

SECTION **ST**
STEERING SYSTEM

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

CONTENTS

| | |
|--|-----------|
| WITH HEATED STEERING WHEEL | |
| PRECAUTION | 3 |
| PRECAUTIONS | 3 |
| Precaution for Technicians Using Medical Electric..... | 3 |
| Point to Be Checked Before Starting Maintenance Work | 3 |
| Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" | 3 |
| Precautions for Removing Battery Terminal | 4 |
| Service Notice or Precautions for Steering System | 5 |
| PREPARATION | 6 |
| PREPARATION | 6 |
| Special Service Tools | 6 |
| Commercial Service Tools | 6 |
| SYSTEM DESCRIPTION | 7 |
| COMPONENT PARTS | 7 |
| HEATED STEERING WHEEL SYSTEM | 7 |
| HEATED STEERING WHEEL SYSTEM : Component Parts Location | 7 |
| HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel | 8 |
| HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch | 8 |
| HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay | 8 |
| HEATED STEERING WHEEL SYSTEM : A/C Auto Amp. | 8 |
| SYSTEM | 9 |
| HEATED STEERING WHEEL SYSTEM | 9 |
| HEATED STEERING WHEEL SYSTEM : System Description | 9 |
| HEATED STEERING WHEEL SYSTEM : Circuit Diagram | 10 |
| WIRING DIAGRAM | 11 |
| HEATED STEERING WHEEL | 11 |
| Wiring Diagram | 11 |
| BASIC INSPECTION | 13 |
| DIAGNOSIS AND REPAIR WORK FLOW | 13 |
| Work Flow (Heated Steering Wheel) | 13 |
| STEERING WHEEL | 14 |
| Inspection | 14 |
| DTC/CIRCUIT DIAGNOSIS | 16 |
| HEATED STEERING WHEEL SYSTEM | 16 |
| Component Function Check | 16 |
| Diagnosis Procedure | 16 |
| Component Inspection (Heated Steering Wheel Switch) | 18 |
| Component Inspection (Heated Steering Wheel) | 19 |
| Component Inspection (Heated Steering Wheel Relay) | 19 |
| HEATED STEERING WHEEL SWITCH INDICATOR LAMP | 20 |
| Component Function Check | 20 |
| Diagnosis Procedure | 20 |
| Component Inspection (Heated Steering Wheel Switch) | 22 |
| Component Inspection (Heated Steering Wheel Relay) | 22 |
| SYMPTOM DIAGNOSIS | 23 |
| HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE | 23 |
| Description | 23 |
| Diagnosis Procedure | 23 |

| | | | |
|--|----|---|----|
| HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON | 26 | Precautions for Removing Battery Terminal | 45 |
| Description | 26 | Service Notice or Precautions for Steering System | 46 |
| Diagnosis Procedure | 26 | | |
| NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING | 28 | PREPARATION | 47 |
| NVH Troubleshooting Chart | 28 | PREPARATION | 47 |
| | | Special Service Tools | 47 |
| | | Commercial Service Tools | 47 |
| PERIODIC MAINTENANCE | 29 | BASIC INSPECTION | 48 |
| STEERING WHEEL | 29 | STEERING WHEEL | 48 |
| Inspection | 29 | Inspection | 48 |
| REMOVAL AND INSTALLATION | 30 | SYMPTOM DIAGNOSIS | 50 |
| STEERING WHEEL | 30 | NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING | 50 |
| Exploded View | 30 | NVH Troubleshooting Chart | 50 |
| Removal and Installation | 30 | PERIODIC MAINTENANCE | 51 |
| STEERING COLUMN | 31 | STEERING WHEEL | 51 |
| Exploded View | 31 | Inspection | 51 |
| Removal and Installation | 31 | REMOVAL AND INSTALLATION | 52 |
| Inspection | 32 | STEERING WHEEL | 52 |
| STEERING SHAFT | 34 | Exploded View | 52 |
| Exploded View | 34 | Removal and Installation | 52 |
| Removal and Installation | 34 | STEERING COLUMN | 53 |
| Inspection | 35 | Exploded View | 53 |
| STEERING GEAR AND LINKAGE | 36 | Removal and Installation | 53 |
| Exploded View | 36 | Inspection | 54 |
| Removal and Installation | 37 | STEERING SHAFT | 56 |
| Disassembly and Assembly | 39 | Exploded View | 56 |
| Inspection | 40 | Removal and Installation | 56 |
| HEATED STEERING WHEEL SWITCH | 42 | Inspection | 57 |
| Removal and Installation | 42 | STEERING GEAR AND LINKAGE | 58 |
| SERVICE DATA AND SPECIFICATIONS (SDS) | 43 | Exploded View | 58 |
| SERVICE DATA AND SPECIFICATIONS (SDS) | 43 | Removal and Installation | 59 |
| General Specifications | 43 | Disassembly and Assembly | 61 |
| Steering Wheel | 43 | Inspection | 62 |
| Steering Angle | 43 | SERVICE DATA AND SPECIFICATIONS (SDS) | 64 |
| Steering Column | 43 | SERVICE DATA AND SPECIFICATIONS (SDS) | 64 |
| Steering Gear and Linkage | 43 | General Specifications | 64 |
| WITHOUT HEATED STEERING WHEEL | | Steering Wheel | 64 |
| PRECAUTION | 44 | Steering Angle | 64 |
| PRECAUTIONS | 44 | Steering Column | 64 |
| Precaution for Technicians Using Medical Electric.. | 44 | Steering Gear and Linkage | 64 |
| Point to Be Checked Before Starting Maintenance Work | 44 | | |
| Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" | 44 | | |

PRECAUTIONS

< PRECAUTION >

[WITH HEATED STEERING WHEEL]

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:000000007073117

OPERATION PROHIBITION

WARNING:

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

NORMAL CHARGE PRECAUTION

WARNING:

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) during normal charge operation.

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

Point to Be Checked Before Starting Maintenance Work

INFOID:000000007080017

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

NOTE:

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:000000007011212

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

PRECAUTIONS

[WITH HEATED STEERING WHEEL]

< PRECAUTION >

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 power switch ON, 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 power switch OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.

Precautions for Removing Battery Terminal

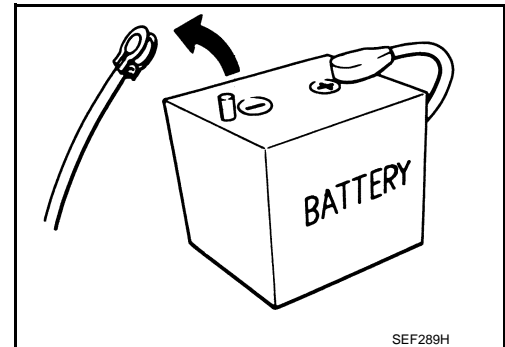
INFOID:000000007011213

- When removing the 12V battery terminal, turn OFF the power switch and wait at least 5 minutes.

NOTE:

ECU may be active for several minutes after the power switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- Always disconnect the battery terminal within 60 minutes after turning OFF the power switch. Even when the power switch is OFF, the 12V battery automatic charge control may automatically start after a lapse of 60 minutes from power switch OFF.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

1. Check that EVSE is not connected.

NOTE:

If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.

2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).
3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.

NOTE:

If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.

4. Remove 12V battery terminal within 60 minutes after turning the power switch OFF → ON → OFF.

CAUTION:

- After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.
- After turning the power switch OFF, if "Remote A/C" is activated by user operation, stop the air conditioner and start over from Step 1.

NOTE:

Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

PRECAUTIONS

[WITH HEATED STEERING WHEEL]

< PRECAUTION >

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the power switch. A
NOTE:
If the power switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC. B
NOTE:
The removal of 12V battery may cause a DTC detection error. C

Service Notice or Precautions for Steering System

INFOID:0000000006827852

- In case of removing steering gear assembly, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment. D
- Observe the following precautions when disassembling. E
 - 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. F
 - Never reuse non-reusable parts.
 - Before assembling, apply the specified grease to the directed parts.
- During quick steering, rasping noise may be heard from around the steering wheel. This is not a malfunction. The noise is an operating noise of the EPS system under normal conditions. If the rasping noise occurs during slow steering, this may not be an operating noise of the system. In this case, it is necessary to find out the location of the noise and repair, if necessary. ST
- Never repeat static steering. (Motor and EPS control unit could be heated.) H

I
J
K
L
M
N
O
P

PREPARATION

< PREPARATION >

[WITH HEATED STEERING WHEEL]

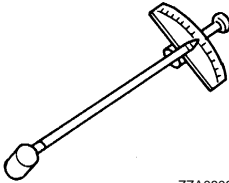
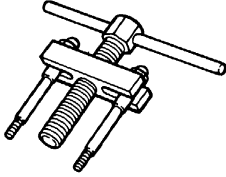
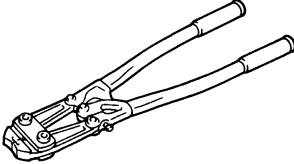
PREPARATION

PREPARATION

Special Service Tools

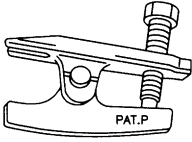
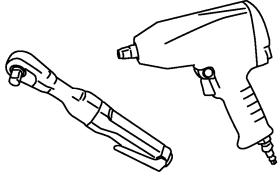
INFOID:000000006827853

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 |
|---|---|
| ST3127S000 (J-25765-A) Preload gauge  ZZA0806D | Measuring steering column rotating torque |
| ST27180001 (J-25726-A) Steering wheel puller  ZZA0819D | Removing steering wheel |
| KV40107300 (—) Boot band crimping tool  ZZA1229D | Installing boot clamp (large diameter) |

Commercial Service Tools

INFOID:000000006827854

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

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

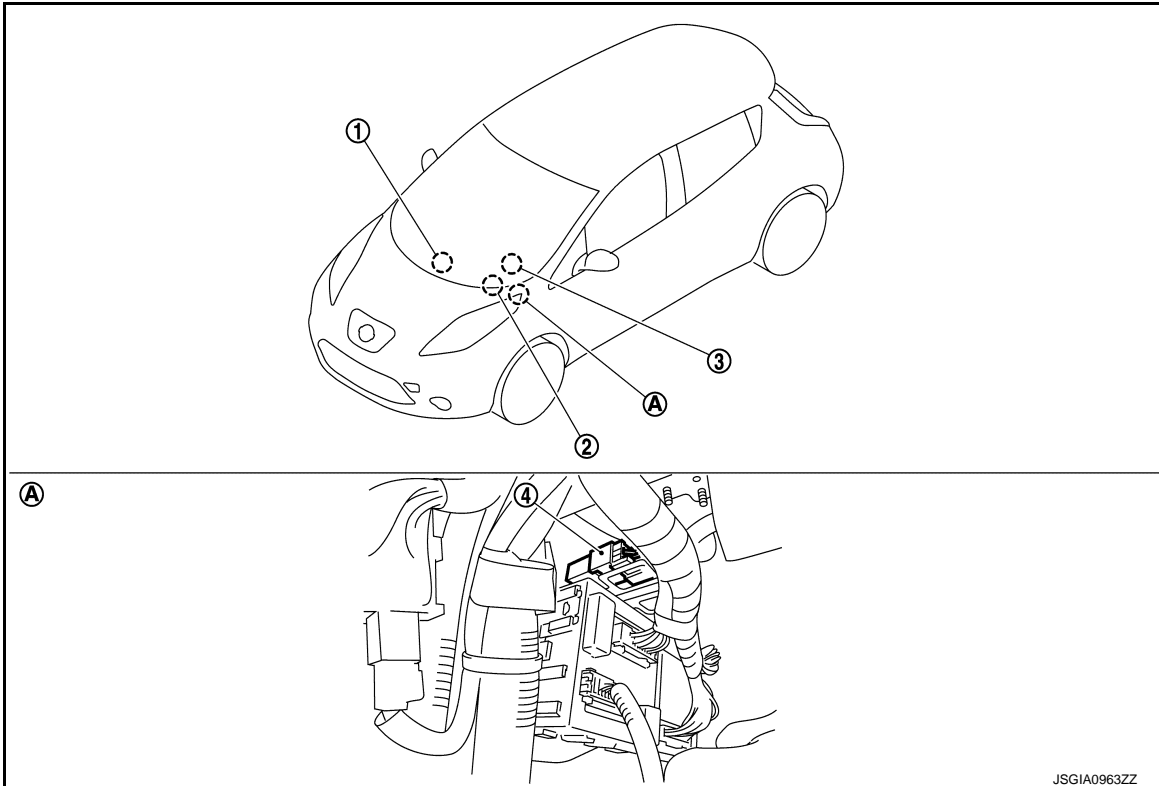
SYSTEM DESCRIPTION

COMPONENT PARTS

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:000000007461761



A. At the back of instrument lower panel
LH

| No. | Component | Function |
|-----|------------------------------|---|
| 1 | A/C auto amp. | ST-8. "HEATED STEERING WHEEL SYSTEM : A/C Auto Amp." |
| 2 | Heated steering wheel switch | ST-8. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch" |
| 3 | Heated steering wheel | ST-8. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel" |
| 4 | Heated steering wheel relay | ST-8. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay" |

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel

INFOID:000000007461762

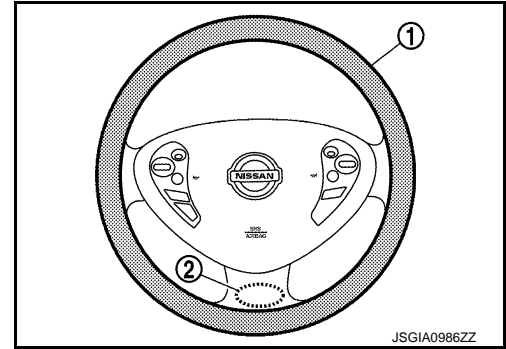
With the power supply from the heated steering wheel relay, the heated steering wheel controls temperature through the heating element (1) and thermostat (2) built into the steering wheel.

- Heating element: Generates heat by energization.

NOTE:

Heating element is located at the back of the steering wheel leather surface.

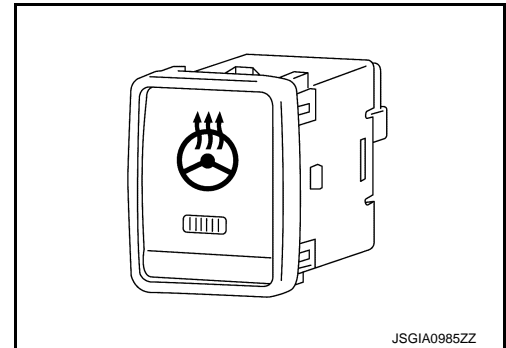
- Thermostat: Turns ON/OFF power supply according to the specified temperature.



HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch

INFOID:000000007461763

- The heated steering wheel switch include the indicator lamp. It turns ON when the system starts.
- The heated steering wheel switch transmits a heated steering wheel ON/OFF signal to the A/C auto amp.



HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay

INFOID:000000007461764

Through the control of the A/C auto amp., the heated steering wheel relay turns ON/OFF electricity to the heating element built-in the steering wheel and turns ON/OFF the indicator lamp mounted on the heated steering wheel switch. For location, refer to [ST-7. "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.

INFOID:000000007461765

- A/C auto amp. turns ON/OFF the heated steering wheel relay, according to a signal transmitted from the heated steering wheel switch.
- The A/C auto amp. includes a timer. The heated steering wheel relay is turned OFF when the timer operating time reaches 30 minutes.
- Timer: Turns ON/OFF the heated steering wheel relay for a specified period of time
- For other information of A/C auto amp., refer to [HAC-13. "A/C Auto Amp."](#).

SYSTEM

[WITH HEATED STEERING WHEEL]

< SYSTEM DESCRIPTION >

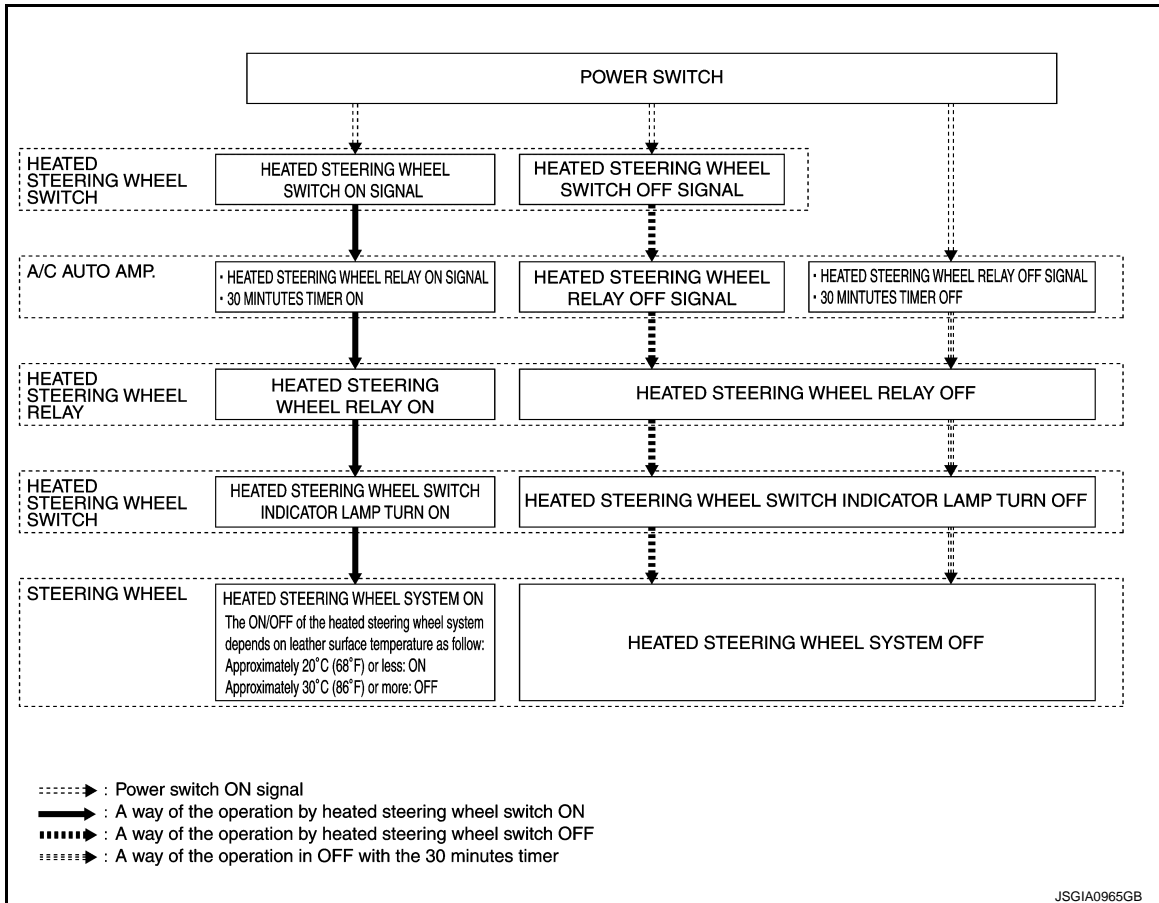
SYSTEM

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Description

INFOID:000000007461766

SYSTEM DIAGRAM



DESCRIPTION

- The heated steering wheel system maintains the surface temperature of the steering wheel between 20°C (68°F) and 30°C (86°F).
- When the heated steering wheel switch is pressed, the A/C auto amp. turns ON the heated steering wheel relay and the indicator lamp mounted on the heated steering wheel switch turns ON. In addition, the heated steering wheel relay turns ON electricity to the heating element built-in the steering wheel to heat the steering wheel.
- When the heated steering wheel switch is pressed again, the A/C auto amp. turns OFF the heated steering wheel relay and the indicator lamp mounted on the heated steering wheel switch turns OFF. In addition, the heated steering wheel relay turns OFF electricity to the heating element built-in the steering wheel to heat the steering wheel.
- When the surface temperature of the steering wheel is higher than 30°C (86°F), the thermostat built-in the steering wheel turns OFF, and electricity to the heating element is turned OFF. When the surface temperature drops to less than 20°C (68°F), the thermostat built-in the steering wheel turns ON, and electricity to the heating element is turned ON.
- The A/C auto amp. has a timer. After the heated steering wheel switch is turned ON, when operating time becomes more than the specified time (30 minutes), the A/C auto amp. turns OFF the heated steering wheel relay to stop heating.
- The A/C auto amp. can control the steering heater by the AC-heater timer and remote climate control.
 - For AC-heater timer: Refer to [HAC-23, "AUTOMATIC AIR CONDITIONING SYSTEM : A/C-Heater Timer \(Climate Ctrl. Timer\)".](#)
 - For remote climate control: Refer to [HAC-24, "AUTOMATIC AIR CONDITIONING SYSTEM : Remote Climate Control".](#)

SYSTEM

< SYSTEM DESCRIPTION >

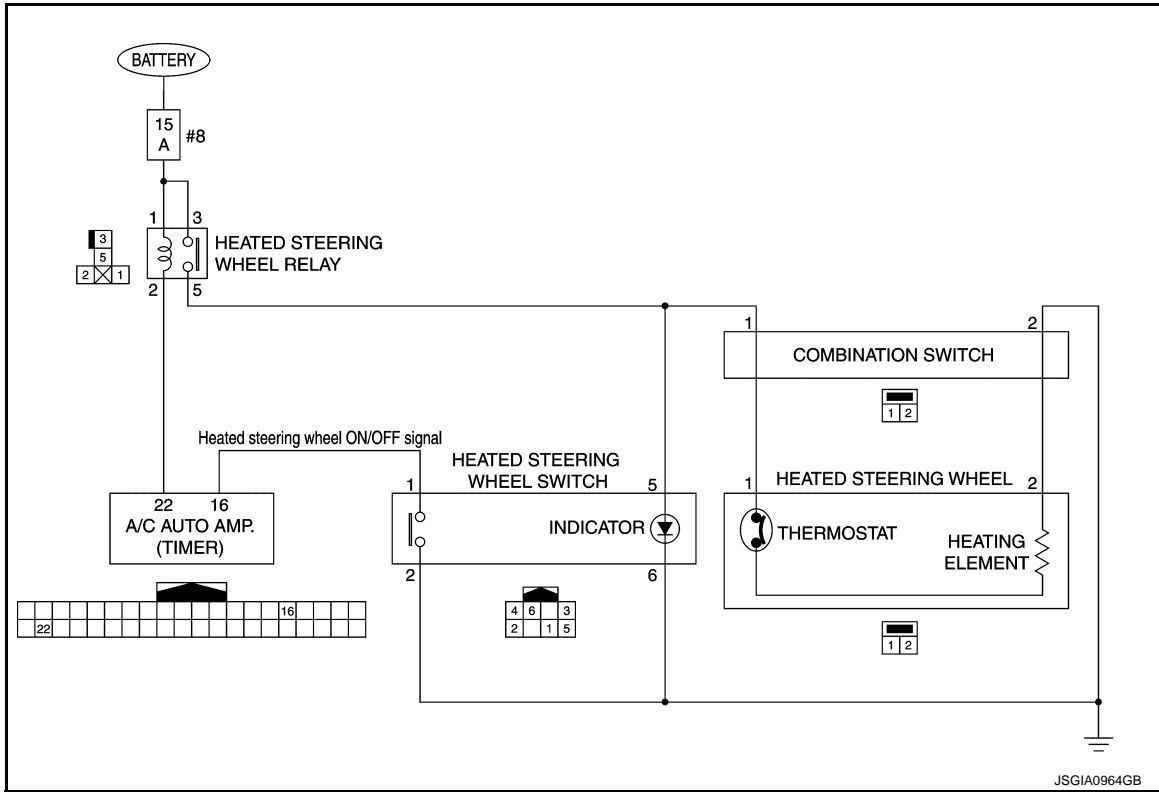
[WITH HEATED STEERING WHEEL]

NOTE:

The indicator lamp will remain on as long as the system is on. Push the heated steering wheel switch again to turn the heated steering wheel system off manually. The indicator lamp will go off.

HEATED STEERING WHEEL SYSTEM : Circuit Diagram

INFOID:000000007461767



HEATED STEERING WHEEL

[WITH HEATED STEERING WHEEL]

< WIRING DIAGRAM >

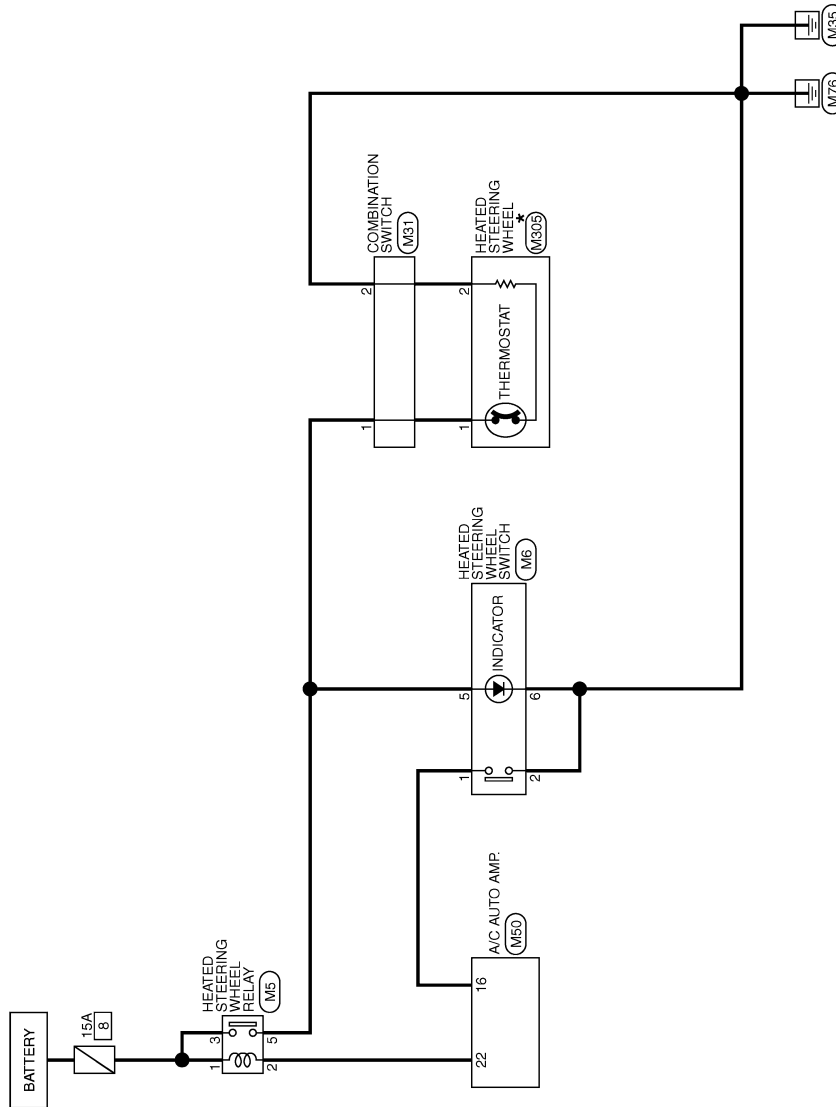
WIRING DIAGRAM

HEATED STEERING WHEEL

Wiring Diagram

INFOID:000000007461768

HEATED STEERING WHEEL



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

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

2011/03/25

JCGWA0365GB

HEATED STEERING WHEEL

[WITH HEATED STEERING WHEEL]

< WIRING DIAGRAM >

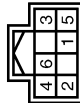
HEATED STEERING WHEEL

| | |
|----------------|-----------------------------|
| Connector No. | M5 |
| Connector Name | HEATED STEERING WHEEL RELAY |
| Connector Type | MS02EL-M2-LC |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1 | B | |
| 2 | V | |
| 3 | B | |
| 5 | BR | |

| | |
|----------------|------------------------------|
| Connector No. | M6 |
| Connector Name | HEATED STEERING WHEEL SWITCH |
| Connector Type | TH09EL-NH |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1 | LG | |
| 2 | B | |
| 3 | W | |
| 4 | B | |
| 5 | BR | |
| 6 | BR | |

| | |
|----------------|--------------------|
| Connector No. | M31 |
| Connector Name | COMBINATION SWITCH |
| Connector Type | NS02FW-CS |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1 | BR | |
| 2 | B | |

| | |
|----------------|---------------|
| Connector No. | M50 |
| Connector Name | A/C AUTO AMP. |
| Connector Type | TH03FW-IN1 |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-------------------------------------|
| 1 | V | REC |
| 2 | R | MODE4 |
| 3 | P | MODE3 |
| 4 | Y | MODE2 |
| 5 | V | MODE1 |
| 6 | BR | MX4 |
| 7 | SB | MX3 |
| 8 | LG | MX2 |
| 9 | L | MX1 |
| 10 | B | GND |
| 12 | GR | BLOWER PWM |
| 13 | V | W/PUMP PWM |
| 14 | L | COMP TX |
| 15 | W | RR DEF SW O/P |
| 16 | LG | HEATED STEERING WHEEL SWITCH SIGNAL |
| 17 | R | W/PUMP F/B |
| 18 | W | COMP RX |
| 19 | W | LIGHT+ |
| 20 | B | LIGHT- |
| 21 | G | FRESH |

| | | |
|----|----|--|
| 22 | LG | HEATED STEERING WHEEL RELAY CONTROL SIGNAL |
| 23 | SS | SEAT HEAT RELAY |
| 27 | W | 5V OUT |
| 28 | L | EV CAN-H |
| 29 | G | EV CAN-L |
| 30 | R | SENS GND |
| 31 | W | BATT |
| 32 | Y | IGN I |
| 33 | LG | INCAR SENS |
| 34 | G | INTAKE SENS |
| 35 | P | SUN SENS |
| 36 | GR | AMB SENS |
| 37 | BR | WATER SENS |
| 38 | SB | INT F/B |
| 40 | SB | PTC LIN |

| | |
|----------------|-----------------------|
| Connector No. | M305 |
| Connector Name | HEATED STEERING WHEEL |
| Connector Type | NS02FW |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|--------------|---------------|-----------------------------|
| 1 | - | - |
| 2 | - | - |

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[WITH HEATED STEERING WHEEL]

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (Heated Steering Wheel)

INFOID:000000007461770

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.

CAUTION:

Customers are not professional. Never guess easily like “maybe the customer means that...,” or “maybe the customer mentions this symptom”.

>> 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.

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

STEERING WHEEL

< BASIC INSPECTION >

[WITH HEATED STEERING WHEEL]

STEERING WHEEL

Inspection

INFOID:000000006827855

NEUTRAL POSITION STEERING WHEEL

1. Check that steering gear assembly, steering column assembly and steering wheel are installed in the correct position.
2. Check wheel alignment within specification. Refer to [FSU-11, "Inspection"](#).
3. Set 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:

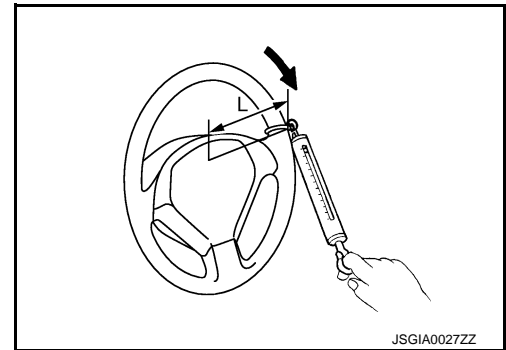
If the adjustment is performed by using the inner socket, check wheel alignment after the adjustment. Refer to [FSU-11, "Inspection"](#).

STEERING WHEEL TURNING FORCE

1. Park vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated normal pressure. Refer to [WT-52, "Tire Air Pressure"](#).
3. Set the vehicle to READY.
4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Steering wheel turning force : Refer to [ST-43, "Steering Wheel"](#).

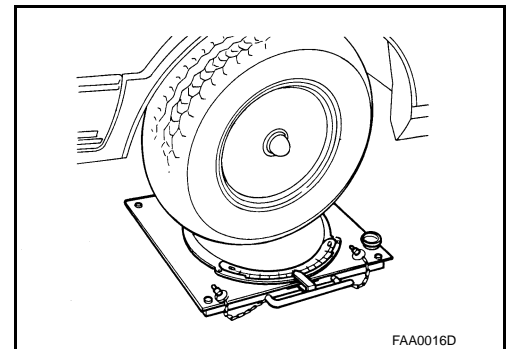
Measuring point (L) : 185 mm (7.28 in)



FRONT WHEEL TURNING ANGLE

1. Perform toe-in inspection. Refer to [FSU-11, "Inspection"](#).

CAUTION:
Perform front wheel turning angle inspection, after toe-in inspection.
2. Place front wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
3. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



STEERING WHEEL

< BASIC INSPECTION >

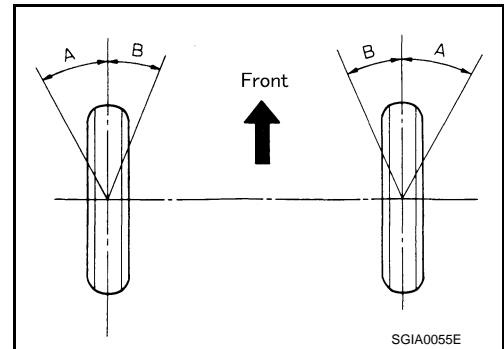
[WITH HEATED STEERING WHEEL]

- 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).

A : Inner wheel angle

B : Outer wheel angle

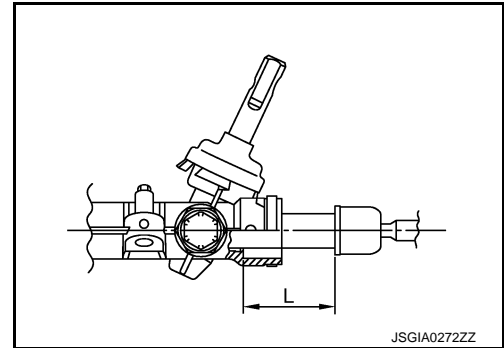
Steering angle : Refer to [ST-43, "Steering Angle"](#).



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

Rack stroke neutral position (L) : Refer to [ST-43, "Steering Gear and Linkage"](#).

- 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.



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

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

DTC/CIRCUIT DIAGNOSIS

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:000000007461771

1. CHECK HEATED STEERING WHEEL SYSTEM

Check operate heated steering wheel system. Refer to [ST-9, "HEATED STEERING WHEEL SYSTEM : System Description"](#).

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to [ST-16, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000007461772

1. CHECK POWER SOURCE

1. Turn power switch OFF.
2. Remove the heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).
3. Turn power switch ON.
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 | | |
| M305 | 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-19, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

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

3. CHECK GROUND CIRCUIT

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

| Heated steering wheel | | Ground | Continuity |
|-----------------------|----------|--------|------------|
| Connector | Terminal | | |
| M305 | 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 power switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-7, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
3. Remove the heated steering wheel. Refer to [ST-30, "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 | |
| M5 | 5 | M305 | 1 | Existed |

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

| Heated steering wheel relay | | Ground | Continuity |
|-----------------------------|----------|--------|-------------|
| Connector | Terminal | | |
| M5 | 5 | | Not existed |

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-7, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

6.CHECK POWER SOURCE (BATTERY)

Check the following.

- 12V battery
- Harness for short or open between 12V battery and 15A fuse (No. 8)
- 15A fuse (No. 8)
- Harness for short or open between 15A fuse (No. 8) and heated steering wheel relay

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7.CHECK GROUND CIRCUIT

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

| Heated steering wheel switch | | Ground | Continuity |
|------------------------------|----------|--------|------------|
| Connector | Terminal | | |
| M6 | 2 | | 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 | |
| M5 | 2 | M50 | 22 | Existed |

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

| Heated steering wheel relay | | Ground | Continuity |
|-----------------------------|----------|--------|-------------|
| Connector | Terminal | | |
| M5 | 2 | | Not existed |

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM

[WITH HEATED STEERING WHEEL]

< DTC/CIRCUIT DIAGNOSIS >

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

9. CHECK HARNESS BETWEEN A/C AUTO AMP. AND HEATED STEERING WHEEL SWITCH

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

| A/C auto amp. | | Heated steering wheel switch | | Continuity |
|---------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M50 | 16 | M6 | 1 | Existed |

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

| A/C auto amp. | | Ground | Continuity |
|---------------|----------|--------|-------------|
| Connector | Terminal | | |
| M50 | 16 | | 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 SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

- YES >> Repair or replace A/C auto amp. Refer to [HAC-141, "Removal and Installation"](#).
NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Switch)

INFOID:000000007461773

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn power switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

| Heated steering wheel switch | | Condition | Continuity |
|------------------------------|---|--|-------------|
| Terminal | | | |
| 1 | 2 | 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-42, "Removal and Installation"](#).

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Apply a voltage of 12V between the heated steering wheel switch connector terminals to check that the indicator lamp turns ON.

CAUTION:

- Connect the fuse between the terminals when applying the voltage.
- To prevent damage, always observe the correct polarity.
- Prevent short-circuit.

| Heated steering wheel switch | | Condition | Indicator lamp status |
|------------------------------|---|--|-----------------------|
| Terminal | | | |
| + | - | | |
| 5 | 6 | Apply 12 V direct current between terminals 5 and 6. | ON |

HEATED STEERING WHEEL SYSTEM

[WITH HEATED STEERING WHEEL]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel)

INFOID:000000007461774

1. CHECK HEATED STEERING WHEEL CONTINUITY

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

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000007461775

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.
- To prevent damage, always observe the correct polarity.
- Prevent short-circuit.

| 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, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:000000007461776

1. CHECK HEATED STEERING WHEEL INDICATOR LAMP

1. Turn power 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-20. "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-20. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000007461777

1. CHECK POWER SOURCE

1. Turn power switch ON.
2. Turn heated steering wheel switch ON.
3. Check voltage between heated steering wheel switch harness connector terminals.

| Heated steering wheel switch | | Condition | Voltage (Approx.) |
|------------------------------|----------|--|-------------------|
| Connector | Terminal | | |
| M6 | 5 - 6 | 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 power switch OFF.
2. Disconnect heated steering wheel switch connector. Refer to [ST-42. "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

| Heated steering wheel switch | | Ground | Continuity |
|------------------------------|----------|--------|------------|
| Connector | Terminal | | |
| M6 | 6 | | 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 HEATED STEERING WHEEL SWITCH

1. Disconnect heated steering wheel relay connector. Refer to [ST-7. "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
2. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

| Heated steering wheel relay | | Heated steering wheel switch | | Continuity |
|-----------------------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M5 | 5 | M6 | 5 | Existed |

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

| Heated steering wheel relay | | Ground | Continuity |
|-----------------------------|----------|--------|-------------|
| Connector | Terminal | | |
| M5 | 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-19, "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, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

5. CHECK POWER SOURCE (BATTERY)

Check the following.

- 12V battery
- Harness for short or open between 12V battery and 15A fuse (No. 8)
- 15A fuse (No. 8)
- Harness for short or open between 15A fuse (No. 8) 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 HEATED STEERING WHEEL SWITCH

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

| A/C auto amp. | | Heated steering wheel switch | | Continuity |
|---------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M50 | 16 | M6 | 1 | Existed |

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

| A/C auto amp. | | Ground | Continuity |
|---------------|----------|--------|-------------|
| Connector | Terminal | | |
| M50 | 16 | | 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 SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-141, "Removal and Installation"](#)

NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Component Inspection (Heated Steering Wheel Switch)

INFOID:000000007461778

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn power switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

| Heated steering wheel switch | | Condition | Continuity |
|------------------------------|---|--|-------------|
| Terminal | | | |
| 1 | 2 | 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-42, "Removal and Installation"](#).

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Apply a voltage of 12V between the heated steering wheel switch connector terminals to check that the indicator lamp turns ON.

CAUTION:

- Connect the fuse between the terminals when applying the voltage.
- To prevent damage, always observe the correct polarity.
- Prevent short-circuit.

| Heated steering wheel switch | | Condition | Indicator lamp status |
|------------------------------|---|--|-----------------------|
| Terminal | | | |
| + | - | | |
| 5 | 6 | Apply 12 V direct current between terminals 5 and 6. | ON |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000007461779

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.
- To prevent damage, always observe the correct polarity.
- Prevent short-circuit.

| 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, "HEATED STEERING WHEEL SYSTEM: Component Parts Location"](#).

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

SYMPTOM DIAGNOSIS

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

Description

INFOID:000000007461780

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

Diagnosis Procedure

INFOID:000000007461781

1. CHECK POWER SOURCE

1. Turn power switch OFF.
2. Remove the heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).
3. Turn power switch ON.
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 | | |
| M305 | 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-19, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

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

3. CHECK GROUND CIRCUIT

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

| Heated steering wheel | | Ground | Continuity |
|-----------------------|----------|--------|------------|
| Connector | Terminal | | |
| M305 | 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 power switch OFF.
2. Disconnect heated steering wheel relay connector. Refer to [ST-7, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
3. Remove the heated steering wheel. Refer to [ST-30, "Removal and Installation"](#).
4. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel harness connector terminal.

| Heated steering wheel relay | | Heated steering wheel | | Continuity |
|-----------------------------|----------|-----------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M5 | 5 | M305 | 1 | Existed |

5. 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 | | |
| M5 | 5 | | Not existed |

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5.CHECK HEATED STEERING WHEEL RELAY

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-7. "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

6.CHECK POWER SOURCE (BATTERY)

Check the following.

- 12V battery
- Harness for short or open between 12V battery and 15A fuse (No. 8)
- 15A fuse (No. 8)
- Harness for short or open between 15A fuse (No. 8) and heated steering wheel relay

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7.CHECK GROUND CIRCUIT

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

| Heated steering wheel switch | | Ground | Continuity |
|------------------------------|----------|--------|------------|
| Connector | Terminal | | |
| M6 | 2 | | 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 | |
| M5 | 2 | M50 | 22 | Existed |

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

| Heated steering wheel relay | | Ground | Continuity |
|-----------------------------|----------|--------|-------------|
| Connector | Terminal | | |
| M5 | 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 HEATED STEERING WHEEL SWITCH

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

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

| A/C auto amp. | | Heated steering wheel switch | | Continuity |
|---------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M50 | 16 | M6 | 1 | Existed |

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

| A/C auto amp. | | Ground | Continuity |
|---------------|----------|--------|-------------|
| Connector | Terminal | | |
| M50 | 16 | | 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 SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-141, "Removal and Installation"](#).

NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

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

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

< SYMPTOM DIAGNOSIS > [WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON

Description

INFOID:000000007461782

- 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:000000007461783

1. CHECK POWER SOURCE

1. Turn power switch ON.
2. Turn heated steering wheel switch ON.
3. Check voltage between heated steering wheel switch harness connector terminals.

| Heated steering wheel switch | | Condition | Voltage (Approx.) |
|------------------------------|----------|--|-------------------|
| Connector | Terminal | | |
| M6 | 5 – 6 | 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 power switch OFF.
2. Disconnect heated steering wheel switch connector. Refer to [ST-42. "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

| Heated steering wheel switch | | Ground | Continuity |
|------------------------------|----------|--------|------------|
| Connector | Terminal | | |
| M6 | 6 | | 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 HEATED STEERING WHEEL SWITCH

1. Disconnect heated steering wheel relay connector. Refer to [ST-7. "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
2. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel switch harness connector terminal.

| Heated steering wheel relay | | Heated steering wheel switch | | Continuity |
|-----------------------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M5 | 5 | M6 | 5 | Existed |

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

| Heated steering wheel relay | | Ground | Continuity |
|-----------------------------|----------|--------|-------------|
| Connector | Terminal | | |
| M5 | 5 | | Not existed |

Is the inspection result normal?

- YES >> GO TO 4.

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

< SYMPTOM DIAGNOSIS >

NO >> Repair or replace damaged parts.

4.CHECK HEATED STEERING WHEEL RELAY

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace heated steering wheel relay. Refer to [ST-7, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

5.CHECK POWER SOURCE (BATTERY)

Check the following.

- 12V battery
- Harness for short or open between 12V battery and 15A fuse (No. 8)
- 15A fuse (No. 8)
- Harness for short or open between 15A fuse (No. 8) 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 HEATED STEERING WHEEL SWITCH

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

| A/C auto amp. | | Heated steering wheel switch | | Continuity |
|---------------|----------|------------------------------|----------|------------|
| Connector | Terminal | Connector | Terminal | |
| M50 | 16 | M6 | 1 | Existed |

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

| A/C auto amp. | | Ground | Continuity |
|---------------|----------|--------|-------------|
| Connector | Terminal | | |
| M50 | 16 | | 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 SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Repair or replace A/C auto amp. Refer to [HAC-141, "Removal and Installation"](#)

NO >> Replace heated steering wheel switch. Refer to [ST-42, "Removal and Installation"](#).

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000006827856

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 | | | | | | | | | | | | | Reference | | | | |
|---------|----------|-----------|---|---|--|---------------------|-------------------------|---|--------------------|---------------------------------------|---|----------------------------|---------------------|------|------------|-----------|-------------|-------|-----------------------------------|---------------------|
| | | | Outer/inner socket ball joint swinging torque | Outer/inner socket ball joint rotating torque | Outer/inner socket ball joint end play | Steering wheel play | 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 | AXLE and SUSPENSION | TIRE | ROAD WHEEL | | DRIVE SHAFT | BRAKE | | |
| Noise | Steering | Noise | x | x | x | x | | | | x | x | | x | x | x | x | x | x | ST-40, "Inspection" | |
| | | Shake | | | | | x | x | x | | | | x | x | x | x | x | x | ST-40, "Inspection" | |
| | | Vibration | | | | | x | x | x | x | x | | x | x | | | | | ST-40, "Inspection" | |
| | | Shimmy | | | | | x | | x | | | | x | x | x | x | | | | ST-40, "Inspection" |
| | | Judder | | | | | | x | x | | | | x | x | x | x | | | | ST-29, "Inspection" |
| | | | | | | | | | | | | | | | | | | | — | |
| | | | | | | | | | | | | | | | | | | | — | |
| | | | | | | | | | | | | | | | | | | | ST-36, "Exploded View" | |
| | | | | | | | | | | | | | | | | | | | ST-32, "Inspection" | |
| | | | | | | | | | | | | | | | | | | | ST-31, "Exploded View" | |
| | | | | | | | | | | | | | | | | | | | ST-36, "Exploded View" | |
| | | | | | | | | | | | | | | | | | | | NVH in FAX, RAX, FSU, RSU section | |
| | | | | | | | | | | | | | | | | | | | NVH in WT section | |
| | | | | | | | | | | | | | | | | | | | NVH in WT section | |
| | | | | | | | | | | | | | | | | | | | NVH in FAX section | |
| | | | | | | | | | | | | | | | | | | | NVH in BR section | |

x: Applicable

PERIODIC MAINTENANCE

STEERING WHEEL

Inspection

INFOID:000000006827857

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-43, "Steering Wheel"](#).

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-43, "Steering Wheel"](#).

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.

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

STEERING WHEEL

< REMOVAL AND INSTALLATION >

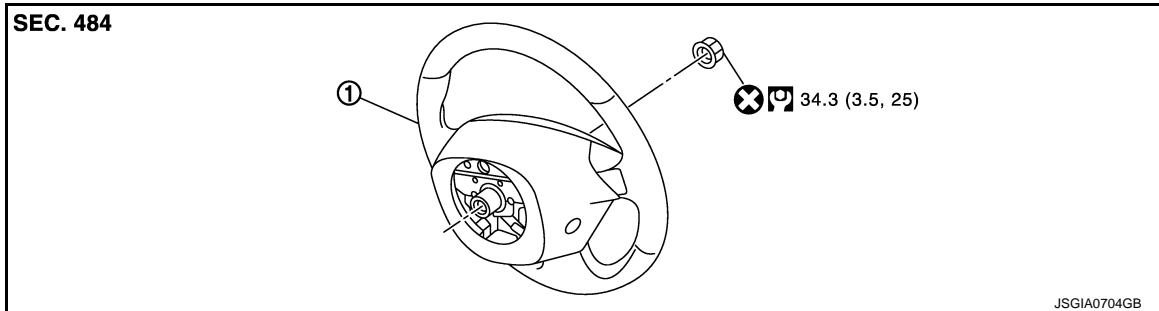
[WITH HEATED STEERING WHEEL]

REMOVAL AND INSTALLATION


STEERING WHEEL


Exploded View

INFOID:000000006827858



1. Steering wheel

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:000000006827859

REMOVAL

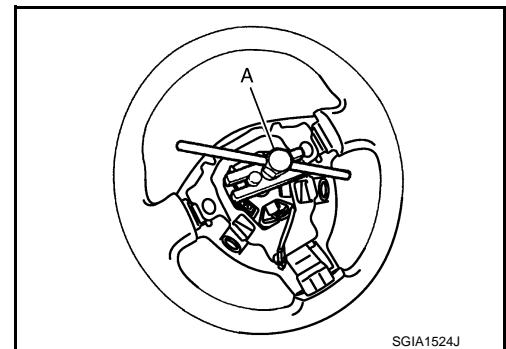
NOTE:

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 vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-19, "Removal and Installation"](#).
3. Remove heated steering wheel harness 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-22, "Removal and Installation"](#).

CAUTION:

- **Never twist spiral cable excessively after it becomes tight. (Twisting may cause the cable to be torn off.)**
- Never reuse steering wheel lock nut.

STEERING COLUMN

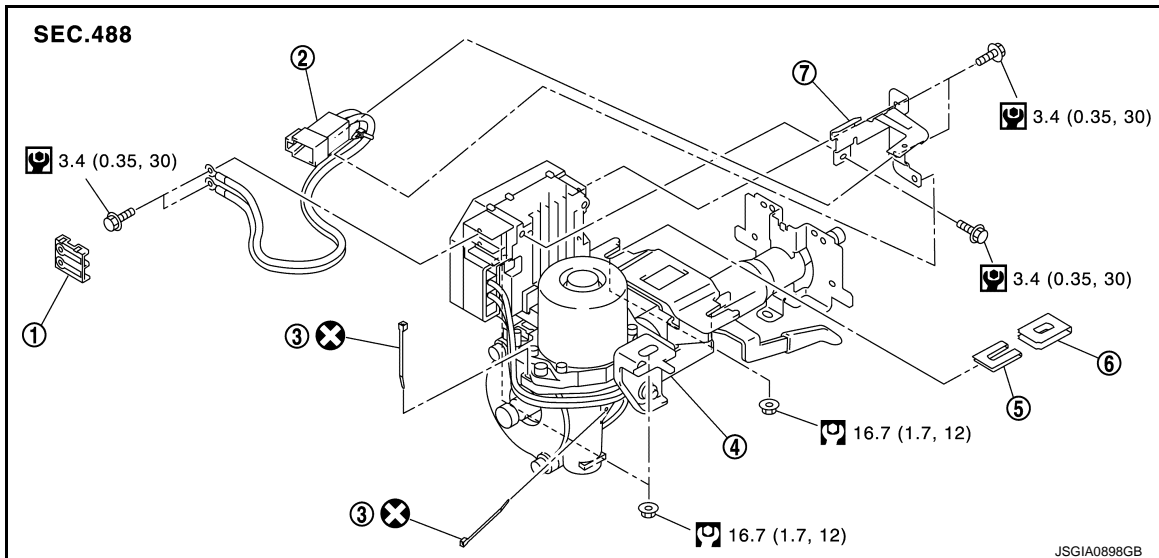
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

STEERING COLUMN

Exploded View

INFOID:000000006827880



- | | | |
|-----------------------------|------------------------|------------------------|
| 1. Cover | 2. Sub-harness | 3. Band |
| 4. Steering column assembly | 5. Slide plate (inner) | 6. Slide plate (outer) |
| 7. Bracket | | |

: N·m (kg·m, in·lb)

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:000000006827861

REMOVAL

CAUTION:

- While removing the steering column assembly, never unlock the tilt lever.
- Never impact on the axis when removing steering column assembly.
- Be careful when removing steering column assembly from the vehicle because it is heavy.
- Keep steering column assembly away from magnetic sources.
- Never disassemble steering column assembly. It is not separable.
- While removing the steering column assembly, never move the steering gear.
- When removing the steering column assembly, be careful not to allow the intermediate shaft to turn.

1. Set vehicle to the straight-ahead position.
2. Place the tilt to the lowest level.

CAUTION:

Securely lock the tilt lever.

3. Remove instrument lower panel. Refer to [IP-14, "Removal and Installation"](#).
4. Remove driver air bag module. Refer to [SR-19, "Removal and Installation"](#).
5. Remove steering wheel. Refer to [ST-30, "Removal and Installation"](#).
6. Remove steering column cover. Refer to [IP-14, "Removal and Installation"](#).
7. Remove spiral cable. Refer to [SR-22, "Removal and Installation"](#).
8. Remove combination switch. Refer to [BCS-78, "Removal and Installation"](#).
9. Remove knee protector.
10. Disconnect each switch harness connectors installed to steering column assembly.

STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

11. Remove intermediate shaft mounting bolt (steering column side), and separate intermediate shaft from steering column assembly. Refer to [ST-34, "Removal and Installation"](#).
CAUTION:
 - Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.
12. Disconnect EPS control unit connectors.
13. Remove steering column assembly.
CAUTION:
When removing the mounting, be careful not to drop the steering column assembly.
14. Remove slide plate (outer and inner) from steering column assembly.
15. Remove cover, sub-harness, band, and bracket from steering column assembly.
CAUTION:
Remove cover, sub-harness, band, and bracket only when necessary.
16. Perform inspection after removal. Refer to [ST-32, "Inspection"](#).

INSTALLATION

CAUTION:

- Never impact on the axis when removing steering column assembly.
- When installing the steering column cover, check that the vehicle harness is not stuck in the cover.

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

- After tightening mounting nut (A) of the steering column assembly, press in slide plate (outer and inner) (1) to tighten mounting nut (B).

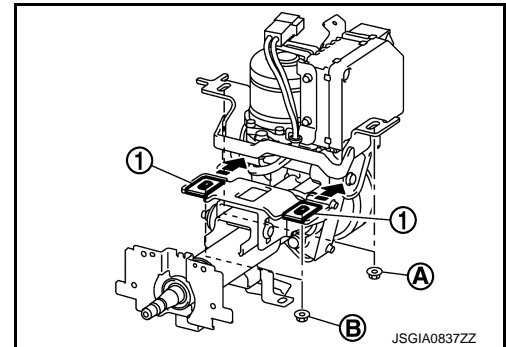
CAUTION:

The slide plate must be securely pressed in before tightening the nut of slide plate (outer and inner).

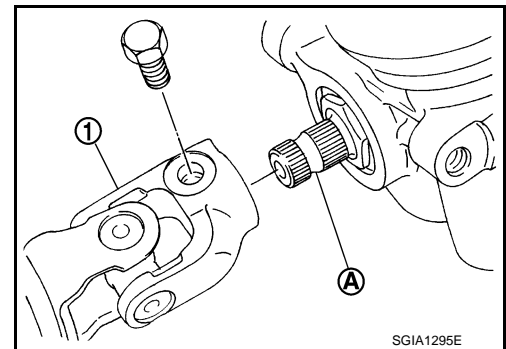
- For intermediate shaft mounting bolt direction, refer to [ST-34, "Exploded View"](#). (Do not insert it from the other side.)

CAUTION:

Never reuse intermediate mounting bolt.



- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft (A) before final tightening.
- After installing steering column assembly, perform self-diagnosis with CONSULT to ensure correct operation. Refer to [STC-10, "CONSULT Function"](#).
- Never reuse band.
- Perform inspection after installation. Refer to [ST-32, "Inspection"](#).



Inspection

INFOID:000000006827862

INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if there are any abnormal conditions.

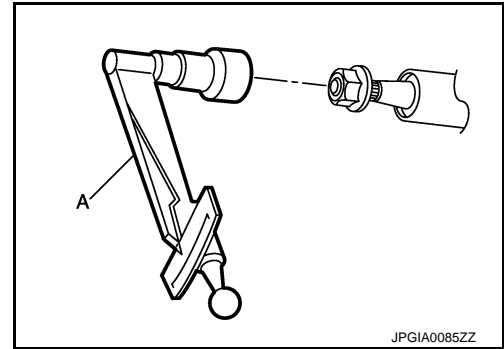
STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

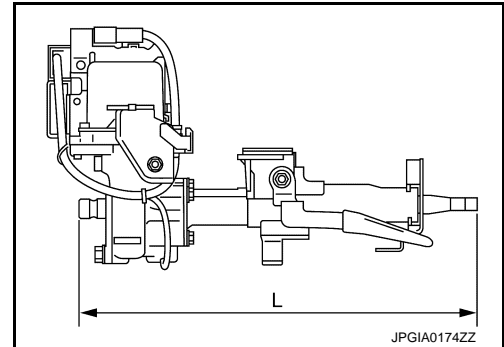
- Measure steering column assembly rotating torque using a preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if the rotating torque is outside the standard.

Rotating torque : Refer to [ST-43, "Steering Column"](#).



- Measure the length "L" shown in the figure, if vehicle has been involved in a minor collision. Replace steering column assembly (with motor, reduction gear, sensor) if "L" is outside the standard.

Steering column length (L) : Refer to [ST-43, "Steering Column"](#).

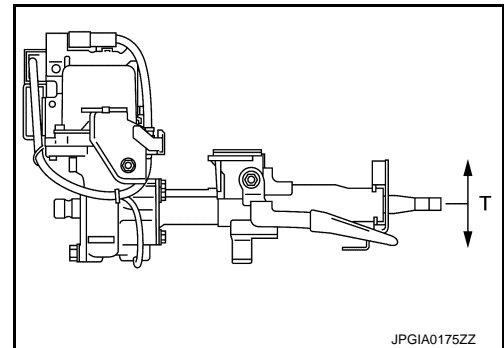


INSPECTION AFTER INSTALLATION

- Check each part of steering column assembly for damage or other malfunctions. Replace if there are any abnormal conditions.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
 - Steering wheel play: Refer to [ST-29, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-14, "Inspection"](#).
- Check tilt mechanism operating range "T" shown in the figure.

Tilt operating range (T) : Refer to [ST-43, "Steering Column"](#).

- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).



STEERING SHAFT

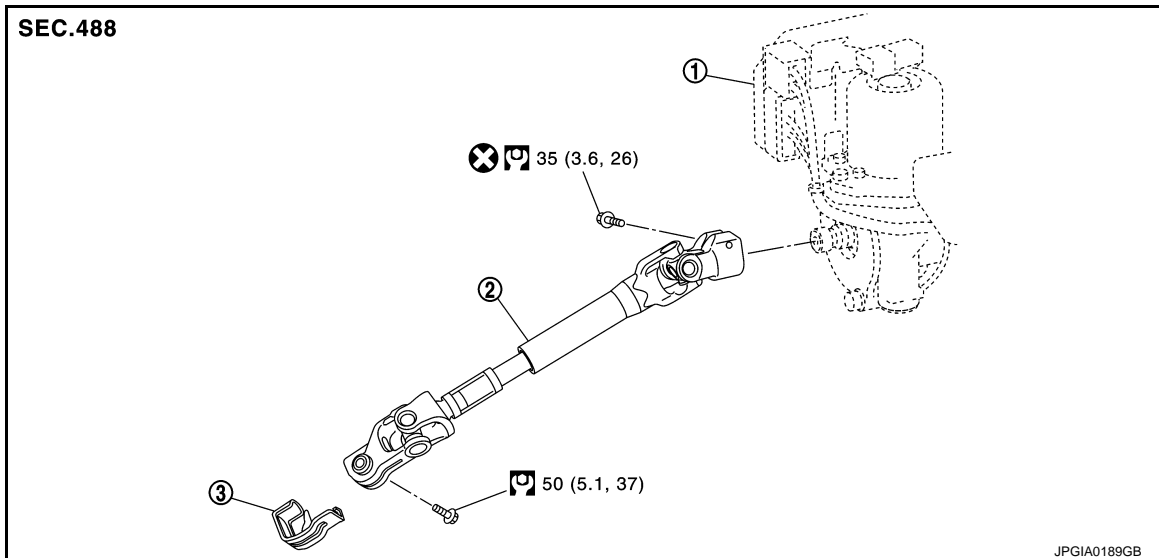
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

STEERING SHAFT

Exploded View

INFOID:000000006827863



1. Steering column assembly
2. Intermediate shaft
3. Guide*

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

: Always replace after every disassembly.

*: The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.

Removal and Installation

INFOID:000000006827864

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. Place the tilt to the lowest level.

CAUTION:

Securely lock the tilt lever.

3. Remove instrument lower panel. Refer to [IP-14, "Removal and Installation"](#).
4. Remove intermediate shaft mounting bolt (steering gear side), and separate intermediate shaft from steering gear assembly.

CAUTION:

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

5. Remove intermediate shaft mounting bolt (steering column side), and remove intermediate shaft from steering column assembly.

CAUTION:

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

STEERING SHAFT

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

6. Remove guide from intermediate shaft.

NOTE:

The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.

7. 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.

- Follow the instructions below to install intermediate shaft to steering gear assembly.
- Insert intermediate shaft into steering gear assembly. Align groove of the steering gear assembly with the bolt hole of the intermediate shaft.

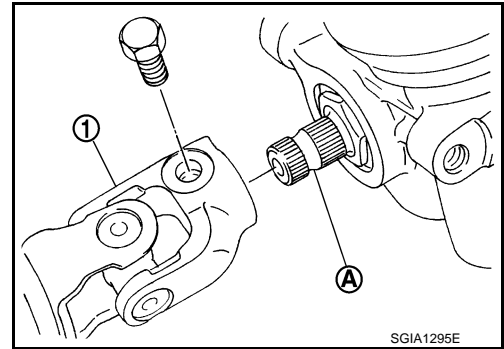
NOTE:

- The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.
- When replacing intermediate shaft with a new one, remove the attached guide.
- Check for galling while hand-tightening the mounting bolt of intermediate shaft (steering gear assembly side). After checking that the bolt is inserted in the groove of steering gear assembly, tighten the bolt to the specified torque.
- For intermediate shaft mounting bolt direction, refer to [ST-34, "Exploded View"](#). (Do not insert it from the other side.)

CAUTION:

Never reuse intermediate mounting bolt.

- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft (A) before final tightening.
- Perform inspection after installation. Refer to [ST-35, "Inspection"](#).



INFOID:0000000006827865

Inspection

INSPECTION AFTER REMOVAL

- Check each part of intermediate shaft for damage or other malfunctions. Replace if there are any abnormal conditions.

INSPECTION AFTER INSTALLATION

- Check each part of intermediate shaft for damage or other malfunctions. Replace if there are any abnormal conditions.
- Rotate steering wheel to check for decentered condition, binding, noise, or excessive steering effort.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
- Steering wheel play: Refer to [ST-29, "Inspection"](#).
- Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-14, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

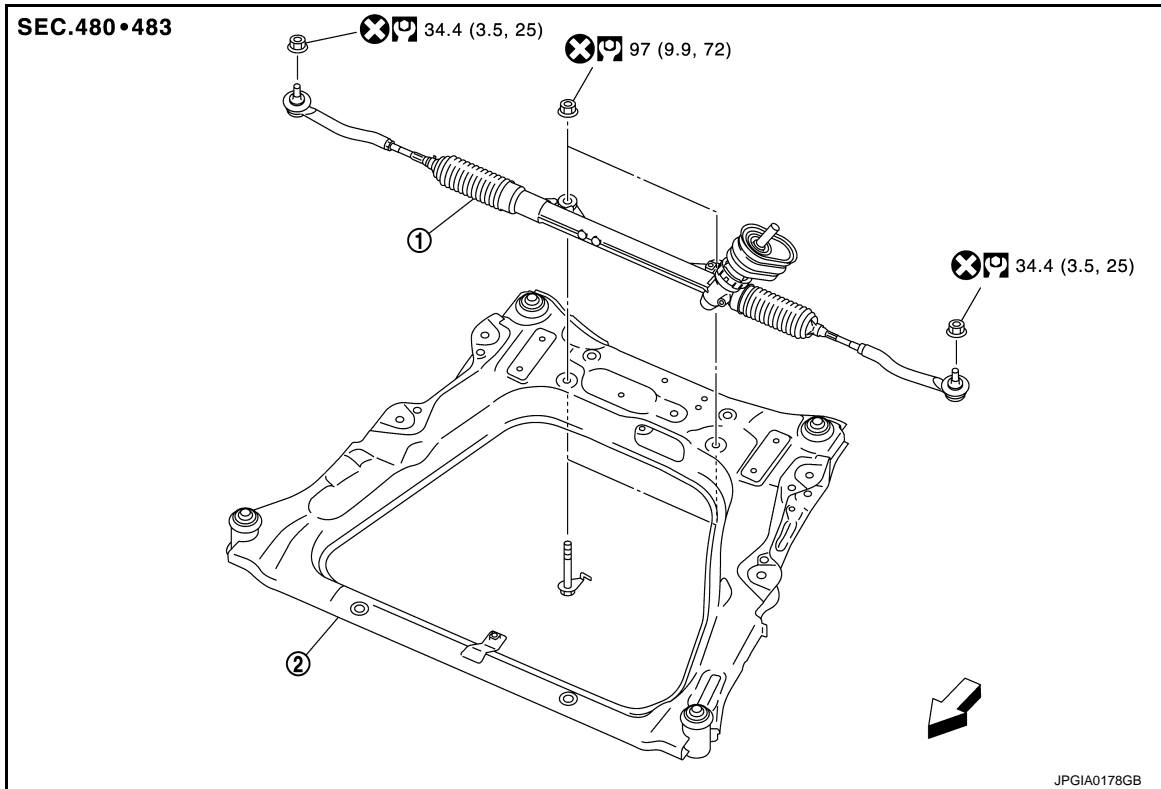
[WITH HEATED STEERING WHEEL]

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000006827866

REMOVAL



1. Steering gear assembly

2. Front suspension member

↔: Vehicle front

⊞: N·m (kg·m, ft·lb)

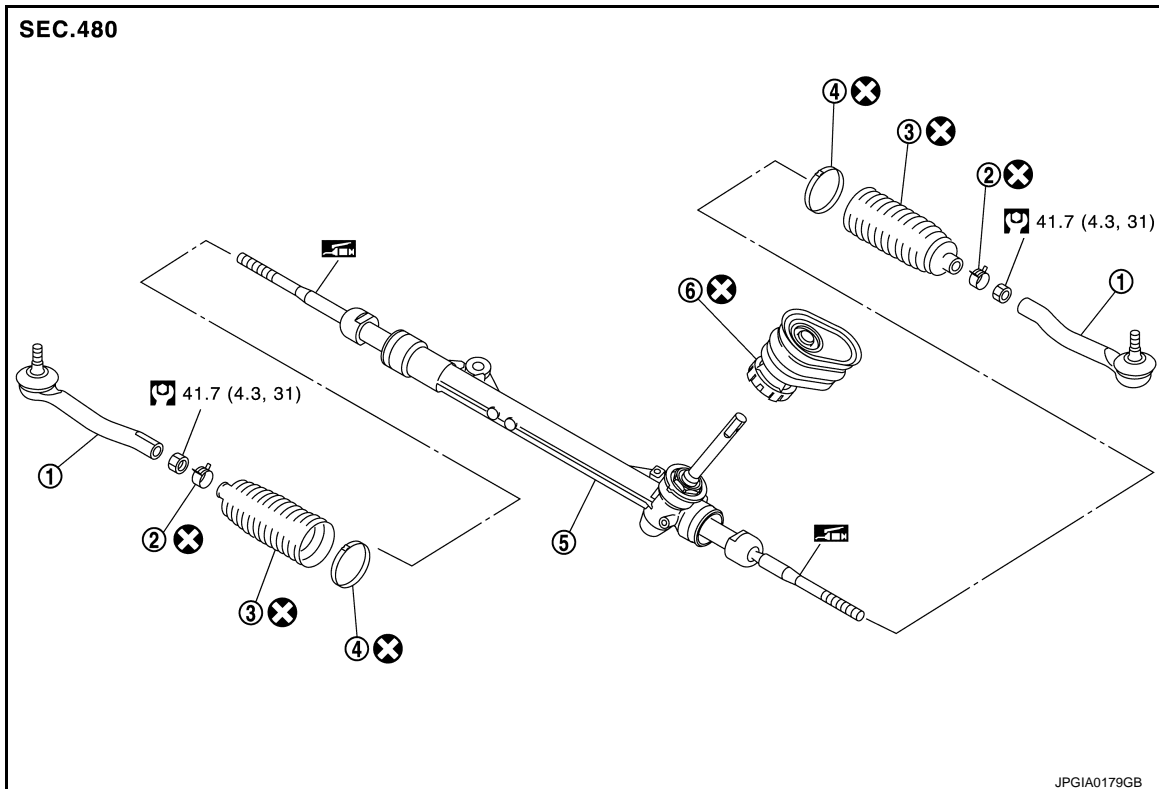
⊗: Always replace after every disassembly.

DISASSEMBLY

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]



- | | | |
|--------------------------------|--------------------------------|-------------------|
| 1. Outer socket | 2. Boot clamp (small diameter) | 3. Boot |
| 4. Boot clamp (large diameter) | 5. Gear housing assembly | 6. Fire wall seal |

41.7 (4.3, 31) N·m (kg-m, ft-lb)

Always replace after every disassembly.

Apply Genuine Lithium Soap, Autorex A (manufactured by Kyodo yushi) or equivalent.

Removal and Installation

INFOID:000000006827867

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove intermediate shaft mounting bolt (steering gear assembly side). Refer to [ST-34. "Removal and Installation"](#).
CAUTION:
 - Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Always fix the steering wheel using string to avoid turning.
 - Place a matching mark on both intermediate shaft and steering gear assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.
3. Remove tires with power tool. Refer to [WT-47. "Exploded View"](#).
4. Remove front under cover. Refer to [EXT-23. "FRONT UNDER COVER : Exploded View"](#).
5. Remove Li-ion battery under cover (front). Refer to [EVB-169. "Removal and Installation"](#).
6. Remove fender protector. Refer to [EXT-21. "FENDER PROTECTOR : Exploded View"](#).
7. Remove stabilizer connecting rod. Refer to [FSU-19. "Exploded View"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

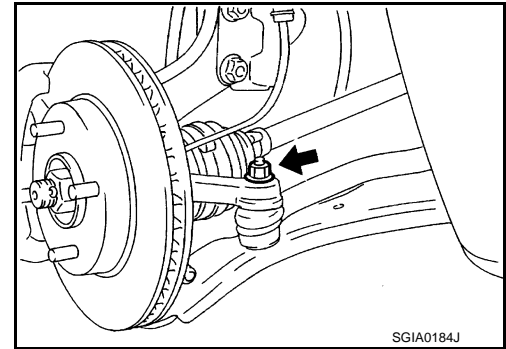
[WITH HEATED STEERING WHEEL]

8. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using suitable ball joint remover (commercial service tool).

CAUTION:

Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover from sudden drop turning.

9. Separate transverse link from steering knuckle with power tool. Refer to [FAX-10, "Exploded View"](#).



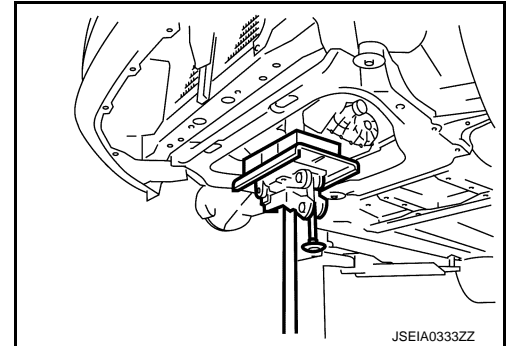
10. Set suitable jack under reduction gear and traction motor.

CAUTION:

- At this step, the jack must be set only for supporting the removal procedure. For details on jacking up the vehicle, refer to [GI-41, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

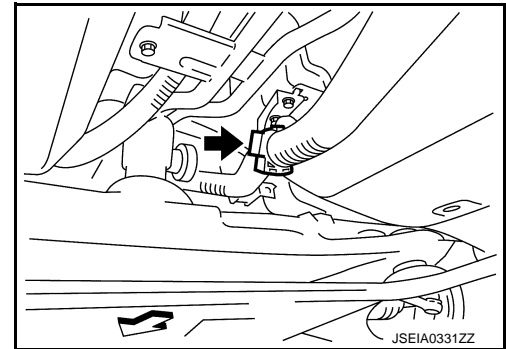
- Never damage the reduction gear and traction motor with a jack.

- Check the stable condition when using a jack.



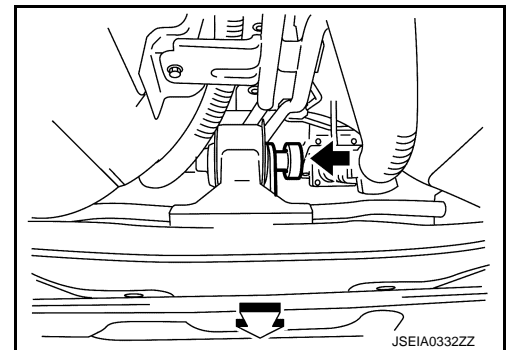
11. Separate high voltage harness clip from bracket.

⇐ : Vehicle front



12. Remove motor mounting rear mounting bolt. Refer to [TMS-124, "Removal and Installation"](#).

⇐ : Vehicle front



13. Remove motor mounting (LH and RH) mounting bolts from front suspension member. Refer to [TMS-124, "Removal and Installation"](#).

14. Remove member stay and rebound stopper with power tool. Refer to [FSU-22, "Exploded View"](#).

15. Remove suspension member mounting bolts, washer, and rebound stopper rubber with power tool. Refer to [FSU-22, "Exploded View"](#).

16. Remove front suspension member from vehicle body.

CAUTION:

Check the stable condition when using a jack.

17. Remove steering gear assembly with power tool.

18. Perform inspection after removal. Refer to [ST-40, "Inspection"](#).

INSTALLATION

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

CAUTION:

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Always fix the steering wheel using string to avoid turning.

- Perform final tightening of nuts and bolts on each part under unladen conditions with tires on level ground when removing steering gear assembly. Check wheel alignment. Refer to [FSU-11. "Inspection"](#).
- Rotate steering wheel to check for decentered condition, binding, noise or excessive steering effort.
- Never reuse steering outer socket fixing nut and steering gear assembly mounting nut.
- Perform inspection after installation. Refer to [ST-40. "Inspection"](#).

Disassembly and Assembly

INFOID:000000006827868

DISASSEMBLY

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

CAUTION:

When loosening lock nut, be sure to fix outer socket with a wrench or an equivalent.

2. Remove boot clamps, and then remove boot from inner socket.

CAUTION:

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

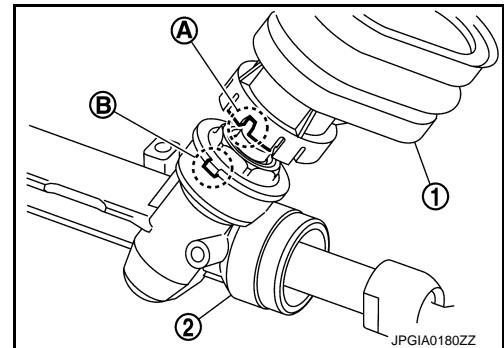
3. Remove fire wall seal.
4. Perform inspection after disassembly. Refer to [ST-40. "Inspection"](#).

ASSEMBLY

1. Install fire wall seal to gear housing assembly.

CAUTION:

Install fire wall seal (1) so that the groove (A) for locating is securely set to gear housing assembly (2) protrusion (B).



2. Apply recommended grease to inner socket part (A) of gear housing assembly, and install boot to gear housing assembly.

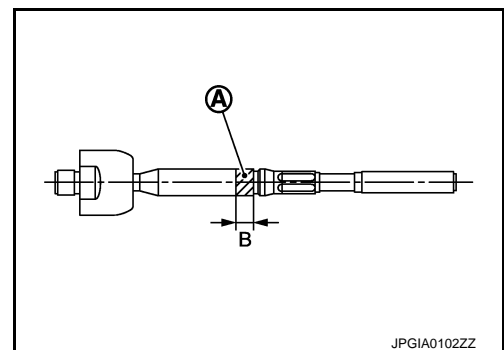
Use Genuine Lithium Soap, Autorex A (manufactured by Kyodo yushi) or equivalent.

CAUTION:

Never reuse boot.

Grease application position (Reference)

B : 10 mm (0.39 in)



STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

3. Install boot clamp (large diameter) (1) to boot using boot band crimping tool (A) [SST: KV40107300 (—)].

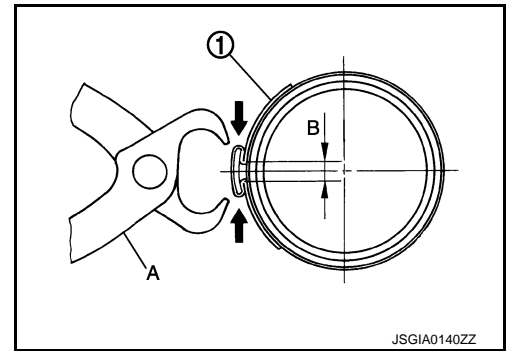
CAUTION:

- Never reuse boot clamp (large diameter).
- Install boot clamp (large diameter) (1) securely to boot groove, and crimp it so as to have clearance (B) of 3 mm (0.12 in) or less as shown.

4. Install boot clamp (small diameter) to boot.

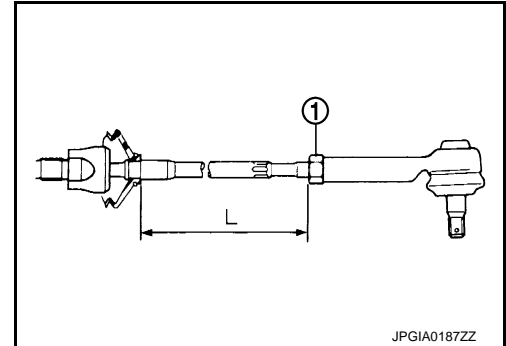
CAUTION:

- Never reuse boot clamp (small diameter).



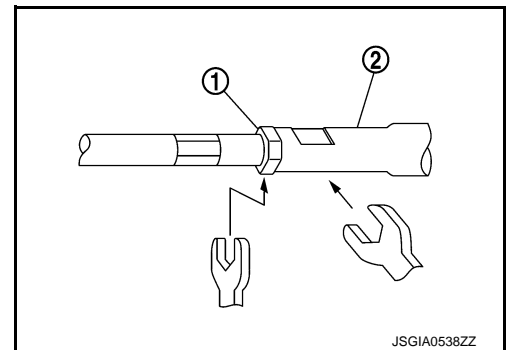
5. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Inner socket length (L) : Refer to [ST-43, "Steering Gear and Linkage"](#).



CAUTION:

- When tightening the lock nut (1), be sure to fix outer socket (2) with a wrench or an equivalent to prevent the ball joint from getting contact with the knuckle.
- Adjust toe-in after this procedure. The length achieved after toe-in adjustment is not necessary the above value.



Inspection

INFOID:000000006827869

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. Replace if there are any abnormal conditions.

Outer Socket and Inner Socket

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

BALL JOINT SWINGING FORCE

STEERING GEAR AND LINKAGE

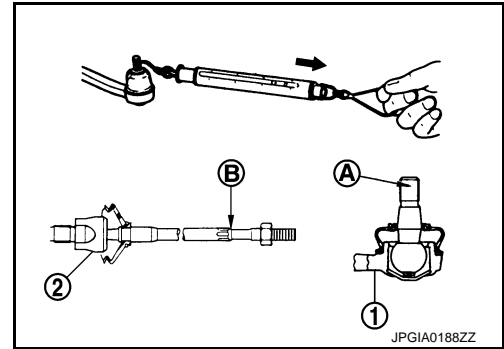
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

- 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 steering gear assembly (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

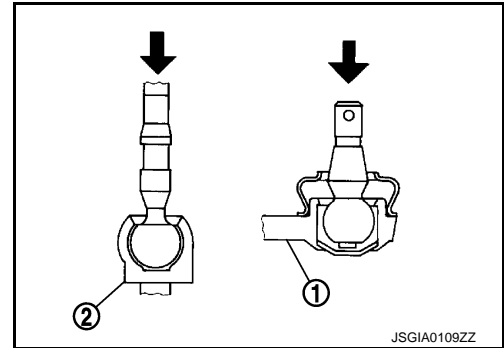
Swinging force : Refer to [ST-43, "Steering Gear and Linkage"](#).



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) or steering gear assembly (inner socket) (2) if the measured value is outside the standard.

Axial end play : Refer to [ST-43, "Steering Gear and Linkage"](#).



INSPECTION AFTER INSTALLATION

- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
 - Steering wheel play: Refer to [ST-29, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-14, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).

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

HEATED STEERING WHEEL SWITCH

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

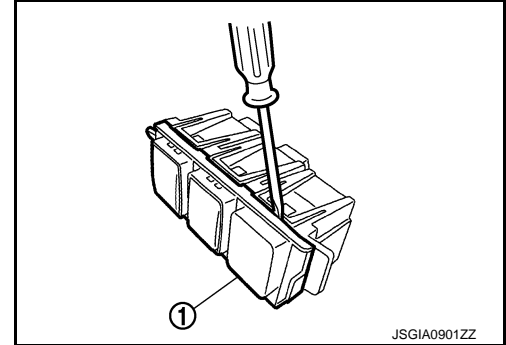
HEATED STEERING WHEEL SWITCH

Removal and Installation

INFOID:000000007461784

REMOVAL

1. Remove instrument lower panel. Refer to [IP-14, "Removal and Installation"](#).
2. Remove switch panel. Refer to [IP-14, "Removal and Installation"](#).
3. Remove heated steering wheel switch (1) from switch panel while pushing the pawl.



INSTALLATION

Install in the reverse order of removal.

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:0000000006827870

| | |
|---------------------|------|
| Steering gear model | R25N |
|---------------------|------|

Steering Wheel

INFOID:0000000006827871

| Item | Standard |
|--|------------------------------------|
| Steering wheel axial end play | 0 mm (0 in) |
| Steering wheel play on the outer circumference | 0 - 35 mm (0 - 1.38 in) |
| Steering wheel turning force | 36 N (3.7 kg-f, 8.09 lb-f) or less |

Steering Angle

INFOID:0000000006827873

Unit: Degree minute (Decimal degree)

| Item | | Standard |
|-------------|---------|-----------------|
| Inner wheel | Minimum | 37° 00' (37.0°) |
| | Nominal | 40° 00' (40.0°) |
| | Maximum | 41° 00' (41.0°) |
| Outer wheel | Nominal | 33° 00' (33.0°) |

Steering Column

INFOID:0000000006827874

| | |
|-------------------------|--|
| Rotating torque | 0 – 2.1 N·m (0 – 0.21 kg-m, 0 – 2 in-lb) |
| Steering column length* | 438.5 – 440.5 mm (17.26 – 17.34 in) |
| Tilt operating range* | 40.0 mm (1.575 in) |

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

Steering Gear and Linkage

INFOID:0000000006827875

| Item | | Standard |
|------------------------------|---|---|
| Rack stroke neutral position | | 73 mm (2.87 in) |
| Inner socket length | | 82.4 mm (3.244 in) |
| Outer socket ball joint | Swing force* (Spring balance measurement) | 6.0 – 58 N (0.61 – 5.9 kg-f, 1.35 – 13.03 lb-f) |
| | Axial end play | 0.5 mm (0.020 in) or less |
| Inner socket ball joint | Swing force* (Spring balance measurement) | 4.3 – 43.1 N (0.44 – 4.39 kg-f, 0.97 – 9.68 lb-f) |
| | Axial end play | 0.2 mm (0.008 in) or less |

*: For measuring position, refer to [ST-40, "Inspection"](#).

PRECAUTIONS

< PRECAUTION >

[WITHOUT HEATED STEERING WHEEL]

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:000000007445548

OPERATION PROHIBITION

WARNING:

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

NORMAL CHARGE PRECAUTION

WARNING:

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) during normal charge operation.

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

Point to Be Checked Before Starting Maintenance Work

INFOID:000000007445549

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

NOTE:

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:000000007445550

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

PRECAUTIONS

[WITHOUT HEATED STEERING WHEEL]

< PRECAUTION >

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 power switch ON, 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 power switch OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.

Precautions for Removing Battery Terminal

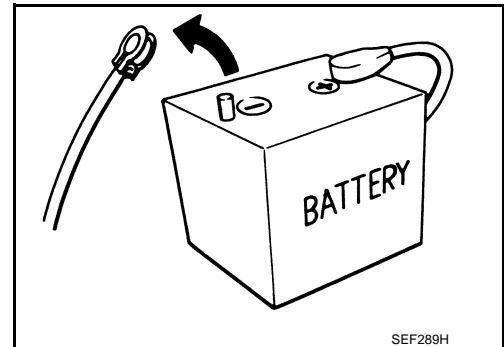
INFOID:000000007445551

- When removing the 12V battery terminal, turn OFF the power switch and wait at least 5 minutes.

NOTE:

ECU may be active for several minutes after the power switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- Always disconnect the battery terminal within 60 minutes after turning OFF the power switch. Even when the power switch is OFF, the 12V battery automatic charge control may automatically start after a lapse of 60 minutes from power switch OFF.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

1. Check that EVSE is not connected.

NOTE:

If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.

2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).
3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.

NOTE:

If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.

4. Remove 12V battery terminal within 60 minutes after turning the power switch OFF → ON → OFF.

CAUTION:

- After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.
- After turning the power switch OFF, if "Remote A/C" is activated by user operation, stop the air conditioner and start over from Step 1.

NOTE:

Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

PRECAUTIONS

< PRECAUTION >

[WITHOUT HEATED STEERING WHEEL]

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the power switch.
NOTE:
If the power switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
NOTE:
The removal of 12V battery may cause a DTC detection error.

Service Notice or Precautions for Steering System

INFOID:000000007445552

- 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.
- During quick steering, rasping noise may be heard from around the steering wheel. This is not a malfunction. The noise is an operating noise of the EPS system under normal conditions. If the rasping noise occurs during slow steering, this may not be an operating noise of the system. In this case, it is necessary to find out the location of the noise and repair, if necessary.
- Never repeat static steering. (Motor and EPS control unit could be heated.)

PREPARATION

[WITHOUT HEATED STEERING WHEEL]

< PREPARATION >

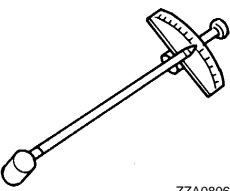
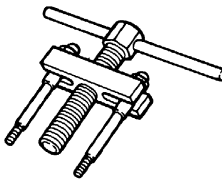
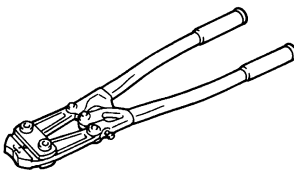
PREPARATION

PREPARATION

Special Service Tools

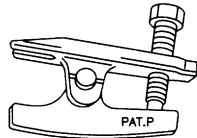
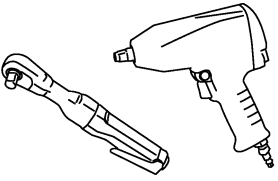
INFOID:000000007445553

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 |
|---|---|
| ST3127S000 (J-25765-A) Preload gauge  ZZA0806D | Measuring steering column rotating torque |
| ST27180001 (J-25726-A) Steering wheel puller  ZZA0819D | Removing steering wheel |
| KV40107300 (—) Boot band crimping tool  ZZA1229D | Installing boot clamp (large diameter) |

Commercial Service Tools

INFOID:000000007445554

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

BASIC INSPECTION

STEERING WHEEL

Inspection

INFOID:000000007445555

NEUTRAL POSITION STEERING WHEEL

1. Check that steering gear assembly, steering column assembly and steering wheel are installed in the correct position.
2. Check wheel alignment within specification. Refer to [FSU-11, "Inspection"](#).
3. Set 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:

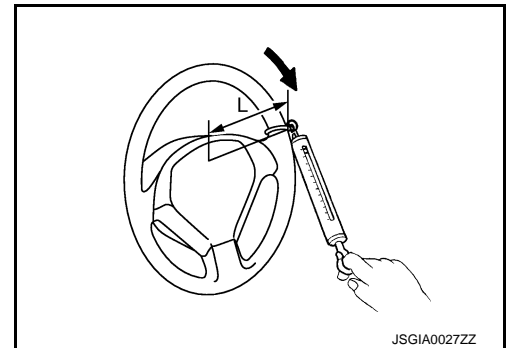
If the adjustment is performed by using the inner socket, check wheel alignment after the adjustment. Refer to [FSU-11, "Inspection"](#).

STEERING WHEEL TURNING FORCE

1. Park vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated normal pressure. Refer to [WT-52, "Tire Air Pressure"](#).
3. Set the vehicle to READY.
4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Steering wheel turning force : Refer to [ST-64, "Steering Wheel"](#).

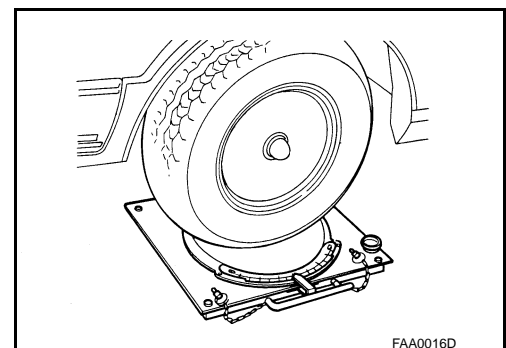
Measuring point (L) : 185 mm (7.28 in)



FRONT WHEEL TURNING ANGLE

1. Perform toe-in inspection. Refer to [FSU-11, "Inspection"](#).

CAUTION:
Perform front wheel turning angle inspection, after toe-in inspection.
2. Place front wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
3. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



STEERING WHEEL

< BASIC INSPECTION >

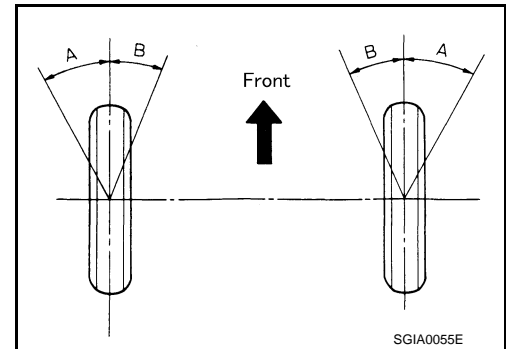
[WITHOUT HEATED STEERING WHEEL]

- 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).

A : Inner wheel angle

B : Outer wheel angle

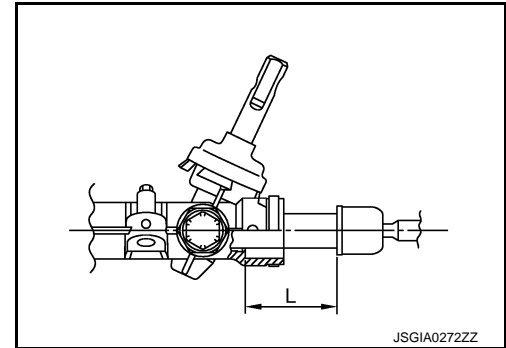
Steering angle : Refer to [ST-64, "Steering Angle"](#).



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

Rack stroke neutral position (L) : Refer to [ST-64, "Steering Gear and Linkage"](#).

- 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.



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

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[WITHOUT HEATED STEERING WHEEL]

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000007445556

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 | | | | | | | | | | | | | | |
|-----------|--|-----------|---|---|--|-------------------------------------|-------------------------|---|--|---------------------------------------|---|--|-----------------------------------|-------------------|-------------------|--------------------|-------------------|
| | | | Outer/inner socket ball joint swinging torque | Outer/inner socket ball joint rotating torque | Outer/inner socket ball joint end play | Steering wheel play | 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 | AXLE and SUSPENSION | TIRE | ROAD WHEEL | DRIVE SHAFT | BRAKE |
| Reference | | | ST-62, "Inspection" | ST-62, "Inspection" | ST-62, "Inspection" | ST-51, "Inspection" | — | — | ST-58, "Exploded View" | ST-54, "Inspection" | ST-53, "Exploded View" | ST-58, "Exploded View" | NVH in FAX, RAX, FSU, RSU section | NVH in WT section | NVH in WT section | NVH in FAX section | NVH in BR section |
| Symptom | | Noise | x | x | x | x | | | | x | x | | x | x | x | x | x |
| | | Shake | | | | | 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

PERIODIC MAINTENANCE**STEERING WHEEL****Inspection**

INFOID:000000007445557

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-64, "Steering Wheel"](#).

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-53, "Exploded View"](#).
 - Check steering gear assembly mounting condition for looseness. Refer to [ST-58, "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-64, "Steering Wheel"](#).

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 >

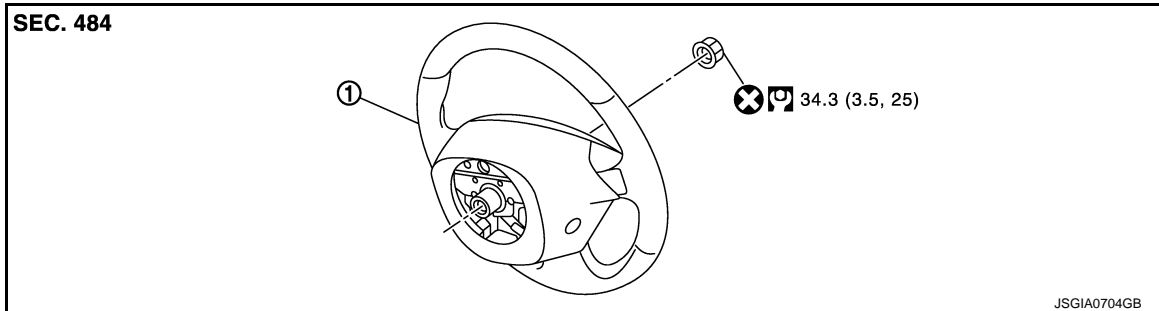
[WITHOUT HEATED STEERING WHEEL]

REMOVAL AND INSTALLATION


STEERING WHEEL


Exploded View

INFOID:000000007445558



1. Steering wheel

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

: Always replace after every disassembly.

Removal and Installation

INFOID:000000007445559

REMOVAL

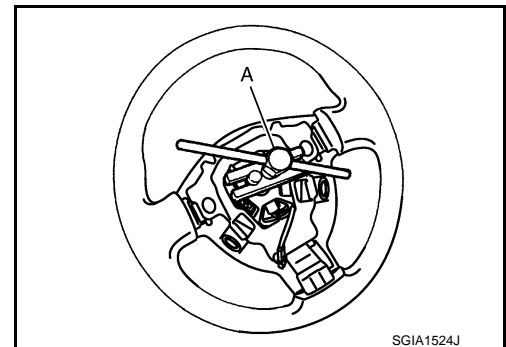
NOTE:

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 vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-19. "Removal and Installation"](#).
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller (A) [SST: ST27180001 (J-25726-A)].

NOTE:

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



INSTALLATION

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

- Check the spiral cable neutral position after replacing or rotating spiral cable. Refer to [SR-22. "Removal and Installation"](#).

CAUTION:

- **Never twist spiral cable excessively after it becomes tight. (Twisting may cause the cable to be torn off.)**
- Never reuse steering wheel lock nut.

STEERING COLUMN

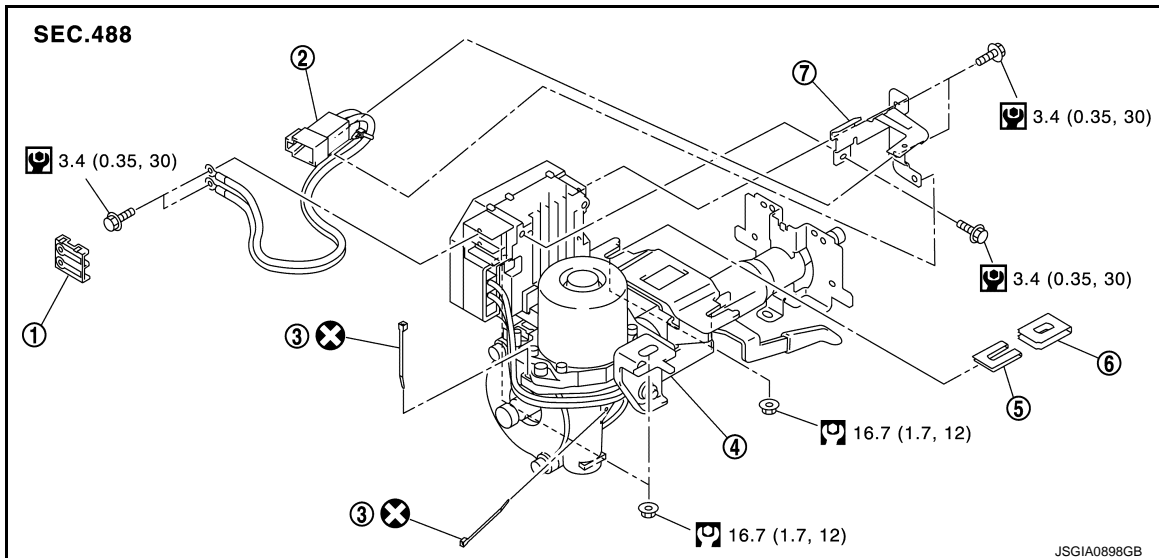
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

STEERING COLUMN

Exploded View

INFOID:000000007445560



- | | | |
|-----------------------------|------------------------|------------------------|
| 1. Cover | 2. Sub-harness | 3. Band |
| 4. Steering column assembly | 5. Slide plate (inner) | 6. Slide plate (outer) |
| 7. Bracket | | |

: N·m (kg·m, in·lb)

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:000000007445561

REMOVAL

CAUTION:

- While removing the steering column assembly, never unlock the tilt lever.
- Never impact on the axis when removing steering column assembly.
- Be careful when removing steering column assembly from the vehicle because it is heavy.
- Keep steering column assembly away from magnetic sources.
- Never disassemble steering column assembly. It is not separable.
- While removing the steering column assembly, never move the steering gear.
- When removing the steering column assembly, be careful not to allow the intermediate shaft to turn.

1. Set vehicle to the straight-ahead position.
2. Place the tilt to the lowest level.

CAUTION:

Securely lock the tilt lever.

3. Remove instrument lower panel. Refer to [IP-14, "Removal and Installation"](#).
4. Remove driver air bag module. Refer to [SR-19, "Removal and Installation"](#).
5. Remove steering wheel. Refer to [ST-52, "Removal and Installation"](#).
6. Remove steering column cover. Refer to [IP-14, "Removal and Installation"](#).
7. Remove spiral cable. Refer to [SR-22, "Removal and Installation"](#).
8. Remove combination switch. Refer to [BCS-78, "Removal and Installation"](#).
9. Remove knee protector.
10. Disconnect each switch harness connectors installed to steering column assembly.

STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

11. Remove intermediate shaft mounting bolt (steering column side), and separate intermediate shaft from steering column assembly. Refer to [ST-56, "Removal and Installation"](#).
CAUTION:
 - Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.
12. Disconnect EPS control unit connectors.
13. Remove steering column assembly.
CAUTION:
When removing the mounting, be careful not to drop the steering column assembly.
14. Remove slide plate (outer and inner) from steering column assembly.
15. Remove cover, sub-harness, band, and bracket from steering column assembly.
CAUTION:
Remove cover, sub-harness, band, and bracket only when necessary.
16. Perform inspection after removal. Refer to [ST-54, "Inspection"](#).

INSTALLATION

CAUTION:

- Never impact on the axis when removing steering column assembly.
- When installing the steering column cover, check that the vehicle harness is not stuck in the cover.

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

- After tightening mounting nut (A) of the steering column assembly, press in slide plate (outer and inner) (1) to tighten mounting nut (B).

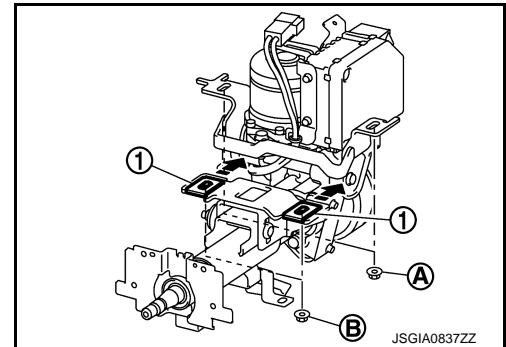
CAUTION:

The slide plate must be securely pressed in before tightening the nut of slide plate (outer and inner).

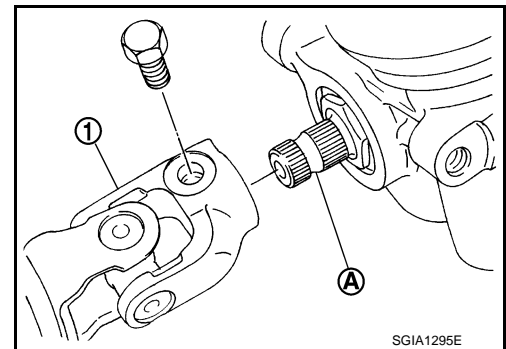
- For intermediate shaft mounting bolt direction, refer to [ST-56, "Exploded View"](#). (Do not insert it from the other side.)

CAUTION:

Never reuse intermediate mounting bolt.



- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft (A) before final tightening.
- After installing steering column assembly, perform self-diagnosis with CONSULT to ensure correct operation. Refer to [STC-10, "CONSULT Function"](#).
- Never reuse band.
- Perform inspection after installation. Refer to [ST-54, "Inspection"](#).



Inspection

INFOID:000000007445562

INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if there are any abnormal conditions.

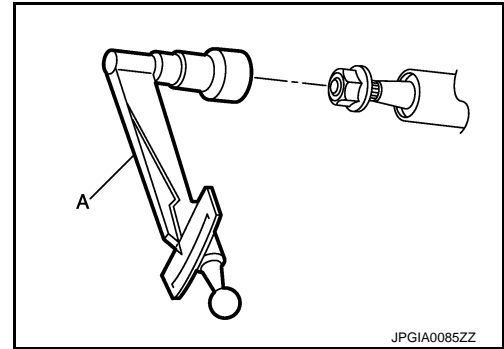
STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

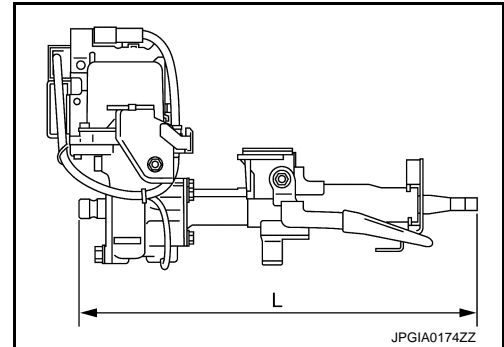
- Measure steering column assembly rotating torque using a preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if the rotating torque is outside the standard.

Rotating torque : Refer to [ST-64, "Steering Column"](#).



- Measure the length "L" shown in the figure, if vehicle has been involved in a minor collision. Replace steering column assembly (with motor, reduction gear, sensor) if "L" is outside the standard.

Steering column length (L) : Refer to [ST-64, "Steering Column"](#).

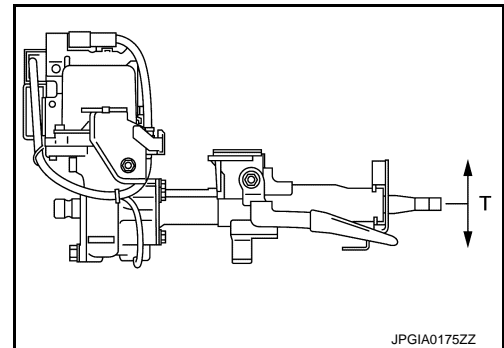


INSPECTION AFTER INSTALLATION

- Check each part of steering column assembly for damage or other malfunctions. Replace if there are any abnormal conditions.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
 - Steering wheel play: Refer to [ST-51, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-48, "Inspection"](#).
- Check tilt mechanism operating range "T" shown in the figure.

Tilt operating range (T) : Refer to [ST-64, "Steering Column"](#).

- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).



STEERING SHAFT

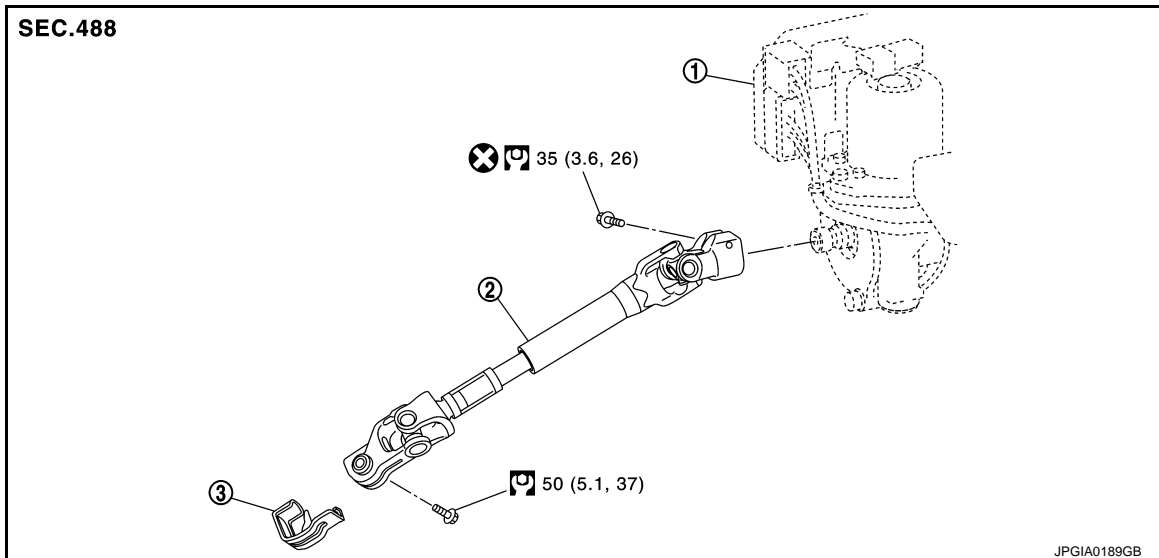
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

STEERING SHAFT

Exploded View

INFOID:000000007445563



1. Steering column assembly 2. Intermediate shaft 3. Guide*

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

: Always replace after every disassembly.

*: The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.

Removal and Installation

INFOID:000000007445564

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. Place the tilt to the lowest level.
CAUTION:
Securely lock the tilt lever.
3. Remove instrument lower panel. Refer to [IP-14, "Removal and Installation"](#).
4. Remove intermediate shaft mounting bolt (steering gear side), and separate intermediate shaft from steering gear assembly.
CAUTION:
 - Place a matching mark on both intermediate shaft and steering gear assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.
5. Remove intermediate shaft mounting bolt (steering column side), and remove intermediate shaft from steering column assembly.
CAUTION:
 - Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.

STEERING SHAFT

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

6. Remove guide from intermediate shaft.

NOTE:

The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.

7. Perform inspection after removal. Refer to [ST-57, "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.

- Follow the instructions below to install intermediate shaft to steering gear assembly.
- Insert intermediate shaft into steering gear assembly. Align groove of the steering gear assembly with the bolt hole of the intermediate shaft.

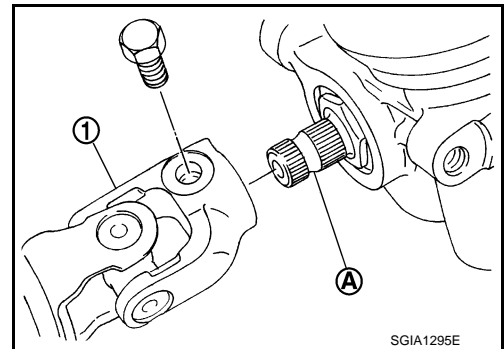
NOTE:

- The guide is provided only for supporting installation in the manufacturing plant. To prevent deformation at the reinstallation procedure, do not use the guide.
- When replacing intermediate shaft with a new one, remove the attached guide.
- Check for galling while hand-tightening the mounting bolt of intermediate shaft (steering gear assembly side). After checking that the bolt is inserted in the groove of steering gear assembly, tighten the bolt to the specified torque.
- For intermediate shaft mounting bolt direction, refer to [ST-56, "Exploded View"](#). (Do not insert it from the other side.)

CAUTION:

Never reuse intermediate mounting bolt.

- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft (A) before final tightening.
- Perform inspection after installation. Refer to [ST-57, "Inspection"](#).



INFOID:000000007445565

Inspection

INSPECTION AFTER REMOVAL

- Check each part of intermediate shaft for damage or other malfunctions. Replace if there are any abnormal conditions.

INSPECTION AFTER INSTALLATION

- Check each part of intermediate shaft for damage or other malfunctions. Replace if there are any abnormal conditions.
- Rotate steering wheel to check for decentered condition, binding, noise, or excessive steering effort.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
- Steering wheel play: Refer to [ST-51, "Inspection"](#).
- Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-48, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

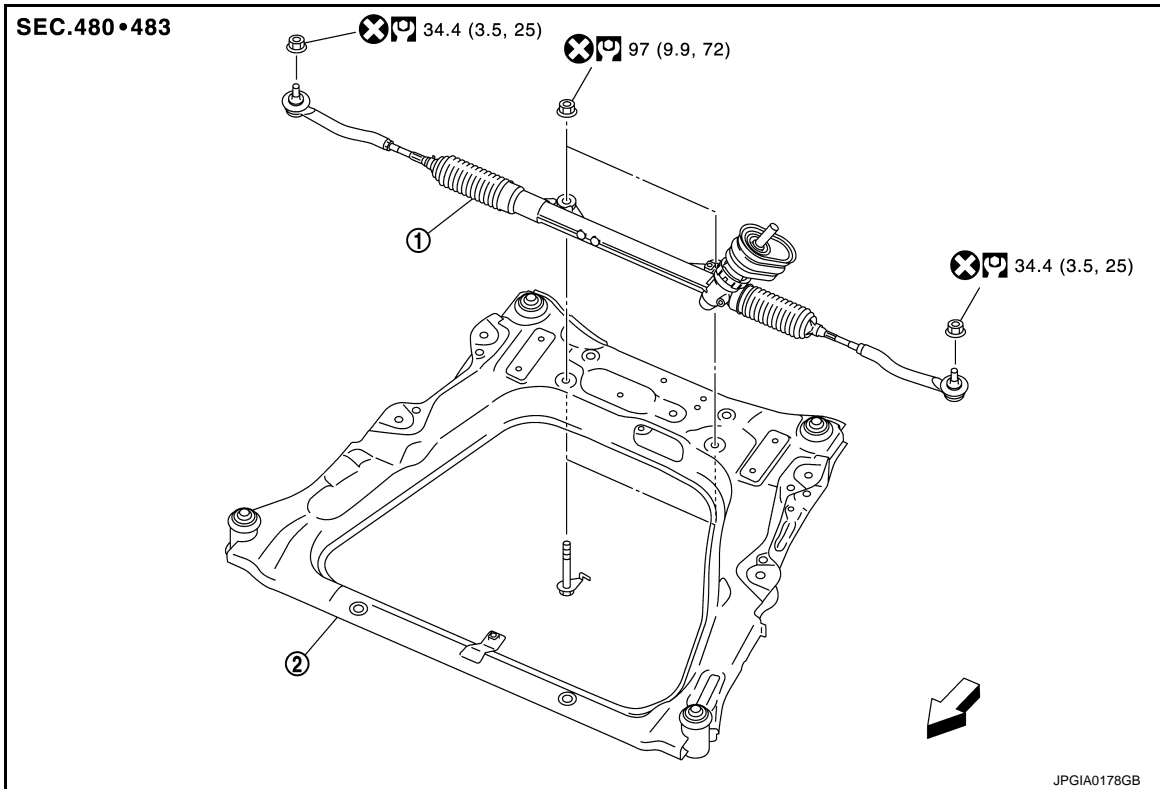
[WITHOUT HEATED STEERING WHEEL]

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000007445566

REMOVAL



1. Steering gear assembly

2. Front suspension member

↔: Vehicle front

⊞: N-m (kg-m, ft-lb)

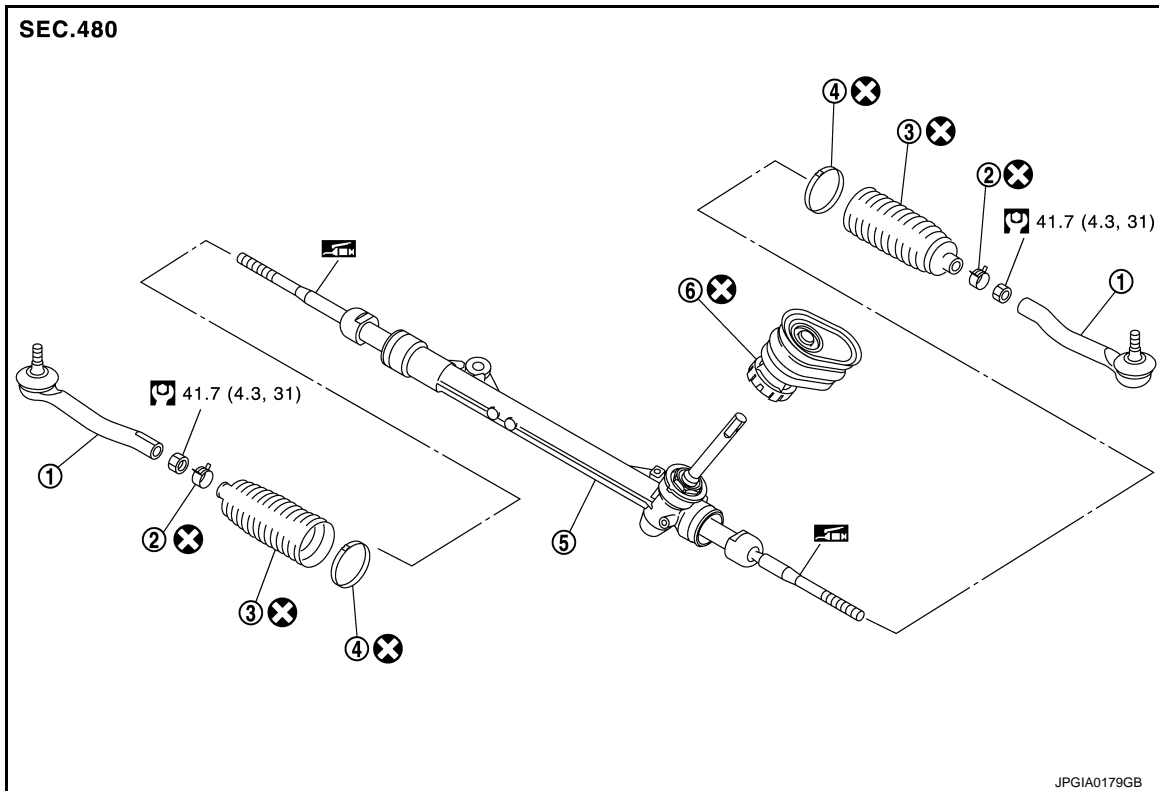
⊗: Always replace after every disassembly.

DISASSEMBLY

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]



- | | | |
|--------------------------------|--------------------------------|-------------------|
| 1. Outer socket | 2. Boot clamp (small diameter) | 3. Boot |
| 4. Boot clamp (large diameter) | 5. Gear housing assembly | 6. Fire wall seal |

41.7 (4.3, 31) N·m (kg-m, ft-lb)

Always replace after every disassembly.

Apply Genuine Lithium Soap, Autorex A (manufactured by Kyodo yushi) or equivalent.

Removal and Installation

INFOID:000000007445567

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove intermediate shaft mounting bolt (steering gear assembly side). Refer to [ST-56. "Removal and Installation"](#).
CAUTION:
 - Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Always fix the steering wheel using string to avoid turning.
 - Place a matching mark on both intermediate shaft and steering gear assembly before removing intermediate shaft.
 - When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.
3. Remove tires with power tool. Refer to [WT-47. "Exploded View"](#).
4. Remove front under cover. Refer to [EXT-23. "FRONT UNDER COVER : Exploded View"](#).
5. Remove Li-ion battery under cover (front). Refer to [EVB-169. "Removal and Installation"](#).
6. Remove fender protector. Refer to [EXT-21. "FENDER PROTECTOR : Exploded View"](#).
7. Remove stabilizer connecting rod. Refer to [FSU-19. "Exploded View"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

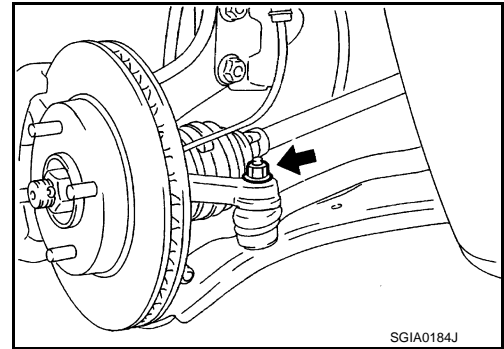
[WITHOUT HEATED STEERING WHEEL]

8. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using suitable ball joint remover (commercial service tool).

CAUTION:

Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover from sudden drop turning.

9. Separate transverse link from steering knuckle with power tool. Refer to [FAX-10, "Exploded View"](#).



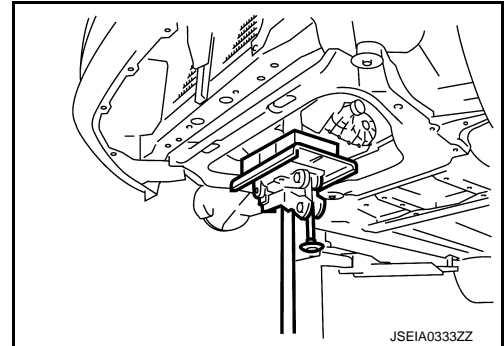
10. Set suitable jack under reduction gear and traction motor.

CAUTION:

- At this step, the jack must be set only for supporting the removal procedure. For details on jacking up the vehicle, refer to [GI-41, "Garage Jack and Safety Stand and 2-Pole Lift"](#).

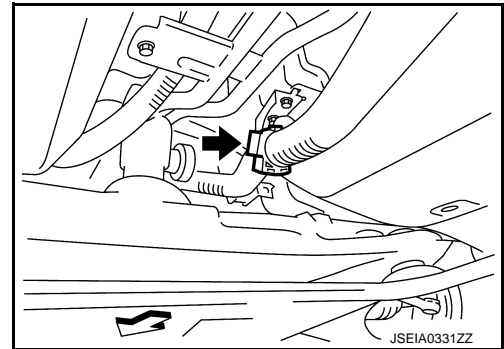
- Never damage the reduction gear and traction motor with a jack.

- Check the stable condition when using a jack.



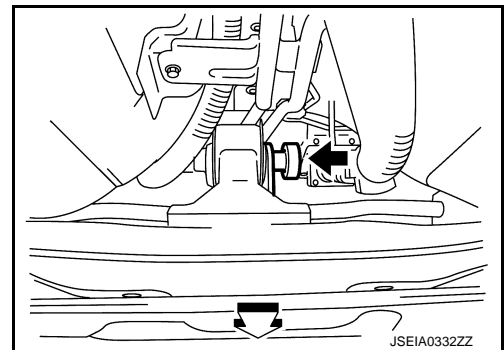
11. Separate high voltage harness clip from bracket.

⇐ : Vehicle front



12. Remove motor mounting rear mounting bolt. Refer to [TMS-124, "Removal and Installation"](#).

⇐ : Vehicle front



13. Remove motor mounting (LH and RH) mounting bolts from front suspension member. Refer to [TMS-124, "Removal and Installation"](#).

14. Remove member stay and rebound stopper with power tool. Refer to [FSU-22, "Exploded View"](#).

15. Remove suspension member mounting bolts, washer, and rebound stopper rubber with power tool. Refer to [FSU-22, "Exploded View"](#).

16. Remove front suspension member from vehicle body.

CAUTION:

Check the stable condition when using a jack.

17. Remove steering gear assembly with power tool.

18. Perform inspection after removal. Refer to [ST-62, "Inspection"](#).

INSTALLATION

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

CAUTION:

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

Spiral cable may be cut if steering wheel turns while separating steering column assembly and steering gear assembly. Always fix the steering wheel using string to avoid turning.

- Perform final tightening of nuts and bolts on each part under unladen conditions with tires on level ground when removing steering gear assembly. Check wheel alignment. Refer to [FSU-11. "Inspection"](#).
- Rotate steering wheel to check for decentered condition, binding, noise or excessive steering effort.
- Never reuse steering outer socket fixing nut and steering gear assembly mounting nut.
- Perform inspection after installation. Refer to [ST-62. "Inspection"](#).

Disassembly and Assembly

INFOID:000000007445568

DISASSEMBLY

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

CAUTION:

When loosening lock nut, be sure to fix outer socket with a wrench or an equivalent.

2. Remove boot clamps, and then remove boot from inner socket.

CAUTION:

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

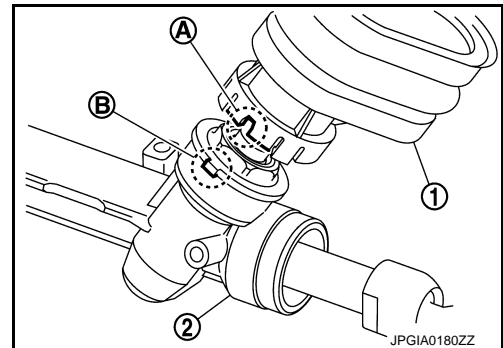
3. Remove fire wall seal.
4. Perform inspection after disassembly. Refer to [ST-62. "Inspection"](#).

ASSEMBLY

1. Install fire wall seal to gear housing assembly.

CAUTION:

Install fire wall seal (1) so that the groove (A) for locating is securely set to gear housing assembly (2) protrusion (B).



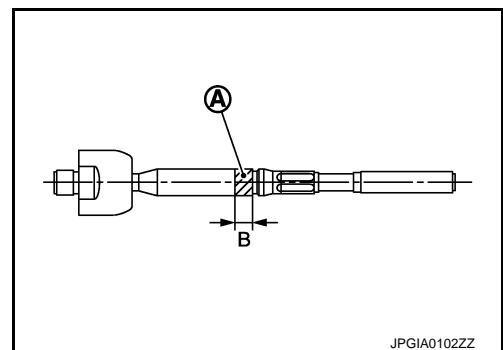
2. Apply recommended grease to inner socket part (A) of gear housing assembly, and install boot to gear housing assembly. **Use Genuine Lithium Soap, Autorex A (manufactured by Kyodo yushi) or equivalent.**

CAUTION:

Never reuse boot.

Grease application position (Reference)

B : 10 mm (0.39 in)



STEERING GEAR AND LINKAGE

[WITHOUT HEATED STEERING WHEEL]

< REMOVAL AND INSTALLATION >

3. Install boot clamp (large diameter) (1) to boot using boot band crimping tool (A) [SST: KV40107300 (—)].

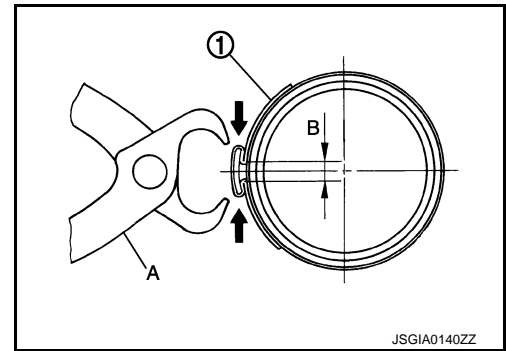
CAUTION:

- Never reuse boot clamp (large diameter).
- Install boot clamp (large diameter) (1) securely to boot groove, and crimp it so as to have clearance (B) of 3 mm (0.12 in) or less as shown.

4. Install boot clamp (small diameter) to boot.

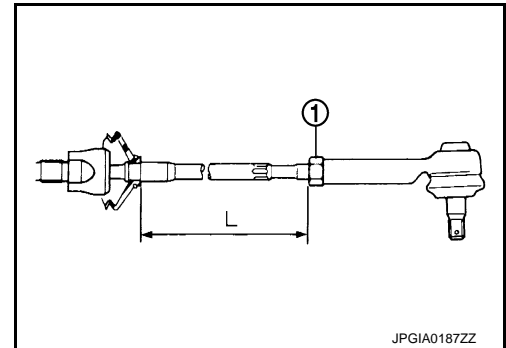
CAUTION:

- Never reuse boot clamp (small diameter).



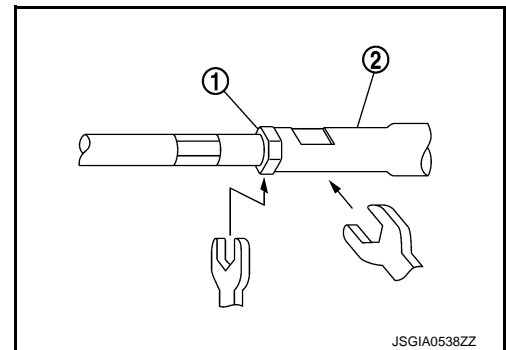
5. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Inner socket length (L) : Refer to [ST-64, "Steering Gear and Linkage"](#).



CAUTION:

- When tightening the lock nut (1), be sure to fix outer socket (2) with a wrench or an equivalent to prevent the ball joint from getting contact with the knuckle.
- Adjust toe-in after this procedure. The length achieved after toe-in adjustment is not necessary the above value.



Inspection

INFOID:000000007445569

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. Replace if there are any abnormal conditions.

Outer Socket and Inner Socket

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

BALL JOINT SWINGING FORCE

STEERING GEAR AND LINKAGE

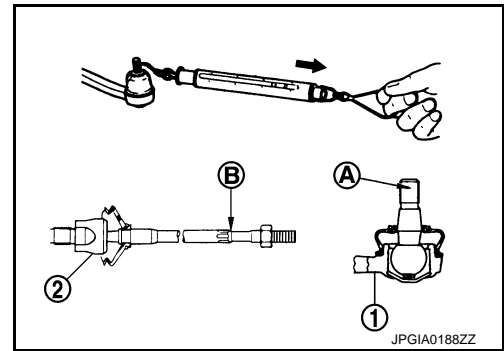
< REMOVAL AND INSTALLATION >

[WITHOUT HEATED STEERING WHEEL]

- 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 steering gear assembly (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

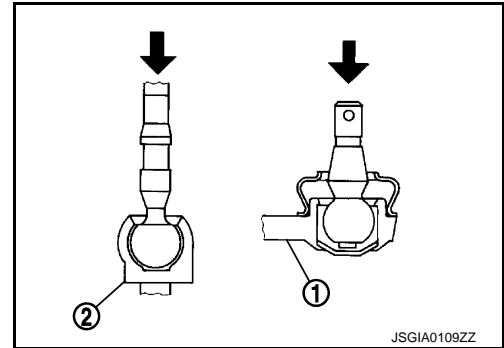
Swinging force : Refer to [ST-64, "Steering Gear and Linkage"](#).



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) or steering gear assembly (inner socket) (2) if the measured value is outside the standard.

Axial end play : Refer to [ST-64, "Steering Gear and Linkage"](#).



INSPECTION AFTER INSTALLATION

- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle.
 - Steering wheel play: Refer to [ST-51, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-48, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-61, "Work Procedure"](#).

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:000000007445570

| | |
|---------------------|------|
| Steering gear model | R25N |
|---------------------|------|

Steering Wheel

INFOID:000000007445571

| Item | Standard |
|--|------------------------------------|
| Steering wheel axial end play | 0 mm (0 in) |
| Steering wheel play on the outer circumference | 0 - 35 mm (0 - 1.38 in) |
| Steering wheel turning force | 36 N (3.7 kg-f, 8.09 lb-f) or less |

Steering Angle

INFOID:000000007445573

Unit: Degree minute (Decimal degree)

| Item | Standard | |
|-------------|----------|-----------------|
| Inner wheel | Minimum | 37° 00' (37.0°) |
| | Nominal | 40° 00' (40.0°) |
| | Maximum | 41° 00' (41.0°) |
| Outer wheel | Nominal | 33° 00' (33.0°) |

Steering Column

INFOID:000000007445574

| | |
|-------------------------|--|
| Rotating torque | 0 – 2.1 N·m (0 – 0.21 kg-m, 0 – 2 in-lb) |
| Steering column length* | 438.5 – 440.5 mm (17.26 – 17.34 in) |
| Tilt operating range* | 40.0 mm (1.575 in) |

*: For measuring position, refer to [ST-54, "Inspection"](#).

Steering Gear and Linkage

INFOID:000000007445575

| Item | Standard | |
|------------------------------|---|---|
| Rack stroke neutral position | 73 mm (2.87 in) | |
| Inner socket length | 82.4 mm (3.244 in) | |
| Outer socket ball joint | Swing force* (Spring balance measurement) | 6.0 – 58 N (0.61 – 5.9 kg-f, 1.35 – 13.03 lb-f) |
| | Axial end play | 0.5 mm (0.020 in) or less |
| Inner socket ball joint | Swing force* (Spring balance measurement) | 4.3 – 43.1 N (0.44 – 4.39 kg-f, 0.97 – 9.68 lb-f) |
| | Axial end play | 0.2 mm (0.008 in) or less |

*: For measuring position, refer to [ST-62, "Inspection"](#).