SECTION ST
STEERING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000005549775

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted.
Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

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

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

WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000005549773

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.

5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

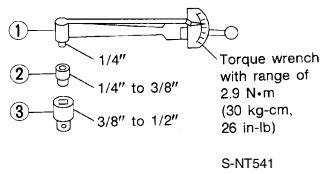
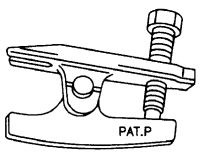
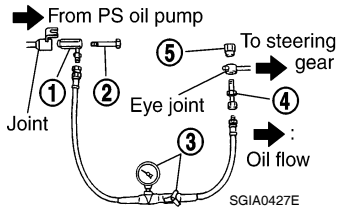
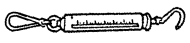
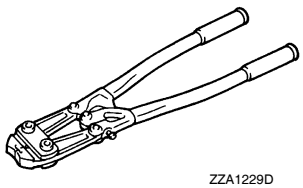
PREPARATION

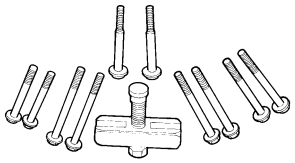
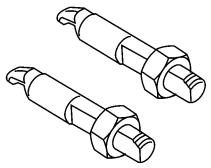
PREPARATION

Special Service Tool

INFOID:0000000005260158

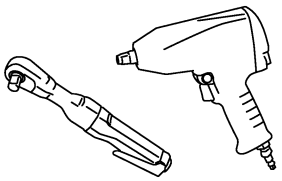
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
ST3127 S000 (See J-25765-A) Preload gauge 1. GG9103000 (J-25765-A) Torque wrench 2. HT62940000 (—) Socket adapter 3. HT62900000 (—) Socket adapter	 S-NT541	Inspecting of pinion rotating torque and rotational torque for ball joint
HT72520000 (J-25730-A) Ball joint remover	 NT146	Removing steering outer socket
1. KV48105300-4 and 5295262U10 (—) Connector A and O-ring 2. KV48105300-3 and 5295262U00 (—) Eye-bolt and O-ring 3. KV48103500 (J-26357 and J-26357-10) Pressure gauge and shut-off valve 4. KV48105300-1 and 5295262U00 (—) Connector B and O-ring 5. KV48105300-2 (—) Nut	 SGIA0427E	Measuring oil pump relief pressure
— (J-44372) Spring gauge	 LST024	Measuring steering wheel turning force
KV40107300 (—)	 ZZA1229D	Crimping boot bands

Tool number (Kent-Moore No.) Tool name	Description
KV481J0010 (J-1859A) Steering wheel puller  LHIA0043E	Removing steering wheel
KV481J0020 (J-42578) Steering wheel puller legs  LHIA0044E	Removing steering wheel

Commercial Service Tool

INFOID:0000000005260159

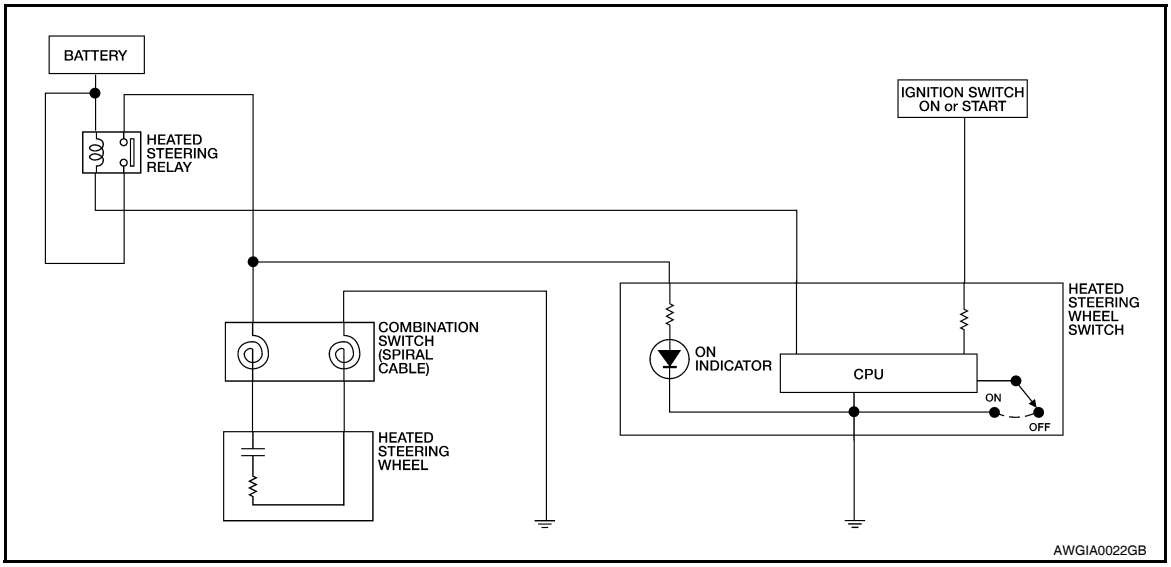
Tool name	Description
Power tool  PBIC0190E	Removing nuts and bolts

FUNCTION DIAGNOSIS

HEATED STEERING WHEEL

System Diagram

INFOID:0000000005260160



System Description

INFOID:0000000005260161

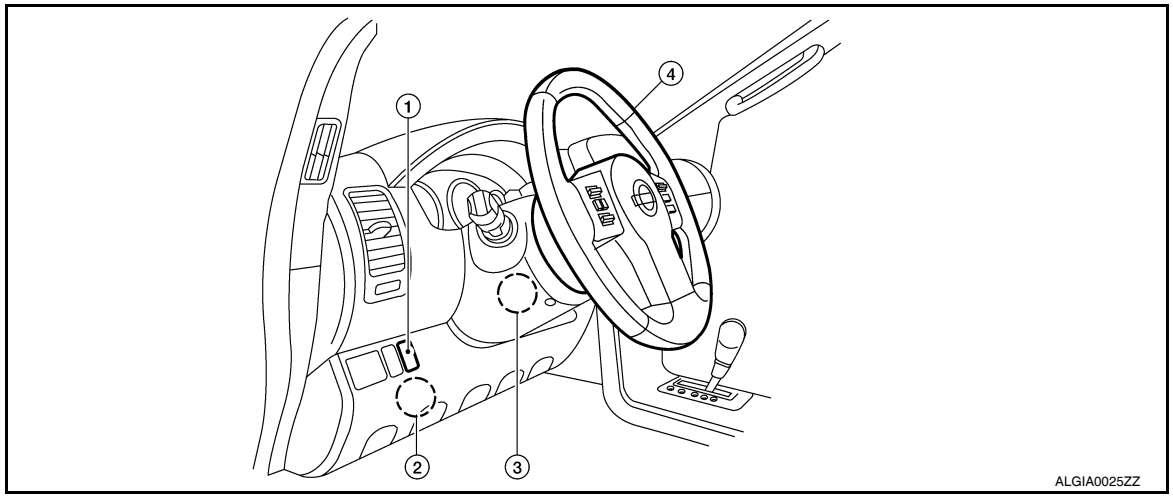
The heated steering wheel switch controls the heated steering relay. When the switch is turned on, the relay is energized and the heated steering system will operate. The heated steering system will turn off when the steering wheel temperature reaches approximately 86°F (30°C). Heated steering system operation can also be canceled by pressing the heated steering wheel switch again.

NOTE:

If the surface temperature of the steering wheel is below 68° F (20° C), the system will heat the steering wheel and cycle off and on to maintain a temperature above 68° F (20° C). The indicator light will remain on as long as the system is on. Push the switch again to turn the heated steering wheel system off manually. The indicator light will go off.

Component Parts Location

INFOID:0000000005260162



1. Heated steering wheel switch M7
2. Heated steering relay M2
3. Combination switch (spiral cable) M5
4. Heated steering wheel M114

Component Description

INFOID:0000000005260163

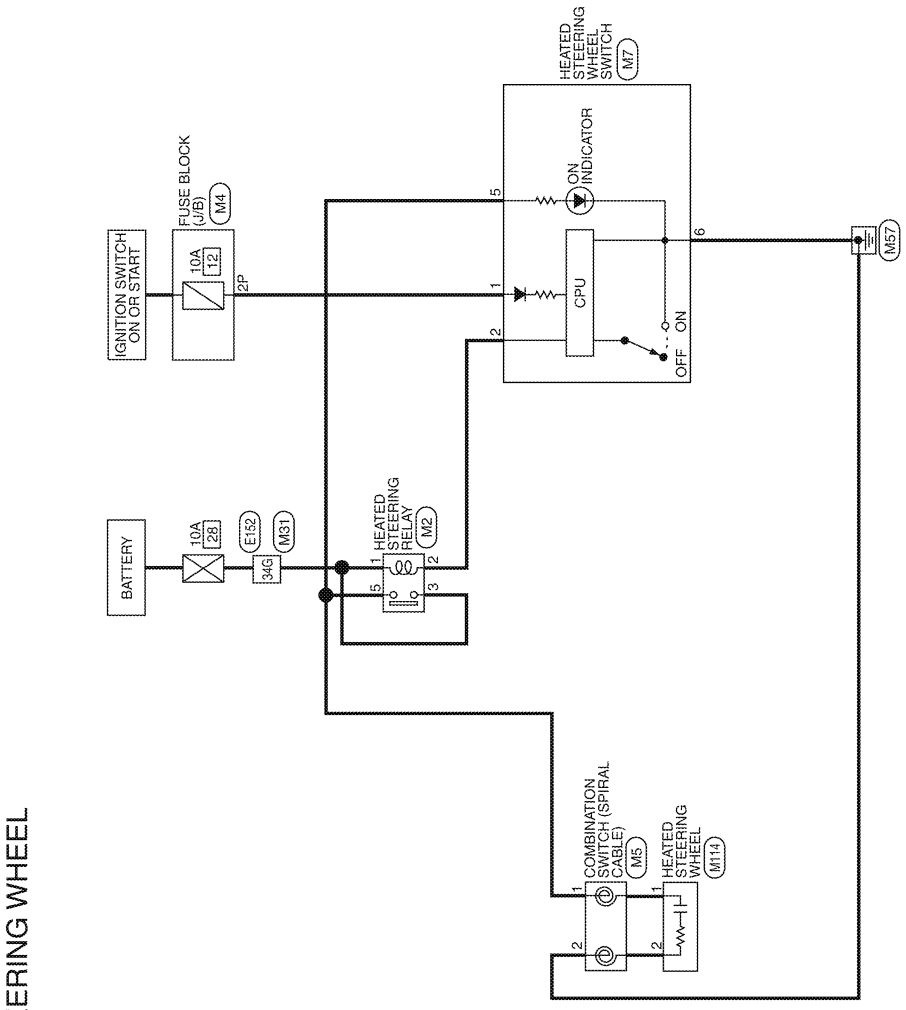
Heated steering wheel switch	• Controls the heated steering relay and operates the heated steering system. • Turns the indicator lamp ON when the system is activated.
Heated steering relay	• Operates the heated steering system with the control signal from the heated steering wheel switch.
Heated steering wheel	• Heats the heating element with the power supplied from the heated steering relay.

COMPONENT DIAGNOSIS

HEATED STEERING WHEEL

Wiring Diagram

INFOID:0000000005260164



HEATED STEERING WHEEL

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HEATED STEERING WHEEL CONNECTORS

Connector No.	M2
Connector Name	HEATED STEERING RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R/B	–
2	V	–
3	R/B	–
5	L	–

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
2P	W/G	–

Connector No.	M5
Connector Name	COMBINATION SWITCH
Connector Color	WHITE

H.S.

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

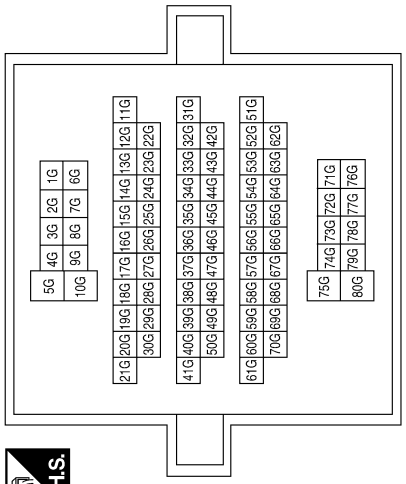
Connector No.	M7
Connector Name	HEATED STEERING WHEEL SWITCH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	V	–
5	L	–
6	B	–

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

H.S.



Terminal No.	Color of Wire	Signal Name
34G	R/B	–

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

H.S.

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

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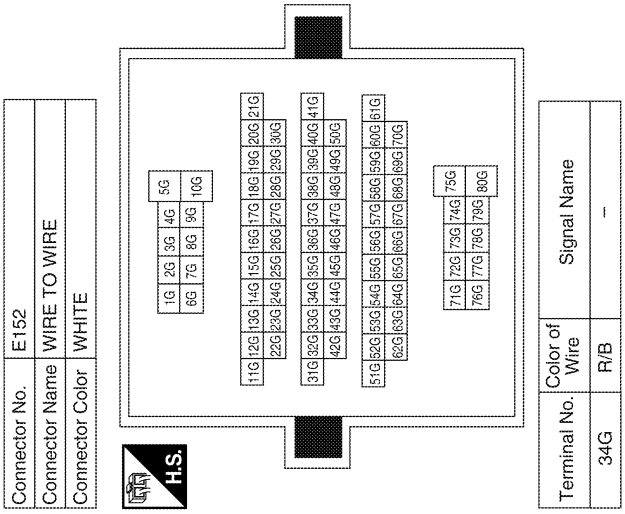

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SYMPTOM DIAGNOSIS

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000005260165

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

Possible cause and suspected parts		Fluid level	Air in hydraulic system	Outer socket ball joint swinging force	Outer socket ball joint rotating torque	Outer socket ball joint end play	Steering fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	Improper installation or looseness of tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	PROPELLER SHAFT	FRONT FINAL DRIVE	WHEEL HUB	SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES
Reference page		ST-13	ST-13	ST-32	ST-32	ST-32	ST-13	ST-15	ST-15	EM-14, "Checking Drive Belts" (VQ40DE), EM-149, "Checking Drive Belts" (VK56DE)	ST-15	ST-19	ST-22	ST-19	ST-19	ST-22	DLN-313, "NVH Troubleshooting Chart" (2F1310), DLN-323, "NVH Troubleshooting Chart" (2S1330), DLN-334, "NVH Troubleshooting Chart" (2S1350)	DLN-346, "NVH Troubleshooting Chart" (R180A), DLN-381, "NVH Troubleshooting Chart" (M205)	FAX-5, "NVH Troubleshooting Chart"	FSU-5, "NVH Troubleshooting Chart"	WT-46, "NVH Troubleshooting Chart"	WT-46, "NVH Troubleshooting Chart"	FAX-5, "NVH Troubleshooting Chart"	BR-6, "NVH Troubleshooting Chart"
Symptom	Noise	×	×	×	×	×	×	×	×	×							×	×	×	×	×	×	×	×
	Shake										×	×	×				×		×	×	×	×	×	×
	Vibration										×	×	×	×	×		×		×	×	×		×	
	Shimmy										×	×	×			×			×	×	×	×		×
	Shudder												×			×			×	×	×	×		×

×: Applicable

ON-VEHICLE MAINTENANCE

POWER STEERING FLUID

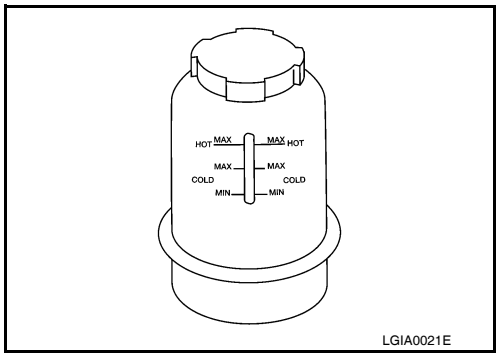
Checking Fluid Level

INFOID:0000000005260166

Check fluid level, referring to the scale on the reservoir tank.
Use HOT range for fluid temperatures of 50° – 80°C (122° – 176°F).
Use COLD range for fluid temperatures of 0° – 30°C (32° – 86°F).

CAUTION:

- **Do not overfill.**
- **Do not reuse any power steering fluid.**
- **Recommended fluid is Genuine NISSAN PSF or equivalent. Refer to MA-16, "For North America".**

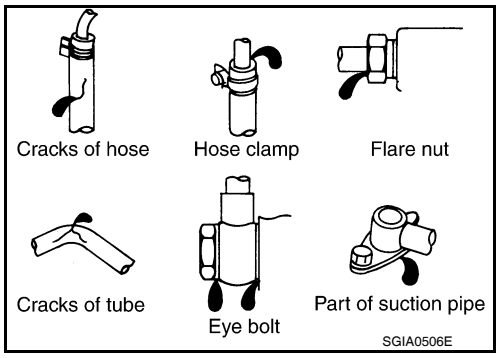


Checking Fluid Leakage

INFOID:0000000005260167

Check the hydraulic piping lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

1. Run the engine until the fluid temperature reaches 50° – 80°C (122° – 176°F) in the reservoir tank. Keep engine speed idle.
   CAUTION:
   Do not allow steering fluid reservoir tank to go below the MIN level line. Check tank frequently and add fluid as needed.
2. Turn the steering wheel to the right and left several times.
3. Hold the steering wheel at each “locked” position for five seconds to check for fluid leakage.
   CAUTION:
   Do not hold steering wheel in the locked position for more than 10 seconds. (There is the possibility that the oil pump may be damaged.)
4. If fluid leakage at a connection is noticed, loosen the connection and then retighten. Do not over-tighten connector as this can damage O-ring, washer and connector. Refer to ST-17 and ST-26.
5. If fluid leakage from the oil pump is noticed, check the oil pump. Refer to ST-17.
6. Check steering gear boots for accumulation of fluid, indicating a leak from the steering gear.



CAUTION:
Do not reuse copper washers.

Air Bleeding Hydraulic System

INFOID:0000000005260168

Incomplete air bleeding causes the following:

- Air bubbles in reservoir tank
- Clicking noise in oil pump
- Excessive buzzing in oil pump

When this happens bleed the air again.

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

1. Check for fluid leakage. Refer to ST-13, "Checking Fluid Leakage".
2. Start the engine and turn the steering wheel fully to the right and left several times.
   CAUTION:
   Do not allow steering fluid reservoir tank to go below the MIN level line. Check tank frequently and add fluid as needed.
3. Run the engine at idle speed. Hold the steering wheel at each "locked" position for three seconds.
   CAUTION:

Do not hold steering wheel in the locked position for more than 10 seconds. (There is the possibility that oil pump may be damaged.)

4. Repeat step 3 several times at about three second intervals.
5. Check for air bubbles, cloudy fluid and fluid leakage.
6. If air bubbles or cloudiness exists, perform steps 3 and 4 again until air bubbles and cloudiness do not exist.
7. Stop the engine and check fluid level.

ON-VEHICLE REPAIR

STEERING WHEEL

On-Vehicle Inspection and Service

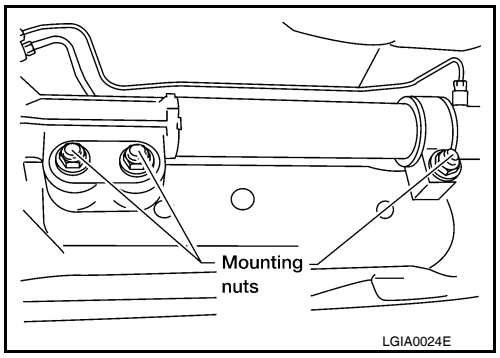
INFOID:0000000005260169

CHECKING CONDITION OF INSTALLATION

- Check the installation condition of the steering gear assembly, front suspension, axle and steering column.
- Check if movement exists when the steering wheel is pushed up and down, left and right and in the axial direction.

End play of the axle direction for steering wheel **Refer to ST-35, "Steering Wheel"**

- Check if the nuts for the steering gear assembly are loose. Refer to ST-22, "Removal and Installation".



CHECKING STEERING WHEEL PLAY

1. Turn the tires straight ahead and start the engine. Lightly turn the steering wheel left and right to the point where the tires start moving, and measure the distance that the outer circumference of the steering wheel travels.

Steering wheel play on the outer circumference **Refer to ST-35, "Steering Wheel"**

CHECKING NEUTRAL POSITION ON STEERING WHEEL

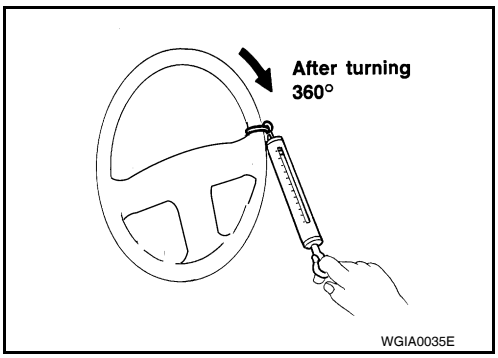
- Check the neutral position on the steering wheel after confirming the front wheel alignment is correct. Refer to FSU-6, "Front Wheel Alignment".

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

CHECKING STEERING WHEEL TURNING FORCE

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring the power steering fluid up to adequate operating temperature. Make sure the fluid temperature is approximately 50°– 80°C (122°– 176°F).
4. Tires need to be inflated to specified pressure. Refer to WT-53, "Tire".

5. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.



Tool number : — (J-44372)

Steering wheel turning force	**Refer to ST-35, "Steering Wheel"**

6. If steering wheel turning force is out of specification, inspect the following:
   - Steering column. Refer to ST-22, "Removal and Installation".
   - Power steering oil pump. Refer to ST-17, "On-Vehicle Inspection and Service".
7. If steering column and power steering oil pump meet specifications, inspect steering gear and replace as necessary. Refer to ST-22, "Removal and Installation".

CHECKING FRONT WHEEL TURNING ANGLE

When checking the front wheel turning angle, refer to FSU-24, "Wheel Alignment (Unladen*1)".

POWER STEERING OIL PUMP

On-Vehicle Inspection and Service

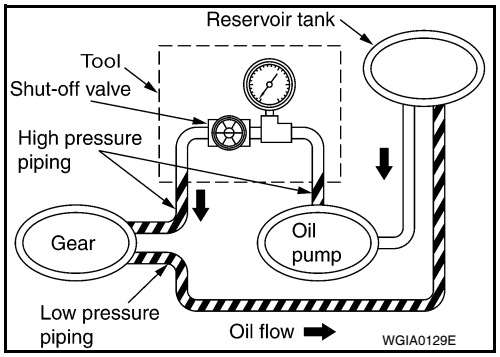
INFOID:0000000005260170

CHECKING RELIEF OIL PRESSURE

CAUTION:

Before starting work, confirm that the belt tension is within specification. Refer to EM-14, "Checking Drive Belts" (VQ40DE), EM-149, "Checking Drive Belts" (VK56DE).

1. Connect the Tool between the power steering oil pump discharge connector and the high pressure hose, then bleed the air from the hydraulic circuit. Refer to ST-13, "Air Bleeding Hydraulic System".



Tool number:		
Pressure gauge and shut-off valve		KV48103500 (J-26357 and J-26357-10)
Oil pump side	Connector A and O-ring	KV48105300-4 and 5295262U10 (—)
	Eye-bolt and O-ring	KV48105300-3 and 5295262U00 (—)
High pressure piping side	Connector B and O-ring	KV48105300-1 and 5295262U00 (—)
	Nut	KV48105300-2 (—)

2. Start the engine. Run the engine until the power steering fluid temperature in reservoir tank reaches 50 – 80°C (122 – 176°F).

   CAUTION:

   - **Warm up the engine with the shut-off valve fully opened. If the engine is started with the shut-off valve closed, fluid pressure in the power steering oil pump increases to maximum pressure. This will raise fluid temperature excessively.**
   - **Do not contact the belt with the hose while the engine is running.**

3. With the engine at idle, close the shut-off valve and read the relief oil pressure.

   Relief oil pressure : 8.0 – 8.8 mPa (81.60 – 89.76 kg/cm^2, 1160.0 – 1276.0 psi)

   CAUTION:

   Do not close the shut-off valve of the pressure gauge for more than 10 seconds.

4. After measurement, open the shut-off valve slowly.
   - If relief oil pressure is outside the specification, replace the power steering oil pump. Refer to ST-24, "Removal and Installation".
5. After inspection, disconnect the oil pressure gauge and oil pressure gauge adapter from the hydraulic circuit, then connect the power steering oil pump discharge connector. Add fluid and bleed the air from the hydraulic circuit thoroughly. Refer to ST-13, "Air Bleeding Hydraulic System".

REMOVAL AND INSTALLATION

STEERING WHEEL

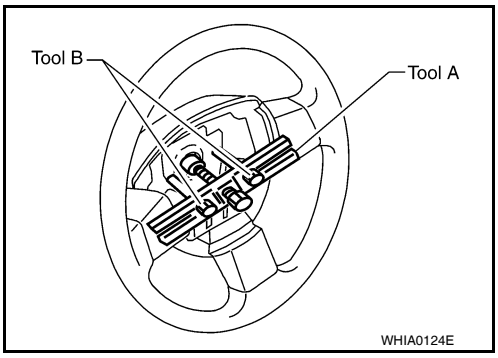
Removal and Installation

INFOID:0000000005260171

REMOVAL

1. Set the front wheels in the straight-ahead position.
2. Remove the driver air bag module. Refer to SR-5, "Removal and Installation".
3. Disconnect the steering wheel switches and heated steering wheel connector.
4. Remove the steering wheel center nut.
5. Remove the steering wheel, using Tools.

Tool number **A: KV481J0010 (J-1859A)**
B: KV481J0020 (J-42578)



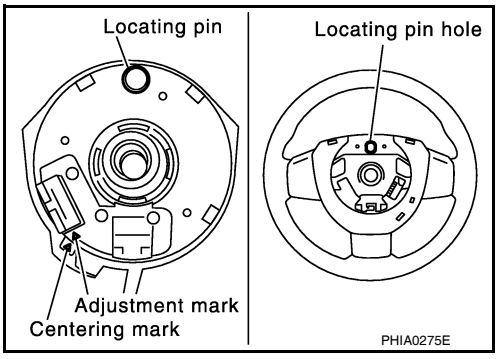
6. Inspect the steering wheel near the puller holes for damage. If damage is found, replace the steering wheel.
   - Remove the steering wheel rear cover and steering wheel switches, if required.

CAUTION:
Place a piece of tape across the spiral cable so it will not be rotated out of position.

INSTALLATION

Installation is in the reverse order of removal.

- Align spiral cable correctly when installing steering wheel. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left 2.5 revolutions from the right end position and ending with the locating pin at the top.
- If equipped with VDC, refer to BRC-8, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement" for steering angle sensor adjustment.
- After the work is completed, perform self-diagnosis to make sure no malfunction is detected. Refer to SRC-13, "SRS Operation Check".
- Tighten steering wheel center nut to specification. Refer to ST-19, "Removal and Installation".



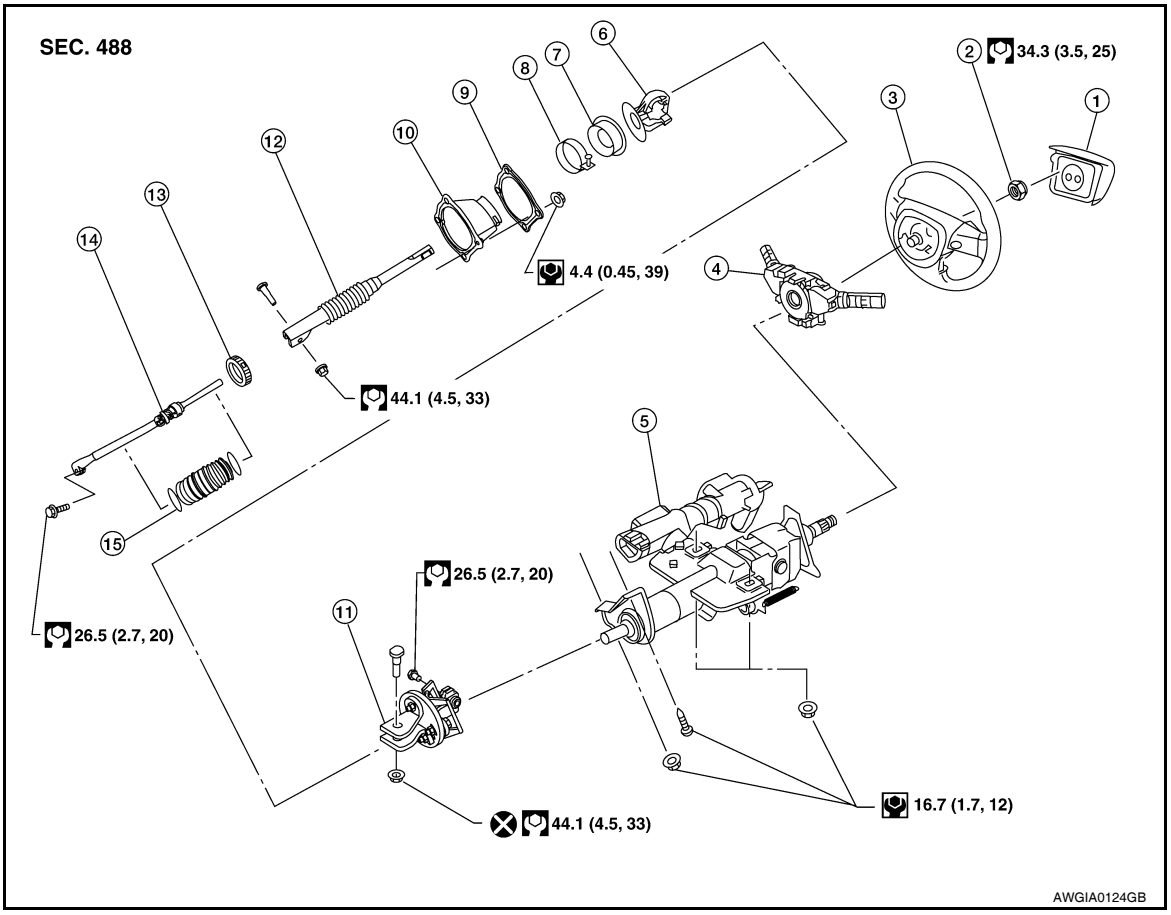
CAUTION:

- **The spiral cable may snap due to steering operation if the cable is not installed in the correct position.**
- **With the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. The spiral cable can be turned counterclockwise about 2.5 turns from the neutral position.**

STEERING COLUMN

Removal and Installation

INFOID:0000000005260172



1. Driver air bag module	2. Steering wheel center nut	3. Steering wheel
4. Combination switch and spiral cable	5. Steering column assembly and ignition switch	6. Collar
7. Hole cover seal	8. Clamp	9. Hole cover mounting plate
10. Hole cover	11. Upper joint	12. Upper shaft
13. Boot clamp	14. Lower joint shaft	15. Boot and clips (plastic)

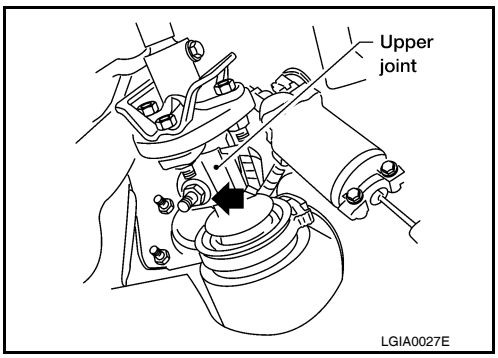
CAUTION:

- **Do not exert any axial load or impact to the steering column.**
- **Do not move the steering gear while the steering column assembly is removed.**
- **Any time the ignition switch has been removed and installed, the keys must be re-registered in the BCM. Refer to CONSULT–III Operation Manual IVIS/NVIS.**

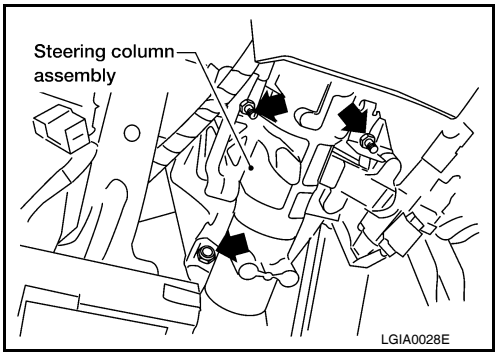
REMOVAL

1. Remove the spiral cable with the combination switches attached from the steering column assembly. Refer to SR-7, "Removal and Installation".
2. Remove the lower instrument panel LH. Refer to IP-12, "Removal and Installation".
3. Remove the steering column cover and ignition key finisher. Refer to IP-12, "Removal and Installation".
4. Remove the lower knee protector. Refer to IP-12, "Removal and Installation".

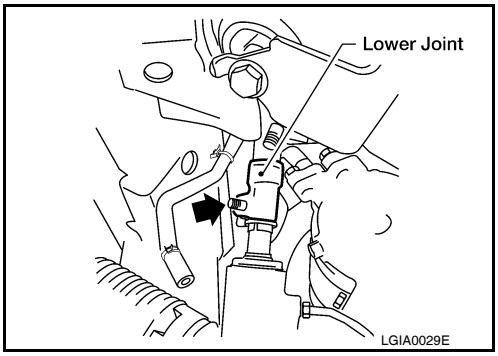
5. Remove the lock nut and bolt from the upper joint, then separate the upper joint from the upper shaft.
   CAUTION:
   - **Do not reuse the lock nut.**



6. Remove the three nuts and bolt from the steering column assembly, then remove the steering column assembly from the steering member.
7. Remove the hole cover seal and clamp.
8. Remove the hole cover nuts, then remove the hole cover from the dash panel.



9. Remove the bolt from the lower joint of the lower joint shaft, then remove the lower joint shaft from the vehicle.
   CAUTION:
   - **Do not damage the lower joint.**



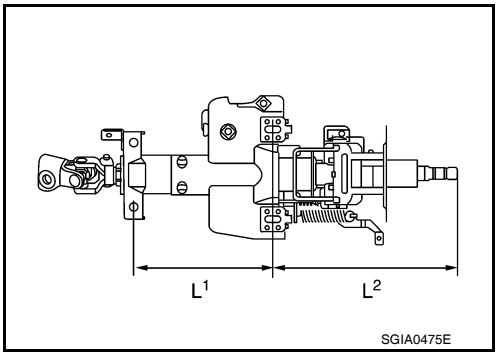
INSPECTION AFTER REMOVAL

- Check for damage to the steering column jacket tube. If damage is found, replace the steering column with a new one.
  CAUTION:
  - **Do not exert any axial load or impact to the steering column.**
  - **Replace the column if it is depleted of grease, worn, damaged, or if any scratches or coating separation is present on the shaft seal area.**
- If the vehicle has been in a collision, or if noises are heard coming from the steering column, check column length (L1) and (L2) as shown. If out of specification, replace the steering column as an assembly.

Steering column length

L1 **Refer to ST-35, "Steering Column"**

L2 **Refer to ST-35, "Steering Column"**



INSTALLATION

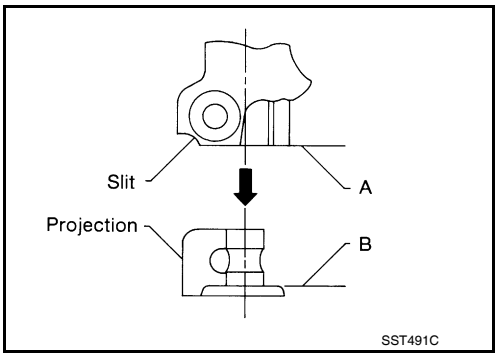
Installation is in the reverse order of removal.

CAUTION:

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

NOTE:

- With the wheels in the straight ahead position, align the slit of the lower joint with the projection on the dust cover. Insert the joint until surface (A) contacts surface (B).
- After installation, inspect the steering column for proper operation.

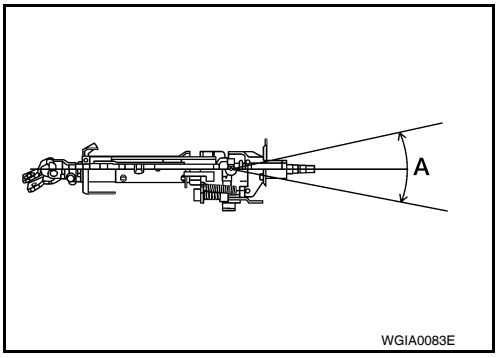


INSPECTION AFTER INSTALLATION

- Check the tilt device for proper tilt range.

Tilt range (A) **Refer to ST-35, "Steering Column"**

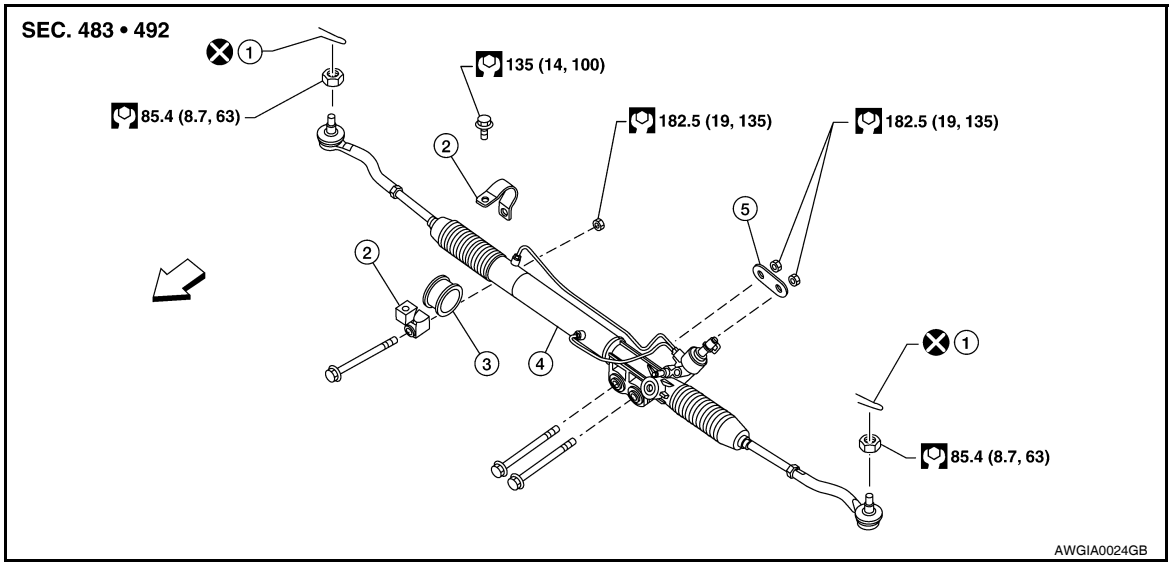
- Check that the steering wheel turns smoothly to the left and right locks.
- Check that the number of turns are the same from the straight-forward position to the left and right locks.
- Check that the steering wheel is in the neutral position when driving straight ahead.



POWER STEERING GEAR AND LINKAGE

Removal and Installation

INFOID:0000000005260173



1. Cotter pin
2. Mounting bracket
3. Mounting insulator
4. Steering gear assembly
5. Washer
⇦ Front

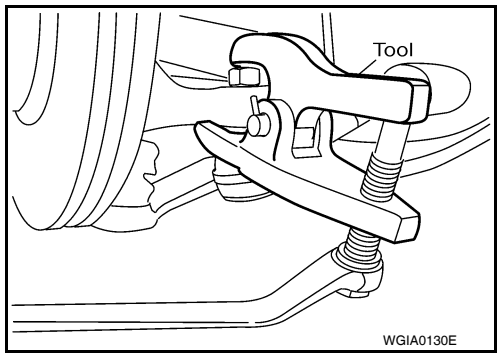
CAUTION:
Spiral cable may snap due to steering operation if the steering column is separated from the steering gear assembly. Therefore secure the steering wheel to avoid turning.

REMOVAL

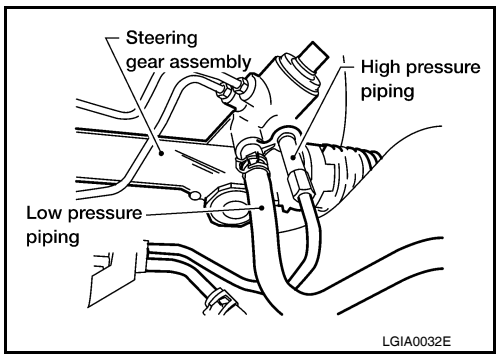
1. Set front wheels in the straight-ahead position.
2. Drain the power steering fluid.
3. Remove the front tires from the vehicle, using power tool.
4. Remove the undercover, using power tool.
5. On 4WD models, remove the front final drive, then support the drive shafts, using suitable wire. Refer to DLN-353, "Removal and Installation" (R180A), DLN-387, "Removal and Installation" (M205).
6. Remove the stabilizer bar brackets and reposition the stabilizer bar. Refer to FSU-15, "Removal and Installation".
7. Remove the cotter pins at the steering outer sockets.
   CAUTION:
   Do not reuse the cotter pins.
8. Loosen the outer socket nuts.
9. Remove the steering outer sockets from the steering knuckles, using Tool, then remove the nuts.

   Tool number : HT72520000 (J-25730-A)

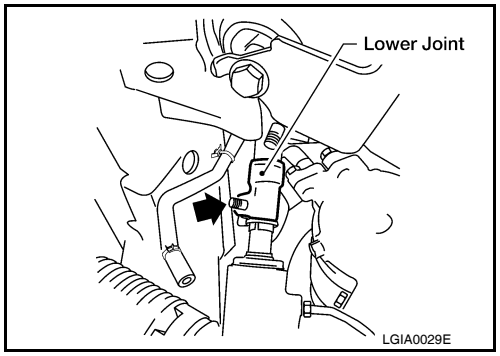
   CAUTION:
   - **Do not damage the outer socket boots.**
   - **Do not damage the outer socket threads. Thread the ball joint nut onto the end of the outer socket during removal.**



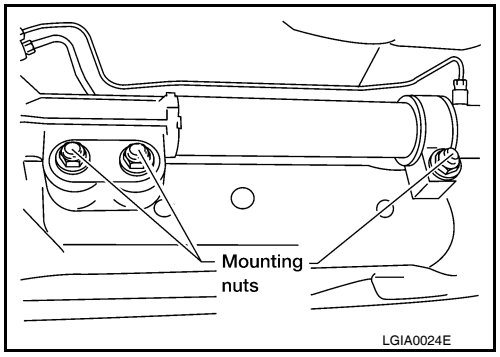
10. Remove the high-pressure and low-pressure piping from the steering gear assembly, then drain the fluid from the piping.



11. Remove the bolt from the lower joint of the lower joint shaft, then separate the lower joint from the steering gear assembly.
CAUTION:
- **Do not damage the lower joint.**



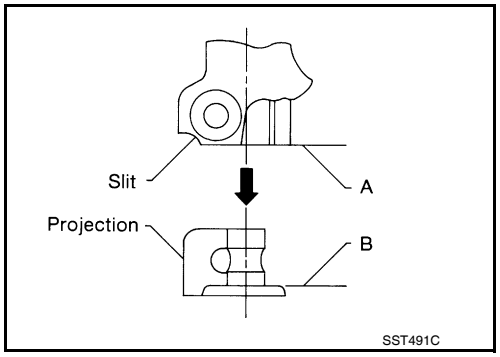
12. Remove the nuts and bolts of the steering gear assembly, using power tool, then remove the steering gear assembly from the vehicle.



INSTALLATION

Installation is in the reverse order of removal.

- With the steering wheel in the straight ahead position, align the slit of the lower joint with the projection on the dust cover. Insert the joint until surface (A) contacts surface (B).
- After removing/installing or replacing steering components, check wheel alignment. Refer to FSU-6, "Front Wheel Alignment".
- After adjusting wheel alignment, adjust neutral position of the steering angle sensor. Refer to BRC-8, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Special Repair Requirement".
- Bleed the air from the steering hydraulic system. Refer to ST-13, "Air Bleeding Hydraulic System".



INSPECTION AFTER INSTALLATION

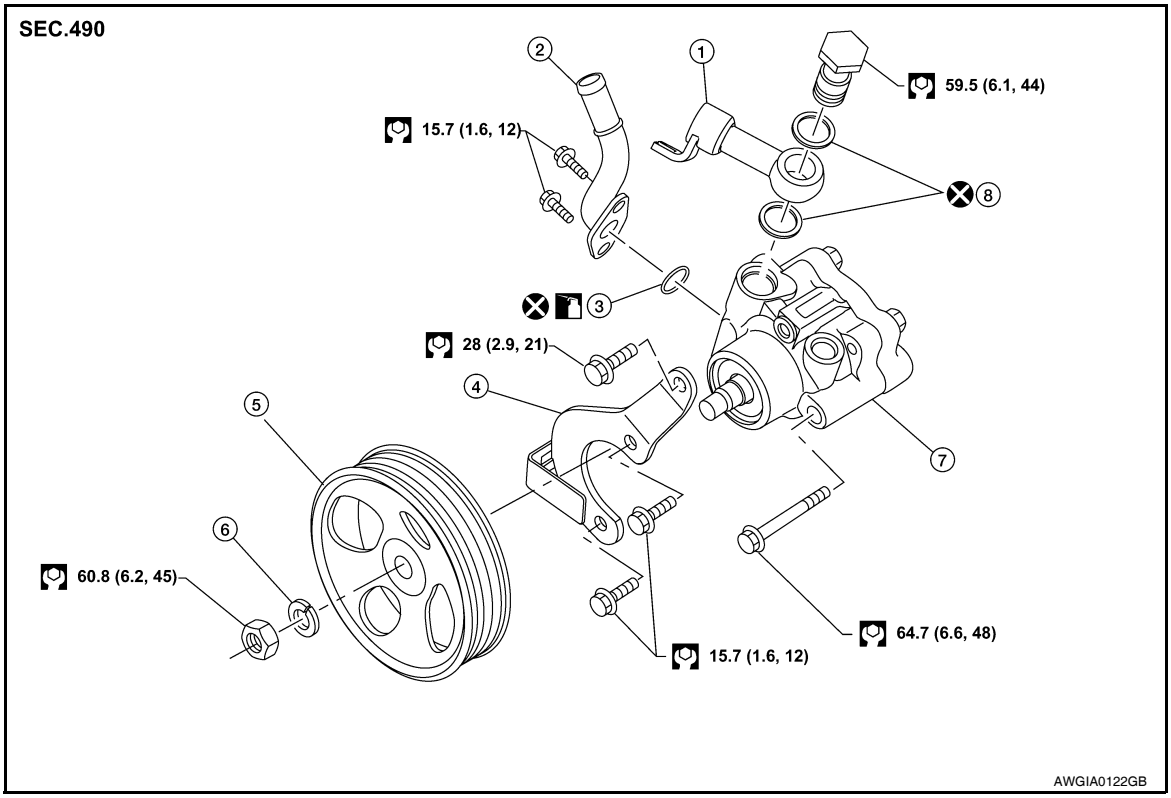
- Check that the steering wheel turns smoothly to the left and right locks.
- Check that the number of turns are the same from the straight-forward position to the left and right locks.
- Check that the steering wheel is in the neutral position when driving straight ahead.

POWER STEERING OIL PUMP

Removal and Installation

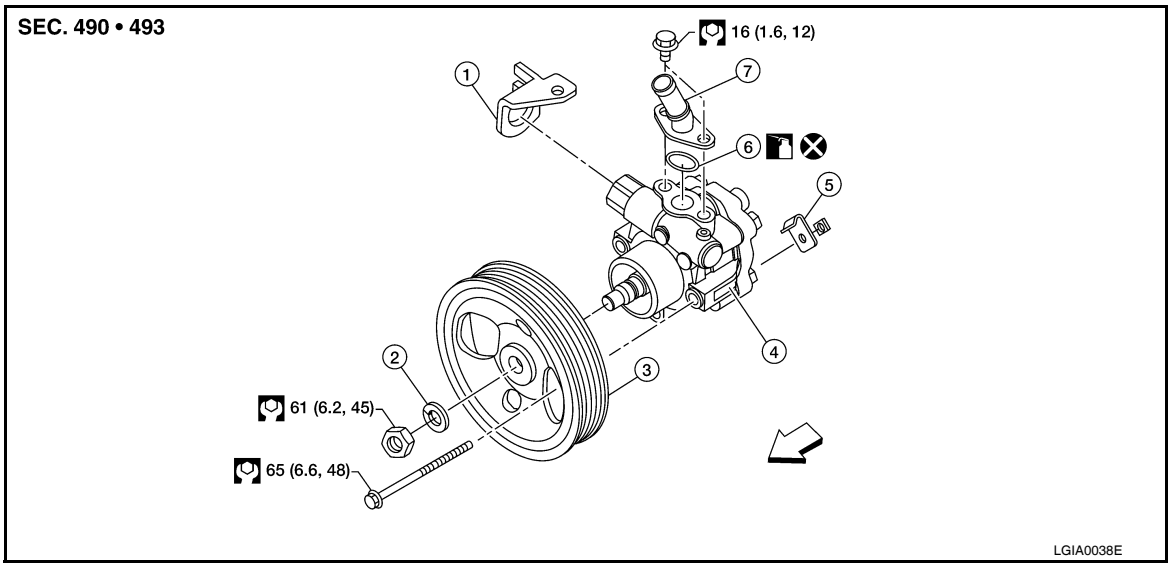
INFOID:0000000005260174

VQ40DE ENGINE



1. Connector
2. Suction pipe
3. O-ring
4. Bracket
5. Pulley
6. Lock washer
7. Body assembly
8. Copper washers
- Apply Genuine NISSAN PSF or equivalent

VK56DE ENGINE



1. Bracket
2. Spring washer
3. Pulley
4. Power steering pump
5. High pressure hose bracket
6. O-ring
7. Suction pipe
- Front
- Apply Genuine NISSAN PSF or equivalent

POWER STEERING OIL PUMP

Removal

1. Drain the power steering fluid from the reservoir tank.
2. Remove the engine room cover. Refer to EM-25, "Removal and Installation" (VQ40DE), EM-160, "Removal and Installation" (VK56DE).
3. Remove cooling fan assembly. Refer to CO-20, "Removal and Installation (Motor driven type)" (VQ40DE).
4. Remove the air duct assembly. Refer to EM-26, "Removal and Installation" (VQ40DE), EM-161, "Removal and Installation" (VK56DE).
5. Remove the serpentine drive belt from the auto tensioner and power steering oil pump. Refer to EM-14, "Removal and Installation" (VQ40DE), EM-149, "Removal and Installation" (VK56DE).
6. Disconnect the pressure sensor electrical connector.
7. Remove the high pressure and low pressure piping from the power steering oil pump. Refer to ST-26, "Removal and Installation".
8. Remove the power steering oil pump bolts, then remove the power steering pump.

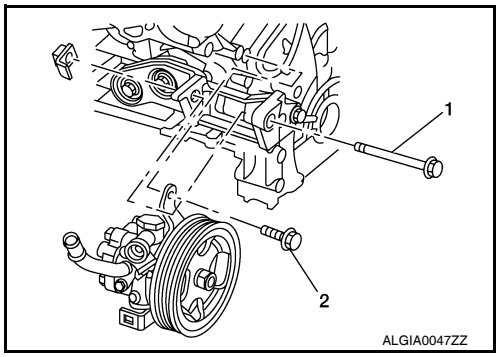
Installation

Installation is in the reverse order of removal.

- On VQ40DE, install the bolts and tighten to specification in the order shown.

Power steering pump to bracket bolt (1) : **64.7 Nm (6.6 kg–m, 48 ft–lb)**

Power steering pump to block bolt (2) : **28 Nm (2.9 kg–m, 21 ft–lb)**



- After installation, bleed the air from the hydraulic circuit thoroughly. Refer to ST-13, "Air Bleeding Hydraulic System".

NOTE:
Belt tension is automatic and requires no adjustment.

POWER STEERING OIL PUMP BRACKET (VQ40DE)

Removal

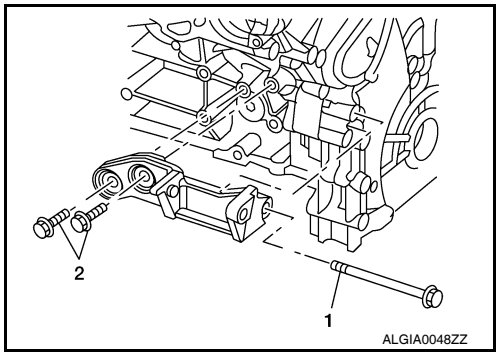
1. Remove the power steering oil pump.
2. Remove the bolts and the power steering oil pump bracket.

Installation

1. Position the bracket and install the bracket to block bolts finger tight.
2. Tighten the bolts to specification in order as shown.

Bracket to front of block bolt (1) : **61.3 Nm (6.3 kg–m, 45 ft–lb)**

Bracket to side of block bolt (2) : **61.3 Nm (6.3 kg–m, 45 ft–lb)**



3. Install the power steering oil pump.

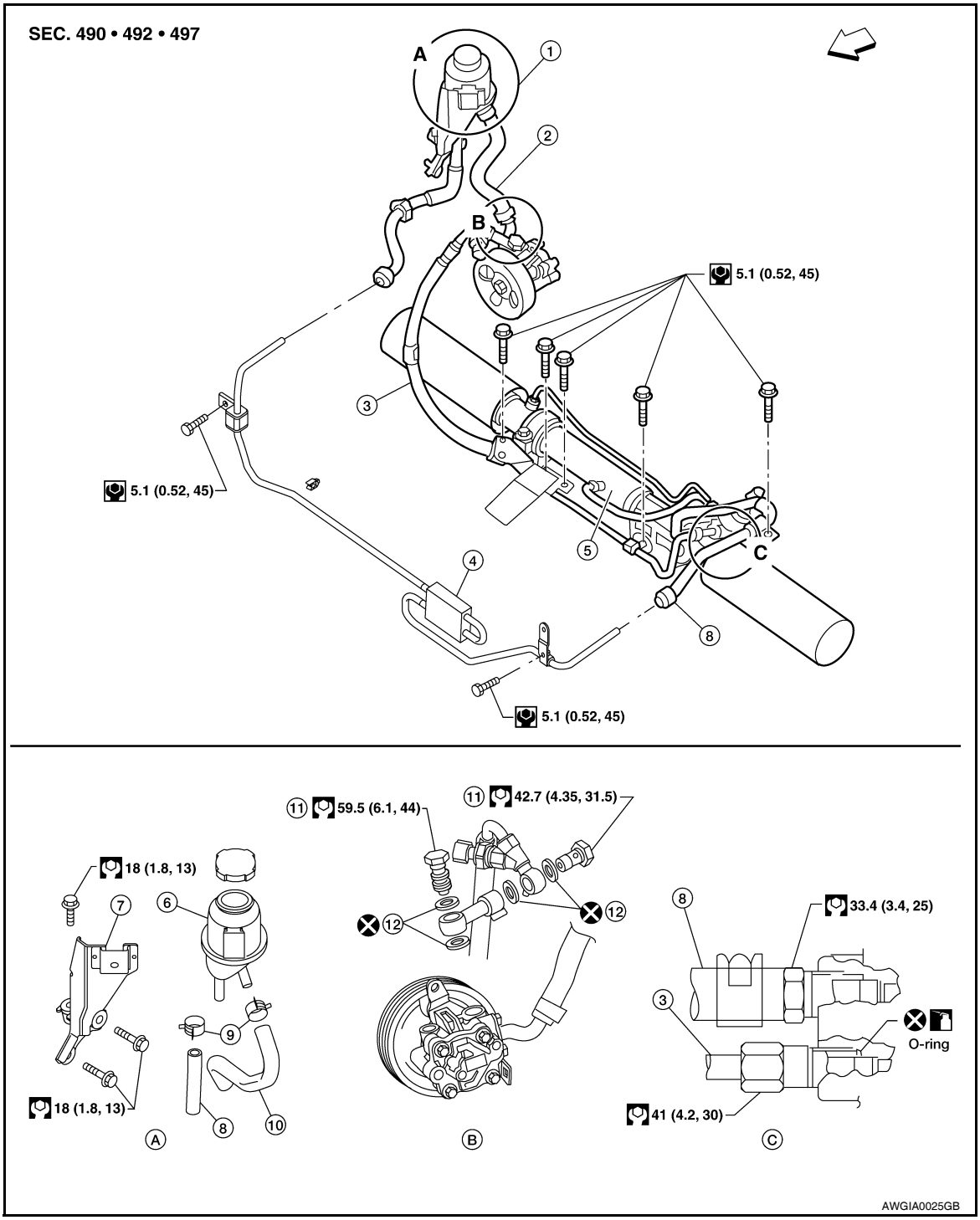
HYDRAULIC LINE

Removal and Installation

INFOID:0000000005260175

Refer to the following illustrations for hydraulic line removal and installation.

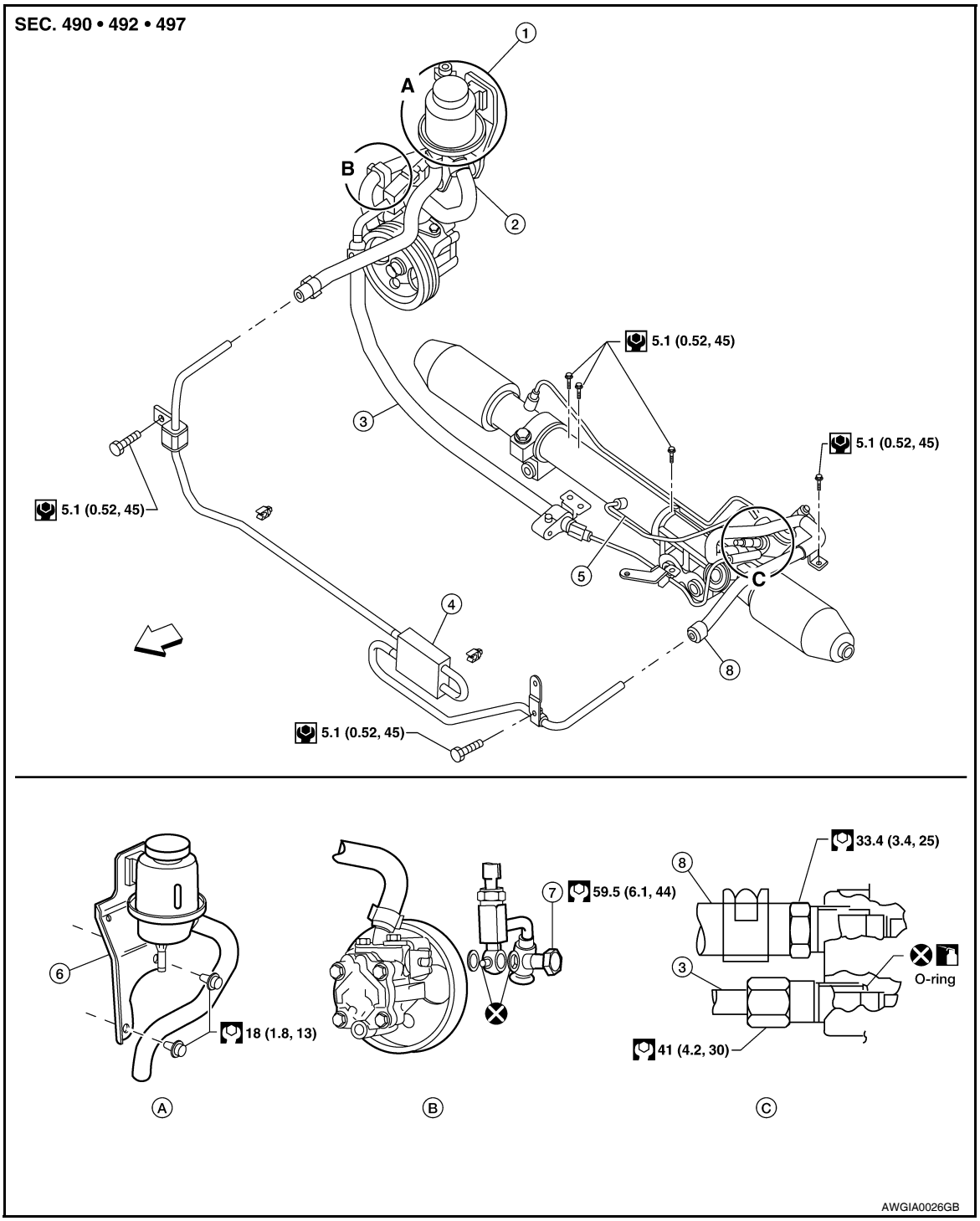
VQ40DE ENGINE



1. Reservoir tank
2. Suction hose
3. High pressure hose
4. Oil cooler
5. Steering gear assembly
6. Reservoir tank
7. Reservoir tank bracket
8. Return hose
9. Hose clamps
10. Suction hose
11. Connector bolts
12. Copper washers

⇦ Front

VK56DE ENGINE



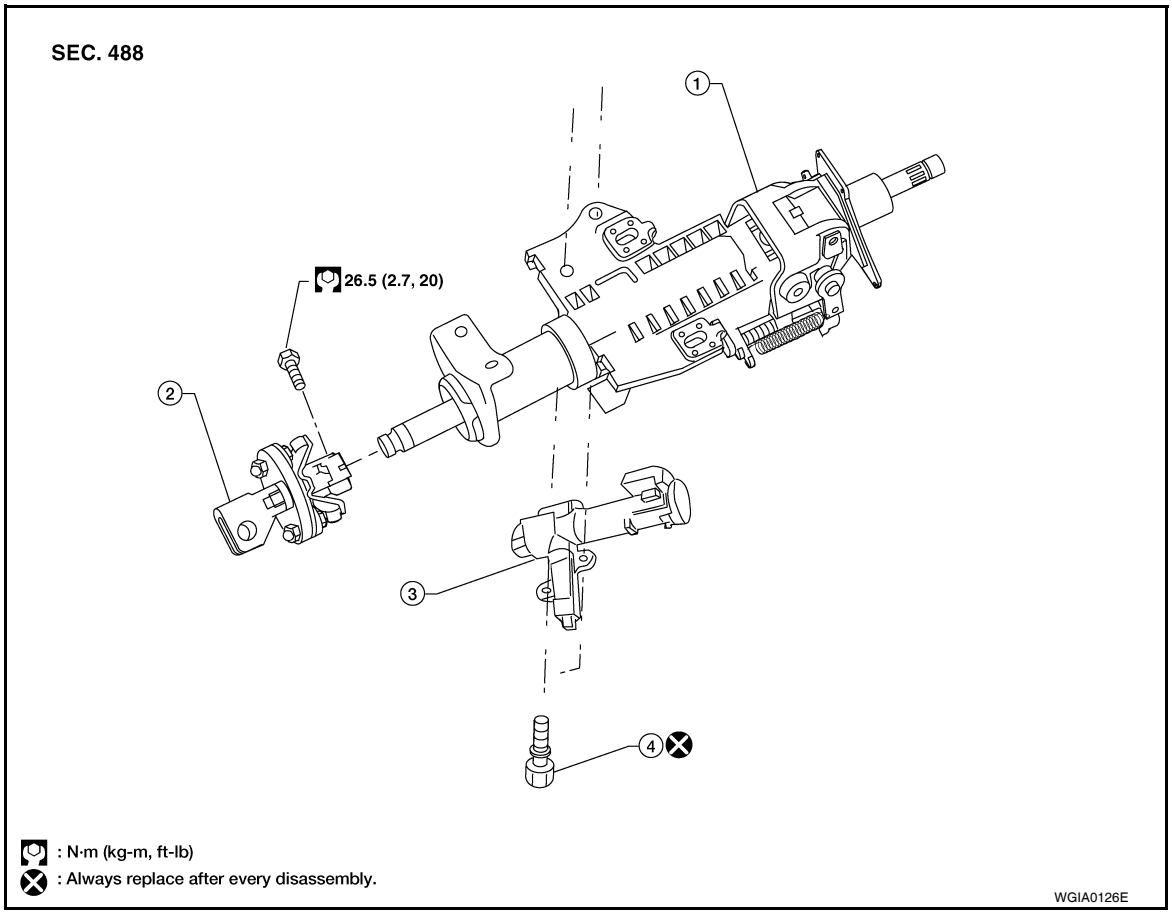
1. Reservoir tank
2. Suction hose
3. High pressure hose
4. Oil cooler
5. Steering gear assembly
6. Reservoir tank bracket
7. Eye bolt
8. Return hose
⇦ Front

DISASSEMBLY AND ASSEMBLY

STEERING COLUMN

Disassembly and Assembly

INFOID:0000000005260176



1. Steering column assembly
2. Upper joint
3. Ignition switch
4. Self-shear screw

DISASSEMBLY

1. Remove the bolt from the upper joint, then remove the upper joint from the steering column assembly.
2. Remove the ignition switch tamper resistant self-shear screws, using a drill.
3. Remove the ignition switch from the steering column.

ASSEMBLY

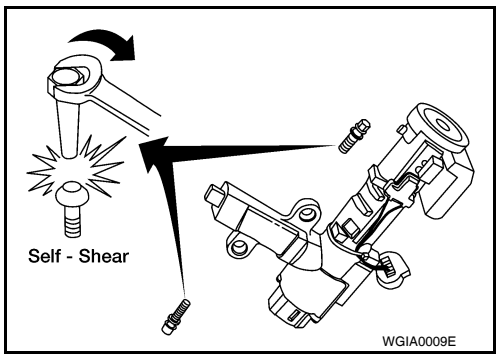
Assembly is in the reverse order of disassembly.

CAUTION:

Any time the ignition switch has been removed and installed, the keys must be re-registered in the BCM. Refer to CONSULT–III Operation Manual IVIS/NVIS.

NOTE:

Install new tamper resistant self-shear screws.



INSPECTION AFTER ASSEMBLY

When the steering wheel does not turn smoothly, check as follows:

1. Check the steering column for the following:
   - Damage to the column tube or bearings
   - Wear around the seal edges
   - Corrosion or pitting around the seal sliding area

   Replace the steering column as an assembly, if necessary.

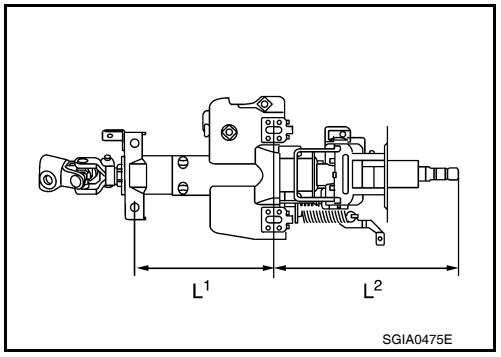
   CAUTION:
   - **Do not exert any axial load or impact to the steering column.**
   - **Replace the column if it is depleted of grease, worn, damaged, or if any scratches or coating separation is present on the shaft seal area.**

2. If the vehicle has been in a collision, or if noises are heard coming from the steering column, check column length (L1) and (L2) as shown. If out of specification, replace the steering column as an assembly.

   Steering column length

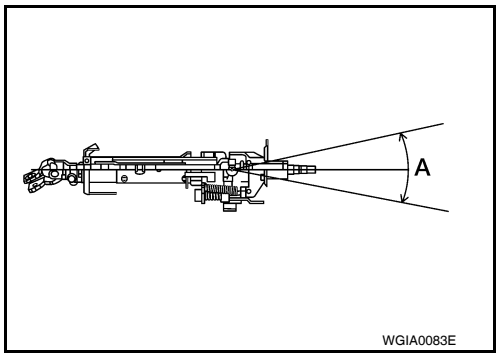
   L1 **Refer to ST-35, "Steering Column"**

   L2 **Refer to ST-35, "Steering Column"**



3. Check the tilt device for proper operation range.

   Range (A) **Refer to ST-35, "Steering Column"**

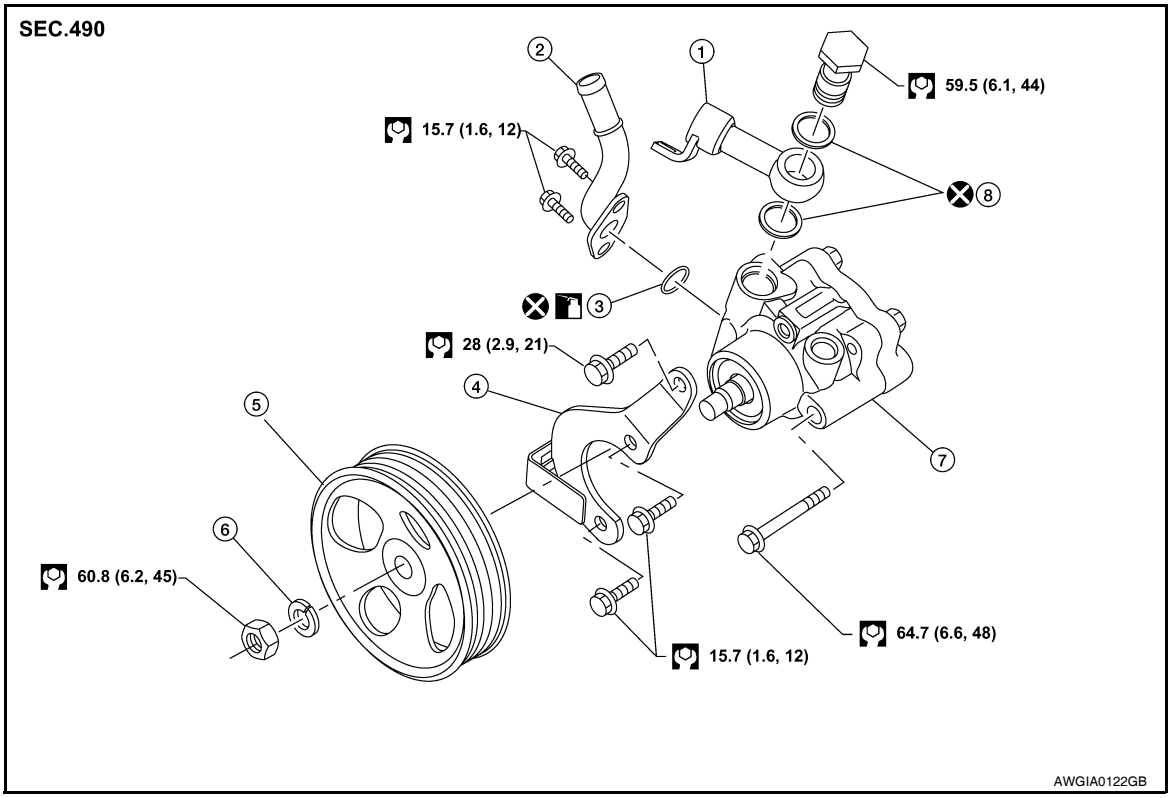


POWER STEERING OIL PUMP

Disassembly and Assembly

INFOID:0000000005260177

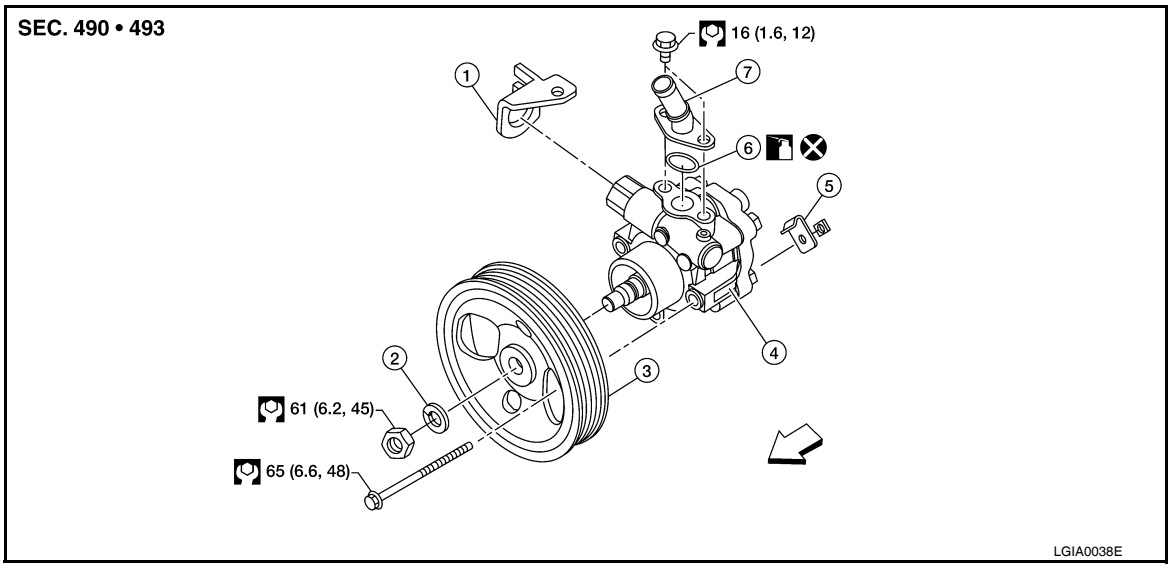
VQ40DE ENGINE



1. Connector
2. Suction pipe
3. O-ring
4. Bracket
5. Pulley
6. Lock washer
7. Body assembly
8. Copper washers

Apply Genuine NISSAN PSF or equivalent

VK56DE ENGINE



1. Bracket
2. Spring washer
3. Pulley
4. Power steering pump
5. High pressure bracket
6. O-ring
7. Suction pipe

Front

Apply Genuine NISSAN PSF or equivalent

INSPECTION BEFORE DISASSEMBLY

Disassemble the power steering oil pump only if the following items are found.

- Deformed or damaged pulley, bracket, connector or suction pipe
- Oil leakage from the suction pipe or connector.

DISASSEMBLY

NOTE:

Mount the power steering oil pump in a vise as needed.

1. Remove the connector bolt, connector and copper washers.
   CAUTION:
   Do not reuse the copper washers.
2. Remove the suction pipe and O-ring.
   CAUTION:
   Do not reuse the O-ring.
3. Remove the pulley nut and pulley.
4. Remove the bracket bolts and bracket(s).

INSPECTION AFTER DISASSEMBLY

Body Assembly Inspection

Check the power steering oil pump body assembly for damage. If any damage is found, replace with a new power steering oil pump assembly.

ASSEMBLY

Assembly is in the reverse order of disassembly.

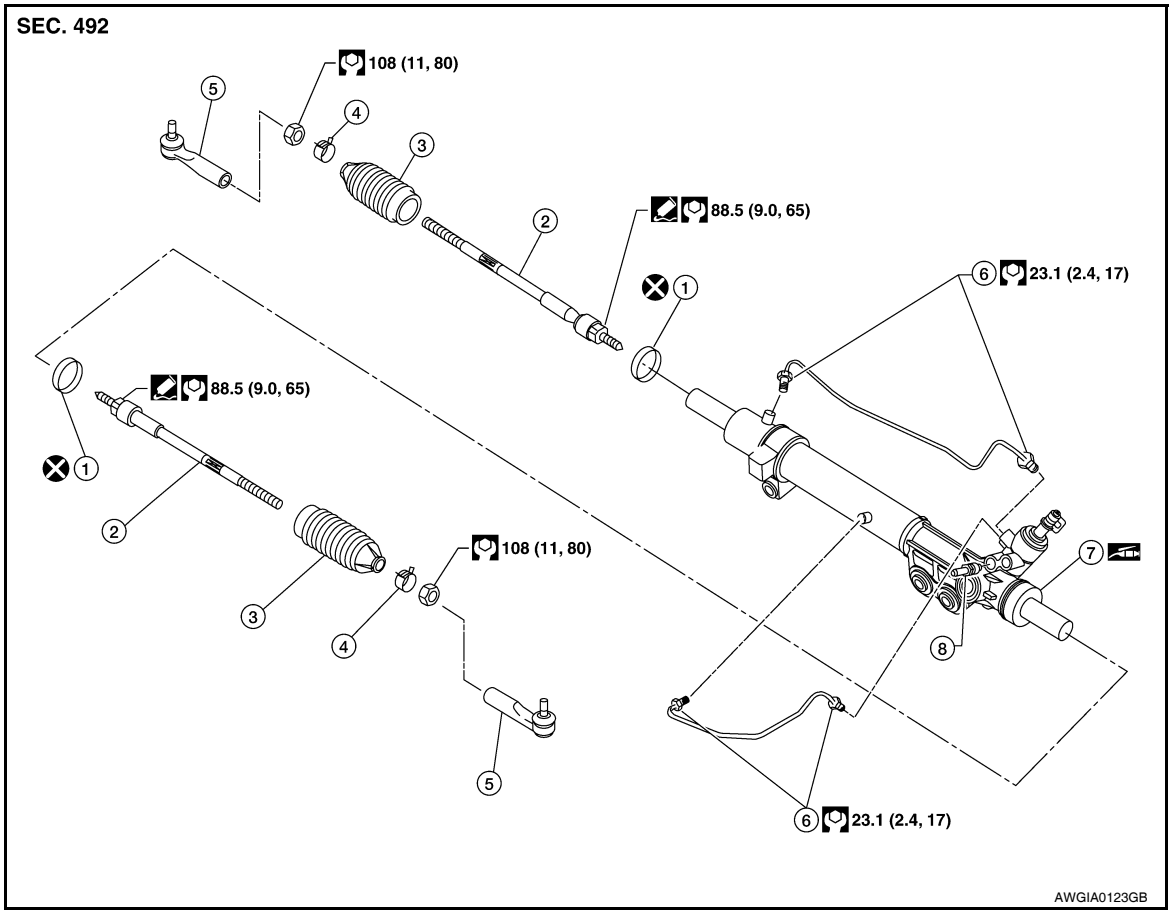
CAUTION:

- **Do not reuse the copper gaskets**
- **Do not reuse the O-ring. Apply a coat of Genuine NISSAN PSF or equivalent to the O-ring. Refer to MA-16, "For North America".**

STEERING GEAR AND LINKAGE

Disassembly and Assembly

INFOID:0000000005260178



1. Boot clamp
2. Inner socket
3. Boot
4. Boot clamp
5. Outer socket
6. Cylinder tubes
7. Gear housing assembly
8. Connector

CAUTION:

- **Secure the gear housing assembly with a vise. Use copper plates or equivalent to prevent it from being damaged. Do not grip the cylinder with a vise.**
- **Before performing disassembly, clean the gear housing assembly. Be careful not to allow any cleaner to contact the discharge and return port connectors.**

DISASSEMBLY

1. Remove the cylinder tubes from the gear housing assembly.
2. Loosen the lock nuts of the outer sockets, then remove the outer sockets from the inner sockets.
3. Remove the boot clamps from the boots, then remove the boots from the inner sockets and gear housing assembly.
   CAUTION:
   - **Do not reuse the large-diameter boot clamps.**
   - **Do not damage the boots, inner socket or gear housing assembly. If they are damaged, replace them.**
4. Remove the inner sockets.

INSPECTION AFTER DISASSEMBLY

Boot

Check boot for tears, cracks and deformation. Replace if necessary.

Gear Housing Assembly

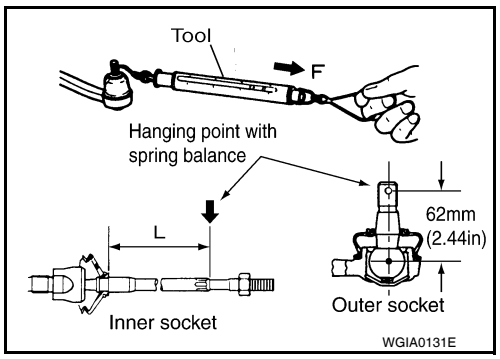
Check gear housing assembly for dents, cracks or damage. Replace as an assembly if necessary.

Outer Socket and Inner Socket

SWING TORQUE

- Measure the swing torque, using Tool. When ball stud and inner socket start moving the measured value must be within the specification. If the reading is outside the specification, replace the socket.

Tool number : — (J-44372)



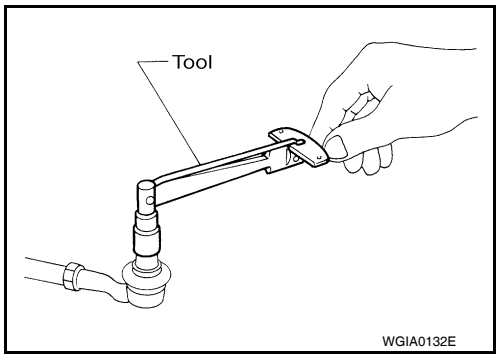
Item	Outer socket	Inner socket
Measuring point	Cotter pin hole of stud	Refer to ST-35, "Steering Outer Socket and Inner Socket"
Swing torque	Refer to ST-35, "Steering Outer Socket and Inner Socket"	Refer to ST-35, "Steering Outer Socket and Inner Socket"
Measuring value	Refer to ST-35, "Steering Outer Socket and Inner Socket"	Refer to ST-35, "Steering Outer Socket and Inner Socket"

ROTATING TORQUE

- Measure the rotating torque, using Tool. If the value is outside the specification, replace the outer sockets.

Tool number : ST3127S000 (J-25765-A)

Outer socket rotating torque **Refer to ST-35, "Steering Outer Socket and Inner Socket"**

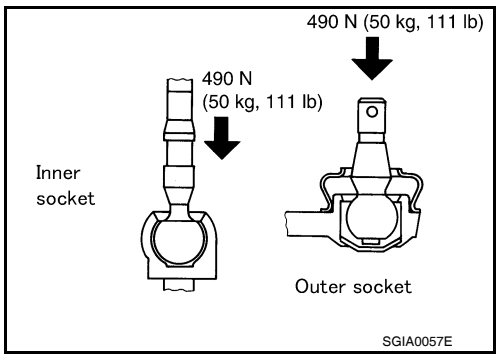


AXIAL END PLAY

- Apply a load of 490 N (50 kg-f, 110 lb-f) to the ball stud axially. Use a dial gauge to measure the amount of the movement that the stud makes. If the value is outside the specification, replace the sockets.

Outer socket **Refer to ST-35, "Steering Outer Socket and Inner Socket"**

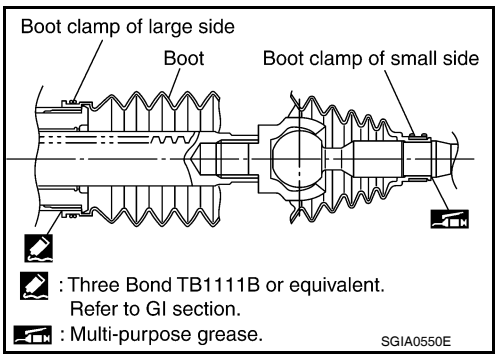
Inner socket **Refer to ST-35, "Steering Outer Socket and Inner Socket"**



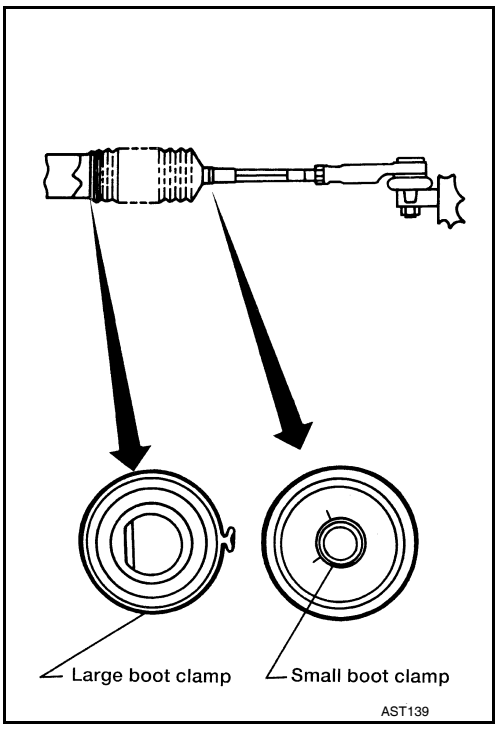
ASSEMBLY

1. Install the inner sockets.

2. Install the large-diameter side of the boots to the gear housing assembly.
3. Install the small-diameter side of the boots to the groove of the inner sockets.



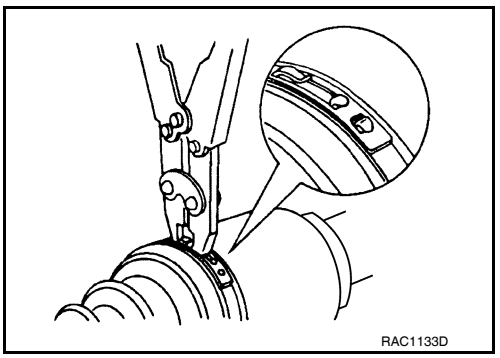
4. Install the boot clamps to the boots, as shown.
CAUTION:
Do not reuse the large boot clamps.



5. Crimp the large boot clamps, using Tool.

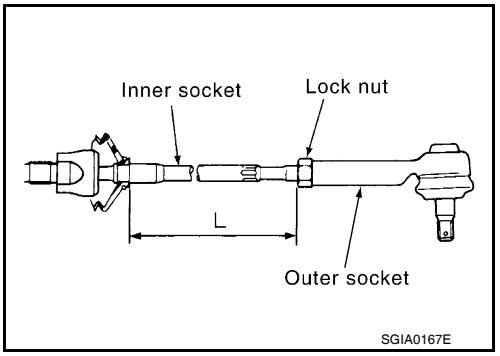
Tool number : KV40107300 (—)

6. Install the cylinder tubes to the gear housing assembly.
7. Install the lock nuts and outer sockets to the inner sockets.



8. Thread the outer sockets onto the inner sockets to the specified length (L) and a minimum thread depth of 18 mm threads. Then tighten the lock nuts to the specified torque. Refer to "Disassembly and Assembly". Reconfirm that the tie-rod length (L) is within specification.

Maximum inner socket length (L)	**Refer to ST-35, "Steering Outer Socket and Inner Socket"**



SERVICE DATA AND SPECIFICATIONS (SDS)

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Steering Wheel

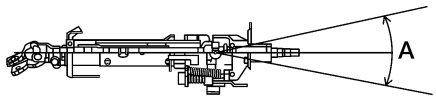
INFOID:0000000005260179

End play of the axle direction for steering wheel	0 mm (0 in)
Steering wheel turning force	39 N (4 kg-f, 9 lb-f) or less
Steering wheel play on the outer circumference	0 – 35 mm (0 – 1.38 in)

Steering Column

INFOID:0000000005260180

Steering column length	553.0 mm (21.77 in)



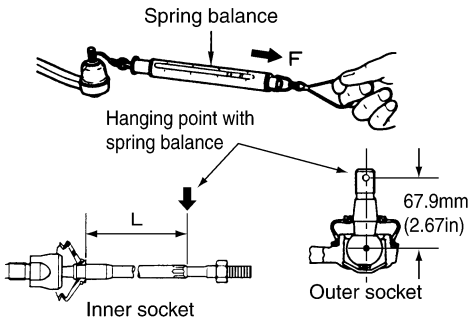
WGIA0083E

Tilt range (A)	73.5 mm (2.894 in)

Steering Outer Socket and Inner Socket

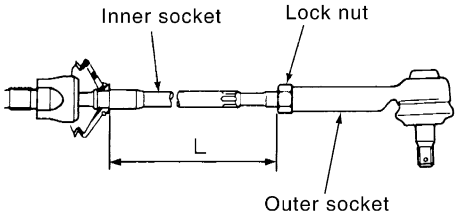
INFOID:0000000005260181

Steering gear type	PR26AM



SGIA0358E

Outer socket	Swinging torque	0.3 – 2.9 N·m (0.03 – 0.29 kg-m, 3 – 25 in-lb)
	Measurement on spring balance • Measuring point: cotter pin hole of stud	4.84 – 46.7 N (0.50 – 4.7 kg-f, 4 – 34 lb-f)
	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)
	Measurement on spring balance • Measuring point: L mark see above, L=84.0 mm (3.307 in) max.	12.1 – 93.7 N (1.3 – 9.5 kg-f, 9 – 69 lb-f)
	Axial end play	0.2 mm (0.08 in) or less



SGIA0167E

Maximum inner socket length (L)	84.0 mm (3.31 in) max

Oil Pump

INFOID:0000000005260182

Oil pump relief hydraulic pressure	8.0 – 8.8 mPa (81.60 – 89.76 kg/cm^2, 1160.0 – 1276.0 psi)

Steering Fluid

INFOID:0000000005260183

Fluid capacity	Approx. 1.0 ℓ (2 1/8 US pt, 1 3/4 Imp pt)