

**SECTION** **ST**  
**STEERING SYSTEM**

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# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

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

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

**WARNING:**

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

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

**WARNING:**

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

#### Service Notice or Precautions for Steering System

INFOID:000000009385527

- In case of removing the 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 >

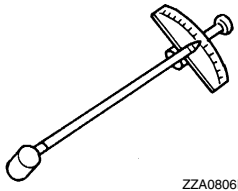
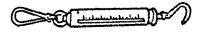
## PREPARATION

### PREPARATION

#### Special Service Tool

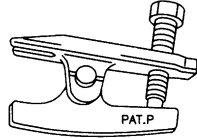
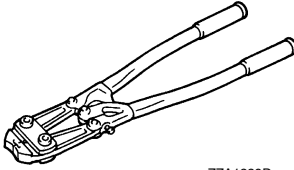
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The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST3127S000 (J-25765-A) Preload gauge   ZZA0806D	Inspecting steering column rotating torque, pinion rotating torque and ball joint rotating torque
— (J-44372) Pull gauge   LST024	Measuring steering wheel turning force or rack sliding force

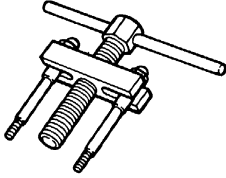

#### Commercial Service Tool

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Tool name	Description
Ball joint remover   S-NT146	Remove steering outer socket
Boot band crimping tool   ZZA1229D	Installing boot clamp (large diameter)

# PREPARATION

## < PREPARATION >

Tool name	Description
<p data-bbox="164 197 375 224">Steering wheel puller</p>  <p data-bbox="824 415 889 432">ZZA0819D</p>	<p data-bbox="1008 197 1260 224">Removing steering wheel</p>
<p data-bbox="164 449 272 476">Power tool</p>  <p data-bbox="824 663 889 680">PIIB1407E</p>	<p data-bbox="1008 449 1341 476">Loosening nuts, screws and bolts</p>

# STEERING WHEEL

< BASIC INSPECTION >

## BASIC INSPECTION

### STEERING WHEEL

#### Inspection

INFOID:000000009385530

#### CONDITION OF INSTALLATION

- Check installation conditions of 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-19, "Steering Wheel Axial End Play and Play"](#).

- Verify that the steering gear nuts are tightened to specification. Refer to [ST-14, "Exploded View"](#).

#### STEERING WHEEL PLAY

1. Set the front wheels and tires in the straight-ahead position, start engine, then lightly turn steering wheel to the left and right until the front wheels start to move. Measure steering wheel movement on the outer circumference.

**Steering wheel play on the outer circumference**

: Refer to [ST-19, "Steering Wheel Axial End Play and Play"](#).

2. When the measurement value is outside the standard value, check backlash for each joint of steering column and installation condition of steering gear.

#### STEERING WHEEL NEUTRAL POSITION

Check steering wheel neutral position using the following procedure:

1. Confirm that front wheel alignment is correct. Refer to [FSU-8, "Adjustment"](#).
2. Set the front wheels and tires in the straight-ahead position, check if steering wheel is in the neutral position.
3. If it is not in the neutral position, remove steering wheel and reinstall it correctly.
4. If the neutral position cannot be attained by repositioning the steering wheel two teeth or less on steering stem, loosen the steering gear outer socket lock nuts, then adjust the inner sockets by the same amount in the opposite direction.
5. Re-check the front wheel alignment. Refer to [FSU-8, "Adjustment"](#).

#### STEERING WHEEL TURNING FORCE

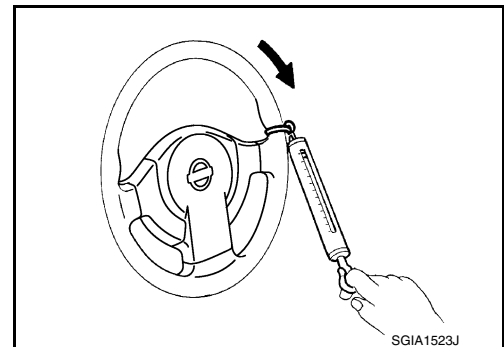
1. Park vehicle on a level and dry surface, set parking brake.
2. Tires need to be inflated normal pressure. Refer to [WT-50, "Tire Air Pressure"](#).
3. Start engine.
4. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.

**Tool number** : — (J-44372)

**Steering wheel turning force**

: Refer to [ST-19, "Steering Wheel Turning Force"](#).

5. If steering wheel turning force is out of specification, inspect steering column. Refer to [ST-10, "Inspection"](#).
6. If steering column meets specification, inspect steering gear. Refer to [ST-14, "Inspection"](#).



#### FRONT WHEEL TURNING ANGLE

1. Perform toe-in inspection. Refer to [FSU-8, "Adjustment"](#).

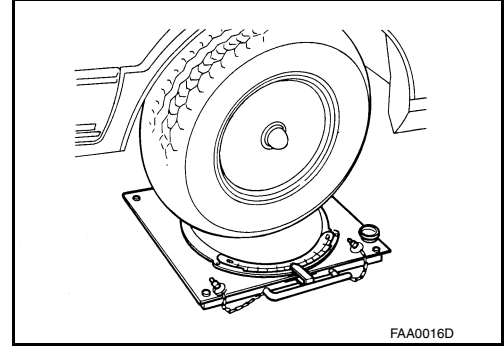
**CAUTION:**

# STEERING WHEEL

## < BASIC INSPECTION >

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

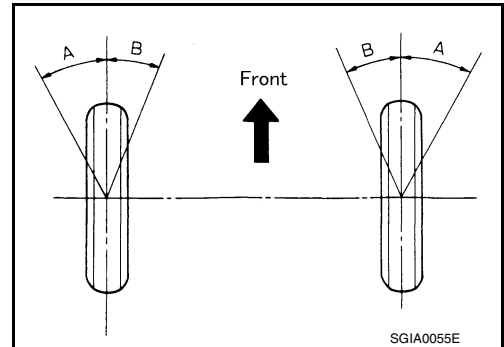
2. Place front wheels on turning radius gauges and rear wheels on stands, so that vehicle can be level.
3. Check the maximum inner and outer wheel turning angles for (LH/ RH) wheels and tires.



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

**Inner wheel (Angle: A)** : Refer to [ST-19, "Steering Angle"](#).

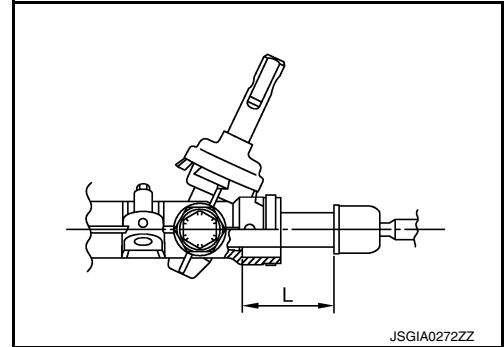
**Outer wheel (Angle: B)** : Refer to [ST-19, "Steering Angle"](#).



- Check the following items when turning angle is out of the standard.
  - Check rack stroke (L).

**Rack stroke (L)** : Refer to [ST-20, "Rack Stroke"](#).

- Disassemble steering gear to check the cause that rack stroke is outside of the standard.
- Steering angles are not adjustable. Check steering gear, steering column and front suspension components for wear or damage if any of the turning angles are different from the specified value. Replace any of them, if any non-standard condition exists.





# STEERING WHEEL

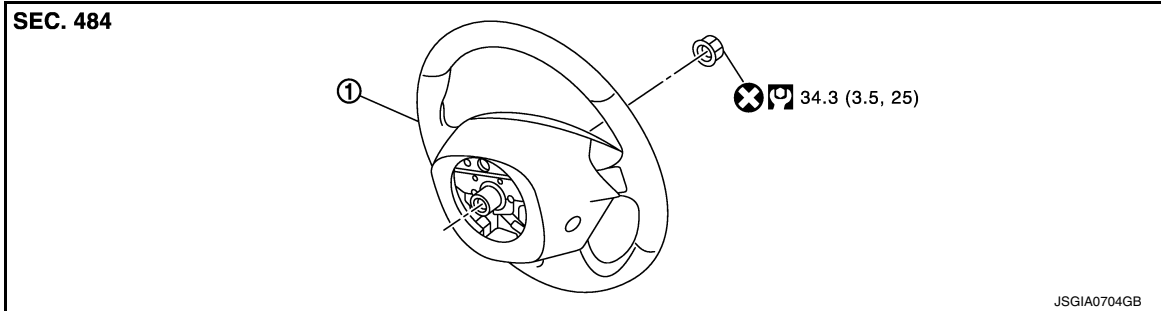
< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### STEERING WHEEL

Exploded View

INFOID:000000009385532



1. Steering wheel

### Removal and Installation

INFOID:000000009385533

#### REMOVAL

1. Set the front wheels and tires in the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-12, "Removal and Installation"](#).
3. Remove steering wheel lock nut.
4. Remove steering wheel using suitable tool.

**CAUTION:**

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

5. Inspect steering wheel near the puller holes for damage. Replace as necessary.

#### INSTALLATION

Installation is in the reverse order of removal.

- Align spiral cable correctly before installing steering wheel. Make sure that the spiral cable is in the neutral position. Refer to [SR-15, "Removal and Installation"](#).
- Adjust the neutral position of the steering angle sensor. Refer to [BRC-53, "Work Procedure"](#).

**CAUTION:**

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



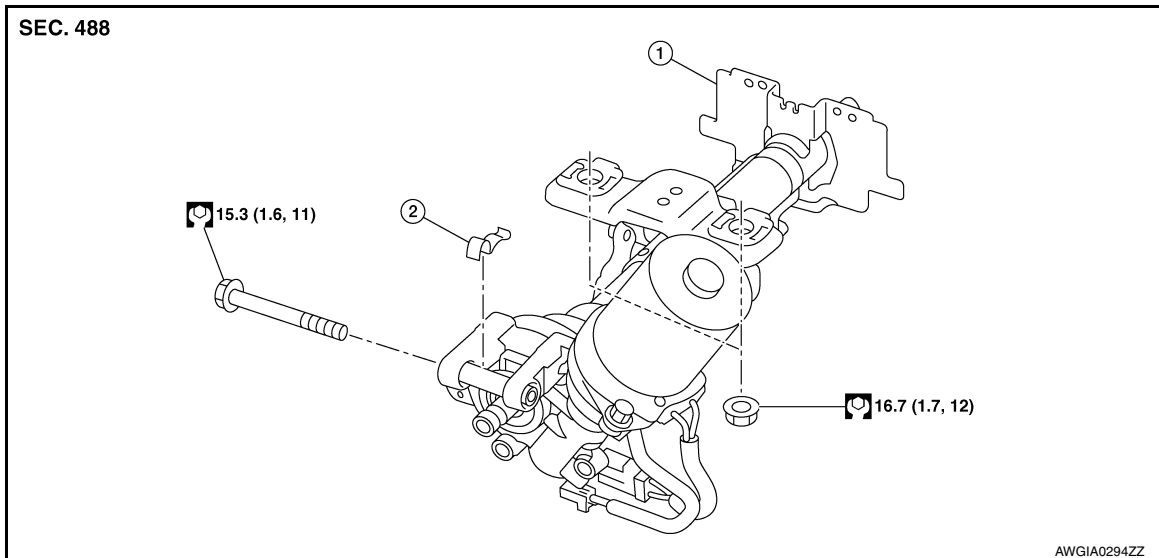
# STEERING COLUMN

< REMOVAL AND INSTALLATION >

## STEERING COLUMN

### Exploded View

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1. Steering column

2. Clamp

### Removal and Installation

INFOID:000000009385535

#### CAUTION:

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

#### REMOVAL

1. Set the front wheels and tires in the straight-ahead position.
2. Set the steering column tilt to the lowest position.  
**CAUTION:**  
Securely lock the tilt lever.
3. Remove instrument lower panel LH. Refer to [IP-24, "Removal and Installation"](#).
4. Remove spiral cable. Refer to [SR-15, "Removal and Installation"](#).
5. Remove combination switch. Refer to [EXL-103, "Removal and Installation"](#).
6. Remove the cluster lid A. Refer to [IP-21, "Removal and Installation"](#).
7. Disconnect the switch harness connectors.
8. Remove the key cylinder if necessary. Refer to [TM-235, "Removal and Installation"](#).
9. Set the steering column tilt to the middle position.  
**CAUTION:**  
Do not change the position of the tilt mechanism until the steering column is reinstalled.
10. Loosen the steering shaft lower joint bolt.
11. Remove the steering intermediate shaft upper bolt and separate the steering intermediate shaft from the steering column. Refer to [ST-12, "Removal and Installation"](#).  
**CAUTION:**
  - Place a matching mark on both steering intermediate shaft and steering column before removing the steering intermediate shaft.
  - When removing steering intermediate shaft, do not insert any tool into the yoke groove to pull out the steering intermediate shaft or damage could occur. Replace steering intermediate shaft if damaged.

# STEERING COLUMN

## < REMOVAL AND INSTALLATION >

12. Disconnect EPS control unit harness connectors.
13. Remove steering column.
14. Remove EPS control unit from steering column if necessary. Refer to [STC-37. "Removal and Installation"](#).
15. Remove clamp from steering column if necessary.
16. Inspect steering column after removal. Refer to [ST-10. "Inspection"](#).

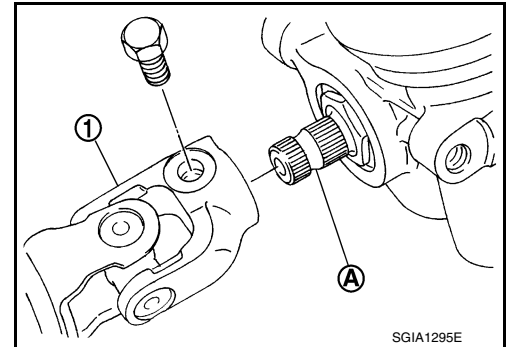
## INSTALLATION

### CAUTION:

- During installation, finger-tighten all of the bracket and joint retaining bolts, then tighten them to specification.
- When installing the steering column cover, check that the vehicle harness is not stuck in the cover.
- Replace the steering column if it has been dropped or sustained an impact.

Installation is in the reverse order of removal.

- For intermediate shaft bolt direction, refer to [ST-12. "Exploded View"](#).
- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft before final tightening.
- After installing steering column, perform self-diagnosis with CONSULT to ensure correct operation. Refer to [STC-6. "CONSULT Function"](#).
- Inspect steering column after installation. Refer to [ST-10. "Inspection"](#).



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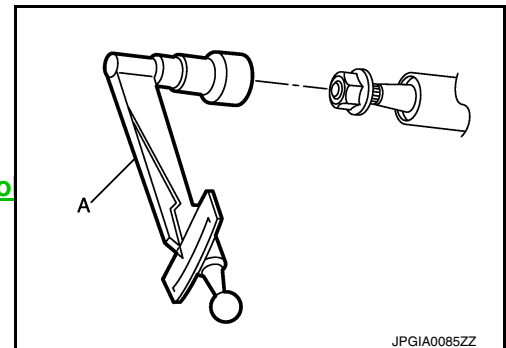
## Inspection

### INSPECTION AFTER REMOVAL

- Check each part of steering column assembly for damage or other malfunctions. Replace if there are any abnormal conditions.
- Measure steering column rotating torque using Tool (A). Replace steering column if the rotating torque is outside specification

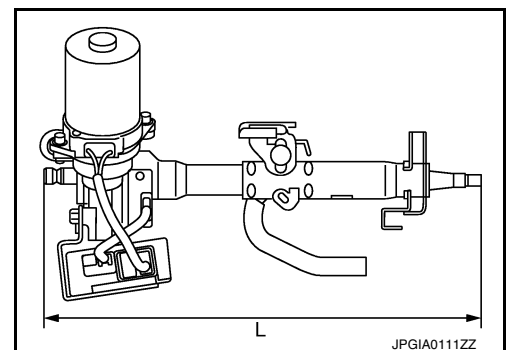
**Tool number** : — (J-25765-A)

**Rotating torque** : Refer to [ST-19. "Steering Column Operating Range"](#).



- Measure the steering column length (L) as shown, if vehicle has been involved in a minor collision. Replace steering column if outside specification.

**Steering column length (L)** : Refer to [ST-19. "Steering Column Operating Range"](#).



### INSPECTION AFTER INSTALLATION

- Rotate steering wheel to make sure it is centered and there is no binding, noise or excessive steering effort.
- Make sure that the number of turns are the same from the straight-ahead position to the left and right locks.

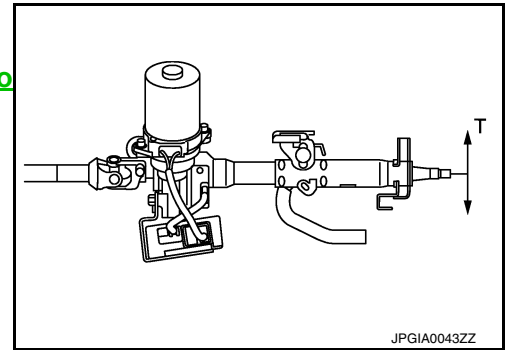
# STEERING COLUMN

## < REMOVAL AND INSTALLATION >

- Check each part of steering column for damage or other malfunctions. Replace if there are any abnormal conditions. Refer to [ST-10, "Inspection"](#).
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-5, "Inspection"](#).
- Check tilt mechanism operating range (T) as shown.

Tilt operating range (T)

: Refer to [ST-19, "Steering Column Operating Range"](#).



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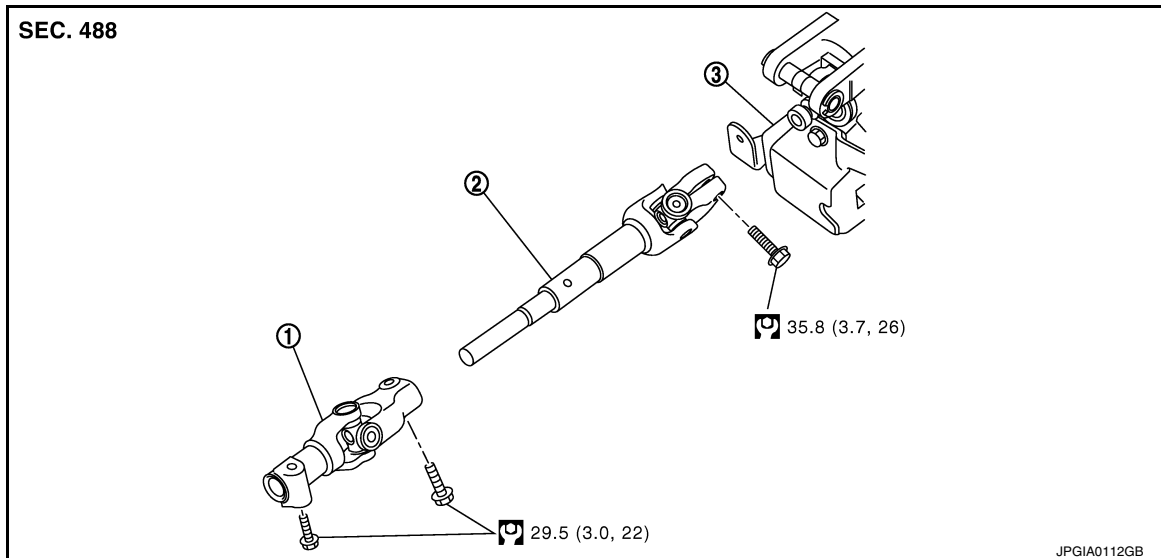
# STEERING SHAFT

< REMOVAL AND INSTALLATION >

## STEERING SHAFT

Exploded View

INFOID:000000009385537



1. Lower joint

2. Steering intermediate shaft

3. Steering column

## Removal and Installation

INFOID:000000009385538

### REMOVAL

#### CAUTION:

Spiral cable may be cut if steering wheel turns while separating steering column and steering gear. Be sure to secure steering wheel using string to avoid turning.

1. Set the front wheels and tires in the straight-ahead position.
2. Set the steering column tilt to the middle position.

#### CAUTION:

Securely lock the tilt lever.

3. Remove instrument lower panel LH. Refer to [IP-24, "Removal and Installation"](#).
4. Loosen lower joint upper bolt.
5. Remove lower joint lower bolt and separate lower joint from the steering gear lower shaft.

#### CAUTION:

- Place a matching mark on both lower joint and steering gear lower shaft before removing lower joint.
- When removing lower joint, do not insert any tool into the yoke groove to pull out the lower joint. Replace the lower joint if damaged.

6. Remove lower joint from steering intermediate shaft.
7. Remove the steering intermediate shaft bolt, from steering column, and remove steering intermediate shaft from steering column.

#### CAUTION:

- Place a matching mark on both steering intermediate shaft and steering column before removing steering intermediate shaft.
- When removing the steering intermediate shaft, do not insert any tool into the yoke groove to pull out the steering intermediate shaft or damage could occur. Replace the steering intermediate shaft if damaged.

### INSTALLATION

#### CAUTION:

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

Installation is in the reverse order of removal.

# STEERING SHAFT

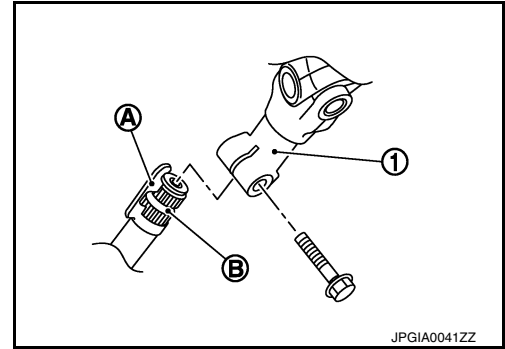
## < REMOVAL AND INSTALLATION >

- Before installation, check that steering column tilt is in the middle position.
- For intermediate shaft bolt, and lower joint bolt direction, refer to [ST-12, "Exploded View"](#).
- To install align the steering gear guide protrusion (A) with the groove of lower joint (1), make sure the bolt is securely seated in groove (B) of steering gear before final tightening.

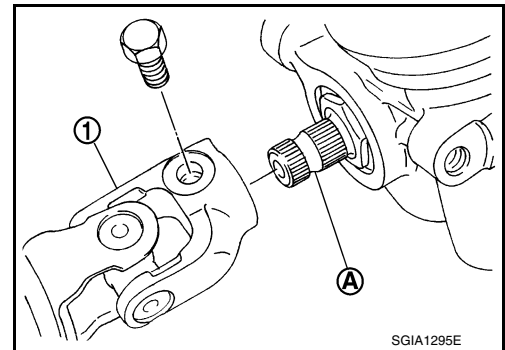
### CAUTION:

**If a guide protrusion is not included, align with the matching mark placed at the removal step.**

- When tightening lower joint bolt to the steering gear lower shaft, temporarily tighten it and make sure there is no sticking or galling before final tightening.



- When connecting intermediate shaft upper side (1) and column shaft, make sure the bolt is securely seated in groove (A) of column shaft before final tightening.



- Perform inspection after installation. Refer to [ST-13, "Inspection"](#).

## Inspection

INFOID:000000009385539

### INSPECTION AFTER REMOVAL

- Check each part of steering intermediate shaft, lower joint, and steering column for damage or other malfunctions. Replace if there are any abnormal conditions.

### INSPECTION AFTER INSTALLATION

- Rotate steering wheel to make sure it is centered and there is no binding, noise or excessive steering effort.
- Make sure that the number of turns are the same from the straight-ahead position to the left and right locks.
- Check each part of steering intermediate shaft, lower joint, and steering column for damage or other malfunctions. Replace if there are any abnormal conditions.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-5, "Inspection"](#).
- Check the neutral position of the steering angle sensor. Refer to [BRC-53, "Work Procedure"](#).



# STEERING GEAR AND LINKAGE

## < REMOVAL AND INSTALLATION >

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### INSPECTION AFTER INSTALLATION

- Rotate steering wheel to make sure it is centered and there is no binding, noise or excessive steering effort.
- Make sure that the number of turns are the same from the straight-ahead position to the left and right locks.
- Check each part of steering system for damage or other malfunctions. Replace if there are any abnormal conditions.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-5, "Inspection"](#).
- Check wheel alignment. Refer to [FSU-8, "Adjustment"](#).
- Check the neutral position of the steering angle sensor. Refer to [BRC-53, "Work Procedure"](#).

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# STEERING GEAR AND LINKAGE

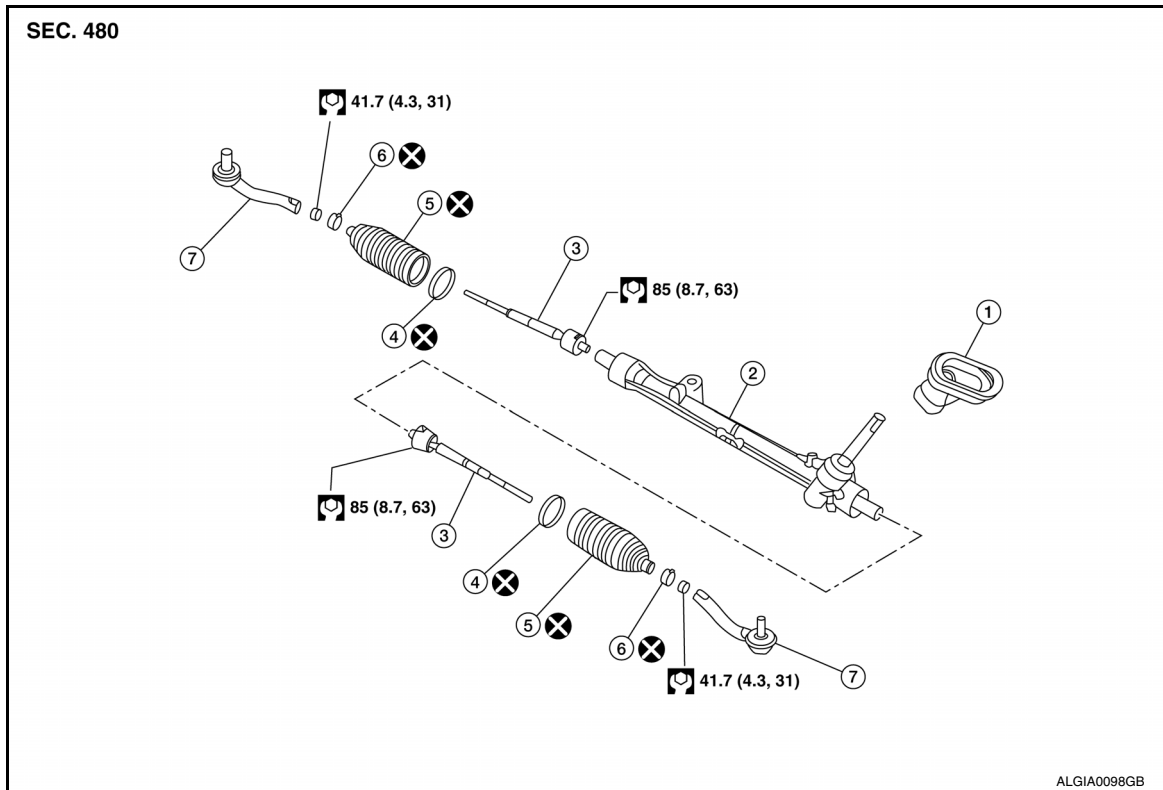
< UNIT DISASSEMBLY AND ASSEMBLY >

## UNIT DISASSEMBLY AND ASSEMBLY

### STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000009385543



- |                     |                  |                     |
|---------------------|------------------|---------------------|
| 1. Joint cover      | 2. Steering gear | 3. Inner socket     |
| 4. Inner boot clamp | 5. Boot          | 6. Outer boot clamp |
| 7. Outer socket     |                  |                     |

### Disassembly and Assembly

INFOID:000000009385544

#### DISASSEMBLY

1. Remove outer socket lock nut and outer socket.  
**CAUTION:**  
When loosening outer socket lock nut, be sure to hold outer socket with a suitable tool to prevent ball joint from contacting knuckle.
2. Remove inner boot clamp, outer boot clamp and remove boot.  
**CAUTION:**  
Do not damage inner socket or steering gear housing when removing boot.
3. Remove inner socket.

#### ASSEMBLY

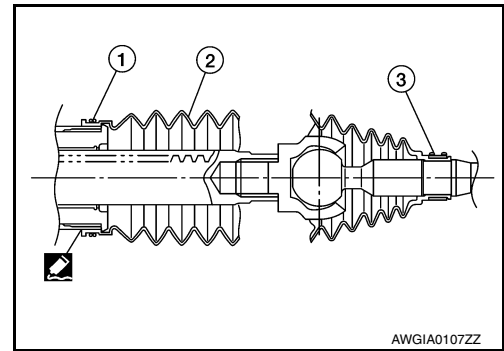
1. Apply (Autolex A or Dow Corning 111) or equivalent to inner socket and turn pinion fully to retract inner socket into gear housing assembly.  
**CAUTION:**  
Make sure there are no contaminants in the grease, on the inner socket, or inside the steering gear housing.



# STEERING GEAR AND LINKAGE

## < UNIT DISASSEMBLY AND ASSEMBLY >

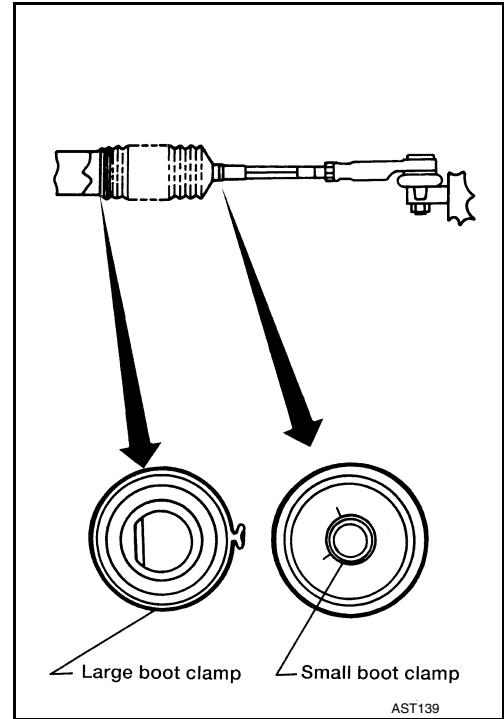
2. Install large end (1) of boot (2) to gear housing assembly.
3. Install small end (3) of boot (2) to inner socket boot mounting groove.



4. Install outer boot clamp to boot small end using suitable tool.
5. Install inner boot clamp to boot large end using suitable tool.

**CAUTION:**

**Do not reuse boot clamps.**

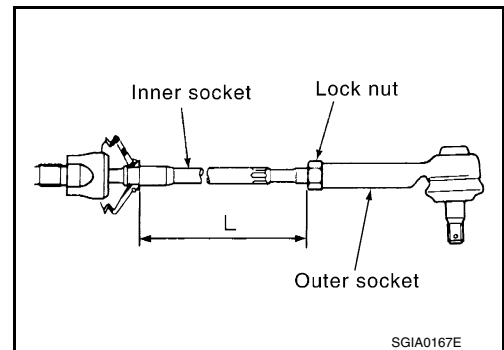


6. Install outer socket.
7. Adjust inner socket to standard length (L) and then tighten lock nut to the specified torque. Check length of inner socket (L) again after tightening lock nut.

**Inner socket length (L) : Refer to [ST-20, "Inner Socket Length"](#).**

**CAUTION:**

**The length achieved after toe-in adjustment is not necessarily the above value.**



8. Check wheel alignment. Refer to [FSU-8, "Adjustment"](#).

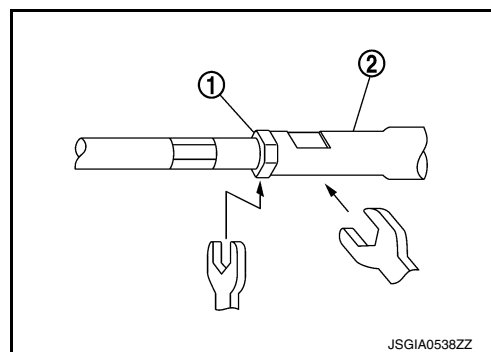
**CAUTION:**

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# STEERING GEAR AND LINKAGE

## < UNIT DISASSEMBLY AND ASSEMBLY >

When tightening outer socket lock nut (1), be sure to hold outer socket (2) using a suitable tool to prevent ball joint from contacting knuckle.



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## Inspection

### INSPECTION AFTER DISASSEMBLY

#### Boot

- Check boot for cracks and replace it if damage exists.

#### Steering gear

- Check steering gear for damage and scratches to the inner wall. Replace if there are any abnormal conditions.

#### Outer Socket and Inner Socket

Check the following items and replace the component if outside specification:

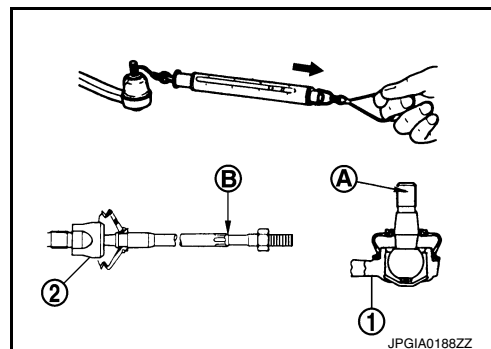
#### BALL JOINT SWINGING FORCE

- Hook a Tool at the point shown and pull the spring balance. Make sure that the Tool reads the specified value when ball stud and inner socket start to move. Replace outer socket (1) and inner socket (2) if they are outside the standard.

Tool number : — (J-44372)

Measuring point of outer socket (1) : Ball stud upper side (A)

Measuring point of inner socket (2) : Point (B)

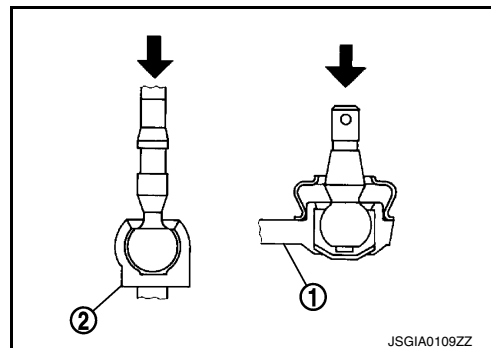


Swinging force : Refer to [ST-20, "Ball Joint Swinging Force"](#).

#### BALL JOINT AXIAL END PLAY

- Apply an axial load of 490 N (50 kg-f, 110 lb-f) to ball stud. Using a dial gauge, measure amount of stud movement and make sure that the value is within the following specified range. Replace outer socket (1) and inner socket (2) if the measured value is outside the standard.

Axial end play : Refer to [ST-20, "Ball Joint Axial End Play"](#).



# SERVICE DATA AND SPECIFICATIONS (SDS)

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#### General Specifications

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Steering gear model	R24K
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#### Steering Wheel Axial End Play and Play

INFOID:000000009385547

Unit: mm (in)

Item	Standard
Steering wheel axial end play	0 (0)
Steering wheel play on the outer circumference	0 - 35 (0 - 1.38)

#### Steering Wheel Turning Force

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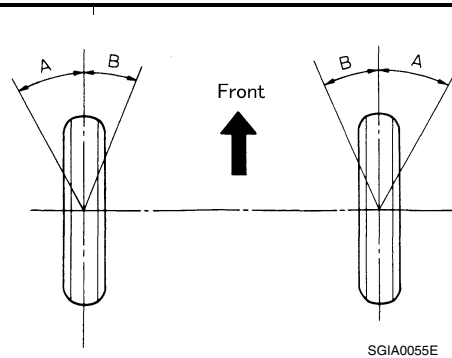
Unit: N (kg-f, lb-f)

Item	Standard
Steering wheel turning force	36 (3.7, 8.09) or less

#### Steering Angle

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Unit: Degree minute (Decimal degree)



Item		Standard
Inner wheel (Angle A)	Minimum	34° 30' (34.5°)
	Nominal	37° 30' (37.5°)
	Maximum	38° 30' (38.5°)
Outer wheel (Angle B)	Nominal	32° 00' (32.0°)

#### Steering Column Operating Range

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Item	Standard
Tilt operating range*	39.4 mm (1.551 in)
Rotating torque	1.4 - 2.1 N·m (0.14 - 0.21 kg-m, 12 - 19 in-lb)
Steering column length*	477.9 mm (18.81 in)

\*: For measuring position, refer to [ST-10. "Inspection"](#).

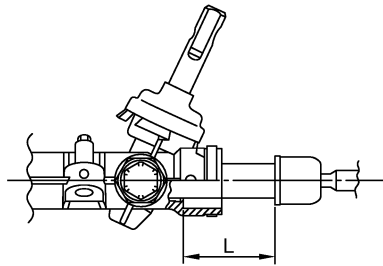
# SERVICE DATA AND SPECIFICATIONS (SDS)

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### Rack Stroke

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Unit: mm (in)



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Item	Standard
Rack stroke neutral position (L)	64.6 (2.543)

### Ball Joint Swing Force

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Item	Standard
Outer socket Spring balance measurement*	6.0 – 58 N (0.61 – 5.9 kg-f, 1.35 – 13.03 lb-f)
Inner socket Spring balance measurement*	3.5 – 34.7 N (0.36 – 3.5 kg-f, 0.79 – 7.8 lb-f)

\*: For measuring position, refer to [ST-14, "Inspection"](#).

### Ball Joint Axial End Play

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Unit: mm (in)

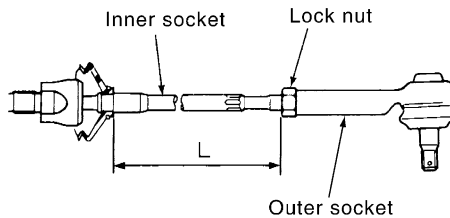
Item	Standard
Outer socket	0.5 (0.020) or less
Inner socket	0.2 (0.008 in) or less

### Inner Socket Length

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Unit: mm (in)

Item	Standard
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Inner socket length (L)	67.4 (2.654)
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