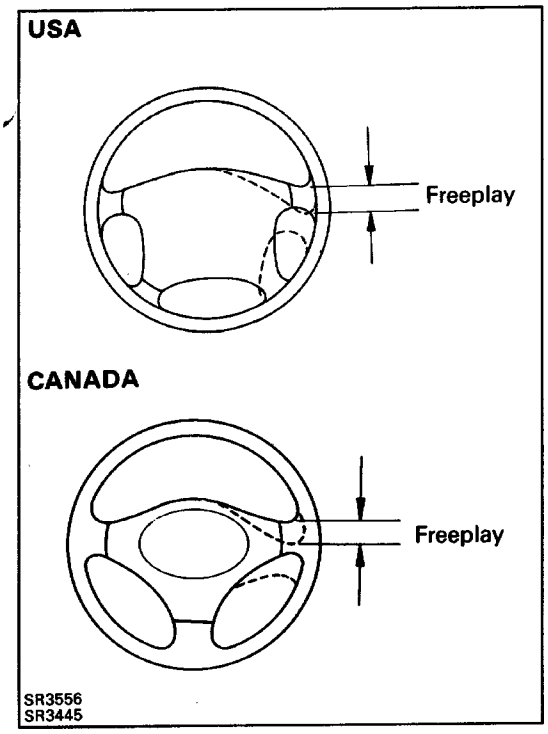
# STEERING

# PRECAUTIONS

- Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- (USA)
  The steering wheel pad has an airbag built in, so take all due precautions when handling it. For more details, see the SRS AIRBAG section.

# TROUBLESHOOTING

| Problem | Possible cause | Remedy | Page |
|---|---|---|---|
| Hard steering | Tires improperly inflated | Inflate tires to proper pressure | SA–3 |
| | Insufficient lubricant | Lubricate suspension and steering linkage | |
| | Excessive caster | Check front wheel alignment | SA–4 |
| | Steering system joint worn | Replace steering system joints | SR–74 |
| | Lower arm ball joints worn | Replace lower arm ball joints | SA–8 |
| | Steering column binding | Inspect steering column | SR–4 |
| | Steering gear out of adjustment or broken | Adjust or repair steering gear | SR–74 |
| | Power steering belt loose | Adjust belt | SR–38 |
| | Fluid level in reservoir low | Check reservoir | SR–38 |
| | Power steering unit faulty | Check power steering unit | SR–38 |
| Poor return | Tires improperly inflated | Inflate tires to proper pressure | SA–3 |
| | Insufficient lubricant | Lubricate suspension and steering linkage | |
| | Wheel alignment incorrect | Check front wheel alignment | SA–4 |
| | Steering column binding | Inspect steering column | SR–4 |
| | Steering gear out of adjustment or broken | Adjust or repair steering gear | SR–74 |
| Excessive play | Front wheel bearing worn | Replace front wheel bearing | SA–8 |
| | Main shaft yoke or intermediate shaft yoke worn | Replace main shaft or intermediate shaft | SR–4 |
| | Lower arm ball joints worn | Replace lower arm ball joints | SA–8 |
| | Steering system joints worn | Replace steering system joint | SR–74 |
| | Steering gear out of adjustment or broken | Adjust or repair steering gear | SR–74 |
| Abnormal noise | Steering linkage loose | Tighten steering linkage | |
| | Steering system joints worn | Replace steering system joints | SR–74 |
| | Steering gear out of adjustment or broken | Adjust or repair steering gear | SR–74 |




# ON–VEHICLE INSPECTION

## CHECK THAT STEERING WHEEL FREEPLAY IS CORRECT

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

Freeplay should not exceed the maximum.

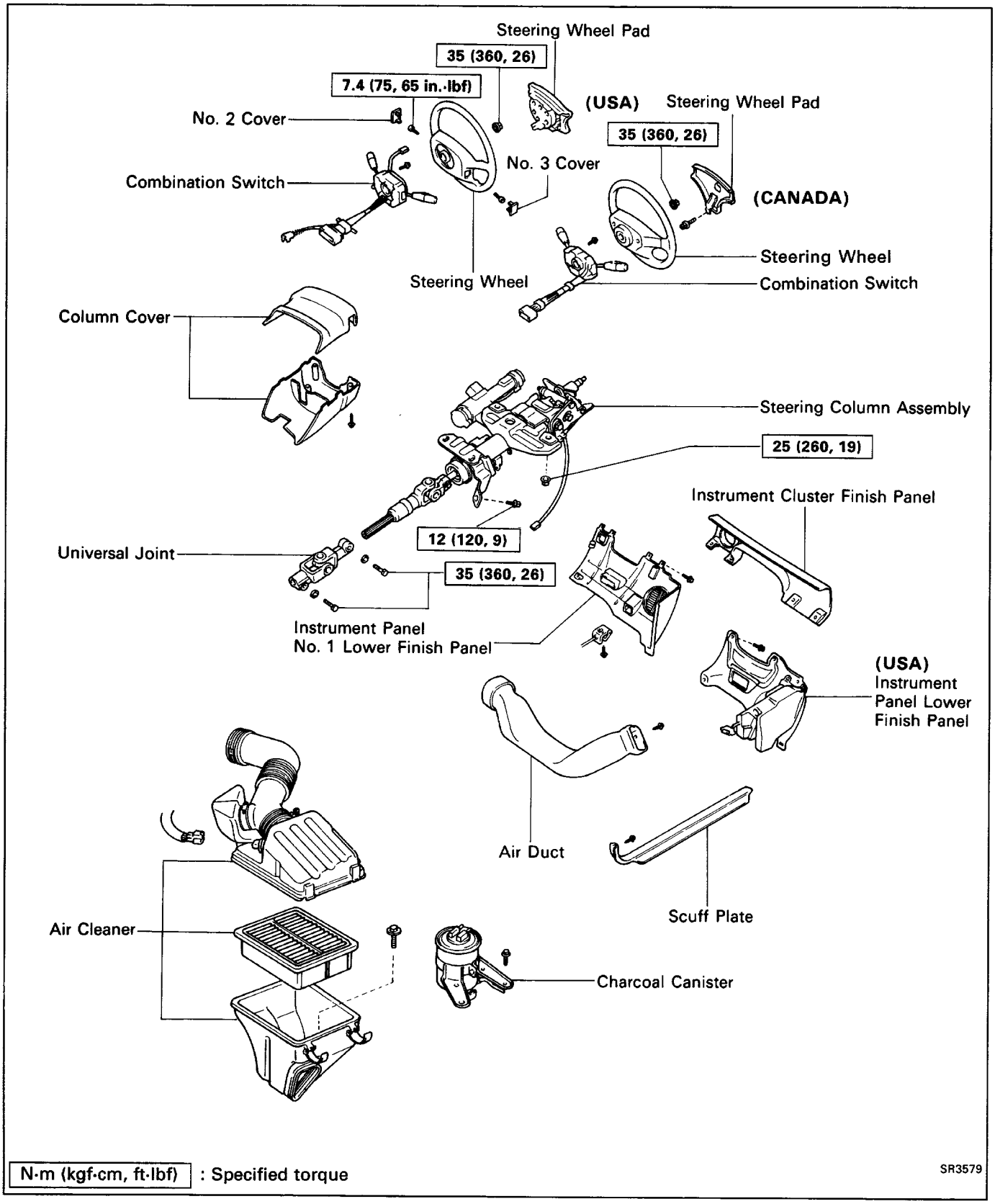
**Maximum freeplay: 30 mm (1.18 in.)**

If incorrect, repair.

# STEERING COLUMN

## REMOVAL AND INSTALLATION OF STEERING COLUMN

Remove and install the parts as shown.



# (MAIN POINTS OF REMOVAL AND INSTALLATION)
# (USA)

**CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected from the battery (See page AB–2).**

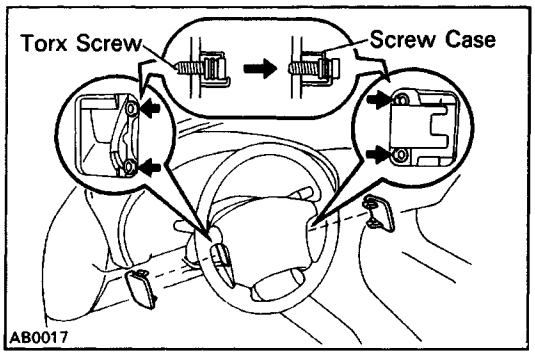
**NOTICE: If the wiring connector of the airbag system is disconnected with the ignition switch at ON or ACC, diagnostic codes will be recorded.**

**REMOVE STEERING WHEEL PAD**

(a) Remove negative terminal (–) from the battery.
(b) Place the front wheels facing straight ahead.
(c) Using a torx wrench, loosen the four screws.

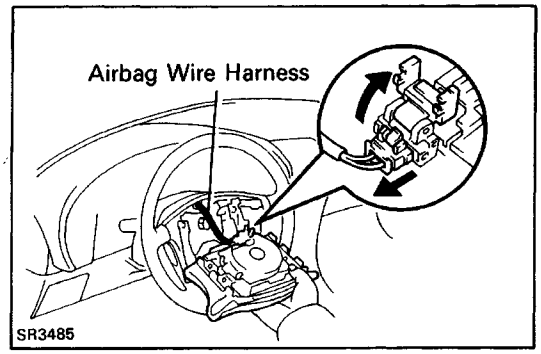
Torx wrench: T30 (Part No.. 09042–00010 or locally manufactured tool)

(d) Loosen the torx screws until the groove along the screw circumference catches on the screw case.
(e) Pull the wheel pad out from the steering wheel and disconnect the airbag connector.




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

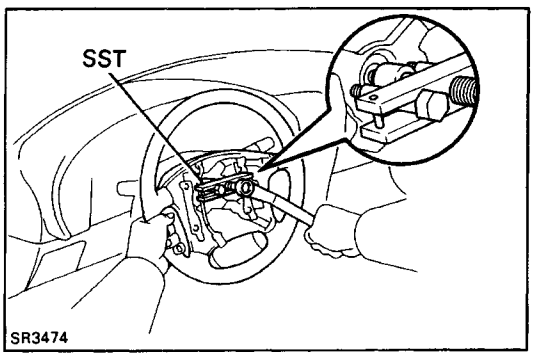
**CAUTION: When storing the wheel pad, keep the upper surface of the pad facing upward.**




**2. REMOVE STEERING WHEEL**

(a) Disconnect the connector.
(b) Remove the set nut.
(c) Using SST, remove the steering wheel.

SST 09213–31021

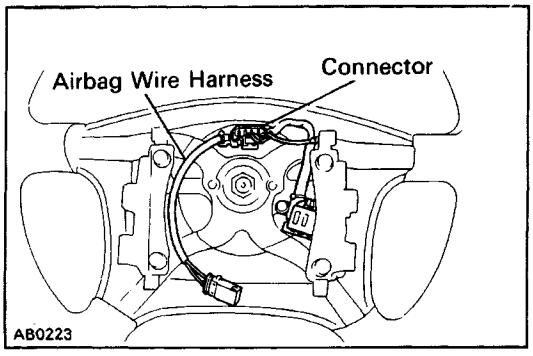


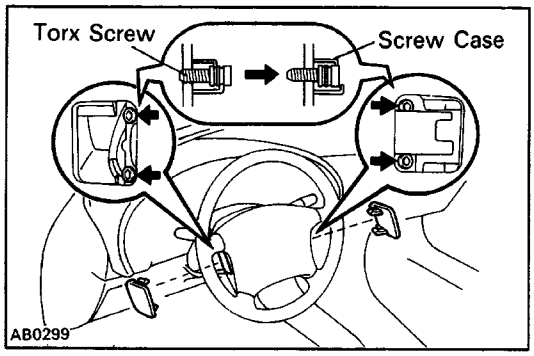

**3. INSTALL STEERING WHEEL AND WHEEL PAD**

(a) Check that the front wheels are facing straight ahead.
(b) Center the spiral cable.
(See page AB–16)
(c) Install the steering wheel and torque the set nut.

**Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)**

(d) Connect the connector.






(e) Install the wheel pad after confirming that the circumference groove of the torx screws is caught on the screw case.

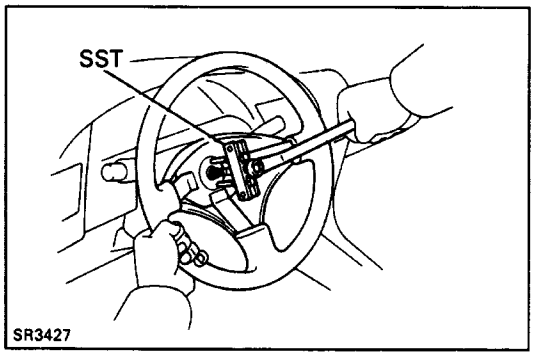
(f) Using a torx wrench, tighten the four screws.

**Torque: 7 N–m (75 kgf–cm, 65 in.–lbf)**

**NOTICE:**

- Make sure the wheel pad is installed to the specified torque.
- If the wheel pad has been dropped, or there are cracks, dents or other defects in the case or connec–tor, 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 are not pinched between other parts.

**4. CHECK STEERING WHEEL CENTER POINT AFTER INSTALLING STEERING COLUMN**




# (CANADA)

**9. REMOVE STEERING WHEEL**

(a) Remove a screw and the steering wheel pad.

(b) Remove the steering wheel nut.

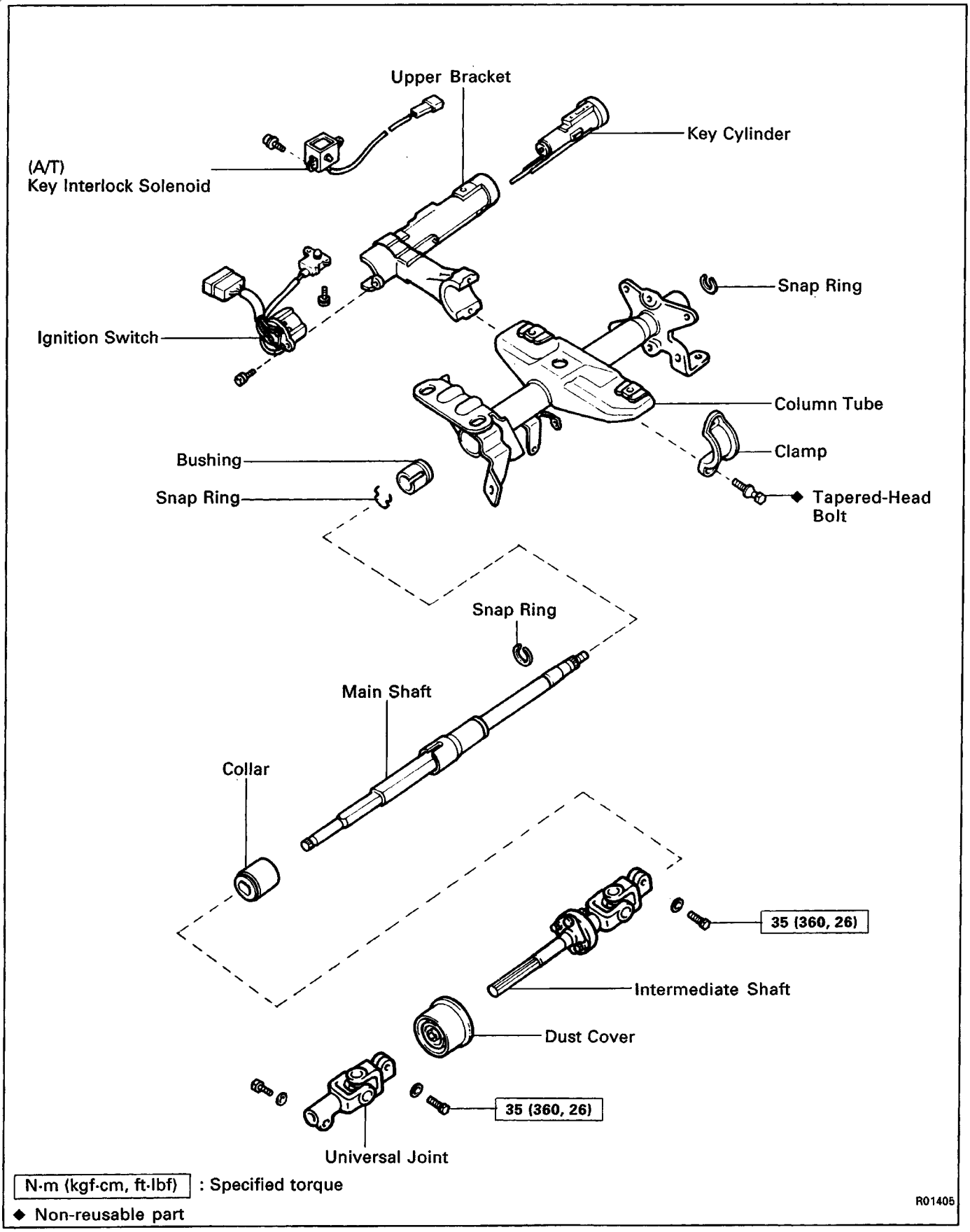
(c) Using SST, remove the steering wheel.

SST 09609–20011

**2. CHECK STEERING WHEEL CENTER POINT AFTER INSTALLING STEERING COLUMN**

# Non–Tilt Steering Column

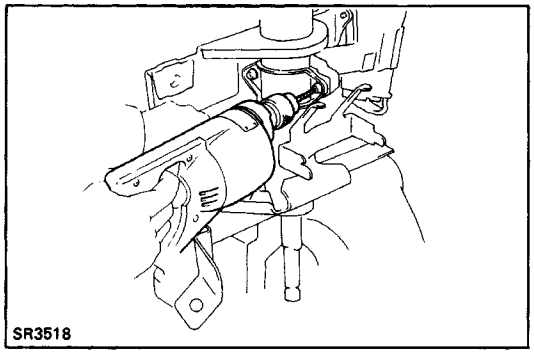
## COMPONENTS

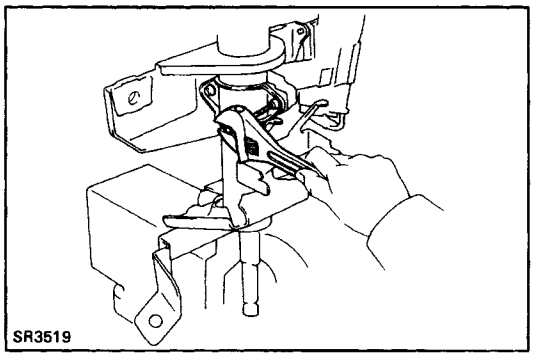



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

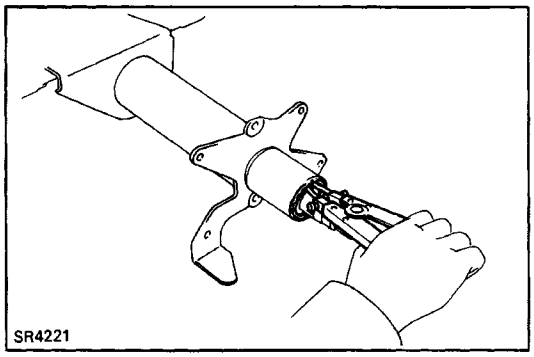
R01405


SR3518

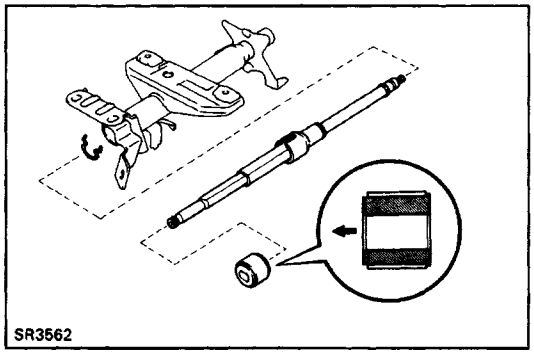

SR3519

## DISASSEMBLY OF STEERING COLUMN

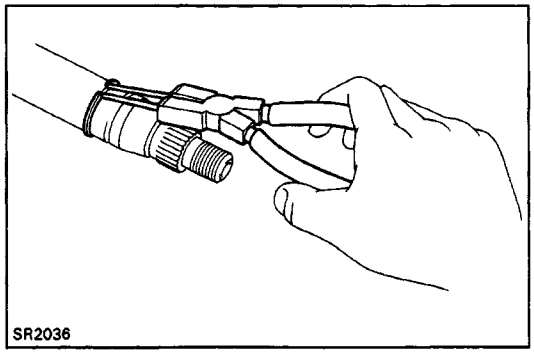
1. **REMOVE INTERMEDIATE SHAFT**
2. **REMOVE DUST COVER**
3. **REMOVE UPPER BRACKET**
   (a) Using a centering punch, mark the center of the tapered–head bolts.
   (b) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill into the tapered–head bolts.
   (c) Using a screw extractor, remove the tapered–head bolts.
   (d) Remove the two bolts and separate the upper bracket and column tube.


SR4221

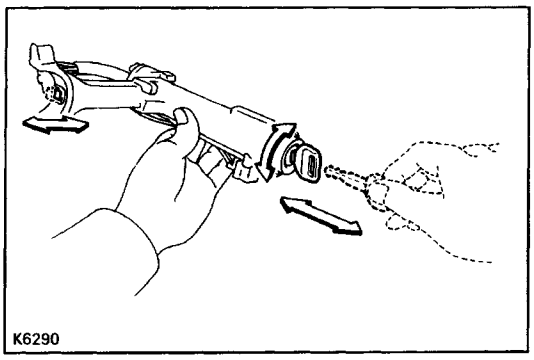
4. **PULL OUT MAIN SHAFT**
   (a) Using snap ring pliers, remove the snap ring.


SR3562

   (b) Remove the lower snap ring.
   (c) Pull out the main shaft from the column tube.
   (d) Remove the collar from the main shaft.


SR2036

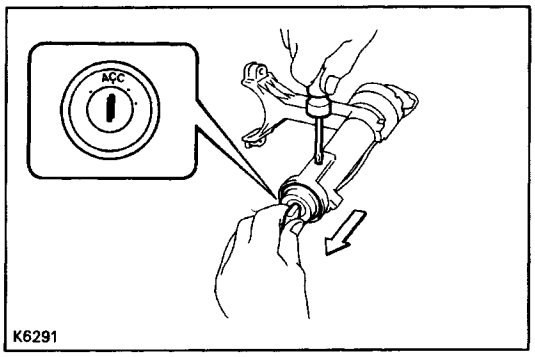
   (e) Using snap ring pliers, remove the snap ring.




# INSPECTION AND REPLACEMENT OF STEERING COLUMN

**1. INSPECT UPPER BRACKET**

Check that the steering lock mechanism operates properly.

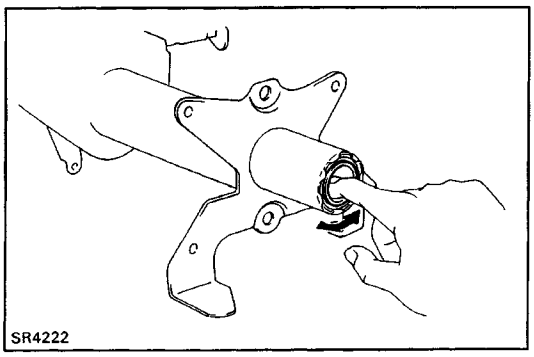



**2. IF NECESSARY, REPLACE IGNITION KEY CYLINDER**

(a) Place the ignition key at the ACC position.

(b) Push down the stop pin with a thin rod, and pull out the key cylinder.

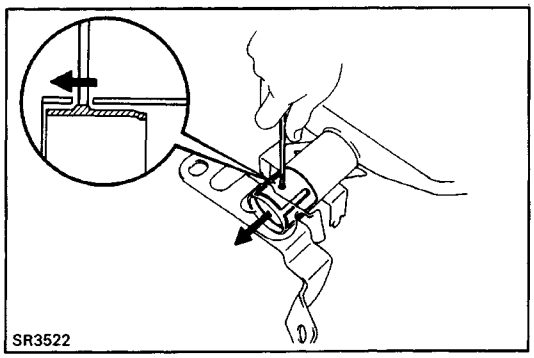
(c) Turn the ignition key to the ACC position, and install a new key cylinder into the upper bracket.




**3. INSPECT UPPER BEARING**

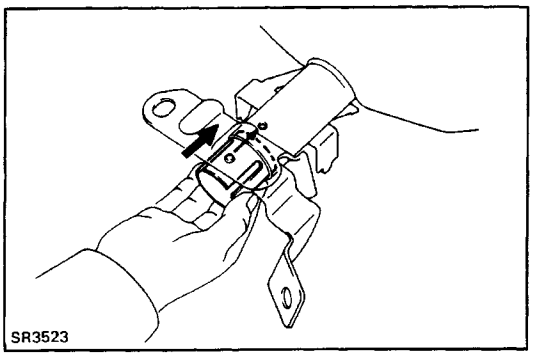
Check the upper bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the column tube assembly.




**4. IF NECESSARY, REPLACE BUSHING**

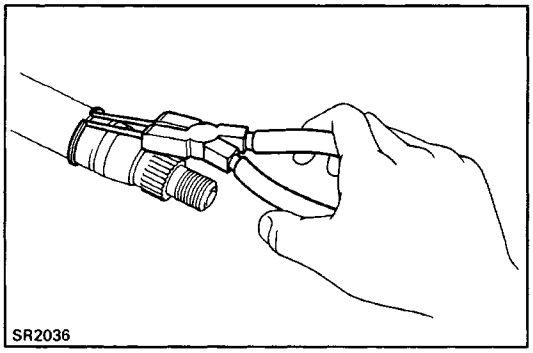
(a) Using a screwdriver, remove the bushing.




(b) Align the holes of the tube and the projections of a new. bushing, and install the bushing to the column tube.

**5. INSPECT KEY INTERLOCK SOLENOID**

**(See page AT–182)**

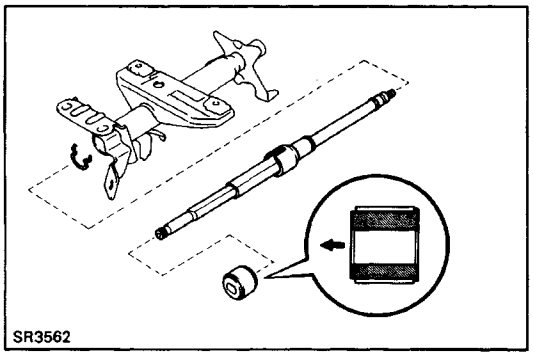

SR2036

# ASSEMBLY OF STEERING COLUMN

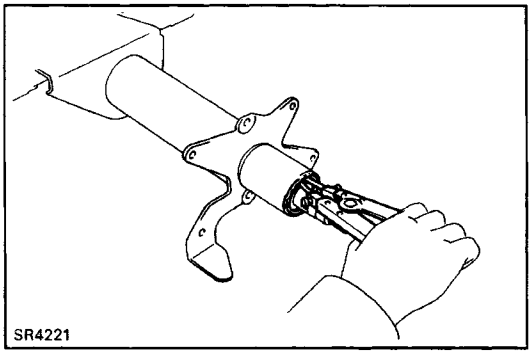
**(See page SR–7)**

**1. INSTALL MAIN SHAFT TO COLUMN TUBE**

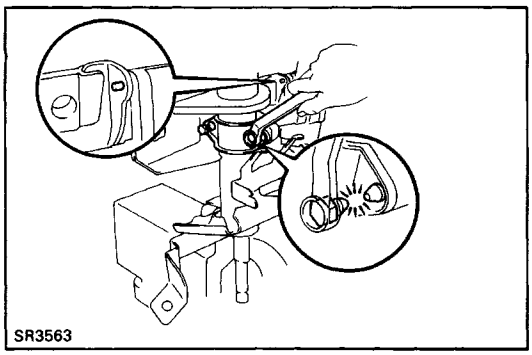
(a) Using snap ring pliers, install the snap ring in the lower groove of the main shaft.


SR3562

(b) Install the collar to the main shaft.
(c) Install the main shaft in the column tube.
(d) Install the lower snap ring.


SR4221

(e) Using snap ring pliers, install the upper snap ring.

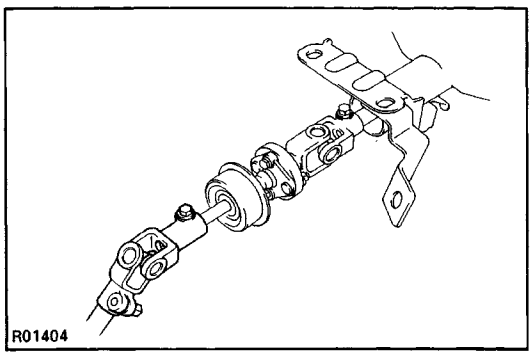

SR3563

**2. INSTALL UPPER BRACKET TO COLUMN TUBE**

(a) Install the upper bracket with two new taperedhead bolts.

HINT: Install the upper bracket pin into the column tube hole.

(b) Tighten the tapered–head bolts until the bolt heads break off.

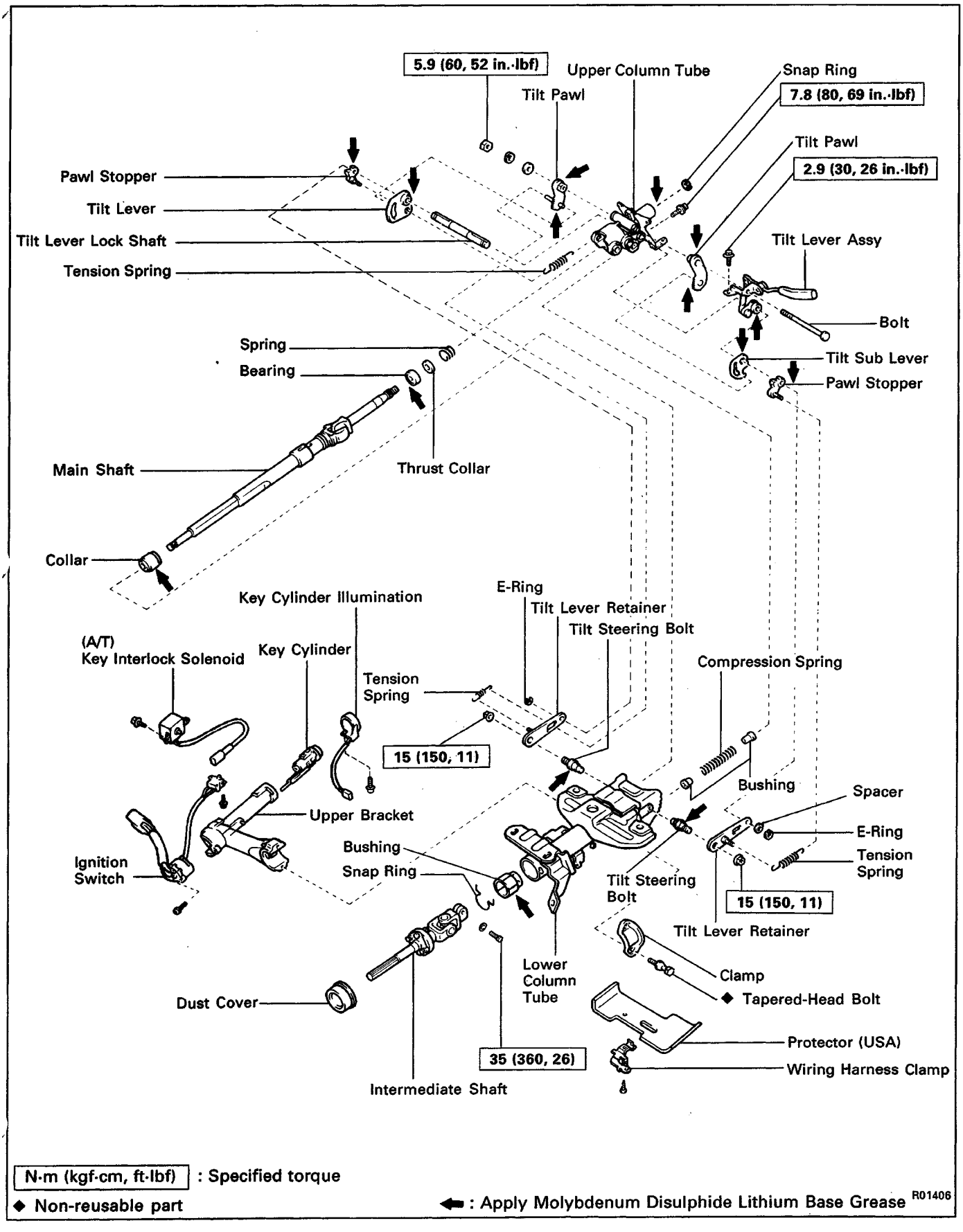

R01404

**3. INSTALL INTERMEDIATE SHAFT**

**Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)**

# Tilt Steering Column

## COMPONENTS

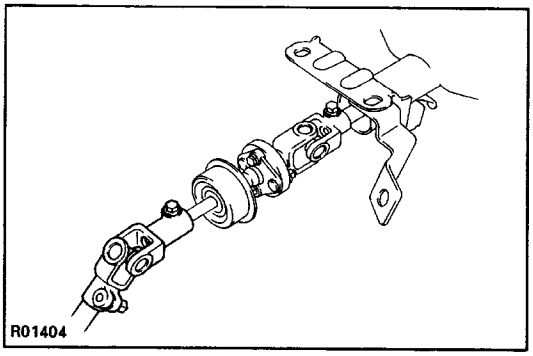



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

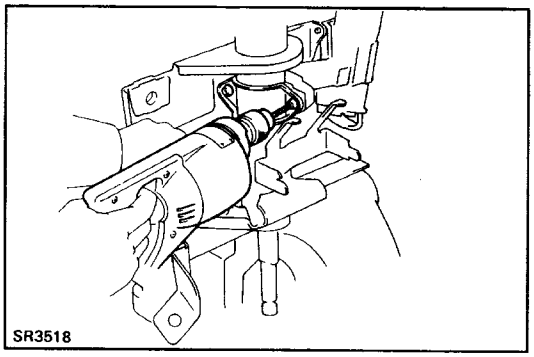
⬅ : Apply Molybdenum Disulphide Lithium Base Grease

R01406

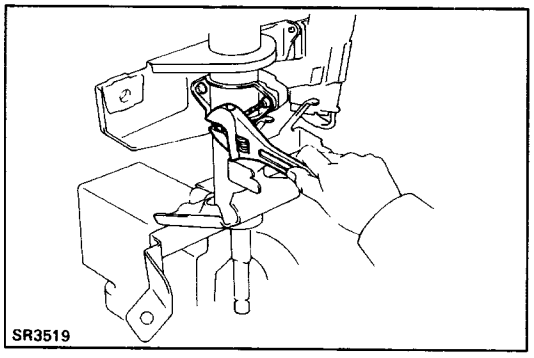



## DISASSEMBLY OF STEERING COLUMN

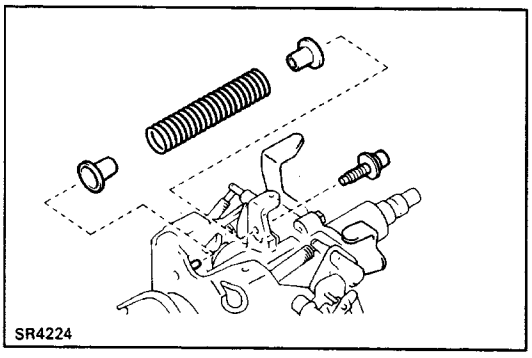
1. **(5S–FE ENGINE)**
   **REMOVE IGNITION KEY CYLINDER ILLUMINATION**
2. **REMOVE INTERMEDIATE SHAFT**
3. **REMOVE WIRING HARNESS CLAMP**
4. **(USA)**
   **REMOVE PROTECTOR**



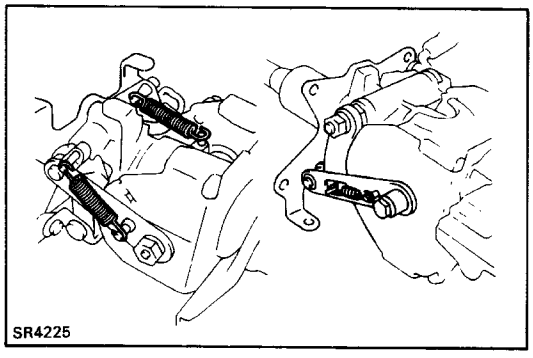

5. **REMOVE UPPER BRACKET**
   (a) Using a centering punch, mark the center of the tapered–head bolts.
   (b) Using a 3–4 mm (0.12–0.16 in.) drill, drill into the tapered–head bolts.



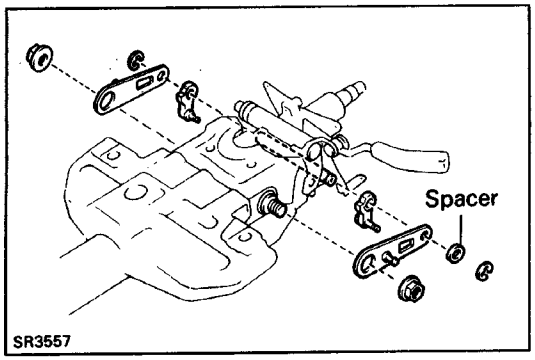

   (c) Using a screw extractor, remove the tapered–head bolts.
   (d) Remove the two bolts, and separate the upper bracket and the column tube.




6. **REMOVE COMPRESSION SPRING**
   (a) Using a torx wrench, remove the bolt and spring.
   Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)
   (b) Remove the two bushings from the spring.

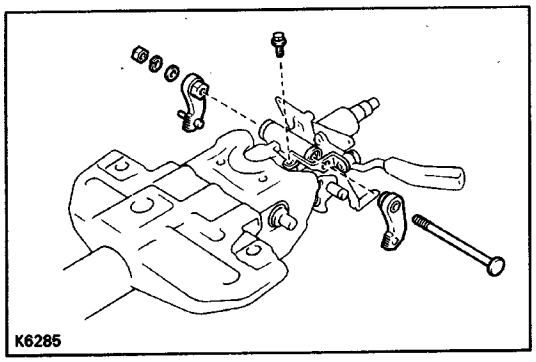



7. **REMOVE THREE TENSION SPRINGS**



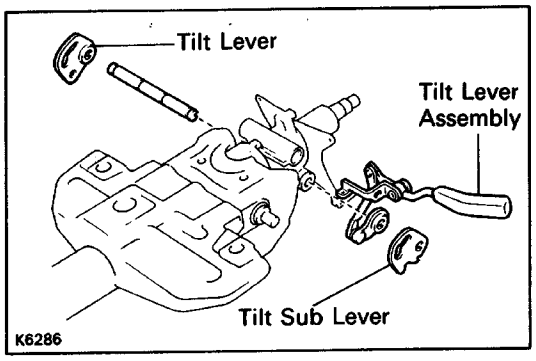

**8. REMOVE TILT LEVER RETAINERS AND PAWL STOPPERS**

(a) Remove the two E–rings from the tilt lever lock shaft.
(b) Remove the spacer.
(c) Remove the two nuts from the tilt steering bolts.
(d) Remove the two tilt lever retainers and two pawl stoppers.



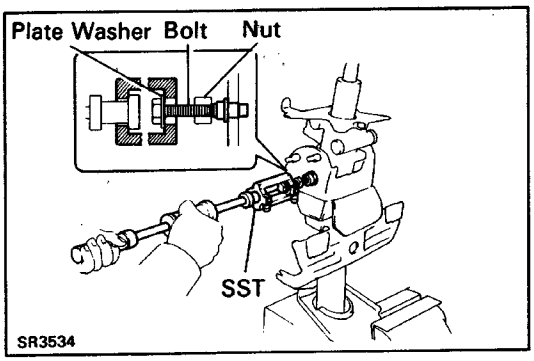

**9. REMOVE TILT PAWLS**

(a) Remove the nut and two washers.
(b) Pull out the bolt.
(c) Remove the tilt *lever assembly installation bolt.
(d) Remove the two tilt pawls.



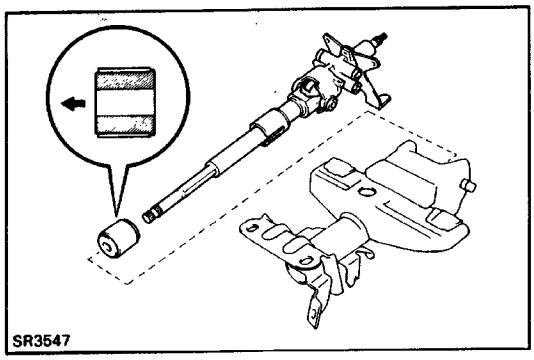

**10. REMOVE TILT LEVER, TILT SUB LEVER, TILT LEVER ASSEMBLY AND TILT LEVER LOCK SHAFT**

(a) Remove the tilt lever, tilt sub lever and tilt lever assembly from the tilt lever lock shaft.
(b) Pull out the tilt lever lock shaft.

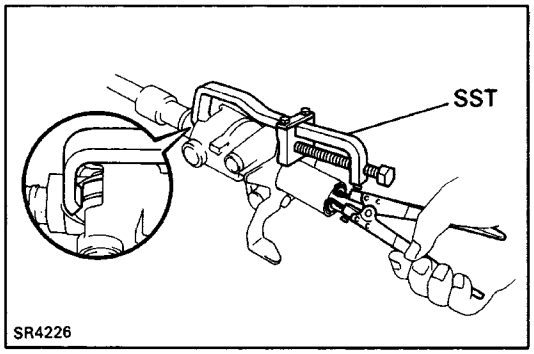



**17. REMOVE UPPER COLUMN TUBE**

(a) Set SST, the nut (10 mm diameter, 1.25 mm pitch), plate washer (36 mm outer diameter) and bolt (10 mm diameter, 1.25 mm pitch, 50 mm length) as shown.
And then remove the two tilt steering bolts.
SST 09910–00015 (09911–00011, 09912–00010)
(Reference) Nut 90170–10004
Plate washer 90201–10201
Bolt 91111–51050



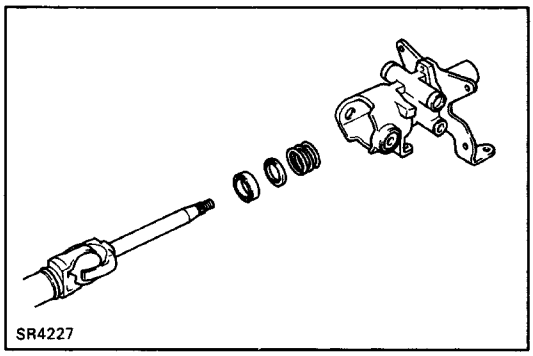

(b) Remove the upper column tube from the lower column tube.
(c) Remove the collar from the main shaft.




**12. REMOVE MAIN SHAFT**

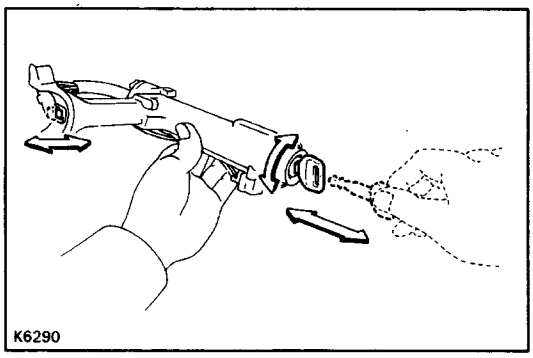
(a) Using SST to compress the main shaft spring, remove the snap ring with snap ring pliers.

SST 09950–20017




(b) Remove the main shaft from the column tube.

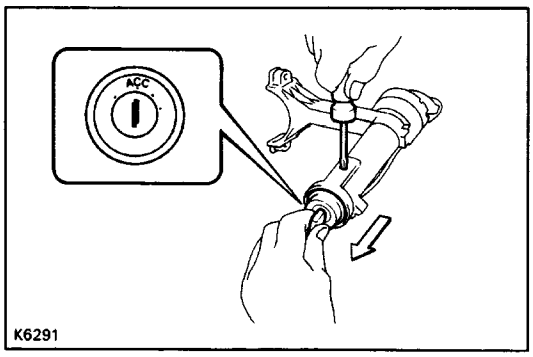
(c) Remove the spring, thrust collar and bearing.




# INSPECTION AND REPLACEMENT OF STEERING COLUMN

**1. INSPECT KEY CYLINDER**

Check that the steering lock mechanism operates properly.



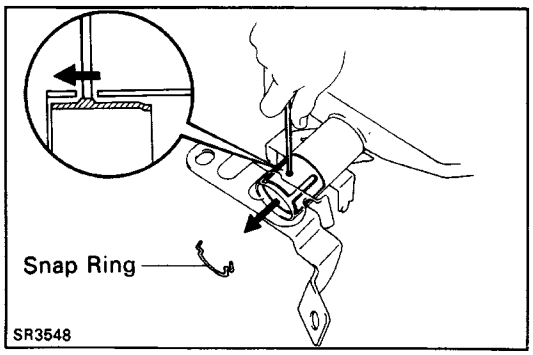

**2. IF NECESSARY, REPLACE KEY CYLINDER**

(a) Place the ignition key at the ACC position.

(b) Push down the stop pin with a thin rod, and pull out the key cylinder.

(c) Make sure the ignition key is at the ACC position.

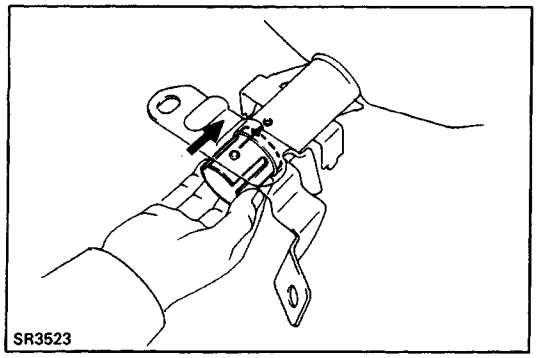
(d) Install a new key cylinder.



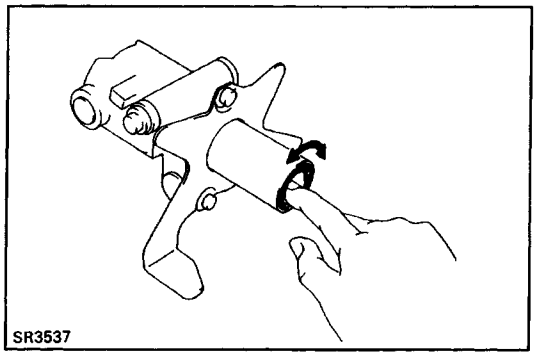

**3. IF NECESSARY, REPLACE MAIN SHAFT BUSHING**

(a) Remove the snap ring.

(b) Using a screwdriver, remove the bushing.

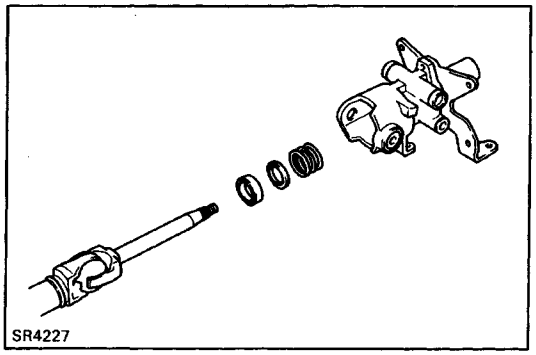



(c) Align the holes of the tube and projections of a new bushing, and install the bushing to the column tube.
(d) Install the snap ring.




**4. INSPECT UPPER BEARING**
Check the upper bearing rotation condition and check for abnormal noise.

**5. INSPECT KEY INTERLOCK SOLENOID**
**(See page AT–182)**

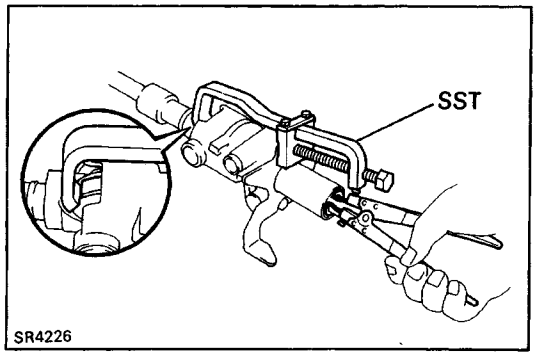


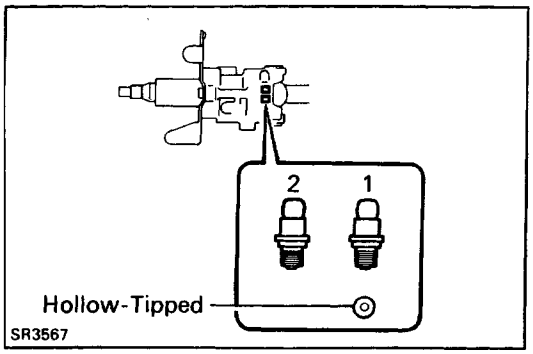

## ASSEMBLY OF STEERING COLUMN

**(See page SR–11)**

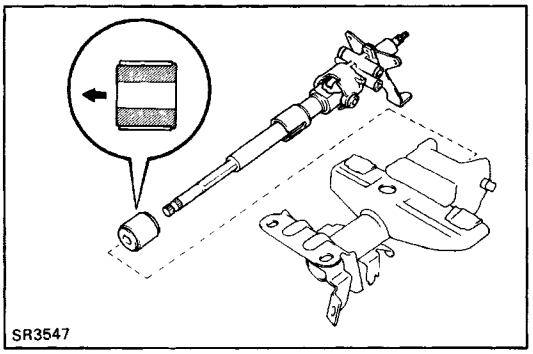
**1. APPLY MOLYBDENUM DISULPHID LITHIUM BASE GREASE (See page SR–11)**

**2. INSTALL MAIN SHAFT**
(a) Install the bearing, thrust collar and spring to the main shaft.
(b) Install the main shaft into the upper column tube.
(c) Using SST to compress the main shaft spring, install the snap ring with snap ring pliers.
SST 09950–20017



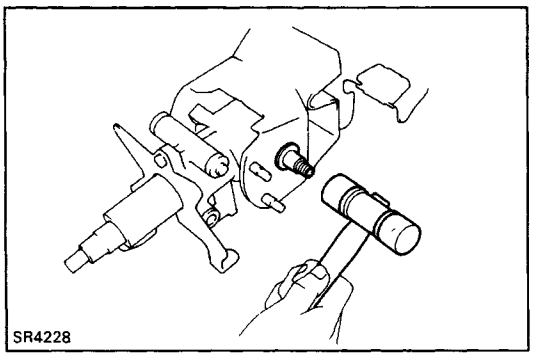

**3. SELECT TILT STEERING BOLTS**
Select the bolt with the plain thread end when the upper column tube mark is 2, and the bolt with the hollowtipped thread end when the mark is 1.



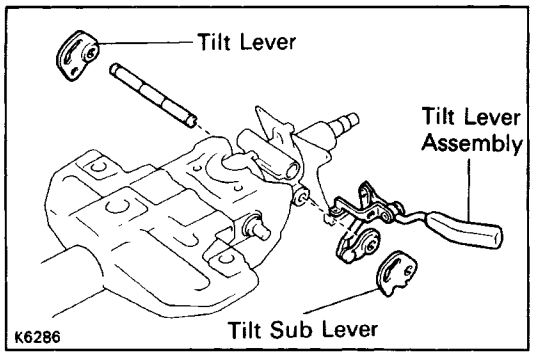

**4. INSTALL MAIN SHAFT WITH UPPER COLUMN TUBE**

(a) Install the collar to the main shaft.

(b) Install the main shaft with the upper column tube into the lower column tube.




(c) Using a plastic hammer, drive in the tilt steering bolts.

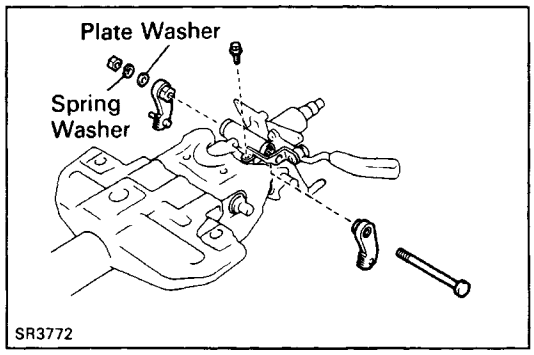



**5. INSTALL TILT LEVER LOCK SHAFT, TILT LEVER ASSEMBLY, TILT SUB LEVER AND TILT LEVER**

(a) Install the tilt lever lock shaft into the upper column tube.

(b) Install the tilt lever assembly.

(c) Install the tilt lever and tilt sub lever.




**6. INSTALL TILT PAWLS**

(a) Install the two tilt pawls to the upper column tube.

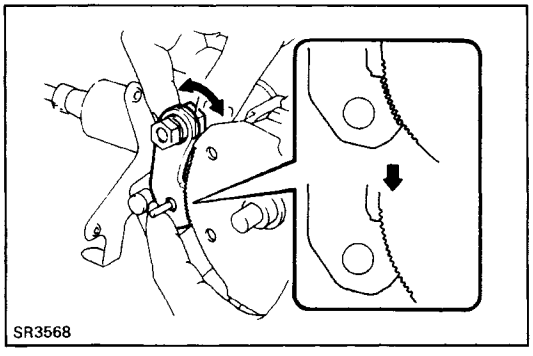
HINT: Install the pawl pin into the long hole of the tilt lever and tilt sub lever.

(b) Install the bolt through the tilt pawls and tilt lever assembly.

(c) Temporarily install the two washers and nut.

(d) Install and torque the tilt lever assembly installation bolt.

**Torque: 2.9 N–m (30 kgf–cm, 26 in.–lbf)**




**7. ENGAGE AND ADJUST TILT PAWL**

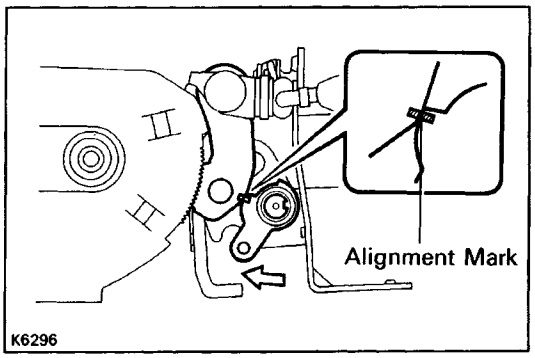
(a) Engage the tilt sub lever side pawl to the center of the ratchet.

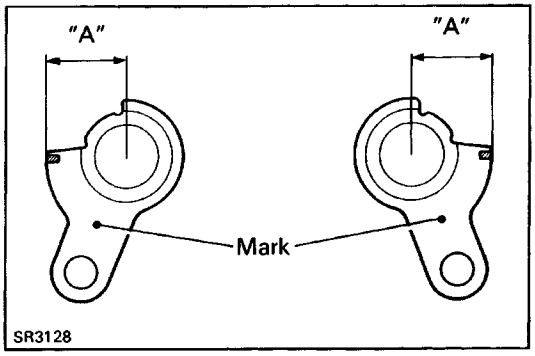
(b) While turning the tilt lever side collar, completely engage the tilt lever side pawl to the ratchet.

(c) Tighten the nut.

**Torque: 5.9 N–m (60 kgf–cm, 52 in.–lbf)**

(d) Check that the pawls rotate smoothly.




**8. SELECT PAWL STOPPERS**

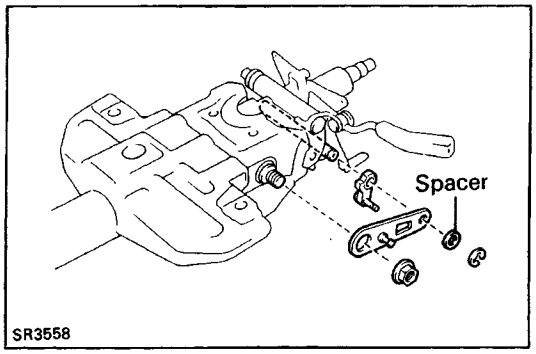
(a) With the tilt pawl and ratchet engaged, install two pawl stoppers.

(b) Check that the alignment marks on the stopper and pawl align when the stopper is rotated to the pawl side.

(c) If the alignment marks do not align, select pawl stoppers according to the following table.

| Tilt lever side | Tilt sub lever side | Dimension "A" mm (in.) |
|---|---|---|
| 1 | A | 12.68 – 12.74 (0.4992 – 0.5016) |
| 2 | B | 12.61 – 12.67 (0.4965 – 0.4988) |
| 3 | C | 12.54 – 12.60 (0.4937 – 0.4961) |
| 4 | D | 12.47 – 12.53 (0.4909 – 0.4933) |
| 5 | E | 12.40 – 12.46 (0.4882 – 0.4906) |
| 6 | F | 12.33 – 12.39 (0.4854 – 0.4878) |
| 7 | G | 12.26 – 12.32 (0.4827 – 0.4850) |

(d) After selecting the stoppers, check that on both sides the pawl and ratchet are fully engaged.




**9. INSTALL PAWL STOPPERS AND TILT LEVER RETAINERS**

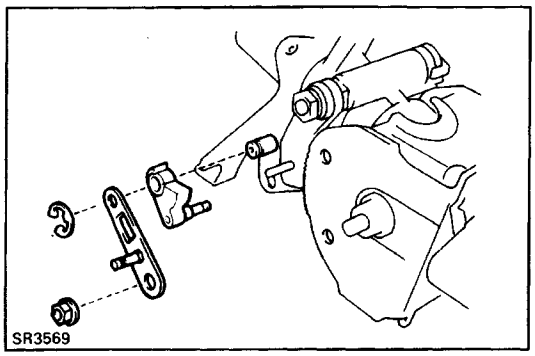
(a) Install the tilt sub lever side pawl stopper and tilt lever retainer.

(b) Install the spacer.

(c) Install the E–ring.

(d) Install and torque the nut.

**Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)**

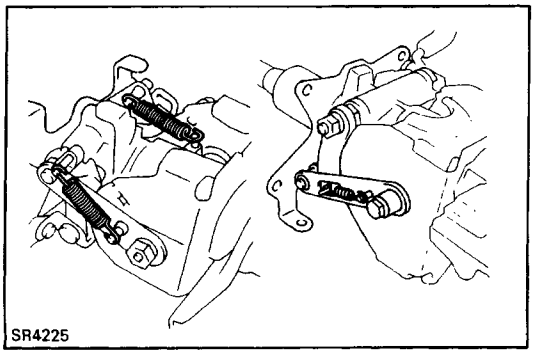



(e) Install the tilt lever side pawl stopper and tilt lever retainer.

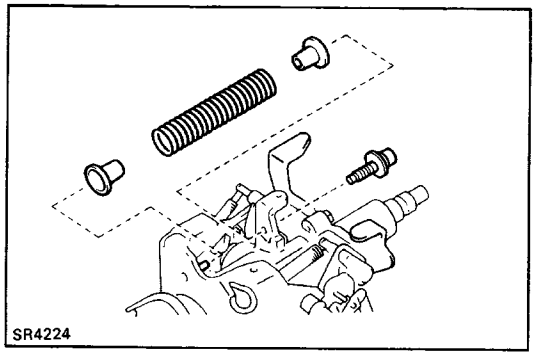
(f) Install the E–ring.

(g) Install and torque the nut.

**Torque: 15 N–m (750 kgf–cm, 11 ft–lbf)**




**10. INSTALL THREE TENSION SPRINGS**




**11. INSTALL COMPRESSION SPRING**

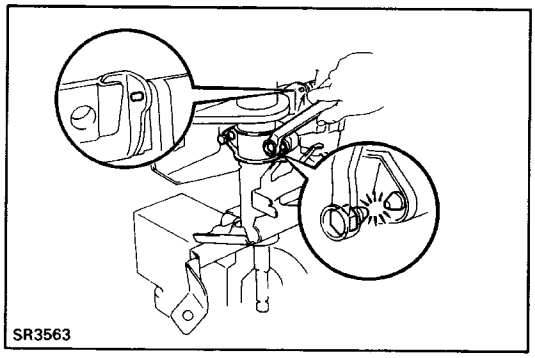
(a) Install the two bushings to the spring.

(b) Install the spring and bolt.

(c) Using a torx wrench, tighten the bolt.

Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)

**Torque: 7.9 N–m (08 kgf–cm, 69 in.–lbf)**




**12. INSTALL UPPER BRACKET**

(a) Install the upper bracket with two new taperedhead bolts.

HINT: Install the upper bracket pin into the column tube hole.

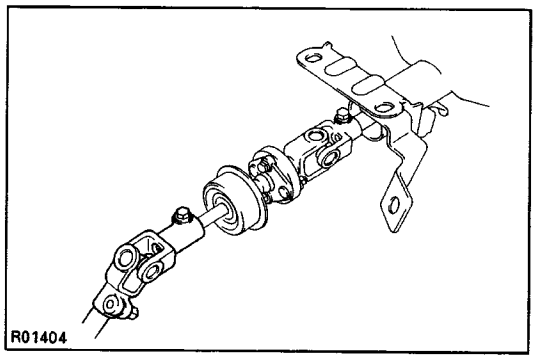
(b) Tighten the tapered–head bolts until the bolt heads break off.

**13. (USA)**
**INSTALL PROTECTOR**

**14. INSTALL WIRING HARNESS CLAMP**

**15. INSTALL INTERMEDIATE SHAFT**

**Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)**




**16. (5S–FE ENGINE)**
**INSTALL IGNITION KEY CYLINDER ILLUMINATION**

**17. CHECK OPERATION OF TILT STEERING**

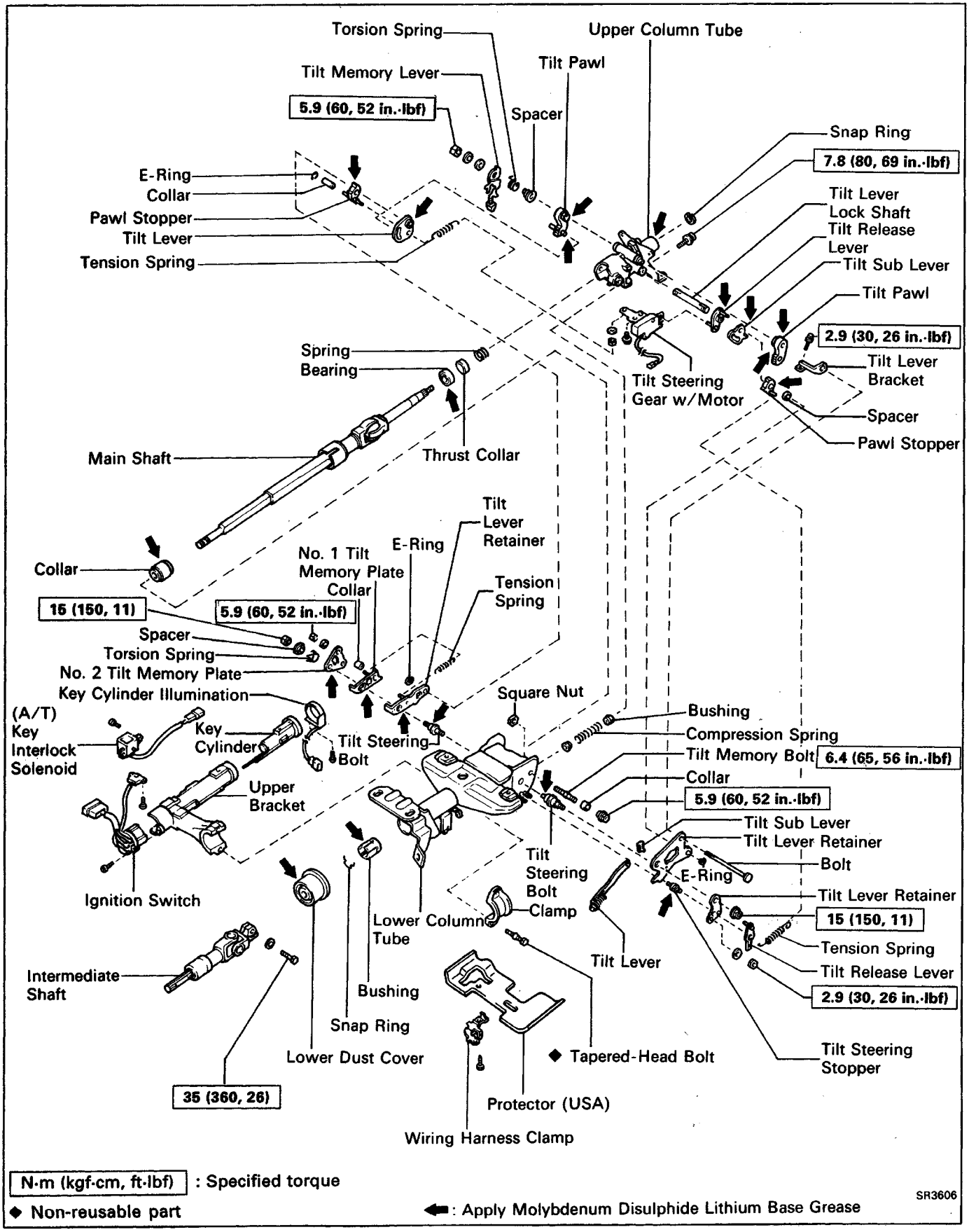
(a) Check that there is no axial play at the end of the main shaft.

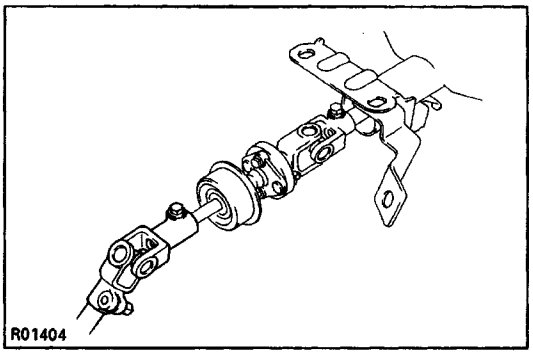
(b) With the main shaft in the neutral position, push the tilt lever and check that the main shaft rises to the uppermost position.

(c) Lower the main shaft, and check that it locks in the uppermost position.

# Auto Tilt Away Steering Column

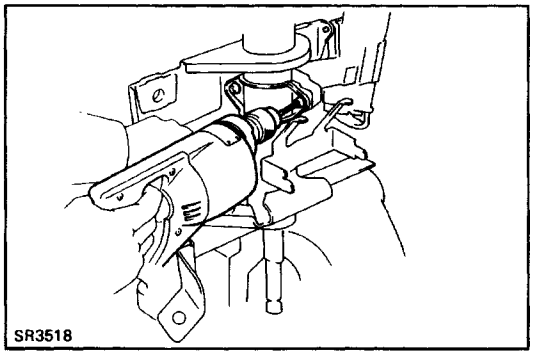
## COMPONENTS



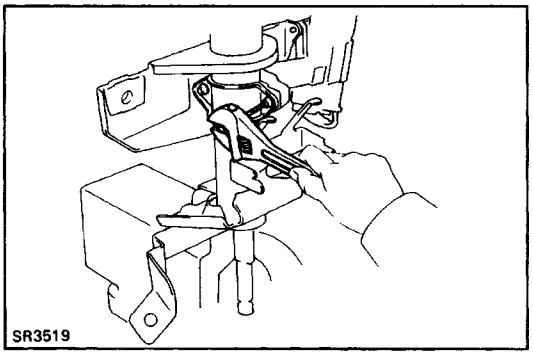



## DISASSEMBLY OF STEERING COLUMN

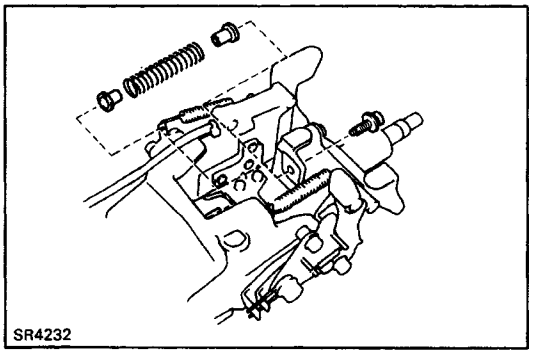
1. **REMOVE IGNITION KEY CYLINDER ILLUMINATION**
2. **REMOVE INTERMEDIATE SHAFT**
3. **REMOVE WIRING HARNESS CLAMP**
4. **(USA)**
   **REMOVE PROTECTOR**



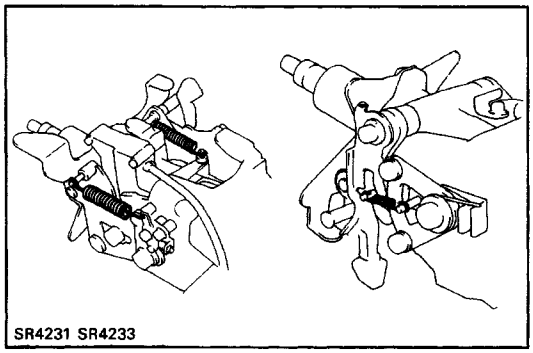

5. **REMOVE UPPER BRACKET**
   (a) Using a centering punch, mark the center of the tapered–head bolts.
   (b) Using a 3–4 mm (0.12–0.16 in.) drill, drill into the tapered–head bolts.



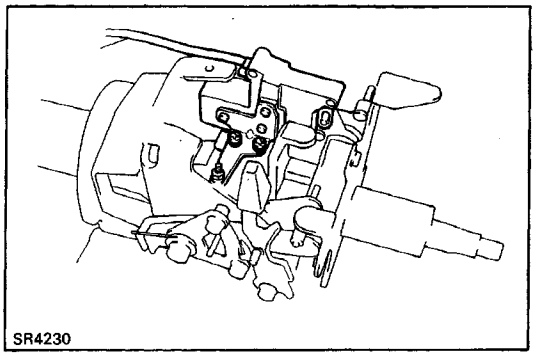

   (c) Using a screw extractor, remove the tapered–head bolts.
   (d) Remove the two bolts, and separate the upper bracket and the column tube.



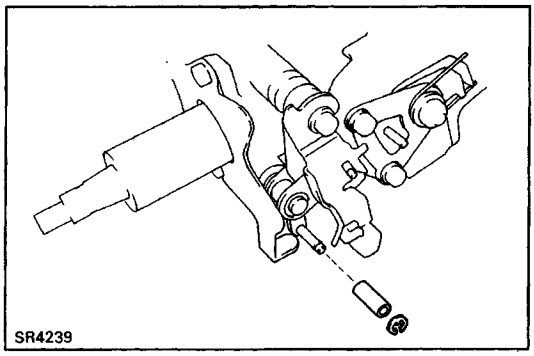

6. **REMOVE COMPRESSION SPRING**
   (a) Using a torx wrench, remove the bolt and spring.
   Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)
   (b) Remove the two bushings from the spring.



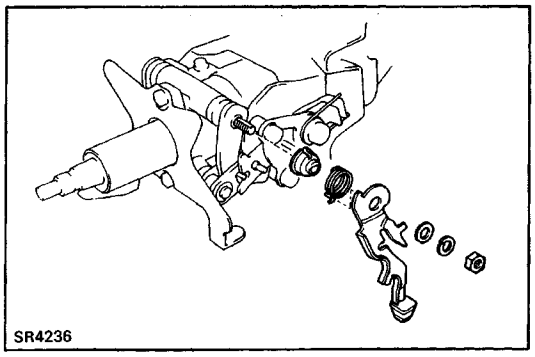

7. **REMOVE THREE TENSION SPRINGS**




**8. REMOVE TILT STEERING GEAR WITH MOTOR**

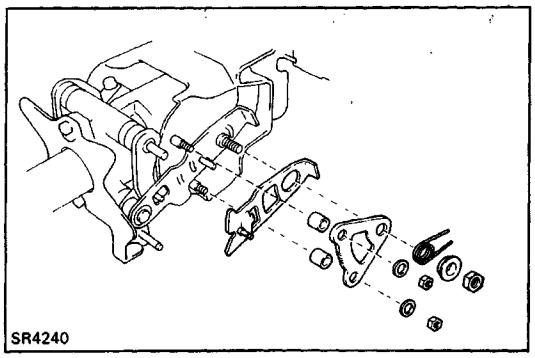



**9. REMOVE E–RING AND COLLAR**



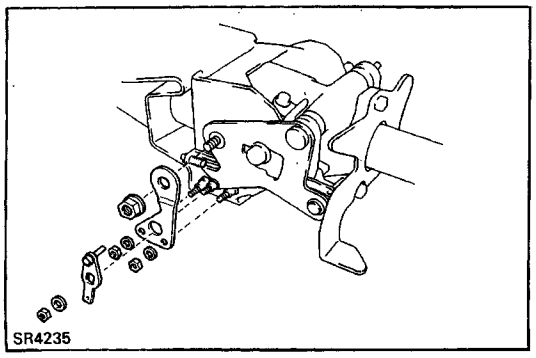

**10. REMOVE TILT MEMORY LEVER, TORSION SPRING AND SPACER**

(a) Remove the nut and two washers.
(b) Remove the tilt memory lever, torsion spring and spacer.




**11. REMOVE SPACER, TORSION SPRING, NO. 1 AND NO. 2 TILT MEMORY PLATES AND COLLARS**

(a) Remove the three nuts and two washers.
(b) Remove the spacer, torsion spring, No. 1 and No. 2 tilt memory plates.
(c) Remove the two collars.

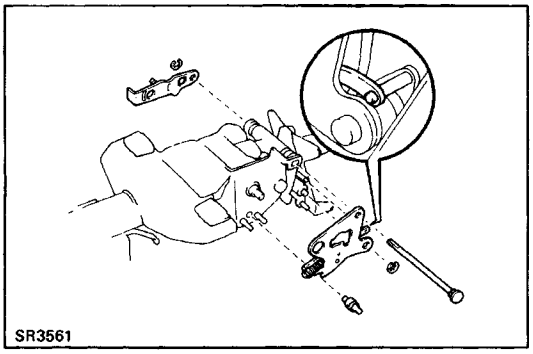


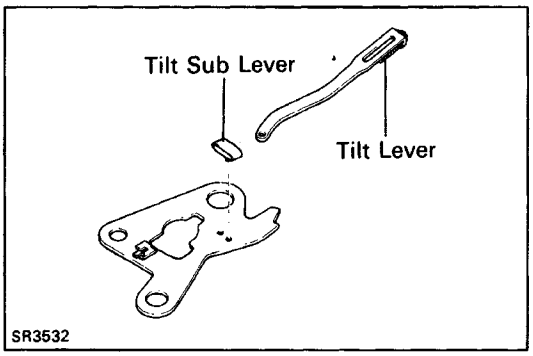

**12. REMOVE TILT RELEASE LEVER AND TILT LEVER RETAINER**

(a) Remove the four nuts and three washers.
(b) Remove the tilt release lever and tilt lever retainer.

**13. REMOVE BOLT, TILT LEVER RETAINERS AND TILT STEERING STOPPER**

(a) Remove the two E–rings.
(b) Pull out the bolt.
(c) Remove the two tilt lever retainers and tilt steering stopper.

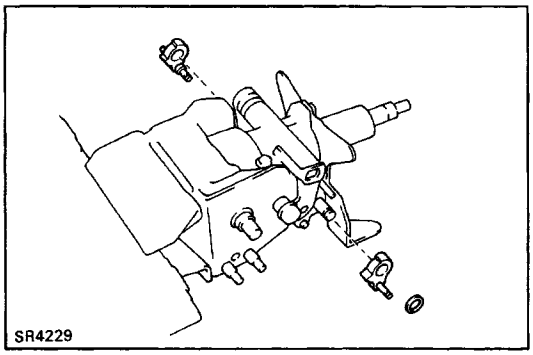

SR3561



SR3532

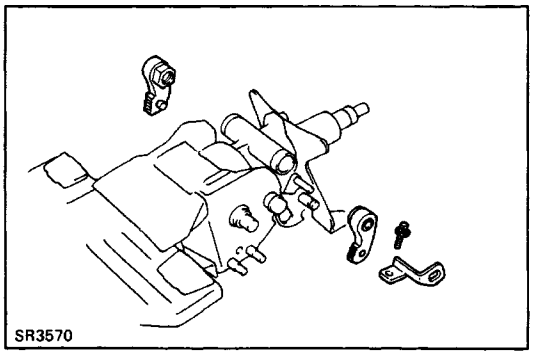
(d) Remove the tilt lever and tilt sub lever from the tilt lever retainer.

**14. REMOVE SPACER AND PAWL STOPPERS**


SR4229

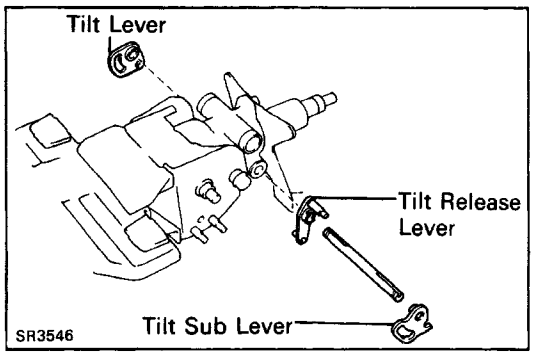
**15. REMOVE TILT LEVER BRACKET AND TILT PAWLS**

(a) Remove the bolt and tilt lever bracket.
(b) Remove the two tilt pawls.

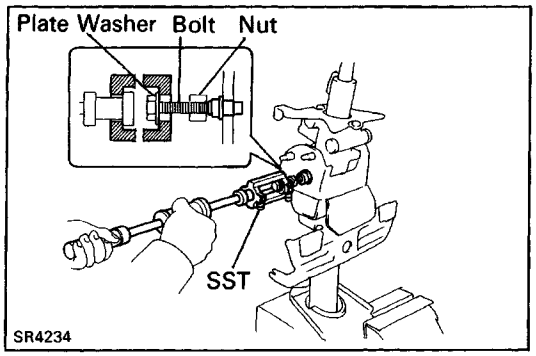

SR3570

**16. REMOVE TILT LEVER, TILT SUB LEVER, TILT RELEASE LEVER AND TILT LEVER LOCK SHAFT**

(a) Remove the tilt lever, tilt sub lever, and tilt release lever.
(b) Pull out the tilt lever lock shaft.



SR3546




**17. REMOVE UPPER COLUMN TUBE**

(a) Set SST, the nut (10 mm diameter, 1.25 mm pitch), plate washer (36 mm outer diameter) and bolt (10 mm diameter, 1.25 mm pitch, 50 mm length) as shown.

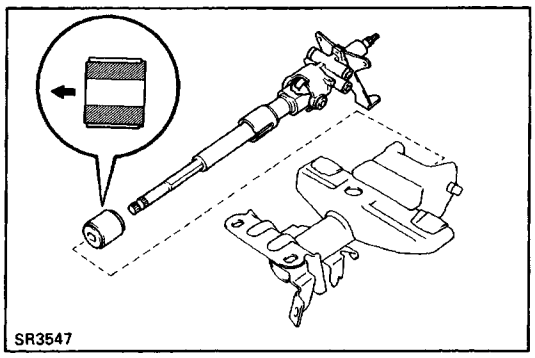
And then remove the two tilt steering bolts.

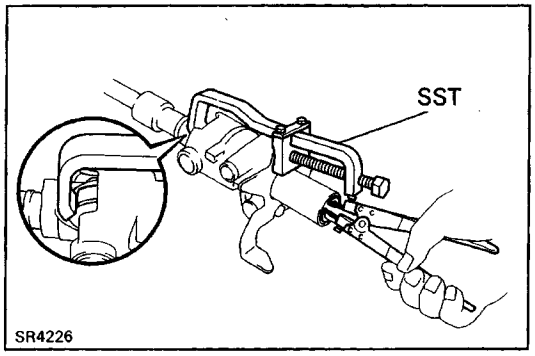
SST 09910–00015 (09911–00011, 09912–00010)

(Reference) Nut 90170–10004
Plate washer 90201–10201
Bolt 91111–51050

(b) Remove the upper column tube from the lower column tube.

(c) Remove the collar from the main shaft.

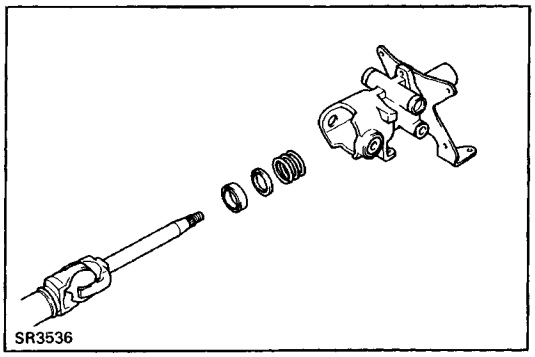



**18. REMOVE MAIN SHAFT**

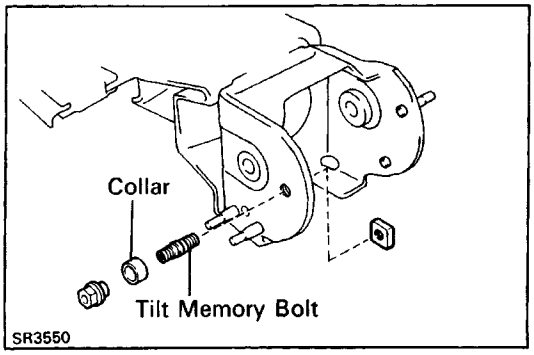
(a) Using SST to compress the main shaft spring, remove the snap ring with snap ring pliers.

SST 09950–20017




(b) Remove the main shaft from the column tube.

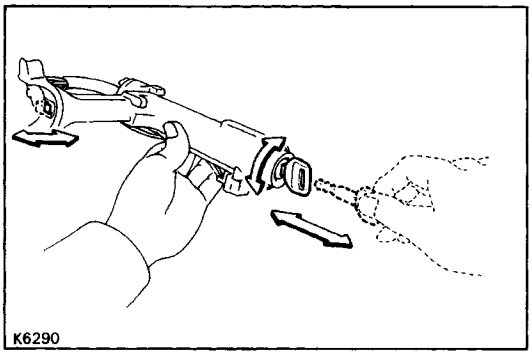
(c) Remove the spring, thrust collar and bearing.




**19. REMOVE COLLAR AND TILT MEMORY BOLT**

(a) Remove the nut and collar.

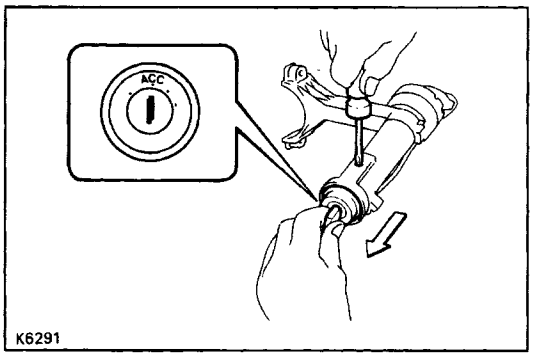
(b) Using a hexagon wrench, remove the tilt memory bolt and square nut.




# INSPECTION AND REPLACEMENT OF STEERING COLUMN

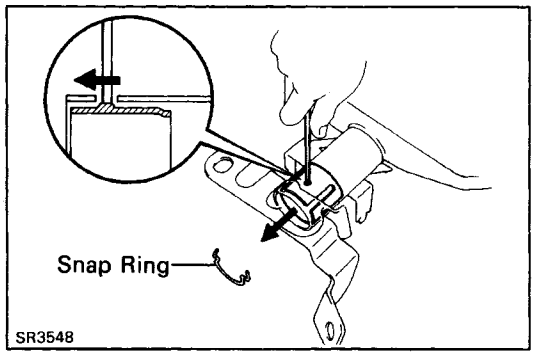
**7. INSPECT KEY CYLINDER**

Check that the steering lock mechanism operates properly.



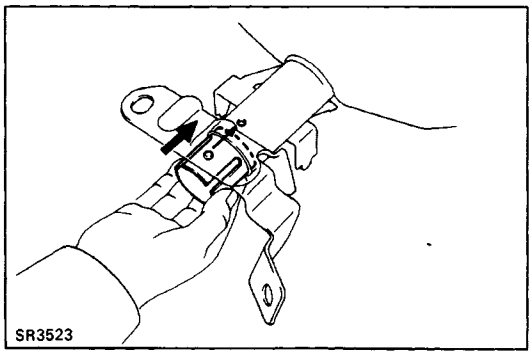

**2. IF NECESSARY, REPLACE KEY CYLINDER**

(a) Place the ignition key at the ACC position.
(b) Push down the stop pin with a thin rod, and pull out the key cylinder.
(c) Make sure the ignition key is at the ACC position.
(d) Install a new key cylinder.

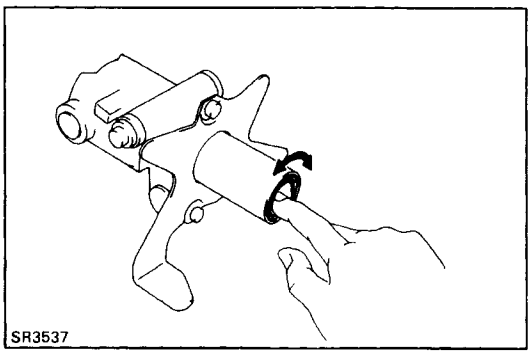



**3. IF NECESSARY, REPLACE MAIN SHAFT BUSHING**

(a) Remove the snap ring.
(b) Using a screwdriver, remove the bushing.




(c) Align the holes of the tube and projections of a new bushing, and install the bushing to the column tube.
(d) Install the snap ring.

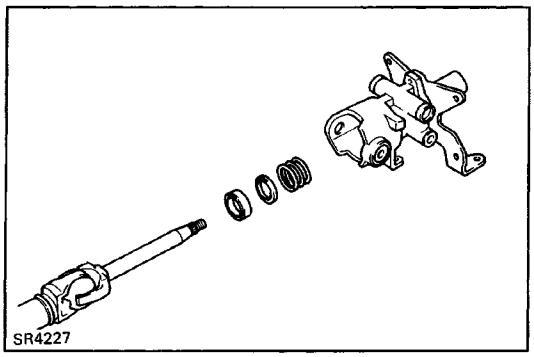



**4. INSPECT UPPER BEARING**

Check the upper bearing rotation condition and check for abnormal noise.

**5. INSPECT KEY INTERLOCK SOLENOID**

**(See page AT–1 82)**




# ASSEMBLY OF STEERING COLUMN

**(See page SR–19)**

**1. APPLY MOLYBDENUM DISULPHID LITHIUM BASE GREASE (See page SR–19)**

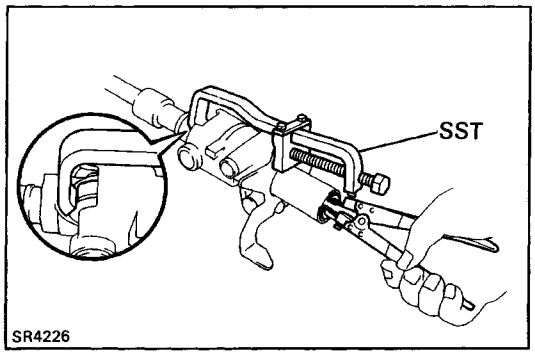
**2. INSTALL MAIN SHAFT**

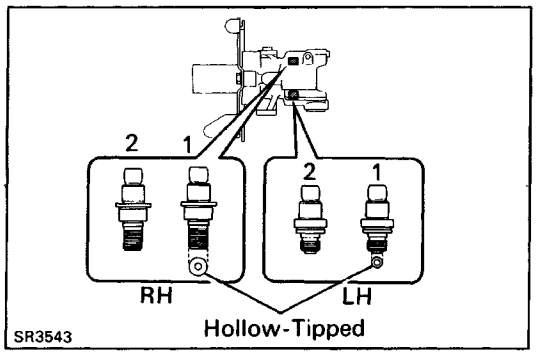
(a) Install the bearing, thrust collar and spring to the main shaft,

(b) Install the main shaft into the upper column tube.

(c) Using SST to compress the main shaft spring, install the snap ring with snap ring pliers.

SST 09950–20017

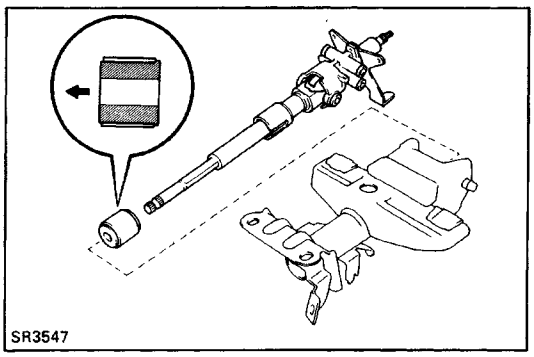



**3. SELECT TILT STEERING BOLTS**

Select the bolt for the left or right side and then select the bolt for the other side as the left and right bolt have different shapes.

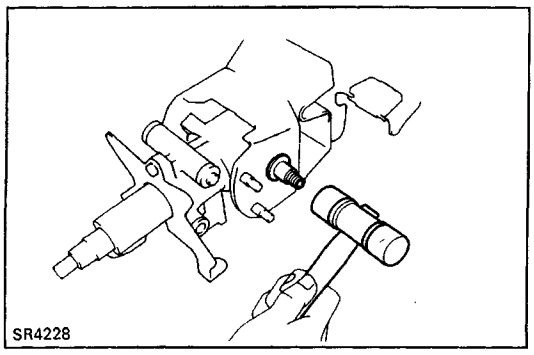
HINT: Select the bolt with the plain thread end when the upper column tube mark is 2, and the bolt with the hollow–tipped thread end when the mark is 1.




**4. INSTALL MAIN SHAFT WITH UPPER COLUMN TUBE**

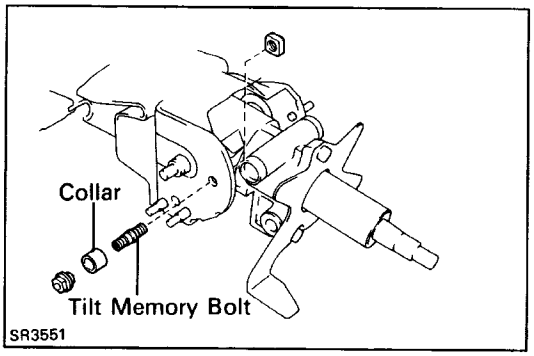
(a) Install the collar to the main shaft.

(b) Install the main shaft with the upper column tube into the lower column tube.




(c) Using a plastic hammer, drive in the tilt steering bolts.

**NOTICE: Be careful not to mis–install the left and right bolts.**




**5. INSTALL TILT MEMORY BOLT AND COLLAR**

(a) Install the square nut and tilt memory bolt.

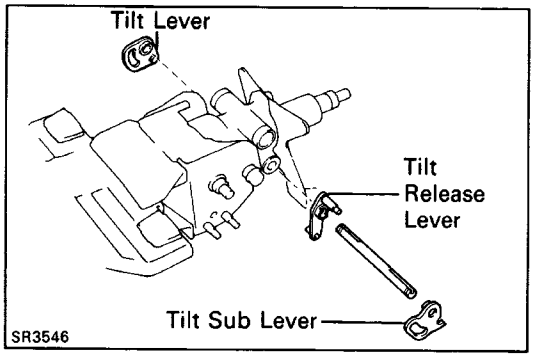
(b) Using a hexagon wrench, torque the tilt memory bolt.

**Torque: 6.4 N–m (65 kgf–cm, 56 in.–lbf)**

(c) Install the collar.

(d) Temporarily install the nut.

HINT: Torque the nut after selecting the collar in step 16.

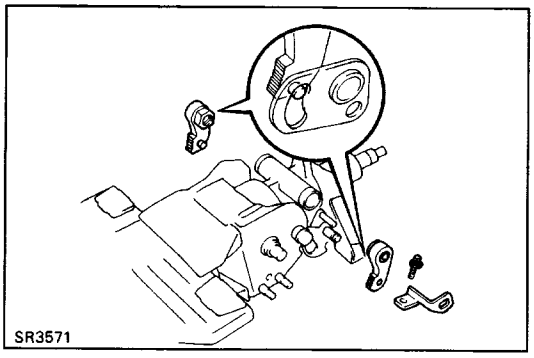



**6. INSTALL TILT LEVER LOCK SHAFT, TILT RELEASE LEVER, TILT SUB LEVER AND TILT LEVER**

(a) Install the tilt lever lock shaft into the upper column tube.

(b) Install the tilt release lever.

(c) Install the tilt lever and tilt sub lever.




**7. INSTALL TILT PAWLS AND TILT LEVER BRACKET**

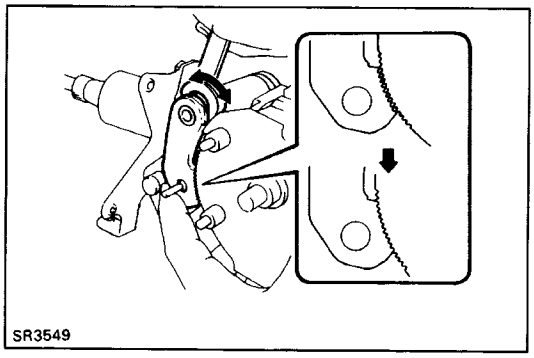
(a) Install the two tilt pawls to the upper column tube.

HINT: Install the pawl pin into the long hole of the tilt lever and tilt sub lever.

(b) Install the tilt lever bracket.

(c) Install and torque the tilt lever bracket installation bolt.

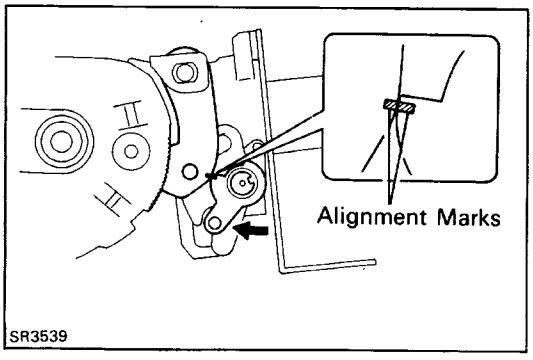
**Torque: 2.9 N–m (30 kgf–cm, 26 in.–lbf)**




**8. ENGAGE AND ADJUST TILT PAWL**

(a) Engage the tilt sub lever side pawl to the center of the ratchet.

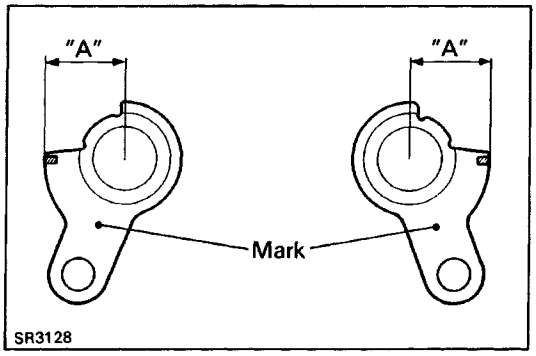
(b) While turning the tilt lever side collar, completely engage the tilt lever side pawl to the ratchet.




**9. SELECT PAWL STOPPERS**

(a) With the tilt pawl and ratchet engaged, install two pawl stoppers.

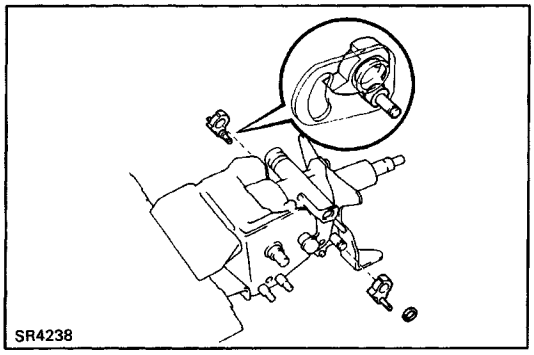
(b) Check that the alignment marks on the stopper and pawl align when the stopper is rotated to the pawl side.



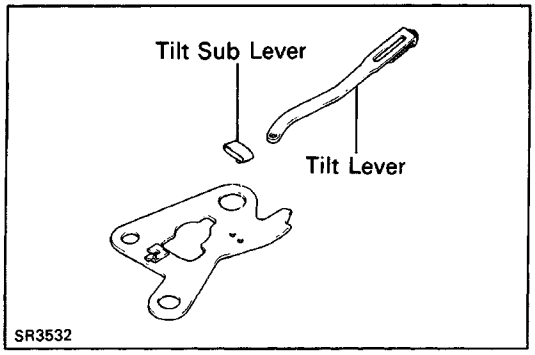

(c) If the alignment marks do not align, select pawl stoppers according to the following table.

| Tilt lever side | Tilt sub lever side | Dimension "A" mm (in.) |
|---|---|---|
| 1 | A | 12.68 – 12.74 (0.4992 – 0.5016) |
| 2 | B | 12.61 – 12.67 (0.4965 – 0.4988) |
| 3 | C | 12.54 – 12.60 (0.4937 – 0.4961) |
| 4 | D | 12.47 – 12.53 (0.4909 – 0.4933) |
| 5 | E | 12.40 – 12.46 (0.4882 – 0.4906) |
| 6 | F | 12.33 – 12.39 (0.4854 – 0.4878) |
| 7 | G | 12.26 – 12.32 (0.4827 – 0.4850) |

(d) After selecting the stoppers, check that on both sides the pawl and ratchet are fully engaged.

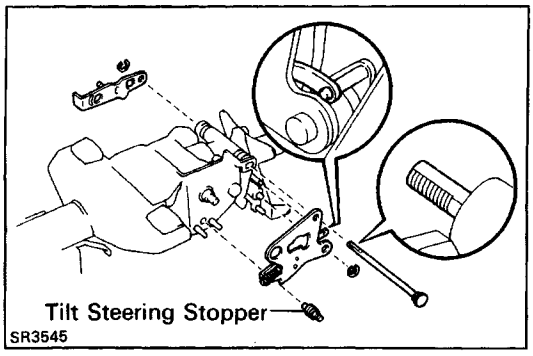



**10. INSTALL PAWL STOPPERS AND SPACER**




**11. INSTALL TILT STEERING STOPPER, TILT LEVER RETAINERS AND BOLT**

(a) Install the tilt sub lever and tilt lever to the tilt lever retainer.

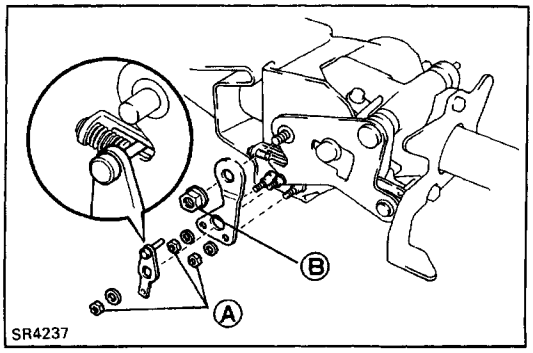



(b) Install the tilt steering stopper and two tilt lever retainers.

(c) Install the bolt through the tilt lever retainer, tilt lever bracket and tilt pawls.

HINT: Install the bolt so that the smooth part on the opposite side to the thread is facing upward.

(d) Install the two E–rings.




**12. INSTALL TILT LEVER RETAINER AND TILT RELEASE LEVER**

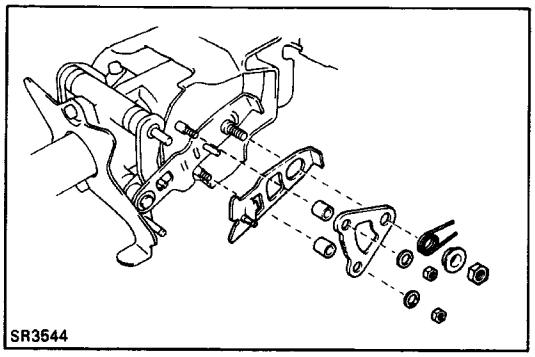
(a) Install the tilt lever retainer and tilt release lever.

HINT: Install the release lever pin into the long hole of the tilt lever.

(b) Install the three washers and four nuts.

(c) Tighten the nuts.

**Torque: (A) 2.9 N–m (30 kgf–cm, 26 in.–lbf)**
**(B) 15 N–m (150 kgf–cm, 11 ft–lbf)**


SR3544

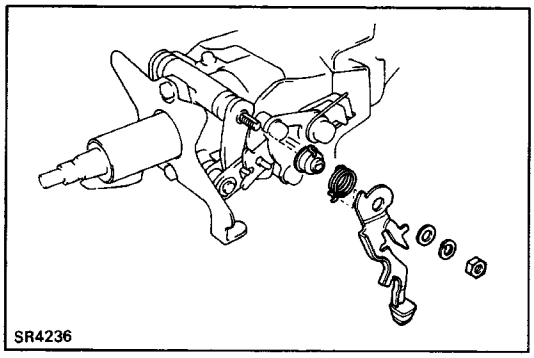
**13. INSTALL COLLARS, NO. 1 AND NO. 2 TILT MEMORY PLATES, TORSION SPRING AND SPACER**

(a) Install the two collars.
(b) Install No. 1 and No. 2 tilt memory plates.
(c) Install the two washers and nuts.
(d) Torque the two nuts.

**Torque: 5.9 N–m (60 kgf–cm, 52 in..lbf)**

(e) Install the torsion spring to the tilt steering bolt so that the spring clips onto No. 1 memory plate and the tilt lever retainer. Then install the spacer and nut to the steering bolt.

**Torque: 15 N–m (150 kgf–cm, 11 ft.lbf)**

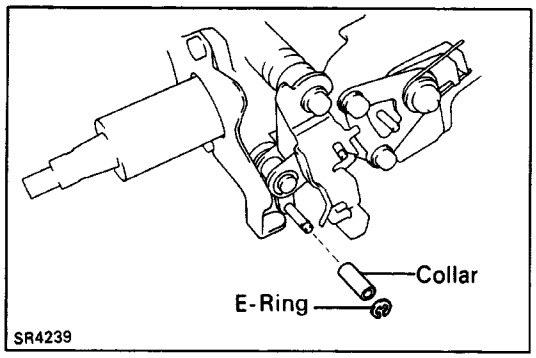

SR4236

**14. INSTALL SPACER, TORSION SPRING AND TILT MEMORY LEVER**

(a) Install the spacer, torsion spring and tilt memory lever.
(b) Install two washers and nut.
(c) Check that on both sides the pawl and ratchet are fully engaged.
(d) Tighten the nut.

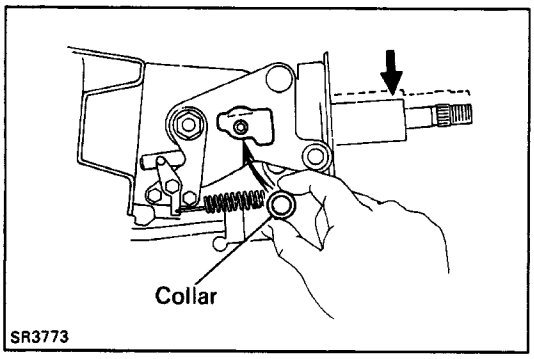
**Torque: 5.9 N–m (60 kgf–cm, 52 in..lbf)**

(e) Check that the pawls rotate smoothly.



SR4239

**15. INSTALL COLLAR AND E–RING**



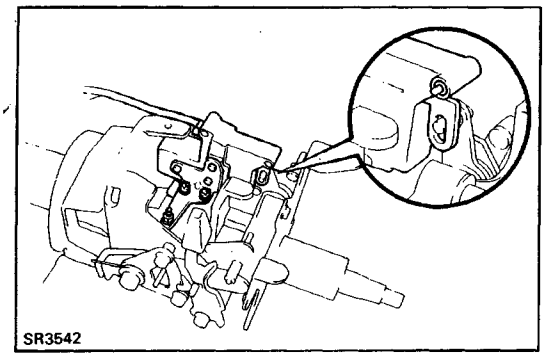
SR3773

**16. SELECT COLLAR**

(a) Put the steering column in tilt away position.
(b) Push the upper column tube downward and install the collar between the tilt memory bolt and tilt lever retainer.

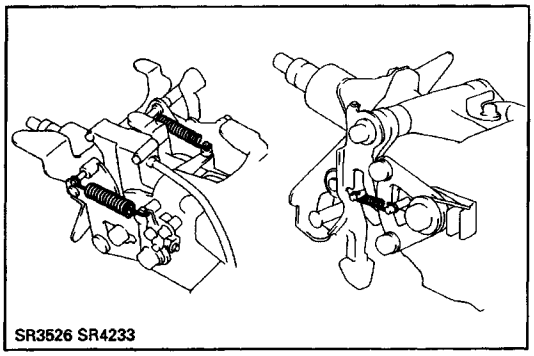
Select a collar with an outer diameter one rank below the collar which fits most tightly.

| Color | Outer diameter mm (in.) |
|---|---|
| Blue | 12.75 – 12.85 (0.5020 – 0.5059) |
| Yellow-Plated | 12.55 – 12.65 (0.4941 – 0.4980) |
| Pink-Plated | 12.35 – 12.45 (0.4862 – 0.4902) |
| None | 12.15 – 12.25 (0.4783 – 0.4823) |
| Black-Plated | 11.95 – 12.05 (0.4705 – 0.4744) |
| Red | 11.75 – 11.85 (0.4610 – 0.4665) |
| Green | 11.55 – 11.65 (0.4547 – 0.4587) |
| Pink | 11.25 – 11.35 (0.4429 – 0.4468) |

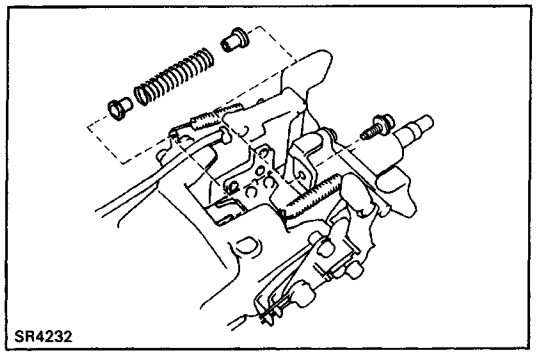



**17. INSTALL TILT STEERING GEAR WITH MOTOR**

Install the tilt release lever pin into the long hole of the steering gear lever.



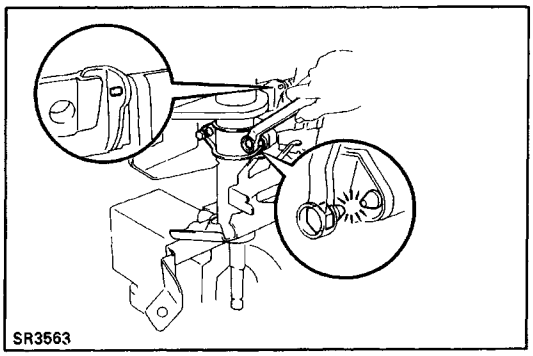

**18. INSTALL THREE TENSION SPRINGS**




**19. INSTALL COMPRESSION SPRING**

(a) Install the two bushings to the spring.
(b) Install the spring and bolt.
(c) Using a torx wrench, tighten the bolt.
Torx wrench: T30 (Part No. 09042–00010 or locally manufactured tool)

**Torque: 7.8 N–m (80 kgf–cm, 69 in..lbf)**




**20. INSTALL UPPER BRACKET**

(a) Install the upper bracket with two new taperedhead bolts.

HINT: Install the upper bracket pin into the column tube hole.

(b) Tighten the tapered–head bolts until the bolt heads break off.

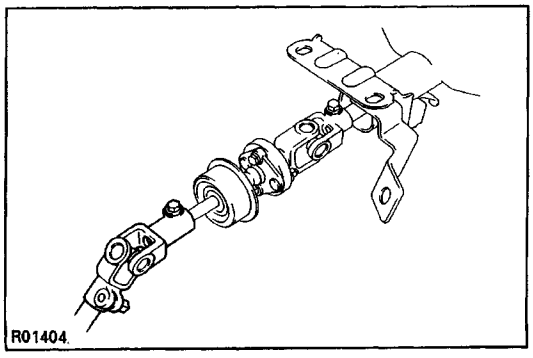
**21. (USA)**
**INSTALL PROTECTOR**

**22. INSTALL WIRING HARNESS CLAMP**

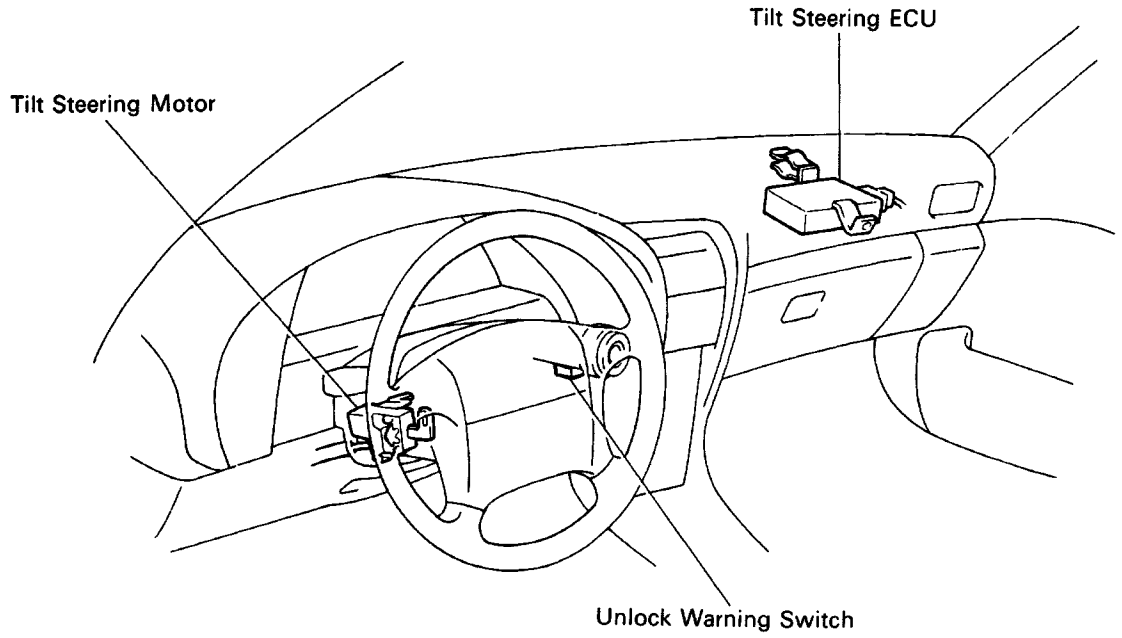
**23. INSTALL INTERMEDIATE SHAFT**

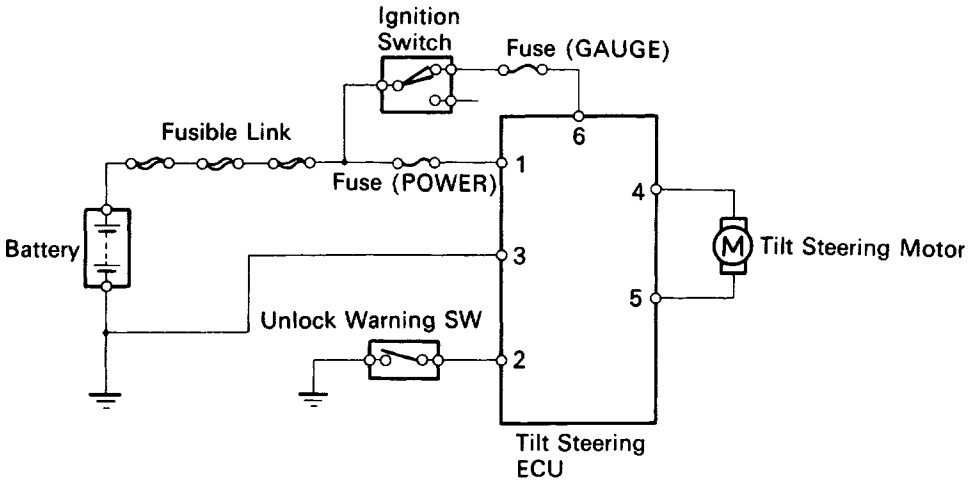
**Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)**

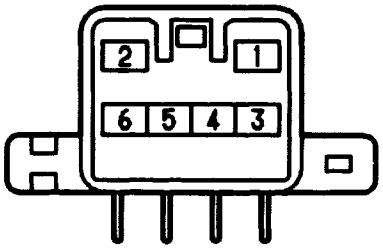
**24. INSTALL IGNITION KEY CYLINDER ILLUMINATION**



# ELECTRONIC CONTROL SYSTEM
## Components and Circuit




| No. | Symbol | Terminal Name |
|---|---|---|
| 1 | +B | Power Source |
| 2 | UWSW | Unlock Warning Switch |
| 3 | GND | Ground |
| 4 | TiM+ | Tilt Away |
| 5 | TiM– | Tilt Return |
| 6 | IGSW | Ignition Switch |

SR3607
SR3589
e-6-2-A

# Troubleshooting Flow–Chart

Check battery voltage.

Less than 8 V → Check battery and charging system.

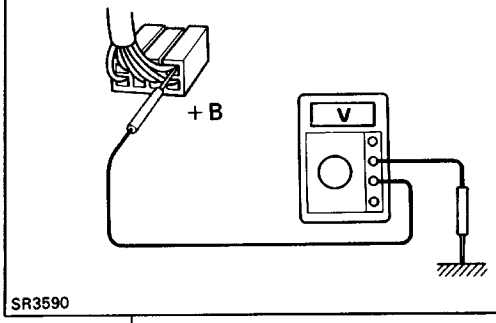
8 V or more

Is POWER fuse nomal? — No → Replace fuse. Is operation nomal? — No → Short circuit in wire harness between fuse and ECU terminal + B.

Yes

Yes → Fuse faulty.

Disconnect the ECU connector.

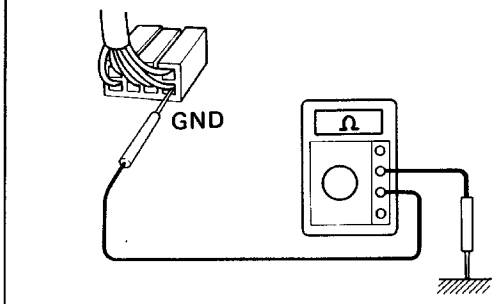


SR3590

**Check 1.**
Check that there is the battery voltage between the ECU terminal + B and body ground.

Yes

No → Open circuit in wire harness between the fuse and ECU terminal + B.



SR3591

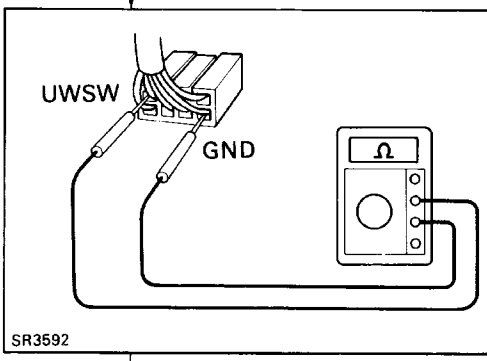
**Check 2.**
Check that there is continuity between the ECU terminal GND and body ground.

Yes

No →
- Open circuit in wire harness between the ECU terminal GND and body ground.
- Body ground faulty.

CONTINUED ON NEXT PAGE

Yes CONTINUED FROM PREVIOUS PAGE

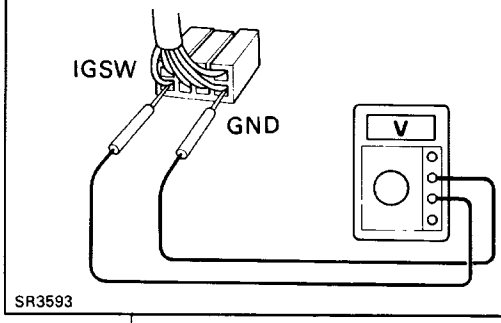



**Check 3.**
Check continuity between the ECU terminals UWSW and GND.
- Ignition switch is inserted . . . Continuity
- Ignition switch is removed ... No continuity

Yes

No

- Open or short circuit in wire harness between the ECU terminal UWSW and unlock warning switch.
- Unlock warning switch faulty.

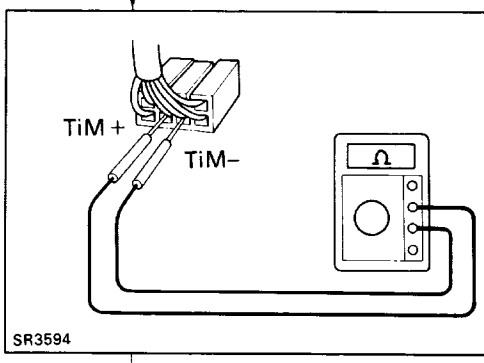



**Check 4.**
Check voltage between the ECU terminals IGSW and GND.
- Ignition switch ON ... Battery voltage
- Ignition switch OFF . . . 0 V

Yes

No

Open or short circuit in wire harness between the ECU terminal IGSW and ignition switch.




**Check 5.**
Check that there is continuity between terminals TiM + and TiM–.

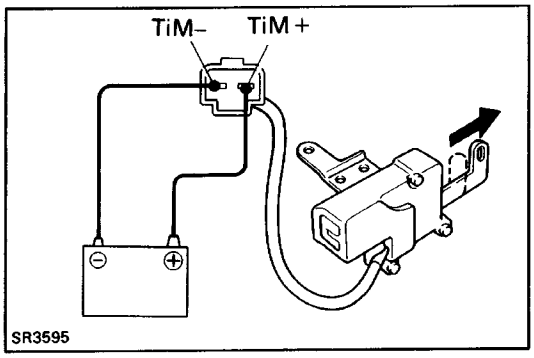
Yes

No

- Open circuit in wire harness between the terminals TiM + and TiM–.
- Tilt steering motor faulty. (See page SR–33)

**Check 6.**
Inspect ECU.
(See page SR–33)

Bad → Replace ECU.



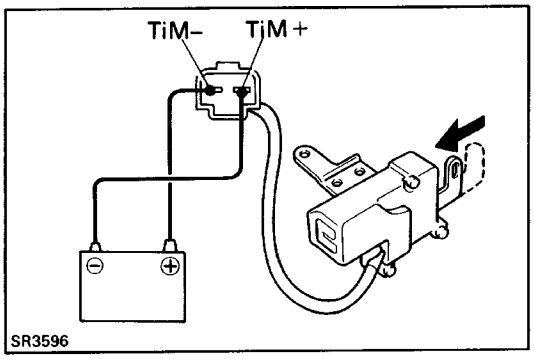

# Inspection of Electronic Control Components

**1. INSPECT TILT STEERING MOTOR**

(a) Disconnect the tilt motor connector.

(b) Connect the positive ( + ) lead from the battery to terminal TiM + and the negative (–) lead to terminal TiM–.

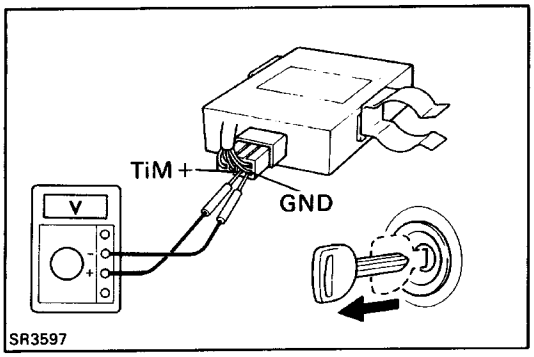
Check that the motor operates in the away direction.




(c) Connect the positive (+ ) lead from the battery to terminal TiM– and the negative (–) lead to terminal TiM+.

Check that the motor operates in the return direction.

If operation is not as specified, replace the motor.

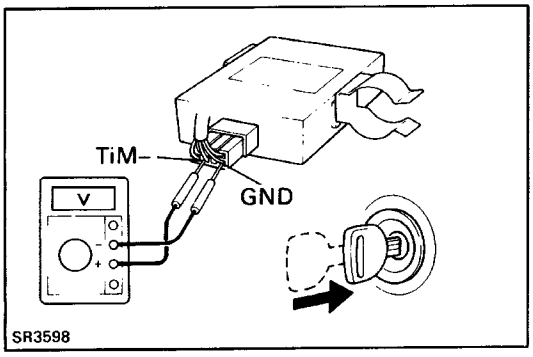



**2. INSPECT TILT STEERING ECU**

(a) Remove the glove compartment box.

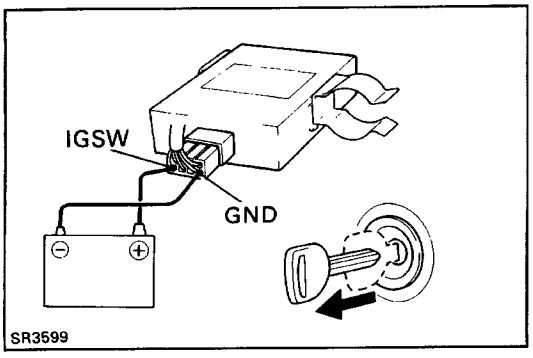
(b) Measure the voltage between ECU terminal TiM + and GND.

Check that the meter needle jumps once to approx. 10 V when the ignition key is removed from the ignition.




(c) Measure the voltage between ECU terminal TiM – and GND.

Check that the meter needle jumps once to approx. 10 V when the ignition key is inserted in the ignition.




(d) Remove the ignition key from the ignition while battery voltage is applied to ECU terminal IGSW. Check that tilt–away does not operate at this time.

If operation is not as specified, replace the ECU.

**3. INSPECT UNLOCK WARNING SWITCH**

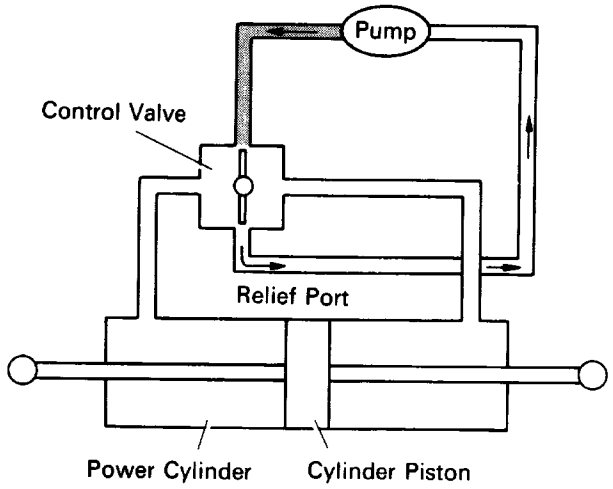
**(SEE PAGE BE–11)**

# POWER STEERING
# Description
## PRINCIPLES OF POWER STEERING

Power steering is one type of hydraulic device for utilizing engine power to reduce steering effort. Consequently, the engine is used to drive a pump to develop fluid pressure, and this pressure acts on a piston within the power cylinder so that the piston assists the rack effort. The amount of this assistance depends on the extent of pressure acting on the piston. Therefore, if more steering force is required, the pressure must be raised. The variation in the fluid pressure is accomplished by a control valve which is linked to the steering main shaft.

## NEUTRAL (STARAIGHT–AHEAD) POSITION

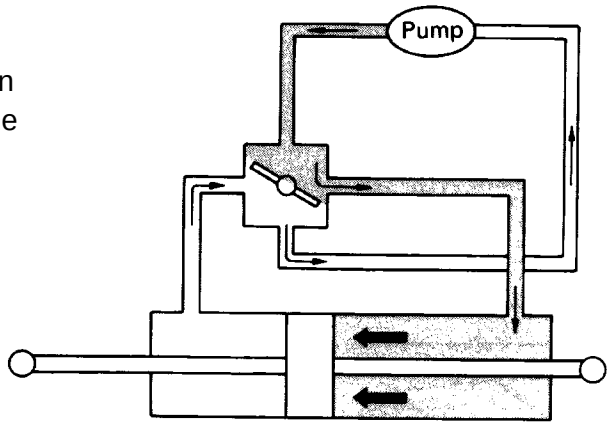
Fluid from the pump is sent to the control valve. If the control valve is in the neutral position, all the fluid will flow through the control valve into the relief port and back to the pump. At this time, hardly any pressure is created and because the pressure on the cylinder piston is equal on both sides, the piston will not move in either direction.



SR2390

## WHEN TURNING

When the steering main shaft is turned in either direction, the control valve also moves, closing one of the fluid passages. The other passage then opens wider, causing a change in fluid flow volume and, at the same time, pressure is created. Consequently, a pressure difference occurs between both sides of the piston and the piston moves in the direction of the lower pressure so that the fluid in the cylinder is forced back to the pump through the control valve.



SR2391

# SERVICE HINT

Troubles with the power steering system are usually concerned with hard steering due to the fact 'that there is no assist. In such cases, before attempting to make repairs, it is necessary to determine whether the trouble lies with the pump or with the gear housing. To do this, an on–vehicle inspection can be made by using a pressure gauge.

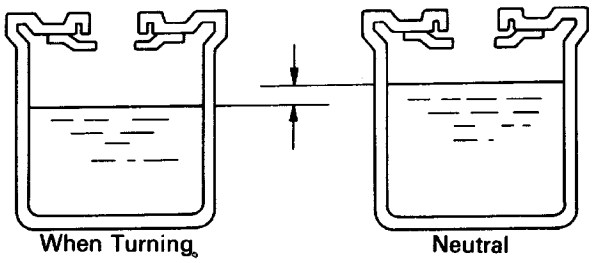
**ON–VEHICLE INSPECTION**

Power steering is a hydraulic device and problems are normally due to insufficient fluid pressure acting on the piston. This could be caused by either the pump not producing the specified fluid pressure or the control valve in the gear housing not functioning properly so that the proper fluid pressure can not be obtained.

If the fault lies with the pump, the same symptoms will generally occur whether the steering wheel is turned fully to the right or left. On the other hand, if the fault lies with the control valve, there will generally be a difference between the amount of assist when the steering wheel is turned to the left and right, causing harder steering. However, if the piston seal of the power cylinder is worn, there will be a loss of fluid pressure whether the steering wheel is turned to the 'right or left and the symptoms will be the same for both.

Before performing an on–vehicle inspection, a check must first be made to confirm that the power steering system is completely free of any air. If there is any air in the system, the volume of this air will change when the fluid pressure is raised, causing a fluctuation in the fluid pressure so that the power steering will not function properly. To determine if there is any air in the system, check to see if there is a change of fluid level in the reservoir tank when the steering wheel is turned fully to the right or left.

For example, if there is air in the system, it will be compressed to a smaller volume when the steering wheel is turned, causing a considerable drop in the fluid level. If the system is free of air, there will be very little change in the level even when the fluid pressure is raised. This is because the fluid, being a liquid, does not change volume when compressed. The little change in the fluid level is due to expansion of the hoses between the pump and gear housing when pressure rises.




SR2392 SR2393

Also, air in the system will sometimes result in an abnormal noise occuring from the pump or gear housing when the steering wheel is fully turned in either direction.

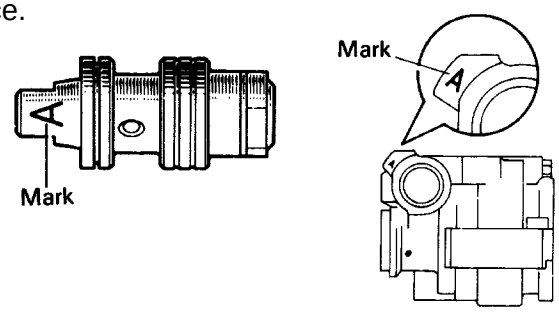
This on–vehicle inspection must be performed every time to ensure that the power steering system is working properly after overhauling or repairing the pump or gear housing.

**VANE PUMP**

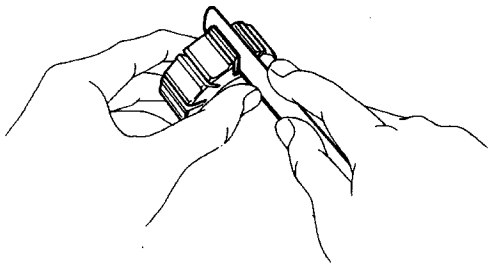
The main component parts of the vane pump, such as the cam ring, rotor, vanes and flow control valve are high precision parts and must be handled carefully. Also, because this pump produces a very high fluid pressure, 0–rings are used for sealing each part. When reassembling the pump, always use new 0–rings.

I n the flow control vlave, there is a relief valve which controls the maximum pressure of the pump. The amount of this maximum pressure is very important; if it is too low, there will be insufficient power steering assist and if too high, it will have an adverse effect on the pressure hoses, oil seals, etc. If the maximum pressure is either too high or too low due to a faulty relief valve, do not disassemble or adjust the relief valve, but replace the flow control valve as an assembly.

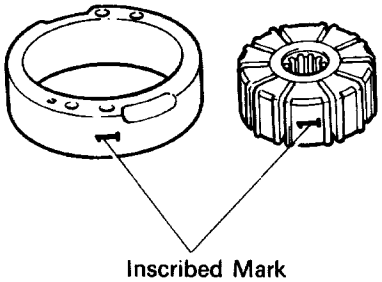
The clearance between the flow control valve and pump body installation hole is very important. After manufacture, the factory measures the size of the installation hole and outer circumference of the flow control valve, and punches a mark accordingly. Therefore, when replacing the flow control valve, be sure to do so with one having the same mark in order to insure the proper clearance.




The functional parts of the pump which produce fluid pressure are the cam ring, rotor and vanes, and these should be checked for wear. If the clearance between each is not within standard when reassembling, any worn parts should be replaced.
In this case, the replaced cam ring and rotor should be of the same length (have the same mark), and the vanes should be replaced with those having a length corresponding to that mark, otherwise the proper thrust clearance cannot be obtained. If there is too much thrust clearance, there will be insufficient fluid pressure at low speeds. If there is too little thrust clearance, it may result in seizure of the vanes.



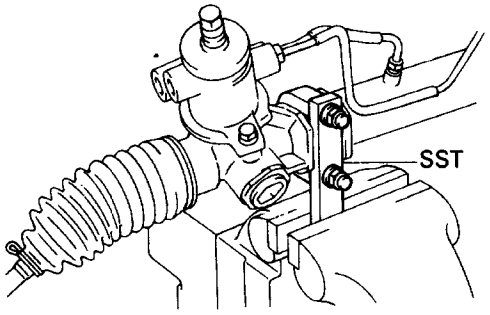
SR3191



SR2673 Inscribed Mark

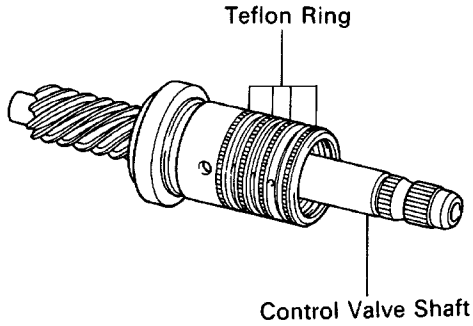
## GEAR HOUSING

If the gear housing is secured directly in a vise during overhaul, there is danger of deforming it, so always first secure it in the SST provided (rack
and pinion steering rack housing stand) before placing it in the vise.



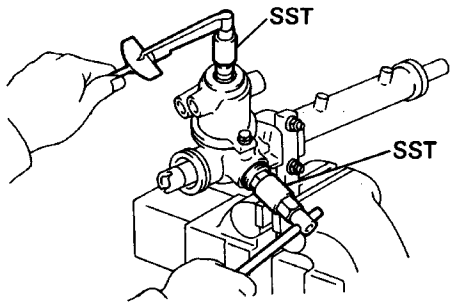

SR3476

The oil seals on both sides of the power cylinder are for the prevention of leakage of the high pressure fluid which acts on the piston. Always use new oil seals when reassembling and be very careful not to scratch or damage them.
Because of the high pressure, even the slightest scratch will cause fluid leakage, resulting in an inoperative power steering system.
Also, be very careful not to scratch the sliding portion of the rack which makes contact with the oil seals. When removing the rack ends from the rack, it is very easy to cause a burr when holding the tip of the rack with a wrench. Therefore, before assembling the rack, first check the tip for burrs and remove any with an oil stone.
Teflon rings are used for the piston and control valve. These teflon rings are highly durable against wear, but if it is necessary to replace them, be careful not to stretch the new ones. After installing a teflon ring into its groove, snug it down into the groove before assembly of the cylinder or housing to prevent possible damage.




SR2400

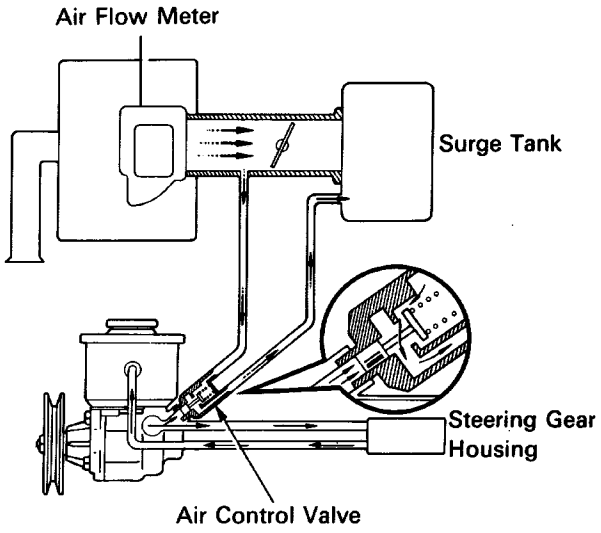
As with the rack and pinion type steering, preload is very important. If the preload is not correct, it could result in such trouble as steering wheel play or shimmy or lack of durability, so always make sure that it is correct.




SR1367

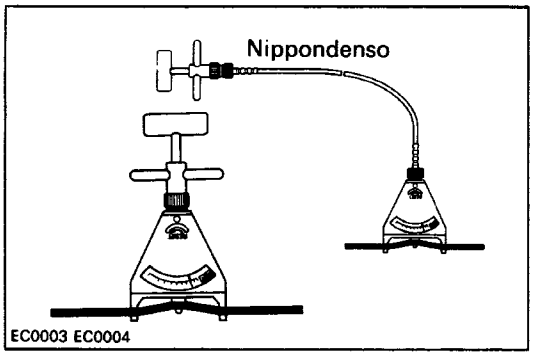
## IDLE–UP DEVICE

The pump produces the maximum fluid pressure when the steering wheel is turned fully to the right or left and, at this time, there is a maximum load on the pump which causes a decrease in engine idle rpm. To solve this problem, vehicles are equipped with an idle– up device which acts to raise the engine idle rpm whenever there is a heavy load on the pump.
On EFI engines, when the piston of the air control valve is pushed by fluid pressure, the air valve opens and the volume of air by–passing the throttle valve is increased to regulate engine rpm.




SR2402

The idle–up device functions to raise engine idle rpm when pump fluid pressure acts on the air control valve, installed to the pump body, to control the flow of air.




# On–Vehicle Inspection

## CHECK DRIVE BELT TENSION

Using a belt tension gauge, check the drive belt tension.

**Belt tension gauge:**

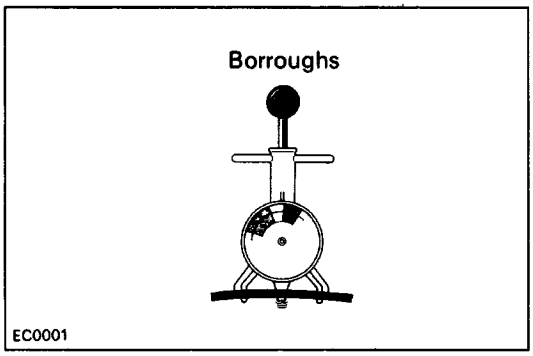
**Nippondenso BTG–20 (95506–00020) or**
**Borroughs No. BT–33–73F**

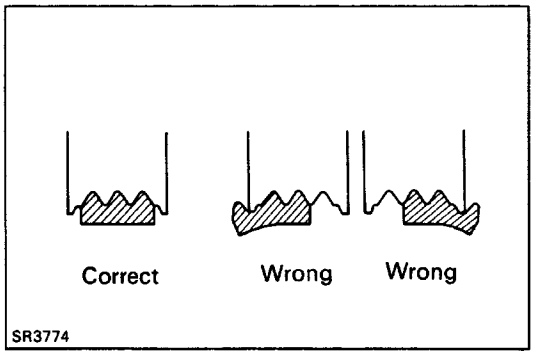
**Drive belt tension:**

**New belt 441 – 667 N (45 – 68 kgf, 100 – 150 lbf)**
**Used belt 265 – 441 N (27 – 45 kgf, 60 – 100 lbf)**

HINT:

- ”New belt” refers to a belt which has been 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 the drive belt, check that it fits properly in the ribbed grooves.

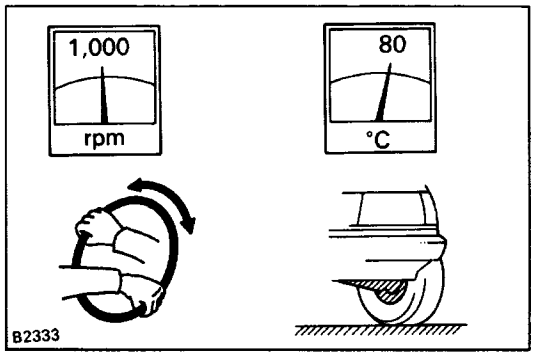
## FLUID LEVEL CHECK

**1. KEEP VEHICLE LEVEL**

**2. BOOST FLUID TEMPERATURE**

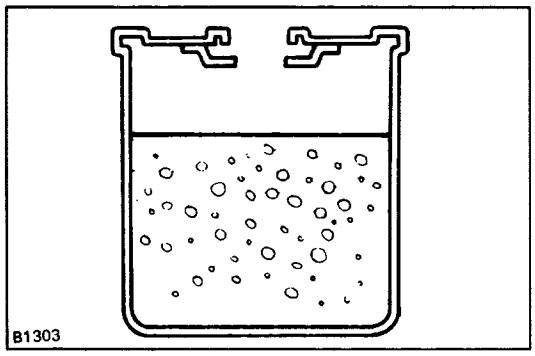
With the engine idling at 1,000 rpm or less, turn the steering wheel from lock to lock several times to boost fluid temperature.

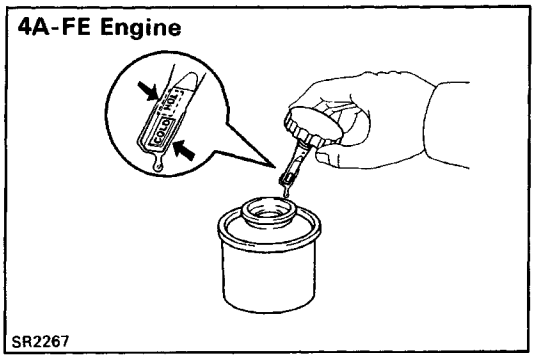
**Fluid temperature: 80˚C (176˚F)**




**3. CHECK FOR FOAMING OR EMULSIFICATION**

HINT: Foaming and emulsification indicate either the existence of air in the system or that the fluid level is too low.



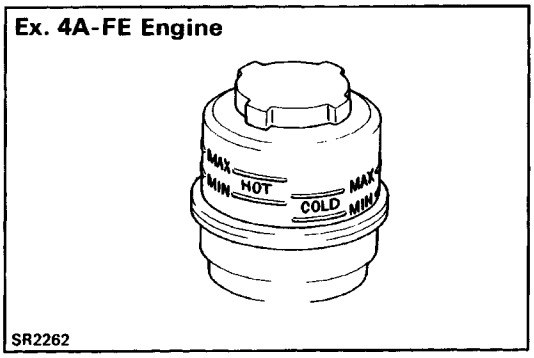



**4. CHECK FLUID LEVEL IN RESERVOIR**

Check the fluid level and add fluid if necessary.

**Fluid: ATF DEXRON II**

HINT: Check that the fluid level is within the HOT LEVEL of the tank or dipstick. If the fluid is cold, check that it is within the COLD LEVEL of the tank or dipstick.




## CHECK IDLE–UP

**1. WARM UP ENGINE**

**2. TURN AIR CONDITIONER SWITCH OFF**

**3. CHECK IDLE–UP**

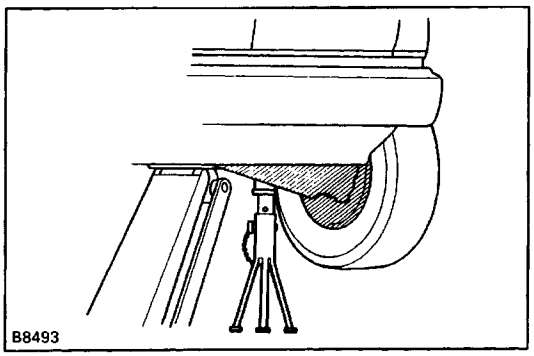
(a) Fully turn the steering wheel.

(b) Check that the engine rpm decreases when the air control valve hose is pinched.

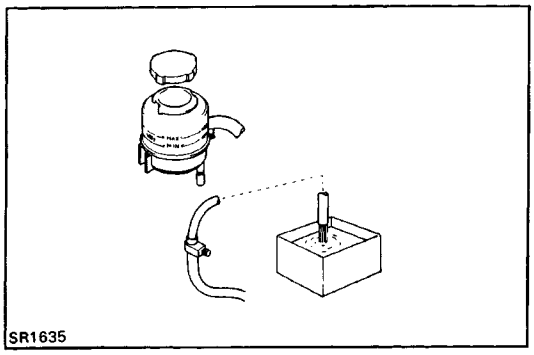
(c) Check that the engine rpm increases when the air control valve hose is released.

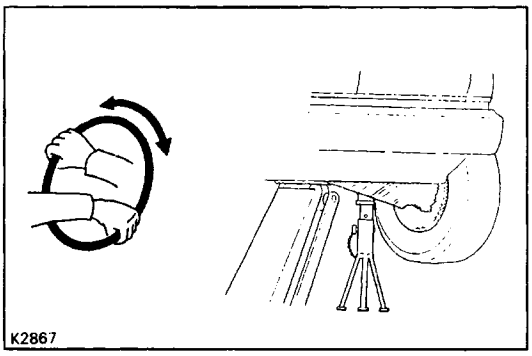
## REPLACEMENT OF POWER STEERING FLUID

**1. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS**

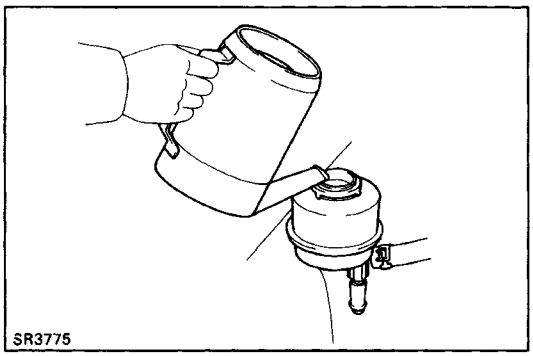



**2. REMOVE FLUID RETURN HOSE FROM RESERVOIR TANK AND DRAIN FLUID INTO CONTAINER**

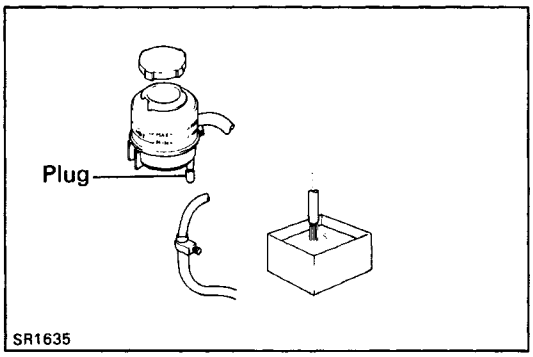



K2867

**3. TURN STEERING WHEEL FROM LOCK TO LOCK WHILE DRAINING FLUID**


SR3775

**4. FILL RESERVOIR TANK WITH FRESH FLUID**
**Fluid type: ATF DEXRON II**



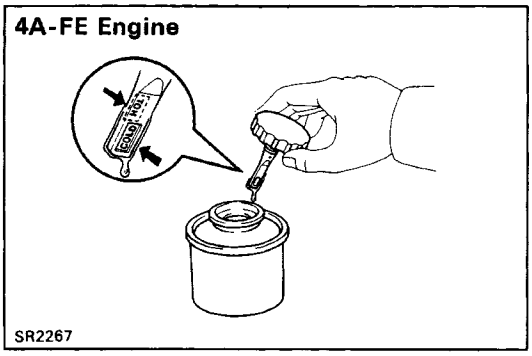
SR1635

**5. START ENGINE AND RUN IT AT 1,000 RPM**
After 1 or 2 seconds, fluid will begin to discharge from the return hose. Stop the engine immediately at this time.
**NOTICE: Take care that some fluid remains left in the reservoir tank.**

**6. REPEAT STEPS 4 AND 5 FOUR OR FIVE TIMES UNTIL THERE IS NO MORE AIR IN FLUID**

**7. CONNECT RETURN HOSE TO RESERVOIR TANK**

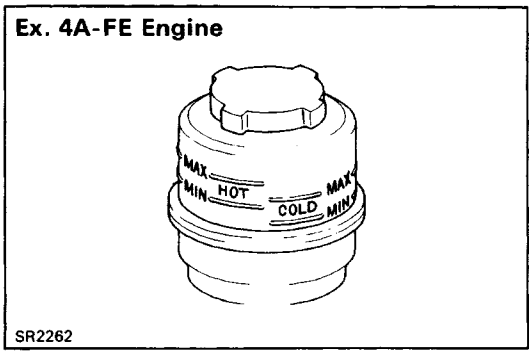
**8. BLEED POWER STEERING SYSTEM**



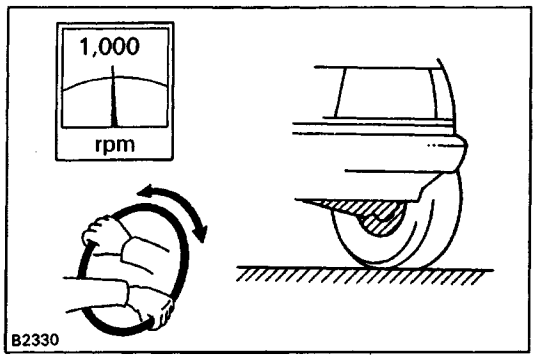
SR2267

## BLEEDING OF POWER STEERING SYSTEM

**1. CHECK FLUID LEVEL IN RESERVOIR TANK**
Check the fluid level and add fluid if necessary.
**Fluid: ATF DEXRON II**
HINT: Check that the fluid level is within the HOT LEVEL of the tank or dipstick. If the fluid is cold, check that it is within the COLD LEVEL of the tank or dipstick.

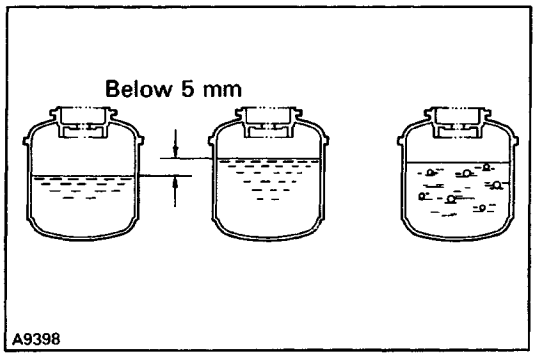


SR2262




**2. START ENGINE AND TURN STEERING WHEEL FROM LOCK TO LOCK THREE OR FOUR TIMES**

With the engine speed below 1,000 rpm, turn the steering wheel to left or right full lock and keep it there for 2 – 3 seconds, then turn the wheel to the reverse full lock and keep it there for 2 – 3 seconds.



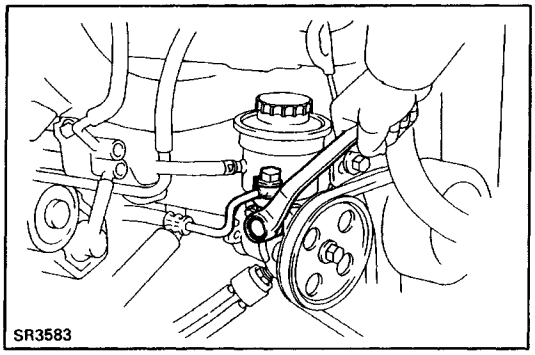

**3. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED**

Measure the fluid level with the engine running. Stop the engine and measure the fluid level.

**Maximum rise: 5 mm (0.20 in.)**

If a problem is found, repeat steps 4 and 5 on page SR–40. Repair the PS if the problem persists.

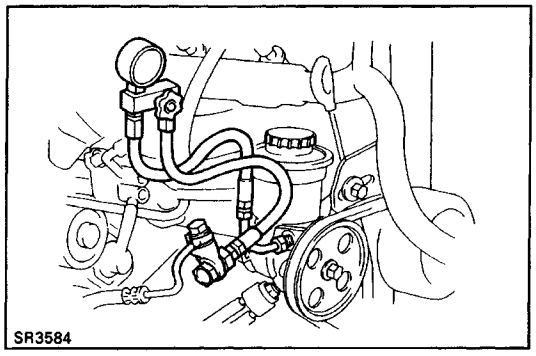
# OIL PRESSURE CHECK




**1. CONNECT PRESSURE GAUGE**

**(4A–FE Engine)**

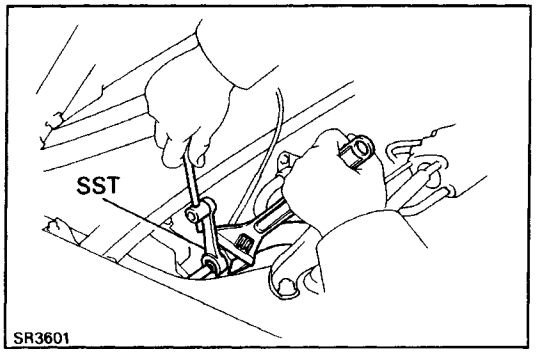
(a) Disconnect the pressure line from the PS pump.




(b) Connect the gauge side of the pressure gauge to the PS pump and the valve side to the pressure line.

(c) Bleed the system. Start the engine and turn the steering wheel from lock to lock two or three times.

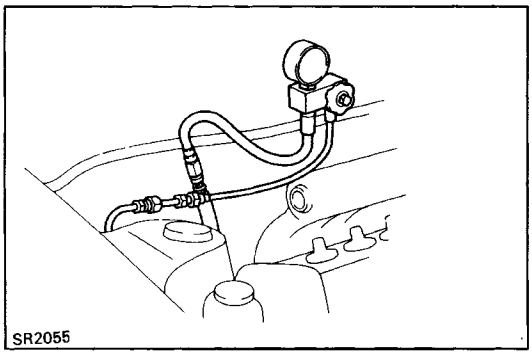
(d) Check that the fluid level is correct.

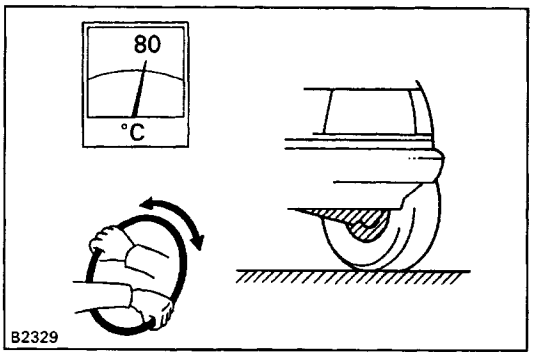



**(Ex. 4A–FE Engine)**

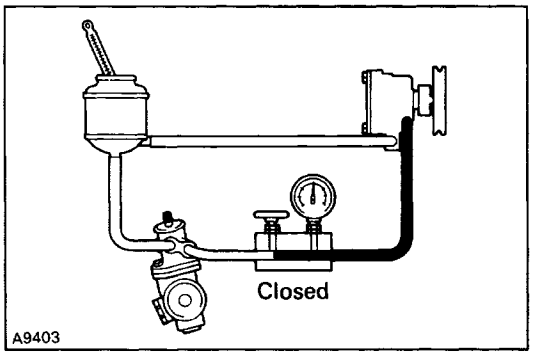
(a) Using SST, disconnect the pressure line joint.

SST 09631–22020

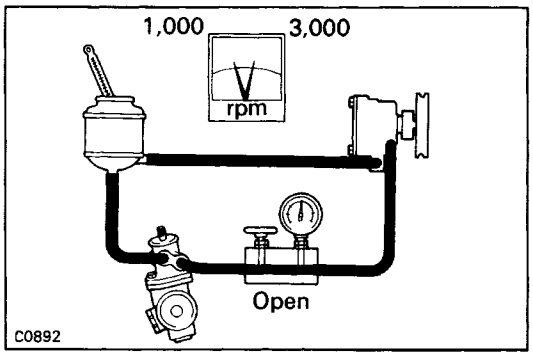

SR2055



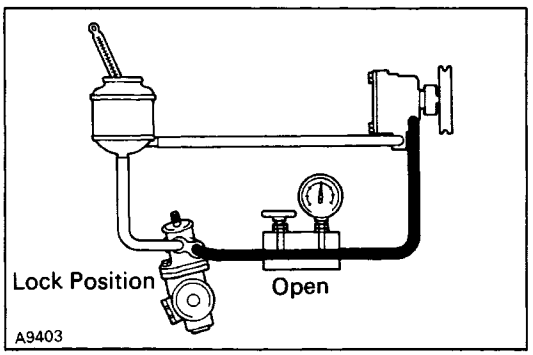
B2329



A9403



C0892



A9403

(b) Connect the gauge side of the pressure gauge to the PS pump side, and the valve side to the gear housing side.
(c) Bleed the system. Start the engine and turn the steering wheel from lock to lock two or three times.
(d) Check that the fluid level is correct.

**2. CHECK THAT FLUID TEMPERATURE IS AT LEAST 80˚C (176˚F)**

**3. START ENGINE AND RUN IT AT IDLE**

**4. CHECK FLUID PRESSURE READING WITH VALVE CLOSED**

Close the pressure gauge valve and observe the reading on the gauge.

**Minimum pressure:**

**4A–FE Engine 6,865 kPa (70 kgf/cm$^2$, 996 psi)**
**5S–FE Engine 7,355 kPa (75 kgf/cm$^2$, 1,068 psi)**
**3S–GTE Engine 7,845 kPa (80 kgf/cm$^2$, 1,138 psi)**

**NOTICE:**

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

If pressure is low, repair or replace the PS pump.

**5. OPEN VALVE FULLY**

**6. CHECK AND RECORD PRESSURE READING AT 1,000 RPM**

**7. CHECK AND RECORD PRESSURE READING AT 3,000 RPM**

Check that there is 490 kPa (5 kgf/cm2, 71 psi) or less difference in pressure between the 1,000 rpm and 3,000 rpm checks.

If the difference is excessive, repair or replace the flow control valve of the PS pump.

**8. CHECK PRESSURE READING WITH STEERING WHEEL TURNED TO FULL LOCK**

Be sure the pressure gauge valve is fully opened and the engine idling.

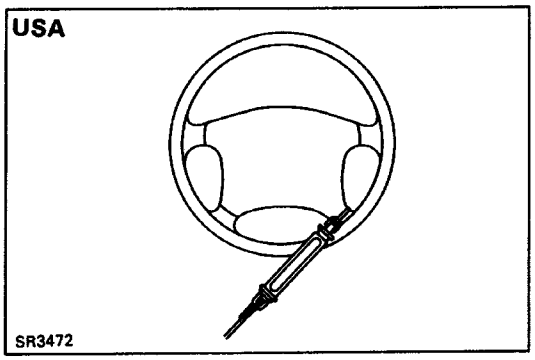
**Minimum pressure:**

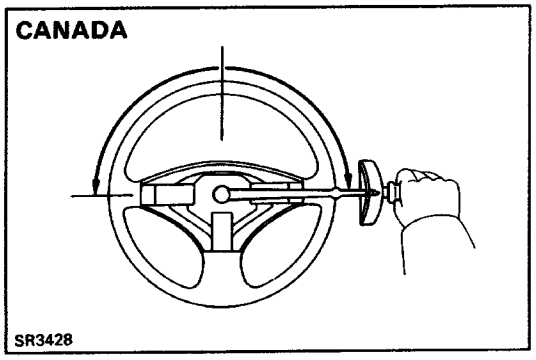
**4A–FE Engine 6,865 kPa (70 kgf/cm$^2$, 996 psi)**
**5S–FE Engine 7,355 kPa (75 kgf/cm$^2$, 1,068 psi)**
**3S–GTE Engine 7,845 kPa (80 kgf/cm$^2$, 1,138 psi)**

**NOTICE:**

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

If pressure is low, the gear housing has an internal leak and must be repaired or replaced.




**9. MEASURE STEERING EFFORT**

**(USA)**

(a) Center the steering wheel and run the engine at idle.

(b) Using a spring balance, measure the steering effort in both directions.

**Maximum steering effort: 39 N (4 kgf, 8.8 lbf)**

If steering effort is excessive, repair the power steering unit.

HINT: Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

**(CANADA)**

(a) Center the steering wheel and run the engine at idle.

(b) Using a torque meter, measure the steering effort in both directions.

**Maximum steering effort: 6.9 N–m (70 kgf–cm, 61 in..lbf**

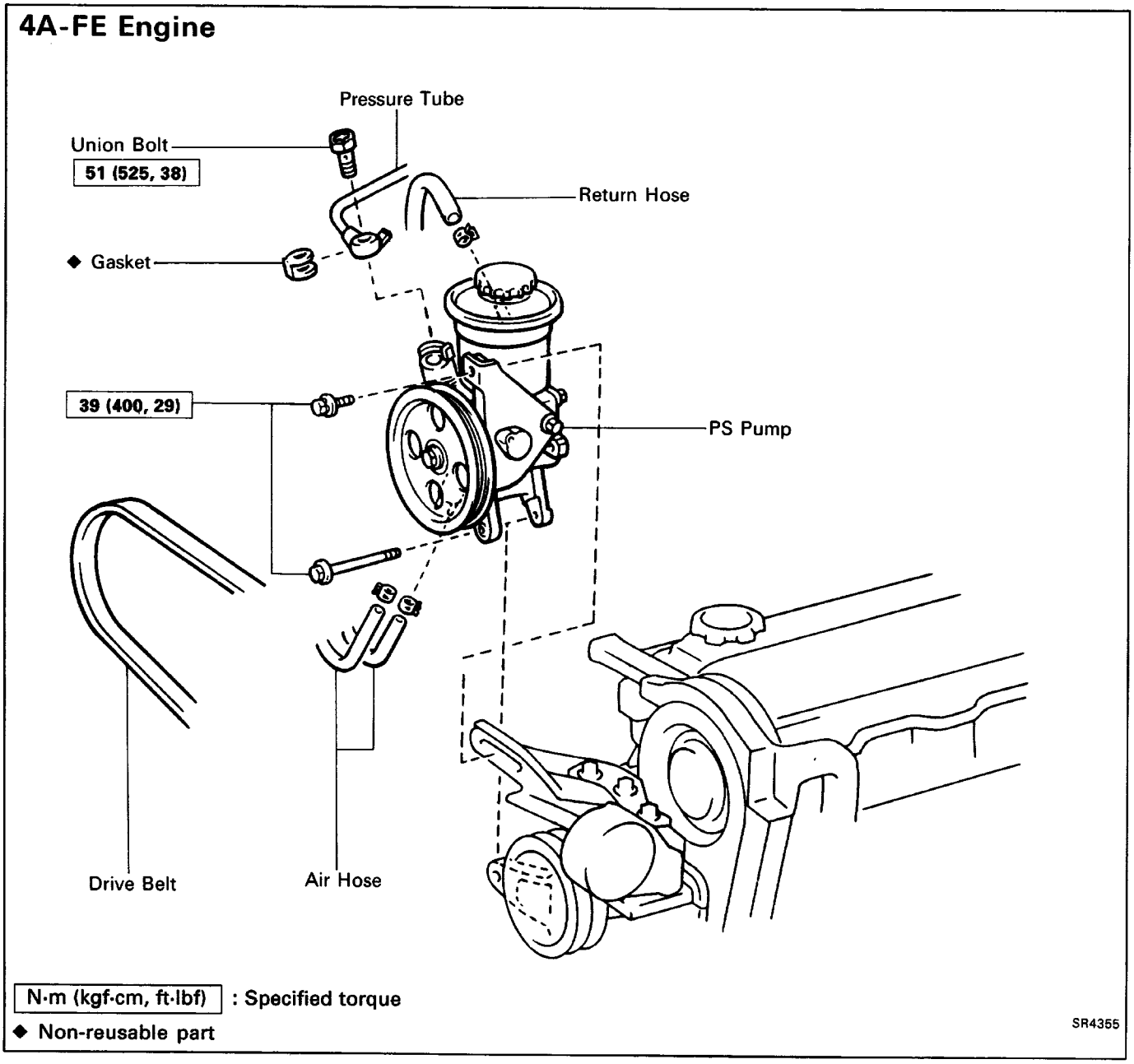
If steering effort is excessive, repair the power steering unit.

HINT: Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

# Power Steering Pump

## REMOVAL AND INSTALLATION OF POWER STEERING PUMP

Remove and install the parts as shown.

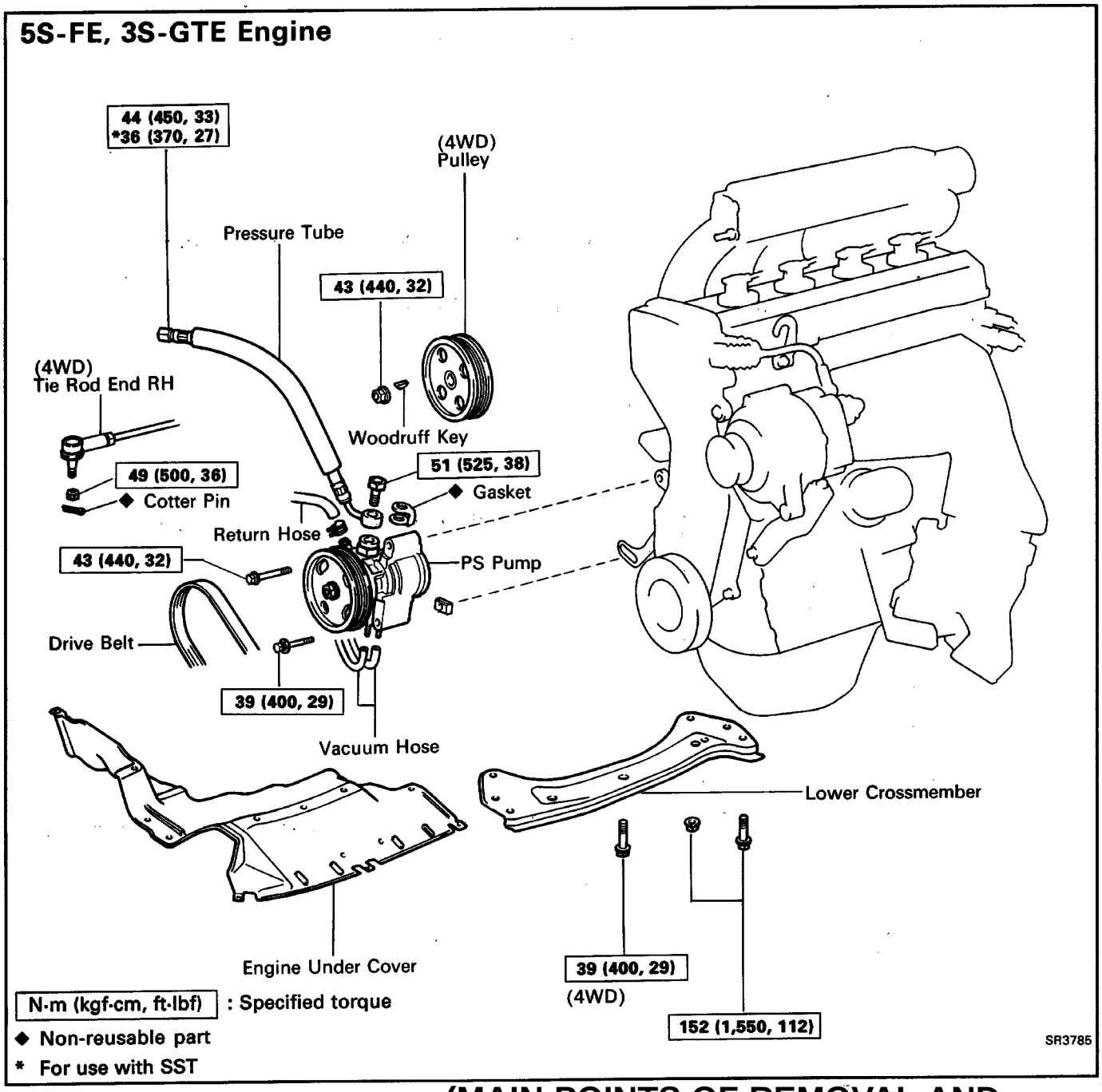


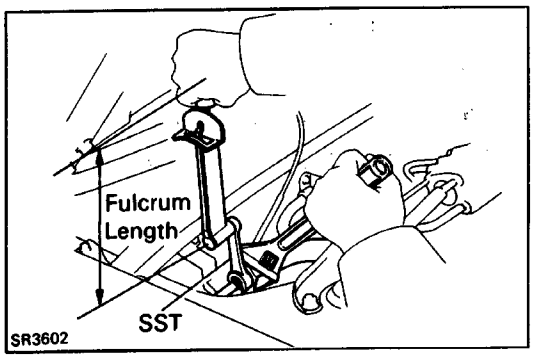

## (MAIN POINTS OF REMOVAL AND INSTALLATION)

1. **ADJUST DRIVE BELT TENSION AFTER INSTALLING PS PUMP (See page SR–38)**
2. **BLEED POWER STEERING SYSTEM (See page SR–40)**

# REMOVAL AND INSTALLATION OF POWER STEERING PUMP (CONT'D)

Remove and install the parts as shown.




# (MAIN POINTS OF REMOVAL AND INSTALLATION)

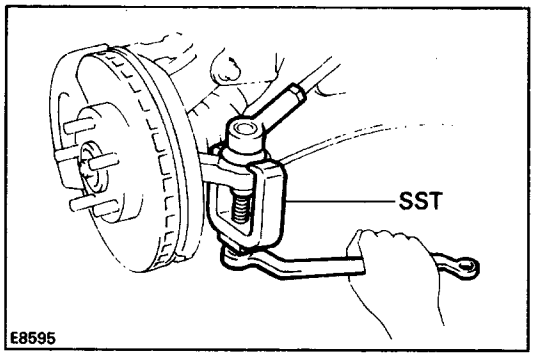
**1. DISCONNECT AND CONNECT PRESSURE LINE**

Using SST, disconnect and connect the pressure line.

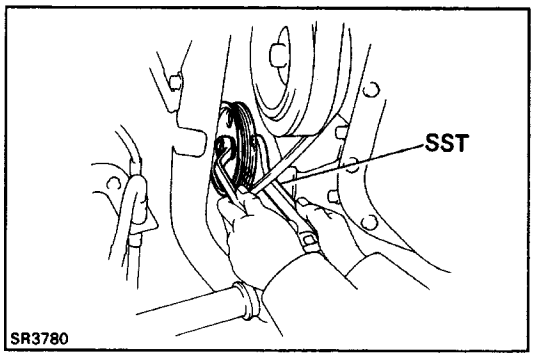
SST 09631–22020

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

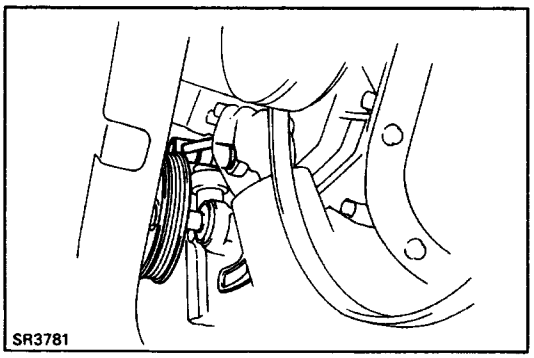
HINT: When connecting, use a torque wrench with a fulcrum length of 300 mm (11.81 in.).



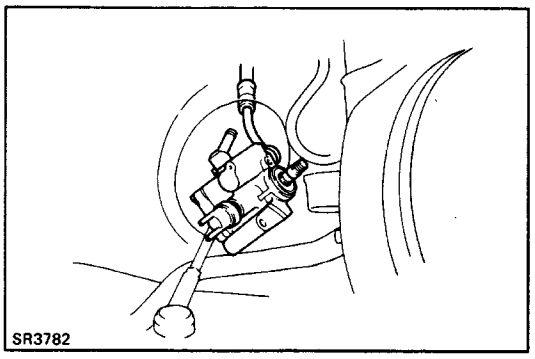

**2. (4WD)**
**DISCONNECT TIE ROD END RH**
(a) Remove the cotter pin and nut.
(b) Using SST, disconnect the tie rod end RH.
SST 09611–22012



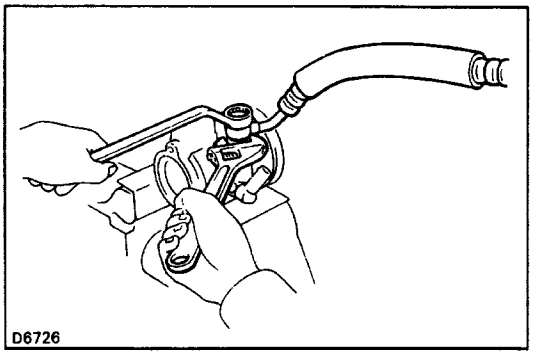

**3. (4WD)**
**REMOVE PS PUMP WITH PRESSURE TUBE**
(a) Using SST to hold the pulley, loosen the pulley set
SST 09616–30020



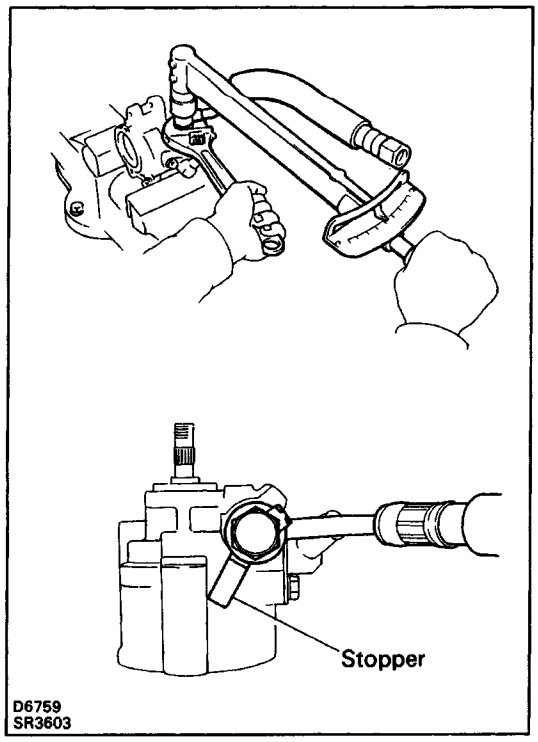

(b) Slide the pump pulley, and loosen the through bolt.




(c) Remove the PS pump from the tie rod end hole.




**4. REMOVE PRESSURE TUBE**
(a) Mount the PS pump in the vise.
**NOTICE: Do not tighten the vise too tight.**
(b) Remove the union bolt and pressure tube.




**5. INSTALL PRESSURE TUBE**

(a) Install the pressure tube with the union bolt and a new gasket.

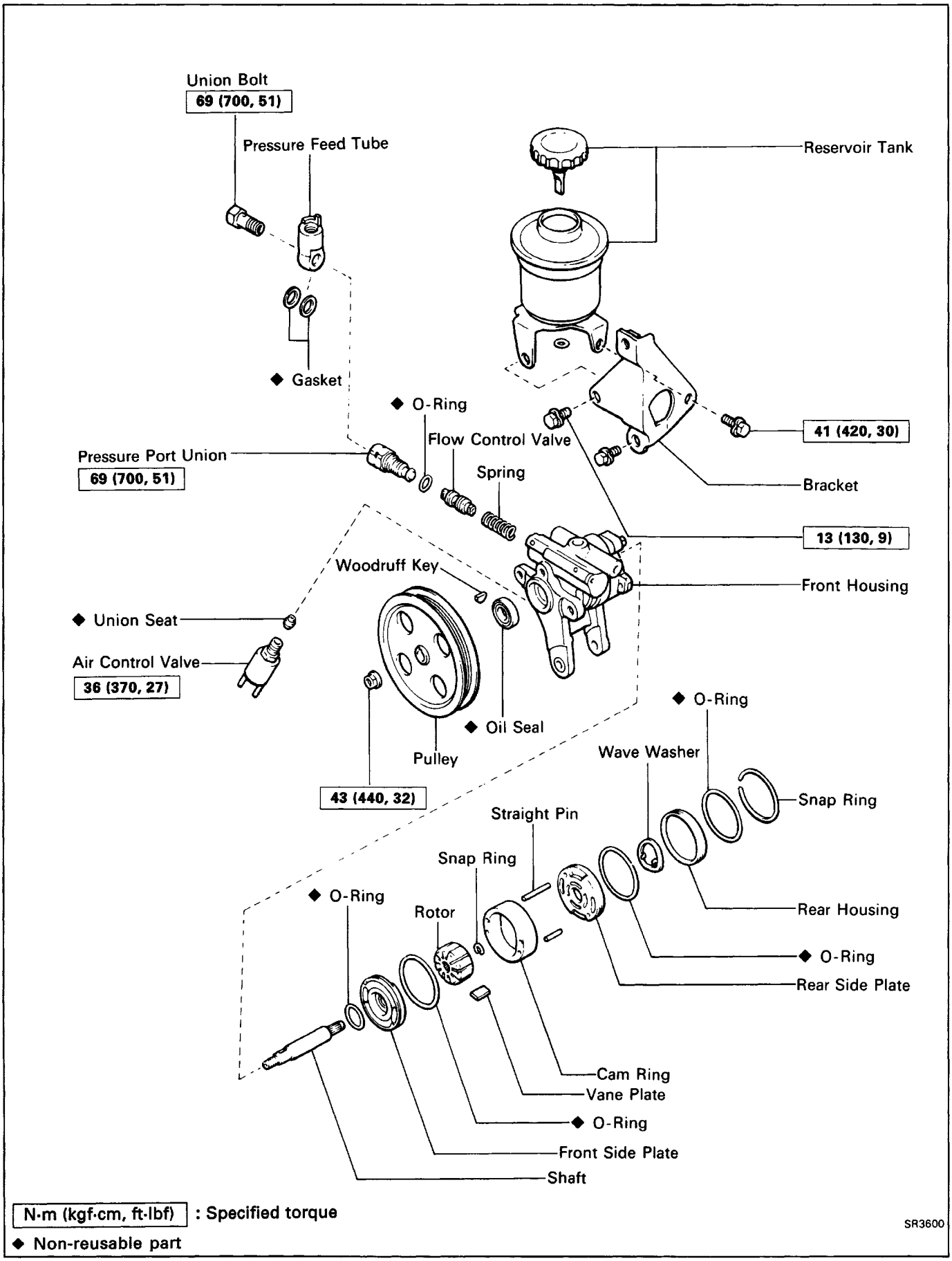
(b) Make sure the stopper is touching the pump housing as shown, then torque the union bolt.

**Torque: 51 N–m (525 kgf–cm, 38 ft–lbf)**

**6. ADJUST DRIVE BELT TENSION AFTER INSTALLING PS PUMP**

**7. BLEED POWER STEERING SYSTEM**

# COMPONENTS (4A–FE ENGINE)

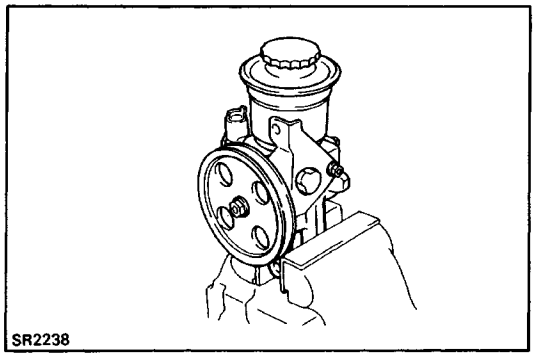



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

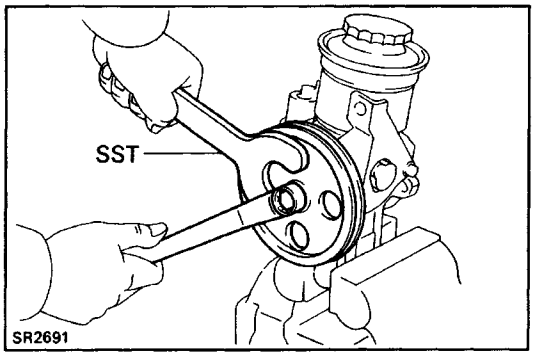
SR3600

# DISASSEMBLY OF POWER STEERING PUMP




**1. MOUNT POWER STEERING PUMP IN VISE**

**NOTICE: Do not tighten the vise too tight.**

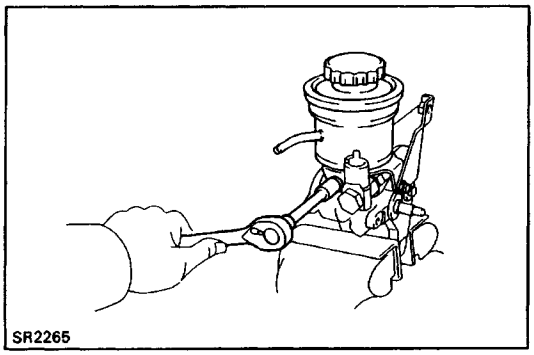



**2. REMOVE DRIVE PULLEY**

(a) Using SST to hold the pulley, remove the pulley set nut.

SST 09616–22010

(b) Remove the pulley and woodruff key.

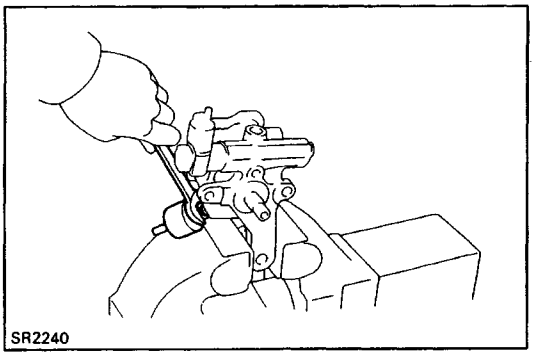



**3. REMOVE RESERVOIR TANK AND BRACKET**

(a) Remove the three bolts and bracket.

(b) Remove the bolt and reservoir tank.

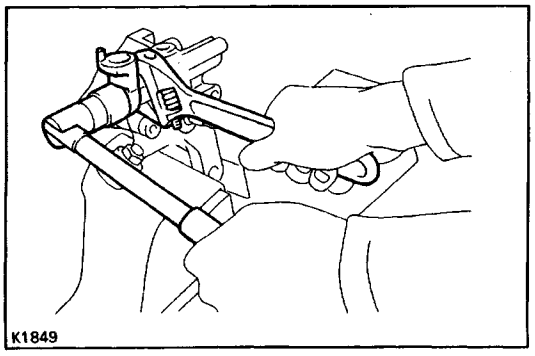
(c) Remove the 0–ring from the reservoir tank.




**4. REMOVE AIR CONTROL VALVE**

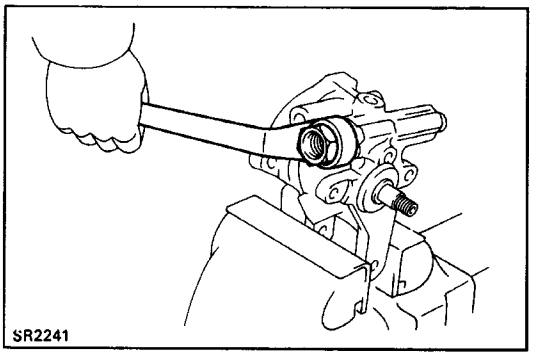
Remove the air control valve.

HINT: Replace the union seat with a new one only when it is damaged.

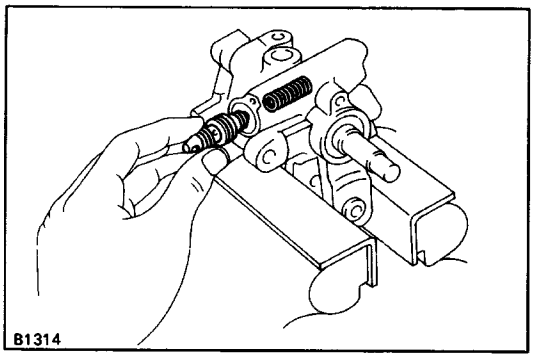



**5. REMOVE PRESSURE FEED TUBE, PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING**

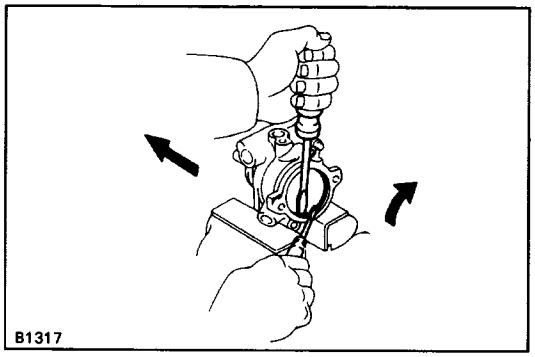
(a) Remove the union bolt, gaskets and pressure feed tube.




(b) Remove the pressure port union.
(c) Remove the 0–ring from the union.

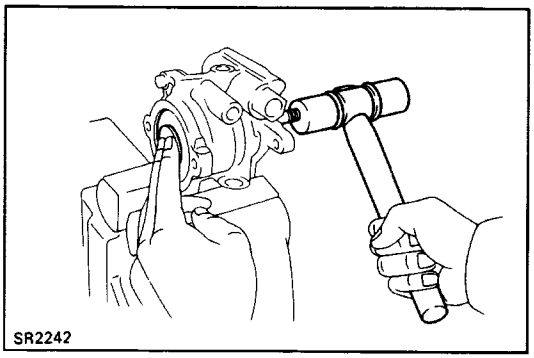



(d) Remove the flow control valve and spring.

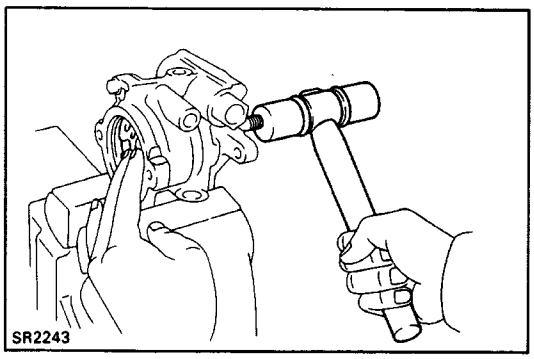



**6. REMOVE REAR HOUSING**

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

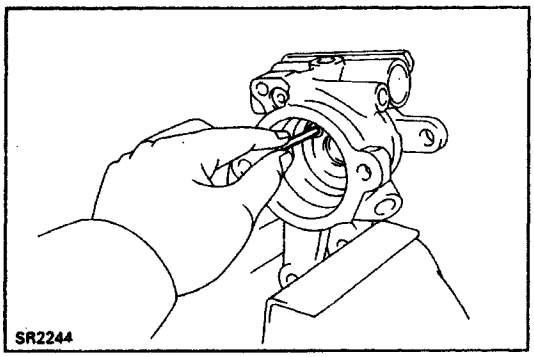



(b) Using a plastic hammer, tap out the rear housing and wave washer.
(c) Remove the O–ring from the rear housing.




**7. REMOVE REAR SIDE PLATE**

(a) Using a plastic hammer, tap the shaft end and remove the rear plate.
(b) Remove the O–ring from the rear plate.

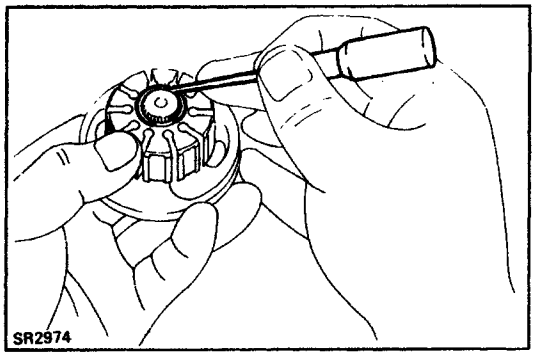



**8. REMOVE VANE PUMP SHAFT, CAM RING AND VANE PLATES**

(a) Remove the pump shaft with cam ring, vane plates from the front housing.

(b) Remove the cam ring and ten vane plates from the pump shaft.

(c) Remove the longer straight pin from the front housing.

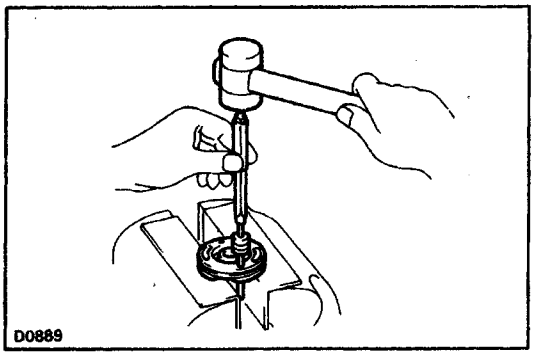



**9. REMOVE ROTOR AND FRONT SIDE PLATE**

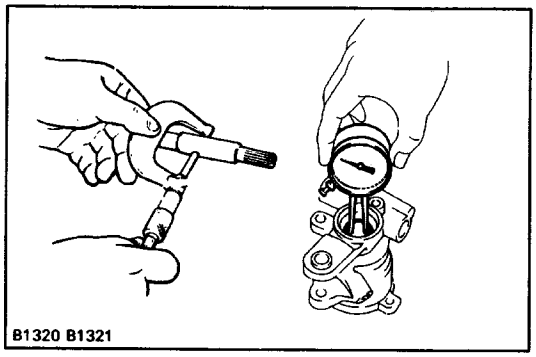
(a) Using a screwdriver, remove the snap ring.

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

(c) Remove the two 0–rings from the front plate.




(d) Using a pin punch and hammer, drive out the straight pin.


B1320 B1321

# INSPECTION OF POWER STEERING PUMP

**1. MEASURE OIL CLEARANCE OF SHAFT AND BUSHING**

Using a micrometer and calipers, measure the oil clearance.

**Standard clearance: 0.01 – 0.03 mm (0.0004 – 0.0012 i n. )**

**Maximum clearance: 0.07 mm (0.0028 in.)**

If more than maximum, replace the entire power steering pump.

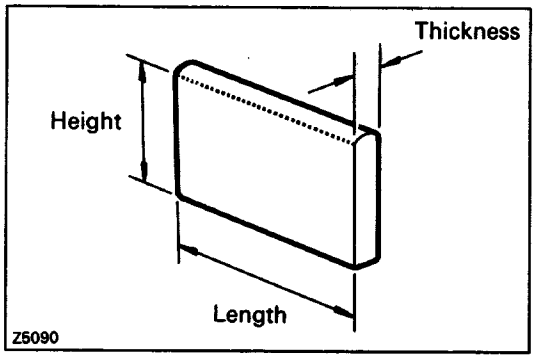
**2. INSPECT ROTOR AND VANE PLATES**

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

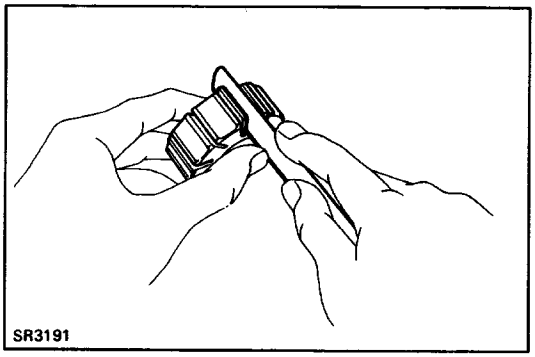
**Minimum height: 8.00 mm (0.3150 in.)**

**Minimum thickness: 1.77 mm (0.0697 in.)**

**Minimum length: 14.97 mm (0.5894 in.)**



Z5090


SR3191

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

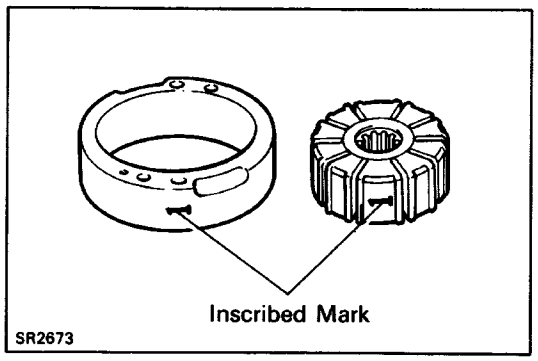
**Maximum clearance: 0.03 mm (0.0012 in.)**

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

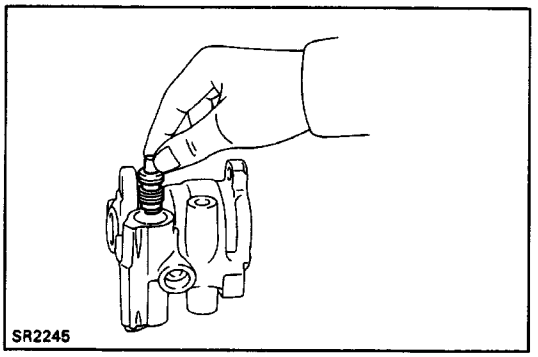
**Inscribed mark: 1,2,3,4 or None**

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

| Rotor and cam ring mark | Vane length mm (in.) |
|---|---|
| None | 14.996 – 14.998 (0.59039 – 0.59047) |
| 1 | 14.994 – 14.996 (0.59032 – 0.59039) |
| 2 | 14.992 – 14.994 (0.59024 – 0.59032) |
| 3 | 14.990 – 14.992 (0.59016 – 0.59024) |
| 4 | 14.988 – 14.990 (0.59008 – 0.59016) |

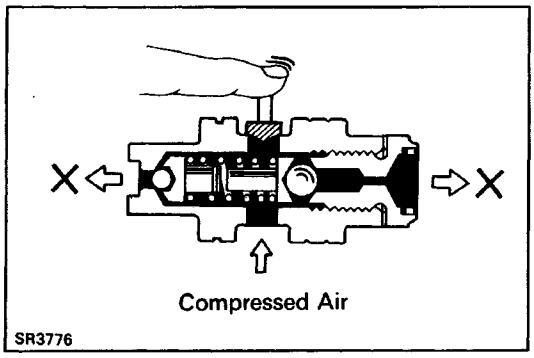


SR2673

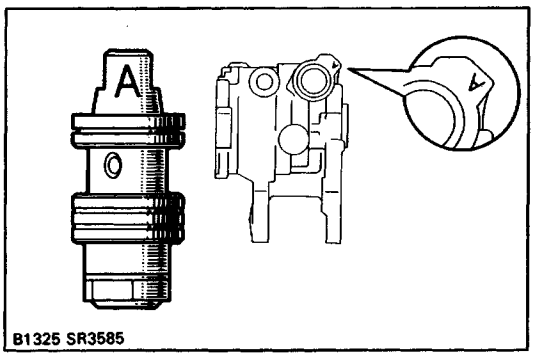

SR2245

**3. INSPECT FLOW CONTROL VALVE**

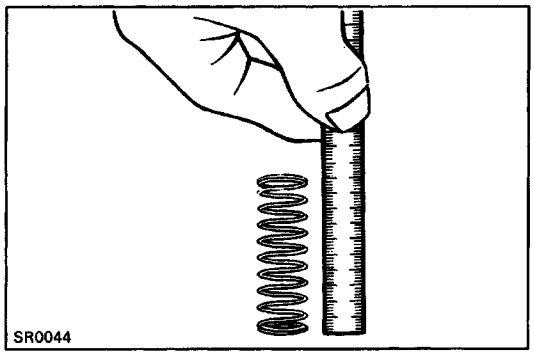
(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



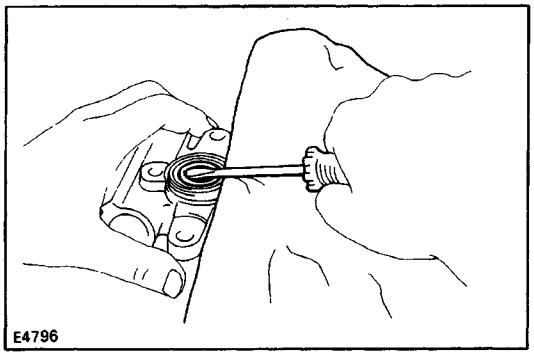

(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air [392 – 490 kPa (4 – 5 kg¿¿¿m2, 57 – 71 psi)] into the opposite side, and confirm that air does not come out from the end hole.



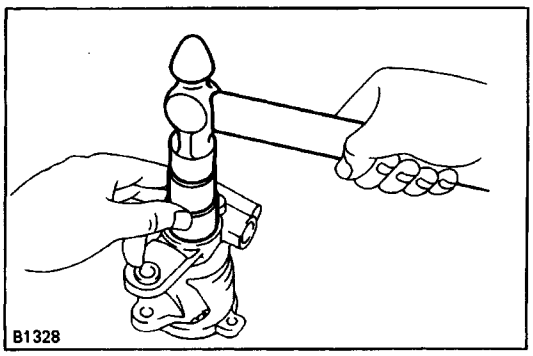

If necessary, replace the valve with one having the same
letter as inscribed on the front housing.
**Inscribed mark: A,B,C,D,E or F**



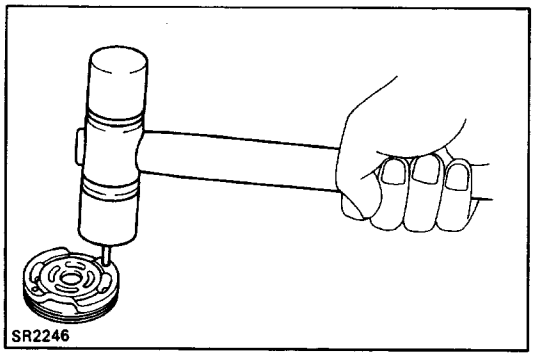

**4. INSPECT FLOW CONTROL SPRING**
Using a scale, measure the free length of the spring.
**Spring length: 36 – 38 mm (1.42 –1.49 in.)**
If not within specification, replace the spring.




**5. IF NECESSARY, REPLACE OIL SEAL**
(a) Using a screwdriver, pry out the oil seal.




(b) Using a socket wrench and hammer, drive in a new oil seal.


SR2246

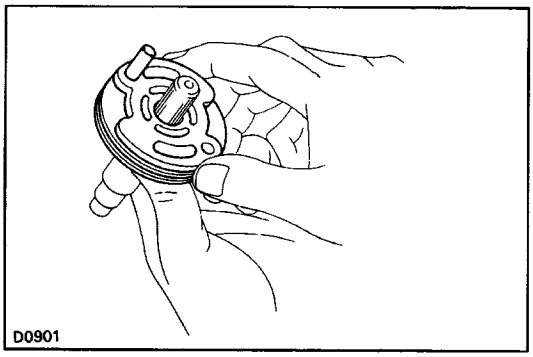
# ASSEMBLY OF POWER STEERING PUMP

**(See page SR–48)**

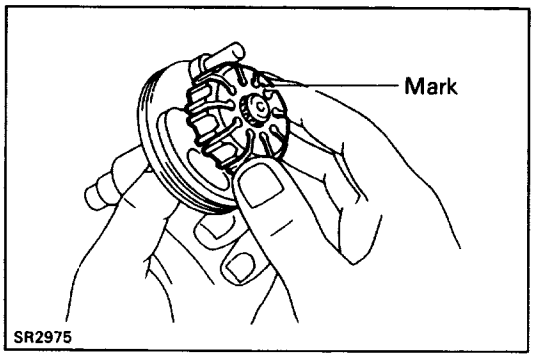
**1. COAT ALL SLIDING SURFACES WITH POWER STEERING FLUID BEFORE ASSEMBLY**

**2. INSTALL FRONT SIDE PLATE AND ROTOR TO PUMP SHAFT**

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

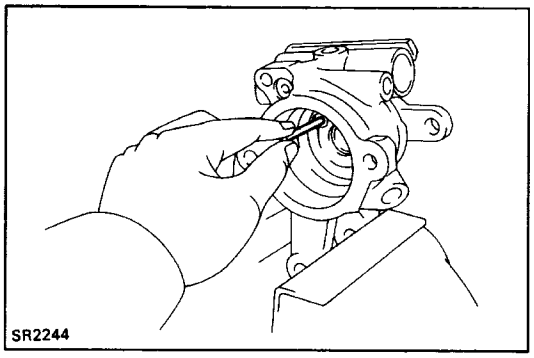

D0901

(b) Install two new 0–rings to the front plate.
(c) Install the front plate to the pump shaft.



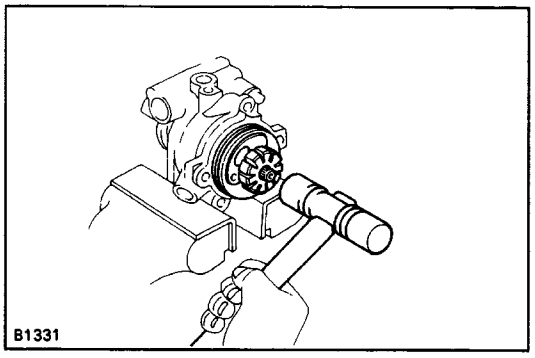
SR2975

(d) Install the rotor to the shaft with the inscribed mark on the rotor facing toward the rear.
(e) Install the snap ring.

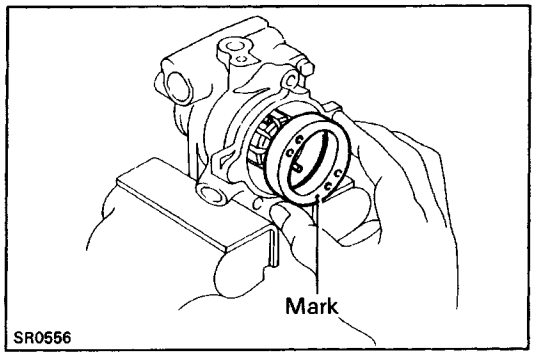

SR2244

**3. INSTALL PS PUMP SHAFT TO FRONT HOUSING**

(a) Coat the oil seal lip with MP grease.
(b) Install the longer straight pin to the front housing.


B1331

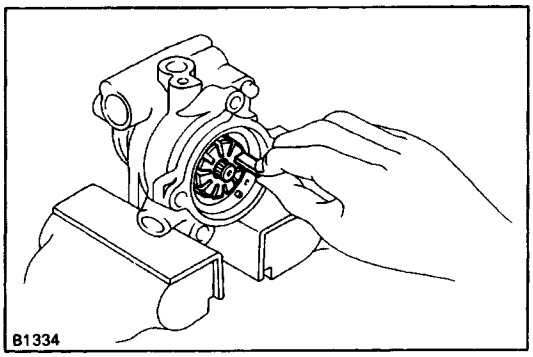
(c) Align the hole of the front plate and straight pin and tap in the pump shaft with a plastic hammer.
**NOTICE: Be careful not to damage the oil seal and O–rings.**




**4. INSTALL CAM RING**

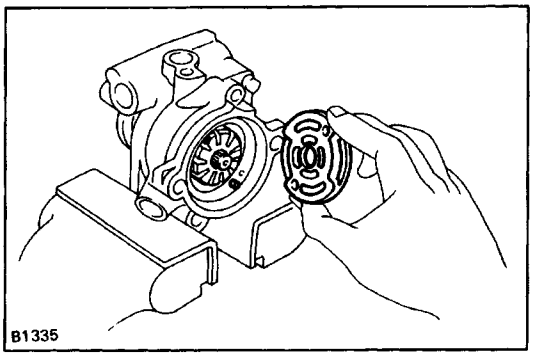
Match the wide hole of the cam ring with the longer straight pin, and install the cam ring.

HINT: Install the cam ring with the inscribed mark facing the rear.




**5. INSTALL VANE PLATES**

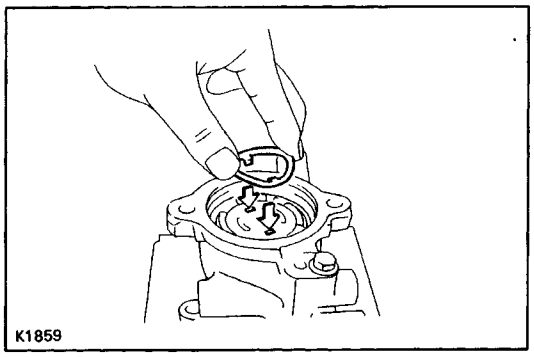
Install the vane plates with the round end facing outward.




**6. INSTALL REAR SIDE PLATE**

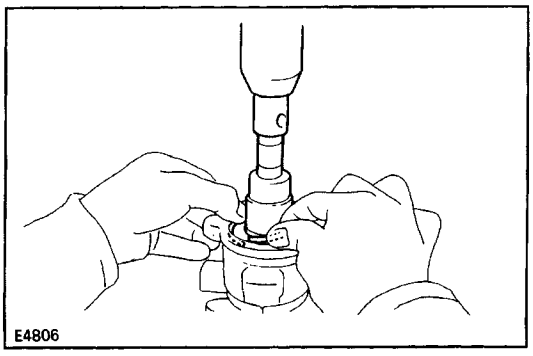
(a) Install a new 0–ring to the side plate.

(b) Match the wide hole with the longer straight pin and install the plate.




**7. INSTALL WAVE WASHER**

Install the wave washer so that its protrusions fit into the slots i n the rear side plate.



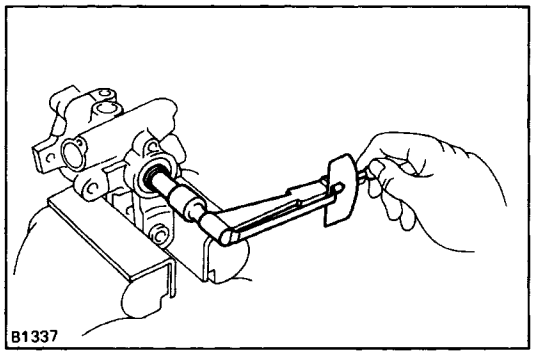

**8. INSTALL REAR HOUSING**

(a) Install a new 0–ring to the rear housing.

(b) Install the rear housing and use a press to push down on the wave washer hard enough to compress it.

**NOTICE: Do not apply too much pressure.**

(c) Install the snap ring.

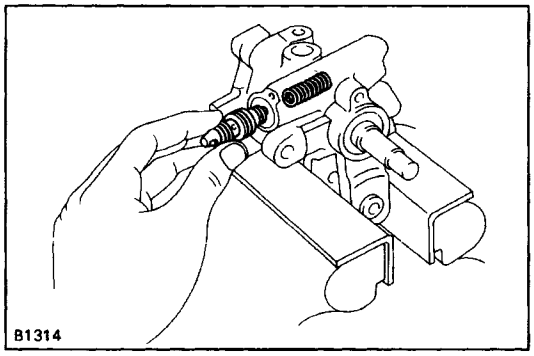



**9. MEASURE PUMP SHAFT PRELOAD**

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

(b) Temporarily install the pulley nut and check the rotating torque.

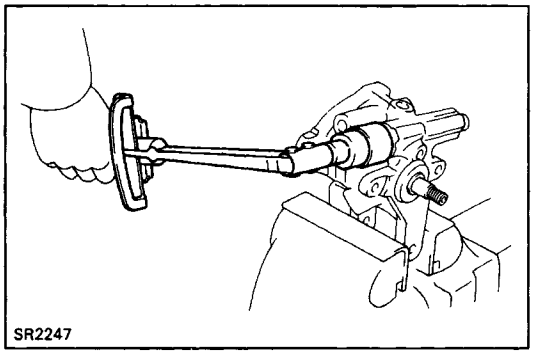
**Rotating torque: 0.3 N–m (2.8 kgf–cm, 2.4 in.–lbf) or less**



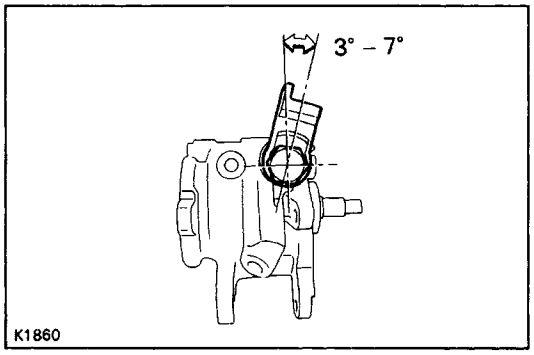

**10. INSTALL SPRING, FLOW CONTROL VALVE, PRESSURE PORT UNION AND PRESSURE FEED TUBE**

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

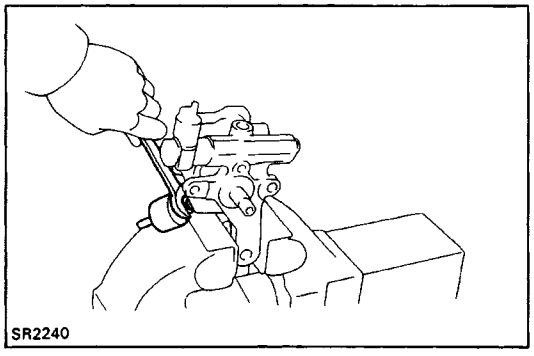
(b) Install a new 0–ring in the groove of the pressure port union.




(c) Install and torque the pressure port union.
**Torque: 69 N–m (700 kgf–cm, 51 ft–lbf)**

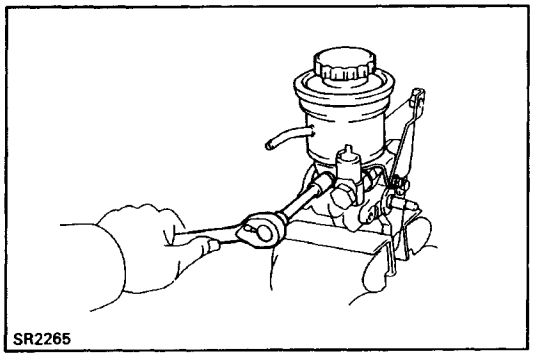



(d) Install the pressure feed tube, new gaskets and union bolt.
**Torque: 69 N–m (700 kgf–cm, 51 ft.lbf)**




**11. INSTALL AIR CONTROL VALVE**

Install and tighten the valve.
**Torque: 36 N–m (370 kgf–cm, 27 ft–lbf)**




**12. INSTALL RESERVOIR TANK AND BRACKET**

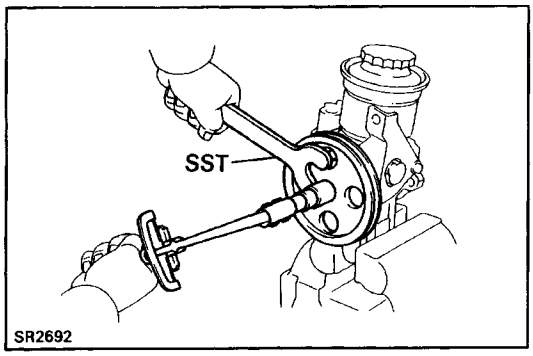
(a) Install a new 0–ring to the reservoir tank.

(b) Install the reservoir tank and bracket and torque the bolts.

**Torque:**

**12 mm head bolt 13 N–m (730 kgf–cm, 9 ft–lbf)**

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




**13. INSTALL DRIVE PULLEY**

(a) Install the woodruff key to the shaft.

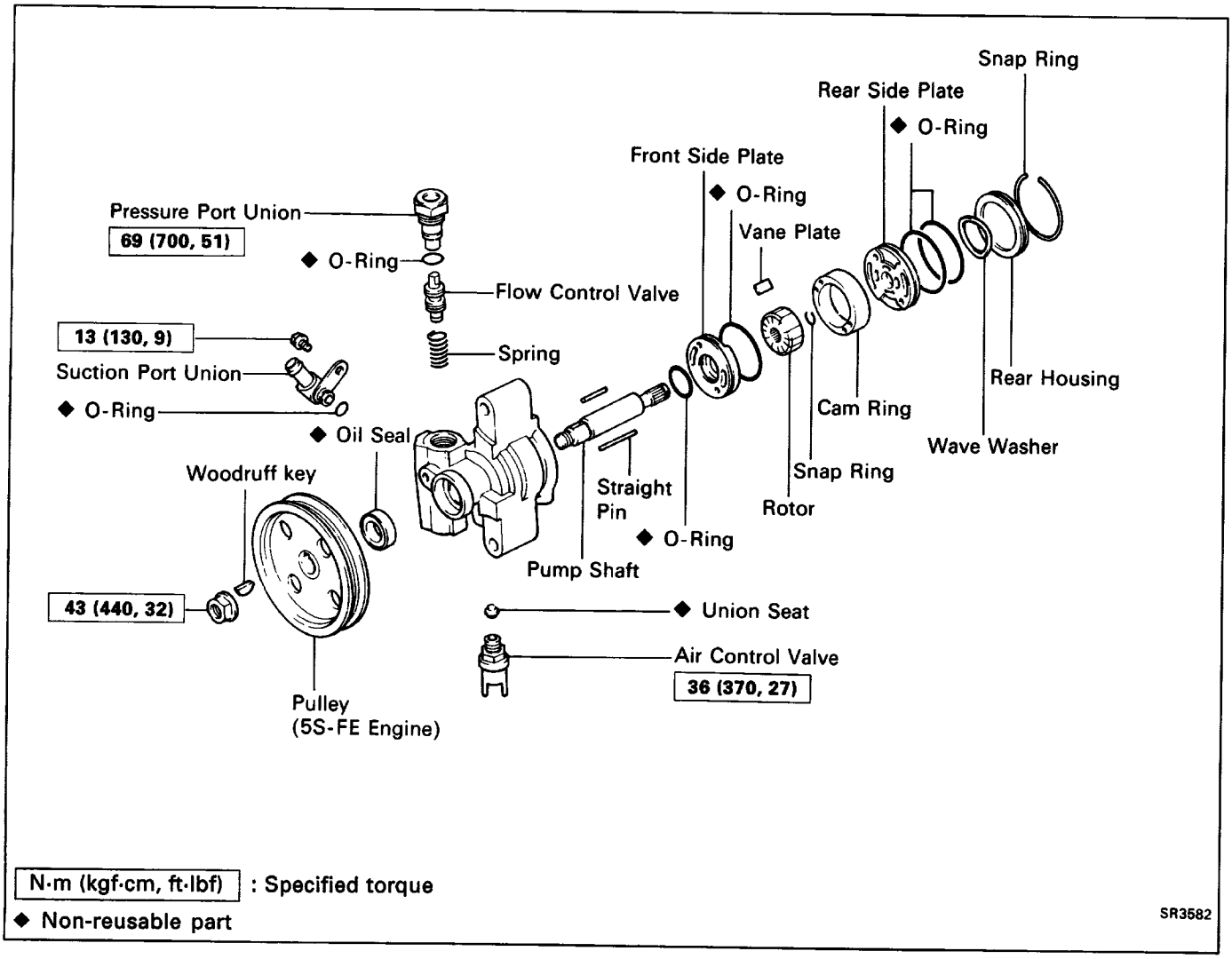
(b) Install the pulley and nut to the shaft.

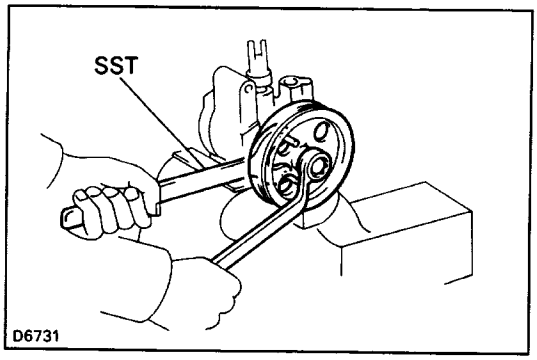
(c) Using SST to hold the pulley, torque the nut.

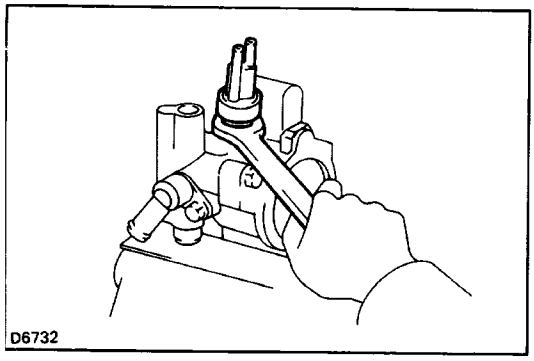
SST 09616–22010

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

# COMPONENTS (5S–FE, 3S–GTE ENGINE)

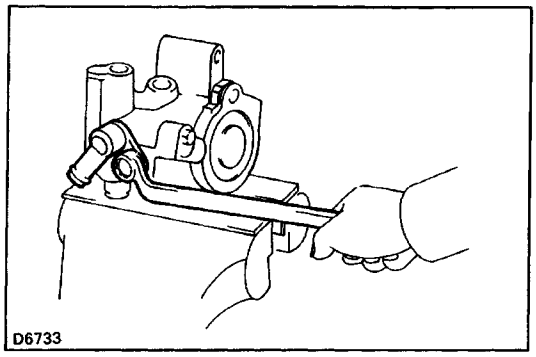



# DISASSEMBLY OF POWER STEERING PUMP

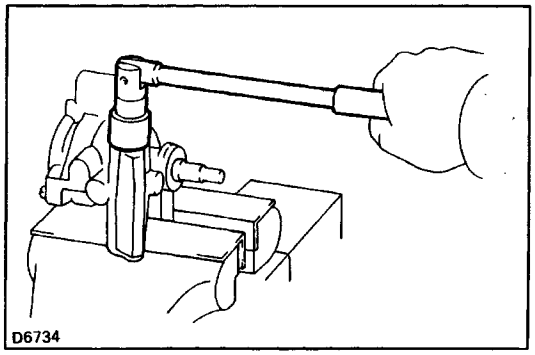
1. **MOUNT POWER STEERING PUMP IN VISE**
   **NOTICE: Do not tighten the vise too tight.**
2. **(5S–FE Engine)**
   **REMOVE PS PUMP PULLEY**
   (a) Using SST, remove the pulley set nut.
   SST 09616–30020
   (b) Remove the pulley and woodruff key.
3. **REMOVE AIR CONTROL VALVE**
   Remove the air control valve.
   HINT: Replace the union seat with a new one only when it is damaged.




**4. REMOVE SUCTION PORT UNION**

(a) Remove the bolt and union.

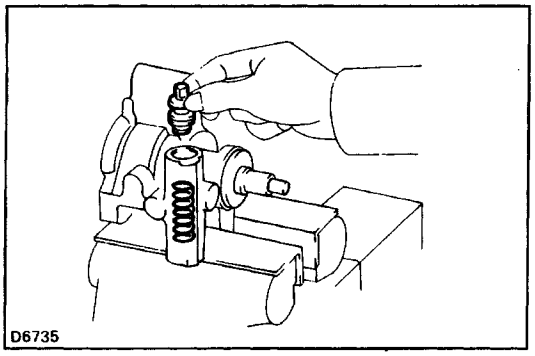
(b) Remove the O–ring from the union.



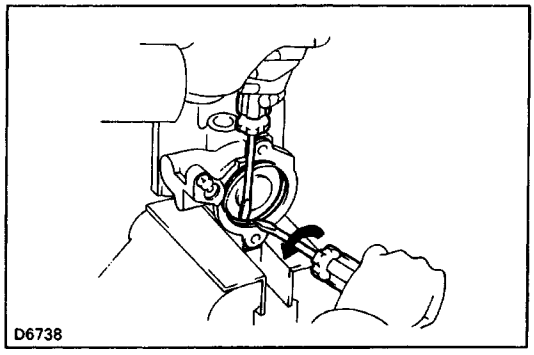

**5. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING**

(a) Remove the pressure port union.

(b) Remove the O–ring from the union.

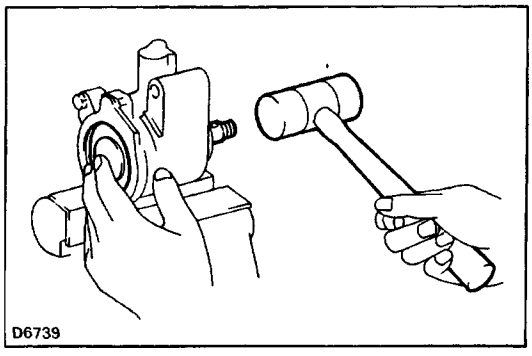



(c) Remove the flow control valve and spring.



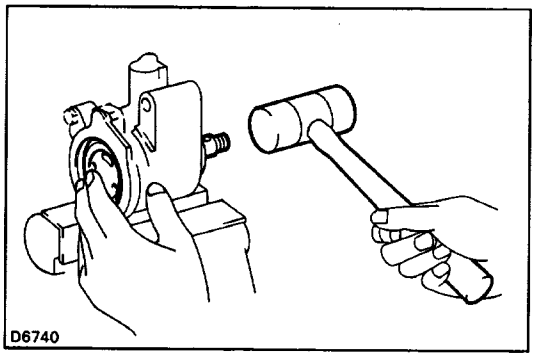

**6. REMOVE REAR HOUSING**

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




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

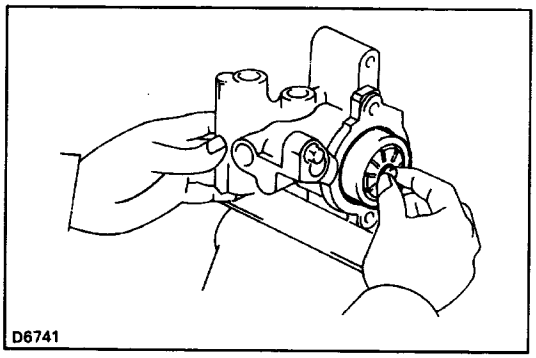
(c) Remove the O–ring from the rear housing.




**7. REMOVE REAR SIDE PLATE**

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

(b) Remove the 0–ring from the rear plate.

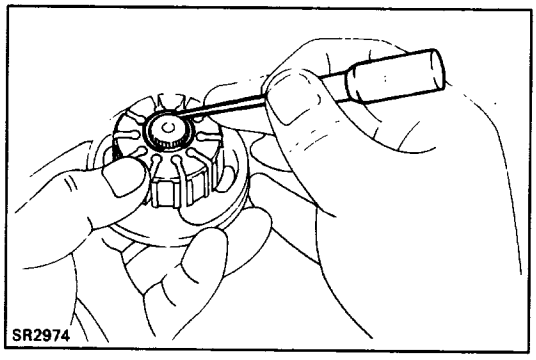



**8. REMOVE VANE PUMP SHAFT, CAM RING AND VANE PLATES**

(a) Remove the pump shaft with cam ring and vane plates from the front housing.

(b) Remove the cam ring and ten vane plates from the pump shaft.

(c) Remove the longer straight pin from the front housing.

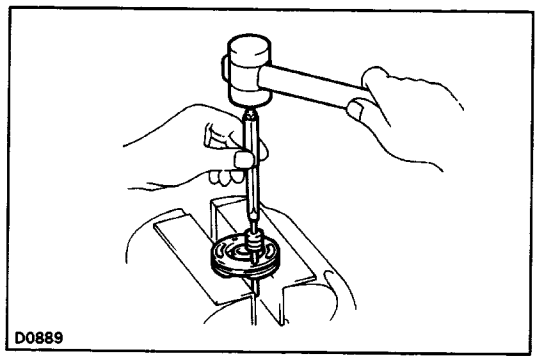



**9. REMOVE ROTOR AND FRONT SIDE PLATE**

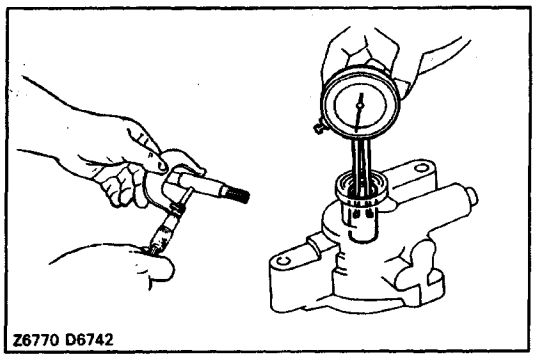
(a) Using a screwdriver, remove the snap ring.

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

(c) Remove the two 0–rings from the front plate.




(d) Using a pin punch and hammer, driver out the straight pin.


Z6770 D6742

# INSPECTION OF POWER STEERING PUMP

**1. MEASURE OIL CLEARANCE OF SHAFT AND BUSHING**

Using a micrometer and calipers, 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 more than maximum, replace the entire power steering pump.

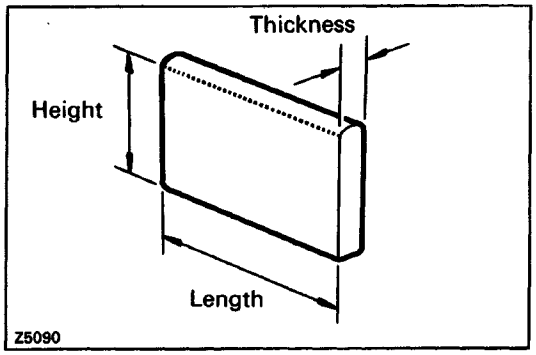
**2. INSPECT ROTOR AND VANE PLATES**

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

**Minimum height: 8.0 mm (0.315 in.)**

**Minimum thickness: 1.77 mm (0.0697 in.)**

**Minimum length: 14.97 mm (0.5894 in.)**



Z5090

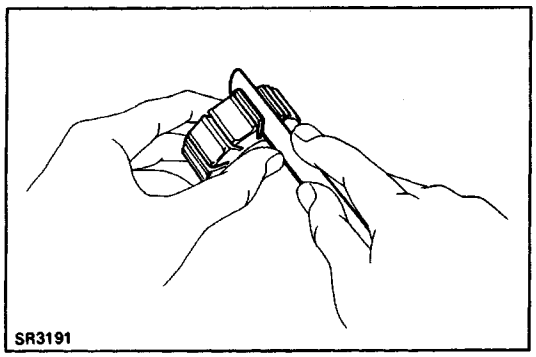
(b) Using a feeler gauge, measure the clearance between the rotor groove and vane plate.

**Maximum clearance: 0.03 mm (0.0012 in.)**

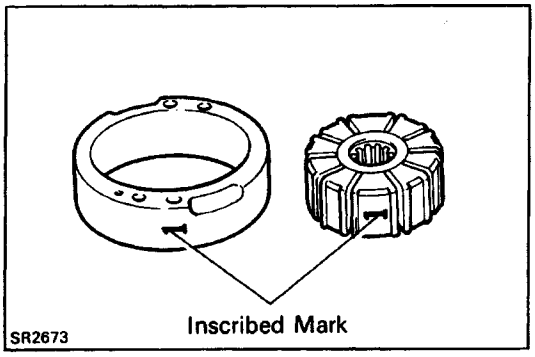
If more than maximum, replace the vane plate and/or rotor with one having the same mark stamped on the cam ring.

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

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


SR3191

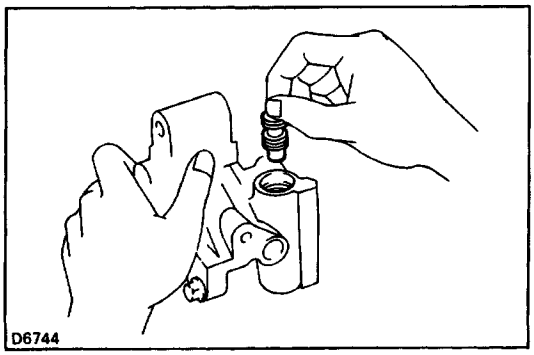
| Rotor and cam ring mark | Vane length mm (in.) |
|---|---|
| None | 14.996 – 14.998 (0.59039 – 0.59047) |
| 1 | 14.994 – 14.996 (0.59032 – 0.59039) |
| 2 | 14.992 – 14.994 (0.59024 – 0.59032) |
| 3 | 14.990 – 14.992 (0.59016 – 0.59024) |
| 4 | 14.988 – 14.990 (0.59008 – 0.59016) |



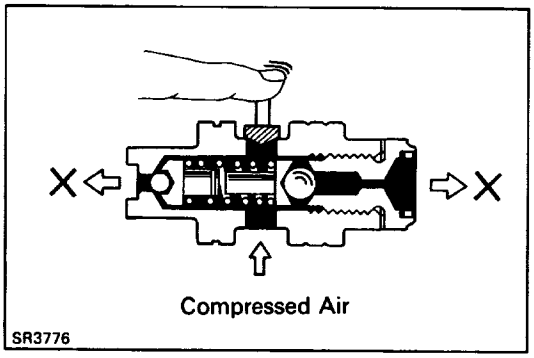
SR2673

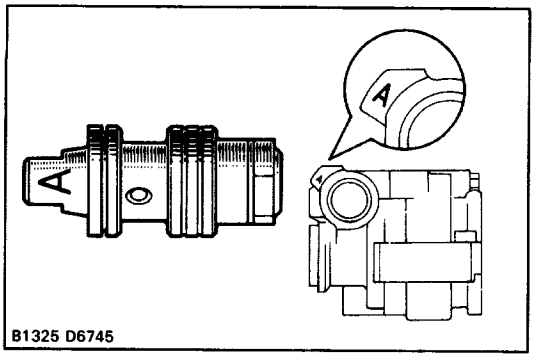
**3. INSPECT FLOW CONTROL VALVE**

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

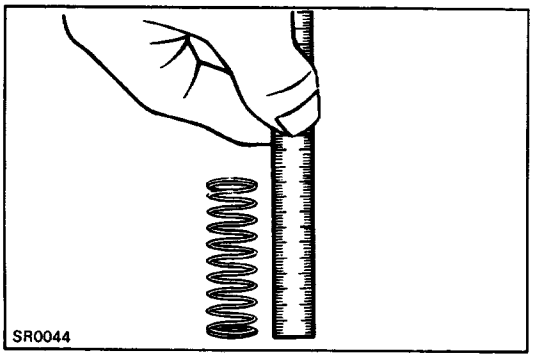

D6744

(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air I392 – 490 kPa (4 – 5 kg¿¿crn2, 57 – 71 psi)] into the opposite side, and confirm that air does not come out from the end hole.

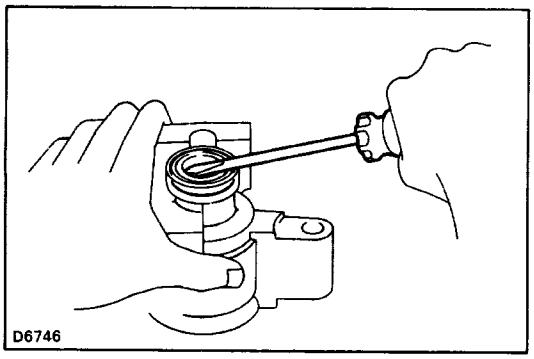


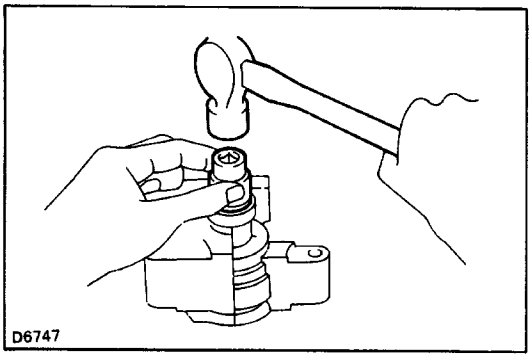

If necessary, replace the valve with one having the same letter as inscribed on the front housing.
**Inscribed mark: A, B, C, D, E or F**



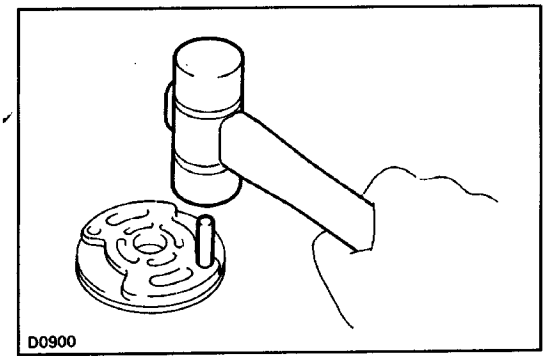

**4. INSPECT FLOW CONTROL SPRING**
Using a scale, measure the free length of the spring.
**Spring length: 36 – 38 mm (1.42 – 1.49 in.)**
If not within specification, replace the spring.

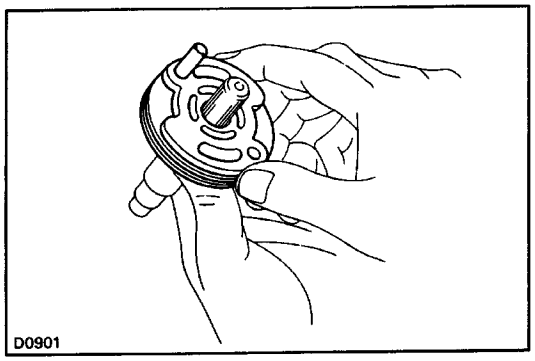


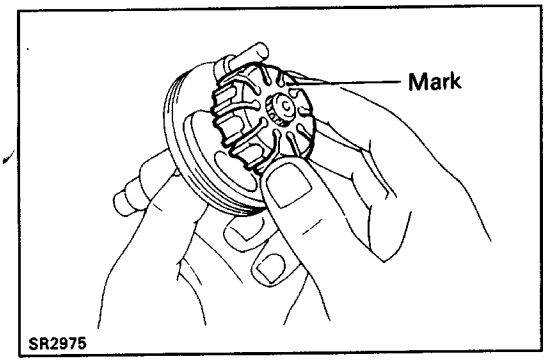

**5. IF NECESSARY, REPLACE OIL SEAL**
(a) Using a screwdriver, pry out the oil seal.

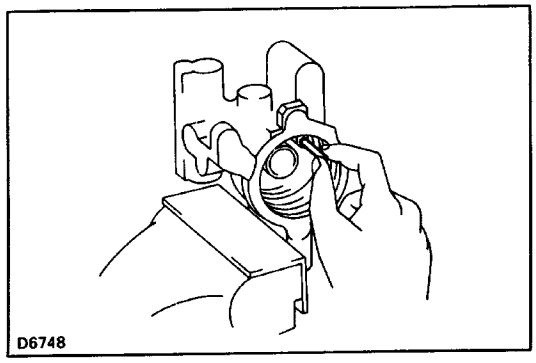


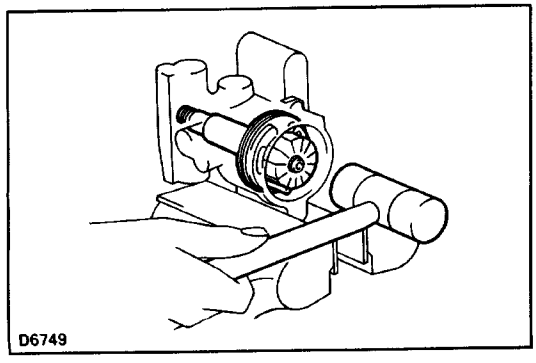

(b) Using a socket wrench and hammer, drive in a new oil seal.




# ASSEMBLY OF POWER STEERING PUMP

**(See page SR–58)**

**1. COAT ALL SLIDING SURFACES WITH POWER STEERING FLUID BEFORE ASSEMBLY**

**2. INSTALL FRONT SIDE PLATE AND ROTOR TO PUMP SHAFT**

(a) Using a plastic hammer, drive in the shorter straight pin to the front plate.

(b) Install two new 0–rings to the front plate.

(c) Install the front plate to the pump shaft.

(d) Install the rotor to the shaft with the inscribed mark on the rotor facing toward the rear.

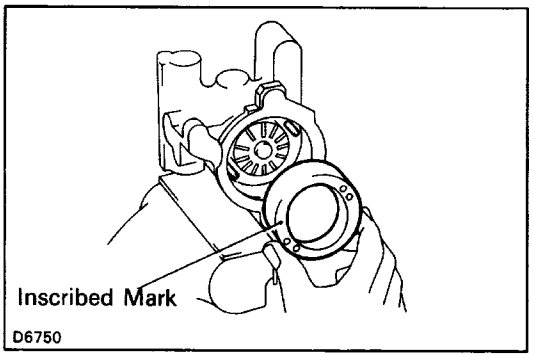
(e) Install the snap ring.

**3. INSTALL PS PUMP SHAFT TO FRONT HOUSING**

(a) Coat the oil seal lip with MP grease.

(b) Install the longer straight pin to the front housing.

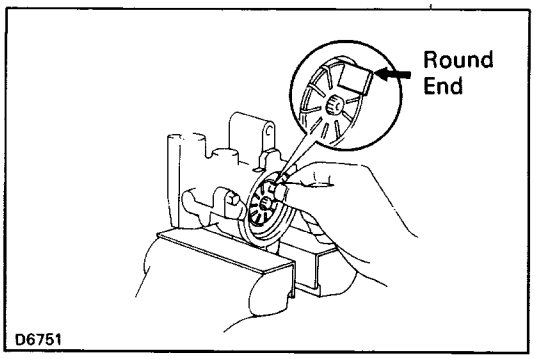
(c) Align the hole of the front plate and straight pin and tap in the pump shaft with a plastic hammer.
**NOTICE: Be careful not to damage the oil seal and O–rings.**




**4. INSTALL CAM RING**

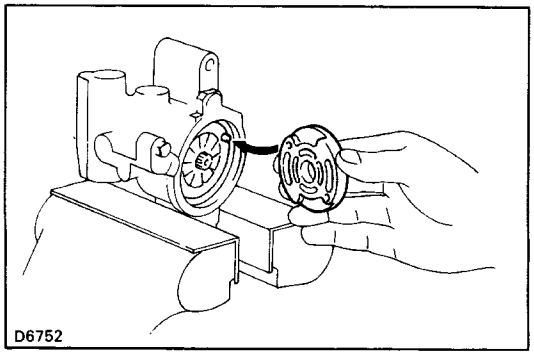
Match the wide hole of the cam ring with the longer straight pin, and install the cam ring.

HINT: Install the cam ring with the inscribed mark facing the rear.




**5. INSTALL VANE PLATES**

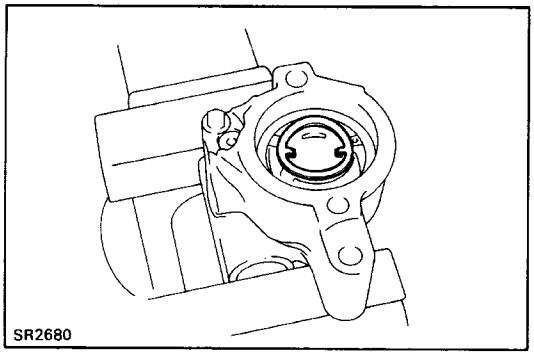
Install the vane plates with the round end facing outward.




**6. INSTALL REAR SIDE PLATE**

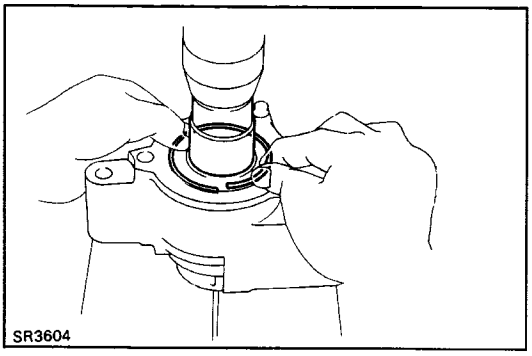
(a) Install a new O–ring to the side plate.

(b) Match the wide hole with the longer straight pin and install the plate.




**7. INSTALL WAVE WASHER**

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



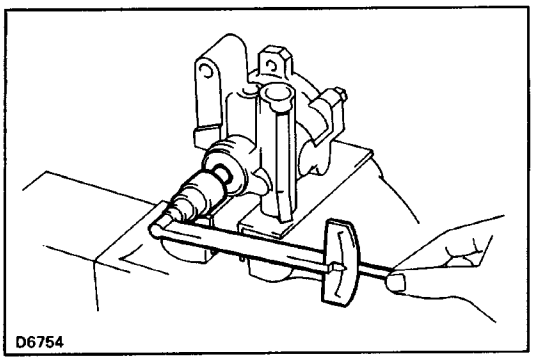

**8. INSTALL REAR HOUSING**

(a) Install a new O–ring to the rear housing.

(b) Install the rear housing and use a press to push down on the wave washer hard enough to compress it.

**NOTICE: Do not apply too much pressure.**

(c) Install the snap ring.

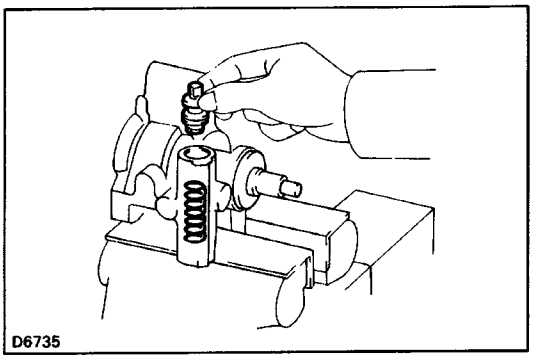



**9. MEASURE PUMP SHAFT PRELOAD**

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

(b) Temporarily install the pulley nut and check the rotating torque.

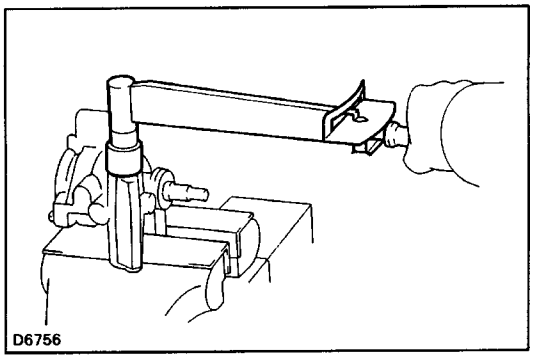
**Rotating torque: 0.3 N–m (2.8 kgf–cm, 2.4 in..lbf) or less**



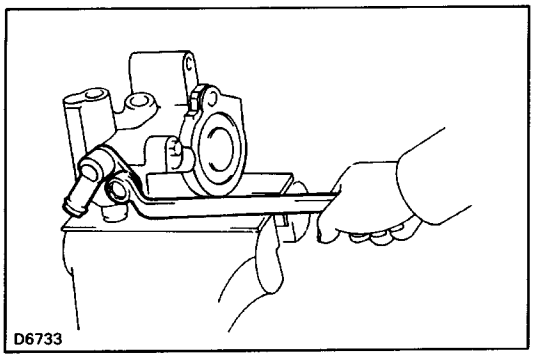

**10. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION**

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

(b) Install a new O–ring in the groove of the pressure port union.




(c) Install and torque the pressure port union.
**Torque: 69 N–m (700 kgf–cm, 51 ft–lbf)**



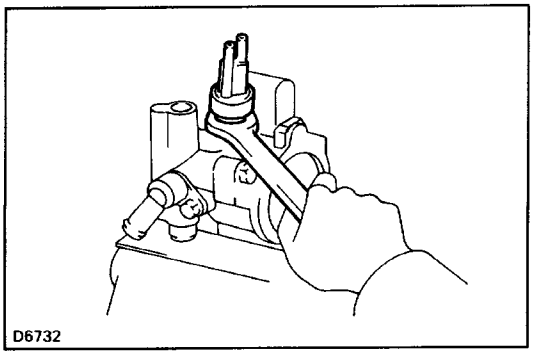

**11. INSTALL SUCTION PORT UNION**

(a) Install a new O–ring to the suction port union.

(b) Install the suction port union into the housing.

(c) Install and torque the bolt.

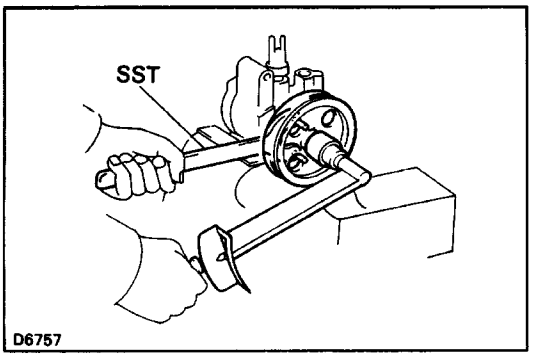
**Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)**




**12. INSTALL AIR CONTROL VALVE**

Install and tighten the valve.

**Torque: 3.6 N–m (370 kgf.crn, 27 ft–lbf)**




**13. (5S–FE Engine)**

**INSTALL PS PUMP PULLEY**

(a) Install the woodruff key to the shaft.

(b) Install the pulley and nut to the shaft.

(c) Using SST, torque the nut.

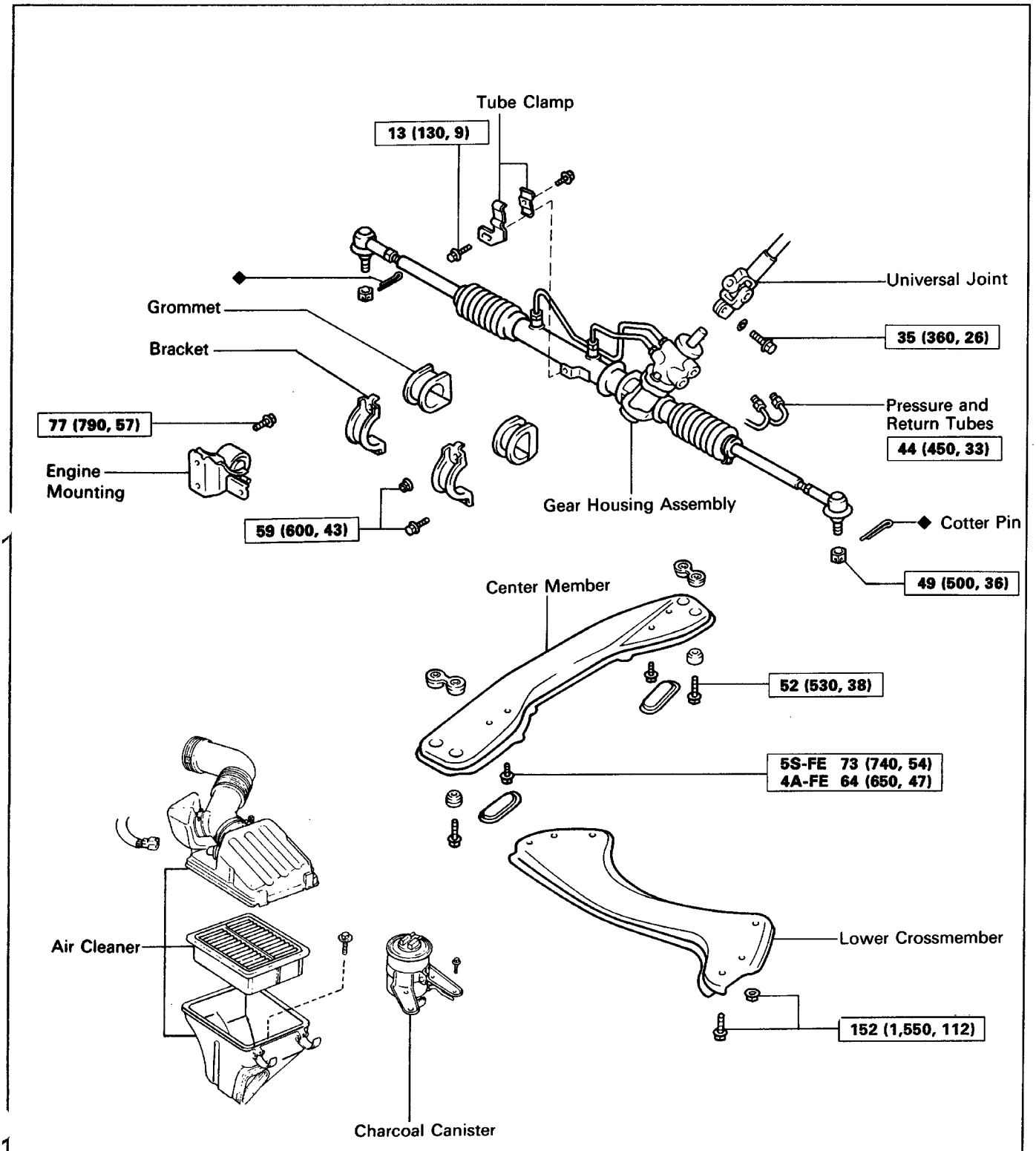
SST 09616–30020

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

# Gear Housing

## REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING (2WD)

Remove and install the parts as shown.



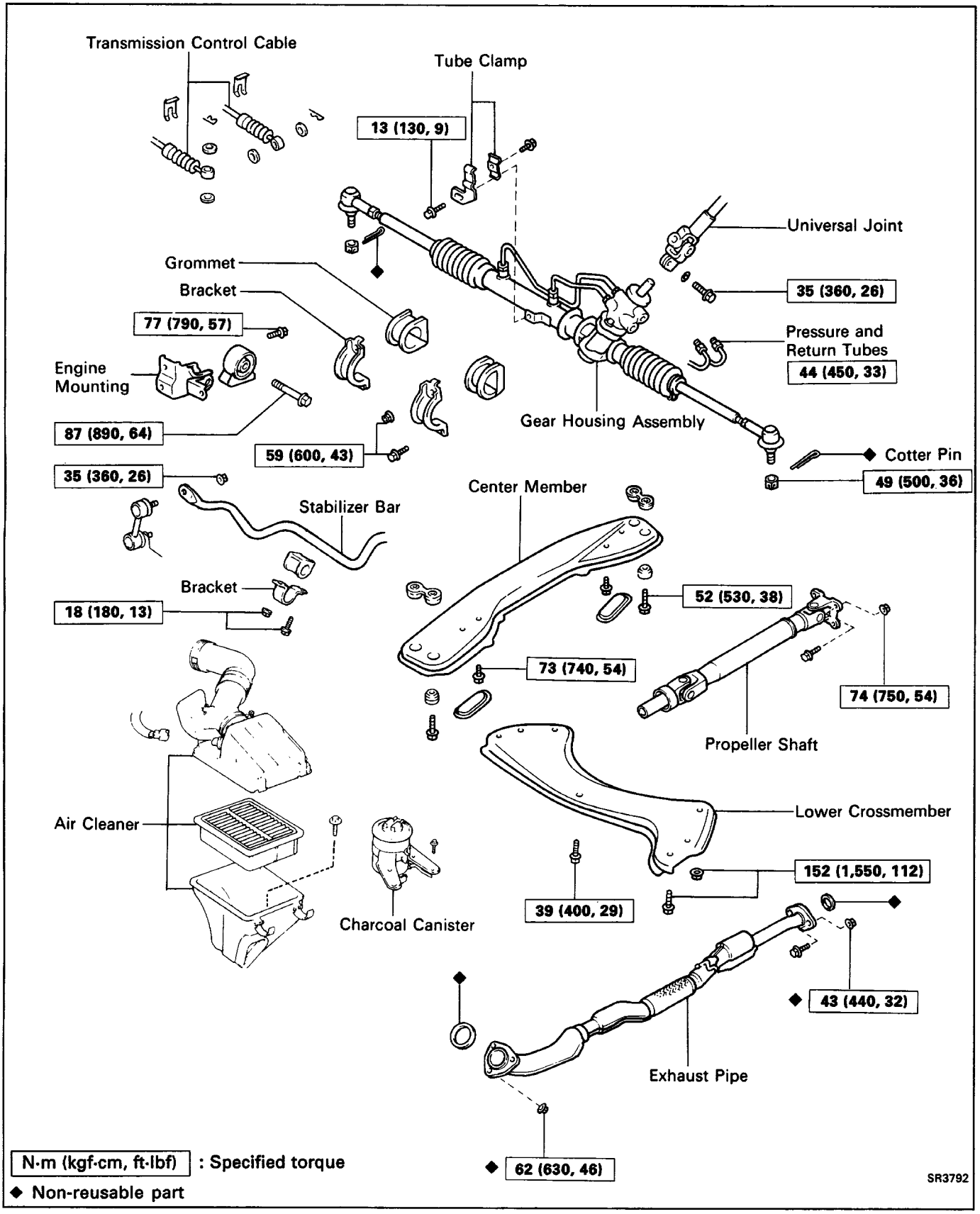

N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

SR3581

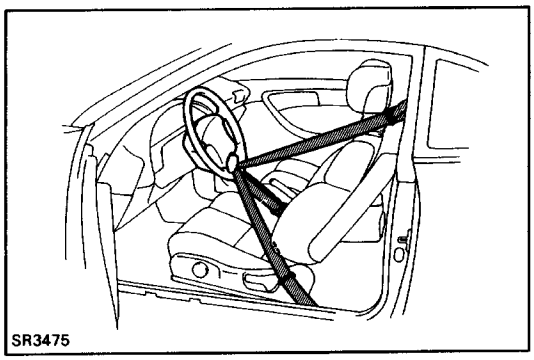
# REMOVAL AND INSTALLATION OF STEERING GEAR HOUSING (4WD)

Remove and install the parts as shown.



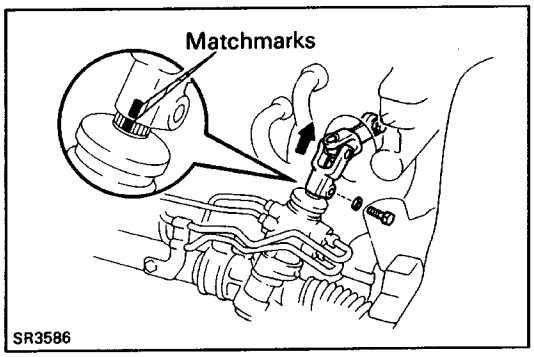
# (MAIN POINTS OF REMOVAL AND INSTALLATION)
# (USA)

**NOTICE: When disconnecting the universal joint during removal of the gear housing, remove the steering wheel and perform centering of the spiral cable.**
**(See page AB–15)**
**If the operation is performed without removing the steering wheel, use the procedure below to make sure the steering wheel is firmly fixed in position and cannot turn.**


SR3475

**1. DISCONNECT UNIVERSAL JOINT**

(a) Position the front wheels facing straight ahead.
(b) Using the seat belt of the driver's seat, fix the steering wheel so that it does not turn.



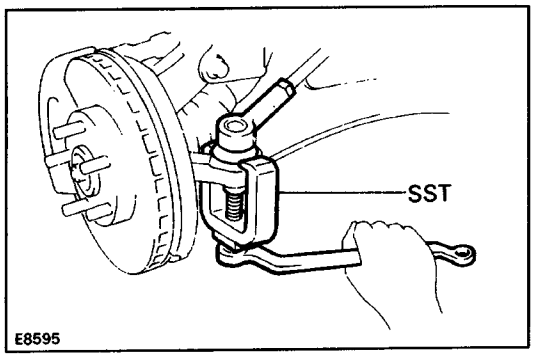
SR3586

(c) Place matchmarks on the universal joint and control valve shaft.
(d) Loosen the bolt on the upper side of the universal joint, remove the bolt on the lower side and disconnect the universal joint.

**2. DISCONNECT TIE ROD ENDS**

(a) Remove the cotter pin and nut.
(b) Using SST, disconnect the tie rod end from the knuckle arm.

SST 09611–22012



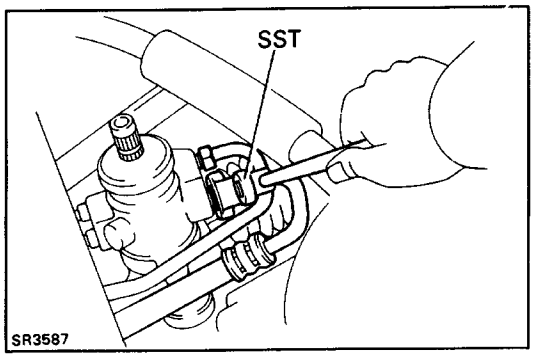
E8595

**3. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE**

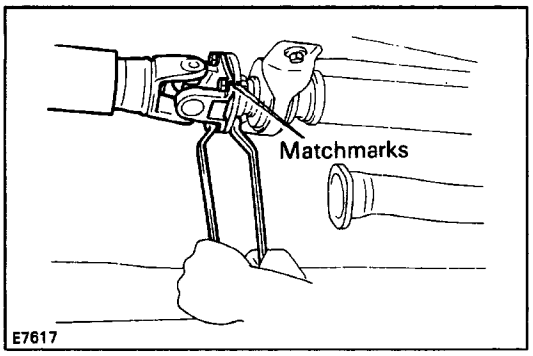
Using SST, disconnect and connect the pressure and return line.

SST 09631–22020

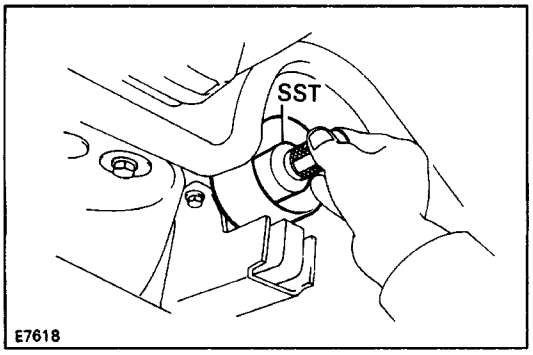
**Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)**



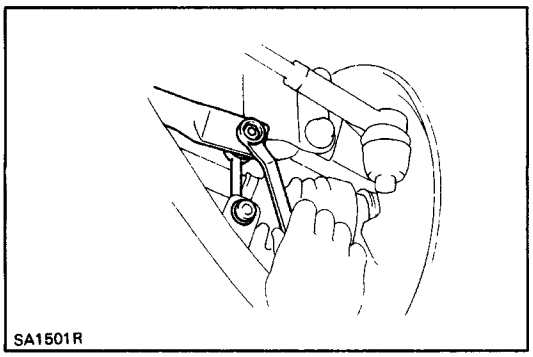
SR3587



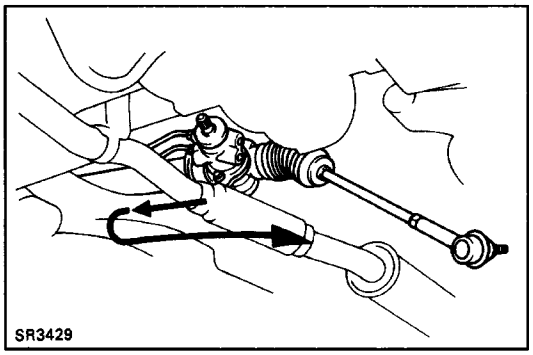

**4. (4W D)**
**REMOVE PROPELLER SHAFT**
(a) Place matchmarks to the propeller shaft flange and intermediate shaft flange.
(b) Remove the four bolts and nuts.



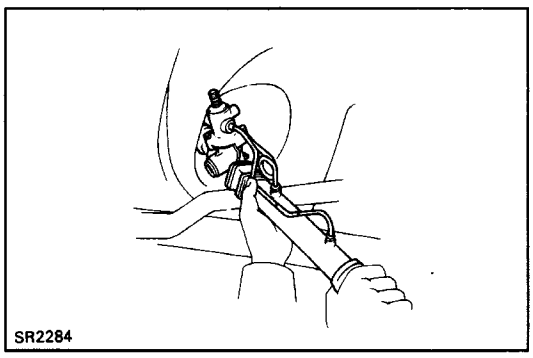

(c) Pull out the propeller shaft and install SST.
SST 09325–20010




**5. (4W D)**
**DISCONNECT STABILIZER BAR RH**
(a) Remove the stabilizer bar bracket RH.
(b) Disconnect the stabilizer bar from the link.



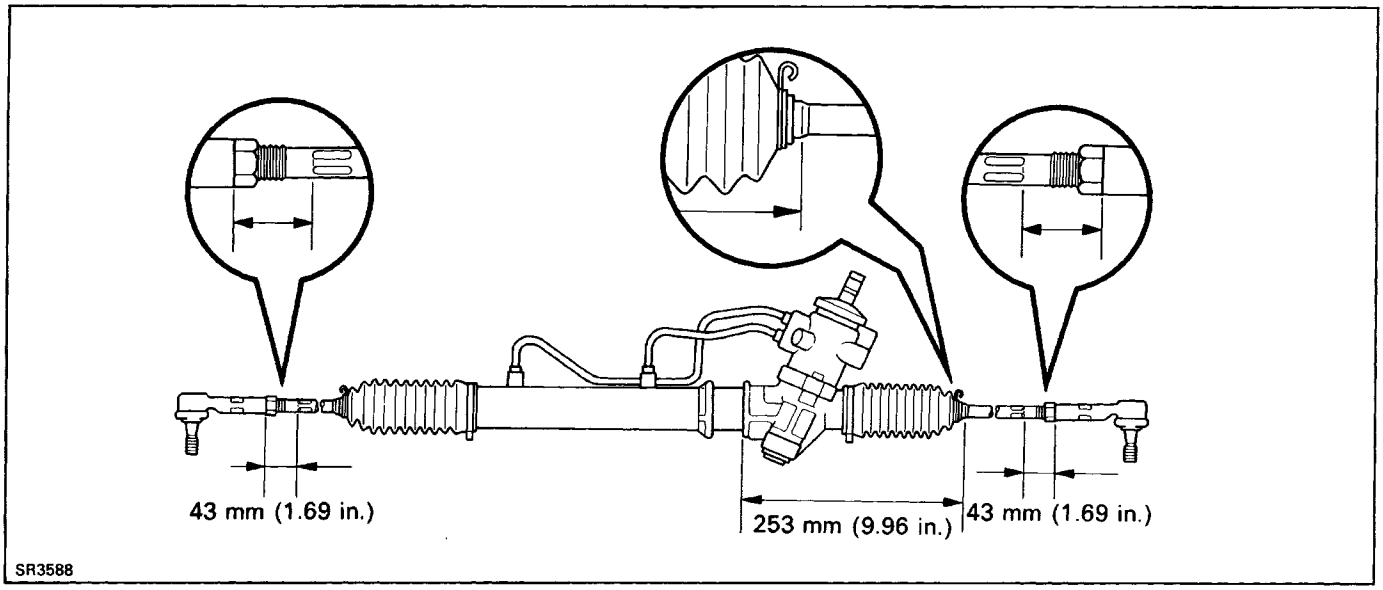

**6. (2W D)**
**REMOVE GEAR HOUSING**
(a) Slide the gear housing to the RH side of the vehicle.
(b) Pull the gear housing out through the LH lower side of vehicle body.
**NOTICE: Do not damage the turn pressure tubes.**

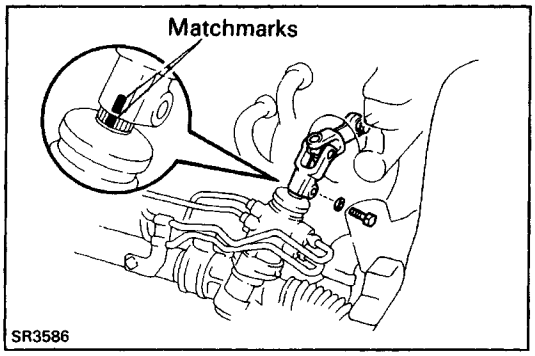



**7. (4W D)**
**REMOVE GEAR HOUSING**
(a) Remove the two bolts, two nuts and the two brackets.
(b) Remove the PS tube clamp bolt.
(c) Move the gear housing to the right side.
(d) Remove the gear housing through the RH hole.

**8. CONNECT UNIVERSAL JOINT**

(a) Set the gear housing so that it matches the dimensions shown below, with the gear housing at the center point.




HINT: The dimension of the tie rod end is a reference value, so always adjust the toe–in before tightening the lock nut.

(b) Align matchmarks on the universal joint and control valve shaft and connect them.

**9. CENTER SPIRAL CABLE**

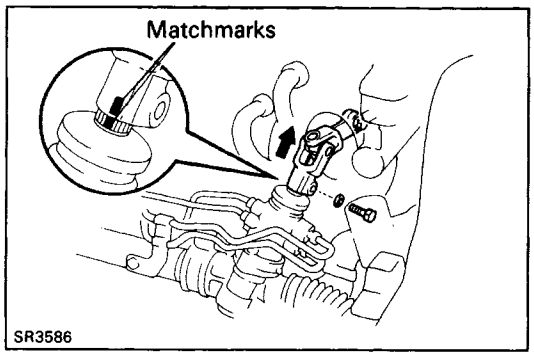
If the steering wheel has been removed, or the steering wheel may have moved during the .operation, always perform centering of the spiral cable.

(See page AB–16)

**10. CHECK STEERING WHEEL CENTER POINT**

**11. CHECK TOE–IN**

**(See page SA–4)**

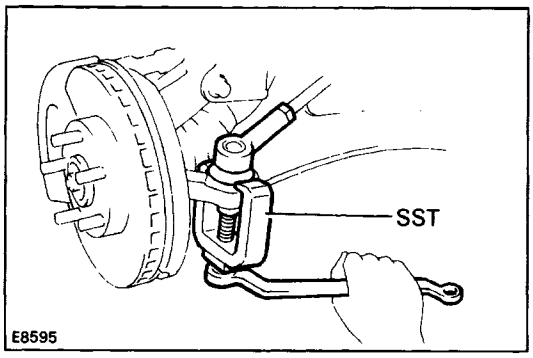



# (CANADA)

**1. DISCONNECT UNIVERSAL JOINT**

(a) Place matchmarks on the universal joint and control valve shaft.

(b) Loosen the bolt on the upper side of the universal joint. remove the bolt on the lower side and disconnect the universal joint.

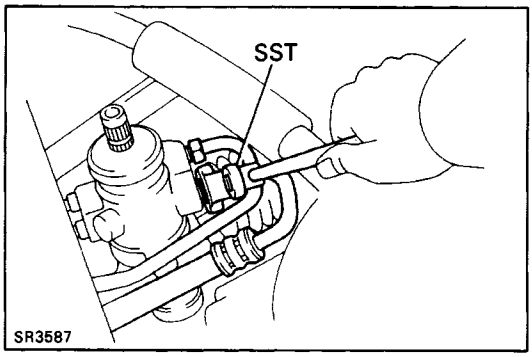



**2. DISCONNECT TIE ROD ENDS**

(a) Remove the cotter pin and nut.

(b) Using SST, disconnect the tie rod end from the knuckle arm.

SST 09611–22012

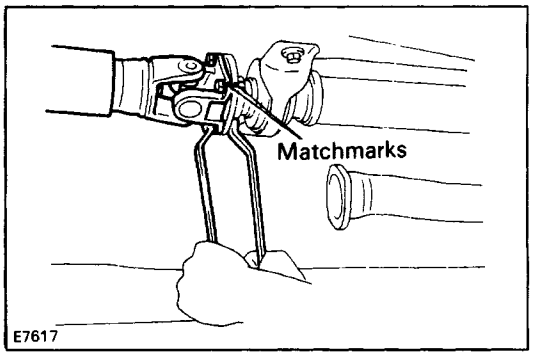



**3. DISCONNECT AND CONNECT PRESSURE AND RETURN LINE**

Using SST, disconnect and connect the pressure and return line.

SST 09631–22020

**Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)**

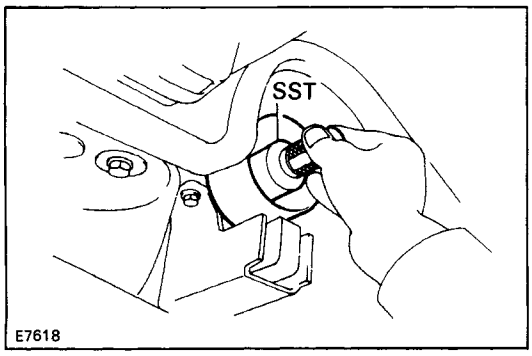



**4. (4W D)**

**REMOVE PROPELLER SHAFT**

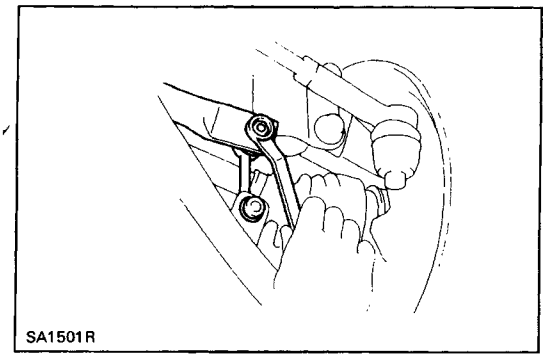
(a) Place matchmarks to the propeller shaft flange and intermediate shaft flange.

(b) Remove the four bolts and nuts.

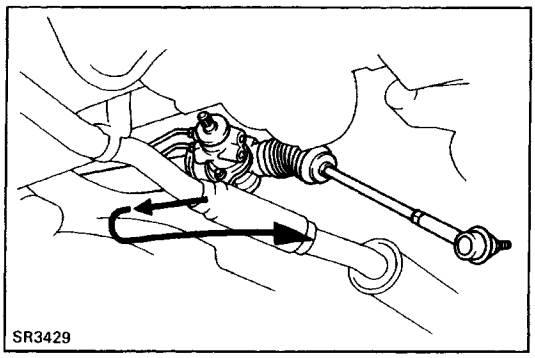



(c) Pull out the propeller shaft and install SST.

SST 09325–20010

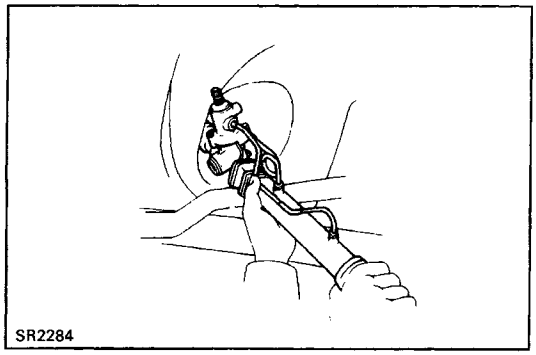



**5. (4W D)**
**DISCONNECT STABILIZER BAR RH**
(a) Remove the stabilizer bar bracket RH.
(b) Disconnect the stabilizer bar from the link.




**6. (2W D)**
**REMOVE GEAR HOUSING**
(a) Slide the gear housing to the RH side of the vehicle.
(b) Pull the gear housing out through the LH lower side of vehicle body.

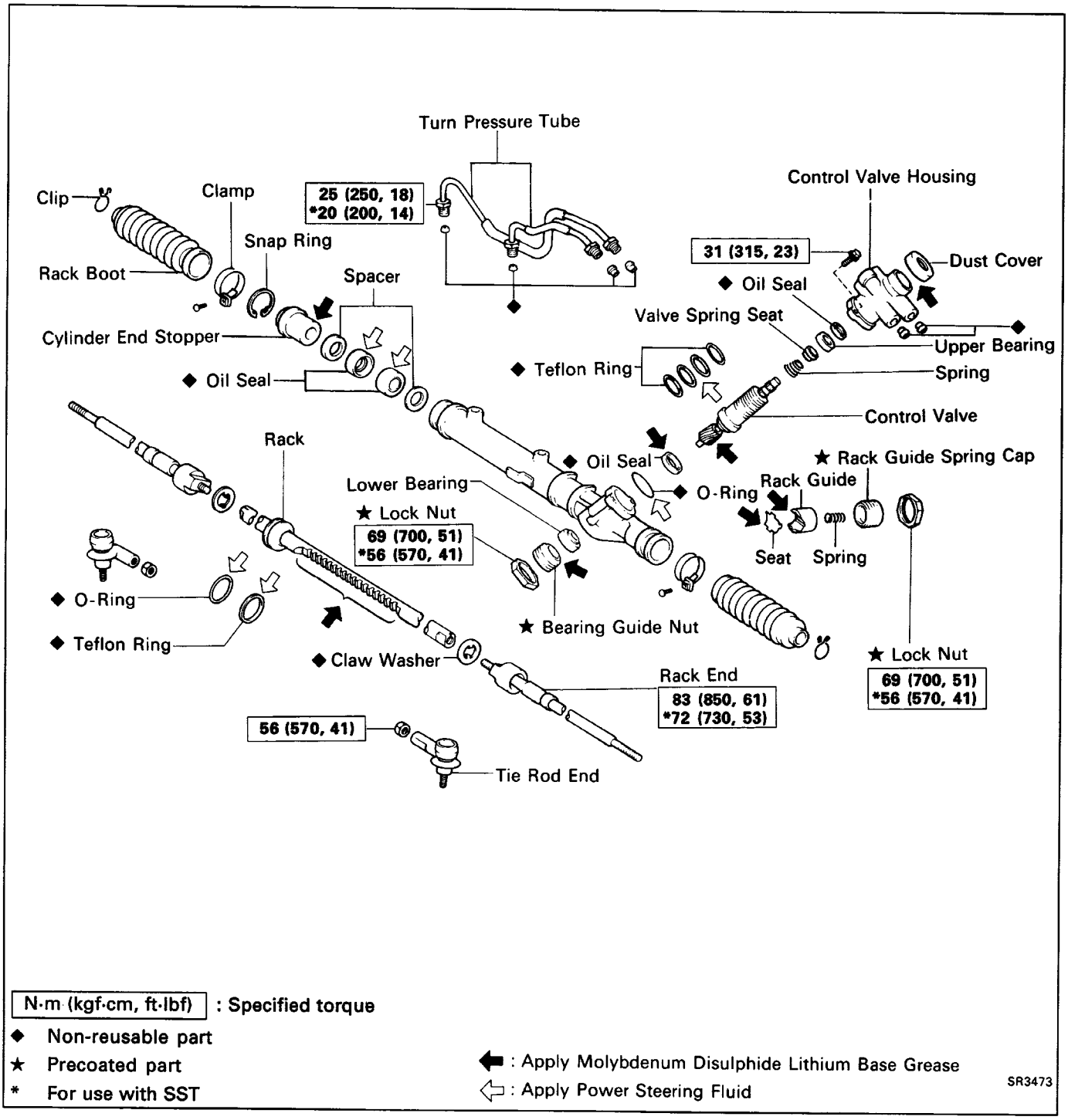
**NOTICE: Do not damage the turn pressure tubes.**

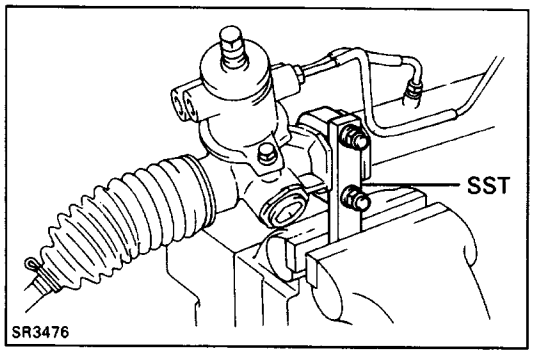



**7. (4W D)**
**REMOVE GEAR HOUSING**
(a) Remove the two bolts, two nuts and the two brackets.
(b) Remove the PS tube clamp bolt.
(c) Move the gear housing to the right side.
(d) Remove the gear housing through the RH hole.

**8. CHECK STEERING WHEEL CENTER POINT**
**9. CHECK TOE–IN**
**(See page SA–4)**

# COMPONENTS

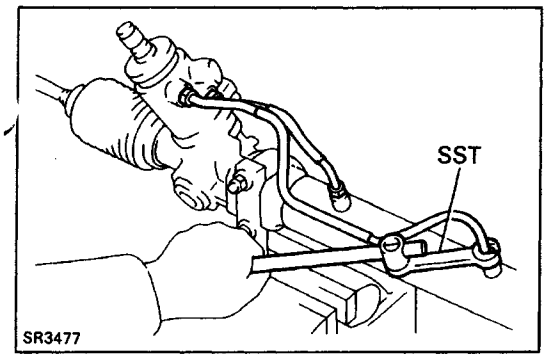



# DISASSEMBLY OF GEAR HOUSING

**1. CLAMP GEAR HOUSING IN VISE**

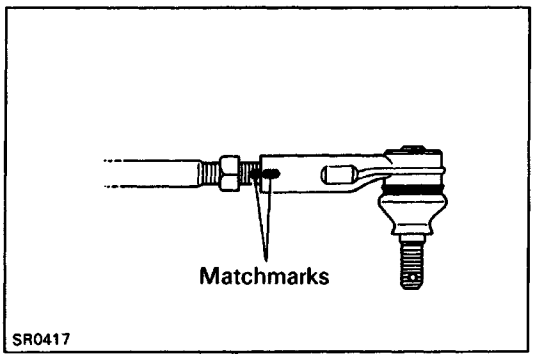
Using SST, secure the steering gear housing in a vise.
SST 09612–00012




**2. REMOVE RIGHT AND LEFT TURN PRESSURE TUBES**

Using SST, remove the pressure tubes.

SST 09633–00020




**3. REMOVE TIE ROD ENDS**

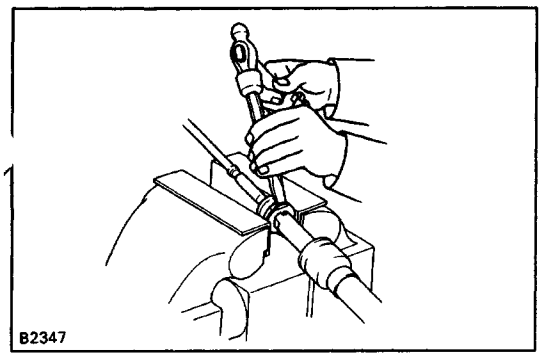
(a) Loosen the lock nuts and place matchmarks on the tie rod ends and rack ends.

(b) Remove the tie rod ends and lock nuts.

**4. REMOVE RACK BOOTS**

(a) Remove the clips and clamps.

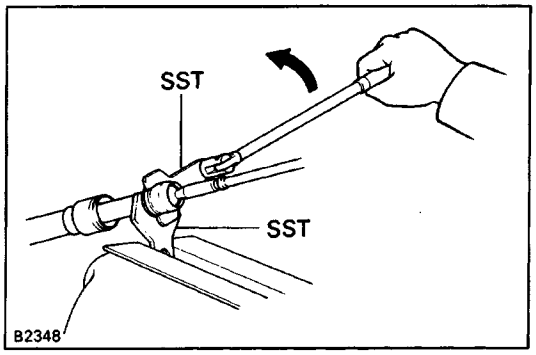
(b) Remove the rack boots.




**5. REMOVE RACK ENDS AND CLAW WASHERS**

(a) Unstake the claw washers.

**NOTICE: Avoid any impact to the rack.**

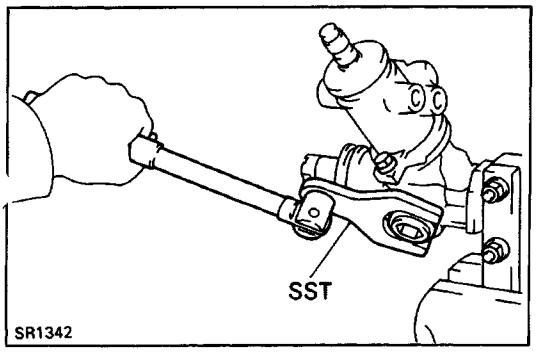



(b) Using SST, remove the rack ends.

SST 09612–10093 (09628–10020) and
09612–24014 (09617–24011)

(c) Mark the left and right rack ends accordingly.

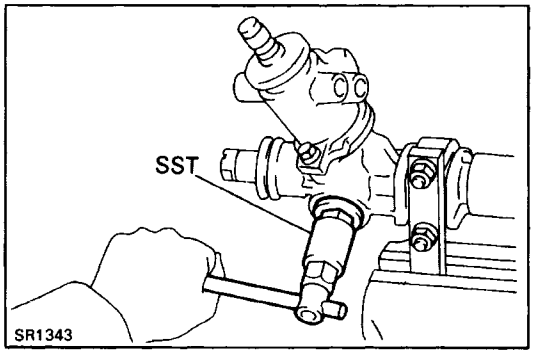
(d) Remove the claw washers.




**6. REMOVE RACK GUIDE SPRING CAP LOCK NUT**

Using SST, remove the rack guide spring cap lock nut.

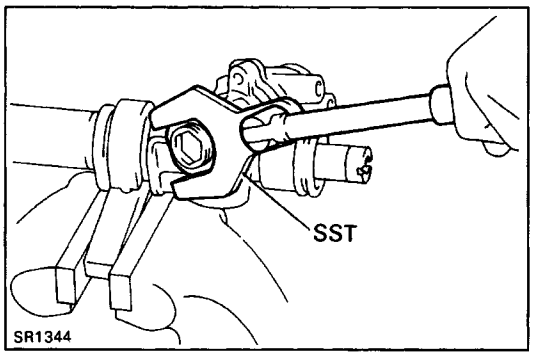
SST 09612–24014 (09617–24020)




**7. REMOVE RACK GUIDE SPRING CAP**

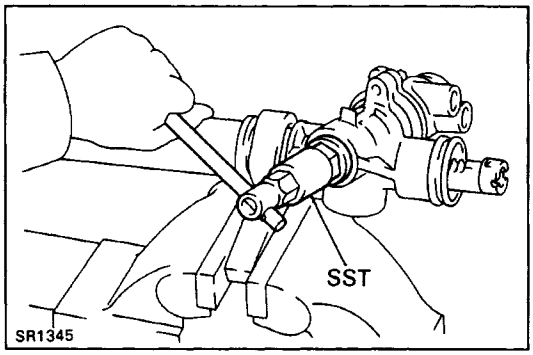
Using SST, remove the rack guide spring cap.
SST 09612–24014 (09612–10022)

**8. REMOVE RACK GUIDE SPRING, RACK GUIDE AND SEAT**




**9. REMOVE BEARING GUIDE LOCK NUT**

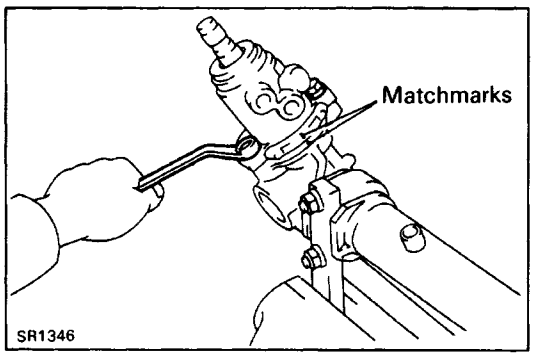
Using SST, remove the lock nut.
SST 09612–24014 (09617–24020)




**10. REMOVE BEARING GUIDE NUT**

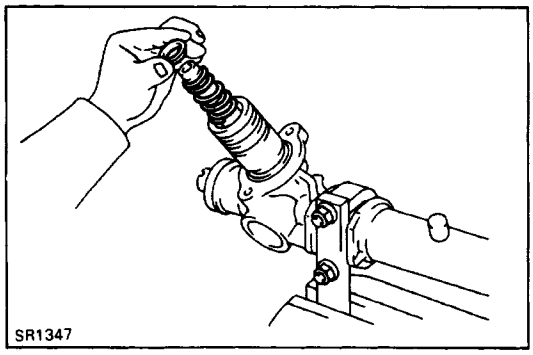
Using SST, remove the bearing guide nut.
SST 09612–24014 (09612–10022)

**11. REMOVE DUST COVER**



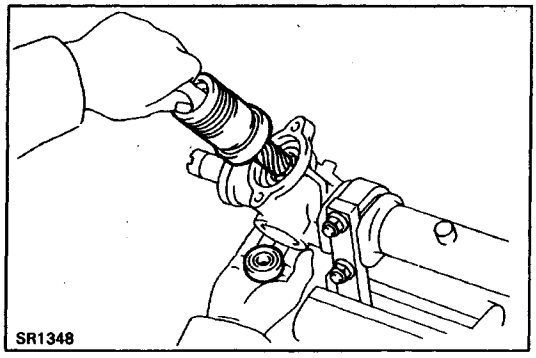

**12. REMOVE CONTROL VALVE HOUSING**

(a) Place matchmarks on the valve housing and rack housing.
(b) Remove the two bolts.
(c) Pull out the valve housing.
(d) Remove the 0–ring from the rack housing.

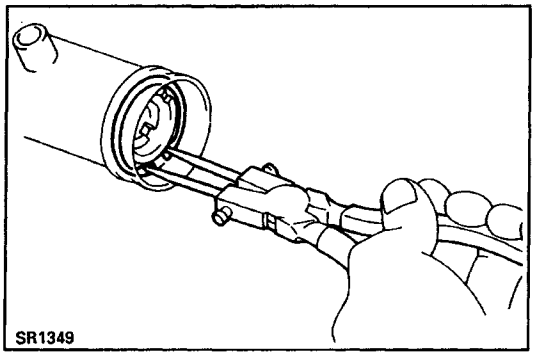



**13. REMOVE CONTROL VALVE**

(a) Remove the valve spring seat and spring.

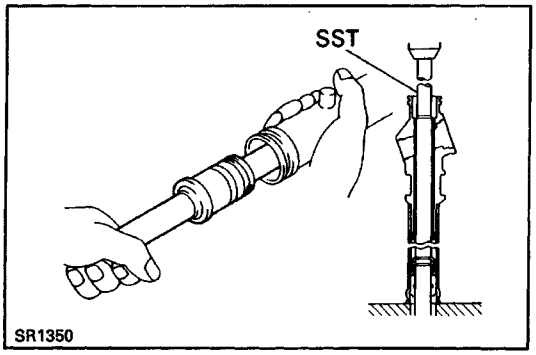



(b) Remove the control valve and bearing.




**14. REMOVE CYLINDER END STOPPER, SPACER, OIL SEAL AND RACK**

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

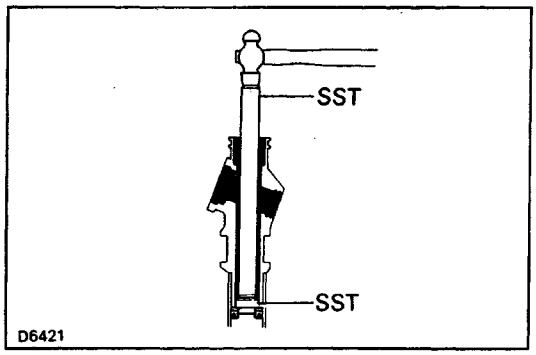



(b) Using SST, press the rack until the– end stopper slightly touches the press block.

SST 09612–24014 (09612–10061)

(c) Pull out the rack with the cylinder end stopper, spacer and oil seal.

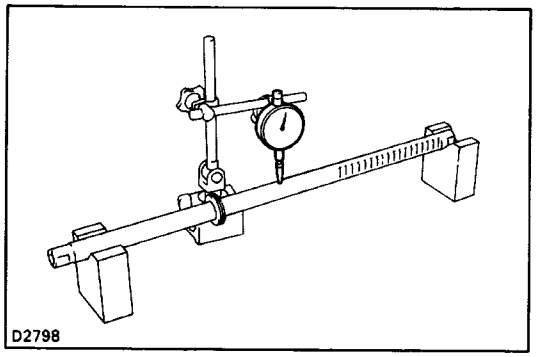
HINT: If necessary, slightly tap the rack end with a brass bar and hammer.




**15. REMOVE RACK HOUSING OIL SEAL AND SPACER**

Using SST, drive out the spacer and oil seal.

SST 09631–12020 and 09631–20031




# INSPECTION AND REPAIR OF GEAR HOUSING COMPONENTS

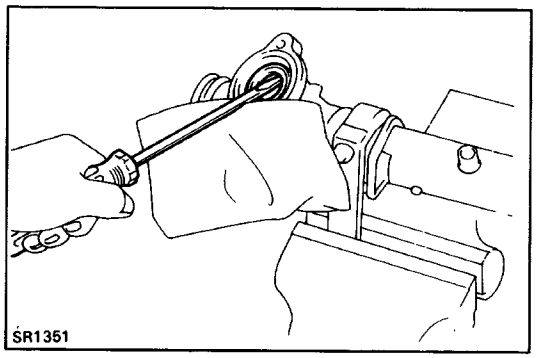
**1. INSPECT RACK**

(a) Check the rack for runout and for tooth wear or damage.

(b) Check the back surface for wear or damage.

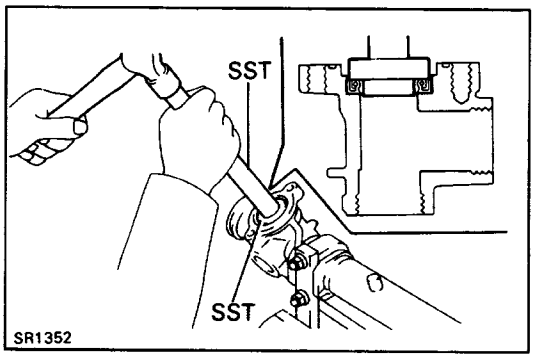
If faulty, replace it.

**Maximum runout: 0.3 mm (0.012 in.)**



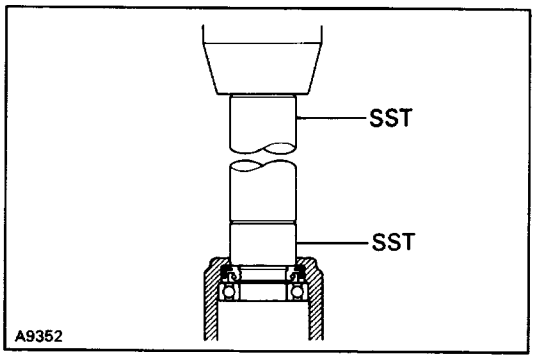

**2. IF NECESSARY, REPLACE RACK HOUSING OIL SEAL**

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




(b) Using SST, drive in a new oil seal.

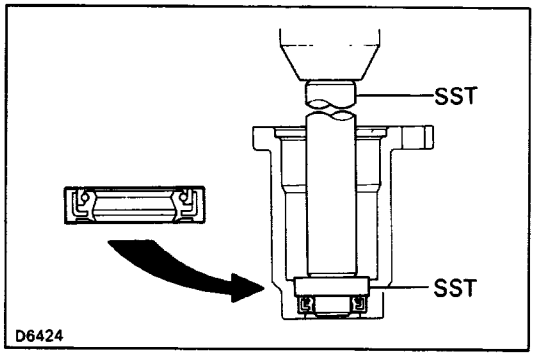
SST 09630–24013 (09631–24070) and 09631–12020




**3. IF NECESSARY, REPLACE CONTROL VALVE HOUSING OIL SEAL**

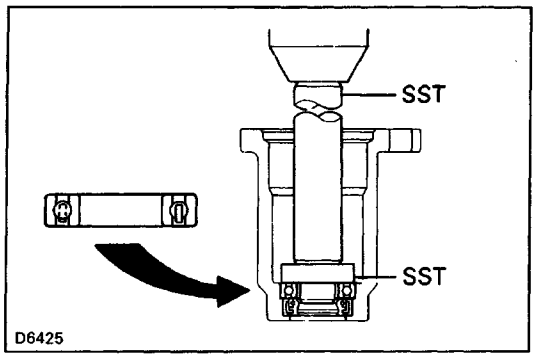
(a) Using SST, press out the oil seal with the bearing.

SST 09630–24013 (09620–24010) and 09631–12020

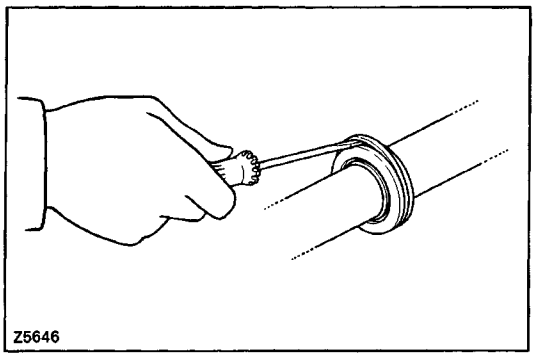



(b) Using SST, press in a new oil seal.

SST 09630–24013 (09620–24020) and 09631–12020




(c) Using SST, press in a new bearing.
SST 09630–24013 (09620–24030) and 09631–12020




**4. IF NECESSARY, REPLACE STEERING RACK TEFLON RING AND O–RING**

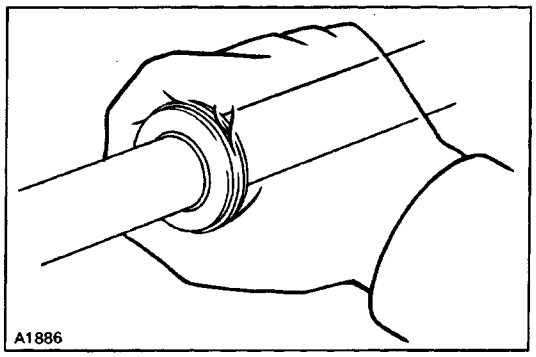
(a) Remove the teflon ring and 0–ring.

**NOTICE: Be careful not to damage the steering rack.**

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

(c) Expand a new teflon ring with your fingers.

**NOTICE: Be careful not to over–expand the teflon ring.**



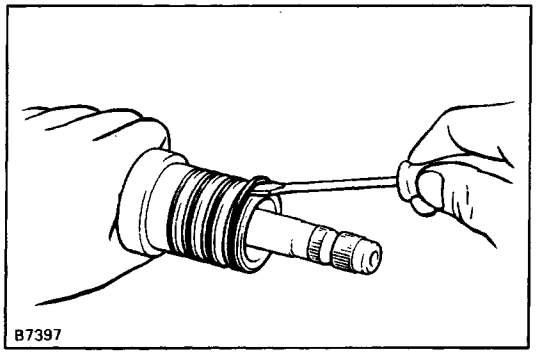

(d) Install the new teflon ring to the steeting rack.

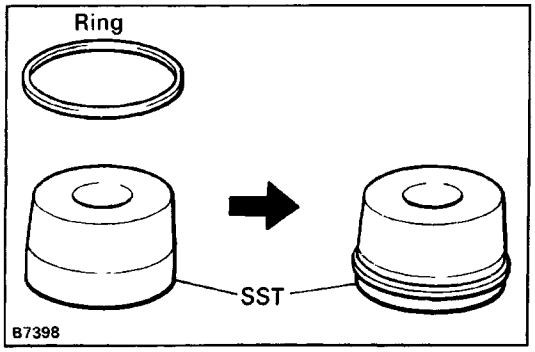
(e) Coat the teflon ring with power steering fluid and snug it down with your fingers.

**5. IF NECESSARY, REPLACE CONTROL VALVE TEFLON RINGS**

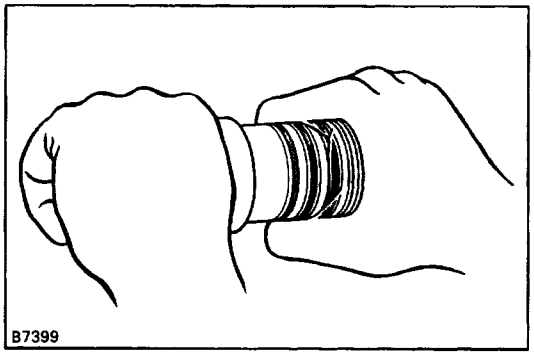
(a) Using a screwdriver, remove the teflon rings.

**NOTICE: Be careful not to damage the control valve.**

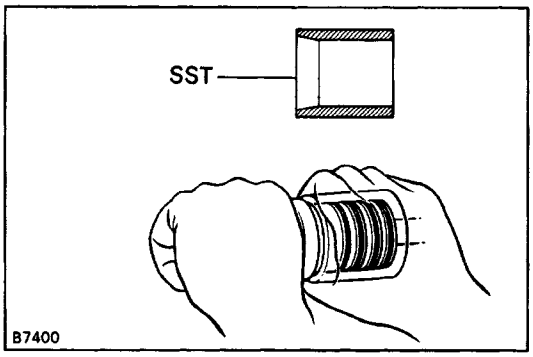



(b) Install new tefion rings to SST and expand them.
SST 09630–24013 (09620–24040)

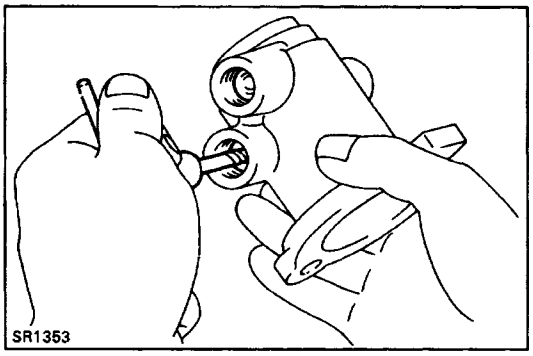



(c) Install the expanded tefion rings to the control valve and snug them down with your fingers.




(d) Coat the teflon rings with power steering fluid, and carefully slide the tapered end of SST over the teflon rings to seat the rings.

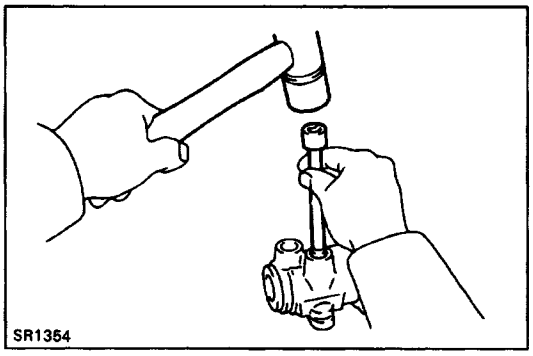
SST 09630–24013(09620–24050)




**6. IF NECESSARY, REPLACE UNION SEATS**

HINT: Replace the union seats with new ones only when they are damaged.

(a) Using a screw extractor, remove the union seats.



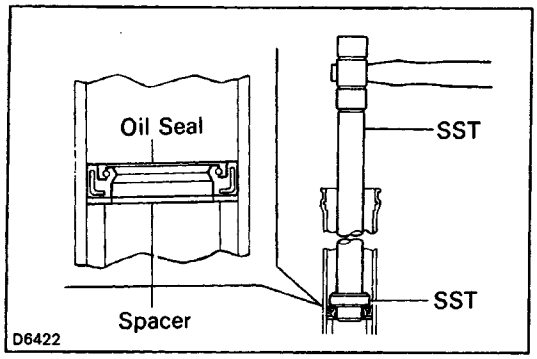

(b) Using a plastic hammer and extension bar, lightly tap in new union seats.

## ASSEMBLY OF GEAR HOUSING

**(See page SR–74)**

**1. COAT WITH POWER STEERING FLUID OR MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE**

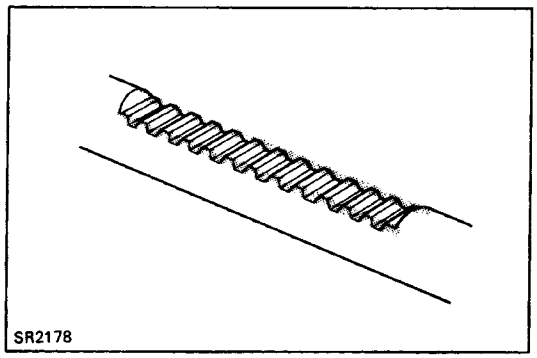
**(See page SR–74)**




**2. INSTALL RACK HOUSING OIL SEAL AND SPACER**

Install a new oil seal and spacer to SST, and drive them in with a plastic hammer.

SST [5S–FE, 3S–GTE Engine]
09631–12020 and 09631–32010
[4A–FE Engine]
09631–12020 and 09631–22070

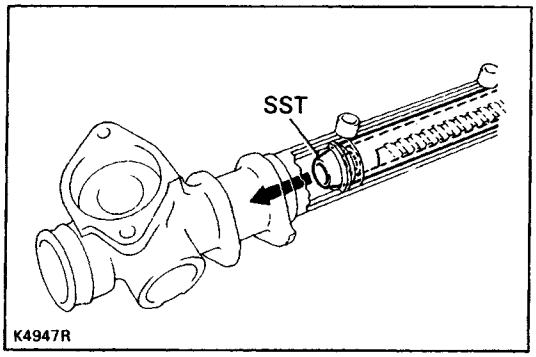



**3. INSTALL RACK**

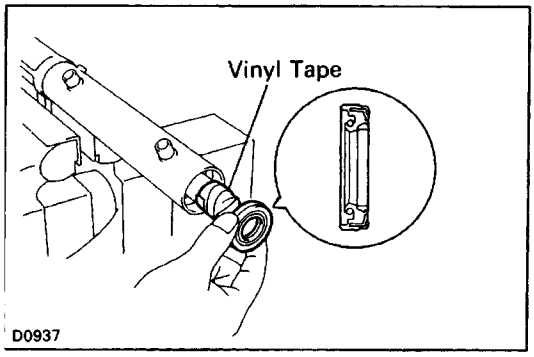
(a) Install SST to the rack.

HINT: If necessary, scrape the burrs off the rack teeth end and burnish.

SST 09631–20102

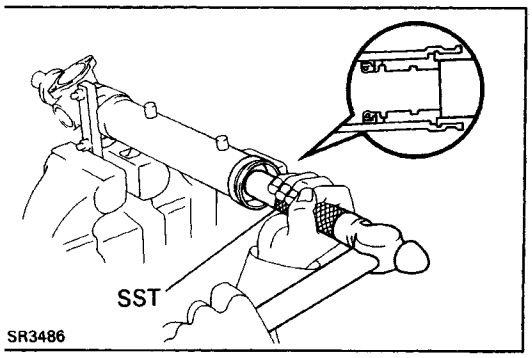



(b) Coat SST with power steering fluid.
(c) Install the rack into the cylinder.
(d) Remove SST.



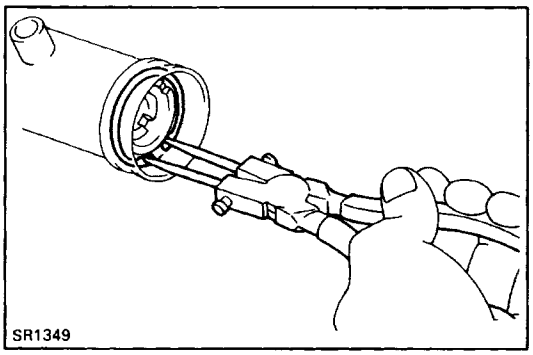

**4. INSTALL CYLINDER END STOPPER, OIL SEAL AND SPACER**

(a) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
(b) Install the oil seal by pushing it into the cylinder in the direction shown in drawing, without tilting.

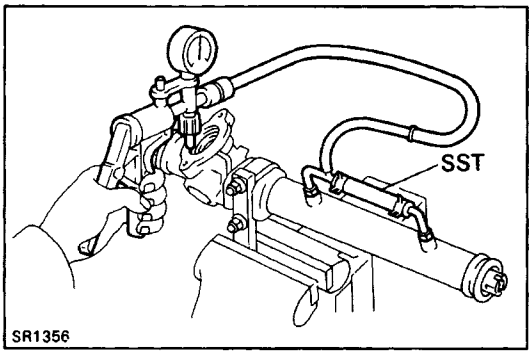



(c) Install the spacer and cylinder end stopper.
(d) Using SST, drive in the cylinder end stopper.

SST 09612–22011




(e) Using snap ring pliers, install the snap ring.

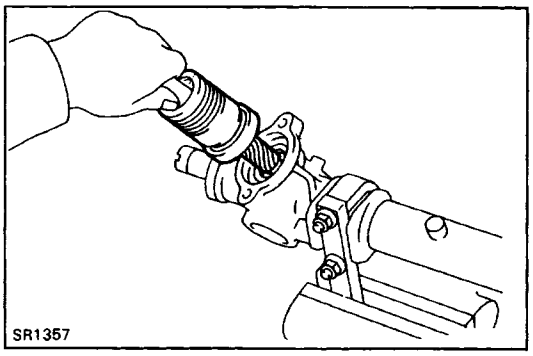



**5. AIR TIGHTNESS TEST**

(a) Install SST to the unions of the cylinder housing.
SST 09631–12070

(b) Apply 53 kPa (400 mmHg, 15.75 in–Hg) of vacuum for about 30 seconds.

(c) Check that there is no change in the vacuum.
If there is change in the vacuum, check the installation of the rack housing oil seals.

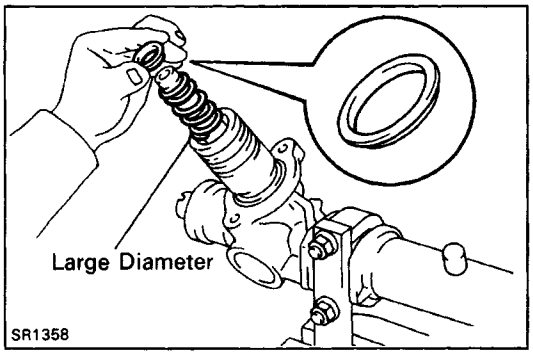



**6. INSTALL CONTROL VALVE**

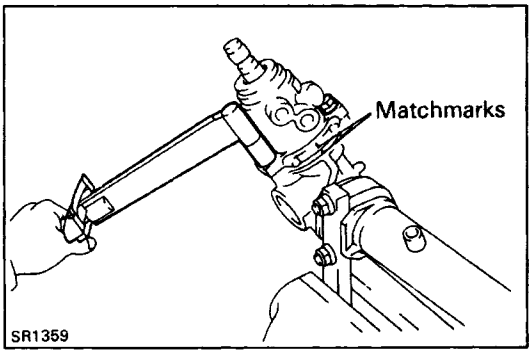
(a) Coat the teflon ring with power steering fluid.

(b) Push the control valve into the rack housing.

(c) Coat a new 0–ring with power steering fluid, and install it.




**7. INSTALL SPRING AND VALVE SPRING SEAT**



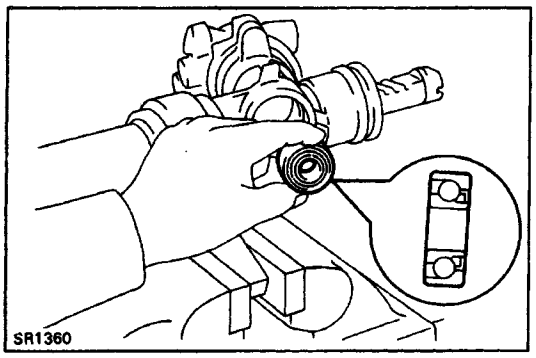

**8. INSTALL CONTROL VALVE HOUSING**

(a) Align the matchmarks on the valve housing and rack housing.

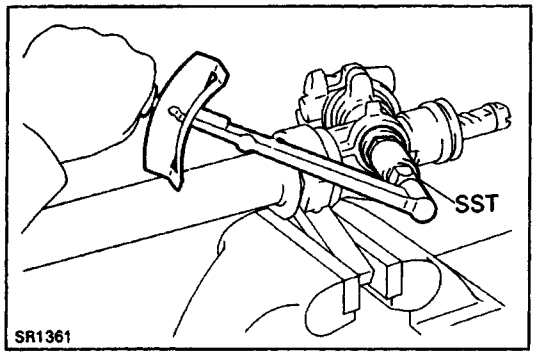
**NOTICE: To prevent oil seal lip damage, wind vinyl tape on the serration part of the control valve shaft.**

(b) Torque the two bolts.

**Torque: 31 N–m (315 kgf–cm, 23 ft–lbf)**




**9. INSTALL CONTROL VALVE LOWER BEARING**




**10. INSTALL BEARING GUIDE NUT**

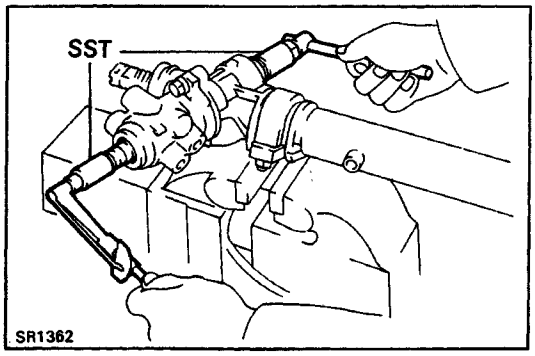
(a) Apply sealant to 2 or 3 threads of the guide nut.

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

(b) Using SST, torque the bearing guide nut.

SST 09612–24014 (09612–10022)

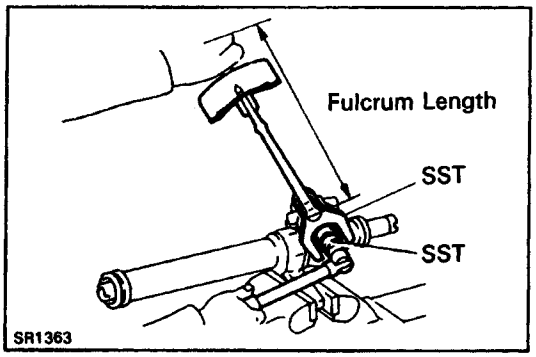
**Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)**




(c) Using SST and torque meter, loosen the bearing guide nut until the preload is within specification.

SST 09612–24014 (09612–10022) and 09616–00010

**Preload (turning): 0.4 – 0.6 N–m (4.5 – 6.5 kgf–cm, 3.9 – 5.6 in.–lbf)**




**11. INSTALL BEARING GUIDE LOCK NUT**

(a) Apply sealant to 2 or 3 threads of the lock nut.

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

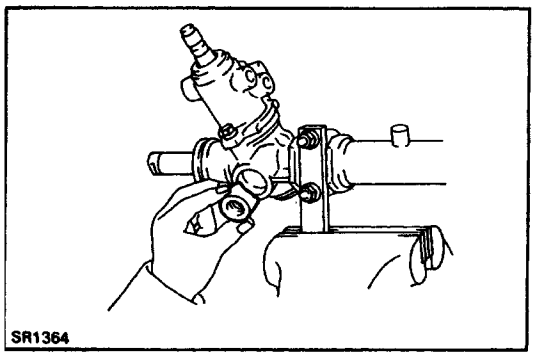
(b) Using SST, install and torque the lock nut.

SST 09612–24014 (09612–10022, 09617–24020)

**Torque: 56 N–m (570 kgf–cm, 41 ft–lbf)**

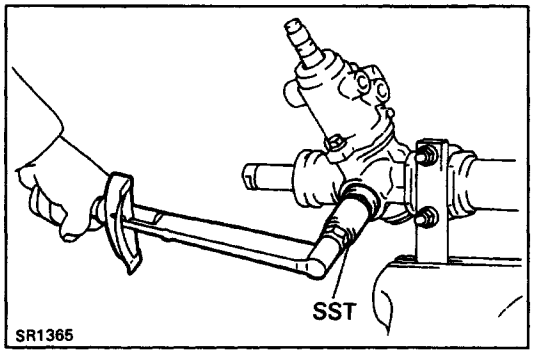
HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39. in.).

(c) Recheck the preload.




**12. INSTALL RACK GUIDE SEAT, RACK GUIDE AND RACK GUIDE SPRING**

Install the rack guide with the seat and spring.




**13. ADJUST TOTAL PRELOAD**

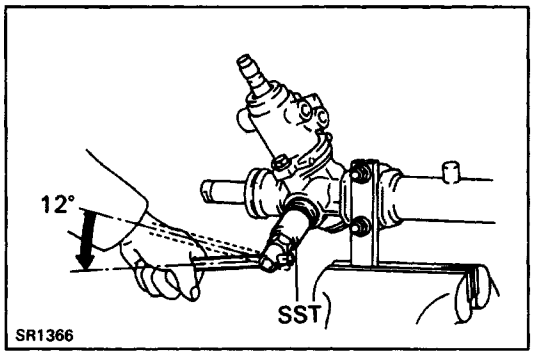
(a) Apply sealant to 2 or 3 threads of the spring cap.

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

(b) Using SST, install and torque the spring cap.

SST 09612–24014 (09612–10022)

**Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)**

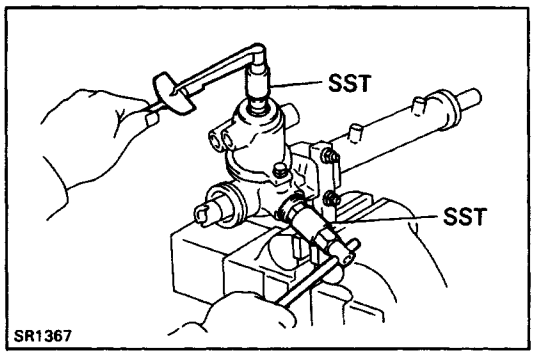



(c) Using SST, return the rack guide spring cap 12°.

(d) Turn the control valve shaft right and left one or two times.

**NOTICE: If the rack overstrokes, the oil seal will be damaged by the teeth of the rack, so temporarily install the rack end so that it does not overstroke.**

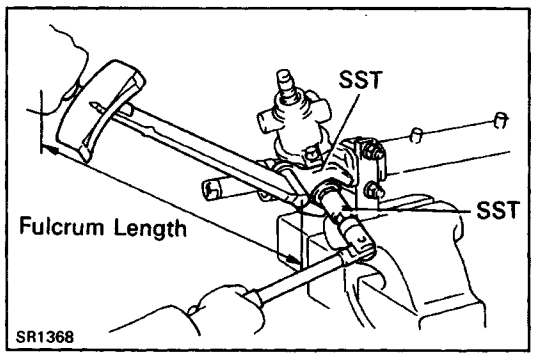
(e) Loosen the spring cap until the rack guide compression spring is not functioning.




(f) Using SST and a torque meter, tighten the rack guide spring cap until the preload is within specification.

SST 09612–24014 (09612–10022) and 09616–00010

**Preload (turning): 0.9 – 1.2 N–m (9 – 12 kgf–cm, 7.8 – 10.4 in.–lbf)**




**14. INSTALL RACK GUIDE SPRING CAP LOCK NUT**

(a) Apply sealant to 2 or 3 threads of the lock nut.

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

(b) Using SST, install and torque the lock nut.

SST 09612–24014 (09612–10022, 09617–24020)

**Torque: 56 N–m (570 kgf–cm, 41 ft–lbf)**

HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

(c) Recheck the total preload.

**15. INSTALL DUST COVER**

**16. INSTALL CLAW WASHERS AND RACK ENDS**

(a) Install new claw washers.

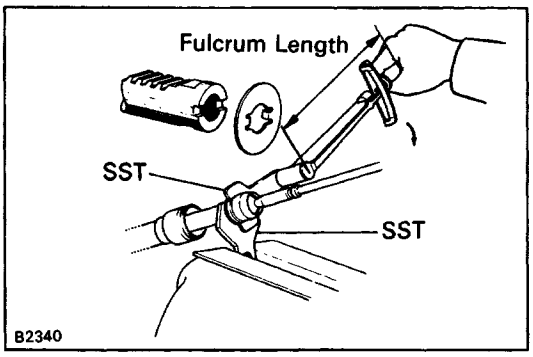
HINT: Align the claws of the claw washer with the rack grooves.

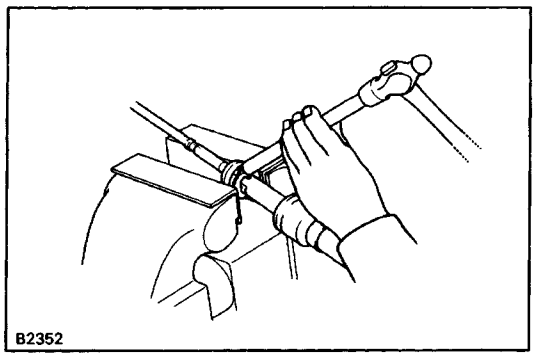
(b) Using SST, install and torque the rack ends.

SST 09612–10093 (09628–10020) and 09612–24014 (09617–24011)

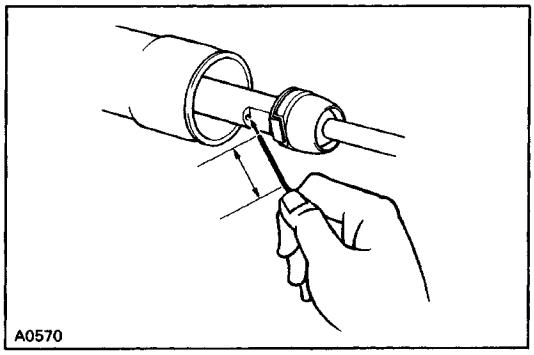
**Torque: 72 N–m (730 kgf–cm, 53 ft–lbf)**

HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).





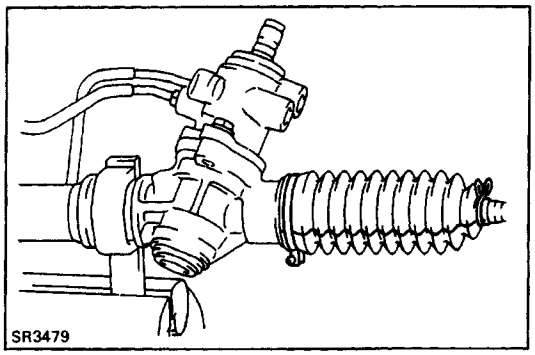

(c) Using a brass bar and hammer, stake the claw washers.




**17. INSTALL RACK BOOTS, CLAMPS AND CLIPS**

(a) Insure that the tube hole is not clogged with grease.

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

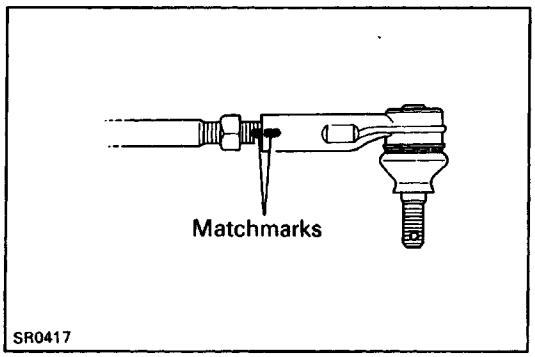



(b) Install the boots.

**NOTICE: Be careful not to damage or twist the boots.**

(c) Install the clamps.

(d) Install the clips with the ends facing outward.

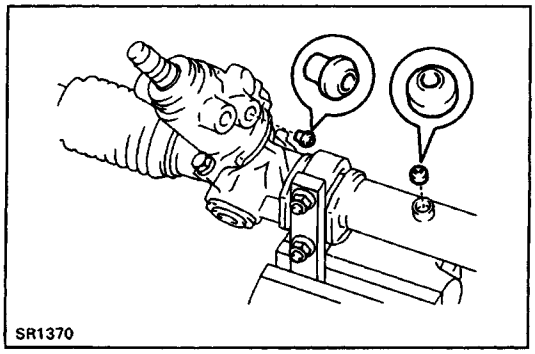



**18. INSTALL TIE ROD ENDS**

(a) Screw the lock nuts and tie rod ends onto the rack ends until the matchmarks are aligned.

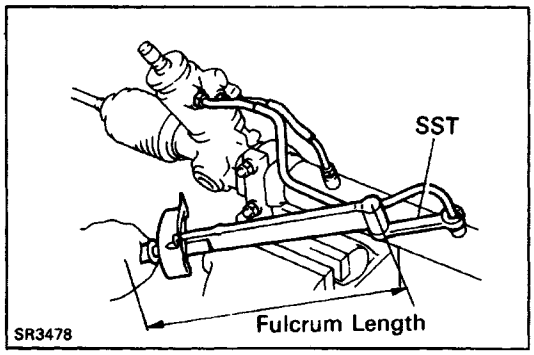
(b) After adjusting toe–in, torque the lock nuts.

**Torque: 56 N–m (570 kgf–cm, 41 ft–lbf)**




**19. INSTALL RIGHT AND LEFT TURN PRESSURE TUBES**

(a) Install new union seats as shown.




(b) Using SST, install and torque the tubes.
SST 09633–00020
**Torque: 20 N–m (200 kgf–cm, 14 ft–lbf)**
HINT: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).