

# STEERING SYSTEM

SR0BE-02

## PRECAUTION

- ★ Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- ★ The LEXUS LS400 is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

# TROUBLESHOOTING

SR0BF-02

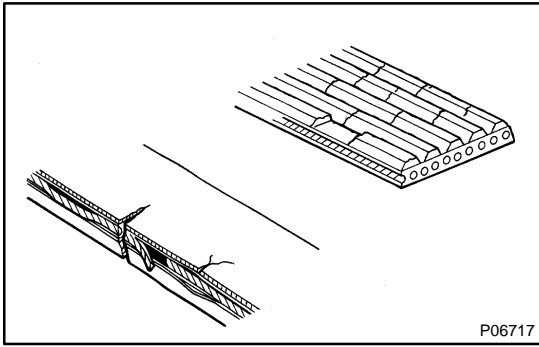
## PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page	
Hard steering	6. Tires (Improperly inflated)	SA-3	
	7. Power steering fluid level (Low)	SR-5	
	8. Drive belt (Loose)	–	
	9. Front wheel alignment (Incorrect)	SA-5	
	10. Steering system joints (Worn)	–	
	11. Suspension arm ball joints (Worn)	SA-38 SA-47	
	12. Steering column (Binding)	–	
	13. Power steering gear	SR-40	
	14. PPS system	SR-61	
	Poor return	1. Tires (Improperly inflated)	SA-3
		2. Front wheel alignment (Incorrect)	SA-5
		3. Steering column (Binding)	–
		4. Power steering gear	SR-40
	Excessive play	1. Steering system joints (Worn)	–
2. Suspension arm ball joints (Worn)		SA-38 SA-47	
3. Intermediate shaft, Universal joint, Sliding yoke (Worn)		–	
4. Front wheel bearing (Worn)		SA-13	
5. Power steering gear		SR-40	
6. PPS system		SR-61	
Abnormal noise	1. Power steering fluid level (Low)	SR-5	
	2. Steering system joints (Worn)	–	
	3. Power steering gear	SR-40	

### HINT:

When the problem occurs on the power tilt and telescopic steering system, refer to the DI section (See page [DI-408](#)).



# DRIVE BELT INSPECTION

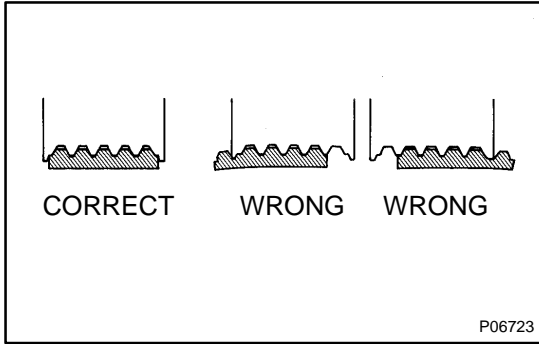
SR070-01

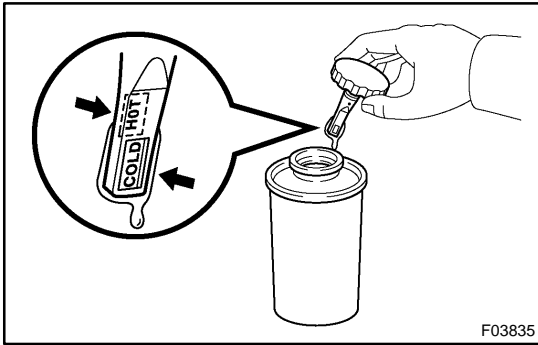
## INSPECT DRIVE BELT

Visually check the belt for excessive wear, frayed cords, etc. If any defect has been found, replace the drive belt.

**HINT:**

- ★ Cracks on the rib side of a belt are considered acceptable. If the missing chunks from the ribs are found on the belt, it should be replaced.
- ★ After installing a belt, check that it fits properly in the ribbed grooves.
- ★ Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.





## INSPECTION

### 1. CHECK FLUID LEVEL

- (a) Keep the vehicle level.
- (b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

**Fluid: ATF DEXRON® II or III**

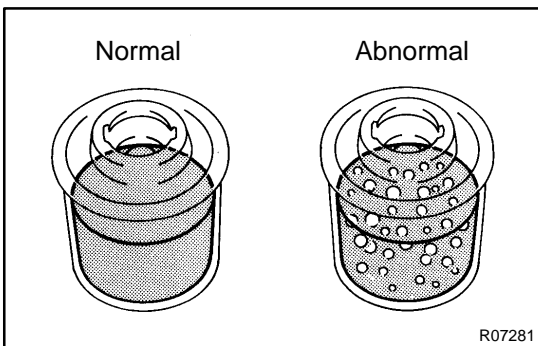
#### HINT:

Check that the fluid level is within the HOT LEVEL range on the reservoir cap dipstick.

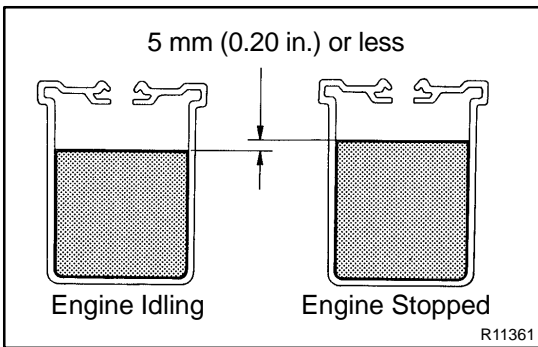
If the fluid is cold, check that it is within the COLD LEVEL range.

- (c) Start the engine and run it at idle.
- (d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

**Fluid temperature: 80°C (176°F)**



- (e) Check for foaming or emulsification. If there is foaming or emulsification, bleed power steering system (See page [SR-4](#)).

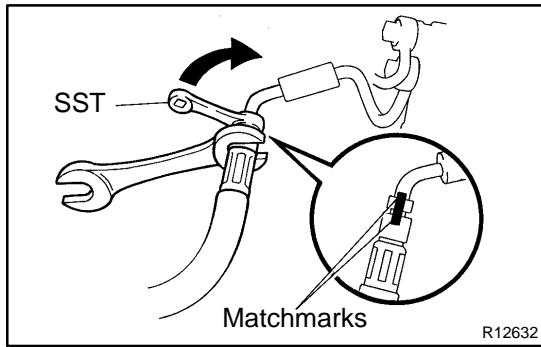


- (f) With the engine idling, measure the fluid level in the oil reservoir.
- (g) Stop the engine.
- (h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

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

If a problem is found, bleed power steering system (See page [SR-4](#)).

- (i) Check the fluid level.

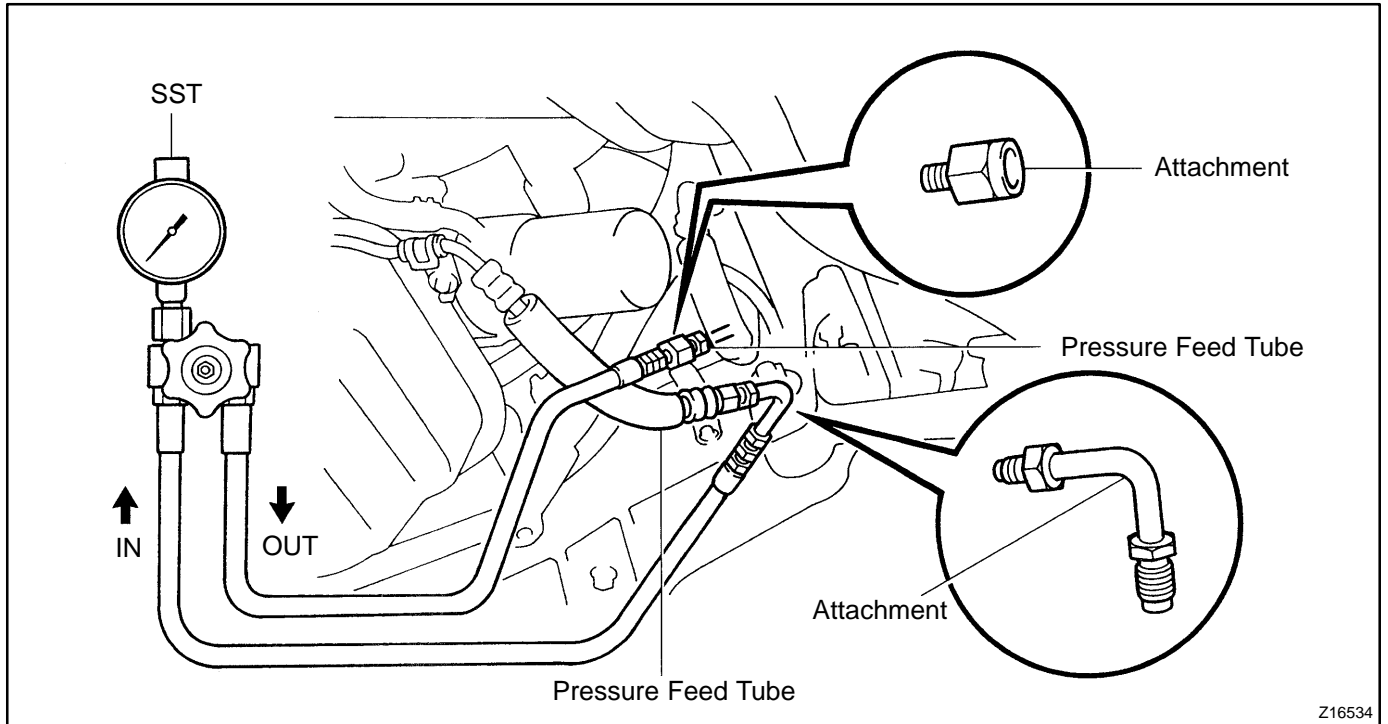


**2. CHECK STEERING FLUID PRESSURE**

- (a) Place matchmarks on the pressure feed tubes.
- (b) Using SST, disconnect the pressure line joint.  
SST 09631-22020
- (c) Connect SST, as shown in the illustration below.  
SST 09640-10010 (09641-01010, 09641-01030, 09641-01040)

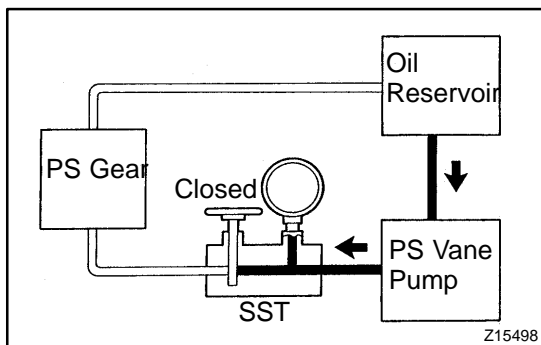
**NOTICE:**

**Check that the valve of the SST is in the open position.**



- (d) Bleed the power steering system (See page SR-4).
- (e) Start the engine and run it at idle.
- (f) Turn the steering wheel from lock to lock several times to boost fluid temperature.

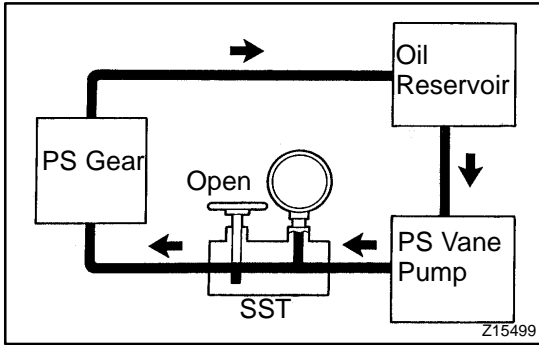
**Fluid temperature: 80 °C (176 °F)**



- (g) With the engine idling, close the valve of the SST and observe the reading on the SST.  
**Minimum fluid pressure:**  
**8,336 kPa (85 kgf/cm<sup>2</sup>, 1,209 psi)**

**NOTICE:**

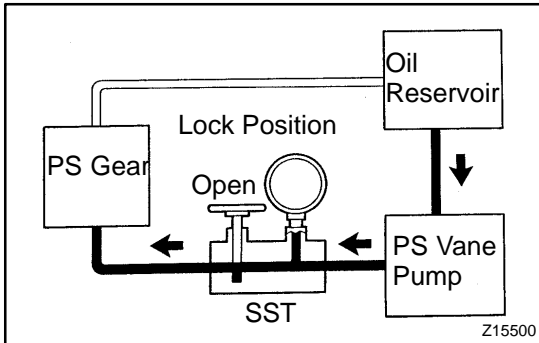
- ★ Do not keep the valve closed for more than 10 seconds.
- ★ Do not let the fluid temperature become too high.



- (h) With the engine idling, open the valve fully.
- (i) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.

**Difference fluid pressure:**  
**490 kPa (5 kgf/cm<sup>2</sup>, 71 psi) or less**

**NOTICE:**  
**Do not turn the steering wheel.**

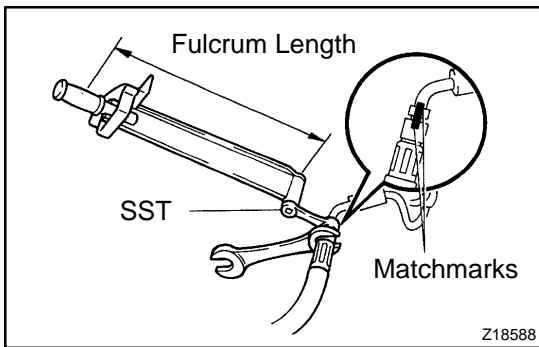


- (j) With the engine idling and valve fully opened, turn the steering wheel to full lock.

**Minimum fluid pressure:**  
**8,336 kPa (85 kgf/cm<sup>2</sup>, 1,209 psi)**

**NOTICE:**  
 ★ **Do not maintain lock position for more than 10 seconds.**  
 ★ **Do not let the fluid temperature become too high.**

- (k) Disconnect the SST.  
 SST 09640-10010 (09641-01010, 09641-01030, 09641-01040)

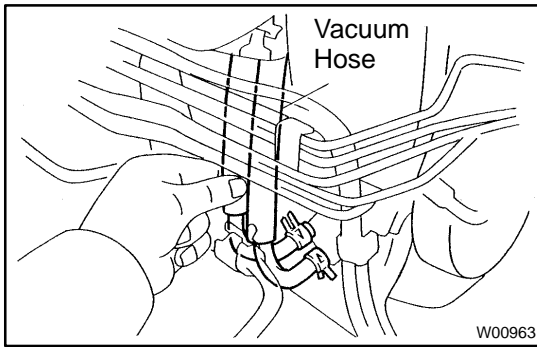


- (l) Align the matchmarks on the pressure feed tubes and connect them with SST.

SST 09631-22020  
**Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)**

**HINT:**  
 ★ Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).  
 ★ This torque value is effective in case that SST is parallel to a torque wrench.

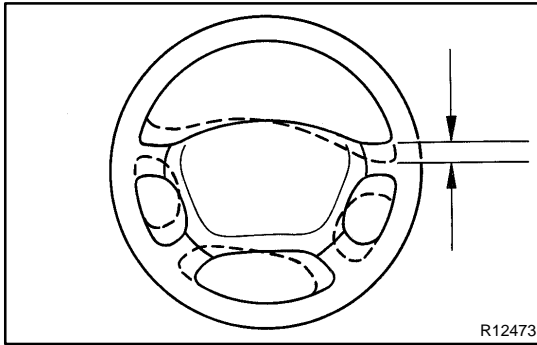
- (m) Bleed the power steering system (See page SR-4).



## AIR CONTROL VALVE INSPECTION

SR0BI-02

1. **TURN AIR CONDITIONING SWITCH OFF**
2. **CHECK IDLE-UP**
  - (a) Start the engine and run it at idle.
  - (b) Fully turn the steering wheel.
  - (c) Check that the engine rotations decrease when the vacuum hose of the air control valve is pinched.
  - (d) Check that the engine rotations increase when the hose is released.



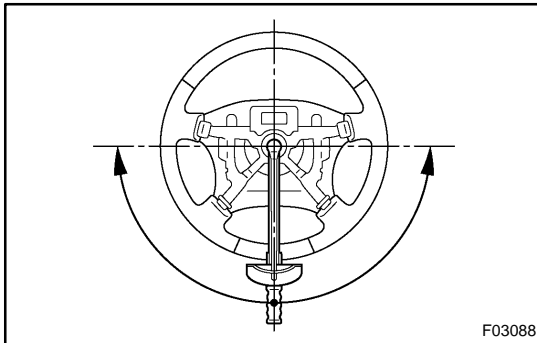
## STEERING WHEEL INSPECTION

SROBJ-03

### 1. CHECK STEERING WHEEL FREEPLAY

- (a) Stop the vehicle and face the tires straight ahead.
- (b) Rock the steering wheel gently up and down with a finger lightly, check the steering wheel freeplay.

**Maximum freeplay: 30 mm (1.18 in.)**



### 2. CHECK STEERING EFFORT

- (a) Center the steering wheel.
- (b) Remove the steering wheel pad (See page [SR-12](#)).
- (c) Start the engine and run it at idle.
- (d) Measure the steering effort in both directions.

**Steering effort (Reference):**

**6.9 N·m (70 kgf·cm, 61 in.-lbf)**

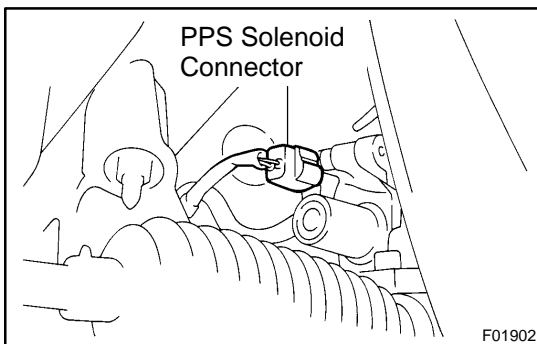
#### HINT:

Take the tire type, pressure and contact surface into consideration before making your diagnosis.

- (e) Disconnect the PPS solenoid connector.
- (f) Measure the steering effort in both directions and check that the steering effort exceeds the reference value in (d), and that the power assist is operating. If steering effort is not heavier than (d), check the solenoid.

#### HINT:

Take the tire type, pressure and contact surface into consideration before making your diagnosis.

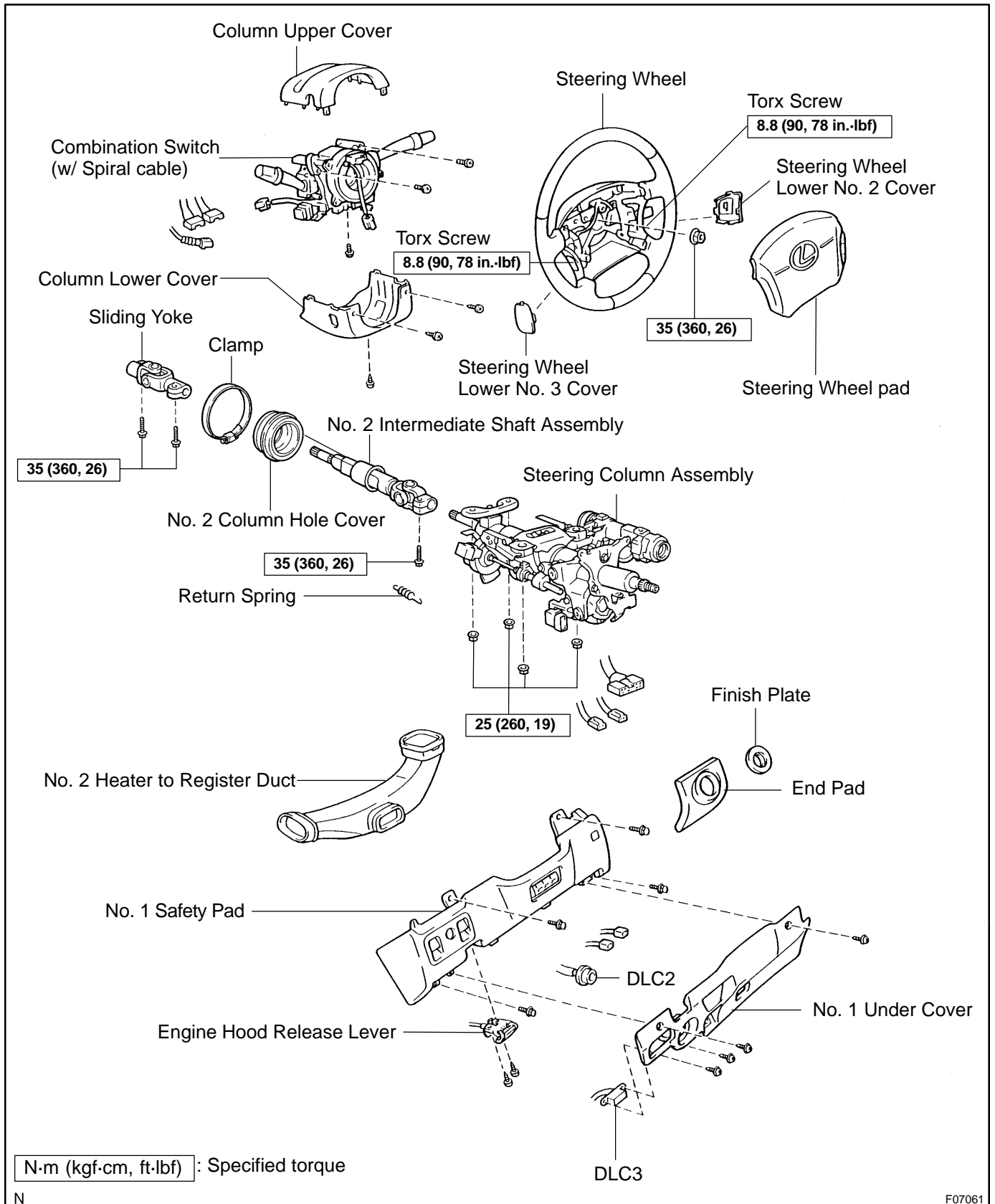


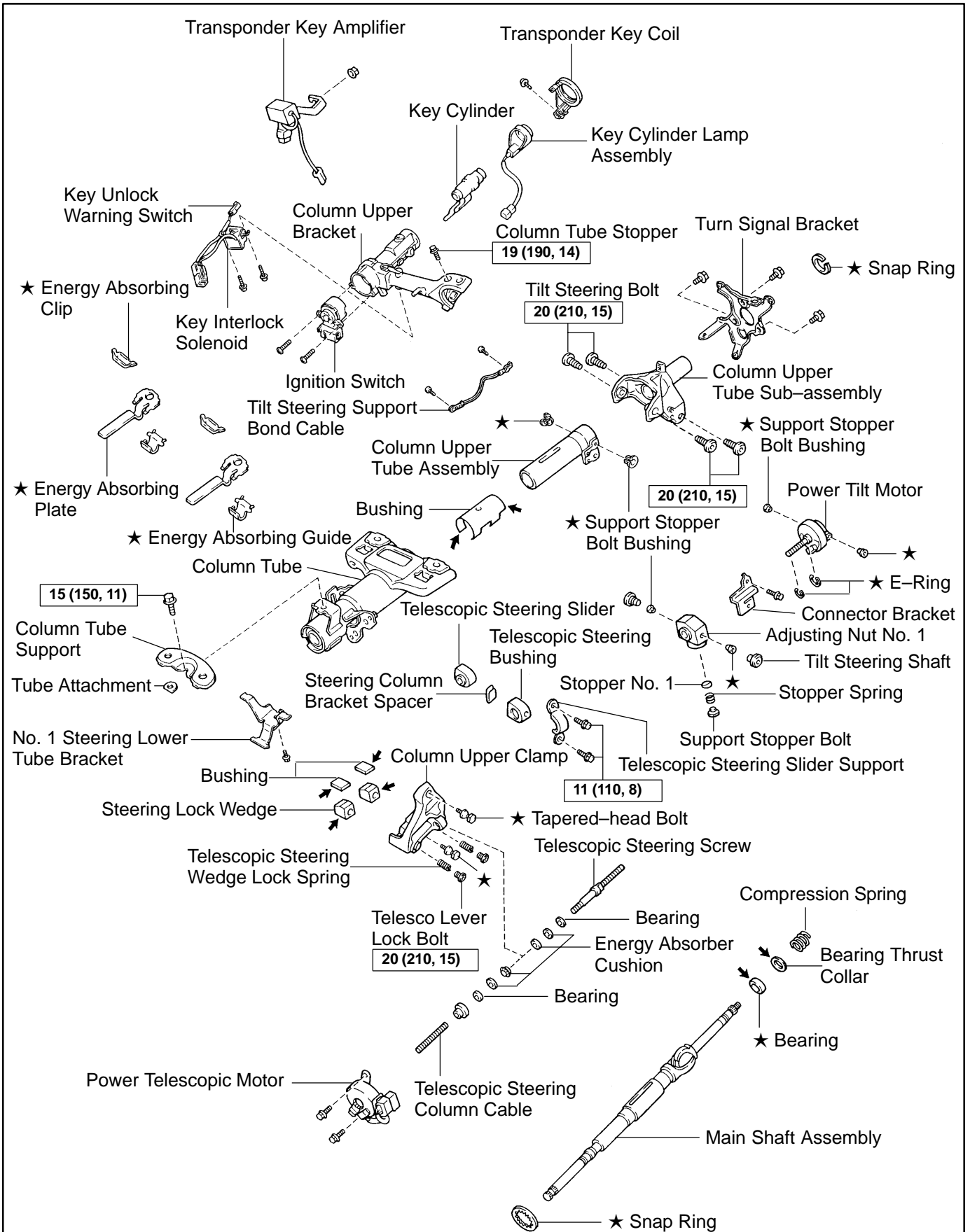
- (g) Connect the connector.
- (h) Torque the steering wheel set nut.  
**Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)**
- (i) Install the steering wheel pad (See page [SR-23](#)).



# POWER TILT AND POWER TELESCOPIC STEERING COLUMN COMPONENTS

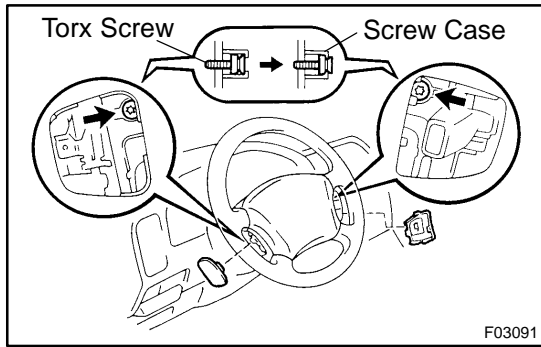
SR071-01





**N-m (kgf-cm, ft-lbf) : Specified torque**  
 ★ Non-reusable part  
 N ← Molybdenum disulfide lithium base grease

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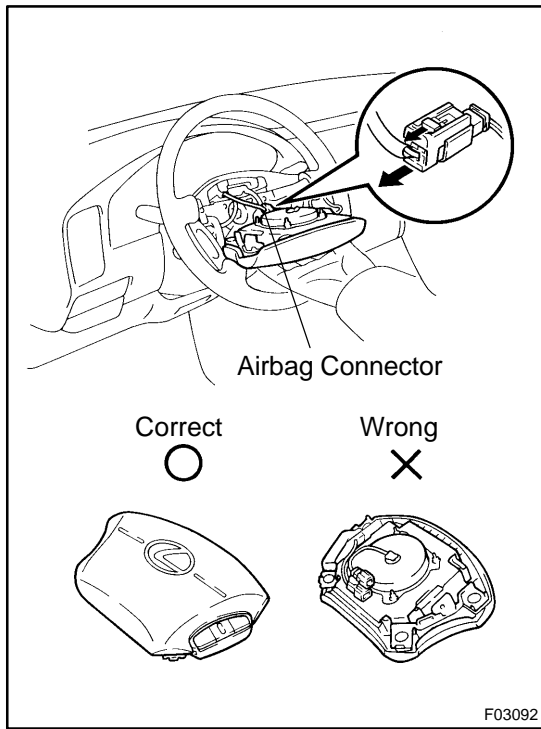
## REMOVAL

### 1. REMOVE STEERING WHEEL PAD

**NOTICE:**

If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.

- (a) Place the front wheels facing straight ahead.
- (b) Remove the steering wheel lower No. 2 and No. 3 covers.
- (c) Using a torx socket wrench, loosen the 2 torx screws until the groove along the screw circumference catches on the screw case.



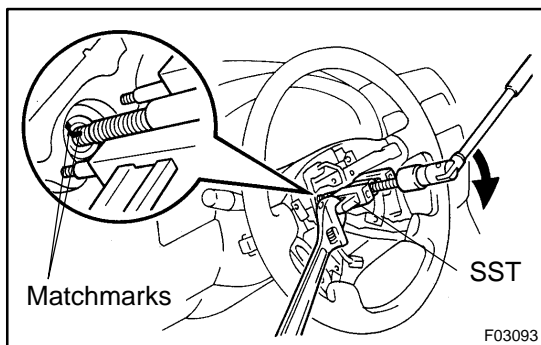
- (d) Pull out the wheel pad from the steering wheel and disconnect the airbag connector.
- (e) Disconnect the connector.

**CAUTION:**

- ★ When storing the wheel pad, keep the upper surface of the pad facing upward.
- ★ Never disassemble the wheel pad.

**NOTICE:**

When removing the wheel pad, take care not to pull the airbag wire harness.



### 2. REMOVE STEERING WHEEL

- (a) Disconnect the connectors.
- (b) Remove the steering wheel set nut.
- (c) Place matchmarks on the steering wheel and main shaft assembly.
- (d) Using SST, remove the steering wheel.  
SST 09950-50012 (09951-05010, 09952-05010, 09953-05020, 09954-05020)

**3. REMOVE NO. 1 UNDER COVER**

- (a) Remove the 2 screws and No. 1 under cover.
- (b) Disconnect the 2 connectors and DLC 2.
- (c) Remove the 2 screws and DLC3.

**4. REMOVE END PAD AND FINISH PLATE**

**5. REMOVE NO. 1 SAFETY PAD**

- (a) Remove the 2 screws and disconnect the engine hood release lever.
- (b) Remove the 4 pad set bolts and No. 1 safety pad.

**6. REMOVE NO. 2 HEATER TO REGISTER DUCT**

**7. REMOVE COLUMN UPPER AND LOWER COVERS**

Remove the 3 screws, column upper and lower covers.

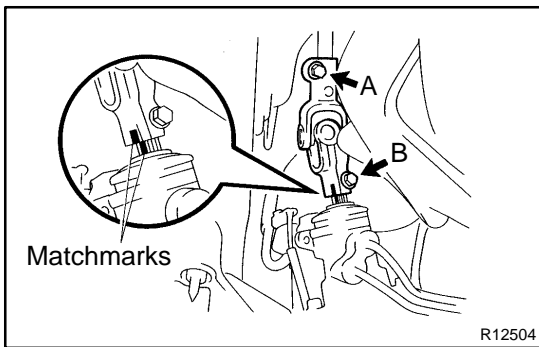
**8. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE**

- (a) Disconnect the connectors.
- (b) Disconnect the airbag connector.
- (c) Remove the 3 screws and combination switch with spiral cable.

**9. REMOVE SPIRAL CABLE (See page BE-36)**

**NOTICE:**

Do not disassemble the cable or apply oil to it.



**10. DISCONNECT SLIDING YOKE**

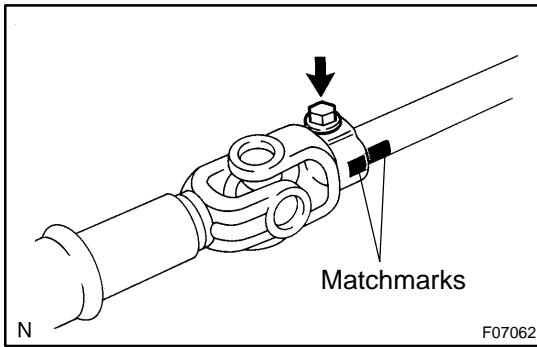
- (a) Place matchmarks on the sliding yoke and control valve shaft.
- (b) Loosen the bolt A and remove the bolt B.

**11. REMOVE STEERING COLUMN ASSEMBLY**

- (a) Disconnect the connectors.
- (b) Disconnect the No. 2 column hole cover.
- (c) Loosen the clamp.
- (d) Remove the return spring.
- (e) Remove the 4 column assembly set nuts and steering column assembly.
- (f) Remove the No. 2 column hole cover and clamp from the No. 2 intermediate shaft assembly.

**12. REMOVE SLIDING YOKE**

Remove the bolt A and sliding yoke.



- 13. REMOVE NO. 2 INTERMEDIATE SHAFT ASSEMBLY**
- (a) Place matchmarks on the No. 2 intermediate shaft assembly and main shaft assembly.
  - (b) Remove the bolt and No. 2 intermediate shaft assembly.

## DISASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

#### 1. REMOVE TRANSPONDER KEY COIL AND KEY CYLINDER LAMP ASSEMBLY

Remove the screw, transponder key coil and key cylinder lamp assembly.

#### 2. REMOVE CONNECTOR BRACKET

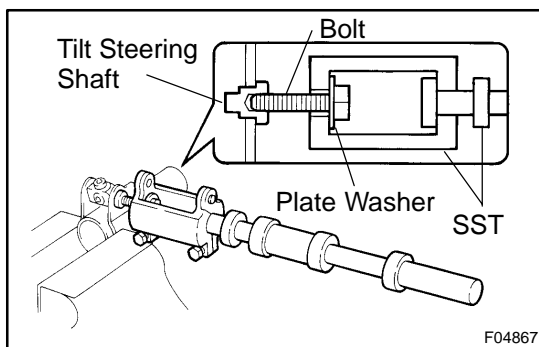
- (a) Disconnect the connector.
- (b) Remove the screw and connector bracket.

#### 3. REMOVE TURN SIGNAL BRACKET

Remove the 3 bolts and turn signal bracket.

#### 4. REMOVE POWER TILT MOTOR

- (a) Using a hexagon wrench, remove the support stopper bolt.
- (b) Remove the stopper spring and stopper No. 1.
- (c) Using a screwdriver, remove the 2 E-rings.
- (d) Using a hexagon wrench, remove the 2 tilt steering bolts and power tilt motor.
- (e) Remove the 2 support stopper bolt bushings from the power tilt motor.



#### 5. REMOVE ADJUSTING NUT NO. 1

- (a) Set SST, a plate washer (36 mm outer diameter) and bolt (6 mm normal diameter, 1.0 mm pitch, 50 mm length), as shown in the illustration.

SST 09910-00015 (09911-00011, 09912-00010)

Reference:

Plate washer 90201-10201

Bolt 91111-51050

- (b) Remove the 2 tilt steering shafts by using the sliding hammer on SST and adjusting nut No. 1.
- (c) Remove the 2 support stopper bolt bushings from the adjusting nut No. 1.

#### 6. REMOVE NO. 1 STEERING LOWER TUBE BRACKET

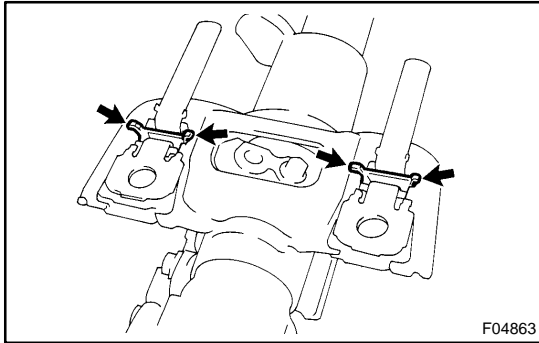
Remove the bolt and No. 1 steering lower tube bracket.

#### 7. REMOVE POWER TELESCOPIC MOTOR

- (a) Remove the 2 bolts and power telescopic motor.
- (b) Remove the telescopic steering column cable.

**8. REMOVE COLUMN TUBE SUPPORT**

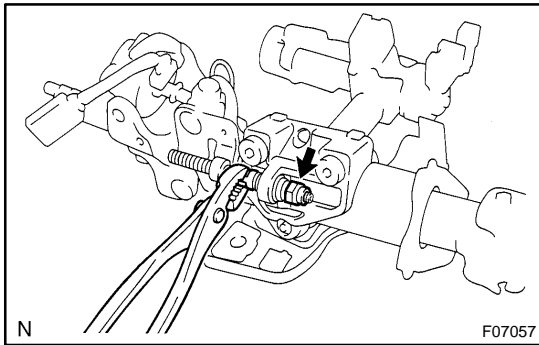
- (a) Remove the bolt.
- (b) Remove the column tube support with tube attachment.
- (c) Remove the tube attachment from the column tube support.

**9. REMOVE 2 ENERGY ABSORBING PLATES**

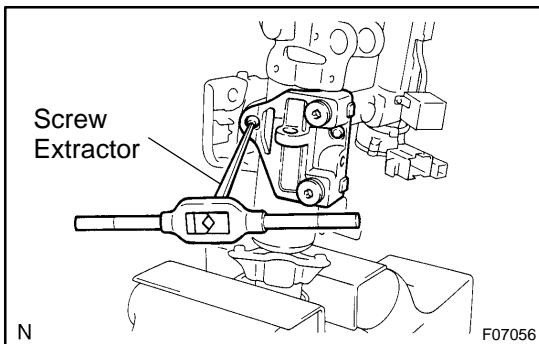
- (a) Using pliers, remove the 2 energy absorbing clips.
- (b) Remove the 2 energy absorbing plates and 2 energy absorbing guides.

**10. REMOVE TELESCOPIC STEERING SLIDER SUPPORT**

Remove the 2 bolts and telescopic steering slider support.

**11. REMOVE TELESCOPIC STEERING SCREW**

Using Pliers, remove the nut, 4 energy absorber cushions, 2 bearings and telescopic steering screw.

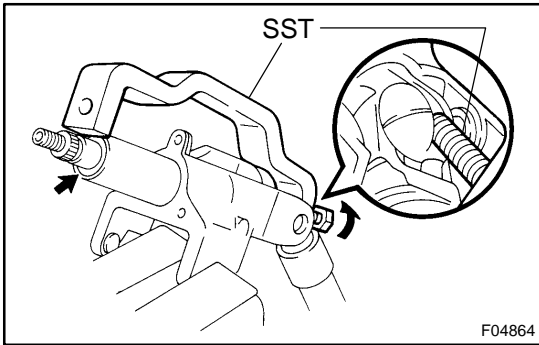
**12. REMOVE TELESCOPIC STEERING BUSHING, STEERING COLUMN BRACKET SPACER AND TELESCOPIC STEERING SLIDER FROM TELESCOPIC STEERING SCREW****13. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP**

- (a) Remove column tube stopper.
- (b) Using a centering punch, mark the center of the 2 tapered-head bolts.
- (c) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the 2 tapered-head bolts.
- (d) Using a screw extractor, remove 2 tapered-head bolts, column upper bracket, column upper clamp and 2 steering lock wedges.
- (e) Using a hexagon wrench, remove the 2 telescopic lever lock bolts and 2 telescopic steering wedge lock springs.

**14. REMOVE COLUMN UPPER TUBE SUB-ASSEMBLY WITH MAIN SHAFT ASSEMBLY**

- (a) Using a screwdriver, remove the snap ring.
- (b) Remove the 2 screws and tilt steering support bond cable.
- (c) Using a hexagon wrench, remove the 2 tilt steering bolts and column upper tube sub-assembly with main shaft assembly.

- (d) Remove the column upper tube assembly from the column tube.
- (e) Remove the 2 support stopper bolt bushings from the column upper tube assembly.
- (f) Remove the 3 bushings from the column tube.



**15. REMOVE MAIN SHAFT ASSEMBLY**

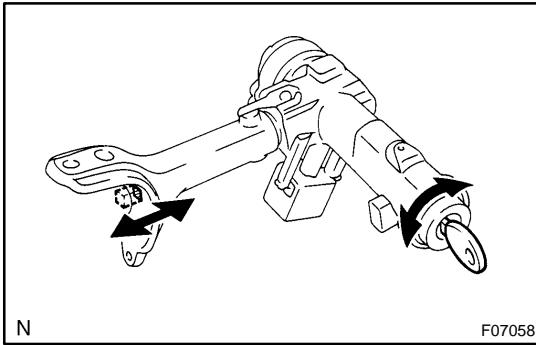
- (a) Using SST, compress the compression spring.  
SST 09950-40011 (09958-04011)

**NOTICE:**

**Do not bend the universal joint of the shaft assembly more than 20°.**

- (b) Using a snap ring expander, remove the snap ring.
- (c) Remove the main shaft assembly from the column upper tube sub-assembly.
- (d) Remove the compression spring, bearing thrust collar and bearing from the main shaft assembly.





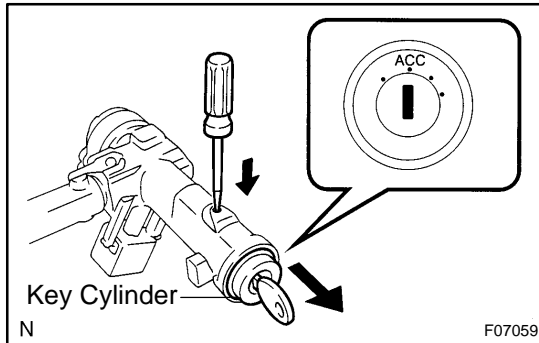
## INSPECTION

### NOTICE:

When using a vise, do not overtighten it.

#### 1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



#### 2. IF NECESSARY, REPLACE KEY CYLINDER

- (a) Place the ignition key at the ACC position.
- (b) Using a screwdriver, push down the stop pin of the cylinder, and pull out the key cylinder.
- (c) Install a new cylinder.

#### HINT:

Make sure the key is at the ACC position.

#### 3. INSPECT IGNITION SWITCH

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

#### 4. IF NECESSARY, REPLACE IGNITION SWITCH

- (a) Remove the 2 screws and ignition switch.
- (b) Install a new ignition switch with the 2 screws.

#### 5. INSPECT KEY UNLOCK WARNING SWITCH

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

#### 6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

- (a) Slide the key unlock warning switch out of the column upper bracket.
- (b) Slide a new key unlock warning switch in the column upper bracket.

#### 7. INSPECT KEY INTERLOCK SOLENOID

(See page [AT-14](#))

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

- (a) Remove the 2 screws and key interlock solenoid.
- (b) Install a new key interlock solenoid with the 2 screws.

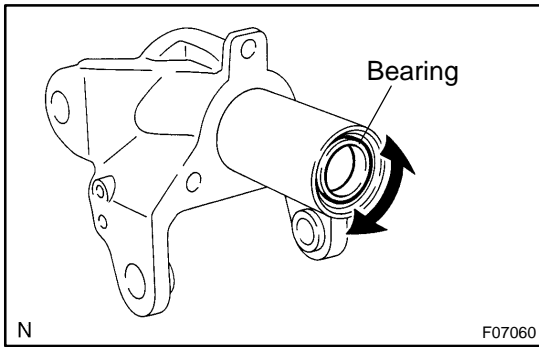
#### 9. INSPECT TRANSPONDER KEY COIL

(See page [BE-255](#))

#### 10. IF NECESSARY, REPLACE TRANSPONDER KEY COIL

#### 11. IF NECESSARY, REPLACE TRANSPONDER KEY AMPLIFIER

- (a) Remove the nut and transponder key amplifier.
- (b) Install a new transponder key amplifier with the nut.



## 12. INSPECT BEARING

- (a) Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the column upper tube sub-assembly.

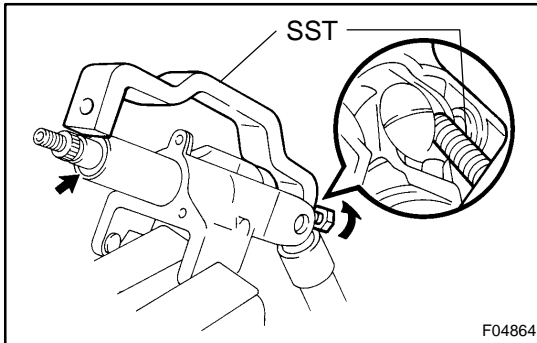
- (b) Coat the bearing with molybdenum disulfide lithium base grease.

## REASSEMBLY

### NOTICE:

When using a vise, do not over tighten it.

1. **COAT PARTS INDICATED BY ARROWS WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR-10)**



### 2. INSTALL MAIN SHAFT ASSEMBLY

- (a) Install a new bearing, bearing thrust collar and compression spring to the main shaft assembly.
- (b) Install the main shaft assembly to the column upper tube sub-assembly.
- (c) Using SST, compress the compression spring.  
SST 09950-40011 (09958-04011)

### NOTICE:

Do not bend the universal joint of the shaft more than 20°.

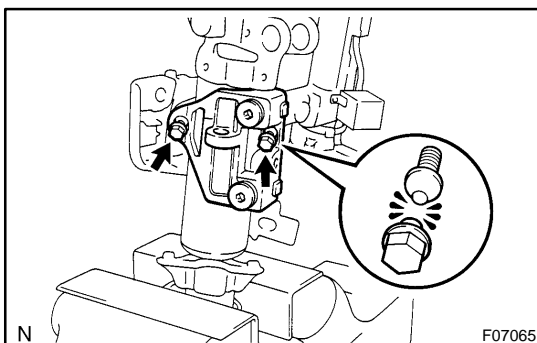
- (d) Using a snap ring expander, install a new snap ring to the main shaft.

### 3. INSTALL COLUMN UPPER TUBE SUB-ASSEMBLY WITH MAIN SHAFT ASSEMBLY

- (a) Install the 3 bushings to the column tube.
- (b) Install 2 new support stopper bolt bushings to the column upper tube assembly.
- (c) Install the column upper tube assembly to the column tube.
- (d) Using a hexagon wrench, install the column upper tube sub-assembly with main shaft assembly with the 2 tilt steering bolts.

**Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)**

- (e) Install the tilt steering support bond cable with the 2 screws.
- (f) Install a new snap ring.



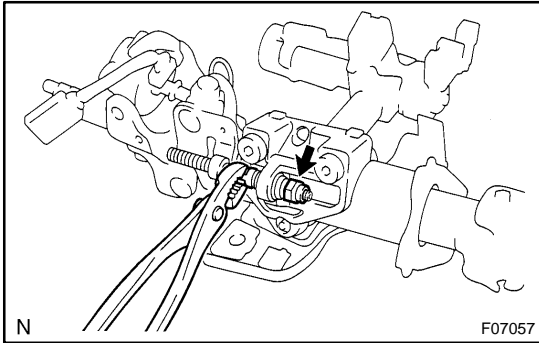
### 4. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

- (a) Using a hexagon wrench, install the 2 telescopic steering wedge lock springs and 2 telescopic lever lock bolts.

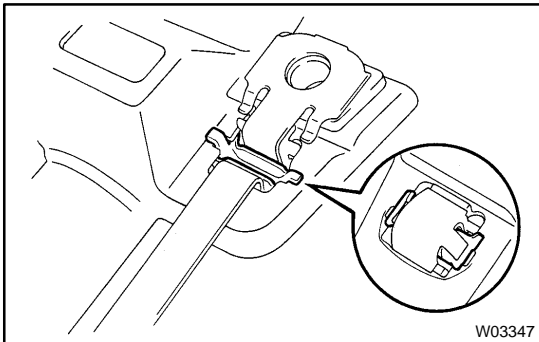
**Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)**

- (b) Install the 2 steering lock wedges, column upper clamp and column upper bracket with 2 new tapered-head bolts.
- (c) Tighten the 2 tapered-head bolts until the bolt heads break off.

- (d) Install the column tube stopper.  
**Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)**
- 5. **INSTALL TELESCOPIC STEERING SLIDER, STEERING COLUMN BRACKET SPACER AND TELESCOPIC STEERING BUSHING TO TELESCOPIC STEERING SCREW**
- 6. **INSTALL TELESCOPIC STEERING SCREW**
  - (a) Install the 4 energy absorber cushions, 2 bearings and telescopic steering screw.



- (b) Using pliers, install the nut.
- (c) Using a punch, stake the nut.
- 7. **INSTALL TELESCOPIC STEERING SLIDER SUPPORT**  
Install the telescopic steering slider support with the 2 bolts.  
**Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)**



- 8. **INSTALL 2 ENERGY ABSORBING PLATES**
  - (a) Install 2 new energy absorbing guides and energy absorbing plates.
  - (b) Install 2 new energy absorbing clips.
- 9. **INSTALL COLUMN TUBE SUPPORT**
  - (a) Install the tube attachment to the column tube support.
  - (b) Install the column tube support with tube attachment with the bolt.

**Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)**

- 10. **INSTALL POWER TELESCOPIC MOTOR**
  - (a) Install the telescopic steering column cable.
  - (b) Install the power telescopic motor with the 2 bolts.
- 11. **INSTALL NO. 1 STEERING LOWER TUBE BRACKET**  
Install the No. 1 steering lower tube bracket with the bolt.

- 12. **INSTALL ADJUSTING NUT NO. 1**
  - (a) Install 2 new support stopper bolt bushings to the adjusting nut No. 1.
  - (b) Install the adjusting nut No. 1 with the 2 tilt steering shafts.

- 13. **INSTALL POWER TILT MOTOR**
  - (a) Install 2 new support stopper bolt bushings to the power tilt motor.
  - (b) Using a hexagon wrench, install the power tilt motor with the 2 tilt steering bolts.  
**Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)**
  - (c) Install 2 new E-rings.
  - (d) Install the stopper No. 1 and stopper spring.
  - (e) Using a hexagon wrench, install the support stopper bolt.

**14. INSTALL TURN SIGNAL BRACKET**

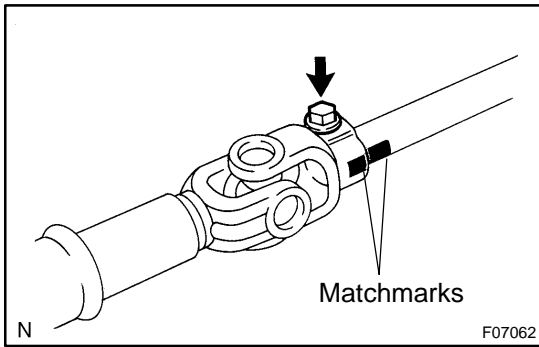
Install the turn signal bracket with the 3 screws.

**15. INSTALL CONNECTOR BRACKET**

- (a) Install the connector bracket with the screw.
- (b) Connect the connector.

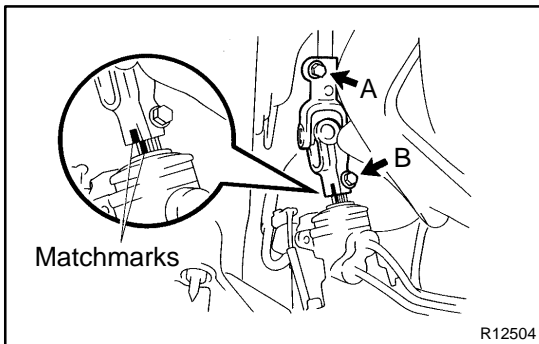
**16. INSTALL KEY CYLINDER LAMP ASSEMBLY AND  
TRANSPONDER KEY COIL**

Install the key cylinder lamp assembly and transponder key coil with the screw.

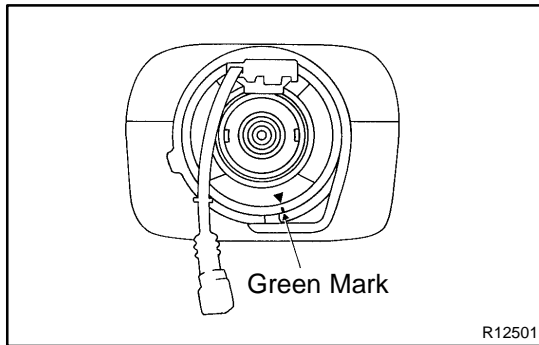


## INSTALLATION

- 1. INSTALL NO. 2 INTERMEDIATE SHAFT ASSEMBLY**
  - (a) Align the matchmarks on the No. 2 intermediate shaft assembly and main shaft assembly.
  - (b) Install the No. 2 intermediate shaft assembly with the bolt.  
**Torque: 35 N·m (360 kgf-cm, 26 ft-lbf)**
- 2. INSTALL SLIDING YOKE**  
Temporarily install the sliding yoke with the bolt A.
- 3. INSTALL STEERING COLUMN ASSEMBLY**
  - (a) Install the No. 2 column hole cover and clamp to the No. 2 intermediate shaft assembly.
  - (b) Install the steering column assembly with the 4 column assembly set nuts.  
**Torque: 25 N·m (260 kgf-cm, 19 ft-lbf)**
  - (c) Install the return spring.
  - (d) Tighten the clamp.
  - (e) Connect the No. 2 column hole cover.
  - (f) Connect the connectors.



- 4. CONNECT SLIDING YOKE**
  - (a) Align the matchmarks on the sliding yoke and control valve shaft.
  - (b) Install the bolt B.  
**Torque: 35 N·m (360 kgf-cm, 26 ft-lbf)**
  - (c) Torque the bolt A.  
**Torque: 35 N·m (360 kgf-cm, 26 ft-lbf)**
- 5. INSTALL SPIRAL CABLE (See page BE-36)**
- 6. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE**
  - (a) Install the combination switch with spiral cable with the 3 screws.
  - (b) Connect the airbag connector.
  - (c) Connect the connectors.
- 7. INSTALL COLUMN UPPER AND LOWER COVERS**  
Install the column upper and lower covers with the 3 screws.
- 8. INSTALL NO. 2 HEATER TO REGISTER DUCT**
- 9. INSTALL NO. 1 SAFETY PAD**
  - (a) Install the No. 1 safety pad with the 4 pad set bolts.
  - (b) Connect the engine hood release lever with the 2 screws.
- 10. INSTALL END PAD AND FINISH PLATE**
- 11. INSTALL NO. 1 UNDER COVER**
  - (a) Connect the DLC3 with the 2 screws.
  - (b) Connect the 2 connectors and DLC2.
  - (c) Install the No. 1 under cover with the 2 screws.

**12. CENTER SPIRAL CABLE**

- (a) Check that the front wheels are facing straight ahead.
- (b) Turn the cable counterclockwise by hand until it becomes harder to turn.
- (c) Then rotate the cable clockwise about 2.5 turns to align the marks.

**HINT:**

The cable will rotate about 2.5 turns to either left or right of the center.

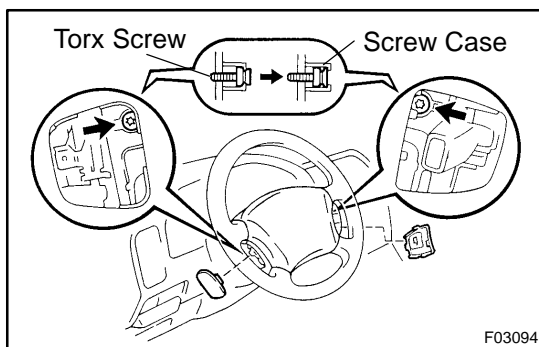
**13. INSTALL STEERING WHEEL**

- (a) Align the matchmarks on the steering wheel and main shaft assembly.
- (b) Install the steering wheel set nut.  
**Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)**
- (c) Connect the connectors.

**14. INSTALL STEERING WHEEL PAD****NOTICE:**

- ★ **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**
- ★ **Make sure the wheel pad is installed with the specified torque.**
- ★ **If the wheel pad has been dropped, or there are cracks, dents or other defects on the case or connector, replace the wheel pad with a new one.**
- ★ **When installing the wheel pad, take care that the wirings do not interfere with other parts and that they are not pinched between other parts.**

- (a) Connect the connector.
- (b) Connect the airbag connector.



- (c) Install the steering wheel pad after confirming that the circumference groove of the torx screws is caught on the screw case.

- (d) Using a torx socket wrench, torque the 2 screws.

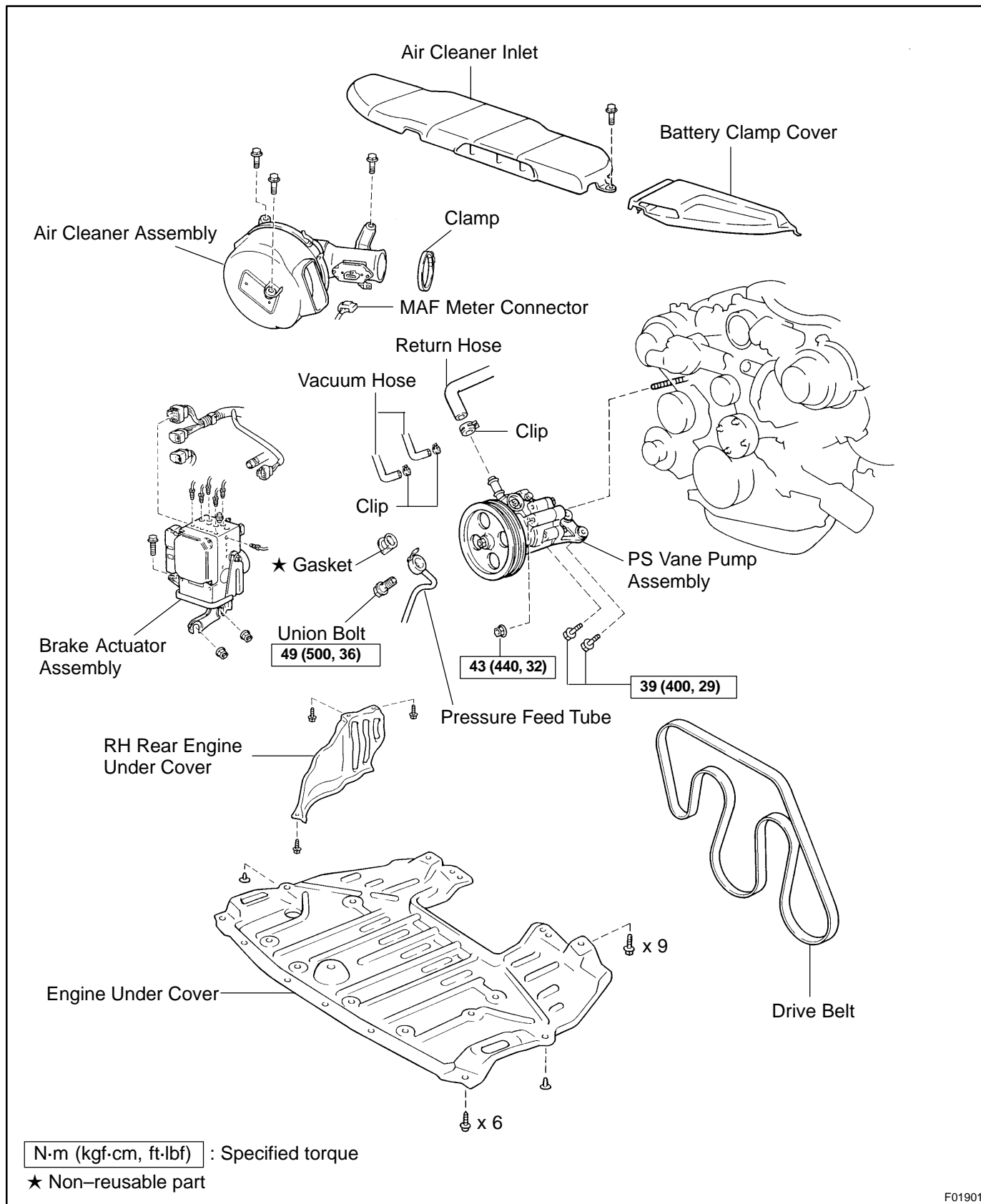
**Torque: 8.8 N·m (90 kgf·cm, 78 in.-lbf)**

- (e) Install the steering wheel lower No. 2 and No. 3 covers.

**15. CHECK STEERING WHEEL CENTER POINT**

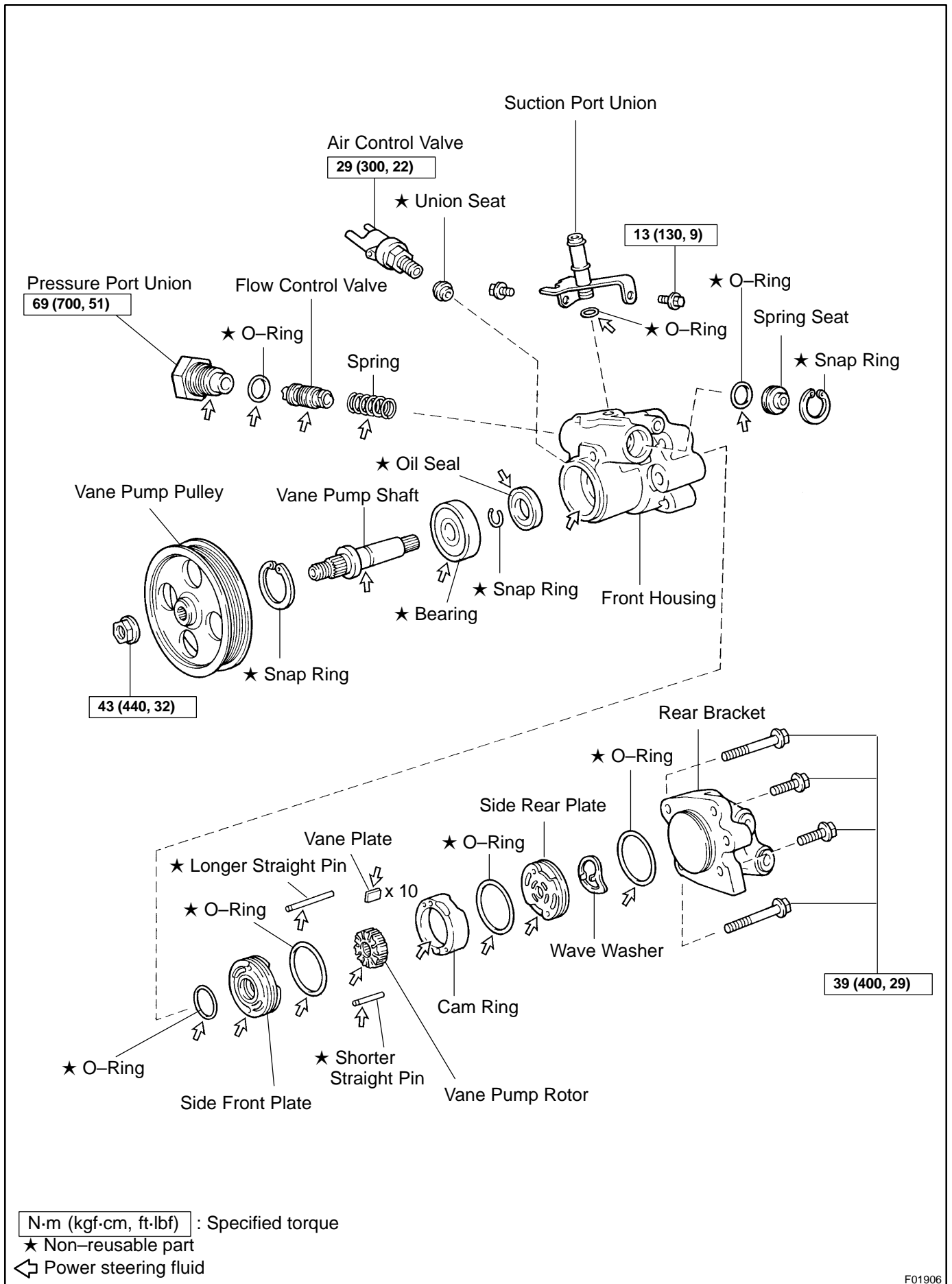
# POWER STEERING VANE PUMP COMPONENTS

SR0BQ-03



F01901





## REMOVAL

### 1. REMOVE ENGINE UNDER COVER

Remove the 9 bolts, 6 screws, 2 clips and engine under cover.

### 2. REMOVE RH REAR ENGINE UNDER COVER

Remove the 3 bolts and RH rear engine under cover.

### 3. REMOVE AIR CLEANER INLET AND BATTERY CLAMP COVER

Remove the bolt, air cleaner inlet and battery clamp cover.

### 4. REMOVE AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

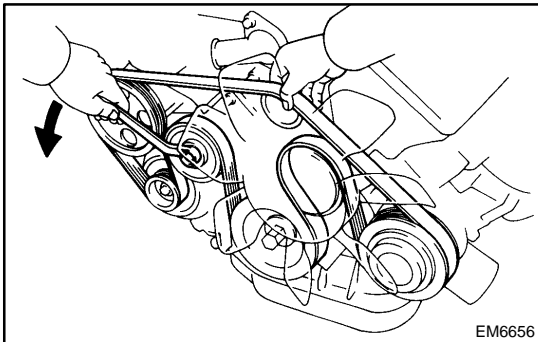
(a) Disconnect the MAF meter connector.

(b) Remove the clamp.

(c) Remove the 3 bolts and air cleaner assembly with air cleaner hose.

### 5. REMOVE BRAKE ACTUATOR ASSEMBLY

(See page [BR-50](#))



### 6. REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.

### 7. DISCONNECT 2 VACUUM HOSES

Remove the 2 clips and disconnect the 2 vacuum hoses.

### 8. DISCONNECT RETURN HOSE

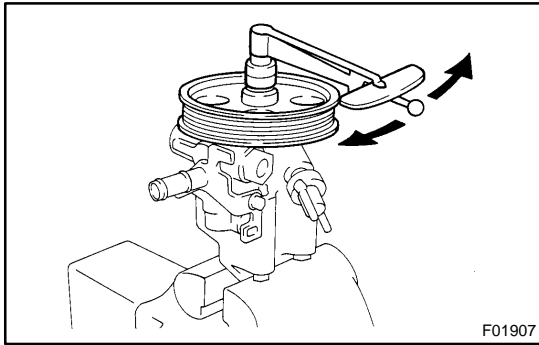
Remove the clip and disconnect the return hose.

### 9. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket, and disconnect the pressure feed tube.

### 10. REMOVE PS VANE PUMP ASSEMBLY

Remove the 2 bolts, nut and PS vane pump assembly.

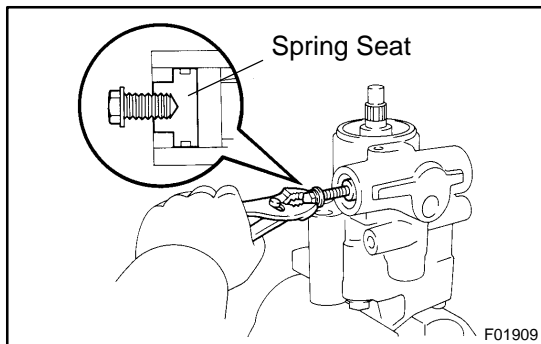
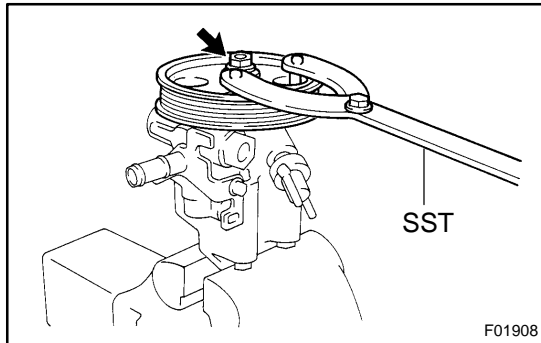


## DISASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

1. **MEASURE PS VANE PUMP ROTATION TORQUE**
  - (a) Check that the pump rotates smoothly without abnormal noise.
  - (b) Using a torque wrench, check the pump rotating torque.  
**Rotating torque:**  
**0.25 N·m (2.5 kgf·cm, 2.2 in.-lbf) or less**
2. **REMOVE VANE PUMP PULLEY**
  - (a) Using SST, stop the pulley rotating and loosen the nut.  
SST 09960-10010 (09962-01000, 09963-01000)
  - (b) Remove the nut and vane pump pulley from the vane pump shaft.
3. **REMOVE AIR CONTROL VALVE**
4. **REMOVE SUCTION PORT UNION**
  - (a) Remove the 2 bolts and suction port union.
  - (b) Remove the O-ring from the suction port union.
5. **REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING**
  - (a) Remove the pressure port union, flow control valve and spring.
  - (b) Remove the O-ring from the pressure port union.

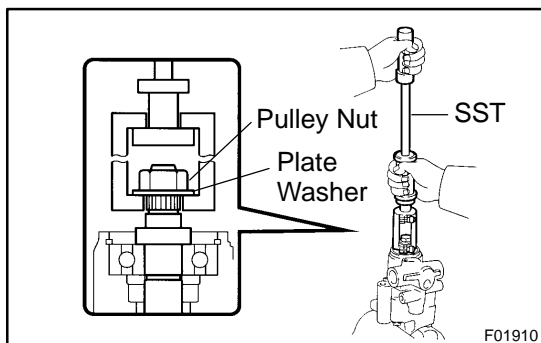


6. **REMOVE SPRING SEAT**
  - (a) Using snap ring pliers, remove the snap ring from the front housing.
  - (b) Temporarily install a bolt to the spring seat and pull it out together with the spring seat.

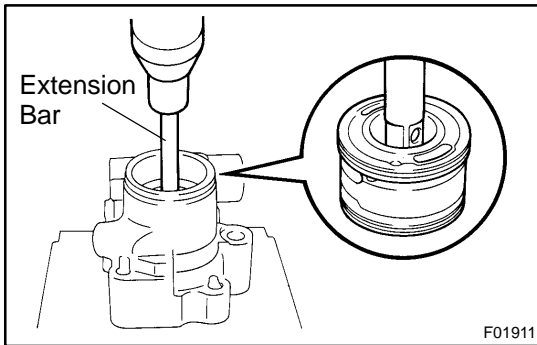
### HINT:

Use a bolt with diameter 6 mm (0.24 in.) and pitch 1.0 mm (0.039 in.).

- (c) Remove the O-ring from the spring seat.



7. **REMOVE VANE PUMP SHAFT WITH BEARING**
  - (a) Using snap ring pliers, remove the snap ring from the front housing.
  - (b) Temporarily install a appropriate plate washer and the pulley set nut to the vane pump shaft.
  - (c) Using SST, pull out the vane pump shaft with the bearing.  
SST 09910-00015 (09911-00011, 09912-00010)
8. **REMOVE REAR BRACKET**
  - (a) Remove the 4 bolts and rear bracket.
  - (b) Remove the O-ring from the rear bracket.

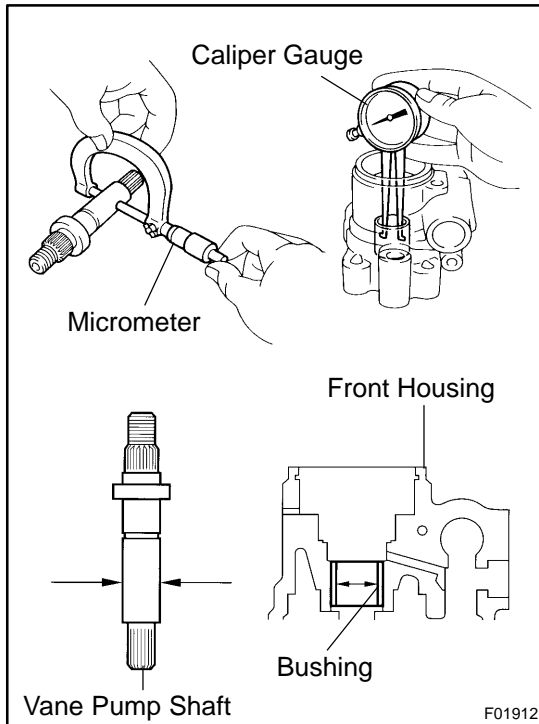
**9. REMOVE WAVE WASHER****10. REMOVE SIDE FRONT PLATE, CAM RING, VANE PUMP ROTOR, 10 VANE PLATES AND SIDE REAR PLATE**

- (a) Using an extension bar, press out the side front plate, cam ring, vane pump rotor, 10 vane plates and side rear plate as an assembly.
- (b) Remove the O-ring from the side rear plate.
- (c) Remove the cam ring, vane pump rotor and the 10 vane plates.

**NOTICE:**

**Take care not to drop the vane plate.**

- (d) Remove the shorter straight pin from the side front plate.
- (e) Remove the 2 O-rings from the side front plate.
- (f) Using pliers, remove the longer straight pin from the front housing.



## INSPECTION

### NOTICE:

When using a vise, do not overtighten it.

#### 1. MEASURE OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

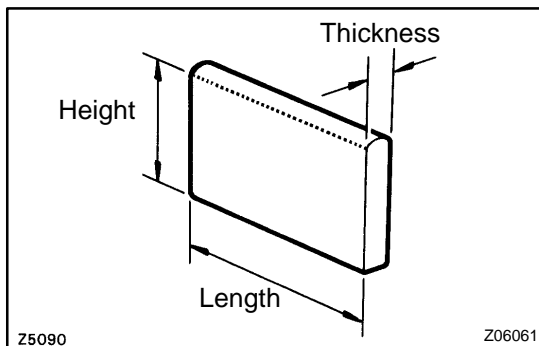
Using a micrometer and caliper gauge, measure the oil clearance.

**Standard clearance:**

**0.030 – 0.045 mm (0.0012 – 0.0018 in.)**

**Maximum clearance: 0.07 mm (0.0028 in.)**

If it is more than the maximum, replace the front housing and vane pump shaft.



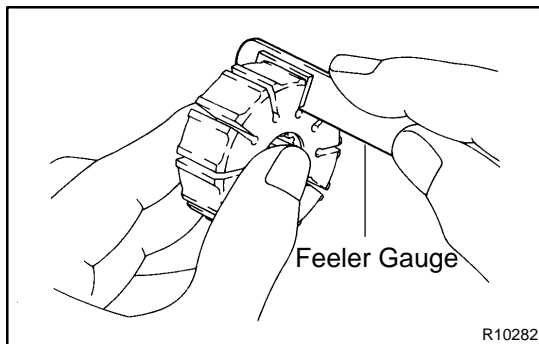
#### 2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 vane plates.

**Minimum height: 8.0 mm (0.315 in.)**

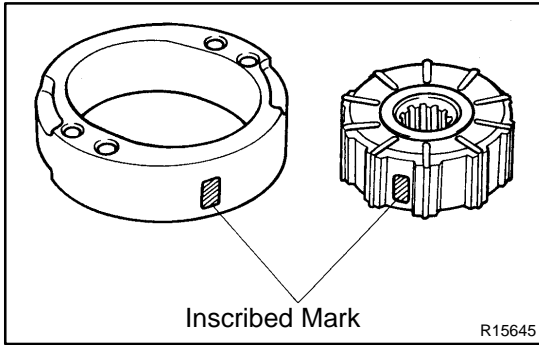
**Minimum thickness: 1.77 mm (0.0697 in.)**

**Minimum length: 14.97 mm (0.5894 in.)**



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

**Maximum clearance: 0.030 mm (0.0012 in.)**



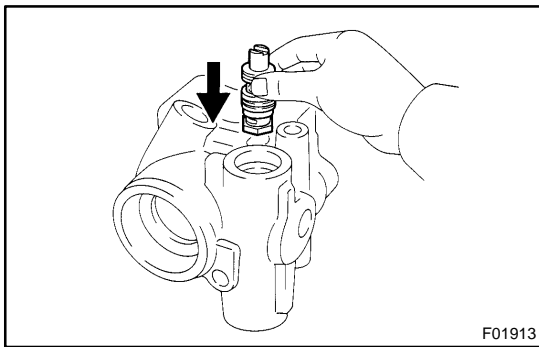
If it is more than the maximum, replace the vane plate and/or vane pump rotor with the one having the same mark stamped on the cam ring.

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

HINT:

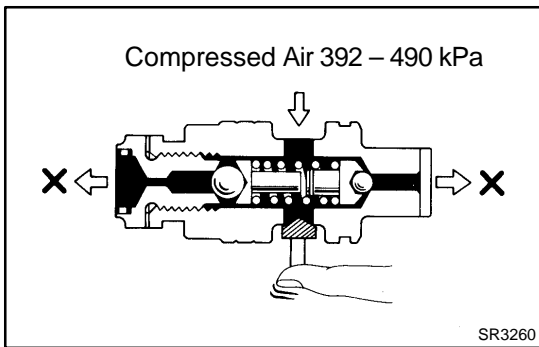
There are 5 vane plate lengths corresponding to the following vane pump rotor and cam ring marks:

Vane pump rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345-12010	14.996 – 14.998 (0.59039 – 0.59047)
1	44345-12020	14.994 – 14.996 (0.59032 – 0.59039)
2	44345-12030	14.992 – 14.994 (0.59024 – 0.59032)
3	44345-12040	14.990 – 14.992 (0.59016 – 0.59024)
4	44345-12050	14.988 – 14.990 (0.59008 – 0.59016)

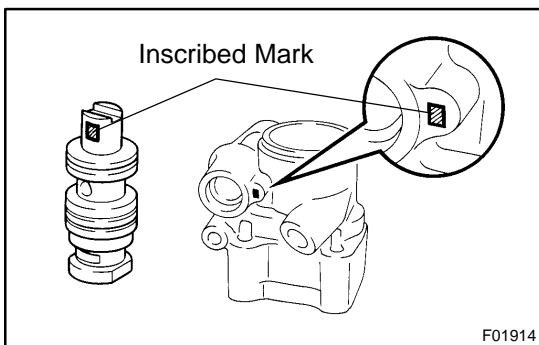


**3. INSPECT FLOW CONTROL VALVE**

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

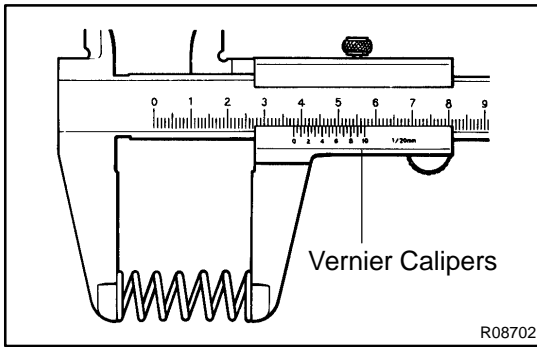


(b) Check the flow control valve for leakage. Close one of the holes and apply compressed air of 392 – 490 kPa (4 – 5 kgf/cm<sup>2</sup>, 57 – 71 psi) into the opposite side hole, and confirm that air does not come out from the end holes.



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

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

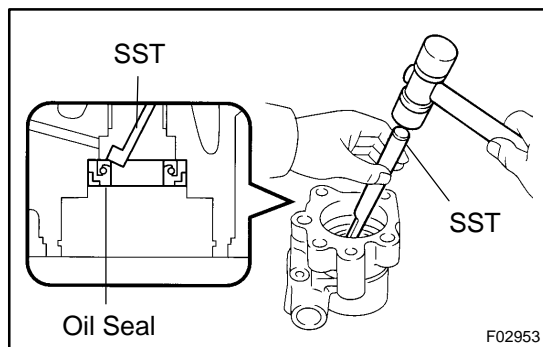


#### 4. INSPECT SPRING

Using vernier calipers, measure the free length of the spring.

**Minimum free length: 36.0 mm (1.417 in.)**

If it is not within the specification, replace the spring.



## REPLACEMENT

### NOTICE:

When using a vise, do not overtighten it.

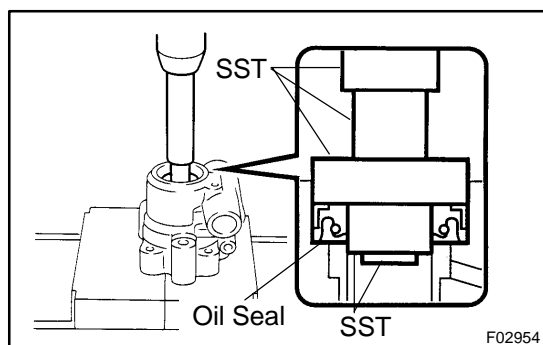
### 1. IF NECESSARY, REPLACE OIL SEAL

- (a) Using SST, tap out the oil seal.

SST 09631-10030

### NOTICE:

Be careful not to damage the front housing.



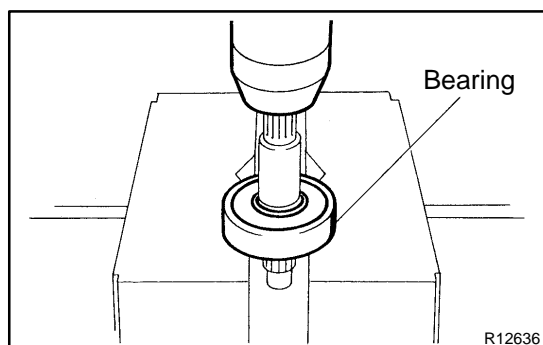
- (b) Coat a new oil seal lip with power steering fluid.

- (c) Using SST, press in the oil seal.

SST 09950-60010 (09951-00180, 09951-00300,  
09952-06010), 09950-70010 (09951-07100)

### NOTICE:

Make sure to install the oil seal facing in the correct direction.



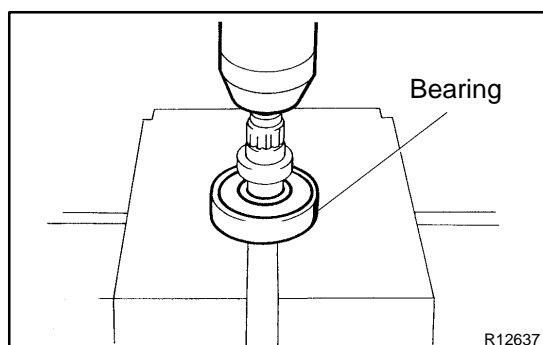
### 2. IF NECESSARY, REPLACE BEARING

- (a) Using a snap ring expander, remove the snap ring from the vane pump shaft.

### NOTICE:

Be careful not to damage the shaft.

- (b) Press out the bearing.



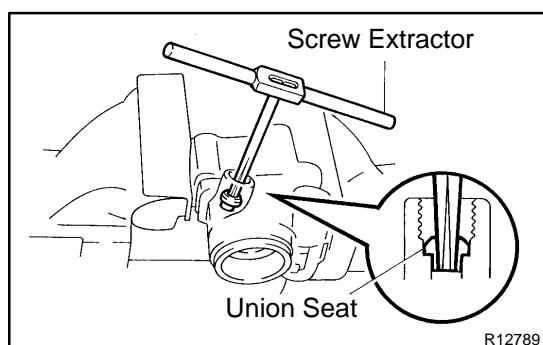
- (c) Coat a new bearing with power steering fluid.

- (d) Press in the bearing.

- (e) Using a snap ring expander, install a new snap ring.

### NOTICE:

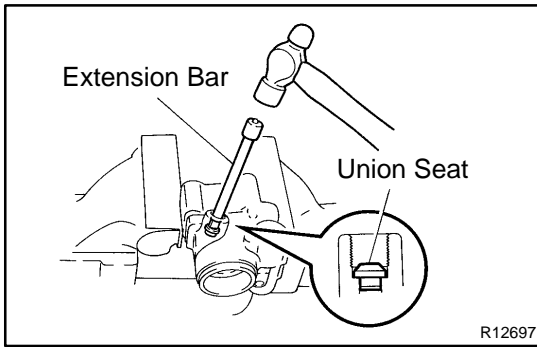
Be careful not to damage the shaft.



### 3. IF NECESSARY, REPLACE UNION SEAT

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

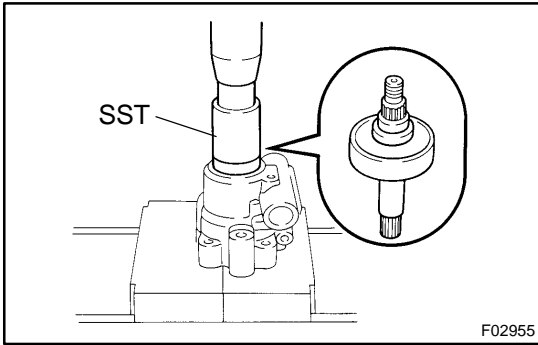




- (b) Using an extension bar and hammer, tap in a new union seat.

**NOTICE:**

**Before installing the union seat, remove dust sticking to the front housing.**



## REASSEMBLY

### NOTICE:

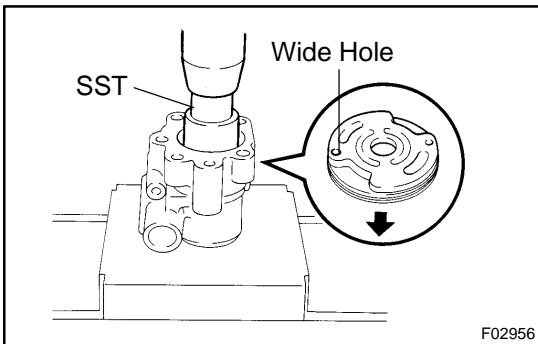
When using a vise, do not overtighten it.

1. **COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID (See page SR-25)**
2. **INSTALL VANE PUMP SHAFT WITH BEARING**
  - (a) Using SST, press in the vane pump shaft with the bearing. SST 09238-47012
  - (b) Using snap ring pliers, install a new snap ring to the front housing.
3. **INSTALL SIDE FRONT PLATE**
  - (a) Install a new longer straight pin to the front housing.

### NOTICE:

Be careful not to damage the pin.

- (b) Coat 2 new O-rings with power steering fluid and install them to the side front plate.



- (c) Using SST, press in the side front plate. SST 09238-47012

### NOTICE:

- ★ **Make sure to install the side front plate facing in the correct direction.**
- ★ **Be careful not to damage the O-ring.**

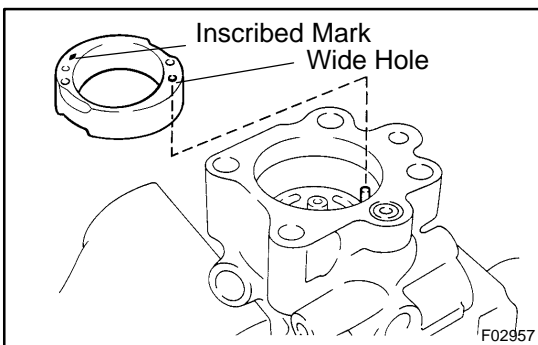
### HINT:

Align the wide hole of the side front plate and longer straight pin.

- (d) Install a new shorter straight pin to the side front plate.

### NOTICE:

Be careful not to damage the pin.

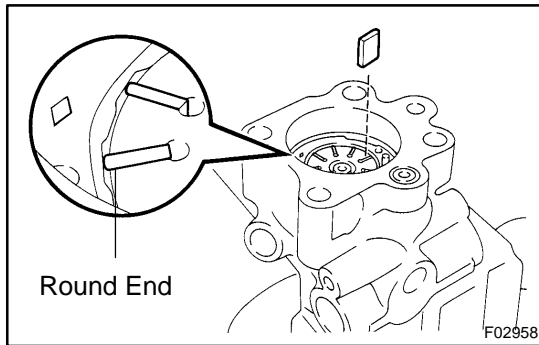


## 4. INSTALL CAM RING

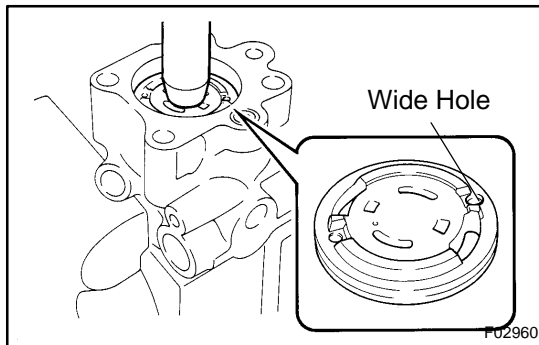
Align the wide hole of the cam ring and longer straight pin, and install the cam ring with the inscribed mark facing outward.

## 5. INSTALL VANE PUMP ROTOR

Install the vane pump rotor with the inscribed mark facing outward.

**6. INSTALL 10 VANE PLATES**

Install the 10 vane plates with the round end facing outward.

**7. INSTALL SIDE REAR PLATE**

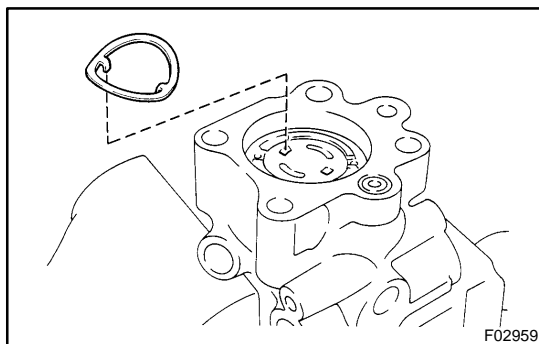
- (a) Coat a new O-ring with power steering fluid and install it to the side rear plate.
- (b) Press in the side rear plate.

**NOTICE:**

**Be careful not to damage the O-ring.**

**HINT:**

Align the wide hole of the side rear plate and longer straight pin.

**8. INSTALL WAVE WASHER**

Install the wave washer so that its protrusions fit into the slots in the side rear plate.

**9. INSTALL REAR BRACKET**

- (a) Coat a new O-ring with power steering fluid and install it to the rear bracket.
- (b) Install the rear bracket with the 4 bolts.

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

**10. INSTALL SPRING SEAT**

- (a) Coat a new O-ring with power steering fluid and install it to the spring seat.
- (b) Install the spring seat with the bolt hole facing outward.
- (c) Using snap ring pliers, install a new snap ring.

**11. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION**

- (a) Install the spring.
- (b) Install the flow control valve facing in the correct direction (See page [SR-25](#)).
- (c) Coat a new O-ring with power steering fluid and install it to the pressure port union.
- (d) Install the pressure port union.

**Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)**

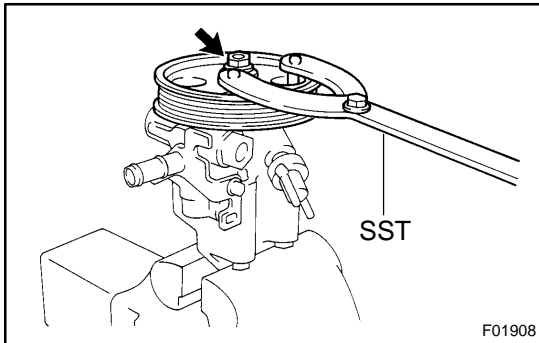
**12. INSTALL SUCTION PORT UNION**

- (a) Coat a new O-ring with power steering fluid and install it to the suction port union.
- (b) Install the suction port union with the 2 bolts.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

**13. INSTALL AIR CONTROL VALVE**

**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

**14. INSTALL VANE PUMP PULLEY**

- (a) Install the nut and vane pump pulley to the vane pump shaft.
- (b) Using SST, stop the pulley rotating and torque the nut.

SST 09960-10010 (09962-01000, 09963-01000)

**Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)**

**15. MEASURE PS VANE PUMP ROTATING TORQUE**

(See page [SR-28](#))

## INSTALLATION

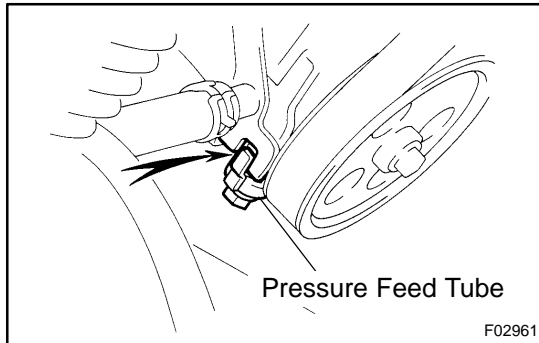
### 1. INSTALL PS VANE PUMP ASSEMBLY

Install the PS vane pump assembly with the 2 bolts and nut.

**Torque:**

**Bolt: 39 N·m (400 kgf·cm, 29 ft·lbf)**

**Nut: 43 N·m (440 kgf·cm, 32 ft·lbf)**



### 2. INSTALL PRESSURE FEED TUBE

Install a new gasket, then connect the pressure feed tube with the union bolt.

**Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)**

**HINT:**

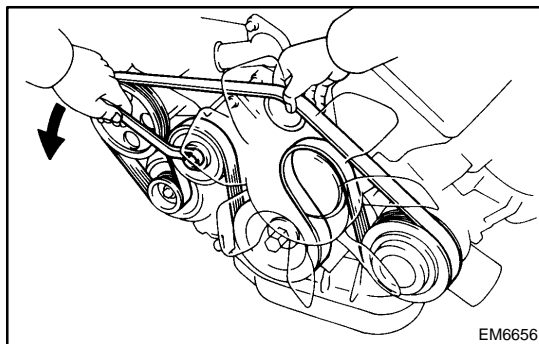
Make sure the stopper of the pressure feed tube touches the PS vane pump body as shown in the illustration, then torque the union bolt.

### 3. CONNECT RETURN HOSE

Connect the return hose with the clip.

### 4. CONNECT 2 VACUUM HOSES

Connect the 2 vacuum hoses with the 2 clips.



### 5. INSTALL DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and install the belt.

### 6. INSTALL BRAKE ACTUATOR ASSEMBLY

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

### 7. INSTALL AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Install the air cleaner assembly with air cleaner hose with the 3 bolts.

(b) Install the clamp.

(c) Connect the MAF meter connector.

### 8. INSTALL AIR CLEANER INLET AND BATTERY CLAMP COVER

Install the air cleaner inlet and battery clamp cover with the bolt.

### 9. INSTALL RH REAR ENGINE UNDER COVER

Install the RH rear engine under cover with the 3 bolts.

**10. INSTALL ENGINE UNDER COVER**

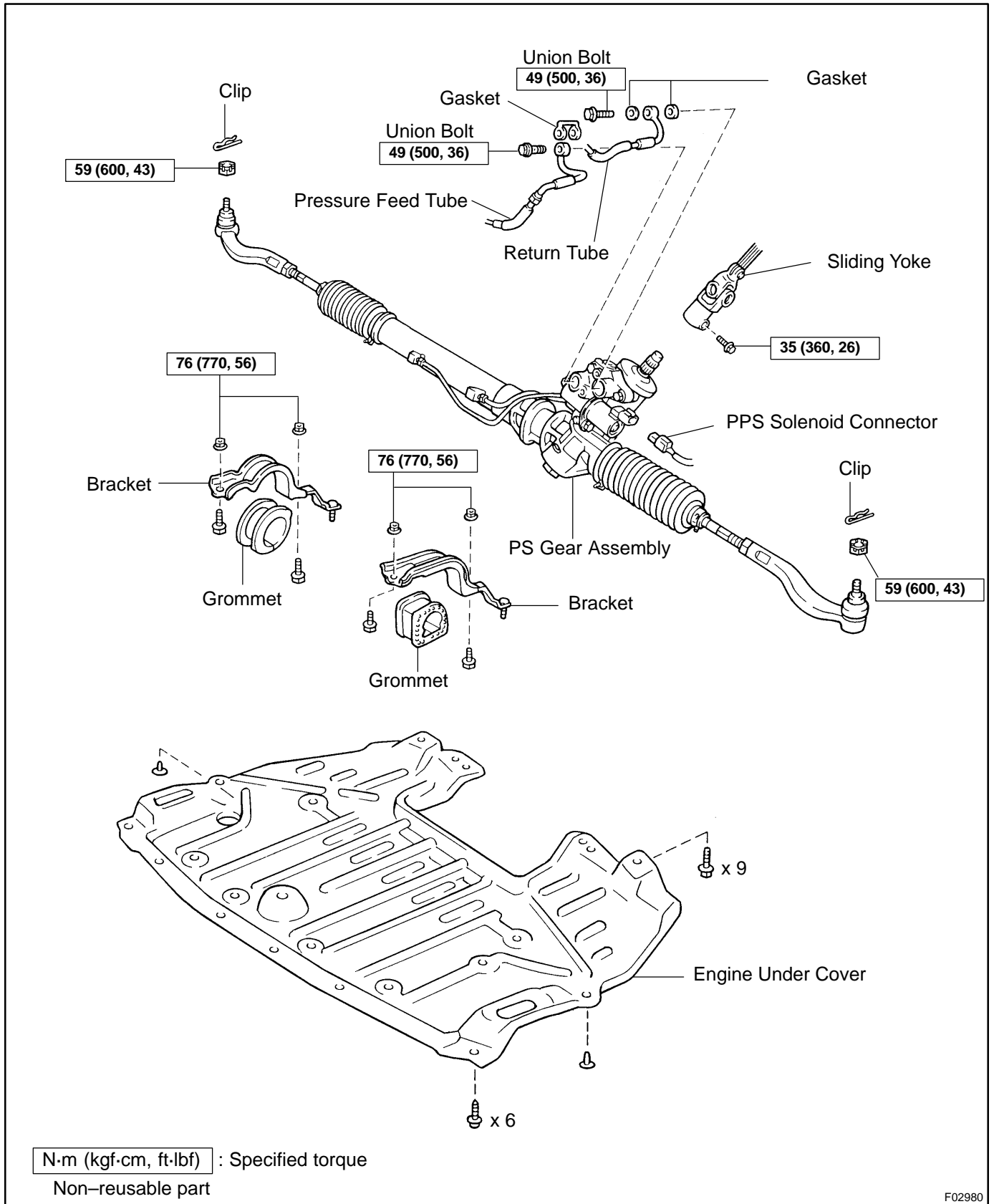
Install the engine under cover with the 9 bolts, 6 screws and 2 clips.

**11. BLEED POWER STEERING SYSTEM**

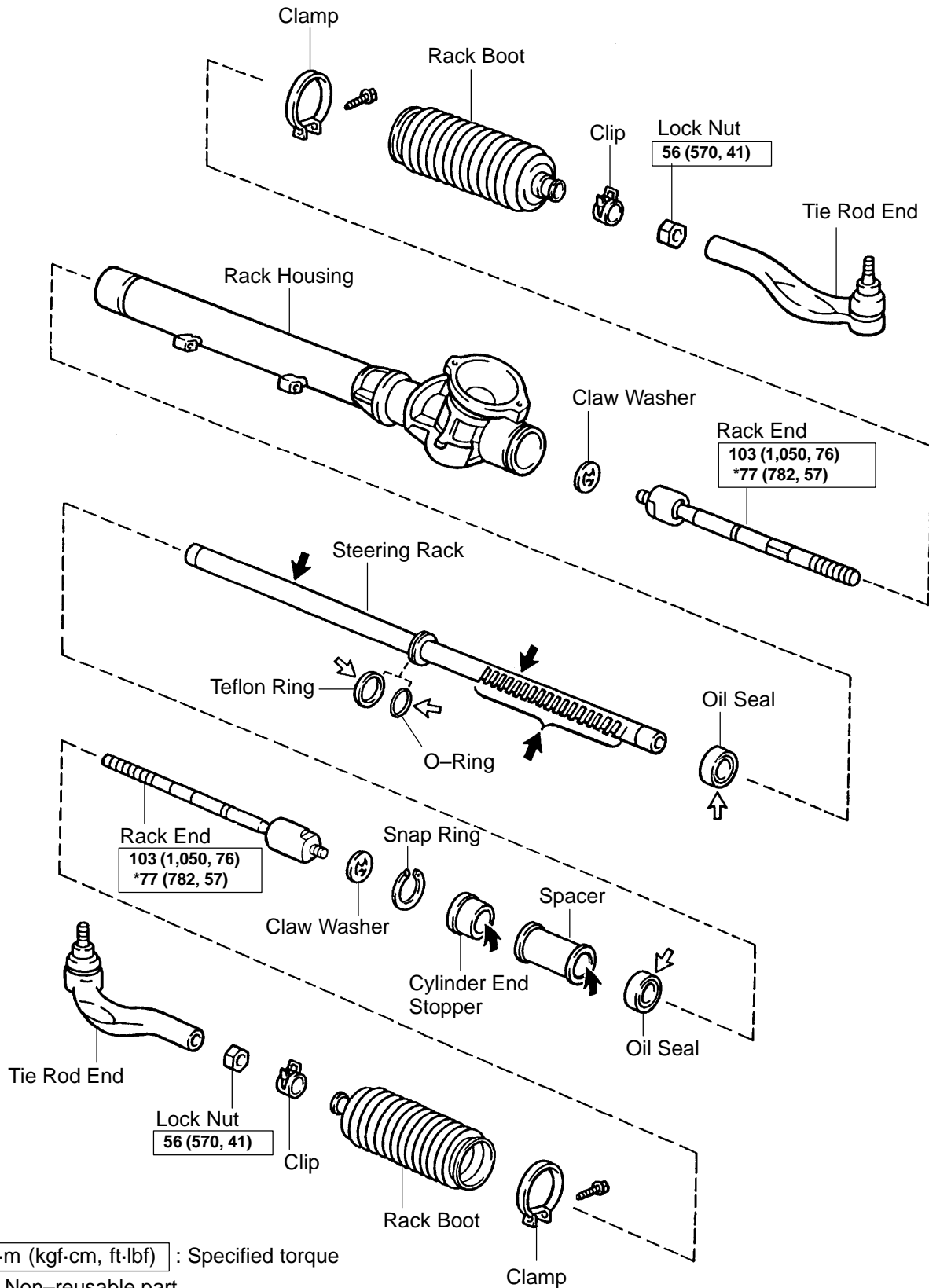
(See page [SR-4](#))

# POWER STEERING GEAR COMPONENTS

SROBW-03



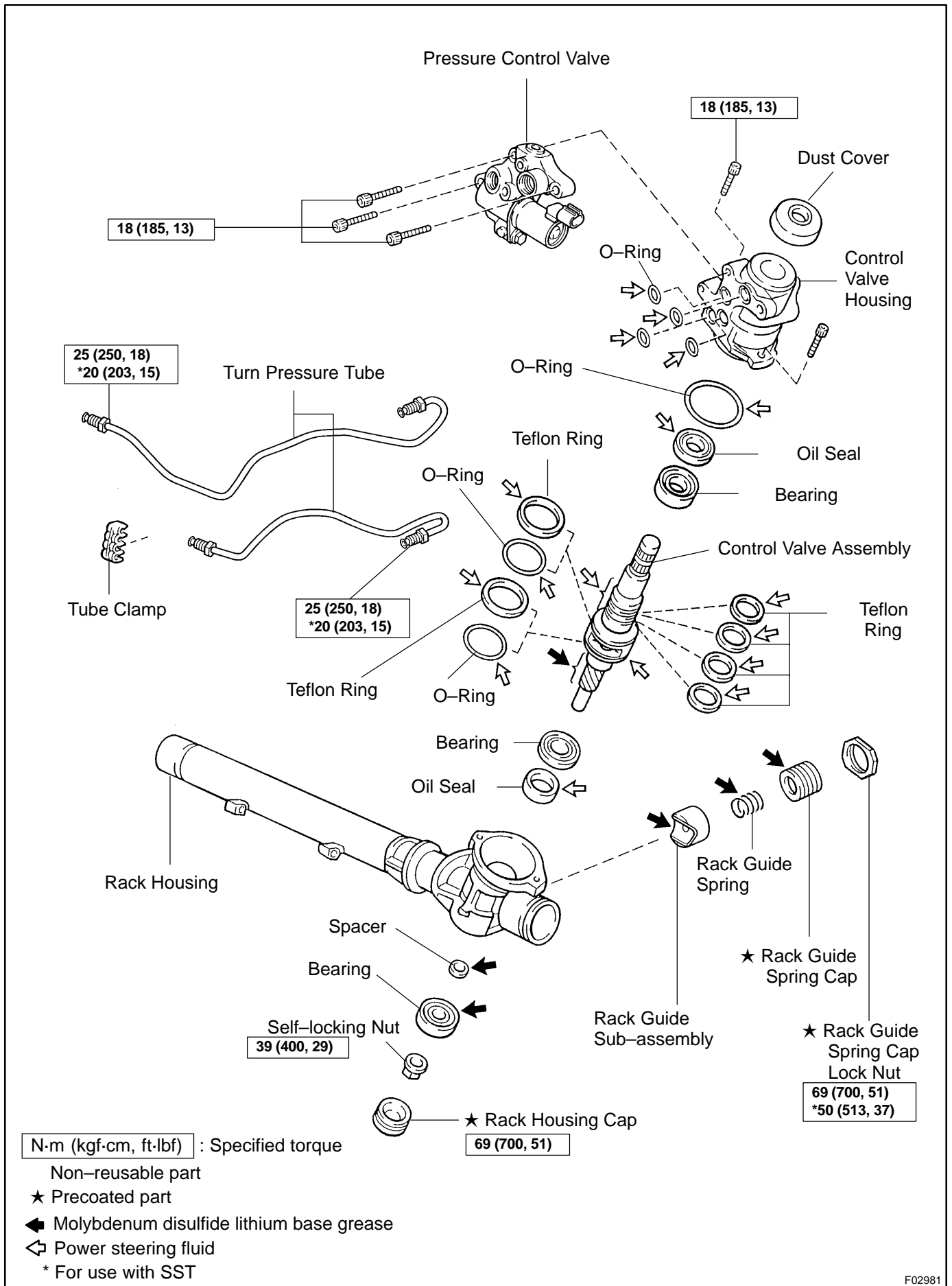
F02980



- N·m (kgf·cm, ft·lbf) : Specified torque
- Non-reusable part
- ◀ Molybdenum disulfide lithium base grease
- ↻ Power steering fluid
- \* For use with SST

F03831





F02981

## REMOVAL

### NOTICE:

Remove the steering wheel assembly before the steering gear removal, because there is possibility of breaking of the spiral cable.

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD
2. REMOVE STEERING WHEEL PAD (See page [SR-12](#))
3. REMOVE STEERING WHEEL (See page [SR-12](#))
4. REMOVE ENGINE UNDER COVER

Remove the 9 bolts, 6 screws, 2 clips and engine under cover.

5. DISCONNECT RH AND LH TIE ROD ENDS  
(See page [SA-41](#))

6. DISCONNECT SLIDING YOKE (See page [SR-12](#))

7. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket, and disconnect the pressure feed tube.

8. DISCONNECT RETURN TUBE

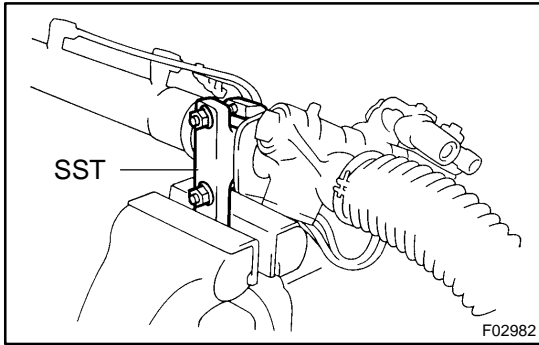
Remove the union bolt and 2 gaskets, and disconnect the return tube.

9. REMOVE PS GEAR ASSEMBLY

- (a) Disconnect the PPS solenoid connector.
- (b) Remove the 4 mount bolts and nuts.
- (c) Remove the 2 brackets, 2 grommets and PS gear assembly.

### NOTICE:

Do not damage the turn pressure tubes.



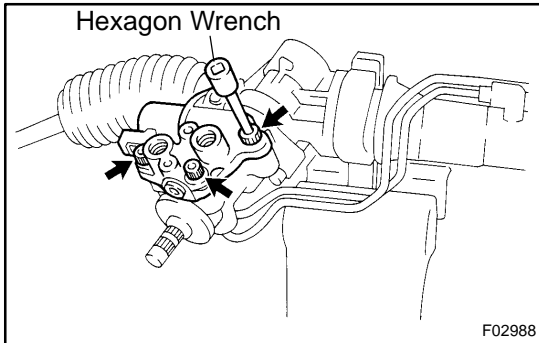
## DISASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

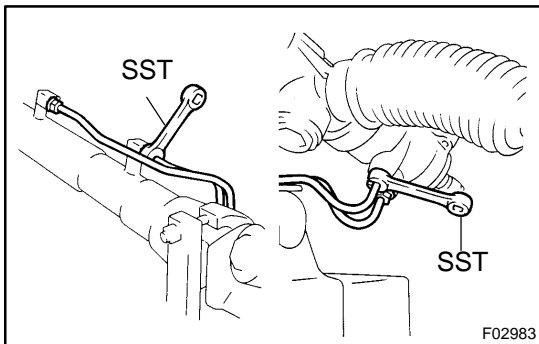
#### 1. SECURE PS GEAR ASSEMBLY IN VISE

- (a) Using SST, secure the PS gear assembly in a vise<sup>GR0BY-03</sup>  
SST 09612-00012
- (b) Remove the tube clamp.



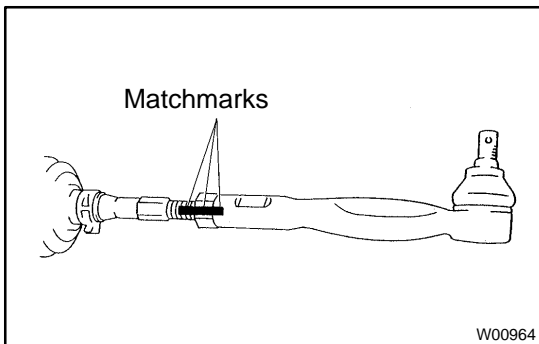
#### 2. REMOVE PRESSURE CONTROL VALVE

- (a) Using a hexagon wrench (6 mm), remove the 3 bolts and pressure control valve.
- (b) Remove the 4 O-rings from the pressure control valve.



#### 3. REMOVE 2 TURN PRESSURE TUBES

Using SST, remove the 2 turn pressure tubes.  
SST 09633-00020



#### 4. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

- (a) Place matchmarks on the tie rod end and rack end.
- (b) Loosen the lock nut and remove the tie rod end and lock nut.
- (c) Employ the same manner described above to the other side.

#### 5. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

- (a) Remove the screw and loosen the clamp.

### NOTICE:

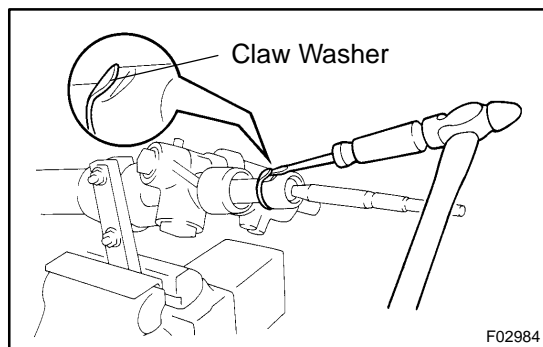
Be careful not to damage the boot.

- (b) Remove the clip and rack boot.

### HINT:

Mark the RH and LH rack boots.

- (c) Employ the same manner described above to the other side.

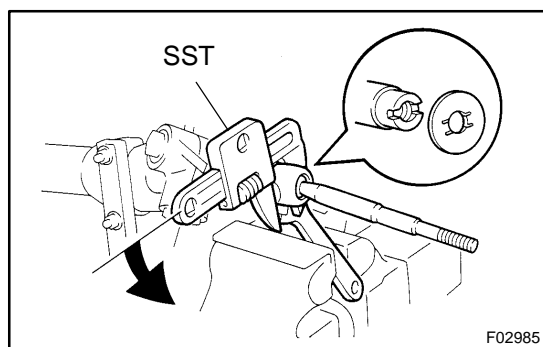


## 6. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

- (a) Using a screwdriver and hammer, unstake the washer.

**NOTICE:**

**Avoid any impact on the steering rack.**



- (b) Using a wrench, hold the steering rack steadily and using SST, remove the rack end.

SST 09922-10010

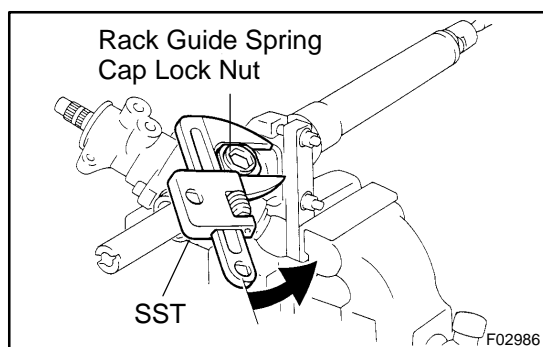
**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

**HINT:**

Mark the RH and LH rack ends.

- (c) Remove the claw washer.  
 (d) Employ the same manner described above to the other side.



## 7. REMOVE RACK GUIDE SPRING CAP LOCK NUT

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

SST 09922-10010

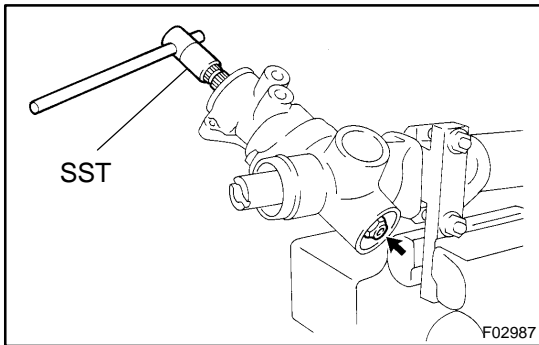
**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

## 8. REMOVE RACK GUIDE SPRING CAP, RACK GUIDE SPRING, RACK GUIDE SUB-ASSEMBLY

- (a) Using a hexagon wrench (24 mm), remove the rack guide spring cap.  
 (b) Remove the rack guide spring and rack guide sub-assembly.

## 9. REMOVE RACK HOUSING CAP

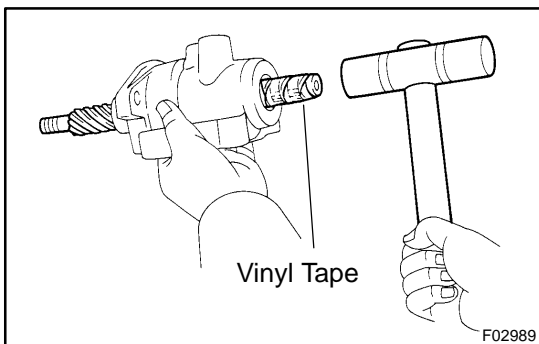
**10. REMOVE SELF-LOCKING NUT**

Using SST, stop the control valve shaft rotating and remove the self-locking nut.

SST 09616-00010

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

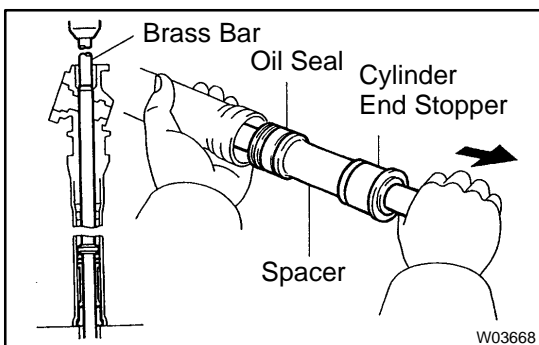
- (a) Using a hexagon wrench (6 mm), remove the 2 bolts.
- (b) Pull out the control valve housing with control valve assembly.
- (c) Remove the O-ring from the valve housing.

**13. REMOVE CONTROL VALVE ASSEMBLY**

- (a) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.
- (b) Using a plastic hammer, tap out the control valve assembly.

**14. REMOVE BEARING AND SPACER**

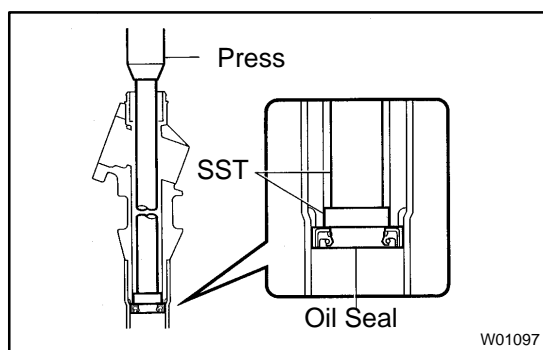
Remove the bearing and spacer from the rack housing.

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

- (a) Using snap ring pliers, remove the snap ring from the rack housing.
- (b) Using a brass bar, press the steering rack until the cylinder end stopper slightly touches the press block.
- (c) Pull out the steering rack with the cylinder end stopper, spacer and oil seal.

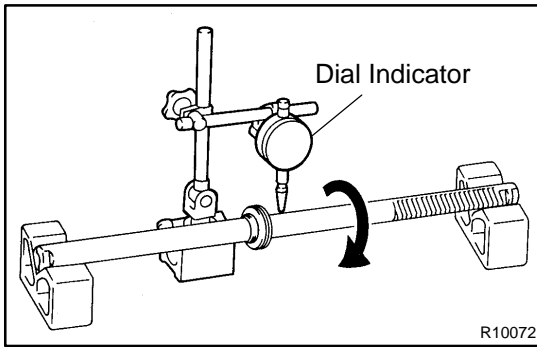
**HINT:**

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

**16. REMOVE OIL SEAL**

Using SST, press out the oil seal.

SST 09950-60010 (09951-00310),  
09950-70010 (09951-07360)



## INSPECTION

### NOTICE:

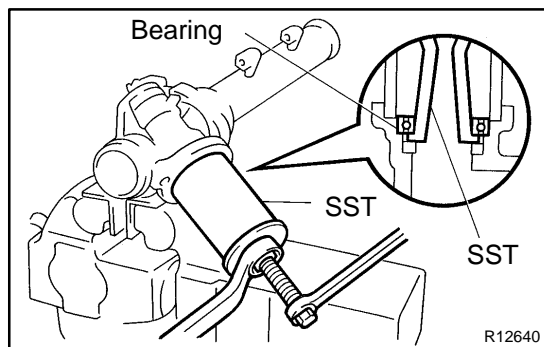
**When using a vise, do not overtighten it.**

### INSPECT STEERING RACK

- (a) Using a dial indicator, check the rack for runout and for teeth wear and damage.

**Maximum runout: 0.30 mm (0.0118 in.)**

- (b) Check the back surface for wear and damage.



## REPLACEMENT

### NOTICE:

When using a vise, do not overtighten it.

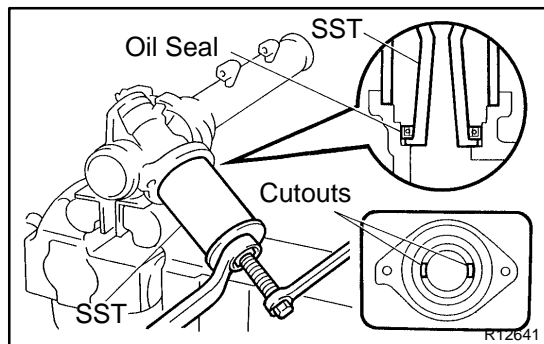
### 1. IF NECESSARY, REPLACE BEARING AND OIL SEAL

(a) Using SST, remove the bearing from the rack housing.

SST 09612-30012

### NOTICE:

Be careful not to damage the rack housing.



(b) Using SST, remove the oil seal from the rack housing.

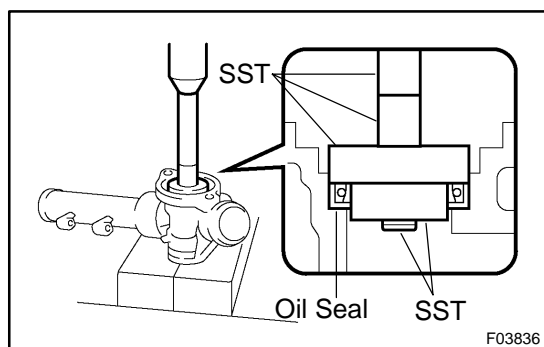
SST 09612-30012

### NOTICE:

Be careful not to damage the rack housing.

### HINT:

When using SST, apply the tips of SST to the cutouts in the rack housing.



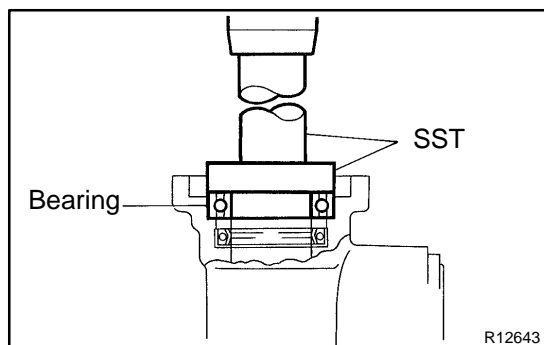
(c) Coat a new oil seal lip with power steering fluid.

(d) Using SST, press in the oil seal.

SST 09950-60010 (09951-00280, 09951-00400,  
09952-06010), 09950-70010 (09951-07100)

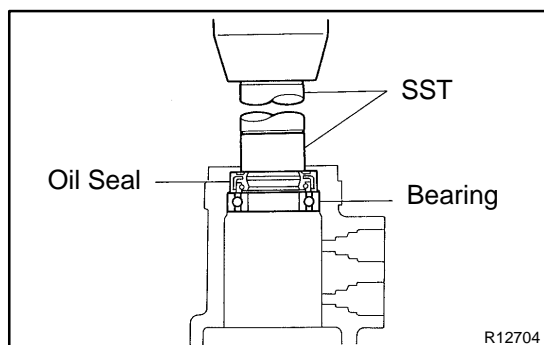
### NOTICE:

Make sure to install the oil seal facing in the correct direction.



(e) Using SST, press in a new bearing.

SST 09950-60010 (09951-00460),  
09950-70010 (09951-07100)

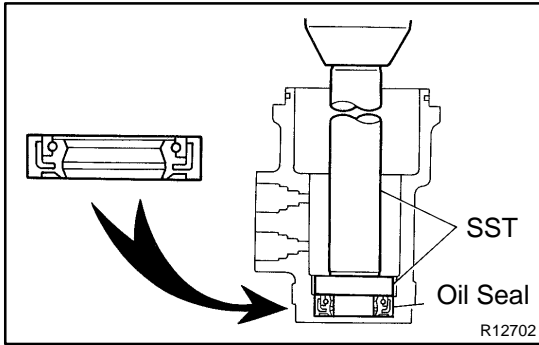


### 2. IF NECESSARY, REPLACE BEARING AND OIL SEAL

(a) Using SST, press out the oil seal and bearing from the control valve housing.

SST 09950-60010 (09951-00240),  
09950-70010 (09951-07100)

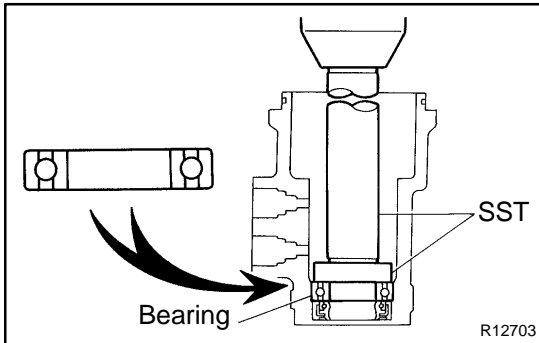




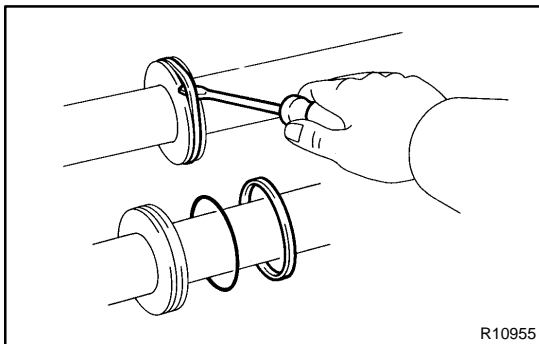
- (b) Coat a new oil seal lip with power steering fluid.
- (c) Using SST, press in the oil seal.  
SST 09950-60010 (09951-00320),  
09950-70010 (09951-07200)

**NOTICE:**

**Make sure to install the oil seal facing in the correct direction.**



- (d) Using SST, press in a new bearing.  
SST 09950-60010 (09951-00340),  
09950-70010 (09951-07200)



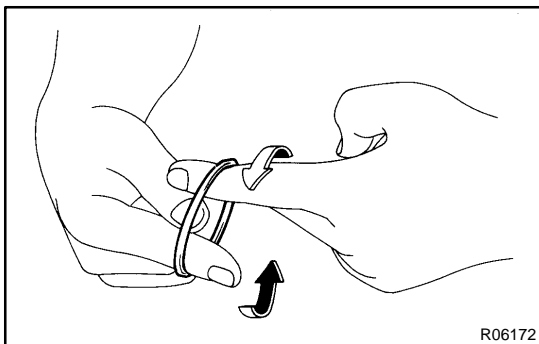
**3. IF NECESSARY, REPLACE TEFLON RING AND O-RING**

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

**NOTICE:**

**Be careful not to damage the groove for the ring.**

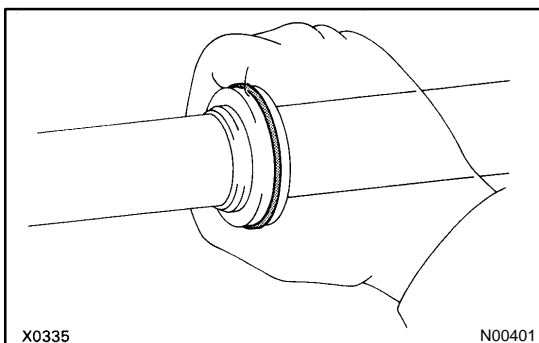
- (b) Coat a new O-ring with power steering fluid and install it to the steering rack.



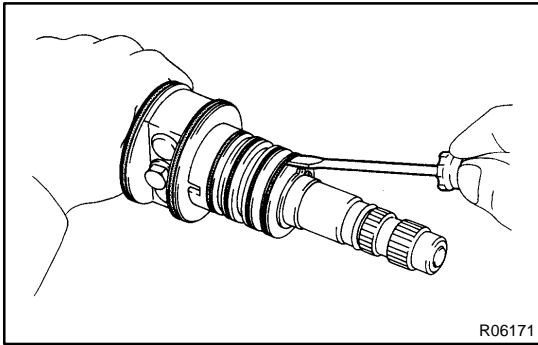
- (c) Expand a new teflon ring with your fingers.

**NOTICE:**

**Be careful not to overexpand the teflon ring.**



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



#### 4. IF NECESSARY, REPLACE TEFLON RINGS

- (a) Using a screwdriver, remove the 4 teflon rings from the control valve assembly.

#### NOTICE:

**Be careful not to damage the grooves for the ring.**

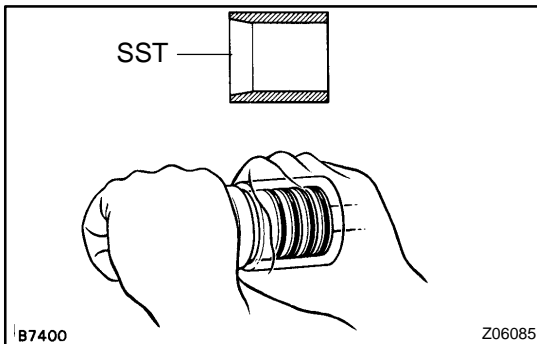
- (b) Expand 4 new teflon rings with your fingers.

#### NOTICE:

**Be careful not to overexpand the teflon rings.**

- (c) Coat the teflon rings with power steering fluid.

- (d) Install the teflon rings to the control valve assembly, and settle them down with your fingers.

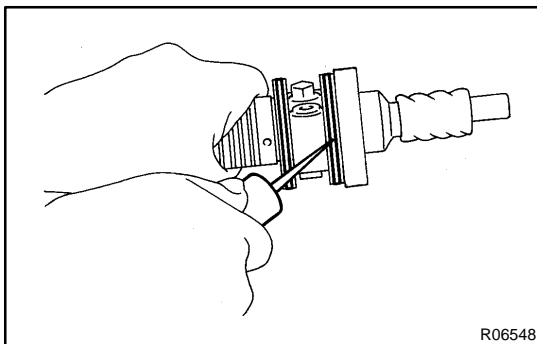


- (e) Carefully slide the tapered end of SST over the teflon rings until they fit to the control valve assembly.

SST 09631-20081

#### NOTICE:

**Be careful not to damage the teflon rings.**



#### 5. IF NECESSARY, REPLACE TEFLON RINGS AND O-RINGS

- (a) Using a screwdriver, remove the 2 teflon rings and O-rings from the control valve assembly.

#### NOTICE:

**Be careful not to damage the grooves for the ring.**

- (b) Coat 2 new O-rings with power steering fluid and install them to the control valve assembly.

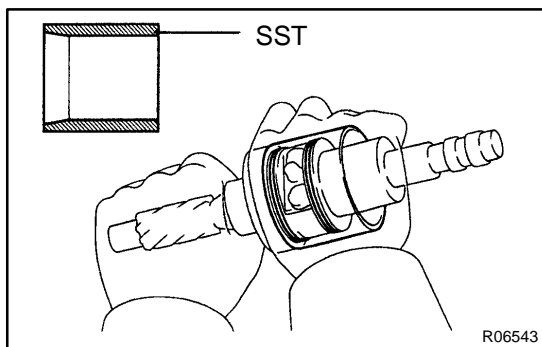
- (c) Expand 2 new teflon rings with your fingers.

#### NOTICE:

**Be careful not to overexpand the teflon rings.**

- (d) Coat the teflon rings with power steering fluid.

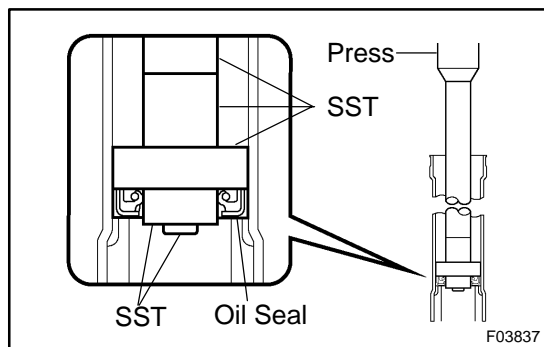
- (e) Install the teflon rings to the control valve assembly, and settle them down with your fingers.



- (f) Carefully slide the tapered end of SST over the rings until they fit to the control valve assembly.  
SST 09631-32020

**NOTICE:**

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



## REASSEMBLY

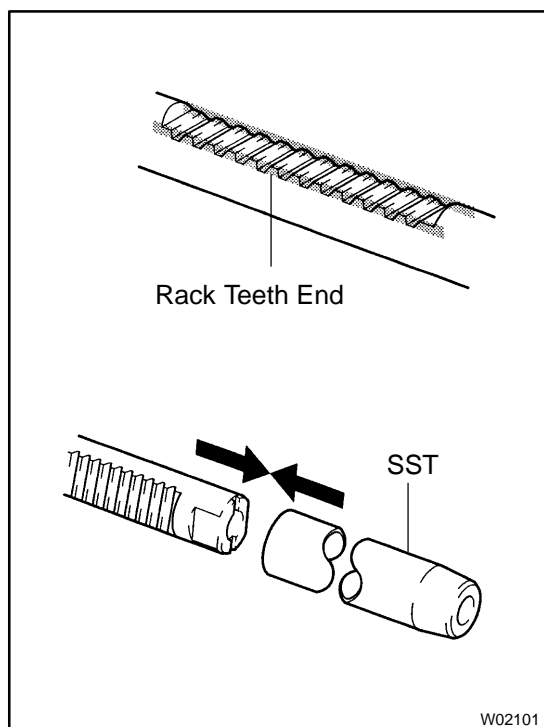
### NOTICE:

When using a vise, do not overtighten it.

1. **COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR-40)**
2. **INSTALL OIL SEAL**
  - (a) Coat a new oil seal lip with power steering fluid.
  - (b) Using SST, press in the oil seal.  
SST 09950-60010 (09951-00240, 09951-00430, 09952-06010), 09950-70010 (09951-07360)

### NOTICE:

- ★ **Make sure to install the oil seal facing in the correct direction.**
- ★ **Take care that the oil seal does not get reversed as you install it.**



### 3. INSTALL STEERING RACK

- (a) Install SST to the steering rack.  
SST 09631-20102

#### HINT:

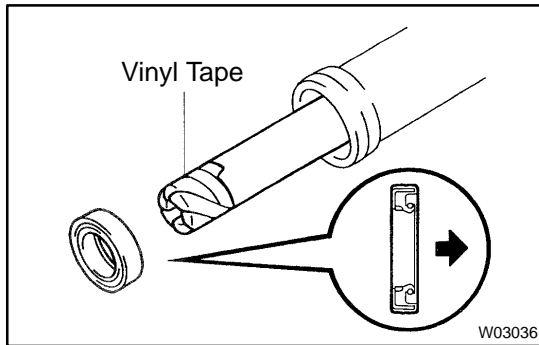
If necessary, scrape the burrs off the rack teeth end and bur-nish.

- (b) Coat SST with power steering fluid.
- (c) Install the steering rack into the rack housing.

### NOTICE:

**Be careful not to damage the oil seal lip.**

- (d) Remove the SST.  
SST 09631-20102

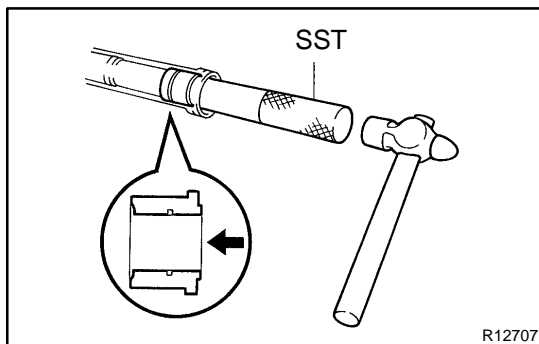


#### 4. INSTALL OIL SEAL AND SPACER

- Coat a new oil seal lip with power steering fluid.
- To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
- Install the oil seal by pushing it into the rack housing without tilting.

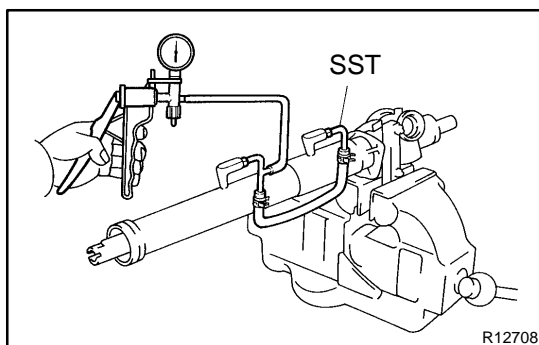
#### NOTICE:

- ★ **Make sure to install the oil seal facing in the correct direction.**
  - ★ **Be careful not to damage the oil seal lip.**
- Install the spacer.



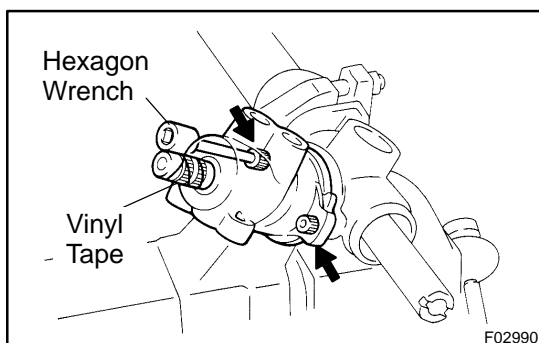
#### 5. INSTALL CYLINDER END STOPPER

- Using SST and a hammer, drive in the cylinder end stopper.  
SST 09612-22011
- Using snap ring pliers, install the snap ring.



#### 6. AIR TIGHTNESS TEST

- Install SST to the rack housing.  
SST 09631-12071
  - Apply 53 kPa (400 mmHg, 15.75 in.Hg) of vacuum for about 30 seconds.
  - Check that there is no change in the vacuum.
- If there is change in the vacuum, check the installation of the oil seals.



#### 7. INSTALL CONTROL VALVE ASSEMBLY

- Coat the teflon rings of the control valve assembly with power steering fluid.
- To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.
- Install the control valve assembly into the control valve housing.

#### NOTICE:

**Be careful not to damage the teflon rings and oil seal.**

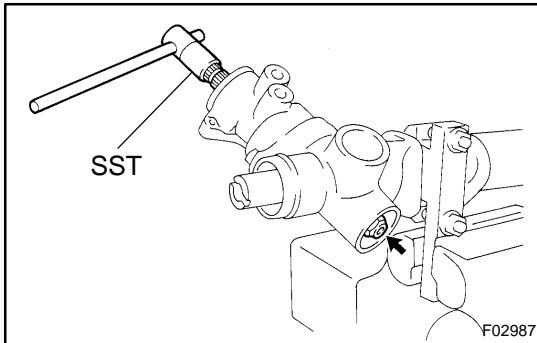
**8. INSTALL CONTROL VALVE HOUSING**

- (a) Coat a new O-ring with power steering fluid and install it to the control valve housing.
- (b) Using a hexagon wrench (6 mm), install the control valve housing with the 2 bolts.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**

**9. INSTALL DUST COVER****10. INSTALL BEARING AND SPACER**

Install the spacer and a new bearing to the rack housing.

**11. INSTALL SELF-LOCKING NUT**

Using SST, stop the control valve shaft rotating and install a new self-locking nut.

SST 09616-00010

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

**12. INSTALL RACK HOUSING CAP**

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

**Sealant:**

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

- (b) Install the rack housing cap.

**Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)**

**13. INSTALL RACK GUIDE SUB-ASSEMBLY, RACK GUIDE SPRING AND RACK GUIDE SPRING CAP**

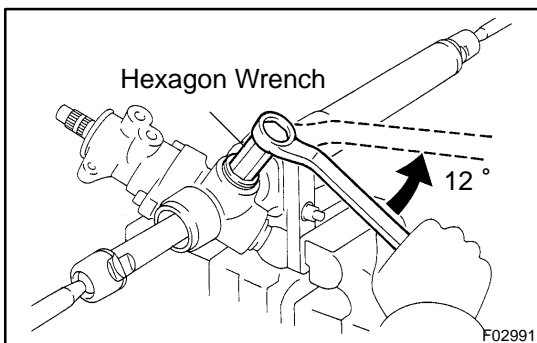
- (a) Install the rack guide sub-assembly and rack guide spring.

- (b) Apply sealant to 2 or 3 threads of the rack guide spring cap.

**Sealant:**

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

- (c) Temporarily install the rack guide spring cap.

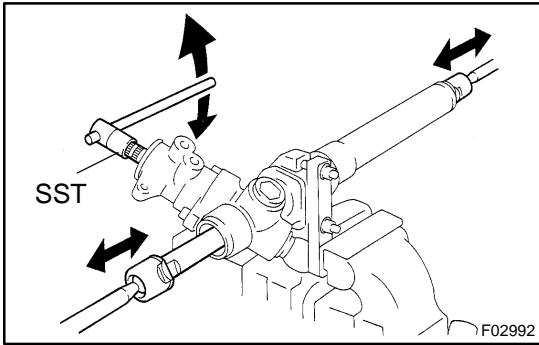
**14. ADJUST TOTAL PRELOAD**

- (a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

- (b) Using a hexagon wrench (24 mm), torque the rack guide spring cap.

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

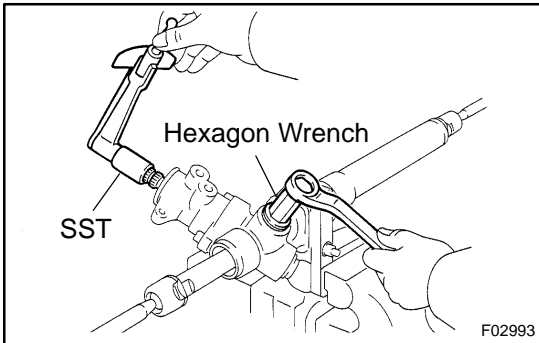
- (c) Using a hexagon wrench (24 mm), return the rack guide spring cap 12°.



(d) Using SST, turn the control valve shaft right and left 1 or 2 times.

SST 09616-00010

(e) Using a hexagon wrench (24 mm), loosen the rack guide spring cap until the rack guide spring is not functioning.



(f) Using SST, a torque wrench and hexagon wrench (24 mm), tighten the rack guide spring cap until the preload is within specification.

SST 09616-00010

**Preload (turning):**

**0.9 - 1.2 N·m (9 - 12 kgf·cm, 7.8 - 10.4 in.-lbf)**

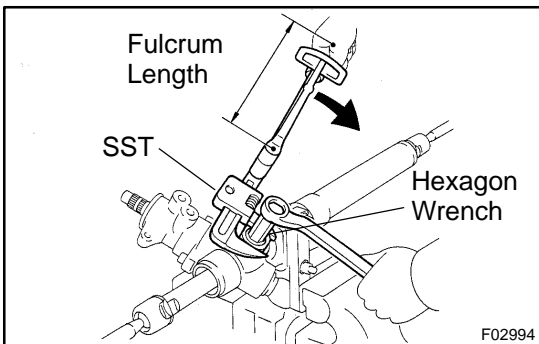
**15. INSTALL RACK GUIDE SPRING CAP LOCK NUT**

(a) Apply sealant to 2 or 3 threads of the rack guide spring cap lock nut.

**Sealant:**

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

(b) Temporarily install the rack guide spring cap lock nut.



(c) Using a hexagon wrench (24 mm), hold the rack guide spring cap and using SST, torque the rack guide spring cap lock nut.

SST 09922-10010

**Torque: 50 N·m (513 kgf·cm, 37 ft·lbf)**

**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

**HINT:**

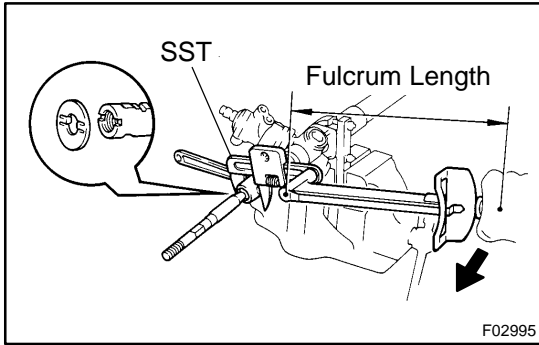
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

(d) Recheck the total preload.

**Preload (turning):**

**0.9 - 1.2 N·m (9 - 12 kgf·cm, 7.8 - 10.4 in.-lbf)**

(e) Remove the RH and LH rack ends.



**16. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS**

- (a) Install a new claw washer, and temporarily install the rack end.

**HINT:**

Align the claws of the washer with the steering rack grooves.

- (b) Using a wrench, hold the steering rack steadily and using SST, torque the rack end.

SST 09922-10010

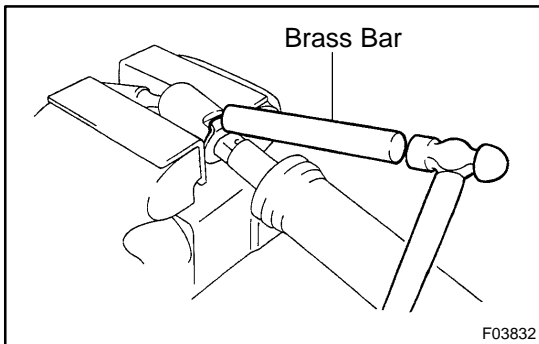
**Torque: 77 N·m (782 kgf-cm, 57 ft-lbf)**

**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

**HINT:**

Use a torque wrench with a fulcrum length of 380 mm (14.96 in.).

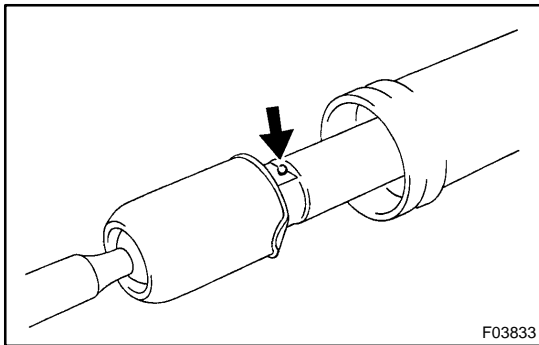


- (c) Using a brass bar and hammer, stake the washer.

**NOTICE:**

**Avoid any impact on the steering rack.**

- (d) Employ the same manner described above to the other side.



**17. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS**

- (a) Ensure that the steering rack hole is not clogged with grease.

**HINT:**

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

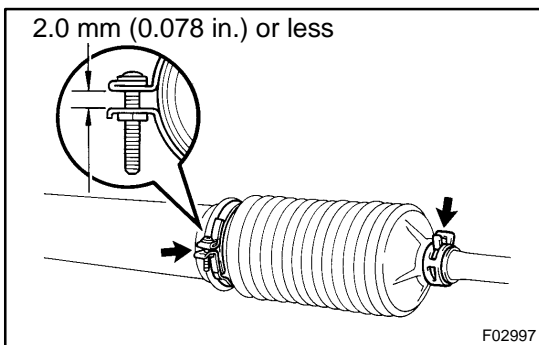
- (b) Install the boot, clip and clamp.

**NOTICE:**

**Be careful not to damage or twist the boot.**

- (c) Tighten the clamp with the screw as shown in the illustration.

- (d) Employ the same manner described above to the other side.



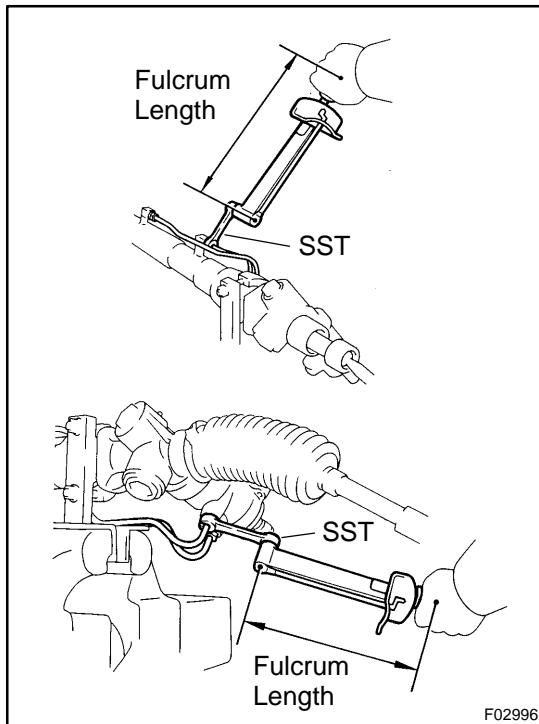


**18. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS**

- (a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.
- (b) After adjusting toe-in, torque the nut  
(See page SA-5).

**Torque: 56 N·m (570 kgf-cm, 41 ft-lbf)**

- (c) Employ the same manner described above to the other side.

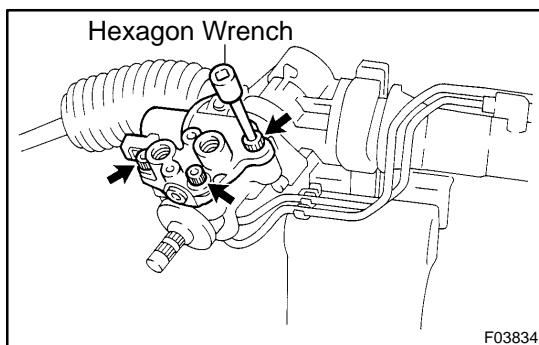
**19. INSTALL 2 TURN PRESSURE TUBES**

- (a) Using SST, install the 2 turn pressure tubes.  
SST 09633-00020

**Torque: 20 N·m (203 kgf-cm, 15 ft-lbf)**

**HINT:**

- ★ Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
  - ★ This torque value is effective in case that SST is parallel to a torque wrench.
- (b) Install the tube clamp.

**20. INSTALL PRESSURE CONTROL VALVE**

- (a) Coat 4 new O-rings with power steering fluid and install them to the pressure control valve.
- (b) Using hexagon wrench (6 mm), install the pressure control valve with the 3 bolts.

**Torque: 18 N·m (185 kgf-cm, 13 ft-lbf)**

## INSTALLATION

### 1. INSTALL PS GEAR ASSEMBLY

- (a) Install the PS gear assembly, 2 grommets and 2 brackets.

#### NOTICE:

**Do not damage the turn pressure tubes.**

- (b) Install the 4 mount bolts and nuts.

**Torque: 76 N·m (770 kgf-cm, 56 ft-lbf)**

- (c) Connect the PPS solenoid connector.

### 2. CONNECT PRESSURE FEED TUBE

Install a new gasket, then connect the pressure feed tube with the union bolt.

**Torque: 49 N·m (500 kgf-cm, 36 ft-lbf)**

### 3. CONNECT RETURN TUBE

Install new gasket on each side of the return tube and connect the return tube with the union bolt.

**Torque: 49 N·m (500 kgf-cm, 36 ft-lbf)**

### 4. CONNECT SLIDING YOKE (See page [SR-23](#))

### 5. CONNECT RH AND LH TIE ROD ENDS

(See page [SA-43](#))

### 6. INSTALL ENGINE UNDER COVER

Install the engine under cover with the 9 bolts, 6 screws and 2 clips.

### 7. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

#### HINT:

Do it with the front of the vehicle jacked up.

### 8. CENTER SPIRAL CABLE (See page [SR-23](#))

### 9. INSTALL STEERING WHEEL

- (a) Align the matchmarks on the steering wheel and main shaft.

- (b) Temporarily tighten the wheel set nut.

- (c) Connect the connector.

### 10. BLEED POWER STEERING SYSTEM

(See page [SR-4](#))

### 11. CHECK STEERING WHEEL CENTER POINT

### 12. TORQUE STEERING WHEEL SET NUT

**Torque: 35 N·m (360 kgf-cm, 26 ft-lbf)**

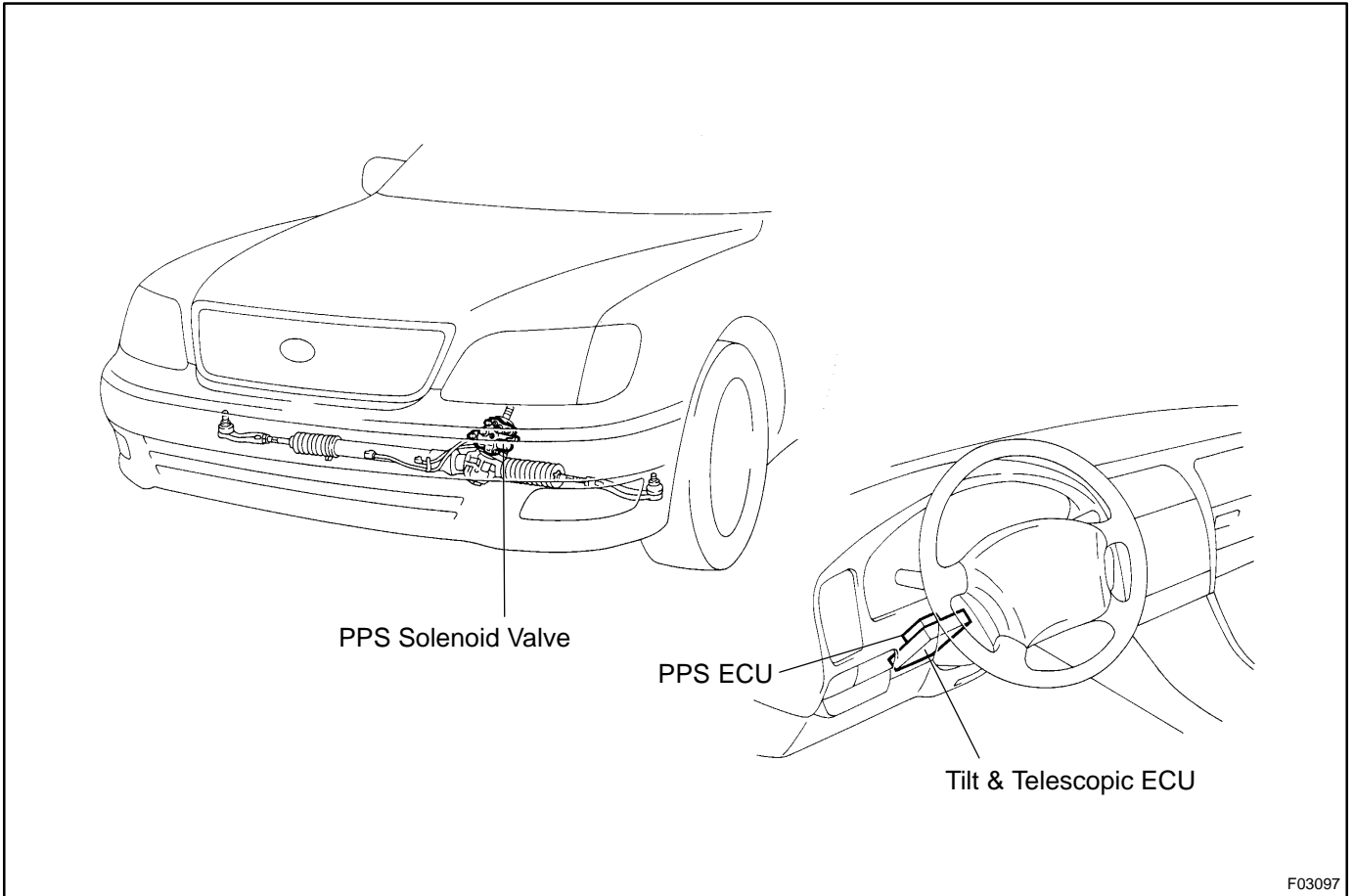
### 13. INSTALL STEERING WHEEL PAD (See page [SR-23](#))

### 14. CHECK FRONT WHEEL ALIGNMENT

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

# PROGRESSIVE POWER STEERING (PPS) LOCATION

SROC2-03

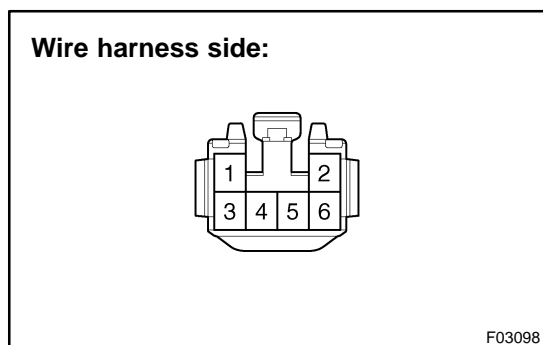


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## INSPECTION

### NOTICE:

- ★ When jacking or lifting up vehicles which have air suspension and running the engine, connect terminals T<sub>D</sub> and E<sub>1</sub> of DLC 2 before starting the inspection (See page SA-1).
- ★ When replacing PPS ECU, be careful not to also replace tilt and telescopic ECU.

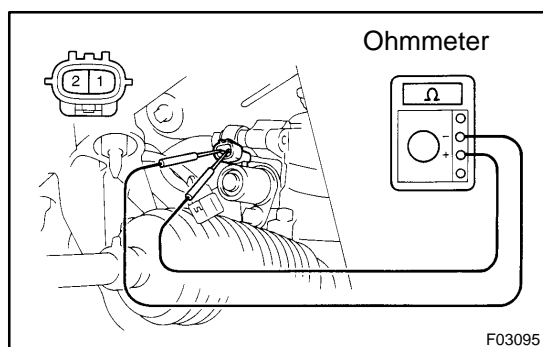


1. **INSPECT ECU-IG FUSE (Instrument panel J/B)**  
(See page BE-23)
2. **INSPECT PPS ECU CIRCUIT**
  - (a) Disconnect the PPS ECU connector.
  - (b) Inspect the connector on wire harness side, as shown in the illustration.

Tester connection	Condition	Specified condition
4 – Body ground	Ignition switch ON	Battery positive voltage
6 – Body ground	Ignition switch ON	Continuity
*5 – 6	Ignition switch ON. Spin the rear wheel on one side with jacking or lifting UP.	0 → ∞ → 0 → ∞ →

If the circuit is not as specified, check and replace the wire harness.

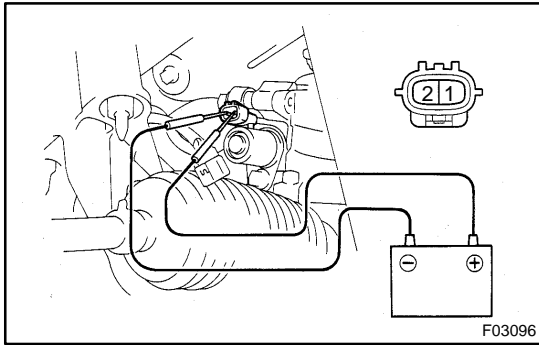
\*If the circuit is not as specified, inspect the speed sensor.



3. **INSPECT PPS SOLENOID VALVE**
  - (a) Disconnect the PPS solenoid connector.
  - (b) Measure the resistance between the terminals of the solenoid 1 and 2.

**Resistance: 6 – 11 Ω**

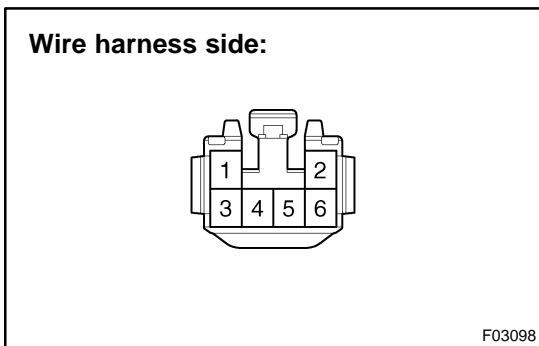
If it is not as specified, replace the pressure control valve with the solenoid valve.



- (c) Check the PPS solenoid operation.
    - (1) Connect the battery positive terminal to the solenoid terminal 1.
    - (2) Connect the battery negative terminal to the solenoid terminal 2.
    - (3) Check that the solenoid makes a "clicks" sound.
- If it is faulty, replace the pressure control valve with the solenoid valve.

**NOTICE:**

- ★ Do not apply voltage for more than 30 seconds to avoid burning out the solenoid.
  - ★ If repeating this step, wait until the solenoid cools down enough that it can be touched by hand.
- (d) Connect the PPS solenoid connector.

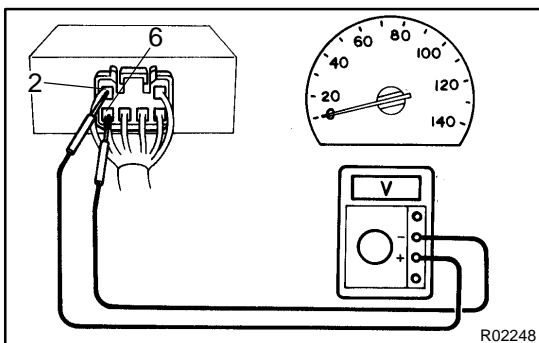


- (e) Inspect the PPS solenoid valve circuit.
  - (1) Disconnect the PPS ECU connector.
  - (2) Check continuity between the terminals of the connector on wire harness side, as shown in the illustration.

Tester connection	Specified condition
1 – 6	No continuity
2 – 6	No continuity

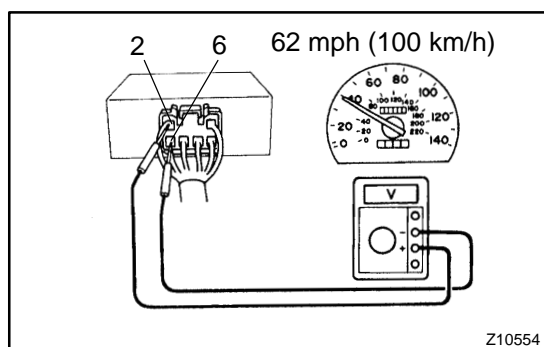
If it is not as specified, repair or replace wire harness or connector.

- (3) Connect the PPS ECU connector.



**4. INSPECT PPS ECU**

- (a) Jack up the vehicle and support it on stands.
  - (b) Start the engine.
  - (c) Measure the voltage of ECU.
    - (1) Using a voltmeter, measure the voltage between ECU terminals 2 and 6 while the engine is idling.
- Standard voltage: 0.33 – 0.43 V**



- (2) Place the transmission in gear and while running at about 62 mph (100 km/h), measure the voltage between ECU terminals 2 and 6.

**Standard voltage: 0.12 – 0.25 V**

If no voltage, try another ECU for LEXUS LS400.

- (d) Lower the vehicle.