SECTION ST
STEERING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000008487532

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes dual stage front air bag modules. The SRS system may only deploy one front air bag, depending on the severity of a collision and whether the front passenger seat is occupied. 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 3 minutes before performing any service.**

Service Notice or Precautions for Steering System

INFOID:0000000008242837

- In case of removing steering gear assembly, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment.
- Observe the following precautions when disassembling.
- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- For easier and proper assembly, place disassembled parts in order on a parts rack.
- Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Never reuse non-reusable parts.
- Before assembling, apply the specified grease to the directed parts.

PREPARATION

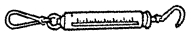
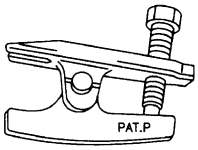
PREPARATION

Special Service Tool

INFOID:0000000007883798

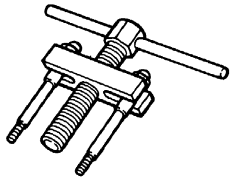
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST3127S000 (J-25765-A) Preload gauge 1. GG9103000 (J-25765-A) Torque wrench 2. HT62940000 (–) Socket adapter 3. HT62900000 (–) Socket adapter	Inspecting of rotating torque for ball joint and steering column
KV48103500 (J-26357) Pressure gauge	Measuring oil pump relief pressure
KV40107300 (—) Boot clamp crimping tool	Installing boot clamps
KV48102500 (J-33914) Pressure gauge adapter	Measuring oil pump relief pressure

Tool number (Kent-Moore No.) Tool name	Description
— (J-44372) Spring gauge  LST024	Measuring steering wheel turning force, rack sliding force and ball joint swinging force
HT72520000 (J-25730-A) Ball joint remover  NT146	Removing ball joint

Commercial Service Tool

INFOID:0000000008242838

Tool name	Description
Steering wheel puller  ZZA0819D	Removing steering wheel
Power tool  PIIB1407E	Loosening nuts, screws and bolts

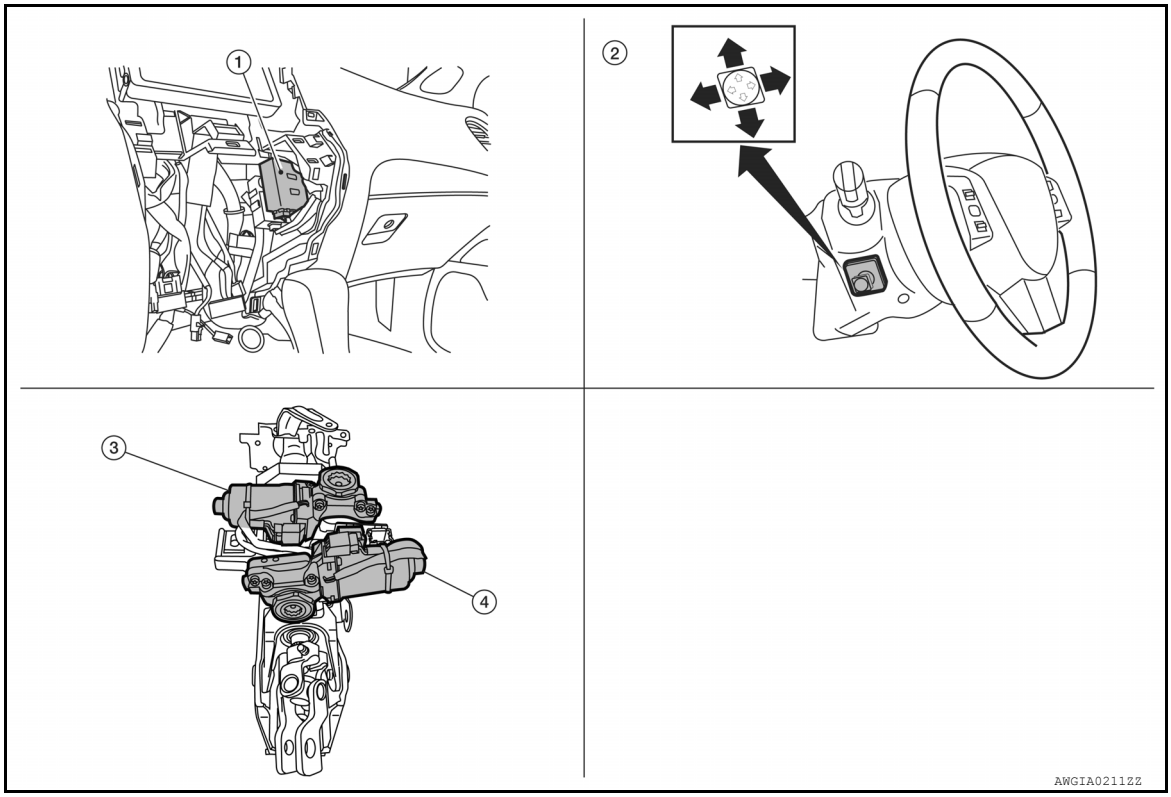
SYSTEM DESCRIPTION

COMPONENT PARTS

STEERING TILT & STEERING TELESCOPIC

STEERING TILT & STEERING TELESCOPIC : Component Parts Location

INFOID:0000000008267042



1. Automatic drive positioner control unit
   (view with cluster lid C removed)
2. ADP steering switch
3. Tilt motor
   (view with steering column assembly removed)
4. Teloscopic motor
   (view with steering column assembly removed)

STEERING TILT & STEERING TELESCOPIC : Component Description

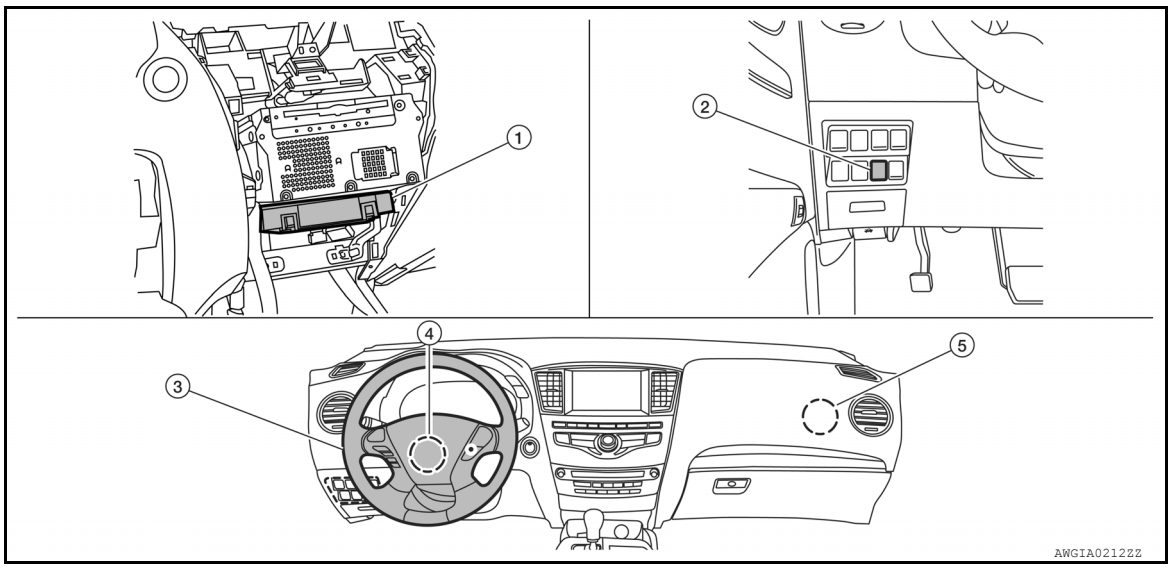
INFOID:0000000008267043

Component parts		Description
Automatic drive positioner control unit		• Supplies power and ground for tilt and telescopic motors. • Receives signals from the ADP steering switch.
ADP steering switch	Tilt switch	• Controls movement of steering column up and down. • Sends tilt up and down signals to automatic drive positioner control unit.
	Telescopic switch	• Controls movement of steering column forward and backward. • Sends forward and backward signals to automatic drive positioner control unit.
Tilt motor		• Tilts steering column upward and downward by changing the polarity of the tilt motor.
Telescopic motor		• Telescopes steering column forward and backward by changing the polarity of the telescopic motor.

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:0000000007883792



1. A/C Auto amp (view with cluster lid C removed)
2. Heated steering wheel switch
3. Heated steering wheel
4. Spiral cable
5. Heated steering relay

HEATED STEERING WHEEL SYSTEM : Component Description

INFOID:0000000007883793

Components	Description
A/C Auto amp	Controls the heated steering relay by providing a ground signal to the coil.
Heated steering wheel switch	• Controls the heated steering relay by providing a ground signal to A/C Auto amp. • Provides switch indicator for system.
Heated steering relay	Provides battery power supply to heated steering wheel and switch indicator.
Heated steering wheel	Contains heating element and over-heat protection.
Spiral cable	Provides rotating electrical connection for heated steering wheel.

SYSTEM

STEERING TILT & STEERING TELESCOPIC

STEERING TILT & STEERING TELESCOPIC : System Diagram

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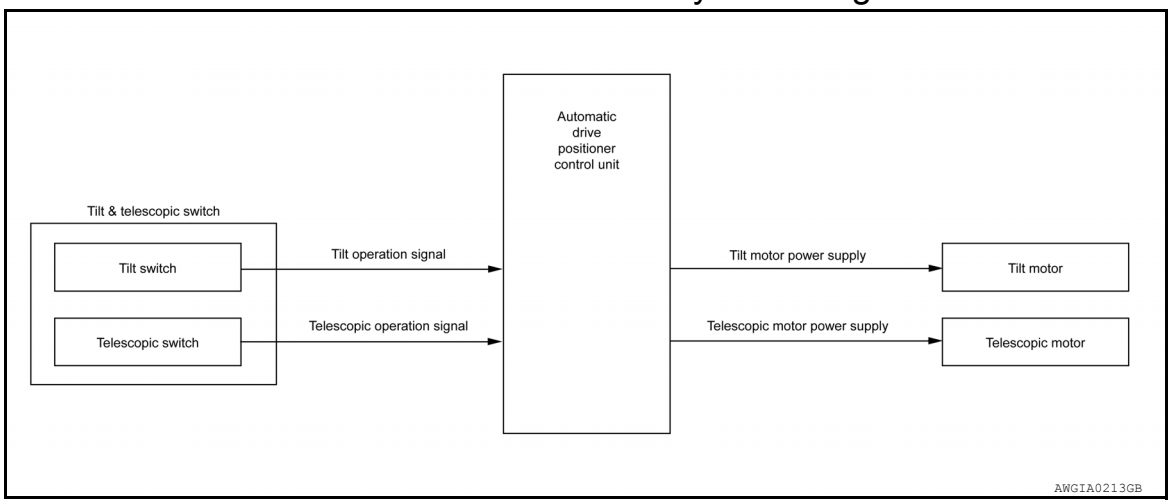


STEERING TILT & STEERING TELESCOPIC : System Description

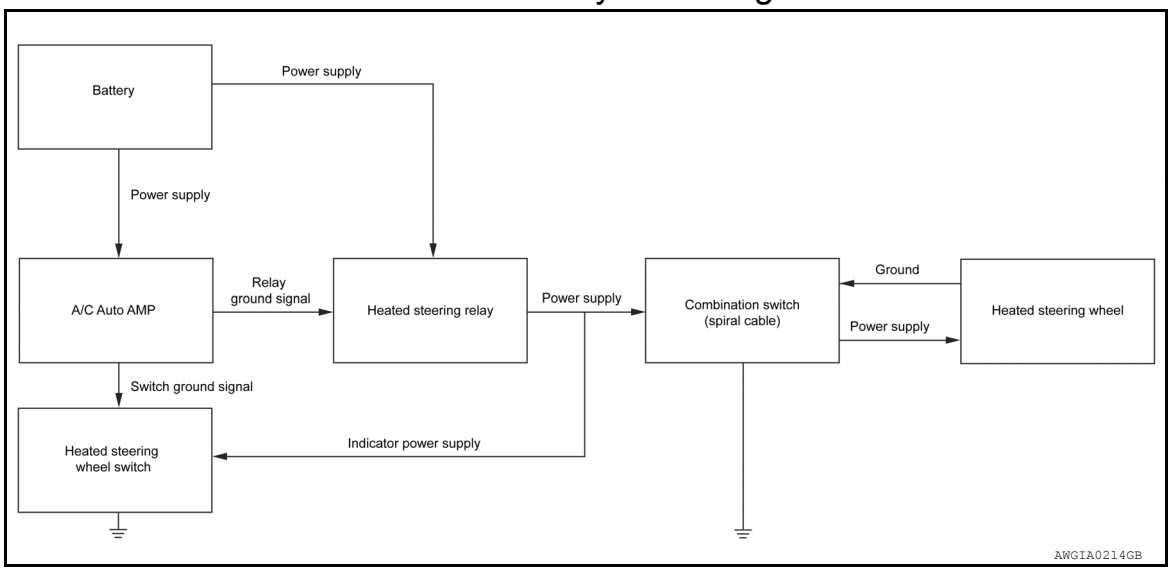
INFOID:0000000008267047

When the operator adjusts the steering column position using the ADP steering switches (tilt/telescopic), the switch provides a ground signal to the ADP control unit. Power and ground is supplied to the tilt or telescopic motors to move the column in the desired direction.

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Diagram

INFOID:0000000007883790



HEATED STEERING WHEEL SYSTEM : System Description

INFOID:0000000007883791

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 86° F (30° C). 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 68° F (20° C), the system will heat the steering wheel and cycle off and on to maintain a temperature above 68° F (20° C). The indicator light will remain on as long as the system is on.

ECU DIAGNOSIS INFORMATION

AUTOMATIC DRIVE POSITIONER CONTROL UNIT

List of ECU Reference

INFOID:0000000008267084

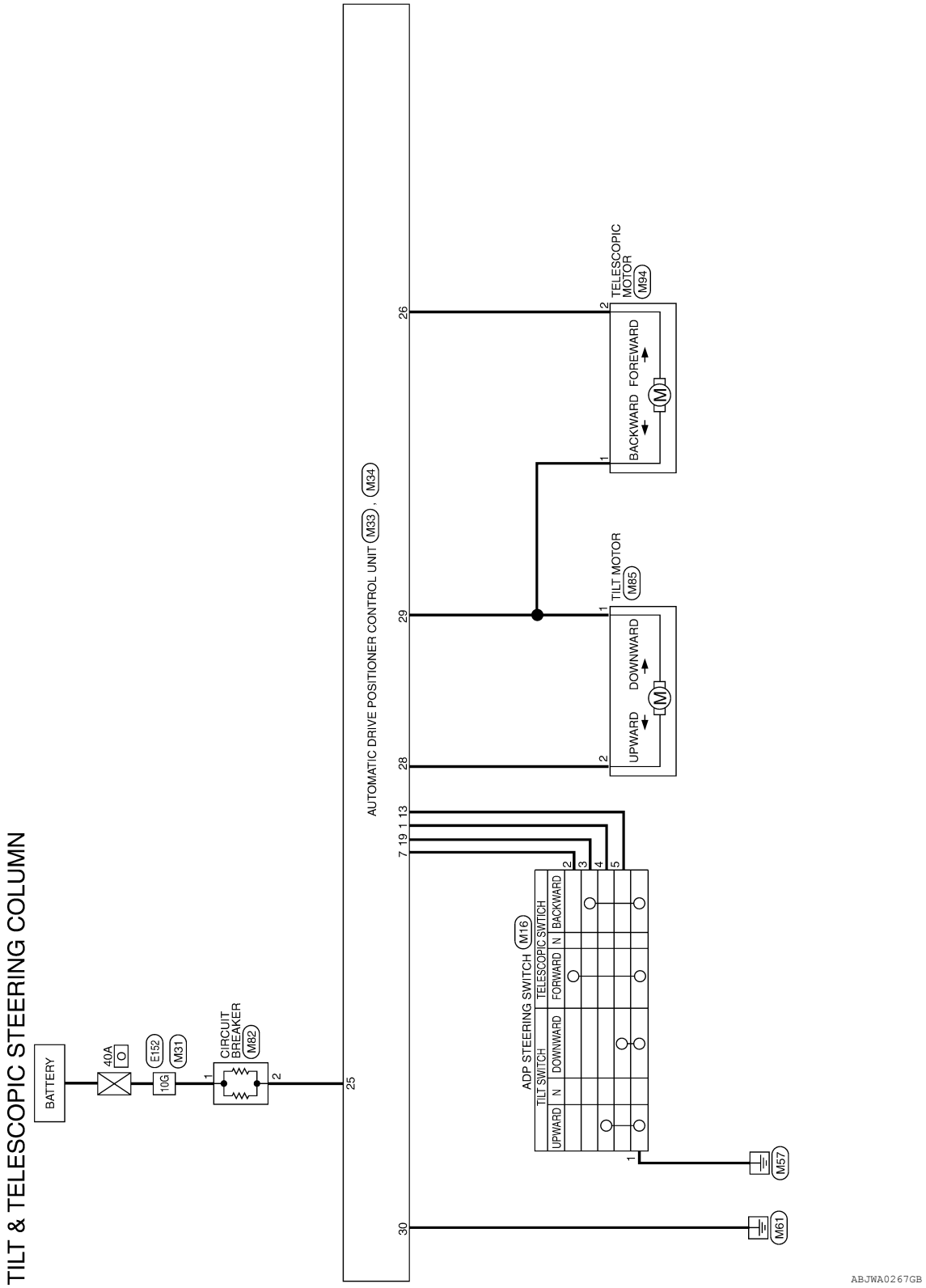
ECU	Reference
ADP Control Unit	ADP-32, "Reference Value"

WIRING DIAGRAM

STEERING COLUMN

Wiring Diagram

INFOID:0000000008267055



TILT & TELESCOPIC STEERING COLUMN CONNECTORS

Connector No.	M16
Connector Name	ADP STEERING SWITCH
Connector Color	GRAY

H.S.

6 5 4 3 2 1

Terminal No.	Color of Wire	Signal Name
1	B	–
2	BR	–
3	L	–
4	LG	–
5	Y	–

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1G 2G 3G 4G 5G
6G 7G 8G 9G 10G
11G 12G 13G 14G 15G 16G 17G 18G 19G 20G 21G
22G 23G 24G 25G 26G 27G 28G 29G 30G
31G 32G 33G 34G 35G 36G 37G 38G 39G 40G 41G
42G 43G 44G 45G 46G 47G 48G 49G 50G
51G 52G 53G 54G 55G 56G 57G 58G 59G 60G 61G
62G 63G 64G 65G 66G 67G 68G 69G 70G
71G 72G 73G 74G 75G 76G 77G 78G 79G 80G 81G
82G 83G 84G 85G 86G 87G 88G 89G 90G
91G 92G 93G 94G 95G
96G 97G 98G 99G 100G

Terminal No.	Color of Wire	Signal Name
10G	W	–

Connector No.	M33
Connector Name	AUTOMATIC DRIVE POSITIONER CONTROL UNIT
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

Terminal No.	Color of Wire	Signal Name
1	LG	
7	BR	
13	Y	
19	L	

Connector No.	M34
Connector Name	AUTOMATIC DRIVE POSITIONER CONTROL UNIT
Connector Color	WHITE

H.S.

25 26
27 28 29 30

Terminal No.	Color of Wire	Signal Name
25	L	
26	V	
28	SB	
29	BR	
30	B	

Connector No.	M82
Connector Name	CIRCUIT BREAKER-2
Connector Color	WHITE

H.S.

1
2

Terminal No.	Color of Wire	Signal Name
1	W	–
2	L	–

ABJIA0600GB

Connector No.	M85
Connector Name	TILT MOTOR
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	SB	–

Connector No.	M94
Connector Name	TELESCOPIC MOTOR
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	V	–

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
10G	P	–

ABJIA0601GB

HEATED STEERING WHEEL

Wiring Diagram

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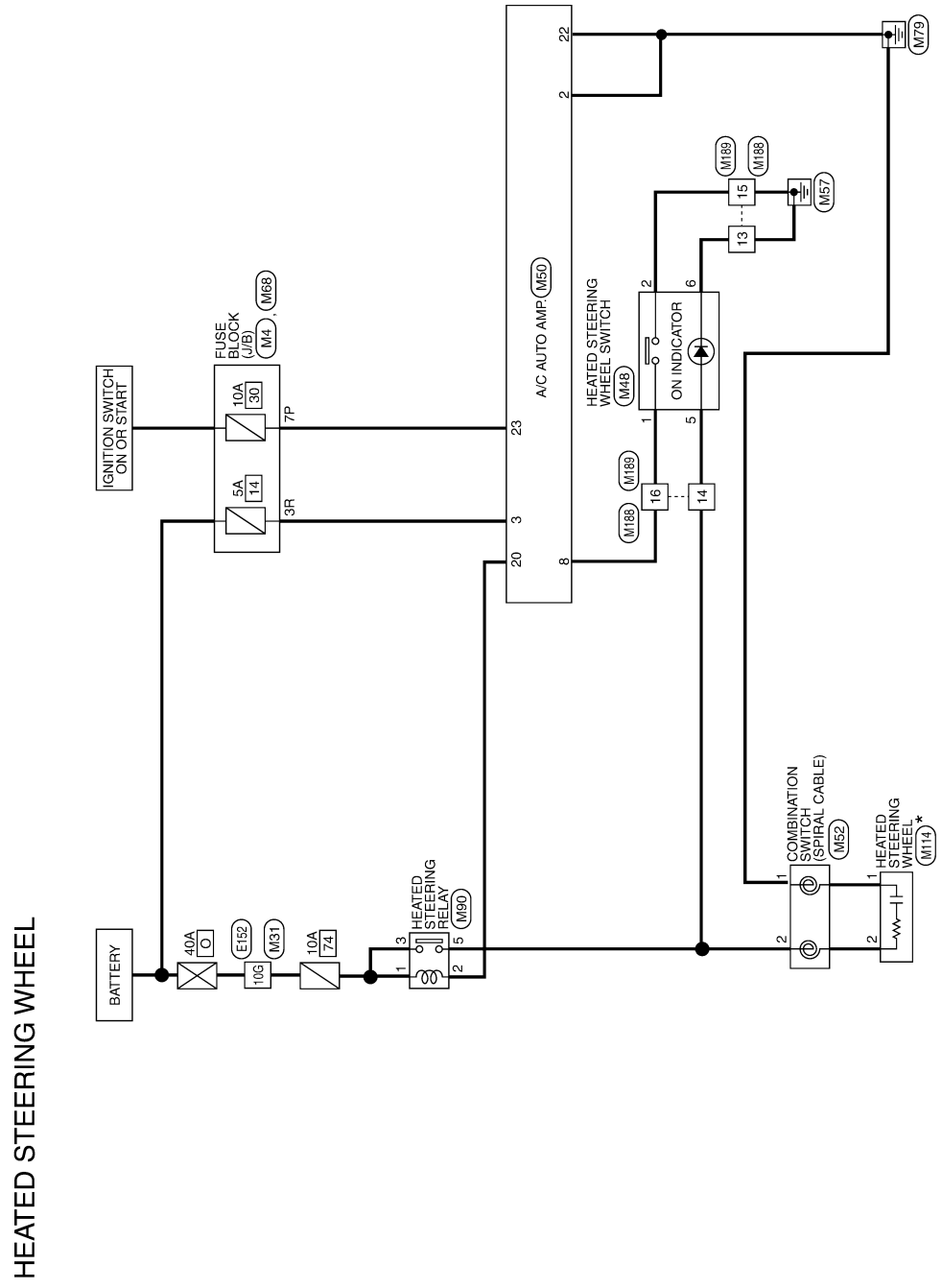


HEATED STEERING WHEEL CONNECTORS

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
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	LG	–

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1G 2G 3G 4G 5G
6G 7G 8G 9G 10G

11G 12G 13G 14G 15G 16G 17G 18G 19G 20G 21G
22G 23G 24G 25G 26G 27G 28G 29G 30G

31G 32G 33G 34G 35G 36G 37G 38G 39G 40G 41G
42G 43G 44G 45G 46G 47G 48G 49G 50G

51G 52G 53G 54G 55G 56G 57G 58G 59G 60G 61G
62G 63G 64G 65G 66G 67G 68G 69G 70G

71G 72G 73G 74G 75G 76G 77G 78G 79G 80G 81G
82G 83G 84G 85G 86G 87G 88G 89G 90G

91G 92G 93G 94G 95G
96G 97G 98G 99G 100G

Terminal No.	Color of Wire	Signal Name
10G	W	–

Connector No.	M48
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Color	BLUE

H.S.

4 6 3
2 1 5

Terminal No.	Color of Wire	Signal Name
1	G	–
2	GR	–
5	Y	–
6	B	–

Connector No.	M50
Connector Name	A/C AUTO AMP.
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	GR	GND
3	G	BATT
8	G	STRG HTR SW

Terminal No.	Color of Wire	Signal Name
20	BR	STRG HTR RLY
22	GR	GND (POWER)
23	LG	IGN

ABJIA0602GB

Connector No.	M52
Connector Name	COMBINATION SWITCH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	B	–

Connector No.	M68
Connector Name	FUSE BLOCK (J/B)
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
3R	G	–

Connector No.	M90
Connector Name	HEATED STEERING RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	BR	–
3	LG	–
5	Y	–

Connector No.	M114
Connector Name	HEATED STEERING WHEEL
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	L	–

Connector No.	M188
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
13	B	–
14	Y	–
15	GR	–
16	G	–

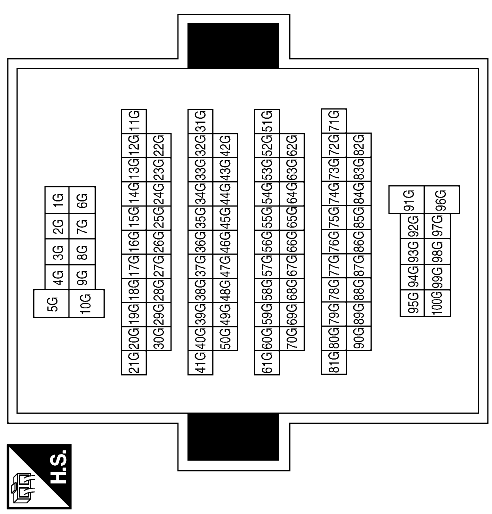
Connector No.	M189
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
13	B	–
14	Y	–
15	GR	–
16	G	–

ABJIA0625GB

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
10G	P	–

AAGIA0024GB

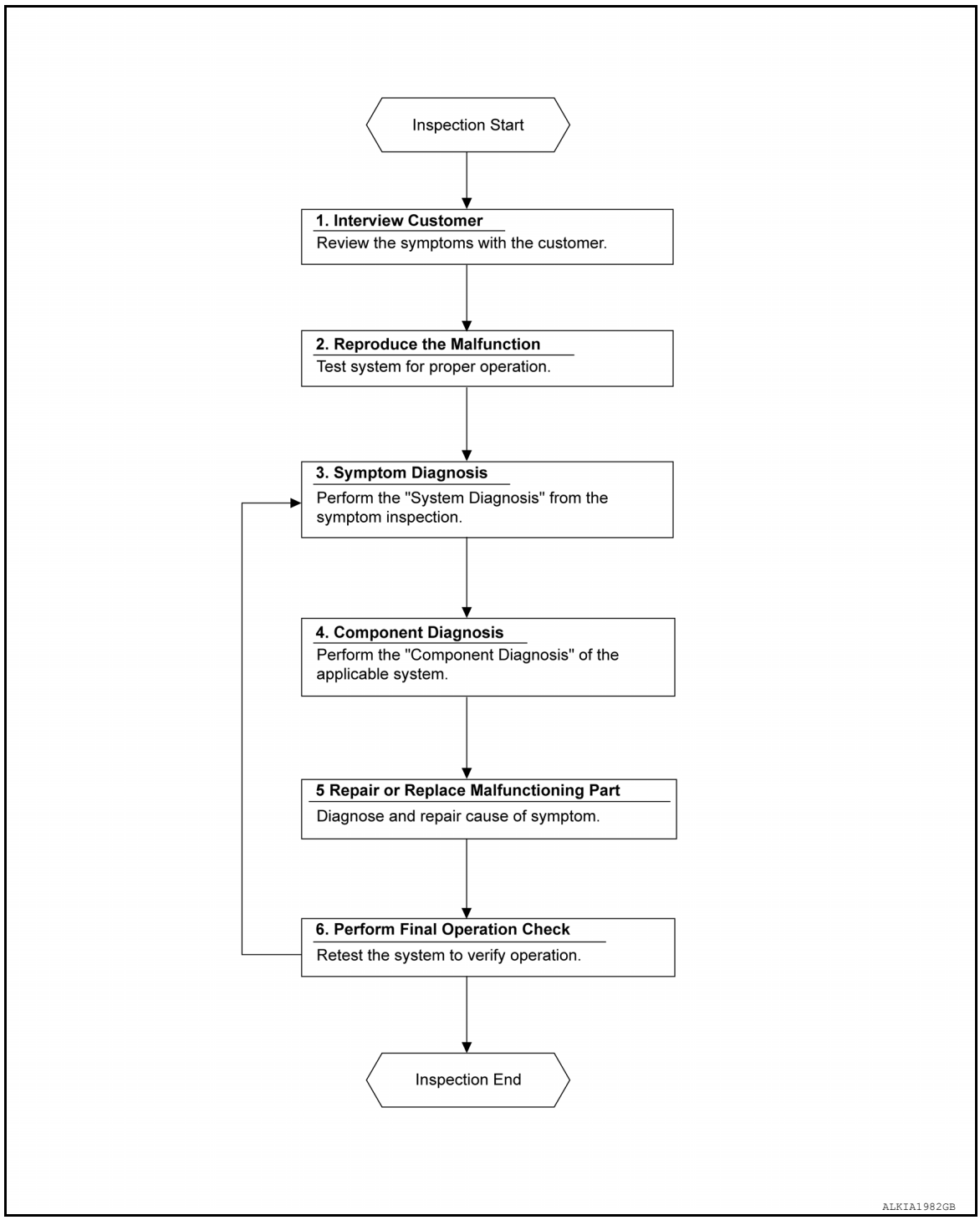
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000008267089

OVERALL SEQUENCE



DETAILED FLOW

1. OBTAIN INFORMATION ABOUT SYMPTOM

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

>> GO TO 2.

2. CONFIRM THE SYMPTOM

Check the malfunction on the vehicle that the customer describes.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 3.

3. IDENTIFY THE MALFUNCTIONING SYSTEM WITH SYMPTOM DIAGNOSIS

Use Symptom diagnosis from the symptom inspection result in step 2 and then identify where to start performing the diagnosis based on possible causes and symptoms. Refer to ST-41, "Symptom Table".

>> GO TO 4.

4. PERFORM THE COMPONENT DIAGNOSIS OF THE OF THE APPLICABLE SYSTEM

Perform the diagnosis with Component diagnosis of the applicable system.

>> GO TO 5.

5. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the specified malfunctioning parts.

>> GO TO 6.

6. FINAL CHECK

Check that malfunctions are not reproduced when obtaining the malfunction information from the customer, referring to the symptom inspection result in step 2.

Are the malfunctions corrected?

YES >> Inspection End.
NO >> GO TO 3.

POWER STEERING FLUID

Inspection

INFOID:0000000008297193

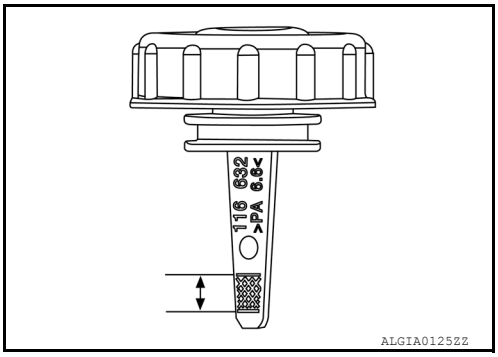
FLUID LEVEL

Check power steering fluid level at the scale on reservoir tank cap indicator.

- 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 between the hatching area of the indicator on the power steering reservoir tank cap.

CAUTION:

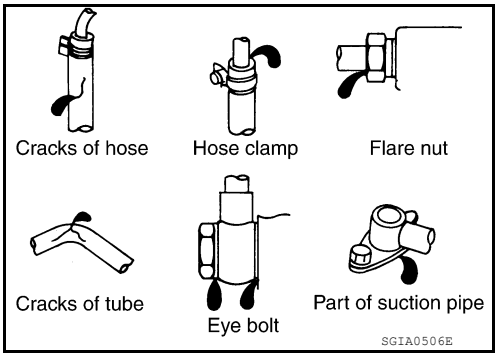
- **Do not overfill.**
- **Do not reuse used power steering fluid.**
- **Recommended power steering fluid is Genuine NISSAN E-PSF or equivalent. Refer to MA-11, "Fluids and Lubricants".**



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-52, "Removal and Installation".
6. Check steering gear boots for accumulation of power steering fluid. Power steering fluid indicates a leak from the power steering gear, replace as necessary. Refer to ST-49, "Removal and Installation - FWD" (FWD) or ST-50, "Removal and Installation - AWD" (AWD).



STEERING WHEEL

Inspection

INFOID:0000000008297196

CONDITION OF INSTALLATION

- Check installation condition of power steering gear assembly, 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-60, "Steering Wheel".**

- Verify that the power steering gear nuts are tightened to specification. Refer to ST-49, "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-60, "Steering Wheel".**

NEUTRAL POSITION ON STEERING WHEEL

- Check neutral position on steering wheel after confirming that front wheel alignment is correct. Refer to FSU-5, "Inspection and Adjustment".

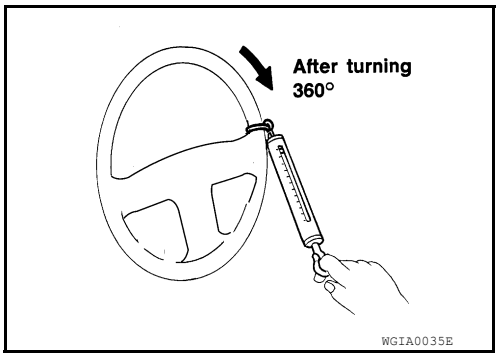
1. Turn tires straight ahead, check if steering wheel is in the neutral position.
2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
3. If the neutral position cannot be attained by repositioning the steering wheel two teeth or less on steering stem, loosen tie-rod lock nuts of power 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-58, "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)

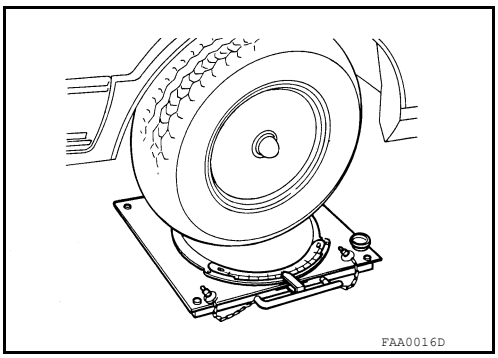
Steering wheel turning force : Refer to ST-60, "Steering Wheel".



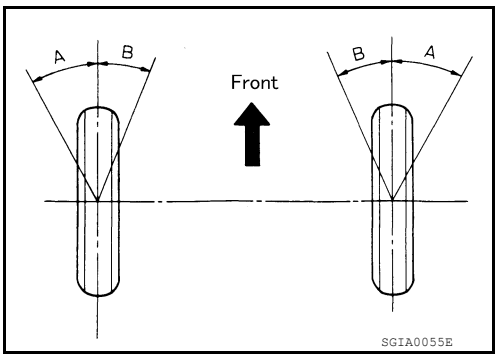
6. If steering wheel turning force is out of specification, inspect steering column. Refer to ST-22, "Inspection".
7. If steering column meets specification, inspect steering gear. Refer to ST-24, "Inspection".

CHECKING FRONT WHEEL TURNING ANGLE

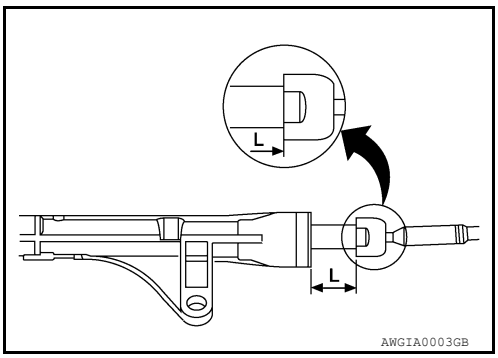
- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- 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-60, "Steering Angle".



- Measure the rack stroke specification with vehicle in neutral position. Refer to ST-61, "Power Steering Gear".



STEERING COLUMN

Inspection

INFOID:0000000008297179

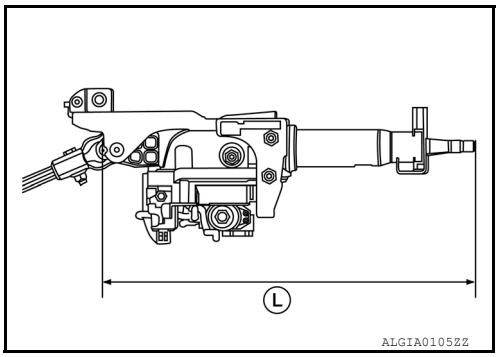
HOLE COVER SEAL, HOLE COVER AND LOWER SHAFT ASSEMBLY

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

STEERING COLUMN ASSEMBLY

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

Steering column length (L) : Refer to ST-60, "Steering Column".



- Measure steering column rotating torque using Tool. Replace steering column assembly if outside the standard.

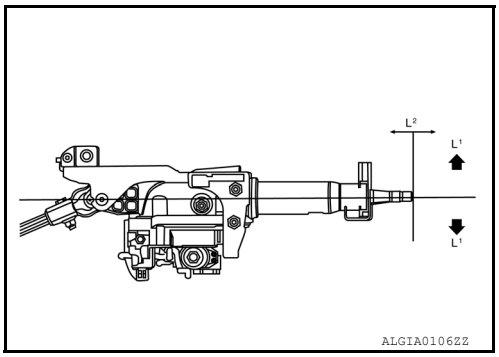
Tool number : ST3127S000 (J-25765-A)

Rotating torque : Refer to ST-60, "Steering Column".

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

Tilt operating range (L^1) : Refer to ST-60, "Steering Column".

Telescopic operating range (L^2) : Refer to ST-60, "Steering Column".



POWER STEERING OIL PUMP

Inspection

INFOID:0000000008297197

RELIEF OIL PRESSURE

CAUTION:

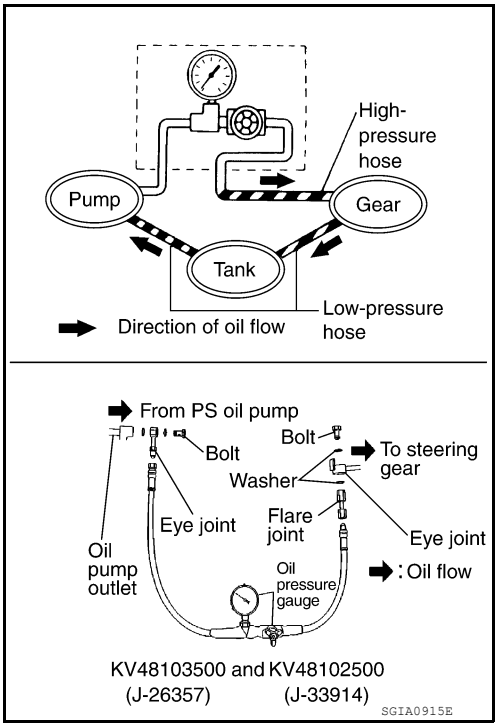
Make sure that belt tension is normal before starting the following procedure.

1. Connect the Tool between oil pump discharge connector and high-pressure hose. Bleed air from the hydraulic circuit while opening valve fully. Refer to ST-43, "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 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-62, "Power Steering Oil Pump"



   CAUTION:
   Do not keep valve closed for 10 seconds or longer.
4. Open the valve slowly after measuring. Replace 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-43, "Air Bleeding Hydraulic System".

STEERING GEAR AND LINKAGE

Inspection

INFOID:0000000008297181

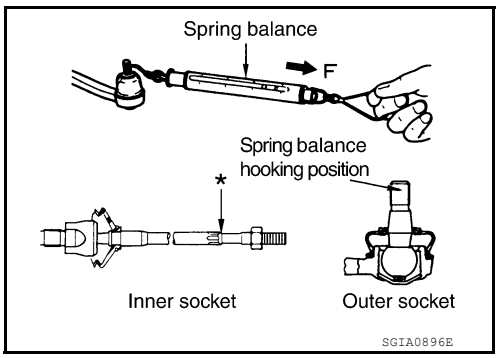
BOOT

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

OUTER SOCKET AND INNER SOCKET

- Ball joint swinging torque

- Hook a spring balance to the ball stud and inner socket measuring point (*) and pull the spring balance. Make sure that the spring balance reads the specified value when ball stud and inner socket start to move. Replace outer socket and inner socket if they are outside the specification.

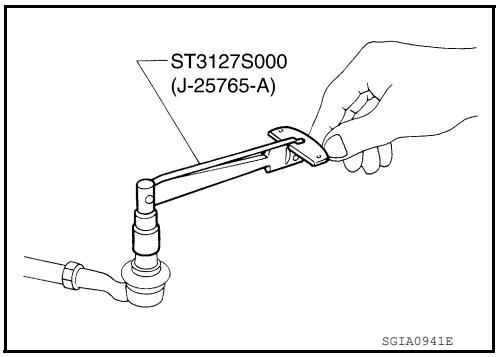


Tool number : — (J-44372)

Swinging torque : Refer to ST-61, "Power Steering Gear".

- Ball joint rotating torque

- Make sure that the reading is within the following specified range using Tool. Replace outer socket if the reading is outside the specification.

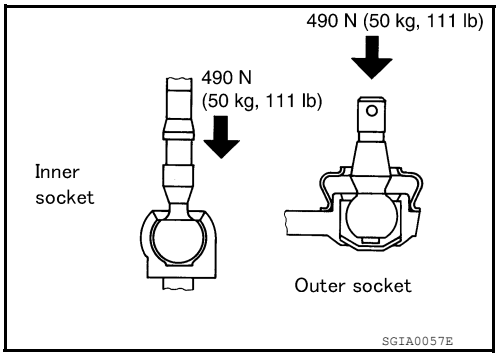


Tool number : ST3127S000 (J-25765-A)

Rotating torque : Refer to ST-61, "Power 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 dial gauge, make sure that the value is within specification. Replace outer socket and inner socket if the measured value is outside specification.



Axial end play : Refer to ST-61, "Power Steering Gear".

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

AUTOMATIC DRIVE POSITIONER CONTROL UNIT

AUTOMATIC DRIVE POSITIONER CONTROL UNIT : Diagnosis Procedure

INFOID:0000000008267060

NOTE:
Do not disconnect the battery negative terminal and the driver seat control unit connector until DTC is confirmed with CONSULT.

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

1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect automatic drive positioner control unit.
3. Check voltage between automatic drive positioner control unit harness connector and ground.

(+)		(–)	Voltage (V) (Approx.)
Automatic drive positioner control unit			
Connector	Terminal		
M34	25	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check the following.
- Repair or replace harness.
- Circuit breaker.

2. CHECK GROUND CIRCUIT

Check continuity between the automatic drive positioner control unit harness connector and ground.

Automatic drive positioner control unit		Ground	Continuity
Connector	Terminal		
M34	30		Yes

Is the inspection result normal?

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

AUTOMATIC DRIVE POSITIONER CONTROL UNIT : Special Repair Requirement

INFOID:0000000008267090

1. PERFORM ADDITIONAL SERVICE

Perform additional service when removing battery negative terminal.

>> Refer to ADP-54, "ADDITIONAL SERVICE WHEN REMOVING BATTERY NEGATIVE TERMINAL : Description".

TILT SWITCH

Description

INFOID:0000000008267062

ADP steering switch (tilt switch) is equipped to the steering column. The operation signal is input to the automatic drive positioner control unit when the ADP steering switch is operated.

Component Function Check

INFOID:0000000008267063

1. CHECK FUNCTION

1. Select “TILT SW-UP”, “TILT SW-DOWN” in “DATA MONITOR” mode with CONSULT.
2. Check tilt switch signal under the following conditions.

Monitor item	Condition		Status
TILT SW-UP	Tilt switch (up)	Operate	ON
		Release	OFF
TILT SW-DOWN	Tilt switch (down)	Operate	ON
		Release	OFF

Is the inspection result normal?

YES >> Inspection End.
NO >> Perform diagnosis procedure. Refer to ST-26, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008267064

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

1. CHECK TILT SWITCH SIGNAL

1. Disconnect ADP steering switch (tilt switch).
2. Check voltage between ADP steering switch harness connector and ground.

(+)		(–)	Voltage (V) (Approx.)
ADP steering switch (tilt switch)			
Connector	Terminals		
M16	4	Ground	Battery voltage
	5		

Is the inspection result normal?

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

2. CHECK TILT SWITCH CIRCUIT

1. Disconnect automatic drive positioner control unit.
2. Check continuity between automatic drive positioner control unit harness connector and ADP steering switch harness connector.

Automatic drive positioner control unit		ADP steering switch (tilt switch)		Continuity
Connector	Terminal	Connector	Terminal	
M33	1	M16	4	Yes
	13		5	

3. Check continuity between automatic drive positioner control unit harness connector and ground.

Automatic drive positioner control unit		Ground	Continuity
Connector	Terminal		
M33	1		No
	13		

Is the inspection result normal?

YES >> Replace automatic drive positioner unit. Refer to ADP-141, "Removal and Installation".
NO >> Repair or replace harness.

3. CHECK TILT SWITCH

Refer to ST-27, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ADP steering switch (tilt switch). Refer to ADP-144, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-53, "Intermittent Incident".

>> Inspection End.

Component Inspection

INFOID:0000000008267065

1. CHECK TILT SWITCH

1. Turn ignition switch OFF.
2. Disconnect ADP steering switch (tilt switch).
3. Check continuity between ADP steering switch terminals.

ADP steering switch (tilt switch)		Condition		Continuity
Terminal				
1	4	Tilt switch (up)	Operate	Yes
			Release	No
	5	Tilt switch (down)	Operate	Yes
			Release	No

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace ADP steering switch (tilt switch). Refer to ADP-144, "Removal and Installation".

TELESCOPIC SWITCH

Description

INFOID:0000000008267066

ADP steering switch (telescopic switch) is equipped to the steering column. The operation signal is input to the automatic drive positioner control unit when the telescopic switch is operated.

Component Function Check

INFOID:0000000008267067

1. CHECK FUNCTION

1. Select “TELESCO SW-FR”, “TELESCO SW-RR” in “DATA MONITOR” mode with CONSULT.
2. Check telescopic switch signal under the following conditions.

Monitor item	Condition		Status
TELESCO SW-FR	Telescopic switch (forward)	Operate	ON
		Release	OFF
TELESCO SW-RR	Telescopic switch (backward)	Operate	ON
		Release	OFF

Is the inspection result normal?

YES >> Inspection End.
NO >> Perform diagnosis procedure. Refer to ST-28, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008267068

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

1. CHECK TELESCOPIC SWITCH SIGNAL

1. Disconnect ADP steering switch (telescopic switch).
2. Check voltage between ADP steering switch harness connector and ground.

(+)		(–)	Voltage (V) (Approx.)
ADP steering switch (telescopic switch)			
Connector	Terminals		
M16	2	Ground	Battery voltage
	3		

Is the inspection result normal?

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

2. CHECK TELESCOPIC SWITCH CIRCUIT

1. Disconnect automatic drive positioner control unit.
2. Check continuity between automatic drive positioner control unit harness connector and ADP steering switch harness connector.

Automatic drive positioner control unit		ADP steering switch (telescopic switch)		Continuity
Connector	Terminal	Connector	Terminal	
M33	7	M16	2	Yes
	19		3	

3. Check continuity between automatic drive positioner control unit harness connector and ground.

Automatic drive positioner control unit		Ground	Continuity
Connector	Terminal		
M33	7		No
	19		

Is the inspection result normal?

YES >> Replace automatic drive positioner unit. Refer to ADP-141, "Removal and Installation".
NO >> Repair or replace harness.

3. CHECK TELESCOPIC SWITCH

Refer to ST-29, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ADP steering switch (telescopic switch). Refer to ADP-144, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-53, "Intermittent Incident".

>> Inspection End.

Component Inspection

INFOID:0000000008267069

1. CHECK TELESCOPIC SWITCH

1. Turn ignition switch OFF.
2. Disconnect ADP steering switch (telescopic switch).
3. Check continuity between ADP steering switch terminals.

ADP steering switch (telescopic switch)		Condition		Continuity
Terminal				
1	2	Telescopic switch (forward)	Operate	Yes
			Release	No
	3	Telescopic switch (backward)	Operate	Yes
			Release	No

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace ADP steering switch (telescopic switch). Refer to ADP-144, "Removal and Installation".

TILT &TELESCOPIC SWITCH GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000008267070

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

1. CHECK ADP STEERING SWITCH (TILT & TELESCOPIC SWITCH) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ADP steering switch (tilt & telescopic switch).
3. Check continuity between ADP steering switch (tilt & telescopic switch) and ground.

ADP steering switch (tilt & telescopic switch)		Ground	Continuity
Connector	Terminal		
M16	1		Yes

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-53, "Intermittent Incident".
NO >> Repair or replace harness.

TILT MOTOR

Description

INFOID:0000000008267077

- The tilt motor is installed to the steering column assembly.
- The tilt motor is activated with the automatic drive positioner control unit.
- The steering column is tilted upward/downward by changing the rotation direction of tilt motor.

Component Function Check

INFOID:0000000008267078

1. CHECK FUNCTION

1. Select “TILT MOTOR“ in “ACTIVE TEST” mode with CONSULT.
2. Check the tilt motor operation.

Test item		Description	
TILT MOTOR	OFF	Steering tilt	Stop
	UP		Upward
	DWN		Downward

Is the operation of relevant parts normal?

YES >> Inspection End.
NO >> Perform diagnosis procedure. Refer to ST-31, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008267079

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

1. CHECK TILT MOTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect tilt motor.
3. Turn the ignition switch ON.
4. Perform “ACTIVE TEST” (“TILT MOTOR”) with CONSULT.
5. Check voltage between tilt motor harness connector and ground.

(+)		(–)	Condition		Voltage (V) (Approx.)
Tilt motor					
Connector	Terminals				
M85	2	Ground	TILT MOTOR	OFF	0
				UP	0
				DWN (down)	Battery voltage
	1			OFF	0
				UP	Battery voltage
				DWN (down)	0

Is the inspection result normal?

YES >> Replace tilt motor. Refer to ST-47, "Exploded View".
NO >> GO TO 2.

2. CHECK TILT MOTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect automatic drive positioner control unit.
3. Check continuity between automatic drive positioner control unit harness connector and tilt motor harness connector.

Automatic drive positioner control unit		Tilt motor		Continuity
Connector	Terminal	Connector	Terminal	
M34	28	M85	2	Yes
	29		1	

4. Check continuity between automatic drive positioner control unit harness connector and ground.

Automatic drive positioner control unit		Ground	Continuity
Connector	Terminal		
M34	28		No
	29		

Is the inspection result normal?

YES >> Replace automatic drive positioner control unit. Refer to ADP-141, "Removal and Installation".
NO >> Repair or replace harness.

TELESCOPIC MOTOR

Description

INFOID:0000000008267080

- The telescopic motor is installed to the steering column assembly.
- The telescopic motor is activated with the automatic drive positioner control unit.
- Compresses the steering column by changing the rotation direction of telescopic motor.

Component Function Check

INFOID:0000000008267081

1.CHECK FUNCTION

1. Select “TELESCO MOTOR” in “ACTIVE TEST” mode with CONSULT.
2. Check the telescopic motor operation.

Test item		Description	
TELESCO MOTOR	OFF	Steering telescopic	Stop
	FR		Forward
	RR		Backward

Is the operation of relevant parts normal?

YES >> Inspection End.
NO >> Perform diagnosis procedure. Refer to ST-33, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008267082

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

1. CHECK TELESCOPIC MOTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect telescopic motor.
3. Turn the ignition switch ON.
4. Perform “ACTIVE TEST” (“TELESCO MOTOR”) with CONSULT.
5. Check voltage between telescopic motor harness connector and ground.

(+)		(–)	Condition		Voltage (V) (Approx.)
Telescopic motor					
Connector	Terminals				
M94	2	Ground	TELE-SCOPIC MOTOR	OFF	0
				FR (forward)	0
				RR (backward)	Battery voltage
	1			OFF	0
				FR (forward)	Battery voltage
				RR (backward)	0

Is the inspection result normal?

YES >> Replace telescopic motor. Refer to ST-47, "Exploded View".
NO >> GO TO 2.

2.CHECK TELESCOPIC MOTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect automatic drive positioner control unit.
3. Check continuity between automatic drive positioner control unit harness connector and telescopic motor harness connector.

Automatic drive positioner control unit		Telescopic motor		Continuity
Connector	Terminal	Connector	Terminal	
M34	29	M94	1	Yes
	26		2	

4. Check continuity between automatic drive positioner control unit harness connector and ground.

Automatic drive positioner control unit		Ground	Continuity
Connector	Terminal		
M34	29		No
	26		

Is the inspection result normal?

YES >> Replace automatic drive positioner control unit. Refer to ADP-141, "Removal and Installation".
NO >> Repair or replace harness.

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:0000000008282684

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-35, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008282685

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to ST-45, "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	2	1	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-38, "Component Inspection (Heated Steering Wheel)".

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel. Refer to ST-45, "Removal and Installation".

3.CHECK GROUND CIRCUIT

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

Connector	Terminal	Ground	Continuity
M114	1		Yes

Is the inspection result normal?

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

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

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

Heated steering wheel relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M90	5	M114	2	Yes

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

Heated steering wheel 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-37, "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. 74)
- 10A fuse (No. 74)
- Harness for open or short between 10A fuse (No. 74) 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	2		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 wheel 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.

A/C Auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M50	8	M48	1	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-37, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C Auto amp. Refer to HAC-157, "Removal and Installation".
NO >> Replace heated steering wheel switch. Refer to IP-23, "Removal and Installation".

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000008282686

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to IP-23, "Removal and Installation".
3. Check continuity between heated steering wheel switch terminals.

Terminal		Condition	Continuity
1	2	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	6	Apply 12V direct current between terminals	ON

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel switch.

Component Inspection (Heated Steering Relay)

INFOID:0000000008282688

1. CHECK HEATED STEERING RELAY CONTINUITY

1. Turn ignition switch OFF.
2. Remove heated steering relay. Refer to ST-7, "HEATED STEERING WHEEL SYSTEM : Component Parts Location".
3. Apply 12V direct current between heated steering relay terminals and check continuity.

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 wheel relay.

Component Inspection (Heated Steering Wheel)

INFOID:0000000008282687

1.CHECK HEATED STEERING WHEEL CONTINUITY

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to ST-45, "Removal and Installation".
3. Check continuity between 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

Component Function Check

INFOID:0000000008282689

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-39, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008282690

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to IP-23, "Removal and Installation".
3. Turn ignition switch ON.
4. Check voltage between heated steering wheel switch harness connector terminals.

Connector	Terminal		Voltage (Approx.)
	+	-	
M48	1	2	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	6		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

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-37, "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. 74)
- 10A fuse (No. 74)
- Harness for open or short between 10A fuse (No. 74) and heated steering wheel 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	1	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-37, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C Auto amp. Refer to HAC-157, "Removal and Installation"
NO >> Replace heated steering wheel switch. Refer to IP-23, "Removal and Installation".

SYMPTOM DIAGNOSIS

STEERING COLUMN

Symptom Table

INFOID:0000000008368264

STEERING COLUMN

Symptom	Inspection item
Tilt and telescopic functions are inoperative	Refer to ST-25, "AUTOMATIC DRIVE POSITIONER CONTROL UNIT : Diagnosis Procedure" (power supply and ground circuit). Refer to ST-30, "Diagnosis Procedure" (tilt and telescopic switch ground circuit).
Tilt function only is inoperative	Refer to ST-26, "Diagnosis Procedure" (tilt switch). Refer to ST-31, "Diagnosis Procedure" (tilt motor).
Telescopic function only is inoperative	Refer to ST-28, "Diagnosis Procedure" (telescopic switch). Refer to ST-33, "Diagnosis Procedure" (telescopic motor).

HEATED STEERING WHEEL

Symptom	Inspection item
Heated steering wheel system inoperative	Refer to ST-35, "Diagnosis Procedure".
Heated steering wheel switch indicator lamp inoperative	Refer to ST-39, "Diagnosis Procedure".

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000007883795

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

Reference page			ST-19, "Inspection"	—	ST-24, "Inspection"	ST-24, "Inspection"	ST-24, "Inspection"	ST-19, "Inspection"	ST-20, "Inspection"	ST-24, "Inspection"	—	—	ST-24, "Inspection"	ST-22, "Inspection"	ST-22, "Inspection"	ST-24, "Inspection"	Refer to FAX-5, "NVH Troubleshooting Chart"	Refer to FAX-5, "NVH Troubleshooting Chart" Refer to FSU-3, "NVH Troubleshooting Chart"	Refer to WT-50, "NVH Troubleshooting Chart"	Refer to WT-50, "NVH Troubleshooting Chart"	Refer to DLN-97, "NVH Troubleshooting Chart"	Refer to BR-3, "NVH Troubleshooting Chart"
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	Improper installation or looseness of tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	WHEEL HUB	AXLE and SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES
Symptom	Steering	Noise	×	×	×	×	×	×	×	×							×	×	×	×	×	×
		Shake									×		×					×	×	×	×	×
		Vibration									×		×	×	×			×	×		×	
		Shimmy									×		×			×		×	×	×		×
		Shudder											×			×		×	×	×		×

×: Applicable

PERIODIC MAINTENANCE

POWER STEERING FLUID

Draining and Refilling

INFOID:0000000007883801

DRAINING

1. Disconnect the high and low pressure piping from power steering gear.
2. Drain power steering fluid into a suitable container.

REFILLING

1. Fill power steering reservoir while checking power steering fluid level.
2. Bleed air from power steering hydraulic system. Refer to ST-43, "Air Bleeding Hydraulic System".
3. Check for power steering fluid leaks.

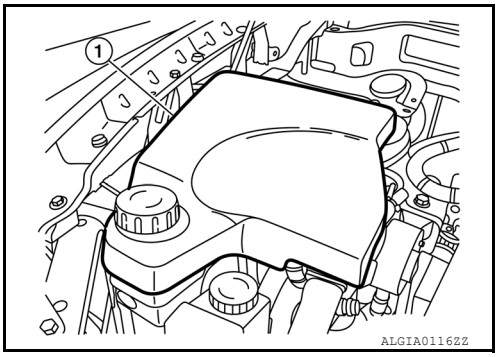
Air Bleeding Hydraulic System

INFOID:0000000007883802

AIR BLEEDING HYDRAULIC SYSTEM

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

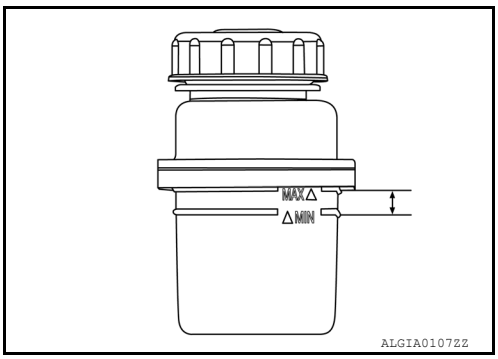
1. Make sure engine is off.
2. Remove power steering oil pump cover (1).



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.

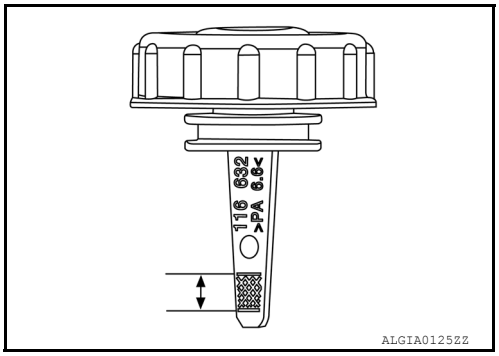
CAUTION:

Do not allow the power steering fluid level to drop below the MIN line.



5. Repeat steps one and two 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 between the hatching area of the indicator on the power steering reservoir tank cap.

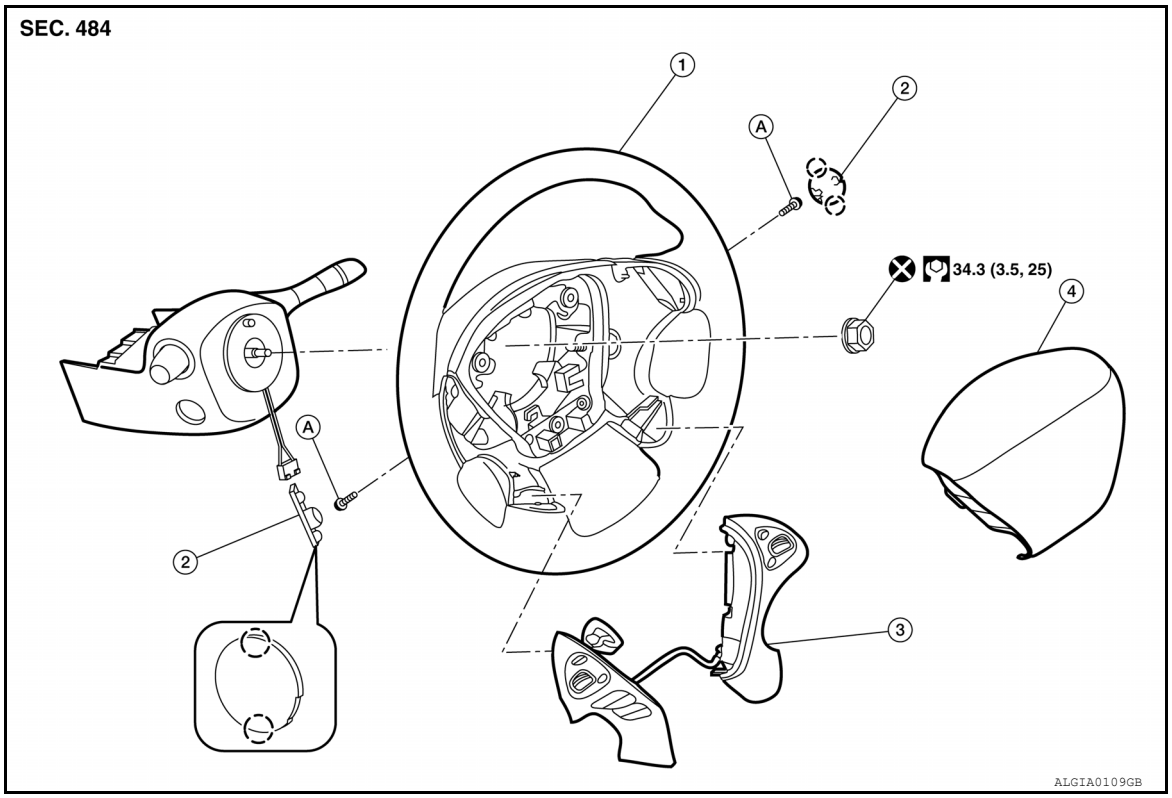


REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:0000000008249400



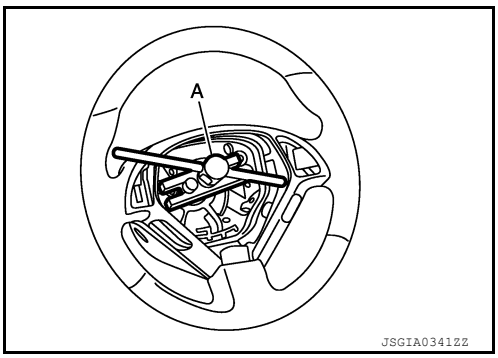
1. Steering wheel
2. Cover
3. Steering switches
4. Driver air bag module
A. Refer to SR-10, "Exploded View".
Pawl

Removal and Installation

INFOID:0000000007883805

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to SR-10, "Removal and Installation".
3. Remove steering wheel lock nut.
4. Remove steering switches. Refer to AV-130, "Removal and Installation" (BASE AUDIO), AV-390, "Removal and Installation" (BOSE AUDIO W/O SURROUND SOUND) or AV-670, "Removal and Installation" (BOSE AUDIO WITH SURROUND SOUND).
5. Remove steering wheel using suitable tool (A).
   CAUTION:
   Place a piece of tape across the spiral cable so it will not be rotated out of position.



6. 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-13, "Removal and Installation".
- Refer to BRC-59, "Work Procedure" for steering angle sensor adjustment.
- Tighten steering wheel center nut to specification. Refer to ST-45, "Exploded View".

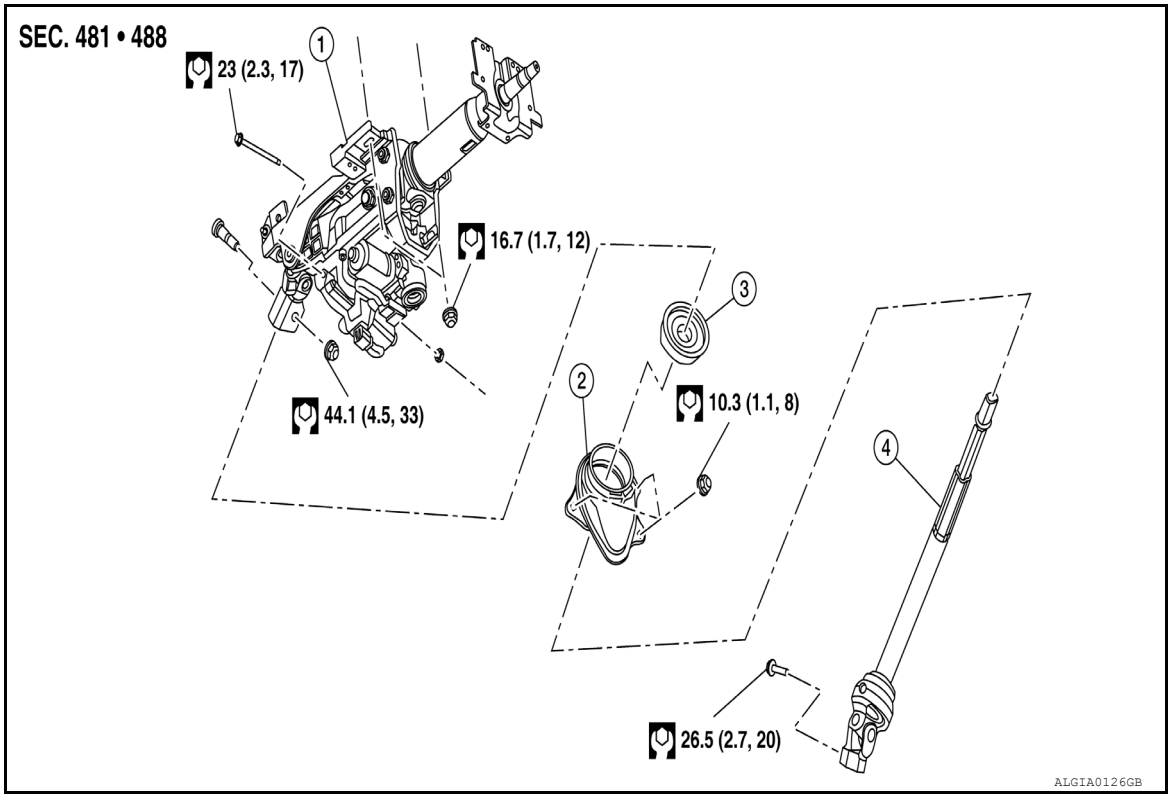
CAUTION:

- **The spiral cable may snap due to steering operation if the cable is not installed in the correct position.**
- **With the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns.**

STEERING COLUMN

Exploded View

INFOID:0000000008256363



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

Removal and Installation

INFOID:0000000008256364

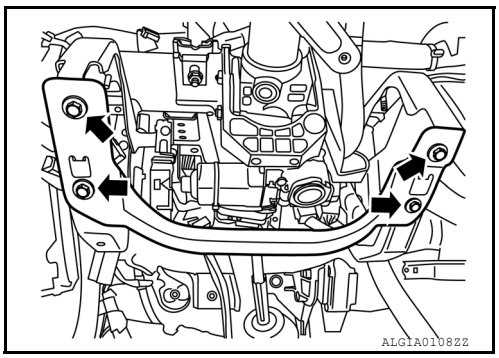
CAUTION:

- **Any time the ignition switch has been disconnected, removed or installed, the keys must be re-registered in the BCM. Refer to CONSULT operations manual.**
- **Care must be taken not to give axial impact to steering column assembly during removal and installation.**
- **Care must be taken not to move steering gear during removal of steering column assembly.**

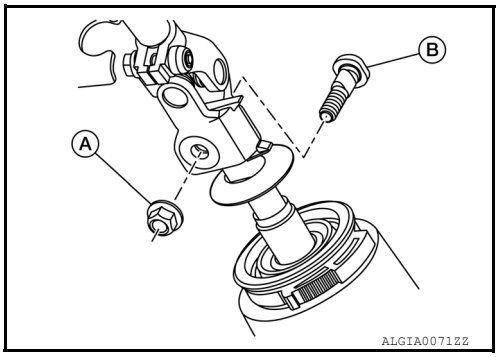
REMOVAL

1. Remove the spiral cable from the steering column assembly. Refer to SR-13, "Removal and Installation".
2. Remove the steering angle sensor from the steering column assembly. Refer to BRC-130, "Removal and Installation".
3. Remove the steering column covers. Refer to IP-17, "Removal and Installation".
4. Remove the combination switch. Refer to BCS-78, "Removal and Installation".
5. Remove the instrument lower panel LH. Refer to IP-23, "Removal and Installation".

6. Remove the instrument panel brace bolts and the instrument panel brace.



7. Disconnect the tilt motor and telescopic motor harness connectors.
8. Remove lock nut (A) and bolt (B), then separate steering column assembly from steering intermediate shaft.



9. Remove the steering column assembly nuts and bolt, then remove steering column assembly.

INSTALLATION

Installation is in the reverse order of removal.

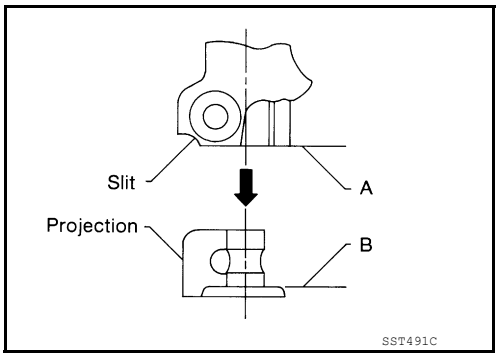
CAUTION:

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 slit of the coupling joint with projection on dust cover. Insert the joint until surface (A) contacts surface (B).

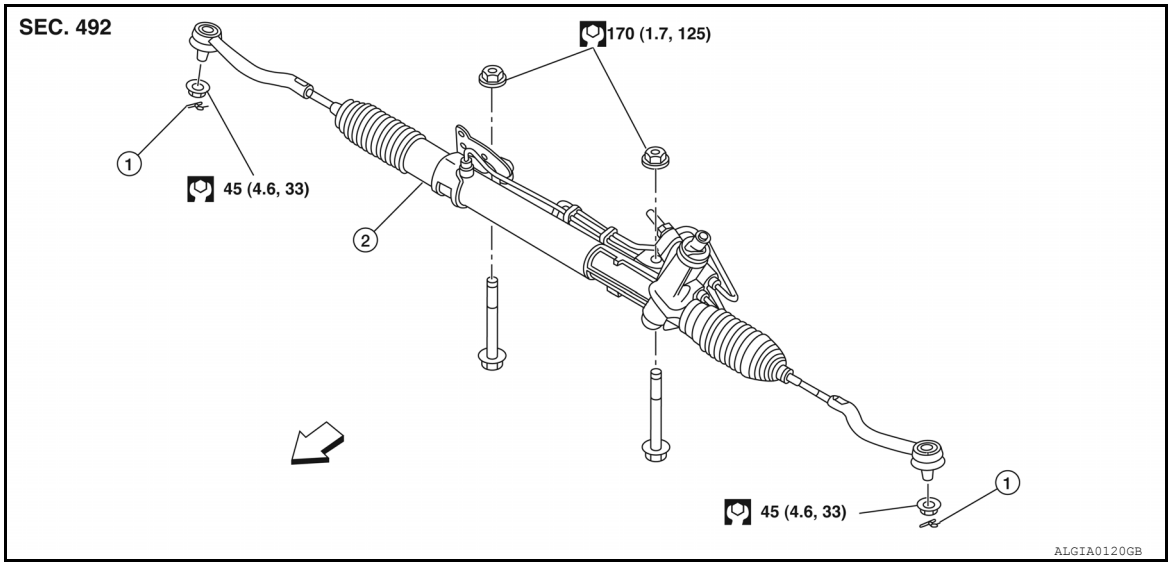
- After installation, turn steering wheel to make sure it moves smoothly. Make sure the number of turns are the same from the straight-forward position to left and right locks. Make sure that the steering wheel is in a neutral position when driving straight ahead.
- When installing steering column to steering member, install nut from front of vehicle.
- After installing the steering column, check the tilt mechanism for proper operation.
- After installing the steering column, check if steering wheel has smooth operation while turning to the left and right end stops.



STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000007883812



1. Cotter pin
2. Steering gear assembly
⇦ Front

Removal and Installation - FWD

INFOID:0000000008256376

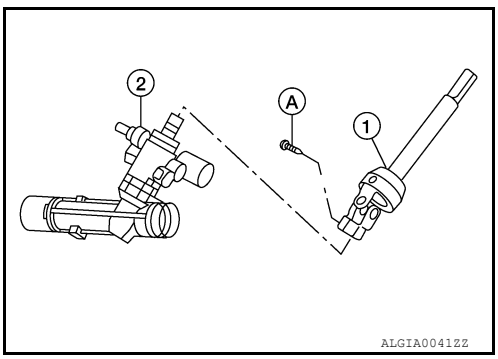
NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

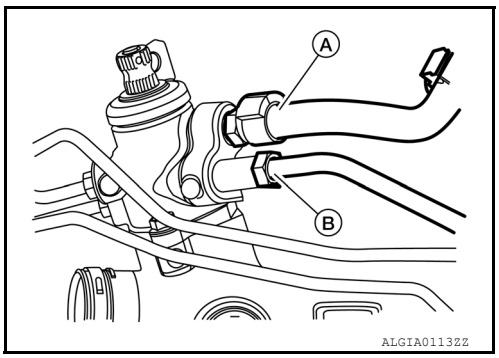
1. Set the front wheels in the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to WT-52, "Adjustment".
3. Drain the power steering fluid. Refer to ST-43, "Draining and Refilling".
4. Disconnect the outer sockets from the steering knuckles using Tool.

Tool number : HT72520000 (J-25730-A)

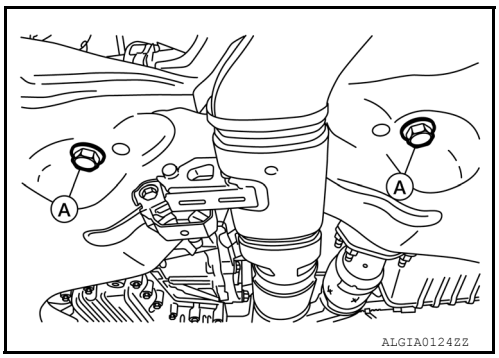
5. Remove the rear engine bracket. Refer to EM-102, "2WD : Exploded View".
6. Remove the stabilizer bar. Refer to FSU-11, "Removal and Installation".
7. Remove the hose and line bracket on the steering gear.
8. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).



9. Disconnect the low pressure piping (A) and high pressure piping (B) from the steering gear.



10. Remove the steering gear nuts and bolts (A).



11. Remove the steering gear.

INSTALLATION

Installation is in the reverse order of removal.

- Bleed the air from hydraulic system. Refer to ST-43, "Air Bleeding Hydraulic System".
- Check wheel alignment. Refer to FSU-5, "Inspection and Adjustment".

Removal and Installation - AWD

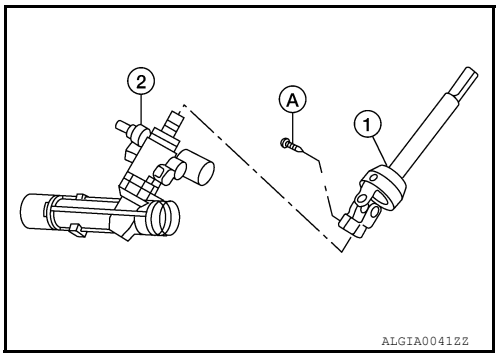
INFOID:0000000008297176

REMOVAL

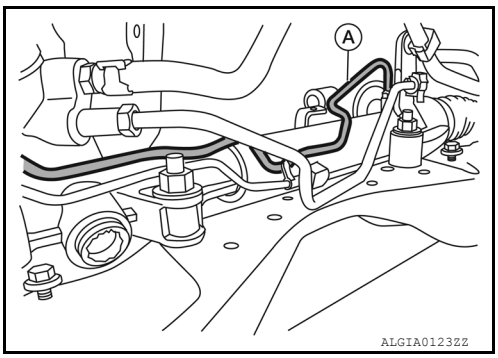
1. Set the front wheels in the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to WT-52, "Adjustment".
3. Drain the power steering fluid. Refer to ST-43, "Draining and Refilling".
4. Disconnect the LH outer socket from the steering knuckle using Tool.

Tool number : HT72520000 (J-25730-A)

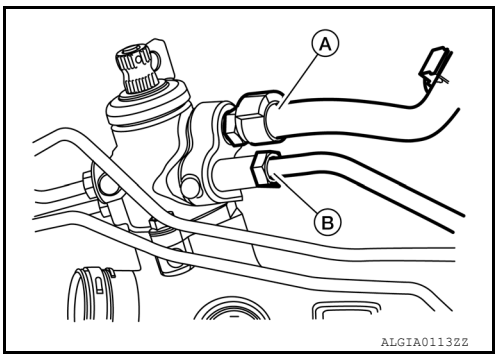
5. Remove the rear engine mount bracket. Refer to EM-106, "AWD : Exploded View".
6. Remove the front exhaust pipe. Refer to EX-5, "Removal and Installation".
7. Remove the propeller shaft. Refer to DLN-99, "Removal and Installation".
8. Remove the stabilizer bar from the LH side. Refer to FSU-11, "Removal and Installation".
9. Disconnect the low pressure piping and high pressure piping bracket from the steering gear.
10. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).



11. Remove the steering gear pressure relief pipe from the steering gear (A).



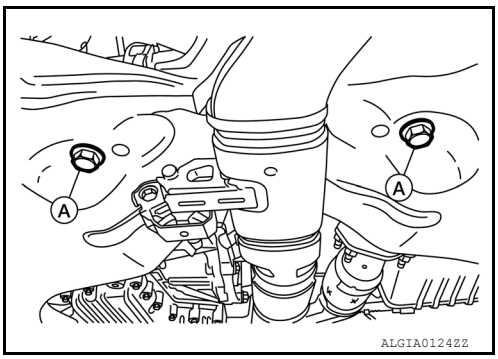
12. Disconnect the low pressure piping (A) and high pressure piping (B) from the steering gear.



13. Disconnect the RH outer socket from the steering knuckle using Tool.

Tool number : HT72520000 (J-25730-A)

14. Remove the steering gear nuts and bolts (A).



15. Remove the steering gear.

INSTALLATION

Installation is in the reverse order of removal.

- Bleed the air from power steering system. Refer to ST-43, "Air Bleeding Hydraulic System".
- Check wheel alignment. Refer to FSU-5, "Inspection and Adjustment".

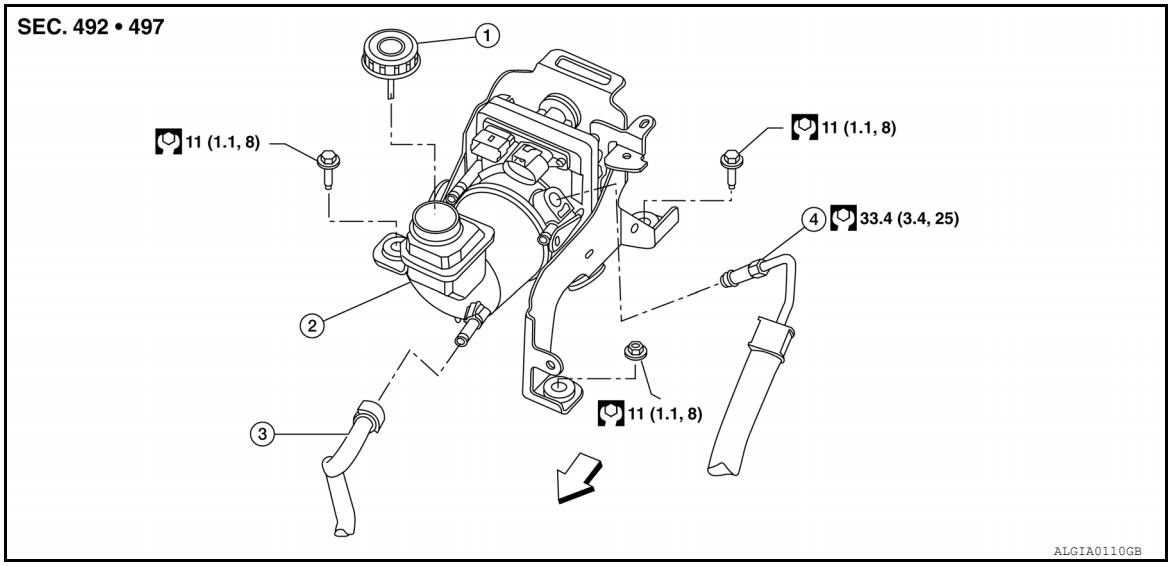
CAUTION:

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

POWER STEERING OIL PUMP

Exploded View

INFOID:0000000007883814



1. Power steering reservoir cap
2. Power steering oil pump assembly
3. Low pressure piping
4. High pressure piping
⇦ Front

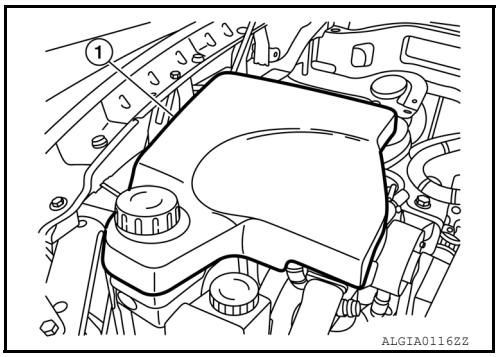
Removal and Installation

INFOID:0000000007883815

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

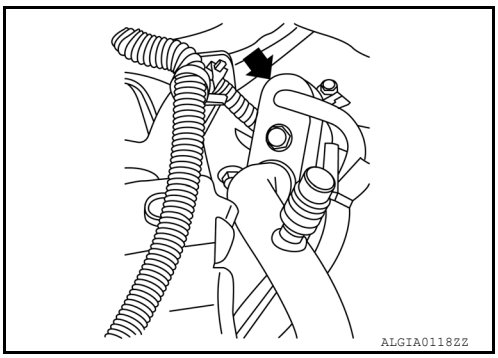
REMOVAL

1. Remove the power steering oil pump cover (1).

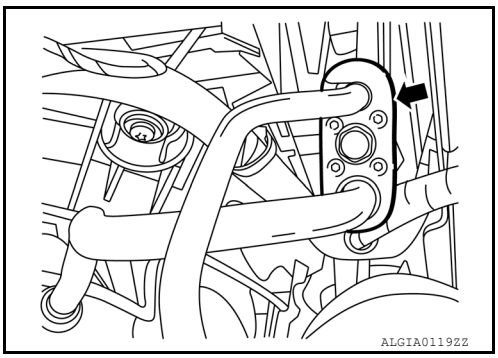


2. Drain power steering fluid. Refer to ST-43, "Draining and Refilling".
3. Remove the upper torque rod. Refer to EM-102, "2WD : Exploded View" (FWD) or EM-106, "AWD : Exploded View" (AWD).
4. Remove the RH upper engine mount insulator nuts. Refer to EM-102, "2WD : Exploded View" (FWD) or EM-106, "AWD : Exploded View" (AWD).

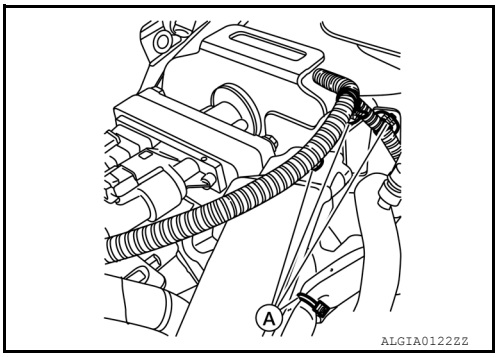
5. Disconnect the A/C rear lines at lower pipes. Refer to HA-36, "Exploded View".



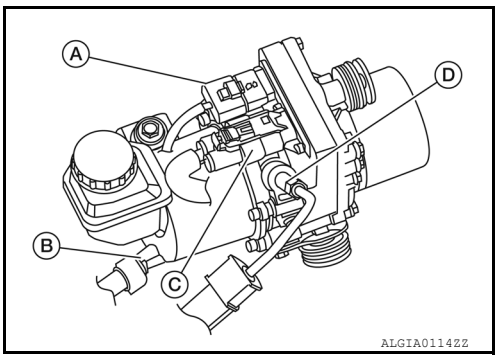
6. Disconnect the A/C front lines at junction. Refer to Refer to HA-36, "Exploded View".



7. Disconnect wiring harness clips from bracket (A).



8. Disconnect the follow components from the power steering oil pump:
   - LH power steering pump connector (A).
   - Reservoir hose (B).
   - RH power steering pump connector (C).
   - High pressure piping (D).
9. Remove power steering oil pump bolts, and then remove power steering oil pump.



INSTALLATION

Installation is in the reverse order of removal.

- Bleed air from power steering system.

CAUTION:

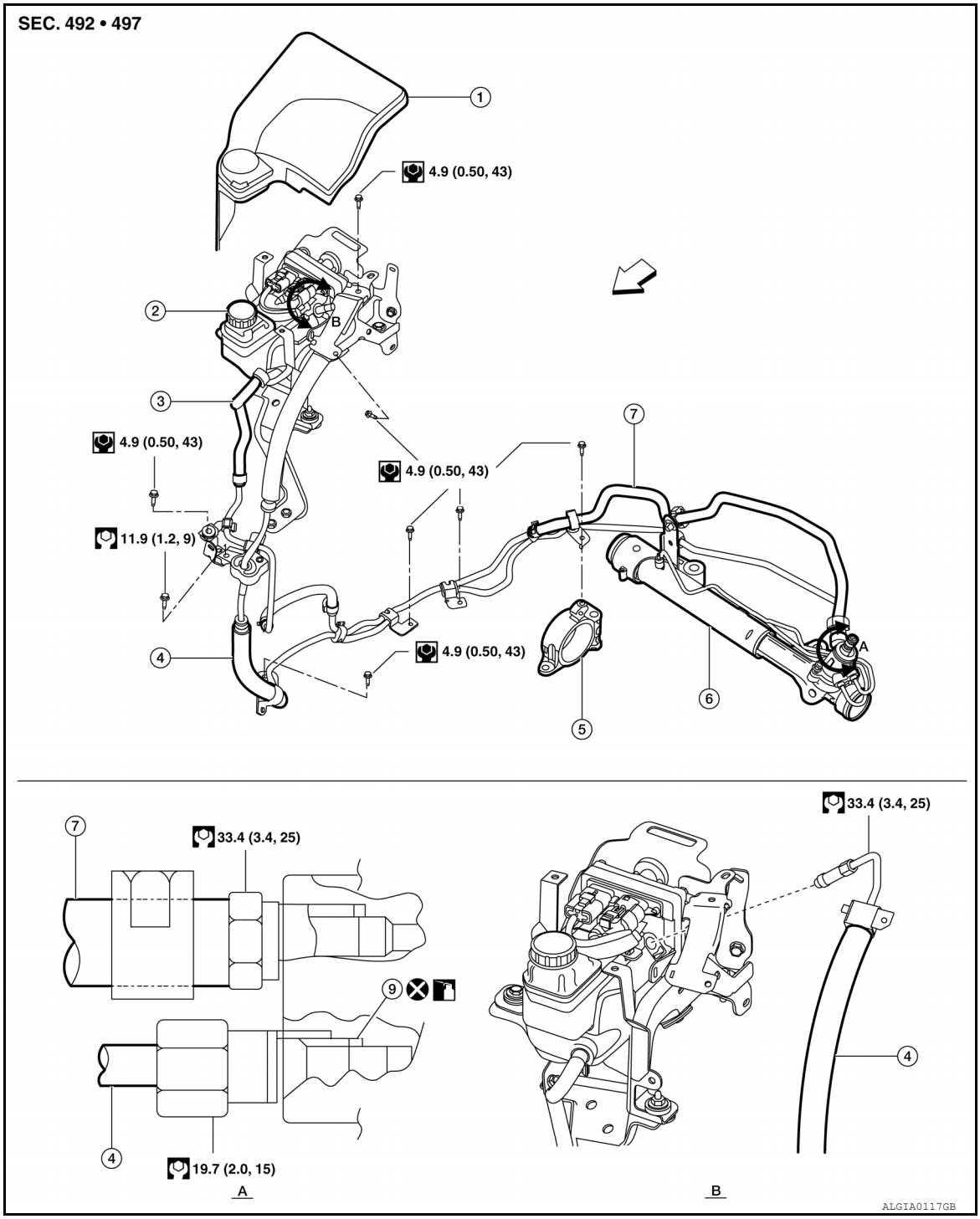
Do not reuse O-rings

HYDRAULIC LINE

Exploded View

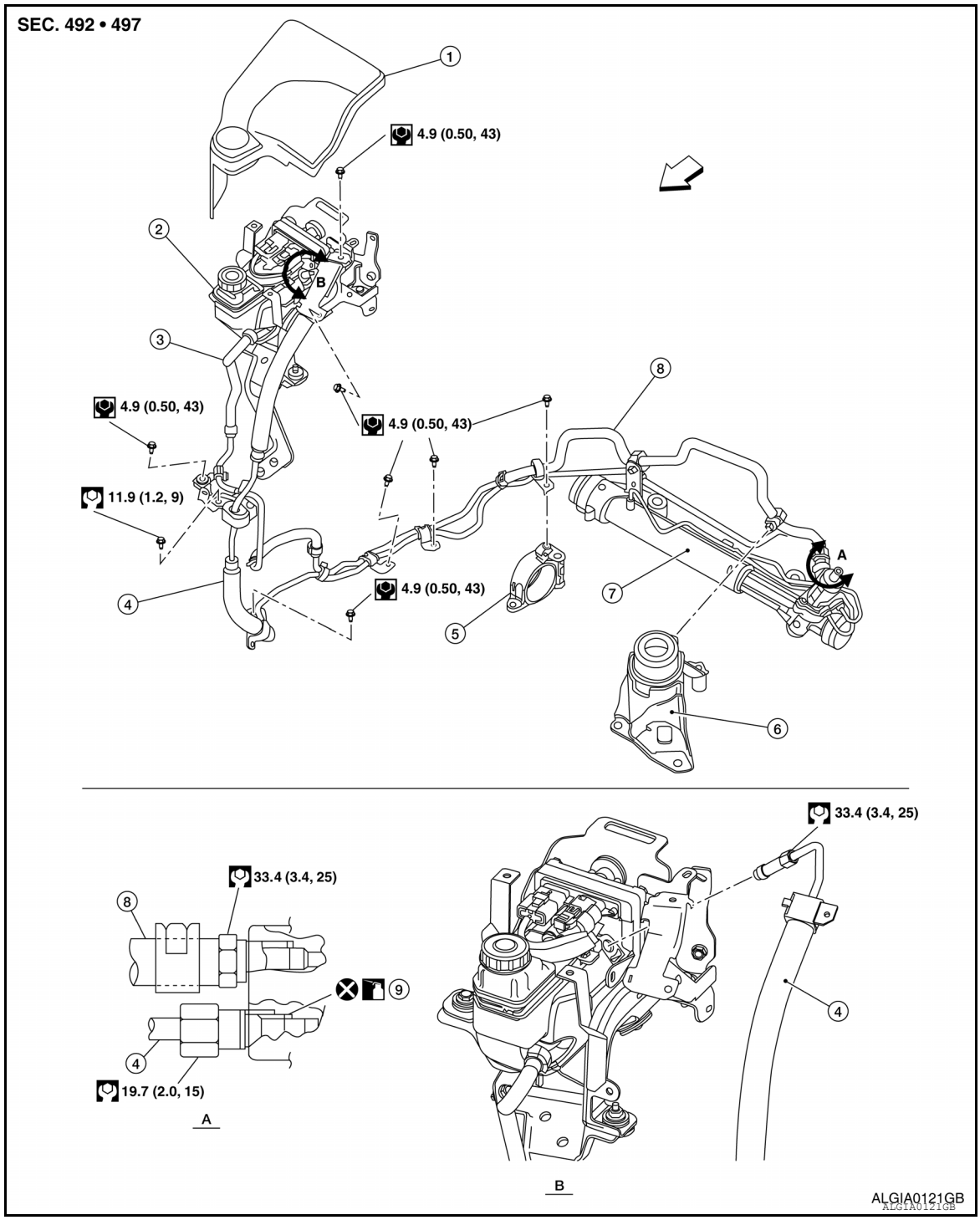
INFOID:0000000007883816

FWD



1. Cover
2. Power steering pump assembly
3. Low pressure piping - upper
4. High pressure piping
5. Engine mount
6. Power steering gear assembly
7. Low pressure piping - lower
⇦ Front

AWD



1.	Cover	2.	Power steering pump assembly	3.	Low pressure piping - upper
4.	High pressure piping	5.	Engine mount	6.	Engine mount bracket
7.	Power steering gear assembly	8.	Low pressure piping - lower	⇦	Front

Removal and Installation

INFOID:0000000007883817

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-54, "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-43, "Air Bleeding Hydraulic System".
- Check for fluid leaks. Repair as necessary.

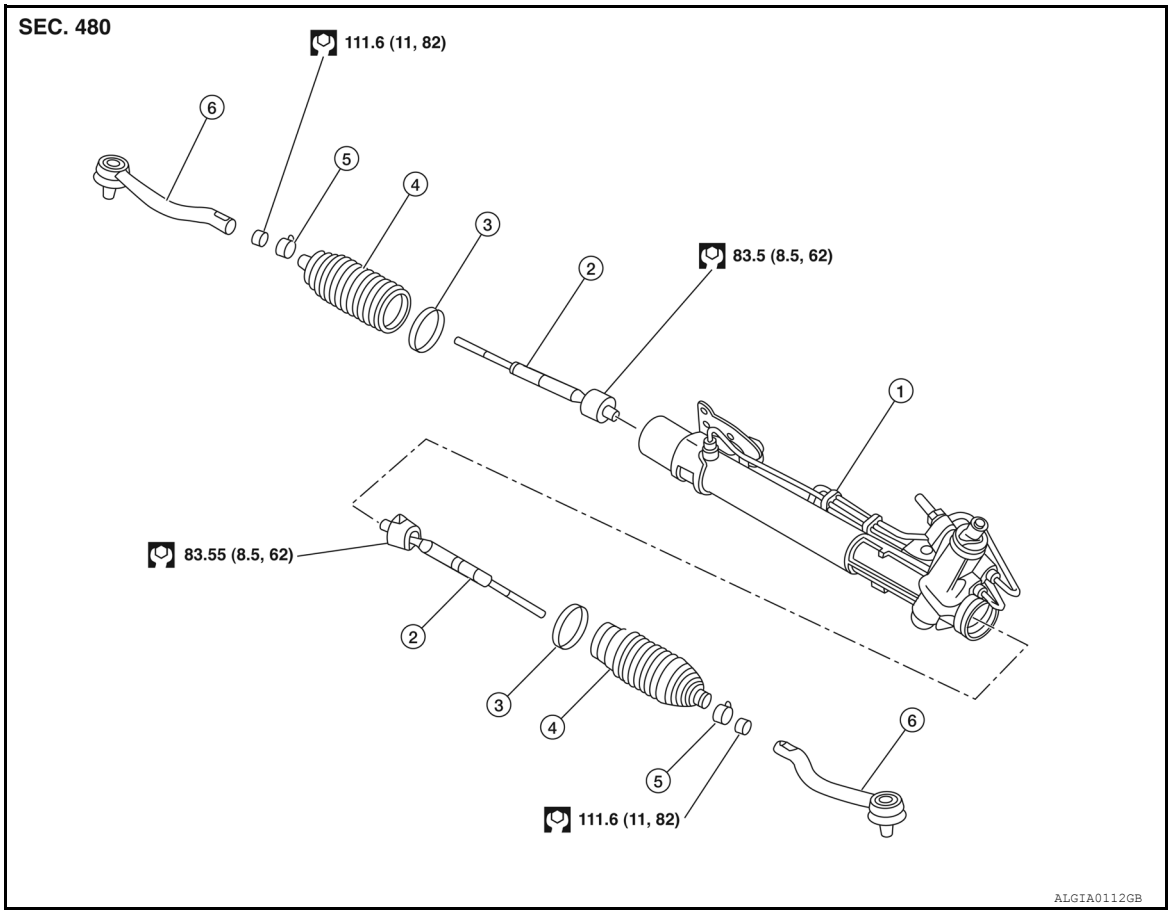
CAUTION:
- **Do not reuse O-rings.**

UNIT DISASSEMBLY AND ASSEMBLY

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000007883819



1.	Steering gear assembly	2.	Inner socket	3.	Inner boot clamp
4.	Boot	5.	Outer boot clamp	6.	Outer socket
⇦	Front				

Disassembly and Assembly

INFOID:0000000008266485

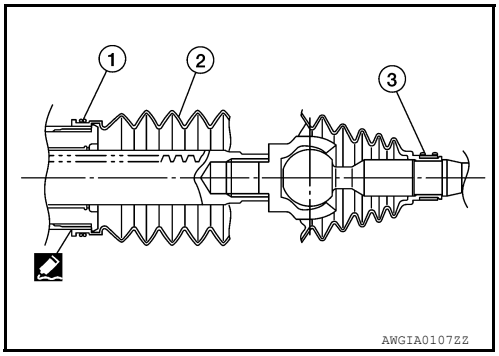
DISASSEMBLY

1. Remove outer socket locknut and outer socket.
2. Remove boot clamps and boot.
3. Remove inner socket.

ASSEMBLY

1. Apply Three Bond 1111B or equivalent to inner socket and turn pinion fully to retract inner socket into gear housing assembly.

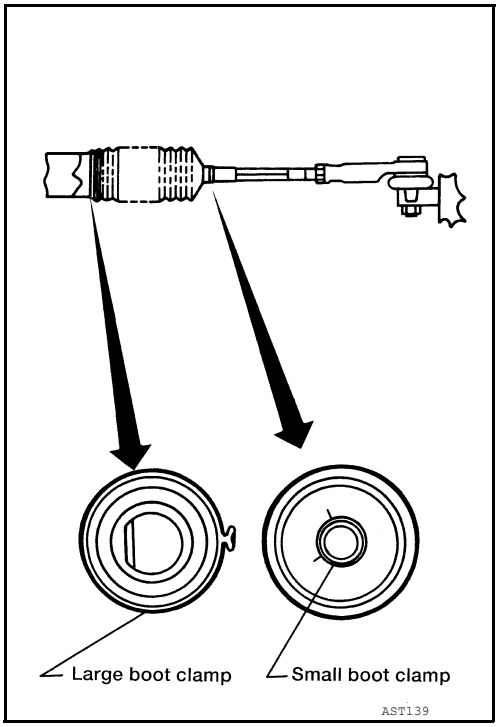
2. Install large end (1) of boot (2) to gear housing assembly.
3. Install small end (3) of boot (2) to inner socket boot mounting groove.



4. Install boot clamp to boot small end.
5. Install boot clamp to boot large end using Tool.

CAUTION:
Do not reuse boot clamps.

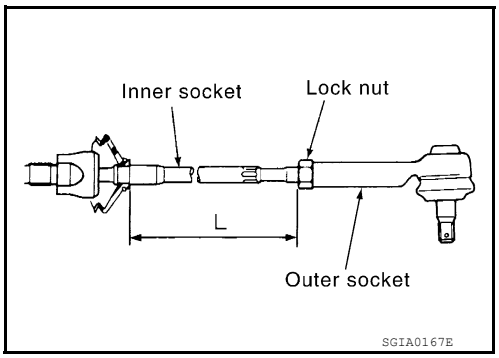
Tool number : KV40107300 (—)



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

Inner socket length (L) : Refer to ST-61, "Power Steering Gear".

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



POWER STEERING OIL PUMP

Disassembly and Assembly

INFOID:0000000007883823

The power steering oil pump is not serviceable and should be replaced as an assembly. Refer to ST-52, "Removal and Installation".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Wheel

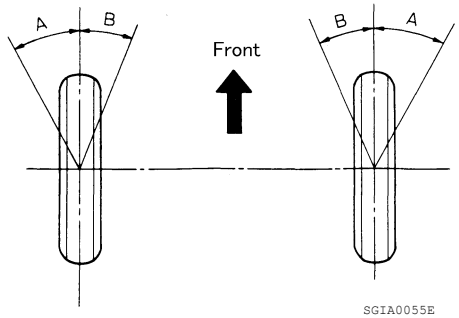
INFOID:0000000007883824

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:0000000007883825

Unit: Degree minute (Decimal Degree)



SGIA0055E

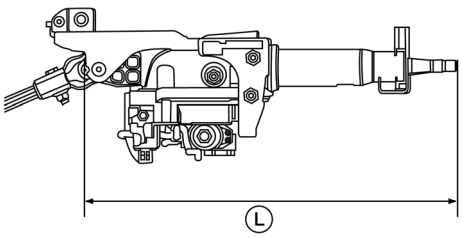
Inner wheel angle (A)	Minimum	35° 00′ (35.0°)
	Nominal	38° 00′ (38.0°)
	Maximum	39° 00′ (39.0°)
Outer wheel angle (B)	Nominal	33° 00′ (33.0°)

Steering Column

INFOID:0000000007883826

STEERING COLUMN LENGTH

Unit: mm (in)



ALGIA0105ZZ

Steering column length	Length (L)	463 (18.23)
	Telescopic maximum	540 - 560 (21.26 - 22.05)
	Telescopic minimum	520 - 540 (20.47 - 21.26)

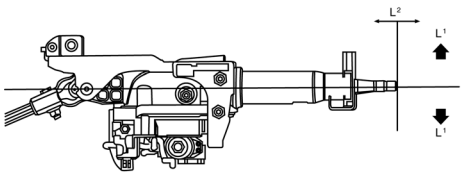
STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

Rotating torque	0 - 0.25 (0 - 0.03, 0 - 2)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0106ZZ

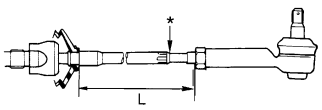
Tilt operating range (L^1)	50 (1.97)
Telescopic operating range (L^2)	20 (0.79)

Power Steering Gear

INFOID:0000000007883827

STEERING OUTER SOCKET AND INNER SOCKET

Outer socket	Rocking torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)
	• Measurement on spring balance • Measuring point: cotter pin hole of stud	1.4 - 42.7 N (0.14 - 4.4 kg, 12 - 31 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3.0 - 25 in-lb)
	Axial end play	0.5 mm (0.020 in) or less
Inner socket	Rocking torque	0.1 - 7.8 N·m (0.01 - 0.79 kg-m, 1.0 - 69 in-lb)
	• Measurement on spring balance • Measuring point at * mark shown	0.8 - 64 N (0.082 - 6.5 kg, 0.18 - 14.4 lb)
	Axial end play	0.2 mm (0.008 in) or less
Inner socket length (L)		127.5 mm (5.02 in) or less



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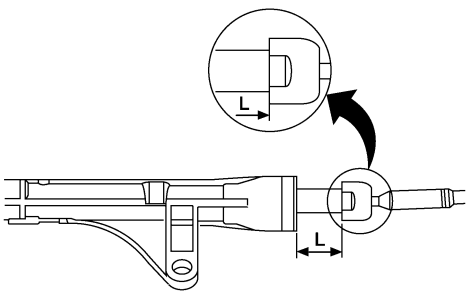
RACK STROKE



AWGIA0003GB

Rack stroke in neutral position (L)	73 mm (2.87 in)

RACK SLIDING FORCE

Standard	265 - 330 N-f (27 - 33.7 kg-f, 59.6 - 74.2 lb-f)
Average	270 N-f (27.5 kg-f, 60.7 lb-f)

Power Steering Oil Pump

INFOID:0000000007883828

Relief oil pressure	10,600 kPa (108.12 kg/cm^2, 1,537 psi)

Power Steering Fluid

INFOID:0000000007883829

Fluid type	E-PSF
Fluid capacity	—