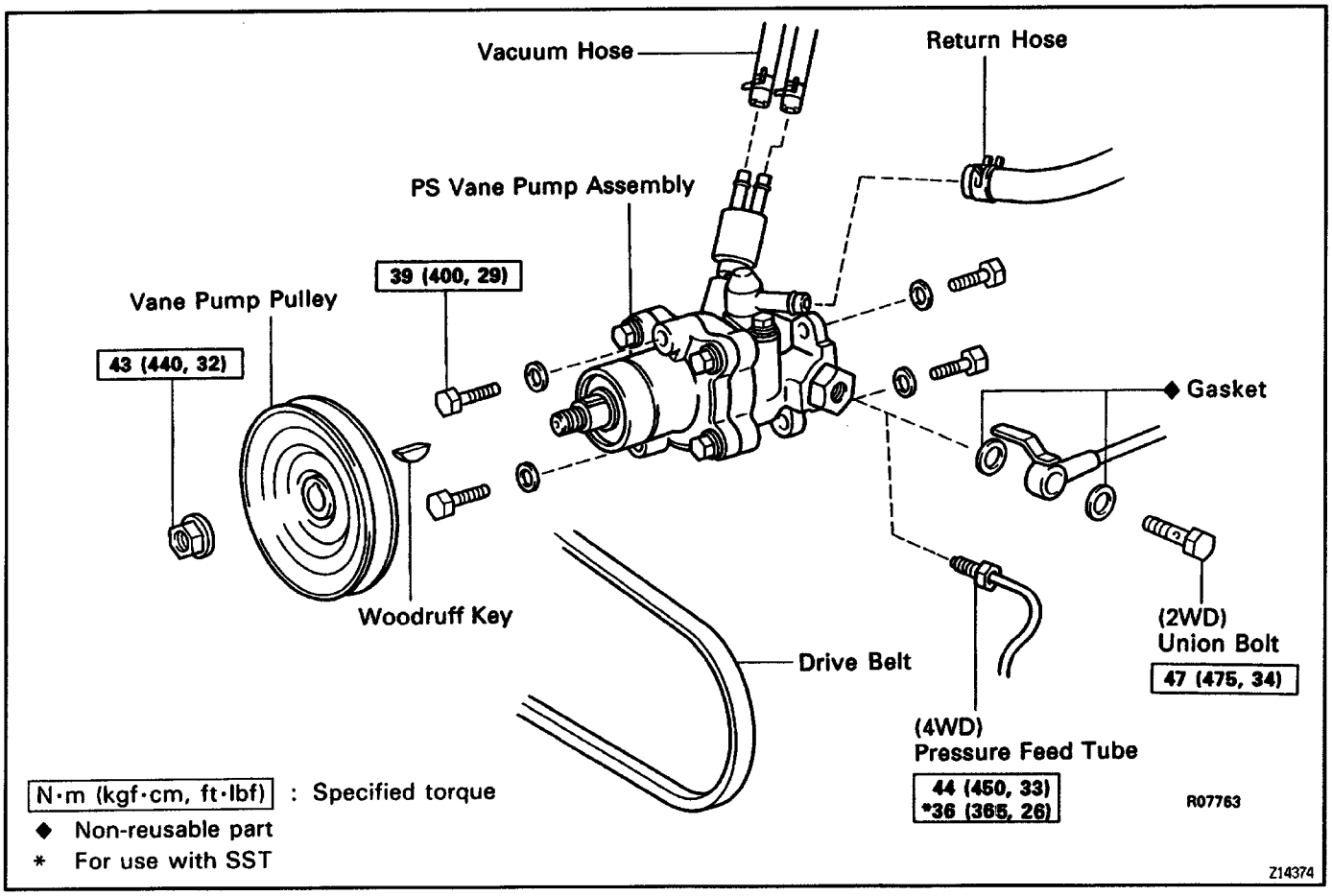
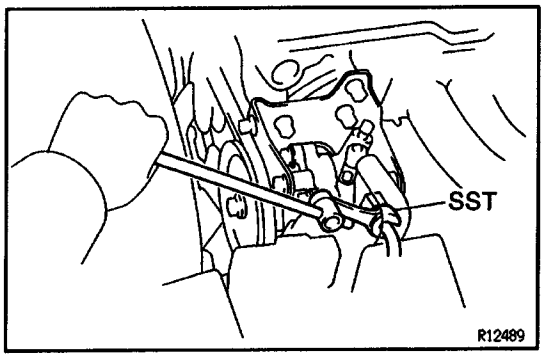
POWER STEERING VANE PUMP (22R–E)

POWER STEERING VANE PUMP REMOVAL AND INSTALLATION

Remove and install the parts, as shown.





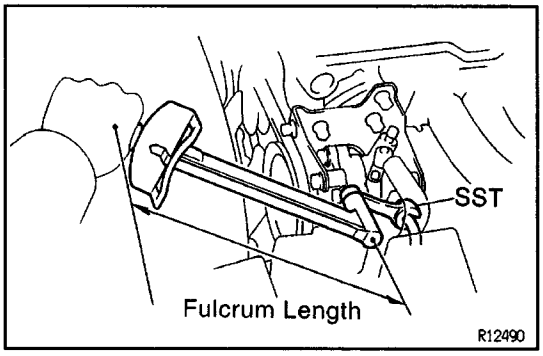
MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT PRESSURE FEED TUBE

4WD:

Using SST, disconnect and connect the pressure feed tube from/to the PS vane pump.

SST 09631–22020



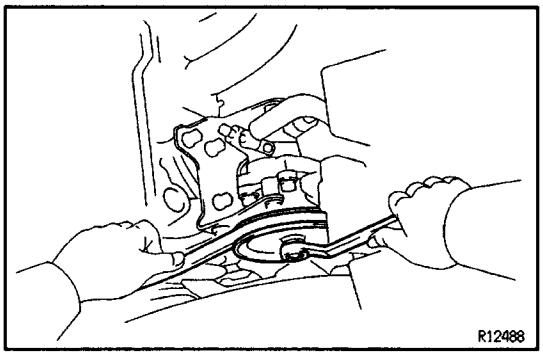
Torque: 36 N–m (365 kgf–cm, 26 ft–lbf)

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

2WD:

Torque the union bolt with a new gasket on each side of the pressure feed tube.

Torque: 47 N–m (475 kgf–cm, 34 ft–lbf)



2. REMOVE AND INSTALL VANE PUMP PULLEY

Push on the drive belt with your hand to hold the pulley in place and loosen/torque the pulley nut.

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

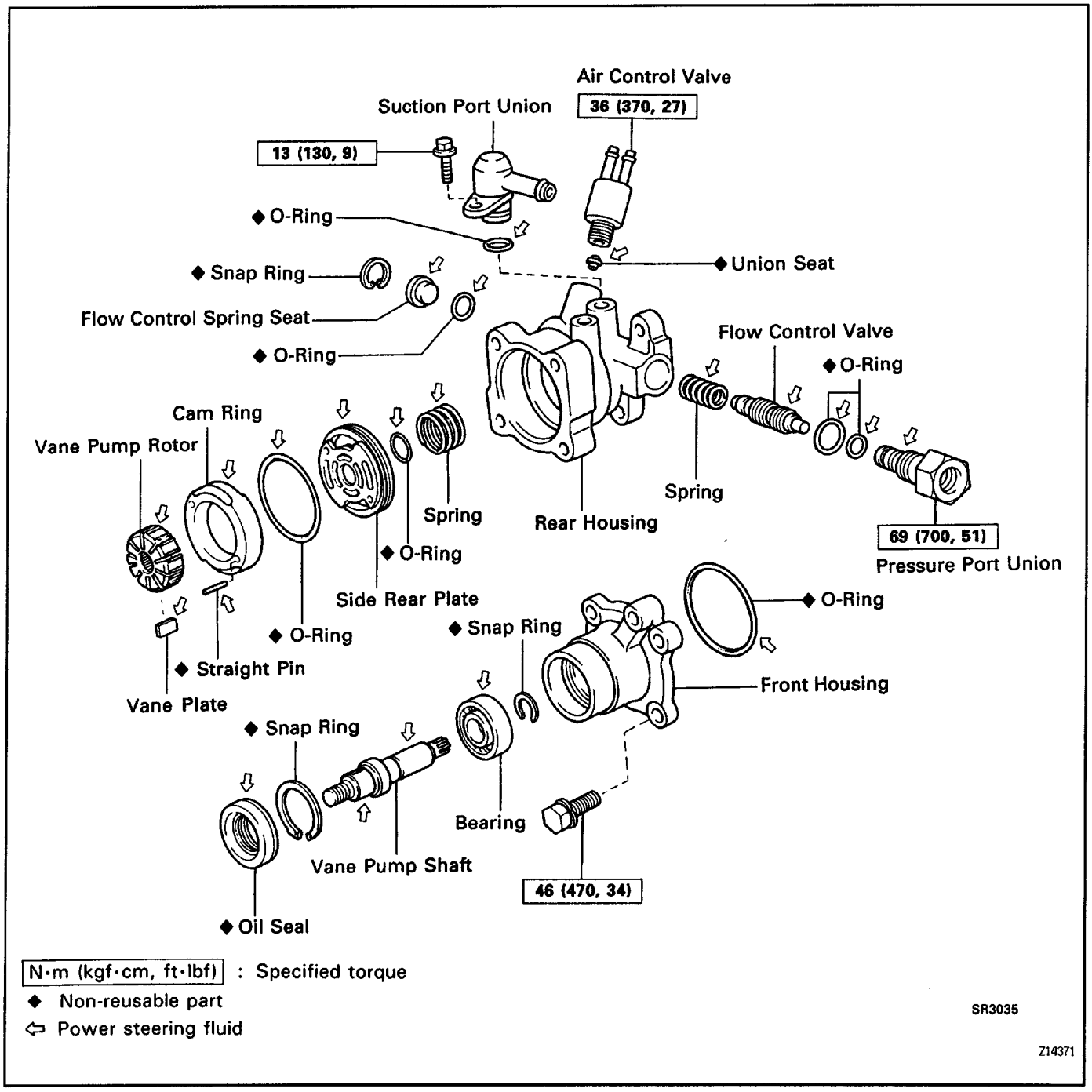
3. ADJUST DRIVE BELT TENSION AFTER INSTALLING PS VANE PUMP ASSEMBLY

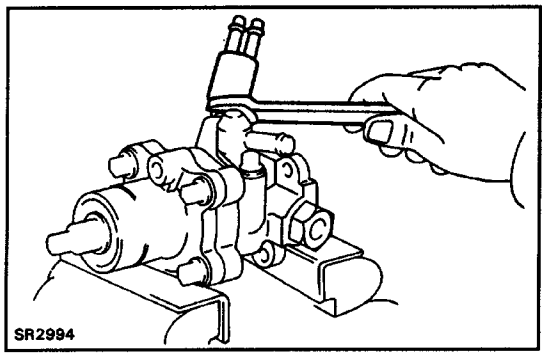
(See page SR–29)

4. BLEED POWER STEERING SYSTEM

(See page SR–31)

COMPONENTS





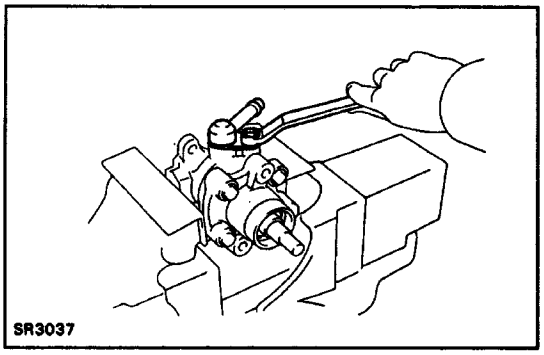
POWER STEERING VANE PUMP DISASSEMBLY

NOTICE: When using a vise, do not overtighten it.

1. REMOVE AIR CONTROL VALVE

(a) Remove the air control valve.

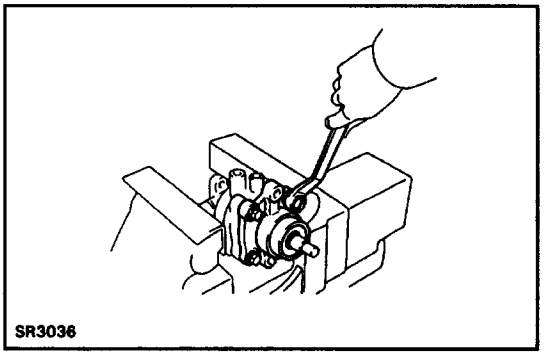
(b) Remove the union seat.



2. REMOVE SUCTION PORT UNION

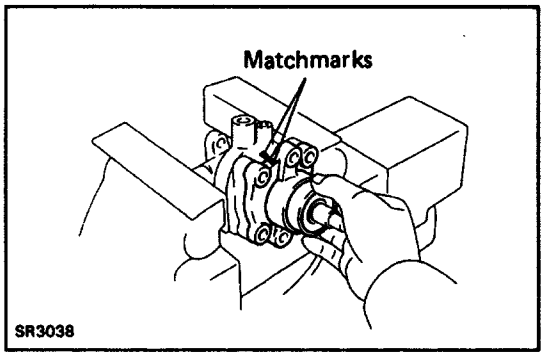
(a) Remove the bolt and union.

(b) Remove the O–ring from the union.



3. REMOVE FRONT HOUSING

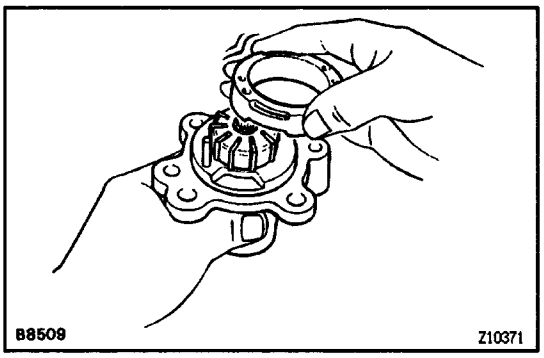
(a) Remove the 4 bolts.



(b) Place matchmarks on the front and rear housing.

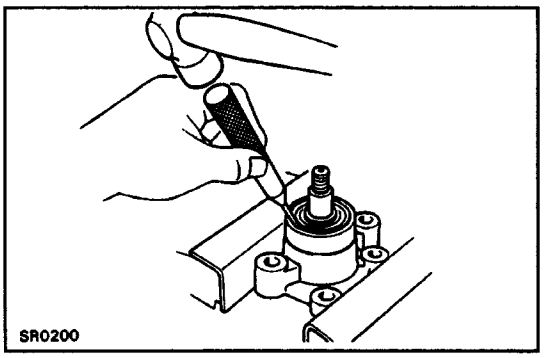
(c) Using a plastic hammer, tap off the front housing.

NOTICE: Be careful that the vane plates, rotor and cam ring do not fall out.



4. REMOVE CAM RING, VANE PUMP ROTOR AND 10 VANE PLATES

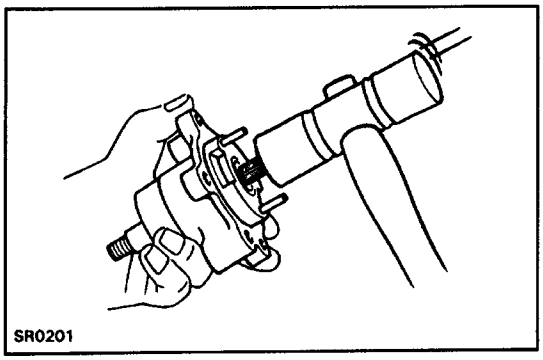
NOTICE: Be careful not to scratch the cam ring, rotor or vane plates.



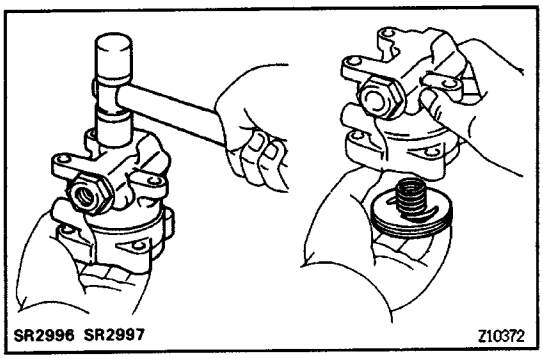
5. REMOVE VANE PUMP SHAFT

(a) Using a chisel and hammer, pry off the oil seal.

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

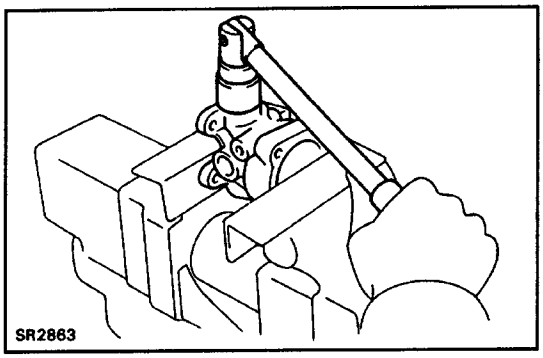


(c) Using a plastic hammer, tap out the rotor from the front housing.



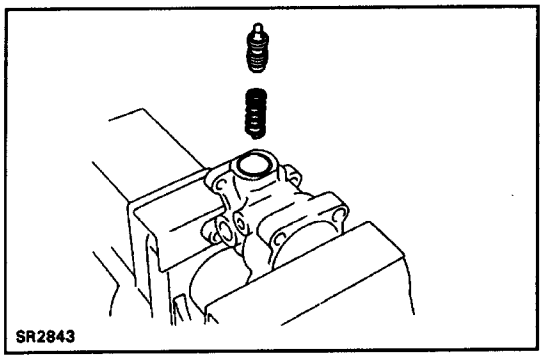
6. REMOVE SIDE REAR PLATE AND SPRING

Using a plastic hammer, tap the bottom end of the rear housing, and remove the plate and spring.

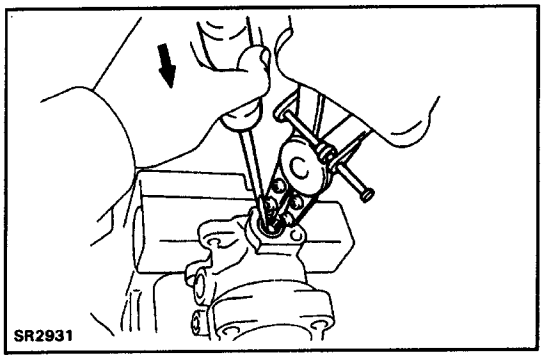


7. REMOVE PRESSURE PORT UNION

(a) Remove the pressure port union.
(b) Remove the 2 O–rings from the union.

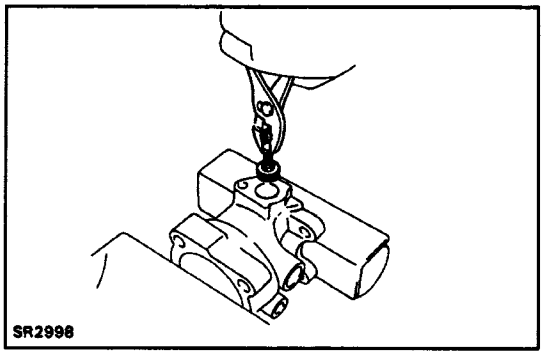


(c) Remove the flow control valve and spring.

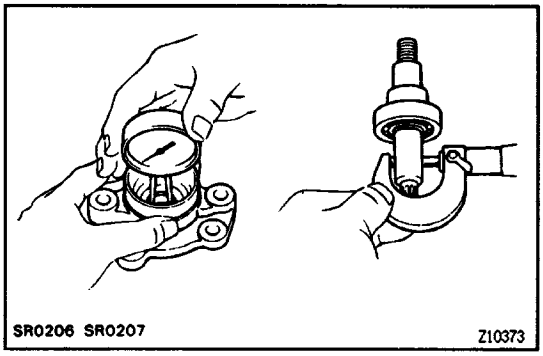


8. REMOVE FLOW CONTROL VALVE SPRING SEAT

(a) Temporarily install a bolt to the spring seat.
(b) Push the bolt and remove the snap ring with snap ring pliers.



(c) Pull out the bolt and remove the spring seat.
(d) Remove the O–ring from the spring seat.



POWER STEERING VANE PUMP INSPECTION AND REPLACEMENT

NOTICE: When using a vise, do not overtighten it.

1. MEASURE OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

Using a micrometer and calipers, measure the oil clearance.

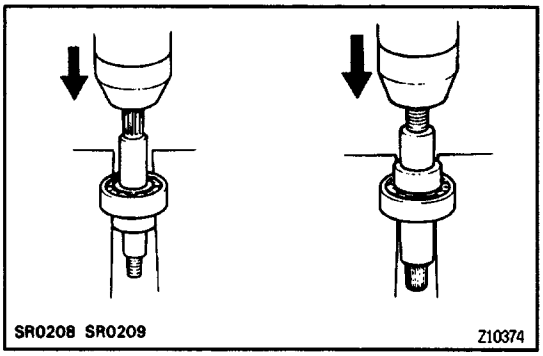
Standard clearance:

0.030–0.047 mm (0.0012–0.0019 in.)

Maximum oil clearance:

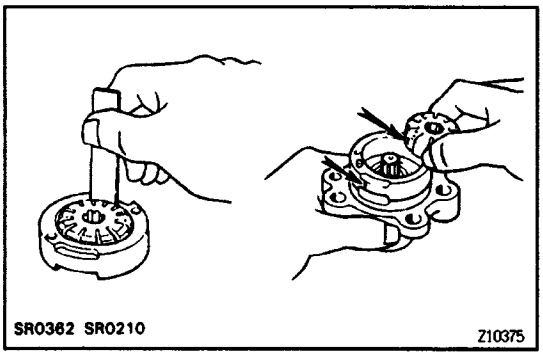
0.07 mm (0.0028 in.)

If more than maximum, replace the entire PS vane pump.



2. IF NECESSARY, REPLACE BEARING

(a) Using snap ring pliers, remove the snap ring.
(b) Using a press, press out the bearing.
(c) Coat a new bearing with power steering fluid.
(d) Using a press, press in the bearing.
(e) Using snap ring pliers, install a new snap ring.



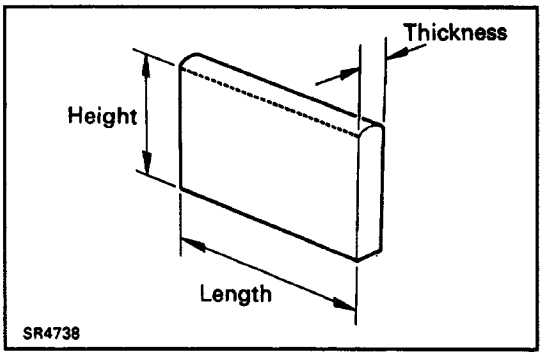
3. INSPECT VANE PUMP ROTOR AND CAM RING

Measure the cam ring thickness. Check that the difference between the rotor and cam ring measurement is less than maximum.

Maximum difference:

0.06 mm (0.0024 In.)

If the difference is excessive, replace the cam ring with one having the same letter as on the rotor.



4. INSPECT VANE PUMP ROTOR AND VANE PLATES

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

Minimum height:

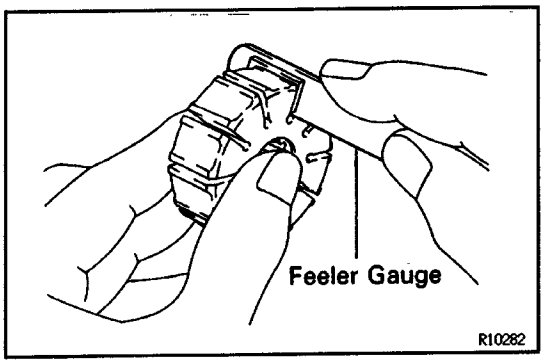
7.8 mm (0.307 in.)

Minimum thickness:

1.7 mm (0.067 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:

0.06 mm (0.0024 in.)

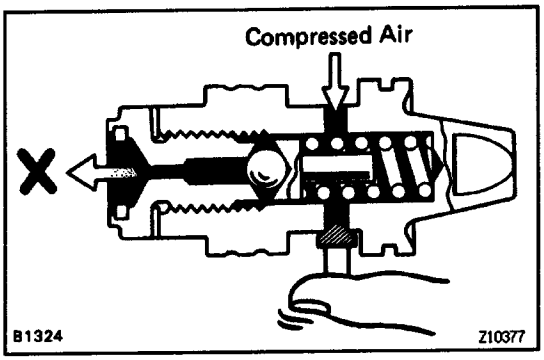
If more than maximum, replace the vane plate and/or rotor with one having the same mark stamped on the cam ring.

Inscribed mark:

1. 2. 3. 4. or None

HINT: There are 5 vane lengths with the following rotor and cam ring numbers:

Rotor and cam ring mark	Vane length mm (in.)
None	14.996 – 14.998 (0.59039 – 0.59047)
1	14.994 – 14.996 (0.59031 – 0.59039)
2	14.992 – 14.994 (0.59024 – 0.59031)
3	14.990 – 14.992 (0.59016 – 0.59024)
4	14.988 – 14.990 (0.59008 – 0.59016)

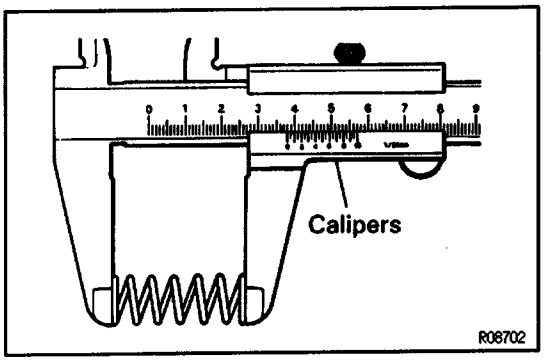


5. INSPECT FLOW CONTROL VALVE

(a) Check the flow control valve for wear or damage.

(b) Apply fluid to the valve and check that if falls smoothly into the valve hole by its own weight.

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

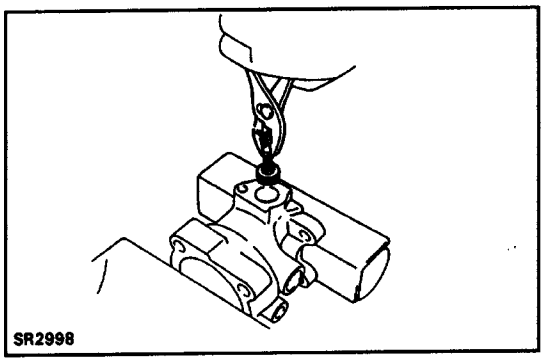


6. INSPECT SPRING

Using calipers, measure the free length of the spring.

Spring length:

47–50 mm (1.85–1.97 in.)



POWER STEERING VANE PUMP ASSEMBLY

NOTICE: When using a vise, do not overtighten it.

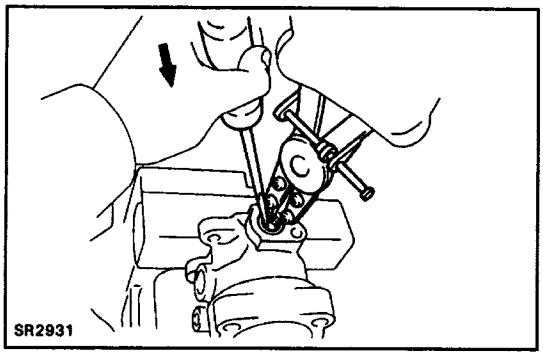
1. COAT WITH POWER STEERING FLUID

(See page SR–37)

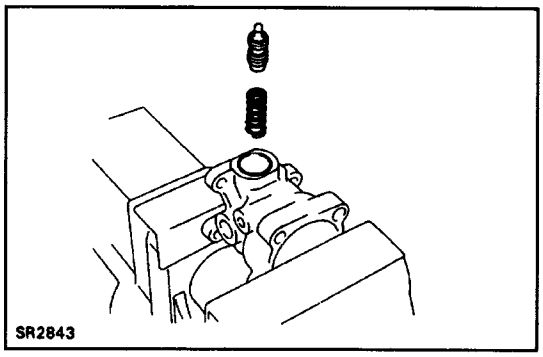
2. INSTALL FLOW CONTROL VALVE SPRING SEAT

(a) Coat a new O–ring with power steering fluid.

(b) Install the O–ring to the spring seat.

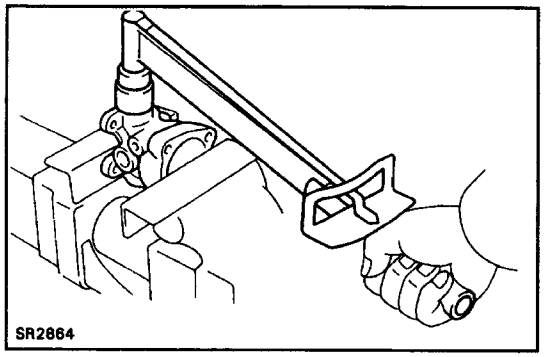


(c) Install the spring seat to the housing.
(d) Using snap ring pliers, install a new snap ring.



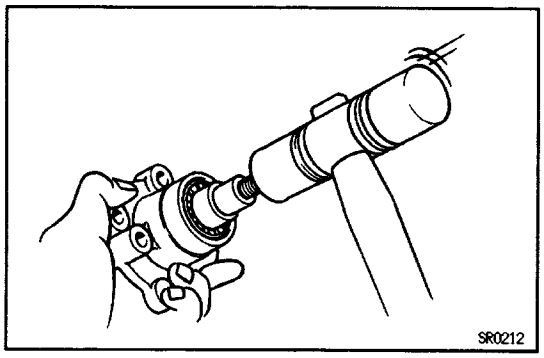
3. INSTALL FLOW CONTROL VALVE AND SPRING

(a) Coat a new O–ring with power steering fluid.
(b) Install the O–ring to the housing.
(c) Insert the spring and control valve.



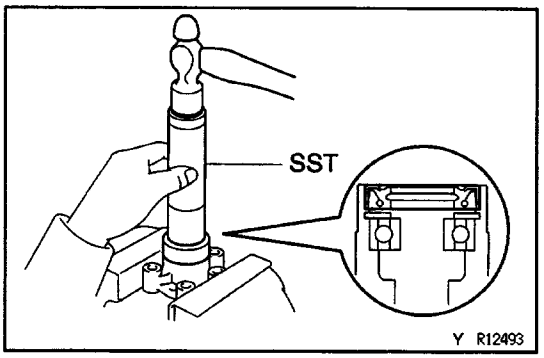
4. INSTALL PRESSURE PORT UNION

(a) Coat a new O–ring with power steering fluid.
(b) Install the O–ring to the pressure port union.
(c) Torque the union.
Torque: 69 N–m (700 kgf–cm, 51 ft–lbf)



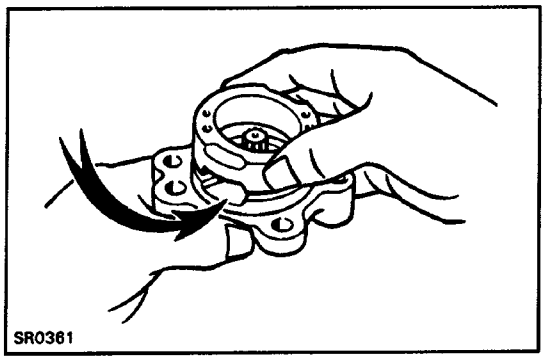
5. INSTALL VANE PUMP SHAFT

(a) Install the pump shaft into the front housing by tapping it in with a plastic hammer.
(b) Using snap ring pliers, install a new snap ring.



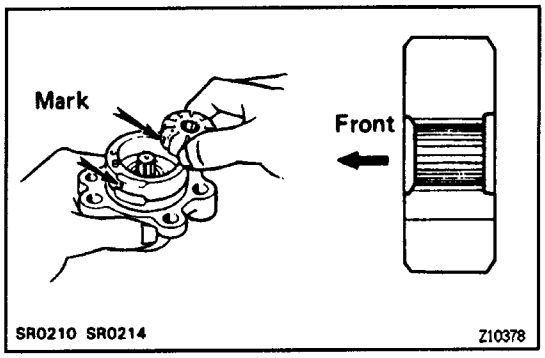
(c) Coat a new oil seal lip with power steering fluid.
(d) Using SST and a hammer, install the oil seal.
SST 09608–30012 (09608–04030)

NOTICE: Make sure you install the oil seal facing the correct direction.



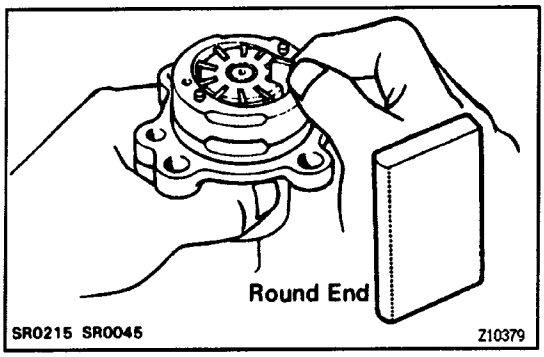
6. INSTALL CAM RING

Align the fluid passages of the cam ring and front housing, and install the cam ring.



7. INSTALL VANE PUMP ROTOR

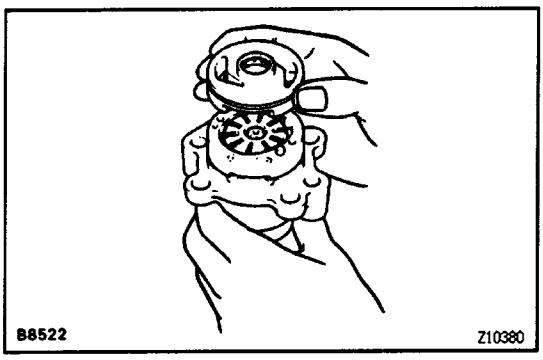
Install the rotor with the chamfered end facing toward the front.



8. INSTALL VANE PLATES

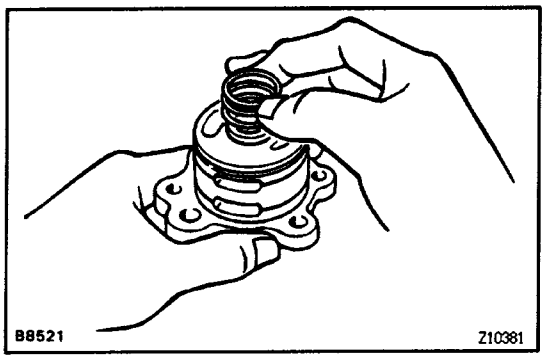
(a) Coat the 10 vane plates with power steering fluid.

(b) Install the plates with the round end facing outward.

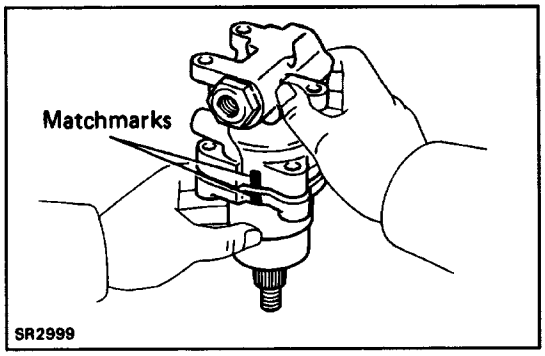


9. INSTALL SIDE REAR PLATE AND SPRING

(a) Align the fluid passages of the rear plate and cam ring, and install the rear plate.

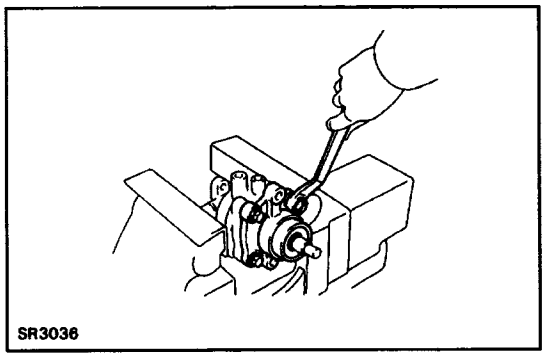


(b) Place the spring on the rear plate.



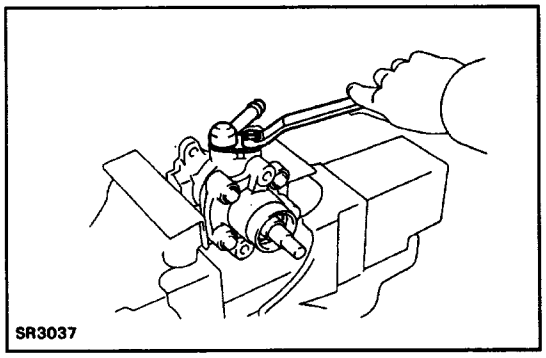
10. INSTALL REAR HOUSING

(a) Align the matchmarks on the front and rear housings and assemble them.



(b) Torque the 4 bolts evenly in 3 or 4 passes.

Torque: 46 N–m (470 kgf–cm, 34 ft–lbf)



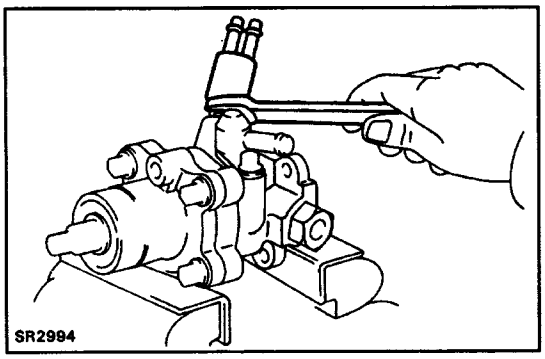
11. INSTALL SUCTION PORT UNION

(a) Coat a new O–ring with power steering fluid.

(b) Install the O–ring to the union.

(c) Torque the bolt.

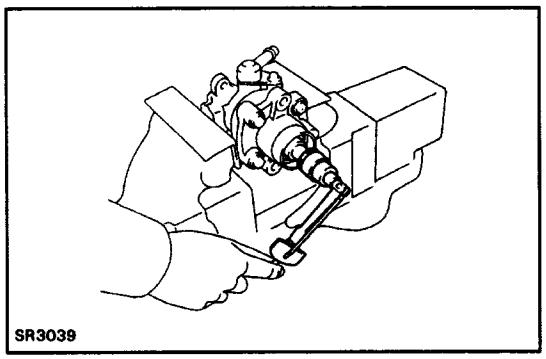
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)



12. INSTALL AIR CONTROL VALVE

Install a new union seat and the valve.

Torque: 36 N–m (370 kgf–cm, 27 ft–lbf)



13. MEASURE PS VANE PUMP ROTATING TORQUE

(a) Check that the pump shaft rotates smoothly without abnormal noise.

(b) Temporarily install the pulley nut and using a torque wrench check the pump rotating torque.

Rotation torque:

0.3 N–m (2.8 kgf–cm, 2.4 in.–lbf)