POWER STEERING SYSTEM

PRECAUTION

1. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

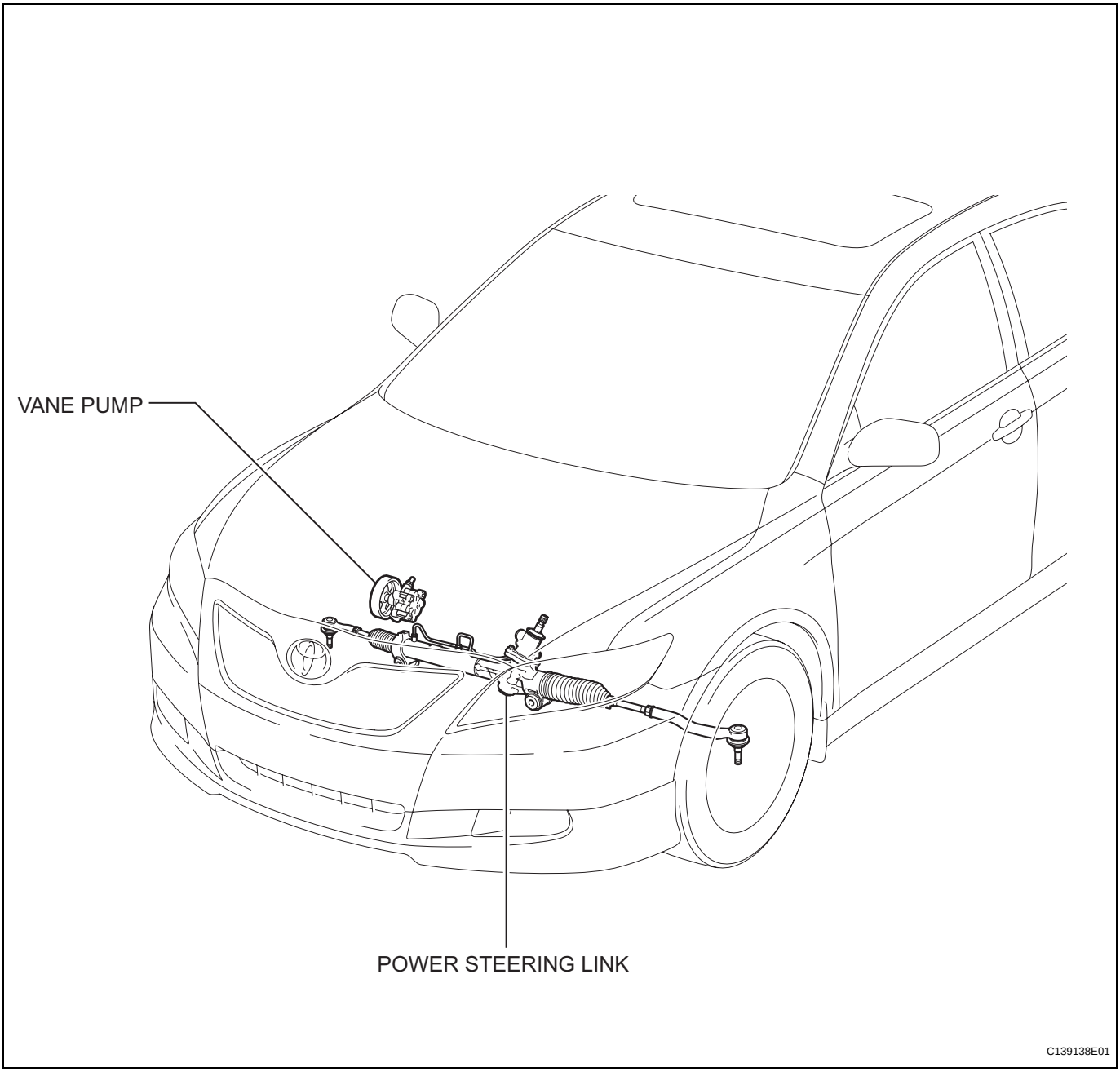
(a) The vehicle is equipped with an SRS (Supplemental Restraint System) such as airbags. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System (See page RS-1).

2. PRECAUTIONS FOR REMOVAL, INSTALLATION AND REPLACEMENT OF POWER STEERING COMPONENTS

(a) Be sure to turn the front wheels straight ahead when removing and installing the power steering link assembly.

(b) If disconnecting the steering sliding yoke and the pinion shaft of the power steering link assembly, be sure to put matchmarks before starting the operation.

PARTS LOCATION



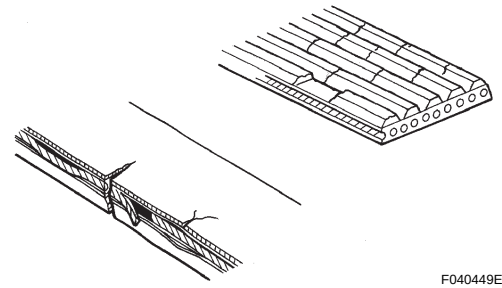
PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem. The numbers indicate likely causes of the problem in descending order. Check each part in order. If necessary, repair or replace faulty parts.

POWER STEERING SYSTEM

Symptom	Suspected area	See page
Hard steering	1. Tire (Improperly inflated)	TW-3
	2. Power steering fluid level (Low)	PS-3
	3. Drive belt (Loose) (for 2AZ-FE)	EM-6
	4. Drive belt (Loose) (for 2GR-FE)	EM-6
	5. Front wheel alignment (Incorrect)	SP-4
	6. Steering system joints (Worn)	-
	7. Suspension arm ball joints (Worn)	SP-28
	8. Steering column (Binding)	SR-38
	9. Power steering vane pump (for 2AZ-FE)	PS-10
	10. Power steering vane pump (for 2GR-FE)	PS-24
	11. Power steering gear	PS-40
Poor return	1. Tire (Improperly inflated)	TW-3
	2. Front wheel alignment (Incorrect)	SP-4
	3. Steering column (Binding)	SR-38
	4. Power steering gear	PS-40
Excessive free play	1. Steering system joints (Worn)	-
	2. Suspension arm ball joints (Worn)	SP-28
	3. Front wheel bearing (Worn)	AH-5
	4. Power steering gear	PS-40
Abnormal noise	1. Power steering fluid level (Low)	PS-3
	2. Steering system joints (Worn)	-
	3. Power steering vane pump (for 2AZ-FE)	PS-10
	4. Power steering vane pump (for 2GR-FE)	PS-24
	5. Power steering gear	PS-40

Example:



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ON-VEHICLE INSPECTION

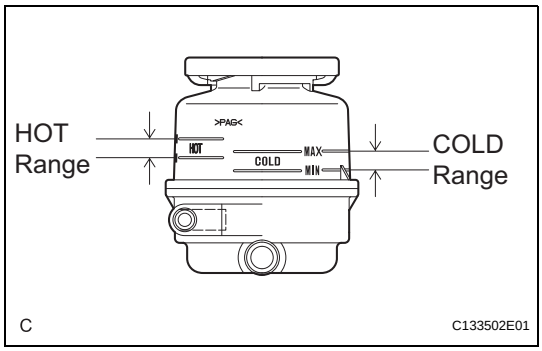
1. INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords, etc.
If any defect is found, replace the drive belt.
HINT:
Cracks on the rib side of a belt are considered acceptable. Replace the belt if there are any missing ribs.

2. CHECK POWER STEERING FLUID LEVEL

(a) Keep the vehicle level.

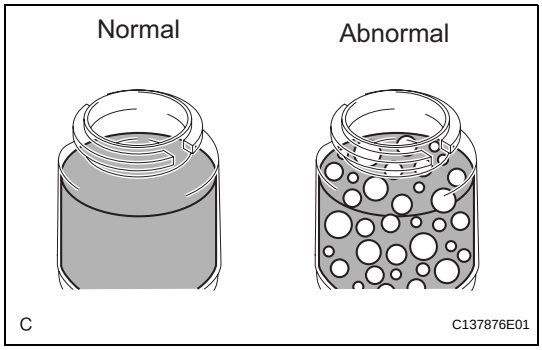
PS



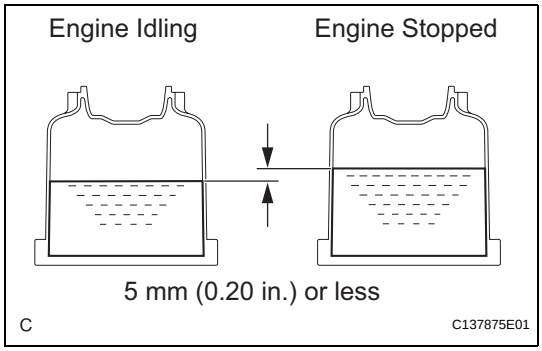
(b) With the engine stopped, check the fluid level in the fluid reservoir.
If necessary, add fluid.
Fluid:
ATF DEXRON II or III, or equivalent
HINT:
If the fluid is hot, check that the fluid level is within the HOT range on the fluid reservoir. If the fluid is cold, check that the fluid level is within the COLD range.

(c) Start the engine and run it at idle.

(d) Turn the steering wheel from lock to lock several times to raise fluid temperature.
Fluid temperature:
70 to 80°C (158 to 176°F)



(e) Check for foaming or emulsification.
If foaming or emulsification is identified, bleed the power steering system (See page PS-7).



(f) With the engine idling, measure the fluid level in the fluid reservoir.

(g) Stop the engine.

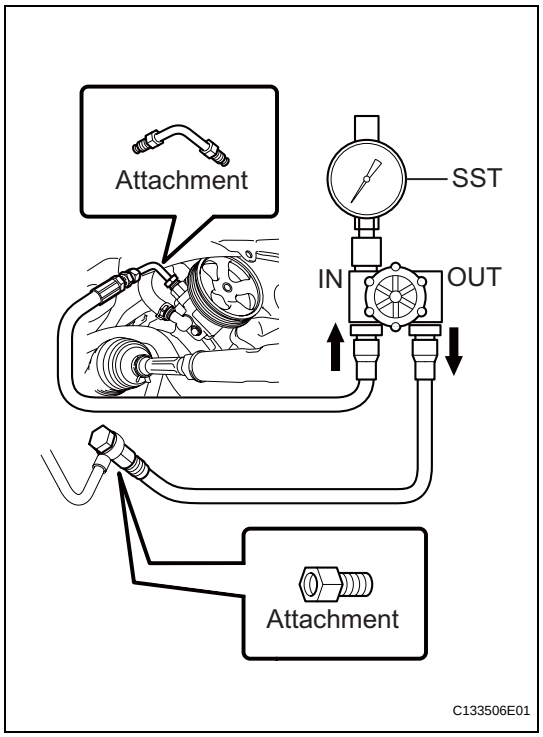
(h) Wait a few minutes and remeasure the fluid level in the fluid reservoir.
Maximum fluid level rise:
5 mm (0.20 in.)
If a problem is found, bleed the power steering system (See page PS-7).

(i) Check the fluid level.

3. INSPECT STEERING FLUID PRESSURE

(a) Disconnect the pressure feed tube assembly from the vane pump assembly (See page PS-10 for 2AZ-FE, PS-24 for 2GR-FE).

PS

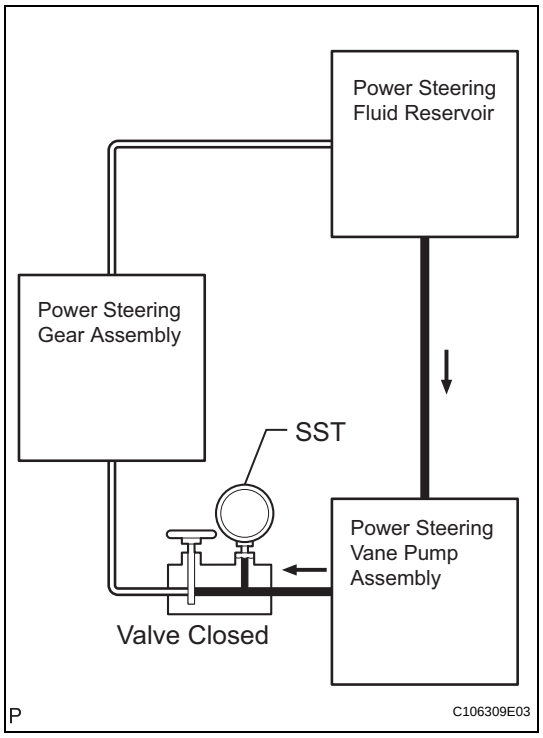


(b) Connect SST as shown in the illustration.
SST 09640-10010 (09641-01010, 09641-01060, 09641-01030)
NOTICE:
Check that the valve of the SST is in the open position.

(c) Bleed the power steering system (See page PS-7).

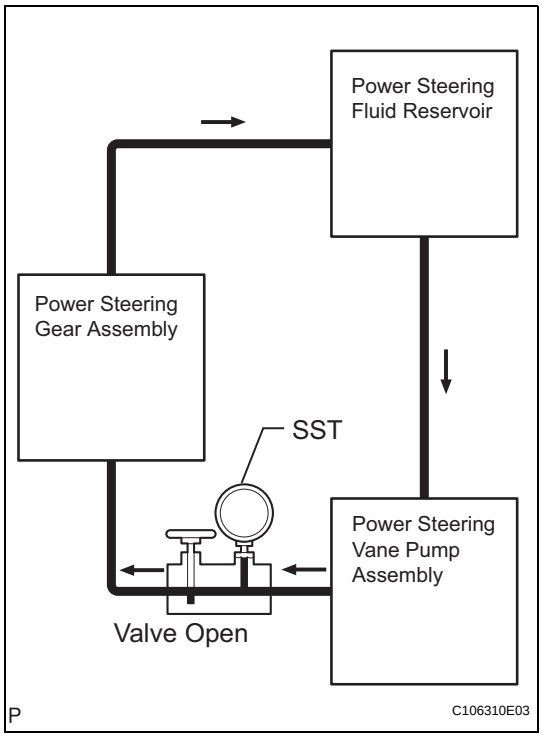
(d) Start the engine and run it at idle.

(e) Turn the steering wheel from lock to lock several times to raise fluid temperature.
Fluid temperature:
70 to 80°C (158 to 176°F)

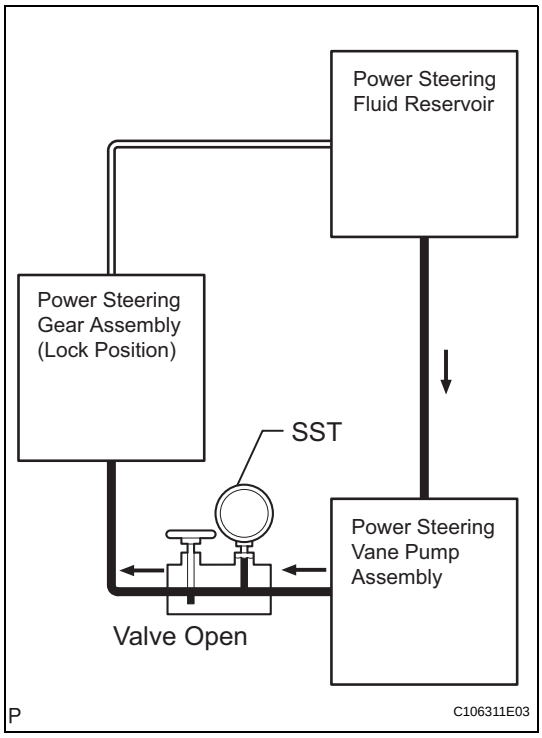


(f) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm^2, 1,131 to 1,204 psi)
NOTICE:
- **Do not keep the valve closed for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

PS



(g) With the engine idling, open the valve fully.
(h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Fluid pressure difference:
490 kPa (5 kgf/cm^2, 71 psi) or less
NOTICE:
Do not turn the steering wheel.



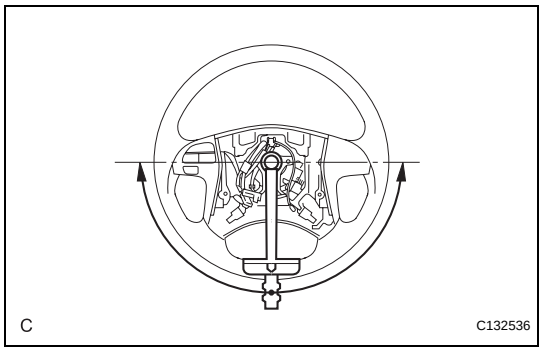
(i) With the engine idling and the valve fully opened, turn the steering wheel left or right to the full lock position. Observe the reading on the SST.
Minimum fluid pressure:
7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm^2, 1,131 to 1,204 psi)
NOTICE:
- **Do not keep the steering wheel in the full lock position for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

(j) Disconnect the SST.
(k) Connect the pressure feed tube assembly to the vane pump assembly (See page PS-20 for 2AZ-FE, PS-34 for 2GR-FE).
(l) Bleed the power steering system (See page PS-7).

4. CHECK STEERING EFFORT

(a) Stop the vehicle on a level, paved surface and turn the wheels straight ahead.
(b) Disconnect the negative (-) battery cable from the battery (See page RS-1).
(c) Remove the steering pad (See page RS-349).
(d) Connect the negative (-) battery cable to the battery.
(e) Using a torque wrench, check if the steering wheel set nut is properly tightened.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
(f) Start the engine and run it at idle.

PS



(g) Turn the steering wheel 90 degrees to the right and check steering effort (torque) while turning the wheel. Check the opposite direction in the same manner.
Torque: Steering effort (Reference)
6.0 N*m (61 kgf*cm, 53 in.*lbf) (LE Grade, XLE Grade)
Steering effort (Reference)
6.8 N*m (69 kgf*cm, 60 in.*lbf) (SE Grade)
HINT:
Check tire type, pressure, and the road surface before making your diagnosis.

(h) Disconnect the negative (-) battery cable from the battery.

(i) Torque the steering wheel set nut.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)

(j) Install the steering pad (See page RS-350).

(k) Connect the negative (-) battery cable to the battery.

(l) Clear the DTCs (See page RS-41).

(m) Inspect the airbag warning light (See page RS-32).

PS

POWER STEERING FLUID

BLEEDING

1. BLEED POWER STEERING SYSTEM

(a) Check the fluid level (See page PS-3).

(b) Jack up the front of the vehicle and support it with stands.

(c) Turn the steering wheel.

(1) With the engine stopped, turn the steering wheel slowly from lock to lock several times.

(d) Lower the vehicle.

(e) Start the engine.

(1) Run the engine at idle for a few minutes.

(f) Turn the steering wheel.

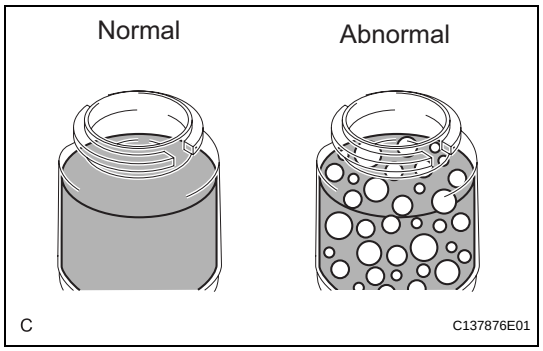
(1) With the engine idling, turn the steering wheel left or right to the full lock position and keep it in that position for 2 to 3 seconds, then turn the steering wheel to the opposite full lock position and keep it there for 2 to 3 seconds.

(2) Repeat this procedure several times.

(g) Stop the engine.

(h) Check for foaming or emulsification.
If the system has to be bled twice because of forming or emulsification, be sure to check for fluid leaks in the system.

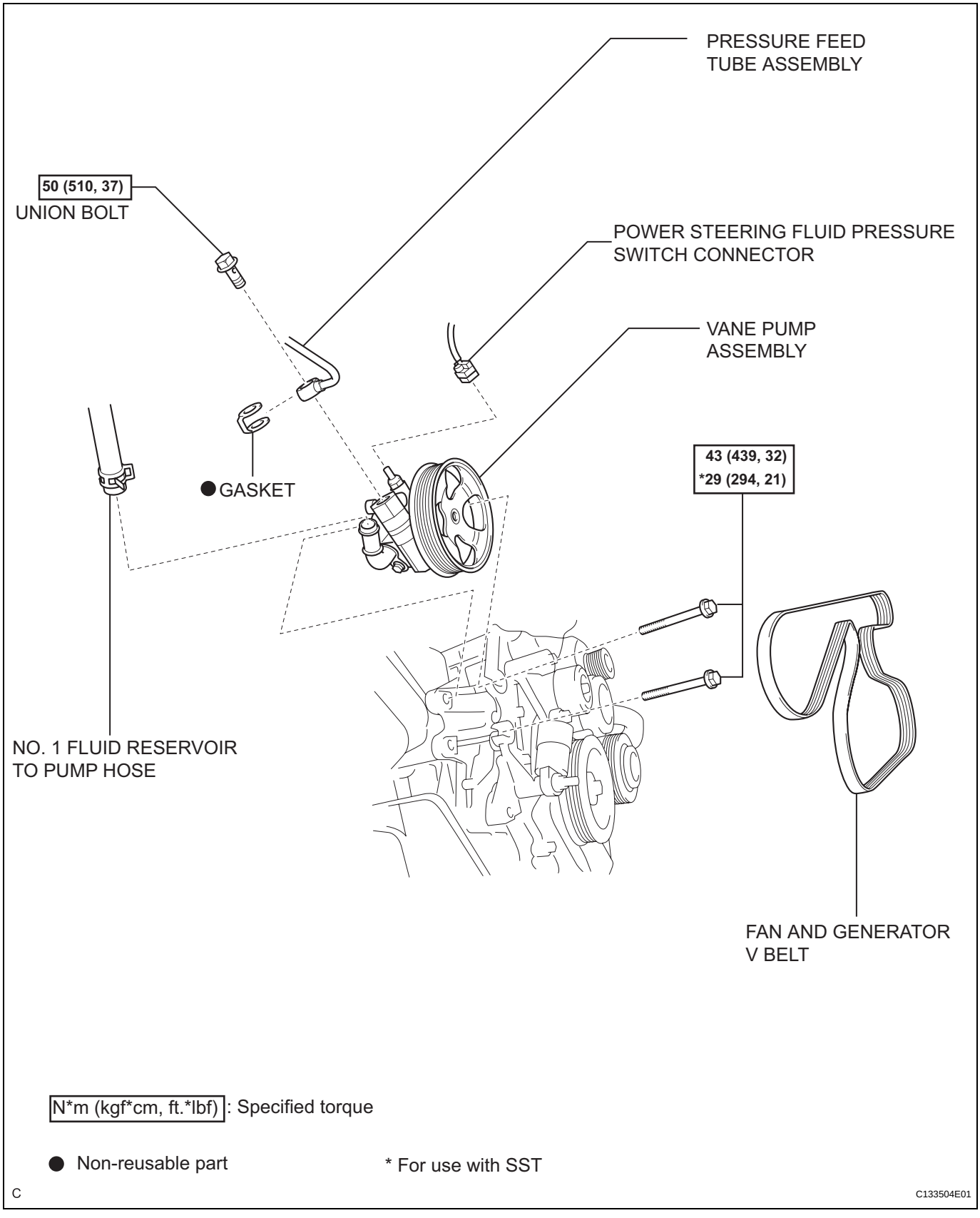
(i) Check the fluid level (See page PS-3).



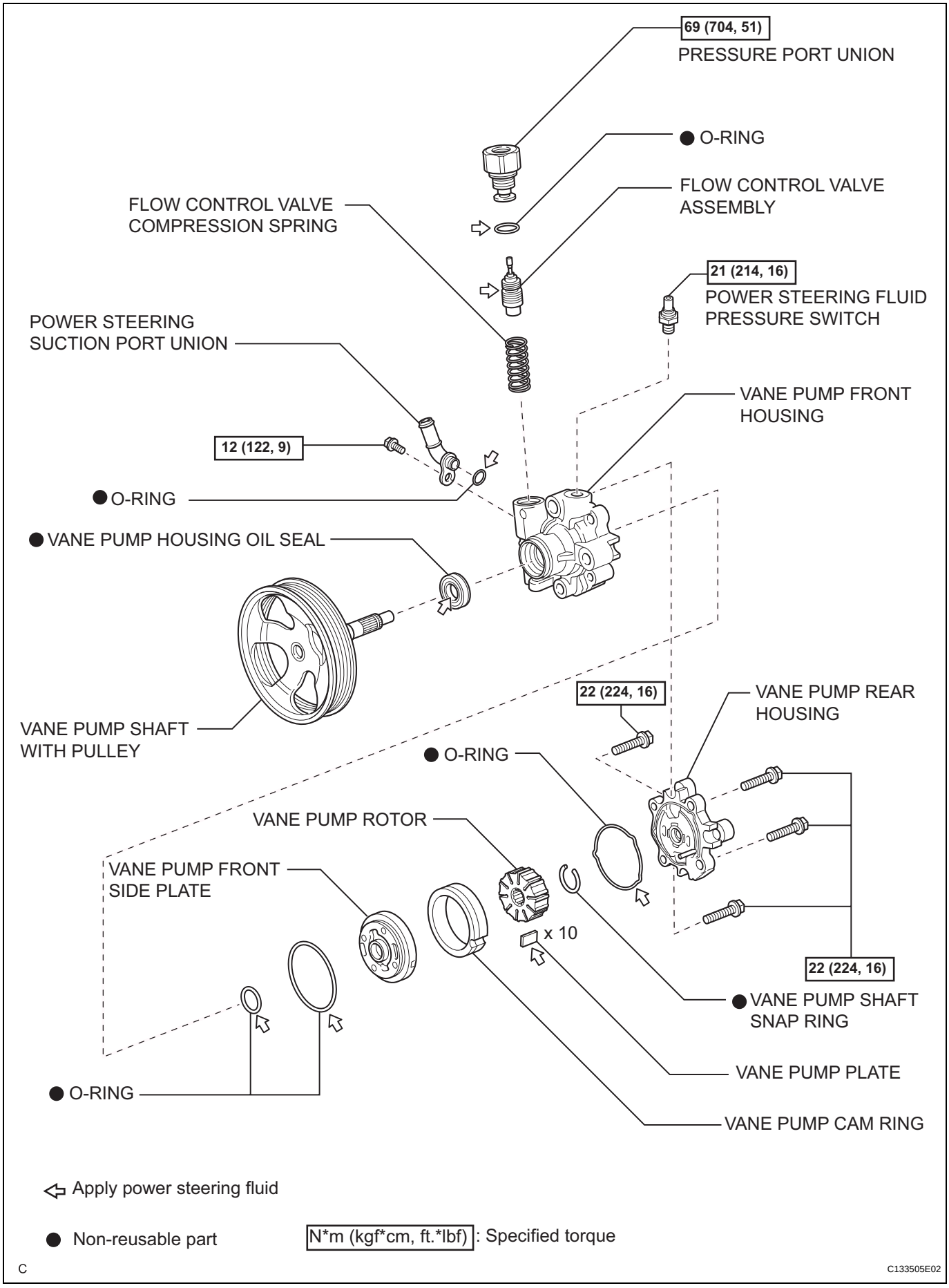
PS

VANE PUMP (for 2AZ-FE)

COMPONENTS



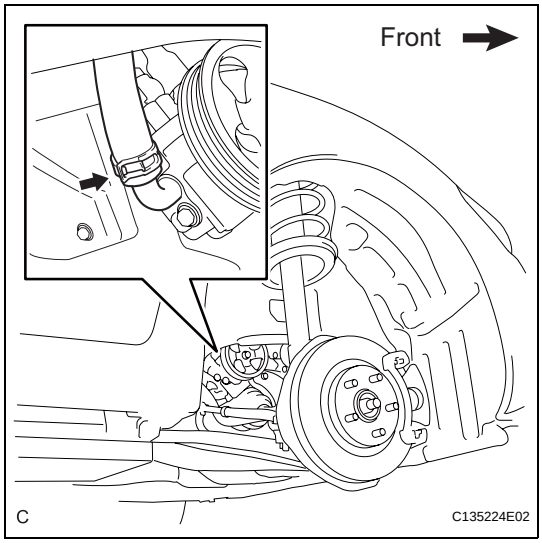
PS


69 (704, 51)
PRESSURE PORT UNION
● O-RING
FLOW CONTROL VALVE ASSEMBLY
FLOW CONTROL VALVE COMPRESSION SPRING
21 (214, 16)
POWER STEERING FLUID PRESSURE SWITCH
POWER STEERING SUCTION PORT UNION
VANE PUMP FRONT HOUSING
12 (122, 9)
● O-RING
● VANE PUMP HOUSING OIL SEAL
22 (224, 16)
VANE PUMP REAR HOUSING
VANE PUMP SHAFT WITH PULLEY
● O-RING
VANE PUMP ROTOR
VANE PUMP FRONT SIDE PLATE
x 10
22 (224, 16)
● VANE PUMP SHAFT SNAP RING
VANE PUMP PLATE
● O-RING
VANE PUMP CAM RING
⇦ Apply power steering fluid
● Non-reusable part
N*m (kgf*cm, ft.*lbf) : Specified torque
C
C133505E02

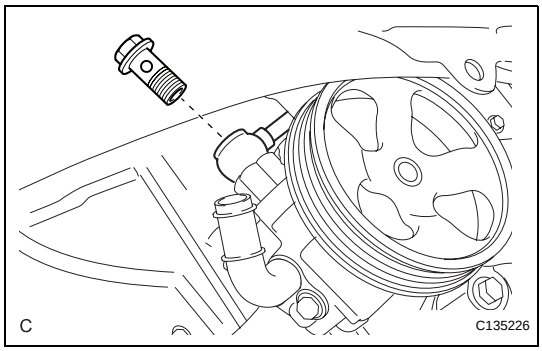
PS

REMOVAL

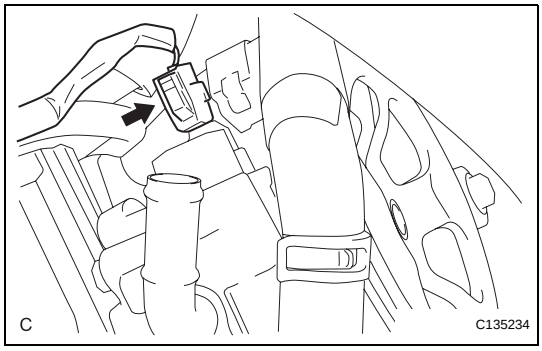
1. **DRAIN POWER STEERING FLUID**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE FRONT FENDER APRON SEAL RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page EM-6)**



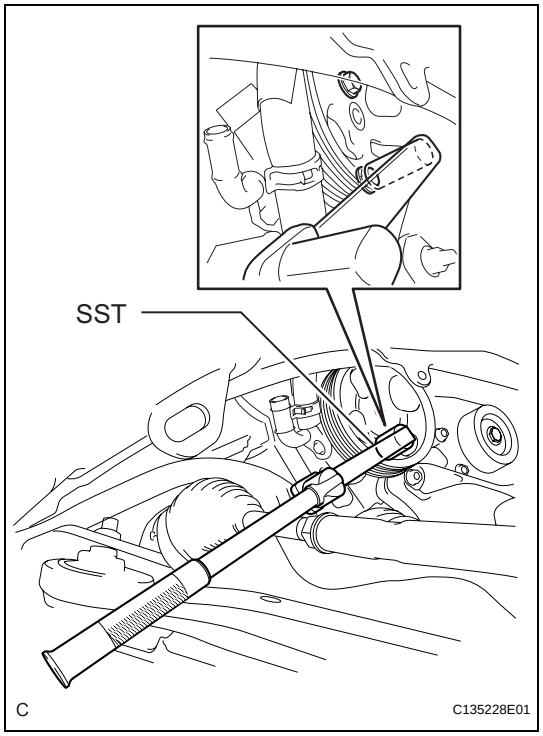
6. **DISCONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE**
   (a) Slide the clip and disconnect the No. 1 fluid reservoir to pump hose from the vane pump assembly.



7. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
   (a) Remove the union bolt and disconnect the pressure feed tube assembly from the vane pump assembly.
   (b) Remove the gasket from the pressure feed tube assembly.

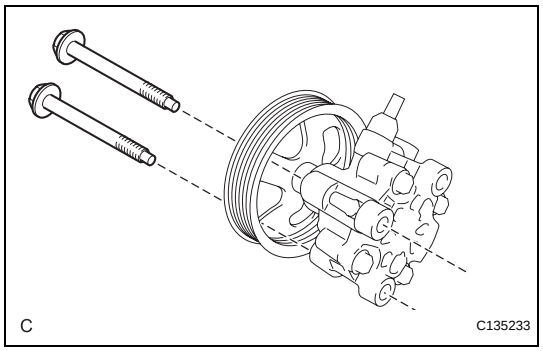


8. **DISCONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR**
   (a) Disconnect the power steering fluid pressure switch connector.



9. REMOVE VANE PUMP ASSEMBLY

(a) Using SST, loosen the 2 bolts and remove the vane pump assembly.
SST 09249-63010



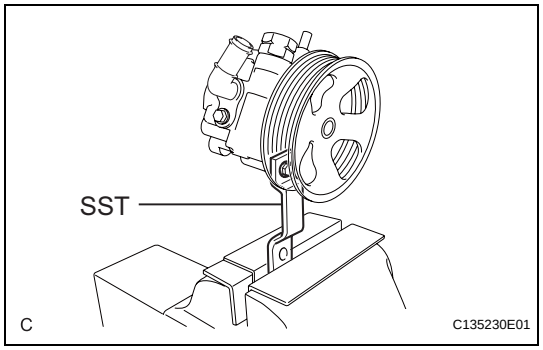
(b) Remove the 2 bolts from the vane pump assembly.

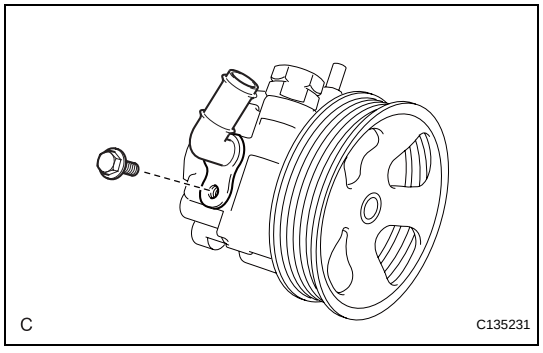
PS

DISASSEMBLY

1. HOLD VANE PUMP ASSEMBLY

(a) Using SST, hold the vane pump assembly in a vise.
SST 09630-00014 (09631-00132)

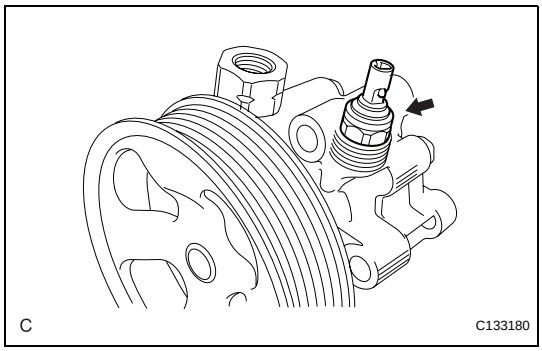




2. REMOVE POWER STEERING SUCTION PORT UNION

(a) Remove the bolt and power steering suction port union from the vane pump assembly.

(b) Using a screwdriver, remove the O-ring from the power steering suction port union.

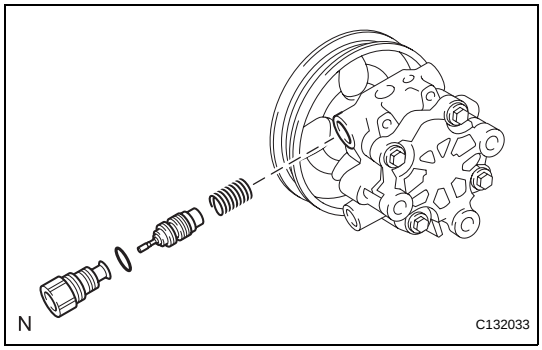


3. REMOVE POWER STEERING FLUID PRESSURE SWITCH

(a) Remove the power steering fluid pressure switch from the vane pump assembly.

NOTICE:

Perform this procedure only when the power steering fluid pressure switch is replaced.

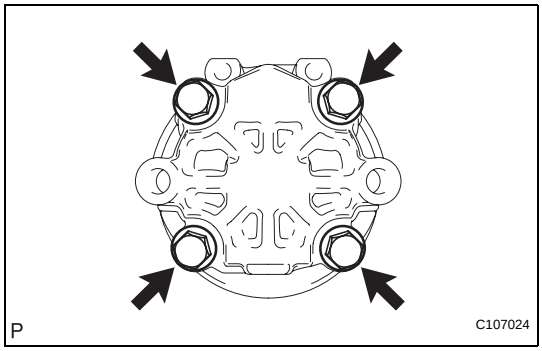


4. REMOVE FLOW CONTROL VALVE ASSEMBLY

(a) Remove the pressure port union.

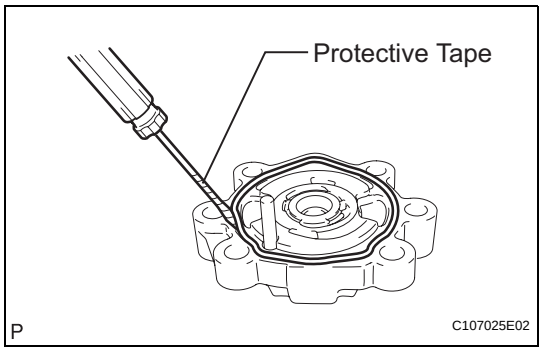
(b) Remove the O-ring from the pressure port union.

(c) Remove the flow control valve assembly and the flow control valve compression spring.



5. REMOVE VANE PUMP REAR HOUSING

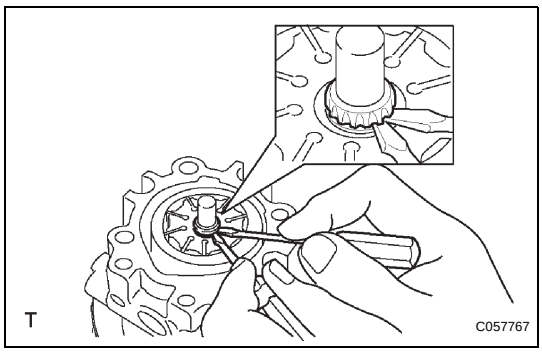
(a) Remove the 4 bolts and vane pump rear housing from the vane pump front housing.



(b) Using a screwdriver, remove the O-ring from the vane pump rear housing.

HINT:

Tape the screwdriver tip before use.

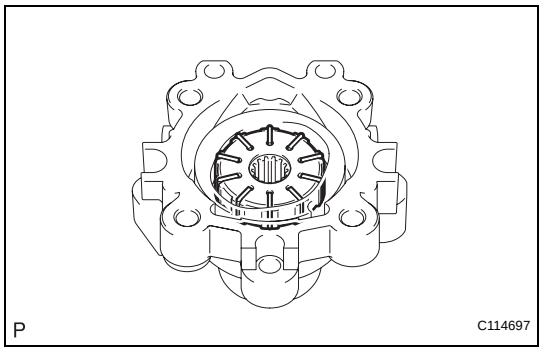


6. REMOVE VANE PUMP SHAFT WITH PULLEY

(a) Using 2 screwdrivers, remove the vane pump shaft snap ring from the vane pump shaft with pulley.

(b) Remove the vane pump shaft with pulley.

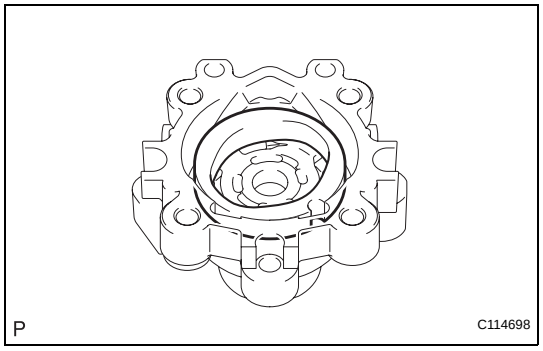
PS



7. REMOVE VANE PUMP ROTOR

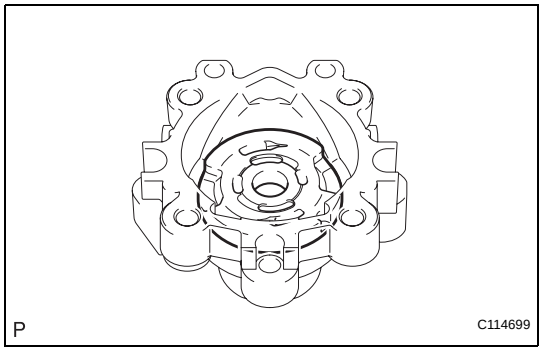
(a) Remove the 10 vane pump plates.

(b) Remove the vane pump rotor.



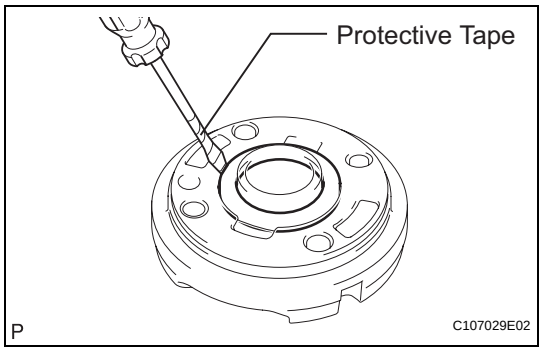
8. REMOVE VANE PUMP CAM RING

(a) Remove the vane pump cam ring from the vane pump front housing.

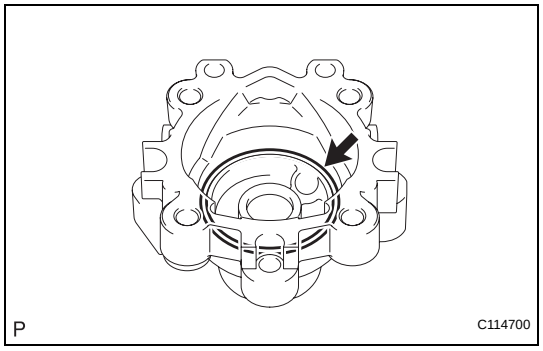


9. REMOVE VANE PUMP FRONT SIDE PLATE

(a) Remove the vane pump front side plate from the vane pump front housing.

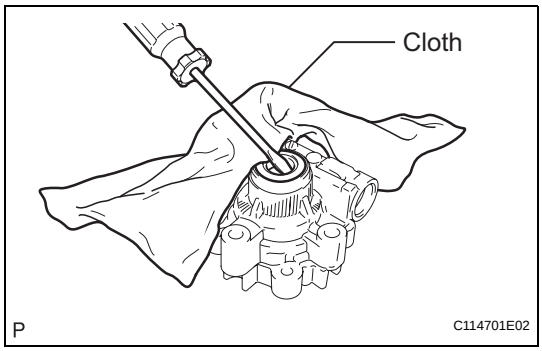


(b) Using a screwdriver, remove the O-ring from the vane pump front side plate.
HINT:
Tape the screwdriver tip before use.



(c) Remove the O-ring from the vane pump front housing.

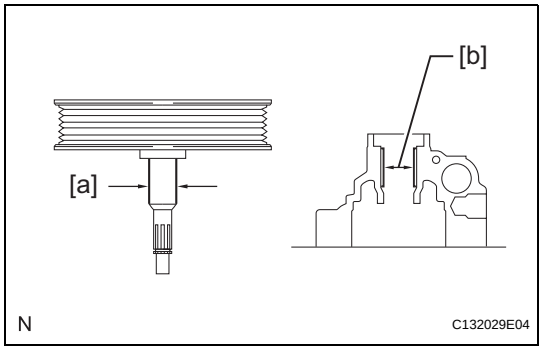
PS



10. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using a screwdriver and a shop rag or a piece of cloth, remove the vane pump housing oil seal.
NOTICE:
Be careful not to damage the vane pump front housing.

INSPECTION



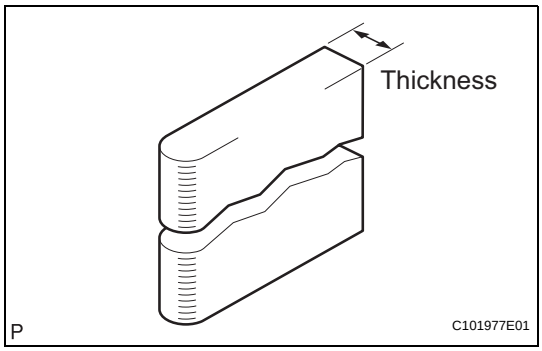
1. INSPECT VANE PUMP SHAFT AND BUSHING IN VANE PUMP FRONT HOUSING

(a) Using a micrometer, measure the outer diameter [a] of the vane pump shaft with pulley.

(b) Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bushing.

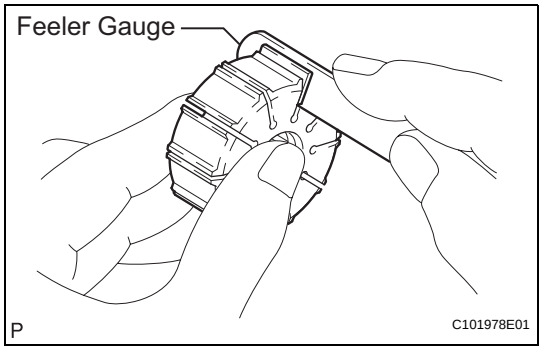
(c) Calculate the oil clearance.
Oil clearance = Inner diameter of the bushing [b] - Outer diameter of the shaft [a].
Maximum oil clearance:
0.07 mm (0.0028 in.)
If oil clearance exceeds the maximum, replace the vane pump assembly.

PS

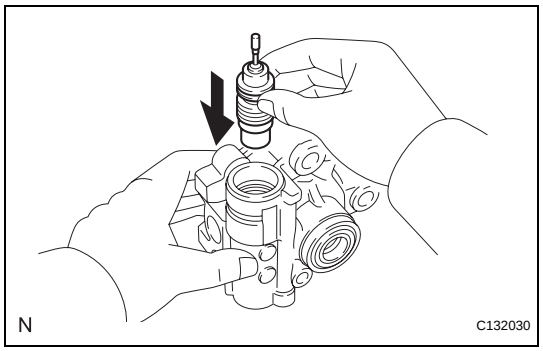


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE CLEARANCE

(a) Using a micrometer, measure the thickness of the vane pump plates.
Standard thickness:
1.405 to 1.411 mm (0.05531 to 0.05555 in.)
If the thickness is not within the specified range, replace the vane pump assembly.

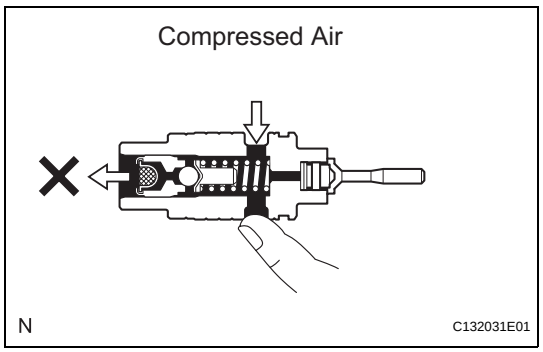


(b) Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plates.
Maximum clearance:
0.03 mm (0.0012 in.)
If clearance exceeds the maximum, replace the vane pump assembly.

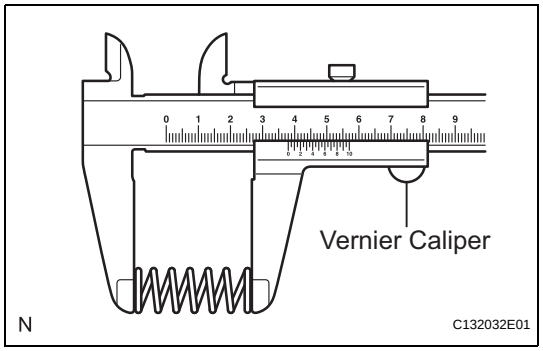


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid and check that it falls smoothly into the flow control valve due to its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



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

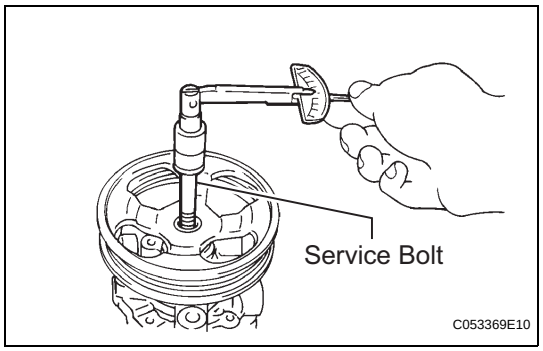


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the flow control valve compression spring.
Minimum free length:
29.2 mm (1.150 in.)
If the length is less than the minimum, replace the vane pump assembly.

5. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is severely damaged, replace the vane pump assembly.



6. INSPECT TOTAL PRELOAD

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

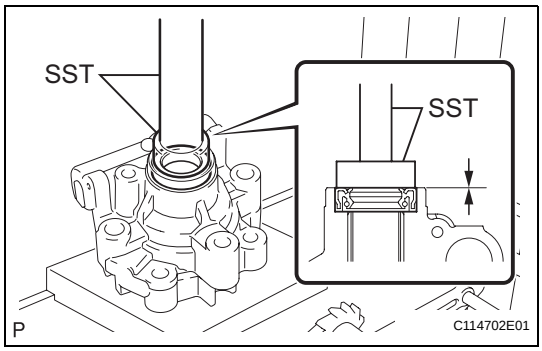
(b) Temporarily install the service bolt.
Recommended service bolt:
Thread diameter:
10 mm (0.39 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

(c) Using a torque wrench, check the pump rotating torque.
Rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less
If the rotating torque is not as specified, check the vane pump housing oil seal.

PS

REASSEMBLY

NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid (See page PS-8).



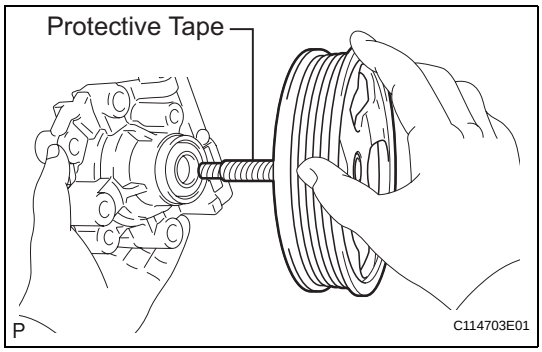
1. INSTALL VANE PUMP HOUSING OIL SEAL

(a) Coat a new vane pump housing oil seal lip with power steering fluid.

(b) Using SST and a press, install the vane pump housing oil seal.

SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)

NOTICE:
Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



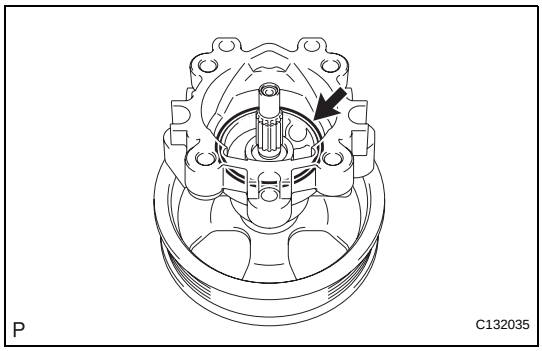
2. INSTALL VANE PUMP SHAFT WITH PULLEY

(a) Coat the inside surface of the bushing in the vane pump front housing with power steering fluid.

(b) Gradually insert the vane pump shaft with pulley.

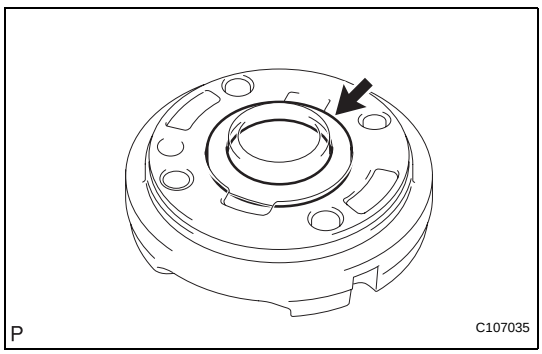
NOTICE:
Do not damage the oil seal lip in the front housing.

HINT:
Wrap protective tape around the spline of the vane pump shaft with pulley in order to prevent damage to the oil seal.



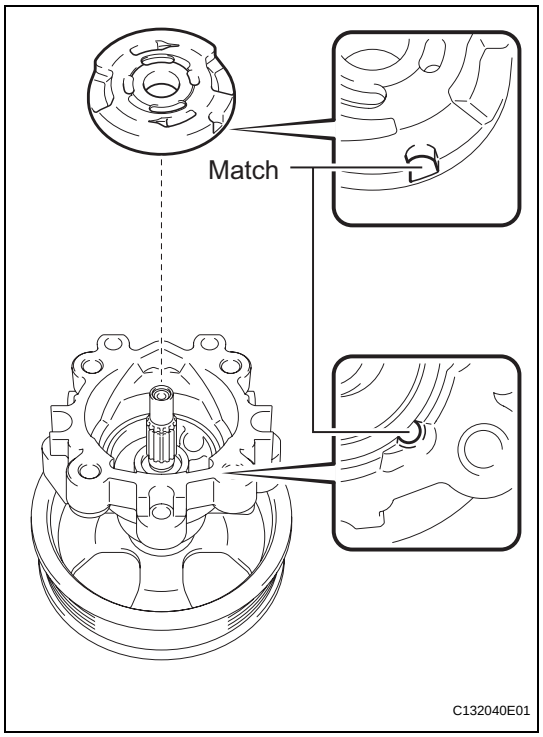
3. INSTALL VANE PUMP FRONT SIDE PLATE

(a) Coat a new O-ring with power steering fluid and install it into the vane pump front housing.

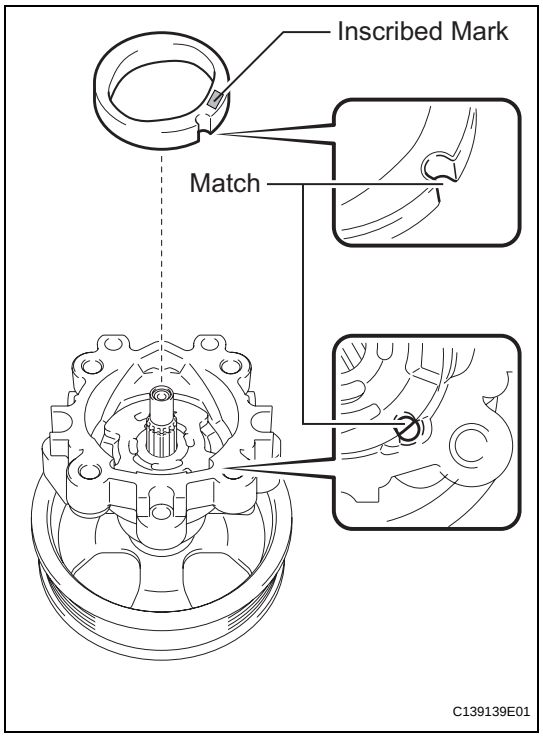


(b) Coat a new O-ring with power steering fluid and install it onto the vane pump front side plate.

PS



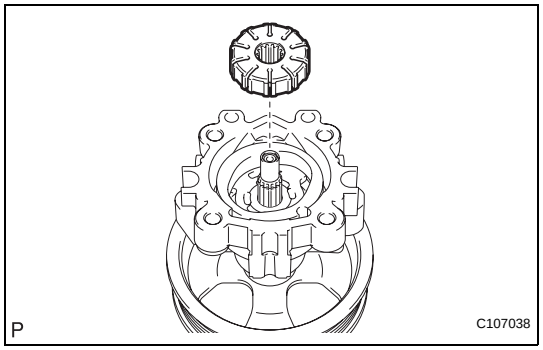
(c) Align the notch of the vane pump front side plate with that of the vane pump front housing, and install the vane pump front side plate.
NOTICE:
Make sure that the vane pump front side plate is installed facing in the correct direction.



4. INSTALL VANE PUMP CAM RING

(a) Align the notch of the cam ring with that of the vane pump front side plate, and install the vane pump cam ring with the inscribed mark facing upward.
NOTICE:
Make sure that the vane pump cam ring is installed facing in the correct direction.

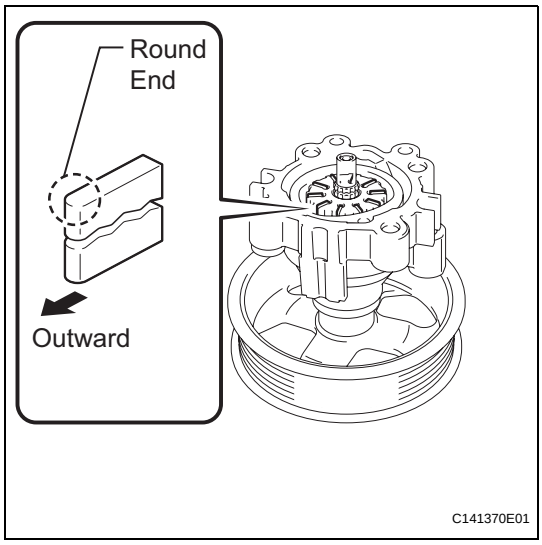
PS



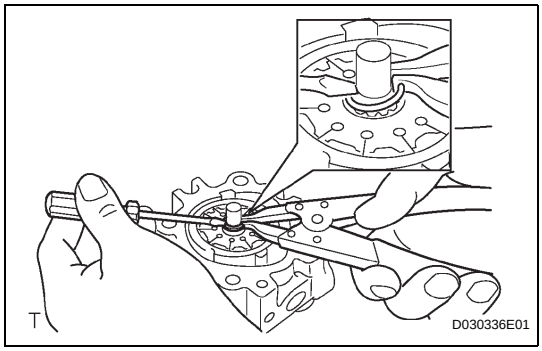
5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor.
HINT:
Vane pump rotor can be installed in both directions.

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

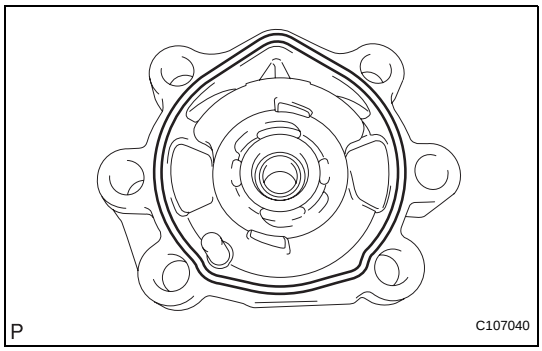


(c) Install the vane pump plates with the round end facing outward.
NOTICE:
Make sure that the vane pump plates are installed facing in the correct direction.



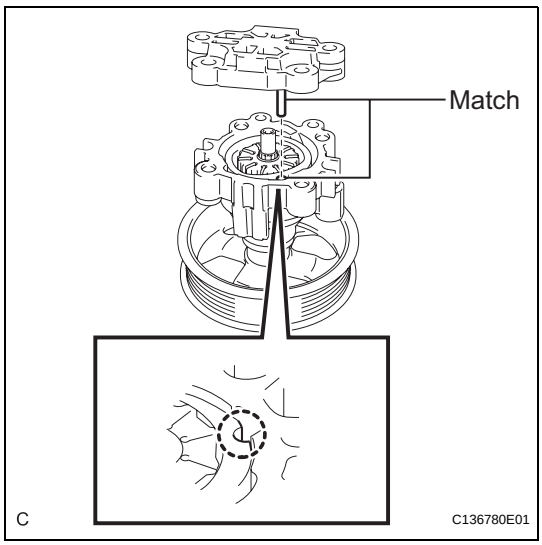
6. INSTALL VANE PUMP SHAFT SNAP RING

(a) Using a screwdriver and a snap ring expander, install a new vane pump shaft snap ring onto the vane pump shaft with pulley.

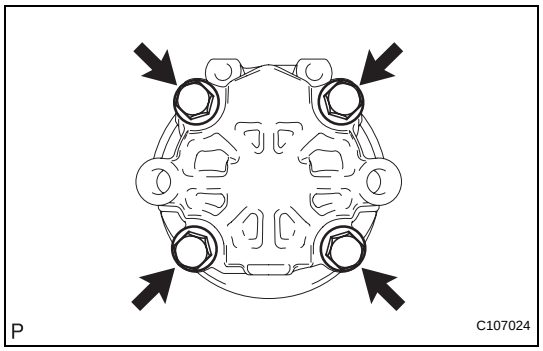


7. INSTALL VANE PUMP REAR HOUSING

(a) Coat a new O-ring with power steering fluid and install it onto the vane pump rear housing.

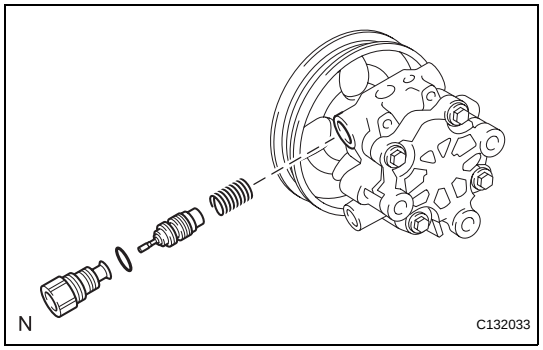


(b) Align the straight pin of the vane pump rear housing with the notches of the vane pump cam ring, vane pump front side plate, and vane pump front housing.



(c) Install the vane pump rear housing with the 4 bolts.
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

8. INSPECT TOTAL PRELOAD (See page PS-15)



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid.

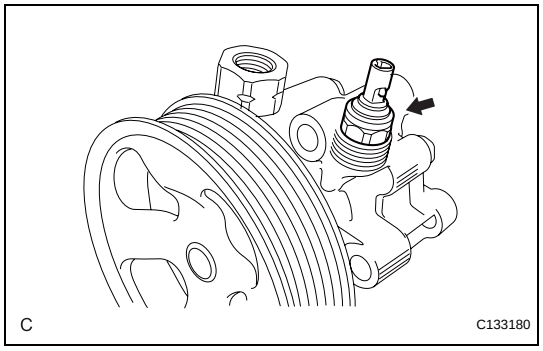
(b) Install the flow control valve compression spring and the flow control valve assembly to the vane pump front housing.

(c) Coat a new O-ring with power steering fluid and install it onto the pressure port union.

(d) Install the pressure port union to the vane pump front housing.
Torque: 69 N*m (704 kgf*cm, 51 ft.*lbf)

10. INSTALL POWER STEERING FLUID PRESSURE SWITCH

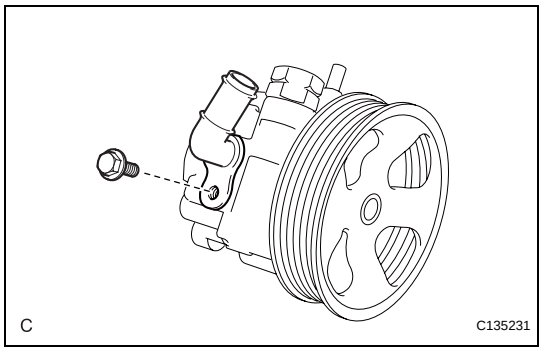
(a) Coat the new O-ring attached to the new power steering fluid pressure switch with power steering fluid.



(b) Install the power steering fluid pressure switch to the vane pump assembly.
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
NOTICE:
Do not use a power steering fluid pressure switch that has been subjected an impact; for example, due to it having been dropped.

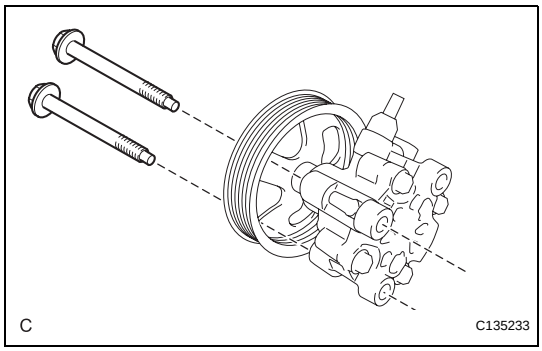
11. INSTALL POWER STEERING SUCTION PORT UNION

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



(b) Install the power steering suction port union to the vane pump assembly with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

PS

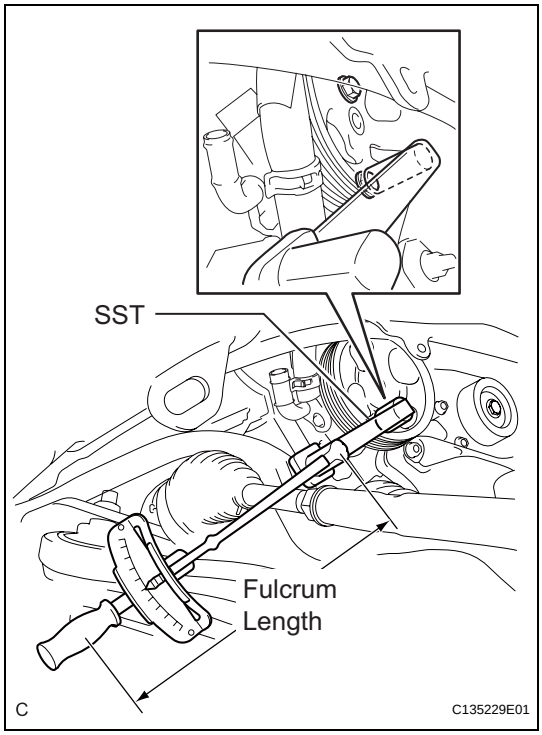


INSTALLATION

1. INSTALL VANE PUMP ASSEMBLY

(a) Temporarily install the 2 bolts to the vane pump assembly.

(b) Install the vane pump assembly.



(c) Using SST, tighten the 2 bolts.

SST 09249-63010

Torque: Without SST

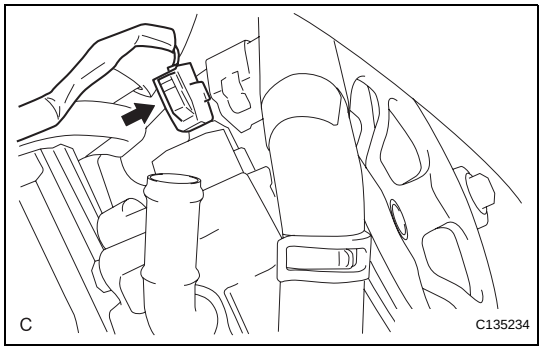
43 N*m (439 kgf*cm, 32 ft.*lbf)

With SST

29 N*m (294 kgf*cm, 21 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is accurate when SST is parallel to the torque wrench.**



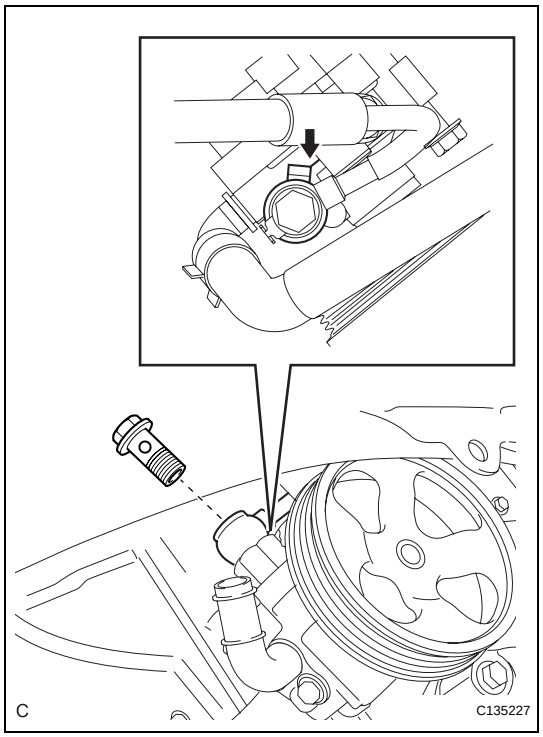
2. CONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR

(a) Connect the connector to the power steering fluid pressure switch.

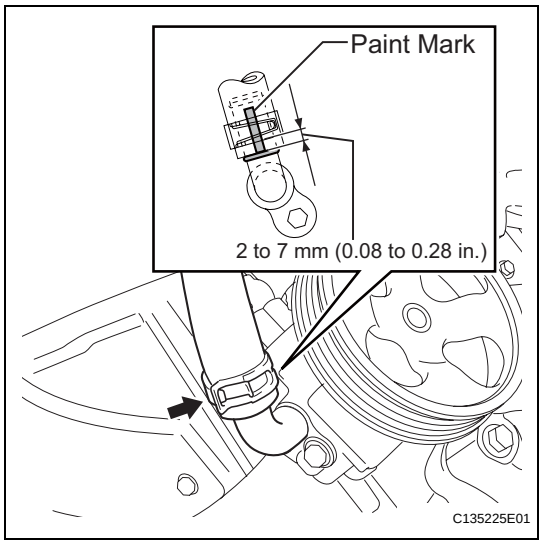
3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Install a new gasket to the pressure feed tube assembly.

PS



(b) Connect the pressure feed tube assembly to the vane pump assembly with the union bolt.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
NOTICE:
Make sure that the stopper of the pressure feed tube assembly contacts the vane pump assembly securely as shown in the illustration.



4. CONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE

(a) Connect the No. 1 fluid reservoir to pump hose to the vane pump assembly with the clip.
NOTICE:
- **Connect the No. 1 oil reservoir to pump hose with the paint mark facing toward the rear of the vehicle.**
- **Push the No. 1 oil reservoir to pump hose as far as it will go as shown in the illustration.**
- **Install the clip at the position specified in the illustration.**

5. INSTALL FAN AND GENERATOR V BELT (See page EM-6)

6. ADD POWER STEERING FLUID

7. BLEED POWER STEERING FLUID (See page PS-7)

8. CHECK POWER STEERING FLUID LEVEL (See page PS-3)

9. CHECK FOR POWER STEERING FLUID LEAKS

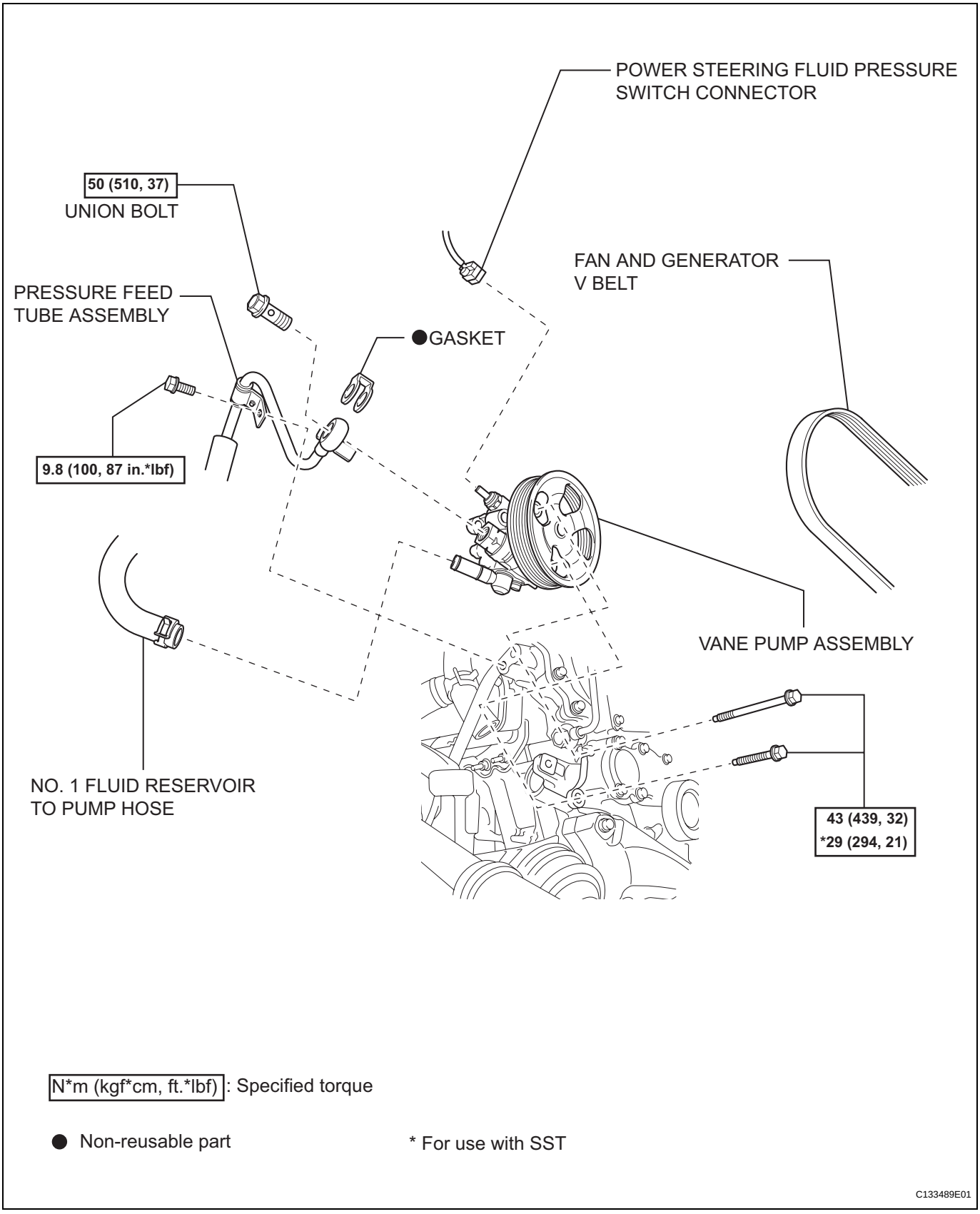
10. INSTALL FRONT FENDER APRON SEAL RH

11. INSTALL ENGINE UNDER COVER RH

12. INSTALL FRONT WHEEL RH
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

VANE PUMP (for 2GR-FE)

COMPONENTS



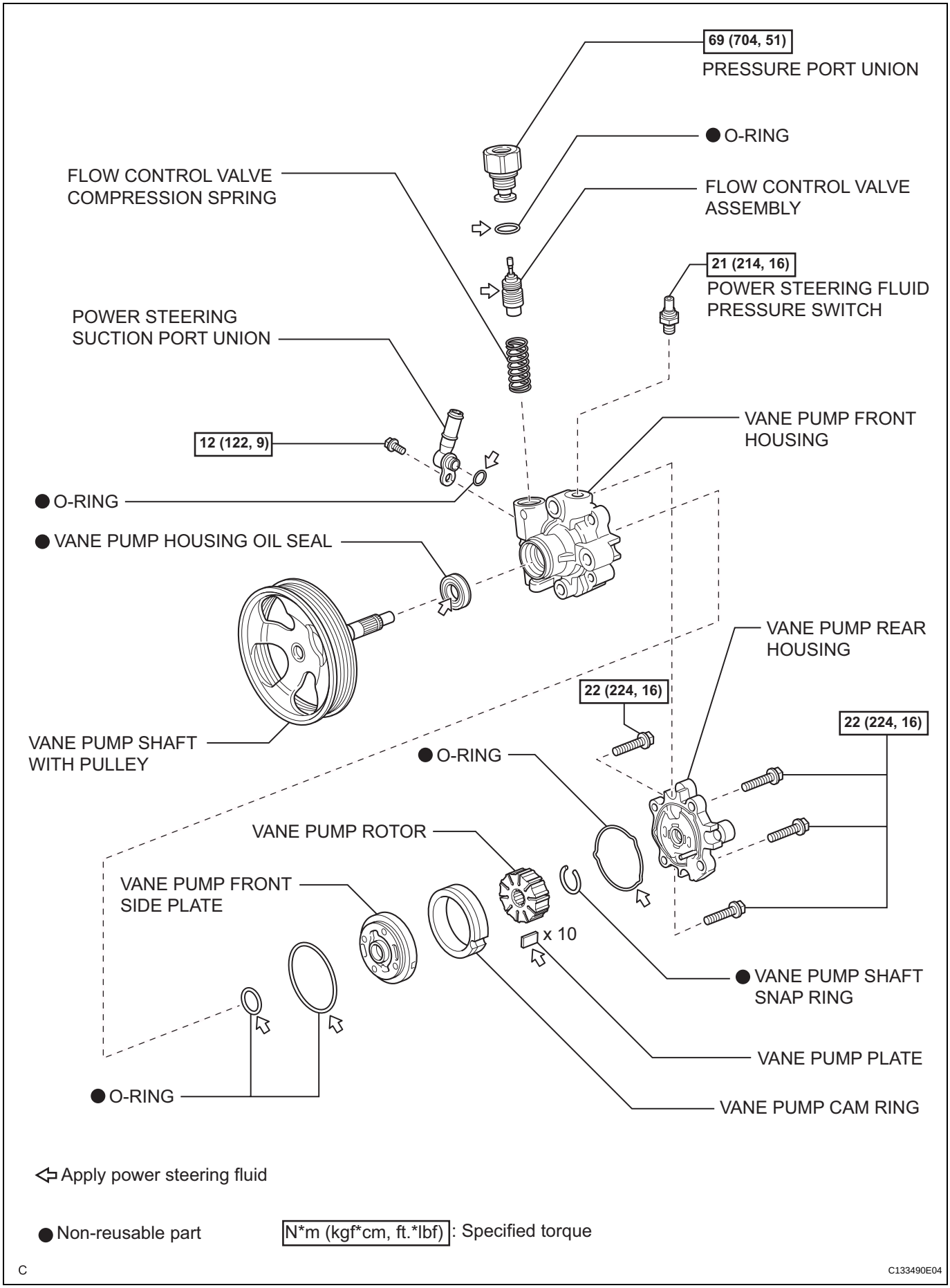
PS

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

● Non-reusable part

* For use with SST

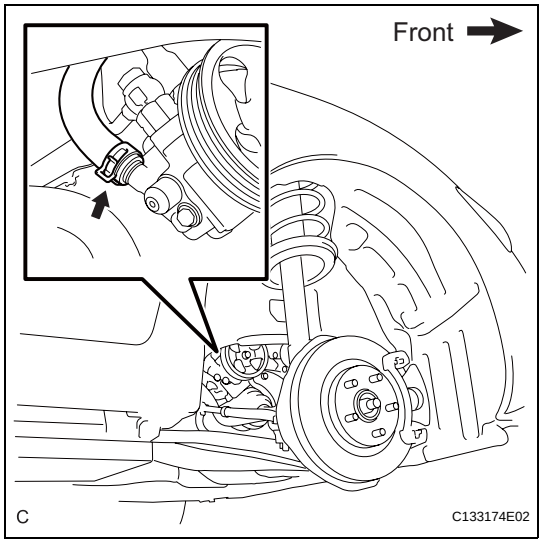
C133489E01


69 (704, 51)
PRESSURE PORT UNION
● O-RING
FLOW CONTROL VALVE
COMPRESSION SPRING
FLOW CONTROL VALVE
ASSEMBLY
21 (214, 16)
POWER STEERING FLUID
PRESSURE SWITCH
POWER STEERING
SUCTION PORT UNION
12 (122, 9)
VANE PUMP FRONT
HOUSING
● O-RING
● VANE PUMP HOUSING OIL SEAL
VANE PUMP REAR
HOUSING
22 (224, 16)
22 (224, 16)
VANE PUMP SHAFT
WITH PULLEY
● O-RING
VANE PUMP ROTOR
VANE PUMP FRONT
SIDE PLATE
x 10
● VANE PUMP SHAFT
SNAP RING
VANE PUMP PLATE
● O-RING
VANE PUMP CAM RING
⇦ Apply power steering fluid
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
C
C133490E04

PS

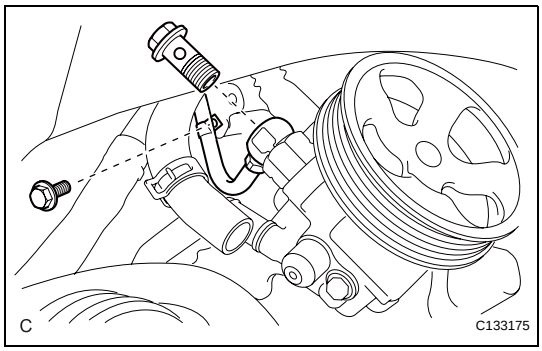
REMOVAL

1. **DRAIN POWER STEERING FLUID**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE FRONT FENDER APRON SEAL RH**
4. **REMOVE V-BANK COVER SUB-ASSEMBLY**
5. **REMOVE FAN AND GENERATOR V BELT (See page EM-6)**
6. **DISCONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE**
   (a) Slide the clip and disconnect the No. 1 fluid reservoir to pump hose from the vane pump assembly.

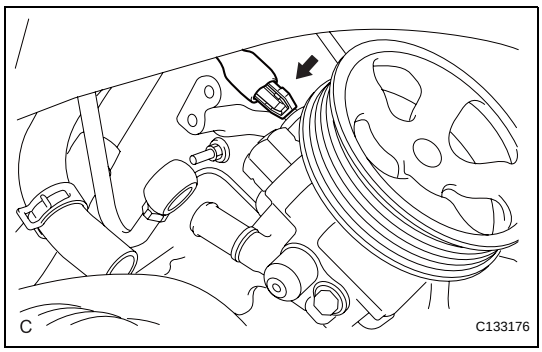


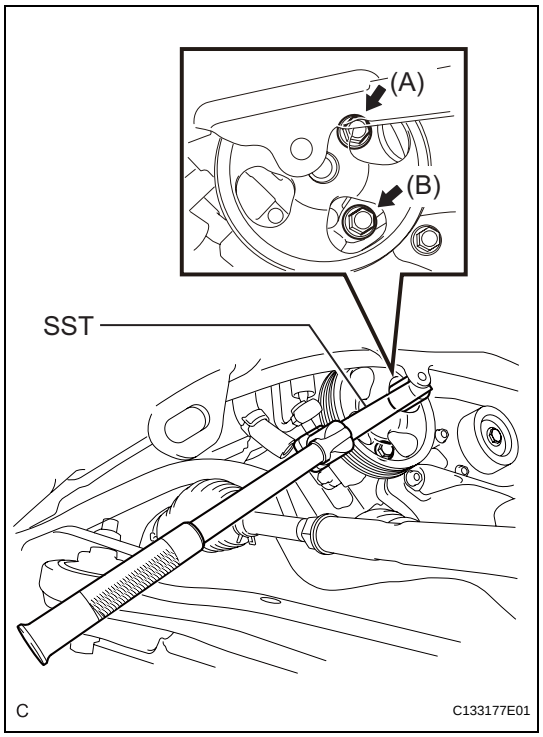
PS

7. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
   (a) Remove the union bolt and disconnect the pressure feed tube assembly from the vane pump assembly.
   (b) Remove the bolt and separate the pressure feed tube clamp.
   (c) Remove the gasket from the pressure feed tube assembly.



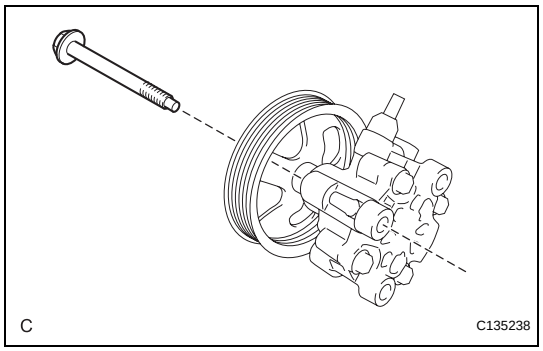
8. **DISCONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR**
   (a) Disconnect the power steering fluid pressure switch connector.





9. REMOVE VANE PUMP ASSEMBLY

(a) Using SST, loosen bolt (A) and remove bolt (B), and then remove the vane pump assembly.
SST 09249-63010



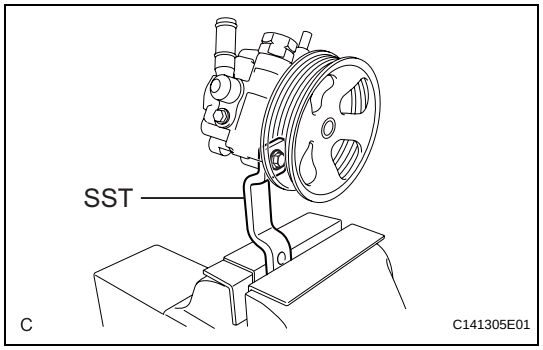
(b) Remove the bolt from the vane pump assembly.

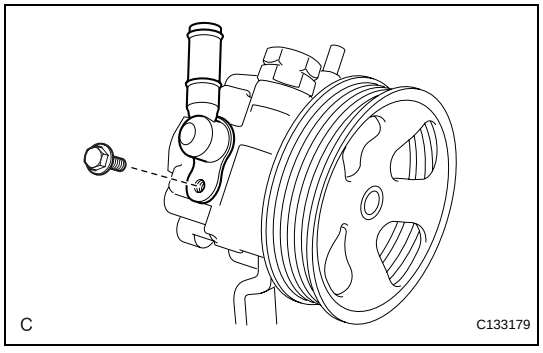
PS

DISASSEMBLY

1. HOLD VANE PUMP ASSEMBLY

(a) Using SST, hold the vane pump assembly in a vise.
SST 09630-00014 (09631-00132)

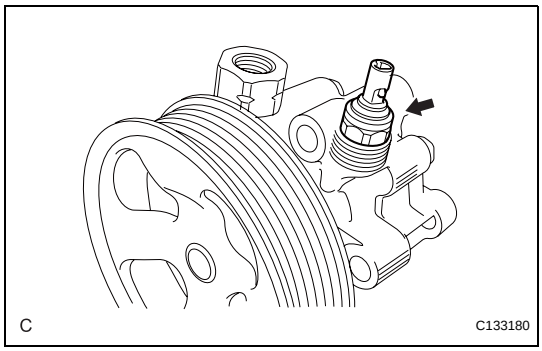




2. REMOVE POWER STEERING SUCTION PORT UNION

(a) Remove the bolt and the power steering suction port union from the vane pump assembly.

(b) Using a screwdriver, remove the O-ring from the power steering suction port union.

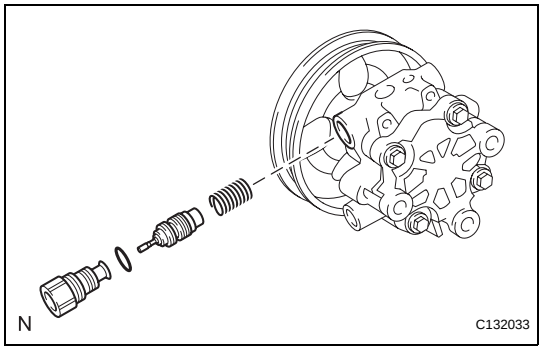


3. REMOVE POWER STEERING FLUID PRESSURE SWITCH

(a) Remove the power steering fluid pressure switch from the vane pump assembly.

NOTICE:

Perform this procedure only when the power steering fluid pressure switch is replaced.

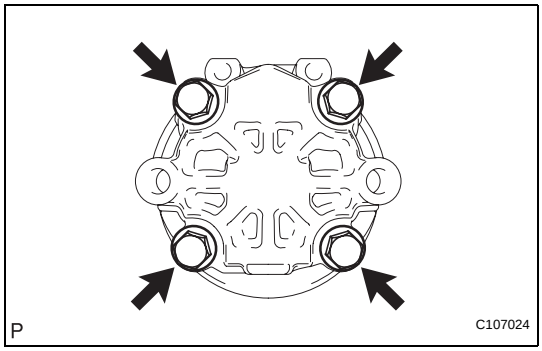


4. REMOVE FLOW CONTROL VALVE ASSEMBLY

(a) Remove the pressure port union.

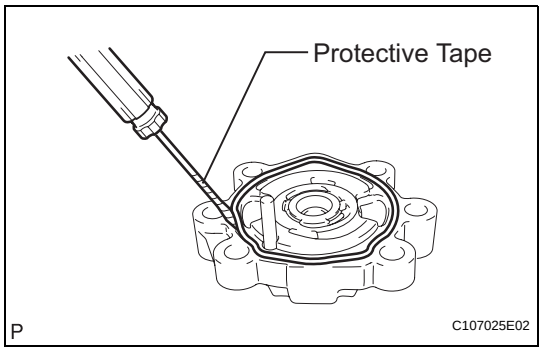
(b) Remove the O-ring from the pressure port union.

(c) Remove the flow control valve assembly and the flow control valve compression spring.



5. REMOVE VANE PUMP REAR HOUSING

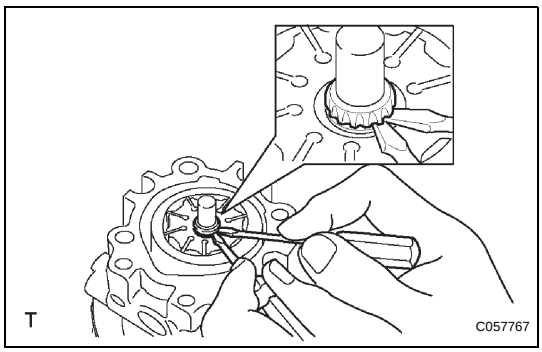
(a) Remove the 4 bolts and vane pump rear housing from the vane pump front housing.



(b) Using a screwdriver, remove the O-ring from the vane pump rear housing.

HINT:

Tape the screwdriver tip before use.

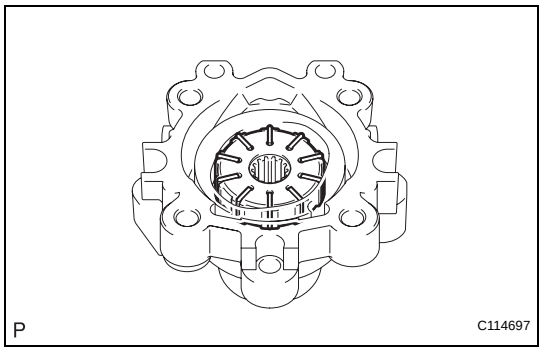


6. REMOVE VANE PUMP SHAFT WITH PULLEY

(a) Using 2 screwdrivers, remove the vane pump shaft snap ring from the vane pump shaft with pulley.

(b) Remove the vane pump shaft with pulley.

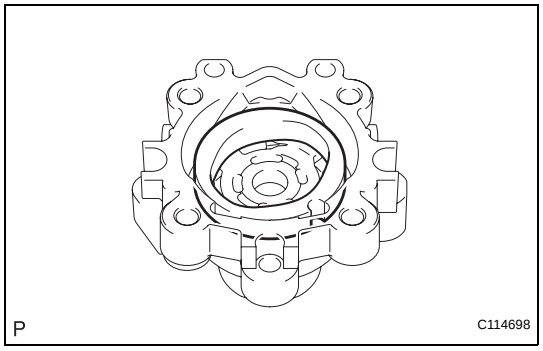
PS



7. REMOVE VANE PUMP ROTOR

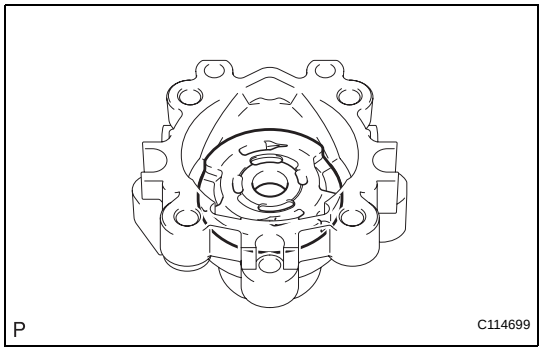
(a) Remove the 10 vane pump plates.

(b) Remove the vane pump rotor.



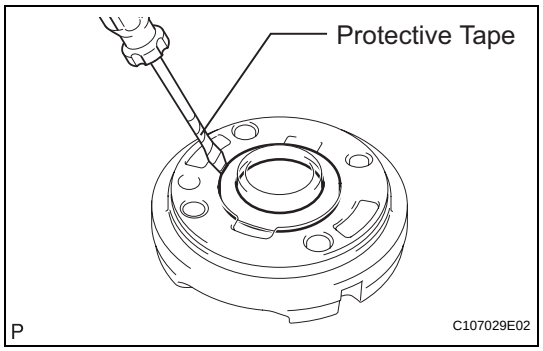
8. REMOVE VANE PUMP CAM RING

(a) Remove the vane pump cam ring from the vane pump front housing.

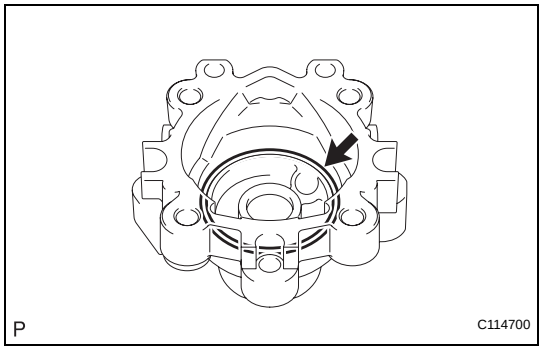


9. REMOVE VANE PUMP FRONT SIDE PLATE

(a) Remove the vane pump front side plate from the vane pump front housing.

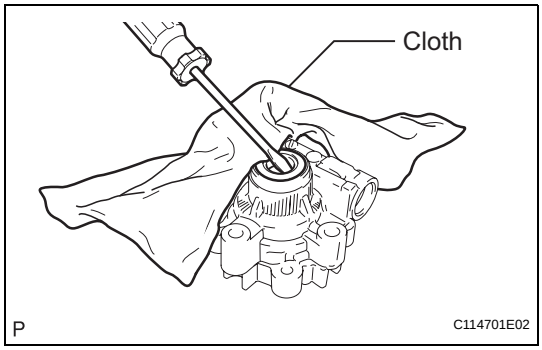


(b) Using a screwdriver, remove the O-ring from the vane pump front side plate.
HINT:
Tape the screwdriver tip before use.



(c) Remove the O-ring from the vane pump front housing.

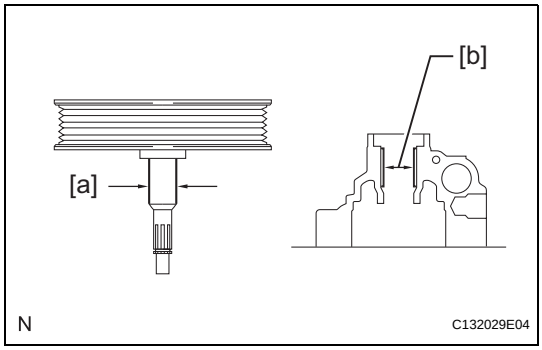
PS



10. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using a screwdriver and a shop rag or a piece of cloth, remove the vane pump housing oil seal.
NOTICE:
Be careful not to damage the vane pump front housing.

INSPECTION



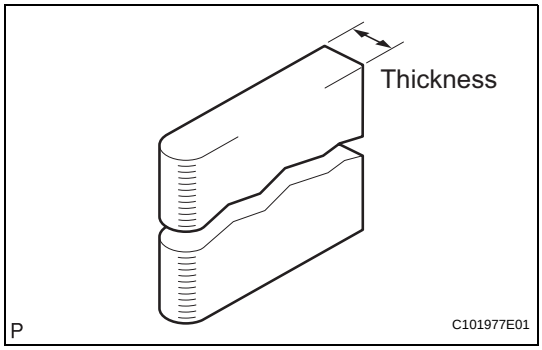
1. INSPECT VANE PUMP SHAFT AND BUSHING IN VANE PUMP FRONT HOUSING

(a) Using a micrometer, measure the outer diameter [a] of the vane pump shaft with pulley.

(b) Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bushing.

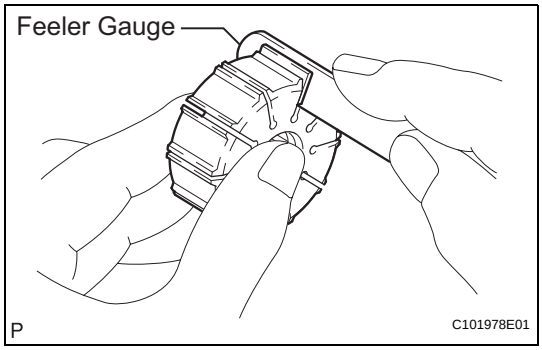
(c) Calculate the oil clearance.
Oil clearance = Inner diameter of the bushing [b] - Outer diameter of the shaft [a].
Maximum oil clearance:
0.07 mm (0.0028 in.)
If oil clearance exceeds the maximum, replace the vane pump assembly.

PS

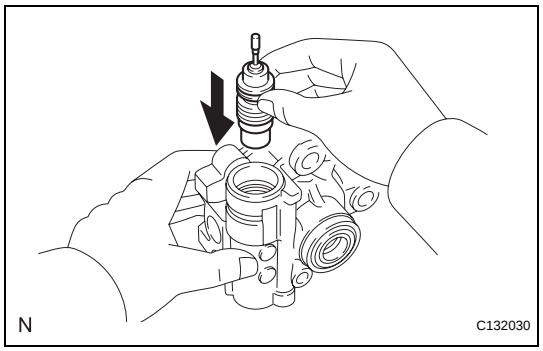


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE CLEARANCE

(a) Using a micrometer, measure the thickness of the vane pump plates.
Standard thickness:
1.405 to 1.411 mm (0.05531 to 0.05555 in.)
If the thickness is not within the specified range, replace the vane pump assembly.

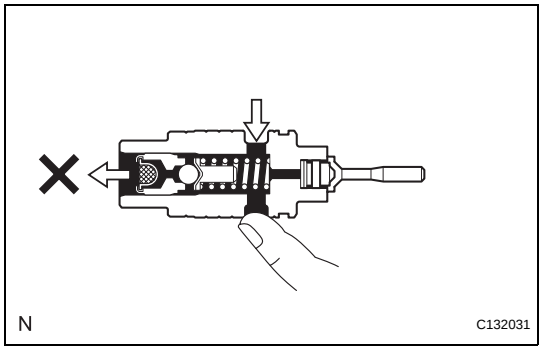


(b) Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plates.
Maximum clearance:
0.03 mm (0.0012 in.)
If clearance exceeds the maximum, replace the vane pump assembly.

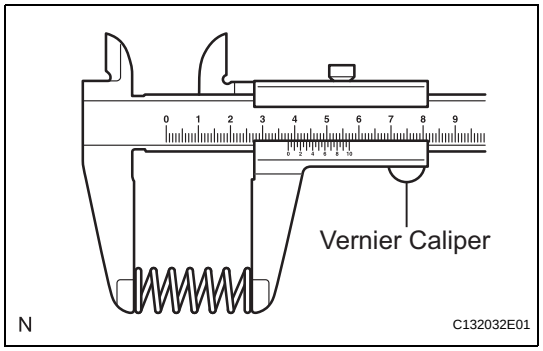


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid and check that it falls smoothly into the flow control valve due to its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



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

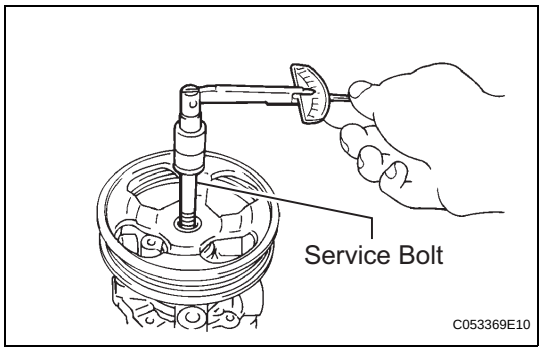


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the flow control valve compression spring.
Minimum free length:
29.2 mm (1.150 in.)
If the length is less than the minimum, replace the vane pump assembly.

5. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is severely damaged, replace the vane pump assembly.



6. INSPECT TOTAL PRELOAD

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

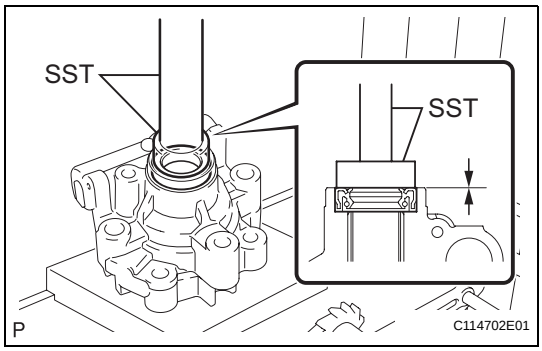
(b) Temporarily install the service bolt.
Recommended service bolt:
Thread diameter:
10 mm (0.39 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

(c) Using a torque wrench, check the pump rotating torque.
Rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less
If the rotating torque is not as specified, check the vane pump housing oil seal.

PS

REASSEMBLY

NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid (See page PS-22).



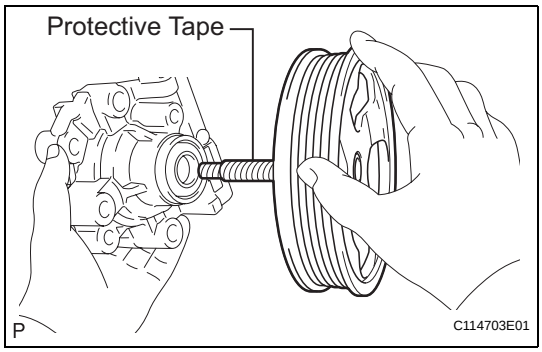
1. INSTALL VANE PUMP HOUSING OIL SEAL

(a) Coat a new vane pump housing oil seal lip with power steering fluid.

(b) Using SST and a press, install the vane pump housing oil seal.

SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)

NOTICE:
Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



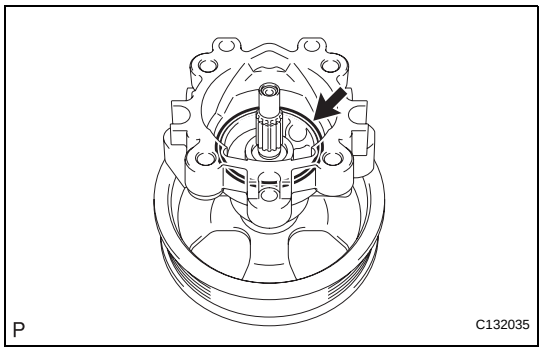
2. INSTALL VANE PUMP SHAFT WITH PULLEY

(a) Coat the inside surface of the busing in the vane pump front housing with power steering fluid.

(b) Gradually insert the vane pump shaft with pulley.

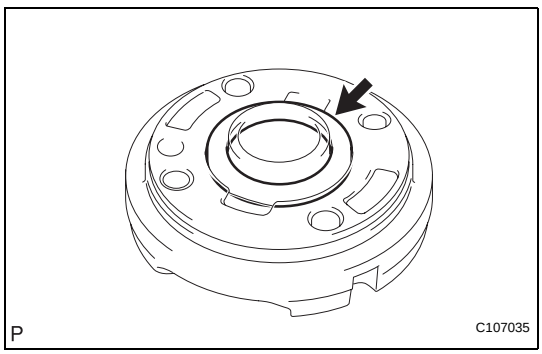
NOTICE:
Do not damage the oil seal lip in the front housing.

HINT:
Wrap protective tape around the spline of the vane pump shaft with pulley in order to prevent damage to the oil seal.



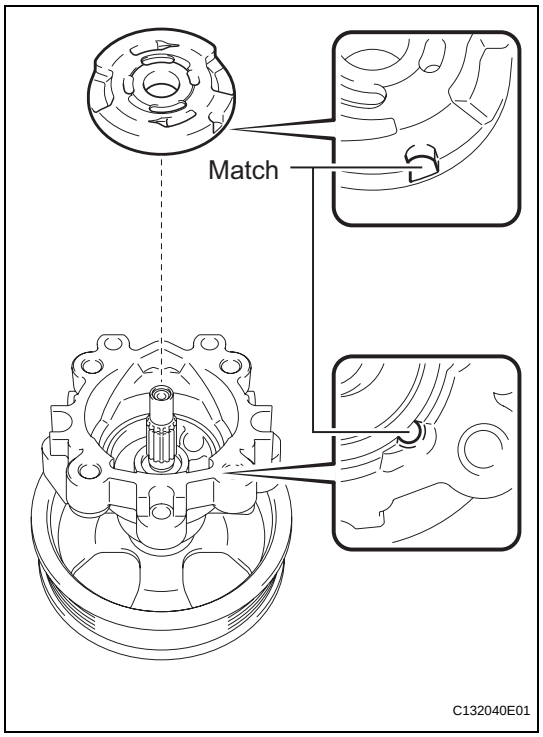
3. INSTALL VANE PUMP FRONT SIDE PLATE

(a) Coat a new O-ring with power steering fluid and install it into the vane pump front housing.

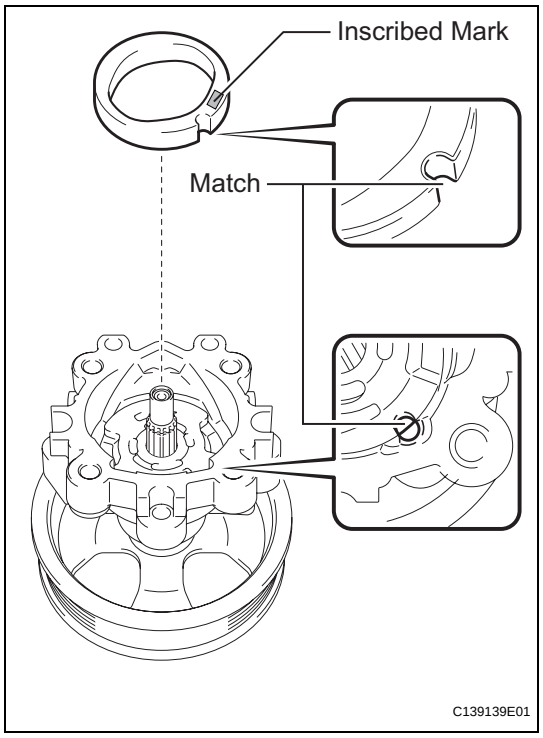


(b) Coat a new O-ring with power steering fluid and install it onto the vane pump front side plate.

PS



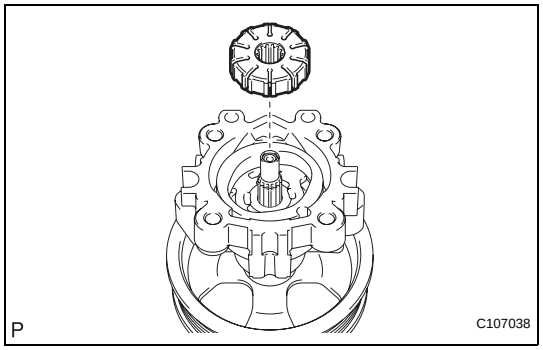
(c) Align the notch of the vane pump front side plate with that of the vane pump front housing, and install the vane pump front side plate.
NOTICE:
Make sure that the vane pump front side plate is installed facing in the correct direction.



4. INSTALL VANE PUMP CAM RING

(a) Align the notch of the cam ring with that of the vane pump front side plate, and install the vane pump cam ring with the inscribed mark facing upward.
NOTICE:
Make sure that the vane pump cam ring is installed facing in the correct direction.

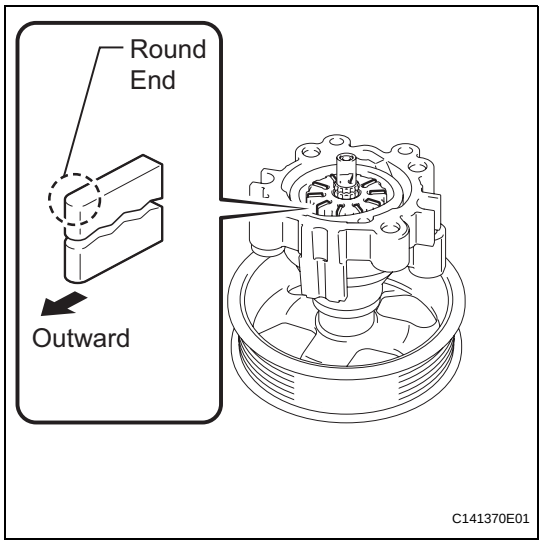
PS



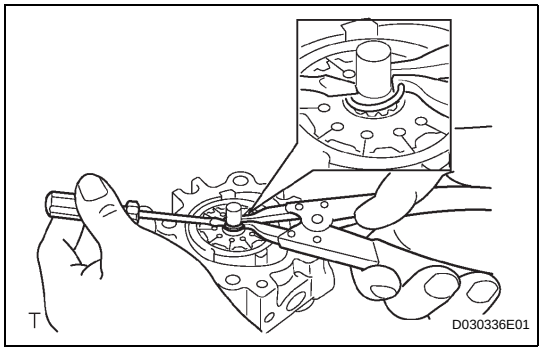
5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor.
HINT:
Vane pump rotor can be installed in both directions.

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

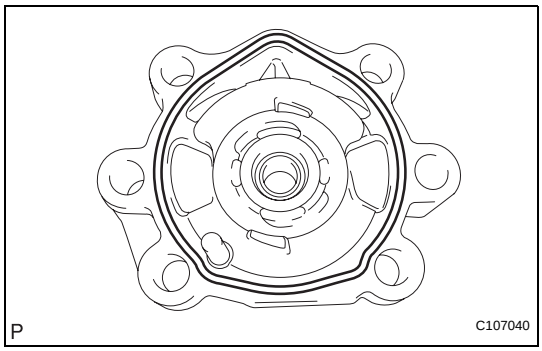


(c) Install the vane pump plates with the round end facing outward.
NOTICE:
Make sure that the vane pump plates are installed facing in the correct direction.



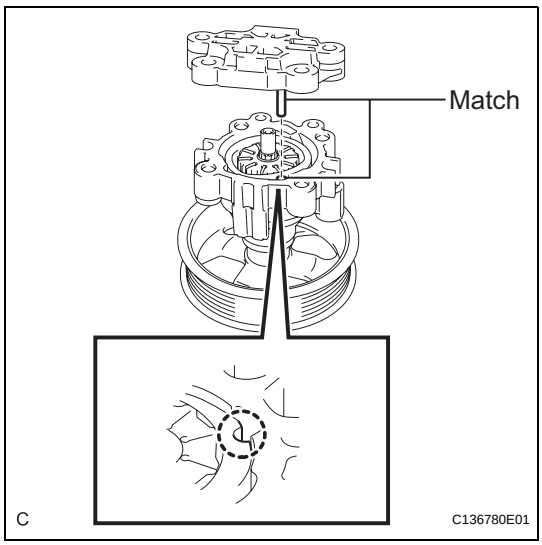
6. INSTALL VANE PUMP SHAFT SNAP RING

(a) Using a screwdriver and a snap ring expander, install a new vane pump shaft snap ring onto the vane pump shaft with pulley.

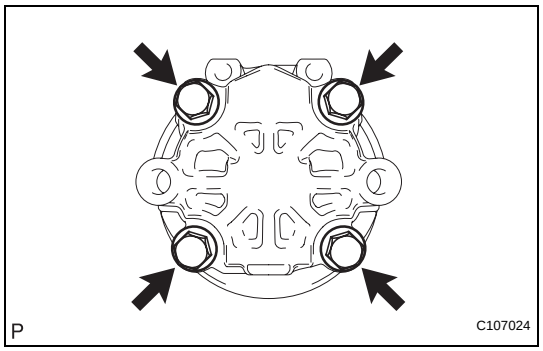


7. INSTALL VANE PUMP REAR HOUSING

(a) Coat a new O-ring with power steering fluid and install it onto the vane pump rear housing.

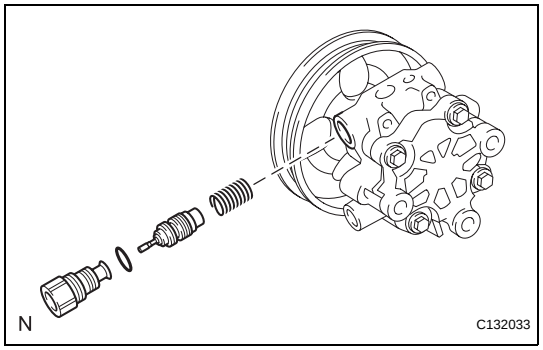


(b) Align the straight pin of the vane pump rear housing with the notches of the vane pump cam ring, vane pump front side plate, and vane pump front housing.



(c) Install the vane pump rear housing with the 4 bolts.
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

8. INSPECT TOTAL PRELOAD (See page PS-29)



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid.

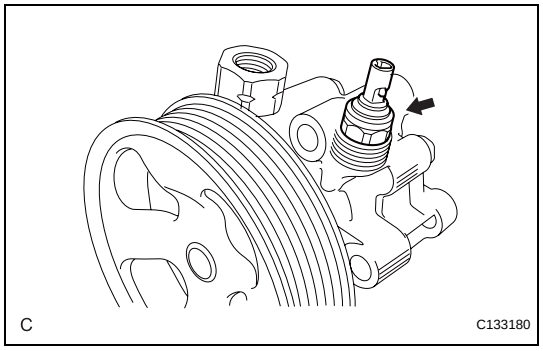
(b) Install the flow control valve compression spring and the flow control valve assembly to the vane pump front housing.

(c) Coat a new O-ring with power steering fluid and install it onto the pressure port union.

(d) Install the pressure port union to the vane pump front housing.
Torque: 69 N*m (704 kgf*cm, 51 ft.*lbf)

10. INSTALL POWER STEERING FLUID PRESSURE SWITCH

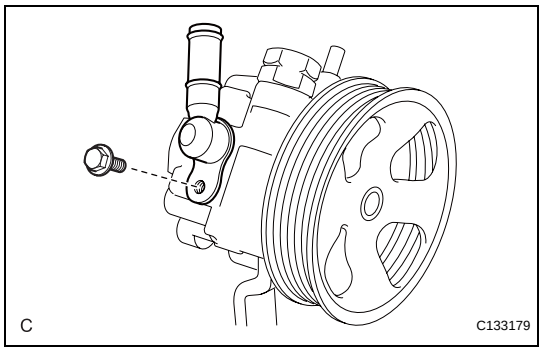
(a) Coat the new O-ring attached to the new power steering fluid pressure switch with power steering fluid.



(b) Install the power steering fluid pressure switch to the vane pump assembly.
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
NOTICE:
Do not use a power steering fluid pressure switch that has been subjected an impact; for example, due to it having been dropped.

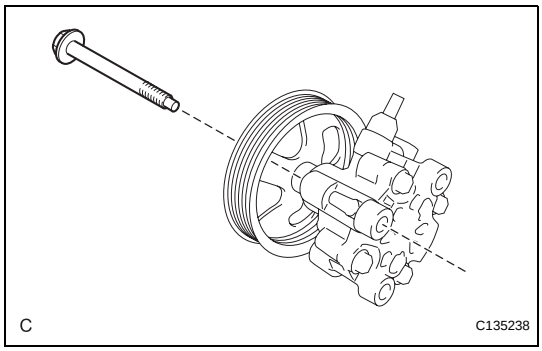
11. INSTALL POWER STEERING SUCTION PORT UNION

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



(b) Install the power steering suction port union to the vane pump assembly with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

PS

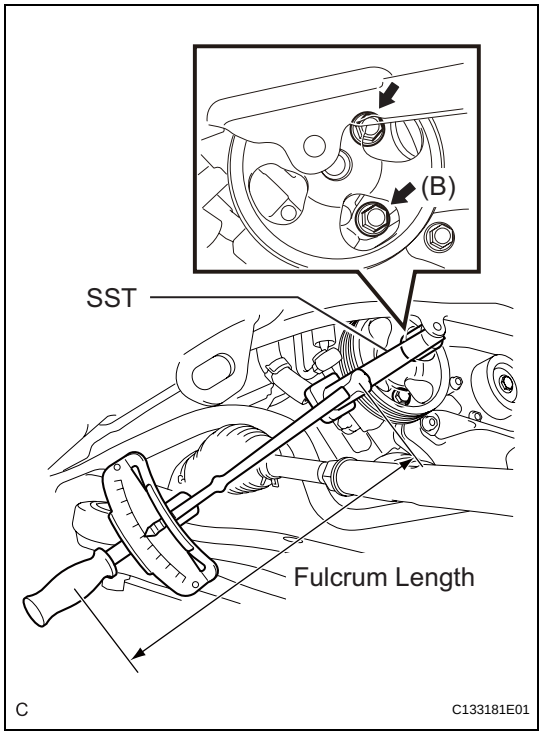


INSTALLATION

1. INSTALL VANE PUMP ASSEMBLY

(a) Temporarily install the bolt to the vane pump assembly.

(b) Install the vane pump assembly.



(c) Using SST, install bolt (B) and tighten the 2 bolts.

SST 09249-63010

Torque: Without SST

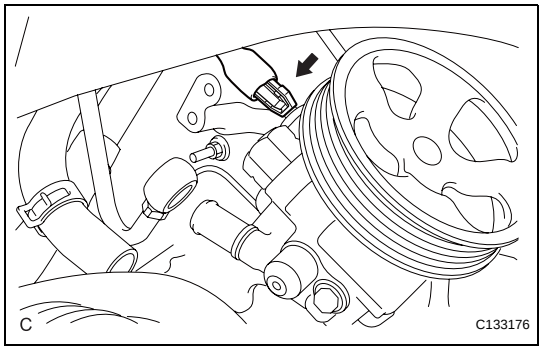
43 N*m (439 kgf*cm, 32 ft.*lbf)

With SST

29 N*m (294 kgf*cm, 21 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is accurate when SST is parallel to the torque wrench.**



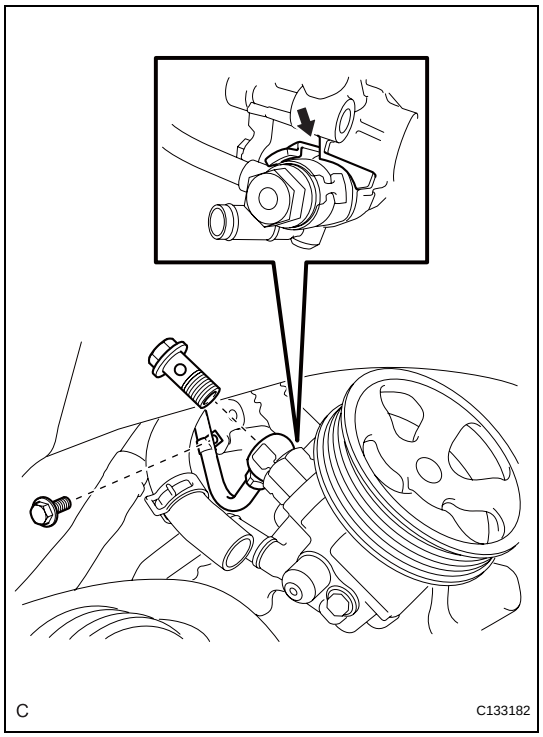
2. CONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR

(a) Connect the connector to the power steering fluid pressure switch.

3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Install a new gasket to the pressure feed tube assembly.

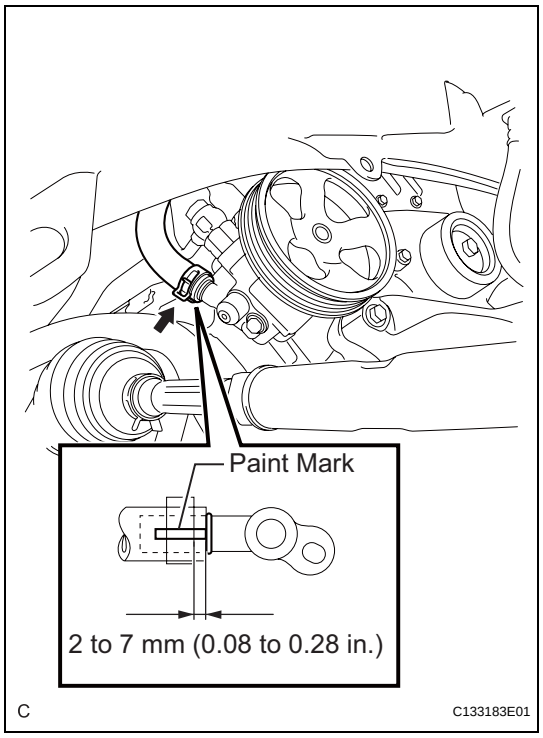
PS



(b) Temporarily connect the pressure feed tube assembly to the vane pump assembly with the union bolt.

(c) Install the pressure feed tube assembly clamp with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
NOTICE:
Install the pressure feed tube assembly clamp in the correct position.

(d) Fully tighten the union bolt.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
NOTICE:
Make sure that the stopper of the pressure feed tube assembly contacts the vane pump assembly securely as shown in the illustration.



4. CONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE

(a) Connect the No. 1 fluid reservoir to pump hose to the vane pump assembly with the clip.
NOTICE:
- **Connect the No. 1 fluid reservoir to pump hose with the paint mark facing toward the rear of the vehicle.**
- **Push the No. 1 fluid reservoir to pump hose as far as it will go as shown in the illustration.**
- **Install the clip at the position specified in the illustration.**

5. INSTALL FAN AND GENERATOR V BELT (See page EM-7)

6. ADD POWER STEERING FLUID

7. BLEED POWER STEERING FLUID (See page PS-7)

8. CHECK POWER STEERING FLUID LEVEL (See page PS-3)

9. CHECK FOR POWER STEERING FLUID LEAKS

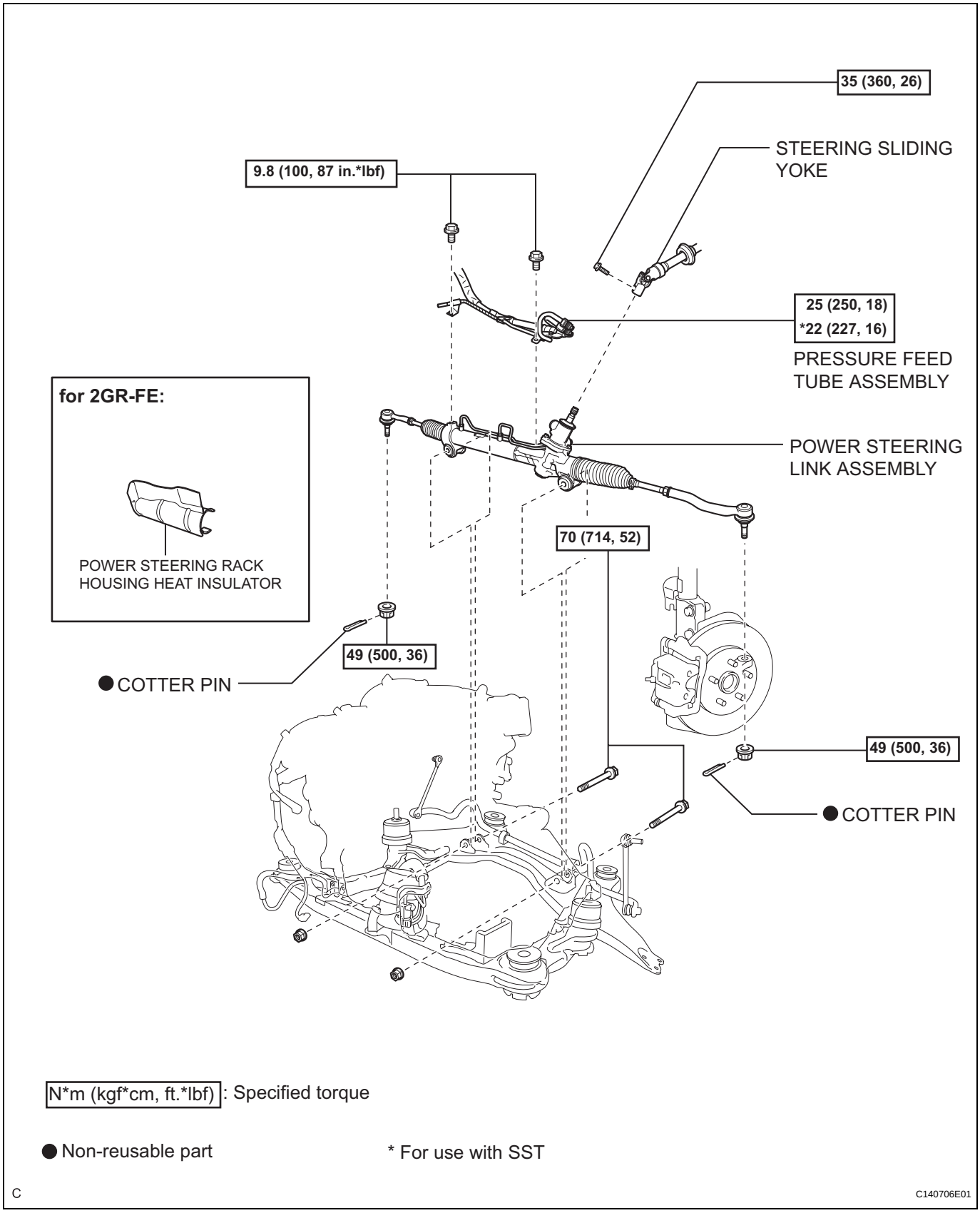
10. INSTALL V-BANK COVER SUB-ASSEMBLY

11. INSTALL FRONT FENDER APRON SEAL RH

12. INSTALL FRONT WHEEL RH
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

POWER STEERING LINK

COMPONENTS



PS

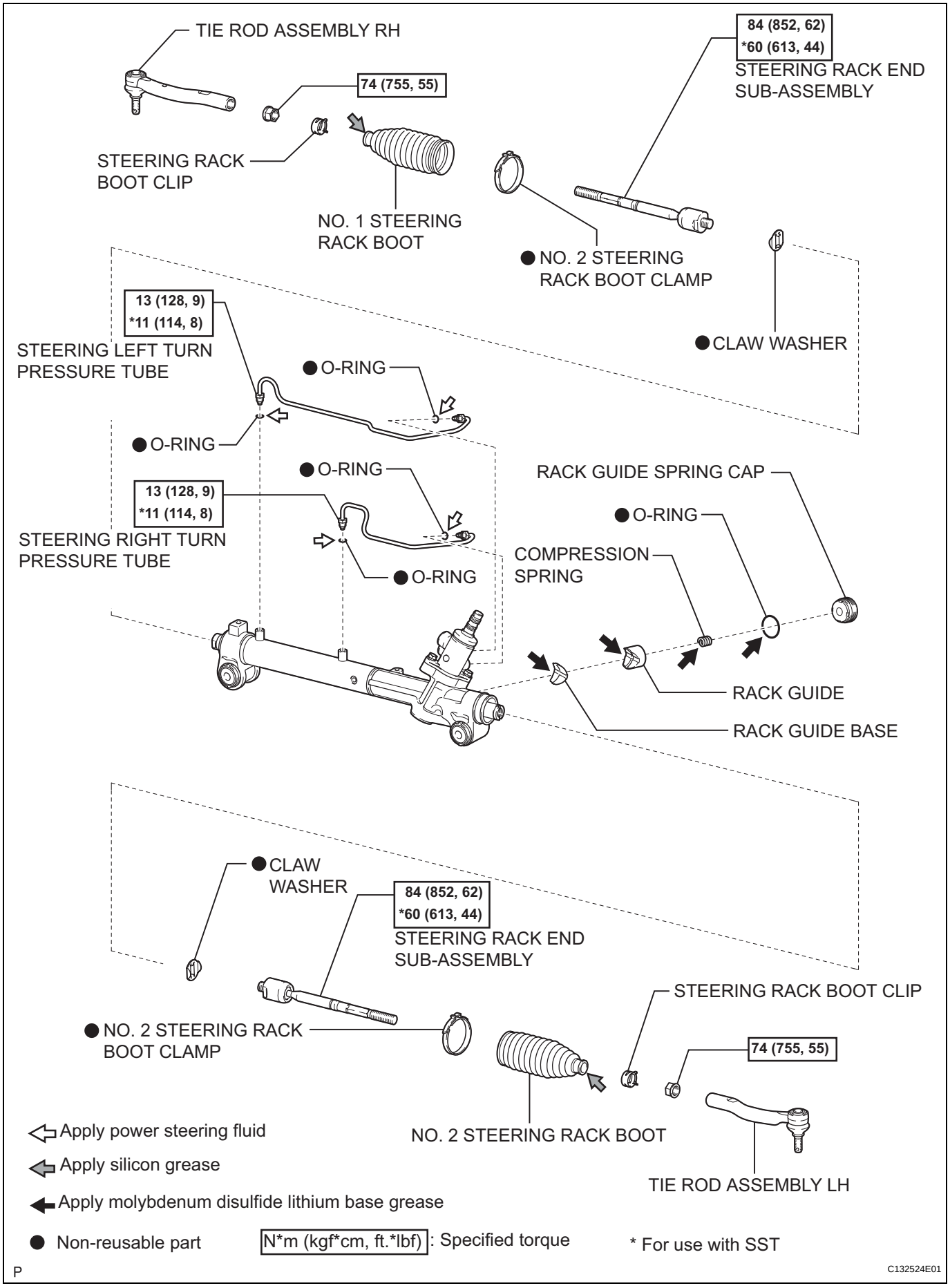
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

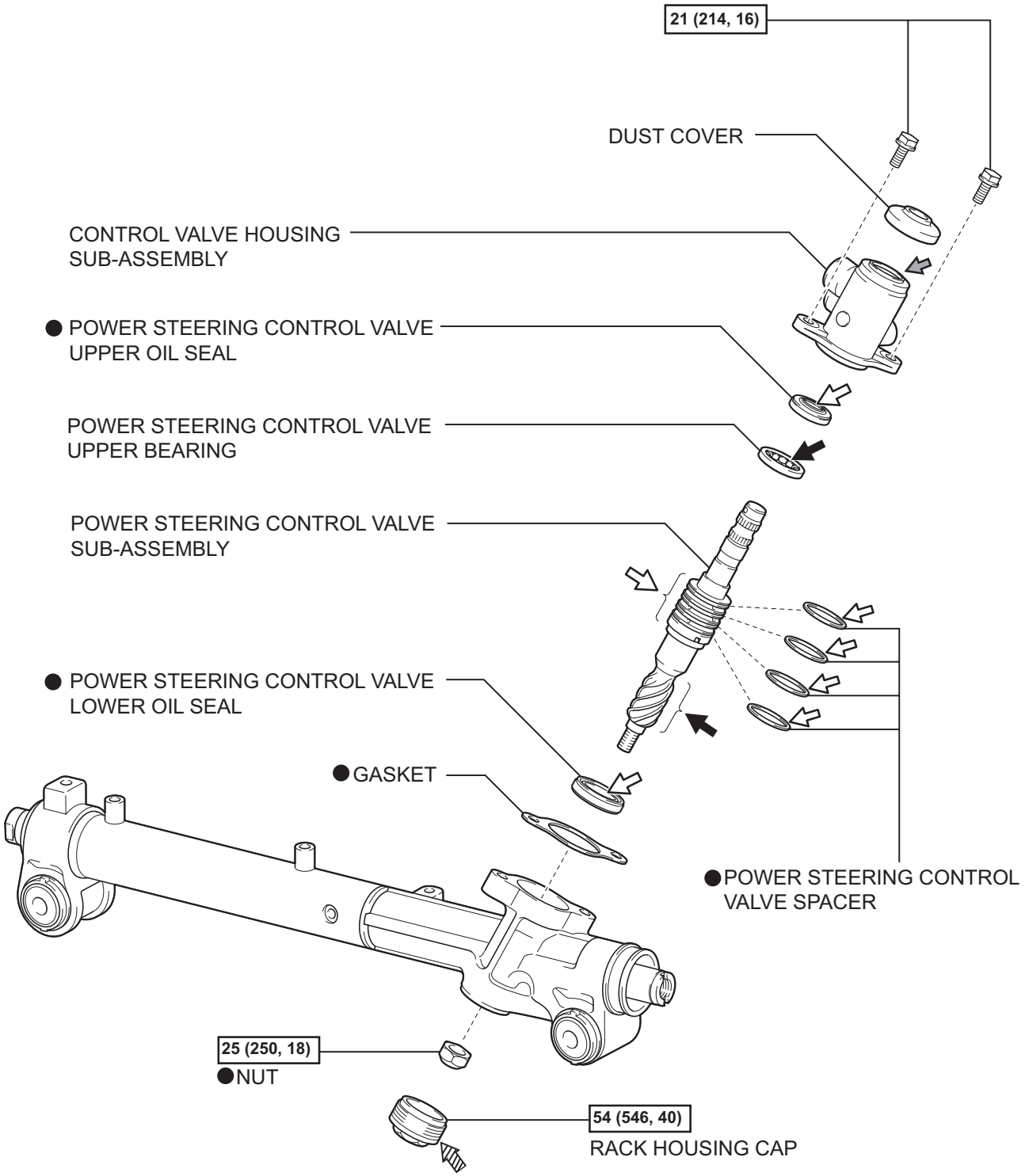
* For use with SST

C

C140706E01


TIE ROD ASSEMBLY RH
74 (755, 55)
STEERING RACK BOOT CLIP
NO. 1 STEERING RACK BOOT
84 (852, 62)
*60 (613, 44)
STEERING RACK END SUB-ASSEMBLY
● NO. 2 STEERING RACK BOOT CLAMP
● CLAW WASHER
13 (128, 9)
*11 (114, 8)
STEERING LEFT TURN PRESSURE TUBE
● O-RING
● O-RING
● O-RING
13 (128, 9)
*11 (114, 8)
STEERING RIGHT TURN PRESSURE TUBE
● O-RING
RACK GUIDE SPRING CAP
● O-RING
COMPRESSION SPRING
RACK GUIDE
RACK GUIDE BASE
● CLAW WASHER
84 (852, 62)
*60 (613, 44)
STEERING RACK END SUB-ASSEMBLY
● NO. 2 STEERING RACK BOOT CLAMP
STEERING RACK BOOT CLIP
74 (755, 55)
NO. 2 STEERING RACK BOOT
TIE ROD ASSEMBLY LH
Apply power steering fluid
Apply silicon grease
Apply molybdenum disulfide lithium base grease
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
* For use with SST
P
C132524E01

PS



Precoated part

Apply MP grease

Apply power steering fluid

Apply molybdenum disulfide lithium base grease

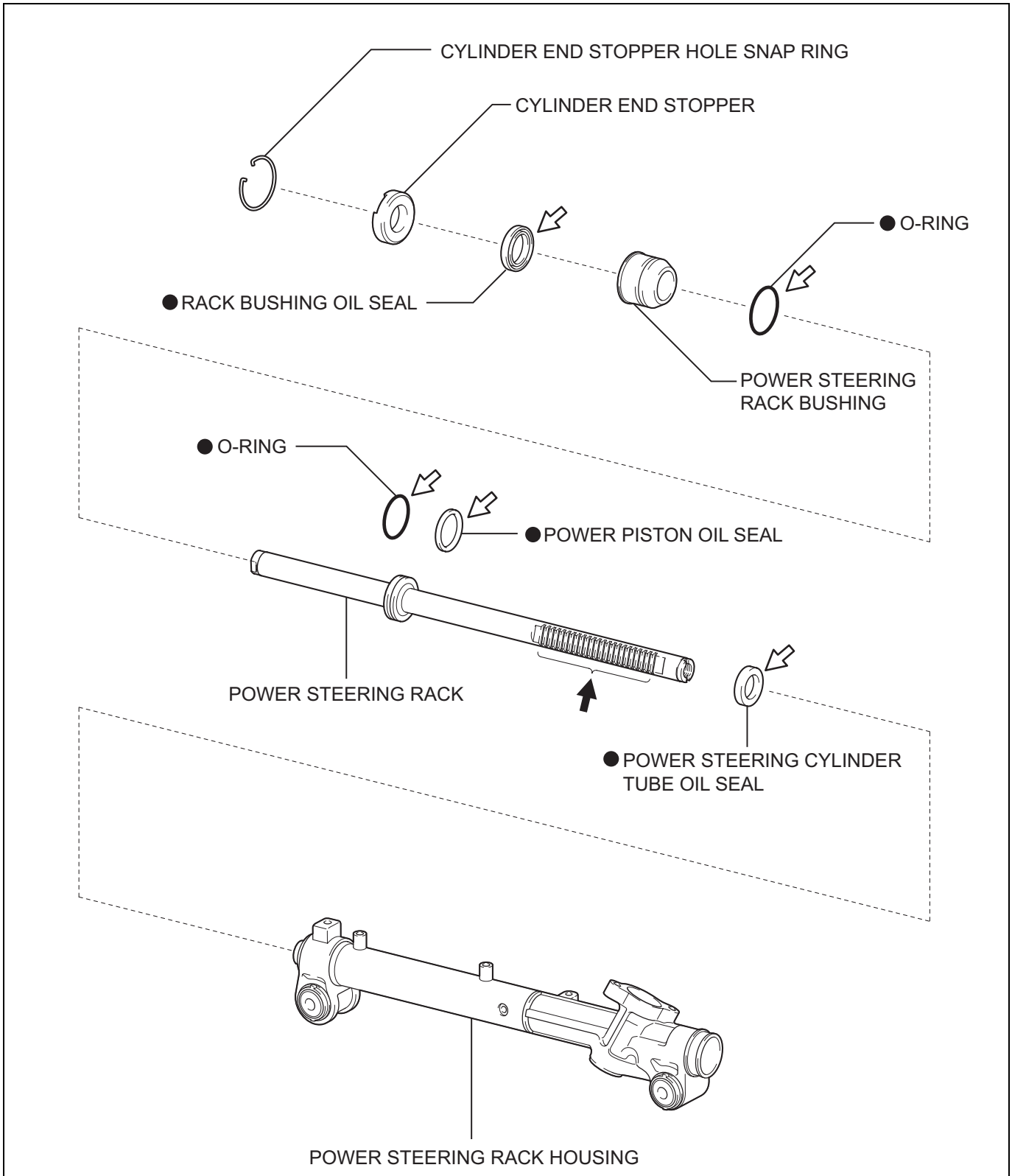
● Non-reusable part

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

P

C132525E01

PS



⇦ Apply power steering fluid

⬅ Apply molybdenum disulfide lithium base grease

● Non-reusable part

P

C132526E01

PS

REMOVAL

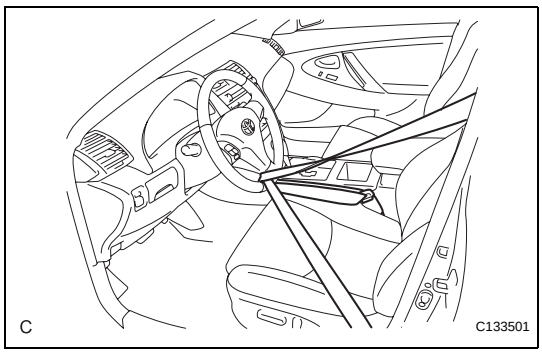
1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

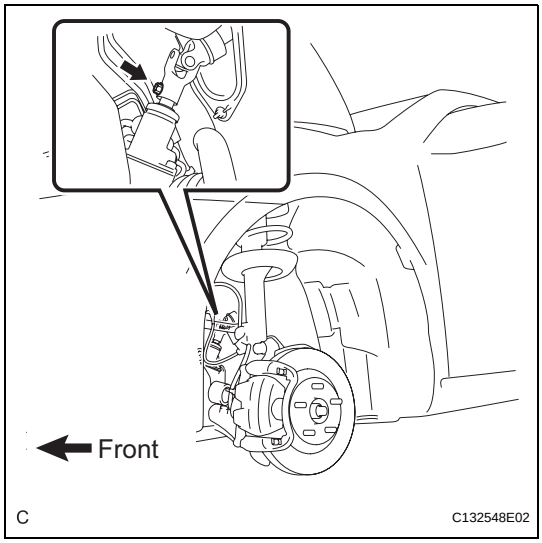
2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

3. REMOVE FRONT WHEELS

4. SEPARATE STEERING SLIDING YOKE

(a) Secure the steering wheel with the seat belt in order to prevent rotation.
HINT:
This operation is useful to prevent damage to the spiral cable.

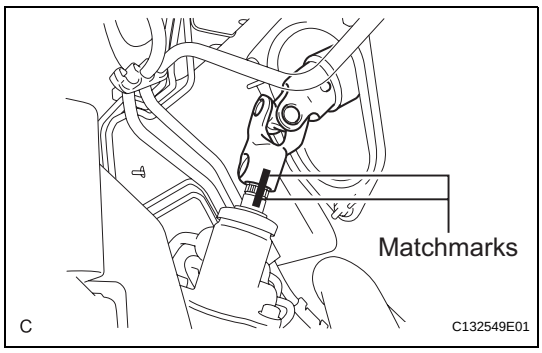




(b) Remove the bolt and slide the steering sliding yoke.
NOTICE:
Do not separate the steering sliding yoke from the power steering link assembly.

(c) Put matchmarks on the steering sliding yoke and the power steering link assembly.

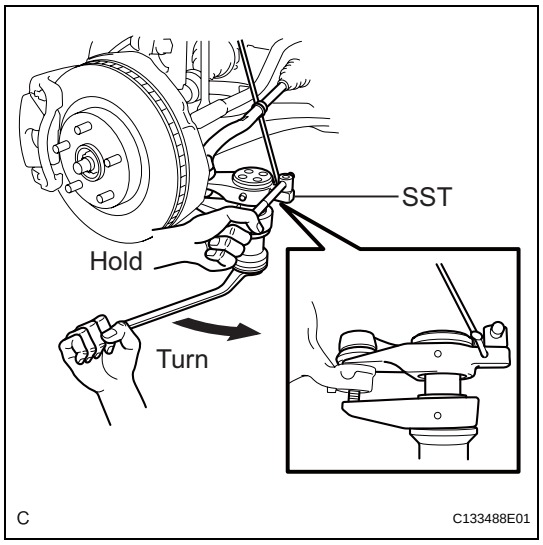
(d) Separate the steering sliding yoke from the power steering link assembly.



5. SEPARATE TIE ROD ASSEMBLY LH

(a) Remove the cotter pin and the nut.

PS

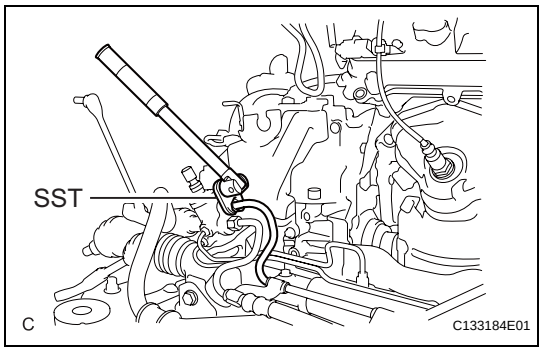


(b) Using SST, separate the tie rod assembly LH from the steering knuckle.
SST 09628-00011
NOTICE:
- **Hang SST with a string, etc. to prevent it from falling.**
- **Do not damage the front disc brake dust cover.**
- **Do not damage the ball joint dust cover.**
- **Do not damage the steering knuckle.**

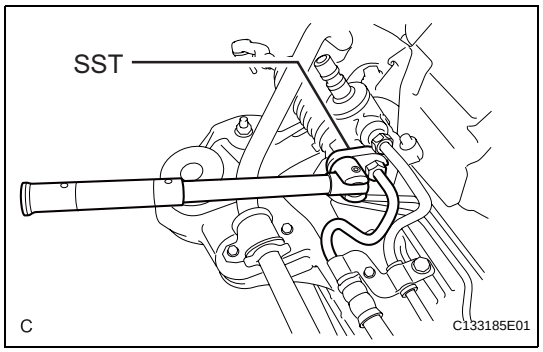
6. SEPARATE TIE ROD ASSEMBLY RH
HINT:
Perform the same procedure as for the LH side.

7. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
Refer to the instructions for removal of the engine assembly (See page EM-94 for 2AZ-FE, EM-23 for 2GR-FE).

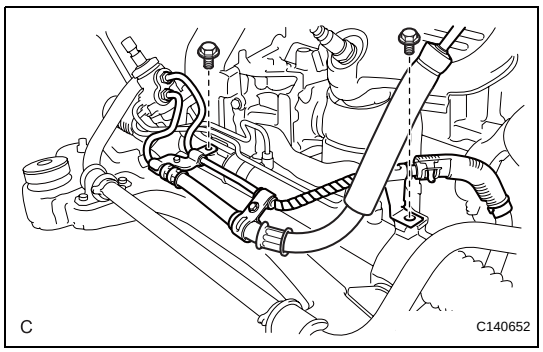
8. DISCONNECT PRESSURE FEED TUBE ASSEMBLY



(a) Using SST, disconnect the pressure feed tube assembly (return tube side) from the power steering link assembly.
SST 09023-12701

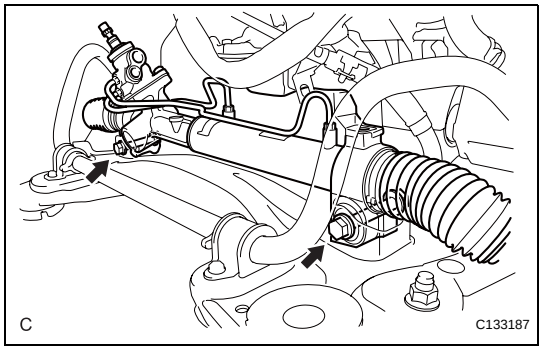


(b) Using SST, disconnect the pressure feed tube assembly (pressure feed tube side) from the power steering link assembly.
SST 09023-12701



(c) Remove the 2 bolts and separate the pressure feed tube clamp.

PS

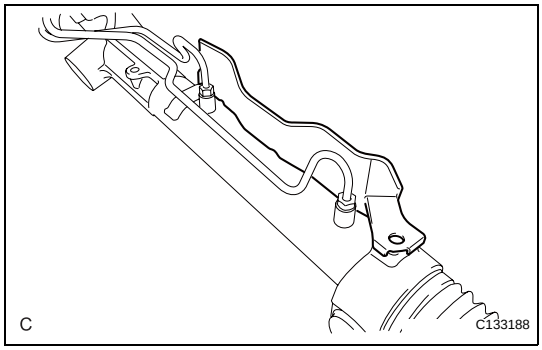


9. REMOVE POWER STEERING LINK ASSEMBLY

(a) Remove the 2 bolts, 2 nuts, and the power steering link assembly.

NOTICE:

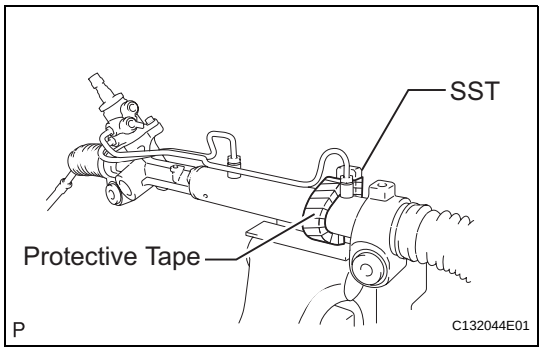
Because the nut has its own stopper, do not turn the nut. Loosen the bolt with the nut fixed.



10. REMOVE POWER STEERING RACK HOUSING HEAT INSULATOR (for 2GR-FE)

(a) Remove the power steering rack housing heat insulator from the power steering link assembly.

DISASSEMBLY



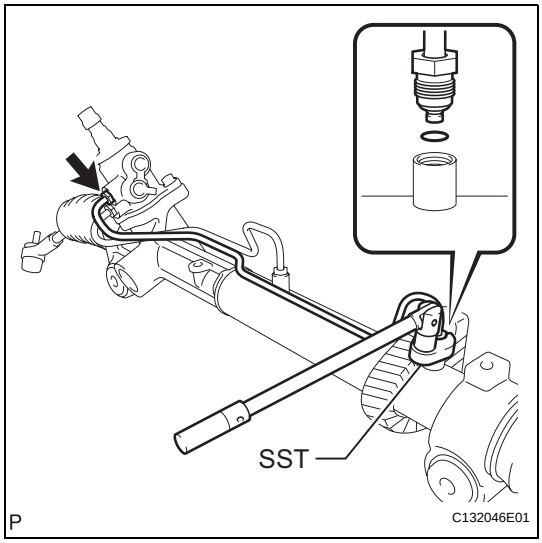
1. SECURE POWER STEERING LINK ASSEMBLY

(a) Using SST, secure the power steering link assembly.

SST 09612-00012

HINT:

Tape the SST before use.



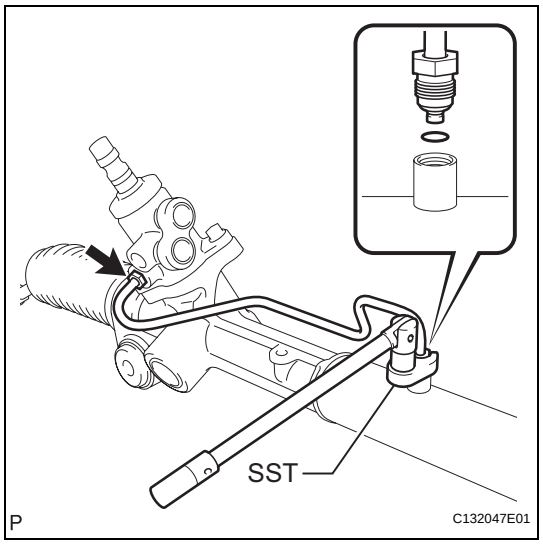
2. REMOVE STEERING LEFT TURN PRESSURE TUBE

(a) Using SST, remove the steering left turn pressure tube.

SST 09023-38201

(b) Remove the 2 O-rings from the steering left turn pressure tube.

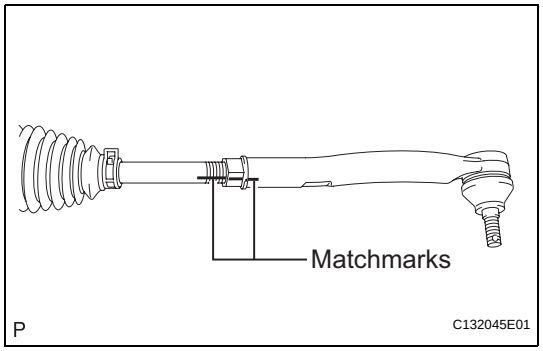
PS



3. REMOVE STEERING RIGHT TURN PRESSURE TUBE

(a) Using SST, remove the steering right turn pressure tube.
SST 09023-38201

(b) Remove the 2 O-rings from the steering right turn pressure tube.



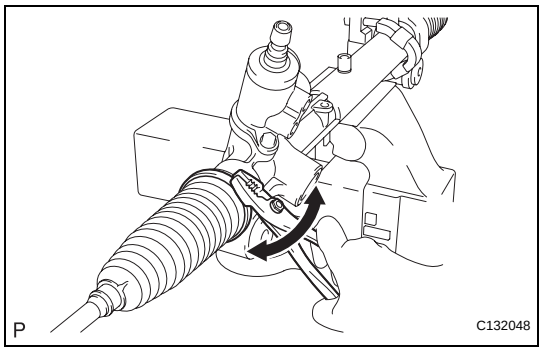
4. REMOVE TIE ROD ASSEMBLY LH

(a) Put matchmarks on the tie rod assembly LH and the steering rack end sub-assembly.

(b) Loosen the lock nut, and remove the tie rod assembly LH and the lock nut.

5. REMOVE TIE ROD ASSEMBLY RH

HINT:
Perform the same procedure as for the LH side.



6. REMOVE STEERING RACK BOOT CLIP

(a) Using pliers, remove the 2 steering rack boot clips.

7. REMOVE NO. 2 STEERING RACK BOOT CLAMP

(a) Using pliers, remove the 2 No. 2 steering rack boot clamps as shown in the illustration.
NOTICE:
Be careful not to damage the No. 2 steering rack boot.

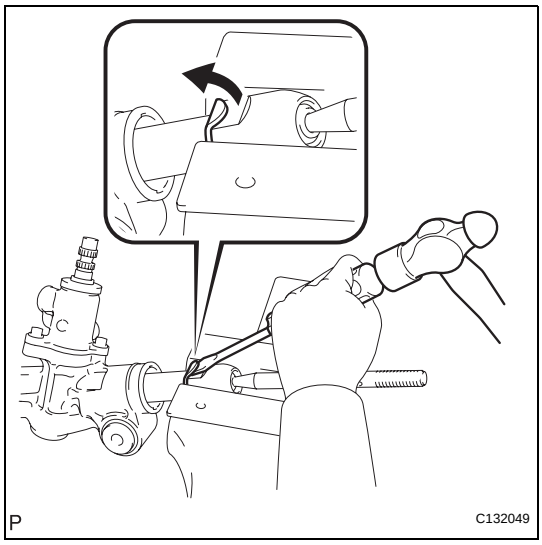
8. REMOVE NO. 2 STEERING RACK BOOT

(a) Remove the No. 2 steering rack boot.

9. REMOVE NO. 1 STEERING RACK BOOT

(a) Remove the No. 1 steering rack boot.

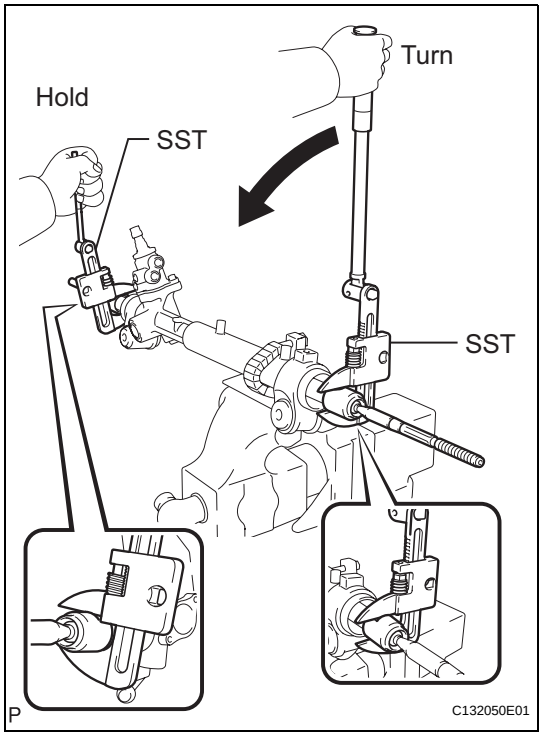
PS



10. REMOVE STEERING RACK END SUB-ASSEMBLY

(a) Using a screwdriver and a hammer, unstake the RH and LH claw washers.

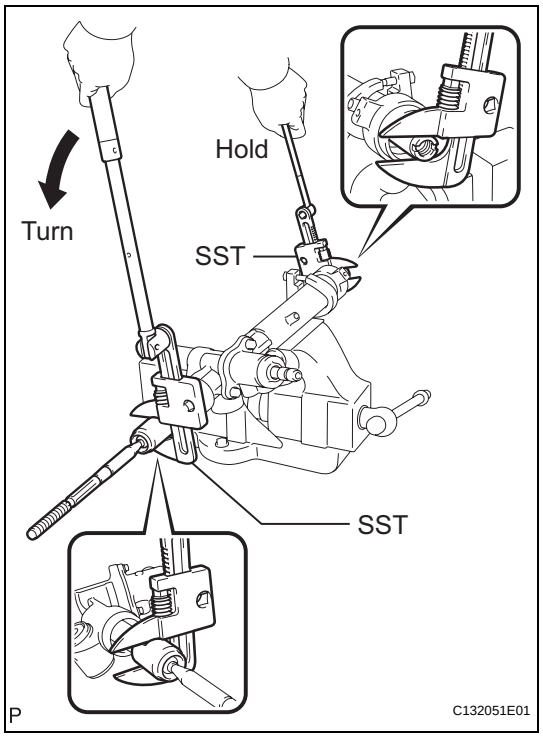
NOTICE:
Avoid any impact to the steering rack.



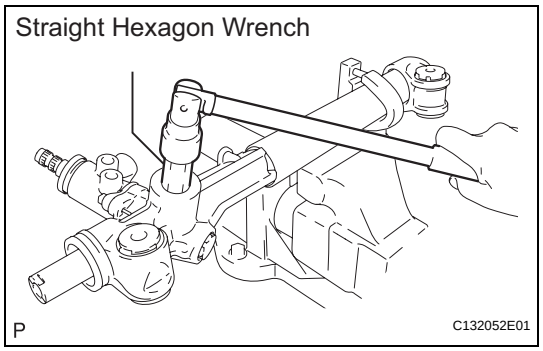
(b) Using SST, remove the steering rack end sub-assembly (RH side) and the claw washer.

SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.

PS

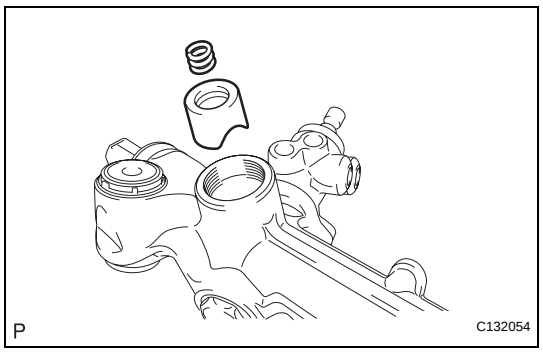


(c) Using SST, remove the steering rack end sub-assembly (LH side) and the claw washer.
SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.
HINT:
Using SST, hold the rack and remove the steering rack end sub-assembly.

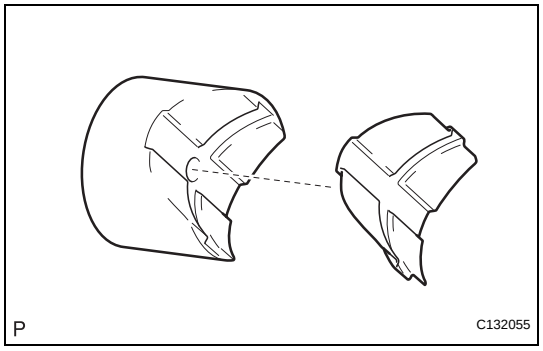


11. REMOVE RACK GUIDE

(a) Using a straight hexagon wrench (24 mm (0.94 in.)), remove the rack guide spring cap.

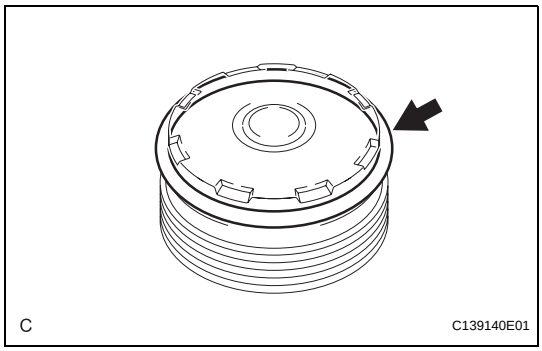


(b) Remove the compression spring and the rack guide sub-assembly.

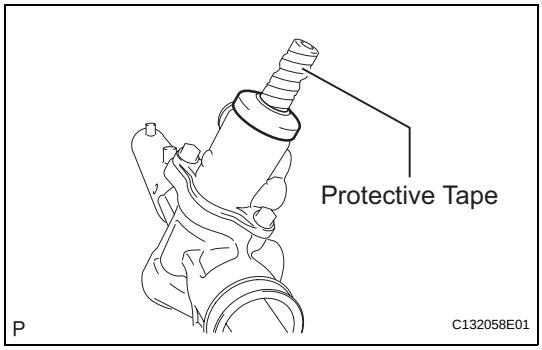


(c) Remove the rack guide base from the rack guide.

PS



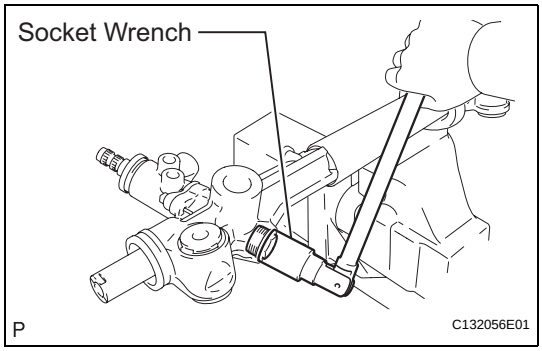
(d) Remove the O-ring from the rack guide spring cap.



12. REMOVE DUST COVER

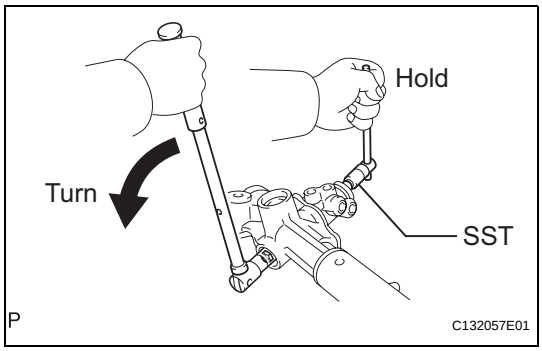
(a) Wrap protective tape around the spline of the control valve in order to prevent damaging the dust cover.

(b) Remove the dust cover.

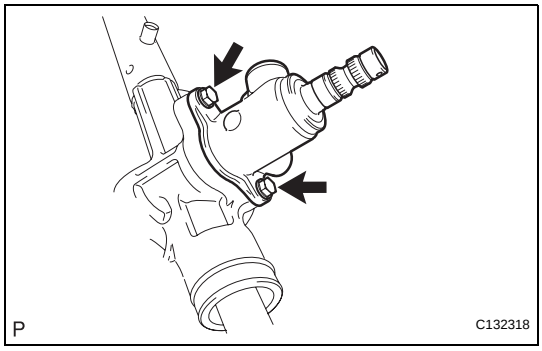


13. REMOVE POWER STEERING CONTROL VALVE ASSEMBLY

(a) Using a socket wrench (27 mm (1.06 in.)), remove the rack housing cap.

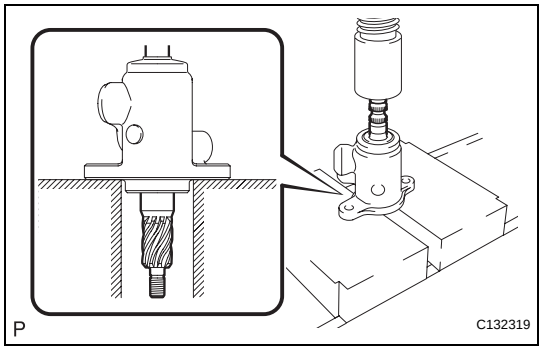


(b) Using SST, hold the control valve shaft and remove the nut.
SST 09616-00011



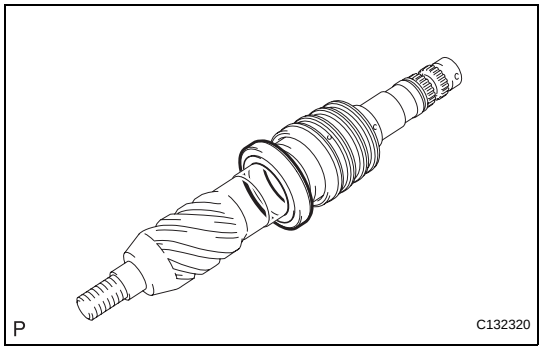
(c) Remove the 2 bolts and the power steering control valve assembly.

(d) Remove the gasket.



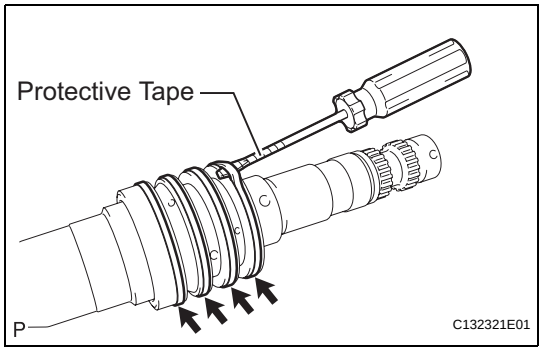
14. REMOVE POWER STEERING CONTROL VALVE SUB-ASSEMBLY

(a) Using a press, remove the power steering control valve sub-assembly.



15. REMOVE POWER STEERING CONTROL VALVE LOWER OIL SEAL

(a) Remove the power steering control valve lower oil seal from the power steering control valve sub-assembly.



16. REMOVE POWER STEERING CONTROL VALVE SPACER

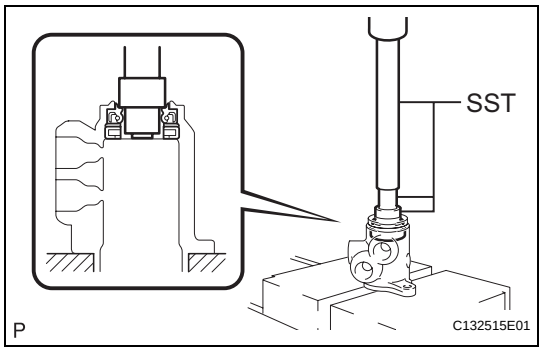
(a) Using a screwdriver, remove the 4 power steering control valve spacers from the power steering control valve sub-assembly.

NOTICE:

Be careful not to damage the spacer grooves on the control valve.

HINT:

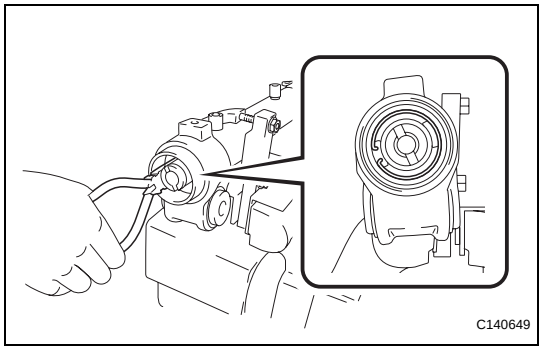
Tape the screwdriver tip before use.



17. REMOVE POWER STEERING CONTROL VALVE UPPER OIL SEAL

(a) Using SST and a press, press out the power steering control valve upper oil seal and the power steering control valve upper bearing from the control valve housing sub-assembly.

SST 09950-70010 (09951-07150), 09950-60010 (09951-00250, 09951-00180, 09952-06010)



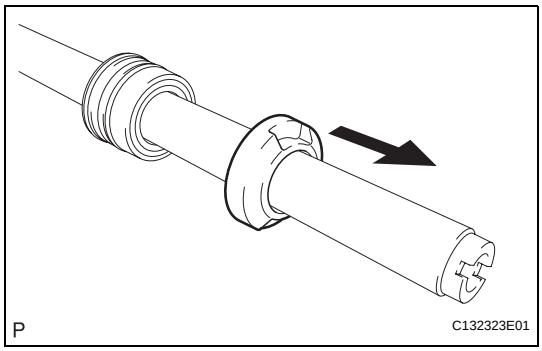
18. REMOVE CYLINDER END STOPPER HOLE SNAP RING

(a) Using needle-nose pliers, remove the cylinder end stopper hole snap ring from the power steering rack housing.

19. REMOVE POWER STEERING RACK SUB-ASSEMBLY

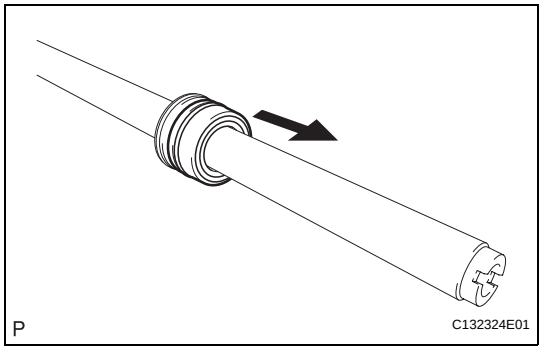
(a) Remove the power steering rack sub-assembly with the cylinder end stopper and power steering rack bushing.

PS



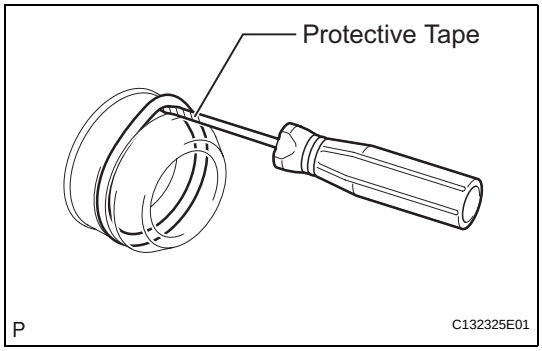
20. REMOVE CYLINDER END STOPPER

(a) Remove the cylinder end stopper from the power steering rack sub-assembly.

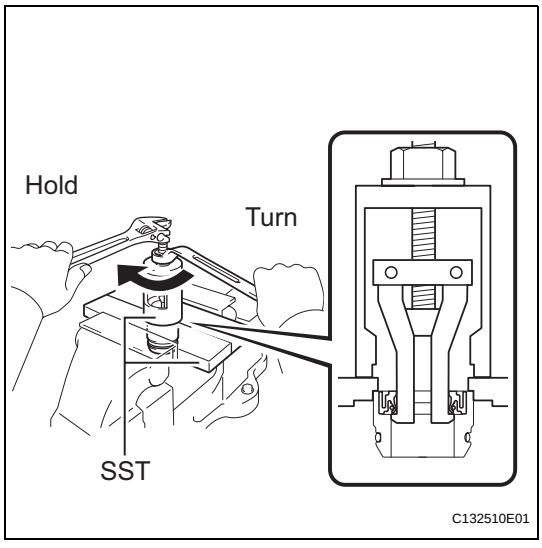


21. REMOVE POWER STEERING RACK BUSHING

(a) Remove the power steering rack bushing from the power steering rack sub-assembly.

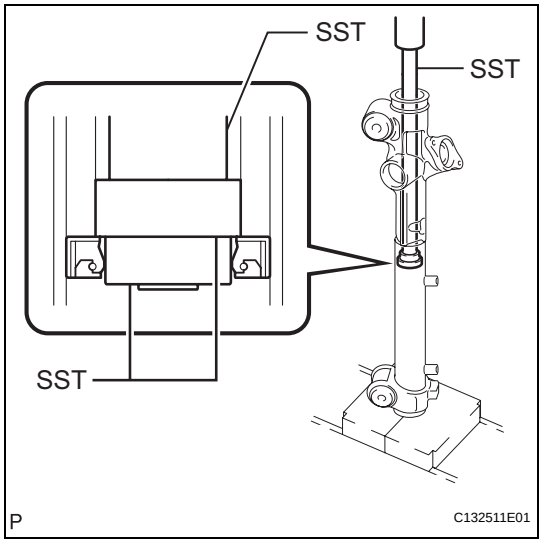


(b) Using a screwdriver, remove the O-ring from the power steering rack bushing.
HINT:
Tape the screwdriver tip before use.



(c) Using SST, remove the rack bushing oil seal from the power steering rack bushing.
SST 09527-21011, 09612-24014 (09613-22011)
NOTICE:
Be careful not to drop the power steering rack bushing.

PS



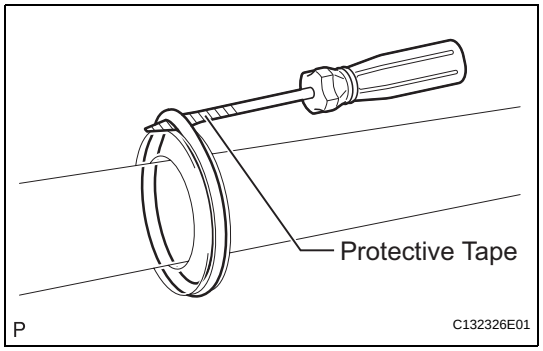
22. REMOVE POWER STEERING CYLINDER TUBE OIL SEAL

(a) Using SST and a press, remove the power steering cylinder tube oil seal.

SST 09950-70010 (09951-07360), 09950-60010 (09951-00290, 09951-00250)

NOTICE:

Be careful not to damage the inside surface of the power steering rack housing.



23. REMOVE POWER PISTON OIL SEAL

(a) Using a screwdriver, remove the power piston oil seal and the O-ring from the power steering rack.

NOTICE:

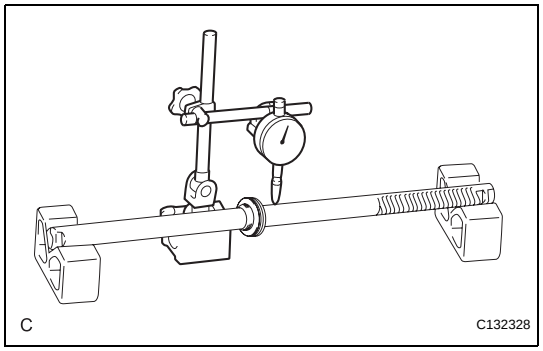
Be careful not to damage the power piston oil seal groove on the power steering rack.

HINT:

Tape the screwdriver tip before use.

PS

INSPECTION



1. INSPECT POWER STEERING RACK

(a) Using a dial indicator, check for runout of the steering rack.

Maximum runout:

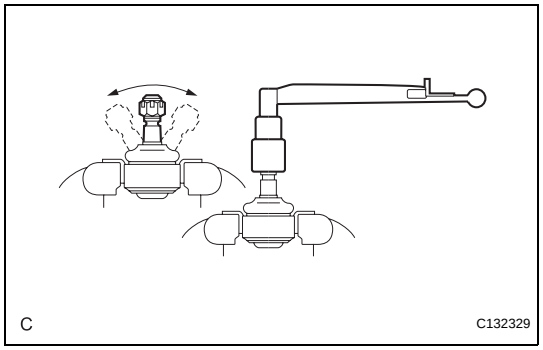
0.3 mm (0.0118 in.)

NOTICE:

Make sure that the steering rack is placed horizontally.

If runout exceeds the maximum, replace the power steering link assembly.

(b) Check the rack surface for wear and damage.



2. INSPECT TIE ROD ASSEMBLY LH

(a) Secure the tie rod assembly LH in a vise.

(b) Install the nut to the stud bolt.

(c) Flip the ball joint back and forth 5 times or more.

(d) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque

0.98 to 3.92 N*m (10 to 40 kgf*cm, 8.7 to 34.7 in.*lbf)

If turning torque is not within the specified range, replace the tie rod assembly LH.

3. INSPECT TIE ROD ASSEMBLY RH

HINT:

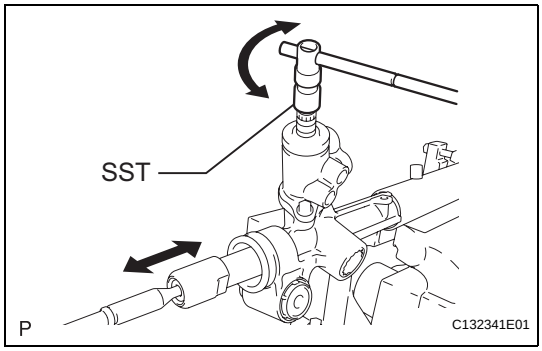
Perform the same procedure as for the LH side.

4. INSPECT TOTAL PRELOAD

(a) Temporarily install the 2 steering rack ends to the power steering rack.

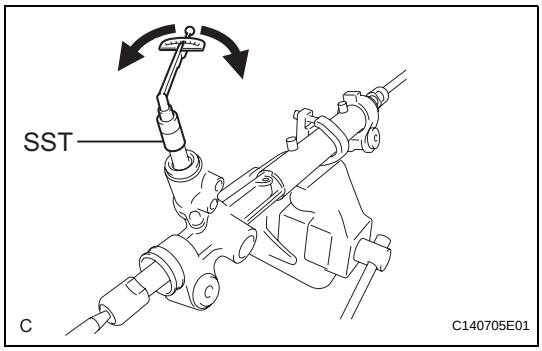
NOTICE:

Do not fully turn the power steering rack without the steering rack ends as it may damage the oil seal in the rack housing.



(b) Using SST, fully turn the power steering rack right and left 10 times to settle it.

SST 09616-00011



(c) Using SST, turn the control valve and measure the preload.

SST 09616-00011

Torque: Standard preload (turning)

1.5 N*m (15.3 kgf*cm, 13.3 in.*lbf) or less

If the preload exceeds the specified value, proceed to INSTALL RACK GUIDE (See page PS-56).

(d) Remove the 2 steering rack ends from the power steering rack.

PS

REASSEMBLY

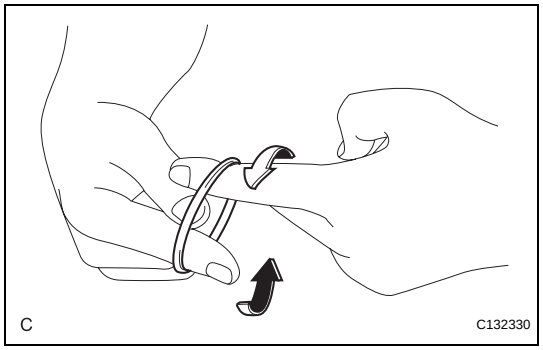
NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid, molybdenum disulfide lithium base grease, MP grease or silicon grease (See page PS-36).

1. INSTALL POWER PISTON OIL SEAL

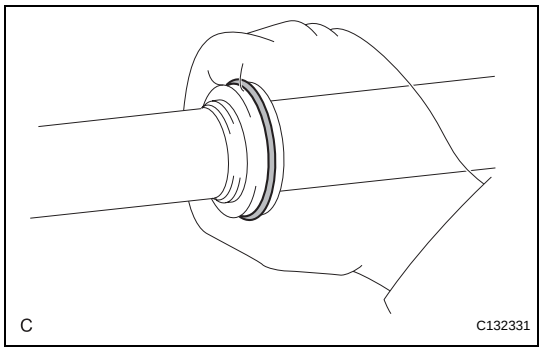
(a) Coat a new O-ring with power steering fluid and install it to the steering rack.

(b) Expand a new power piston oil seal with your fingers.
NOTICE:
Be careful not to expand the oil seal excessively.

(c) Coat the power piston oil seal with power steering fluid.



(d) Install the power piston oil seal to the steering rack, and adjust it with your fingers.



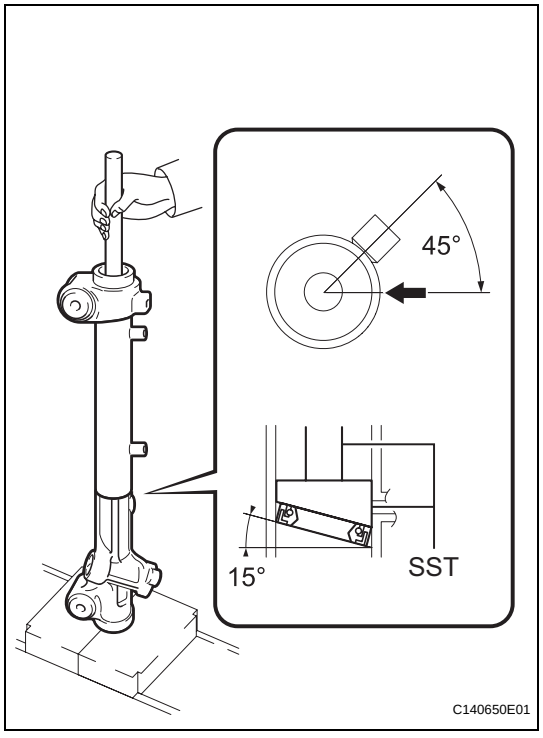
2. INSTALL POWER STEERING CYLINDER TUBE OIL SEAL

(a) Apply power steering fluid to the lip of a new power steering cylinder tube oil seal.

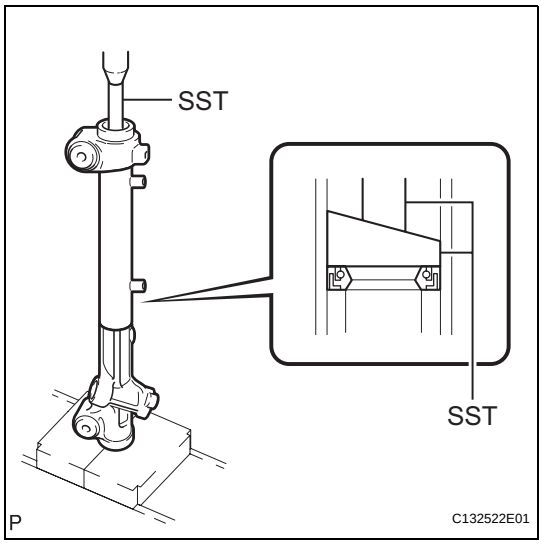
(b) Install the power steering cylinder tube oil seal to the rack housing at a slant.

(c) Using SST, insert the power steering cylinder tube oil seal by pushing the SST in by hand until the oil seal passes the 2 ports.
SST 09950-70010 (09951-07360), 09631-00200
NOTICE:
- **Ensure that the power steering cylinder tube oil seal is installed in the correct direction as shown in the illustration.**
- **Install the power steering cylinder tube oil seal at an angle of approximately 15° so that the lowermost part comes to the point, indicated by the arrow in the illustration, to prevent damage to the side of the oil seal when it passes the 2 ports.**
- **Do not turn the SST when inserting the oil seal.**

(d) Install SST (09631-00200) to SST (09951-07360) upside down.



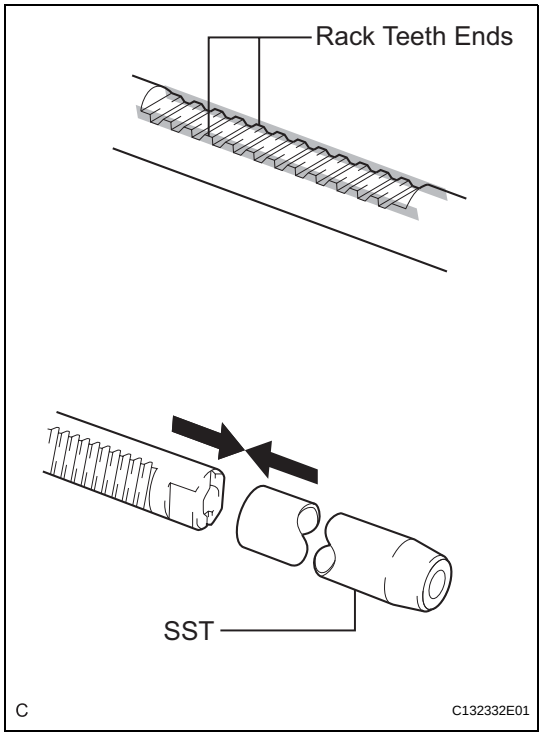
PS



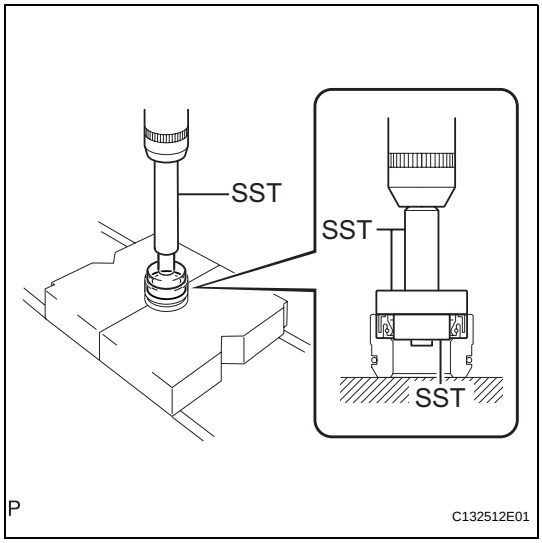
(e) Using SST, level the power steering cylinder tube oil seal by pushing the SST in by hand. Using SST and a press, install the oil seal.
SST 09950-70010 (09951-07360), 09631-00200

3. INSTALL POWER STEERING RACK SUB-ASSEMBLY

(a) Apply molybdenum disulfide lithium base grease to the rack teeth ends.

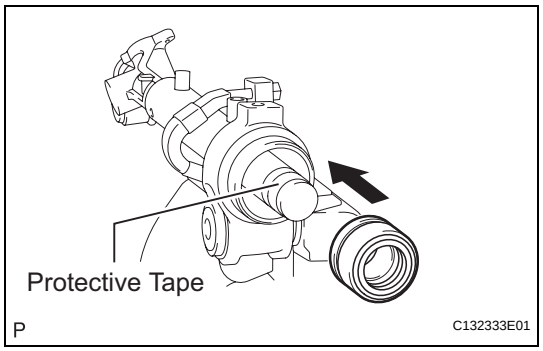


(b) Connect SST to the power steering rack sub-assembly.
SST 09631-33010
(c) Coat SST with power steering fluid.
(d) Install the power steering rack sub-assembly to the power steering rack housing.
(e) Remove SST.

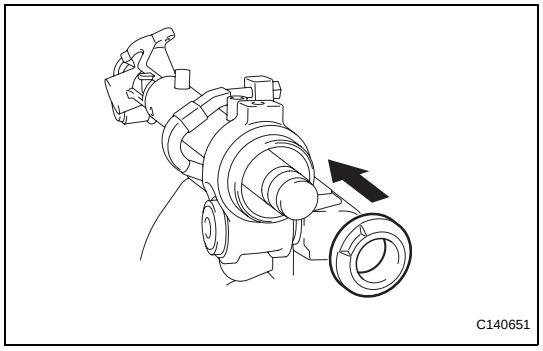


4. INSTALL POWER STEERING RACK BUSHING

(a) Using SST and a press, install the rack bushing oil seal to the power steering rack bushing.
SST 09950-70010 (09951-07100), 09950-60010 (09951-00400, 09951-00250, 09952-06010)
NOTICE:
Ensure that the rack bushing oil seal is installed in the correct direction as shown in the illustration.
(b) Coat a new O-ring with power steering fluid and install it to the rack bushing.
(c) Coat the rack bushing oil seal lip with power steering fluid.

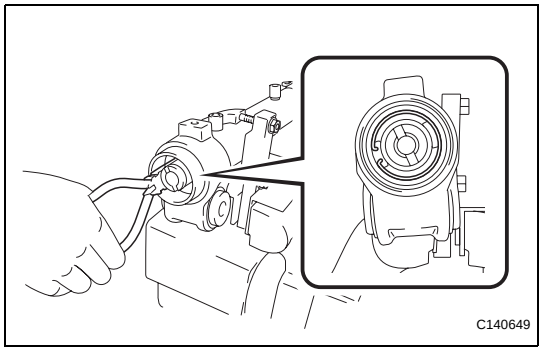


(d) Install the power steering rack bushing to the power steering rack housing.
NOTICE:
Do not damage the rack bushing oil seal.
HINT:
Wrap protective tape around the end of the steering rack in order to prevent damage to the rack bushing oil seal.



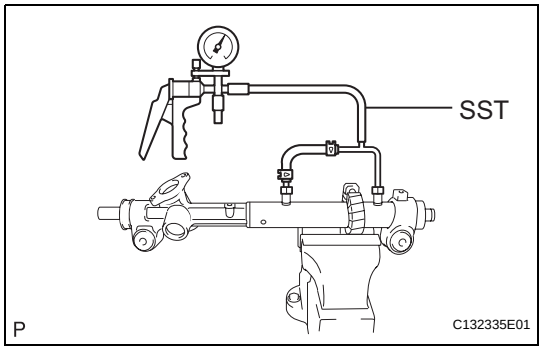
5. INSTALL CYLINDER END STOPPER

(a) Install the cylinder end stopper to the power steering rack housing.



6. INSTALL CYLINDER END STOPPER HOLE SNAP RING

(a) Using needle nose pliers, install the cylinder end stopper hole snap ring to the power steering rack housing.
NOTICE:
- **Make sure that the cylinder end stopper hole snap ring is securely installed in the power steering rack housing groove.**
- **Make sure that the cylinder end stopper hole snap ring claws are aligned with the cylinder end stopper notch.**



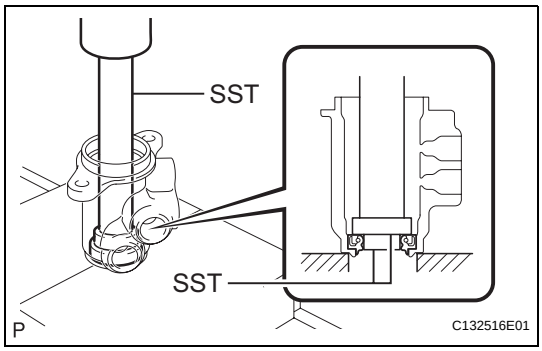
7. AIR TIGHTNESS TEST

(a) Install SST to the power steering rack housing.
SST 09631-12071 (09633-00010)
(b) Apply a vacuum of 53 kPa (398 mmHg, 15.65 in.Hg) for approximately 30 seconds.
(c) Check that there is no change in the vacuum pressure.
If there is a change in the vacuum pressure, check the installation of the oil seals.

8. INSTALL POWER STEERING CONTROL VALVE UPPER OIL SEAL

(a) Coat a new power steering control valve upper oil seal lip with power steering fluid.

PS

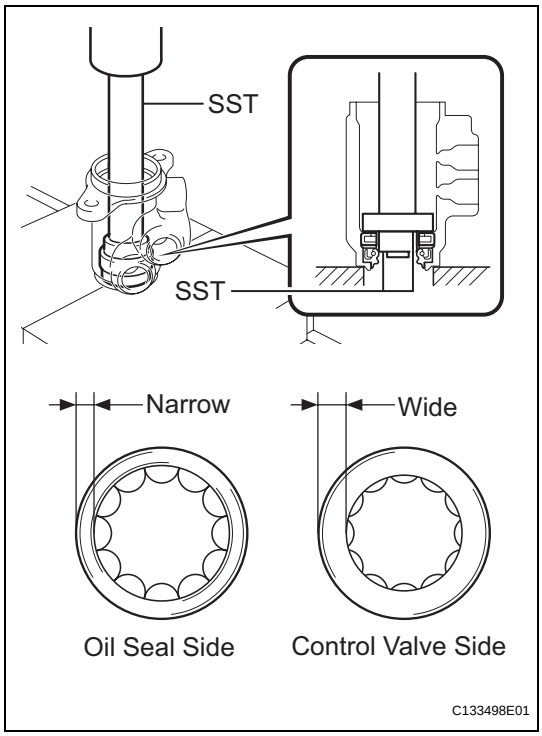


(b) Using SST and a press, press in the power steering control valve upper oil seal.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09952-06010, 09951-00320)
NOTICE:
Make sure that the power steering control valve upper oil seal is installed in the correct direction as shown in the illustration.

9. INSTALL POWER STEERING CONTROL VALVE UPPER BEARING

(a) Coat the power steering control valve upper bearing with molybdenum disulfide lithium base grease.

(b) Using SST and a press, press in the power steering control valve upper bearing.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09951-00340)
NOTICE:
Make sure that the power steering control valve upper bearing is installed in the correct direction as shown in the illustration.



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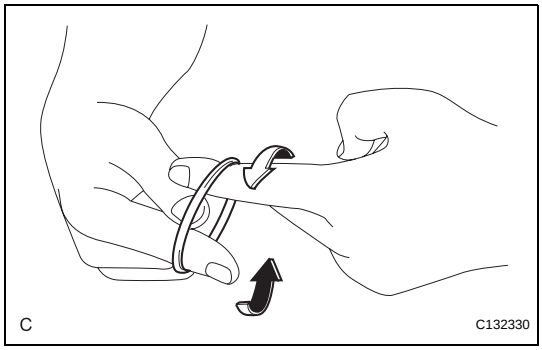
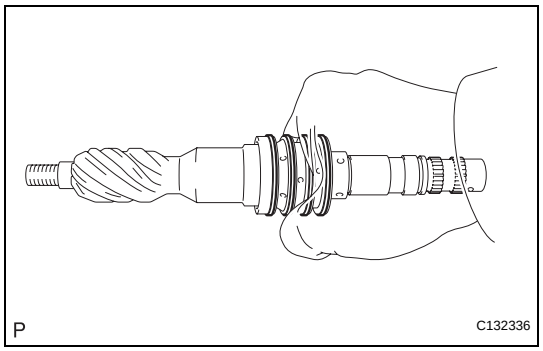


10. INSTALL POWER STEERING CONTROL VALVE SPACER

(a) Expand 4 new power steering control valve spacers with your fingers.
NOTICE:
Be careful not to expand the power steering control valve spacers excessively.

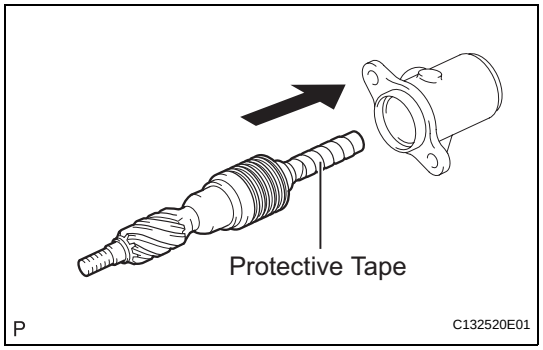
(b) Coat the 4 power steering control valve spacers with power steering fluid.



(c) Install the 4 power steering control valve spacers to the control valve, and adjust them with your fingers.

11. INSTALL POWER STEERING CONTROL VALVE SUB-ASSEMBLY

(a) Coat the power steering control valve sub-assembly with power steering fluid.



(b) Install the power steering control valve sub-assembly into the control valve housing sub-assembly.

NOTICE:

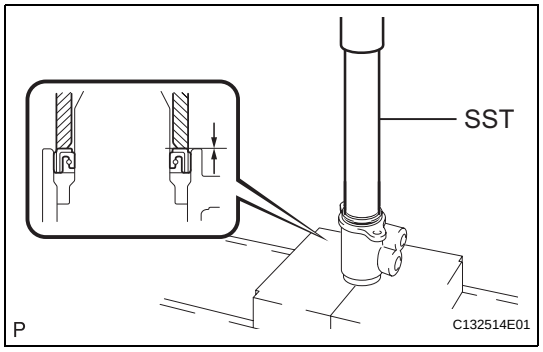
Be careful not to damage the power steering control valve spacers and power steering control valve upper oil seal lip.

HINT:

Wrap protective tape around the spline of the power steering control valve sub-assembly in order to prevent damage to the oil seal.

12. INSTALL POWER STEERING CONTROL VALVE LOWER OIL SEAL

(a) Coat a new power steering control valve lower oil seal lip with power steering fluid.

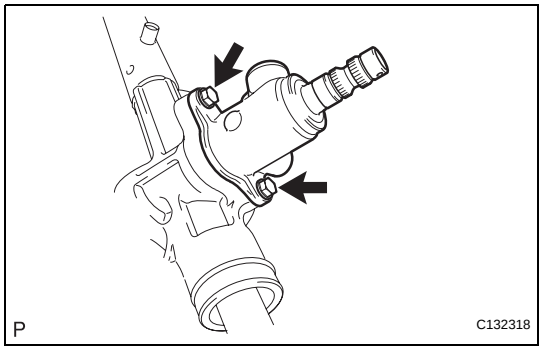


(b) Using SST and a press, install the power steering control valve lower oil seal to the control valve assembly.

SST 09612-22011

NOTICE:

- **Make sure that the power steering control valve lower oil seal is installed in the correct direction as shown in the illustration.**
- **Do not damage the power steering control valve lower oil seal.**

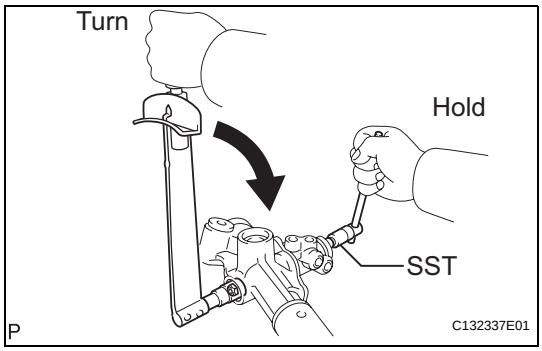


13. INSTALL POWER STEERING CONTROL VALVE ASSEMBLY

(a) Install the power steering control valve assembly and a new gasket to the power steering rack housing with the 2 bolts.

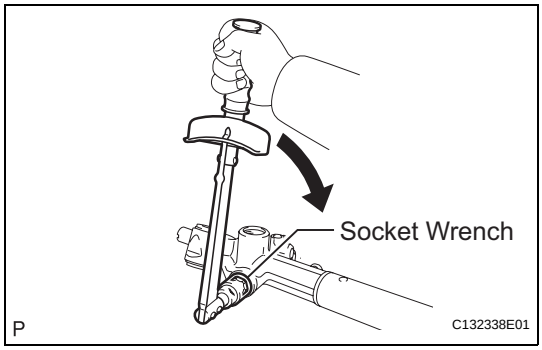
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

PS

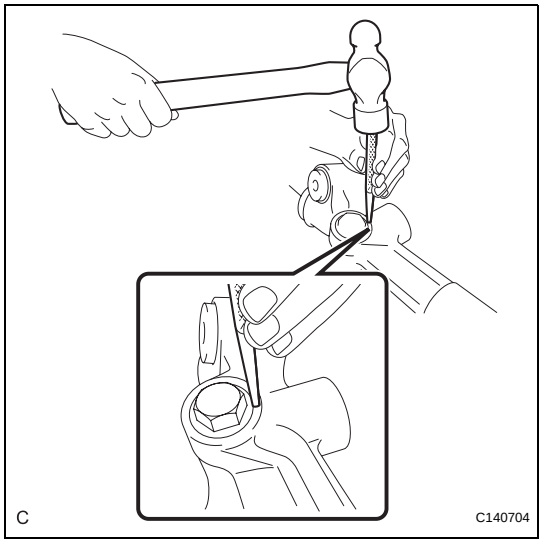


(b) Using SST, hold the control valve shaft and install a new nut.
SST 09616-00011
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

(c) Apply sealant to 2 or 3 threads of the rack housing cap.
Sealant:
TOYOTA genuine adhesive 1344, THREE BOND 1344 or equivalent

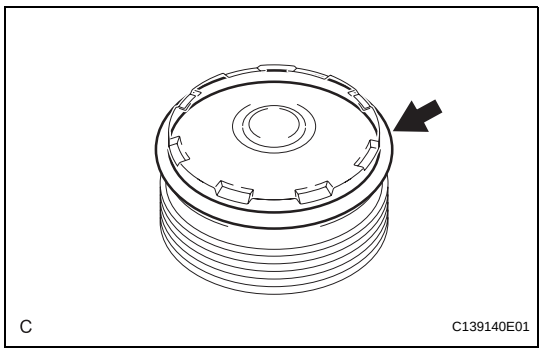


(d) Using a socket wrench (27 mm (1.06 in.)), install the rack housing cap.
Torque: 54 N*m (546 kgf*cm, 40 ft.*lbf)



(e) Using a punch and a hammer, stake the rack housing cap and the power steering rack housing.

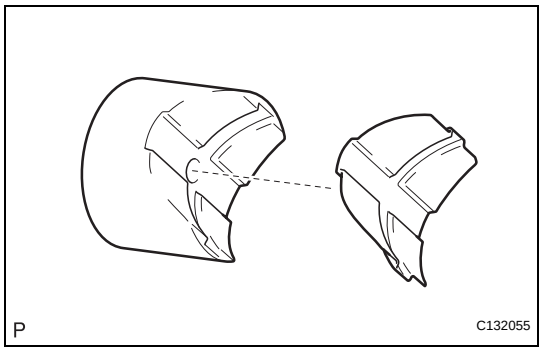
PS



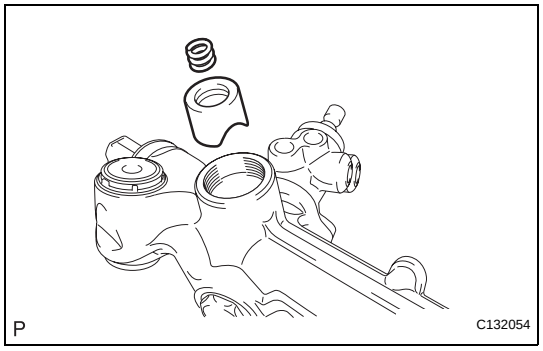
14. INSTALL RACK GUIDE

(a) Coat a new O-ring with molybdenum disulfide lithium base grease and install it to the rack guide spring cap.
NOTICE:
Make sure that no foreign matter, such as aluminum dust, is on the power steering rack housing and rack guide spring cap.

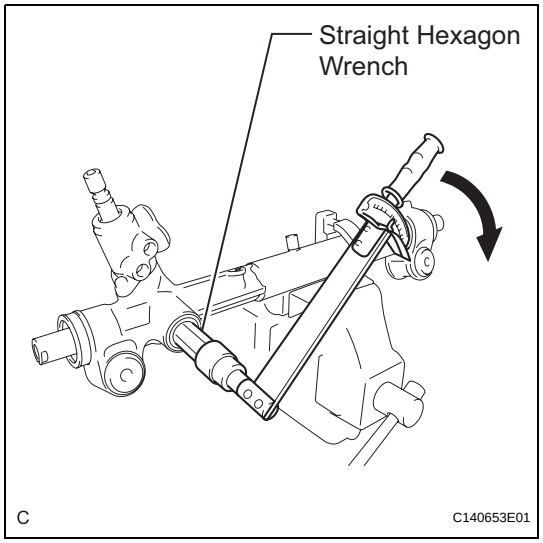
(b) Apply molybdenum disulfide lithium base grease to the rack guide base and rack guide.



(c) Install the rack guide base to the rack guide.
(d) Apply molybdenum disulfide lithium base grease to the compression spring and the contact surface of the rack guide sub-assembly and the power steering rack.

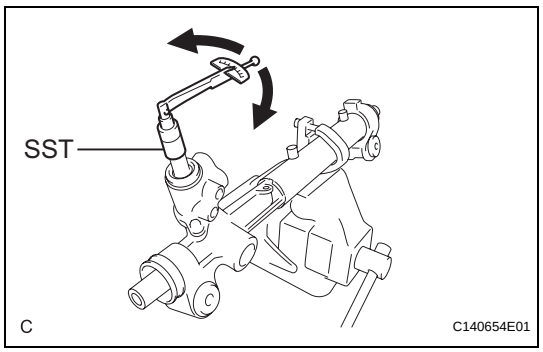


(e) Install the compression spring and rack guide sub-assembly to the power steering rack housing.

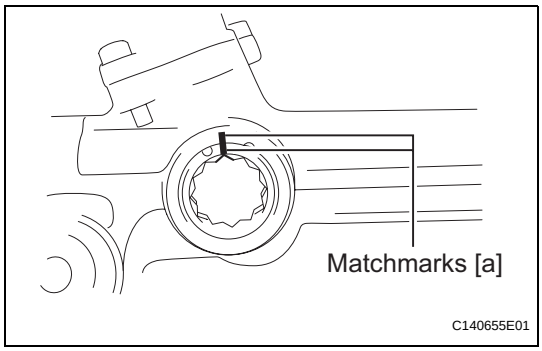


(f) Using a straight hexagon wrench (24 mm (0.94 in.)), install the rack guide spring cap to the power steering rack housing.
Torque: 50 to 70 N*m (514 to 714 kgf*cm, 37 to 52 ft.*lbf)

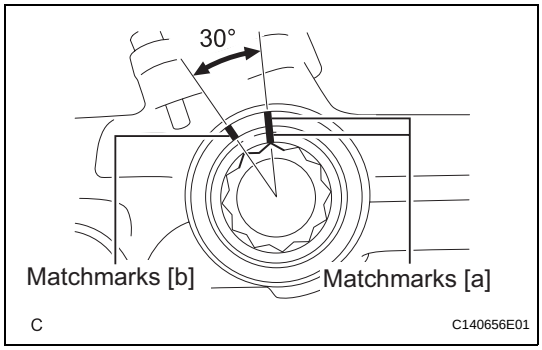
PS



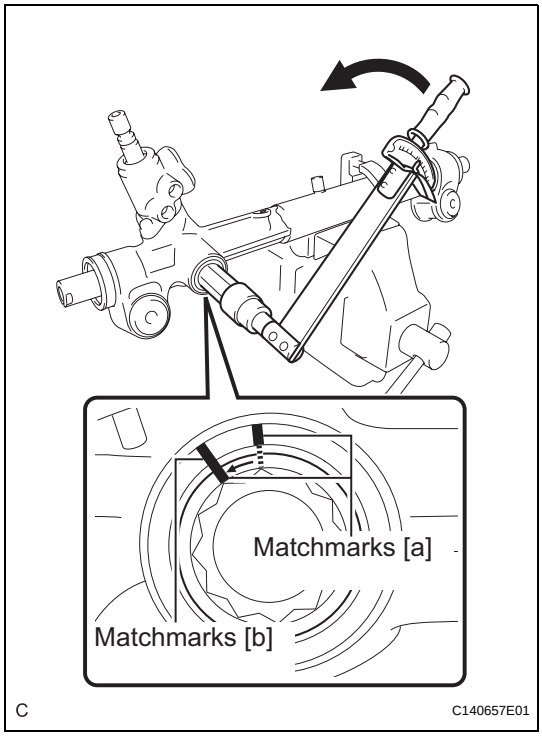
(g) Using SST, turn the control valve and measure the turning torque.
Torque: 6.0 N*m (61 kgf*cm, 54 in.*lbf) or more



(h) Put matchmarks <a> on the power steering rack housing and the rack guide spring cap.

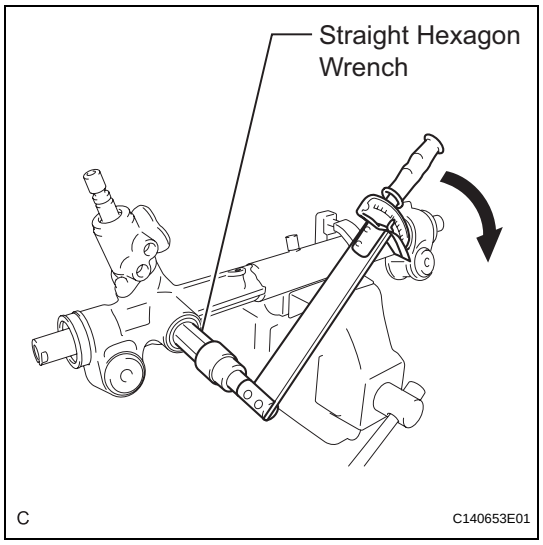


(i) Put matchmarks <b> 30° counterclockwise from matchmarks <a> on the power steering rack housing.



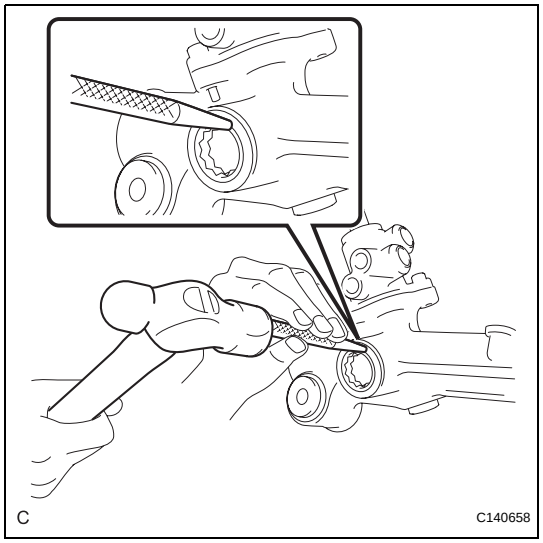
(j) Using a straight hexagon wrench (24 mm (0.94 in.)), loosen the rack guide spring cap until matchmarks <b> and matchmarks <a> on the rack guide spring cap are aligned. Measure the rotating torque required when loosening the rack guide spring cap.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf) or more

PS

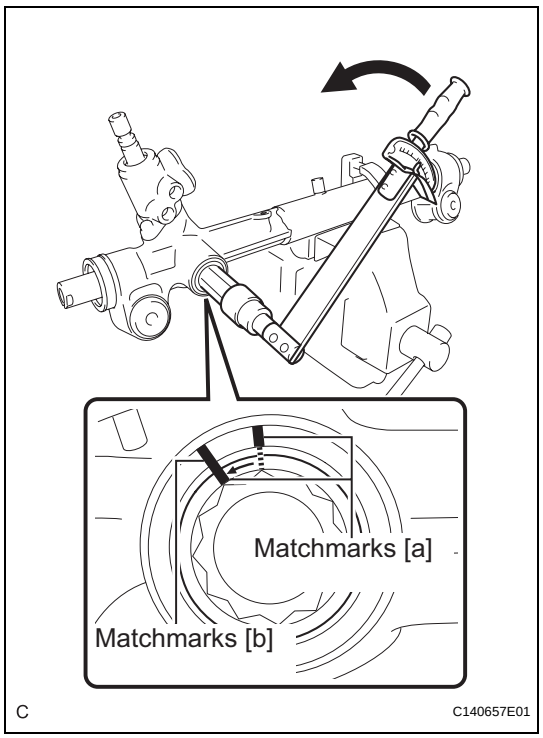


(k) If the rotating torque required when loosening is below the specified value, perform the following procedure to achieve the specified value.

(1) Using a straight hexagon wrench (24 mm (0.94 in.)), re-tighten the rack guide spring cap.
Torque: 50 to 70 N*m (510 to 714 kgf*cm, 37 to 52 ft.*lbf)



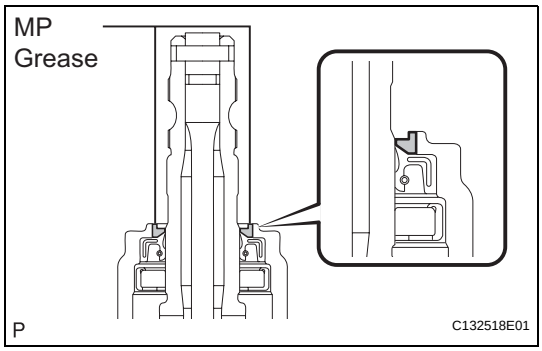
(2) Using a punch and hammer, stake the power steering rack housing and rack guide spring cap at 3 equally spaced positions.
HINT:
Tap the power steering rack housing and rack guide spring cap strongly and repeatedly to stake them securely.



(3) Using a straight hexagon wrench (24 mm (0.94 in.)), loosen the rack guide spring cap until matchmarks <b> and matchmarks <a> on the rack guide spring cap are aligned. Measure the rotating torque required when loosening the rack guide spring cap.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf) or more

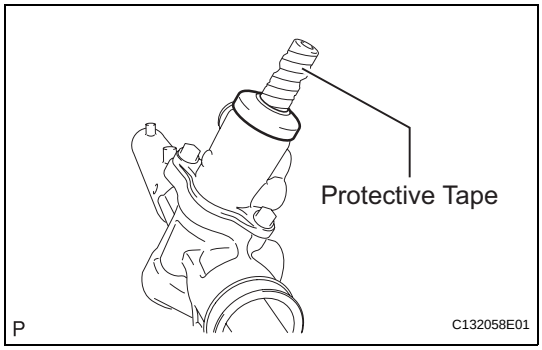
15. INSPECT TOTAL PRELOAD (See page PS-50)

PS



16. INSTALL DUST COVER

(a) Apply MP grease around the control valve shaft as shown in the illustration.

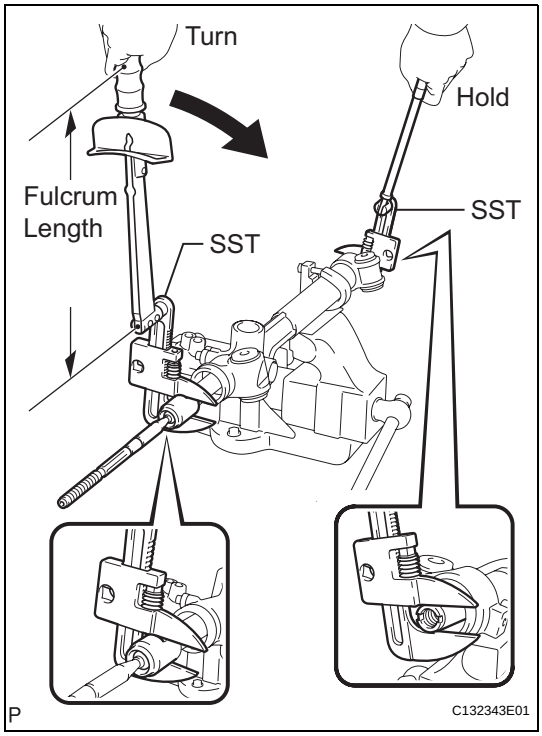


(b) Wrap vinyl tape around the spline of the control valve.

(c) Install the dust cover to the control valve assembly.

17. INSTALL STEERING RACK END SUB-ASSEMBLY

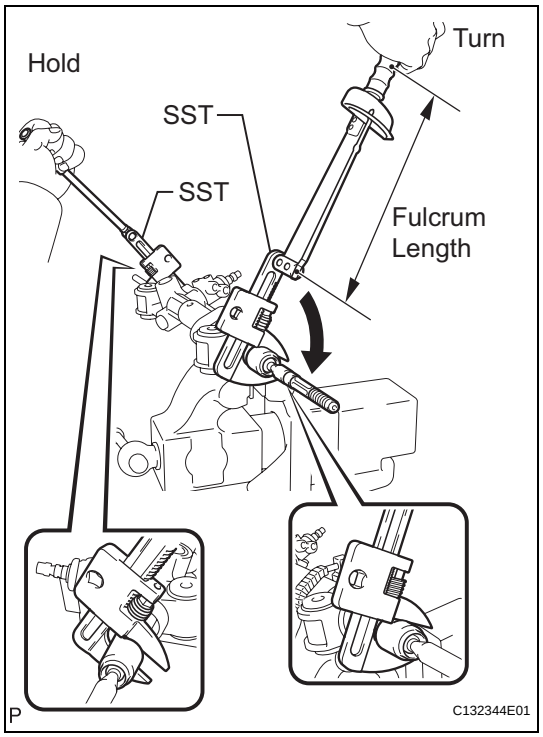
(a) Install 2 new claw washers.
HINT:
Align the claws of the claw washer with the steering rack grooves.



(b) Using SST, install the steering rack end sub-assembly (LH side).
SST 09922-10010
Torque: Without SST
84 N*m (852 kgf*cm, 62 ft.*lbf)
With SST
60 N*m (613 kgf*cm, 44 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.)**
- **This torque value is effective when SST is parallel to the torque wrench.**

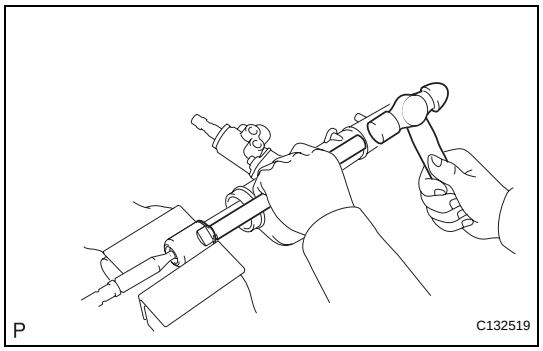
HINT:
Using SST, hold the steering rack and install the steering rack end sub-assembly (LH side).

PS



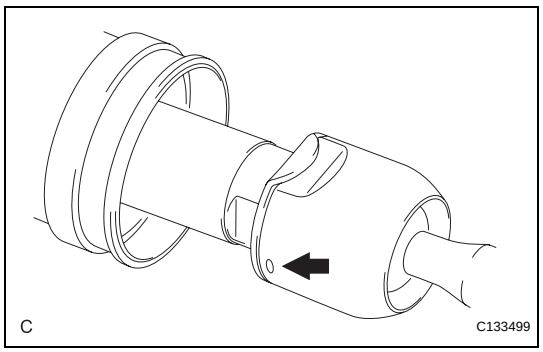
(c) Using SST, install the steering rack end sub-assembly (RH side).
SST 09922-10010
Torque: Without SST
84 N*m (852 kgf*cm, 62 ft.*lbf)
With SST
60 N*m (613 kgf*cm, 44 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.)**
- **This torque value is effective when SST is parallel to the torque wrench.**

HINT:
Using SST, hold the steering rack end sub-assembly (LH side) and install the steering rack end sub-assembly (RH side).

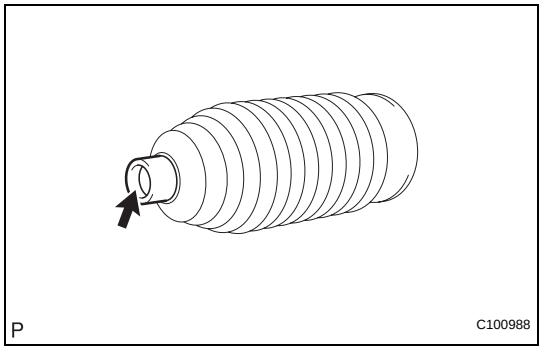


(d) Using a brass bar and a hammer, stake the 2 claw washers.
NOTICE:
Avoid any impact to the steering rack.

PS



(e) Ensure that the holes of the rack ends are 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.



18. INSTALL NO. 2 STEERING RACK BOOT

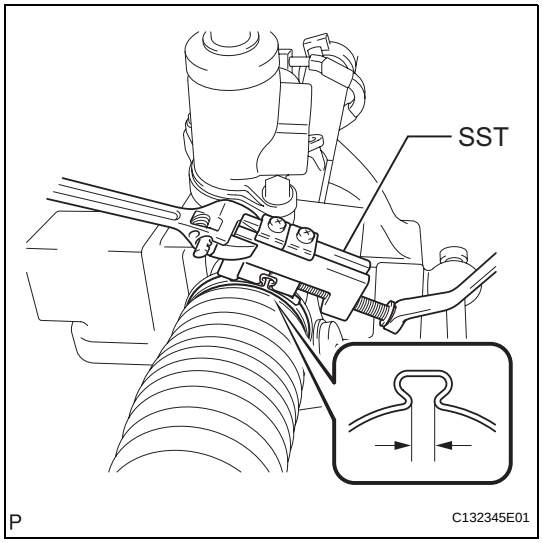
(a) Apply silicon grease to the inside of the small opening of the No. 2 steering rack boot.

(b) Install the No. 2 steering rack boot to the groove on the rack housing.
NOTICE:
Be careful not to damage or twist the No. 2 steering rack boot.

19. INSTALL NO. 1 STEERING RACK BOOT

HINT:

Perform the same procedure as for the No. 2 steering rack boot.



20. INSTALL NO. 2 STEERING RACK BOOT CLAMP

(a) Using SST, tighten the 2 No. 2 steering rack boot clamps as shown in the illustration.

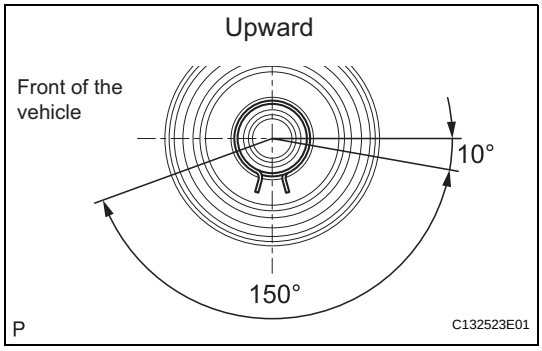
SST 09521-24010

Clearance:

2.0 mm (0.079 in.) or less

NOTICE:

Be careful not to damage the No. 2 steering rack boot.

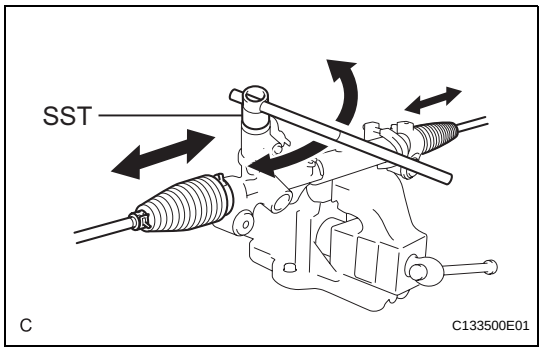


21. INSTALL STEERING RACK BOOT CLIP

(a) Using pliers, install the 2 steering rack boot clips.

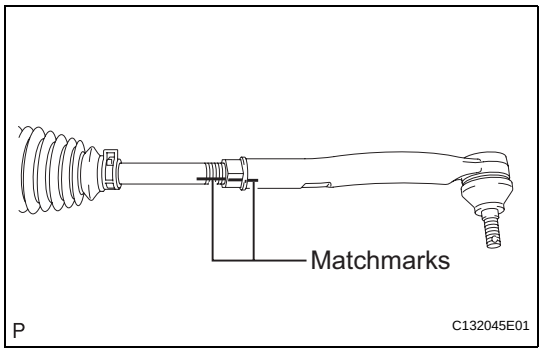
NOTICE:

Make sure that each clip claw is positioned within the area shown in the illustration.



(b) Using SST, turn the pinion and check that the rack boots expand and contract smoothly.

SST 09616-00011



22. INSTALL TIE ROD ASSEMBLY LH

(a) Install the lock nut and the tie rod assembly LH to the steering rack end sub-assembly until the matchmarks are aligned.

HINT:

After adjusting toe-in, torque the lock nut.

23. INSTALL TIE ROD ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

PS

24. INSTALL STEERING RIGHT TURN PRESSURE TUBE

(a) Coat 2 new O-rings with power steering fluid and install them to the steering right turn pressure tube.

(b) Using SST, install the right turn pressure tube to the power steering link assembly.

SST 09023-38201

Torque: Without SST

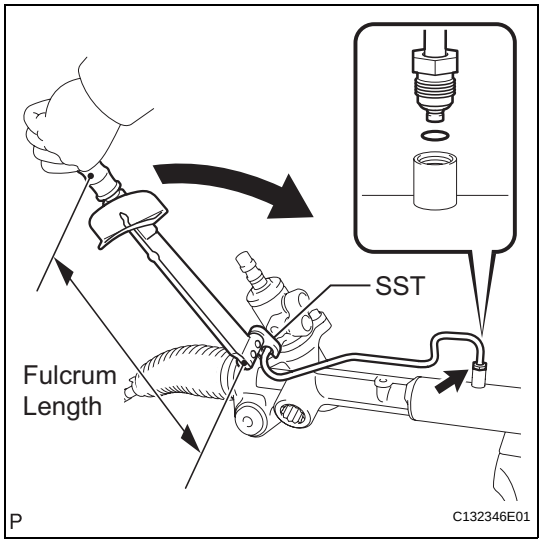
13 N*m (128 kgf*cm, 9 ft.*lbf)

With SST

11 N*m (114 kgf*cm, 8 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**



25. INSTALL STEERING LEFT TURN PRESSURE TUBE

(a) Coat 2 new O-rings with power steering fluid and install them to the steering left turn pressure tube.

(b) Using SST, install the left turn pressure tube to the power steering link assembly.

SST 09023-38201

Torque: Without SST

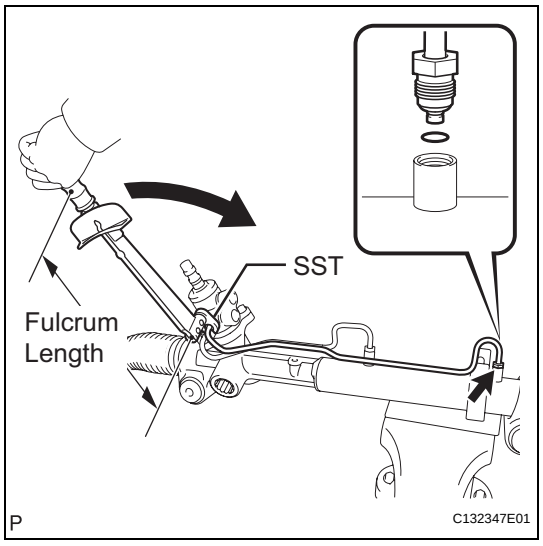
13 N*m (128 kgf*cm, 9 ft.*lbf)

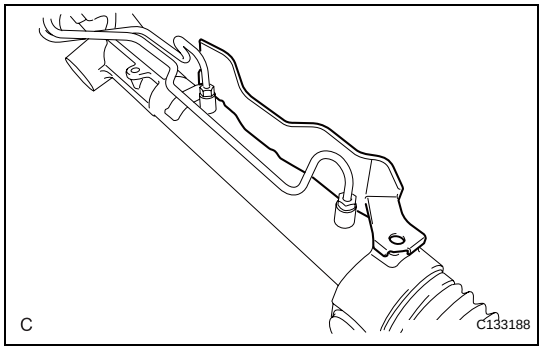
With SST

11 N*m (114 kgf*cm, 8 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**



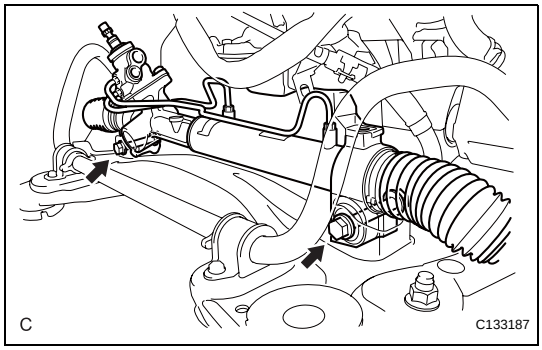


INSTALLATION

1. INSTALL POWER STEERING RACK HOUSING HEAT INSULATOR (for 2GR-FE)

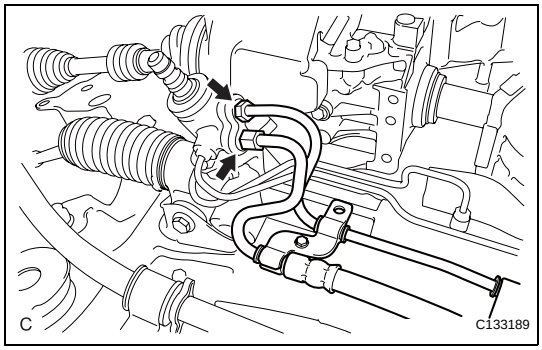
(a) Install the power steering rack housing heat insulator to the power steering link assembly.

PS



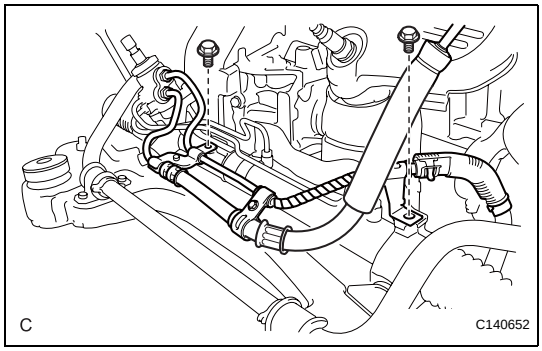
2. INSTALL POWER STEERING LINK ASSEMBLY

(a) Install the power steering link assembly with the 2 bolts and 2 nuts.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)



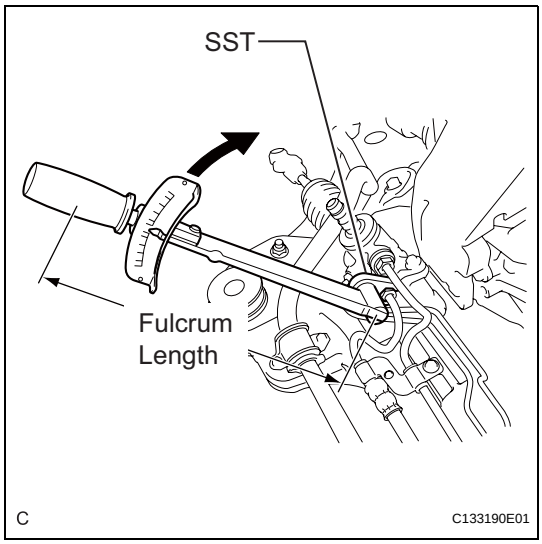
3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Temporarily connect the pressure feed tube assembly to the power steering link assembly.

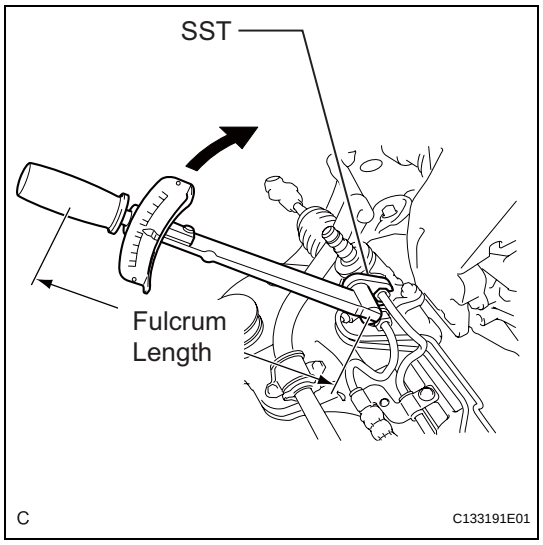


(b) Install the pressure feed tube assembly clamp with the 2 bolts.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

PS



(c) Using SST, tighten the pressure feed tube assembly (pressure feed tube side).
SST 09023-12701
Torque: Without SST
25 N*m (250 kgf*cm, 18 ft.*lbf)
With SST
22 N*m (227 kgf*cm, 16 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**

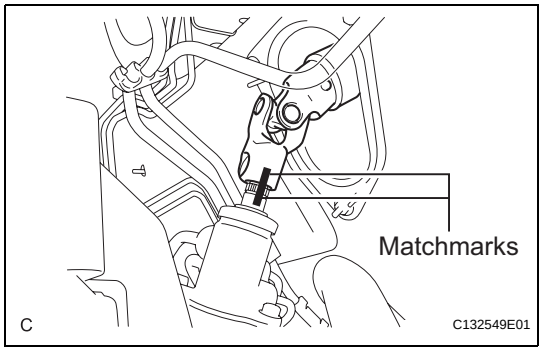


(d) Using SST, tighten the pressure feed tube assembly (return tube side).
SST 09023-12701
Torque: Without SST
25 N*m (250 kgf*cm, 18 ft.*lbf)
With SST
22 N*m (227 kgf*cm, 16 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

4. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
Refer to the instructions for installation of the engine assembly (See page EM-107 for 2AZ-FE, EM-37 for 2GR-FE).

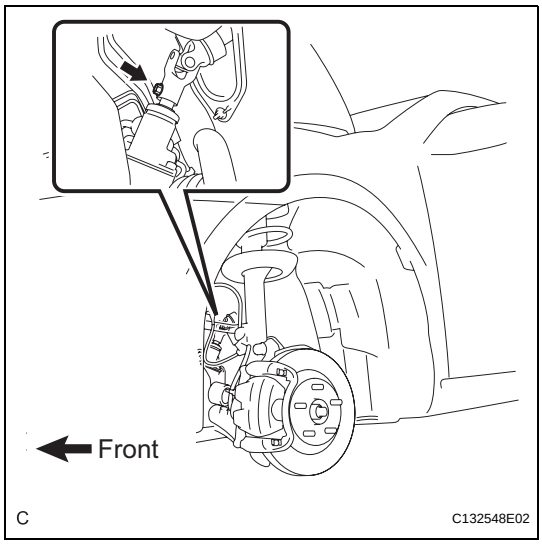
5. CONNECT TIE ROD ASSEMBLY LH
(a) Connect the tie rod assembly LH to the steering knuckle with the nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
(b) Install a new cotter pin.
NOTICE:
Further tighten the nut up to 60° if the holes for the cotter pin are not aligned.

6. CONNECT TIE ROD ASSEMBLY RH
HINT:
Perform the same procedure on the other side.



7. CONNECT STEERING SLIDING YOKE
(a) Align the matchmarks on the steering sliding yoke and the steering link assembly.

PS



(b) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)

8. **INSTALL FRONT WHEELS**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
10. **BLEED POWER STEERING FLUID (See page PS-7)**
11. **CHECK POWER STEERING FLUID LEVEL (See page PS-3)**
12. **CHECK FOR POWER STEERING FLUID LEAKAGE**
13. **CHECK FOR EXHAUST GAS LEAKS**
14. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
15. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
HINT:
(See page SP-4)

PS