SECTION ST
STEERING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000014392410

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

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

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

WARNING:

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

Service Notice or Precautions for Steering System

INFOID:0000000014392411

- In case of removing steering gear, make the final tightening with grounded and unloaded vehicle condition, and then check wheel alignment.
- Observe the following precautions when disassembling.
- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- For easier and proper assembly, place disassembled parts in order on a parts rack.
- Use nylon cloth or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Do not reuse non-reusable parts.
- Before assembling, apply the specified grease to the directed parts.

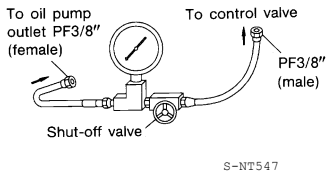
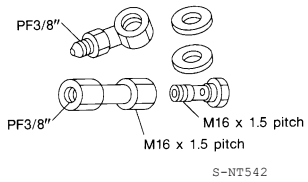
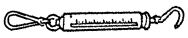
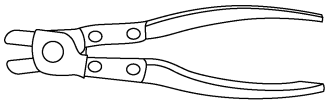
PREPARATION

PREPARATION

Special Service Tool

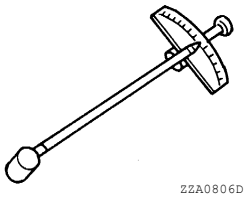
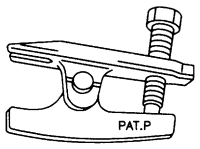
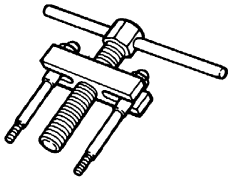
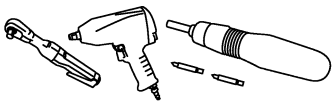
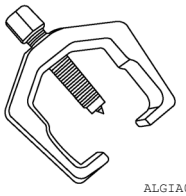
INFOID:0000000014392412

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

Tool number (TechMate No.) Tool name	Description
KV48103500 (J-26357) Pressure gauge 	Measuring oil pump relief pressure
KV48102500 (J-33914) Pressure gauge adapter 	Measuring oil pump relief pressure
— (J-44372) Spring gauge 	Measuring steering wheel turning force and ball joint swinging force
KV40107300 (J-51751) Boot band crimping tool 	Installing boot bands (large diameter)

Commercial Service Tool

INFOID:0000000014392413

Tool name	Description
Preload gauge  ZZA0806D	Inspecting steering column rotating torque, pinion rotating torque and ball joint rotating torque
Ball joint remover  S-NT146	Remove steering outer socket
Steering wheel puller  ZZA0819D	Removing steering wheel
Power tools  PIIB1407E	Loosening nuts, screws and bolts
Pitman arm puller  ALGIA0091ZZ	Removing pitman arm from steering gear

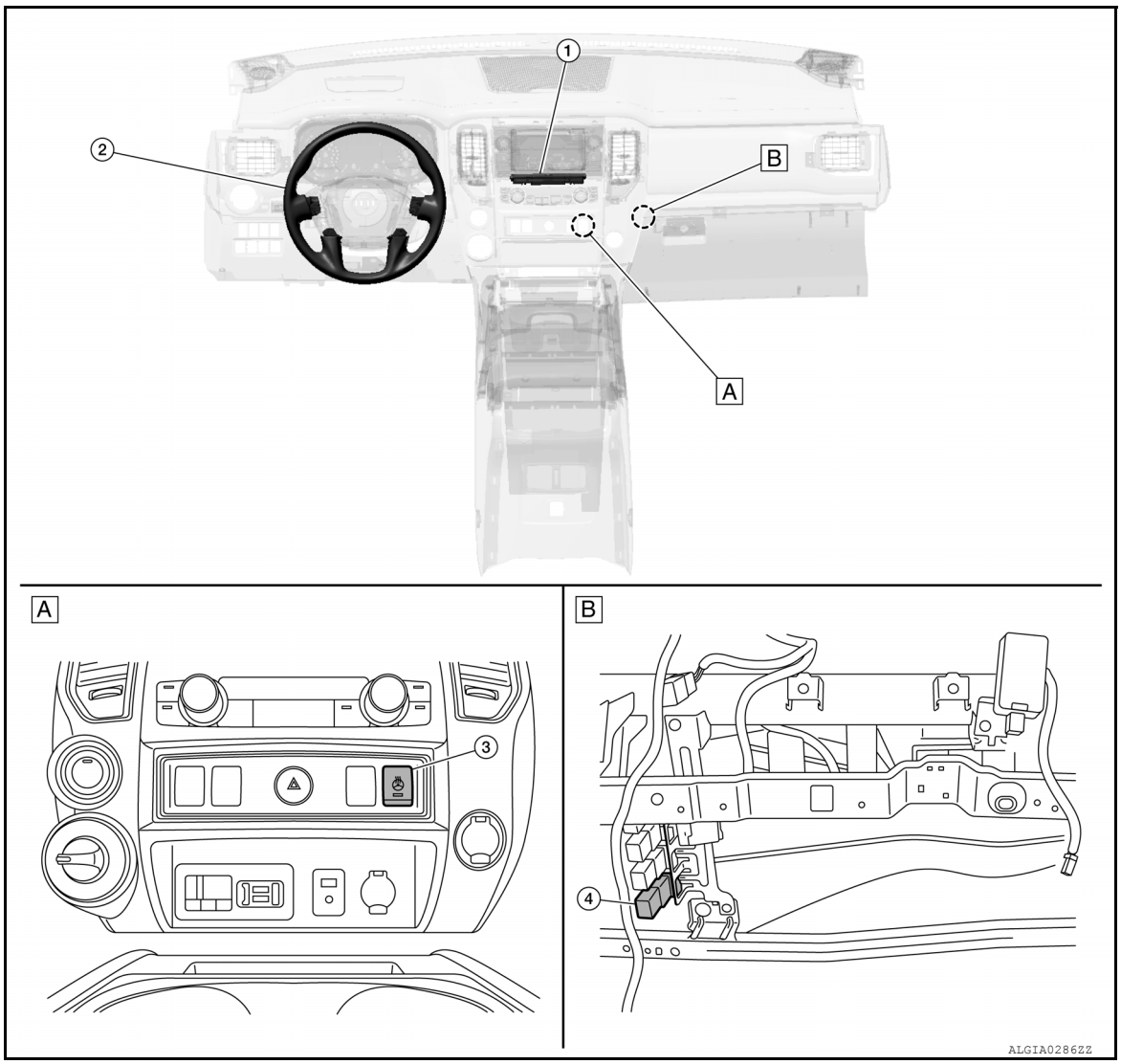
SYSTEM DESCRIPTION

COMPONENT PARTS

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : Component Parts Location

INFOID:0000000014392414



A. Center of instrument panel

B. Lower instrument panel passenger side

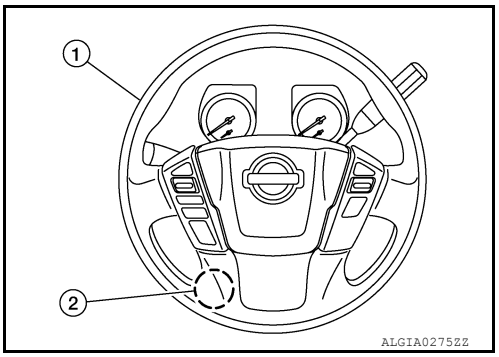
No.	Component	Function
1.	A/C auto amp.	• For the function, refer to ST-7, "HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.". • Refer to HAC-10, "Component Parts Location" for detailed installation location.
2.	Heated steering wheel	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel"
3.	Heated steering wheel switch	Steering wheel heater function ON/OFF.
4.	Heated steering relay	ST-7, "HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay"

HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel

INFOID:0000000014392415

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

- Heating element: Generates heat by energizing.
  NOTE:
  Heating element is located at the back of the steering wheel leather surface.
- Thermostat: Turns ON/OFF power supply according to the specified temperature.



HEATED STEERING WHEEL SYSTEM : Heated Steering Wheel Relay

INFOID:0000000014392416

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

HEATED STEERING WHEEL SYSTEM : A/C Auto Amp.

INFOID:0000000014392417

- A/C auto amp. turns ON/OFF the heated steering wheel relay according to a signal transmitted from the display control unit by CAN communication.
- The A/C auto amp. includes a timer. The heated steering wheel relay is turned OFF when the timer operating time reaches 30 minutes.

- Timer: Turns ON/OFF the heated steering wheel relay for a specified period of time

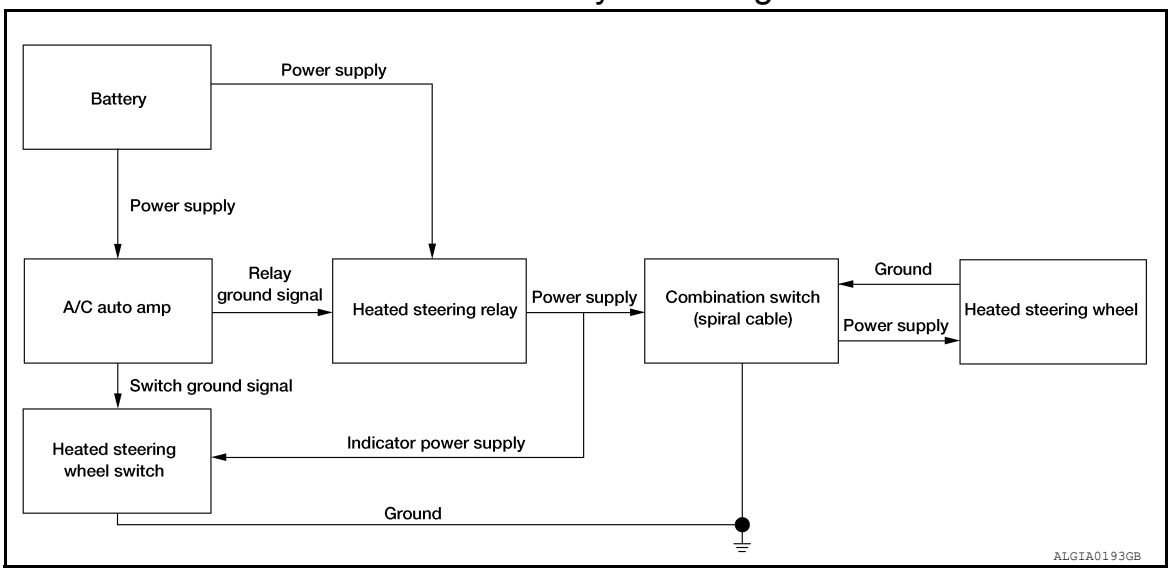
- For other information about the A/C auto amp., refer to HAC-15, "A/C Auto Amp.".

SYSTEM

HEATED STEERING WHEEL SYSTEM

HEATED STEERING WHEEL SYSTEM : System Diagram

INFOID:0000000014392418



HEATED STEERING WHEEL SYSTEM : System Description

INFOID:0000000014392419

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

NOTE:

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

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

List of ECU Reference

INFOID:0000000014392420

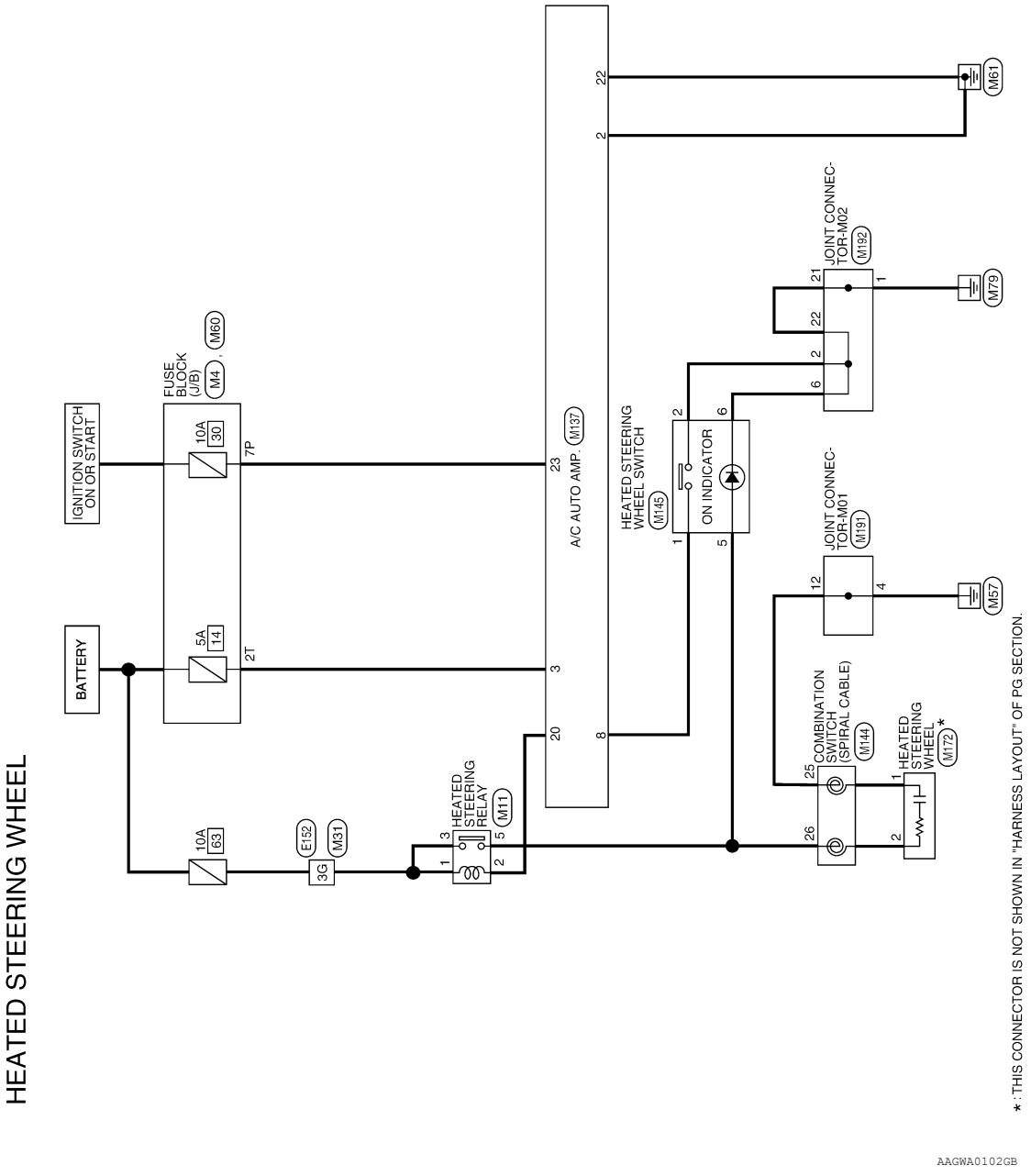
ECU	Reference
A/C auto amp.	HAC-35, "Reference Value"

WIRING DIAGRAM

HEATED STEERING WHEEL

Wiring Diagram

INFOID:0000000014392421



HEATED STEERING WHEEL CONNECTORS

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1G	G	TO MAIN HARNESS
2G	B/R	TO MAIN HARNESS
3G	W/B	TO MAIN HARNESS
4G	BR/W	TO MAIN HARNESS
5G	BR	TO MAIN HARNESS
6G	P	TO MAIN HARNESS - (WITH VK56VD)
6G	R/W	TO MAIN HARNESS - (WITH CUMMINS 5.0L)
7G	Y	TO MAIN HARNESS
8G	G	TO MAIN HARNESS
9G	R	TO MAIN HARNESS
10G	W	TO MAIN HARNESS
11G	R/G	TO MAIN HARNESS
12G	W/B	TO MAIN HARNESS
13G	BR	TO MAIN HARNESS
14G	Y/B	TO MAIN HARNESS
15G	G/W	TO MAIN HARNESS
16G	G	TO MAIN HARNESS
17G	G/Y	TO MAIN HARNESS
18G	G/Y	TO MAIN HARNESS
19G	Y/V	TO MAIN HARNESS
20G	G/Y	TO MAIN HARNESS
21G	B/Y	TO MAIN HARNESS
22G	G/R	TO MAIN HARNESS
23G	Y/R	TO MAIN HARNESS
24G	G/B	TO MAIN HARNESS
25G	R/W	TO MAIN HARNESS
26G	R	TO MAIN HARNESS
27G	LG	TO MAIN HARNESS
28G	G/B	TO MAIN HARNESS
29G	G/B	TO MAIN HARNESS
30G	BR/Y	TO MAIN HARNESS
31G	P	TO MAIN HARNESS - (WITH CUMMINS 5.0L)
31G	R	TO MAIN HARNESS - (WITH VK56VD)
32G	P	TO MAIN HARNESS
33G	Y/L	TO MAIN HARNESS
34G	GR	TO MAIN HARNESS
35G	G/R	TO MAIN HARNESS
36G	SB	TO MAIN HARNESS
37G	R/W	TO MAIN HARNESS
38G	BR	TO MAIN HARNESS
39G	BR	TO MAIN HARNESS
40G	–	TO MAIN HARNESS
41G	R/G	TO MAIN HARNESS
42G	O	TO MAIN HARNESS
43G	B	TO MAIN HARNESS - (WITH CUMMINS 5.0L)
43G	G	TO MAIN HARNESS - (WITH VK56VD)
44G	R/Y	TO MAIN HARNESS
45G	G	TO MAIN HARNESS
46G	LG	TO MAIN HARNESS
47G	R	TO MAIN HARNESS
48G	W	TO MAIN HARNESS
49G	–	TO MAIN HARNESS
50G	BR	TO MAIN HARNESS
51G	R	TO MAIN HARNESS
52G	L	TO MAIN HARNESS
53G	W	TO MAIN HARNESS
54G	W	TO MAIN HARNESS
55G	G	TO MAIN HARNESS
56G	W	TO MAIN HARNESS
57G	Y	TO MAIN HARNESS
58G	BG	TO MAIN HARNESS
59G	BG	TO MAIN HARNESS
60G	BG	TO MAIN HARNESS
61G	B	TO MAIN HARNESS
62G	W	TO MAIN HARNESS
63G	R	TO MAIN HARNESS
64G	W/L	TO MAIN HARNESS
65G	W/R	TO MAIN HARNESS
66G	BG	TO MAIN HARNESS
67G	BG	TO MAIN HARNESS
68G	B	TO MAIN HARNESS
69G	Y	TO MAIN HARNESS
70G	L	TO MAIN HARNESS
71G	R/W	TO MAIN HARNESS
72G	L/W	TO MAIN HARNESS
73G	SHIELD	TO MAIN HARNESS
74G	W	TO MAIN HARNESS
75G	R	TO MAIN HARNESS
76G	R/G	TO MAIN HARNESS
77G	G	TO MAIN HARNESS
78G	W	TO MAIN HARNESS
79G	–	TO MAIN HARNESS
80G	R	TO MAIN HARNESS
81G	L	TO MAIN HARNESS
82G	R	TO MAIN HARNESS
83G	L	TO MAIN HARNESS
84G	L	TO MAIN HARNESS
85G	W/B	TO MAIN HARNESS
86G	B/R	TO MAIN HARNESS
87G	W/B	TO MAIN HARNESS
88G	P	TO MAIN HARNESS
89G	L	TO MAIN HARNESS
90G	G	TO MAIN HARNESS
91G	G	TO MAIN HARNESS
92G	V/W	TO MAIN HARNESS
93G	BR	TO MAIN HARNESS
94G	G	TO MAIN HARNESS
95G	G	TO MAIN HARNESS
96G	W	TO MAIN HARNESS
97G	R	TO MAIN HARNESS
98G	W/B	TO MAIN HARNESS
99G	BR	TO MAIN HARNESS
100G	GR/W	TO MAIN HARNESS

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1P	R	IGNITION
2P	Y	IGNITION
3P	G	IGNITION RELAY OUT
4P	B/W	RR DEF RLY
5P	B/W	RR DEF RLY
6P	O	RR DEF RLY OUT
7P	G	IGNITION
8P	W	IGNITION
9P	L	BATTERY
10P	–	–
11P	–	–
12P	–	–
13P	R	BATTERY
14P	Y	BATTERY
15P	Y/LG	BATTERY
16P	W	BLOWER FAN RELAY OUT

Connector No.	M11
Connector Name	HEATED STEERING RELAY
Connector Type	MS02FL-M2-LC
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	BATTERY
2	P	STEERING WHEEL HEATER CONT
3	W	BATTERY
5	R	RELAY OUTPUT

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HEATED STEERING WHEEL CONNECTORS

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1G	G	TO ENGINE ROOM HARNESS
2G	B/R	TO ENGINE ROOM HARNESS
3G	W	TO ENGINE ROOM HARNESS
4G	BR/W	TO ENGINE ROOM HARNESS
5G	–	TO ENGINE ROOM HARNESS
6G	R/W	TO ENGINE ROOM HARNESS
7G	Y	TO ENGINE ROOM HARNESS
8G	G	TO ENGINE ROOM HARNESS
9G	R	TO ENGINE ROOM HARNESS
10G	W	TO ENGINE ROOM HARNESS
11G	R/G	TO ENGINE ROOM HARNESS
12G	W/B	TO ENGINE ROOM HARNESS
13G	BR	TO ENGINE ROOM HARNESS
14G	Y/B	TO ENGINE ROOM HARNESS
15G	G/W	TO ENGINE ROOM HARNESS
16G	G	TO ENGINE ROOM HARNESS
17G	O	TO ENGINE ROOM HARNESS
18G	G/Y	TO ENGINE ROOM HARNESS
19G	Y/V	TO ENGINE ROOM HARNESS
20G	G/Y	TO ENGINE ROOM HARNESS
21G	B/Y	TO ENGINE ROOM HARNESS
22G	G/R	TO ENGINE ROOM HARNESS
23G	Y/R	TO ENGINE ROOM HARNESS
24G	G/B	TO ENGINE ROOM HARNESS
25G	R/W	TO ENGINE ROOM HARNESS
26G	R	TO ENGINE ROOM HARNESS
27G	LG	TO ENGINE ROOM HARNESS
28G	G/B	TO ENGINE ROOM HARNESS
29G	G/B	TO ENGINE ROOM HARNESS
30G	BR/Y	TO ENGINE ROOM HARNESS
31G	R	TO ENGINE ROOM HARNESS
32G	R	TO ENGINE ROOM HARNESS
33G	Y/L	TO ENGINE ROOM HARNESS
34G	GR	TO ENGINE ROOM HARNESS
35G	G/R	TO ENGINE ROOM HARNESS
36G	SB	TO ENGINE ROOM HARNESS
37G	R/W	TO ENGINE ROOM HARNESS
38G	BR	TO ENGINE ROOM HARNESS
39G	BR	TO ENGINE ROOM HARNESS
40G	–	TO ENGINE ROOM HARNESS
41G	R/G	TO ENGINE ROOM HARNESS
42G	O	TO ENGINE ROOM HARNESS
43G	G	TO ENGINE ROOM HARNESS
44G	R/Y	TO ENGINE ROOM HARNESS
45G	G	TO ENGINE ROOM HARNESS
46G	LG	TO ENGINE ROOM HARNESS
47G	R	TO ENGINE ROOM HARNESS
48G	W	TO ENGINE ROOM HARNESS
49G	–	TO ENGINE ROOM HARNESS
50G	BR	TO ENGINE ROOM HARNESS
51G	R	TO ENGINE ROOM HARNESS
52G	L	TO ENGINE ROOM HARNESS
53G	W	TO ENGINE ROOM HARNESS
54G	W	TO ENGINE ROOM HARNESS
55G	G	TO ENGINE ROOM HARNESS
56G	W	TO ENGINE ROOM HARNESS
57G	Y	TO ENGINE ROOM HARNESS
58G	BG	TO ENGINE ROOM HARNESS
59G	BG	TO ENGINE ROOM HARNESS
60G	BG	TO ENGINE ROOM HARNESS
61G	O	TO ENGINE ROOM HARNESS
62G	W	TO ENGINE ROOM HARNESS
63G	O	TO ENGINE ROOM HARNESS
64G	W/L	TO ENGINE ROOM HARNESS
65G	W/R	TO ENGINE ROOM HARNESS
66G	BG	TO ENGINE ROOM HARNESS
67G	O	TO ENGINE ROOM HARNESS
68G	B	TO ENGINE ROOM HARNESS
69G	Y	TO ENGINE ROOM HARNESS
70G	L	TO ENGINE ROOM HARNESS
71G	R/W	TO ENGINE ROOM HARNESS
72G	L/W	TO ENGINE ROOM HARNESS
73G	SHIELD	TO ENGINE ROOM HARNESS
74G	W	TO ENGINE ROOM HARNESS
75G	R	TO ENGINE ROOM HARNESS
76G	R/G	TO ENGINE ROOM HARNESS
77G	BG	TO ENGINE ROOM HARNESS
78G	P	TO ENGINE ROOM HARNESS
79G	–	TO ENGINE ROOM HARNESS
80G	R	TO ENGINE ROOM HARNESS
81G	L	TO ENGINE ROOM HARNESS
82G	R	TO ENGINE ROOM HARNESS
83G	L	TO ENGINE ROOM HARNESS
84G	L	TO ENGINE ROOM HARNESS
85G	W	TO ENGINE ROOM HARNESS
86G	B/R	TO ENGINE ROOM HARNESS
87G	W	TO ENGINE ROOM HARNESS
88G	G	TO ENGINE ROOM HARNESS
89G	P	TO ENGINE ROOM HARNESS
90G	G	TO ENGINE ROOM HARNESS
91G	P	TO ENGINE ROOM HARNESS
92G	V/W	TO ENGINE ROOM HARNESS
93G	BR	TO ENGINE ROOM HARNESS
94G	B	TO ENGINE ROOM HARNESS
95G	G	TO ENGINE ROOM HARNESS
96G	R	TO ENGINE ROOM HARNESS
97G	R	TO ENGINE ROOM HARNESS
98G	W/B	TO ENGINE ROOM HARNESS
99G	R	TO ENGINE ROOM HARNESS
100G	GR/W	TO ENGINE ROOM HARNESS

Connector No.	M60
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS06FW-CS
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1T	–	–
2T	SB	BATTERY
3T	R	RR DEF RLY
4T	G	BATTERY
5T	–	–
6T	–	–

AAGIA0278GB

HEATED STEERING WHEEL CONNECTORS

Connector No.	M137
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	B	GND
3	SB	BAT
4	BR	TX (FR CONT)
5	–	–
6	–	–
7	W	AMB SENS
8	BR	STRG HEATER SW
9	G	SUN SENS
10	–	–
11	–	–
12	–	–
13	W	IGN2(ACC)
14	P	FAN GATE
15	Y	RR DEF ON
16	G	LIN SIG
17	W	VACTR
18	–	–
19	G/R	PTC1 - (WITH CUMMINS 5.0L)
20	P	STRG HEATER RLY
21	P	CAN-L
22	B	P-GND
23	G	IGN
24	V	RX (FR CONT)
25	–	–
26	R	SENS GND
27	G	INCAR SENS
28	P	INTAKE SENS
29	–	–
30	–	–
31	–	–
32	–	–
33	Y	COMP ON
34	L/W	FAN FB
35	B/W	RR DEF F/B
36	–	–
37	B	ACTR GND
38	W	FAN ON

39	LG	PTC2 - (WITH CUMMINS 5.0L)
40	SB	PTC3 - (WITH CUMMINS 5.0L)

Connector No.	M144
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	NS02FW-CS
Connector Color	WHITE

H.S.

26	25

Terminal No.	Color of Wire	Signal Name
25	B	GROUND
26	R	IGNITION

Connector No.	M145
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Type	TH08FL-NH
Connector Color	BLUE

H.S.

4	6	3
2	1	5

Terminal No.	Color of Wire	Signal Name
1	BR	STEERING HEATER SW
2	B	GROUND
3	L	ILLUMINATION +
4	GR	ILLUMINATION -
5	R	INDICATOR POWER
6	B	INDICATOR GROUND

Connector No.	M172
Connector Name	HEATED STEERING WHEEL
Connector Type	NS02FW-CS
Connector Color	WHITE

H.S.

1	2

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

Connector No.	M191
Connector Name	JOINT CONNECTOR-M01
Connector Type	NH24FW-J
Connector Color	WHITE

H.S.

4	3	2	1
8	7	6	5
12	11	10	9
16	15	14	13
20	19	18	17
24	23	22	21

Terminal No.	Color of Wire	Signal Name
1	–	–
2	B	GND
3	B	GND
4	B	GROUND
5	–	–
6	B	GND
7	B	GND
8	B	GND
9	–	–
10	B	GND
11	B	GND
12	B	GND
13	B	GND
14	B	GND
15	B	GND
16	–	–
17	B	GND
18	B	GND

19	SHIELD	GROUND
20	B	GND
21	B	GND
22	B	GND
23	B	GROUND
24	B	GROUND

Connector No.	M192
Connector Name	JOINT CONNECTOR-M02
Connector Type	NH24FW-J
Connector Color	WHITE

H.S.

4	3	2	1
8	7	6	5
12	11	10	9
16	15	14	13
20	19	18	17
24	23	22	21

Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	B	GND
3	B	GROUND
4	–	–
5	B	GROUND
6	B	GND
7	B	GROUND
8	B	GROUND
9	B	GROUND
10	B	GND
11	B	GROUND
12	B	GND
13	–	–
14	B	GND
15	B	GROUND
16	B	GND
17	–	–
18	SHIELD	SHIELD
19	SHIELD	SHIELD
20	SHIELD	SHIELD
21	B	GND
22	B	GND
23	B	GROUND
24	B	GROUND

AAGIA0279GB

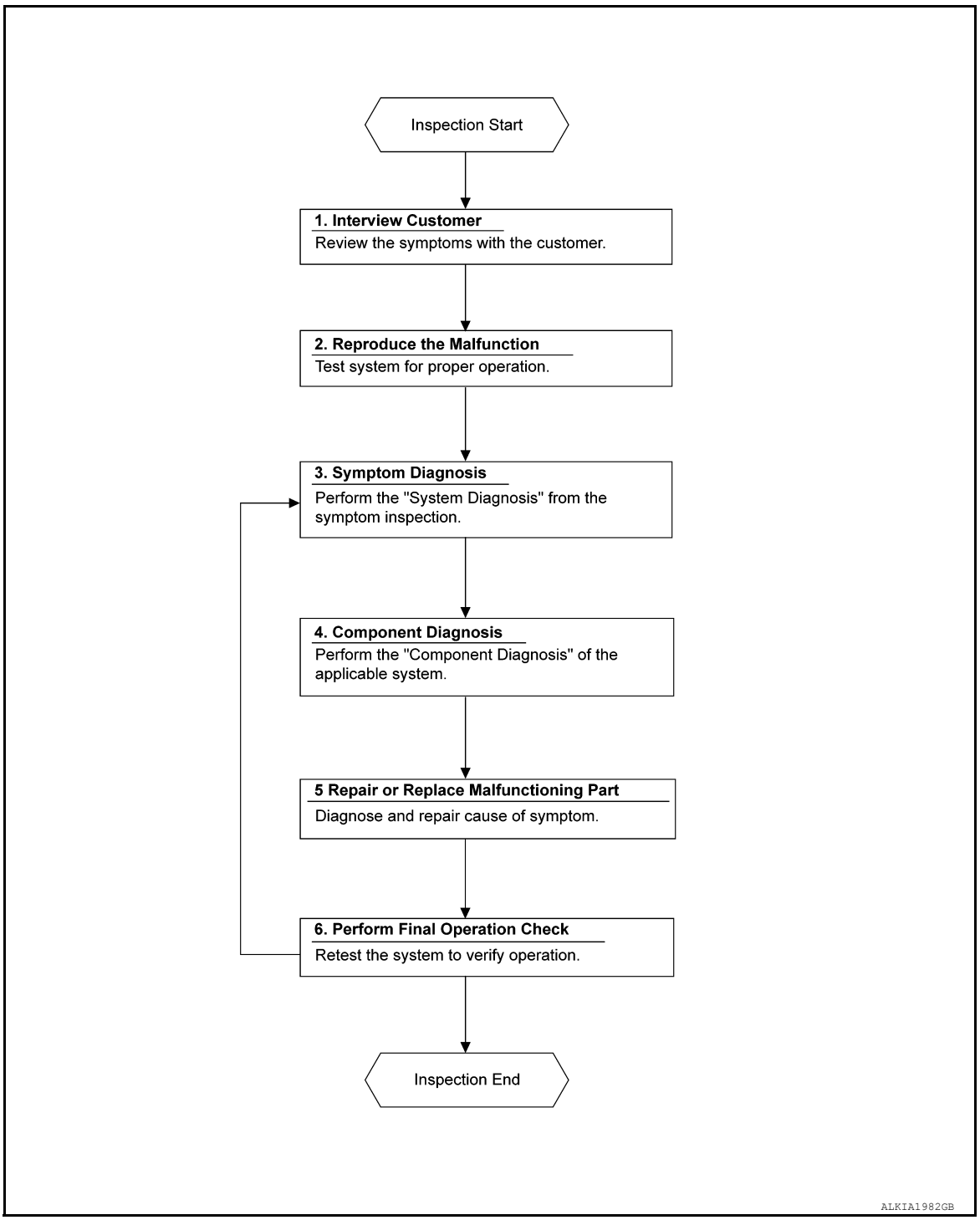
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000014392422

OVERALL SEQUENCE



DETAILED FLOW

1. INTERVIEW CUSTOMER

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

>> GO TO 2.

2. REPRODUCE THE MALFUNCTION

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

>> GO TO 3.

3. SYMPTOM DIAGNOSIS

Use symptom diagnosis from the symptom inspection result in step 2 and then identify where to start performing the diagnosis based on possible causes and symptoms. Refer to ST-32, "Symptom Table".

>> GO TO 4.

4. COMPONENT DIAGNOSIS

Perform the diagnosis with component diagnosis of the applicable system.

>> GO TO 5.

5. REPAIR OR REPLACE THE MALFUNCTIONING PART

Repair or replace the specified malfunctioning parts.

>> GO TO 6.

6. PERFORM FINAL OPERATION CHECK

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

Are the malfunctions corrected?

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

POWER STEERING FLUID

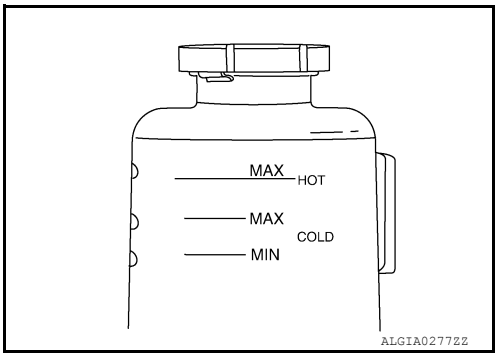
Inspection

INFOID:0000000014392423

FLUID LEVEL

Verify proper power steering fluid level.

- Check power steering fluid level with engine stopped.
- Fluid level should be as follows:
- With cold power steering fluid, level should be between COLD MIN and COLD MAX indicators.
- With hot power steering fluid, level should be between COLD MAX and HOT MAX indicators.



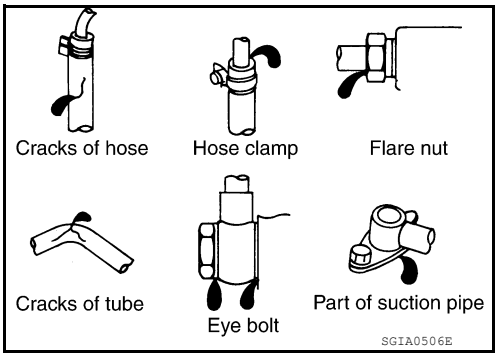
CAUTION:

- **Do not overfill.**
- **Do not reuse power steering fluid.**
- **Recommended power steering fluid is NISSAN Power Steering Fluid or equivalent. Refer to MA-13, "VK56VD Gasoline Engine : Fluids and Lubricants" or MA-62, "Cummins 5.0L Engine : Fluids and Lubricants".**

Fluid Leak Inspection

INFOID:0000000014392424

Check the hydraulic piping lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration. Repair or replace s necessary.



1. Run engine until power steering fluid temperature reaches 50° – 80°C (122° – 176°F) in reservoir tank. Keep engine speed at idle.
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each “lock” position for five seconds and carefully check for fluid leaks.
   CAUTION:
   Do not hold steering wheel in a locked position for more than five seconds. (Damage to the power steering oil pump may occur.)
4. If power steering fluid leaks at connections are noticed, then loosen connection and then reinstall. Refer to ST-69, "Exploded View".
   CAUTION:
   Do not over tighten banjo bolts or connectors as this can damage copper washers and connectors.
5. If power steering fluid leaks from power steering oil pump are noticed, repair connection or replace power steering oil pump. Refer to ST-67, "Removal and Installation - Cummins 5.0" or ST-68, "Removal and Installation - VK56VD".

STEERING WHEEL

Inspection

INFOID:0000000014392425

STEERING WHEEL AXIAL END PLAY

- Check installation condition of power steering gear, front suspension, axle 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-84, "Steering Wheel".

- Verify that steering gear bolts are tightened to specification. Refer to ST-53, "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 outer circumference of steering wheel when it is turned to the point where the tires start moving.

Steering wheel play : Refer to ST-84, "Steering Wheel".

2. If play is outside specifications, check the following items:
   - Backlash for each joint of the steering column
   - Installation condition of steering gear and linkage

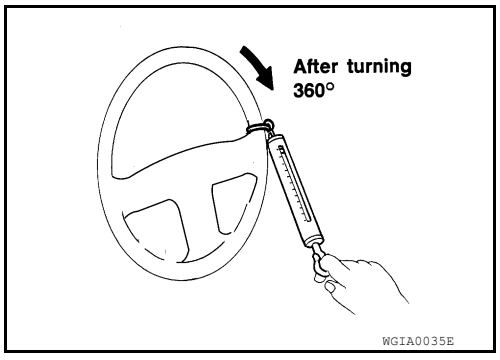
NEUTRAL POSITION OF STEERING WHEEL

1. Check neutral position of steering wheel after confirming that front wheel alignment is correct. Refer to ST-17, "Inspection".
2. Turn tires straight ahead. Check if steering wheel is in the neutral position.
   - If it is not in the neutral position, remove steering wheel and reinstall it correctly. Refer to ST-36, "Removal and Installation".
   - If the neutral position cannot be attained by repositioning steering wheel two teeth or less on steering stem, loosen tie-rod lock nuts of steering sockets, then adjust tie-rods by the same amount in the opposite direction. Retorque lock nuts to specification. Refer to ST-56, "Exploded View" (XD Models) or ST-62, "Exploded View" (Non-XD Models).

   CAUTION:
   Check wheel alignment after the adjustment. Refer to FSU-7, "Inspection".

STEERING WHEEL TURNING FORCE

1. Park vehicle on a level, dry surface and set parking brake.
2. Verify that tires are inflated to specified pressure. Refer to WT-76, "Tire".
3. Start engine.
4. Bring power steering fluid up to operating temperature of 50° – 80°C (122° – 176°F).
5. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.



Tool : — (J-44372)

Steering wheel turning force : Refer to ST-84, "Steering Wheel".

6. If steering wheel turning force is out of specification, inspect steering column. Refer to ST-19, "Inspection".
7. If steering column meets specification, inspect steering gear and linkage. Refer to ST-23, "Inspection".

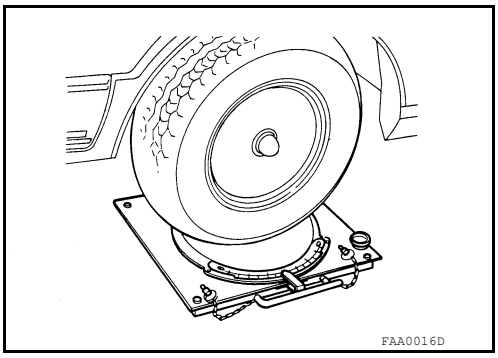
CHECKING FRONT WHEEL TURNING ANGLE

1. Perform toe-in inspection. Refer to FSU-7, "Inspection".

   CAUTION:

Perform front wheel turning angle inspection after toe-in inspection.

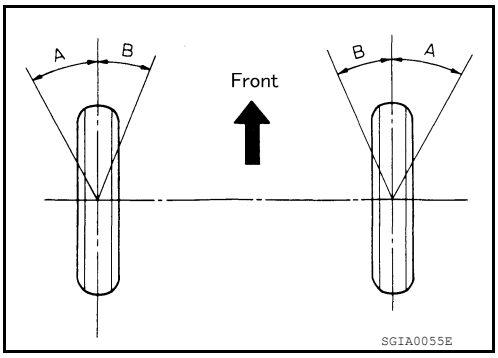
2. Place front wheels on turning radius gauges and rear wheels on stands so that vehicle can be level.
3. Check maximum inner and outer wheel turning angles for LH and RH wheels.



- With engine at idle, turn steering wheel from full left stop to full right stop and measure turning angles.

Outer Wheel Angle (A) : **Refer to ST-84, "Steering Angle".**

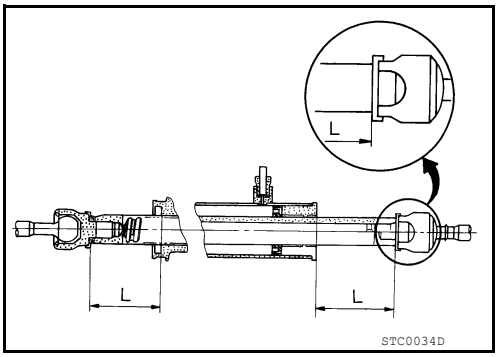
Inner Wheel Angle (B) : **Refer to ST-84, "Steering Angle".**



4. Check following items when turning angle is outside of specifications.

a. Measure the rack stroke specification with the vehicle in neutral position (Non-XD models only).

Rack stroke in neutral position (L) : **Refer to ST-89, "Steering Gear - Non-XD Models".**



Turning angles are not adjustable. If any of steering angles are out of the specification, check if the following parts are worn or damaged.

- For XD Models:
- Steering column
- Steering box
- Steering linkage
- Front suspension components

- For Non-XD Models
- Steering column
- Steering gear and linkage
- Front suspension components

If found that they are worn or damaged, replace them with new ones.

STEERING COLUMN

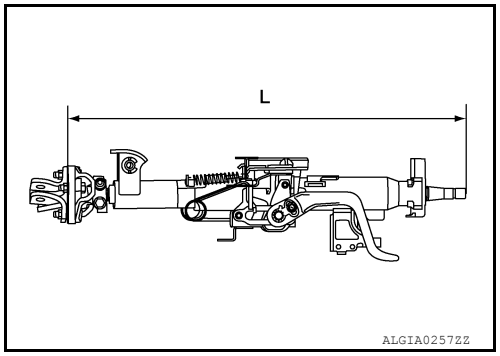
Inspection

INFOID:0000000014392426

STEERING COLUMN

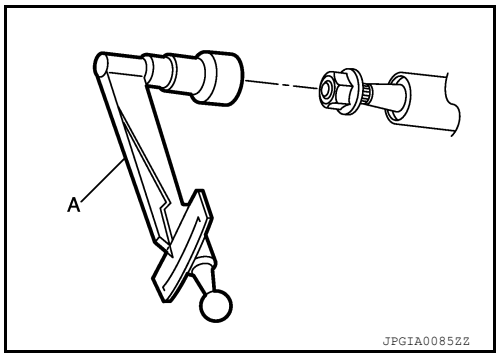
- Check each part of steering column for damage or other malfunctions. Replace entire steering column if any parts are damaged.
- Check length (L) as shown if vehicle has been involved in a minor collision. Replace steering column if outside the specification.

Steering column length (L) : Refer to ST-85, "Electric Steering Column" (Electric steering column) or ST-84, "Mechanical Steering Column" (Mechanical steering column)



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

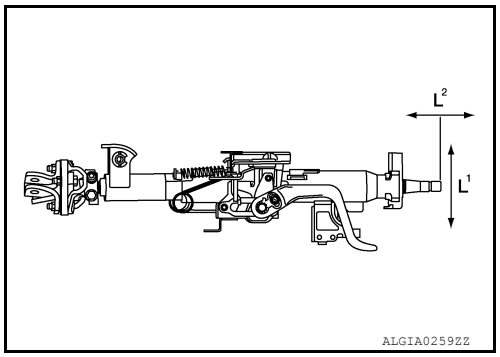
Rotating torque : Refer to ST-85, "Electric Steering Column" (Electric steering column) or ST-84, "Mechanical Steering Column" (Mechanical steering column)



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

Tilt operating range (L^1) : Refer to ST-85, "Electric Steering Column" (Electric steering column) or ST-84, "Mechanical Steering Column" (Mechanical steering column)

Telescopic operating range (L^2) : Refer toST-85, "Electric Steering Column" (Electric steering column) or ST-84, "Mechanical Steering Column" (Mechanical steering column)

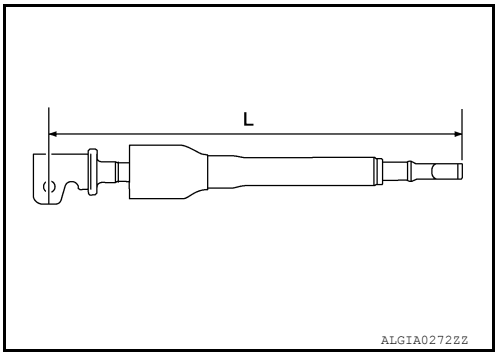


HOLE COVER SEAL, HOLE COVER AND LOWER SHAFT

- Check each part of hole cover seal, hole cover, intermediate shaft and lower joint for damage or other malfunctions. Replace if necessary.
- Check length (L) of intermediate shaft as shown if vehicle has been involved in a collision. Replace intermediate shaft if outside specification.

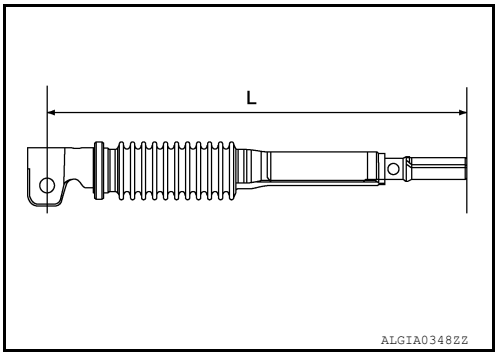
- XD Models:

Intermediate shaft length (L)	**: Refer to ST-86, "Intermediate Shaft Length".**



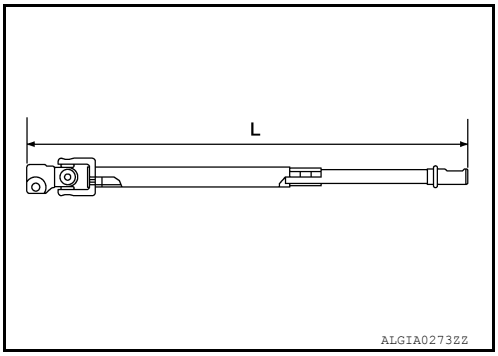
- Non-XD Models

Intermediate shaft length (L)	**: Refer to ST-86, "Intermediate Shaft Length".**



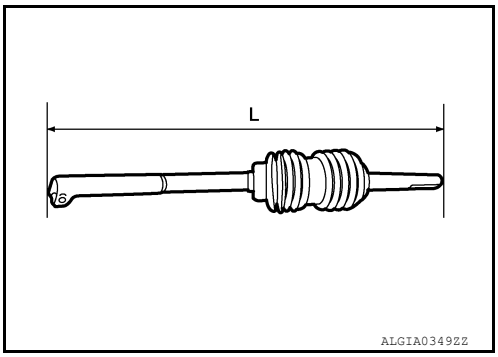
• Check length (L) of lower joint in extended position.
- XD Models

Lower joint length (L)	**: Refer to ST-87, "Lower Joint Sliding Range".**



- Non-XD Models

Lower joint length (L)	**: Refer to ST-87, "Lower Joint Sliding Range".**



POWER STEERING OIL PUMP

Inspection

INFOID:0000000014392427

Relief Oil Pressure

CAUTION:

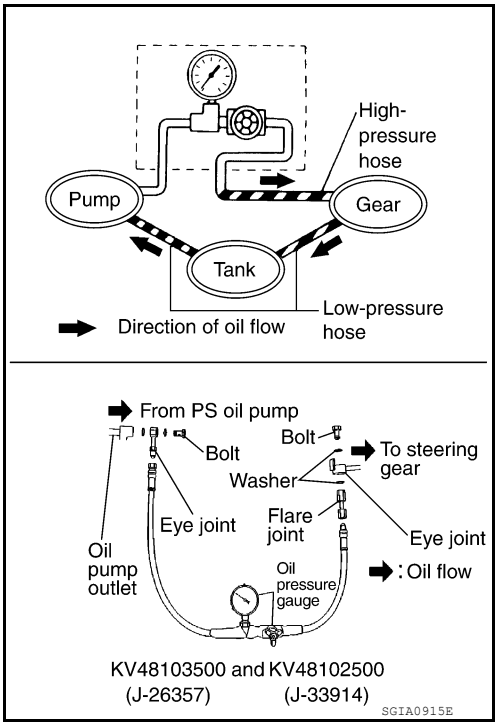
Make sure that belt tension is normal before starting the following procedure.

1. Connect Tool between power steering oil pump discharge port and high-pressure hose. Bleed air from hydraulic circuit while opening valve fully. Refer to ST-34, "Air Bleeding Hydraulic System".

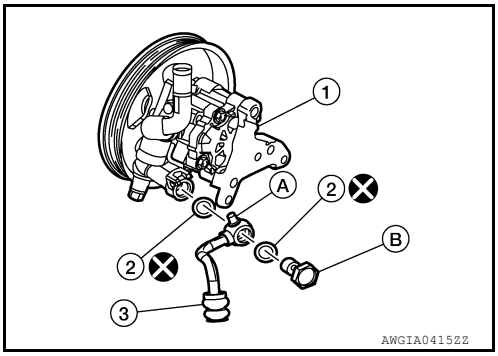
   Tool **: KV48103500 (J-26357)**
   : KV48102500 (J-33914)

2. Start engine. Run engine until oil temperature reaches 50° to 80°C (122° to 176°F).
   CAUTION:
   - **Leave valve of oil pressure gauge fully open while starting and running engine. If engine is started with valve closed, hydraulic pressure in power steering oil pump goes up to relief pressure along with unusual increase of oil temperature.**
   - **Be sure to keep hose clear of belts and other parts when engine is started.**
3. Fully close Tool valve with engine at idle and measure the relief oil pressure.

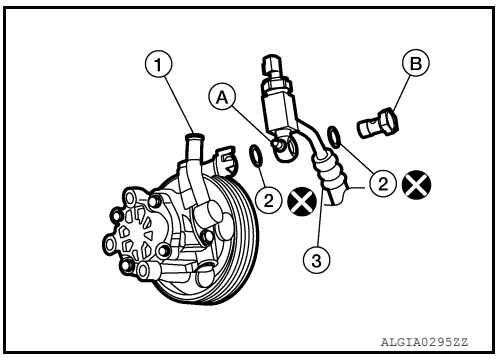
   Relief oil pressure **: Refer to ST-89, "Power Steering Oil Pump".**



   CAUTION:
   Do not keep valve closed for longer than five seconds.
4. Open valve slowly after measuring. Replace power steering oil pump if relief oil pressure is outside specification. Refer to ST-67, "Removal and Installation - Cummins 5.0" or ST-68, "Removal and Installation - VK56VD".
5. After inspection, disconnect Tool from hydraulic circuit.
6. Apply power steering fluid or equivalent to copper washers.
   CAUTION:
   Do not reuse copper washers.
7. For Cummins 5.0 power steering pump, install eye bolt (B), copper washers (2), and high pressure hose (3) to power steering oil pump (1) with protrusion (A) aligned with cutout in power steering oil pump outlet connection.



8. For VK56VD power steering pump, install eye bolt (B), copper washers (2), and high pressure hose (3) to power steering oil pump (1) with protrusion (A) aligned with cutout in power steering oil pump outlet connection.



9. Tighten eye bolt finger-tight.
10. Tighten eye bolt to specification. Refer to ST-69, "Exploded View".
11. Check fluid level, fluid leaks and air bleed hydraulic system after installation. Refer to ST-34, "Air Bleeding Hydraulic System".

STEERING GEAR AND LINKAGE

Inspection

INFOID:0000000014392428

BOOTS

Check inner and outer socket boots for cracks or damage. Replace if any damage is found. Refer to ST-60, "INNER AND OUTER SOCKETS : Removal and Installation - Outer Socket" (XD Models) or ST-62, "Removal and Installation - Outer socket" (Non-XD Models).

STEERING GEAR

Check steering gear housing for damage and scratches. Replace steering gear if any damage is found. Refer to ST-53, "Removal and Installation" (XD Models) or ST-77, "Removal and Installation" (Non-XD Models).

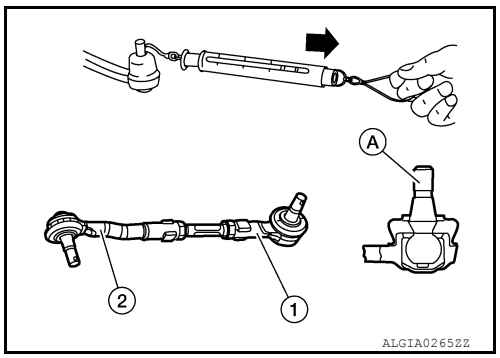
POWER STEERING HOSE CONNECTIONS

Check power steering pressure and return lines at steering gear for damage or leaks. Replace pressure and return lines, steering box, or steering gear as required. Refer to ST-73, "Removal and Installation" (Hydraulic lines) or ST-53, "Removal and Installation" (Steering box) or ST-77, "Removal and Installation" (Steering gear and linkage).

OUTER SOCKET AND INNER SOCKET

- Ball joint swinging torque

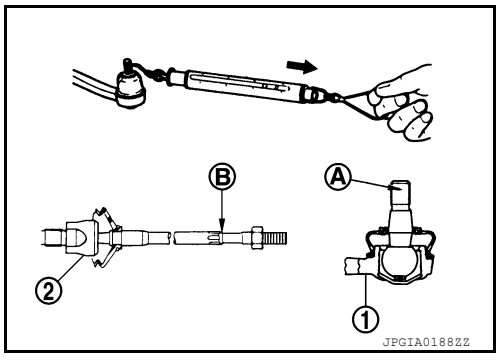
- For XD models, hook Tool at measuring point (A) as shown and pull Tool. Make sure that Tool reads the specified value when ball stud starts to move. If outer socket (1) is outside specification, replace outer socket. If inner socket (2) is outside specification, replace inner socket.



Tool : — (J-44372)

Swinging torque : Refer to ST-87, "Steering Linkage - XD Models".

- For Non XD Models, hook Tool at measuring point [A (for outer socket) or B (for inner socket)] as shown and pull Tool. Make sure that Tool reads the specified value when ball stud and inner socket start to move. If outer socket (1) is outside specification, replace socket. If inner socket (2) is outside specification, replace steering gear.

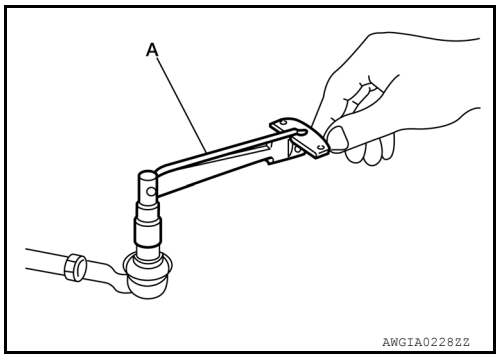


Tool number : — (J-44372)

Swinging torque : Refer to ST-88, "Steering Linkage - Non-XD Models".

- Ball joint rotating torque

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

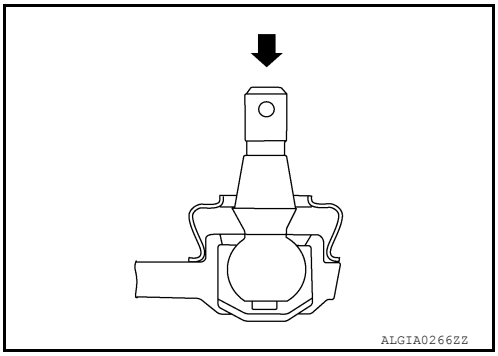


Rotating torque : Refer to ST-87, "Steering Linkage - XD Models" or ST-88, "Steering Linkage - Non-XD Models".

- Ball joint axial end play

- Apply an axial load of 490 N (50.0 kg, 110.2 lb.) to ball stud as shown. Measure amount of stud movement using suitable tool. Make sure that value is within specification. If either outer socket or inner socket is outside specification, replace socket.

Rotating torque **: Refer to ST-87, "Steering Linkage - XD Models" or ST-88, "Steering Linkage - Non-XD Models".**



DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:0000000014664563

Regarding Wiring Diagram information, refer to HAC-42, "CUMMINS 5.0L : Wiring Diagram" or HAC-51, "VK56VD : Wiring Diagram".

1.CHECK FUSE

Check fuses [No. 14 and 30, located in the fuse block (J/B)].

NOTE:

Refer to PG-164, "Terminal Arrangement".

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK A/C AUTO AMP. POWER SUPPLY

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

(+)		(–)	Voltage		
A/C auto amp.			Ignition switch position		
Connector	Terminal		OFF	ACC	ON
M137	3	Ground	Battery voltage	Battery voltage	Battery voltage
	23		Approx. 0 V	Approx. 0 V	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK A/C AUTO AMP. GROUND CIRCUIT

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

A/C auto amp.		(–)	Continuity
Connector	Terminal		
M137	2	Ground	Yes
	22		

Is the inspection result normal?

YES >> Inspection End.

NO >> Repair harness or connector.

HEATED STEERING WHEEL SYSTEM

Component Function Check

INFOID:0000000014392430

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-26, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014392431

Regarding Wiring Diagram information, refer to ST-10, "Wiring Diagram".

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the steering wheel. Refer to ST-36, "Removal and Installation".
3. Turn ignition switch ON.
4. Turn heated steering wheel switch ON.
5. Check voltage between heated steering wheel harness connector terminals.

Connector	Terminals		Voltage (Approx.)
	+	-	
M172	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-29, "Component Inspection (Heated Steering Wheel)".

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel. Refer to ST-36, "Removal and Installation".

3.CHECK GROUND CIRCUIT

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

Connector	Terminal	Ground	Continuity
M172	2		Yes

Is the inspection result normal?

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

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

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

Heated steering relay		Heated steering wheel		Continuity
Connector	Terminal	Connector	Terminal	
M11	5	M172	2	Yes

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M11	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-28, "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. 63)
- 10A fuse (No. 63)
- Harness for open or short between 10A fuse (No. 63) 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
M145	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 relay harness connector terminal and A/C auto amp. harness connector terminal.

Heated steering relay		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M11	2	M137	20	Yes

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

Heated steering relay		Ground	Continuity
Connector	Terminal		
M11	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	
M137	8	M145	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M137	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-28, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-122, "Removal and Installation".
NO >> Replace heated steering wheel switch. Refer to ST-76, "Removal and Installation".

Component Inspection (Heated Steering Wheel Switch)

INFOID:0000000014392432

1. CHECK HEATED STEERING WHEEL SWITCH

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to ST-76, "Removal and Installation".
3. Check continuity between heated steering wheel switch terminals.

Terminals		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. Refer to ST-76, "Removal and Installation".

Component Inspection (Heated Steering Relay)

INFOID:0000000014392433

1. CHECK HEATED STEERING RELAY CONTINUITY

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

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

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering relay.

Component Inspection (Heated Steering Wheel)

INFOID:0000000014392434

1. CHECK HEATED STEERING WHEEL CONTINUITY

1. Turn ignition switch OFF.
2. Remove the heated steering wheel. Refer to ST-36, "Removal and Installation".
3. Check continuity between heated steering wheel connector terminals.

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace heated steering wheel. Refer to ST-36, "Removal and Installation".

2. CHECK HEATED STEERING WHEEL RESISTANCE

Check resistance between heated steering wheel connector terminals.

Terminals	Condition	Resistance
1 – 2	Surface temperature of 20°C (68°F)	1.7 – 2.17 Ω

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace heated steering wheel. Refer to ST-36, "Removal and Installation".

HEATED STEERING WHEEL SWITCH INDICATOR LAMP

Component Function Check

INFOID:0000000014392435

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-30, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014392436

Regarding Wiring Diagram information, refer to ST-10, "Wiring Diagram".

1.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Remove the heated steering wheel switch. Refer to ST-76, "Removal and Installation".
3. Turn ignition switch ON.
4. Check voltage between heated steering wheel switch harness connector terminals.

Connector	Terminals		Voltage (Approx.)
	+	-	
M145	5	6	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
M145	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	
M11	5	M145	5	Yes

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

Connector	Terminal	Ground	Continuity
M11	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-28, "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. 63)
- 10A fuse (No. 63)
- Harness for open or short between 10A fuse (No. 63) and heated steering relay

Is the inspection result normal?

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

6. CHECK HARNESS BETWEEN A/C AUTO AMP. AND HEATED STEERING WHEEL SWITCH

1. Check continuity between A/C auto amp. harness connector terminal and heated steering wheel switch harness connector terminal.

A/C auto amp.		Heated steering wheel switch		Continuity
Connector	Terminal	Connector	Terminal	
M137	8	M145	1	Yes

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

A/C auto amp.		Ground	Continuity
Connector	Terminal		
M137	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-28, "Component Inspection (Heated Steering Wheel Switch)".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-122, "Removal and Installation"
NO >> Replace heated steering wheel switch. Refer to ST-76, "Removal and Installation".

SYMPTOM DIAGNOSIS

STEERING COLUMN

Symptom Table

INFOID:0000000014392437

HEATED STEERING WHEEL

Symptom	Inspection item
Heated steering wheel system inoperative	Refer to ST-26, "Diagnosis Procedure".
Heated steering wheel switch indicator lamp inoperative	Refer to ST-30, "Diagnosis Procedure".

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000014392438

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

Reference page		ST-16	ST-34	ST-23	ST-23	ST-23	ST-16	ST-17	ST-17	MA-72 or MA-23	ST-17	ST-19	ST-19	ST-38	ST-23	DLN-146 or DLN-155	FAX-5	FSU-5	WT-64	WT-65	FAX-5	BR-7
Possible cause and suspected parts		Fluid level	Air in hydraulic system	Steering outer and inner socket ball joint swinging torque	Steering outer and inner socket ball joint rotating torque	Steering outer and inner socket ball joint axial end play	Power steering fluid leaks	Steering wheel play	Steering wheel turning force	Drive belt looseness	Improper steering wheel	Improper installation or looseness of tilt lock lever	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	FRONT PROPELLER SHAFT	WHEEL HUB AND BEARING	FRONT SUSPENSION	TIRES	WHEEL	FRONT AXLE	BRAKES
Symptom	Noise	×	×	×	×	×	×	×	×	×						×	×	×	×	×	×	×
	Shake										×	×				×	×	×	×	×	×	×
	Vibration										×	×	×	×		×	×	×	×		×	
	Shimmy										×	×			×		×	×	×	×		×
	Shudder														×		×	×	×	×		×

×: Applicable

PERIODIC MAINTENANCE

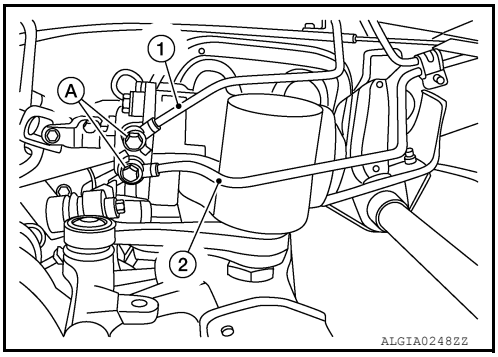
POWER STEERING FLUID

Draining and Refilling

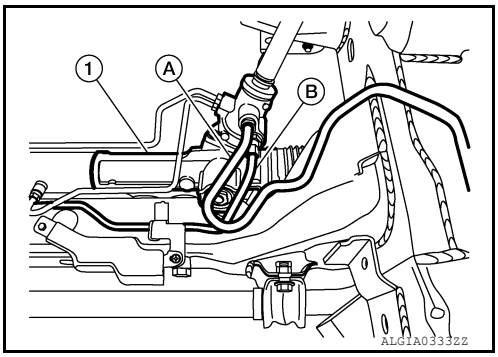
INFOID:0000000014392439

DRAINING

1. Drain power steering fluid using the following procedures.
   - For XD Models:
   - Remove banjo bolts (A) and disconnect power steering pressure line (1) and return line (2) from steering gear. Discard copper sealing washers.
     CAUTION:
     Do not reuse copper sealing washers.



   - For Non-XD Models:
   - Disconnect power steering pressure hose (B) and return line (A) from steering gear (1). Discard o-rings.
     CAUTION:
     Do not reuse o-rings.
     NOTE:
     Shown with engine removed for clarity.



2. Drain power steering fluid into a suitable container.
   CAUTION:
   Do not reuse drained power steering fluid.

REFILLING

1. Connect hydraulic lines.
   - For XD Models, connect hydraulic lines to steering box. Refer to ST-69, "Exploded View".
     CAUTION:
     Do not reuse copper sealing washers.
   - For Non-XD Models, connect hydraulic lines to steering gear. Refer to ST-69, "Exploded View".
     CAUTION:
     Do not reuse o-rings.
2. Fill power steering reservoir while checking power steering fluid level.
   CAUTION:
   Do not reuse drained power steering fluid.
3. Bleed air from power steering hydraulic system. Refer to ST-34, "Air Bleeding Hydraulic System".
4. Check for power steering fluid leaks. Repair as necessary.

Air Bleeding Hydraulic System

INFOID:0000000014392440

Incomplete air bleeding causes the following. When this happens, bleed air again.
- Air bubbles in reservoir tank.
- Clicking noise in power steering oil pump.
- Excessive buzzing in power steering oil pump.

NOTE:
When vehicle is stationary or while steering wheel is being turned slowly, some noise may be heard from power steering oil pump or the power steering gear. This noise is normal and does not affect any system.

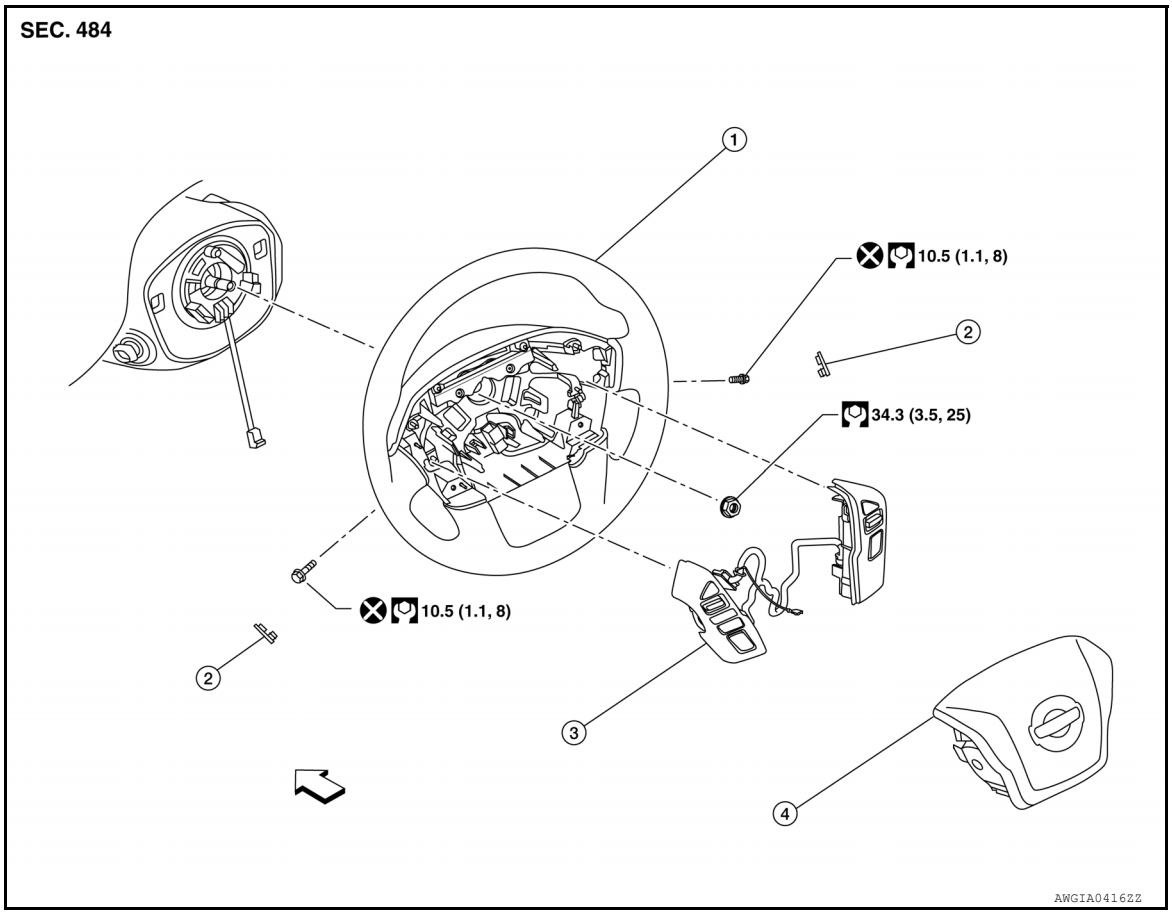
1. Stop engine and turn steering wheel fully to right and left several times. When fluid is lowered, refill reservoir. Repeat process until fluid level is stabilized.
   CAUTION:
   Do not allow steering fluid reservoir tank to go below the MIN level line. Check tank frequently and add power steering fluid as needed.
2. Run engine at idle speed. Turn steering wheel fully right and then fully left, hold for about three seconds. Then check for power steering fluid leakage.
3. Repeat step 2 several times at about three second intervals.
   CAUTION:
   Do not hold steering wheel in the locked position for more than five seconds. (There is the possibility that the power steering oil pump may be damaged.)
4. Check for air bubbles or cloudy fluid.
5. If air bubbles or cloudiness still exists, stop engine, perform steps 2 and 3 again until air bubbles or cloudiness does not exist.
6. Stop engine, check power steering fluid level.

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:0000000014392441



1. Steering wheel
2. Cover
3. Steering switches
4. Driver air bag module
⇦ Front

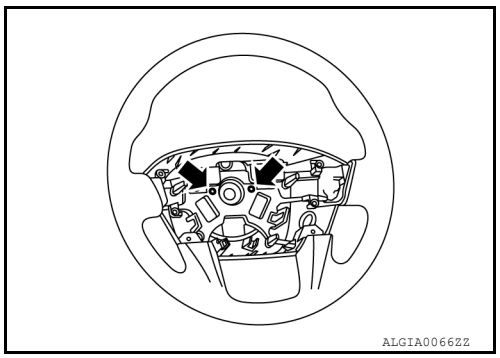
Removal and Installation

INFOID:0000000014392442

REMOVAL

1. Set front wheels in the straight-ahead position.
2. Remove driver air bag module. Refer to SR-12, "Removal and Installation".
3. Disconnect harness connector from steering wheel heater (if equipped).
4. Disconnect harness connector from steering switches.
5. Remove steering wheel lock nut.
   CAUTION:
   Do not reuse steering wheel lock nut.
6. Remove steering wheel using suitable tool.
   CAUTION:
   Place a piece of tape across spiral cable so it will not be rotated out of position.

7. Inspect steering wheel near puller holes for damage. If damaged, replace steering wheel.



8. If necessary, remove steering switches. Refer to AV-70, "Removal and Installation" (DISPLAY AUDIO), AV-164, "Removal and Installation" (NAVIGATION WITHOUT AMPLIFIER), or AV-289, "Removal and Installation" (NAVIGATION WITH AMPLIFIER).

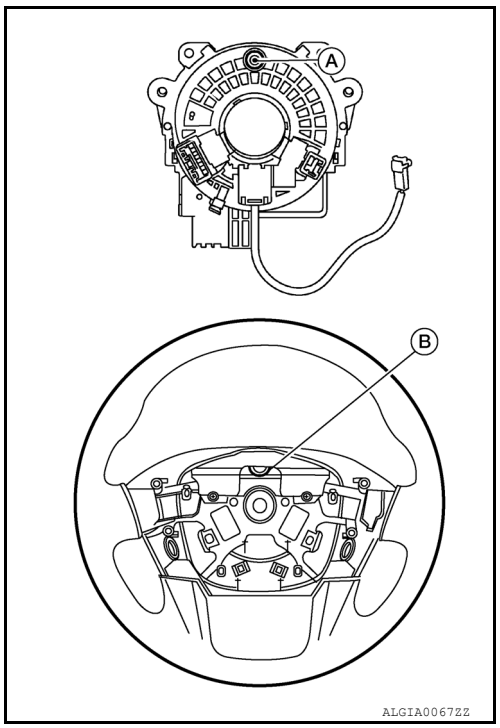
INSTALLATION

Installation is in the reverse order of removal.

- Align spiral cable correctly before installing steering wheel. Make sure that spiral cable is in neutral position ending up with locating pin (A) on top. Refer to SR-14, "Removal and Installation".
- During steering wheel installation, make sure locating pin hole (B) is aligned with locating pin of spiral cable (A).

CAUTION:

- **If cable is not installed in correct position, spiral cable may snap by turning steering wheel beyond limited number of turns.**
- **Do not reuse steering wheel lock nut.**

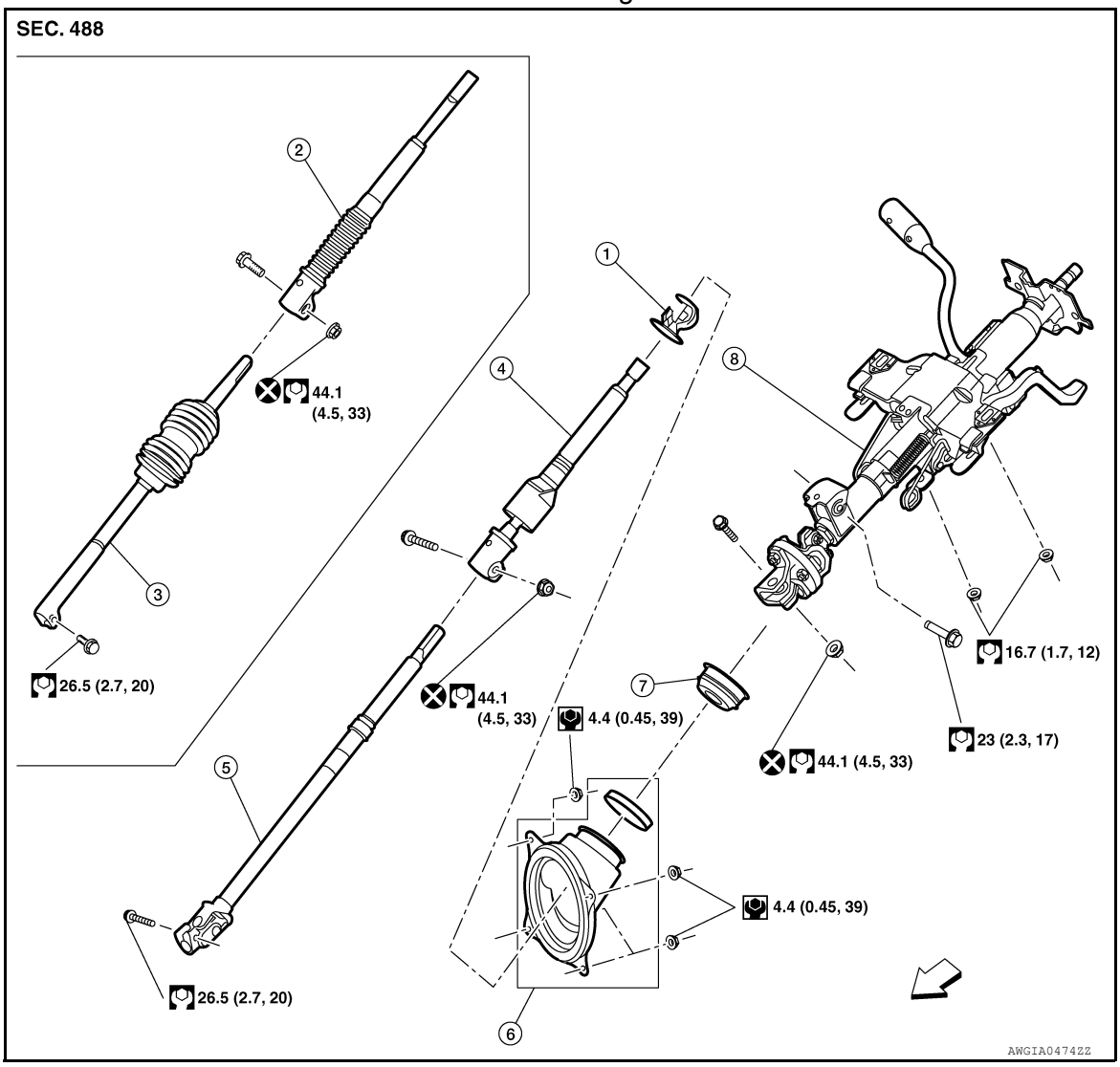


STEERING COLUMN

Exploded View

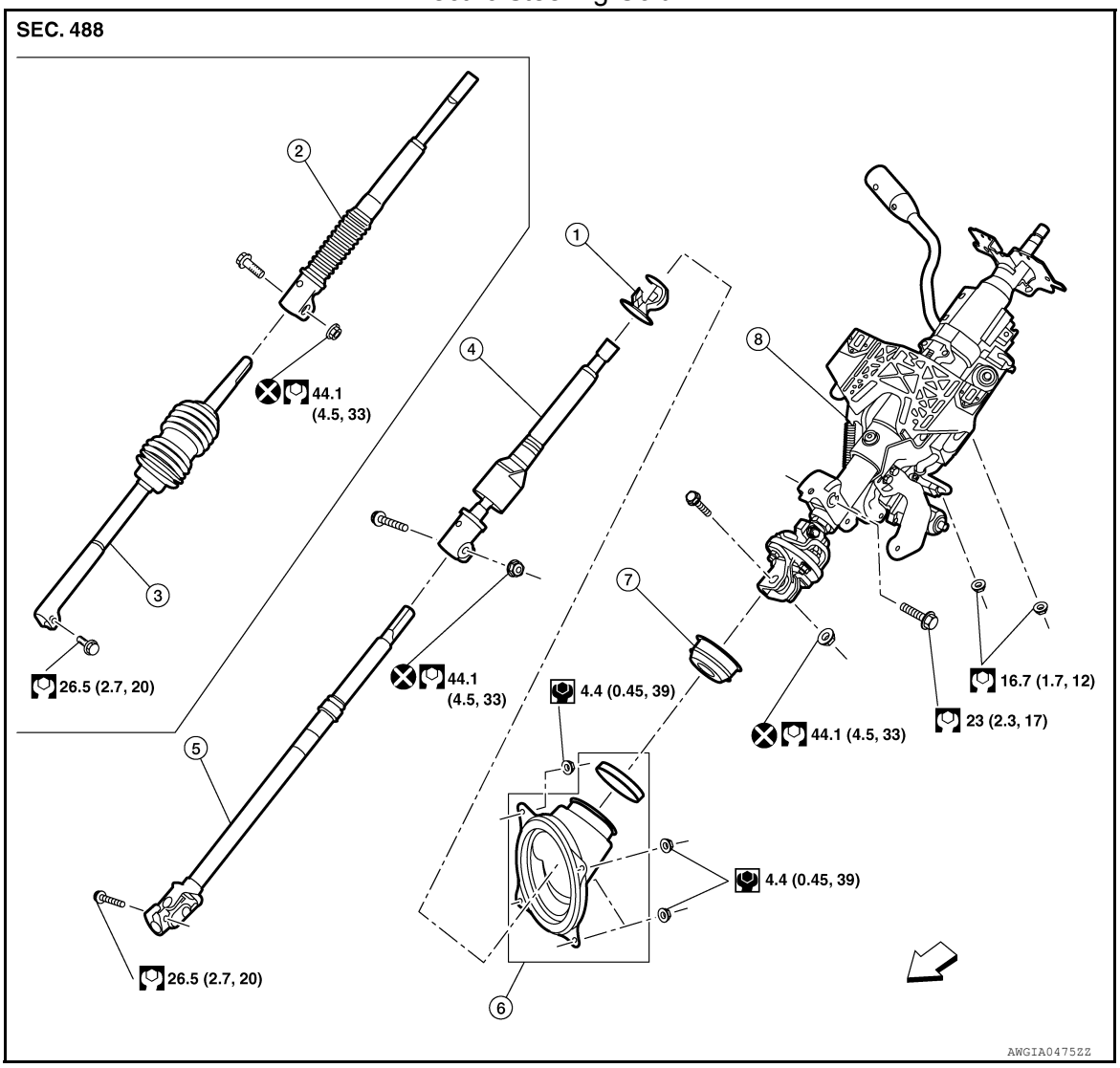
INFOID:0000000014392443

Mechanical Steering Column



1. Steering column collar
2. Intermediate shaft - (Non-XD models)
3. Steering lower joint - (Non-XD Models)
4. Intermediate shaft - (XD models)
5. Steering lower joint - (XD Models)
6. Hole cover and clamp
7. Hole cover seal
8. Steering column
⇦ Front

Electric Steering Column



1. Steering column collar	2. Intermediate shaft - Non-XD Models	3. Steering lower joint - Non-XD Models
4. Intermediate shaft - XD Models	5. Steering lower joint - XD Models	6. Hole cover and clamp
7. Hole cover seal	8. Steering column	⇦ Front

Removal and Installation

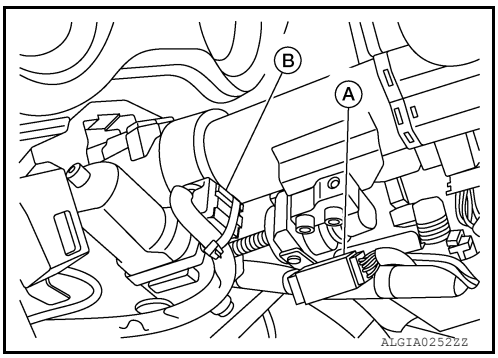
INFOID:0000000014392444

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

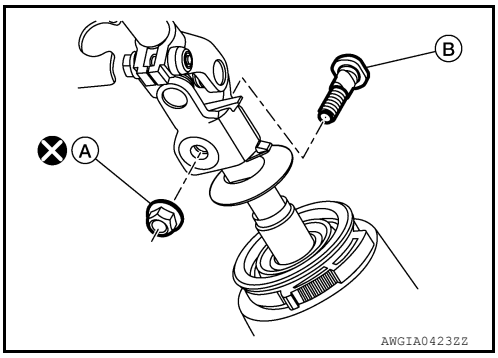
REMOVAL

1. Remove steering wheel. Refer to ST-36, "Removal and Installation".
2. Remove steering column covers. Refer to IP-18, "Removal and Installation".

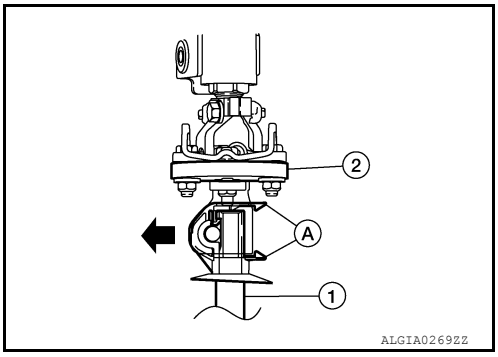
3. Disconnect harness connector (A) from shift interlock.
4. Disconnect harness connector (B) from steering column (if equipped).



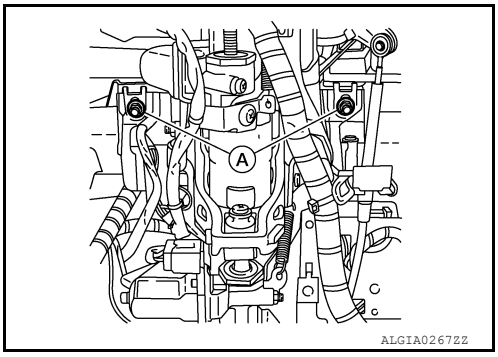
5. Disconnect harness connector from combination switch.
6. Disconnect harness connector from spiral cable
7. Disconnect harness connector from steering angle sensor.
8. Separate wiring harness from steering column and position wiring harness aside.
9. Remove instrument lower panel LH. Refer to IP-22, "Removal and Installation".
10. Remove knee protector. Refer to IP-14, "Exploded View".
11. Disconnect A/T shift selector control cable from steering column. Refer to TM-221, "Removal and Installation".
12. Remove nut (A) and pinch bolt (B) from steering column joint.
    CAUTION:
    Do not reuse nut.



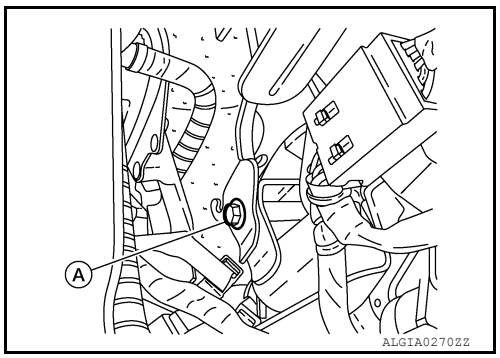
13. Release collar lock tabs (A), then separate intermediate shaft (1) from steering column joint (2) in direction shown (⬅).



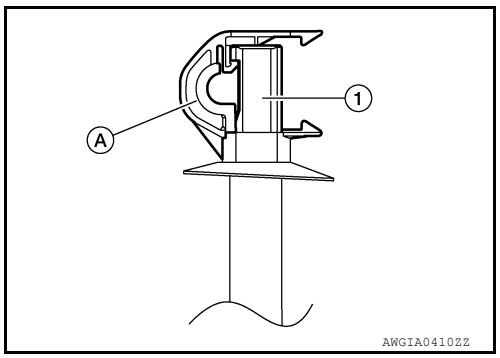
14. Remove steering column nuts (A).



15. Remove steering column bolt (A), then remove steering column from vehicle.



16. Inspect collar (A) on intermediate shaft (1).
CAUTION:
If collar is damaged or separates from intermediate shaft, collar must be replaced.



INSPECTION AFTER REMOVAL

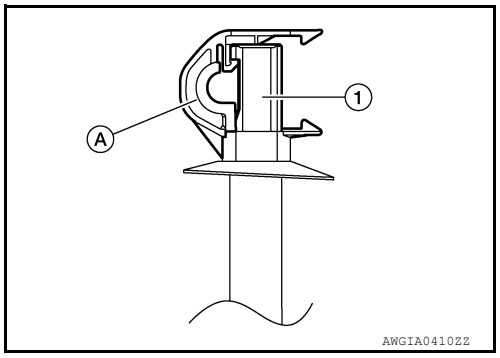
- Check each part of steering column for damage or wear. If damage is found, replace steering column.
- If vehicle has been involved in a collision, or if noise and rattles are heard during a turn, check the length of the column. Refer to ST-19, "Inspection". If out of specification, replace steering column.

INSTALLATION

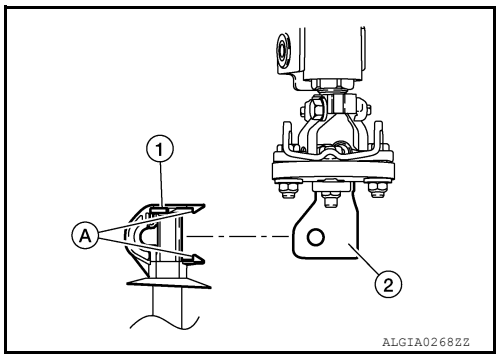
Installation is in the reverse order of removal.

CAUTION:

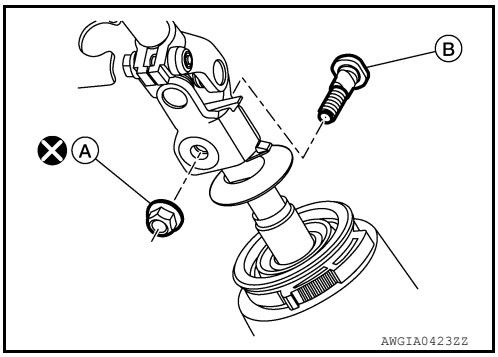
- **Verify that collar (A) is installed correctly onto intermediate shaft (1).**



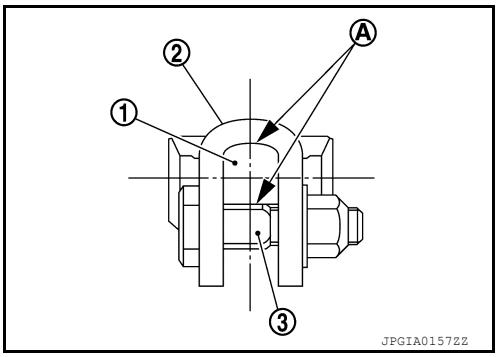
1. Install steering column mounting nuts and bolt finger-tight, then tighten them to specification.
CAUTION:
Do not apply undue stress to steering column.
2. Assemble intermediate shaft collar (1) into steering column coupling joint (2) as shown. Verify that pinch bolt holes align and lock tabs (A) engage on coupling joint (2).



3. Install pinch bolt (B) and nut (A) finger-tight, then torque to specification. Pinch bolt is directional. Refer to ST-38, "Exploded View".
CAUTION:
Do not reuse nut.



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

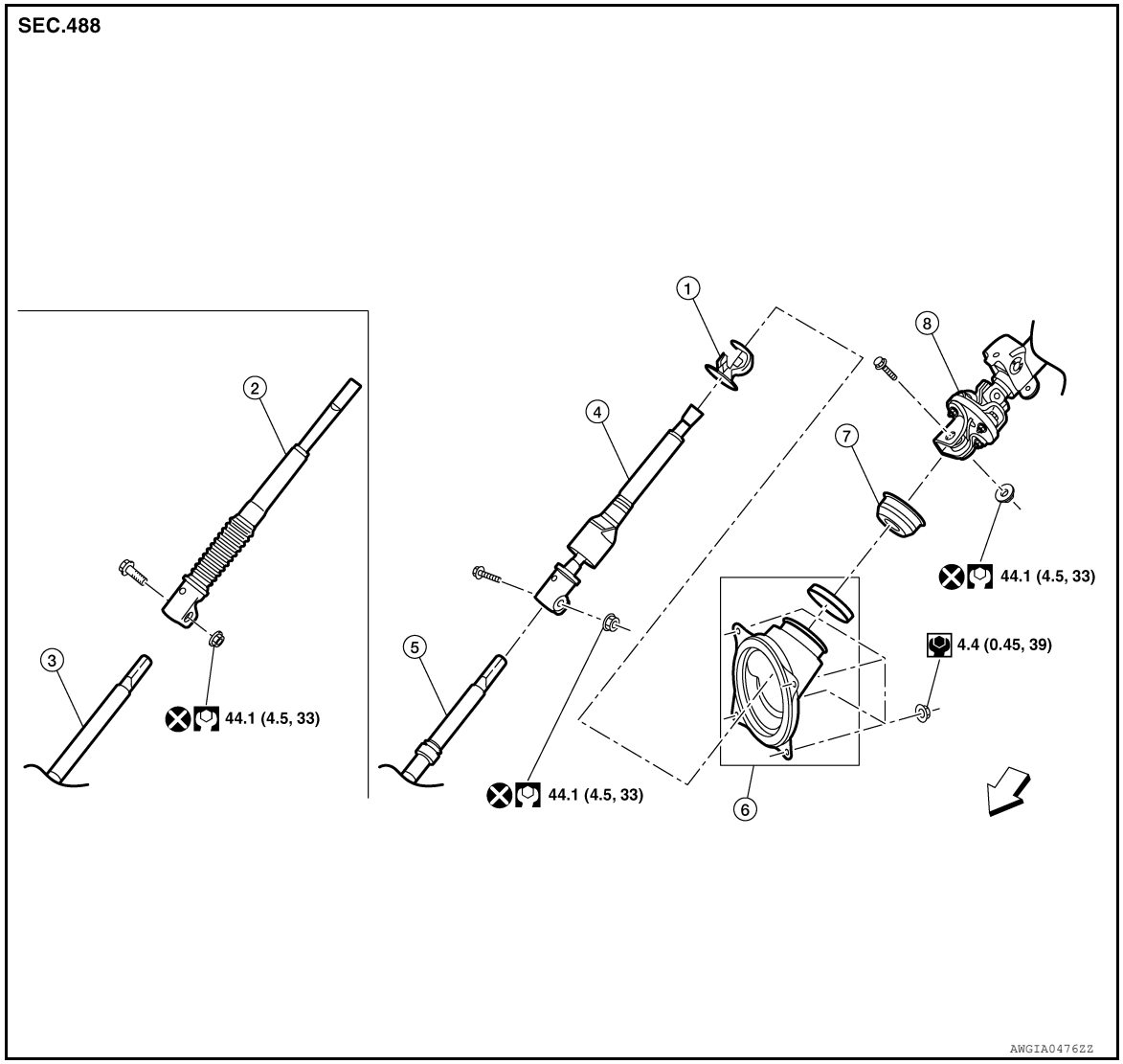


5. After installation:
   - Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
   - Make sure the number of turns are the same from the straight-forward position to left and right stops.
   - Make sure that steering wheel is in a neutral position when driving straight ahead.
   - Check tilt and telescope mechanism operating range. Refer to ST-84, "Mechanical Steering Column" (Mechanical steering column) or ST-85, "Electric Steering Column" (Electric steering column).
   - Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

INTERMEDIATE SHAFT

Exploded View

INFOID:0000000014392445



1. Steering column collar
2. Intermediate shaft (Non-XD Models)
3. Lower joint (Non-XD Models)
4. Intermediate shaft (XD Models)
5. Lower joint (XD Models)
6. Steering column
7. Hole cover seal
8. Steering column
- ⇦ Front

Removal and Installation

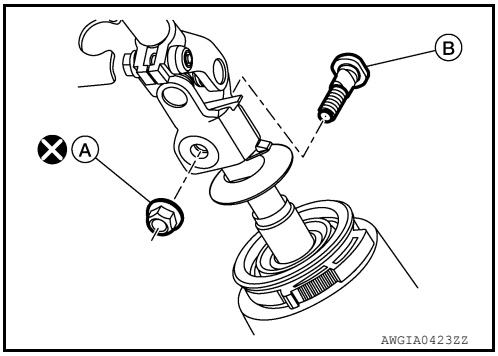
INFOID:0000000014392446

CAUTION:
Do not move steering box (XD Models) or steering gear (Non-XD Models) during removal and installation of intermediate shaft.

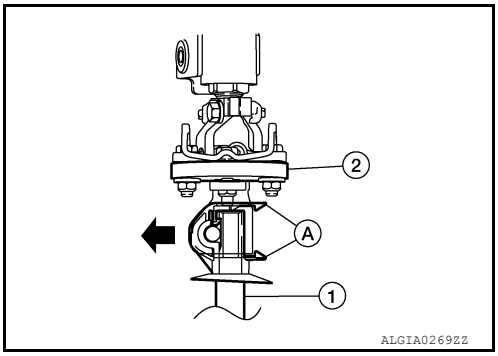
REMOVAL

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.

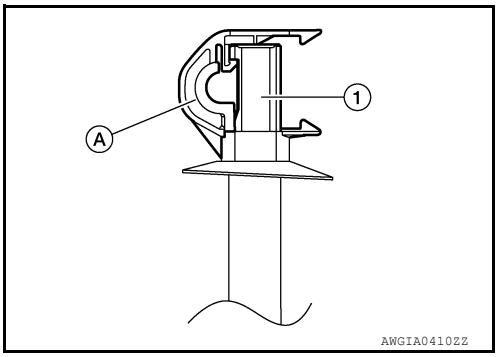
2. Remove nut (A) and pinch bolt (B) from steering column joint.
CAUTION:
Do not reuse nut.



3. Release collar lock tabs (A), then separate intermediate shaft (1) from steering column joint (2) in direction shown (⬅).



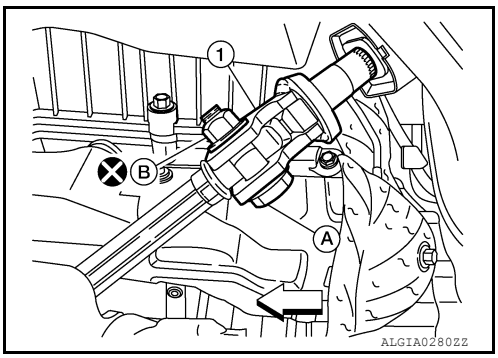
4. Remove collar (A) from intermediate shaft (1).
CAUTION:
If collar is damaged, collar must be replaced



5. Remove nut and pinch bolt from intermediate shaft lower joint.
- For XD Models, remove nut (B) and pinch bolt (A) from intermediate shaft (1).

CAUTION:
Do not reuse nut.

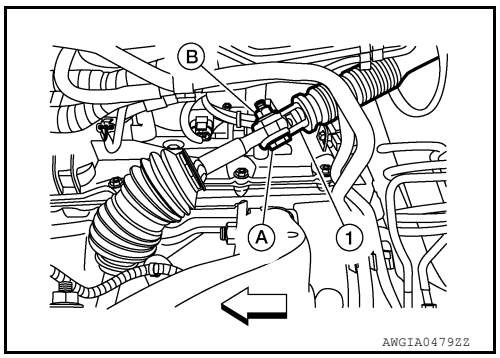
⇦ : Front



- For Non-XD models, remove nut (B) and pinch bolt (A) from intermediate shaft (1).

CAUTION:
Do not reuse nut.

⇦ : Front



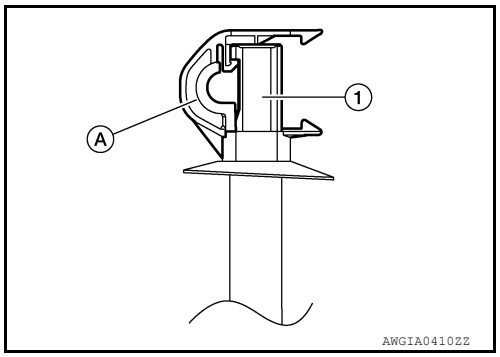
6. Separate intermediate shaft from lower join and remove from vehicle.

CAUTION:
Do not damage hole cover during removal. If hole cover is damaged, it must be replaced.

INSTALLATION

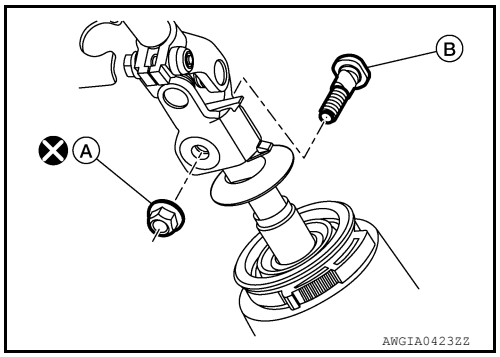
Installation is in reverse order of removal.

CAUTION:
Verify that collar (A) is installed correctly onto intermediate shaft (1).



1. Install pinch bolt (B) and nut (A) into steering column joint finger-tight, then torque to specification. Pinch bolt is directional. Refer to ST-43, "Exploded View".

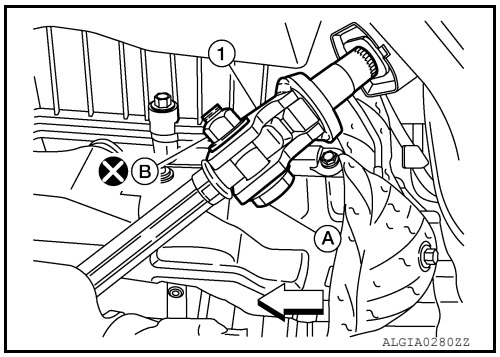
CAUTION:
Do not reuse nut.



2. Install pinch bolt and nut into intermediate shaft lower joint.
   - For XD Models, install pinch bolt (A) and nut (B) into intermediate shaft finger-tight. Pinch bolt is directional. Refer to ST-43, "Exploded View"

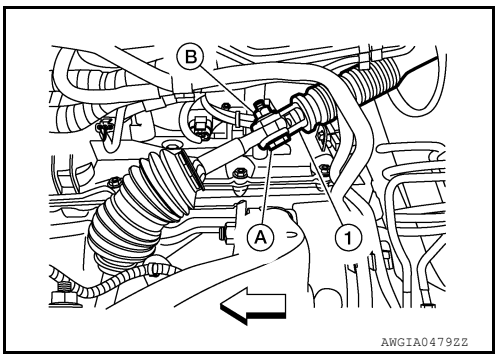
CAUTION:
Do not reuse nut.

⇦ : Front



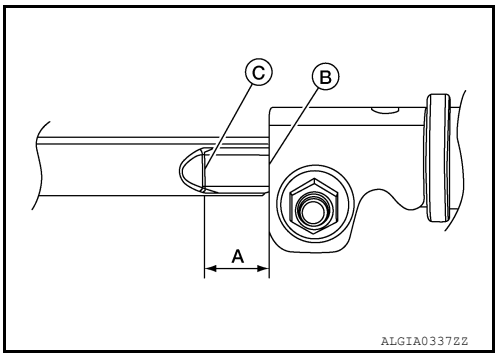
- For Non-XD Models, install pinch bolt (A) and nut (B) into intermediate shaft finger-tight. Pinch bolt is directional. Refer to ST-43, "Exploded View"

⇦ : Front



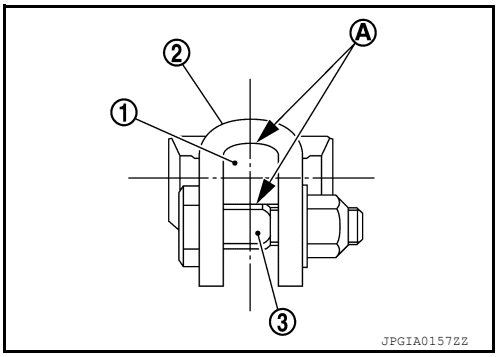
- Adjust dimension (A) between surface (B) and edge (C) to specification.

Dimension (A) 20 +5/-1 mm

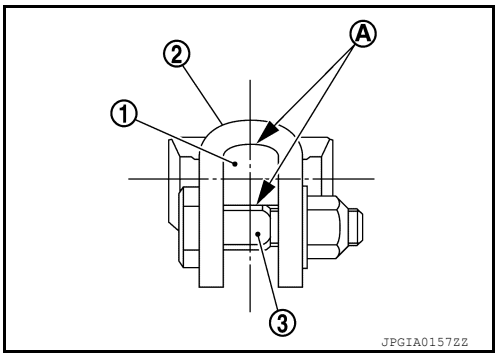


3. For all models, tighten pinch bolt to specification. Refer to ST-43, "Exploded View".

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



5. Check that there is no clearance (A) between lower joint (1) and intermediate shaft joint (2) and between lower shaft and pinch bolt (3).



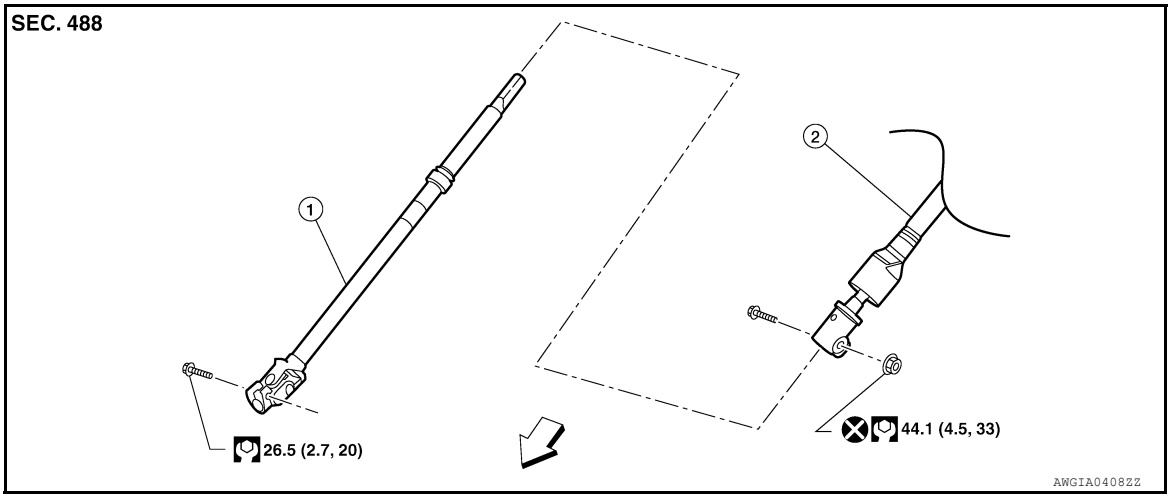
6. After Installation:
   - Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
   - Make sure number of turns are the same from straight-forward position to left and right stops.
   - Make sure steering wheel is in a neutral position when driving straight ahead.
   - Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

LOWER JOINT

Exploded View

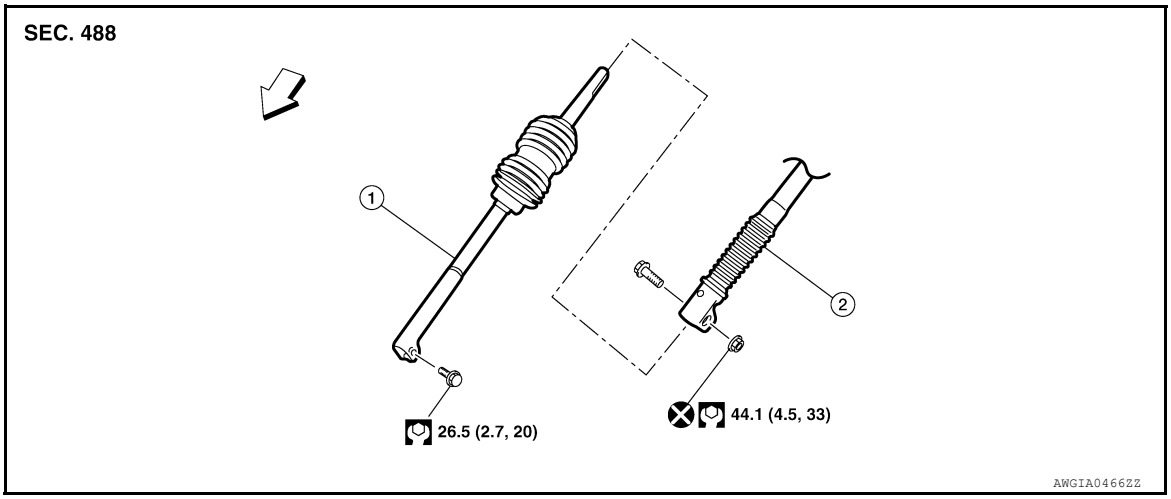
INFOID:0000000014392447

XD Models



1. Lower joint
2. Intermediate shaft
⇦ Front

Non-XD Models



1. Lower joint
2. Intermediate shaft
⇦ Front

Removal and Installation

INFOID:0000000014392448

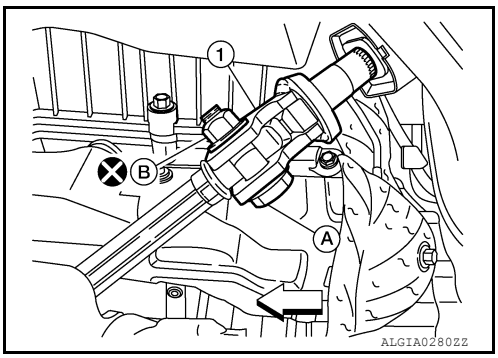
CAUTION:
Do not move steering box (XD Models) or steering gear (Non-XD models) during removal and installation of lower joint.

REMOVAL

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove nut and pinch bolt from intermediate shaft lower joint.
   CAUTION:
   Do not reuse pinch bolt nut.

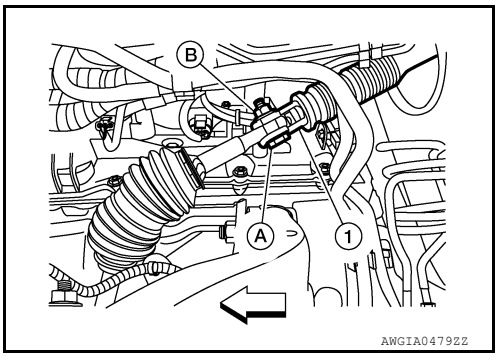
- For XD Models, remove nut (B) and pinch bolt (A) from intermediate shaft (1).

⇦ : Front

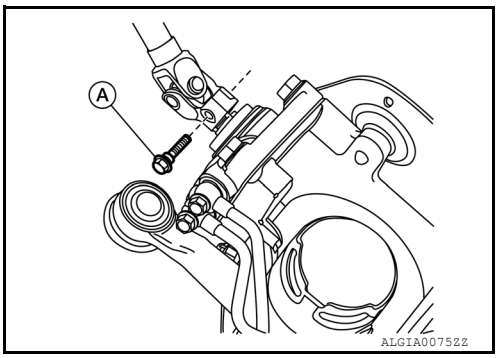


- For Non-XD models, remove nut (B) and pinch bolt (A) from intermediate shaft (1).

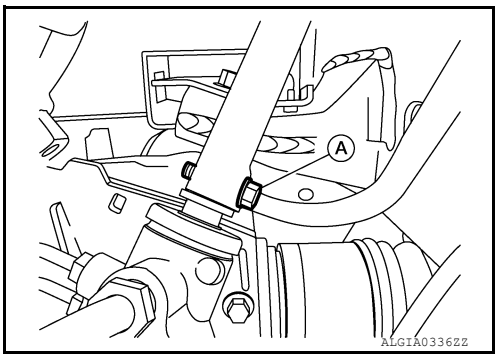
⇦ : Front



3. Separate lower joint from intermediate shaft.
4. Remove pinch bolt (A) from lower joint.
   - For XD Models, remove pinch bolt (A) from lower joint and separate lower joint from steering box



   - For Non-XD Models, remove pinch bolt (A) from lower joint and separate lower joint from steering gear.



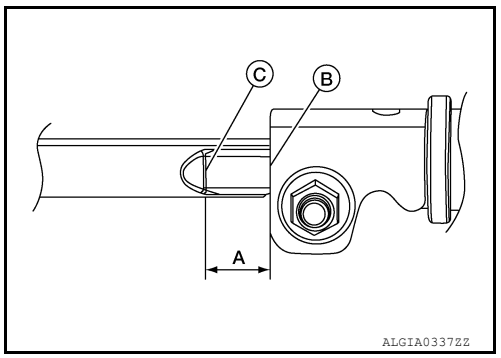
5. Remove lower joint from vehicle.

INSTALLATION

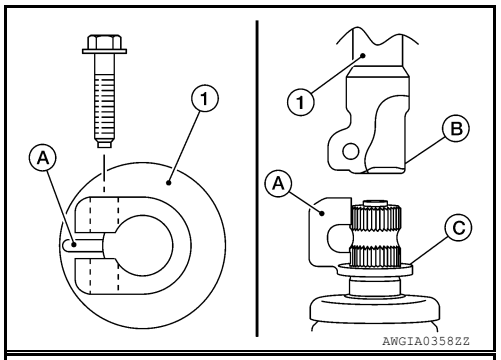
1. When connecting lower joint to intermediate shaft, first finger-tighten pinch bolt nut. Pinch bolt is directional. Refer to ST-43, "Exploded View".
   CAUTION:
   - **Do not reuse pinch bolt nut.**

2. For Non-XD Models, adjust dimension (A) between surface (B) and edge (C) to specification.

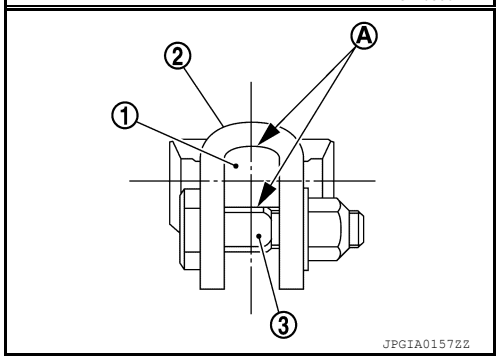
Dimension (A) **20 +5/-1 mm**



3. For all models, tighten pinch bolt to specification. Refer to ST-43, "Exploded View".
4. When connecting lower joint to steering gear, first insert pinch bolt through hole in lower joint, then through hole in steering gear projection. Finger-tighten pinch bolt, then tighten to specification.
   - Align slit on lower joint (1) with projection (A) on steering gear. Connect lower joint to steering gear until surface (B) contacts surface (C).
   - Verify that pinch bolt threads are not damaged. Replace pinch bolt if necessary.



5. Check that there is no clearance (A) between lower joint (1) and intermediate shaft yoke (2) and between lower shaft and pinch bolt (3).



6. Remaining components are installed in reverse order of removal.
7. After Installation:
   - Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
   - Make sure number of turns are the same from straight-forward position to left and right stops.
   - Make sure steering wheel is in a neutral position when driving straight ahead.
   - Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

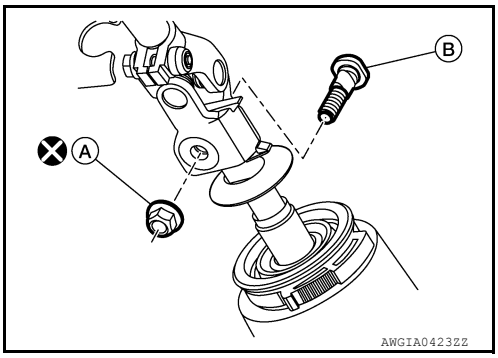
HOLE COVER SEAL

Removal and Installation

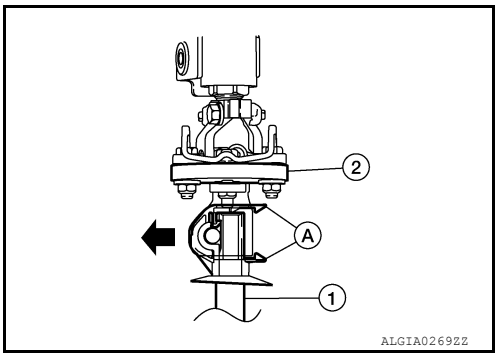
INFOID:0000000014392449

REMOVAL

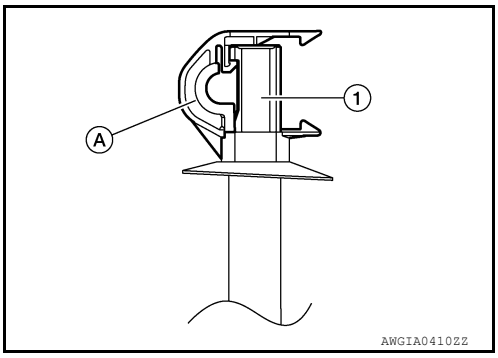
1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove nut (A) and pinch bolt (B) from steering column joint.
   CAUTION:
   Do not reuse nut.



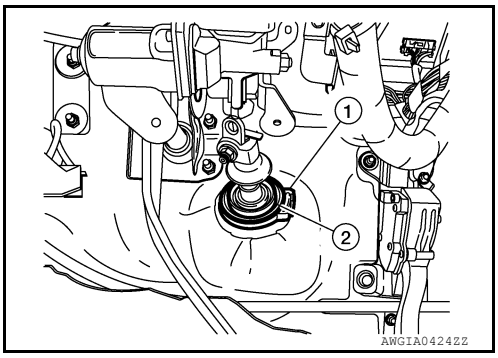
3. Release collar lock tabs (A), then separate intermediate shaft (1) from steering column joint (2) in direction shown (⬅).



4. Remove collar (A) from intermediate shaft (1).
   CAUTION:
   If collar is damaged, collar must be replaced



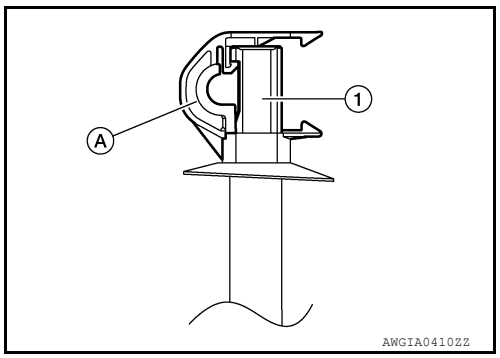
5. Remove clamp (1) and hole cover seal (2) from hole cover.
   CAUTION:
   Do not damage hole cover seal during removal. If seal is damaged, it must be replaced.



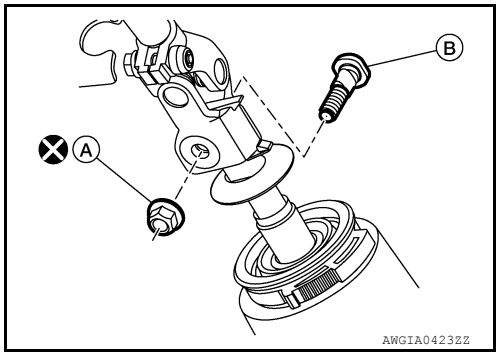
INSTALLATION

CAUTION:

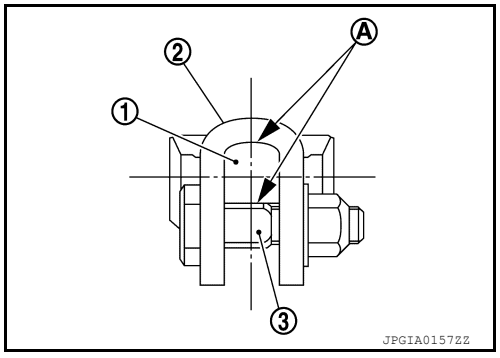
- **Verify that collar (A) is installed correctly onto intermediate shaft (1).**



1. Install pinch bolt (B) and nut (A) into steering column joint finger-tight, then torque to specification. Pinch bolt is directional. Refer to ST-43, "Exploded View".
   CAUTION:
   Do not reuse nut.



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



3. Installation of the remaining components is in the reverse order of removal.
4. After Installation:
   - Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
   - Make sure number of turns are the same from straight-forward position to left and right stops.
   - Make sure steering wheel is in a neutral position when driving straight ahead.
   - Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

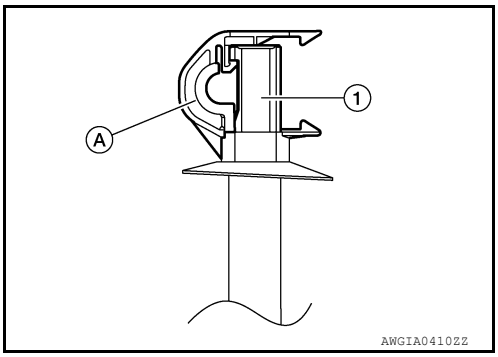
HOLE COVER

Removal and Installation

INFOID:0000000014392450

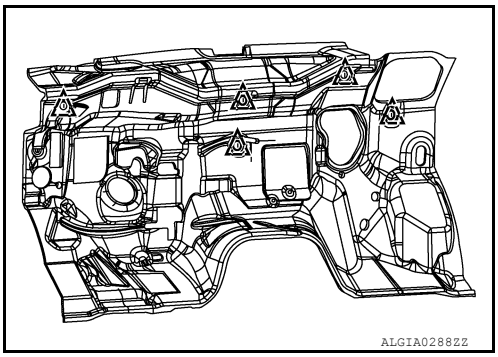
REMOVAL

1. Remove heating and cooling assembly. Refer to HA-49, "HEATING AND COOLING UNIT ASSEMBLY : Removal and Installation".
2. Remove collar (A) from intermediate shaft (1).
   CAUTION:
   If collar is damaged, collar must be replaced.

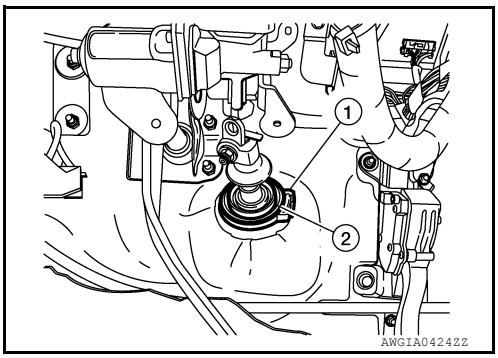


3. Remove accelerator pedal. Refer to ACC-3, "Removal and Installation".
4. Remove brake pedal. Refer to BR-21, "Removal and Installation".
5. Remove parking brake front cable retaining nut at bulkhead (LH). Refer to PB-7, "Exploded View".
6. Remove parking brake control. Refer to PB-8, "Removal and Installation".
   NOTE:
   Do not remove parking brake switch.
7. Remove dash side finisher (LH/RH). Refer to INT-22, "DASH SIDE FINISHER : Removal and Installation".
8. Pull carpet back as necessary for access.
9. Remove clips and remove dash insulator.
   CAUTION:
   Do not damage dash insulator during removal. If insulator is damaged, it must be replaced.

   : Clip



10. Remove clamp (1) and hole cover seal (2) from hole cover.
    CAUTION:
    Do not damage hole cover seal during removal. If seal is damaged, it must be replaced.



11. Remove nuts and remove hole cover. Refer to ST-43, "Exploded View".

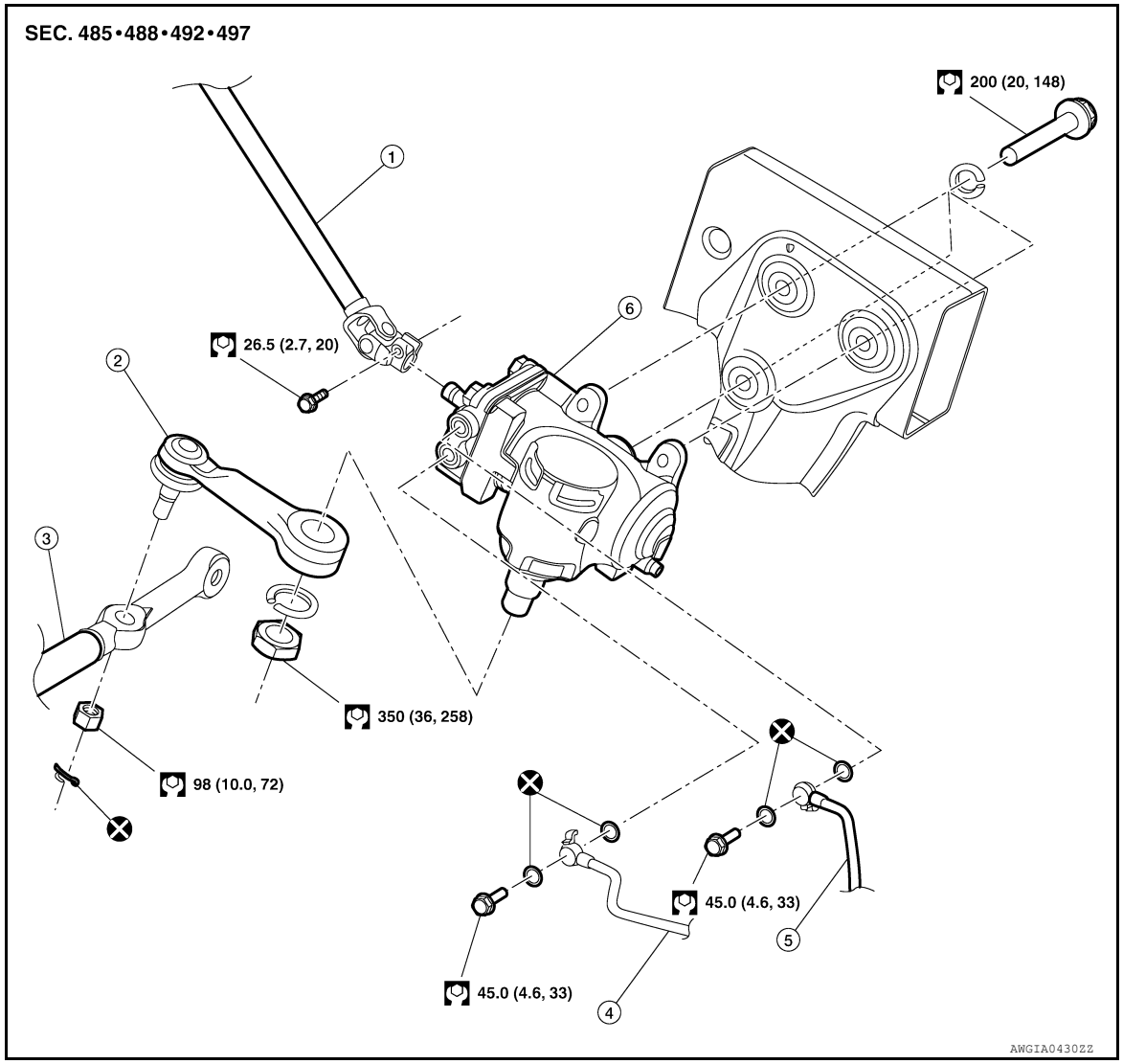
INSTALLATION

Installation is in the reverse order of removal.

STEERING BOX

Exploded View

INFOID:0000000014392451



1. Steering lower joint
2. Pitman arm
3. Relay rod
4. Power steering return line
5. Power steering pressure line
6. Steering box

Removal and Installation

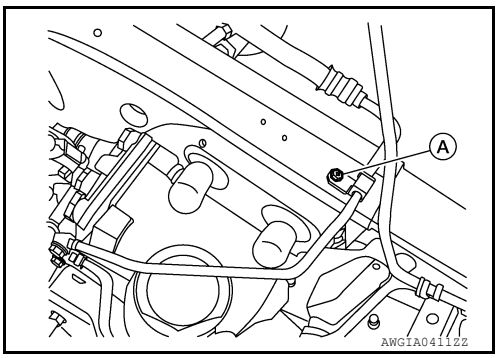
INFOID:0000000014392452

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

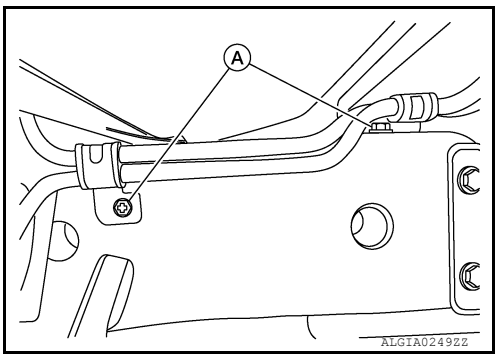
REMOVAL

1. Set front wheels in specified position.
   - For 2WD models, set front wheels and tires in straight ahead position.
   - For 4WD models, set front wheels and tires in full right position.
2. Drain power steering system. Refer to ST-34, "Draining and Refilling".
3. Remove front under cover. Refer to EXT-37, "FRONT UNDER COVER : Removal and Installation".
4. Remove stabilizer clamps. Refer to FSU-23, "Exploded View".
5. Reposition stabilizer out of the way.

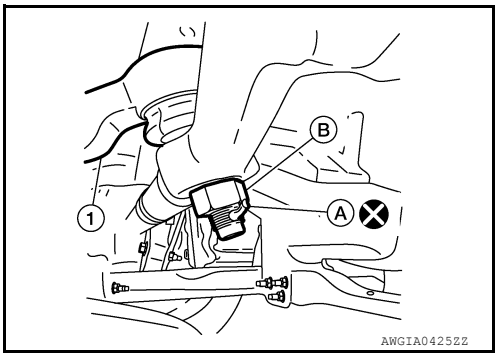
6. For Cummins 5.0 engine, remove bolt (A) from power steering pressure line at frame rail.



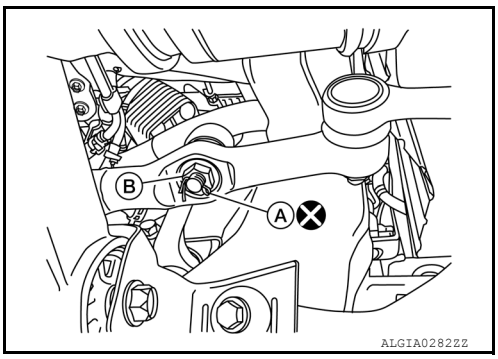
7. Remove bolts (A) from power steering return line at LH side of frame and radiator core support.



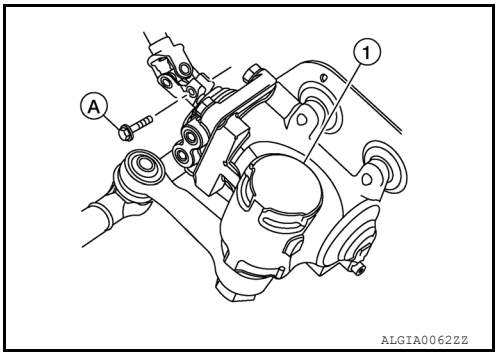
8. Remove cotter pin (A) and nut (B) from pitman arm (1). Separate pitman arm from relay rod using suitable tool. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.
NOTE:
4WD model shown, 2WD model similar.



9. Remove cotter pin (A) and nut (B) from idler arm. Separate idler arm from relay rod using suitable tool. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.
NOTE:
4WD model shown, 2WD model similar.



10. Remove steering lower joint pinch bolt (A) at steering box (1). Separate steering lower joint from steering box.



11. Remove bolts and remove steering box from vehicle.
12. Remove pitman arm from steering box (if necessary). Refer to ST-56, "Exploded View".

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Do not reuse copper sealing washers.

Do not reuse drained power steering fluid.

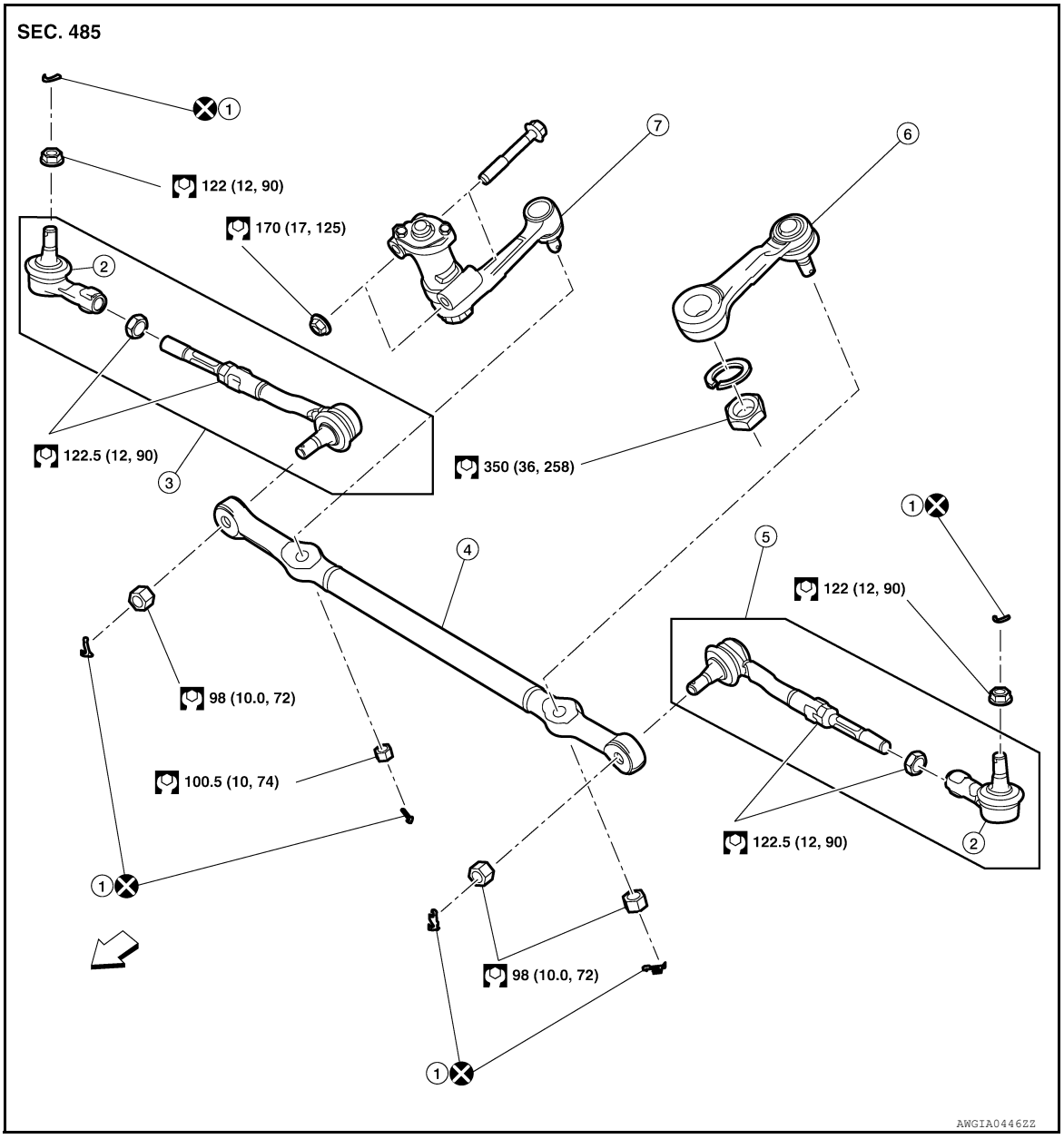
- Fill power steering fluid. Refer to ST-34, "Draining and Refilling".
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering fluid leaks. Refer to ST-16, "Fluid Leak Inspection".
- Adjust neutral position of the steering angle sensor. Refer to BRC-70, "Description".

STEERING LINKAGE

Exploded View

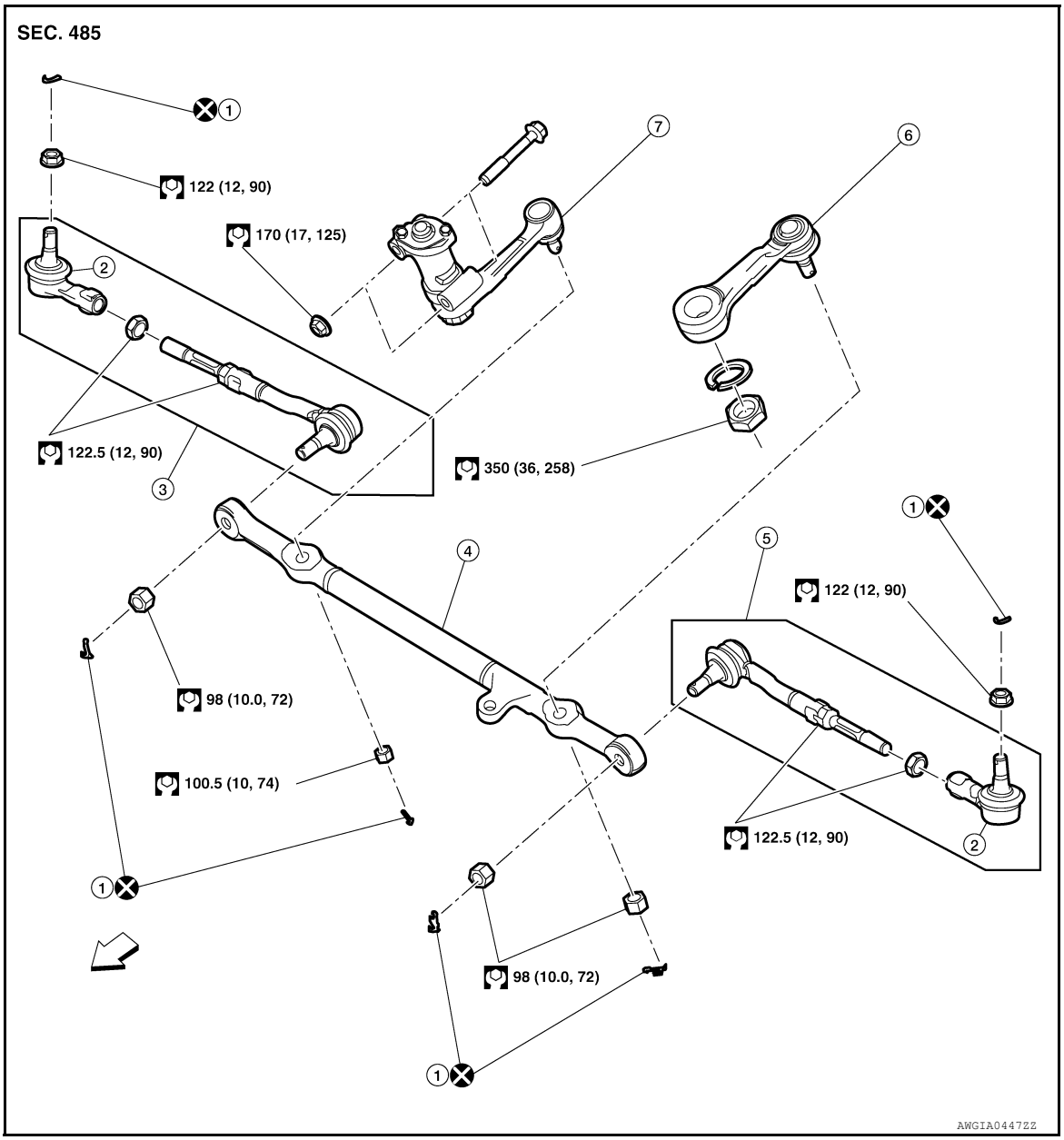
INFOID:0000000014392453

2WD



1. Cotter pin
2. Outer socket
3. Inner/outer socket assembly (RH)
4. Relay rod
5. Inner/outer socket assembly (LH)
6. Pitman arm
7. Idler arm
⇦ Front

4WD



1. Cotter pin
2. Outer socket
3. Inner/outer socket assembly (RH)
4. Relay rod
5. Inner/outer socket assembly (LH)
6. Pitman arm
7. Idler arm
⇦ Front

PITMAN ARM

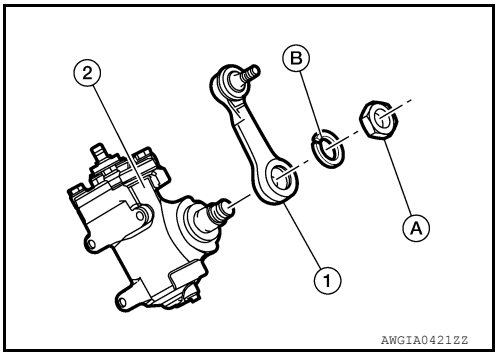
PITMAN ARM : Removal and Installation

INFOID:0000000014392454

REMOVAL

1. Remove steering box. Refer to ST-53, "Removal and Installation".

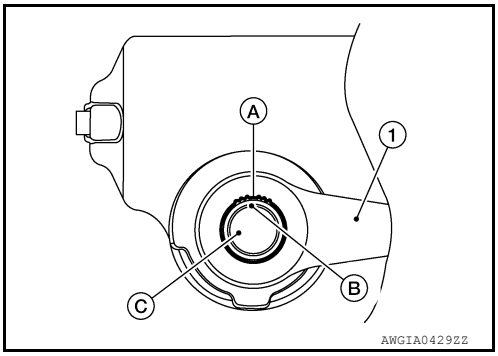
2. Remove pitman arm nut (A) and lock washer (B).
3. Remove pitman arm (1) from steering box (2) using suitable tool.



INSTALLATION

Installation is in the reverse order of removal.

- Align cutting point (A) on pitman arm (1) with cutting point (B) on steering box sector shaft (C).



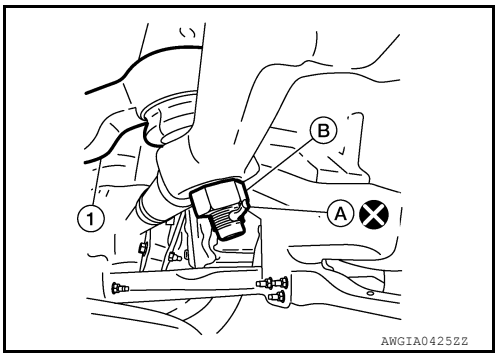
IDLER ARM

IDLER ARM : Removal and Installation

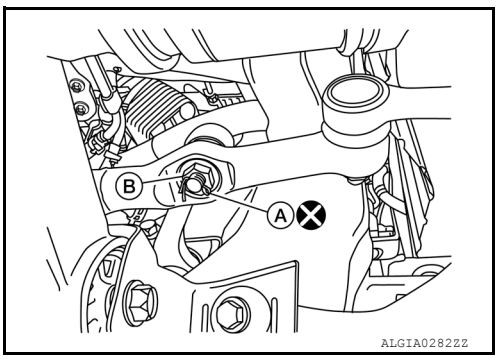
INFOID:0000000014392455

REMOVAL

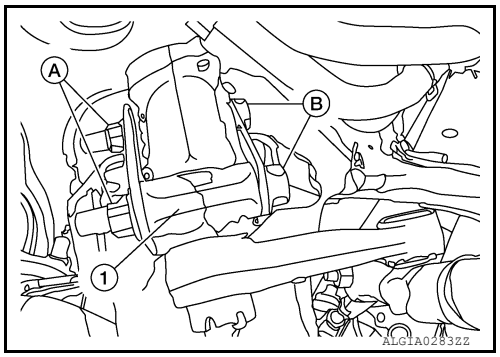
1. Set front wheels in specified position.
   - For 2WD models, set front wheels and tires in straight ahead position.
   - For 4WD models, set front wheels and tires in full right position.
2. Remove front under cover. Refer to EXT-37, "FRONT UNDER COVER : Removal and Installation".
3. Remove cotter pin (A) and nut (B) from pitman arm (1). Separate pitman arm from relay rod using suitable tool. Discard cotter pin.
   CAUTION:
   Do not reuse cotter pin.
   NOTE:
   4WD model shown, 2WD model similar.



4. Remove cotter pin (A) and nut (B) from idler arm. Separate idler arm from relay rod using suitable tool. Discard cotter pin.
   CAUTION:
   Do not reuse cotter pin.
   NOTE:
   4WD model shown, 2WD model similar.



5. Remove nuts (A) and bolts (B), then remove idler arm (1).



INSTALLATION

Installation is in the reverse order of removal.

RELAY ROD

RELAY ROD : Removal and Installation

INFOID:0000000014392456

Removal

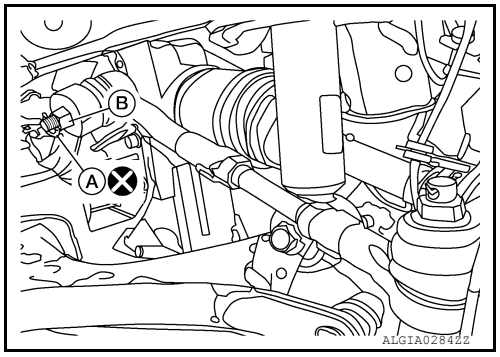
1. Set front wheels in specified position.
   - For 2WD models, set front wheels and tires in straight ahead position.
   - For 4WD models, set front wheels and tires in full right position.
2. Remove front under cover. Refer to EXT-37, "FRONT UNDER COVER : Removal and Installation".
3. Remove cotter pin (A) and nut (B) from inner socket. Separate inner socket (LH/RH) from relay rod using suitable tool. Discard cotter pins.

   CAUTION:

   Do not reuse cotter pins.

   NOTE:

   4WD model shown, 2WD model similar.



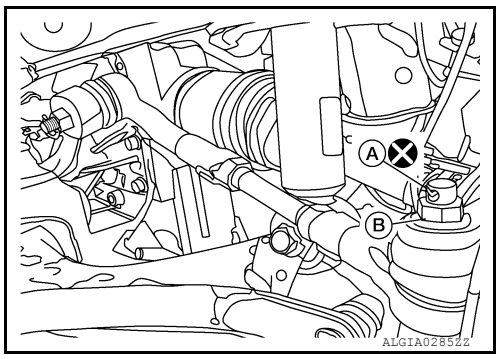
4. Remove cotter pin (A) and loosen nut (B) from outer socket. Discard cotter pin.

   CAUTION:

   Do not reuse cotter pin.

   NOTE:

   4WD model shown, 2WD model similar.

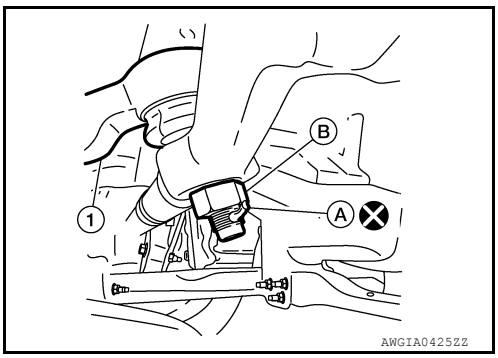


5. Separate outer socket from steering knuckle using suitable tool.

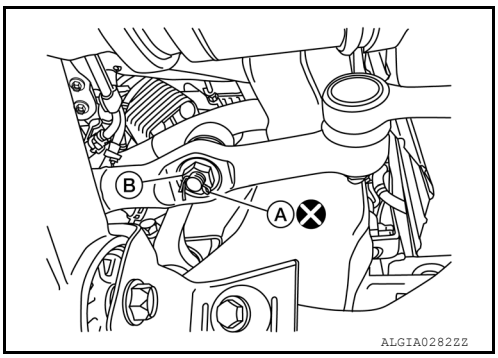
   CAUTION:

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

6. Remove cotter pin (A) and nut (B) from pitman arm (1). Separate pitman arm from relay rod using suitable tool. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.
NOTE:
4WD model shown, 2WD model similar.



7. Remove cotter pin (A) and nut (B) from idler arm. Separate idler arm from relay rod using suitable tool. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.
NOTE:
4WD model shown, 2WD model similar.



8. Remove relay rod.

Installation

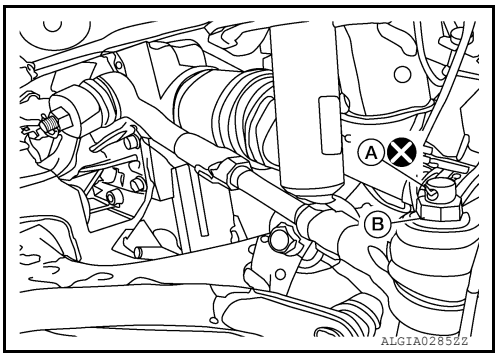
Installation is in the reverse order of removal.
- Check wheel alignment. Refer to FSU-7, "Inspection".
- Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

INNER AND OUTER SOCKETS

INNER AND OUTER SOCKETS : Removal and Installation - Outer Socket *INFOID:0000000014392457*

REMOVAL

1. Remove wheel and tire assembly using power tool. Refer to WT-69, "Removal and Installation".
2. Remove cotter pin (A) and loosen nut (B) from outer socket. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.
NOTE:
4WD model shown, 2WD model similar.



3. Separate outer socket from steering knuckle using suitable tool.
CAUTION:
Leave outer socket nut half threaded on outer socket to prevent damage to threads and to prevent suitable tool from coming off suddenly.
4. Remove outer socket nut and remove outer socket.

Installation

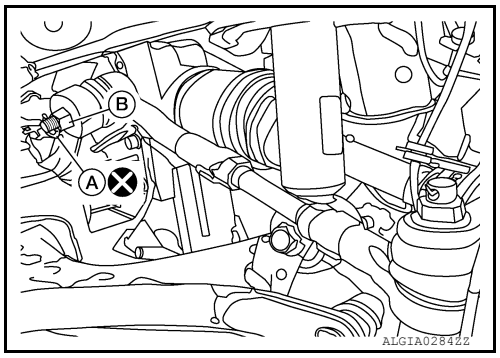
Installation is in the reverse order of removal.
- Check wheel alignment. Refer to FSU-7, "Inspection".
- Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

INNER AND OUTER SOCKETS : Removal and Installation - Inner Socket

INFOID:0000000014392458

REMOVAL

1. Remove outer socket. Refer to ST-60, "INNER AND OUTER SOCKETS : Removal and Installation - Outer Socket".
2. Remove cotter pin (A) and loosen nut (B) from inner socket. Discard cotter pin.
   CAUTION:
   Do not reuse cotter pin.
   NOTE:
   4WD model shown, 2WD model similar.



3. Separate inner socket from relay rod using suitable tool.
   CAUTION:
   Leave inner socket nut half threaded on inner socket to prevent damage to threads and to prevent suitable tool from coming off suddenly.
4. Remove inner socket.

INSTALLATION

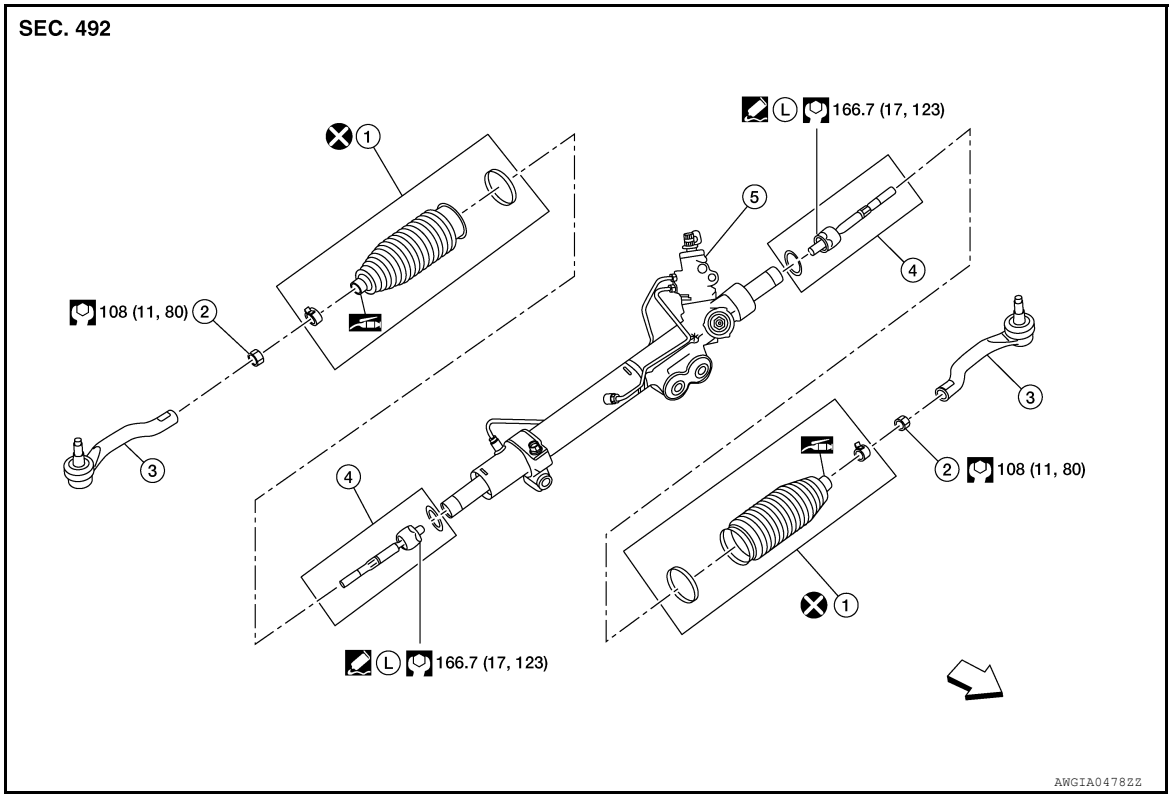
Installation is in the reverse order of removal.

- Check wheel alignment. Refer to FSU-7, "Inspection".
- Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000014632954



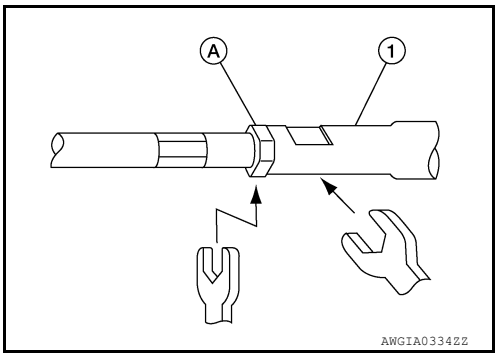
1. Boot
2. Lock nut
3. Outer socket
4. Inner socket
5. Steering gear
⇦ Front

Removal and Installation - Outer socket

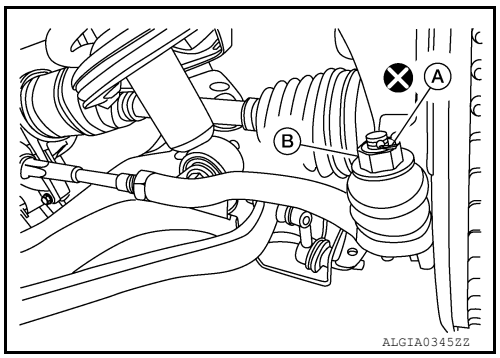
INFOID:0000000014632955

REMOVAL

1. Remove front wheel and tire using power tool. Refer to WT-69, "Removal and Installation".
2. Loosen inner socket lock nut (A).
   CAUTION:
   To prevent damage, hold outer socket (1) across flats using suitable tool while loosening inner socket lock nut (A).



3. Remove cotter pin (A) and loosen outer socket nut (B) from outer socket. Discard cotter pin.
CAUTION:
Do not reuse cotter pin.

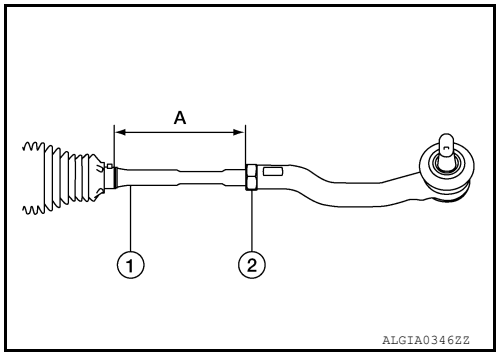


4. Separate outer socket from steering knuckle using suitable tool.
CAUTION:
Leave the outer socket nut half threaded on the outer socket to prevent damage to threads and to prevent the suitable tool from coming off suddenly.
5. Remove outer socket nut and outer socket.

INSTALLATION

1. Install outer socket to inner socket.
2. Adjust inner socket (1) to standard length (A), then tighten inner socket lock nut (2) to specification. Refer to ST-62, "Exploded View". Verify inner socket length after tightening lock nut.

Inner socket length (L) : Refer to ST-88, "Steering Linkage - Non-XD Models".



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

3. Install outer socket to steering knuckle.
4. Install outer socket nut to outer socket. Refer to ST-62, "Exploded View".
5. Install front wheel and tire. Refer to WT-69, "Removal and Installation".
6. Check wheel alignment. Refer to FSU-7, "Inspection".
7. Adjust the neutral position of the steering angle sensor. Refer to BRC-70, "Description".

Removal and Installation - Boot

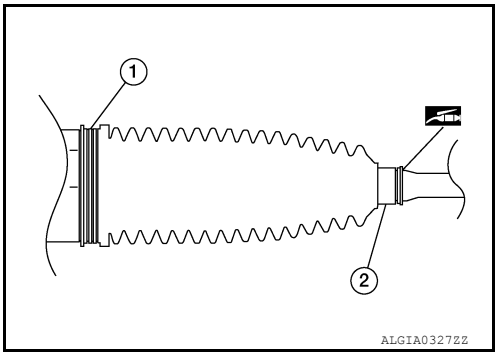
INFOID:0000000014632956

REMOVAL

1. Remove outer socket. Refer to ST-62, "Removal and Installation - Outer socket".
2. Remove inner socket lock nut.
3. Remove small boot clamp and large boot clamp.
CAUTION:
Do not reuse boot clamps.
4. Remove boot.
CAUTION:
Do not reuse boot.

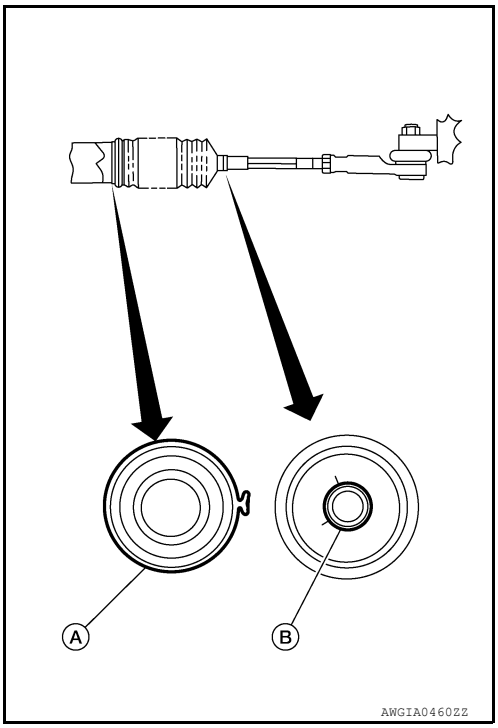
INSTALLATION

1. Install large end of boot (1) onto steering gear housing.
CAUTION:
Do not reuse boot.
2. Apply silicone grease between inner socket and small end of boot.
3. Install small end of boot (2) to inner socket boot mounting groove.
CAUTION:
To prevent boot deformation or damage during toe-in adjustment, apply silicone grease between the inner socket and small end of boot.



4. Install small boot clamp (B).
5. Install large boot clamp (A) using Tool.
CAUTION:
Do not reuse boot clamps.

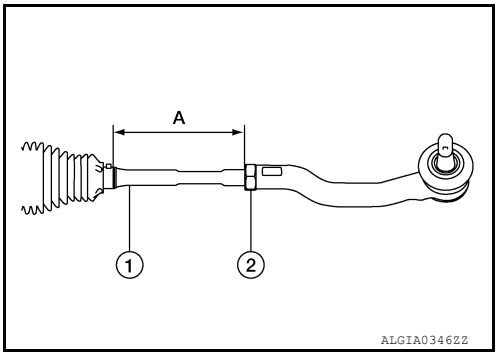
Tool number : KV40107300 (J-51751)



6. Partially thread the inner socket lock nut on the inner socket.
7. Install outer socket. Refer to ST-62, "Removal and Installation - Outer socket".
8. Adjust inner socket (1) to standard length (A), then tighten inner socket lock nut (2) to specification. Refer to ST-62, "Exploded View". Verify inner socket length after tightening lock nut.

Inner socket length (A) : Refer to ST-88, "Steering Linkage - Non-XD Models".

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



9. Check wheel alignment. Refer to FSU-7, "Inspection".
10. Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

Removal and Installation - Inner socket

INFOID:0000000014727238

REMOVAL

1. Remove boot. Refer to ST-63, "Removal and Installation - Boot".

CAUTION:
Do not reuse boot.

2. Remove inner socket.
3. Remove spacer.

INSTALLATION

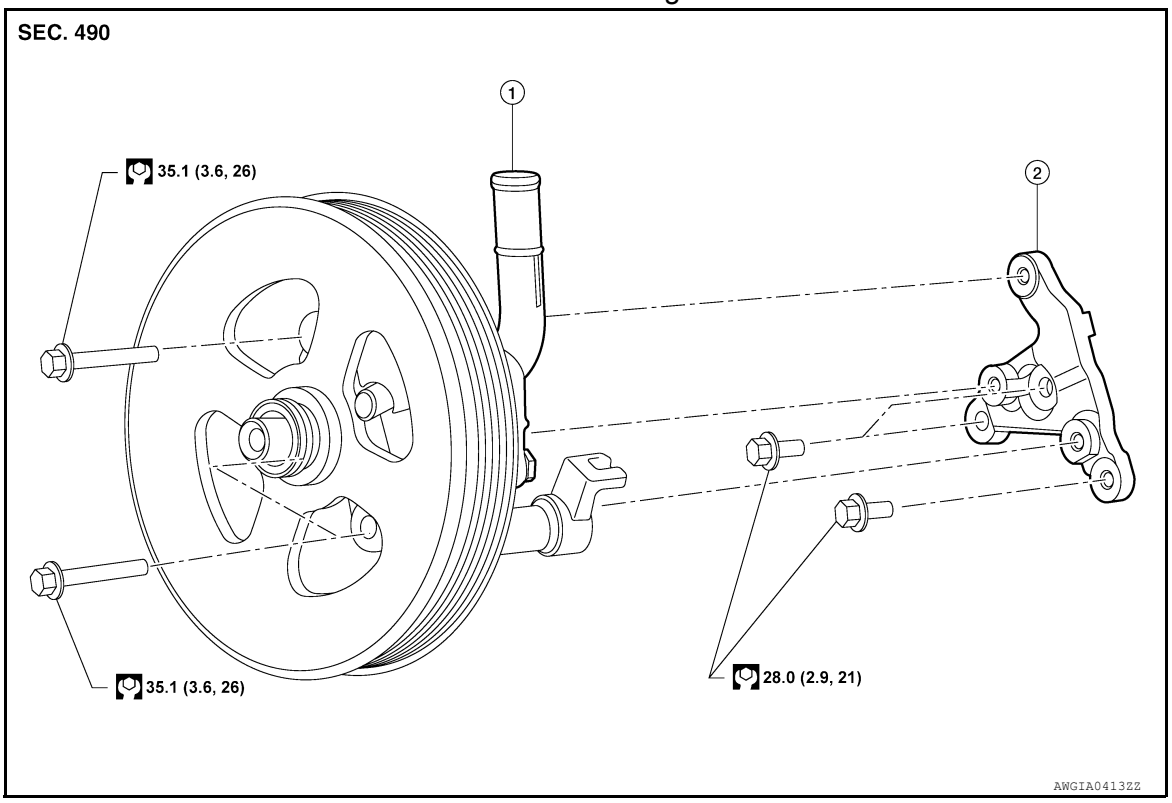
1. Place spacer on end of rack bar.
2. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to specified torque. Refer to ST-62, "Exploded View".
3. Install boot. Refer to ST-63, "Removal and Installation - Boot".
4. Check wheel alignment. Refer to FSU-7, "Inspection".
5. Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

POWER STEERING OIL PUMP

Exploded View

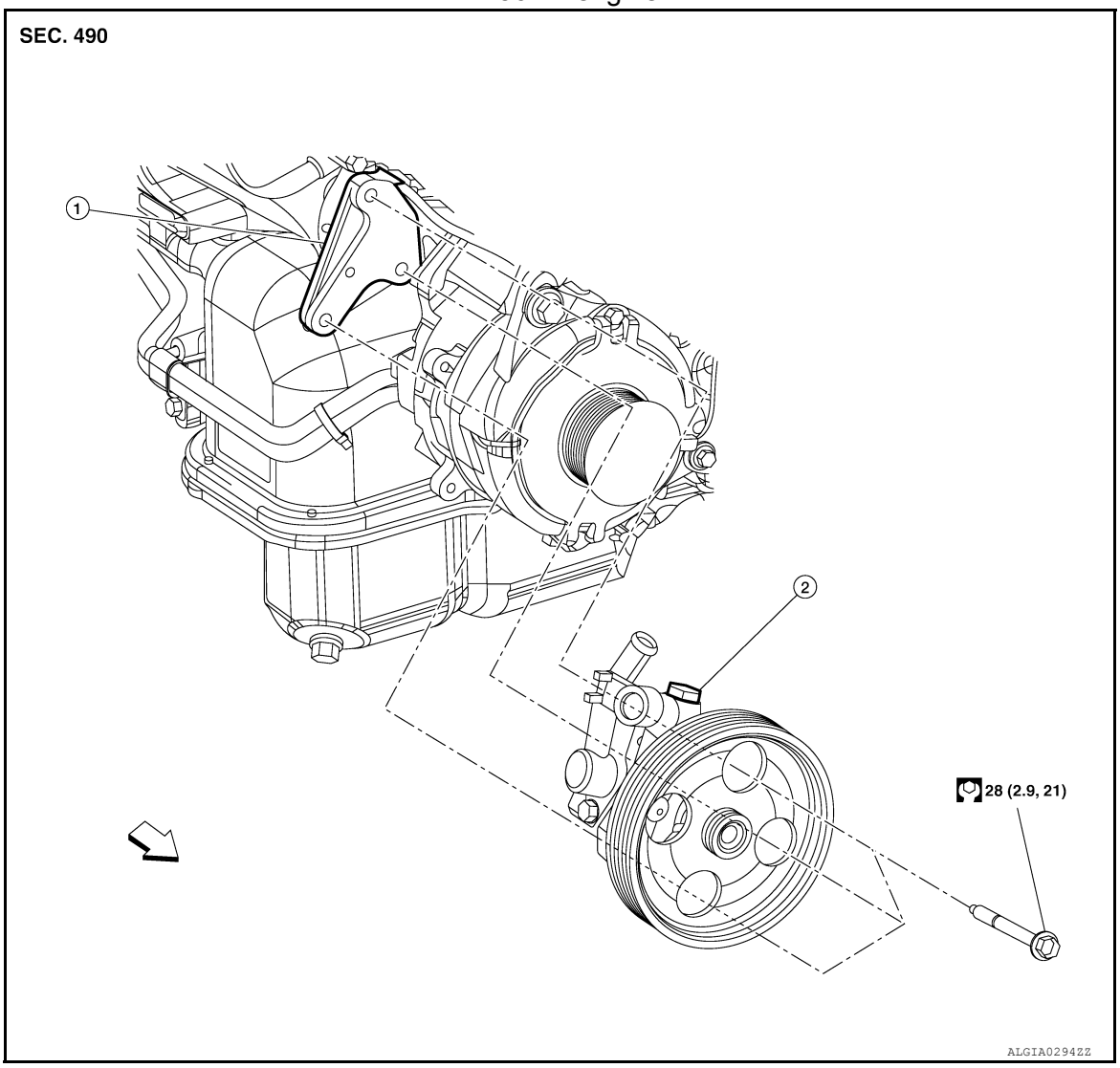
INFOID:0000000014392459

Cummins 5.0 engine



1. Power steering oil pump 2. Bracket

VK56VD engine



1. Bracket
2. Power steering oil pump

Removal and Installation - Cummins 5.0

INFOID:0000000014392460

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

REMOVAL

1. Drain power steering fluid from power steering reservoir tank. Refer to ST-34, "Draining and Refilling".
   CAUTION:
   Do not reuse drained power steering fluid.
2. Remove upper air cleaner case. Refer to EM-31, "Removal and Installation".
3. Remove drive belt. Refer to MA-73, "DRIVE BELT : Removal and Installation - Drive Belt".
4. Disconnect air inlet hose on air inlet tube at engine. Set air inlet tube aside. Refer to EM-220, "Exploded View".
5. Disconnect power steering suction hose from power steering oil pump.
6. Remove eye bolt and disconnect power steering pressure line from power steering oil pump. Plug lines and discard copper sealing washers.
   CAUTION:
   Do not reuse copper sealing washers.
7. Remove bolts and power steering pump.

8. Remove power steering pump mounting bracket from engine, if necessary.

INSTALLATION

Installation is in the reverse order of removal.

- Fill power steering system fluid. Refer to ST-34, "Draining and Refilling".
  CAUTION:
  Do not reuse drained power steering fluid.
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering leaks. Refer to ST-16, "Fluid Leak Inspection".

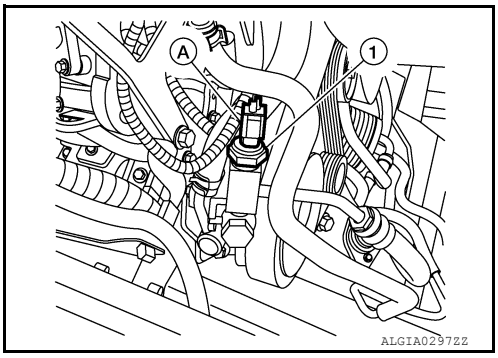
Removal and Installation - VK56VD

INFOID:0000000014392461

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

REMOVAL

1. Drain power steering fluid. Refer to ST-34, "Draining and Refilling".
   CAUTION:
   Do not reuse drained power steering fluid.
2. Remove drive belt. Refer to MA-23, "DRIVE BELTS : Removal and Installation - Drive Belt".
3. Disconnect harness connector (A) from power steering pressure switch (1).



4. For non-XD models:

a. Remove front wheel and tire (RH). Refer to WT-69, "Removal and Installation".

b. Remove front fender protector (RH). Refer to EXT-41, "Removal and Installation - Front Fender Protector".

c. Complete remaining steps from wheelhouse.

NOTE:
For XD models, complete remaining steps from engine compartment.

5. Disconnect power steering suction hose from power steering oil pump.
6. Remove eye bolt and disconnect power steering pressure line from power steering oil pump. Plug lines and discard copper sealing washers.
   CAUTION:
   Do not reuse copper sealing washers.
7. Remove bolts and power steering pump.
8. Remove power steering pump mounting bracket from engine, if necessary. Refer to CHG-46, "Removal and Installation: VK56VD".

INSTALLATION

Installation is in the reverse order of removal.

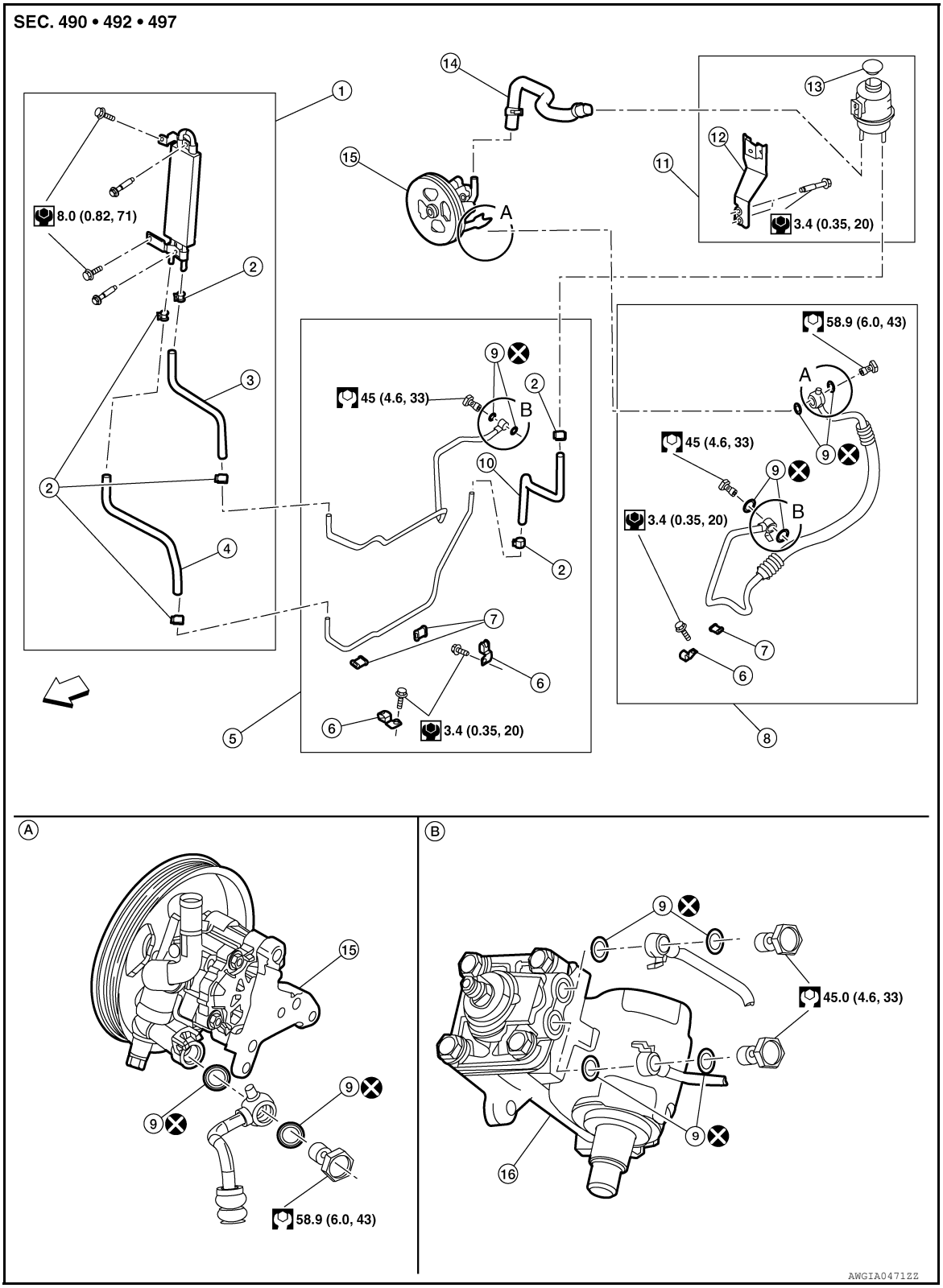
- Fill power steering system fluid. Refer to ST-34, "Draining and Refilling".
  CAUTION:
  Do not reuse drained power steering fluid.
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering leaks. Refer to ST-16, "Fluid Leak Inspection".

HYDRAULIC LINE

Exploded View

INFOID:0000000014392462

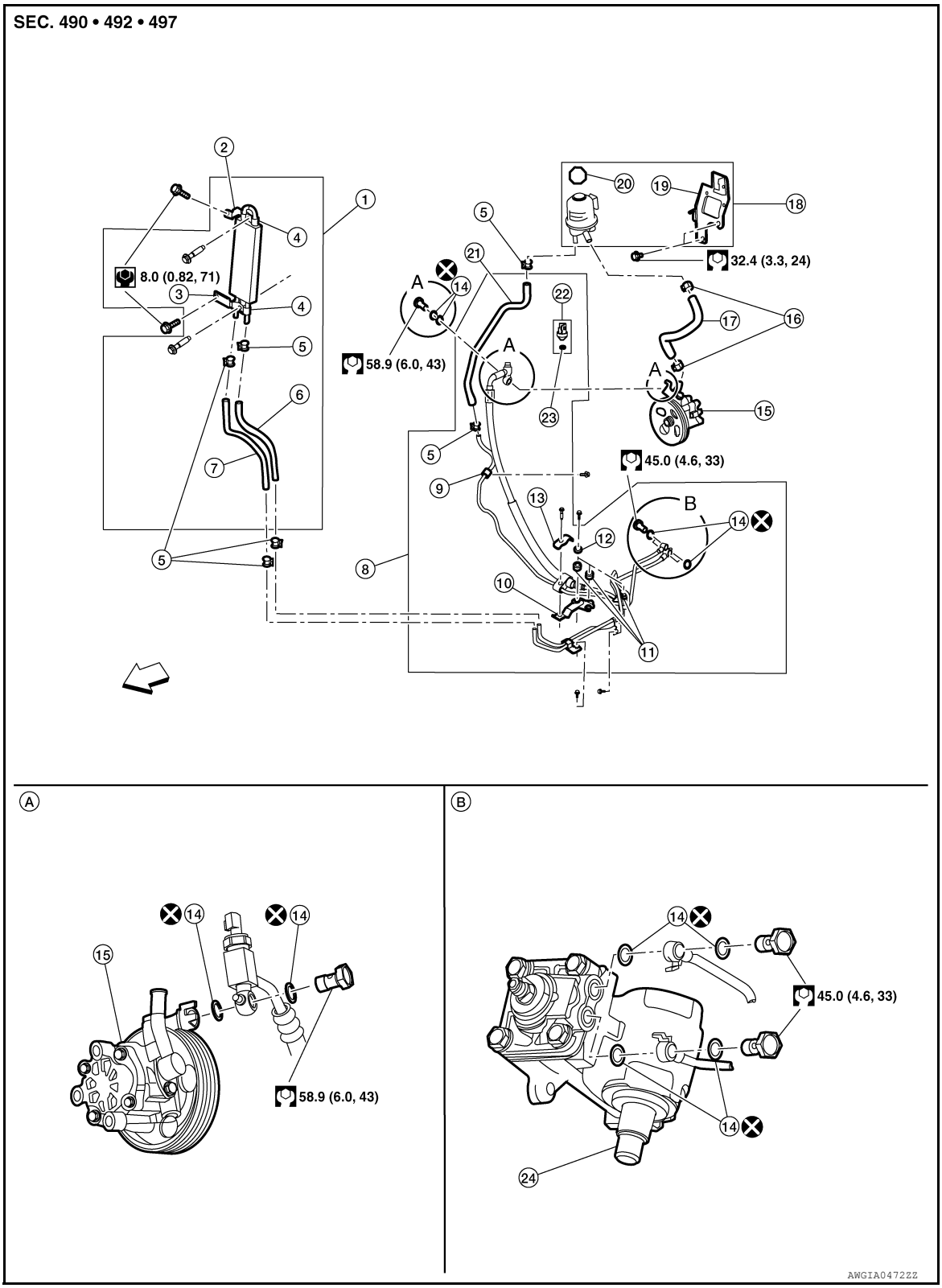
Cummins 5.0



1. Power steering oil cooler
2. Hose clamp
3. Power steering oil cooler hose
4. Power steering oil cooler hose
5. Power steering return pipe assembly
6. Pipe clamp

7. Pipe insulator
8. Power steering pressure hose
9. Copper sealing washer
10. Power steering return hose
11. Power steering reservoir assembly
12. Power steering reservoir bracket
13. Power steering oil reservoir cap
14. Power steering suction hose
15. Power steering oil pump
16. Power steering box
⇦ Front

VK56VD - XD Models

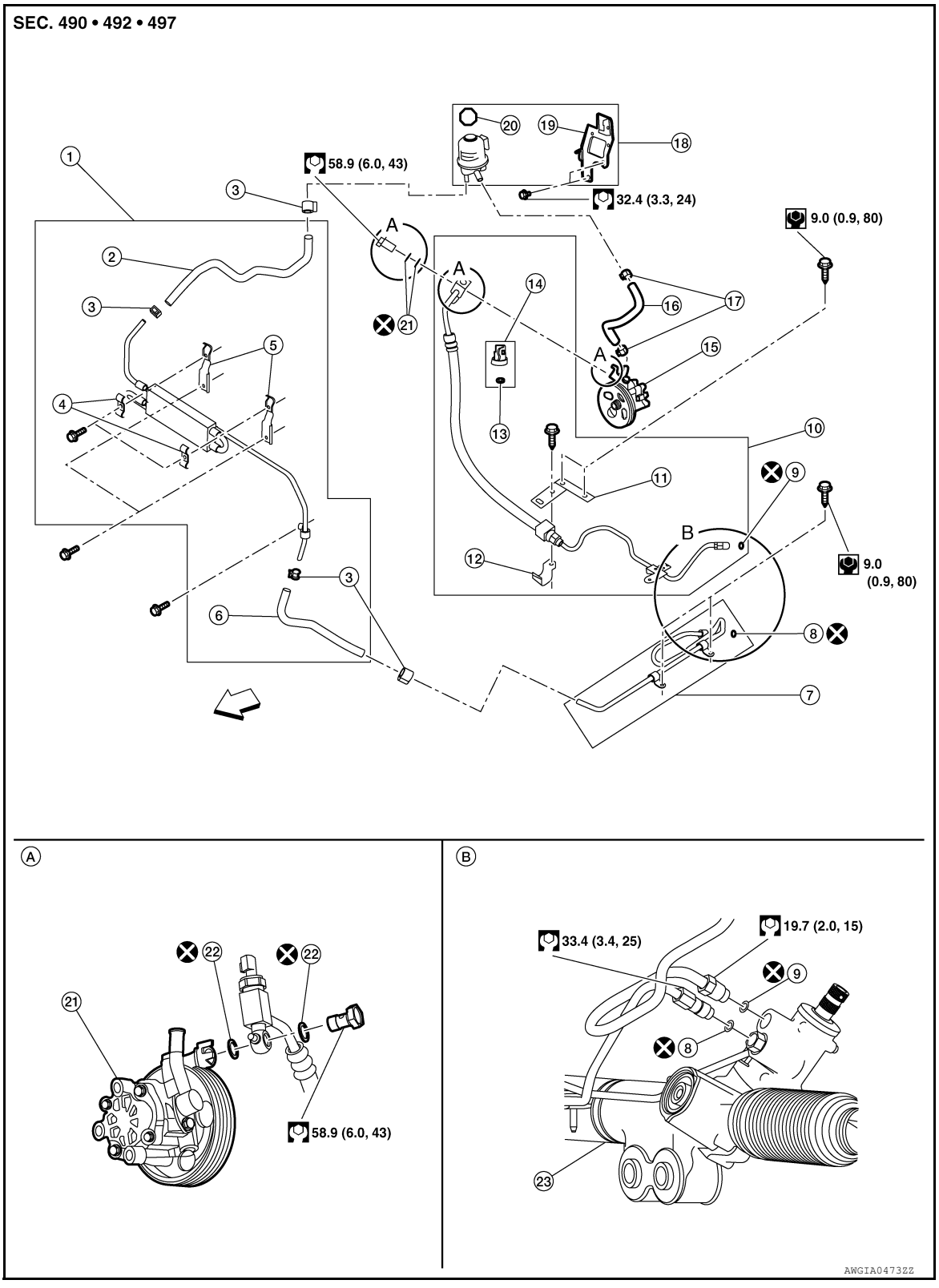


1. Power steering oil cooler
2. Bracket, upper (rear)
3. Bracket, lower (rear)
4. Bracket, front
5. Return hose clamp
6. Power steering oil cooler inlet hose
7. Power steering oil cooler outlet hose
8. Power steering hose assembly
9. Power steering pipe clamp
10. Power steering hose assembly clamp (lower)
11. Clamp insulator bushing
12. Insulator bushing insert
13. Power steering hose clamp (upper)
14. Copper sealing washer
15. Power steering oil pump
16. Power steering suction hose clamp
17. Power steering suction hose
18. Power steering oil reservoir
19. Power steering oil reservoir bracket
20. Power steering oil reservoir cap
21. Power steering oil return hose
22. Power steering pressure switch
23. O-ring
24. Power steering box

⇦ Front

VK56KD - Non-XD Models

SEC. 490 • 492 • 497



1. Power steering oil cooler assembly
2. Power steering oil cooler outlet hose
3. Clamp
4. Power steering oil cooler bracket (front)
5. Power steering oil cooler bracket (rear)
6. Power steering oil cooler inlet hose
7. Power steering oil return pipe assembly
8. O-ring
9. O-ring

10. Power steering oil pressure hose assembly	11. Power steering pressure hose bracket (upper)	12. Power steering pressure hose bracket (lower)
13. O-ring	14. Power steering pressure switch	15. Power steering oil pump
16. Power steering suction hose	17. Clamp	18. Power steering oil reservoir assembly
19. Power steering oil reservoir bracket	20. Power steering oil reservoir cap	21. Power steering oil pump
22. Copper sealing washer	23. Power steering gear	⇦ Front

Removal and Installation

INFOID:0000000014392464

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

REMOVAL

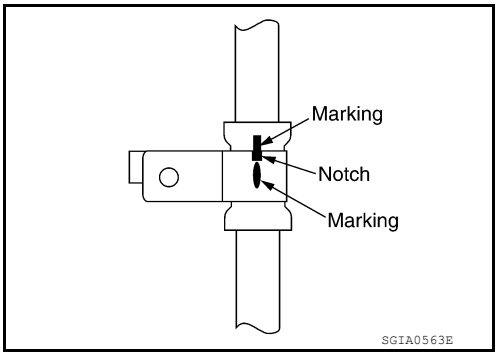
Refer to component parts location illustration for hydraulic line removal. Refer to ST-69, "Exploded View".

CAUTION:
Do not reuse copper sealing washers or o-rings.

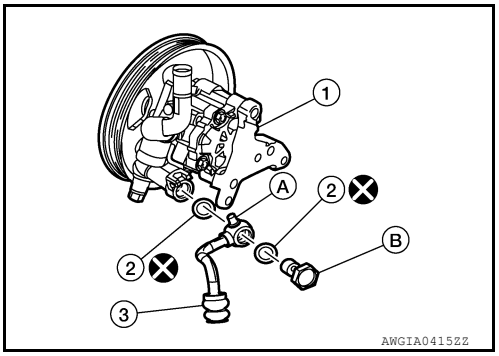
INSTALLATION

Installation is in the reverse order of removal.

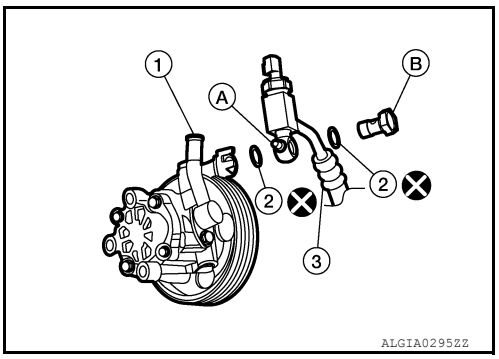
- Confirm mating marks are aligned with hose and clamp. Correct if needed.



- For Cummins 5.0, using new copper sealing washers (2), align power steering pressures hose (3) projection (A) with notch on power steering pump (1). Install eye bolt (B) and tighten by hand, then torque to specification. Refer to ST-69, "Exploded View".
  CAUTION:
  Do not reuse copper sealing washers.



- For VK56VD, using new copper sealing washers (2), align power steering pressures hose (3) projection (A) with notch on power steering pump (1). Install eye bolt (B) and tighten by hand, then torque to specification. Refer to ST-69, "Exploded View".
  CAUTION:
  Do not reuse copper sealing washers.



- Fill power steering fluid. Refer to ST-34, "Draining and Refilling".

CAUTION:
Do not reuse drained power steering fluid.

- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering fluid leaks. Refer to ST-16, "Fluid Leak Inspection".

POWER STEERING OIL COOLER

Removal and Installation

INFOID:0000000014724400

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

REMOVAL

1. Drain power steering fluid. Refer to ST-34, "Draining and Refilling".
   CAUTION:
   Do not reuse drained power steering fluid.
2. Remove front grille. Refer to EXT-32, "Removal and Installation".
3. For Non-XD models, remove active griller shutter. Refer to EXT-34, "Removal and Installation".
4. Disconnect inlet and outlet hoses from power steering oil cooler. Refer to ST-69, "Exploded View".
5. Remove bolts and remove power steering oil cooler. Refer to ST-69, "Exploded View".

INSTALLATION

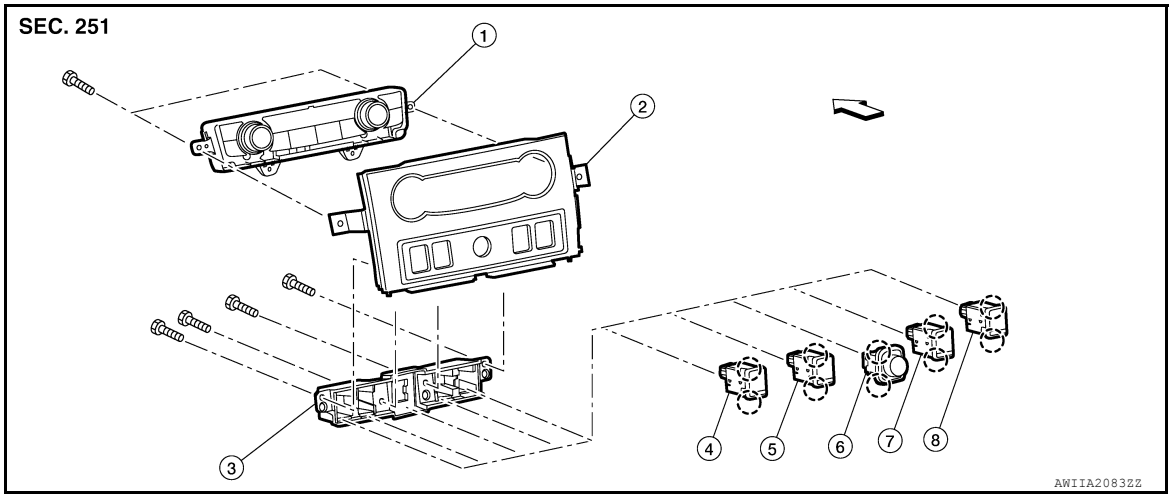
Installation is in the reverse order of removal.

- Fill power steering system fluid. Refer to ST-34, "Draining and Refilling".
  CAUTION:
  Do not reuse drained power steering fluid.
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering leaks. Refer to ST-16, "Fluid Leak Inspection".

HEATED STEERING WHEEL SWITCH

Exploded View

INFOID:0000000014392465



1. A/C switch assembly
2. Cluster lid C
3. Switch carrier
4. VDC OFF switch
5. Sonar system off switch (if equipped)
6. Hazard switch
7. Warning system switch (if equipped)
8. Heated steering wheel switch

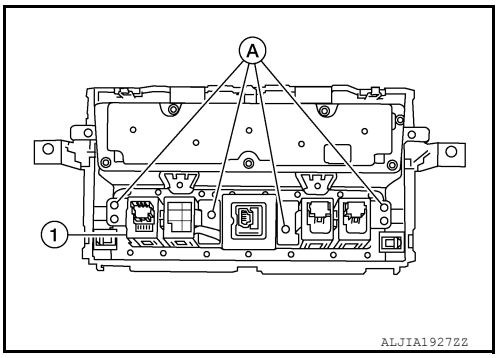
⇦ Front

Removal and Installation

INFOID:0000000014392466

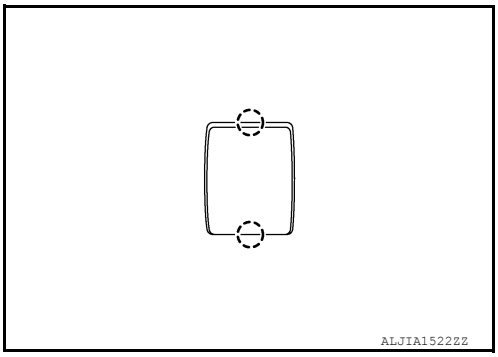
REMOVAL

1. Remove cluster lid C. Refer to IP-20, "Removal and Installation".
2. Remove screws (A) and switch carrier (1) from cluster lid C.



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

◌ : Pawl



INSTALLATION

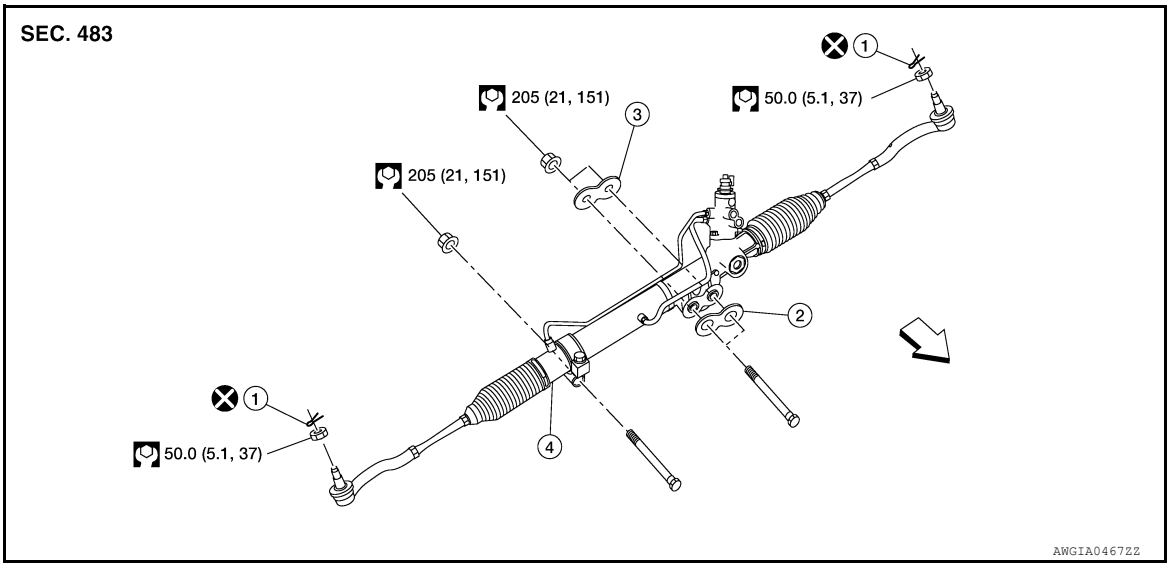
Installation is in the reverse order of removal.

UNIT REMOVAL AND INSTALLATION

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000014628745



1. Cotter pin
2. Insulator
3. Washer
4. Steering gear
⇦ Vehicle front

Removal and Installation

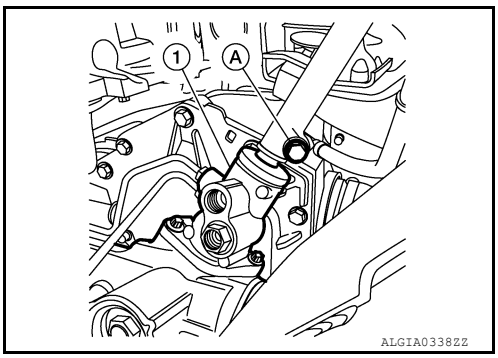
INFOID:0000000014629899

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

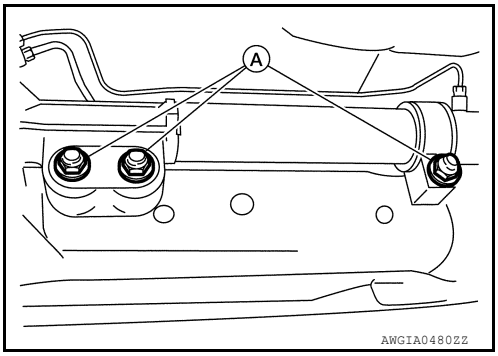
REMOVAL - 4WD

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove front wheels and tires (LH/RH) using power tool. Refer to WT-69, "Removal and Installation".
3. Remove engine under cover. Refer to EXT-39, "ENGINE UNDER COVER : Removal and Installation".
4. Remove skid plate (if equipped).
5. Drain power steering fluid. Refer to ST-34, "Draining and Refilling".
   CAUTION:
   Do not reuse drained power steering fluid.
6. Remove front final drive. Refer to DLN-220, "Removal and Installation" (MA210).
7. Remove stabilizer bar clamp bolts and reposition stabilizer bar. Refer to FSU-24, "Removal and Installation - XD Models".

8. Remove lower joint pinch bolt (A) at steering gear (1). Separate lower joint from steering gear.



9. Remove nuts (A) and bolts and remove steering gear.



INSTALLATION - 4WD

Installation is in the reverse order of removal.

CAUTION:

Do not reuse O-rings.

- Fill power steering fluid. Refer to ST-34, "Draining and Refilling".
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering leaks. Refer to ST-16, "Fluid Leak Inspection".
- Check wheel alignment. Refer to FSU-7, "Inspection".
- Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

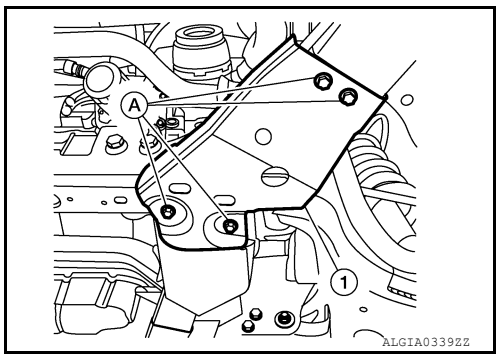
INSPECTION AFTER INSTALLATION

1. Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
2. Make sure number of turns are the same from straight-forward position to left and right stops.
3. Make sure steering wheel is in a neutral position when driving straight ahead.

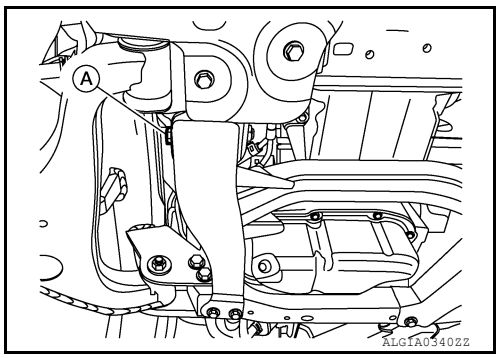
REMOVAL - 2WD

1. Set front wheels and tires in straight-ahead position.
   CAUTION:
   Secure steering wheel with string so that it will not be rotated out of position and damage spiral cable.
2. Remove front wheels and tires (LH/RH) using power tool. Refer to WT-69, "Removal and Installation".
3. Remove engine under cover. Refer to EXT-39, "ENGINE UNDER COVER : Removal and Installation".
4. Drain power steering fluid. Refer to ST-34, "Draining and Refilling".
   CAUTION:
   Do not reuse drained power steering fluid.

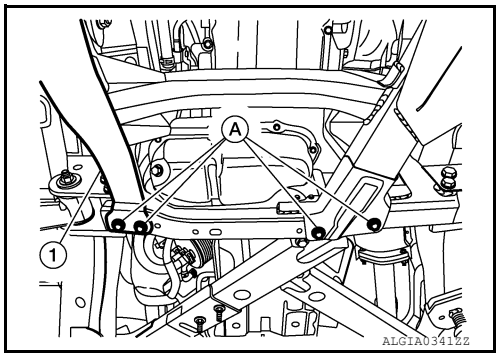
5. Remove bolts (A) and remove front frame reinforcement [LH (1)].



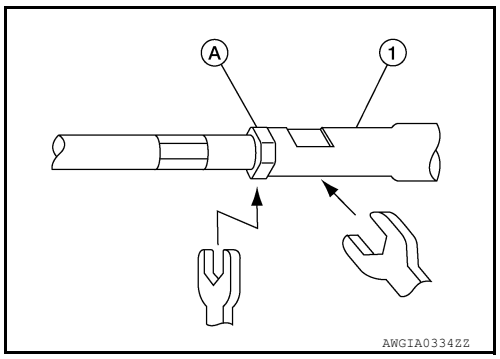
6. Remove differential mounting bolt (A).



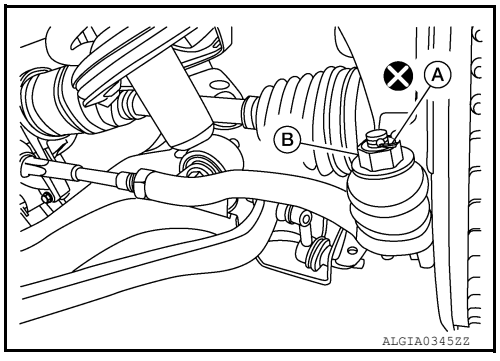
7. Remove bolts (A) and remove diagonal member (1).



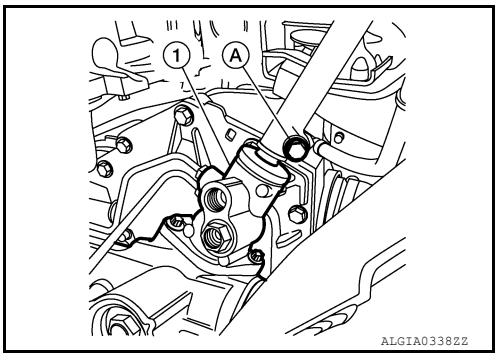
8. Loosen inner socket lock nut [A (LH/RH)].
CAUTION:
To prevent damage, hold outer socket (1) across flats using suitable tool while loosening inner socket lock nut (A).



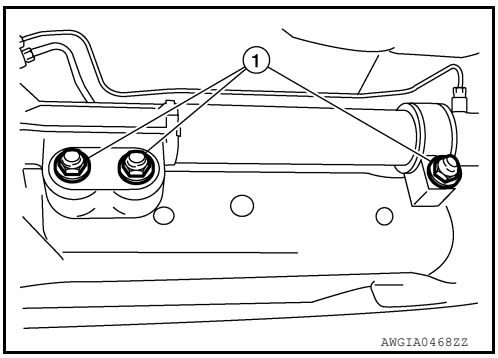
9. Remove cotter pin (A) and loosen outer socket nut (B) from outer socket (LH/RH). Discard cotter pin.
CAUTION:
Do not reuse cotter pin.



10. Separate outer socket (LH/RH) from steering knuckle using suitable tool.
CAUTION:
Leave the outer socket nut half threaded on the outer socket to prevent damage to threads and to prevent the suitable tool from coming off suddenly.
11. Remove lower joint pinch bolt (A) at steering gear (1). Separate lower joint from steering gear.

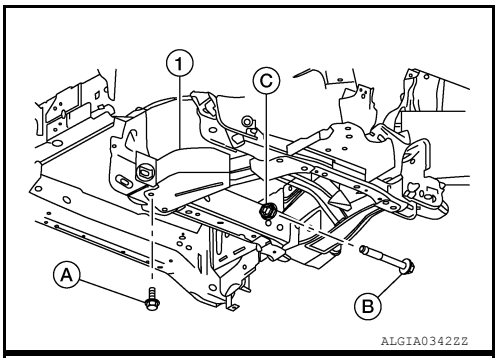


12. Remove nuts (A) and bolts and remove steering gear.



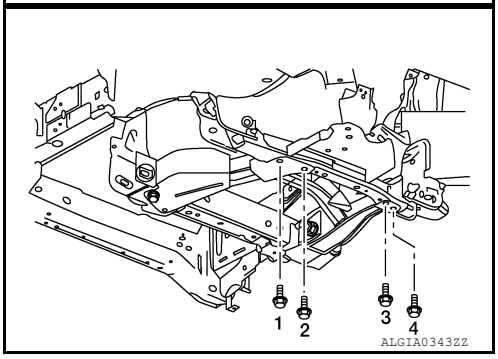
INSTALLATION - 2WD
Installation is in the reverse order of removal.
CAUTION:
Do not reuse O-rings.
Install frame components in the following sequence.
1. Install diagonal member (1).
2. Temporarily install bolt (A) finger tight.
3. Install differential mounting bolt (B) and nut (C) finger tight, then tighten to specification.

Nut (C) : 210 Nm (21 kg-m, 155 ft-lb)

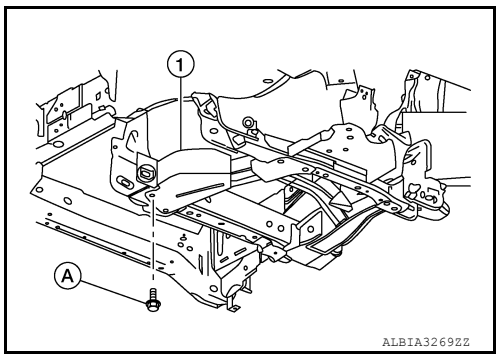


4. Install diagonal member bolts finger tight, then tighten to specification in sequence as shown.

Bolts 1 - 4 : 80.0 Nm (8.2 kg-m, 59 ft-lb)

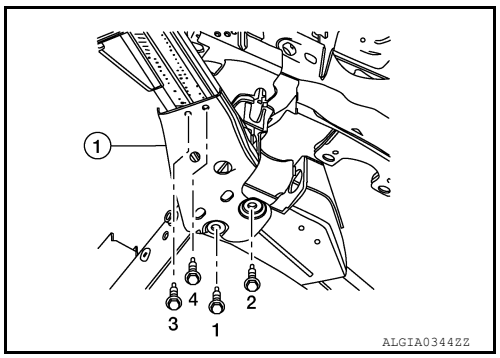


5. Remove bolt (A) from diagonal member (1).



6. Install front suspension member reinforcement [LH (1)] bolts finger tight, then tighten to specification in sequence as shown.

Bolts 1 - 4 : 80.0 Nm (8.2 kg-m, 59 ft-lb)



Remaining components are installed in the reverse order of removal.
- Fill power steering fluid. Refer to ST-34, "Draining and Refilling".
- Bleed air from power steering system. Refer to ST-34, "Air Bleeding Hydraulic System".
- Check for power steering leaks. Refer to ST-16, "Fluid Leak Inspection".
- Check wheel alignment. Refer to FSU-7, "Inspection".
- Adjust neutral position of steering angle sensor. Refer to BRC-70, "Description".

INSPECTION AFTER INSTALLATION

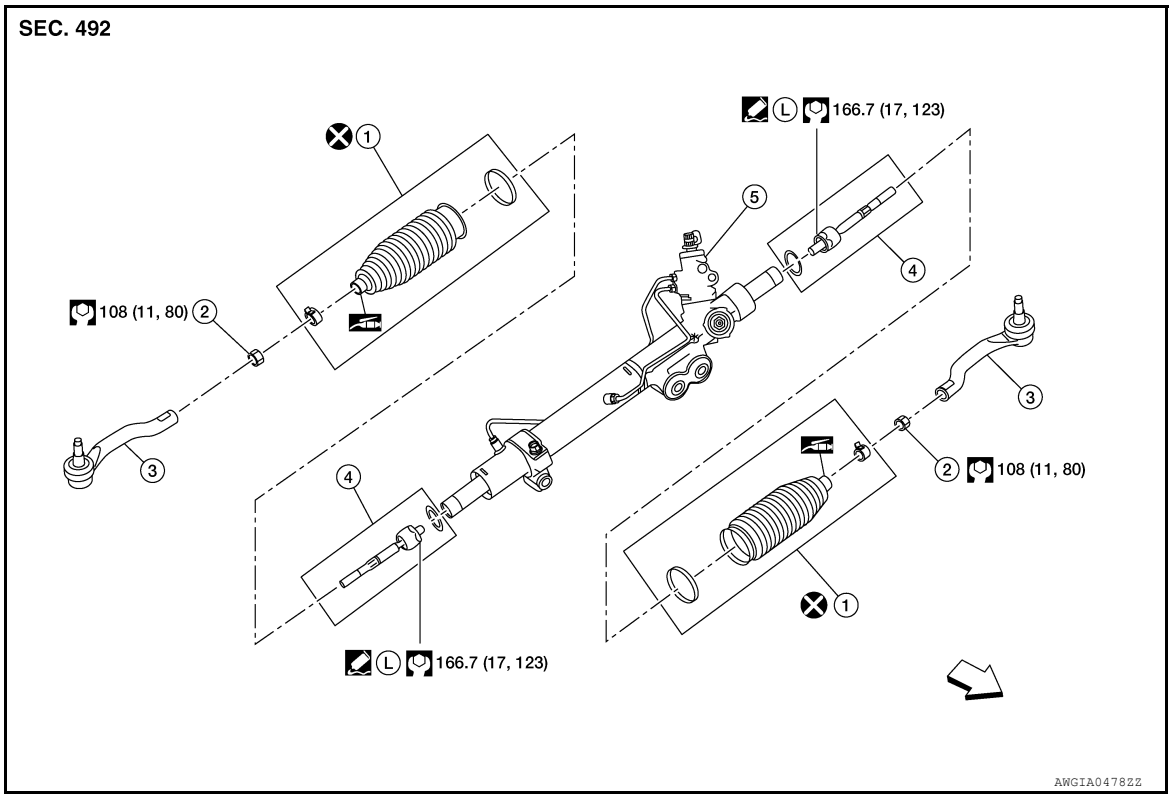
1. Turn steering wheel to make sure it moves smoothly while turning to left and right stops.
2. Make sure number of turns are the same from straight-forward position to left and right stops.
3. Make sure steering wheel is in a neutral position when driving straight ahead.

UNIT DISASSEMBLY AND ASSEMBLY

STEERING GEAR AND LINKAGE

Exploded View

INFOID:0000000014664645



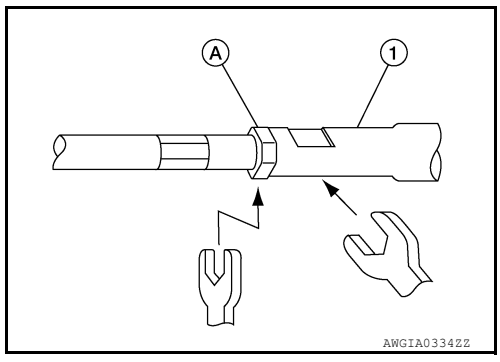
1. Boot
2. Lock nut
3. Outer socket
4. Inner socket
5. Steering gear
⇦ Front

Disassembly and Assembly

INFOID:0000000014664646

DISASSEMBLY

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



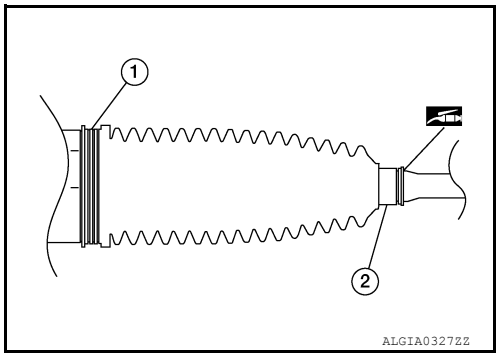
2. Remove boot clamps.
   CAUTION:
   Do not reuse boot clamps.
3. Remove Boots.
   CAUTION:
   Do not reuse boot.
4. Remove inner socket and spacer.

INSPECTION AFTER DISASSEMBLY

Inspect steering gear, linkage components, and boots for damage. Refer to ST-23, "Inspection".

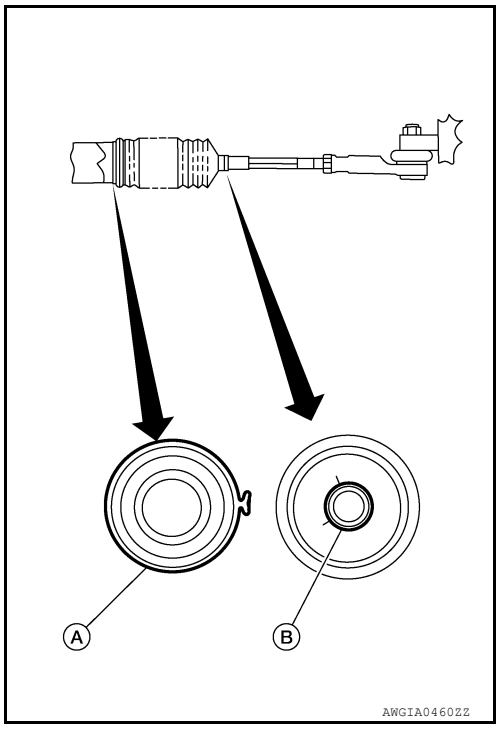
ASSEMBLY

1. Place spacer on end of rack bar.
2. Apply medium strength thread locker to threads of inner socket. Tighten inner socket to specified torque. Refer to ST-82, "Exploded View".
3. Install large end of boot (1) to steering gear housing.
   CAUTION:
   Do not reuse boot.
4. Apply silicone grease between the inner socket and small end of boot (2).
5. Install small end of boot to inner socket boot mounting groove.
   CAUTION:
   To prevent boot deformation or damage during toe-in adjustment, apply silicone grease between inner socket and small end of boot.



6. Install small boot clamp (B).
7. Install large boot clamp (A) using Tool.
   CAUTION:
   Do not reuse boot clamps.

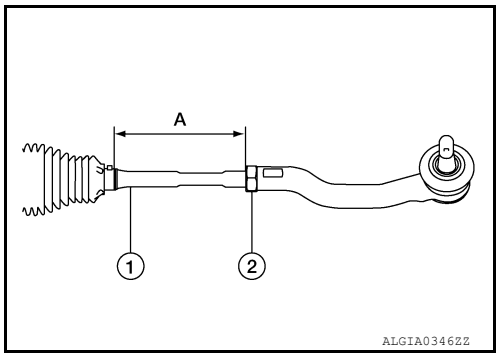
   Tool number : KV40107300 (J-51751)



8. Install outer socket to inner socket.
9. Adjust inner socket (1) to standard length (A), then tighten inner socket lock nut (B) to specification. Refer to ST-62, "Exploded View". Verify inner socket length after tightening lock nut.

   Inner socket length (L) : Refer to ST-87, "Steering Linkage - XD Models".

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



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Steering Wheel

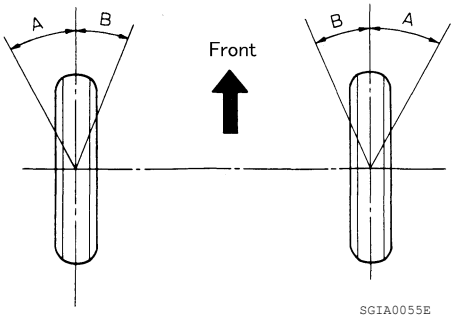
INFOID:0000000014392467

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:0000000014392468

Unit: Degree minute (Decimal degree)



XD Models			
Axle		2WD	4WD
Inner wheel angle	Nominal	36° 25′ (36.42°)	36° 15′ (36.25°)
Outer wheel angle	Minimum	29° 10′ (29.17°)	
	Nominal	32° 10′ (32.17°)	
	Maximum	33° 10′ (33.17°)	

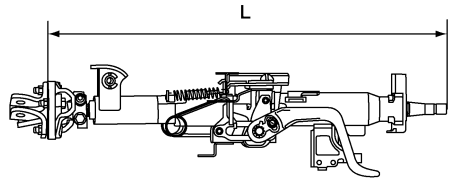
Non-XD Models			
Axle		2WD	4WD
Inner wheel angle	Minimum	34° 30′ (34.50°)	34° 56′ (34.93°)
	Nominal	37° 30′ (37.50°)	37° 56′ (37.93°)
	Maximum	38° 30′ (38.50°)	38° 56′ (37.93°)
Outer wheel angle	Minimum	30° 58′ (30.97°)	31° 01′ (31.02°)
	Nominal	33° 58′ (33.97°)	34° 01′ (34.02°)
	Maximum	34° 58′ (34.97°)	35° 01′ (35.02°)

Mechanical Steering Column

INFOID:0000000014392469

STEERING COLUMN LENGTH

Unit: mm (in)

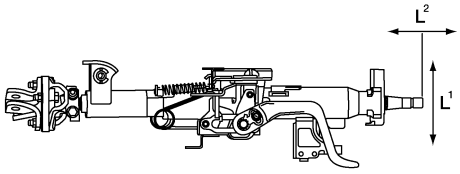


ALGIA0257ZZ

Steering column length	Length (L)	560.3 (22.1)
	Telescopic maximum	590.3 (23.2)
	Telescopic minimum	550.3 (21.7)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0259ZZ

Tilt operating range (L^1)	50 (1.97)
Telescopic operating range (L^2)	40 (1.57)

STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

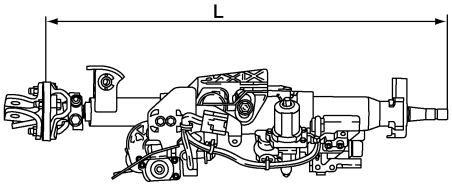
Rotating torque	1.47 (0.15, 13)

Electric Steering Column

INFOID:0000000014392470

STEERING COLUMN LENGTH

Unit: mm (in)

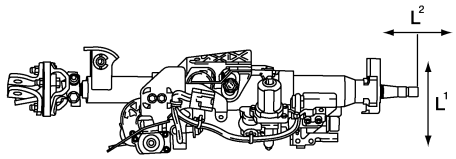


ALGIA0263ZZ

Steering column length	Length (L)	560.3 (22.1)
	Telescopic maximum	590.3. (23.2)
	Telescopic minimum	550.3 (21.7)

TILT MECHANISM OPERATING RANGE

Unit: mm (in)



ALGIA0260ZZ

Tilt operating range (L^1)	50 (1.97)
Telescopic operating range (L^2)	40 (1.57)

STEERING COLUMN ROTATING TORQUE

Unit: N·m (kg-m, in-lb)

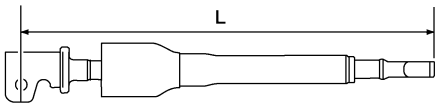
Rotating torque	1.47 (0.15, 13)

Intermediate Shaft Length

INFOID:0000000014392471

XD Models

Unit: mm (in)

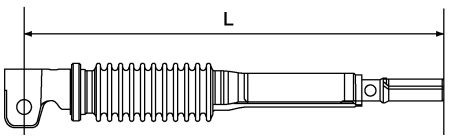


ALGIA0272ZZ

Item	Standard
Intermediate shaft length	360 (14.17)

Non-XD models

Unit: mm (in)



ALGIA0348ZZ

Item	Standard
Intermediate shaft length	304.5 (11.99)

Lower Joint Sliding Range

INFOID:0000000014392472

XD Models

Unit: mm (in)

Item	Standard
Lower joint length (extended position)	518.6 (± 1.5) (20.42 ± 0.1 in)
Range	120 (4.72 in)

Non-XD Models

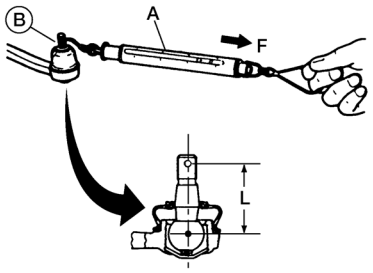
Unit: mm (in)

Item	Standard
Lower joint length	500.9 (19.72)
Range	Fixed

Steering Linkage - XD Models

INFOID:0000000014392473

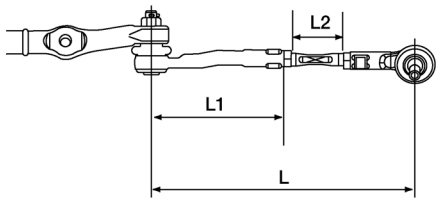
XD Models



AWGIA0164ZZ

Tie-rod ball stud	Swinging torque (F) Measurement on spring balance (A) • Measuring point: cotter pin hole of stud (B)	0.7 - 1.4 Nm (0.07 - 0.14 kg-m, 6 - 12 in-lb)
	Rotating torque	1.2 - 2.4 N·m (0.12 – 0.24 kg-m, 11 - 21 in-lb)
	Axial end play	0.5 mm (0.020 in) or less
	Ball stud length (L)	67.7 mm (2.67 in)
Pitman arm ball stud	Swinging torque (F) Measurement on spring balance (A) • Measuring point: cotter pin hole of stud (B)	0.4 - 3.0 Nm (0.04 - 0.3 kg-m, 4 - 27 in-lb)
	Ball stud length (L)	67.7 mm (2.63 in)
Idler arm ball stud	Swinging torque (F) Measurement on spring balance (A) • Measuring point: cotter pin hole of stud (B)	2.2 - 3.4 Nm (0.22 - 0.35 kg-m, 2.0 - 3.0 ft-lb)
	Ball stud length (L)	55 mm (2.17 in)
Idler arm	Swinging torque (F) Measurement on spring balance (A) • Measuring point: cotter pin hole of stud (B)	1.0 - 1.9 Nm (0.10 - 0.19 kg-m, 9 - 17 in-lb)

Unit: mm (in)

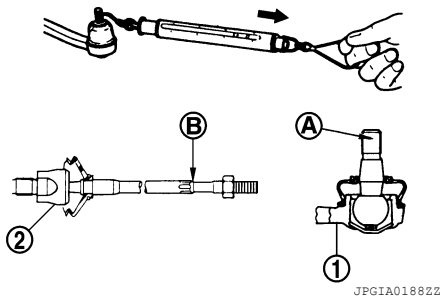


ALGIA0089ZZ

Standard dimension before toe-in adjustment (L)	388.1 (15.28)
Inner socket length (L^1)	195 (7.68)
Possible amount of adjustment (L^2)	± 5 (± 0.2)

Steering Linkage - Non-XD Models

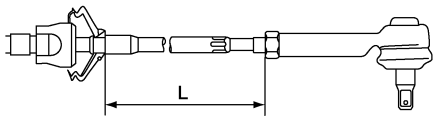
INFOID:0000000014727266



JPGIA0188ZZ

Outer socket	Swinging torque	0.3 – 2.9 N·m (0.03 – 0.29 kg-m, 3 – 25 in-lb)
	Rotating torque	0.3 – 2.9 N·m (0.03 – 0.29 kg-m, 3 – 25 in-lb)
	Axial end play	0.5 mm (0.020 in) or less
Inner socket	Swinging torque	1.0 – 7.8 N·m (0.11 – 0.79 kg-m, 9 – 69 in-lb)
	Axial end play	0.2 mm (0.008 in) or less

Unit: mm (in)



AWGIA0477ZZ

Inner socket length (L)	Normal (before toe adjust)	109.7 (4.319)
	Maximum (after toe adjust)	124.2 (4.890)

Steering Box - XD Models

INFOID:0000000014392474

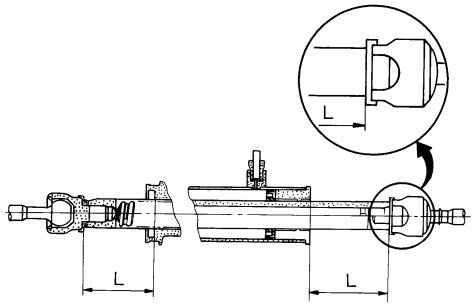
Unit: mm (in)

Power steering box model	PB64Z
End play at sector shaft	0.1 (0.004)

Steering Gear - Non-XD Models

INFOID:0000000014727285

Unit: mm (in)



STC0034D

Item	Standard
Rack stroke neutral position (L)	85.5 (3.360)
Rack sliding force	191–249 N (19.5–25.4 kg-f, 42.9–56.0 lb-f)

Power Steering Oil Pump

INFOID:0000000014392475

Relief oil pressure	Cummins 5.0	10.0– 10.8 mPa (101.97 – 110.31 kg/cm^2, 1450.38 – 1566.41 psi)
	VK56VD	9.5 – 10.3 mPa (96.9 – 105.1 kg/cm^2, 1377.86 – 1493.9 psi)

Power Steering Fluid

INFOID:0000000014392476

	Capacity (Approximate)			Recommended Fluid
	Metric Measure	US Measure	Imperial Measure	
XD Models	2.0 ℓ	4 1/4 pt.	3 1/2 pt.	• Genuine NISSAN PSF II or equivalent • DEXRON^{TM} VI type ATF may also be used.
Non-XD Models	1.4 ℓ	3 pt.	2 1/2 pt.	