

# STEERING

## 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

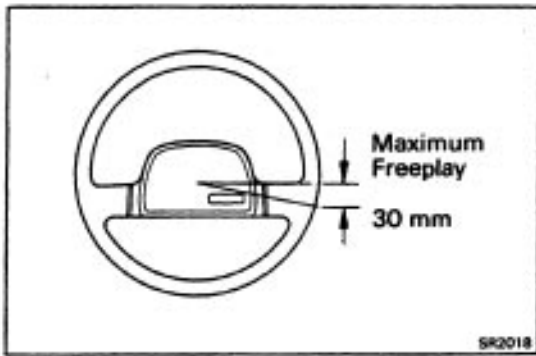
Problem	Possible cause	Remedy	Page
Hard steering	Tires improperly inflated Insufficient lubricant	Inflate tires to proper pressure lubricate suspension and steering linkage	<a href="#">FA-3</a>
	Excessive caster Steering system joint worn Lower arm ball joints worn Steering column binding Steering gear out of adjustment or broken  Power steering belt loose Fluid level in reservoir low Power steering unit faulty	Check front wheel alignment Replace steering system joints Replace lower arm ball joints Inspect steering column Adjust or repair steering gear Adjust belt Check reservoir Check power steering unit	<a href="#">FA-3</a> <a href="#">SR-43,45,48</a> <a href="#">FA-57</a> <a href="#">SR-4</a> <a href="#">SR-43,45,48</a> <a href="#">SR-22</a> <a href="#">SR-22</a> <a href="#">SR-22</a>
Poor return	Tires improperly inflated Insufficient lubricant	Inflate tires to proper pressure Lubricate suspension and steering linkage	<a href="#">FA-3</a>
	Wheel alignment incorrect Steering column binding Steering gear out of adjustment or broken	Check front wheel alignment Inspect steering column Adjust or repair steering gear	<a href="#">FA-3</a> <a href="#">SR-4</a> <a href="#">SR-43,45,48</a>
Excessive play	Hub bearing worn Main shaft yoke or intermediate shaft yoke worn Lower arm ball joints worn Steering system joints worn Steering gear out of adjustment or broken	Replace hub bearing Replace main shaft or intermediate shaft Replace lower arm ball joints Replace steering system joints Adjust or repair steering gear	<a href="#">FA-7</a>  <a href="#">FA-57</a> <a href="#">SR-43,45,48</a> <a href="#">SR-43,45,48</a>
	Steering linkage loose Steering system joints worn  Steering gear out of adjustment or broken	Tighten steering linkage Replace steering system joints  Adjust or repair steering gear	<a href="#">SR-43,45,48</a> <a href="#">SR-43,45,48</a>

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## 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 freeplay: 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:

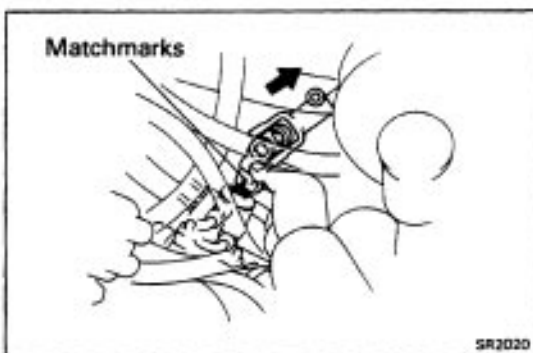
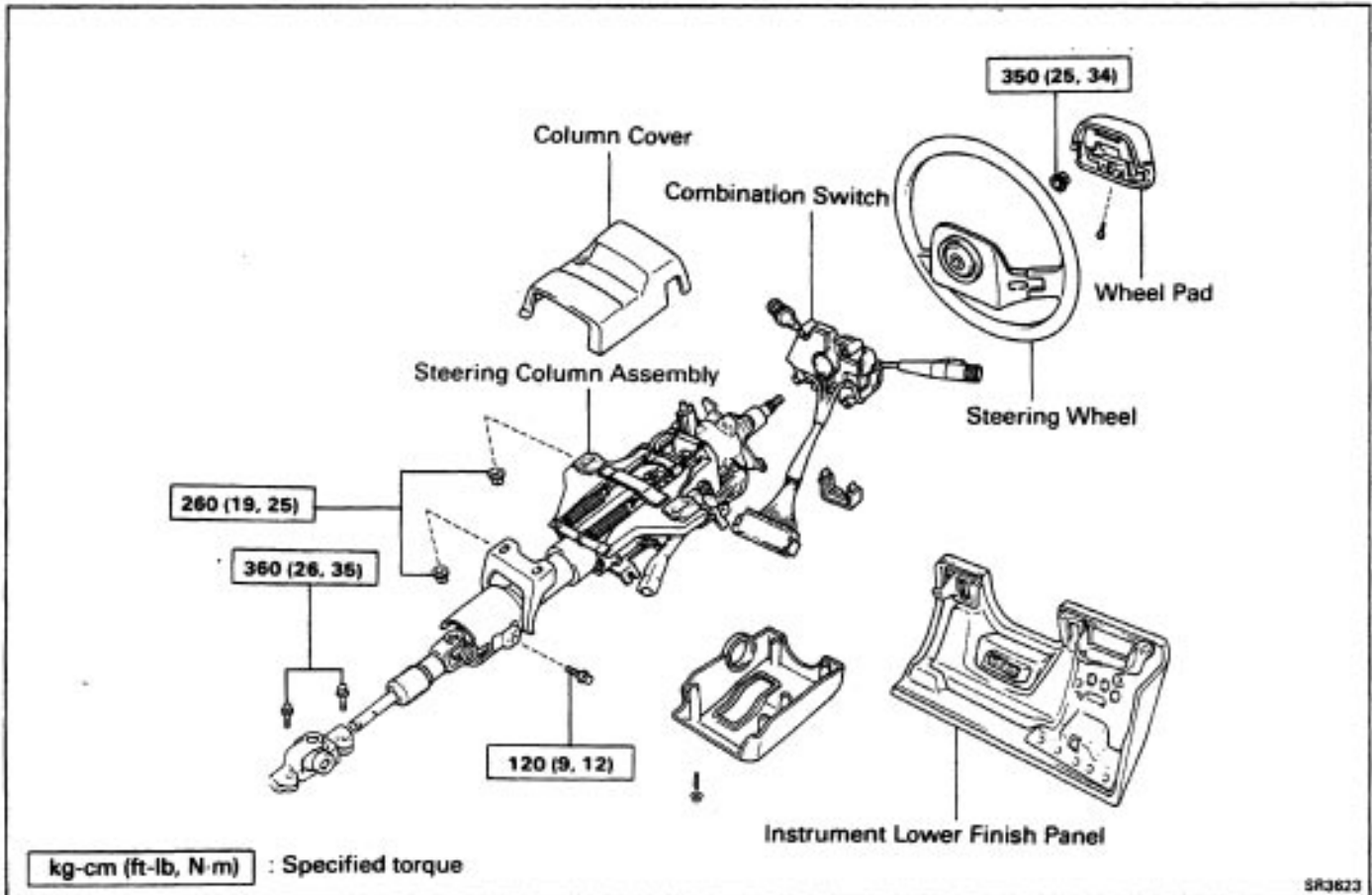
- Tie rod ends do not have excessive play.
- Boots are not damaged.
- Boot clamps are not loose.

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

# STEERING COLUMN

## REMOVAL AND INSTALLATION OF STEERING COLUMN

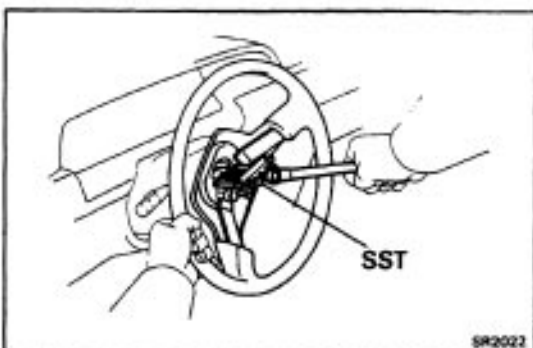
Remove and install the parts as shown.



## (MAIN POINTS OF REMOVAL AND INSTALLATION)

### 1. REMOVE UNIVERSAL JOINT

- Remove the two set bolts.
- Place matchmarks on the universal joint and control valve shaft.
- First pull the universal joint from the gear housing, and then pull it out from the main shaft.

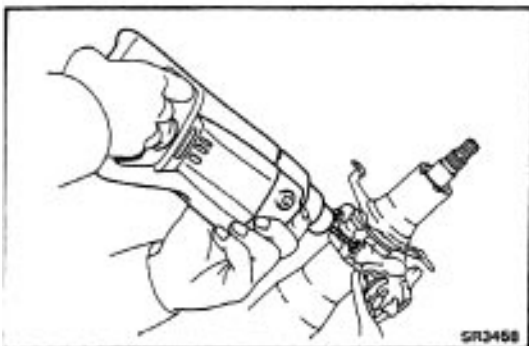
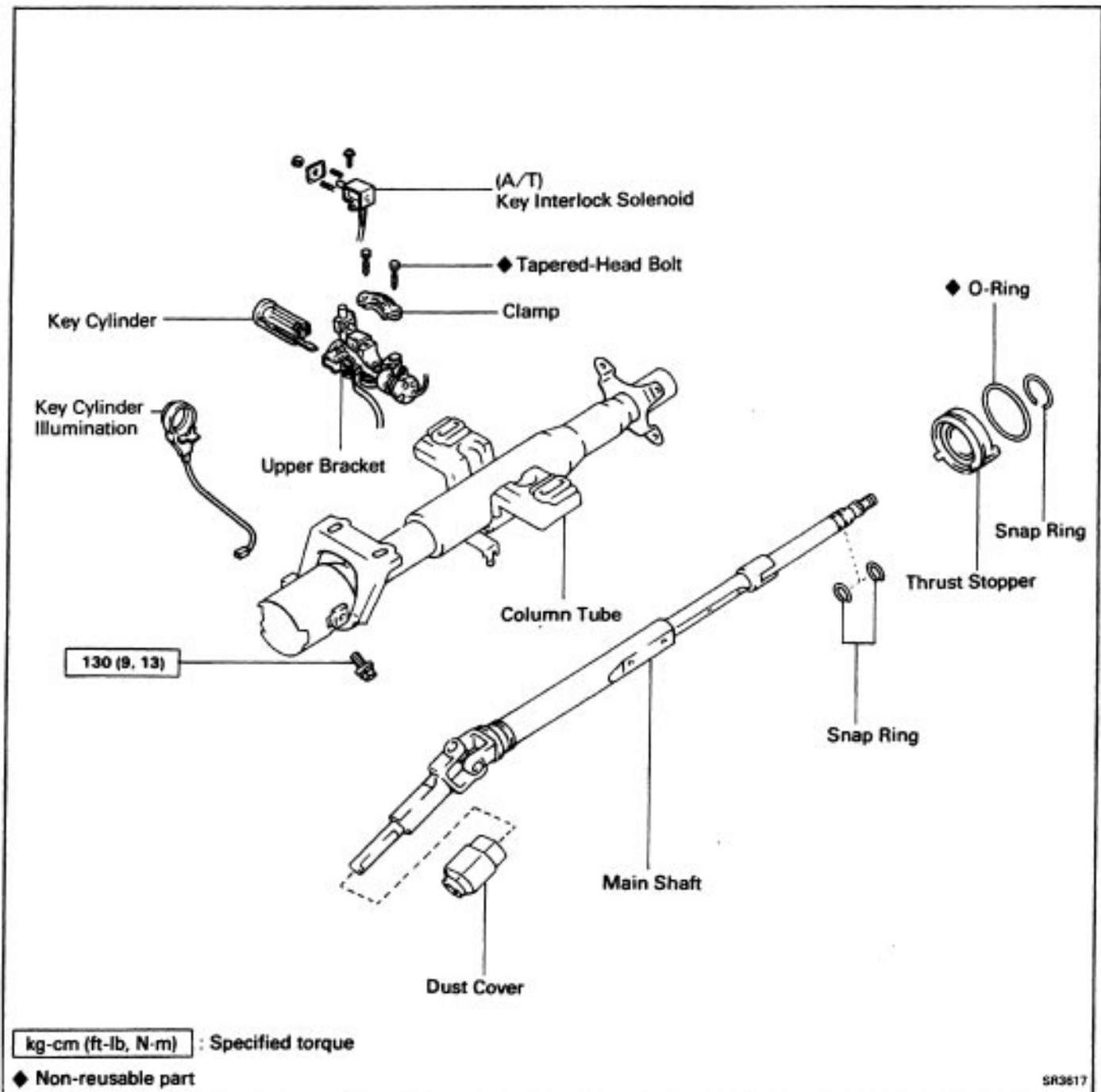


### 2. REMOVE STEERING WHEEL

Using SST, remove the steering wheel.  
SST 09609-20011

### 3. CHECK STEERING WHEEL CENTER POINT AFTER INSTALLING STEERING COLUMN

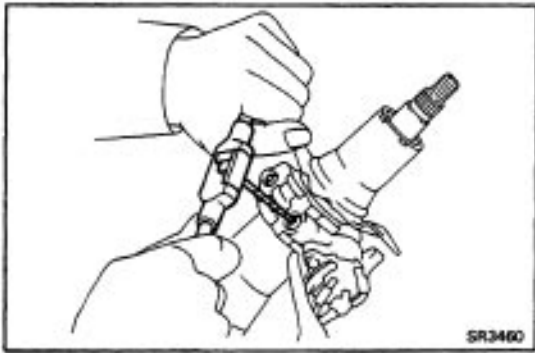
## Non-Tilt Steering Column COMPONENTS



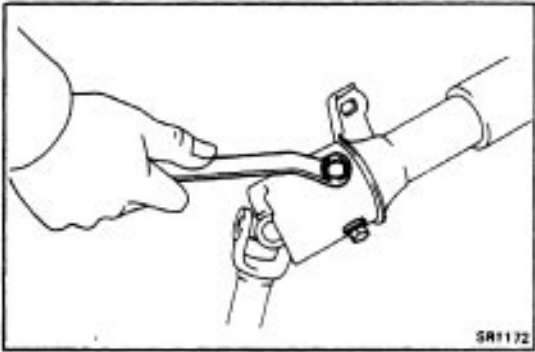
## DISASSEMBLY OF STEERING COLUMN

### 1. REMOVE UPPER BRACKET

- Using a centering punch, mark the center of the tapered-head bolt.
- Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the tapered-head bolt.

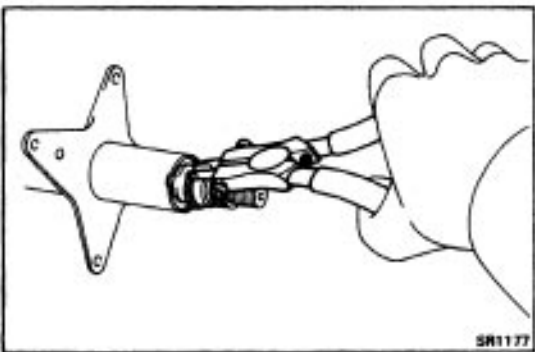


- (c) Using a screw extractor, remove the tapered-head bolt.
- (d) Remove the two bolts, and separate the upper bracket and the column tube.

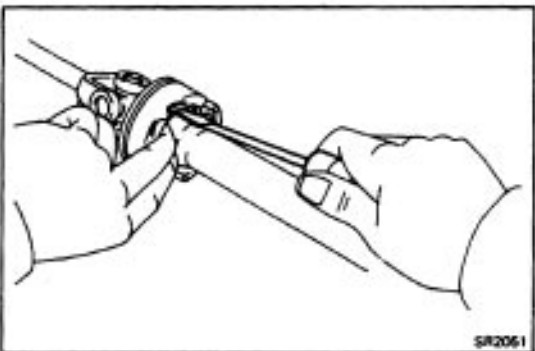


## 2. REMOVE MAIN SHAFT

- (a) Remove the two thrust stopper set bolts. ,

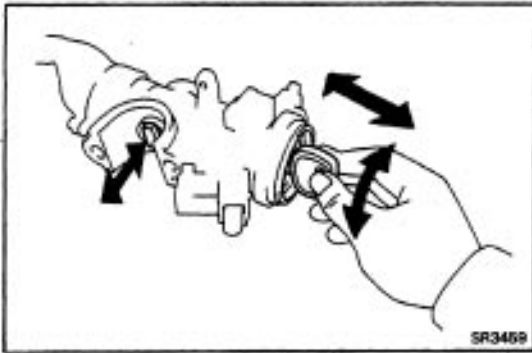


- (b) Using snap ring pliers, remove the snap ring.
- (c) Remove the main shaft.
- (d) Using snap ring pliers, remove the snap ring from the main shaft.



## 3. REMOVE THRUST STOPPER

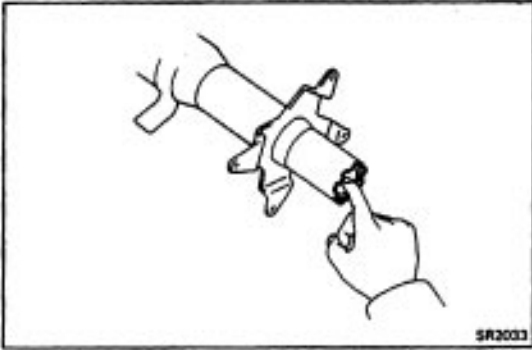
- (a) Using a screwdriver, remove the snap ring and thrust stopper.
- (b) Remove the O-ring from the thrust stopper.



## INSPECTION AND REPLACEMENT OF STEERING COLUMN

### 1. INSPECT UPPER BRACKET

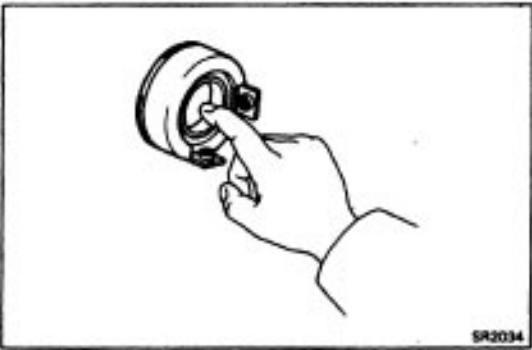
Check that the steering lock mechanism operates properly.



### 2. INSPECT UPPER BEARING

Check the upper bearing rotation condition and check for abnormal noise.

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



### 3. INSPECT LOWER BEARING

Check the lower bearing rotation condition and check for abnormal noise.

If bearing is worn or damaged, replace the thrust stopper.

### 4. (A /T)

#### INSPECT KEY INTERLOCK SOLENOID

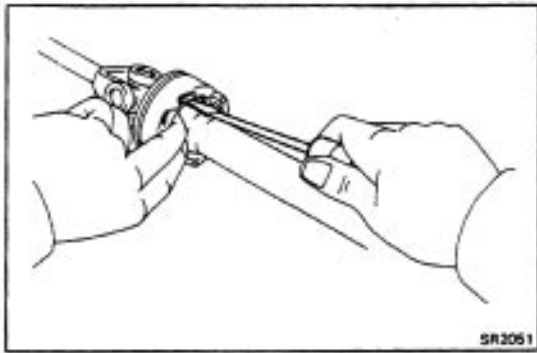
(See page [AT-411](#))

### 5. (A/T)

#### IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

(See page [SR-1 3](#))



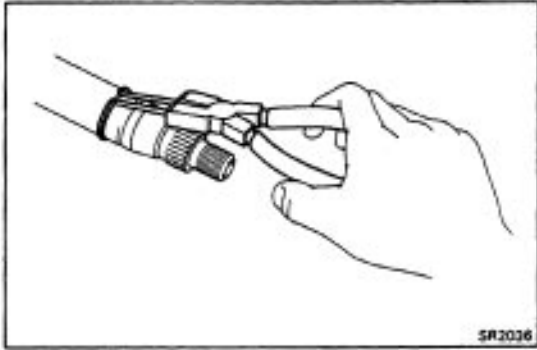


## ASSEMBLY OF STEERING COLUMN

(See page [SR-5](#))

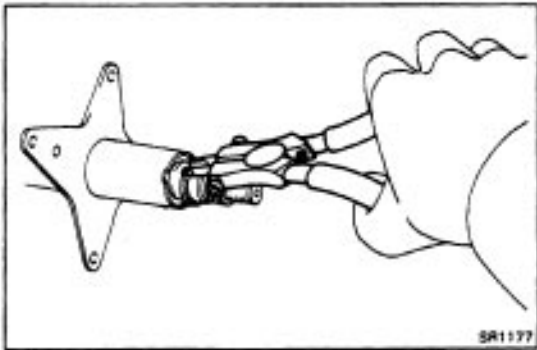
### 1. INSTALL THRUST STOPPER

- (a) Install a new O-ring to the thrust stopper.
- (b) Install the thrust stopper and snap ring.

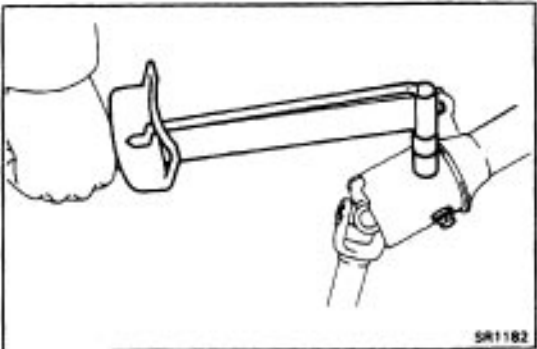


### 2. INSTALL MAIN SHAFT TO COLUMN TUBE

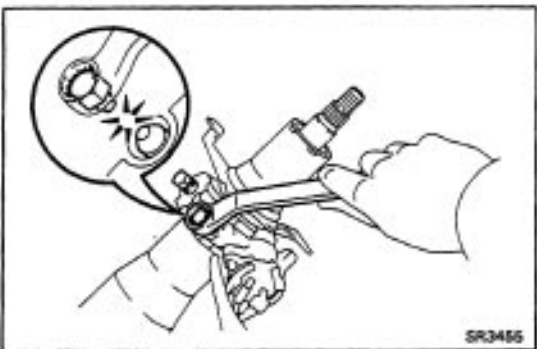
- (a) Using snap ring pliers, install the snap ring in the lower groove of the main shaft.
- (b) Apply molybdenum disulphide lithium base grease to the thrust stopper.
- (c) Insert the main shaft into the column tube.



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



- (e) Install the two thrust stopper set bolts.  
**Torque: 130 kg-cm (9 ft-11b, 13 N-m)**



### 3. INSTALL UPPER BRACKET TO COLUMN TUBE

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

# POWER STEERING

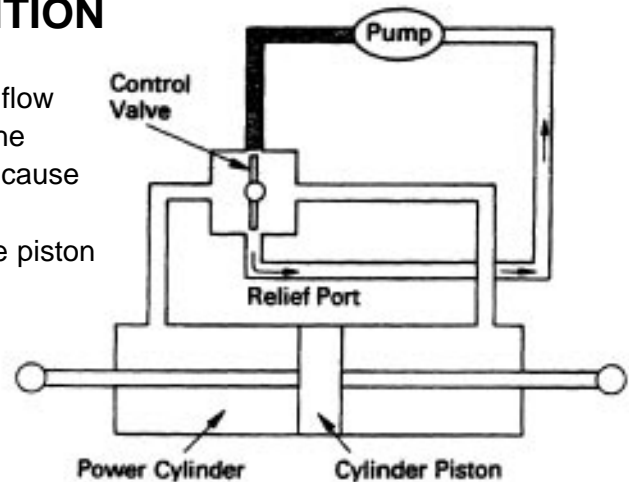
## Description

### PRINCIPLES OF POWER STEERING

Power steering is one type of hydraulic device for utilizing engine power to reduce 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 steering main shaft.

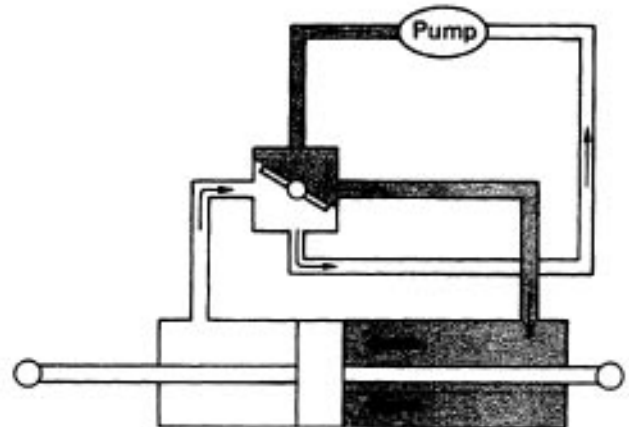
### NEUTRAL (STRAIGHT-AHEAD) POSITION

Fluid from the pump is sent to the control valve. If the control valve is in the neutral position, all the fluid will flow 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.



### 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 the cylinder is forced back to the pump through the control valve.



## SERVICE HINT

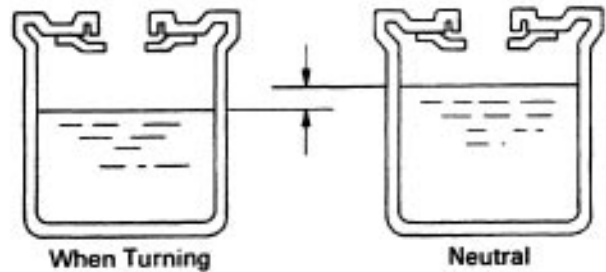
Troubles with the power steering system are usually concerned with hard steering due to the fact that there is no assist. In such cases, before attempting to make repairs, it is necessary to determine whether the trouble lies with the pump or with the gear housing. To do this, an on-vehicle inspection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

### ON-VEHICLE INSPECTION

Power steering is a hydraulic device and 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 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.



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 be performed every time to ensure that the power steering system is working properly after overhauling or repairing the pump or gear housing.

### VANE PUMP

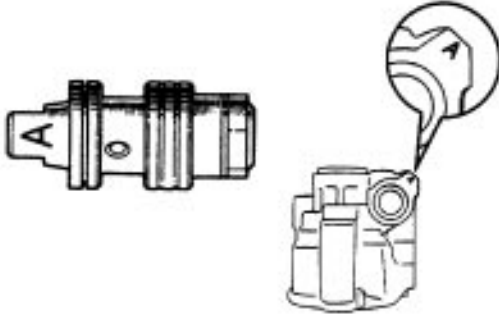
The main component parts of the vane pump, such as the cam ring, rotor, vanes and flow control valve are high precision parts and must be handled carefully. Also, because this pump produces a very high fluid pressure, O-rings are used for sealing each part. When reassembling the pump, always use new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

In the flow control valve, there is a relief valve which controls the maximum pressure of the pump.

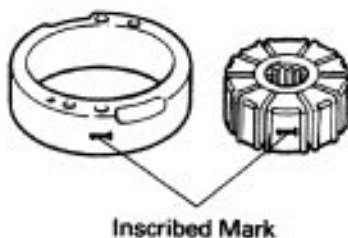
The amount of this maximum pressure is very important; if it is too low, there will be insufficient power steering assist and if too high, it will have an adverse effect on the pressure hoses, oil seals, etc.

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.



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.



## GEAR HOUSING

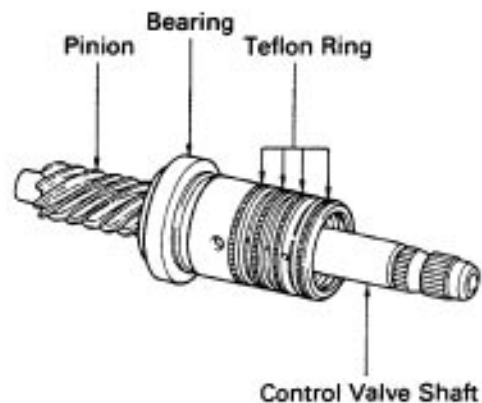
If the gear housing is secured directly in a vise during overhaul, there is danger of deforming it, so always first secure it in the SST provided (rack & pinion steering rack housing stand) before placing it in the vise **SST**



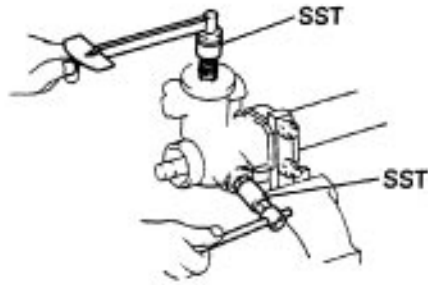
The oil seals on both sides of the power cylinder are for the prevention of leakage of the high pressure fluid which acts on the piston. Always use new oil seals when reassembling and be very careful not to scratch or damage them. Because of the high pressure, even the slightest scratch will cause fluid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



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.



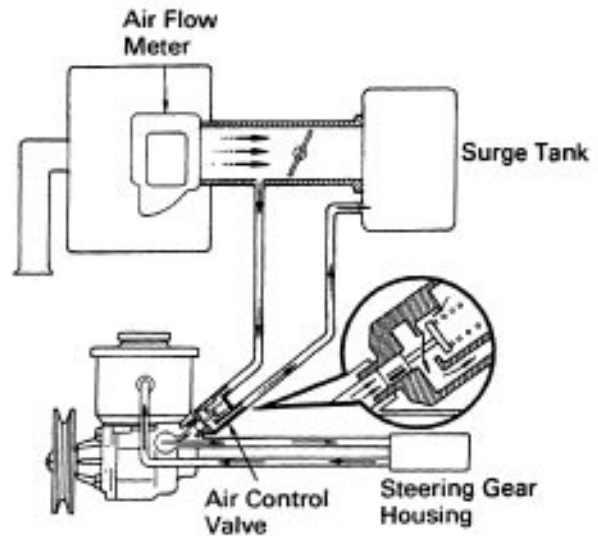
## IDLE-UP DEVICE

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, 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.

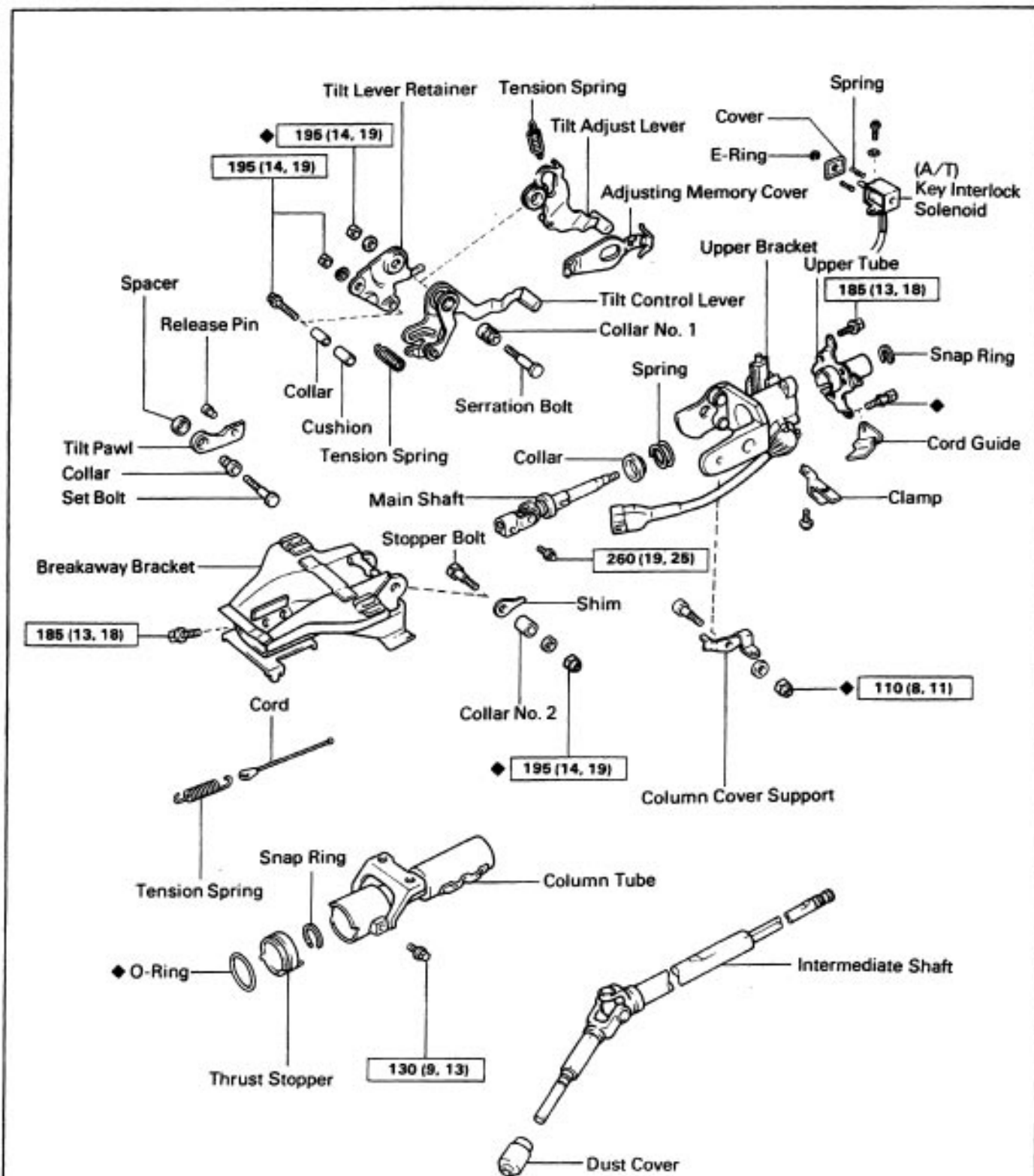
On ER engines, when the piston of the air control valve is pushed by fluid pressure, the air valve opens and the volume of air by-passing the throttle valve is increased to regulate engine rpm.

**(SV Series)**



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 or pressure tube, to control the flow of air.

## Tilt Steering Column COMPONENTS



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

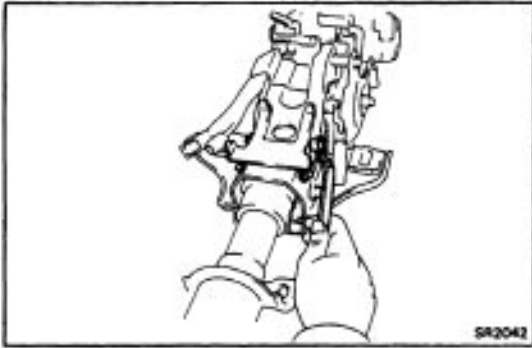
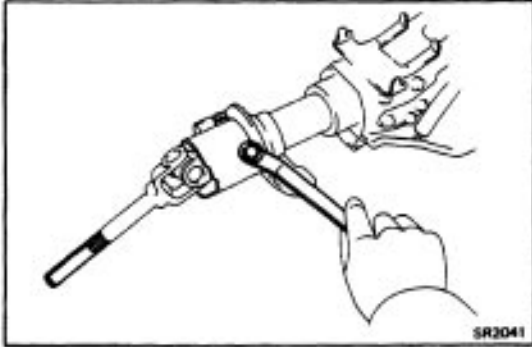
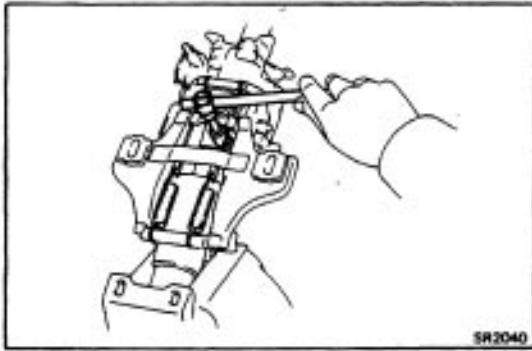
◆ Non-reusable part

## DISASSEMBLY OF STEERING COLUMN

(See page [SR-9](#))

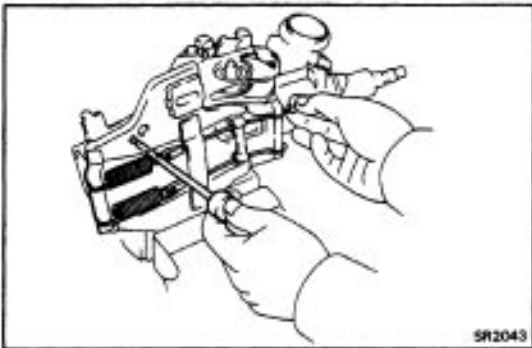
### 1. REMOVE INTERMEDIATE SHAFT

- (a) Remove the bolt from the main shaft.
- (b) Remove the two thrust stopper set bolts.
- (c) Pull out the intermediate shaft from the column tube.



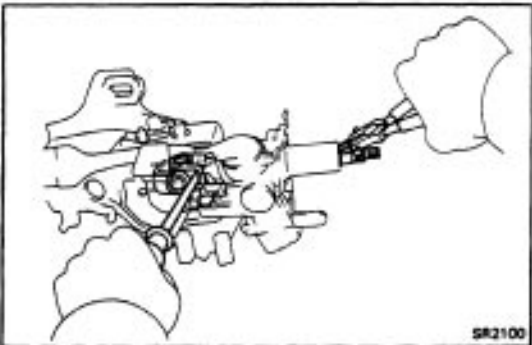
### 2. REMOVE COLUMN TUBE

Remove the four bolts and column tube.



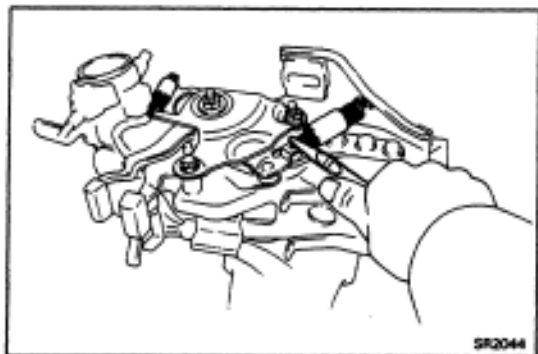
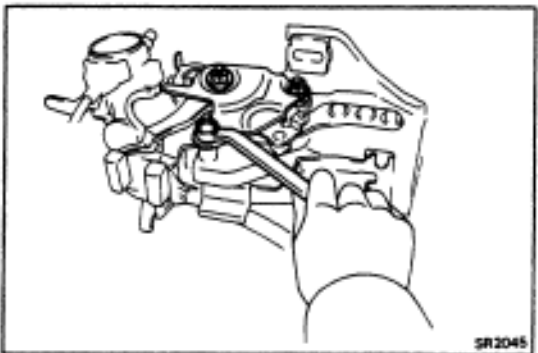
### 3. REMOVE TENSION SPRINGS AND CORDS

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

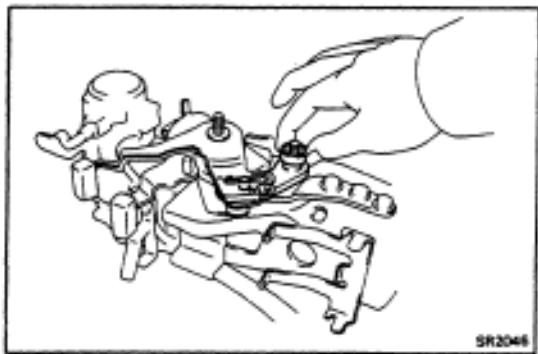


### 4. REMOVE MAIN SHAFT

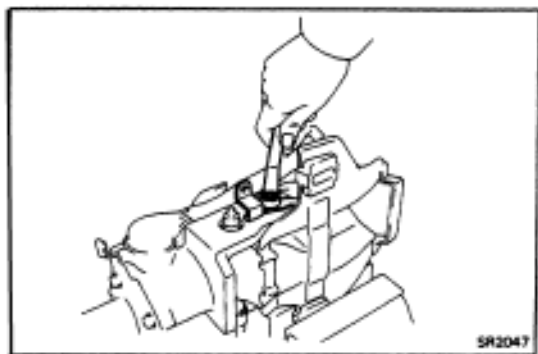
- (a) Using a screwdriver, push the main shaft.
- (b) Using snap ring pliers, remove the snap ring.
- (c) Pull out the main shaft.
- (d) Remove the spring and collar from the main shaft.

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

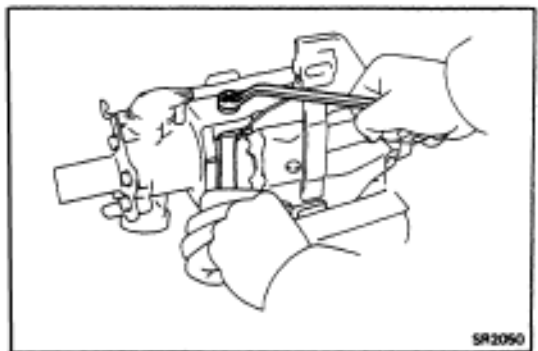
- (a) Remove the bolt, collar and cushion.
- (b) Remove the two nuts and tilt lever retainer.

**7. REMOVE TILT PAWL**

- (a) Remove the spacer and pin.
- (b) Remove the tilt pawl and collar.

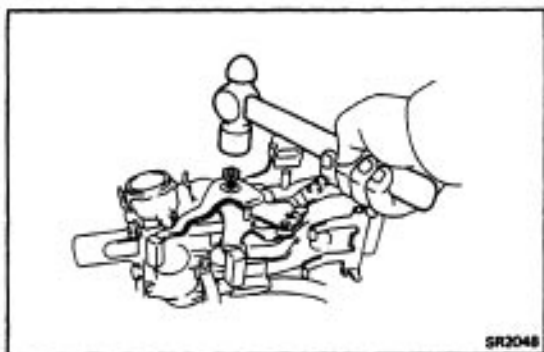
**8. REMOVE STOPPER BOLT**

- (a) Remove the nut and column cover support.
- (b) Tap out the stopper bolt and cushion.

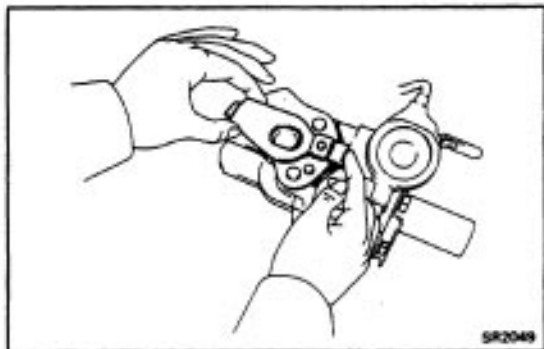
**9. REMOVE COLUMN UPPER BRACKET**

- (a) Remove the nut and set bolt.

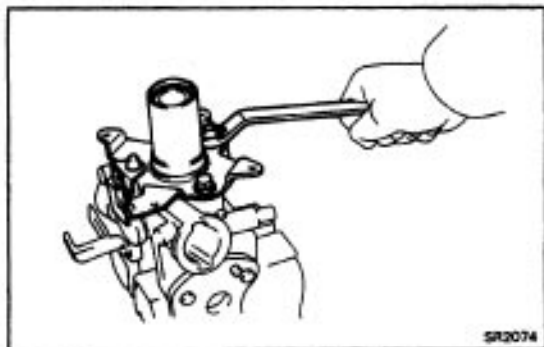




- (b) Temporarily install the nut to the serration bolt end for protection, and tap out the serration bolt from the breakaway bracket.
- (e) Remove the upper bracket.
- (d) Remove the two collars, shim and tilt levers from the upper bracket.

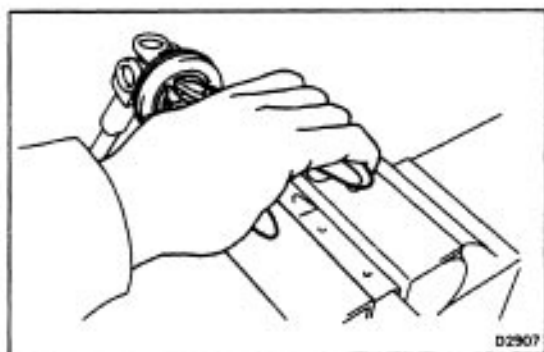


#### 10. REMOVE ADJUSTING MEMORY COVER



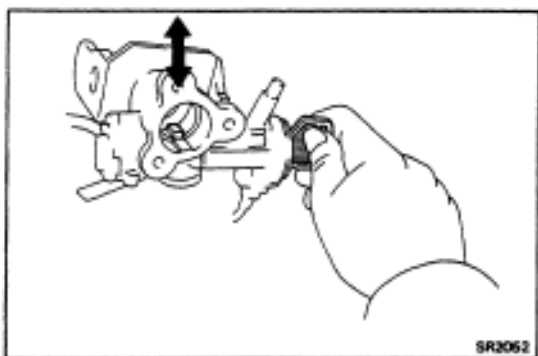
#### 11. REMOVE UPPER TUBE

- (a) Loosen the tapered-head bolt by tapping the chisel.
- (b) Remove the three bolts and upper tube.



#### 12. REMOVE THRUST STOPPER

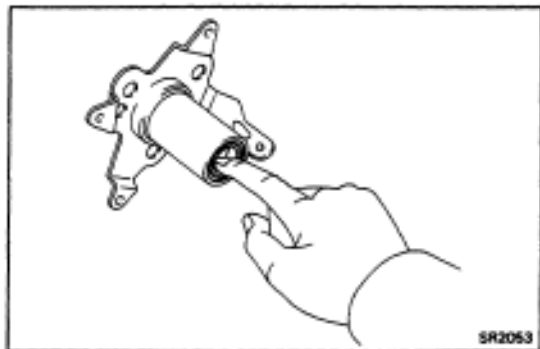
- (a) Using snap ring pliers, remove the snap ring and thrust stopper.
- (b) Remove the O-ring from the thrust stopper.



## INSPECTION AND REPLACEMENT OF STEERING COLUMN

### 1. INSPECT STEERING LOCK OPERATION

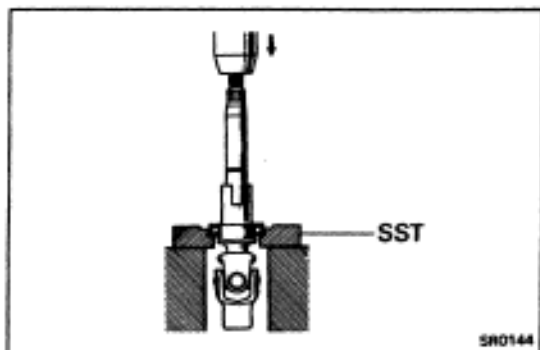
Check that the steering lock mechanism operates properly.



### 2. INSPECT MAIN SHAFT UPPER BEARING

Check the upper bearing rotation condition and check for abnormal noise.

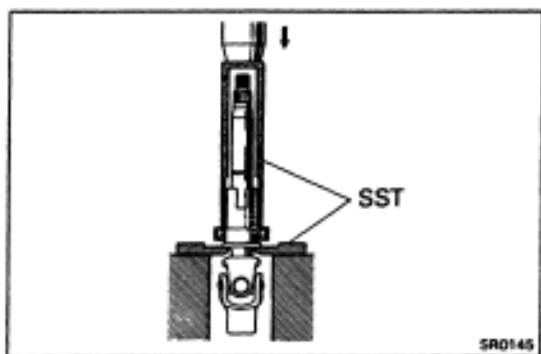
If the bearing is worn or damaged, replace the upper tube.



### 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 the bearing to the main shaft.  
SST 09236-00101 (09237-00010), 09612-22011

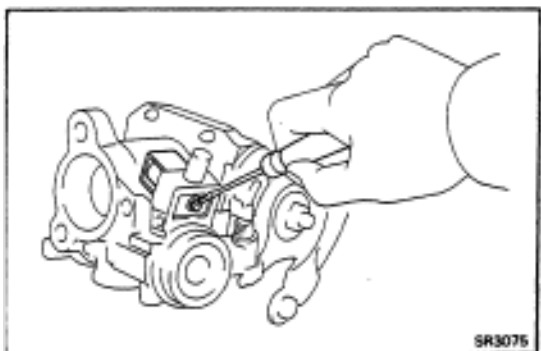


### 4. INSPECT KEY INTERLOCK SOLENOID

(See page [AT-41](#) 1)

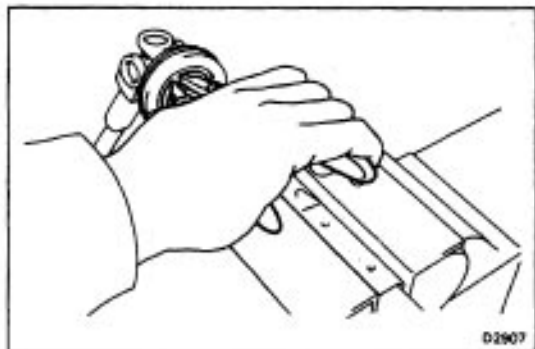
### 5. IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

(a) Using a screwdriver, remove E-ring and the cover.  
(b) Remove two screws and the solenoid.  
(c) Install a new solenoid with two screws.  
(d) Install the cover and E-ring over the two springs.



## ASSEMBLY OF STEERING COLUMN

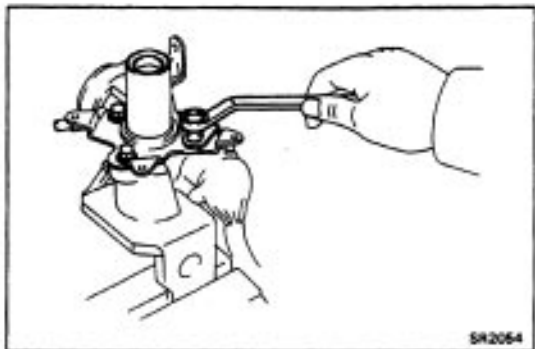
(See page [SR-9](#))



1. COAT ALL RUBBING PARTS WITH MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE

2. INSTALL THRUST STOPPER

- (a) Install a new O-ring to the thrust stopper.
- (b) Install the thrust stopper and snap ring with snap ring pliers.

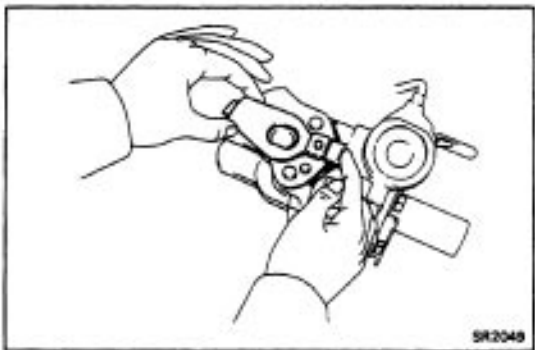


3. INSTALL UPPER TUBE

- (a) Install the upper tube with the three bolts and cord guide.
- (b) Torque the two bolts.

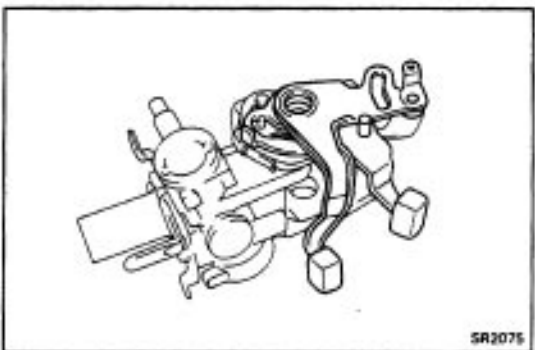
**Torque: 185 k9-cm (13 ft-lb, 18 N-m)**

- (c) Tighten the tapered-head bolt until the bolt head breaks off.

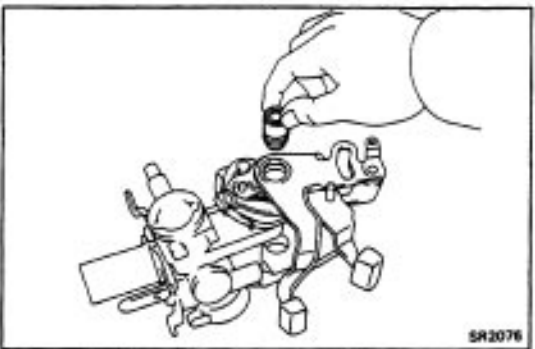


4. INSTALL ADJUSTING MEMORY COVER

Install the adjusting memory cover to the ratchet of the column upper bracket.



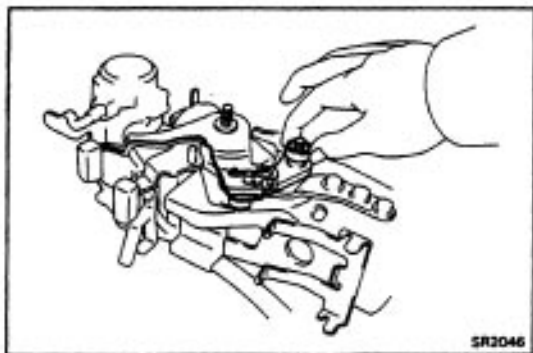
5. INSTALL TILT ADJUST LEVER AND CONTROL LEVER



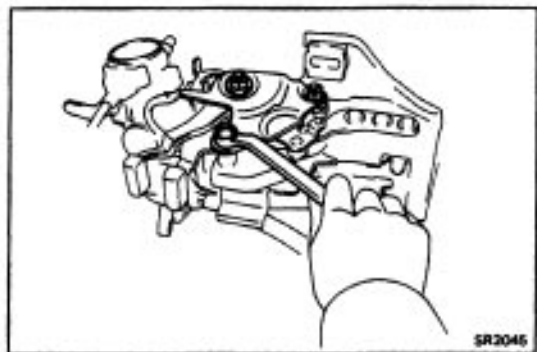
6. SELECT COLLAR NO.1

Select a collar No. 1 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)



7. **INSTALL COLLAR NO. 1**
8. **INSTALL UPPER BRACKET TO BREAKAWAY BRACKET**
9. **INSTALL TILT PAWL**
  - (a) Pull up the control lever.
  - (b) Install the collar and tilt pawl to the set bolt.
  - (c) Install the spacer and release pin.

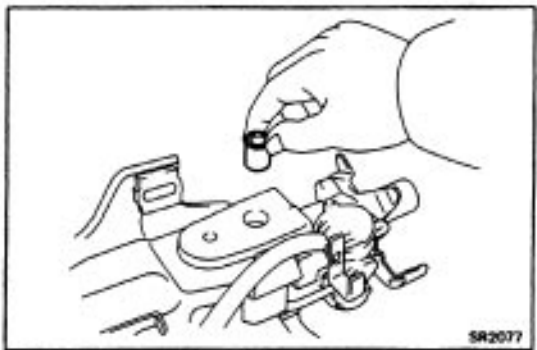


10. **INSTALL TILT LEVER RETAINER**
  - (a) Insert the serration bolt.
  - (b) Install the tilt lever retainer with the collar, cushion and bolt.

**Torque: 195 kg-cm (14 ft-lb, 19 N-m)**

  - (c) Install the two washers and two nuts.

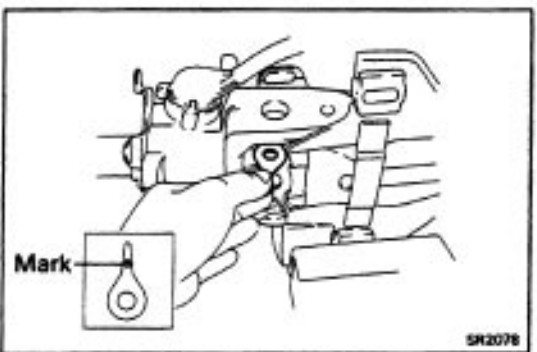
**Torque: 195 kg-cm (14 ft-lb, 19 N-m)**



#### 11. **SELECT COLLAR NO.2**

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

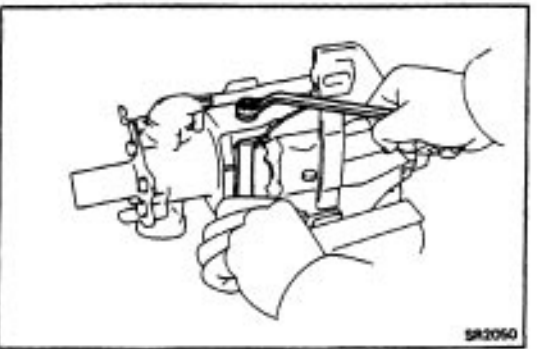
Outer diameter	mm(in.)
17.982 — 18.000	(0.7080 — 0.7087)
18.000 — 18.018	(0.7087 — 0.7094)



#### 12. **SELECT SHIM**

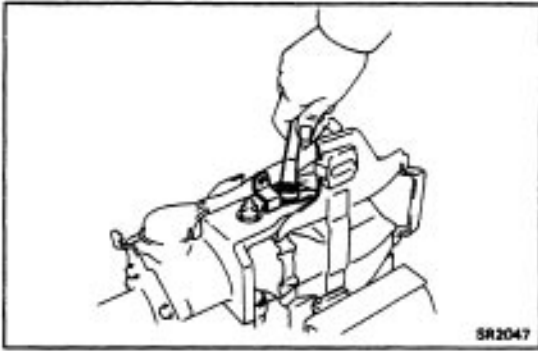
Select one or two shims which fit snugly when pressed in by hand.

Mark	Thickness mm (in.)
None	0.17—0.23 (0.0067—0.0091)
5	0.45—0.55 (0.0177—0.0217)
8	0.75—0.85 (0.0295—0.0335)
14	1.35—1.45 (0.0531—0.0571)
18	1.75—1.85 (0.0689—0.0728)



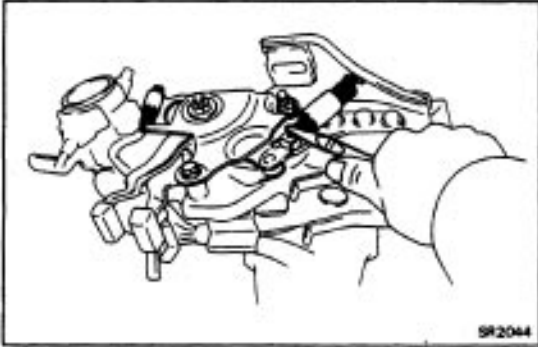
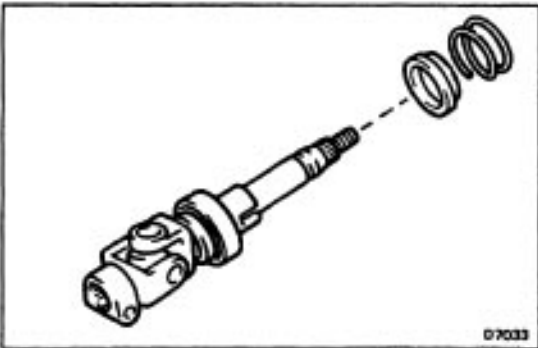
#### 13. **INSTALL COLLAR NO.2 AND SHIM**

- (a) Install the collar No.2 and shim.
  - (b) Install the bolt, washer and nut.
- Torque: 195 kg-cm 114 ft-lb, 19 N-m)**

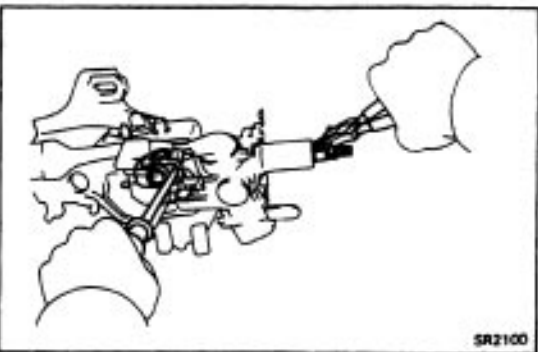
**14. INSTALL STOPPER6OLT**

- (a) Install the cushion to the stopper bolt.
- (b) Install the stopper bolt, column cover support and nut.

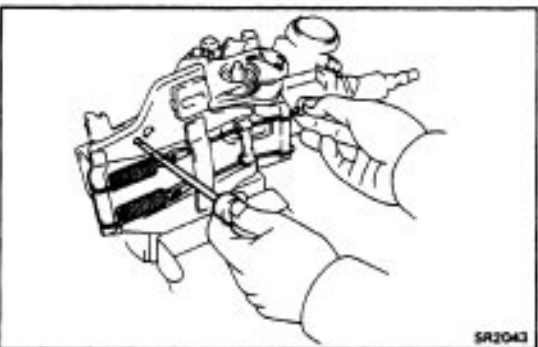
**Torque: 110 kg-cm (8 ft-lb, 11 N-m)**

**15. INSTALL TWO TENSION SPRINGS****16. INSTALL MAIN SHAFT**

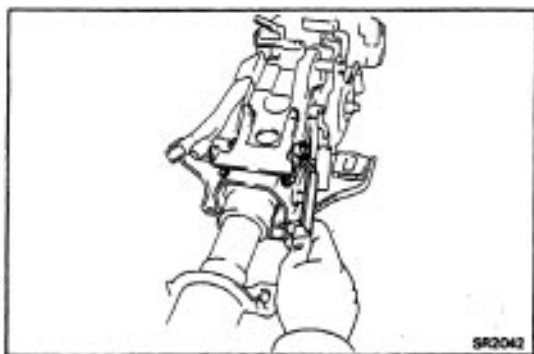
- (a) Place the ignition key at the ACC position.
- (b) Install the collar and spring to the main shaft and insert the main shaft into the upper bracket.



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

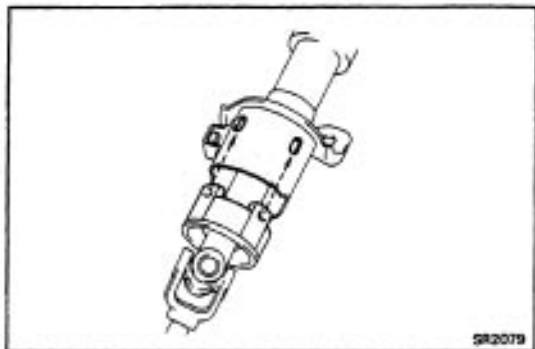
**17. INSTALL TENSION SPRINGS AND CORDS**

- (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.

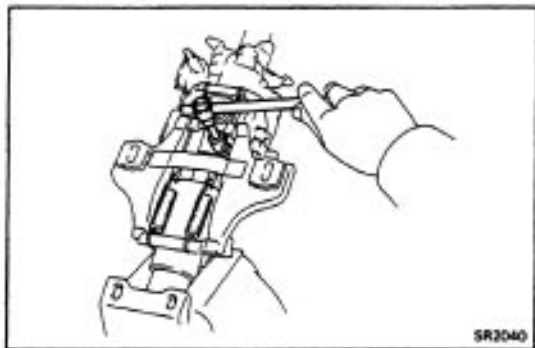
**18. INSTALL COLUMN TUBE TO BREAKAWAY BRACKET**

- (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)**

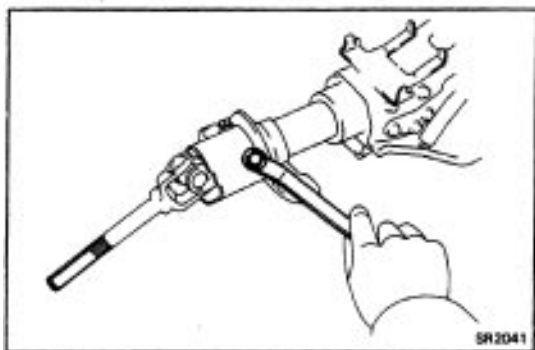
**19. INSTALL INTERMEDIATE SHAFT TO COLUMN TUBE**

- (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 the main shaft and intermediate shaft.

**Torque: 260 kg-cnn (19 ft-lb, 25 N-m)**

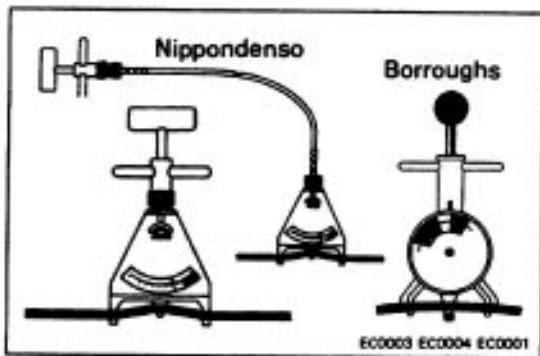


- (e) Install and torque the two bolts with the plate washers.

**Torque: 130 kg-cm (9 ft-lb, 13 N-m)**

**20. CHECK OPERATION OF TILT STEERING LEVER AND SUPPORT**

- (a) Check that there is no axial or horizontal play at the end of the main shaft.
- (b) Using the tilt adjust lever, check that the main shaft locks securely in all positions.
- (c) With the main shaft in the neutral position, pull the tilt control lever and check that the main shaft rises to the uppermost position.
- (d)
  - Pull the tilt adjust lever, and set the main shaft to the lowermost position.
  - Pull the tilt control lever, and raise the main shaft to the uppermost position.
  - Lower the main shaft, and check that it locks in the lowermost position.



## 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

Borroughs No.BT-33-73F

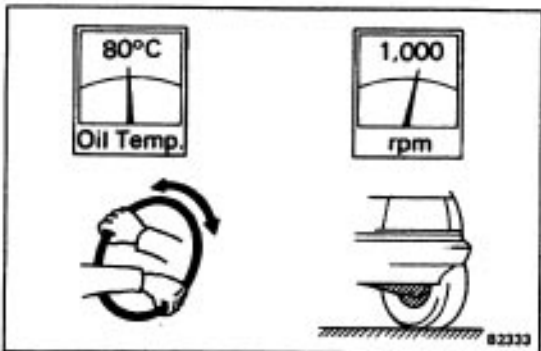
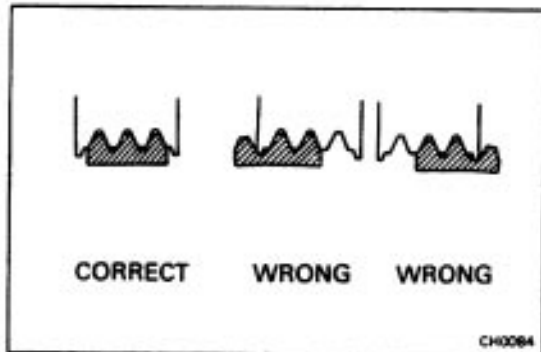
**Drive belt tension:**

**New belt  $125 \pm 25$  lb**

**Used belt  $80 \pm 20$  lb**

HINT:

- "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**

HINT: 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 II**

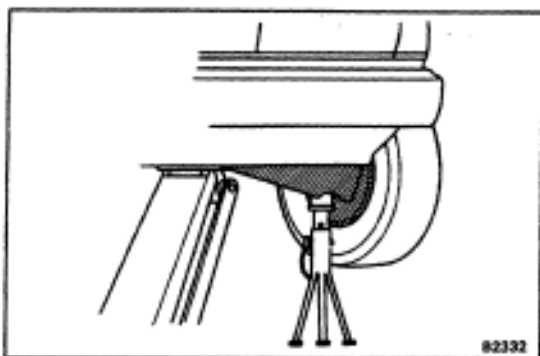
HINT: Check that the fluid level is within the HOT LEVEL of the tank. If the fluid is cold, check that it is within the COLD LEVEL of the tank.



### CHECK IDLE-UP

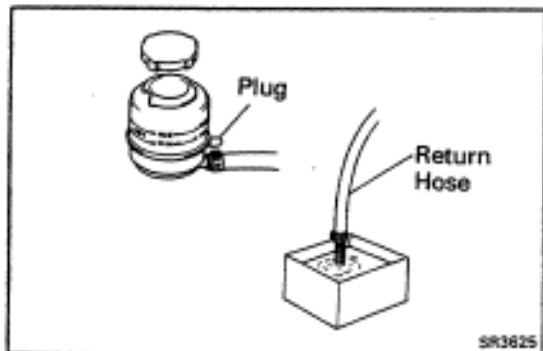
1. **WARM UP ENGINE**
2. **TURN AIR CONDITIONER SWITCH OFF**
3. **CHECK IDLE-UP**

- (a) Fully turn the steering wheel.
- (b) Check that the engine rpm decreases when the air control valve hose is pinched.
- (c) Check that the engine rpm increases when the air control valve hose is released.

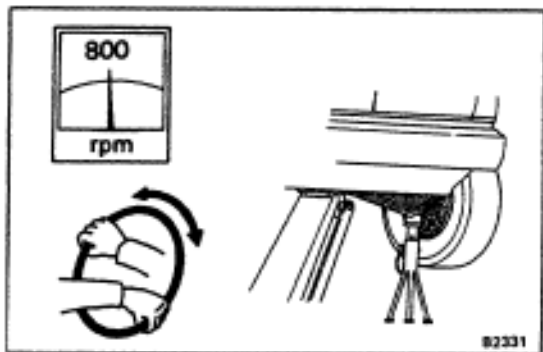


## REPLACEMENT OF POWER STEERING FLUID

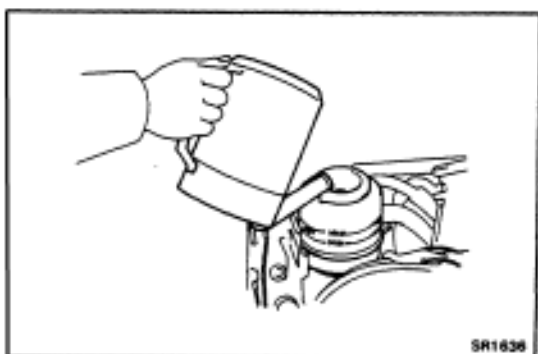
1. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS



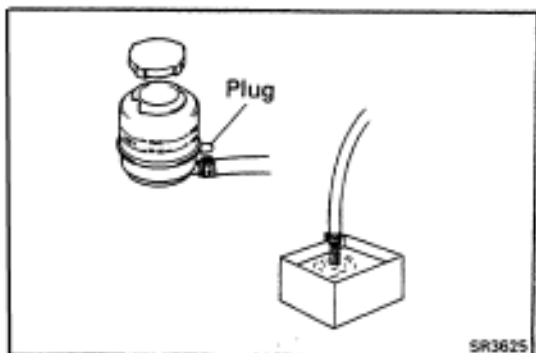
2. REMOVE FLUID RETURN HOSE FROM RESERVOIR TANK AND DRAIN FLUID INTO CONTAINER



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

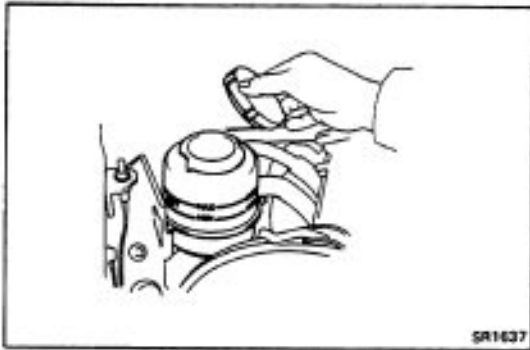


5. FILL RESERVOIR TANK WITH FRESH FLUID  
Fluid type: ATF DEXRON II



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.  
**NOTICE:** Take care that some fluid remains left in the reservoir tank.
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





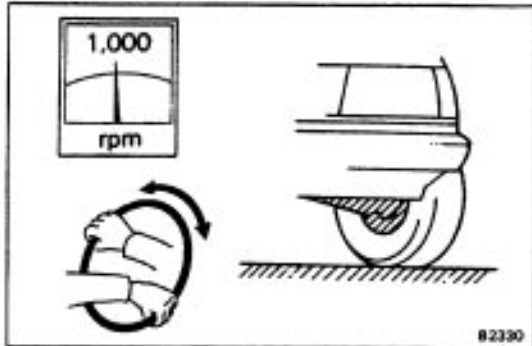
## BLEEDING OF POWER STEERING SYSTEM

### 1. CHECK FLUID LEVEL IN RESERVOIR TANK

Check the fluid level and add fluid if necessary.

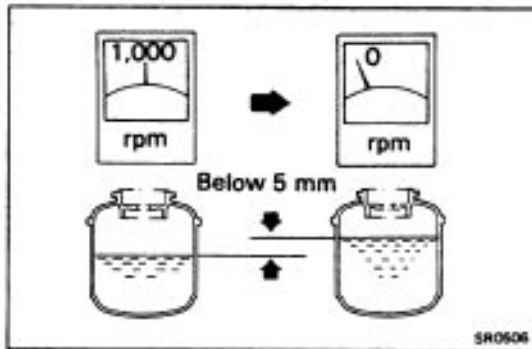
**Fluid: ATF DEXRON II**

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



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

With the engine speed below 1,000 rpm, turn the steering wheel to left or right full lock and keep it there for 2 – 3 seconds, then turn the wheel to the reverse full lock and keep it there for 2 3 seconds.

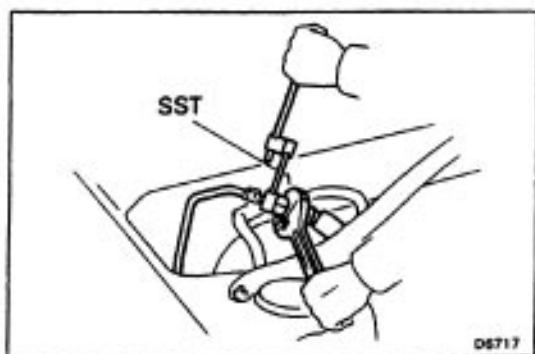


### 3. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED

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

**Maximum rise: 5 mm (0.20 in.)**

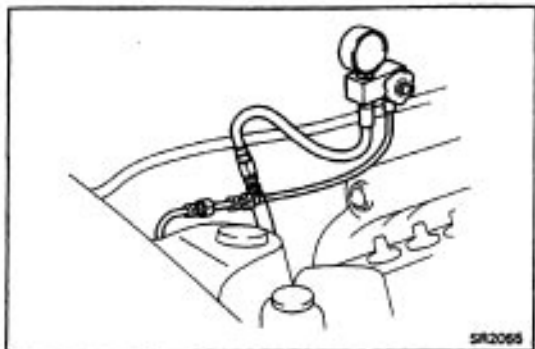
If a problem is found, repeat steps 5 to 8 on page [SR-23](#)– Repair the PS if the problem persists.



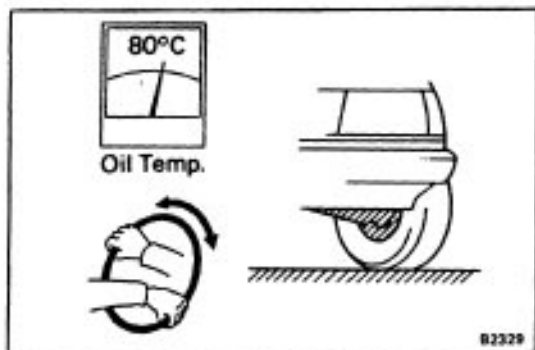
## OIL PRESSURE CHECK

### 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.

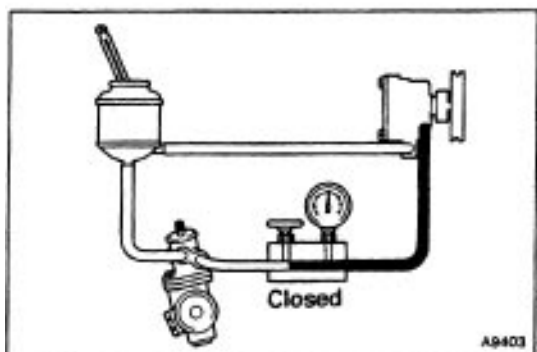
**Minimum pressure:**

(VZV series) 75 kg/cm<sup>2</sup> (1,067 psi, 7,355 kPa)

(Others) 65 kg/cm<sup>2</sup> (924 psi, 6,374 kPa)

**NOTICE:**

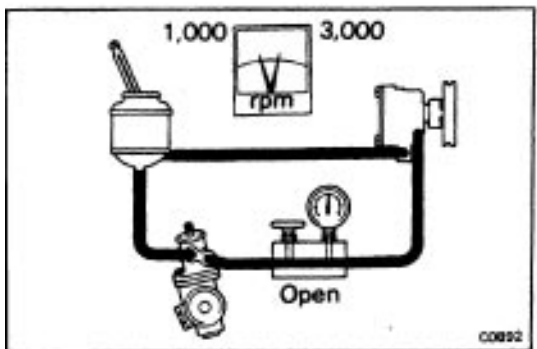
- Do not keep the valve closed for more than 10 seconds.
- Do not let the fluid temperature become too high.  
If pressure is low, repair or replace the PS pump.

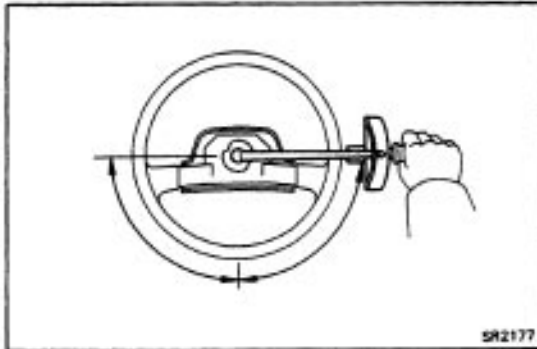
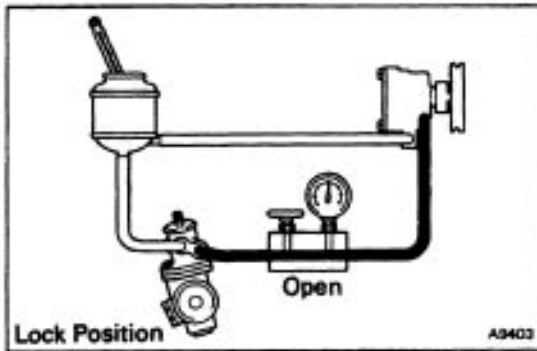


5. OPEN VALVE FULLY .
6. CHECK AND RECORD PRESSURE READING AT 1,000 RPM
7. CHECK AND RECORD PRESSURE READING AT 3,000 RPM

Check that there is 5 kg/cm<sup>2</sup> (71 psi, 490 kPa) or less difference in pressure between the 1,000 rpm and 3, 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:

(VZV series) 75 kg/cm<sup>2</sup> (1,067 psi, 7,355 kPa)

(Others) 65 kg/cm<sup>2</sup> (924 psi, 6,374 kPa)

##### NOTICE:

- Do not maintain lock position for more than 10 seconds.
- Do not let the fluid temperature become too high. 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)**

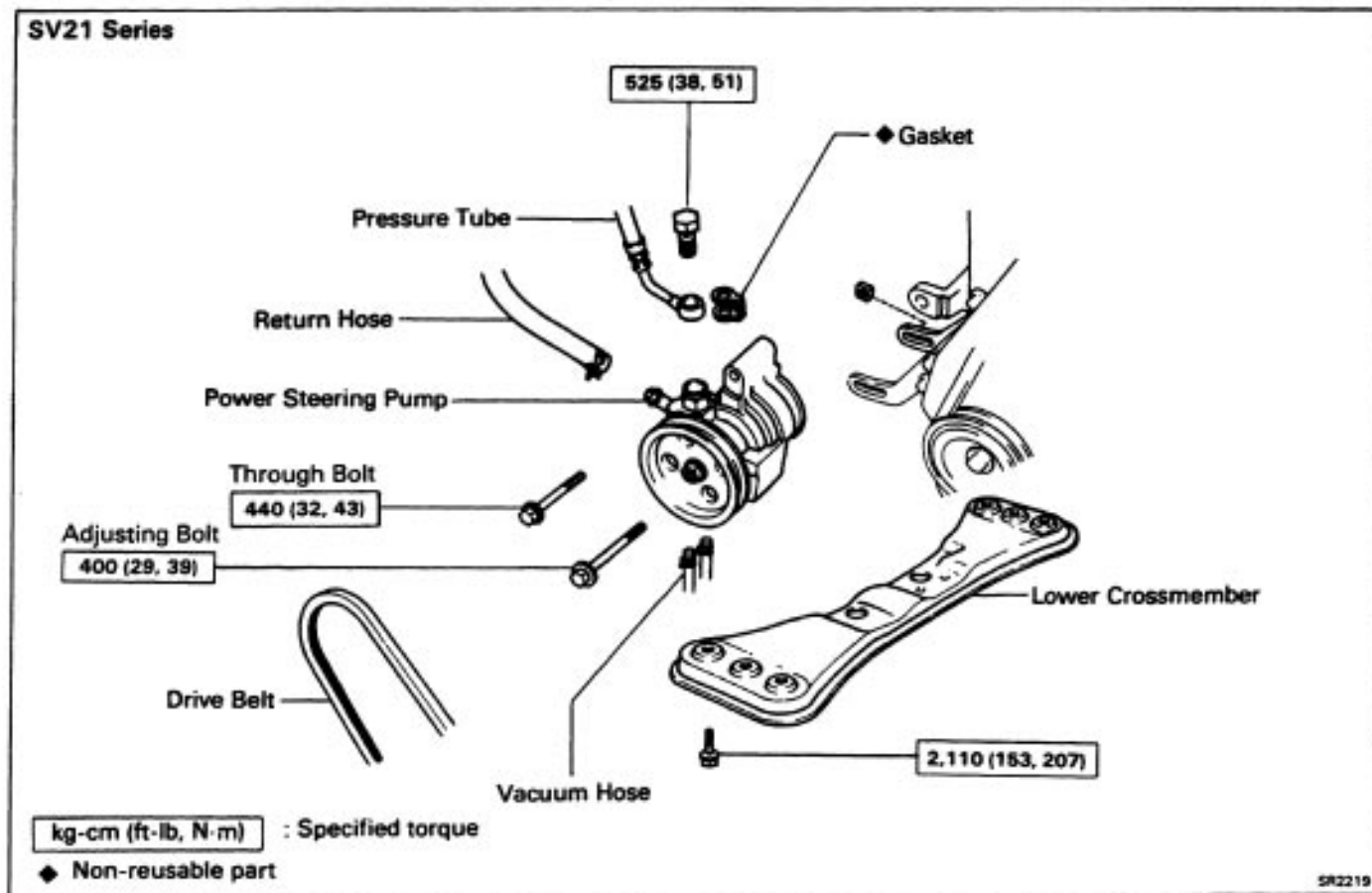
If steering effort is excessive, repair the power steering unit.

HINT: 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 (SV21 Series)

Remove and install the parts as shown.



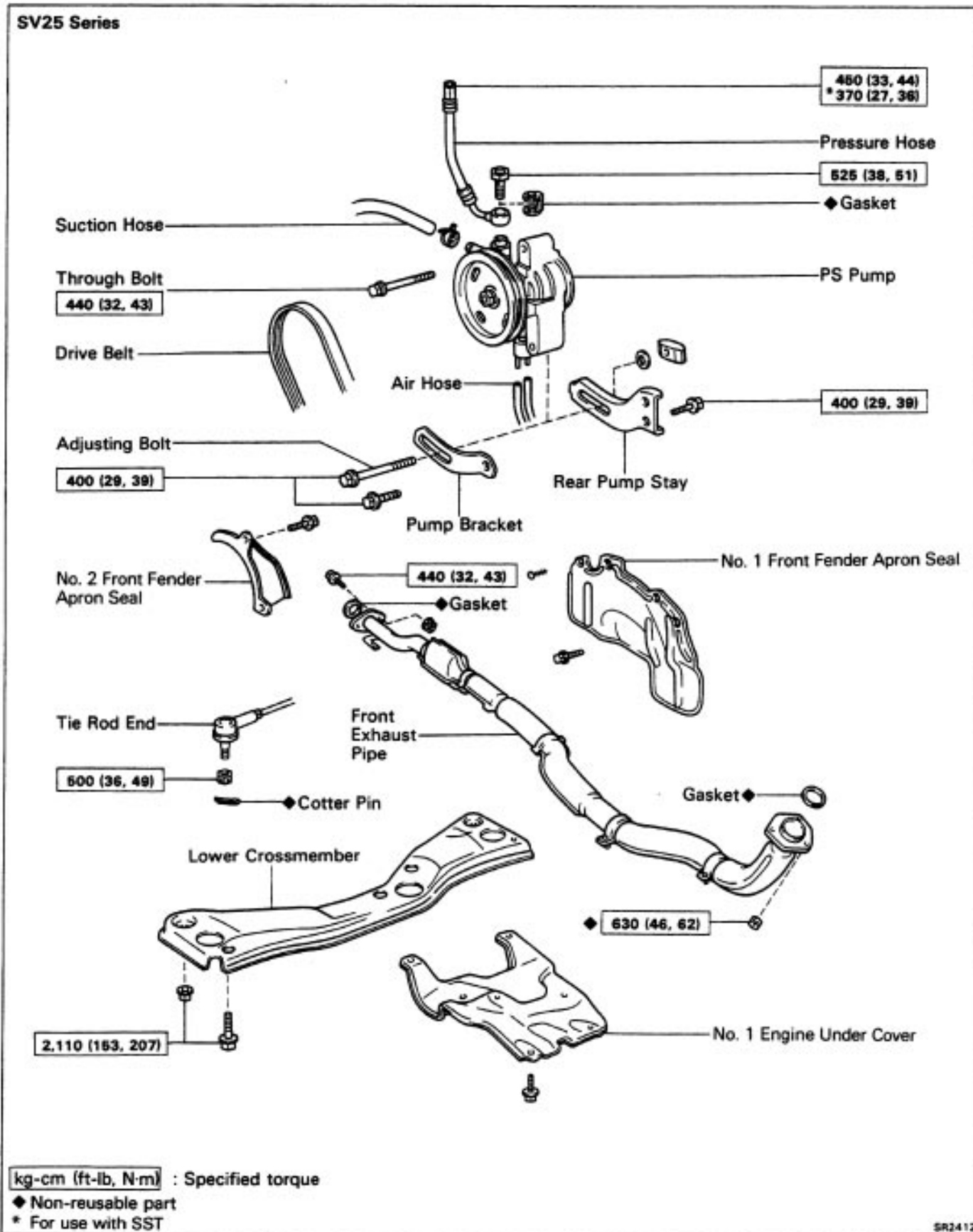
### (MAIN POINT OF INSTALLATION)

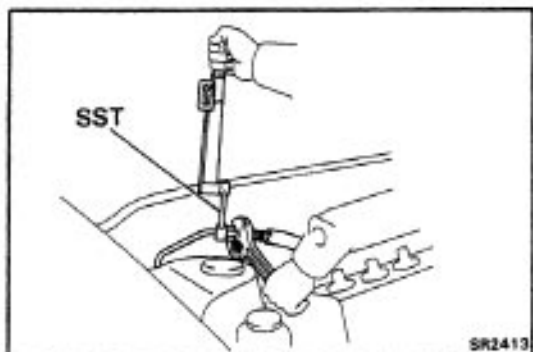
ADJUST DRIVE BELT TENSION AFTER INSTALLING PS PUMP

(See page [SR-22](#))

## REMOVAL AND INSTALLATION OF POWER STEERING PUMP (SV25 Series)

Remove and install the parts as shown.



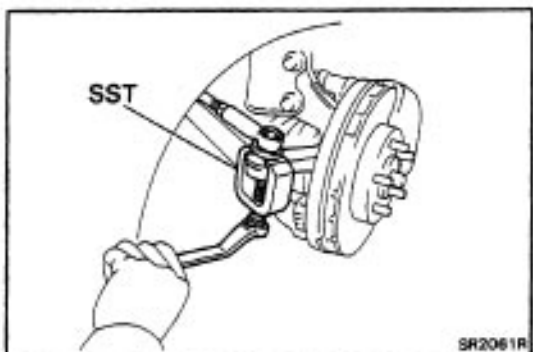


## (MAIN POINTS OF REMOVAL AND INSTALLATION)

### 1. DISCONNECT AND CONNECT PRESSURE LINE

Using SST, disconnect and connect the pressure line.  
SST 09631-22020

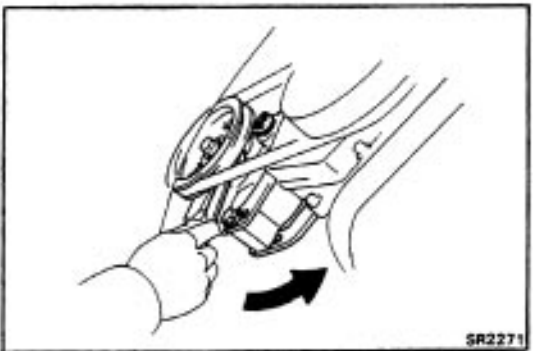
HINT: When connecting, use a torque wrench with a full-crum length of 340 mm (13.39 in.).



### 2. DISCONNECT TIE ROD END RH

(a) Remove the cotter pin and nut.

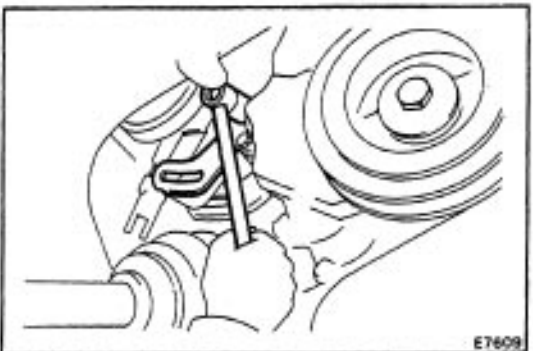
(b) Using SST, disconnect the tie rod end RH.  
SST 09610-55012



### 3. REMOVE DRIVE BELT

(a) Loosen the adjusting bolt and the through bolt and push the PS pump forward.

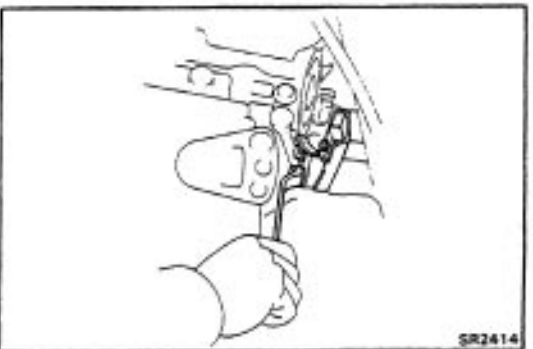
(b) Remove the drive belt.



### 4. REMOVE PUMP BRACKET

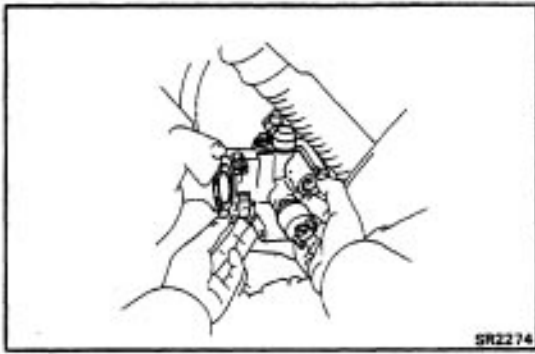
(a) Remove the adjusting bolt.

(b) Remove the bolt and bracket.



### 5. REMOVE REAR PUMP STAY

Remove the two bolts and stay.

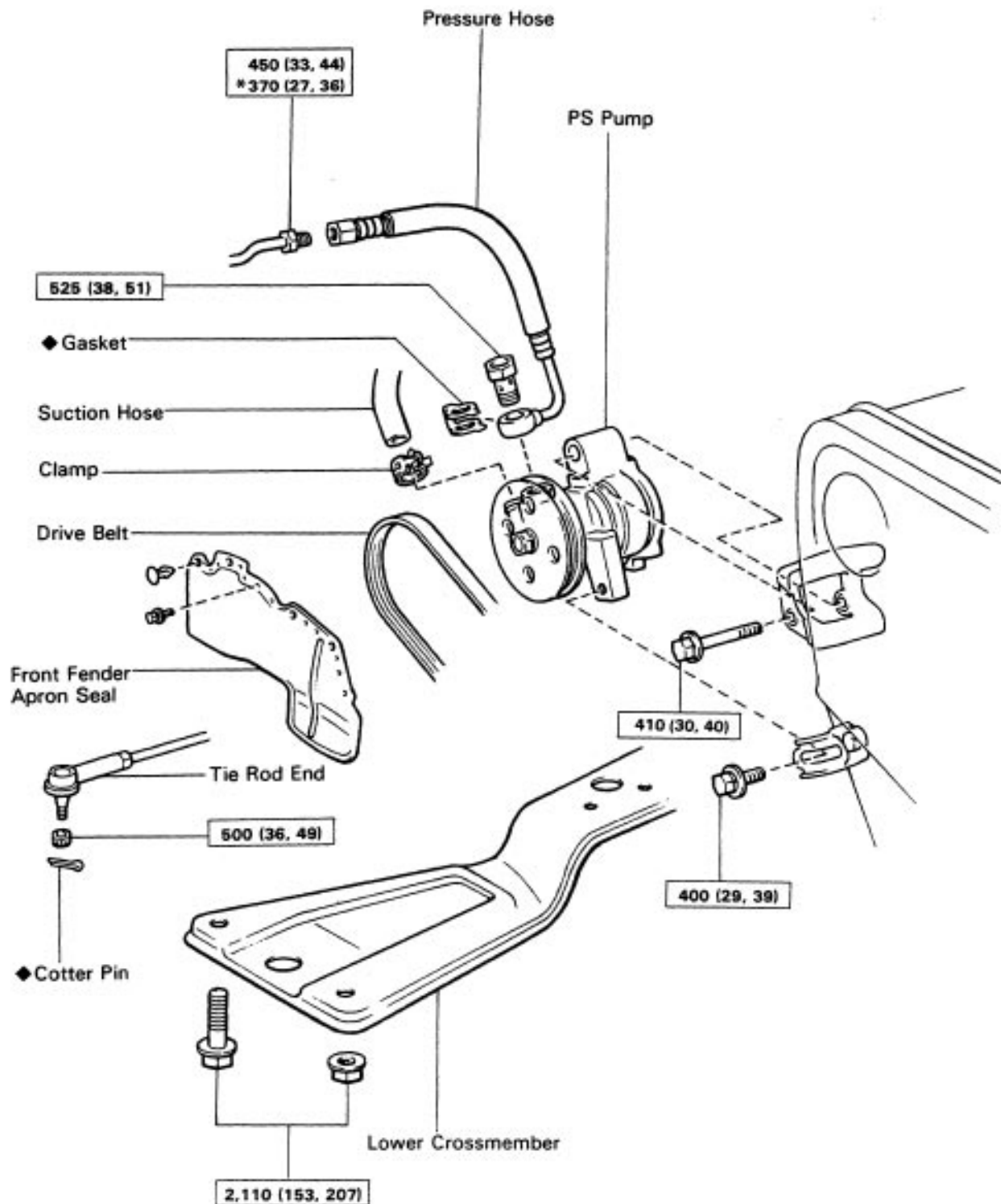
**6. REMOVE PS PUMP WITH PRESSURE TUBE**

- (a) Remove the through bolt.
- (b) Remove the PS pump from the lower side of body.

## REMOVAL AND INSTALLATION OF POWER STEERING PUMP (VZV Series)

Remove and install the parts as shown.

VZV Series

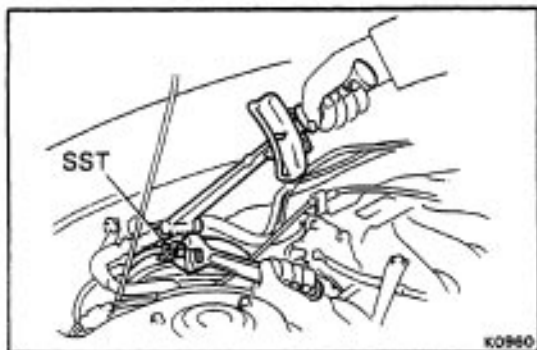


[kg-cm (ft-lb, N-m)] : Specified torque

◆ Non-reusable part

\* For use with SST





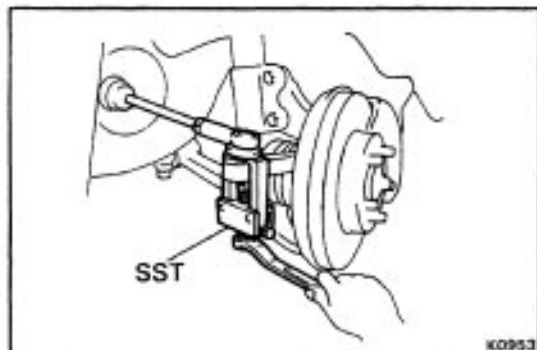
## (MAIN POINTS OF REMOVAL AND INSTALLATION)

### 1. DISCONNECT AND CONNECT PRESSURE LINE

Using SST, disconnect and connect the pressure line.

SST 09631-22020

HINT: When connecting, use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

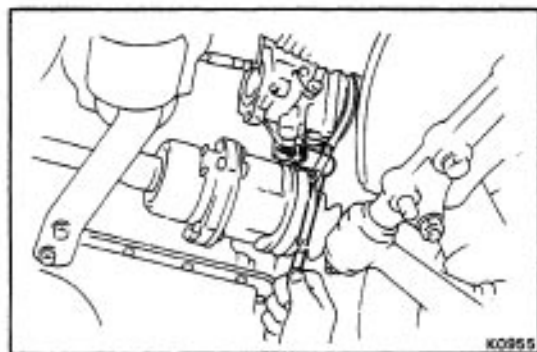


### 2. DISCONNECT TIE ROD END RH

(a) Remove the cotter pin and nut.

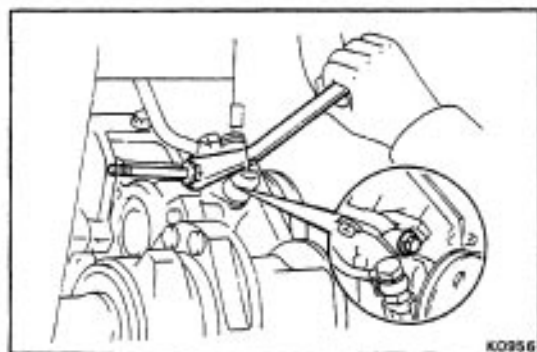
(b) Using SST, disconnect the tie rod end RH.

SST 09628-62011



### 3. REMOVE DRIVE BELT

(a) Loosen the adjusting bolt.

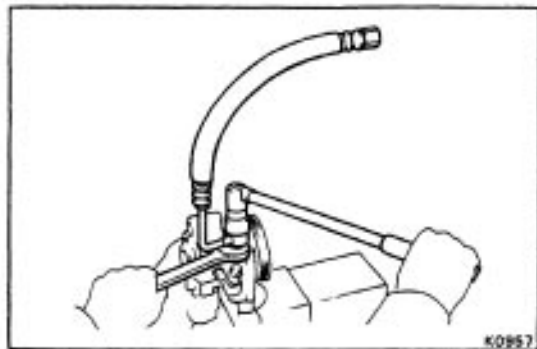


(b) Loosen the through bolt and push the PS pump forward.

(c) Remove the drive belt.

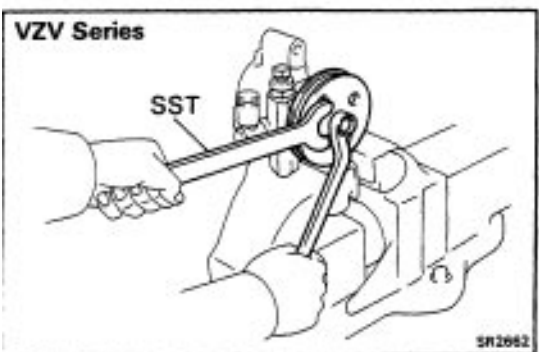
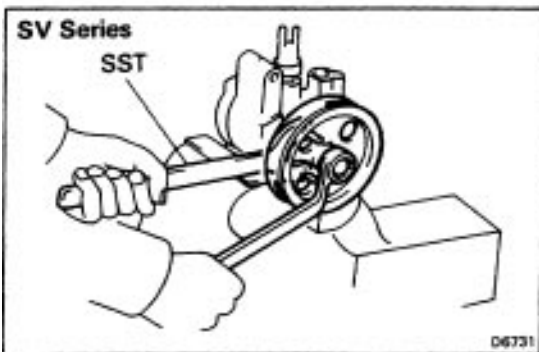
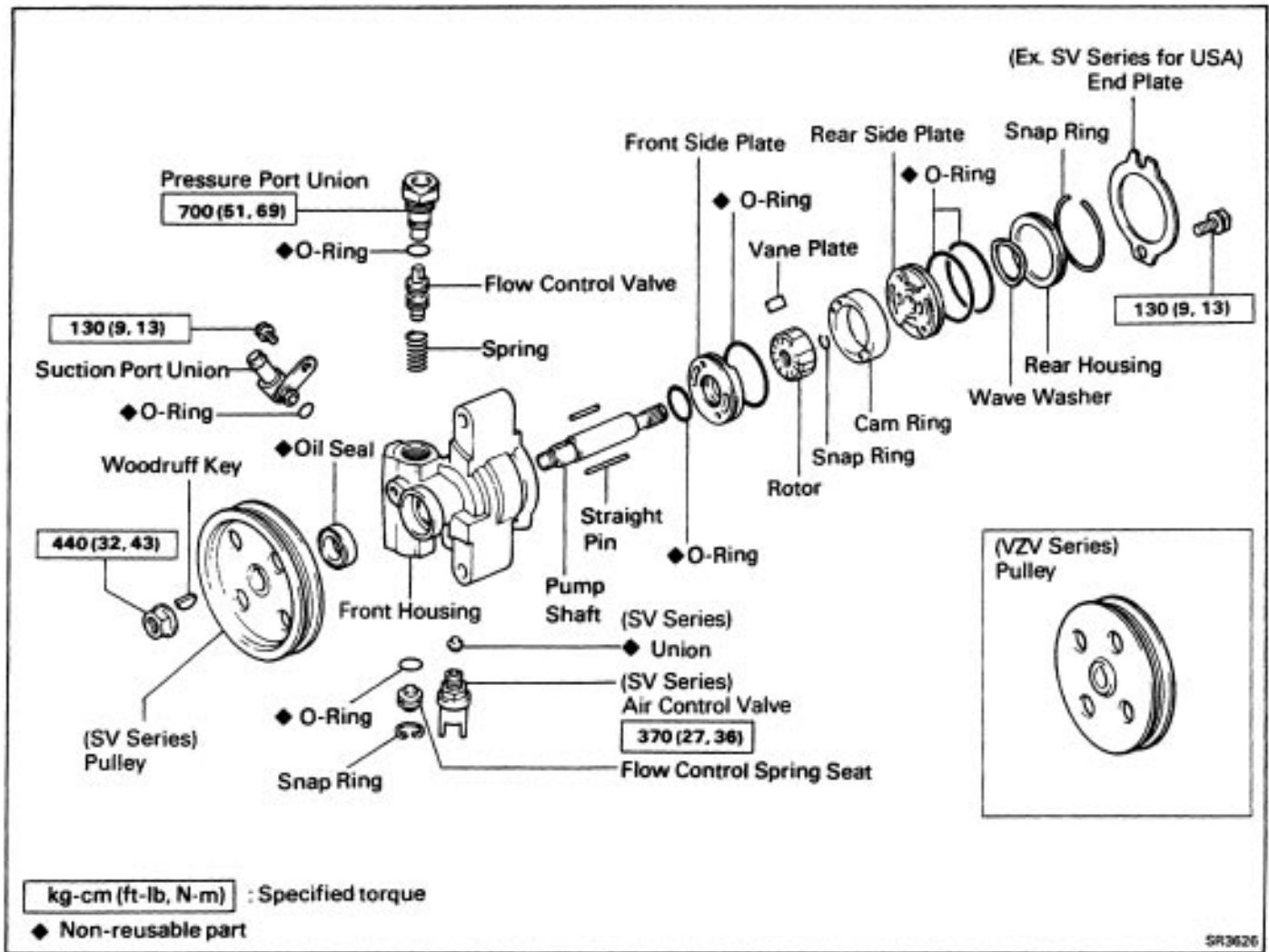
### 4. REMOVE PS PUMP WITH PRESSURE TUBE

Remove the adjusting bolt and through bolt, then remove PS pump from the lower side of vehicle body.



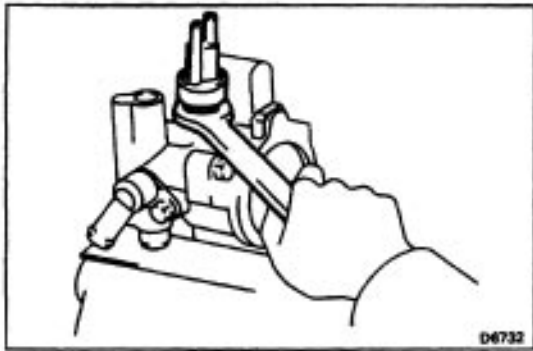
### 5. REMOVE PRESSURE TUBE

## COMPONENTS

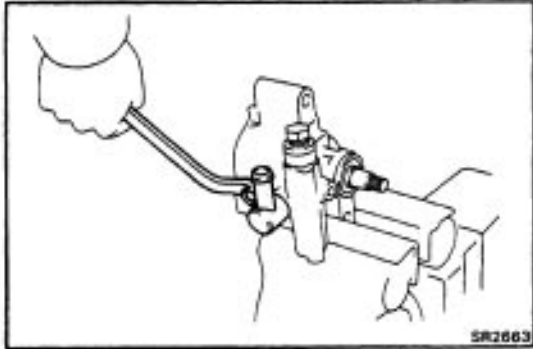


## DISASSEMBLY OF POWER STEERING PUMP

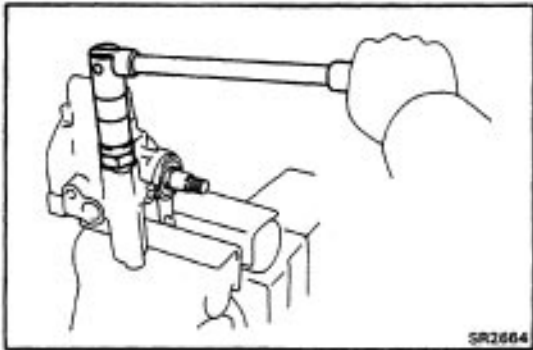
- MOUNT POWER STEERING PUMP IN VISE**  
NOTICE: Do not tighten the vise too tight.
- REMOVE PS PUMP PULLEY**
  - Using SST, remove the pulley set nut.  
SST 09616-30020 (For SV Series)  
SST 09616-22010 (For VZV Series)
  - Remove the pulley and woodruff key.
- (Ex. SV Series for USA) REMOVE END PLATE**

**4. (SV Series)****REMOVE AIR CONTROL VALVE**

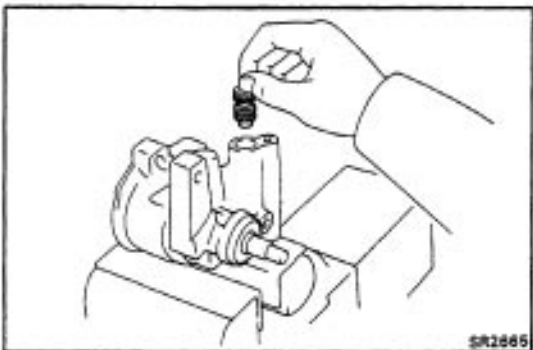
- (a) Remove the air control valve.
- (b) Remove the union seat.

**5. REMOVE SUCTION PORT UNION**

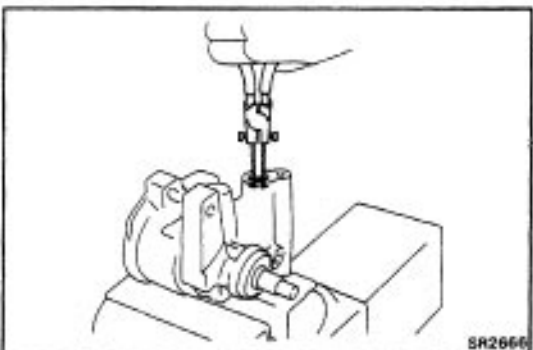
- (a) Remove the bolt and union.
- (b) Remove the O-ring from the union.

**6. REMOVE FLOW CONTROL VALVE**

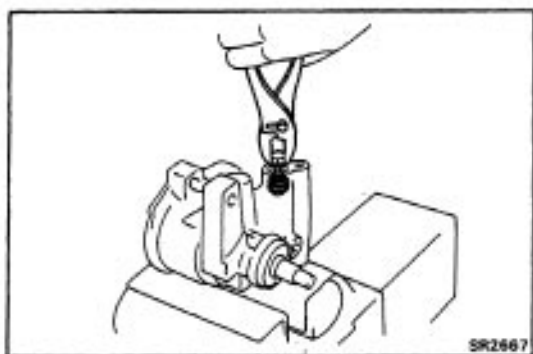
- (a) Remove the pressure port union.
- (b) Remove the O-ring from the union.



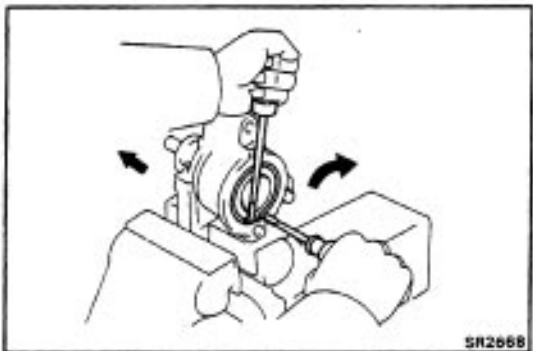
- (e) Remove the flow control valve and spring.

**7. REMOVE FLOW CONTROL SPRING SEAT**

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

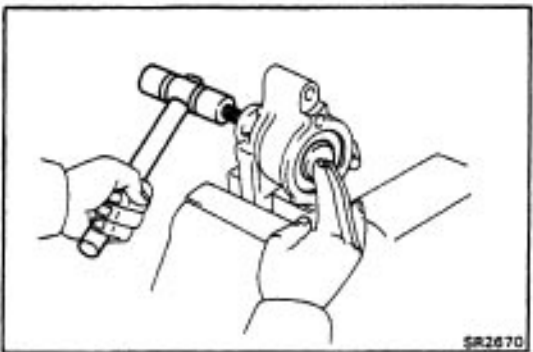


- (b) Temporarily install a bolt to the seat and pull out the seat.
- (c) Remove the O-ring from the seat.

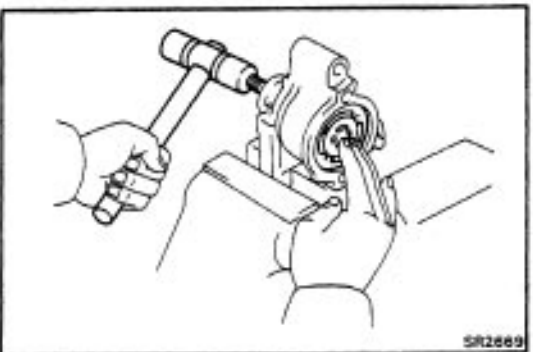


## 8. REMOVE REAR HOUSING

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

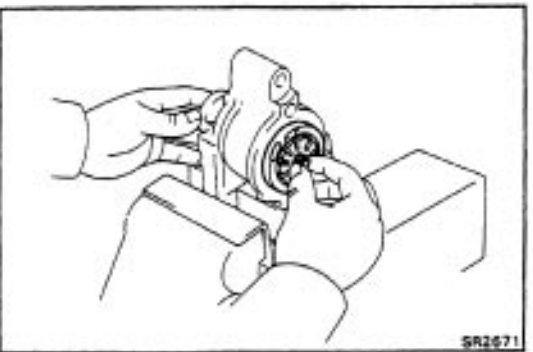


- (b) Using a plastic hammer, tap out the rear housing and wave washer.
- (c) Remove the O-ring from the rear housing.



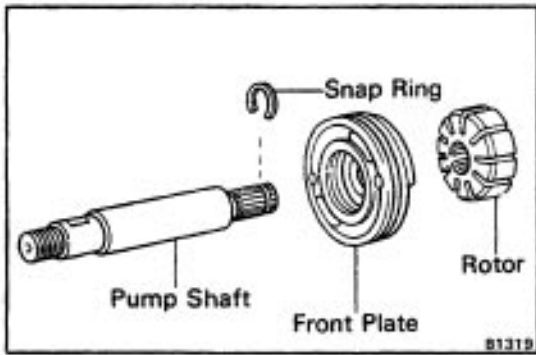
## 9. REMOVE REAR SIDE PLATE

- (a) Using a plastic hammer, tap the shaft end and remove the rear plate.
- (b) Remove the O-ring from the rear plate.

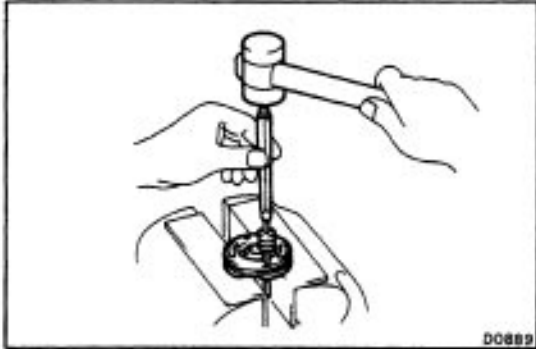


## 10. REMOVE PUMP SHAFT, CAM RING AND VANE PLATES

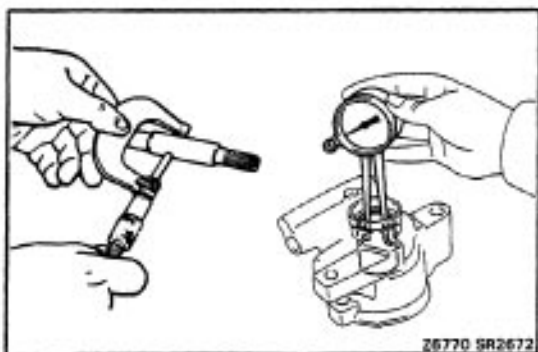
- (a) Remove the pump shaft with cam ring, vane plates from the front housing.
- (b) Remove the cam ring and ten vane plates from the pump shaft.
- (c) Remove the long straight pin from the front housing.

**11. 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

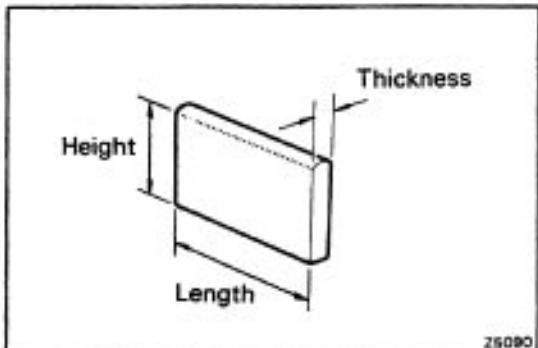
Using a micrometer and calipers, measure the oil clearance.

**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.



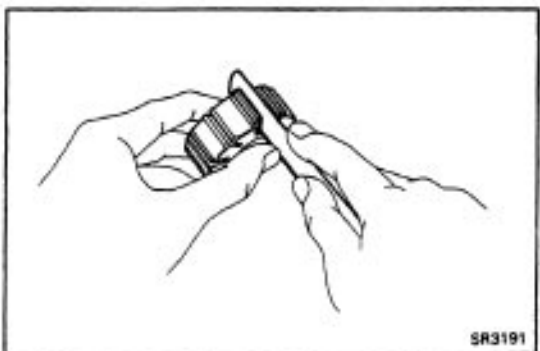
### 2. INSPECT ROTOR AND VANE PLATES

(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.

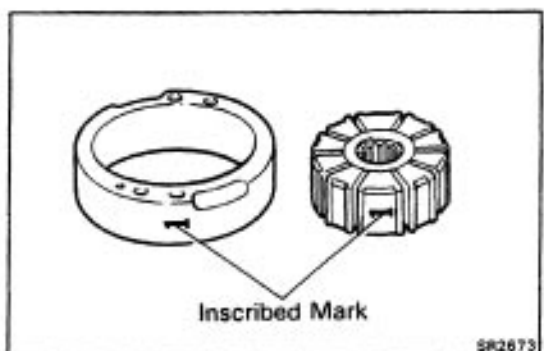
**Maximum clearance: 0.03 mm (0.0012 in.)**

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

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

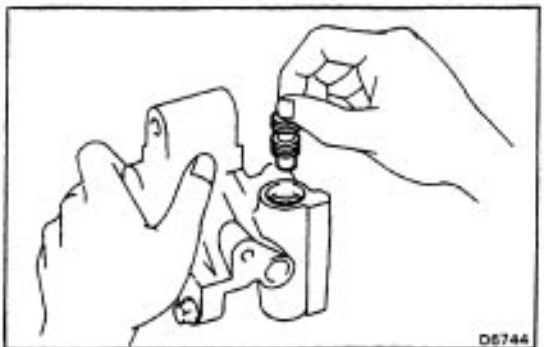
HINT: There are five vane lengths with the following rotor and cam ring marks:

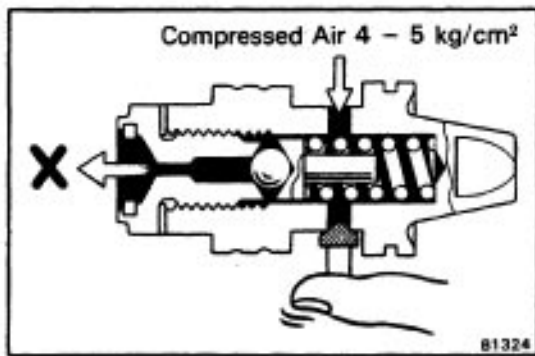
Rotor and cam ring mark	Vane length	mm (in.)
None	14.996 – 14.998	(0.5904 – 0.5905)
1	14.994 – 14.996	(0.5903 – 0.5904)
2	14.992 – 14.994	(0.5902 – 0.5903)
3	14.990 – 14.992	(0.59016 – 0.59024)
4	14.988 – 14.990	(0.5901 – 0.5902)



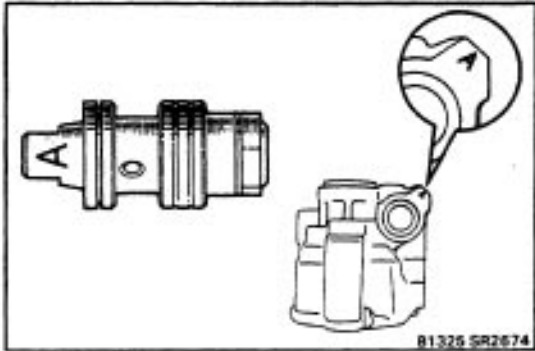
### 3. INSPECT FLOW CONTROL VALVE

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



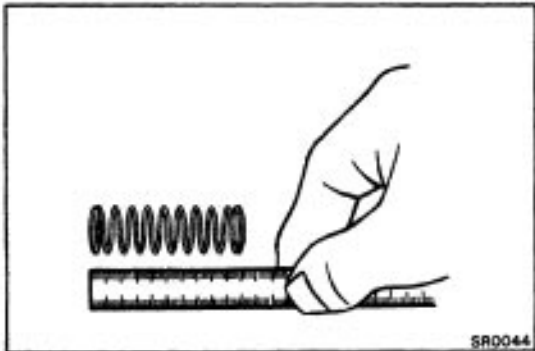


- (b) Check the flow control valve for leakage. Close one of the holes and apply compressed air [4 – 5 kg/cm<sup>2</sup> (57 – 71 psi, 392 – 490 kPa)] into the opposite side, and confirm that air does not come out from the end hole.



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

Inscribed mark: A, 6, C, 6, E or F

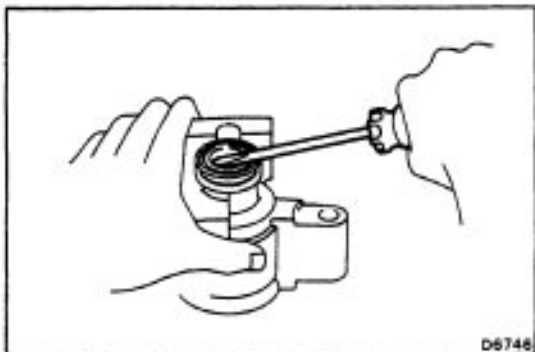


#### 4. INSPECT FLOW CONTROL SPRING

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

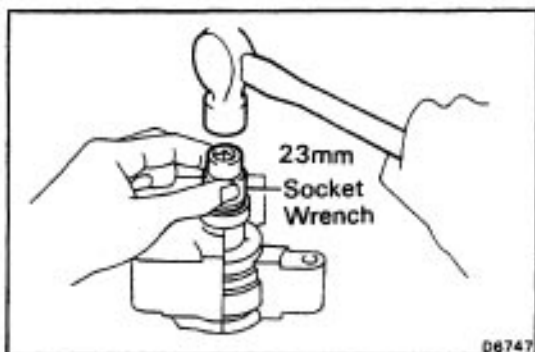
Spring length: 36 – 38 mm (1.42 – 1.49 in.)

If not within specification, replace the spring.

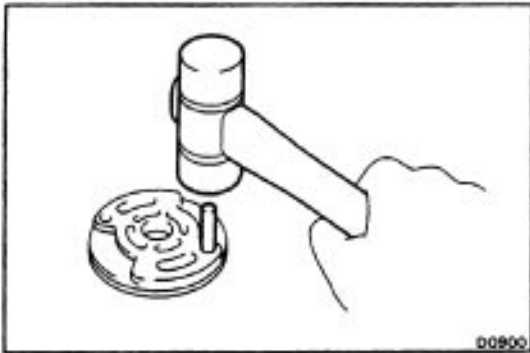


#### 5. IF NECESSARY, REPLACE OIL SEAL

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



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

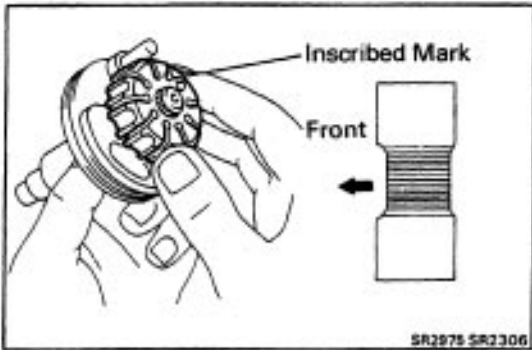
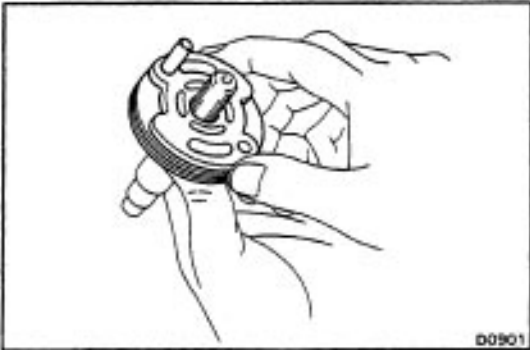


## ASSEMBLY OF POWER STEERING PUMP

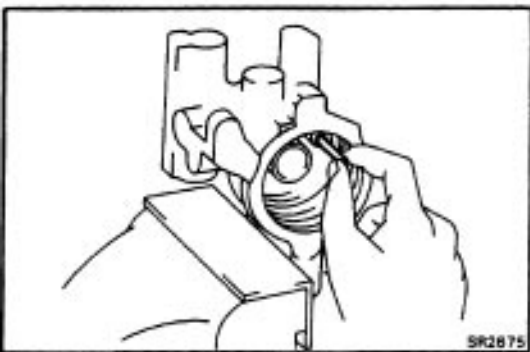
(See page [SR-33](#))

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

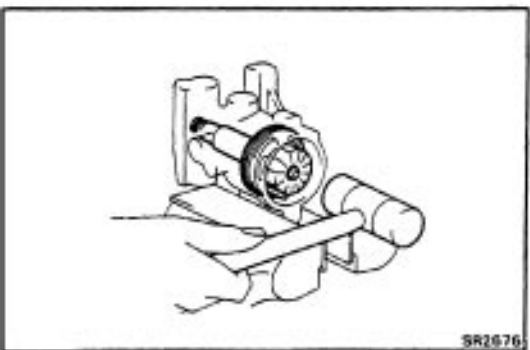


- (d) Install the rotor to the pump shaft.
- (e) Install the snap ring.



### 3. INSTALL PS PUMP SHAFT TO FRONT HOUSING

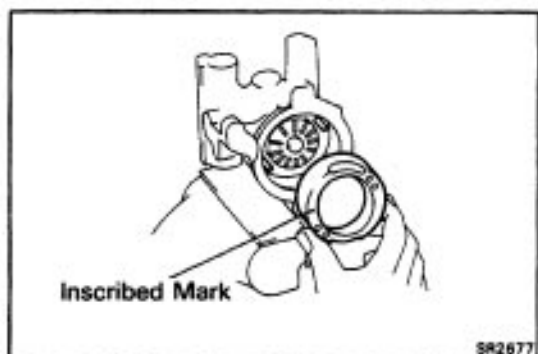
- (a) Coat the oil seal lip with MP grease.
- (b) Install the long straight pin to the front housing.



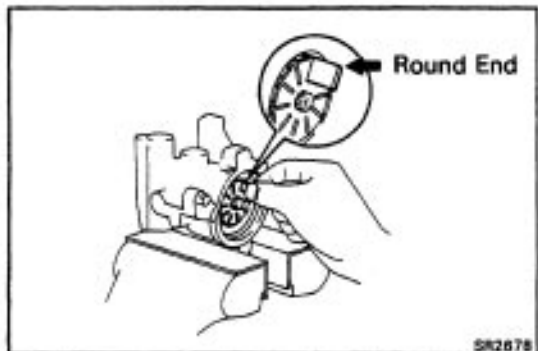
- (c) Align the hole of the front plate and straight pin and tap in the pump shaft with a plastic hammer.

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

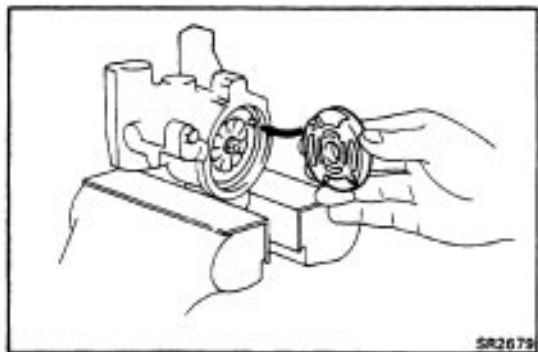


**4. INSTALL CAM RING**

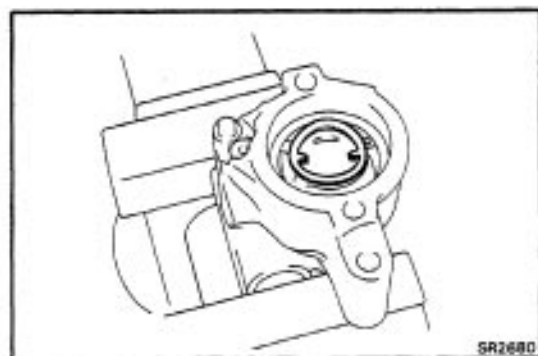
Align the holes of the cam ring and straight pins, and insert the cam ring with the inscribed mark facing outward.

**5. INSTALL VANE PLATES**

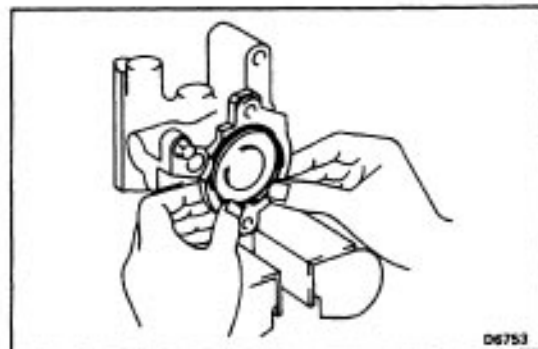
Install the vane plates with the round end facing outward.

**6. INSTALL REAR SIDE PLATE AND O-RING**

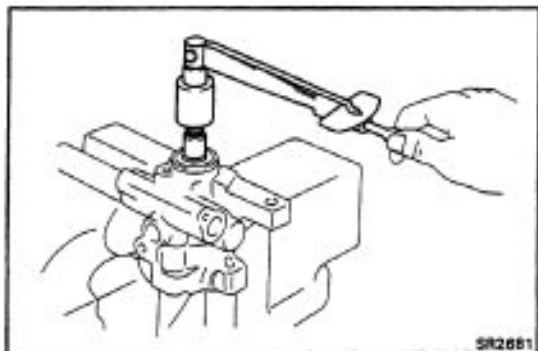
- (a) Install a new O-ring to the side plate.
- (b) Align the holes of the side plate with the pins, and install the plate.

**7. INSTALL REAR HOUSING**

- (a) Install the wave washer.



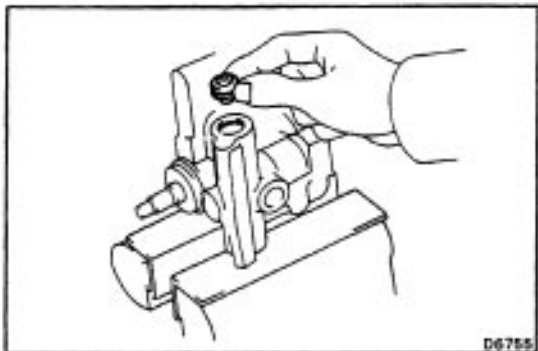
- (b) Install a new O-ring to the rear housing.
- (c) Using a plastic hammer, tap in the rear housing.
- (d) Install the snap ring.



## 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.

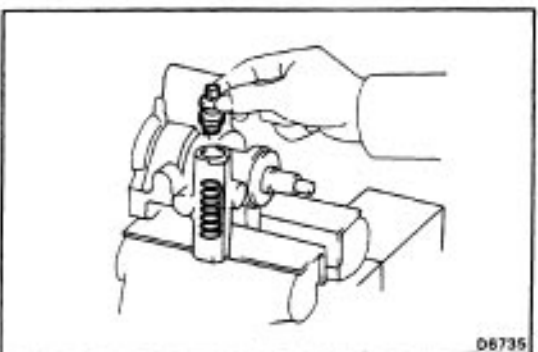
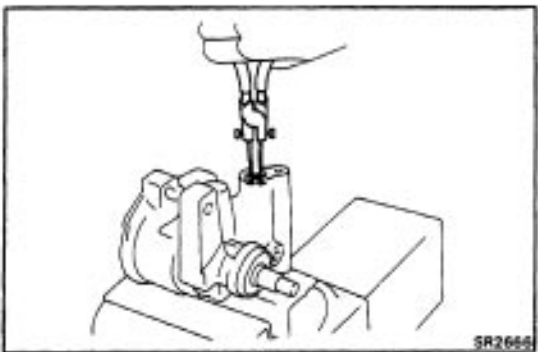
**Rotating torque: 2.8 kg-cm (2.4 in.-lb, 0.3 N-m) or less**



## 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.

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

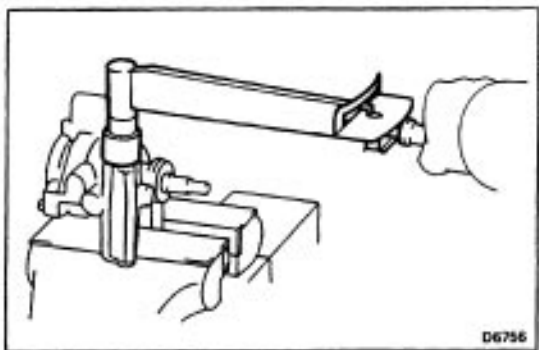


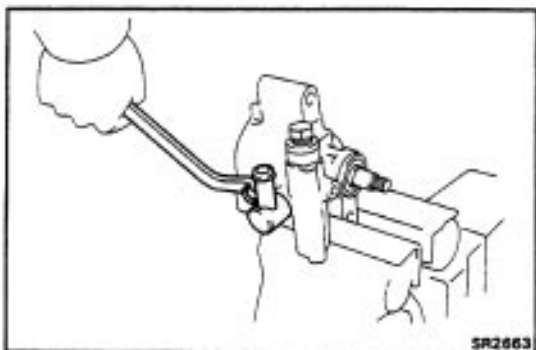
## 10. INSTALL SPRING, FLOW CONTROL VALVE, O-RING AND PRESSURE PORT UNION

- (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.

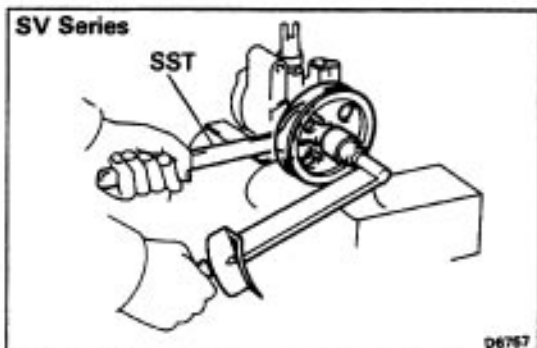
**Torque: 700 kg-cm (51 ft-lb, 69 N-m)**



**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)**

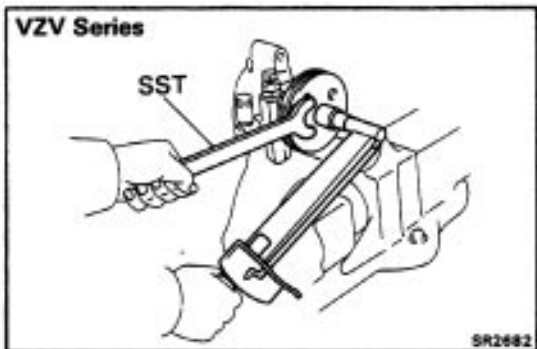
**12. (SV Series)****INSTALL AIR CONTROL VALVE****13. INSTALL PS PUMP PULLEY**

- (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 (For SV Series)

SST 09616-22010 (For VZV Series)

**Torque: 440 kg-cm (32 ft-lb, 43 N-m)**

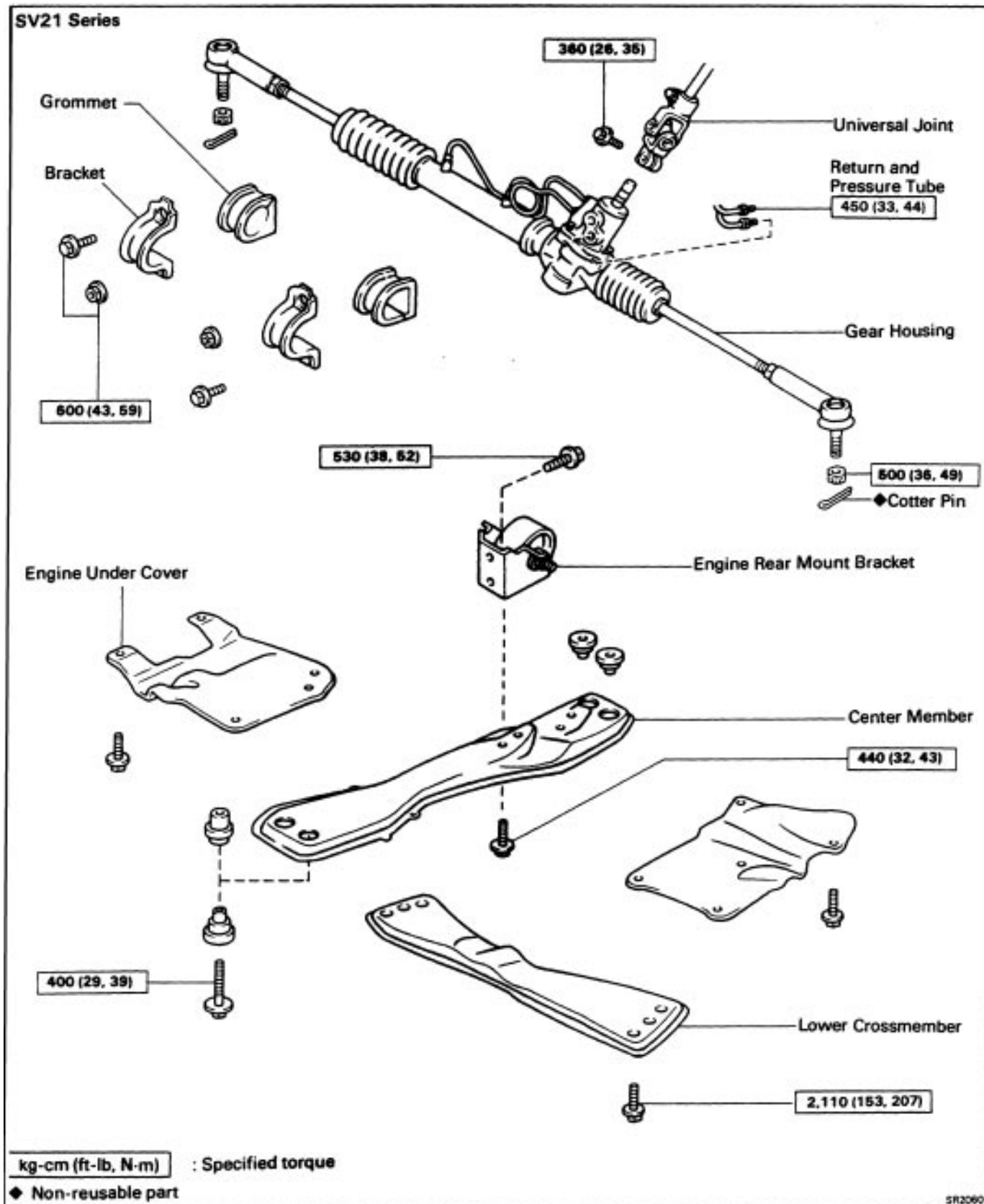
**14. (Ex. SV Series for USA)****INSTALL END PLATE**

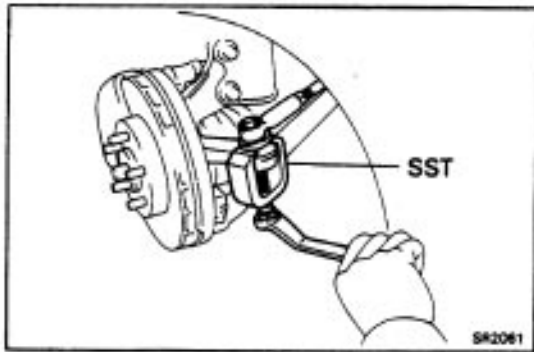
**Torque: 130 kg-cm (9 ft-lb, 13 N-m)**

## Gear Housing

### REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING (SV21 Series)

Remove and install the parts as shown.



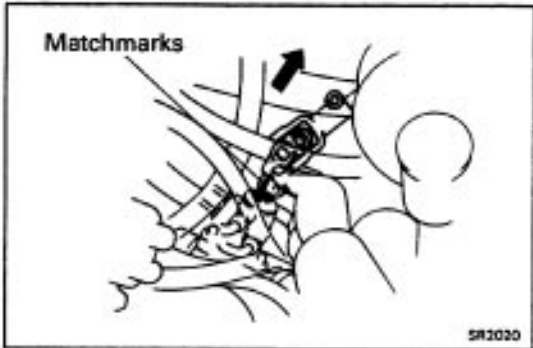


## (MAIN POINTS OF REMOVAL AND INSTALLATION)

### 1. DISCONNECT TIE ROD ENDS

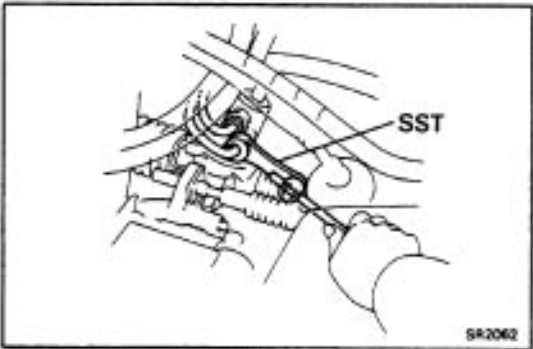
- (a) Remove the cotter pins and nuts.
- (b) Using SST, disconnect the tie rod ends from the knuckle arm.

SST 09610-55012



### 2. REMOVE UNIVERSAL JOINT

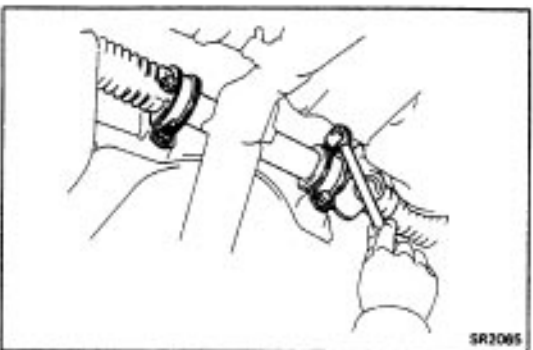
- (a) Remove the two bolts.
- (b) Place matchmarks on the universal joint and control valve shaft.
- (c) Slide the joint to the column side and disconnect the joint from the gear housing.
- (d) Remove the universal joint.



### 3. DISCONNECT PRESSURE AND RETURN TUBES

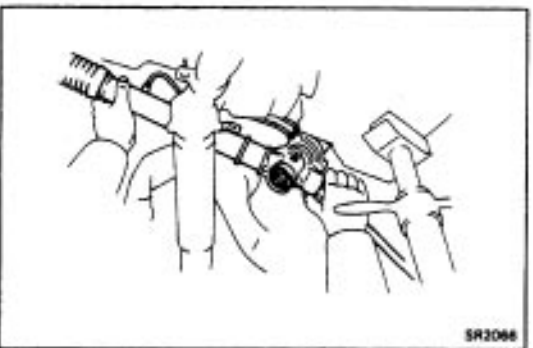
Using SST, disconnect the pressure and return tubes from the gear housing.

SST 09631-22020



### 4. REMOVE GEAR HOUSING

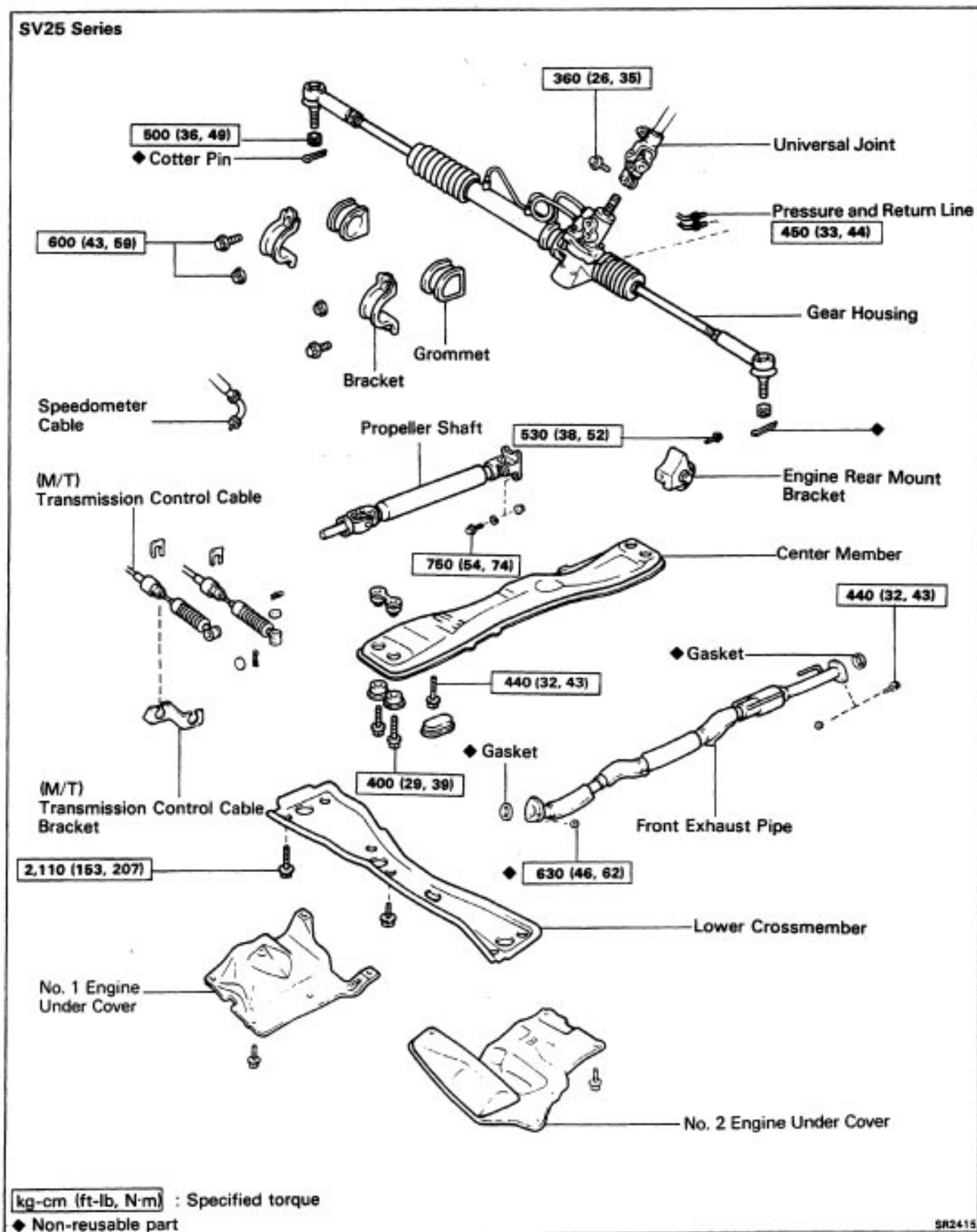
- (a) Remove the two bolts, two nuts and two brackets.

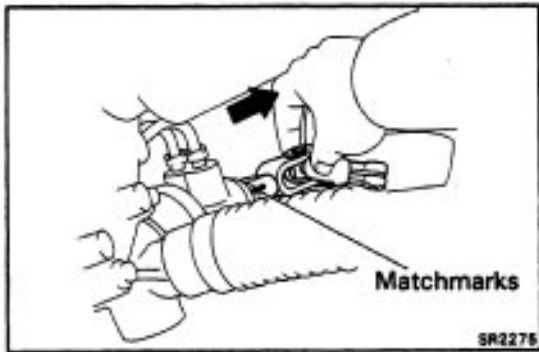


- (b) Slide the gear housing to the RH side.
- (c) Slide the gear housing to the LH side and pull it out.

# REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING (SV25 Series)

Remove and install the parts as shown.

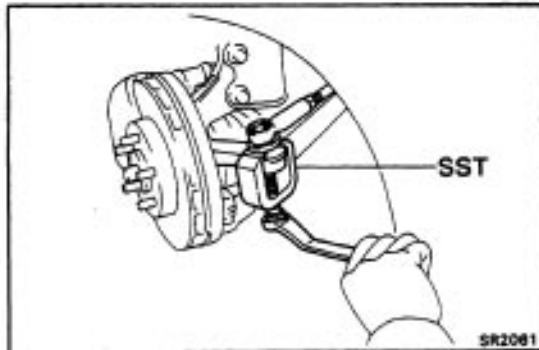




## (MAIN POINTS OF REMOVAL AND INSTALLATION)

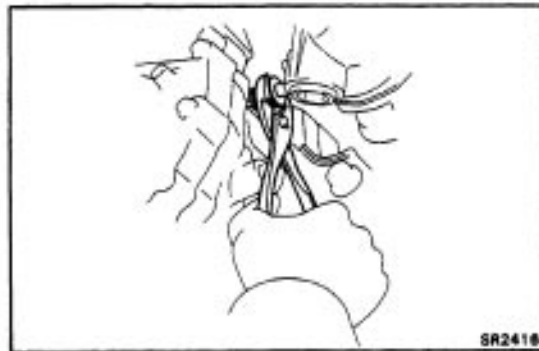
### 1. REMOVE UNIVERSAL JOINT

- (a) Place matchmarks on the universal joint and control valve shaft.
- (b) Loosen the upper side of universal joint set bolt.
- (c) Remove the lower side of universal joint set bolt.
- (d) Pull the universal joint upward from the control valve shaft.

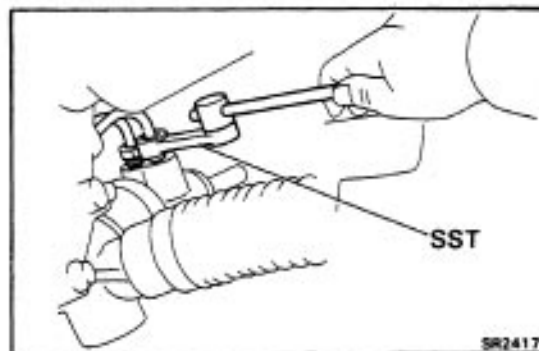


### 2. DISCONNECT TIE ROD ENDS

- (a) Remove the cotter pins and nuts.
  - (b) Using SST, disconnect the tie rod ends.
- SST 09610-55012



### 3. DISCONNECT SPEEDOMETER CABLE

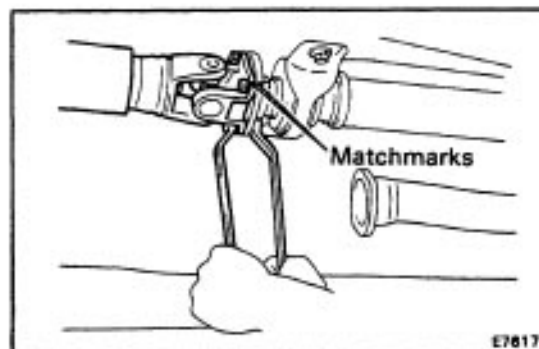


### 4. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE

Using SST, disconnect and connect the pressure and return line.

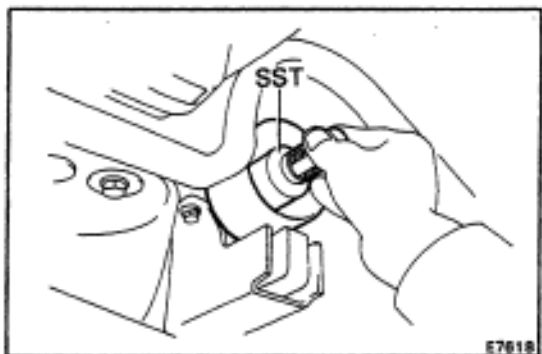
SST 09631-22020

Torque: 450 kg-cm (33 ft-lb, 44 N-m)

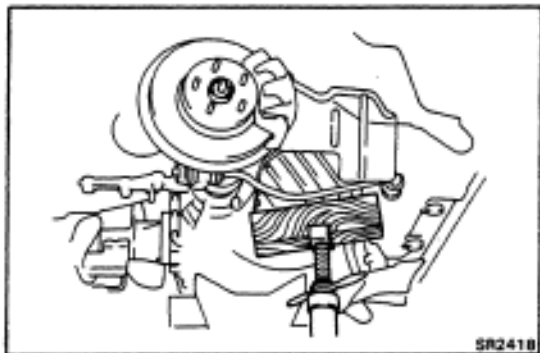


### 6. REMOVE PROPELLER SHAFT

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



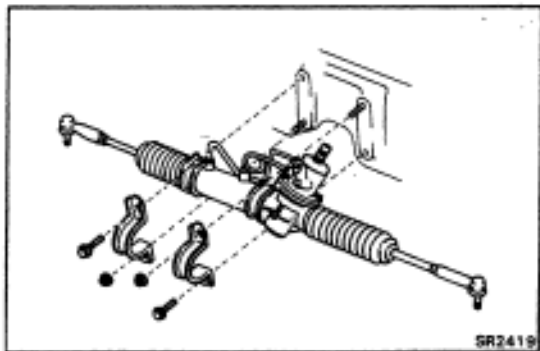
- (e) Pull out the propeller shaft and insert SST.  
SST .09325-20010



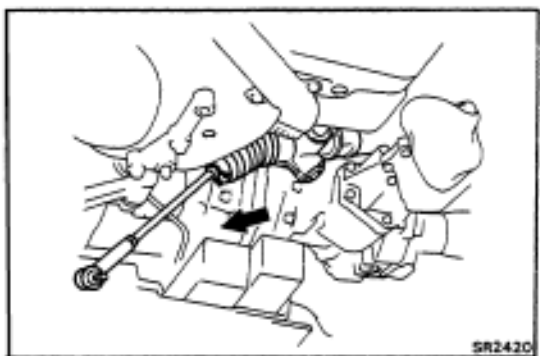
## 6. REMOVE GEAR HOUSING

- (a) Jack up the front of the engine.

**NOTICE:** Do not overtilt the engine.



- (b) Remove the two bolts, two nuts and two brackets.



- (c) Slide the gear housing to the RH side to put the LH tie rod end in the body panel, then pull it out through the opening in the LH lower side of vehicle body.

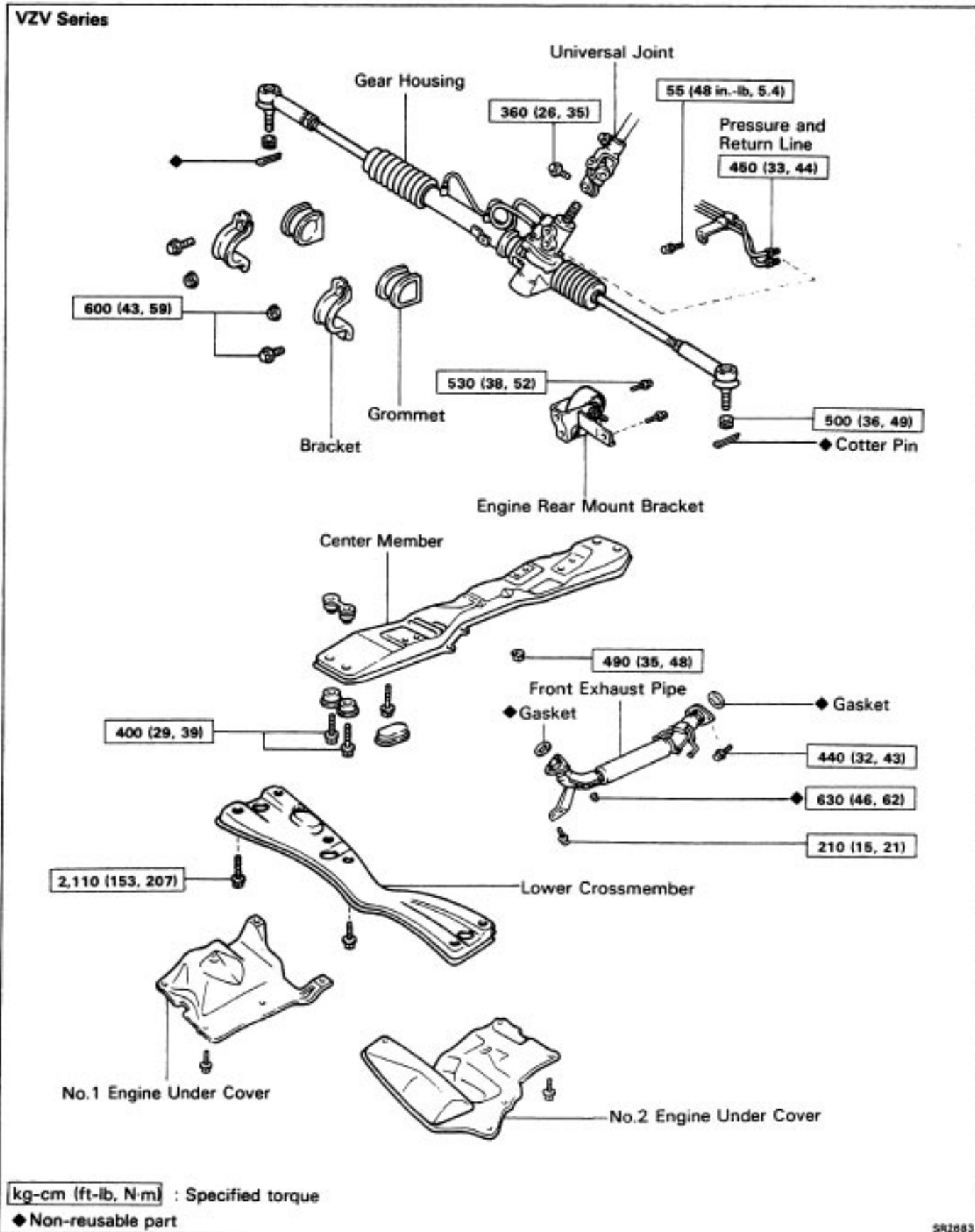
**HINT:** Do not damage the turn pressure tube and the transmission control cables.

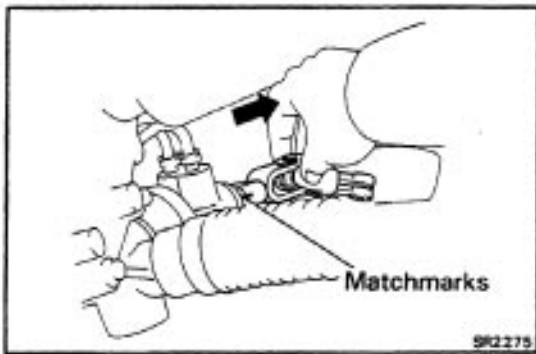
- (d) Remove two grommets from the gear housing.



## REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING (VZV Series)

Remove and install the parts as shown.

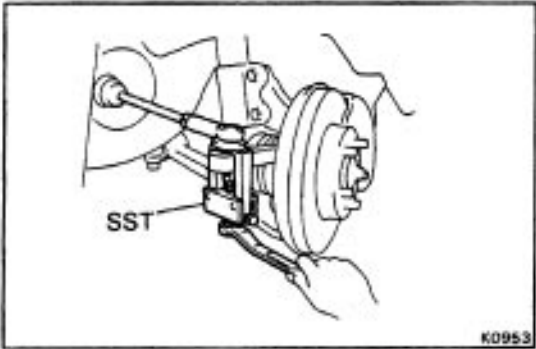




## (MAIN POINTS OF REMOVAL AND INSTALLATION)

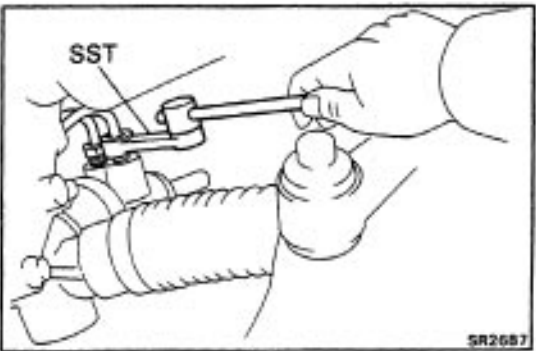
### 7. REMOVE UNIVERSAL JOINT

- Place matchmarks on the universal joint and control valve shaft.
- Loosen the upper side of universal joint set bolt.
- Remove the lower side of universal joint set bolt.
- Pull the universal joint upward from the control valve shaft.



### 2. DISCONNECT TIE ROD ENDS

- Remove the cotter pins and nuts.
- Using SST, disconnect the tie rod ends.  
SST 09628-62011

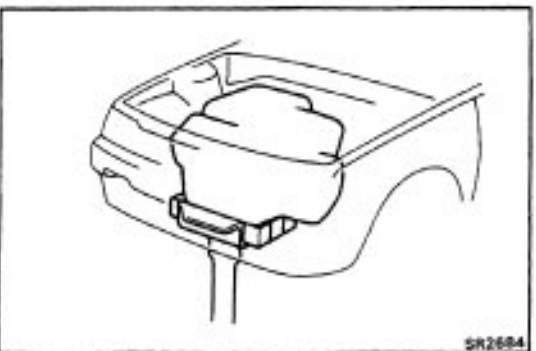


### 3. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE

Using SST, disconnect and connect the pressure and return line.

SST 09631-22020

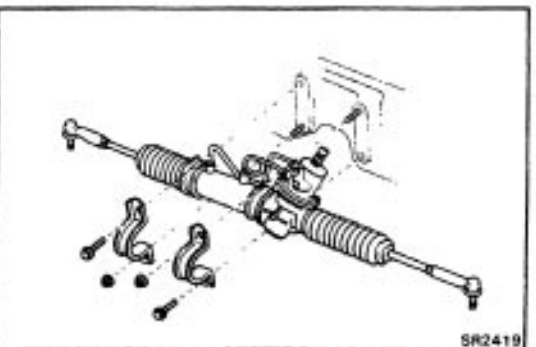
Torque: 450 kg-cm (33 ft-lb, 44 N-m)



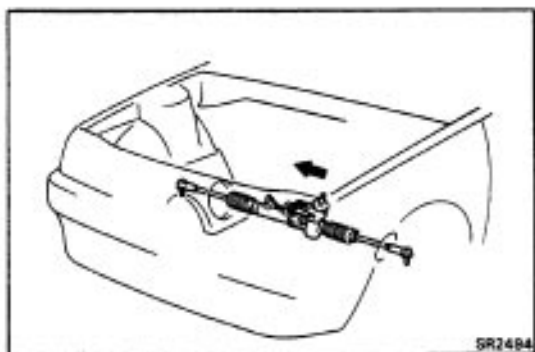
### 4. REMOVE GEAR HOUSING

- Jack up the front of the engine.

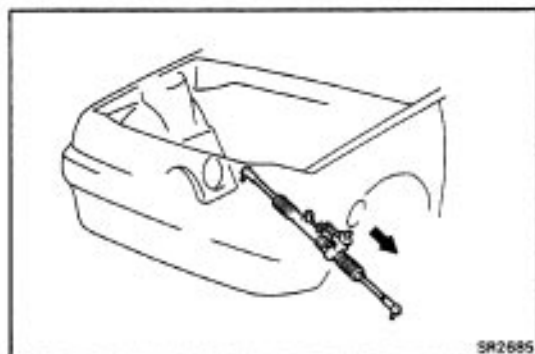
**NOTICE: Do not overtilt the engine.**



- Remove the two bolts, two nuts and brackets.



- (c) Slide the gear housing to the RH side to put the LH tie rod end in the body panel.

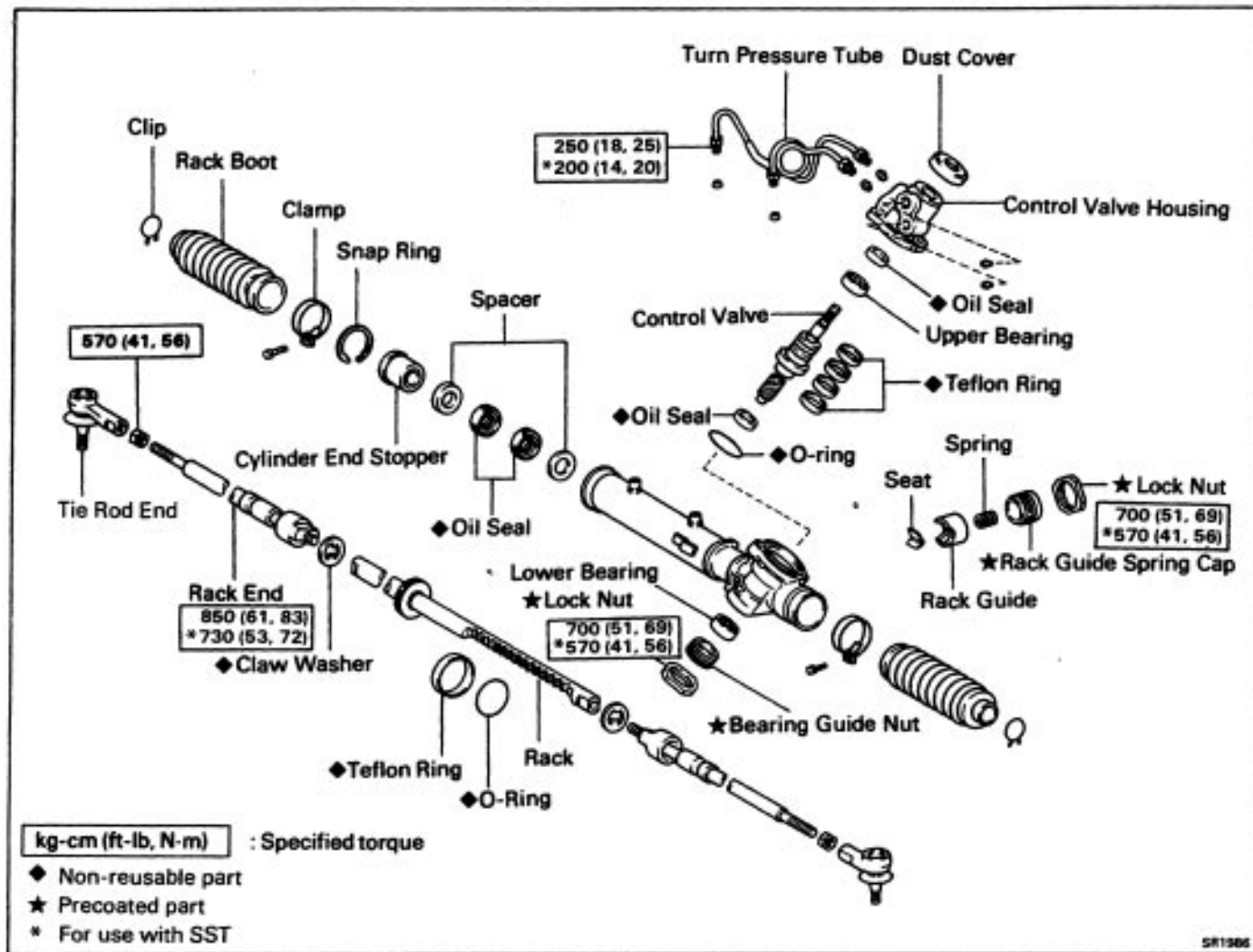


- (d) Pull the gear housing out through the opening in the LH lower side of vehicle body.

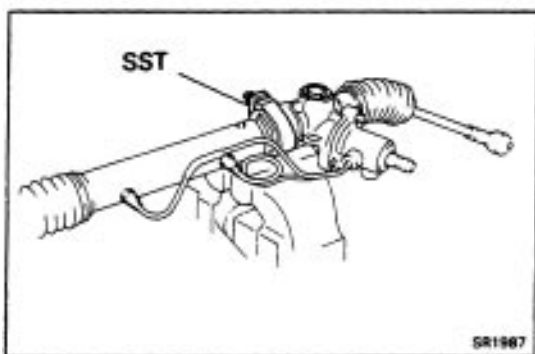
HINT: Do not damage the turn pressure tube and the transmission control cables.

- (e) Remove two grommets from the gear housing.

## COMPONENTS



SR1386

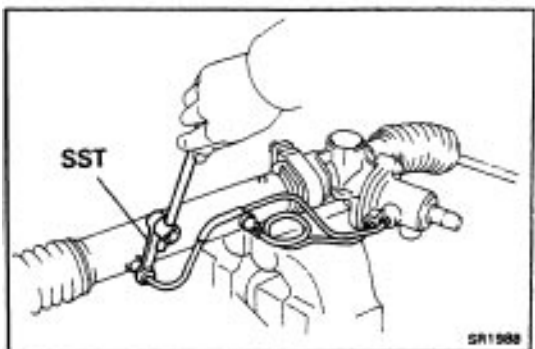


SR1387

## DISASSEMBLY OF STEERING GEAR HOUSING

### 1. CLAMP GEAR HOUSING IN VISE

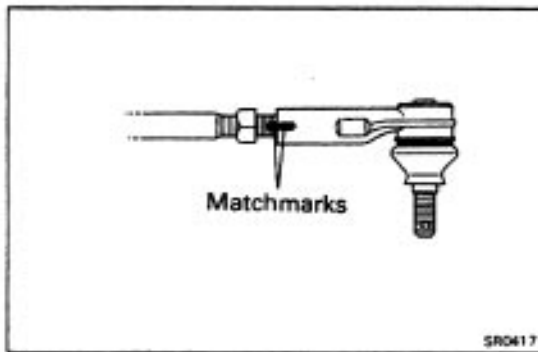
Using SST secure the steering gear in a vise.  
SST 09612-00012



SR1388

### 2. REMOVE RIGHT AND LEFT TURN PRESSURE TUBES

Using SST, remove the pressure tubes.  
SST 09633-20

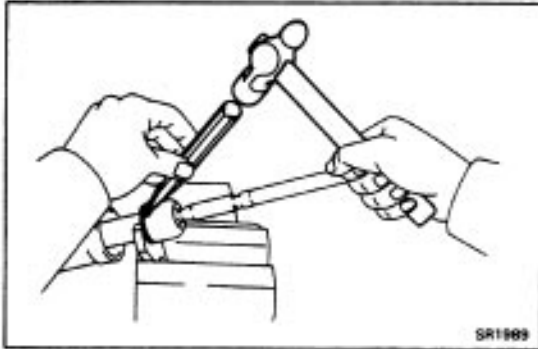


### 3. REMOVE TIE ROD ENDS

- Loosen the lock nuts and place matchmarks on the tie rod ends and rack ends.
- Remove the tie rod ends and lock nuts.

### 4. REMOVE RACK BOOTS

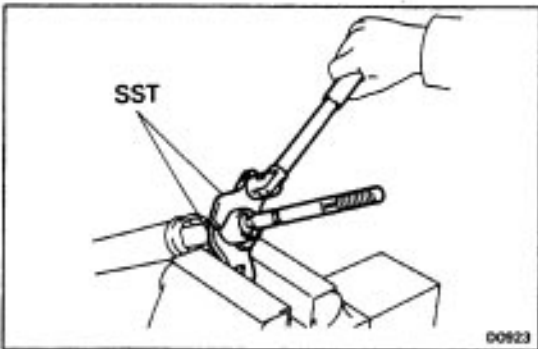
- Remove the clips and clamps.
- Remove the rack boots.



### 5. REMOVE RACK ENDS AND CLAW WASHERS

- Unstake the claw washer.

**NOTICE:** Avoid any impact to the rack.

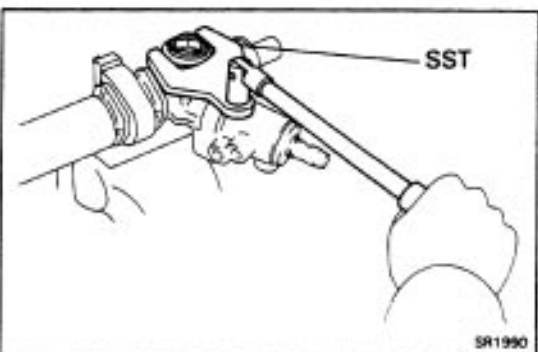


- Using SST, remove the rack ends.

SST 09612-10093 (09628-10020)

09612-24014 (09617-24011)

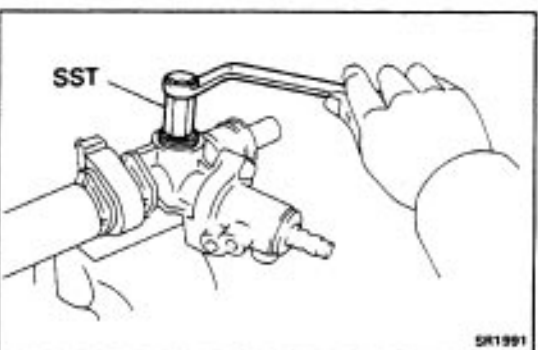
- Mark the left and right rack ends accordingly.
- Remove the claw washer.



### 6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the rack guide spring cap lock nut.

SST 09612-24014 (09617-24020)

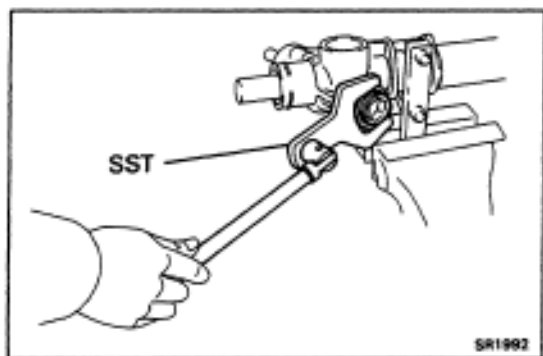


### 7. REMOVE RACK GUIDE SPRING CAP

Using SST, remove the rack guide spring cap.

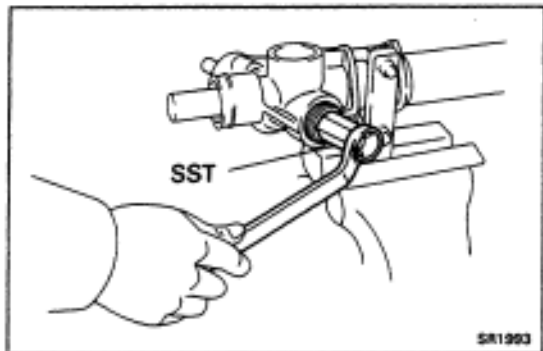
SST 09612-24014 (49612-10022)

### 8. REMOVE RACK GUIDE SPRING, RACK GUIDE AND SEAT

**9. REMOVE BEARING GUIDE LOCK NUT**

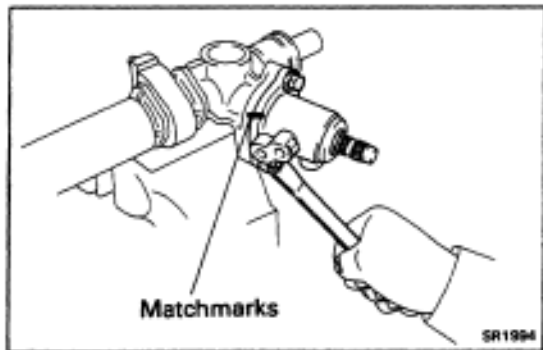
Using SST, remove the lock nut.

SST 09612-24014 (09617-24020)

**10. REMOVE BEARING GUIDE NUT**

Using SST, remove the bearing guide nut.

SST 09612-24014 (09612-10022)

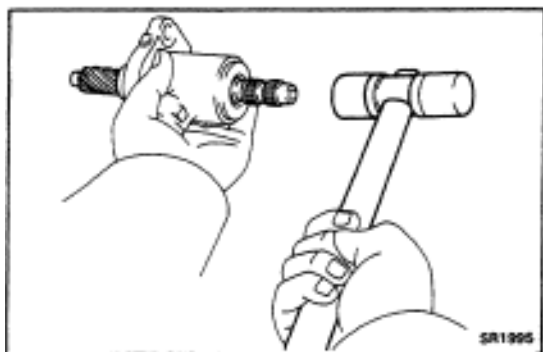
**11. REMOVE DUST COVER****12. REMOVE CONTROL VALVE HOUSING**

(a) Place matchmarks on the valve housing and rack housing.

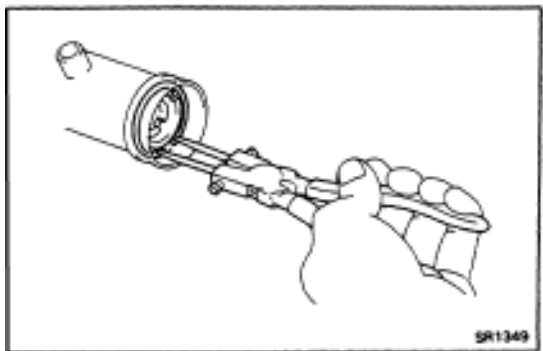
(b) Remove the two bolts.

(c) Pull out the valve with the valve housing.

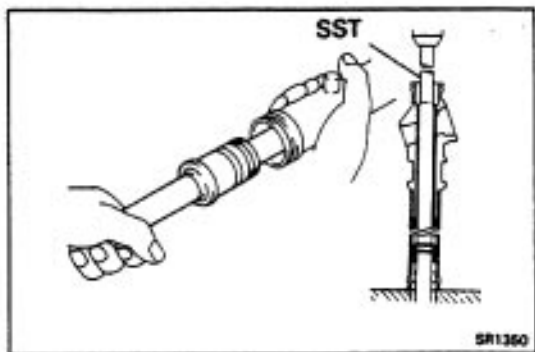
(d) Remove the O-ring from the rack housing.

**13. REMOVE LOWER BEARING****14. REMOVE CONTROL VALVE FROM HOUSING**

Tap out the control valve.

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

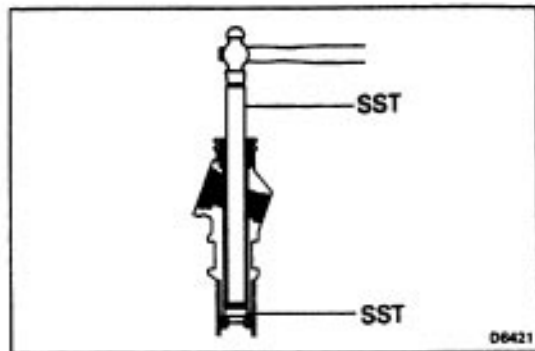
(a) Using snap ring pliers, remove the snap ring.



(b) Using SST, press the rack until the end stopper slightly touches the press block.

SST 09612-24014 (09612-10061) Pull out the rack with the cylinder end stopper, spacer and oil seal.

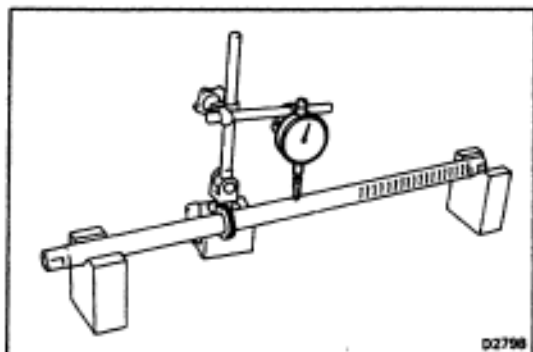
HINT: If necessary, slightly tap the rack end with a brass bar and hammer.



#### 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

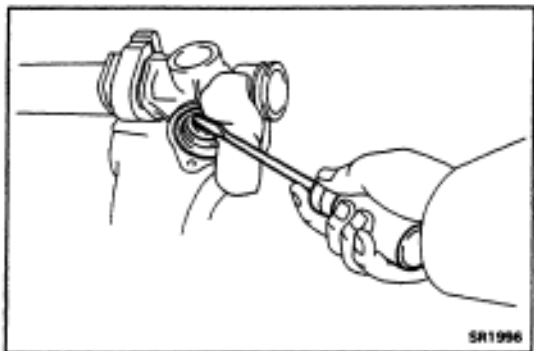
- (a) Check the rack for runout and for tooth wear or damage.
- (b) Check the back surface for wear or damage.

**If faulty, replace it.**

**Maximum runout: 0.3 mm (0.012 in.)**

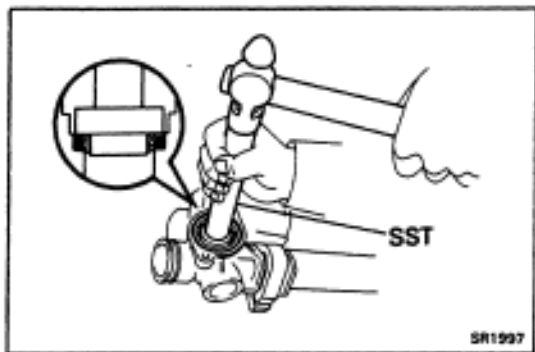
### 2. IF –NECESSARY, REPLACE RACK HOUSING OIL SEAL

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



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

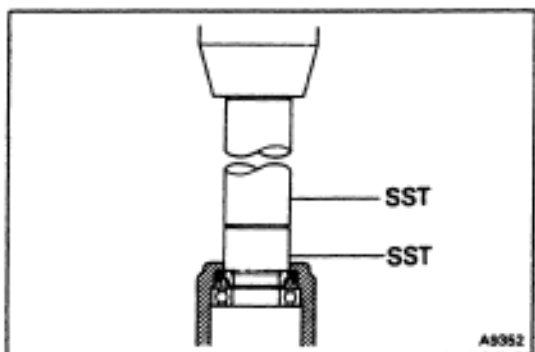
SST 09620-30010 (09624-30010, 09631-00020)



### 3. IF NECESSARY, REPLACE CONTROL VALVE HOUSING OIL SEAL AND BEARING

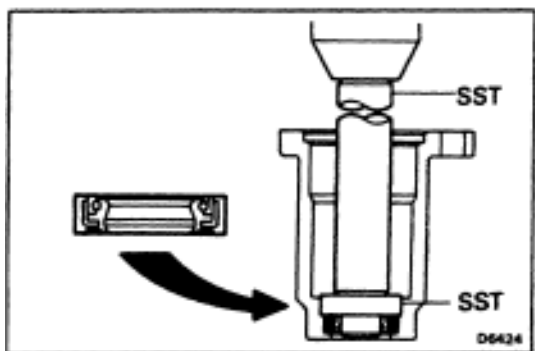
- (a) Using SST, press out the oil seal with bearing.

SST 09630-24013 (09620-24010), 09631-12020

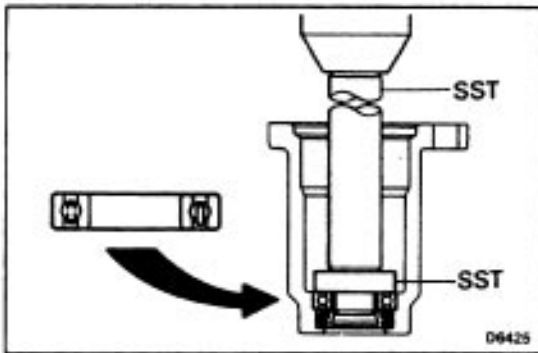


- (b) Using SST, press in a new oil seal.

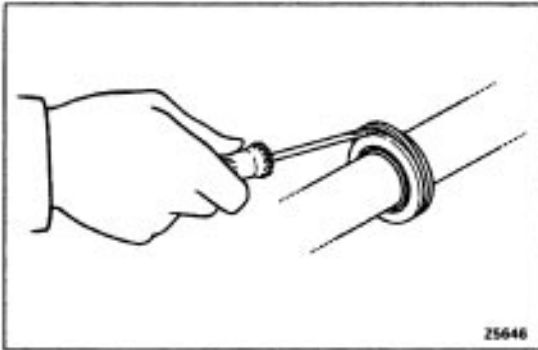
SST 09630-24013 (09620-24020), 09631-12020







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

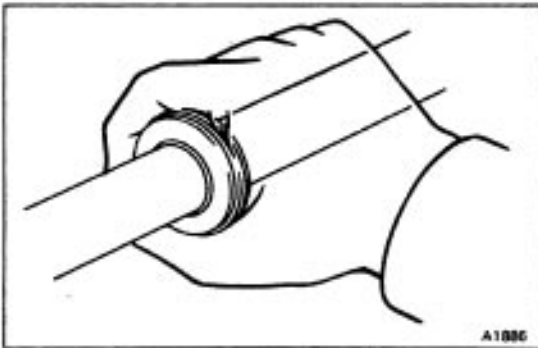


#### 4. IF NECESSARY, REPLACE TEFLON RING AND O-RING

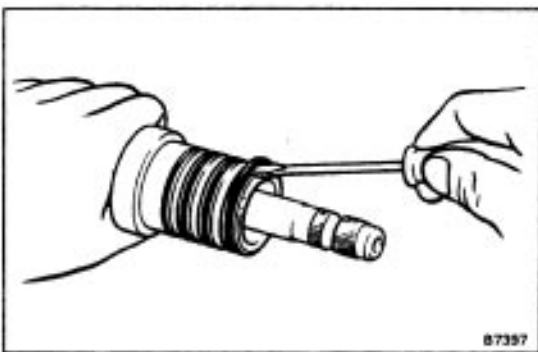
- (a) Using a screwdriver, remove the teflon ring and O-ring.

**NOTICE:** Be careful not to damage the rack.

- (b) Install a new O-ring and teflon ring.



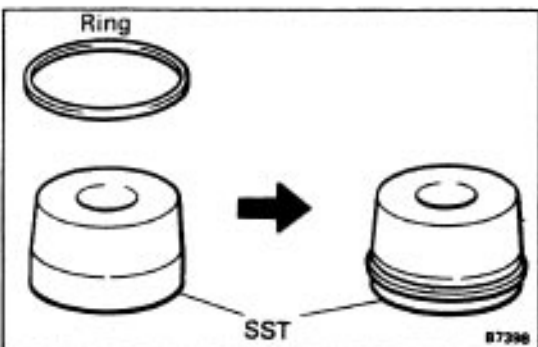
- (c) Coat the teflon ring with power steering fluid and snug it down with your fingers.



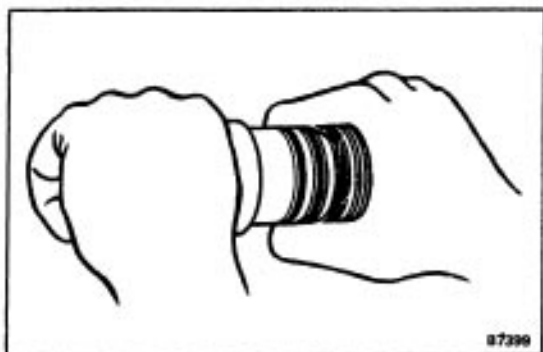
#### 5. IF NECESSARY, REPLACE CONTROL VALVE TEFLON RINGS

- (a) Using a screwdriver, remove the teflon rings.

**NOTICE:** Be careful not to damage the control valve.

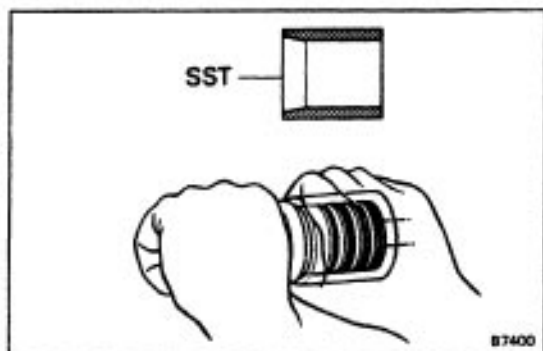


- (b) Install new teflon rings to SST and expand them.  
SST 09631-20070



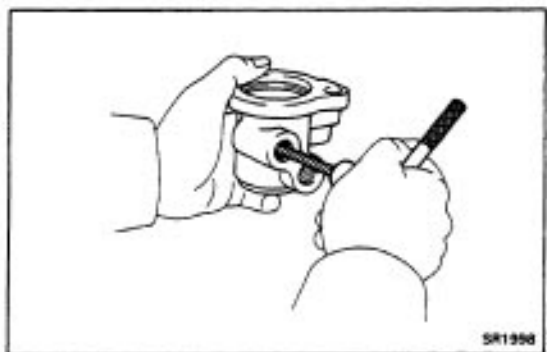
- (c) Install the expanded teflon rings to the control valve and snug them down with your fingers.

**NOTICE: Be careful not to damage the rings.**



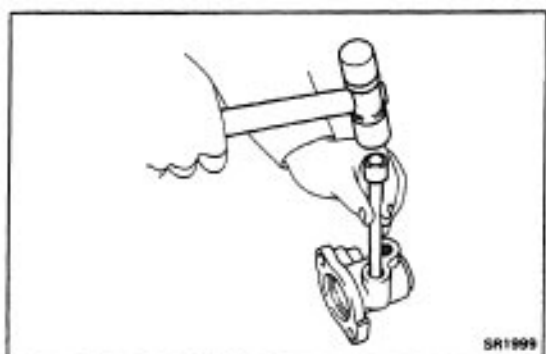
- (d) Coat the teflon rings with power steering fluid, and carefully slide the tapered end of SST over the teflon rings to seat the rings.

SST 09631-20081



#### 6. IF NECESSARY, REPLACE UNION SEAT

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

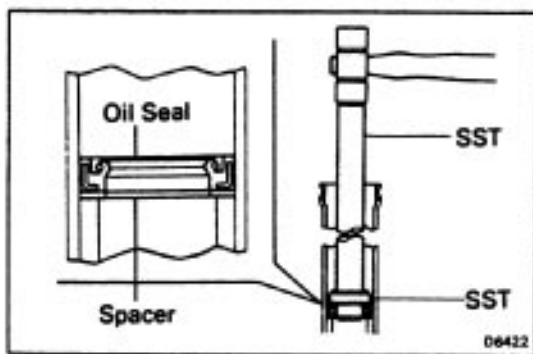
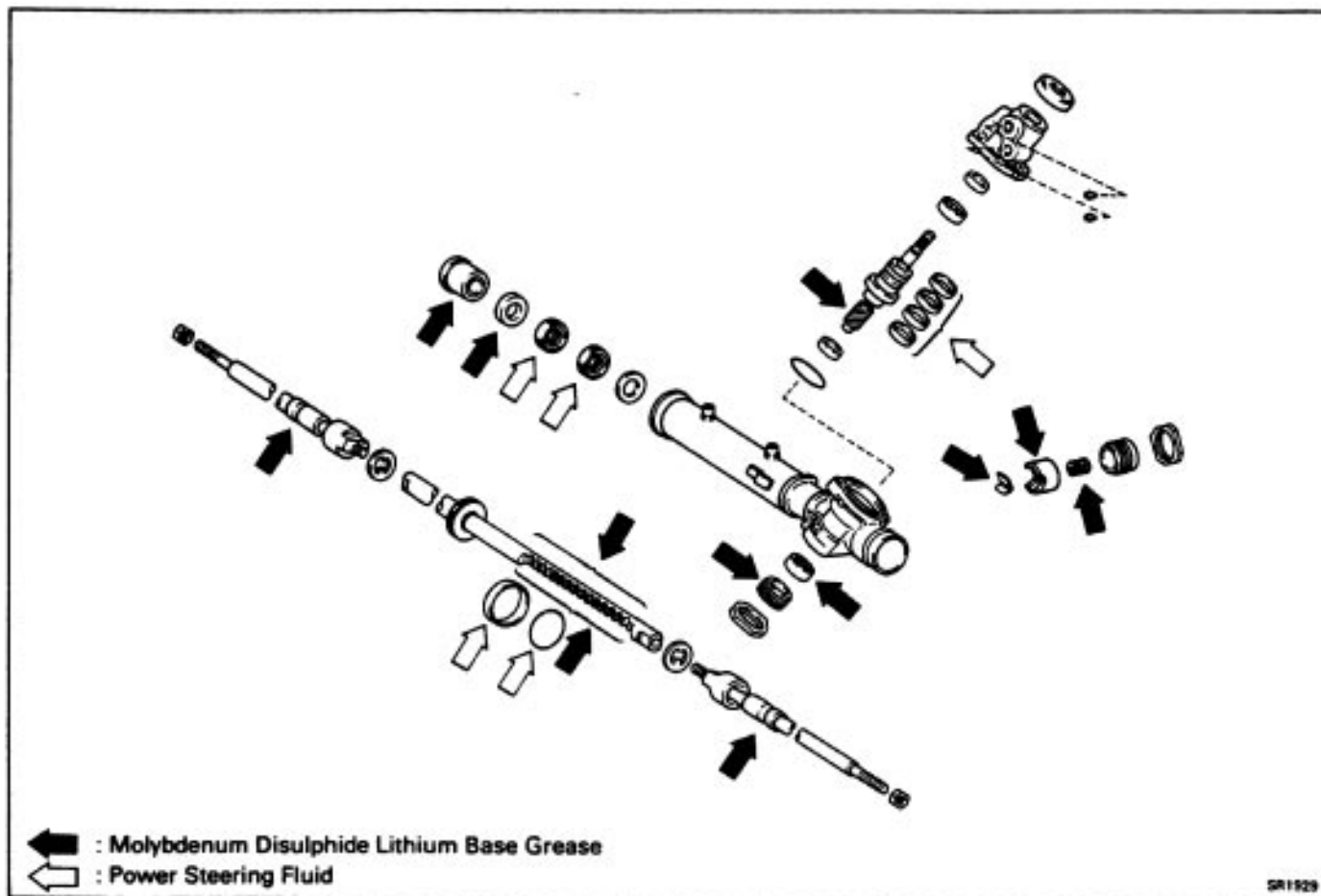


- (b) Using a plastic hammer and extension bar, tap in a new union seat.

## ASSEMBLY OF GEAR HOUSING

(See page [SR-51](#))

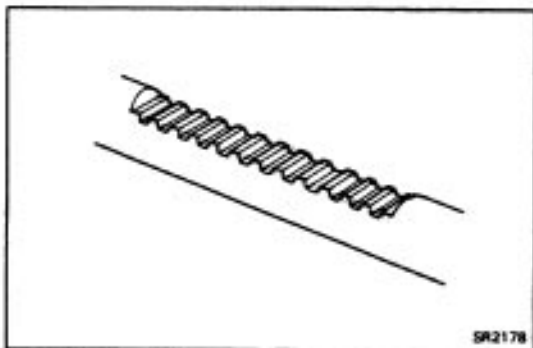
1. COAT POWER STEERING FLUID OR GREASE ON FOLLOWING PARTS:



2. INSTALL CYLINDER HOUSING OIL SEAL AND SPACER

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

SST 09631-12020, 09631-32010

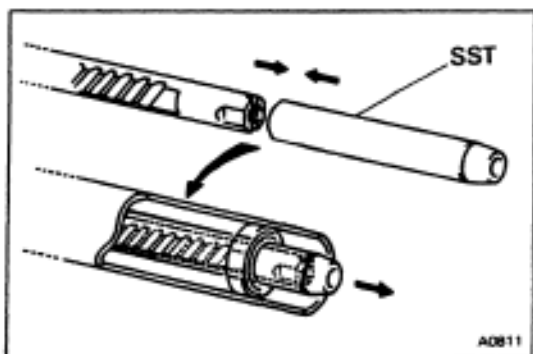


3. INSTALL RACK

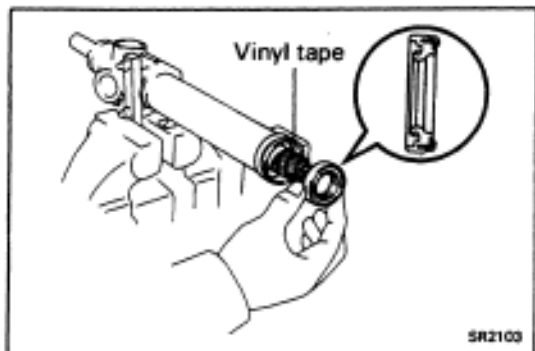
(a) Install SST to the rack.

HINT: if necessary, scrape the burrs off the rack teeth end and burnish.

SST 09631-20051

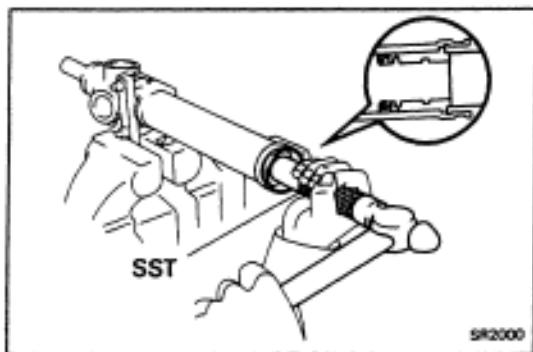


- (b) Coat SST with power steering fluid.
- (c) Insert the rack into the cylinder.
- (d) Remove SST.

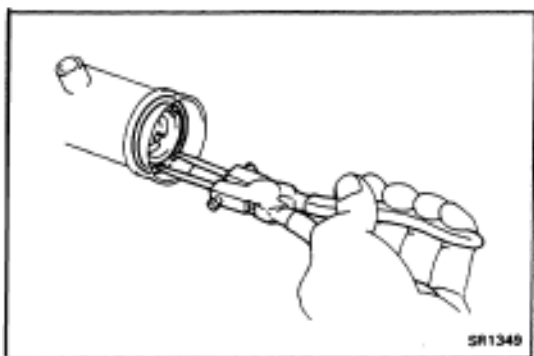


#### 4. INSTALL CYLINDER END STOPPER, OIL SEAL AND SPACER

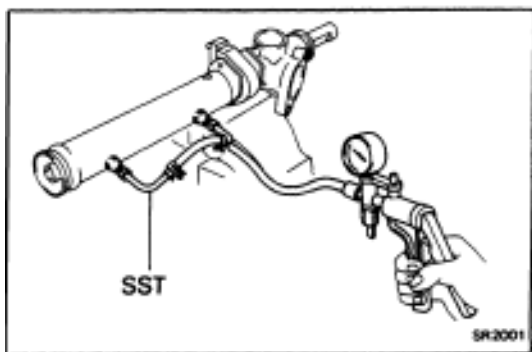
- (a) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
- (b) Install the oil seal by pushing it into the cylinder in the direction shown in drawing, without tilting.



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

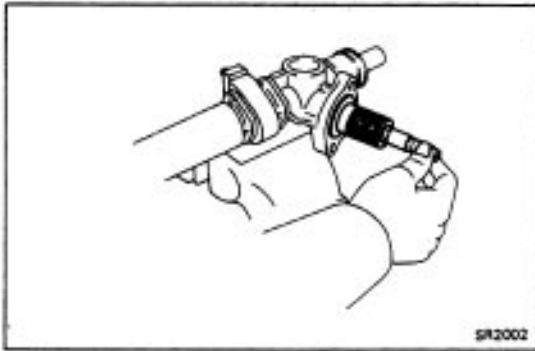


- (e) Using snap ring pliers, install the snap ring.

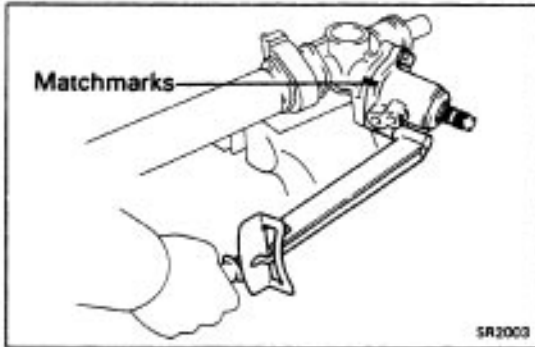


#### 5. AIR TIGHTNESS TEST

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

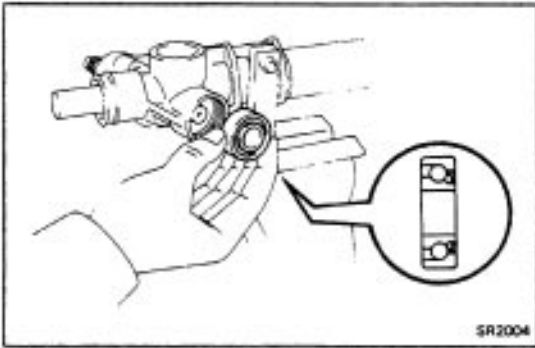
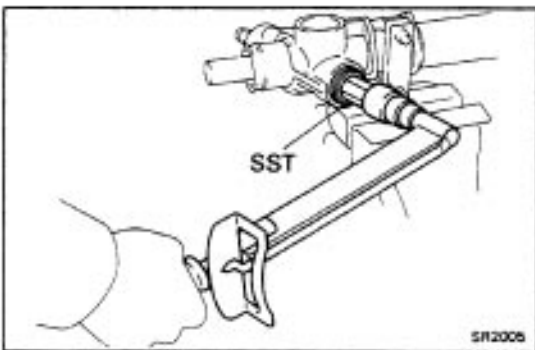
**6. INSTALL CONTROL VALVE**

- (a) Coat the teflon ring with power steering fluid.
- (b) Push the control valve into the housing.

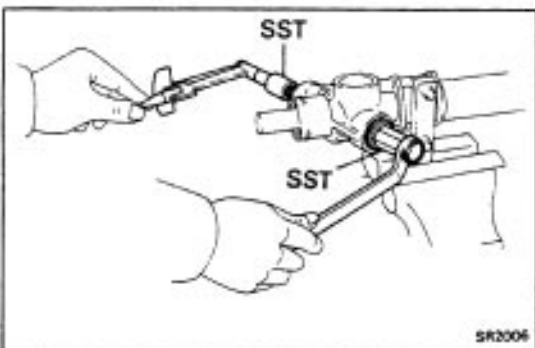
**7. INSTALL CONTROL VALVE HOUSING**

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

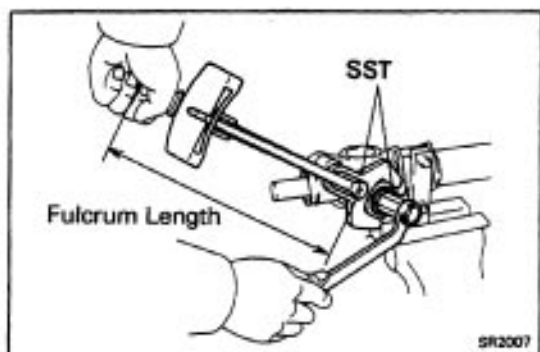
**Torque: 315 kg-cm (23 ft-lb, 31 N-m)**

**8. INSTALL CONTROL VALVE LOWER BEARING****9. 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 09612-24014 (09612-10022)  
**Torque: 150 kg-crn (11 ft-lb, 15 N-m)**



- (c) Using SST and torque meter, loosen the bearing guide nut until the preload is within specification.  
SST 09612-24014 (09612-10022), 09616-00014  
**Preload (turning): 4.5 – 6.5 kg-cm  
(3.9 – 5.6 in.-lb, 0.4 – 0.6 N-m)**



#### 10. 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.

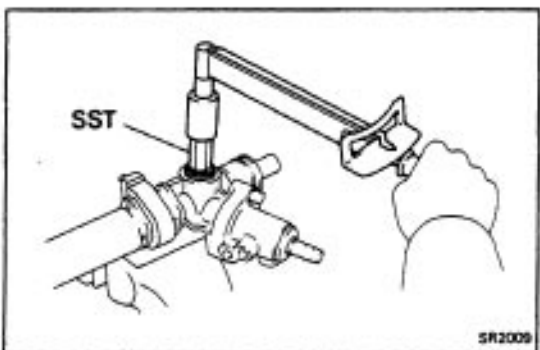
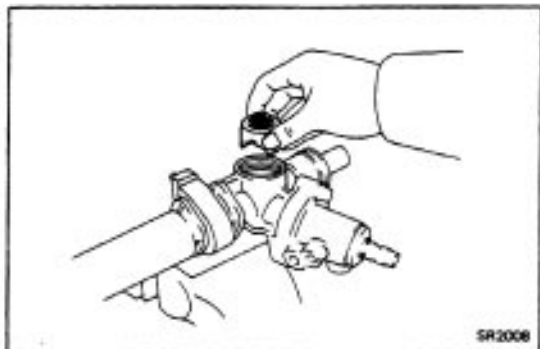
SST 09612-24014 (09612-10022, 09617-24020)

**Torque: 570 kg-cm (41 ft-lb, 56 N-m)**

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

#### 11. INSTALL RACK GUIDE SEAT, RACK GUIDE AND RACK GUIDE SPRING

Install the rack guide with the seat and spring.



#### 12. ADJUST TOTAL PRELOAD

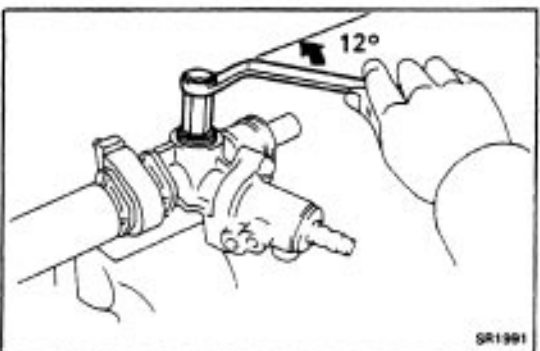
(a) Apply sealant to 2 or 3 threads of the spring cap.

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

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

SST 09612-24014 (09612-10022)

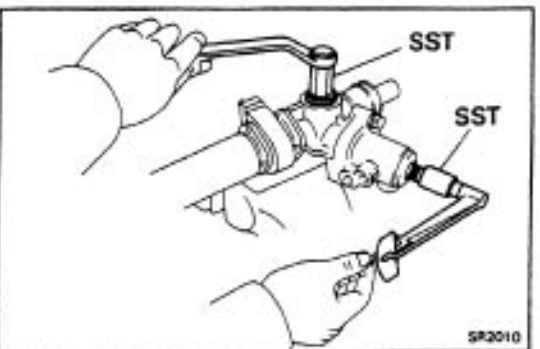
**Torque: 250 kg-cm (18 ft-lb, 25 N-m)**



(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 coil spring is not functioning.

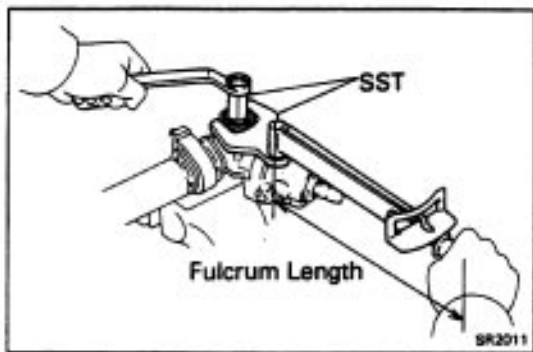


(f) Using SST and a torque meter, tighten the rack guide spring cap until the preload is within specification.

SST 09612-24014 (09612-10022), 09616-00010

**Preload (turning): 9 –12 kg-cm**

**(7.8 – 10.4 in.-lb, 0.9 –1.2 N-m)**



### 13. 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**

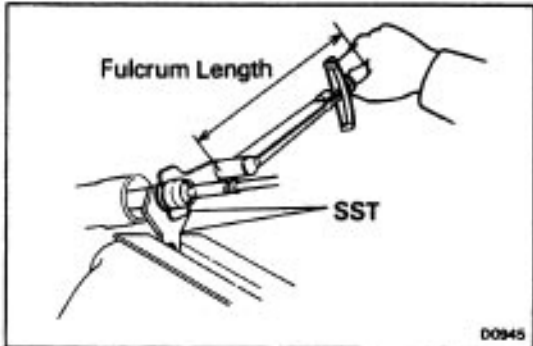
(b) Using SST, install and torque the lock nut.

SST 09612-24014 (09612-10022, 09617-24020)

**Torque: 570 kg-cm (41 ft-lb, 56 N-m)**

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

(c) Recheck the total preload.



### 14. INSTALL DUST COVER

### 15. INSTALL CLAW WASHERS AND RACK ENDS

(a) Install a new claw washer.

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

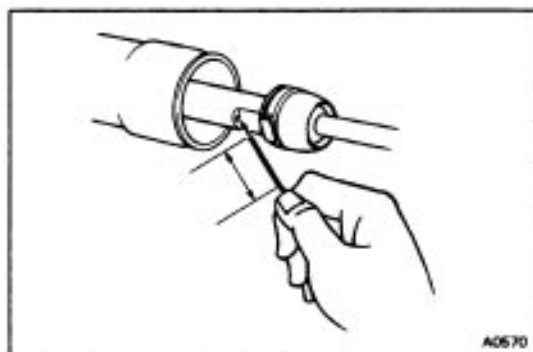
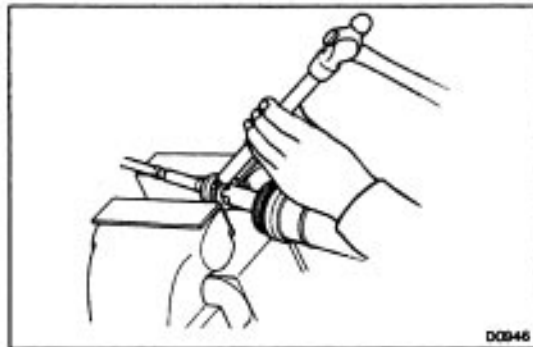
SST 09612-10093 (09628-10020)

09612-24014 (09617-24011)

**Torque: 730 kg-cm (53 ft-lb, 72 N-m)**

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

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



### 16. INSTALL RACK BOOTS, CLAMPS AND CLIPS

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

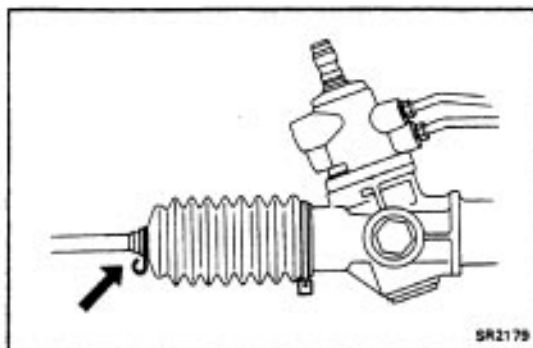
HINT: If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel turned.

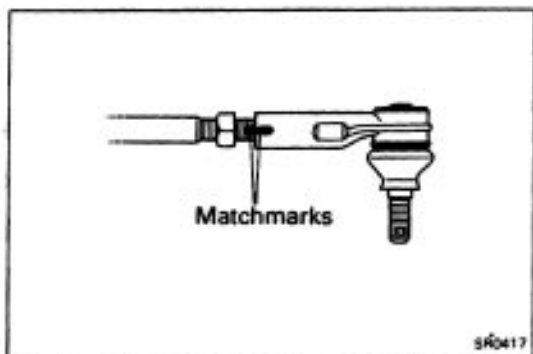
(b) Install the boots.

HINT: be careful not to damage or twist the boots.

(e) Install the clamps.

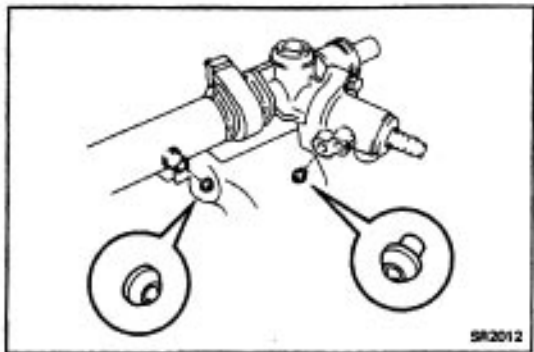
(d) Install the clips with the ends facing outward.



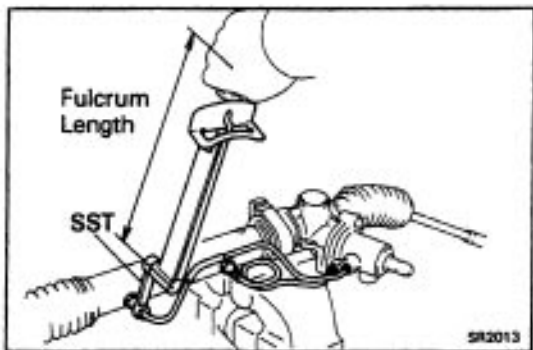
**17. INSTALL TIE ROD ENDS**

- (a) 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)**

**18. 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)**

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