SECTION PS
POWER STEERING SYSTEM

CONTENTS

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EGS001B3

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 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 SRS 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.**

Caution:

EGS000J1

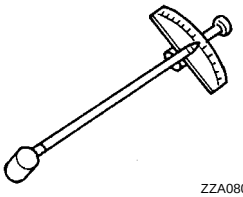
- Always follow the warnings and the cautions below in disassembly procedures:
  - Work in a clean, dust-free place. No dustproof device is necessary.
  - Clean the outside of the unit before disassembly.
  - Clean the parts to be disassembled. Care must be taken not to allow any dirt or other foreign materials to enter or come in contact with the parts.
  - Assemble the disassembled parts properly, following the order shown in the manual. If work has been suspended in the middle of assembly, place a clean cover over the parts to prevent them from being contaminated.
  - Use paper towels when removing dirt and other foreign materials. Cloth shop towels can leave lint on the cleaned parts that might affect the operation of the parts.
  - Clean disassembled parts with kerosene (except rubber parts), and then dry them thoroughly with an air blower or paper towels.

PREPARATION

PFP:00002

Special Service Tools

EGS000J2

Description	Application
Preload gauge ST3127S000  ZZA0806D	● Checking steering torque ● Pinion gear rotating torque measurement for steering gear

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Trouble Shooting Chart

EGS000J3

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

Reference page			PS-9	PS-9	PS-9	PS-5	–	PS-7	–	PS-7	PS-7	PS-9	NVH in FAX, RAX, FSU, RSU section	NVH in WT section	NVH in WT section	NVH in FAX section	NVH in BR section
Possible cause and SUSPECTED PARTS			Tie-rod ball joint tensile force	Tie-rod ball joint sliding torque	Tie-rod ball joint end play	Steering wheel play	Improper steering wheel	Improper installation or looseness or tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKES
Symptom	STEERING	Noise	×	×	×	×							×	×	×	×	×
		Shake					×	×	×				×	×	×	×	×
		Vibration					×	×	×	×	×		×	×		×	
		Shimmy					×	×	×			×	×	×	×		×
		Judder							×			×	×	×	×		×

×: Applicable

STEERING WHEEL

PFP:48430

On Board Inspection and Service

EGS000J4

PLAY INSPECTION

1. Turn steering wheel to the straight-ahead position. Start engine and lightly turn steering wheel clockwise and counterclockwise until the front wheels start moving. Measure the travel to the starting point on the circumference of steering wheel. If play is outside the specified range, check steering gear assembly, front suspension, axles, and steering column for proper installation.

   Steering wheel play inspection standard : 0 - 35 mm (0 - 1.38 in)

2. Check steering wheel for vertical, horizontal, or axial play.

   Steering wheel axial end play : 0 mm (0 in)

- Lift vehicle and check steering gear nuts and bolts for looseness.

  Tightening torque : 85 - 103 N·m (8.7 - 10.5 kg-m, 63 - 75 ft-lb)

NEUTRAL POSITION INSPECTION

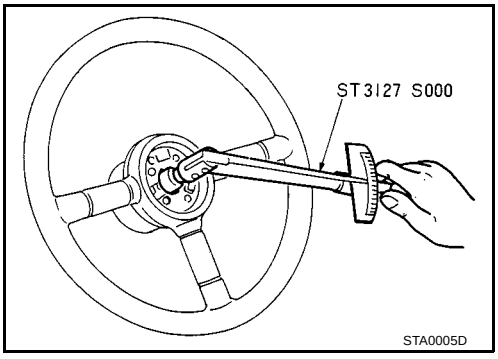
- After wheel alignment inspection, perform neutral position inspection. Refer to FSU-6, "Wheel Alignment" .
- Set vehicle to the straight-ahead position and confirm steering wheel is in the neutral position.
- If it is not in the neutral position, loosen lock nut on tie-rod. Then adjust until the amount of left and right becomes equal.

STEERING TORQUE INSPECTION

1. Stop vehicle on a dry flat paved road and apply parking brake.
2. Remove air bag module. Refer to SRS-36, "DRIVER AIR BAG MODULE" .
3. Start engine and use a preload gauge (SST) to check steering wheel torque.

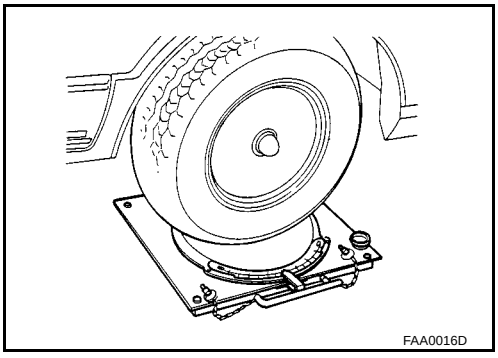
   Steering torque : 1.8 - 5.6 N·m (0.18 - 0.57 kg-m, 16 - 49 in-lb) or less

4. When torque is outside the standard, check steering column and steering gear. If any non-standard condition is detected, replace if necessary.



STEERING ANGLE INSPECTION

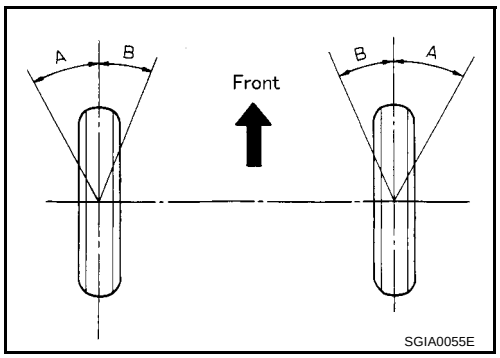
- After toe-in inspection, check the steering angle. Place the front wheels on turning radius gauges and the rear wheels on stands so that the vehicle can be level. Check the maximum inner and outer wheel steering angles for LH and RH road wheels.



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

  Inner wheel : 44° +1° -3°

  Outer wheel : 36° +1° -3°



- Steering angles are not adjustable. If any of the steering angles is different from the specified value, check steering gear, column and front suspension components for wear or damage. If any non-standard condition exists, replace if necessary.

Removal and Installation

EGS000J5

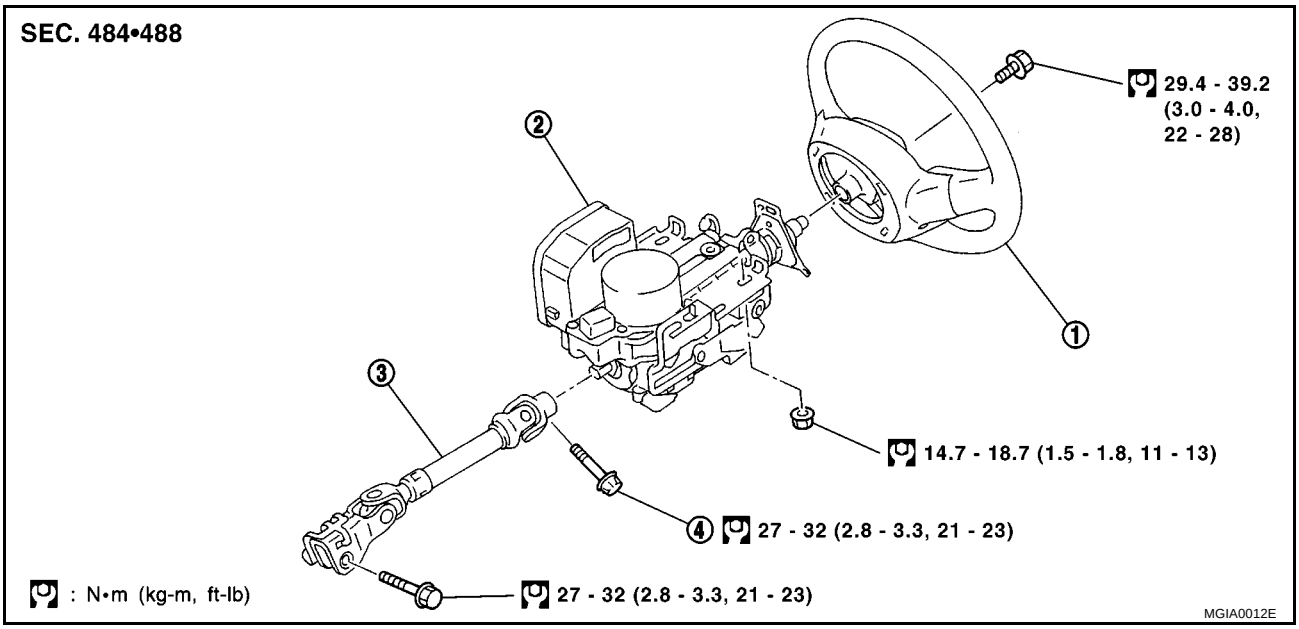
Refer to SRS-36, "DRIVER AIR BAG MODULE" and SRS-38, "SPIRAL CABLE" .

STEERING COLUMN

PFP:48810

Removal and Installation

EGS000J6



1. Steering wheel
2. Steering column assembly (with EPS control unit, motor, reduction gear, sensor)
3. Intermediate shaft
4. Torx bolt (E10)

CAUTION:

- **Care must be taken not to give axial impact to the steering column assembly during removal and installation.**
- **When steering wheel is turned repeatedly with the vehicle stopped, care must be taken because motor and control unit may get too hot.**
- **Steering column assembly is heavy (approximately 10 kg). Care must be taken when removing column from vehicle.**
- **Steering column assembly cannot be disassembled. If any non-standard condition exists, replace column assembly as a unit.**

REMOVAL OF STEERING COLUMN ASSEMBLY

1. Remove driver air bag module. Refer to SRS-36, "DRIVER AIR BAG MODULE" .
2. Remove steering wheel and spiral cable. Refer to SRS-38, "SPIRAL CABLE" .
3. Remove column cover and instrument panel & pad. Refer to IP-4, "INSTRUMENT PANEL ASSEMBLY" .
4. Remove front wiper and washer switch and light and turn signal lamp switch. Refer to SRS-38, "Removal and Installation" in “Light and Turn Signal Switch”, and SRS-38, "Removal and Installation" .
5. Disconnect all the clamps and harness connectors from steering column assembly.
6. Remove intermediate shaft mounting bolt on steering gear, and disconnect the shaft from steering gear.
7. Remove nut on steering column assembly, and make sure steering column moves freely.
8. Remove harness connector of electric power steering.
9. Remove steering column assembly from vehicle.
10. Remove intermediate shaft mounting bolt (torx bolt E10), and disconnect the shaft from steering column.

CAUTION:

Be sure not to rotate column shaft by 360° or more. (Doing this causes error in steering angle value memorized in electric power steering.)

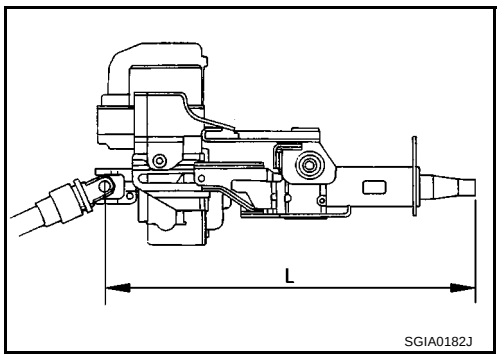
INSPECTION AFTER REMOVAL OF STEERING COLUMN ASSEMBLY

- Check each part of column assembly and intermediate shaft for damage or other malfunctions. If any non-standard condition exists, replace if necessary.
- If vehicle has been involved in a minor collision, measure length L as shown. If outside the standard, replace steering column assembly.

  Length L : 429±2 mm (16.9±0.1 in)

- Using preload gauge, measure steering column rotating torque. If outside the standard, replace steering column assembly.

  Rotating torque : 0 - 2.1 N·m (0 - 0.21 kg-m, 0 - 18 in-lb)

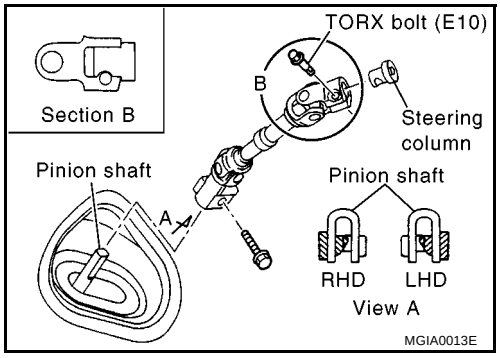


INSTALLATION OF STEERING COLUMN ASSEMBLY

Note the following, and install in the reverse order of removal. Tighten bolts and nuts to the specified torque.

- Connect intermediate shaft to steering column, and tighten torx bolt (E10) to the specified torque. Connect pinion shaft to yoke of intermediate shaft, and tighten bolt to the specified torque.

  CAUTION:
  - **When tightening bolts, tighten them by hand first, and make sure there is no feeling of sticking or galling before final tightening.**
  - **Insert bolts in the proper direction. (Do not insert them from the other side.)**
  - **When connecting intermediate shaft and steering column, make sure the bolt is securely fit into the groove of steering column before final tightening.**
  - **Tighten bolts at connecting pinion shaft and intermediate shaft side. Make sure there is no space between pinion shaft and yoke, and between pinion shaft and cam nut.**



CHECK AFTER STEERING COLUMN ASSEMBLY INSTALLATION

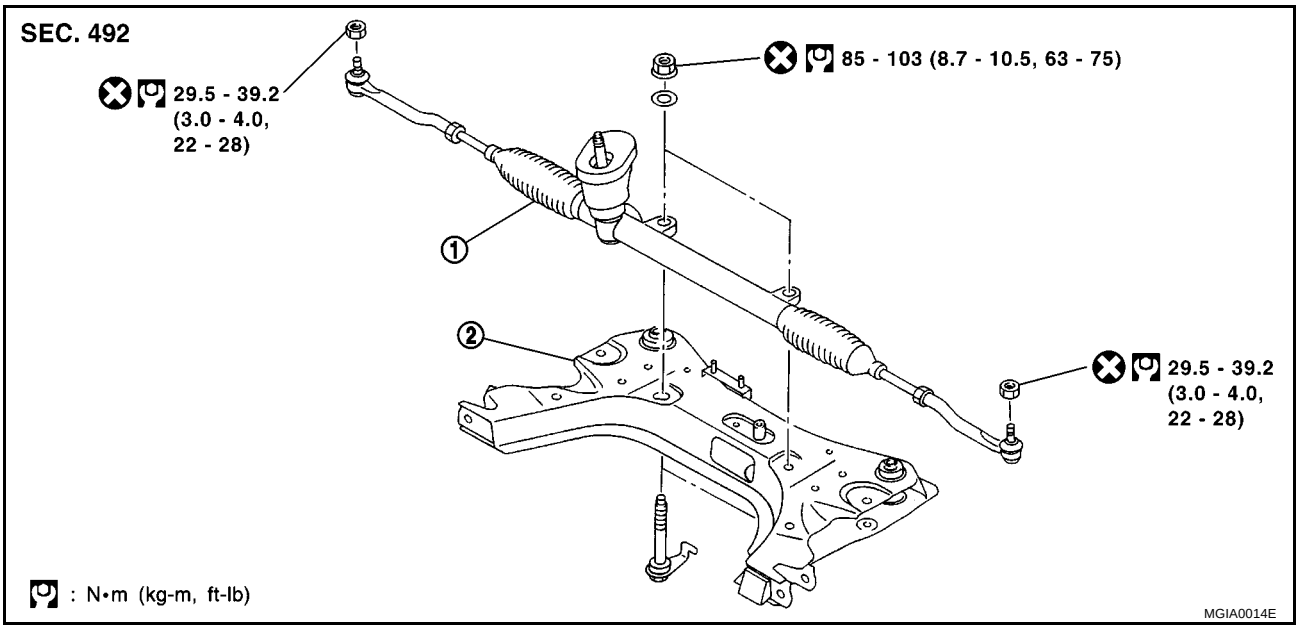
- Using CONSULT-II, check steering angle. Refer to STC-4, "Steering Angle Adjustment (WORK SUPPORT)" .
- Rotating steering wheel, check for decentered condition, binding, noise or excessive steering effort.

POWER STEERING GEAR AND LINKAGE

PFP:49001

Removal and Installation

EGS000J7

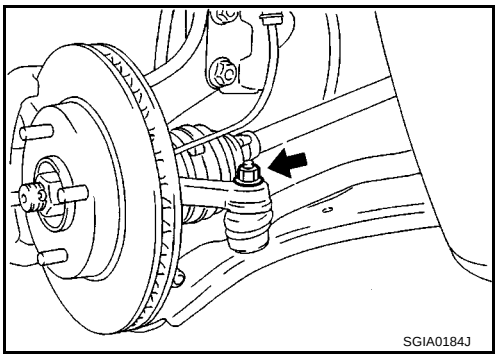


1. Steering gear assembly
2. Suspension member

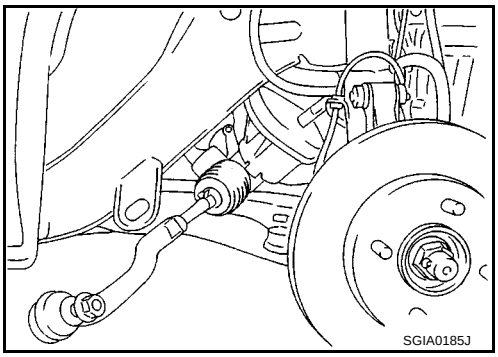
REMOVAL

1. Lift vehicle and remove tires.
2. Activate key lock of steering column.
3. Remove intermediate shaft mounting bolt on steering gear, and disconnect the shaft.
4. Remove tie-rod from steering knuckle. If tie-rod could not be removed easily, use ball joint remover (commercial service tool).

   CAUTION:
   To avoid damage to threads and sudden disconnection of ball joint remover (commercial service tool), temporarily tighten lock nut.
5. Remove the exhaust front tube (CR engine models). Refer to EX-3, "EXHAUST SYSTEM" .



6. Remove steering gear mounting nuts and bolts, and remove the steering gear through the right side of vehicle.
   (Remove from left side for LHD models and right side for RHD models.)



INSTALLATION

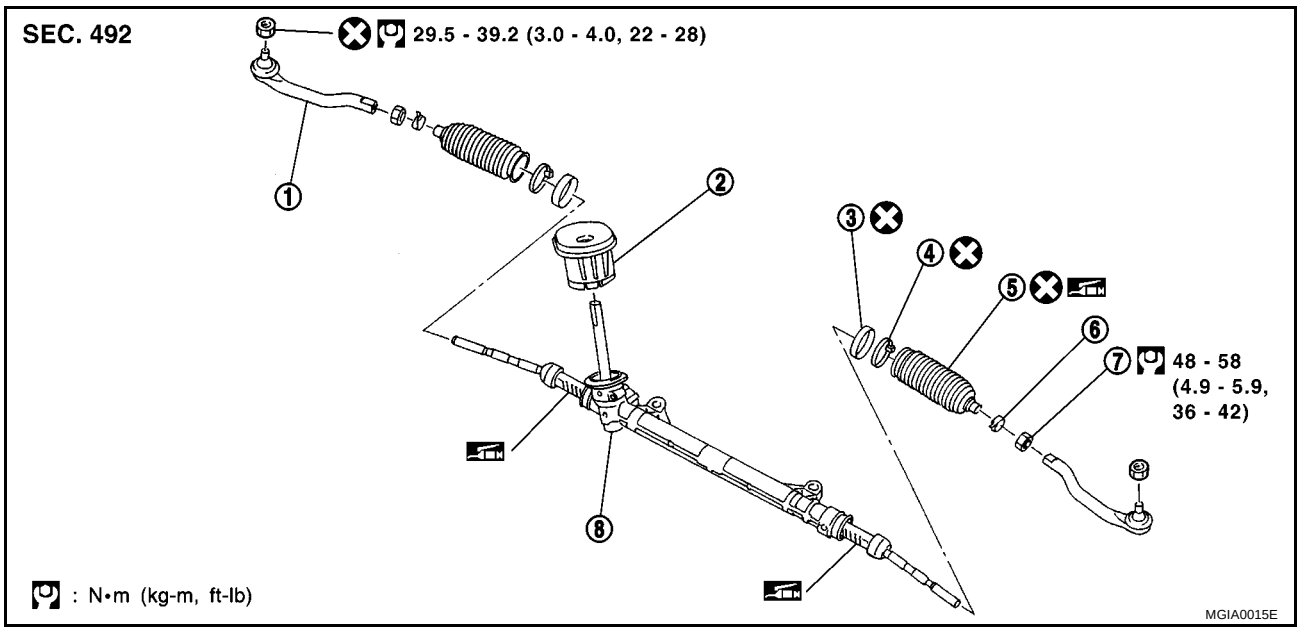
Note the following, and install in the reverse order of removal. Tighten bolts and nuts to the specified torque.

- Refer to PS-7, "Removal and Installation" .

Disassembly and Assembly

EGS000J8

COMPONENT PARTS LOCATION (R24T TYPE)

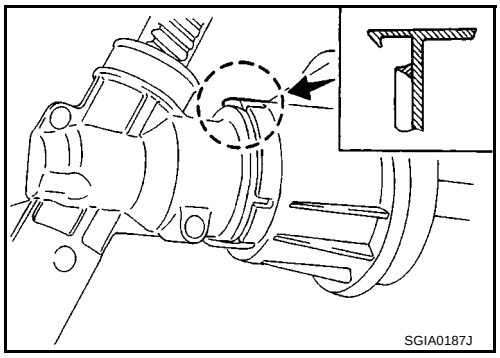


1. Outer socket
2. Bulkhead sealing
3. Seal ring
4. Strap
5. Dust boot
6. Spring clip
7. Lock nut
8. Steering gear assembly

DISASSEMBLY

1. Disengage the tab of bulkhead seal, and remove it from steering gear.
2. Loosen lock nut of tie-rod outer socket, and remove it from steering gear.
3. Remove spring clip and strap (cutting off), and remove dust boot and seal ring.

   CAUTION:
   When removing dust boot, be careful not to damage inner socket and gear housing assembly.



INSPECTION AFTER DISASSEMBLY

Rack

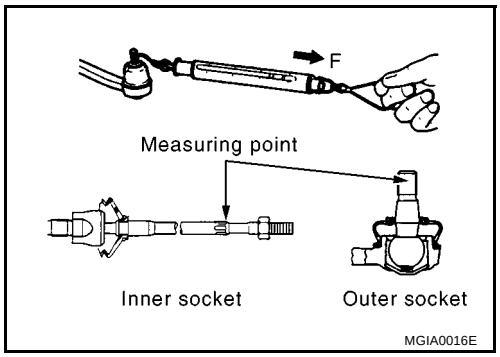
Check rack gear, and, if any damage or wear, replace steering gear assembly.

Bulkhead Sealing

In case of broken tab, or torn sealing in bulkhead seal, replace the damaged part.

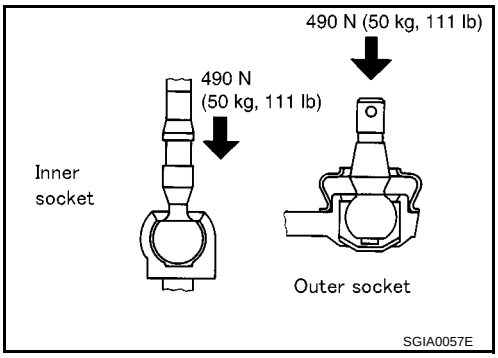
Tie-Rod Ball Joint

1. Tensile force
   - Hook a spring balance onto the point shown in the figure and pull the balance. Make sure the balance reads the specified value when ball stud and the inner socket start to move. If it is outside the standard, replace both outer socket and steering gear assembly.



	Outer socket	Inner socket
Measuring point of spring balance	Edge of stud bolt	Measuring point
Tensile force N·m (kg-m, in-lb)	0.3 - 2.9 (0.03 - 0.29, 3 - 25)	0.5 - 5.0 (0.05 - 0.51, 5 - 44)
Spring balance measurement N (kg, lb)	5 - 54 (0.51 - 5.5, 1.1 - 12.1)	4 - 43 (0.41 - 4.4, 0.9 - 9.7)

2. Axial end play
   - Apply 490 N (50 kg, 110 lb) of load to the ball stud axially and use a dial gauge to measure the amount of movement the stud makes. Make sure the reading is within the range specified. If outside the standard, replace outer socket and steering assembly.

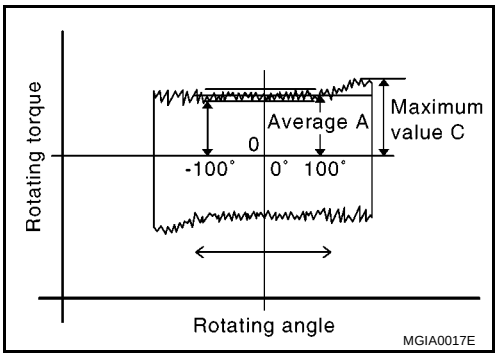


Outer socket	No Free Play
Inner socket	No Free Play

3. Using preload gauge (SST), measure rotating torque of pinion gear. If the measurement is outside of the specified range, replace steering gear.

Rotating torque of pinion gear

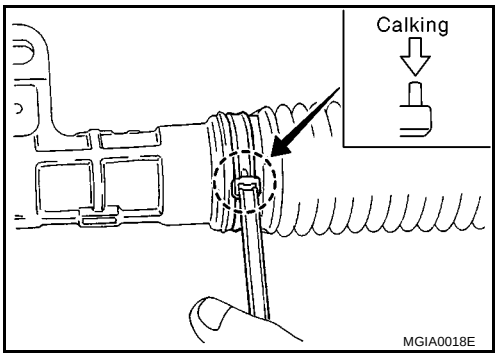
Around neutral position (Within ±100°) Average A	: 1.3 N·m (0.13 kg-m, 11 in-lb)
Other than the above: Maximum value C	: 1.6 N·m (0.16 kg-m, 14 in-lb)



ASSEMBLY

Note the following, and assemble in the reverse order of disassembly

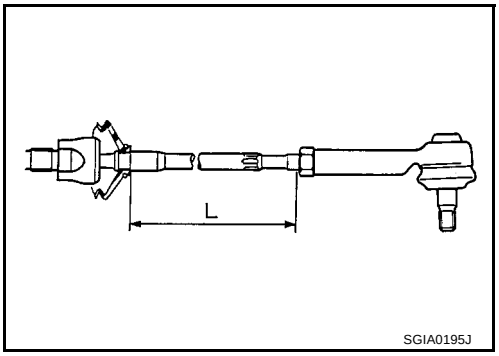
- Apply multi-purpose grease to the sliding part of rack.
- Securely fix dust boot and seal ring with strap. Caulk the strap, and cut the excess of strap off.
- Engage the tab of bulkhead seal to steering gear.



- Install lock nut and the outer socket to the inner socket and tighten lock nut until the length of the tie-rod is within the standard (length before toe-in adjustment.)

  Length of tie-rod (L) : 62.6 mm (2.46 in)

  CAUTION:
  Perform toe-in adjustment after this procedure. Length achieved after toe-in adjustment is not necessarily the value given here.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Wheel

EGS000J9

Steering wheel axial end play	0 mm (0 in)
Steering wheel free play	0 - 35 mm (0 - 138 in)

Steering Angle

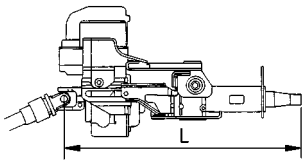
EGS000JA

Inner wheel	44° +1° -3°
Outer wheel	36° +1° -3°

Steering Column

EGS000JB

Steering column length L	429±2 mm (16.9±0.1 in)



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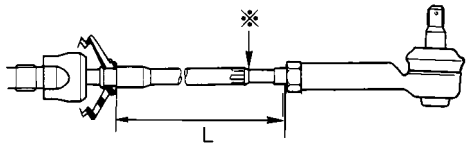
Steering Linkage

EGS000JC

Steering gear type		R24T
Tie-rod ball joint outer socket	Tensile force	0.3 - 2.9 N·m (0.03 - 0.29 kg-m, 3 - 25 in-lb)
	Spring balance measurement (Upper edge of stud bolt)	5 - 54 N (0.51 - 5.5 kg, 1.1 - 12.1 lb)
	Axial end play	No Free Play
Tie-rod ball joint inner socket	Tensile force	0.5 - 5.0 N·m (0.05 - 0.51 kg-m, 5 - 44 in-lb)
	Spring Balance measurement (measured at * mark)	4 - 43 N (0.41 - 4.4 kg, 0.9 - 9.7 lb)
	Axial end play	No Free Play
Tie-rod length L		62.6mm (2.46 in)



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Tightening Torque

EGS000JD

Unit: N·m (kg-m, ft-lb)

Steering wheel bolt	29.4 - 39.2 (3.0 - 4.0, 22 - 28)
Steering column to intermediate shaft to Steering gear	27 - 32 (2.8 - 3.3, 21 - 23)
Steering gear to Suspension member	85 - 103 (8.7 - 10.5, 63 - 75)
Outer socket to Steering knuckle	29.5 - 39. 2 (23.0 - 4.0, 22 - 28)
Tie-rod outer socket lock nut	48 - 58 (4.9 - 5.9, 36 - 42)