STEERING SYSTEM

SECTION ST

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Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER” (Dual Air Bag System)

The Supplemental Restraint System “Air Bag” and “Seat Belt Pre-tensioner”, used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

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 dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to do so in this Service Manual. SRS wiring harnesses are covered with yellow insulation (either just before the harness connectors or for the complete harness), for easy identification.**

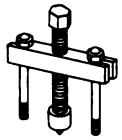
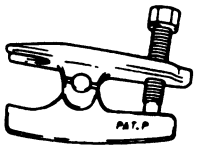
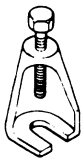
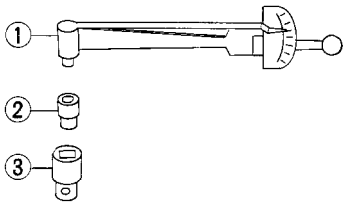
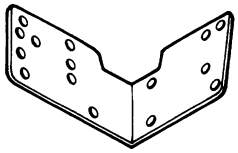
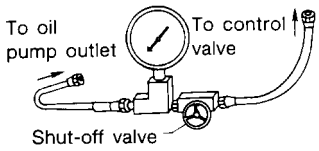
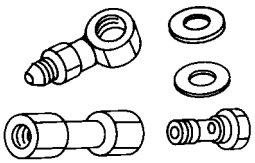
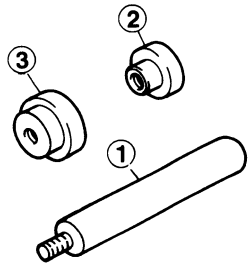
Precautions for Steering System

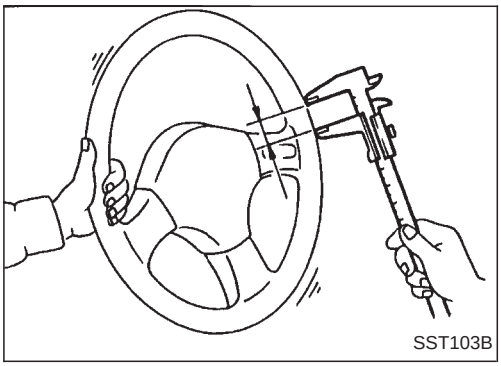
- **Before disassembly, thoroughly clean the outside of the unit.**
- **Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.**
- **When disassembling parts, be sure to place them in order on a part rack so they can be reinstalled in their proper positions.**
- **Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.**
- **Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.**
- **Before assembly, apply a coat of recommended ATF* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.**
- **Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.**

  ***: Automatic transmission fluid**

Special Service Tools

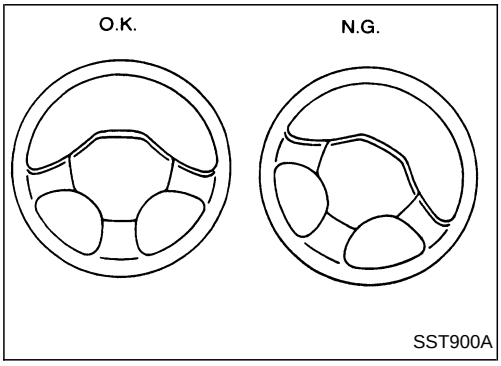
*: Special tool or commercial equivalent

Tool number Tool name	Description	
KV48100700 Torque adapter		Measuring pinion rotating torque
ST27180001* Steering wheel puller		Removing and installing steering wheel
ST27850000 Ball joint remover		Removing ball joint
ST29020001* Steering gear arm puller		Removing and installing pitman arm
ST3127S000* ① GG91030000 Torque wrench ② HT62940000 Socket adapter ③ HT62900000 Socket adapter		Measuring turning torque
KV48100301* Strut & steering gearbox attachment		Steering gear is installed
KV48103500-A Pressure gauge		Measuring oil pressure
KV48102500 Pressure gauge adapter		Measuring oil pressure
KV481009S0 Oil seal drift set ① KV48100910 Drift ② KV48100920 Adapter ③ KV48100930 Adapter		Installing oil seal


SST103B

Checking Steering Wheel Play

1. With wheels in a straight-ahead position, check steering wheel play.
   Steering wheel play:
   35 mm (1.38 in) or less
2. If it is not within specification, check steering gear assembly when front suspension and axle, steering gear assembly and steering column are mounted correctly.

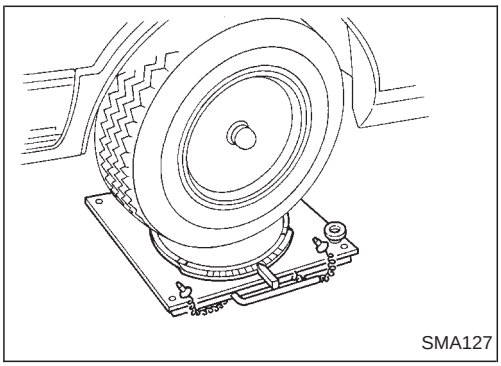


SST900A

Checking Neutral Position on Steering Wheel

CHECKING

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in the neutral position.


SMA127

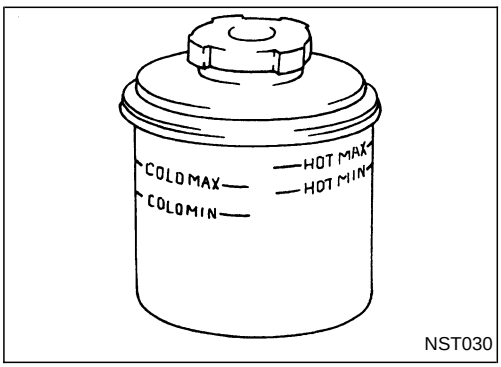
Front Wheel Turning Angle

Rotate steering wheel all the way right and left; measure turning angle.

Turning angle of full turns:
Refer to section FA for SDS.

Checking and Adjusting Drive Belts

Refer to section MA for Drive Belt Inspection.



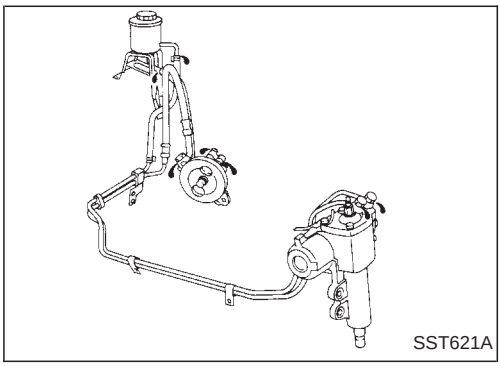
NST030

Checking Fluid Level

Check the fluid level in the reservoir when the engine is cold. If the fluid level is below the MIN line, and fluid up to the MAX line.

CAUTION:

- **Do not overfill.**
- **Use only "DEXRON™" type automatic transmission fluid.**


SST621A

Checking Fluid Leakage

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

1. Run engine between idle speed and 1,000 rpm.

Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F).

2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each “lock” position for five seconds and carefully check for fluid leakage.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

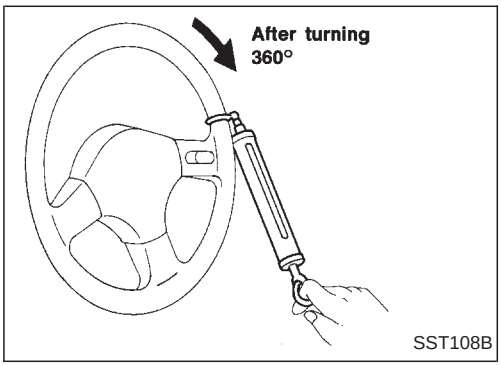
Bleeding Hydraulic System

1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Meanwhile quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

a. Generation of air bubbles in reservoir tank
b. Generation of clicking noise in oil pump
c. Excessive buzzing in oil pump

While the vehicle is stationary or while moving the steering wheel slowly, fluid noise may occur in the valve or oil pump. This noise is inherent in this steering system, and it will not affect performance or durability of the system.

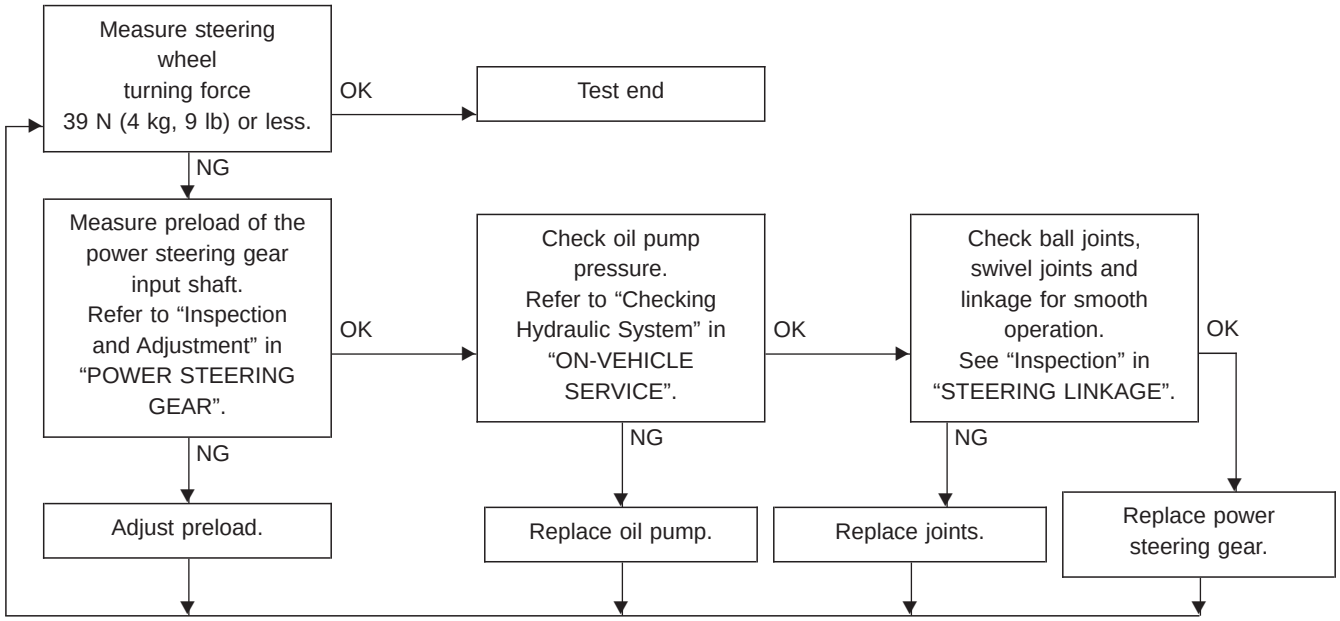


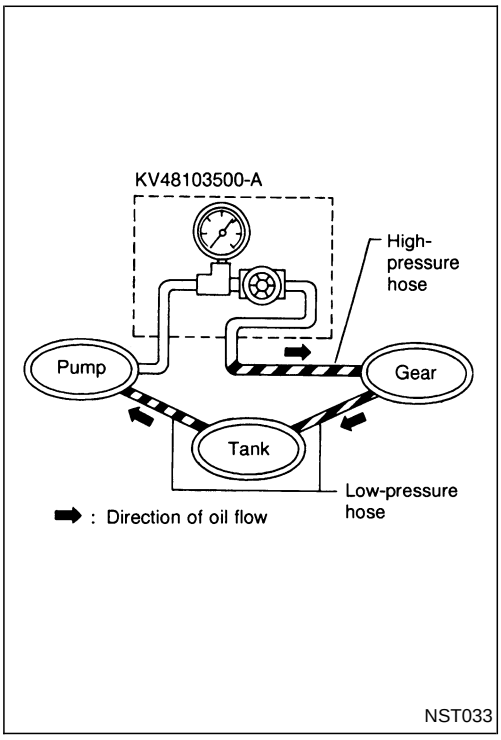
Checking Steering Wheel Turning Force

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature.
   Temperature:
   60° - 80°C (140 - 176°F)

Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.
   Steering wheel turning force:
   39 N (4 kg, 9 lb) or less
   - If steering wheel turning force is not within specification, perform the following inspection procedure:





Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve, then bleed air. (Refer to “Bleeding Hydraulic System”, ST-5.)
2. Run engine.

Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, oil pressure in oil pump will increase to relief pressure, resulting in an abnormal rise in oil temperature.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Oil pump maximum standard pressure:

TD27Ti engine

8,800 - 9,200 kPa (88 - 92 bar, 89 - 93 kg/cm^2, 1,276 - 1,334 psi)

ZD30DTi engine

9,800 - 10,500 kPa (98.0 - 105.0 bar, 99.96 - 107.10 kg/cm^2, 1,421 - 1,523 psi)

4. If oil pressure is below the maximum pressure, slowly close shut-off valve and check pressure.

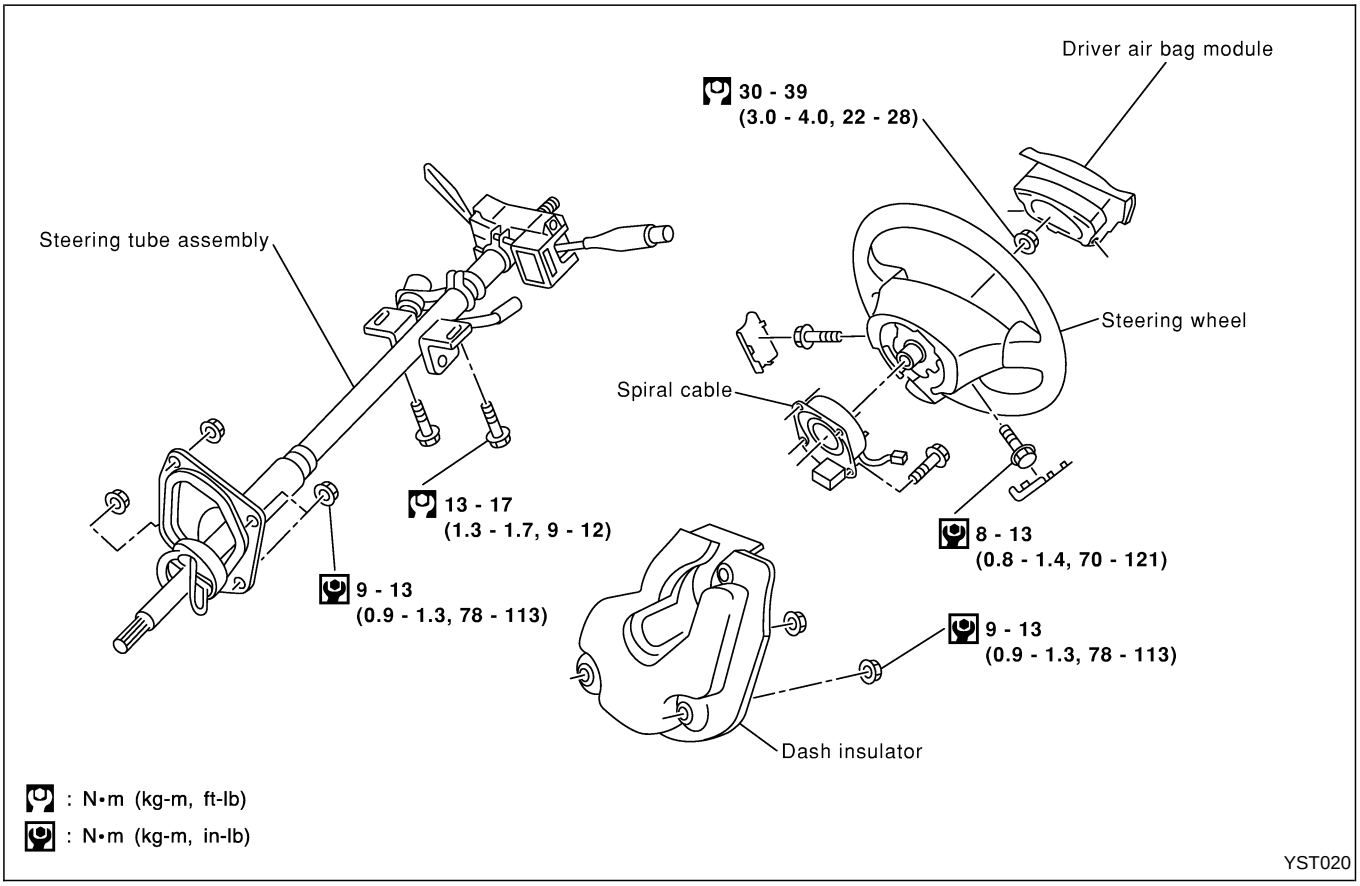
- When pressure reaches maximum pressure, gear is damaged.
- When pressure remains below maximum pressure, pump is damaged.

CAUTION:

Do not close shut-off valve for more than 15 seconds.

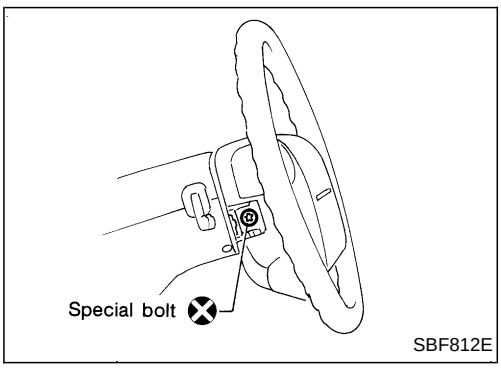
5. If oil pressure is higher than maximum pressure, check oil pump flow control valve.
6. After checking hydraulic system, remove Tool and add fluid if necessary, then completely bleed air out of system.

Removal and Installation



CAUTION:

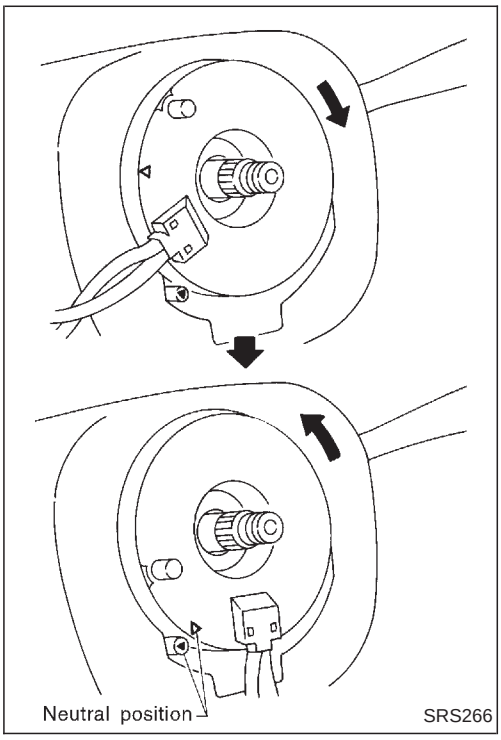
- **The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**



STEERING WHEEL

- Remove remote audio control (if applied).
- Remove air bag module and spiral cable.
  Refer to RS-26, "Removal — Air Bag Module and Spiral Cable".

Removal and Installation (Cont'd)



- Align spiral cable correctly when installing steering wheel.

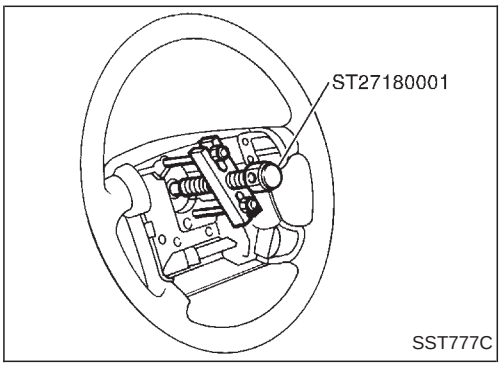
a) Set the front wheels in the straight-ahead position.

b) 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. Align the two marks (⧗).

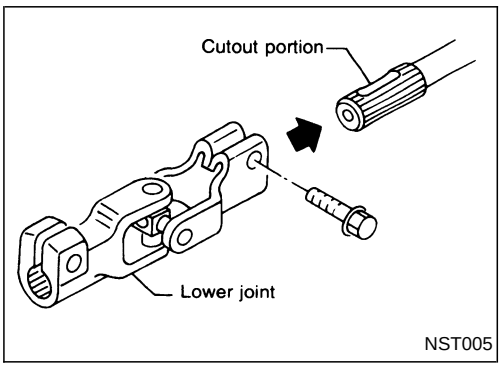
CAUTION:

The spiral cable may snap due to steering operation if the cable is installed in an improper position.

Also, 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 up to 2.5 turns from the neutral position to both the right and left.)



- Remove steering wheel with Tool.



STEERING COLUMN

- When installing steering column, fingertighten upper support bracket bolts and lower support bracket nuts; then tighten them to the specified torque. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.
- When inserting coupling joint onto steering gear axle, make sure that it is positioned correctly.

CAUTION:

After installing steering column, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight-ahead forward position to left and right locks are equal. Be sure that the steering wheel is in a neutral position when driving straight ahead.

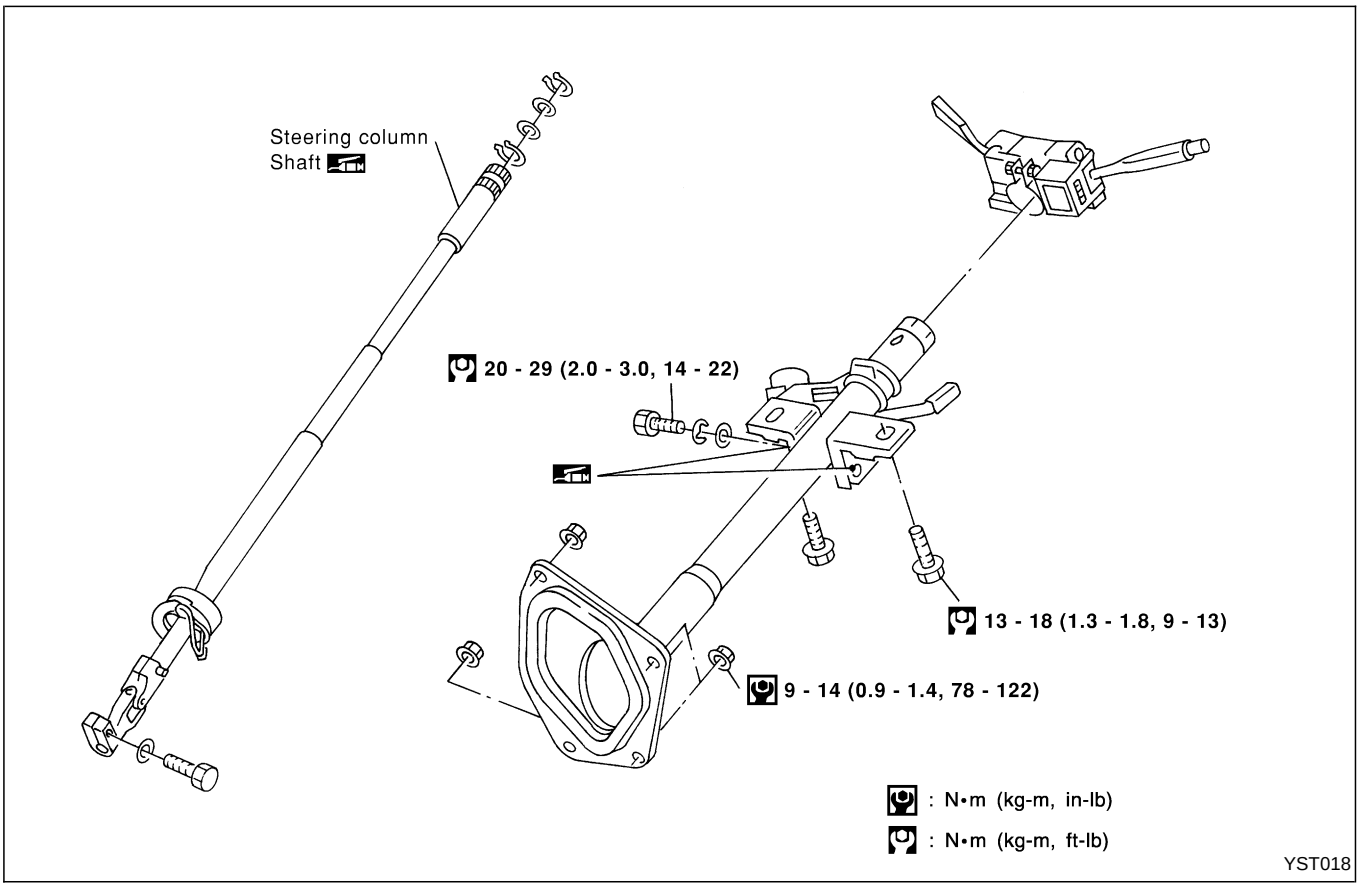
Number of steering wheel turns from straight-ahead position:

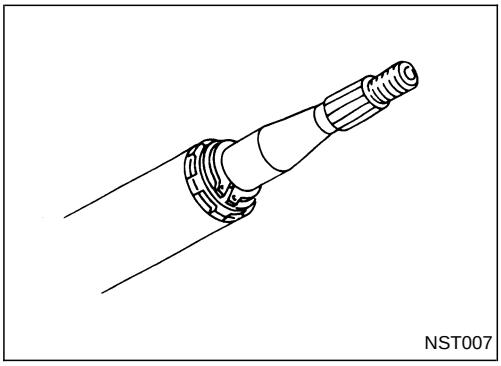
Right 1.93

Left 1.93

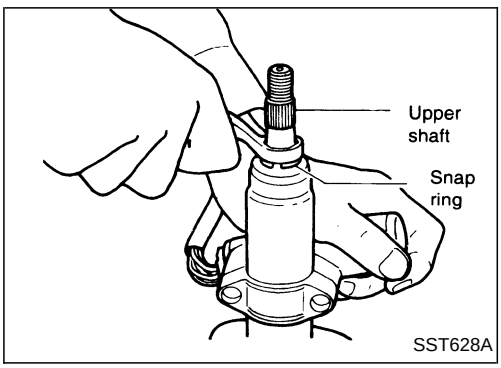
Disassembly and Assembly

L.H.D., R.H.D.



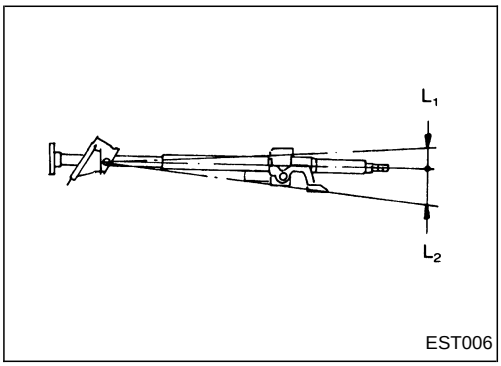


- When disassembling and assembling, unlock steering lock with key.



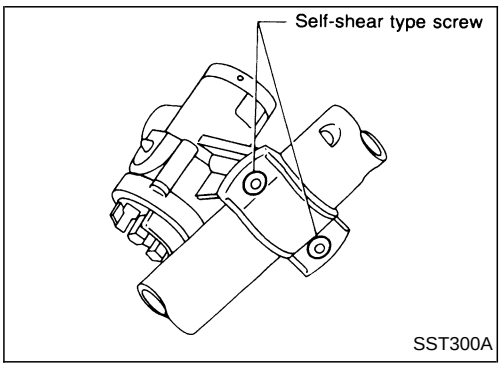
- Install snap ring on upper shaft with box wrench.

Disassembly and Assembly (Cont'd)



EST006

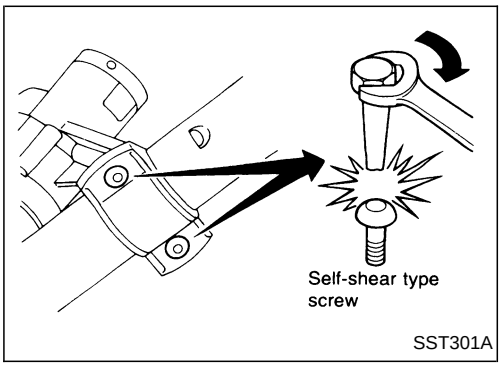
- After installing steering column, check tilt mechanism operation.
  L_1: 8 - 12 mm (0.32 - 0.47 in)
  L_2: 18 - 22 mm (0.71 - 0.87 in)



SST300A

- Steering lock

a. Break self-shear type screws with a drill or other appropriate tool.

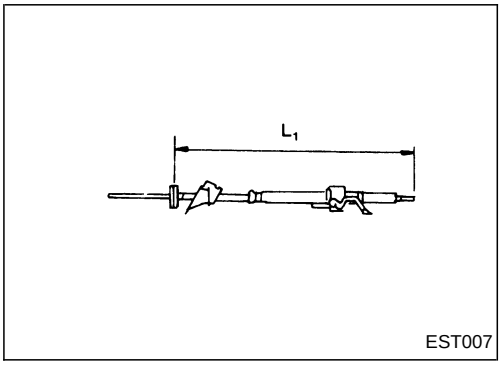


SST301A

b. Install self-shear type screws until self-shear type screw heads are cut off.

- When disassembling and assembling, unlock steering lock with key.
- Ensure that rounded surface of snap ring faces towards bearing when snap ring is installed.

Inspection



EST007

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts:

a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

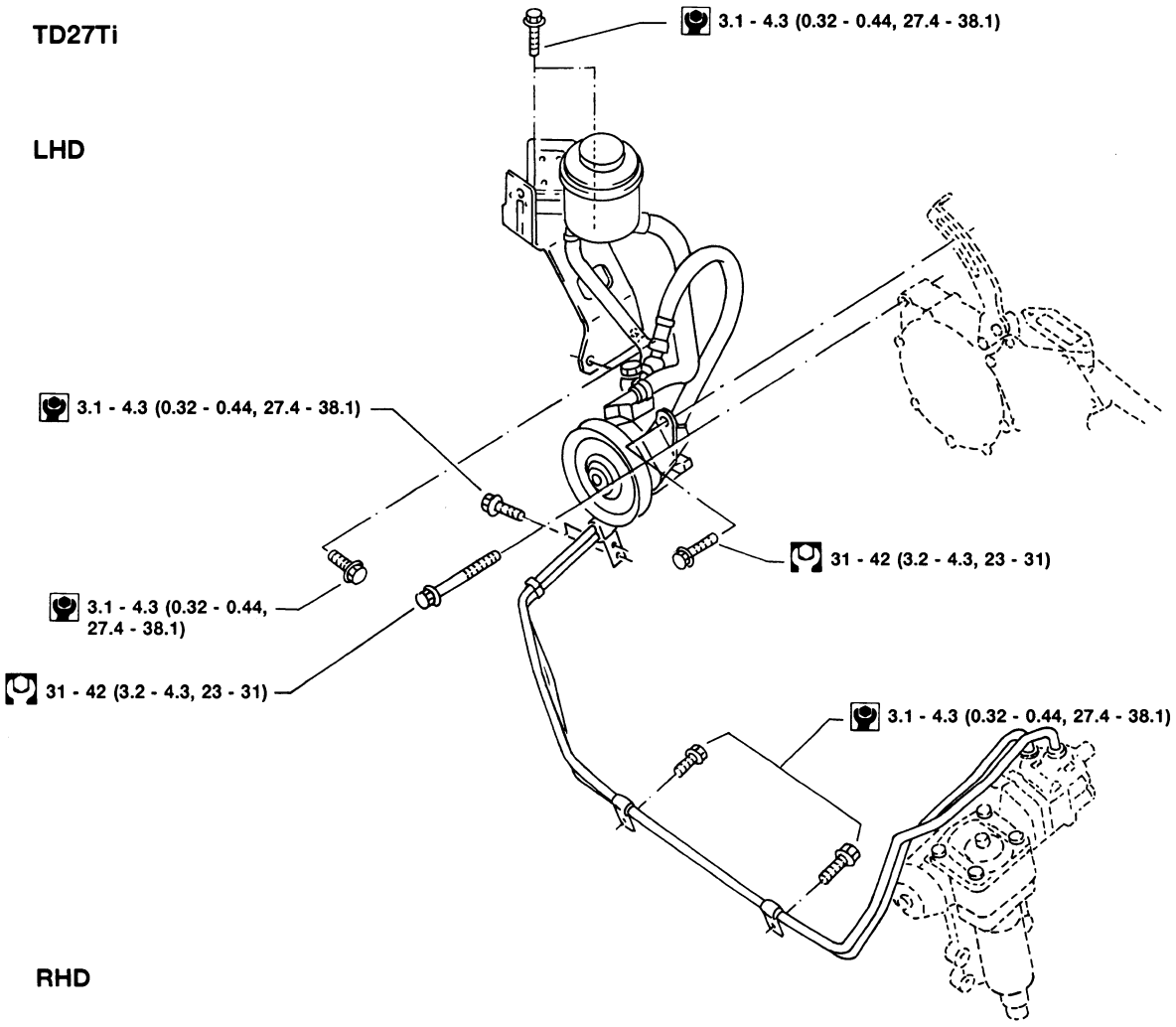
b. Check jacket tube for deformation or breakage. Replace if necessary.

- When the vehicle is involved in a light collision, check column length "L". If it is not within specifications, replace steering column assembly "L_1".
  Column length:
  "L_1": 830.5 - 832.7 mm (32.697 - 32.783 in)

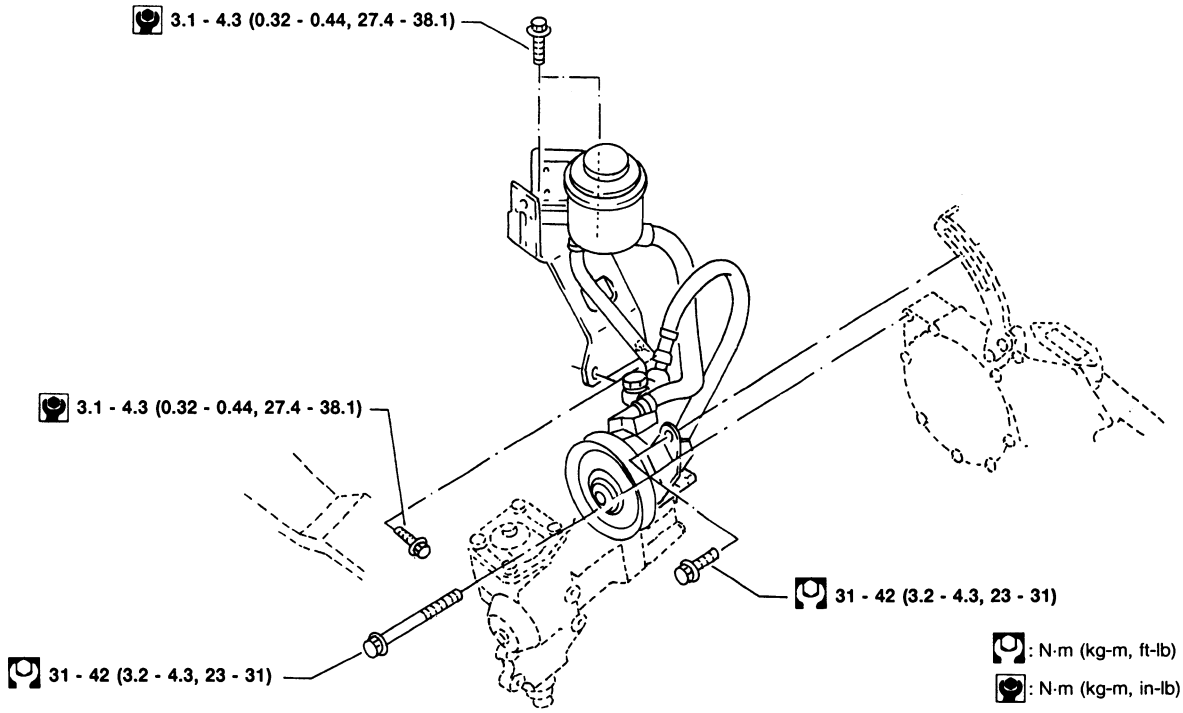
Description

TD27Ti

LHD

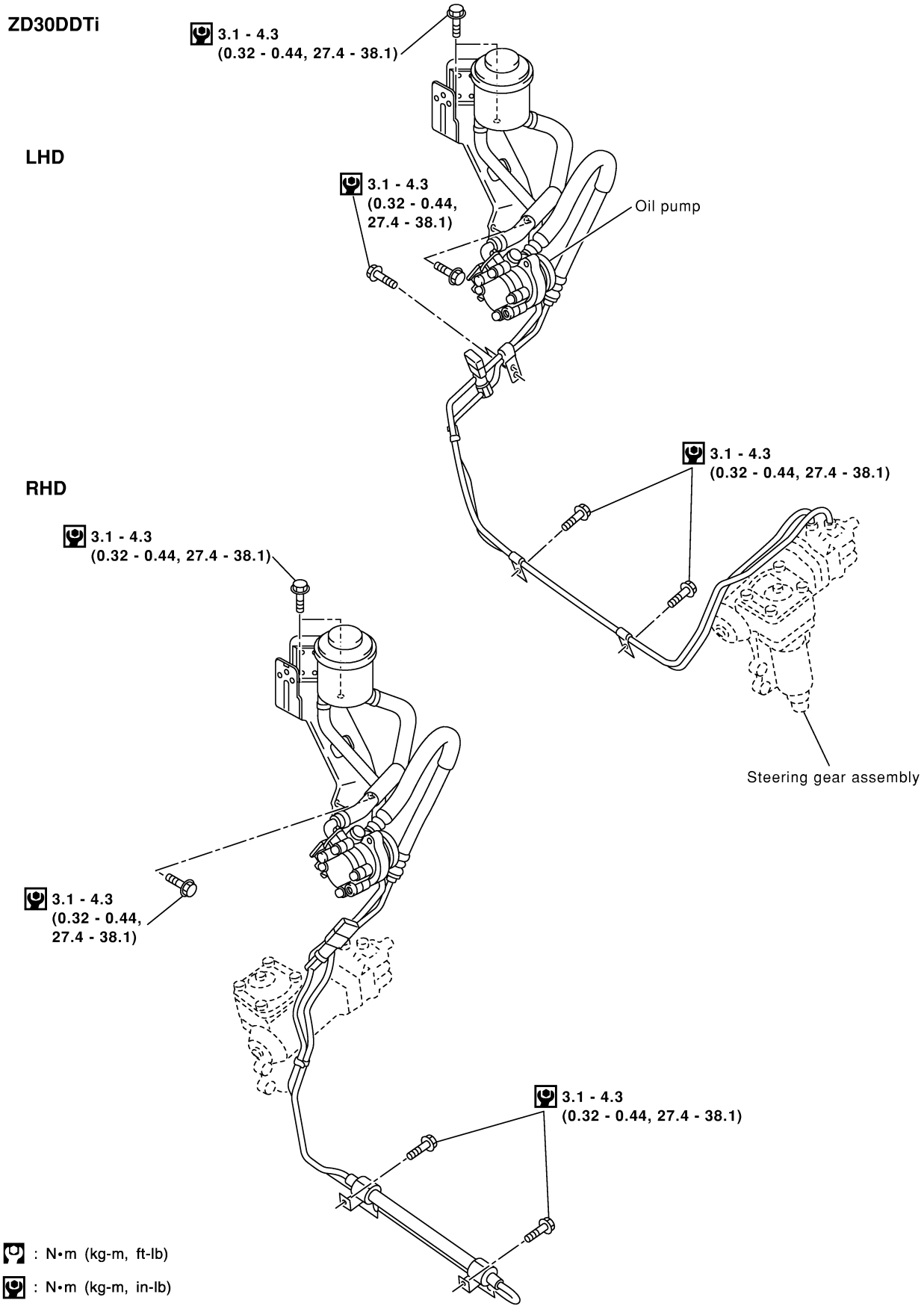


RHD



NST028

Description (Cont'd)

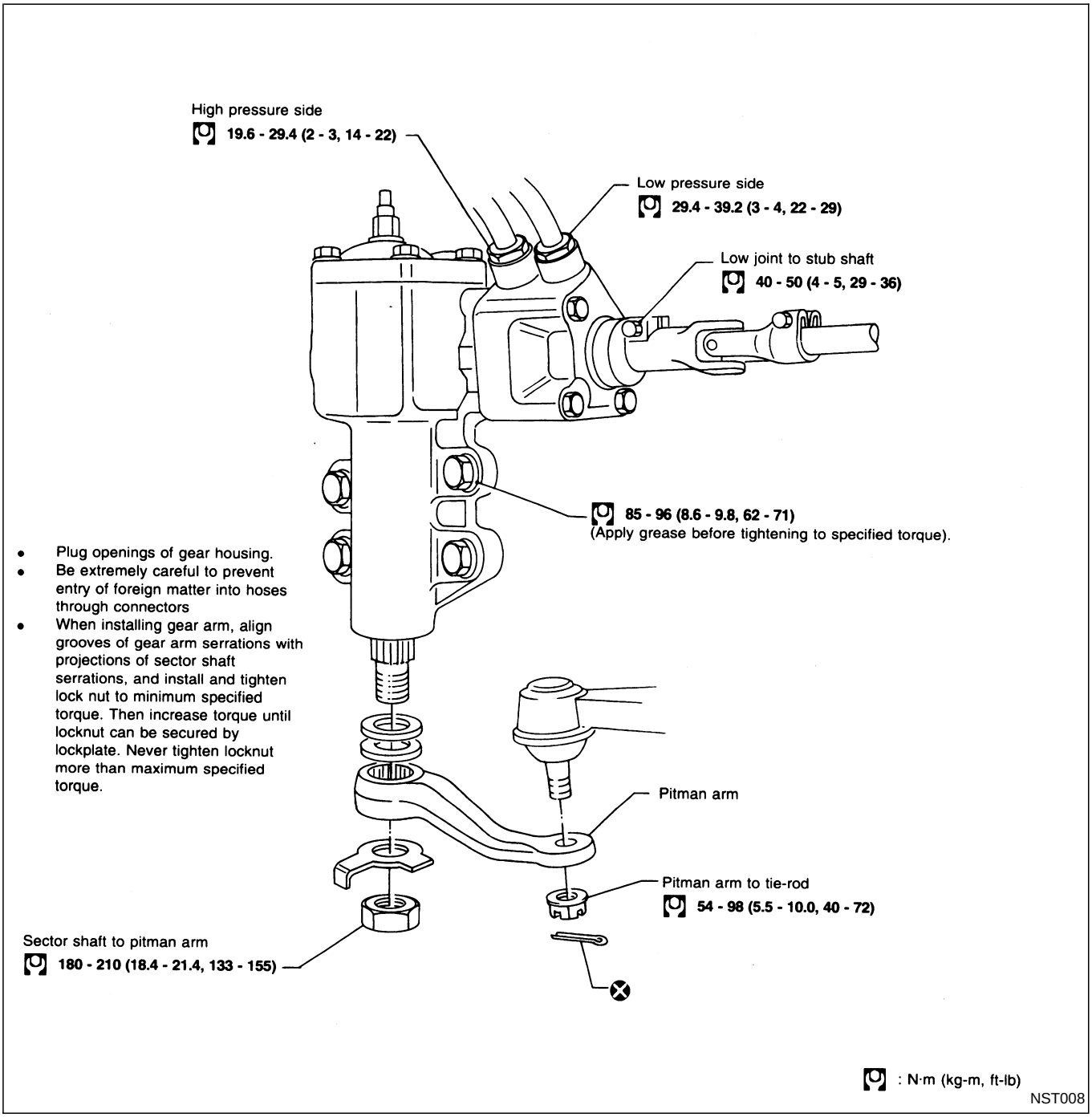


YST021

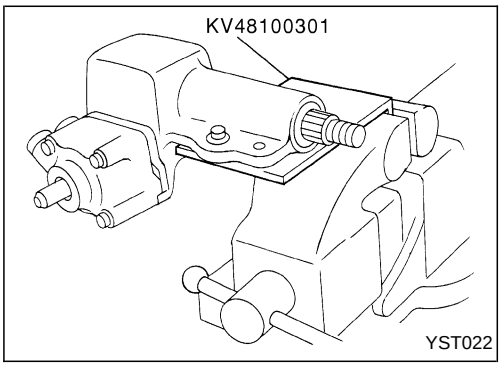
Removal and Installation

Before removing, clean exteriors of gear housing and oil pump with steam and dry with compressed air.

STEERING GEAR



- The steering gear must not be disassembled. Replace as an assembly.
- Remove only the parts shown in the illustration.

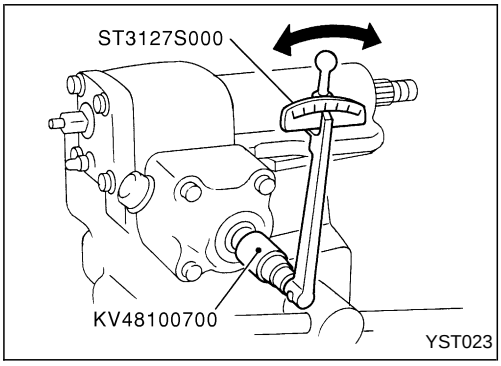


Inspection and Adjustment

STEERING GEAR PRELOAD

Measure preload in worm gear.

1. Mount steering gear to Tool (KV48100301) and place it in a vise, as shown in the illustration.
2. Turn worm gear several times by hand completely to the left and right (full lock to lock).



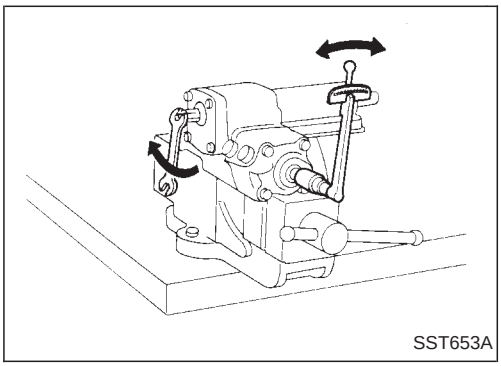
3. Measure preload at ±360° from straight-ahead position.

a. Turn worm gear counterclockwise until full lock position. Then turn clockwise more than two turns until the straight-ahead position.
Straight-ahead position is the position where the two mating marks are in line (approx. 765° from full lock position).

b. Turn worm gear one full turn (360°) clockwise and measure total preload at this position.

c. Turn worm gear two full turns (720°) counterclockwise and measure total preload.

Total preload at ±360° from straight-ahead position:
: 0.4 - 1.2 N·m (0.04 - 0.12 kg-m, in-lb)

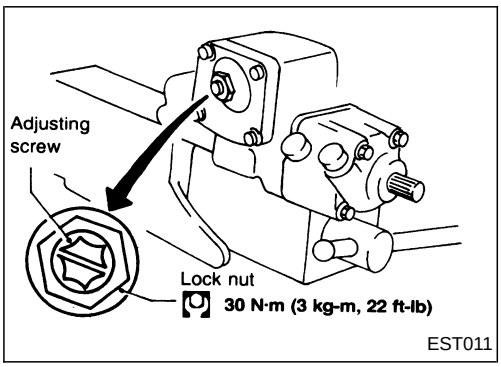


4. Measure total preload at straight-ahead position.

a. Place worm gear in straight-ahead position. See step 3.a.

b. Measure total preload in straight-ahead position.

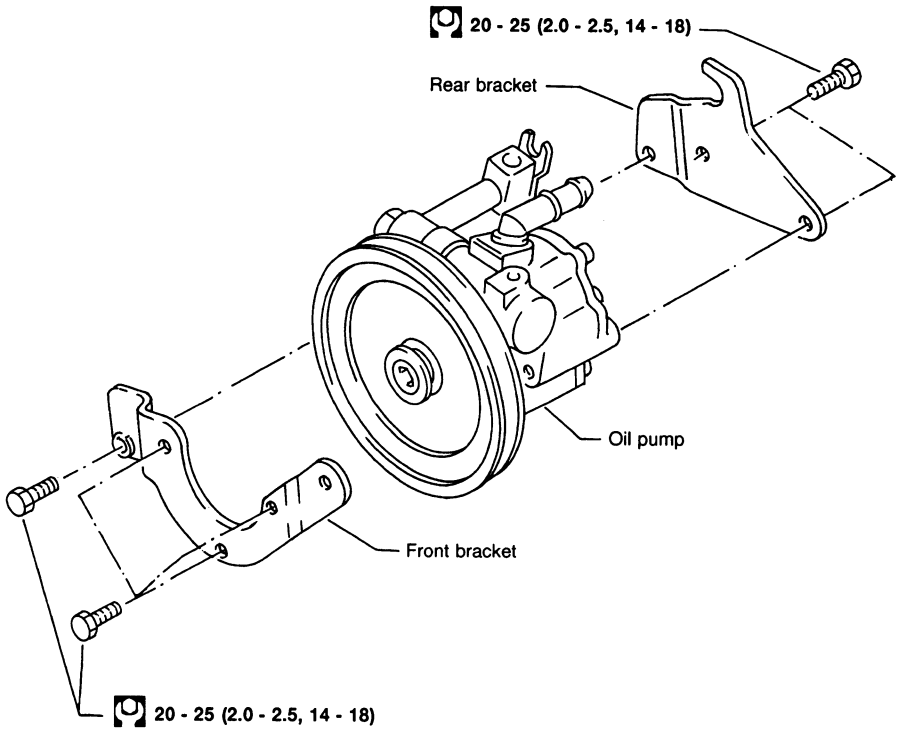
Total preload at straight-ahead position:
: 0.6 - 1.6 N·m (0.06 - 0.16 kg-m, 5 - 14 in-lb)

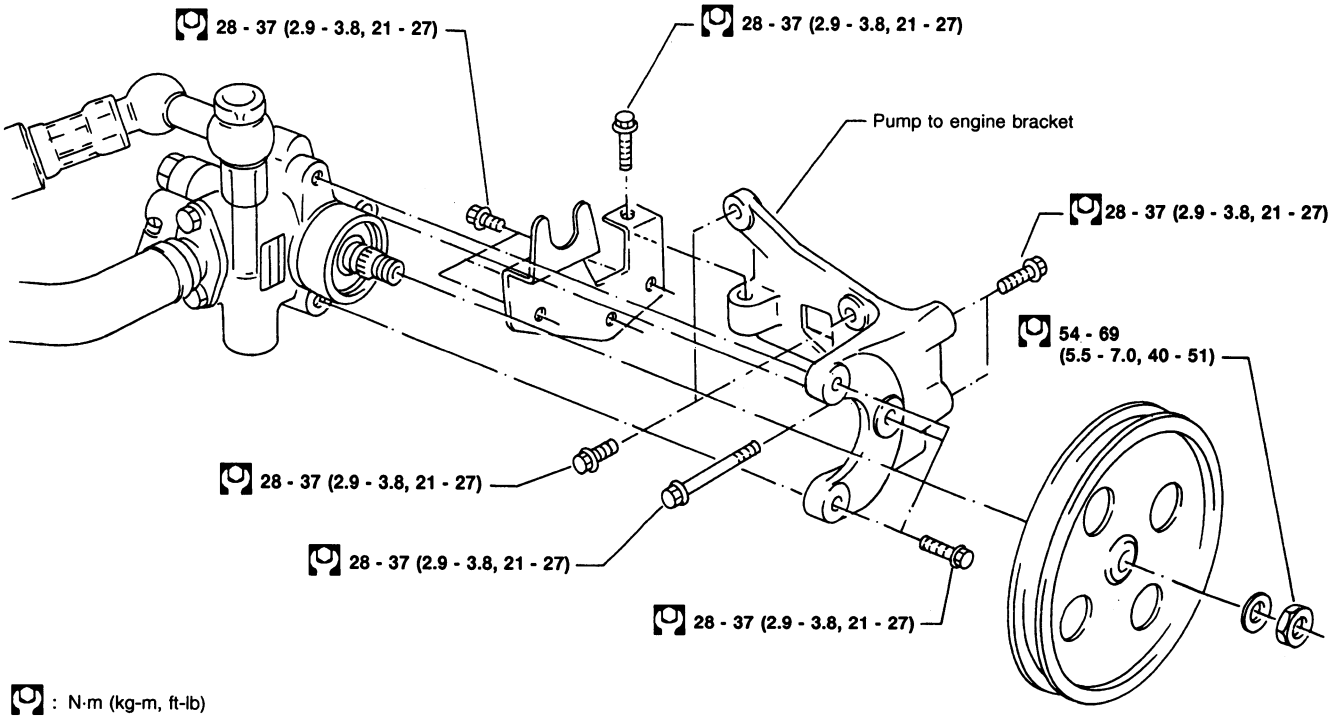


5. If either one of the above measured values are not within specifications, adjust total preload by turning sector shaft adjusting screw. Tighten adjusting screw lock nut with tools.

Lock nut:
: 30 N·m (3 kg-m, 22 ft-lb)

Removal and Installation



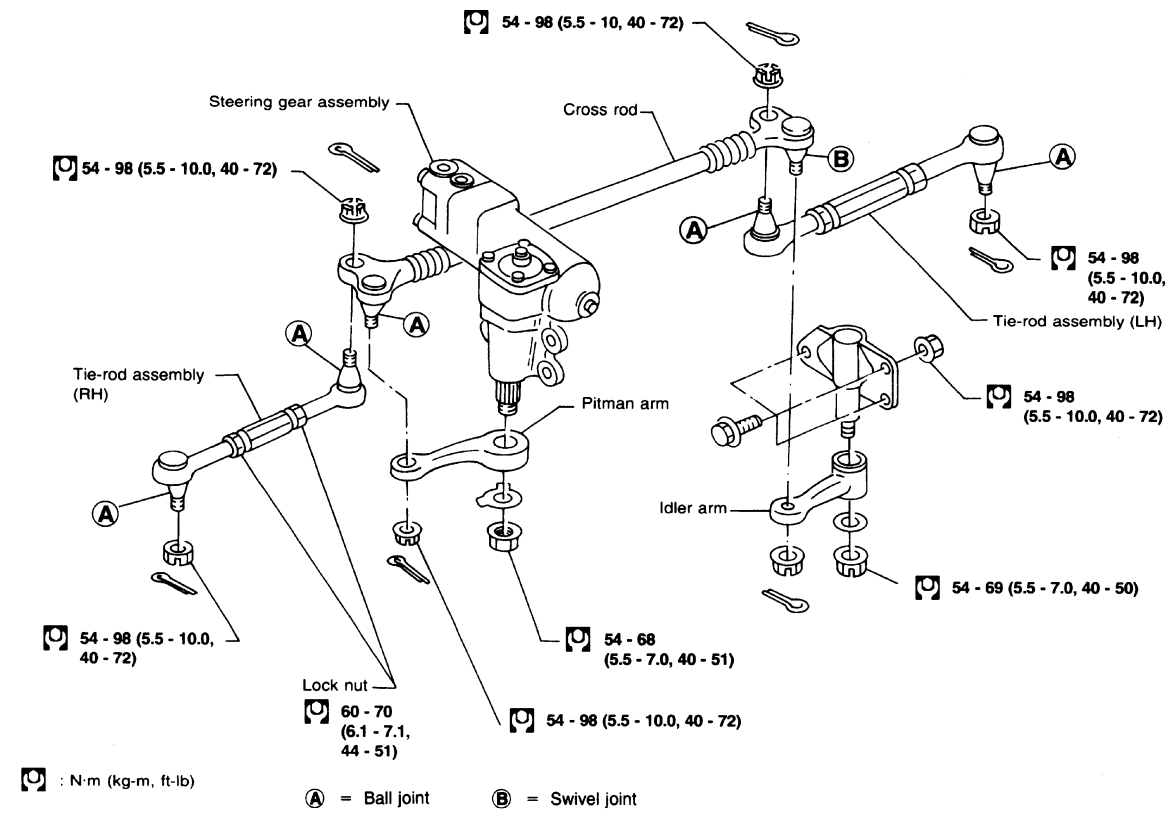


: N·m (kg-m, ft-lb)

NST027

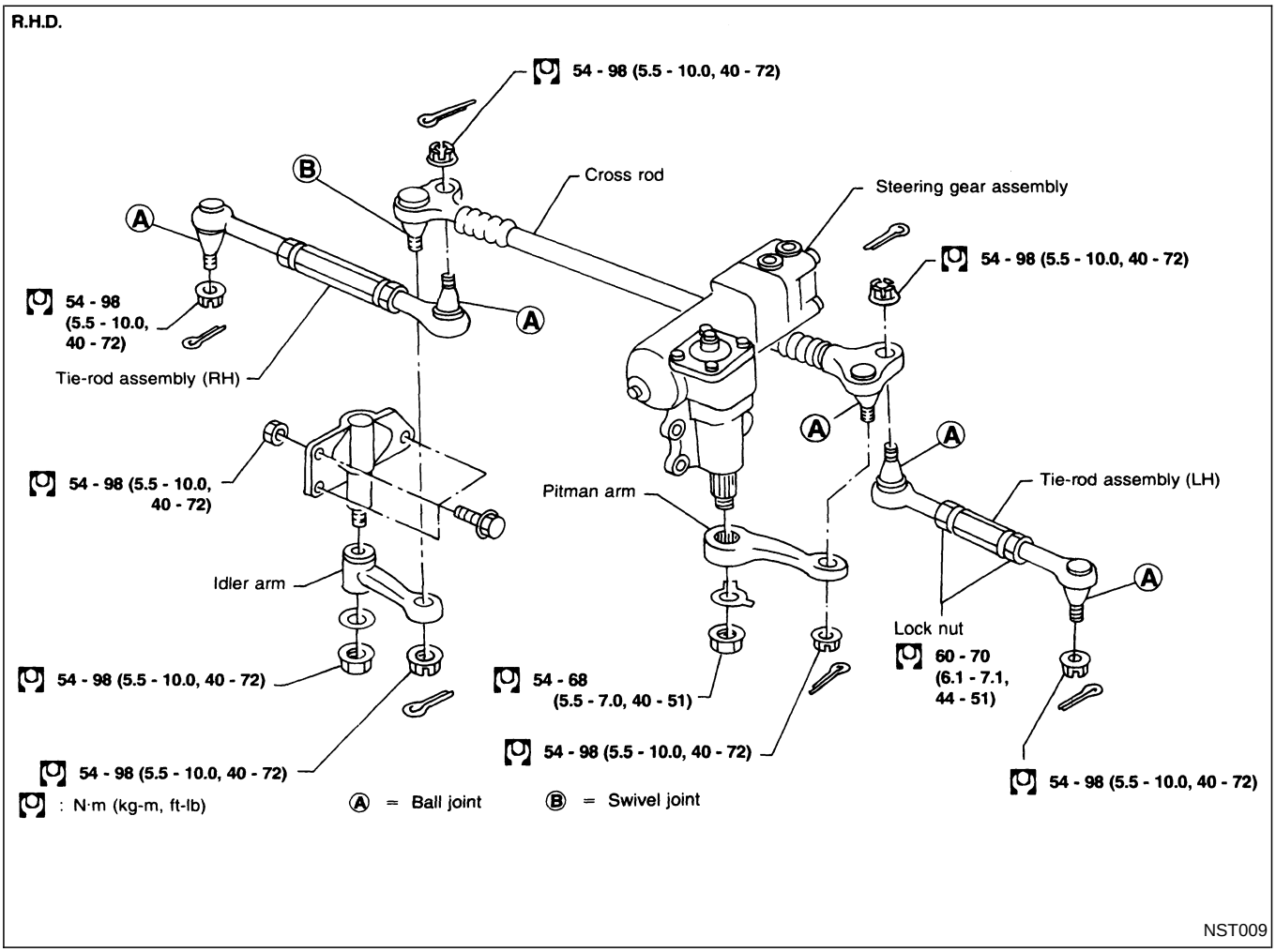
Removal and Installation

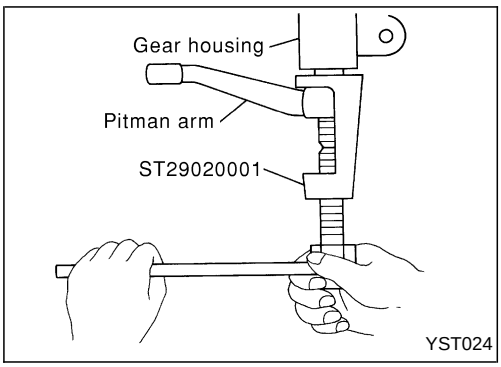
L.H.D.



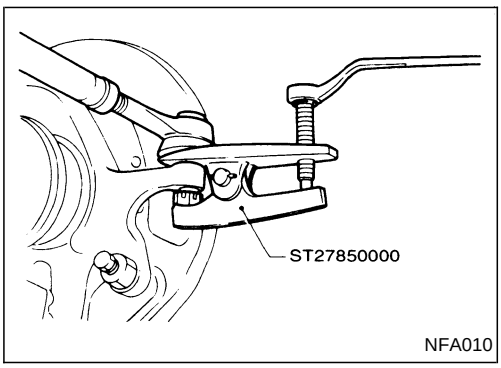
NST010

Removal and Installation (Cont'd)

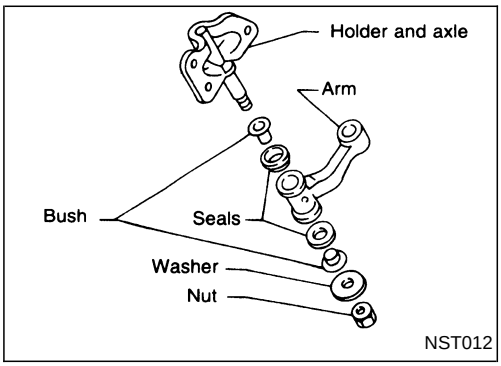




Remove gear arm with Tool.



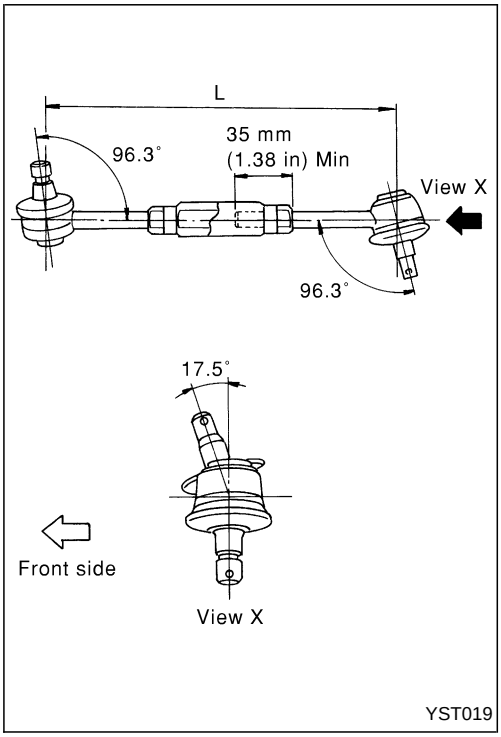
Remove tie-rod from knuckle arm with Tool.



Disassembly and Assembly

IDLER ARM ASSEMBLY

- Apply coat of multi-purpose grease to bushing.
- Press bushing into idler body, and insert shaft of idler bracket carefully until bushing protrudes.
  Tighten nut to the specified torque.
  : 54 - 68 N·m (5.5 - 7.0 kg-m, 40 - 51 ft-lb)

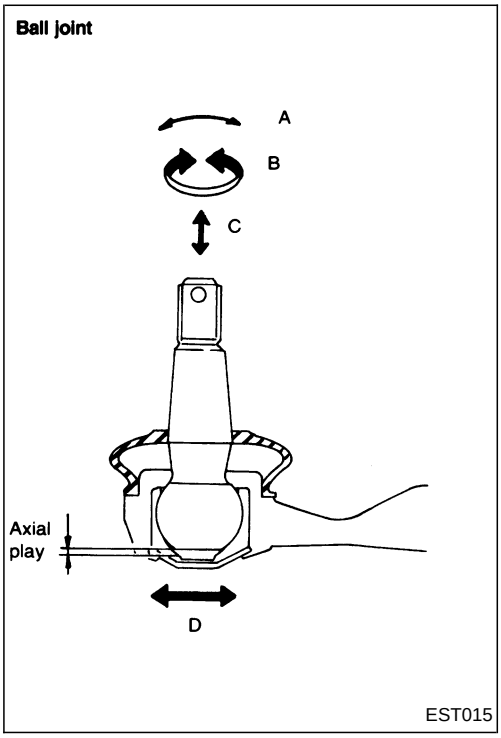


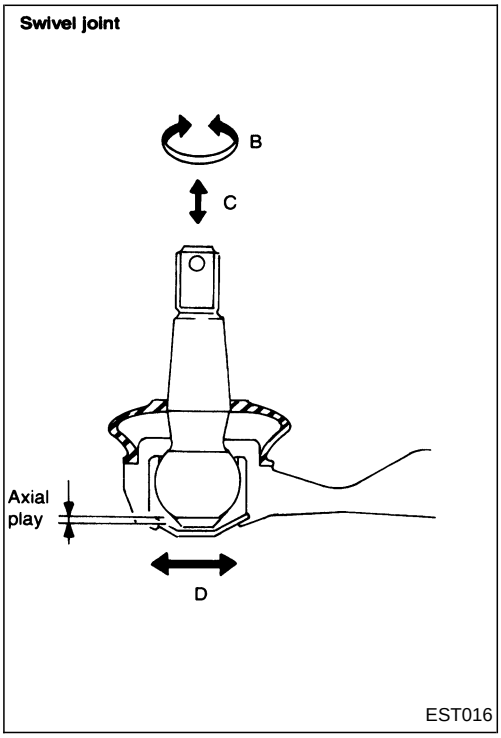
CROSS ROD AND TIE-ROD

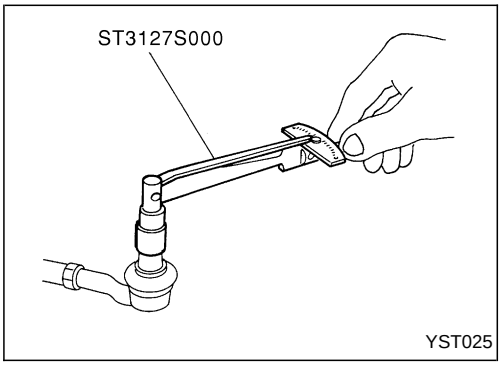
1. When tie-rod ball joints and tie-rod bar are separated, adjust tie-rod length correctly.
   Adjustment should be done between ball stud centers.
   L: Standard
   287 mm (11.30 in)
2. Lock tie-rod clamp nuts so that ball joint on outer ball stud is as follows with respect to that on inner ball stud.

CAUTION:

Make sure that tie-rod bars are screwed into tie-rod tube more than 35 mm (1.38 in). Refer to illustration.







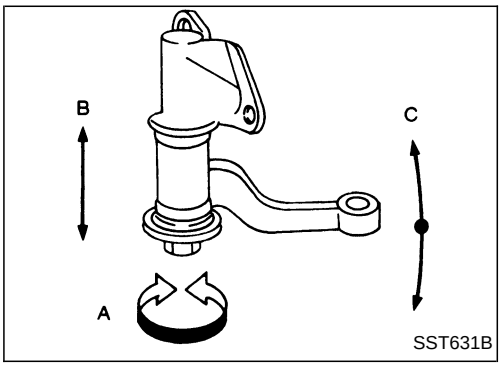
Inspection

BALL JOINT AND SWIVEL JOINT

1. Check joints for play. If ball or swivel stud is worn and play in axial direction is excessive or joint is hard to swing or does not meet the specified values, replace as a complete unit.
   Swinging force (Measuring point: Cotter pin hole) “A”:
   The ball joint must rotate smoothly in all directions.
   Rotating torque “B”: (both)
   0.5 - 5.0 N·m (0.05 - 0.51 kg-m, 4 - 44 in-lb)
   Axial end play “C”: (both)
   0 - 0.2 mm (0 - 0.008 in)
   Radial play “D” (both)
   0 mm (0 in)
2. Check condition of dust cover. If it is cracked excessively, replace ball joint or swivel joint as an assembly.

- Check rotating torque “B”.

Inspection (Cont'd)



IDLER ARM ASSEMBLY

- Check idler arm assembly for breakage, wear or play, and if necessary replace.

  Rotating force "A":
  1 - 6 N·m (0.1 - 0.6 kg-m, 9 - 52 in-lb)
  Axial end play "B":
  0 m (0 in)
  Deflection "C" (when load is applied to the end of arm):

Load	N (kg, lb)	1,569 (160, 353)	3,923 (400, 882)
Deflection	mm (in)		
Max.		3 (0.12)	5.5 (0.217)
Min.		0.7 (0.028)	1.0 (0.039)

- Lubricate idler arm assembly with recommended multipurpose grease.
  When lubricating, refer to section MA.

CROSS ROD AND TIE-ROD

Check tie-rod and cross rod for breakage, bend or cracks, and replace with a new one if necessary.

FIXING LOCATION

- Check fixing location (nuts and cotter pins) for looseness, play or breakage.
- When looseness or play is found, check for wear on tapered portion of joints, gear arm and idler arm.

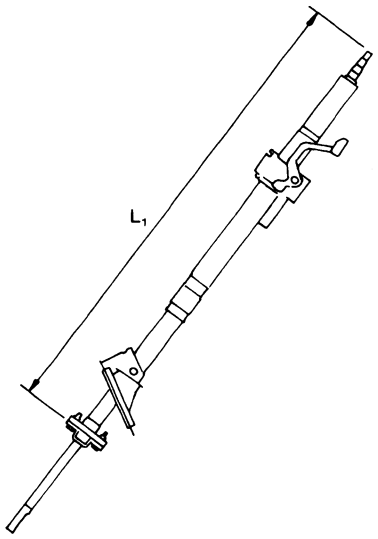
General Specifications

Models	All
Steering gear type	ZF 8054
Turns of steering wheel (Lock to lock)	3.86
Overall gear ratio	17.1 : 1
Steering column type	Collapsible, adjustable height

Inspection and Adjustment

STEERING WHEEL AND COLUMN

Applied model		AIR BAG
Steering wheel axial play	mm (in)	0 (0)
Steering wheel play	mm (in)	35 (1.38) or less
Steering column length “L”	mm (in)	830.5 - 832.7 (32.697 - 32.783)



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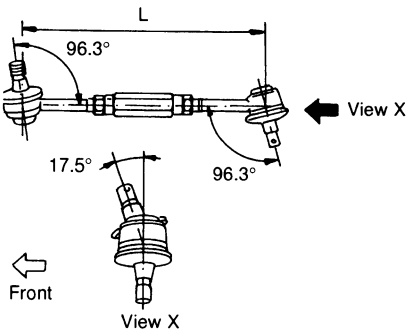
STEERING GEAR AND LINKAGE

Ball joint and swivel joint		
Rotating torque “B”	N·m (kg-m, in-lb)	0.5 - 5.0 (0.05 - 0.51, 4 - 44)
Axial end play “C”	mm (in)	0 - 0.2 (0 - 0.008)
Radial play “D”	mm (in)	0 (0)
Length “L”	mm (in)	287 (11.30)



SST583B

OIL PUMP

Unit: kPa (bar, kg/cm^2, psi)

Engine	ZD30DDTi	TD27Ti
Make	UNISIA	
Max. pressure	9,800 - 10,500 (98.0 - 105.0, 99.96 - 107.10, 1,421 - 1,523)	8,800 - 9,200 (88 - 92, 89 - 93, 1,276 - 1,334)