

SECTION **ST**
STEERING SYSTEM

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CONTENTS

SYMPTOM DIAGNOSIS	2	STEERING WHEEL	9
NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING	2	Inspection	9
NVH Troubleshooting Chart	2	REMOVAL AND INSTALLATION	11
PRECAUTION	4	STEERING WHEEL	11
PRECAUTIONS	4	Exploded View	11
FOR USA AND CANADA	4	Removal and Installation	11
FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	4	STEERING COLUMN	12
FOR USA AND CANADA : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect	4	Exploded View	12
FOR USA AND CANADA : Service Notice or Precautions for Steering System	5	Removal and Installation	12
FOR MEXICO	5	Inspection	13
FOR MEXICO : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	5	STEERING GEAR AND LINKAGE	15
FOR MEXICO : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect	5	Exploded View	15
FOR MEXICO : Service Notice or Precautions for Steering System	6	Removal and Installation	16
PREPARATION	7	Disassembly and Assembly	16
PREPARATION	7	Inspection	17
Special Service Tools	7	SERVICE DATA AND SPECIFICATIONS (SDS)	19
Commercial Service Tools	7	SERVICE DATA AND SPECIFICATIONS (SDS)	19
PERIODIC MAINTENANCE	9	General Specifications	19
		Steering Wheel Axial End Play and Play	19
		Steering Wheel Turning Force	19
		Steering Angle	19
		Steering Column Operating Range	19
		Rack Stroke	19
		Socket Swing Force and Rotating Torque	19
		Socket Axial End Play	20
		Inner Socket Length	20

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:000000006199525

2WD MODELS

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

Symptom		Steering	Possible cause and SUSPECTED PARTS											Reference				
			Outer/inner socket ball joint swinging torque	Outer/inner socket ball joint rotating torque	Outer/inner socket ball joint end play	Steering wheel play	Improper steering wheel	Improper installation or looseness of tilt lock lever	Mounting looseness	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	AXLE and SUSPENSION		TIRE	ROAD WHEEL	DRIVE SHAFT	BRAKE
Noise	Shake	Noise	x	x	x	x				x	x	x	x	x	x	x	x	ST-17, "Inspection"
		Shake					x	x	x				x	x	x	x	x	ST-17, "Inspection"
		Vibration					x	x	x	x	x		x	x				ST-17, "Inspection"
		Shimmy					x		x			x	x	x				ST-9, "Inspection"
		Judder						x	x			x	x	x				ST-9, "Inspection"
																	—	
																		ST-15, "Exploded View"
																		ST-13, "Inspection"
																		ST-12, "Exploded View"
																		ST-15, "Exploded View"
																		NVH in FAX, RAX, FSU, RSU section
																		NVH in WT section
																		NVH in WT section
																		NVH in FAX section
																		NVH in BR section

x: Applicable

AWD MODELS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

< SYMPTOM DIAGNOSIS >

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

Symptom		Possible cause and SUSPECTED PARTS	Reference																	
			ST-17, "Inspection"	ST-17, "Inspection"	ST-17, "Inspection"	ST-9, "Inspection"	ST-9, "Inspection"	—	ST-15, "Exploded View"	ST-13, "Inspection"	ST-12, "Exploded View"	ST-15, "Exploded View"	NVH in DLN section	NVH in DLN section	NVH in FAX, RAX, FSU, RSU section	NVH in WT section	NVH in WT section	NVH in FAX, RAX section	NVH in BR section	
Steering	Noise		x	x	x	x				x	x			x	x	x	x	x	x	x
	Shake						x	x	x					x		x	x	x	x	x
	Vibration						x	x	x	x				x		x	x	x	x	x
	Shimmy						x		x			x				x	x	x		x
	Judder							x	x			x				x	x	x		x

x: Applicable

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PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

FOR USA AND CANADA

FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006448674

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 "SRS AIR BAG" and "SEAT BELT" 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 that 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 "SRS AIR BAG".
- Never 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, never 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.

FOR USA AND CANADA : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:000000006448676

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 switch 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.

PRECAUTIONS

< PRECAUTION >

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.

FOR USA AND CANADA : Service Notice or Precautions for Steering System

INFOID:000000006199528

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

FOR MEXICO

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

INFOID:000000006448675

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 "SRS AIR BAG" and "SEAT BELT" 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 "SRS AIR BAG".**
- **Never 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, never 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.**

FOR MEXICO : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:000000006448677

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 switch 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.

PRECAUTIONS

< PRECAUTION >

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.

FOR MEXICO : Service Notice or Precautions for Steering System

INFOID:000000006199531

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

PREPARATION

< PREPARATION >

PREPARATION

PREPARATION

Special Service Tools

INFOID:000000006199532

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
ST27180001 (J-25726-A) Steering wheel puller	Removing steering wheel
ST3127S000 (J-25765-A) Preload gauge	Inspecting sliding column assembly rotating torque, pinion rotating torque and ball joint rotating torque
KV40107300 (—) Boot Band crimping tool	Installing boot bands (large diameter)

Commercial Service Tools

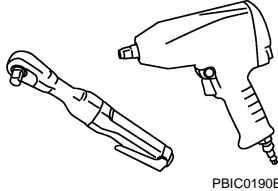
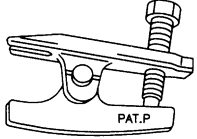
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Tool name	Description
Spring gauge	Inspecting steering wheel turning force and power steering gear linkage

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PREPARATION

< PREPARATION >

Tool name	Description
<p data-bbox="162 199 267 220">Power tool</p>  <p data-bbox="820 415 893 430">PBIC0190E</p>	<p data-bbox="1006 199 1258 220">Loosening bolts and nuts</p>
<p data-bbox="162 451 332 472">Ball joint remover</p>  <p data-bbox="787 625 828 640">PAT.P</p> <p data-bbox="820 667 885 682">S-NT146</p>	<p data-bbox="1006 451 1307 472">Remove steering outer socket</p>

STEERING WHEEL

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE

STEERING WHEEL

Inspection

INFOID:000000006199534

STEERING WHEEL AXIAL END PLAY

1. Check installation conditions of steering gear assembly, front suspension assembly, axle and steering column assembly.
2. Check if movement exists when steering wheel is moved up and down, to the left and right and to the axial direction.

Standard

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

3. Check the following items when steering wheel axial end play is out of the standard.
 - Check the steering column assembly mounting condition. Refer to [ST-12, "Exploded View"](#).
 - Check steering gear assembly mounting condition for looseness. Refer to [ST-15, "Exploded View"](#).

STEERING WHEEL PLAY

1. Turn steering wheel so that front wheels come to the straight-ahead position.
2. Start engine and lightly turn steering wheel to the left and right until front wheels start to move.
3. Measure steering wheel movement on the outer circumference.

Standard

Steering wheel play on the outer circumference : Refer to [ST-19, "Steering Wheel Axial End Play and Play"](#).

4. Check the following items when steering wheel play is out of the standard.
 - Check backlash for each joint of steering column assembly.
 - Check installation condition of steering gear assembly.

NEUTRAL POSITION STEERING WHEEL

1. Make sure that steering gear assembly, steering column assembly and steering wheel are installed in the correct position.
2. Perform neutral position inspection after wheel alignment. Refer to [FSU-8, "Inspection"](#).
3. Set vehicle to the straight-ahead position and confirm steering wheel is in the neutral position.
4. Loosen outer socket lock nut and turn inner socket to left and right equally to make fine adjustments if steering wheel is not in the neutral position.

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-53, "Tire"](#).
3. Start engine.

STEERING WHEEL

< PERIODIC MAINTENANCE >

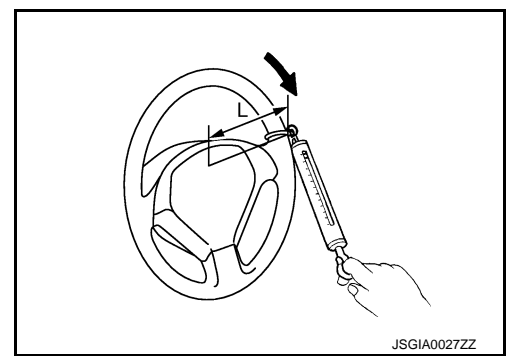
4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Standard

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

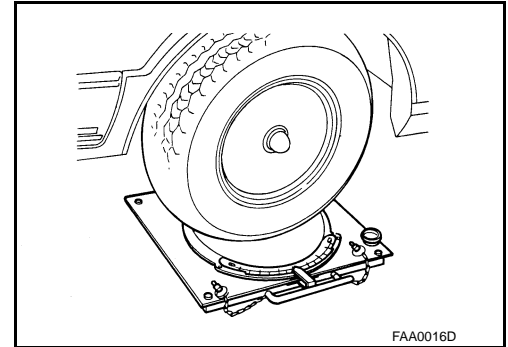
NOTE:

Multiply the distance (L) from the hook of spring balance to the center of steering wheel by the measurement value with a spring balance.



FRONT WHEEL TURNING ANGLE

1. Check front wheel turning angle after toe-in inspection. Refer to [FSU-8, "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 and RH road wheels.

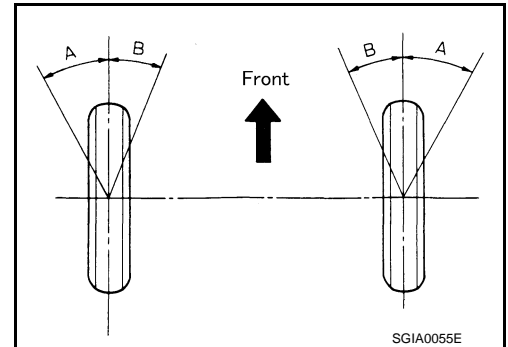


4. With the engine at idle, turn steering wheel from full left stop to full right stop and measure the turning angles.

Standard

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

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



5. Check the following items when turning angle is out of the standard.

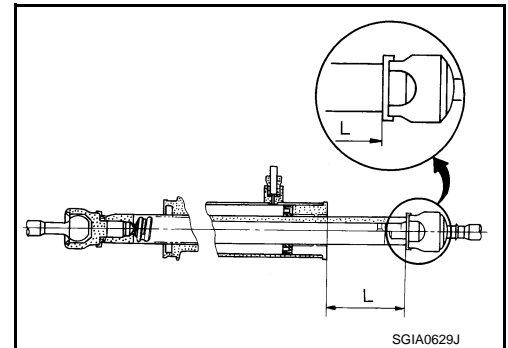
- a. Check the neutral position of the rack stroke (L).

Standard

L : Refer to [ST-19, "Rack Stroke"](#).

- b. Disassemble steering gear assembly to check the cause that rack stroke is outside of the standard.

- Steering angles are not adjustable. Check steering gear assembly, steering column assembly 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

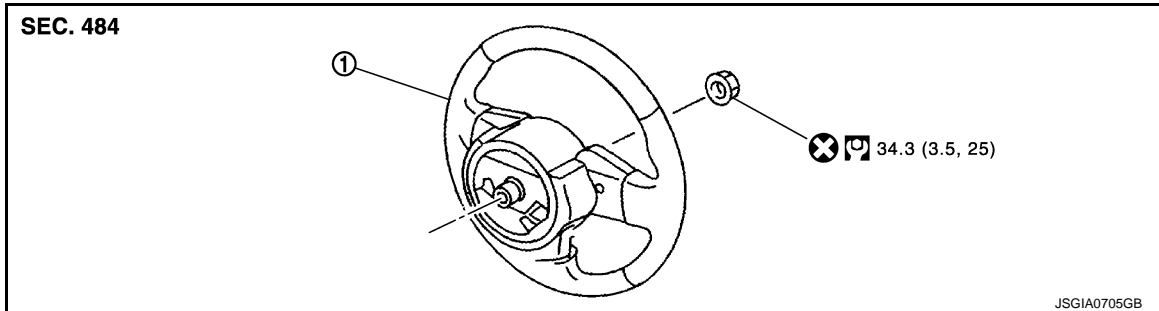
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

STEERING WHEEL

Exploded View

INFOID:000000006199535



1. Steering wheel

Refer to [GI-4, "Components"](#) for symbols in the figure.

Removal and Installation

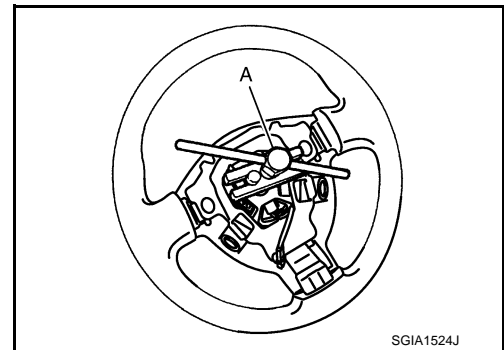
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REMOVAL

NOTE:

When reconnecting spiral cable, fix cable with a tape so that fixing case and rotating part keep aligned. This will omit neutral position alignment procedure during spiral cable installation.

1. Set vehicle to the straight-ahead position.
2. Remove driver air bag module. Refer to [SR-11, "Exploded View"](#) (for USA and Canada), [SR-36, "Exploded View"](#) (for Mexico).
3. Remove steering wheel lock nut after steering is locked.
4. Remove steering wheel with the steering wheel puller (A) [SST: ST27180001 (J-25726-A)].



INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

Never twist spiral cable excessively after it becomes tight. (twisting may cause the cable to be torn off.)

NOTE:

Check the spiral cable neutral position after replacing or rotating spiral cable. Refer to [SR-14, "Removal and Installation"](#) (for USA and Canada), [SR-39, "Removal and Installation"](#) (for Mexico).

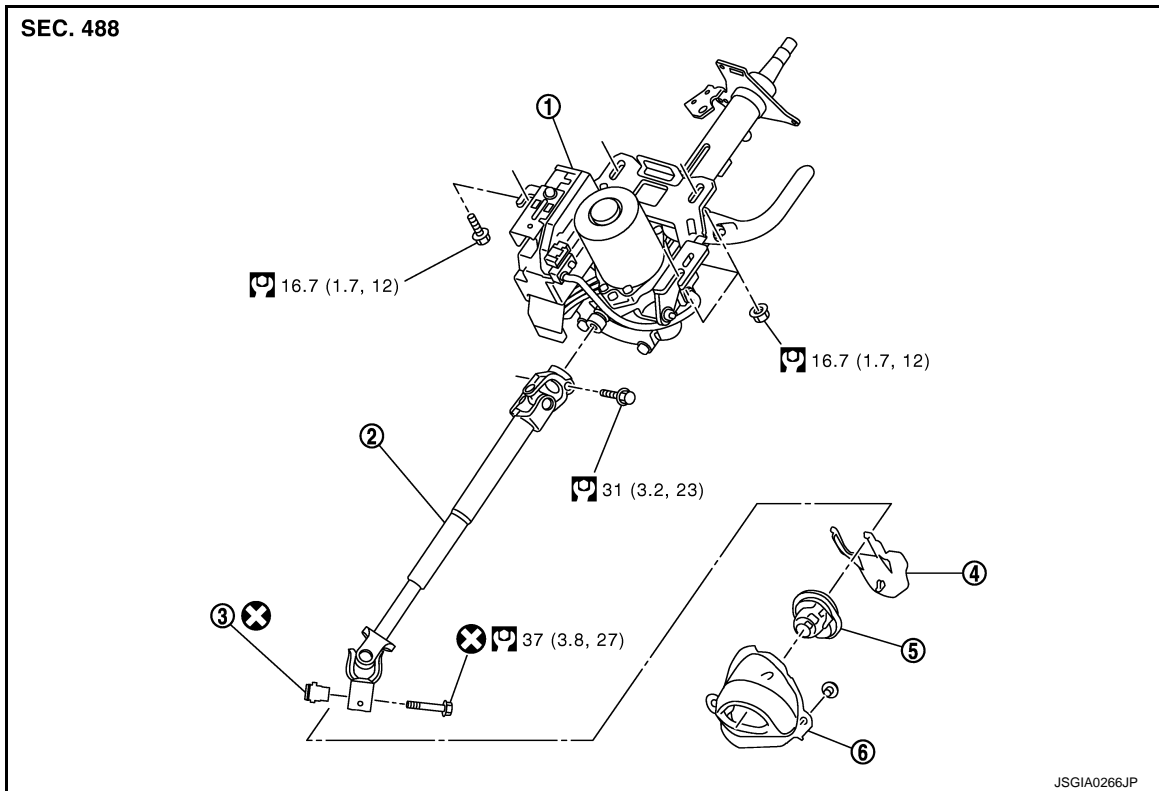
STEERING COLUMN

< REMOVAL AND INSTALLATION >

STEERING COLUMN

Exploded View

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- | | | |
|-----------------------------|-----------------------|---------------|
| 1. Steering column assembly | 2. Intermediate shaft | 3. Cam nut |
| 4. Upper cover | 5. Dash seal | 6. Hole cover |

Refer to [GI-4, "Components"](#) for symbols in the figure.

Removal and Installation

INFOID:000000006199538

REMOVAL

CAUTION:

- Never impact on the axis when removing steering column assembly.
- Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
- Never repeat static steering. (Motor and EPS control unit could be heated.)
- Be careful when removing steering column assembly from the vehicle because it is heavy.
- Keep steering column assembly away from magnetic sources.
- Never disassemble steering column assembly. It is not separable.

1. Set vehicle to the straight-ahead position.
2. Place the tilt to the highest level.
3. Remove steering wheel. Refer to [ST-11, "Exploded View"](#).
4. Remove steering column cover. Refer to [IP-13, "Exploded View"](#).
5. Remove spiral cable. Refer to [SR-14, "Exploded View"](#) (for USA and Canada), [SR-39, "Exploded View"](#) (for Mexico).
6. Remove combination switch. Refer to [BCS-67, "Exploded View"](#).
7. Remove instrument driver lower cover. Refer to [IP-13, "Exploded View"](#).
8. Remove combination meter. Refer to [MWI-78, "Exploded View"](#).
9. Disconnect each switch harness connectors installed to steering column assembly.

STEERING COLUMN

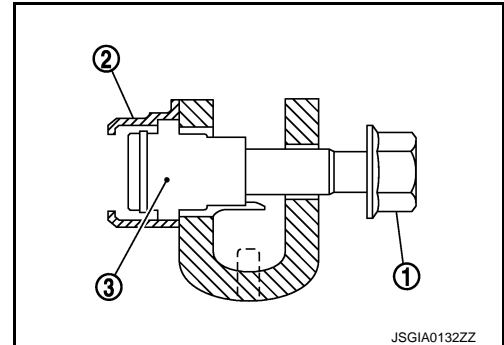
< REMOVAL AND INSTALLATION >

10. Remove upper cover.
11. Remove intermediate shaft to steering column assembly with the following procedure.

CAUTION:

When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.

- a. Remove fixing bolt (1).
 - b. Remove pressed cam nut holder (2) completely from intermediate shaft yoke.
 - c. Remove cam nut (3) completely from intermediate shaft yoke.
12. Remove steering column assembly.



INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

- Never impact on the axis when removing steering column assembly.
- Place a matching mark on both intermediate shaft and steering column assembly before removing intermediate shaft.
- Never repeat static steering. (Motor and EPS control unit could be heated.)
- Be careful when removing steering column assembly from the vehicle because it is heavy.
- Keep steering column assembly away from magnetic sources.
- Never disassemble steering column assembly. It is not separable.

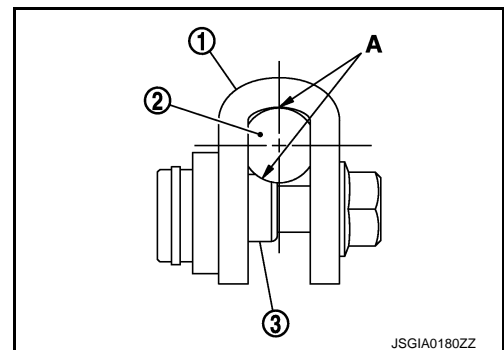
Be careful of the following points when installing the steering column assembly.

CAUTION:

- Never reuse cam nut and fixing bolt.
 - Installation of cam nut holder is unneeded.
1. Check that all parts of the cam nut holder are removed.
 2. Fit yoke to pinion shaft, ensuring no clearance between yoke and pinion shaft.
 3. Insert cam nut fully.
 4. Whilst holding cam nut in position by hand, insert bolt and tighten to specified torque. Take care to hold cam nut in correct axial position during this process.
 5. After intermediate shaft fitted, make sure there is no gap (A) between the yoke (1), pinion shaft (2) and cam nut (3).

CAUTION:

- When tightening mounting bolt, never hold cam nut with a tool.
- Adjust neutral position of steering angle sensor. Refer to [BRC-76, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description"](#). (VDC models)



Inspection

INFOID:000000006199539

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 assembly rotating torque using a preload gauge [SST: ST3127S000 (J-25765-A)]. Replace steering column assembly if the rotating torque is outside the standard.

STEERING COLUMN

< REMOVAL AND INSTALLATION >

Standard

Rotating torque

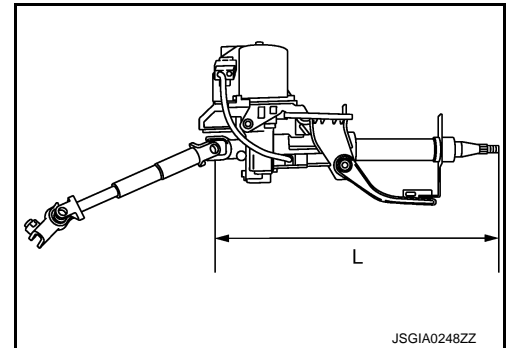
: Refer to [ST-19, "Steering Column Operating Range"](#).

- Measure the length (L) shown in the figure, if vehicle has been involved in a minor collision. Replace steering column assembly (with motor, reduction gear, sensor) if outside the standard.

Standard

L

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



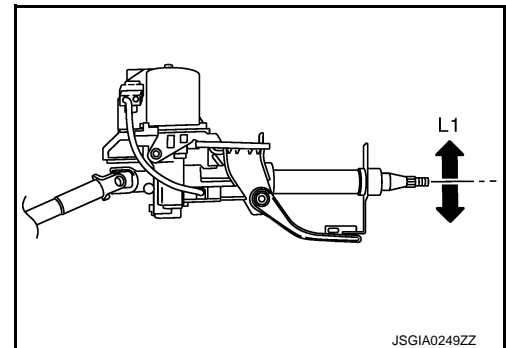
INSPECTION AFTER INSTALLATION

- Check each part of steering column assembly 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-9, "Inspection"](#).
- Check tilt mechanism operating range (L1) shown in the figure.

Standard

L1

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



STEERING GEAR AND LINKAGE

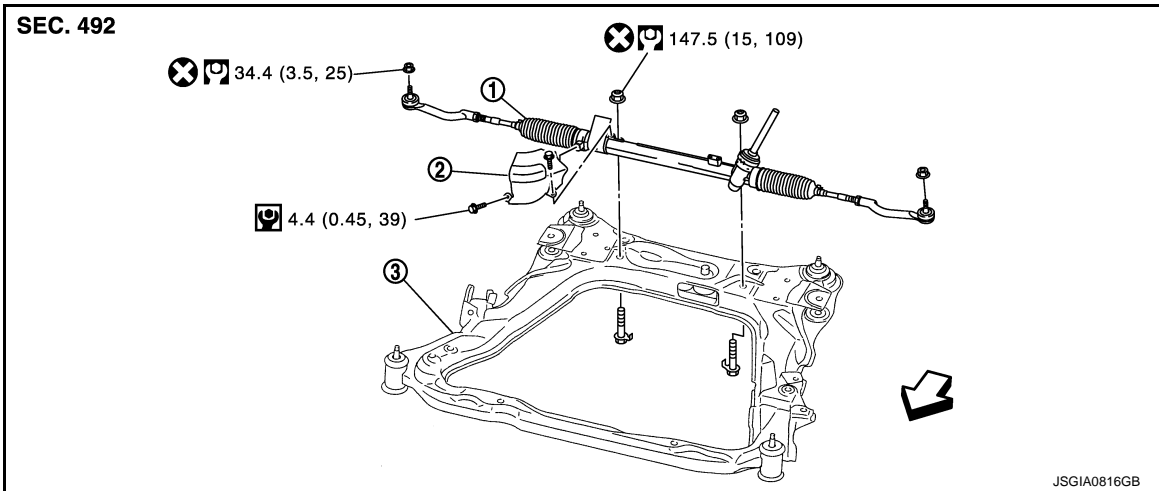
< REMOVAL AND INSTALLATION >

STEERING GEAR AND LINKAGE

Exploded View

INFOID:000000006199540

REMOVAL AND INSTALLATION

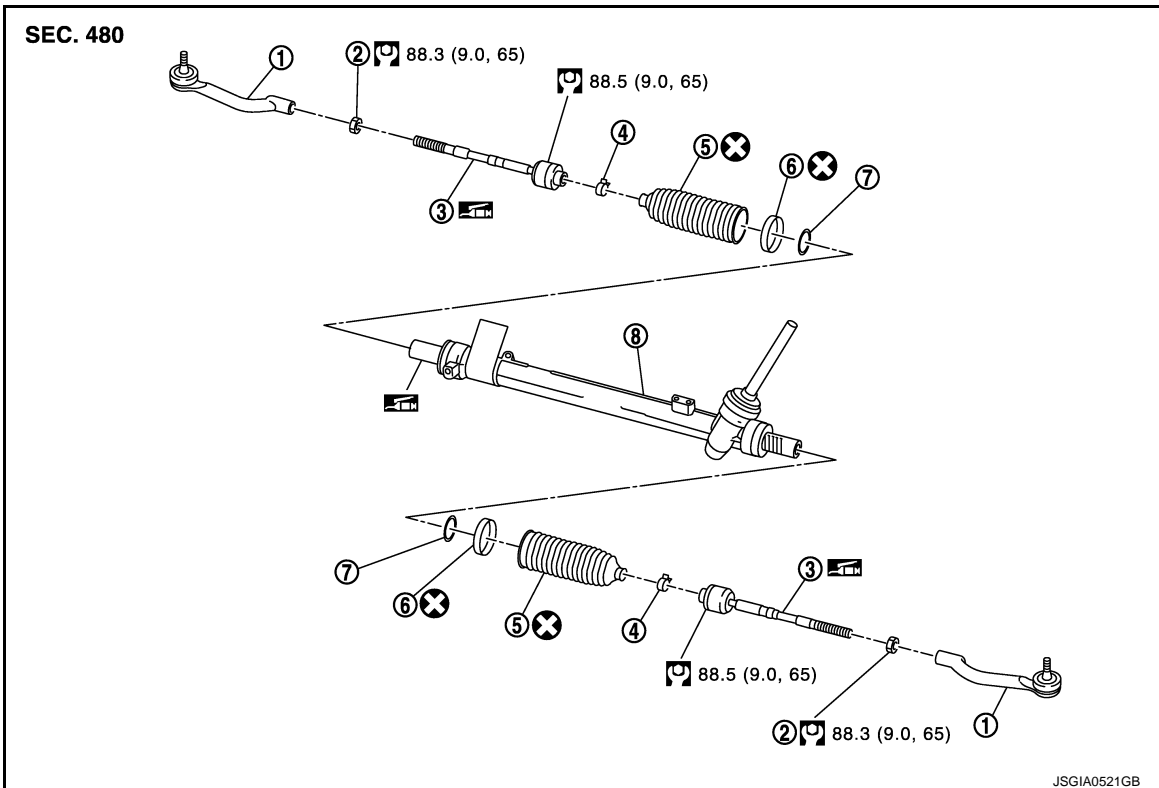


- 1. Steering gear assembly
- 2. Heat insulator
- 3. Front suspension member

← Vehicle front

Refer to [GI-4, "Components"](#) for symbols in the figure.

DISASSEMBLY AND ASSEMBLY



- 1. Outer socket
- 2. Outer socket lock nut
- 3. Inner socket
- 4. Boot clamp (small diameter)
- 5. Boot
- 6. Boot clamp (large diameter)
- 7. Spacer
- 8. Gear housing assembly

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

 Apply Molywhite LSG or equivalent.

Refer to [GI-4, "Components"](#) for symbols not described on the above.

Removal and Installation

INFOID:000000006199541

REMOVAL

1. Set vehicle to the straight-ahead position.
2. Remove upper cover. Refer to [ST-12, "Exploded View"](#).
3. Remove dash seal. Refer to [ST-12, "Exploded View"](#).
4. Remove hole cover. Refer to [ST-12, "Exploded View"](#).
5. Remove bolt of intermediate shaft (lower side), and then remove intermediate shaft from steering gear pinion shaft. Refer to [ST-12, "Exploded View"](#).

CAUTION:

When removing intermediate shaft, never insert a tool, such as a screwdriver, into the yoke groove to pull out the intermediate shaft. In case of the violation of the above, replace intermediate shaft with a new one.

6. Remove tires with a power tool.
7. Remove steering outer socket from steering knuckle so as not to damage ball joint boot using suitable ball joint remover (commercial service tool).

CAUTION:

Temporarily tighten the nut to prevent damage to threads and to prevent the ball joint remover from suddenly coming off.

8. Remove front suspension member.
9. Remove steering gear assembly.

INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

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

- Check each part of dash seal for damage or other malfunctions. Replace if there are.
- Perform final tightening of nuts and bolts on each part under unladen conditions with tires on level ground when removing steering gear assembly. Check wheel alignment. Refer to [FSU-8, "Inspection"](#).
- Adjust neutral position of steering angle sensor after checking wheel alignment. Refer to [BRC-76, "ADJUSTMENT OF STEERING ANGLE SENSOR NEUTRAL POSITION : Description"](#). (VDC models)

Disassembly and Assembly

INFOID:000000006199542

DISASSEMBLY

1. Loosen outer socket lock nut, and remove outer socket.

CAUTION:

When loosening lock nut, be sure to fix outer socket with a wrench or an equivalent to prevent ball joint from getting contact with knuckle.

2. Remove boot clamps, and then remove boot from inner socket.

CAUTION:

Never damage inner socket and gear housing assembly when removing boot. Inner socket and gear housing assembly must be replaced if inner socket and gear housing assembly are damaged because it may cause foreign material interfusion.

3. Remove inner socket from gear housing assembly.
4. Remove spacer from gear housing assembly.

ASSEMBLY

1. Install spacer to gear housing assembly.
2. Install inner socket to gear housing assembly.
3. Apply recommended grease to inner socket.

STEERING GEAR AND LINKAGE

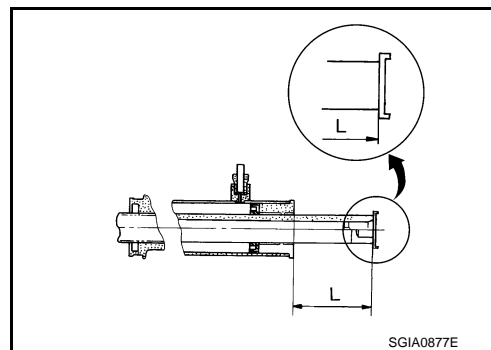
< REMOVAL AND INSTALLATION >

4. Set the rack to the neutral position for the rack stroke (L).

Standard

L

: Refer to [ST-19, "Rack Stroke"](#).

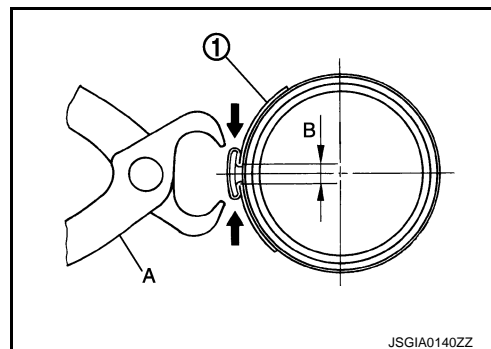


5. Install boot to gear housing assembly and inner socket.

6. Install boot clamp (large diameter) (1) to boot using boot band crimping tool (A) [SST: KV40107300 (—)]

CAUTION:

Install large diameter side boot clamp (1) securely to boot groove, and crimp it so as to have clearance (B) of 3 mm (0.12 in) or less as shown.



7. Install boot clamp (small diameter) to boot.

8. Adjust inner socket to standard length (L), and then tighten lock nut to the specified torque. Check length again after tightening lock nut.

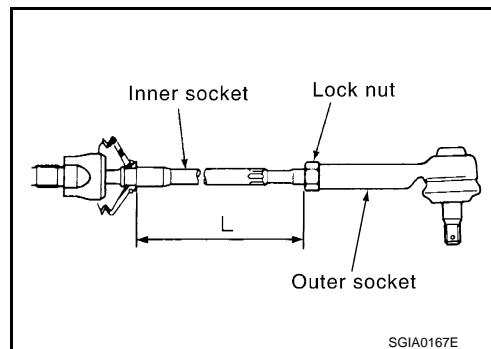
Standard

L

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

CAUTION:

- Adjust toe-in after this procedure. Length achieved after toe-in adjustment is not necessary the value above.
- When tightening lock nut, be sure to fix outer socket with a wrench or equivalent to prevent ball joint from getting contact with knuckle.



Inspection

INFOID:000000006199543

INSPECTION AFTER INSTALLATION

- Check if steering wheel turns smoothly when it is turned several times fully to the end of the left and right.
- Check the steering wheel play, neutral position steering wheel, steering wheel turning force, and front wheel turning angle. Refer to [ST-9, "Inspection"](#).

INSPECTION AFTER DISASSEMBLY

Boot

- Check boot for cracks, and replace it if a malfunction is detected.

Gear Housing Assembly

- Check gear housing assembly for damage and scratches (inner wall). Replace if there are any abnormal conditions.

Outer Socket and Inner Socket

- Check the following items and replace the component if it does not meet the standard.

BALL JOINT SWINGING TORQUE

STEERING GEAR AND LINKAGE

< REMOVAL AND INSTALLATION >

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

Standard for outer socket

(Measuring point: Ball stud upper side)

Swinging torque : Refer to [ST-19, "Socket Swing Force and Rotating Torque"](#).

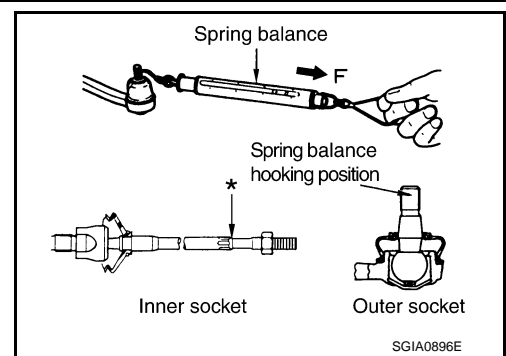
Spring balance measurement : Refer to [ST-19, "Socket Swing Force and Rotating Torque"](#).

Standard for inner socket

(Measuring point: "*" mark shown in the figure)

Swinging torque : Refer to [ST-19, "Socket Swing Force and Rotating Torque"](#).

Spring balance measurement : Refer to [ST-19, "Socket Swing Force and Rotating Torque"](#).



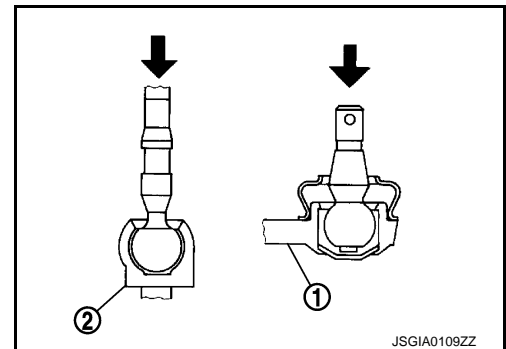
BALL JOINT AXIAL END PLAY

- Apply an axial load of 490 N (50 kg, 110 lb) to ball stud. Using a dial gauge, measure amount of stud movement, and then 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.

Standard

Outer socket : Refer to [ST-20, "Socket Axial End Play"](#).

Inner socket : Refer to [ST-20, "Socket Axial End Play"](#).



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

INFOID:000000006199544

Steering gear model	R27N
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Steering Wheel Axial End Play and Play

INFOID:000000006199545

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

INFOID:000000006199546

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

Item	Standard
Steering wheel turning force	34 (3.5, 7.64) or less

Steering Angle

INFOID:000000006199547

Unit: Degree minute (Decimal degree)

Item		Standard
Inner wheel	Minimum	33°00' (33.0°)
	Nominal	36°00' (36.0°)
	Maximum	37°00' (37.0°)
Outer wheel	Nominal	31°00' (31.0°)

Steering Column Operating Range

INFOID:000000006199548

Item	Standard
Tilt operating range	40 mm (1.57 in)
Rotating torque	1.9 N·m (0.19 kg-m, 17 in-lb) or less
Steering column length	495 mm (19.49 in)

Rack Stroke

INFOID:000000006199549

Unit: mm (in)

Item	Standard
Rack neutral position, dimension	73.5 (2.894)

Socket Swing Force and Rotating Torque

INFOID:000000006199550

Item		Spring balance
Outer socket	Swinging torque	0.3 – 2.9 N·m (0.03 – 0.29 kg-m, 3 – 25 in-lb)
	Spring balance measurement	5.0 – 54 N (0.51 – 5.5 kg-f, 1.12 – 12.14 lb-f)
Inner socket	Swinging torque	0.5 – 5.0 N·m (0.06 – 0.51 kg-m, 5 – 44 in-lb)
	Spring balance measurement	4.0 – 40 N (0.41 – 4.08 kg-f, 0.90 – 8.99 lb-f)

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

Socket Axial End Play

INFOID:000000006199551

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

Inner Socket Length

INFOID:000000006199552

Unit: mm (in)

Item	Standard
Rack neutral position, dimension	100.7 (3.965)