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**SR**

# STEERING

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## IN-VEHICLE INSPECTION

### STEERING WHEEL

#### Check for rattle

Move the steering wheel in an axial direction and/or in a perpendicular direction so as to ensure that no looseness and/or excessive play is present.

If any looseness and/or excessive play is present, check the steering wheel for improper installing condition. Repair any defective parts.

#### Check for free play

1. Set the steering wheel to a straight-ahead state.
2. Turn the steering wheel clockwise and counterclockwise. Measure the steering wheel movement at the circumference of the steering wheel which is registered before the steering tires start to be steered. Ensure that this steering wheel play is not more than the specified value.

Specified Value: 10 mm

If not, check each joint section for excessive play. If the joints are satisfactory, replace the steering gear assembly. If the joint sections exhibit defects, such as excessive play, replace the defective parts.

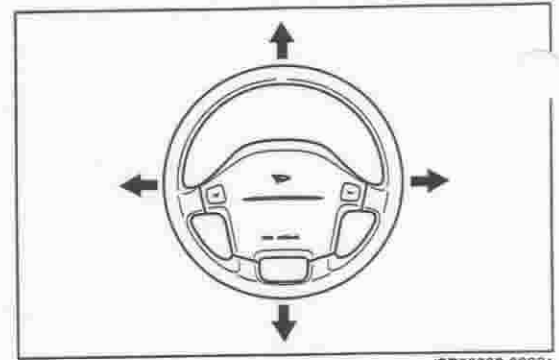
#### Check of turning effort

Check of turning effort of steering wheel with vehicle in its stationary state

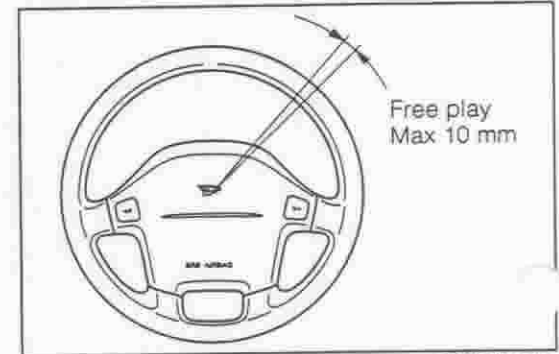
While the engine is idling and with the vehicle in its stationary state, measure the force required to turn the steering wheel from the straight-ahead position.

Specified Value: Not to exceed 5.4 N·m (0.55 kgf·m)

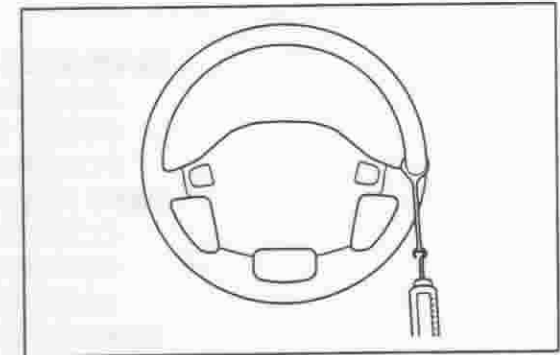
If the turning effort is fails to meet with specified value, check tire pressure, quality of fluid etc., or check and overhaul the power steering systems as necessary.



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JSR00003-00002



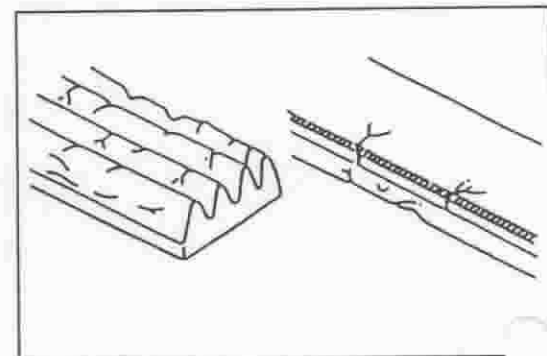
JSR00004-00003

## POWER STEERING DRIVE BELT

### Visual inspection

Inspect the drive belt for damage.

Visually check the belt for separation of the adhesive rubber above and below the core, core separation from the belt side, severed cord, separation of the rib from the adhesive rubber, cracks or separation of the ribs, torn ribs or cracks in the inner ridges of the ribs. Replace the drive belt, if necessary.



JSR00005-00004

**Check of drive belt tension**

Ensure that the amount of the drive belt deflection within specified value, by depressing the midpoint of the drive belt between the vane pump and water pump pulley is pushed with a force of 98 N (10 kgf).

**Specified Belt Deflection**

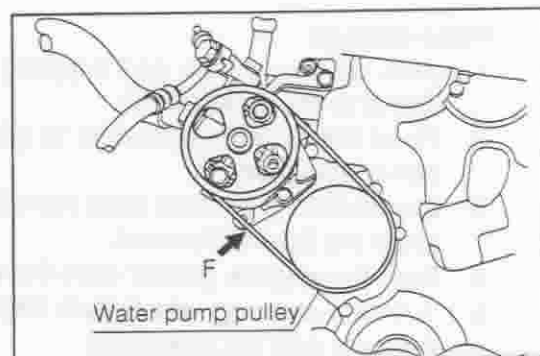
New belt: 7 - 9 mm

Used belt: 9 - 11 mm

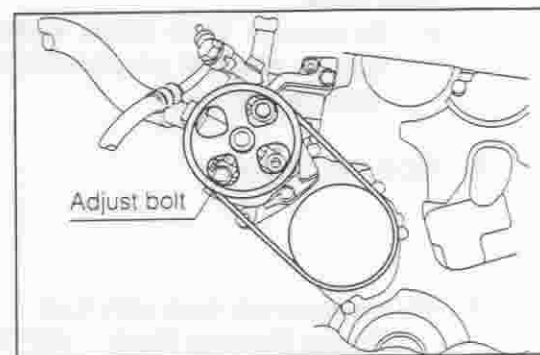
Adjust the drive belt deflection by means of adjusting bolt, if the deflection fails to meet with the specified value.

**NOTE:**

- Prior to the check, ensure that the drive belt is applied correctly on the pulley.
- The new belt refers to that belt driven not more than five minutes on the engine.
- The used belt refer to that belt driven more than five minutes on the engine.



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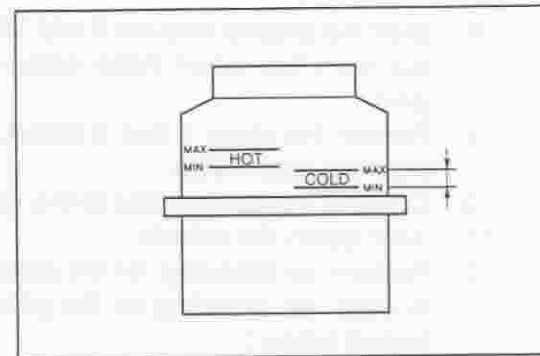
JSR00007-00006

**POWER STEERING FLUID****Check of fluid level**

1. Park the vehicle on a level floor.
2. Stop the engine.
3. Ensure that the power steering fluid level within specified level at the reservoir tank.

**NOTE:**

- Hot range denotes that when the fluid temperature is between 40 to 80 degrees.
- Cold range denotes that when the fluid temperature is between 0 to 40 degrees.
- When the fluid level does not conform to the specification, check the fluid leakage or component parts for malfunction. Then, add the specified power steering fluid to specified level as necessary.



JSR00008-00007

**Check of fluid properties**

1. While the vehicle is in its stationary state and the engine is idling, turn the steering wheel from lock to lock position in both right and left directions.
2. Visually inspect the fluid inside the reservoir tank.

**NOTE:**

- If the fluid is foamy or exhibits whitish cloudiness, most likely the fluid is lacking. Hence, perform air bleeding and adjust the fluid level.
- If foreign matters, such as dirt, are mixed in the fluid, be certain to change the fluid.

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**Fluid change**

1. Jack up the vehicle and support it with the safety stands. (Refer to the GI section.)
2. Place the suitable container to under the return hose at reserve tank side.
3. Disconnect the return hose from the reservoir tank so as to allow the fluid to flow out.
4. Start the engine. (Never race the engine.)
5. Turn the steering wheel from lock to lock position in both the right and left directions.

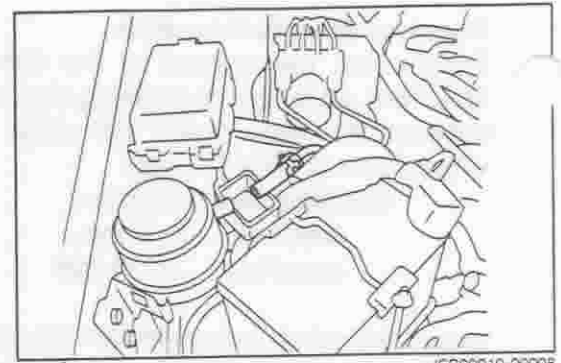
**CAUTION:**

- To prevent vane pump seizure, be sure to drain the fluid as shortest as possible without raising the engine revolution speed.

6. Stop the engine.

7. Fill the reservoir tank with fluid.  
Power Steering Fluid: ATF DEXRON®II

8. Start the engine and run it idly. When the fluid starts to flow out from the return hose side, immediately stop the engine.
9. Repeat the steps 7 and 8 above, until air no longer injects from the return side.
10. Connect the return hose to the reservoir tank.
11. Jack down the vehicle.
12. Perform air bleeding for the power steering system. (Refer to step "Air bleeding for the power steering system" mentioned below.)



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**Air bleeding for the power steering system**

1. Check the fluid level of the reservoir tank.

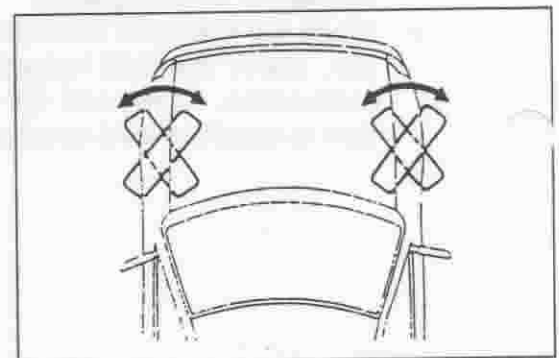
**NOTE:**

- If the fluid is lacking, add the specified fluid to the maximum level in the reservoir tank.

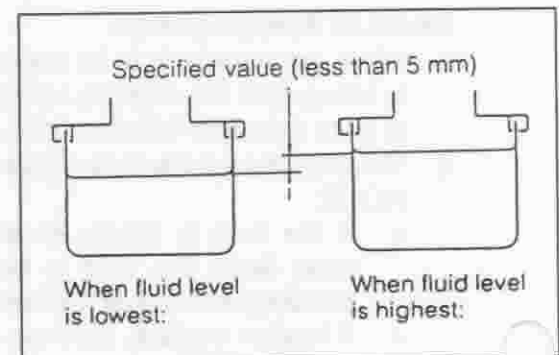
2. Run the engine at a speed below the fast idle speed. Turn the steering wheel up to the lock position in either the right or left direction. Hold this locked state for about two to three seconds. Next, turn the steering wheel up to the opposite lock position. Hold this locked state for about two to three seconds. Repeat this operation two to three times.

**NOTE:**

- Be certain to turn the steering wheel quickly.
- If the fluid temperature is low, most likely the fluid remains foamy. Hence, prior to the bleeding operation, be certain to warm the fluid up to 40 to 70°C by turning the steering wheel repeatedly with the vehicle in its stationary state.
- Check the fluid level of the reservoir tank during the bleeding operation. If the drop in fluid level is more than 5 mm, recheck the piping for fluid leakage.



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3. While turning the steering wheel with the vehicle in its stationary state, check that the power steering system is operating properly or it emits no abnormal noise, etc. Perform this check with the engine running at over 3000 rpm.

**NOTE:**

- If the following abnormalities are encountered during this check, check each part of the power steering system for sign of leakage. Again repeat the operations described in the step (2) afterward. If the trouble persists even these steps have been followed, replace faulty components of the power steering system.
- The fluid exhibits whitish cloudiness when the engine revolution speed is rising quickly.
- The steering operation is not smooth and also emitting abnormal noise.
- The change in fluid level exceeds 5 mm between a time when the engine is running and a time when the engine is stopped or between a time when the power steering is operating and a time when the power steering is stopped.
- The power steering system emits abnormal noise during the running (when the front wheels are turning).

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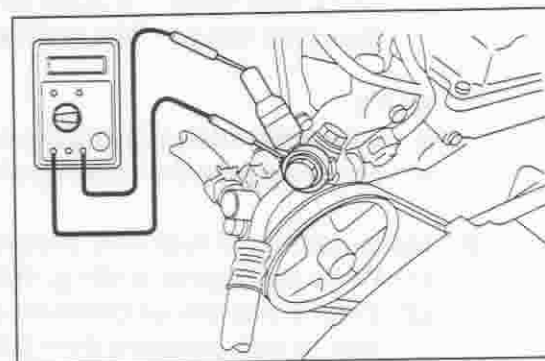
**Check of pressure switch**

1. Disconnect the harness from the pressure switch.
2. With the steering wheel set to the straight-ahead state, start the engine.
3. Confirm continuity between the pressure switch and the body earth.

Specified Value: No continuity exists.

4. Turn the steering wheel fully to the right or to the left.
5. With the steering wheel turned fully, confirm continuity between the pressure switch and the body earth.

Specified Value: Continuity exists.



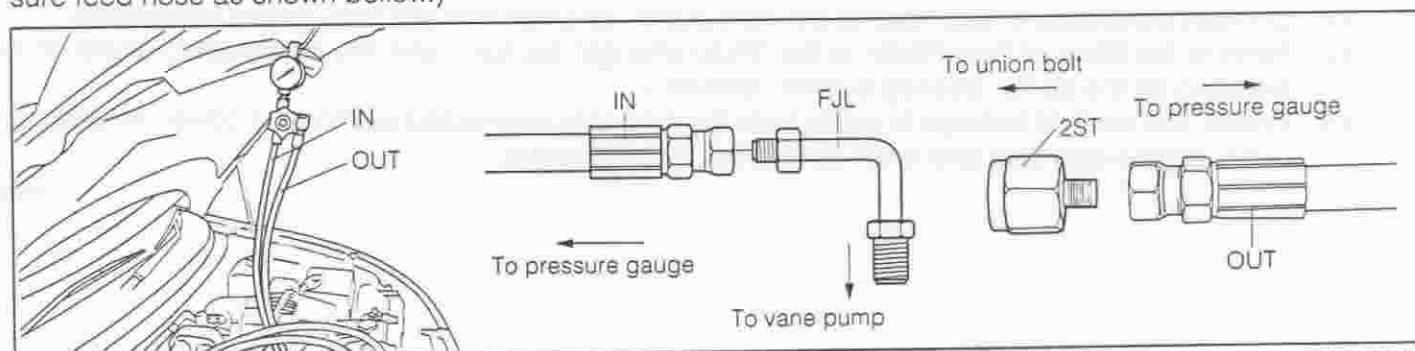
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**Check of power steering fluid pressure**

1. Drain the fluid from the power steering system. (Refer to the "Fluid change" section.)
2. Disconnect the pressure feed hose with gasket from the vane pump by disconnecting the union bolt.
3. Connect the two end of the following SST to vane pump.
  - (1) Connect the one end of the SST to vane pump.
  - (2) Connect the other end of the SST to pressure feed hose with gasket using the union bolt.

SST: 09990-87704-000

(Use the attachments (PSG-FJL, 2ST) for connection of the oil pressure gauge to the vane pump and pressure feed hose as shown below.)



JSR00015-00012

## CAUTION:

- Never connect the "IN" and "OUT" side hoses of the oil pressure gauge in wrong way. Failure to observe this caution may lead to damaging the oil pressure gauge.
- Never bend or twist the hoses and tubes forcibly.
- Never close the valve of the oil pressure gauge at this moment.

4. Perform the filling of fluid (Refer to the "Fluid change" section.) and the air bleeding (Refer to the "Air bleeding for the power steering system" section.).
5. Warm up the power steering fluid, until its temperature rises above 50°C.
6. Measurement of hydraulic pressure generated by vane pump  
While the engine is idling, measure the hydraulic pressure generated by the vane pump by closing the valve of the oil pressure gauge fully.  
Specified Pressure: 5390 - 5880 kPa (55 - 60 kgf/cm<sup>2</sup>)

If the hydraulic pressure is low, replace the vane pump assembly with new one.

## CAUTION:

- Never close the valve of oil pressure gauge not more than 10 seconds during measurement.

7. Check of pressure difference under unloaded state
  - (1) Open the pressure gauge valve fully.
  - (2) Determine the difference in pressure between a time when the engine revolution speed is 1000 rpm and a time when it is 3000 rpm.  
Specified Value: Not to exceed 490 kPa (5 kgf/cm<sup>2</sup>)

## NOTE:

- If the difference in hydraulic pressure exceeds the specified value, replace the vane pump assembly.
- Never operate the steering wheel during the measurement.

8. Measurement of hydraulic pressure at gear housing side
  - (1) While the engine is idling, open the pressure gauge valve fully.
  - (2) Ensure that the oil pressure gauge reading is more than that specified during steering wheel turns lock to lock positions from the steering wheel turns fully in right and left positions.  
Specified Value: 5.4 MPa <sup>±0.5</sup> (55 <sup>±5</sup> kgf/cm<sup>2</sup>)

If the hydraulic pressure is lower than that specified at either side of the right or the left, overhaul the steering gear assembly.

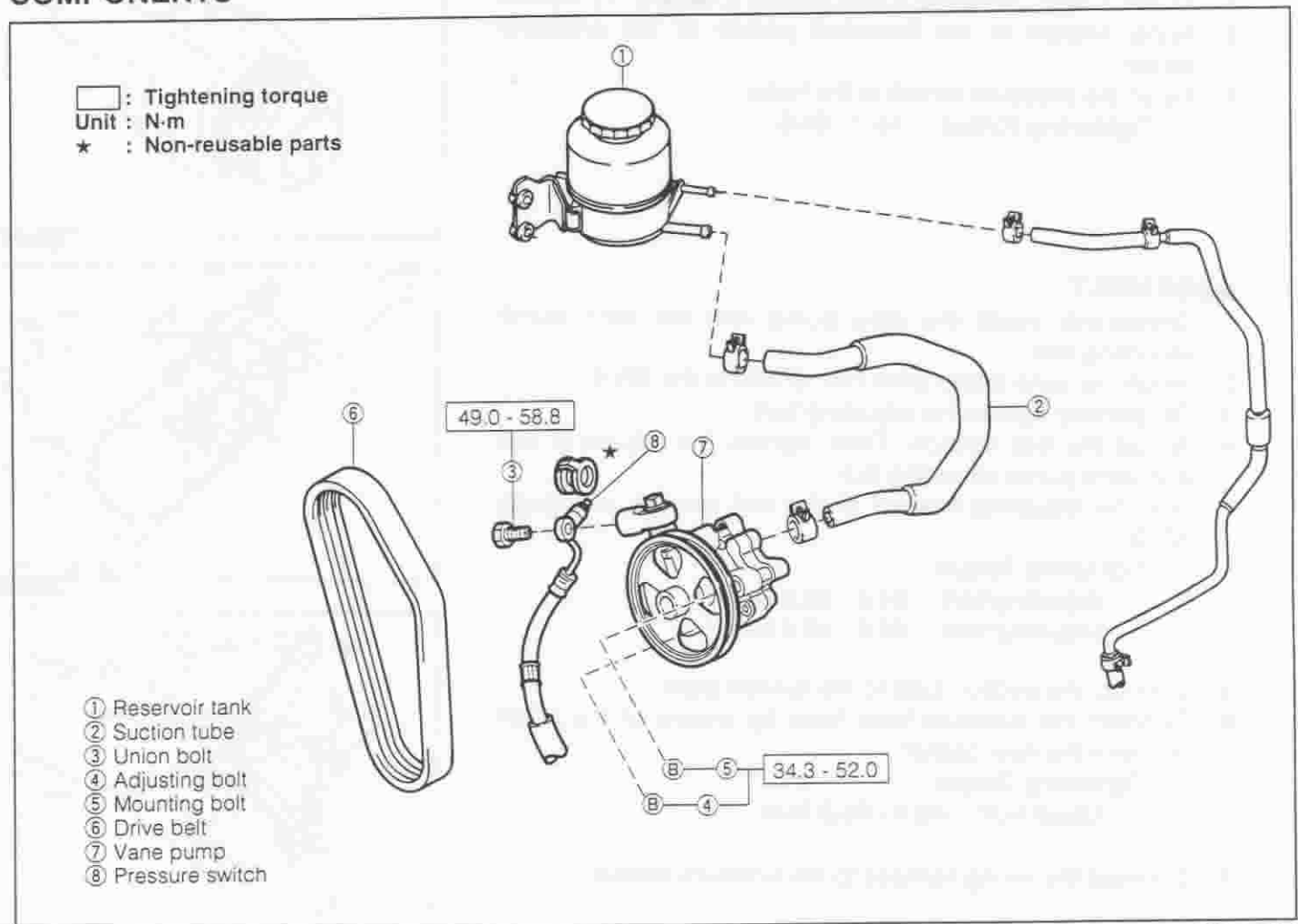
9. Drain the fluid from the power steering system. (Refer to the "Fluid change" section.)
10. Remove the oil pressure gauge (SST).

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11. Connect the pressure feed hose to the vane pump, by union bolt with new gasket interposed.
12. Perform the filling of fluid (Refer to the "Fluid change" section.) and the air bleeding (Refer to the "Air bleeding for the power steering system" section.).
13. Ensure that no fluid leakage is exists from the fluid pipe connected sections of power steering systems under engine operated and when turning the steering wheel.

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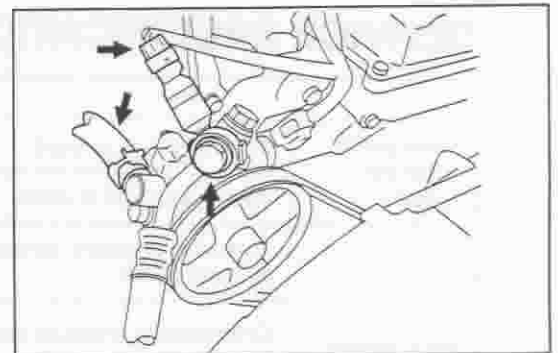
## VANE PUMP COMPONENTS



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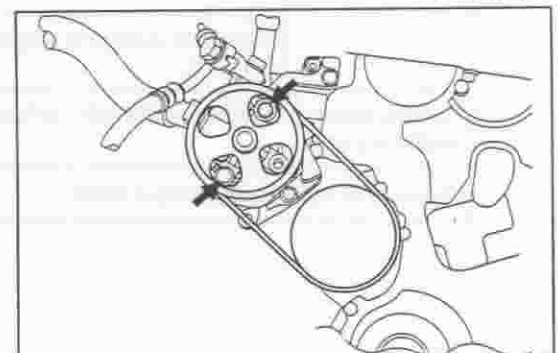
## REMOVAL

1. Drain the power steering fluid. (See page SR-3.)
2. Disconnect the suction tube from the suction pipe.
3. Disconnect the wire harness from the pressure switch.
4. Remove the union bolt. Disconnect the pressure feed hose.



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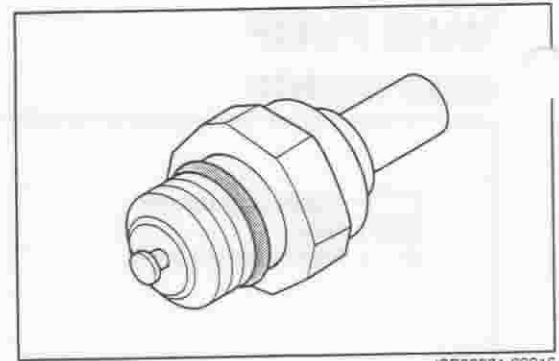
5. Remove the adjusting bolt.
6. Remove the vane pump mounting bolt.
7. Remove the vane pump drive belt.
8. Remove the vane pump.



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**Replacement of pressure switch**

1. Remove the pressure switch from the pressure feed hose.
2. Attach a new O-rings to a new pressure switch.
3. Apply sealant to the threaded portion of the pressure switch.
4. Install the pressure switch to the hose.  
Tightening Torque: 16.7 - 24.5



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**ASSEMBLY**

1. Temporarily install the vane pump with the vane pump mounting bolt.
2. Install the vane pump drive belt. (Refer to the SR-2.)
3. Temporarily tighten the adjusting bolt.
4. Adjust the belt tension. Then, tighten the adjusting bolt and vane pump mounting bolt.  
(For the adjusting method of the belt tension, see page SR-2.)

Tightening Torque:

Adjusting bolt: 34.3 - 52.0 N·m

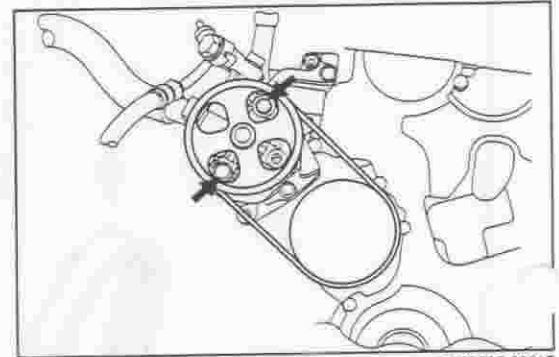
Mounting bolt: 34.3 - 52.0 N·m

5. Connect the suction tube to the suction pipe.
6. Connect the pressure feed hose by means of the union bolt with the new gasket.

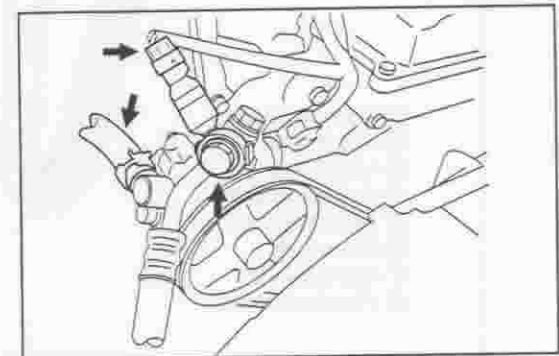
Tightening Torque:

Union bolt: 49.0 - 58.8 N·m

7. Connect the wiring harness to the pressure switch.



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JSR00023-00018


**SERVICE SPECIFICATIONS**

Item		Specified value	Remarks
Vane pump drive belt tension	When new belt is used:	7 - 9 mm	When pushed with a force of 98 N
	When used belt is used:	9 - 11 mm	
Oil pressure	Hydraulic pressure generated by vane pump	$5.4^{+0.5}$ MPa ( $55^{+5}$ kgf/cm <sup>2</sup> ) at 500 rpm	With oil pressure gauge valve closed
	Difference in pressure under unloaded state	Within 490 kPa (5 kgf/cm <sup>2</sup> )	Pressure difference that occurs between 1000 rpm and 3000 rpm of engine speed
	Hydraulic pressure at gear housing	$5.4^{+0.3}$ MPa ( $55^{+3}$ kgf/cm <sup>2</sup> ) at 500 rpm	With steering gear in fully-locked state
Turning effort of steering wheel with vehicle in stationary state		Not to exceed 5.4 N·m (0.55 kgf-m)	
Pre-load of steering gear input shaft		0.7 - 1.4 N·m (7 - 14 kgf-cm)	While rotating:

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## SSTs

Shape	Part No.	Part name
	09990-87704-000	P/S pressure gauge

JSR00025-00019

## TIGHTENING TORQUE

Components	N·m	kgf·m
Vane pump mounting bolt	34.3 - 52.0	3.52 - 5.28
Pressure switch × Pressure feed hose	16.7 - 24.5	1.70 - 2.5
Pressure feed hose × Vane pump (Union bolt)	49.0 - 58.8	5.0 - 6.0
Vane pump bracket × Engine	14.2 - 21.1	1.5 - 2.15
Drive belt adjusting bolt	34.3 - 52.0	3.52 - 5.28

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