SECTION ST

CONTENTS

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps 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), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS 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 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 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.**

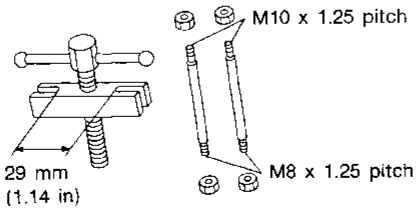
STEERING SYSTEM

- **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.**
- **Place disassembled parts in order, on a parts rack, for easier and proper assembly.**
- **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.**

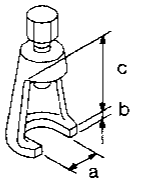
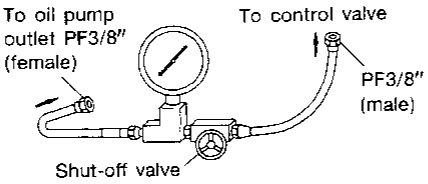
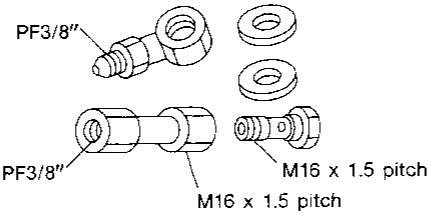
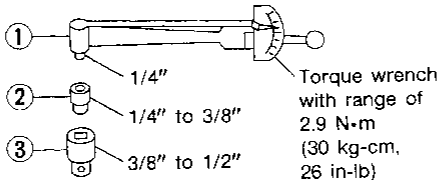
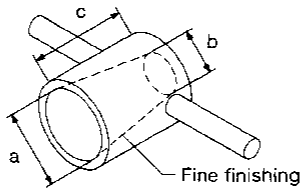
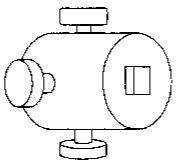
***: Automatic Transmission Fluid type DEXRON™ IIE, DEXRON™III or equivalent**

Special Service Tools

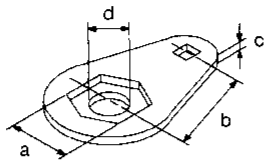
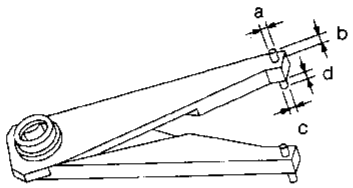
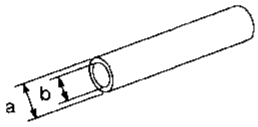
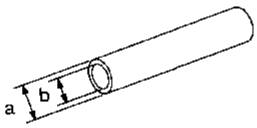
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV48100700 (J26364) Torque adapter	 NT169 — Measuring pinion rotating torque
ST27180001 (J25726-A) Steering wheel puller	 NT544 — Removing and installing steering wheel

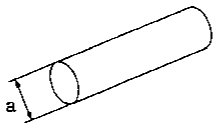
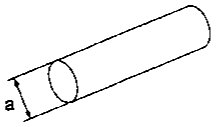
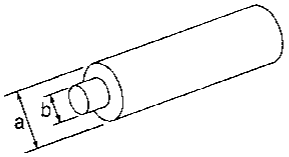
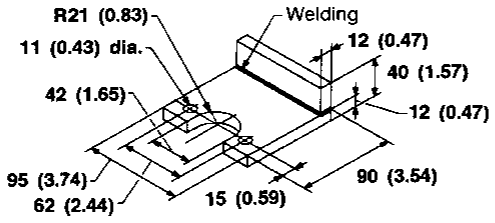
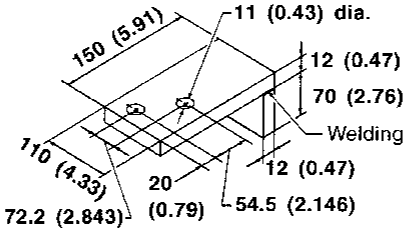
Special Service Tools (Cont'd)

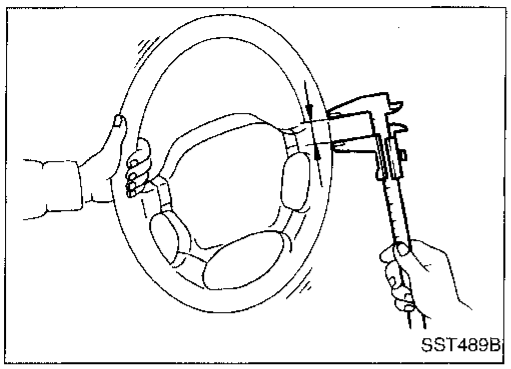
Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Ball joint remover	 NT551	Removing ball joint **a: 34 mm (1.34 in)** **b: 6.5 mm (0.256 in)** **c: 61.5 mm (2.421 in)**
ST27091000 (J26357 and J26357-10) Pressure gauge	 NT547	Measuring oil pressure
KV48102500 (—) Pressure gauge adapter	 NT542	Measuring oil pressure
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	 NT541	Measuring turning torque
KV48104400 (—) Rack seal ring reformer	 NT550	Reforming teflon ring **a: 50 mm (1.97 in) dia.** **b: 36 mm (1.42 in) dia.** **c: 100 mm (3.94 in)**
KV48103400 (—) Torque adapter	 NT236	Measuring steering transfer gear rotating torque

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
KV48104500 (—) Lock nut wrench	 NT534	Removing and installing transfer gear rear cover **a: 58 mm (2.28 in)** **b: 100 mm (3.94 in)** **c: 6 mm (0.24 in)** **d: 53 mm (2.09 in) dia.**
KV48104200 (—) Rear cover wrench	 NT540	Adjusting and tightening gear rear cover **a: 4 mm (0.16 in) dia.** **b: 5 mm (0.20 in)** **c: 3 mm (0.12 in) dia.** **d: 5 mm (0.20 in)**
ST23860000 (—) Output shaft oil seal drift	 NT065	Installing output shaft oil seal **a: 38 mm (1.50 in) dia.** **b: 33 mm (1.30 in) dia.**
ST22350000 (—) Input shaft oil seal drift	 NT065	Installing input shaft oil seal **a: 34 mm (1.34 in) dia.** **b: 28 mm (1.10 in) dia.**

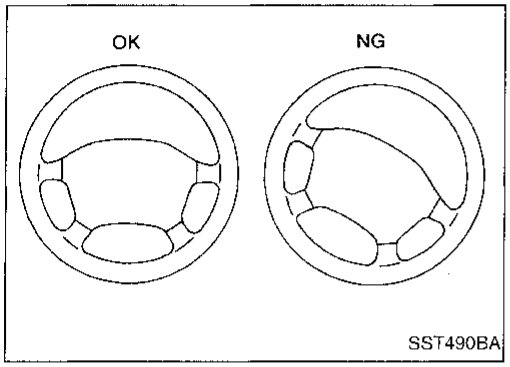
Commercial Service Tools

Tool name	Description	
Rear oil seal drift	 NT063	Installing rear oil seal **a: 28 mm (1.10 in) dia.**
Pinion oil seal drift	 NT063	Installing pinion oil seal **a: 40 mm (1.57 in) dia.**
Output shaft bearing drift	 NT386	Installing output shaft bearing **a: 34 mm (1.34 in)** **b: 16 mm (0.63 in)**
Oil pump attachment	 NT179	Disassembling and assembling oil pump Unit: mm (in)
Transfer gear attachment	 NT387	Disassembling and assembling transfer gear Unit: mm (in)


SST489B

Checking Steering Wheel Play

- With wheels in a straight-ahead position, check steering wheel play.
  Steering wheel play:
  35 mm (1.38 in) or less
- If it is not within specification, check the following for loose or worn components.
  Steering gear assembly
  Steering column
  Front suspension and axle



SST490BA

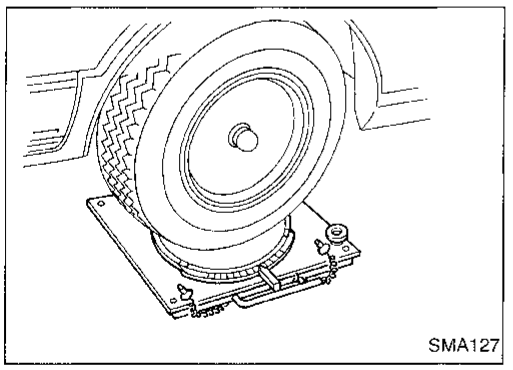
Checking Neutral Position on Steering Wheel

Pre-checking

- Make sure that wheel alignment is correct.
  Wheel alignment:
  Refer to SDS in FA section.
- Verify that the steering gear is centered before removing the steering wheel.

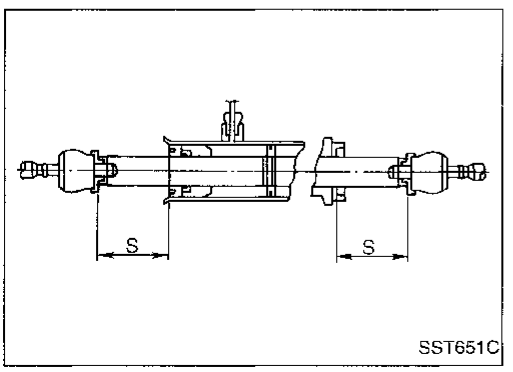
Checking

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 teeth, loosen tie-rod lock nuts. Turn the tie-rods by the same amount in opposite directions on both left and right sides.


SMA127

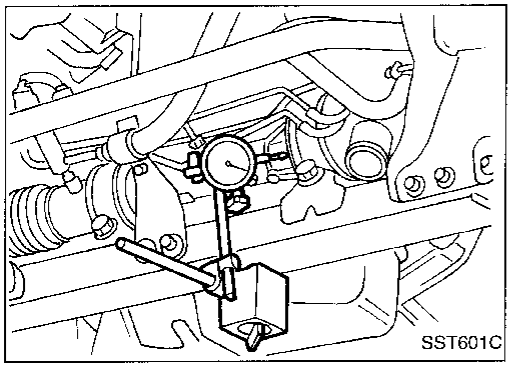
Front Wheel Turning Angle

1. Rotate steering wheel all the way right and left; measure turning angle.
   Turning angle of full turns:
   Refer to SDS in FA section.



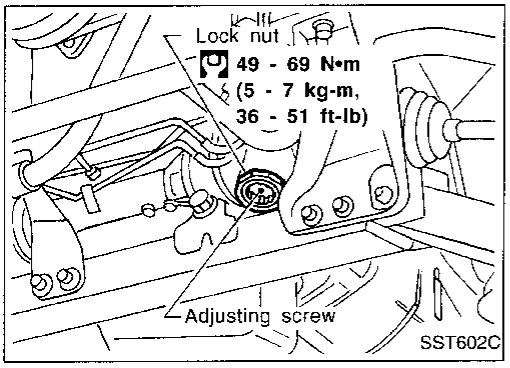
SST651C

2. If it is not within specification, check rack stroke.
   Rack stroke "S":
   Refer to SDS (ST-35).



Checking Gear Housing Movement

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.
- Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.
  Turn off ignition key while checking.
  Movement of gear housing:
  ±2 mm (±0.08 in) or less
2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.

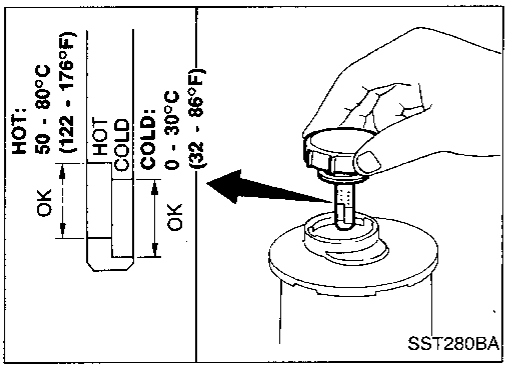


Adjusting Rack Retainer

- Perform this driving test on a flat road.
1. Check whether vehicle moves in a straight line when steering wheel is released.
2. Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx. 20°) position.
- If any abnormality is found, correct it by resetting adjusting screw.

Checking and Adjusting Drive Belts (For power steering)

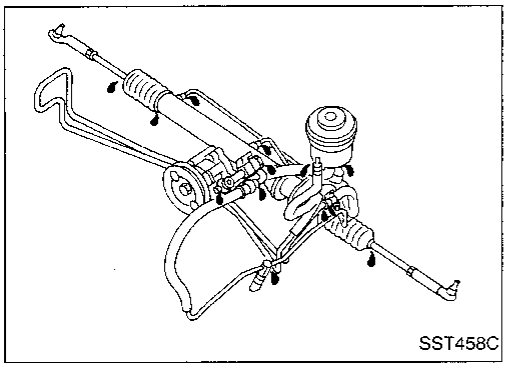
Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").



Checking Fluid Level

Check fluid level.
Use the correct range of the dipstick depending on the fluid temperature. Use the "HOT" range at 50 to 80°C (122 to 176°F), or the "COLD" range at 0 to 30°C (32 to 86°F).

CAUTION:
- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid type DEXRON™ IIE, DEXRON™III or equivalent.**



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.

Checking Fluid Leakage (Cont'd)

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.

5. Check rack boots for accumulation of power steering fluid.

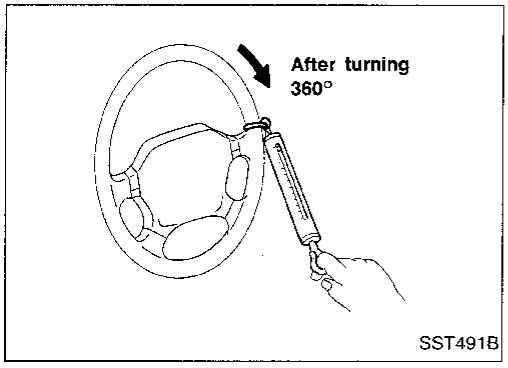
Bleeding Hydraulic System

1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Then, 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.

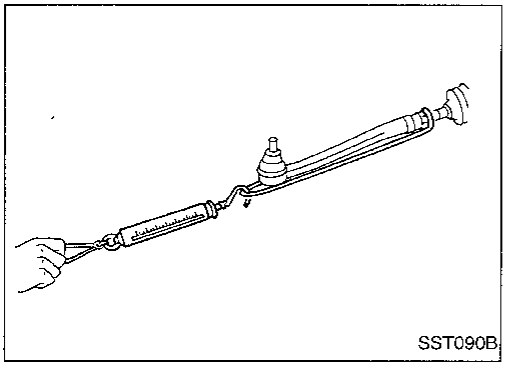
- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.

a. Air bubbles in reservoir tank
b. Clicking noise in oil pump
c. Excessive buzzing in oil pump

Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning steering wheel slowly. This does not affect performance or durability of the system.



SST491B


SST090B

Checking Steering Wheel Turning Force (For power steering)

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. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

Tires need to be inflated to normal pressure.

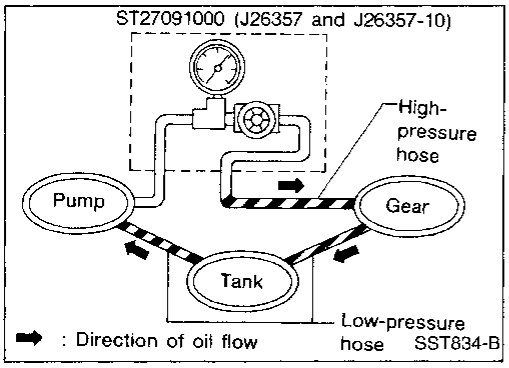
4. Check steering wheel turning force when steering wheel has been turned 360° from the neutral position.
   Steering wheel turning force:
   39 N (4 kg, 9 lb) or less
5. If steering wheel turning force is out of specification, check rack sliding force.

a. Disconnect steering column lower joint and knuckle arms from the gear.
b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
c. Pull tie-rod slowly to move it from neutral position to ±11.5 mm (±0.453 in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

Checking Steering Wheel Turning Force (For power steering) (Cont'd)

Rack sliding force:
137 - 255 N (14 - 26 kg, 31 - 57 lb)

6. If rack sliding force is not within specification, overhaul steering gear assembly.
7. If rack sliding force is OK, inspect steering column. Refer to ST-13.



Checking Hydraulic System

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

1. Set Tool. Open shut-off valve. Then bleed air. [See "Bleeding Hydraulic System" (ST-8).]
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, fluid pressure in oil pump will increase to maximum. This will raise oil temperature abnormally.

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 pressure:
8,630 - 9,219 kPa
(88 - 94 kg/cm^2, 1,251 - 1,337 psi)

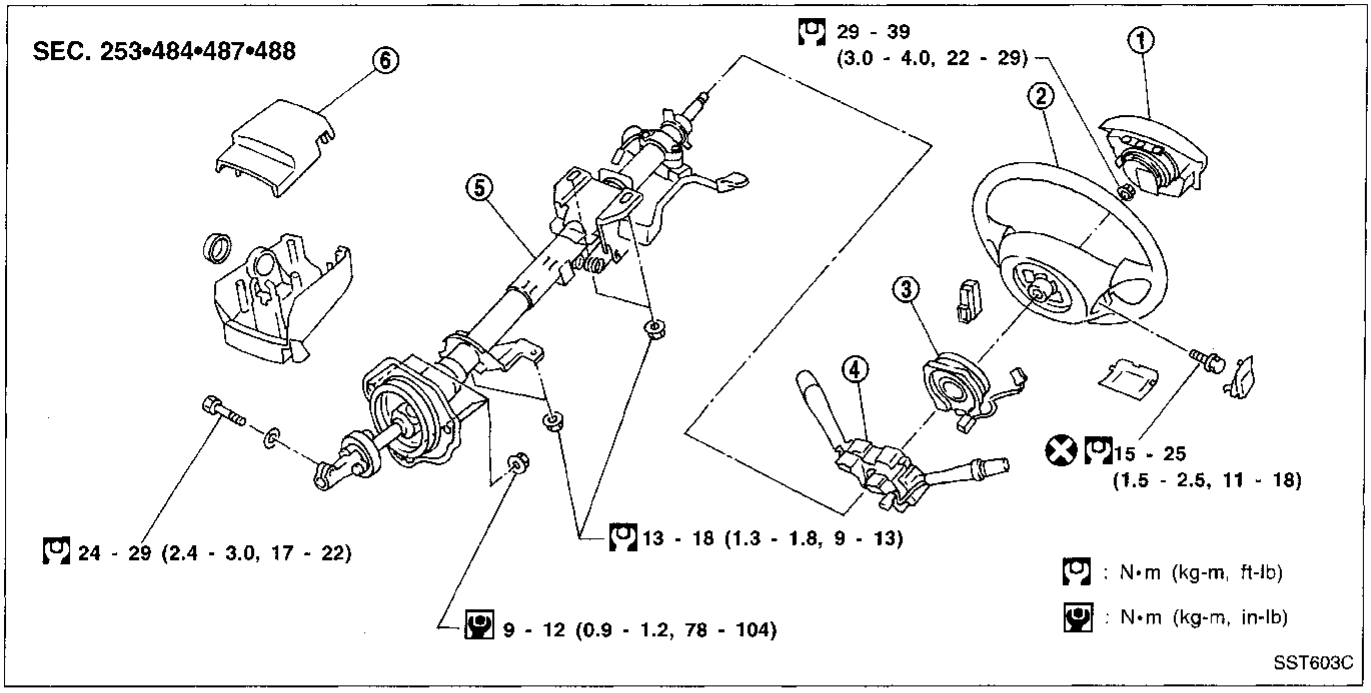
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.

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

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

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

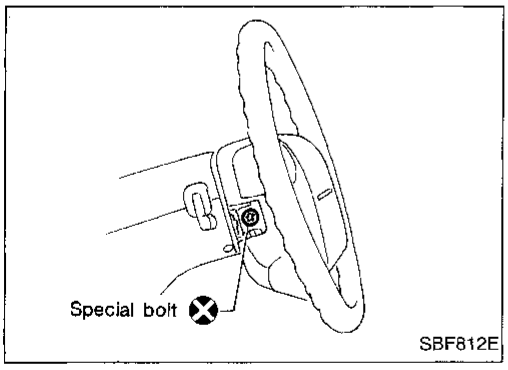
Removal and Installation



① Air bag module
② Steering wheel
③ Spiral cable
④ Combination switch
⑤ Steering column assembly
⑥ Column cover

CAUTION:

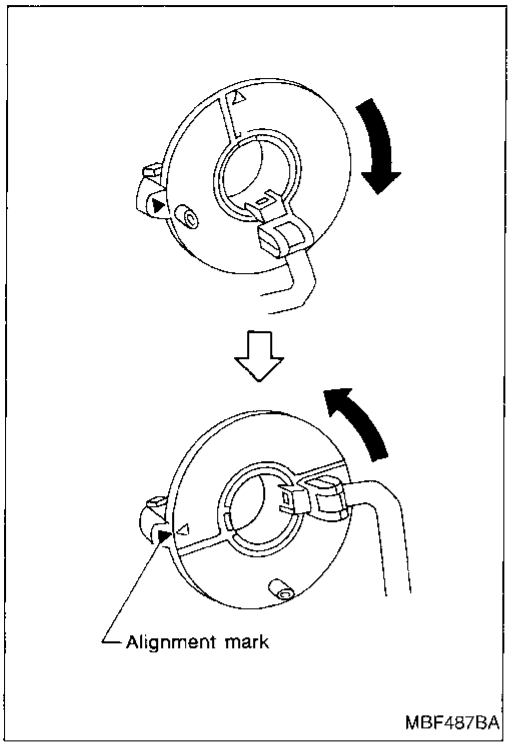
- **The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering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



STEERING WHEEL

- Remove air bag module and spiral cable. Refer to RS section ("Removal — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM").

Removal and Installation (Cont'd)

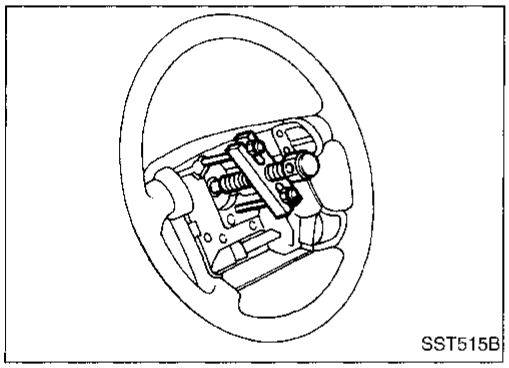


- Align spiral cable correctly when installing steering wheel.

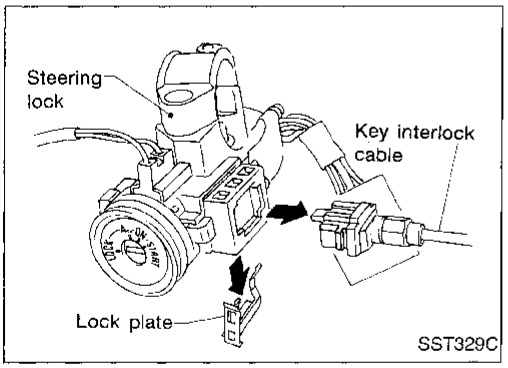
a. Set the front wheels in the straight-ahead position.

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 (⧗).

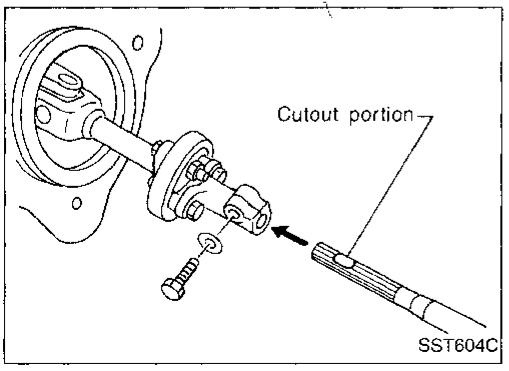
CAUTION:
The spiral cable may snap due to steering operation if the cable is installed in an improper position.
Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.5 turns from the neutral position to both the right and left.)



- Remove steering wheel with Tool.



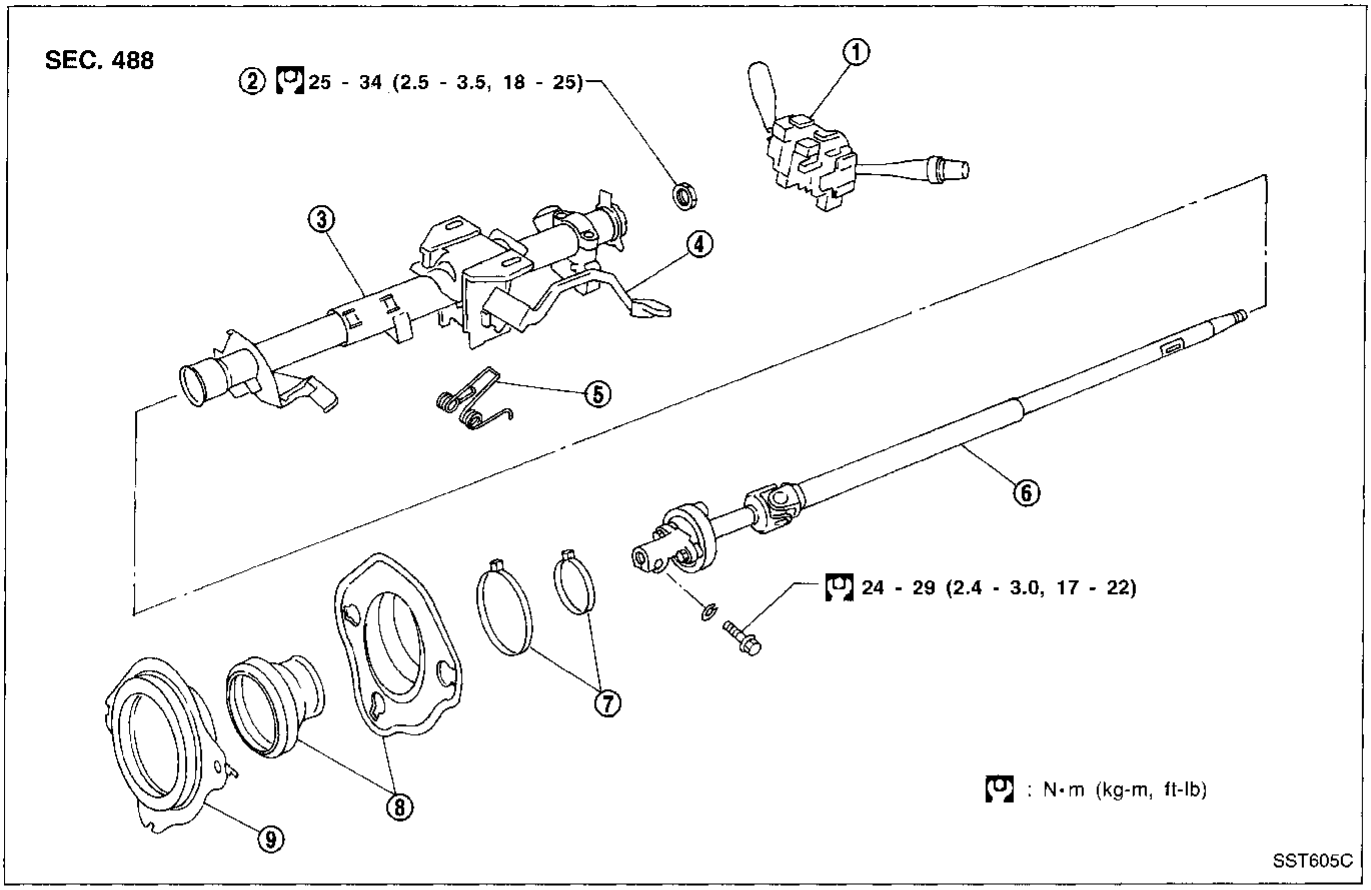
- Remove key interlock cable (A/T models).



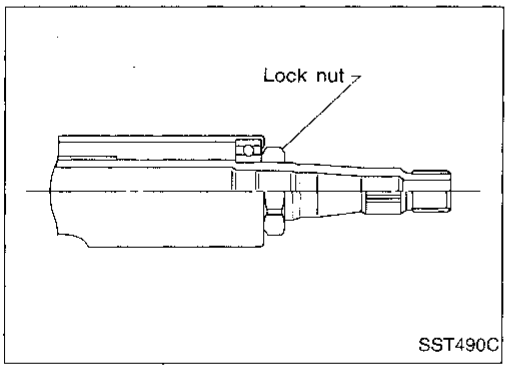
STEERING COLUMN

- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

Disassembly and Assembly

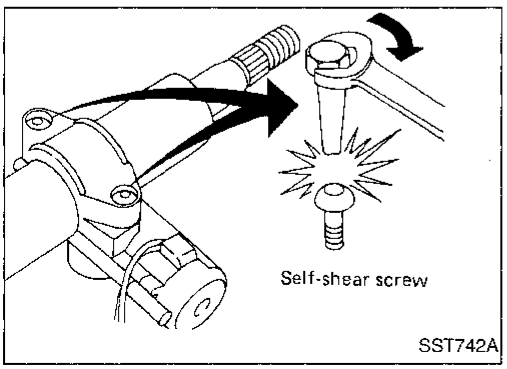


① Combination switch
② Lock nut
③ Jacket tube assembly
④ Tilt lever
⑤ Tilt spring
⑥ Steering column shaft assembly
⑦ Band
⑧ Jacket tube bracket insulator assembly
⑨ Hole cover



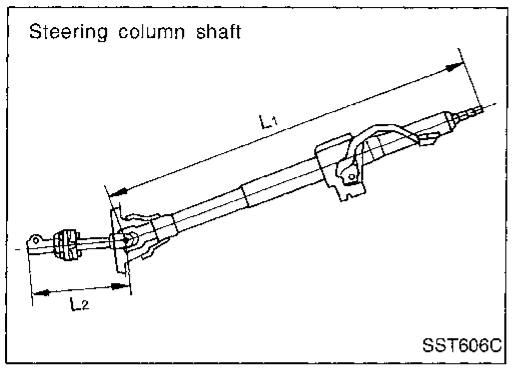
- When disassembling and assembling, unlock steering lock with key.
- Install lock nut on steering column shaft and tighten the nut to specification.

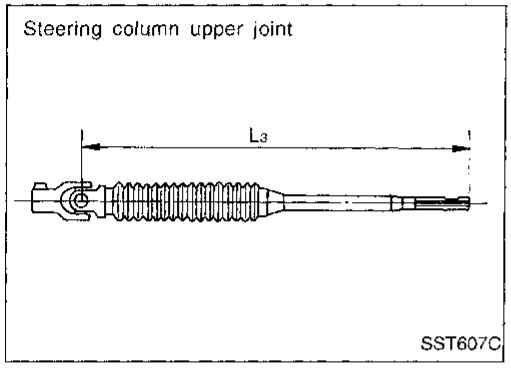
  : 25 - 34 N·m (2.5 - 3.5 kg-m, 18 - 25 ft-lb)

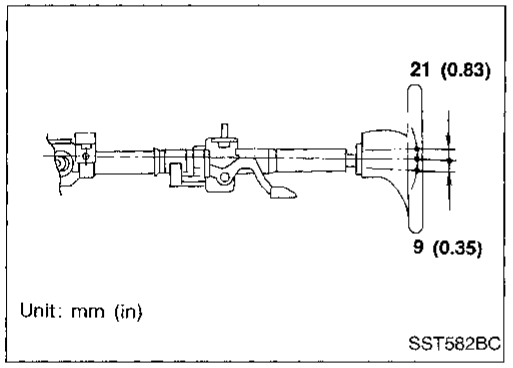


- Steering lock

a. Break self-shear type screws with a drill or other appropriate tool.
b. Install new self-shear type screws and then cut off self-shear type screw heads.







Inspection

- When steering wheel does not turn smoothly, check the steering column as follows 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 steering column lower shaft for deformation or breakage. Replace if necessary.

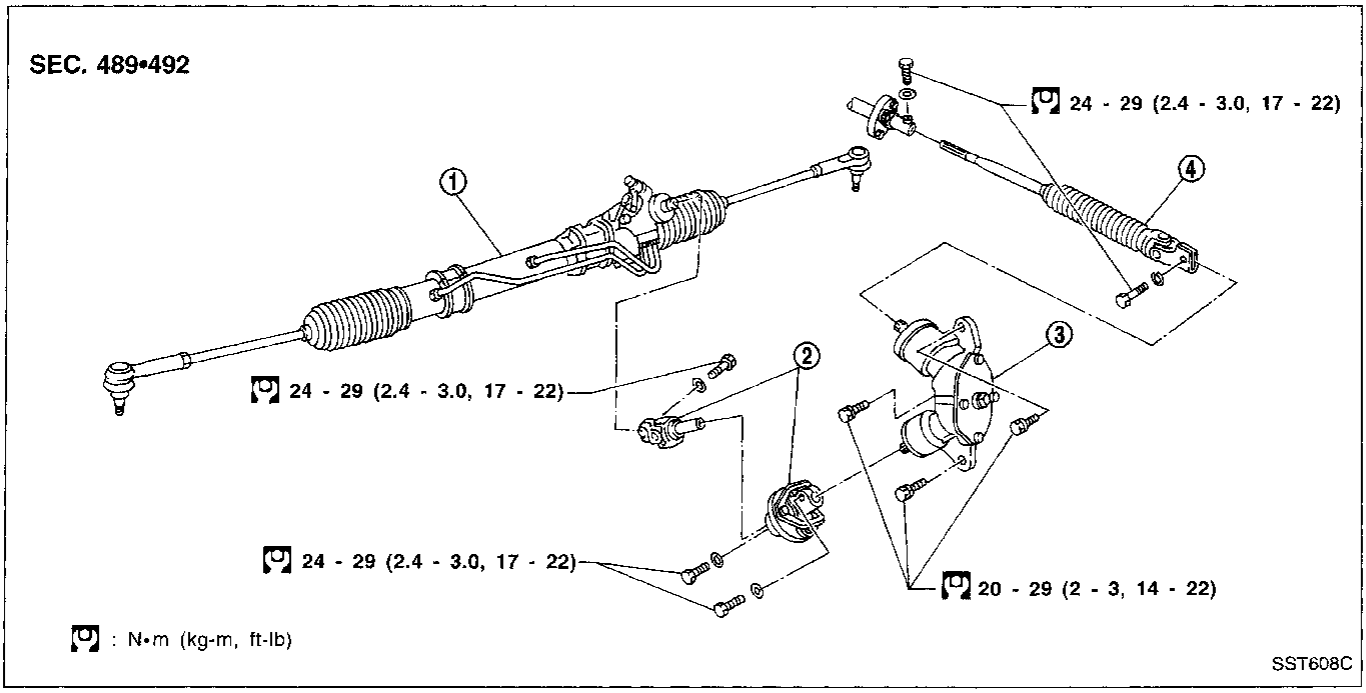
- When the vehicle comes into a light collision, check length "L_1", "L_2" and "L_3".

Steering column length "L_1":
700.3 - 704.3 mm (27.57 - 27.73 in)
Steering column lower shaft length "L_2":
178 - 180 mm (7.01 - 7.09 in)
Steering column upper joint length "L_3":
430.7 - 432.7 mm (16.96 - 17.04 in)

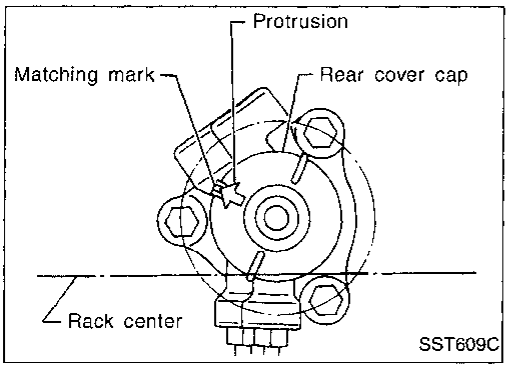
If out of the specifications, replace steering column upper joint or steering column as an assembly.

Tilt mechanism

After installing steering column, check tilt mechanism operation.

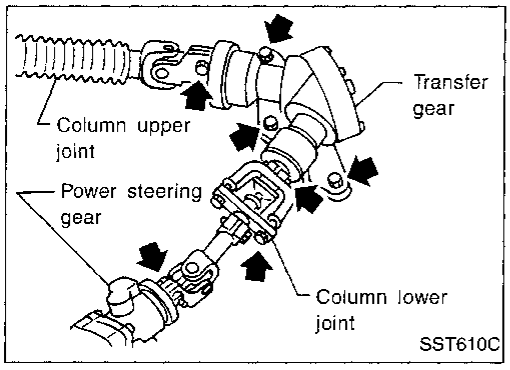


① Power steering gear assembly
② Steering column lower joint
③ Transfer gear assembly
④ Steering column upper joint

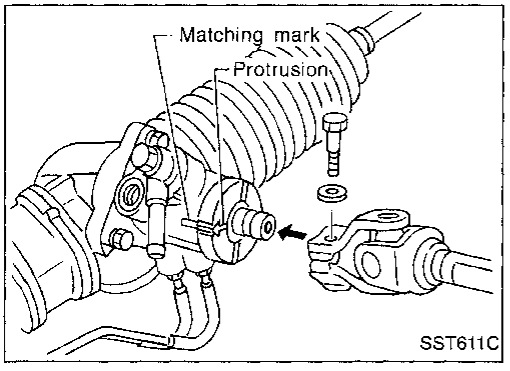


Removal

1. Set wheels in the straight-ahead position.
2. Straight-forward position is indicated by a protrusion on the power steering gear rear cover cap and matching mark on the rear housing.



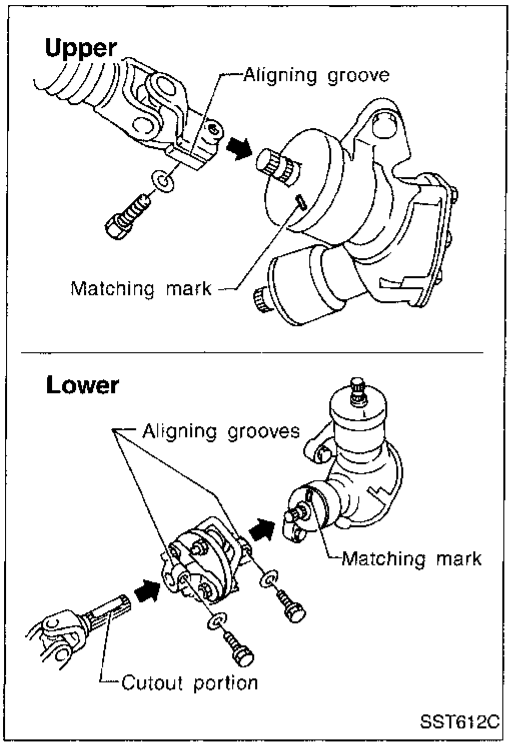
3. Remove steering column upper and lower joint from transfer gear.
4. Remove transfer gear assembly.



Installation

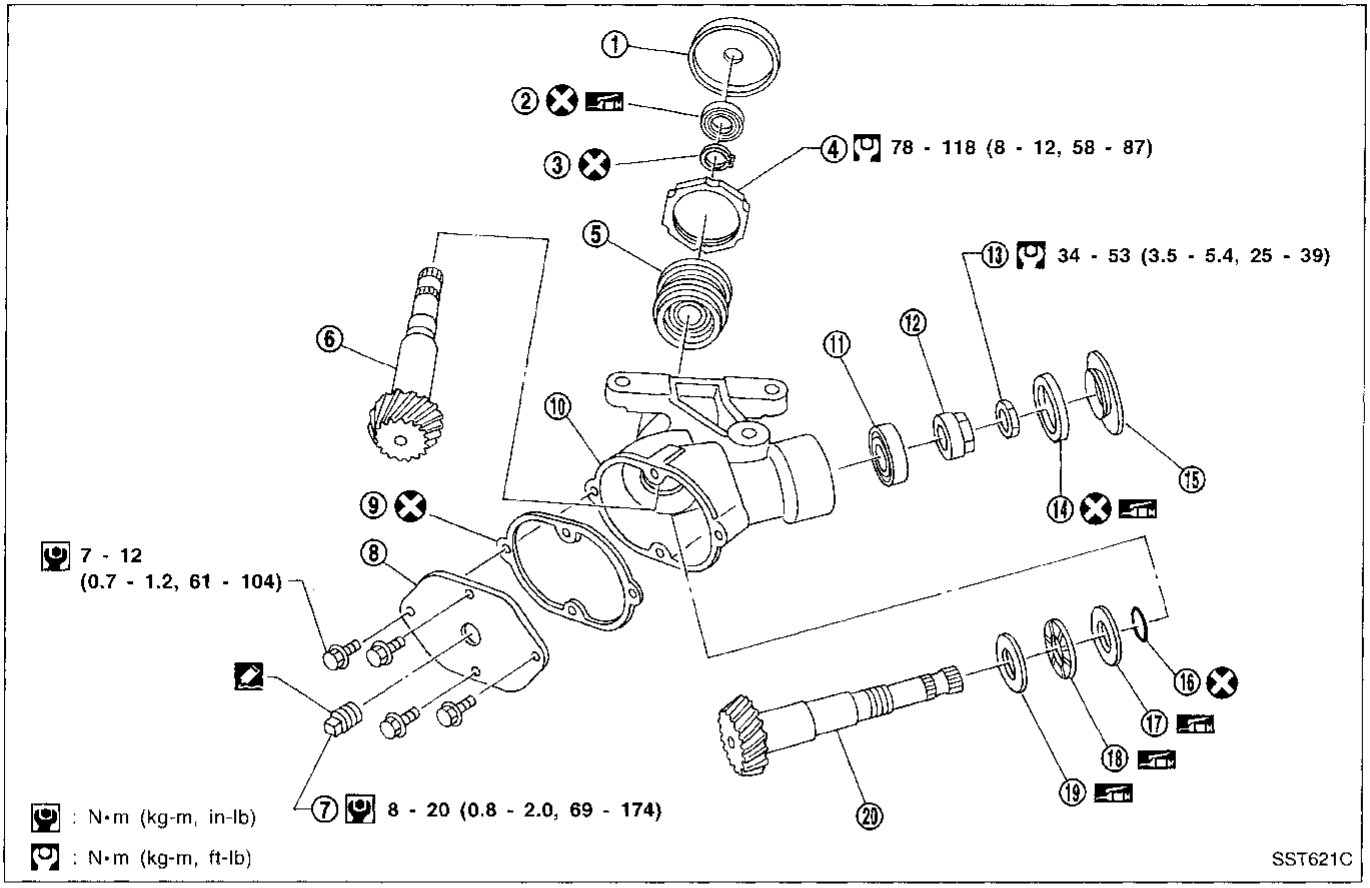
1. Set wheels in the straight-ahead position.
2. Install transfer gear assembly.
3. Install column lower joint while aligning groove with protrusions on the steering gear rear cover cap.
4. Tighten bolt while aligning groove on steering gear. Before tightening bolt, ensure it is inserted correctly.

Installation (Cont'd)

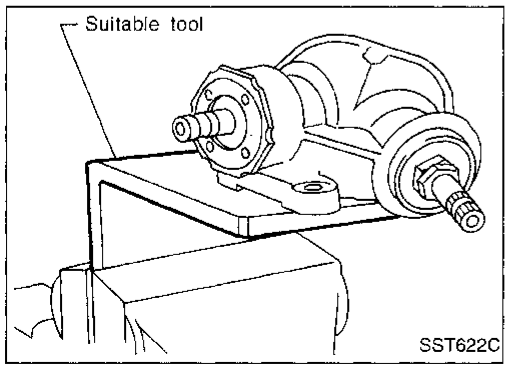


5. When attaching steering column upper and lower joint to transfer gear, it must be positioned as shown in figure at left.

Components



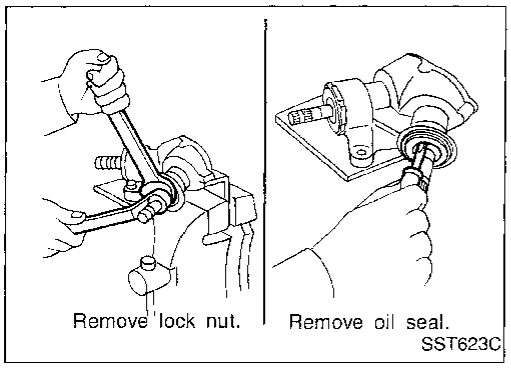
① Dust cover
② Oil seal
③ Snap ring
④ Lock nut
⑤ Rear cover assembly
⑥ Input shaft
⑦ Plug
⑧ Front cover
⑨ Gasket
⑩ Transfer gear box
⑪ Bearing
⑫ Nut
⑬ Lock nut
⑭ Oil seal
⑮ Dust cover
⑯ O-ring
⑰ Bearing race
⑱ Thrust bearing
⑲ Bearing race
⑳ Output shaft



Disassembly

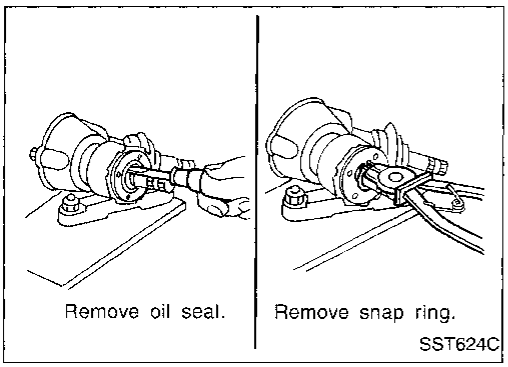
1. Clean exterior of transfer gear assembly.
2. Set transfer gear assembly on vise with suitable tool.
3. Remove dust cover.

Disassembly (Cont'd)



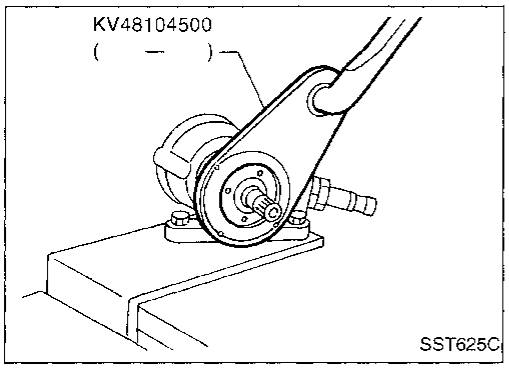
OUTPUT SHAFT SIDE

1. While holding inner nut using one wrench, remove lock nut using another.
2. Remove inner nut.
3. Remove oil seal.

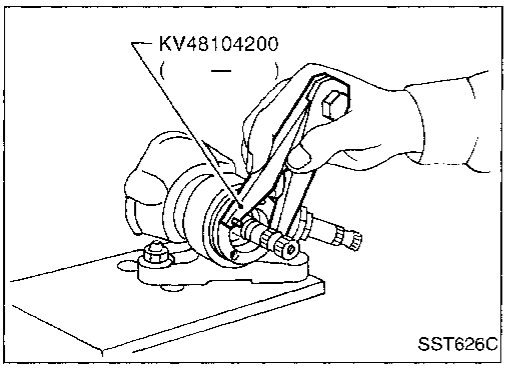


INPUT SHAFT SIDE

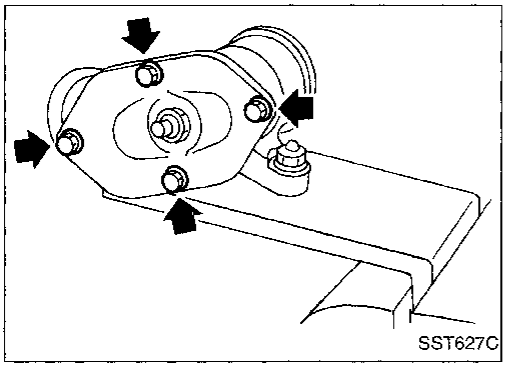
1. Remove oil seal.
2. Remove snap ring.



3. Remove lock nut with Tool.

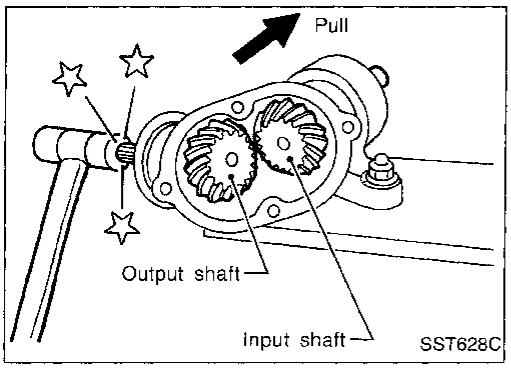


4. Remove rear cover with Tool (pin-type lock nut wrench).



5. Remove front cover.

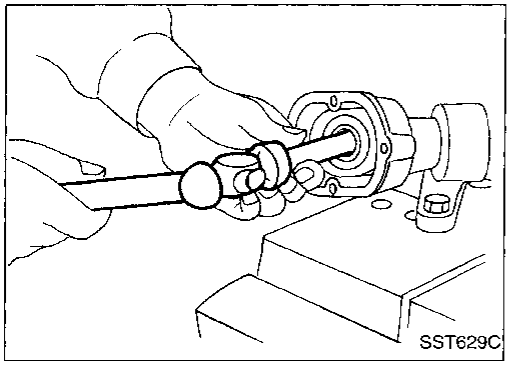
Disassembly (Cont'd)



6. While pulling input shaft in the direction of the arrow shown in figure, drive output shaft out using a plastic hammer. (Input shaft cannot be removed before removing output shaft.)

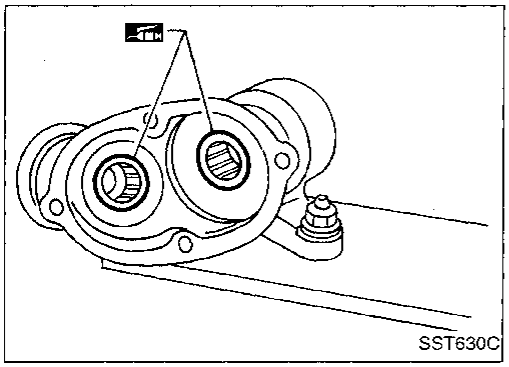
Be careful not to damage thrust bearing between output shaft gear and gear box during removal.

7. Remove thrust bearing from output shaft.
8. Remove input shaft.

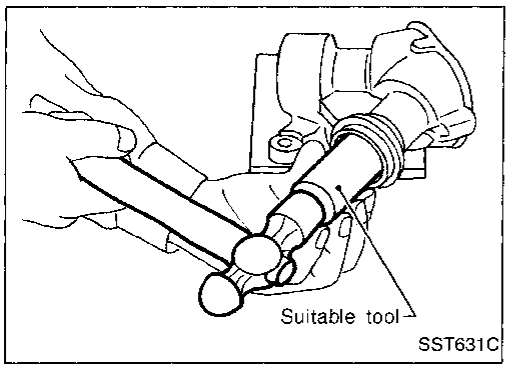


9. Remove output shaft bearing with a brass drift.

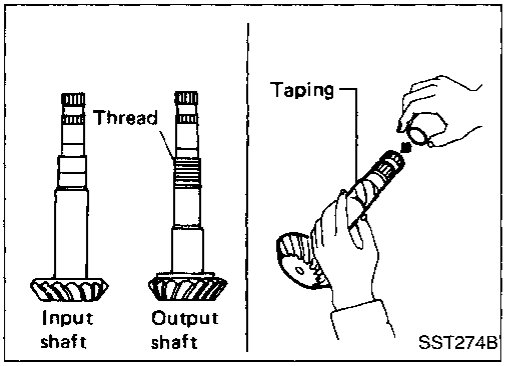
Assembly



1. Apply grease to needle bearings before installing output shaft and input shaft.



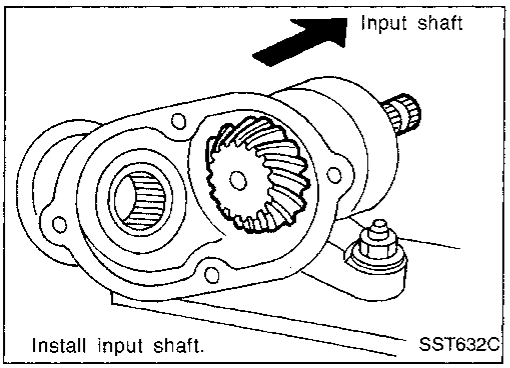
2. Install output shaft bearing with a suitable tool.



3. Insert new O-ring to output shaft.

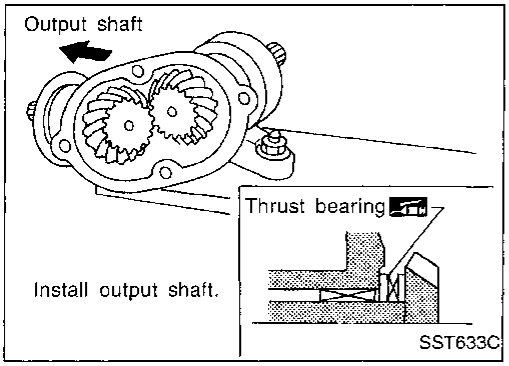
Output shaft is identified by screw threads, as shown. Cover screw threads of output shaft with tape to prevent damage to O-ring.

Assembly (Cont'd)

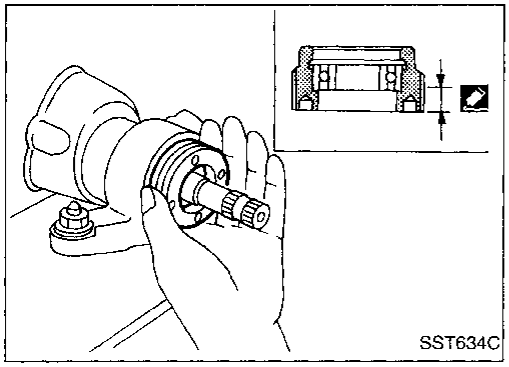


4. Insert input shaft until it comes in contact with end face of gear box.

Output shaft cannot be installed before installing input shaft.

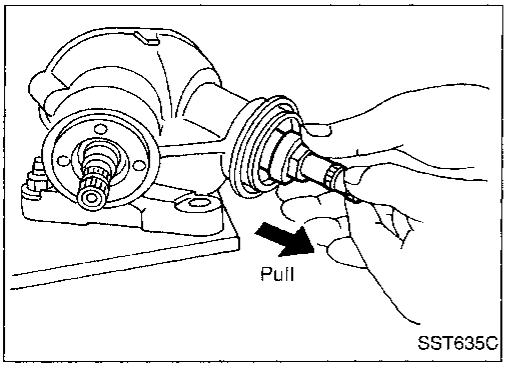


5. Apply grease to output shaft thrust bearing.
6. Insert output shaft until it comes in contact with end face of gear box.



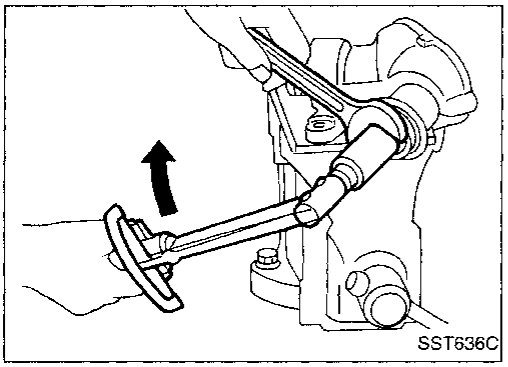
7. Apply liquid packing to input shaft rear cover.
8. Temporarily install input shaft rear cover.

Do not allow input shaft to mesh with output shaft.



9. While pulling output shaft in the direction of the arrow, hand-tighten inner nut.

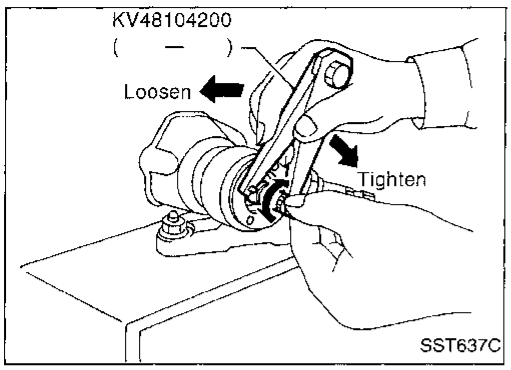
: Approx. 0.1 N·m (1 kg-cm, 0.9 in-lb)



10. While holding inner nut using one wrench, tighten lock nut using another.

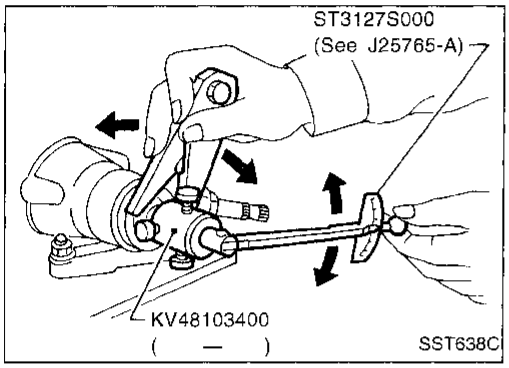
: 34 - 53 N·m (3.5 - 5.4 kg-m, 25 - 39 ft-lb)

Assembly (Cont'd)

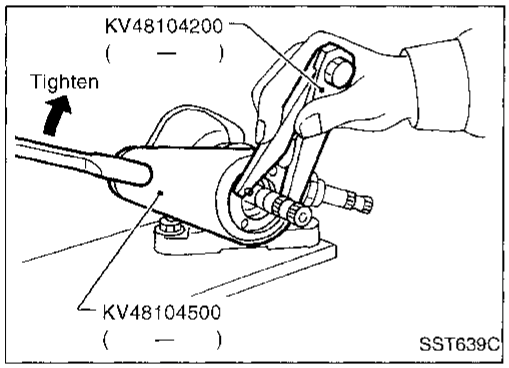


11. Tighten input shaft rear cover until input shaft meshes with output shaft.

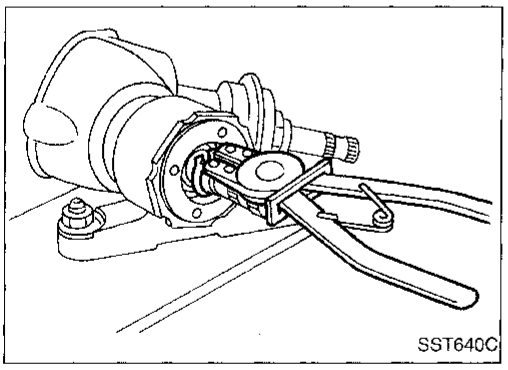
When gears mesh with each other, preload occurs and resistance is felt when gears are rotated.



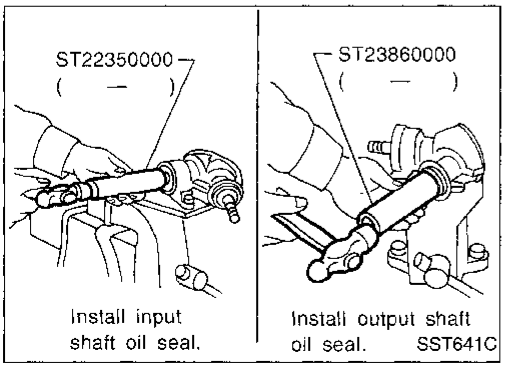
12. While adjusting rear cover, measure rotating torque of input and output shaft (as a unit) with Tools.
    - **Rotating torque:**
      0.03 - 0.15 N·m (0.3 - 1.5 kg-cm, 0.26 - 1.30 in-lb)



13. While holding rear cover with Tool (pin-type nut wrench), tighten lock nut with Tool.
    : 78 - 118 N·m (8 - 12 kg-m, 58 - 87 ft-lb)

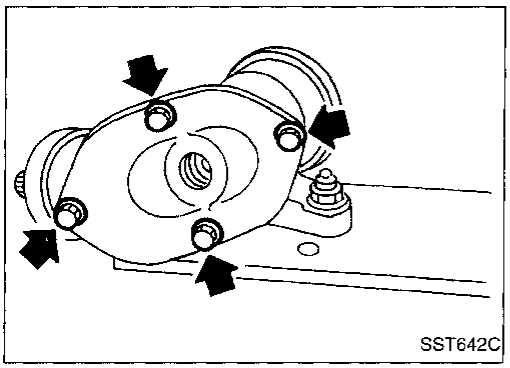


14. Install snap ring.

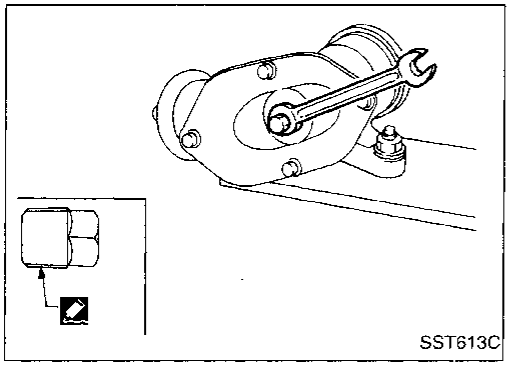


15. Apply grease to input and output seal lips. Install oil seals with Tools.

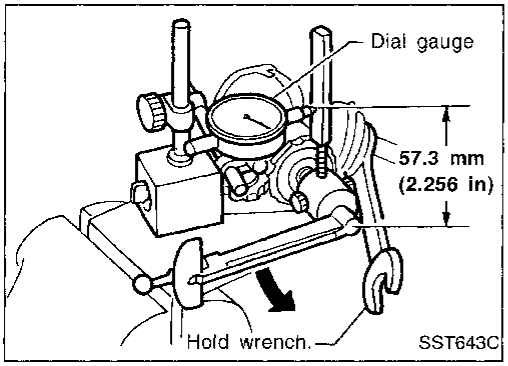
Assembly (Cont'd)



16. Pack input and output shaft gears with specified amount of grease.
    Specified amount of grease:
    40 - 45 g (1.41 - 1.59 oz)
17. Install front cover.

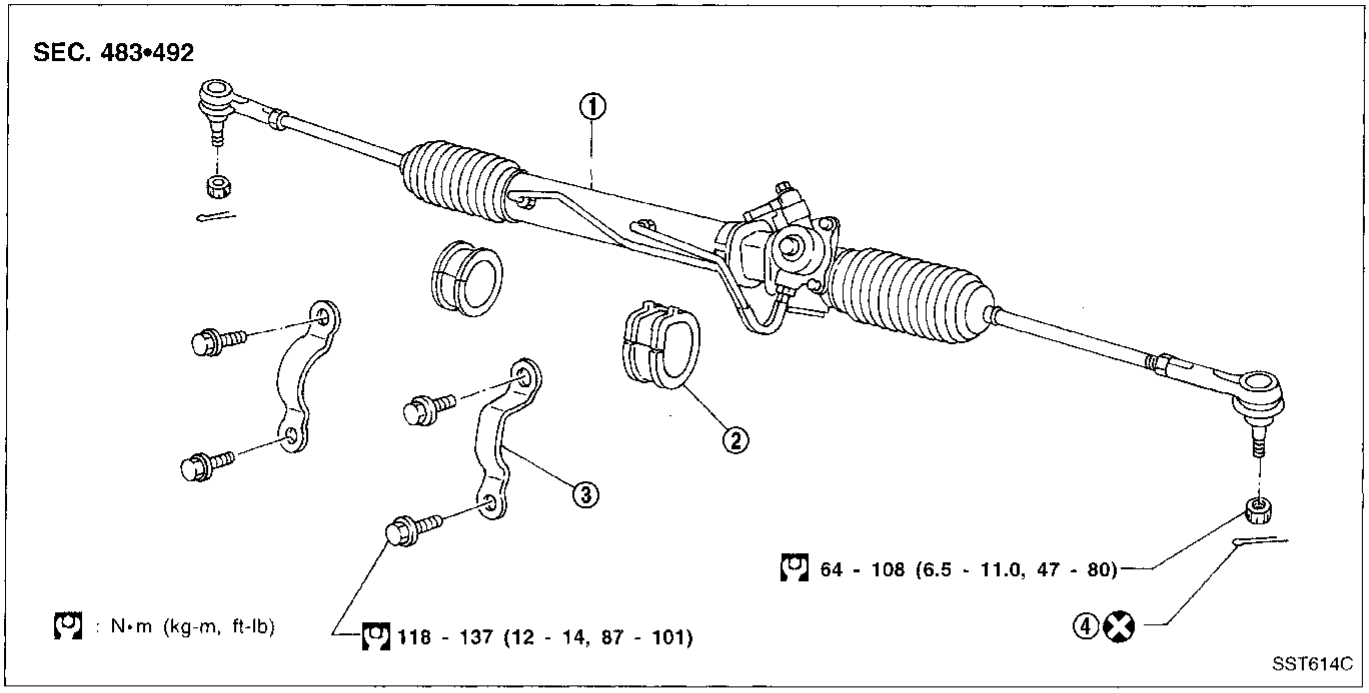


18. Apply liquid packing to threads of plug, and tighten it.
    : 8 - 20 N·m (0.8 - 2.0 kg-m, 69 - 174 in-lb)
19. Install dust cover.

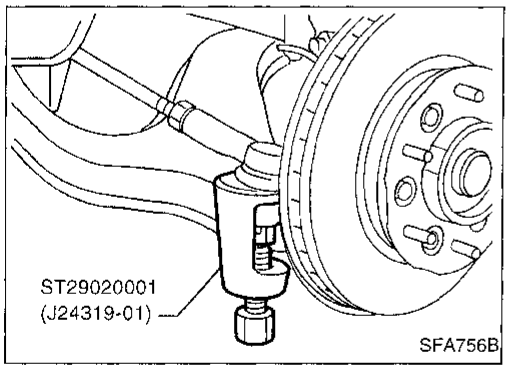


20. While holding output shaft, attach a dial gauge along the shaft 57.3 mm (2.256 in) (in height) from center. Measure backlash while applying a torque of ±0.5 N·m (±5 kg-cm, ±4.3 in-lb) to input shaft.
    Backlash: Less than 0.2 mm (0.008 in)

Removal and Installation

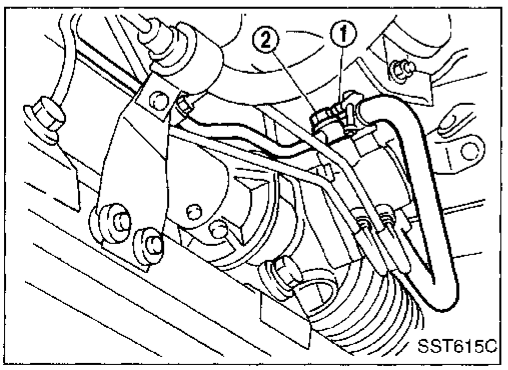


① Gear and linkage assembly
② Rack mounting insulator
③ Gear housing mounting bracket
④ Cotter pin



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.**
- Detach tie-rod outer sockets from knuckle arms with Tool.



- Install pipe connector.
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening will damage threads of connector or O-ring.

  Connector tightening torque:

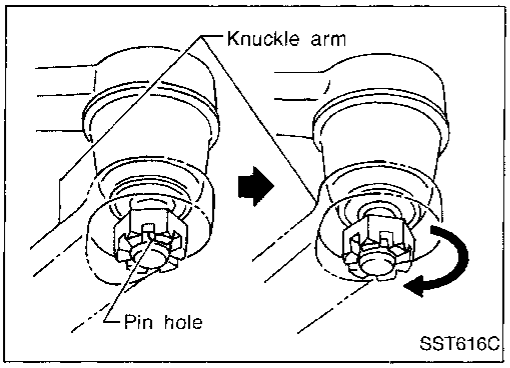
  Low-pressure side "1"

  30 - 35 N·m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)

  High-pressure side "2"

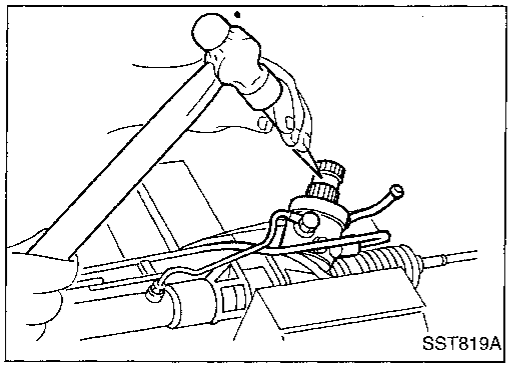
  30 - 35 N·m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.

Removal and Installation (Cont'd)

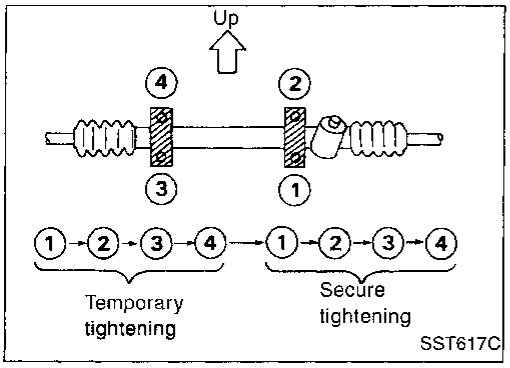


- Initially, tighten nut on tie-rod outer socket and knuckle arm to 64 to 69 N·m (6.5 to 7.0 kg-m, 47 to 51 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:
Tightening torque must not exceed 108 N·m (11.0 kg-m, 80 ft-lb).



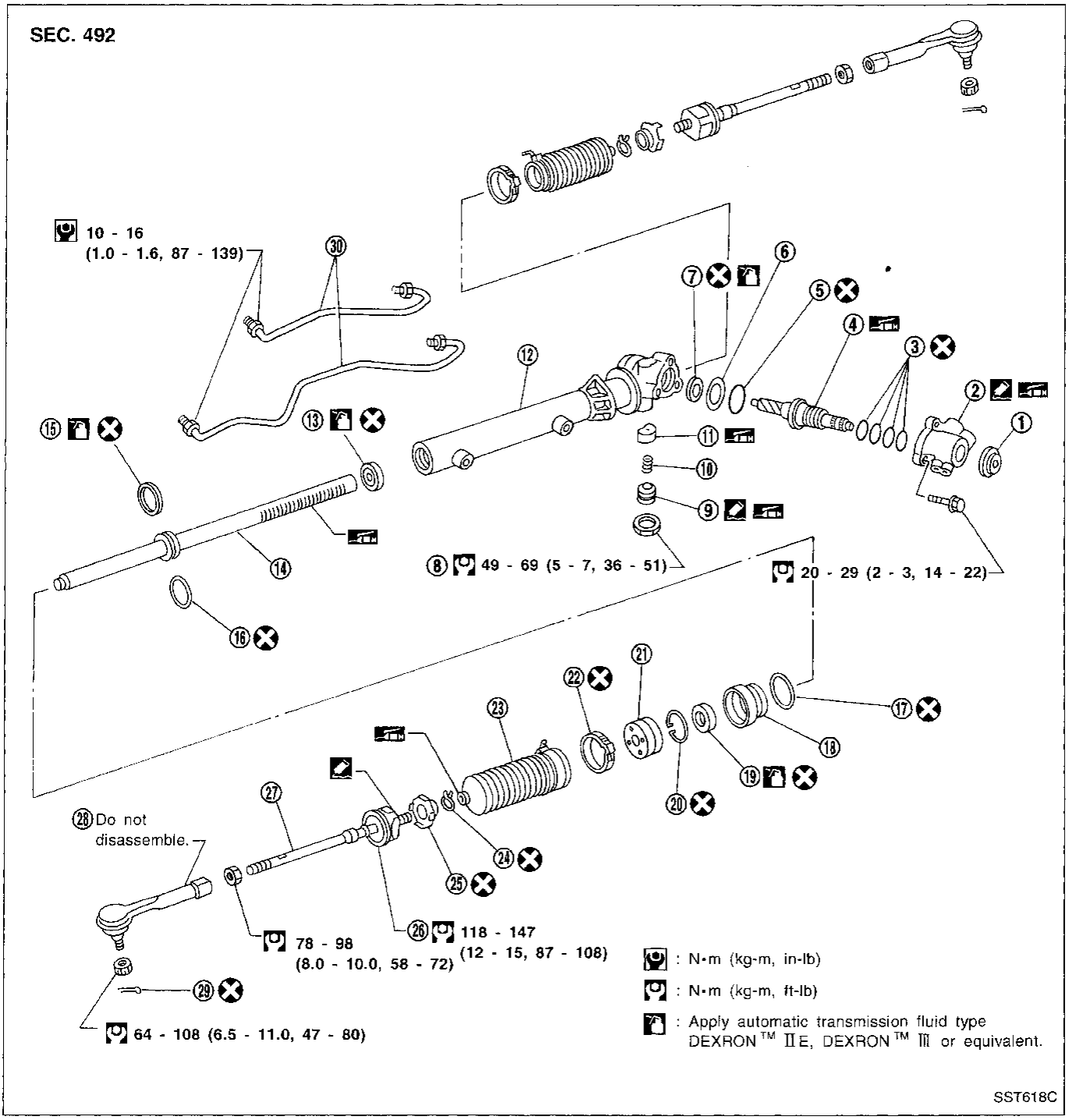
- Before removing steering column lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing steering column lower joint, put matching mark on pinion shaft and pinion housing to record neutral position.
- To install, set left and right dust boots to equal deflection. Attach steering column lower joint by aligning matching marks of pinion shaft and pinion housing.



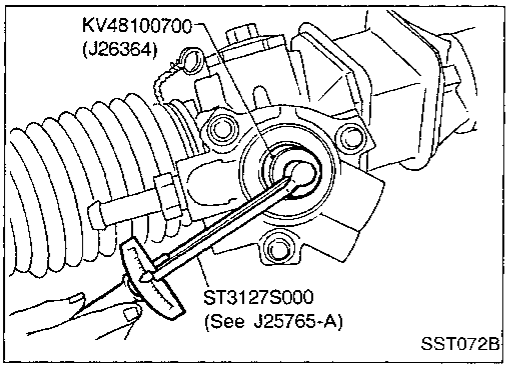
- Tighten gear housing mounting bracket bolts in the order shown.

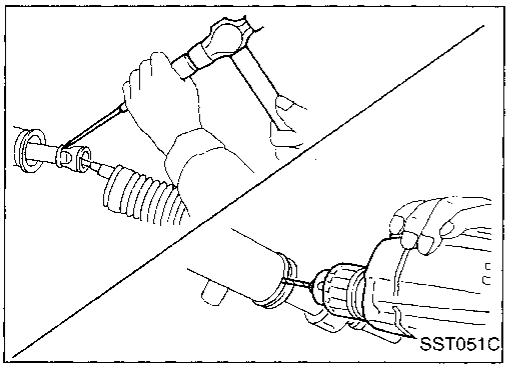
Secure tightening torque:
118 - 137 N·m (12 - 14 kg-m, 87 - 101 ft-lb)

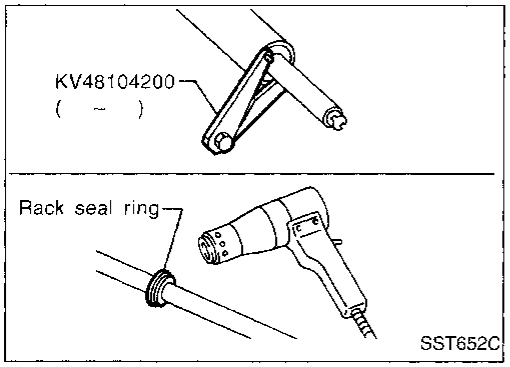
Disassembly and Assembly

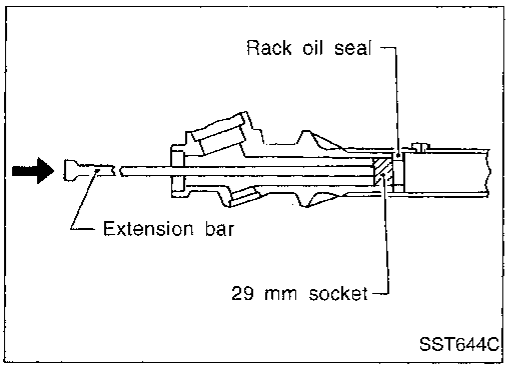


① Rear cover cap
② Rear housing assembly
③ Pinion seal ring
④ Pinion assembly
⑤ O-ring
⑥ Shim
⑦ Pinion oil seal
⑧ Lock nut
⑨ Adjusting screw
⑩ Spring
⑪ Retainer
⑫ Gear housing assembly
⑬ Rack oil seal
⑭ Rack assembly
⑮ Rack seal ring
⑯ O-ring
⑰ O-ring
⑱ Rack bushing
⑲ Rack oil seal
⑳ Snap ring
㉑ End cover assembly
㉒ Boot clamp
㉓ Dust boot
㉔ Boot clamp
㉕ Lock plate
㉖ Tie-rod inner socket
㉗ Tie-rod
㉘ Tie-rod outer socket
㉙ Cotter pin
㉚ Cylinder tube









Disassembly

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.

- **Before measuring, disconnect cylinder tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**

2. Remove pinion gear.

Be careful not to damage pinion gear when removing pinion seal ring.

3. Remove tie-rod outer sockets and boots.
4. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
5. Remove retainer.
6. Remove pinion assembly.
7. Use a 2 to 2.5 mm (0.079 to 0.098 in) diameter drill to completely remove staked portion of gear housing end.
8. Remove gear housing end cover assembly with a suitable tool.
9. Draw out rack assembly.
10. Remove rack seal ring.

- Using a heat gun, heat rack seal to approximately 40°C (104°F).
- Remove rack seal ring.

Be careful not to damage rack.

11. Remove rack bushing and rack oil seal using tape wrapped socket and extension bar.

Do not scratch inner surfaces of pinion housing.

Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid type DEXRON™ IIE, DEXRON™ III or equivalent. Blow dry with compressed air, if available.

BOOT

- Check condition of boot. If cracked excessively, replace it.
- Check boots for accumulation of power steering fluid.

RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it.

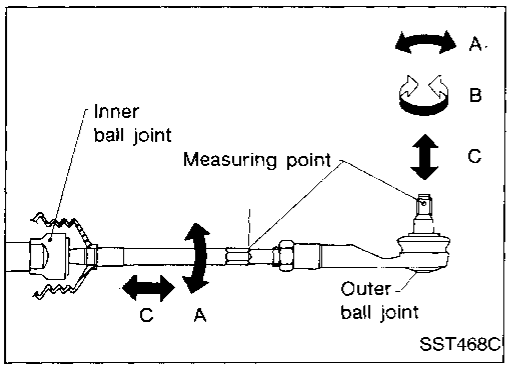
Inspection (Cont'd)

PINION ASSEMBLY

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Check that all bearings roll freely. Ensure that balls, rollers and races are not cracked, pitted or worn.

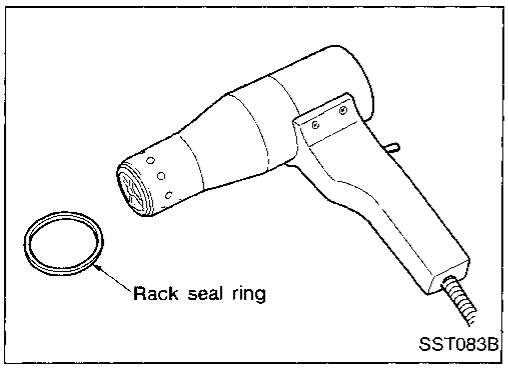
GEAR HOUSING CYLINDER

Check gear housing cylinder bore for scratches or other damage. Replace if necessary.



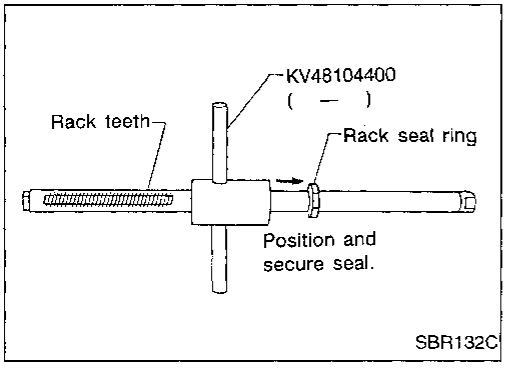
TIE-ROD OUTER AND INNER SOCKETS

- Check ball joints for swinging force.
  Tie-rod outer and inner ball joints swinging force "A":
  Refer to SDS (ST-35).
- Check ball joint for rotating torque.
  Tie-rod outer ball joint rotating torque "B":
  Refer to SDS (ST-35).
- Check ball joints for axial end play.
  Tie-rod outer and inner ball joints axial end play "C":
  Refer to SDS (ST-35).
- Check condition of dust cover. If cracked excessively, replace outer tie-rod.



Assembly

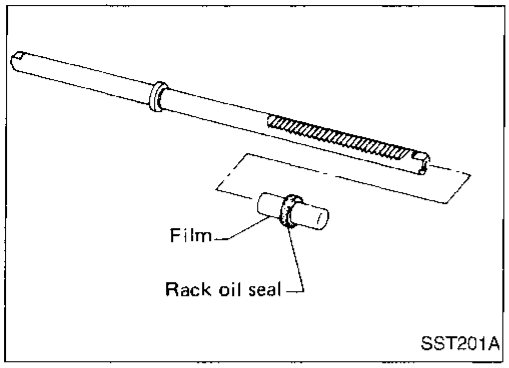
1. Using a heat gun, heat new teflon rack seal ring to approximately 40°C (104°F). Then place it onto rack.



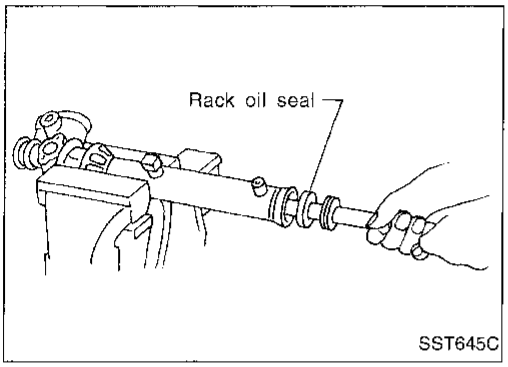
2. Using Tool, compress rack seal ring securely on rack.

Always insert Tool from the rack gear side.

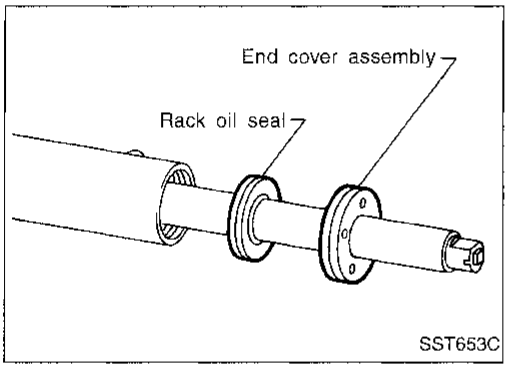
Assembly (Cont'd)



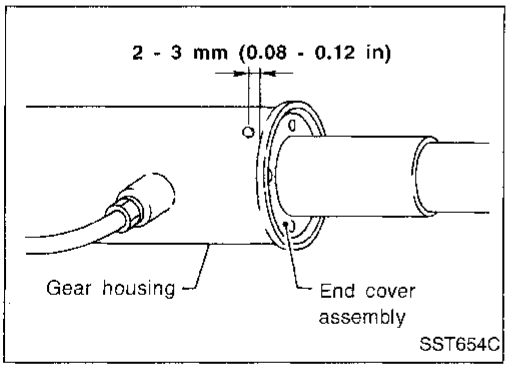
3. Insert new rack oil seal.
   - **Place plastic film into rack oil seal to prevent damage by rack teeth.**
   - **Do not forget to remove plastic film after rack oil seal is positioned properly.**
   - **Make sure lips of rack oil seal face each other.**



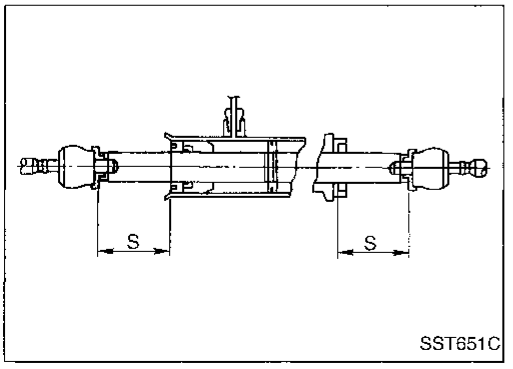
4. Install rack oil seal and rack bushing with rack assembly.



5. Insert rack oil seal and end cover assembly to rack. Then tighten end cover assembly.

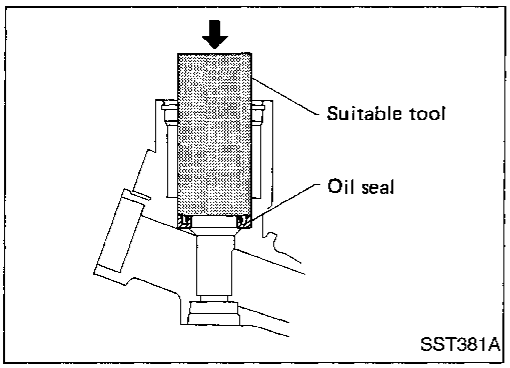


6. Fasten cylinder end cover assembly to gear housing by staking.



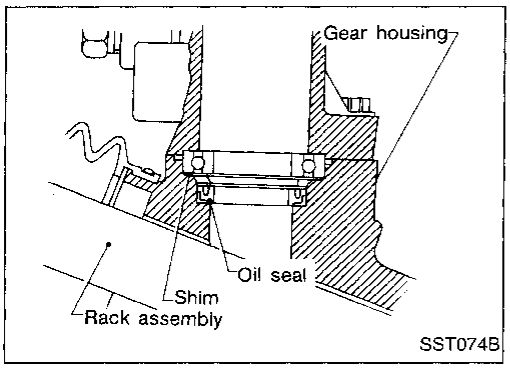
7. Set rack gear in the neutral position.
   Rack stroke "S":
   Refer to SDS (ST-35).

Assembly (Cont'd)

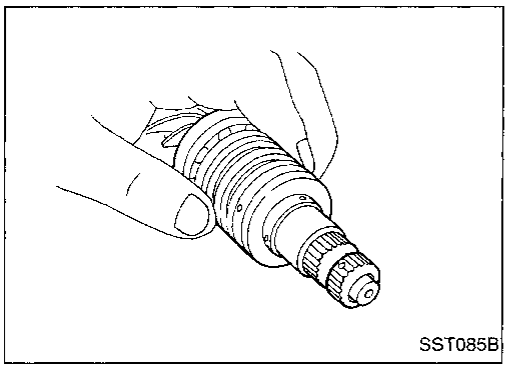


8. Coat seal lip of new pinion oil seal with multi-purpose grease. Install it into pinion housing of gear with a suitable tool.

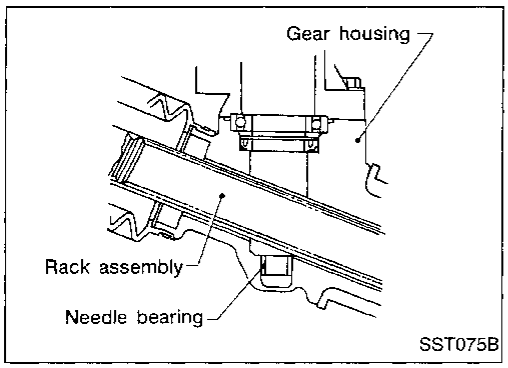
Make sure lip of oil seal faces up when installed.



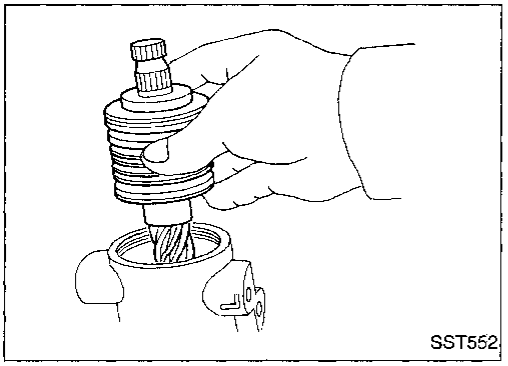
9. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



10. Install new pinion seal ring (made of Teflon) on pinion gear assembly.
- Using a heat gun, heat pinion seal ring to approximately 40°C (104°F) before installing it onto pinion gear assembly.
- Make sure pinion seal ring is properly settled in valve groove.



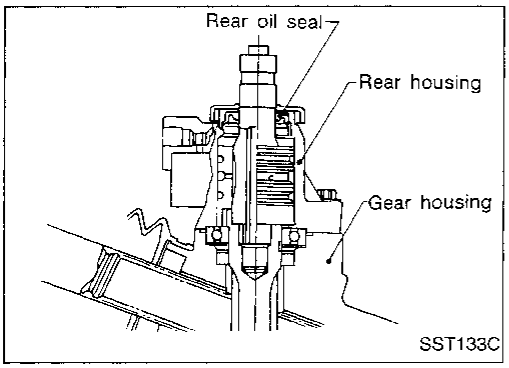
11. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip.



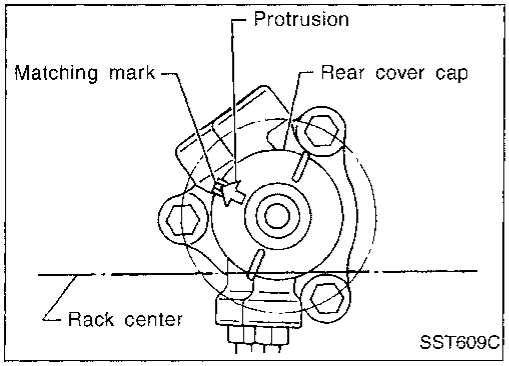
12. Install pinion assembly to rear housing.

Be careful not to damage pinion oil seal.

Assembly (Cont'd)



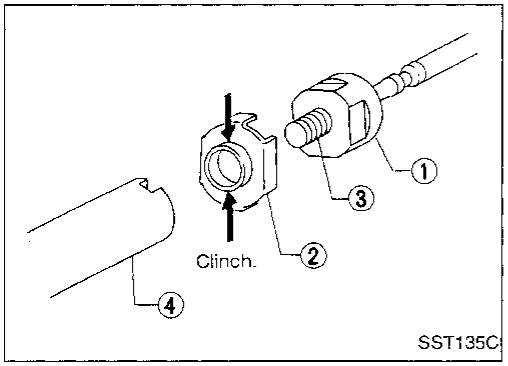
13. Apply a coat of multi-purpose grease to new rear oil seal lip before installing rear housing.



14. Ensure that the rack is centered. Install rear cover cap so that its protrusion is positioned as shown in figure.

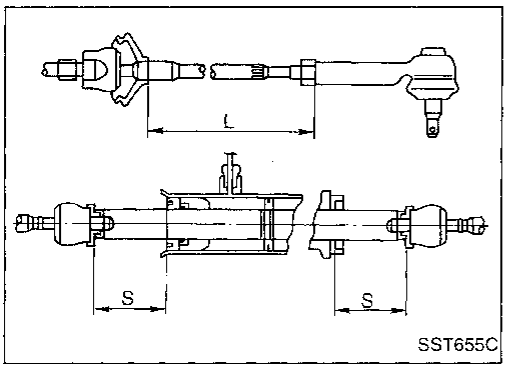
Be careful not to damage worm ring and oil seal.

15. Install retainer, spring and adjusting screw temporarily.

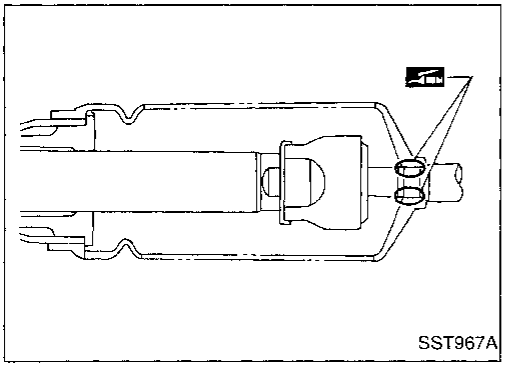


16. Install new lock plate.
- Attach lock plate ② to side rod inner socket ①.
- Apply locking sealant to inner socket threads ③. Screw inner socket into rack ④ and tighten to specified torque.
- Clinch two places of lock plate at rack's groove.

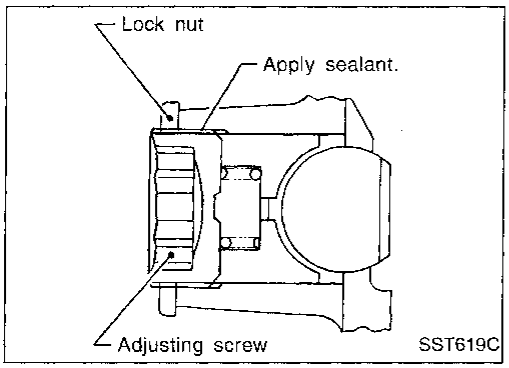
CAUTION:
To prevent scratching the boot, remove burrs from lock plate.



17. Tighten outer socket lock nut.
Tie-rod length "L":
Refer to SDS (ST-35).
18. Measure rack stroke.
Rack stroke "S":
Refer to SDS (ST-35).



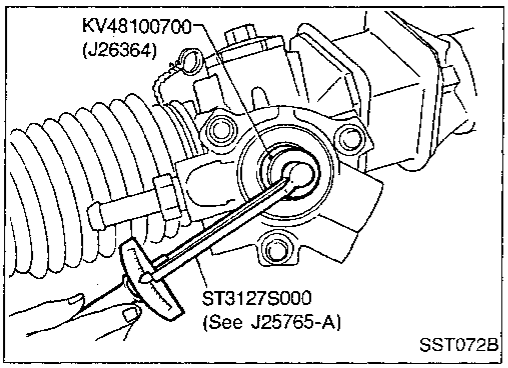
19. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.



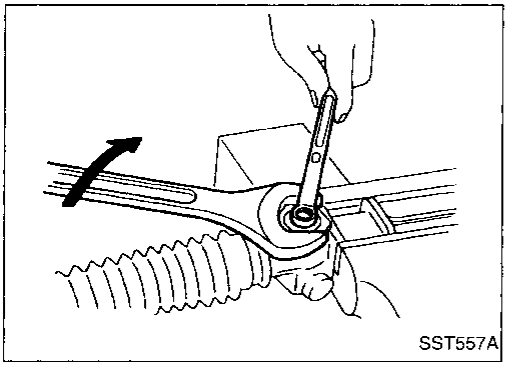
Adjustment

Adjust pinion rotating torque as follows:

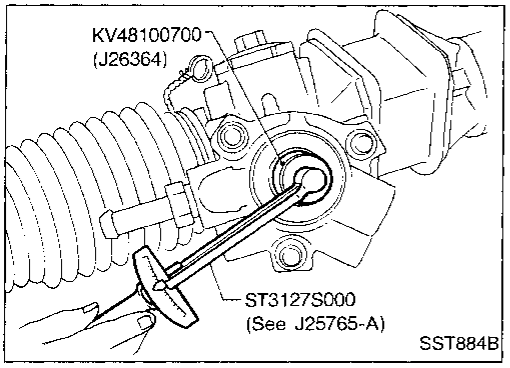
1. Set rack to the neutral position without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.2 N·m (2 kg-cm, 1.7 in-lb).



6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of 180° from neutral position.
   Stop the gear at the point of maximum torque.
8. Loosen adjusting screw, then retighten it to 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
9. Loosen adjusting screw by 10° to 20°.



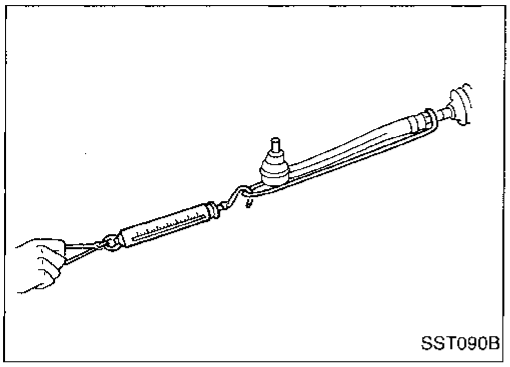
10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.



11. Measure pinion rotating torque.
    Lock to lock:
    Average rotating torque
    0.78 - 1.47 N·m (8.0 - 15.0 kg-cm, 6.9 - 13.0 in-lb)
    Within ±100° from the neutral position:
    Maximum torque variation
    0.4 N·m (4 kg-cm, 3.5 in-lb)
    Outside the above range:
    Maximum force variation
    0.6 N·m (6 kg-cm, 5.2 in-lb)

- If pinion rotating torque is not within specifications, readjust it starting from step 4. If pinion rotating torque is still out of specifications after readjustment, replace steering gear assembly.

Adjustment (Cont'd)

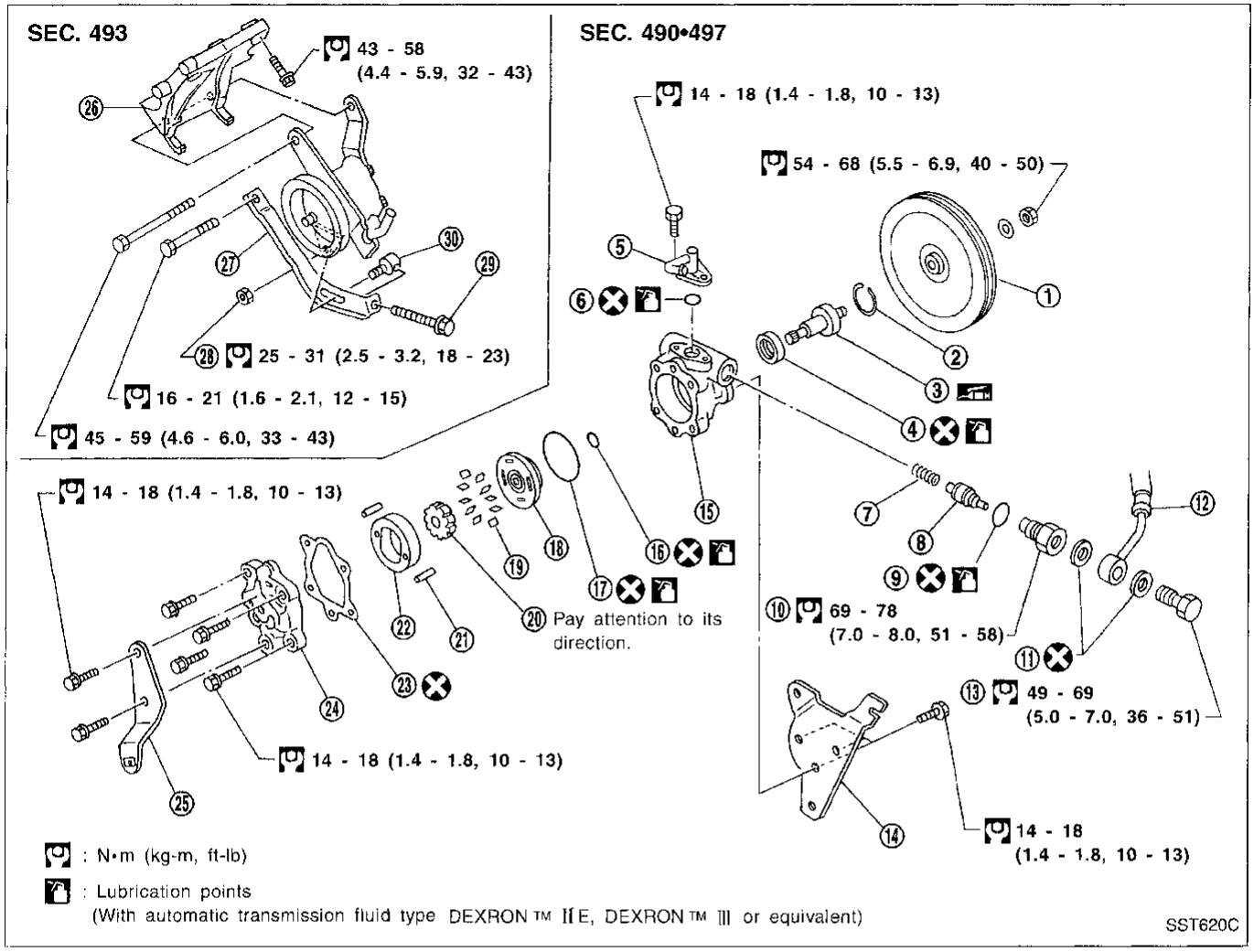

SST090B

12. Check rack sliding force on vehicle as follows:
a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
b. Connect all piping and fill with steering fluid.
c. Start engine and bleed air completely.
d. Disconnect steering column lower joint from the gear.
e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
f. Pull tie-rod slowly to move it from neutral position to ±11.5 mm (±0.453 in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

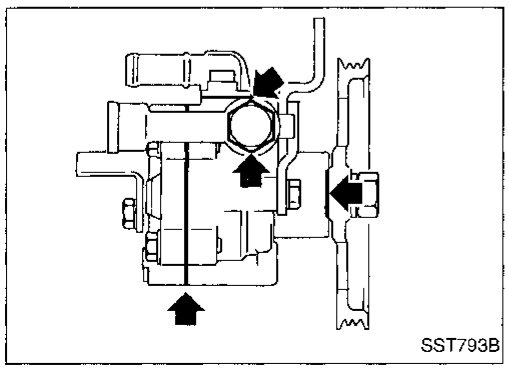
Rack sliding force:
137 - 255 N (14 - 26 kg, 31 - 57 lb)

- If rack sliding force is not within specification, readjust by repeating adjustment procedure from the beginning.
- If rack sliding force is still out of specification after readjustment, gear assembly needs to be replaced.

Disassembly and Assembly



① Pulley
② Snap ring
③ Drive shaft assembly
④ Oil seal
⑤ Suction pipe
⑥ O-ring
⑦ Spring
⑧ Flow control valve
⑨ O-ring
⑩ Connector
⑪ Copper washer
⑫ Hose
⑬ Eye bolt
⑭ Front bracket
⑮ Front housing
⑯ O-ring
⑰ O-ring
⑱ Front side plate
⑲ Vane
⑳ Rotor
㉑ Pin
㉒ Cam ring
㉓ Gasket
㉔ Rear cover
㉕ Rear bracket
㉖ Power steering pump bracket
㉗ Adjusting bar
㉘ Adjusting bolt lock nut
㉙ Adjusting bolt
㉚ Adjusting bolt bracket



Pre-disassembly Inspection

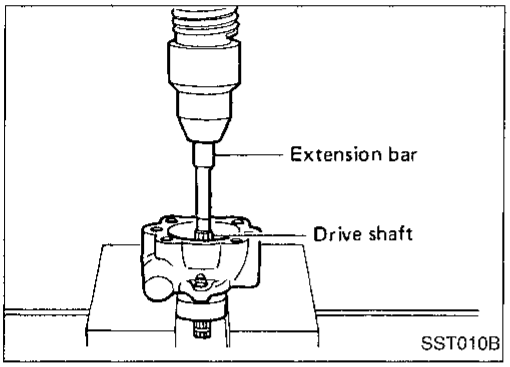
Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance.

Disassembly

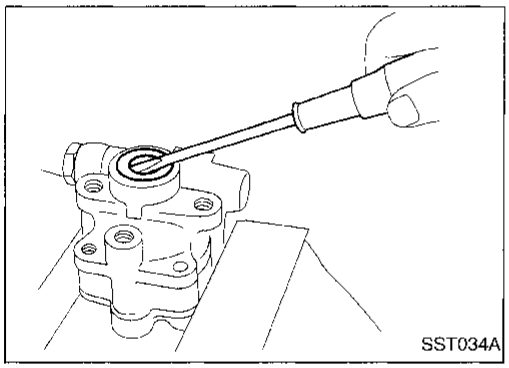
CAUTION:

- **Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.**
- **Disassemble in as clean a place as possible.**
- **Clean your hands before disassembly.**
- **Do not use rags; use nylon cloths or paper towels.**
- **Follow the procedures and cautions in the Service Manual.**
- **When disassembling and reassembling, do not let foreign matter enter or contact the parts.**



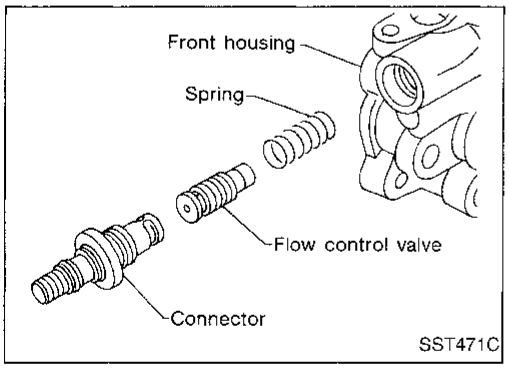
- Remove snap ring, then draw pulley shaft out.

Be careful not to drop drive shaft.



- Remove oil seal.

Be careful not to damage front housing.

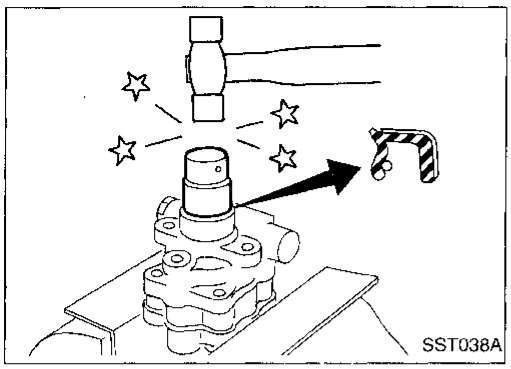


- Remove connector and flow control valve with spring.

Be careful not to drop flow control valve.

Inspection

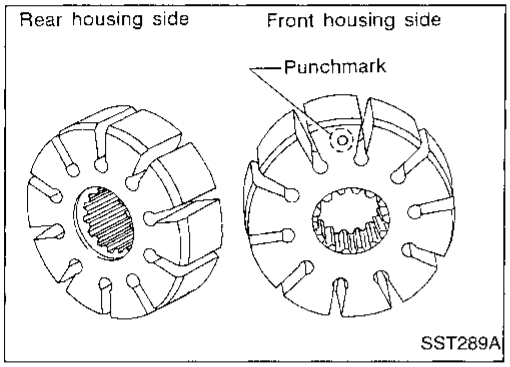
- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration on pulley or pulley shaft is deformed or worn, replace it.



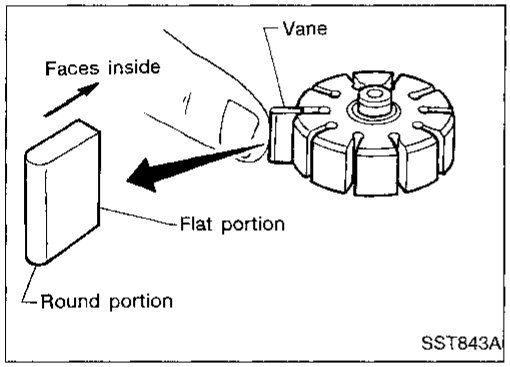
Assembly

Assemble oil pump, noting the following instructions.

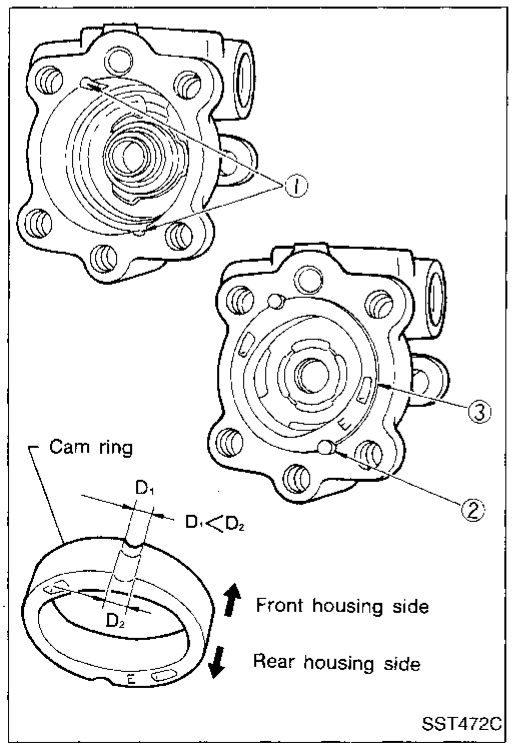
- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with ATF when assembling.



- Pay attention to the direction of rotor.



- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.



- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

  Cam ring:

  D_1 is less than D_2.

General Specifications

Applied model	235/70 R15 tire	265/70 R15 tire
Steering model	Power steering	
Steering gear type	PR32K	
Steering overall gear ratio	17.2	
Turns of steering wheel (Lock to lock)	3.28	3.09
Steering column type	Collapsible, tilt	

Inspection and Adjustment

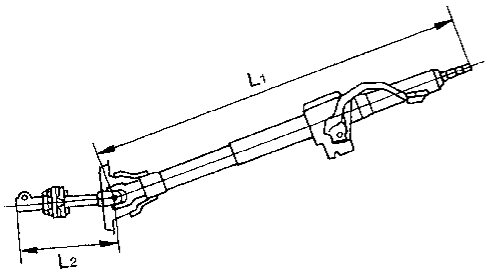
GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less
Movement of gear housing mm (in)	±2 (±0.08) or less

STEERING COLUMN

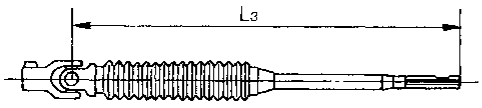
Steering column length "L_1" mm (in)	700.3 - 704.3 (27.57 - 27.73)
Steering column lower shaft length "L_2" mm (in)	178 - 180 (7.01 - 7.09)
Steering column upper joint length "L_3" mm (in)	430.7 - 432.7 (16.96 - 17.04)

Steering column shaft



SST606C

Steering column upper joint

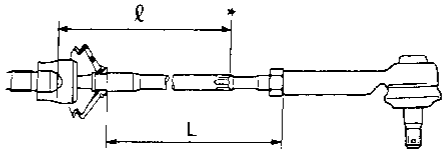


SST607C

STEERING GEAR AND LINKAGE

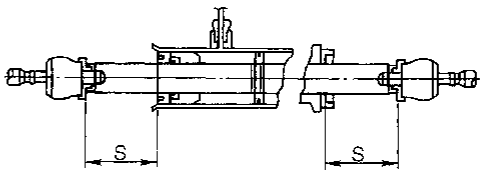
Applied model	235/70 R15 tire	265/70 R15 tire
Steering gear type	PR32K	
Tie-rod outer ball joint		
Swinging force at cotter pin hole: "A" N (kg, lb)	4.9 - 47.1 (0.5 - 4.8, 1.1 - 10.6)	
Rotating torque: "B" N·m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)	
Axial end play: "C" mm (in)	0.1 (0.004) or less	
Tie-rod inner ball joint		
Swinging force*: "A" N (kg, lb)	3.9 - 32.4 (0.4 - 3.3, 0.9 - 7.3)	
Axial end play: "C" mm (in)	0.3 (0.012) or less	
Tie-rod standard length "L" mm (in)	200 (7.87)	

*: Measuring point [ℓ: 240 mm (9.45 in)]



SST488C

Rack stroke "S"	mm (in)	76.5 (3.012)	72.0 (2.835)



SST651C

Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE (Cont'd)

Steering gear type	PR32K
Pinion gear preload without gear fluid N·m (kg-cm, in-lb)	
Lock to lock	
Average rotating torque	0.78 - 1.47 (8.0 - 15.0, 6.9 - 13.0)
Within ±100° from the neutral position	
Maximum torque variation	0.4 (4, 3.5)
Outside the above range	
Maximum torque variation	0.6 (6, 5.2)

STEERING TRANSFER GEAR

Rotating torque N·m (kg-cm, in-lb)	0.03 - 0.15 (0.3 - 1.5, 0.26 - 1.30)
Grease	
Quality	Multi-purpose grease [NLGI No.2 (Lithium soap base)]
Specified amount of grease g (oz)	40 - 45 (1.41 - 1.59)
Backlash mm (in)	Less than 0.2 (0.008)

POWER STEERING

Steering gear type	PR32K
Rack sliding force N (kg, lb)	
Under normal operating oil pressure	137 - 255 (14 - 26, 31 - 57)
Retainer adjustment	
Adjusting screw	
Initial tightening torque N·m (kg-cm, in-lb)	4.9 - 5.9 (50 - 60, 43 - 52)
Retightening torque after loosening	0.2 (2, 1.7)
Tightening torque after gear has settled	4.9 - 5.9 (50 - 60, 43 - 52)
Returning angle degree	10° - 20°
Steering wheel turning force (Measured at one full turn from the neutral position) N (kg, lb)	39 (4, 9) or less
Fluid capacity (Approximate) ℓ (US qt, Imp qt)	0.9 (1, 3/4)
Oil pump maximum pressure kPa (kg/cm^2, psi)	8,630 - 9,219 (88 - 94, 1,251 - 1,337)