

STEERING SYSTEM

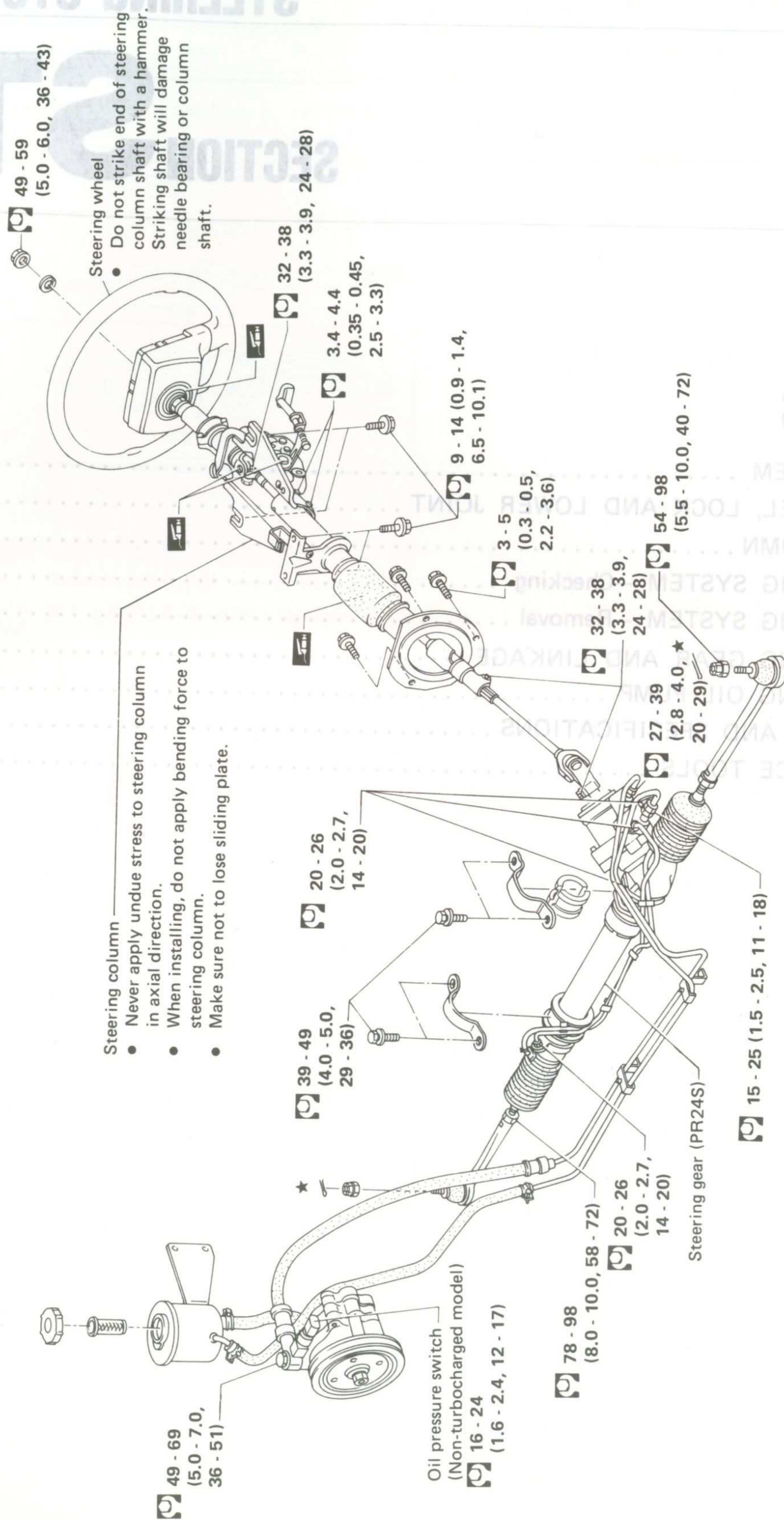
SECTION **ST**

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ST

STEERING SYSTEM



★: Always replace when disassembled.
 [N·m symbol]: N·m (kg-m, ft-lb)

SST338A

STEERING WHEEL, LOCK AND LOWER JOINT

Removal and Installation

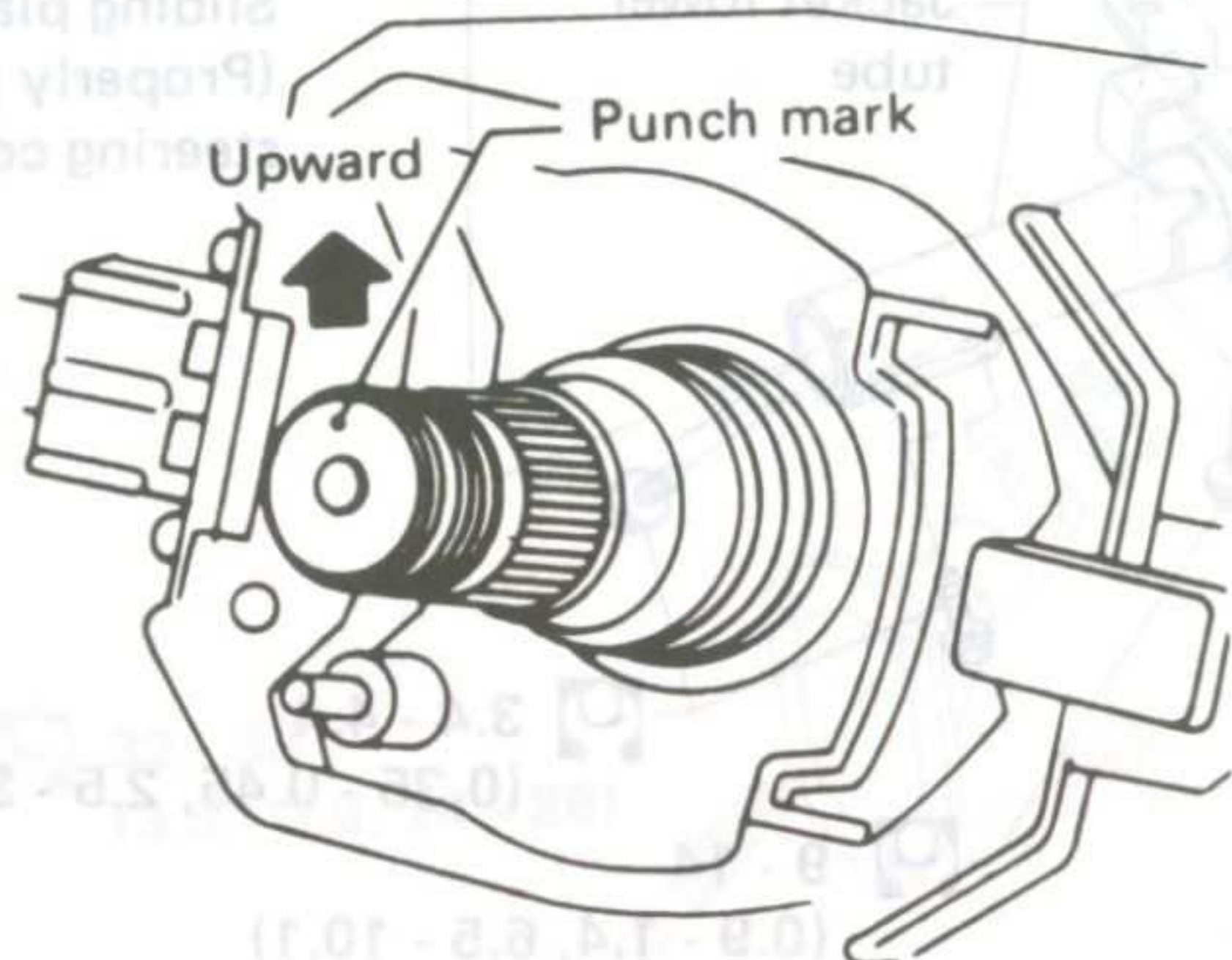
STEERING WHEEL

Remove steering wheel using Tool.



SST068

- Install steering wheel on column shaft in a straight-ahead position.

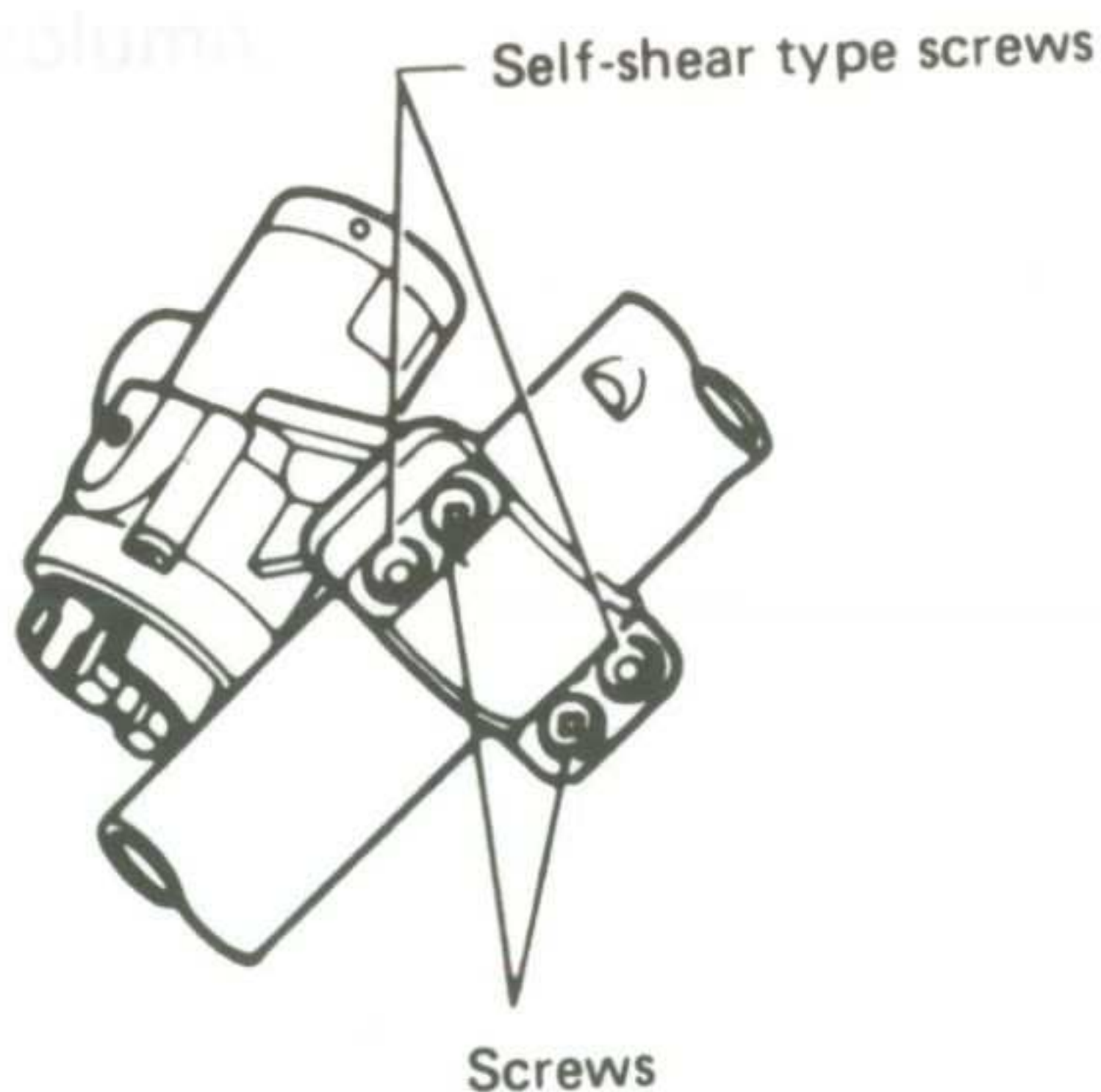


SST070

- 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.

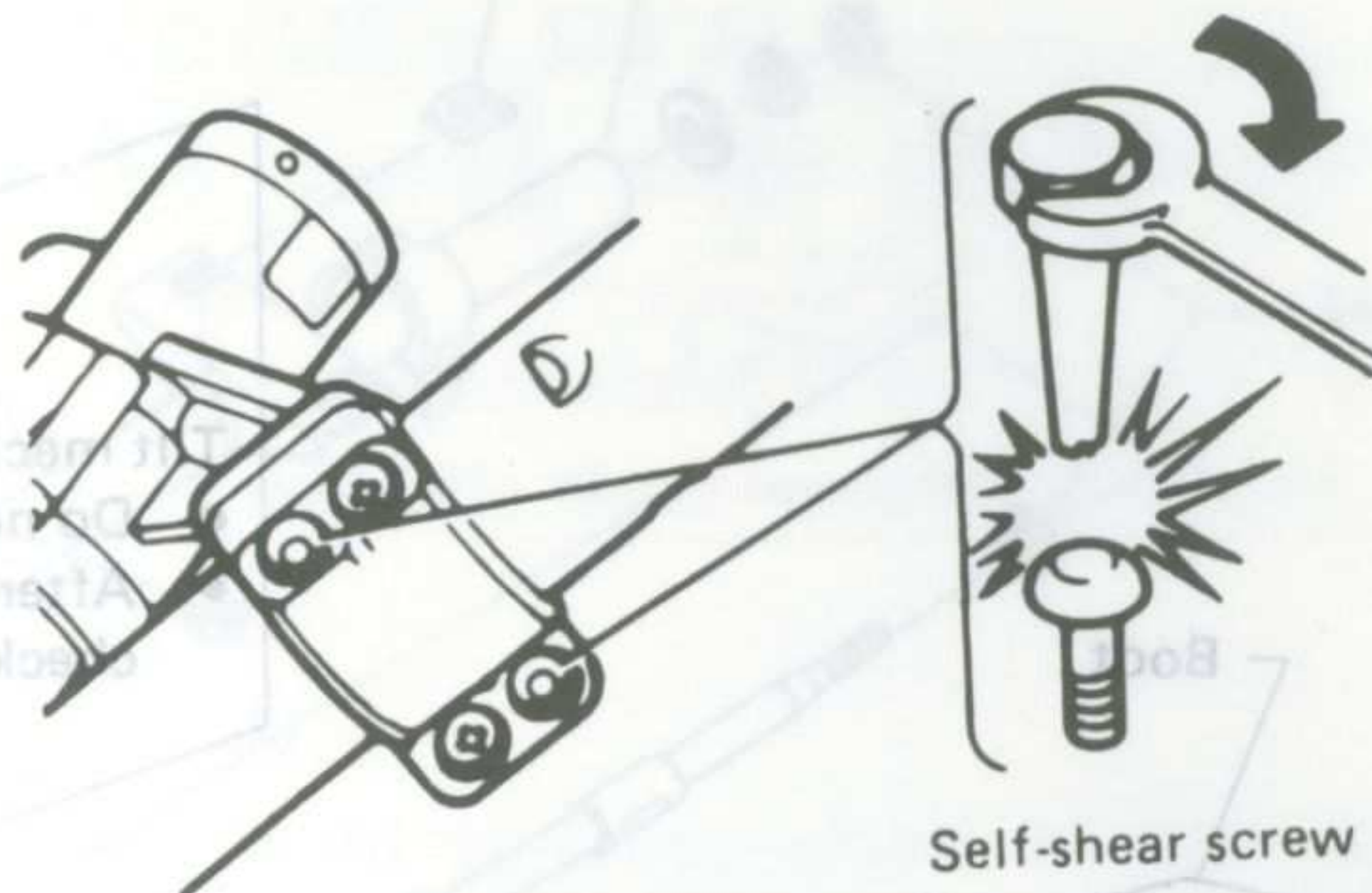
STEERING LOCK

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



SST073

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

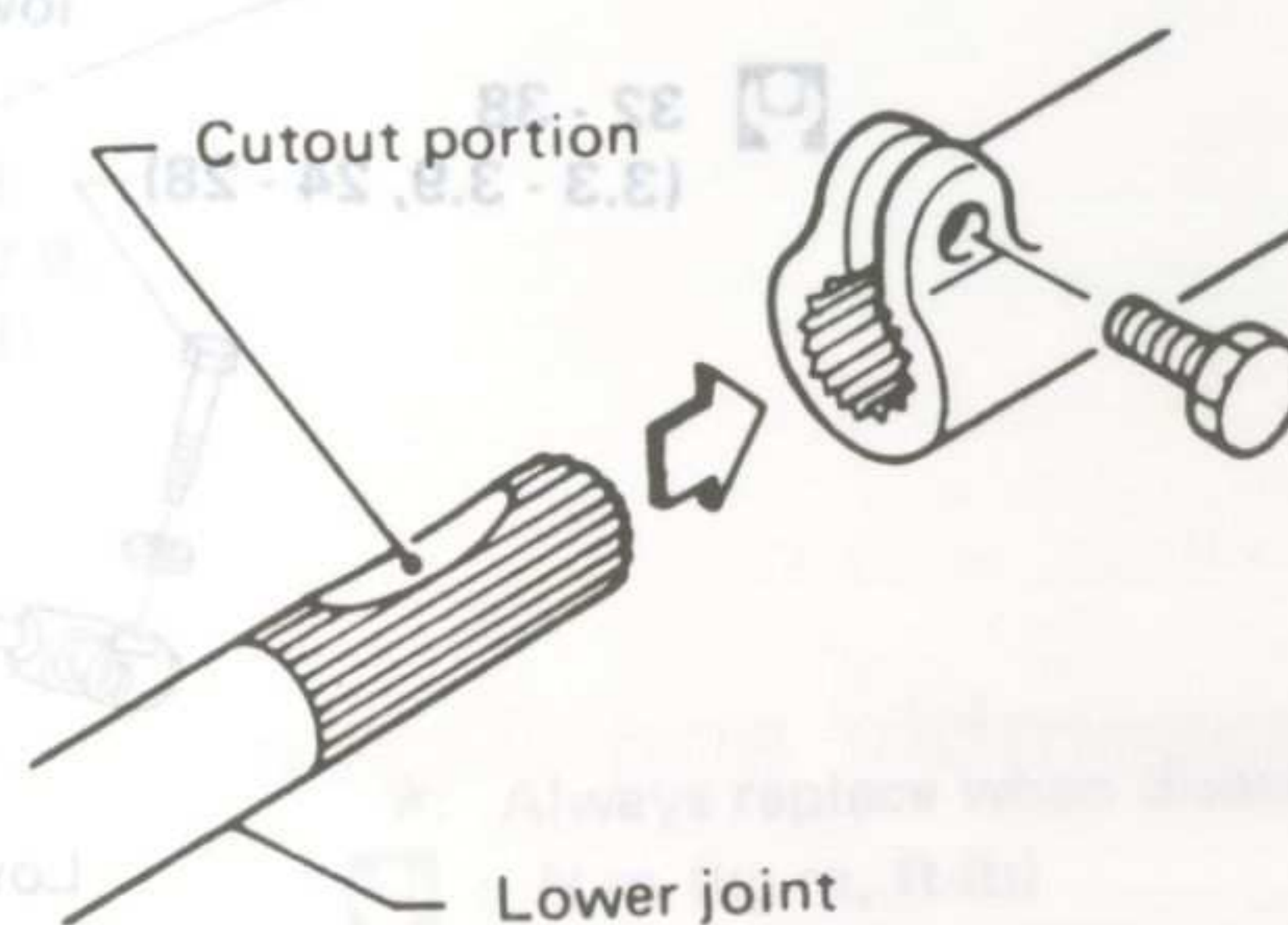


SST074

STEERING LOWER JOINT

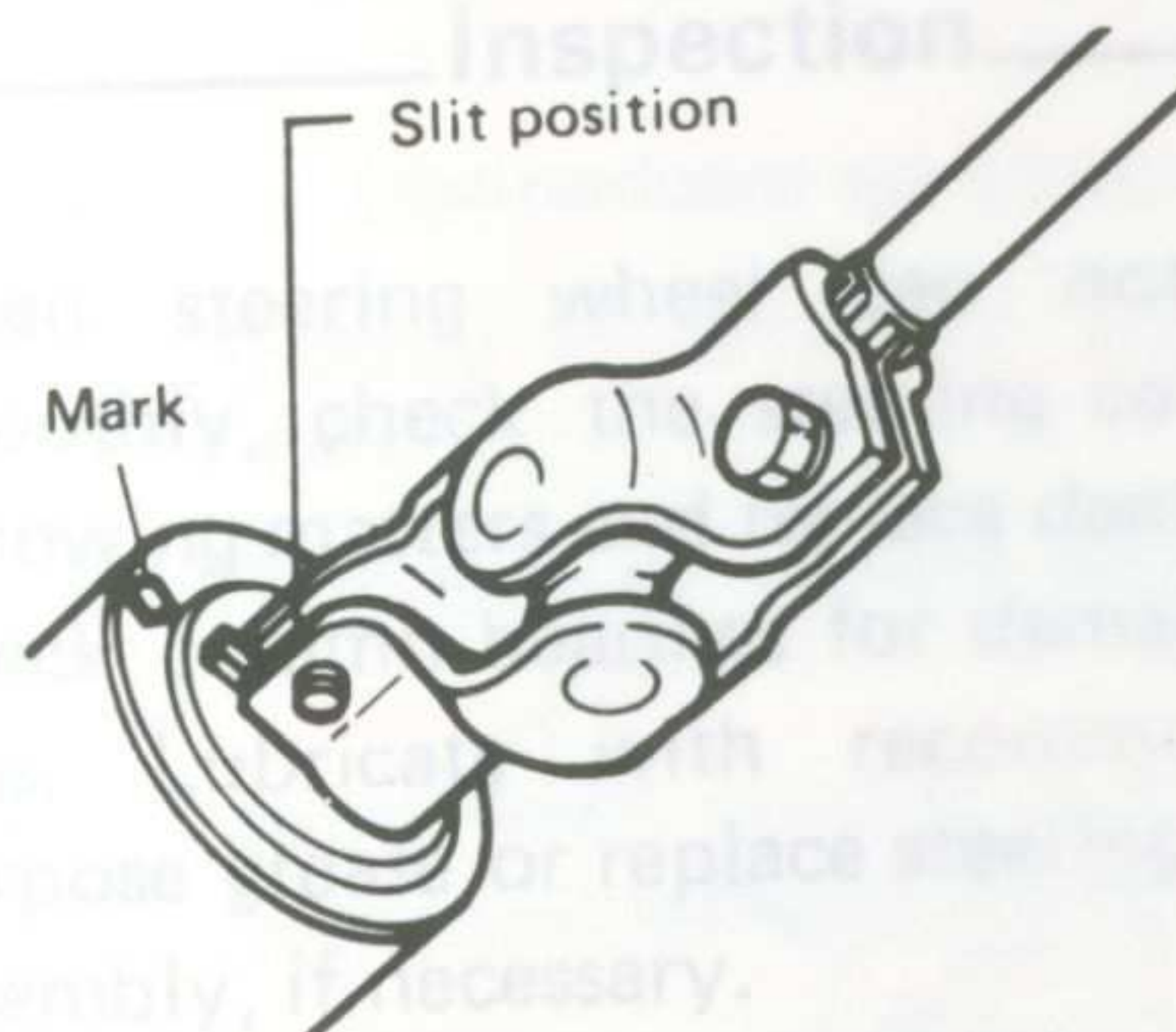
Remove hole cover if necessary.

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



SST840

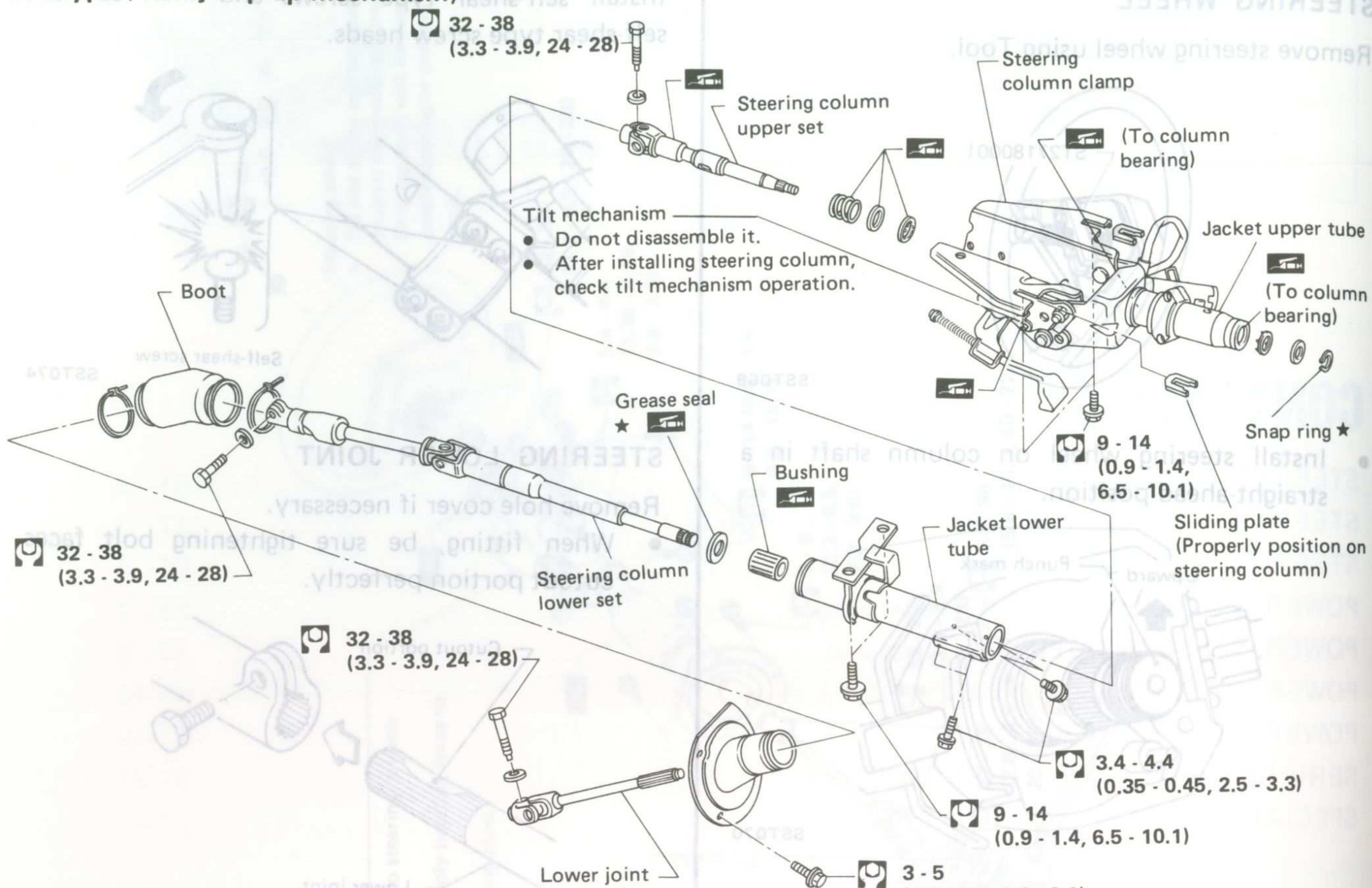
Ensure that slit position of steering lower joint is aligned with steering gear cap or spacer mark.



SST841

STEERING COLUMN

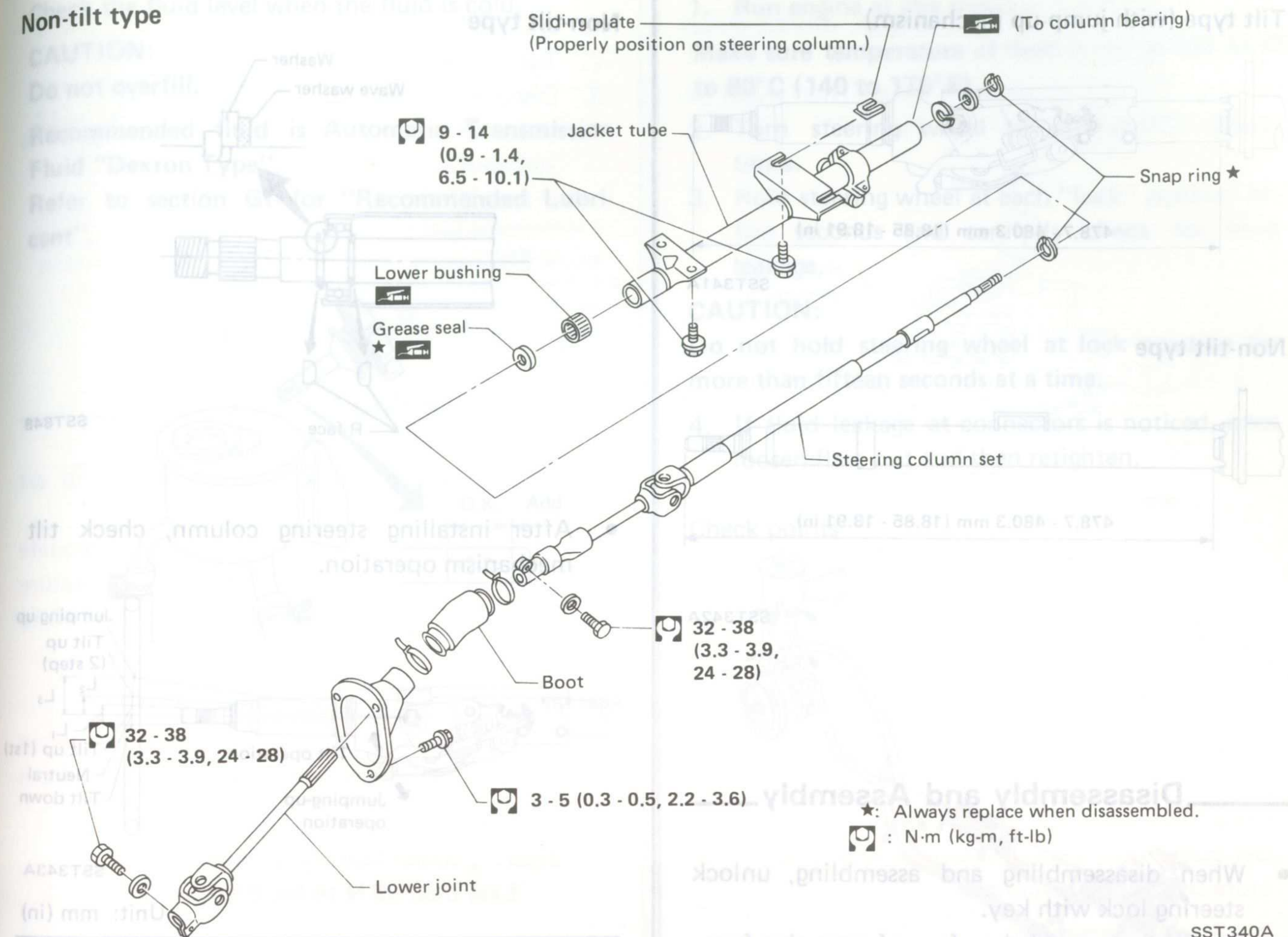
Tilt type (with jump-up mechanism)



★: Always replace when disassembled.
 : N·m (kg-m, ft-lb)

STEERING COLUMN

Non-tilt type



Installation

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

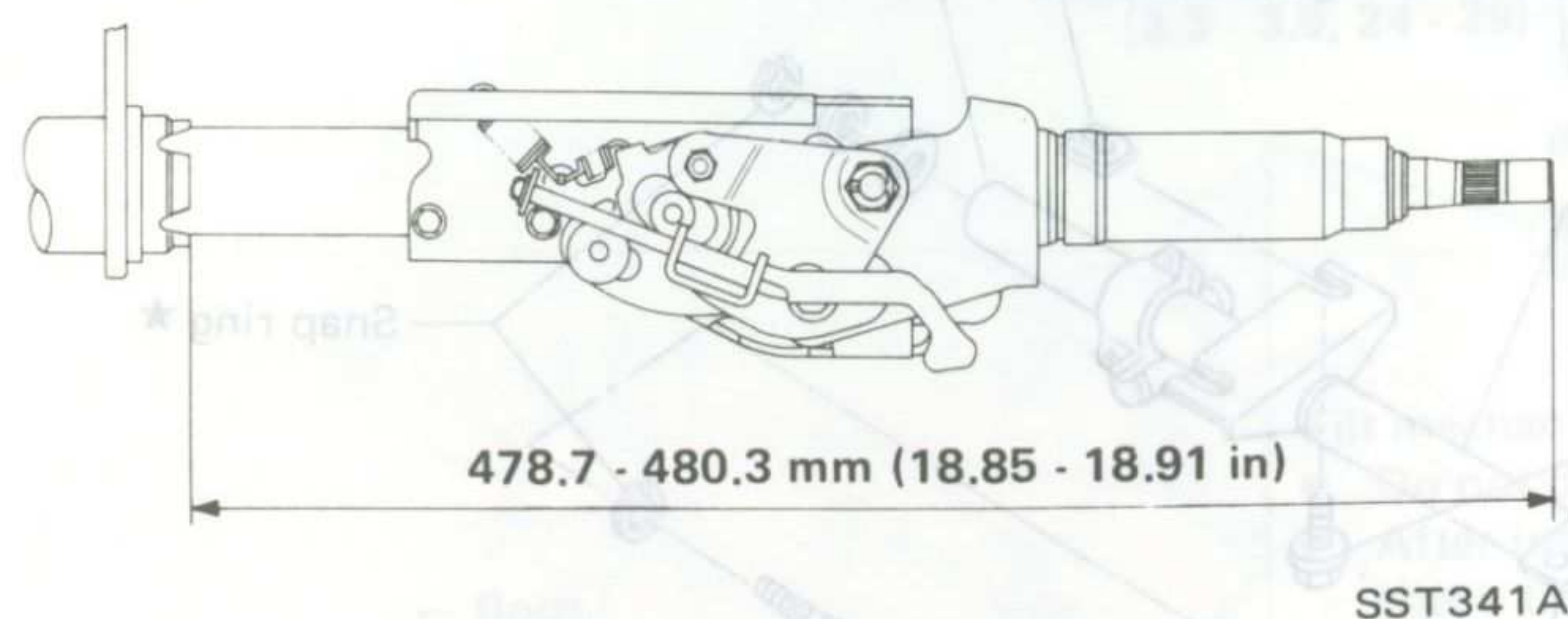
Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.
 - Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.
 - Check jacket tube for deformation or breakage. Replace if necessary.
- When the vehicle is involved in a light collision, check dimension "A". If it is not within specifications, replace steering column as an assembly.

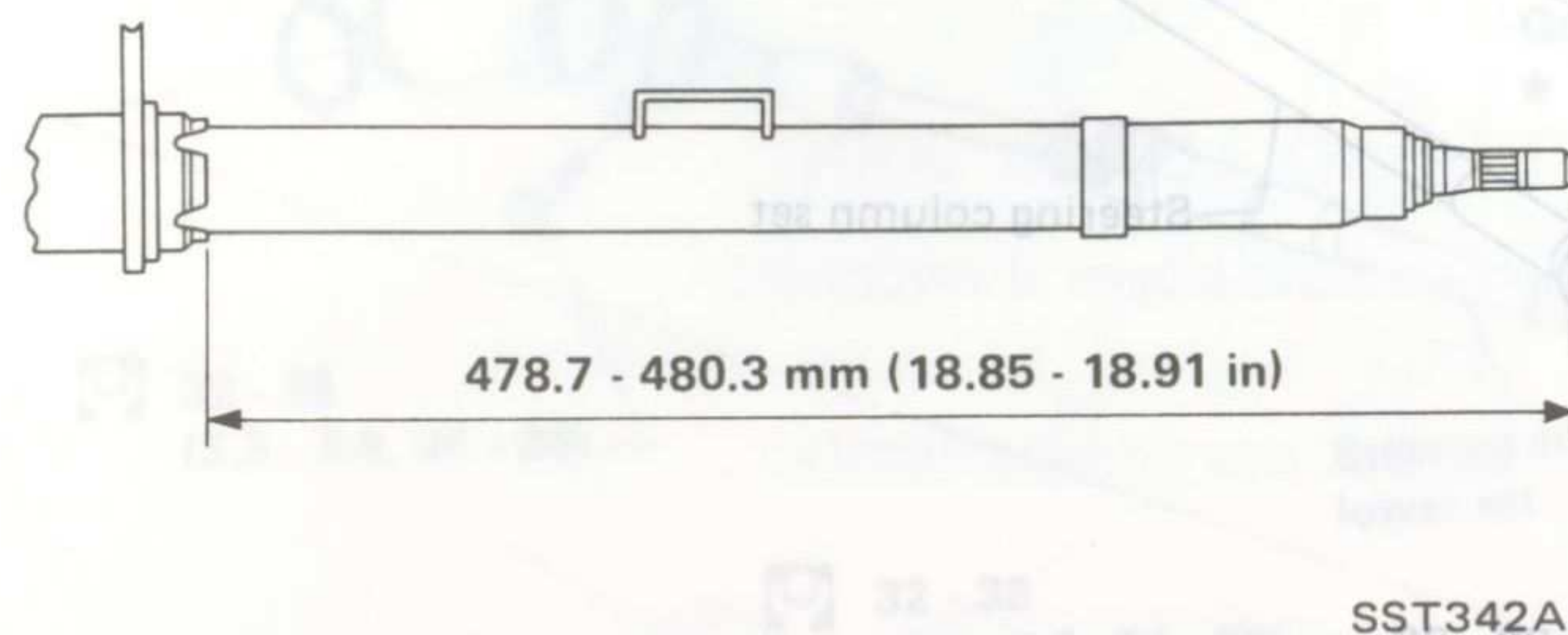
STEERING COLUMN

Inspection (Cont'd)

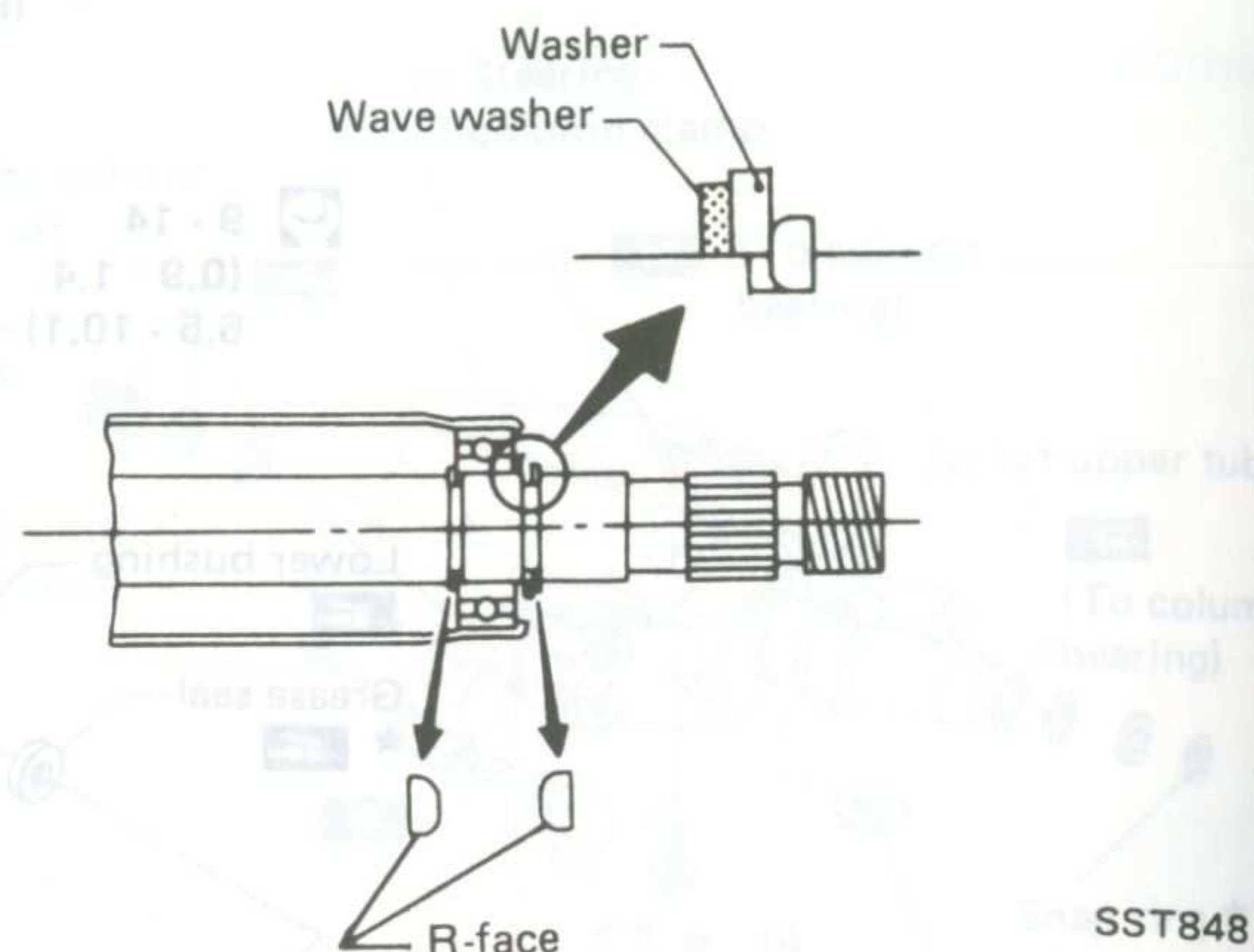
Tilt type (with jump-up mechanism)



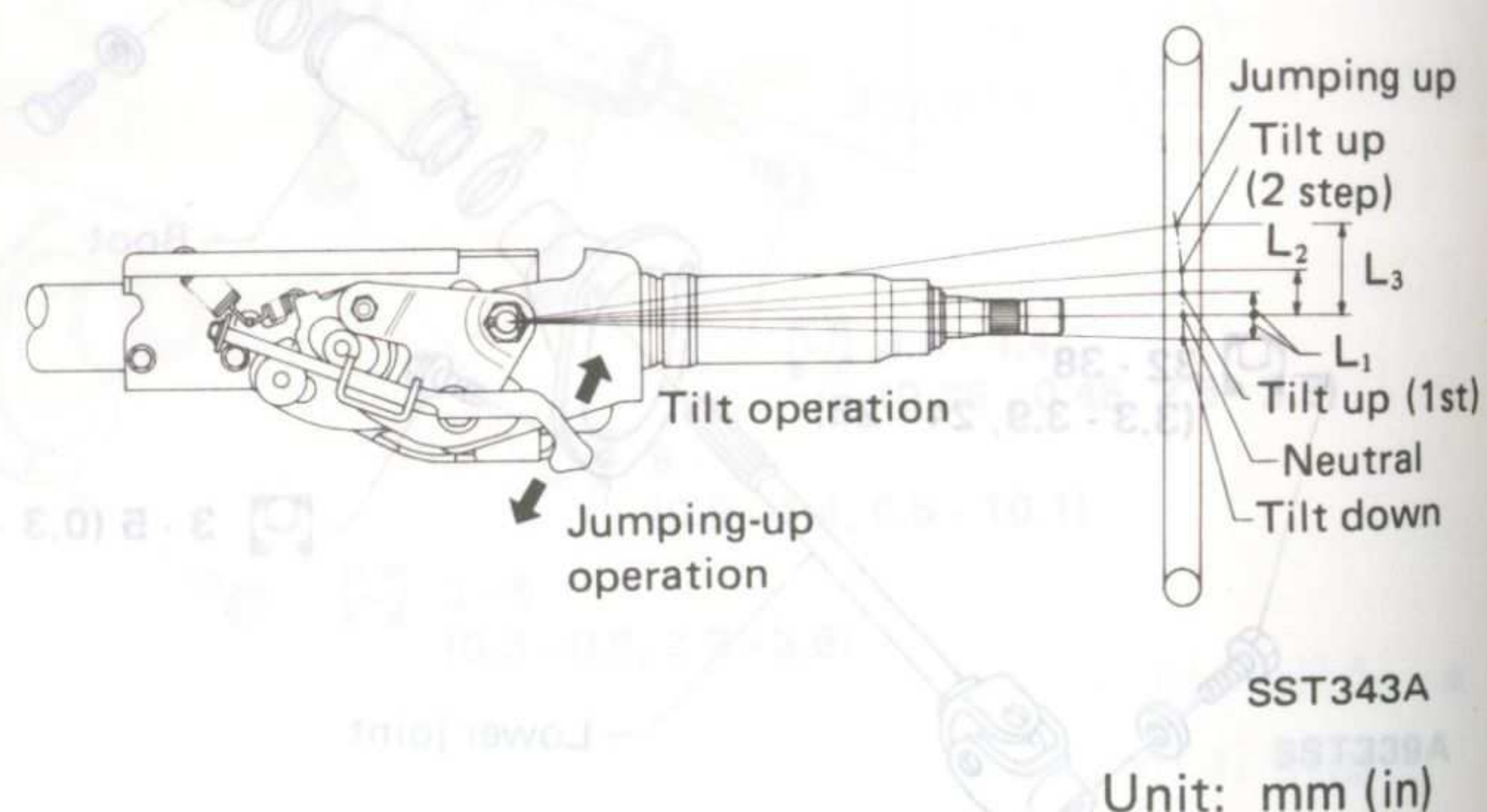
Non-tilt type



Non-tilt type



- After installing steering column, check tilt mechanism operation.



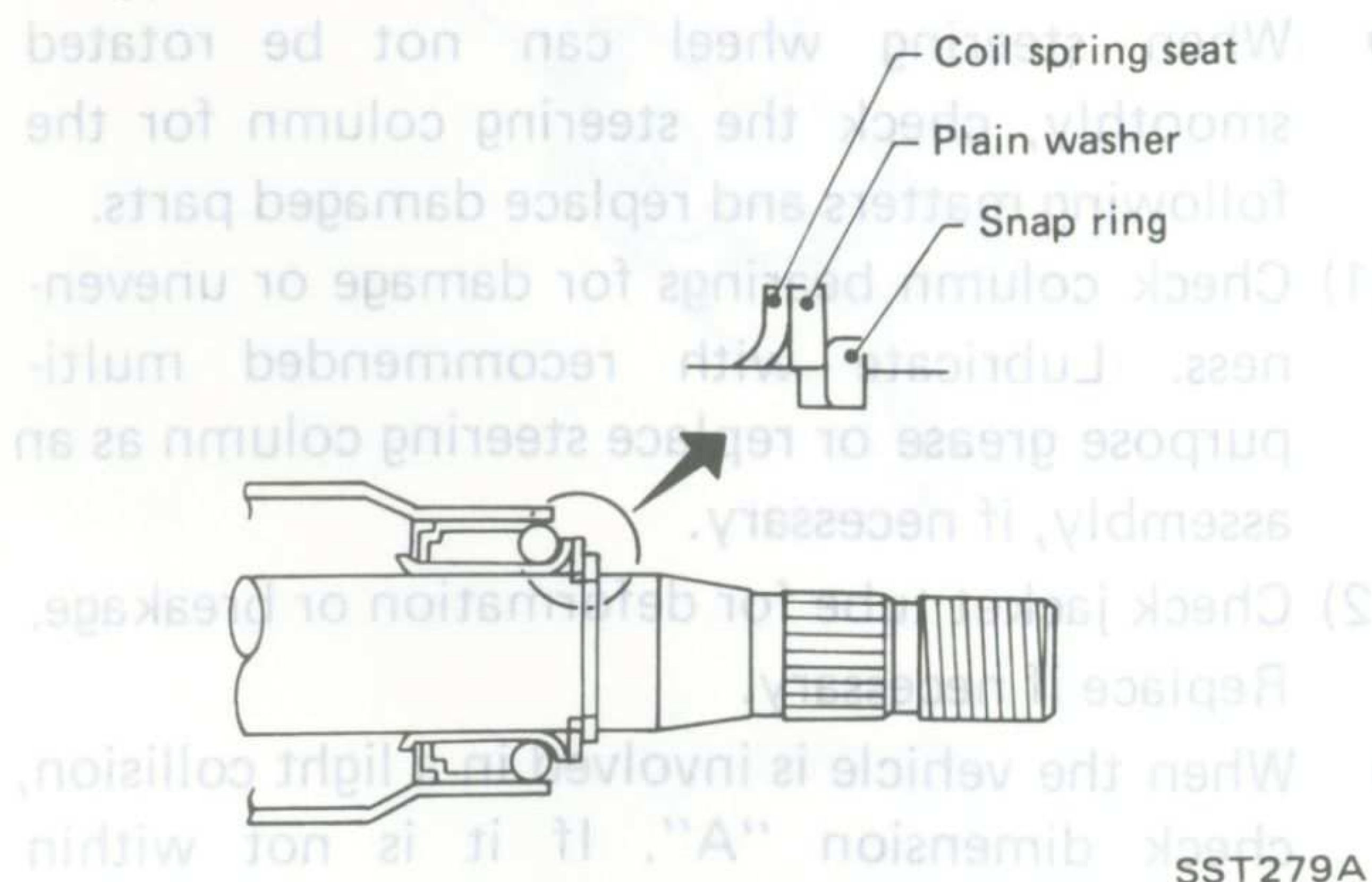
Unit: mm (in)

L ₁	10 (0.39)
L ₂	20 (0.79)
L ₃	40 (1.57)

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.

Tilt type (With jump-up mechanism)



POWER STEERING SYSTEM—Checking

Fluid Level Check

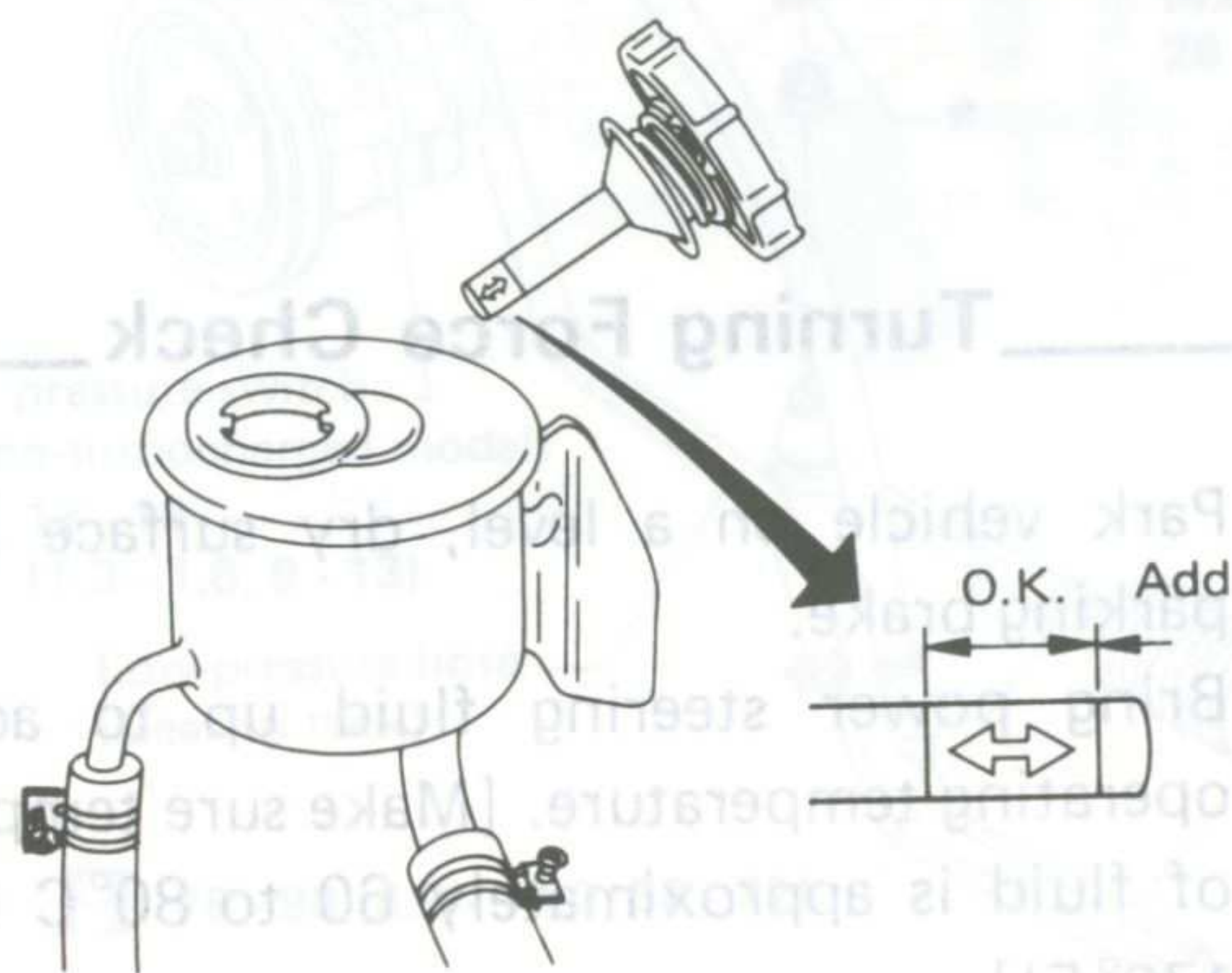
Check the fluid level when the fluid is cold.

CAUTION:

Do not overfill.

Recommended fluid is Automatic Transmission Fluid "Dexron Type".

Refer to section G1 for "Recommended Lubricant".



SST283A

Fluid Leakage Check

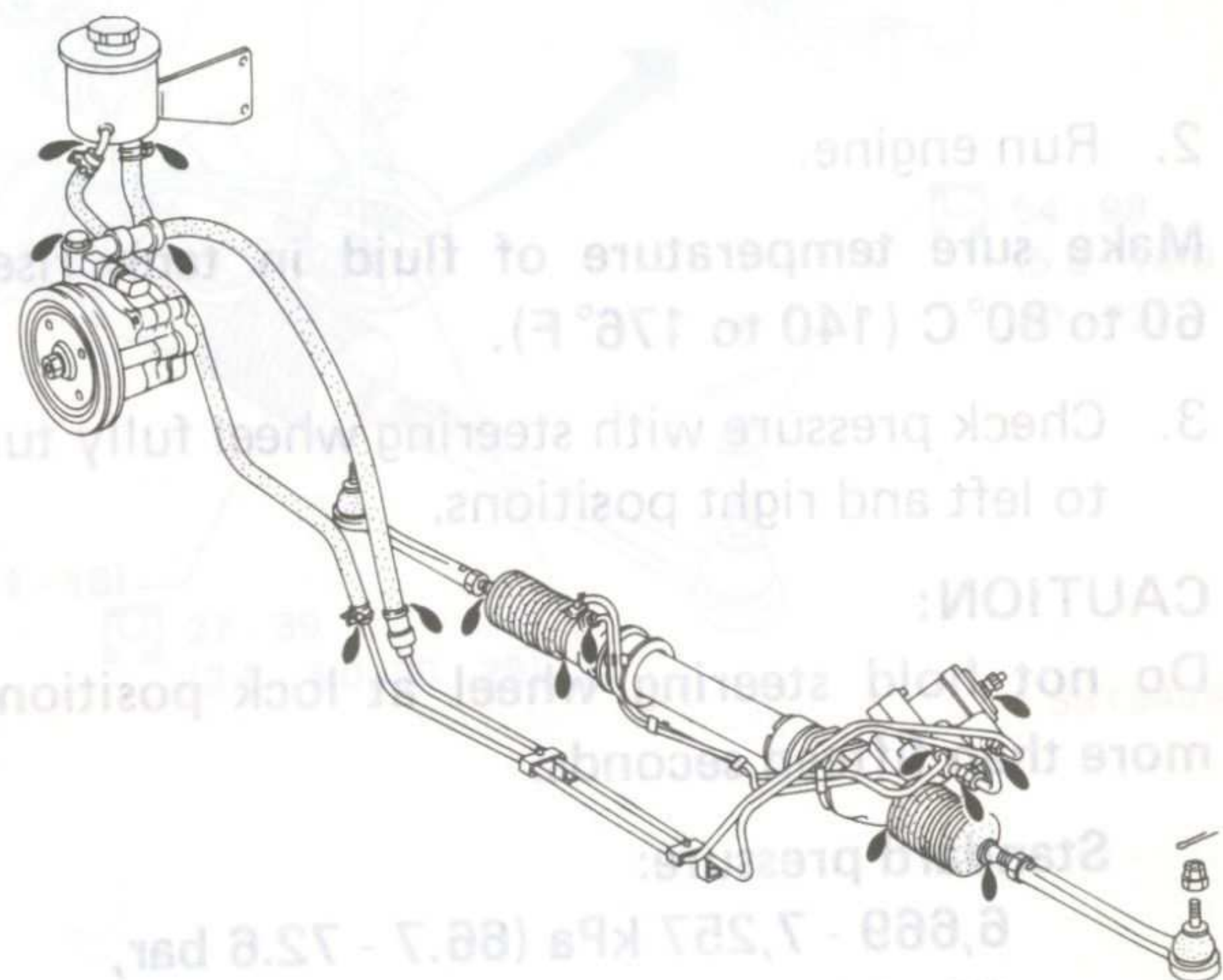
1. Run engine at idle speed or 1,000 rpm. Make sure temperature of fluid in pump rises to 60 to 80°C (140 to 176°F).
2. Turn steering wheel to right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

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, once loosen flare nut and then retighten.

Check points



SST344A

Bleeding Hydraulic System

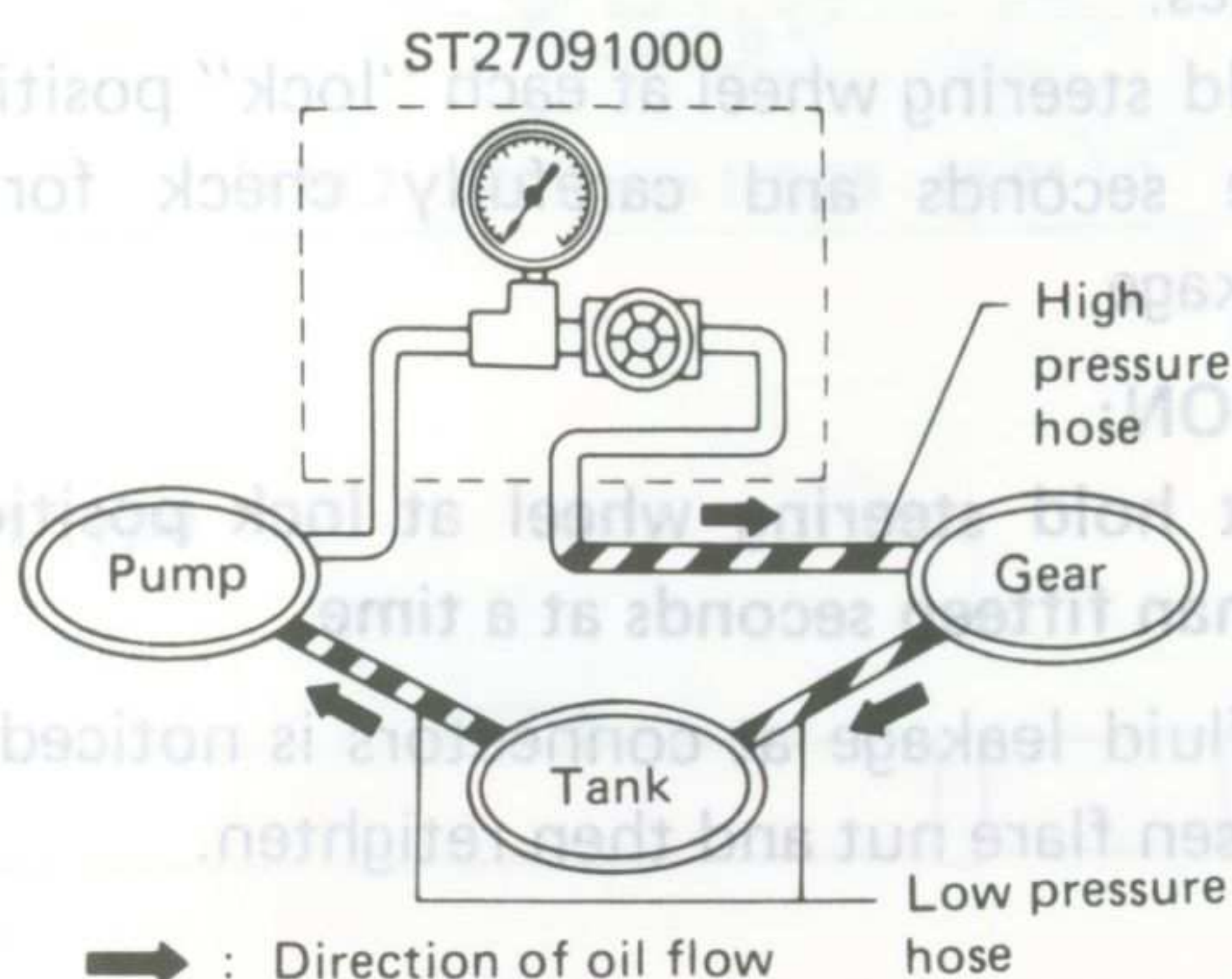
1. Raise front end of vehicle until wheels clear ground.
2. While adding fluid, quickly turn steering wheel fully to right and left and lightly touch steering stoppers. Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine. Repeat step 2 above.

POWER STEERING SYSTEM —Checking—

Hydraulic System Check

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).

3. Check pressure with steering wheel fully turned to left and right positions.

CAUTION:

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

Standard pressure:

6,669 - 7,257 kPa (66.7 - 72.6 bar,
68 - 74 kg/cm², 967 - 1,052 psi) at idling

4. If oil pressure is below the standard, slowly close shut-off valve and check pressure.
 - If pressure rises to standard level, gear is damaged.
 - If pressure remains below standard, pump is damaged.
- Gear may be damaged.

CAUTION:

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

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

Pressure Switch Check

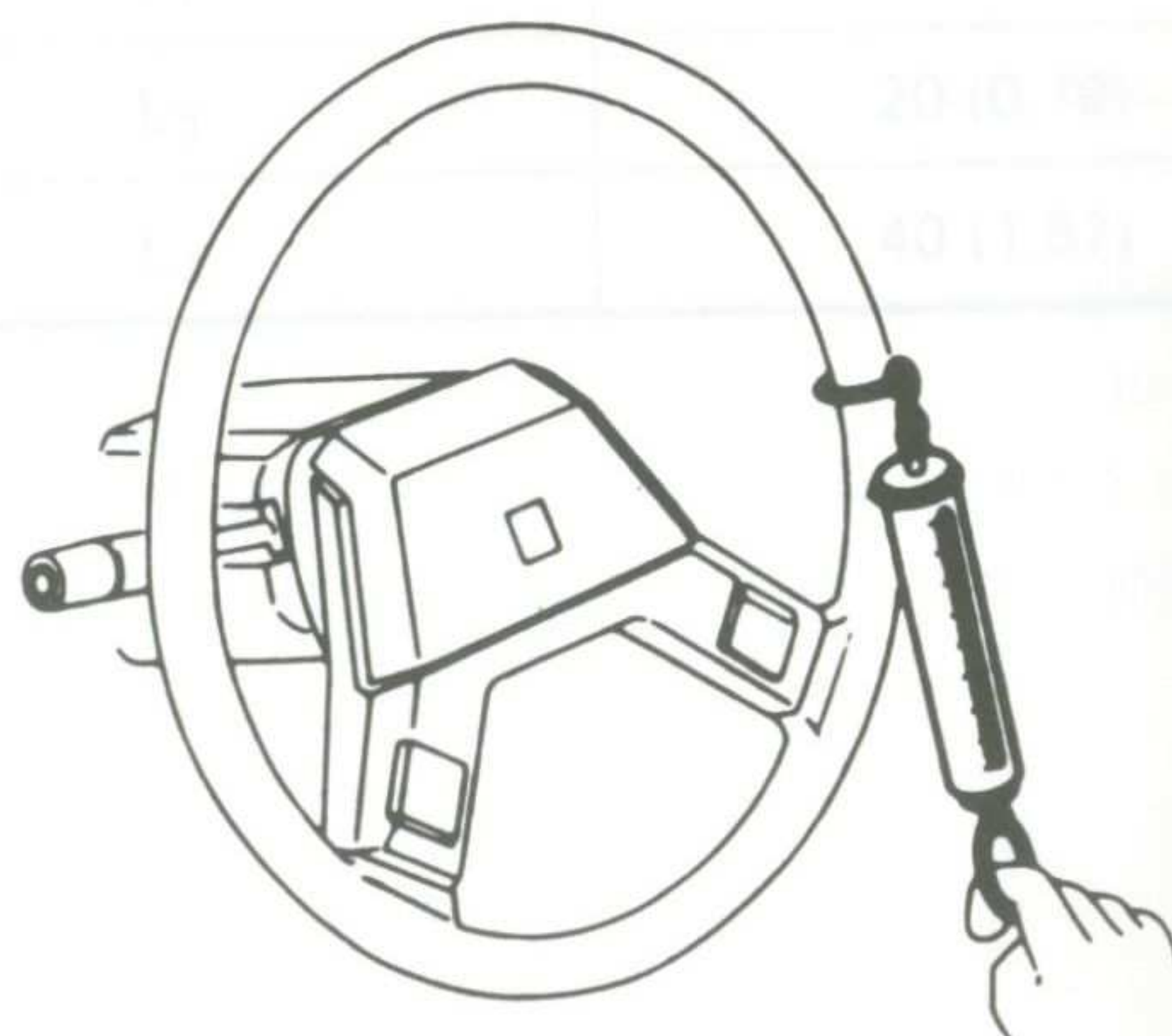
1. Warm up engine.
 2. Turn steering wheel fully.
 3. Disconnect pressure switch connector.
 4. Make sure engine idle speed decreases by 50 to 100 rpm.
- If it does not, replace pressure switch.

Turning Force Check

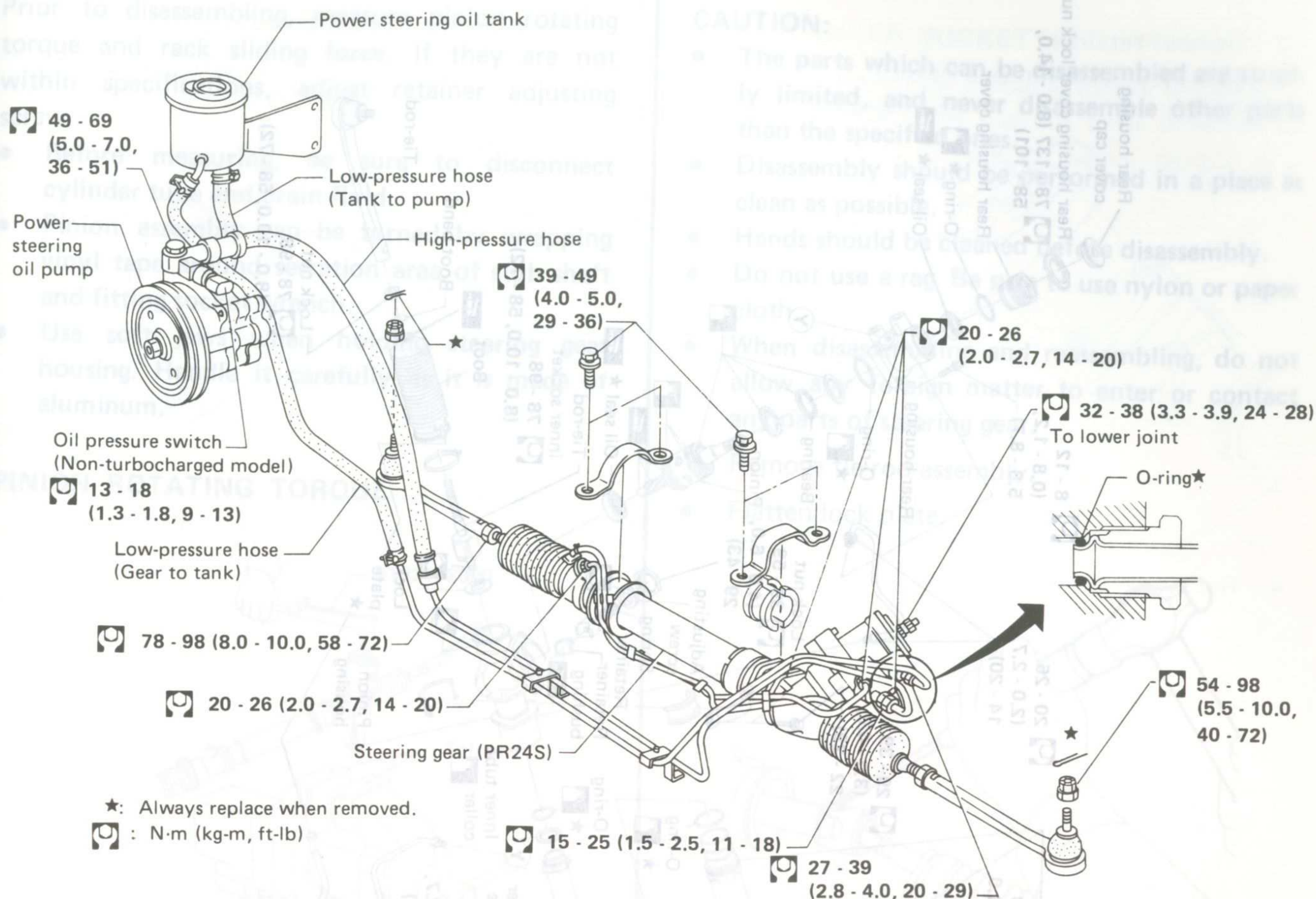
1. Park vehicle on a level, dry surface and set parking brake.
2. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F)].
 - Tires must be inflated to normal pressure.
3. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Steering wheel turning force:

Less than 39 N (4 kg, 9 lb)



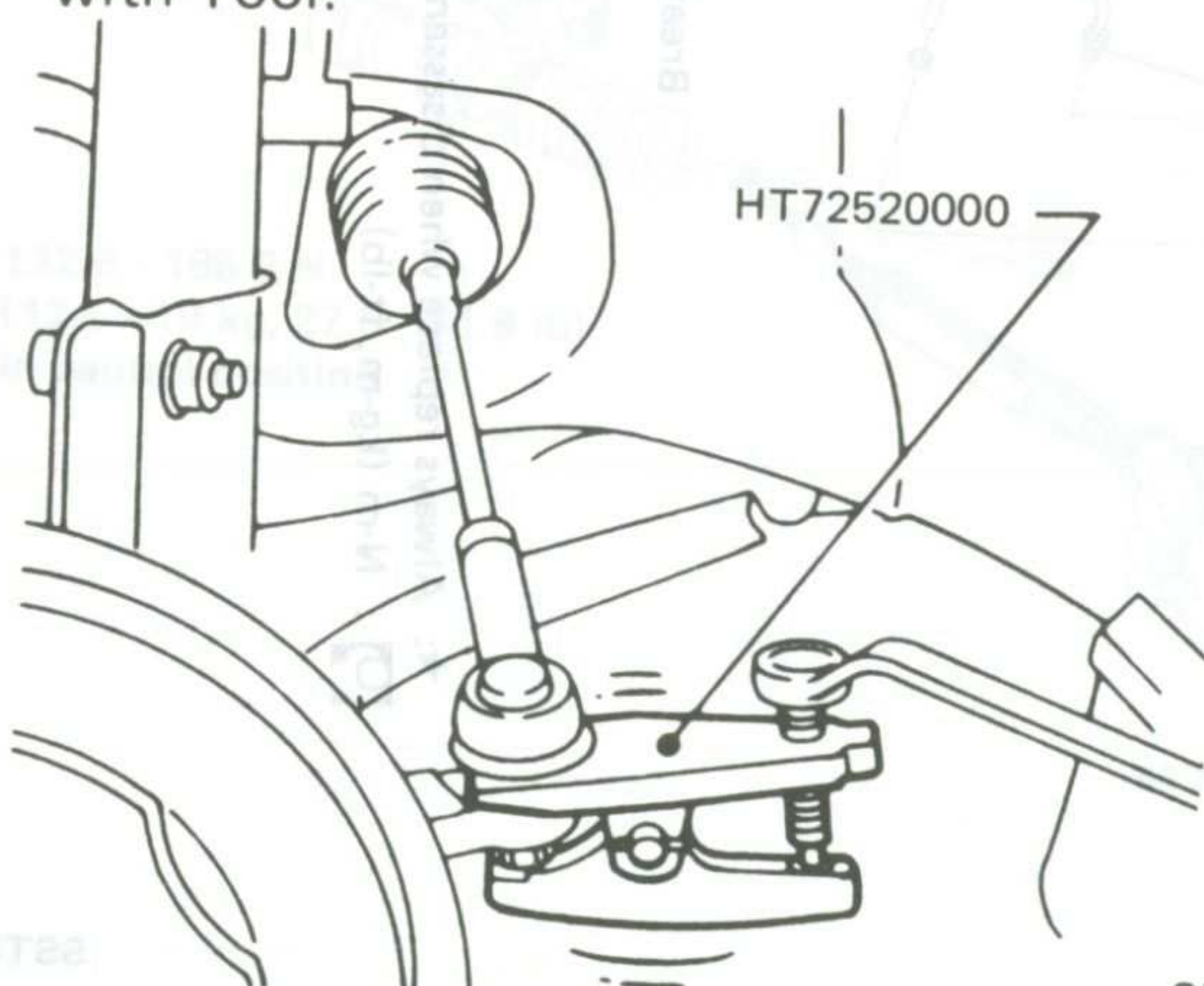
POWER STEERING SYSTEM—Removal



SST345A

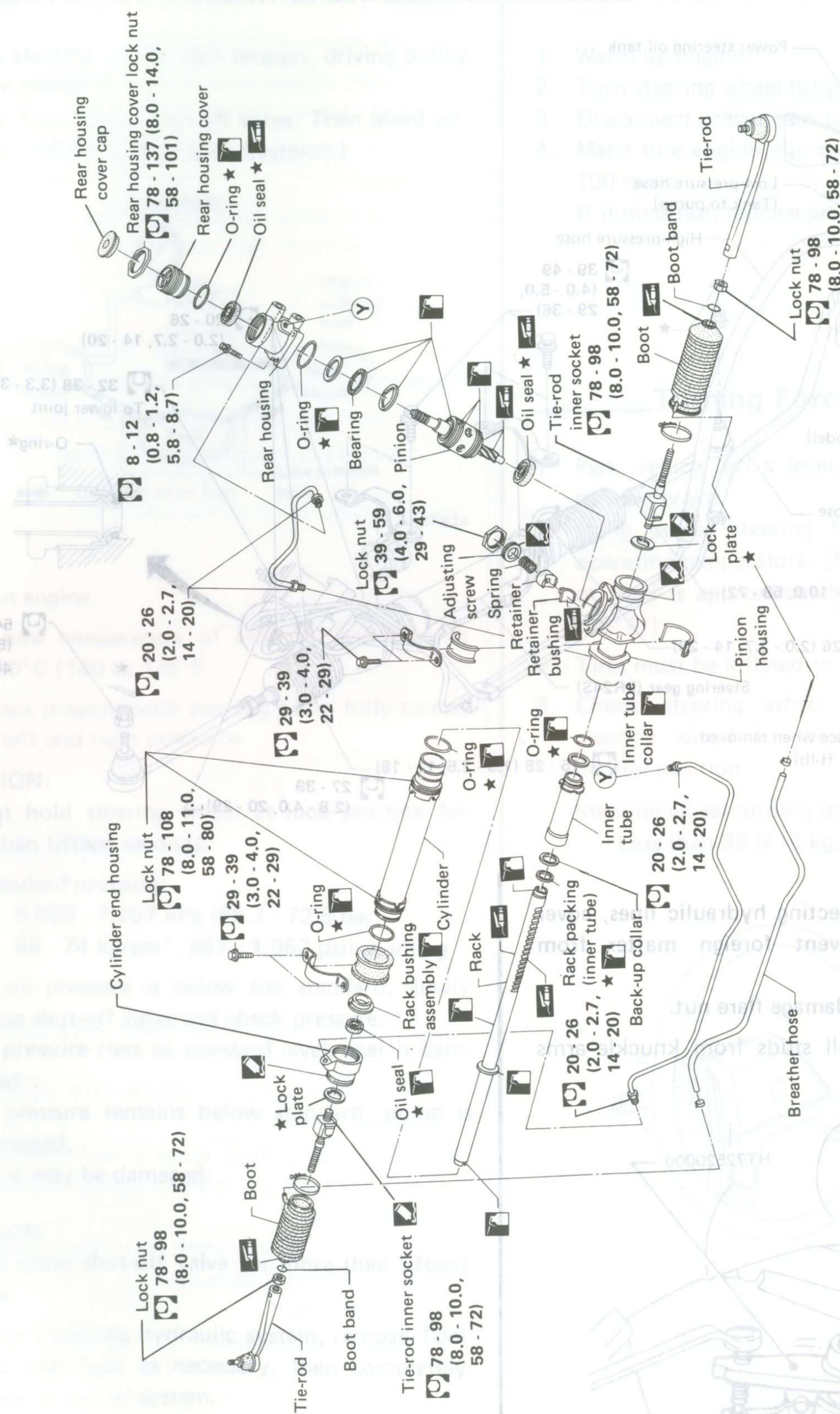
CAUTION:

- Whenever disconnecting hydraulic lines, cover openings to prevent foreign matter from entering.
- Be careful not to damage flare nut.
- Detach tie-rod ball studs from knuckle arms with Tool.



SFA372

POWER STEERING GEAR AND LINKAGE



★: Always replace when disassembled.

: N·m (kg·m, ft·lb)

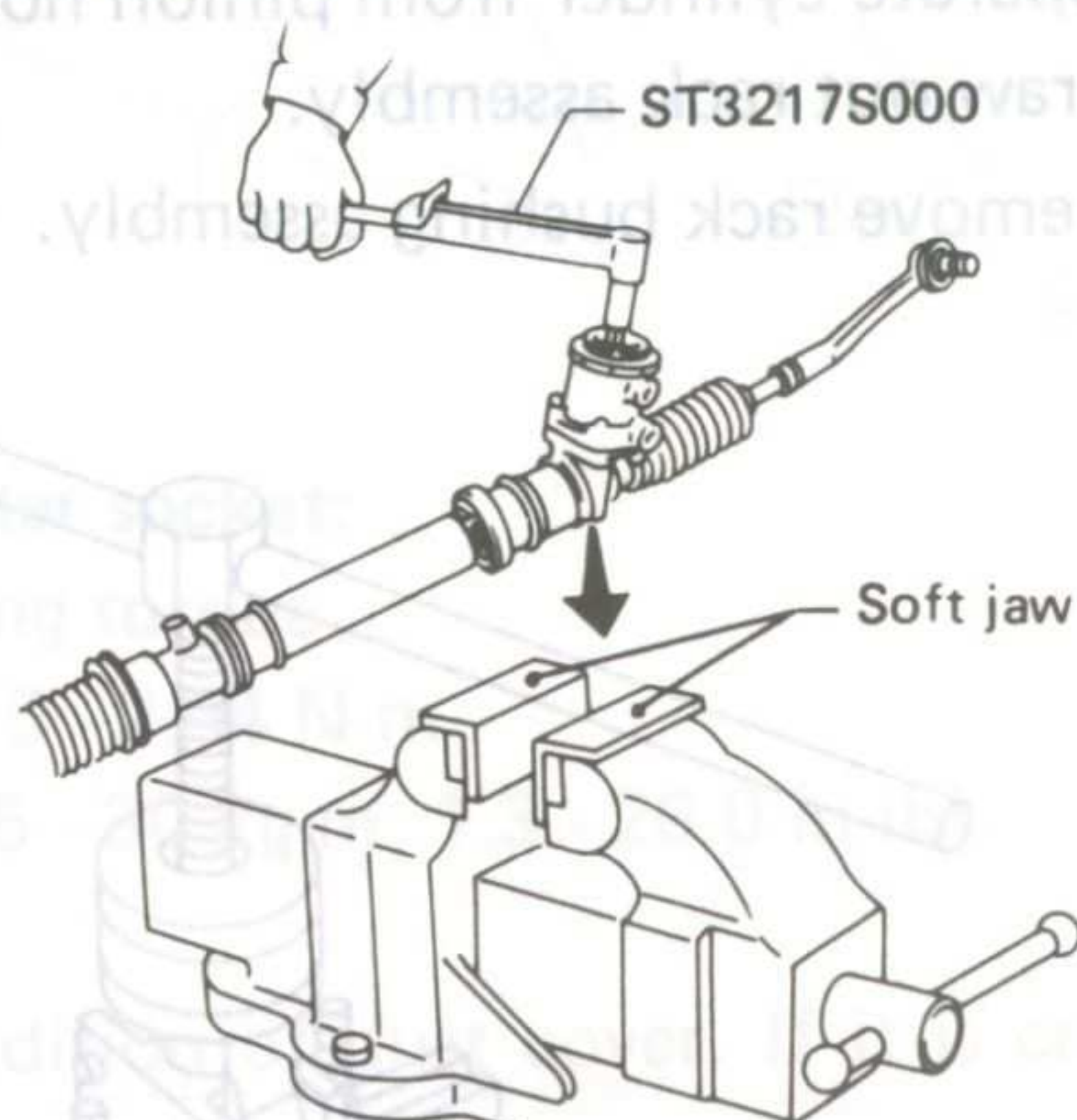
POWER STEERING GEAR AND LINKAGE

Pre-Disassembly Inspection

Prior to disassembling, measure pinion rotating torque and rack sliding force. If they are not within specifications, adjust retainer adjusting screw.

- Before measuring, be sure to disconnect cylinder tube and drain fluid.
- Pinion assembly can be turned by wrapping vinyl tape around serration area of stub shaft and fitting socket wrench.
- Use soft jaws when holding steering gear housing. Handle it carefully as it is made of aluminum.

PINION ROTATING TORQUE

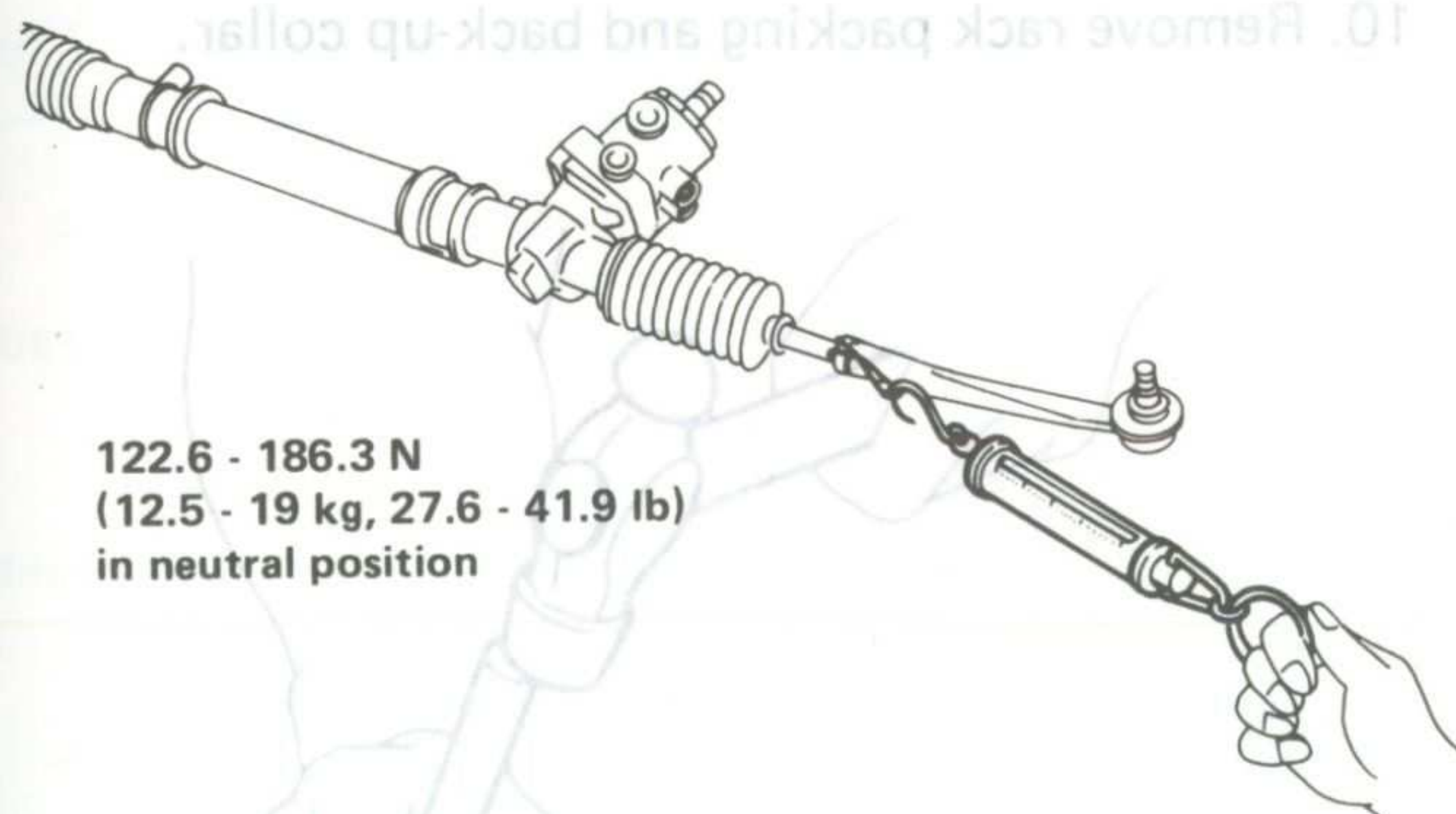


Pinion rotating torque:

Less than 1.8 N·m (18 kg-cm, 16 in-lb)

SST257A

RACK SLIDING FORCE



122.6 - 186.3 N
(12.5 - 19 kg, 27.6 - 41.9 lb)
in neutral position

SST264A

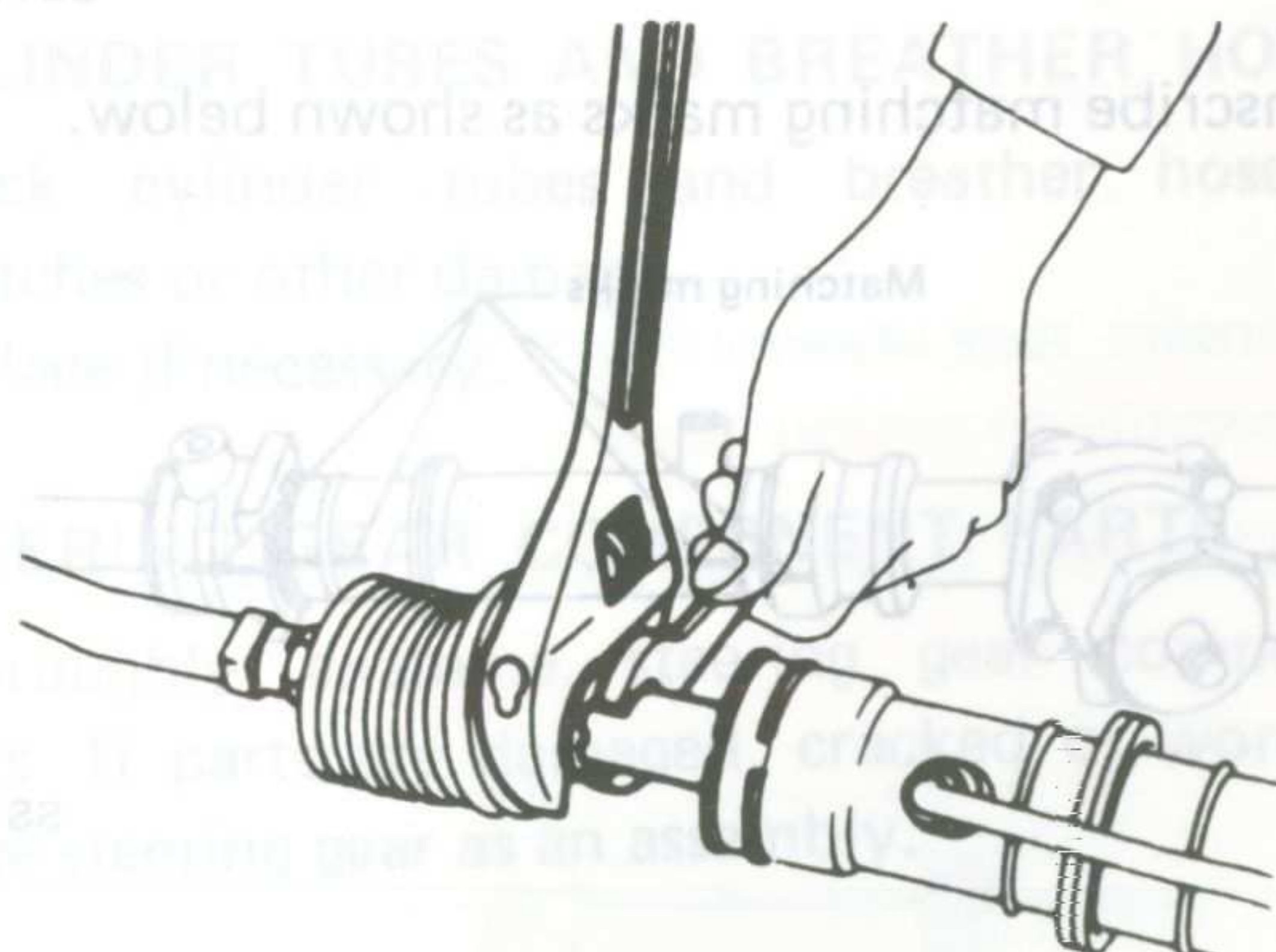
Disassembly

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.
 - When disassembling and reassembling, do not allow any foreign matter to enter or contact any parts of steering gear.
1. Remove tie-rod assembly.
- Flatten lock plate.



SST881



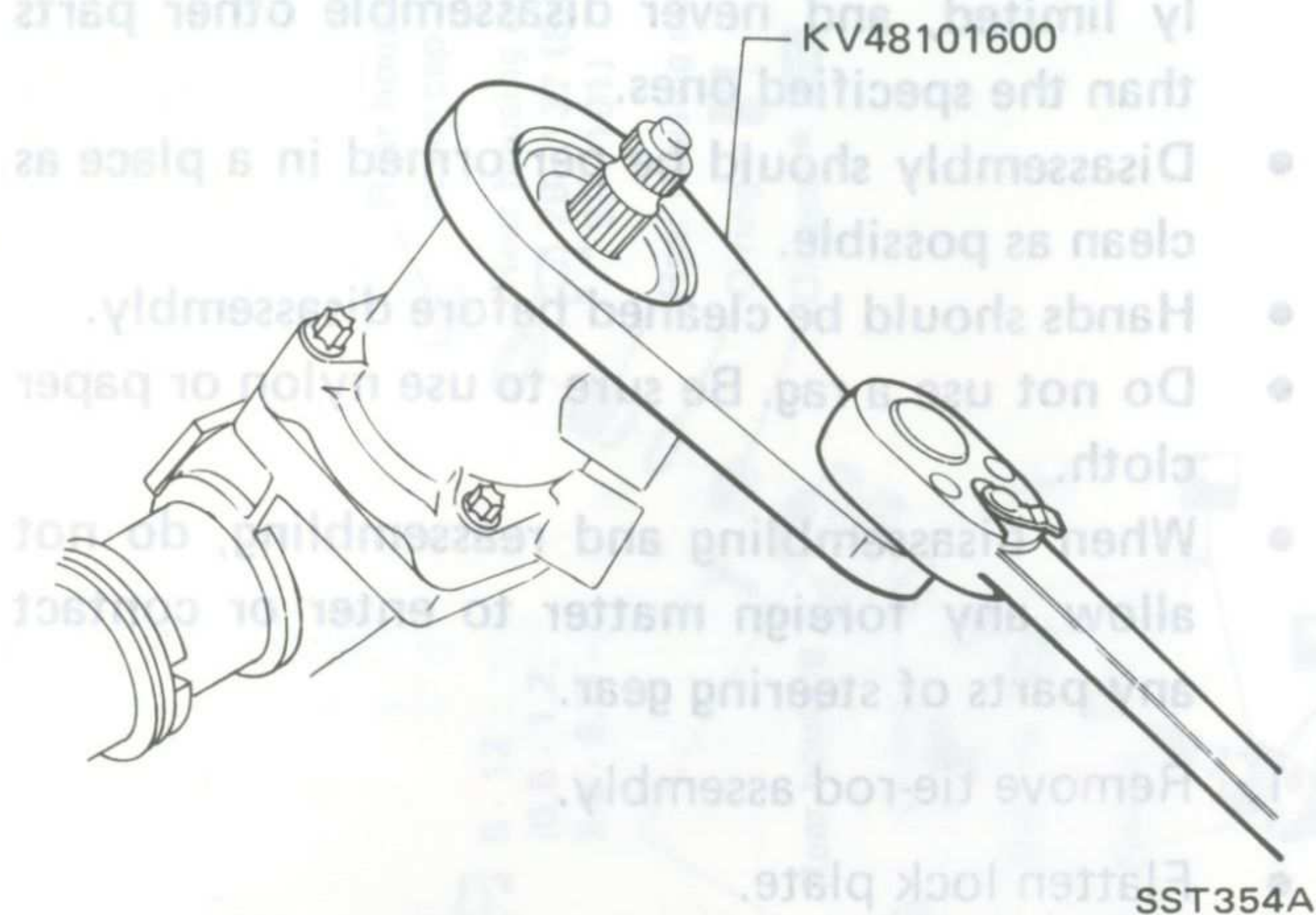
SST409

POWER STEERING GEAR AND LINKAGE

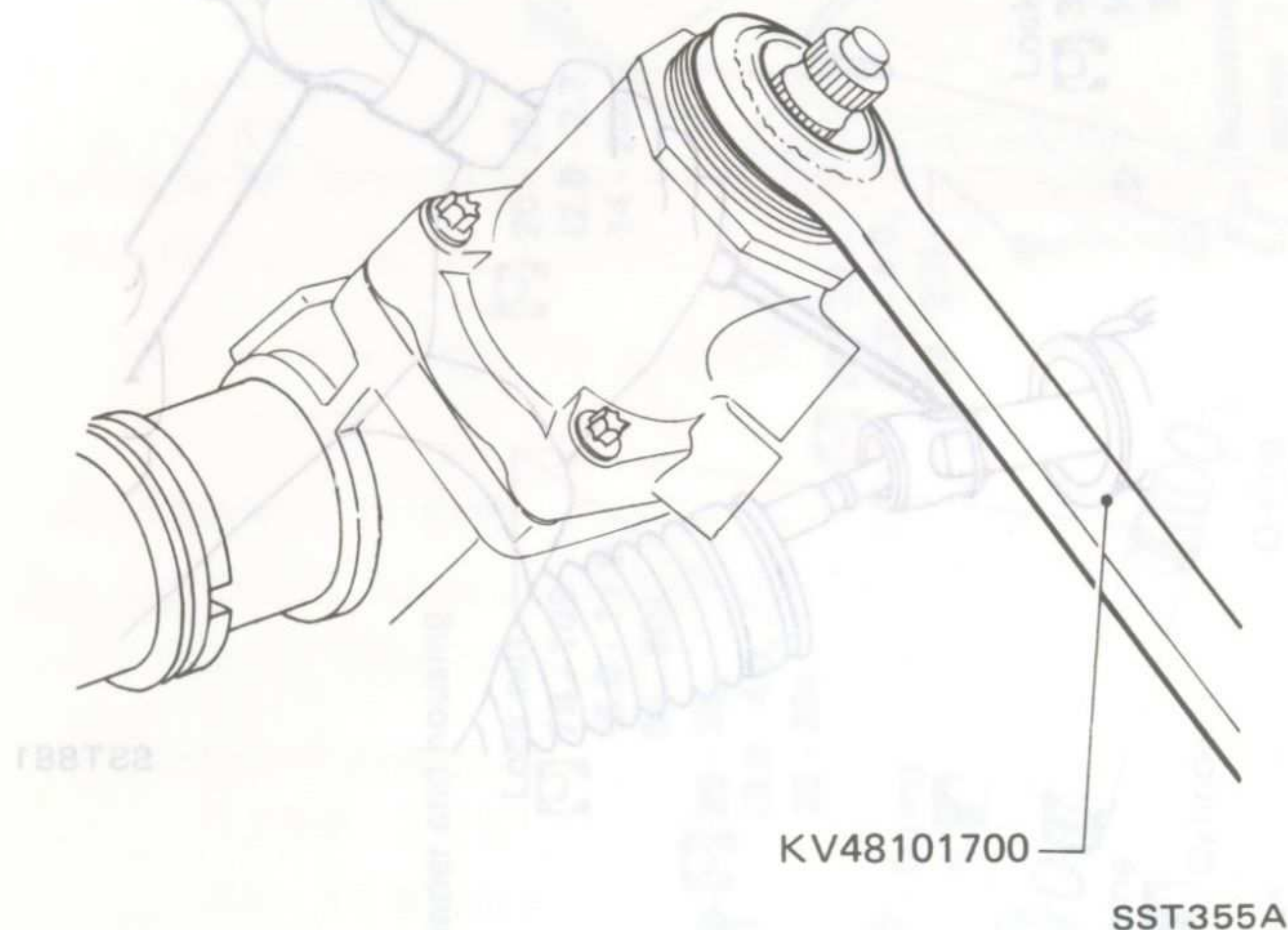
Disassembly (Cont'd)

2. Remove retainer.

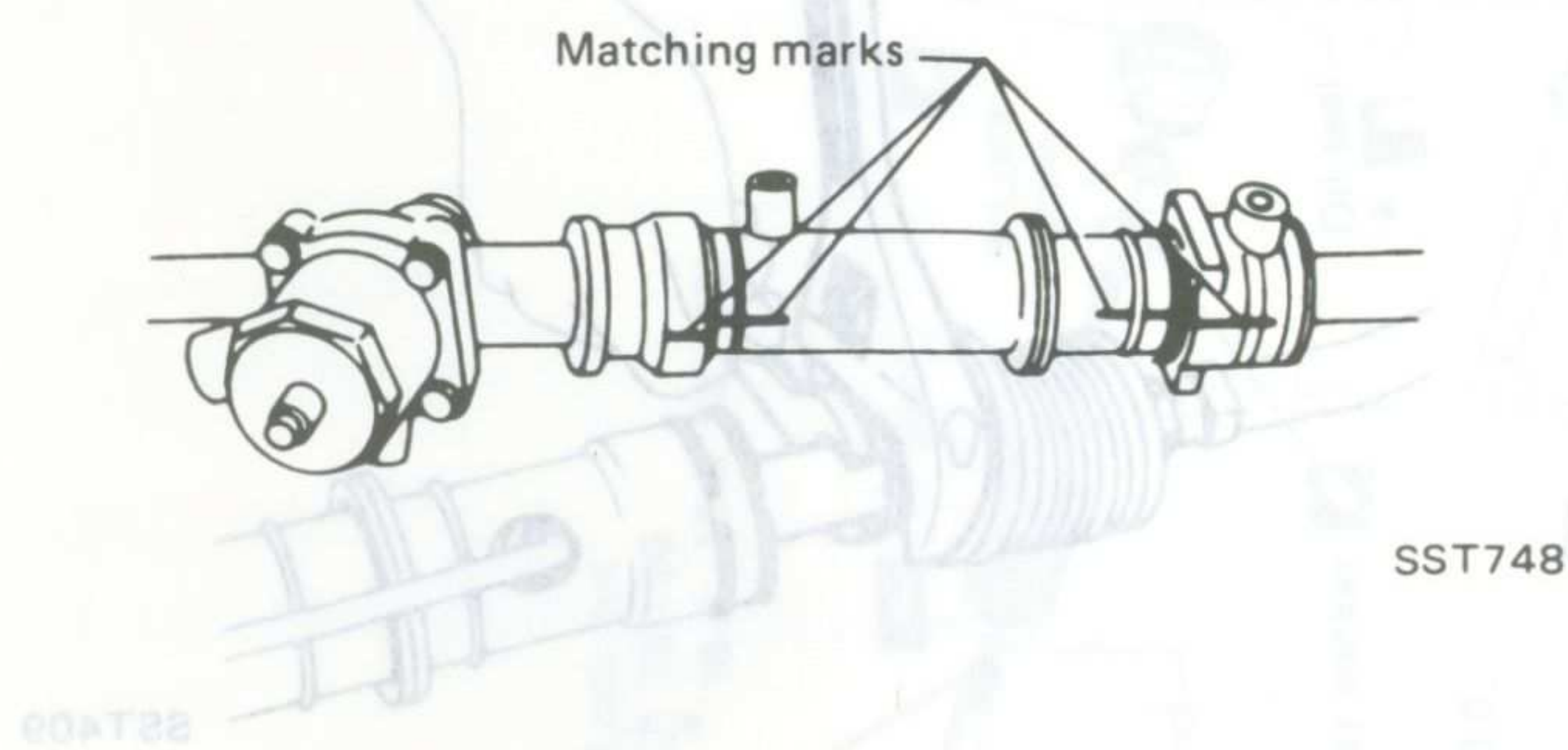
3. Remove rear cover lock nut.



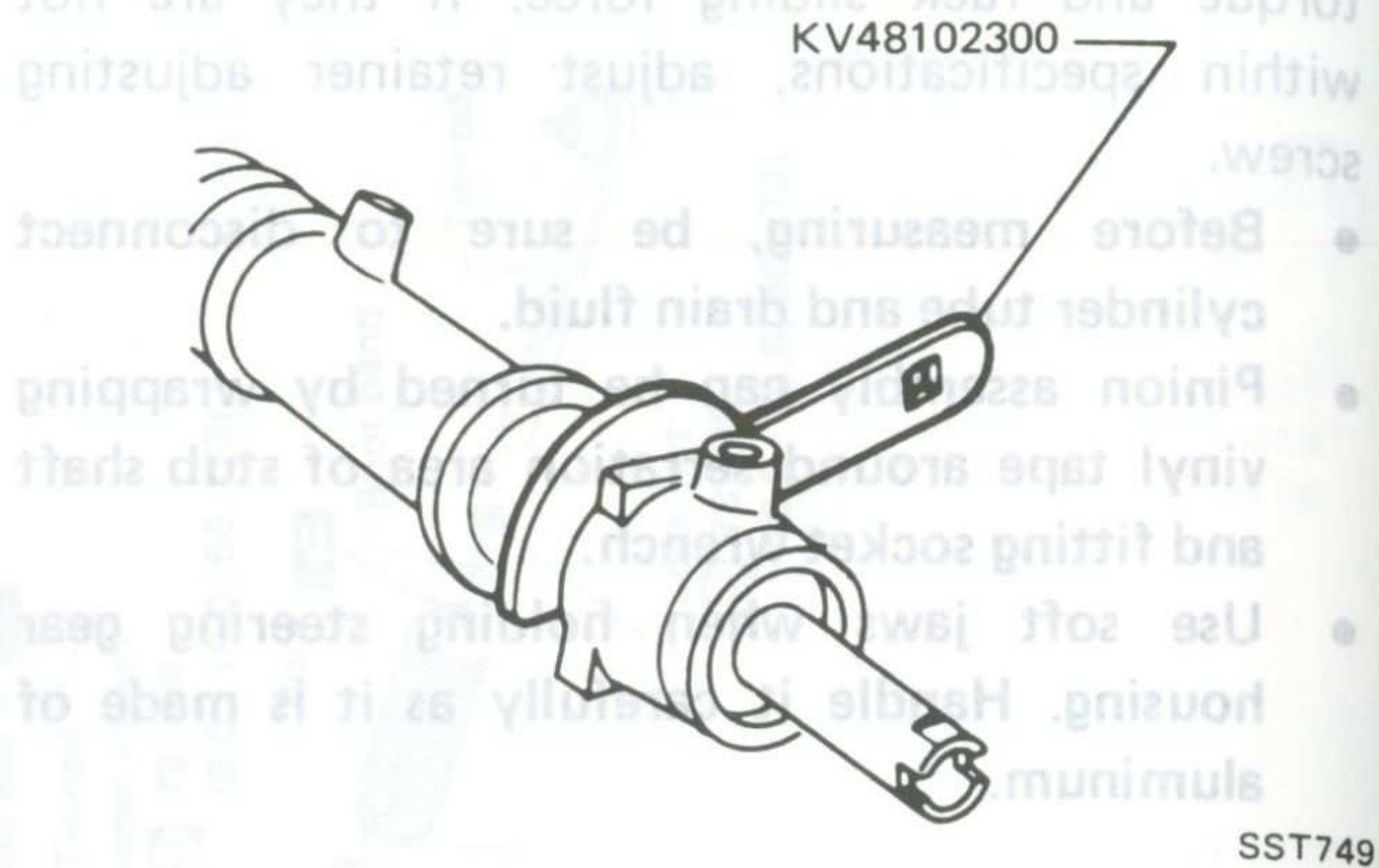
4. Remove rear housing cover.



5. Inscribe matching marks as shown below.



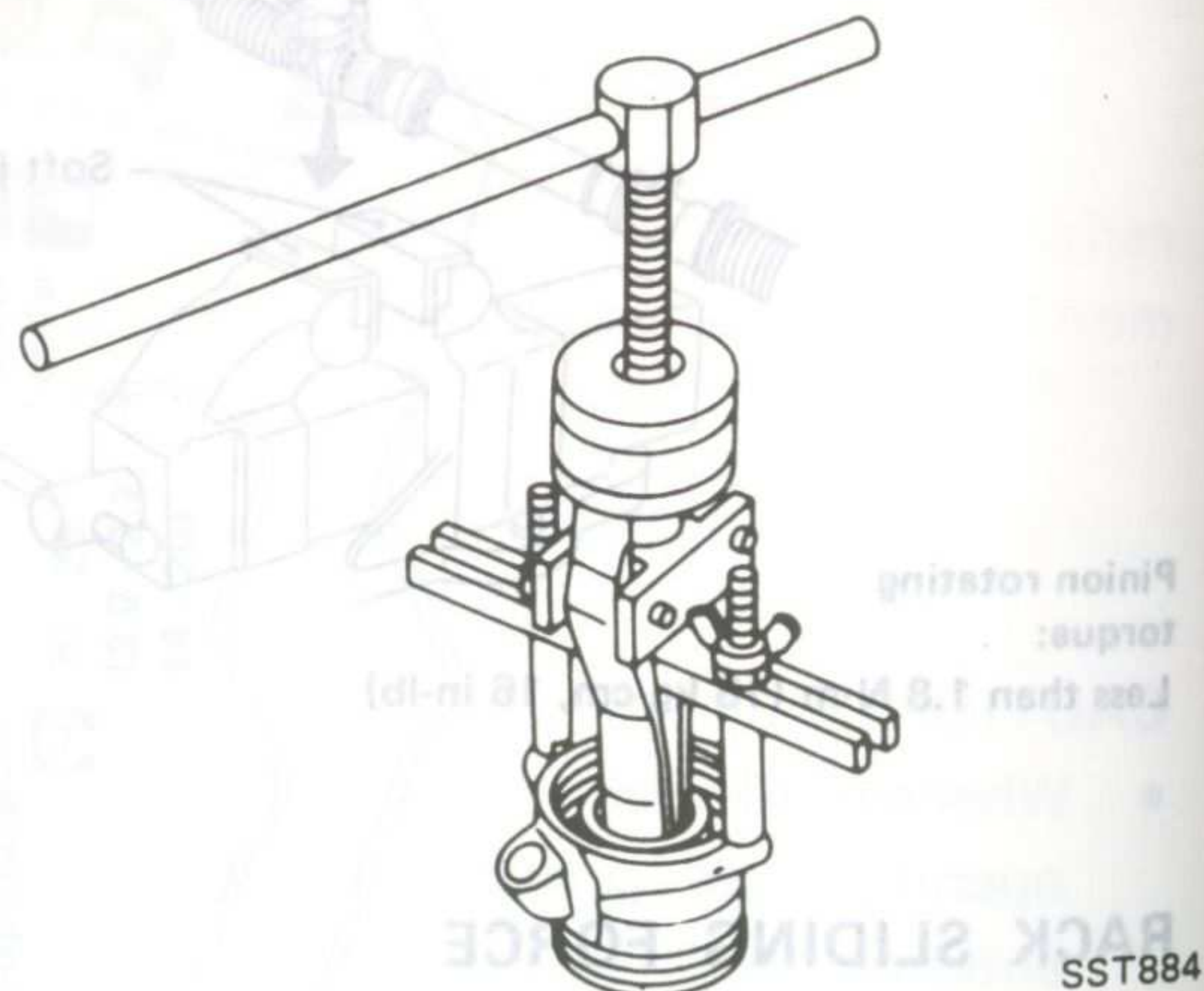
6. Remove cylinder end housing using Tool.



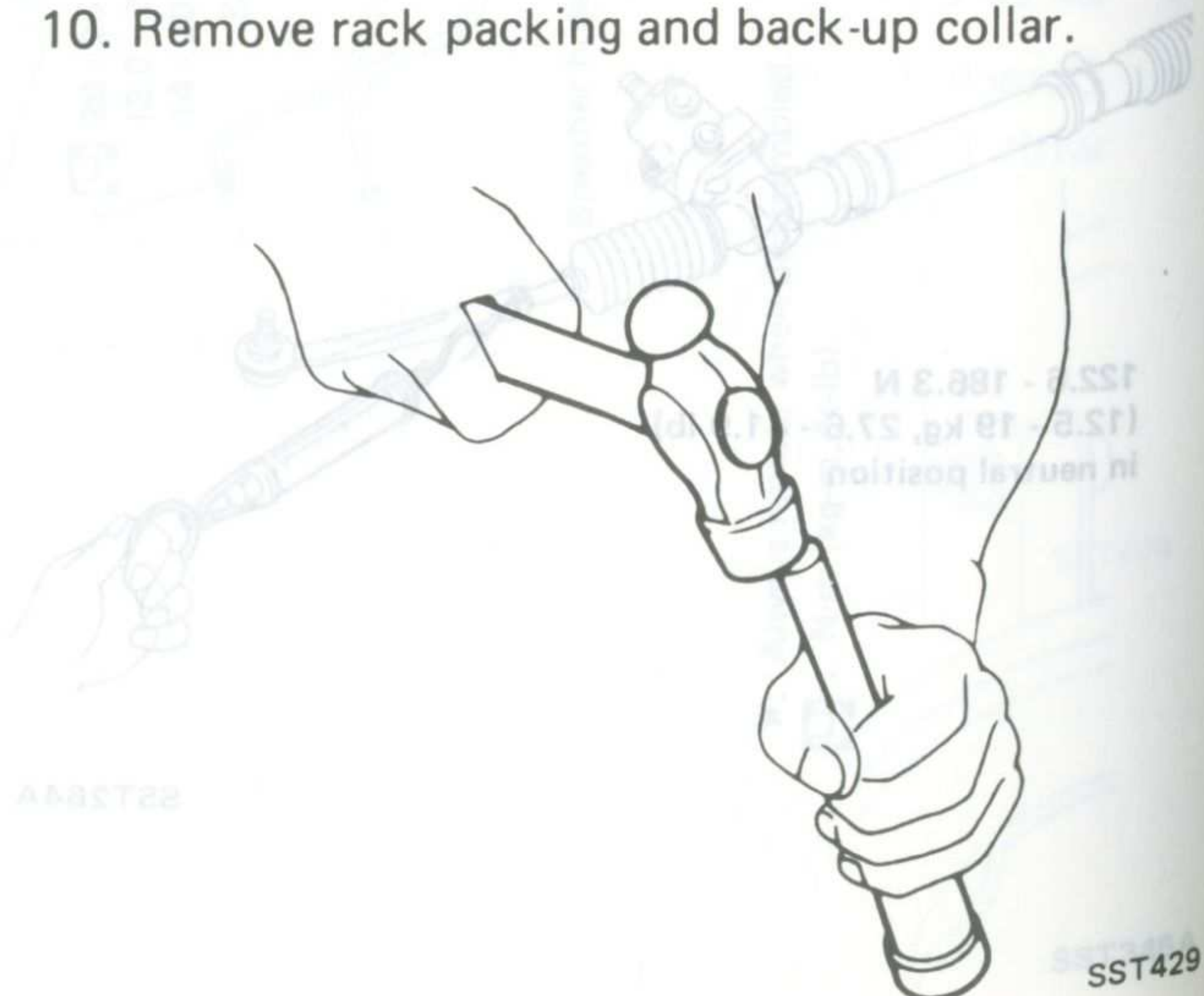
7. Disconnect cylinder lock nut using Tool and separate cylinder from pinion housing.

8. Draw out rack assembly.

9. Remove rack bushing assembly.



10. Remove rack packing and back-up collar.



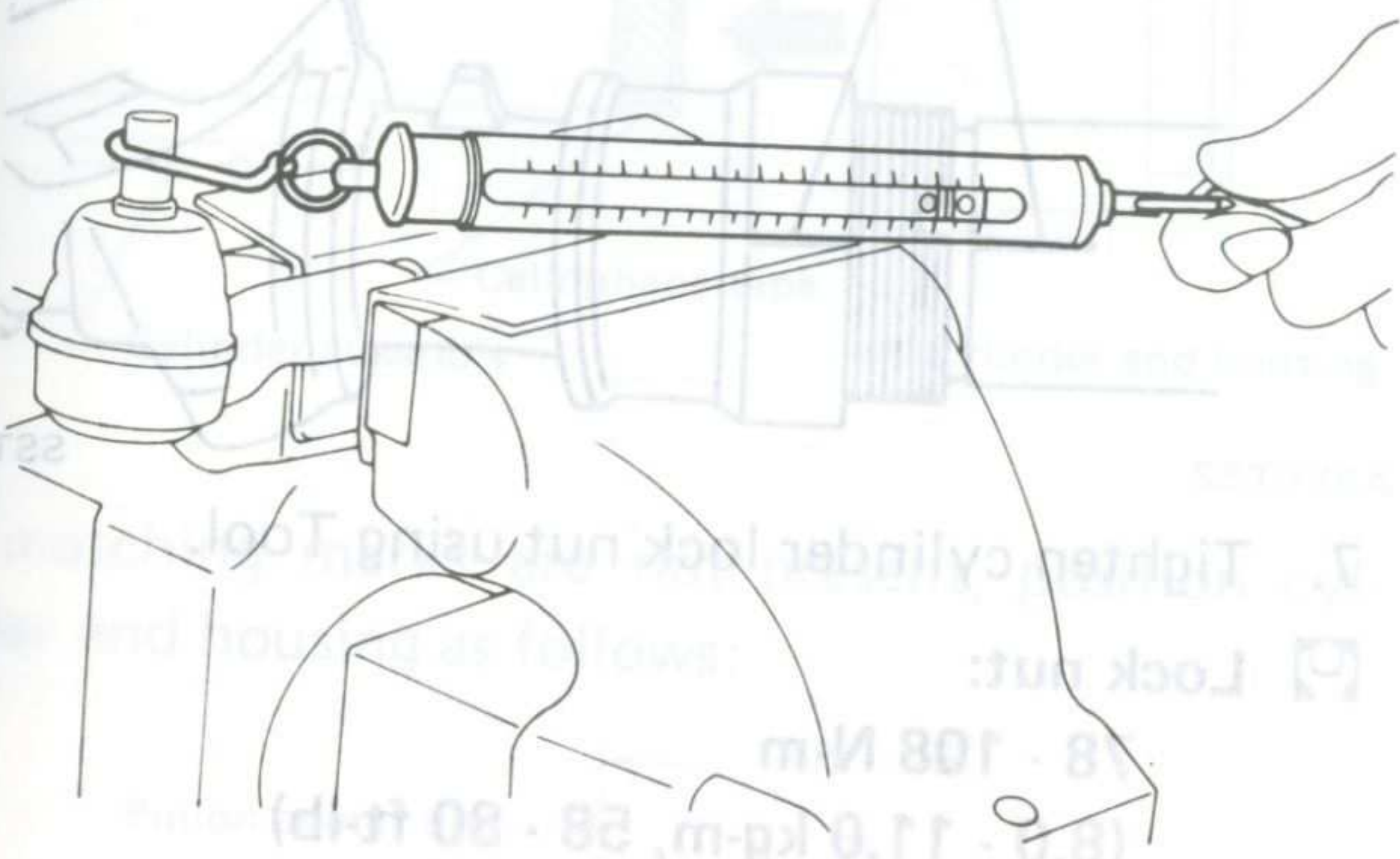
POWER STEERING GEAR AND LINKAGE

Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid "Dexron Type", and blow dry with compressed air, if available.

TIE-ROD OUTER SOCKET

1. Check ball joint for swinging torque.



SST130A

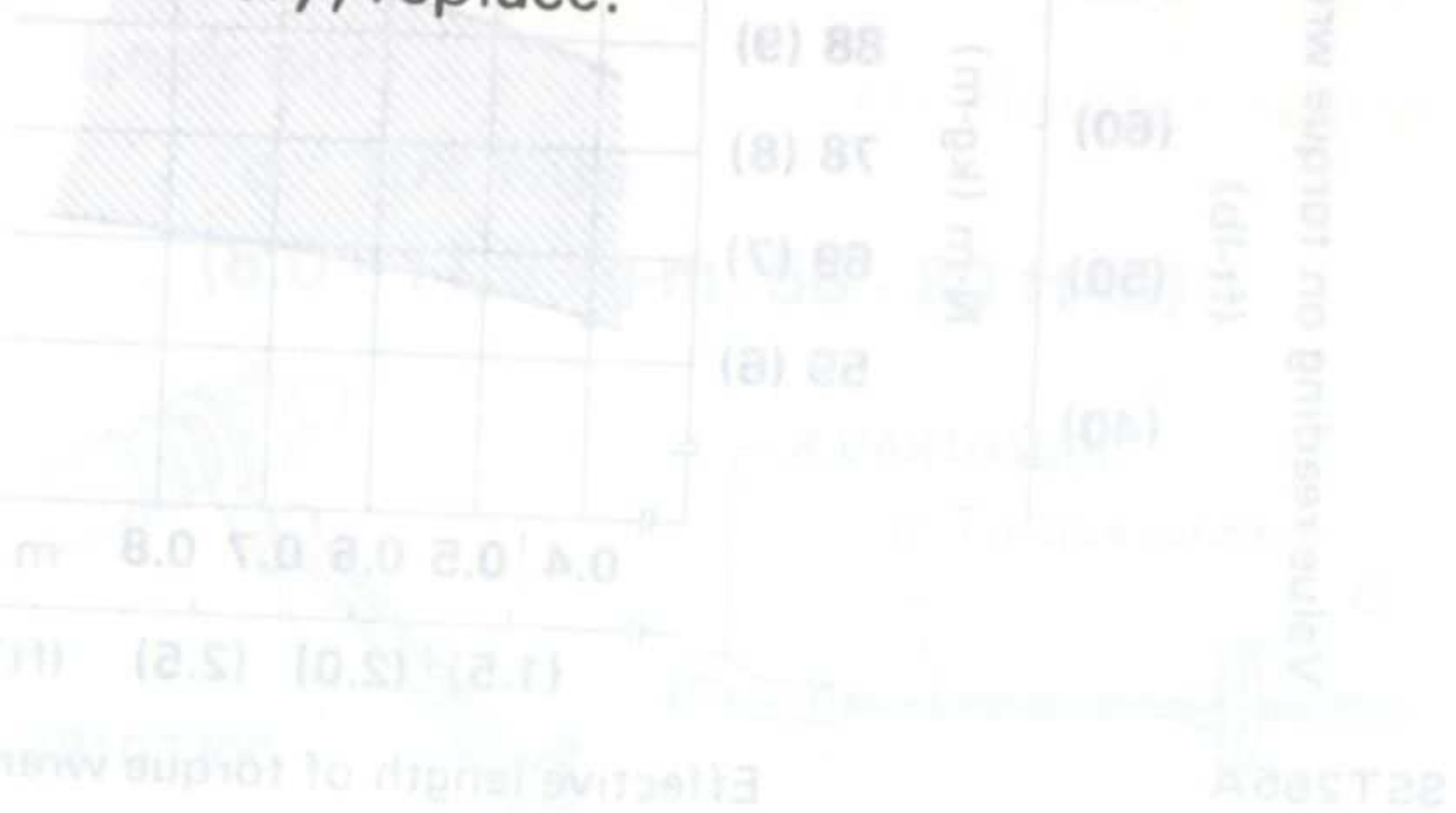
Tie-rod outer socket:

Swinging torque

0.15 - 2.94 N·m

(1.5 - 30 kg-m, 1.3 - 26.0 in-lb)

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



TIE-ROD INNER SOCKET

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

Tie-rod inner socket:

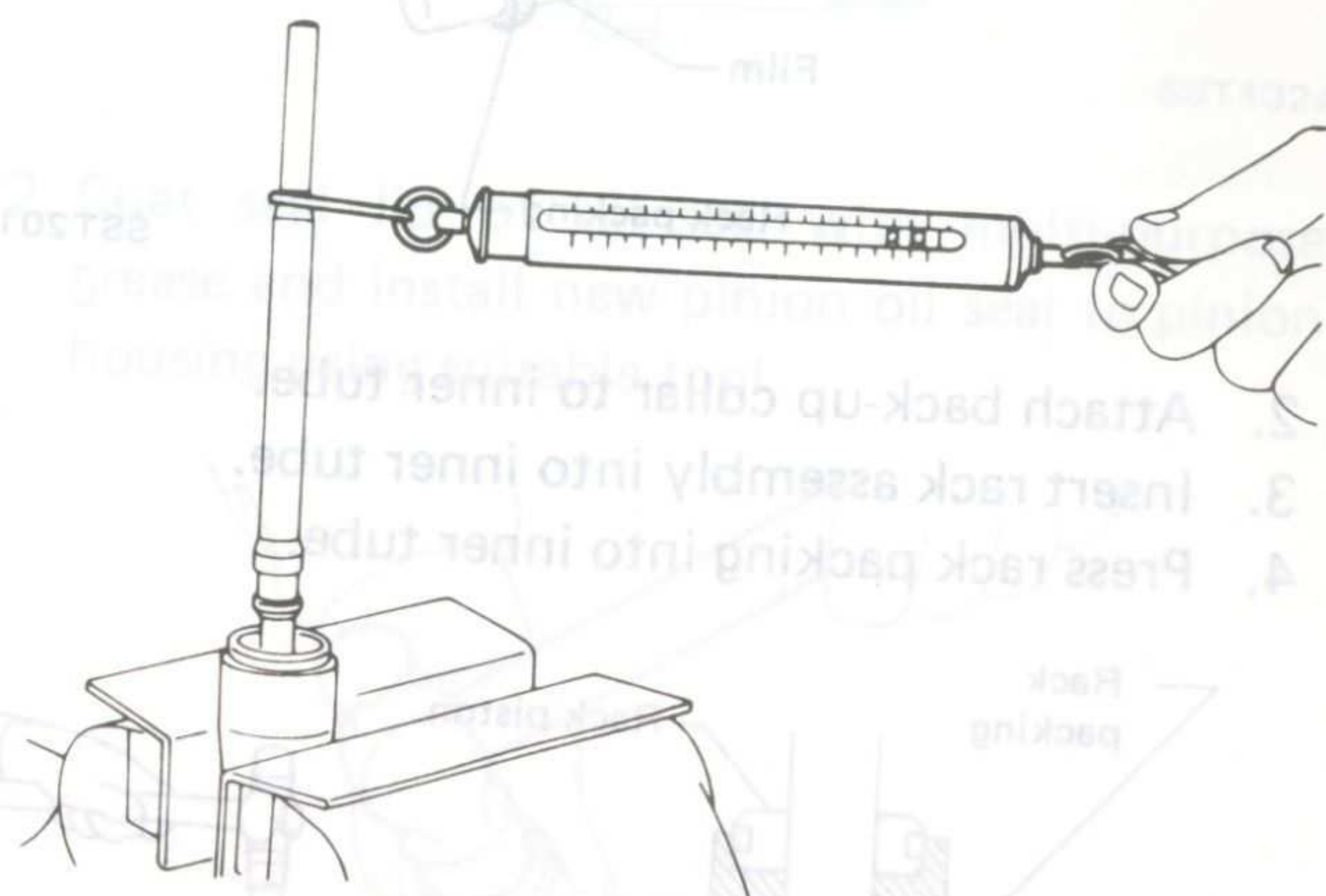
Swinging torque

1.0 - 7.8 N·m

(10 - 80 kg-cm, 8.7 - 69.4 in-lb)

Axial play

0 mm (0 in)



SST106A

BOOT

Check condition of boot. If it is cracked excessively, replace boot.

CYLINDER TUBES AND BREATHER HOSE

Check cylinder tubes and breather hose for scratches or other damage.

Replace if necessary.

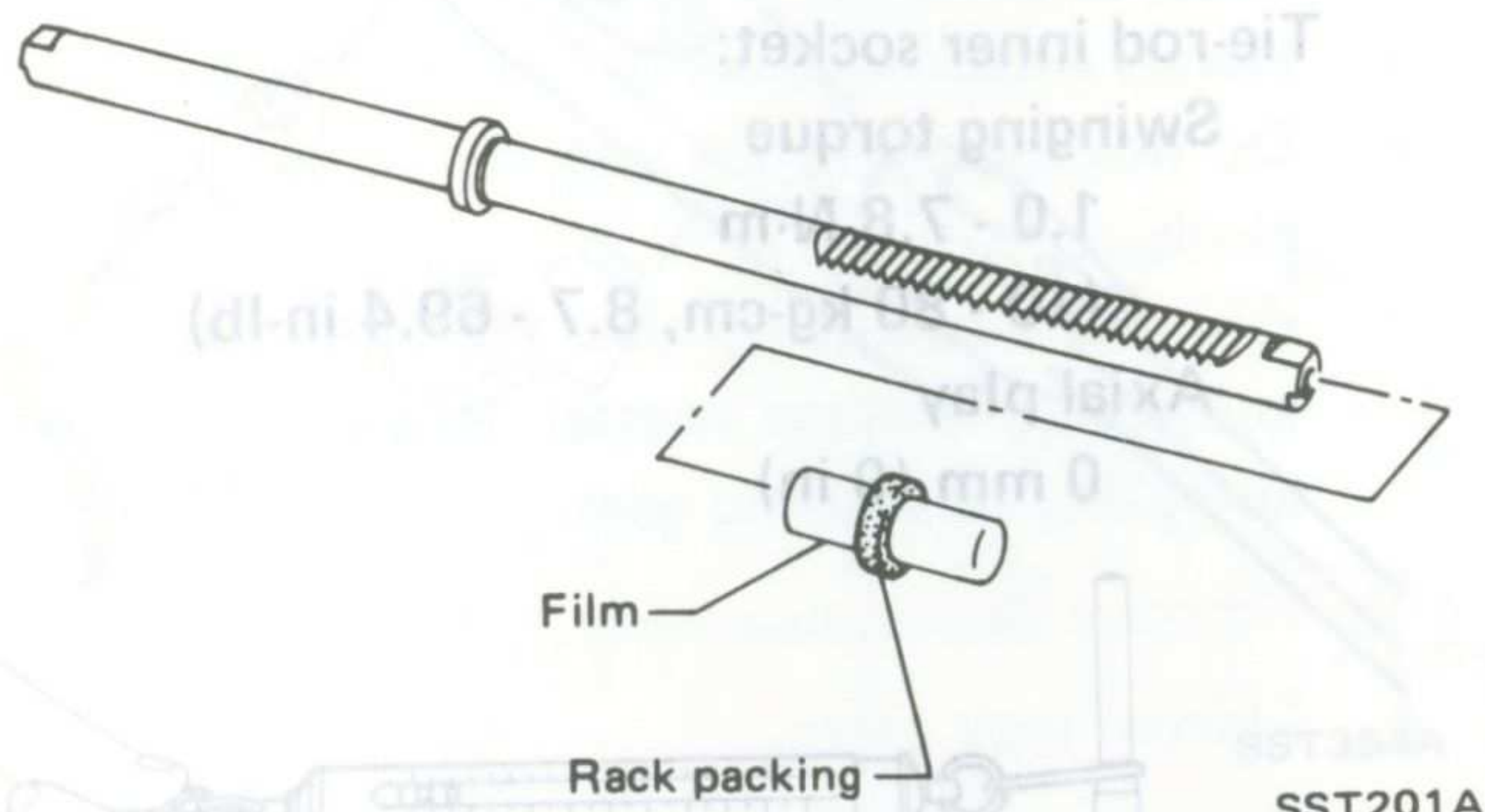
STEERING GEAR COMPONENT PARTS

Thoroughly examine steering gear component parts. If parts are damaged, cracked or worn, replace steering gear as an assembly.

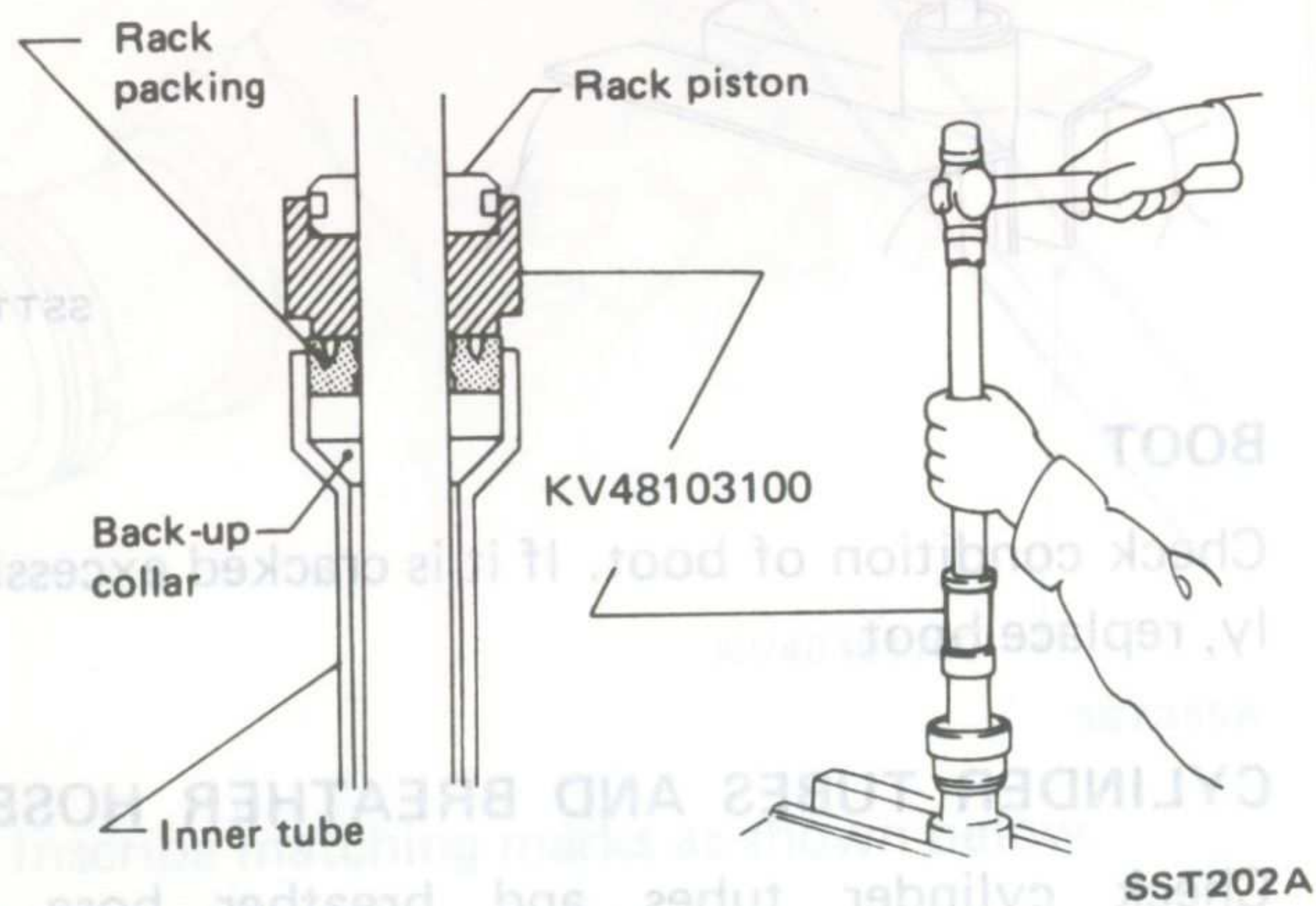
POWER STEERING GEAR AND LINKAGE

Assembly

1. Insert rack packing.
 - Place plastic film on inner side of rack packing to prevent damage by rack teeth.
 - Always remove plastic film after rack packing is positioned properly.

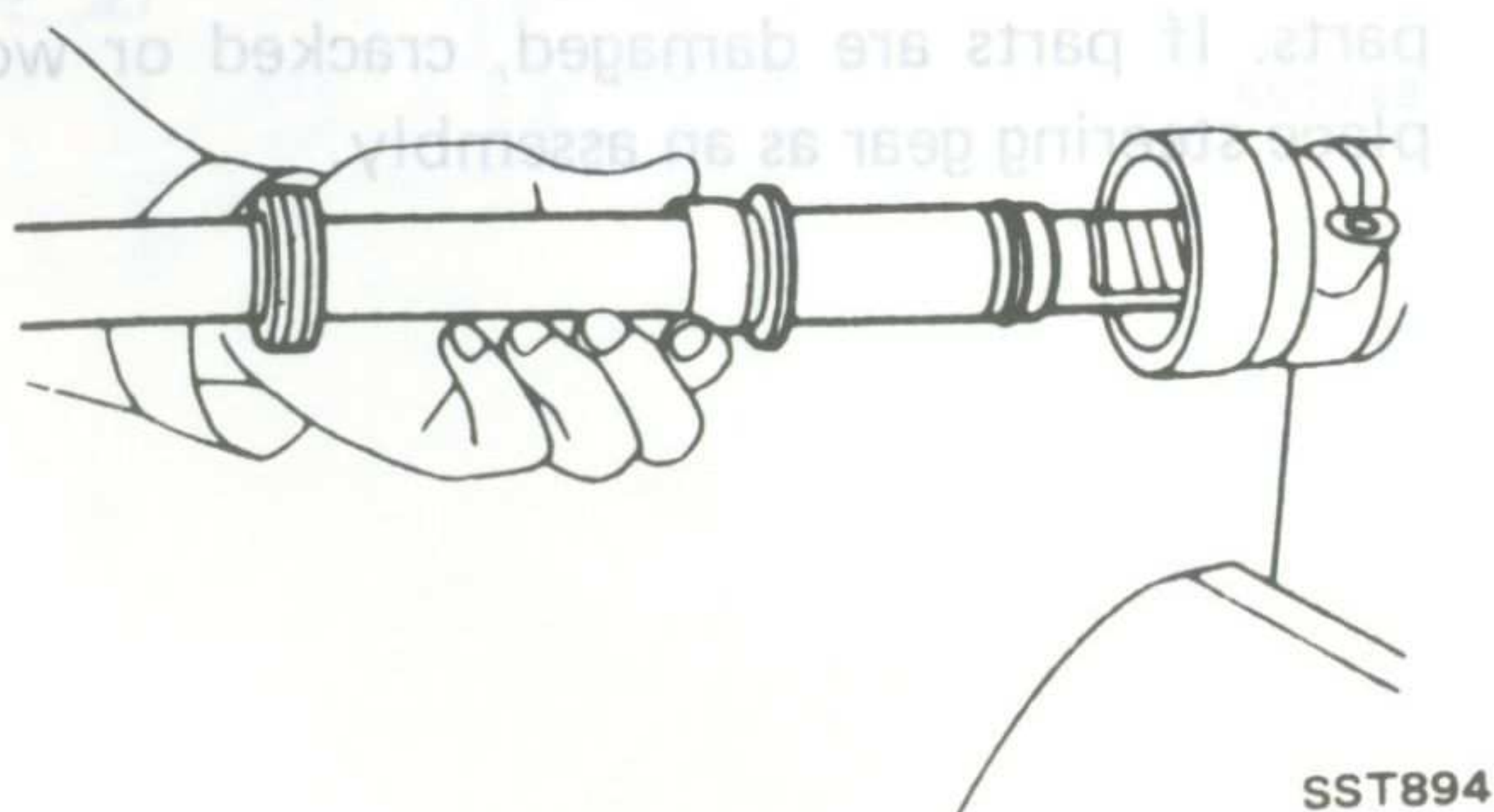


2. Attach back-up collar to inner tube.
3. Insert rack assembly into inner tube.
4. Press rack packing into inner tube.



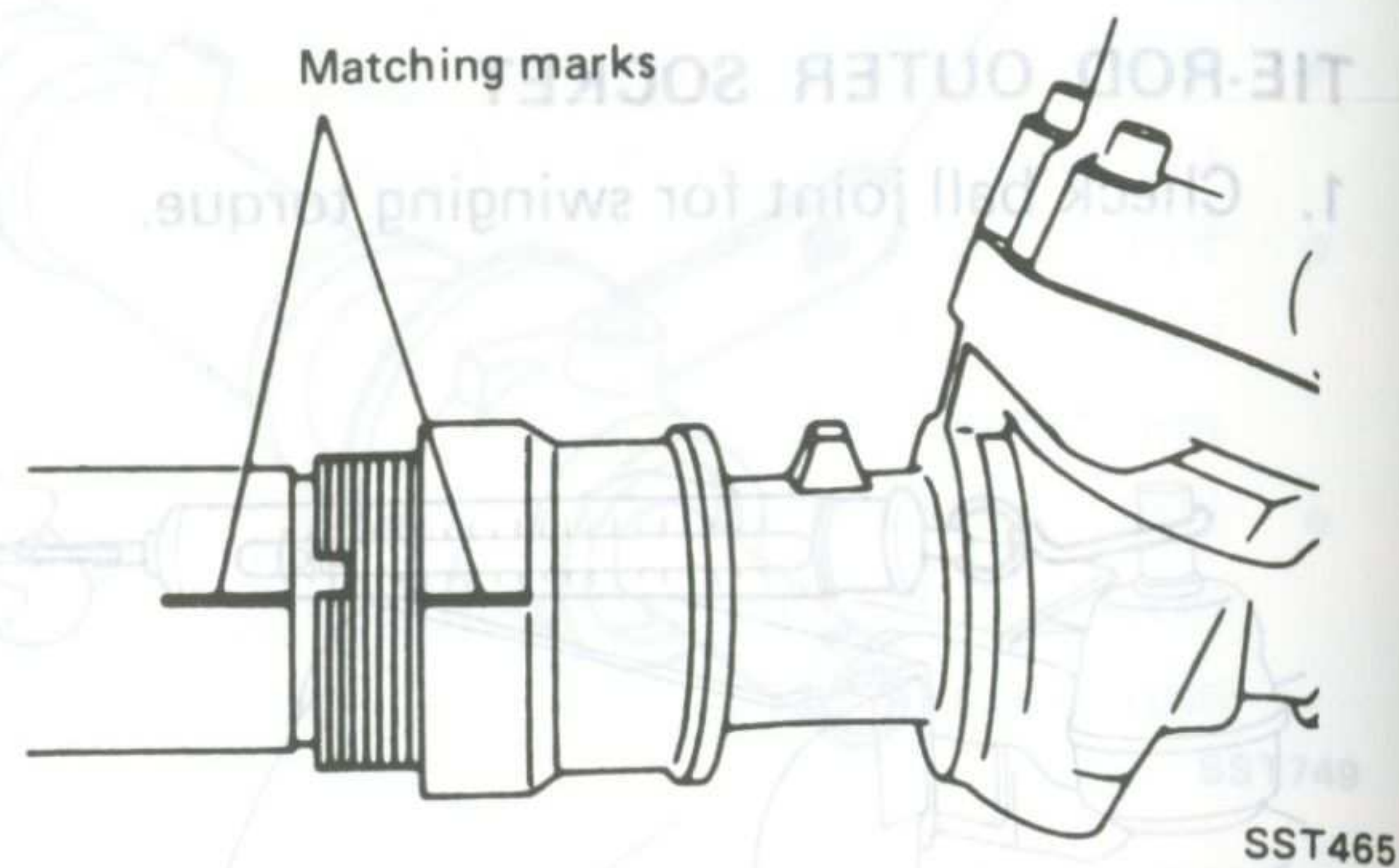
5. Insert rack assembly, then set inner tube assembly to pinion housing.

Coat rack teeth with grease.



6. Position cylinder assembly on pinion housing by aligning matching marks.

Be careful not to damage piston teflon ring.

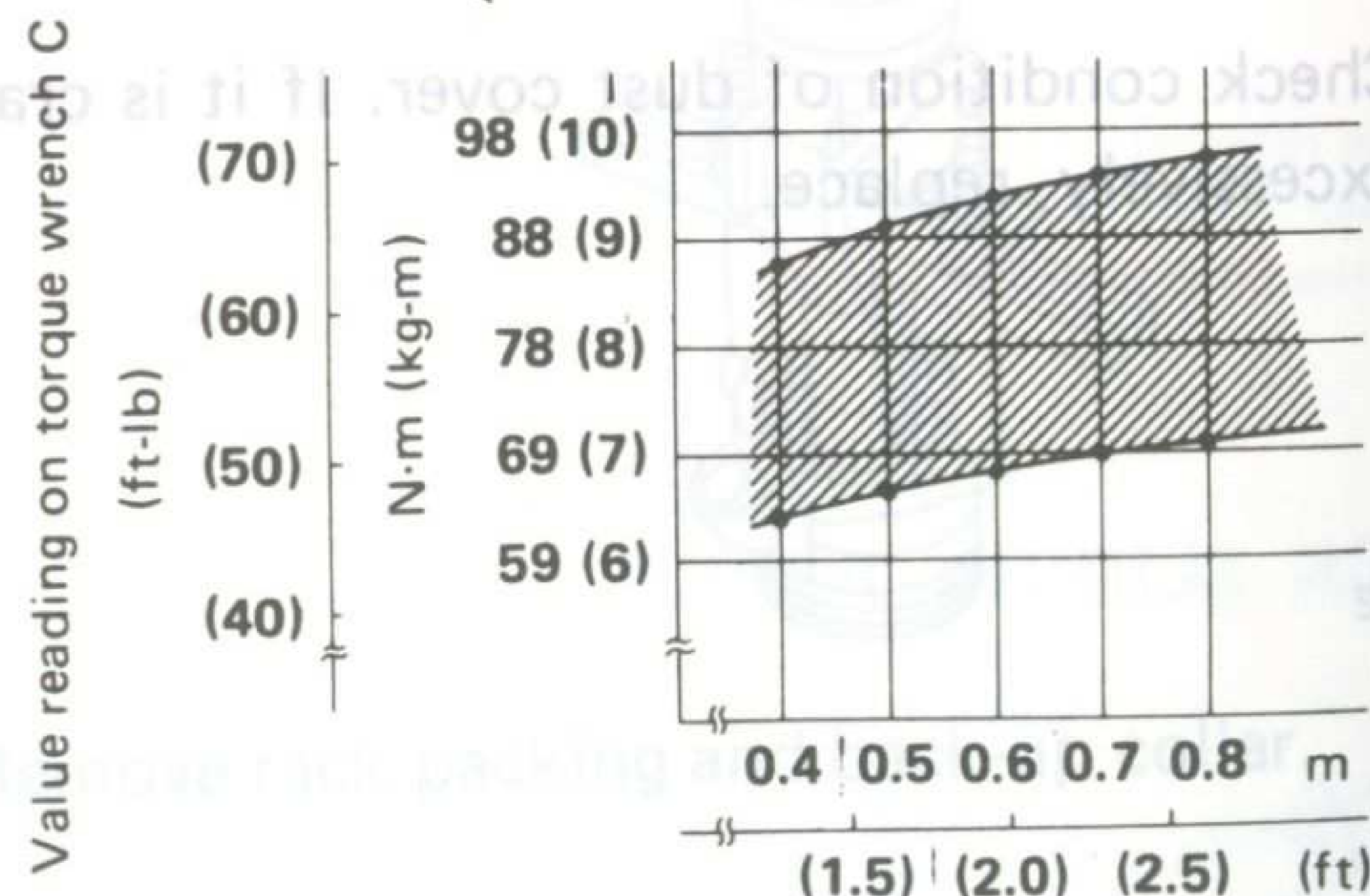
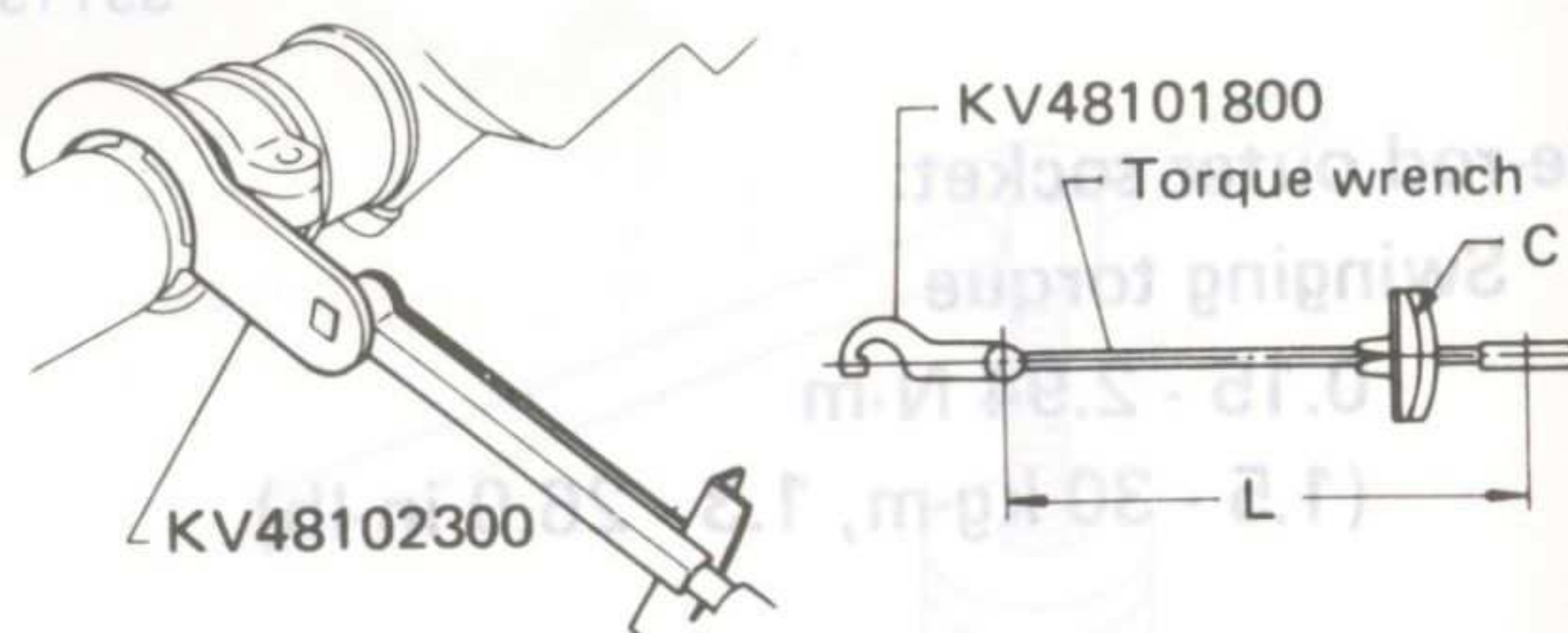


7. Tighten cylinder lock nut using Tool.

Lock nut:

78 - 108 N·m

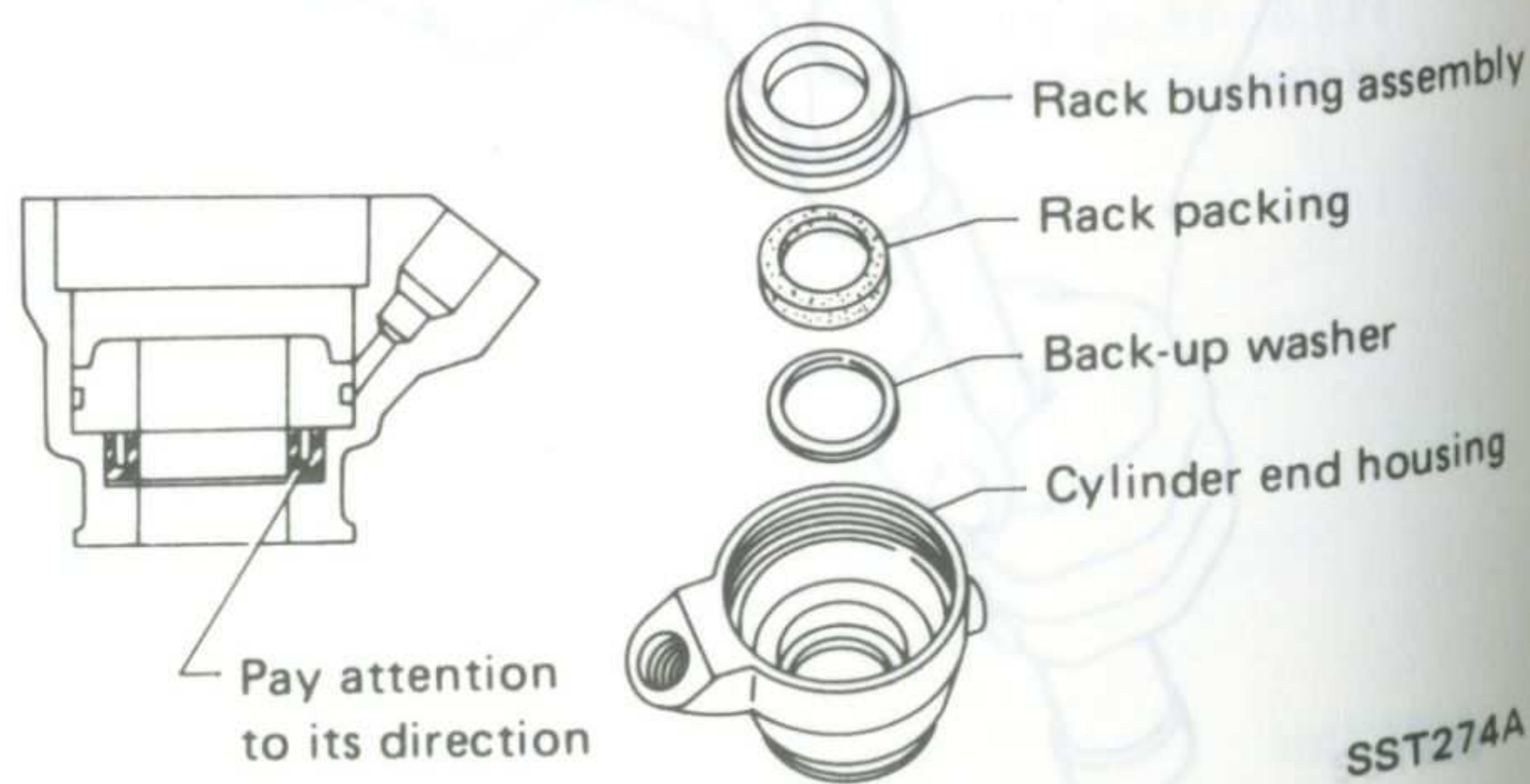
(8.0 - 11.0 kg-m, 58 - 80 ft-lb)



SST265A

Effective length of torque wrench L

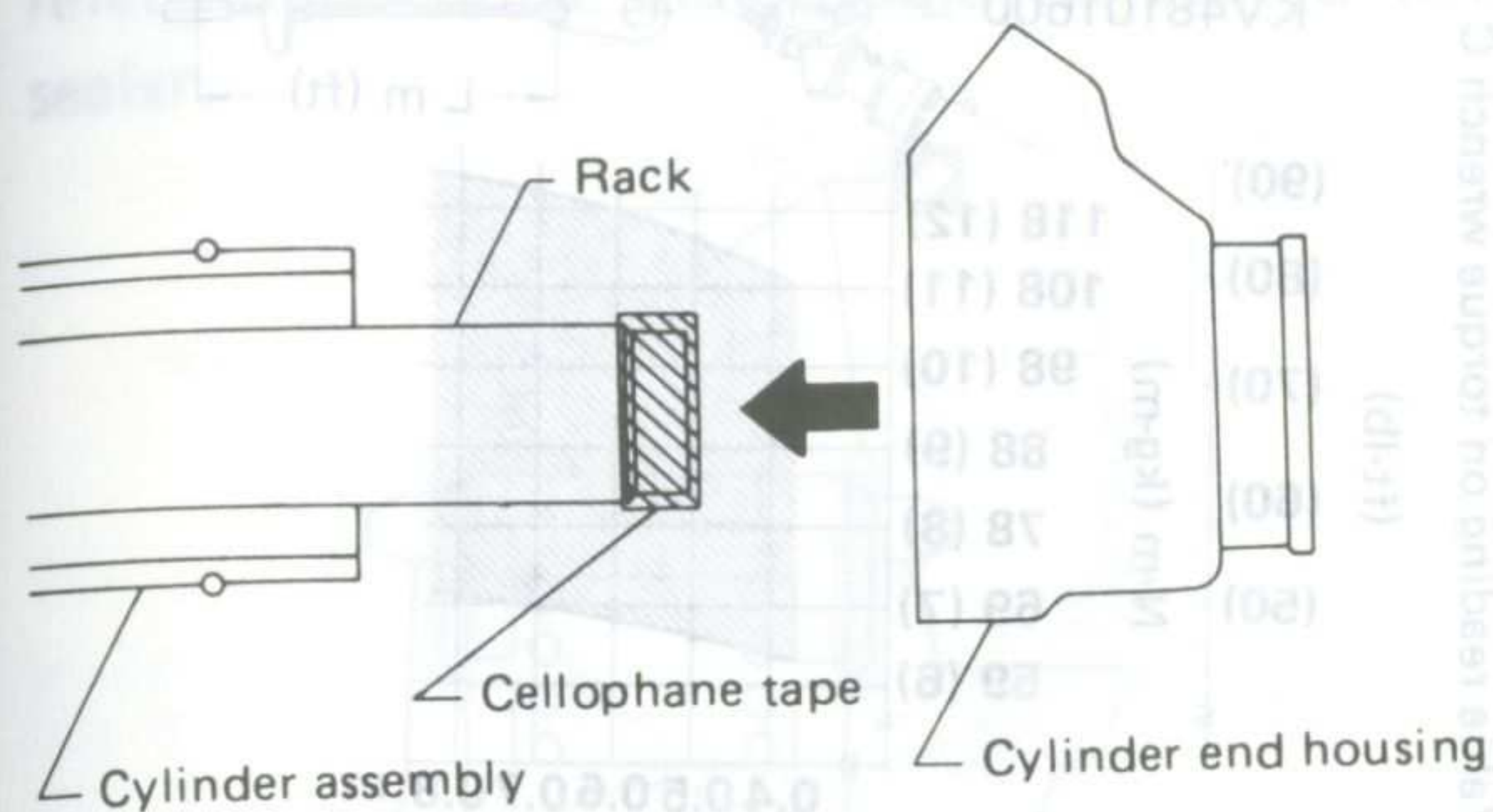
8. Install back-up washer, rack packing and rack bushing assembly to cylinder end housing.



POWER STEERING GEAR AND LINKAGE

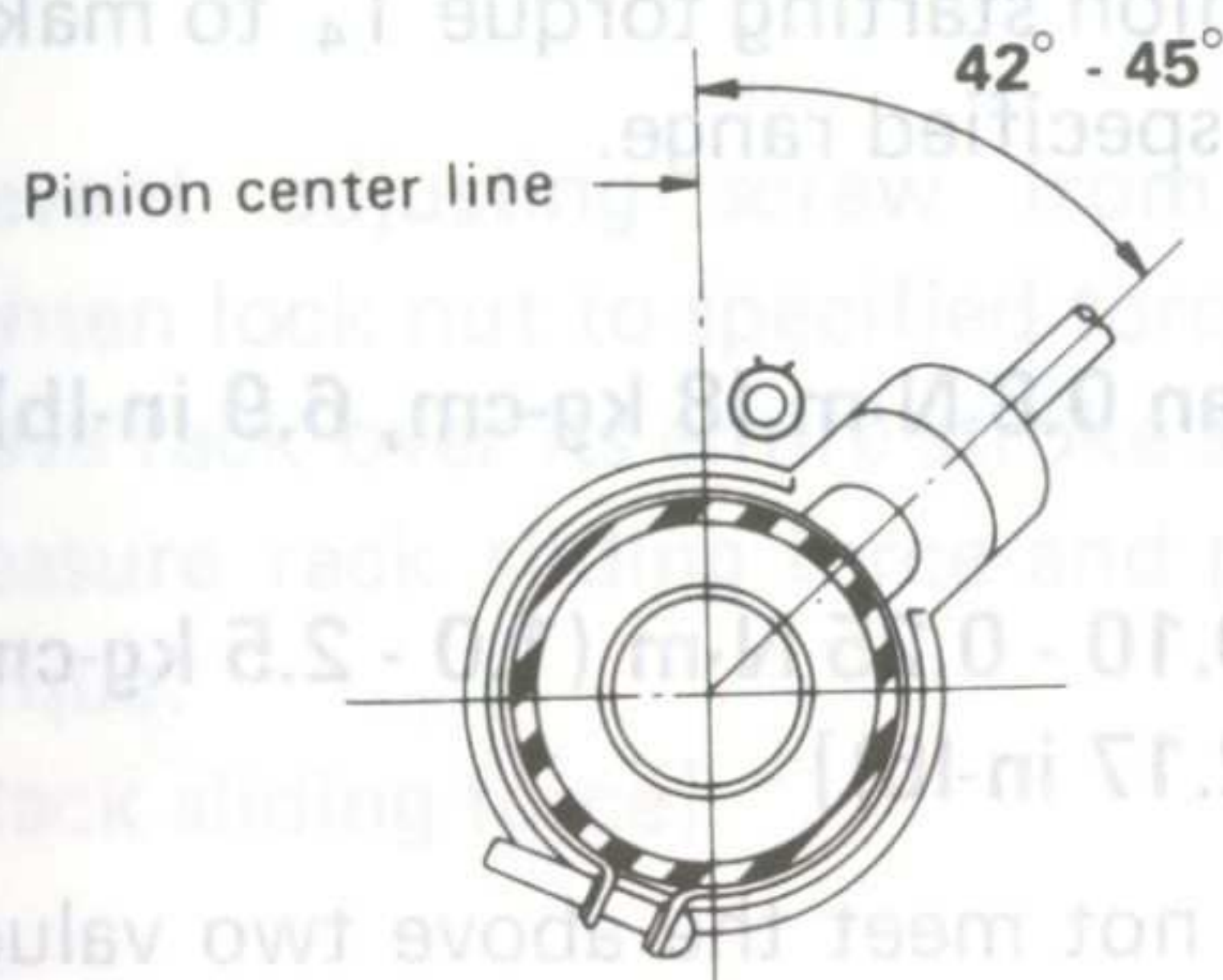
Assembly (Cont'd)

9. Wrap cellophane tape around rack end. Then position cylinder end housing on cylinder assembly by aligning matching marks.



SST275A

If matching marks are not present, position cylinder end housing as follows:



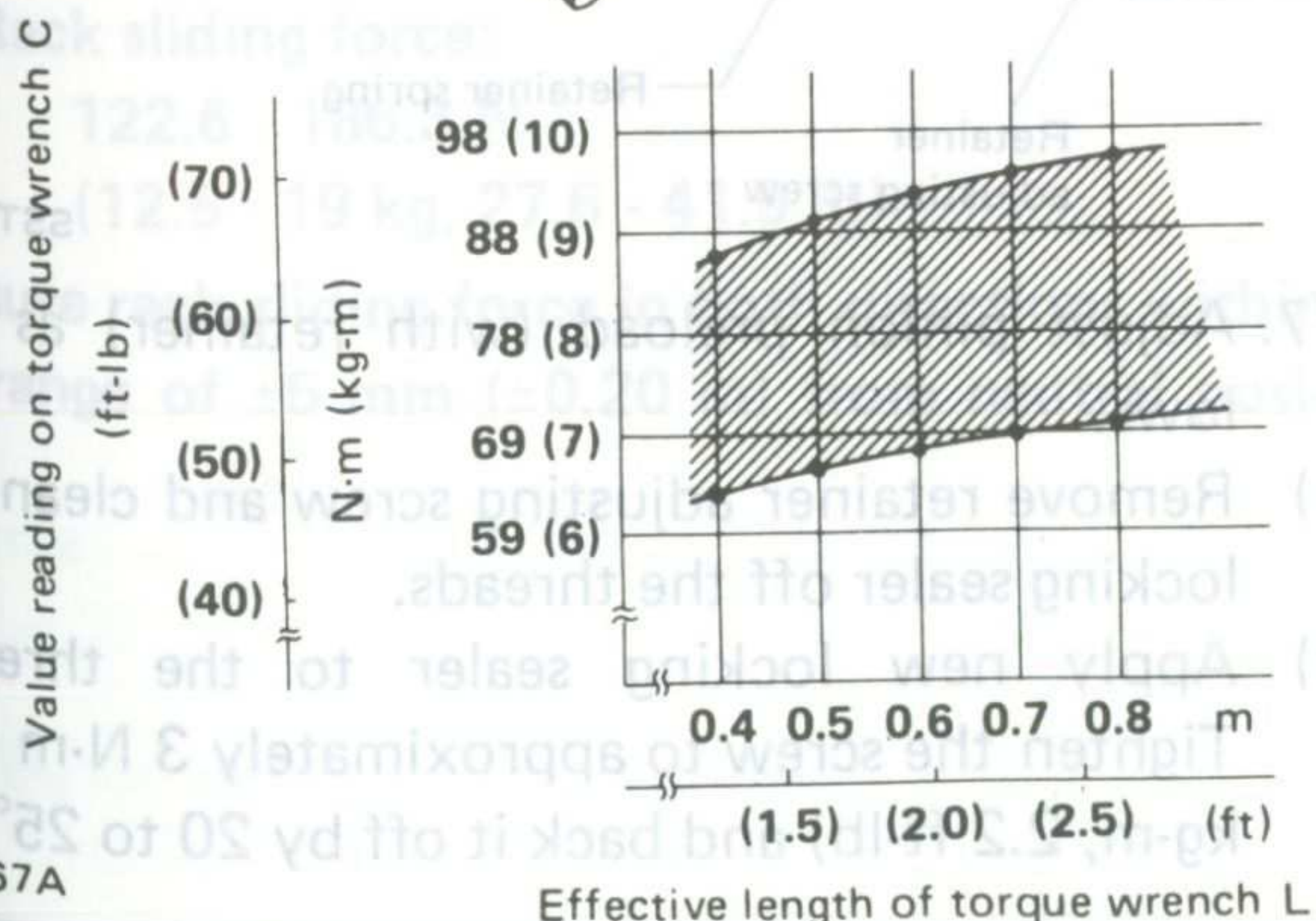
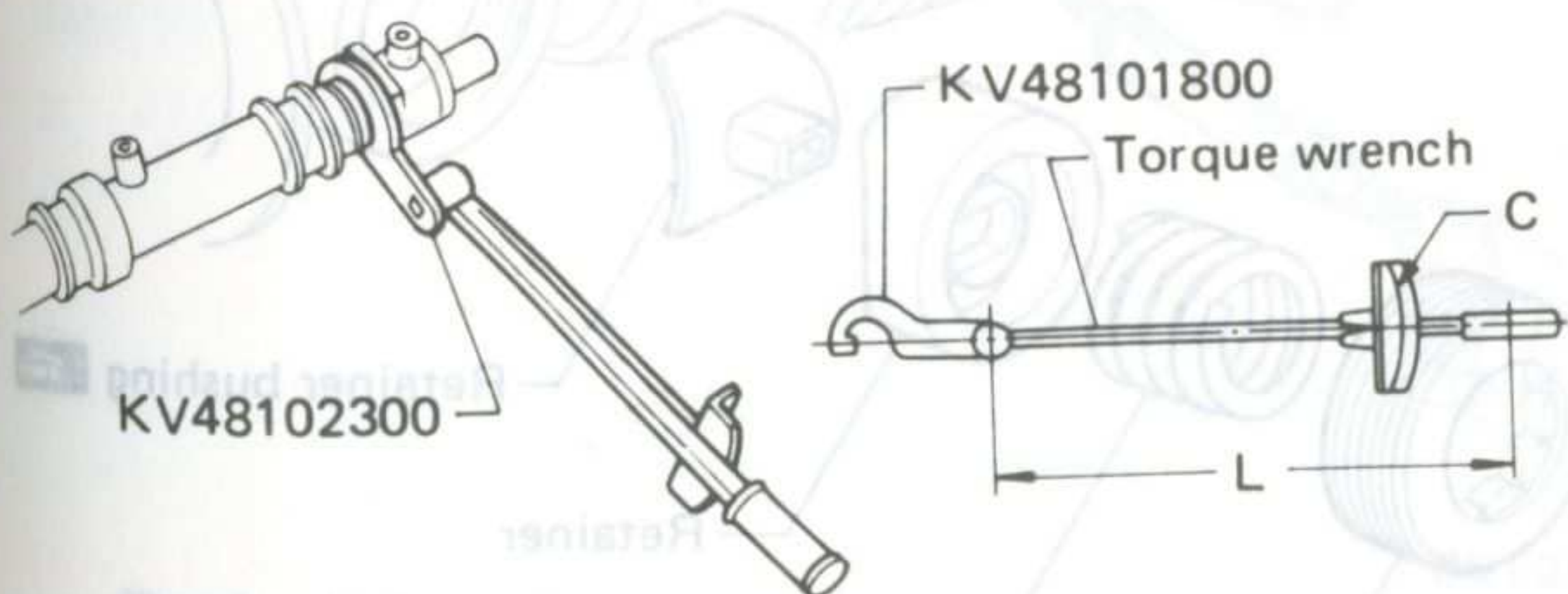
SST266A

10. Tighten cylinder end housing Tool.

Lock nut:

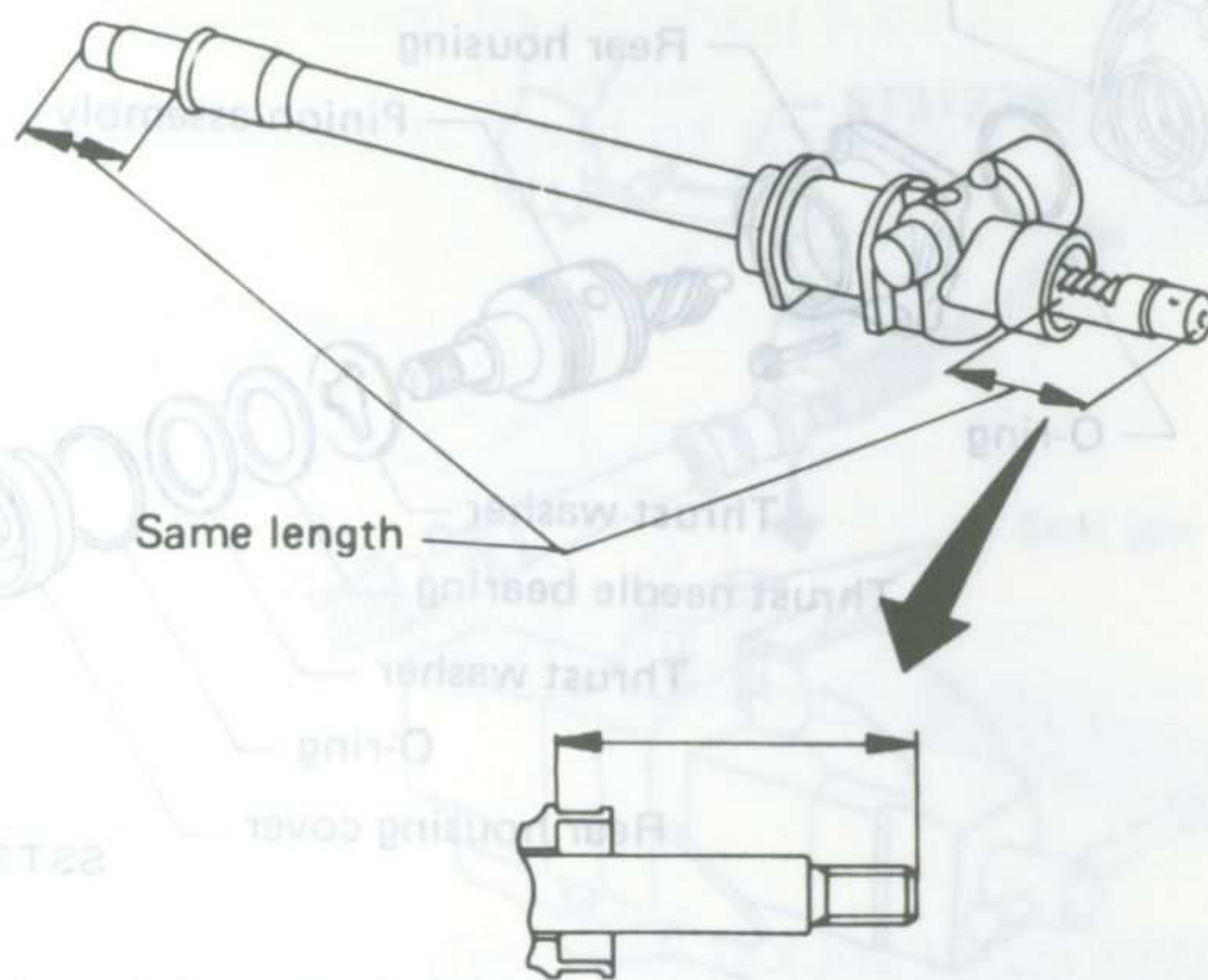
78 - 108 N·m

(8.0 - 11.0 kg-m, 58 - 80 ft-lb)



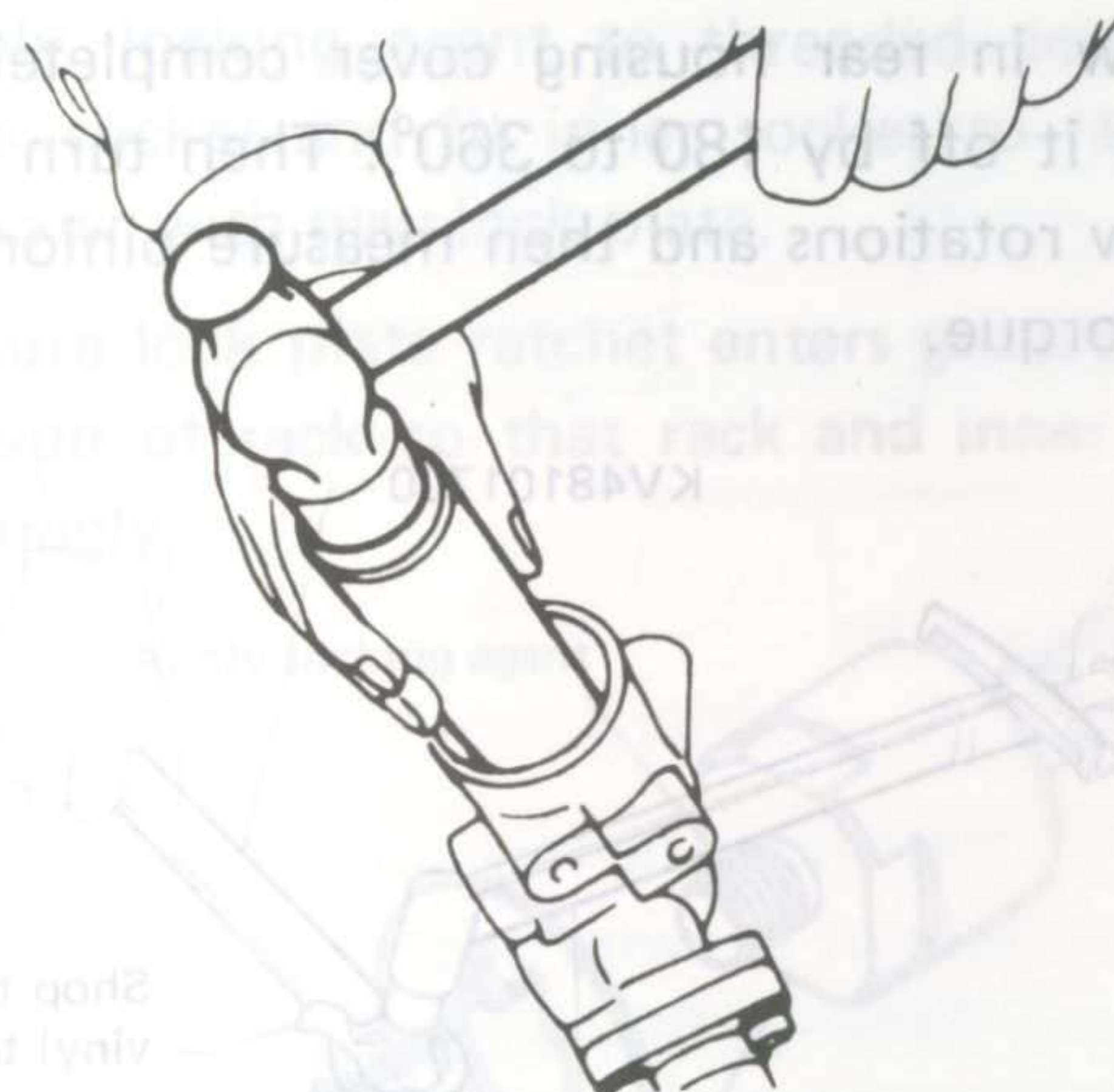
SST267A

11. Set in neutral position.



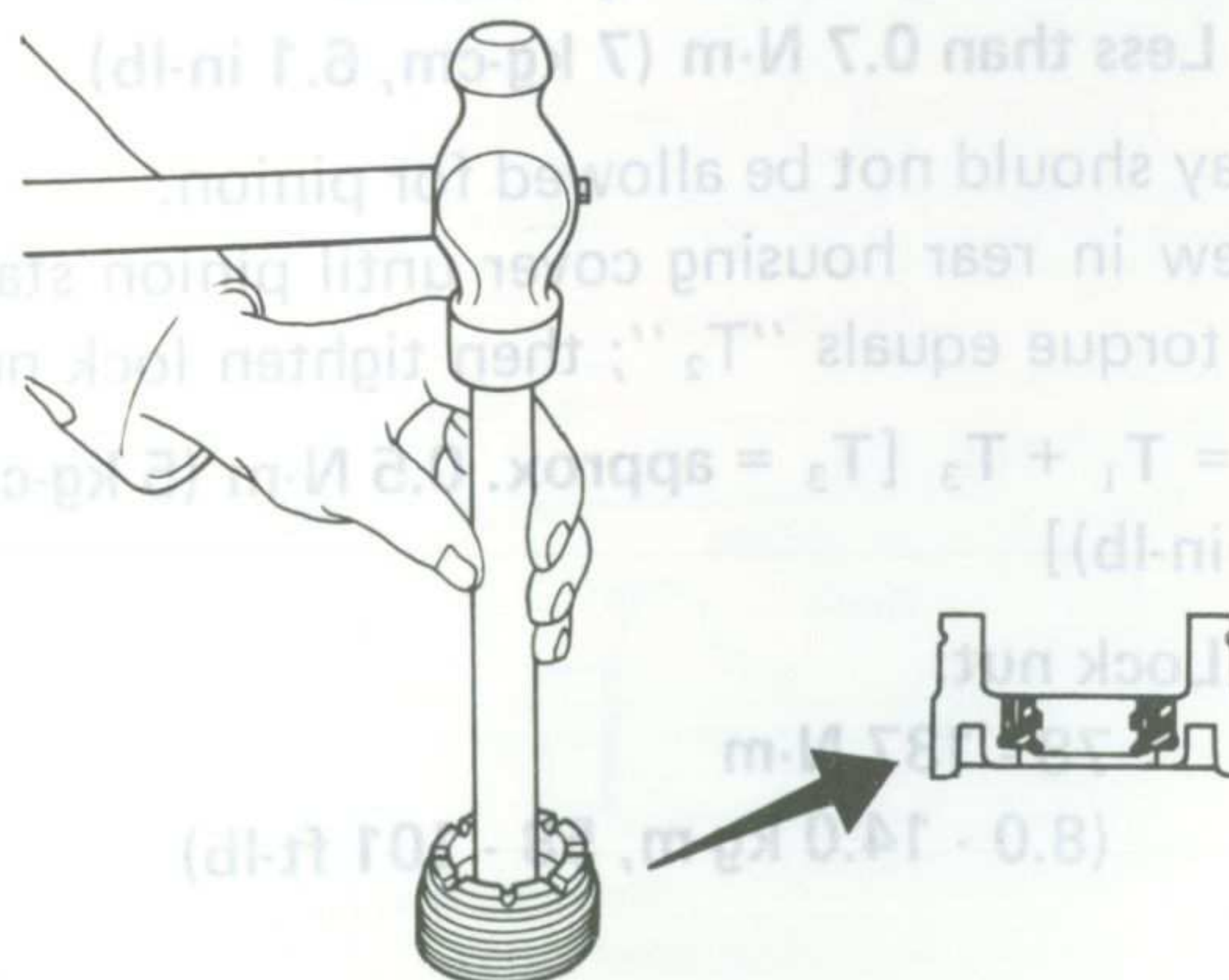
SST132A

12. Coat seal lip of oil seal with multi-purpose grease and install new pinion oil seal to pinion housing using suitable tool.



SST548

13. Install rear oil seal using suitable tool.

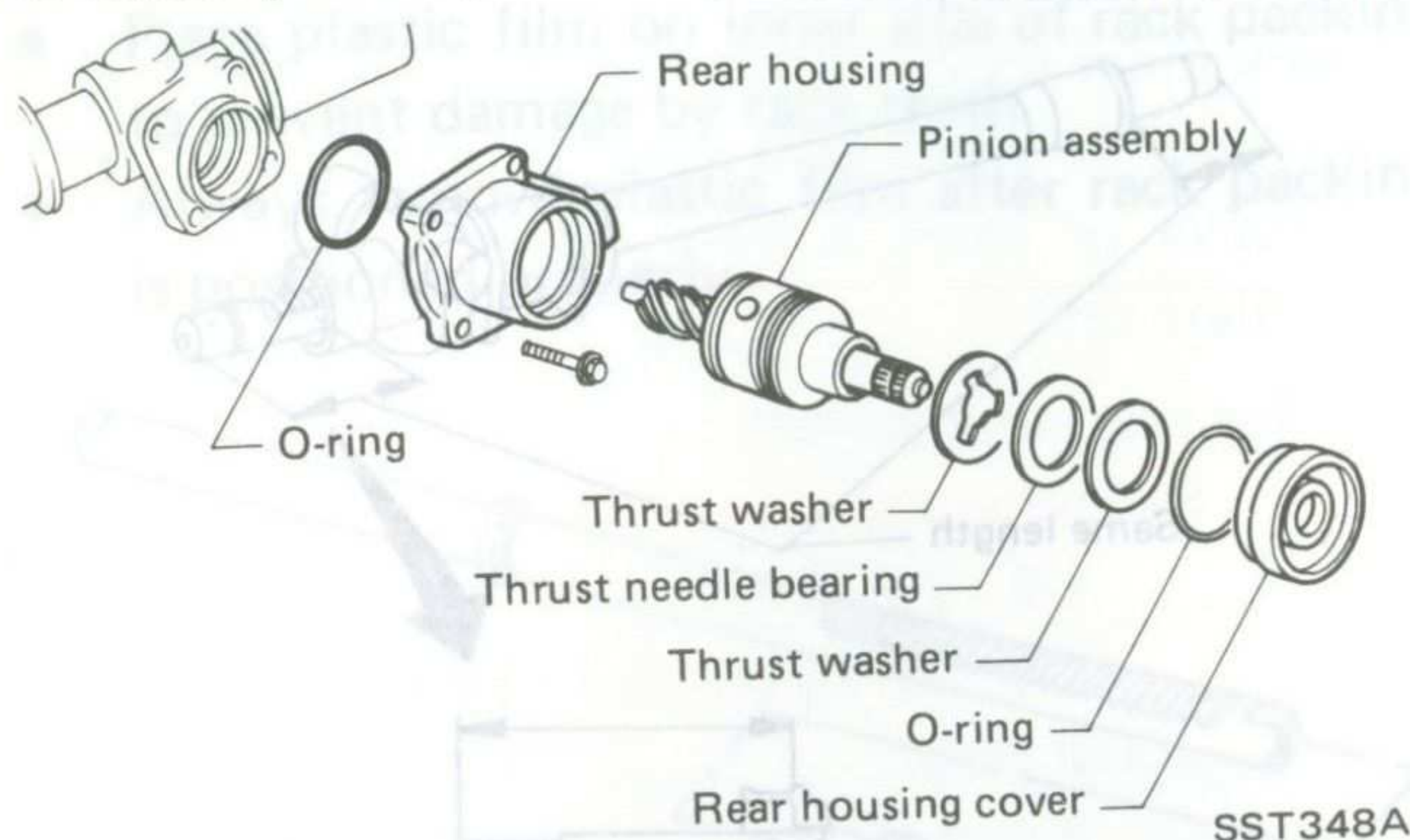


SST347A

POWER STEERING GEAR AND LINKAGE

Assembly (Cont'd)

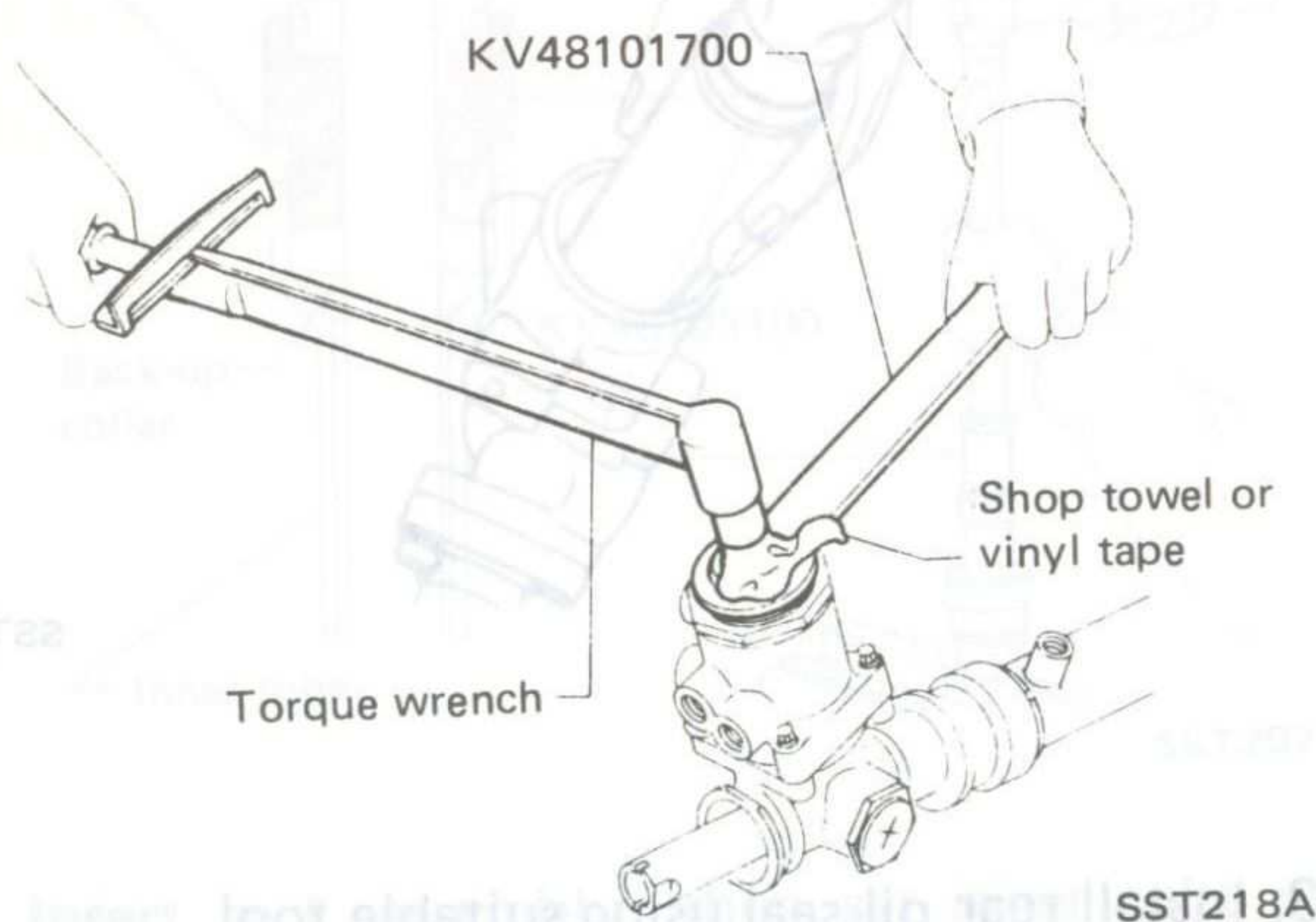
14. Install pinion parts.



15. Adjust pinion preload (without retainer) as follows.

Before making pinion preload adjustment, make sure retainer adjusting screw is loosened completely.

- 1) Screw in rear housing cover completely and back it off by 180 to 360°. Then turn pinion a few rotations and then measure pinion starting torque.



Pinion starting torque T_1 :

Less than 0.7 N·m (7 kg·cm, 6.1 in-lb)

Free play should not be allowed for pinion.

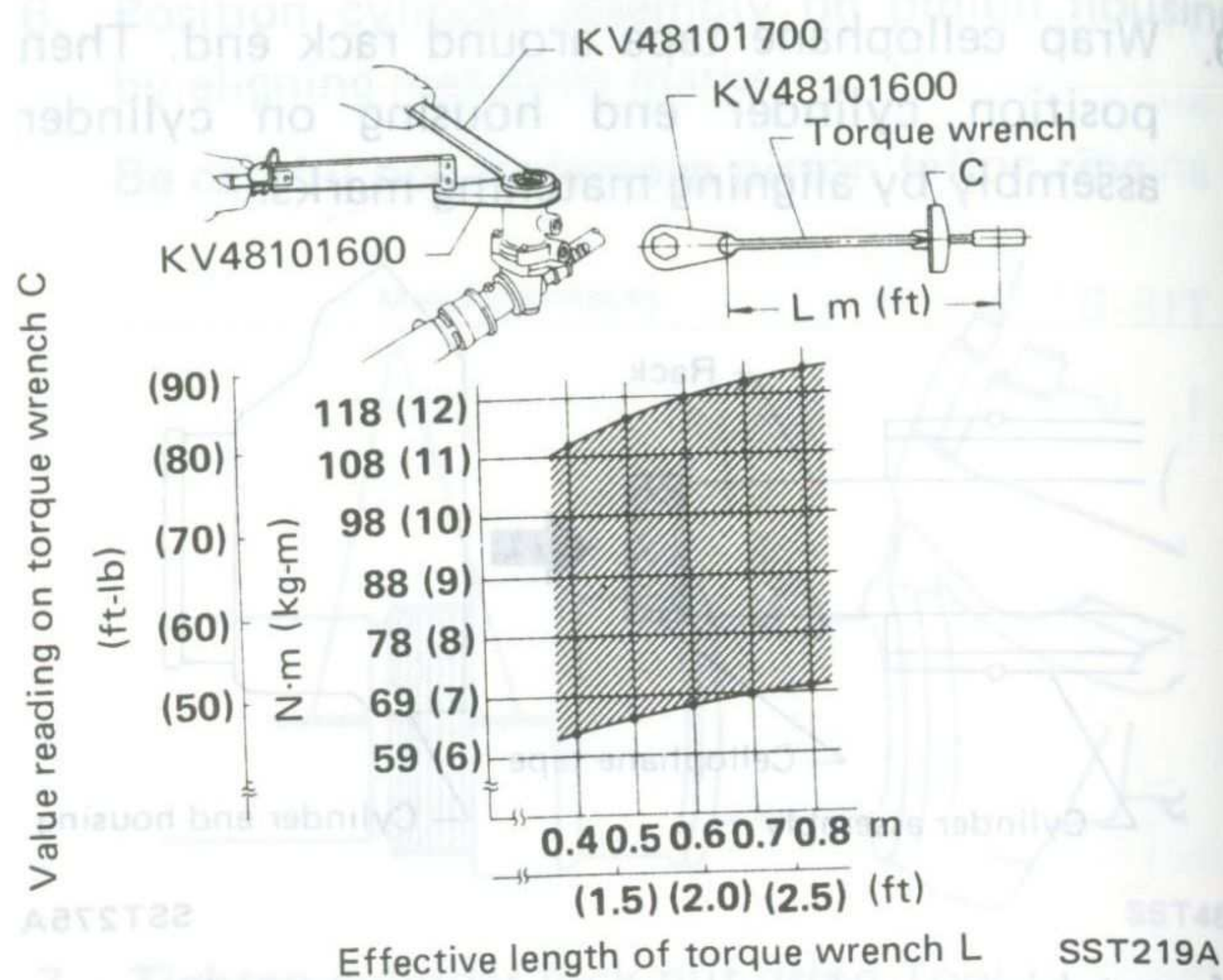
- 2) Screw in rear housing cover until pinion starting torque equals " T_2 "; then tighten lock nut.

$$T_2 = T_1 + T_3 \quad [T_3 = \text{approx. } 0.5 \text{ N·m (5 kg·cm, 4.3 in-lb)}]$$

: Lock nut:

78 - 137 N·m

(8.0 - 14.0 kg·m, 58 - 101 ft-lb)



- 3) Measure pinion starting torque T_4 to make sure it is within specified range.

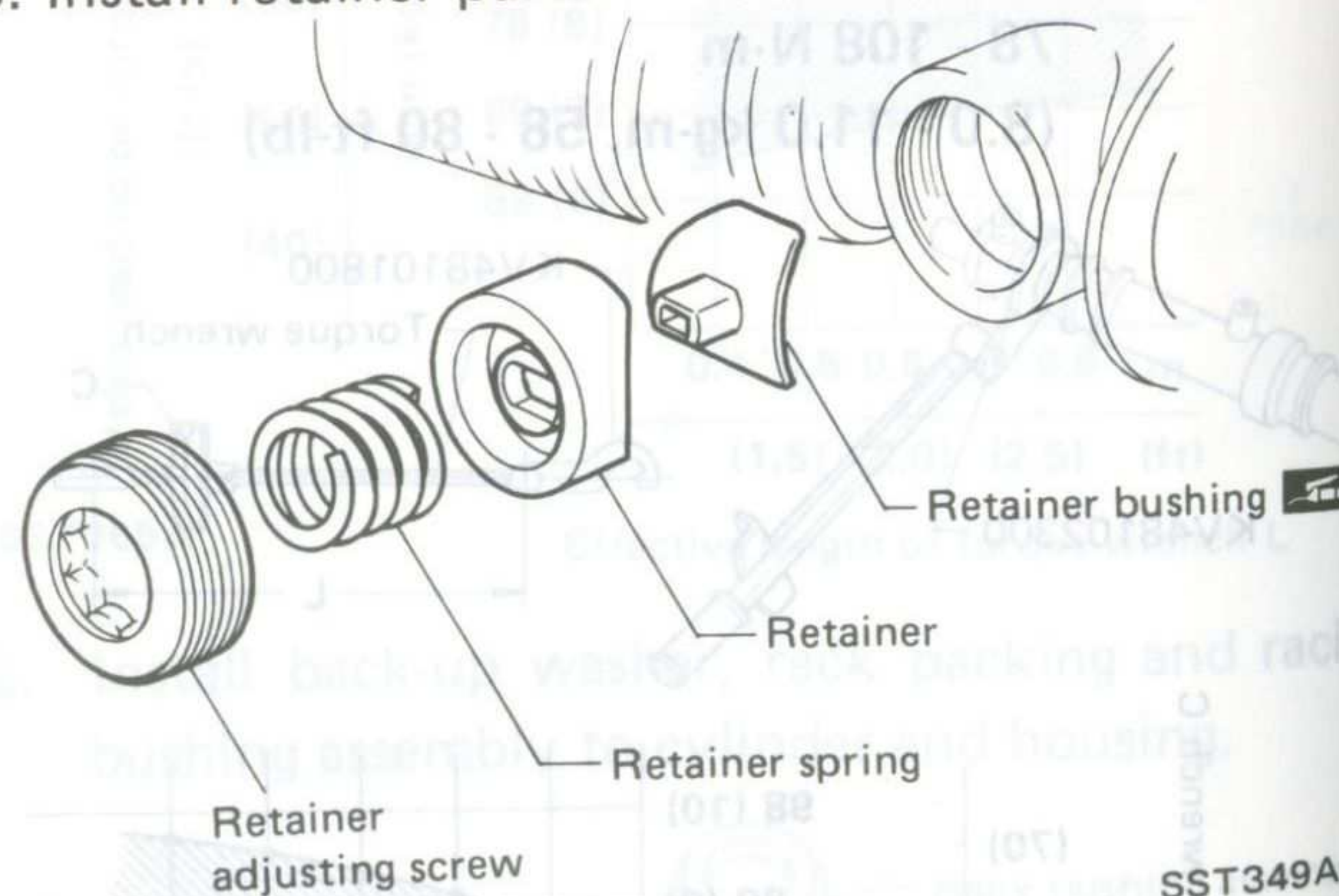
T_4 :

Less than 0.8 N·m (8 kg·cm, 6.9 in-lb)
and

$T_1 + [0.10 - 0.25 \text{ N·m (1.0 - 2.5 kg·cm, 0.87 - 2.17 in-lb)}]$

- 4) If T_4 does not meet the above two values, repeat step 2 and re-adjust pinion preload using T_3 .

16. Install retainer parts.



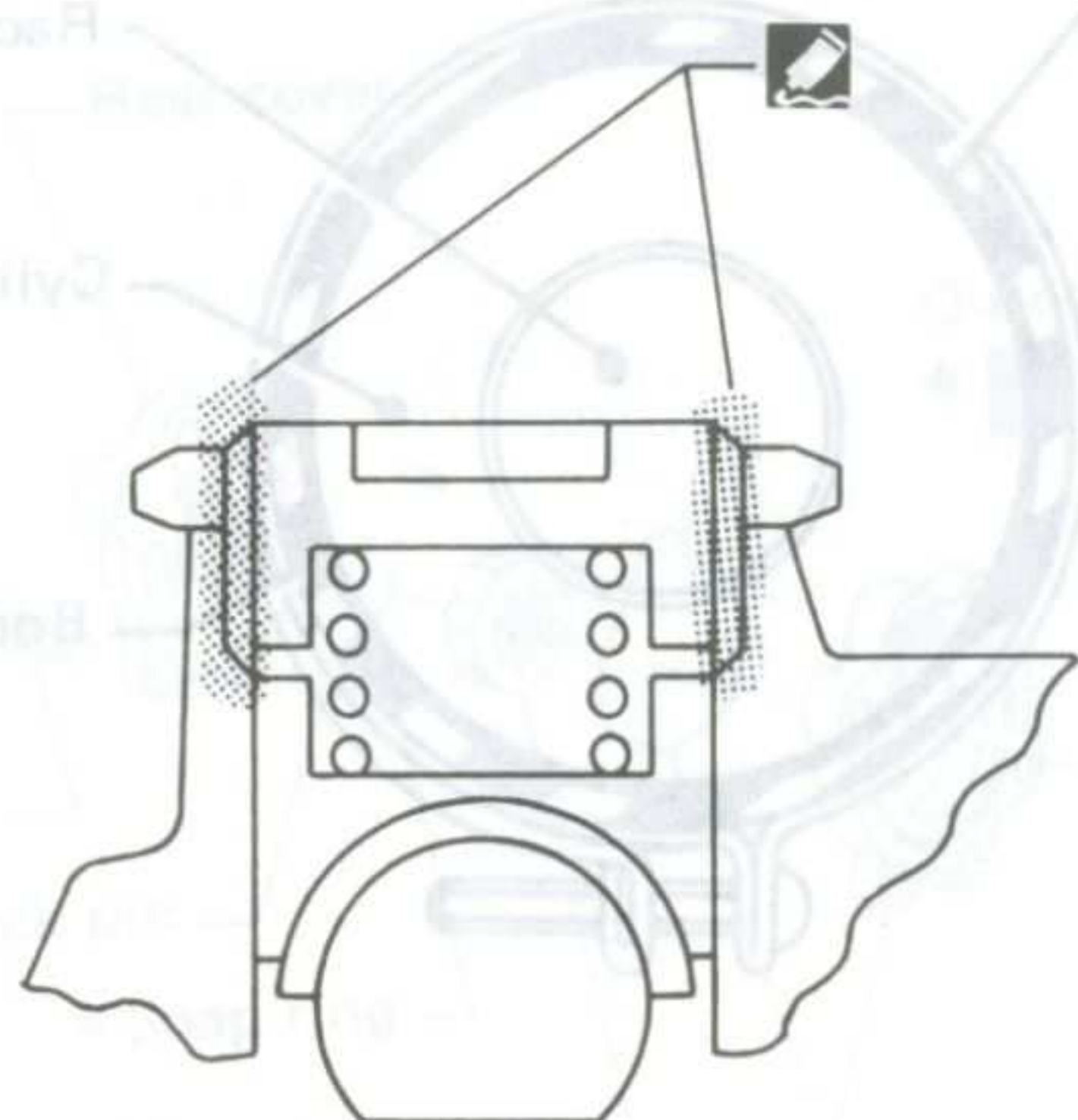
17. Adjust pinion preload (with retainer) as follows.

- 1) Remove retainer adjusting screw and clean old locking sealer off the threads.
- 2) Apply new locking sealer to the threads. Tighten the screw to approximately 3 N·m (0.3 kg·m, 2.2 ft-lb) and back it off by 20 to 25°.

POWER STEERING GEAR AND LINKAGE

Assembly (Cont'd)

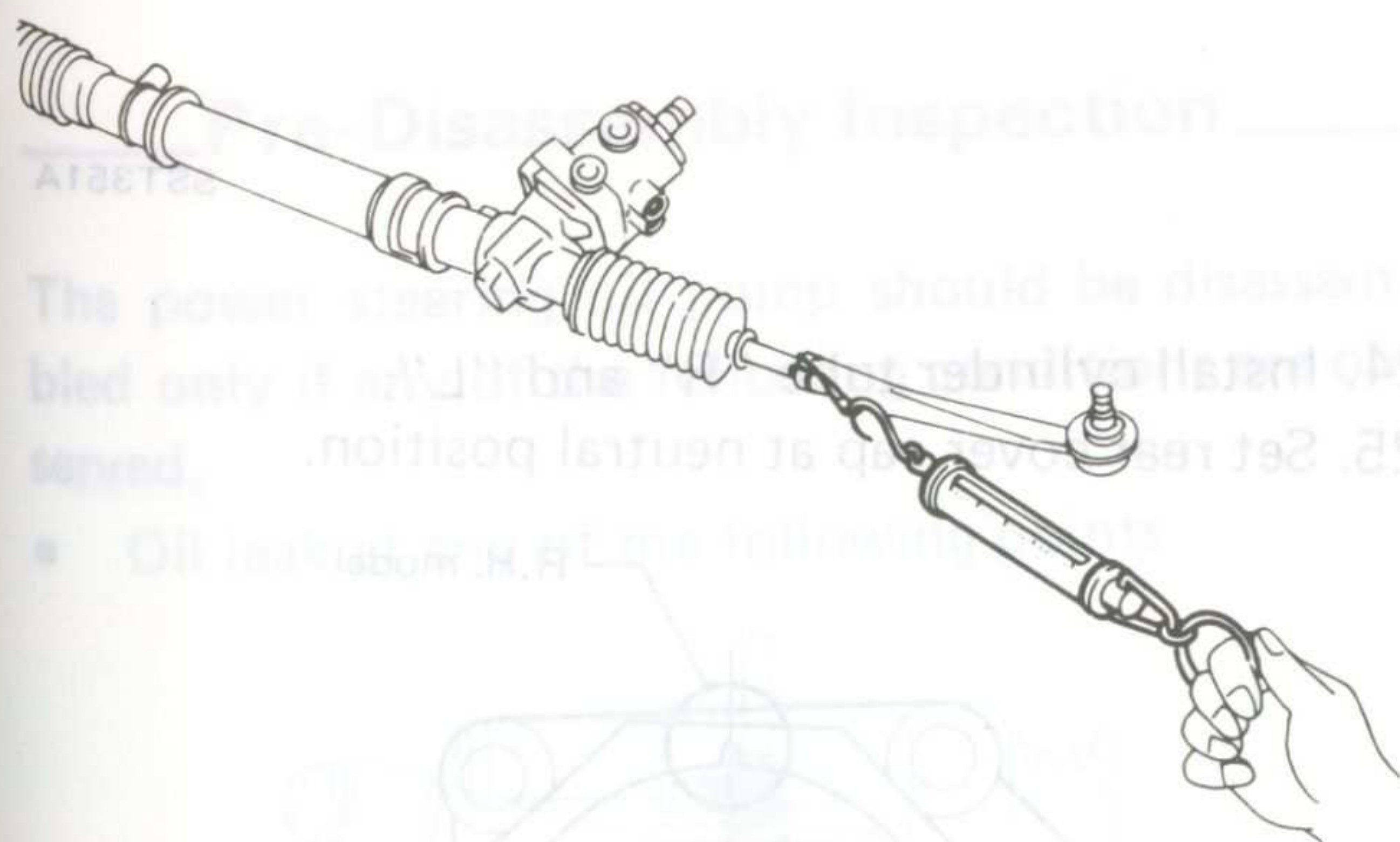
- 3) Apply a coat of locking sealer to adjusting screw and lock nut.
- Shaded areas shown in the following figure refer to portions that should be coated with sealer.



SST350A

- 4) Prevent adjusting screw from turning, and tighten lock nut to specified torque.
- 5) Move rack over its entire stroke several times.
- 6) Measure rack sliding force and pinion rotating torque.

[Rack sliding force]



SST264A

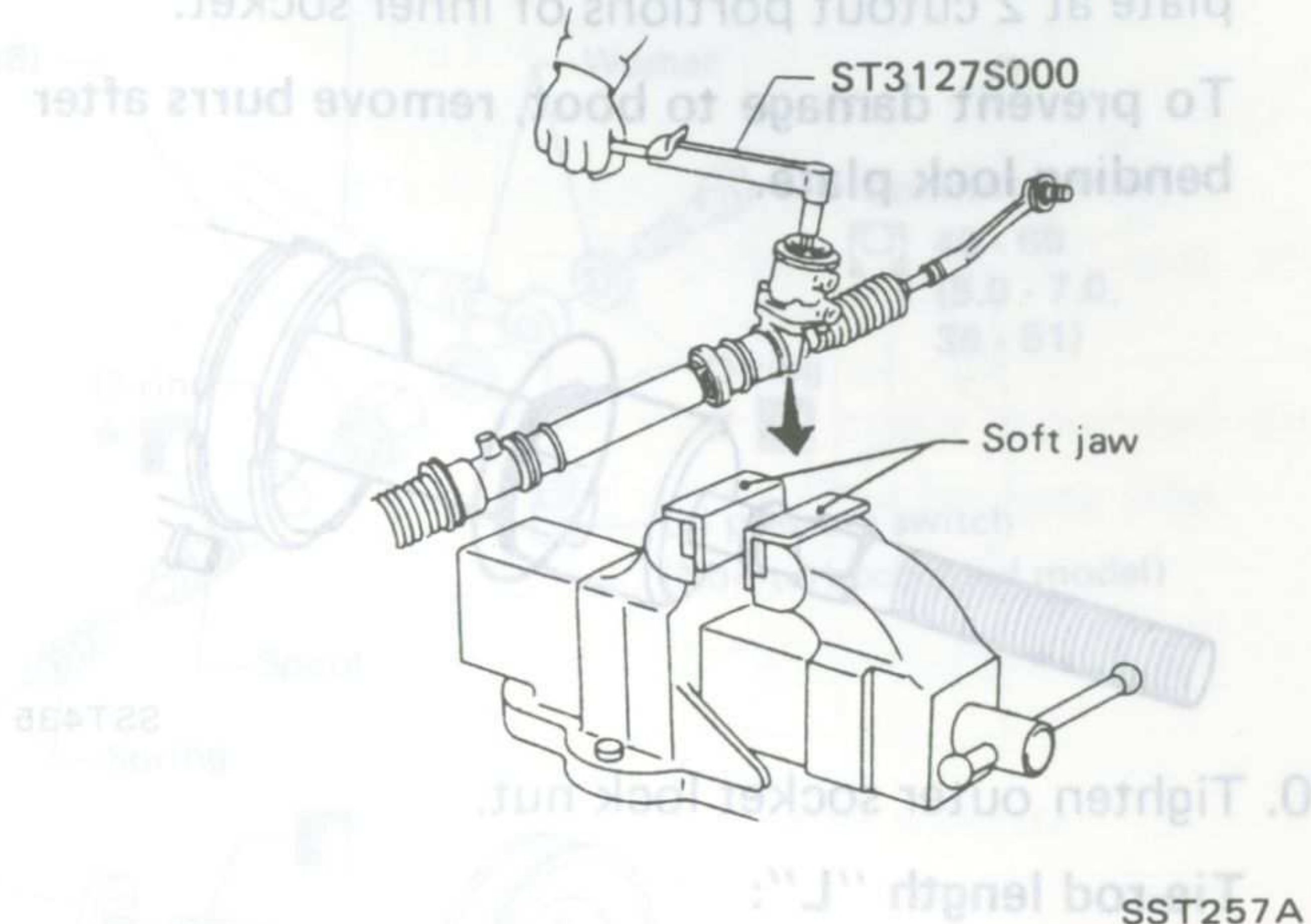
Rack sliding force:

122.6 - 186.3 N

(12.5 - 19 kg, 27.6 - 41.9 lb)

Measure rack sliding force in both directions within the range of ± 5 mm (± 0.20 in) from neutral position.

[Pinion rotating torque]



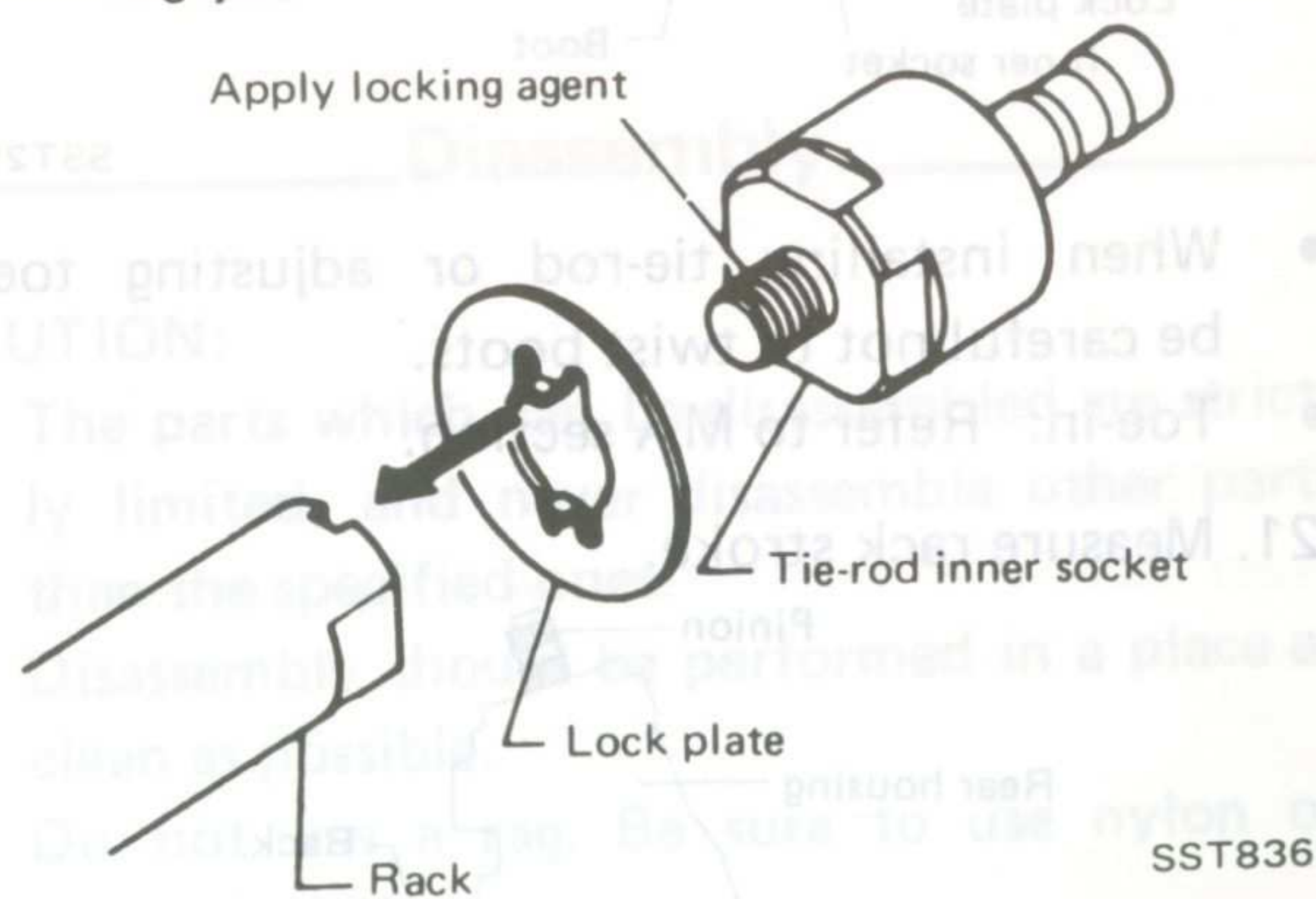
SST257A

Pinion rotating torque:

Less than 1.8 N·m (18 kg-cm, 16 in-lb)

18. Apply locking agent to threaded portion of inner socket and fit inner socket to rack end together with new lock plate.

Be sure lock plate ratchet enters groove at end portion of rack so that rack and inner socket fit snugly.



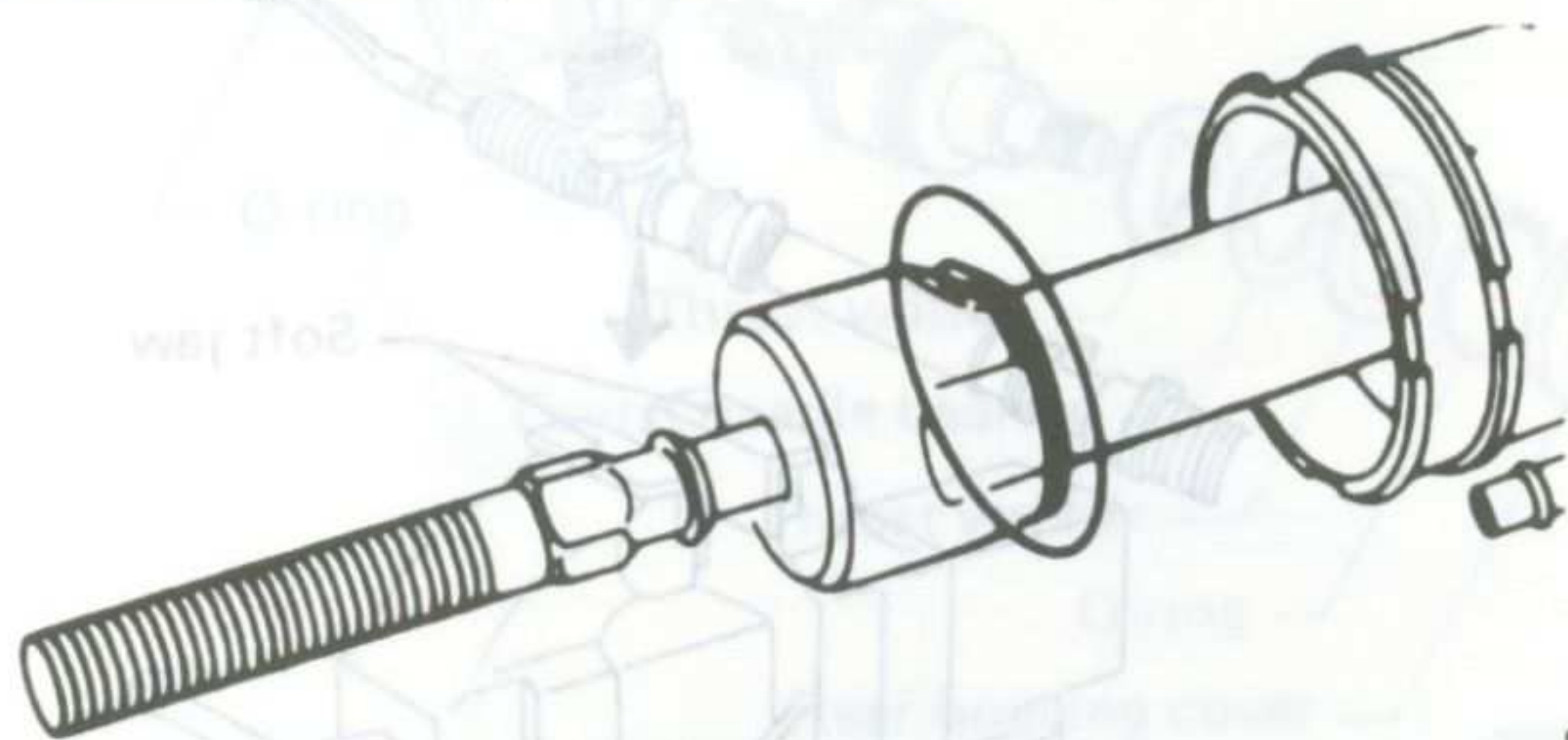
SST836

POWER STEERING GEAR AND LINKAGE

Assembly (Cont'd)

19. Tighten inner socket and securely bend lock plate at 2 cutout portions of inner socket.

To prevent damage to boot, remove burrs after bending lock plate.

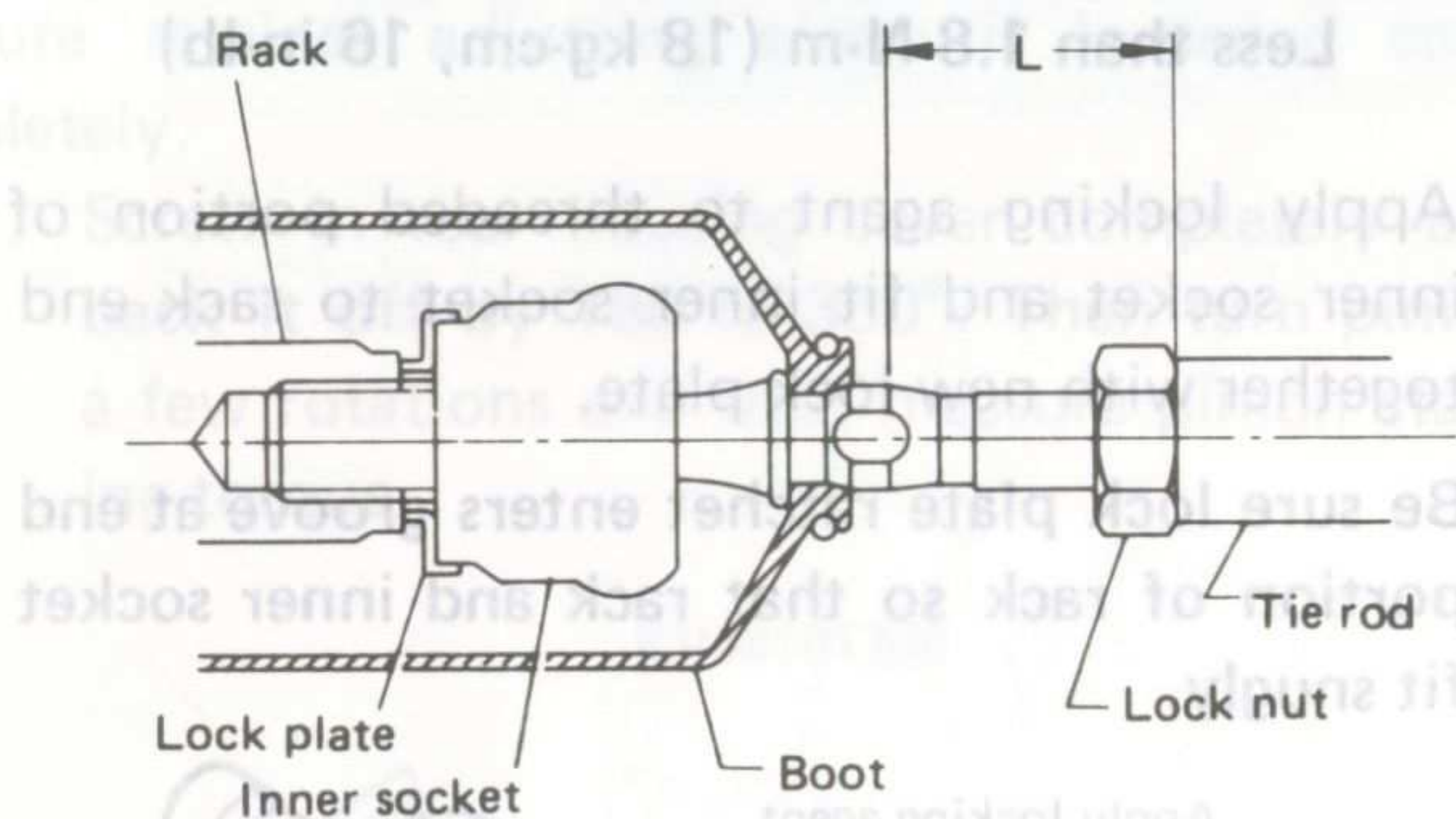


SST435

20. Tighten outer socket lock nut.

Tie-rod length "L":

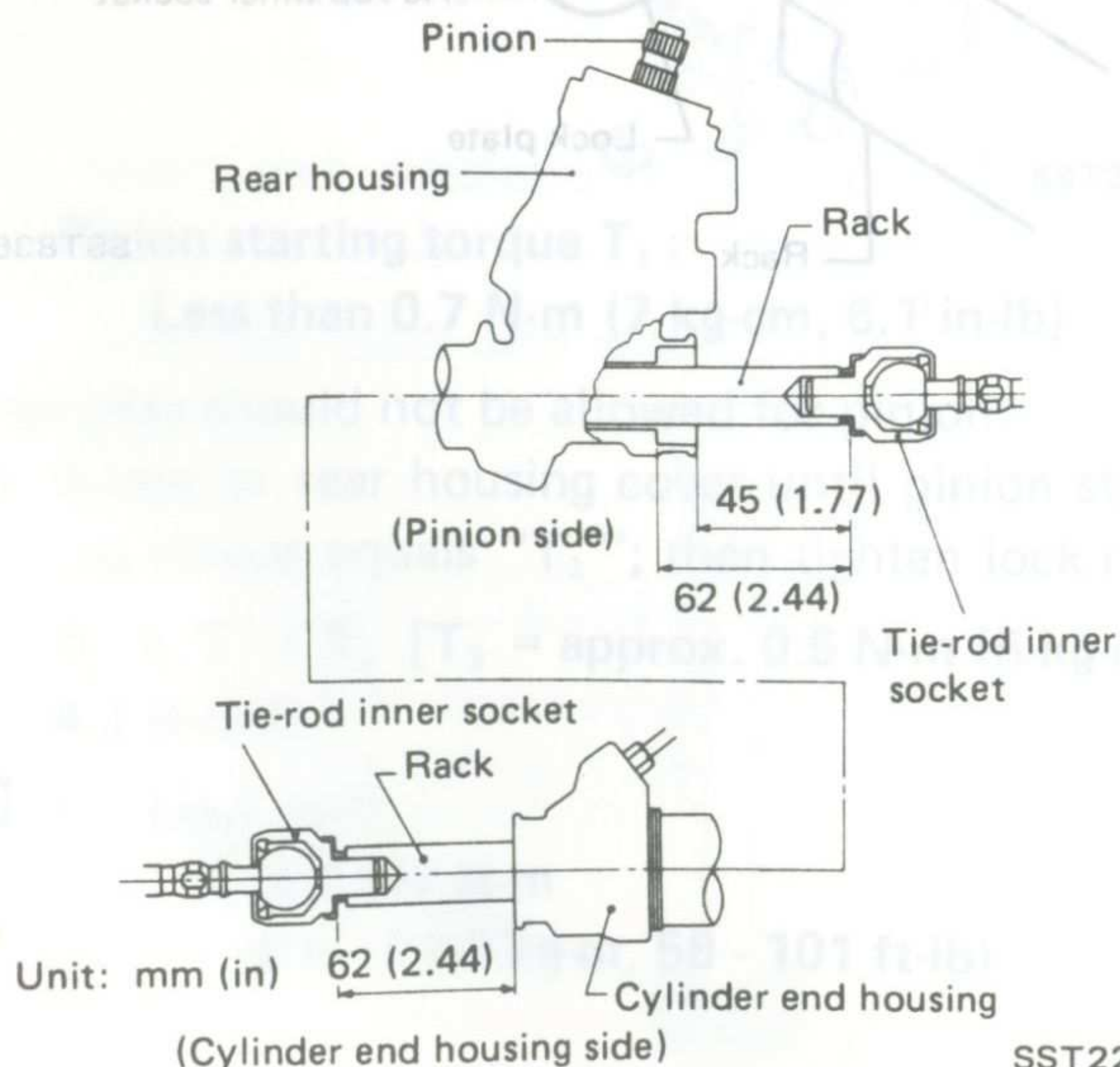
Refer to S.D.S.



SST291A

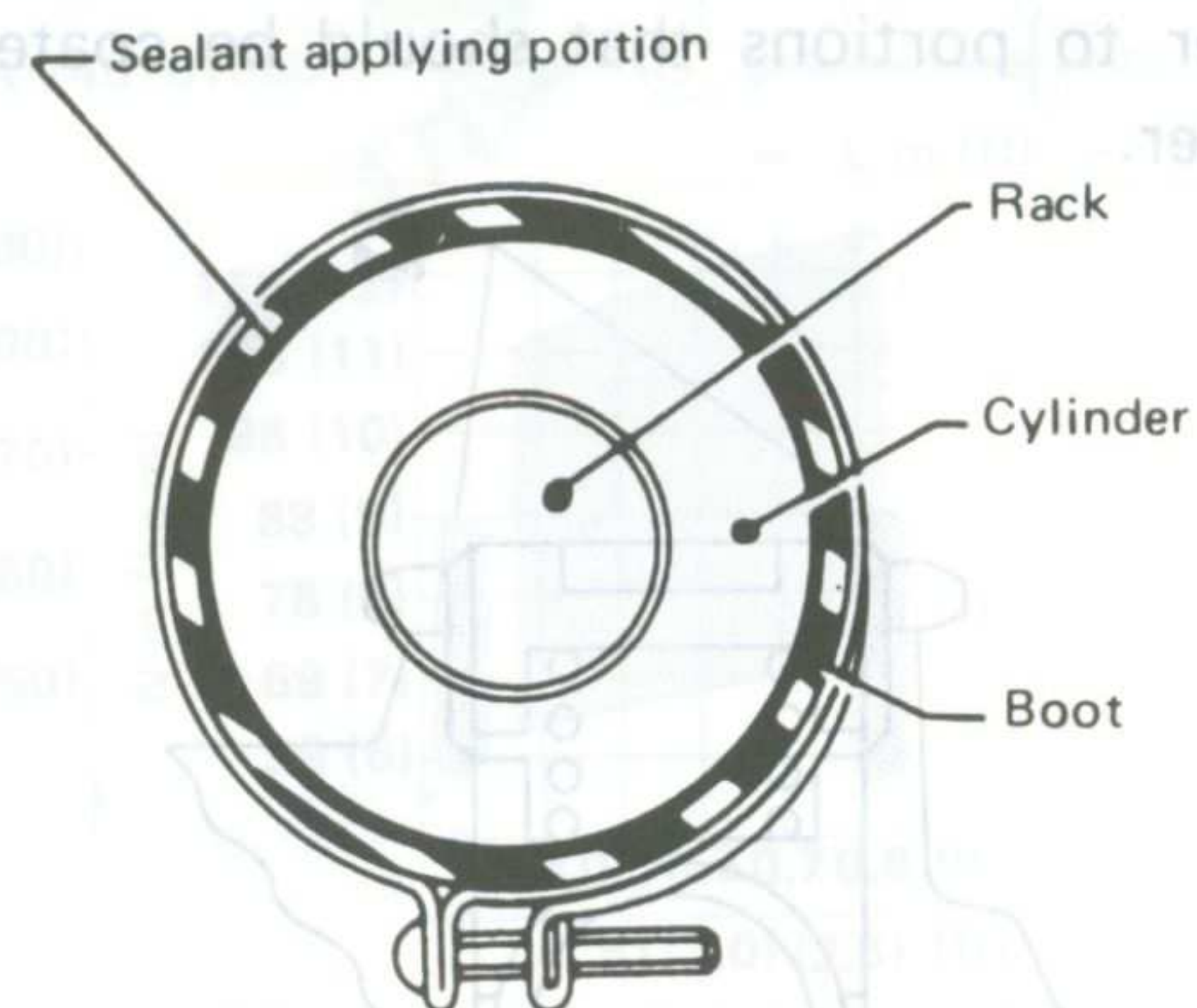
- When installing tie-rod or adjusting toe-in, be careful not to twist boots.
- Toe-in: Refer to MA section.

21. Measure rack stroke.



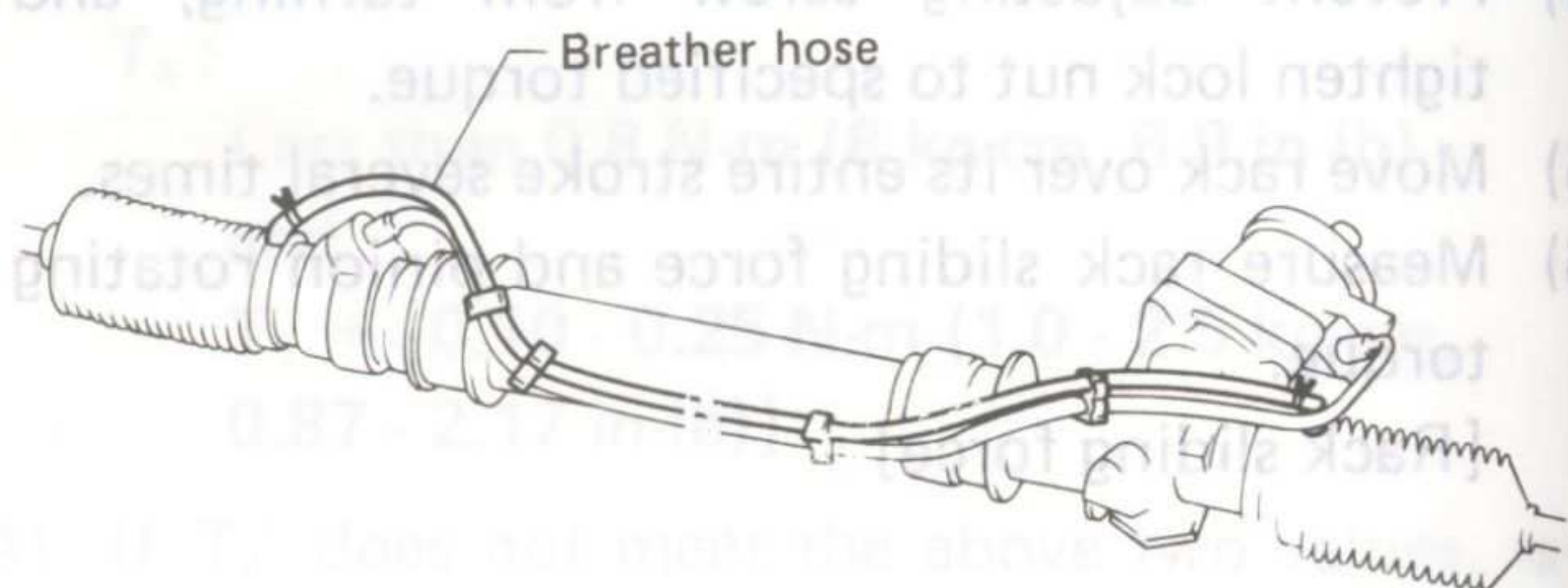
SST223A

22. Apply a coat of sealant to contact surfaces between boot and cylinder before installing boot.



SST888

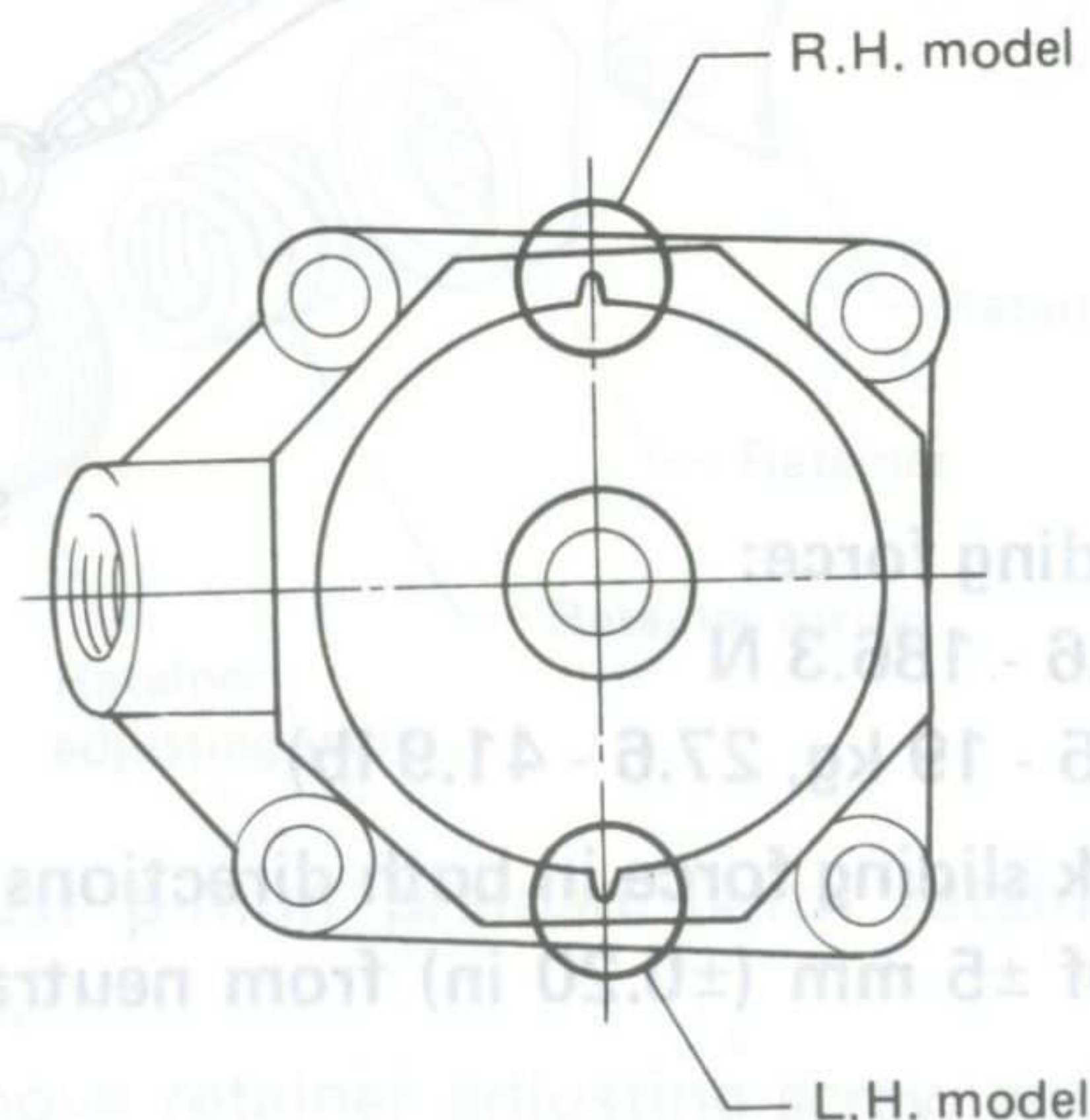
23. Install breather hose.



SST351A

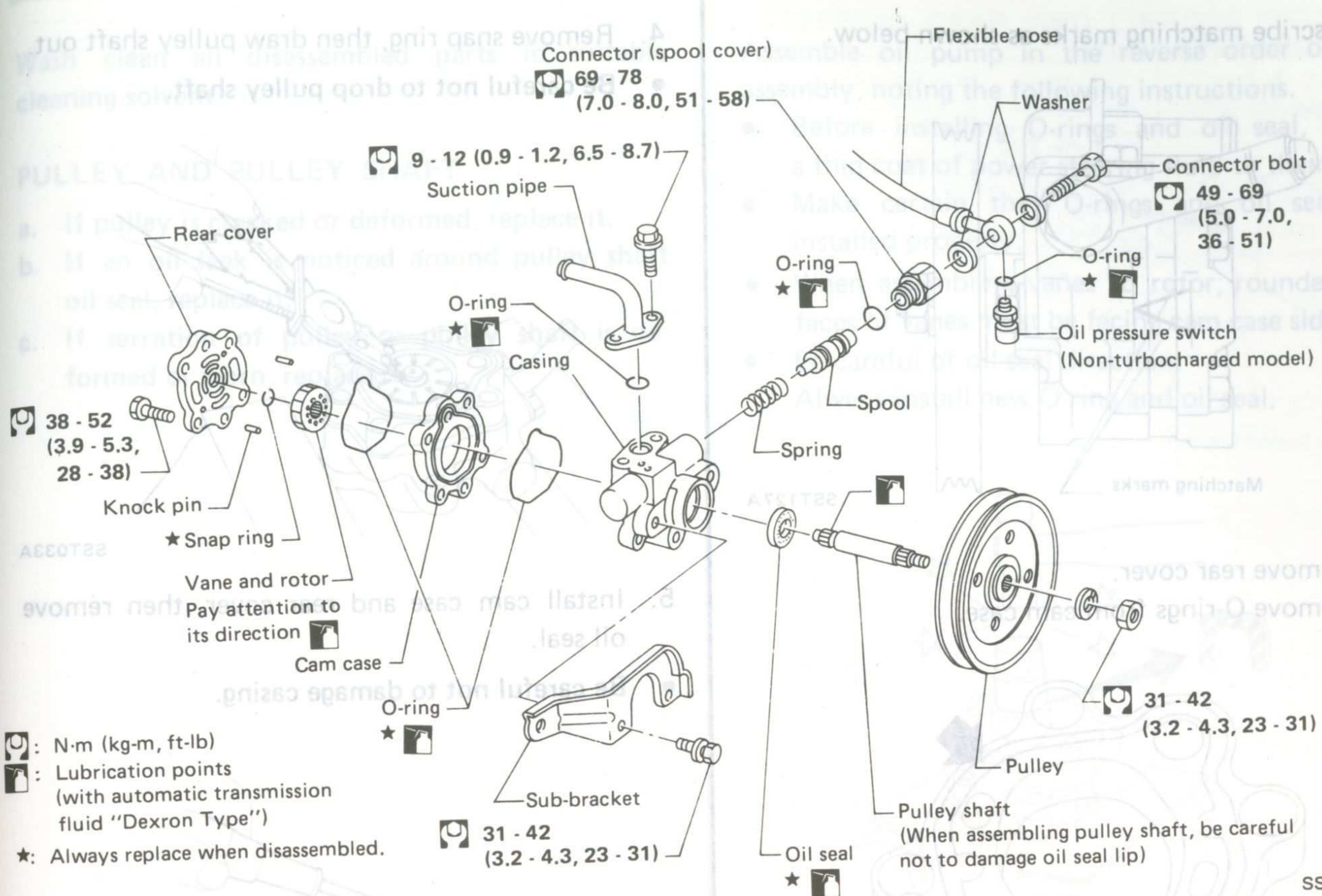
24. Install cylinder tube "R" and "L".

25. Set rear cover cap at neutral position.



SST352A

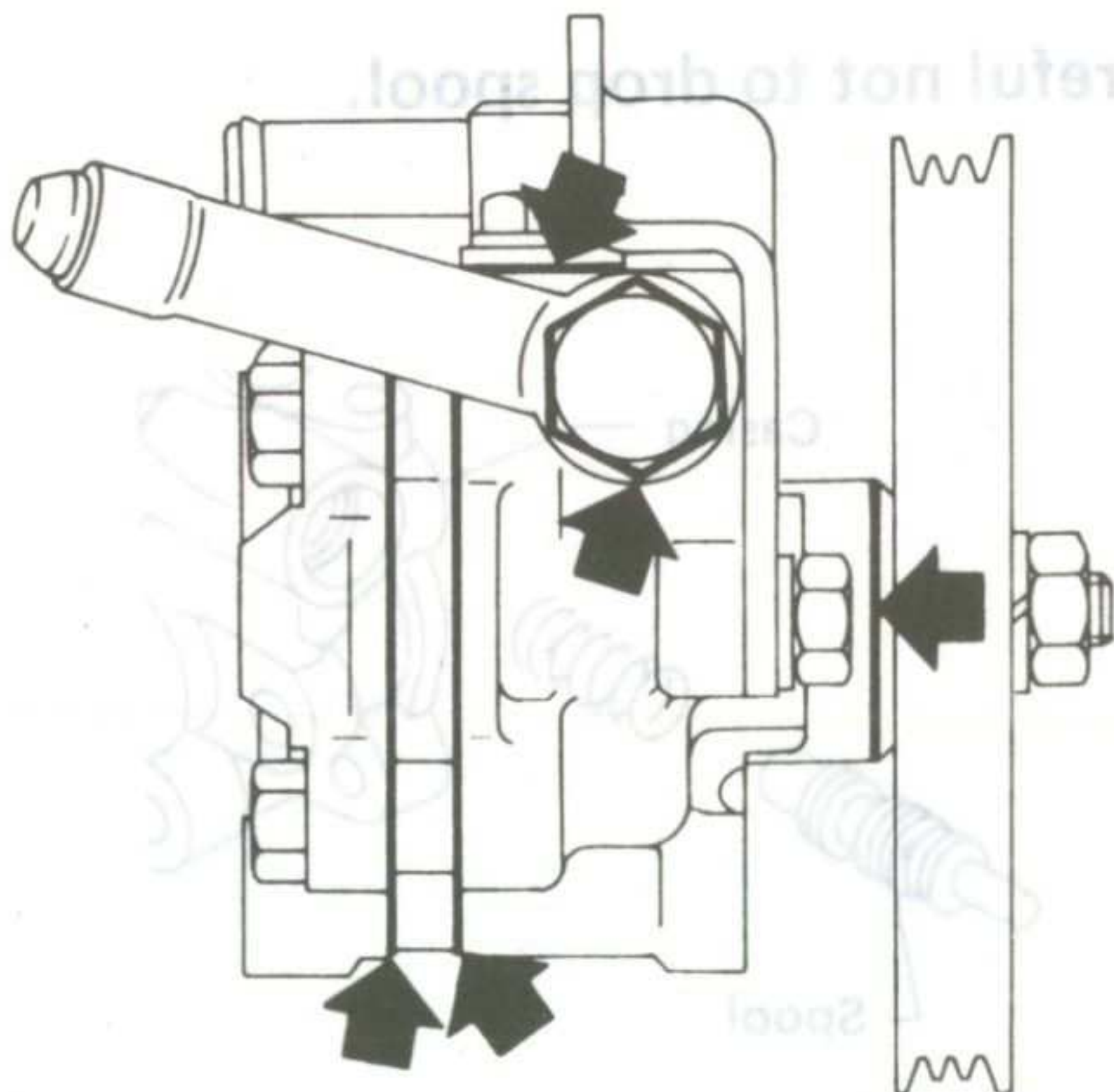
POWER STEERING OIL PUMP



Pre-Disassembly Inspection

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

- Oil leak at any of the following points



- Deformed or damaged pulley

Disassembly

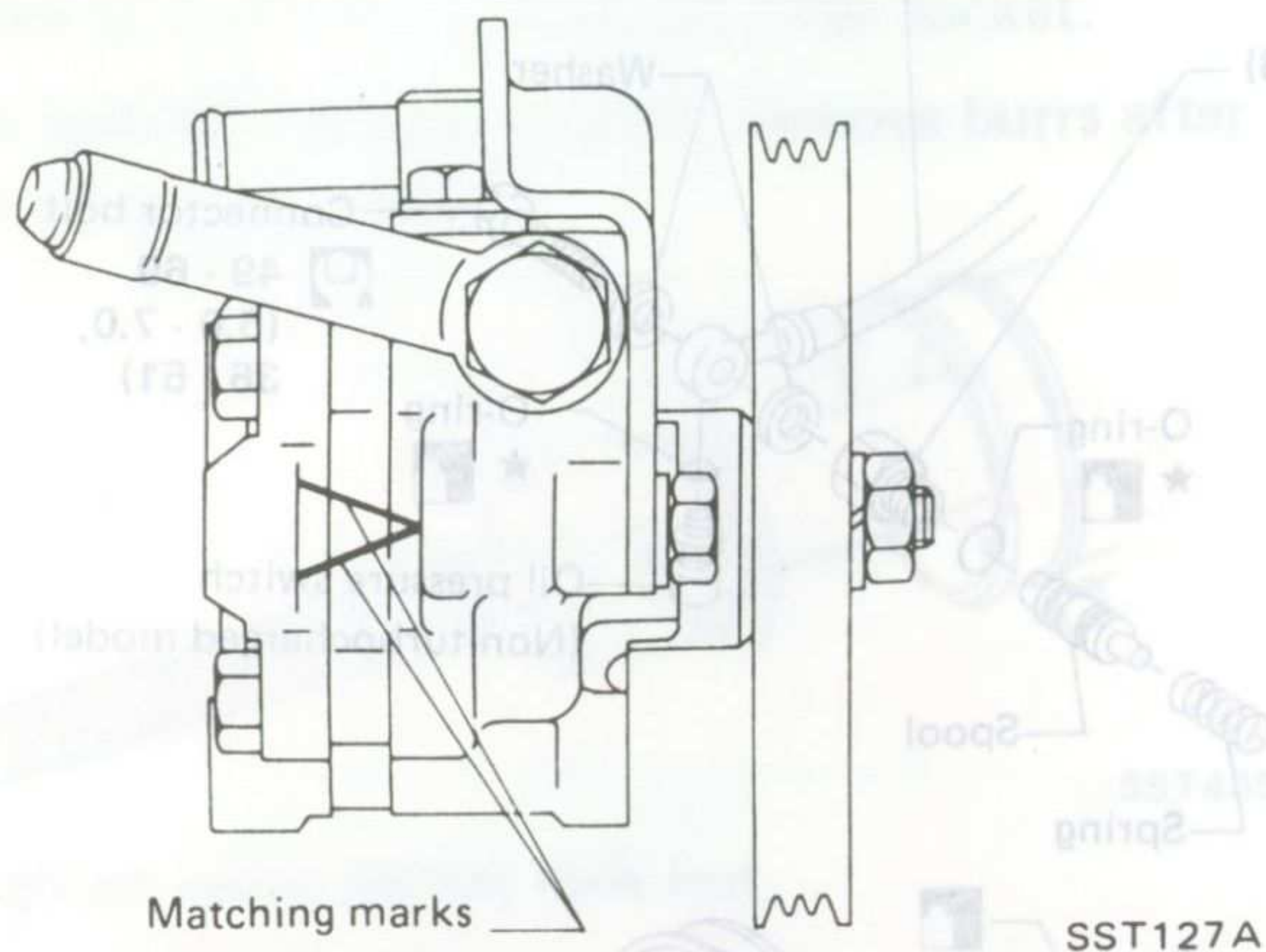
CAUTION:

- 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.
- Do not use a rag. Be sure to use nylon or paper cloth.
- When disassembling and reassembling, do not allow any foreign matter to enter or contact any parts.

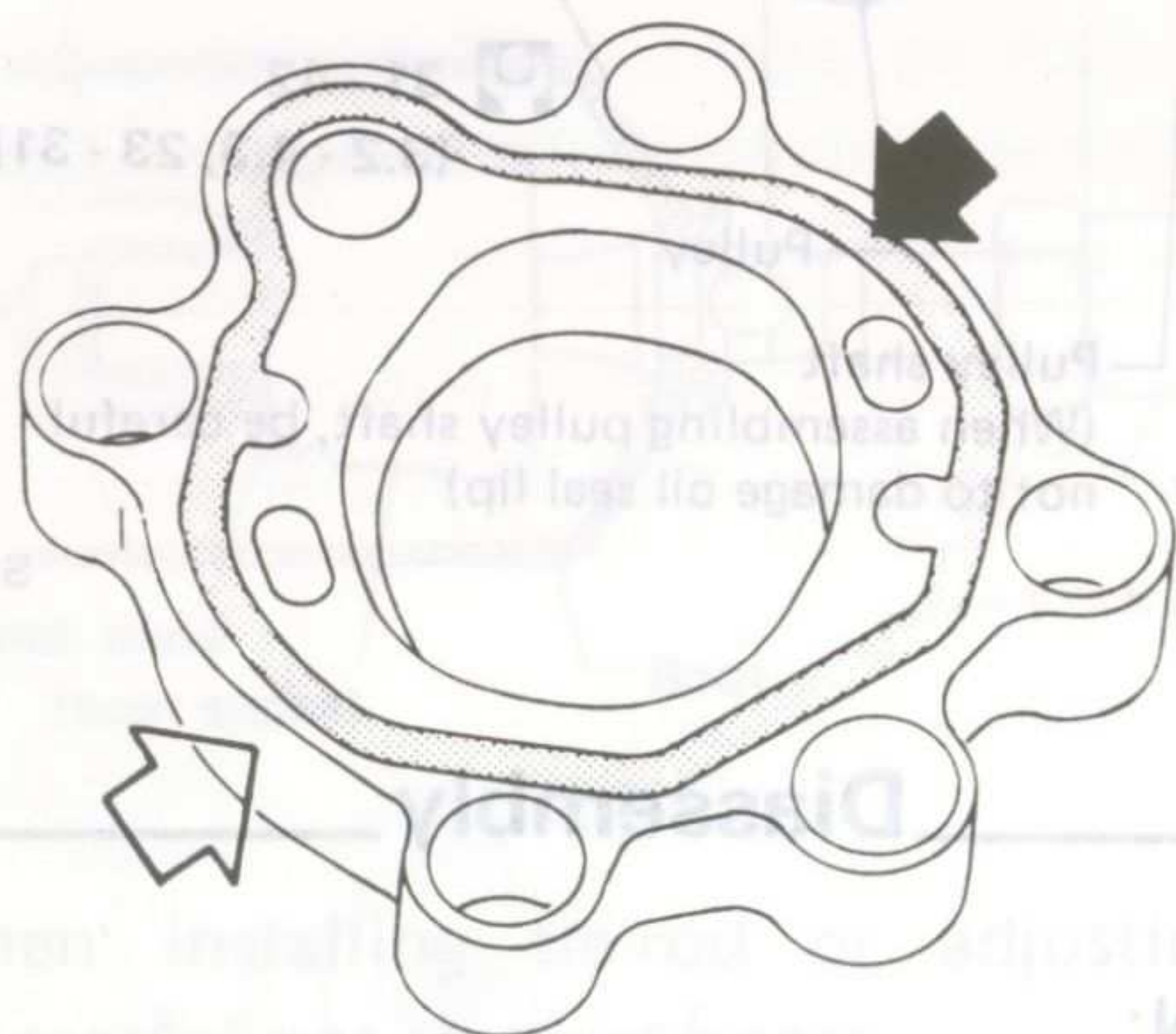
POWER STEERING OIL PUMP

Disassembly (Cont'd)

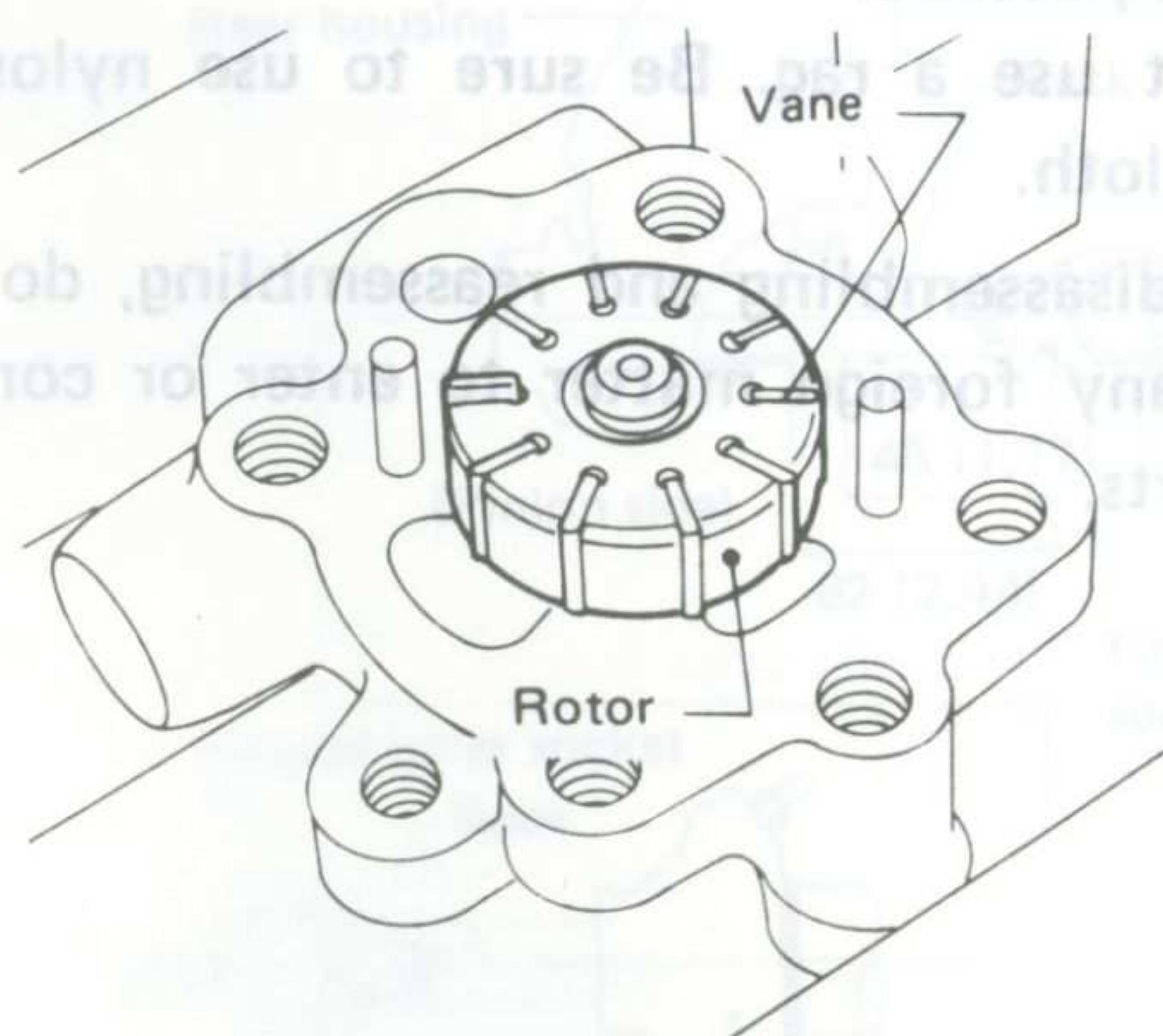
1. Inscribe matching marks as shown below.



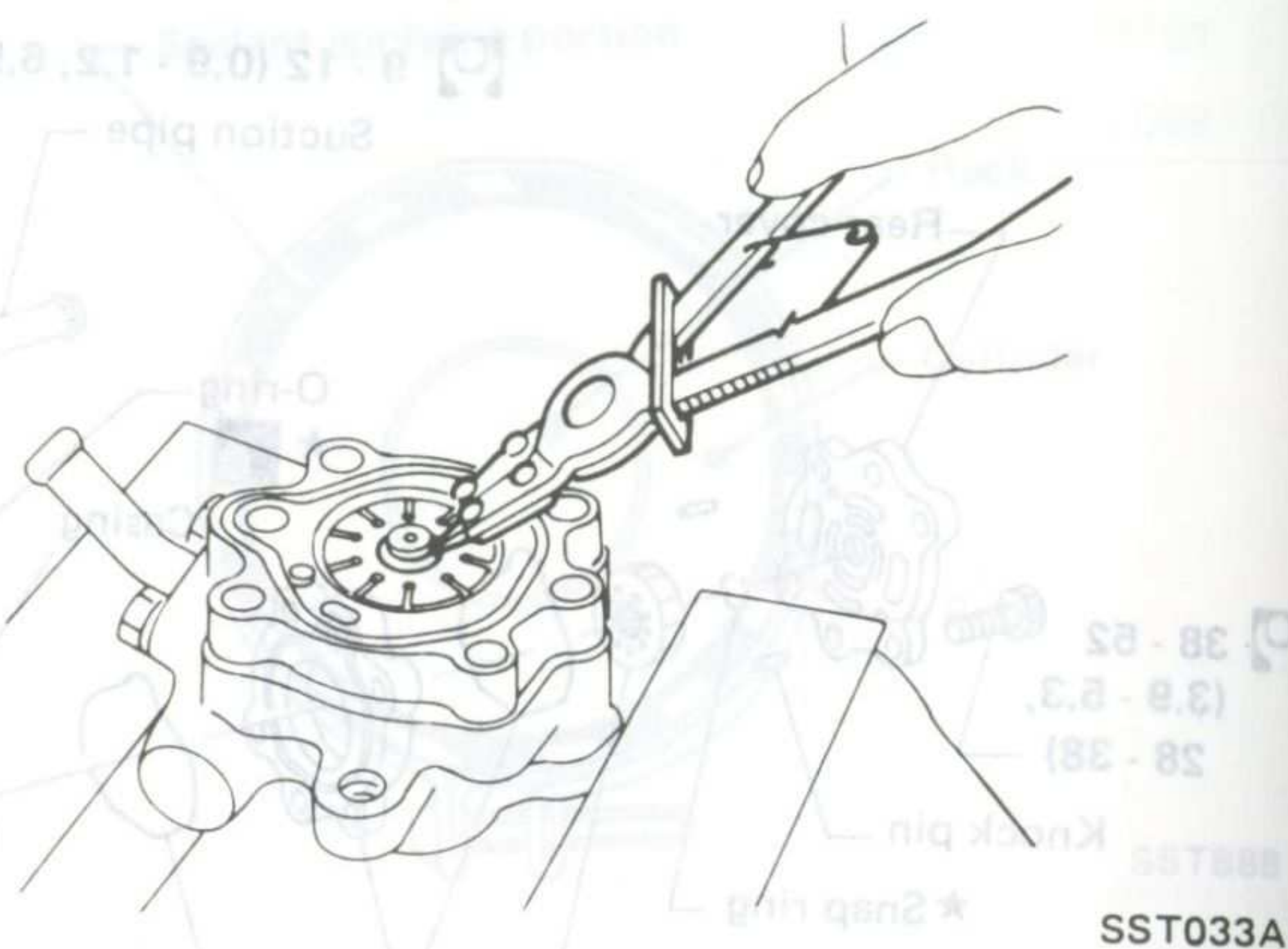
2. Remove rear cover.
3. Remove O-rings from cam case.



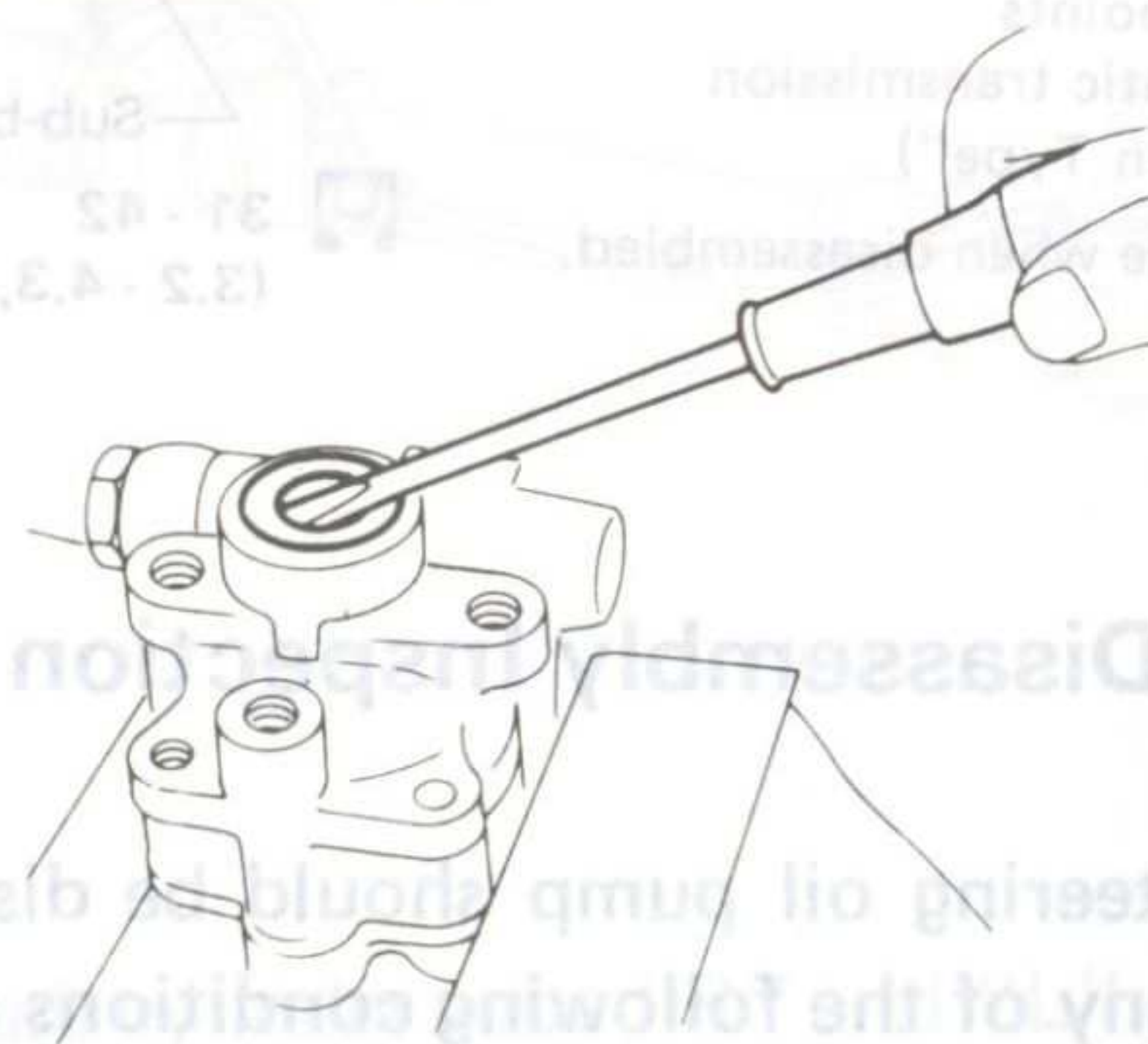
CAUTION:
When removing cam case, be sure that the vane does not come off the rotor.



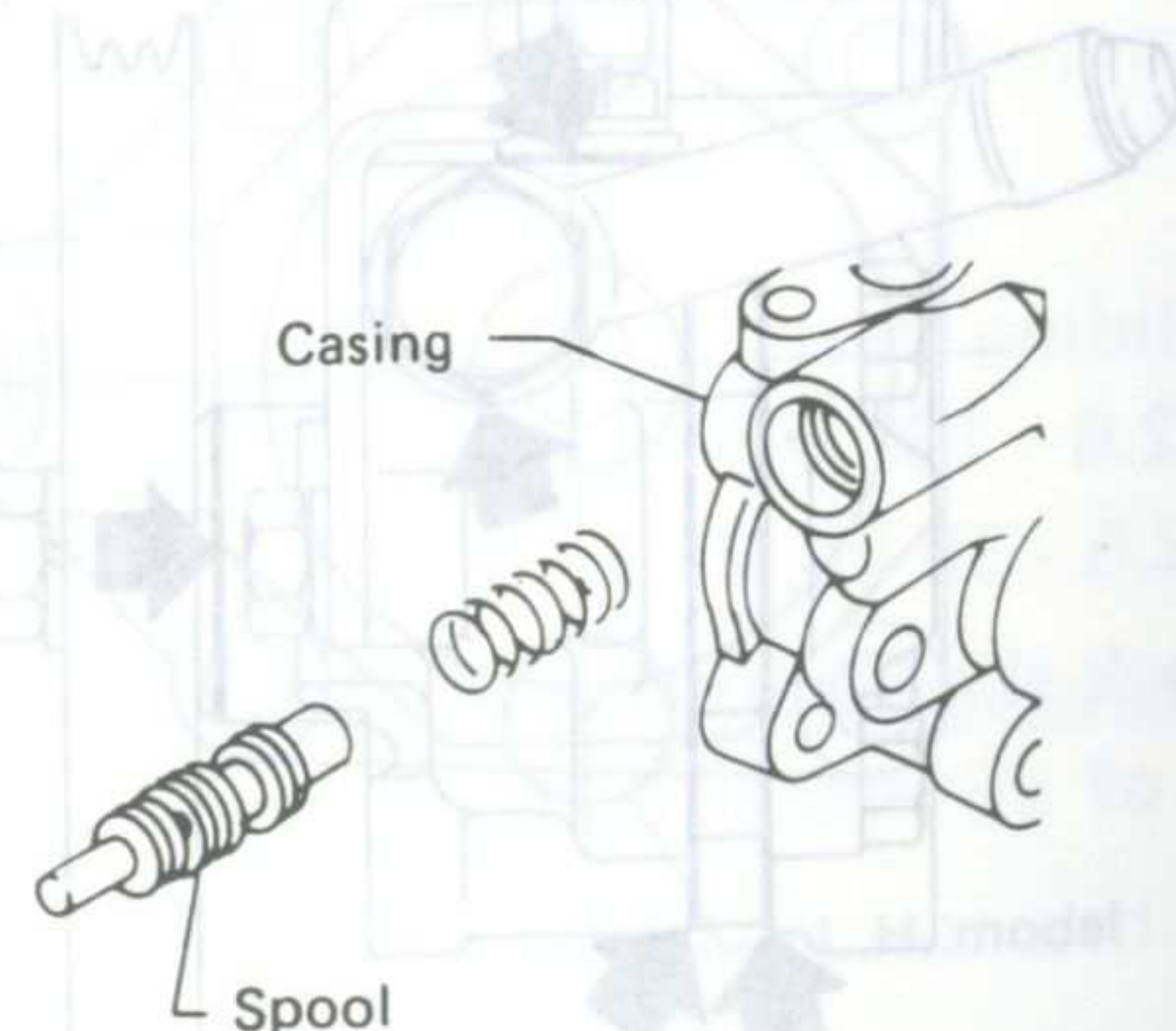
4. Remove snap ring, then draw pulley shaft out.
• Be careful not to drop pulley shaft.



5. Install cam case and rear cover, then remove oil seal.
• Be careful not to damage casing.



6. Remove joint.
• Be careful not to drop spool.



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

POWER STEERING OIL PUMP

Inspection

Wash clean all disassembled parts in suitable cleaning solvent.

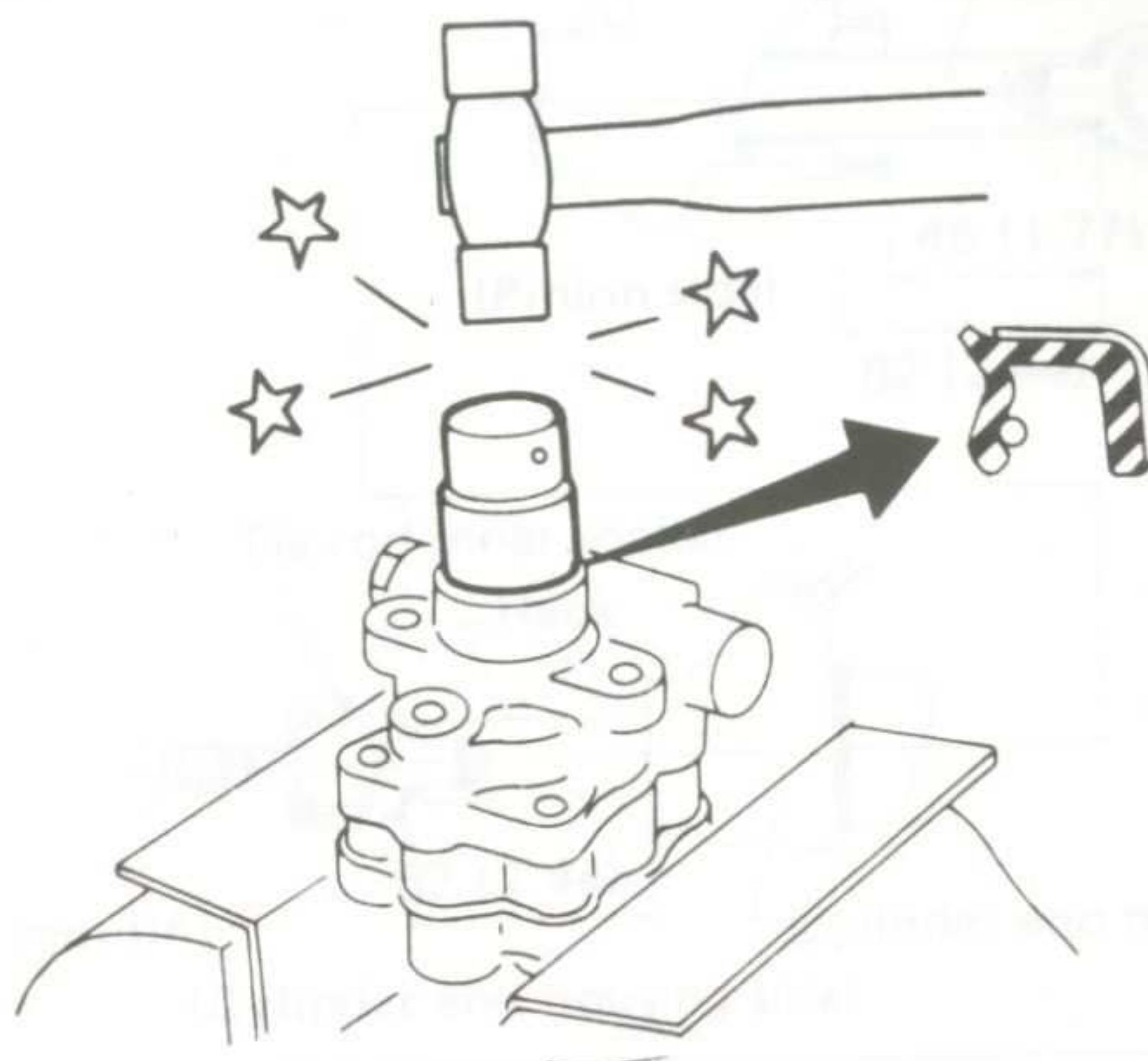
PULLEY AND PULLEY SHAFT

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

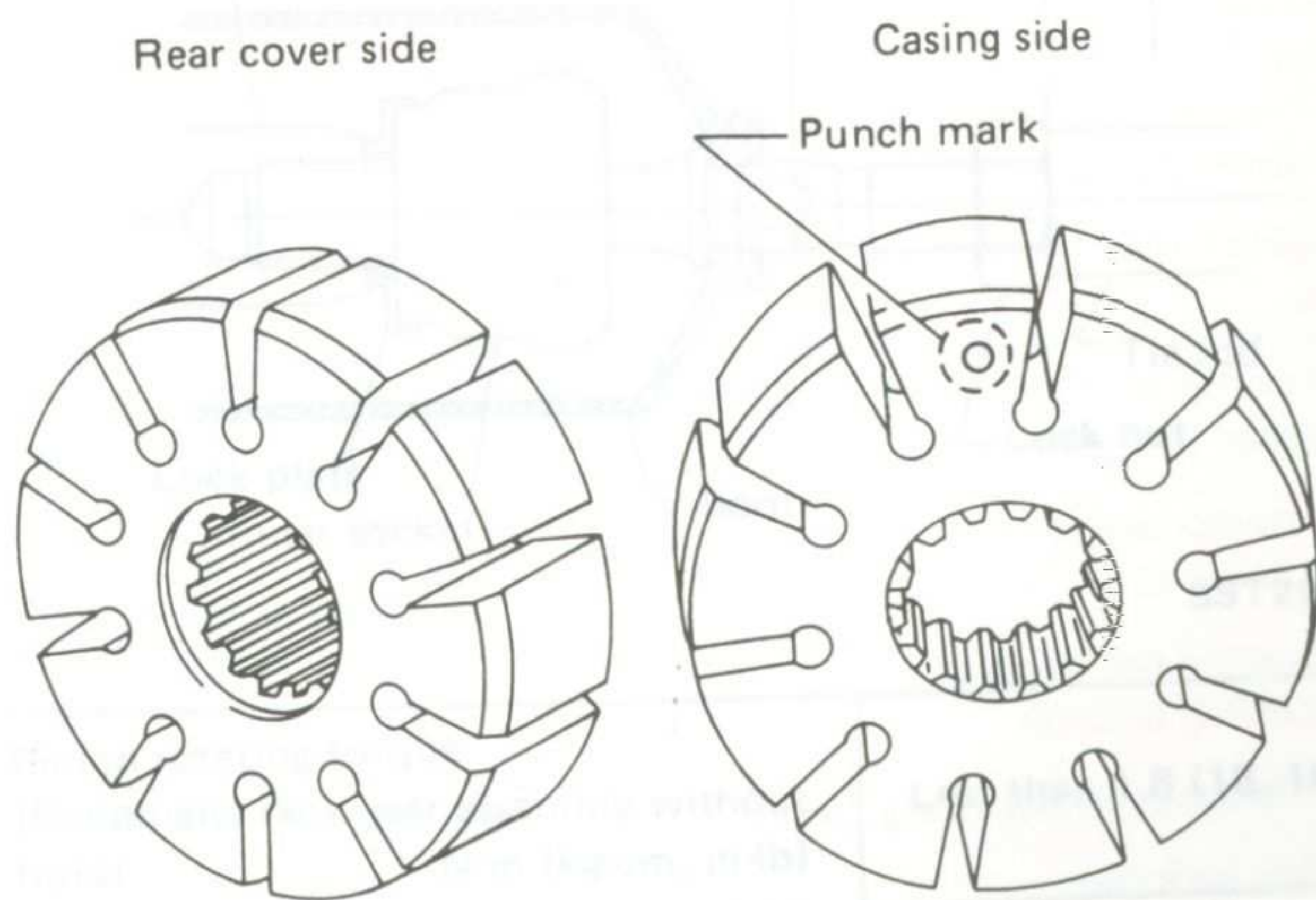
Assembly

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.
 - When assembling vanes to rotor, rounded surfaces of vanes must be facing cam case side.
 - Be careful of oil seal direction.
- Always install new O-ring and oil seal.



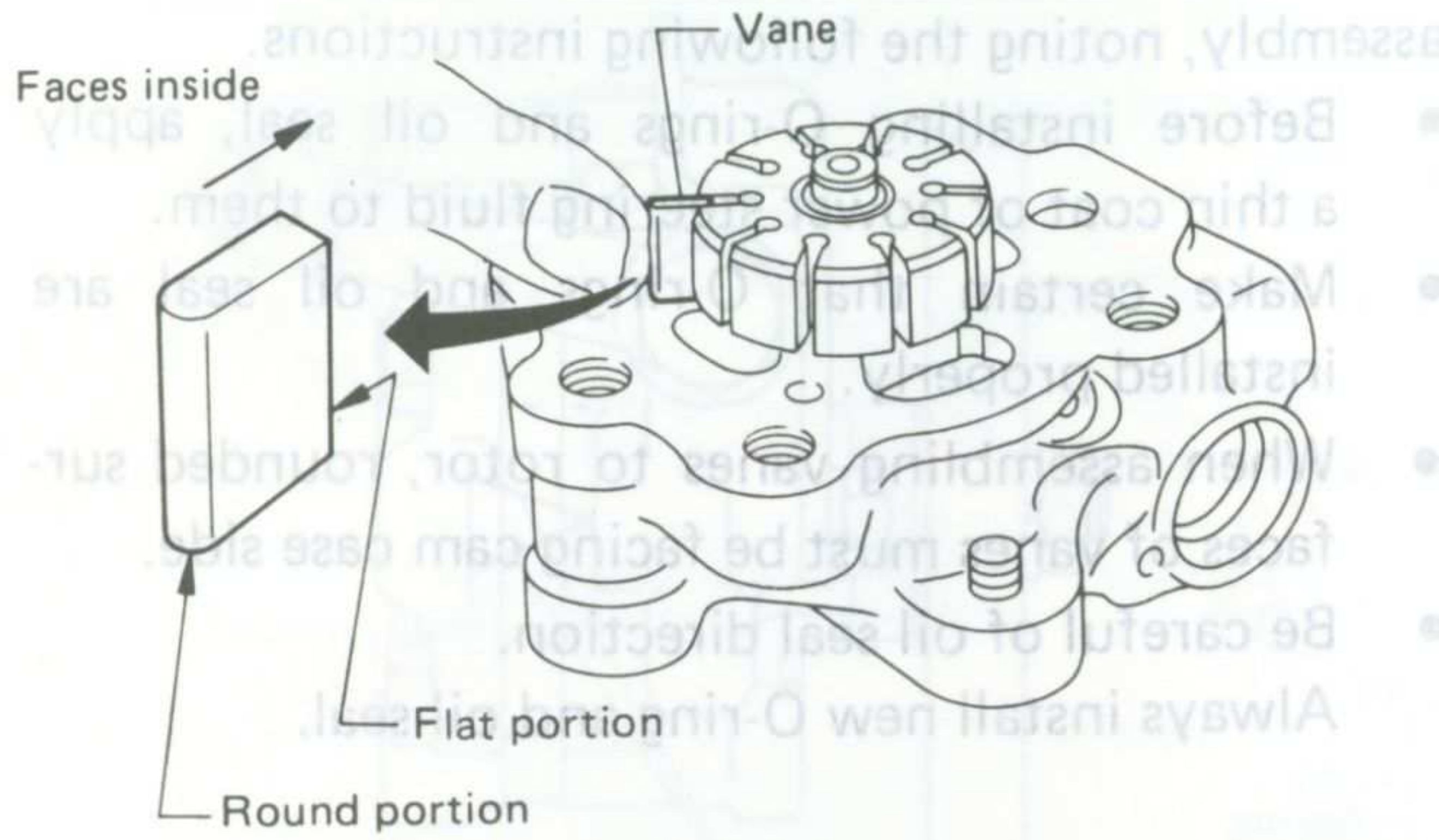
- Pay attention to the direction of rotor.



POWER STEERING OIL PUMP

Assembly (Cont'd)

- Install vanes properly.



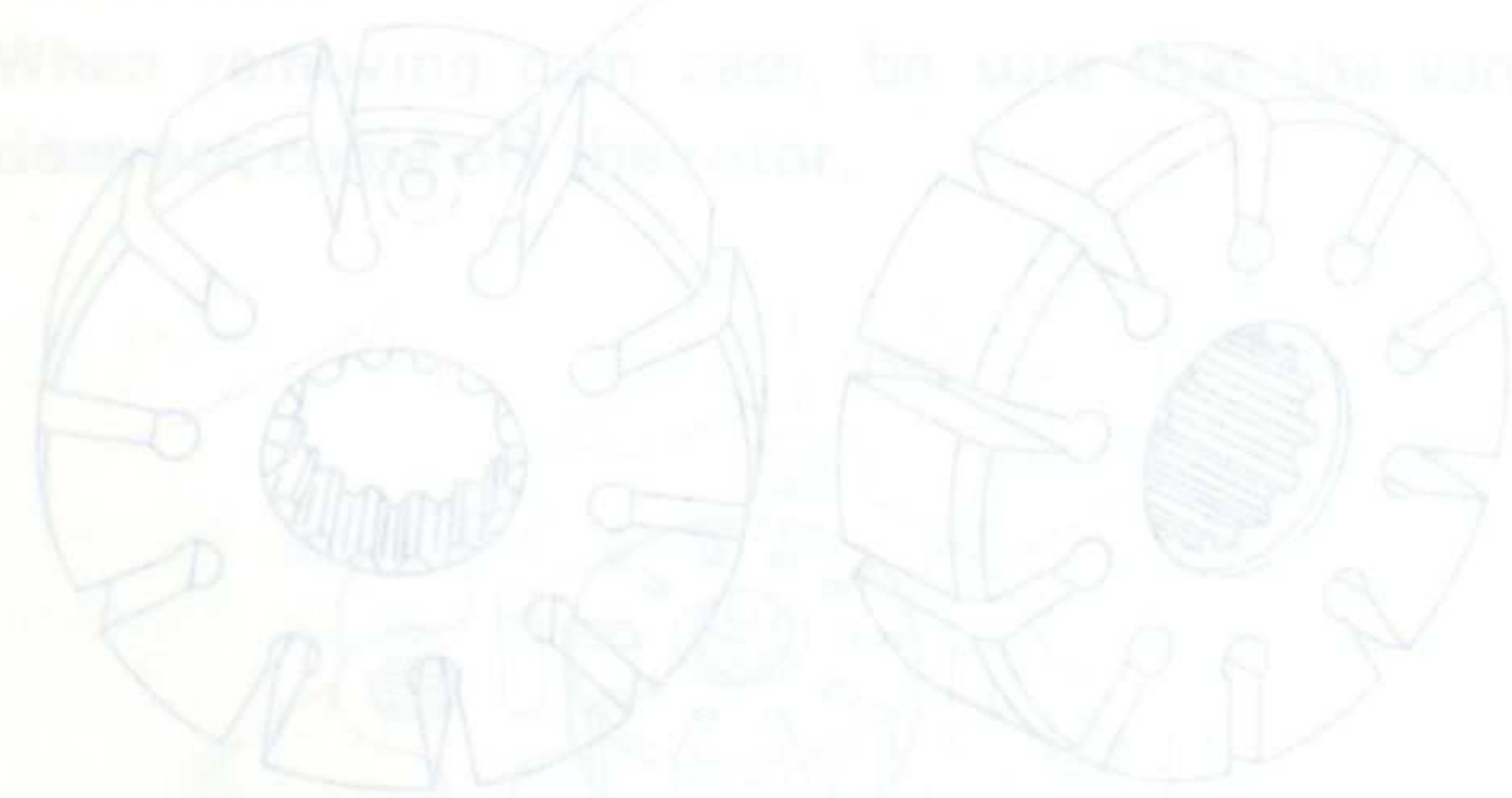
SST290A



- Pay attention to the direction of rotor.

CAUTION: Bear cover side

CAUTION: Bunch mark



SST290A

Rotor

SST290A

Wash clean all disassembled parts in suitable cleaning solvent.

PULLEY AND PULLEY SHAFT

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

SST033A

- Install cam case and rear cover, then remove oil seal.

- Be careful not to damage timing

- Remove pulley.

- Be careful not to damage oil

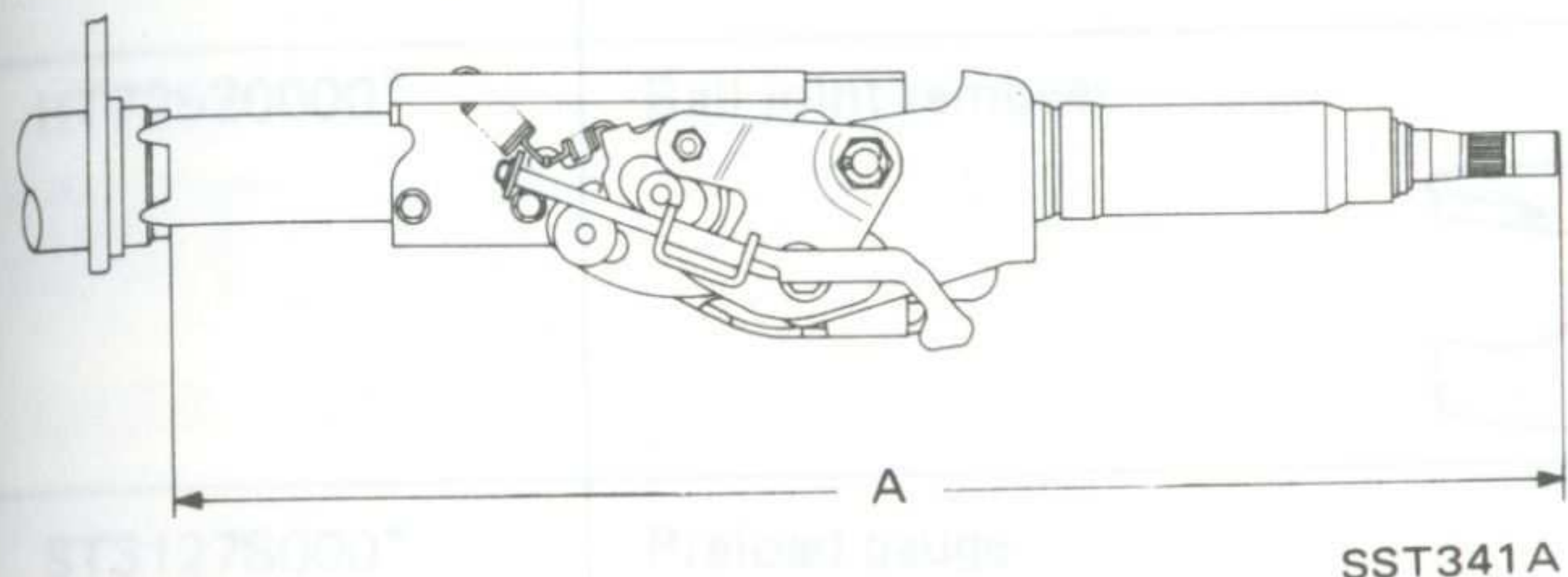
- Remove suction pipe, then remove O-ring.

SERVICE DATA AND SPECIFICATIONS

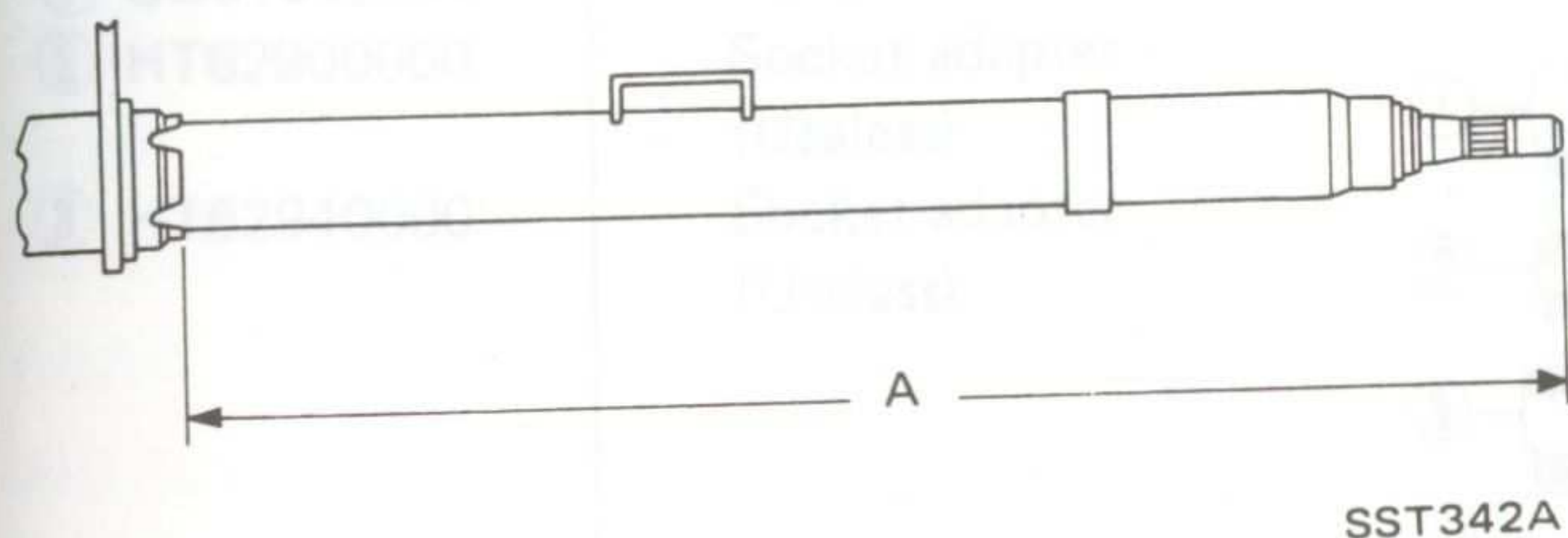
General Specifications

Steering gear type	PR24S [Power steering]
Steering column	Collapsible
Steering column length "A" mm (in)	
Tilt type (With jump-up mechanism)	478.7 - 480.3 (18.85 - 18.91)
Non-tilt type	478.7 - 480.3 (18.85 - 18.91)

Tilt type (with jump-up mechanism)



Non-tilt type



Turn of steering wheel (Lock to lock)	2.8
Steering overall gear ratio	17.1
Power steering fluid	
Type	Automatic transmission fluid "DEXRON type"
Capacity ℓ (Imp qt)	Approx. 0.9 (3/4)
Normal operating temperature °C (°F)	60 - 80 (140 - 176)

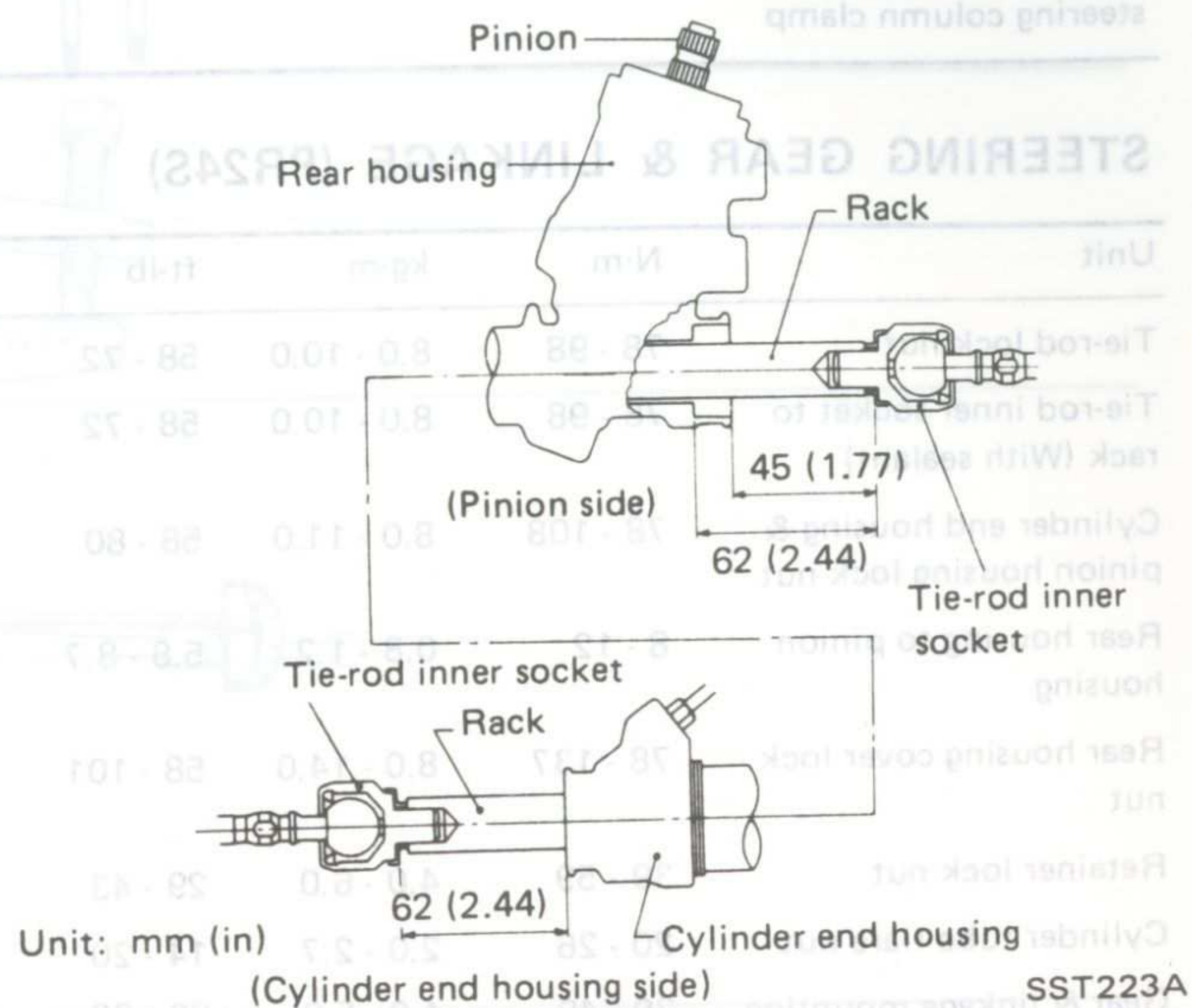
Inspection and Adjustment

GENERAL

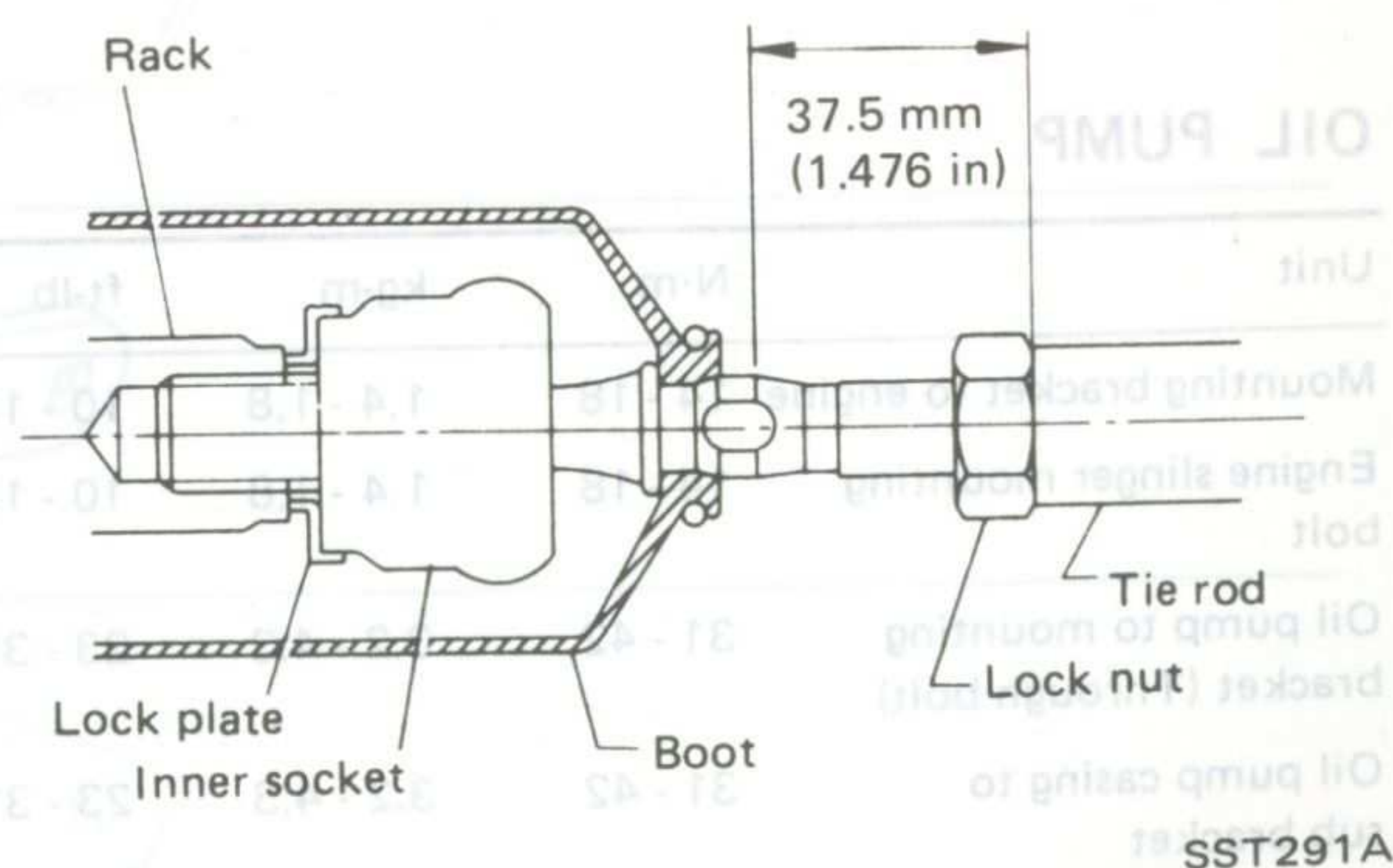
Steering wheel axial play	mm (in)	0 (0)
Steering wheel play	mm (in)	Less than 35 (1.38)
Power steering system		
Steering wheel turning force at 360° position from Neutral	N (kg, lb)	Less than 39.2 (4.0, 8.8)

STEERING GEAR AND LINKAGE (PR24S)

Tie-rod outer ball joint		0.15 - 2.94
Swinging torque N·m (kg-cm, in-lb)		(1.5 - 30, 1.3 - 26.0)
Tie-rod inner ball joint		1.0 - 7.8
Swinging torque N·m (kg-cm, in-lb)		(10 - 80, 8.7 - 69.4)
Axial play	mm (in)	0 (0)
Rack stroke		



Tie-rod standard length



Pinion rotating torque (Pinion and rack gear assembly without fluid)	N·m (kg-cm, in-lb)	Less than 1.8 (18, 16)
Rack starting force at steering center (Pinion and rack gear assembly without fluid)	N (kg, lb)	122.6 - 186.3 (12.5 - 19, 27.6 - 41.9)

SERVICE DATA AND SPECIFICATIONS

Tightening Torque

STEERING COLUMN

Unit	N·m	kg-m	ft-lb
Steering wheel nut	49 - 59	5.0 - 6.0	36 - 43
Steering column to body	9 - 14	0.9 - 1.4	6.5 - 10.1
Hole cover to dash panel	3 - 5	0.3 - 0.5	2.2 - 3.6
Column joint fixing bolt (Lower joint, column set)	32 - 38	3.3 - 3.9	24 - 28
Jacket lower tube to steering column clamp	3.4 - 4.4	0.35 - 0.45	2.5 - 3.3

STEERING GEAR & LINKAGE (PR24S)

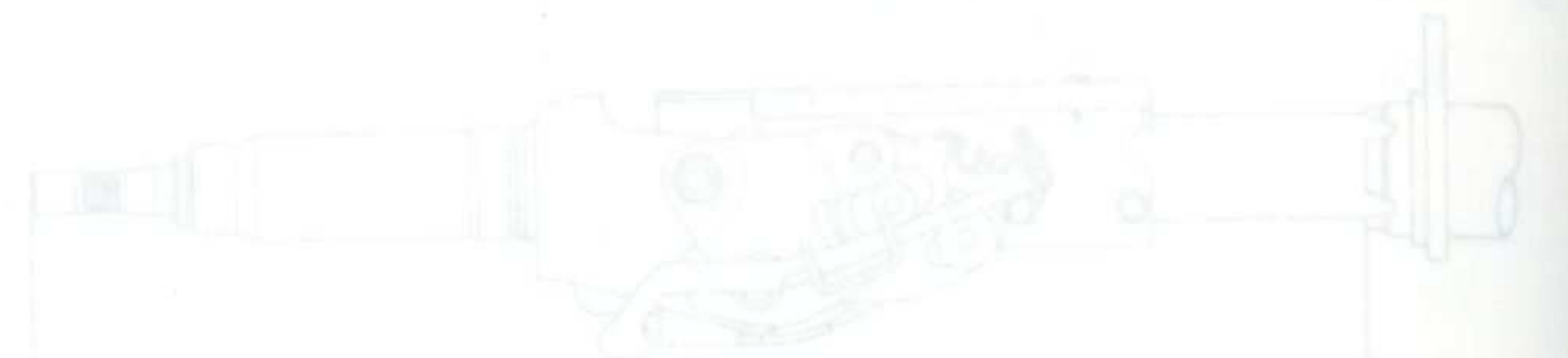
Unit	N·m	kg-m	ft-lb
Tie-rod lock nut	78 - 98	8.0 - 10.0	58 - 72
Tie-rod inner socket to rack (With sealant)	78 - 98	8.0 - 10.0	58 - 72
Cylinder end housing & pinion housing lock nut	78 - 108	8.0 - 11.0	58 - 80
Rear housing to pinion housing	8 - 12	0.8 - 1.2	5.8 - 8.7
Rear housing cover lock nut	78 - 137	8.0 - 14.0	58 - 101
Retainer lock nut	39 - 59	4.0 - 6.0	29 - 43
Cylinder tube flare nut	20 - 26	2.0 - 2.7	14 - 20
Gear & linkage mounting	39 - 49	4.0 - 5.0	29 - 36
Tie-rod to knuckle arm	54 - 98	5.5 - 10.0	40 - 72

OIL PUMP

Unit	N·m	kg-m	ft-lb
Mounting bracket to engine	14 - 18	1.4 - 1.8	10 - 13
Engine slinger mounting bolt	14 - 18	1.4 - 1.8	10 - 13
Oil pump to mounting bracket (Through bolt)	31 - 42	3.2 - 4.3	23 - 31
Oil pump casing to sub bracket	31 - 42	3.2 - 4.3	23 - 31
Adjusting bar bracket to mounting bracket	16 - 21	1.6 - 2.1	12 - 15
Sub bracket to adjusting bar	16 - 21	1.6 - 2.1	12 - 15
Pulley lock nut	31 - 42	3.2 - 4.3	23 - 31
Rear cover fixing bolt	38 - 52	3.9 - 5.3	28 - 38
Connector (Spool cover)	69 - 78	7.0 - 8.0	51 - 58
Suction pipe to casing	9 - 12	0.9 - 1.2	6.5 - 8.7

Steering gear type	PR24S (Power steering)
Steering column	Collapsible
Steering column length "A" mm (in)	478.5 - 480.3 (18.82 - 18.91)
Tilt type (With jump-up mechanism)	Non-tilt type
Non-tilt type	478.5 - 480.3 (18.82 - 18.91)

Tilt type (with jump-up mechanism)



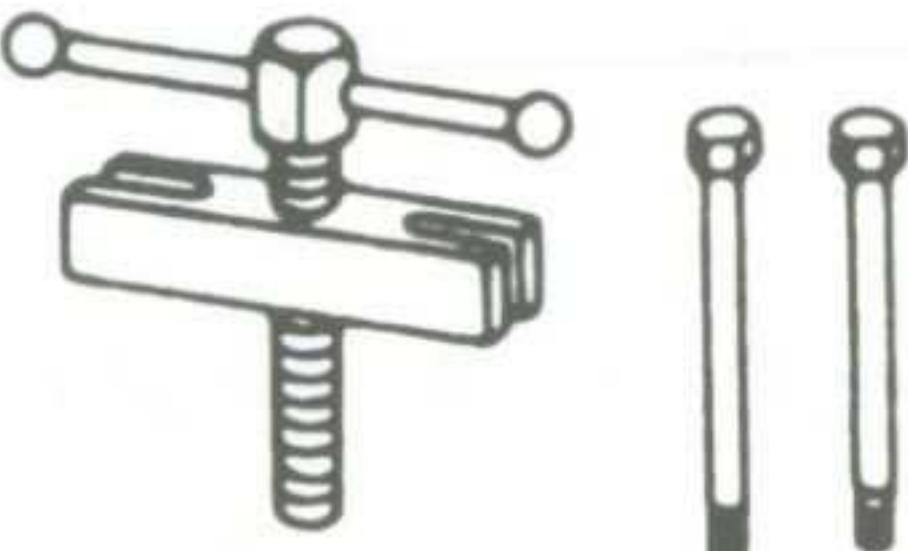
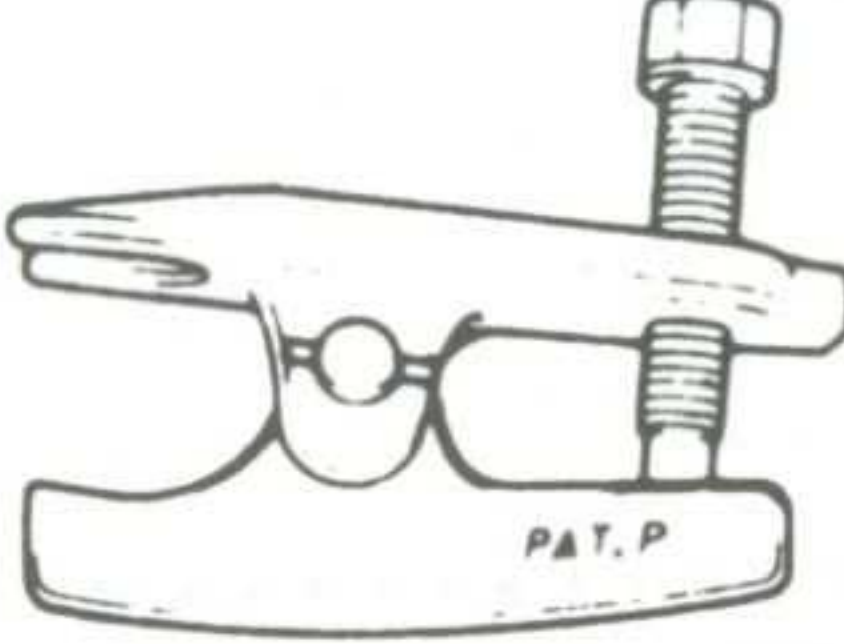
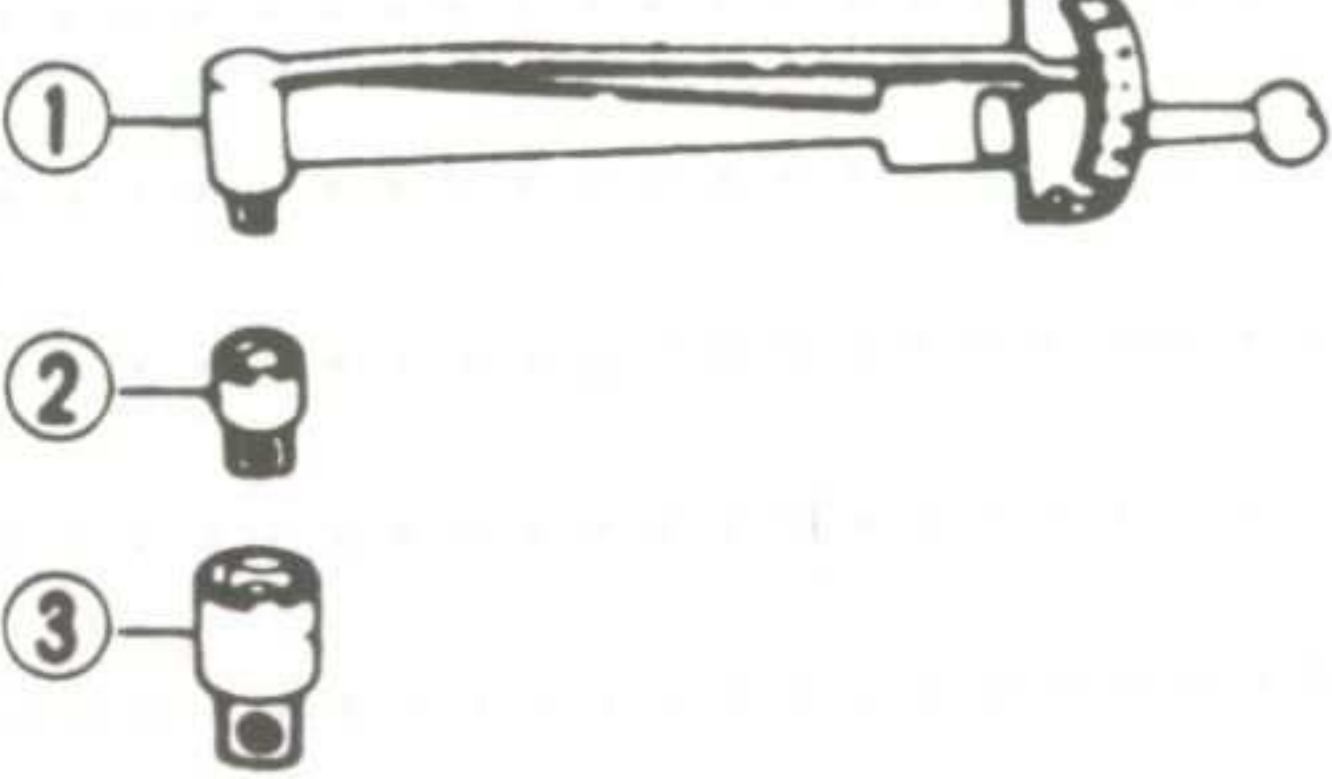
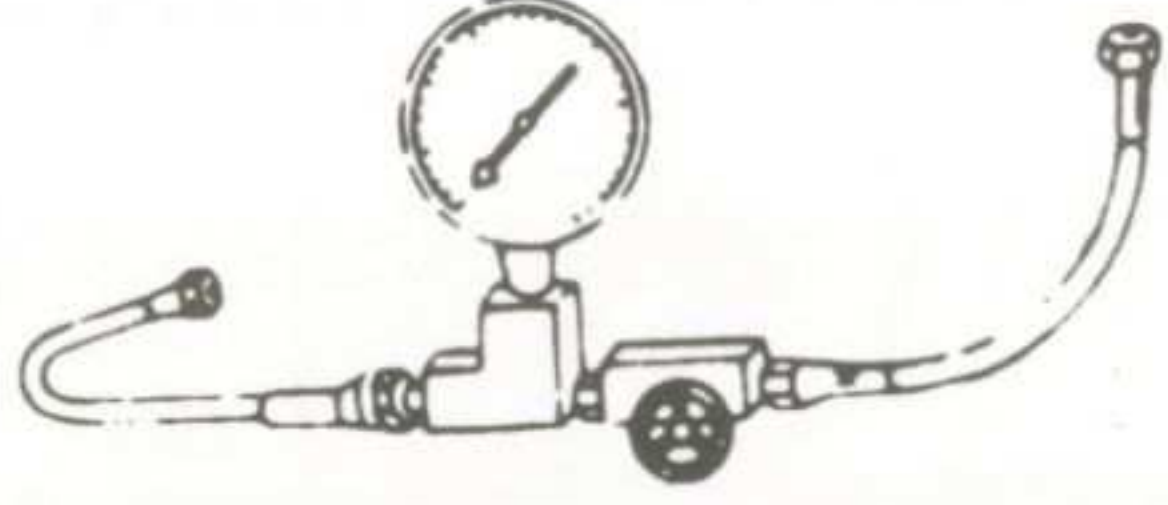
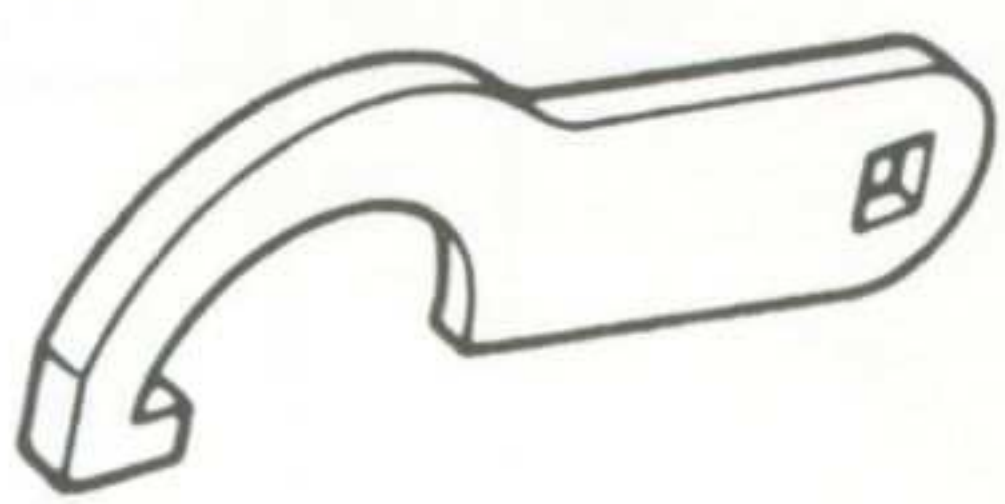
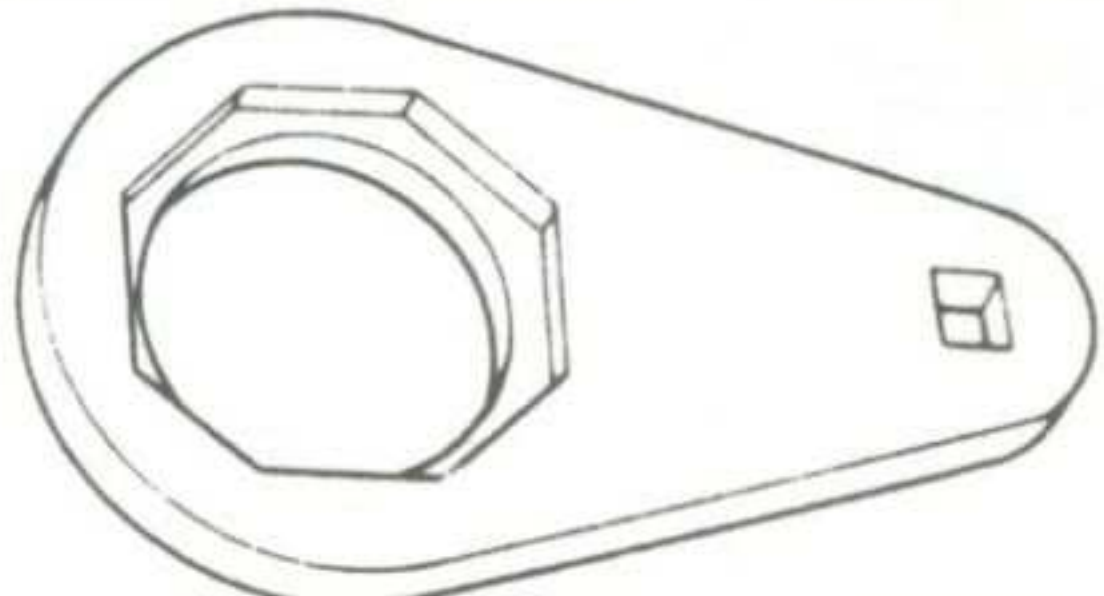
Turn of steering wheel (Lock to lock)	2.8
Steering overall gear ratio	13.1
Power steering fluid	Automatic transmission fluid "DEXRON type"
Type	
Capacity	6 (imp qt)
Normal operating temperature	60 - 80 (140 - 176) °C (°F)

Inspection and Adjustment

Steering wheel axial play	mm (in)	0 (0)
Steering wheel play	mm (in)	Less than 35 (1.38)
Power steering system Steering wheel turning force at 360° position from Neutral	N (kg, lb)	Less than 38.3 (4.0, 8.8)

SPECIAL SERVICE TOOLS

*: Special tool or a commercial equivalent

Tool number	Tool name	
ST27180001*	Steering wheel puller	
HT72520000*	Ball joint remover	
ST3127S000* ① GG91030000 ② HT62900000 ③ HT62940000	Preload gauge Torque wrench Socket adapter (Useless) Socket adapter (Useless)	
ST27091000*	Pressure gauge	
KV48102300	Cylinder lock nut wrench	
KV48101600	Rear housing lock nut wrench	
KV48101700	Rear cover wrench	
KV48103100	Oil seal drift	