
STEERING

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STEERING SYSTEM

SR014-01

PRECAUTION

- Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- The AVENSIS/CORONA is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the 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 notices in the RS section.

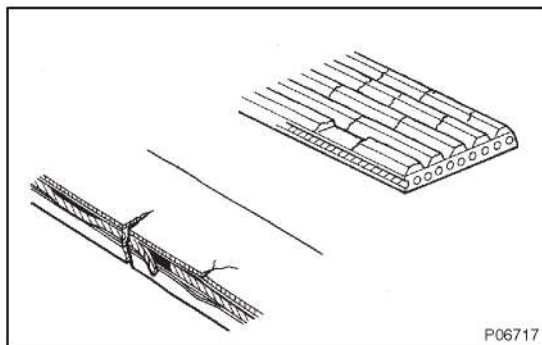
TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

SR01E-01

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. Power steering vane pump 9. Power steering gear	SA-2 SR-6 SR-3 SA-4 – SA-44 – SR-20 SR-23 SR-26 SR-36
Poor return	1. Tires (Improperly inflated) 2. Front wheel alignment (Incorrect) 3. Steering column (Binding) 4. Power steering gear	SA-2 SA-4 – SR-36
Excessive play	1. Steering system joints (Worn) 2. Suspension arm ball joints (Worn) 3. Intermediate shaft, Sliding yoke (Worn) 4. Front wheel bearing (Worn) 5. Power steering gear	– SA-44 – SA-11 SR-36
Abnormal noise	1. Power steering fluid level (Low) 2. Steering system joints (Worn) 3. Power steering vane pump 4. Power steering gear	SR-6 – SR-20 SR-23 SR-26 SR-36



DRIVE BELT INSPECTION

SR08-D1

1. INSPECT DRIVE BELT

Visually check the belt for excessive wear, frayed cords etc. If any defect has been 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. CHECK DRIVE BELT TENSION

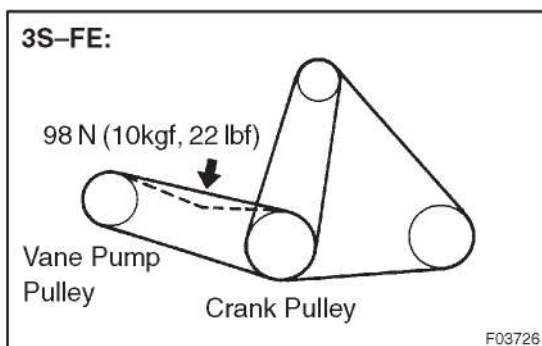
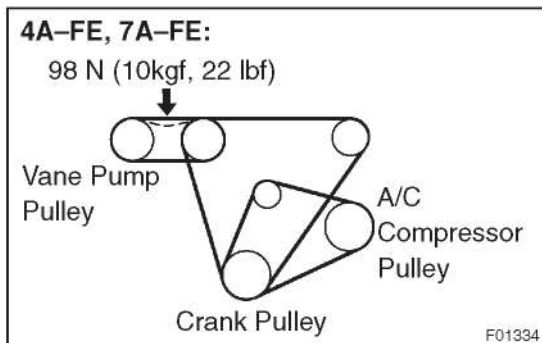
Measure the drive belt deflection.

Drive belt tension: at 98 N (10 kgf, 22 lbf)

4A-FE, 7A-FE Engines:

New Belt: 5 – 6 mm (0.20 – 0.24 in.)

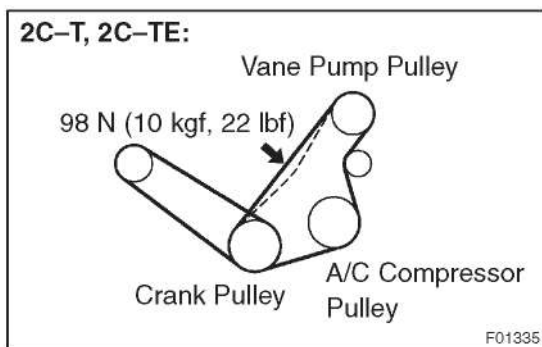
Used Belt: 6 – 8 mm (0.24 – 0.31 in.)



3S-FE Engine:

New Belt: 8 – 10 mm (0.31 – 0.39 in.)

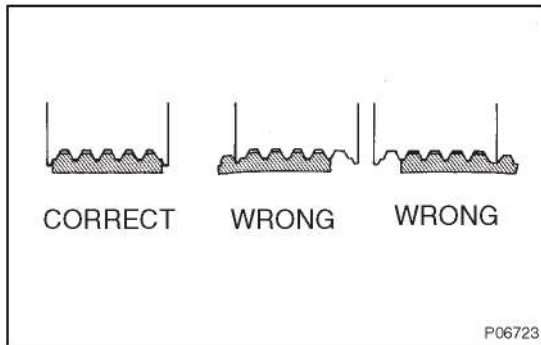
Used Belt: 10 – 13 mm (0.39 – 0.51 in.)



2C-T, 2C-TE Engines:

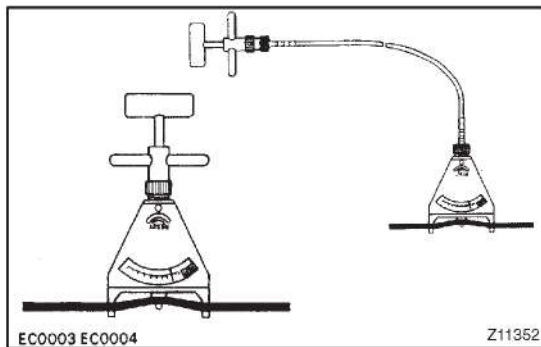
New Belt: 11 – 14 mm (0.43 – 0.55 in.)

Used Belt: 15 – 18 mm (0.59 – 0.71 in.)



HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



(Reference)

- Using a belt tension gauge, measure the drive belt tension.

Drive belt tension:**4A-FE, 7A-FE, 3S-FE Engines:****New Belt:** 441 – 539 N (45 – 55 kgf)**Used Belt:** 245 – 392 N (25 – 40 kgf)**2C-T, 2C-TE Engines:****New Belt:** 539 – 637 N (55 – 65 kgf)**Used Belt:** 245 – 392 N (25 – 40 kgf)

If the belt tension is not as specified, adjust it.

POWER STEERING FLUID BLEEDING

SR07-D1

1. **CHECK FLUID LEVEL**
(See page SR-6)
2. **JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS**
3. **TURN STEERING WHEEL**

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. **LOWER VEHICLE**
5. **START ENGINE**

Run the engine at idle for a few minutes.

6. **TURN STEERING WHEEL**

(a) 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.

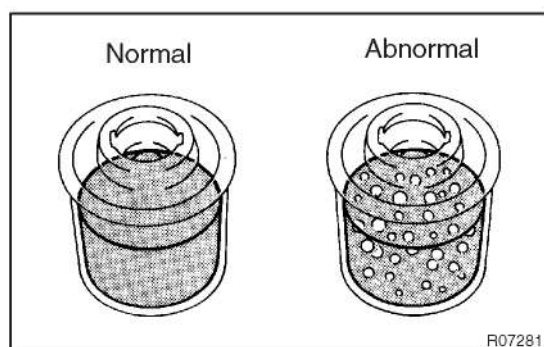
(b) Repeat (a) several times.

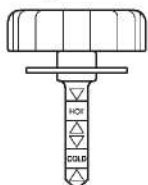
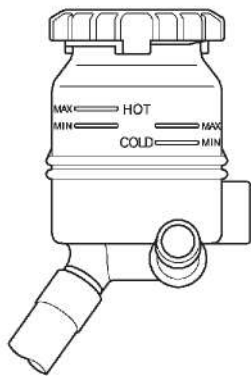
7. **STOP ENGINE**

8. **CHECK FOR FOAMING OR EMULSIFICATION**

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

9. **CHECK FLUID LEVEL**
(See page SR-6)



4A-FE, 7A-FE Engines:**2C-T, 2C-TE, 3S-FE Engines:**

F03737

INSPECTION**1. 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

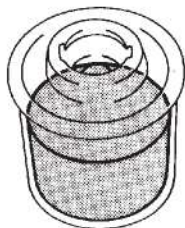
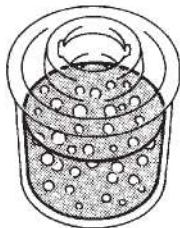
HINT:

Check that the fluid level is within the HOT LEVEL range on the reservoir / reservoir cap dipstick.

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 boost fluid temperature.

Fluid temperature: 80°C (176°F)

Normal**Abnormal**

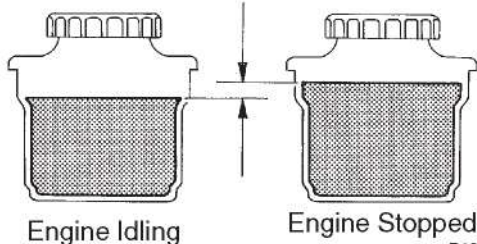
R07281

- (e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed power steering system.

(See page SR-5)

5 mm (0.20 in.) or less



R10552

- (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 power steering system.

(See page SR-5)

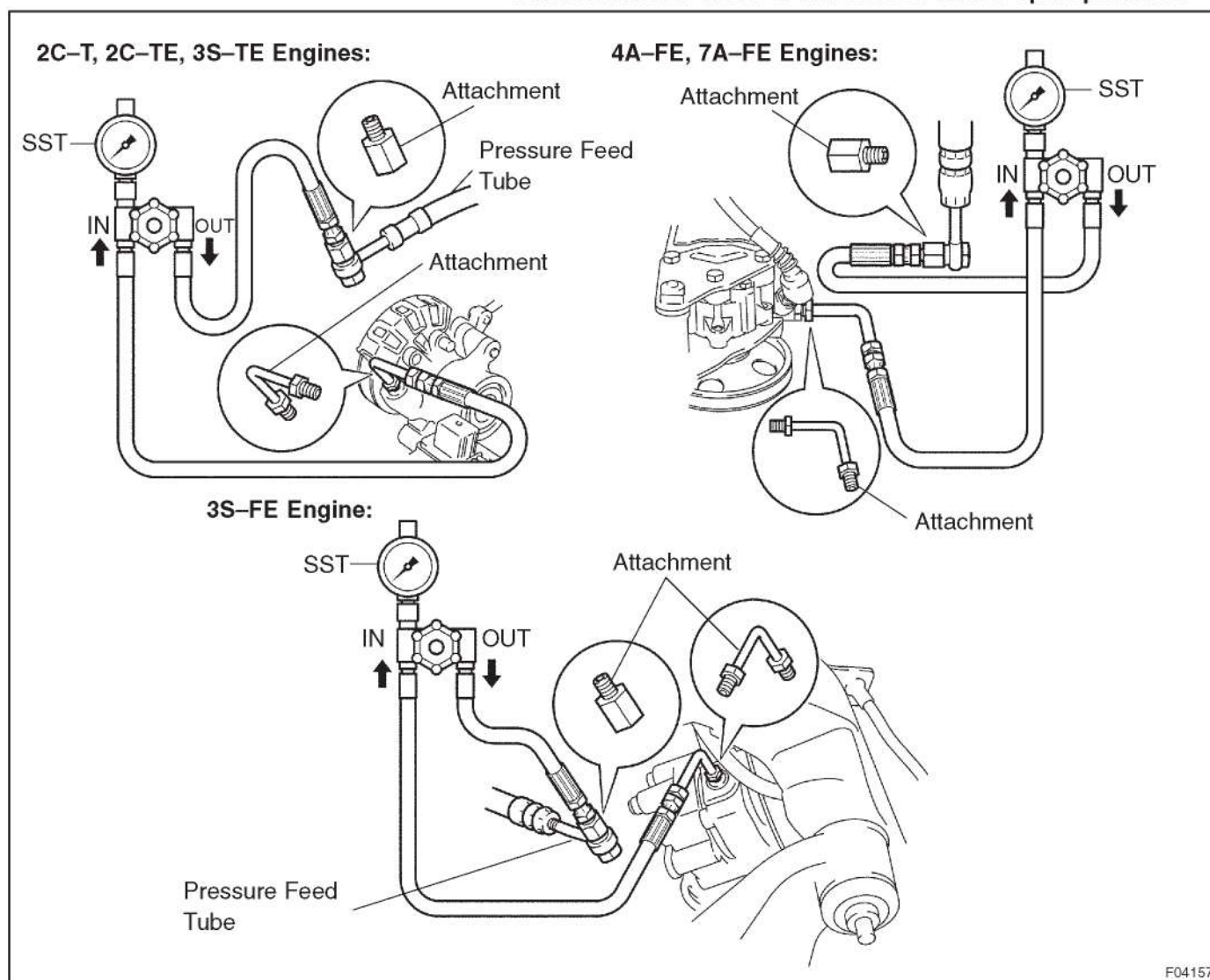
- (i) Check the fluid level.

2. CHECK STEERING FLUID PRESSURE

- (a) Disconnect the pressure feed tube from the PS vane pump.
 (4A-FE, 7A-FE Engines: See page SR-21)
 (3S-FE Engine: See page SR-24)
 (2C-T, 2C-TE Engines: See page SR-28)
- (b) Connect SST, as shown in the illustration below.
 SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)

NOTICE:

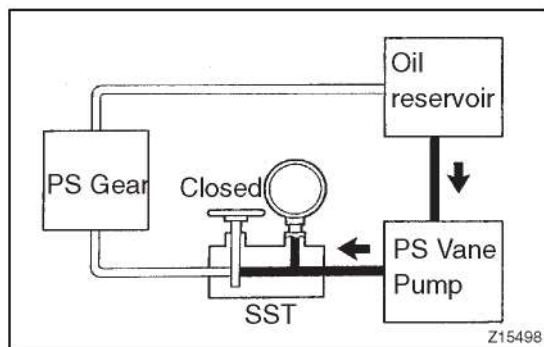
Check that the valve of the SST is in the open position.



F04157

- (c) Bleed the power steering system.
(See page SR-5)
- (d) Start the engine and run it at idle.
- (e) Turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80°C (176°F)



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

Minimum fluid pressure:

4A-FE, 7A-FE Engines:

8,238 kPa (84 kgf/cm², 1,195 psi)

3S-FE Engine:

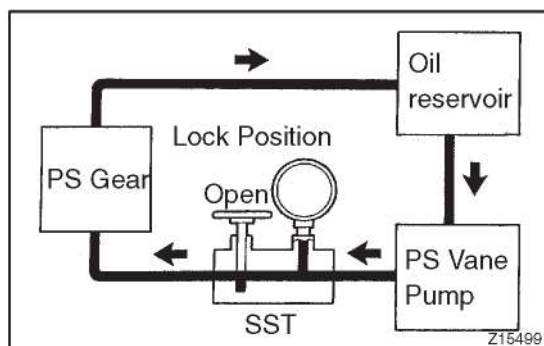
9,022 kPa (92 kgf/cm², 1,309 psi)

2C-T, 2C-TE Engines:

8,826 kPa (90 kgf/cm², 1,280 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.

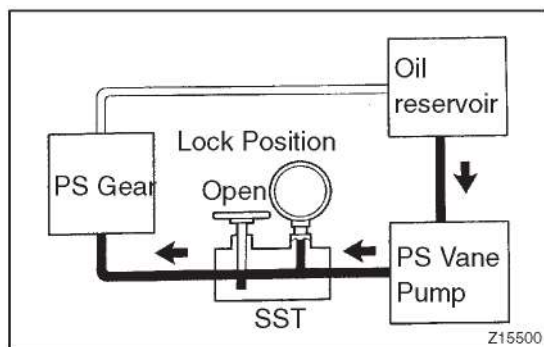
- (h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.

Difference fluid pressure:

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.

Minimum fluid pressure:

4A-FE, 7A-FE Engines:

8,238 kPa (84 kgf/cm², 1,195 psi)

3S-FE Engine:

9,022 kPa (92 kgf/cm², 1,309 psi)

2C-T, 2C-TE Engines:

8,826 kPa (90 kgf/cm², 1,280 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.

- (k) Connect the pressure feed tube to PS vane pump.

(4A-FE, 7A-FE Engines: See page SR-22)

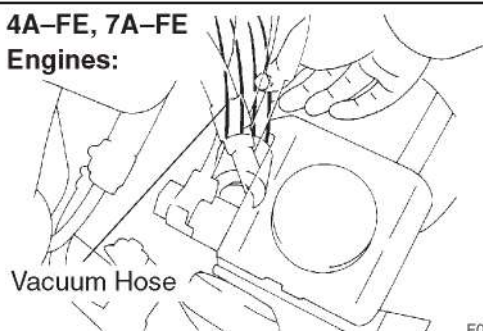
(3S-FE Engine: See page SR-25)

(2C-T, 2C-TE Engines: See page SR-35)

- (l) Bleed the power steering system.

(See page SR-5)

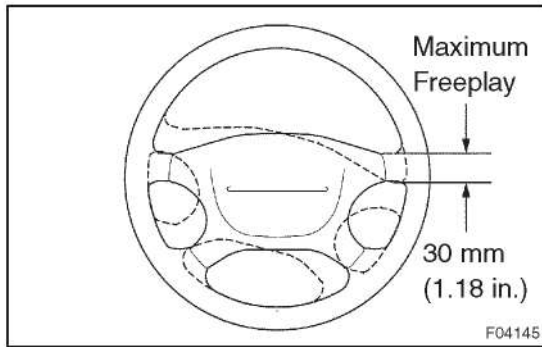
**4A-FE, 7A-FE
Engines:**



AIR CONTROL VALVE INSPECTION

SR09-D1

- 1. TURN AIR CONDITIONING SWITCH OFF**
- 2. CHECK IDLE-UP**
 - (a) Start the engine and run it at idle.
 - (b) Fully turn the steering wheel.
 - (c) Check that the engine rpm decreases when the vacuum hose of the air control valve is pinched.
 - (d) Check that the engine rpm increases when the hose is released.



STEERING WHEEL INSPECTION

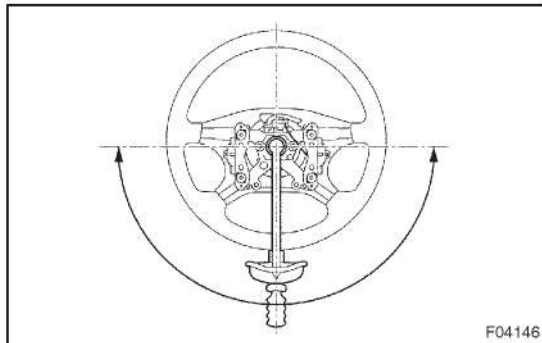
SR01A-01

1. CHECK STEERING WHEEL FREEPLAY

With the vehicle stopped and tires facing straight ahead, rock the steering wheel gently back and forth with light finger pressure.

Freeplay should not exceed the maximum.

Maximum freeplay: 30 mm (1.18 in.)



2. CHECK STEERING EFFORT

- Center the steering wheel.
- Remove the steering wheel pad.
(See page SR-13)
- Start the engine and run it at idle.
- Measure the steering effort in both directions.

Reference: 7.8 N·m (80 kgf·cm, 69 in.-lbf)

HINT:

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

- Torque the steering wheel set nut.

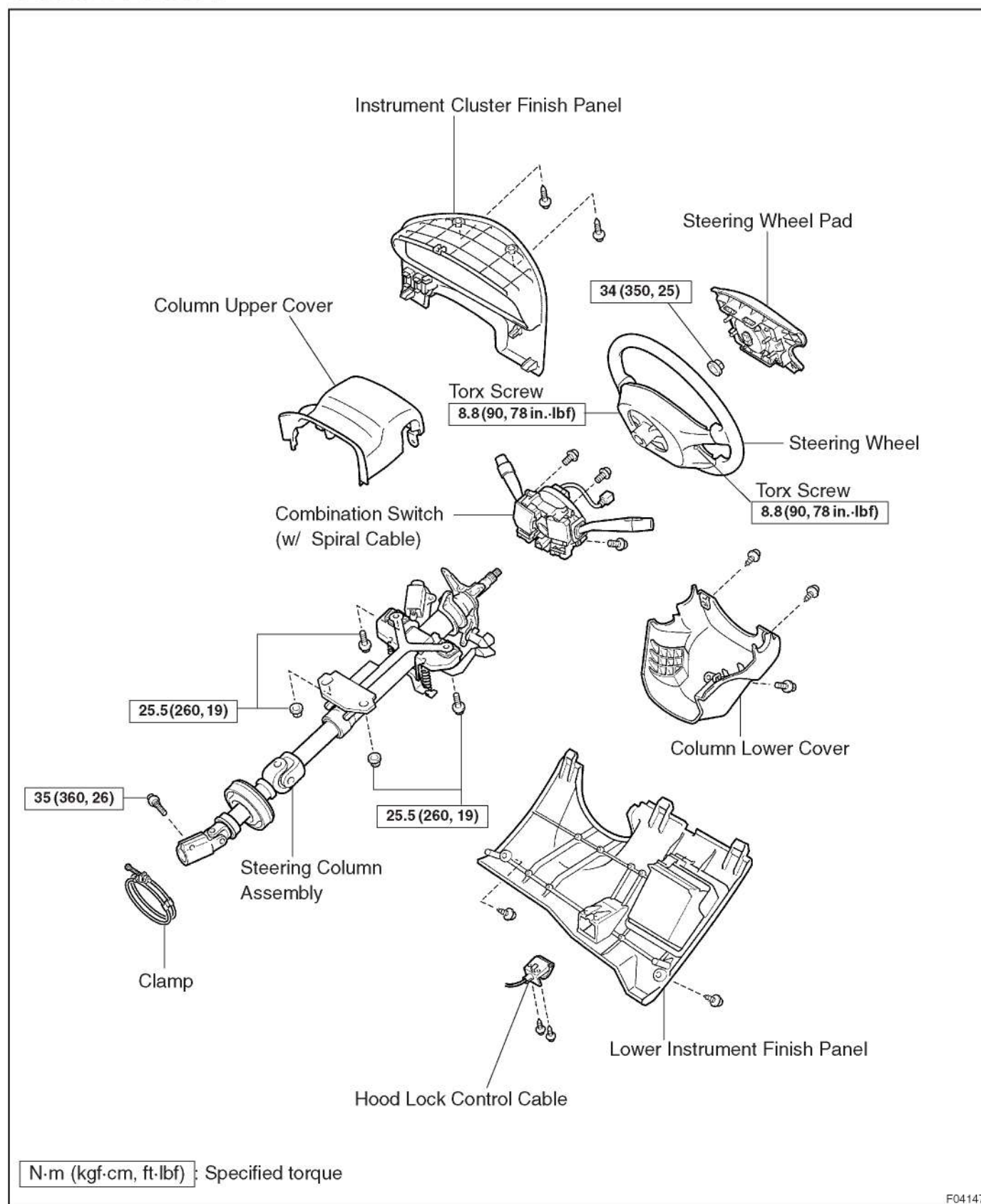
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

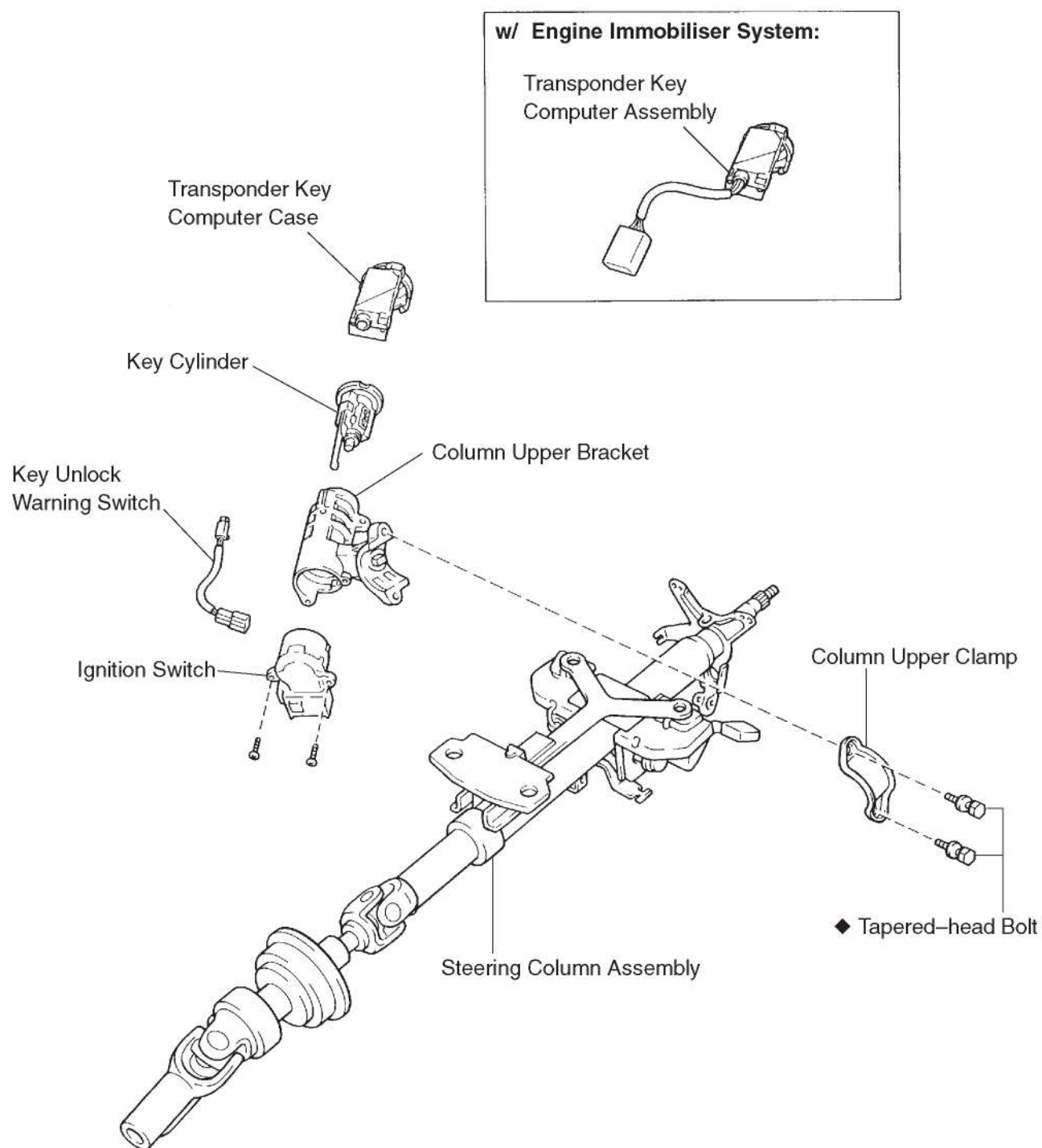
- Install the steering wheel pad.

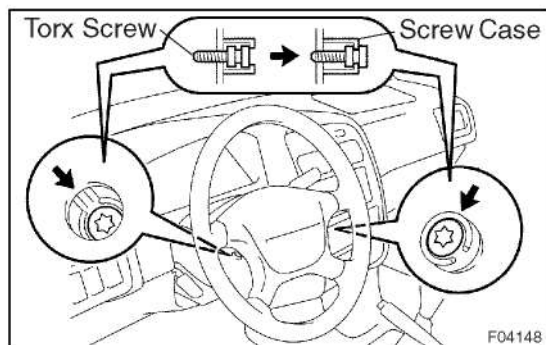
(See page SR-18)

TILT STEERING COLUMN COMPONENTS

SR01B-01







REMOVAL

1. REMOVE STEERING WHEEL PAD

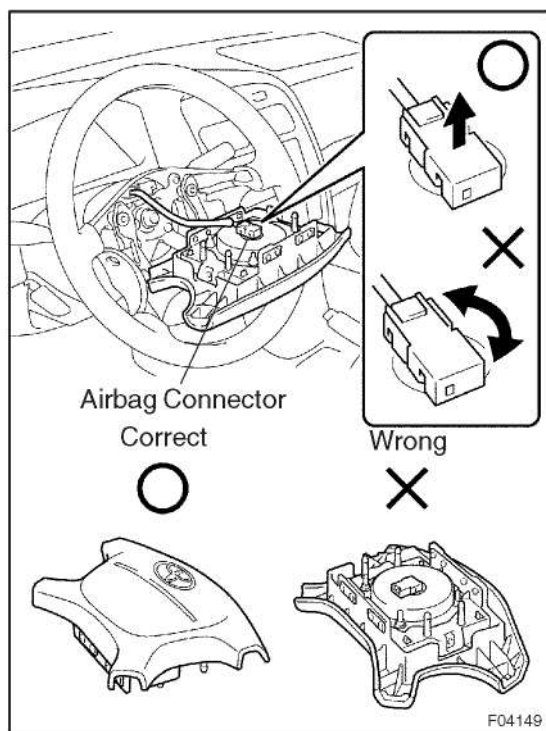
NOTICE:

- If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.
- Never use airbag parts from another vehicle. When replacing parts, replace with new ones.

- Place the front wheels facing straight ahead.
- Using a torx socket wrench, loosen the 2 torx screws.

HINT:

Loosen the 2 screws until the groove along the screw circumference catches on the screw case.



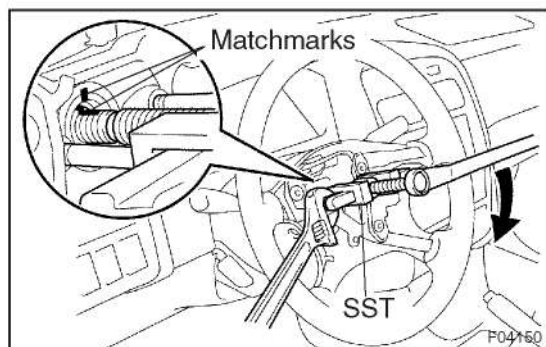
- Pull out the wheel pad from the steering wheel and disconnect the airbag connector.

CAUTION:

- When storing the wheel pad, keep the upper surface of the pad facing upward.
- Never disassemble the wheel pad.

NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.



2. REMOVE STEERING WHEEL

- Disconnect the connector.
 - Remove the steering wheel set nut.
 - Place matchmarks on the steering wheel and main shaft assembly.
 - Using SST, remove the wheel.
- SST 09950-50010 (09951-05010, 09952-05010, 09953-05020, 09954-05020)

3. REMOVE LOWER INSTRUMENT FINISH PANEL

- (a) Remove the 2 screws and disconnect the hood lock control cable.
- (b) Remove the 2 screws.

4. REMOVE INSTRUMENT CLUSTER FINISH PANEL

Remove the 2 screws.

5. REMOVE UPPER AND LOWER COLUMN COVERS

- (a) Remove the 3 screws from the lower cover.
- (b) Remove the screw from the upper cover.

6. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE

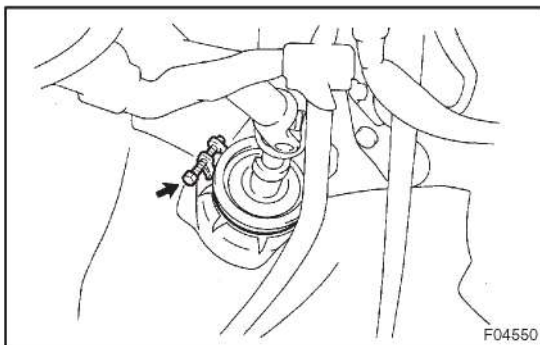
- (a) Disconnect the connectors.
- (b) Disconnect the airbag connector.
- (c) Remove the 3 screws.

7. REMOVE SPIRAL CABLE

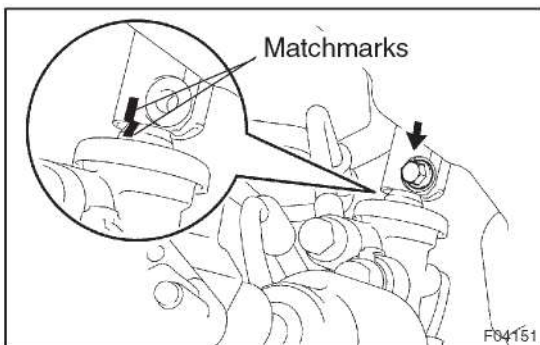
(See page BE-22)

NOTICE:

Do not disassemble the cable or apply oil to it.

**8. DISCONNECT YOKE**

- (a) Loosen the column hole cover clamp.



- (b) Place matchmarks on the yoke and control valve shaft.
- (c) Remove the bolt, and slide out the yoke.

9. REMOVE STEERING COLUMN ASSEMBLY

- (a) Disconnect the connectors.
- (b) Remove the 2 column assembly set bolts and nuts.

DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. w/o Engine Immobiliser System:

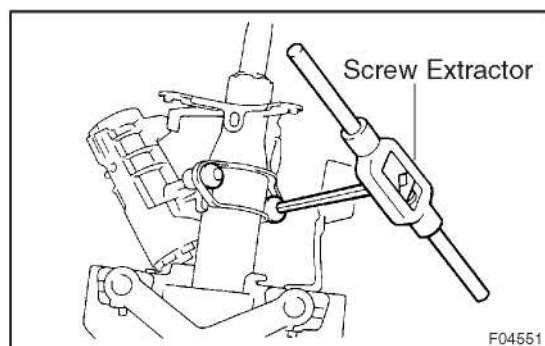
REMOVE TRANSPONDER KEY COMPUTER CASE

Slide the case out of the column upper bracket.

2. w/ Engine Immobiliser System:

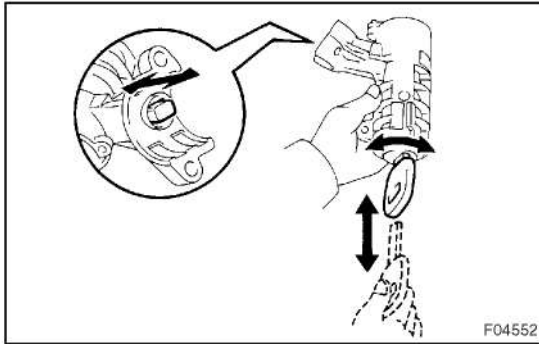
REMOVE TRANSPONDER KEY COMPUTER ASSEMBLY

Slide the computer assembly out of the column upper bracket.



3. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

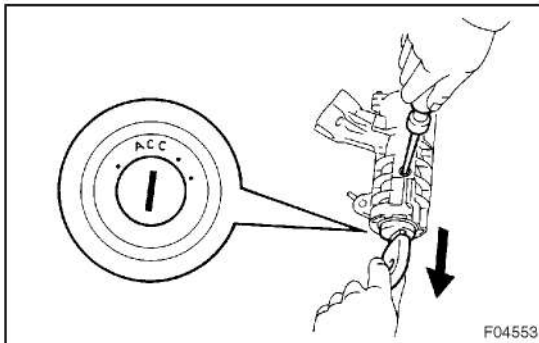
- (a) Using a centering punch, mark the center of the 2 tapered-head bolts.
- (b) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the 2 bolts.
- (c) Using a screw extractor, remove the 2 bolts.



INSPECTION

1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



2. IF NECESSARY, REPLACE KEY CYLINDER

- Place the ignition key at the ACC position.
- Push down the stop pin with a screwdriver, and pull out the cylinder.
- Install a new cylinder.

HINT:

Make sure the key is at the ACC position.

3. INSPECT IGNITION SWITCH

(See page BE-19)

4. IF NECESSARY, REPLACE IGNITION SWITCH

- Remove the 2 screws and switch from the upper bracket.
- Install a new switch with the 2 screws.

5. INSPECT KEY UNLOCK WARNING SWITCH

(See page BE-19)

6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

- Slide out the switch.
- Slide in a new switch.

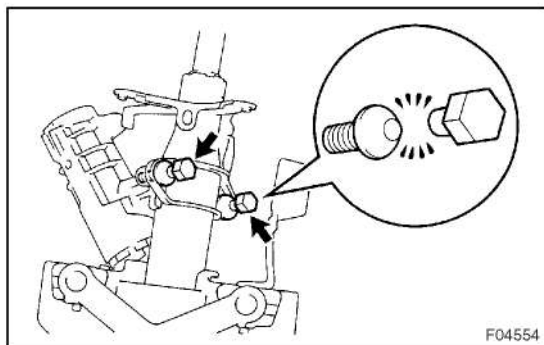
7. w/ Engine Immobiliser System:

INSPECT TRANSPONDER KEY COMPUTER ASSEMBLY

(See page BE-139)

8. w/ Engine Immobiliser System:

IF NECESSARY, REPLACE TRANSPONDER KEY COMPUTER ASSEMBLY



REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

Tighten the 2 new tapered-head bolts until the bolt heads break off.

2. w/o Engine Immobiliser System: INSTALL TRANSPONDER KEY COMPUTER CASE

Slide the case in the column upper bracket.

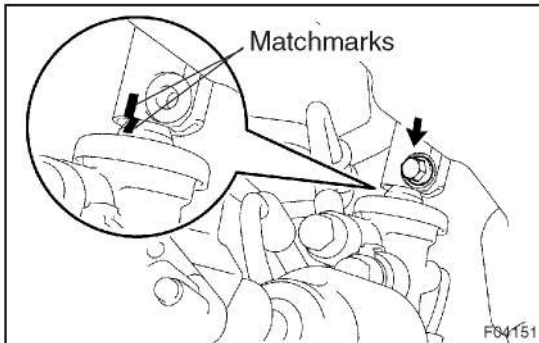
3. w/ Engine Immobiliser System: INSTALL TRANSPONDER KEY COMPUTER ASSEMBLY

Slide the computer assembly in the column upper bracket.

INSTALLATION

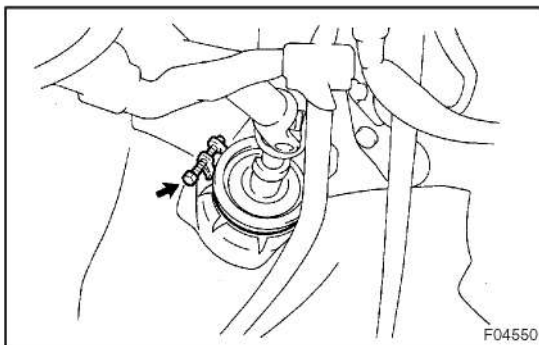
1. INSTALL STEERING COLUMN ASSEMBLY

- Torque the 2 column assembly set bolts and nuts.
Torque: 25.5 N·m (260 kgf·cm, 19 ft·lbf)
- Connect the connectors.



2. CONNECT YOKE

- Align the matchmarks on the yoke and control valve shaft, and slide in the yoke.
- Torque the bolt.
Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)



- Tighten the column hole cover clamp.

3. INSTALL SPIRAL CABLE

(See page BE-22)

4. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

- Tighten the 3 screws.
- Connect the airbag connector.
- Connect the connectors.

5. INSTALL UPPER AND LOWER COLUMN COVERS

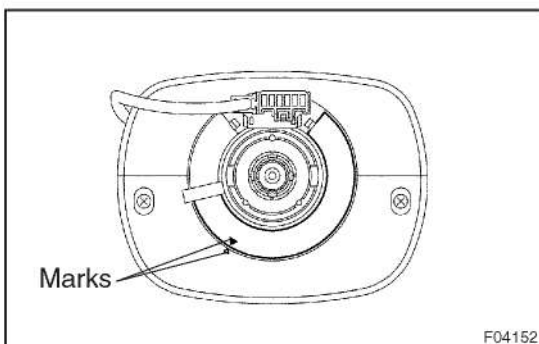
- Tighten the screw to the upper cover.
- Tighten the 3 screws to the lower cover.

6. INSTALL INSTRUMENT CLUSTER FINISH PANEL

Tighten the 2 screws.

7. INSTALL LOWER INSTRUMENT FINISH PANEL

- Connect the hood lock control cable with the 2 screws.
- Tighten the 2 screws.



8. CENTER SPIRAL CABLE

- Check that the front wheels are facing straight ahead.
- Turn the cable counterclockwise by hand until it becomes harder to turn the cable.
- Then rotate the cable clockwise about 2.5 turns to align the marks.

HINT:

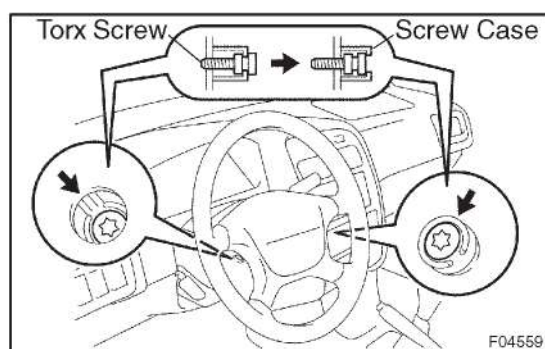
The cable will rotate about 2.5 turns to either left or right of the center.

9. INSTALL STEERING WHEEL

- (a) Align the matchmarks on the steering wheel and main shaft assembly.
- (b) Torque the steering wheel set nut.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
- (c) Connect the connector.

10. INSTALL STEERING WHEEL PAD**NOTICE:**

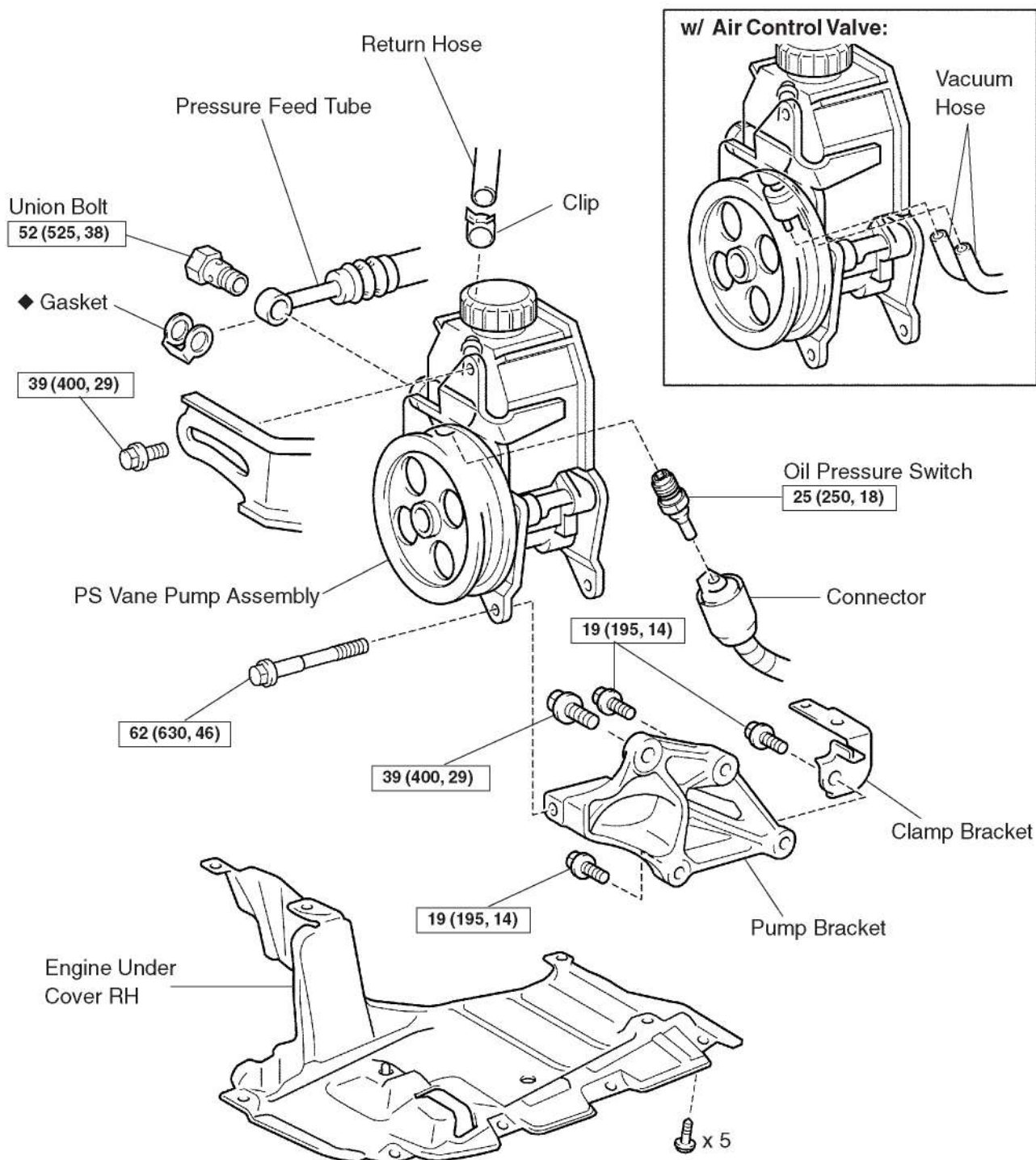
- Make sure the wheel pad is installed with the specified torque.
 - If the wheel pad has been dropped, or if there are cracks, dents or other defects in the case or connector, replace the wheel pad with a new one.
 - When installing the wheel pad, take care that the wirings do not interfere with other parts and that they are not pinched between other parts.
- (a) Connect the airbag connector.



- (b) Install the wheel pad after confirming that the circumference groove of the torx screws are caught on the screw case.
 - (c) Using a torx socket wrench, torque the 2 screws.
Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)
- 11. CHECK STEERING WHEEL CENTER POINT**

POWER STEERING VANE PUMP (4A-FE, 7A-FE) COMPONENTS

SR01H-01



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

◆ Non-reusable part

REMOVAL

1. REMOVE ENGINE UNDER COVER RH

Remove the 5 bolts.

2. DISCONNECT RETURN HOSE

Remove the clip and disconnect the hose.

NOTICE:

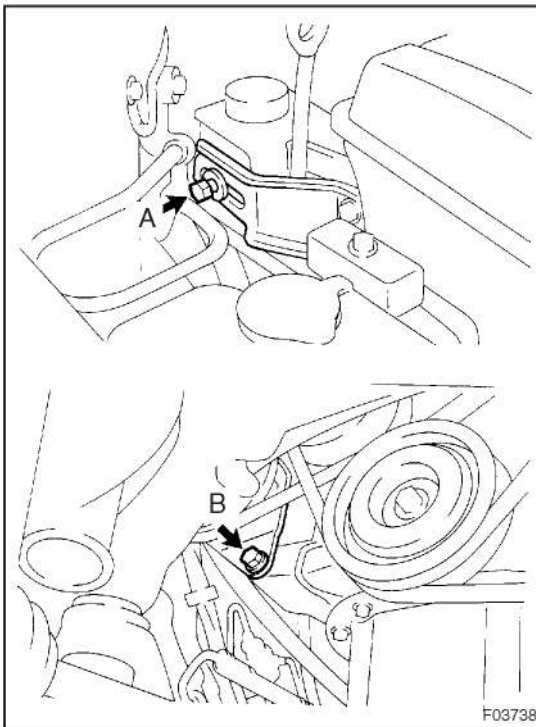
Take care not to spill fluid on the drive belt.

3. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket.

4. w/ Air control valve:

DISCONNECT 2 VACUUM HOSES



5. REMOVE DRIVE BELT

Remove the bolt A and loosen the bolt B.

6. REMOVE PS VANE PUMP ASSEMBLY

(a) w/o Air control valve:

Disconnect the connector.

(b) Remove the 4 pump bracket set bolts and clamp bracket.

(c) Remove the bolt and pump bracket from the pump assembly.

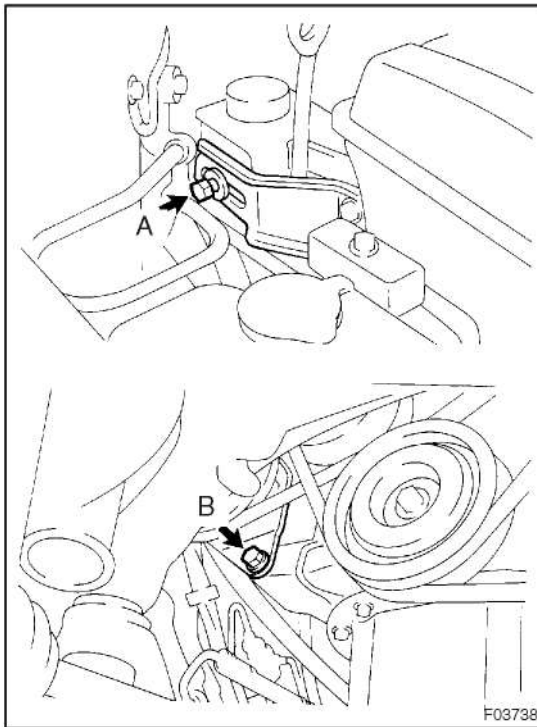
(d) w/o Air control valve:

Remove the oil pressure switch from the pump assembly.

INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

- (a) w/o Air control valve:
Install the oil pressure switch to the pump assembly.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Temporarily install the pump bracket and bolt to the pump assembly.
- (c) Torque the 4 pump bracket set bolts and clamp bracket.
Torque:
12 mm head bolts
19 N·m (195 kgf·cm, 14 ft·lbf)
14 mm head bolt
39 N·m (400 kgf·cm, 29 ft·lbf)
- (d) w/o Air control valve:
Connect the connector.



2. INSTALL DRIVE BELT

- (a) Adjust the drive belt tension.
(See page SR-3)
- (b) Torque the bolt A.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
- (c) Torque the bolt B.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

3. w/ Air control valve:

CONNECT 2 VACUUM HOSES

4. CONNECT PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

Torque: 52 N·m (525 kgf·cm, 38 ft·lbf)

5. CONNECT RETURN HOSE

Connect the hose with the clip.

6. INSTALL ENGINE UNDER COVER RH

Tighten the 5 bolts.

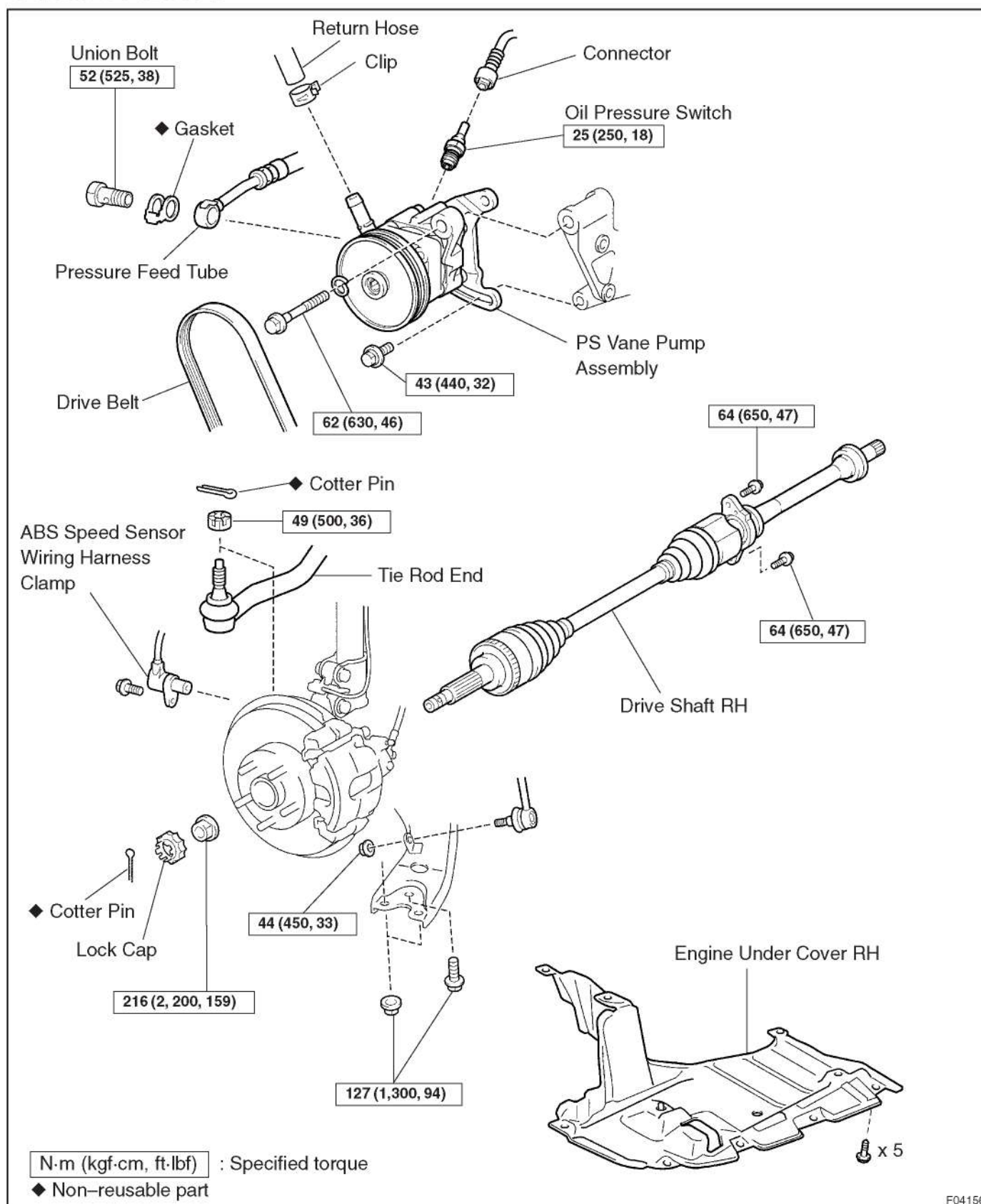
7. BLEED POWER STEERING SYSTEM

(See page SR-5)

POWER STEERING VANE PUMP (3S-FE)

COMPONENTS

SR01K-01



F04156

REMOVAL

1. REMOVE ENGINE UNDER COVER RH

Remove the 5 bolts.

2. w/ ABS:

DISCONNECT ABS SPEED SENSOR WIRING HARNESS CLAMP

Remove the bolt.

3. REMOVE DRIVE SHAFT RH

(See page SA-19)

4. DISCONNECT RETURN HOSE

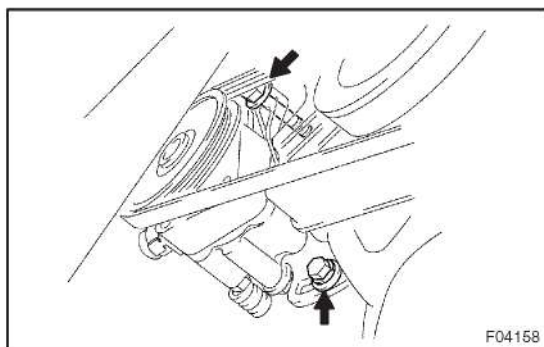
Remove the clip and disconnect the hose.

NOTICE:

Take care not to spill fluid on the drive belt.

5. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket.



6. REMOVE DRIVE BELT

Loosen the 2 bolts.

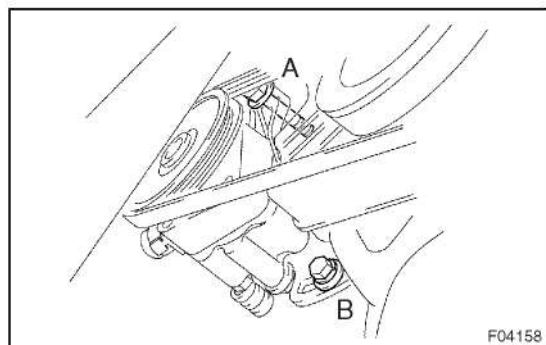
7. REMOVE PS VANE PUMP ASSEMBLY

- Disconnect the connector.
- Remove the 2 pump assembly set bolts.
- Remove the oil pressure switch from the pump assembly.

INSTALLATION

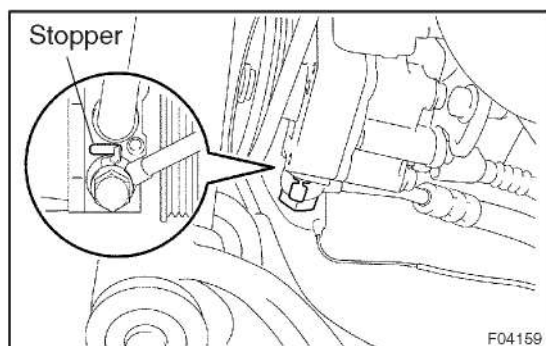
1. INSTALL PS VANE PUMP ASSEMBLY

- (a) Install the oil pressure switch to the pump assembly.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Temporarily install the 2 pump assembly set bolts.



2. INSTALL DRIVE BELT

- (a) Adjust the drive belt tension.
(See page SR-3)
- (b) Torque the bolt A.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)
- (c) Torque the bolt B.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



3. CONNECT PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

HINT:

Make sure that the tube touches the stopper of the PS vane pump assembly as shown in the illustration, then torque the union bolt.

Torque: 52 N·m (525 kgf·cm, 38 ft·lbf)

4. CONNECT RETURN HOSE

Connect the hose with the clip.

5. INSTALL DRIVE SHAFT RH

(See page SA-19)

6. w/ ABS:

CONNECT ABS SPED SENSOR WIRING HARNESS CLAMP

Tighten the bolt.

7. INSTALL ENGINE UNDER COVER RH

Tighten the 5 bolts.

8. BLEED POWER STEERING SYSTEM

(See page SR-5)

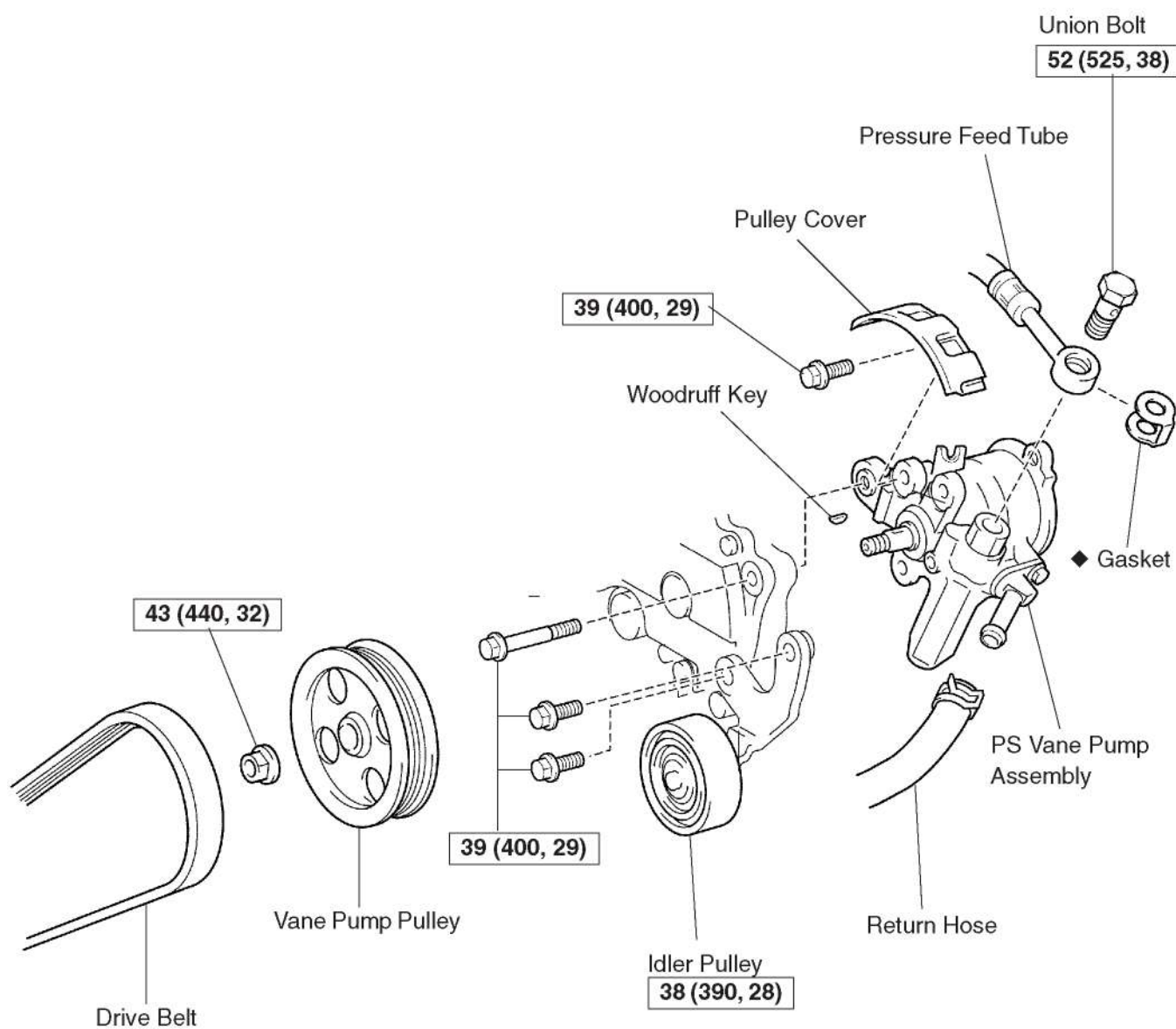
9. w/ ABS:

CHECK ABS SPED SENSOR SIGNAL

(See page DI-113)

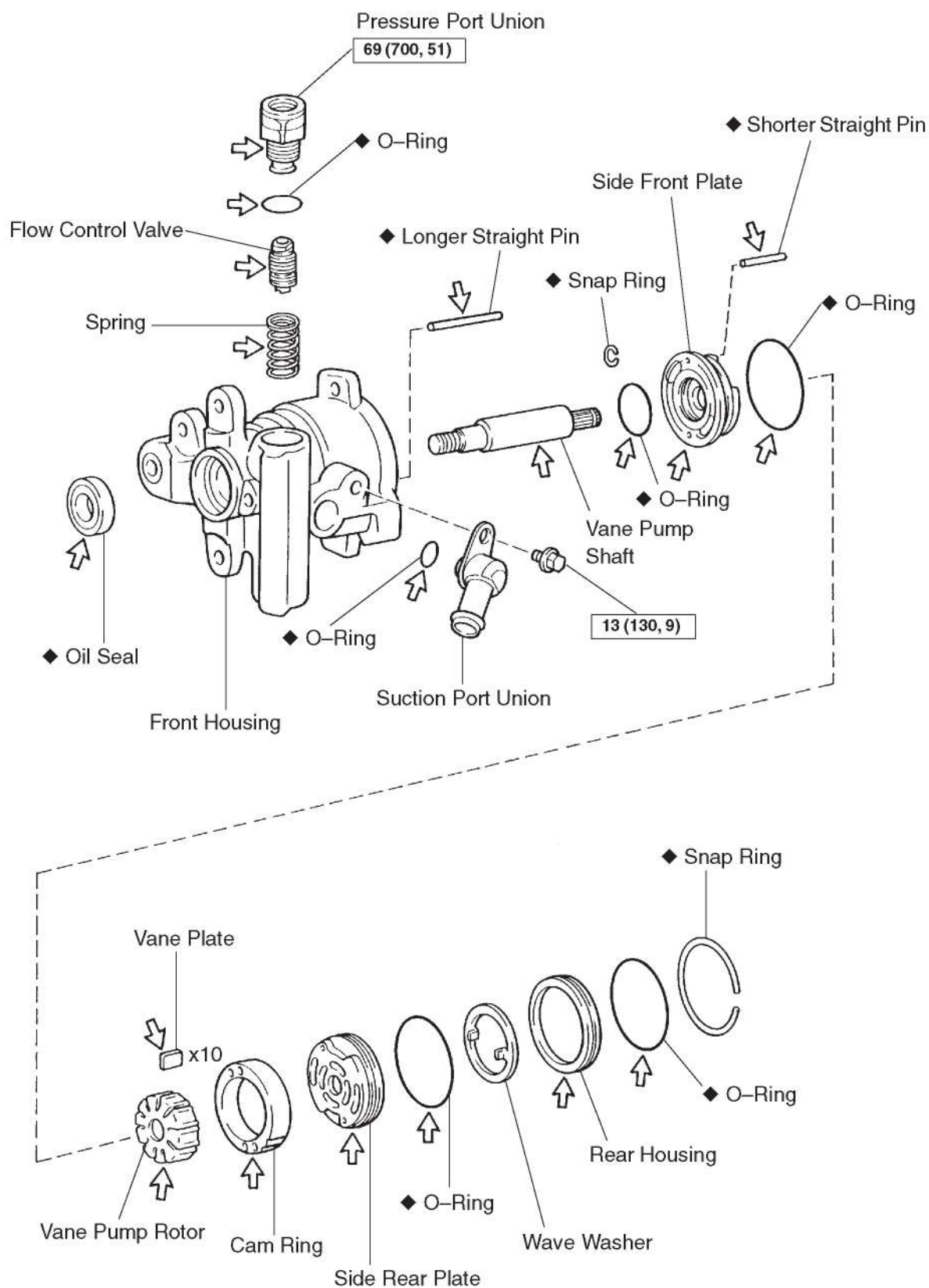
POWER STEERING VANE PUMP (2C-T, 2C-TE) COMPONENTS

SR01N-01



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

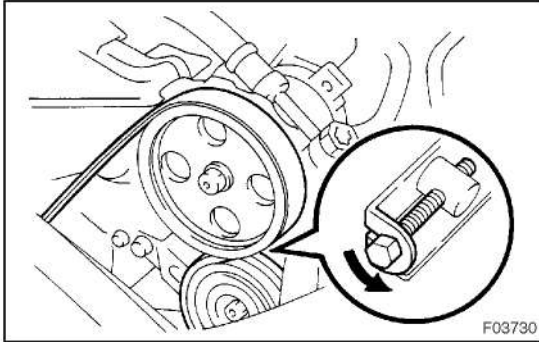
◆ Non-reusable part



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

◆ Non-reusable part

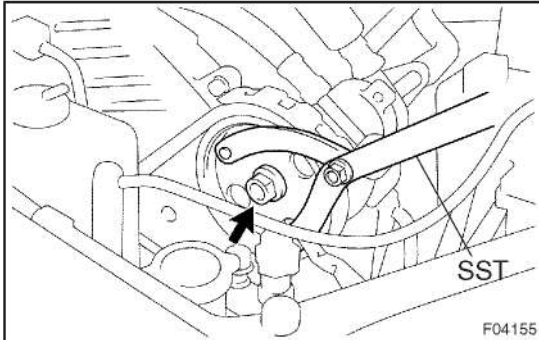
⇐ Power steering fluid



REMOVAL

1. REMOVE DRIVE BELT

- Loosen the idler pulley set nut.
- Loosen the belt tension adjusting bolt, and remove the drive belt.



2. REMOVE VANE PUMP PULLEY

- Using SST to stop the pulley rotating, remove the pulley set nut.
SST 09960-10010 (09962-01000, 09963-01000)
- Remove the woodruff key from the vane pump shaft.

3. DISCONNECT RETURN HOSE

Remove the clip and disconnect the hose.

4. DISCONNECT PRESSURE FEED TUBE

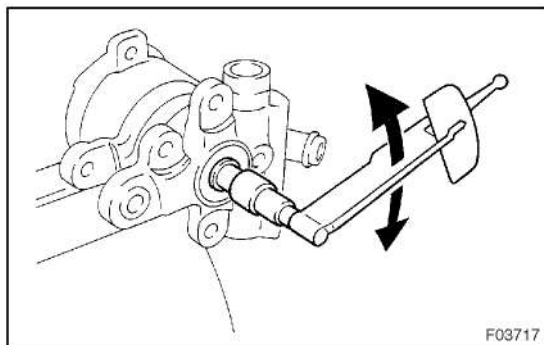
Remove the union bolt and gasket.

5. REMOVE PS VANE PUMP ASSEMBLY

Remove the 3 bolts.

6. REMOVE PULLEY COVER

Remove the bolt.



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE PS VANE PUMP ROTATING TORQUE

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

Rotating torque:

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

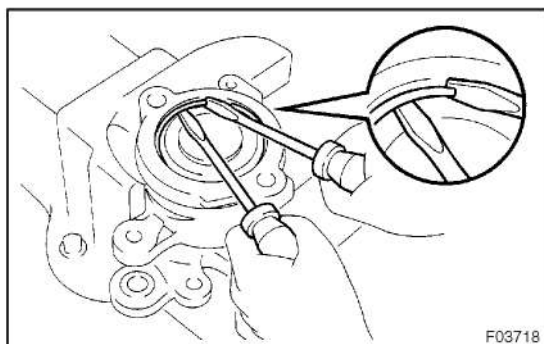
2. REMOVE SUCTION PORT UNION

- Remove the bolt.
- Remove the O-ring from the union.

3. REMOVE PRESSURE PORT UNION

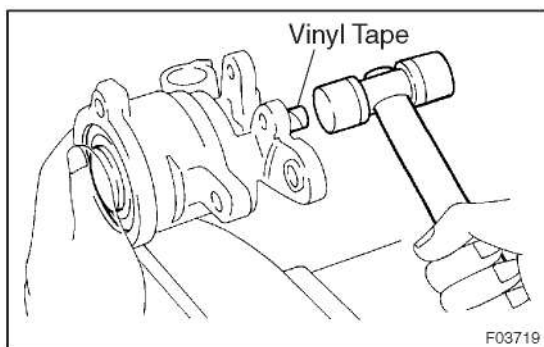
Remove the O-ring from the union.

4. REMOVE FLOW CONTROL VALVE AND SPRING



5. REMOVE REAR HOUSING, WAVE WASHER AND SIDE REAR PLATE

- Using 2 screwdrivers, remove the snap ring.



- To prevent oil seal lip damage, wind vinyl tape on the serrated part of the vane pump shaft.
- Using a plastic hammer, tap out the housing, washer and plate.
- Remove the O-ring from the housing.
- Remove the O-ring from the plate.

6. REMOVE CAM RING AND 10 VANE PLATES

NOTICE:

Be careful not to drop the plate.

7. REMOVE VANE PUMP SHAFT WITH VANE PUMP ROTOR AND SIDE FRONT PLATE

8. REMOVE VANE PUMP ROTOR AND SIDE FRONT PLATE

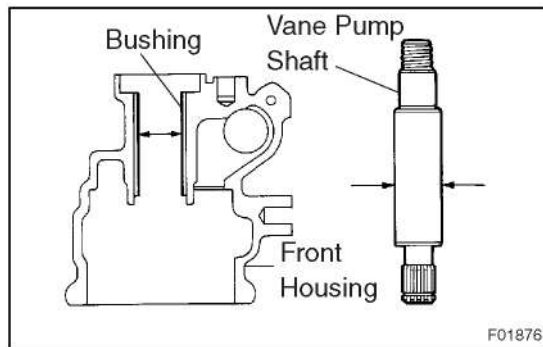
- Using a screwdriver, remove the snap ring from the vane pump shaft.
- Remove the 2 O-rings from the plate.

9. REMOVE SHORTER STRAIGHT PIN

Using pliers, remove the pin from the side front plate.

10. REMOVE LONGER STRAIGHT PIN

Using pliers, remove the pin from the front housing.



INSPECTION

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

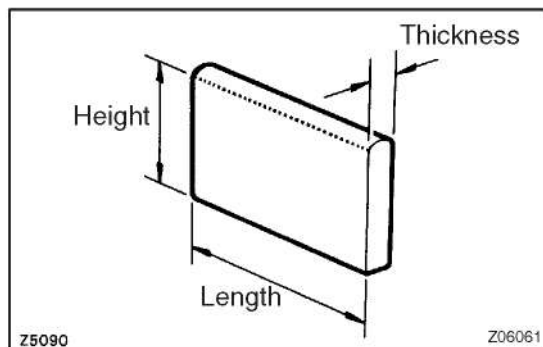
Using a micrometer and caliper gauge, measure the oil clearance.

Standard clearance:

0.01 – 0.03 mm (0.0004 – 0.0012 in.)

Maximum clearance: 0.07 mm (0.0028 in.)

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



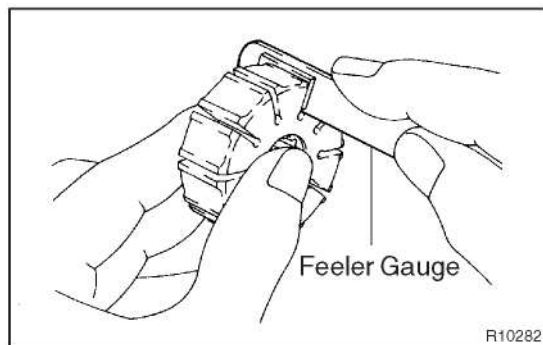
2. INSPECT VANE PUMP ROTOR AND VANE PLATES

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

Minimum height: 8.1 mm (0.319 in.)

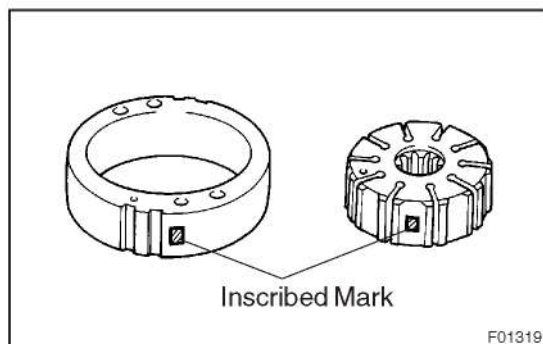
Minimum thickness: 1.797 mm (0.0708 in.)

Minimum length: 14.988 mm (0.5901 in.)



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

Maximum clearance: 0.03 mm (0.0012 in.)



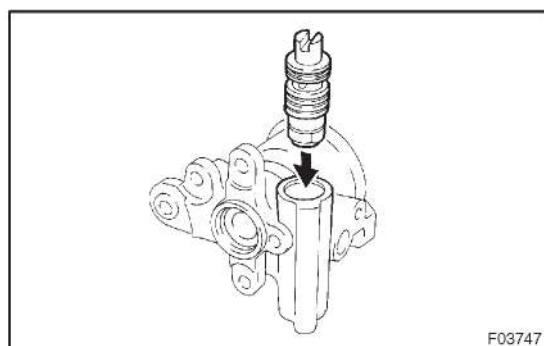
If it is more than the maximum, replace the plate and/or rotor with the one having the same mark stamped on the cam ring.

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

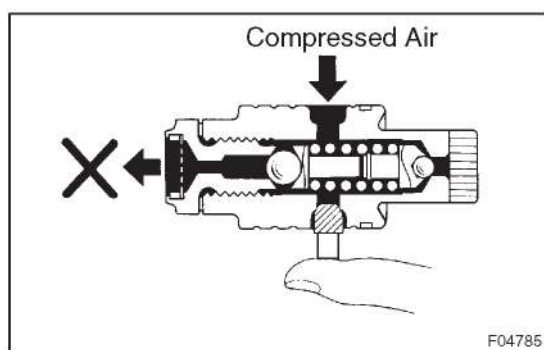
HINT:

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

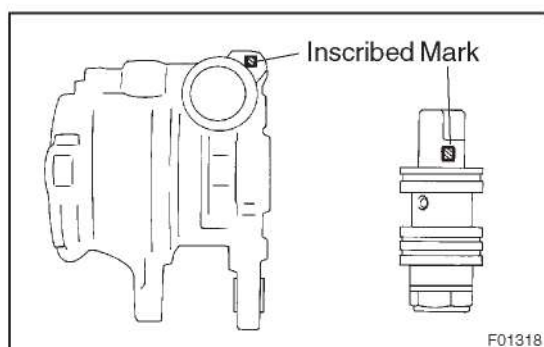
Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345-12010	14.996 – 14.998 (0.59039 – 0.59047)
1	44345-12020	14.994 – 14.996 (0.59032 – 0.59039)
2	44345-12030	14.992 – 14.994 (0.59024 – 0.59032)
3	44345-12040	14.990 – 14.992 (0.59016 – 0.59024)
4	44345-12050	14.988 – 14.990 (0.59008 – 0.59016)

**3. INSPECT FLOW CONTROL VALVE**

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

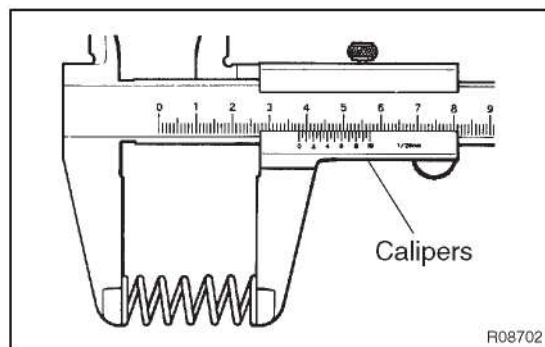


- (b) Check the flow control valve for leakage. Close one of the holes and apply compressed air 392 – 490 kPa (4 – 5 kgf/cm², 57 – 71 psi) into the opposite side hole, and confirm that air does not come out from the end hole.



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

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

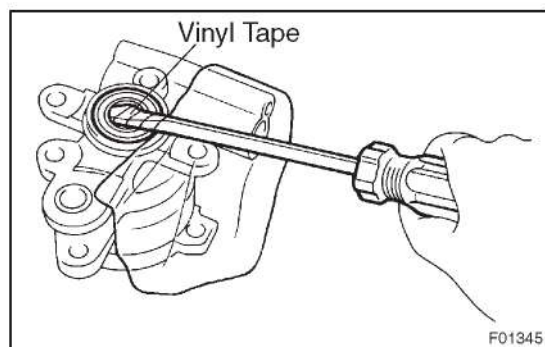


4. INSPECT SPRING

Using calipers, measure the free length of the spring.

Minimum free length: 36.0 mm (1.417 in.)

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

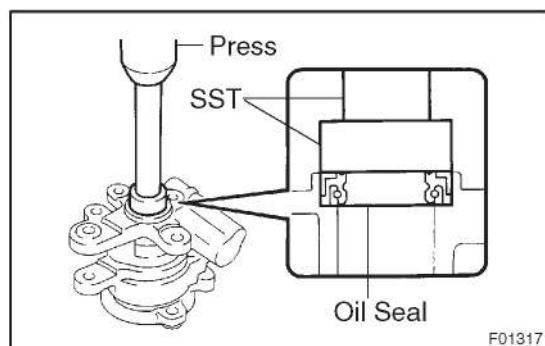


5. IF NECESSARY, REPLACE OIL SEAL

- (a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the front housing.



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

- (c) Using SST and a press, press in the oil seal.

SST 09950-60010 (09951-00310),
09950-70010 (09951-07100)

NOTICE:

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

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT WITH POWER STEERING FLUID
(See page SR-26)

2. INSTALL LONGER STRAIGHT PIN

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

NOTICE:

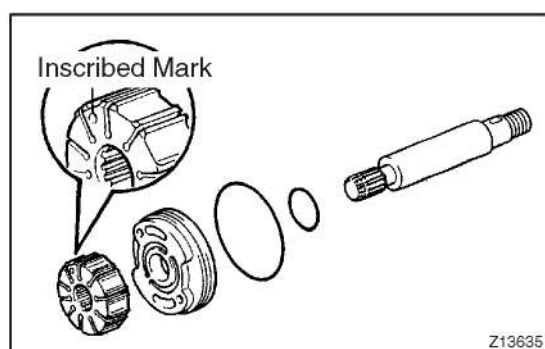
Be careful not to damage the pin.

3. INSTALL SHORTER STRAIGHT PIN

Install a new pin to the side front plate.

NOTICE:

Be careful not to damage the pin.



4. INSTALL SIDE FRONT PLATE AND VANE PUMP ROTOR

- (a) Coat 2 new O-rings with power steering fluid and install them to the plate.
- (b) Install the plate to the pump shaft.

NOTICE:

Make sure to install the plate facing the correct direction.

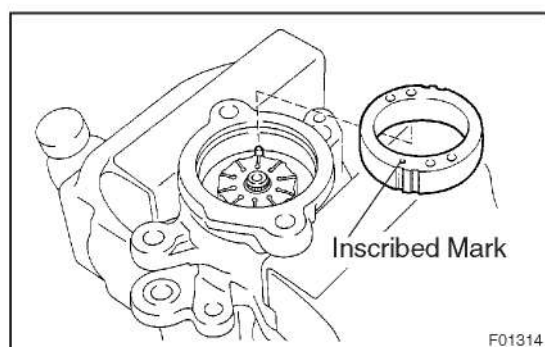
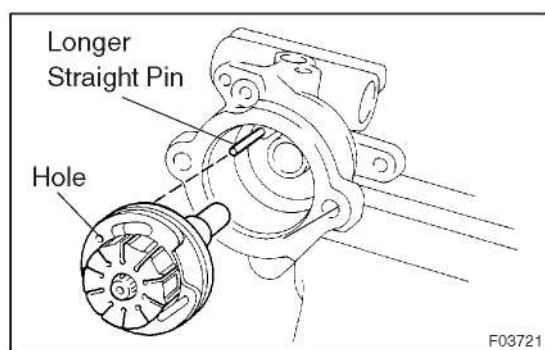
- (c) Install the rotor to the pump shaft with the inscribed mark facing outward.
- (d) Install a new snap ring to the vane pump shaft.

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

Align the hole of the plate and longer straight pin, and tap in the shaft with a plastic hammer.

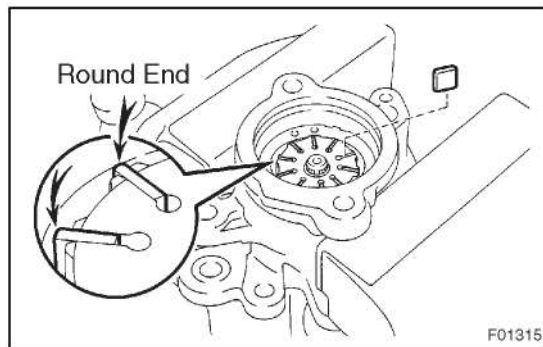
NOTICE:

Be careful not to damage the oil seal and O-rings.



6. INSTALL CAM RING

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

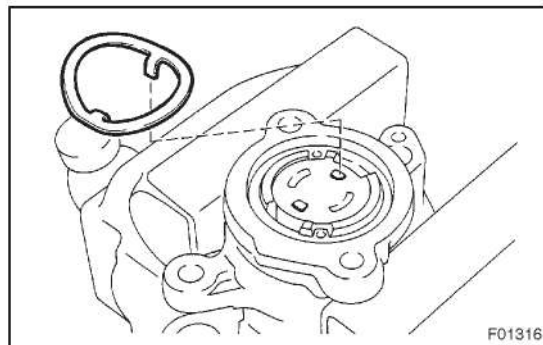


7. INSTALL VANE PLATES

Install the 10 plates with the round end facing outward.

8. INSTALL SIDE REAR PLATE

- Coat a new O-ring with power steering fluid and install it to the plate.
- Align the holes of the plate and 2 straight pins, and install the plate.

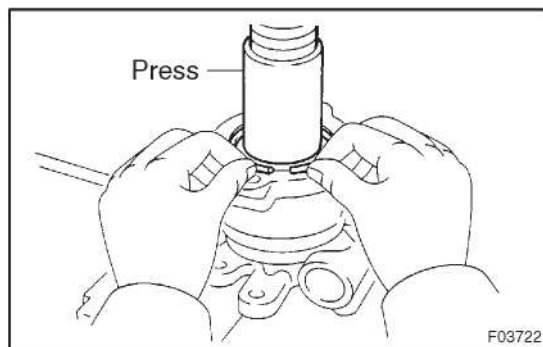


9. INSTALL WAVE WASHER

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

10. INSTALL REAR HOUSING

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



- Install the housing and use a press to push down on the wave washer hard enough to compress it.

NOTICE:

- Do not apply too much pressure.
 - Be careful not to damage the O-ring.
- Install a new snap ring.

11. INSTALL SPRING AND FLOW CONTROL VALVE

Install the valve facing the correct direction.

(See page SR-26)

12. INSTALL PRESSURE PORT UNION

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

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

13. INSTALL SUCTION PORT UNION

- Coat a new O-ring with power steering fluid and install it to the union.
- Torque the bolt.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

14. MEASURE PS VANE PUMP ROTATING TORQUE

(See page SR-29)

INSTALLATION

1. INSTALL PULLEY COVER

Torque the bolt.

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

2. INSTALL PS VANE PUMP ASSEMBLY

Torque the 3 bolts.

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

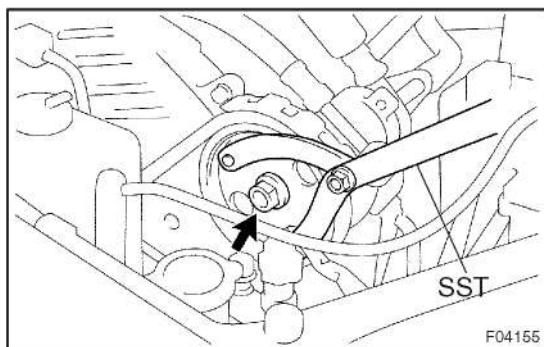
3. CONNECT PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

Torque: 52 N·m (525 kgf·cm, 38 ft·lbf)

4. CONNECT RETURN HOSE

Connect the hose with the clip.



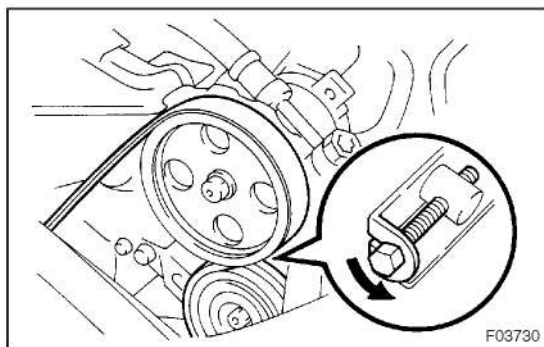
5. INSTALL VANE PUMP PULLEY

- (a) Install the woodruff key to the vane pump shaft.
- (b) Using SST to stop the pulley rotating, torque the nut.
SST 09960-10010 (09962-01000, 09963-01000)

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

6. INSTALL DRIVE BELT

- (a) Install the drive belt to the pulley.



- (b) Adjust drive belt tension with the belt tension adjusting bolt.

(See page SR-3)

- (c) Torque the idler pulley set nut.

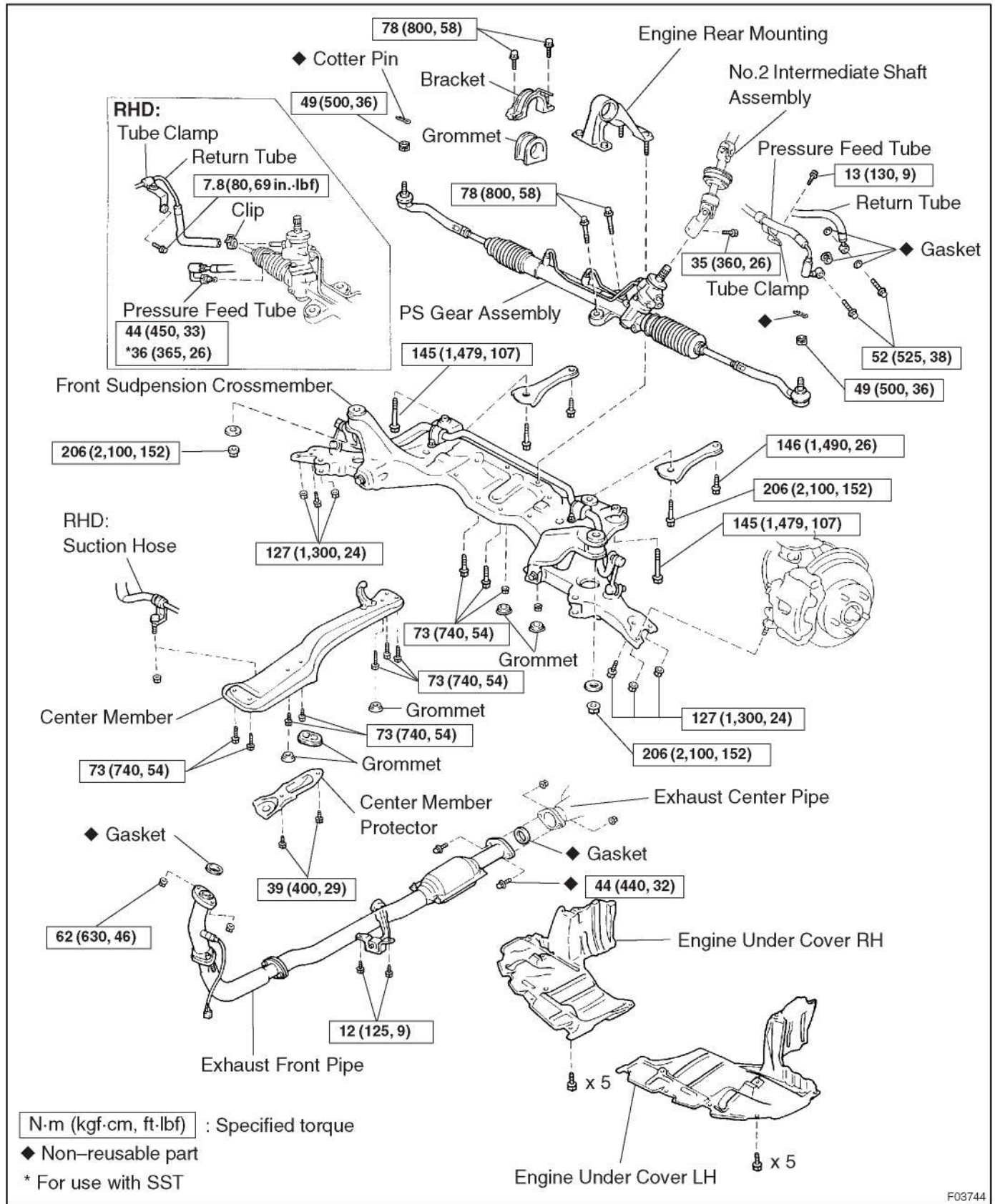
Torque: 38 N·m (390 kgf·cm, 28 ft·lbf)

7. BLEED POWER STEERING SYSTEM

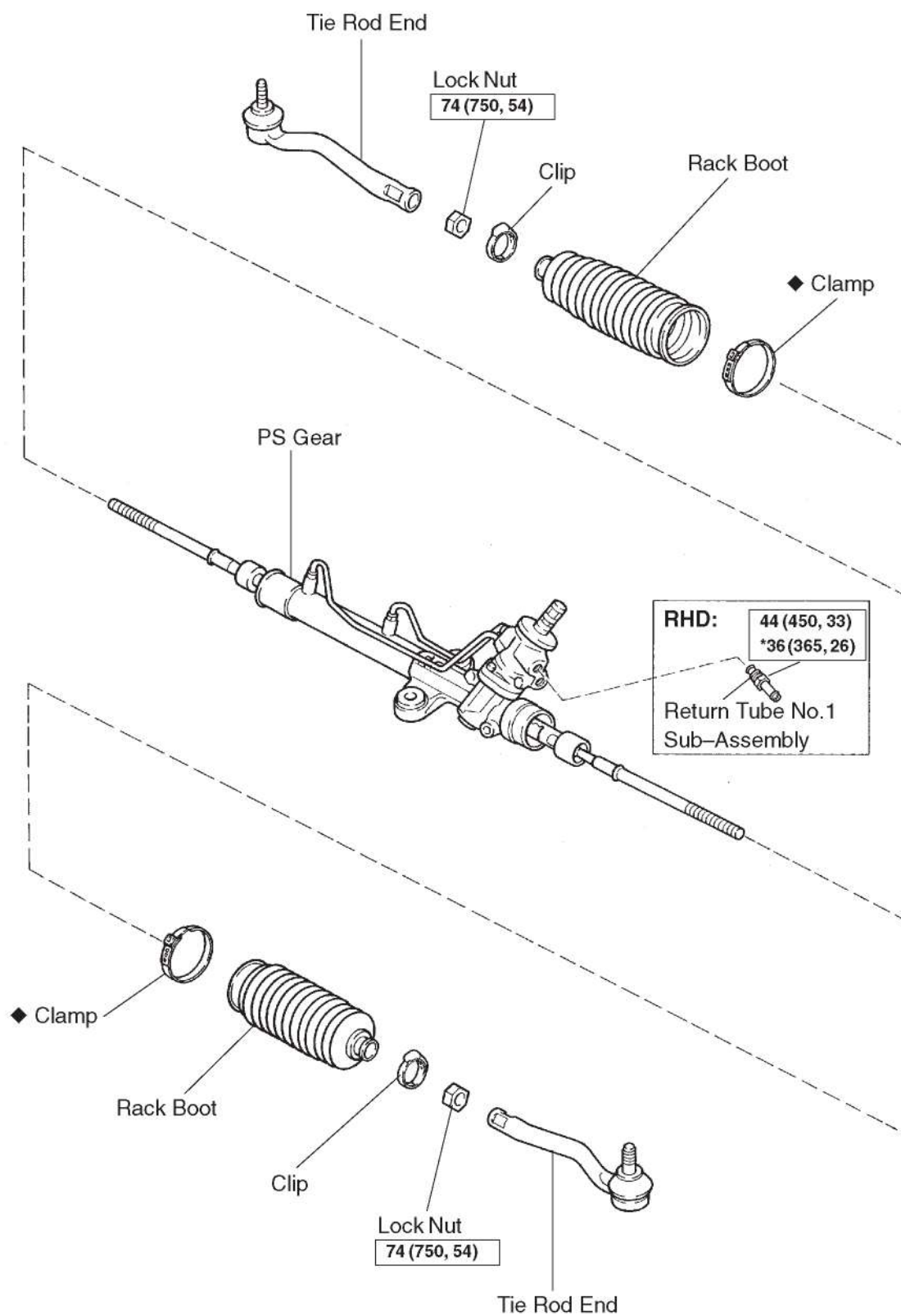
(See page SR-5)

POWER STEERING GEAR COMPONENTS

SR01T-01



F03744



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

◆ Non-reusable part

* For use with SST

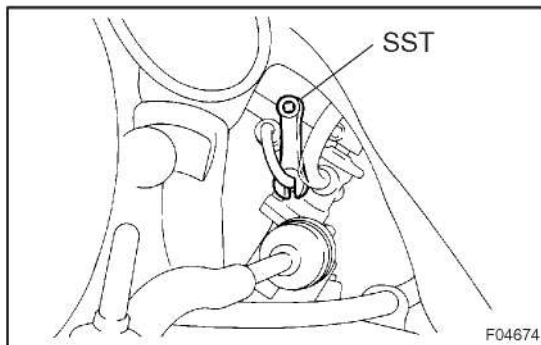
REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD
2. REMOVE STEERING WHEEL PAD
(See page SR-13)
3. REMOVE STEERING WHEEL
(See page SR-13)
4. REMOVE RH AND LH ENGINE UNDER COVERS
Remove 10 bolts.

5. DISCONNECT RH AND LH TIE ROD ENDS
(See page SA-11)

6. REMOVE EXHAUST FRONT PIPE
 - (a) Disconnect the oxygen sensor connector.
 - (b) Remove the 2 nut and gasket.
 - (c) Remove the 2 bolts with the exhaust front pipe support bracket.
 - (d) Remove the 2 bolts, 2 nuts, gasket and exhaust front pipe.

7. DISCONNECT YOKE
(See page SR-13)



8. LHD:
DISCONNECT PRESSURE FEED AND RETURN TUBES

- (a) Pressure feed tube:
Remove the union bolt and gasket.
- (b) Return tube:
Remove the union bolt and 2 gaskets.

9. RHD:
DISCONNECT PRESSURE FEED TUBE

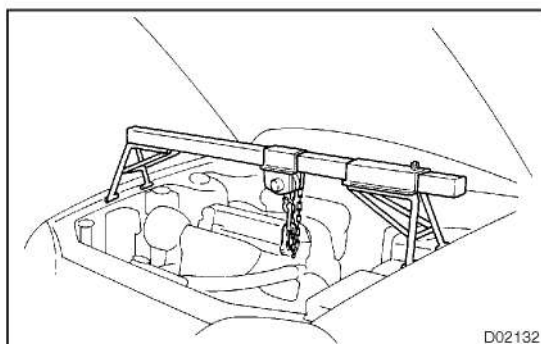
Using SST, disconnect the tube.

SST 09631-22020

10. RHD:
DISCONNECT RETURN TUBE

Remove the clip and disconnect the hose.

11. DISCONNECT TUBE CLAMP BRACKET
Remove the bolt.



12. SUPPORT ENGINE

Using an engine support fixture, support the engine.

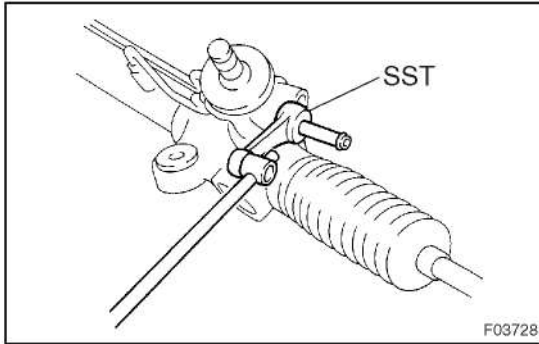
13. **DISCONNECT RH AND LH LOWER SUSPENSION ARM FROM LOWER BALL JOINT**
(See page SA-38)

14. **REMOVE CENTER MEMBER AND FRONT SUSPENSION CROSSMEMBER**
(See page SA-38)

15. **REMOVE PS GEAR ASSEMBLY**

Remove 4 gear assembly set bolts and washers from the front suspension crossmember.

16. **REMOVE BRACKET AND GROMMET**



DISASSEMBLY

NOTICE:

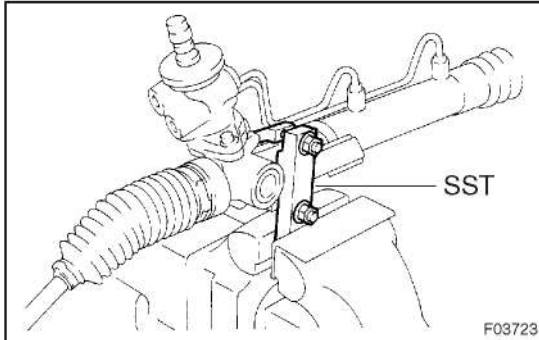
When using a vise, do not overtighten it.

1. RHD:

REMOVE RETURN TUBE NO.1 SUB-ASSEMBLY

Using SST, remove the tube.

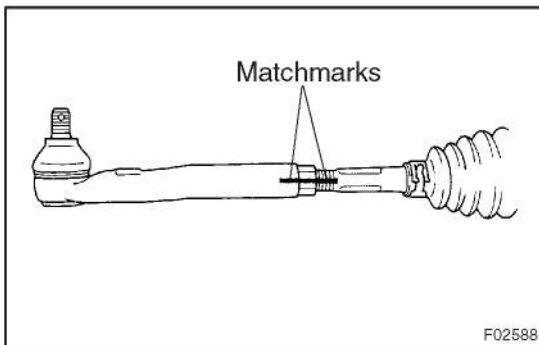
SST 09631-22020



2. SECURE PS GEAR ASSEMBLY IN VISE

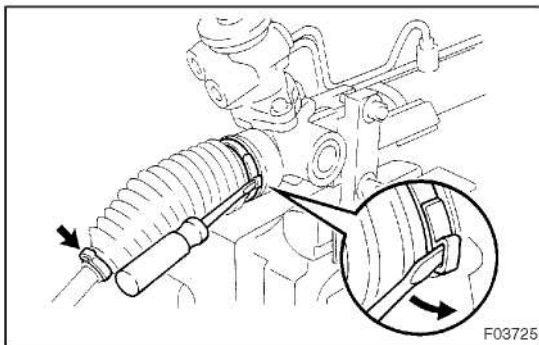
Using SST, secure the gear assembly in a vise, as shown in the illustration.

SST 09612-00012



3. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

Place matchmarks on the tie rod end and rack end.



4. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

Using a screwdriver, loosen the clamp, as shown in the illustration.

NOTICE:

- Be careful not to damage the boot.
- Mark the RH and LH boots.

REASSEMBLY

NOTICE:

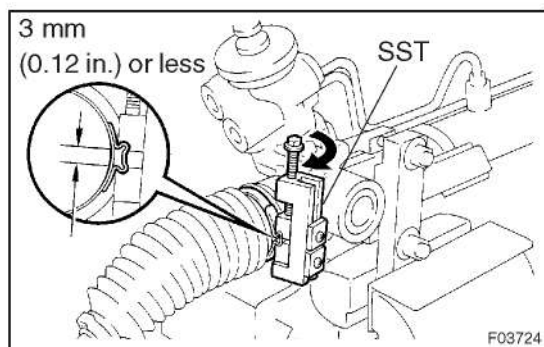
When using a vise, do not overtighten it.

1. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

- (a) Install the boot.

NOTICE:

Be careful not to damage or twist the boot.



- (b) Using SST tighten a new clamp, as shown in the illustration.

SST 09521-24010

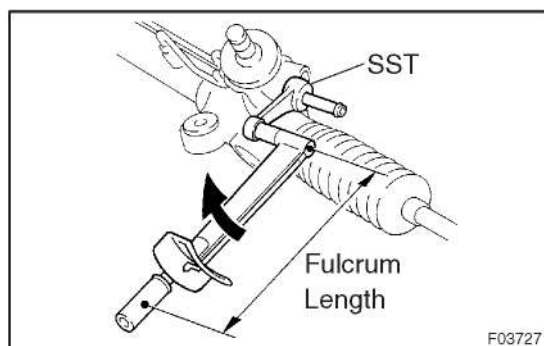
2. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

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

- (b) After adjusting toe-in, torque the nut.

(See page SA-4)

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



3. RHD:

INSTALL RETURN TUBE NO.1 SUB-ASSEMBLY

- (a) Using SST install the tube.

SST 09631-22020

Torque: 36 N·m (365 kgf·cm, 26 ft·lbf)

HINT:

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

INSTALLATION

1. INSTALL BRACKET AND GROMMET

2. INSTALL PS GEAR ASSEMBLY

Torque the 4 gear assembly set bolts and washers to the front suspension cross member.

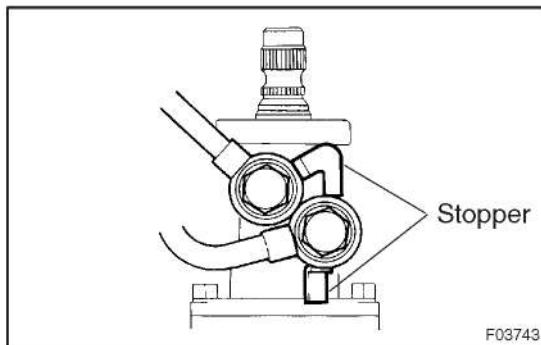
Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

3. INSTALL CENTER MEMBER AND FRONT SUSPENSION CROSSMEMBER

(See page SA-38)

4. CONNECT RH AND LH LOWER SUSPENSION ARM TO LOWER BALL JOINT

(See page SA-38)



5. LHD:

CONNECT PRESSURE FEED AND RETURN TUBES

(a) Pressure feed tube:

Torque the union bolt with a new gasket.

Torque: 52 N·m (525 kgf·cm, 38 ft·lbf)

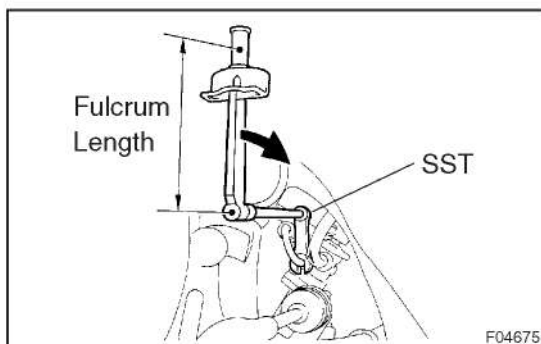
(b) Return tube:

Torque the union bolt with a new gasket on each side of the tube.

Torque: 52 N·m (525 kgf·cm, 38 ft·lbf)

HINT:

Make sure that the tube touches the stopper of the PS gear as shown in the illustration, then torque the union bolt.



6. RHD:

CONNECT PRESSURE FEED TUBE

Using SST, connect the tube.

SST 09631-22020

Torque: 36 N·m (365 kgf·cm, 26 ft·lbf)

HINT:

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

7. RHD:**CONNECT RETURN TUBE**

Connect the hose with the clip.

8. CONNECT TUBE CLAMP BRACKET

Torque the bolt.

LHD:

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

RHD:

Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

9. CONNECT YOKE

(See page SR-18)

10. INSTALL EXHAUST FRONT PIPE

(a) Install the 2 nuts with a new gasket.

Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

(b) Install the 2 bolts with the exhaust front pipe support bracket.

Torque: 12 N·m (125 kgf·cm, 9 ft·lbf)

(c) Install the 2 bolts, 2 new nuts with a new gasket.

Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

(d) Connect the oxygen sensor connector.

11. CONNECT RH AND LH TIE ROD ENDS

(See page SA-11)

12. INSTALL RH AND LH ENGINE UNDER COVERS

Tighten the 10 bolts.

13. PLACE FRONT WHEELS FACING STRAIGHT AHEAD**HINT:**

Do it with the front of the vehicle jacked up.

14. CENTER SPIRAL CABLE

(See page SR-18)

15. INSTALL STEERING WHEEL

(a) Align the matchmarks on the wheel and steering column main shaft.

(b) Temporarily tighten the wheel set nut.

(c) Connect the connector.

16. BLEED POWER STEERING SYSTEM

(See page SR-5)

17. CHECK STEERING WHEEL CENTER POINT**18. TORQUE STEERING WHEEL SET NUT**

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

19. INSTALL STEERING WHEEL PAD

(See page SR-18)

20. CHECK FRONT WHEEL ALIGNMENT

(See page SA-4)