

SECTION **ST**
STEERING SYSTEM

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:000000012894006

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. 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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 Air Bag Diagnosis Sensor Unit or other Air Bag 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 or batteries, and wait at least three minutes before performing any service.

Service Notice or Precautions for Steering System

INFOID:000000012894007

- In case of removing steering gear, 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.
 - Do not reuse non-reusable parts.
 - Before assembling, apply the specified grease to the directed parts.

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PREPARATION

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PREPARATION

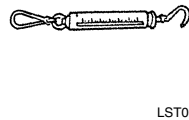
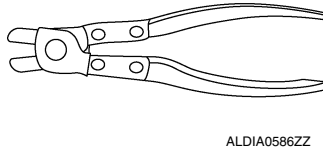
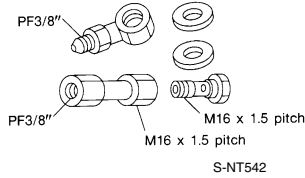
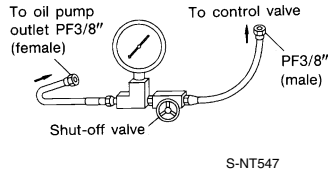
PREPARATION

Special Service Tool

INFOID:0000000012894008

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

Tool number (TechMate No.) Tool name	Description
KV48103500 (J-26357) Pressure gauge	Measuring power steering oil pump relief pressure
KV48102500 (J-33914) Pressure gauge adapter	Measuring power steering oil pump relief pressure
KV40107300 (J-51751) Boot clamp crimping tool	Installing boot clamps
— (J-44372) Pull gauge	Measuring steering wheel turning force, rack sliding force and ball joint swinging force

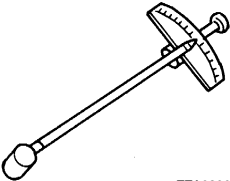
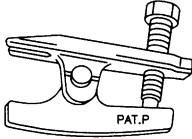
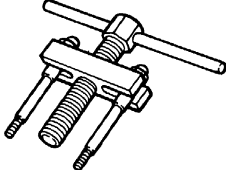



PREPARATION

< PREPARATION >

Commercial Service Tool

INFOID:000000012894009

Tool name	Description
Preload gauge  ZZA0806D	Inspecting steering column rotating torque, pinion rotating torque and ball joint rotating torque
Ball joint remover  S-NT146	Remove steering outer socket
Steering wheel puller  ZZA0819D	Removing steering wheel
Power tool  PIIB1407E	Loosening nuts, screws and bolts

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COMPONENT PARTS

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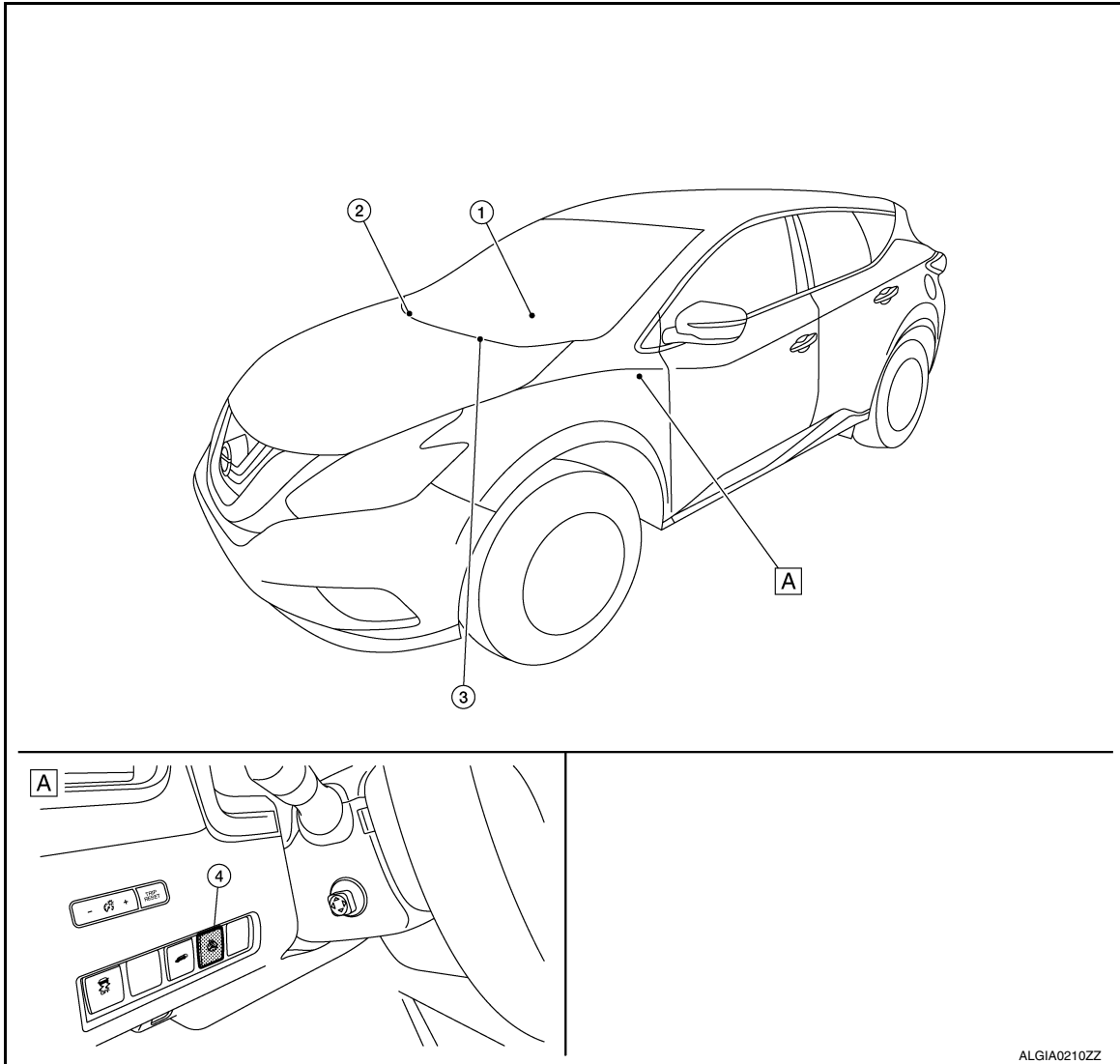
SYSTEM DESCRIPTION

COMPONENT PARTS

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:0000000012894010



A. Left of the steering column

No.	Component	Function
1.	Heated steering wheel	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel"
2.	Heated steering relay	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay"
3.	A/C auto amp.	<ul style="list-style-type: none"> For the function, refer to ST-7, "HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.". Refer to HAC-6, "Component Parts Location" for detailed installation location.
4.	Heated steering wheel switch	Steering heater function ON/OFF.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel

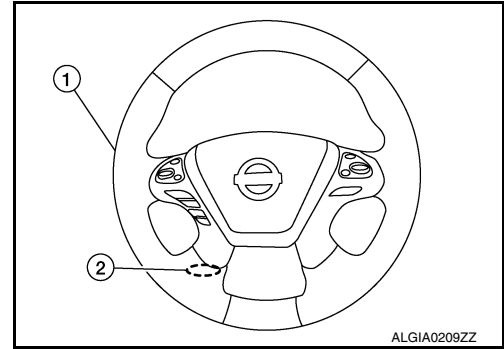
INFOID:000000012894011

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 Relay

INFOID:000000012894012

Through the control of the A/C auto amp., the heated steering wheel relay turns ON/OFF electricity to the heating element built into the steering wheel. For location, refer to [ST-6, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).

HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.

INFOID:000000012894013

- A/C auto amp. turns ON/OFF the heated steering wheel relay according to a signal transmitted from display control unit by CAN communication.
- 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 about the A/C auto amp., refer to [HAC-10, "A/C Auto Amp."](#).

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SYSTEM

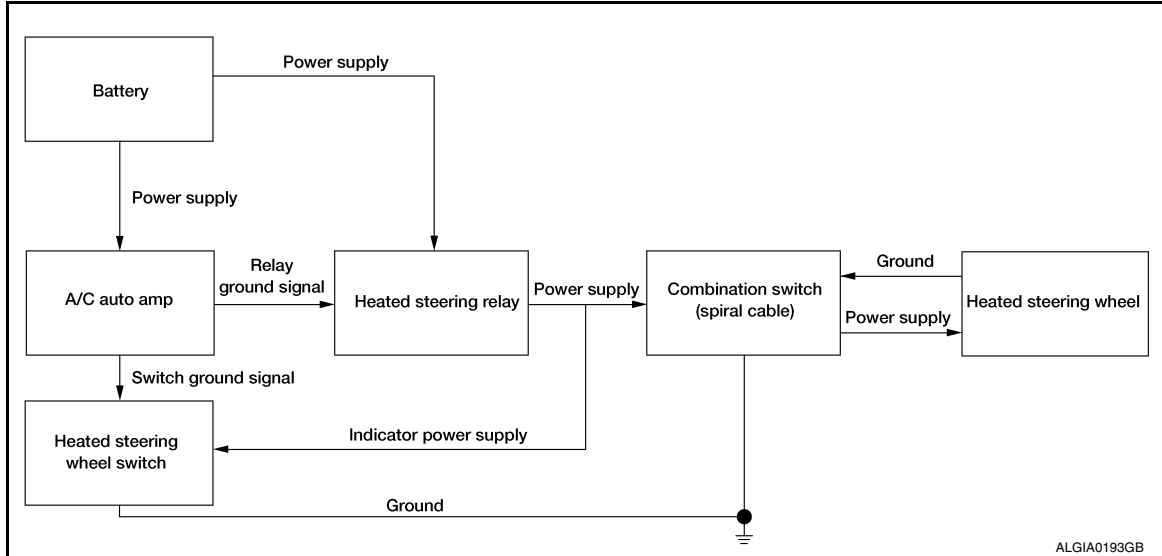
< SYSTEM DESCRIPTION >

SYSTEM

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Diagram

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HEATED STEERING WHEEL SYSTEM : System Description

INFOID:0000000012894015

The heated steering wheel switch controls the heated steering relay through the A/C auto amp. When the switch is turned on, the relay is energized and the heated steering system will operate. The heated steering system will turn off when the steering wheel temperature reaches approximately 30° C (86° F). Heated steering system operation can also be canceled by pressing the heated steering wheel switch again. If the surface temperature of the steering wheel is below 20° C (68° F), the system will heat the steering wheel and cycle off and on to maintain a temperature above 20° C (68° F). The indicator light will remain on as long as the system is on.

NOTE:

The A/C auto amp. is equipped with a 30-minute timer. After the heated steering wheel switch has been activated for 30 minutes, the system will automatically turn off. If the surface temperature of the steering wheel is above 20° C (68° F) when the switch is turned on, the system will not heat the steering wheel. This is not a malfunction.

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

List of ECU Reference

INFOID:0000000012894016

ECU	Reference
A/C auto amp.	HAC-23, "Reference Value"

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HEATED STEERING WHEEL

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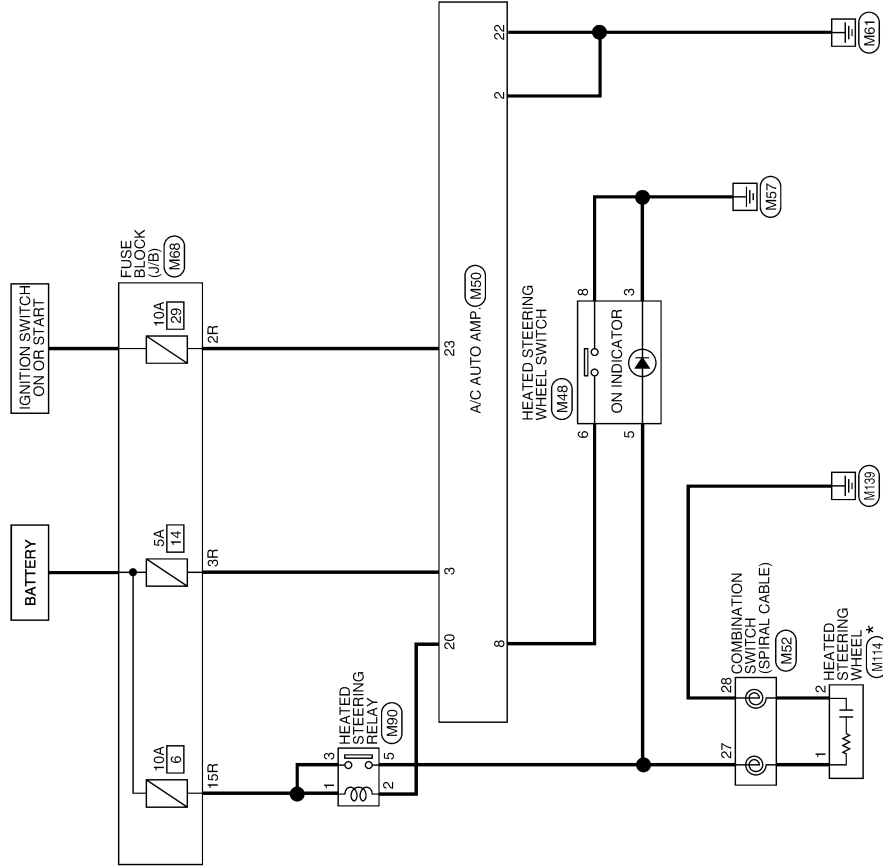
WIRING DIAGRAM

HEATED STEERING WHEEL

Wiring Diagram

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HEATED STEERING WHEEL



* : THIS CONNECTOR IS NOT SHOWN IN "HARNES LAYOUT" OF PG SECTION.

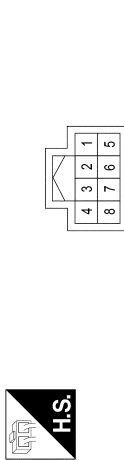
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HEATED STEERING WHEEL

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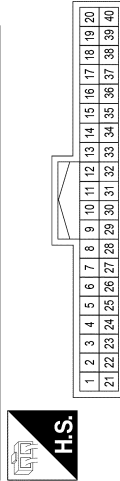
HEATED STEERING WHEEL CONNECTORS

Connector No.	M48
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Type	TH08FL-NH
Connector Color	BLUE



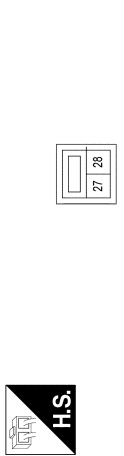
Terminal No.	Color of Wire	Signal Name
3	B	-
5	Y	-
6	G	-
8	B	-

Connector No.	M50
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH
Connector Color	WHITE



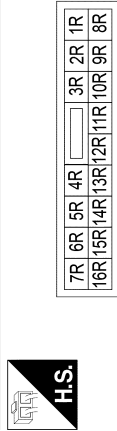
Terminal No.	Color of Wire	Signal Name
2	B	GND
3	G	BATT
8	G	STRG HTR SW
20	BR	STRG HTR RLY
22	B	P-GND
23	LG	IGN

Connector No.	M52
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	NS02FW-CS
Connector Color	WHITE



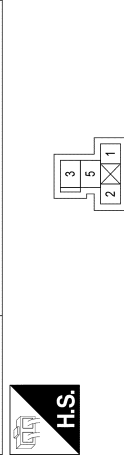
Terminal No.	Color of Wire	Signal Name
27	Y	-
28	GR	-

Connector No.	M68
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FBR-CS
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
2R	LG	-
3R	G	-
15R	LG	-

Connector No.	M90
Connector Name	HEATED STEERING RELAY
Connector Type	MS02FL-M2-LC
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name

1	LG	-
2	BR	-
3	LG	-
5	Y	-

Connector No.	M114
Connector Name	HEATED STEERING WHEEL
Connector Type	NS02MM-X
Connector Color	WHITE



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

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DIAGNOSIS AND REPAIR WORK FLOW

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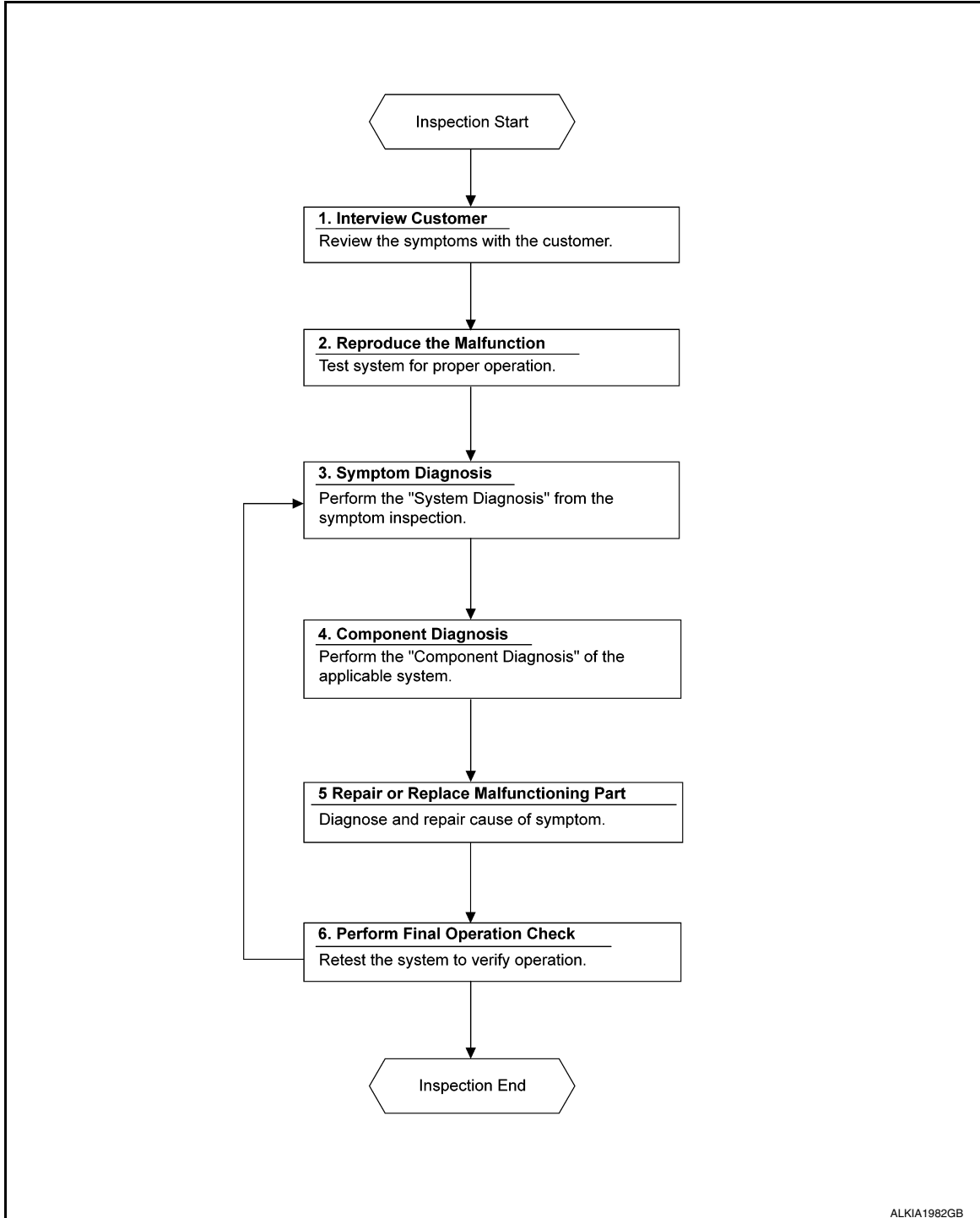
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000012894018

OVERALL SEQUENCE



DETAILED FLOW

1. INTERVIEW CUSTOMER

Interview the customer to obtain as much information as possible about the conditions and environment under which the malfunction occurred.

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

>> GO TO 2.

2. REPRODUCE THE MALFUNCTION

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. 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. Refer to [ST-27, "Symptom Table"](#).

>> GO TO 4.

4. COMPONENT DIAGNOSIS

Perform the diagnosis with component diagnosis of the applicable system.

>> GO TO 5.

5. REPAIR OR REPLACE THE MALFUNCTIONING PART

Repair or replace the specified malfunctioning parts.

>> GO TO 6.

6. PERFORM FINAL OPERATION 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 3.

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POWER STEERING FLUID

< BASIC INSPECTION >

POWER STEERING FLUID

Inspection

INFOID:000000012894019

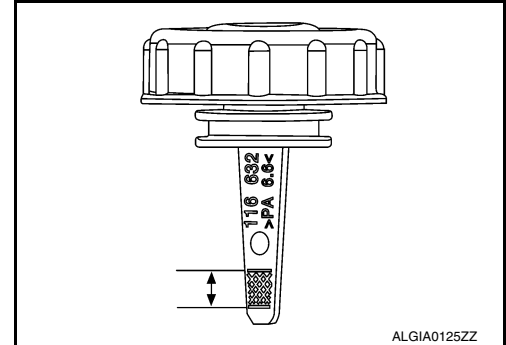
FLUID LEVEL

Verify proper power steering fluid level.

- Check power steering fluid level with engine stopped and the fluid temp between 0 – 30° C (32 – 86° F).
- Power steering fluid level should be within the range shown on the power steering reservoir cap indicator.

CAUTION:

- Do not overfill.
- Do not reuse used power steering fluid.
- Recommended power steering fluid is Genuine NISSAN E-PSF or equivalent. Refer to [MA-12, "Fluids and Lubricants"](#).



FLUID LEAKAGE

Check the power steering hydraulic system for leaks, cracks, damage, loose connections, chafing or deterioration. Repair or replace as necessary.

1. Start engine and allow engine to idle.
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds to check fluid leakage.

CAUTION:

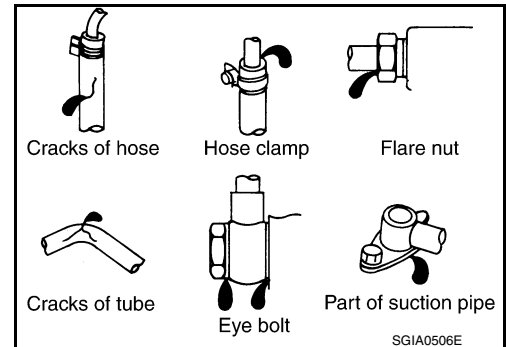
Do not hold steering wheel in a locked position for more than 10 seconds. Damage to power steering oil pump may occur.

4. If power steering fluid leakage at connections is noticed, loosen flare nut and retighten.

CAUTION:

Do not over tighten flare nut as damage to O-ring and connection can occur.

5. If power steering fluid leakage from the power steering oil pump is noticed, repair connection or replace power steering oil pump. Refer to [ST-38, "Removal and Installation"](#).
6. Check steering gear boots for accumulation of power steering fluid. Power steering fluid indicates a leak from the steering gear, replace as necessary. Refer to [ST-42, "Removal and Installation - FWD"](#) (FWD) or [ST-44, "Removal and Installation - AWD"](#) (AWD).



STEERING WHEEL

< BASIC INSPECTION >

STEERING WHEEL

Inspection

INFOID:000000012894020

CONDITION OF INSTALLATION

- Check installation condition of steering gear, front suspension, front drive shaft and steering column.
- 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-51, "Steering Wheel"](#).

- Verify that the steering gear nuts are tightened to specification. Refer to [ST-42, "Exploded View"](#).

STEERING WHEEL PLAY

1. Turn tires straight ahead, start engine, then turn steering wheel to the left and right lightly. Measure steering wheel movement on the outer circumference of the steering wheel when it is turned to the point where tires start moving.

Steering wheel play

: Refer to [ST-51, "Steering Wheel"](#).

NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to [FSU-7, "Inspection"](#).

1. Turn tires straight ahead, check if steering wheel is in the neutral position.
2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
3. If the neutral position cannot be attained by repositioning the steering wheel two teeth or less on steering stem, loosen tie-rod lock nuts of steering gear outer sockets, then adjust tie-rods by the same amount in the opposite direction.

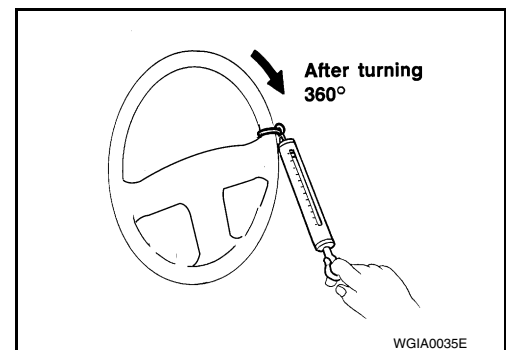
STEERING WHEEL TURNING FORCE

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to operating temperature.
4. Verify that the tires are inflated to the specified pressure. Refer to [WT-72, "Tire Air Pressure"](#).
5. 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-51, "Steering Wheel"](#).

6. If steering wheel turning force is out of specification, inspect steering column. Refer to [ST-17, "Inspection"](#).
7. If steering column meets specification, inspect steering gear. Refer to [ST-19, "Inspection"](#).

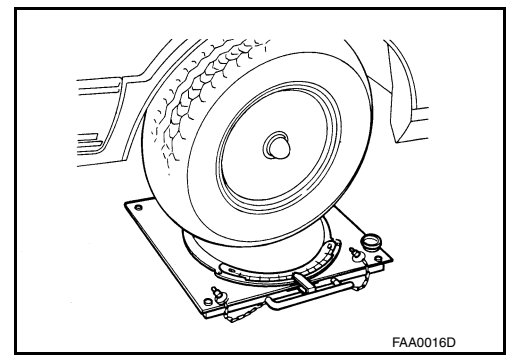


CHECKING FRONT WHEEL TURNING ANGLE

STEERING WHEEL

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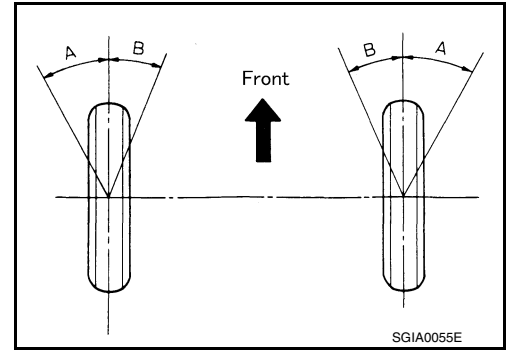
- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH wheels.



- Measure the turning angles with the engine at idle, then turn the steering wheel from full left stop to full right stop and measure the turning angle. Refer to [ST-51, "Steering Angle"](#).

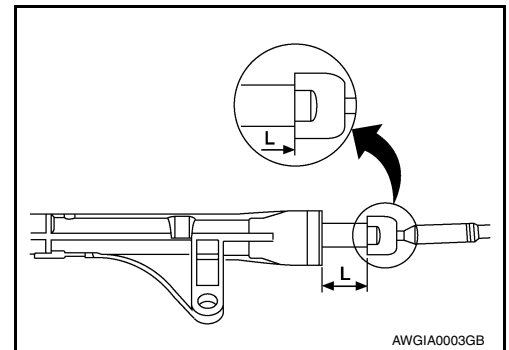
Inner wheel angle (A) : Refer to [ST-51, "Steering Angle"](#).

Outer wheel angle (B) : Refer to [ST-51, "Steering Angle"](#).



- Measure the rack stroke specification with vehicle in neutral position. Refer to [ST-52, "Steering Gear"](#).

Rack stroke in neutral position (L) : Refer to [ST-52, "Steering Gear"](#).



STEERING COLUMN

< BASIC INSPECTION >

STEERING COLUMN

Inspection

INFOID:000000012894021

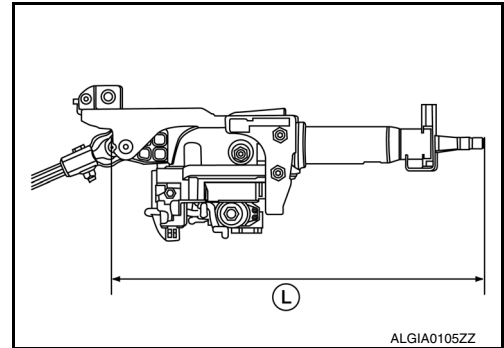
HOLE COVER SEAL, HOLE COVER AND LOWER SHAFT

Check each part of hole cover seal, hole cover and steering column and lower shaft for damage or other malfunctions. Replace if necessary.

STEERING COLUMN

- Check each part of steering column for damage or other malfunctions. Replace entire steering column if any parts are damaged.
- Measure the length (L) as shown if vehicle has been involved in a minor collision. Replace steering column if outside the specifications.

Steering column length (L) : Refer to [ST-51, "Steering Column"](#).



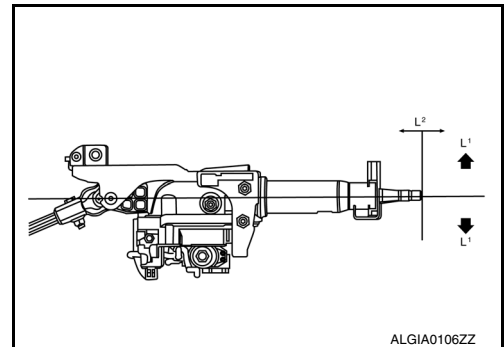
- Measure steering column rotating torque using suitable tool. Replace steering column if outside the standard.

Rotating torque : Refer to [ST-51, "Steering Column"](#).

- Check tilt and telescopic mechanism operating range (L^1), (L^2) as shown.

Tilt operating range (L^1) : Refer to [ST-51, "Steering Column"](#).

Telescopic operating range (L^2) : Refer to [ST-51, "Steering Column"](#).



POWER STEERING OIL PUMP

< BASIC INSPECTION >

POWER STEERING OIL PUMP

Inspection

INFOID:000000012894022

RELIEF OIL PRESSURE

1. Connect the Tool between power steering oil pump discharge connector and high-pressure hose. Bleed air from the hydraulic circuit while opening valve fully. Refer to [ST-29, "Air Bleeding Hydraulic System"](#).

Tool numbers : KV48103500 (J-26357)
: KV48102500 (J-33914)

2. Start engine. Run engine until power steering fluid temperature reaches 50° - 80°C (122° - 176°F).

CAUTION:

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

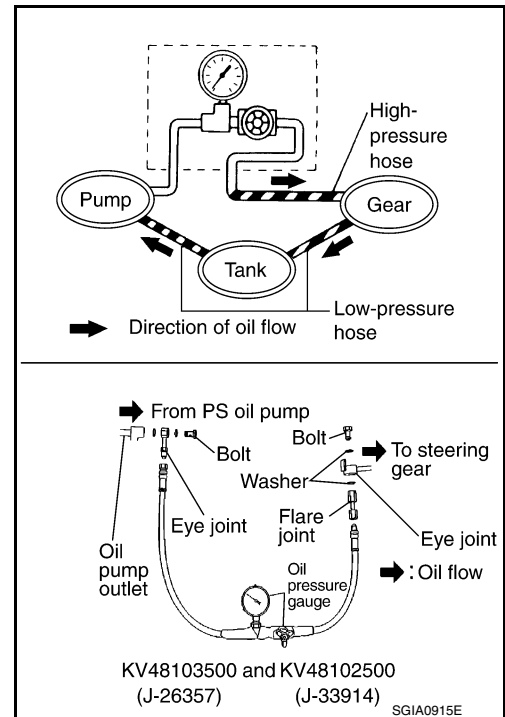
3. Fully close the Tool valve with engine at idle and measure the relief oil pressure.

Relief oil pressure : Refer to [ST-53, "Power Steering Oil Pump"](#)

CAUTION:

Do not keep valve closed for 10 seconds or longer.

4. Open the valve slowly after measuring. Replace the power steering oil pump if the relief oil pressure is outside the standard.
5. After inspection, disconnect the Tool from hydraulic circuit, then add fluid and bleed air. Refer to [ST-29, "Air Bleeding Hydraulic System"](#).



STEERING GEAR AND LINKAGE

< BASIC INSPECTION >

STEERING GEAR AND LINKAGE

Inspection

INFOID:000000012894023

BOOT

Check boot for cracks. Replace if any damage is found.

OUTER SOCKET AND INNER SOCKET

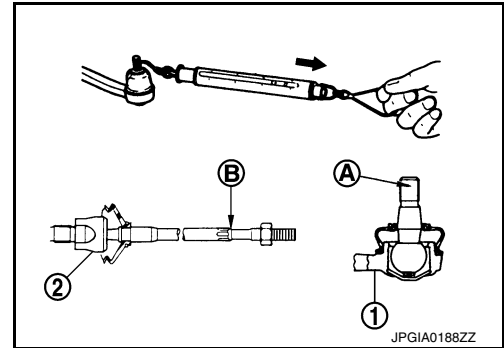
- Ball joint swinging torque
- Hook the Tool at the measuring point and pull the Tool. Make sure that the Tool reads the specified value when ball stud and inner socket start to move. Replace outer socket or inner socket if measured values are outside the standard.

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

Measuring point of inner socket (2) : Point (B) as shown

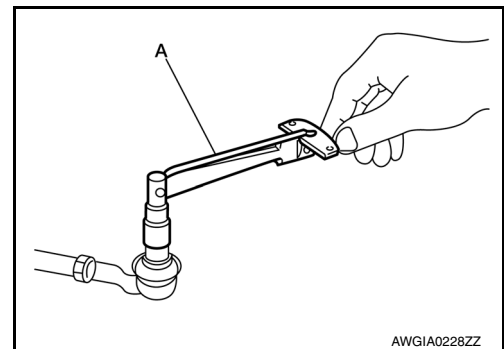
Tool number : — (J-44372)

Swinging torque : Refer to [ST-52, "Steering Gear"](#).



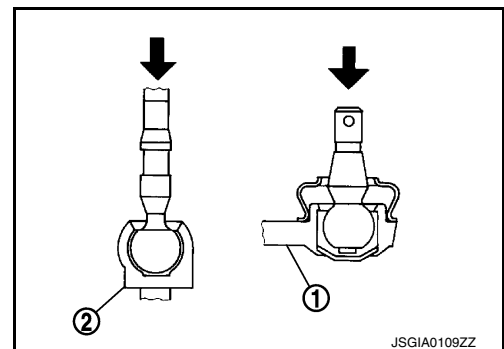
- Ball joint rotating torque
- Make sure that the reading is within the following specified range using suitable tool (A). Replace outer socket if the reading is outside the specification.

Rotating torque : Refer to [ST-52, "Steering Gear"](#).



- Ball joint axial end play
- Apply an axial load of 490 N (50 kg, 111 lb) to ball stud. Measuring the amount of stud movement using a suitable tool, make sure that the value is within specification. Replace outer socket (1) or inner socket (2) if the measured value is outside specification.

Axial end play : Refer to [ST-52, "Steering Gear"](#).



POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:000000013352054

Regarding Wiring Diagram information, refer to [HAC-29, "Wiring Diagram"](#).

1. CHECK FUSE

Check fuses [No. 14 and 29, located in the fuse block (J/B)].

NOTE:

Refer to [PG-99, "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the blown fuse after repairing the affected circuit.

2. CHECK A/C AUTO AMP. POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check voltage between A/C auto amp. harness connector and ground.

+		-	Voltage		
A/C auto amp.			Ignition switch position		
Connector	Terminal		OFF	ACC	ON
M50	23	Ground	Approx. 0 V	Approx. 0 V	Battery voltage
	3		Battery voltage	Battery voltage	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector between A/C auto amp. and fuse block (J/B).

3. CHECK A/C AUTO AMP. GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between A/C auto amp. harness connector and ground.

A/C auto amp.		—	Continuity
Connector	Terminal		
M50	2	Ground	Yes
	22		

Is the inspection result normal?

YES >> Inspection End.

NO >> Repair harness or connector.

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:000000012894025

1.CHECK HEATED STEERING WHEEL SYSTEM

Check operation of heated steering wheel system. Refer to [ST-8, "HEATED STEERING WHEEL SYSTEM : System Description"](#).

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Go to [ST-21, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000012894026

Regarding Wiring Diagram information, refer to [ST-10, "Wiring Diagram"](#).

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to [ST-30, "Removal and Installation"](#).
3. Turn ignition switch ON.
4. Turn heated steering wheel switch ON.
5. Check voltage between heated steering wheel harness connector terminals.

Connector	Terminal		Voltage (Approx.)
	+	-	
M114	1	2	Battery voltage

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-24, "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.

Connector	Terminal	Ground	Continuity
M114	2		Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace harness or connector.

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

1. Turn ignition switch OFF.
2. Disconnect heated steering relay connector.
3. Check continuity between heated steering relay harness connector terminal and steering wheel harness connector terminal.

Heated steering relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M90	5	M114	1	Yes

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M90	5		No

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connector.

5. CHECK HEATED STEERING RELAY

Check heated steering relay. Refer to [ST-23, "Component Inspection \(Heated Steering Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated steering relay.

6. CHECK POWER TO HEATED STEERING RELAY

Check the following:

- Battery
- Harness for open or short between battery and 10A fuse (No. 6)
- 10A fuse (No. 6)
- Harness for open or short between 10A fuse (No. 6) and heated steering relay

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7. CHECK GROUND CIRCUIT

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

Connector	Terminal	Ground	Continuity
M48	8		

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace harness or connector.

8. CHECK HARNESS BETWEEN HEATED STEERING RELAY AND A/C AUTO AMP.

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

Heated steering relay		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M90	2	M50	20	Yes

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M90	2		No

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace harness or connector.

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

< DTC/CIRCUIT DIAGNOSIS >

A/C auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M50	8	M48	6	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M50	8		No

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace harness or connector.

10. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-23, "Component Inspection \(Heated Steering Wheel Switch\)"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-92, "Removal and Installation"](#).

NO >> Replace heated steering wheel switch. Refer to [ST-41, "Removal and Installation"](#).

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000012894027

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-41, "Removal and Installation"](#).
3. Check continuity between heated steering wheel switch terminals.

Terminal		Condition	Continuity
6	8	Switch pressed	Yes
		Switch released	No

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel switch.

2. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Apply 12V direct current between heated steering wheel switch terminals and check that the indicator lamp turns ON.

Terminals		Condition	Indicator lamp status
+	-	Apply 12V direct current between terminals	ON
5	3		

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace heated steering wheel switch.

Component Inspection (Heated Steering Relay)

INFOID:0000000012894028

1. CHECK HEATED STEERING RELAY CONTINUITY

1. Turn ignition switch OFF.
2. Remove heated steering relay. Refer to [ST-6, "HEATED STEERING WHEEL SYSTEM : Component Parts Location"](#).
3. Apply 12V direct current between heated steering relay terminals and check continuity.

HEATED STEERING WHEEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

Terminal	Condition	Continuity
3 – 5	12V direct current applied between terminals 1 and 2.	Yes
	No current applied.	No

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace heated steering relay.

Component Inspection (Heated Steering Wheel)

INFOID:0000000012894029

1. CHECK HEATED STEERING WHEEL CONTINUITY

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

Terminals	Condition	Continuity
1 – 2	Surface temperature of less than 30°C (86°F)	Yes
	Surface temperature of 30°C (86°F) or more	No

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace heated steering wheel.

2. CHECK HEATED STEERING WHEEL RESISTANCE

Check resistance between heated steering wheel connector terminals.

Terminals	Condition	Resistance
1 – 2	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.

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:000000012894030

1. CHECK HEATED STEERING WHEEL SWITCH INDICATOR LAMP

1. Turn ignition switch ON.
2. Turn heated steering wheel switch ON. Observe indicator.
3. Turn heated steering wheel switch OFF. Observe indicator.

Does heated steering wheel switch indicator lamp turn ON and then OFF?

- YES >> Inspection End.
NO >> Go to [ST-25, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000012894031

Regarding Wiring Diagram information, refer to [ST-10, "Wiring Diagram"](#).

1. CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to [ST-41, "Removal and Installation"](#).
3. Turn ignition switch ON.
4. Check voltage between heated steering wheel switch harness connector terminals.

Connector	Terminal		Voltage (Approx.)
	+	-	
M48	6	8	Battery voltage

Is the inspection result normal?

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

2. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated steering wheel switch connector.
3. Check continuity between heated steering wheel switch harness connector terminal and ground.

Connector	Terminal	Ground	Continuity
M48	3		Yes

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair harness or connector.

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

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

Heated steering relay		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M90	5	M48	5	Yes

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

Connector	Terminal	Ground	Continuity
M90	5		No

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK HEATED STEERING RELAY

Check heated steering relay. Refer to [ST-23. "Component Inspection \(Heated Steering Relay\)"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace heated steering relay.

5. CHECK BATTERY POWER

Check the following:

- Battery
- Harness for open or short between battery and 10A fuse (No. 6)
- 10A fuse (No. 6)
- Harness for open or short between 10A fuse (No. 6) and heated steering relay

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

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	8	M48	6	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M50	8		No

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair harness or connector.

7. CHECK HEATED STEERING WHEEL SWITCH

Check heated steering wheel switch. Refer to [ST-23. "Component Inspection \(Heated Steering Wheel Switch\)"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-92. "Removal and Installation"](#)
- NO >> Replace heated steering wheel switch. Refer to [ST-41. "Removal and Installation"](#).

STEERING COLUMN

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

STEERING COLUMN

Symptom Table

INFOID:0000000012894032

HEATED STEERING WHEEL

Symptom	Inspection item
Heated steering wheel system inoperative	Refer to ST-21, "Diagnosis Procedure" .
Heated steering wheel switch indicator lamp inoperative	Refer to ST-25, "Diagnosis Procedure" .

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

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000012894033

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

Reference page		ST-14	ST-29	ST-19	ST-19	ST-19	ST-14	ST-15	ST-19	ST-30	ST-17	ST-19	ST-17	ST-17	ST-19	FAX-5	FAX-5 FSU-5	WT-61	FAX-5	FAX-5	BR-6	
Possible cause and SUSPECTED PARTS		Fluid level	Air in hydraulic system	Outer socket ball joint swinging force	Outer socket ball joint rotating torque	Outer socket ball joint end play	Steering fluid leakage	Steering wheel play	Steering gear rack sliding force	Improper steering wheel	Looseness of tilt lock lever	Improper installation or looseness of steering gear	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	WHEEL HUB AND BEARING	SUSPENSION	TIRES	WHEEL	DRIVE SHAFT	BRAKES	
Symptom	Steering	Noise	x	x	x	x	x	x	x							x	x	x	x	x	x	
		Shake									x	x	x				x	x	x	x	x	x
		Vibration									x	x	x	x			x	x	x		x	
		Shimmy									x		x		x		x	x	x	x		x
		Shudder											x		x		x	x	x	x		x

x: Applicable

POWER STEERING FLUID

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE

POWER STEERING FLUID

Draining and Refilling

INFOID:0000000012894034

DRAINING

1. Disconnect the hydraulic lines from the steering gear. Refer to [ST-39, "Exploded View"](#).
2. Drain power steering fluid into a suitable container.

REFILLING

1. Connect the hydraulic lines to the steering gear. Refer to [ST-39, "Exploded View"](#).
2. Fill power steering reservoir while checking power steering fluid level.
3. Bleed air from power steering hydraulic system. Refer to [ST-29, "Air Bleeding Hydraulic System"](#).
4. Check for power steering fluid leaks.

Air Bleeding Hydraulic System

INFOID:0000000012894035

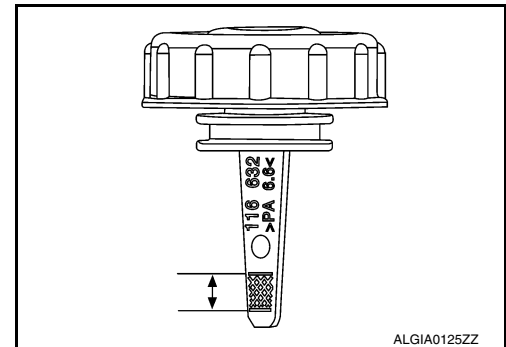
AIR BLEEDING HYDRAULIC SYSTEM

If air bleeding is not complete, excessive noise in the power steering oil pump will be present.

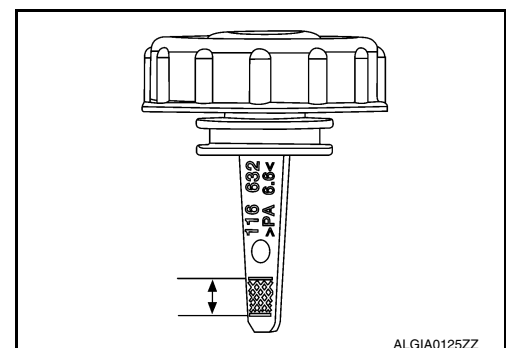
1. Make sure the engine is off.
2. Remove cover. Refer to [ST-39, "Exploded View"](#).
3. Turn the steering wheel from the full right stop position and then to full left stop position several times. Repeat until bubbles are no longer being generated in the reservoir.
4. When the power steering fluid level lowers, refill the reservoir.

CAUTION:

Do not allow the power steering fluid level to drop below the hatching area on the power steering reservoir cap indicator.



5. Repeat steps three and four until the power steering fluid level stabilizes.
6. Start the engine and run at idle.
7. Turn the steering wheel from the full right stop position and then to full left stop position several times. Repeat until bubbles or fluid discoloration are no longer being generated in the reservoir.
8. When the power steering fluid level lowers, refill the reservoir.
9. Stop the engine.
10. Verify proper power steering fluid level. Power steering fluid level should be in the hatching area on the power steering reservoir cap indicator.



STEERING WHEEL

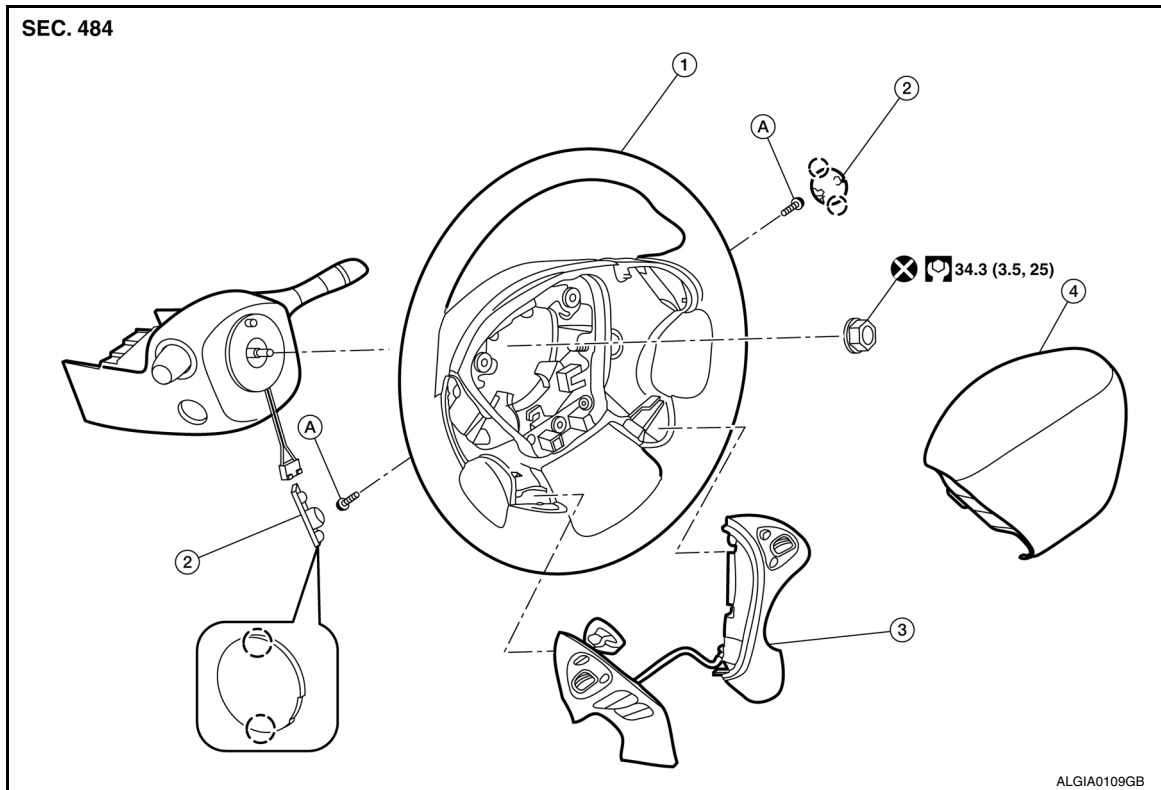
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:000000012894036



- | | | |
|--------------------------|--|----------------------|
| 1. Steering wheel | 2. Cover | 3. Steering switches |
| 4. Driver air bag module | A. Refer to SR-12, "Exploded View" . | ⊗ Pawl |

Removal and Installation

INFOID:000000012894037

REMOVAL

1. Set the front wheels and tires in the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-12, "Removal and Installation"](#).
3. Disconnect harness connector from steering switches.
4. Disconnect harness connector from steering wheel heater (if equipped).
5. Remove steering wheel lock nut.
6. 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.
7. If necessary, remove steering switches. Refer to [AV-63, "Removal and Installation"](#) (MULTI AV - DISPLAY AUDIO) or [AV-200, "Removal and Installation"](#) (MULTI AV - NAVIGATION).
8. Inspect steering wheel near the puller holes for damage. Replace as necessary.

INSTALLATION

Installation is in the reverse order of removal.

Align spiral cable correctly before installing steering wheel. Make sure that the spiral cable is in the neutral position. Refer to [SR-15, "Removal and Installation"](#).

CAUTION:

- If the spiral cable is not installed in the correct position, the spiral cable may snap by turning the steering wheel beyond the limited number of turns.

STEERING WHEEL

< REMOVAL AND INSTALLATION >

- Do not reuse steering wheel lock nut.

A

B

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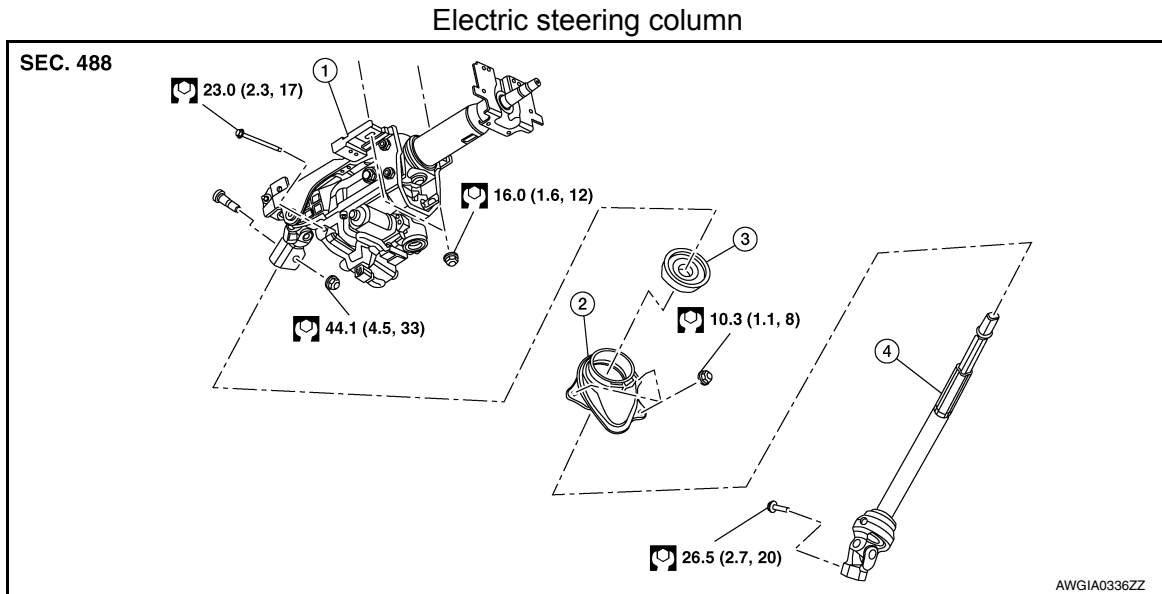
STEERING COLUMN

< REMOVAL AND INSTALLATION >

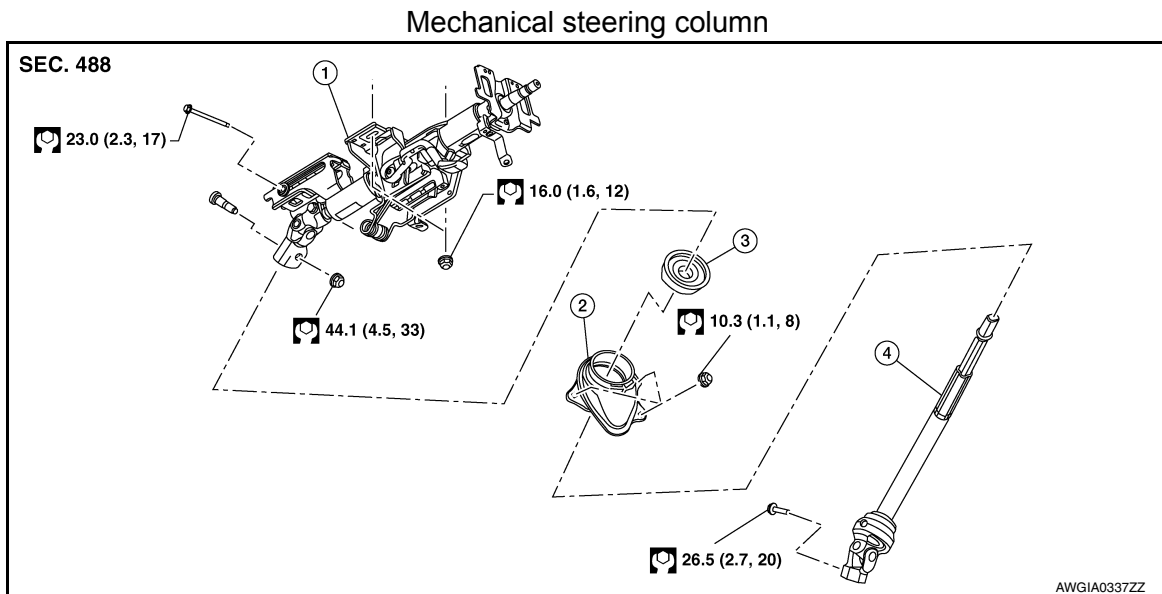
STEERING COLUMN

Exploded View

INFOID:000000012894038



1. Steering column
2. Hole cover
3. Lower boot
4. Steering intermediate shaft



1. Steering column
2. Hole cover
3. Lower boot
4. Steering intermediate shaft

Removal and Installation

INFOID:000000012894039

CAUTION:

- Do not cause impact to steering column during removal and installation.
- Do not move the steering gear during removal and installation of the steering column.

REMOVAL

1. Remove the combination switch. Refer to [BCS-80, "Removal and Installation"](#).
2. Remove the steering angle sensor from the steering column. Refer to [BRC-175, "Removal and Installation"](#).

STEERING COLUMN

< REMOVAL AND INSTALLATION >

3. Remove the left knee air bag module. Refer to [SR-20. "Removal and Installation"](#).
4. Disconnect the harness connectors from the tilt and telescopic motor (if equipped).
5. Remove the nut and bolt and separate the steering intermediate shaft from steering column.
6. Remove the steering column nuts and bolt then remove the steering column.

INSTALLATION

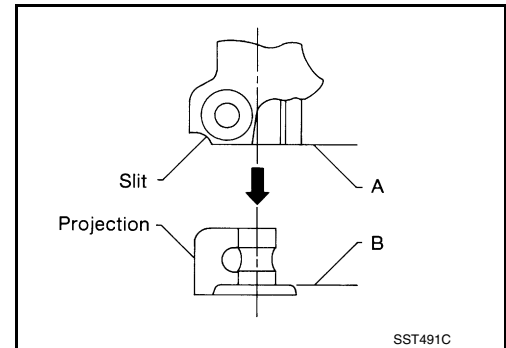
Installation is in the reverse order of removal.

CAUTION:

When installing the steering column, finger-tighten all of the lower bracket and joint retaining bolts then tighten them to specification. Do not apply undue stress to the steering column.

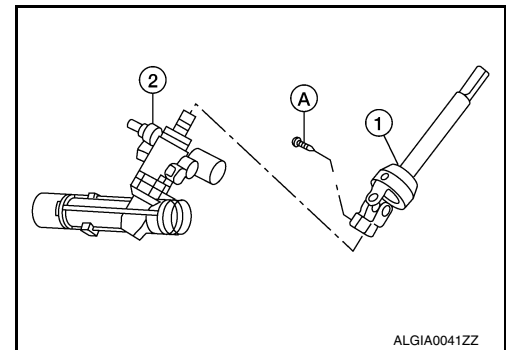
NOTE:

Align the slit on the steering intermediate shaft with projection on the steering gear. Connect surface (A) to surface (B).



CAUTION:

When connecting the steering intermediate shaft (1) to the steering gear (2), first finger-tighten the joint retaining bolt (A) then tighten to specification. The joint retaining bolt is directional. Refer to [ST-32. "Exploded View"](#).



- After installation, turn steering wheel to make sure it moves smoothly while turning to the left and right stops. Make sure the number of turns are the same from the straight-forward position to the left and right stops. Make sure that the steering wheel is in a neutral position when driving straight ahead.
- After installing the steering column, check the tilt mechanism for proper operation.
- Adjust the neutral position of the steering angle sensor. Refer to [BRC-62. "Description"](#).

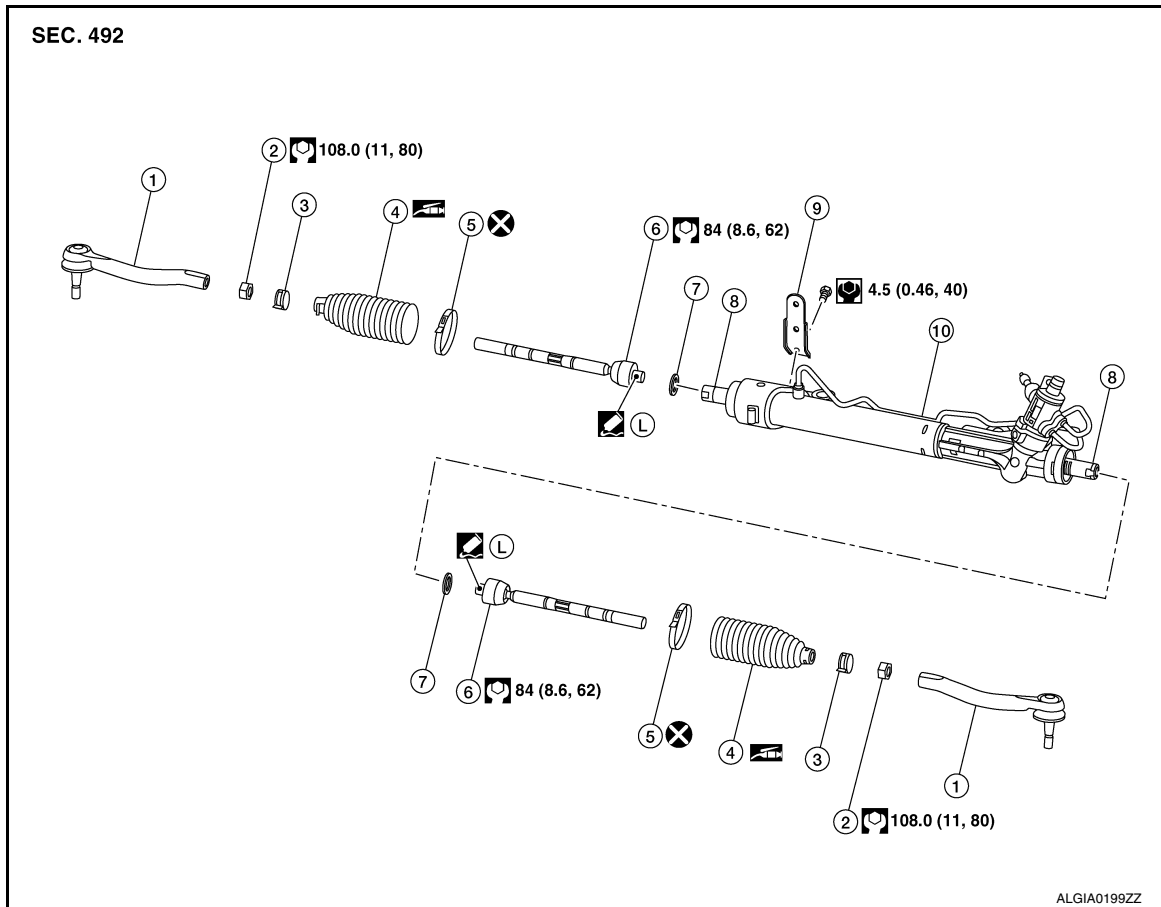
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000012894040



- | | | |
|-------------------|-------------------------------|---------------------|
| 1. Outer socket | 2. Inner socket lock nut | 3. Small boot clamp |
| 4. Boot | 5. Large boot clamp | 6. Inner socket |
| 7. Spacer | 8. Rack bar (not serviceable) | 9. Bracket |
| 10. Steering gear | | |

Removal and Installation - Outer socket

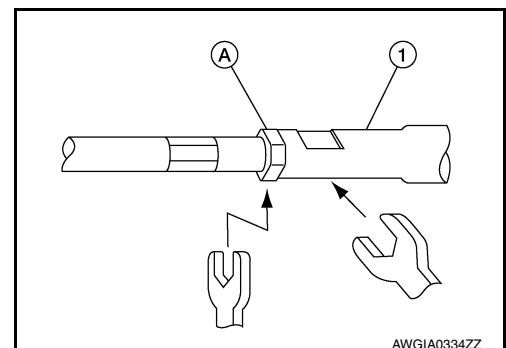
INFOID:000000012894041

REMOVAL

1. Remove front wheel and tire using power tool.
2. Loosen inner socket lock nut (A).

CAUTION:

To prevent damage, hold outer socket (1) across flats using suitable tool while loosening inner socket lock nut (A).



3. Remove cotter pin from outer socket.
4. Loosen outer socket nut and separate outer socket from steering knuckle using suitable tool.

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

CAUTION:

Leave the outer socket nut half threaded on the outer socket to prevent damage to threads and to prevent the suitable tool from coming off suddenly.

5. Remove outer socket nut and outer socket.

INSTALLATION

1. Install outer socket to inner socket.
2. Adjust inner socket to standard length (L), and then tighten inner socket lock nut to the specified torque. Refer to [ST-34, "Exploded View"](#). Check length of inner socket (L) again after tightening inner socket lock nut. Make sure that the length is the standard.

Inner socket length (L) : Refer to [ST-52, "Steering Gear"](#).

CAUTION:

- To prevent damage, hold outer socket across flats using suitable tool while tightening inner socket lock nut.
- Adjust toe-in after this procedure. The length achieved after toe-in adjustment is not necessarily the above value.
- Inspect to make sure no boot deformation has occurred during toe-in adjustment. Adjust boot as necessary.

3. Install outer socket to steering knuckle.
4. Install outer socket nut to outer socket. Refer to [ST-34, "Exploded View"](#).
5. Install cotter pin to outer socket stud hole.

WARNING:

After torquing the outer socket nut, be sure to install the cotter pin through the outer socket stud hole and bend the cotter pin around the outer socket stud.

CAUTION:

Do not reuse cotter pin.

6. Install front wheel and tire. Refer to [WT-66, "Removal and Installation"](#).
7. Check wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen*1\)"](#).
8. Adjust the neutral position of the steering angle sensor. Refer to [BRC-62, "Description"](#).

Removal and Installation - Boot

INFOID:000000012894042

REMOVAL

1. Remove outer socket. Refer to [ST-34, "Removal and Installation - Outer socket"](#).
2. Remove inner socket lock nut.
3. Remove small boot clamp and large boot clamp.

CAUTION:

Do not reuse large boot clamp.

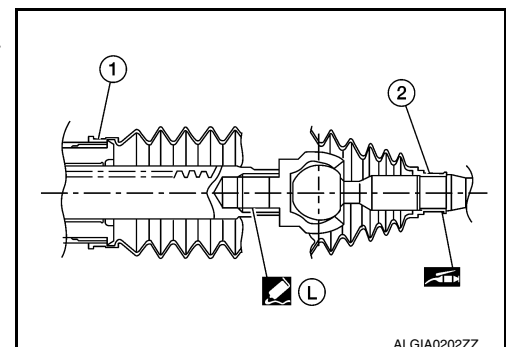
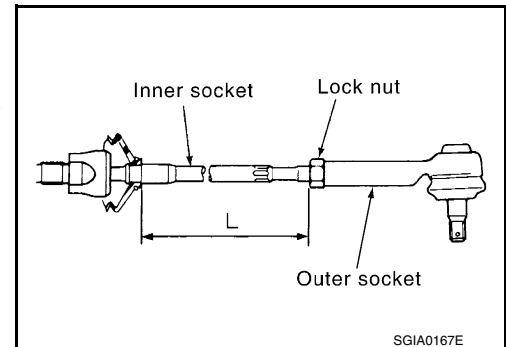
4. Remove boot.

INSTALLATION

1. Install large end of boot (1) to gear housing.
2. Apply silicone grease between the inner socket and small end of boot (2). Install small end of boot to inner socket boot mounting groove.

CAUTION:

To prevent boot deformation or damage during toe-in adjustment, apply silicone grease between the inner socket and small end of boot.

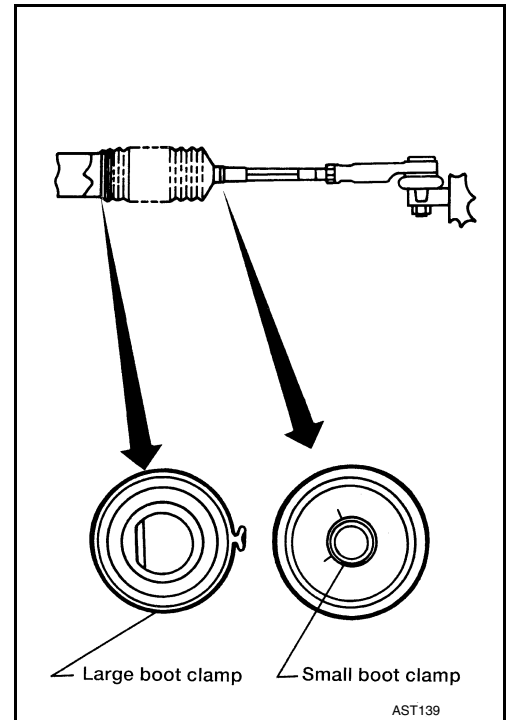


STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

3. Install small boot clamp.
4. Install large boot clamp using Tool.
CAUTION:
Do not reuse large boot clamp.

Tool number : KV40107300 (J-51751)



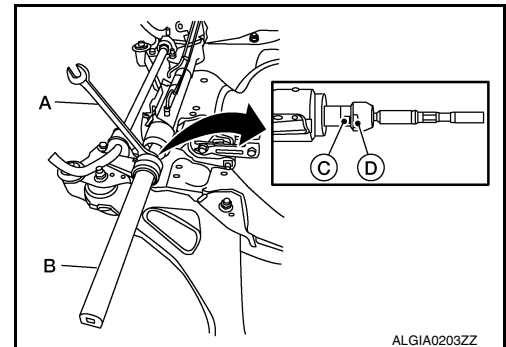
5. Partially thread the inner socket lock nut on the inner socket.
6. Install the outer socket. Refer to [ST-34, "Removal and Installation - Outer socket"](#).
7. Check wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen*1\)"](#).
8. Adjust the neutral position of the steering angle sensor. Refer to [BRC-62, "Description"](#).

Removal and Installation - Inner socket

INFOID:000000012894043

REMOVAL

1. Remove boot. Refer to [ST-35, "Removal and Installation - Boot"](#).
2. Remove inner socket.
CAUTION:
To prevent damage to the rack bar when removing the inner socket, hold suitable tool (A) across rack bar flats (C) while turning suitable tool (B) across inner socket flats (D).
3. Remove spacer.



INSTALLATION

1. Place spacer on the end of the rack bar.

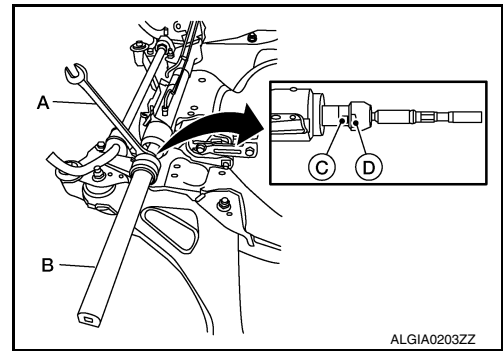
STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

2. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to the specified torque. Refer to [ST-34, "Exploded View"](#).

CAUTION:

To prevent damage to the rack bar when installing the inner socket, hold suitable tool (A) across rack bar flats (C) while turning suitable tool (B) across inner socket flats (D).



3. Install boot. Refer to [ST-35, "Removal and Installation - Boot"](#).
4. Check wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen*1\)"](#).
5. Adjust the neutral position of the steering angle sensor. Refer to [BRC-62, "Description"](#).

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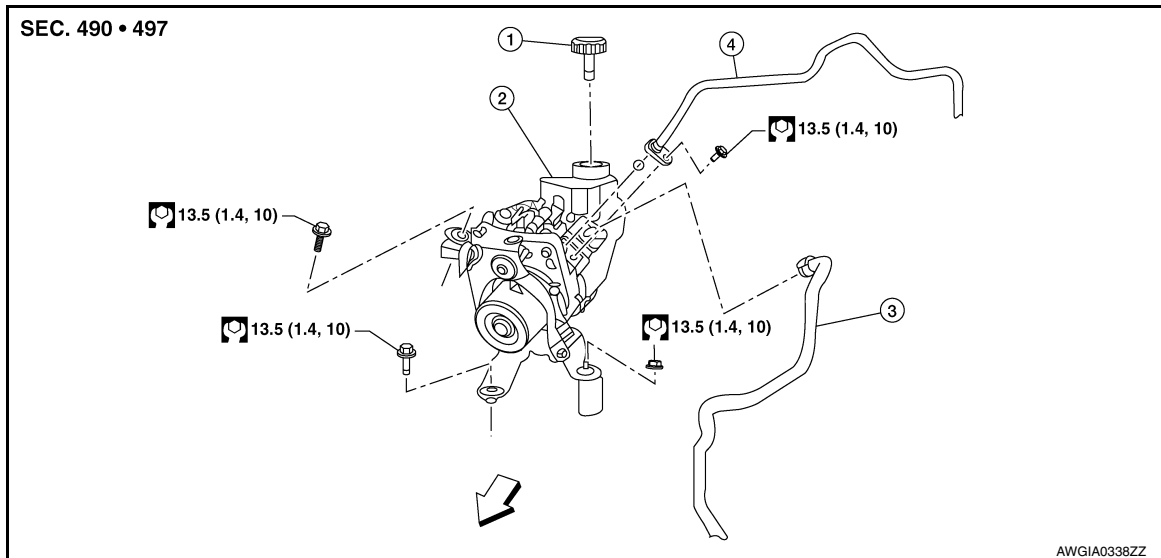
POWER STEERING OIL PUMP

< REMOVAL AND INSTALLATION >

POWER STEERING OIL PUMP

Exploded View

INFOID:000000012894044



- | | | |
|---------------------------------|----------------------------|------------------------|
| 1. Power steering reservoir cap | 2. Power steering oil pump | 3. Low-pressure piping |
| 4. High-pressure piping | ⇐ Front | |

Removal and Installation

INFOID:000000012894045

WARNING:

Power steering pump outer shell will be hot while running and after driving. When working, be sure to wear protective equipment to avoid getting burned.

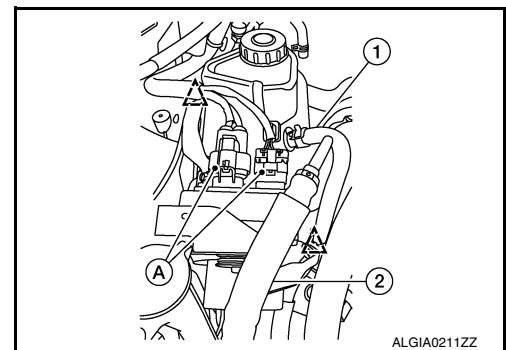
NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove the cover. Refer to [ST-39. "Exploded View"](#).
2. Drain power steering fluid. Refer to [ST-29. "Draining and Refilling"](#).
3. Disconnect the harness connectors (A) from the power steering oil pump.
4. Remove the harness retainer from the power steering oil pump bracket.
5. Remove the line retaining bolt from bracket.
6. Separate the high pressure piping (2) and low-pressure piping (1) from the power steering oil pump.
7. Separate the clips from the power steering oil pump.

△: Clip



8. Remove nut and bolts and remove the power steering oil pump.

INSTALLATION

Installation is in the reverse order of removal.

- Bleed air from power steering system. Refer to [ST-29. "Air Bleeding Hydraulic System"](#).

CAUTION:

Do not reuse O-rings.

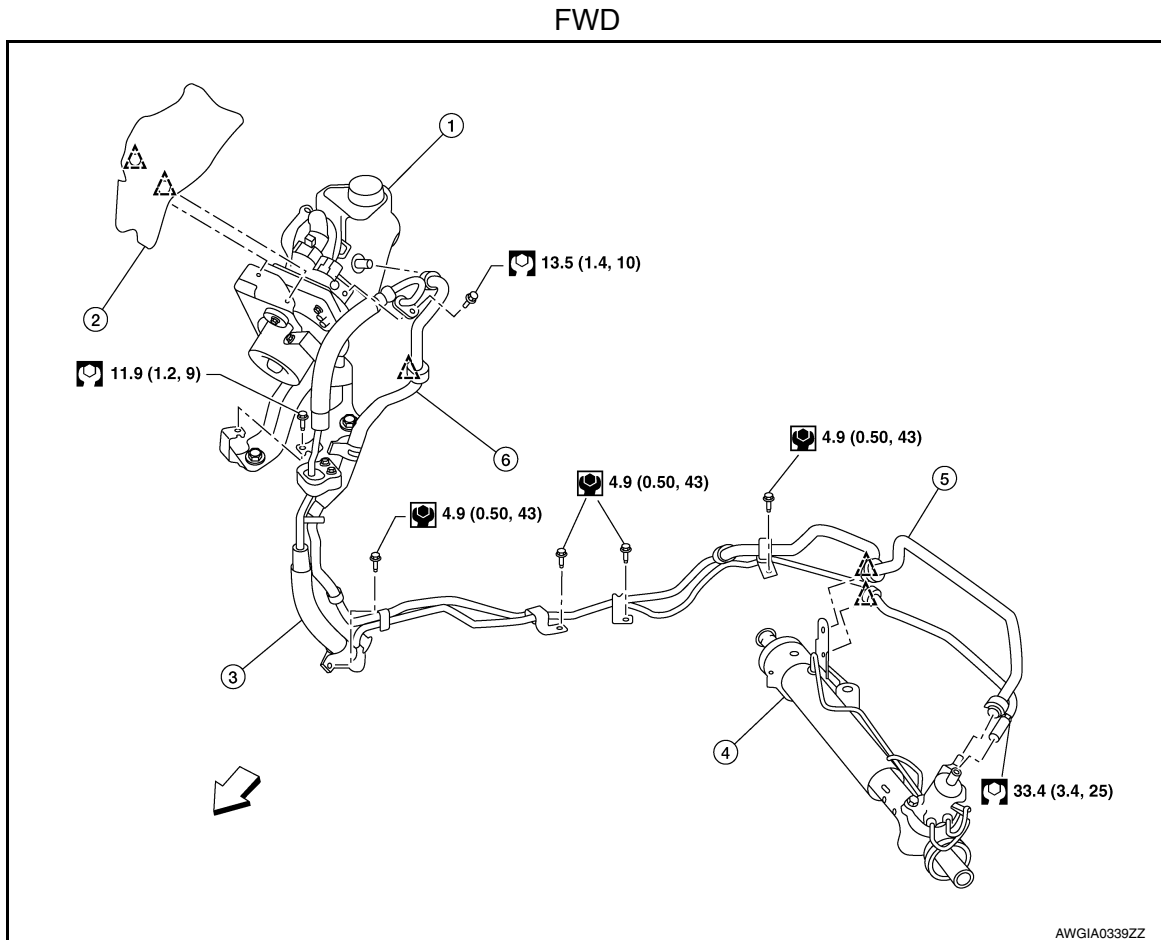
HYDRAULIC LINE

< REMOVAL AND INSTALLATION >

HYDRAULIC LINE

Exploded View

INFOID:000000012894046



- | | | |
|----------------------------|--------------------------------|--------------------------------|
| 1. Power steering oil pump | 2. Cover | 3. High-pressure piping |
| 4. Steering gear | 5. Low-pressure piping (lower) | 6. Low-pressure piping (upper) |
| Clip | Front | |

NOTE:

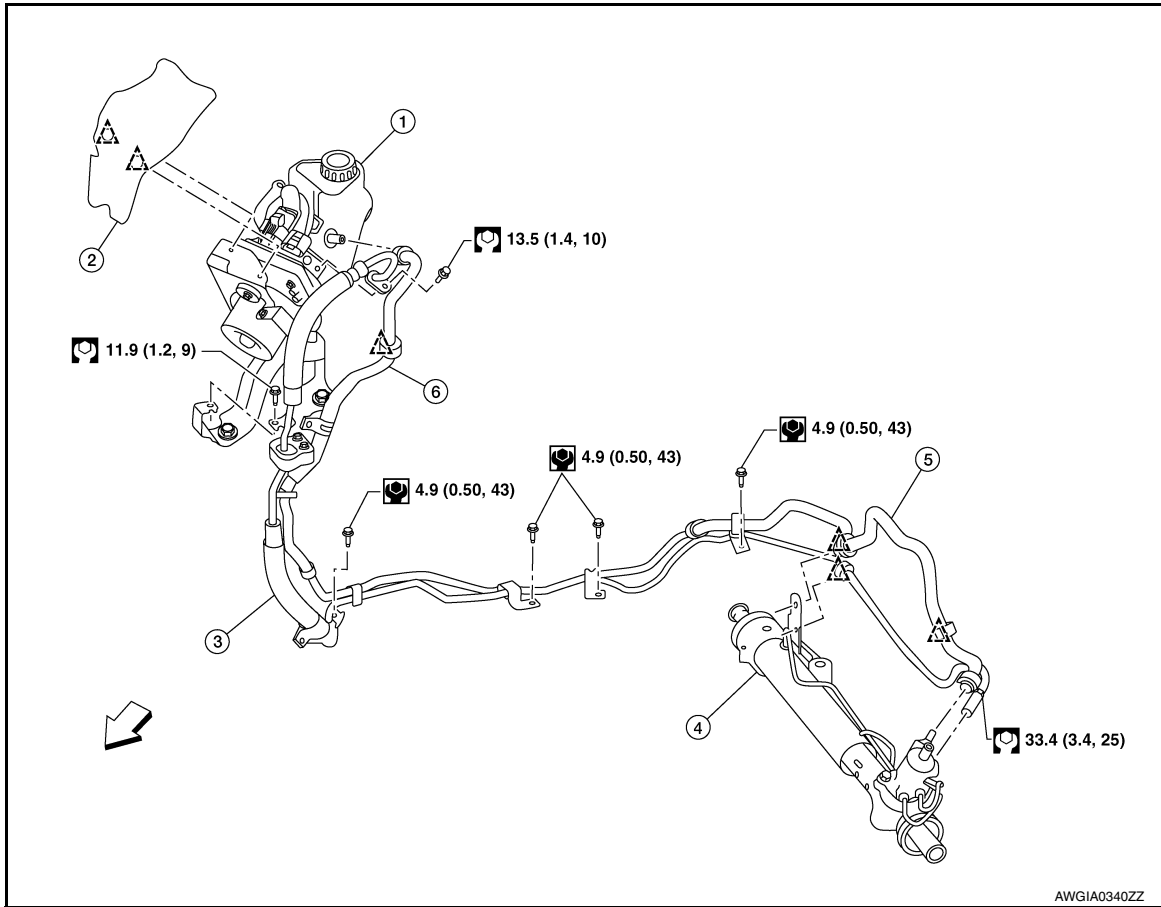
Service high-pressure and low-pressure piping as an assembly of hydraulic lines.

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HYDRAULIC LINE

< REMOVAL AND INSTALLATION >

AWD



- | | | |
|----------------------------|--------------------------------|--------------------------------|
| 1. Power steering oil pump | 2. Cover | 3. High-pressure piping |
| 4. Steering gear | 5. Low-pressure piping (lower) | 6. Low-pressure piping (upper) |
| Clip | Front | |

NOTE:

Service high-pressure and low-pressure piping as an assembly of hydraulic lines.

Removal and Installation

INFOID:0000000012894047

NOTE:

- When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.
- Service high-pressure piping and low-pressure piping as an assembly of hydraulic lines.

REMOVAL

Refer to the component parts location illustration for hydraulic line removal. Refer to [ST-39. "Exploded View"](#).

CAUTION:

- **Do not reuse O-rings.**

INSTALLATION

Installation is in the reverse order of removal.

- Bleed air from power steering system. Refer to [ST-29. "Air Bleeding Hydraulic System"](#).
- Check for fluid leaks. Repair as necessary.

CAUTION:

- **Do not reuse O-rings.**

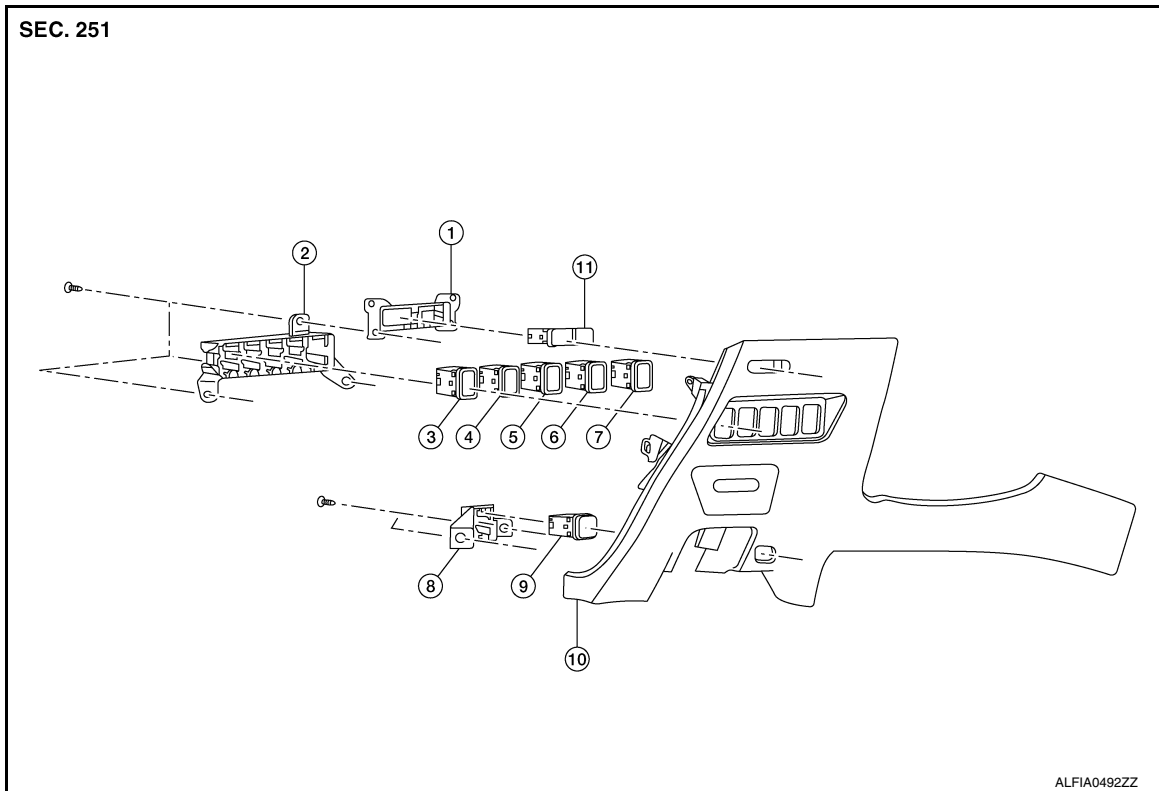
HEATED STEERING WHEEL SWITCH

< REMOVAL AND INSTALLATION >

HEATED STEERING WHEEL SWITCH

Exploded View

INFOID:000000012894048



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|-------------------------------|---------------------------------|---------------------------------|
| 1. Upper switch carrier | 2. Middle switch carrier | 3. VDC OFF switch |
| 4. Mask | 5. Automatic back door switch | 6. Heated steering wheel switch |
| 7. Mask | 8. Lower switch carrier | 9. Front power return switch |
| 10. Instrument lower panel LH | 11. Illumination control switch | |

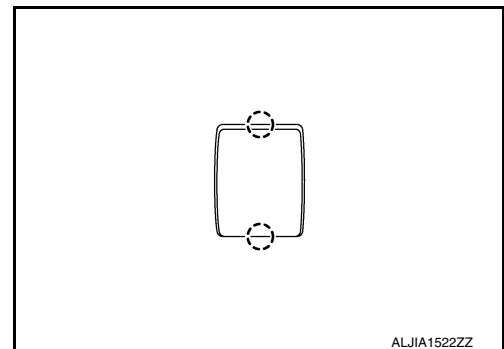
Removal and Installation

INFOID:000000012894049

REMOVAL

1. Remove the instrument lower panel LH. Refer to [IP-24, "Removal and Installation"](#).
2. Remove the screws and middle switch carrier from the instrument lower panel LH.
3. Release pawls using suitable tool and remove the heated steering wheel switch from the middle switch carrier.

○: Pawl



INSTALLATION

Installation is in the reverse order of removal.

STEERING GEAR AND LINKAGE

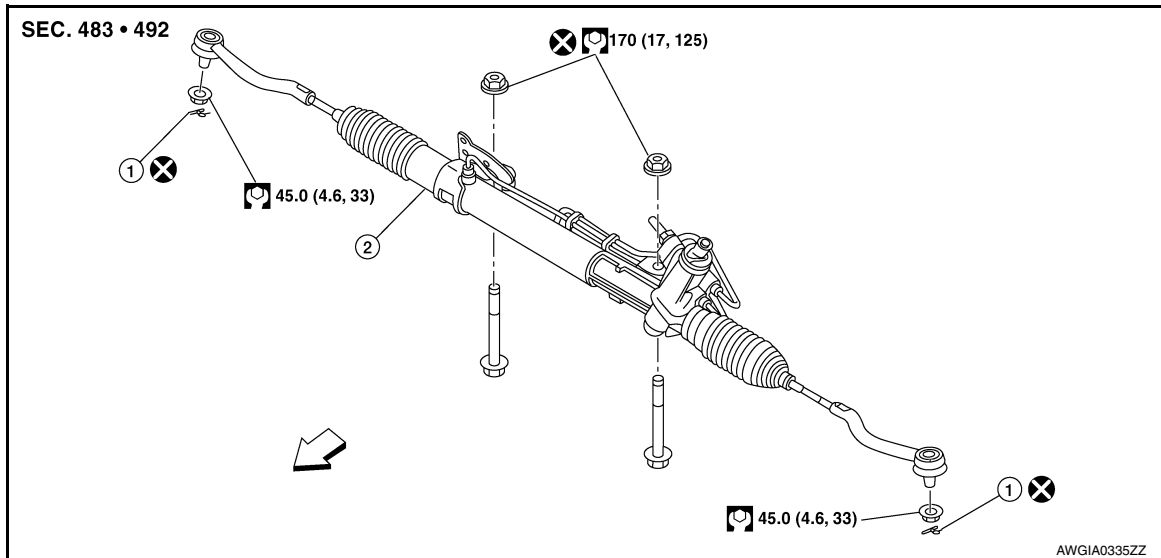
< UNIT REMOVAL AND INSTALLATION >

UNIT REMOVAL AND INSTALLATION

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000012894050



1. Cotter pin

2. Steering gear

← Front

Removal and Installation - FWD

INFOID:000000012894051

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Set the front wheels and tires to the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to [WT-66, "Exploded View"](#).
3. Drain the power steering fluid. Refer to [ST-29, "Draining and Refilling"](#).
4. Remove the cotter pins from outer sockets (RH/LH).
5. Loosen the outer socket nuts and separate outer sockets from the steering knuckles (RH/LH) using suitable tool.

CAUTION:

Leave the outer socket nuts half threaded on the outer socket to prevent damage to threads and to prevent the suitable tool from coming off suddenly.

6. Remove outer socket nuts and separate the outer sockets from the steering knuckles (RH/LH).
7. Remove the rear engine bracket. Refer to [EM-105, "FWD : Exploded View"](#).
8. Remove the front exhaust tube. Refer to [EX-5, "Exploded View"](#).
9. Remove steering gear heat shield.

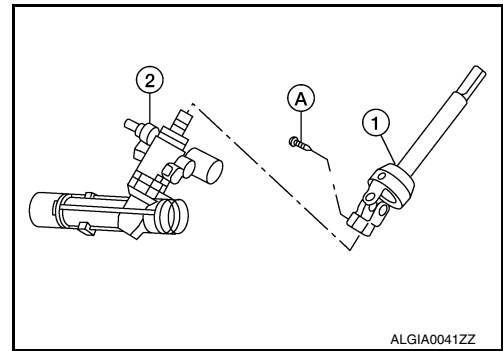
STEERING GEAR AND LINKAGE

< UNIT REMOVAL AND INSTALLATION >

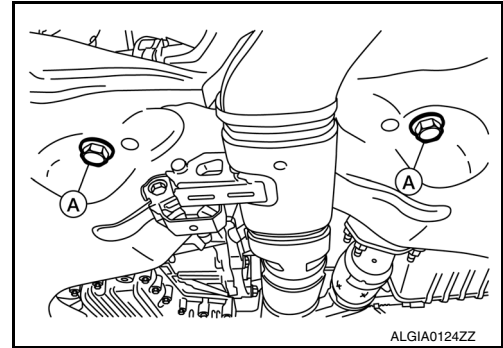
10. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).

CAUTION:

With the steering linkage disconnected, the spiral cable may snap by turning the steering wheel beyond the limited number of turns. Secure the steering wheel during removal of the steering gear.



11. Remove the steering gear nuts and bolts (A). Position the steering gear forward.



12. Remove the front stabilizer. Refer to [FSU-15, "Removal and Installation"](#).
13. Separate the hydraulic lines with clips from the bracket on the steering gear and reposition. Refer to [ST-39, "Exploded View"](#).
14. Separate the hydraulic lines from the steering gear. Refer to [ST-39, "Exploded View"](#).
15. Remove the steering gear.

INSTALLATION

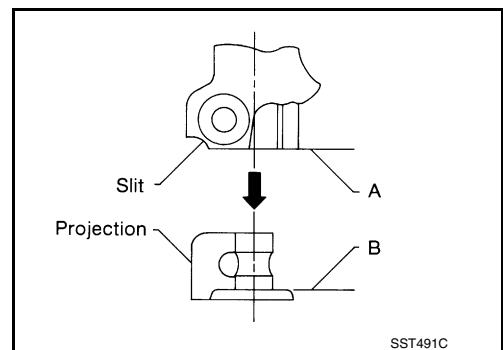
Installation is in the reverse order of removal.

CAUTION:

With the steering linkage disconnected, the spiral cable may snap by turning the steering wheel beyond the limited number of turns. Secure the steering wheel during installation of the steering gear.

NOTE:

Align slit of the steering intermediate shaft with the projection on the steering gear. Insert the joint until surface (A) contacts surface (B).

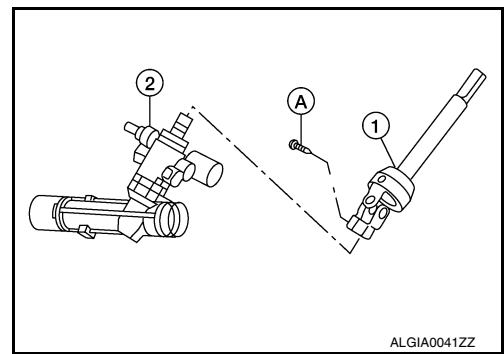


CAUTION:

STEERING GEAR AND LINKAGE

< UNIT REMOVAL AND INSTALLATION >

When connecting the steering intermediate shaft (1) to the steering gear (2), first finger-tighten the joint retaining bolt (A) then tighten to specification. The joint retaining bolt is directional. Refer to [ST-32, "Exploded View"](#).



WARNING:

After torquing the outer socket nuts, be sure to install the cotter pins through the outer socket stud holes and bend the cotter pins around the outer socket studs.

CAUTION:

- Do not reuse O-rings.
- Do not reuse steering gear nuts.
- Do not reuse cotter pins.
- Bleed the air from hydraulic system. Refer to [ST-29, "Air Bleeding Hydraulic System"](#).
- Check wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen*¹\)"](#).
- Adjust the neutral position of the steering angle sensor. Refer to [BRC-62, "Description"](#).

Removal and Installation - AWD

INFOID:000000012894052

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Set the front wheels and tires to the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to [WT-66, "Exploded View"](#).
3. Drain the power steering fluid. Refer to [ST-29, "Draining and Refilling"](#).
4. Remove the coolant reservoir. Refer to [CO-12, "Exploded View"](#).
5. Remove the steering gear heat shield.
6. Remove the drive shafts (RH/LH). Refer to [FAX-19, "Removal and Installation \(LH\)"](#) (LH) and [FAX-21, "Removal and Installation \(RH\)"](#) (RH).
7. Remove the three way catalyst (bank 1). Refer to [EM-35, "Removal and Installation \(bank 1\)"](#).
8. Remove the cotter pins from outer sockets (RH/LH).
9. Loosen the outer socket nuts and separate outer sockets from the steering knuckles (RH/LH) using suitable tool.

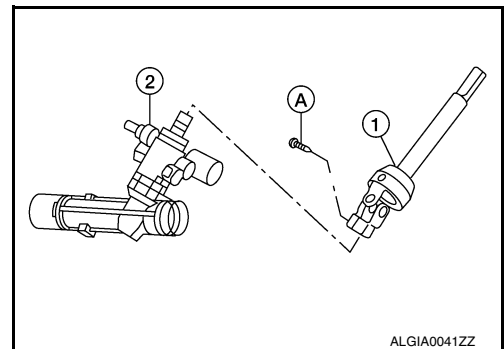
CAUTION:

Leave the outer socket nuts half threaded on the outer sockets to prevent damage to threads and to prevent the suitable tool from coming off suddenly.

10. Remove outer socket nuts and separate the outer sockets from the steering knuckles (RH/LH).
11. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).

CAUTION:

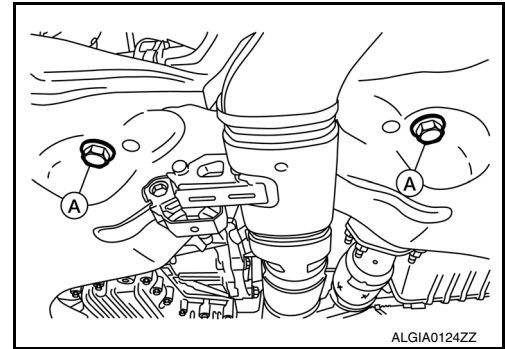
With the steering linkage disconnected, the spiral cable may snap by turning the steering wheel beyond the limited number of turns. Secure the steering wheel during removal of the steering gear.



STEERING GEAR AND LINKAGE

< UNIT REMOVAL AND INSTALLATION >

12. Remove the steering gear nuts and bolts (A). Position the steering gear forward.



13. Remove the front stabilizer. Refer to [FSU-15. "Removal and Installation"](#).
14. Remove power steering oil pump. Refer to [ST-38. "Removal and Installation"](#).
15. Remove the upper torque rod and the engine mounting insulator (RH). Refer to [EM-109. "AWD : Exploded View"](#).
16. Support the engine and transmission assembly with a suitable jack.

WARNING:

Place a suitable jack under the engine and transmission assembly.

CAUTION:

Do not damage the engine and transmission assembly with the suitable jack.

17. Remove the engine mounting insulator (LH). Refer to [EM-105. "FWD : Exploded View"](#).
18. Remove the engine mounting insulator (rear) and rear engine mount bracket (LH). Refer to [EM-105. "FWD : Exploded View"](#).
19. Separate the hydraulic lines with clips from the bracket on the steering gear. Refer to [ST-39. "Exploded View"](#).
20. Separate the hydraulic lines from the steering gear. Refer to [ST-39. "Exploded View"](#).
21. Remove the steering gear.

INSTALLATION

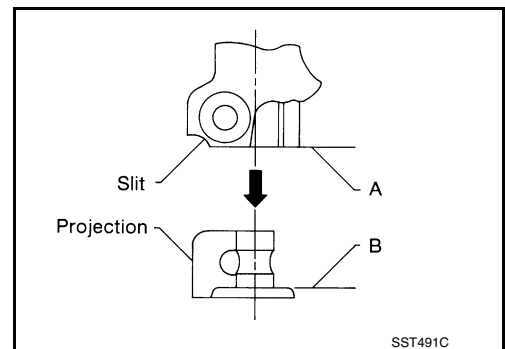
Installation is in the reverse order of removal.

CAUTION:

With the steering linkage disconnected, the spiral cable may snap by turning the steering wheel beyond the limited number of turns. Secure the steering wheel during installation of the steering gear.

NOTE:

Align the slit on the steering intermediate shaft with the projection on the steering gear. Connect surface (A) to surface (B).

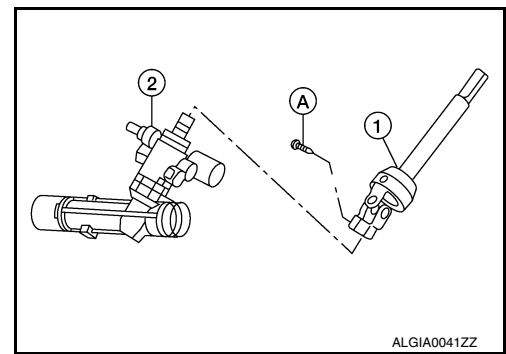


CAUTION:

STEERING GEAR AND LINKAGE

< UNIT REMOVAL AND INSTALLATION >

When connecting the steering intermediate shaft (1) to the steering gear (2), first finger-tighten the joint retaining bolt (A) then tighten to specification. The joint retaining bolt is directional. Refer to [ST-32, "Exploded View"](#).



WARNING:

After torquing the outer socket nuts, be sure to install the cotter pins through the outer socket stud holes and bend the cotter pins around the outer socket studs.

CAUTION:

- Do not reuse O rings.
- Do not reuse steering gear nuts.
- Do not reuse cotter pins.
- Bleed the air from power steering system. Refer to [ST-29, "Air Bleeding Hydraulic System"](#).
- Check wheel alignment. Refer to [FSU-25, "Wheel Alignment \(Unladen*¹\)"](#).
- Adjust the neutral position of the steering angle sensor. Refer to [BRC-62, "Description"](#).

STEERING GEAR AND LINKAGE

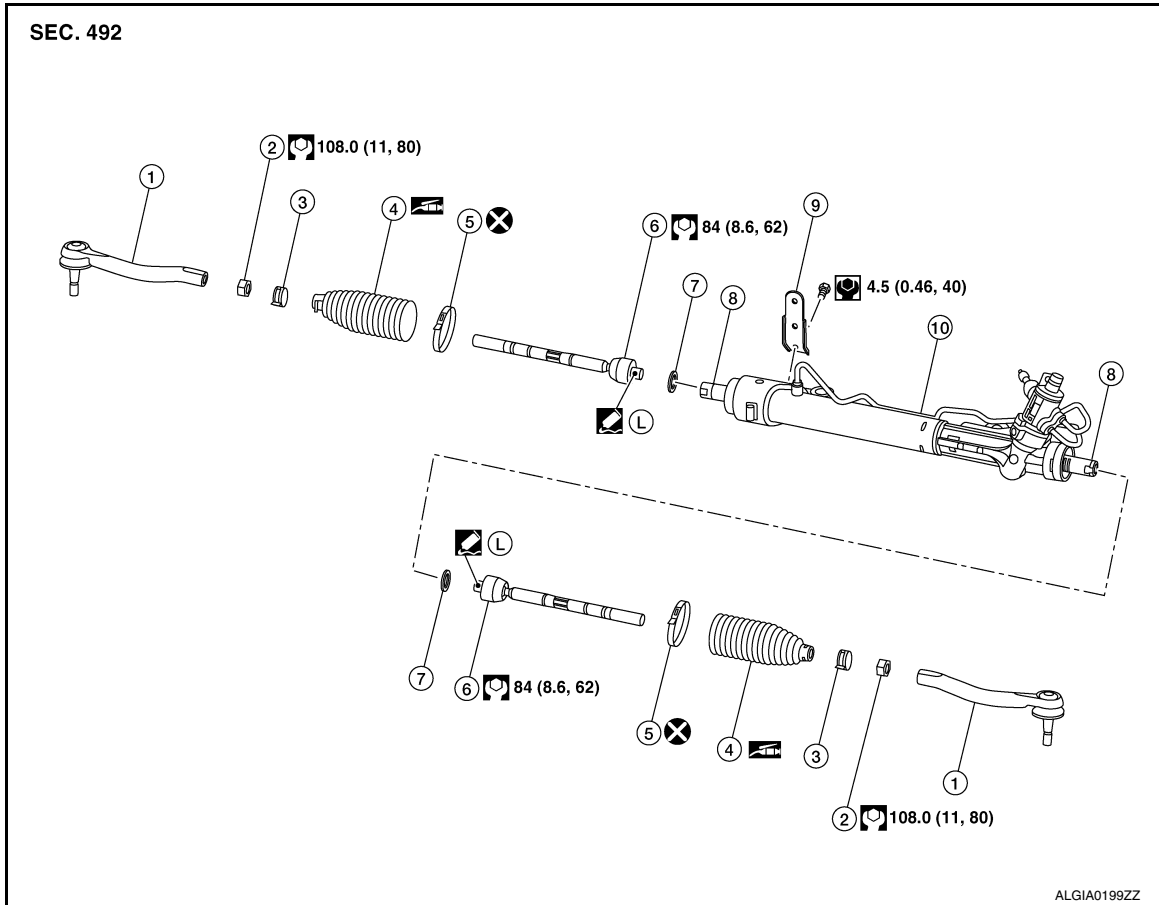
< UNIT DISASSEMBLY AND ASSEMBLY >

UNIT DISASSEMBLY AND ASSEMBLY

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000012894053



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|-------------------|-------------------------------|---------------------|
| 1. Outer socket | 2. Inner socket lock nut | 3. Small boot clamp |
| 4. Boot | 5. Large boot clamp | 6. Inner socket |
| 7. Spacer | 8. Rack bar (not serviceable) | 9. Bracket |
| 10. Steering gear | | |

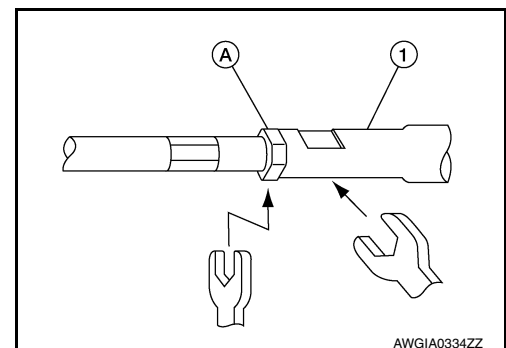
Disassembly and Assembly

INFOID:0000000012894054

DISASSEMBLY

- Remove inner socket lock nut (A) and outer socket (1).

CAUTION:
To prevent damage, hold outer socket (1) across flats using suitable tool while loosening inner socket lock nut (A).



- Remove boot clamps and boot.

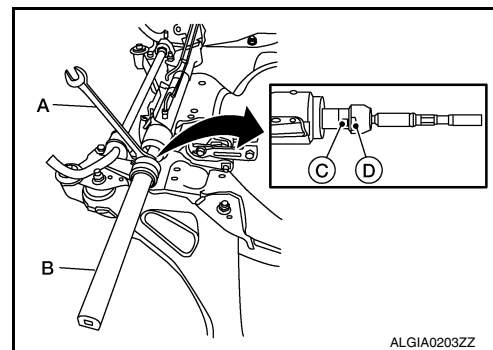
STEERING GEAR AND LINKAGE

< UNIT DISASSEMBLY AND ASSEMBLY >

3. Remove inner socket.

CAUTION:

To prevent damage to the rack bar when removing the inner socket, hold suitable tool (A) across rack bar flats (C) while turning suitable tool (B) across inner socket flats (D).



4. Remove spacer.
5. Remove bracket bolt and bracket.

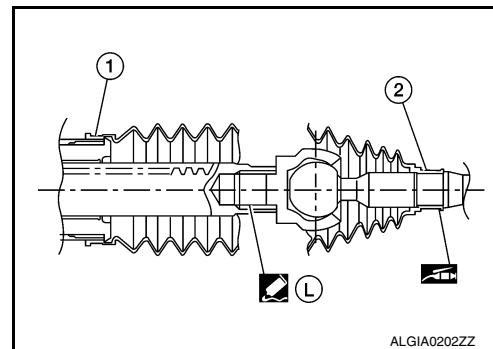
ASSEMBLY

1. Install bracket and bracket bolt to gear housing.
2. Install spacer on the end of the rack bar.
3. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to the specified torque. Refer to [ST-47](#), "Exploded View".

CAUTION:

To prevent damage to the rack bar when installing the inner socket, hold suitable tool across rack bar flats while turning suitable tool across inner socket flats.

4. Install large end of boot (1) to gear housing.
5. Apply silicone grease between the inner socket and small end of boot (2). Install small end of boot to inner socket boot mounting groove.



CAUTION:

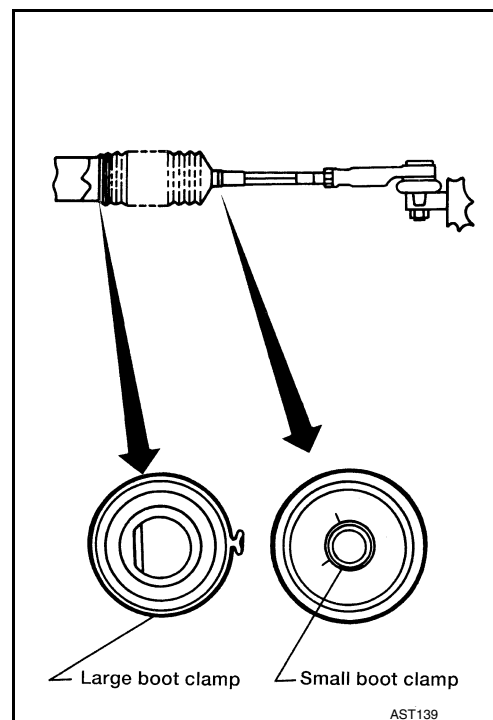
To prevent boot deformation or damage during toe-in adjustment, apply silicone grease between the inner socket and small end of boot.

6. Install small boot clamp.
7. Install large boot clamp using Tool.

CAUTION:

Do not reuse boot clamp.

Tool number : KV40107300 (J-51751)



STEERING GEAR AND LINKAGE

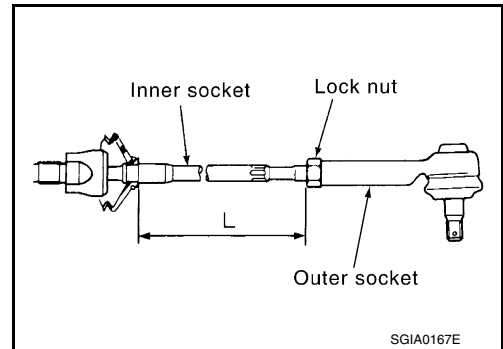
< UNIT DISASSEMBLY AND ASSEMBLY >

8. Adjust inner socket to standard length (L), and then tighten inner socket lock nut to the specified torque. Refer to [ST-47, "Exploded View"](#). Check length of inner socket (L) again after tightening inner socket lock nut. Make sure that the length is the standard.

Inner socket length (L) : Refer to [ST-52, "Steering Gear"](#).

CAUTION:

- **Adjust toe-in after this procedure. The length achieved after toe-in adjustment is not necessarily the above value.**
- **To prevent damage, hold outer socket across flats using suitable tool while tightening inner socket lock nut.**
- **Inspect to make sure no boot deformation has occurred during toe-in adjustment. Adjust boot as necessary.**



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POWER STEERING OIL PUMP

< UNIT DISASSEMBLY AND ASSEMBLY >

POWER STEERING OIL PUMP

Disassembly and Assembly

INFOID:000000012894055

The power steering oil pump is not serviceable and should be replaced as an assembly. Refer to [ST-38](#), "[Removal and Installation](#)".

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Wheel

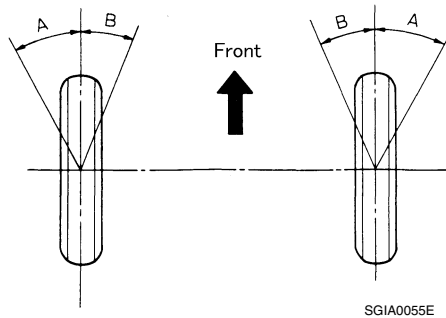
INFOID:0000000012894056

Steering wheel axial end play	0 mm (0 in)
Steering wheel play	0 - 35 mm (0 - 1.38 in)
Steering wheel turning force	39 N (4 kg-f, 9 lb-f) or less

Steering Angle

INFOID:0000000012894057

Unit: Degree minute (Decimal degree)



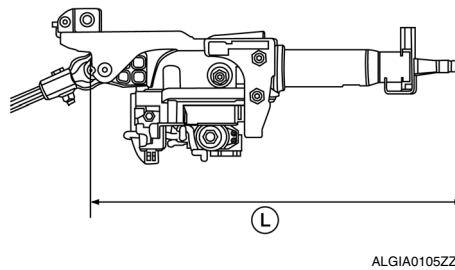
Inner wheel angle (A)	Minimum	34° 50' (34.83°)
	Nominal	37° 50' (37.83°)
	Maximum	38° 50' (38.83°)
Outer wheel angle (B)	Nominal	32° 50' (32.83°)

Steering Column

INFOID:0000000012894058

STEERING COLUMN LENGTH

Unit: mm (in)



Steering column length	Length (L)	463 (18.2)
	Telescopic maximum	483 (19.0)
	Telescopic minimum	443 (17.4)

STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg·m, in·lb)

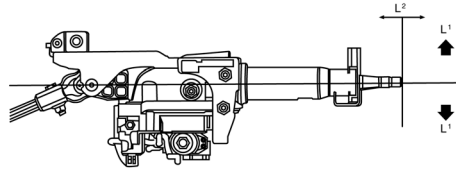
Rotating torque	0.67 (0.07, 6)
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TILT MECHANISM OPERATING RANGE

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

Unit: mm (in)



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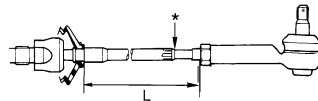
Tilt operating range (L ¹)	50 (2.0)
Telescopic operating range (L ²)	40 (1.6)

Steering Gear

INFOID:0000000012894059

STEERING OUTER SOCKET AND INNER SOCKET

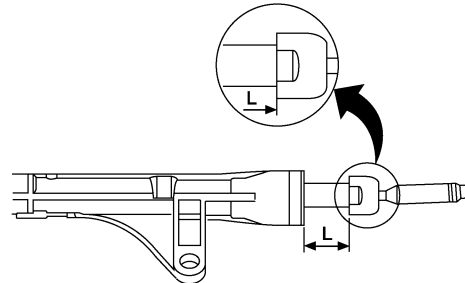
Outer socket	Swinging torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Axial end play	0.5 mm (0.020 in) or less
Inner socket	Swinging torque	0.1 - 7.8 N·m (0.01 - 0.80 kg-m, 1 - 69 in-lb)
	Axial end play	0.2 mm (0.008 in) or less
Inner socket length (L)		112.7 ± 1 mm (4.44 ± 0.04 in)



SGIA0950E

RACK STROKE

Unit: mm (in)



AWGIA0003GB

Rack stroke in neutral position (L)	72 (2.83)
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RACK SLIDING FORCE

Unit: N-f (kg-f, lb-f)

Rack sliding force	290 - 370 (29.6 - 37.7, 65.2 - 83.2)
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SERVICE DATA AND SPECIFICATIONS (SDS)

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Power Steering Oil Pump

INFOID:000000012894060

Unit: kPa (kg/cm², psi)

Relief oil pressure	9,700 -10,300 (98.94 - 105.06, 1,406.5 - 1,493.5)
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Power Steering Fluid

INFOID:000000012894061

Fluid type	E-PSF
Fluid capacity	1.0 ℓ (1-1/8 US qt, 7/8 Imp qt)

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