SECTION ST
STEERING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000012188054

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, 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.**

Service Notice or Precautions for Steering System

INFOID:0000000012188055

- 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.

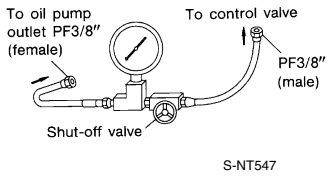
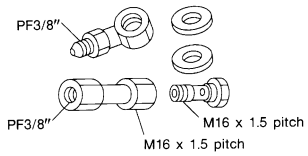
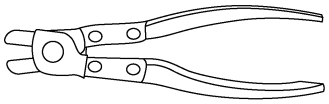
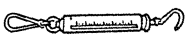
PREPARATION

PREPARATION

Special Service Tool

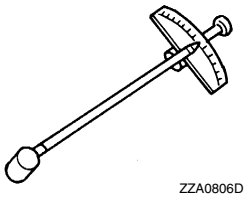
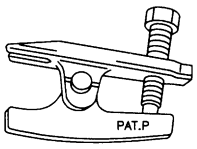
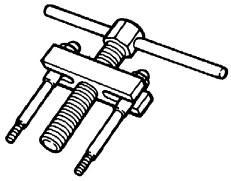
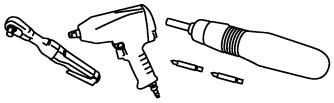
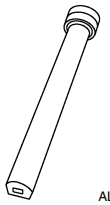
INFOID:0000000012188056

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

Tool number (TechMate No.) Tool name	Description
KV48103500 (J-26357) Pressure gauge  S-NT547	Measuring power steering oil pump relief pressure
KV48102500 (J-33914) Pressure gauge adapter  S-NT542	Measuring power steering oil pump relief pressure
KV40107300 (J-51751) Boot clamp crimping tool  ALDIA0586ZZ	Installing boot clamps
— (J-44372) Pull gauge  LST024	Measuring steering wheel turning force, rack sliding force and ball joint swinging force

Commercial Service Tool

INFOID:0000000012188057

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
Inner socket remover  ALGIA0237ZZ	Remove steering inner socket.

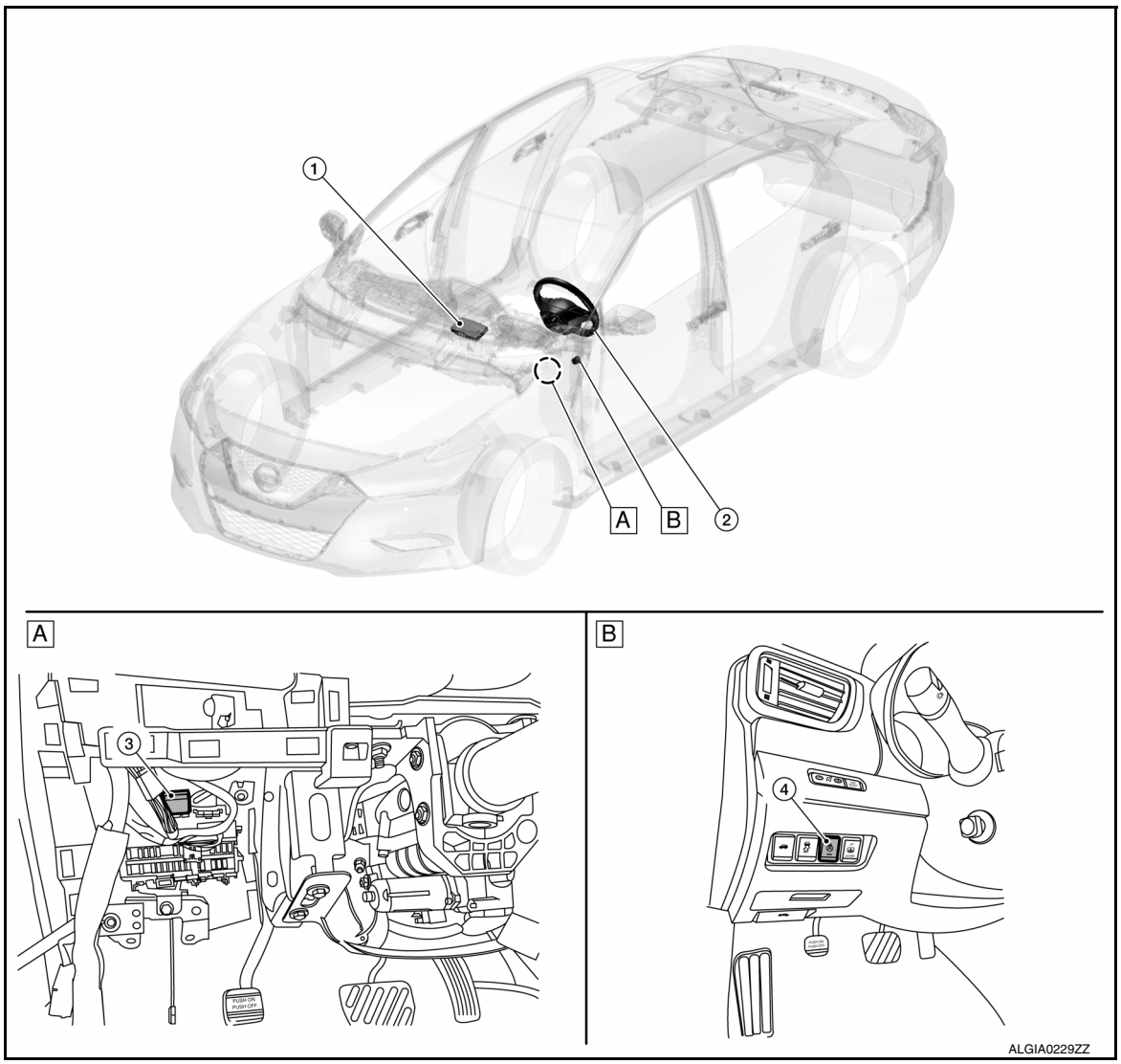
SYSTEM DESCRIPTION

COMPONENT PARTS

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:0000000012188058



A. Left of the steering column B. Lower instrument panel driver side

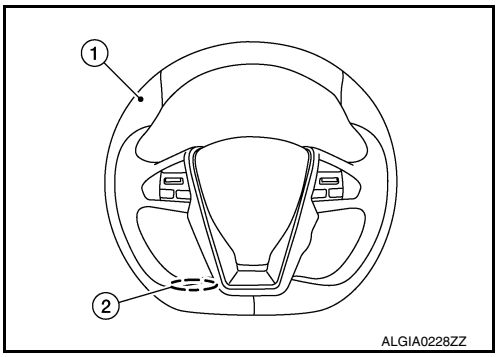
No.	Component	Function
1.	A/C auto amp.	• For the function, refer to ST-7, "HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.". • Refer to HAC-9, "Component Parts Location" for detailed installation location.
2.	Heated steering wheel	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel"
3.	Heated steering relay	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay"
4.	Heated steering wheel switch	Steering wheel heater function ON/OFF.

HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel

INFOID:0000000012188059

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

- Heating element: Generates heat by energizing.
  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:0000000012188060

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:0000000012188061

- A/C auto amp. turns ON/OFF the heated steering wheel relay according to a signal transmitted from the 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-12, "A/C Auto Amp.".

SYSTEM

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Diagram

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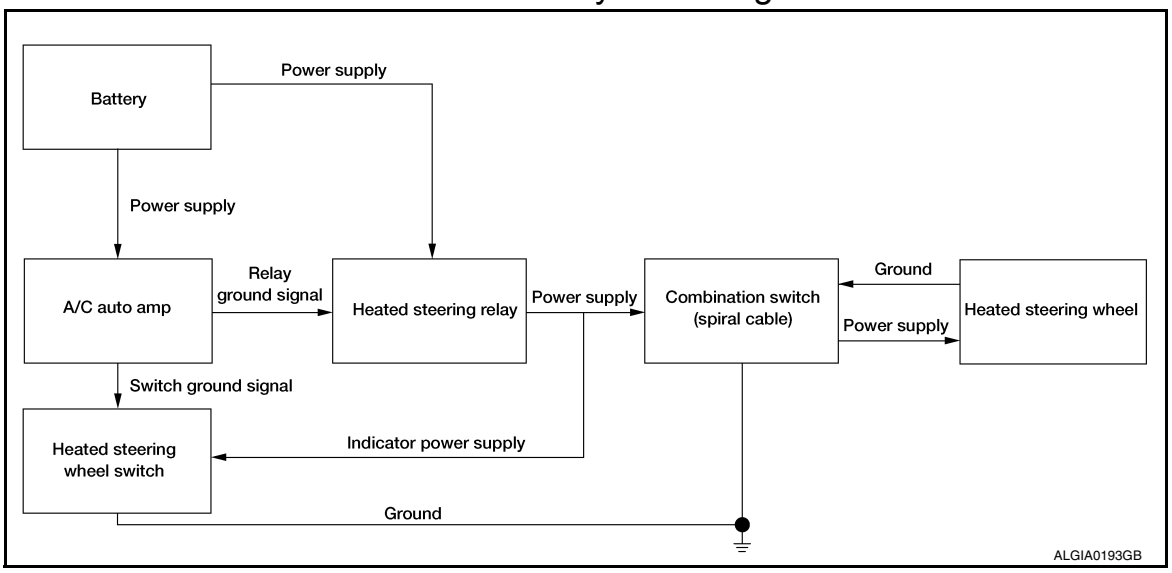


HEATED STEERING WHEEL SYSTEM : System Description

INFOID:0000000012188063

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). The heated steering wheel 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.

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

List of ECU Reference

INFOID:0000000012188064

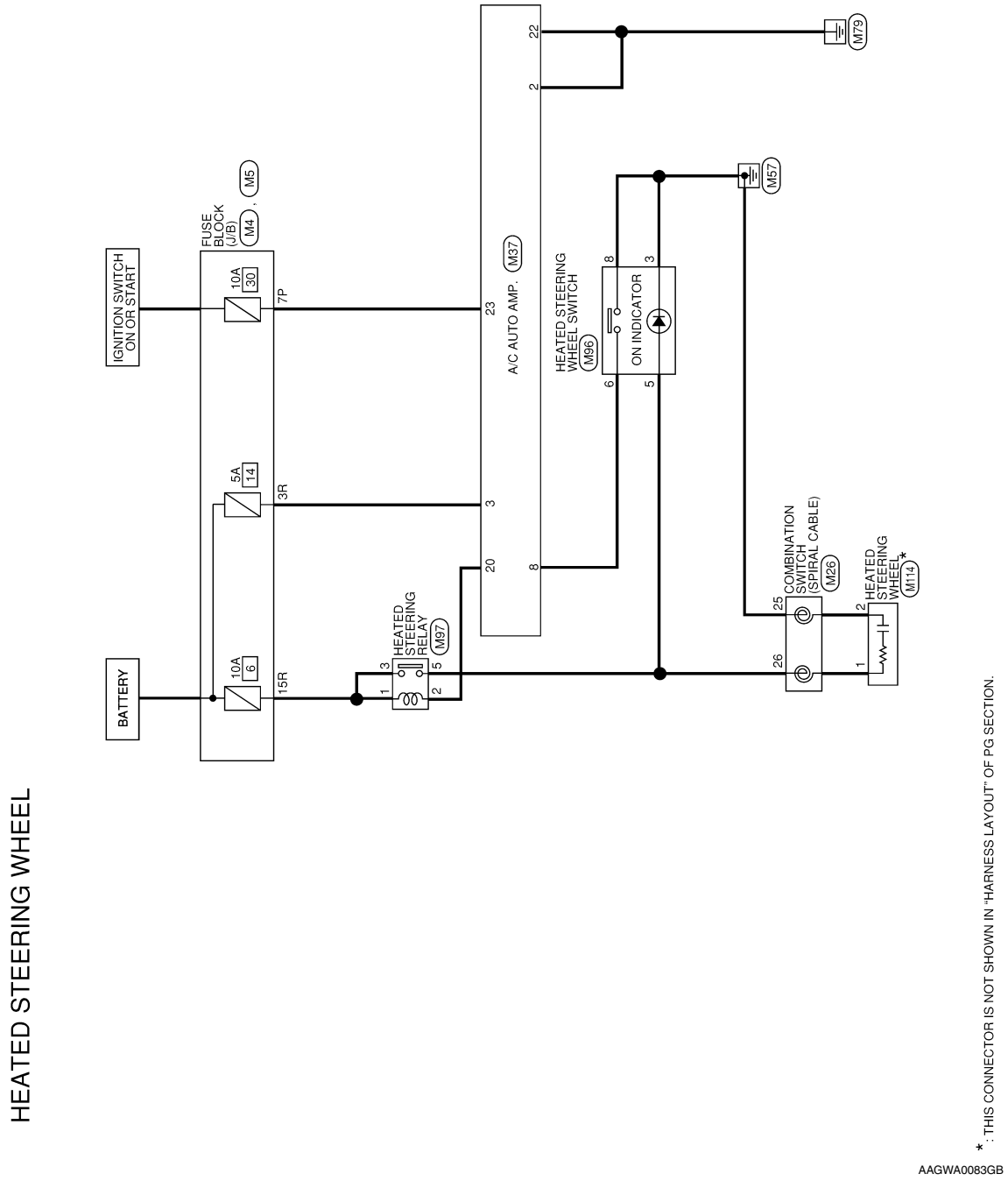
ECU	Reference
A/C auto amp.	HAC-30, "Reference Value"

WIRING DIAGRAM

HEATED STEERING WHEEL

Wiring Diagram

INFOID:0000000012188065



HEATED STEERING WHEEL CONNECTORS

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.

7R	6R	5R	4R		3R	2R	1R
16R	15R	14R	13R	12R	11R	10R	9R	8R

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

Connector No.	M5
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS
Connector Color	WHITE

H.S.

7P	6P	5P	4P		3P	2P	1P
16P	15P	14P	13P	12P	11P	10P	9P	8P

Terminal No.	Color of Wire	Signal Name
7P	BG	-

Connector No.	M26
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	NS02FW-CS
Connector Color	WHITE

H.S.

26	25

Terminal No.	Color of Wire	Signal Name
25	B	-
26	BG	-

Connector No.	M37
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

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

Connector No.	M96
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Type	TH08FL-NH
Connector Color	BLUE

H.S.

4	3	2	1
8	7	6	5

Terminal No.	Color of Wire	Signal Name
3	B	-
5	BG	-
6	SB	-
8	B	-

Connector No.	M97
Connector Name	HEATED STEERING RELAY
Connector Type	MS02FL-M2-LC
Connector Color	BLUE

H.S.

3		
	5	
2		1

Terminal No.	Color of Wire	Signal Name
1	R	-
2	P	-
3	R	-
5	BG	-

Connector No.	M114
Connector Name	HEATED STEERING WHEEL
Connector Type	NS02FW-CS
Connector Color	WHITE

H.S.

1	2

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

AAGIA0217GB

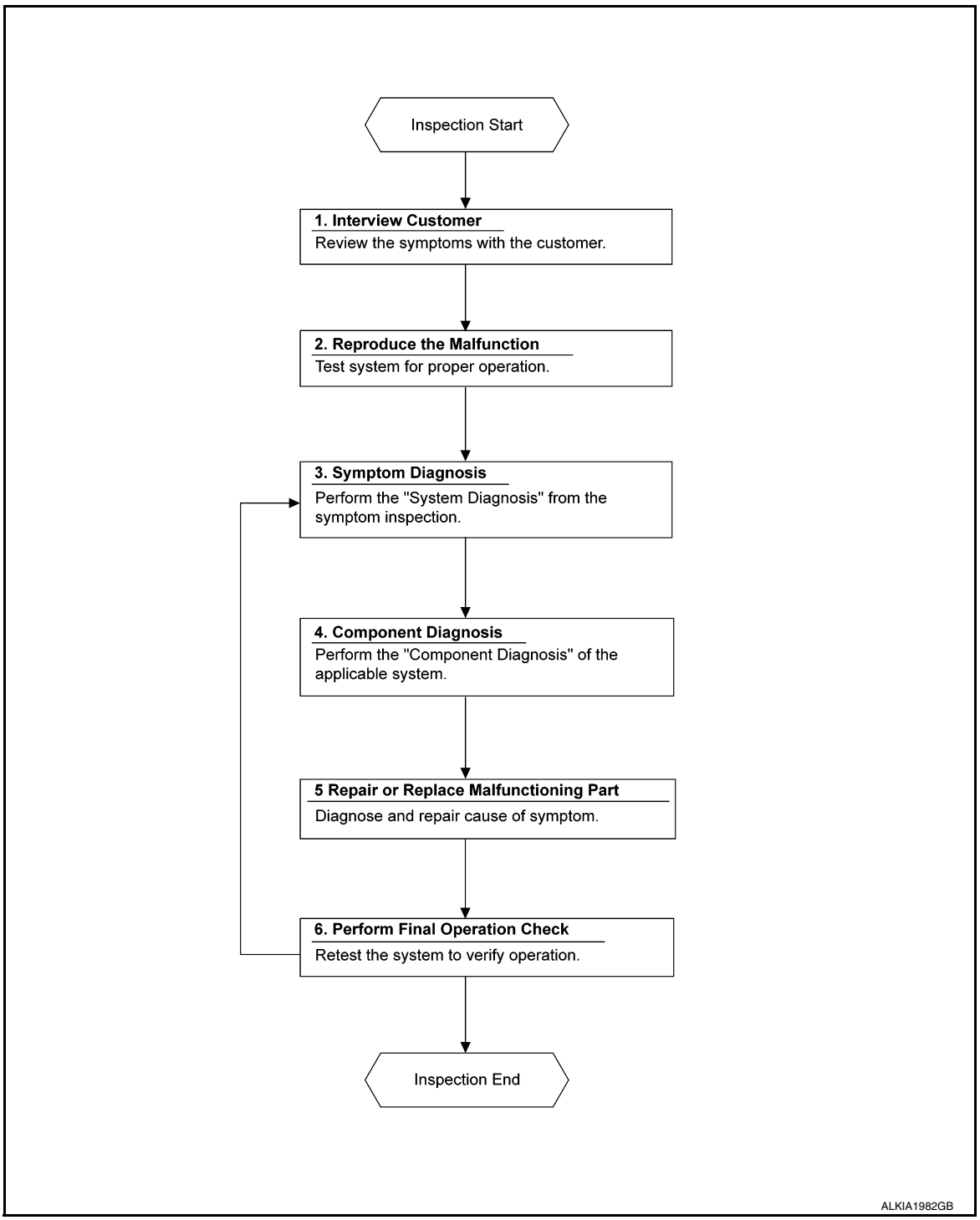
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000012188066

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.

>> 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.

POWER STEERING FLUID

Inspection

INFOID:0000000012188067

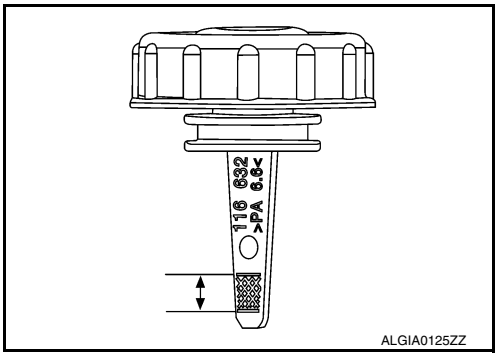
FLUID LEVEL

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:

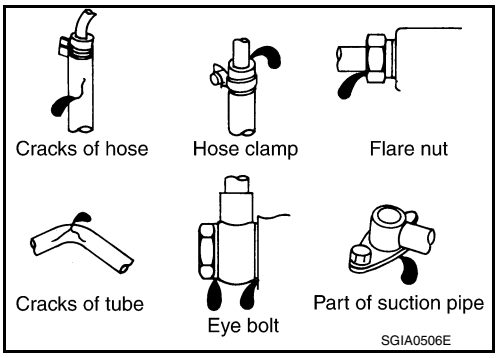
- **Do not overfill.**
- **Do not reuse used power steering fluid.**
- **Recommended power steering fluid is Genuine NISSAN E-PSF or equivalent. Refer to MA-16, "FOR USA AND CANADA : Fluids and Lubricants" (for USA and Canada) or MA-17, "FOR MEXICO : Fluids and Lubricants" (for Mexico).**



FLUID LEAKS

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 for fluid leaks.
   CAUTION:
   Do not hold steering wheel in a locked position for more than five seconds. Damage to power steering oil pump may occur.



4. If power steering fluid leaks at connections are noticed, loosen connections and retighten.
   CAUTION:
   Do not over tighten connections as damage to O-ring and connection can occur.
5. If power steering fluid leaks from the power steering oil pump are noticed, repair connection(s) or replace power steering oil pump. Refer to ST-43, "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-48, "Removal and Installation".

STEERING WHEEL

Inspection

INFOID:0000000012188068

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 left and right and to axial direction.

Steering wheel axial end play : Refer to ST-55, "Steering Wheel".

- Verify that the steering gear nuts are tightened to specification. Refer to ST-48, "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-55, "Steering Wheel".

NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to ST-15, "Inspection".

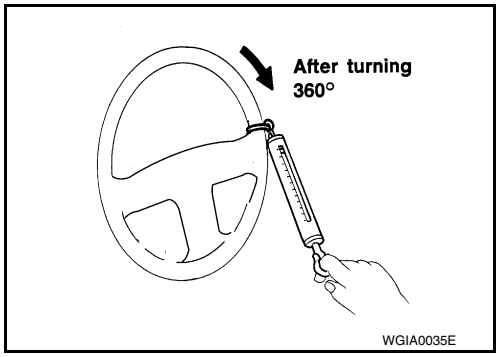
1. Turn tires straight ahead. Check if steering wheel is in the neutral position.
2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
3. If the neutral position cannot be attained by repositioning the steering wheel two teeth or less on steering stem, loosen tie-rod 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 MA-36, "WHEELS : Inspection".
5. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.

Tool number : — (J-44372)

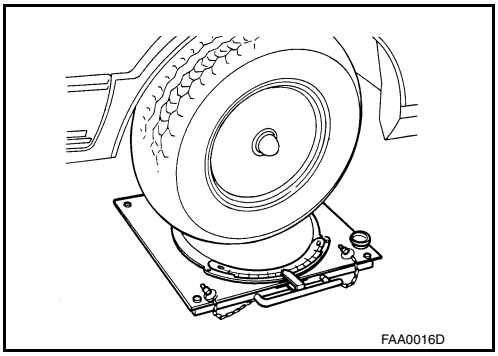
Steering wheel turning force : Refer to ST-55, "Steering Wheel".



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

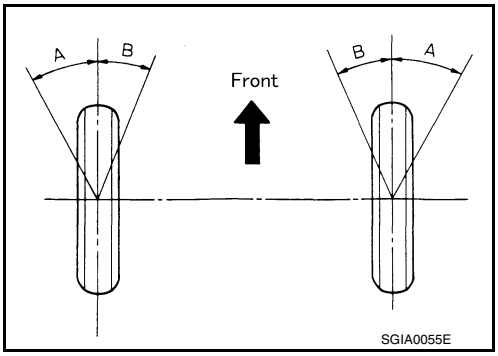
- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH wheels.



- 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-55, "Steering Angle".

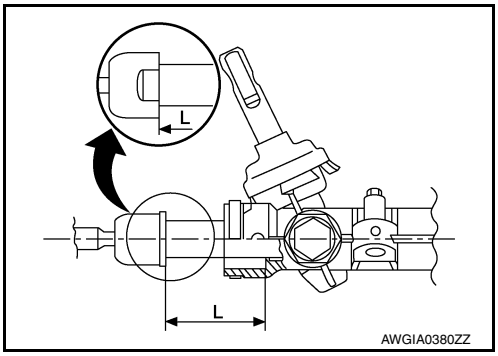
Inner wheel angle (A) : **Refer to ST-55, "Steering Angle".**

Outer wheel angle (B) : **Refer to ST-55, "Steering Angle".**



- Measure the rack stroke specification with vehicle in neutral position. Refer to ST-57, "Steering Gear".

Rack stroke in neutral position (L) : **Refer to ST-57, "Steering Gear".**



STEERING COLUMN

Inspection

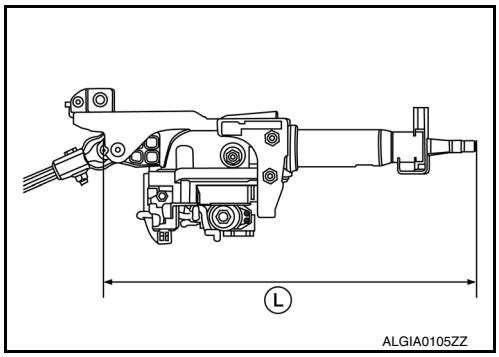
INFOID:0000000012188069

HOLE COVER SEAL, HOLE COVER AND LOWER JOINT

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.
  NOTE:
  Electric steering column shown. Mechanical steering column similar.

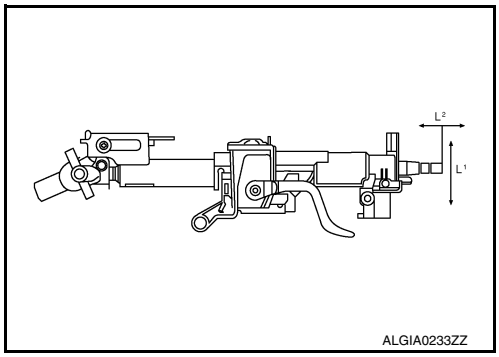


Steering column length (L) : Refer to ST-55, "Mechanical Steering Column" (Mechanical steering column) or ST-56, "Electric Steering Column" (Electric steering column)

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

Rotating torque : Refer to ST-55, "Steering Wheel".

- Check tilt and telescopic mechanism operating range (L^1), (L^2) as shown.
  NOTE:
  Electric steering column shown. Mechanical steering column similar.



Tilt operating range (L^1) : Refer to ST-56, "Electric Steering Column" (Electric steering column) or ST-55, "Mechanical Steering Column" (Mechanical steering column)

Telescopic operating range (L^2) : Refer toST-56, "Electric Steering Column" (Electric steering column) or ST-55, "Mechanical Steering Column" (Mechanical steering column)

POWER STEERING OIL PUMP

Inspection

INFOID:0000000012188070

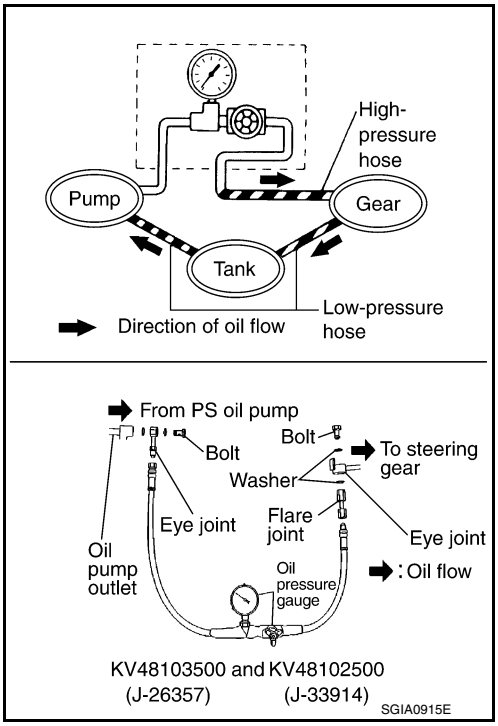
RELIEF OIL PRESSURE

1. Connect Tool between power steering oil pump discharge connector and high-pressure hose. Bleed air from 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 valve of hydraulic pressure gauge fully open while starting and running engine. If engine is started with valve closed, hydraulic pressure in power steering oil pump goes up to 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 Tool valve with engine at idle and measure relief oil pressure.

   Relief oil pressure : Refer to ST-57, "Power Steering Oil Pump"



   CAUTION:
   Do not keep valve closed for 10 seconds or longer.
4. Open valve slowly after measuring. Replace power steering oil pump if relief oil pressure is outside specification.
5. After inspection, disconnect Tool from hydraulic circuit, then add fluid and bleed air. Refer to ST-29, "Air Bleeding Hydraulic System".

STEERING GEAR AND LINKAGE

Inspection

INFOID:0000000012188071

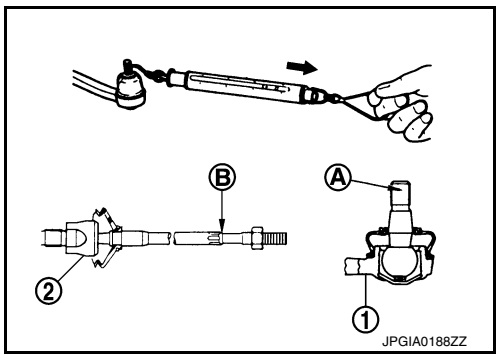
BOOT

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

OUTER SOCKET AND INNER SOCKET

- Ball joint swinging torque

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



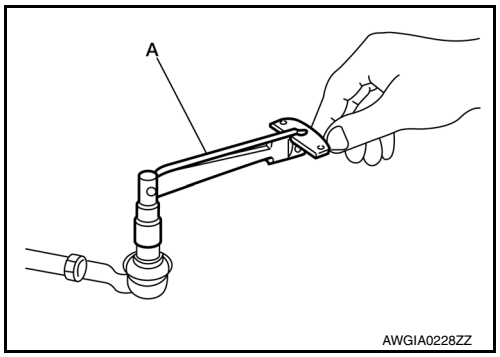
Measuring point of outer socket (1) : Ball stud upper side (A)
Measuring point of inner socket (2) : Point (B) as shown

Tool number : — (J-44372)

Swinging torque : Refer to ST-57, "Steering Gear".

- Ball joint rotating torque

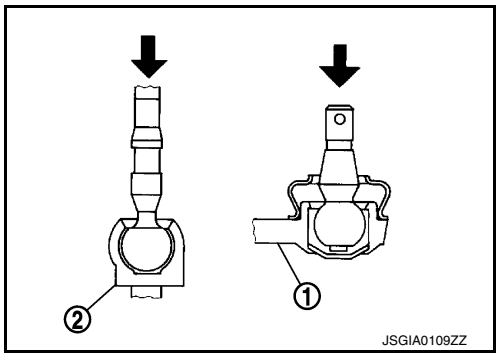
- Make sure that reading is within the following specified range using suitable tool (A). Replace outer socket if reading is outside specifications.



Rotating torque : Refer to ST-57, "Steering Gear".

- Ball joint axial end play

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



Axial end play : Refer to ST-57, "Steering Gear".

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:0000000012189579

Regarding Wiring Diagram information, refer to HAC-36, "Wiring Diagram".

1.CHECK FUSE

Check fuses [No. 14, 21 and 30, located in the fuse block (J/B)].
NOTE:
Refer to PG-89, "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
M37	3	Ground	Battery voltage	Battery voltage	Battery voltage
	13		Approx. 0 V	Battery voltage	Battery voltage
	23		Approx. 0 V	Approx. 0 V	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		
M37	2	Ground	Yes
	22		

Is the inspection result normal?

YES >> Inspection End.
NO >> Repair harness or connector.

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:0000000012188073

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:0000000012188074

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	Terminals		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	
M97	5	M114	1	Yes

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M97	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
M96	8		Yes

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	
M97	2	M37	20	Yes

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M97	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.

A/C auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M37	8	M96	6	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M37	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-102, "Removal and Installation".
NO >> Replace heated steering wheel switch. Refer to ST-46, "Removal and Installation".

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000012188075

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to ST-46, "Removal and Installation".
3. Check continuity between heated steering wheel switch terminals.

Terminals		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
+	–		
5	3	Apply 12V direct current between terminals	ON

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel switch. Refer to ST-46, "Removal and Installation".

Component Inspection (Heated Steering Relay)

INFOID:0000000012188076

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.

Terminals	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:0000000012188077

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. Refer to ST-30, "Removal and Installation".

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. Refer to ST-30, "Removal and Installation".

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:0000000012188078

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:0000000012188079

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-46, "Removal and Installation".
3. Turn ignition switch ON.
4. Check voltage between heated steering wheel switch harness connector terminals.

Connector	Terminals		Voltage (Approx.)
	+	-	
M96	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
M96	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	
M97	5	M96	5	Yes

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

Connector	Terminal	Ground	Continuity
M97	5		No

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	
M37	8	M96	6	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M37	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-102, "Removal and Installation"
NO >> Replace heated steering wheel switch. Refer to ST-46, "Removal and Installation".

SYMPTOM DIAGNOSIS

STEERING COLUMN

Symptom Table

INFOID:0000000012188080

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".

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000012188081

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-17	ST-17	ST-19	FAX-6	FSU-5 RSU-4	WT-23	WT-23	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 leaks	Steering wheel play	Steering gear rack sliding force	Improper steering wheel	Improper installation or looseness of tilt lock lever	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	×	×	×	×	×	×	×	×						×	×	×	×	×	×
		Shake									×						×	×	×	×	×
		Vibration									×		×	×			×	×		×	
		Shimmy									×				×		×	×	×		×
		Shudder													×		×	×	×		×

×: Applicable

PERIODIC MAINTENANCE

POWER STEERING FLUID

Draining and Refilling

INFOID:0000000012188082

DRAINING

1. Disconnect hydraulic lines from steering gear. Refer to ST-44, "Exploded View".
2. Drain power steering fluid into a suitable container.

REFILLING

1. Connect hydraulic lines to steering gear. Refer to ST-44, "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.

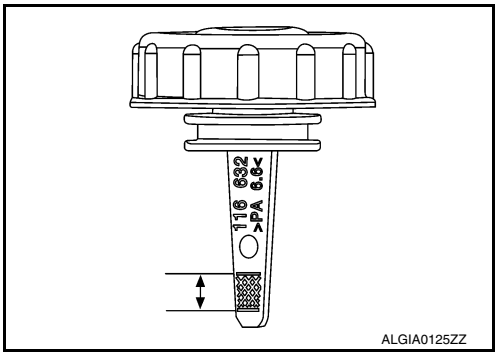
Air Bleeding Hydraulic System

INFOID:0000000012188083

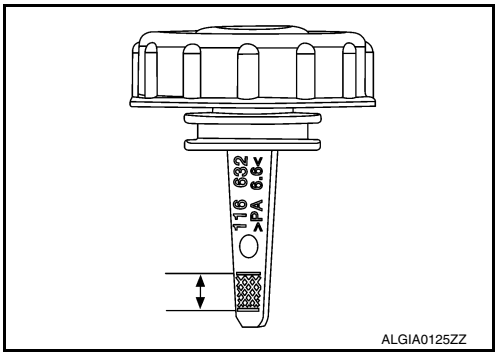
AIR BLEEDING HYDRAULIC SYSTEM

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

1. Make sure engine is off.
2. Remove cover. Refer to .ST-43, "Exploded View"
3. Turn steering wheel from full right stop position and then to full left stop position several times. Repeat until bubbles are no longer being generated in reservoir.
4. When power steering fluid level lowers, refill reservoir.
   CAUTION:
   Do not allow power steering fluid level to drop below hatching area on power steering reservoir cap indicator.



5. Repeat steps one and two until power steering fluid level stabilizes.
6. Start engine and run at idle.
7. Turn steering wheel from 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 reservoir.
8. When power steering fluid level lowers, refill reservoir.
9. Stop engine.
10. Verify proper power steering fluid level. Power steering fluid level should be in hatching area on power steering reservoir cap indicator.

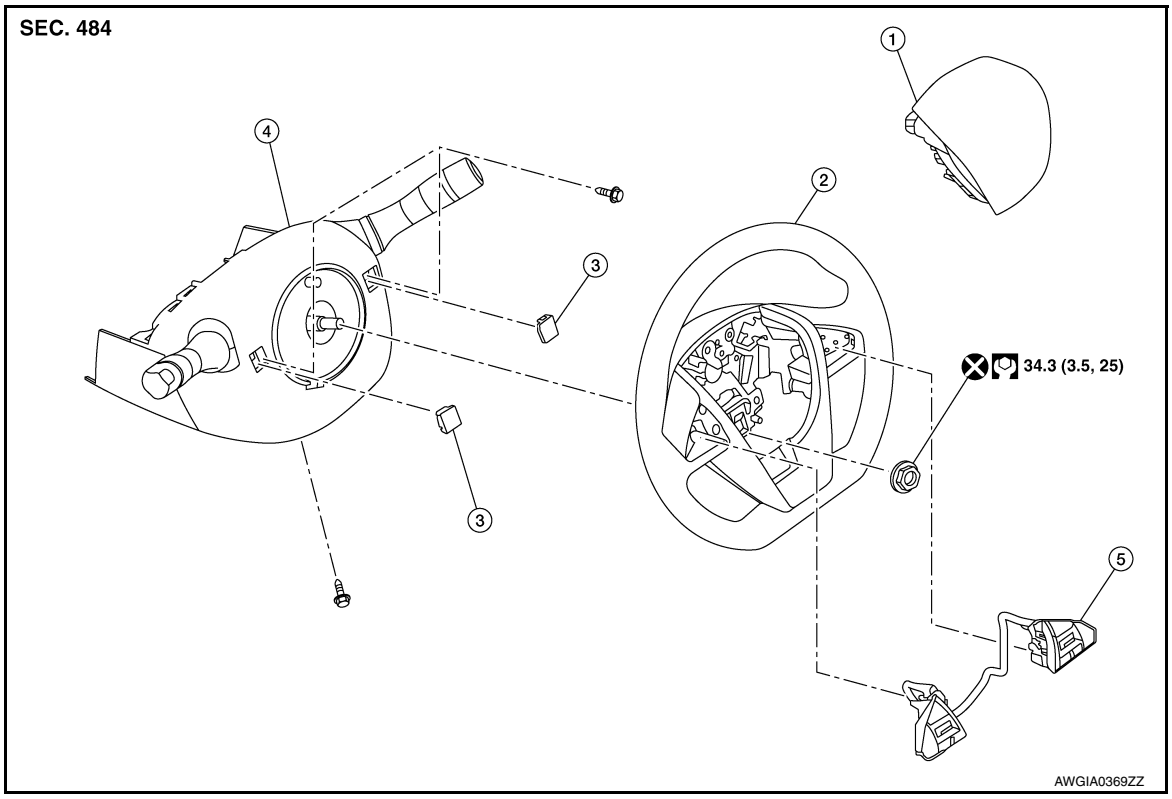


REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:0000000012188084



1. Driver air bag module
2. Steering wheel
3. Cover
4. Steering column cover
5. Steering wheel switches

Removal and Installation

INFOID:0000000012188085

REMOVAL

1. Set front wheels and tires in 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.
   CAUTION:
   Do not reuse steering wheel lock nut.
6. Remove steering wheel using suitable tool.
   CAUTION:
   Place a piece of tape across spiral cable so it will not be rotated out of position.
7. If necessary, remove steering switches. Refer to AV-184, "Removal and Installation".
8. Inspect steering wheel near 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 spiral cable is in neutral position. Refer to SR-16, "Removal and Installation".
CAUTION:

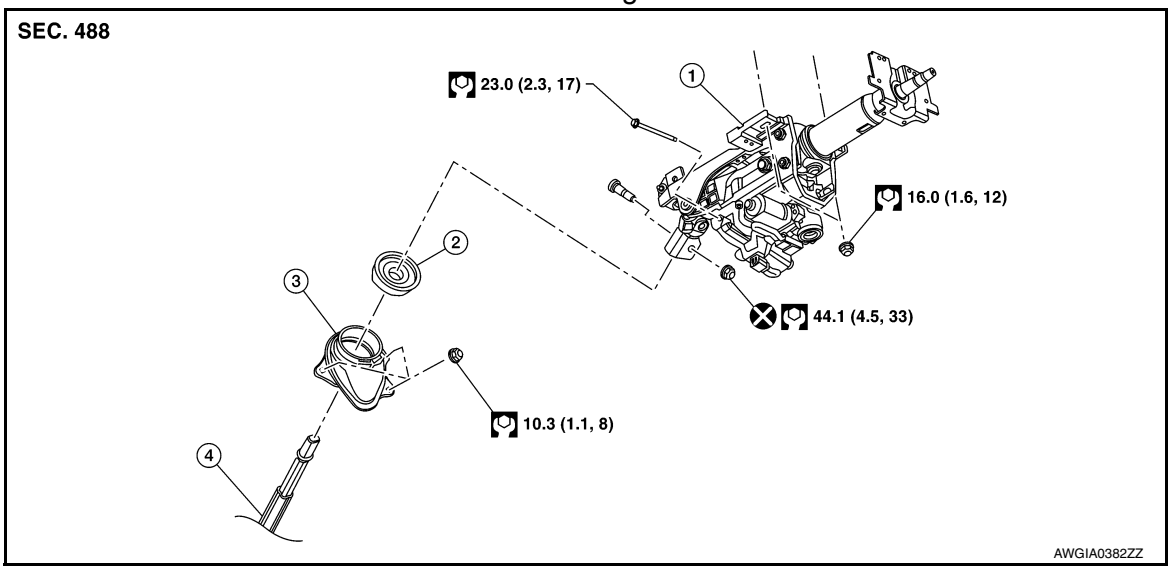
If spiral cable is not installed in correct position, spiral cable may snap by turning steering wheel beyond limited number of turns.

STEERING COLUMN

Exploded View

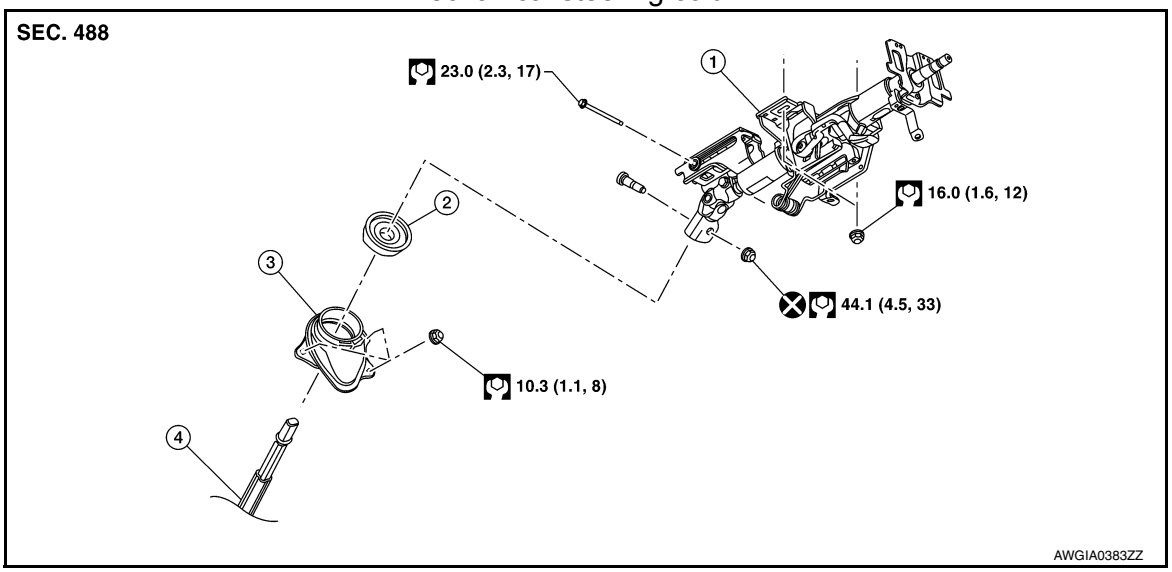
INFOID:0000000012188086

Electric steering column



1. Steering column
2. Hole cover seal
3. Hole cover
4. Lower joint

Mechanical steering column



1. Steering column
2. Hole cover seal
3. Hole cover
4. Lower joint

Removal and Installation

INFOID:0000000012188087

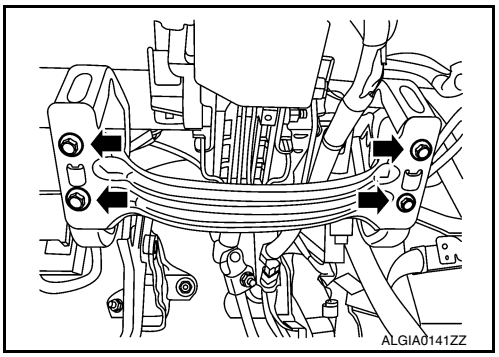
CAUTION:

- **Do not cause impact to steering column during removal and installation.**
- **Do not move steering gear during removal and installation of steering column.**
- **Do not unlock steering column tilt/telescope lever (if equipped) during removal and installation of steering column.**

REMOVAL

1. Remove combination switch. Refer to WW-59, "Exploded View".

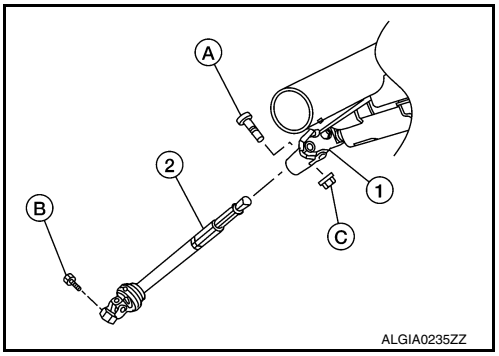
2. Remove steering angle sensor from steering column. Refer to BRC-370, "Removal and Installation".
3. Disconnect the harness connectors from the paddle shifter (if equipped). Refer to TM-189, "Exploded View".
4. Remove instrument lower panel LH. Refer to IP-23, "Removal and Installation".
5. Remove the instrument panel brace bolts (⬅) and the instrument panel brace.



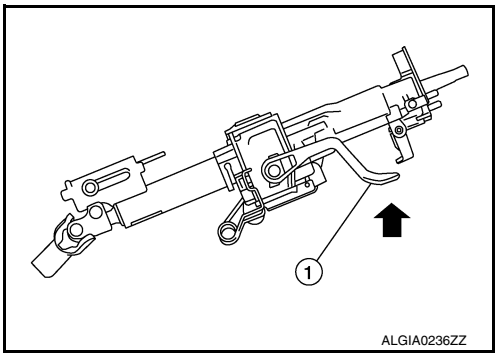
6. Disconnect harness connectors from tilt and telescopic motors (if equipped).
7. Separate harness from steering column.
8. Remove nut (C) and bolt (A) and separate steering lower joint (2) from steering column upper joint (1).

(B) Steering lower joint pinch bolt

CAUTION:
Do not reuse pinch bolt nut.



9. Place steering column tilt/telescope lever (1) in locked position (⬅) as shown (if equipped).



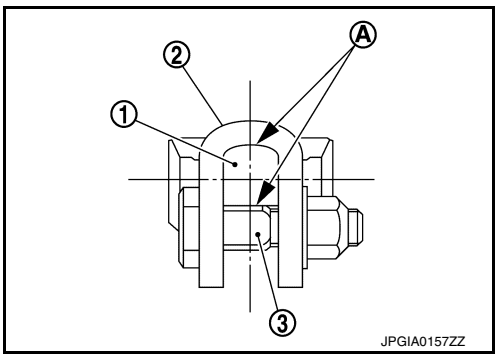
10. Remove steering column nuts and bolts then remove steering column.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:
- **Do not reuse pinch bolt nut.**
- **When installing steering column, finger tighten all nuts and bolts, then torque to specification. Do not apply undue stress to the steering column.**
- **When connecting steering column joint to lower joint, first finger tighten nut, then torque to specification. Pinch bolt is directional. Refer to ST-32, "Exploded View".**

- After installation, check that there is no clearance (A) between lower joint (1) and steering column upper joint (2) and between lower joint and bolt (3).

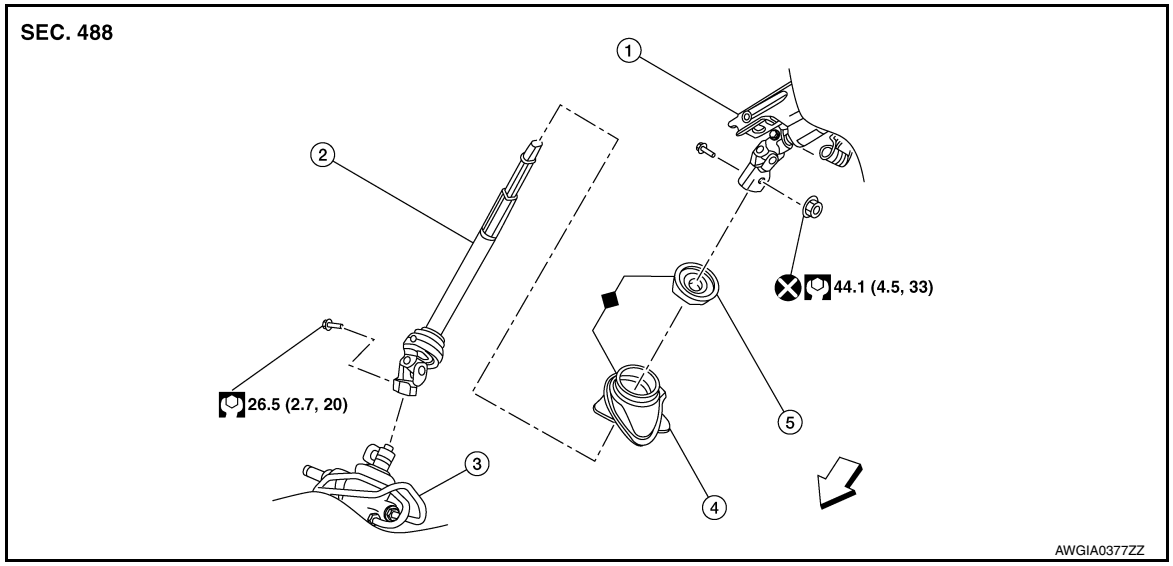


- After installation, turn steering wheel to make sure it moves smoothly while turning to left and right stops.
- Make sure number of turns are the same from straight-forward position to left and right stops.
- Make sure steering wheel is in a neutral position when driving straight ahead.
- For models with a tilt steering column, check tilt mechanism operating range. Refer to ST-56, "Electric Steering Column" (Electric Steering Column) or ST-55, "Mechanical Steering Column" (Mechanical Steering Column).
- Adjust neutral position of steering angle sensor. Refer to BRC-248, "Description".

LOWER JOINT

Exploded View

INFOID:0000000012230018



1. Steering column
2. Lower joint
3. Steering gear
4. Hole cover
5. Hole cover seal
■ Replace as a set.
⇦ Front

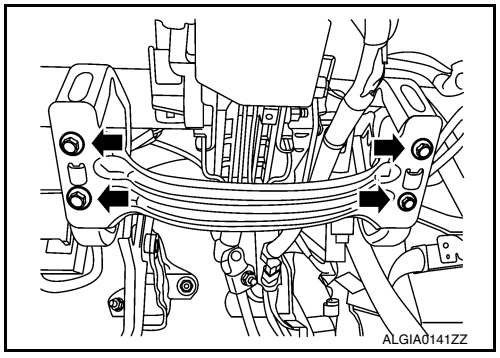
Removal and Installation

INFOID:0000000012230019

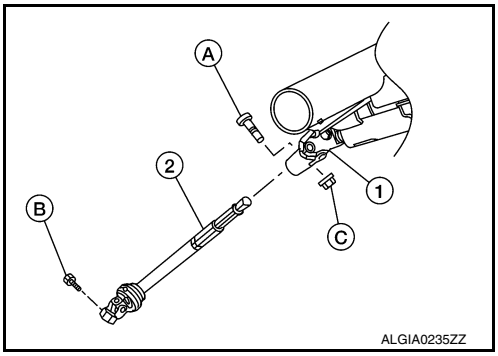
CAUTION:
- **Do not cause impact to steering column during removal and installation.**
- **Do not move steering gear during removal and installation of lower joint.**

REMOVAL

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove instrument lower panel LH. Refer to IP-23, "Removal and Installation".
3. Remove the instrument panel brace bolts (⬅) and the instrument panel brace.



4. Remove nut (C) and bolt (A) and separate steering lower joint (2) from steering column upper joint (1).
5. Remove clamp and remove hole cover seal.
6. Remove nuts and remove hole cover.
7. Remove lower joint pinch bolt (B) and separate lower joint from steering gear.
   CAUTION:
   Do not reuse pinch bolt nut.



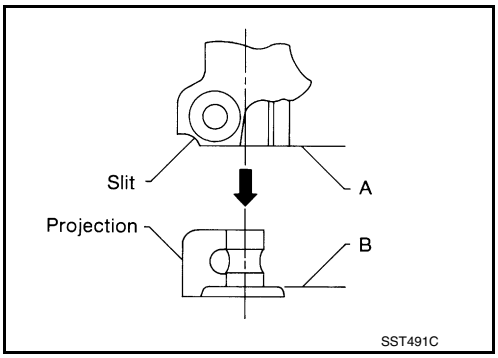
8. Remove lower joint from vehicle.
   CAUTION:
   Do not damage hole cover seal during removal. If seal is damaged, it must be replaced.

INSTALLATION

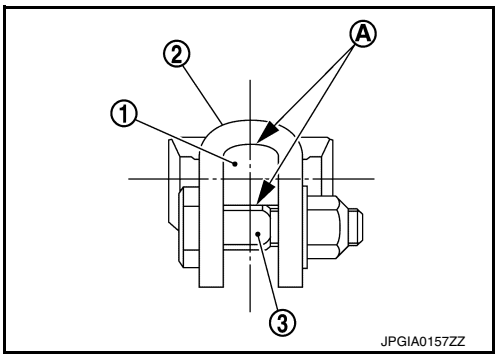
Installation is in the reverse order of removal.

CAUTION:

- **Do not reuse pinch bolt nut.**
- **When connecting lower joint to steering column upper joint, first finger tighten pinch bolt nut, then torque to specification. Pinch bolt is directional. Refer to ST-32, "Exploded View".**
- **Finger tighten lower joint pinch bolt, then tighten to specification. Lower joint pinch bolt is directional.**
- Align slit on lower joint with projection on steering gear. Connect lower joint to steering gear until surface (A) contacts surface (B).
- Verify that pinch bolt threads are not damaged. Replace pinch bolt if necessary.



- Check that there is no clearance (A) between lower joint (1) and steering column upper joint (2) and between lower joint and pinch bolt (3).

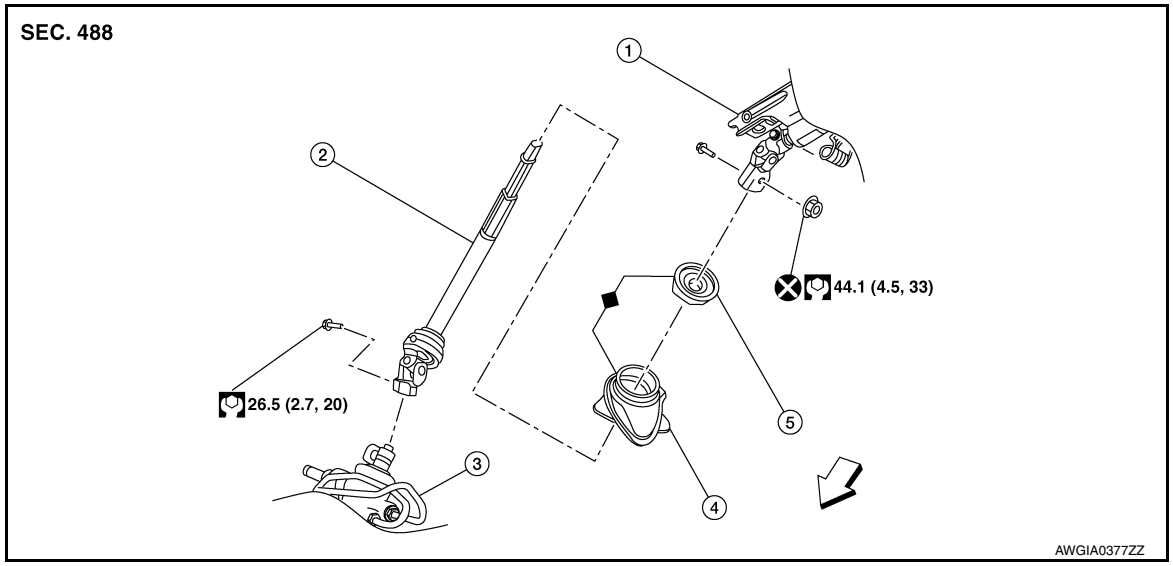


- Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
- Make sure number of turns are the same from straight-forward position to left and right stops.
- Make sure steering wheel is in a neutral position when driving straight ahead.
- Adjust neutral position of steering angle sensor. Refer to BRC-248, "Description".

HOLE COVER

Exploded View

INFOID:0000000012472618



1. Steering column
2. Lower joint
3. Steering gear
4. Hole cover
5. Hole cover seal
■ Replace as a set.
⇦ Front

Removal and Installation

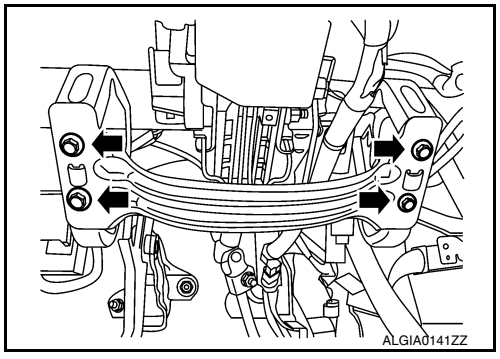
INFOID:0000000012472619

REMOVAL

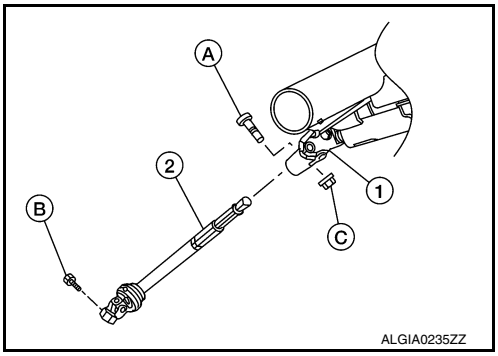
CAUTION:

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

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove instrument lower panel LH. Refer to IP-23, "Removal and Installation".
3. Remove the instrument panel brace bolts (⬅) and the instrument panel brace.



4. Remove nut (C) and bolt (A) and separate steering lower joint (2) from steering column upper joint (1).
5. Remove clamp and remove hole cover seal.
   CAUTION:
   Do not damage hole cover seal during removal. If seal is damaged, it must be replaced.
6. Remove nuts and remove hole cover.



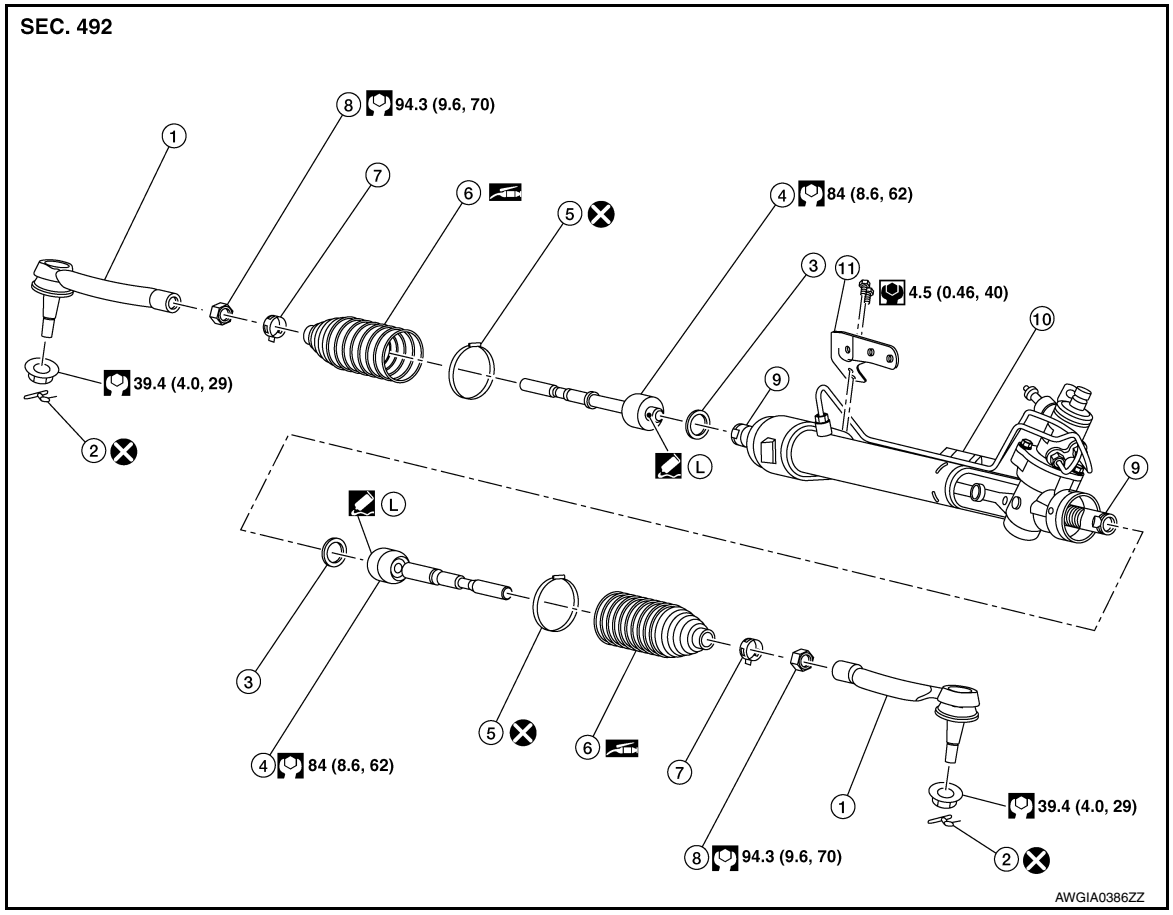
INSTALLATION

Installation is in the reverse order of removal.

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000012188088



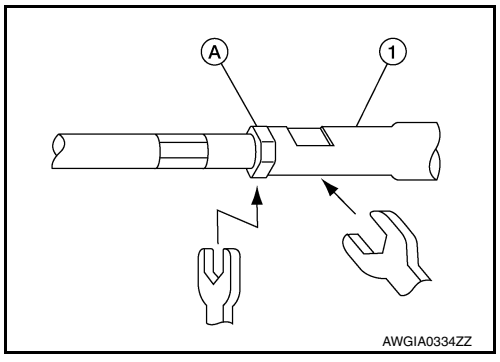
1.	Outer socket	2.	Cotter pin	3.	Spacer
4.	Inner socket	5.	Large boot clamp	6.	Boot
7.	Small boot clamp	8.	Inner socket lock nut	9.	Rack bar (not serviceable)
10.	Steering gear	11.	Bracket		

Removal and Installation - Outer socket

INFOID:0000000012188089

REMOVAL

1. Remove front wheel and tire using a 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).



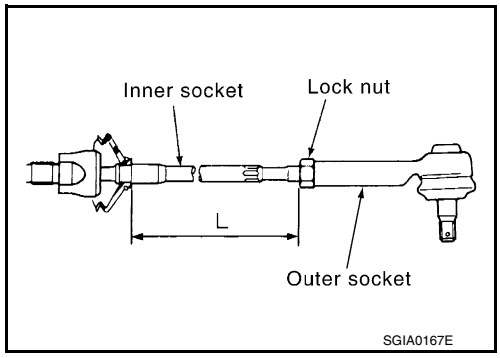
3. Remove cotter pin from outer socket.
4. Loosen outer socket nut and separate outer socket from steering knuckle using suitable tool.

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 specified torque. Refer to ST-39, "Exploded View". Check length of inner socket (L) again after tightening inner socket lock nut. Make sure that the length is to specification.



Inner socket length (L) : Refer to ST-57, "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-39, "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-64, "Adjustment".
7. Check wheel alignment. Refer to FSU-23, "Wheel Alignment (Unladen*)".
8. Adjust the neutral position of the steering angle sensor. Refer to BRC-248, "Description".

Removal and Installation - Boot

INFOID:0000000012188090

REMOVAL

1. Remove outer socket. Refer to ST-39, "Removal and Installation - Outer socket".
2. Remove inner socket lock nut.
3. Remove small boot clamp and large boot clamp.

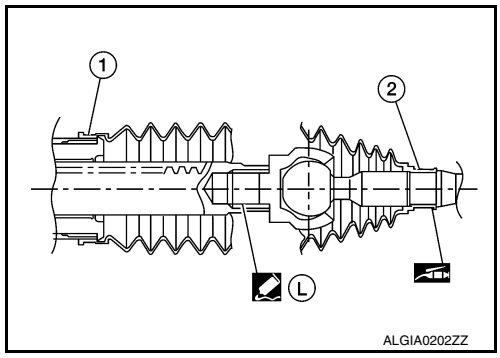
CAUTION:
Do not reuse large boot clamp.

4. Remove boot.

INSTALLATION

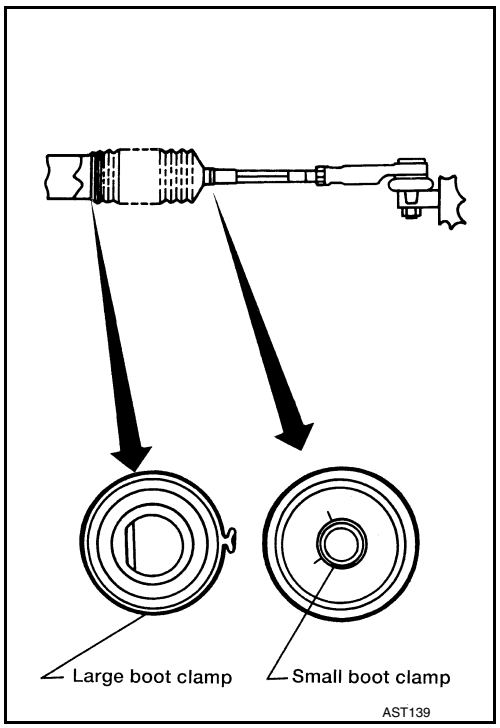
1. Install large end of boot (1) onto steering gear housing.
2. Apply silicone grease between the inner socket and small end of boot (2). Install small end of boot to inner socket boot mounting groove.

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



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

   Tool number : KV40107300 (J-51751)



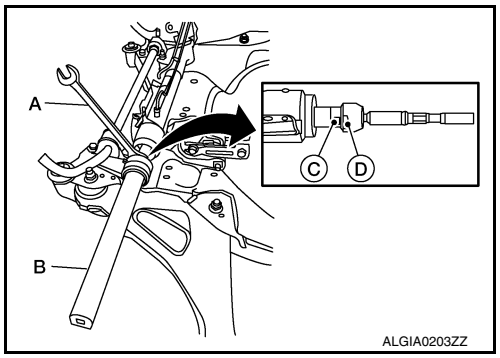
5. Partially thread the inner socket lock nut on the inner socket.
6. Install the outer socket. Refer to ST-39, "Removal and Installation - Outer socket".
7. Check wheel alignment. Refer to FSU-23, "Wheel Alignment (Unladen*)".
8. Adjust the neutral position of the steering angle sensor. Refer to BRC-248, "Description".

Removal and Installation - Inner socket

INFOID:0000000012188091

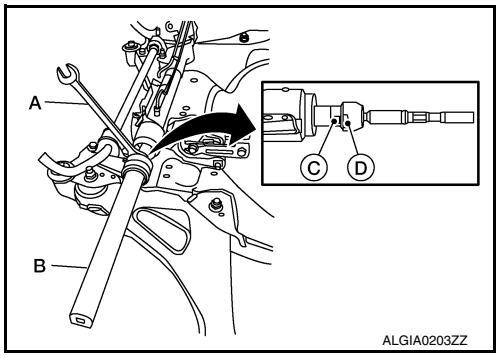
REMOVAL

1. Remove boot. Refer to ST-40, "Removal and Installation - Boot".
2. Remove inner socket.
   CAUTION:
   To prevent damage to rack bar when removing 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 end of rack bar.
2. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to specified torque. Refer to ST-39, "Exploded View".
   CAUTION:
   To prevent damage to rack bar when installing inner socket, hold suitable tool (A) across rack bar flats (C) while turning suitable tool (B) across inner socket flats (D).

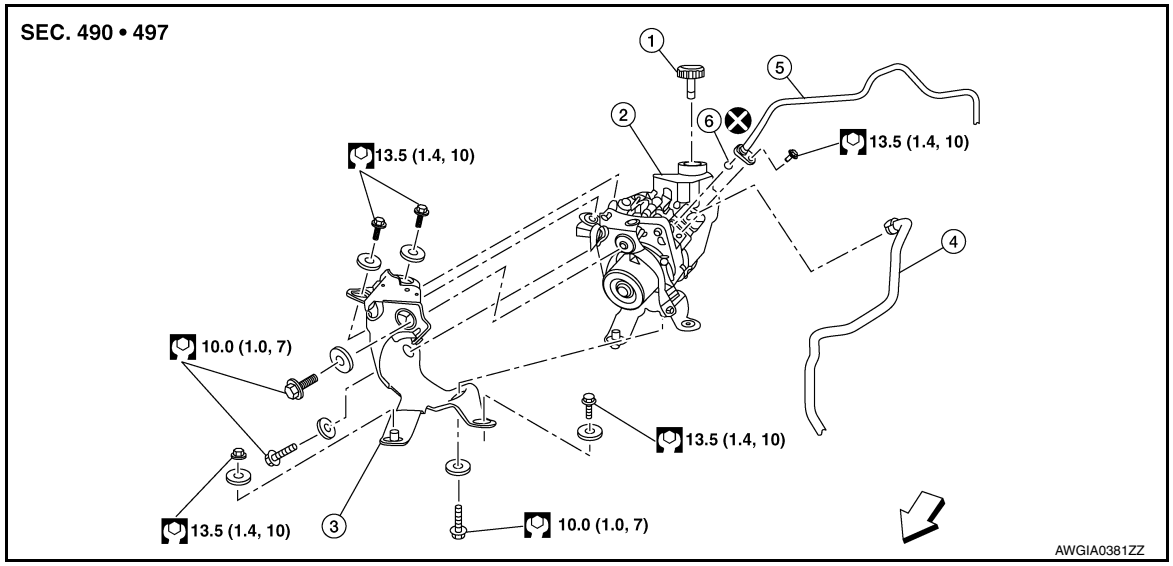


3. Install boot. Refer to ST-40, "Removal and Installation - Boot".
4. Check wheel alignment. Refer to FSU-23, "Wheel Alignment (Unladen*)".
5. Adjust neutral position of steering angle sensor. Refer to BRC-248, "Description".

POWER STEERING OIL PUMP

Exploded View

INFOID:0000000012188092



1. Power steering reservoir cap
2. Power steering oil pump
3. Power steering oil pump bracket
4. Low-pressure piping
5. High-pressure piping
6. O-ring

⇦ Front

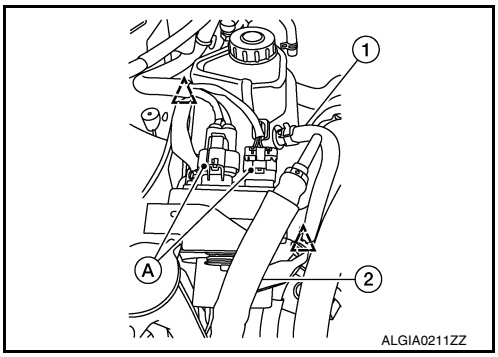
Removal and Installation

INFOID:0000000012188093

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



△ Clip

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

INSTALLATION

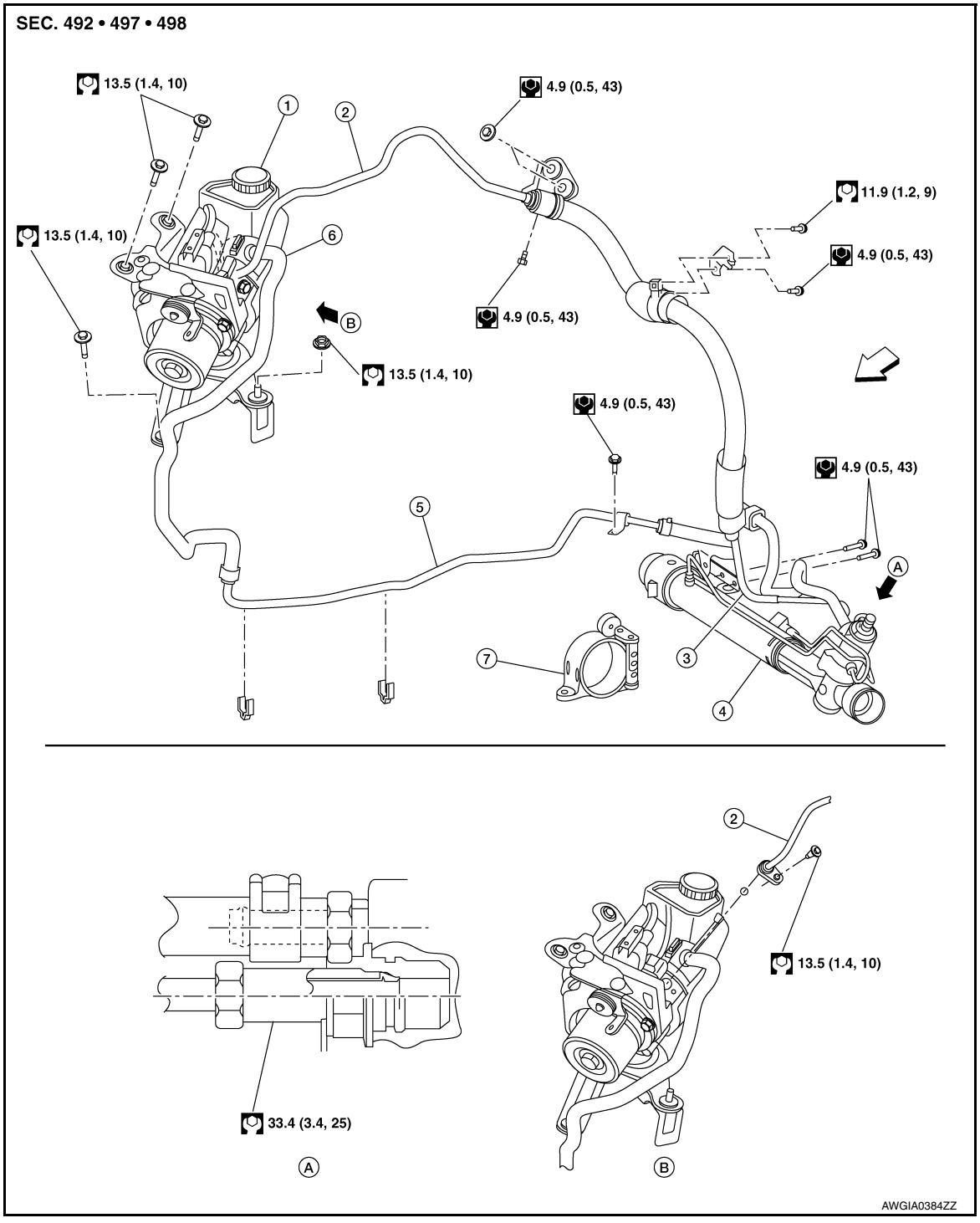
Installation is in the reverse order of removal.
- Bleed air from power steering system. Refer to ST-29, "Air Bleeding Hydraulic System".

CAUTION:
Do not reuse O-rings.

HYDRAULIC LINE

Exploded View

INFOID:0000000012188094



1. Power steering oil pump
2. High-pressure piping (upper)
3. High-pressure piping (lower)
4. Steering gear
5. Low-pressure piping (lower)
6. Low-pressure piping (upper)
7. Torque Rod Bracket
A. View A
B. View B

⇦ Front

Removal and Installation

INFOID:0000000012188095

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

REMOVAL

Refer to the component parts location illustration for hydraulic line removal. Refer to ST-44, "Exploded View".

INSTALLATION

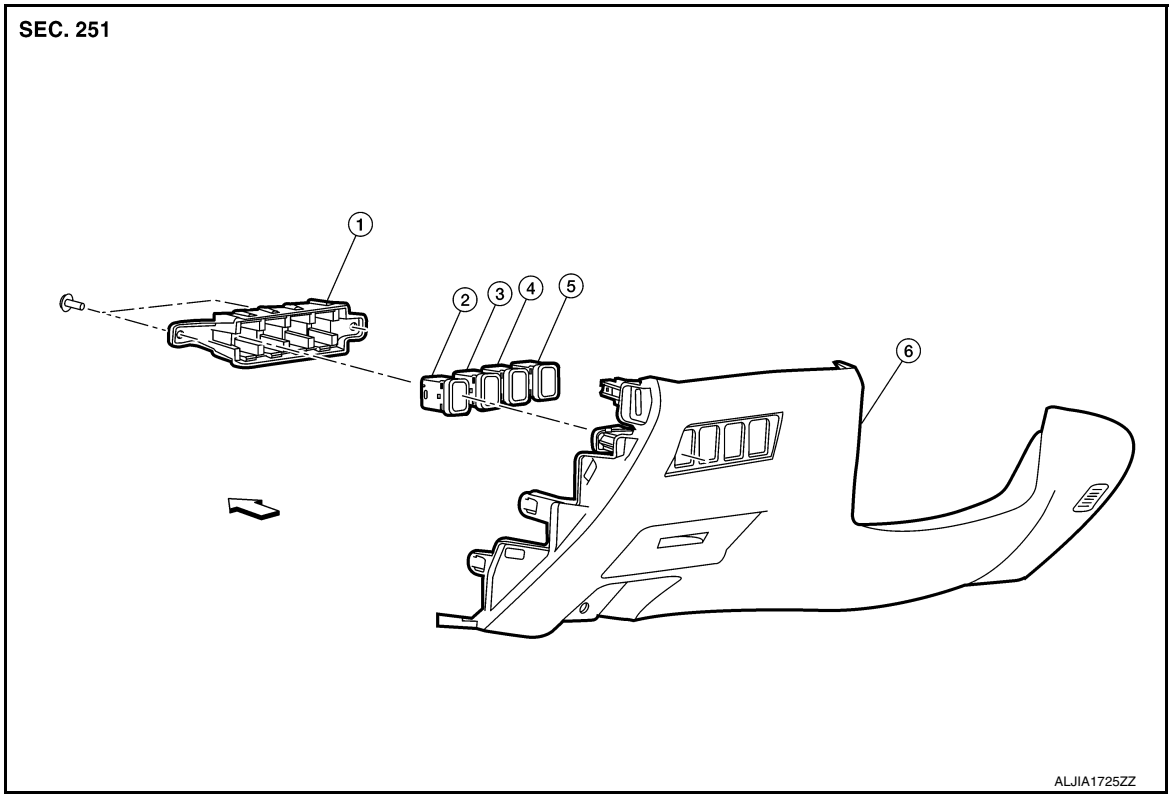
Installation is in the reverse order of removal.
- Bleed air from power steering system. Refer to ST-29, "Air Bleeding Hydraulic System".
- Check for fluid leaks. Repair as necessary.

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

HEATED STEERING WHEEL SWITCH

Exploded View

INFOID:0000000012188096



1. Switch carrier
2. Trunk lid switch
3. VDC OFF switch
4. Heated steering wheel switch
5. Rear sunshade switch (if equipped)
6. Instrument lower panel LH

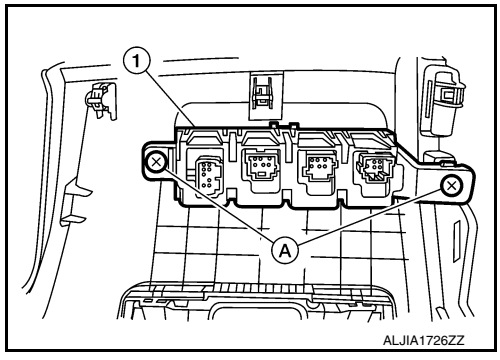
⇦ Front

Removal and Installation

INFOID:0000000012188097

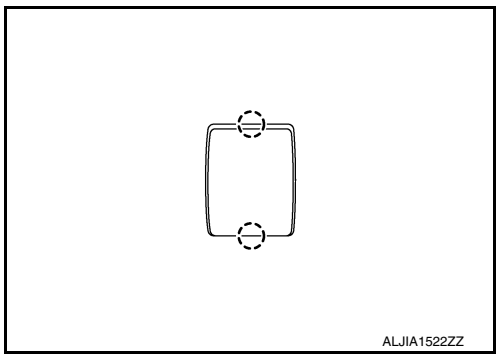
REMOVAL

1. Remove instrument lower panel LH. Refer to IP-23, "Removal and Installation".
2. Remove screws (A) and switch carrier (1) from instrument lower panel LH.



3. Release pawls using suitable tool and remove heated steering wheel switch from switch carrier.

: Pawl



INSTALLATION

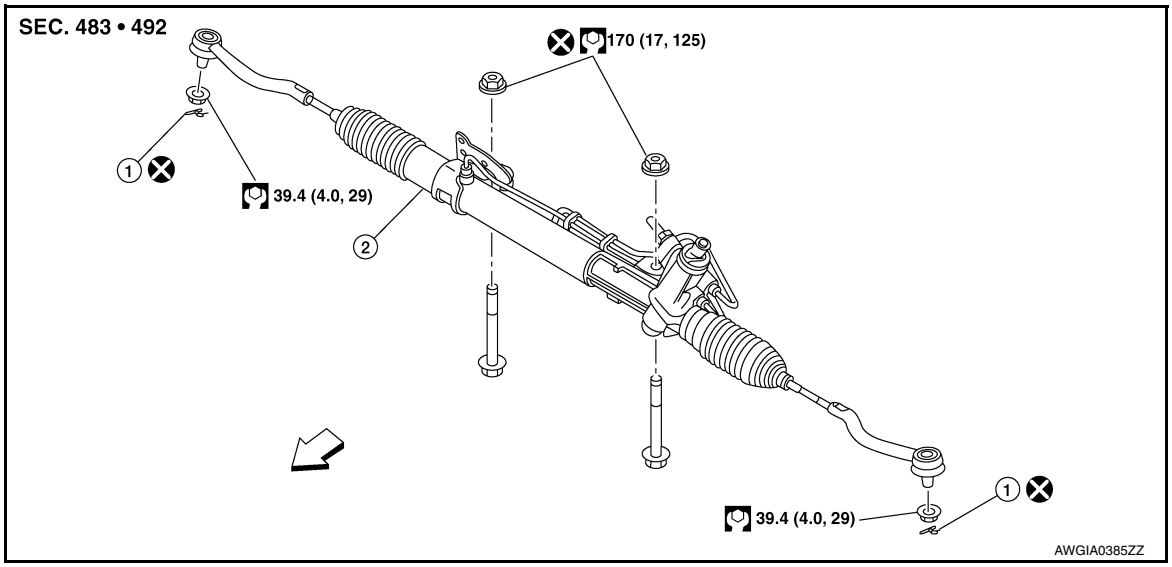
Installation is in the reverse order of removal.

UNIT REMOVAL AND INSTALLATION

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000012188098



1. Cotter pin
2. Steering gear
⇦ Front

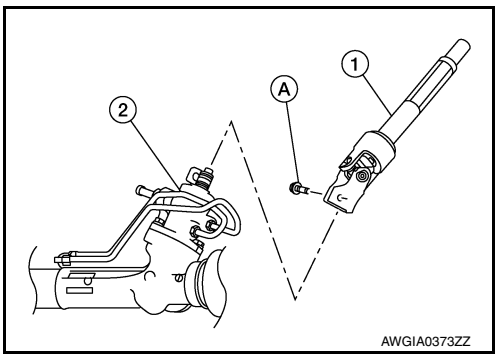
Removal and Installation

INFOID:0000000012188099

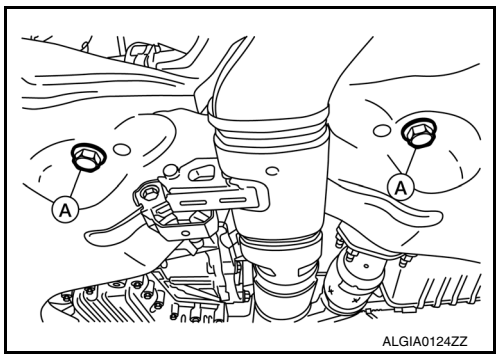
NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Set front wheels and tires to straight-ahead position.
2. Remove front wheels and tires using a power tool. Refer to WT-64, "Adjustment".
3. Drain power steering fluid. Refer to ST-29, "Draining and Refilling".
4. Remove cotter pins from outer sockets (RH/LH).
5. Loosen outer socket nuts and separate outer sockets from steering knuckles (RH/LH) using suitable tool.
   CAUTION:
   Leave outer socket nuts half threaded on outer socket to prevent damage to threads and to prevent suitable tool from coming off suddenly.
6. Remove outer socket nuts and separate outer sockets from steering knuckles (RH/LH).
7. Remove front exhaust tube. Refer to EX-5, "Exploded View".
8. Remove steering gear heat shield.
9. Remove bolt (A) and separate steering lower joint (1) from steering gear (2).
   CAUTION:
   With steering linkage disconnected, spiral cable may snap by turning steering wheel beyond limited number of turns. Secure steering wheel during removal of steering gear.



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



11. Remove nuts and separate stabilizer connecting rods from front stabilizer bar. Refer to FSU-15, "Exploded View".
12. Reposition stabilizer away from steering gear.
13. Separate hydraulic lines with clips from bracket on steering gear and reposition. Refer to ST-44, "Exploded View".
14. Separate hydraulic lines from steering gear. Refer to ST-44, "Exploded View".
15. Remove steering gear.

INSTALLATION

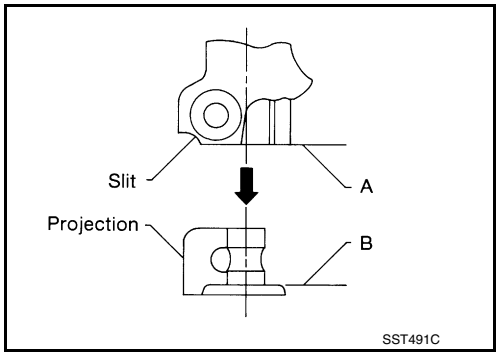
Installation is in the reverse order of removal.

CAUTION:

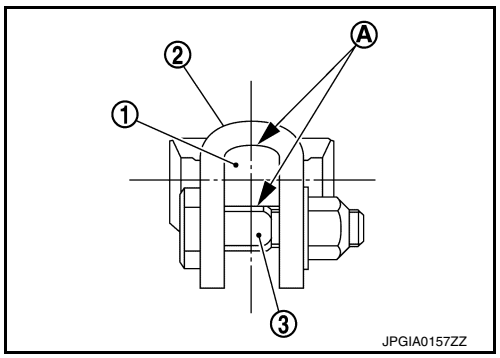
With steering linkage disconnected, spiral cable may snap by turning steering wheel beyond limited number of turns. Secure steering wheel during removal of steering gear.

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

Verify that pinch bolt threads are not damaged. Replace pinch bolt if necessary.

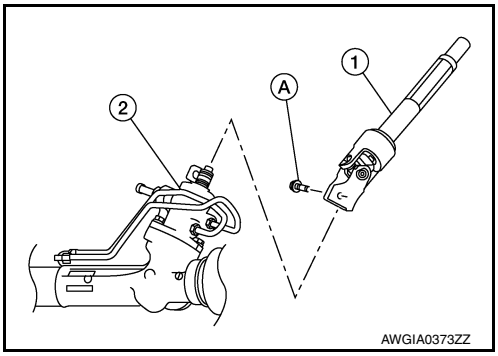


Check that there is no clearance (A) between lower joint (1) and steering column upper joint (2) and between lower joint and pinch bolt (3).



CAUTION:

When connecting steering lower joint (1) to steering gear (2), first finger-tighten joint retaining bolt (A) then tighten to specification. Joint retaining bolt is directional. Refer to ST-35, "Exploded View".



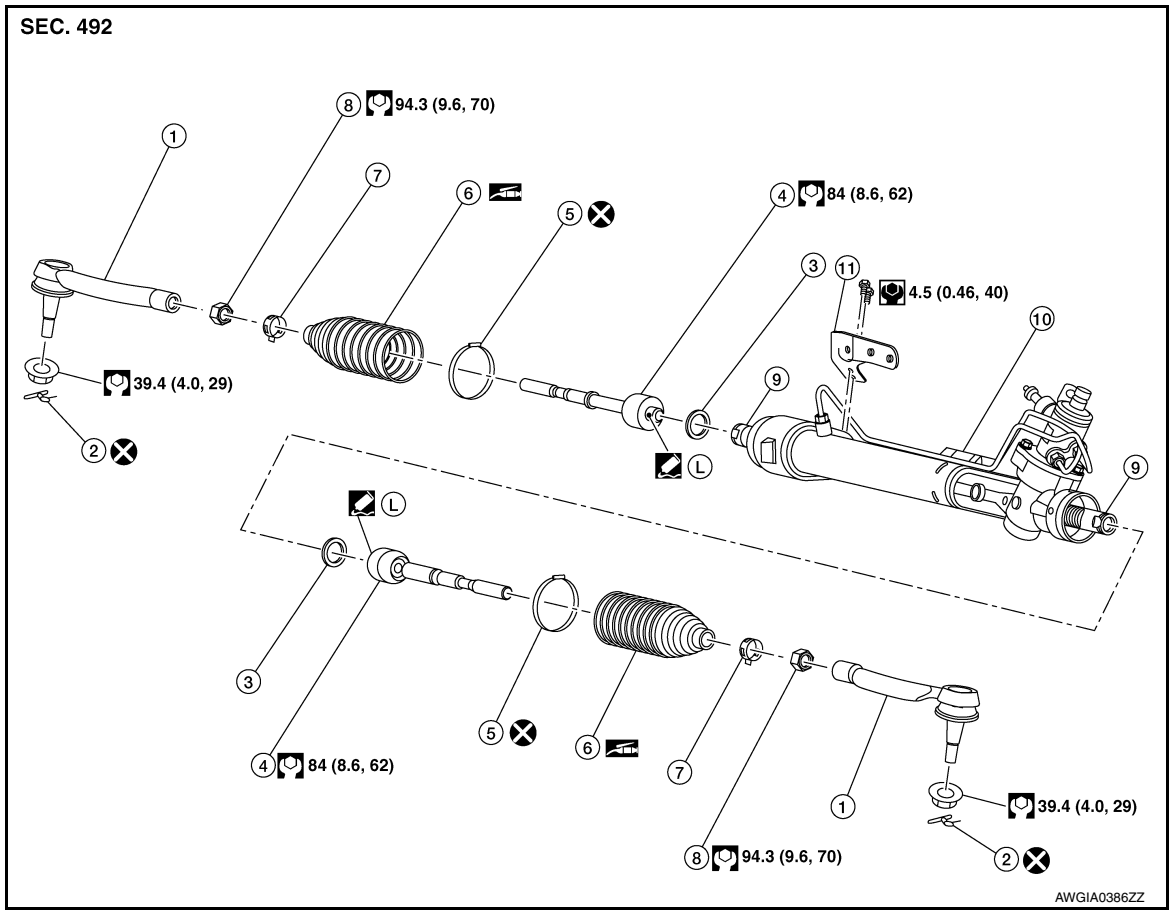
WARNING:
After torquing outer socket nuts, be sure to install cotter pins through outer socket stud holes and bend cotter pins around outer socket studs.
CAUTION:
- **Do not reuse drained power steering fluid.**
- **Do not reuse O-rings.**
- **Do not reuse steering gear nuts.**
- **Do not reuse cotter pins.**
- After installation, bleed air from hydraulic system. Refer to ST-29, "Air Bleeding Hydraulic System".
- Check wheel alignment. Refer to FSU-23, "Wheel Alignment (Unladen*)".
- Adjust neutral position of steering angle sensor. Refer to BRC-248, "Description".

UNIT DISASSEMBLY AND ASSEMBLY

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000012188101



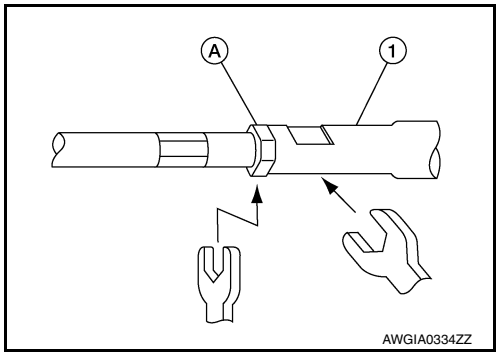
1.	Outer socket	2.	Cotter pin	3.	Spacer
4.	Inner socket	5.	Large boot clamp	6.	Boot
7.	Small boot clamp	8.	Inner socket lock nut	9.	Rack bar (not serviceable)
10.	Steering gear	11.	Bracket		

Disassembly and Assembly

INFOID:0000000012188102

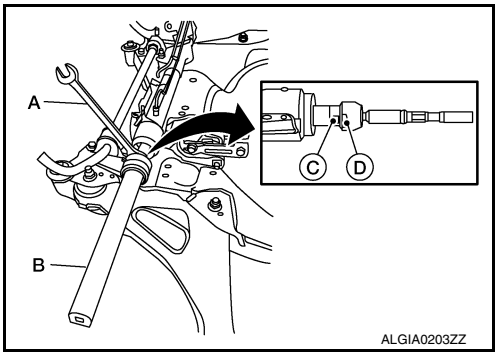
DISASSEMBLY

1. 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).



2. Remove boot clamps and boot.

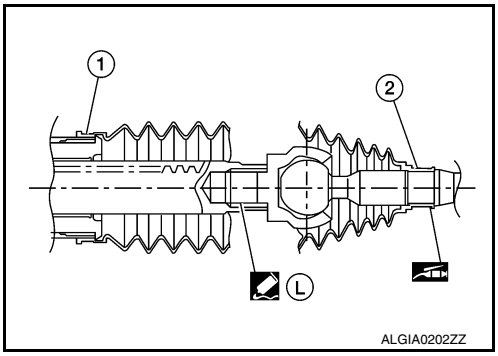
3. Remove inner socket.
CAUTION:
To prevent damage to rack bar when removing inner socket, hold suitable tool (A) across rack bar flats (C) while turning suitable tool (B) across inner socket flats (D).



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

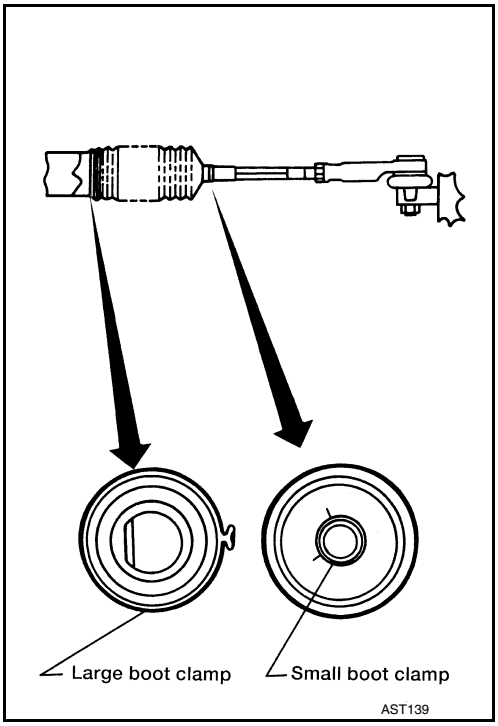
ASSEMBLY

1. Install bracket and bracket bolt to gear housing.
2. Install spacer on end of rack bar.
3. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to specified torque. Refer to ST-51, "Exploded View".
CAUTION:
To prevent damage to rack bar when installing 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 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 inner socket and small end of boot.

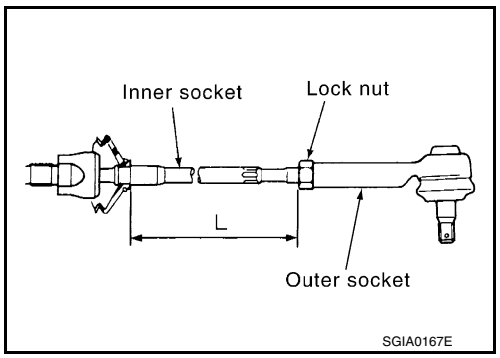


6. Install small boot clamp.
7. Install large boot clamp using Tool.
CAUTION:
Do not reuse boot clamp.

Tool number : KV40107300 (J-51751)



8. Adjust inner socket to standard length (L), and then tighten inner socket lock nut to specified torque. Refer to ST-51, "Exploded View". Check length of inner socket (L) again after tightening inner socket lock nut. Make sure that length is to specification.



Inner socket length (L) : Refer to ST-57, "Steering Gear".

CAUTION:

- **Adjust toe-in after this procedure. Length achieved after toe-in adjustment is not necessarily 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.**

POWER STEERING OIL PUMP

Disassembly and Assembly

INFOID:0000000012188103

Power steering oil pump is not serviceable and should be replaced as an assembly. Refer to ST-43, "Removal and Installation".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Wheel

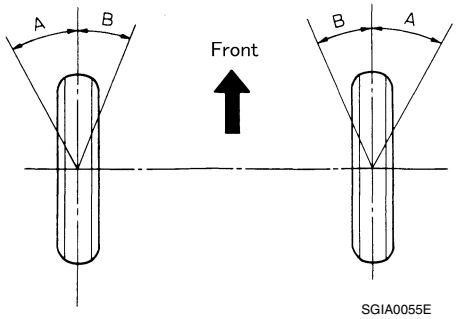
INFOID:0000000012188104

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:0000000012188105

Unit: Degree minute (Decimal degree)



SGIA0055E

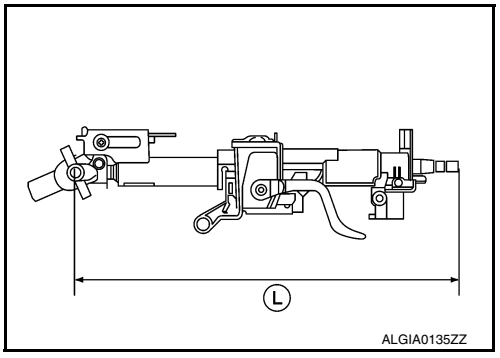
Inner wheel angle (A)	Minimum	34° 00′ (34.00°)
	Nominal	37° 00′ (37.00°)
	Maximum	38° 00′ (38.00°)
Outer wheel angle (B)	Nominal	31° 00′ (31.00°)

Mechanical Steering Column

INFOID:0000000012237976

STEERING COLUMN LENGTH

Unit: mm (in)



ALGIA0135ZZ

Steering column length	Length (L)	513 (20.2)
	Telescopic maximum	543 (21.4)
	Telescopic minimum	483 (19.0)

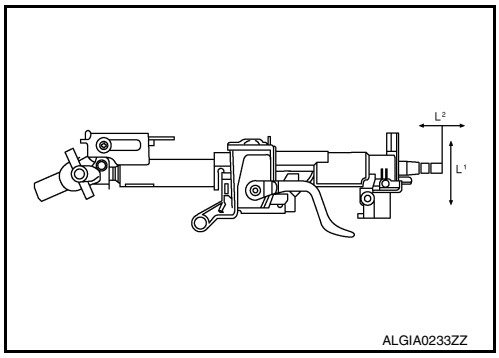
STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

Rotating torque	0.67 (0.07, 6)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0233ZZ

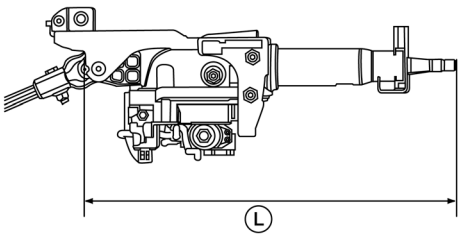
Tilt operating range (L^1)	50 (1.97)
Telescopic operating range (L^2)	60 (2.36)

Electric Steering Column

INFOID:0000000012188106

STEERING COLUMN LENGTH

Unit: mm (in)



ALGIA0105ZZ

Steering column length	Length (L)	513 (20.2)
	Telescopic maximum	541 (21.3)
	Telescopic minimum	493 (19.4)

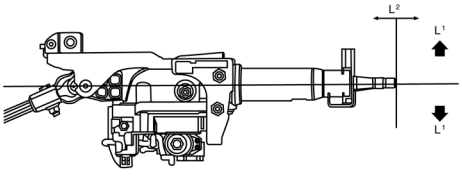
STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

Rotating torque	0.67 (0.07, 6)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0106ZZ

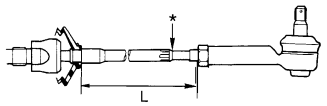
Tilt operating range (L^1)	50 1.97)
Telescopic operating range (L^2)	48 (1.89)

Steering Gear

INFOID:0000000012188107

STEERING OUTER SOCKET AND INNER SOCKET

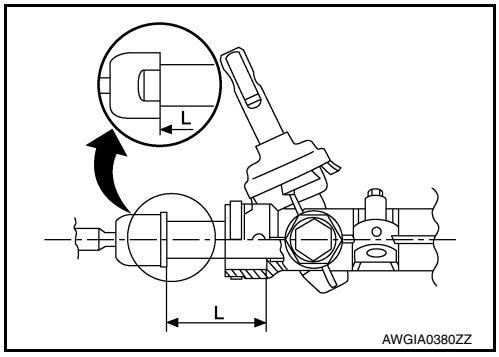
Outer socket	Swinging torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Axial end play	0.4 mm (0.016 in) or less
Inner socket	Swinging torque	0.1 - 7.8 N·m (0.01 - 0.80 kg-m, 1 - 69 in-lb)
	Axial end play	0.2 mm (0.008 in) or less
Inner socket length (L) before setting toe		89.7 mm (3.5 in)



SGIA0950E

RACK STROKE

Unit: mm (in)



AWGIA0380ZZ

Rack stroke in neutral position (L)	70 (2.76)

RACK SLIDING FORCE

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

Rack sliding force range	290 - 370 (29.6 - 37.7, 65.2 - 83.2)

Power Steering Oil Pump

INFOID:0000000012188108

Unit: kPa (kg/cm², psi)

Relief oil pressure	9,800 -10,300 (99.96 - 105.06, 1,421.0 - 1,493.5)

Power Steering Fluid

INFOID:0000000012188109

Fluid type	E-PSF
Fluid capacity	1.1 ℓ (1-1/8 US qt 1.0 Imp qt)