STEERING SYSTEM

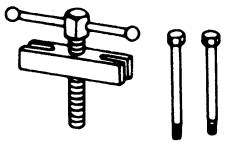
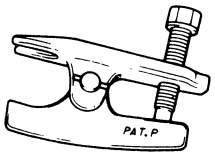
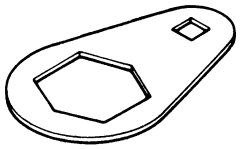
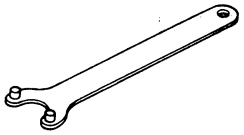
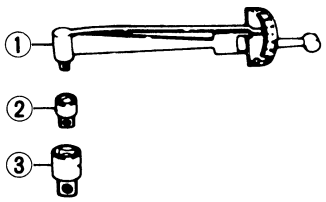
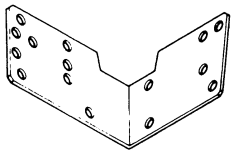
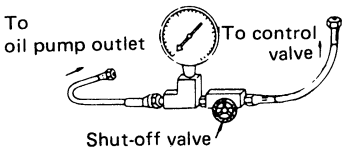
SECTION ST

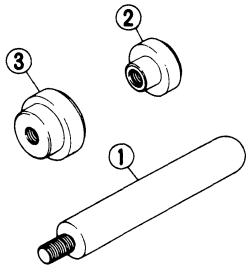
CONTENTS

- 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 in parts rack so they can be put back in the unit in their proper positions.
- Use a nylon cloth or paper towel for wiping parts clean. Common shop rags can leave lint that might interfere with the operation.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Before assembly, apply a coat of recommended A.T.F.* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Gaskets, seals, and O-rings should be replaced. Care should be taken to avoid damaging O-rings, seals and gaskets when assembling. It is also very important to perform functional tests whenever it is designated.

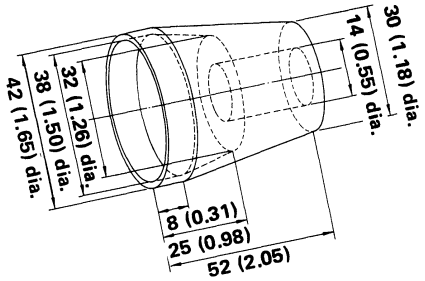
*A.T.F.: Automatic transmission fluid

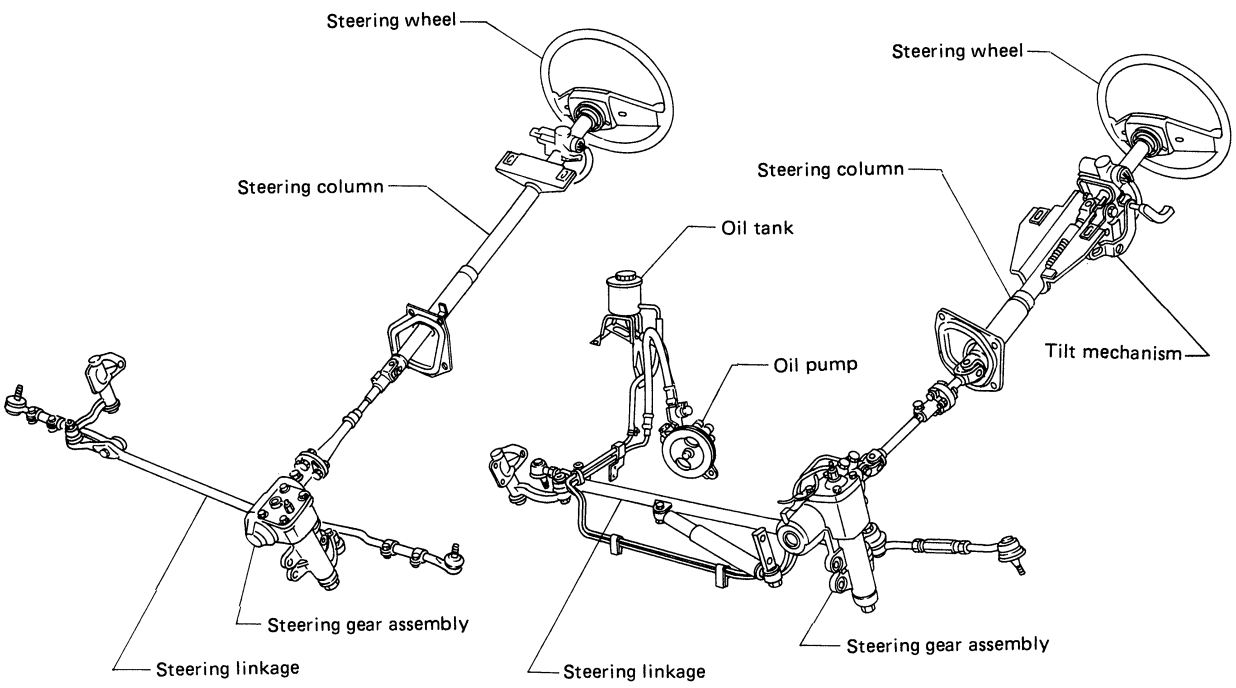
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description		Unit application	
			Manual steering	Power steering
ST27180001 (J25726-A) Steering wheel puller		Removing steering wheel	X	X
HT72520000 (J25730-A) Ball joint remover		Removing ball joint	X	X
ST29020001 (J24319-01) Steering gear arm puller		Removing pitman arm	X	X
KV48101500 (J28802) Lock nut wrench			X	–
KV48101400 (J28803) Adjusting plug wrench		Adjusting and tightening lock nut	X	–
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (–) Socket adapter ③ HT62900000 (–) Socket adapter		Measuring turning torque	X	X
KV48100301 (–) Strut & steering gearbox attachment		Steering gear is installed.	X	X
ST27091000 (J26357) Pressure gauge		Measuring oil pressure	–	X

Tool number (Kent-Moore No.) Tool name	Description	Unit application	
		Manual steering	Power steering
KV481009S0 (–) Oil seal drift set ① KV48100910 (–) Drift ② KV48100920 (J26367) Adapter ③ KV48100930 (J26367) Adapter	Installing oil seal 	–	X
KV48100700 (J26364) Torque adapter	Adjusting worm bearing preload 	X	X

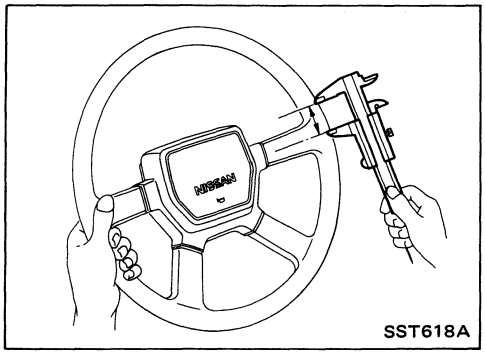
COMMERCIAL SERVICE TOOL

Tool name	Description	Unit application	
		Manual steering	Power steering
Boot band attachment	Installing boot band  Unit: mm (in) SST671A	X	X



Manual steering **Power steering**

SST719A



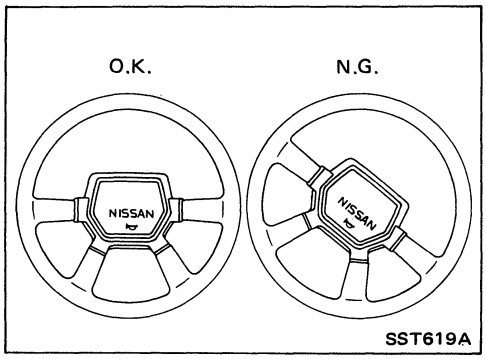
Checking Steering Wheel Play

- With wheels in a straight ahead position and check steering wheel play.

  Steering wheel play:

  35 mm (1.38 in) or less

- If it is not within specification, check backlash of steering gear, tie-rod outer and inner ball joints.



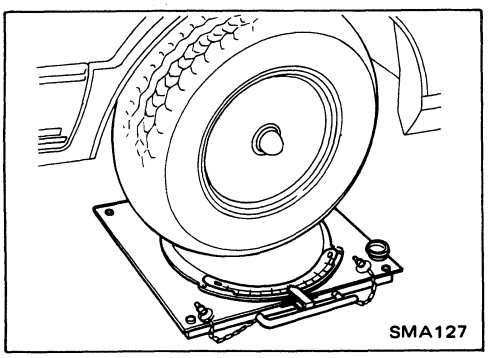
Checking Neutral Position on Steering Wheel

Pre-checking

- Verify that the steering gear is centered before removing the steering wheel.

Checking

- Check that the steering wheel is in the neutral position when driving straight-ahead.
- If it is not in the neutral position, remove the steering wheel and reinstall it correctly in the neutral position.
- 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.



Checking Front Wheel Turning Angle

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

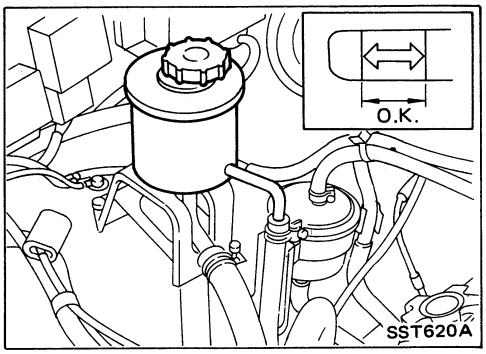
  Turning angle:

  Full turns and toe-out turn

  Refer to section FA for S.D.S.

Checking and Adjusting Drive Belts (Power steering)

- **Refer to section MA for Drive Belt Inspection.**

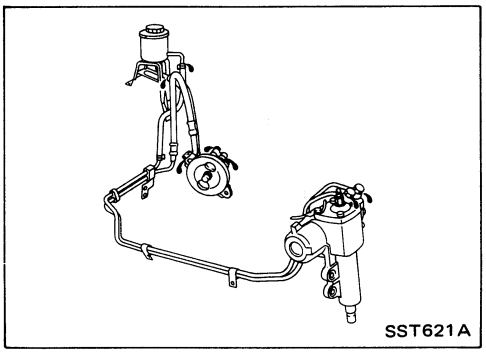


Checking Fluid Level (Power steering)

Check the fluid level when the fluid is cold.

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Automatic Transmission Fluid "Dexron Type".**



Checking Fluid Leakage (Power steering)

Check lines for proper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.

1. Run engine at idle speed or 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 steering wheel at lock position for more than fifteen seconds at a time.

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 (Power steering)

1. Raise front end of vehicle until wheels clear ground.
2. While adding fluid, quickly turn steering wheel fully to right and left until it lightly touches steering stoppers.

CAUTION:

Do not hold steering wheel in lock position for more than fifteen seconds.

   Repeat steering wheel operation until fluid level no longer decreases.

3. Start engine.
   Repeat step 2 above.

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

① Generation of air bubbles in reservoir tank
② Generation of clicking noise in oil pump
③ Excessive buzzing in oil pump

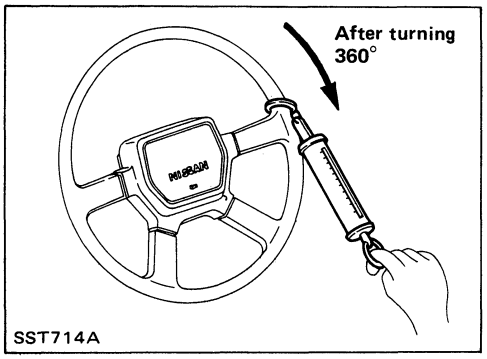
Bleeding Hydraulic System (Power steering) (Cont'd)

In steering while the vehicle is stationary, or when moving wheel slowly, fluid noise may be caused in the valve or oil pump. This type of fluid noise is inherent in an integral power steering system, and it will not affect performance or durability of the system.

Checking Steering Wheel Turning Torque (Power steering)

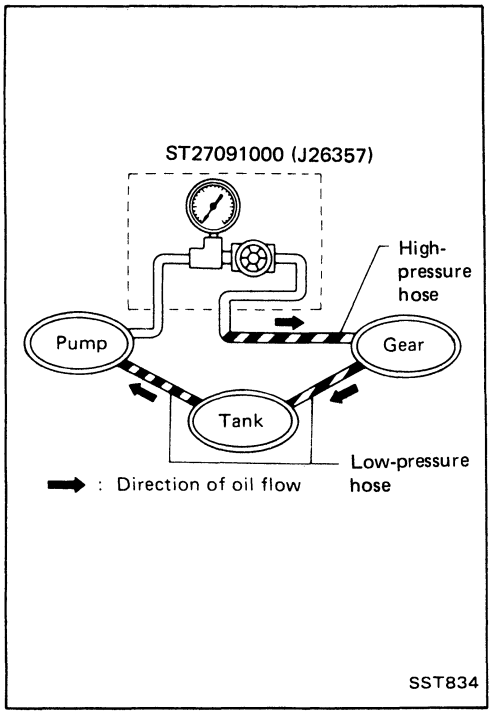
1. Park vehicle on a level, dry surface and set parking brake.
2. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F)].

Tires need to be inflated to normal pressure.



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

Steering wheel turning force:
PB48S-type
24.5 - 29.4 N (2.5 - 3.0 kg, 5.5 - 6.6 lb)
PB56S-type
39 N (4 kg, 9 lb) or less



Checking Hydraulic System (Power steering)

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

1. Set Tool. Open shut-off valve. Then bleed air. (See "Bleeding Hydraulic System".)
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.

Checking Hydraulic System (Power steering) (Cont'd)

CAUTION:

Do not hold steering wheel at lock position for more than fifteen seconds.

Oil pump standard pressure:
7,649 - 8,238 kPa
(78 - 84 kg/cm^2, 1,109 - 1,194 psi) at idling

4. If oil pressure is below the standard, slowly close shut-off valve and check pressure.
- When pressure becomes standard, gear is damaged.
- When pressure remains beyond standard, pump is damaged.

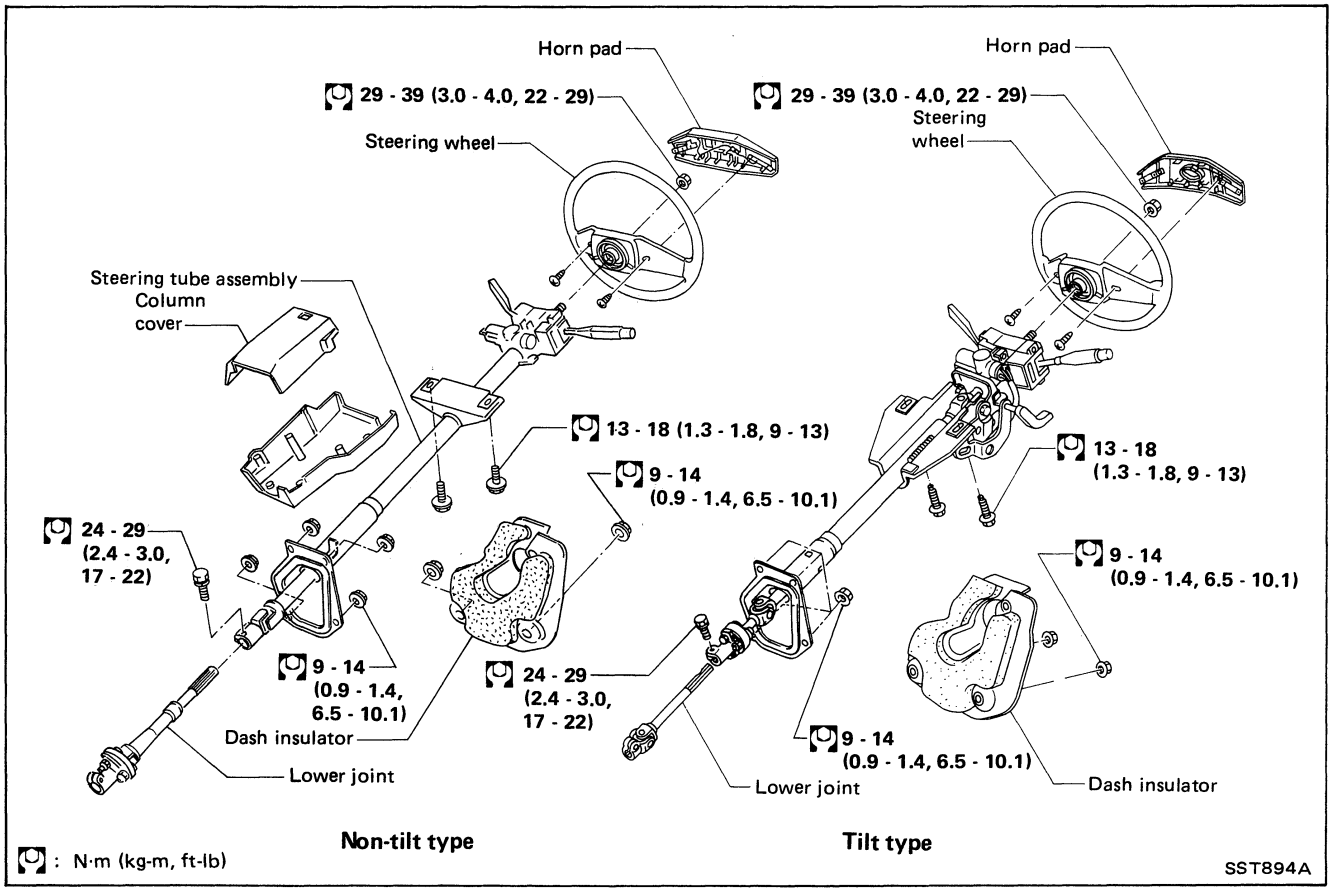
5. If oil pressure is higher than the standard level, pump is damaged.

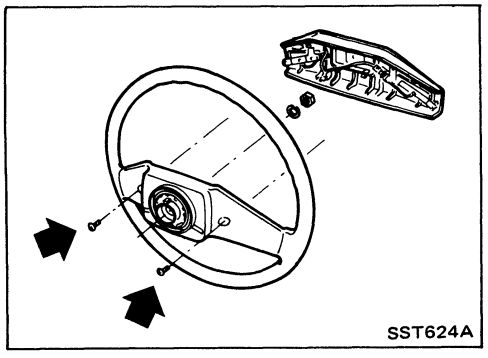
CAUTION:

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

6. After checking hydraulic system, remove Tool and add fluid as necessary, then completely bleed air out of system.

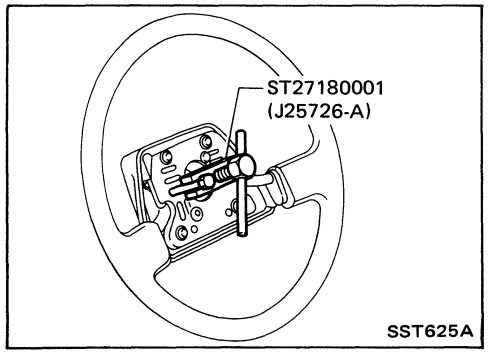
Removal and Installation





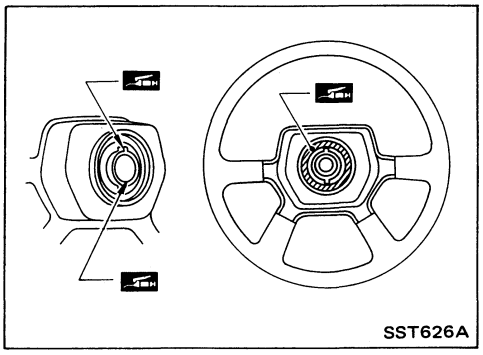
STEERING WHEEL

- Remove two screws from the rear of steering wheel.



- Remove steering wheel with Tool.

Removal and Installation (Cont'd)

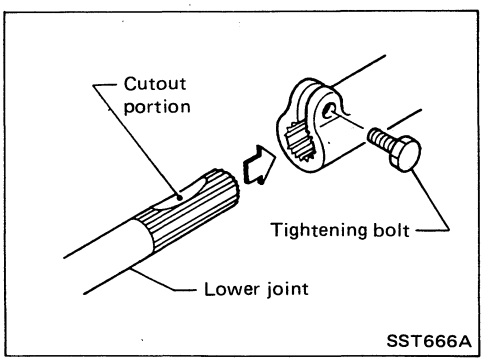

SST626A

- When installing steering wheel, apply multi-purpose grease to entire surface of turn signal cancel pin (both portions) and also to horn contact slip ring.

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

STEERING COLUMN

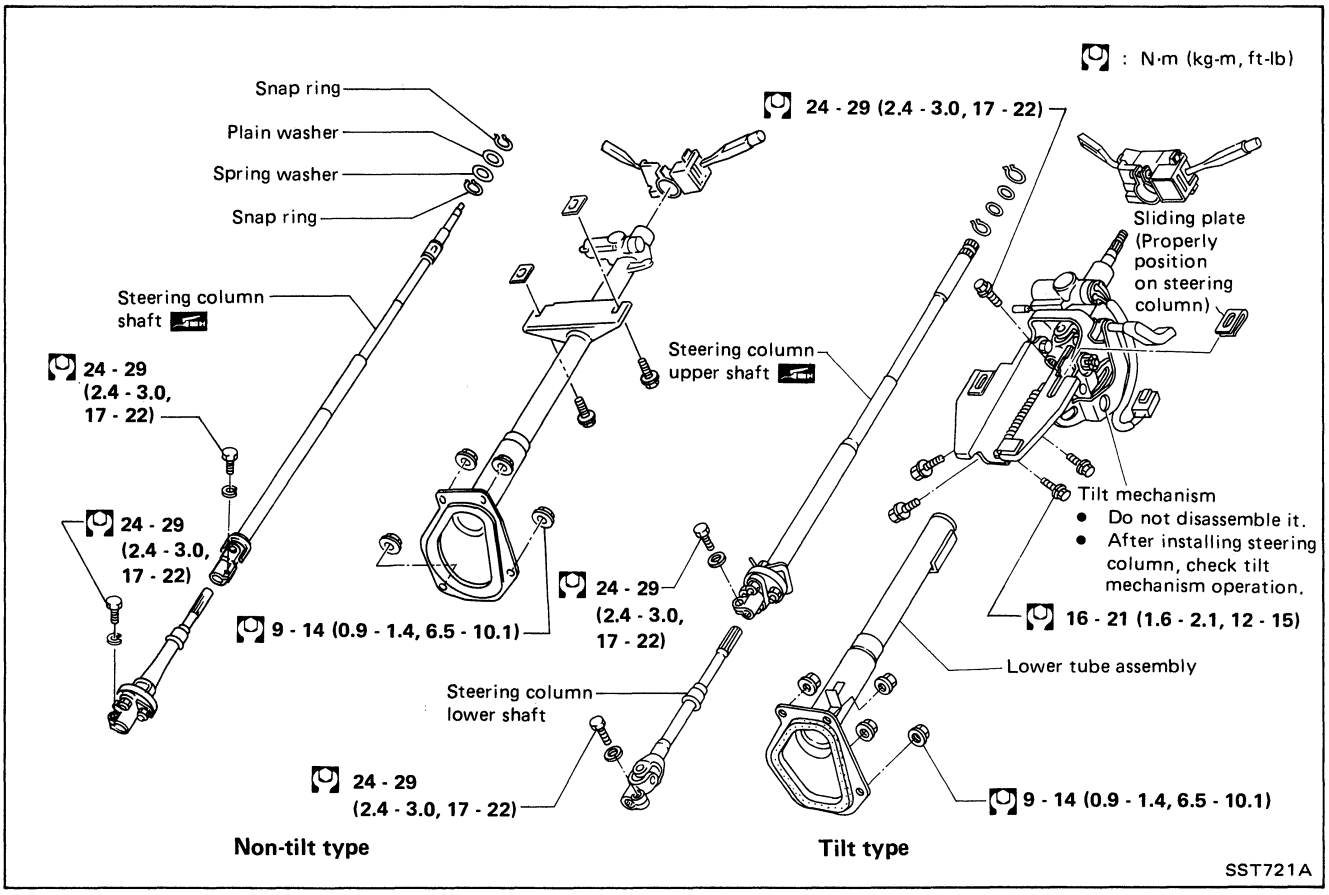
- When installing steering column, finger-tighten all lower bracket and clamp retaining bolts; then retighten them securely. Make sure that undue stress is not applied to steering column.

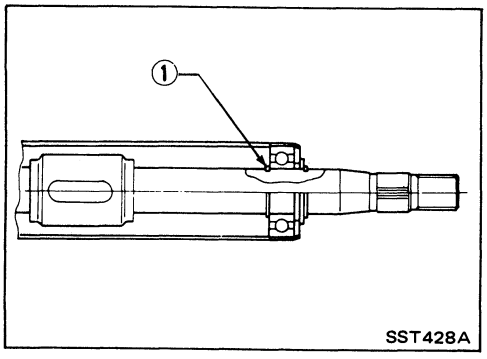


SST666A

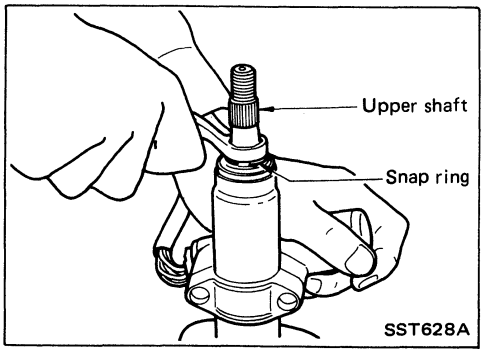
- When fitting steering lower joint, be sure tightening bolt faces cutout portion perfectly.

Disassembly and Assembly



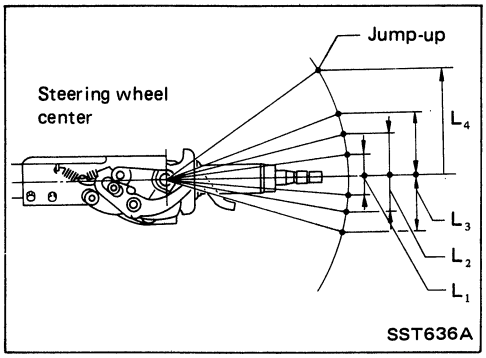


- When disassembling and assembling, unlock steering lock with key.
- Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.
- Install snap ring ① before inserting shaft into jacket tube.

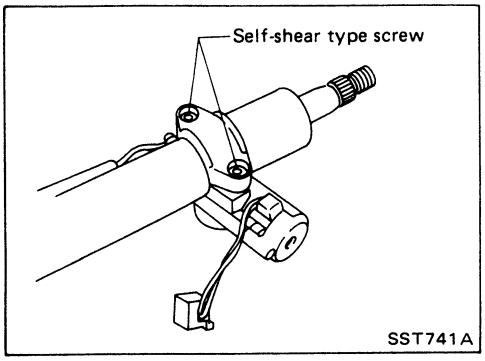


- Install snap ring on upper shaft with tool.

Disassembly and Assembly (Cont'd)

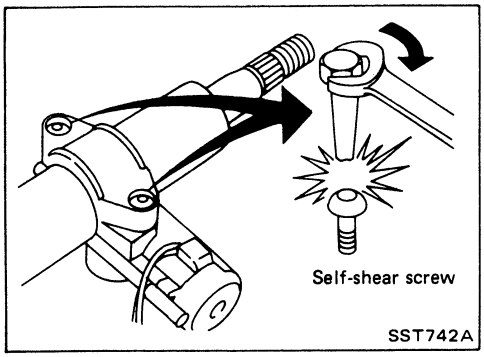


- Tilt type
  After installing steering column, check tilt mechanism operation.
  L_1 : 8.7 mm (0.343 in)
  L_2 : 17.3 mm (0.681 in)
  L_3 : 26.0 mm (1.024 in)
  L_4 : 100.0 mm (3.937 in)

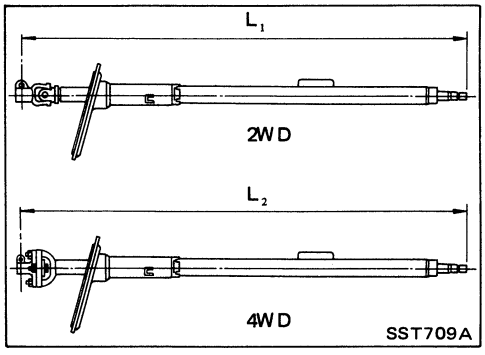


- Steering lock

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



b) Install self-shear type screws and then cut off self-shear type screw heads.



Inspection

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

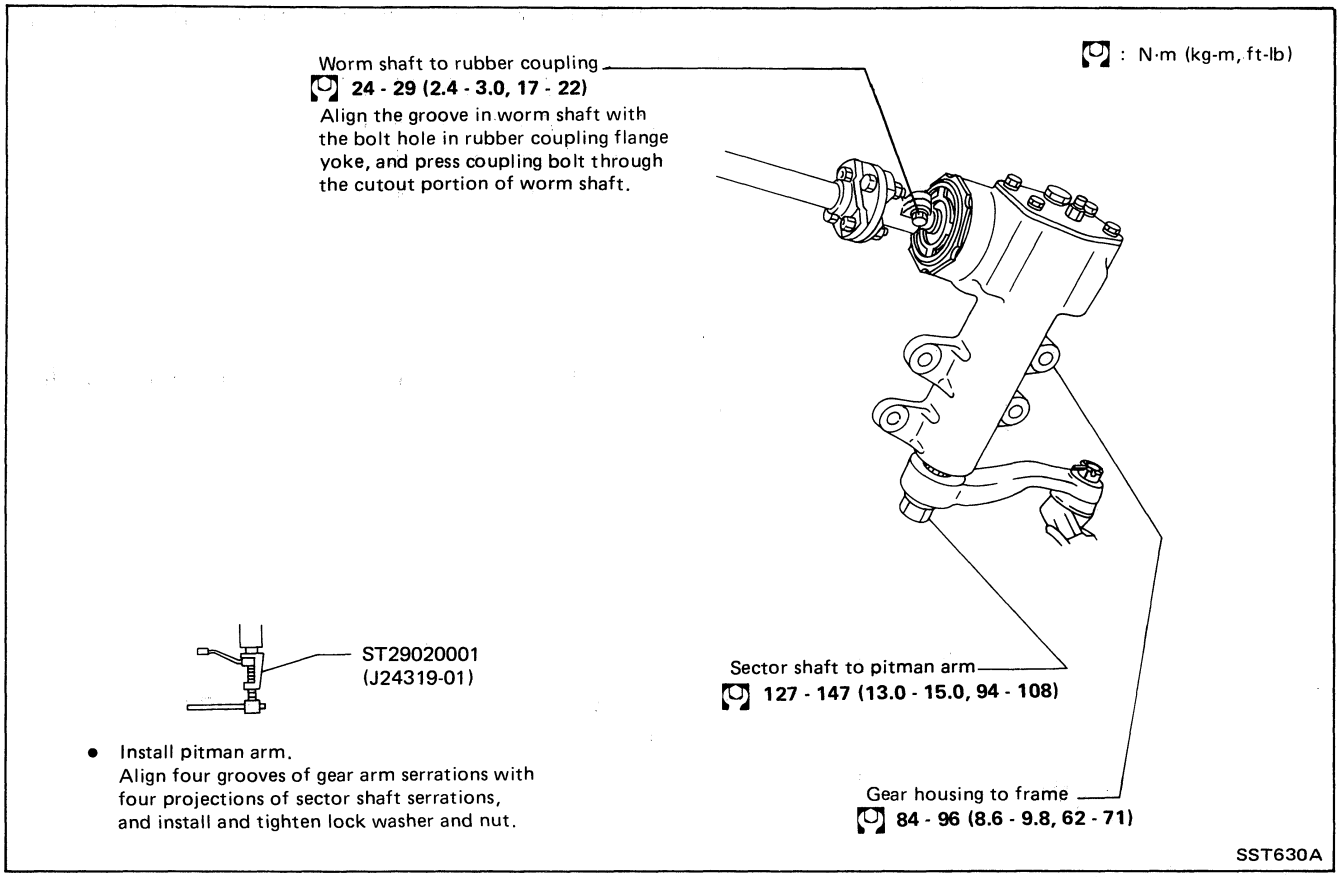
(1) Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

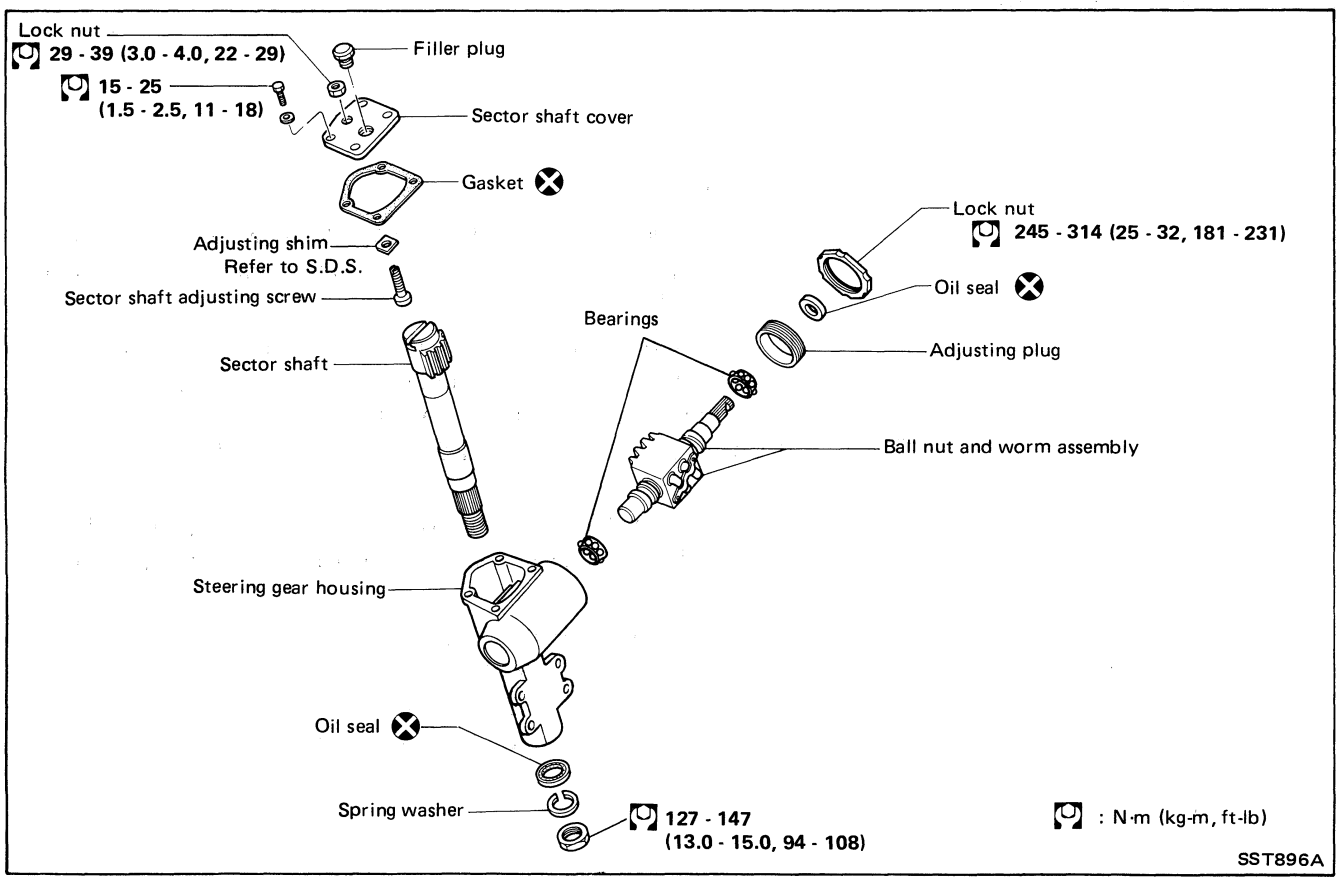
(2) Check jacket tube for deformation or breakage. Replace if necessary.

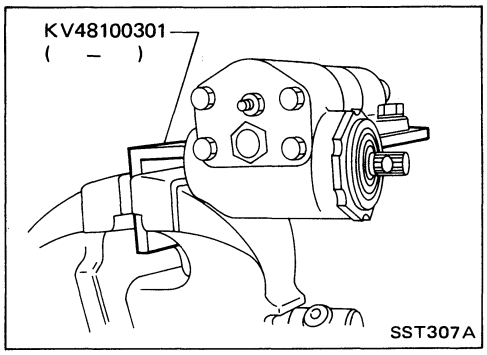
- When the vehicle is involved in a light collision, check dimension "L". If it is not within specifications, replace steering column as an assembly.

Column length "L_1 & L_2":
L_1 = 918.0 - 919.6 mm (36.14 - 36.20 in)
L_2 = 886.1 - 887.7 mm (34.89 - 34.95 in)

Removal and Installation

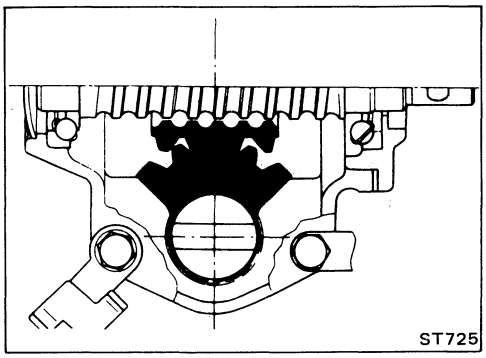






Disassembly

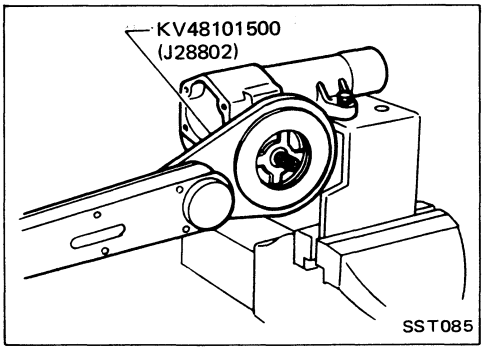
1. Place steering gear in a vise with Tool.



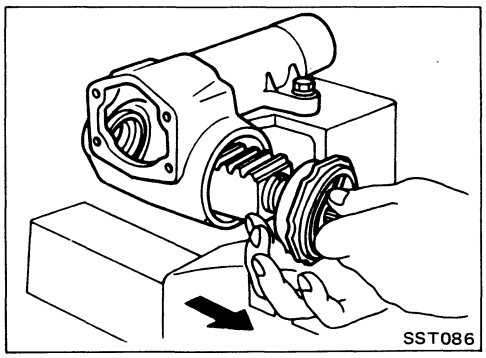
2. Set worm gear in a straight-ahead position.
3. Remove sector shaft with sector shaft cover.

CAUTION:

a. **When pulling sector shaft out, be careful not to damage oil seal or associated parts.**
b. **Set worm gear in a straight-ahead position.**
c. **Do not remove sector shaft needle bearings from steering gear housing. If necessary, replace gear housing assembly.**



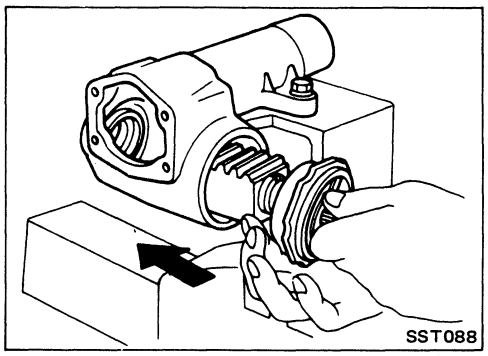
4. Loosen adjusting plug lock nut with Tool.



5. Draw out worm gear with worm bearing.

CAUTION:

a. **Be careful not to allow ball nut to run down to either end of worm.**
   Ends of ball guides will be damaged if nut is rotated until it stops at end of worm.
b. **Do not detach ball nut from worm shaft assembly.**
   If necessary, replace entire unit as an assembly.
c. **Do not remove sector shaft needle bearings from steering gear housing.**
   If necessary, replace entire gear housing as an assembly.

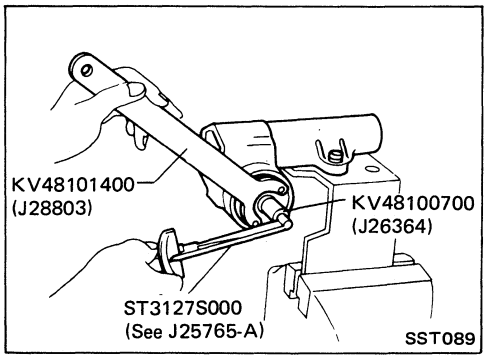


Assembly and Adjustment

Fill space between sealing lips of new sector shaft and adjusting plug oil seals with multi-purpose grease.

WORM BEARING PRELOAD

1. Fit worm gear assembly with worm bearing in gear housing.

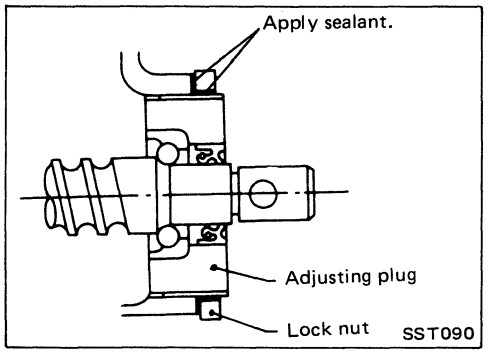


2. Adjust worm bearing preload with Tools.

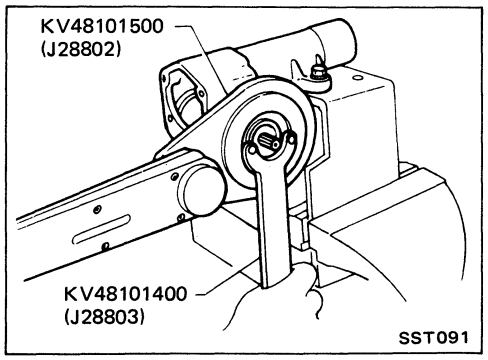
CAUTION:

- **Always adjust worm bearing preload by turning adjusting plug in "tighten" direction.**
- **Rotate worm shaft a few turns in both directions to settle down worm bearing and measure preload.**

Worm bearing preload (without oil seal):
0.20 - 0.59 N·m
(2.0 - 6.0 kg-cm, 1.7 - 5.2 in-lb)

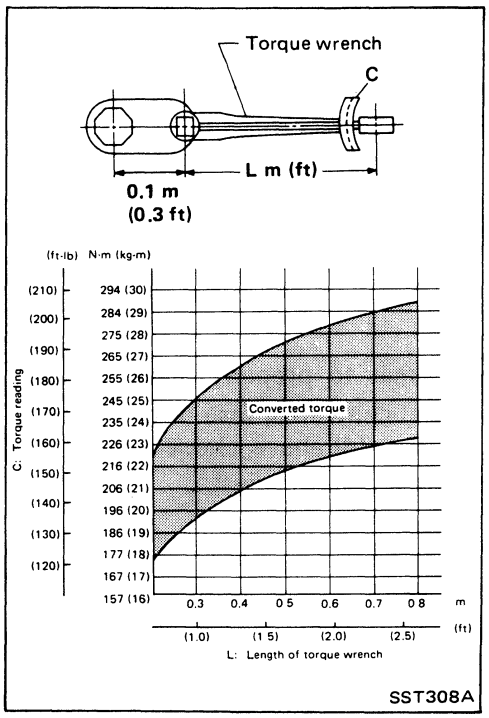


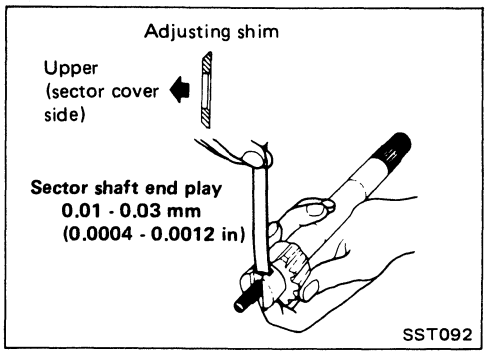
3. Apply suitable sealant around lock nut inner surface.



4. Tighten lock nut using Tools.
5. After tightening lock nut, check worm bearing preload to make sure it is within specification.

Assembly and Adjustment (Cont'd)



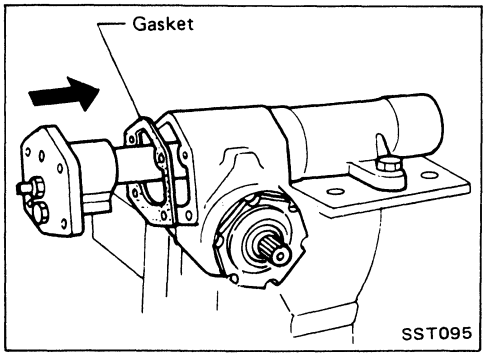


SECTOR SHAFT END PLAY

Select suitable adjusting shim and adjust end play between sector shaft and adjusting screw.

Sector shaft end play:
0.01 - 0.03 mm (0.0004 - 0.0012 in)

Sector shaft adjusting screw shims:
Refer to S.D.S.

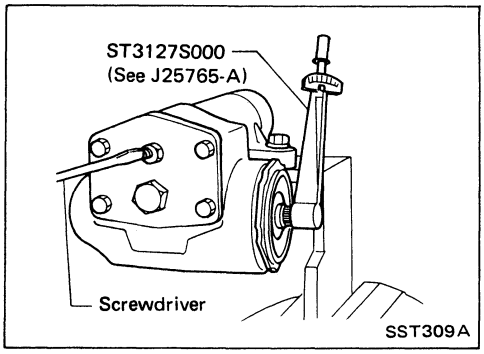


STEERING GEAR PRELOAD AND BACKLASH

1. Set worm gear in a straight-ahead position.

Carefully insert sector shaft in place, using care not to scratch oil seal.

2. Adjust adjusting screw until sector shaft just contacts ball nut. Temporarily tighten lock nut.
3. Lubricate contacting portion of sector shaft and ball nut with gear oil or bearing grease.



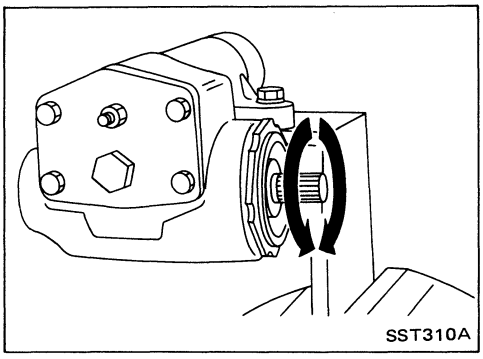
4. Tighten adjusting screw further to increase worm gear preload, and lock with lock nut.

Preload increment:
0.2 - 0.4 N·m (2 - 4 kg-cm, 1.7 - 3.5 in-lb)

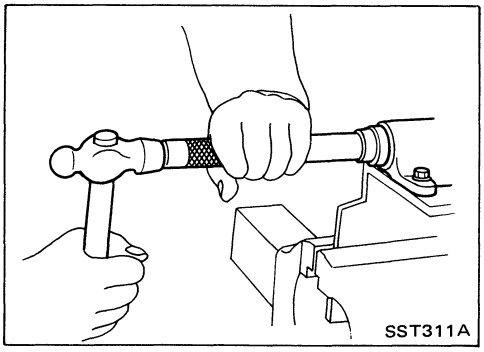
CAUTION:

- **Always adjust steering gear preload by turning adjusting screw in "tighten" direction.**
- **Rotate worm gear a few turns in both directions to settle down steering gear.**

Assembly and Adjustment (Cont'd)


SST310A

5. Turn worm gear several times by hand to properly break in worm bearing.
6. Check steering gear preload. If not within specification, readjust it.

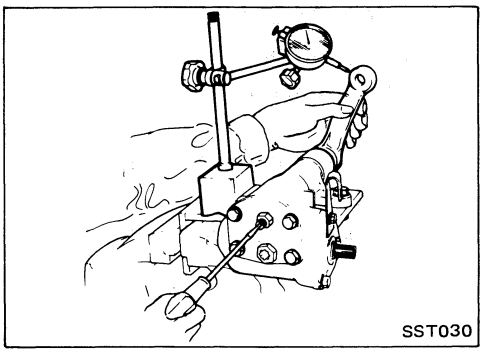

SST311A

7. Drive oil seal into place.

Before pressing oil seal, coat seal contacting face of oil seal with gear fluid.

8. Measure total preload.

Steering gear total preload (with oil seals):
New parts
0.83 - 1.23 N·m
(8.5 - 12.5 kg-cm, 7.4 - 10.9 in-lb)
Used parts
0.59 - 0.98 N·m
(6.0 - 10.0 kg-cm, 5.2 - 8.7 in-lb)


SST030

9. Check backlash.
Measure backlash at pitman arm top end in straight-ahead position.

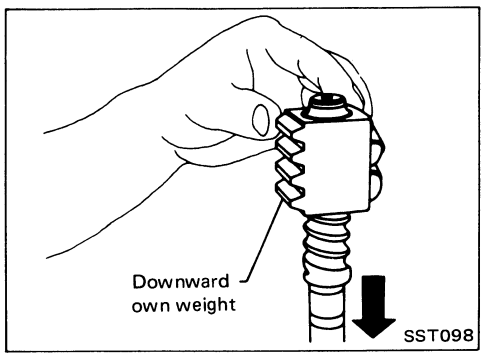
Backlash (in straight-ahead position):
New gear: 0.1 mm (0.004 in) or less
Used gear: 0.3 mm (0.012 in) or less

Inspection

Wash clean all the disassembled parts in solvent and check for condition.

SECTOR SHAFT

1. Check gear tooth surface for pitting, burrs, cracks or any other damage, and replace if necessary.
2. Check sector shaft for distortion on its serration, and replace if necessary. Also check gear housing for deformation.



Inspection (Cont'd)

STEERING WORM ASSEMBLY

1. Inspect ball nut gear tooth surface, and replace if pitting, burrs, wear or any other damage is found.
2. Ball nut must rotate smoothly on worm gear. If found too tight, assembly should be replaced. Check rotation of ball nut as follows:

(1) Move ball nut to either end of worm gear, and gradually stand worm shaft and ball nut assembly until ball nut moves downward on worm gear under its own weight.

(2) If ball nut does not move freely over entire stroke, replace assembly.

Be careful not to damage ball nut guide tube while check is being made.

CAUTION:

Be careful not to allow ball nut to run down to either end of worm.

BEARING

1. Inspect worm bearing for wear, pitting or any other damage. Replace as required.

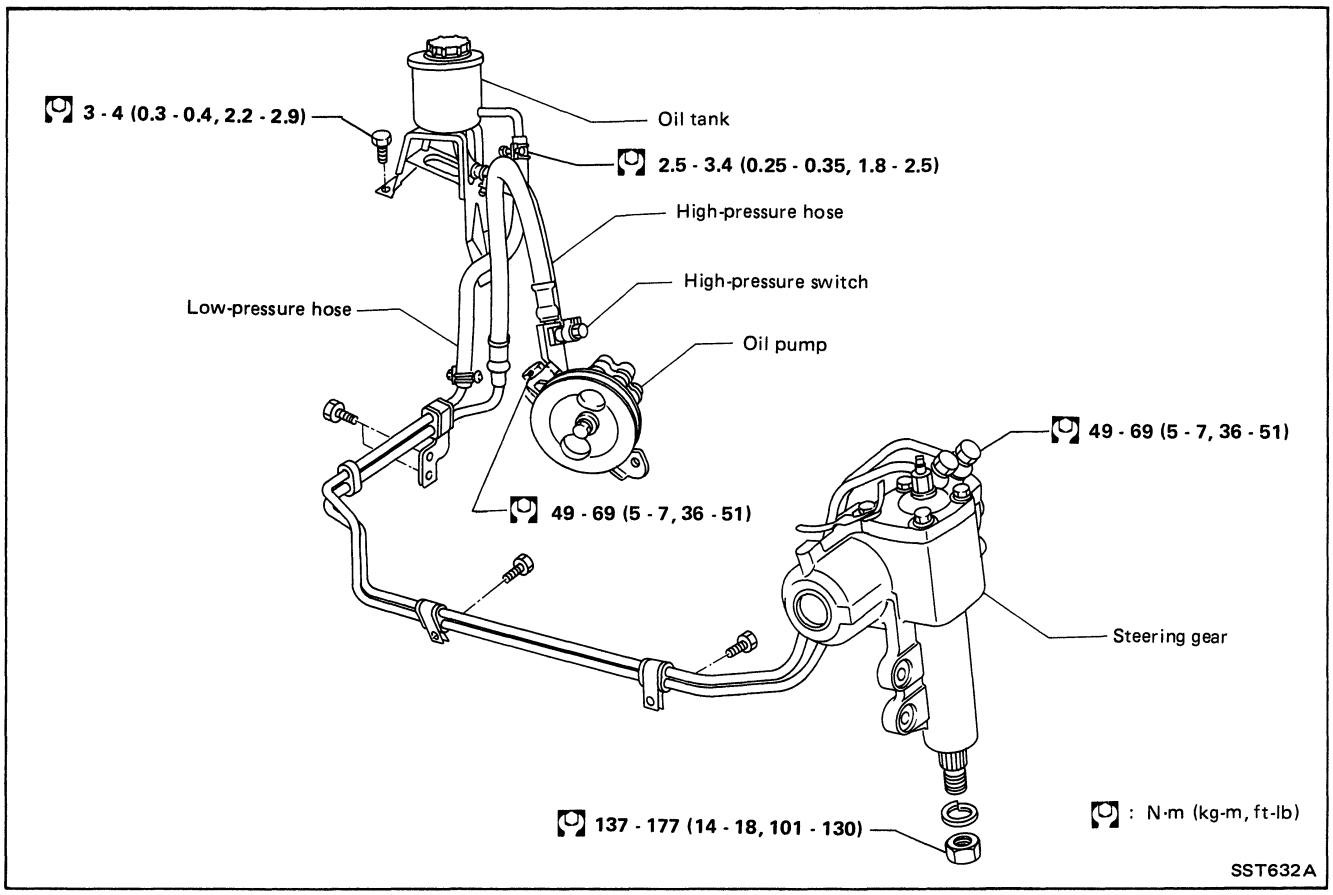
When replacing worm bearing, replace it as a set of bearing and outer race.

2. If sector shaft needle bearings are worn or damaged, replace as an assembly of gear housing and bearings.

OIL SEALS

- Discard any oil seal which has once been removed.
- Replace oil seal if sealing lip is deformed or cracked.
- Discard oil seal if spring is fatigued or dislocated.

Description



This power steering adopts spool valve control which was developed in a technical tie-up with the ZF Company.

Only the sealing parts can be replaced. The remaining parts must be replaced as an assembly.

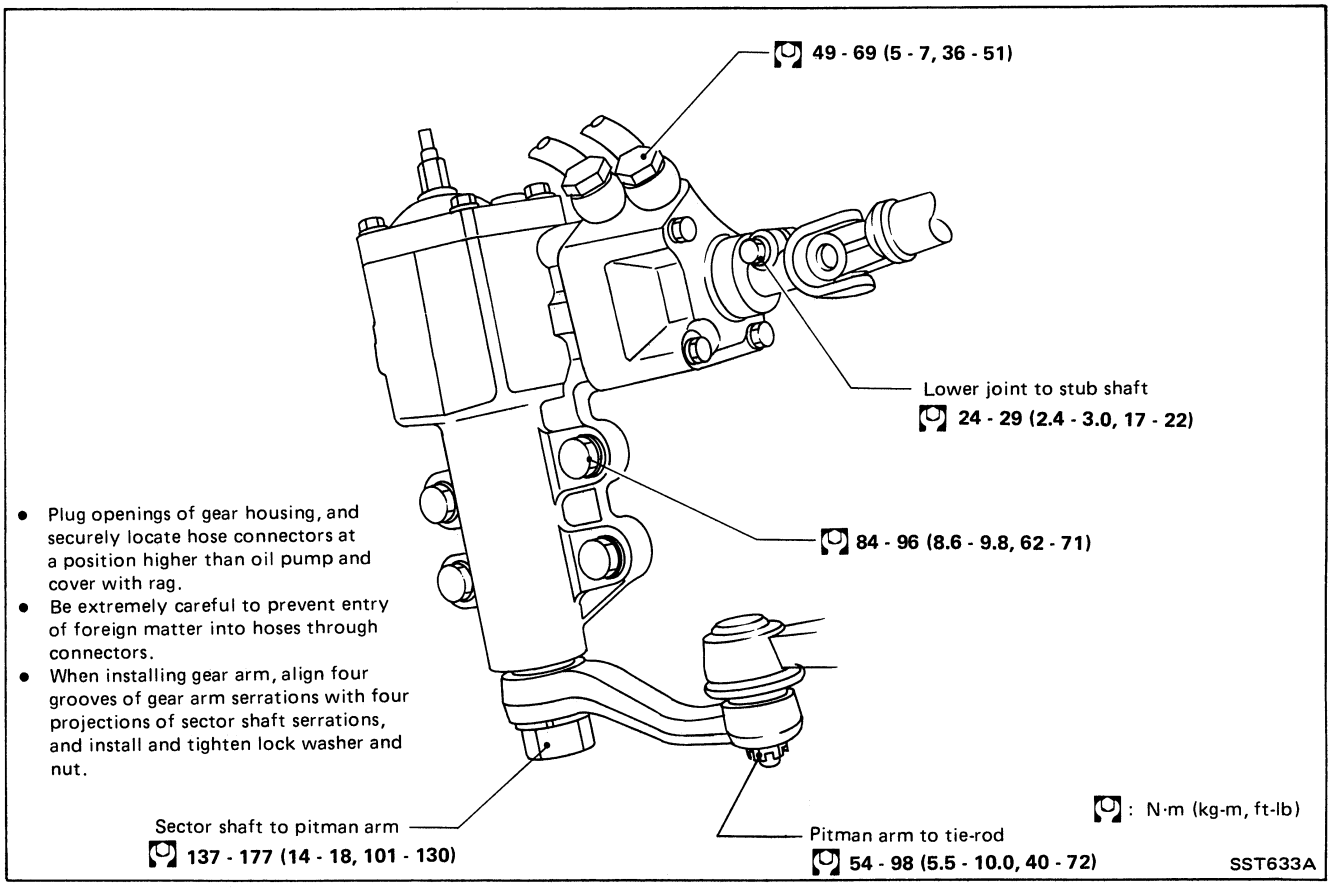
CAUTION:

a. **The parts which can be disassembled are strongly restricted, and never disassemble other parts than the specified ones.**
b. **Disassembly should be performed in a place as clean as possible.**
c. **Hands should be cleaned before disassembly.**
d. **Do not use a rag. Be sure to use nylon or paper cloth.**
e. **Be sure to follow procedures and cautions indicated in the Service Manual.**

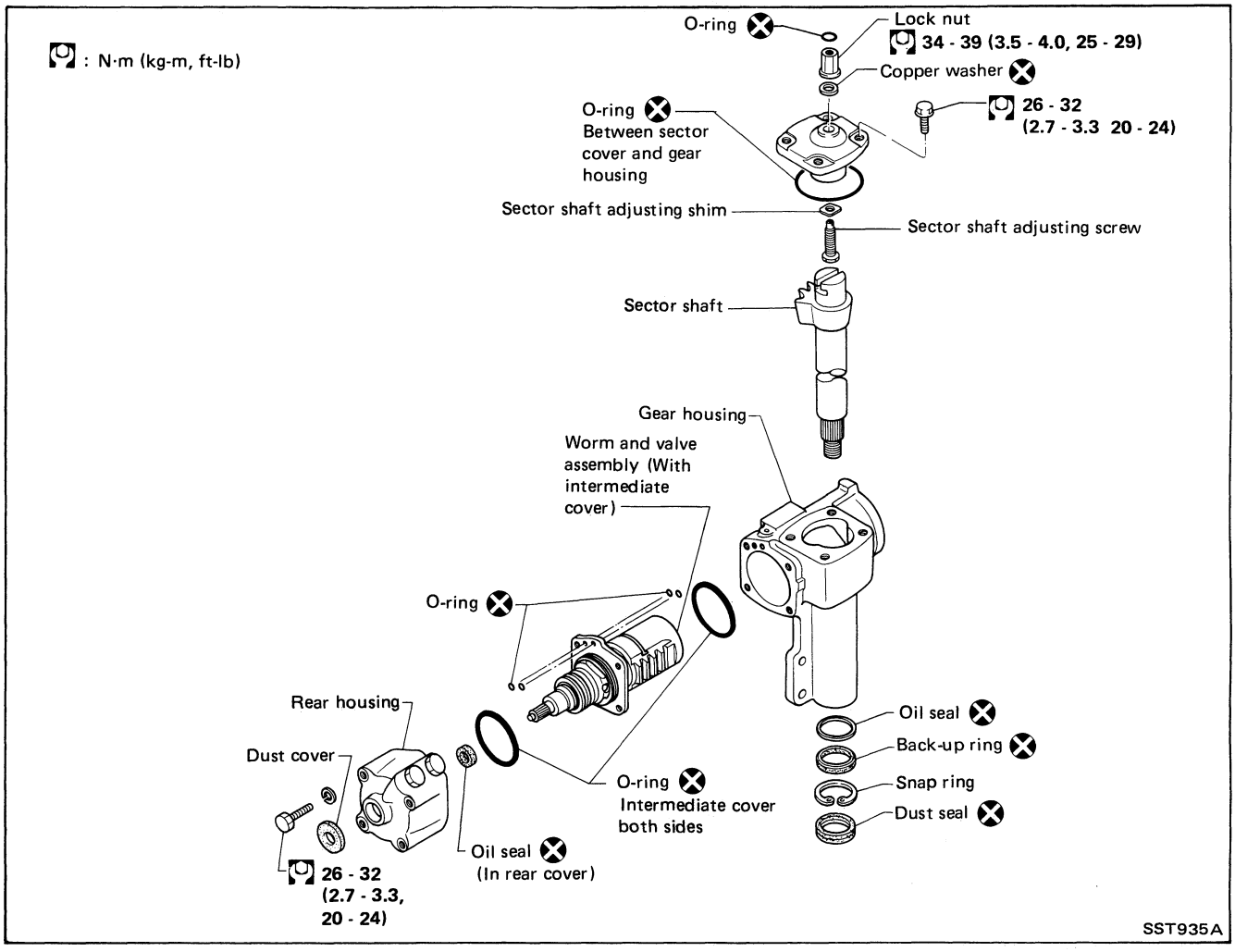
Removal

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

STEERING GEAR



Power Steering Gear Component



Inspection and Adjustment

Before disassembling power steering gear component parts, make sure there is no oil leakage around sealing portion and check steering turning torque as follows:

Check sealing portion.

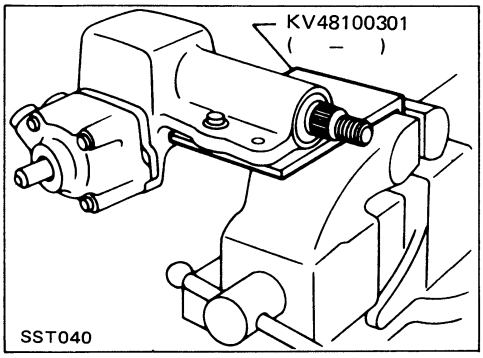
- Adjusting screw nut O-ring
- Sector shaft cover O-ring
- Sector shaft oil seal
- Rear cover oil seal and O-ring
- Rear housing O-ring
- Gear housing O-ring

Discard any oil seal and O-ring which have once been removed.

Replace oil seal and O-ring if sealing surface is deformed or cracked.

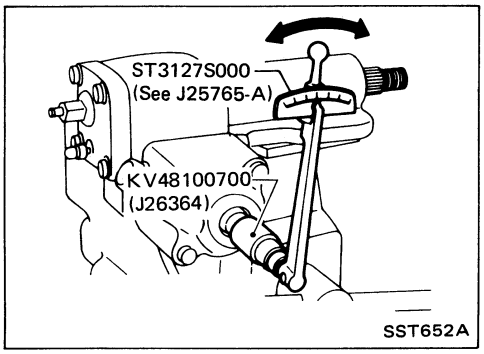
Inspection and Adjustment (Cont'd)

TURNING TORQUE MEASUREMENT



1. Measure turning torque at 360° position.

(1) Install steering gear on Tool.



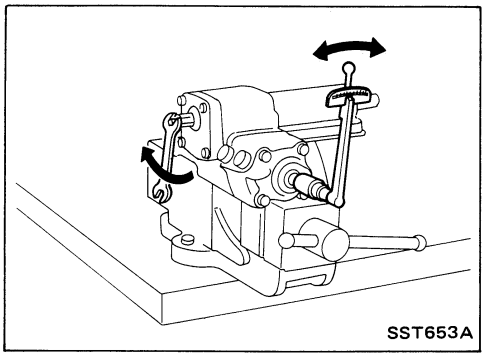
(2) Turn stub shaft all the way to right and left several times.

(3) Measure turning torque at 360° position from straight-ahead position with Tools.

Turning torque at 360°:

0.7 - 1.2 N·m

(7 - 12 kg-cm, 6.1 - 10.4 in-lb)



(4) Measure turning torque at straight-ahead position.

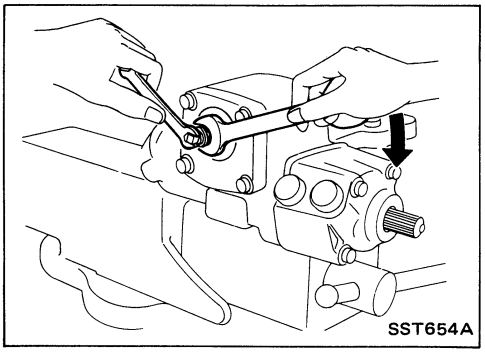
Straight-ahead position is a position where stub shaft is turned 2.14 turns (two full turns and 50°) from lock position.

Turning torque at straight-ahead position:

0.1 - 0.4 N·m

(1 - 4 kg-cm, 0.9 - 3.5 in-lb) higher than at 360°

If they are not within specifications, adjust turning torque by turning sector shaft adjusting screw.



2. Tighten adjusting screw lock nut with tools.

Disassembly

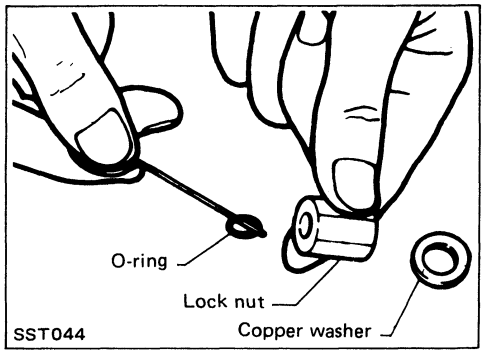
Before disassembly, measure turning torque.

If they are not within specifications, replace steering gear assembly.

CAUTION:

Each oil sealing parts, dust cover, copper wahser and snap ring once removed must not be used again.

Disassembly (Cont'd)



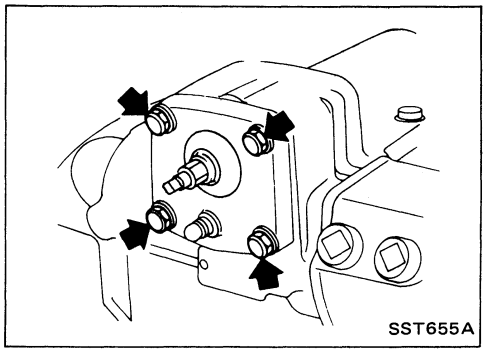
ADJUSTING SCREW LOCK NUT O-RING

Remove adjusting screw lock nut, and replace O-ring.

SECTOR SHAFT OIL SEAL AND DUST SEAL

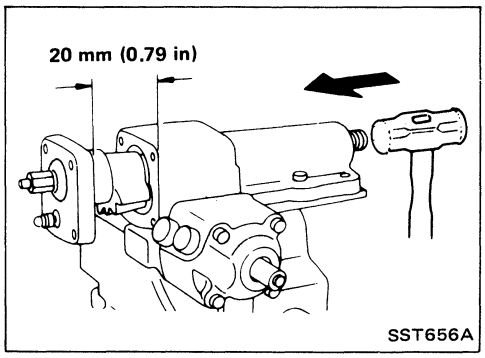
1. Set stub shaft in a straight-ahead position.

Straight-ahead position is a position where stub shaft is turned 2.14 turns (two full turns and 50°) from lock position.



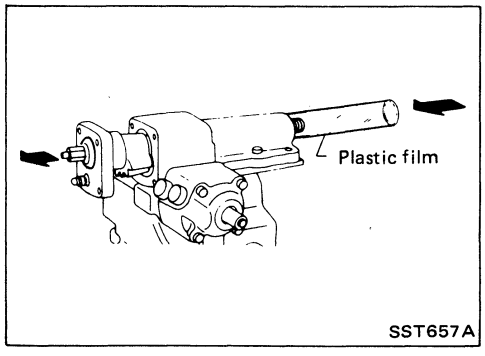
2. Disconnect sector shaft cover bolt.

Do not turn lock nut unless necessary; otherwise it will damage O-ring, resulting in an oil leak.



3. Draw out sector shaft.

Knock out end of sector shaft approximately 20 mm (0.79 in).



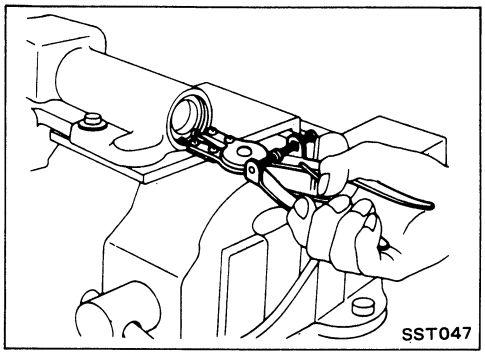
4. Connect a roll of plastic film to sector shaft.

Plastic film:
Thickness 0.1 mm (0.004 in)
Length x width
200 x 200 mm (7.87 x 7.87 in)

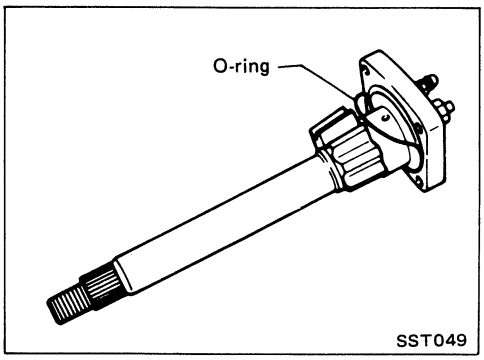
5. Pull out sector shaft by hand.

Attach plastic film to needle bearings located at two places inside gear housing while simultaneously pulling out sector shaft so that bearings will not drop into housing.

Disassembly (Cont'd)


SST047

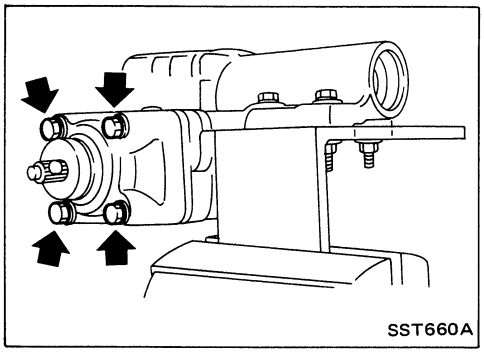
6. Remove gear housing dust seal.
7. Remove snap ring.



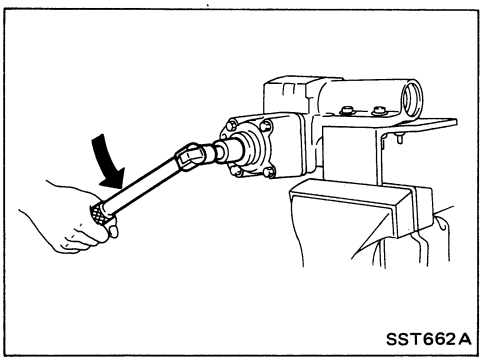
SST049

8. Remove back-up ring and oil seal.
9. Remove O-ring.

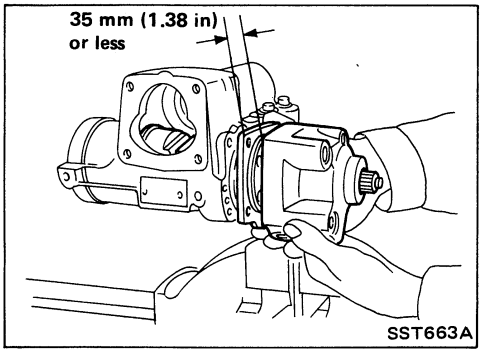
REAR HOUSING O-RING


SST660A

1. Remove sector shaft.
2. Loosen (do not remove) rear housing bolts.


SST662A

3. Turn stub shaft counterclockwise slightly to raise intermediate cover through piston.



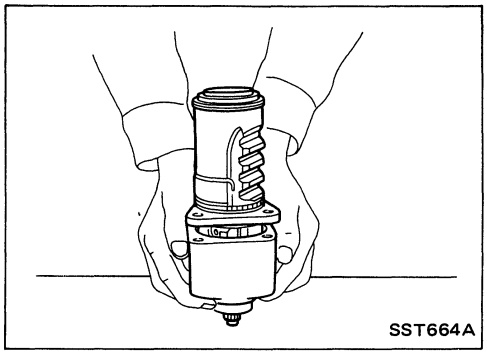
SST663A

4. Remove rear housing together with worm gear assembly.

CAUTION:

a. **When worm assembly is removed, piston may turn and come off under its own weight. Hold piston to prevent it from turning.**
   If piston-to-rear housing clearance exceeds 35 mm (1.38 in) by loosening, recirculating ball will be out of groove of worm; do not reinstall piston but replace the entire assembly.
b. **Take care not to damage teflon ring at piston end when removing.**

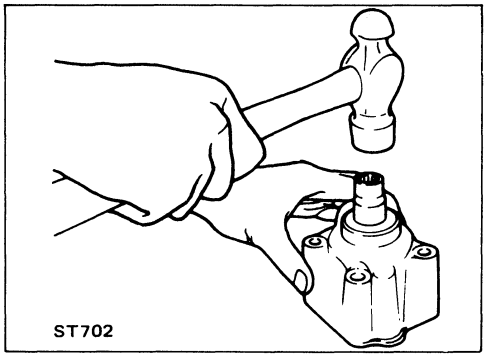
Disassembly (Cont'd)


SST664A

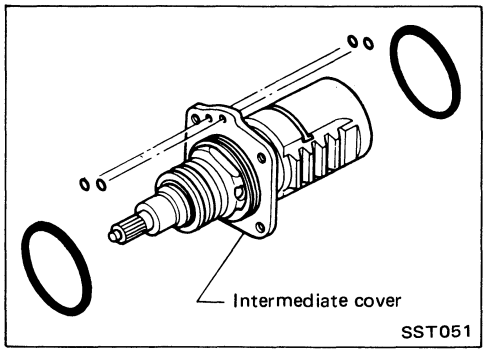
5. Remove rear housing, turn worm assembly upside down, and lightly tap stub shaft end on top of workbench.

CAUTION:

- **Do not strike shaft with a hammer or pry it with a screwdriver.**
- **Do not disassemble worm and valve.**


ST702

6. Remove rear housing oil seal with tool.



SST051

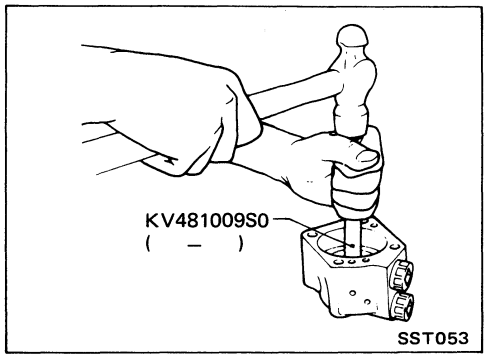
7. Remove O-ring on both sides of intermediate cover.

Assembly

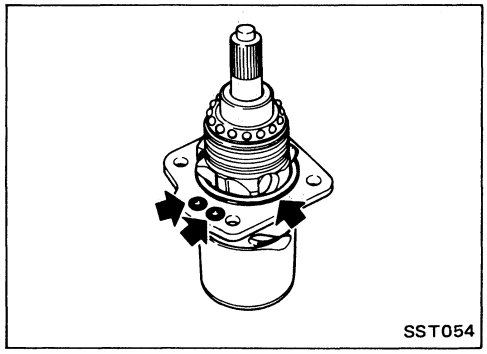
Rear housing seal and intermediate cover (between worm and valve)

1. Install new rear housing oil seal with Tool.

Before installing oil seal, apply multi-purpose grease to lips.



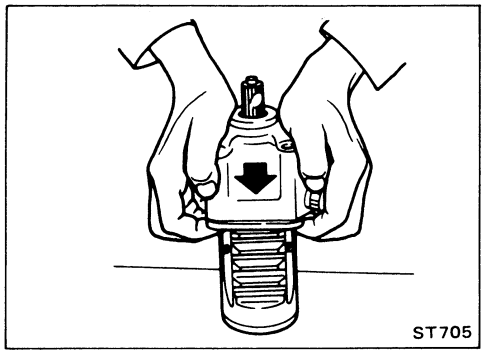
SST053


SST054

2. Install new O-rings on both sides of intermediate cover.

- **Apply a thin coat of vaseline to new O-rings prior to their installation.**
- **Be careful not to install wrong O-rings as some of them resemble in size.**

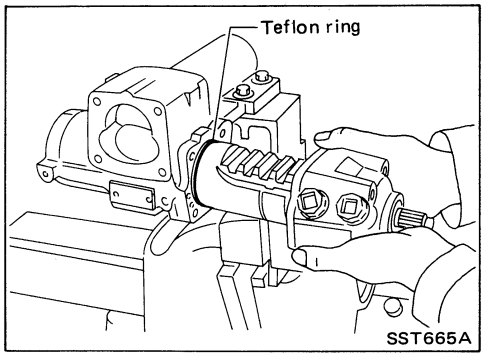
Assembly (Cont'd)



3. Fit rear housing onto intermediate cover with worm gear assembly.

CAUTION:

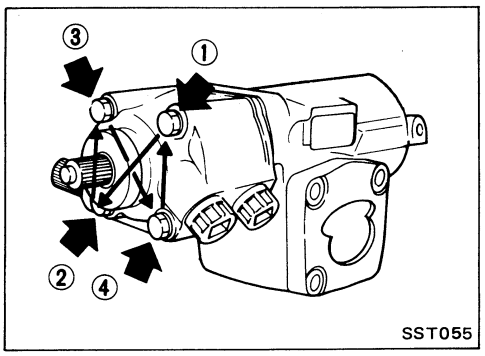
- **Do not tilt ball bearing on rear cover side.**
- **Make sure that O-rings are not protruding or extruding.**
- **Be careful not to separate worm and stub shaft.**
- **Wrap vinyl tape around serration of stub shaft to prevent oil seal lip from being damaged during insertion.**



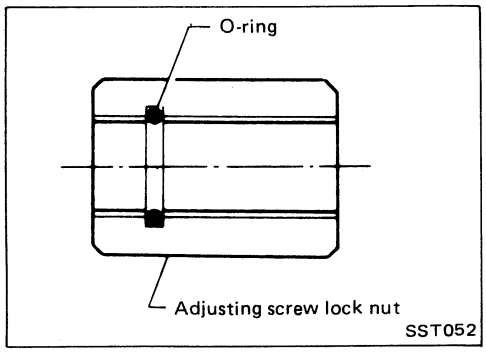
4. Install worm gear assembly with rear housing and intermediate cover into gear housing.

CAUTION:

- **Apply a thin coat of A.T.F. inside gear housing and piston before insertion.**
- **Be sure that teflon ring at piston end is not damaged during insertion of gear housing. If it is damaged, replace entire assembly.**
- **Be sure that teflon ring settles in its correct position.**



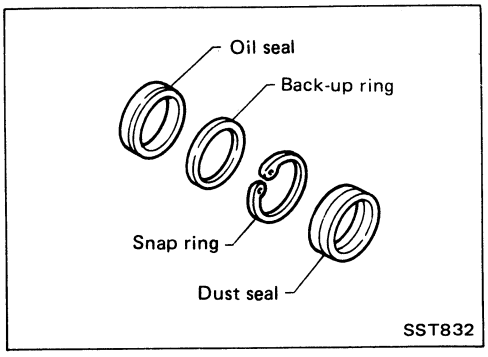
5. Gradually tighten rear housing bolts in a criss-cross fashion.



ADJUSTING SCREW LOCK NUT O-RING

Insert new O-ring into adjusting screw lock nut.

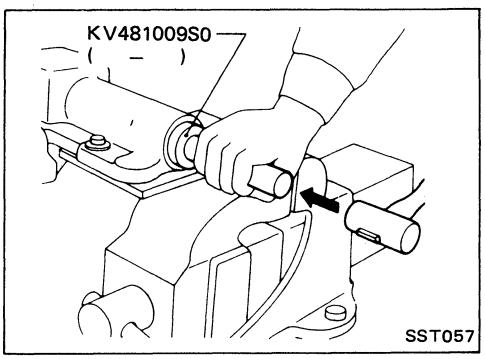
- **Before inserting, apply a thin coat of vaseline to O-ring.**
- **Insert O-ring to make sure it fits into groove.**



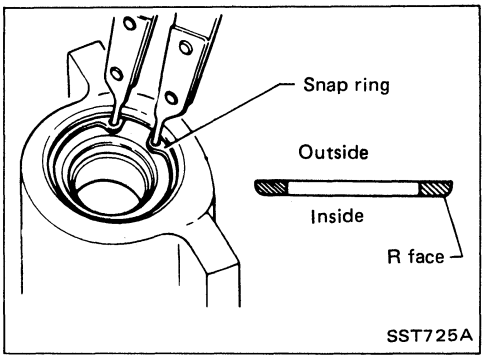
SECTOR SHAFT OIL SEAL

- **When installing, be sure to use new oil seal, dust seal, back-up ring and snap ring.**
- **Before installing, apply a thin coat of vaseline to new oil seal and dust seal.**

Assembly (Cont'd)



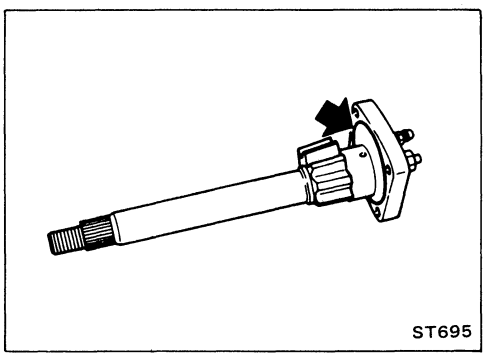
1. Press new oil seal and then install back-up ring with Tool.



2. Install a new snap ring into gear housing.

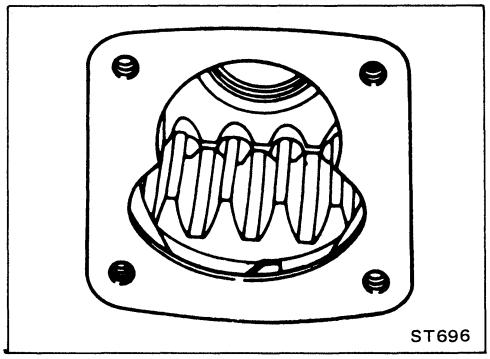
CAUTION:

a. **Turn snap ring to make sure it fits into groove.**
b. **Always install snap ring with R face facing inward.**



3. Fit new O-ring into sector shaft cover.

- **Before installing, apply a thin coat of vaseline to O-ring.**
- **Make certain that O-ring is installed properly, and not damaged by sector shaft.**



SECTOR SHAFT

1. Set piston rack at straight-ahead position.

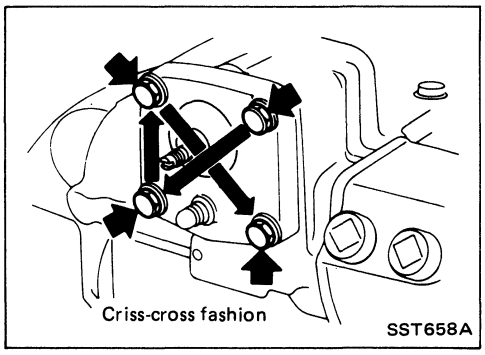
Turn piston rack about 10° to 15° toward yourself with your finger.

This is for smooth insertion of sector gear.

2. Gradually insert sector shaft into gear housing.

When inserting sector shaft, simultaneously pull out plastic film so that bearings will not drop into housing.

Assembly (Cont'd)



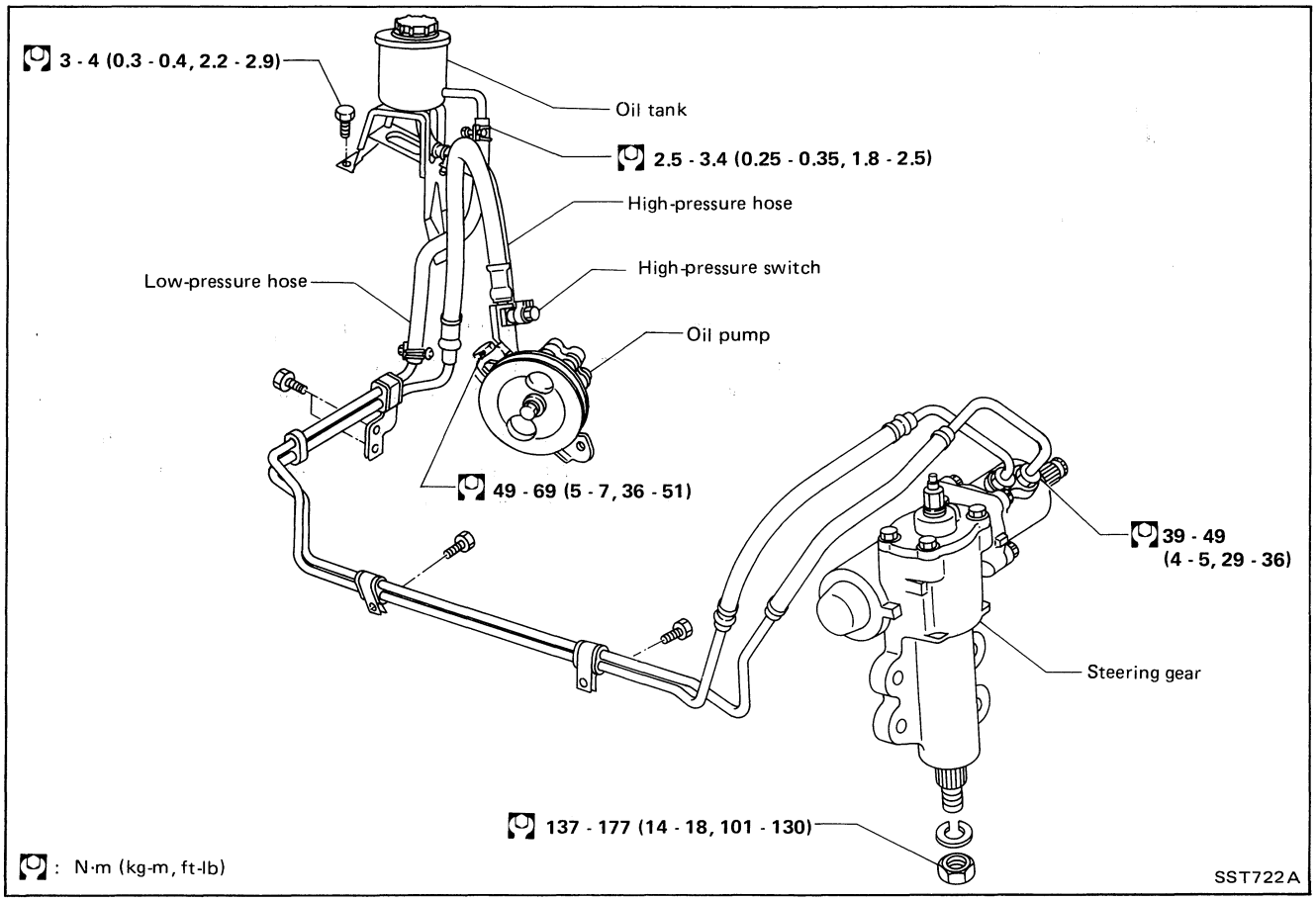
3. Tighten sector shaft cover bolts.

4. Check turning torque and steering gear preload.

Refer to Inspection and Adjustment.

- **If there is more than 0.2 N·m (2 kg-cm, 1.7 in-lb) difference between values of turning torque before and after disassembly, it must be assumed that some new problem has occurred. It will be necessary to replace the entire assembly.**

Description



This power steering adopts spool valve control which was developed in a technical tie-up with the ZF Company.

Only the sealing parts can be replaced. The remaining parts must be replaced as an assembly.

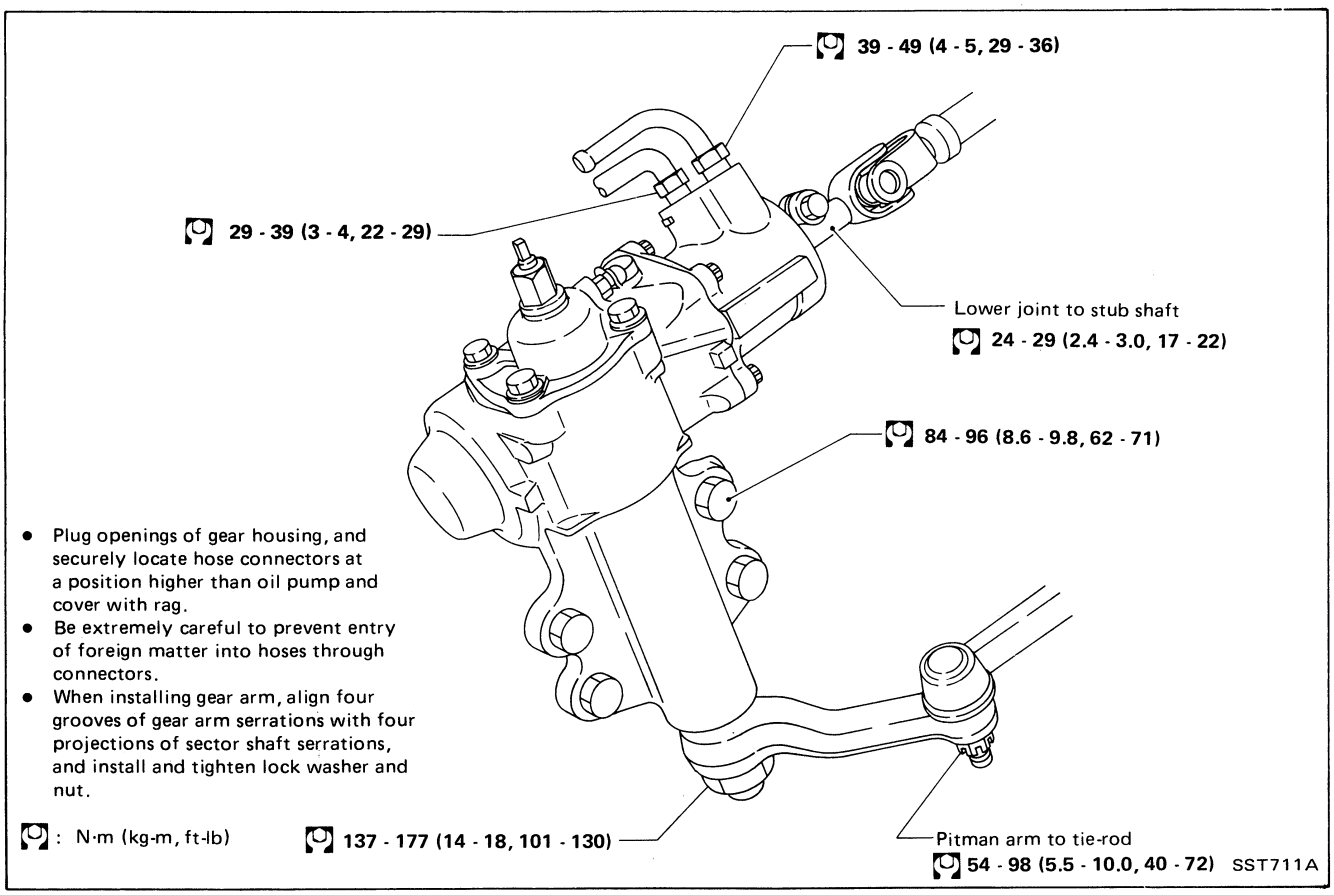
CAUTION:

a. **The parts which can be disassembled are strongly restricted, and never disassemble other parts than the specified ones.**
b. **Disassembly should be performed in a place as clean as possible.**
c. **Hands should be cleaned before disassembly.**
d. **Do not use a rag. Be sure to use nylon or paper cloth.**
e. **Be sure to follow procedures and cautions indicated in the Service Manual.**

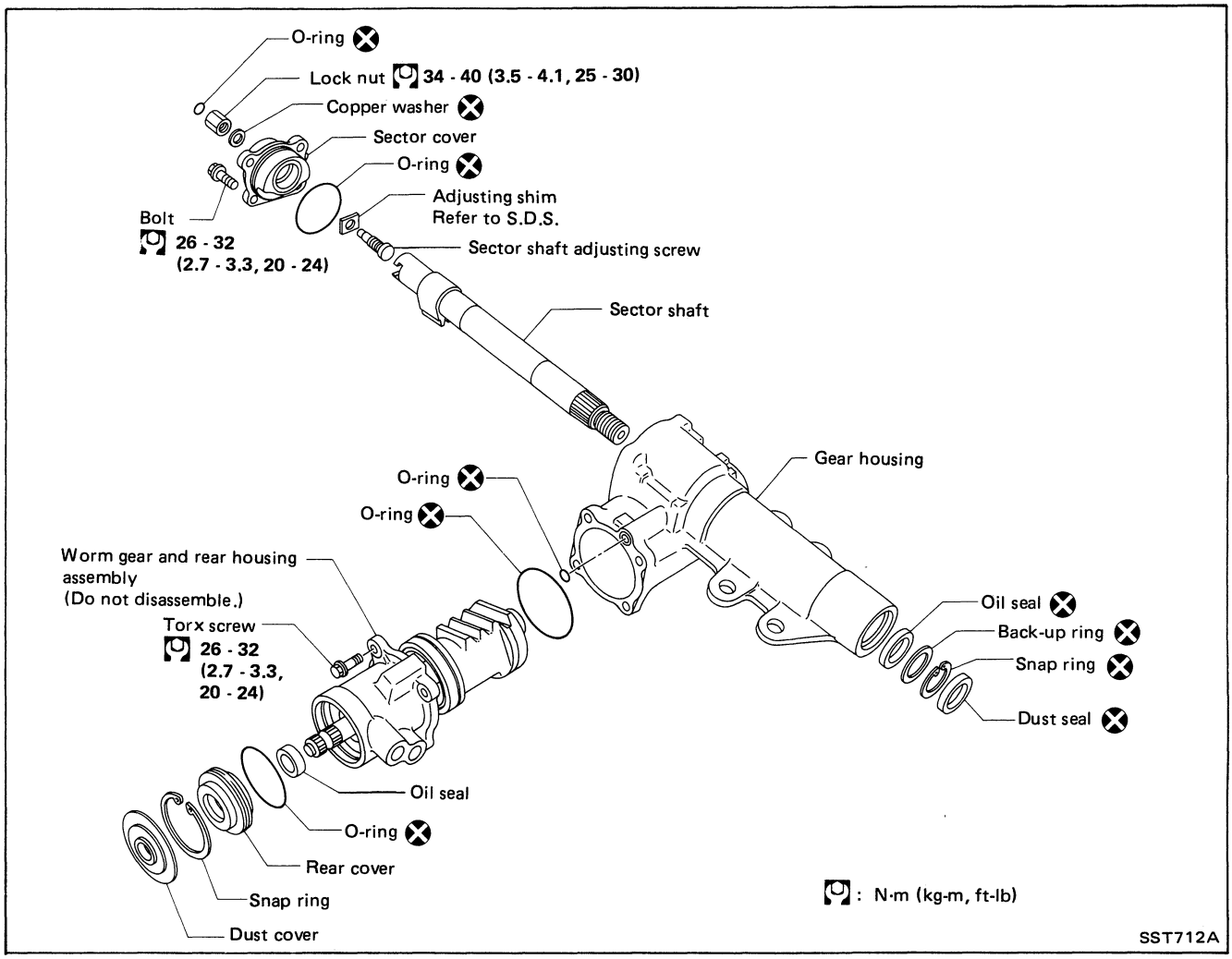
Removal

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

STEERING GEAR



Power Steering Gear Component



Inspection and Adjustment

Before disassembling power steering gear component parts, make sure there is no oil leakage around sealing portion and check steering turning torque as follows:

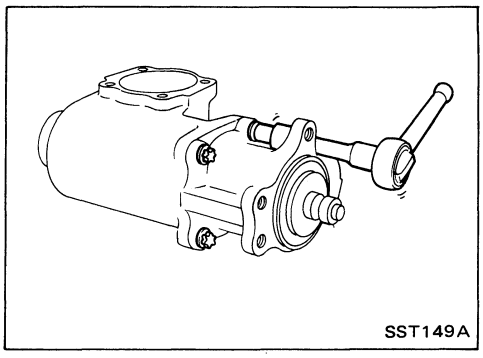
Check sealing portion.

- Adjusting screw nut O-ring
- Sector shaft cover O-ring
- Sector shaft oil seal
- Rear cover oil seal and O-ring
- Rear housing O-ring
- Gear housing O-ring

Discard any oil seal and O-ring which have once been removed.

Replace oil seal and O-ring if sealing surface is deformed or cracked.

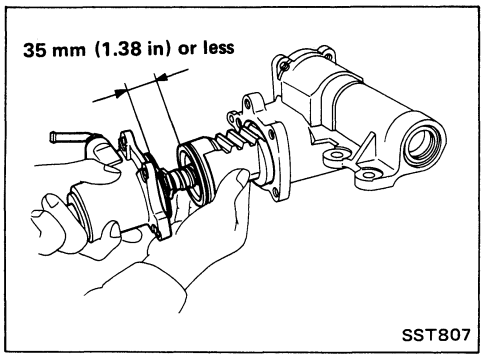
Servicing procedures for PB48S model are almost the same as those for PB56S model. Except for Disassembly and Assembly sections, refer to POWER STEERING GEAR (Model: PB56S).


SST149A

Disassembly

REAR HOUSING O-RING

1. Remove sector shaft. Refer to steps 1 through 5 in "Disassembly of Sector Shaft Oil Seal in POWER STEERING GEAR (Model: PB56S)".
2. Remove torx screws.

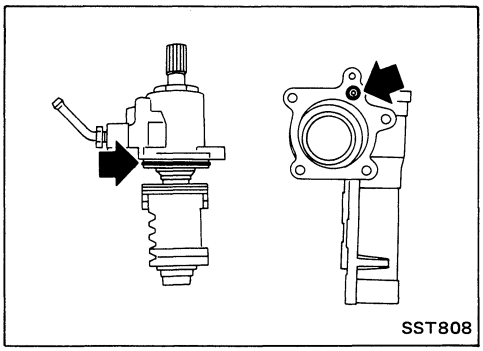


SST807

3. Remove rear housing together with worm gear assembly.

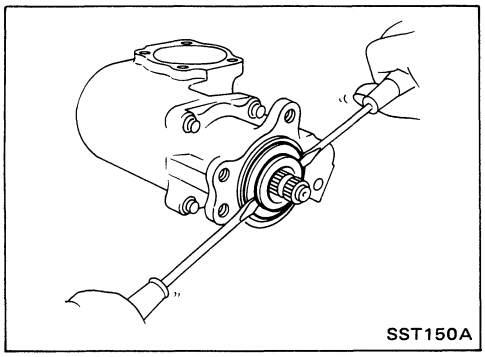
CAUTION:

a. **When worm assembly is removed, piston may turn and come off under its own weight. Hold piston to prevent it from turning.**
   If piston-to-rear housing clearance exceeds 35 mm (1.38 in) by loosening recirculating ball will be out of groove of worm; do not reinstall piston but replace the entire assembly.
b. **Take care not to damage teflon ring at piston end when removing.**
4. Remove O-rings.

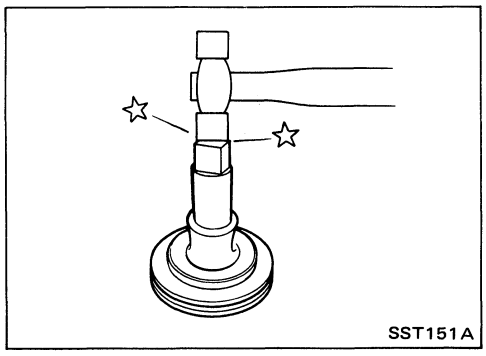

SST808

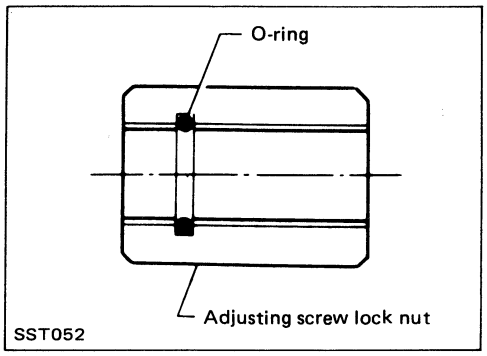
REAR COVER O-RING AND OIL SEAL

1. Remove snap ring, then rear cover.


SST150A

2. Remove O-ring and oil seal.


SST151A

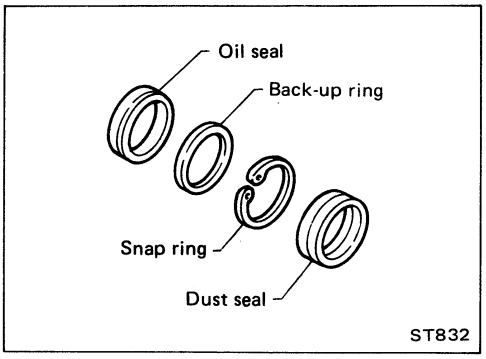


Assembly

ADJUSTING SCREW LOCK NUT O-RING

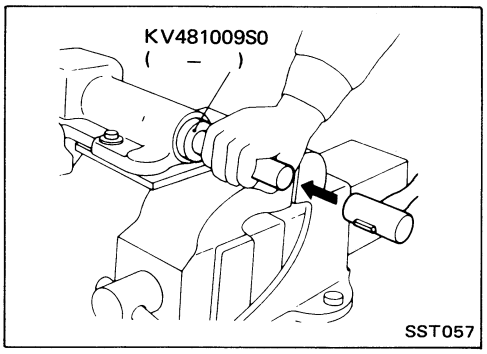
Insert new O-ring into adjusting screw lock nut.

- **Before inserting, apply a thin coat of vaseline to O-ring.**
- **Insert O-ring to make sure it fits into groove.**

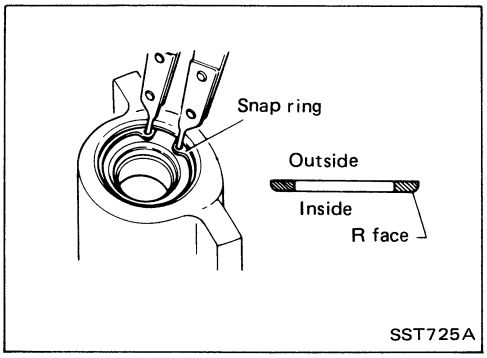


SECTOR SHAFT OIL SEAL

- **When installing, be sure to use new oil seal, dust seal, back-up ring and snap ring.**
- **Before installing, apply a thin coat of vaseline to new oil seal and dust seal.**



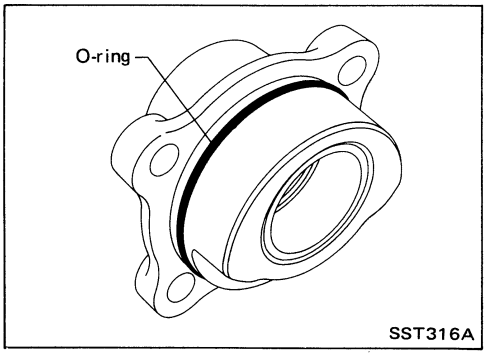
1. Press new oil seal and then install back-up ring with Tool.



2. Install a new snap ring into gear housing.

CAUTION:

a. **Turn snap ring to make sure it fits into groove.**
b. **Always install snap ring with R face facing inward.**



3. Press a new dust seal.
4. Fit new O-ring into sector shaft cover.

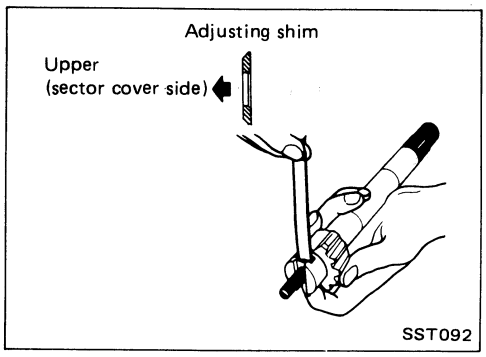
- **Before installing, apply a thin coat of vaseline to O-ring.**
- **Make certain that O-ring is installed properly, and not damaged by sector shaft.**

Assembly (Cont'd)

SECTOR SHAFT END PLAY

Select suitable adjusting shim and adjust end play between sector shaft and adjusting screw.

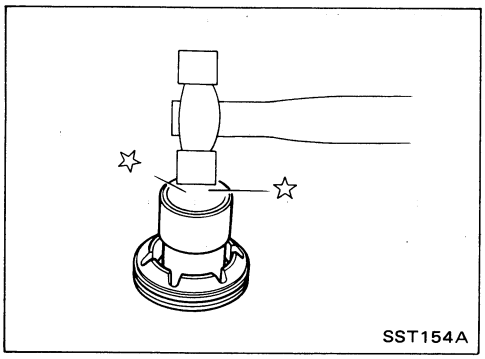
Sector shaft end play:
0.01 - 0.03 mm (0.0004 - 0.0012 in)
Sector shaft adjusting screw shims:
Refer to S.D.S.



SST092

REAR COVER O-RING AND OIL SEAL

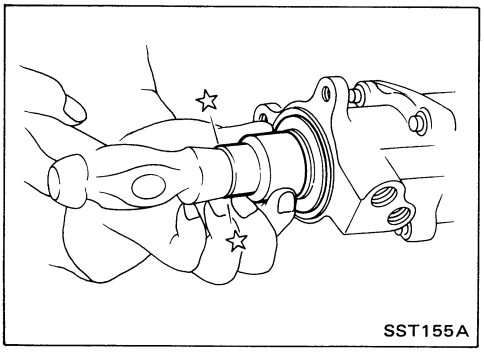
1. Install new O-ring and oil seal.


SST154A

2. Install rear cover, then snap ring.

CAUTION:

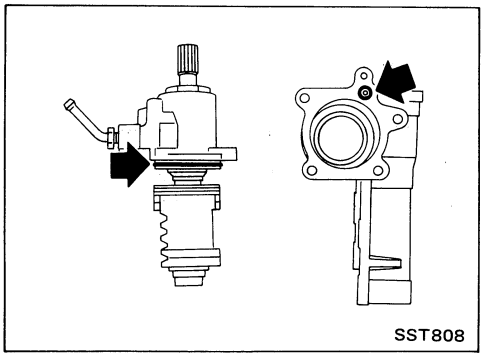
a. **Turn snap ring to make sure it fits into grooves.**
b. **Always install snap ring with its rounded edge facing rear cover.**


SST155A

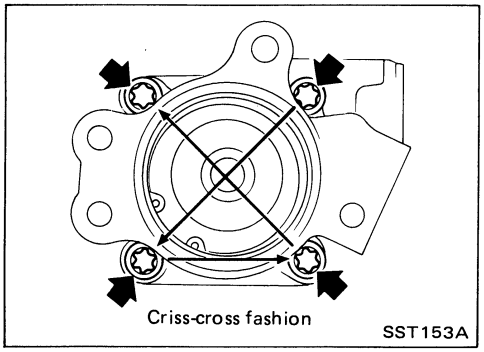
REAR HOUSING O-RING

1. Install new O-rings.

a. **Before installing, apply a thin coat of vaseline to O-ring.**
b. **Make sure O-ring is installed correctly and is not damaged by worm gear.**

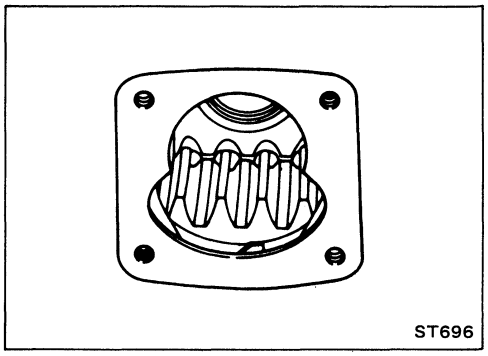

SST808

2. Gradually insert worm gear and rear housing assembly into gear housing, being careful not to damage oil seal and O-rings.
3. Install torx screws.



SST153A

Assembly (Cont'd)


ST696

SECTOR SHAFT

1. Set piston rack at straight-ahead position.

Turn piston rack about 10° to 15° toward yourself with your finger.

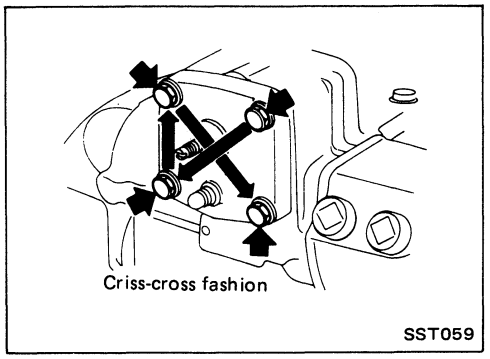
This is for smooth insertion of sector gear.

2. Wrap vinyl tape around serration area of sector shaft.

The reason is that vinyl tape prevents oil seal lip from being damaged during insertion.

3. Gradually insert sector shaft into gear housing, being careful not to damage oil seal.

When inserting sector shaft into gear housing, remove plastic film. Be careful not to drop bearings into gear housing.



SST059

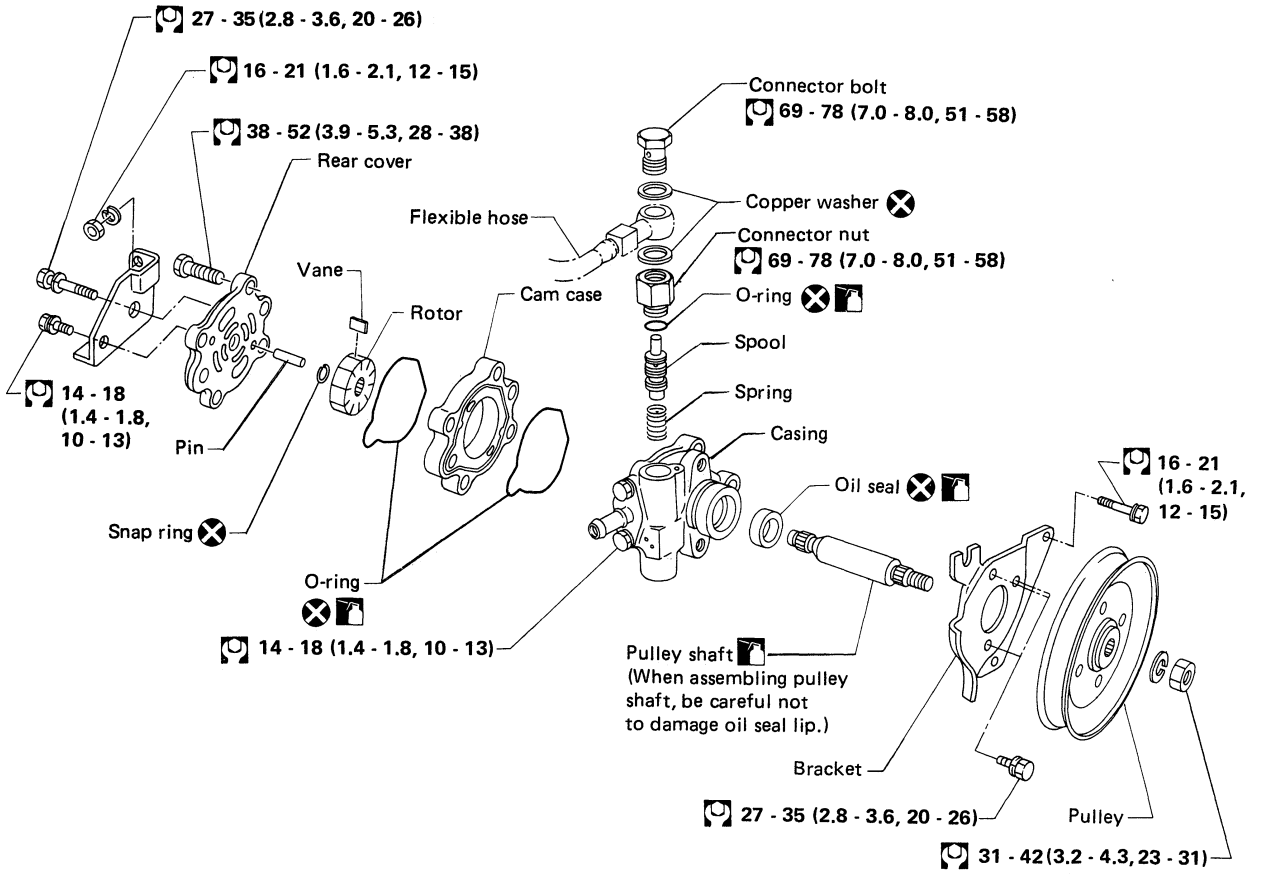
4. Tighten sector shaft cover bolts.

5. Check turning torque and steering gear preload.

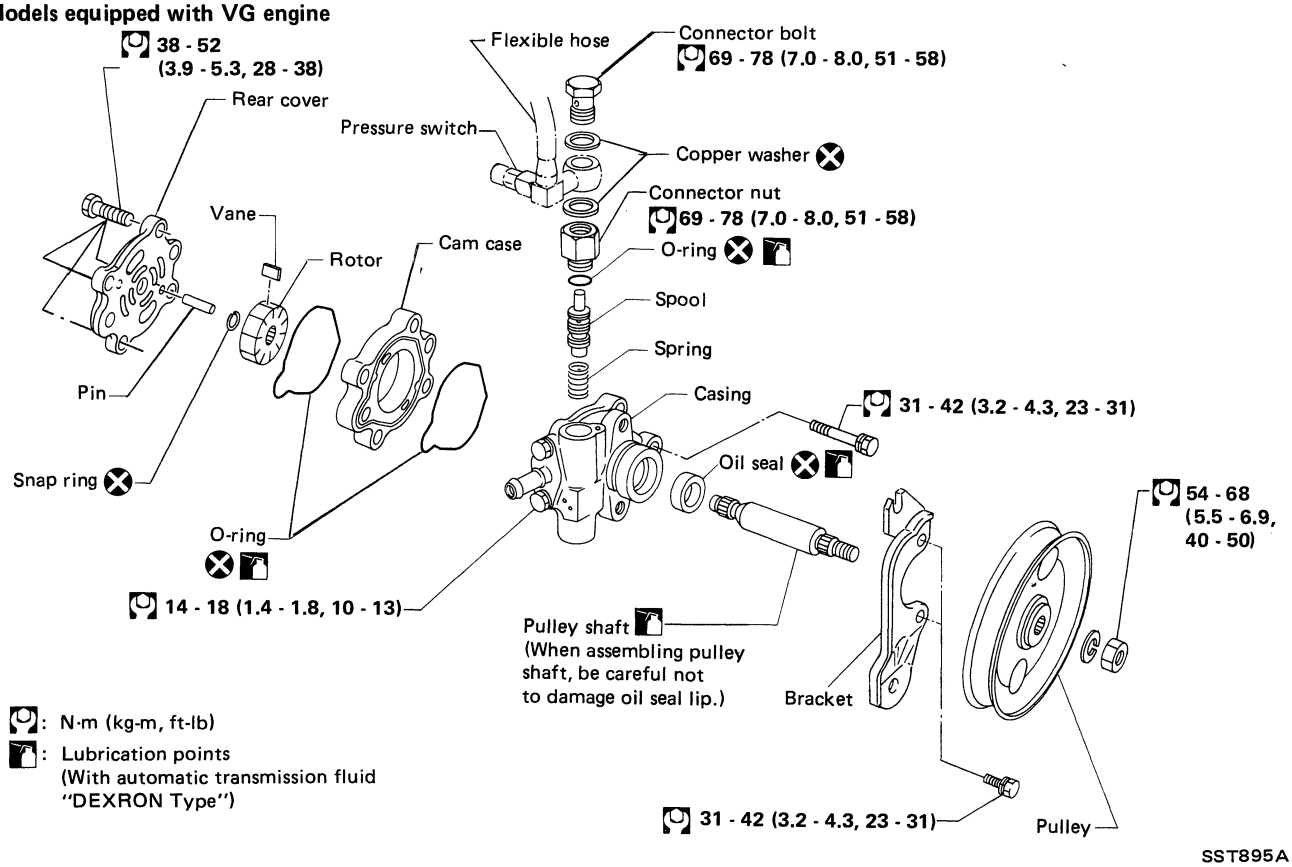
Refer to Inspection and Adjustment of POWER STEERING GEAR (Model: PB56S)

- **If there is a great difference between values of turning torque before and after diassembly, it must be assumed that some new problem has occurred. It will be necessary to replace the entire assembly.**

Models equipped with Z engine



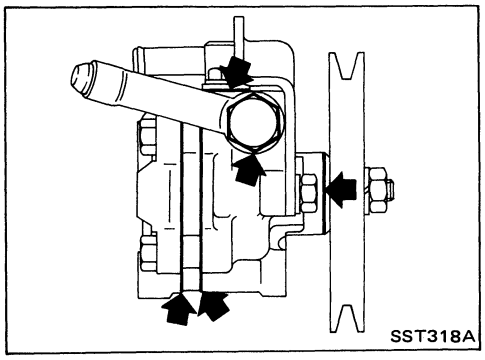
Models equipped with VG engine



: N·m (kg-m, ft-lb)

: Lubrication points
(With automatic transmission fluid "DEXRON Type")

SST895A


SST318A

The power steering oil pump should be disassembled only if any of the following conditions are observed.

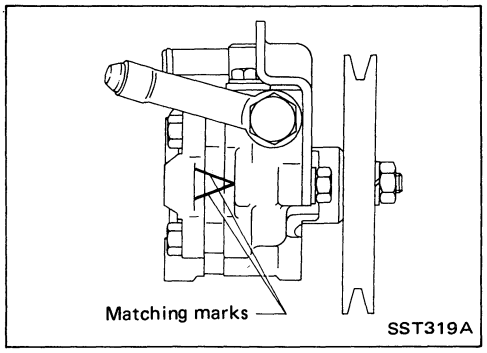
- Oil leak
- Deformed or damaged pulley

Disassembly

CAUTION:

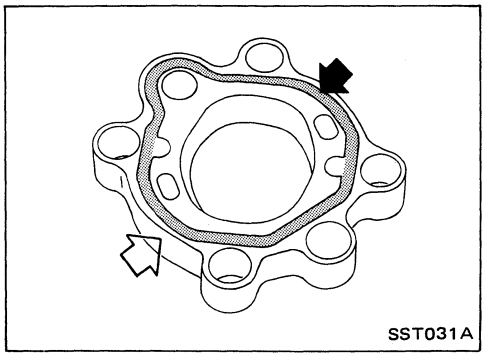
- The parts which can be disassembled are strictly limited, and never disassemble other parts than the specified ones.
- Disassembly should be performed in a place as clean as possible.
- Hands should be cleaned before disassembly.
- Do not use a rag. Be sure to use nylon or paper cloth.
- Be sure to follow procedures and cautions indicated in the Service Manual.
- When disassembling and reassembling, do not allow any foreign matter to enter or contact any parts.

1. Inscribe matching marks.



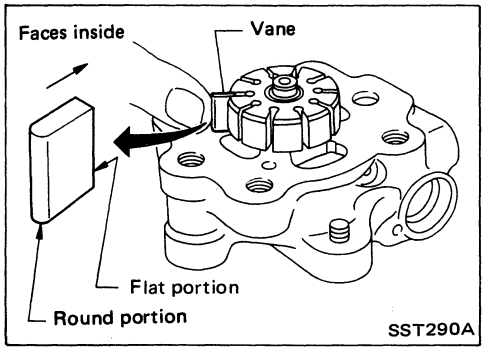
SST319A

2. Remove rear cover.
3. Remove O-ring from cam case.


SST031A

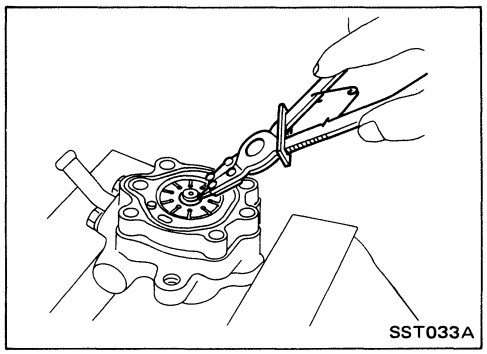
CAUTION:

- When removing cam case, be sure that the vane does not come off the rotor.

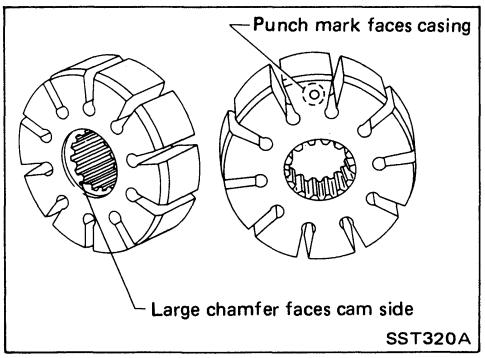


SST290A

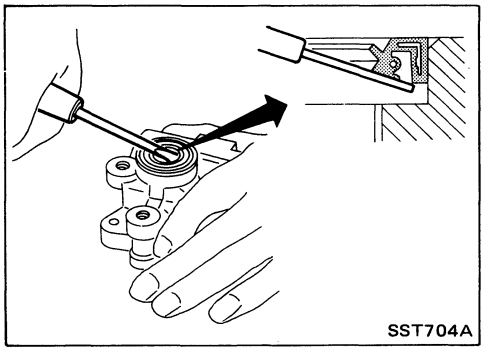
Disassembly (Cont'd)



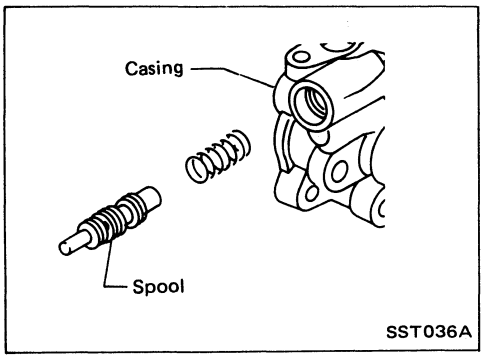
4. Remove snap ring, then draw pulley shaft out.
- **Be careful not to drop pulley shaft.**



5. Pay attention to the direction of rotor.



6. Remove oil seal.
- **Be careful not to damage casing.**



7. Remove connector.
- **Be careful not to drop spool.**

8. Remove suction pipe, then remove O-ring.

Inspection

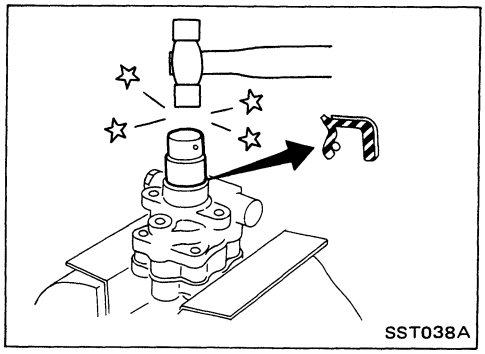
Wash clean all disassembled parts in suitable cleaning solvent.

PULLEY AND PULLEY SHAFT

a. **If pulley is cracked or deformed, replace it.**
b. **If an oil leak is noticed around pulley shaft oil seal, replace it.**
c. **If serration of pulley or pulley shaft is deformed or worn, replace it.**

CONNECTOR

a. **If connector is deformed or cracked, replace oil pump assembly.**
b. **If an oil leak is noticed, replace O-ring.**


SST038A

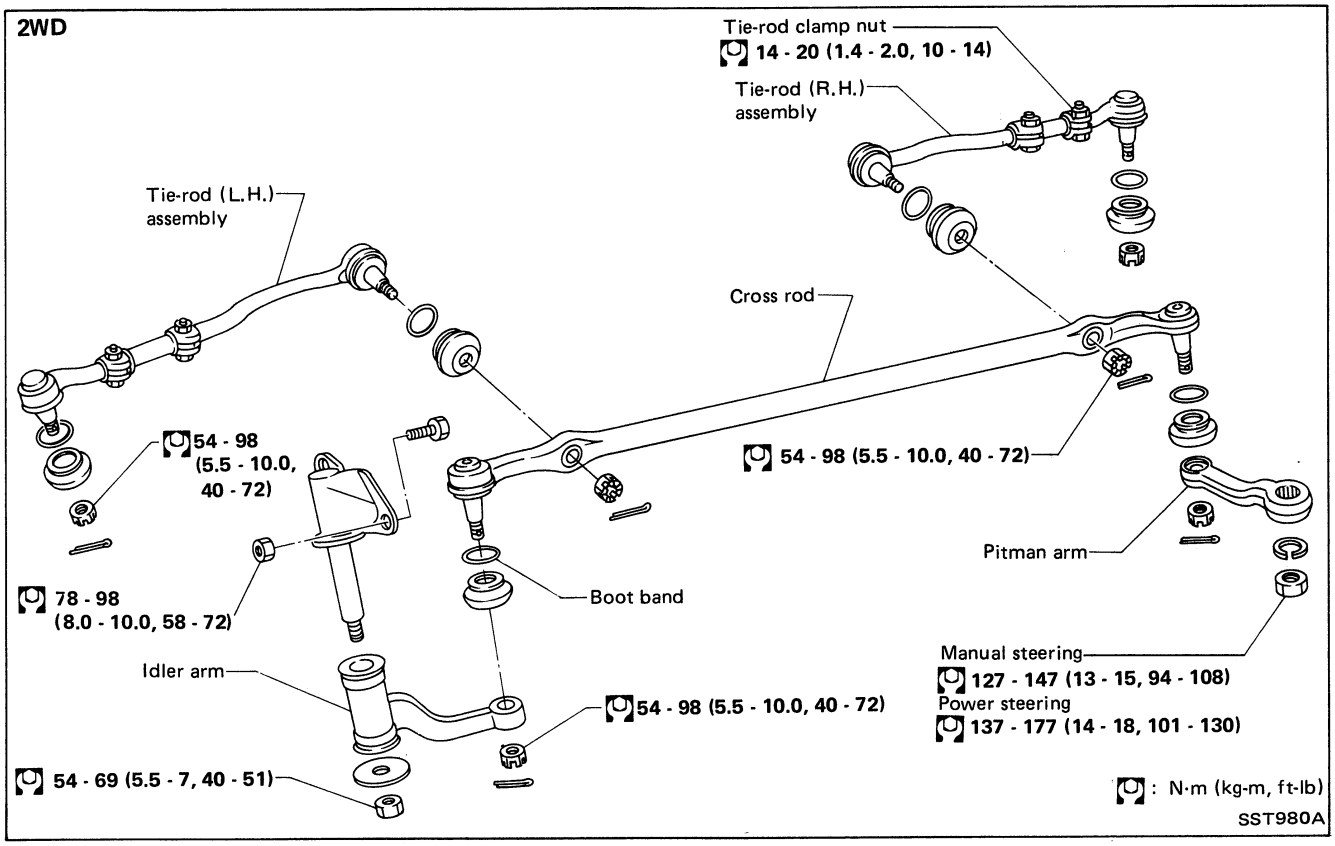
Assembly

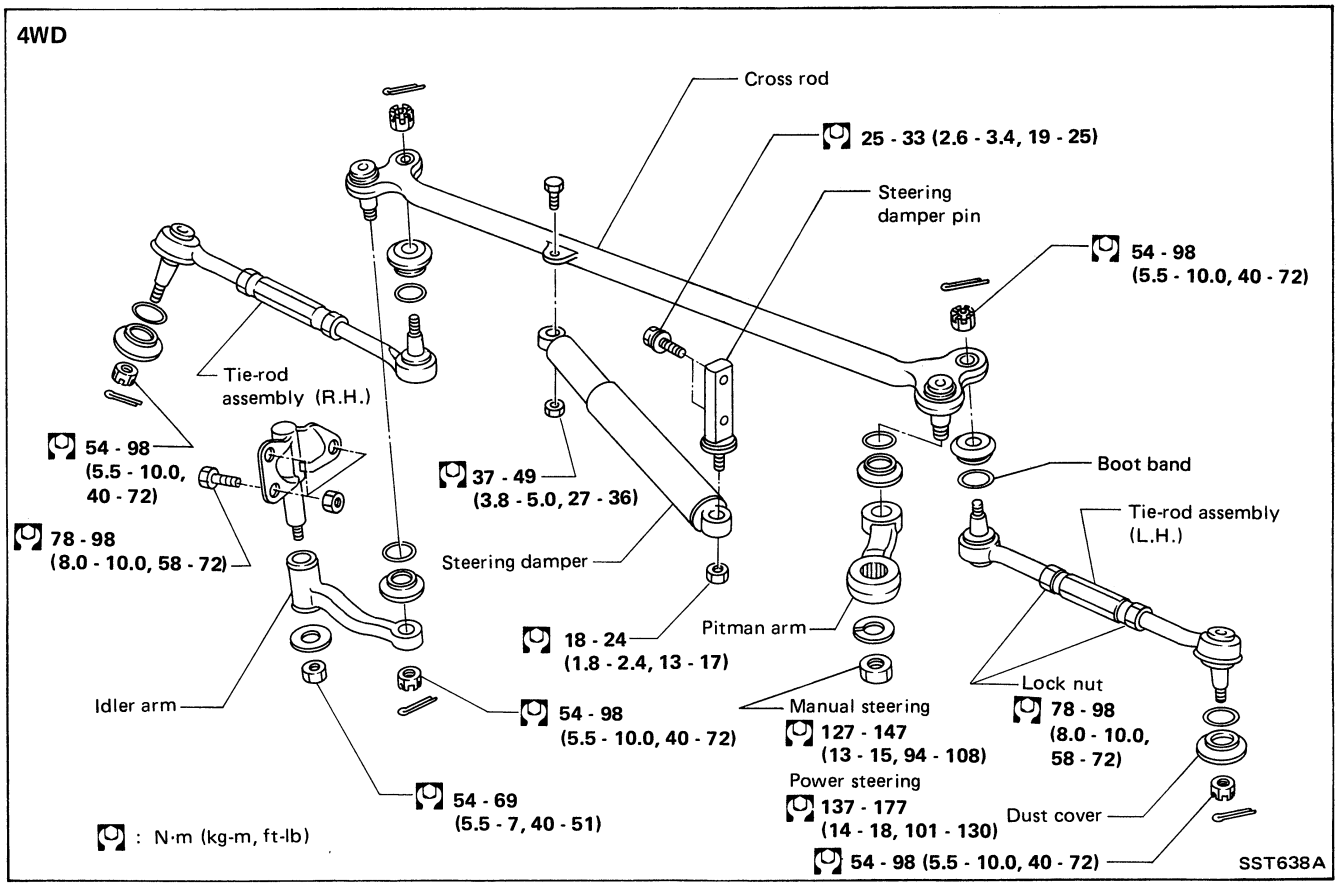
Assemble oil pump in the reverse order of disassembly, noting the following instructions.

- Before installing O-rings and oil seal, apply a thin coat of power steering fluid to them.
- Make certain that O-rings and oil seal are installed properly.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.

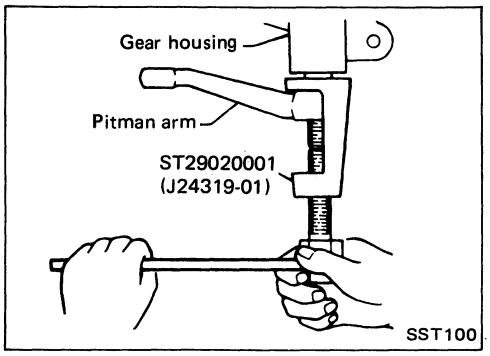
- Install rotor so that larger chamfer of spline faces the cam side and smaller chamfer faces the front housing. (Or install rotor so that portion with punch mark faces the front housing and portion without punch mark faces the cam side.)

Removal and Installation

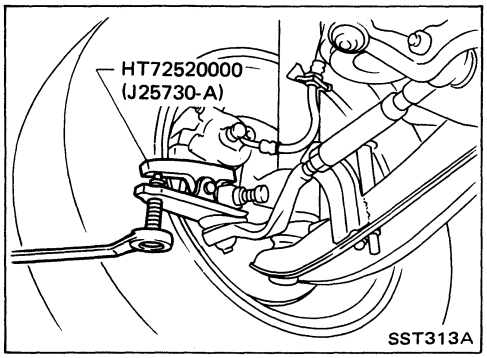




Removal and Installation (Cont'd)



Remove gear arm with Tool.

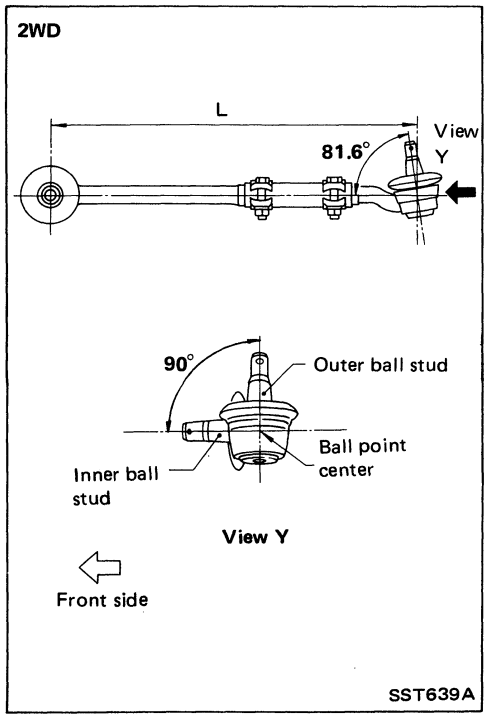


Remove tie-rod from knuckle arm with Tool.

Disassembly

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.



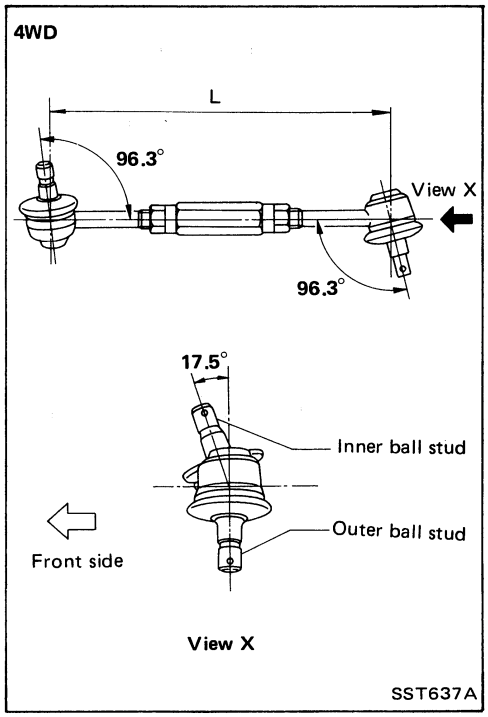
CROSS ROD AND TIE-ROD

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
   344 mm (13.54 in) ... 2WD
2. Lock tie-rod clamp nut so that ball joint on outer ball stud is as follows with respect to that on inner ball stud.

CAUTION:

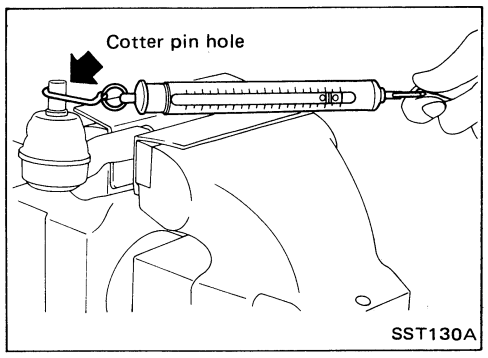
Make sure that tie-rod bars are screwed into tie-rod tube more than 35 mm (1.38 in).

Disassembly (Cont'd)



L: Standard
281 mm (11.06 in) ... 4WD

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



Inspection

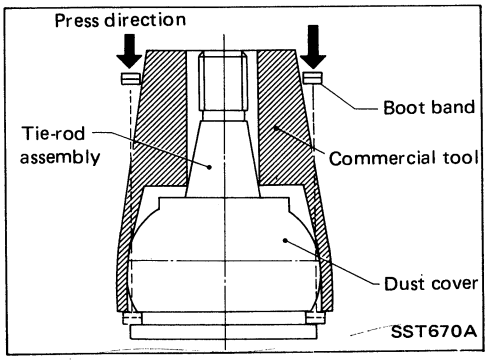
BALL JOINT

1. Check ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Swinging force*:
Ball joint
10.8 - 108.9 N
(1.1 - 11.1 kg, 2.4 - 24.5 lb)
***Measure point: Cotter pin hole**

2. Check condition of dust cover. If it is cracked excessively, replace dust cover.

- When replacing dust cover, be careful not to damage it.
- Lubricate ball joint with multi-purpose grease, if necessary.



- When installing boot band with *commercial tool, be careful not to overexpand it.

*** Refer to PREPARATION.**

CAUTION:
Be careful not to apply grease or oil to taper of ball joint.

Inspection (Cont'd)

IDLER ARM ASSEMBLY

- Check rubber bushing of idler arm for breakage, wear or play, and if necessary replace.
- Lubricate idler arm assembly with recommended multi-purpose grease, if necessary.
  When lubricating, refer to BALL JOINT of Inspection.

CROSS ROD AND TIE-ROD

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

STEERING DAMPER

Check for oil leakage and measure damping force of damper, and replace if necessary.

Damping force:
at 0.3 m (1.0 ft)/sec
1,942 N (198 kg, 437 lb)
. . . Extended direction
1,775 N (181 kg, 399 lb)
. . . Compressed direction

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 ball stud, gear arm of idler arm.
- When reassembling each ball joint, use new cotter pins.

General Specifications

Steering column type (Collapsible)	Manual steering	Power steering	
Steering gear type	B56S	PB48S	PB56S
Turns of steering wheel on the vehicle (Lock-to-lock)	4.9 (2WD) 5.0 (4WD) 3.9*1	3.7	3.8 3.0*1
Steering gear ratio	22	16.5	17.0
Steering damper (4WD) [at 0.3 m (1.0 ft)/sec.] N (kg, lb)	1,942 (198, 437)*2 1,775 (181, 399)*3		

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less

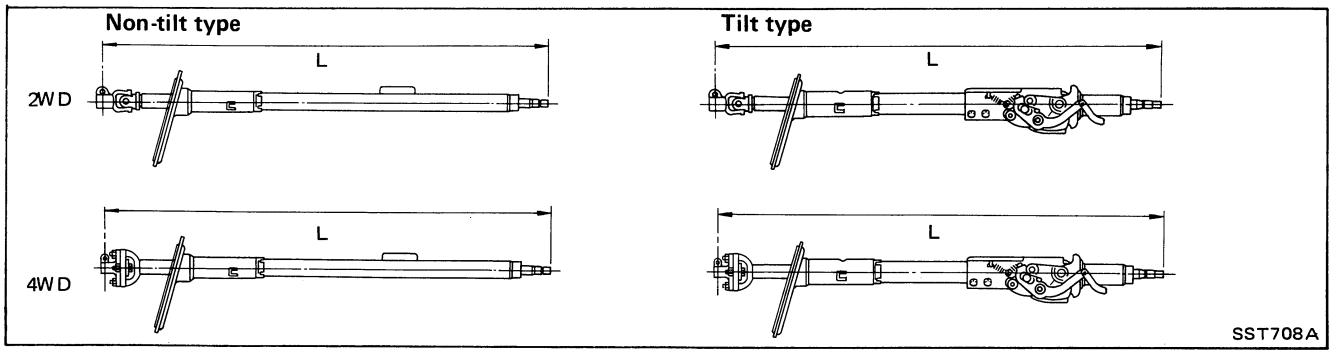
*1: 4WD: Tire size ... 10.50R15
*2: Extended direction
*3: Compressed direction

Inspection and Adjustment

STEERING COLUMN

Unit: mm (in)

	Dimension "L"
2WD model	918.0 - 919.6 (36.14 - 36.20)
4WD model	886.1 - 887.7 (34.89 - 34.95)



Inspection and Adjustment (Cont'd)

MANUAL STEERING GEAR (Model: B56S)

Worm bearing preload (Without oil seal) N·m (kg-cm, in-lb)	0.20 - 0.59 (2.0 - 6.0, 1.7 - 5.2)	
Steering gear preload (With oil seal) N·m (kg-cm, in-lb)		
New parts	0.83 - 1.23 (8.5 - 12.5, 7.4 - 10.9)	
Used parts	0.59 - 0.98 (6.0 - 10.0, 5.2 - 8.7)	
Backlash at pitman arm top end (in a straight-ahead position) mm (in)		
New gear	0 - 0.1 (0 - 0.004)	
Used gear	0 - 0.3 (0 - 0.012)	
End play (Between sector shaft and adjusting screw) mm (in)	0.01 - 0.03 (0.0004 - 0.0012)	
Adjusting shim thickness	Thickness mm (in)	Part number
	1.575 - 1.600 (0.0620 - 0.0630)	48213-B0100
	1.550 - 1.575 (0.0610 - 0.0620)	48214-B0100
	1.525 - 1.550 (0.0600 - 0.0610)	48215-B0100
	1.500 - 1.525 (0.0591 - 0.0600)	48216-B0100
	1.475 - 1.500 (0.0581 - 0.0591)	48217-B0100
	1.450 - 1.475 (0.0571 - 0.0581)	48218-B0100
Oil capacity liters (US pt, Imp pt)	Approx. 0.33 (3/4, 5/8)	

POWER STEERING SYSTEM (Model: PB48S, PB56S)

Steering wheel turning force (at 360° from neutral position and circumference of steering wheel) N (kg, lb)	24.5 - 29.4 (2.5 - 3.0, 5.5 - 6.6) 39 (4, 9) or less*	
Oil pump pressure kPa (kg/cm², psi)	7,649 - 8,238 (78 - 84, 1,109 - 1,194) at idling	
Fluid capacity mℓ (US fl oz, Imp fl oz)	Approximately 900 - 1,000 (30.4 - 33.8, 31.7 - 35.2)	
Normal operating temperature °C (°F)	60 - 80 (140 - 176)	
Steering gear turning torque N·m (kg-cm, in-lb) 360° position from straight-ahead position	0.7 - 1.2 (7 - 12, 6.1 - 10.4)	
Straight-ahead position (As compared with steering wheel turned 360°)	0.1 - 0.4 (1 - 4, 0.9 - 3.5) higher	
Backlash at pitman arm top end (in a straight-ahead position) mm (in)	0 - 0.1 (0 - 0.004)	
End play (Between sector shaft and adjusting screw) mm (in)	0.01 - 0.03 (0.0004 - 0.0012)	
Adjusting shim thickness	Thickness mm (in)	Part number
	1.575 - 1.600 (0.0620 - 0.0630)	48213-B0100
	1.550 - 1.575 (0.0610 - 0.0620)	48214-B0100
	1.525 - 1.550 (0.0600 - 0.0610)	48215-B0100
	1.500 - 1.525 (0.0591 - 0.0600)	48216-B0100
	1.475 - 1.500 (0.0581 - 0.0591)	48217-B0100
	1.450 - 1.475 (0.0571 - 0.0581)	48218-B0100

*Model: PB56S-type

STEERING LINKAGE

Model	2WD	4WD
Ball joint swinging force* N (kg, lb)		
New part	10.8 - 108.9 (1.1 - 11.1, 2.4 - 24.5)	
Used part	10.8 (1.1, 2.4) or more	
Standard tie-rod length mm (in)	Approx. 344 (13.54)	Approx. 281 (11.06)

*Measuring point: Cotter pin hole

Tightening Torque

STEERING COLUMN

Unit	N·m	kg-m	ft-lb
Steering wheel nut	29 - 39	3.0 - 4.0	22 - 29
Steering column mounting bracket	13 - 18	1.3 - 1.8	9 - 13
Jacket tube bracket to dash panel	9 - 14	0.9 - 1.4	6.5 - 10.1
Tilt joint fixing bolt	24 - 29	2.4 - 3.0	17 - 22
Mounting bracket to lower jacket tube (Tilt type)	16 - 21	1.6 - 2.1	12 - 15
Steering column shaft to coupling	24 - 29	2.4 - 3.0	17 - 22
Coupling to column shaft and gear	24 - 29	2.4 - 3.0	17 - 22
Coupling fixing nut	16 - 22	1.6 - 2.2	12 - 16

MANUAL STEERING GEAR

Unit	N·m	kg-m	ft-lb
Steering gear housing to body side frame	84 - 96	8.6 - 9.8	62 - 71
Pitman arm to sector shaft	127 - 147	13 - 15	94 - 108
Sector shaft cover bolt	15 - 25	1.5 - 2.5	11 - 18
Sector shaft adjusting screw lock nut	29 - 39	3.0 - 4.0	22 - 29
Adjusting plug lock nut	245 - 314	25 - 32	181 - 231

POWER STEERING SYSTEM

Installation

Unit	N·m	kg-m	ft-lb
Steering gear housing to body side frame	84 - 96	8.6 - 9.8	62 - 71
Pitman arm to sector shaft	137 - 177	14 - 18	101 - 130
Oil pump to engine bracket			
Z engine model	16 - 21	1.6 - 2.1	12 - 15
VG engine model	31 - 42	3.2 - 4.3	23 - 31
Tank fixing bolt bracket	3 - 4	0.3 - 0.4	2.2 - 2.9
High-pressure pipe to gear	29 - 39	3.0 - 4.0	22 - 29
Low-pressure pipe to gear	39 - 49	4.0 - 5.0	29 - 36
Low-pressure hose clip bolt	2.5 - 3.4	0.25 - 0.35	1.8 - 2.5
High-pressure hose to oil pump	49 - 69	5.0 - 7.0	36 - 51

Power steering gear

Unit	N·m	kg-m	ft-lb
Sector shaft cover bolt	26 - 32	2.7 - 3.3	20 - 24
Sector shaft adjusting screw lock nut	34 - 40	3.5 - 4.1	25 - 30
Rear housing bolt	26 - 32	2.7 - 3.3	20 - 24
Bleeder screw*	6 - 8	0.6 - 0.8	4.3 - 5.8

*: Only 2WD model

Power steering oil pump

Unit	N·m	kg-m	ft-lb
Pulley lock nut			
(Z engine)	31 - 42	3.2 - 4.3	23 - 31
(VG engine)	54 - 68	5.5 - 6.9	40 - 50
Rear cover fixing bolt	38 - 52	3.9 - 5.3	28 - 38
Connector bolt	69 - 78	7.0 - 8.0	51 - 58
Connector nut	69 - 78	7.0 - 8.0	51 - 58
Suction pipe	14 - 18	1.4 - 1.8	10 - 13
Oil pump bracket			
(Z engine)	27 - 35	2.8 - 3.6	20 - 26
(VG engine)	31 - 42	3.2 - 4.3	23 - 31

STEERING LINKAGE

Unit	N·m	kg-m	ft-lb
Idle arm to body side frame	78 - 98	8.0 - 10.0	58 - 72
Idle arm nut	54 - 69	5.5 - 7.0	40 - 51
Ball stud nut	54 - 98	5.5 - 10.0	40 - 72
Tie-rod clamp nut (2WD)	14 - 20	1.4 - 2.0	10 - 14
Tie-rod lock nut (4WD)	78 - 98	8.0 - 10.0	58 - 72
Steering damper			
To cross rod	37 - 49	3.8 - 5.0	27 - 36
To damper pin	18 - 24	1.8 - 2.4	13 - 17
Pin to body	25 - 33	2.6 - 3.4	19 - 25