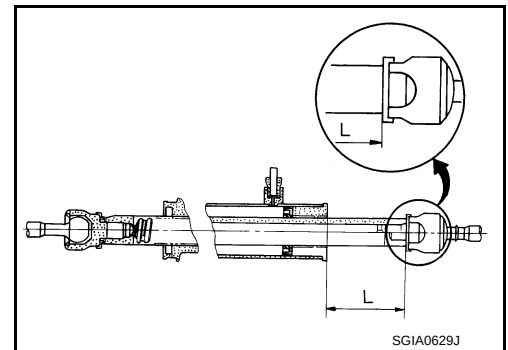


- Check the following items when turning angle is out of the standard.
- Check the neutral position of the rack stroke (L).

Standard

Rack stroke neutral position (L) : Refer to [ST-57, "Rack Stroke"](#).

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



HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:0000000008461716

1.CHECK HEATED STEERING WHEEL SYSTEM

Check operate heated steering wheel system. Refer to [ST-8. "System Description \(Heated Steering Wheel\)".](#)

Is the inspection result normal?

YES >> Go to [ST-13. "Diagnosis Procedure".](#)

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008461717

1.CHECK POWER SOURCE AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to [ST-30. "Removal and Installation".](#)
3. Turn ignition switch ON.

CAUTION:

Never start the engine.

4. Turn heated steering wheel switch ON.
5. Check voltage between heated steering wheel harness connector terminals.

Heated steering wheel		Condition	Voltage (Approx.)
Connector	Terminal		
M309	1 – 2	Within 30 minutes after turning ON the heated steering switch.	Battery voltage
		Other conditions.	0 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED STEERING WHEEL

Check heated steering wheel. Refer to [ST-15. "Component Inspection \(Heated Steering Wheel\)".](#)

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel. Refer to [ST-30. "Removal and Installation".](#)

3.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel harness connector terminal and ground.

Heated steering wheel		Ground	Continuity
Connector	Terminal		
M309	2		Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL

1. Turn ignition switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-7. "Component Parts Location \(Heated Steering Wheel\)".](#)
3. Disconnect heated steering wheel switch connector. Refer to [ST-55. "Removal and Installation".](#)
4. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel harness connector terminal.

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M27	5	M309	1	Existed

5. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	5		Not existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-16, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-7, "Component Parts Location \(Heated Steering Wheel\)"](#).

6.CHECK POWER SUPPLY (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and 15 A fuse (No.25).
- 15 A fuse (No.25).
- Harness for short or open between 15 A fuse (No.25) and heated steering wheel relay.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Ground	Continuity
Connector	Terminal		
M28	6		Existed

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace damaged parts.

8.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	2	M28	2	Existed

2. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	2		Not existed

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 9.
NO >> Repair or replace damaged parts.

9.CHECK HARNESS BETWEEN FUSE BLOCK (J/B) AND HEATED STEERING WHEEL SWITCH

1. Check continuity between fuse block (J/B) connector terminal and heated steering wheel switch harness connector terminal.

Fuse block (J/B)		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M1	2A	M28	1	Existed

2. Check continuity between fuse block (J/B) harness connector terminal and ground.

Fuse block (J/B)		Ground	Continuity
Connector	Terminal		
M1	2A		Not existed

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace damaged parts.

10.CHECK POWER SUPPLY (IGNITION)

Check the following.

- Ignition switch
- Harness for short or open between ignition switch and fuse block (J/B). Refer to [PG-27. "Wiring Diagram - IGNITION POWER SUPPLY -"](#).
- 10A fuse [No.3, located in the fuse block (J/B)]. Refer to [PG-33. "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)

Is the inspection result normal?

- YES >> Replace heated steering wheel switch. Refer to [ST-55. "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

Component Inspection (Heated Steering Wheel)

INFOID:0000000008461718

1.CHECK HEATED STEERING WHEEL CONTINUITY

Check continuity between heated steering wheel connector terminals.

Heated steering wheel		Condition	Continuity
Terminal			
1 – 2		Leather surface temperature of 20°C (68°F) or less	Existed
		Leather surface temperature of 30°C (86°) or more	Not existed

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace heated steering wheel. Refer to [ST-30. "Removal and Installation"](#).

2.CHECK HEATED STEERING WHEEL RESISTANCE

Check resistance between heated steering wheel connector terminals.

Heated steering wheel		Condition	Resistance (Approx.)
Terminal			
1 – 2		Leather surface temperature of 20°C (68°F)	1.83 Ω

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000008461719

1. CHECK HEATED STEERING WHEEL RELAY CONTINUITY

Check continuity between heated steering wheel relay terminals.

CAUTION:

Connect the fuse between the terminals when applying the voltage.

Heated steering wheel relay	Condition	Continuity
Terminal		
3 – 5	Apply 12 V direct current between terminals 1 and 2.	Existed
	Other conditions.	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel relay. Refer to [ST-7, "Component Parts Location \(Heated Steering Wheel\)"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:000000008461720

1.CHECK HEATED STEERING WHEEL INDICATOR LAMP

1. Turn ignition switch ON.
2. Turn heated steering wheel switch ON.

Does heated steering wheel indicator lamp turn on the lamp?

- YES >> GO TO 2.
NO >> Go to [ST-17, "Diagnosis Procedure"](#).

2.CHECK HEATED STEERING WHEEL INDICATOR LAMP

Turn heated steering wheel switch OFF.

Does heated steering wheel indicator lamp turn off the lamp?

- YES >> INSPECTION END
NO >> Go to [ST-17, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000008461721

1.CHECK POWER SOURCE AND GROUND CIRCUIT

1. Turn ignition switch ON.
CAUTION:
Never start the engine.
2. Turn heated steering wheel switch ON.
3. Check voltage between heated steering wheel switch harness connector terminals.

Heated steering wheel		Condition	Voltage (Approx.)
Connector	Terminal		
M28	5 – 6	Within 30 minutes after turning ON the heated steering switch.	Battery voltage
		Other conditions.	0 V

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK POWER SUPPLY (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and 15 A fuse (No.25).
- 15 A fuse (No.25).
- Harness for short or open between 15 A fuse (No.25) and heated steering wheel relay.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Ground	Continuity
Connector	Terminal		
M28	6		Existed

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace damaged parts.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

4.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-7. "Component Parts Location \(Heated Steering Wheel\)"](#).
3. Disconnect heated steering wheel switch connector. Refer to [ST-55. "Removal and Installation"](#).
4. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	5	M28	5	Existed

5. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	5		Not existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-19. "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-7. "Component Parts Location \(Heated Steering Wheel\)"](#).

6.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	2	M28	2	Existed

2. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	2		Not existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7.CHECK HARNESS BETWEEN FUSE BLOCK (J/B) AND HEATED STEERING WHEEL SWITCH

1. Check continuity between fuse block (J/B) connector terminal and heated steering wheel switch harness connector terminal.

Fuse block (J/B)		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M1	2A	M28	1	Existed

2. Check continuity between fuse block (J/B) harness connector terminal and ground.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

Fuse block (J/B)		Ground	Continuity
Connector	Terminal		
M1	2A		Not existed

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace damaged parts.

8.CHECK POWER SUPPLY (IGNITION)

Check the following.

- Ignition switch
- Harness for short or open between ignition switch and fuse block (J/B). Refer to [PG-27, "Wiring Diagram - IGNITION POWER SUPPLY -"](#).
- 10A fuse [No.3, located in the fuse block (J/B)]. Refer to [PG-33, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)

Is the inspection result normal?

YES >> Replace heated steering wheel switch. Refer to [ST-55, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

Component Inspection (Heated Steering Wheel Relay)

INFOID:0000000008461722

1.CHECK HEATED STEERING WHEEL RELAY CONTINUITY

Check continuity between heated steering wheel relay terminals.

CAUTION:

Connect the fuse between the terminals when applying the voltage.

Heated steering wheel relay		Condition	Continuity
Terminal			
3 – 5	Apply 12 V direct current between terminals 1 and 2.	Existed	
	Other conditions.	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel relay. Refer to [ST-7, "Component Parts Location \(Heated Steering Wheel\)"](#).

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

Description

INFOID:000000008461723

- The heated steering wheel does not warm up.
- The heated steering wheel system cannot be turned OFF.

Diagnosis Procedure

INFOID:000000008461724

1.CHECK POWER SOURCE AND GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).
3. Turn ignition switch ON.
CAUTION:
Never start the engine.
4. Turn heated steering wheel switch ON.
5. Check voltage between heated steering wheel harness connector terminals.

Heated steering wheel		Condition	Voltage (Approx.)
Connector	Terminal		
M309	1 – 2	Within 30 minutes after turning ON the heated steering switch.	Battery voltage
		Other conditions.	0 V

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED STEERING WHEEL

Check heated steering wheel. Refer to [ST-15, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).

3.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel harness connector terminal and ground.

Heated steering wheel		Ground	Continuity
Connector	Terminal		
M309	2		Existed

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL

1. Turn ignition switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-15, "Component Inspection \(Heated Steering Wheel\)"](#).
3. Disconnect heated steering wheel switch connector. Refer to [ST-55, "Removal and Installation"](#).
4. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel harness connector terminal.

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M27	5	M309	1	Existed

5. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	5		Not existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-16, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-16, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

6.CHECK POWER SUPPLY (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and 15 A fuse (No.25).
- 15 A fuse (No.25).
- Harness for short or open between 15 A fuse (No.25) and heated steering wheel relay.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Ground	Continuity
Connector	Terminal		
M28	6		Existed

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace damaged parts.

8.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	2	M28	2	Existed

2. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	2		Not existed

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

- YES >> GO TO 9.
NO >> Repair or replace damaged parts.

9.CHECK HARNESS BETWEEN FUSE BLOCK (J/B) AND HEATED STEERING WHEEL SWITCH

1. Check continuity between fuse block (J/B) connector terminal and heated steering wheel switch harness connector terminal.

Fuse block (J/B)		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M1	2A	M28	1	Existed

2. Check continuity between fuse block (J/B) harness connector terminal and ground.

Fuse block (J/B)		Ground	Continuity
Connector	Terminal		
M1	2A		Not existed

Is the inspection result normal?

- YES >> GO TO 10.
NO >> Repair or replace damaged parts.

10.CHECK POWER SUPPLY (IGNITION)

Check the following.

- Ignition switch
- Harness for short or open between ignition switch and fuse block (J/B). Refer to [PG-27, "Wiring Diagram - IGNITION POWER SUPPLY -"](#).
- 10A fuse [No.3, located in the fuse block (J/B)]. Refer to [PG-33, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)

Is the inspection result normal?

- YES >> Replace heated steering wheel switch. Refer to [ST-55, "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

Description

INFOID:000000008461725

- Heated steering wheel switch indicator lamp does not turn on the lamp.
- Heated steering wheel switch indicator lamp does not turn off the lamp.

Diagnosis Procedure

INFOID:000000008461726

1.CHECK POWER SOURCE AND GROUND CIRCUIT

1. Turn ignition switch ON.
CAUTION:
Never start the engine.
2. Turn heated steering wheel switch ON.
3. Check voltage between heated steering wheel switch harness connector terminals.

Heated steering wheel		Condition	Voltage (Approx.)
Connector	Terminal		
M28	5 – 6	Within 30 minutes after turning ON the heated steering switch.	Battery voltage
		Other conditions.	0 V

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK POWER SUPPLY (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and 15 A fuse (No.25).
- 15 A fuse (No.25).
- Harness for short or open between 15 A fuse (No.25) and heated steering wheel relay.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK GROUND CIRCUIT

Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Ground	Continuity
Connector	Terminal		
M28	6		Existed

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-16. "Component Inspection \(Heated Steering Wheel Relay\)"](#).
3. Disconnect heated steering wheel switch connector. Refer to [ST-55. "Removal and Installation"](#).
4. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	5	M28	5	Existed

5. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	5		Not existed

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-16, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Replace heated steering wheel relay. Refer to [ST-16, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

6.CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND HEATED STEERING WHEEL SWITCH

1. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

Heated steering wheel relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M27	2	M28	2	Existed

2. Check continuity between heated steering wheel relay harness connector terminal and ground.

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M27	2		Not existed

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair or replace damaged parts.

7.CHECK HARNESS BETWEEN FUSE BLOCK (J/B) AND HEATED STEERING WHEEL SWITCH

1. Check continuity between fuse block (J/B) connector terminal and heated steering wheel switch harness connector terminal.

Fuse block (J/B)		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M1	2A	M28	1	Existed

2. Check continuity between fuse block (J/B) harness connector terminal and ground.

Fuse block (J/B)		Ground	Continuity
Connector	Terminal		
M1	2A		Not existed

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair or replace damaged parts.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS >

8.CHECK POWER SUPPLY (IGNITION)

Check the following.

- Ignition switch
- Harness for short or open between ignition switch and fuse block (J/B). Refer to [PG-27, "Wiring Diagram - IGNITION POWER SUPPLY -"](#).
- 10A fuse [No.3, located in the fuse block (J/B)]. Refer to [PG-33, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)

Is the inspection result normal?

- YES >> Replace heated steering wheel switch. Refer to [ST-55, "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

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NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000008461727

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

Symptom			Possible cause and SUSPECTED PARTS		Reference
Steering	Noise	×	Fluid level		ST-27, "Inspection"
	Shake		Air in hydraulic system		ST-27, "Inspection"
	Vibration		Outer/inner socket ball joint swinging torque		ST-45, "Inspection"
	Shimmy		Outer/inner socket ball joint rotating torque		ST-45, "Inspection"
	Judder		Outer/inner socket ball joint end play		ST-45, "Inspection"
		×	Steering fluid leakage		ST-27, "Inspection"
		×	Steering wheel play		ST-29, "Inspection"
		×	Steering gear rack sliding force		ST-29, "Inspection"
		×	Drive belt looseness		EM-14, "Checking"
			Improper steering wheel	—	—
			Improper installation or looseness of tilt lock lever	—	—
		×	Mounting looseness		ST-37, "Exploded View"
		×	Steering column deformation or damage		ST-32, "Inspection"
		×	Improper installation or looseness of steering column		ST-31, "Exploded View"
			Steering linkage looseness		ST-37, "Exploded View"
		×	PROPELLER SHAFT		NVH in DLN section.
		×	DIFFERENTIAL		NVH in DLN section.
		×	AXLE and SUSPENSION		NVH in FAX, RAX, FSU, RSU section.
		×	TIRE		NVH in WT section.
		×	ROAD WHEEL		NVH in WT section.
		×	DRIVE SHAFT		NVH in FAX, RAX section.
		×	BRAKE		NVH in BR section.

×: Applicable

POWER STEERING FLUID

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE

POWER STEERING FLUID

Inspection

INFOID:000000008461728

FLUID LEVEL

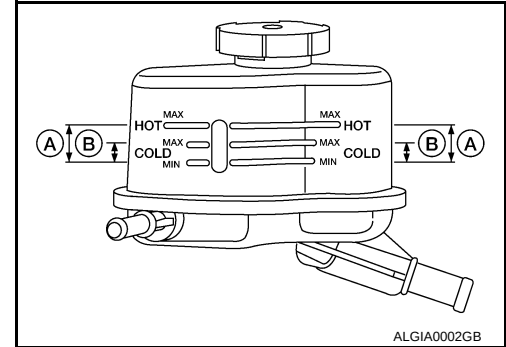
1. Check fluid level with engine stopped.
2. Ensure that fluid level is between MIN and MAX.
3. Fluid levels at HOT and COLD are different. Do not confuse them.

HOT (A) : Fluid temperature 50 – 80°C (122 – 176°F)

COLD (B) : Fluid temperature 0 – 30°C (32 – 86°F)

Recommended fluid : Refer to [MA-10, "Fluids and Lubricants"](#).

Fluid capacity : Refer to [ST-56, "General Specifications"](#).



CAUTION:

- The fluid level should not exceed the MAX line. Excessive fluid causes fluid leakage from the cap.
- Never reuse drained power steering fluid.

FLUID LEAKAGE

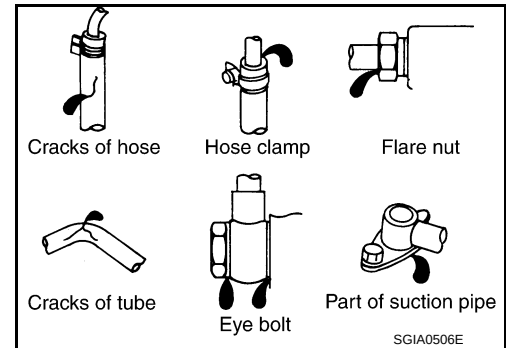
Check hydraulic connections for fluid leakage, cracks, damage, looseness, or wear.

1. Run the engine until the fluid temperature reaches 50 to 80°C (122 to 176°F) in reservoir tank, and keep engine speed idle.
2. Turn steering wheel several times from full left stop to full right stop.
3. Hold steering wheel at each lock position for five seconds and carefully check for fluid leakage.

CAUTION:

Never hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that power steering oil pump assembly may be damaged.)

4. If fluid leakage at connections is noticed, then loosen flare nut and then retighten. Do not overtighten connector as this can damage O-ring, washer and connector.
5. If fluid leakage from oil pump is noticed, check oil pump.
6. Check steering gear boots for accumulation of fluid leaked from steering gear.



AIR BLEEDING HYDRAULIC SYSTEM

If air bleeding is not complete, the following symptoms can be observed.

- Bubbles are created in reservoir tank.
- Clicking noise can be heard from oil pump.
- Excessive buzzing in the oil pump.

NOTE:

Fluid noise may occur in the steering gear or oil pump. This does not affect performance or durability of the system.

1. Turn steering wheel several times from full left stop to full right stop with engine off.

CAUTION:

Fill reservoir tank with a sufficient amount of fluid so that fluid level is not below the MIN line while turning steering wheel.

2. Start the engine and hold steering wheel at each lock position for 3 second at idle to check for fluid leakage.

POWER STEERING FLUID

< PERIODIC MAINTENANCE >

3. Repeat step 2 above several times at approximately 3 second intervals.

CAUTION:

Never hold the steering wheel in a locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)

4. Check fluid for bubbles and white contamination.
5. Stop the engine if bubbles and white contamination do not drain out. Perform step 2 and 3 above after waiting until bubbles and white contamination drain out.
6. Stop the engine, and then check fluid level.

STEERING WHEEL

< PERIODIC MAINTENANCE >

STEERING WHEEL

Inspection

INFOID:000000008461729

STEERING WHEEL AXIAL END PLAY

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

Standard

Steering wheel axial end play : Refer to [ST-56, "Steering Wheel Axial End Play and Play"](#).

3. Check the following items when steering wheel axial end play is out of the standard.
 - Check the steering column assembly mounting condition. Refer to [ST-31, "Exploded View"](#).
 - Check steering gear assembly mounting condition for looseness. Refer to [ST-37, "Exploded View"](#).

STEERING WHEEL PLAY

1. Turn steering wheel so that front wheels come to the straight-ahead position.
2. Start the engine and lightly turn steering wheel to the left and right until front wheels start to move.
3. Measure steering wheel movement on the outer circumference.

Standard

Steering wheel play : Refer to [ST-56, "Steering Wheel Axial End Play and Play"](#).

4. Check the following items when steering wheel play is out of the standard.
 - Check backlash for each joint of steering column assembly.
 - Check installation condition of steering gear assembly.

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STEERING WHEEL

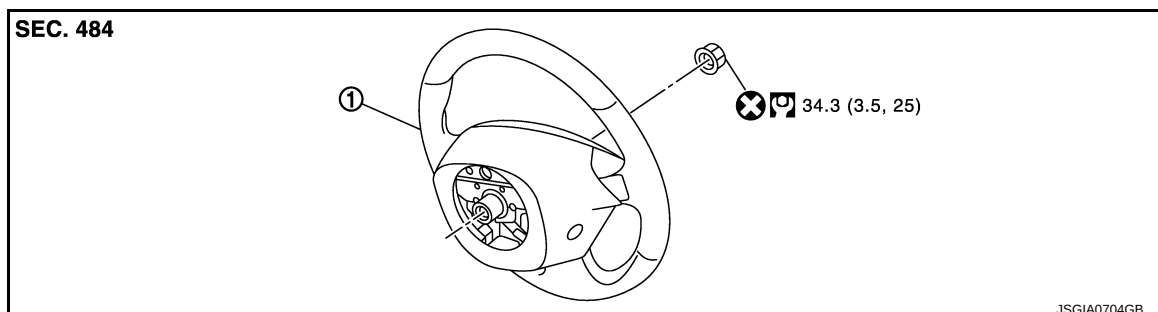
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:000000008461730



1. Steering wheel

Refer to [GI-4, "Components"](#) for symbols in the figure.

Removal and Installation

INFOID:000000008461731

REMOVAL

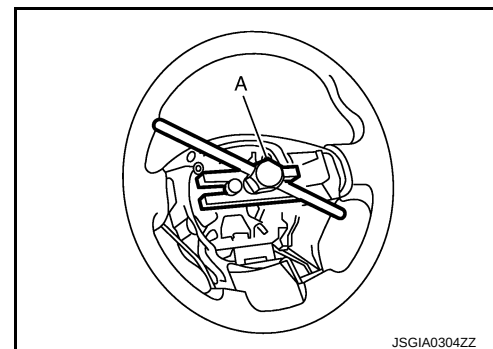
NOTE:

When reconnecting spiral cable, fix cable with a tape so that fixing case and rotating part keep aligned. This will omit neutral position alignment procedure during spiral cable installation.

1. Set the vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-11, "Removal and Installation"](#).
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller (A) [SST: ST27180001 (J-25726-A)].

NOTE:

Put paint marks on the steering wheel and the column shaft head for supporting accurate positioning during the installation procedure.



INSTALLATION

Note the following, and install in the reverse order of removal.

- Check the spiral cable neutral position after replacing or rotating spiral cable. Refer to [SR-14, "Removal and Installation"](#).

CAUTION:

Never twist spiral cable freely on excessively after it becomes tight (doing so may cause the cable to tear off).

- Never reuse steering wheel lock nut.

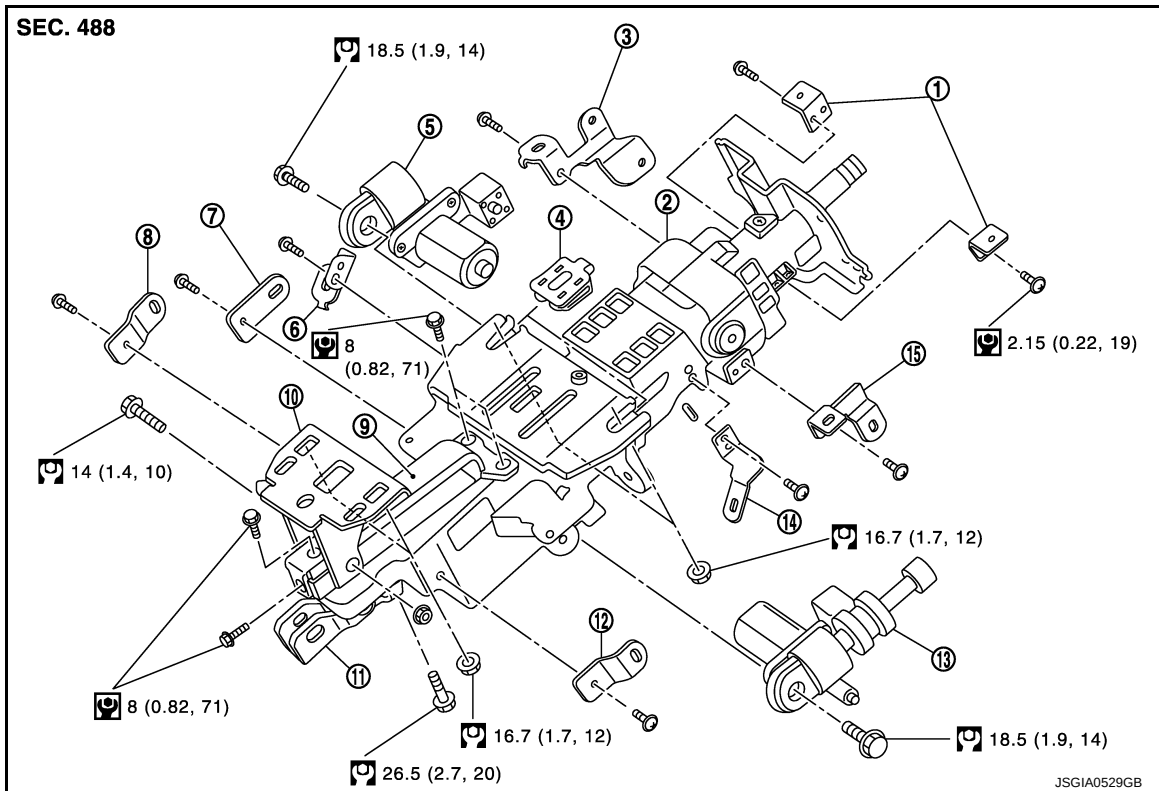
STEERING COLUMN

< REMOVAL AND INSTALLATION >

STEERING COLUMN

Exploded View

INFOID:000000008461732



- | | | |
|-------------------------|-----------------------------|------------------|
| 1. Bracket | 2. Steering column assembly | 3. Bracket |
| 4. Clip | 5. Tilt motor | 6. Bracket |
| 7. Bracket | 8. Bracket | 9. Slide bracket |
| 10. Lower mount bracket | 11. Upper joint | 12. Bracket |
| 13. Telescopic motor | 14. Bracket | 15. Bracket |

Refer to [GI-4, "Components"](#) for symbols in the figure.

Removal and Installation

INFOID:000000008461733

REMOVAL

1. Set the vehicle to the straight-ahead position.
2. Place the tilt to the highest level. Place the telescopic to the longest level.
3. Remove driver air bag module. Refer to [SR-11, "Removal and Installation"](#).
4. Remove steering wheel. Refer to [ST-30, "Exploded View"](#).
5. Remove instrument driver lower panel. Refer to [IP-12, "Exploded View"](#).
6. Remove steering column cover. Refer to [IP-12, "Exploded View"](#).
7. Remove spiral cable. Refer to [SR-14, "Removal and Installation"](#).
8. Remove cluster lid A. Refer to [IP-12, "Exploded View"](#).

STEERING COLUMN

< REMOVAL AND INSTALLATION >

9. Remove knee protector (1).

← : Bolt

10. Disconnect each switch harness connectors installed to steering column assembly.
11. Remove the upper joint mounting bolt and nut (lower shaft side), and separate the upper joint from lower shaft.

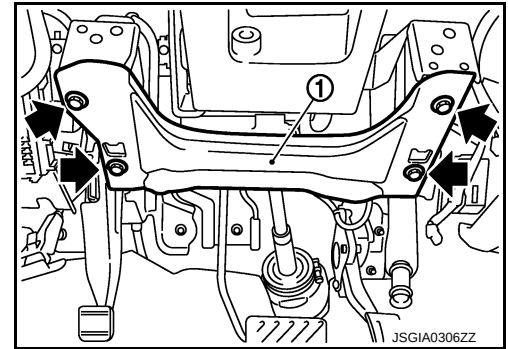
CAUTION:

When removing upper joint, never insert a tool, such as a screwdriver, into the yoke groove to pull out the upper joint. In case of the violation of the above, replace upper joint with a new one.

12. Remove steering column assembly.

CAUTION:

- Never give axial impact to steering column assembly during removal.
- Never move steering gear assembly when removing steering column assembly.



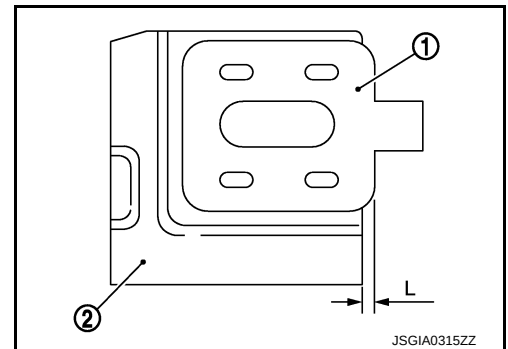
INSTALLATION

Note the following, and install in the reverse order of removal.

- Install the slide plate (1) and steering column housing (2) so that the mounting dimensions (L) is within the specified range as described below.

Standard

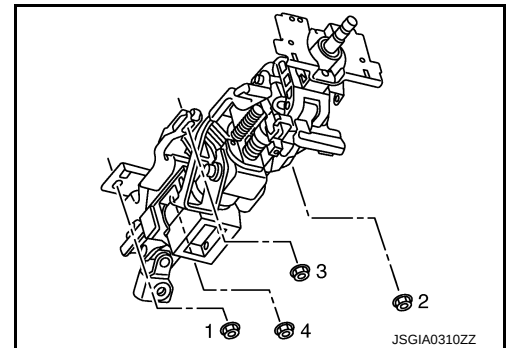
L : 2.0 mm (0.079 in) or less



- Tighten the mounting bolts in the order shown in the figure when installing the steering column assembly.
- Be careful of the following points when installing the steering column assembly.

CAUTION:

- Never give axial impact to steering column assembly during installation.
- Never move steering gear assembly.
- Never reuse the joint mounting nut (lower shaft side).
- Adjust neutral position of steering angle sensor. Refer to [BRC-31, "Work Procedure"](#).



Inspection

INFOID:000000008461734

INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if necessary.
- Measure steering column assembly rotating torque using a preload gauge [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if outside the standard.

Standard

Rotating torque : Refer to [ST-56, "Steering Column Operating Range"](#).

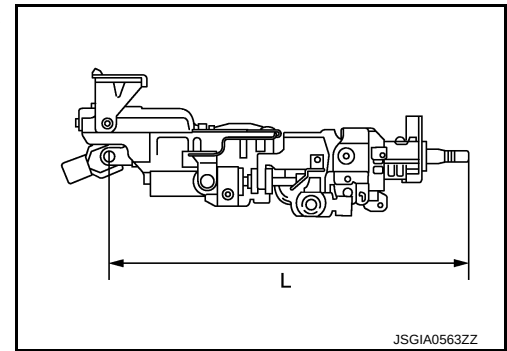
STEERING COLUMN

< REMOVAL AND INSTALLATION >

- Measure the length (L) as shown, if vehicle has been involved in a minor collision. Replace steering column assembly if out side the standard.

Standard

Steering column length (L) : Refer to [ST-56, "Steering Column Length"](#).

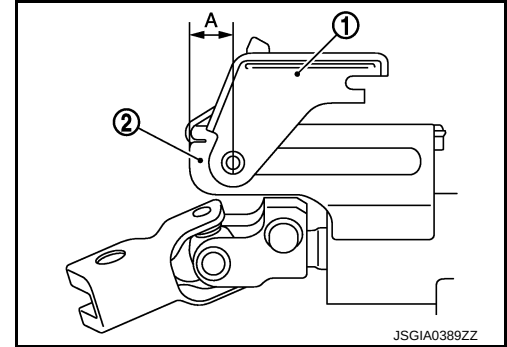


JSGIA0563ZZ

- Install the bracket (1) and steering column housing (2) so that the clearance (A) is within the specified range as described below. Replace steering column assembly if out side the standard.

Standard

Mounting dimensions (A) : Refer to [ST-56, "Steering Column Mounting Dimensions"](#).



JSGIA0389ZZ

INSPECTION AFTER INSTALLATION

- Check each part of steering column assembly for damage or other malfunctions. Replace if necessary.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-29, "Inspection"](#).
- Check tilt and telescopic mechanism operating range tilt operating range (T), telescopic operating range (L) as shown in the figure.

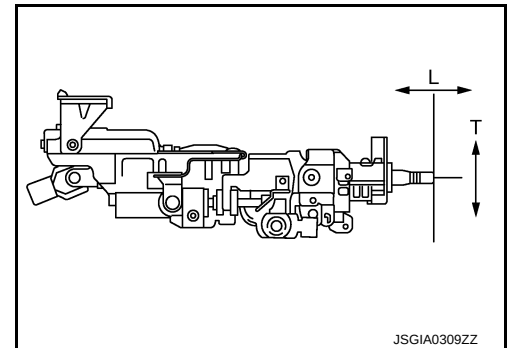
Standard

Tilt operating range (T)

: Refer to [ST-56, "Steering Column Operating Range"](#).

Telescopic operating range (L)

: Refer to [ST-56, "Steering Column Operating Range"](#).



JSGIA0309ZZ

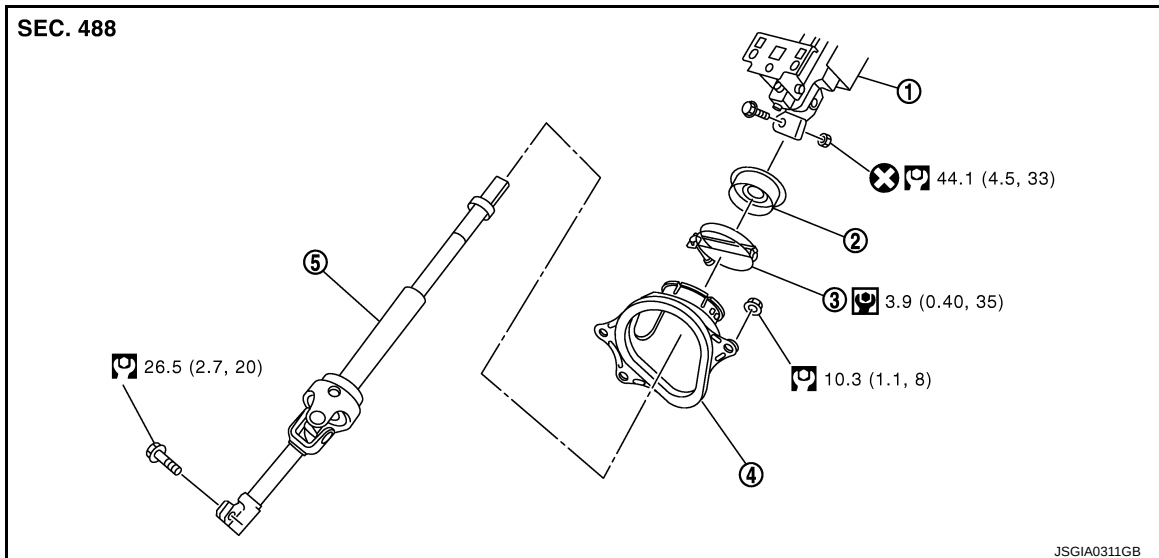
LOWER SHAFT

< REMOVAL AND INSTALLATION >

LOWER SHAFT

Exploded View

INFOID:000000008461735



- | | | |
|-----------------------------|--------------------|----------|
| 1. Steering column assembly | 2. Hole cover seal | 3. Clamp |
| 4. Hole cover | 5. Lower shaft | |

Refer to [GI-4, "Components"](#) for symbols in the figure.

Removal and Installation

INFOID:000000008461736

REMOVAL

1. Set the vehicle to the straight-ahead position.
2. Fix the steering wheel.
3. Remove upper joint fixing bolt and nut (lower shaft side).
4. Separate the lower shaft from the upper joint by sliding the slide shaft (A: sliding range).

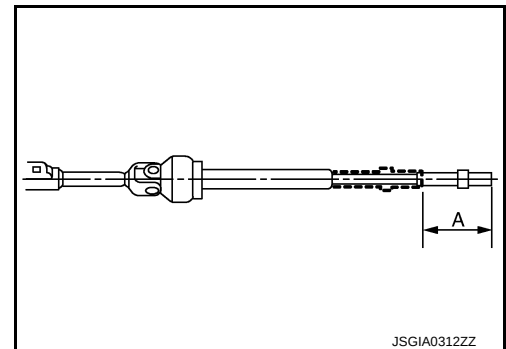
CAUTION:

- Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering column assembly. Be sure to secure steering wheel using string to avoid turning.
- When removing upper joint, never insert a tool, such as a screwdriver, into the yoke groove to pull out the upper joint. In case of the violation of the above, replace upper joint with a new one.

5. Remove the accelerator pedal bracket and lever assembly. Refer to [ACC-3, "Exploded View"](#).
6. Remove the side brake pedal bracket and wire clamp stay.
7. Remove the hole cover mounting nuts.
8. Remove the hole cover seal, clamp and hole cover.
9. Remove lower shaft joint fixing bolt (steering gear side).
10. Remove the lower shaft from steering gear assembly.

CAUTION:

- Place a matching mark on both lower shaft and steering gear assembly before removing lower shaft.



LOWER SHAFT

< REMOVAL AND INSTALLATION >

- When removing lower shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the lower shaft. In case of the violation of the above, replace lower shaft with a new one.

INSTALLATION

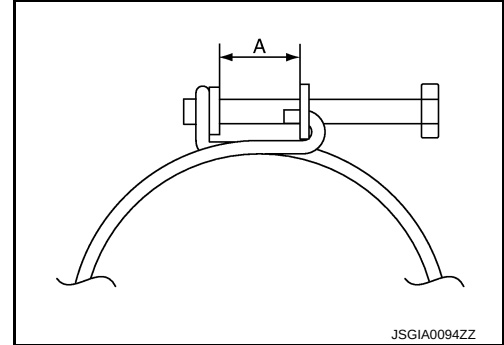
Note the following, and install in the reverse order of removal.

CAUTION:

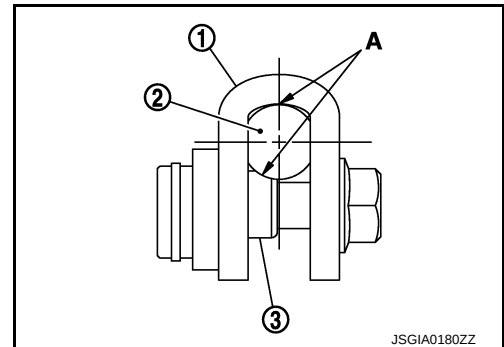
Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Be sure to secure steering wheel using string to avoid turning.

- Tighten the clamp to the specified torque and check the clamp length (A).

Clamp length "A" : 14.0 – 18.0 mm (0.551 – 0.709 in)



- After lower shaft (steering gear side) fitted, make sure there is not gap (A) between the yoke (1), lower shaft (2), joint fixing bolt (3).



- When installing lower joint to steering gear assembly, follow the procedure listed below.
- Set rack of steering gear in the neutral position.

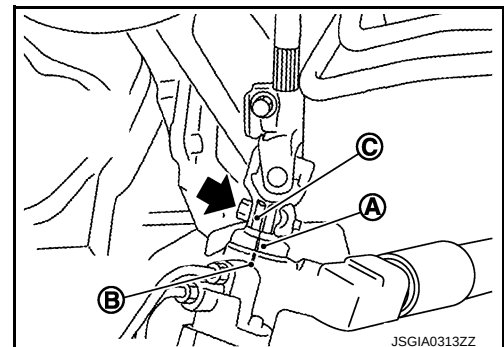
NOTE:

To get the neutral position of rack, turn gear-sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.

- Align rear cover cap projection (A) with the marking position of gear housing assembly (B).

← : Bolt

- Install slit part of lower joint (C) aligning with the rear cover cap projection (A). Make sure that the slit part of lower joint (C) is aligned with rear cover cap projection (A) and the marking position of gear housing assembly (B).
- Adjust neutral position of steering sensor. Refer to [BRC-31, "Work Procedure"](#).
- Check the following after installation:
 - Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
 - Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-29, "Inspection"](#).



LOWER SHAFT

< REMOVAL AND INSTALLATION >

Inspection

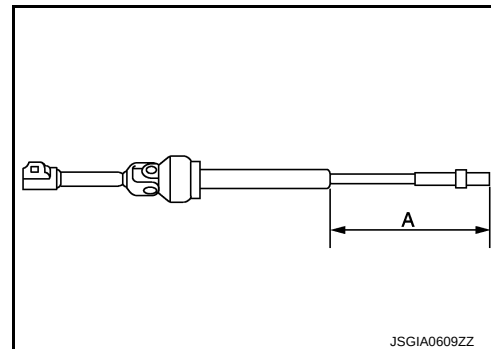
INFOID:000000008461737

- Check the length (A) (extended position) of the lower shaft.

Standard

Lower shaft length (A) : Refer to [ST-57, "Lower Shaft Length"](#).

- Check each part of lower shaft for damage or other malfunctions. Replace if there are.



STEERING GEAR AND LINKAGE

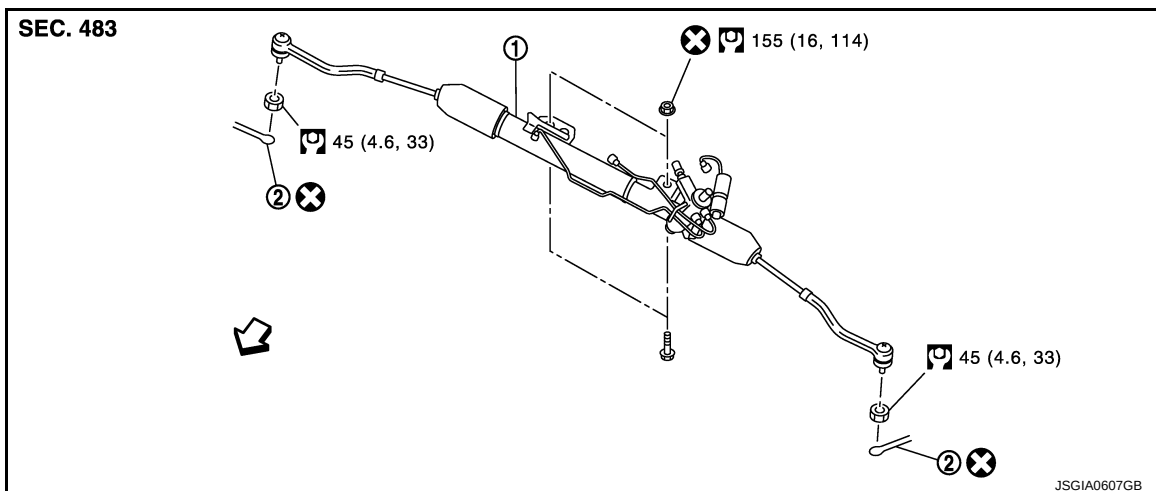
< REMOVAL AND INSTALLATION >

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000008461738

REMOVAL

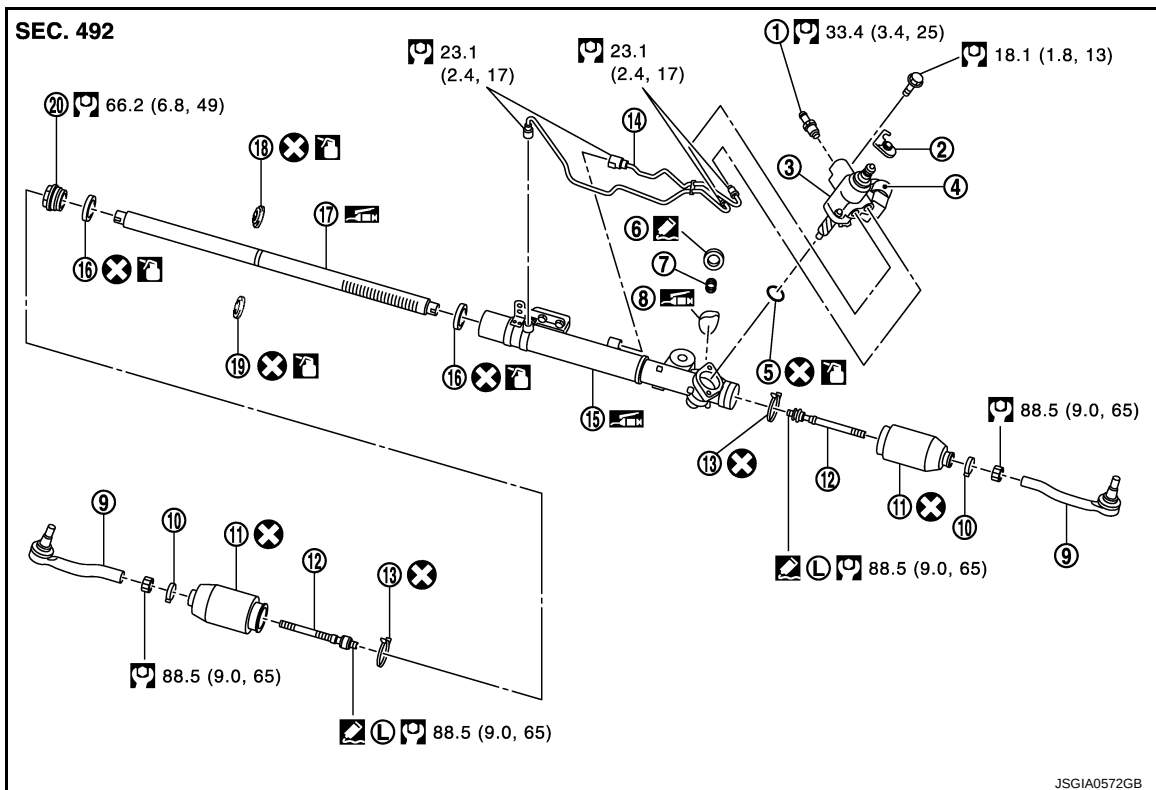


1. Steering gear assembly
2. Cotter pin

←: Vehicle front

Refer to [GI-4, "Components"](#) for symbols in the figure.

DISASSEMBLY



1. Low pressure piping
2. Rear cover cap
3. Gear-sub assembly
4. Power steering solenoid valve
5. O-ring
6. Adjusting screw
7. Spring
8. Retainer
9. Outer socket

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

- | | | |
|---------------------------------|------------------------|---------------------------|
| 10. Boot clamp | 11. Boot | 12. Inner socket |
| 13. Boot clamp (stainless wire) | 14. Cylinder tube | 15. Gear housing assembly |
| 16. Rack oil seal | 17. Rack assembly | 18. Rack Teflon ring |
| 19. O-ring | 20. End cover assembly | |

: Apply power steering fluid.

 (L): Apply Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).

: Apply Genuine High Performance Thread Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).

: Apply multi-purpose grease.

Refer to [GI-4, "Components"](#) for symbols not described on the above.

Removal and Installation

INFOID:000000008461739

REMOVAL

- Set the vehicle to the straight-ahead position.
- Remove front road wheel and tires.
- Remove splash guards (RH and LH). Refer to [EXT-26, "FENDER PROTECTOR : Exploded View"](#).
- Remove engine under cover. Refer to [EXT-29, "Exploded View"](#).
- Remove exhaust front tube. Refer to [EX-5, "Exploded View"](#).
- Separate the rear propeller shaft (front side). Refer to [DLN-79, "Exploded View"](#).
- Remove heat insulator from front floor.
- Remove cotter pin (1), and then loosen the nuts.

- Remove steering outer socket (2) from steering knuckle (3) so as not to damage ball joint boot (4) using a ball joint remover (commercial service tool).

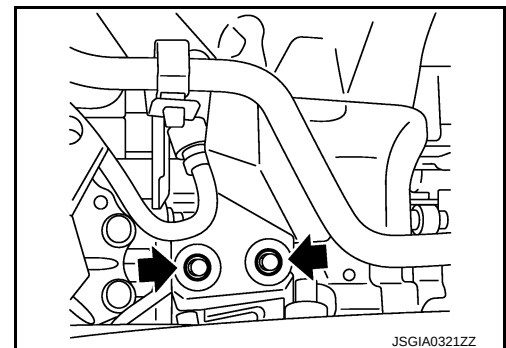
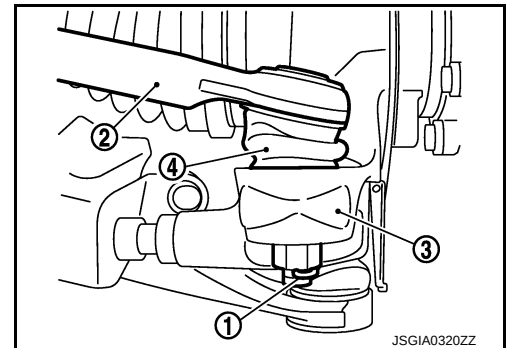
CAUTION:

Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover from suddenly coming off.

- Remove high pressure piping and low pressure hose of hydraulic piping, and then drain power steering fluid.

- Remove steering hydraulic piping bracket from front steering gear assembly.

 : Bolt



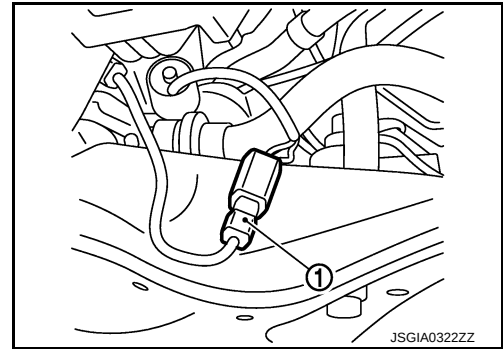
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

12. Remove power steering solenoid valve harness connector (1) and harness clip.
13. Remove lower joint fixing bolt (steering gear side).
14. Separate the lower shaft from the steering gear assembly by sliding the slide shaft.

CAUTION:

- Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Be sure to secure steering wheel using string to avoid turning.
- Place a matching mark on both lower shaft and steering gear assembly before removing lower shaft.
- When removing lower shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the lower shaft. In case of the violation of the above, replace lower shaft with a new one.



15. Remove the stabilizer assembly. Refer to [FSU-14, "Exploded View"](#).
16. Support front suspension member with a suitable jack.
17. Remove engine mounting insulator (rear) mounting bolt (lower side). Refer to [EM-67, "Exploded View"](#).
18. Remove engine mounting insulator (LH). Refer to [EM-67, "Exploded View"](#).
19. Remove the mounting bolts and nuts of steering gear assembly.
20. Remove member stay, front suspension member fixing bolts and nuts. Refer to [FSU-16, "Exploded View"](#).
21. Lower the suitable jack for the front suspension member to the steering gear assembly can be removed.

INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Be sure to secure steering wheel using string to avoid turning.

- When installing low pressure hose (1), refer to the figure.

CAUTION:

- Never apply fluid to the hose (1) and tube (2).
- Insert hose securely until it contacts spool (A) of tube.
- Leave clearance (L) when installing clamp (3).

Standard

L

: 3 – 8 mm (0.12 – 0.31 in)

- When installing lower joint to steering gear assembly, follow the procedure listed below.
- Set rack of steering gear in the neutral position.

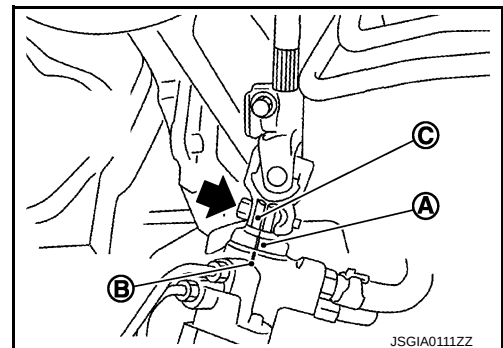
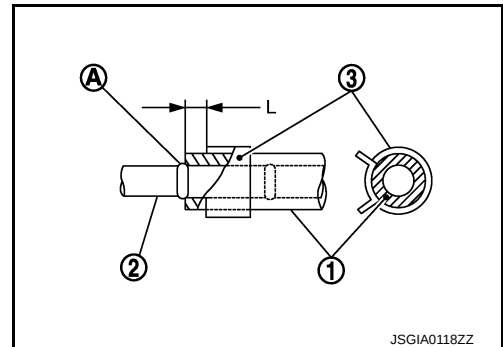
NOTE:

To get the neutral position of rack, turn gear-sub assembly and measure the distance of inner socket, and then measure the intermediate position of the distance.

- Align rear cover cap projection (A) with the marking position of gear housing assembly (B).

← : Bolt

- Install slit part of lower joint (C) aligning with the rear cover cap projection (A). Make sure that the slit part of lower joint (C) is aligned with rear cover cap projection (A) and the marking position of gear housing assembly (B).
- After installation, bleed air from the steering hydraulic system. Refer to [ST-27, "Inspection"](#).
- Perform final tightening of nuts and bolts on each part under unladen conditions with tires on level ground when removing steering gear assembly. Check wheel alignment. Refer to [FSU-7, "Inspection"](#).
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to [BRC-31, "Work Procedure"](#).



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

Disassembly and Assembly

INFOID:000000008461740

DISASSEMBLY

1. Remove low pressure piping.

CAUTION:

- Disassemble and assemble steering gear assembly by fixing the mounting area with a vise using copper plates.
- Clean steering gear assembly with kerosene before disassembling. Be careful to avoid splashing or applying any kerosene over connector of discharge port or return port.

2. Remove cylinder tubes from gear housing assembly.
3. Remove rear cover cap from gear-sub assembly.
4. Measure adjusting screw height "H", and loosen adjusting screw.

CAUTION:

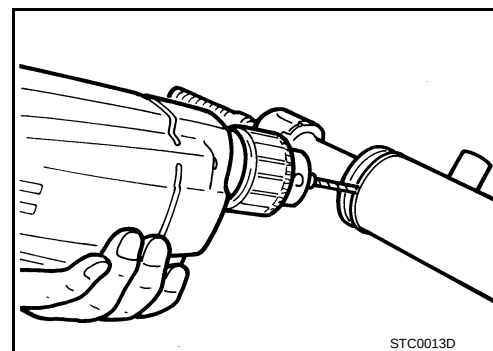
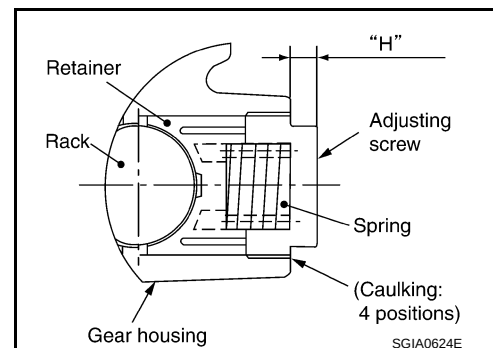
- Never loosen adjusting screw 2 turns or more.
- Replace steering gear assembly if adjusting screw is loosened 2 turns or more and it is removed.

5. Remove gear-sub assembly from gear housing assembly.
6. Remove O-ring from gear housing assembly.
7. Loosen outer socket lock nut, and remove outer socket.
8. Remove boot clamps, and then remove boot from inner socket.

CAUTION:

Never damage inner socket and gear housing assembly when removing boot. Inner socket and gear housing assembly must be replaced if inner socket and gear housing assembly are damaged because it may cause foreign material interfusion.

9. Remove inner socket from gear housing assembly.
10. Drill out the clinching part of gear housing assembly (end cover assembly side) outer rim with a 3 mm (0.12 in) drill bit. [Drill for approximately 1.5 mm (0.059 in) depth.]



11. Remove end cover assembly with a 36 mm (1.42 in) open head (commercial service tool).

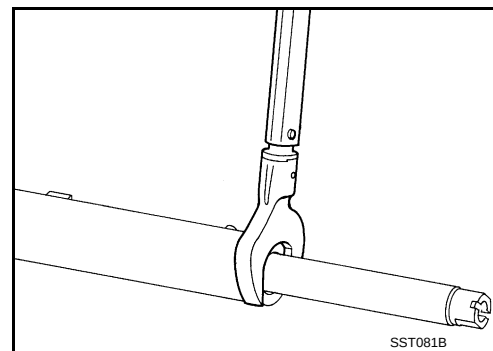
CAUTION:

Never damage rack assembly surface when removing. Rack assembly must be replaced if damaged because it may cause fluid leakage.

12. Pull rack assembly together with rack oil seal (outer side) out from gear housing assembly.

CAUTION:

Never damage cylinder inner wall when remove rack assembly. Gear housing assembly must be replaced if damaged because it may cause fluid leakage.



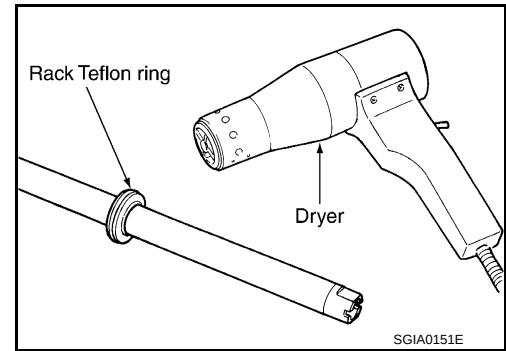
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

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

CAUTION:

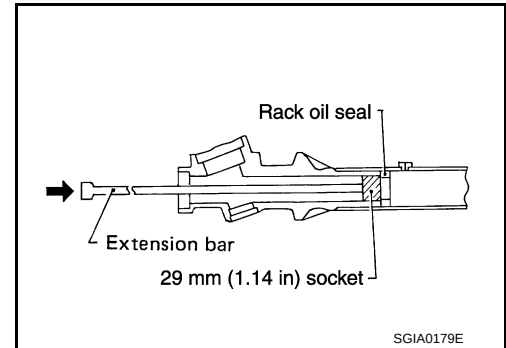
Never damage rack assembly. Rack assembly must be replaced if damaged because it cause fluid leakage.



- Push rack oil seal inside with a 29 mm (1.14 in) socket and an extension bar to push out rack oil seal (inner side) from gear housing assembly.

CAUTION:

Never damage gear housing assembly and cylinder inner wall. Gear housing assembly must be replaced if damaged because it may cause fluid leakage.



ASSEMBLY

- Apply recommended fluid to O-ring. Put an O-ring into a rack Teflon ring.

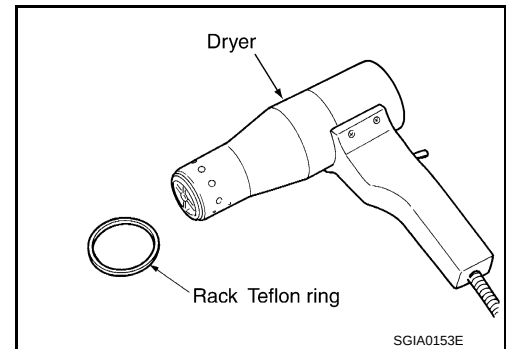
CAUTION:

Never reuse O-ring.

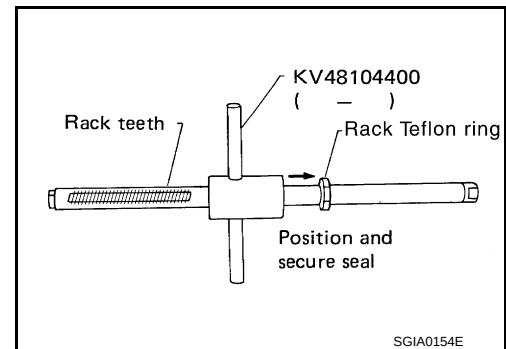
- Heat rack Teflon ring to approximately 40°C (104°C) with a dryer. Assemble it to mounting groove of rack assembly.

CAUTION:

Never reuse rack Teflon ring.



- Install the rack Teflon ring correcting tool [SST: KV48104400 (—)] from tooth side of rack fit rack Teflon ring on rack. Compress the with tool.



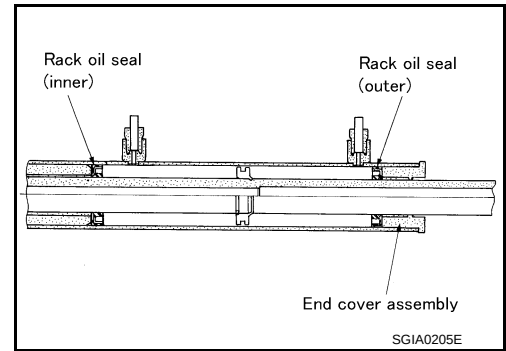
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

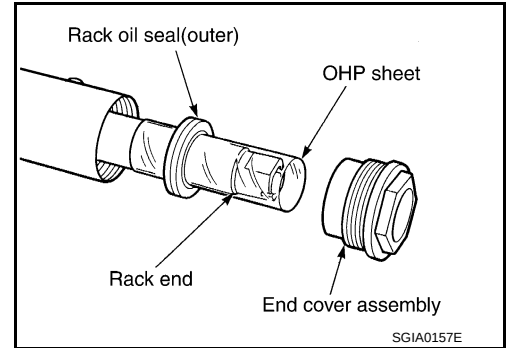
4. Apply recommended grease to rack oil seal, and then install rack oil seal in the following procedure. Then assemble rack assembly to gear housing assembly.

CAUTION:

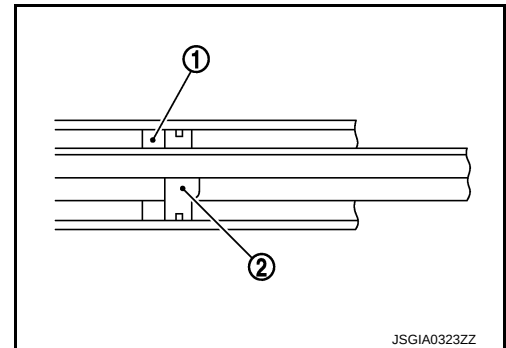
- Install rack oil seal in a direction so that the lip of inner oil seal and the lip of outer oil seal face each other.
- Never damage retainer sliding surface by rack assembly. Replace gear housing assembly if damaged.
- Never damage gear housing assembly inner wall by rack assembly. Gear housing assembly must be replaced if damaged because it may cause fluid leakage.



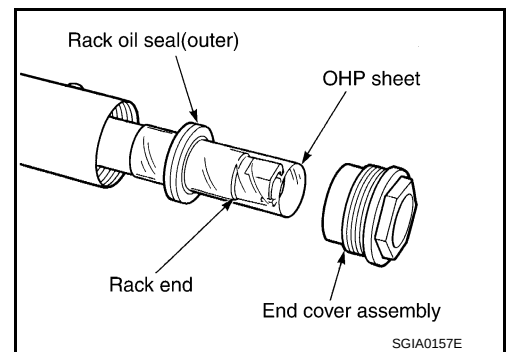
- a. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in)]. Around rack assembly teeth to avoid damaging rack oil seal (inner). Install rack oil seal over sheet. Then, pull OHP sheet along with rack oil seal until they pass rack assembly teeth, and remove OHP sheet.



- b. Insert rack oil seal (inner) (1) into rack assembly piston (2).
- c. Push retainer to adjusting screw side by hand, and move the rack assembly inside the gear housing assembly so that the rack oil seal (inner) can be pressed against the gear housing assembly.



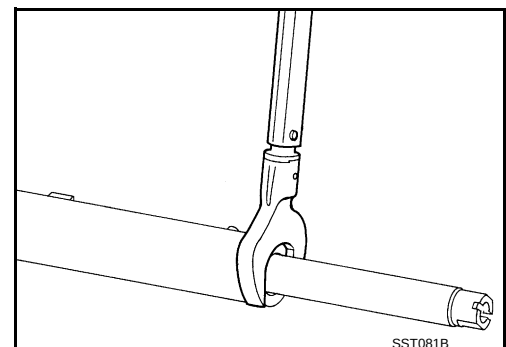
- d. Wrap an OHP sheet [approximately 70 mm (2.76 in) × 100 mm (3.94 in)]. Around the edge to avoid damaging rack oil seal (outer). Install rack oil seal over sheet. Then, pull oil seal along with OHP sheet until they pass rack edge, and remove OHP sheet.
- e. Install end cover assembly to rack edge, and move rack oil seal (outer) until it contacts with gear housing assembly.



5. Tighten end cover assembly to specified torque using a 36 mm (1.42 in) open head (commercial service tool).

CAUTION:

Never damage rack assembly. Replace it if damaged because it may cause fluid leakage.



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

6. Crimp gear housing assembly at one point using a punch as shown in the figure so as to prevent end cover assembly from getting loose after tightening end cover assembly.
7. Apply recommended fluid to O-ring, and then install O-ring to gear housing assembly.
8. Install gear-sub assembly to gear housing assembly.

CAUTION:

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

9. Install inner socket to gear housing assembly with the following procedure.
 - a. Apply thread sealant into the thread of inner socket.
Use Genuine Medium Strength Thread Locking Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).
 - b. Screw inner socket into rack part and tighten at the specified torque.
10. Decide on the neutral position of the rack stroke (L).

Standard

Rack stroke neutral position (L) : Refer to [ST-57, "Rack Stroke"](#).

11. Install rear cover cap to gear sub-assembly.

CAUTION:

Make sure that the projection of rear cover cap is aligned with the marking position of gear housing assembly.

12. Apply recommended thread locking sealant to the thread (2 turns thread), and then screw in the adjusting screw until it reaches height "H" from gear housing assembly measured before disassembling.

Use Genuine High Performance Thread Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).

13. Move rack assembly 10 strokes throughout the full stroke so that the parts can fit with each other.

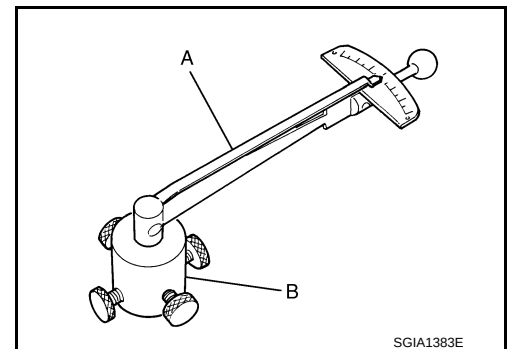
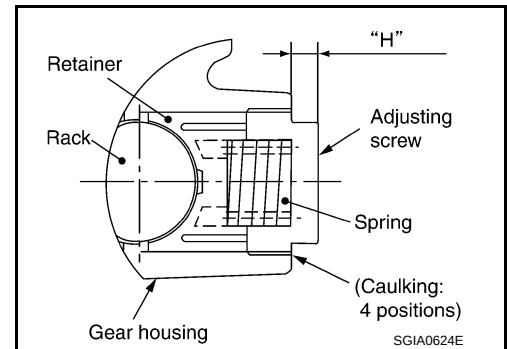
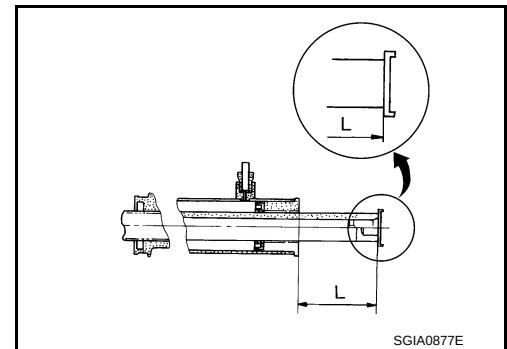
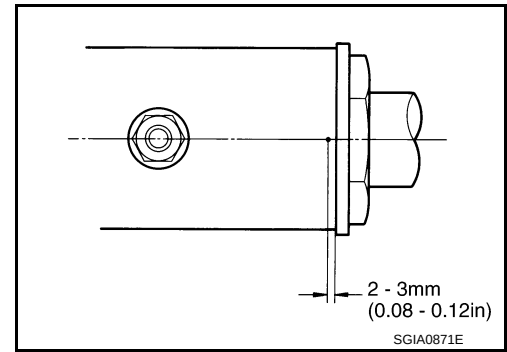
14. Adjust pinion rotating torque with the following procedure.

- a. Measure pinion rotating torque within $\pm 180^\circ$ of neutral position of the rack assembly using Tools. Stop the gear at the point where highest torque is read.

A: Preload gauge [SST: ST3127S000 (J-25765-A)]

B: Preload adapter [SST: KV48103400 (—)]

- b. Loosen adjusting screw and retighten to 5.4 N·m (0.55 kg·m, 48 in·lb), and then loosen by 20 to 40°.



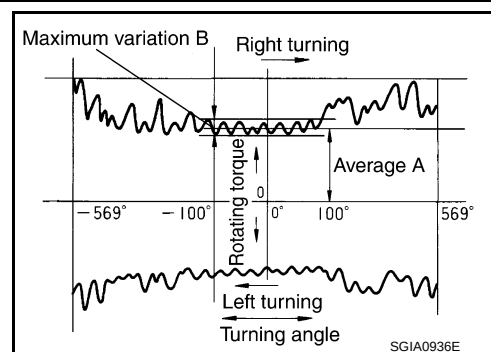
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

- c. Measure pinion rotating torque using Tools to make sure that the measured value is within the standard. Readjust if the value is outside the standard. Replace steering gear assembly, if the value is outside the standard after readjusting, or adjusting screw rotating torque is 5 N·m (0.51 kg-m, 44 in-lb) or less.

Pinion rotating torque

Around neutral position : 1.59 – 2.0 N·m (0.17 – 0.20 kg-m, 14 – 17 in-lb)
(within ±100°) average (A)
Maximum variation (B) : 0.39 N·m (0.04 kg-m, 3.0 in-lb)



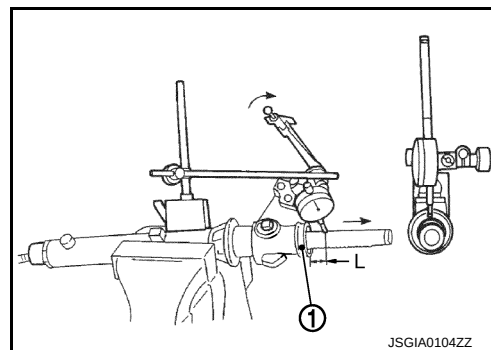
- d. Apply recommended liquid gasket to inner socket and turn pinion fully to left with inner socket installed to gear housing assembly.
- e. Install dial gauge at 5 mm (0.20 in) (L) from the edge of gear housing assembly (1), and tooth point.
- f. Measure vertical movement of rack assembly when pinion is turned clockwise with torque of 19.6 N·m (2.0 kg-m, 14 ft-lb). Readjust adjusting screw angle if the measured value is outside the standard.

Vertical movement : 0.265 mm (0.0104 in)

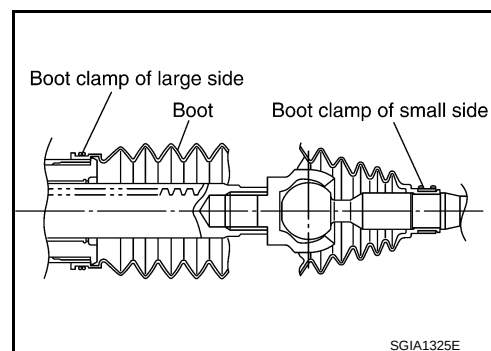
- If reading is outside of the specification, readjust screw angle with adjusting screw.

CAUTION:

- If reading is still outside of specification, or if the rotating torque of adjusting screw is less than 5 N·m (0.51 kg-m, 44 in-lb), replace steering gear assembly.
- Never turn adjusting screw more than twice.
- Replace steering gear assembly when adjusting screw is removed or turned more than twice.



15. Install large end of boot to gear housing assembly.
16. Install small end of boot to inner socket boot mounting groove.
17. Install boot clamp to boot small end.



18. Install boot clamp to the large side of boot with the following procedure.

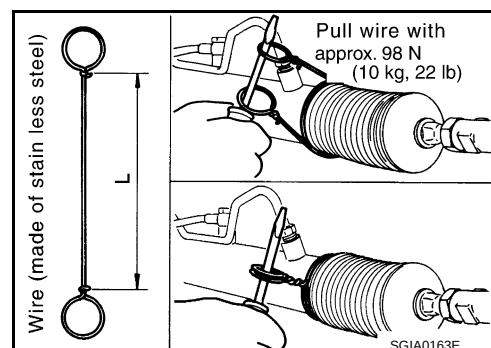
CAUTION:

Never reuse boot clamp.

- a. Tighten large side of boot with boot clamp (stainless wire).

Wire length (L) : 370 mm (14.57 in)

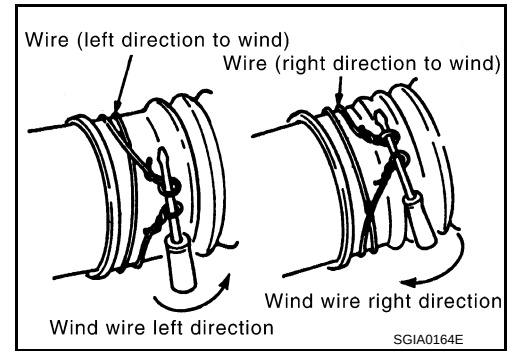
- b. Wrap clamp around boot groove for two turns. Insert a flat-bladed screwdriver in loops on both ends of wire. Twist 4 to 4.5 turns while pulling them with force of approximately 98 N (10 kg, 22 lb).



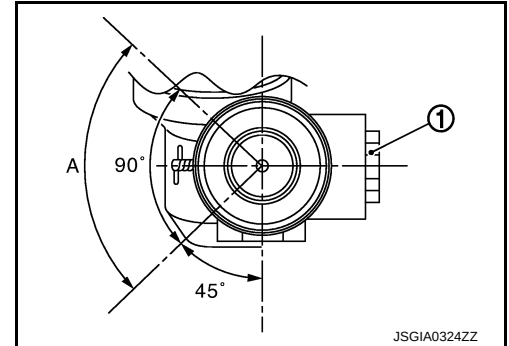
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

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



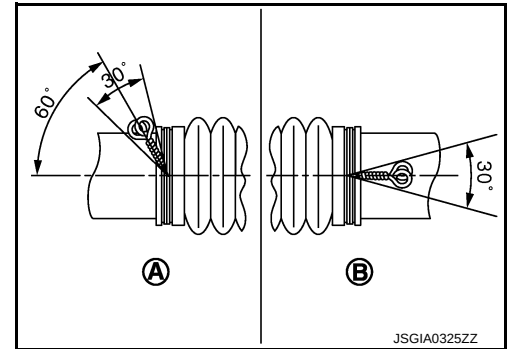
- d. Twisted area (A) of clamp is in the opposite side of adjusting screw (1) as shown in the figure (to prevent contact with other parts).



- e. Bent cut end of the wire toward rack axial as shown in the figure after twisting the wire 4 to 4.5 turns so that cut end does not contact with boot.

- A : Gear housing RHD side
B : Gear housing LHD side

19. Install cylinder tubes to gear housing assembly.
20. Install low pressure piping.



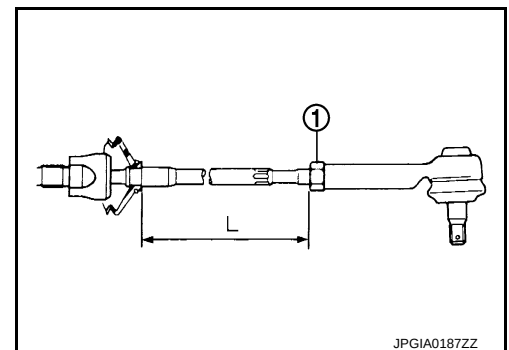
21. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Standard

Inner socket length (L) : Refer to [ST-57, "Inner Socket Length"](#).

CAUTION:

Adjust toe-in after this procedure. The length achieved after toe-in adjustment is not necessary the above value.



INFOID:000000008461741

Inspection

INSPECTION AFTER DISASSEMBLY

Boot

Check boot for cracks, and replace it if a malfunction is detected.

Rack Assembly

Check rack for damage or wear, and replace it if a malfunction is detected.

Gear-Sub Assembly

- Check gear-sub assembly for damage or wear, and replace it if a malfunction is detected.
- Rotate gear-sub assembly and check for torque variation or rattle, and replace it if a malfunction is detected.

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

Gear Housing Assembly

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

Outer Socket and Inner Socket

Check the following items and replace the component if it does not meet the standard.

BALL JOINT SWINGING TORQUE

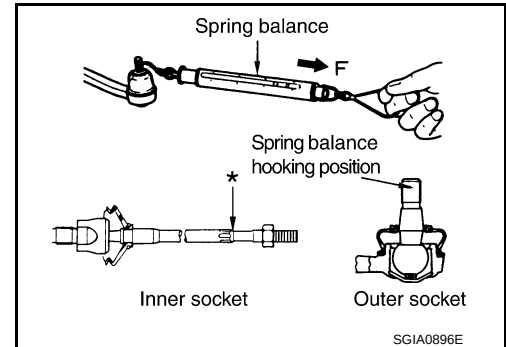
Hook a spring balance at the point shown in the figure and pull the spring balance. Make sure that the spring balance reads the specified value when ball stud and inner socket start to move. Replace outer socket and inner socket if they are outside the standard.

Standard

(Measuring point of outer socket: Stud cotter pin mounting hole)

Outer socket

: Refer to [ST-57, "Socket Swing Force and Rotating Torque"](#).



Standard

(Measuring point of inner socket: "*" mark shown in the figure)

Inner socket

: Refer to [ST-57, "Socket Swing Force and Rotating Torque"](#).

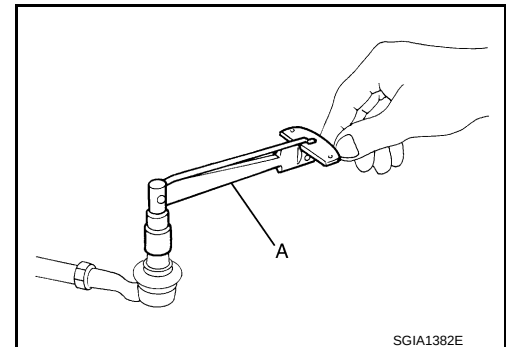
BALL JOINT ROTATING TORQUE

Make sure that the reading is within the following specified range using preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace outer socket if the reading is outside the specified value.

Standard

Rotating torque

: Refer to [ST-57, "Socket Swing Force and Rotating Torque"](#).



BALL JOINT AXIAL END PLAY

Apply an axial load of 490 N (50 kg, 110 lb) to ball stud. Using a dial gauge, measure amount of stud movement, and then make sure that the value is within the following specified range. Replace outer socket (1) and inner socket (2) if the measured value is outside the standard.

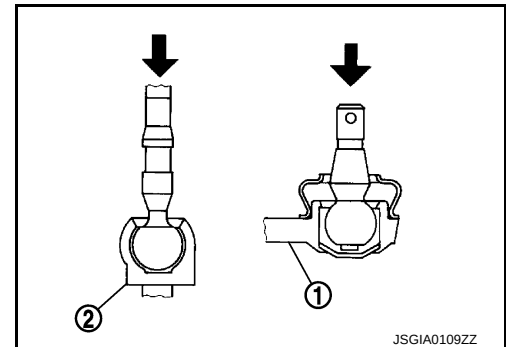
Standard

Outer socket

: Refer to [ST-57, "Socket Axial End Play"](#).

Inner socket

: Refer to [ST-57, "Socket Axial End Play"](#).



INSPECTION AFTER INSTALLATION

- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-29, "Inspection"](#).
- Check the fluid level, fluid leakage, and air bleeding hydraulic system. Refer to [ST-27, "Inspection"](#).

POWER STEERING OIL PUMP

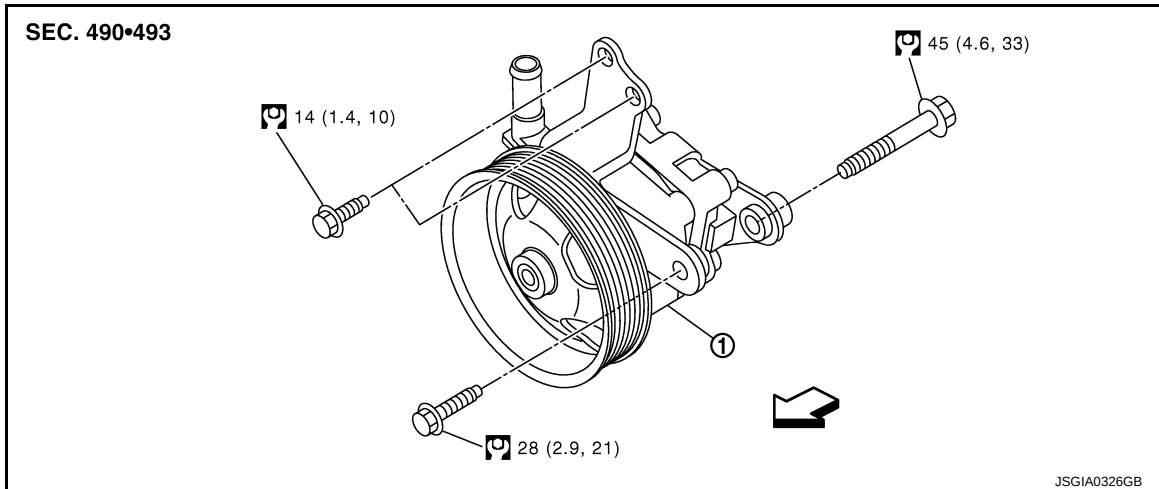
< REMOVAL AND INSTALLATION >

POWER STEERING OIL PUMP

Exploded View

INFOID:000000008461742

REMOVAL

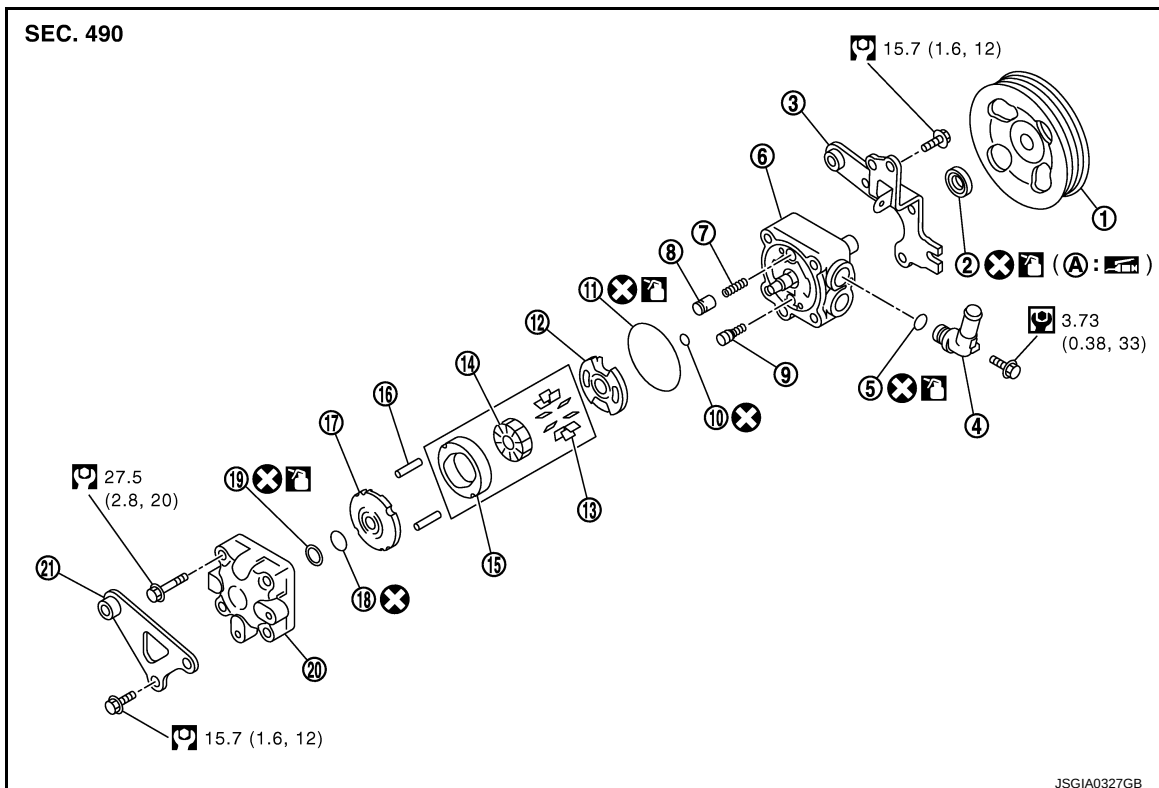


1. Power steering oil pump

⇐: Vehicle front

Refer to [GI-4, "Components"](#) for symbols in the figure.

DISASSEMBLY



- | | | |
|------------------------------|-----------------------|------------------------------------|
| 1. Pulley | 2. Oil seal | 3. Front bracket |
| 4. Suction pipe | 5. O-ring | 6. Body assembly |
| 7. Flow control valve spring | 8. Flow control valve | 9. Flow control valve sub assembly |

POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

- | | | |
|-----------------|---------------------|----------------------|
| 10. O-ring | 11. O-ring | 12. Front side plate |
| 13. Vane | 14. Rotor | 15. Cam ring |
| 16. Dowel pin | 17. Rear side plate | 18. O-ring |
| 19. Teflon ring | 20. Rear cover | 21. Rear bracket |
| A. Oil seal lip | | |

: Apply power steering fluid.

: Apply multi-purpose grease.

Refer to [GI-4, "Components"](#) for symbols not described on the above.

Removal and Installation

INFOID:000000008461743

REMOVAL

1. Drain power steering fluid from reservoir tank.
2. Remove front road wheel and tires.
3. Remove splash guard. Refer to [EXT-26, "FENDER PROTECTOR : Exploded View"](#).
4. Loosen drive belt. Refer to [EM-14, "Removal and Installation"](#).
5. Remove drive belt from oil pump pulley.
6. Remove copper washers and eye bolt (drain fluid from their pipings).
7. Remove suction hose (drain fluid from their pipings).
8. Remove oil pump mounting bolts, and then remove oil pump.

CAUTION:

Never damage drive shaft boot.

INSTALLATION

Note the following, and install in the reverse order of removal.

- When installing suction hoses (1), refer to the figure.

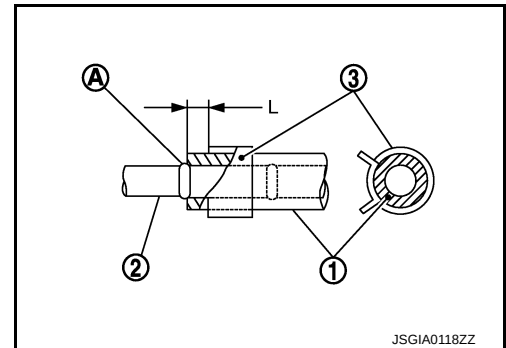
CAUTION:

- **Never apply fluid to the hose (1) and tube (2).**
- **Insert hose securely until it contacts spool (A) of tube.**
- **Leave clearance (L) when installing clamp (3).**

Standard

L

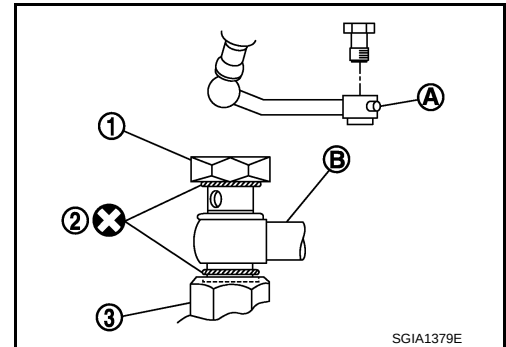
: 3 – 8 mm (0.12 – 0.31 in)



- When installing eye bolt (1) and copper washers (2) to oil pump (3), refer to the figure.

CAUTION:

- **Never reuse copper washer.**
- **Apply power steering fluid to around copper washer, then install eye bolt.**
- **Install eye bolt with eye joint (assembled to high pressure hose) (B) protrusion (A) facing with pump side cutout, and then tighten it to the specified torque after tightening by hand. Refer to [ST-53, "Exploded View"](#).**
- **Securely insert harness connector to pressure sensor.**
- Adjust belt tension. Refer to [EM-14, "Tension Adjustment"](#).
- Check fluid level, fluid leakage and air bleeding hydraulic system after the installation. Refer to [ST-27, "Inspection"](#).



Disassembly and Assembly

INFOID:000000008461744

DISASSEMBLY

1. Remove rear bracket.

POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

2. Remove rear cover mounting bolts, and then remove rear cover from body assembly.

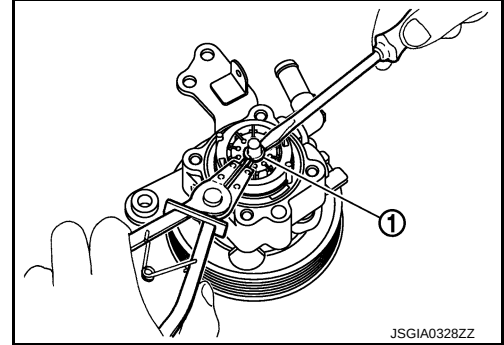
CAUTION:

- Fix oil pump with a vise if necessary.
- Use copper plates when fixing with a vise.

3. Remove O-ring from body assembly.
4. Remove rear side plate from cartridge, and then remove Teflon ring and O-ring from rear side plate.
5. Remove rotor snap ring (1) using a snap ring pliers, and remove cam ring, rotor and vane from body assembly.

CAUTION:

When removing the snap ring, never damage the pulley shaft.



6. Remove front side plate.
7. Remove cartridge, flow control valve (1), flow control valve spring (2) and flow control valve sub assembly (3) from body assembly (4).

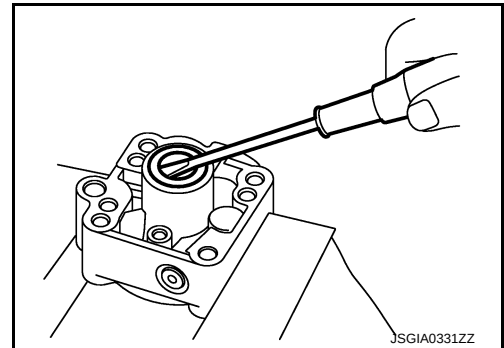
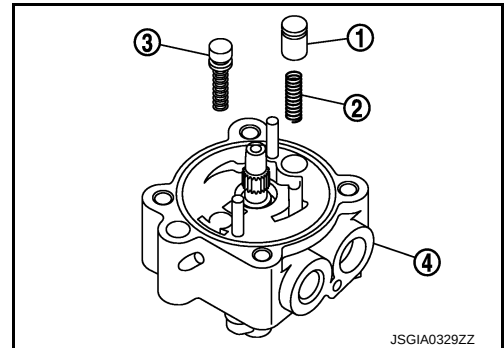
CAUTION:

Never drop and damage flow control valve and flow control valve sub assembly when removing.

8. Remove oil seal from body assembly.
9. Remove mounting bolt of suction pipe, and then remove suction pipe from body assembly.
10. Remove pulley from body assembly.
11. Remove front bracket from body assembly.
12. Remove oil seal from body assembly using a flat-bladed screwdriver.

CAUTION:

Never damage the body assembly.



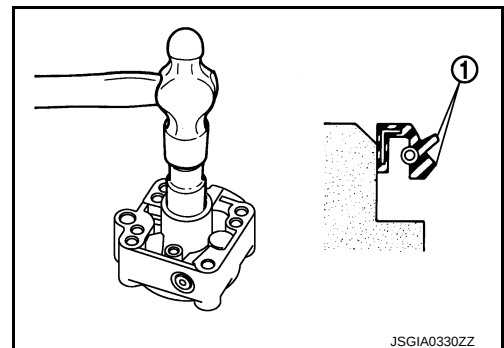
ASSEMBLY

1. Apply recommended grease to oil seal lips (1). Apply recommended fluid to around oil seal. Install oil seal to body assembly using a drift (commercial service tool).

CAUTION:

- Never reuse the oil seal.
- Fix oil pump with a vise if necessary.
- Use copper plates when fixing with a vise.

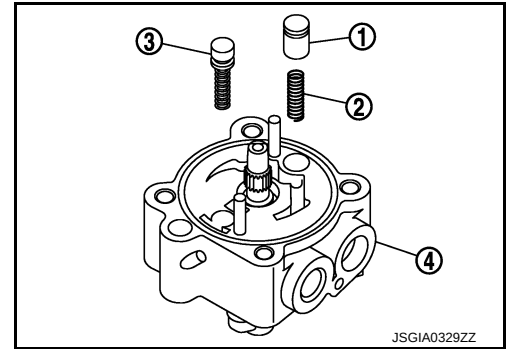
2. Install front bracket to body assembly.
3. Install pulley to body assembly.
4. If dowel pin has been removed, insert it into body assembly by hand. If it cannot be inserted by hand, lightly tap with a hammer.



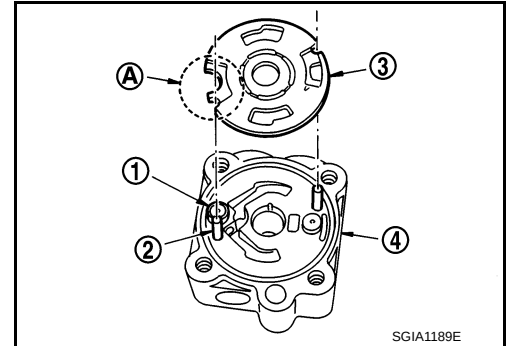
POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

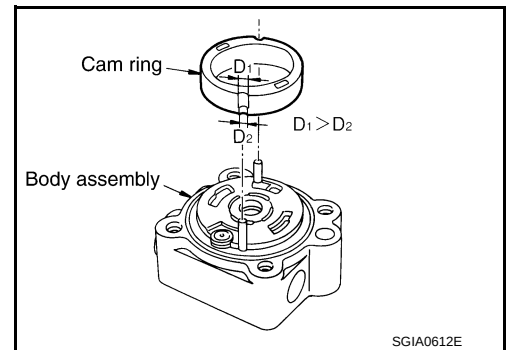
5. Install flow control valve (1), flow control valve spring (2) and flow control valve sub assembly (3) as shown in the figure to body assembly (4).



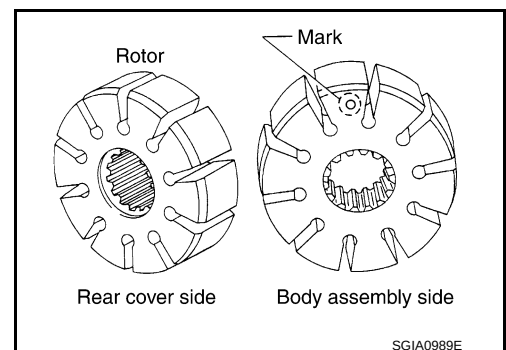
6. Install front side plate (3) with dowel pin (2) on flow control valve A (1) side as shown in the figure aligning with front side plate cutout (A) to body assembly (4).



7. Install cam ring as shown in the figure.



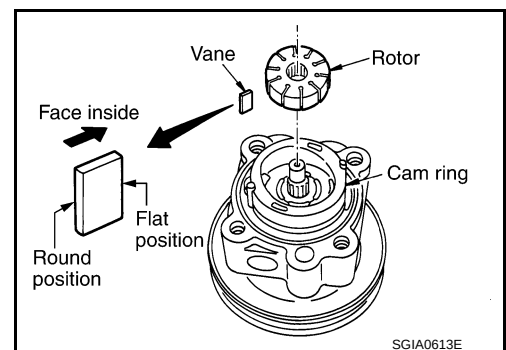
8. Install rotor so that mark faces body assembly, and then install it to pulley shaft.



9. Install vane to rotor so that arc of vane faces cam ring side.
10. Install rotor snap ring to slit of pulley shaft using a hammer and a drift (commercial service tool).

CAUTION:

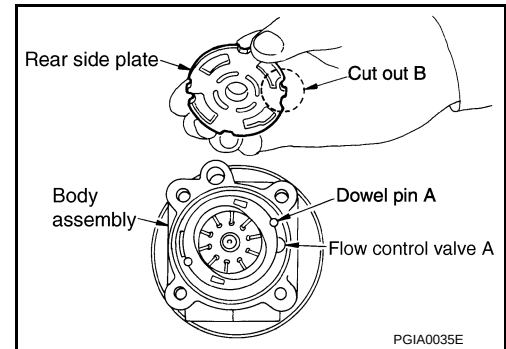
- Never damage rotor and pulley shaft.
- Oil pump assembly must be replaced if rotor is damaged.



POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

11. Install rear side plate with dowel pin A on flow control valve A side as shown in the figure aligning with rear side plate cutout B to cartridge.
12. Apply recommended fluid to O-ring, and then install O-ring to body assembly.
13. Apply recommended fluid to O-ring, and then install O-ring to rear side plate.
14. Apply recommended fluid to Teflon ring, and then install Teflon ring to rear side plate.
15. Install rear cover to body assembly.
16. Apply recommended fluid to O-ring, and then install O-ring to body assembly.
17. Install suction pipe to body assembly.
18. Install rear bracket.



Inspection

INFOID:000000008461745

RELIEF OIL PRESSURE

CAUTION:

Make sure that belt tension is normal before starting the following procedure.

1. Connect the oil pressure gauge [SST: KV48103500 (J-26357)] and the oil pressure gauge adapter [SST: KV48102500 (J-33914)] between oil pump discharge connector and high-pressure hose. Bleed air from the hydraulic circuit while opening valve fully. Refer to [ST-27, "Inspection"](#).
2. Start the engine. Run the engine until oil temperature reaches 50 to 80°C (122 to 176°F).

CAUTION:

- **Leave the valve of the oil pressure gauge fully open while starting and running the engine. If engine is started with the valve closed, the hydraulic pressure in oil pump goes up to the relief pressure along with unusual increase of oil temperature.**
- **Be sure to keep hose clear of belts and other parts when engine is started.**

3. Fully close the oil pressure gauge valve with engine at idle and measure the relief oil pressure.

Standard

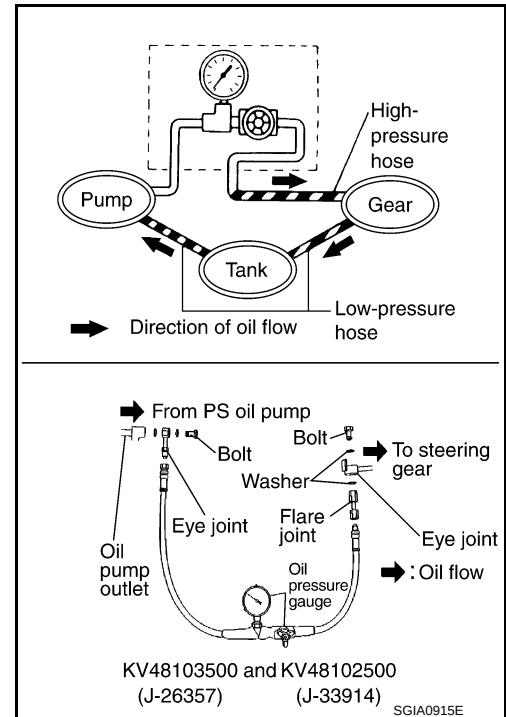
Relief oil pressure

: Refer to [ST-57, "Relief Oil Pressure"](#).

CAUTION:

Never keep valve closed for 10 seconds or longer.

4. Open the valve slowly after measuring. Repair oil pump if the relief oil pressure is outside the standard. Refer to [ST-48, "Disassembly and Assembly"](#).
5. Disconnect the oil pressure gauge from hydraulic circuit.



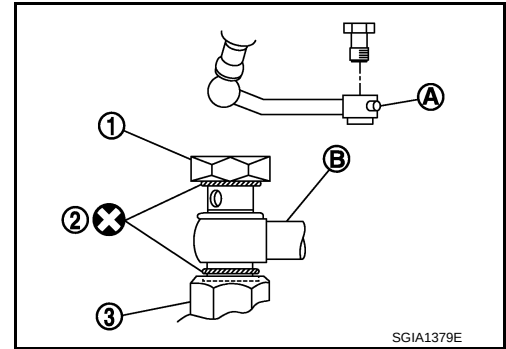
POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

6. When installing eye bolt (1) and copper washers (2) to oil pump (3), refer to the figure.

CAUTION:

- Never reuse copper washer.
 - Apply power steering fluid or equivalent to around copper washer, then install eye bolt.
 - Install eye bolt with eye joint (assembled to high pressure hose) (B) protrusion (A) facing with pump side cutout, and then tighten it to the specified torque after tightening by hand. Refer to [ST-53. "Exploded View"](#).
 - Securely insert harness connector to pressure sensor.
7. Check fluid level, fluid leakage and air bleeding hydraulic system after the installation. Refer to [ST-27. "Inspection"](#).



BEFORE DISASSEMBLY

Disassemble oil pump only when the following malfunctions occur.

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

AFTER DISASSEMBLY

Body Assembly and Rear Cover Inspection

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

Cartridge Assembly Inspection

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

Side Plate Inspection

- Check side plate for damage. Replace side plate if necessary.

Flow Control Valve Inspection

- Check flow control valve and spring for damage. Replace if necessary.

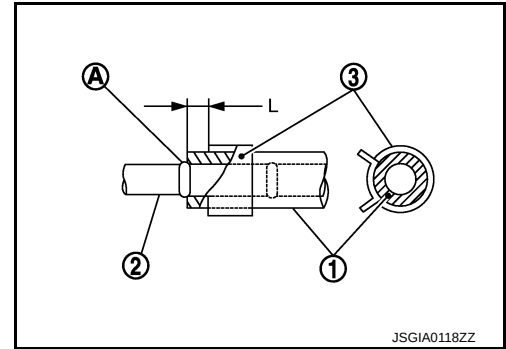
HYDRAULIC LINE

< REMOVAL AND INSTALLATION >

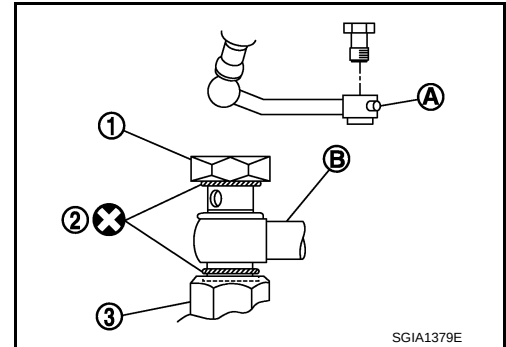
- Never apply fluid to the hose (1) and tube (2).
- Insert hose securely until it contacts spool (A) of tube.
- Leave clearance (L) when installing clamp (3).

Standard

L : 3 – 8 mm (0.12 – 0.31 in)



- Install eye bolt with eye joint (assembled to high pressure hose) (B) protrusion (A) facing with pump side cutout, and then tighten it to the specified torque after tightening by hand. Refer to [ST-53, "Exploded View"](#).
- Securely insert harness connector to pressure sensor.
- Apply power steering fluid to around copper washer, then install eye bolt.
- Never reuse copper washer.



HEATED STEERING WHEEL SWITCH

< REMOVAL AND INSTALLATION >

HEATED STEERING WHEEL SWITCH

Removal and Installation

INFOID:000000008461748

REMOVAL

1. Remove Instrument lower panel LH. Refer to [IP-13, "Removal and Installation"](#).
2. Remove heated steering wheel switch.

INSTALLATION

Install in the reverse order of removal.

A
B
C
D
E
F
ST
H
I
J
K
L
M
N
O
P

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:000000008461749

Steering gear model	PR26AF
Fluid capacity (Approx.) ℓ (US qt, Imp qt)	1.0 (1-1/8, 7/8)

Steering Wheel Axial End Play and Play

INFOID:000000008461750

Unit: mm (in)

Item	Standard
Steering wheel axial end play	0 (0)
Steering wheel play on the outer circumference	0 – 35 (0 – 1.38)

Steering Wheel Turning Force

INFOID:000000008461751

Unit: N·m (kg-m, in-lb)

Item	Standard
Steering wheel turning force	7.45 (0.76, 66)

Steering Angle

INFOID:000000008461752

Unit: Degree minute (Decimal degree)

Item		Standard
Inner wheel	Minimum	32° 00' (32.0°)
	Nominal	35° 00' (35.0°)
	Maximum	36° 00' (36.0°)
Outer wheel	Nominal	30° 30' (30.5°)

Steering Column Length

INFOID:000000008461753

Unit: mm (in)

Item	Standard
Steering column length	463 (18.23)

Steering Column Mounting Dimensions

INFOID:000000008461754

Unit: mm (in)

Item	Standard
Mounting dimension	30 (1.18) or less

Steering Column Operating Range

INFOID:000000008461755

Item	Standard
Tilt operating range	18°
Telescopic operating range	40 mm (1.57 in)
Rotating torque	0.49 N·m (0.05 kg-m, 4 in-lb)

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

Lower Shaft Length

INFOID:0000000008461756

Unit: mm (in)

Item	Standard
Lower shaft length	160 (6.3) or more

Rack Sliding Force

INFOID:0000000008461757

Unit: N (kg, lb)

Item	Standard
Rack sliding force	227 – 305 (23.2 – 31.1, 51.1 – 68.5)

Rack Stroke

INFOID:0000000008461758

Unit: mm (in)

Item	Standard
Rack stroke neutral position	68.0 (2.677)

Socket Swing Force and Rotating Torque

INFOID:0000000008461759

SWING FORCE

Unit: N (kg, lb)

Item	Standard
Outer socket	4.81 – 45.7 (0.5 – 4.6, 1.1 – 10.2)
Inner socket	8.9 – 64 (0.91 – 6.5, 2.01 – 14.3)

ROTATING TORQUE

Unit: N·m (kg·m, in·lb)

Item	Standard
Outer socket	0.3 – 2.9 (0.03 – 0.29, 3 – 25)

Socket Axial End Play

INFOID:0000000008461760

Unit: mm (in)

Item	Standard
Outer socket	0.5 (0.02) or less
Inner socket	0.2 (0.008) or less

Inner Socket Length

INFOID:0000000008461761

Unit: mm (in)

Item	Standard
Inner socket length	120.3 (4.74)

Relief Oil Pressure

INFOID:0000000008461762

Unit: kPa (kg/cm², psi)

Item	Standard
Relief oil pressure	9,500 – 10,300 (96.9 – 105.1, 1,378 – 1,494)