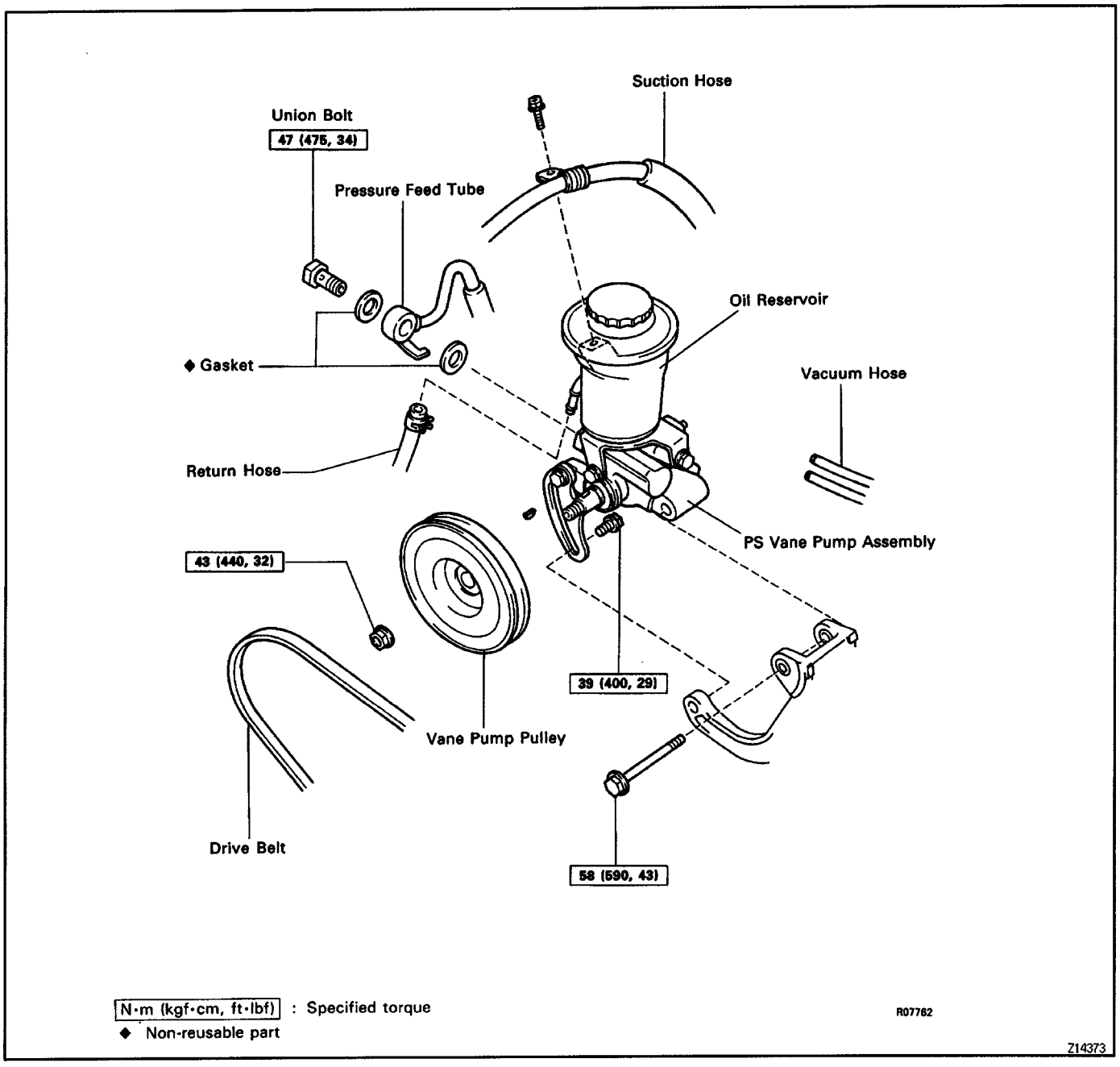
POWER STEERING VANE PUMP (3VZ–E)

POWER STEERING VANE PUMP REMOVAL AND INSTALLATION

Remove and install the parts, as shown.



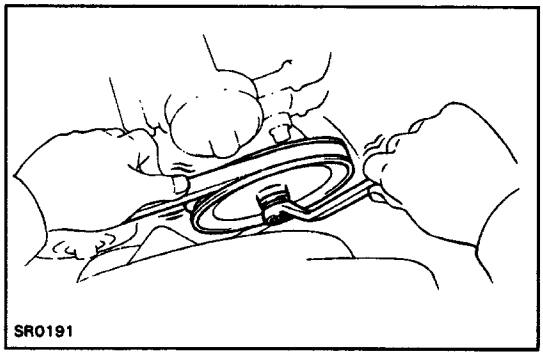
MAIN POINTS OF REMOVAL AND INSTALLATION

1. DISCONNECT AND CONNECT PRESSURE FEED TUBE

(a) Disconnect and connect the return hose from the oil reservoir.

(b) 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: 44 N–m (440 kgf–cm, 32 ft–lbf)

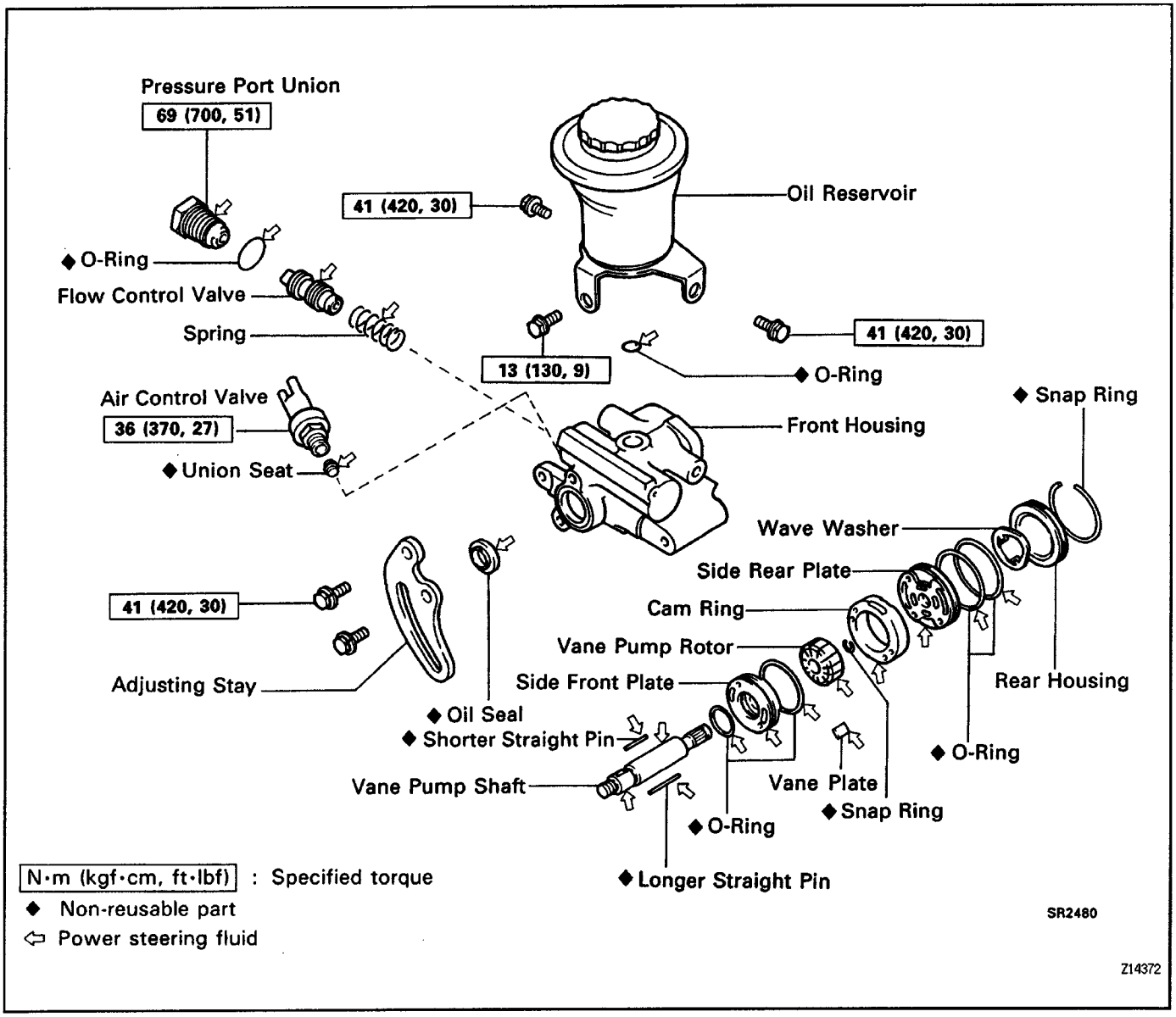
3. ADJUST DRIVE BELT TENSION AFTER INSTALLING PS VANE PUMP ASSEMBLY

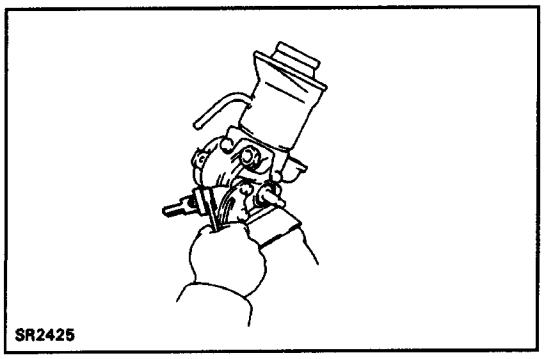
(See page SR–29)

4. BLEED POWER STEERING SYSTEM

(See page SR–31)

COMPONENTS





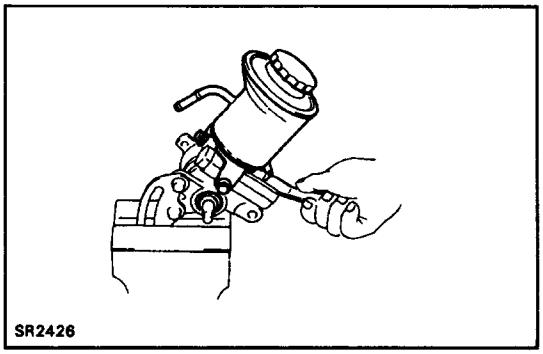
POWER STEERING VANE PUMP DISASSEMBLY

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

1. REMOVE AIR CONTROL VALVE

(a) Remove the air control valve.

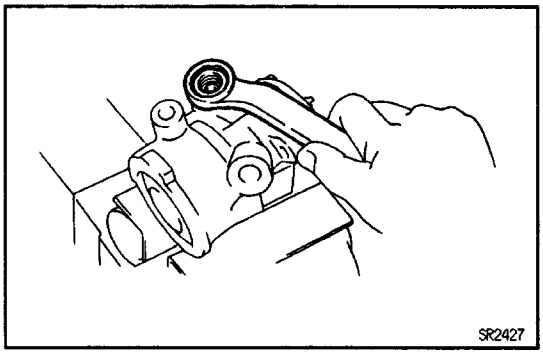
(b) Remove the union seat.



2. REMOVE OIL RESERVOIR

(a) Remove 3 bolts and the oil reservoir.

(b) Remove the O–ring from the oil reservoir.

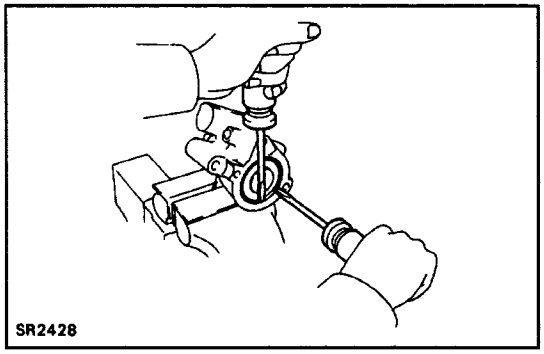


3. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

(a) Remove the pressure port union.

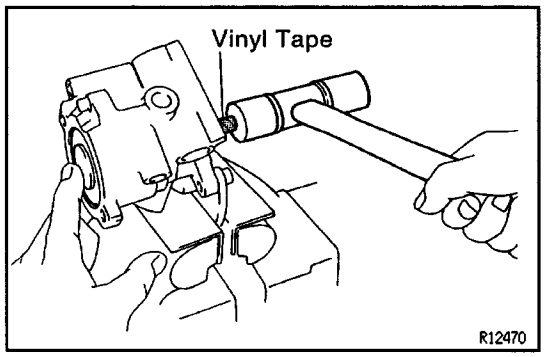
(b) Remove the O–ring from the pressure port union.

(c) Remove the flow control valve and spring.



4. REMOVE REAR HOUSING

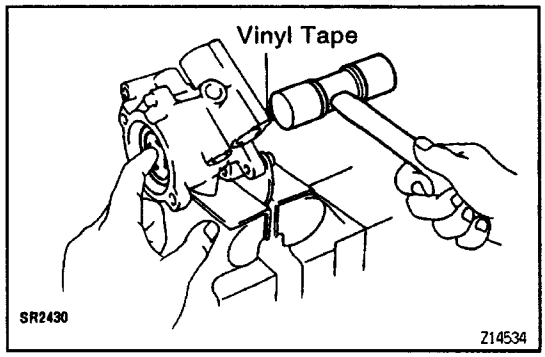
(a) Using 2 screwdrivers, remove the snap ring.



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

NOTICE: Tape the pump shaft tip before tapping.

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

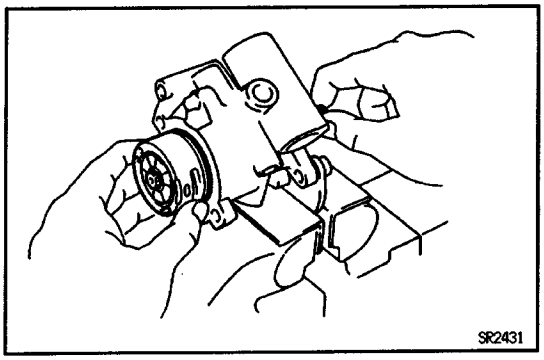


5. REMOVE SIDE REAR PLATE

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

NOTICE: Tape the pump shaft tip before tapping.

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



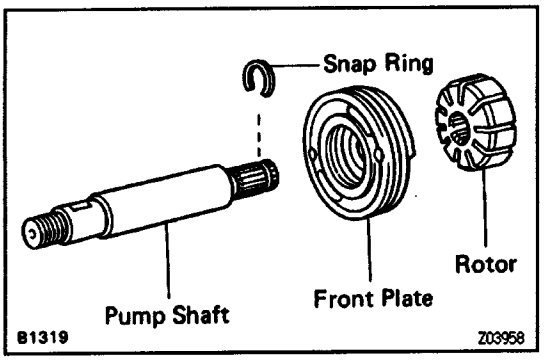
6. REMOVE VANE PUMP SHAFT WITH CAM RING, VANE PLATES, VANE PUMP ROTOR AND SIDE FRONT PLATE

Remove the shaft with the ring, vane plates, rotor and front plate from the front housing.

7. REMOVE CAM RING AND VANE PLATES

(a) Remove the ring from the vane pump shaft.

(b) Remove the 10 plates from the shaft.



8. REMOVE VANE PUMP ROTOR AND SIDE FRONT PLATE

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

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

(c) Remove the 2 O–rings from the side front plate.

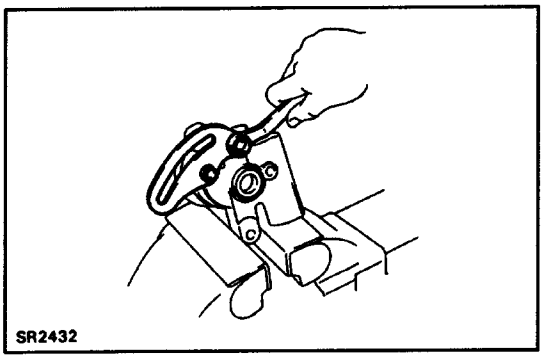
(d) Remove the shorter straight pin from the side front plate.

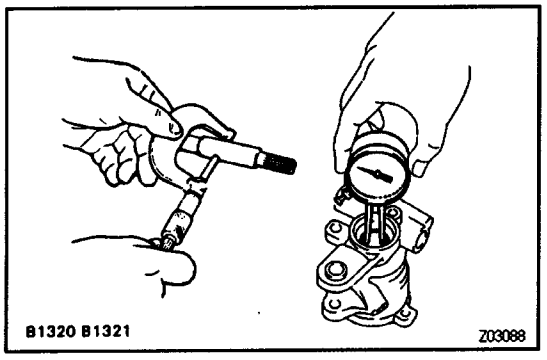
9. REMOVE LONGER STRAIGHT PIN

Remove the pin from the front housing.

10. REMOVE ADJUSTING STAY

Remove the 2 bolts and adjusting stay.





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

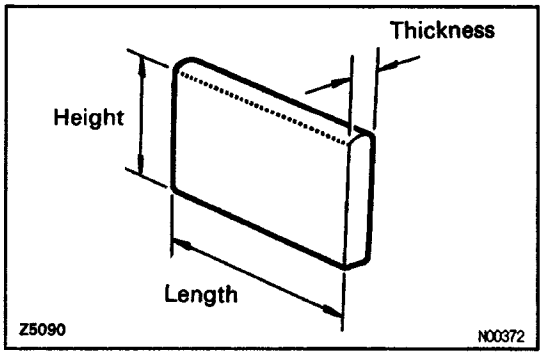
Using a micrometer and caliper gauge, measure the oil clearance.

Standard clearance:

0.01 – 0.03 mm (0.0004 – 0.0012 in.)

Maximum clearance:

0.07 mm (0.0028 in.)



2. INSPECT VANE PUMP ROTOR AND VANE PLATES

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

Minimum height:

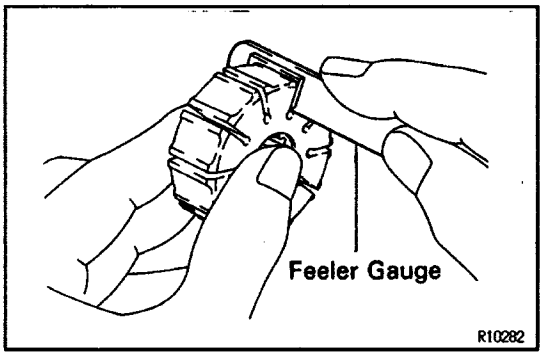
8.1 mm (0.319 in.)

Minimum thickness:

1.797 mm (0.0707 in.)

Minimum length:

14.988 mm (0.5901 in.)



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

Maximum clearance:

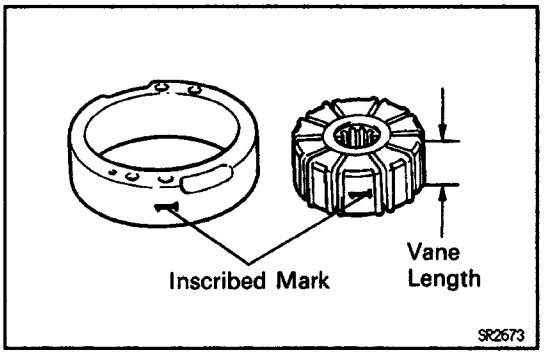
0.03 mm (0.0012 in.)

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

Inscribed mark:

1, 2, 3, 4 or None

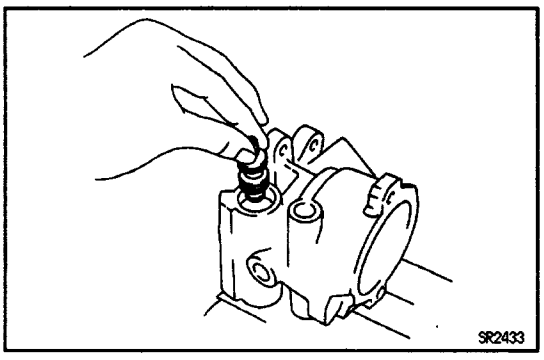
HINT: There are 5 vane lengths with the following rotor and cam ring marks:



Rotor and cam ring mark	Vane length mm (in.)
None	14.996 – 14.998 (0.59039 – 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)

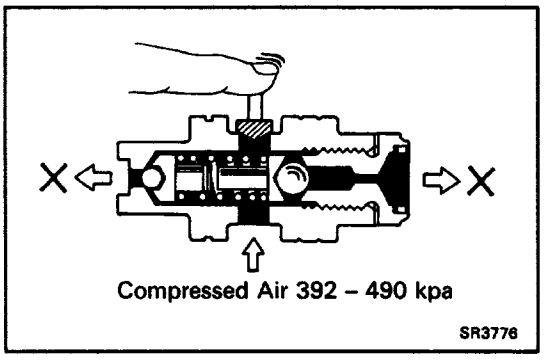
3. INSPECT FLOW CONTROL VALVE

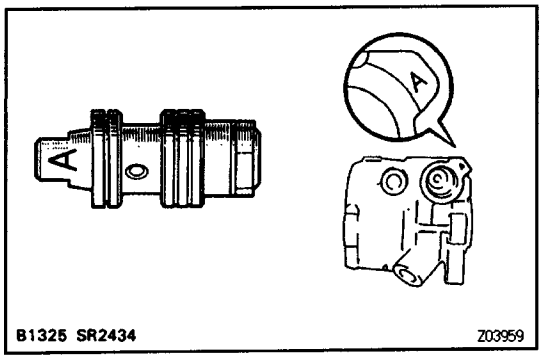
(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



(b) Check the flow control valve for leakage.

Close one of the holes and apply 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 hole.

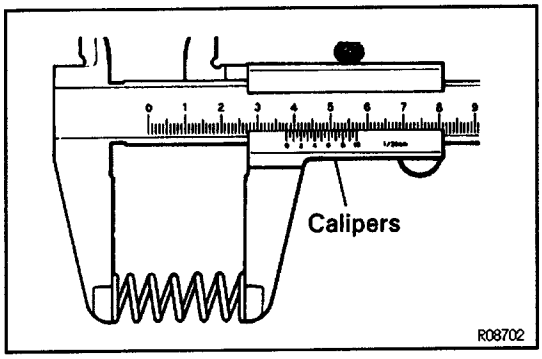




If necessary, replace the valve with one having the same letter as inscribed on the front housing.

Inscribed mark

A, B, C, D, E or F

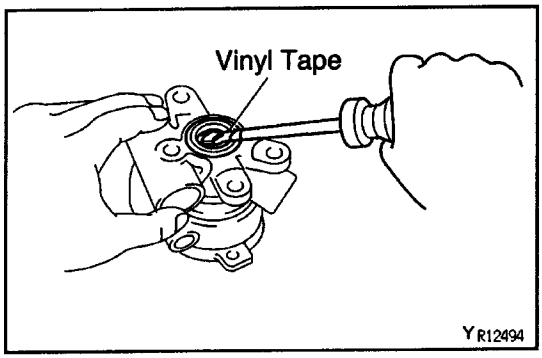


4. INSPECT SPRING

Using calipers, measure the free length of the spring.

Spring length:

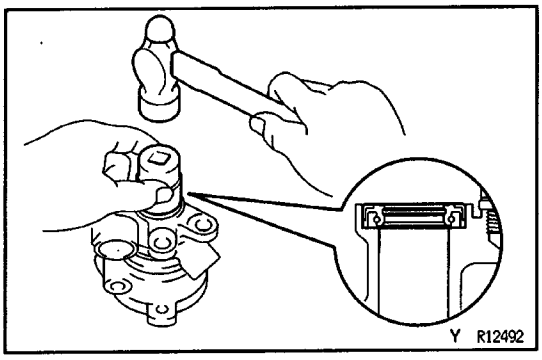
35 – 37 mm (1.38 – 1.46 in.)



5. IF NECESSARY. REPLACE OIL SEAL

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

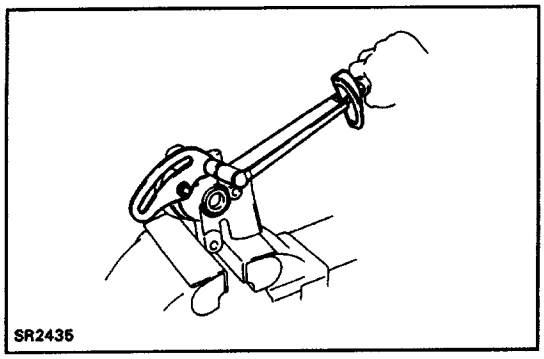
NOTICE: Tape the screwdriver tip before use. Be careful not to damage the front housing.



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

(c) Using a socket wrench and hammer, tap in the oil seal.

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



POWER STEERING VANE PUMP ASSEMBLY

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

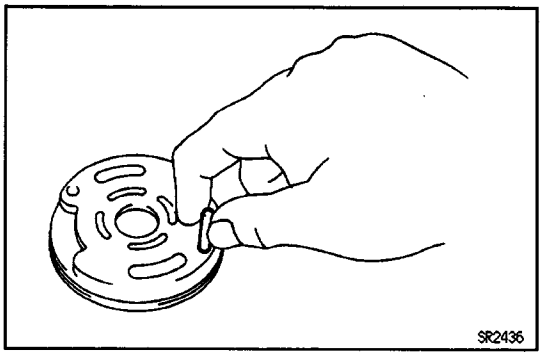
1. COAT WITH POWER STEERING FLUID

(See page SR–47)

2. INSTALL ADJUSTING STAY

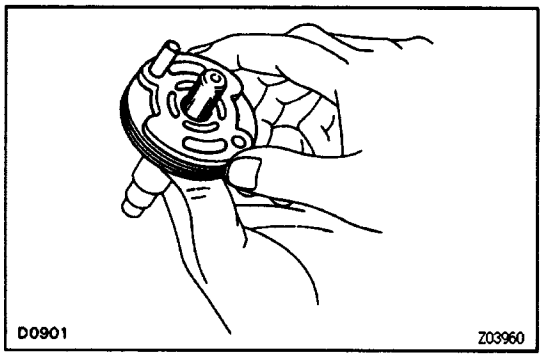
Install the adjusting stay and torque the 2 bolts.

Torque: 41 N–m (420 kgf–cm, 30 ft–lbf)

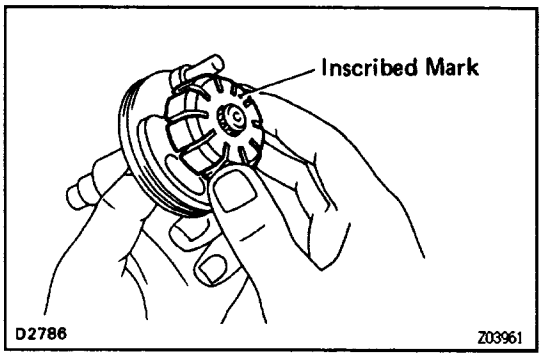


3. INSTALL SIDE FRONT PLATE AND VANE PUMP ROTOR

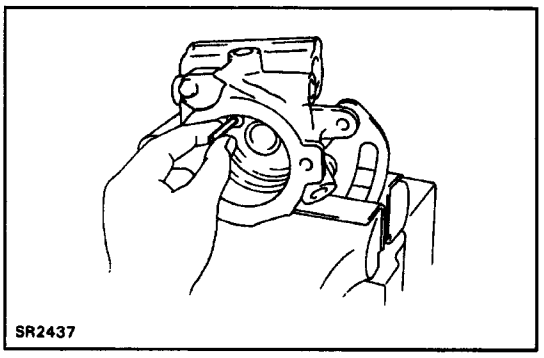
(a) Install a new shorter straight pin to the front plate.



(b) Coat 2 new 0– rings with power steering fluid.
(c) Install the 2 O–rings to the front plate.
(d) Install the front plate to the vane pump shaft.

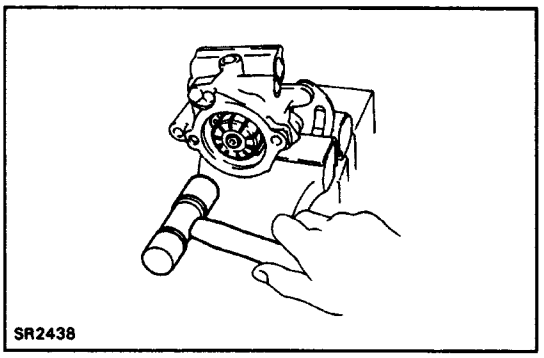


(e) Install the rotor to the vane pump shaft with the inscribed mark facing outward.
(f) Install the snap ring to the shaft.



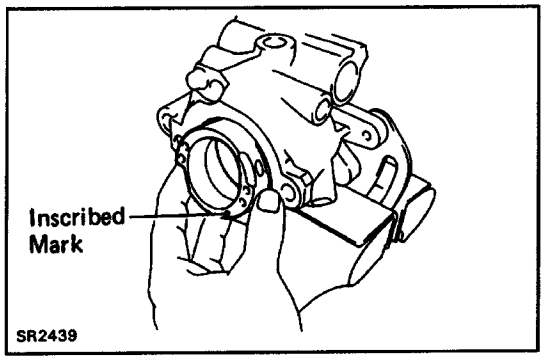
4. INSTALL VANE PUMP SHAFT WITH VANE PUMP ROTOR AND SIDE FRONT PLATE

(a) Install a new longer straight pin to the front housing.



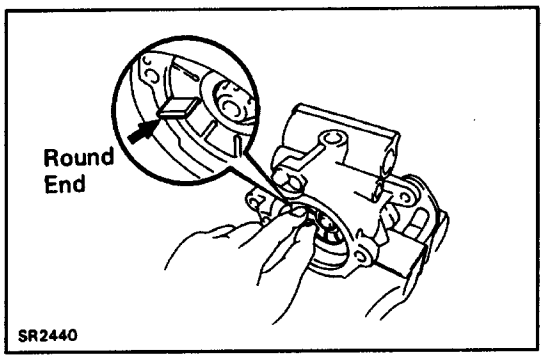
(b) Align the hole of the front plate and longer straight pin and tap in the pump shaft with a plastic hammer.

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



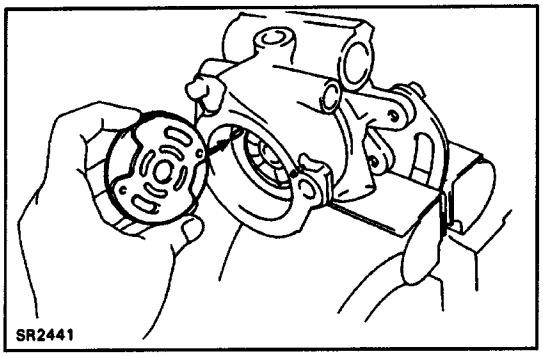
5. INSTALL CAM RING

Align the holes of the cam ring and 2 straight pins, and install the cam ring with the inscribed mark facing outward.



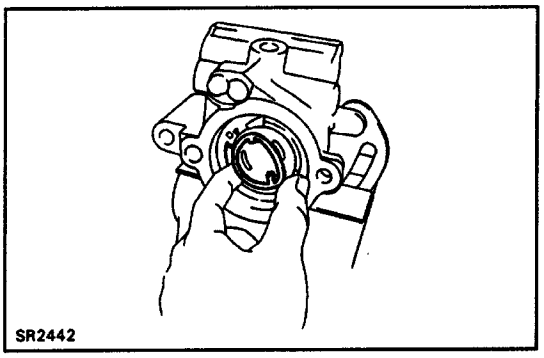
6. INSTALL VANE PLATES

Install the 10 plates with the round end facing outward.



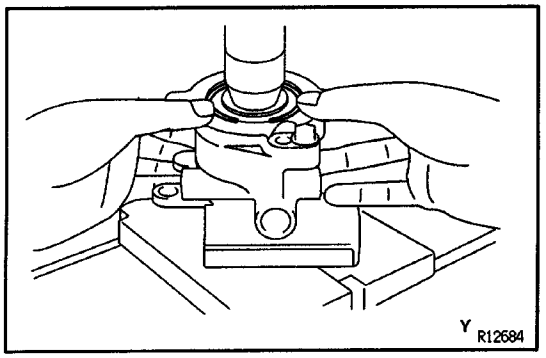
7. INSTALL SIDE REAR PLATE

(a) Coat a new O–ring with power steering fluid.
(b) Install the O–ring to the plate.
(c) Align the holes of the plate and 2 straight pins, and install the plate.



8. INSTALL WAVE WASHER

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

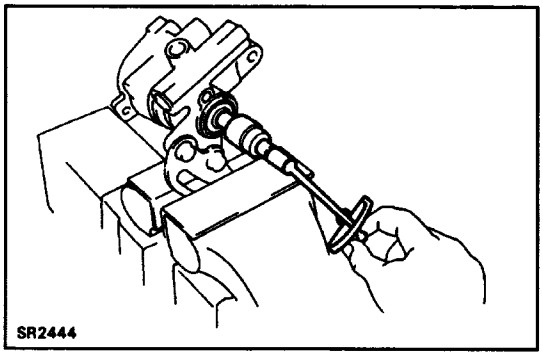


9. INSTALL REAR HOUSING

(a) Coat a new O–ring with power steering fluid and install it to the rear housing.
(b) Install the rear housing and use a press to push down on the wave washer hard enough to compress it.

NOTICE: Do not apply too much pressure.

(c) Install a new snap ring.



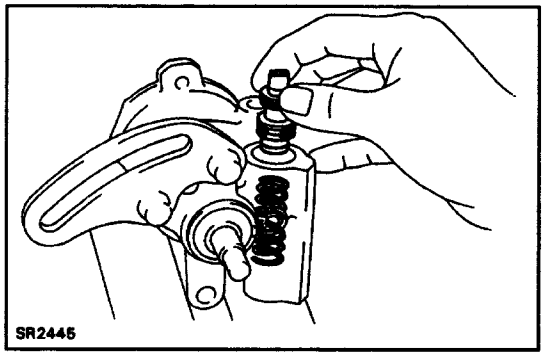
10. MEASURE PS VANE PUMP SHAFT ROTATING TORQUE

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

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

Rotating torque:

0.3 N–m (2.8 kgf–cm, 2.4 in–lbf) or less

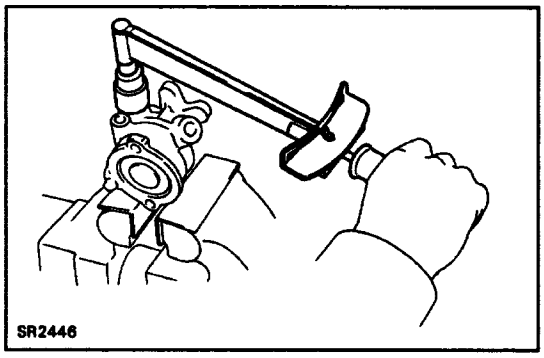


11. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION

(a) Install the spring and the valve into the housing.

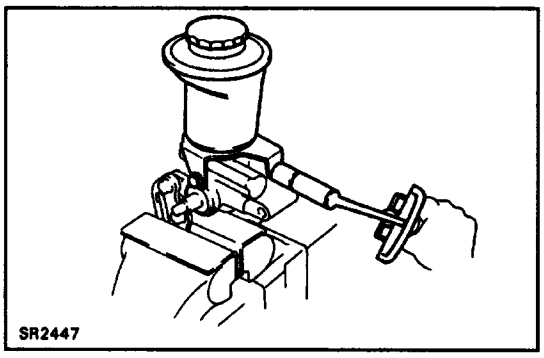
(b) Coat a new 0– ring with power steering fluid.

(c) Install the O–ring to the pressure port union.



(d) Torque the union.

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



12. INSTALL OIL RESERVOIR

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

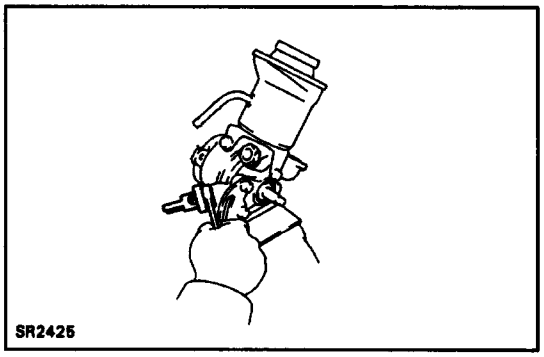
(b) Install the O–ring to the oil reservoir.

(c) Install the oil reservoir with the 3 bolts.

Torque:

12 mm bolt 13 N–m (130 kgf–cm, 9 ft–lbf)

14 mm bolt 41 N–m (420 kgf–cm, 30 ft–lbf)



13. INSTALL AIR CONTROL VALVE

(a) Install a new union seat.

(b) Torque the valve.

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