

SECTION **ST**
STEERING SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:000000008143598

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 12V battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation after 12V Battery Disconnect

INFOID:000000008143599

For vehicle with steering lock unit, if the 12V battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the 12V battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both 12V battery cables.
NOTE:
Supply power using jumper cables if 12V battery is discharged.
2. Turn the ignition switch to ACC position.
(At this time, the steering lock will be released.)
3. Disconnect both 12V battery cables. The steering lock will remain released with both 12V battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both 12V battery cables. With the brake pedal released, turn the ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the ignition switch is turned to LOCK position.)
6. Perform All DTC Reading using CONSULT and delete DTC.
NOTE:
Multiple DTCs are detected when 12V battery cable is disconnected while ignition switch is in ACC position.

PRECAUTIONS

< PRECAUTION >

[WITH HEATED STEERING WHEEL]

Precaution for Removing 12V Battery

INFOID:000000008486630

CAUTION:

When the 12V battery is removed, plural DTC may be detected.
After installing 12V battery, always perform "All DTC" with CONSULT and delete DTC.

Precautions Concerning On-board Servicing of Hybrid Systems

INFOID:000000008143600

CAUTION:

Be sure to turn the ignition switch OFF before performing inspection and servicing inside the engine compartment or underneath the vehicle. If the ignition switch is ON (vehicle READY state), even if the engine is stopped, the conditions of the vehicle may cause the engine to start automatically.
If it is necessary to continually operate the engine during inspection or servicing, use the designated inspection mode. [HBC-89, "Description"](#).

Service Notice or Precautions for Steering System

INFOID:000000008143601

- 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.

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PREPARATION

< PREPARATION >

[WITH HEATED STEERING WHEEL]

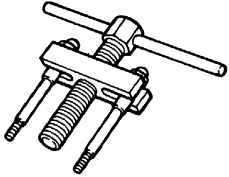
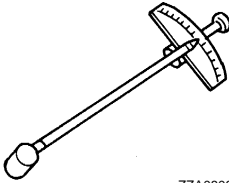
PREPARATION

PREPARATION

Special Service Tools

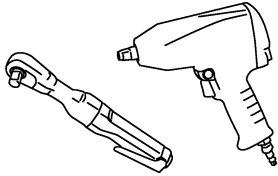
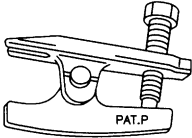
INFOID:000000008143602

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	<ul style="list-style-type: none"> • Measuring steering wheel turning torque • Measuring steering column rotating torque • Measuring ball joint rotating torque

Commercial Service Tools

INFOID:000000008143603

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts
Ball joint remover  S-NT146	Removing steering outer socket

COMPONENT PARTS

< SYSTEM DESCRIPTION >

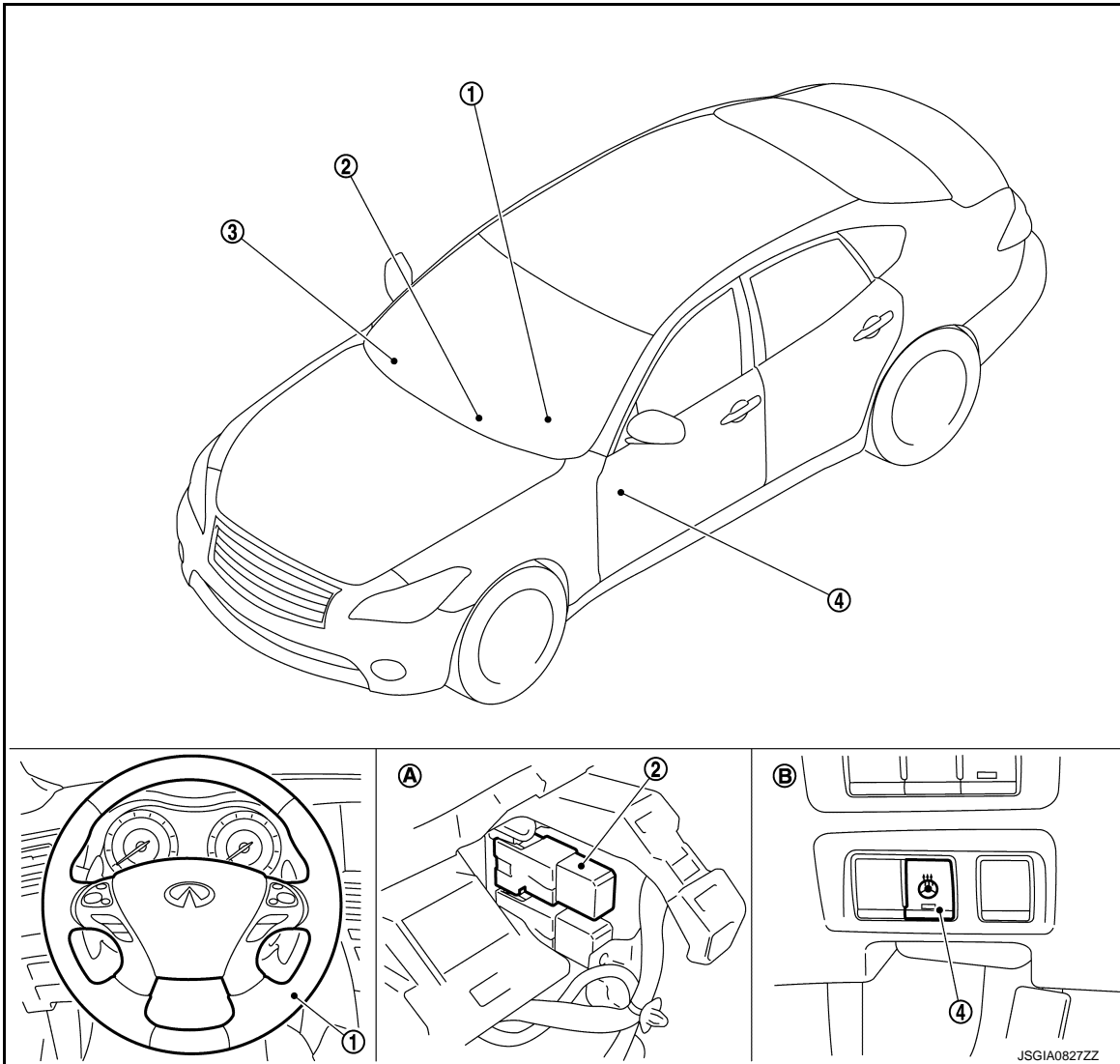
[WITH HEATED STEERING WHEEL]

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location (Heated Steering Wheel)

INFOID:000000008143604



- 1. Heated steering wheel
- 2. Heated steering wheel relay
- 3. A/C auto amp.
Refer to [HAC-8, "AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location"](#).
- 4. Heated steering wheel switch
- A. Right side of AV control unit
- B. Left bottom side of instrument lower panel LH

Component Description (Heated Steering Wheel)

INFOID:000000008143605

Part name		Reference/Function
Heated steering wheel	Heating element	Refer to ST-8, "Heated Steering Wheel" .
	Thermostat	
Heated steering wheel relay		Refer to ST-8, "Heated Steering Wheel Relay" .

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

Part name		Reference/Function
Heated steering wheel switch		Refer to ST-8, "Heated Steering Wheel Switch" .
A/C auto amp.	Timer	Refer to ST-8, "A/C Auto Amp." .

Heated Steering Wheel

INFOID:000000008143606

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:000000008143607

NOTE:

This is an integrated switch with switches for other functions.

- Controls the heated steering wheel relay and operates the heated steering wheel system.
- Turns the indicator lamp ON when the system is activated.

Heated Steering Wheel Relay

INFOID:000000008143608

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

A/C Auto Amp.

INFOID:000000008143609

- The A/C auto amp. 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.

SYSTEM

System Description (Heated Steering Wheel)

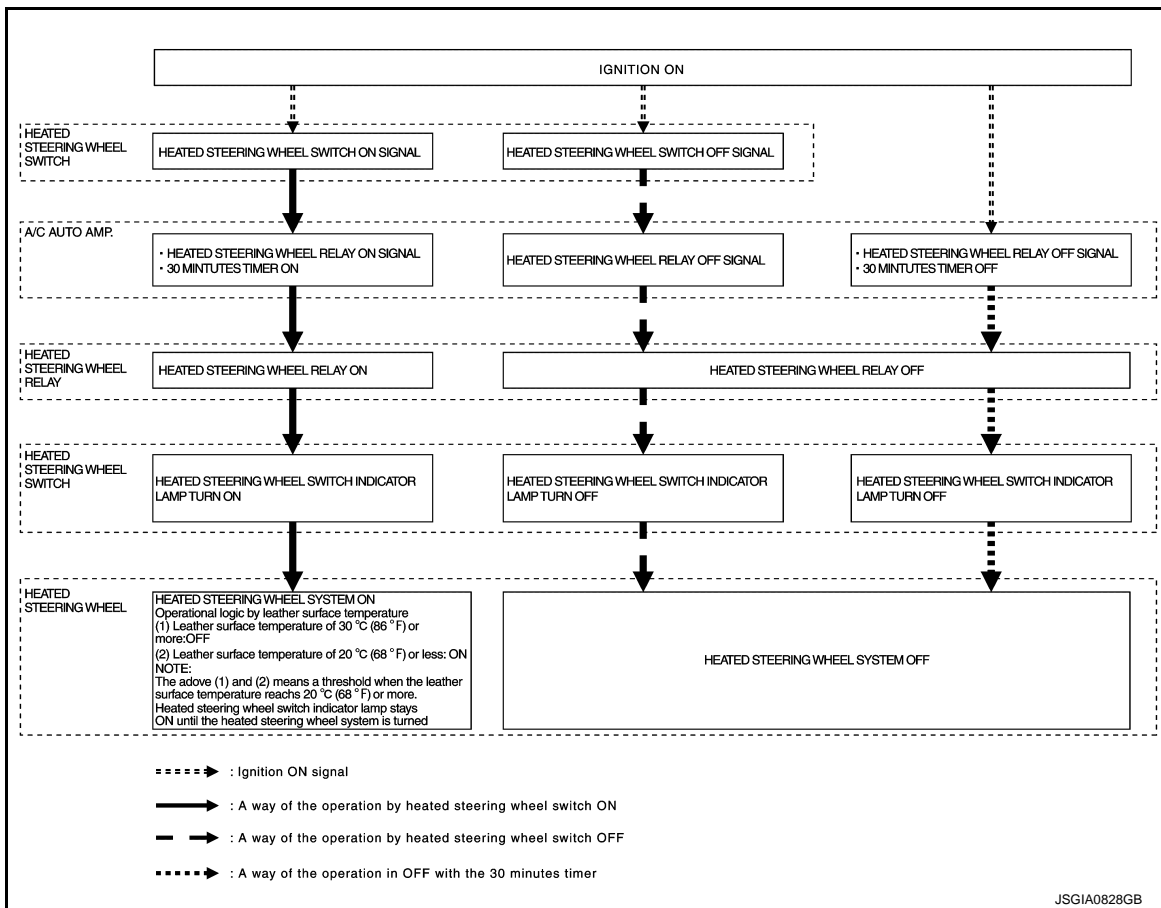
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The heated steering wheel switch controls the heated steering wheel relay. When the heated steering wheel switch is turned on, the heated steering wheel relay is energized and the heated steering wheel system will operate. The heated steering wheel 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. The A/C auto amp. Incorporates a timer and turns OFF the heated steering wheel relay when 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 light 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 light will go off.

SYSTEM DIAGRAM



DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[WITH HEATED STEERING WHEEL]

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (Heated Steering Wheel)

INFOID:000000008143613

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.

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STEERING WHEEL

< BASIC INSPECTION >

[WITH HEATED STEERING WHEEL]

STEERING WHEEL

Inspection

INFOID:000000008143614

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. 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"](#).

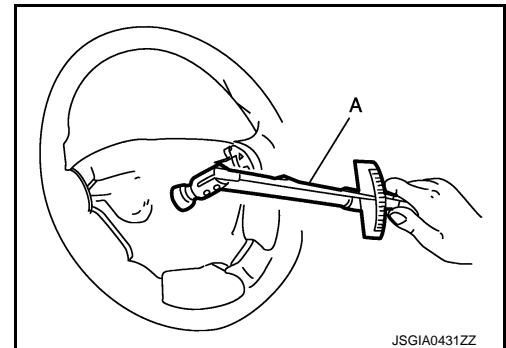
STEERING WHEEL TURNING TORQUE

1. Park the vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated to the specified pressure. Refer to [WT-64, "Tire Air Pressure"](#).
3. Remove driver air bag module. Refer to [SR-11, "Removal and Installation"](#).
4. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

5. Check steering wheel turning torque of the steering wheel by using preload gauge (A) [SST: ST3127S000 (J-25765-A)] with the vehicle set in the READY state.

Steering wheel turning torque : Refer to [ST-46, "Steering Wheel Turning Torque"](#).



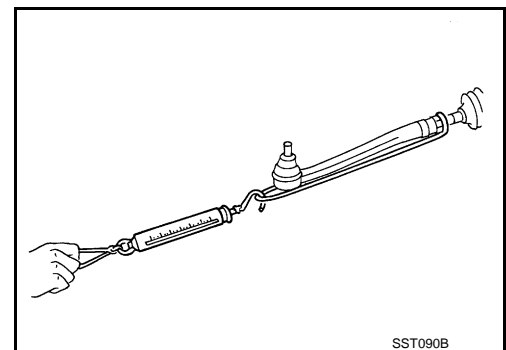
6. If the steering wheel turning torque of the steering wheel is outside the specification, perform diagnosis of "EPS" by using CONSULT. If no malfunction is detected, check rack sliding force.
 - a. Disconnect lower joint and steering knuckle from steering gear assembly. Refer to [ST-37, "Removal and Installation"](#).
 - b. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

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

Rack sliding force : Refer to [ST-47, "Rack Sliding Force"](#).

- d. 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:

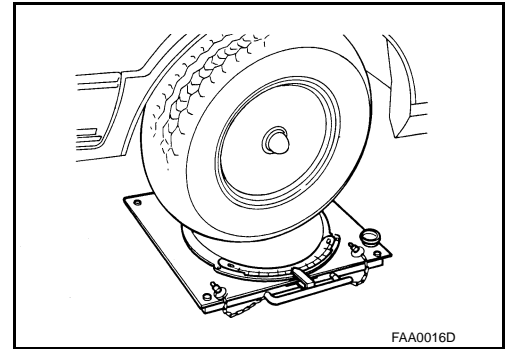
Perform front wheel turning angle inspection, after toe-in inspection.

STEERING WHEEL

< BASIC INSPECTION >

[WITH HEATED STEERING WHEEL]

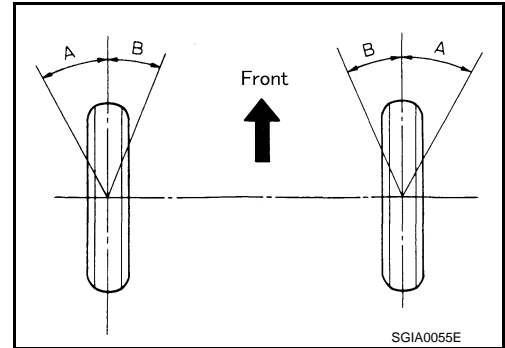
- Place wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
- Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- Set the vehicle to READY and fully steer right and left to check the steering angle (maximum inner wheel steering angle and maximum outer wheel steering angle).

Inner wheel (Angle: A) : Refer to [ST-46, "Steering Angle"](#).

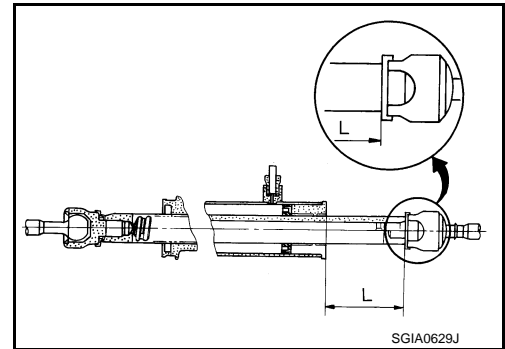
Outer wheel (Angle: B) : Refer to [ST-46, "Steering Angle"](#).



- If the steering angle is outside the specification, fully steer right and left with set the vehicle to READY to check rack stroke (L).

Rack stroke neutral position (L) : Refer to [ST-47, "Rack Stroke"](#).

- If rack stroke is out of specification, replace steering gear assembly.
- 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.



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HEATED STEERING WHEEL SYSTEM

[WITH HEATED STEERING WHEEL]

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:000000008143615

1. CHECK HEATED STEERING WHEEL SYSTEM

Check operate heated steering wheel system. Refer to [ST-9. "System Description \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [ST-14. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000008143616

1. CHECK POWER SOURCE

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to [ST-29. "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		
M71	1 - 2	Within 30 seconds 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-17. "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel. Refer to [ST-29. "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		
M71	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. Remove the heated steering wheel. Refer to [ST-29. "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 >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M68	5	M71	1	Existed

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	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-17, "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 SOURCE (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and fuse block (J/B). Refer to [PG-14, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).
- 15A fuse [No. 5, located in the fuse block (J/B)]. Refer to [PG-42, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)
- Harness for short or open between fuse block (J/B) 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 twin switch harness connector terminal and ground.

Twin switch		Ground	Continuity
Connector	Terminal		
M188	3		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 A/C AUTO AMP.

1. Check continuity between heated steering wheel relay harness connector terminal and A/C auto amp. harness connector terminal.

Heated steering wheel relay		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M68	2	M67	41	Existed

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

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	2		Not existed

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace damaged parts.

9. CHECK HARNESS BETWEEN A/C AUTO AMP. AND TWIN SWITCH

1. Check continuity between A/C auto amp. harness connector terminal and twin switch harness connector terminal.

A/C auto amp.		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M67	45	M188	1	Existed

2. Check continuity between A/C auto amp. harness connector terminal and ground.

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M67	45		Not existed

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace damaged parts.

10. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-8. "Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-183. "Removal and Installation"](#).

NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Switch)

INFOID:000000008143617

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Condition	Continuity
Terminal			
1	3	When while pushing heated steering wheel switch	Existed
		Other condition	Not existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Check status between heated steering wheel switch connector terminals.

CAUTION:

Connect the fuse between the terminals when applying the voltage.

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel switch		Condition	Status
Terminal			
+	-		
8	10	Apply 12 V direct current between terminals 8 and 10.	Indicator lamp turn ON

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel switch. Refer to [ST-45, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel)

INFOID:000000008143618

1. CHECK HEATED STEERING WHEEL CONTINUITY

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to [ST-29, "Removal and Installation"](#).
3. Check continuity between heated steering wheel harness connector terminal and ground.

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel. Refer to [ST-29, "Removal and Installation"](#).

2. CHECK HEATED STEERING WHEEL RESISTANCE

Check resistance between heated steering wheel connector terminals.

Heated steering wheel Terminal	Condition	Resistance
1 - 2	Leather surface temperature of 20°C (68°F)	1.7 - 2.17 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel. Refer to [ST-29, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000008143619

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 Terminal	Condition	Continuity
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 >

[WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:000000008143620

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-18, "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-18, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000008143621

1. CHECK POWER SOURCE

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

Twin switch		Condition	Voltage (Approx.)
Connector	Terminal		
M188	8 – 10	Within 30 seconds 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 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect twin switch connector. Refer to [ST-45, "Removal and Installation"](#).
3. Check continuity between twin switch harness connector terminal and ground.

Twin switch		Ground	Continuity
Connector	Terminal		
M188	10		Existed

Is the inspection result normal?

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

3. CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND TWIN SWITCH

1. Disconnect heated steering wheel relay connector. Refer to [ST-7, "Component Parts Location \(Heated Steering Wheel\)"](#).
2. Check continuity between heated steering wheel relay harness connector terminal and twin switch harness connector terminal.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M68	5	M188	8	Existed

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	5		Not existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4. CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-17, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK POWER SOURCE (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and fuse block (J/B). Refer to [PG-14, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).
- 15A fuse [No. 5, located in the fuse block (J/B)]. Refer to [PG-42, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)
- Harness for short or open between fuse block (J/B) and heated steering wheel relay.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace damaged parts.

6. CHECK HARNESS BETWEEN A/C AUTO AMP. AND TWIN SWITCH

1. Check continuity between A/C auto amp. harness connector terminal and twin switch harness connector terminal.

A/C auto amp.		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M67	45	M188	1	Existed

2. Check continuity between A/C auto amp. harness connector terminal and ground.

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M67	45		Not existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-8, "Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-183, "Removal and Installation"](#)

NO >> Replace heated steering wheel switch. Refer to [ST-45, "Removal and Installation"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Component Inspection (Heated Steering Wheel Switch)

INFOID:000000008143622

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

Heated steering wheel switch		Condition	Continuity
Terminal			
1	3	When while pushing heated steering wheel switch	Existed
		Other condition	Not existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Check status between heated steering wheel switch connector terminals.

CAUTION:

Connect the fuse between the terminals when applying the voltage.

Heated steering wheel switch		Condition	Status
Terminal			
+	-		
8	10	Apply 12 V direct current between terminals 8 and 10.	Indicator lamp turn ON

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000008143623

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 >

[WITH HEATED STEERING WHEEL]

SYMPTOM DIAGNOSIS

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

Description

INFOID:000000008143624

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

Diagnosis Procedure

INFOID:000000008143625

1. CHECK POWER SOURCE

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to [ST-29, "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		
M71	1 - 2	Within 30 seconds 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-17, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace heated steering wheel. Refer to [ST-29, "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		
M71	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. Remove the heated steering wheel. Refer to [ST-29, "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 >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M68	5	M71	1	Existed

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	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-17, "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 SOURCE (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and fuse block (J/B). Refer to [PG-14, "Wiring Diagram - BATTERY POWER SUPPLY -"](#).
- 15A fuse [No. 5, located in the fuse block (J/B)]. Refer to [PG-42, "Fuse, Connector and Terminal Arrangement"](#).
- Fuse block (J/B)
- Harness for short or open between fuse block (J/B) 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 twin switch harness connector terminal and ground.

Twin switch		Ground	Continuity
Connector	Terminal		
M188	3		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 A/C AUTO AMP.

1. Check continuity between heated steering wheel relay harness connector terminal and A/C auto amp. harness connector terminal.

Heated steering wheel relay		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M68	2	M67	41	Existed

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

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	2		Not existed

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace damaged parts.

9. CHECK HARNESS BETWEEN A/C AUTO AMP. AND TWIN SWITCH

1. Check continuity between A/C auto amp. harness connector terminal and twin switch harness connector terminal.

A/C auto amp.		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M67	45	M188	1	Existed

2. Check continuity between A/C auto amp. harness connector terminal and ground.

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M67	45		Not existed

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace damaged parts.

10. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-8. "Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-183. "Removal and Installation"](#).

NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON [WITH HEATED STEERING WHEEL]

< SYMPTOM DIAGNOSIS >

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

Description

INFOID:000000008143626

- 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:000000008143627

1. CHECK POWER SOURCE

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

Twin switch		Condition	Voltage (Approx.)
Connector	Terminal		
M188	8 – 10	Within 30 seconds 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 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect twin switch connector. Refer to [ST-45, "Removal and Installation"](#).
3. Check continuity between twin switch harness connector terminal and ground.

Twin switch		Ground	Continuity
Connector	Terminal		
M188	10		Existed

Is the inspection result normal?

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

3. CHECK HARNESS BETWEEN HEATED STEERING WHEEL RELAY AND TWIN SWITCH

1. Disconnect heated steering wheel relay connector. Refer to [ST-7, "Component Parts Location \(Heated Steering Wheel\)"](#).
2. Check continuity between heated steering wheel relay harness connector terminal and twin switch harness connector terminal.

Heated steering wheel relay		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M68	5	M188	8	Existed

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M68	5		Not existed

Is the inspection result normal?

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON [WITH HEATED STEERING WHEEL]

< SYMPTOM DIAGNOSIS >

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

4. CHECK HEATED STEERING WHEEL RELAY

Check heated steering wheel relay. Refer to [ST-17. "Component Inspection \(Heated Steering Wheel Relay\)".](#)

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace heated steering wheel relay. Refer to [ST-7. "Component Parts Location \(Heated Steering Wheel\)".](#)

5. CHECK POWER SOURCE (BATTERY)

Check the following.

- Battery
- Harness for short or open between battery and fuse block (J/B). Refer to [PG-14. "Wiring Diagram - BATTERY POWER SUPPLY -".](#)
- 15A fuse [No. 5, located in the fuse block (J/B)]. Refer to [PG-42. "Fuse, Connector and Terminal Arrangement".](#)
- Fuse block (J/B)
- Harness for short or open between fuse block (J/B) and heated steering wheel relay.

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace damaged parts.

6. CHECK HARNESS BETWEEN A/C AUTO AMP. AND TWIN SWITCH

1. Check continuity between A/C auto amp. harness connector terminal and twin switch harness connector terminal.

A/C auto amp.		Twin switch		Continuity
Connector	Terminal	Connector	Terminal	
M67	45	M188	1	Existed

2. Check continuity between A/C auto amp. harness connector terminal and ground.

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M67	45		Not existed

Is the inspection result normal?

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

7. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-8. "Heated Steering Wheel Switch".](#)

Is the inspection result normal?

- YES >> Repair or replace A/C auto amp. Refer to [HAC-183. "Removal and Installation"](#)
- NO >> Replace heated steering wheel switch. Refer to [ST-45. "Removal and Installation"](#).

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NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000008143628

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																						
			ST-27, "Inspection"	ST-27, "Inspection"	ST-40, "Inspection and Adjustment"	ST-40, "Inspection and Adjustment"	ST-40, "Inspection and Adjustment"	ST-27, "Inspection"	ST-12, "Inspection"	ST-12, "Inspection"	—	—	ST-36, "Exploded View"	ST-32, "Inspection and Adjustment"	ST-31, "Exploded View"	ST-36, "Exploded View"	NVH in DLN section.	NVH in DLN section.	NVH in FAX, RAX, FSU, RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.		
Steering	Noise	Fluid level	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	Shake	Air in hydraulic system																							
	Vibration	Outer/inner socket ball joint swinging torque																							
	Shimmy	Outer/inner socket ball joint rotating torque																							
	Judder	Outer/inner socket ball joint end play																							
		Steering fluid leakage																							
		Steering wheel play																							
		Steering gear rack sliding force																							
		Improper steering wheel																							
		Improper installation or looseness of tilt lock lever																							
		Mounting looseness																							
		Steering column deformation or damage																							
		Improper installation or looseness of steering column																							
		Steering linkage looseness																							
		PROPELLER SHAFT																							
		DIFFERENTIAL																							
		AXLE and SUSPENSION																							
		TIRE																							
		ROAD WHEEL																							
		DRIVE SHAFT																							
		BRAKE																							

x: Applicable

PERIODIC MAINTENANCE

POWER STEERING FLUID

Inspection

INFOID:000000008143629

FLUID LEVEL

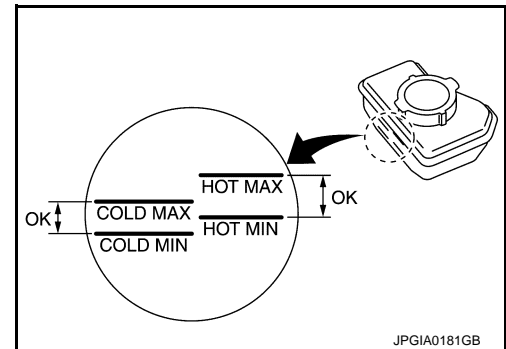
1. Turn the ignition switch OFF.
2. Ensure that fluid level is between MIN and MAX.
3. Fluid levels at HOT and COLD are different. Do not confuse them.

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

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

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

Fluid capacity : Refer to [ST-46, "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.
- Always use the specified fluid. Refer to [MA-10, "Fluids and Lubricants"](#).

FLUID LEAKAGE

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

1. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

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 leaks from the joint, loosen the joint part and retighten it, being careful not to damage it.

CAUTION:

For tightening torque and non reusable parts, refer to [ST-44, "Exploded View"](#).

5. If fluid leakage from oil pump is noticed, check oil pump. Refer to [ST-43, "Inspection"](#).
6. Check steering gear boots for accumulation of fluid leaked from steering gear.

BLEEDING HYDRAULIC SYSTEM

To bleed the hydraulic system, use "Work Support" mode for "EPS" with CONSULT. For the method for bleeding the hydraulic system, refer to [STC-24, "Work Procedure"](#).

NOTE:

- Insufficient bleeding of the system causes the following symptoms:
 - Bubbles form in the reservoir tank.
 - Operating noise of oil pump becomes loud.
 - When turning the steering wheel from fully-steered position to the neutral position, a loud abnormal sound develops.
- When steered fully and quickly, the power steering oil pump may generate an abnormal sound. This is not a malfunction.

STEERING WHEEL

Inspection

INFOID:000000008143630

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.

Steering wheel axial end play : Refer to [ST-46, "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-36, "Exploded View"](#).

STEERING WHEEL PLAY

1. Turn steering wheel so that front wheels come to the straight-ahead position.
2. Set the vehicle to READY 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.

Steering wheel play on the outer circumference : Refer to [ST-46, "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.

STEERING WHEEL

< REMOVAL AND INSTALLATION >

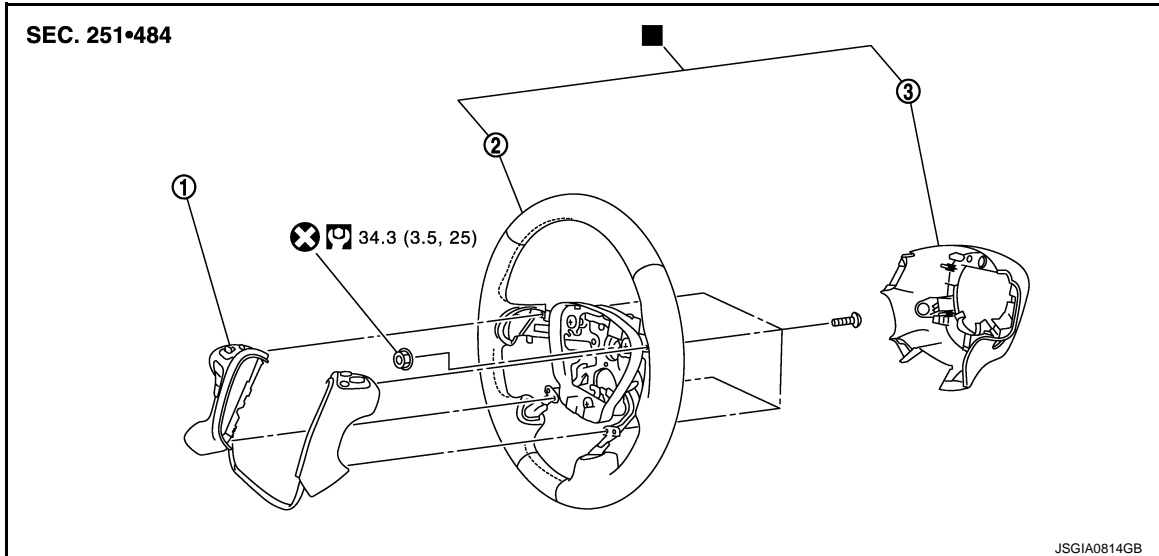
[WITH HEATED STEERING WHEEL]

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:000000008143631



1. Steering switch
2. Steering wheel
3. Steering wheel rear cover

■: Replace the parts as a set.

Ⓜ: N·m (kg·m, ft·lb)

⊗: Always replace after every disassembly.

Removal and Installation

INFOID:000000008143632

REMOVAL

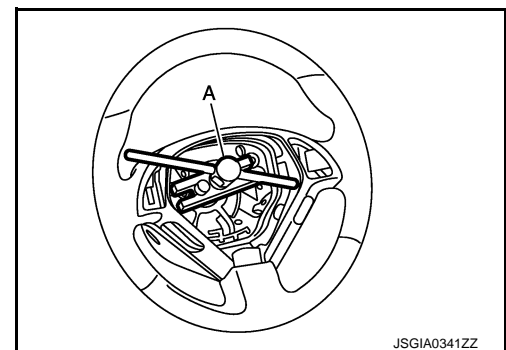
NOTE:

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. Disconnect steering switch connector.
4. Remove steering wheel lock nut after steering is locked.
5. 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"](#).

STEERING WHEEL

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

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.

Disassembly and Assembly

INFOID:000000008143633

DISASSEMBLY

1. Remove steering wheel assembly.
2. Remove steering wheel rear cover.
3. Disconnect horn connector.
4. Remove steering switch.

ASSEMBLY

Install in the reverse order of removal.

STEERING COLUMN

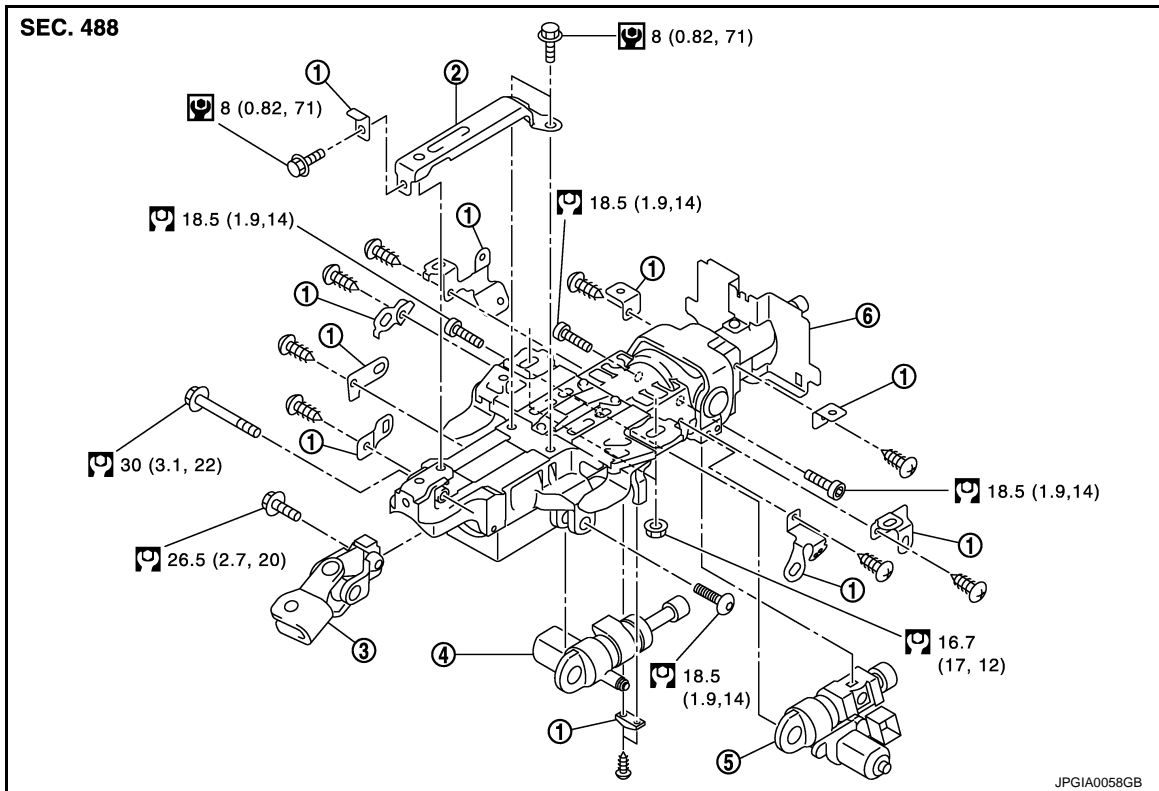
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

STEERING COLUMN

Exploded View

INFOID:000000008143634



- | | | |
|---------------------|-------------------------------------|-----------------------------|
| 1. Bracket | 2. Steering column mounting bracket | 3. Upper joint |
| 4. Telescopic motor | 5. Tilt motor | 6. Steering column assembly |

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:000000008143635

REMOVAL

CAUTION:

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

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-29, "Removal and Installation"](#).
5. Remove the instrument side finisher LH. Refer to [IP-13, "Removal and Installation"](#).
6. Remove instrument lower panel LH. Refer to [IP-13, "Removal and Installation"](#).
7. Remove the steering column cover. Refer to [IP-13, "Removal and Installation"](#).
8. Remove spiral cable. Refer to [SR-14, "Removal and Installation"](#).
9. Remove combination switch. Refer to [BCS-81, "Removal and Installation"](#).
10. Remove knee protector.
11. Disconnect each switch harness connectors installed to steering column assembly.
12. Remove the upper joint mounting bolt and nut (lower shaft side), and separate the joint from lower shaft.

STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

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.

13. Remove the upper joint mounting bolt (steering column side), and remove upper joint from steering column assembly.

CAUTION:

- Place a matching mark on both upper joint and steering column assembly before removing upper joint.
- 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.

14. Remove steering column assembly.

- If necessary, remove telescopic motor, tilt motor, and brackets.

15. Perform inspection after removal. Refer to [ST-32. "Inspection and Adjustment"](#).

INSTALLATION

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

CAUTION:

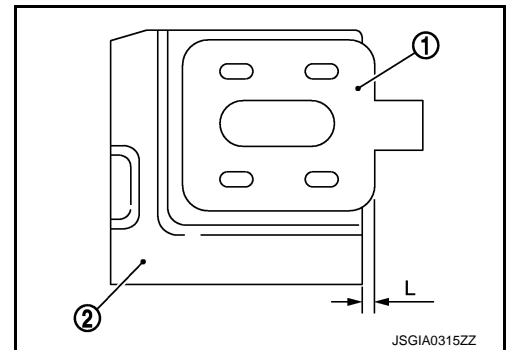
- Never give axial impact to steering column assembly during removal.
- Never move steering gear assembly when removing steering column assembly.
- When tightening the mounting bolt of the upper joint (steering column assembly side) manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the notch of the steering column assembly before tightening the bolt to the specified torque.

CAUTION:

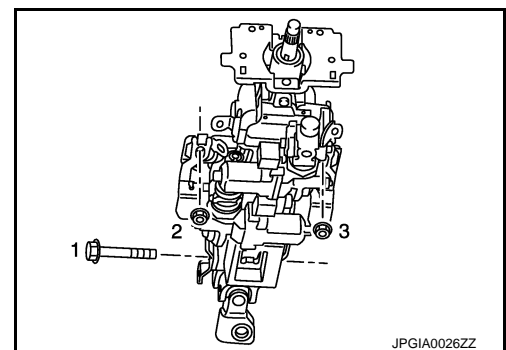
Never reuse upper joint mounting nut (lower shaft side).

- To install the slide plate (1), create clearance (L) in the steering column assembly mounting area (2) as follows.

L : 2.0 mm (0.079 in)



- Tighten the mounting bolts and nuts in the order shown in the figure when installing the steering column assembly.
- Perform inspection after installation. Refer to [ST-32. "Inspection and Adjustment"](#).



Inspection and Adjustment

INFOID:000000008143636

INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if necessary.

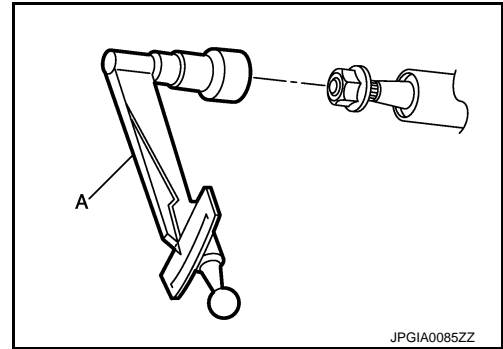
STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

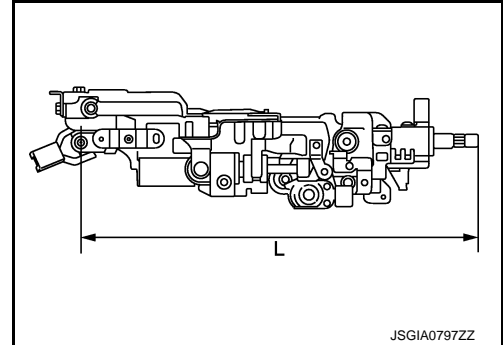
- Measure steering column rotating torque using a preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if outside the standard.

Rotating torque : Refer to [ST-46, "Steering Column Operating Range"](#).



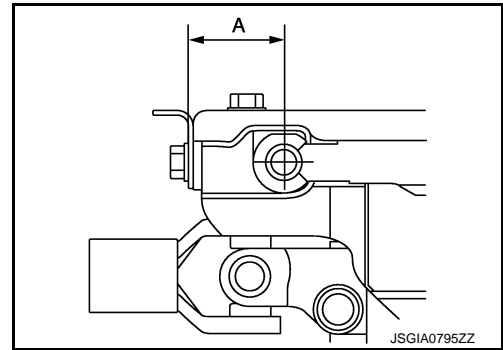
- Measure the length (L) as shown, if vehicle has been involved in a minor collision. Replace steering column assembly if out side the standard.

Steering column length (L) : Refer to [ST-46, "Steering Column Length"](#).



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

Mounting dimensions (A) : Refer to [ST-46, "Steering Column Mounting Dimensions"](#).

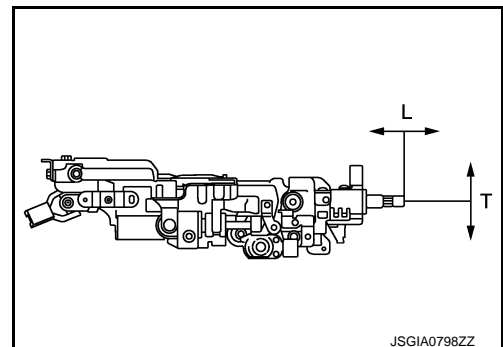


INSPECTION AFTER INSTALLATION

- 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 torque, and front wheel turning angle. Refer to [ST-12, "Inspection"](#).
- Check tilt and telescopic mechanism operating range tilt operating range (T), telescopic operating range (L) as shown in the figure.

Tilt operating range (T) : Refer to [ST-46, "Steering Column Operating Range"](#).

Telescopic operating range (L) : Refer to [ST-46, "Steering Column Operating Range"](#).



- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).

LOWER SHAFT

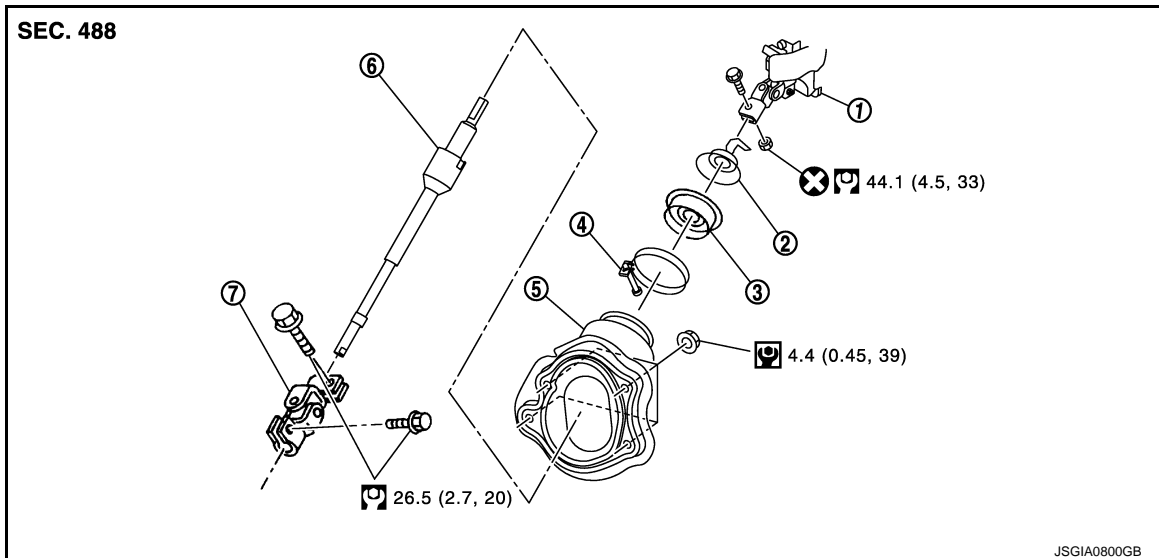
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

LOWER SHAFT

Exploded View

INFOID:000000008143637



- | | | |
|-----------------------------|---------------|--------------------|
| 1. Steering column assembly | 2. Collar | 3. Hole cover seal |
| 4. Clamp | 5. Hole cover | 6. Lower shaft |
| 7. Lower joint | | |

: N·m (kg·m, in·lb)

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:000000008143638

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.

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

CAUTION:

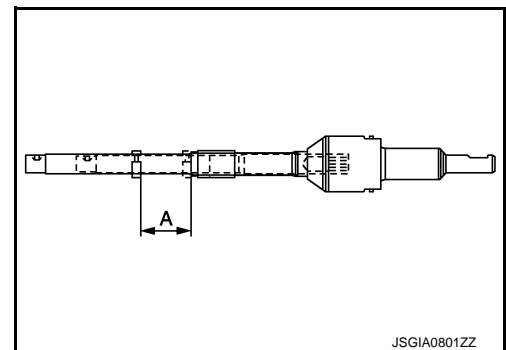
- Place a matching mark on both lower joint and steering gear assembly before removing lower joint.
- When removing lower joint, never insert a tool, such as a screwdriver, into the yoke groove to pull out the lower joint. In case of the violation of the above, replace lower joint with a new one.

5. Remove the side brake wire clamp stay.
6. Remove the hole cover mounting nuts.
7. Remove the upper joint fixing bolt and nut (lower shaft side).

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.

8. Remove the lower shaft and hole cover.



LOWER SHAFT

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

9. Remove collar, hole cover seal, clamp and hole cover.
10. Perform inspection after removal. Refer to [ST-35, "Inspection"](#).

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.**
- **Never reuse upper joint mounting nut (lower shaft side).**
- Tighten the clamp to the specified torque and check the clamp length (A).

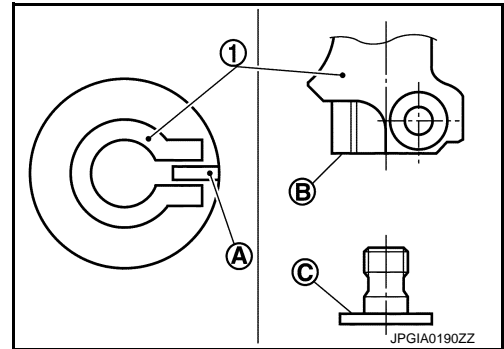
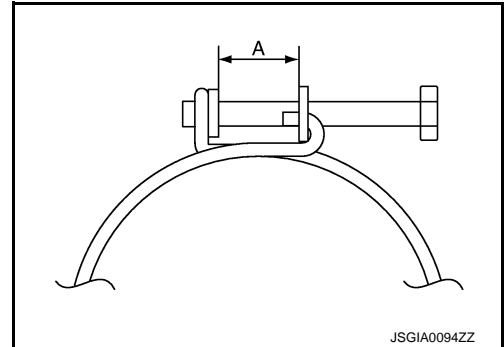
Clamp length "A" : 14.0 – 18.0 mm (0.551 – 0.709 in)

- 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 the slit of lower joint (1) with the cap marking (A) of the steering gear assembly and securely install the lower joint so that lower joint surface (B) and the steering gear assembly surface (C) properly contact.
- When tightening the mounting bolt of the lower joint (steering gear assembly side), manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the groove of the steering gear assembly before tightening the bolt to the specified torque.
- Perform inspection after installation. Refer to [ST-35, "Inspection"](#).



INFOID:000000008143639

Inspection

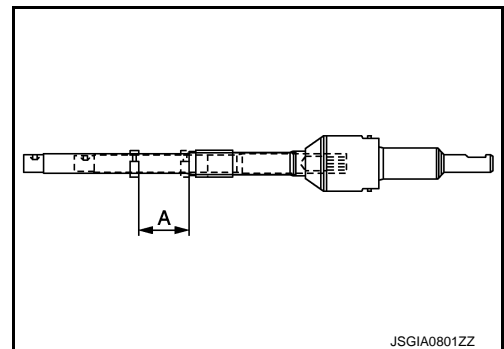
INSPECTION AFTER REMOVAL

- Check lower shaft and lower joint for damage or other malfunctions. Replace if there are.
- Check collar, hole cover seal, clamp, and hole cover for damage or other malfunctions. Replace if there are.
- Check the sliding range of the lower shaft.

CAUTION:

Check the sliding range (A) (between the extended position and the contracted position) of the lower shaft.

Sliding range : Refer to [ST-47, "Lower Shaft Sliding Range"](#).



INSPECTION AFTER INSTALLATION

- Check lower shaft and lower joint for damage or other malfunctions. Replace if there are.
- Check collar, hole cover seal, clamp, and hole cover for damage or other malfunctions. Replace if there are.
- 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 torque, and front wheel turning angle. Refer to [ST-12, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

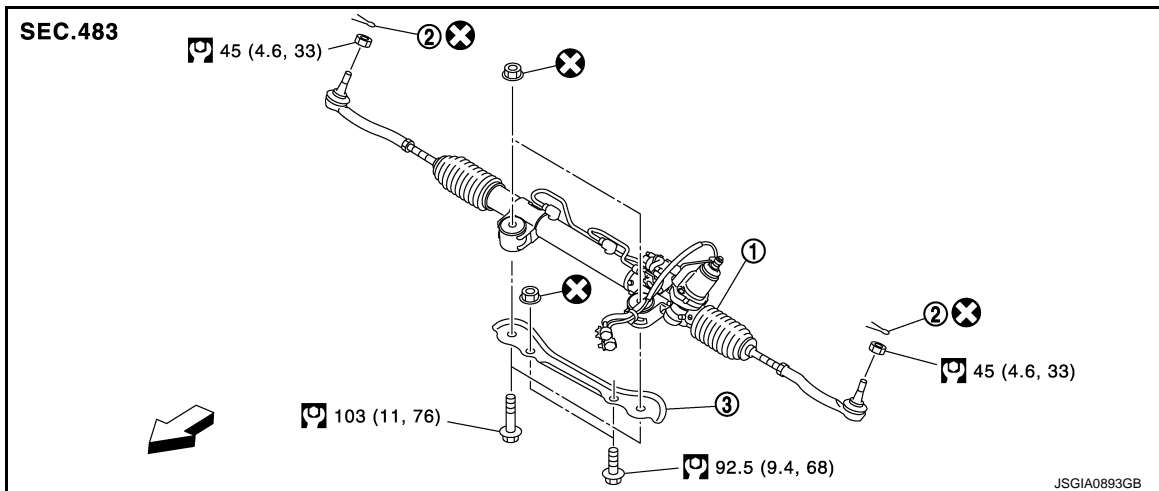
[WITH HEATED STEERING WHEEL]

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000008143640

REMOVAL



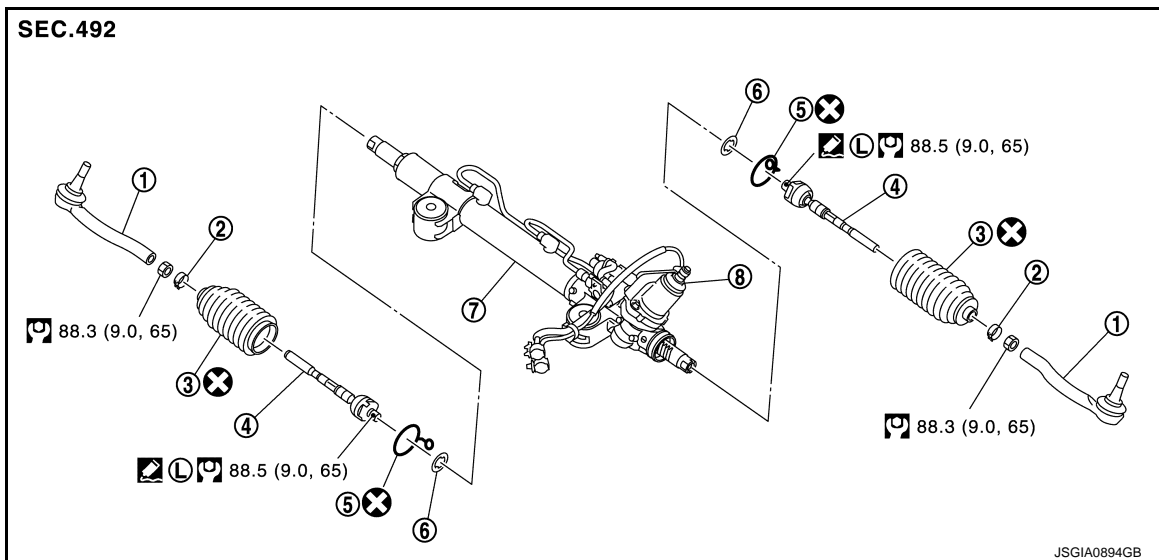
1. Steering gear assembly 2. Cotter pin 3. Rack stay

←: Vehicle front

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

: Always replace after every disassembly.

DISASSEMBLY



1. Outer socket 2. Boot clamp 3. Boot
4. Inner socket 5. Boot clamp (stainless wire) 6. Spacer
7. Gear housing assembly 8. Cap

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

: Always replace after every disassembly.

(L): Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to [GI-23, "Recommended Chemical Products and Sealants"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

Removal and Installation

INFOID:000000008143641

REMOVAL

1. Set the vehicle to the straight-ahead position.
2. Remove tires with a power tool. Refer to [WT-58, "Exploded View"](#).
3. Remove engine under cover and front under cover.
 - Engine under cover: Refer to [EXT-28, "ENGINE UNDER COVER : Removal and Installation"](#).
 - Front under cover: Refer to [EXT-29, "FRONT UNDER COVER : Removal and Installation"](#).
4. Remove suspension member stay. Refer to [FSU-18, "Exploded View"](#).
5. Remove cotter pin, and then loosen the nut.
6. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using a ball joint remover (commercial service tool).

CAUTION:

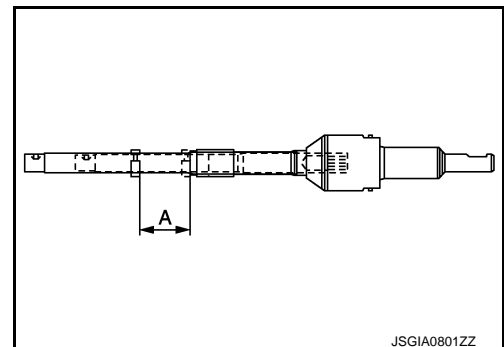
Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover from suddenly coming off.

7. Remove power steering piping assembly from steering gear assembly, and then drain power steering fluid. Refer to [ST-44, "Exploded View"](#).
- CAUTION:**
- Never reuse drained power steering fluid.
 - Always use the specified fluid. Refer to [MA-10, "Fluids and Lubricants"](#).
8. Remove flow connection valve harness and torque sensor harness.
 9. Remove lower joint fixing bolt (steering gear side).

10. Separate the lower joint from the steering gear assembly by sliding the slide shaft (A: sliding range).

CAUTION:

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



11. Remove rack stay.
12. Remove steering gear assembly mounting bolts, and nuts.
13. Remove steering gear assembly.

INSTALLATION

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

CAUTION:

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

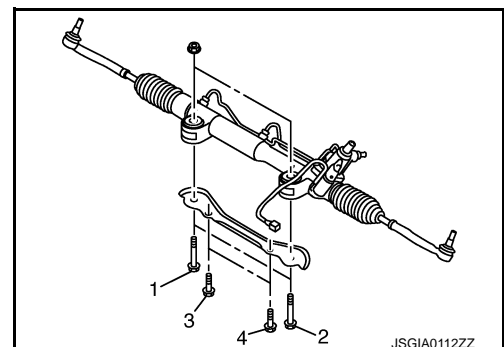
- Never reuse steering outer socket mounting nut.
- Tighten the mounting bolts in the order shown in the figure when installing the steering gear assembly.

Temporary tightening: 1 ⇒ 2 ⇒ 3 ⇒ 4

Final tightening: 1 ⇒ 2 ⇒ 3 ⇒ 4

CAUTION:

Never reuse the steering gear assembly mounting nut.



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

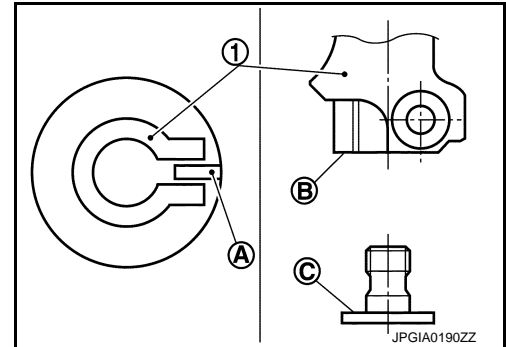
[WITH HEATED STEERING WHEEL]

- 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 the slit of lower joint (1) with the cap marking (A) of the steering gear assembly and securely install the lower joint so that lower joint surface (B) and the steering gear assembly surface (C) properly contact.
- When tightening the mounting bolt of the lower joint (steering gear assembly side), manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the groove of the steering gear assembly before tightening the bolt to the specified torque.
- Perform inspection after installation. Refer to [ST-40, "Inspection and Adjustment"](#).



INFOID:000000008143642

Disassembly and Assembly

DISASSEMBLY

CAUTION:

Disassemble and assemble steering gear assembly by fixing the mounting area with a vise using copper plates.

1. Loosen outer socket lock nut, and remove outer socket.
2. 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.

3. Remove inner socket from gear housing assembly.
4. Remove spacer from gear housing assembly.

CAUTION:

Never damage rack assembly.

5. Perform inspection after disassembly. Refer to [ST-40, "Inspection and Adjustment"](#).

ASSEMBLY

CAUTION:

Disassemble and assemble steering gear assembly by fixing the mounting area with a vise using copper plates.

1. Install inner socket to gear housing assembly with the following procedure.
 - a. Install spacer to gear housing assembly.
 - b. Apply thread sealant into the thread of inner socket.

Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to [GI-23, "Recommended Chemical Products and Sealants"](#).

- c. Screw inner socket into rack part and tighten at the specified torque.
2. Install large end of boot to gear housing assembly.
 3. Install small end of boot to inner socket boot mounting groove.
 4. Install boot clamp to boot small end.
 5. Install boot clamp to the large side of boot with the following procedure.

CAUTION:

Never reuse boot clamp.

STEERING GEAR AND LINKAGE

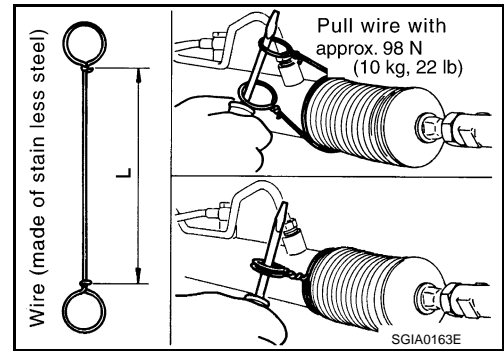
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

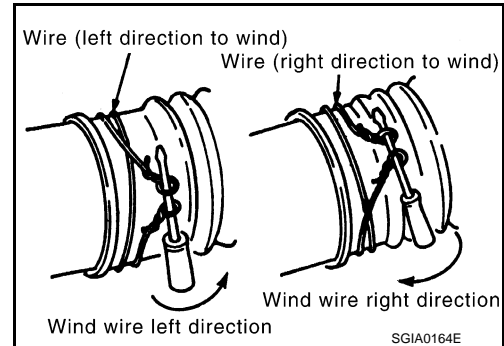
- a. Tighten large side of boot with boot clamp (stainless wire).

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).

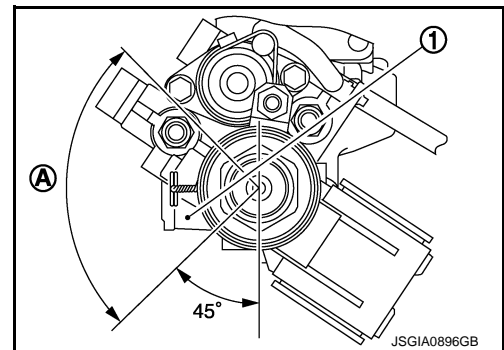


- c. Twist boot clamp as shown. Pay attention to relationship between winding and twisting directions.



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

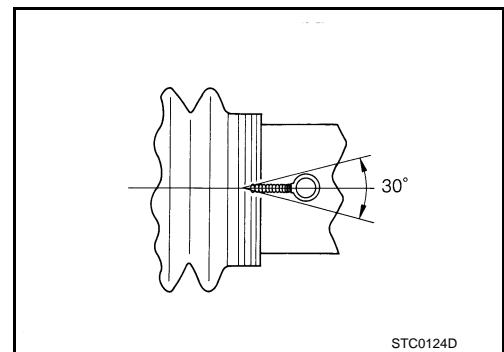
A : 90°



- 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.

CAUTION:

Keep gap from cylinder tube 5 mm (0.20 in) or more.

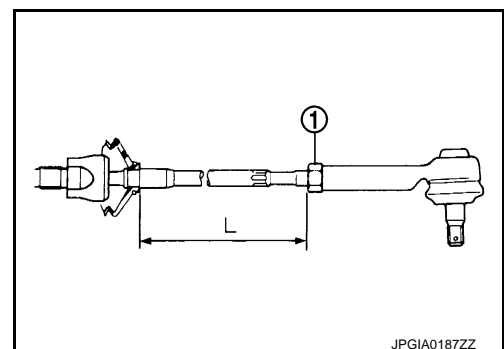


6. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Inner socket length (L) : Refer to [ST-47, "Inner Socket Length"](#).

CAUTION:

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



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STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

INFOID:00000008143643

Inspection and Adjustment

INSPECTION AFTER DISASSEMBLY

Boot

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

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.

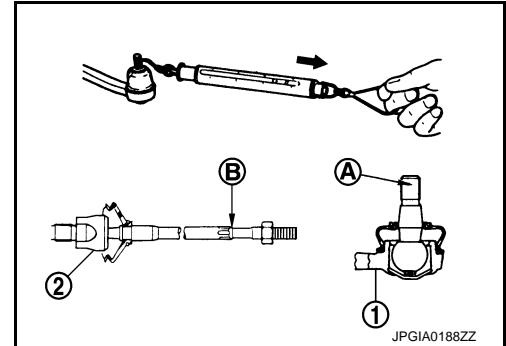
BALL JOINT SWINGING TORQUE

Hook a spring balance at the point 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 or inner socket if they are outside the standard.

Measuring point of outer socket (1) : Ball stud upper side (A)

Measuring point of inner socket (2) : Point (B) shown in the figure

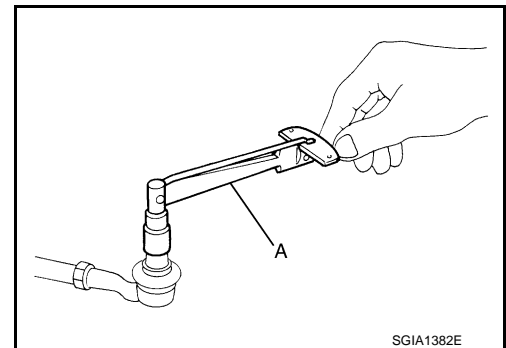
Swinging torque : Refer to [ST-47, "Socket Swing Force and Rotating Torque"](#).



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.

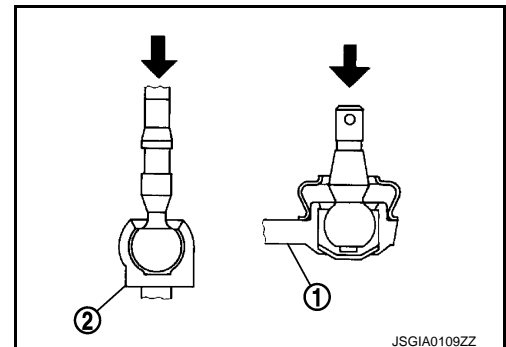
Rotating torque : Refer to [ST-47, "Socket Swing Force and Rotating Torque"](#).



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.

Axial end play : Refer to [ST-47, "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 torque, and front wheel turning angle. Refer to [ST-12, "Inspection"](#).
- Bleed the hydraulic system. Refer to [STC-24, "Work Procedure"](#).
- Check power steering fluid level and check for leakage. Refer to [ST-27, "Inspection"](#).
- Check wheel alignment. Refer to [FSU-7, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

- Use CONSULT to check steering angle signals, according to the following instruction: Turn the steering wheel to the end of right and left racks and check the steering angle signal shown in “DATA MONITOR” for “EPS”. If the difference between right and left steering angles is 50° or more, follow the steps listed below.

A

CAUTION:

Always check with the vehicle lifted up.

B

1. Fix the steering wheel at an angle calculated using the expression below:

(“Steering angle signal when turned to the end of right rack” – “Steering angle signal when turned to the end of left rack”) × 0.5

C

2. Separate lower joint from steering gear assembly. Refer to [ST-34, "Removal and Installation"](#).
3. Fix steering wheel in the neutral position.

D

CAUTION:

Never turn the steering wheel 120° or more. If this is neglected, the spiral cable may be broken

4. Install lower joint to steering gear assembly. Refer to [ST-34, "Removal and Installation"](#).
5. Check wheel alignment. Refer to [FSU-7, "Inspection"](#).
6. Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).
7. Check “DATA MONITOR” for “EPS” again to check that the difference between right and left steering angles is within 50°.

E

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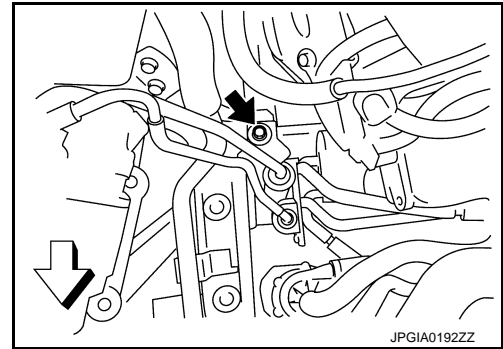
POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

4. Remove bracket mounting bolt of power steering piping assembly. Hang power steering piping assembly not to interfere with work. Refer to [ST-44, "Exploded View"](#).

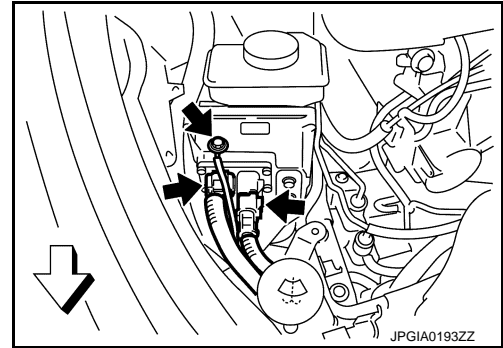
← : Vehicle front



5. Disconnect each connectors of power steering control module, and remove ground cable.

← : Vehicle front

6. Remove oil pump assembly.
7. Remove bracket.
8. Perform inspection after removal. Refer to [ST-43, "Inspection"](#).



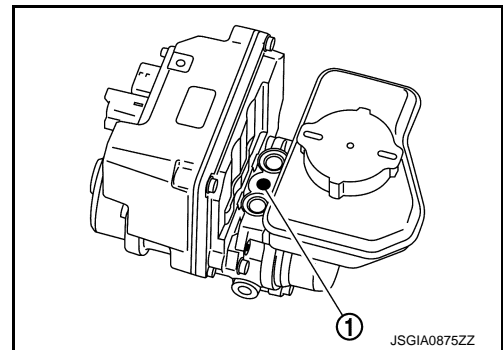
INSTALLATION

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

- When installing eye bolt and copper washer to oil pump assembly, refer to items as follows.

CAUTION:

- **Never reuse copper washer.**
 - **Before installing eye bolt, check that the copper washer has no scratches.**
 - **Securely install eye joint to the mounting surface of the oil pump assembly and manually tighten the eye bolt before tightening it to the specified torque.**
 - **Never loosen air valve (1) of the oil pump assembly.**
- Perform inspection after installation. Refer to [ST-43, "Inspection"](#).



INFOID:000000008143646

Inspection

INSPECTION AFTER REMOVAL

Check the following item. Replace malfunctioning parts, as necessary:

- Oil pump assembly for damage and malfunction.
- Reservoir cap and bracket for damage and malfunction.

INSPECTION AFTER INSTALLATION

- Bleed the hydraulic system. Refer to [STC-24, "Work Procedure"](#).
- Check power steering fluid level and check for leakage. Refer to [ST-27, "Inspection"](#).
- Perform self-diagnosis for "EPS" with CONSULT, and check that there is no malfunction. Refer to [STC-14, "CONSULT Function"](#).

HYDRAULIC LINE

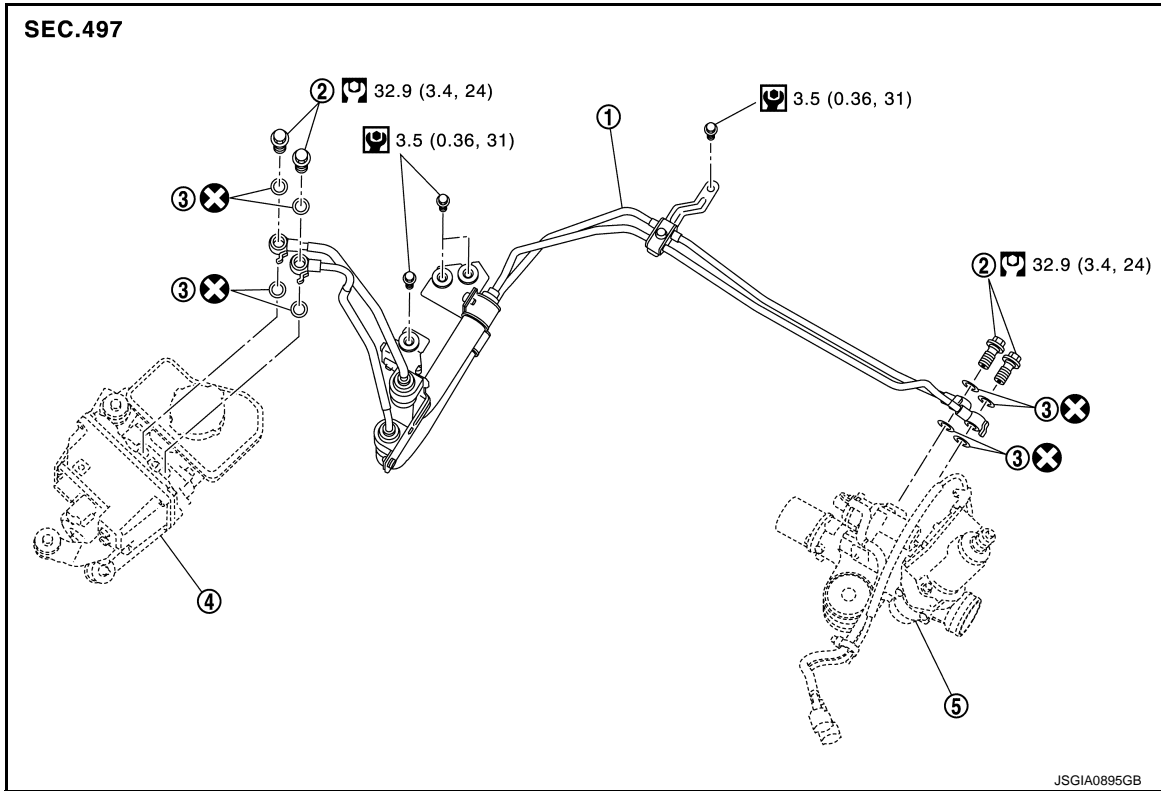
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

HYDRAULIC LINE

Exploded View

INFOID:000000008143647



- 1. Power steering piping assembly
- 2. Eye bolt
- 3. Copper washer
- 4. Power steering oil pump assembly
- 5. Steering gear assembly

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

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

: Always replace after every disassembly.

HEATED STEERING WHEEL SWITCH

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SWITCH

Removal and Installation

INFOID:000000008143648

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-12, "Exploded View"](#).
2. Remove heated steering wheel switch from instrument lower panel LH.

INSTALLATION

Install in the reverse order of removal.

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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[WITH HEATED STEERING WHEEL]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:000000008143649

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:000000008143650

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 Torque

INFOID:000000008143651

Unit: N·m (kg·m, in·lb)

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

Steering Angle

INFOID:000000008143652

Unit: Degree minute (Decimal degree)

Item	Standard	
Inner wheel	Minimum	36° 45' (36.75°)
	Nominal	39° 45' (39.75°)
	Maximum	40° 45' (40.75°)
Outer wheel	Nominal	33° 40' (33.67°)

Steering Column Length

INFOID:000000008143653

Unit: mm (in)

Item	Standard
Column length*	471 – 475 (18.54 – 18.70)

*: For measuring position, refer to [ST-32, "Inspection and Adjustment"](#).

Steering Column Mounting Dimensions

INFOID:000000008143654

Unit: mm (in)

Item	Standard
Mounting dimension	34.1 – 36.1 (1.343 – 1.421)

Steering Column Operating Range

INFOID:000000008143655

Item	Standard
Tilt operating range*	74 mm (2.91 in)
Telescopic operating range*	40 mm (1.57 in)
Rotating torque	0.49 N·m (0.05 kg·m, 4 in·lb)

*: For measuring position, refer to [ST-32, "Inspection and Adjustment"](#).

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[WITH HEATED STEERING WHEEL]

Lower Shaft Sliding Range

INFOID:000000008143656

Unit: mm (in)

Item	Standard
Sliding range	103 (4.06)

Rack Sliding Force

INFOID:000000008143657

Unit: N (kg, lb)

Item	Standard
Rack sliding force	227 – 265 (23.1 – 27.0, 51.0 – 59.5)

Rack Stroke

INFOID:000000008143658

Unit: mm (in)

Item	Standard
Rack stroke neutral position	69.0 (2.72)

Socket Swing Force and Rotating Torque

INFOID:000000008143659

SWING FORCE

Unit: N (kg, lb)

Item	Standard
Outer socket	1.5 – 42.7 (0.15 – 4.3, 0.33 – 9.5)
Inner socket	1.5 – 105.4 (0.15 – 10.7, 0.33 – 23.6)

ROTATING TORQUE

Unit: N·m (kg·m, in·lb)

Item	Standard
Outer socket	0.1 – 2.9 (0.01 – 0.29, 1 – 25)

Socket Axial End Play

INFOID:000000008143660

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:000000008143661

Unit: mm (in)

Item	Standard
Rack neutral position, dimension	77.7 (3.059)

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PRECAUTION

PRECAUTIONS

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

INFOID:000000008143662

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 12V battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation after 12V Battery Disconnect

INFOID:000000008143663

For vehicle with steering lock unit, if the 12V battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the 12V battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both 12V battery cables.
NOTE:
Supply power using jumper cables if 12V battery is discharged.
2. Turn the ignition switch to ACC position.
(At this time, the steering lock will be released.)
3. Disconnect both 12V battery cables. The steering lock will remain released with both 12V battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both 12V battery cables. With the brake pedal released, turn the ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the ignition switch is turned to LOCK position.)
6. Perform All DTC Reading using CONSULT and delete DTC.
NOTE:
Multiple DTCs are detected when 12V battery cable is disconnected while ignition switch is in ACC position.

PRECAUTIONS

< PRECAUTION >

[WITHOUT HEATED STEERING WHEEL]

Precaution for Removing 12V Battery

INFOID:000000008486631

CAUTION:

When the 12V battery is removed, plural DTC may be detected.
After installing 12V battery, always perform "All DTC" with CONSULT and delete DTC.

Precautions Concerning On-board Servicing of Hybrid Systems

INFOID:000000008143664

CAUTION:

Be sure to turn the ignition switch OFF before performing inspection and servicing inside the engine compartment or underneath the vehicle. If the ignition switch is ON (vehicle READY state), even if the engine is stopped, the conditions of the vehicle may cause the engine to start automatically.
If it is necessary to continually operate the engine during inspection or servicing, use the designated inspection mode. [HBC-89, "Description"](#).

Service Notice or Precautions for Steering System

INFOID:000000008143665

- 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.

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PREPARATION

[WITHOUT HEATED STEERING WHEEL]

< PREPARATION >

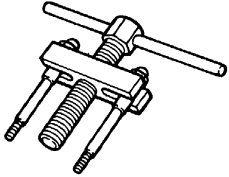
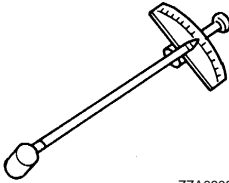
PREPARATION

PREPARATION

Special Service Tools

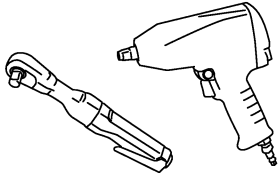
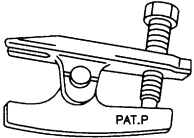
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The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST27180001 (J-25726-A) Steering wheel puller  ZZA0819D	Removing steering wheel
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	<ul style="list-style-type: none"> • Measuring steering wheel turning torque • Measuring steering column rotating torque • Measuring ball joint rotating torque

Commercial Service Tools

INFOID:000000008143667

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts
Ball joint remover  S-NT146	Removing steering outer socket

STEERING WHEEL

< BASIC INSPECTION >

[WITHOUT HEATED STEERING WHEEL]

BASIC INSPECTION

STEERING WHEEL

Inspection

INFOID:000000008143668

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. 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"](#).

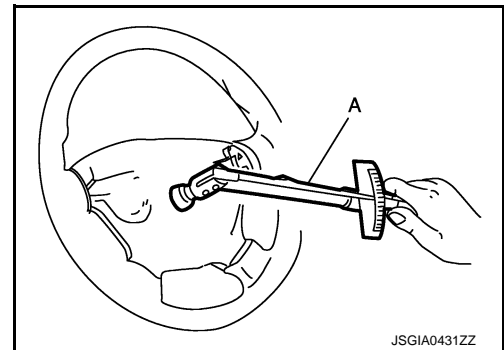
STEERING WHEEL TURNING TORQUE

1. Park the vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated to the specified pressure. Refer to [WT-64, "Tire Air Pressure"](#).
3. Remove driver air bag module. Refer to [SR-11, "Removal and Installation"](#).
4. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

5. Check steering wheel turning torque of the steering wheel by using preload gauge (A) [SST: ST3127S000 (J-25765-A)] with the vehicle set in the READY state.

Steering wheel turning torque : Refer to [ST-72, "Steering Wheel Turning Torque"](#).



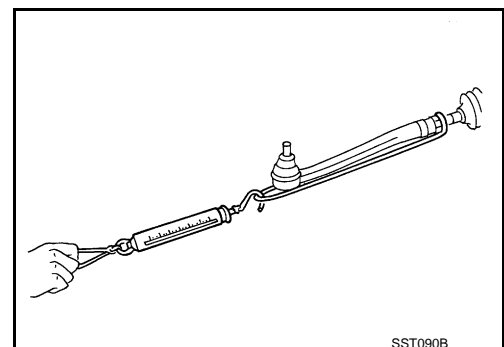
6. If the steering wheel turning torque of the steering wheel is outside the specification, perform diagnosis of "EPS" by using CONSULT. If no malfunction is detected, check rack sliding force.
 - a. Disconnect lower joint and steering knuckle from steering gear assembly. Refer to [ST-64, "Removal and Installation"](#).
 - b. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

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

Rack sliding force : Refer to [ST-73, "Rack Sliding Force"](#).

- d. 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"](#).

STEERING WHEEL

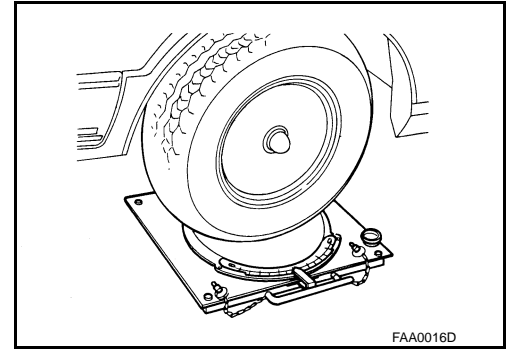
[WITHOUT HEATED STEERING WHEEL]

< BASIC INSPECTION >

CAUTION:

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

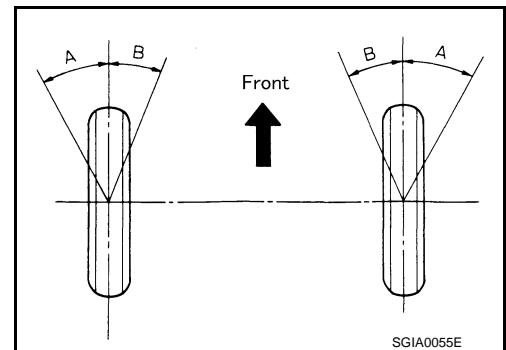
2. Place wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
3. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- Set the vehicle to READY and fully steer right and left to check the steering angle (maximum inner wheel steering angle and maximum outer wheel steering angle).

Inner wheel (Angle: A) : Refer to [ST-72, "Steering Angle"](#).

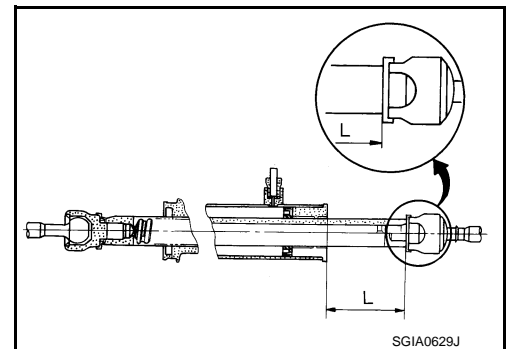
Outer wheel (Angle: B) : Refer to [ST-72, "Steering Angle"](#).



- If the steering angle is outside the specification, fully steer right and left with set the vehicle to READY to check rack stroke (L).

Rack stroke neutral position (L) : Refer to [ST-73, "Rack Stroke"](#).

- If rack stroke is out of specification, replace steering gear assembly.
- 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.



NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[WITHOUT HEATED STEERING WHEEL]

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000008143669

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

Symptom	Steering	Possible cause and SUSPECTED PARTS																				
		Fluid level	Air in hydraulic system	Outer/inner socket ball joint swinging torque	Outer/inner socket ball joint rotating torque	Outer/inner socket ball joint end play	Steering fluid leakage	Steering wheel play	Steering gear rack sliding force	Improper steering wheel	Improper installation or looseness of tilt lock lever	Mounting looseness	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	PROPELLER SHAFT	DIFFERENTIAL	AXLE and SUSPENSION	TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE
Reference		ST-54, "Inspection"	ST-54, "Inspection"	ST-67, "Inspection and Adjustment"	ST-67, "Inspection and Adjustment"	ST-67, "Inspection and Adjustment"	ST-54, "Inspection"	ST-51, "Inspection"	ST-51, "Inspection"	—	—	ST-63, "Exploded View"	ST-59, "Inspection and Adjustment"	ST-58, "Exploded View"	ST-63, "Exploded View"	NVH in DLN section.	NVH in DLN section.	NVH in FAX, RAX, FSU, RSU section.	NVH in WT section.	NVH in WT section.	NVH in RAX section.	NVH in BR section.
	Noise	x	x	x	x	x	x	x	x			x	x		x	x	x	x	x	x	x	x
	Shake									x	x	x			x	x		x	x	x	x	x
	Vibration									x	x	x	x		x			x	x			
	Shimmy									x		x		x				x	x	x		x
	Judder										x	x		x				x	x	x		x

x: Applicable

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PERIODIC MAINTENANCE

POWER STEERING FLUID

Inspection

INFOID:000000008143670

FLUID LEVEL

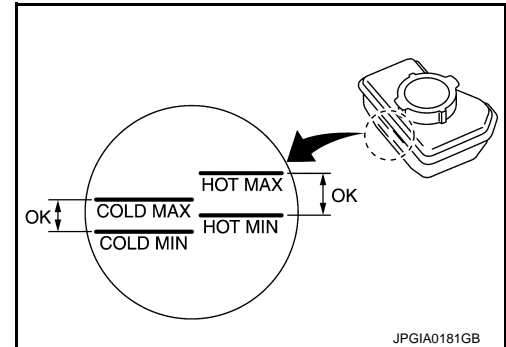
1. Turn the ignition switch OFF.
2. Ensure that fluid level is between MIN and MAX.
3. Fluid levels at HOT and COLD are different. Do not confuse them.

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

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

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

Fluid capacity : Refer to [ST-72, "General Specifications"](#).



JPGIA0181GB

CAUTION:

- The fluid level should not exceed the MAX line. Excessive fluid causes fluid leakage from the cap.
- Never reuse drained power steering fluid.
- Always use the specified fluid. Refer to [MA-10, "Fluids and Lubricants"](#).

FLUID LEAKAGE

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

1. Warm up the engine with the vehicle set in the READY state (engine at idle) and adjust the reservoir tank fluid temperature to the below.

Fluid temperature : 20 – 50°C (68 – 122°F)

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 leaks from the joint, loosen the joint part and retighten it, being careful not to damage it.

CAUTION:

For tightening torque and non reusable parts, refer to [ST-71, "Exploded View"](#).

5. If fluid leakage from oil pump is noticed, check oil pump. Refer to [ST-70, "Inspection"](#).
6. Check steering gear boots for accumulation of fluid leaked from steering gear.

BLEEDING HYDRAULIC SYSTEM

To bleed the hydraulic system, use "Work Support" mode for "EPS" with CONSULT. For the method for bleeding the hydraulic system, refer to [STC-24, "Work Procedure"](#).

NOTE:

- Insufficient bleeding of the system causes the following symptoms:
 - Bubbles form in the reservoir tank.
 - Operating noise of oil pump becomes loud.
 - When turning the steering wheel from fully-steered position to the neutral position, a loud abnormal sound develops.
- When steered fully and quickly, the power steering oil pump may generate an abnormal sound. This is not a malfunction.

STEERING WHEEL

< PERIODIC MAINTENANCE >

[WITHOUT HEATED STEERING WHEEL]

STEERING WHEEL

Inspection

INFOID:000000008143671

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.

Steering wheel axial end play : Refer to [ST-72, "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-58, "Exploded View"](#).
 - Check steering gear assembly mounting condition for looseness. Refer to [ST-63, "Exploded View"](#).

STEERING WHEEL PLAY

1. Turn steering wheel so that front wheels come to the straight-ahead position.
2. Set the vehicle to READY 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.

Steering wheel play on the outer circumference : Refer to [ST-72, "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 >

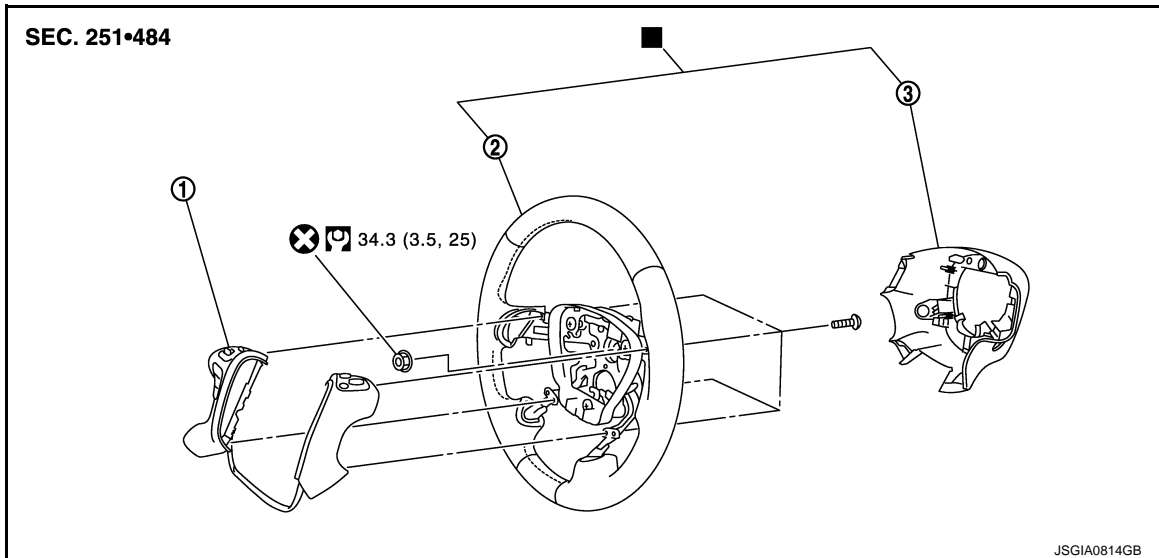
[WITHOUT HEATED STEERING WHEEL]

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:000000008143672



1. Steering switch

2. Steering wheel

3. Steering wheel rear cover

■: Replace the parts as a set.

⊙: N·m (kg·m, ft·lb)

⊗: Always replace after every disassembly.

Removal and Installation

INFOID:000000008143673

REMOVAL

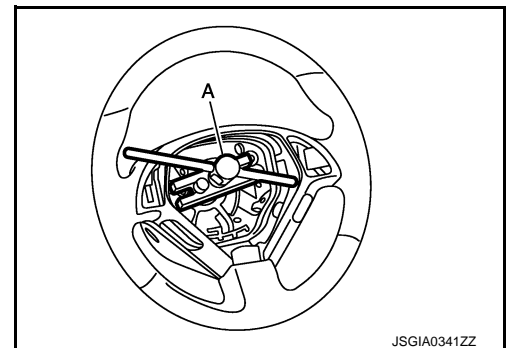
NOTE:

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. Disconnect steering switch connector.
4. Remove steering wheel lock nut after steering is locked.
5. 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"](#).

STEERING WHEEL

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

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.

Disassembly and Assembly

INFOID:000000008143674

DISASSEMBLY

1. Remove steering wheel assembly.
2. Remove steering wheel rear cover.
3. Disconnect horn connector.
4. Remove steering switch.

ASSEMBLY

Install in the reverse order of removal.

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STEERING COLUMN

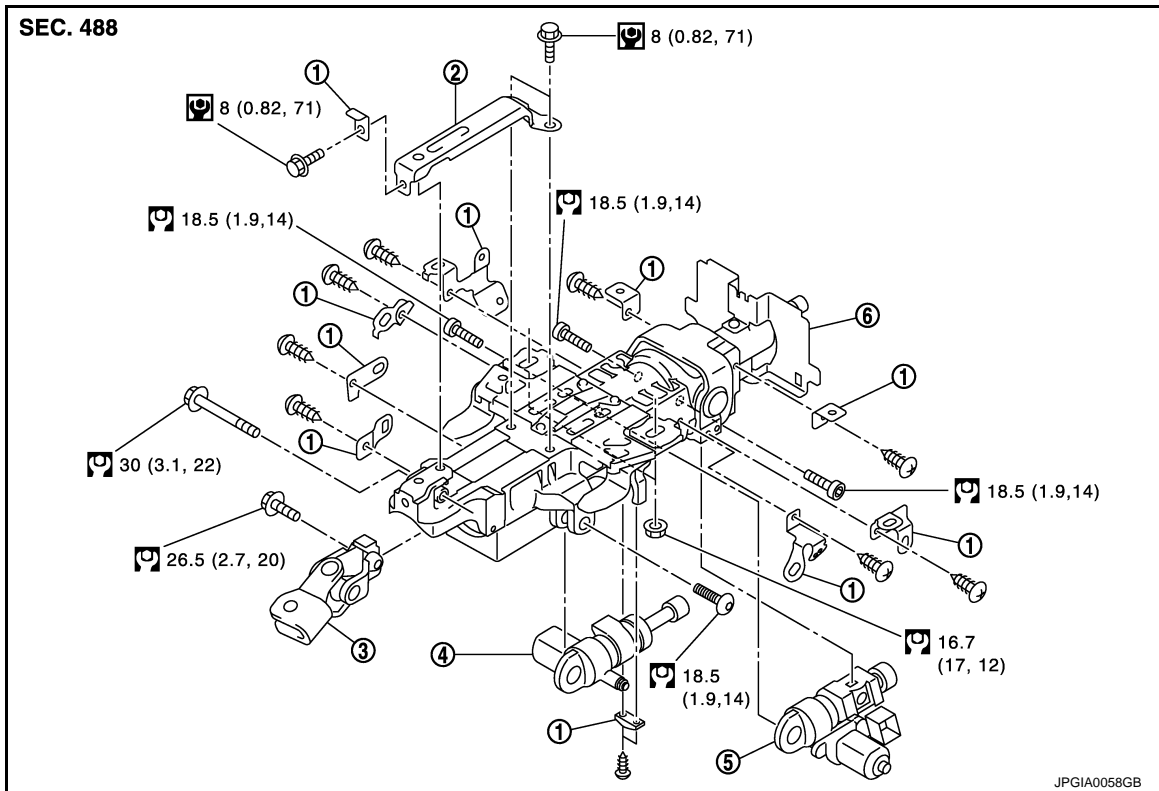
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

STEERING COLUMN

Exploded View

INFOID:000000008143675



- | | | |
|---------------------|-------------------------------------|-----------------------------|
| 1. Bracket | 2. Steering column mounting bracket | 3. Upper joint |
| 4. Telescopic motor | 5. Tilt motor | 6. Steering column assembly |

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

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

Removal and Installation

INFOID:000000008143676

REMOVAL

CAUTION:

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

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-56, "Removal and Installation"](#).
5. Remove the instrument side finisher LH. Refer to [IP-13, "Removal and Installation"](#).
6. Remove instrument lower panel LH. Refer to [IP-13, "Removal and Installation"](#).
7. Remove the steering column cover. Refer to [IP-13, "Removal and Installation"](#).
8. Remove spiral cable. Refer to [SR-14, "Removal and Installation"](#).
9. Remove combination switch. Refer to [BCS-81, "Removal and Installation"](#).
10. Remove knee protector.
11. Disconnect each switch harness connectors installed to steering column assembly.
12. Remove the upper joint mounting bolt and nut (lower shaft side), and separate the joint from lower shaft.

STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

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.

13. Remove the upper joint mounting bolt (steering column side), and remove upper joint from steering column assembly.

CAUTION:

- Place a matching mark on both upper joint and steering column assembly before removing upper joint.
- 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.

14. Remove steering column assembly.

- If necessary, remove telescopic motor, tilt motor, and brackets.

15. Perform inspection after removal. Refer to [ST-59. "Inspection and Adjustment"](#).

INSTALLATION

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

CAUTION:

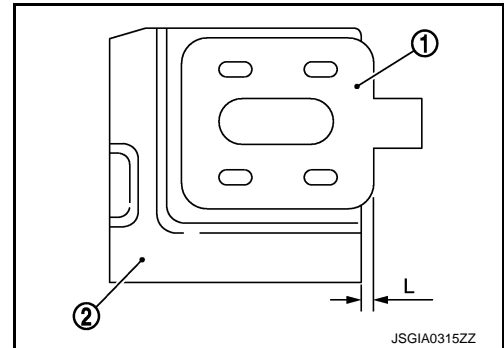
- Never give axial impact to steering column assembly during removal.
- Never move steering gear assembly when removing steering column assembly.
- When tightening the mounting bolt of the upper joint (steering column assembly side) manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the notch of the steering column assembly before tightening the bolt to the specified torque.

CAUTION:

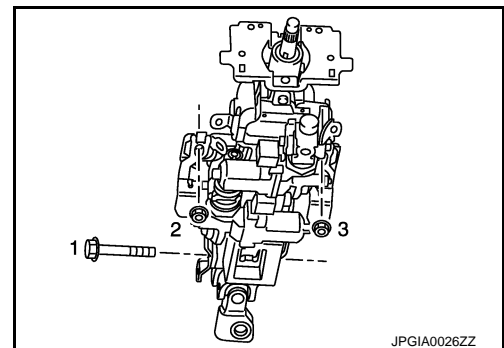
Never reuse upper joint mounting nut (lower shaft side).

- To install the slide plate (1), create clearance (L) in the steering column assembly mounting area (2) as follows.

L : 2.0 mm (0.079 in)



- Tighten the mounting bolts and nuts in the order shown in the figure when installing the steering column assembly.
- Perform inspection after installation. Refer to [ST-59. "Inspection and Adjustment"](#).



INFOID:000000008143677

Inspection and Adjustment

INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if necessary.

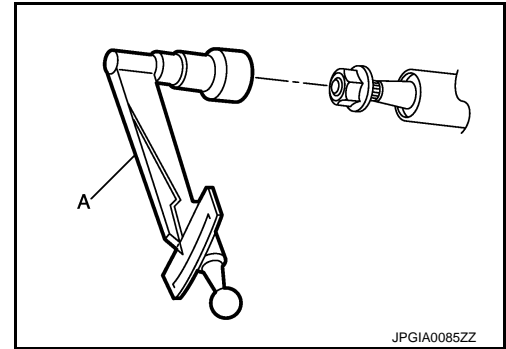
STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

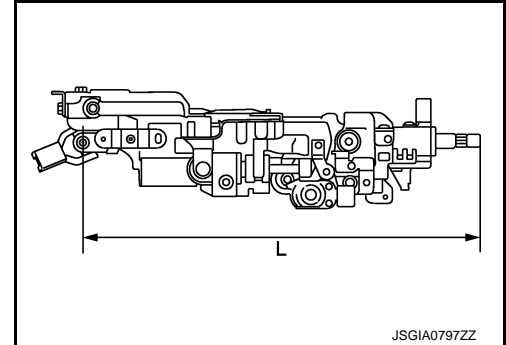
- Measure steering column rotating torque using a preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if outside the standard.

Rotating torque : Refer to [ST-72, "Steering Column Operating Range"](#).



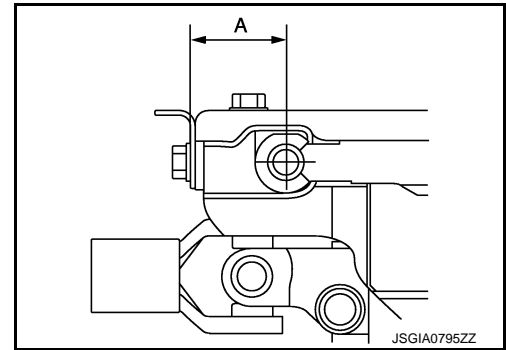
- Measure the length (L) as shown, if vehicle has been involved in a minor collision. Replace steering column assembly if out side the standard.

Steering column length (L) : Refer to [ST-72, "Steering Column Length"](#).



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

Mounting dimensions (A) : Refer to [ST-72, "Steering Column Mounting Dimensions"](#).



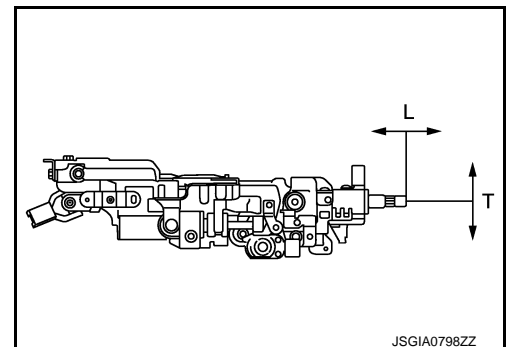
INSPECTION AFTER INSTALLATION

- 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 torque, and front wheel turning angle. Refer to [ST-51, "Inspection"](#).
- Check tilt and telescopic mechanism operating range tilt operating range (T), telescopic operating range (L) as shown in the figure.

Tilt operating range (T) : Refer to [ST-72, "Steering Column Operating Range"](#).

Telescopic operating range (L) : Refer to [ST-72, "Steering Column Operating Range"](#).

- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).



LOWER SHAFT

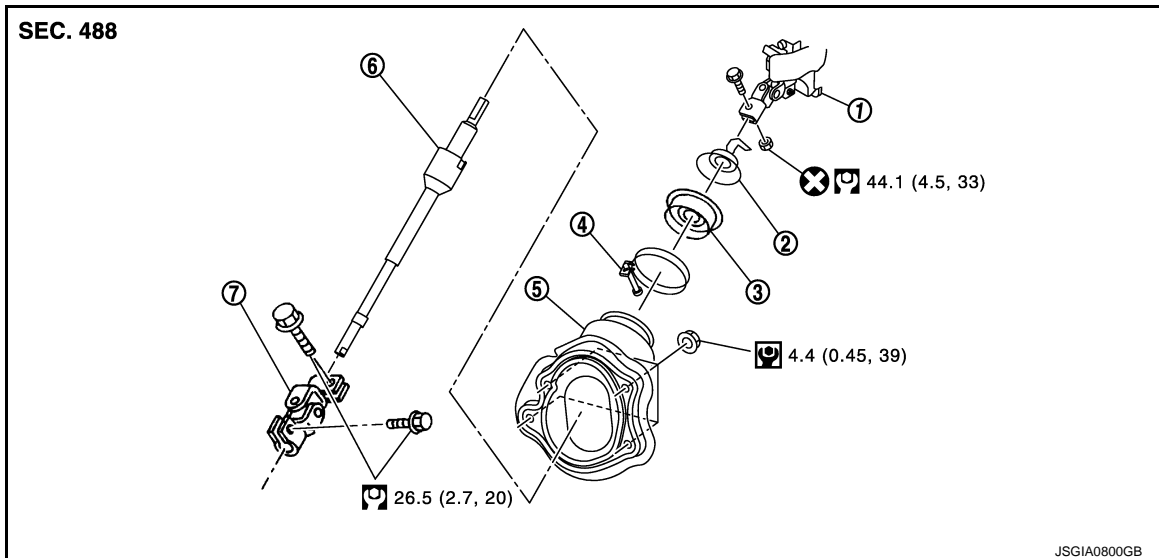
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

LOWER SHAFT

Exploded View

INFOID:000000008143678



- | | | |
|-----------------------------|---------------|--------------------|
| 1. Steering column assembly | 2. Collar | 3. Hole cover seal |
| 4. Clamp | 5. Hole cover | 6. Lower shaft |
| 7. Lower joint | | |

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:000000008143679

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.

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

CAUTION:

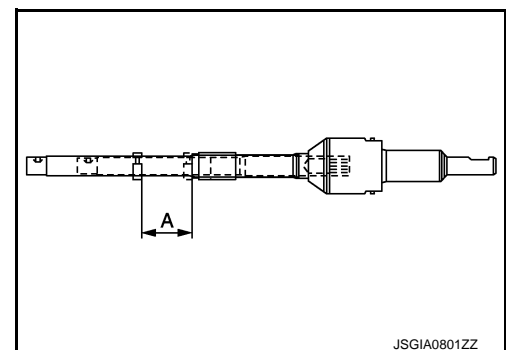
- Place a matching mark on both lower joint and steering gear assembly before removing lower joint.
- When removing lower joint, never insert a tool, such as a screwdriver, into the yoke groove to pull out the lower joint. In case of the violation of the above, replace lower joint with a new one.

5. Remove the side brake wire clamp stay.
6. Remove the hole cover mounting nuts.
7. Remove the upper joint fixing bolt and nut (lower shaft side).

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.

8. Remove the lower shaft and hole cover.



LOWER SHAFT

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

9. Remove collar, hole cover seal, clamp and hole cover.
10. Perform inspection after removal. Refer to [ST-62, "Inspection"](#).

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.**
- **Never reuse upper joint mounting nut (lower shaft side).**
- Tighten the clamp to the specified torque and check the clamp length (A).

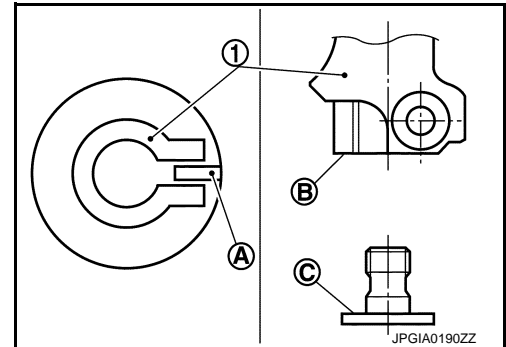
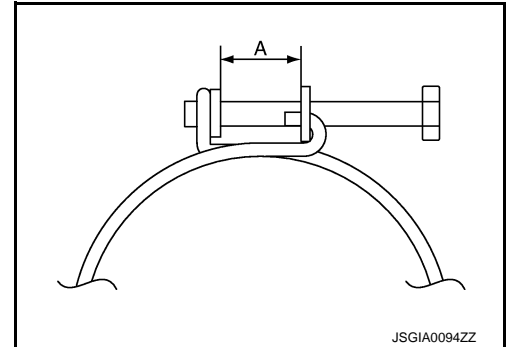
Clamp length "A" : 14.0 – 18.0 mm (0.551 – 0.709 in)

- 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 the slit of lower joint (1) with the cap marking (A) of the steering gear assembly and securely install the lower joint so that lower joint surface (B) and the steering gear assembly surface (C) properly contact.
- When tightening the mounting bolt of the lower joint (steering gear assembly side), manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the groove of the steering gear assembly before tightening the bolt to the specified torque.
- Perform inspection after installation. Refer to [ST-62, "Inspection"](#).



Inspection

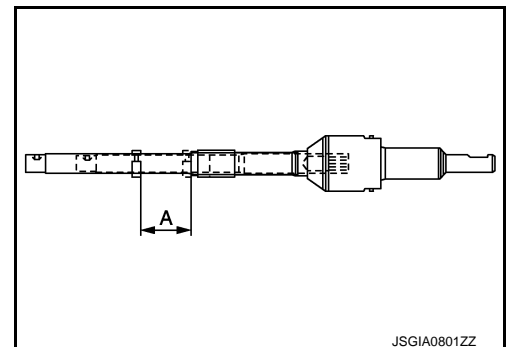
INSPECTION AFTER REMOVAL

- Check lower shaft and lower joint for damage or other malfunctions. Replace if there are.
- Check collar, hole cover seal, clamp, and hole cover for damage or other malfunctions. Replace if there are.
- Check the sliding range of the lower shaft.

CAUTION:

Check the sliding range (A) (between the extended position and the contracted position) of the lower shaft.

Sliding range : Refer to [ST-73, "Lower Shaft Sliding Range"](#).



INSPECTION AFTER INSTALLATION

- Check lower shaft and lower joint for damage or other malfunctions. Replace if there are.
- Check collar, hole cover seal, clamp, and hole cover for damage or other malfunctions. Replace if there are.
- 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 torque, and front wheel turning angle. Refer to [ST-51, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

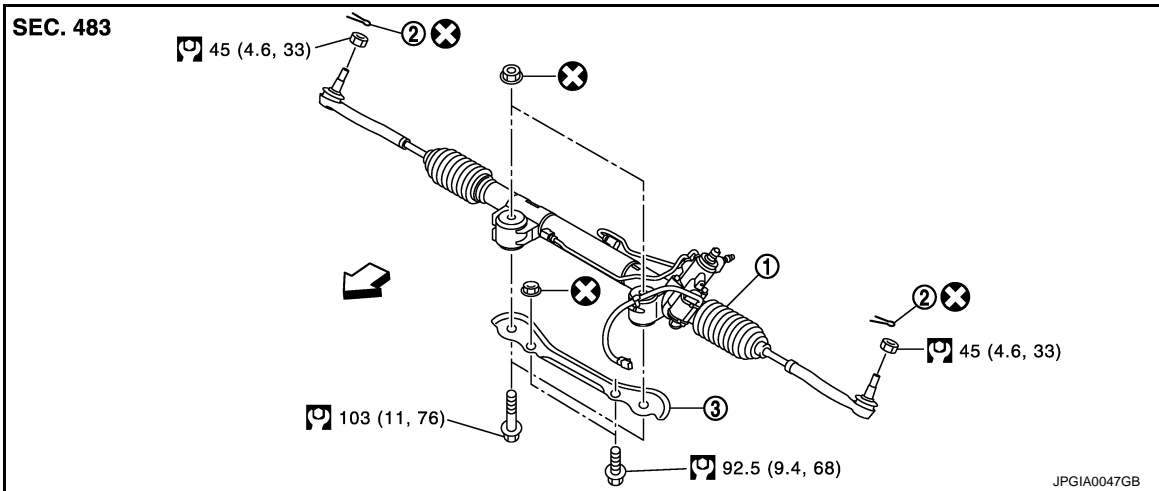
[WITHOUT HEATED STEERING WHEEL]

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000008143681

REMOVAL



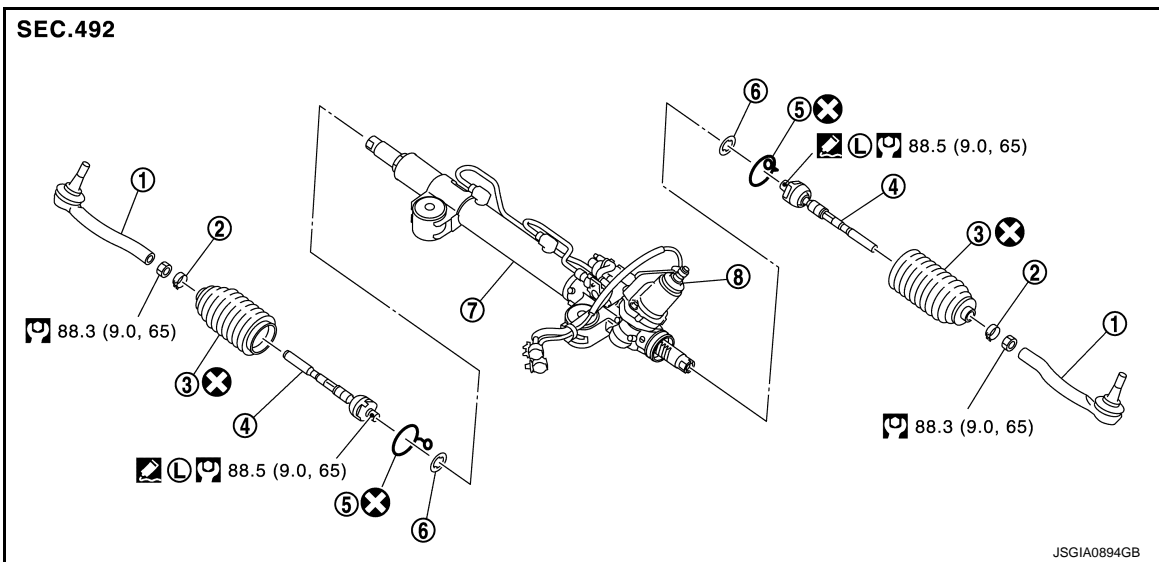
- 1. Steering gear assembly
- 2. Cotter pin
- 3. Rack stay

←: Vehicle front

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

DISASSEMBLY



- 1. Outer socket
- 2. Boot clamp
- 3. Boot
- 4. Inner socket
- 5. Boot clamp (stainless wire)
- 6. Spacer
- 7. Gear housing assembly
- 8. Cap

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

(L): Apply Genuine High Strength Thread Locking Sealant or equivalent. Refer to [GI-23, "Recommended Chemical Products and Sealants"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

INFOID:00000008143682

Removal and Installation

REMOVAL

1. Set the vehicle to the straight-ahead position.
2. Remove tires with a power tool. Refer to [WT-58, "Exploded View"](#).
3. Remove engine under cover and front under cover.
 - Engine under cover: Refer to [EXT-28, "ENGINE UNDER COVER : Removal and Installation"](#).
 - Front under cover: Refer to [EXT-29, "FRONT UNDER COVER : Removal and Installation"](#).
4. Remove suspension member stay. Refer to [FSU-18, "Exploded View"](#).
5. Remove cotter pin, and then loosen the nut.
6. Remove steering outer socket from steering knuckle so as not to damage ball joint boot 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.

7. Remove power steering piping assembly from steering gear assembly, and then drain power steering fluid. Refer to [ST-71, "Exploded View"](#).

CAUTION:

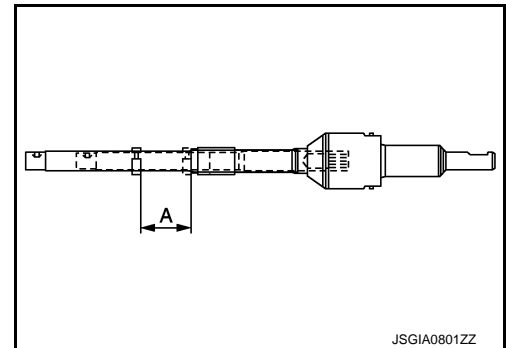
- Never reuse drained power steering fluid.
- Always use the specified fluid. Refer to [MA-10, "Fluids and Lubricants"](#).

8. Remove flow connection valve harness and torque sensor harness.
9. Remove lower joint fixing bolt (steering gear side).

10. Separate the lower joint from the steering gear assembly by sliding the slide shaft (A: sliding range).

CAUTION:

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



11. Remove rack stay.
12. Remove steering gear assembly mounting bolts, and nuts.
13. Remove steering gear assembly.

INSTALLATION

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

CAUTION:

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

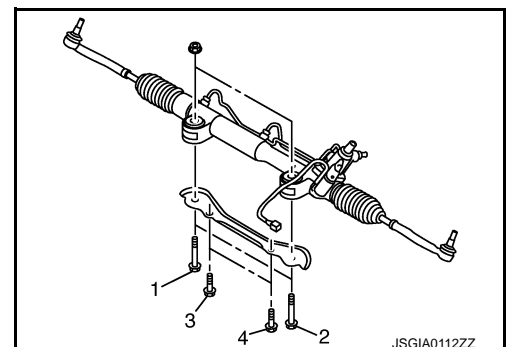
- Never reuse steering outer socket mounting nut.
- Tighten the mounting bolts in the order shown in the figure when installing the steering gear assembly.

Temporary tightening: 1 ⇒ 2 ⇒ 3 ⇒ 4

Final tightening: 1 ⇒ 2 ⇒ 3 ⇒ 4

CAUTION:

Never reuse the steering gear assembly mounting nut.



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

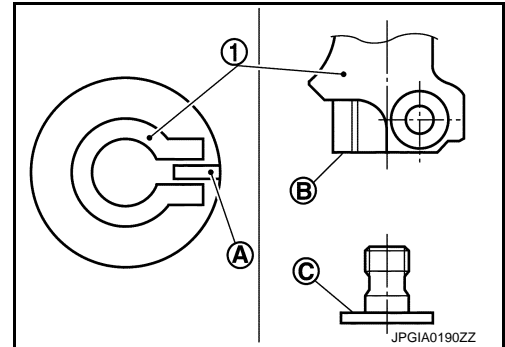
- When installing lower joint to steering gear assembly, follow the procedure listed below.
- Set rack of steering gear in the neutral position.

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 the slit of lower joint (1) with the cap marking (A) of the steering gear assembly and securely install the lower joint so that lower joint surface (B) and the steering gear assembly surface (C) properly contact.
- When tightening the mounting bolt of the lower joint (steering gear assembly side), manually tighten the bolt and check that there is no hook and scratch. Check that the bolt is properly placed in the groove of the steering gear assembly before tightening the bolt to the specified torque.

- Perform inspection after installation. Refer to [ST-67, "Inspection and Adjustment"](#).



INFOID:000000008143683

Disassembly and Assembly

DISASSEMBLY

CAUTION:

Disassemble and assemble steering gear assembly by fixing the mounting area with a vise using copper plates.

1. Loosen outer socket lock nut, and remove outer socket.
2. 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.

3. Remove inner socket from gear housing assembly.
4. Remove spacer from gear housing assembly.

CAUTION:

Never damage rack assembly.

5. Perform inspection after disassembly. Refer to [ST-67, "Inspection and Adjustment"](#).

ASSEMBLY

CAUTION:

Disassemble and assemble steering gear assembly by fixing the mounting area with a vise using copper plates.

1. Install inner socket to gear housing assembly with the following procedure.
 - a. Install spacer to gear housing assembly.
 - b. Apply thread sealant into the thread of inner socket.

Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to [GI-23, "Recommended Chemical Products and Sealants"](#).

- c. Screw inner socket into rack part and tighten at the specified torque.
2. Install large end of boot to gear housing assembly.
 3. Install small end of boot to inner socket boot mounting groove.
 4. Install boot clamp to boot small end.
 5. Install boot clamp to the large side of boot with the following procedure.

CAUTION:

Never reuse boot clamp.

STEERING GEAR AND LINKAGE

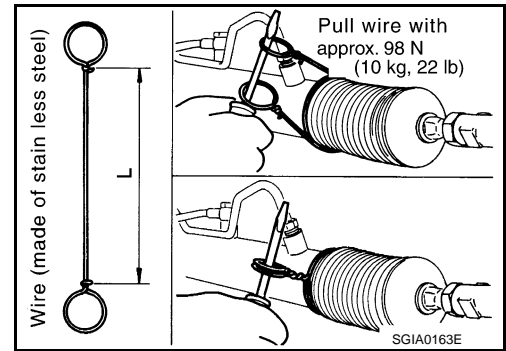
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

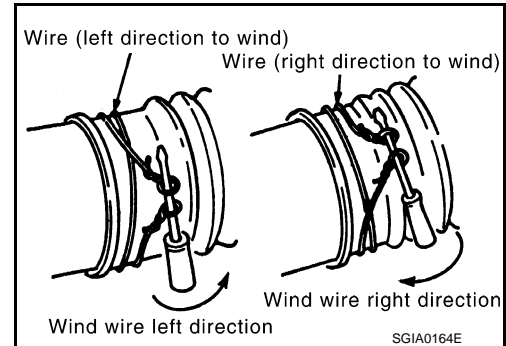
- a. Tighten large side of boot with boot clamp (stainless wire).

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).

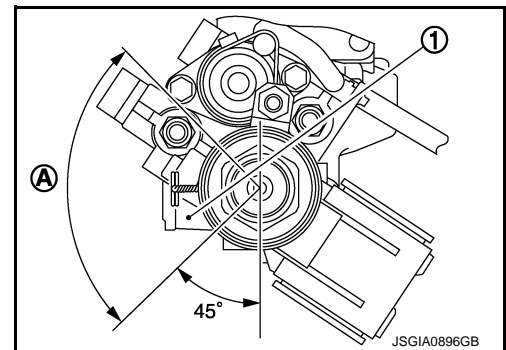


- c. Twist boot clamp as shown. Pay attention to relationship between winding and twisting directions.



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

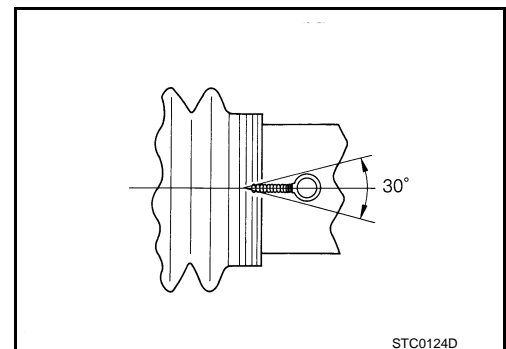
A : 90°



- 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.

CAUTION:

Keep gap from cylinder tube 5 mm (0.20 in) or more.

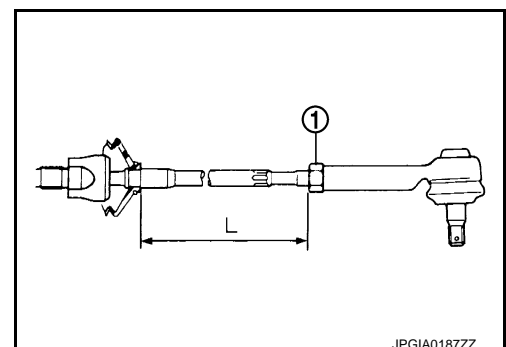


6. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Inner socket length (L) : Refer to [ST-73](#), "Inner Socket Length".

CAUTION:

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



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

Inspection and Adjustment

INFOID:000000008143684

INSPECTION AFTER DISASSEMBLY

Boot

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

Gear Housing Assembly

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

Outer Socket and Inner Socket

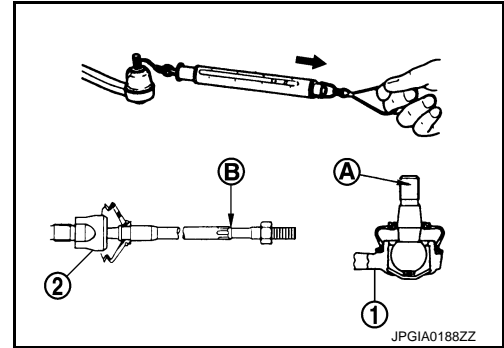
Check the following items and replace the component if it does not meet the standard.

BALL JOINT SWINGING TORQUE

Hook a spring balance at the point 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 or inner socket if they are outside the standard.

- Measuring point of outer socket (1) : Ball stud upper side (A)
Measuring point of inner socket (2) : Point (B) shown in the figure

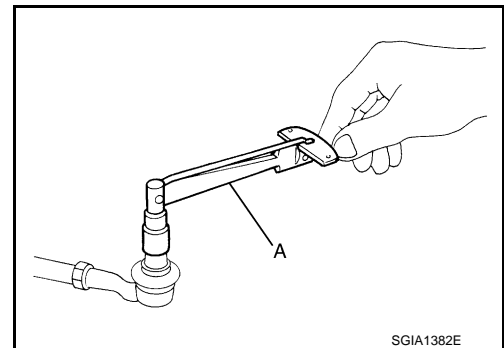
Swinging torque : Refer to [ST-73, "Socket Swing Force and Rotating Torque"](#).



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.

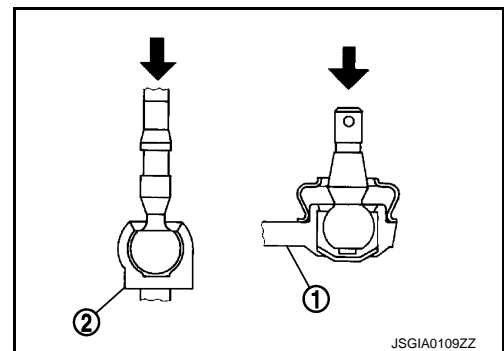
Rotating torque : Refer to [ST-73, "Socket Swing Force and Rotating Torque"](#).



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.

Axial end play : Refer to [ST-73, "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 torque, and front wheel turning angle. Refer to [ST-51, "Inspection"](#).
- Bleed the hydraulic system. Refer to [STC-24, "Work Procedure"](#).
- Check power steering fluid level and check for leakage. Refer to [ST-54, "Inspection"](#).
- Check wheel alignment. Refer to [FSU-7, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

- Use CONSULT to check steering angle signals, according to the following instruction: Turn the steering wheel to the end of right and left racks and check the steering angle signal shown in “DATA MONITOR” for “EPS”. If the difference between right and left steering angles is 50° or more, follow the steps listed below.

CAUTION:

Always check with the vehicle lifted up.

1. Fix the steering wheel at an angle calculated using the expression below:

(“Steering angle signal when turned to the end of right rack” – “Steering angle signal when turned to the end of left rack”) × 0.5

2. Separate lower joint from steering gear assembly. Refer to [ST-61, "Removal and Installation"](#).
3. Fix steering wheel in the neutral position.
CAUTION:
Never turn the steering wheel 120° or more. If this is neglected, the spiral cable may be broken
4. Install lower joint to steering gear assembly. Refer to [ST-61, "Removal and Installation"](#).
5. Check wheel alignment. Refer to [FSU-7, "Inspection"](#).
6. Adjust neutral position of steering angle sensor. Refer to [BRC-66, "Work Procedure"](#).
7. Check “DATA MONITOR” for “EPS” again to check that the difference between right and left steering angles is within 50°.

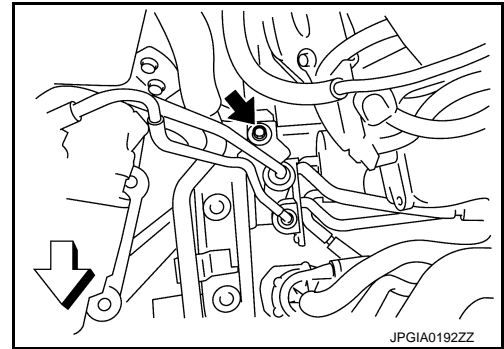
POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

4. Remove bracket mounting bolt of power steering piping assembly. Hang power steering piping assembly not to interfere with work. Refer to [ST-71, "Exploded View"](#).

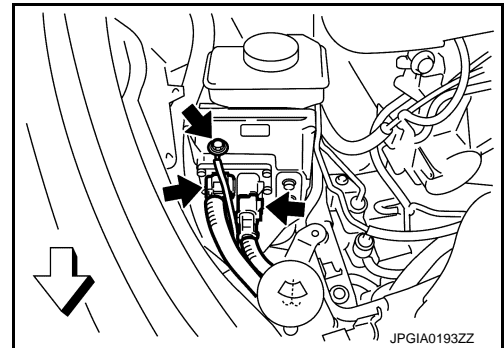
← : Vehicle front



5. Disconnect each connectors of power steering control module, and remove ground cable.

← : Vehicle front

6. Remove oil pump assembly.
7. Remove bracket.
8. Perform inspection after removal. Refer to [ST-70, "Inspection"](#).



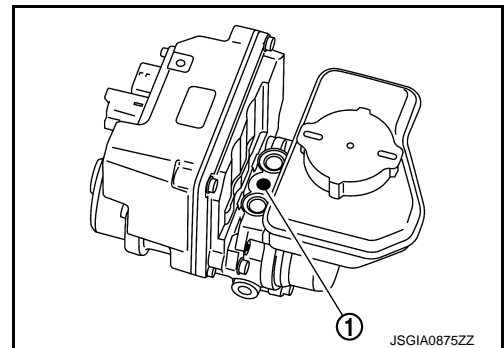
INSTALLATION

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

- When installing eye bolt and copper washer to oil pump assembly, refer to items as follows.

CAUTION:

- **Never reuse copper washer.**
 - **Before installing eye bolt, check that the copper washer has no scratches.**
 - **Securely install eye joint to the mounting surface of the oil pump assembly and manually tighten the eye bolt before tightening it to the specified torque.**
 - **Never loosen air valve (1) of the oil pump assembly.**
- Perform inspection after installation. Refer to [ST-70, "Inspection"](#).



Inspection

INFOID:000000008143687

INSPECTION AFTER REMOVAL

Check the following item. Replace malfunctioning parts, as necessary:

- Oil pump assembly for damage and malfunction.
- Reservoir cap and bracket for damage and malfunction.

INSPECTION AFTER INSTALLATION

- Bleed the hydraulic system. Refer to [STC-24, "Work Procedure"](#).
- Check power steering fluid level and check for leakage. Refer to [ST-54, "Inspection"](#).
- Perform self-diagnosis for "EPS" with CONSULT, and check that there is no malfunction. Refer to [STC-14, "CONSULT Function"](#).

HYDRAULIC LINE

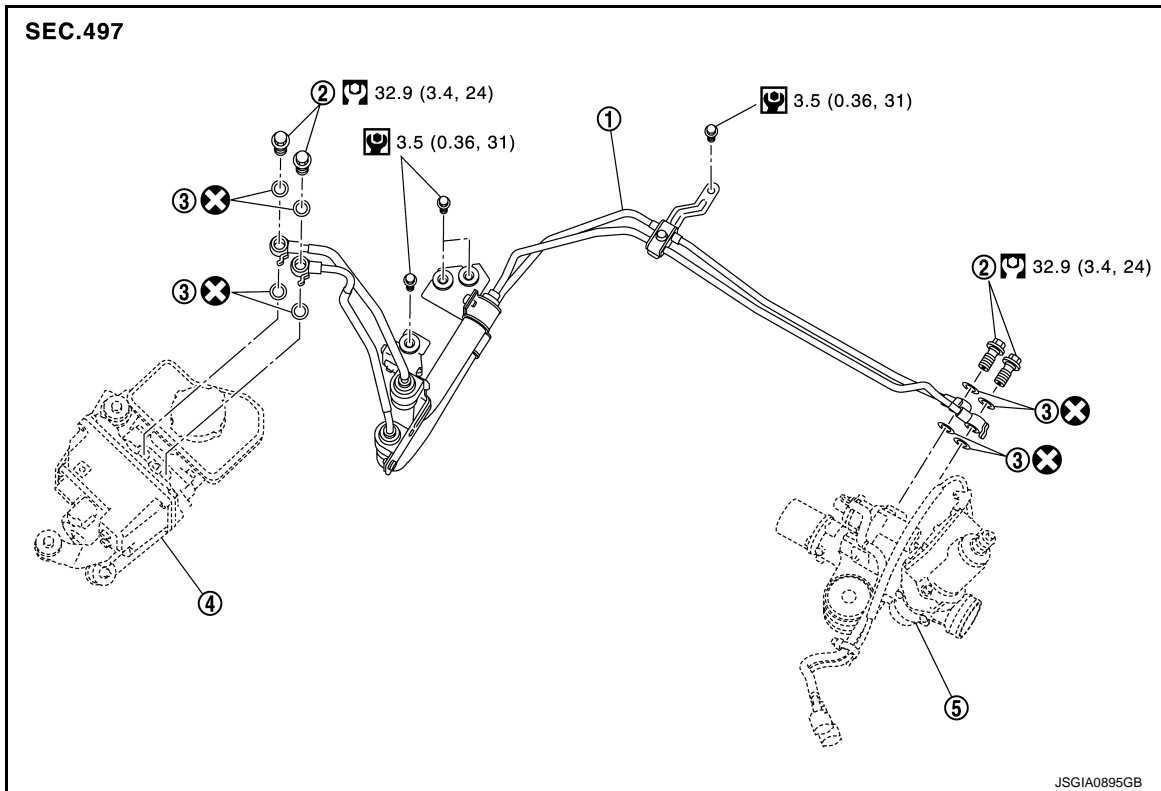
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

HYDRAULIC LINE

Exploded View

INFOID:000000008143688



- 1. Power steering piping assembly
- 2. Eye bolt
- 3. Copper washer
- 4. Power steering oil pump assembly
- 5. Steering gear assembly

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

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)

[WITHOUT HEATED STEERING WHEEL]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:000000008143689

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:000000008143690

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 Torque

INFOID:000000008143691

Unit: N-m (kg-m, in-lb)

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

Steering Angle

INFOID:000000008143692

Unit: Degree minute (Decimal degree)

Item	Standard	
Inner wheel	Minimum	36° 45' (36.75°)
	Nominal	39° 45' (39.75°)
	Maximum	40° 45' (40.75°)
Outer wheel	Nominal	33° 40' (33.67°)

Steering Column Length

INFOID:000000008143693

Unit: mm (in)

Item	Standard
Column length*	471 – 475 (18.54 – 18.70)

*: For measuring position, refer to [ST-59, "Inspection and Adjustment"](#).

Steering Column Mounting Dimensions

INFOID:000000008143694

Unit: mm (in)

Item	Standard
Mounting dimension	34.1 – 36.1 (1.343 – 1.421)

Steering Column Operating Range

INFOID:000000008143695

Item	Standard
Tilt operating range*	74 mm (2.91 in)
Telescopic operating range*	40 mm (1.57 in)
Rotating torque	0.49 N-m (0.05 kg-m, 4 in-lb)

*: For measuring position, refer to [ST-59, "Inspection and Adjustment"](#).

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[WITHOUT HEATED STEERING WHEEL]

Lower Shaft Sliding Range

INFOID:000000008143696

Unit: mm (in)

Item	Standard
Sliding range	103 (4.06)

Rack Sliding Force

INFOID:000000008143697

Unit: N (kg, lb)

Item	Standard
Rack sliding force	227 – 265 (23.1 – 27.0, 51.0 – 59.5)

Rack Stroke

INFOID:000000008143698

Unit: mm (in)

Item	Standard
Rack stroke neutral position	69.0 (2.72)

Socket Swing Force and Rotating Torque

INFOID:000000008143699

SWING FORCE

Unit: N (kg, lb)

Item	Standard
Outer socket	1.5 – 42.7 (0.15 – 4.3, 0.33 – 9.5)
Inner socket	1.5 – 105.4 (0.15 – 10.7, 0.33 – 23.6)

ROTATING TORQUE

Unit: N·m (kg·m, in·lb)

Item	Standard
Outer socket	0.1 – 2.9 (0.01 – 0.29, 1 – 25)

Socket Axial End Play

INFOID:000000008143700

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:000000008143701

Unit: mm (in)

Item	Standard
Rack neutral position, dimension	77.7 (3.059)

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