SECTION ST
STEERING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000009134451

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 three minutes before performing any service.**

Service Notice or Precautions for Steering System

INFOID:0000000009134452

- 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.
- Never reuse non-reusable parts.
- Before assembling, apply the specified grease to the directed parts.

PREPARATION

PREPARATION

Special Service Tool

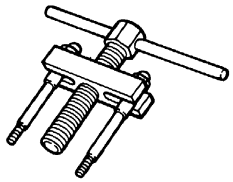
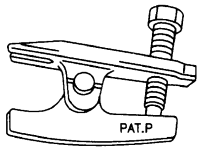
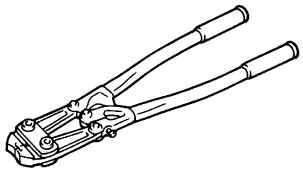
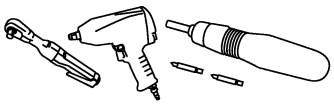
INFOID:0000000009134453

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
KV48102500 (J-33914) Pressure gauge adapter	Measuring oil pump relief pressure
— (J-44372) Pull gauge	Measuring steering wheel turning force, rack sliding force and ball joint swinging force

Commercial Service Tool

INFOID:0000000009134454

Tool name	Description
Steering wheel puller  ZZA0819D	Removing steering wheel
Ball joint remover  NT146	Removing ball joint
Boot clamp crimping tool  ZZA1229D	Installing boot clamps
Power tool  PIIB1407E	Loosening nuts, screws and bolts

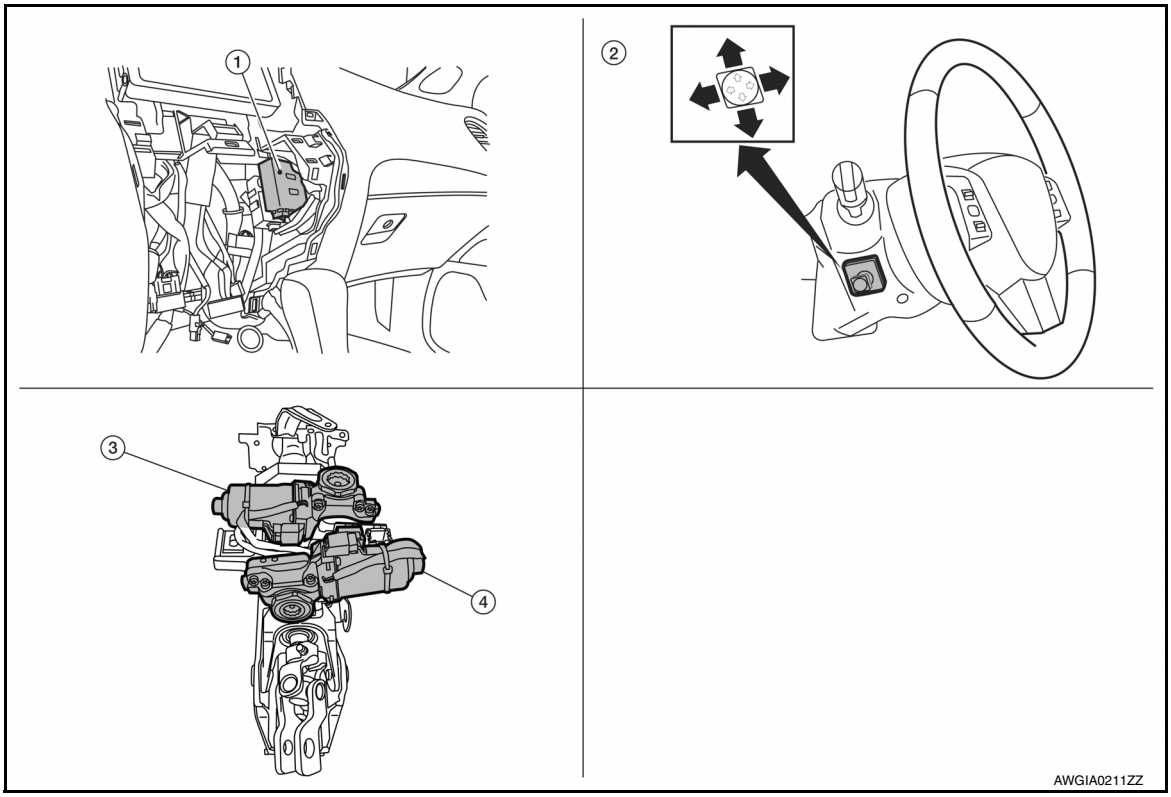
SYSTEM DESCRIPTION

COMPONENT PARTS

STEERING TILT & STEERING TELESCOPIC

STEERING TILT & STEERING TELESCOPIC : Component Parts Location

INFOID:0000000009134455



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

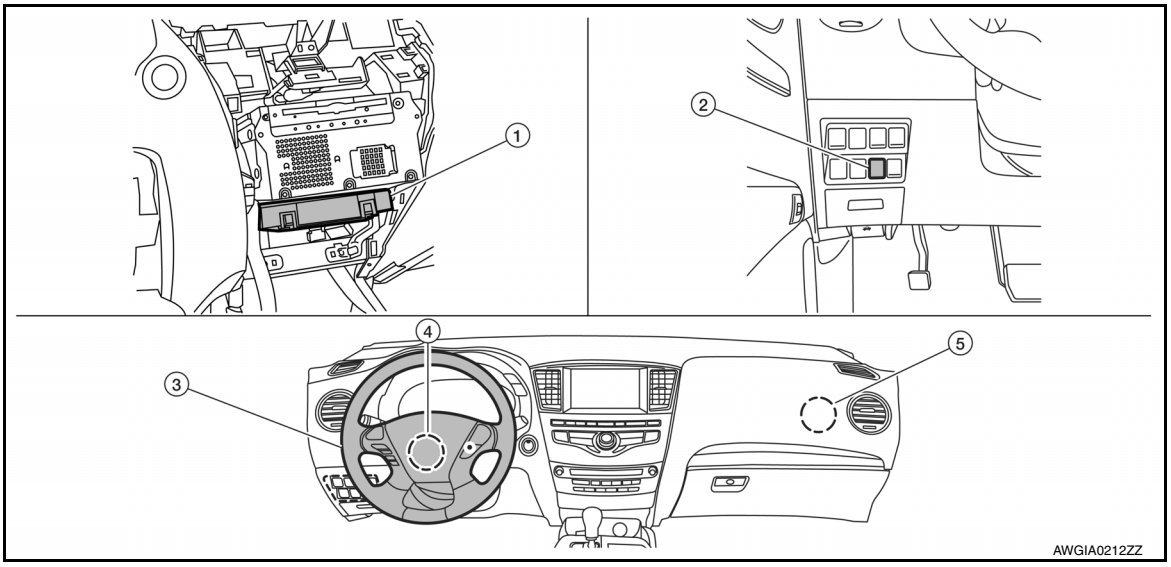
INFOID:0000000009134456

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:0000000009134457



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:0000000009134458

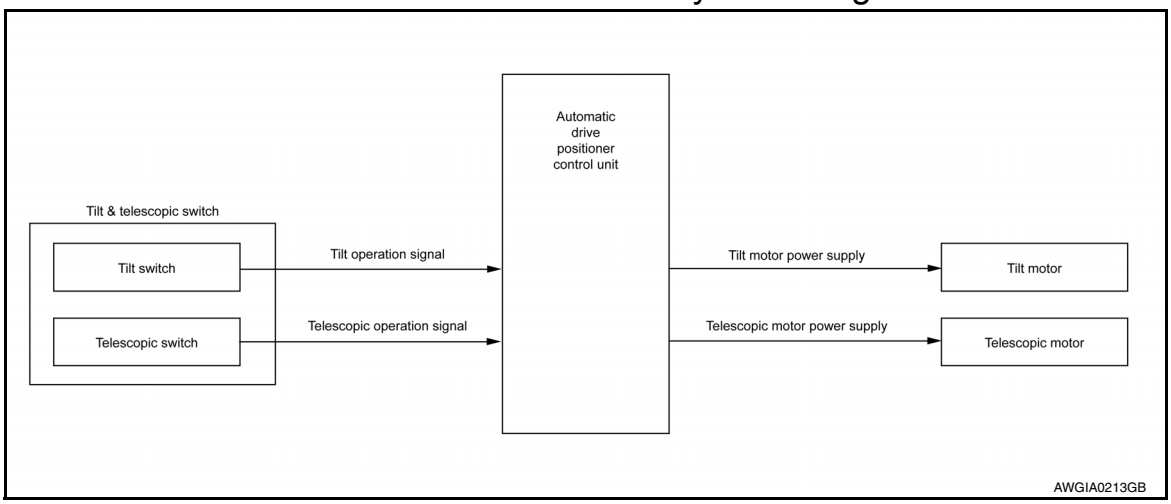
Components	Description
A/C Auto amp	Controls the heated steering relay by providing a ground signal to the coil.
Heated steering wheel switch	• Controls the heated steering relay by providing a ground signal to A/C Auto amp. • Provides switch indicator for system.
Heated steering relay	Provides battery 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

INFOID:0000000009134459



STEERING TILT & STEERING TELESCOPIC : System Description

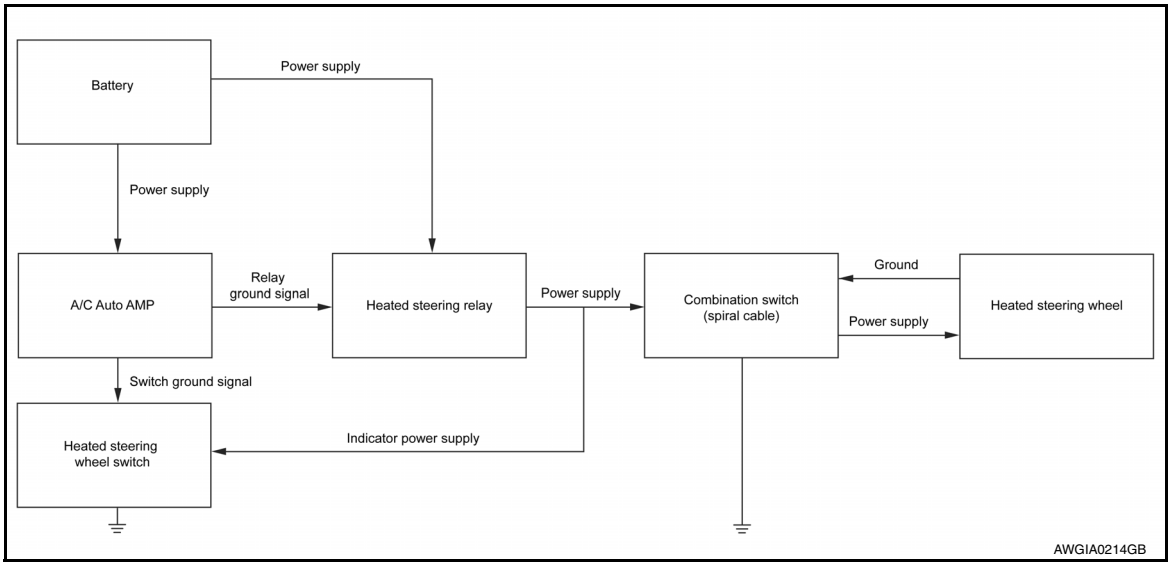
INFOID:0000000009134460

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:0000000009134461



HEATED STEERING WHEEL SYSTEM : System Description

INFOID:0000000009134462

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.

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 68°F (20°C) when the switch is turned on, the system will not heat the steering wheel. This is not a malfunction.

ECU DIAGNOSIS INFORMATION

AUTOMATIC DRIVE POSITIONER CONTROL UNIT

List of ECU Reference

INFOID:0000000009134463

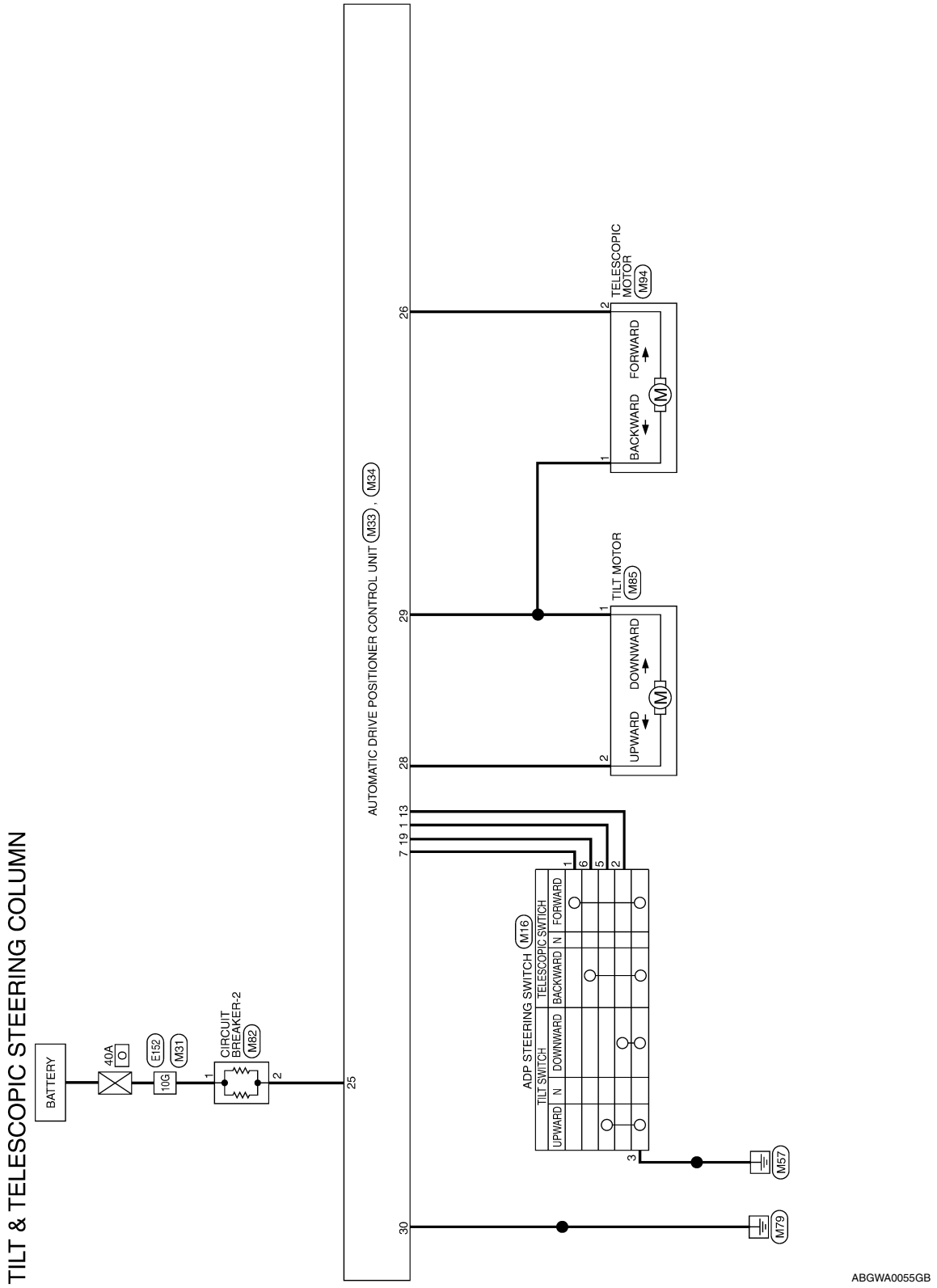
ECU	Reference
ADP Control Unit	ADP-32, "Reference Value"

WIRING DIAGRAM

STEERING COLUMN

Wiring Diagram

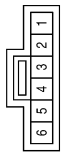
INFOID:0000000009134464



TILT & TELESCOPIC STEERING COLUMN CONNECTORS

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

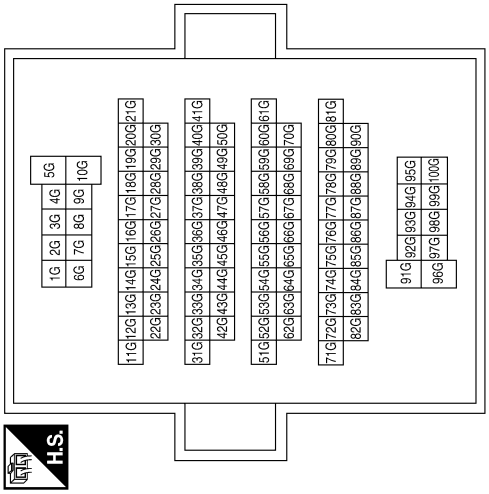
H.S.



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

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

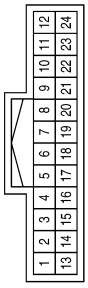
H.S.



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

Connector No.	M33
Connector Name	AUTOMATIC DRIVE POSITIONER CONTROL UNIT
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	LG	TILT SW (UPWARD)
7	BR	TELESCOPIC SW (FRONTWARD)
13	Y	TILT SW (DOWNWARD)
19	L	TELESCOPIC SW (BACKWARD)

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

H.S.

Terminal No.	Color of Wire	Signal Name
25	L	BAT (PTC)
26	V	TELESCOPIC MOTOR (BACKWARD)
28	SB	TILT MOTOR (DOWNWARD)
29	BR	STRG MOTOR COMMON (UPWARD/FORWARD)
30	B	GND (POWER)

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

H.S.

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

ABGIA0088GB

Connector No.	M85
Connector Name	TILT MOTOR
Connector Color	WHITE

H.S.

1		2
3	4	5	6

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

Connector No.	M94
Connector Name	TELESCOPIC MOTOR
Connector Color	BROWN

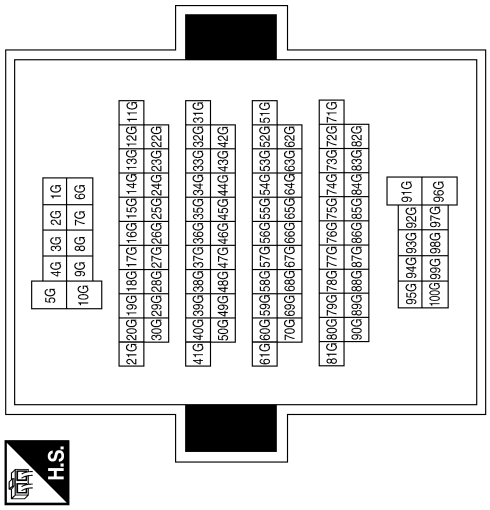
H.S.

1		2
3	4	5	6

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	–

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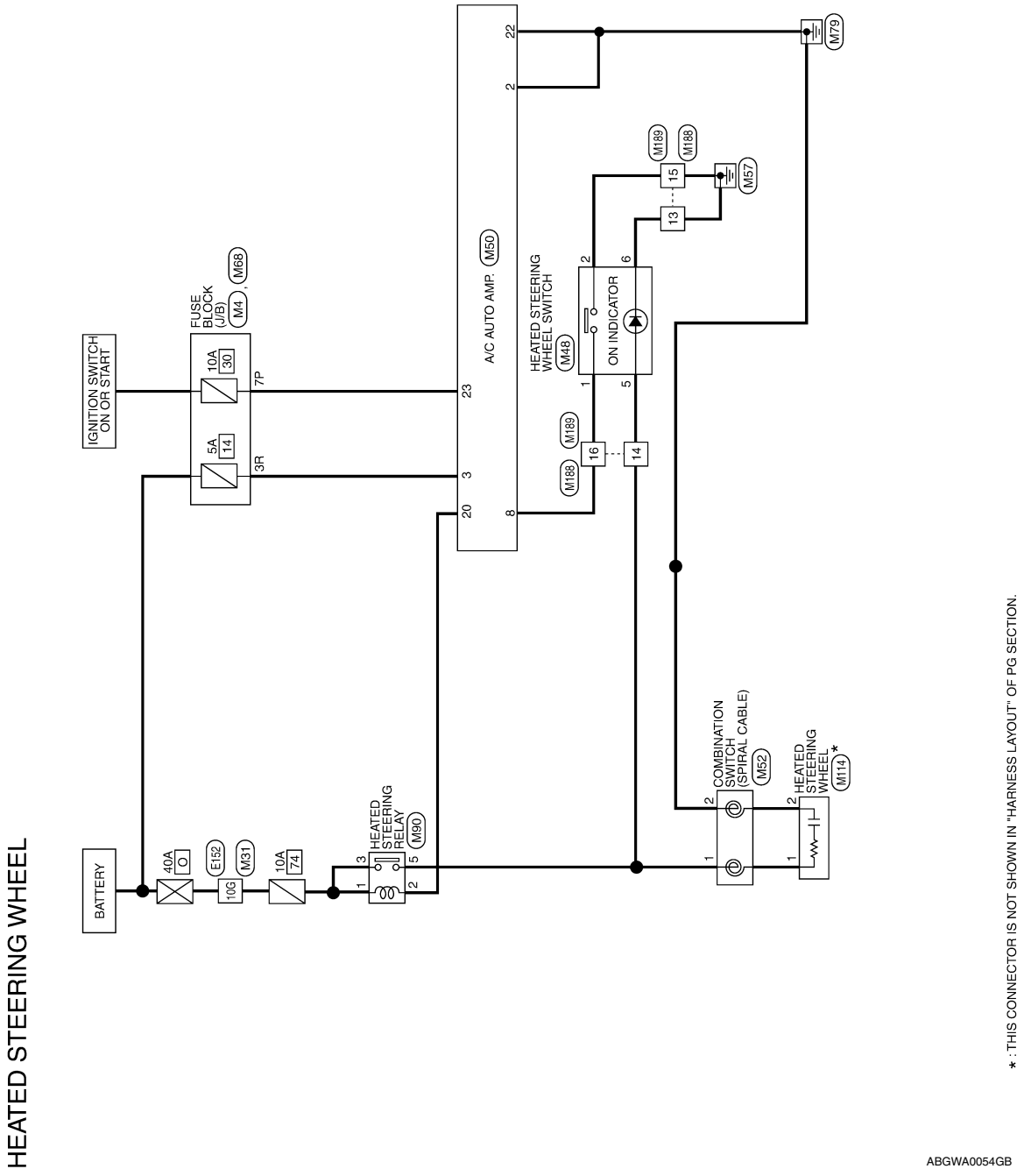
HEATED STEERING WHEEL

Wiring Diagram

INFOID:0000000009134465



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

ABGIA0085GB

Connector No.	M52
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
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	–

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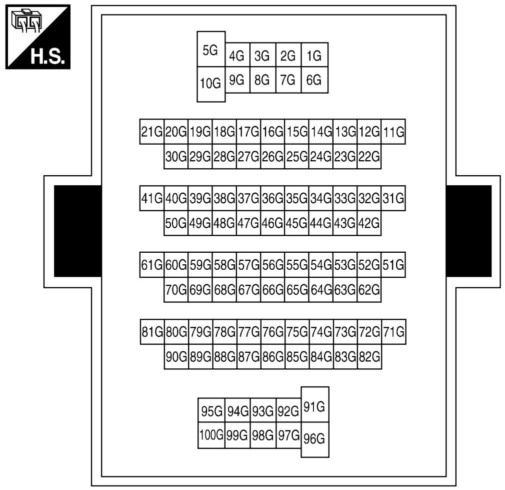
Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Color	WHITE



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

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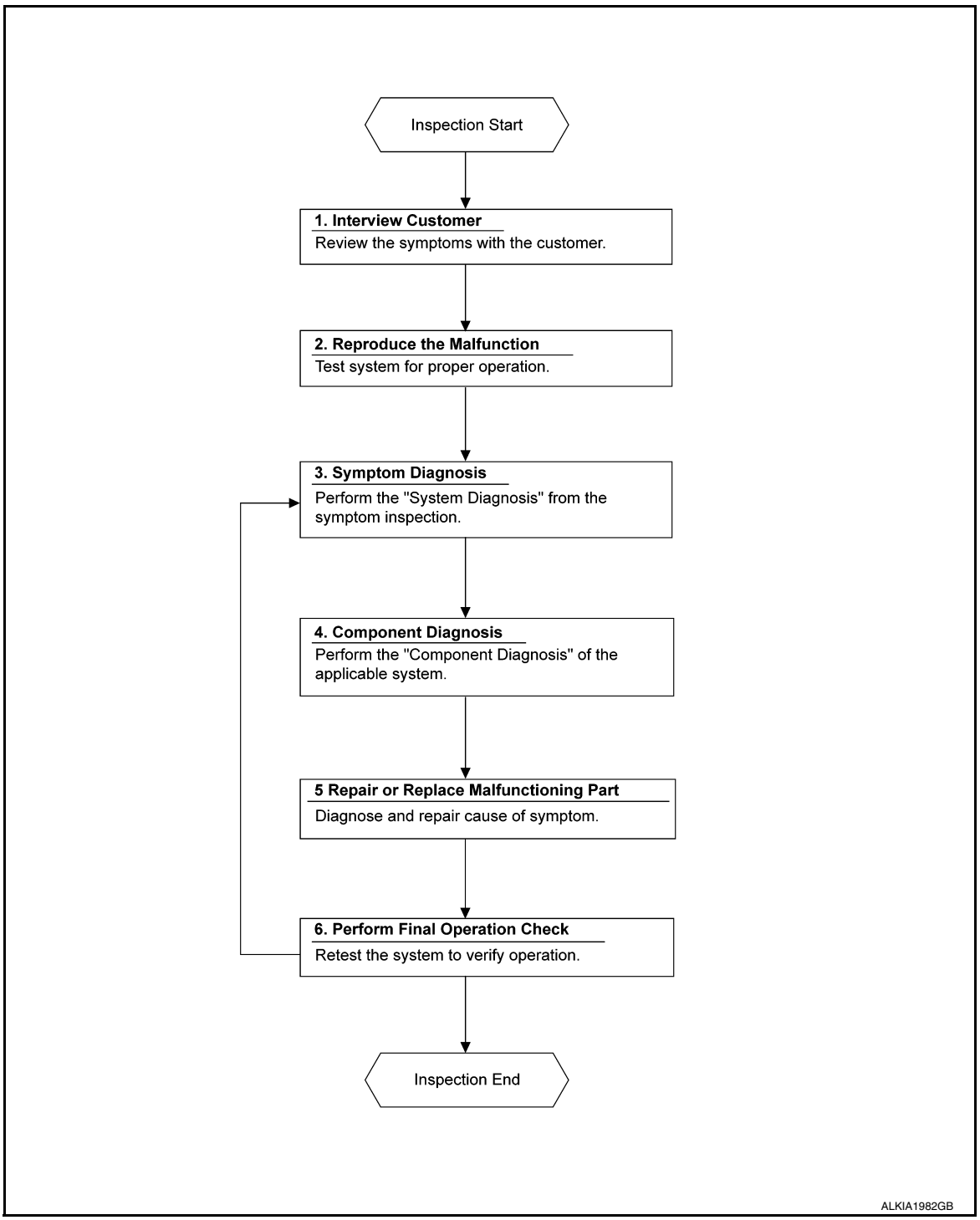
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000009134466

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-42, "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

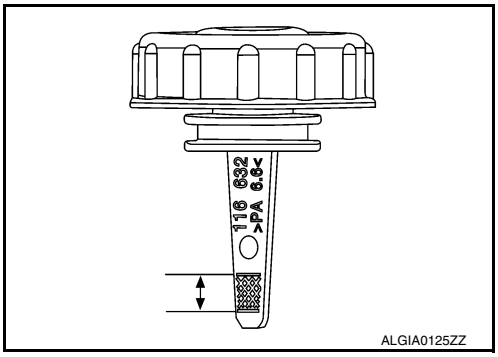
Inspection

INFOID:0000000009134467

FLUID LEVEL

Check power steering fluid level at the scale on the power steering reservoir 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 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-15, "FOR USA AND CANADA : Fluids and Lubricants" (United States and Canada) or MA-16, "FOR MEXICO : Fluids and Lubricants" (Mexico).**

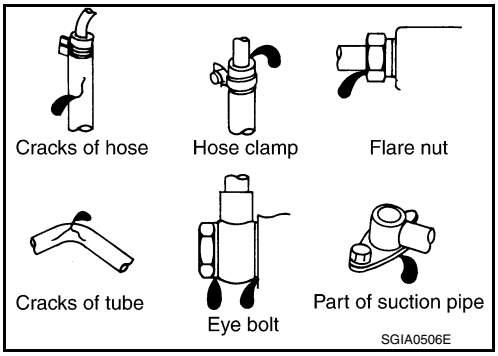
NOTE:

Power steering fluid level marks are on the reservoir and also on the power steering reservoir cap indicator.

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-54, "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-50, "Removal and Installation - FWD" (FWD) or ST-51, "Removal and Installation - AWD" (AWD).

STEERING WHEEL

Inspection

INFOID:0000000009134468

CONDITION OF INSTALLATION

- Check installation condition of power steering gear, front suspension, front drive shaft and steering column.
- Check if movement exists when steering wheel is moved up and down, to the left and right and to the axial direction.

Steering wheel axial end play : Refer to ST-62, "Steering Wheel".

- Verify that the power steering gear nuts are tightened to specification. Refer to ST-50, "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-62, "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".

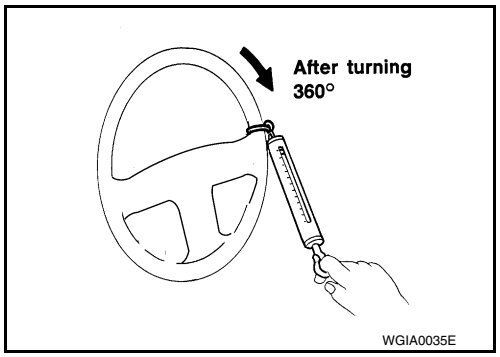
1. Turn tires straight ahead, check if steering wheel is in the neutral position.
2. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
3. If the neutral position cannot be attained by repositioning the steering wheel two teeth or less on steering stem, loosen tie-rod 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-60, "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)

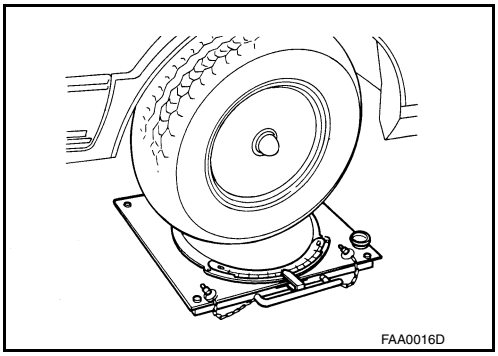
Steering wheel turning force : Refer to ST-62, "Steering Wheel".



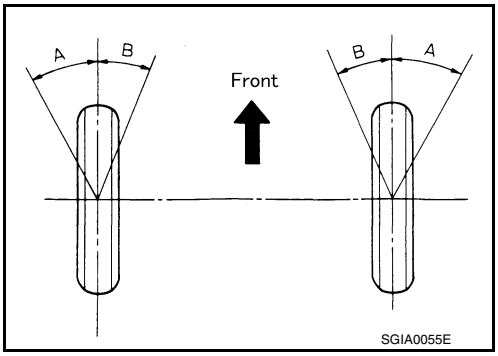
6. If steering wheel turning force is out of specification, inspect steering column. Refer to ST-23, "Inspection".
7. If steering column meets specification, inspect steering gear. Refer to ST-25, "Inspection".

CHECKING FRONT WHEEL TURNING ANGLE

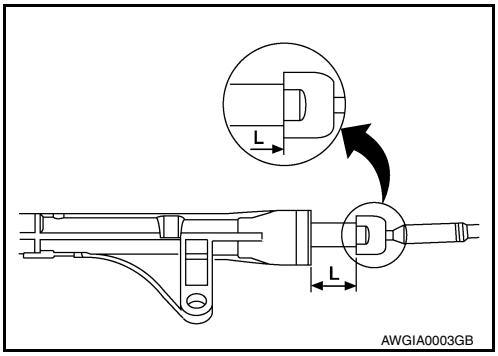
- Check front wheel turning angle after toe-in inspection. Place front wheels on turning radius gauges and rear wheels on stands. Check the maximum inner and outer wheel turning angles for LH and RH road wheels.



- 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-62, "Steering Angle".



- Measure the rack stroke specification with vehicle in neutral position. Refer to ST-63, "Power Steering Gear".



STEERING COLUMN

Inspection

INFOID:0000000009134469

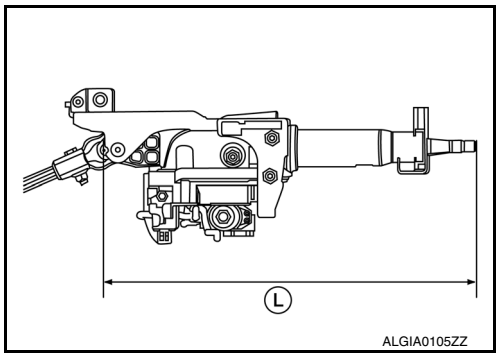
HOLE COVER SEAL, HOLE COVER AND LOWER SHAFT

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

STEERING COLUMN

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

Steering column length (L) : Refer to ST-62, "Steering Column".



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

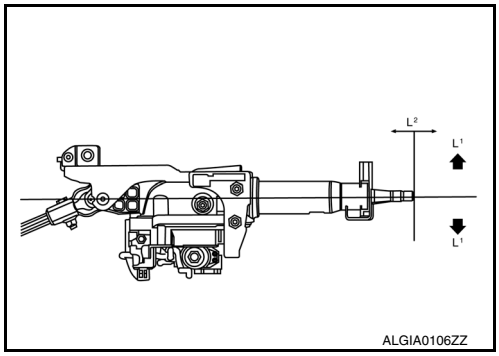
Tool number : ST3127S000 (J-25765-A)

Rotating torque : Refer to ST-62, "Steering Column".

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

Tilt operating range (L^1) : Refer to ST-62, "Steering Column".

Telescopic operating range (L^2) : Refer to ST-62, "Steering Column".



POWER STEERING OIL PUMP

Inspection

INFOID:0000000009134470

RELIEF OIL PRESSURE

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-44, "Air Bleeding Hydraulic System".

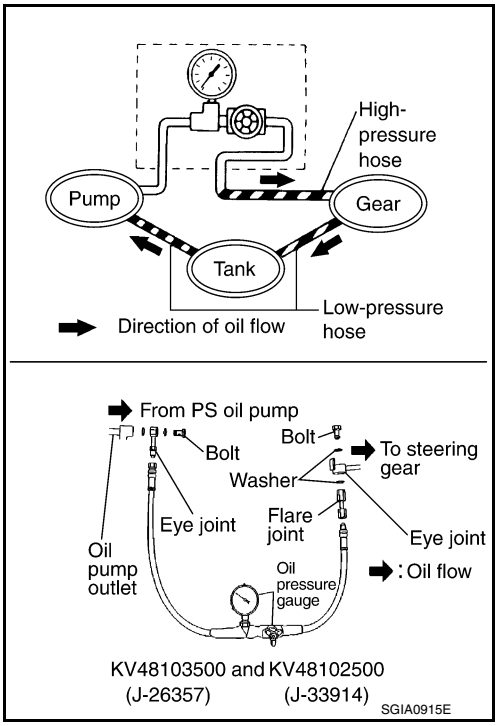
Tool numbers : KV48103500 (J-26357)
: KV48102500 (J-33914)

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-64, "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-44, "Air Bleeding Hydraulic System".

STEERING GEAR AND LINKAGE

Inspection

INFOID:0000000009134471

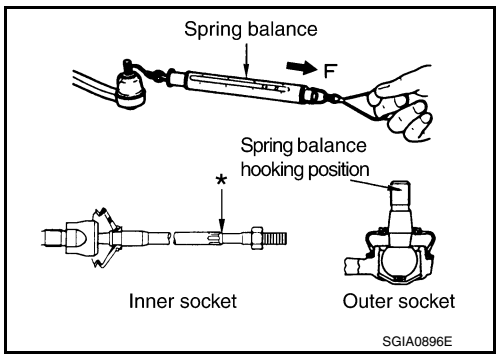
BOOT

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.

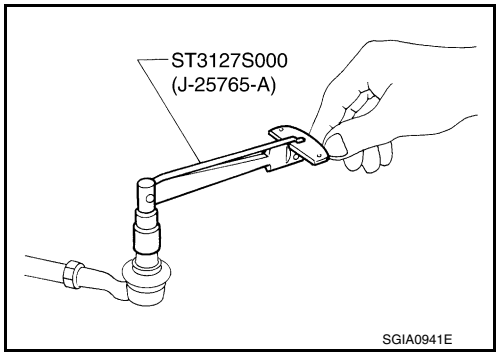


Tool number : — (J-44372)

Swinging torque : Refer to ST-63, "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.

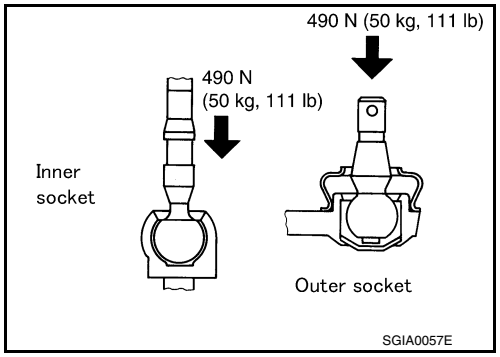


Tool number : ST3127S000 (J-25765-A)

Rotating torque : Refer to ST-63, "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-63, "Power Steering Gear".

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

AUTOMATIC DRIVE POSITIONER CONTROL UNIT

AUTOMATIC DRIVE POSITIONER CONTROL UNIT : Diagnosis Procedure

INFOID:0000000009134472

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.

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:0000000009134473

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:0000000009134474

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:0000000009134475

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-27, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134476

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	5	Ground	Battery voltage
	2		

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	5	Yes
	13		2	

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-143, "Removal and Installation".
NO >> Repair or replace harness.

3. CHECK TILT SWITCH

Refer to ST-28, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ADP steering switch (tilt switch). Refer to ADP-146, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-53, "Intermittent Incident".

>> Inspection End.

Component Inspection

INFOID:0000000009134477

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				
3	5	Tilt switch (up)	Operate	Yes
			Release	No
	2	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-146, "Removal and Installation".

TELESCOPIC SWITCH

Description

INFOID:0000000009134478

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:0000000009134479

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-29, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134480

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	1	Ground	Battery voltage
	6		

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	1	Yes
	19		6	

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-143, "Removal and Installation".
NO >> Repair or replace harness.

3. CHECK TELESCOPIC SWITCH

Refer to ST-30, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ADP steering switch (telescopic switch). Refer to ADP-146, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-53, "Intermittent Incident".

>> Inspection End.

Component Inspection

INFOID:0000000009134481

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				
3	1	Telescopic switch (forward)	Operate	Yes
			Release	No
	6	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-146, "Removal and Installation".

TILT &TELESCOPIC SWITCH GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000009134482

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	3		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:0000000009134483

- 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:0000000009134484

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-32, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134485

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-48, "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-143, "Removal and Installation".
NO >> Repair or replace harness.

TELESCOPIC MOTOR

Description

INFOID:0000000009134486

- 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:0000000009134487

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-34, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134488

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-48, "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-143, "Removal and Installation".
NO >> Repair or replace harness.

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:0000000009134489

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-36, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134490

Regarding Wiring Diagram information, refer to ST-14, "Wiring Diagram".

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to ST-46, "Removal and Installation".
3. Turn ignition switch ON.
4. Turn heated steering wheel switch ON.
5. Check voltage between heated steering wheel harness connector terminals.

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

Is the inspection result normal?

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

2.CHECK HEATED STEERING WHEEL

Check heated steering wheel. Refer to ST-39, "Component Inspection (Heated Steering Wheel)".

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel. Refer to ST-46, "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 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	1	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-38, "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-38, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C Auto amp. Refer to HAC-163, "Removal and Installation".
NO >> Replace heated steering wheel switch. Refer to IP-25, "Removal and Installation".

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000009134491

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to IP-25, "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:0000000009134492

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:0000000009134493

1. CHECK HEATED STEERING WHEEL CONTINUITY

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to ST-46, "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:0000000009134494

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-40, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000009134495

Regarding Wiring Diagram information, refer to ST-14, "Wiring Diagram".

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to IP-25, "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-38, "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-38, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C Auto amp. Refer to HAC-163, "Removal and Installation"
NO >> Replace heated steering wheel switch. Refer to IP-25, "Removal and Installation".

SYMPTOM DIAGNOSIS

STEERING COLUMN

Symptom Table

INFOID:0000000009134496

STEERING COLUMN

Symptom	Inspection item
Tilt and telescopic functions are inoperative	Refer to ST-26, "AUTOMATIC DRIVE POSITIONER CONTROL UNIT : Diagnosis Procedure" (power supply and ground circuit). Refer to ST-31, "Diagnosis Procedure" (tilt and telescopic switch ground circuit).
Tilt function only is inoperative	Refer to ST-27, "Diagnosis Procedure" (tilt switch). Refer to ST-32, "Diagnosis Procedure" (tilt motor).
Telescopic function only is inoperative	Refer to ST-29, "Diagnosis Procedure" (telescopic switch). Refer to ST-34, "Diagnosis Procedure" (telescopic motor).

HEATED STEERING WHEEL

Symptom	Inspection item
Heated steering wheel system inoperative	Refer to ST-36, "Diagnosis Procedure".
Heated steering wheel switch indicator lamp inoperative	Refer to ST-40, "Diagnosis Procedure".

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000009134497

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

Reference page			ST-20, "Inspection"	ST-44, "Air Bleeding Hydraulic System"	ST-25, "Inspection"	ST-25, "Inspection"	ST-25, "Inspection"	ST-20, "Inspection"	ST-21, "Inspection"	ST-25, "Inspection"	—	—	ST-25, "Inspection"	ST-23, "Inspection"	ST-23, "Inspection"	ST-25, "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-51, "NVH Troubleshooting Chart"	Refer to WT-51, "NVH Troubleshooting Chart"	Refer to DLN-95, "NVH Troubleshooting Chart"	Refer to BR-6, "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:0000000009134498

DRAINING

1. Disconnect the high and low pressure piping from the power steering gear. Refer to ST-50, "Exploded View".
2. Drain power steering fluid into a suitable container.

REFILLING

1. Connect the high and low pressure piping to the power steering gear. Refer to ST-50, "Exploded View".
2. Fill power steering reservoir while checking power steering fluid level.
3. Bleed air from power steering hydraulic system. Refer to ST-44, "Air Bleeding Hydraulic System".
4. Check for power steering fluid leaks.

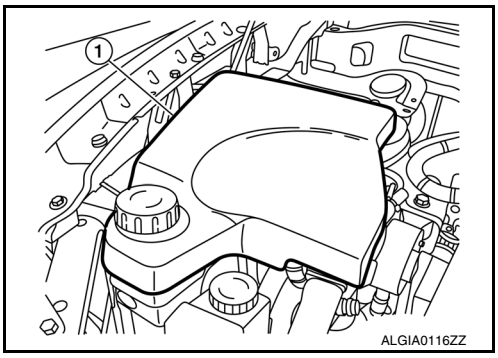
Air Bleeding Hydraulic System

INFOID:0000000009134499

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).



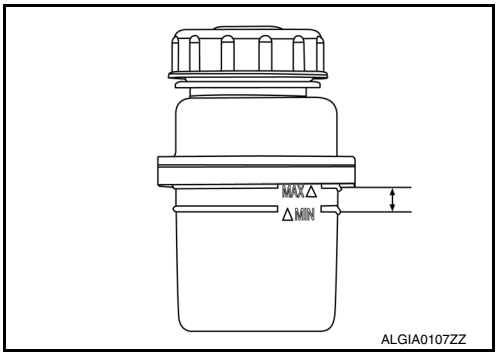
3. Turn the steering wheel from the full right stop position and then to full left stop position several times. Repeat until bubbles are no longer being generated in the reservoir.
4. When the power steering fluid level lowers, refill the reservoir.

CAUTION:

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

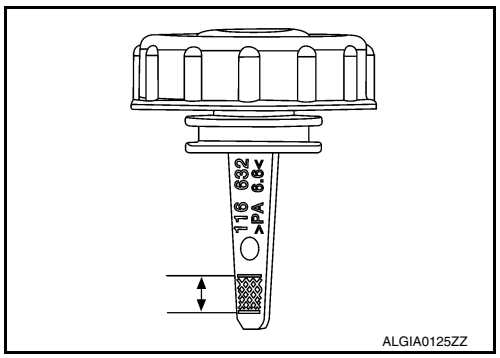
NOTE:

Power steering fluid level marks are on the outside of the power steering reservoir and also on the power steering reservoir cap indicator.



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 on the power steering reservoir cap indicator.

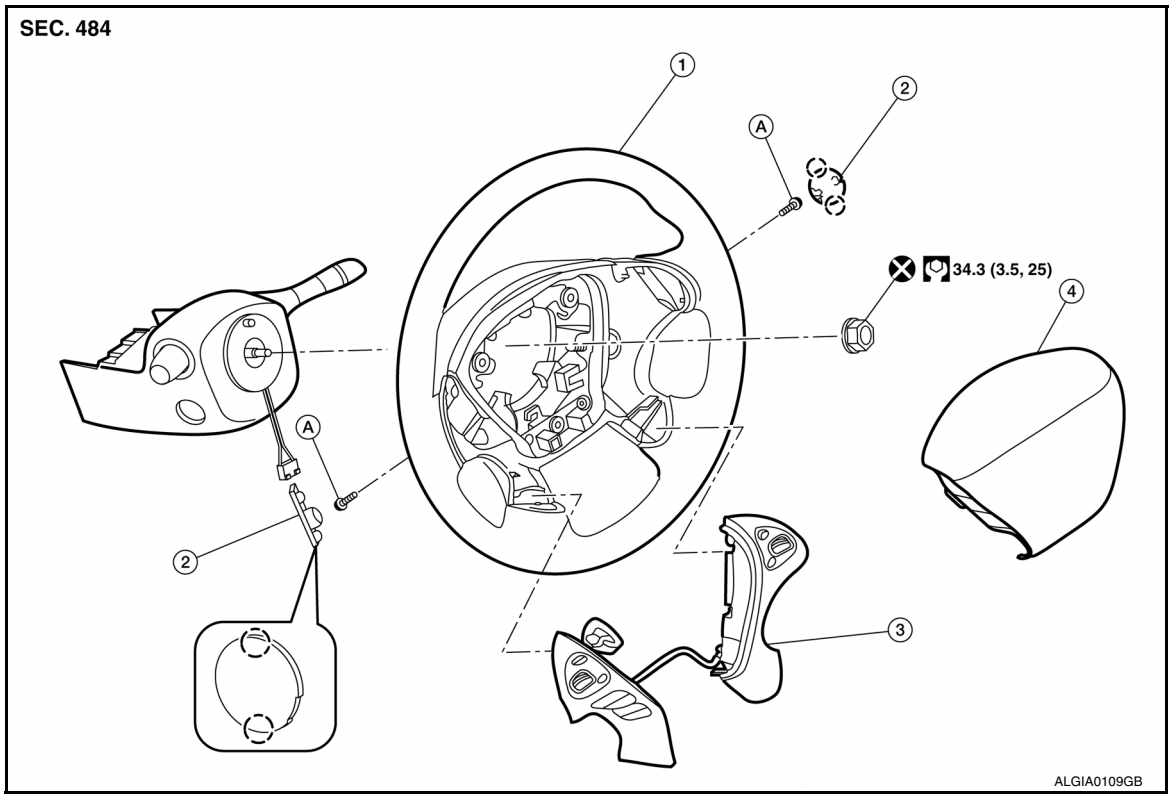


REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:0000000009134500



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

Removal and Installation

INFOID:0000000009134501

REMOVAL

1. Set the front wheels and tires in the straight-ahead position.
2. Remove driver air bag module. Refer to SR-12, "Removal and Installation".
3. Remove steering wheel lock nut.
4. Remove steering switches. Refer to AV-138, "Removal and Installation" (BASE AUDIO), AV-588, "Removal and Installation" (BOSE AUDIO - WITH NAVIGATION W/O SURROUND SOUND) or AV-305, "Removal and Installation" (BOSE AUDIO - WITHOUT NAVIGATION) or AV-305, "Removal and Installation" (BOSE AUDIO - WITH NAVIGATION AND SURROUND SOUND).
5. Remove steering wheel using suitable tool.
   CAUTION:
   Place a piece of tape across the spiral cable so it will not be rotated out of position.
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-15, "Removal and Installation".
- Adjust the neutral position of the steering angle sensor. Refer to BRC-60, "Work Procedure".
- Tighten steering wheel center nut to specification. Refer to ST-46, "Exploded View".

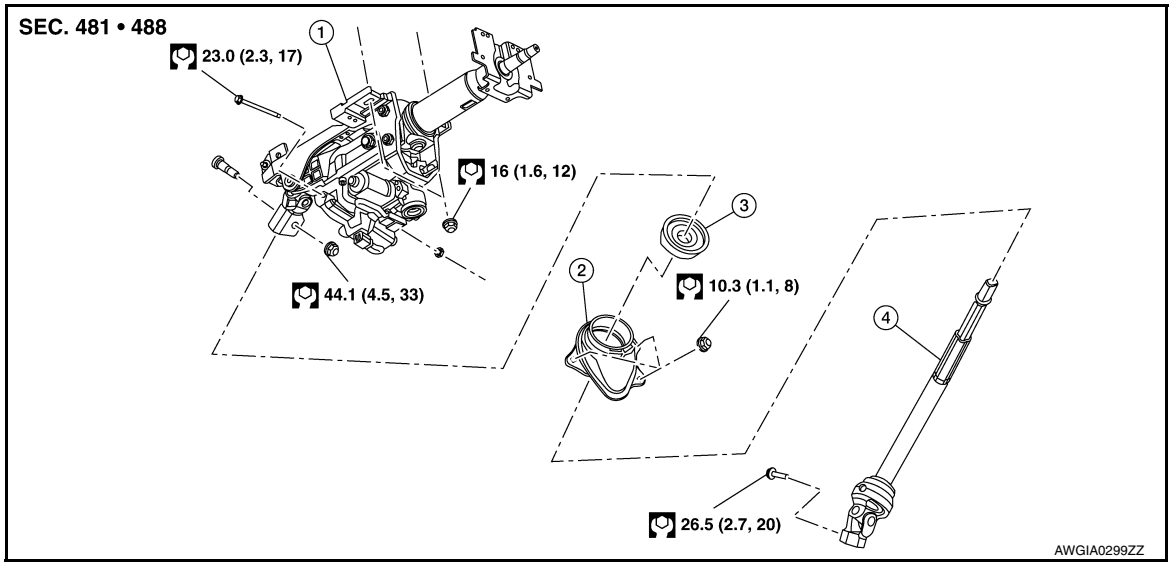
CAUTION:

- **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:0000000009134502



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

Removal and Installation

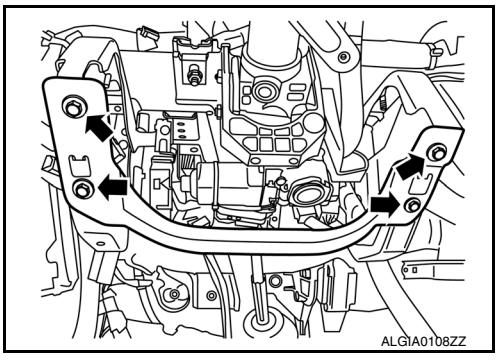
INFOID:0000000009134503

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 during removal and installation.**
- **Care must be taken not to move steering gear during removal of steering column.**

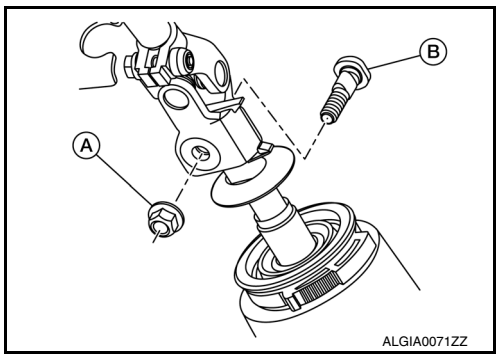
REMOVAL

1. Remove the steering angle sensor from the steering column. Refer to BRC-133, "Removal and Installation".
2. Remove the combination switch. Refer to BCS-80, "Removal and Installation".
3. Remove the instrument lower panel LH. Refer to IP-25, "Removal and Installation".
4. Remove the instrument panel brace bolts and the instrument panel brace.



5. Disconnect the tilt motor and telescopic motor harness connectors.

6. Remove lock nut (A) and bolt (B), then separate steering column from steering intermediate shaft.



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

INSTALLATION

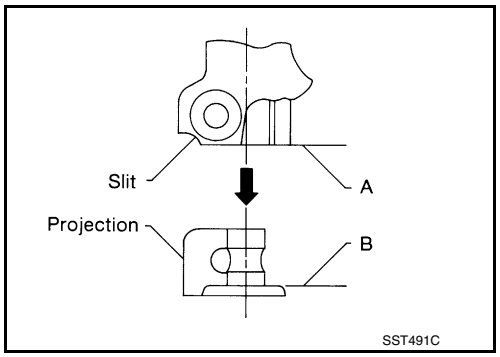
Installation is in the reverse order of removal.

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).

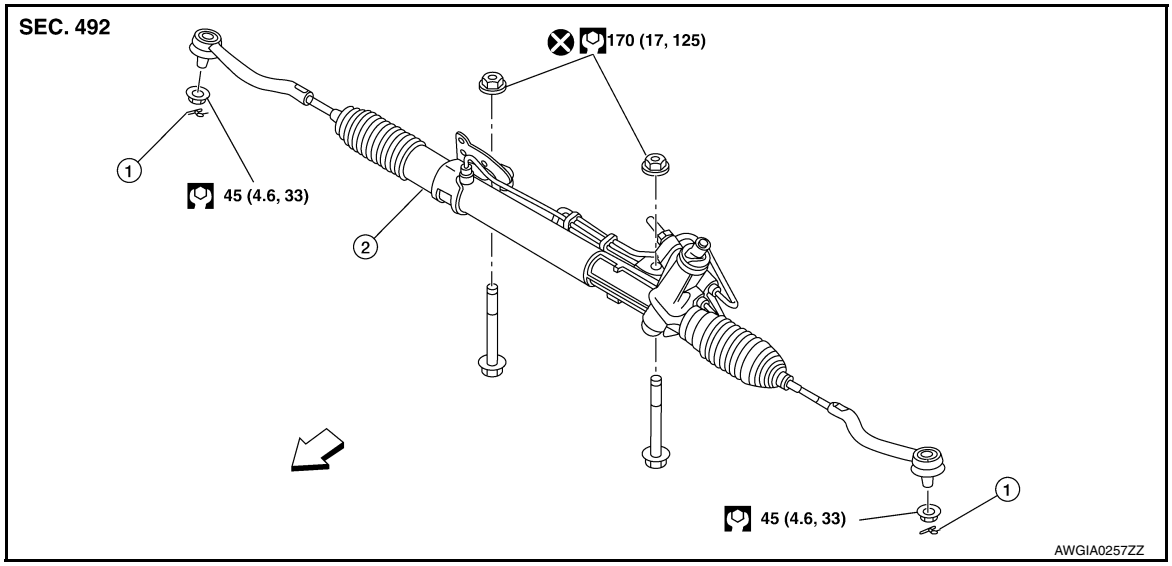


- After installation, turn steering wheel to make sure it moves smoothly. Make sure the number of turns are the same from the straight-forward position to left and right locks. Make sure that the steering wheel is in a neutral position when driving straight ahead.
- When installing steering column to 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.
- Adjust the neutral position of the steering angle sensor. Refer to BRC-60, "Work Procedure".

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000009134504



1. Cotter pin
2. Steering gear
⇦ Front

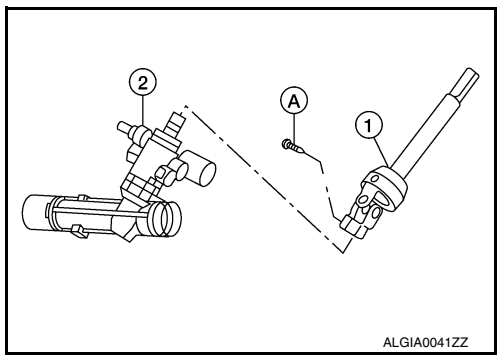
Removal and Installation - FWD

INFOID:0000000009134505

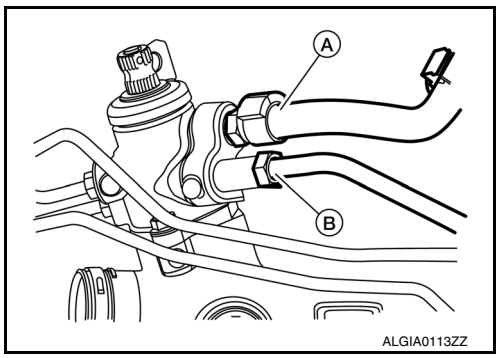
NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

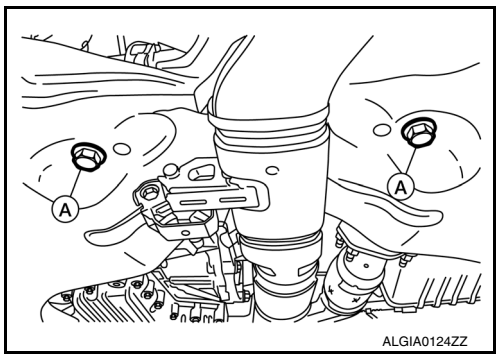
1. Set the front wheels and tires in the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to WT-53, "Adjustment".
3. Drain the power steering fluid. Refer to ST-44, "Draining and Refilling".
4. Disconnect the outer sockets from the steering knuckles using suitable tool.
5. Remove the rear engine bracket. Refer to EM-102, "FWD : Exploded View".
6. Remove the front exhaust tube. Refer to EX-5, "Exploded View".
7. Remove the stabilizer bar. Refer to FSU-12, "Removal and Installation".
8. Remove the hose and line bracket on the steering gear.
9. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).



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



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



12. Remove the steering gear.

INSTALLATION

Installation is in the reverse order of removal.

WARNING:

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

- Bleed the air from hydraulic system. Refer to ST-44, "Air Bleeding Hydraulic System".
- Check wheel alignment. Refer to FSU-5, "Inspection and Adjustment".
- Adjust the neutral position of the steering angle sensor. Refer to BRC-60, "Work Procedure".

CAUTION:

- **Do not reuse O-rings.**
- **Do not reuse steering gear nuts.**

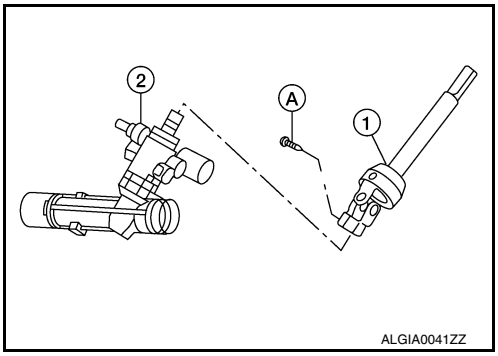
Removal and Installation - AWD

INFOID:0000000009134506

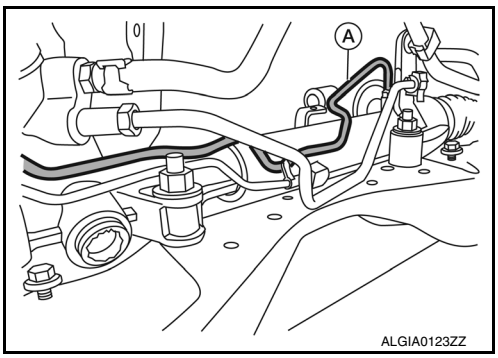
REMOVAL

1. Set the front wheels and tires in the straight-ahead position.
2. Remove the front wheels and tires using power tool. Refer to WT-53, "Adjustment".
3. Drain the power steering fluid. Refer to ST-44, "Draining and Refilling".
4. Disconnect the LH outer socket from the steering knuckle using suitable tool.
5. Remove the rear engine mount bracket. Refer to EM-106, "AWD : Exploded View".
6. Remove the front exhaust tube. Refer to EX-5, "Removal and Installation".
7. Remove the propeller shaft. Refer to DLN-97, "Removal and Installation".
8. Remove the stabilizer bar from the LH side. Refer to FSU-12, "Removal and Installation".
9. Disconnect the low pressure piping and high pressure piping bracket from the steering gear.

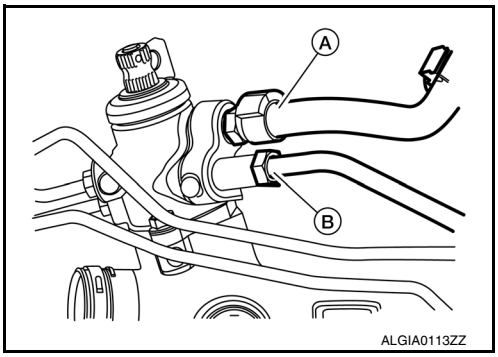
10. Remove bolt (A) and separate the steering intermediate shaft (1) from the steering gear (2).



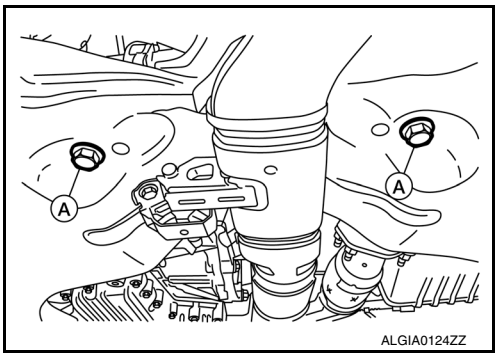
11. Remove the steering gear pressure relief pipe from the steering gear (A).



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



15. Remove the steering gear.

INSTALLATION

Installation is in the reverse order of removal.

WARNING:

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

- Bleed the air from power steering system. Refer to ST-44, "Air Bleeding Hydraulic System".
- Check wheel alignment. Refer to FSU-5, "Inspection and Adjustment".
- Adjust the neutral position of the steering angle sensor. Refer to BRC-60, "Work Procedure".

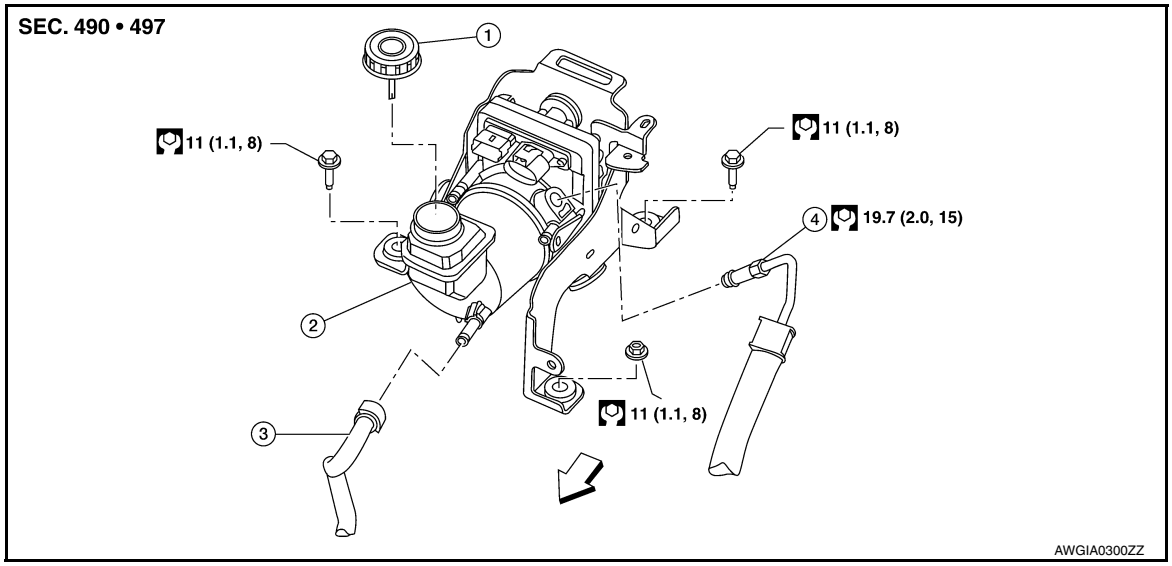
CAUTION:

- **Do not reuse O-rings.**
- **Do not reuse steering gear nuts.**

POWER STEERING OIL PUMP

Exploded View

INFOID:0000000009134507



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

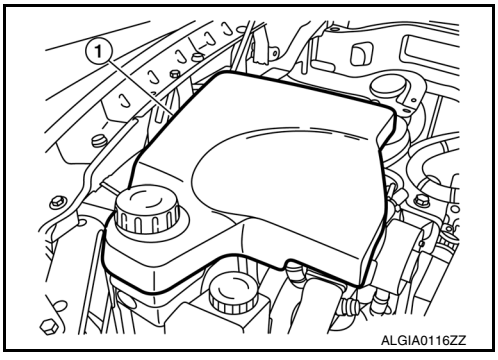
Removal and Installation

INFOID:0000000009134508

WARNING:
Power steering pump outer shell will be hot while running and after driving. When working, be sure to wear protective equipment to avoid getting burned.
NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

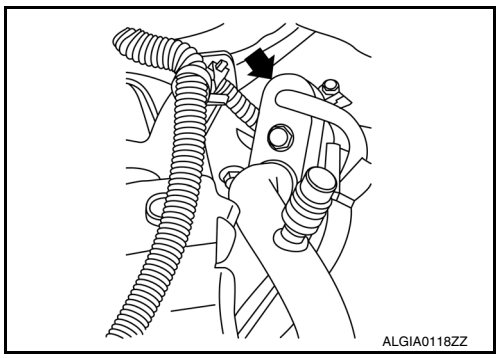
REMOVAL

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

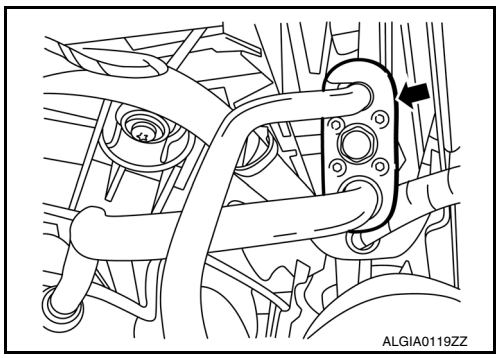


2. Drain power steering fluid. Refer to ST-44, "Draining and Refilling".
3. Remove the upper torque rod. Refer to EM-102, "FWD : Exploded View" (FWD) or EM-106, "AWD : Exploded View" (AWD).
4. Remove the RH upper engine mount insulator nuts. Refer to EM-102, "FWD : Exploded View" (FWD) or EM-106, "AWD : Exploded View" (AWD).

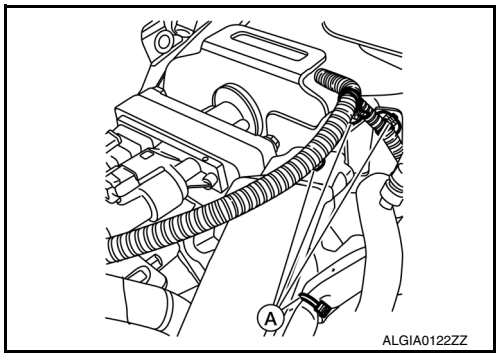
5. Disconnect the A/C rear lines at lower pipes. Refer to HA-34, "Exploded View".



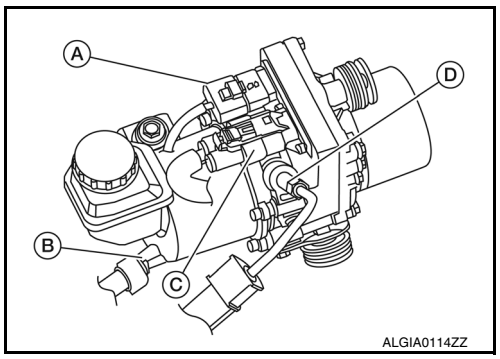
6. Disconnect the A/C front lines at junction. Refer to Refer to HA-34, "Exploded View".



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



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



INSTALLATION

Installation is in the reverse order of removal.

- Bleed air from power steering system. Refer to ST-44, "Air Bleeding Hydraulic System".

CAUTION:

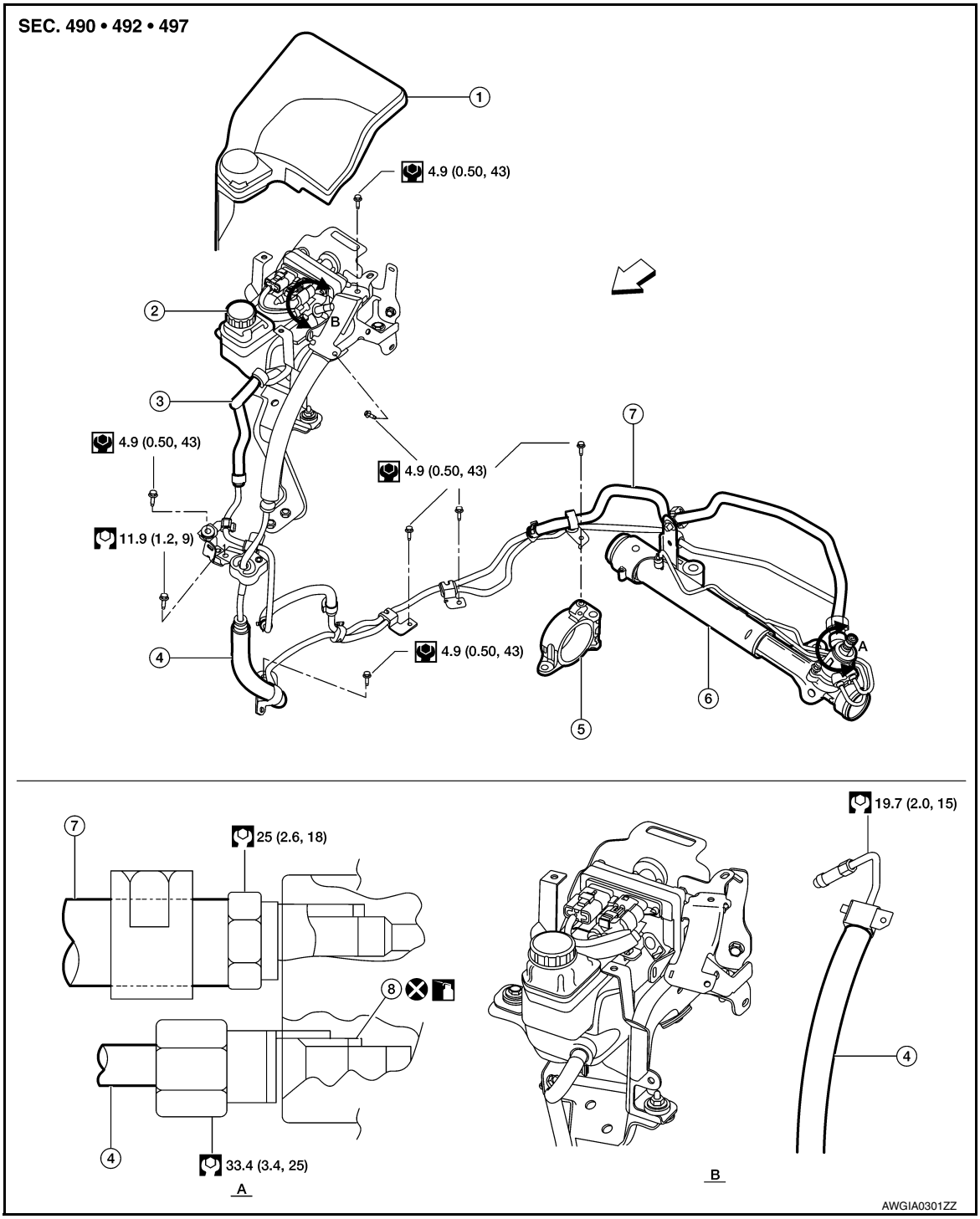
Do not reuse O-rings.

HYDRAULIC LINE

Exploded View

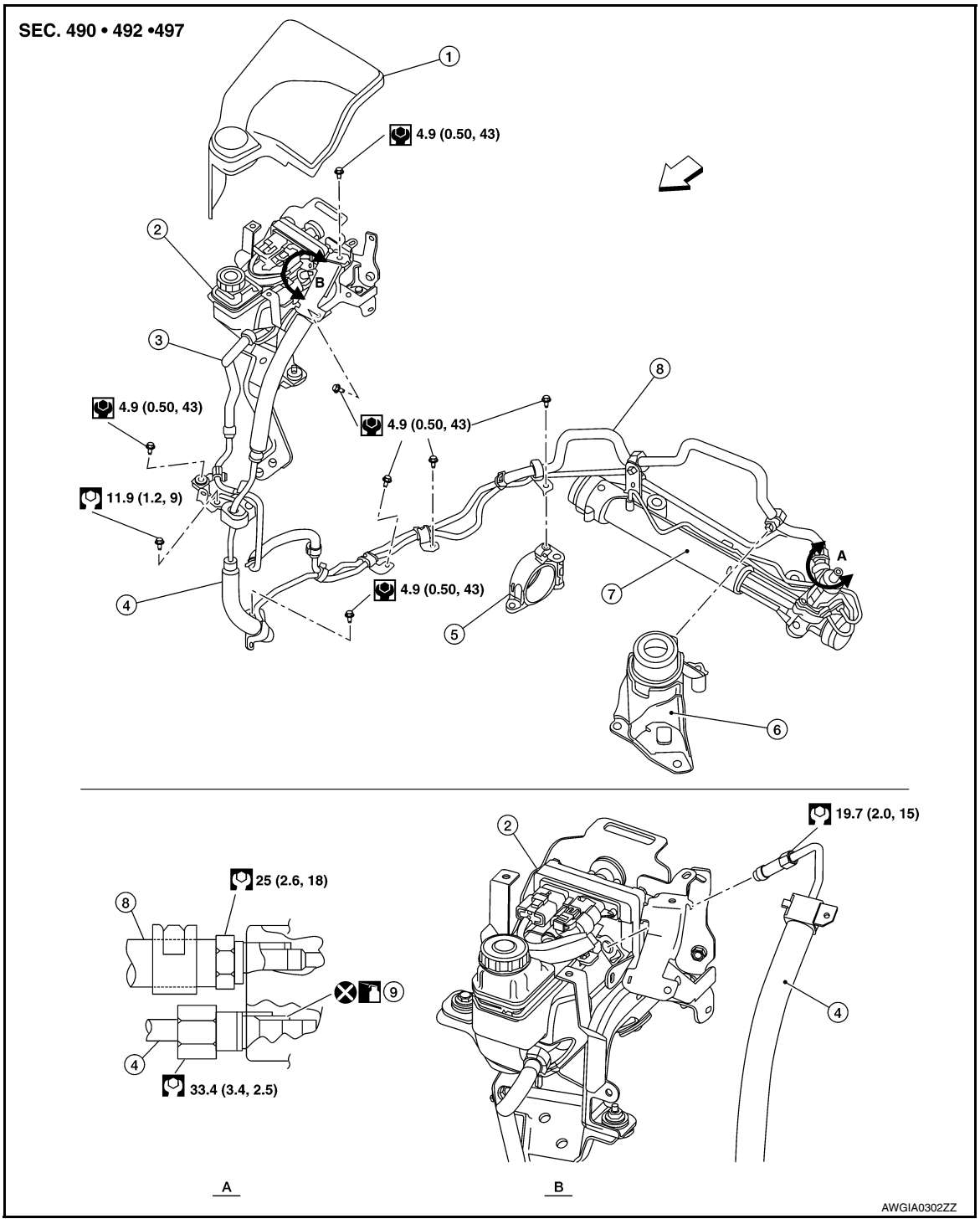
INFOID:0000000009134509

FWD



1. Cover
2. Power steering pump
3. Low pressure piping (upper)
4. High pressure piping
5. Engine mount
6. Power steering gear
7. Low pressure piping (lower)
8. O-ring
A. Steering gear connection detail
B. Power steering pump connection detail
⇦ Front

AWD



1.	Cover	2.	Power steering pump	3.	Low pressure piping (upper)
4.	High pressure piping	5.	Engine mount	6.	Engine mount bracket
7.	Power steering gear	8.	High pressure piping (lower)	9.	O-ring
A.	Steering gear connection detail	B.	Power steering pump connection detail	⇦	Front

Removal and Installation

INFOID:0000000009134510

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-56, "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-44, "Air Bleeding Hydraulic System".
- Check for fluid leaks. Repair as necessary.

CAUTION:

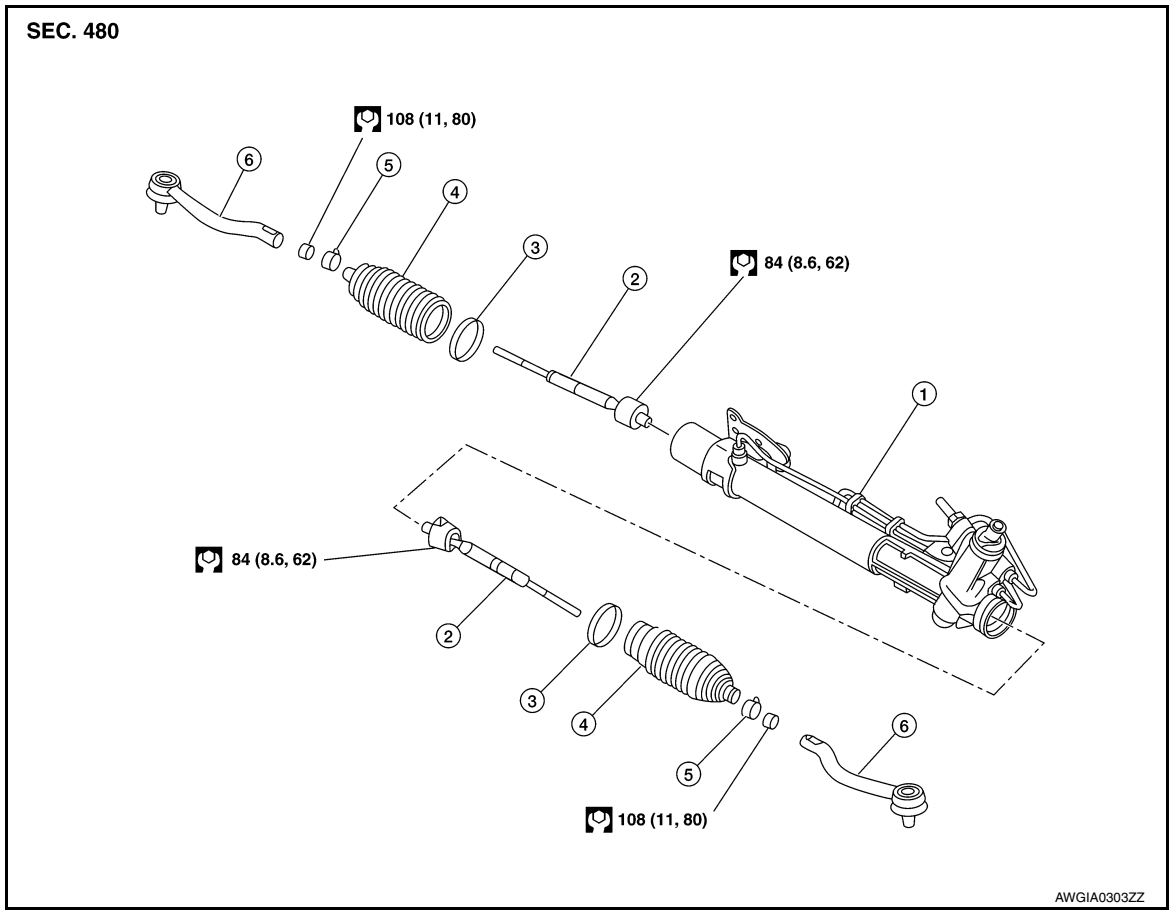
- **Do not reuse O-rings.**

UNIT DISASSEMBLY AND ASSEMBLY

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000009134511



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

⇦ Front

Disassembly and Assembly

INFOID:0000000009134512

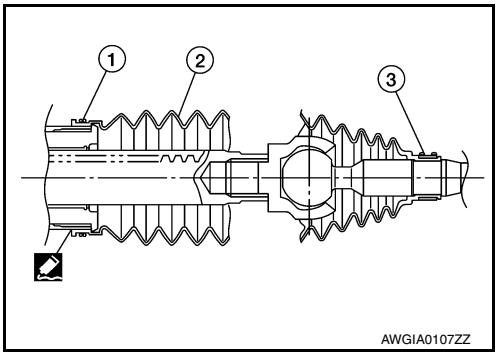
DISASSEMBLY

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

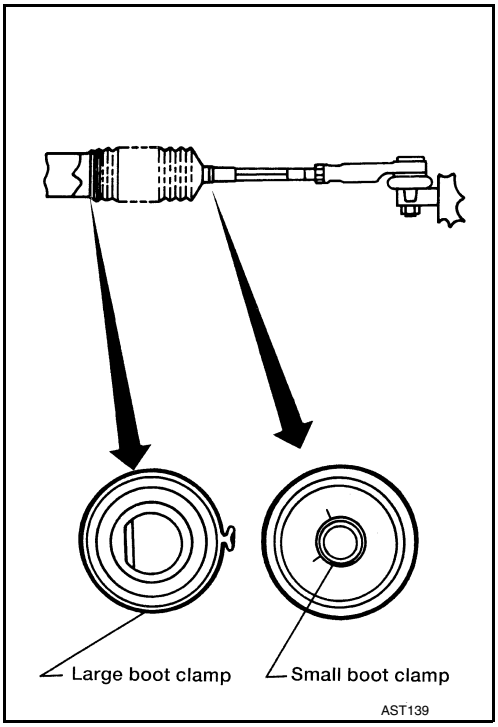
ASSEMBLY

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

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



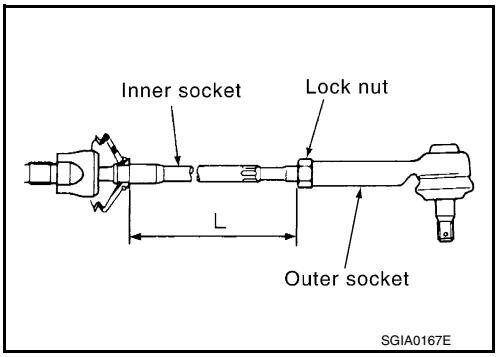
4. Install boot clamp to boot small end.
5. Install boot clamp to boot large end using suitable tool.
   CAUTION:
   Do not reuse boot clamps.



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-63, "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:0000000009134513

The power steering oil pump is not serviceable and should be replaced as an assembly. Refer to ST-54, "Removal and Installation".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Wheel

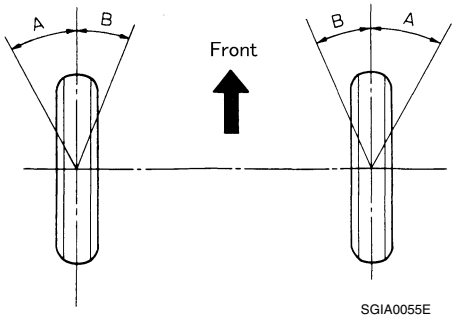
INFOID:0000000009134514

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:0000000009134515

Unit: Degree minute (Decimal Degree)



SGIA0055E

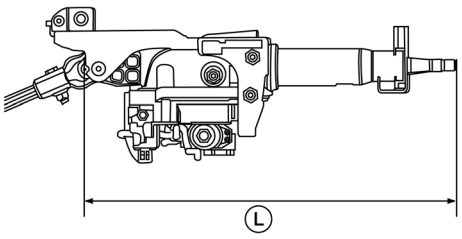
Inner wheel angle (A)	Minimum	35° 00′ (35.0°)
	Nominal	38° 00′ (38.0°)
	Maximum	39° 00′ (39.0°)
Outer wheel angle (B)	Nominal	33° 00′ (33.0°)

Steering Column

INFOID:0000000009134516

STEERING COLUMN LENGTH

Unit: mm (in)



ALGIA0105ZZ

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

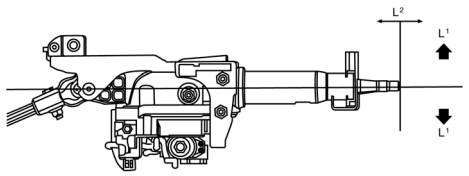
STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

Rotating torque	0.67 (0.07, 6)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0106ZZ

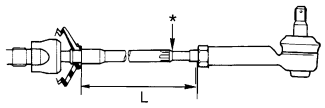
Tilt operating range (L^1)	50 (2.0)
Telescopic operating range (L^2)	40 (1.6)

Power Steering Gear

INFOID:0000000009134517

STEERING OUTER SOCKET AND INNER SOCKET

Outer socket	Rocking torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	• Measurement on spring balance • Measuring point: cotter pin hole of stud	1.4 - 42.7 N (0.143 - 4.36 kg, 0.31 - 9.60 lb)
	Rotating torque	0.3 - 2.9 N·m (0.03 - 0.30 kg-m, 3 - 26 in-lb)
	Axial end play	0.5 mm (0.020 in) or less
Inner socket	Rocking torque	0.1 - 7.8 N·m (0.01 - 0.80 kg-m, 1 - 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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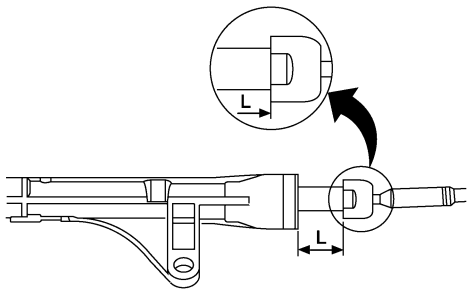
RACK STROKE



AWGIA0003GB

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

RACK SLIDING FORCE

Rack sliding force	270 - 370 N-f (27.5 - 37.7kg-f, 60.7 - 83.2 lb-f)

Power Steering Oil Pump

INFOID:0000000009134518

Relief oil pressure	9,900 -10,400 kPa (100.98 -106.08 kg/cm^2, 1435.5 - 1,508.0 psi)

Power Steering Fluid

INFOID:0000000009134519

Fluid type	E-PSF
Fluid capacity	Refer to MA-15, "FOR USA AND CANADA : Fluids and Lubricants" (United States and Canada) or MA-16, "FOR MEXICO : Fluids and Lubricants" (Mexico).