

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

SECTION **ST**

STEERING SYSTEM

CONTENTS

WITH HEATED STEERING WHEEL	WIRING DIAGRAM12
PRECAUTION 3	HEATED STEERING WHEEL12
PRECAUTIONS 3	Wiring Diagram12
Precaution for Technicians Using Medical Electric.....3	BASIC INSPECTION 15
Point to Be Checked Before Starting Maintenance Work3	DIAGNOSIS AND REPAIR WORK FLOW 15
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"3	Work Flow (Heated Steering Wheel)15
Precaution for Removing 12V Battery4	STEERING WHEEL16
Service Notice or Precautions for Steering System4	Inspection16
PREPARATION 6	DTC/CIRCUIT DIAGNOSIS18
PREPARATION 6	HEATED STEERING WHEEL SYSTEM18
Special Service Tools6	Component Function Check18
Commercial Service Tools6	Diagnosis Procedure18
SYSTEM DESCRIPTION 8	Component Inspection (Heated Steering Wheel Switch)20
COMPONENT PARTS 8	Component Inspection (Heated Steering Wheel)21
HEATED STEERING WHEEL SYSTEM8	Component Inspection (Heated Steering Wheel Relay)21
HEATED STEERING WHEEL SYSTEM : Component Parts Location8	HEATED STEERING WHEEL SWITCH INDICATOR LAMP23
HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel9	Component Function Check23
HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch9	Diagnosis Procedure23
HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay9	Component Inspection (Heated Steering Wheel Switch)25
HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay9	Component Inspection (Heated Steering Wheel Relay)25
HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.9	SYMPTOM DIAGNOSIS26
SYSTEM10	HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE26
HEATED STEERING WHEEL SYSTEM10	Description26
HEATED STEERING WHEEL SYSTEM : System Description10	Diagnosis Procedure26
	HEATED STEERING WHEEL SWITCH INDICATOR LAMP DOES NOT TURN ON29

Description	29	Exploded View	38
Diagnosis Procedure	29	Removal and Installation	38
NOISE, VIBRATION AND HARSHNESS		Inspection	39
(NVH) TROUBLESHOOTING	31	STEERING GEAR AND LINKAGE	40
NVH Troubleshooting Chart	31	Exploded View	40
PERIODIC MAINTENANCE	33	Removal and Installation	41
STEERING WHEEL	33	Disassembly and Assembly	41
Inspection	33	Inspection	43
REMOVAL AND INSTALLATION	34	HEATED STEERING WHEEL SWITCH	45
STEERING WHEEL	34	Removal and Installation	45
Exploded View	34	SERVICE DATA AND SPECIFICATIONS	
Removal and Installation	34	(SDS)	46
STEERING COLUMN	35	SERVICE DATA AND SPECIFICATIONS	
Exploded View	35	(SDS)	46
Removal and Installation	35	General Specifications	46
Inspection	36	Steering Wheel	46
STEERING SHAFT	38	Steering Angle	46
		Steering Column	46
		Steering Gear and Linkage	46

PRECAUTIONS

< PRECAUTION >

[WITH HEATED STEERING WHEEL]

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:0000000010642327

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 PDM (Power Delivery Module) at normal charge operation may affect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not approach motor room [PDM (Power Delivery Module)] at the hood-opened condition 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:0000000010642328

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:0000000010642329

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 SR and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery and wait at least three minutes before performing any service.

Precaution for Removing 12V Battery

INFOID:000000010642330

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 within 1 hour after turning the power switch OFF → ON → OFF.

NOTE:

- The 12V battery automatic charge control may start automatically even when the power switch is in OFF state.
- Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

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.

Service Notice or Precautions for Steering System

INFOID:000000010642331

- 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.

PRECAUTIONS

< PRECAUTION >

[WITH HEATED STEERING WHEEL]

- 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.)

A

B

C

D

E

F

ST

H

I

J

K

L

M

N

O

P

PREPARATION

< PREPARATION >

[WITH HEATED STEERING WHEEL]

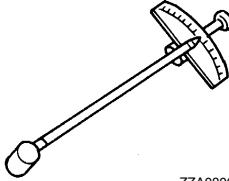
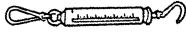
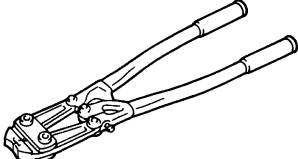
PREPARATION

PREPARATION

Special Service Tools

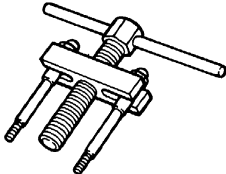
INFOID:000000010642332

The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
ST3127S000 (J-25765-A) Preload gauge  ZZA0806D	Measuring steering column rotating torque
— (J-44372) Pull gauge  LST024	Measuring steering wheel turning force or rack sliding force
KV40107300 (—) Boot band crimping tool  ZZA1229D	Installing boot clamp (large diameter)

Commercial Service Tools

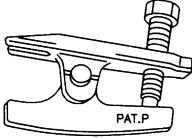

INFOID:000000010642333

Tool name	Description
Steering wheel puller  ZZA0819D	Removing steering wheel

PREPARATION

< PREPARATION >

[WITH HEATED STEERING WHEEL]

Tool name	Description
Ball joint remover  S-NT146	Removing steering outer socket
Power tool  PIIB1407E	Loosening nuts, screws and bolts

A
B
C
D
E
F

ST

H
I
J
K
L
M
N
O
P

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

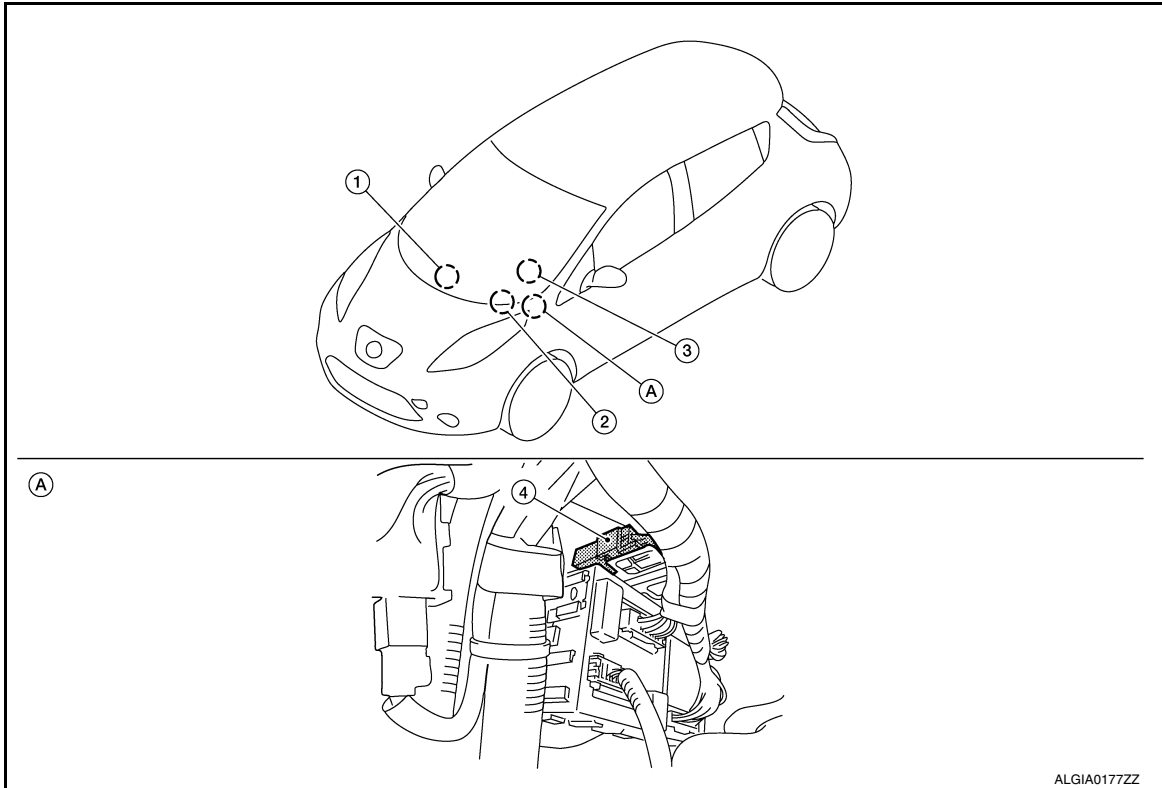
SYSTEM DESCRIPTION

COMPONENT PARTS

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:0000000010642334



- A. At the back of instrument lower panel
LH

No.	Component	Function
1	A/C auto amp.	ST-9. "HEATED STEERING WHEEL SYSTEM : A/C Auto Amp."
2	Heated steering wheel switch	ST-9. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch"
3	Heated steering wheel	ST-9. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel"
4	Heated steering wheel relay	ST-9. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay"

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel

INFOID:0000000110642335

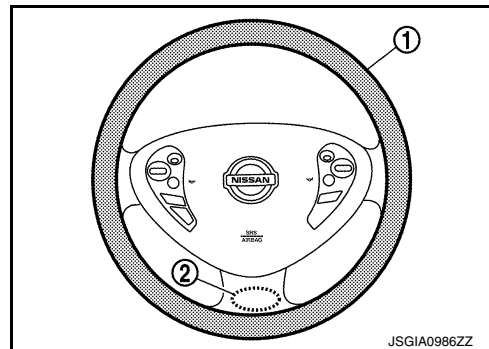
With the power supply from the heated steering wheel relay, the heated steering wheel controls temperature through the heating element (1) and thermostat (2) built into the steering wheel.

- Heating element: Generates heat by energization.

NOTE:

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

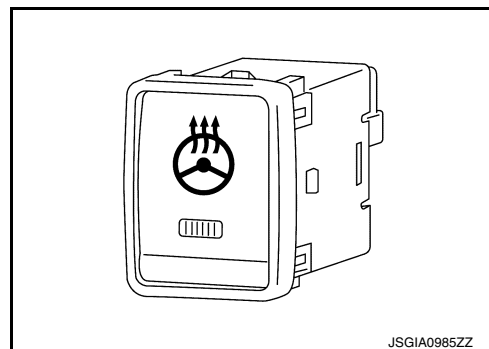
- Thermostat: Turns ON/OFF power supply according to the specified temperature.



HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch

INFOID:0000000110642336

- 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:0000000110642337

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-8. "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.

INFOID:0000000110642338

- 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-25. "A/C Auto Amp."](#)

SYSTEM

[WITH HEATED STEERING WHEEL]

< SYSTEM DESCRIPTION >

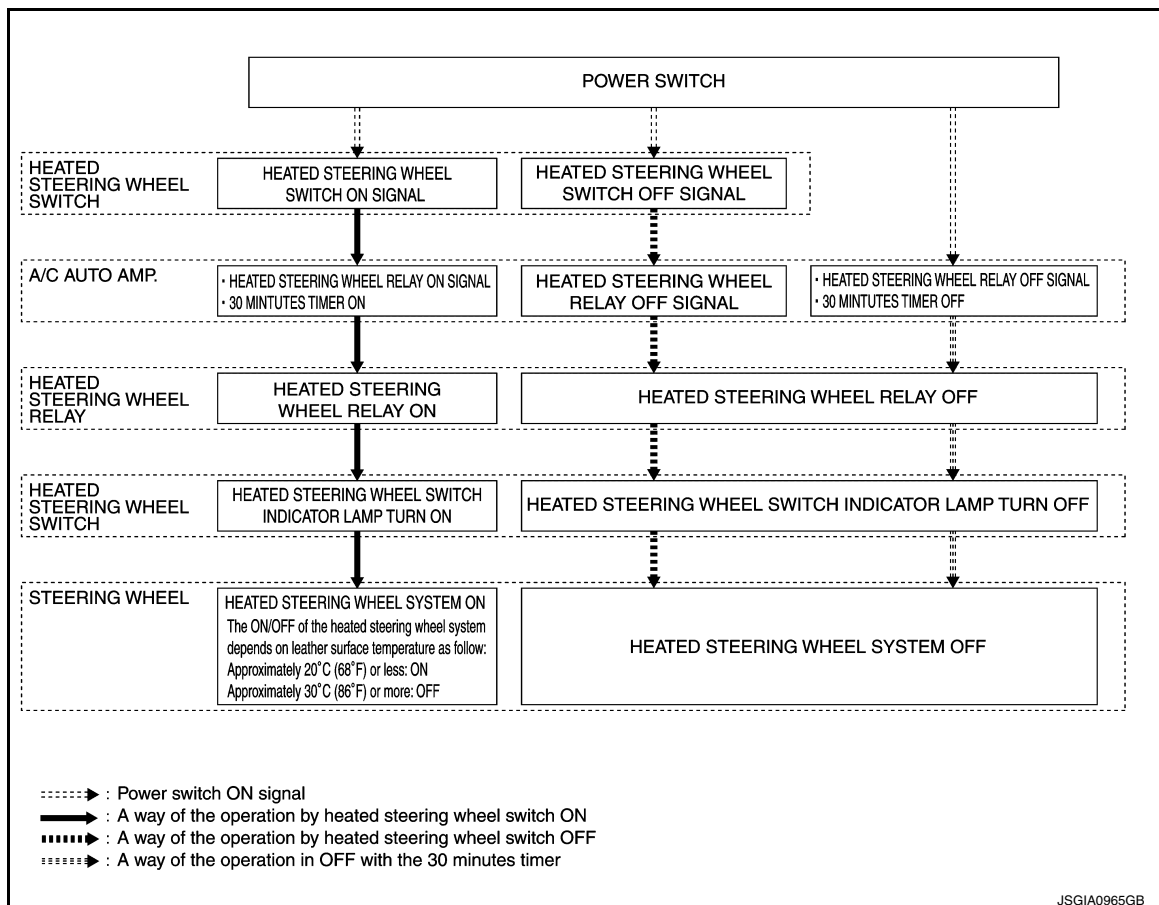
SYSTEM

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Description

INFOID:000000010642339

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 heated steering wheel by the AC-heater timer. For AC-heater timer: Refer to [HAC-38. "AUTOMATIC AIR CONDITIONING SYSTEM : A/C-Heater Timer \(Climate Ctrl. Timer\)"](#) (with heat pump) or [HAC-237. "AUTOMATIC AIR CONDITIONING SYSTEM : A/C-Heater Timer \(Climate Ctrl. Timer\)"](#) (without heat pump).

NOTE:

SYSTEM

< SYSTEM DESCRIPTION >

[WITH HEATED STEERING WHEEL]

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.

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

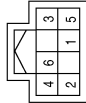
HEATED STEERING WHEEL

[WITH HEATED STEERING WHEEL]

< WIRING DIAGRAM >

HEATED STEERING WHEEL - CONNECTORS

Connector No.	M6
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Color	BLUE



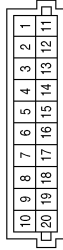
Terminal No.	Color of Wire	Signal Name
1	LG	-
2	B	-
3	R	-
4	B	-
5	BR	-
6	B	-
7	-	-
8	-	-

Connector No.	M7
Connector Name	HEATED STEERING WHEEL RELAY
Connector Color	BLUE



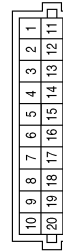
Terminal No.	Color of Wire	Signal Name
1	B	-
2	V	-
3	B	-
5	BR	-

Connector No.	M43
Connector Name	JOINT CONNECTOR-M04
Connector Color	GRAY



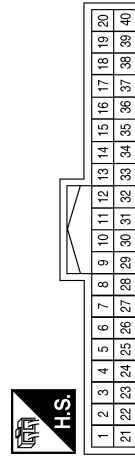
Terminal No.	Color of Wire	Signal Name
19	B	-
20	B	-

Connector No.	M50
Connector Name	JOINT CONNECTOR-M03
Connector Color	PINK



Terminal No.	Color of Wire	Signal Name
1	B	-
2	B	-

Connector No.	M55
Connector Name	A/C AUTO AMP.
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
16	LG	STRG HEATER SW
22	V	STEER RLY

Connector No.	M80
Connector Name	COMBINATION SWITCH
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	BR	-
2	B	-

AAGIA0142GB

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

HEATED STEERING WHEEL

< WIRING DIAGRAM >

[WITH HEATED STEERING WHEEL]

Connector No.	M111
Connector Name	HEATED STEERING WHEEL
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	BR	-
2	B	-

AAGIA0143GB

DIAGNOSIS AND REPAIR WORK FLOW

[WITH HEATED STEERING WHEEL]

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow (Heated Steering Wheel)

INFOID:0000000010642341

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:000000010642342

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:

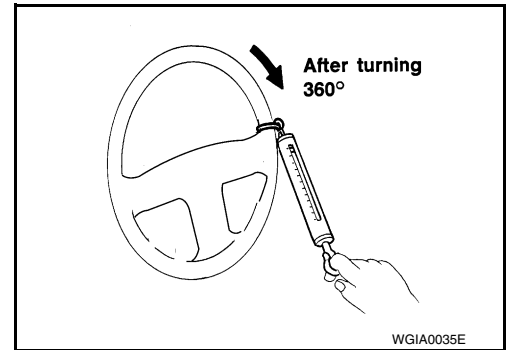
If the adjustment is performed by using the inner socket, check wheel alignment after the adjustment. Refer to [FSU-11, "Inspection"](#).

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-51, "Tire Air Pressure"](#).
3. Set the vehicle to READY.
4. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.

Tool number : — (J-44372)

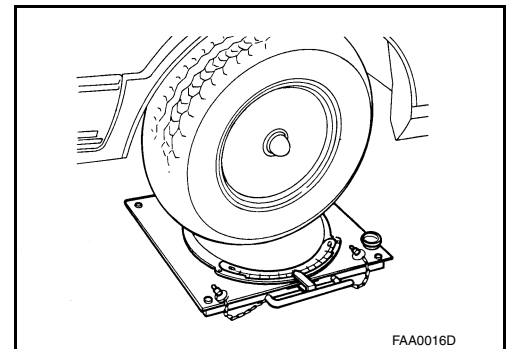
Steering wheel turning force : Refer to [ST-46, "Steering Wheel"](#).



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 >

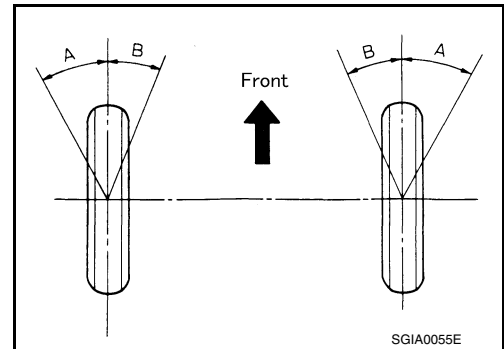
[WITH HEATED STEERING WHEEL]

- 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

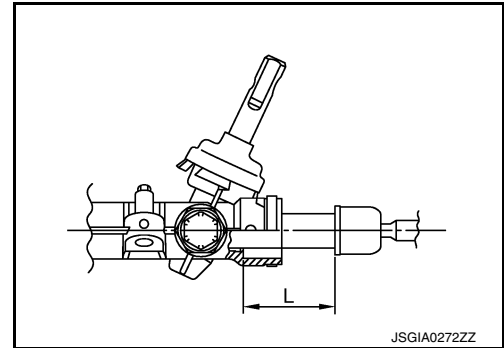
Steering angle : Refer to [ST-46, "Steering Angle"](#).



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

Rack stroke neutral position (L) : Refer to [ST-46, "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:0000000010642343

1. CHECK HEATED STEERING WHEEL SYSTEM

Check heated steering wheel system. Refer to [ST-10, "HEATED STEERING WHEEL SYSTEM : System Description"](#).

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Go to [ST-18, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000010642344

Regarding Wiring Diagram information. Refer to [EXL-31, "Wiring Diagram"](#).

1. CHECK POWER SOURCE

1. Turn power switch OFF.
2. Remove the heated steering wheel. Refer to [ST-34, "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		
M111	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-21, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace heated steering wheel. Refer to [ST-34, "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		
M111	2		Yes

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.

HEATED STEERING WHEEL SYSTEM

[WITH HEATED STEERING WHEEL]

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect heated steering wheel relay connector. Refer to [ST-8, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
3. 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	
M7	5	M111	1	Yes

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	5		No

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-21, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-8, "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		Yes

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	
M7	2	M55	22	Yes

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

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	2		No

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 harness connector terminal.

A/C auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M55	16	M6	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M55	16		No

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-9. "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#) (with heat pump) or [HAC-348. "Removal and Installation"](#) (without heat pump).

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

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000010642345

1. CHECK HEATED STEERING WHEEL SWITCH

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

Heated steering wheel switch		Condition	Continuity
Terminal			
1	2	While pushing heated steering wheel switch	Yes
		Other condition	No

Is the inspection result normal?

YES >> GO TO 2.

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

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

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.

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

• **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-45, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel)

INFOID:000000010642346

1. CHECK HEATED STEERING WHEEL CONTINUITY

1. Turn power switch OFF.
2. Remove the heated steering wheel. Refer to [ST-34, "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	Yes
	Leather surface temperature of 30°C (86°F) or more	No

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel. Refer to [ST-34, "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-34, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000010642347

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.	Yes
	Other conditions.	No

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM

[WITH HEATED STEERING WHEEL]

< DTC/CIRCUIT DIAGNOSIS >

YES >> Inspection End.

NO >> Replace heated steering wheel relay. Refer to [ST-8, "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:000000010642348

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-23. "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-23. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010642349

Regarding Wiring Diagram information. Refer to [EXL-31. "Wiring Diagram"](#).

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-45. "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		Yes

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-8. "HEATED STEERING WHEEL SYS-TEM : Component Parts Location"](#).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

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	
M7	5	M6	5	Yes

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	5		No

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-21, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace heated steering wheel relay. Refer to [ST-8, "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	
M55	16	M6	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M55	16		No

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-9, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#) (with heat pump) or [HAC-348, "Removal and Installation"](#) (without heat pump).

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

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

Component Inspection (Heated Steering Wheel Switch)

INFOID:000000010642350

1. CHECK HEATED STEERING WHEEL SWITCH

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

Heated steering wheel switch		Condition	Continuity
Terminal			
1	2	While pushing heated steering wheel switch	Yes
		Other condition	No

Is the inspection result normal?

YES >> GO TO 2.

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

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

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			
+	-	Apply 12 V direct current between terminals 5 and 6.	ON
5	6		

Is the inspection result normal?

YES >> Inspection End.

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

Component Inspection (Heated Steering Wheel Relay)

INFOID:000000010642351

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.	Yes
	Other conditions.	No

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace heated steering wheel relay. Refer to [ST-8. "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:0000000010642352

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

Diagnosis Procedure

INFOID:0000000010642353

Regarding Wiring Diagram information. Refer to [EXL-31, "Wiring Diagram"](#).

1. CHECK POWER SOURCE

1. Turn power switch OFF.
2. Remove the heated steering wheel. Refer to [ST-34, "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		
M111	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-21, "Component Inspection \(Heated Steering Wheel\)"](#).

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace heated steering wheel. Refer to [ST-34, "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		
M111	2		Yes

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-8, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
3. Check continuity between heated steering wheel relay harness connector terminal and heated steering wheel harness connector terminal.

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M7	5	M111	1	Yes

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	5		No

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-21, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering wheel relay. Refer to [ST-8, "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		Yes

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	
M7	2	M55	22	Yes

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

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	2		No

Is the inspection result normal?

HEATED STEERING WHEEL SYSTEM DOES NOT ACTIVATE

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

- 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.

A/C auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M55	16	M6	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M55	16		No

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-9, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#) (with heat pump) or [HAC-348, "Removal and Installation"](#) (without heat pump).
NO >> Replace heated steering wheel switch. Refer to [ST-45, "Removal and Installation"](#).

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:000000010642354

- 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:000000010642355

Regarding Wiring Diagram information. Refer to [EXL-31, "Wiring Diagram"](#).

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-45, "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		Yes

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-8, "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	
M7	5	M6	5	Yes

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

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

< SYMPTOM DIAGNOSIS >

Heated steering wheel relay		Ground	Continuity
Connector	Terminal		
M7	5		No

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-21, "Component Inspection \(Heated Steering Wheel Relay\)"](#).

Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Replace heated steering wheel relay. Refer to [ST-8, "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	
M55	16	M6	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M55	16		No

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-9, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Switch"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#) (with heat pump) or [HAC-348, "Removal and Installation"](#) (without heat pump).
 NO >> Replace heated steering wheel switch. Refer to [ST-45, "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:0000000110642356

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

Reference	Possible cause and SUSPECTED PARTS	
	Outer/inner socket ball joint swinging torque	ST-43, "Inspection"
	Outer/inner socket ball joint rotating torque	ST-43, "Inspection"
	Outer/inner socket ball joint end play	ST-43, "Inspection"
	Steering wheel play	ST-33, "Inspection"
	Improper steering wheel	—
	Improper installation or looseness of tilt lock lever	—
	Mounting looseness	ST-40, "Exploded View"
	Steering column deformation or damage	ST-36, "Inspection"
	Improper installation or looseness of steering column	ST-35, "Exploded View"
	Steering linkage looseness	ST-40, "Exploded View"
	AXLE and SUSPENSION	FAX-6, "NVH Troubleshooting Chart" (NVH FAX) RAX-5, "NVH Troubleshooting Chart" (NVH RAX) FSU-9, "NVH Troubleshooting Chart" (NVH FSU) RSU-5, "NVH Troubleshooting Chart" (NVH RSU)
	TIRE	WT-42, "NVH Troubleshooting Chart"
	ROAD WHEEL	WT-42, "NVH Troubleshooting Chart"
	DRIVE SHAFT	FAX-6, "NVH Troubleshooting Chart"
	BRAKE	NVH in BR section

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

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

[WITH HEATED STEERING WHEEL]

Symptom	Steering	Noise	×	×	×	×				×	×		×	×	×	×	×
		Shake					×	×	×				×	×	×	×	×
		Vibration					×	×	×	×	×		×	×		×	
		Shimmy					×		×			×	×	×	×		×
		Judder						×	×			×	×	×	×		×

×: Applicable

PERIODIC MAINTENANCE

STEERING WHEEL

Inspection

INFOID:000000010642357

STEERING WHEEL AXIAL END PLAY

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

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

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-35, "Exploded View"](#).
 - Check steering gear assembly mounting condition for looseness. Refer to [ST-40, "Exploded View"](#).

STEERING WHEEL PLAY

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

Steering wheel play on the outer circumference : Refer to [ST-46, "Steering Wheel"](#).

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

STEERING WHEEL

< REMOVAL AND INSTALLATION >

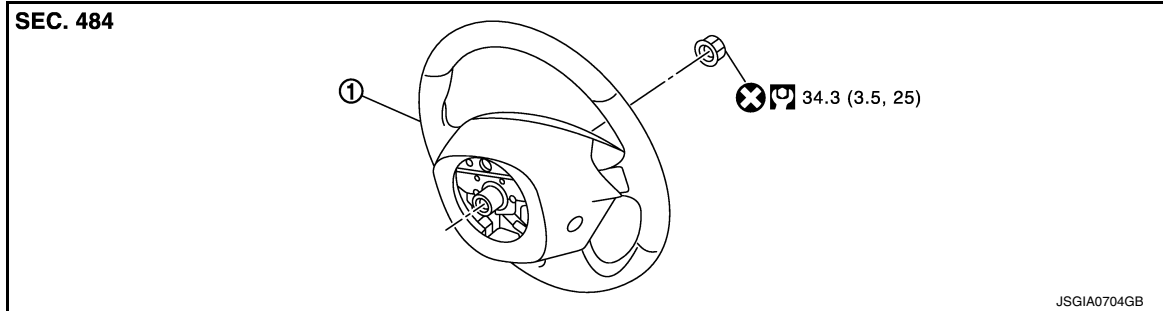
[WITH HEATED STEERING WHEEL]

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:0000000010642358



1. Steering wheel

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

Removal and Installation

INFOID:0000000010642359

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-20, "Removal and Installation"](#).
3. Disconnect the harness connector from the steering wheel.
4. Remove steering wheel lock nut after steering is locked.
5. Remove steering wheel using suitable tool.

CAUTION:

Place a piece of tape across the spiral cable so it will not be rotated out of position.

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-23, "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

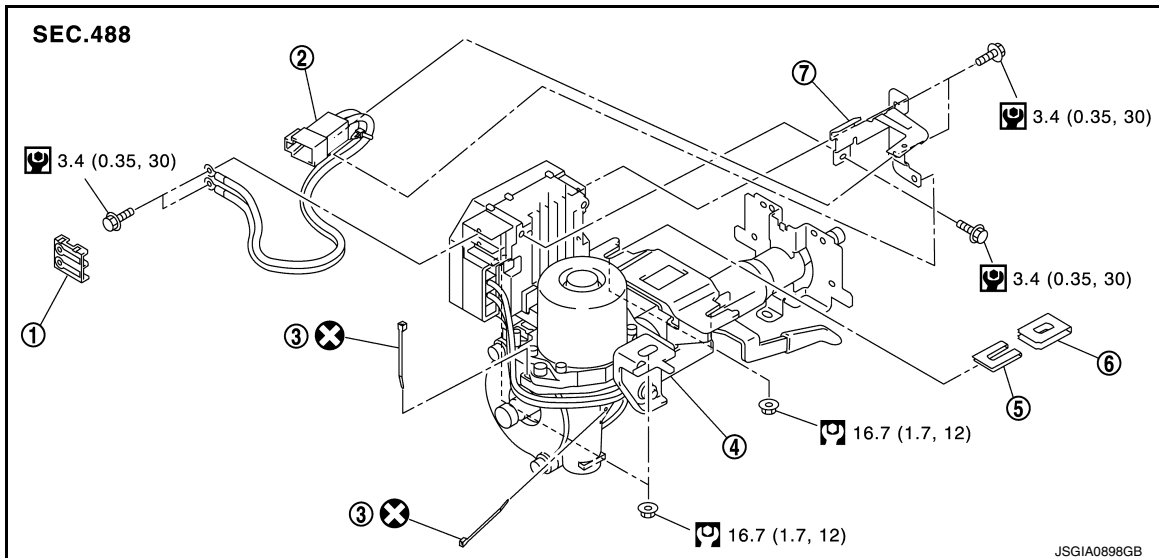
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

STEERING COLUMN

Exploded View

INFOID:000000010642360



- | | | |
|-----------------------------|------------------------|------------------------|
| 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:000000010642361

REMOVAL

CAUTION:

- While removing the steering column assembly, do not unlock the tilt lever.
- Do not 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.
- Do not disassemble steering column assembly. It is not separable.
- While removing the steering column assembly, do not 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 LH. Refer to [IP-17, "Removal and Installation"](#).
4. Remove driver air bag module. Refer to [SR-20, "Removal and Installation"](#).
5. Remove steering wheel. Refer to [ST-34, "Removal and Installation"](#).
6. Remove steering column cover. Refer to [IP-17, "Removal and Installation"](#).
7. Remove spiral cable. Refer to [SR-23, "Removal and Installation"](#).
8. Remove combination switch. Refer to [BCS-73, "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 bolt (steering column side), and separate intermediate shaft from steering column assembly. Refer to [ST-38, "Removal and Installation"](#).
CAUTION:
 - Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
 - When removing intermediate shaft, do not 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-36, "Inspection"](#).

INSTALLATION

CAUTION:

- Do not 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 nut (A) of the steering column assembly, press in slide plate (outer and inner) (1) to tighten nut (B).

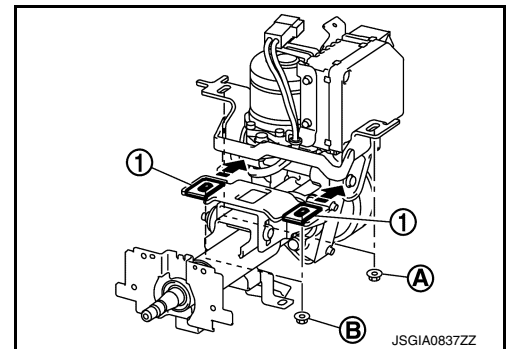
CAUTION:

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

- For intermediate shaft bolt direction, refer to [ST-38, "Exploded View"](#).

CAUTION:

- Do not insert intermediate shaft bolt from the other side.
- Do not reuse intermediate bolt.

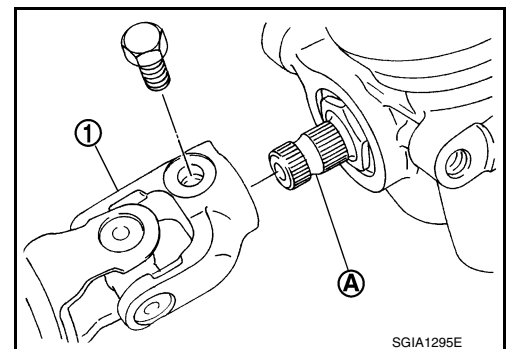


- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft (A) before final tightening.

CAUTION:

Do not reuse band.

- After installing steering column assembly, perform self-diagnosis with CONSULT to ensure correct operation. Refer to [STC-10, "CONSULT Function"](#).
- Perform inspection after installation. Refer to [ST-36, "Inspection"](#).



Inspection

INFOID:000000010642362

INSPECTION AFTER REMOVAL

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

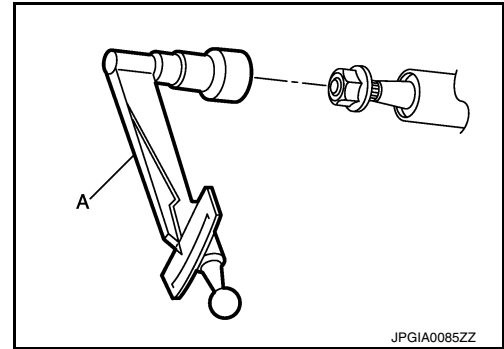
STEERING COLUMN

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

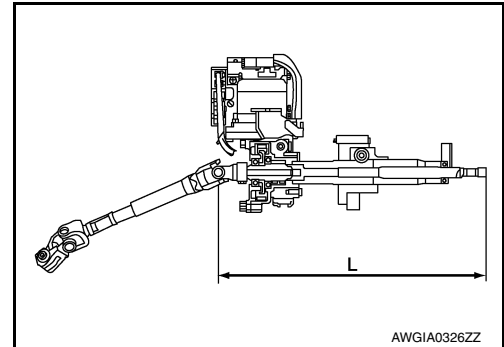
- Measure steering column assembly rotating torque using a preload gauge (A) [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if the rotating torque is outside the standard.

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

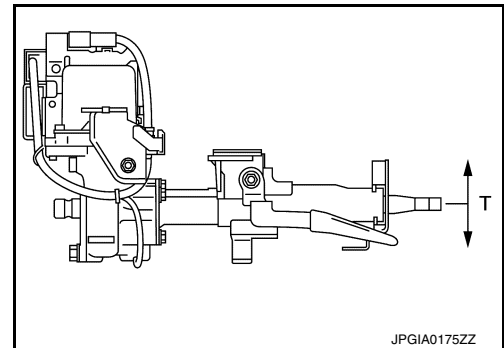


INSPECTION AFTER INSTALLATION

- 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-33, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-16, "Inspection"](#).
- Check tilt mechanism operating range "T" shown in the figure.

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

- Adjust neutral position of steering angle sensor. Refer to [BRC-70, "Work Procedure"](#).



STEERING SHAFT

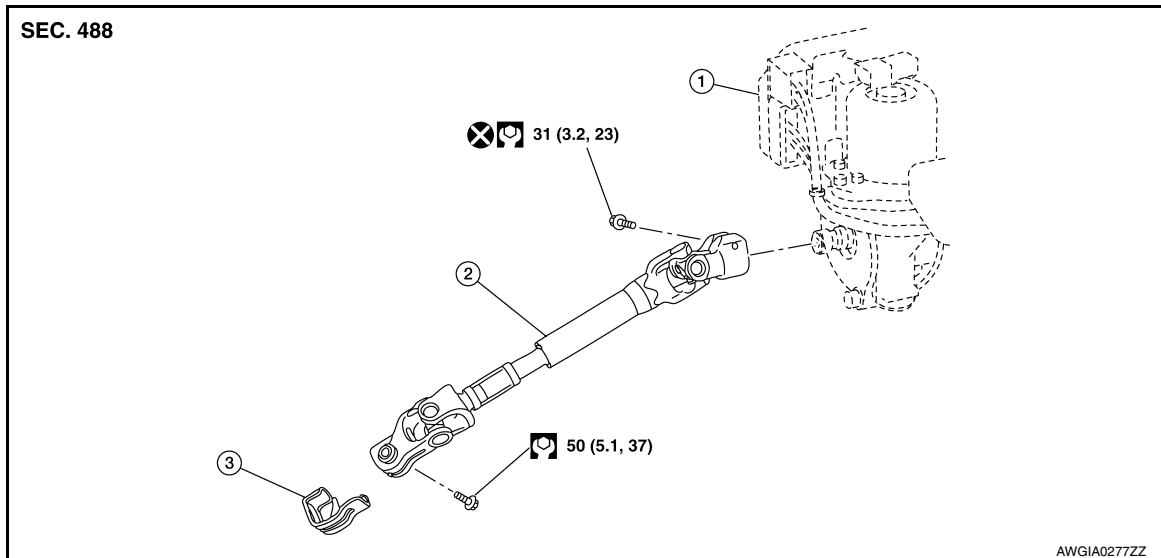
< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

STEERING SHAFT

Exploded View

INFOID:000000010642363



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

Removal and Installation

INFOID:000000010642364

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 LH. Refer to [IP-17, "Removal and Installation"](#).
4. Remove intermediate shaft 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, do not 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 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, do not 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.

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-39, "Inspection"](#).

STEERING SHAFT

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

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.

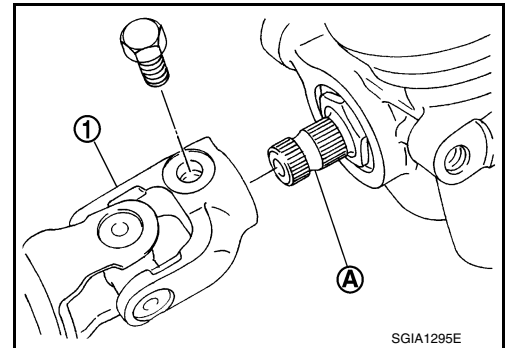
- Follow the instructions below to install intermediate shaft to steering gear assembly.
- Insert intermediate shaft into steering gear assembly. Align groove of the steering gear assembly with the bolt hole of the intermediate shaft.

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 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 bolt direction, refer to [ST-38. "Exploded View"](#).

CAUTION:

- **Do not insert intermediate shaft bolt from the other side.**
- **Do not reuse intermediate 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-39. "Inspection"](#).



INFOID:000000010642365

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-33. "Inspection"](#).
- Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-16. "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-70. "Work Procedure"](#).

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

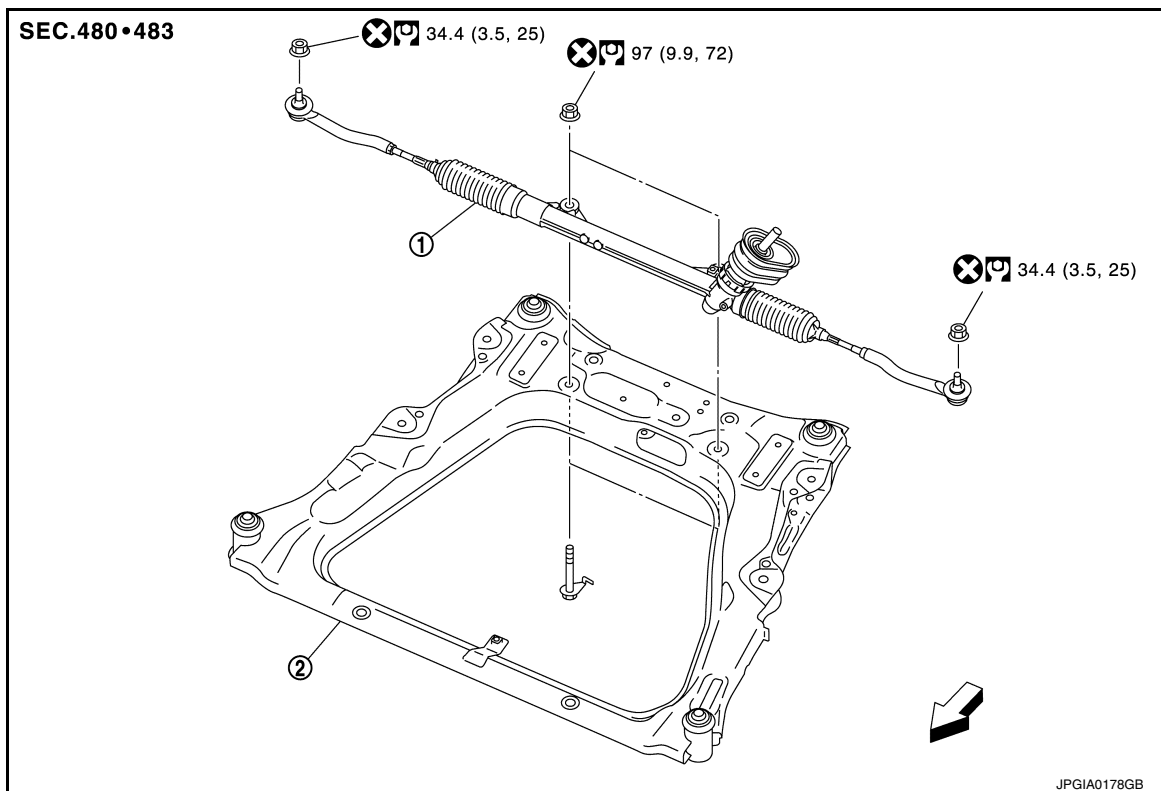
[WITH HEATED STEERING WHEEL]

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000010642366

REMOVAL



1. Steering gear assembly

2. Front suspension member

←: Vehicle front

: N·m (kg-m, ft-lb)

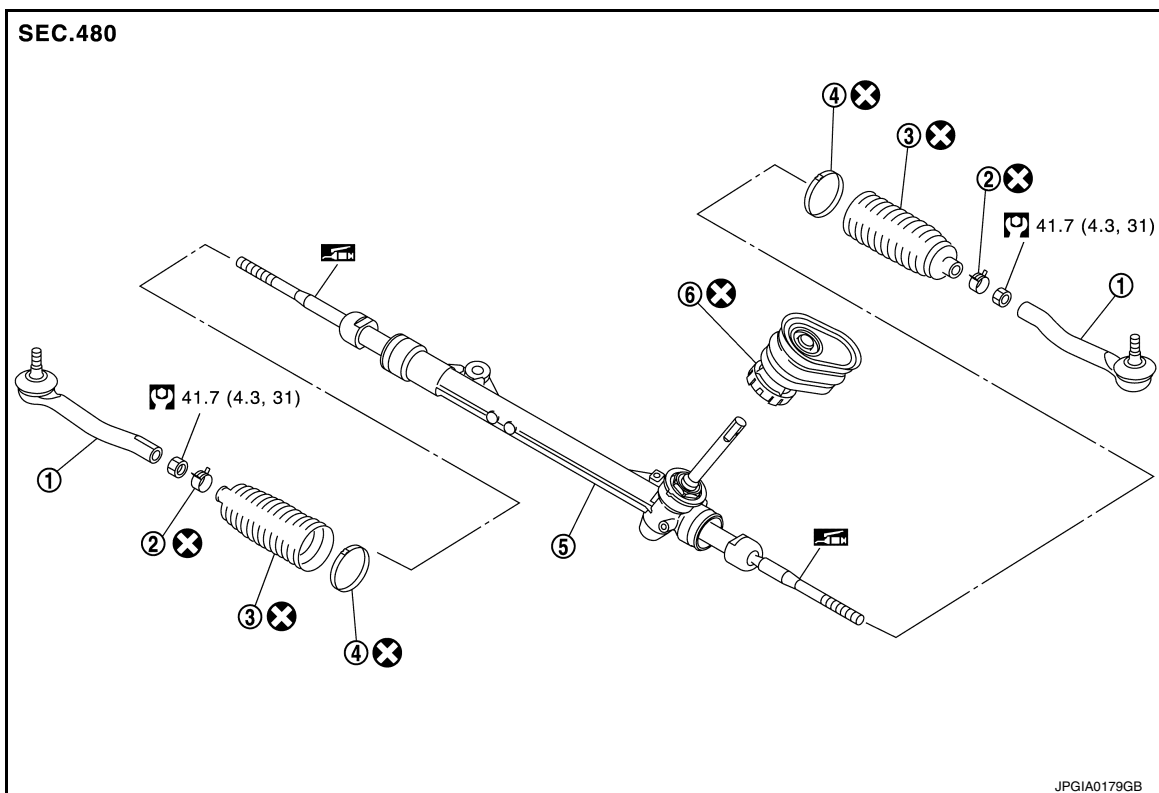
: Always replace after every disassembly.

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 |

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

Always replace after every disassembly.

Apply Genuine Autolex A or Dow Corning® 111.

Removal and Installation

INFOID:000000010642367

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove front suspension member with steering gear as an assembly. Refer to [FSU-21, "Removal and Installation"](#).
3. Remove nuts and bolts and remove steering gear assembly.
4. Perform inspection after removal. Refer to [ST-43, "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. Always fix the steering wheel using string to avoid turning.**
- **Do not reuse steering outer socket fixing nut and steering gear assembly nut.**
- 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.
- Perform inspection after installation. Refer to [ST-43, "Inspection"](#).

Disassembly and Assembly

INFOID:000000010642368

DISASSEMBLY

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

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

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.

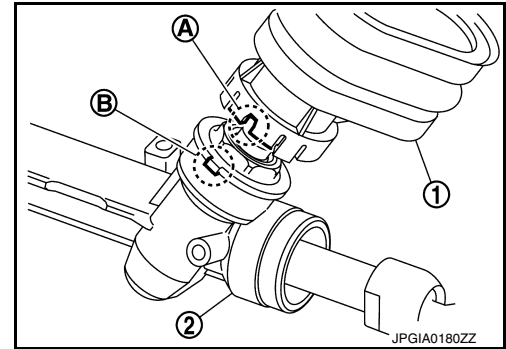
3. Remove fire wall seal.
4. Perform inspection after disassembly. Refer to [ST-43, "Inspection"](#).

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.

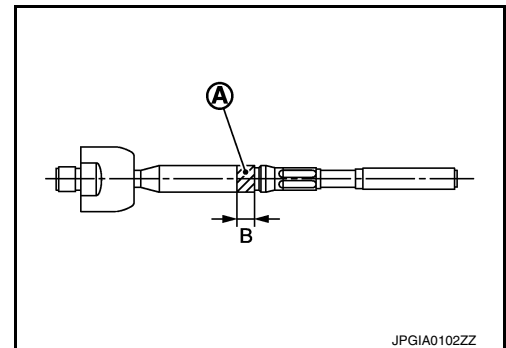
Use Genuine Lithium Soap, Autorex A (manufactured by Kyodo yushi) or equivalent.

CAUTION:

Never reuse boot.

Grease application position (Reference)

B : 10 mm (0.39 in)



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

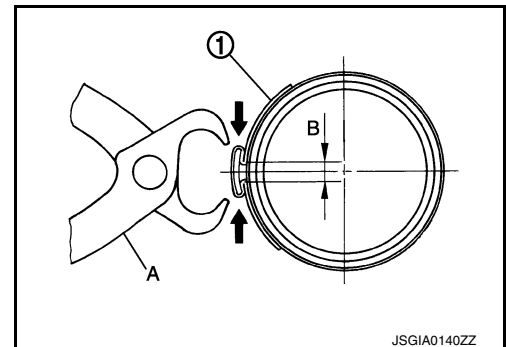
CAUTION:

- 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).



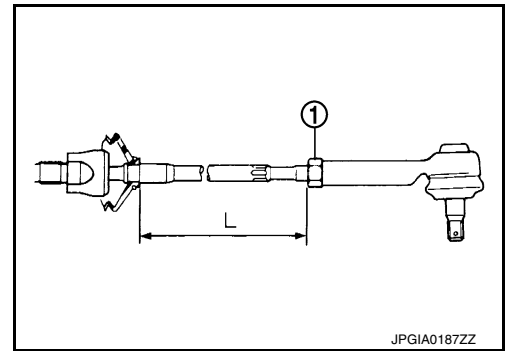
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

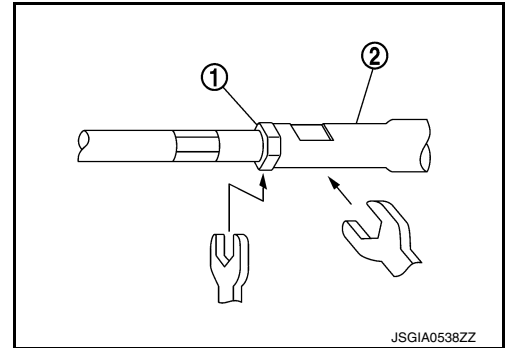
5. Adjust inner socket to standard length (L), and then tighten lock nut (1) to the specified torque. Check length again after tightening lock nut.

Inner socket length (L) : Refer to [ST-46, "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.



INFOID:0000000010642369

Inspection

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

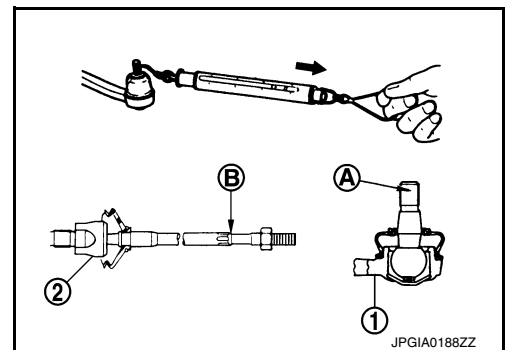
- Hook the Tool at the measuring point and pull the Tool. Make sure that the Tool reads the specified value when ball stud and inner socket start to move. Replace outer socket or steering gear assembly (inner socket) if they are outside the standard.

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

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

Tool number : — (J-44372)

Swinging force : Refer to [ST-46, "Steering Gear and Linkage"](#).



BALL JOINT AXIAL END PLAY

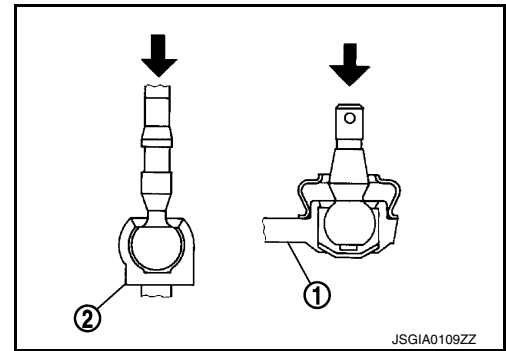
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

- Apply an axial load of 490 N (50 kg, 110 lb) to ball stud. Measure the 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-46, "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-33, "Inspection"](#).
 - Neutral position steering wheel, steering wheel turning force, and front wheel turning angle: Refer to [ST-16, "Inspection"](#).
- Adjust neutral position of steering angle sensor. Refer to [BRC-70, "Work Procedure"](#).

HEATED STEERING WHEEL SWITCH

< REMOVAL AND INSTALLATION >

[WITH HEATED STEERING WHEEL]

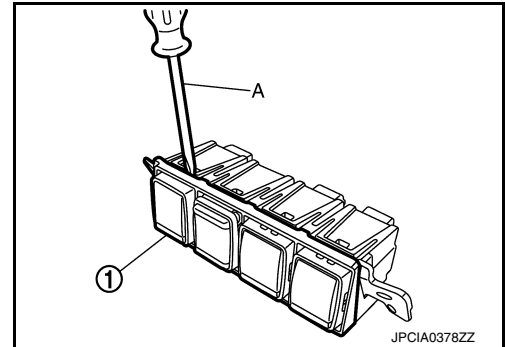
HEATED STEERING WHEEL SWITCH

Removal and Installation

INFOID:000000010642370

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-17, "Removal and Installation"](#).
2. Remove upper switch carrier screws and upper switch carrier.
3. Remove charge connector lock switch. Refer to [VC-145, "Removal and Installation"](#).
4. Remove heated steering wheel switch (1) from upper switch carrier using suitable tool (A).



INSTALLATION

Install in the reverse order of removal.

A

B

C

D

E

F

ST

H

I

J

K

L

M

N

O

P

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[WITH HEATED STEERING WHEEL]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:0000000010642371

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

Steering Wheel

INFOID:0000000010642372

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, 8.1 lb-f) or less

Steering Angle

INFOID:0000000010642373

Unit: Degree minute (Decimal degree)

Tire Size		205/55R16	215/50R17
Inner wheel	Minimum	37° 00' (37.0°)	34° 00' (34.0°)
	Nominal	40° 00' (40.0°)	37° 00' (37.0°)
	Maximum	41° 00' (41.0°)	38° 00' (38.0°)
Outer wheel	Nominal	33° 00' (33.0°)	32° 00' (32.0°)

Steering Column

INFOID:0000000010642374

Rotating torque	0 – 2.1 N·m (0 – 0.21 kg-m, 0 – 19 in-lb)
Steering column length*	460.1mm (18.11in)
Tilt operating range*	40.0 mm (1.575 in)

*: For measuring position, refer to [ST-36. "Inspection"](#).

Steering Gear and Linkage

INFOID:0000000010642375

Tire Size		205/55R16	215/50R17
Rack stroke neutral position		73 mm (2.87 in)	70 mm (2.76 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 – 13.0 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 – 4.40 kg-f, 0.97 – 9.69 lb-f)	
	Axial end play	0.2 mm (0.008 in) or less	

*: For measuring position, refer to [ST-43. "Inspection"](#).