

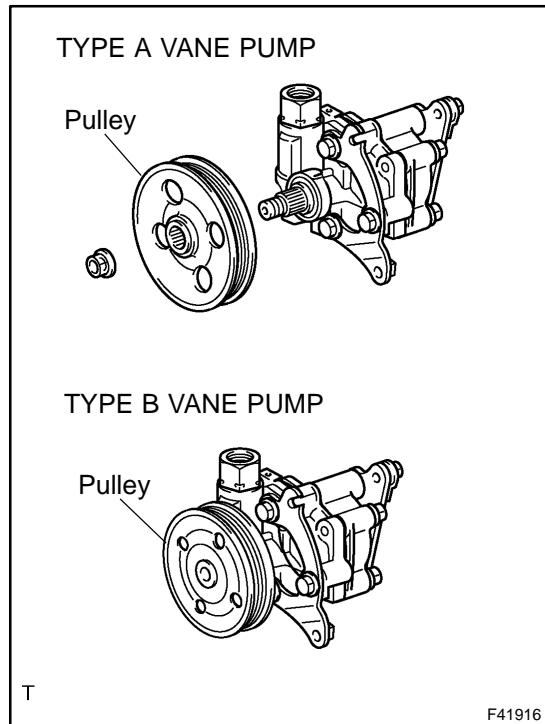
POWER STEERING SYSTEM

PRECAUTION

51067-03

1. HANDLING PRECAUTIONS ON STEERING SYSTEM

(a) Care must be taken to when replacing parts. Incorrect replacement could affect the performance of the steering system and result in a driving hazard.



(b) 1MZ-FE engine has 2 types of vane pump assy.

HINT:

TYPE A VANE PUMP

Vane pump pulley can be removed from the vane pump shaft (See page 51-7).

TYPE B VANE PUMP

Vane pump pulley cannot be removed from the vane pump shaft (See page 51-7).

2. HANDLING PRECAUTIONS ON SRS AIRBAG SYSTEM

(a) The LEXUS ES330 is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notice for the supplemental restraint system (See page 60-1).

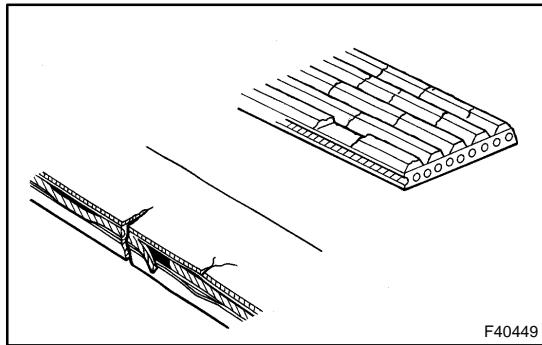
PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page
Hard steering	1. Tires (Improperly inflated) 2. Power steering fluid level (Low) 3. Drive belt (Loose) 4. Front wheel alignment (Incorrect) 5. Steering system joints (Worn) 6. Suspension arm ball joints (Worn) 7. Steering column (Binding) 8. Vane pump assy 9. Rack & pinion power steering gear assy	28-1 51-3 14-1 26-5 - 26-16 - 51-9 51-21
Poor return	1. Tires (Improperly inflated) 2. Front wheel alignment (Incorrect) 3. Steering column (Binding) 4. Rack & pinion power steering gear assy	28-1 26-5 - 51-21
Excessive play	1. Steering system joints (Worn) 2. Suspension arm ball joints (Worn) 3. Steering intermediate shaft sub-assy (Worn) 4. Sliding yoke (Worn) 5. Front wheel bearing (Worn) 6. Rack & pinion power steering gear assy	- 26-16 - - 30-2 51-21
Abnormal noise	1. Power steering fluid level (Low) 2. Steering system joints (Worn) 3. Vane pump assy 4. Rack & pinion power steering gear assy	51-3 - 51-9 51-21

ON-VEHICLE INSPECTION



1. INSPECT DRIVE BELT

(a) Visually check the 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. If the missing chunks from the ribs are found on the belt, it should be replaced.

2. BLEED POWER STEERING SYSTEM

(a) Check the fluid level.

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

(c) Turn the steering wheel.

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

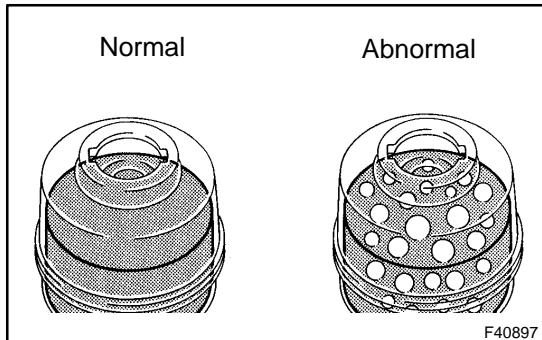
(2) Repeat (1) several times.

(g) Stop the engine.

(h) Check for foaming or emulsification.

Especially, if the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.

(i) Check the fluid level.



3. CHECK FLUID LEVEL

(a) Keep the vehicle level.

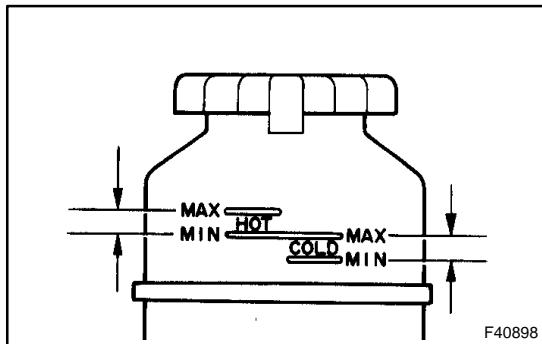
(b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

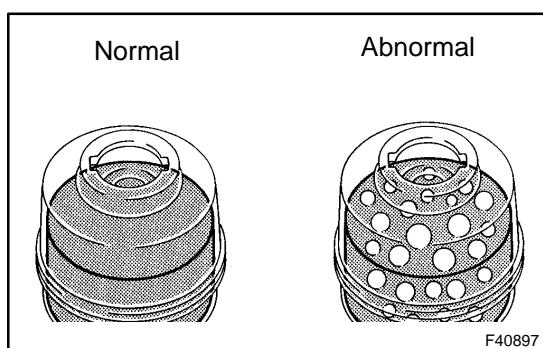
HINT:

Check that the fluid level is within the HOT LEVEL range on the reservoir cap. If the fluid is cold, check that it is within the COLD LEVEL range.

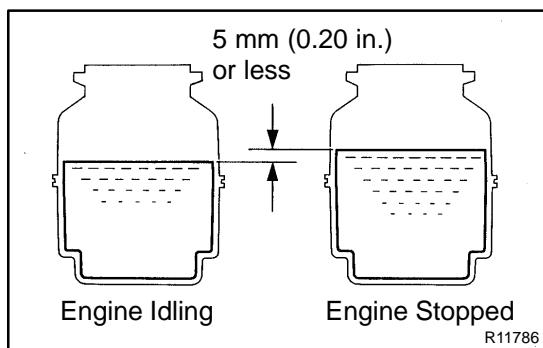


- (c) Start the engine and run it at idle.
- (d) Turn the steering wheel from lock to lock several times to raise fluid temperature.

Fluid temperature: 75 - 80 °C (167 - 176 °F)



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



- (f) With the engine idling, measure the fluid level in the oil reservoir.
- (g) Stop the engine.
- (h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed the power steering system.

- (i) Check the fluid level.

4. CHECK STEERING FLUID PRESSURE

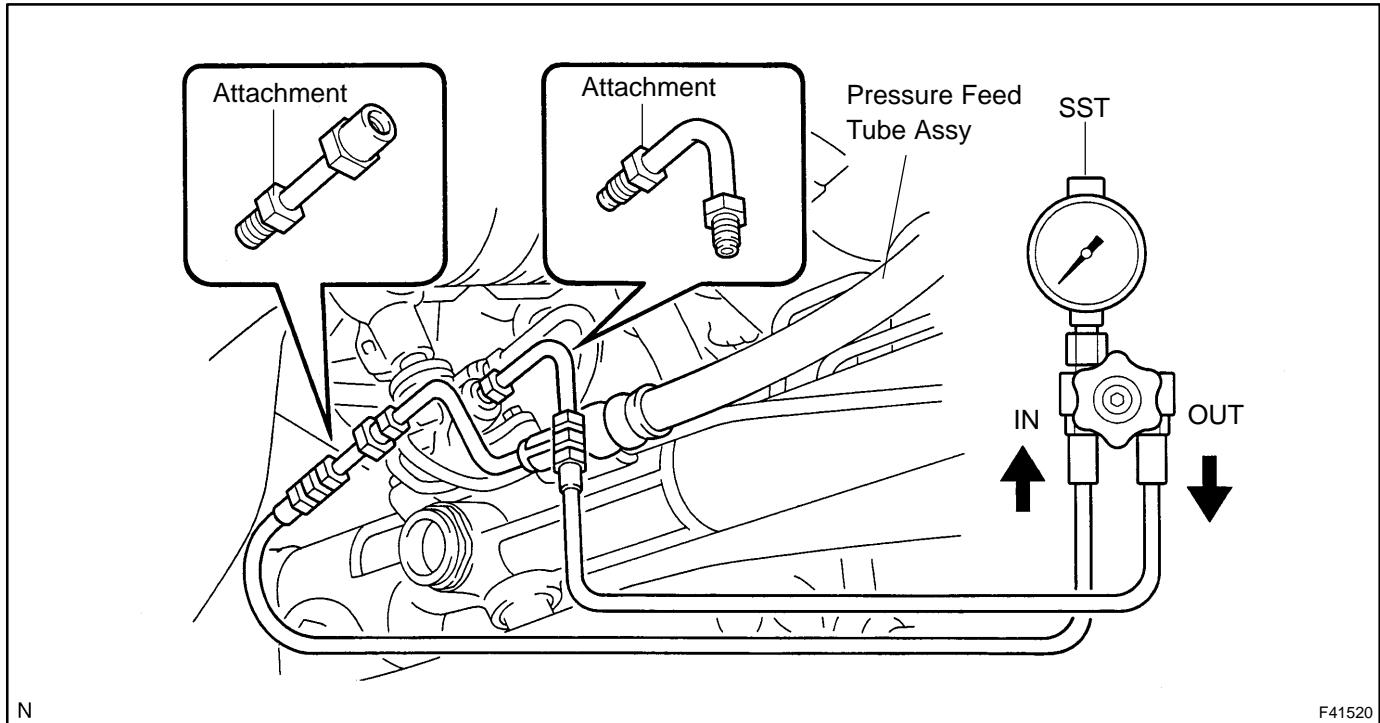
- (a) Disconnect the pressure feed tube assy from the rack & pinion power steering gear assy (See page 51-21).
- (b) Connect SST, as shown in the illustration.
SST 09640-10010 (09641-01010, 09641-01020, 09641-01030)

NOTICE:

Check that the valve of the SST is in the open position.

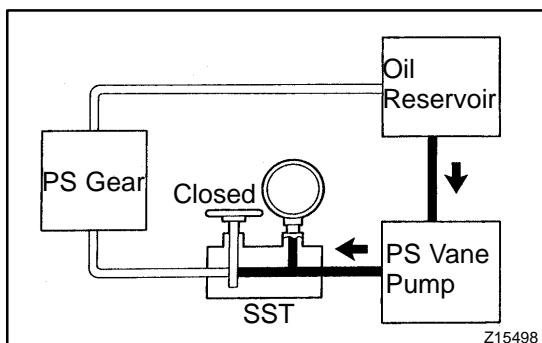
- (c) Bleed the power steering system.
- (d) Start the engine and run it at idle.
- (e) Turn the steering wheel from lock to lock several times to raise fluid temperature.

Fluid temperature: 75 - 80 °C (167 - 176 °F)



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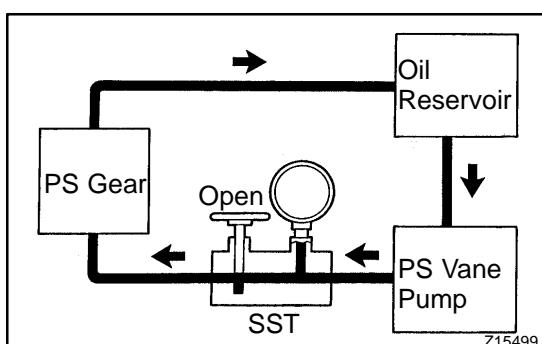
(f) With the engine idling, close the valve of the SST and observe the reading on the SST.

Fluid pressure:

7,800 - 8,300 kPa (80 - 85 kgf/cm², 1,138 - 1,209 psi)

NOTICE:

- ★ Do not keep the valve closed for more than 10 seconds.
- ★ Do not let the fluid temperature become too high.



(g) With the engine idling, open the valve fully.

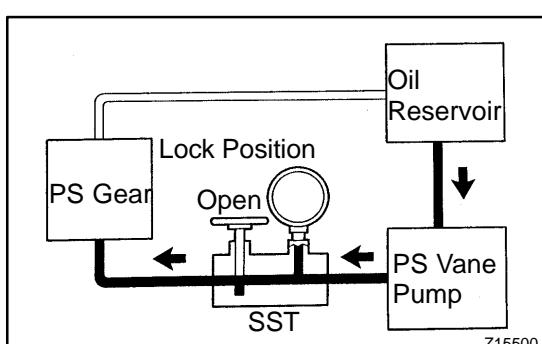
(h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.

Fluid pressure difference:

490 kPa (5 kgf/cm², 71 psi) or less

NOTICE:

Do not turn the steering wheel.



(i) With the engine idling and valve fully opened, turn the steering wheel to full lock position.

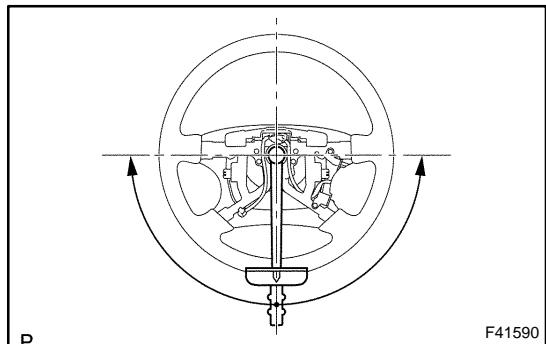
Fluid pressure:

7,800 - 8,300 kPa (80 - 85 kgf/cm², 1,138 - 1,209 psi)

NOTICE:

- ★ Do not maintain lock position for more than 10 seconds.
- ★ Do not let the fluid temperature become too high.

- (j) Disconnect the SST.
SST 09640- 10010 (09641- 01010, 09641- 01020,
09641-01030)
- (k) Connect the pressure feed tube assy to the rack & pinion
power steering gear assy (See page [51-21](#)).
- (l) Bleed the power steering system.



5. CHECK STEERING EFFORT

- (a) Center the steering wheel assy.
- (b) Remove the horn button assy (See page [60-22](#)).
- (c) Start the engine and run it at idle.
- (d) Using a torque wrench, measure the steering effort in both directions.

Steering effort (Reference):

6 N·m (60 kgf·cm, 53 in.-lbf) or less

HINT:

Take the tire type, pressure and contact surface into consideration before making your diagnosis.

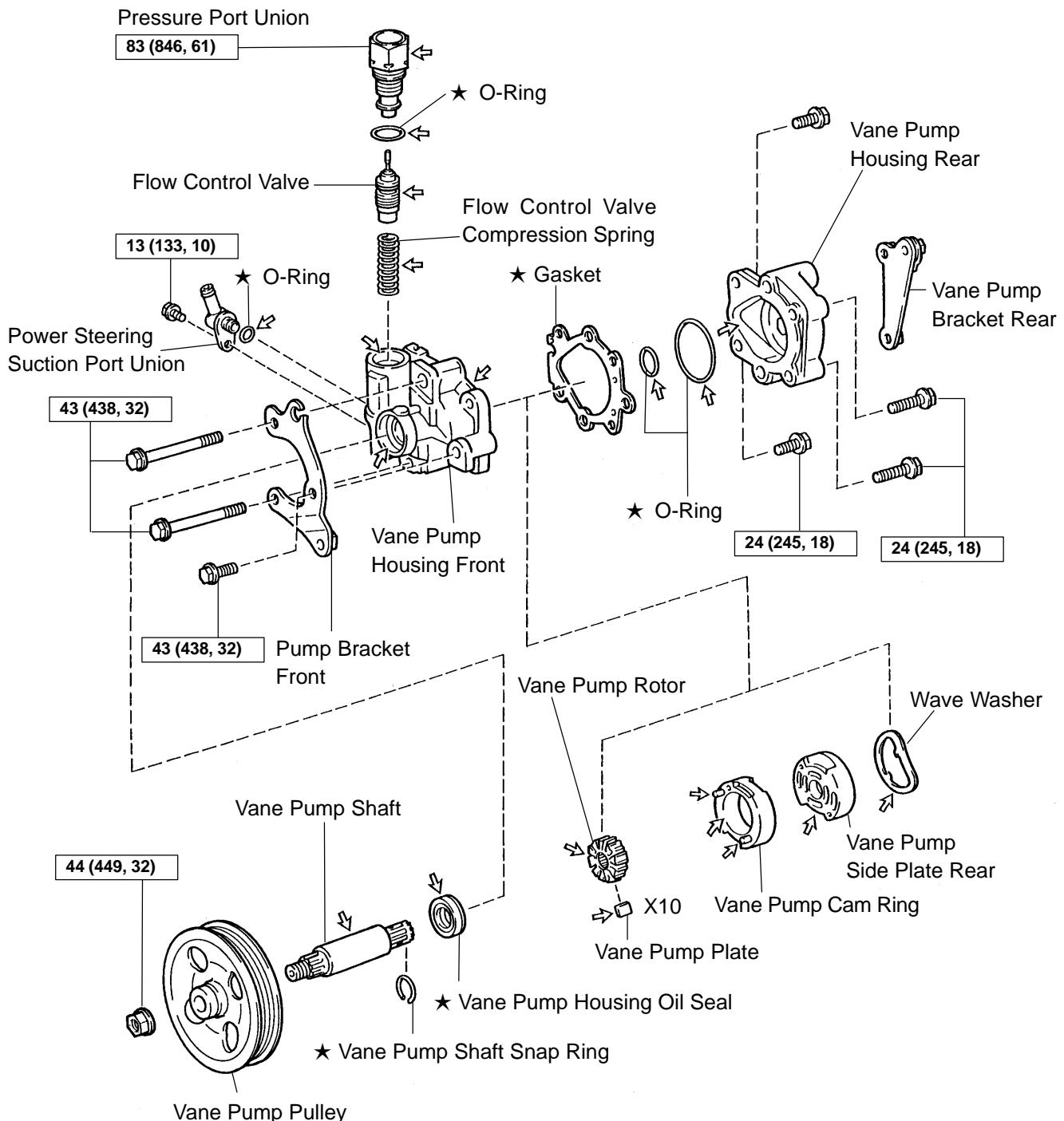
- (e) Install the steering wheel assy set nut.
Torque: 50 N·m (510 kgf·cm, 37 ft-lbf)
- (f) Install the horn button assy (See page [60-22](#)).
- (g) Inspect SRS warning light (See page [05-818](#)).

VANE PUMP ASSY

COMPONENTS

51068-01

TYPE A VANE PUMP:



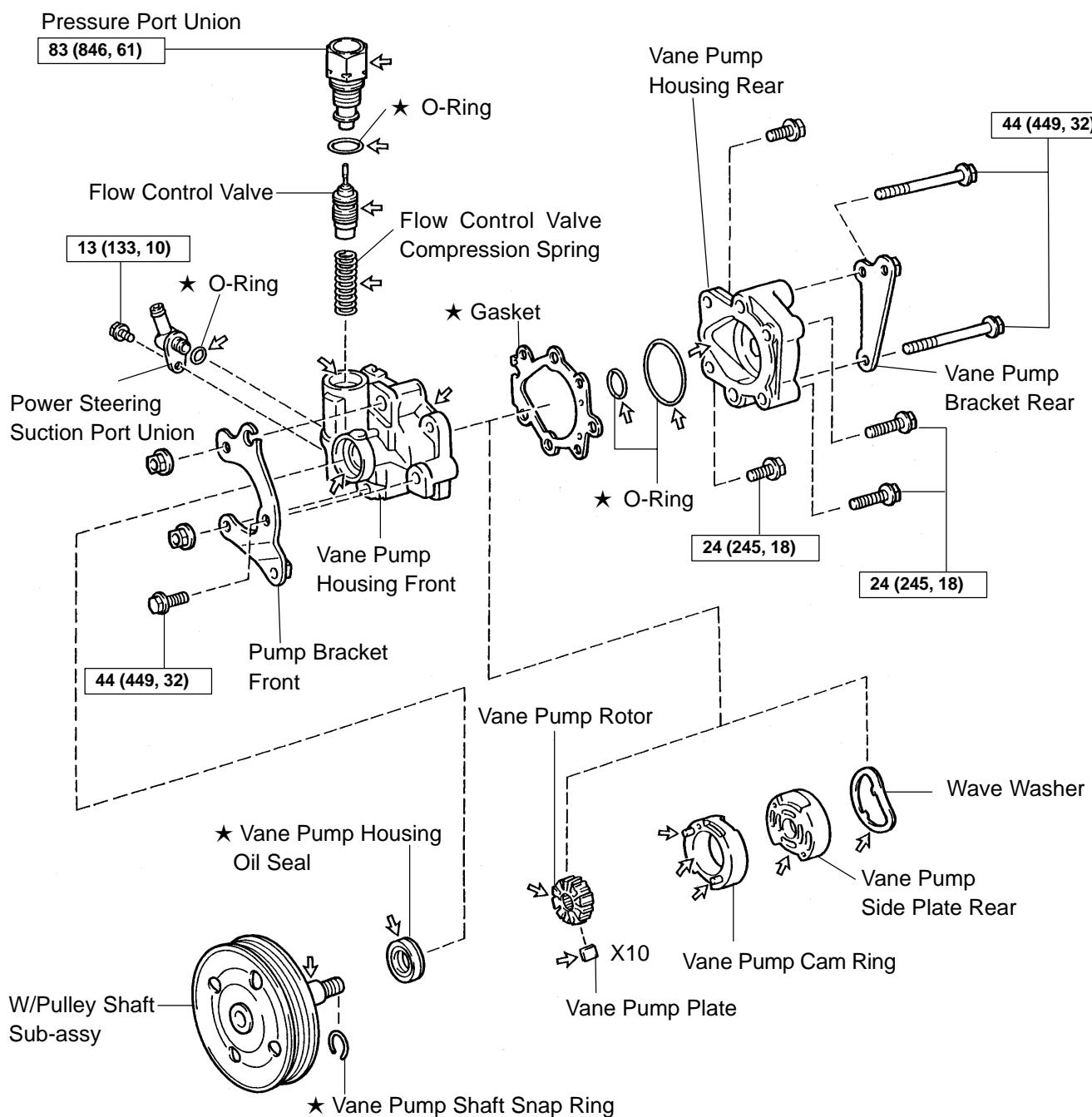
[N·m (kgf·cm, ft-lbf)] : Specified torque

★ Non-reusable part

N ⇝ Power steering fluid

F41597

TYPE B VANE PUMP:



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

★ Non-reusable part

← Power steering fluid

N

F41589

OVERHAUL

NOTICE:

- ★ When using a vise, do not over tighten.
- ★ When installing, coat the parts indicated by the arrows with power steering fluid (See page 51-7).

1. REMOVE FRONT WHEEL RH
2. DRAIN POWER STEERING FLUID
3. REMOVE FRONT FENDER LINER RH
4. REMOVE FRONT FENDER APRON SEAL RH
5. DISCONNECT OIL RESERVOIR TO PUMP HOSE NO.1

(a) Remove the clip and disconnect the oil reservoir to pump hose No.1.

NOTICE:

Take care not to spill fluid on the V belt.

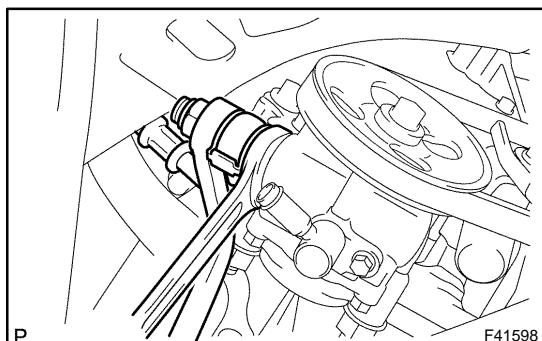
6. REMOVE POWER STEERING OIL PRESSURE SWITCH

(a) Disconnect the connector.
(b) Remove the oil power steering pressure switch from the union bolt.

NOTICE:

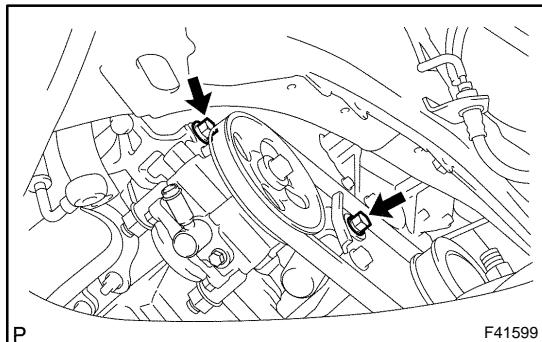
Be careful not to drop the oil power steering pressure switch.

If the oil power steering pressure switch is dropped or strongly damaged, replace it with a new one.



7. DISCONNECT PRESSURE FEED HOSE

(a) Using a spanner (22 mm) to hold the pressure port union, remove the union bolt and gasket.

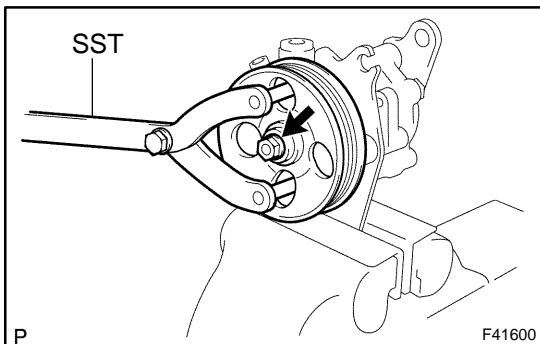


8. REMOVE VANE PUMP V BELT

(a) Loosen the 2 bolts and remove the vane pump V belt.

9. REMOVE VANE PUMP ASSY

(a) Remove the 2 bolts and vane pump assy.



10. REMOVE VANE PUMP PULLEY(TYPE A VANE PUMP)

- (a) Using SST, stop the vane pump pulley rotation and loosen the nut.
SST 09960-10010 (09962-01000, 09963-01000)
- (b) Remove the nut and vane pump pulley from the vane pump shaft.

11. REMOVE POWER STEERING SUCTION PORT UNION

- (a) Remove the bolt and power steering suction port union.
- (b) Remove the O-ring from the power steering suction port union.

12. REMOVE PRESSURE PORT UNION

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

13. REMOVE FLOW CONTROL VALVE

14. REMOVE FLOW CONTROL VALVE COMPRESSION SPRING

15. REMOVE VANE PUMP BRACKET REAR(TYPE A VANE PUMP)

- (a) Remove the 2 bolts and vane pump bracket rear from the vane pump assy.

16. REMOVE VANE PUMP BRACKET REAR(TYPE B VANE PUMP)

- (a) Remove the 2 bolts, 2 nuts and vane pump bracket rear from the vane pump assy.

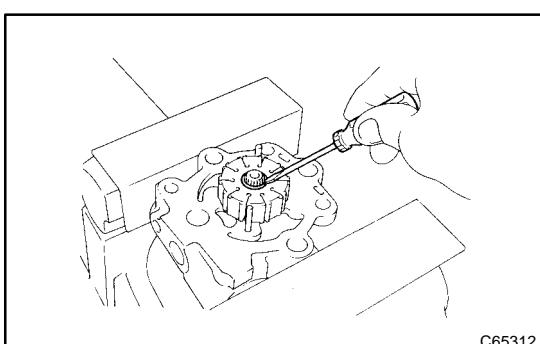
17. REMOVE VANE PUMP HOUSING REAR

- (a) Remove the 4 bolts and vane pump housing rear from the vane pump housing front.
- (b) Remove the gasket.
- (c) Remove the 2 O-rings from the vane pump housing rear.

18. REMOVE VANE PUMP SIDE PLATE REAR

- (a) Remove the wave washer from the vane pump side plate rear.
- (b) Remove the vane pump side plate rear.

19. REMOVE VANE PUMP CAM RING



20. REMOVE VANE PUMP ROTOR

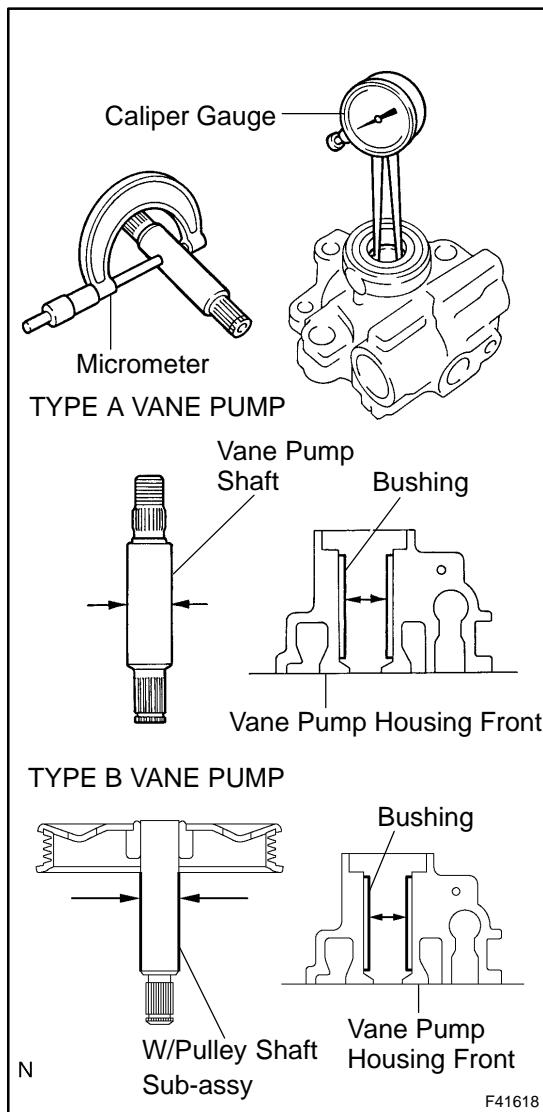
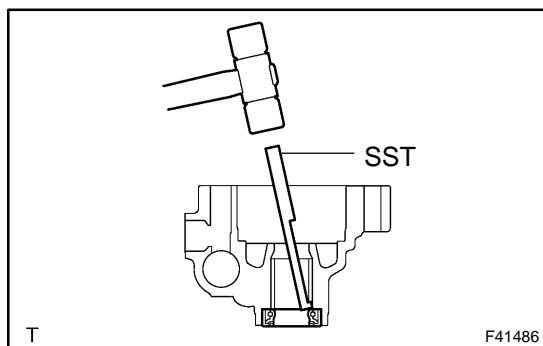
- (a) Remove the 10 vane pump plates from the vane pump rotor.
- (b) Using a screwdriver, remove the vane pump shaft snap ring.
- (c) Remove the vane pump rotor.

21. REMOVE VANE PUMP SHAFT(TYPE A VANE PUMP)

22. REMOVE W/PULLEY SHAFT SUB-ASSY(TYPE B VANE PUMP)

23. REMOVE PUMP BRACKET FRONT

(a) Remove the bolt and pump bracket front from the vane pump housing front.



24. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using SST and a hammer, tap out the vane pump housing oil seal from the vane pump housing front.
SST 09631-10030

NOTICE:

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

25. INSPECT OIL CLEARANCE

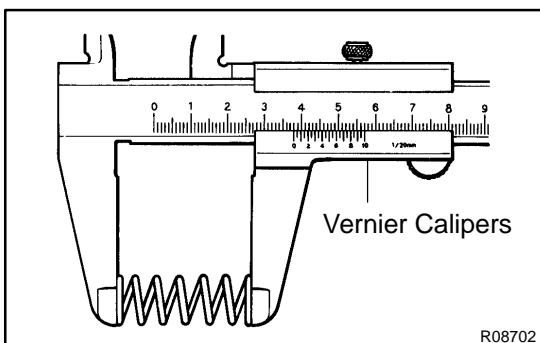
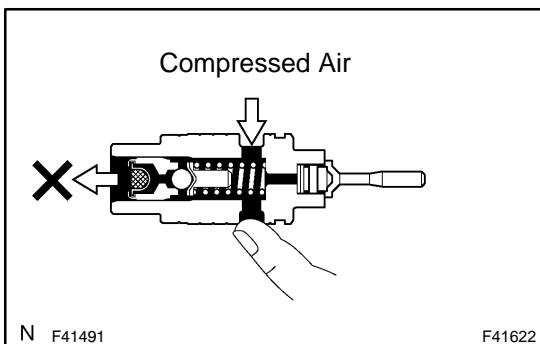
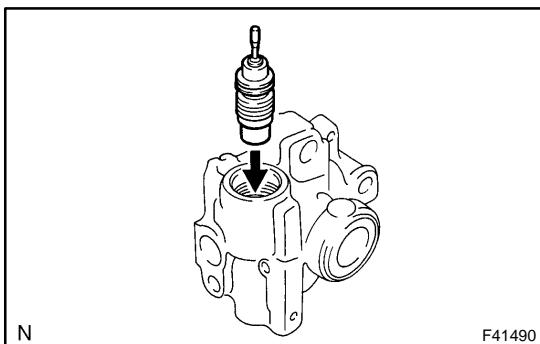
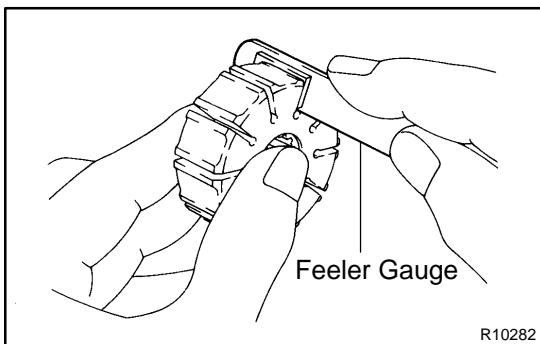
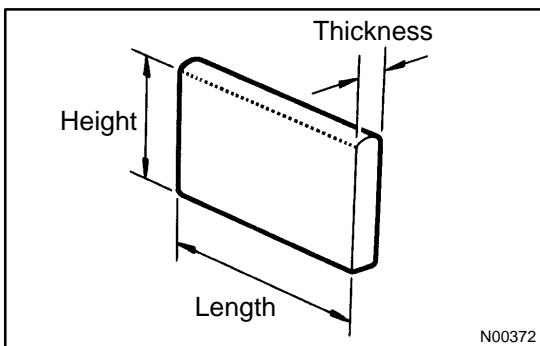
(a) Using a micrometer and a caliper gauge, measure the oil clearance.

Standard clearance:

0.027 - 0.054 mm (0.00106 - 0.00213 in.)

Maximum clearance: 0.07 mm (0.0028 in.)

If it is more than the maximum, replace the vane pump assy.



26. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATES

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

Minimum height: 8.6 mm (0.339 in.)

Minimum thickness: 1.397 mm (0.05500 in.)

Minimum length: 14.991 mm (0.59020 in.)

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

Maximum clearance: 0.03 mm (0.0012 in.)

If it is more than the maximum, replace the vane pump assy.

27. INSPECT FLOW CONTROL VALVE

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

(b) Check the flow control valve for leakage. Close one of the holes and apply compressed air of 392 - 490 kPa (4 - 5 kgf/cm², 57 - 71 psi) into the opposite side hole, and confirm that air does not come out from the end holes.

If necessary, replace the vane pump assy.

28. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

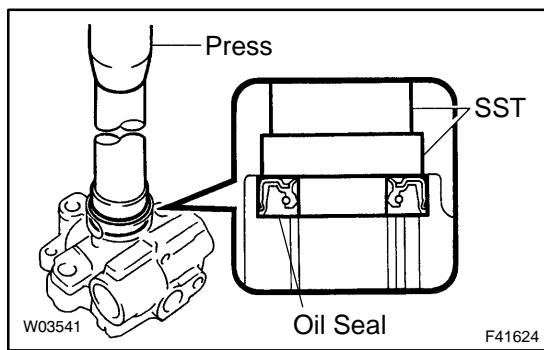
(a) Using vernier calipers, measure the free length of the flow control valve compression spring.

Minimum free length: 32.24 mm (1.2693 in.)

If it is not within the specification, replace the vane pump assy.

29. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is remarkably damaged and it may cause fluid leakage, replace the vane pump assy.



30. INSTALL VANE PUMP HOUSING OIL SEAL

- Coat a new vane pump housing oil seal lip with power steering fluid.
- Using SST and a press, install the new vane pump housing oil seal.

SST 09950-60010 (09951-00330),
09950-70010 (09951-07100)

NOTICE:

Make sure that the vane pump housing oil seal is installed facing the correct direction.

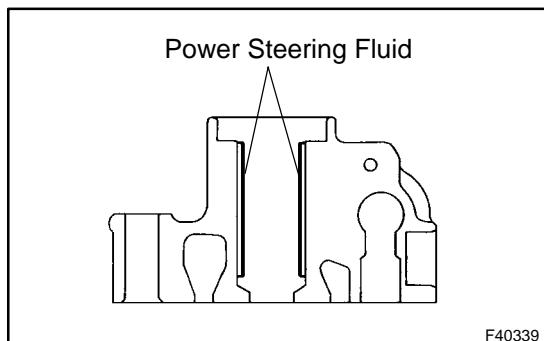
31. INSTALL PUMP BRACKET FRONT

- Install the pump bracket front with the bolt.

Torque:

Type A Vane Pump: 43 N·m (438 kgf·cm, 32 ft·lbf)

Type B Vane Pump: 44 N·m (449 kgf·cm, 32 ft·lbf)

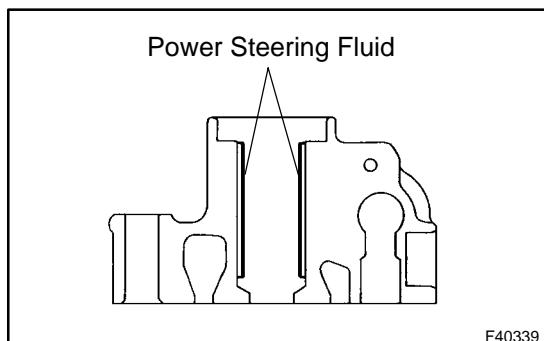


32. INSTALL VANE PUMP SHAFT(TYPE A VANE PUMP)

- Coat inside bushing surface of the vane pump housing front with power steering fluid.
- Gradually insert the vane pump shaft from the pulley side.

NOTICE:

Do not damage the vane pump housing oil seal lip in the vane pump housing front.

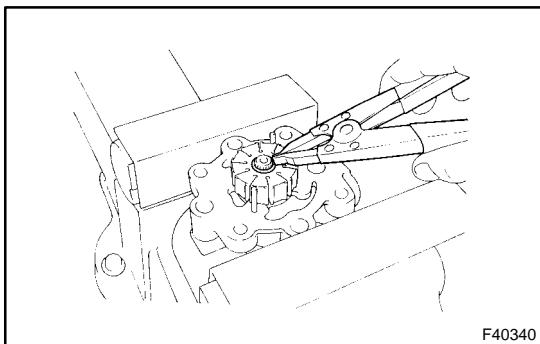


33. INSTALL W/PULLEY SHAFT SUB- ASSY(TYPE B VANE PUMP)

- Coat inside bushing surface of the vane pump housing front with power steering fluid.
- Gradually insert the w/pulley shaft sub-assy from the pulley side.

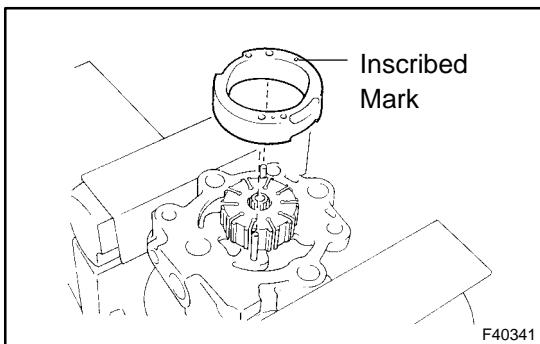
NOTICE:

Do not damage the vane pump housing oil seal lip in the vane pump housing front.



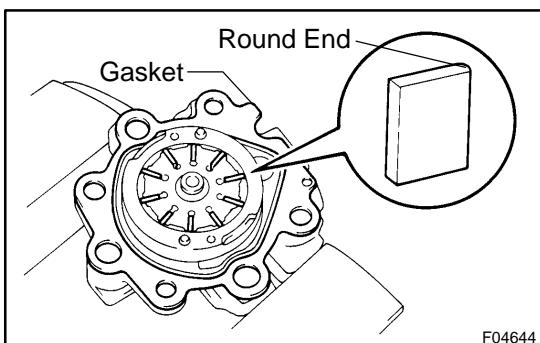
34. INSTALL VANE PUMP ROTOR

- (a) Install the vane pump rotor.
- (b) Using a snap ring expander, install a new vane pump shaft snap ring.

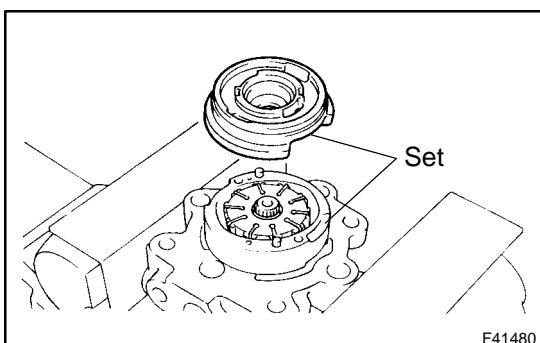


35. INSTALL VANE PUMP CAM RING

- (a) Align the holes of the vane pump cam ring with 2 straight pins, and install the vane pump cam ring with inscribed mark facing outward.

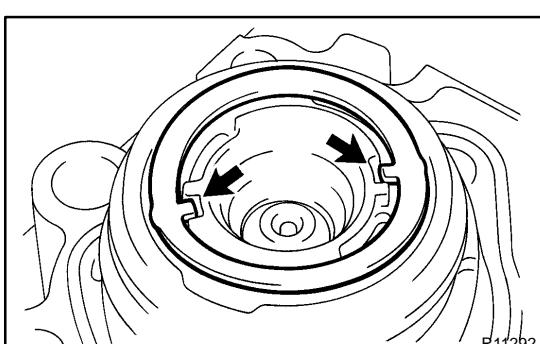


- (b) Coat 10 vane pump plates with power steering fluid.
- (c) Install the vane pump plates with the round end facing outward.
- (d) Install a new gasket.



36. INSTALL VANE PUMP SIDE PLATE REAR

- (a) Coat a new O-ring with power steering fluid and install it to the vane pump side plate rear.
- (b) Align the groove of the vane pump cam ring with that of the vane pump side plate rear, install the vane pump side plate rear.

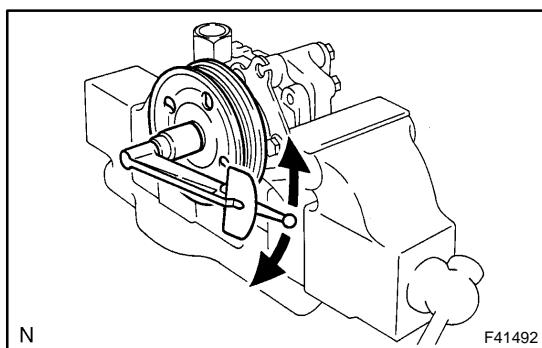
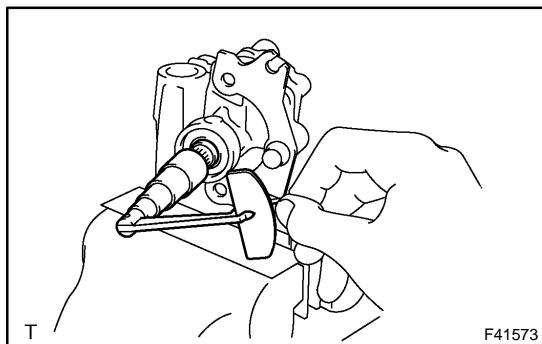


- (c) Install the wave washer so that its protrusions fit into the slots in the vane pump side plate rear.

37. INSTALL VANE PUMP HOUSING REAR

- (a) Coat a new O-ring with power steering fluid and install it to the vane pump housing rear.
- (b) Install the vane pump housing rear with the 4 bolts.

Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)



38. MEASURE VANE PUMP ROTATION TORQUE(TYPE A VANE PUMP)

- (a) Check that the vane pump rotates smoothly without abnormal noise.
- (b) Temporarily install the pulley set nut.
- (c) Using a torque wrench, check the vane pump rotating torque.

Rotating torque:

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

39. MEASURE VANE PUMP ROTATION TORQUE(TYPE B VANE PUMP)

- (a) Check that the vane 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 vane pump rotating torque.

Rotating torque:

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

40. INSTALL VANE PUMP BRACKET REAR(TYPE A VANE PUMP)

- (a) Install the vane pump bracket rear with the 2 bolts.

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)

41. INSTALL VANE PUMP BRACKET REAR(TYPE B VANE PUMP)

- (a) Install the vane pump bracket rear with the 2 bolts and 2 nuts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

42. INSTALL FLOW CONTROL VALVE COMPRESSION SPRING

- (a) Coat the flow control valve compression spring with power steering fluid and install it.
- (b) Install the flow control valve compression spring.

43. INSTALL FLOW CONTROL VALVE

- (a) Coat the flow control valve with power steering fluid.
- (b) Install the flow control valve.

44. INSTALL PRESSURE PORT UNION

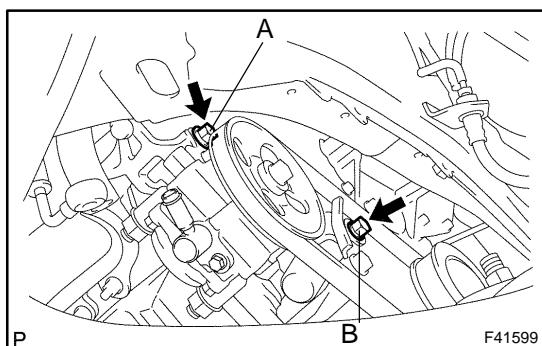
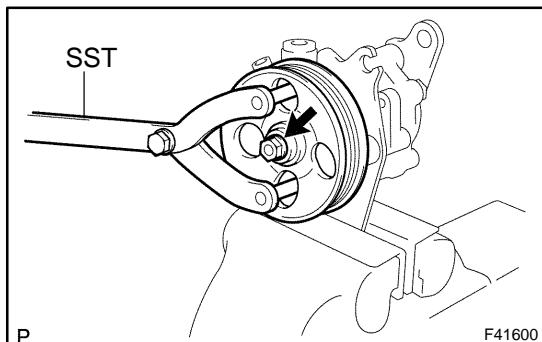
- (a) Coat a new O-ring with power steering fluid and install it to the pressure port union.
- (b) Install the pressure port union.

Torque: 83 N·m (846 kgf·cm, 61 ft·lbf)

45. 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 with the bolt.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



46. INSTALL VANE PUMP PULLEY(TYPE A VANE PUMP)

- (a) Install the vane pump pulley to the vane pump shaft.
- (b) Using SST, stop the vane pump pulley rotation and install the nut.

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

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

47. INSTALL VANE PUMP ASSY

- (a) Temporarily install the vane pump assy with the 2 (A and B) bolts.

48. INSTALL VANE PUMP V BELT

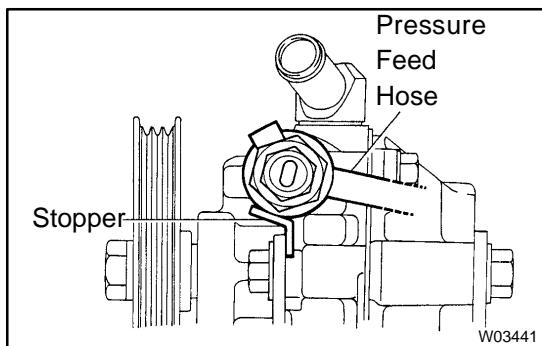
- (a) Install the vane pump V belt and adjust the V belt tension (See page 14-1).

- (b) Torque the bolt A.

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)

- (c) Torque the bolt B.

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)



49. CONNECT PRESSURE FEED HOSE

- (a) Using a spanner (22 mm) to hold the pressure port union, connect the pressure feed hose with the union bolt and a new gasket.

Torque: 51.5 N·m (525 kgf·cm, 38 ft·lbf)

HINT:

Make sure the stopper of the pressure feed hose touches the pump bracket front as shown in the illustration, then install the union bolt.

50. INSTALL POWER STEERING OIL PRESSURE SWITCH

- (a) Install the power steering oil pressure switch to the union bolt.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

NOTICE:

Be careful not to allow oil from being attached to the connector.

- (b) Connect the connector.

51. CONNECT OIL RESERVOIR TO PUMP HOSE NO.1

- (a) Connect the oil reservoir to pump hose No.1.
- (b) Install the clip.

52. INSTALL FRONT FENDER APRON SEAL RH**53. INSTALL FRONT FENDER LINER RH****54. INSTALL FRONT WHEEL RH**

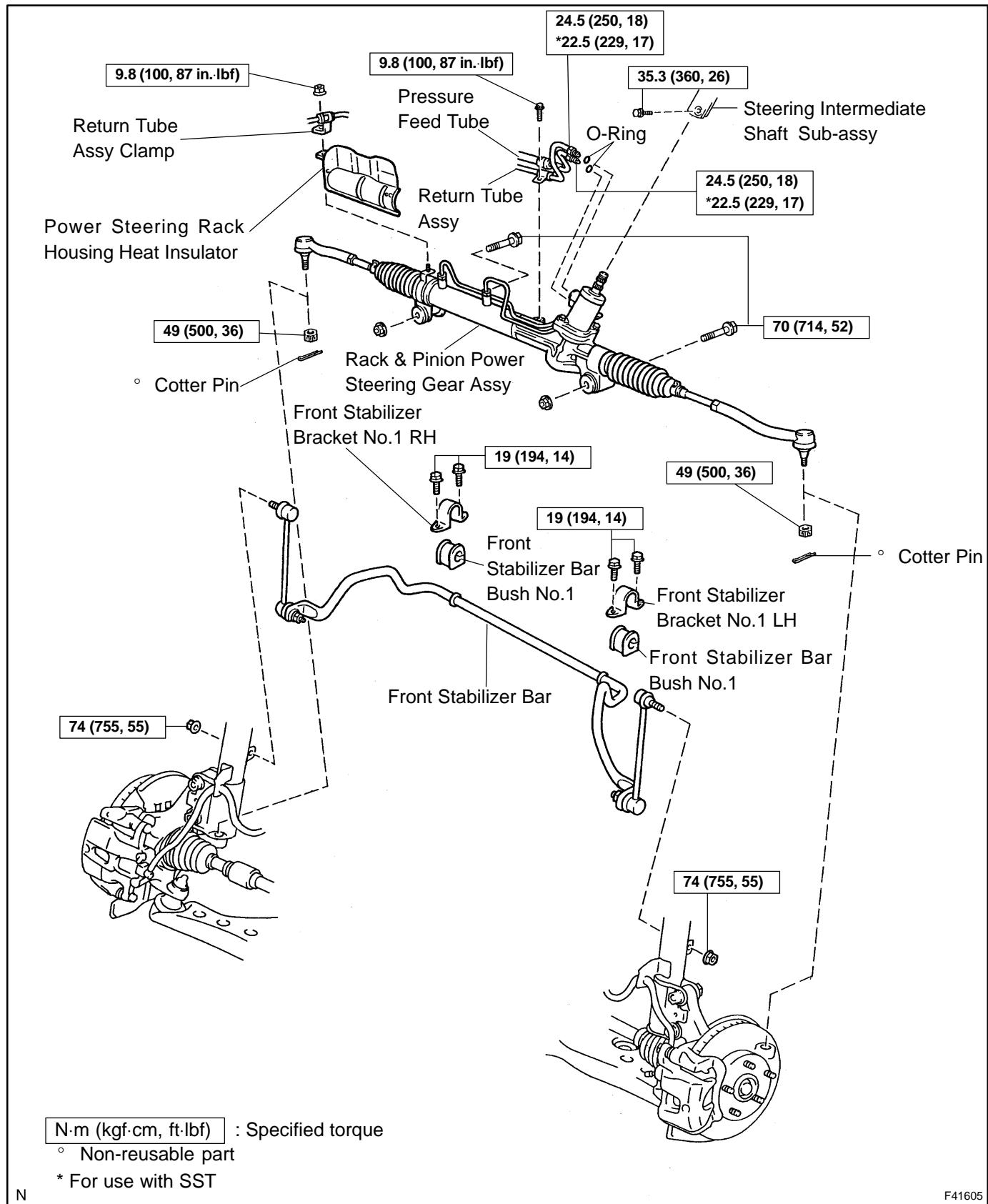
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

55. BLEED POWER STEERING FLUID (See page 51-3)**56. INSPECT FLUID LEAK**

RACK & PINION POWER STEERING GEAR ASSY

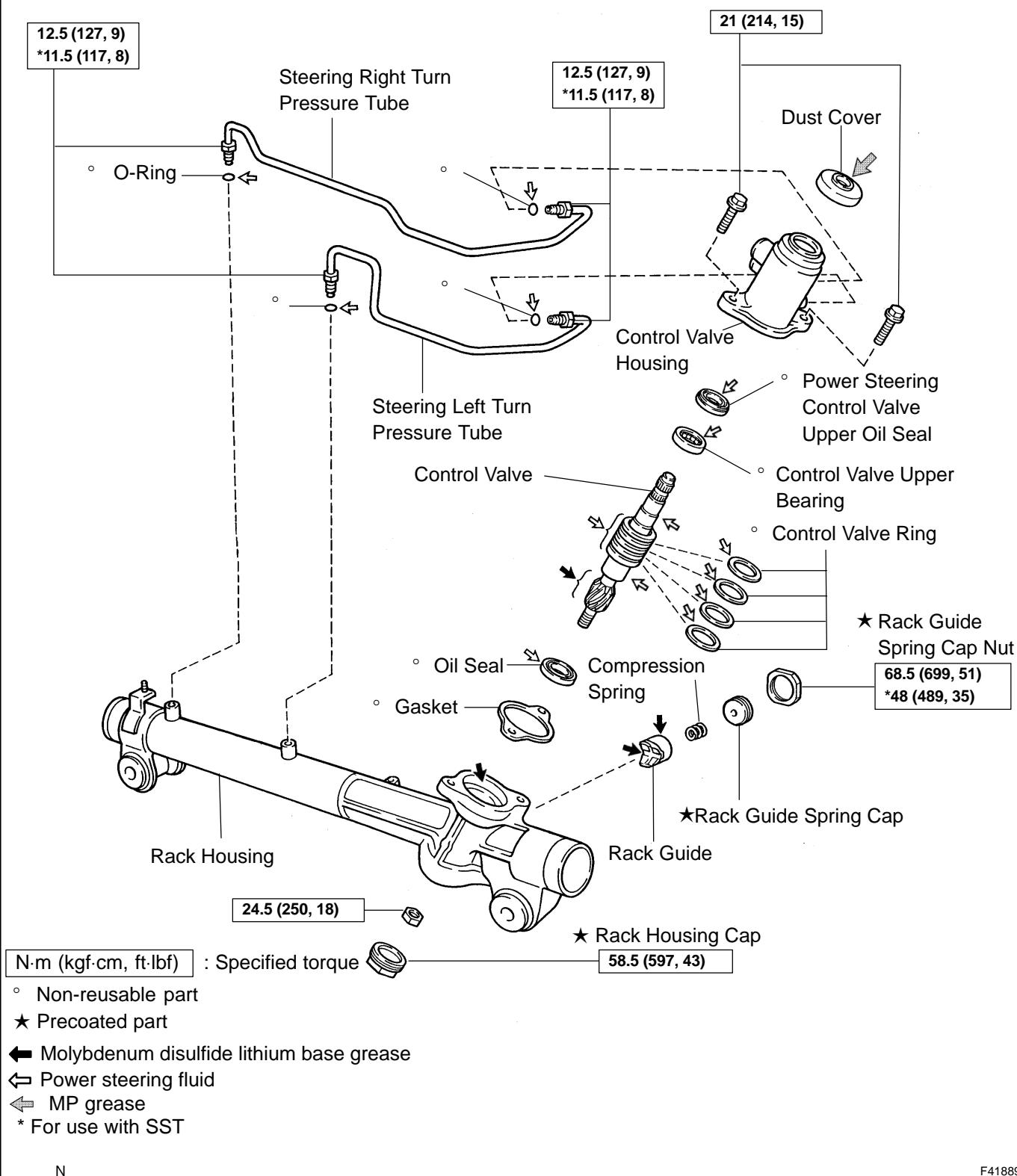
COMPONENTS

5106A-01

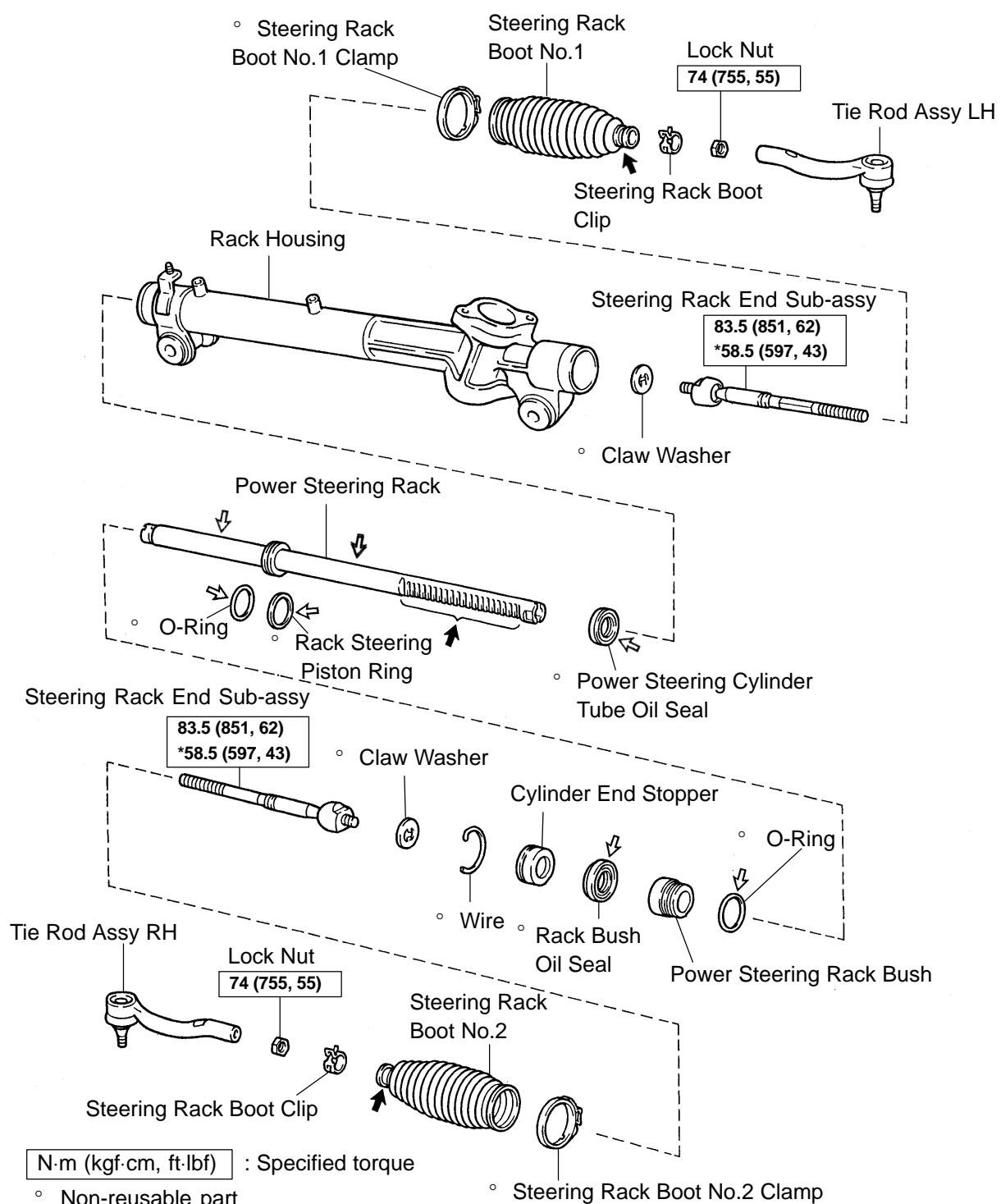


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RACK & PINION POWER STEERING GEAR ASSY:



RACK & PINION GEAR POWER STEERING GEAR ASSY:

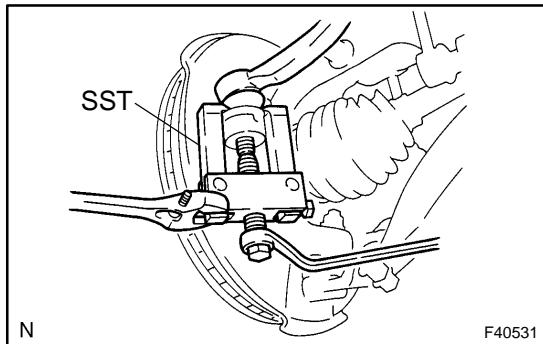


OVERHAUL

NOTICE:

When installing, coat the parts indicated by the arrow with power steering fluid or molybdenum disulfide lithium base grease (See page 51-18).

1. PRECAUTION(See page 60-1)
2. DISCONNECT BATTERY NEGATIVE TERMINAL
3. REMOVE HORN BUTTON ASSY
(See page 60-22)
4. REMOVE STEERING WHEEL ASSY
(See page 50-8)
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
5. REMOVE FRONT WHEEL
6. REMOVE SPIRAL CABLE SUB-ASSY
(See page 50-8)



7. DISCONNECT TIE ROD ASSY LH

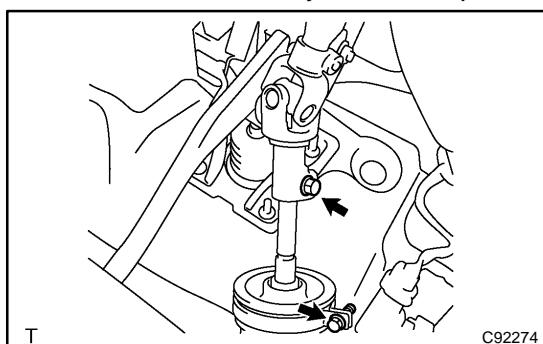
- (a) Remove the cotter pin and nut.
- (b) Using SST, remove the tie rod assy LH from the steering knuckle.
SST 09628-6201 1

8. DISCONNECT TIE ROD ASSY RH

SST 09628-6201 1

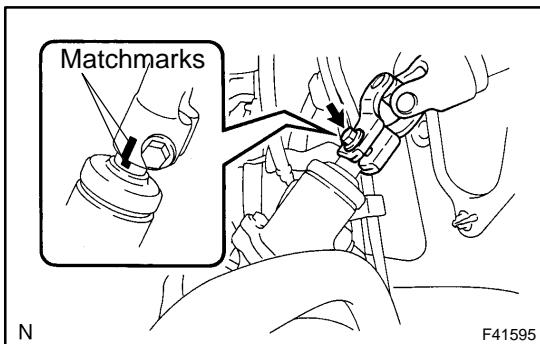
HINT:

Remove the RH side by the same procedures with LH side.

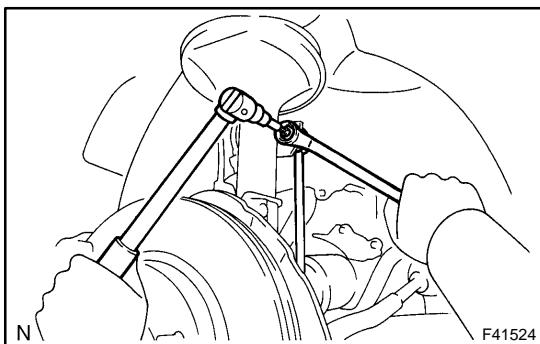


9. DISCONNECT STEERING INTERMEDIATE SHAFT SUB-ASSY

- (a) Loosen the bolt and remove the clamp from the steering column hole cover No.1.
- (b) Disconnect the steering column hole cover No.2 from the steering column hole cover No.1.
- (c) Loosen the bolt.



- (d) Place matchmarks on the steering intermediate shaft sub-assy and rack & pinion power steering gear assy.
- (e) Remove the bolt and disconnect the steering intermediate shaft sub-assy.



10. DISCONNECT FRONT STABILIZER LINK ASSY LH

- (a) Remove the nut and disconnect the front stabilizer link assy LH from the shock absorber assy front LH.

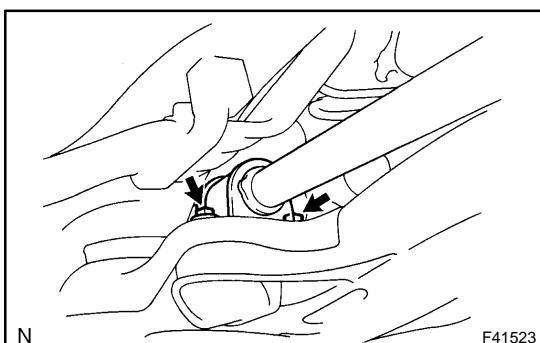
HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.

11. DISCONNECT FRONT STABILIZER LINK ASSY RH

HINT:

Remove the RH side by the same procedures with LH side.



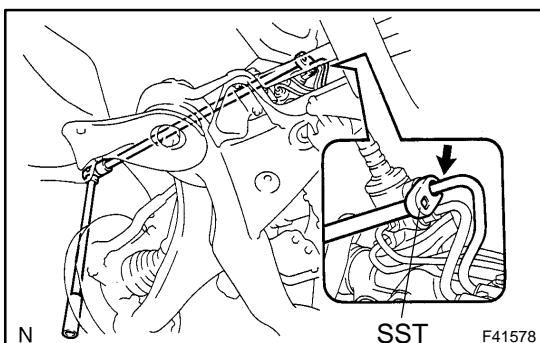
12. REMOVE FRONT STABILIZER BRACKET NO.1 LH

- (a) Remove the 2 bolts and disconnect the front stabilizer bracket No.1 LH.

13. REMOVE FRONT STABILIZER BRACKET NO.1 RH

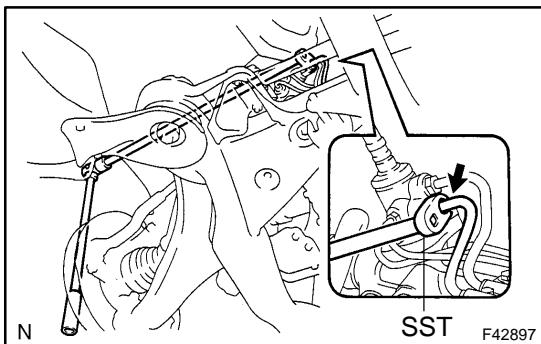
HINT:

Remove the RH side by the same procedures with LH side.

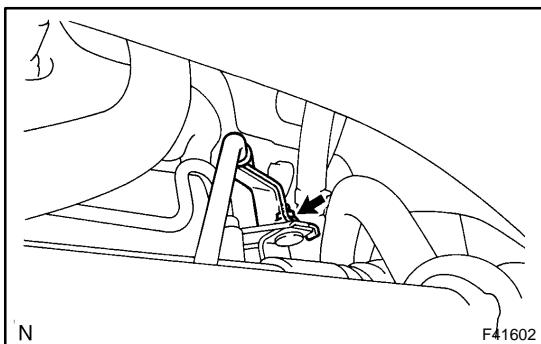


14. DISCONNECT PRESSURE FEED TUBE ASSY

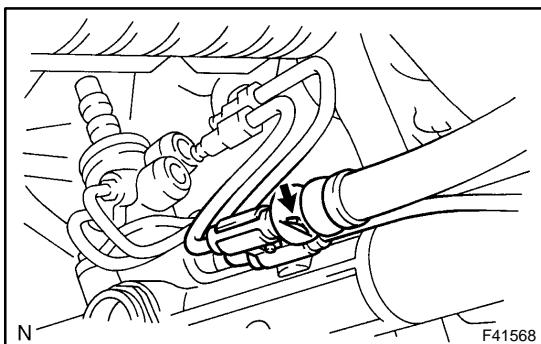
- (a) Using SST, disconnect the return tube assy from the rack & pinion power steering gear assy.
SST 09023-12701



(b) Using SST, disconnect the pressure feed tube assy from the rack & pinion power steering gear assy.
SST 09023-12701

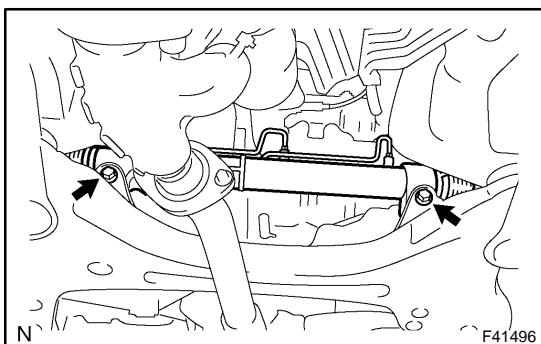


(c) Remove the nut and disconnect the return tube assy clamp.



15. REMOVE RACK & PINION POWER STEERING GEAR ASSY

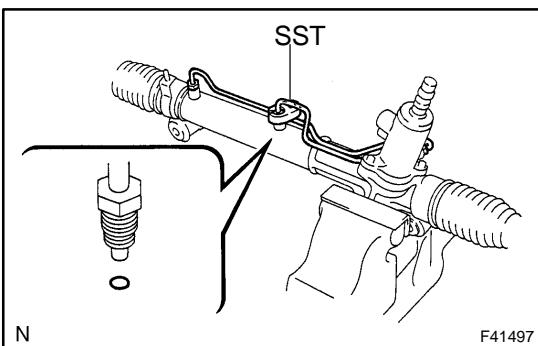
(a) Remove the bolt and disconnect the tube clamp.



(b) Remove the 2 bolts, 2 nuts and rack & pinion power steering gear assy.

16. REMOVE POWER STEERING RACK HOUSING HEAT INSULATOR

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



17. 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.

18. REMOVE STEERING RIGHT TURN PRESSURE TUBE

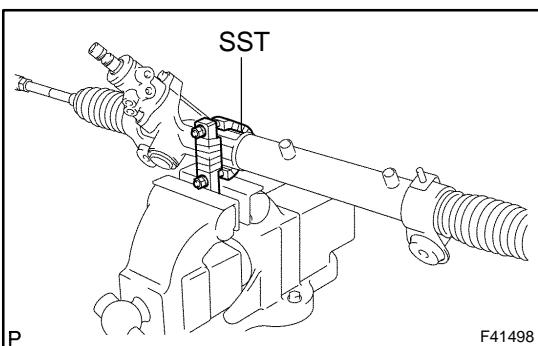
- (a) Using SST, remove the steering right turn pressure tube.
SST 09023-38201
- (b) Remove the 2 O-rings from the steering right turn pressure tube.

19. FIX RACK & PINION POWER STEERING GEAR ASSY

- (a) Using SST, secure the rack & pinion power steering gear assy.
SST 09612-00012

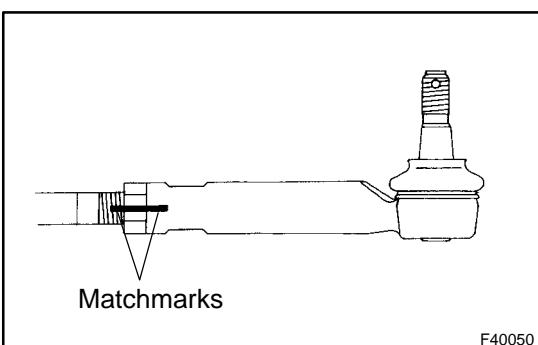
HINT:

Tape the SST before use.



20. REMOVE TIE ROD ASSY LH

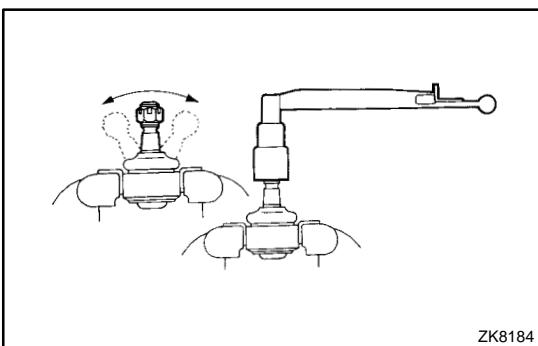
- (a) Place matchmarks on the tie rod assy LH and steering rack end sub-assy.
- (b) Loosen the lock nut, and remove the tie rod assy LH and lock nut.



21. REMOVE TIE ROD ASSY RH

HINT:

Remove the RH side by the same procedures with LH side.



22. INSPECT TIE ROD ASSY LH

- (a) Secure the tie rod assy LH in a vise.
- (b) Install the nut to the stud bolt.
- (c) Flip the ball joint stud back and forth 5 times.
- (d) Using a torque wrench, turn the nut continuously at a rate of 2 - 4 seconds per 1 turn and take the torque reading of the 5th turn.

Turning torque:

0.83 - 3.43 N·m (8.5 - 35.0 kgf·cm, 7.3 - 30.4 in.·lbf)

23. INSPECT TIE ROD ASSY RH

HINT:

Remove the RH side by the same procedures with LH side.

24. REMOVE STEERING RACK BOOT CLIP

(a) Remove the 2 steering rack boot clips.

25. REMOVE STEERING RACK BOOT NO.2 CLAMP

(a) Using pliers, remove the steering rack boot No.2 clamp.

NOTICE:

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

26. REMOVE STEERING RACK BOOT NO.1 CLAMP**HINT:**

Remove the steering rack boot No.1 clamp by the same procedures with the steering rack boot No.2 clamp.

NOTICE:

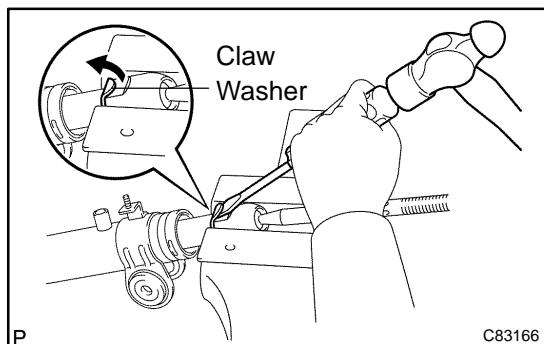
Be careful not to damage the steering rack boot No.1.

27. REMOVE STEERING RACK BOOT NO.2

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

28. REMOVE STEERING RACK BOOT NO.1**HINT:**

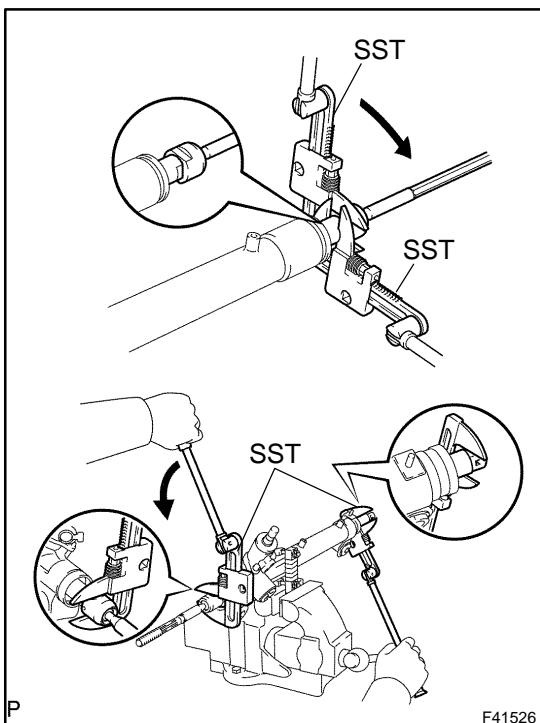
Remove the steering rack boot No.1 by the same procedures with the steering rack boot No.2.

**29. REMOVE STEERING RACK END SUB-ASSY**

(a) Using a screwdriver and a hammer, unstake the claw washer.

NOTICE:

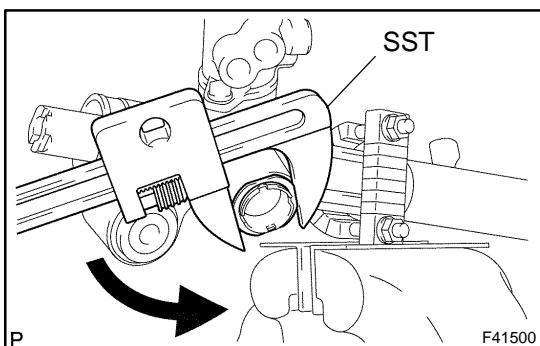
Avoid any impact to the power steering rack.



(b) Using 2 SSTs, remove the 2 steering rack ends sub-assy and 2 claw washers.
SST 09922-10010

NOTICE:

- ★ Use SST 09922-10010 in the direction shown in the illustration.
- ★ Securely hold the steering rack end sub-assy with a SST.

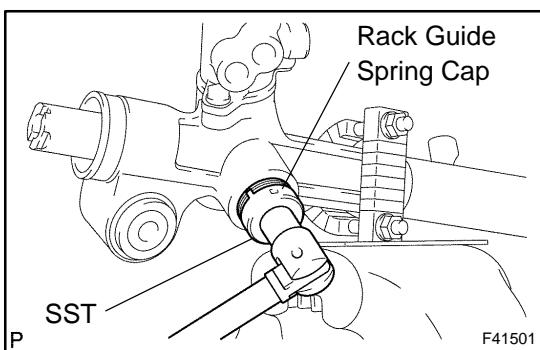


30. REMOVE RACK GUIDE

(a) Using SST, remove the rack guide spring cap nut.
SST 09922-10010

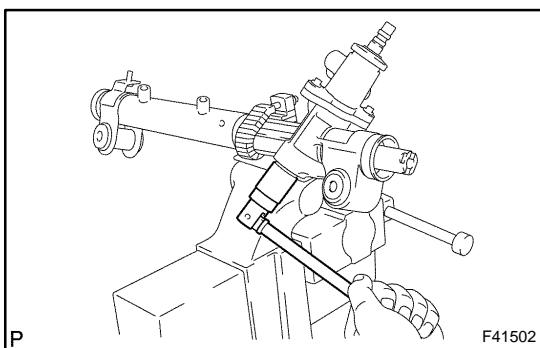
NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.



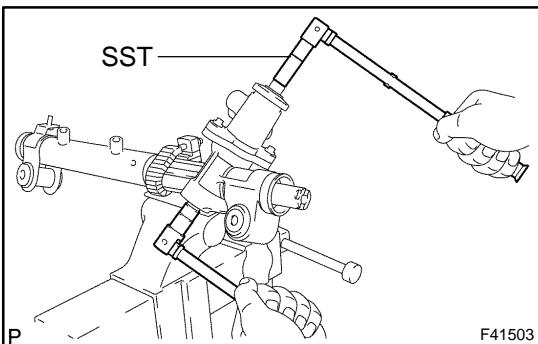
(b) Using SST, remove the rack guide spring cap.
SST 09631-10021

(c) Remove the compression spring and rack guide.

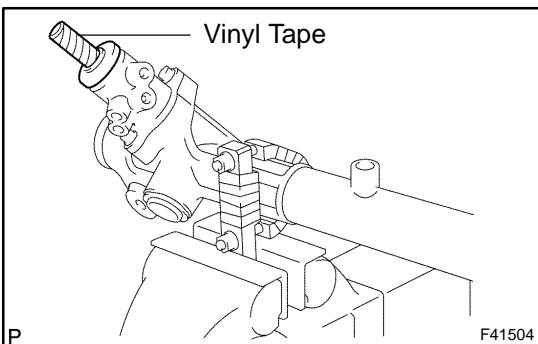


31. REMOVE POWER STEERING CONTROL VALVE

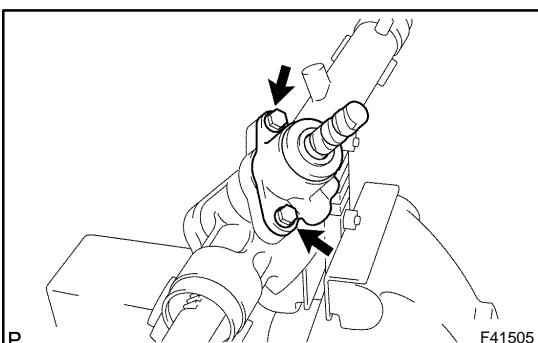
(a) Using a socket wrench (27 mm), remove the rack housing cap.



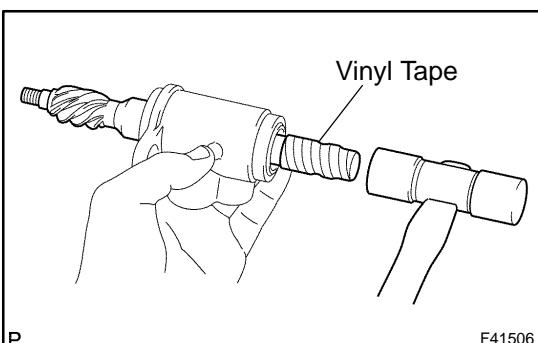
(b) Using SST, hold the control valve and remove the nut.
SST 09616-0001 1



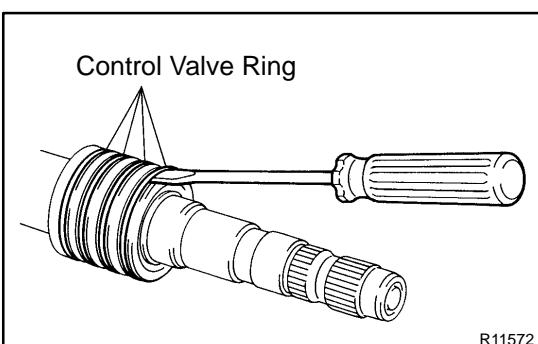
(c) Wind vinyl tape around the serrated part of the control valve.
(d) Remove the dust cover from the control valve housing.



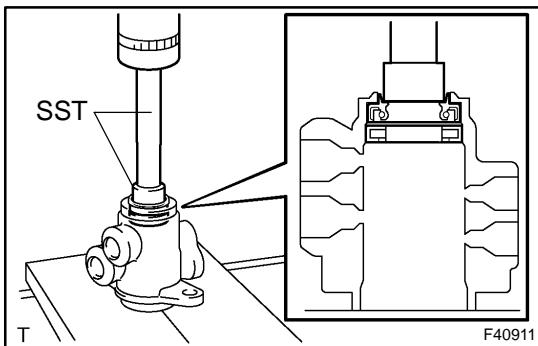
(e) Remove the 2 bolts and control valve housing.
(f) Remove the gasket.



(g) To prevent oil seal lip damage, wind vinyl tape around the serrated part of the control valve.
(h) Using a plastic hammer, remove the control valve with oil seal from the control valve housing.
(i) Remove the oil seal from the control valve.



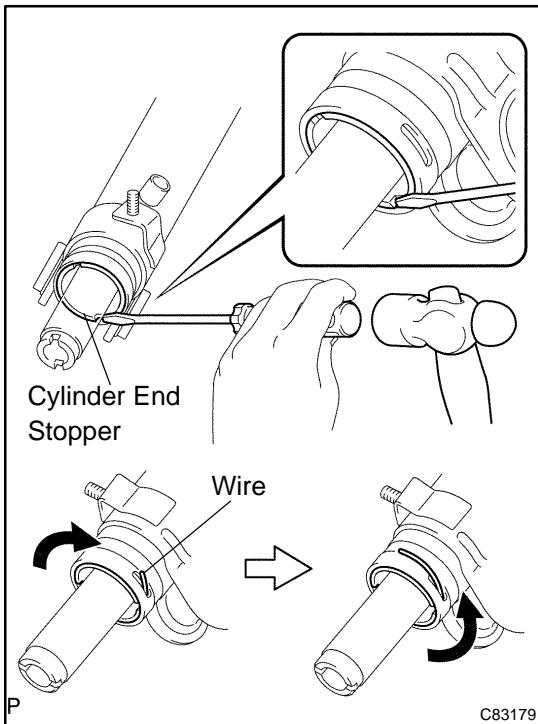
(j) Using a screwdriver, remove the 4 control valve rings.
NOTICE:
Be careful not to damage the grooves for the control valve ring.



32. REMOVE POWER STEERING CONTROL VALVE UPPER OIL SEAL

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

SST 09950-70010 (09951-07150), 09950-60010 (09951-00250)



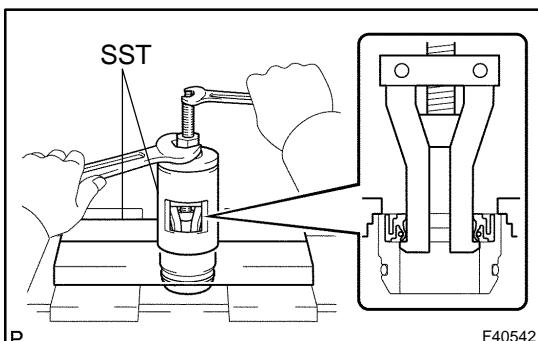
33. REMOVE CYLINDER END STOPPER

(a) Using a screwdriver and a hammer, turn the cylinder end stopper clockwise until the wire end is visible through the service hole.

(b) Using a screwdriver and a hammer, turn the cylinder end stopper counterclockwise, and remove the wire and cylinder end stopper.

34. REMOVE POWER STEERING RACK

(a) Remove the power steering rack and power steering rack bush.

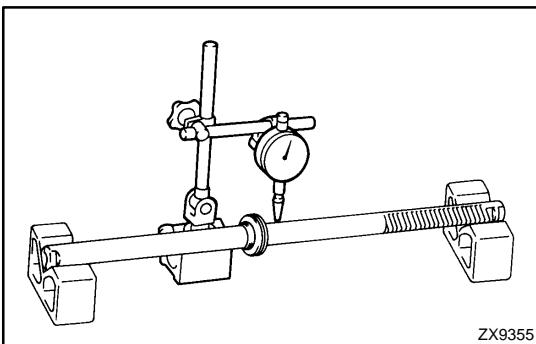


35. REMOVE POWER STEERING RACK BUSH

(a) Remove the power steering rack bush from the power steering rack.

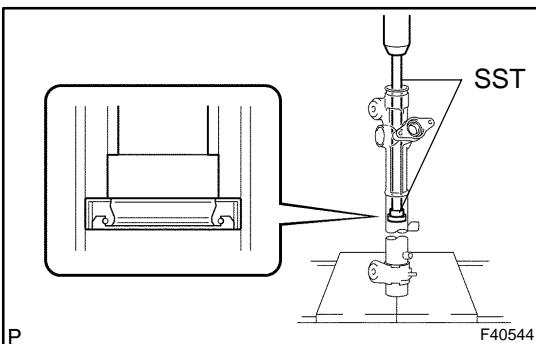
(b) Using SST, remove the rack bush oil seal.
SST 09527-2101 1, 09612-24014 (09613-22011)

(c) Using a screwdriver, remove the O-ring from the power steering rack bush.



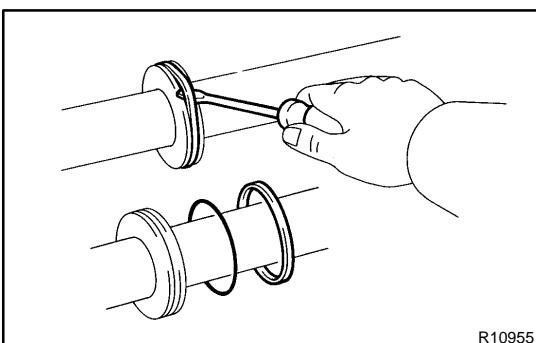
36. INSPECT POWER STEERING RACK

- (a) Using a dial indicator, check the power steering rack for runout and for teeth wear and damage.
Maximum runout: 0.3 mm (0.012 in.)
- (b) Check the back surface for wear and damage.



37. 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)

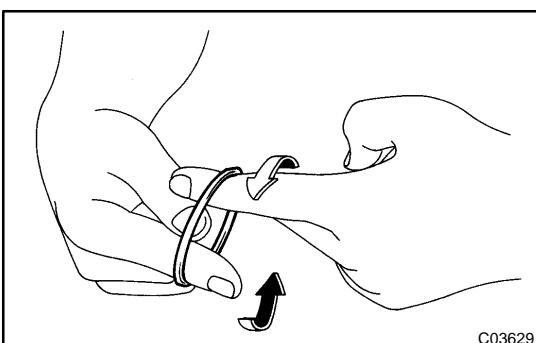


38. REMOVE RACK STEERING PISTON RING

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

NOTICE:

Be careful not to damage the grooves for rack steering piston ring.



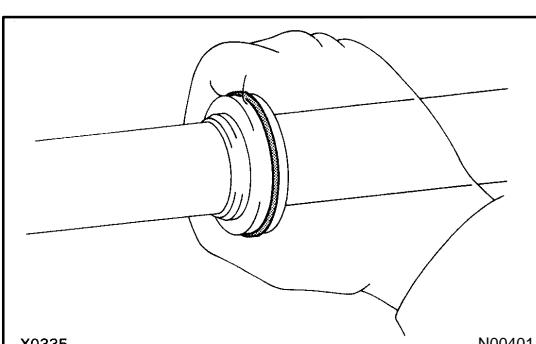
39. INSTALL RACK STEERING PISTON RING

- (a) Coat a new O-ring with power steering fluid and install it to the power steering rack.
- (b) Expand a new rack steering piston ring with your fingers.

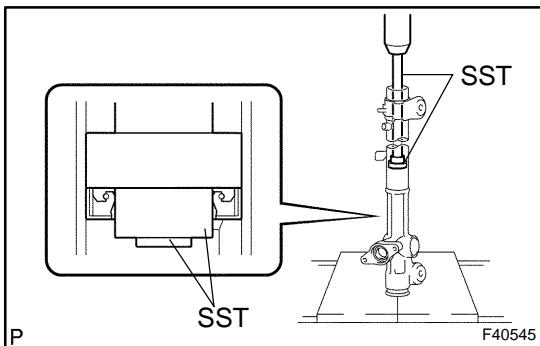
NOTICE:

Be careful not to over expand the rack steering piston ring.

- (c) Coat the new rack steering piston ring with power steering fluid.



- (d) Install the rack steering piston ring to the power steering rack, and settle it down with your fingers.

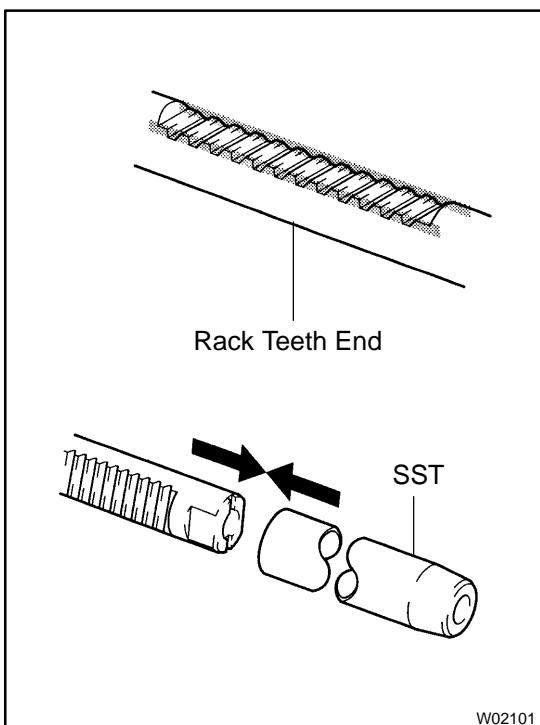


40. INSTALL POWER STEERING CYLINDER TUBE OIL SEAL

- Coat a new power steering cylinder tube oil seal lip with power steering fluid.
SST 09950- 60010 (09951- 00420, 09951- 00250, 09952-06010), 09950-70010 (09951-07360)
- Using SST and a press, install the power steering cylinder tube oil seal.

NOTICE:

- ★ Make sure that the power steering cylinder tube oil seal is installed facing in the correct direction.
- ★ Take care so that the power steering cylinder tube oil seal will not be reversed as you install it.



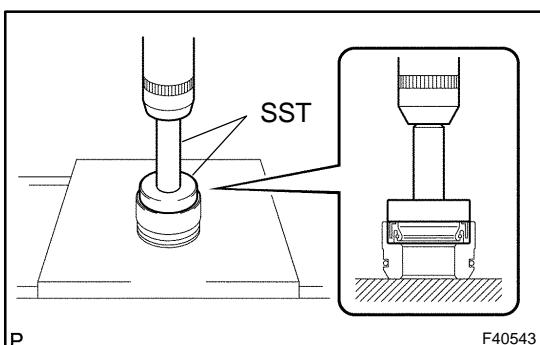
41. INSTALL POWER STEERING RACK

- Install SST to the power steering rack.
SST 09631-33010

HINT:

If necessary, scrape the burrs off the power steering rack teeth end and burnish.

- Coat the SST with power steering fluid.
- Install the power steering rack into the rack housing.
- Remove the SST.



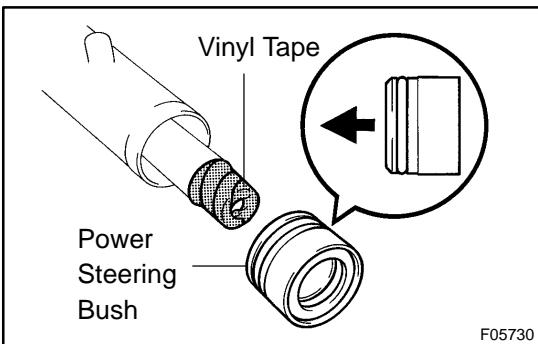
42. INSTALL POWER STEERING RACK BUSH

- Using SST and a press, install the rack bush oil seal to the power steering rack bush.
SST 09950- 60010 (09951- 00400), 09950- 70010 (09951-07100)

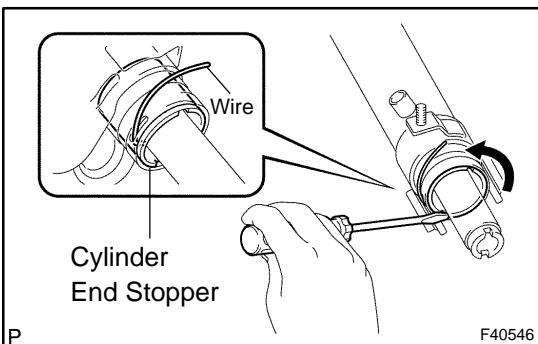
NOTICE:

Make sure that the rack bush oil seal is installed facing in the correct direction.

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

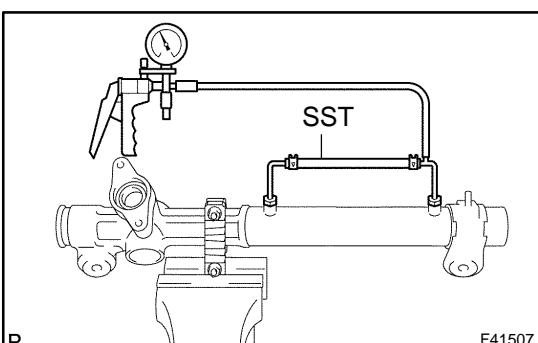


- (c) To prevent rack bush oil seal lip damage, wind vinyl tape around the power steering rack end, and apply power steering fluid.
- (d) Install the power steering rack bush to the power steering rack.



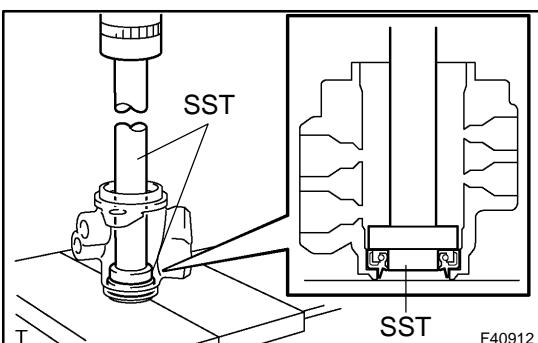
43. INSTALL CYLINDER END STOPPER

- (a) Align the installation hole for the wire of the cylinder end stopper with the slot of the rack housing.
- (b) Install a new wire into the cylinder end stopper.
- (c) Using a screwdriver, turn the cylinder end stopper clockwise by $450 \pm 50^\circ$.



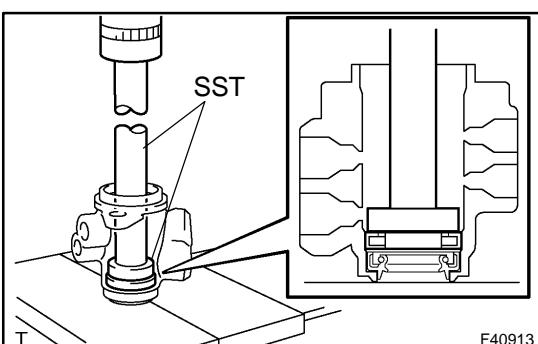
44. AIR TIGHTNESS TEST

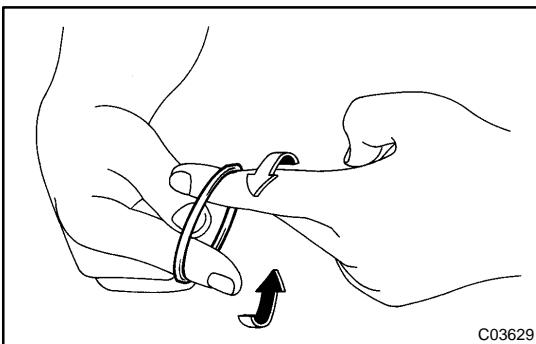
- (a) Install SST to the rack housing.
SST 09631-12071 (09633-00010)
- (b) Apply vacuum of 53 kPa (400 mmHg, 15.75 in.Hg) for about 30 seconds.
- (c) Check that there is no change in the vacuum.
If there is a change in the vacuum, check the installation of the oil seals.



45. INSTALL POWER STEERING CONTROL VALVE UPPER OIL SEAL

- (a) Coat a control valve upper bearing and a new power steering control valve upper oil seal with power steering fluid.
- (b) Using SST and a press, install the power steering control valve upper oil seal.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09952-06010, 09951-00320)
- (c) Using SST and a press, install the control valve upper bearing.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09952-06010, 09951-00340)





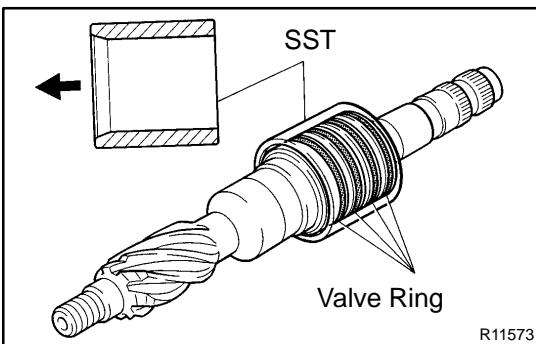
46. INSTALL POWER STEERING CONTROL VALVE

(a) Expand 4 new control valve rings with your fingers.

NOTICE:

Be careful not to over expand the control valve ring.

(b) Coat the 4 control valve rings with power steering fluid.
(c) Install the 4 control valve rings to the control valve, and settle them down with your fingers.

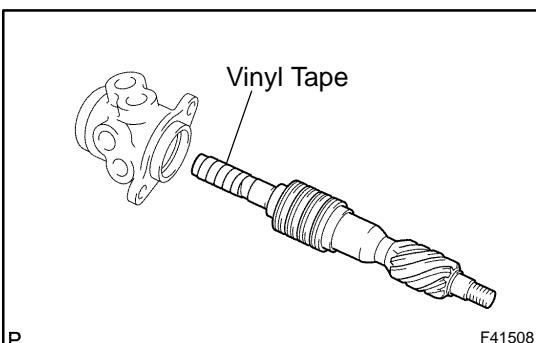


(d) Carefully slide the tapered end of SST over the control valve rings until they fit to the control valve.

SST 09631-20081

NOTICE:

Be careful not to damage the control valve rings.

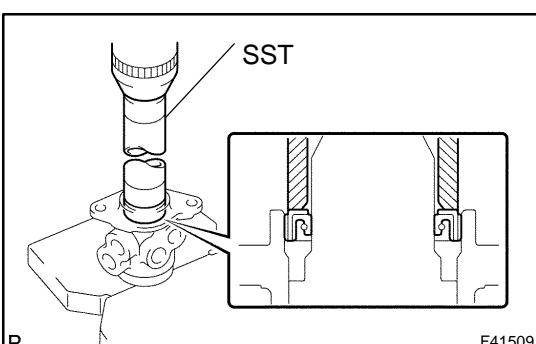


(e) To prevent power steering control valve upper oil seal lip damage, wind vinyl tape around the serrated part of the control valve.

(f) Coat the power steering control valve upper oil seal lip with power steering fluid.
(g) Install the control valve to the control valve housing.

NOTICE:

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

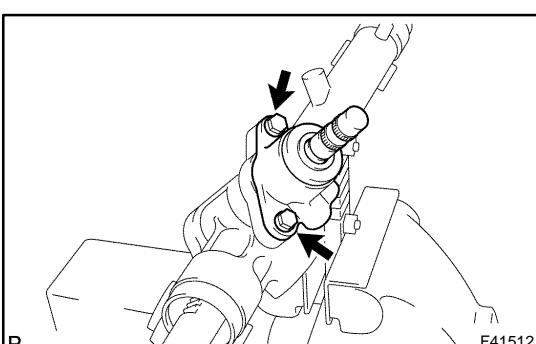


(h) Coat a new oil seal lip with power steering fluid.

(i) Using SST and a press, install the oil seal.
SST 09612-2201 1

NOTICE:

Make sure that the oil seal is installed facing in the correct direction.



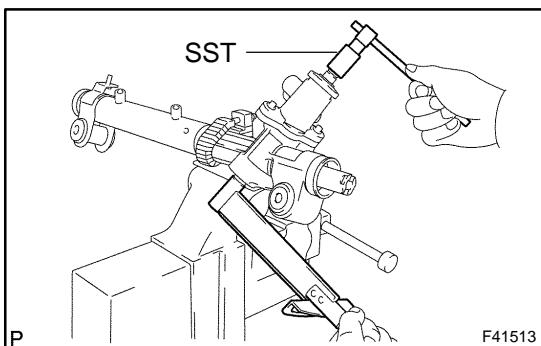
(j) Apply grease to the needle bearing.

(k) Install a new gasket to the control valve housing.

(l) Wind vinyl tape around the serration part of the control valve.

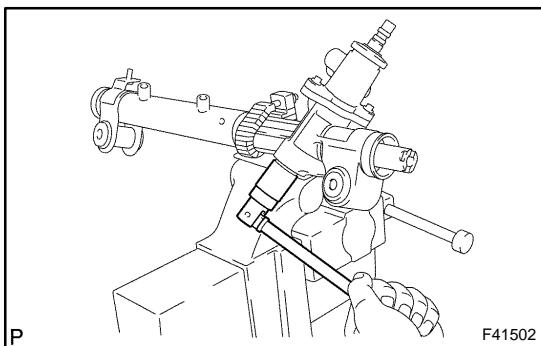
(m) Install the control valve housing to the rack housing with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

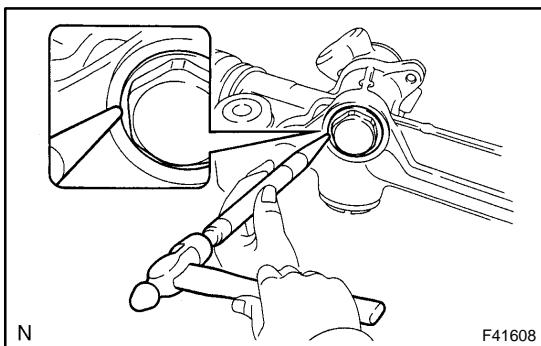


(n) Using SST, stop the control valve rotation and install a new lock nut.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
SST 09616-0001 1

(o) Apply sealant to 2 or 3 threads of the rack housing cap.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent



(p) Using a socket wrench (27 mm), install the rack housing cap.
Torque: 58.5 N·m (597 kgf·cm, 43 ft·lbf)



(q) Using a punch and a hammer, stake the rack housing cap and rack housing.

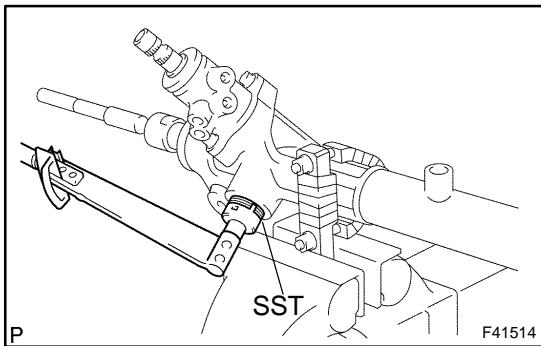
47. INSTALL RACK GUIDE

(a) Apply molybdenum disulfide lithium base grease to the rack guide.
 (b) Install the rack guide.
 (c) Install the compression spring.
 (d) Apply sealant to 2 or 3 threads of the rack guide spring cap.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

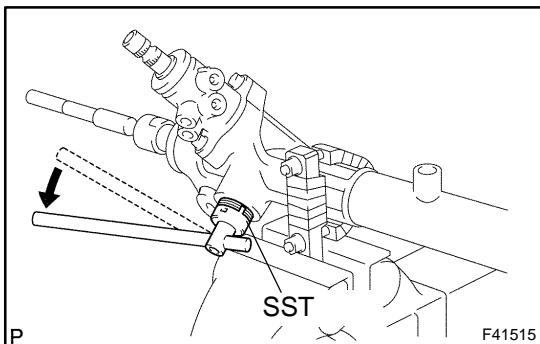
(e) Temporarily install the rack guide spring cap.



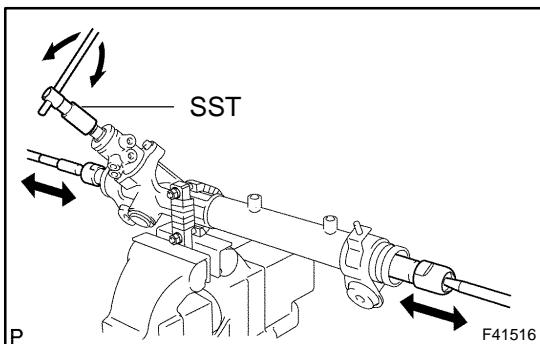
48. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH steering rack ends sub-assy.

(b) Using SST, torque the rack guide spring cap.
SST 09631-10021
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

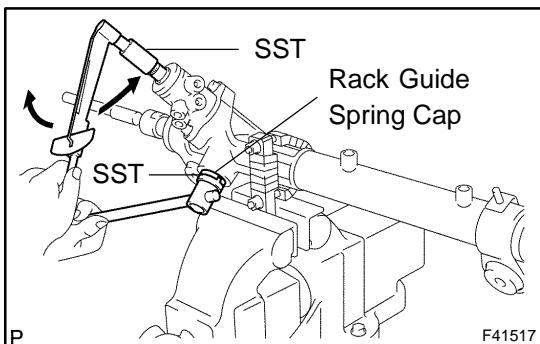


(c) Using SST, loosen the rack guide spring cap.
SST 09631-10021



(d) Using SST, turn the control valve to the right and left 1 or 2 times.
SST 09616-0001 1

(e) Using SST, loosen the rack guide spring cap until the compression spring is not functioning.
SST 09631-10021



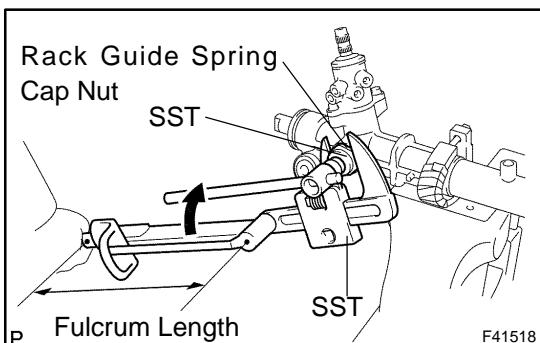
(f) Using SST and a torque wrench, tighten the rack guide spring cap until the preload is within specification.
SST 09616-0001 1, 09631-10021

Preload (turning):
1.2 - 1.5 N·m (12.2 - 15.3 kgf·cm, 10.6 - 13.3 in·lbf)

(g) Apply sealant to 2 or 3 threads of the rack guide spring cap nut.

Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(h) Temporarily install the rack guide spring cap nut.



(i) Using SST, hold the rack guide spring cap and using another SST, tighten the rack guide spring cap nut.
SST 09616-0001 1, 09922-10010

Torque: 48 N·m (489 kgf·cm, 35 ft·lbf)

NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

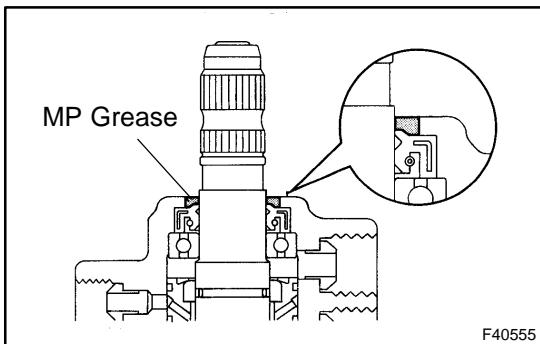
HINT:

Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

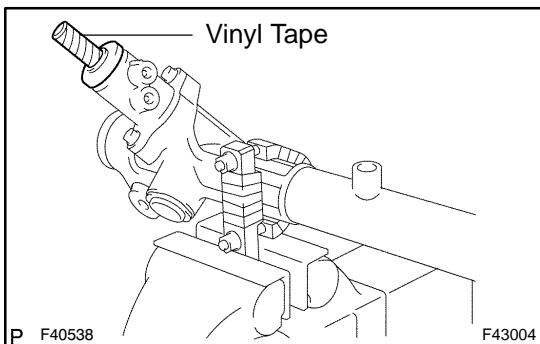
(j) Precheck the total preload.

Preload (turning):
1.2 - 1.5 N·m (12.2 - 15.3 kgf·cm, 10.6 - 13.3 in·lbf)

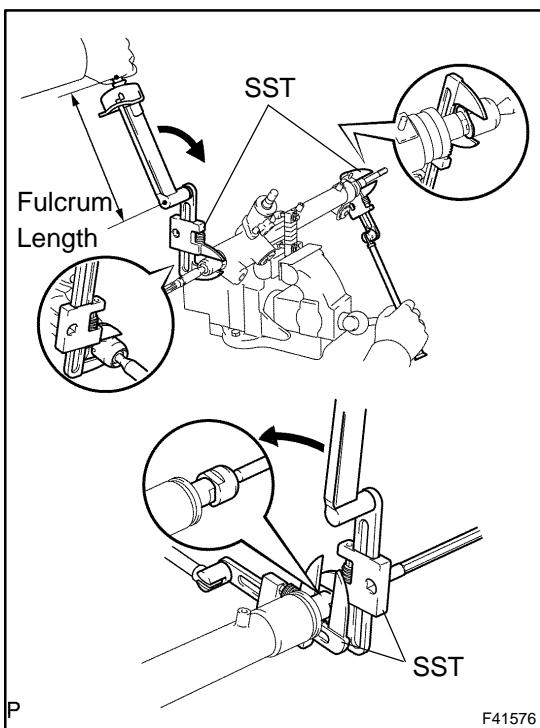
(k) Remove the RH and LH steering rack ends sub-assy.



(l) Apply MP grease into the control valve, as shown in the illustration.



(m) Wind vinyl tape around the serration part of the control valve.
(n) Install the dust cover to the control valve housing.



49. INSTALL STEERING RACK END SUB-ASSY

(a) Install a new 2 claw washers, and temporarily install the 2 steering rack ends sub-assy.

HINT:

Align the claws of the claw washer with the power steering rack grooves.

(b) Using 2 SSTs, install the 2 steering rack ends sub-assy.
SST 09922-10010

Torque: 58.5 N·m (597 kgf·cm, 43 ft·lbf)

NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

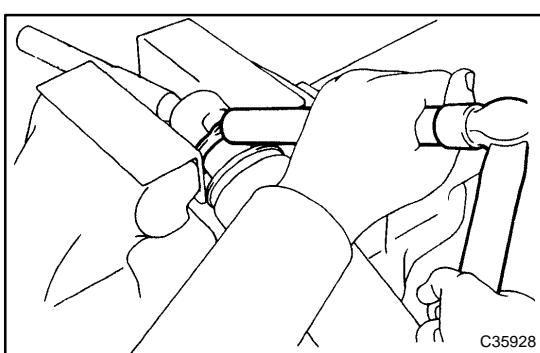
HINT:

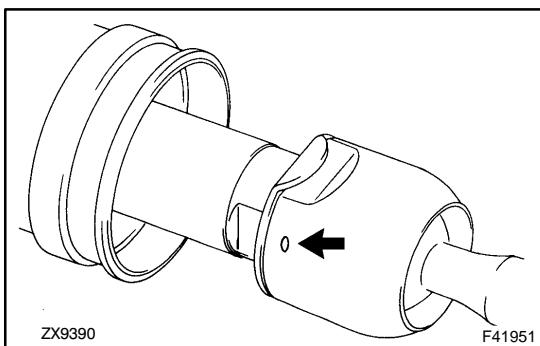
- ★ Using SST, hold the power steering rack and install the steering rack end sub-assy.
- ★ Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

(c) Using a brass bar and a hammer, stake the claw washer.

NOTICE:

Avoid any impact to the power steering rack.





50. INSPECT STEERING RACK END SUB-ASSY

- (a) Ensure that the steering rack end sub-assy hole is not clogged with grease.

HINT:

If the hole is clogged, the pressure inside the boot will change after it is assembled and steering wheel is turned.

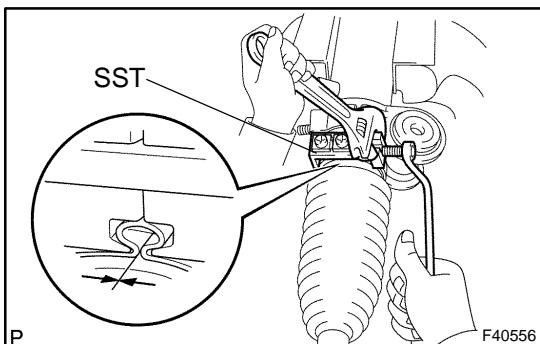
51. INSTALL STEERING RACK BOOT NO.2

- (a) Install the steering rack boot No.2.

52. INSTALL STEERING RACK BOOT NO.1

HINT:

Remove the steering rack boot No.1 by the same procedures with steering rack boot No.2.



53. INSTALL STEERING RACK BOOT NO.2 CLAMP

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

SST 09521-24010

Clearance: 3.0 mm (0.118 in.) or less

NOTICE:

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

54. INSTALL STEERING RACK BOOT NO.1 CLAMP

SST 09521-24010

NOTICE:

Be careful not to damage the steering rack boot No.1.

HINT:

Install the steering rack boot No.1 clamp by the same procedures with steering rack boot No.2 clamp.

55. INSTALL STEERING RACK BOOT CLIP

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

56. INSTALL TIE ROD ASSY LH

- (a) Screw the lock nut and tie rod assy LH onto the steering rack end sub-assy until the matchmarks are aligned.

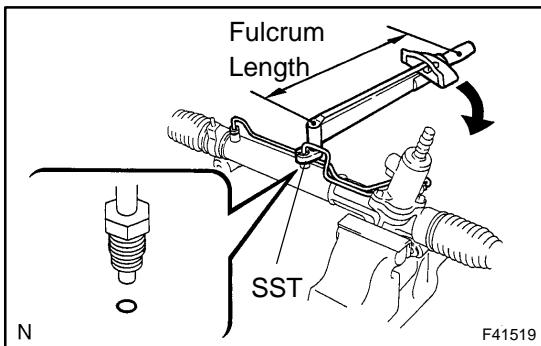
HINT:

After adjusting toe-in, torque the lock nut.

57. INSTALL TIE ROD ASSY RH

HINT:

Install the RH side by the same procedures with LH side.



58. INSTALL STEERING LEFT TURN PRESSURE TUBE

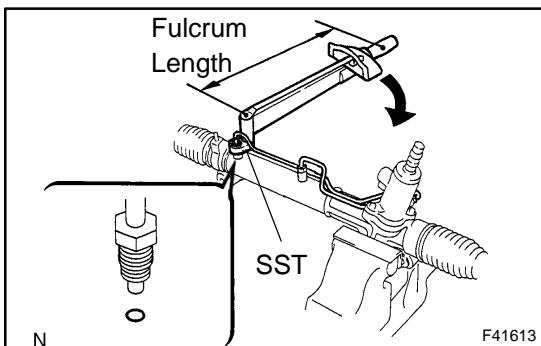
- Coat 2 new O-rings with power steering fluid and install them to the steering left turn pressure tube.
- Using SST, install the steering left turn pressure tube to the rack & pinion power steering gear assy.

SST 09023-38201

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

HINT:

- ★ Use a torque wrench with a fulcrum length of 345 mm (9.84 in.).
- ★ This torque value is effective in the case that SST is parallel to a torque wrench.



59. INSTALL STEERING RIGHT TURN PRESSURE TUBE

- Coat 2 new O-rings with power steering fluid and install them to the steering right turn pressure tube.
- Using SST, install the steering right turn pressure tube to the rack & pinion power steering gear assy.

SST 09023-38201

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

HINT:

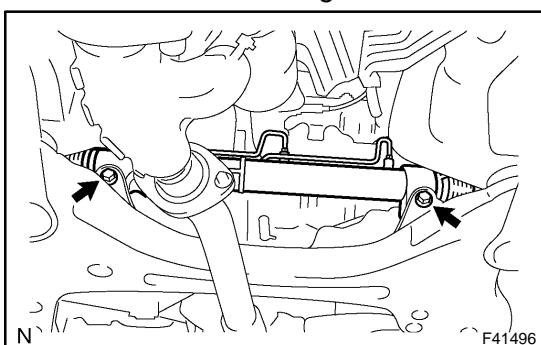
- ★ Use a torque wrench with a fulcrum length of 345 mm (11.81 in.).
- ★ This torque value is effective in the case that SST is parallel to a torque wrench.

60. INSTALL POWER STEERING RACK HOUSING HEAT INSULATOR

- Install the power steering rack housing heat insulator.

HINT:

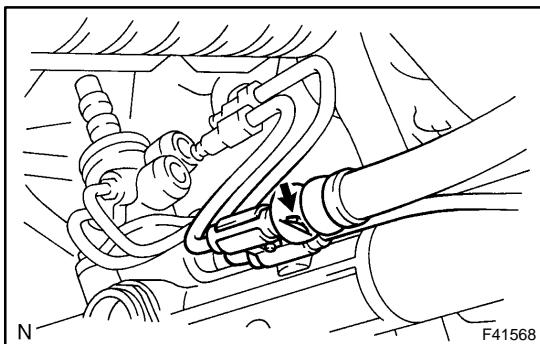
Install nut when installing the return clamp.



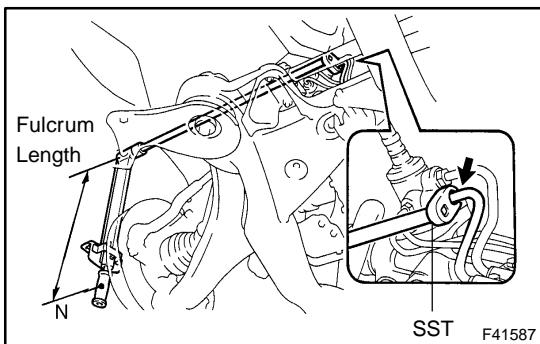
61. INSTALL RACK & PINION POWER STEERING GEAR ASSY

- Install the rack & pinion power steering gear assy with the 2 bolts and 2 nuts.

Torque: 70 N·m (714 kgf·cm, 52 ft·lbf)



(b) Connect the tube clamp with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

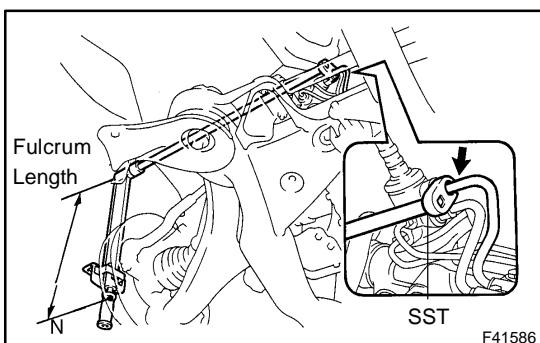


62. CONNECT PRESSURE FEED TUBE ASSY

(a) Using SST, connect the pressure feed tube assy to the rack & pinion power steering gear assy.
SST 09023-12701
Torque: 22.5 N·m (229 kgf·cm, 17 ft·lbf)

HINT:

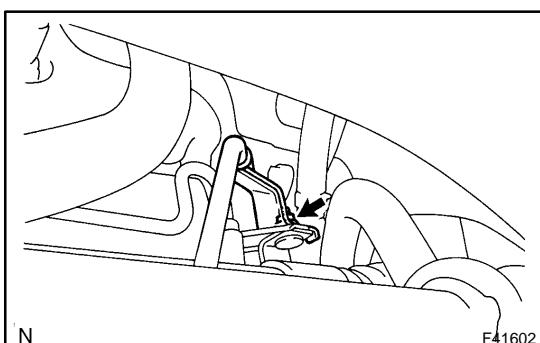
- ★ Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- ★ This torque value is effective in the case that SST is parallel to a torque wrench.



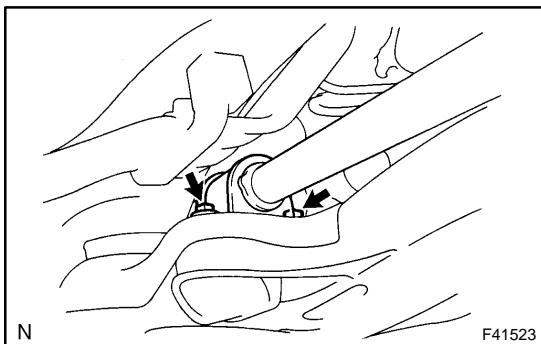
(b) Using SST, connect the return tube assy to the rack & pinion power steering gear assy.
SST 09023-12701
Torque: 22.5 N·m (229 kgf·cm, 17 ft·lbf)

HINT:

- ★ Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- ★ This torque value is effective in the case that SST is parallel to a torque wrench.



(c) Install the return tube assy clamp with the nut.
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)



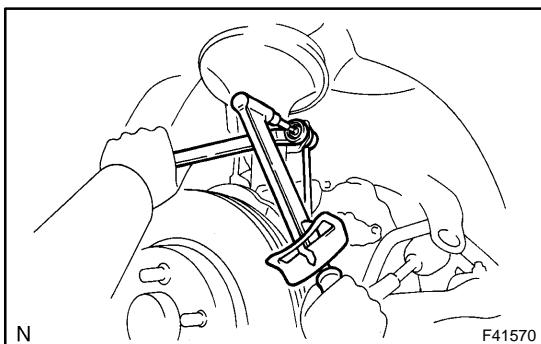
63. INSTALL FRONT STABILIZER BRACKET NO.1 LH

(a) Install the front stabilizer bracket No. 1 LH with the 2 bolts.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

64. INSTALL FRONT STABILIZER BRACKET NO.1 RH

HINT:

Remove the RH side by the same procedures with LH side.



65. CONNECT FRONT STABILIZER LINK ASSY LH

(a) Connect the front stabilizer link assy LH to the shock absorber assy front LH with the nut.
Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)

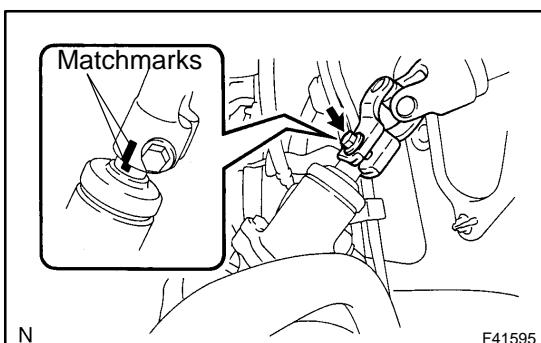
HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.

66. CONNECT FRONT STABILIZER LINK ASSY RH

HINT:

Connect the RH side by the same procedures with LH side.



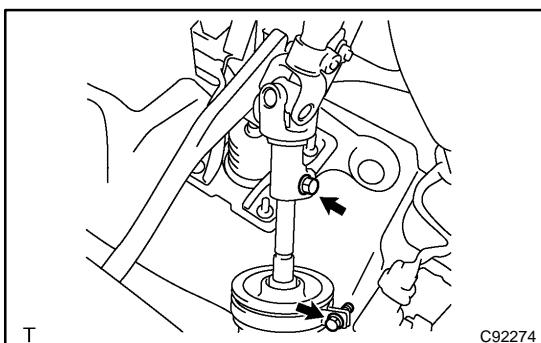
67. CONNECT STEERING INTERMEDIATE SHAFT SUB-ASSY

(a) Align the matchmarks on the steering intermediate shaft sub-assy and rack & pinion power steering gear assy.
(b) Install the bolt.
Torque: 35.3 N·m (360 kgf·cm, 26 ft·lbf)

(c) Tighten the bolt.
Torque: 35.3 N·m (360 kgf·cm, 26 ft·lbf)

(d) Install the steering column hole cover No.2 to the steering hole cover No.1.

(e) Connect the clamp to the steering column hole cover No.1 and tighten the bolt.



68. CONNECT TIE ROD ASSY LH

(a) Connect the tie rod assy LH with the nut.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install a new cotter pin.

NOTICE:

If the holes for a new cotter pin are not aligned, tighten the nut further up 60°.

69. CONNECT TIE ROD ASSY RH**HINT:**

Install the RH side by the same procedures with LH side.

70. INSTALL FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

71. BLEED POWER STEERING FLUID (See page 51-3)**72. CHECK POWERSTEERING FLUID LEAKAGE****73. INSTALL SPIRAL CABLE SUB-ASSY**

(See page 50-8)

74. CENTER SPIRAL CABLE(See page 50-8)**75. INSTALL STEERING WHEEL ASSY**

(See page 50-8)

76. INSTALL HORN BUTTON ASSY

(See page 60-22)

77. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT(See page 26-5)**78. INSPECT STEERING WHEEL CENTER POINT****79. INSPECT SRS WARNING LIGHT(See page 05-826)**