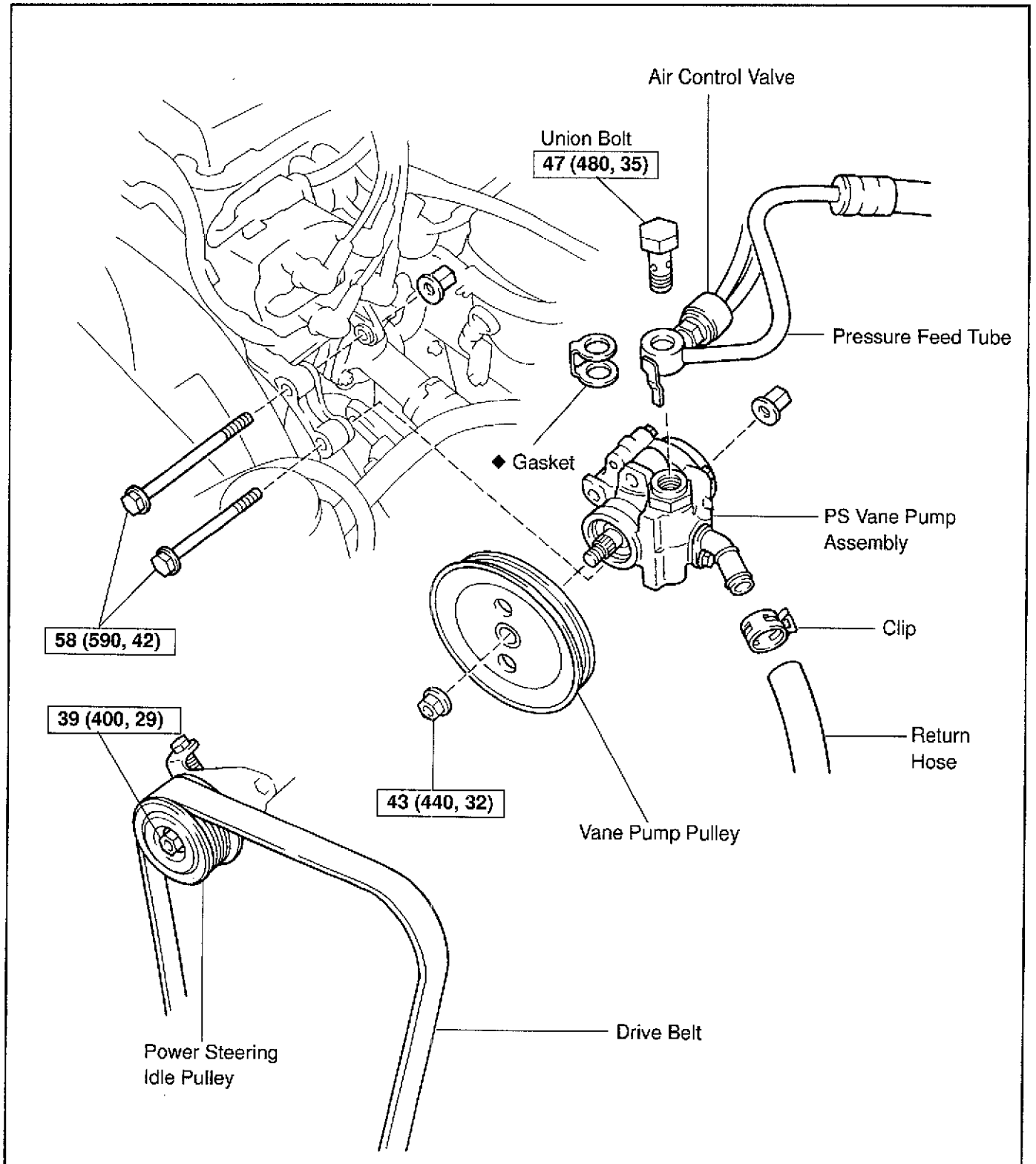
POWER STEERING VANE PUMP (1RZ, 1RZ–E)

COMPONENTS

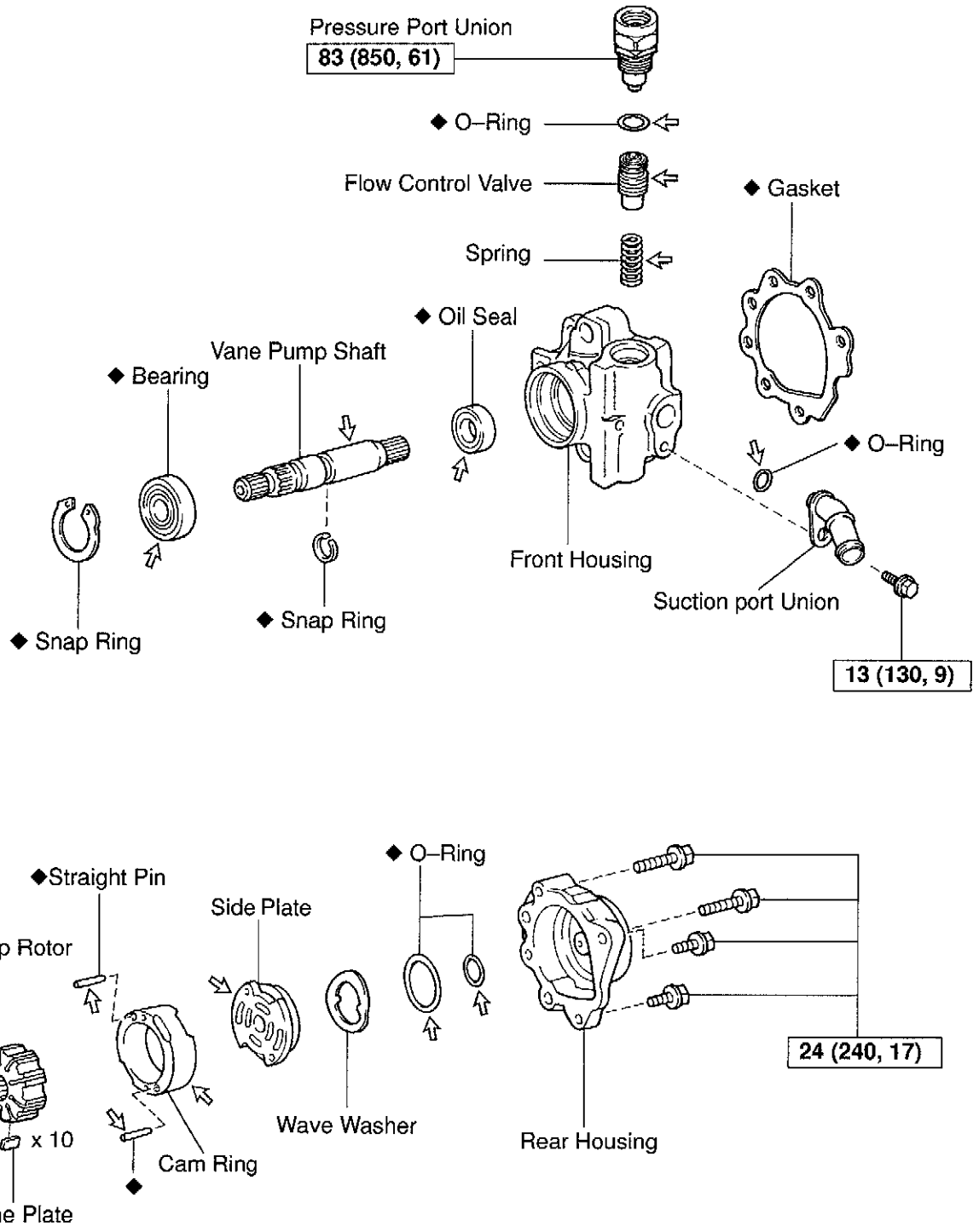
SR09I-01



N·m (kgf·cm, ft·lbf) : Specified torque

* For use with SST

F01800



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
⇦ Power Steering fluid

F01502

5R09J–01

REMOVAL

1. DISCONNECT RETURN HOSE

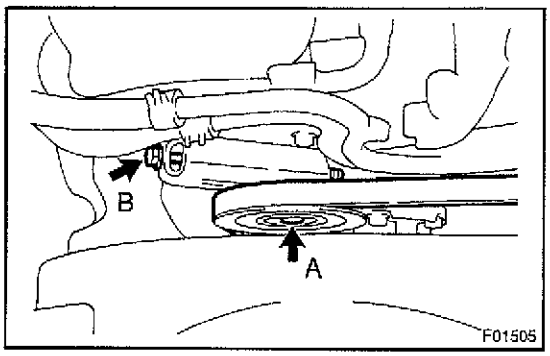
Remove the clip and disconnect the hose.

NOTICE:

Take care not to spill fluid on the drive belt.

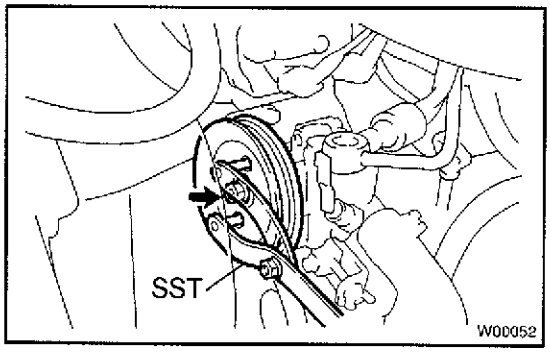
2. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket.



3. REMOVE DRIVE BELT

Loosen the nut A and the bolt B.



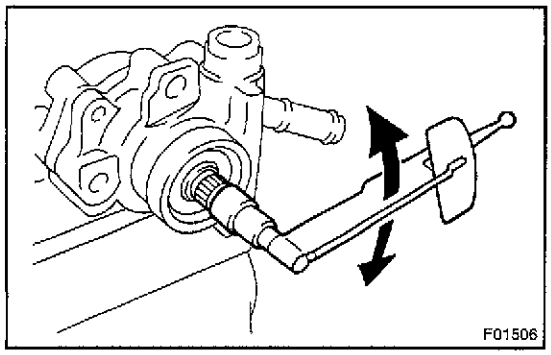
4. REMOVE VANE PUMP PULLEY

Using SST to stop the pulley rotating, remove the pulley set nut.

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

5. REMOVE PULLEY PUMP ASSEMBLY

Remove the 2 pump assembly set bolts and nuts.



SR09K-01

DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE PS VANE PUMP ROTATING TORQUE

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

(b) Temporarily install the vane pump pulley set nut.

(c) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less

2. REMOVE SUCTION PORT UNION

(a) Remove the bolt.

(b) Remove the O–ring from the union.

3. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

Remove the O–ring from the union.

4. REMOVE REAR HOUSING

(a) Remove the 4 bolts.

HINT:

If the wave washer and side plate are stuck to the rear housing, lightly tap the rear housing with a plastic hammer, and remove the wave washer and side plate.

(b) Remove the 2 O–rings from the housing.

5. REMOVE WAVE WASHER

6. REMOVE SIDE PLATE

7. REMOVE GASKET

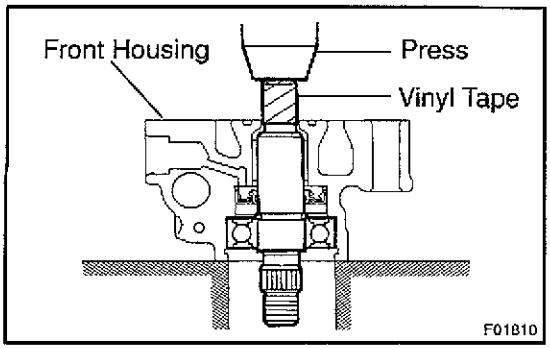
8. REMOVE CAM RING, 10 VANE PLATES AND VANE PUMP ROTOR

NOTICE:

Be careful not to drop the plate.

9. REMOVE STRAIGHT PINS

Remove the 2 pins from the front housing.



10. REMOVE VANE PUMP SHAFT WITH BEARING

(a) Using snap ring pliers, remove the snap ring from the front housing.

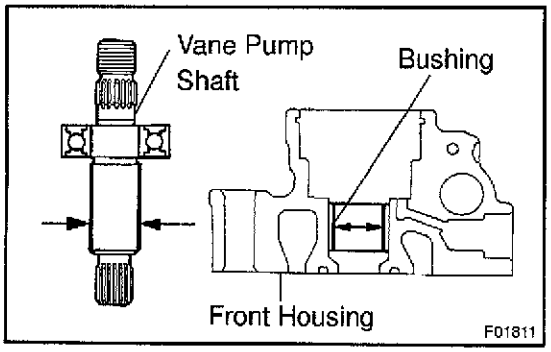
(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the vane pump shaft.

(c) Using a press, remove the shaft with bearing from the front housing.

NOTICE:

Be careful not to damage the oil seal lip.

SR09L-01



INSPECTION

NOTICE:

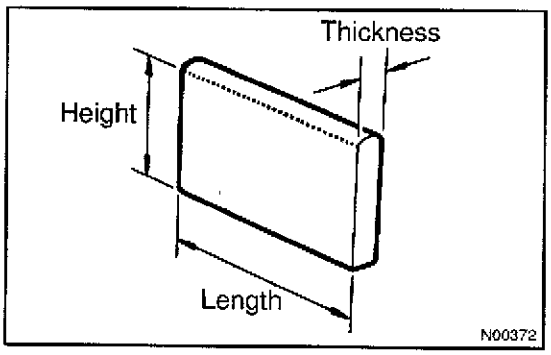
When using a vise, do not overtighten it.

1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

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

Standard clearance:
0.03 – 0.05 mm (0.0012 – 0.0020 in.)
Maximum clearance: 0.07 mm (0.0028 in.)

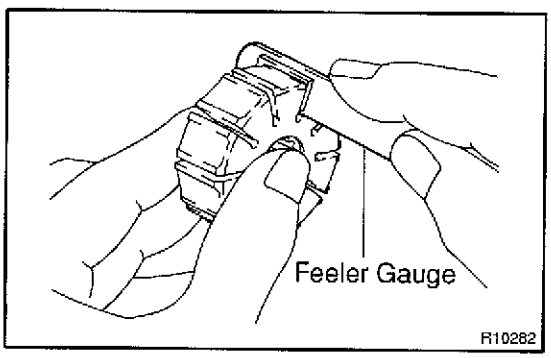
If it is more than the maximum, replace the shaft and front housing.



2. INSPECT VANE PUMP ROTOR AND VANE PLATES

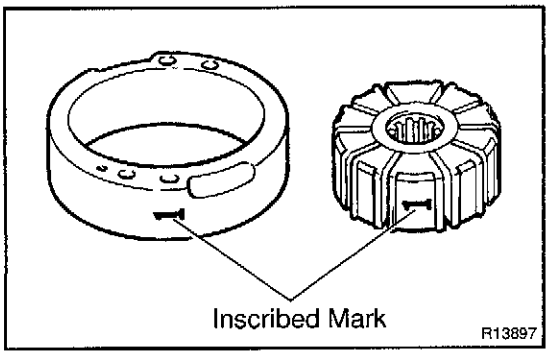
(a) Using a micrometer, measure the height, thickness and length of the 10 plates.

Minimum height: 8.6 mm (0.339 in.)
Minimum thickness: 1.397 mm (0.0550 in.)
Minimum length: 14.991 mm (0.5902 in.)



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

Maximum clearance: 0.033 mm (0.0013 in.)



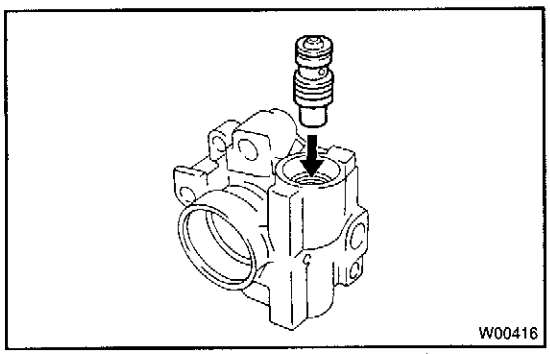
If it is more than the maximum, replace the plate and/or rotor with one having the same mark stamped on the cam ring.

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

HINT:

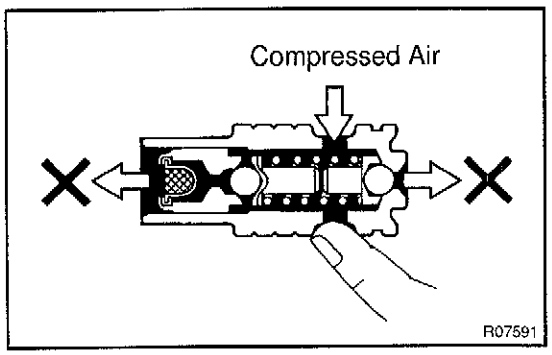
There are 5 vane plate lengths with the following rotor and cam ring marks:

Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345–26010	14.999–15.001 (0.59051–0.59059)
1	44345–26020	14.997–14.999 (0.59043–0.59051)
2	44345–26030	14.995–14.997 (0.59035–0.59043)
3	44345–26040	14.993–14.995 (0.59027–0.59035)
4	44345–26050	14.991–14.993 (0.59020–0.59027)

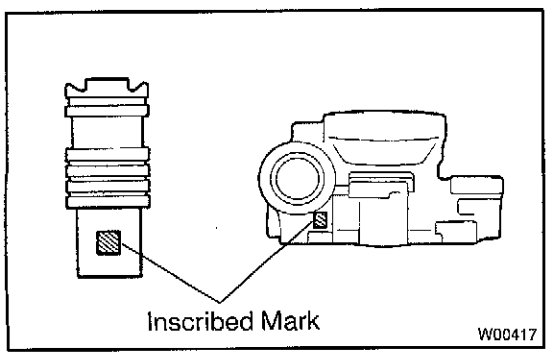


3. INSPECT FLOW CONTROL VALVE

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

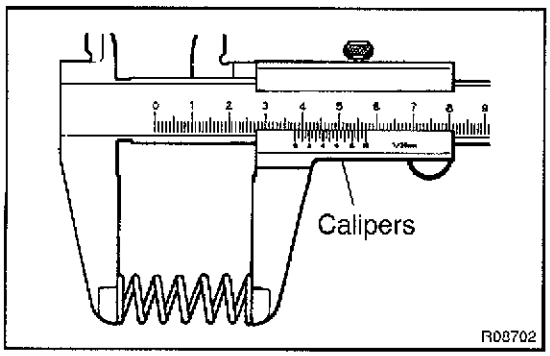


(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air 392–490 kPa (4–5 kgf/cm^2, 57–71 psi) into the opposite side, and confirm that air does not come out from the end holes.



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

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

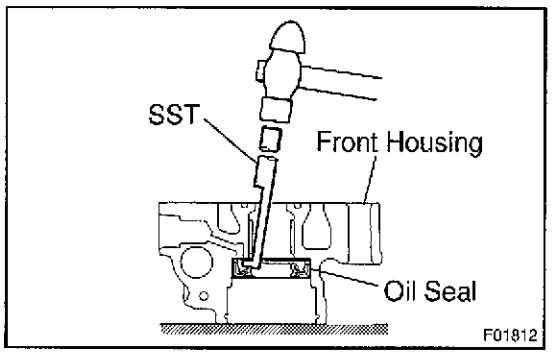


4. INSPECT SPRING

Using calipers, measure the free length of the spring.

Minimum free length: 33.2 mm (1.307 in.)

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

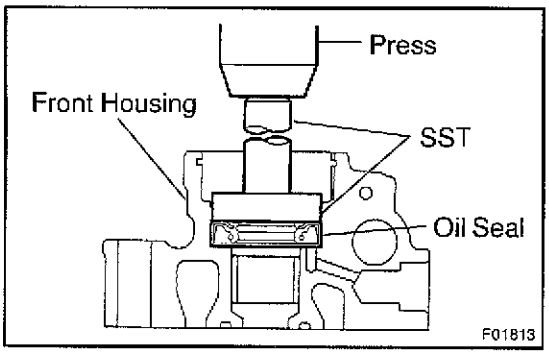


5. IF NECESSARY, REPLACE OIL SEAL

(a) Using SST, tap out the oil seal from the front housing.
SST 09631–10030

NOTICE:

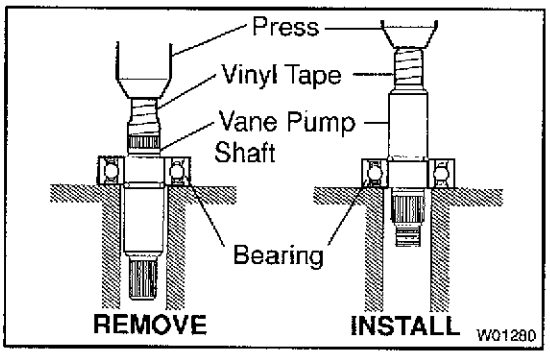
Be careful not to damage the bushing of the front housing.



(b) Coat a new oil seal lip with power steering fluid.
(c) Using SST, press in the oil seal.
SST 09950–60010 (09951–00320),
09950–70010 (09951–07100)

NOTICE:

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



6. IF NECESSARY, REPLACE BEARING

(a) Press out the bearing from the vane pump shaft.
(b) Using snap ring expander, replace the snap ring with new one.

NOTICE:

Be careful not to damage the shaft.

(c) Coat a new bearing with power steering fluid.
(d) Press in the bearing to the shaft.

SR09M-01

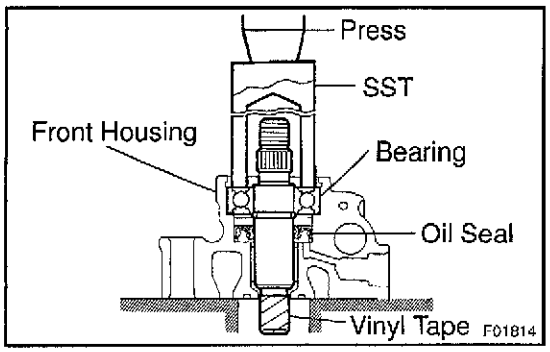
REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT WITH POWER STEERING FLUID

(See page SR–27)



2. INSTALL VANE PUMP SHAFT WITH BEARING

(a) Wind vinyl tape on the serrated part of the vane pump shaft.

(b) Using SST, press in the shaft with the bearing.

SST 09632–36010

NOTICE:

Be careful not to damage the oil seal lip.

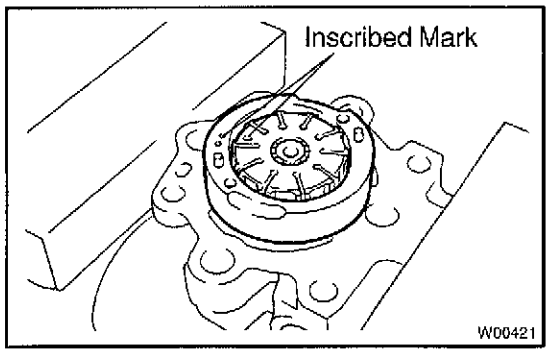
(c) Using snap ring pliers, install a new snap ring to the front housing.

3. INSTALL STRAIGHT PINS

Using a plastic hammer, tap in 2 new pins to the front housing.

NOTICE:

Be careful not to damage the pins.



4. INSTALL CAM RING

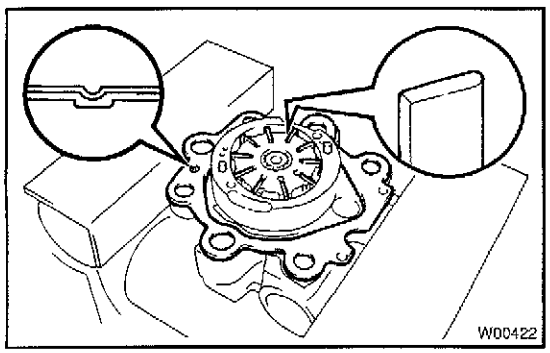
Install the ring with the inscribed mark facing outward.

HINT:

Align the holes of the cam ring with the straight pins.

5. INSTALL VANE PUMP ROTOR

Install the rotor with the inscribed mark facing outward.



6. INSTALL VANE PLATES AND GASKET

(a) Install the 10 plates with the round end facing outward.

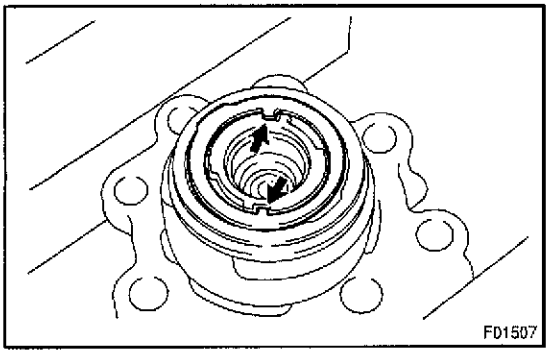
(b) Install a new gasket on the front housing.

NOTICE:

Be careful the direction of the gasket.

7. INSTALL SIDE PLATE

Align the holes of the plate and 2 straight pins.



8. INSTALL WAVE WASHER

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

9. INSTALL REAR HOUSING

(a) Coat 2 new O–rings with power steering fluid and install them to the housing.

(b) Torque the 4 bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

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

(a) Install the valve facing the correct direction.
(See page SR–27)

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

(c) Torque the union.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

11. INSTALL SUCTION PORT UNION

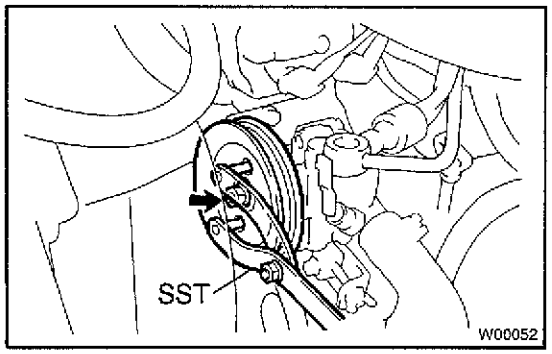
(a) Coat a new O–ring with power steering fluid and install it to the union.

(b) Torque the bolt.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

12. MEASURE PS VANE PUMP ROTATING TORQUE
(See page SR–30)

SR09N-01



INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

Install the pump assembly with the 2 bolts and nuts.

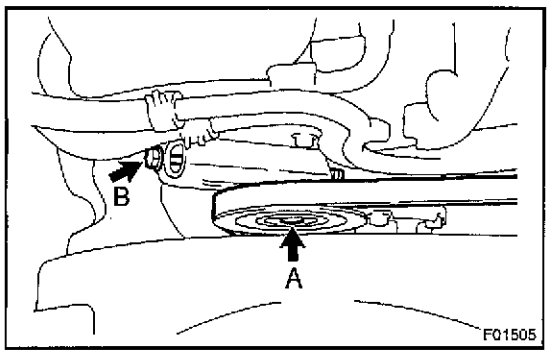
Torque: 58 N·m (590 kgf·cm, 42 ft·lbf)

2. INSTALL VANE PUMP PULLEY

Using SST to stop the pulley rotating, torque the pulley set nut.

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

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

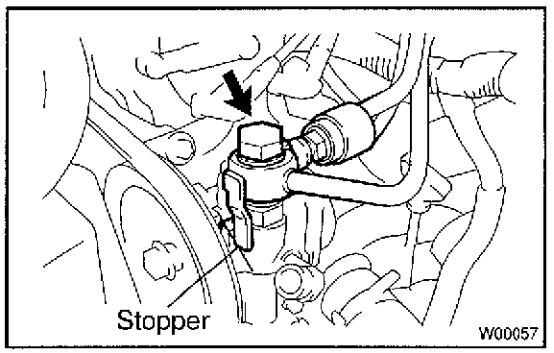


3. INSTALL DRIVE BELT

(a) Tightening the bolt B, adjust the drive belt tension.
(See page SR–3)

(b) Torque the nut A.

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



4. CONNECT PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

HINT:

Make sure the stopper of the tube is touching the PS vane pump body as shown, then torque the union bolt.

5. CONNECT RETURN HOSE

(a) Connect the hose.

(b) Install the clip.

6. BLEED POWER STEERING SYSTEM

(See page SR–5)