

STEERING

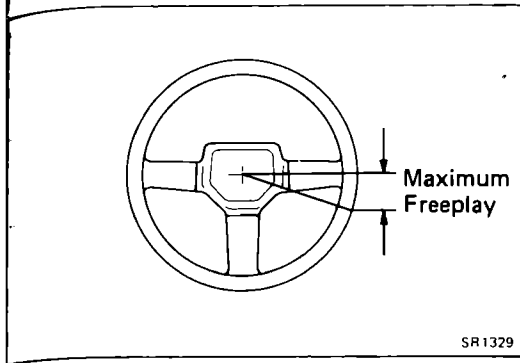
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PRECAUTIONS

Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Hard steering	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Insufficient lubricant linkage	Lubricate suspension and steering	
	Excessive caster	Check front end alignment	FA-3
	Steering system joint worn	Replace steering system joints	SR-56
	Lower arm ball joints worn	Replace lower arm ball joints	FA-49
	Steering column binding	Inspect steering column	SR-4
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-56
	Power steering belt loose	Adjust belt	SR-39
	Fluid level in reservoir low	Check reservoir	SR-39
	Power steering unit faulty	Check power steering unit	SR-39
Poor return	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Insufficient lubricant	Lubricate suspension and steering linkage	
	Wheel alignment incorrect	Check front end alignment	FA-3
	Steering column binding	Inspect steering column	SR-4
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-56
Excessive play	Front wheel bearing worn	Replace front wheel bearing	FA-7
	Main shaft yoke or intermediate shaft yoke worn	Replace main shaft or intermediate shaft	SR-5,8,21
	Lower arm ball joints worn	Replace lower arm ball joints	FA-49
	Steering system joints worn	Replace steering system joint	SR-56
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-56
Abnormal noise	Steering linkage loose	Tighten steering linkage	
	Steering system joints worn	Replace steering system joints	SR-56
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-56



ON-VEHICLE INSPECTION

1. CHECK THAT STEERING WHEEL FREEPLAY IS CORRECT

With the vehicle stopped and tires pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure. Freeplay should not exceed the maximum limit.

Maximum play: 30 mm (1.18 in.)

If incorrect, repair.

2. CHECK STEERING LINKAGE AND GEAR HOUSING

(a) Check the steering linkage for looseness or damage.

Check that:

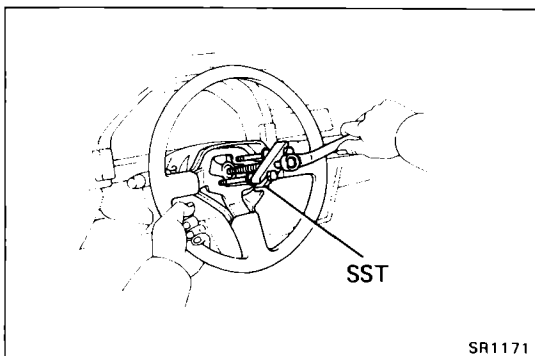
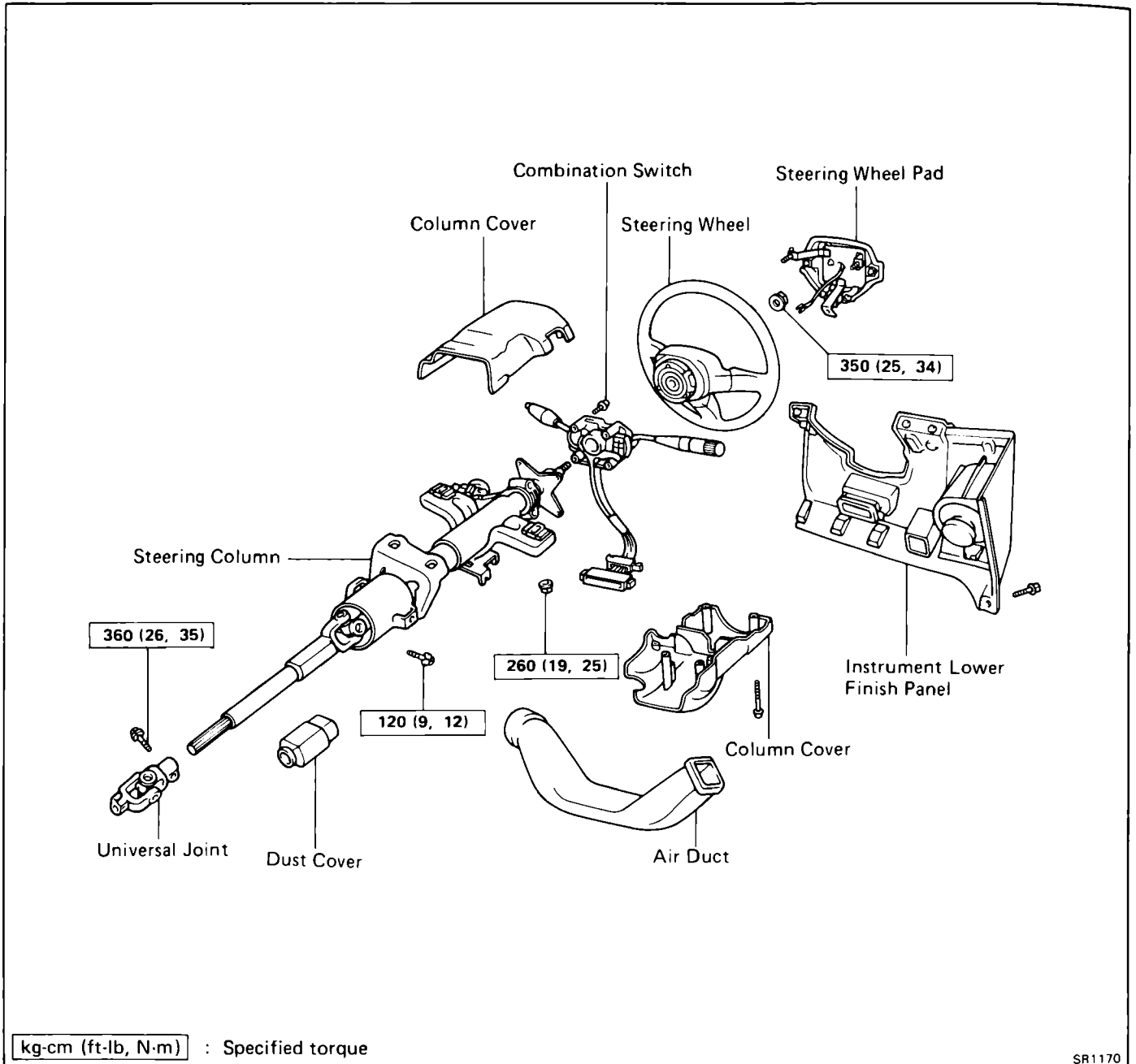
- Tie rod ends do not have excessive play.
- Boots are not damaged.
- Boot clamps are not loose.

(b) Check gear housing for grease leakage or oozing.

STEERING COLUMN

REMOVAL AND INSTALLATION OF STEERING COLUMN

Remove and install the parts as shown.



(MAIN POINT OF REMOVAL AND INSTALLATION)

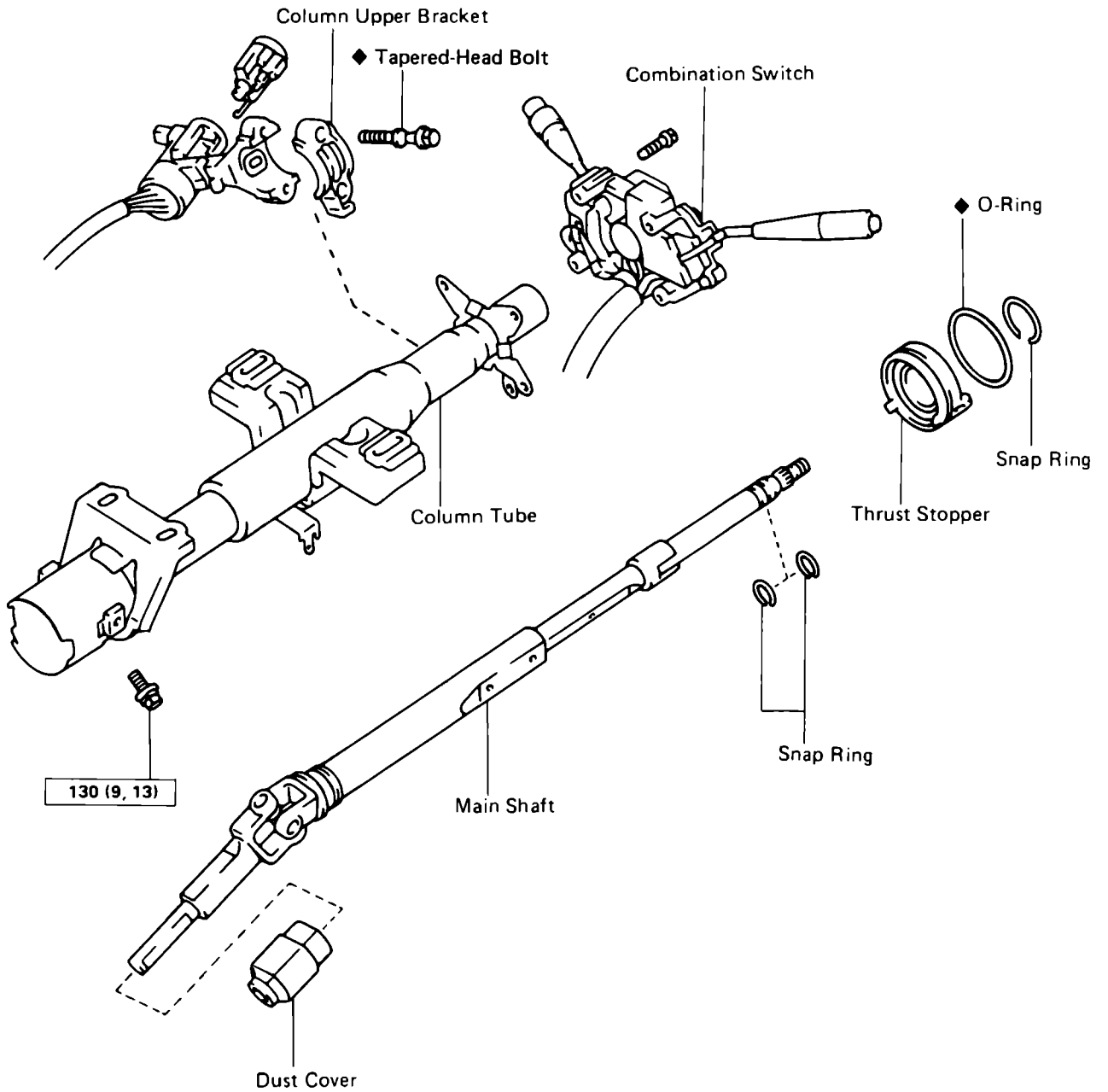
1. REMOVE STEERING WHEEL

- Remove a screw and the steering wheel pad.
- Remove the steering wheel nut.
- Using SST, remove the steering wheel.

SST 09609-20011

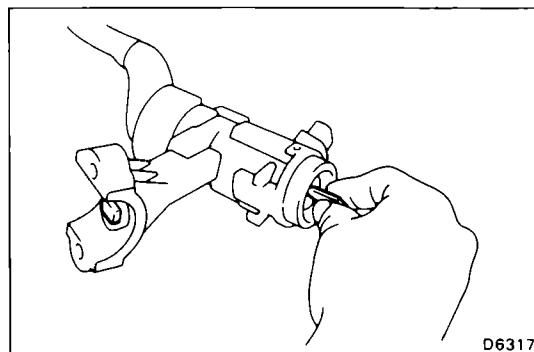
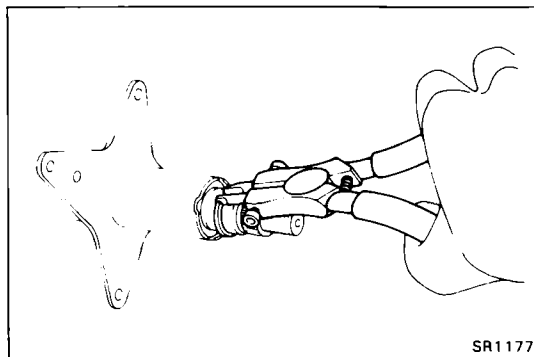
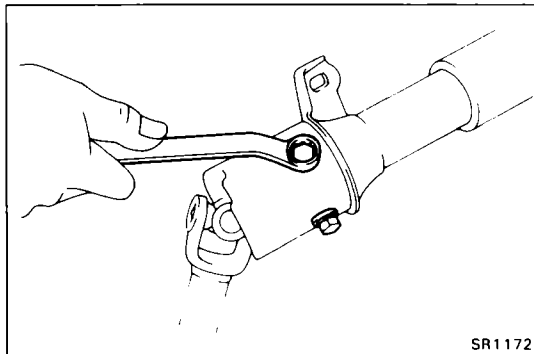
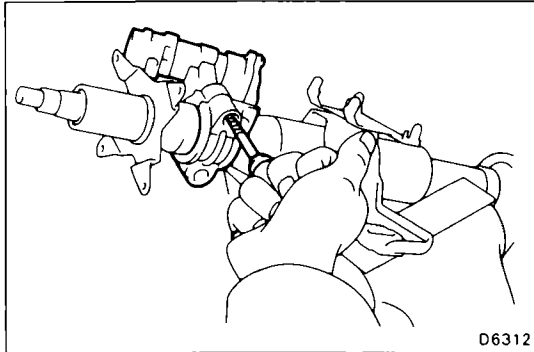
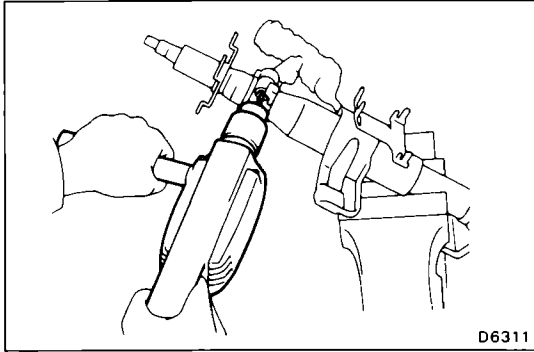
2. CHECK STEERING WHEEL CENTER POINT AFTER INSTALLING STEERING COLUMN

Non-Tilt Steering Column COMPONENTS



kg-cm (ft-lb, N-m) : Specified torque

◆ Non-reusable part



DISASSEMBLY OF NON-TILT STEERING COLUMN (See page SR-5)

1. REMOVE UPPER BRACKET

- (a) Using a centering punch, mark the center of the tapered-head bolt.
- (b) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the tapered-head bolt.
- (c) Using a screw extractor, remove the tapered-head bolt.
- (d) Remove the two bolts, and separate the upper bracket and the column tube.

2. REMOVE MAIN SHAFT

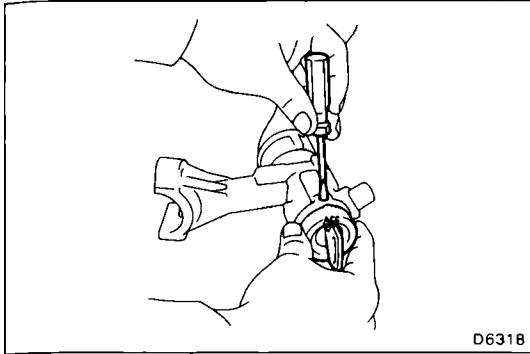
- (a) Remove the two thrust stopper set bolts.
- (b) Using snap ring pliers, remove the snap ring.
- (c) Remove the main shaft.

INSPECTION AND REPAIR OF NON-TILT STEERING COLUMN

1. INSPECT UPPER BRACKET

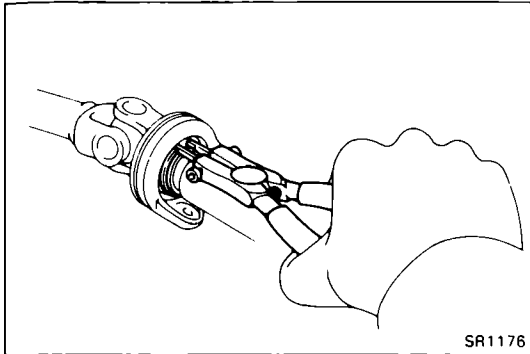
- (a) Check that the steering lock mechanism operates properly.
- (b) Check the upper bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the column tube.



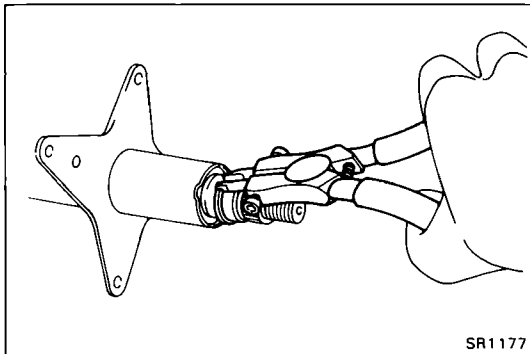
2. IF NECESSARY, REPLACE KEY CYLINDER

- (a) Place the ignition key at the ACC position.
- (b) Push down the stop key with a thin rod, and pull out the key cylinder.
- (c) Make sure that the ignition key is at the ACC position.
- (d) Install a new key cylinder.



3. IF NECESSARY, REPLACE MAIN SHAFT THRUST STOPPER

- (a) Using snap ring pliers, remove the snap ring.
- (b) Pull out the thrust stopper.
- (c) Push in a new thrust stopper.
- (d) Using snap ring pliers, install the snap ring.



ASSEMBLY OF NON-TILT STEERING COLUMN
(See page SR-5)

1. INSTALL MAIN SHAFT TO COLUMN TUBE

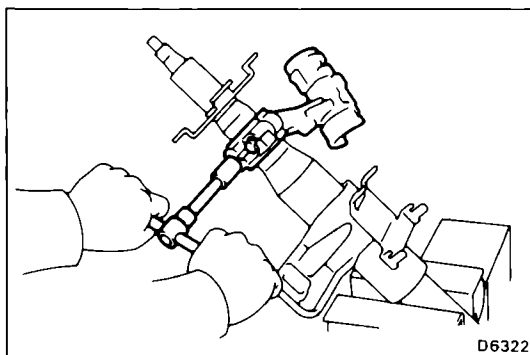
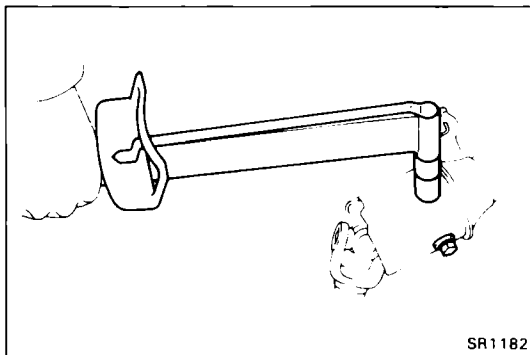
- (a) Insert the main shaft in the column tube.
- (b) Using snap ring pliers, install the snap ring.
If axial play is 0.3 mm (0.012 in.) or more, select a snap ring.

Snap ring thickness:

1.2 mm (0.047 in.) or 1.4 mm (0.055 in.)

- (c) Install the two thrust stopper set bolts.

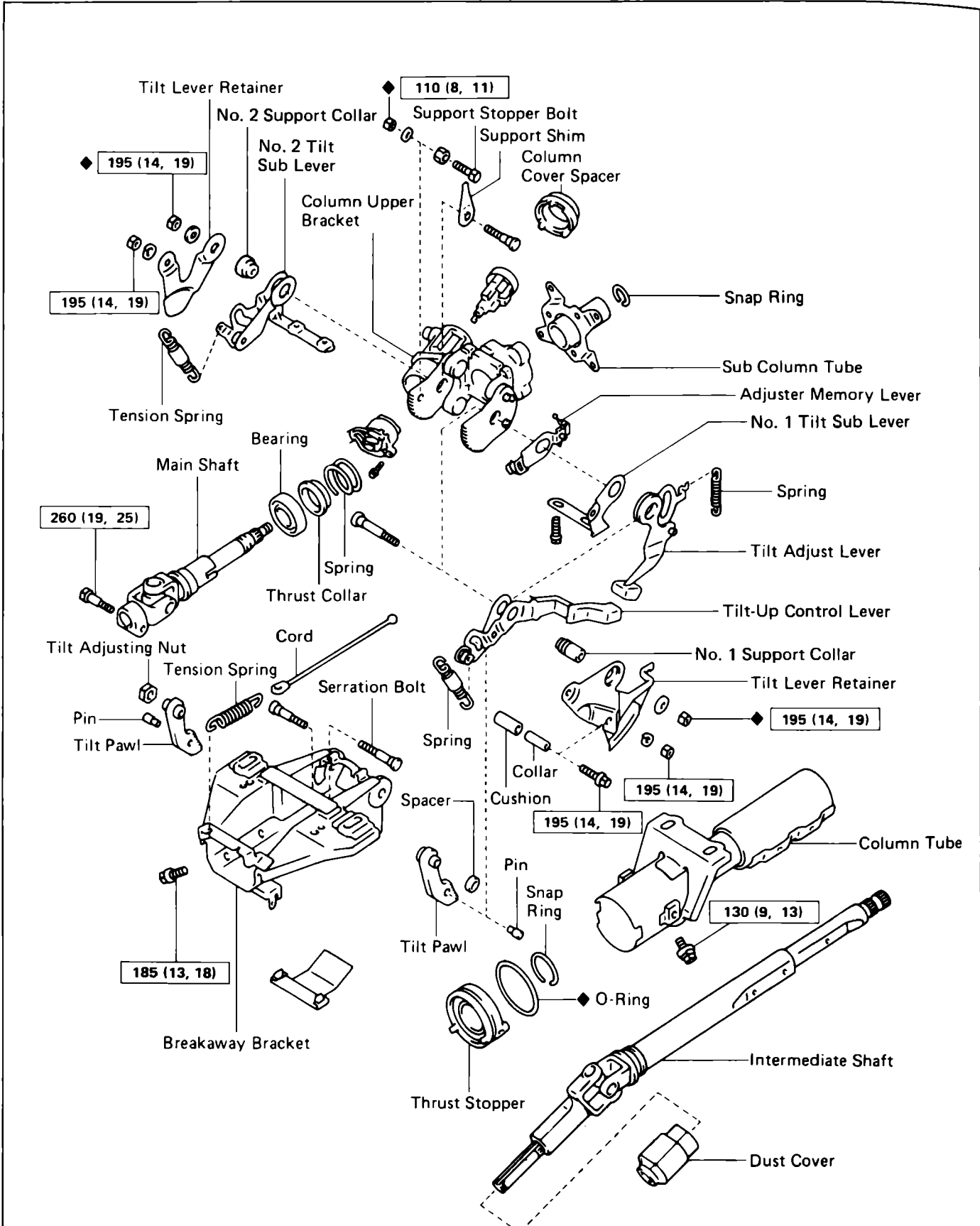
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



2. INSTALL UPPER BRACKET TO COLUMN TUBE

- (a) Install the upper bracket with two tapered-head bolts.
- (b) Tighten the tapered-head bolts until the bolt heads break off.

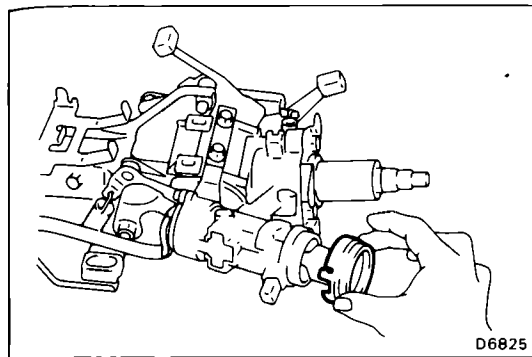
Tilt Steering Column COMPONENTS



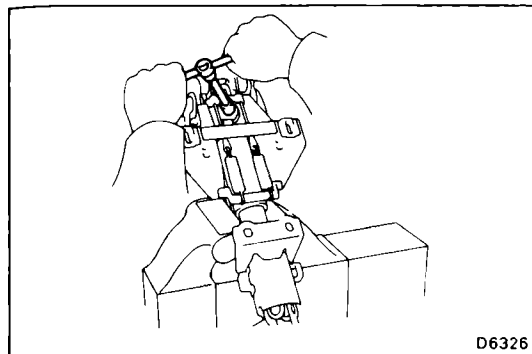
kg-cm (ft-lb, N-m) : Specified torque
 ◆ Non-reusable part

DISASSEMBLY OF TILT STEERING COLUMN

(See page SR-8)

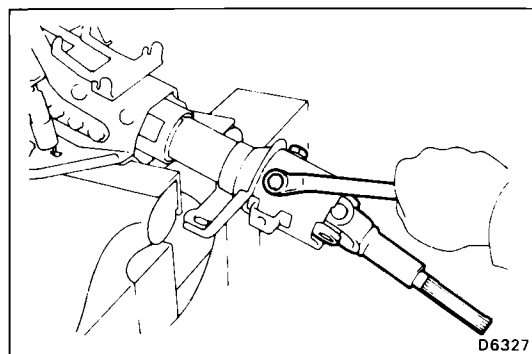


1. REMOVE COLUMN COVER SPACER

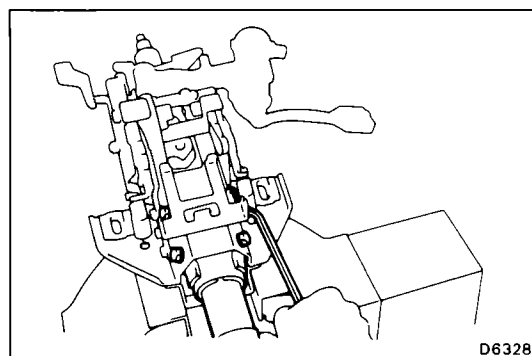


2. REMOVE INTERMEDIATE SHAFT

- (a) Remove the bolt from the main shaft.
- (b) Remove the dust cover.

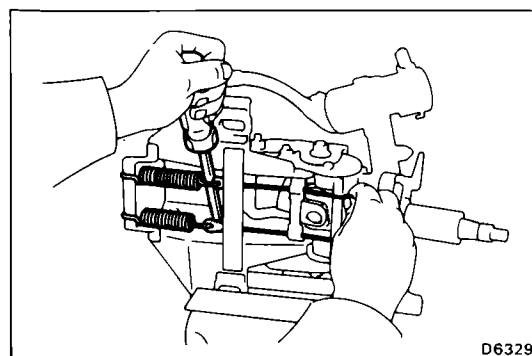


- (c) Remove the two thrust stopper set bolts.
- (d) Pull out the intermediate shaft from the column tube.



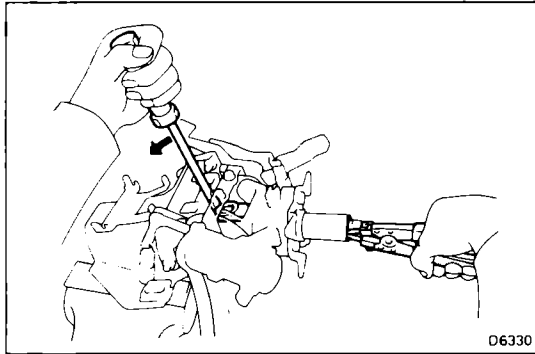
3. REMOVE COLUMN TUBE

Remove the four breakaway bracket bolts, and pull out the column tube.

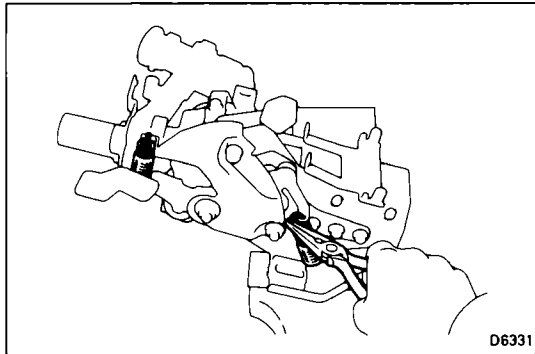
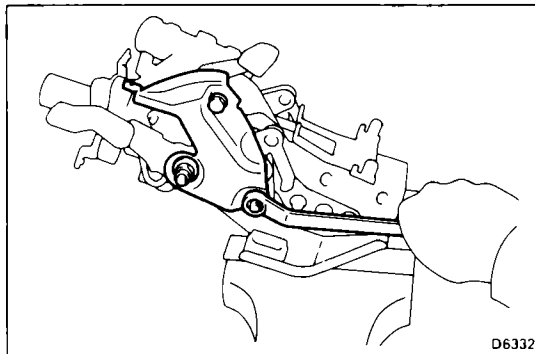


4. REMOVE TENSION SPRINGS AND CORDS

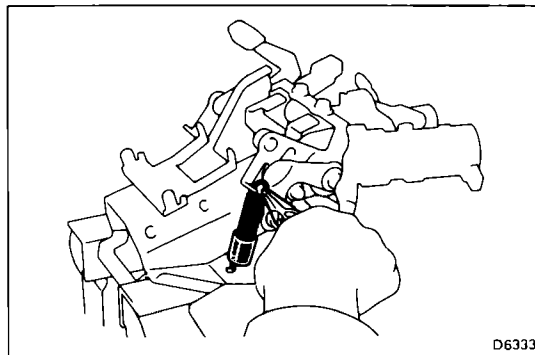
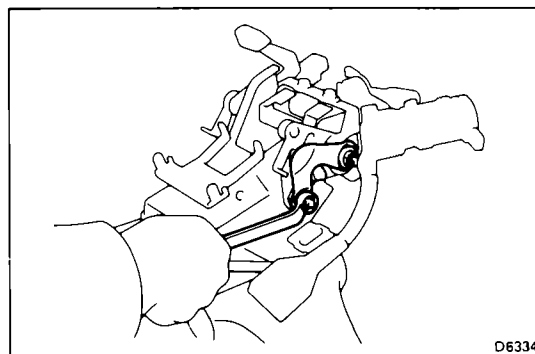
- (a) Fully tilt the main shaft upward.
- (b) Using a screwdriver, pry out the cord tip and remove the springs and cords.

**5. REMOVE MAIN SHAFT**

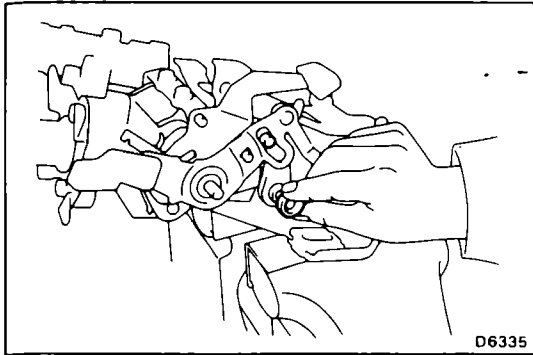
- (a) Using a screwdriver, push the main shaft.
- (b) Using snap ring pliers, remove the snap ring.
- (c) Pull out the main shaft.
- (d) Remove the spring and collar from the main shaft.

**6. REMOVE TWO TENSION SPRINGS****7. REMOVE TILT LEVER RETAINER**

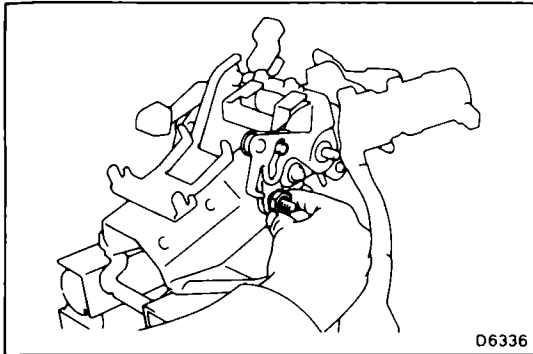
- (a) Remove the bolt and two nuts.
- (b) Remove the tilt lever retainer, collar and cushion.

**8. REMOVE TENSION SPRING****9. REMOVE TILT LEVER RETAINER**

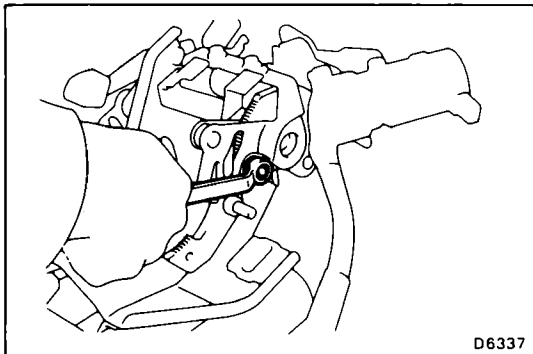
- Remove the two nuts and tilt lever retainer.



10. REMOVE SPACER AND PIN

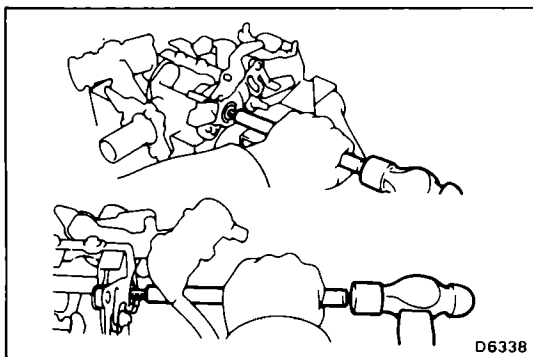


11. REMOVE TILT STEERING ADJUSTING NUT AND PIN



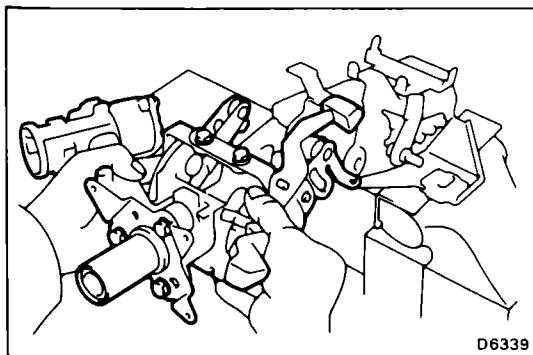
12. REMOVE TILT STEERING SUPPORT STOPPER BOLT

Remove the nut, support stopper bolts and cover.



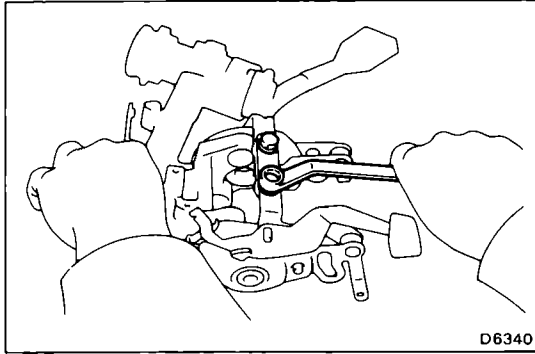
13. REMOVE SERRATION BOLTS

Temporarily install the two nuts to the two serration bolts end for protection, and tap out the two serration bolts from the upper bracket.

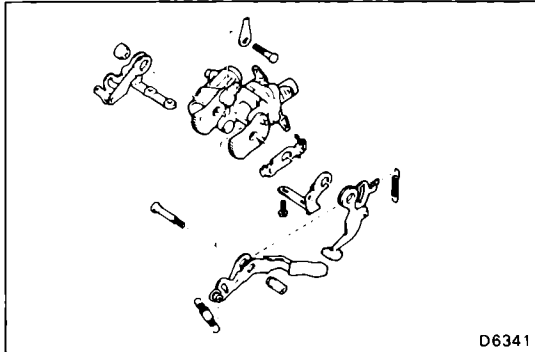


14. REMOVE COLUMN UPPER BRACKET

(a) Remove the column upper bracket from the breakaway bracket.

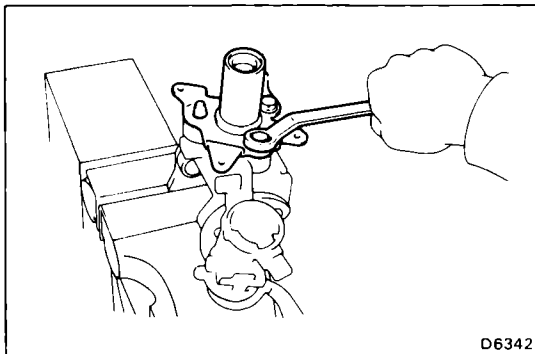


(b) Remove the two bolts.



(c) Remove the following parts:

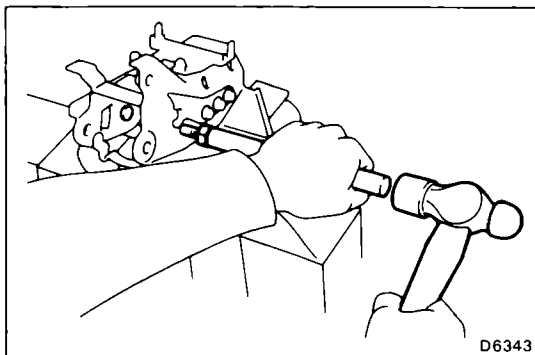
- Tilt steering No.1 support collar
- Tilt-up control lever
- Tilt adjust lever
- No.1 tilt sub lever
- Adjuster memory lever
- Tilt steering No.2 support collar
- No.2 tilt sub lever
- Support shim



(d) Remove the tapered-head bolt by tapping with a chisel.

(e) Remove the two bolts.

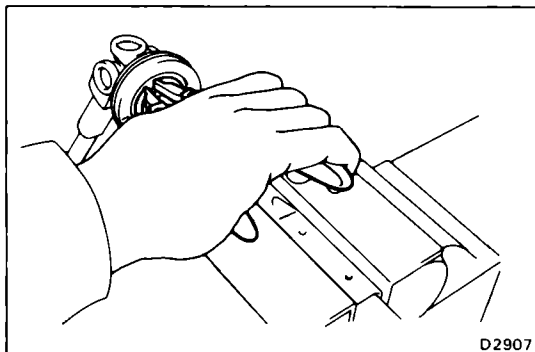
(f) Remove the steering column tube.



15. REMOVE TWO STEERING PAWLS

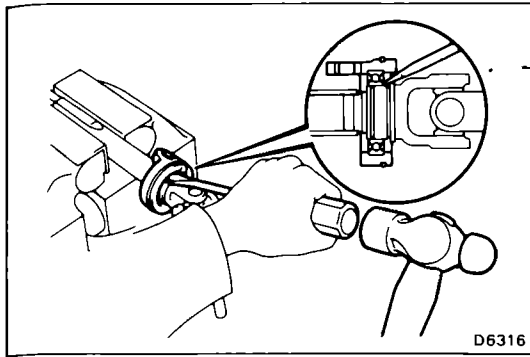
16. REMOVE TWO SERRATION BOLTS

Temporarily install the two nuts to the two serration bolt end for protection, and tap out the serration bolts from the breakaway bracket.

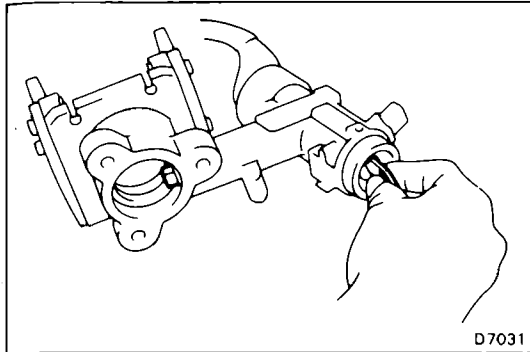


17. REMOVE THRUST STOPPER

(a) Using snap ring pliers, remove the snap ring.



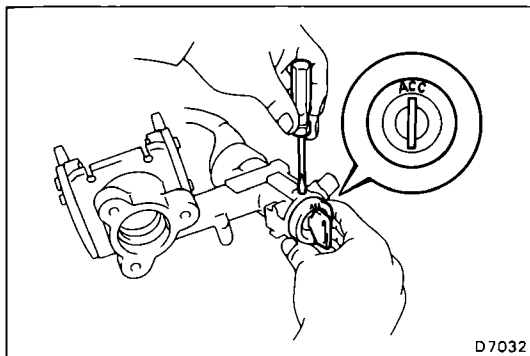
- (b) Using a screwdriver and hammer, tap the bearing inner race and remove the thrust stopper.
- (c) Remove the O-ring from the thrust stopper.



INSPECTION AND REPAIR OF TILT STEERING COLUMN

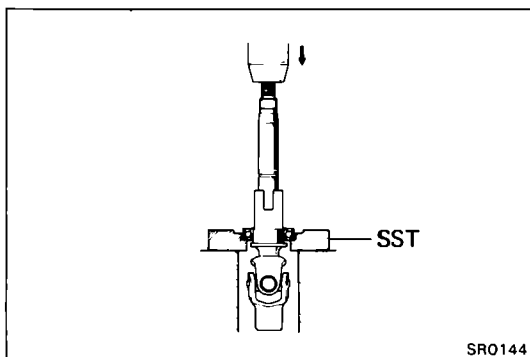
1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



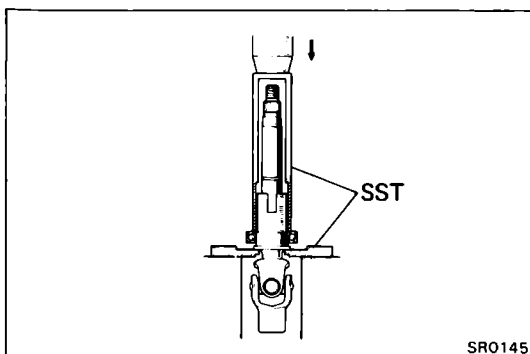
2. IF NECESSARY, REPLACE KEY CYLINDER

- (a) Place the ignition key at the ACC position.
- (b) Push down the stop key with a thin rod, and pull out the key cylinder.
- (c) Make sure that the ignition key is at the ACC position.
- (d) Install a new key cylinder.

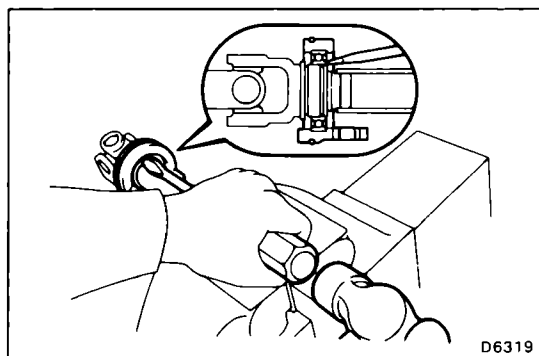


3. IF NECESSARY, REPLACE MAIN SHAFT BEARING

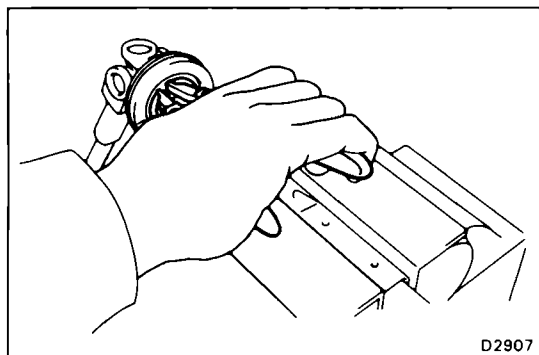
- (a) Using SST, press out the bearing.
SST 09527-20011



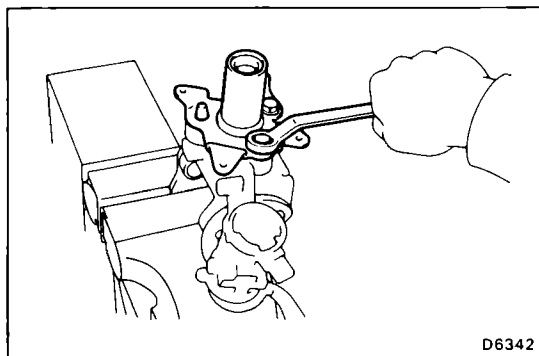
- (b) Pack MP grease into a new bearing.
- (c) Using SST, press in a new bearing to the main shaft.
SST 09236-00101 (09237-00010), 09612-22011



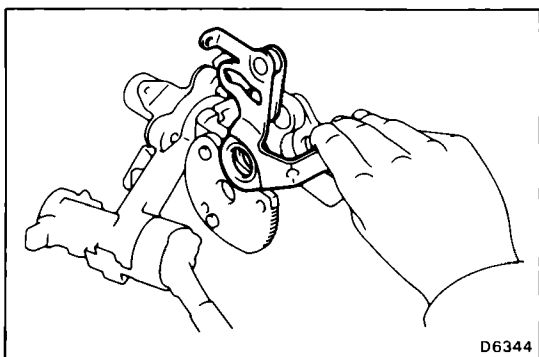
D6319



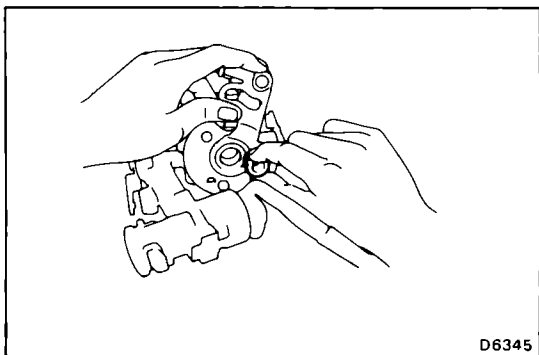
D2907



D6342



D6344



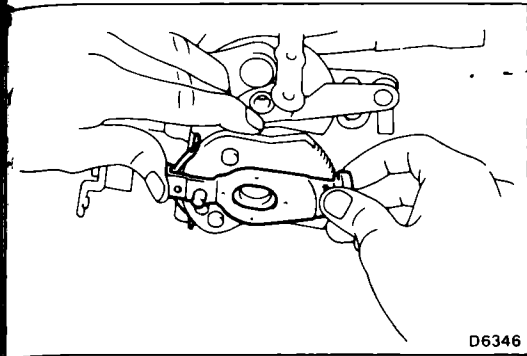
D6345

ASSEMBLY OF TILT STEERING COLUMN

(See page SR-8)

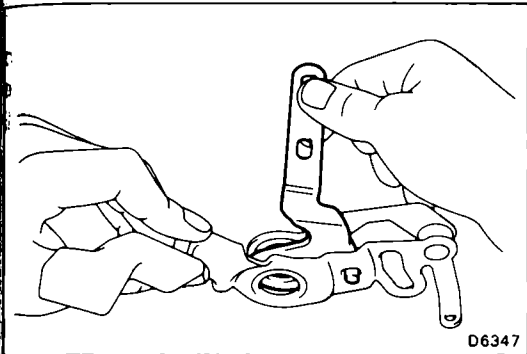
1. **COAT ALL RUBBING PARTS WITH MP GREASE**
2. **INSTALL THRUST STOPPER**
 - (a) Install a new O-ring to the thrust stopper.
 - (b) Using a screwdriver, tap the bearing inner race.
 - (c) Using snap ring pliers, install the snap ring.
3. **INSTALL COLUMN TUBE**
 - (a) Install the column tube with two bolts to the column upper bracket.
 - (b) Install the tapered-head bolt and tighten it until the bolt head breaks off.
4. **INSTALL NO.2 TILT SUB LEVER**
Install the No.2 tilt sub lever to the column upper bracket.
5. **SELECT NO.2 SUPPORT COLLAR**
Select a No.2 collar which will eliminate all play.

Outer diameter	mm (in.)
17.989 – 17.996	(0.7082 – 0.7085)
17.996 – 18.003	(0.7085 – 0.7088)
18.003 – 18.010	(0.7088 – 0.7091)
18.010 – 18.017	(0.7091 – 0.7093)
18.017 – 18.024	(0.7093 – 0.7096)



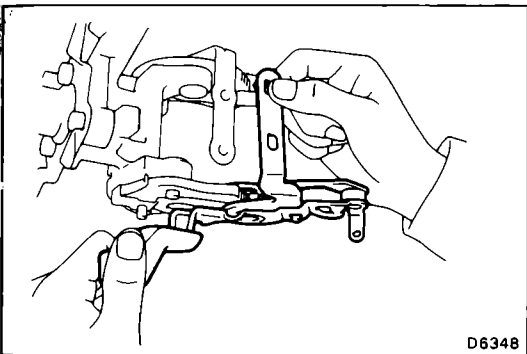
6. INSTALL ADJUSTER MEMORY LEVER

Install the adjuster memory lever to the ratchet of the column upper bracket.

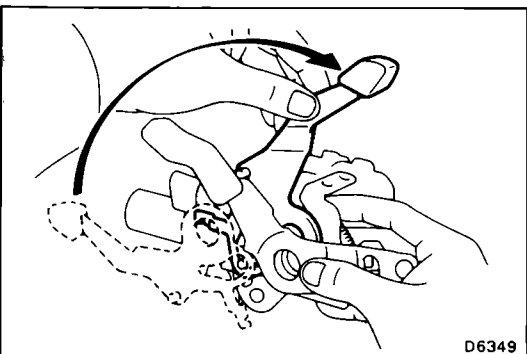


7. INSTALL TILT-UP CONTROL LEVER AND NO. 1 TILT SUB LEVER

(a) Assemble the No. 1 tilt sub lever to the tilt-up control lever.



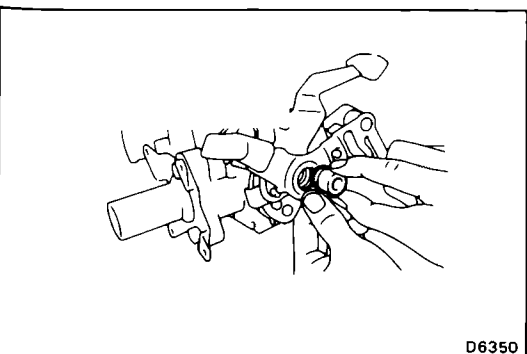
(b) Install the tilt-up control lever to the column upper bracket.



8. INSTALL TILT ADJUST LEVER

(a) Align the tilt adjust lever hole to the adjuster memory cover pin.

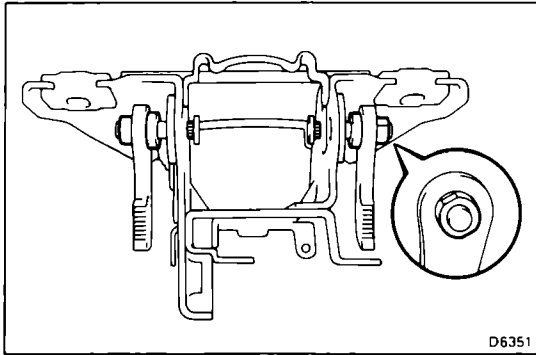
(b) Assemble the tilt adjust lever between the tilt-up control lever and No. 1 tilt sub lever.



9. SELECT NO. 1 SUPPORT COLLAR

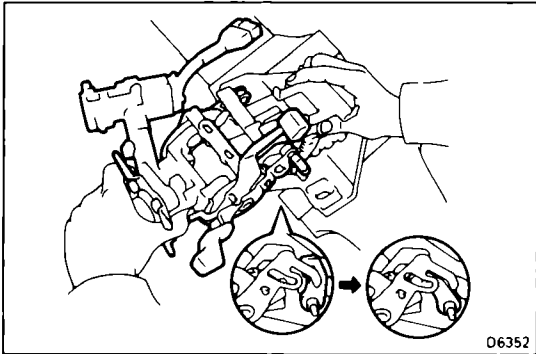
Select a No. 1 collar which will eliminate all play.

Outer diameter mm (in.)
17.989 – 17.996 (0.7082 – 0.7085)
17.996 – 18.003 (0.7085 – 0.7088)
18.003 – 18.010 (0.7088 – 0.7091)
18.010 – 18.017 (0.7091 – 0.7093)
18.017 – 18.024 (0.7093 – 0.7096)



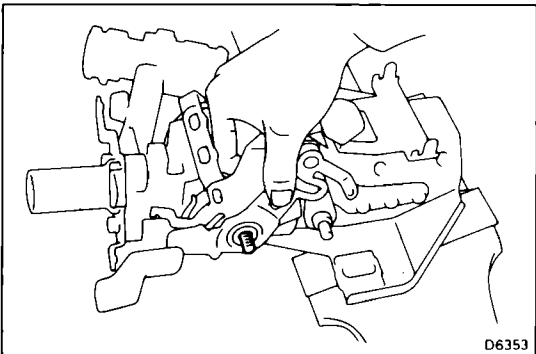
10. INSTALL TWO SERRATION BOLTS AND TWO TILT PAWLS

- (a) Install the two serration bolts to the breakaway bracket.
- (b) Install the two pawls and one of the bushing with cutout portion.

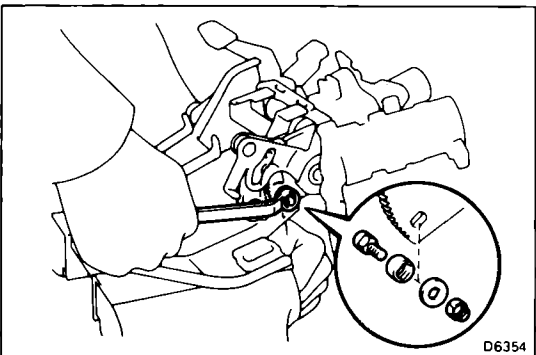


11. INSTALL COLUMN UPPER BRACKET

- (a) With the column upper bracket partially installed to the breakaway bracket, move the pawl toward the column upper bracket side and then completely install the column upper bracket.



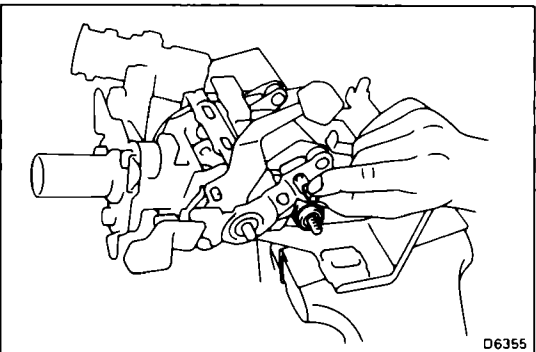
- (b) Insert the serration bolt of the support collar No.1 side.



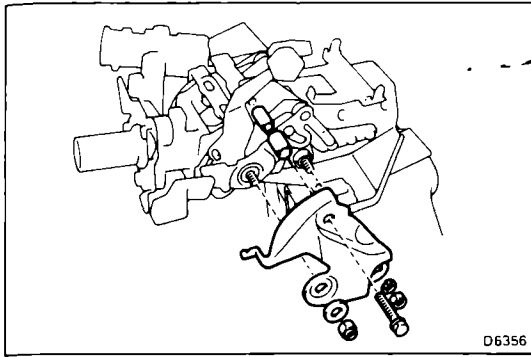
12. INSTALL SUPPORT STOPPER BOLT

Install the support stopper cover to the bolt, and align the cutout portion of the support stopper bolt and tilt pawl, install it from inside of the column upper bracket.

Torque: 110 kg-cm (8 ft-lb, 11 N-m)

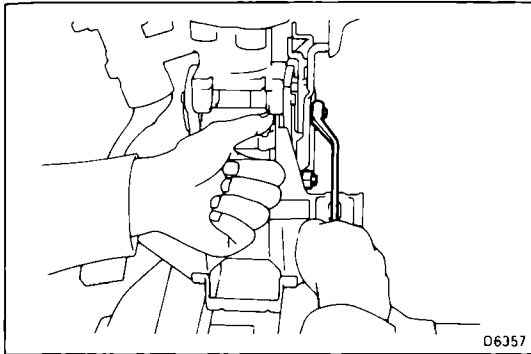


13. INSTALL SPACER AND PIN

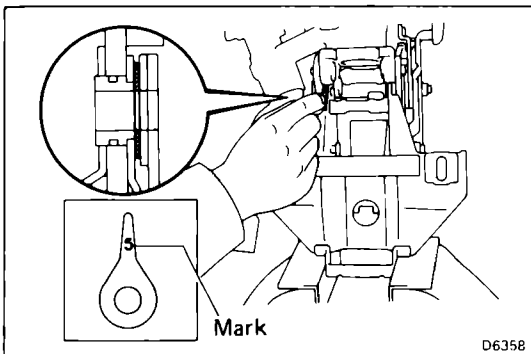


14. INSTALL TILT LEVER RETAINER

- (a) Install the tilt lever retainer with the collar, cushion and bolt.
- (b) Temporarily install the two nuts and washers.



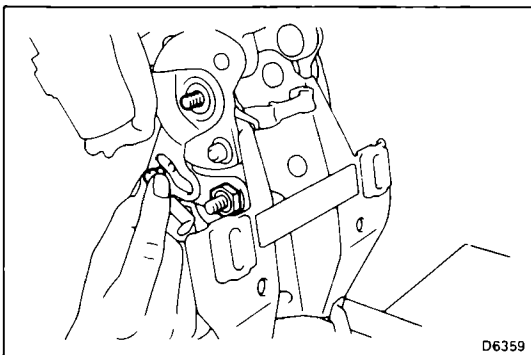
- (c) Hold the serration bolt and tighten the two nuts.
Torque: 195 kg-cm (14 ft-lb, 19 N·m)



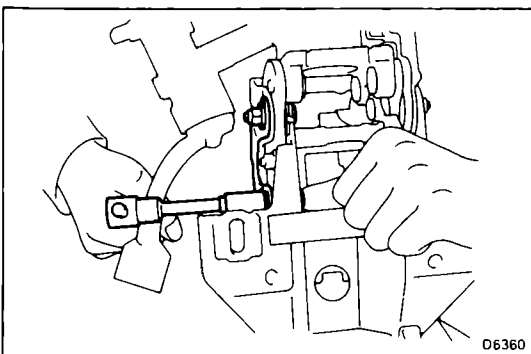
15. SELECT SUPPORT SHIM

Select one or two shims which fit snugly when pressed in by hand.

Mark	Thickness mm (in.)
None	0.197 – 0.203 (0.0078 – 0.0080)
5	0.495 – 0.505 (0.0195 – 0.0199)
8	0.795 – 0.805 (0.0313 – 0.0317)
14	1.395 – 1.405 (0.0549 – 0.0553)
18	1.795 – 1.805 (0.0707 – 0.0711)

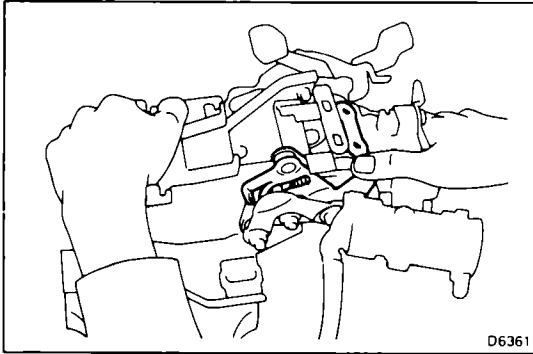


16. INSTALL SERRATION BOLT, TILT STEERING ADJUSTING NUT AND PIN

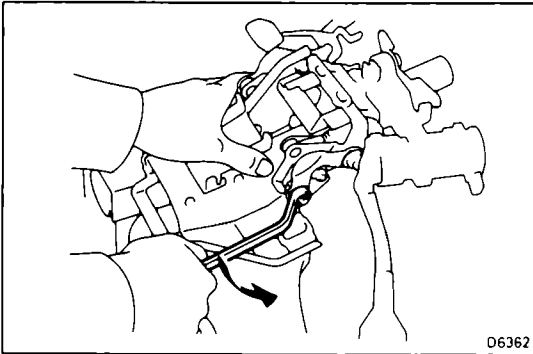


17. INSTALL TILT LEVER RETAINER

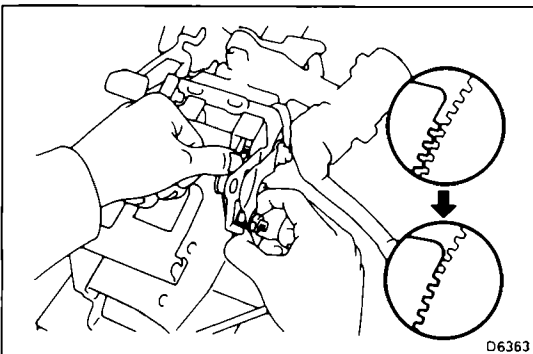
- (a) Install the tilt lever retainer.
- (b) Install the two nuts and washers.
- (c) Holding the bolts and tighten the nuts.
Torque: 195 kg-cm (14 ft-lb, 19 N·m)

**18. ADJUST ENGAGEMENT OF NO.2 TILT SUB LEVER**

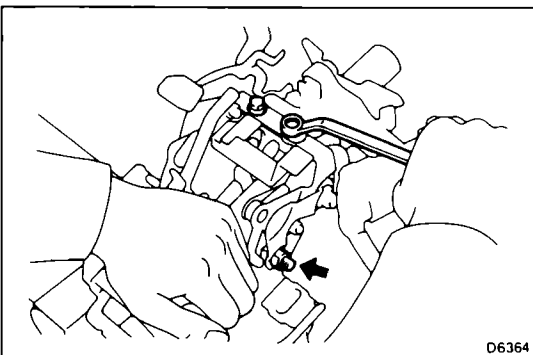
- (a) Pulling the No.2 tilt sub lever, disengage the pawl from the column upper bracket.
- (b) Moving the column upper bracket up or down, engage the opposite pawl with the column upper bracket.



- (c) Loosen the nut until the tilt steering adjusting nut turns smoothly.

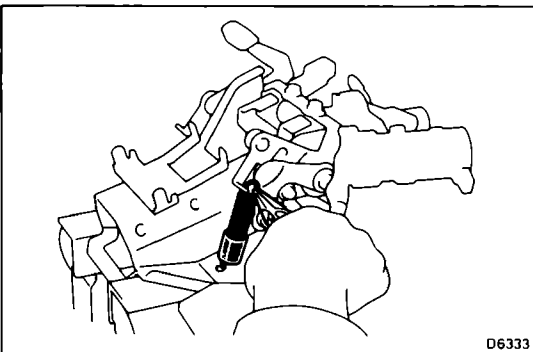


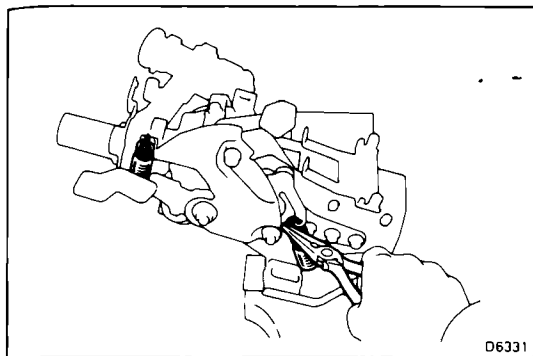
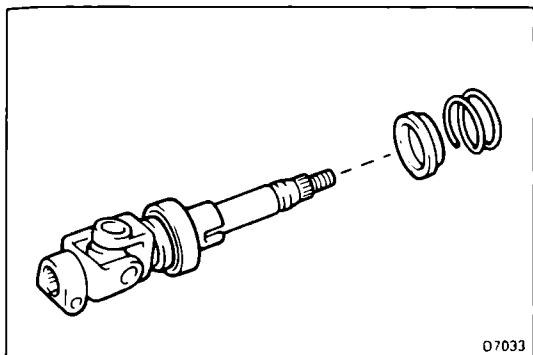
- (d) Pushing the pawl toward the column upper bracket, engage the pawl with the upper bracket by moving the adjusting nut.



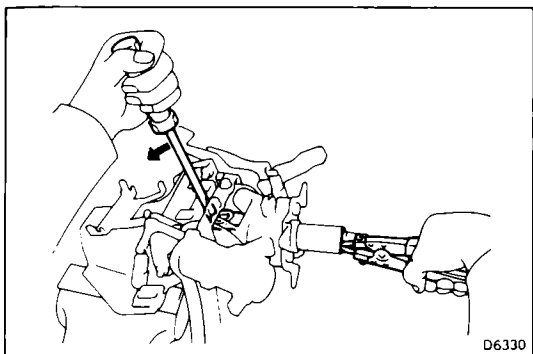
- (e) Tighten the nut as in figure and tighten the right and lift bolts of the tilt lever.

Torque: Nut 195 kg-cm (14 ft-lb, 19 N·m)
Bolt 80 kg-cm (69 in.-lb, 7.8 N·m)

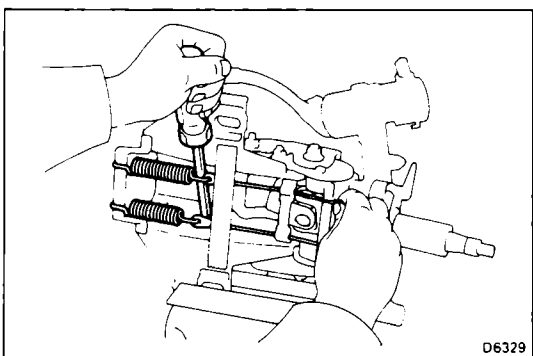
**19. INSTALL TENSION SPRING**

**20. INSTALL TWO TENSION SPRINGS****21. INSTALL MAIN SHAFT**

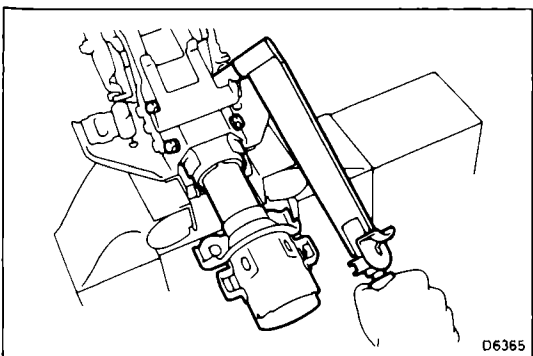
- (a) Place the ignition key at the ACC position.
- (b) Install the collar and spring to the main shaft and insert the main shaft into the upper bracket.



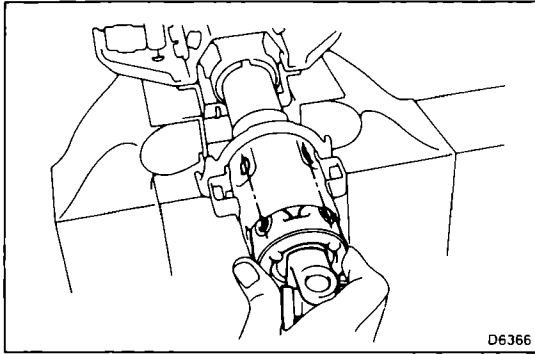
- (c) Using a screwdriver, pushing the main shaft to the main shaft end.
- (d) Using snap ring pliers, install the snap ring.

**22. INSTALL TENSION SPRINGS AND CORDS**

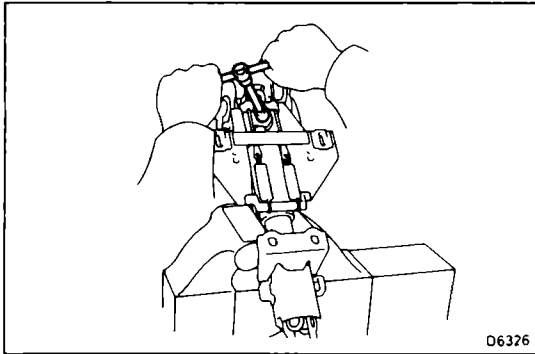
- (a) Fully tilt up the main shaft.
- (b) Connect the spring and cord, and hook the spring to the hanger.
- (c) Using a screwdriver, hook the cord end to the column upper bracket.

**23. INSTALL COLUMN TUBE TO BREAKAWAY BRACKET**

- (a) Install the column tube to the breakaway bracket.
 - (b) Install and torque the four bolts.
- Torque: 185 kg-cm (13 ft-lb, 18 N·m)**

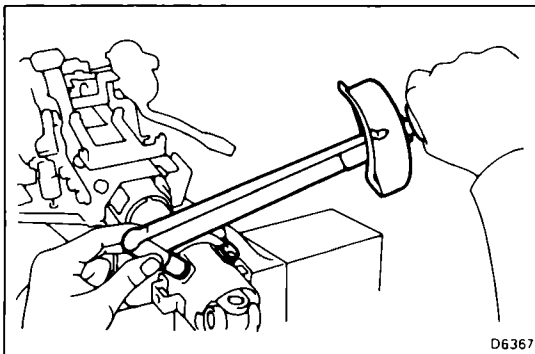
**24. INSTALL INTERMEDIATE SHAFT TO COLUMN TUBE**

- (a) Coat the thrust stopper with molybdenum disulphide lithium base grease.
- (b) Install the intermediate shaft to the column tube.
- (c) Install the dust cover.



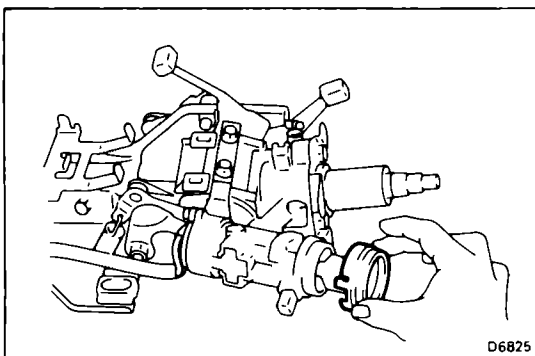
- (d) Connect the universal joint of main shaft and intermediate shaft.

Torque: 260 kg-cm (19 ft-lb, 25 N·m)

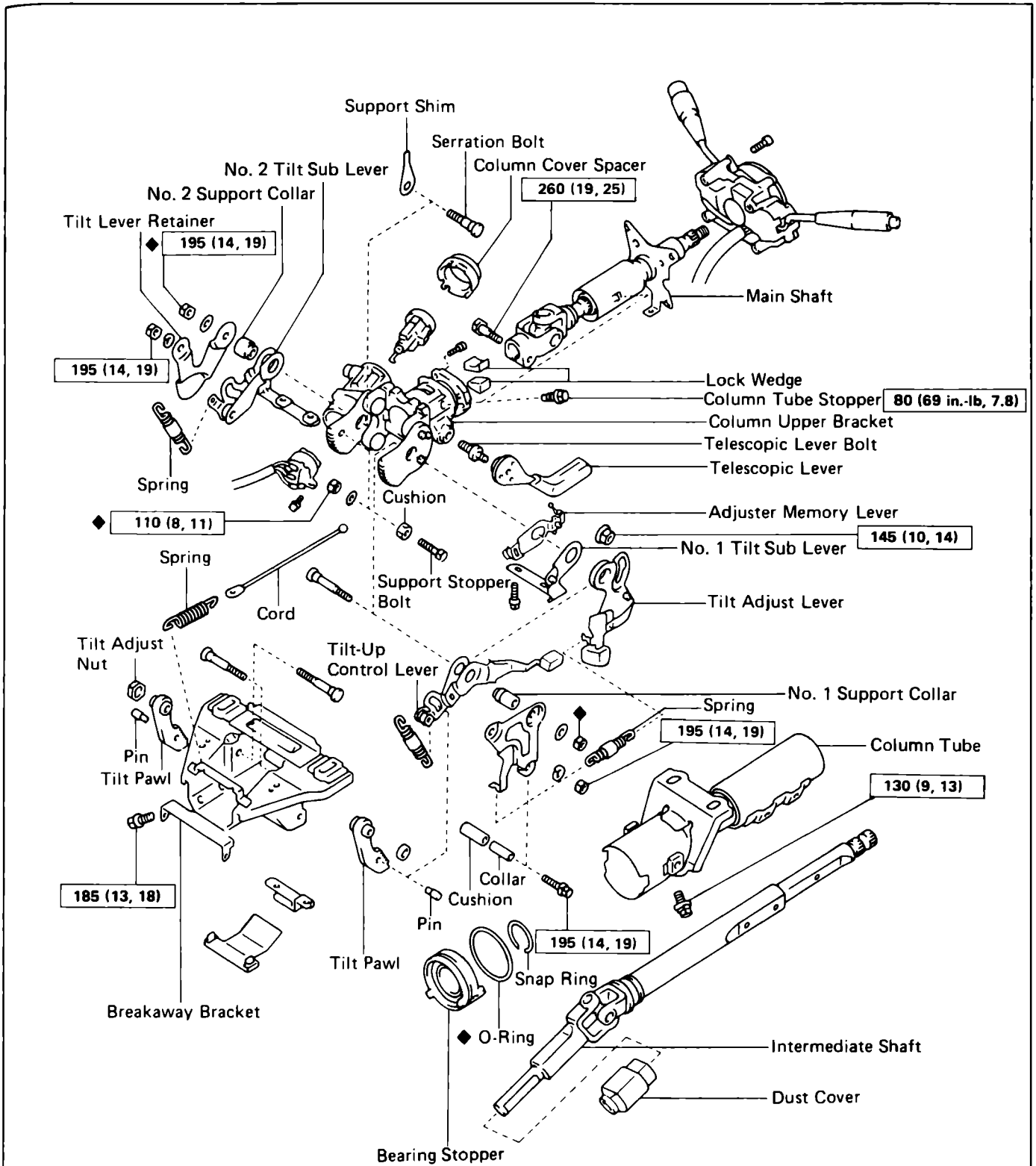


- (e) Install and torque the two bolts with the plate washers.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

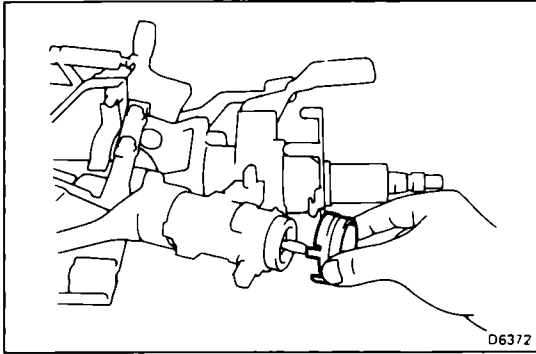
**25. INSTALL COLUMN COVER SPACER**

Telescopic Steering Column COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

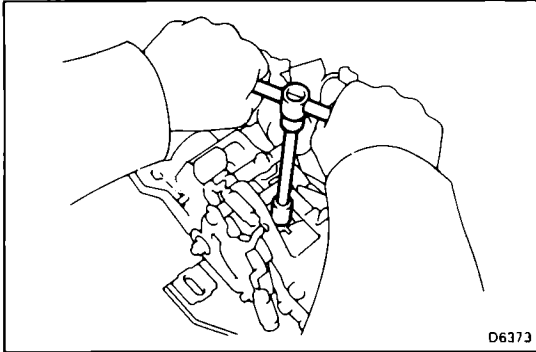
◆ Non-reusable part



DISASSEMBLY OF TELESCOPIC STEERING COLUMN

(See page SR-21)

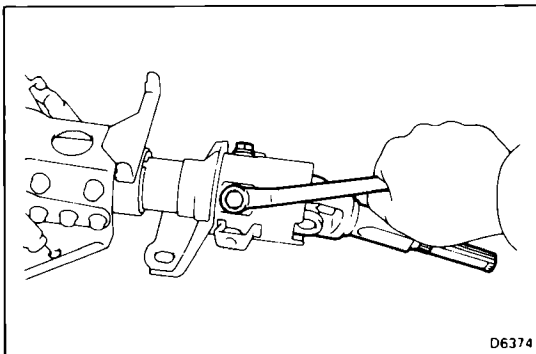
1. REMOVE COLUMN COVER SPACER



2. REMOVE INTERMEDIATE SHAFT

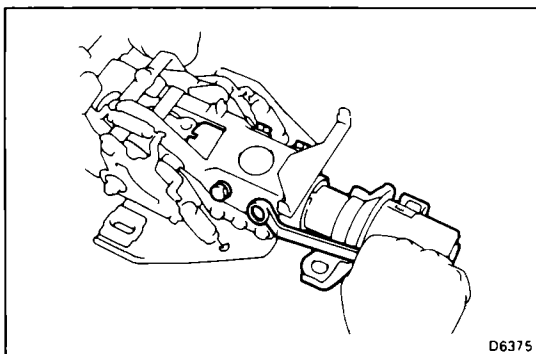
(a) Remove the bolt from the main shaft.

(b) Remove the dust cover.



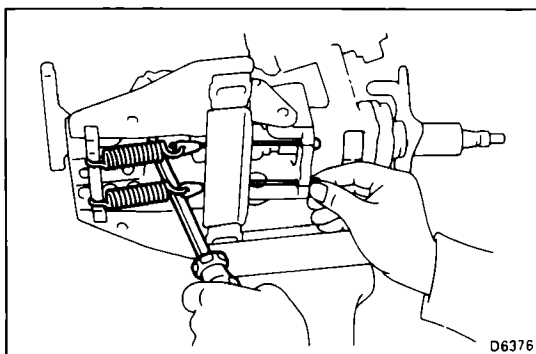
(c) Remove the two thrust stopper set bolts.

(d) Pull out the intermediate shaft from the column tube.



3. REMOVE COLUMN TUBE

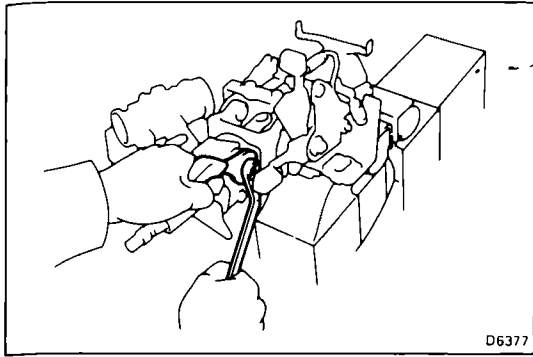
Remove the four breakaway bracket bolts, and pull out the column tube.



4. REMOVE TENSION SPRINGS AND CORDS

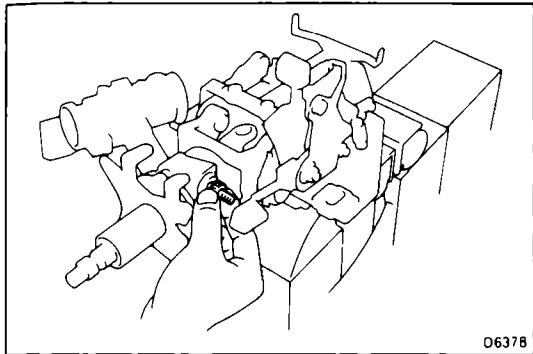
(a) Fully tilt the main shaft upward.

(b) Using a screwdriver, pry out the cord tip and remove the springs and cords.

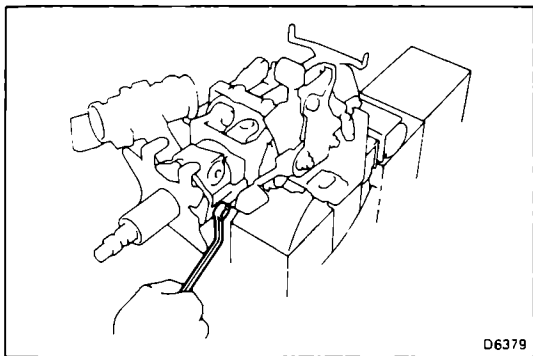


5. REMOVE TELESCOPIC LEVER

Remove the nut and telescopic lever.

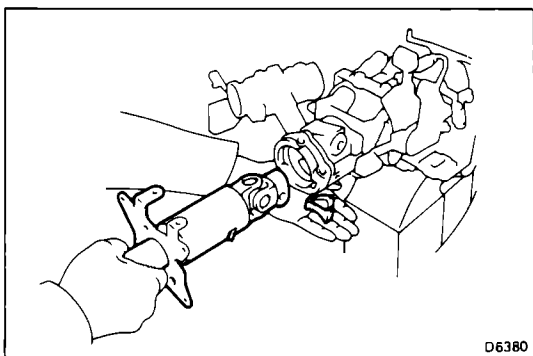


6. REMOVE TELESCOPIC LEVER LOCK BOLT

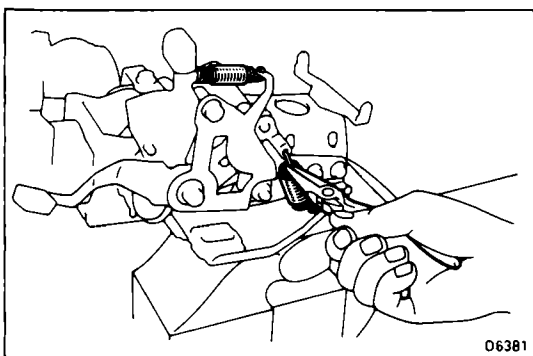


7. REMOVE MAIN SHAFT ASSEMBLY

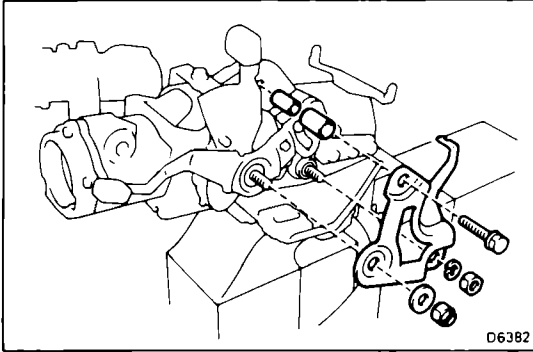
(a) Remove the column tube stopper.



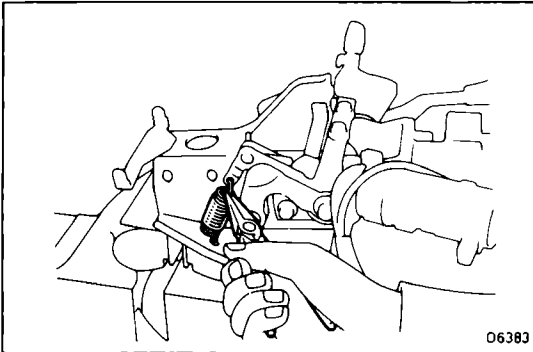
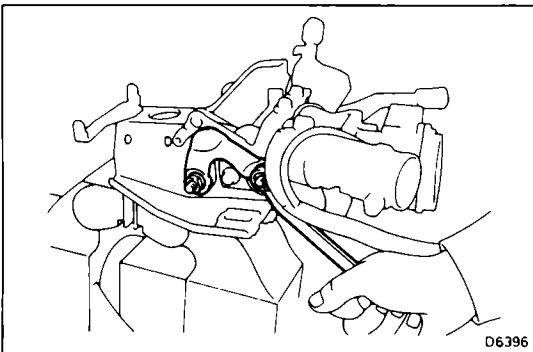
(b) Pull out the main shaft assembly and then catch the two lock wedges by hand.



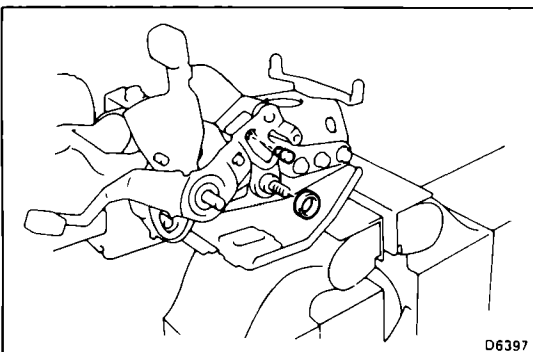
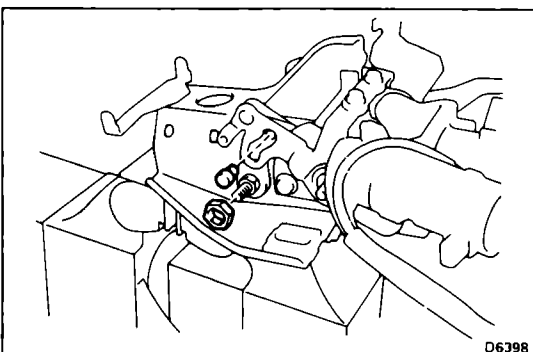
8. REMOVE TWO TENSION SPRINGS

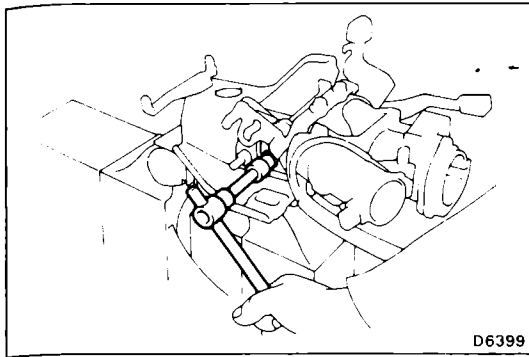
**9. REMOVE TILT LEVER RETAINER**

- (a) Remove the bolt and two nuts.
- (b) Remove the tilt lever retainer, collar and cushion.

**10. REMOVE TENSION SPRING****11. REMOVE TILT LEVER RETAINER**

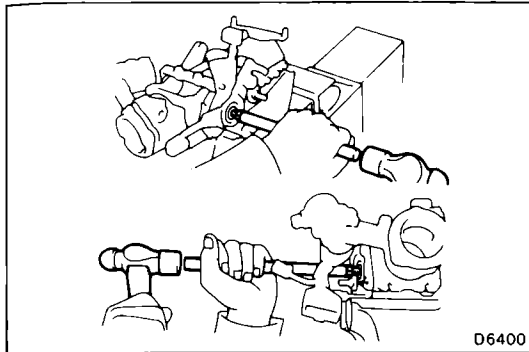
Remove the two nuts and tilt lever retainer.

**12. REMOVE SPACER AND PIN****13. REMOVE TILT STEERING ADJUSTING NUT AND PIN**



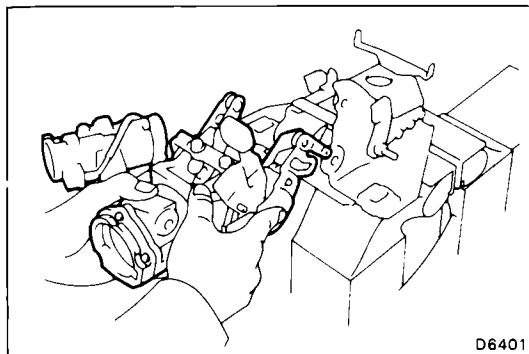
14. REMOVE TILT STEERING SUPPORT STOPPER BOLT

Remove the nut, support stopper bolt and cover.



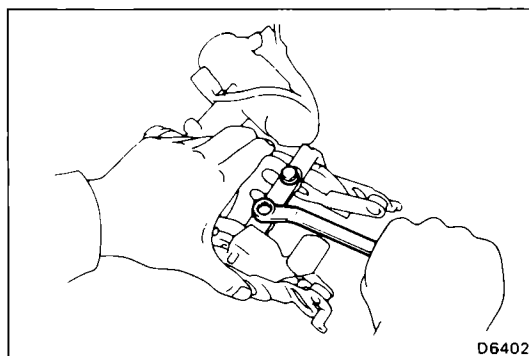
15. REMOVE SERRATION BOLTS

Temporarily install the two nuts to the two serration bolts end for protection, and tap out the two serration bolts from the upper bracket.

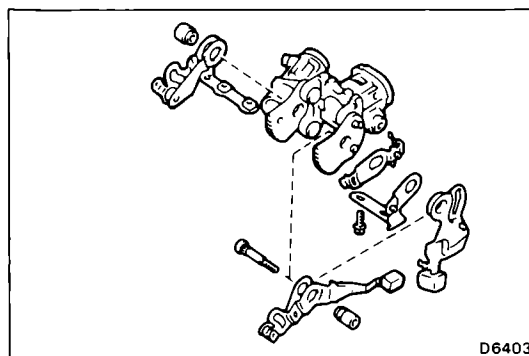


16. REMOVE COLUMN UPPER BRACKET

(a) Remove the column upper bracket from the breakaway bracket.

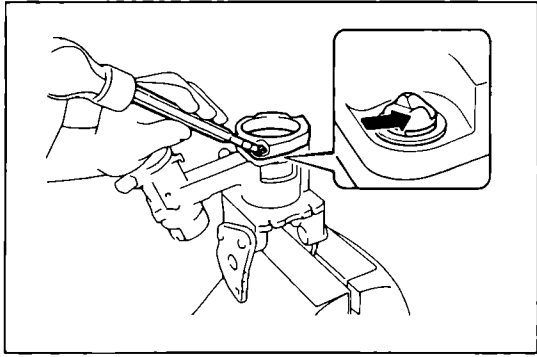


(b) Remove the two bolts.

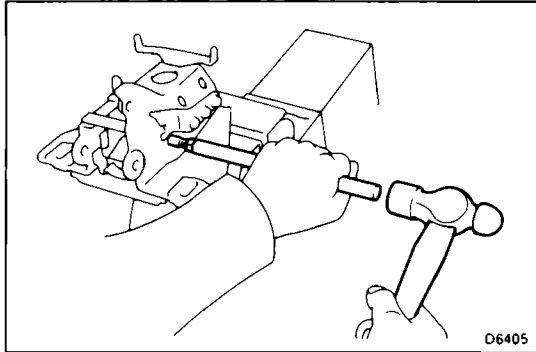


(c) Remove the following parts:

- Tilt steering No.1 support collar
- Tilt-up control lever
- Tilt adjust lever
- No.1 tilt sub lever
- Adjuster memory lever
- Tilt steering No.2 support collar
- No.2 tilt sub lever
- Support shim



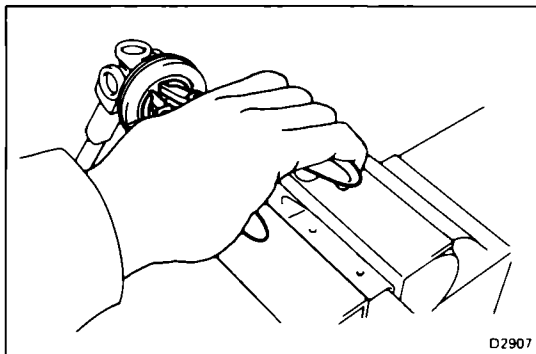
- (d) Using a chisel and hammer, remove the three screws and thrust stopper.



17. REMOVE TWO STEERING PAWLS

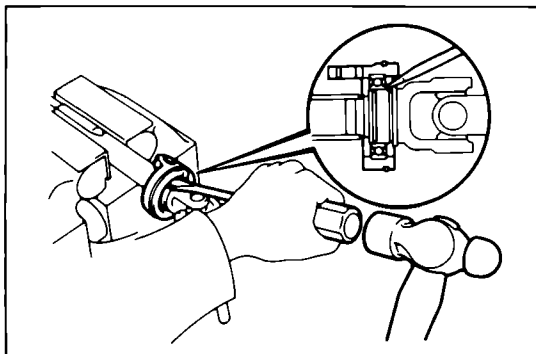
18. REMOVE TWO SERRATION BOLTS

Temporarily install the two nuts to the two serration bolts end for protection, and tap out the serration bolts from the breakaway bracket.



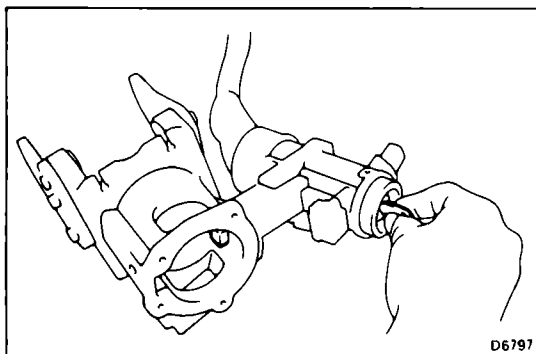
19. REMOVE THRUST STOPPER

- (a) Using snap ring pliers, remove the snap ring.



- (b) Using a screwdriver and hammer, tap the bearing inner race and remove the thrust stopper.

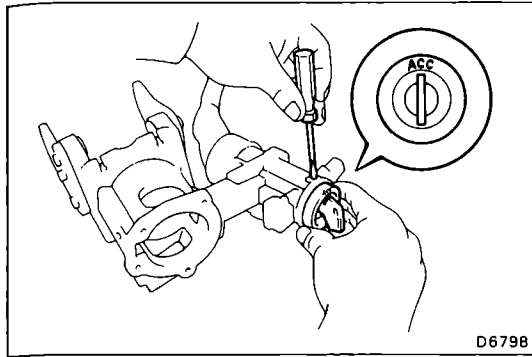
- (c) Remove the O-ring from the thrust stopper.



INSPECTION AND REPAIR OF TELESCOPIC STEERING COLUMN

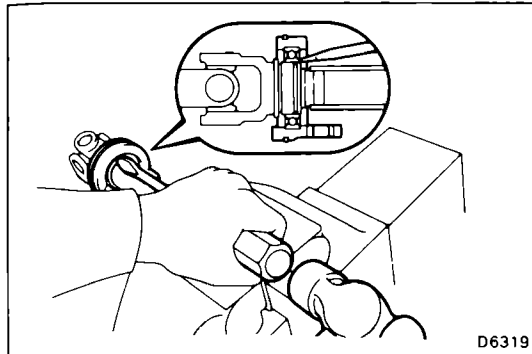
1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



2. IF NECESSARY, REPLACE KEY CYLINDER

- (a) Place the ignition key at the ACC position.
- (b) Push down the stop key with a thin rod, and pull out the key cylinder.
- (c) Make sure that the ignition key is at the ACC position.
- (d) Install a new key cylinder.



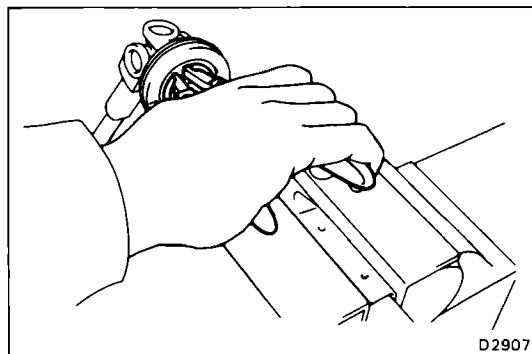
ASSEMBLY OF TELESCOPIC STEERING COLUMN

(See page SR-21)

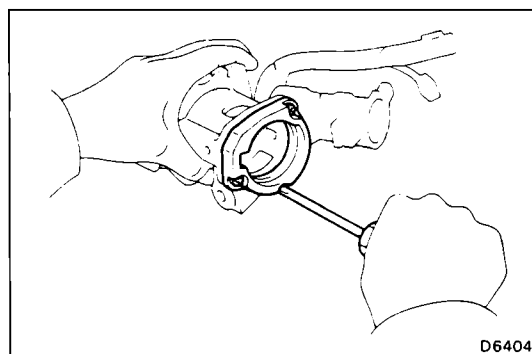
1. COAT ALL RABBING PARTS WITH MP GREASE

2. INSTALL THRUST STOPPER

- (a) Install a new O-ring to the thrust stopper.
- (b) Using a screwdriver, tap the bearing inner race.

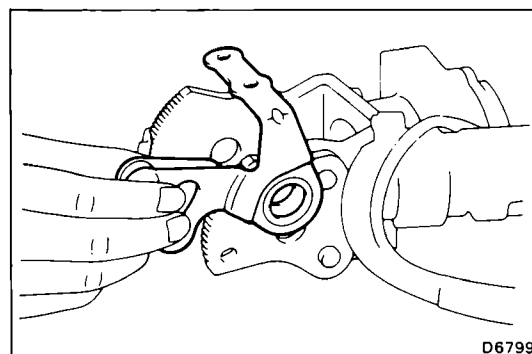


- (c) Using snap ring pliers, install the snap ring.



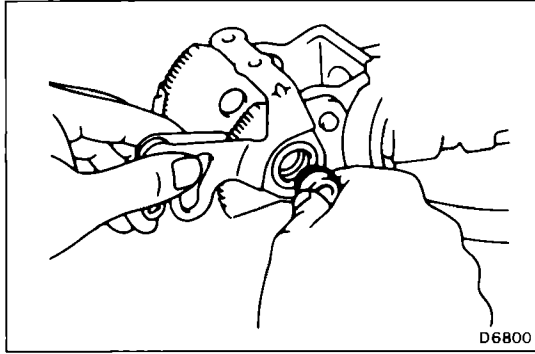
3. INSTALL STEERING SHAFT THRUST STOPPER

Install the steering shaft thrust stopper with three bolts to the column upper bracket.



4. INSTALL NO.2 TILT SUB LEVER

Install the No.2 tilt sub lever to the column upper bracket.

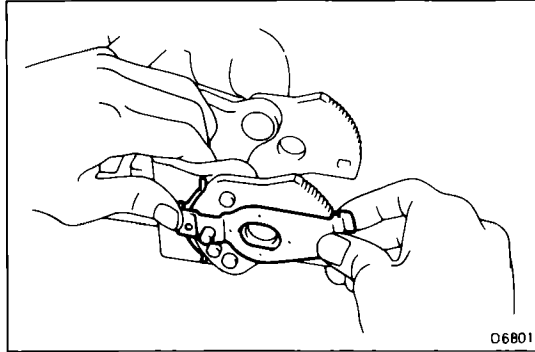


D6800

5. SELECT NO.2 SUPPORT COLLAR

Select a collar No.2 which will eliminate all play.

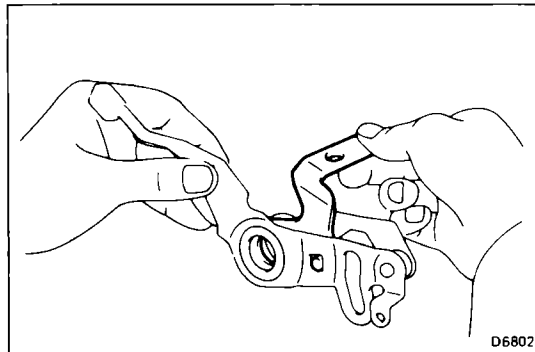
Outer diameter	mm (in.)
17.989 – 17.996	(0.7082 – 0.7085)
17.996 – 18.003	(0.7085 – 0.7088)
18.003 – 18.010	(0.7088 – 0.7091)
18.010 – 18.017	(0.7091 – 0.7093)
18.017 – 18.024	(0.7093 – 0.7096)



D6801

6. INSTALL ADJUSTER MEMORY LEVER

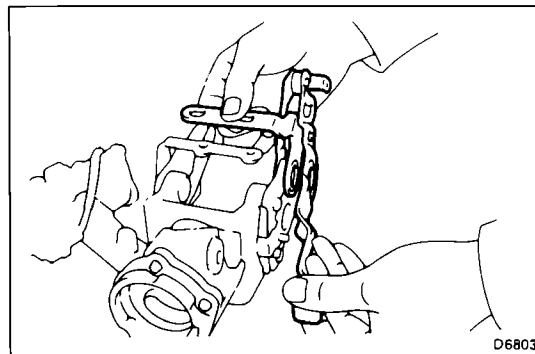
Install the adjuster memory lever to the ratchet of the column upper bracket.



D6802

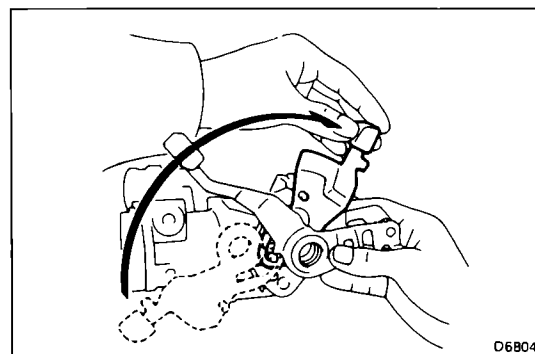
7. INSTALL TILT-UP CONTROL LEVER AND NO.1 TILT SUB LEVER

(a) Assemble the No.1 tilt sub lever to the tilt-up control lever.



D6803

(b) Install the tilt-up control lever to the column upper bracket.

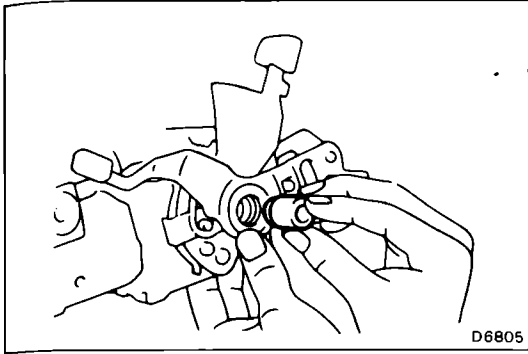


D6804

8. INSTALL TILT ADJUST LEVER

(a) Align the tilt adjust lever hole to the adjuster memory cover pin.

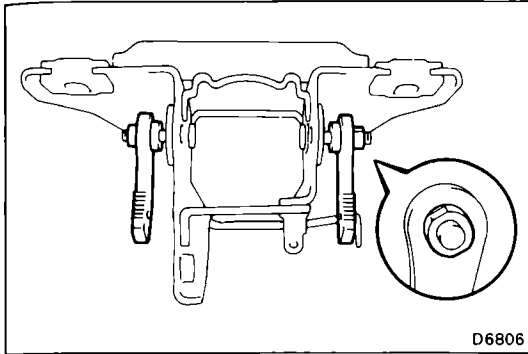
(b) Assemble the tilt adjust lever between the tilt-up control lever and No.1 tilt sub lever.



9. SELECT NO.1 SUPPORT COLLAR

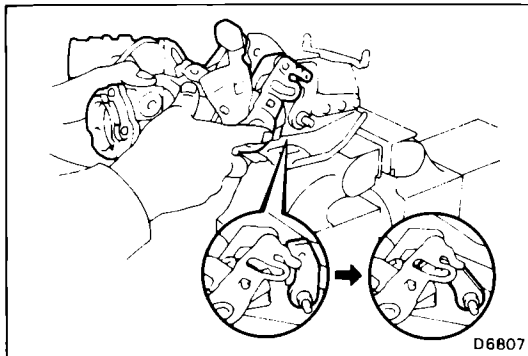
Select a No.1 collar which will eliminate all play.

Outer diameter	mm (in.)
17.989 – 17.996	(0.7082 – 0.7085)
17.996 – 18.003	(0.7085 – 0.7088)
18.003 – 18.010	(0.7088 – 0.7091)
18.010 – 18.017	(0.7091 – 0.7093)
18.017 – 18.024	(0.7093 – 0.7096)



10. INSTALL TWO SERRATION BOLTS AND TWO TILT PAWLS

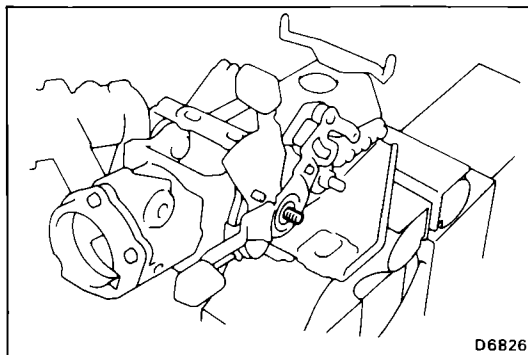
- (a) Install the two serration bolts to the breakaway bracket.
- (b) Install the two pawls and one of the bushing with cutout portion.



11. INSTALL COLUMN UPPER BRACKET

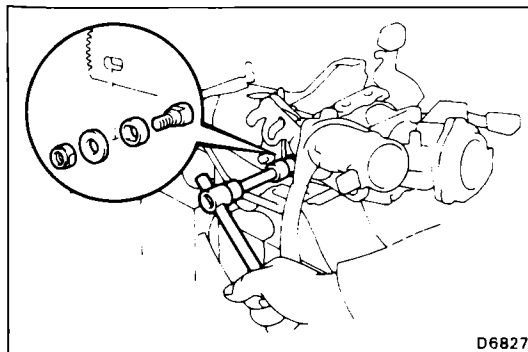
- (a) With the column upper bracket partially installed to the breakaway bracket, move the pawl toward the column upper bracket side and then completely install the column upper bracket.

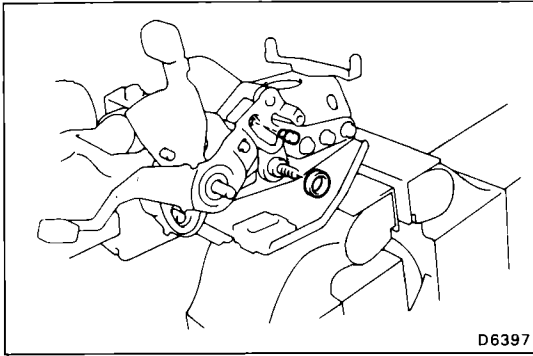
- (b) Insert the serration bolt of the No.1 support collar side.



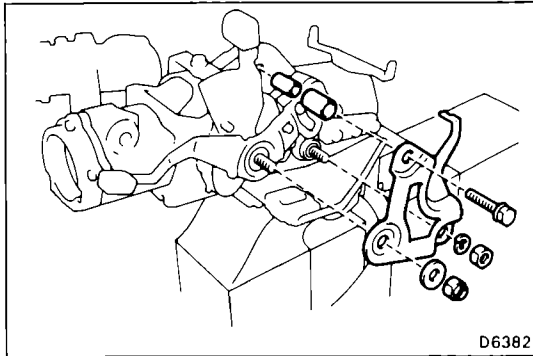
12. INSTALL SUPPORT STOPPER BOLT

Install the cushion to the bolt, and align the cutout portion of the support stopper bolt and tilt pawl, install it from inside of the column upper bracket.





13. INSTALL SPACER AND PIN

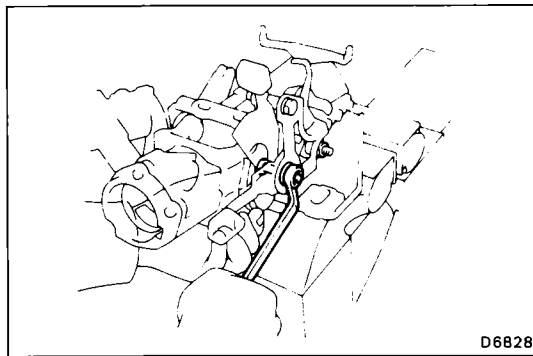


14. INSTALL TILT LEVER RETAINER

- (a) Install the tilt lever retainer with the collar, cushion and bolt.

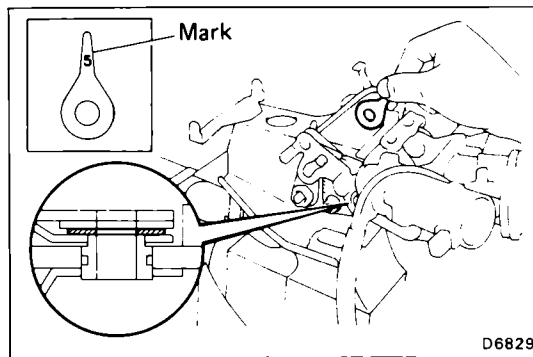
Torque: 195 kg-cm (14 ft-lb, 19 N·m)

- (b) Temporarily install the two nuts and washers.



- (c) Hold the serration bolt and tighten the two nuts.

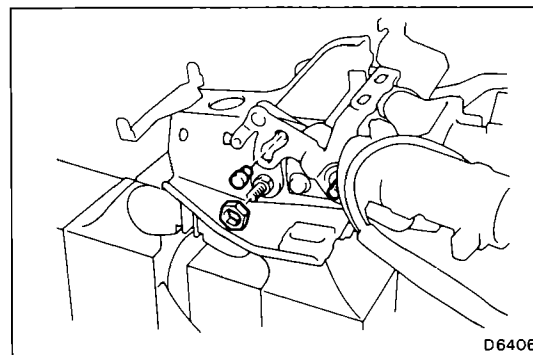
Torque: 195 kg-cm (14 ft-lb, 19 N·m)



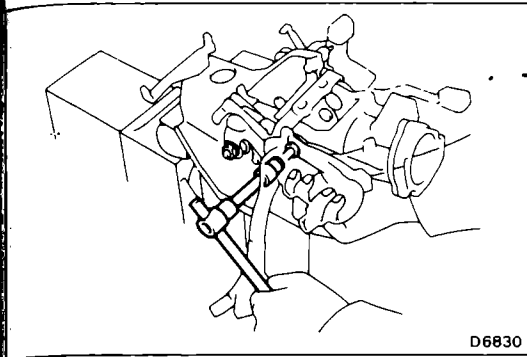
15. SELECT SUPPORT SHIM

Select one or two shims which fit snugly when pressed in by hand.

Mark	Thickness mm (in.)
None	0.197 – 0.203 (0.0078 – 0.0080)
5	0.495 – 0.505 (0.0195 – 0.0199)
8	0.795 – 0.805 (0.0313 – 0.0317)
14	1.395 – 1.405 (0.0549 – 0.0553)
18	1.795 – 1.805 (0.0707 – 0.0711)



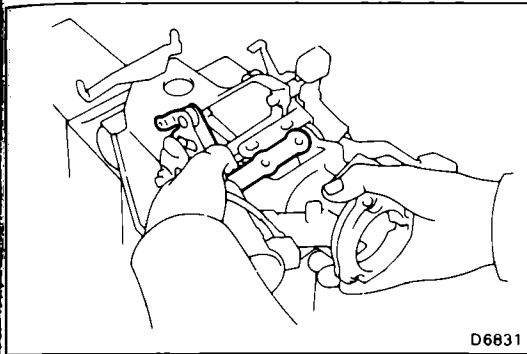
16. INSTALL SERRATION BOLT, TILT STEERING ADJUSTING NUT AND PIN



17. INSTALL TILT LEVER RETAINER

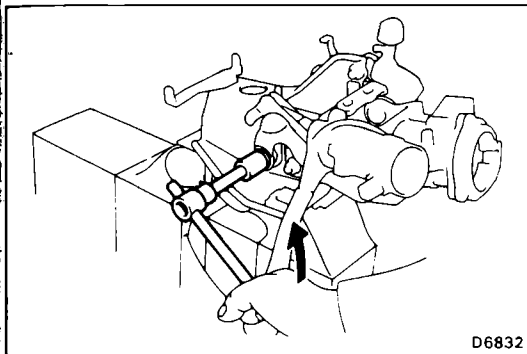
- (a) Install the tilt lever retainer.
- (b) Install the two nuts and washers.
- (c) Holding the bolts and tighten the nuts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

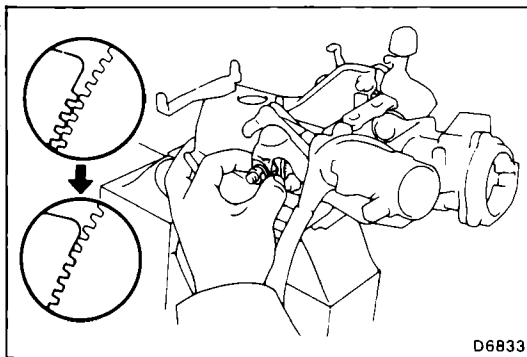


18. ADJUST ENGAGEMENT OF NO.2 TILT SUB LEVER

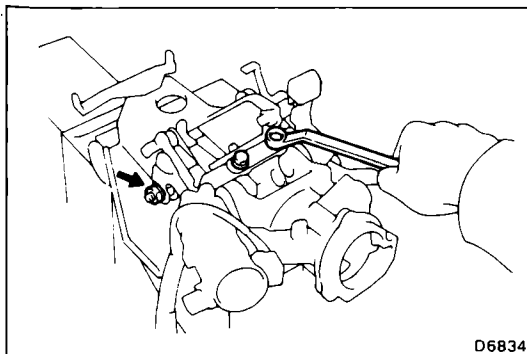
- (a) Pulling the No.2 tilt sub lever, disengage the pawl from the column upper bracket.
- (b) Moving the column upper bracket up or down, engage the opposite pawl with the column upper bracket.



- (c) Loosen the nut until the tilt steering adjusting nut turns smoothly.

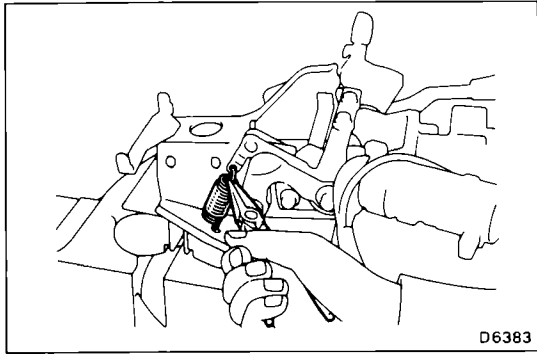
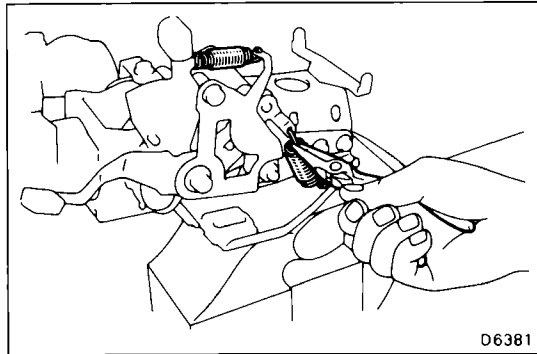
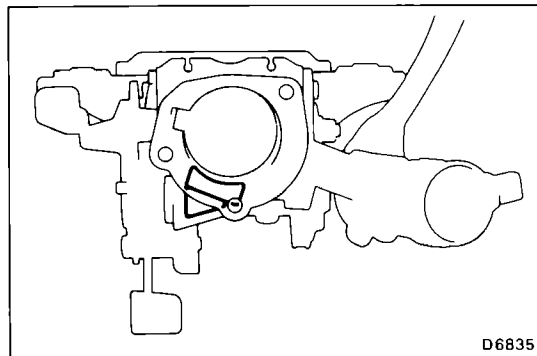


- (d) Pushing the pawl toward the column upper bracket, engage the pawl with the upper bracket by moving the adjusting nut.

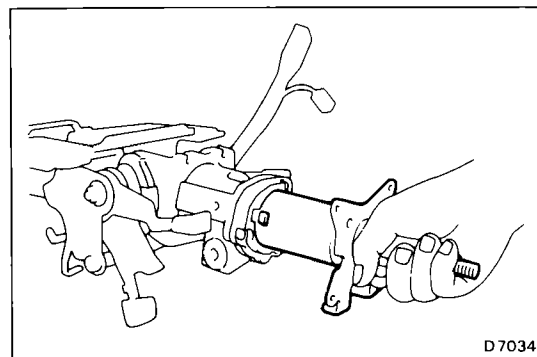


- (e) Tighten the nut as in figure and tighten the right and left bolts of the tilt lever.

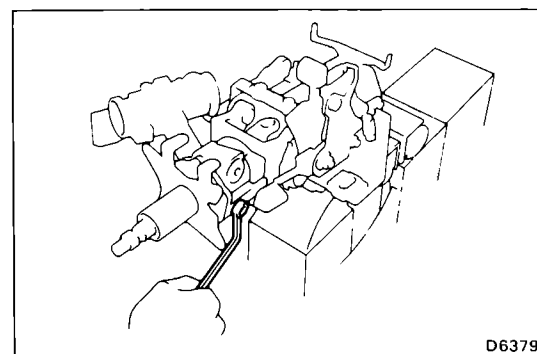
**Torque: Nut 195 kg-cm (14 ft-lb, 19 N·m)
Bolt 80 kg-cm (69 in.-lb, 7.8 N·m)**

**19. INSTALL TENSION SPRING****20. INSTALL TWO TENSION SPRINGS****21. INSTALL MAIN SHAFT ASSEMBLY**

- (a) Install the two lock wedges to the column upper bracket.

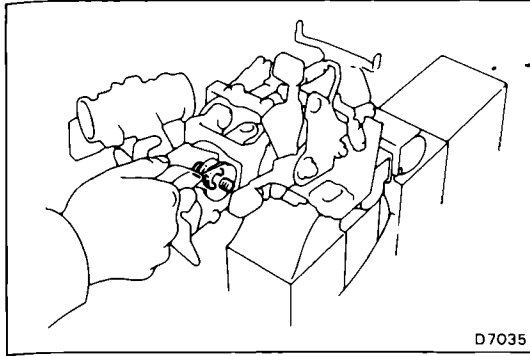


- (b) Place the ignition key at the ACC position.
 (c) Insert the main shaft assembly into the upper bracket.



- (d) Install the column tube stopper.

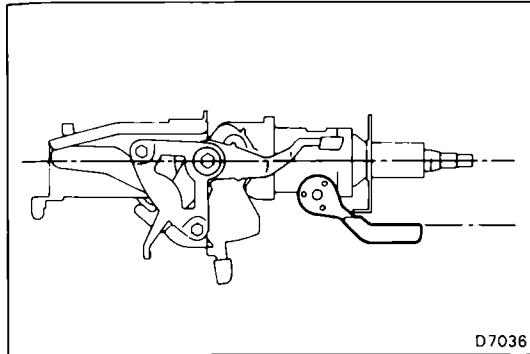
Torque: 80 kg-cm (69 in.-lb, 7.8 N·m)



22. INSTALL TELESCOPIC LEVER LOCK BOLT

Tighten the telescopic lever lock bolt with a telescopic lever.

NOTE: The bolt has LH threads.

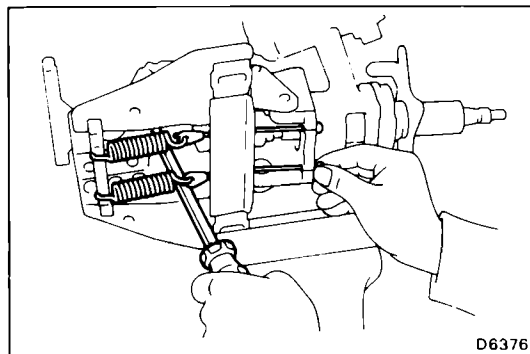


23. INSTALL TELESCOPIC LEVER

(a) Install the telescopic lever so it parallels the main shaft.

(b) Tighten the set nut.

Torque: 145 kg-cm (10 ft-lb, 14 N·m)

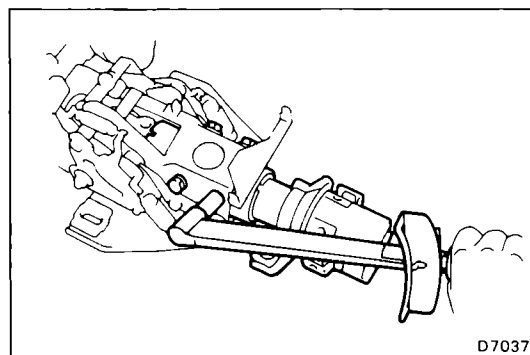


24. INSTALL TENSION SPRINGS AND CORDS

(a) Fully tilt the main shaft upward.

(b) Connect the spring and cord, and hook the spring to the hanger.

(c) Using a screwdriver, hook the cord end to the column upper bracket.

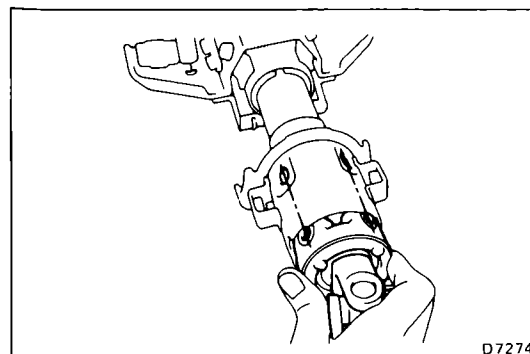


25. INSTALL COLUMN TUBE TO BREAKAWAY BRACKET

(a) Install the column tube to the breakaway bracket.

(b) Install and torque the four bolts.

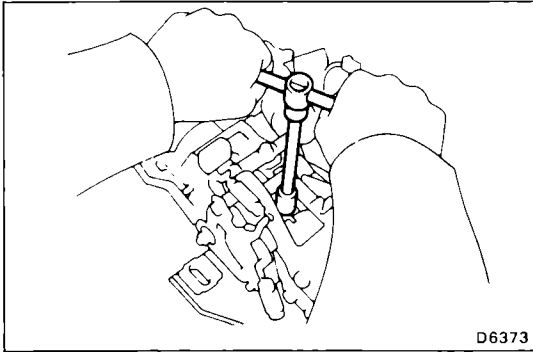
Torque: 185 kg-cm (13 ft-lb, 18 N·m)



26. INSTALL INTERMEDIATE SHAFT TO COLUMN TUBE

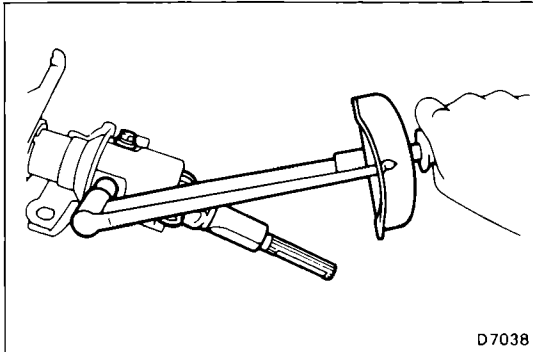
(a) Coat the thrust stopper with molybdenum disulphide lithium base grease.

(b) Install the intermediate shaft to the column tube.



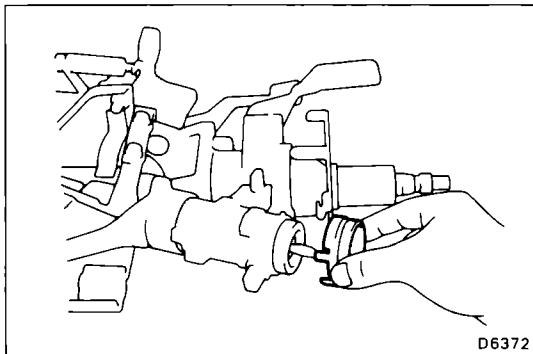
- (c) Connect the universal joint of main shaft and intermediate shaft.

Torque: 260 kg-cm (19 ft-lb, 25 N·m)



- (d) Install and torque the two bolts with plate washers.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)



27. INSTALL COLUMN COVER SPACER

POWER STEERING

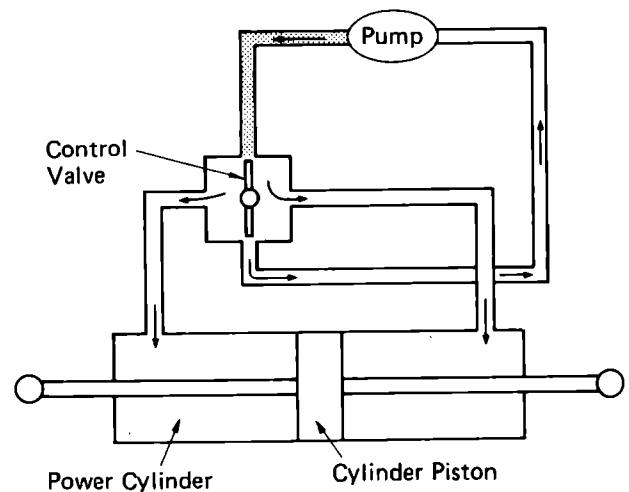
Description

PRINCIPLES OF POWER STEERING

Power steering is one type of hydraulic device for utilizing engine power as steering effort. Consequently, the engine is used to drive a pump to develop fluid pressure, and this pressure acts on a piston within the power cylinder so that the piston assists the rack effort. The amount of this assistance depends on the extent of pressure acting on the piston. Therefore, if more steering force is required, the pressure must be raised. The variation in the fluid pressure is accomplished by a control valve which is linked to the intermediate shaft and the steering main shaft.

NEUTRAL (STRAIGHT-AHEAD) POSITION

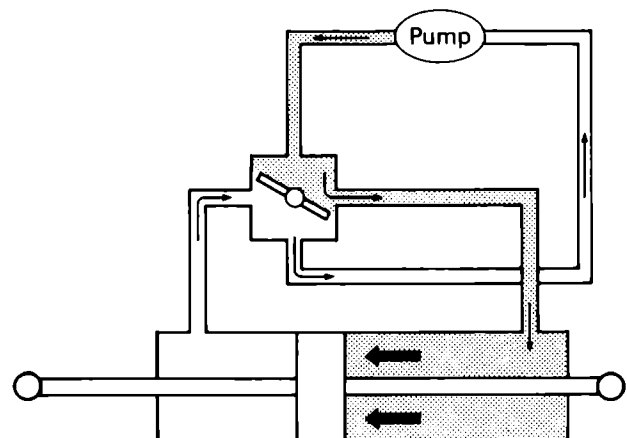
Fluid from the pump is sent to the control valve. If the control valve is in the neutral position, all the fluid will flow pass through the control valve into the relief port and back to the pump. At this time, hardly any pressure is created and because the pressure on the cylinder piston is equal on both sides, the piston will not move in either direction.



SR2390

WHEN TURNING

When the steering main shaft is turned in either direction, the control valve also moves, closing one of the fluid passages. The other passage then opens wider, causing a change in fluid flow volume and, at the same time, pressure is created. Consequently, a pressure difference occurs between both sides of the piston and the piston moves in the direction of the lower pressure so that the fluid in that cylinder is forced back to the pump through the control valve.



SR2391

SERVICE HINT

Troubles with the power steering system are usually concerned with hard steering due to the fact that there is no assist. In such case, before attempting to make repairs, it is necessary to determine whether the trouble lies with the pump or with the gear housing. To do this, an on-vehicle inspection can be made by using a pressure gauge.

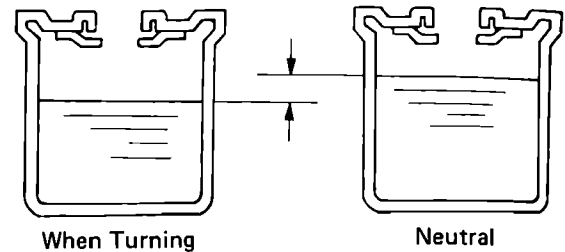
ON-VEHICLE INSPECTION

Power steering is a hydraulic device and any problems are normally due to insufficient fluid pressure acting on the piston. This could be caused by either the pump not producing the specified fluid pressure or the control valve in the gear housing not functioning properly so that the proper fluid pressure can not be obtained.

If the fault lies with the pump, the same symptoms will generally occur whether the steering wheel is turned fully to the right or left. On the other hand, if the fault lies with the control valve, there will generally be a difference between the amount of assist when the steering wheel is turned to the left and right, causing harder steering. However, if the piston seal of the power cylinder is worn, there will be a loss of fluid pressure whether the steering wheel is turned to the right or left and the symptoms will be the same for both.

Before performing an on-vehicle inspection, a check must first be made to confirm that the power steering system is completely free of any air. If there is any air in the system, the volume of this air will change when the fluid pressure is raised, causing a fluctuation in the fluid pressure so that the power steering will not function properly. To determine if there is any air in the system, check to see if there is a change of fluid level in the reservoir tank when the steering wheel is turned fully to the right or left.

For example, if there is air in the system, it will be compressed to a smaller volume when the steering wheel is turned, causing a considerable drop in the fluid level. If the system is free of air, there will be very little change in the level even when the fluid pressure is raised. This is because the fluid, being a liquid, does not change volume when compressed. The little change in the fluid level is due to expansion of the hoses between the pump and gear housing when pressure rises.



SR2392

SR2393

Also, air in the system will sometimes result in an abnormal noise occurring from the pump or gear housing when the steering wheel is fully turned in either direction.

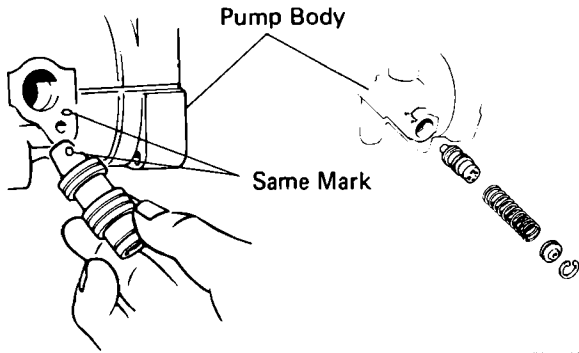
This on-vehicle inspection must always be performed to insure that the power steering system is working properly after overhauling or repairing the pump or gear housing.

VANE PUMP

The main component parts of the vane pump, such as the cam ring, rotor, vanes and flow control valve are high precision parts and must be handled carefully. Also, because this pump produces a very high fluid pressure, O-rings are used for sealing each part. When reassembling the pump, always use new O-rings.

In the flow control valve, there is a relief valve which controls the maximum pressure of the pump. The amount of this maximum pressure is very important; if it is too low, there will be insufficient power steering assist and if too high, it will have an adverse effect on the pressure hoses, oil seals, etc.. if the maximum pressure is either too high or too low due to a faulty relief valve, do not disassemble or adjust the relief valve, but replace the flow control valve as an assembly.

The clearance between the flow control valve and pump body installation hole is very important. After manufacture, the factory measures the size of the installation hole and outer circumference of the flow control valve, and punches a mark accordingly. Therefore, when replacing the flow control valve, be sure to do so with one having the same mark in order to insure the proper clearance.

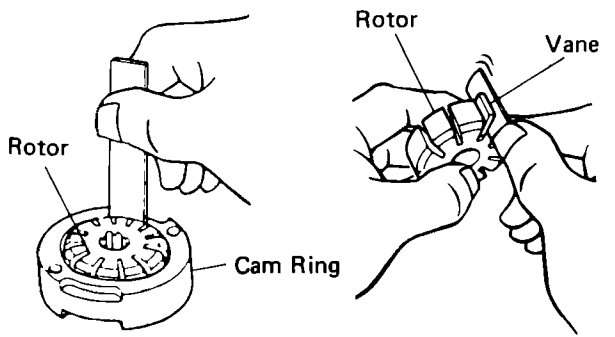


SR2394

SR2395

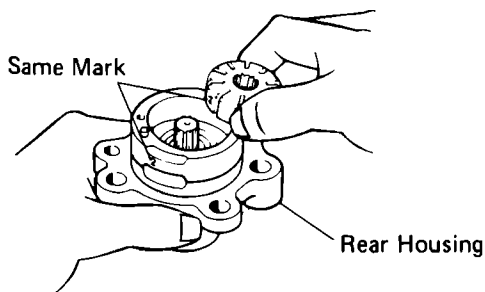
The functional parts of the pump which produce fluid pressure are the cam ring, rotor and vanes, and these should be checked for wear. If the clearance between each is not within standard when reassembling, any worn parts should be replaced.

In this case, the replaced cam ring and rotor should be of the same length (have the same mark), and the vanes should be replaced with those having a length corresponding to that mark, otherwise the proper thrust clearance cannot be obtained. If there is too much thrust clearance, there will be insufficient fluid pressure at low speeds. If there is too little thrust clearance, it may result in seizure of the vanes.



SR2396

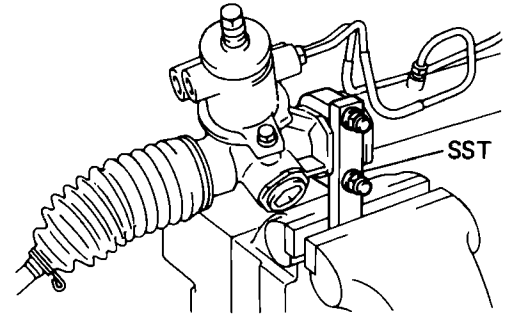
SR2397



SR2398

GEAR HOUSING

If the gear housing is secured directly in a vise during overhaul, there is danger of deforming it, so always first secure it in the SST provided (rack and pinion steering rack housing stand) before placing it in the vise.



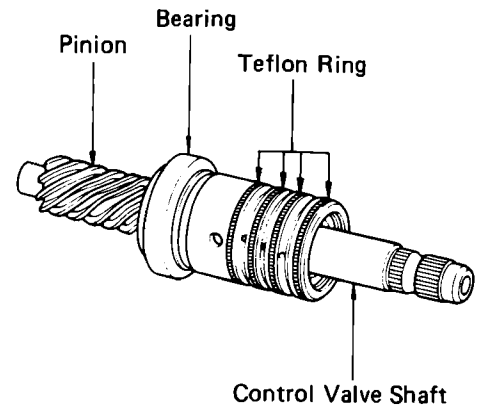
SR1340

The oil seals on both sides of the power cylinder are for the prevention of leakage of the high pressure fluid which acts on the piston. Always use new oil seals when reassembling and be very careful not to scratch or damage them.

Because of the high pressure, even the slightest scratch will cause fluid leakage, resulting in an inoperative power steering system.

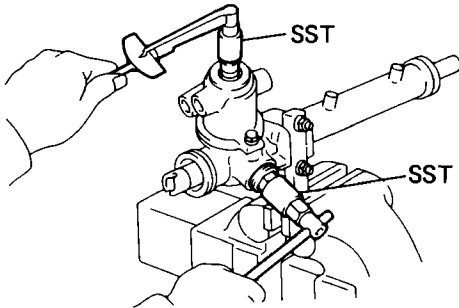
Also, be very careful not to scratch the sliding portion of the rack which makes contact with the oil seals. When removing the rack ends from the rack, it is very easy to cause a burr when holding the tip of the rack with a wrench. Therefore, before assembling the rack, first check the tip for burrs and remove any with an oil stone.

Teflon rings are used for the piston and control valve. These teflon rings are highly durable against wear, but if it is necessary to replace them, be careful not to stretch the new ones. After installing a teflon ring into its groove, snug it down into the groove before assembly of the cylinder or housing to prevent possible damage.



SR2400

As with the rack and pinion type steering, preload is very important. If the preload is not correct, it could result in such trouble as steering wheel play or shimmy or lack of durability, so always make sure that it is correct.



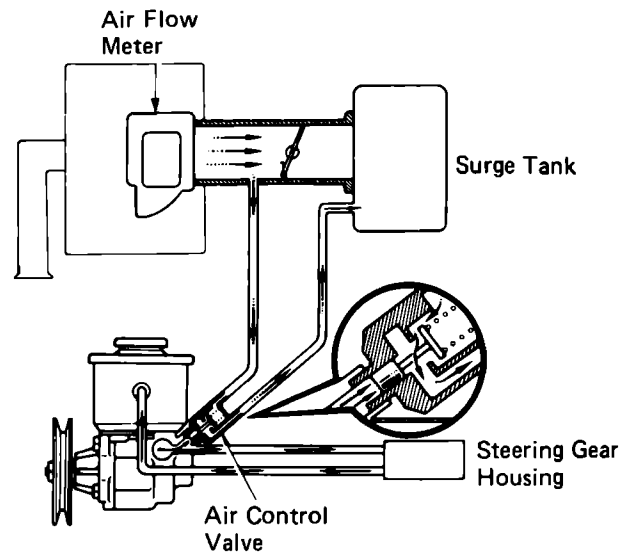
SR1367

IDLE-UP DEVICE

The pump produces the maximum fluid pressure when the steering wheel is turned fully to the right or left and, at this time, there is a maximum load on the pump which causes a decrease in engine idle rpm. To solve this problem, some vehicles are equipped with an idle-up device which acts to raise the engine idle rpm whenever there is a heavy load on the pump.

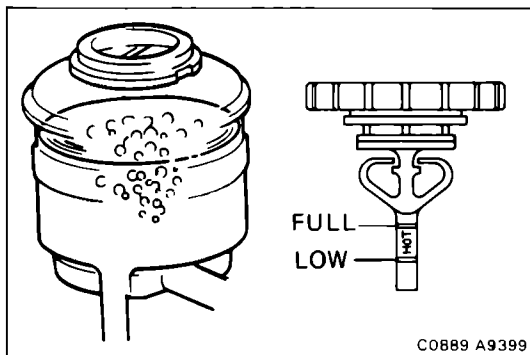
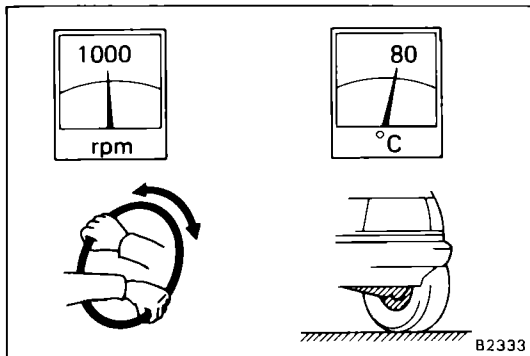
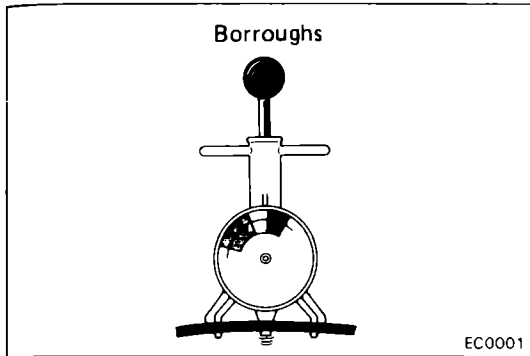
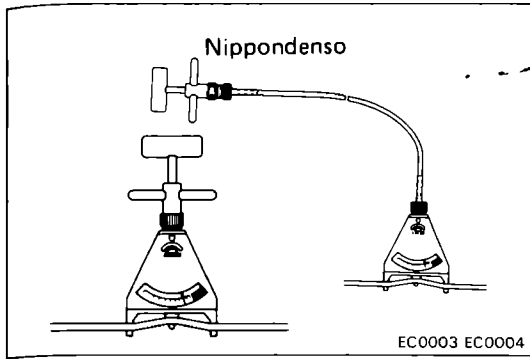
EFI ENGINES

On EFI engines, when the piston of the air control valve is pushed by fluid pressure, the air valve opens and the volume of air by-passing the throttle valve is increased to regulate engine rpm.



SR2402

The idle-up device functions to raise engine idle rpm when pump fluid pressure acts on the air control valve, installed to the pump body, to control the flow of air.



On-Vehicle Inspection

CHECK DRIVE BELT TENSION

Using a belt tension gauge, check the drive belt tension.

Belt tension gauge:

Nippondenso BTG-20 (95506-00020) or

Borrighs No.BT-33-73F

Drive belt tension:

New belt 125 ± 25 lb

Used belt 80 ± 20 lb

NOTE:

- "New belt" refers to a belt which has been less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.

FLUID LEVEL CHECK

1. KEEP VEHICLE LEVEL

2. BOOST FLUID TEMPERATURE

With the engine idling at 1,000 rpm or less, turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80°C (176°F)

3. CHECK FOR FOAMING OR EMULSIFICATION

NOTE: Foaming and emulsification indicate either the existence of air in the system or that the fluid level is too low.

4. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.

Fluid: ATF DEXRON® or DEXRON® II

NOTE: Check that the fluid level is within the HOT LEVEL of the dipstick. If the fluid is cold, check that it is within the COLD LEVEL of the dipstick.

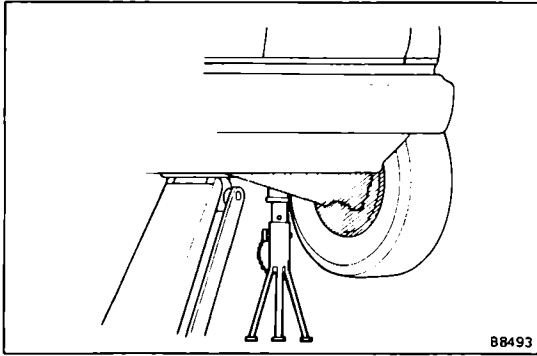
CHECK IDLE-UP

1. WARM UP ENGINE

2. TURN AIR CONDITIONER SWITCH OFF

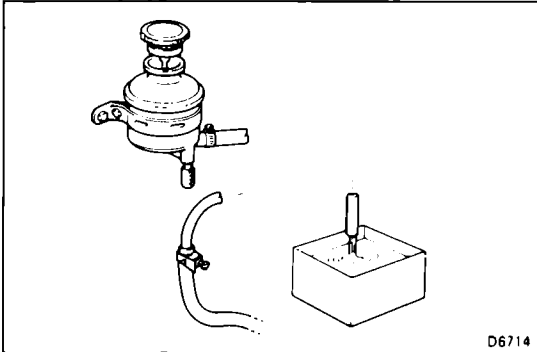
3. CHECK IDLE-UP

- Fully turn the steering wheel.
- Check that the engine rpm decrease when the air control valve hose is pinched.
- Check that the engine rpm increase when the air control valve hose is released.

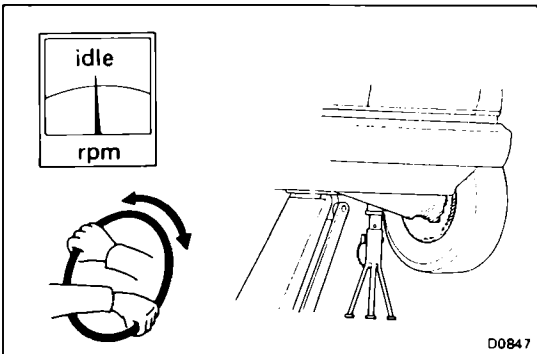


REPLACEMENT OF POWER STEERING FLUID

1. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS

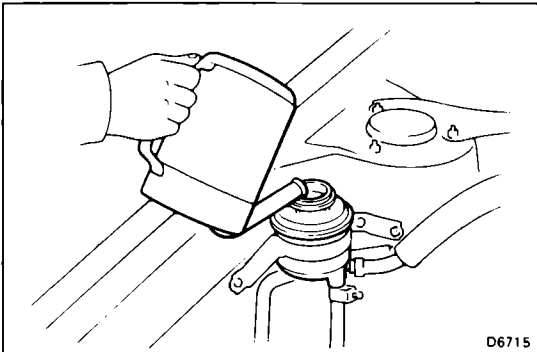


2. REMOVE FLUID RETURN HOSE FROM RESERVOIR TANK AND DRAIN FLUID INTO CONTAINER



3. WITH ENGINE IDLING, TURN STEERING WHEEL FROM LOCK TO LOCK WHILE DRAINING FLUID

4. STOP ENGINE



5. FILL RESERVOIR TANK WITH FRESH FLUID
Fluid type: ATF DEXRON® or DEXRON® II

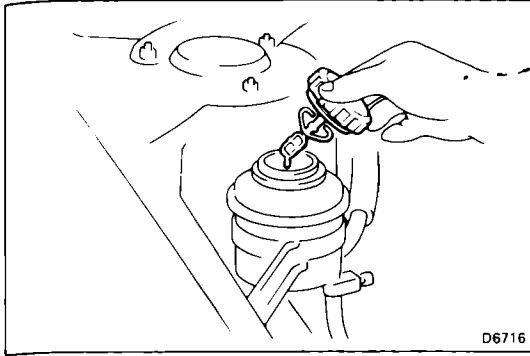
6. START ENGINE AND RUN IT AT 1,000 RPM

After 1 or 2 seconds, fluid will begin to discharge from the return hose. Stop the engine immediately at this time.

7. REPEAT STEPS 5 AND 6 FOUR OR FIVE TIMES UNTIL THERE IS NO MORE AIR IN FLUID

8. CONNECT RETURN HOSE TO RESERVOIR TANK

9. BLEED POWER STEERING SYSTEM



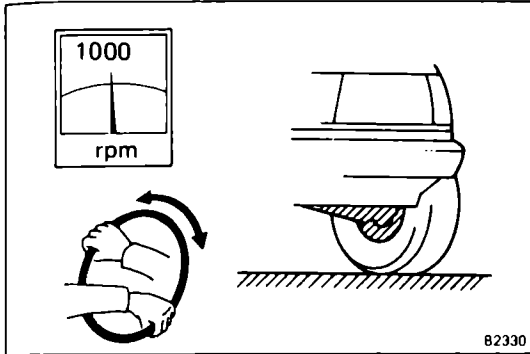
BLEEDING OF POWER STEERING SYSTEM

1. CHECK FLUID LEVEL IN RESERVOIR TANK

Check the fluid level and add fluid if necessary.

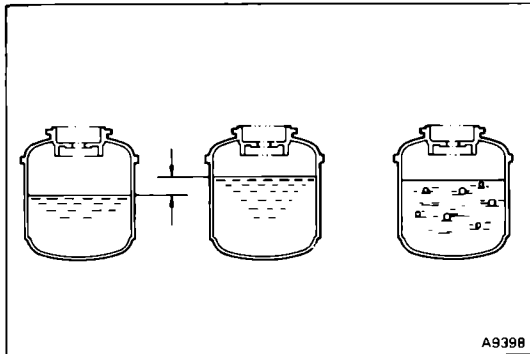
Fluid: ATF DEXRON® or DEXRON® II

NOTE: Check that the fluid level is within the HOT LEVEL of the dipstick. If the fluid is cold, check that it is within the COLD LEVEL of the dipstick.



2. START ENGINE AND TURN STEERING WHEEL FROM LOCK TO LOCK THREE OR FOUR TIMES

Run the engine at 1,000 rpm or less.

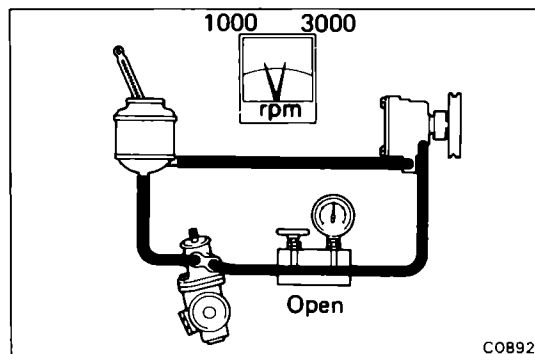
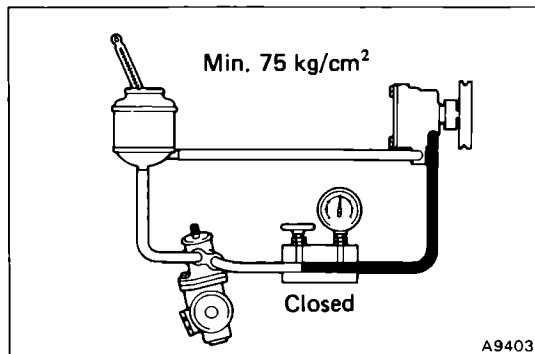
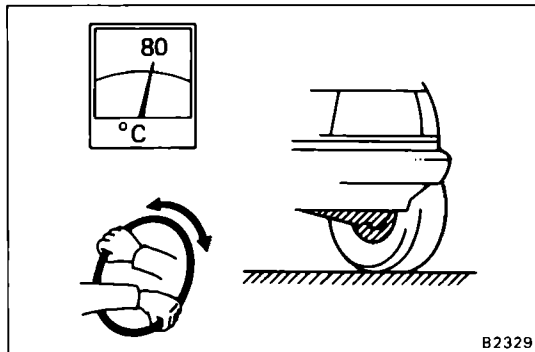
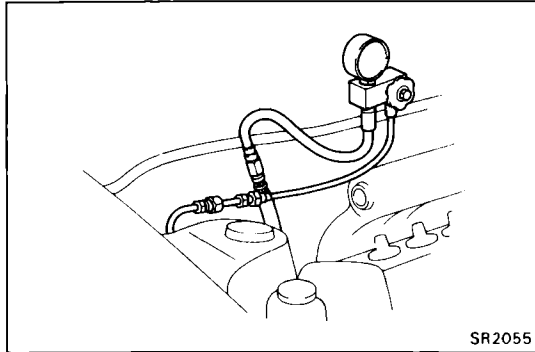
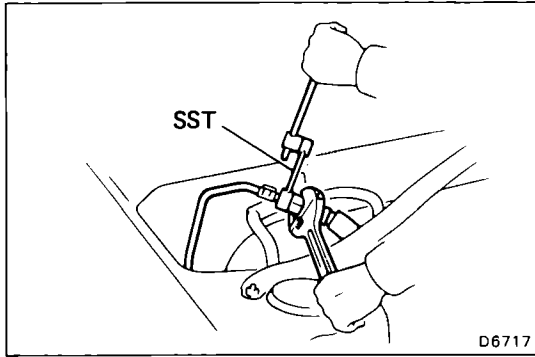


3. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED

Measure the fluid level with the engine running. Stop the engine and measure the fluid level.

Maximum rise: 5 mm (0.20 in.)

If a problem is found, repeat steps 7 and 8. Repair the PS if the problem persists.



OIL PRESSURE CHECK

1. CONNECT PRESSURE GAUGE

(a) Using SST, disconnect the pressure line joint.
SST 09631-22020

(b) Connect the gauge side of the pressure gauge to the PS pump, and the valve side to the pressure line.

(c) Bleed the system. Start the engine and turn the steering wheel from lock to lock two or three times.

(d) Check that the fluid level is correct.

2. CHECK THAT FLUID TEMPERATURE IS AT LEAST 80°C (176°F)

3. START ENGINE AND RUN IT AT IDLE

4. CHECK FLUID PRESSURE READING WITH VALVE CLOSED

Close the pressure gauge valve and observe the reading on the gauge.

Minimum pressure:

75 – 80 kg/cm²

(1,067 – 1,138 psi, 7,355 – 7,845 kPa)

NOTE: Do not keep the valve closed for more than 10 seconds.

If pressure is low, repair or replace the PS pump.

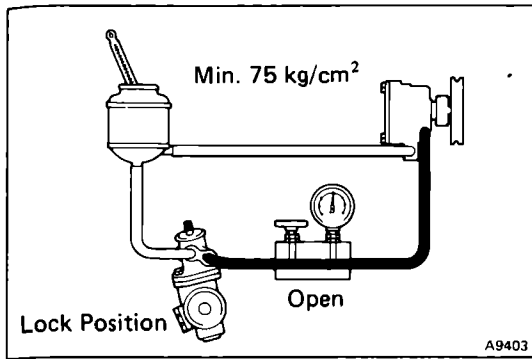
5. OPEN VALVE FULLY

6. CHECK AND RECORD PRESSURE READING AT 1,000 RPM

7. CHECK AND RECORD PRESSURE READING AT 3,000 RPM

Check that there is 5 kg/cm² or less (71 psi, 490 kPa) difference in pressure between the 1,000 rpm and 3,000 rpm checks.

If the difference is excessive, repair or replace the flow control valve of the PS pump.



8. CHECK PRESSURE READING WITH STEERING WHEEL TURNED TO FULL LOCK

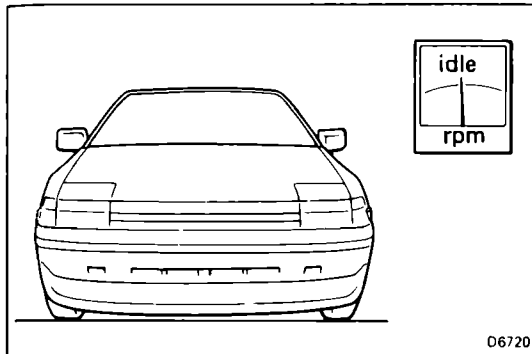
Be sure the pressure gauge valve is fully opened and the engine idling.

Minimum pressure:

75 – 80 kg/cm²

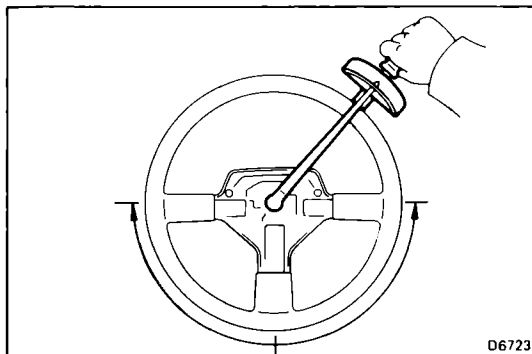
(1,067 – 1,138 psi, 7,355 – 7,845 kPa)

If pressure is low, the gear housing has an internal leak and must be repaired or replaced.



9. MEASURE STEERING EFFORT

Center the steering wheel and run the engine at idle.



Using a torque meter, measure the steering effort in both directions.

Maximum steering effort: 70 kg-cm (61 in.-lb, 6.9 N·m)

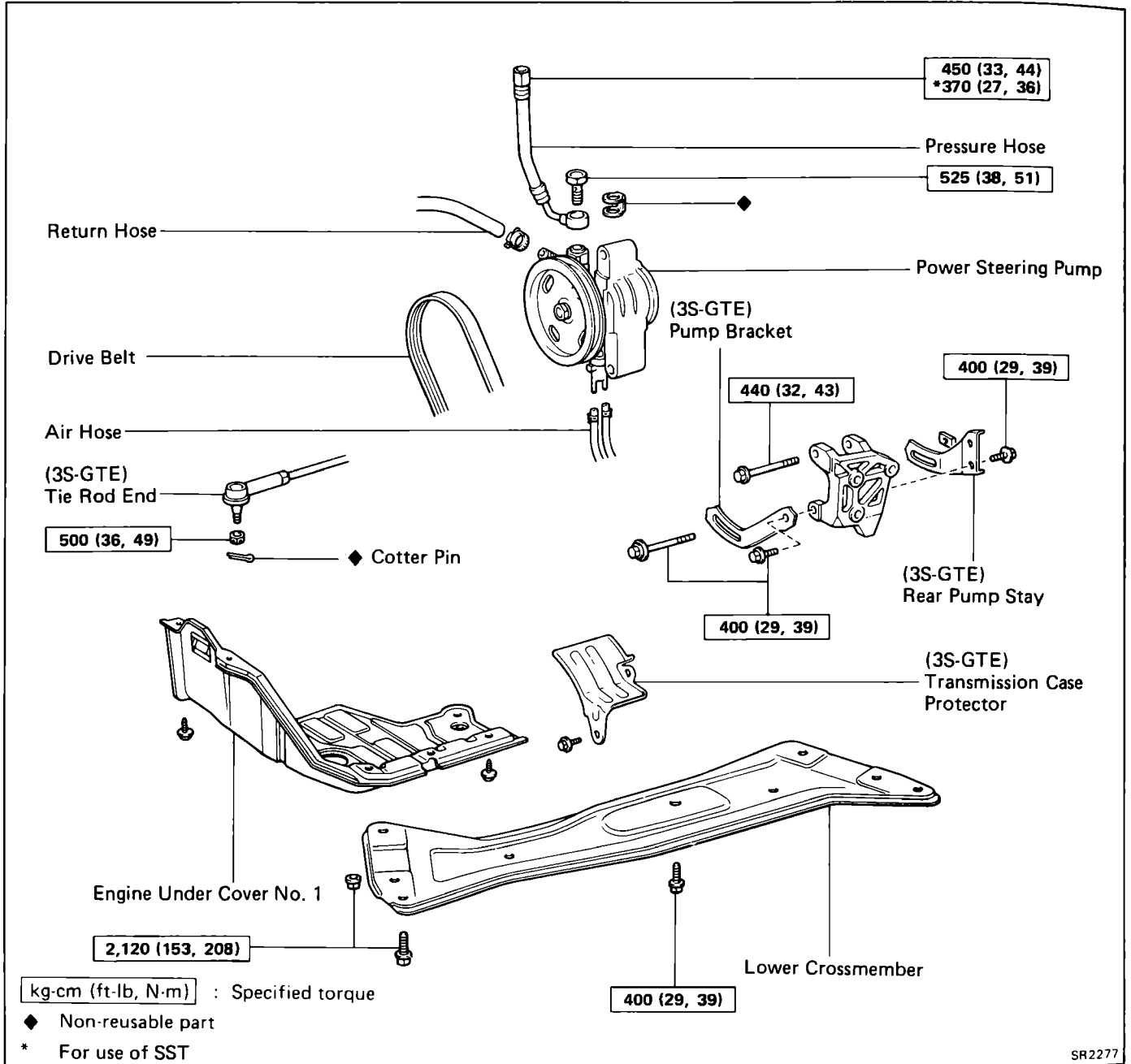
If steering effort is excessive, repair the power steering unit.

NOTE: Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

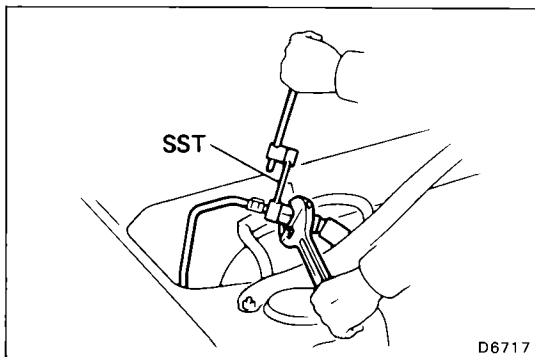
Power Steering Pump

REMOVAL AND INSTALLATION OF POWER STEERING PUMP

Remove and install the parts as shown.



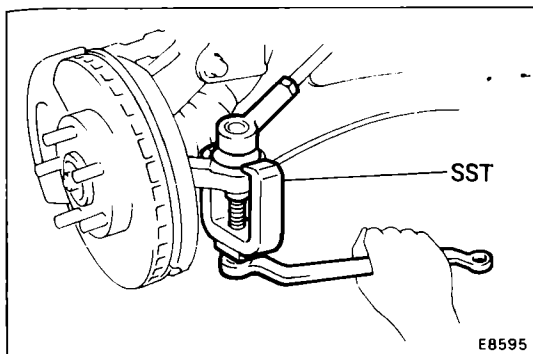
SR2277



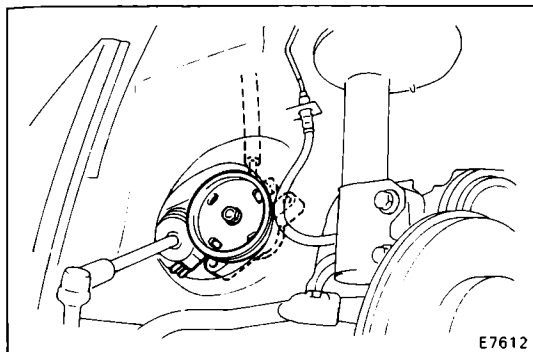
(MAIN POINT OF REMOVAL AND INSTALLATION)

1. DISCONNECT PRESSURE TUBE

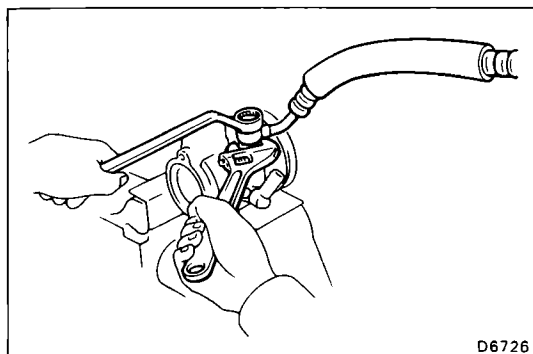
Using SST, disconnect the pressure tube.
SST 09631-22020



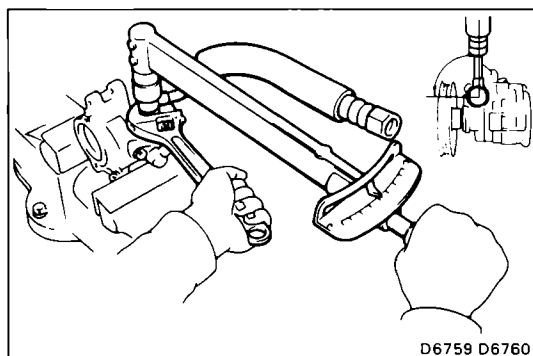
2. (3S-GTE Engine)
DISCONNECT TIE ROD END RH SIDE
 - (a) Remove the cotter pin and nut.
 - (b) Using SST, disconnect the tie rod end RH side.
 SST 09611-22012



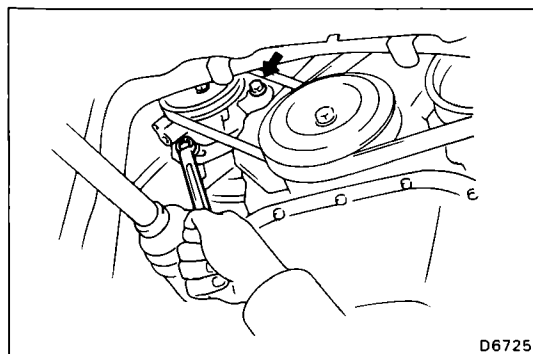
3. (3S-GTE Engine)
REMOVE PS PUMP
 - (a) Remove the through bolt.
 - (b) Remove the PS pump from the tie rod end hole.



4. **REMOVE PRESSURE TUBE**
 - (a) Mount the PS pump in the vise.**CAUTION: Do not tighten the vise too tight.**
 - (b) Remove the union bolt and pressure tube.



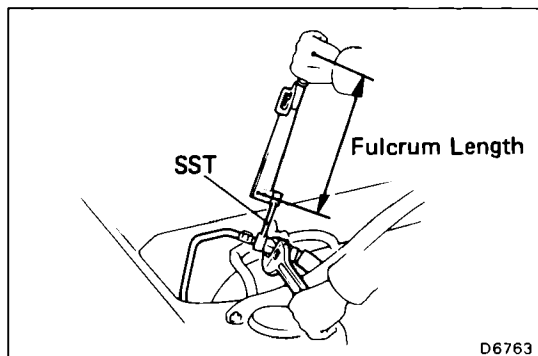
5. **INSTALL PRESSURE TUBE**
 Install the pressure tube with the bolt and a new gasket, and torque the bolt.
Torque: 525 kg-cm (38 ft-lb, 51 N·m)



6. **INSTALL DRIVE BELT**
 - (a) Install the drive belt.
 - (b) Adjust the drive belt tension and torque mount bolts.**Torque: Through bolt 440 kg-cm (32 ft-lb, 43 N·m)**
Adjusting bolt 400 kg-cm (29 ft-lb, 39 N·m)
Drive belt tension:
New belt 125 ± 25 lb
Used belt 80 ± 20 lb

NOTE:

- "New belt" refers to a belt which has been less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.

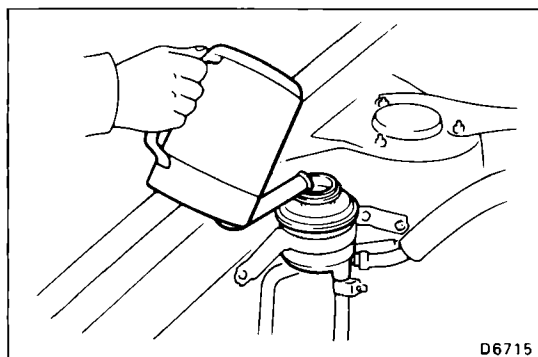
**7. CONNECT PRESSURE TUBE**

Using SST, connect the pressure tube.

SST 09631-22020

Torque: 370 kg-cm (27 ft-lb, 36 N·m)

NOTE: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

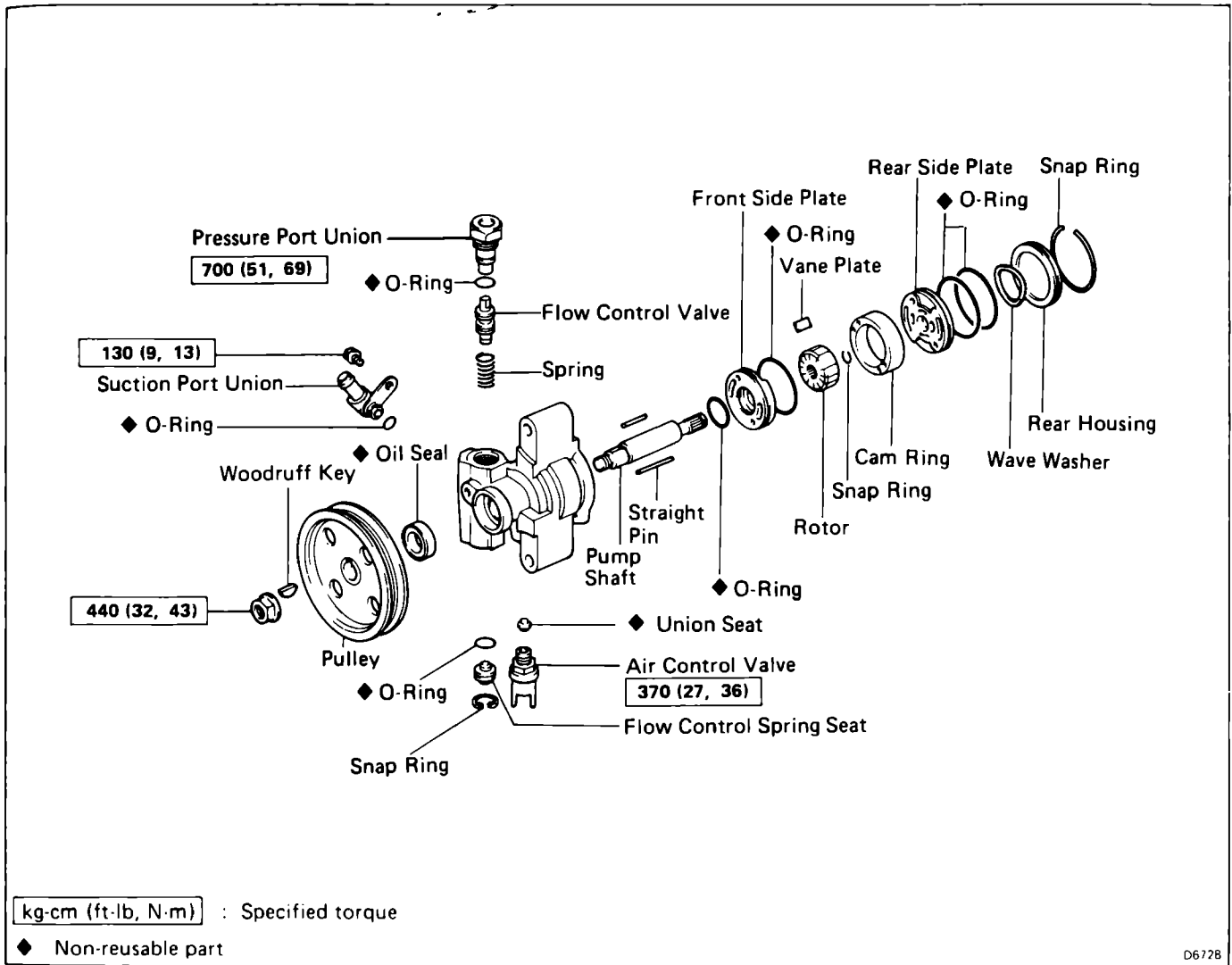
**8. FILL RESERVOIR TANK WITH FLUID**

Fluid type: ATF DEXRON® or DEXRON® II

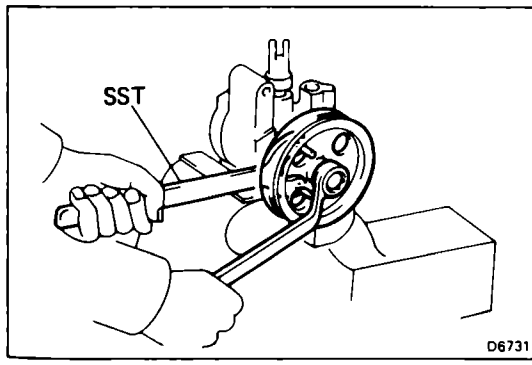
9. BLEED POWER STEERING SYSTEM (See page SR-41)**10. CHECK FOR FLUID LEAKS**

**11. (3S-GTE Engine)
CHECK TOE-IN (See page FA-5)**

COMPONENTS



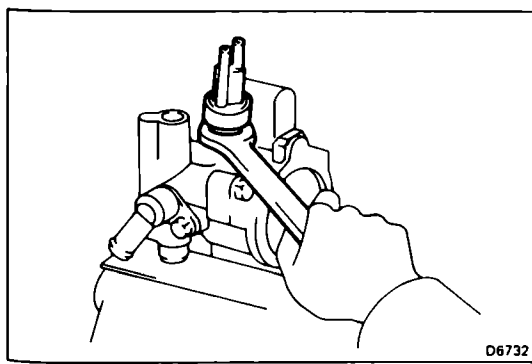
D6728



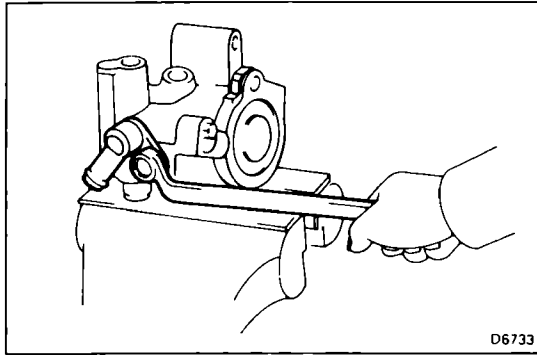
D6731

DISASSEMBLY OF POWER STEERING PUMP

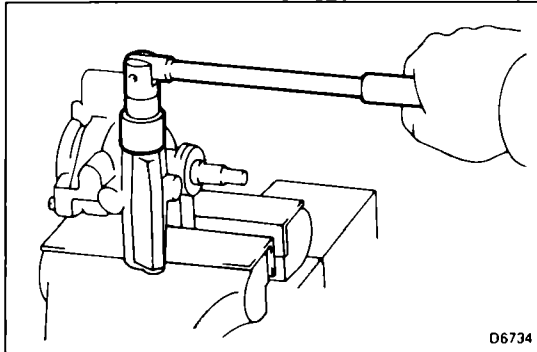
1. MOUNT POWER STEERING PUMP IN VISE
CAUTION: Do not tighten the vise too tight.
2. REMOVE PS PUMP PULLEY
 - (a) Using SST, remove the pulley set nut.
 SST 09616-30020
 - (b) Remove the pulley and woodruff key.
3. REMOVE AIR CONTROL VALVE
 - (a) Remove the air control valve.
 - (b) Remove the union seat.



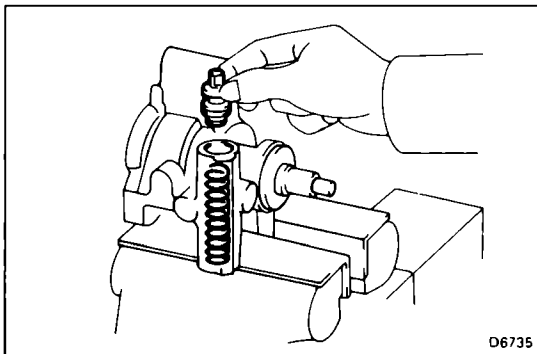
D6732

**4. REMOVE SUCTION PORT UNION**

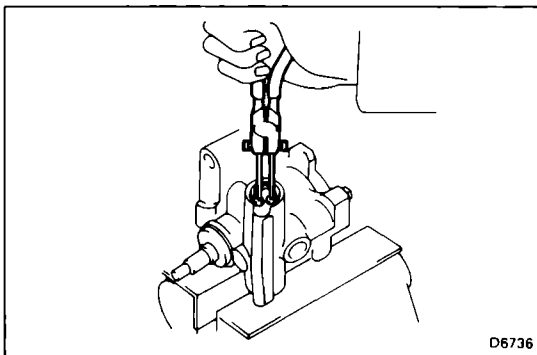
- (a) Remove the bolt and union.
- (b) Remove the O-ring from the union.

**5. REMOVE FLOW CONTROL VALVE**

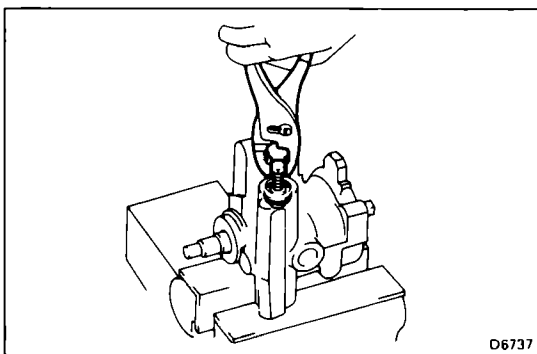
- (a) Remove the pressure port union.
- (b) Remove the O-ring from the union.



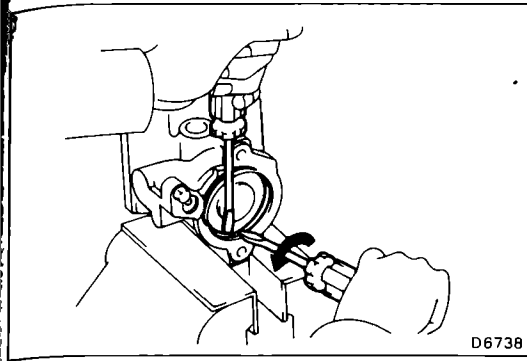
- (c) Remove the flow control valve and spring.

**6. REMOVE FLOW CONTROL SPRING SEAT**

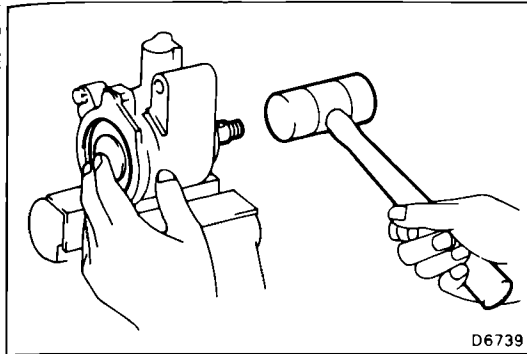
- (a) Using snap ring pliers, remove the snap ring.



- (b) Temporarily install a bolt to the seat and pull out the seat.
- (c) Remove the O-ring from the seat.

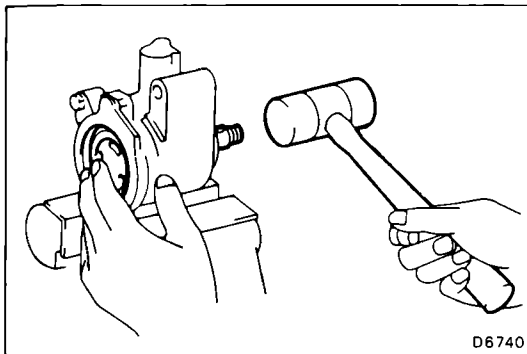
**7. REMOVE REAR HOUSING**

(a) Using two screwdrivers, remove the snap ring.



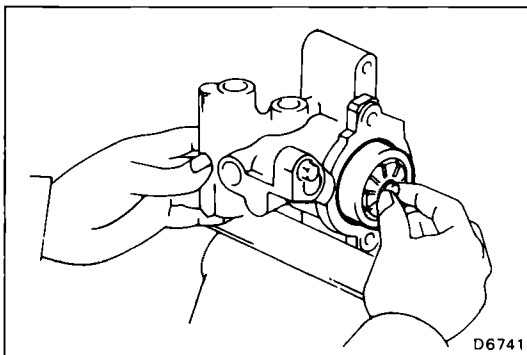
(b) Using a plastic hammer, tap out the rear housing and wave washer.

(c) Remove the O-ring from the rear housing.

**8. REMOVE REAR SIDE PLATE**

(a) Using a plastic hammer, tap the shaft end and remove the rear plate.

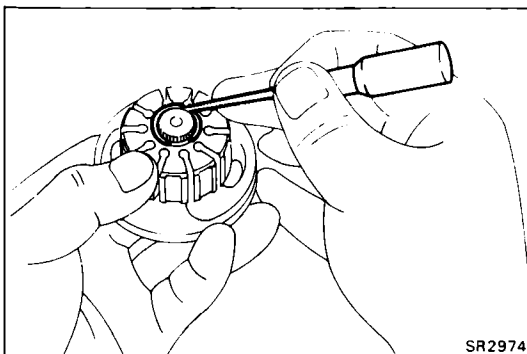
(b) Remove the O-ring from the rear plate.

**9. REMOVE VANE PUMP SHAFT, CAM RING AND VANE PLATES**

(a) Remove the pump shaft with cam ring and vane plates from the front housing.

(b) Remove the cam ring and ten vane plates from the pump shaft.

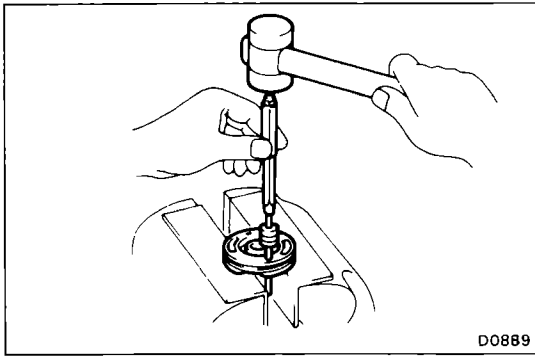
(c) Remove the longer straight pin from the front housing.

**10. REMOVE ROTOR AND FRONT PLATE**

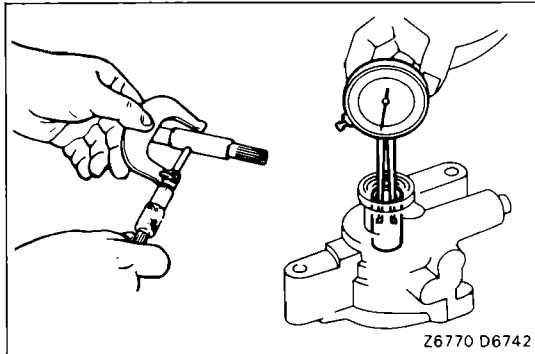
(a) Using a screwdriver, remove the snap ring.

(b) Remove the rotor and front plate from the pump shaft.

(c) Remove the two O-rings from the front plate.



(d) Using a pin punch and hammer, drive out the straight pin.



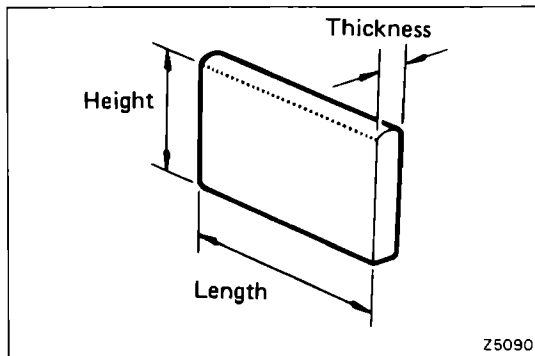
INSPECTION OF POWER STEERING PUMP

1. MEASURE OIL CLEARANCE OF SHAFT AND BUSHING
Using a micrometer and calipers, measure the oil clearance.

Standard clearance: 0.01 – 0.03 mm
(0.0004 – 0.0012 in.)

Maximum clearance: 0.07 mm (0.0028 in.)

If more than maximum, replace the entire power steering pump.



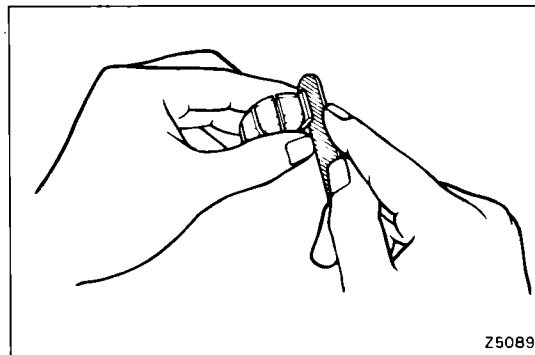
2. INSPECT ROTOR AND VANE PLATES

(a) Using a micrometer measure the height, thickness and length of the vane plates.

Minimum height: 8.0 mm (0.315 in.)

Minimum thickness: 1.77 mm (0.0697 in.)

Minimum length: 14.97 mm (0.5894 in.)



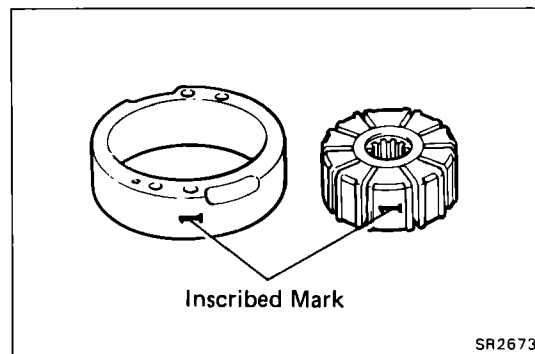
(b) Using a feeler gauge, measure the clearance between the rotor groove and vane plate.

Maximum clearance: 0.03 mm (0.0011 in.)

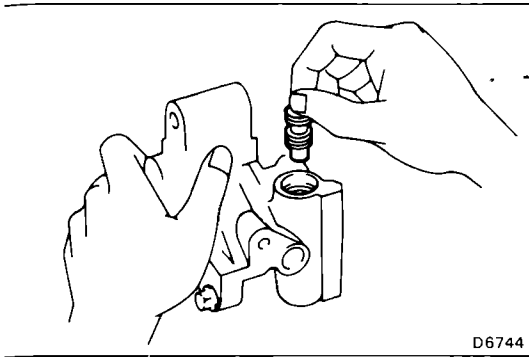
If more than maximum, replace the pump plate and/or rotor with one having the same mark stamped on the cam ring.

Inscribed mark: 1,2,3,4 or None

NOTE: There are five vane lengths with the following rotor and cam ring marks:



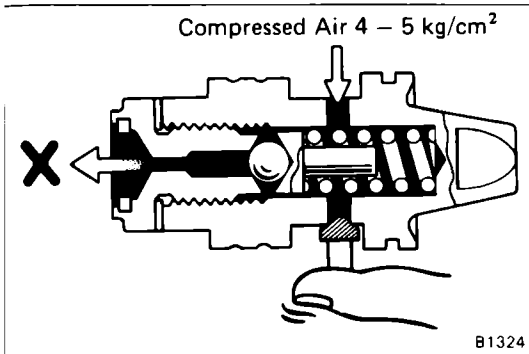
Rotor and cam ring mark	Vane length mm (in.)	
None	14.996 – 14.998	(0.5904 – 0.5905)
1	14.994 – 14.996	(0.5903 – 0.5904)
2	14.992 – 14.994	(0.5902 – 0.5903)
3	14.990 – 14.992	(0.59016 – 0.59024)
4	14.988 – 14.990	(0.5901 – 0.5902)



D6744

3. INSPECT FLOW CONTROL VALVE

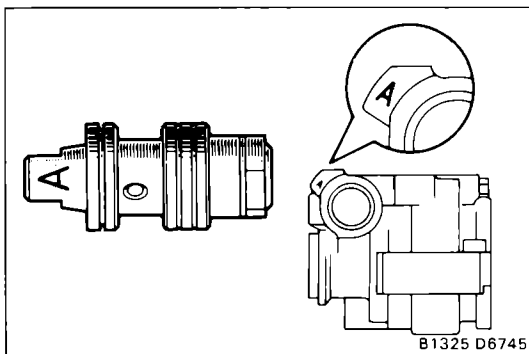
(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



B1324

(b) Check the flow control valve for leakage.

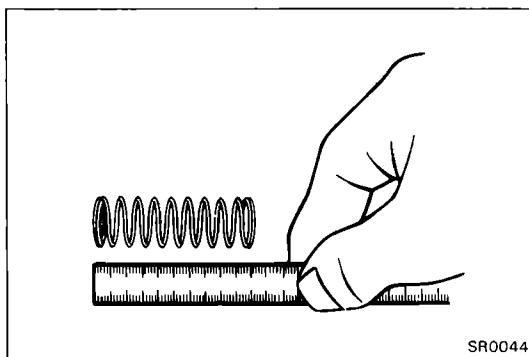
Close one of the holes and apply compressed air [4 or 5 kg/cm² (57 or 71 psi, 392 or 490 kPa)] into the opposite side, and confirm that air does not come out from the end hole.



B1325 D6745

If necessary, replace the valve with one having the same letter as inscribed on the front housing.

Inscribed mark: **A,B,C,D,E or F**



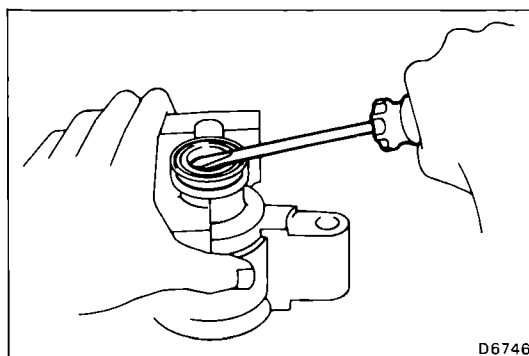
SR0044

4. INSPECT FLOW CONTROL SPRING

Using a scale, measure the free length of the spring.

Spring length: 36–38 mm (1.42–1.49 in.)

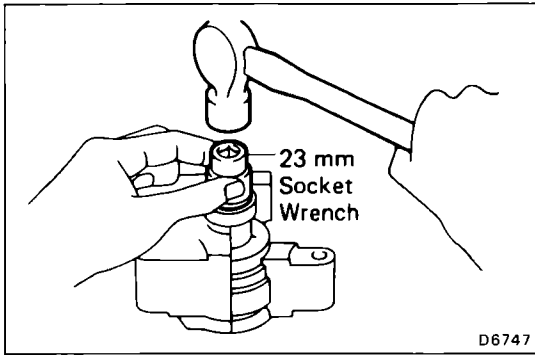
If not within specification, replace the spring.



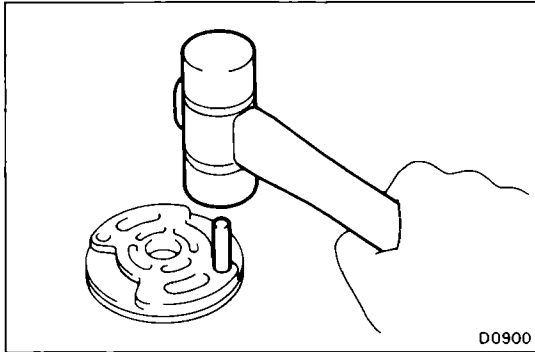
D6746

5. IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver, pry out the seal.



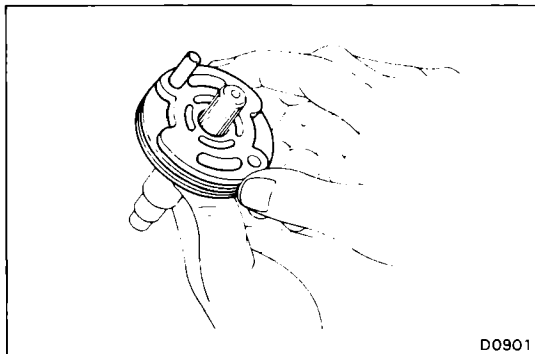
- (b) Using a socket wrench and hammer, drive in a new oil seal.



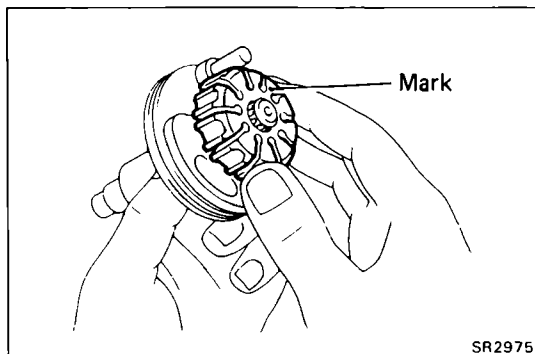
ASSEMBLY OF POWER STEERING PUMP

(See page SR-47)

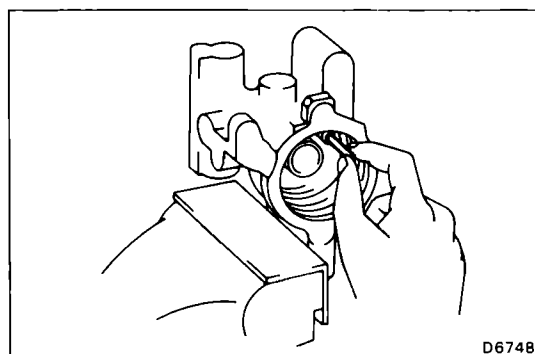
1. COAT ALL SLIDING SURFACES WITH POWER STEERING FLUID BEFORE ASSEMBLY
2. INSTALL FRONT PLATE AND ROTOR TO PUMP SHAFT
 - (a) Using a plastic hammer, drive in the shorter straight pin to the front plate.



- (b) Install new two O-rings to the front plate.
- (c) Install the front plate to the pump shaft.

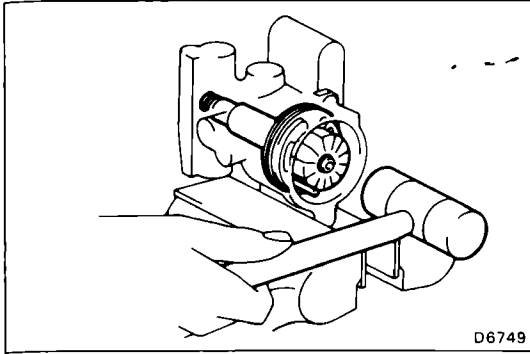


- (d) Install the rotor to the pump shaft.
- (e) Install the snap ring.



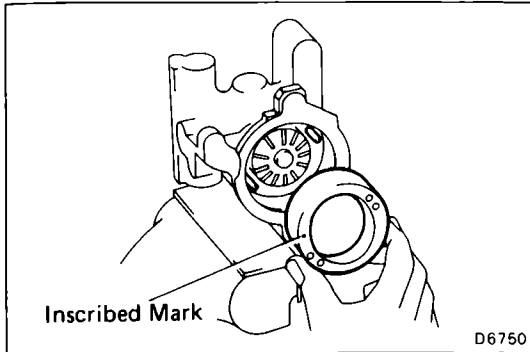
3. INSTALL PS PUMP SHAFT TO FRONT HOUSING

- (a) Coat the oil seal lip with MP grease.
- (b) Install the longer straight pin to the front housing.



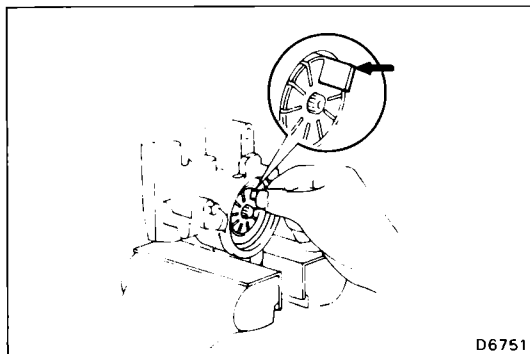
(c) Align the hole of the front plate and straight pin and tap in the pump shaft with a plastic hammer.

NOTE: Be careful not to damage the oil seal and O-rings.



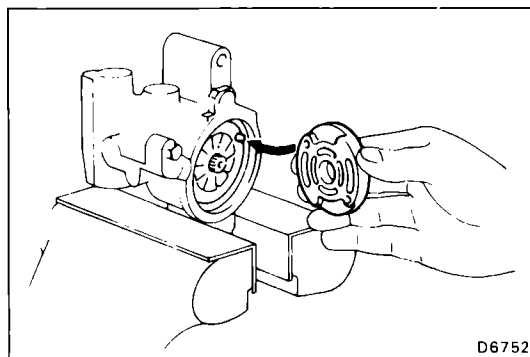
4. INSTALL CAM RING

Align the holes of the cam ring and straight pins, and insert the cam ring with the inscribed mark facing outward.



5. INSTALL VANE PLATES

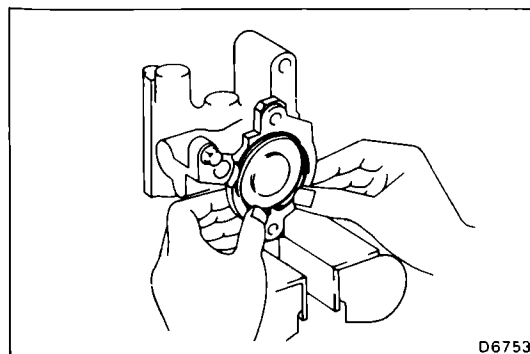
Install the vane plates with the round end facing outward.



6. INSTALL REAR SIDE PLATE AND O-RING

(a) Install a new O-ring to the side plate.

(b) Align the holes of the side plate with the pins, and install the plate.



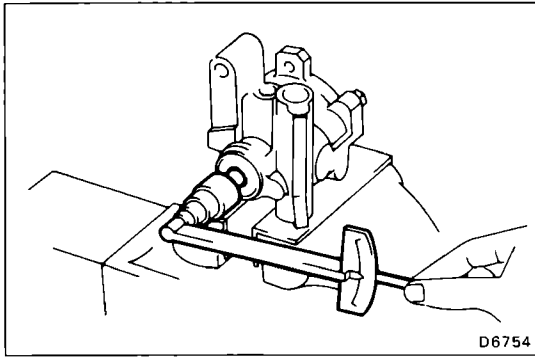
7. INSTALL REAR HOUSING

(a) Install the wave washer.

(b) Install a new O-ring to the rear housing.

(c) Using a plastic hammer, tap in the rear housing.

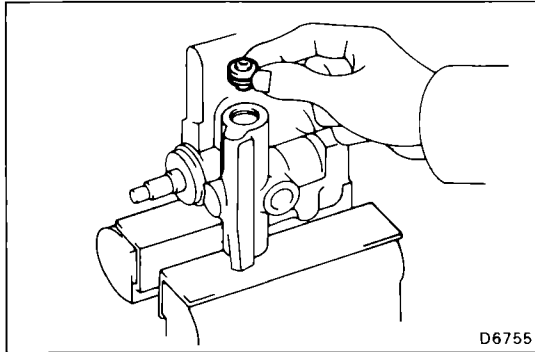
(d) Install the snap ring.



8. MEASURE PUMP SHAFT PRELOAD

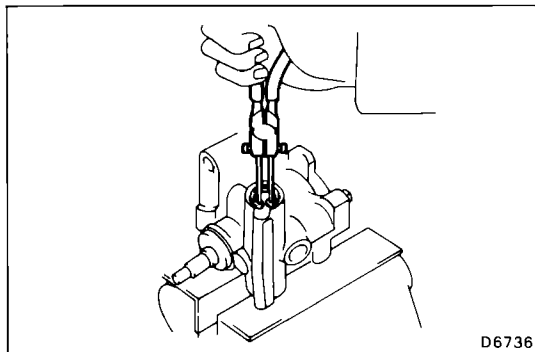
- (a) Check that the shaft rotates smoothly without abnormal noise.
- (b) Temporarily install the pulley nut and check the rotating torque.

Rotating torque: 2.8 kg-cm (2.4 in.-lb, 0.3 N·m) or less

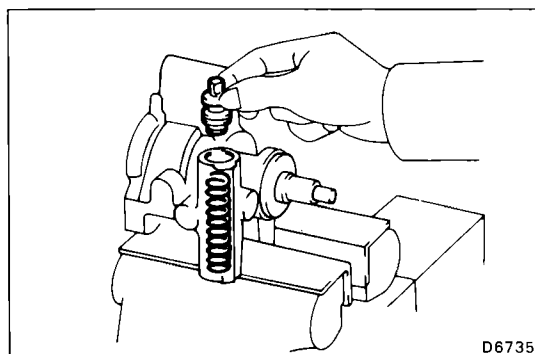


9. INSTALL FLOW CONTROL SPRING SEAT

- (a) Install a new O-ring in the spring seat.
- (b) Insert the spring seat with the bolt hole facing outward to the housing.

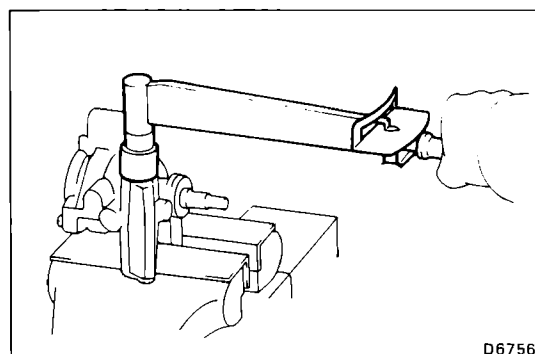


- (c) Using snap ring pliers, install the snap ring.



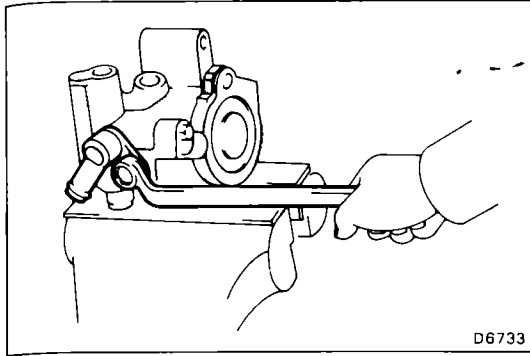
10. INSTALL SPRING, FLOW CONTROL VALVE, O-RING AND PRESSURE PORT UNION

- (a) Install the spring and the valve into the housing.
- (b) Install a new O-ring in the groove of the pressure port union.



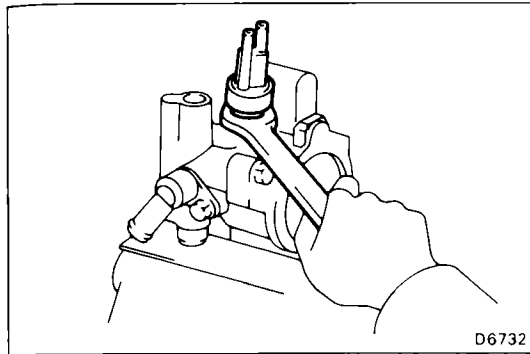
- (c) Install and torque the pressure port union.

Torque: 700 kg-cm (51 ft-lb, 69 N·m)

**11. INSTALL SUCTION PORT UNION**

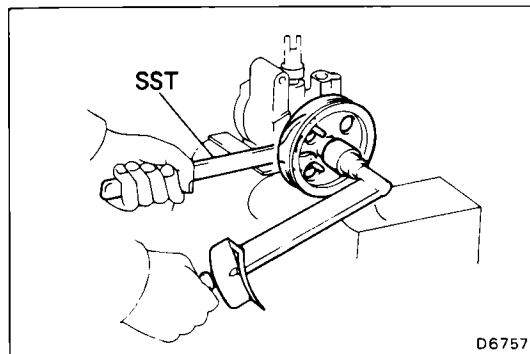
- (a) Install a new O-ring to the suction port union.
- (b) Install the suction port union into the housing.
- (c) Install and torque the bolt.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

**12. INSTALL AIR CONTROL VALVE**

Install a new union seat and tighten the valve.

Torque: 370 kg-cm (27 ft-lb, 36 N·m)

**13. INSTALL PS PUMP PULLEY**

- (a) Install the woodruff key to the shaft.
- (b) Install the pulley and nut to the shaft.
- (c) Using SST, torque the nut.

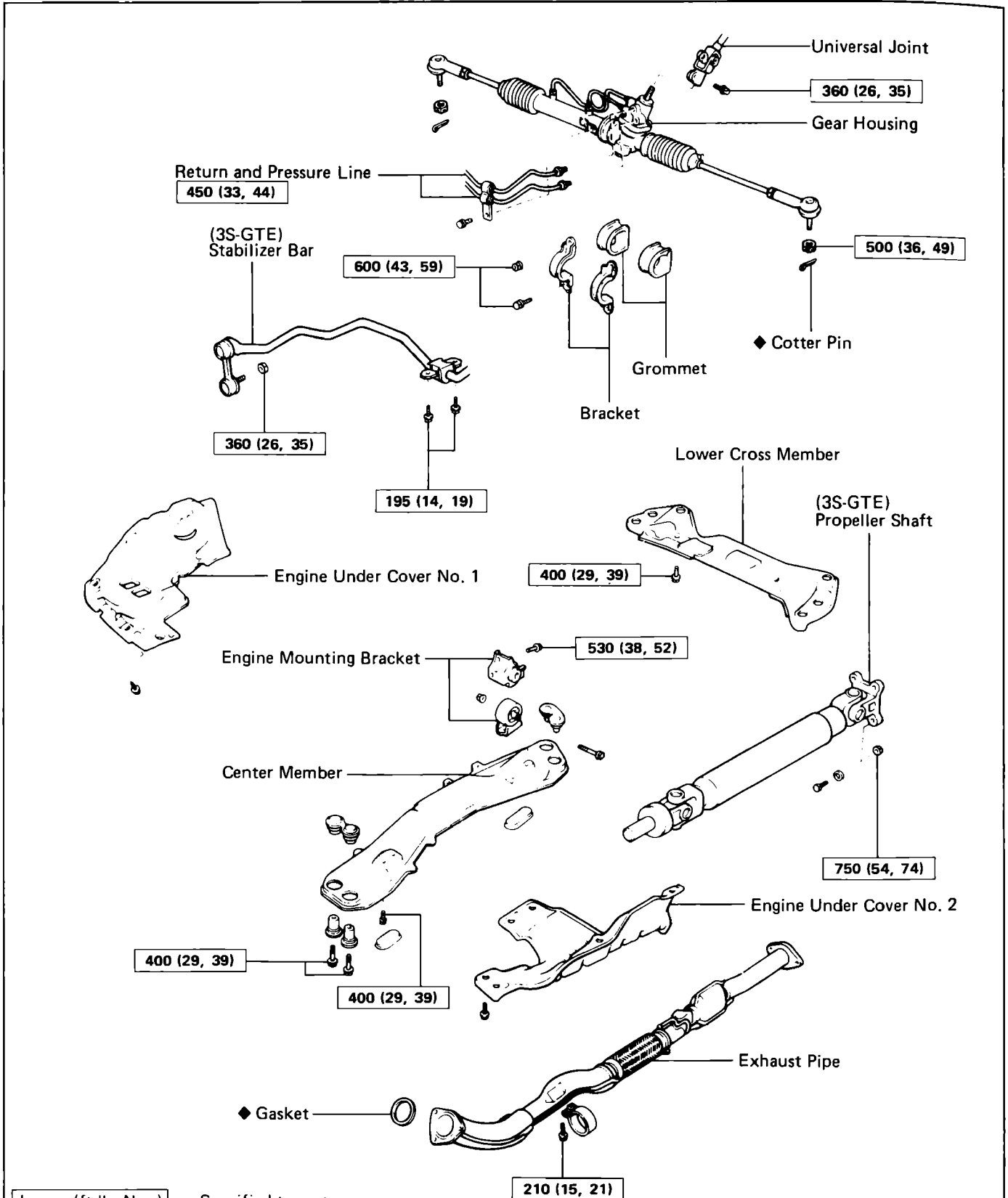
SST 09616-30020

Torque: 440 kg-cm (32 ft-lb, 43 N·m)

Gear Housing

REMOVAL AND INSTALLATION OF GEAR HOUSING

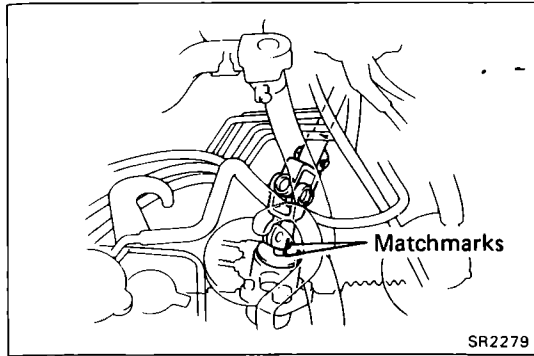
Remove and install the parts as shown.



kg-cm (ft-lb, N-m) : Specified torque

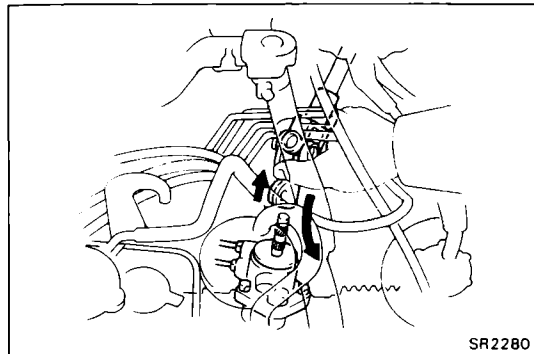
◆ Non-reusable part

(MAIN POINT OF REMOVAL AND INSTALLATION)

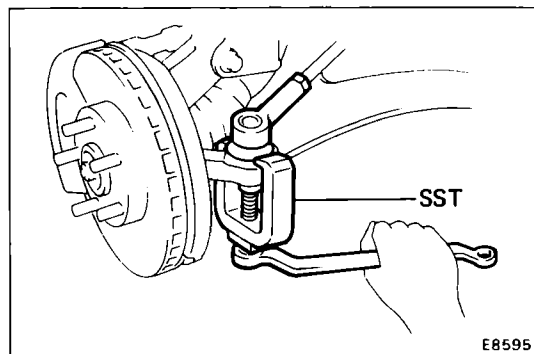


1. REMOVE UNIVERSAL JOINT

- (a) Place matchmarks on the universal joint and control valve shaft.
- (b) Remove the two bolts.

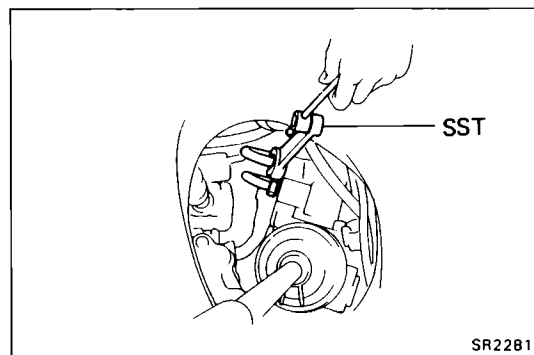


- (c) First pull the universal joint from the gear housing.
- (d) Then pull it out from the main shaft.



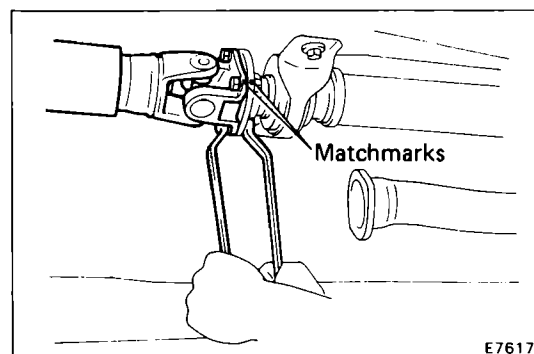
2. DISCONNECT TIE ROD END

- (a) Remove the cotter pin and nut.
- (b) Using SST, disconnect the tie rod end.
SST 09611-22012



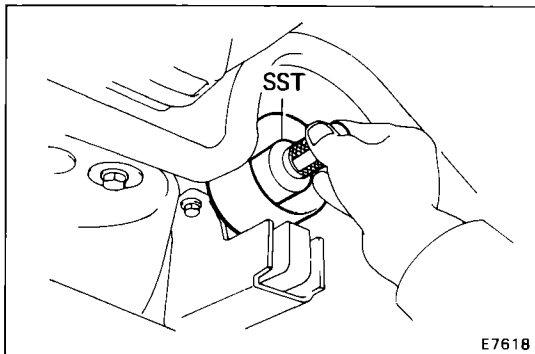
3. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE

- Using SST, disconnect and connect the pressure and return line.
SST 09631-22020
Torque: 450 kg-cm (33 ft-lb, 44 N·m)

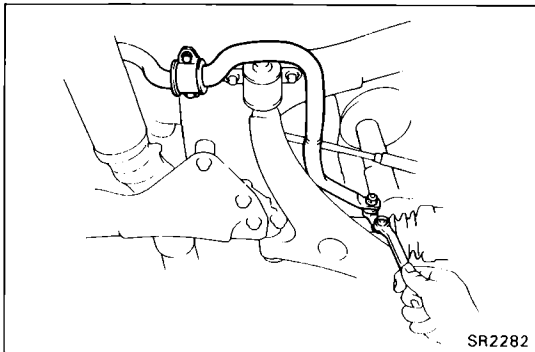


4. (3S-GTE Engine) REMOVE PROPELLER SHAFT

- (a) Place matchmarks to the propeller shaft flange and intermediate shaft flange.
- (b) Remove the four bolts and nuts.

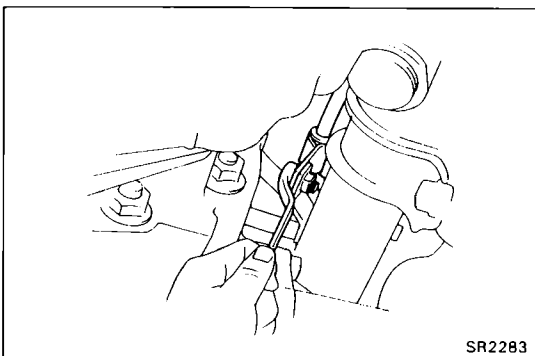


- (c) Pull out the propeller shaft and insert SST.
SST 09325-20010



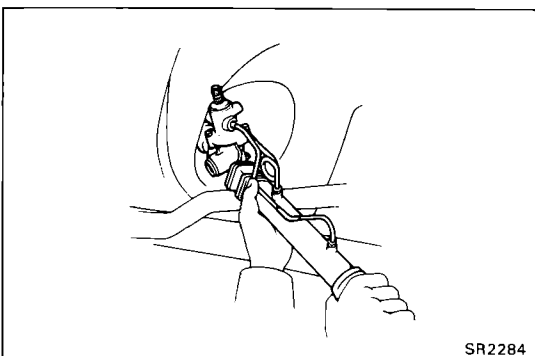
**5. (3S-GTE Engine)
DISCONNECT STABILIZER BAR RH**

- (a) Remove the stabilizer bar bracket RH.
(b) Disconnect the stabilizer link from the lower arm.



6. REMOVE GEAR HOUSING

- (a) Remove the two bolts, two nuts and the two brackets.
(b) Remove the PS tube clamp bolt.
(c) Move the gear housing to the right side.

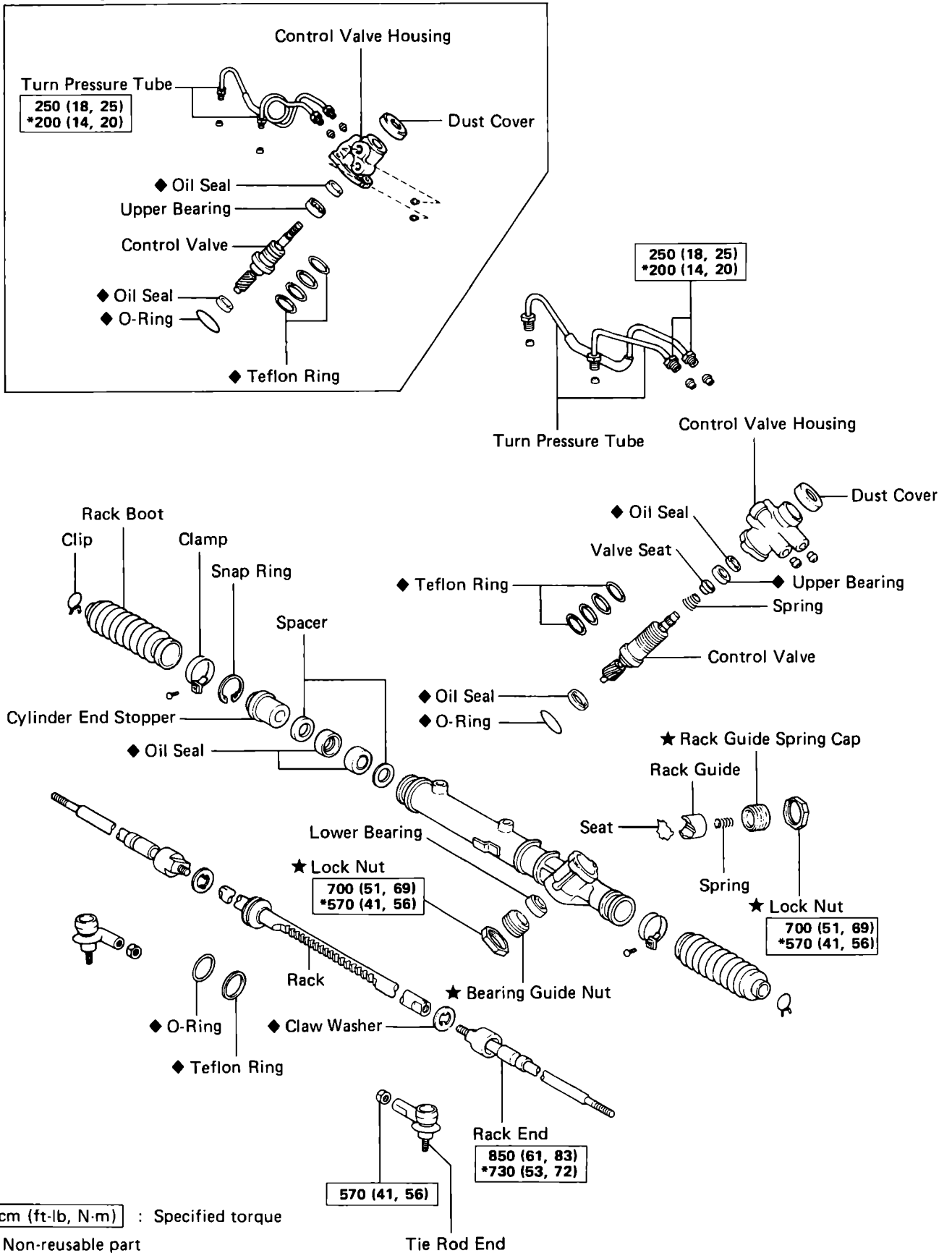


- (d) Remove the gear housing.

**7. AFTER INSTALLING GEAR HOUSING CHECK TOE-IN
(See page FA-5)**

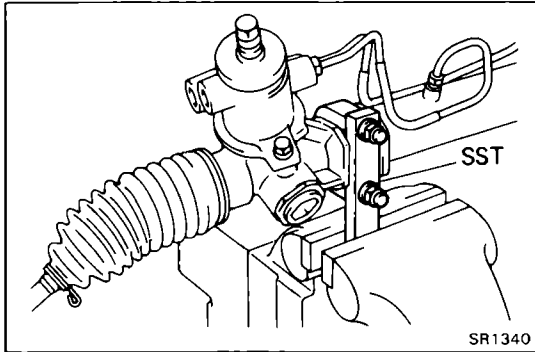
COMPONENTS

(3S-GTE Engine)



kg-cm (ft-lb, N-m) : Specified torque

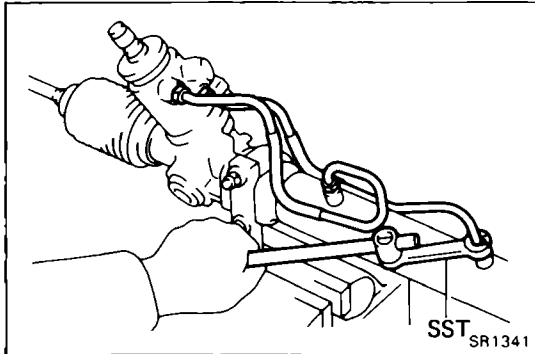
- ◆ Non-reusable part
- ★ Precoated part
- * For use of SST



DISASSEMBLY OF GEAR HOUSING

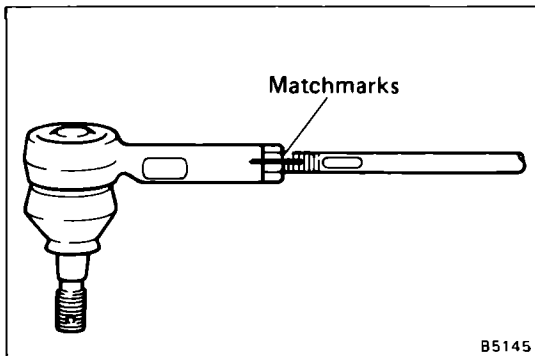
1. CLAMP GEAR HOUSING IN VISE

Using SST, secure the steering gear in a vise.
SST 09612-00012



2. REMOVE RIGHT AND LEFT TURN PRESSURE TUBES

Using SST, remove the pressure tubes.
SST 09633-00020

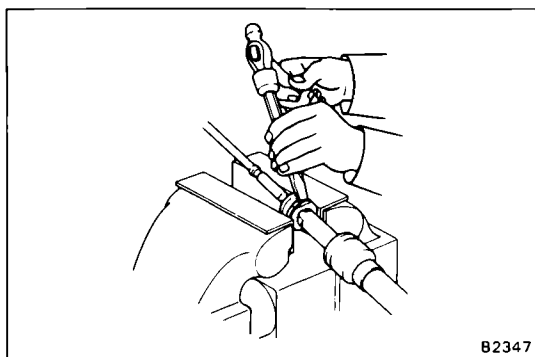


3. REMOVE TIE ROD ENDS

- (a) Loosen the lock nuts and place matchmarks on the tie rod ends and rack ends.
- (b) Remove the tie rod ends and lock nuts.

4. REMOVE RACK BOOTS

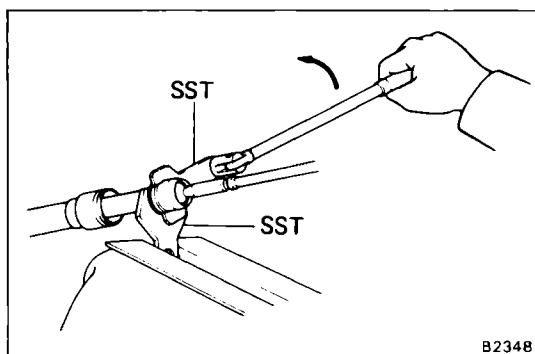
- (a) Remove the clips and clamps.
- (b) Remove the rack boots.



5. REMOVE RACK ENDS AND CLAW WASHERS

- (a) Unstack the claw washers.

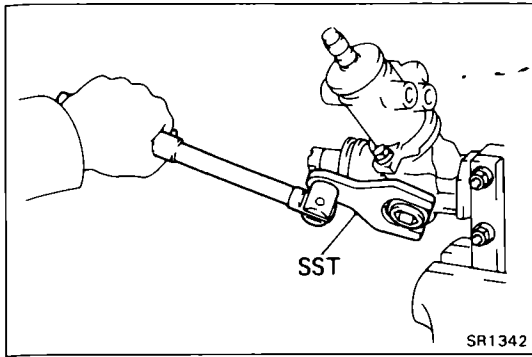
CAUTION: Avoid any impact to the rack.



- (b) Using SST, remove the rack ends.

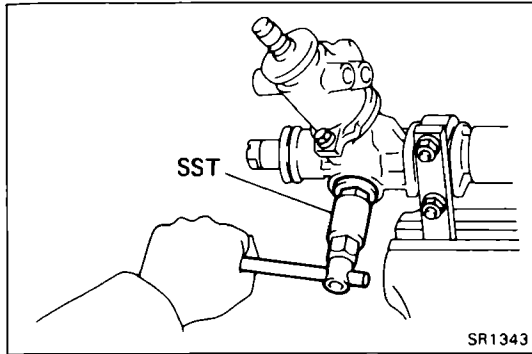
SST 09612-10093 (09628-10020)
09612-24013 (09617-24010)

- (c) Mark the left and right rack ends accordingly.
- (d) Remove the claw washers.



6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

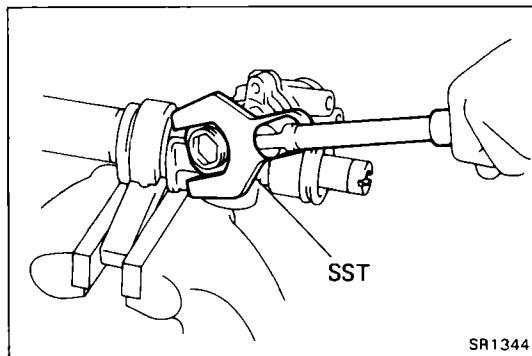
Using SST, remove the rack guide spring cap lock nut.
SST 09612-24013 (09617-24020)



7. REMOVE RACK GUIDE SPRING CAP

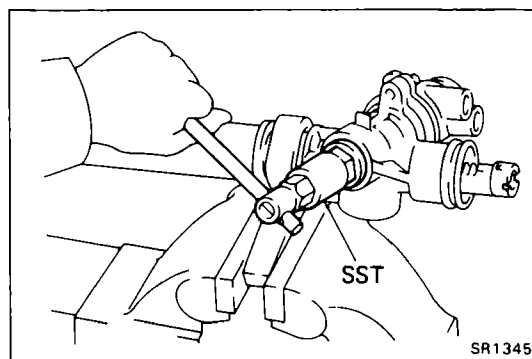
Using SST, remove the rack guide spring cap.
SST 09612-24013 (09612-10022)

8. REMOVE RACK GUIDE SPRING, RACK GUIDE AND SEAT



9. REMOVE BEARING GUIDE LOCK NUT

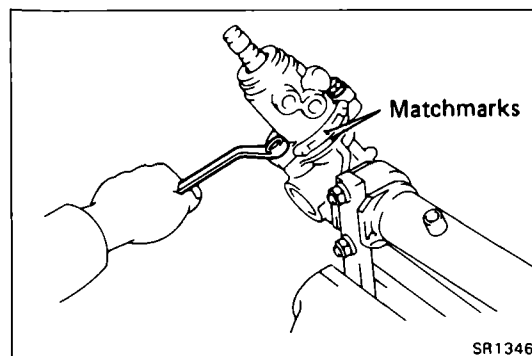
Using SST, remove the lock nut.
SST 09612-24013 (09617-24020)



10. REMOVE BEARING GUIDE NUT

Using SST, remove the bearing guide nut.
SST 09612-24013 (09612-10022)

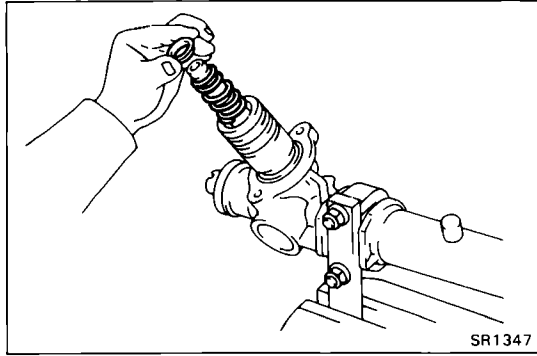
11. REMOVE DUST COVER



12. REMOVE CONTROL VALVE HOUSING

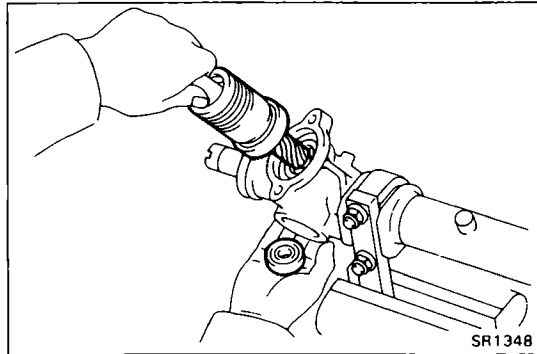
- (a) Place matchmarks on the valve housing and rack housing.
- (b) Remove the two bolts.
- (c) Pull out the valve housing.
- (d) Remove the O-ring from the rack housing.

**13. (3S-GTE Engine)
REMOVE LOWER BEARING**

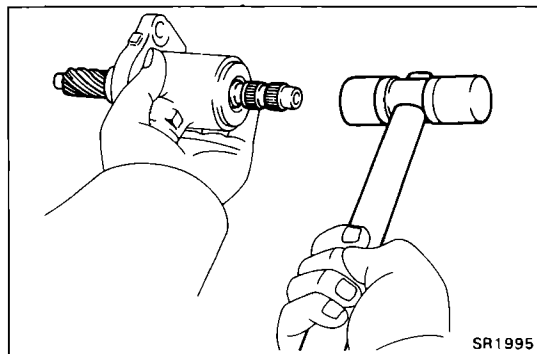


**14-1. (Ex. 3S-GTE Engine)
REMOVE CONTROL VALVE**

(a) Remove the valve spring seat and spring.

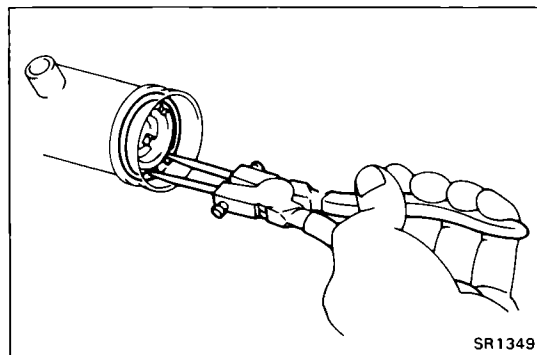


(b) Remove the control valve and bearing.



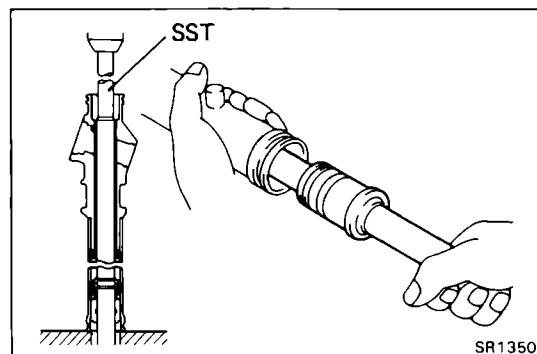
**14-2. (3S-GTE Engine)
REMOVE CONTROL VALVE FROM HOUSING**

Tap out the control valve.



15. REMOVE CYLINDER END STOPPER, SPACER, OIL SEAL AND RACK

(a) Using snap ring pliers, remove the snap ring.

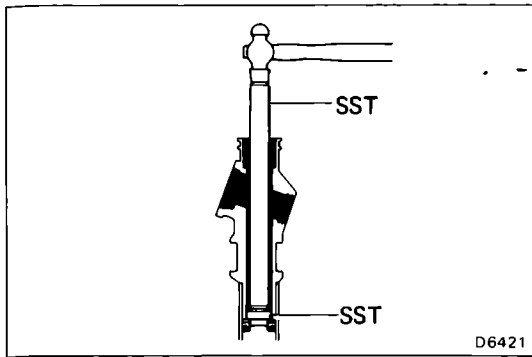


(b) Using SST, press the cylinder end stopper until the end stopper is slightly touch to the press block.

SST 09612-24013 (09612-10061)

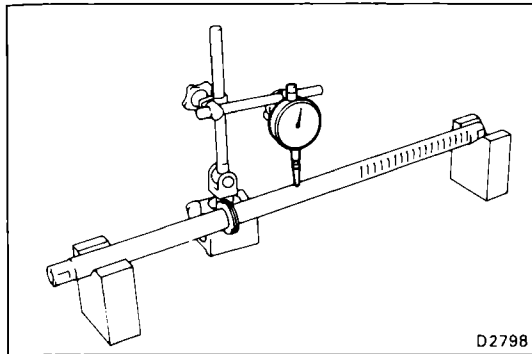
(c) Pull out the rack with the cylinder end stopper, spacer and oil seal.

NOTE: If necessary, slightly tap the rack end with a brass bar and hammer.



16. REMOVE CYLINDER HOUSING OIL SEAL AND SPACER

Using SST, drive out the spacer and oil seal.
SST 09631-12020, 09631-20031

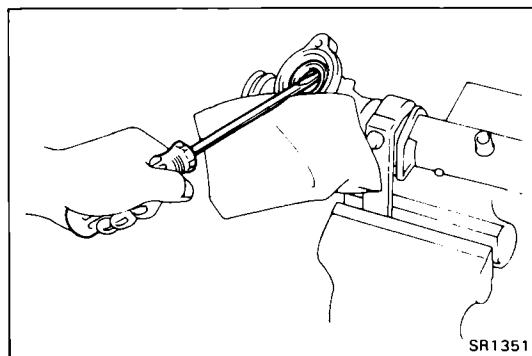


INSPECTION AND REPAIR OF GEAR HOUSING COMPONENTS

1. INSPECT RACK

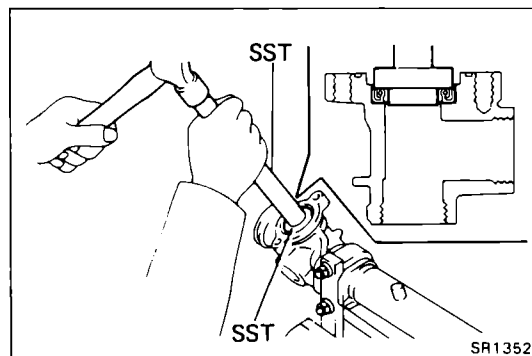
- (a) Check the rack for runout and for tooth wear or damage.
- (b) Check the back surface for wear or damage.
If faulty, replace it.

Maximum runout: 0.3 mm (0.012 in.)



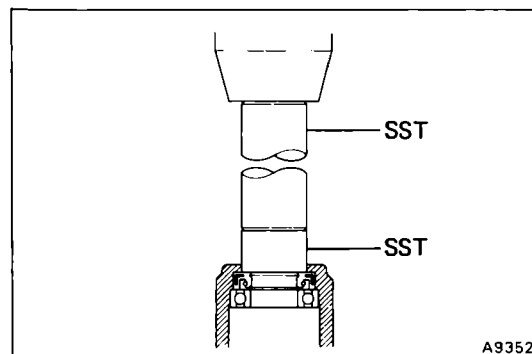
2. IF NECESSARY, REPLACE RACK HOUSING OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.



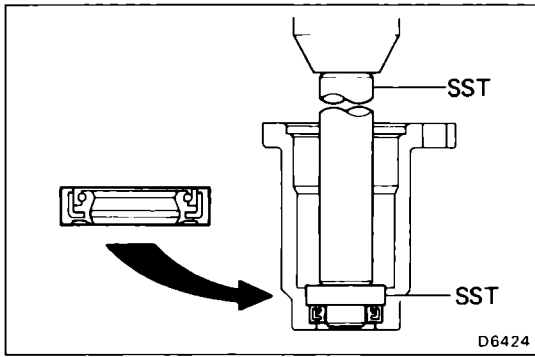
- (b) Using SST, drive in a new oil seal.

SST [Ex. 3S-GTE Engine]
09631-12020, 09630-24013 (09631-24070)
[3S-GTE Engine]
09620-30010 (09624-30010, 09631-00020)

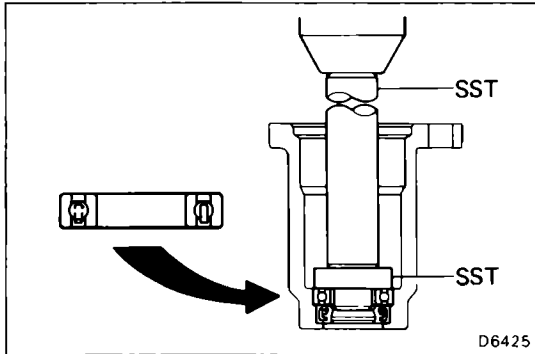


3. IF NECESSARY, REPLACE CONTROL VALVE HOUSING OIL SEAL

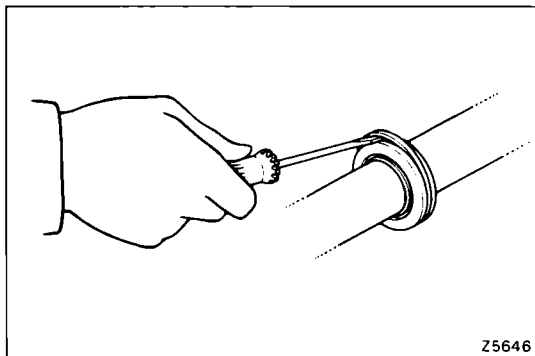
- (a) Using SST, press out the oil seal with the bearing.
SST 09630-24013 (09620-24010), 09631-12020



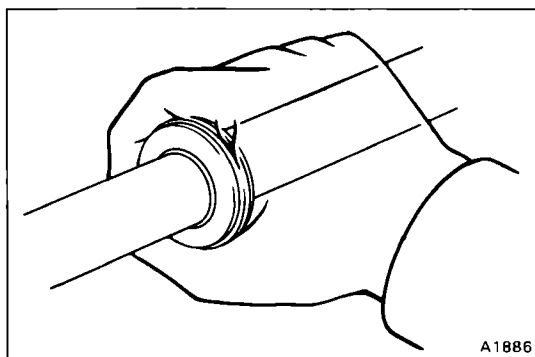
- (b) Using SST, press in a new oil seal.
 SST 09630-24013 (09620-24020), 09631-12020



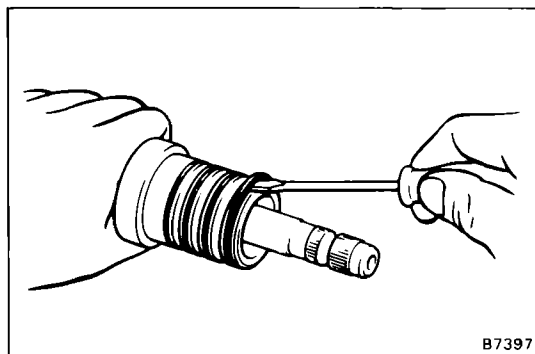
- (c) Using SST, press in a new bearing.
 SST 09630-24013 (09620-24030), 09631-12020



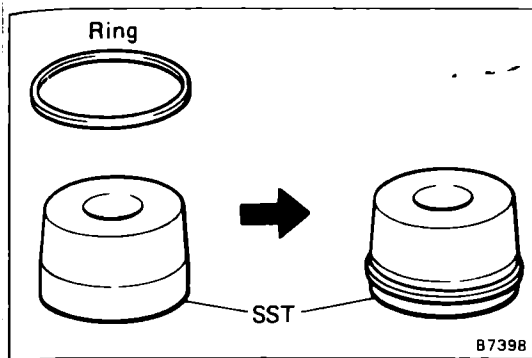
4. **IF NECESSARY, REPLACE TEFLON RING AND O-RING**
 (a) Remove the teflon ring and O-ring.
CAUTION: Be careful not to damage the steering rack.
 (b) Install a new O-ring.
 (c) Expand a new teflon ring with your fingers.
CAUTION: Be careful not to over-expand the teflon ring.



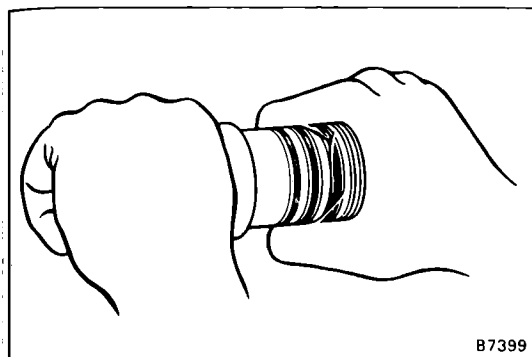
- (d) Install a new teflon ring to the steering rack.
 (e) Coat the teflon ring with power steering fluid and snug it down with your fingers.



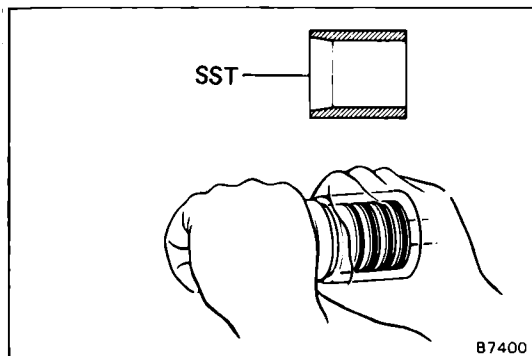
5. **IF NECESSARY, REPLACE CONTROL VALVE TEFLON RING**
 (a) Using a screwdriver, remove the teflon ring.
CAUTION: Be careful not to damage the control valve.



- (b) Install a new teflon ring to SST and expand it.
 SST [Ex. 3S-GTE Engine]
 09630-24013 (09620-24040)
 [3S-GTE Engine]
 09631-20070



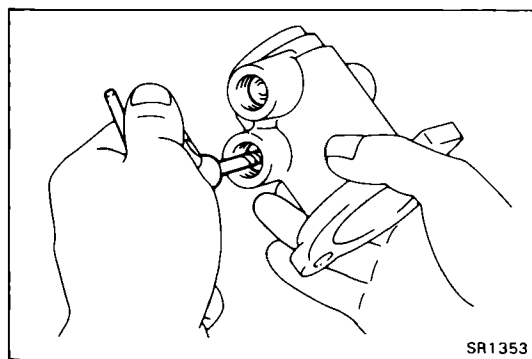
- (c) Install the expanded teflon rings to the control valve and snug it down with your fingers.



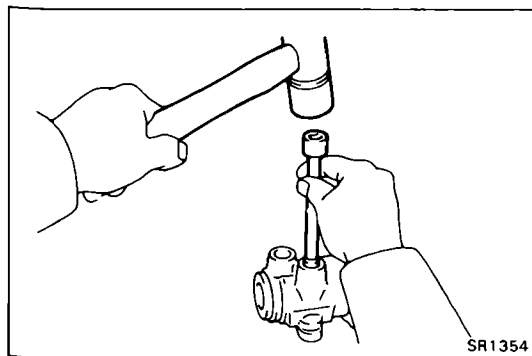
- (d) Coat the teflon ring with power steering fluid, and carefully slide the tapered end of SST over the teflon ring to seat the ring.

- SST [Ex. 3S-GTE Engine]
 09630-24013 (09620-24050)
 [3S-GTE Engine]
 09631-20081

6. IF NECESSARY, REPLACE UNION SEAT



- (a) Using a screw extractor, remove the union seat.

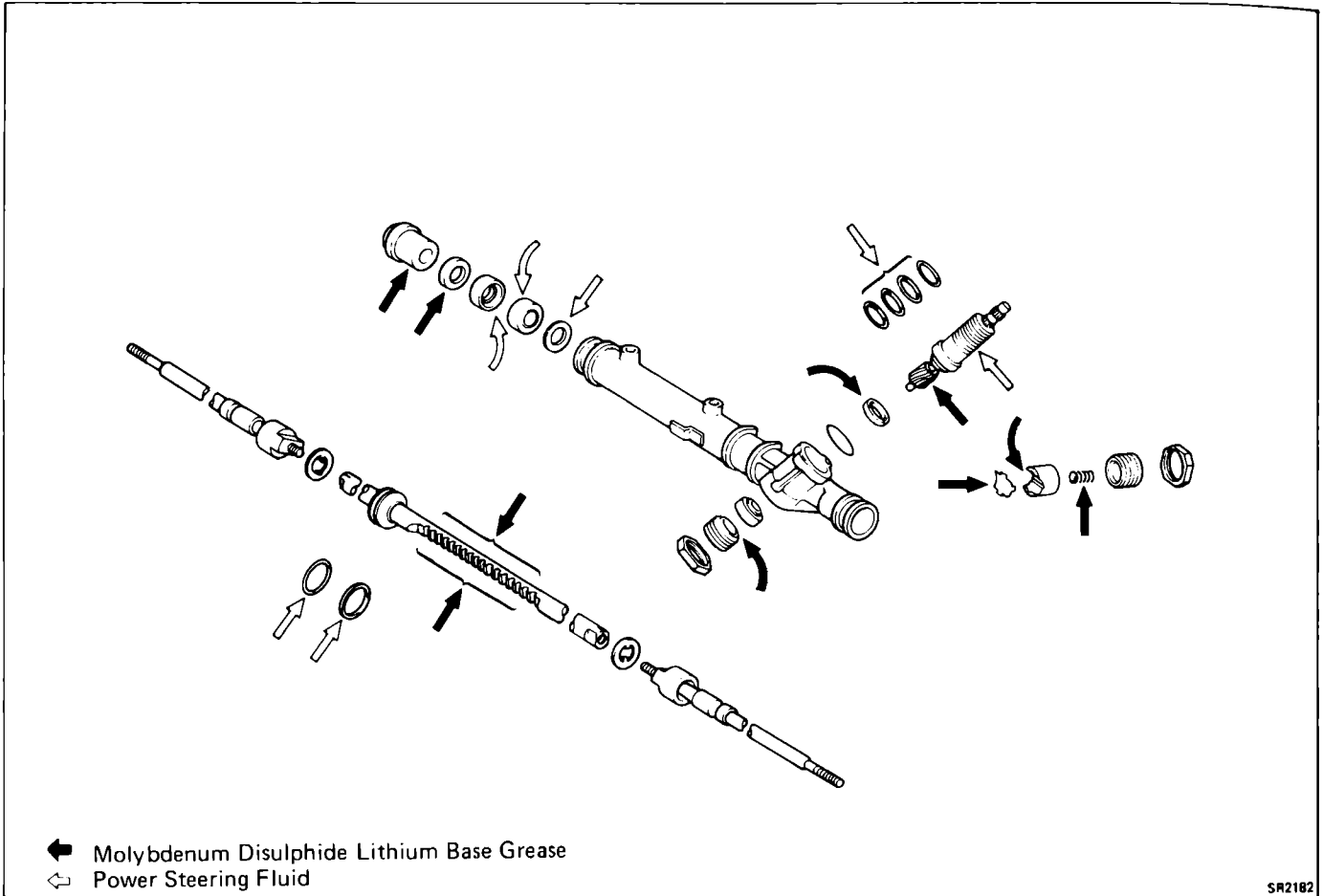


- (b) Using a plastic hammer and extension bar, tap in a new union seat.

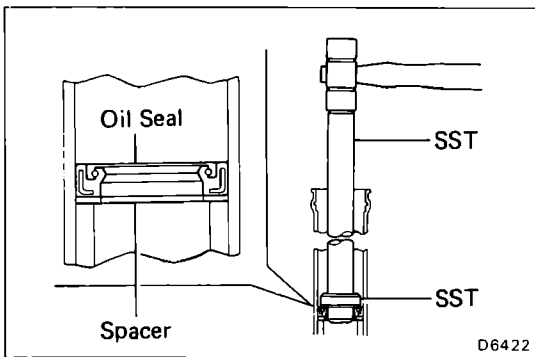
ASSEMBLY OF GEAR HOUSING

(See page SR-59)

1. COAT POWER STEERING FLUID OR GREASE ON FOLLOWING PARTS:



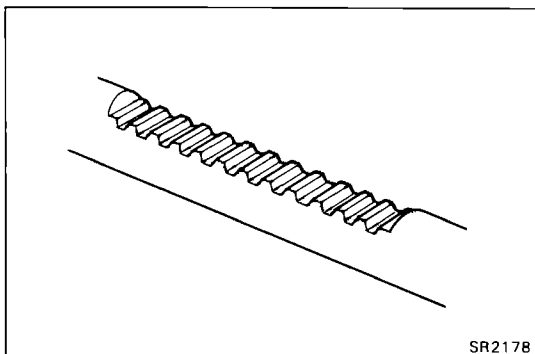
SR2182



2. INSTALL CYLINDER HOUSING OIL SEAL AND SPACER

Install a new oil seal and spacer to SST, and drive it in with a plastic hammer.

SST [Ex. 3S-GTE Engine]
 09631-12020, 09631-22070
 [3S-GTE Engine]
 09631-12020, 09631-32010

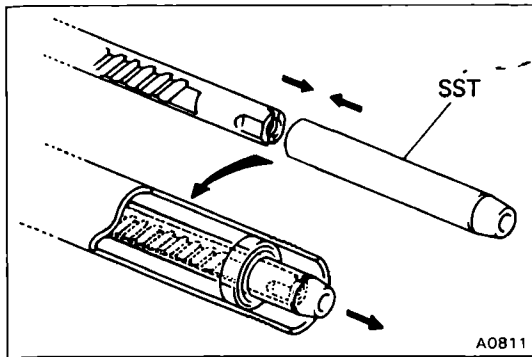


3. INSTALL RACK

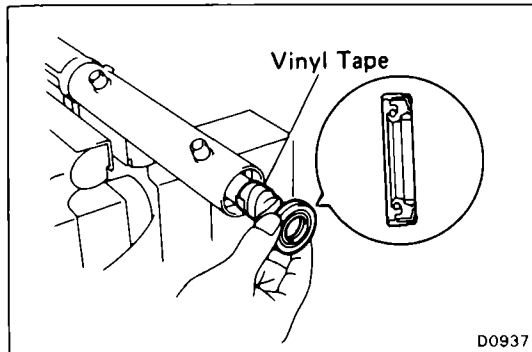
(a) Install SST to the rack.

NOTE: If necessary, scrape the burrs off the rack teeth end and burnish.

SST [Ex. 3S-GTE Engine]
 09631-20102
 [3S-GTE Engine]
 09631-20051

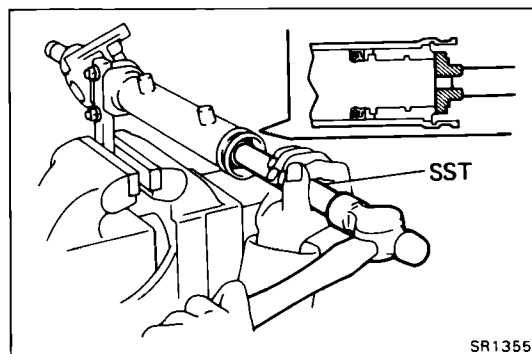


- (b) Coat SST with power steering fluid.
- (c) Insert the rack into the cylinder.
- (d) Remove SST.

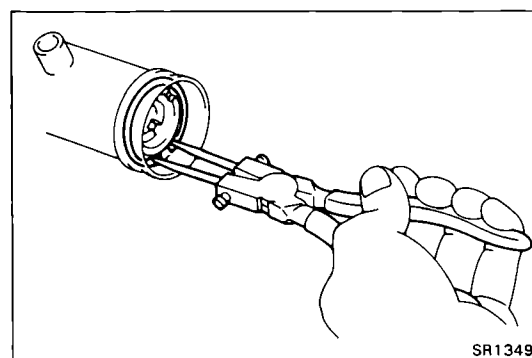


4. INSTALL CYLINDER END STOPPER, OIL SEAL AND SPACER

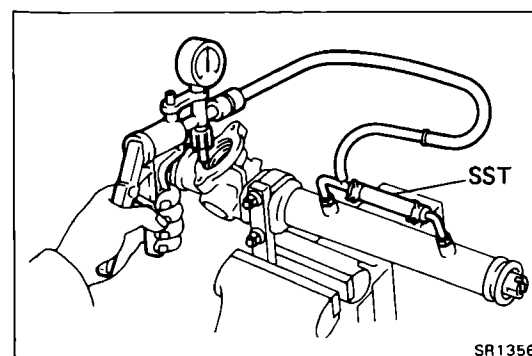
- (a) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
- (b) Install the oil seal by pushing into the cylinder in the direction shown in drawing, without tilting.



- (c) Install the spacer and cylinder end stopper.
- (d) Using SST, drive in the cylinder end stopper.
SST 09612-22011

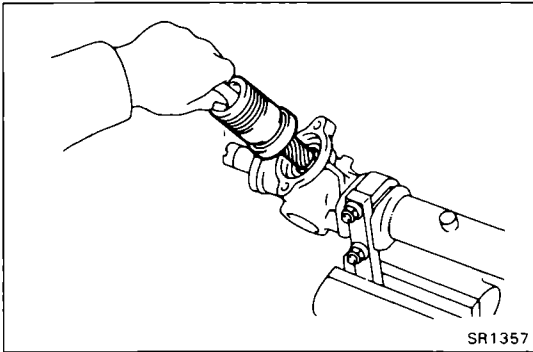


- (e) Using snap ring pliers, install the snap ring.



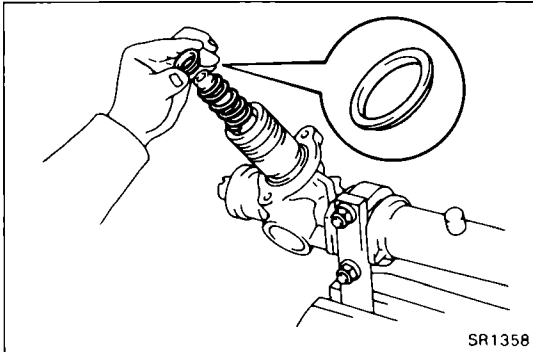
5. AIR TIGHTNESS TEST

- (a) Install SST to the union of the cylinder housing.
SST 09631-12070
- (b) Apply 400 mmHg (15.75 in.Hg, 53.3 kPa) of vacuum for about 30 seconds.
- (c) Check that there is no change in the vacuum.

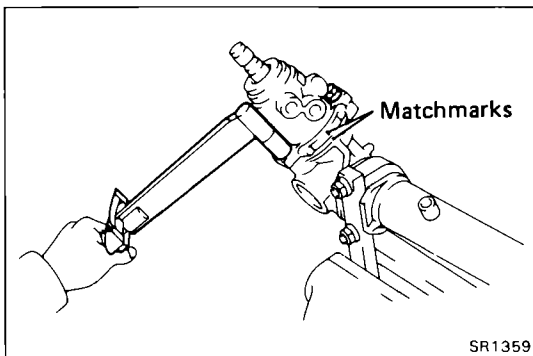


6. INSTALL CONTROL VALVE

- (a) Coat the teflon ring with power steering fluid.
- (b) Push the control valve into the housing.
- (c) Coat a new O-ring with power steering fluid, and install it.



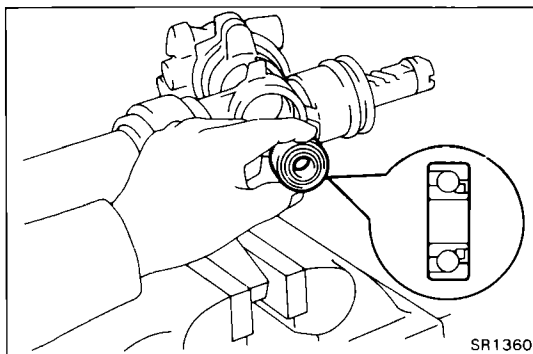
7. (Ex. 3S-GTE Engine) INSTALL SPRING AND VALVE SPRING SEAT



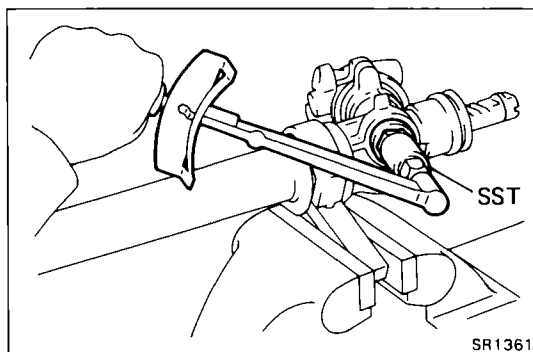
8. INSTALL CONTROL VALVE HOUSING

- (a) Align the marks on the valve housing and rack housing.
- (b) Torque the two bolts.

Torque: 315 kg-cm (23 ft-lb, 31 N·m)

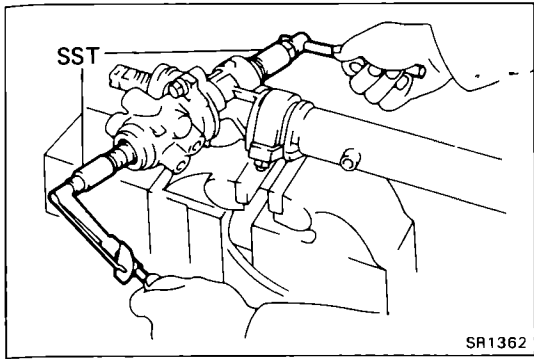


9. INSTALL CONTROL VALVE LOWER BEARING



10. INSTALL BEARING GUIDE NUT

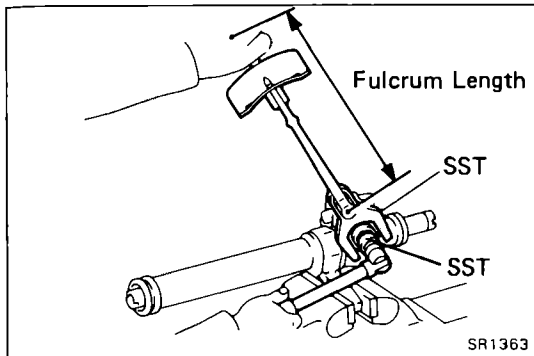
- (a) Apply sealant to 2 or 3 threads of the guide nut.
Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
 - (b) Using SST, torque the bearing guide nut.
SST 09612-24013 (09612-10022)
- Torque: 150 kg-cm (11 ft-lb, 15 N·m)**



- (c) Using SST and torque meter, loosen the bearing guide nut until the preload is within specification.

SST 09612-24013 (09612-10022), 09616-00010

Preload (turning): 4.5 — 6.5 kg-cm
(3.9 — 5.6 in.-lb, 0.4 — 0.6 N·m)



11. INSTALL BEARING GUIDE LOCK NUT

- (a) Apply sealant to 2 or 3 threads of the lock nut.

Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

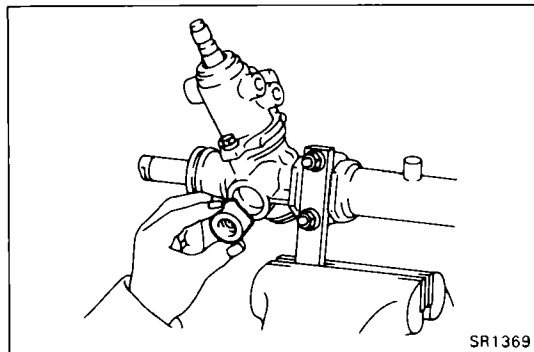
- (b) Using SST, install and torque the lock nut.

SST 09612-24013 (09612-10022, 09617-24020)

Torque: 570 kg-cm (41 ft-lb, 56 N·m)

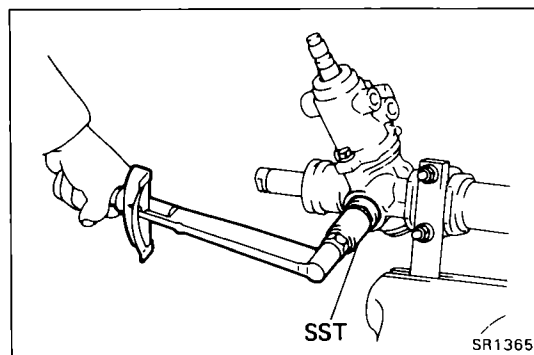
NOTE: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

- (c) Recheck the preload.



12. INSTALL RACK GUIDE SEAT, RACK GUIDE AND RACK GUIDE SPRING

Install the rack guide with the seat and spring.



13. ADJUST TOTAL PRELOAD

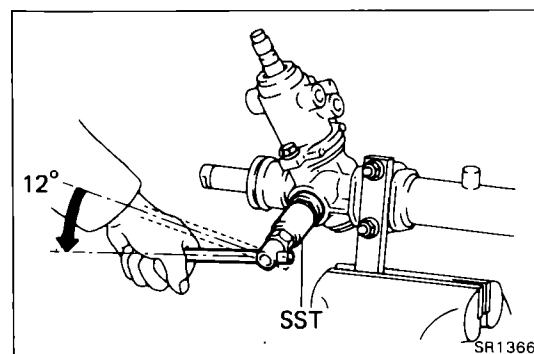
- (a) Apply sealant to 2 or 3 threads of the spring cap.

Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

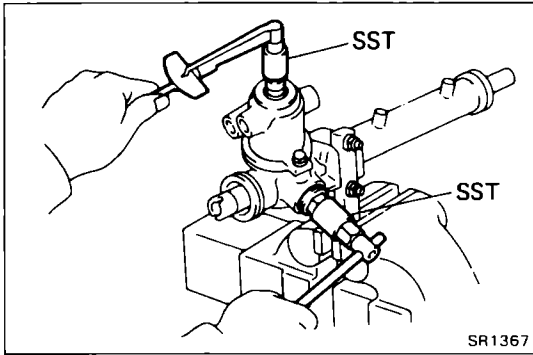
- (b) Using SST, install and torque the spring cap.

SST 09612-24013 (09612-10022)

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



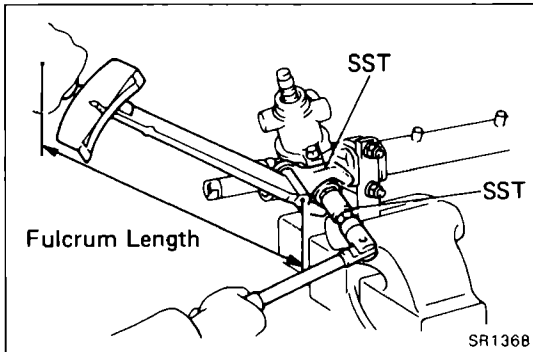
- (c) Using SST, return the rack guide spring cap 12°.
- (d) Turn the control valve shaft right and left one or two times.
- (e) Loosen the spring cap until the rack guide compression spring is not functioning.



- (f) Using SST and a torque meter, tighten the rack guide spring cap until the preload is within specification.

SST 09612-24013 (09612-10022), 09616-00010

Preload (turning): 9 – 12 kg-cm
(7.8 – 10.4 in.-lb, 0.9 – 1.2 N·m)



14. INSTALL RACK GUIDE SPRING CAP LOCK NUT

- (a) Apply sealant to 2 or 3 threads of the lock nut.

Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

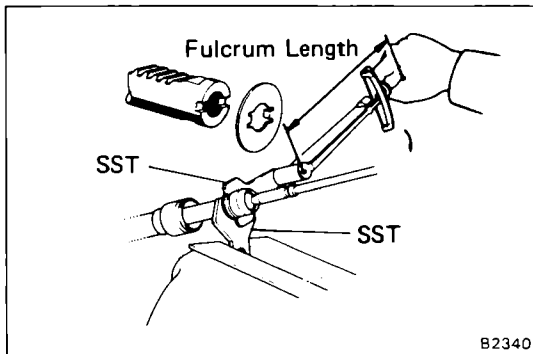
- (b) Using SST, install and torque the lock nut.

SST 09612-24013 (09612-10022, 09617-24020)

Torque: 570 kg-cm (41 ft-lb, 56 N·m)

NOTE: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

- (c) Recheck the total preload.



15. INSTALL DUST COVER

16. INSTALL CLAW WASHERS AND RACK ENDS

- (a) Install new claw washers.

- (b) Using SST, install and torque the rack ends.

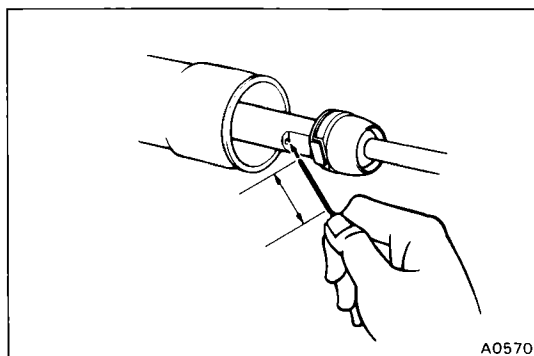
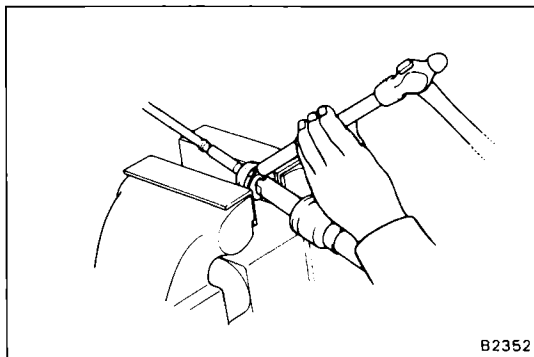
SST 09612-10093 (09628-10020)

09612-24013 (09617-24010)

Torque: 730 kg-cm (53 ft-lb, 72 N·m)

NOTE: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

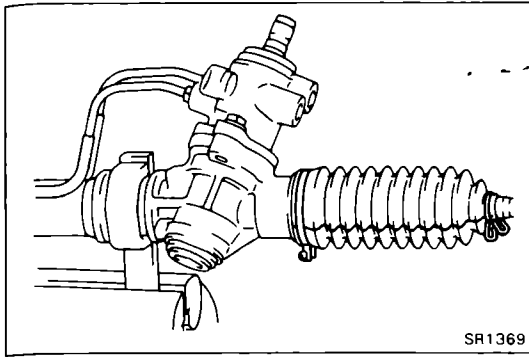
- (c) Using a brass bar and hammer, stake the claw washers.



17. INSTALL RACK BOOTS, CLAMPS AND CLIPS

- (a) Insure that the tube hole is not clogged with grease.

NOTE: If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel turned.

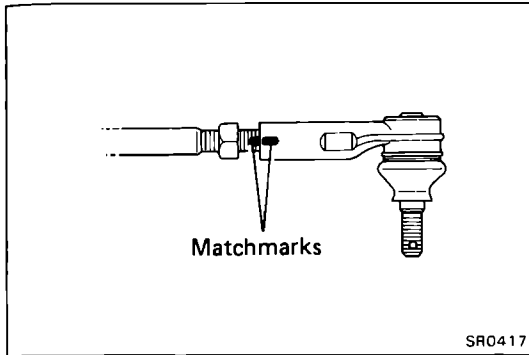


(b) Install the boots.

NOTE: Be careful not to damage or twist the boots.

(c) Install the clamps.

(d) Install the clips with the ends facing outward.

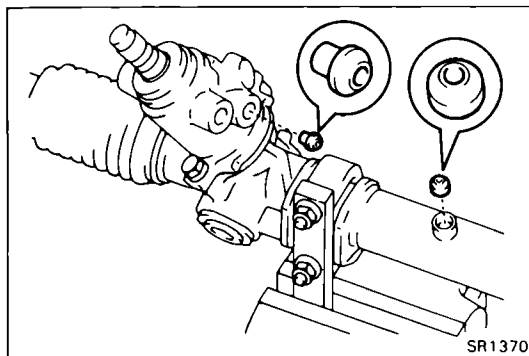


18. INSTALL TIE ROD ENDS

Screw the lock nuts and tie rod ends onto the rack ends until the matchmarks are aligned.

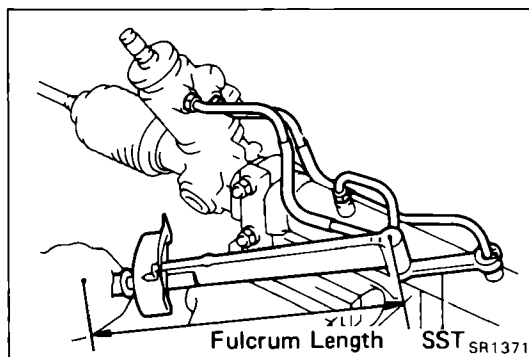
(b) After adjusting toe-in, torque the lock nuts.

Torque: 570 kg-cm (41 ft-lb, 56 N·m)



19. INSTALL RIGHT AND LEFT TURN PRESSURE TUBES

(a) Install new union seats as shown.



(b) Using SST, install and torque the tubes.

SST 09633-00020

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

NOTE: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).