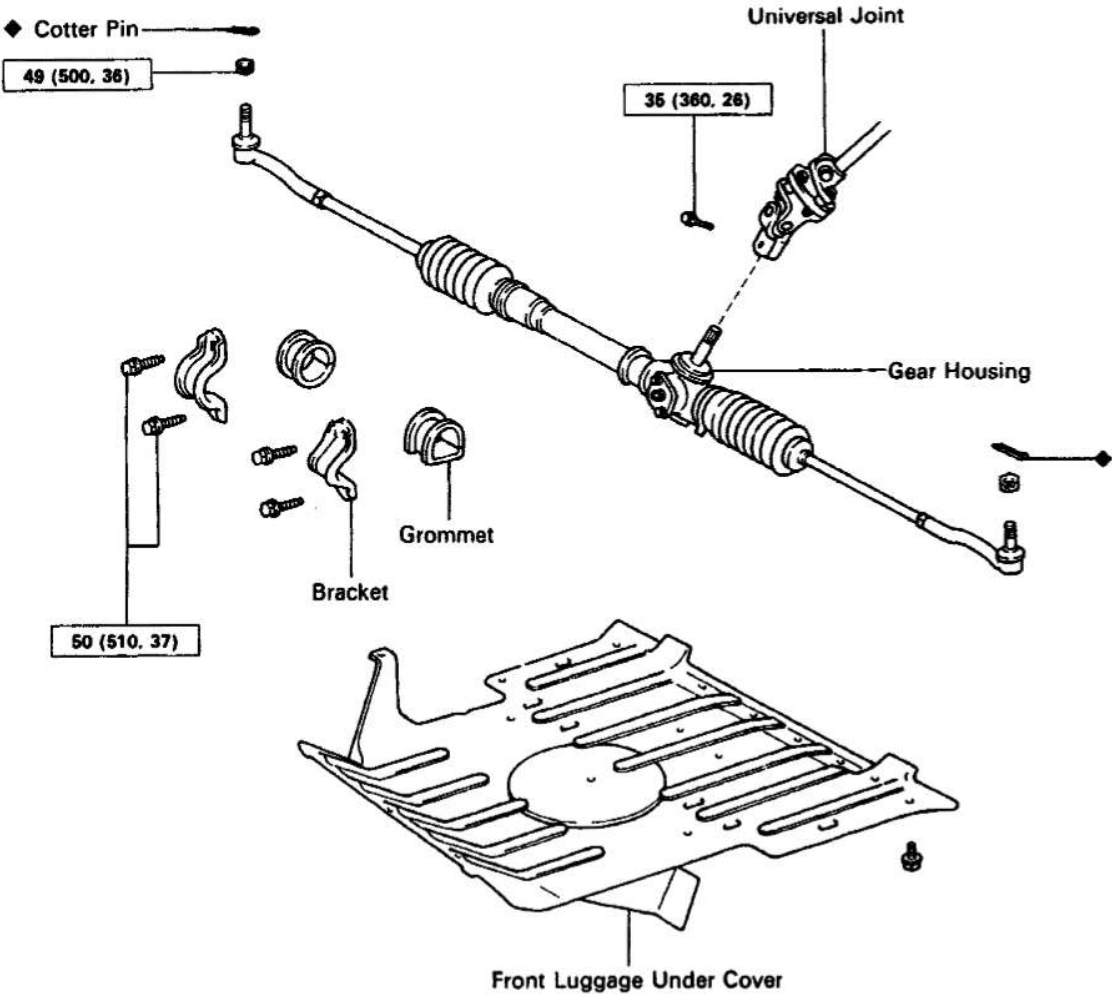


ASSEMBLY REMOVAL AND INSTALLATION

Remove and install the parts as shown.

SR078-01



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

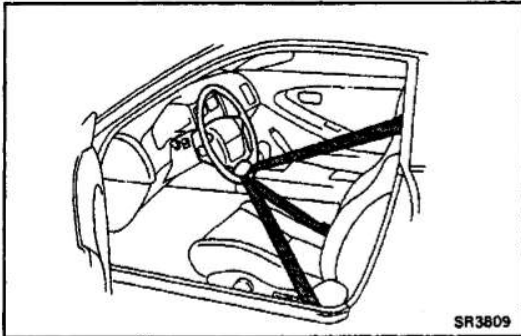
R02646

(MAIN POINTS OF REMOVAL AND INSTALLATION)

NOTICE: When disconnecting the universal joint during removal of the gear housing, remove the steering wheel and perform centering of the spiral cable.

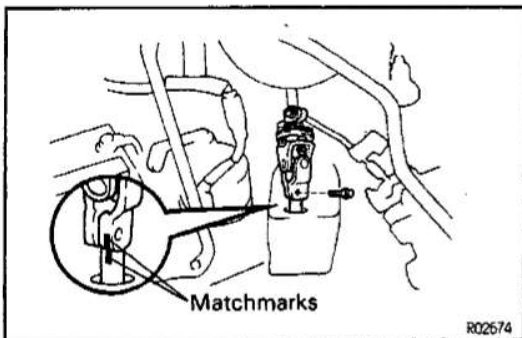
(See page [AB-2](#))

If the operation is performed without removing the steering wheel, use the procedure below to make sure the steering wheel is firmly in position and cannot turn.

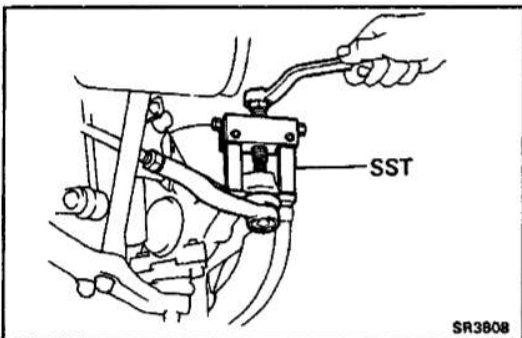


1. DISCONNECT UNIVERSAL JOINT

- (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.



- (c) Place matchmarks on the universal joint and pinion 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

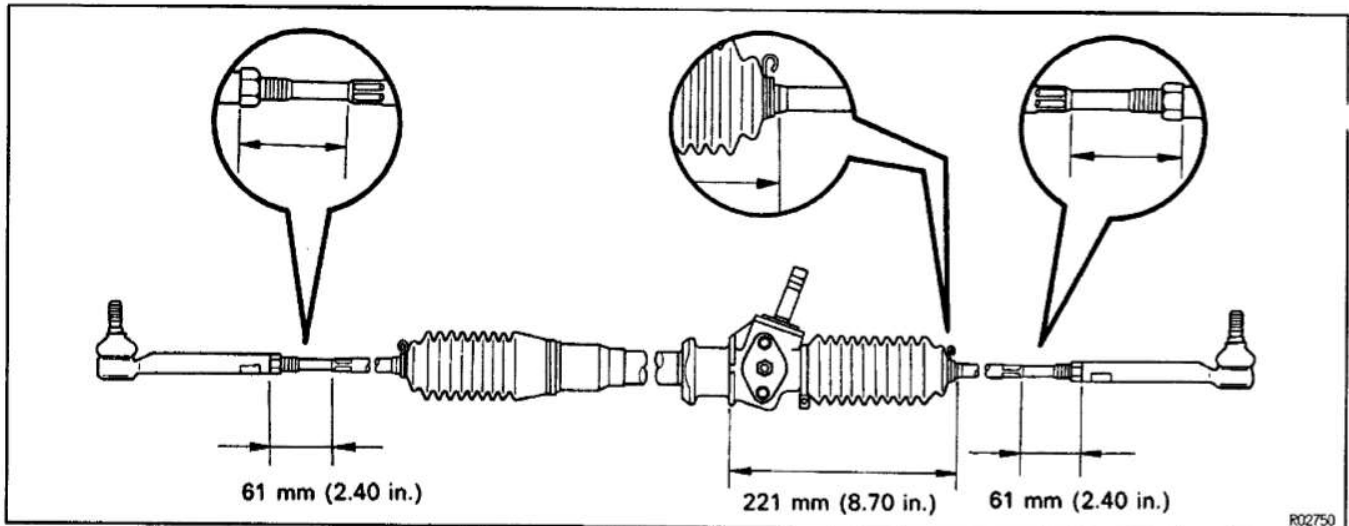
- (a) Remove the cotter pin and nut.
 - (b) Using SST, disconnect the tie rod end from the knuckle arm.
- SST 09628-62011

3. CONNECT UNIVERSAL JOINT

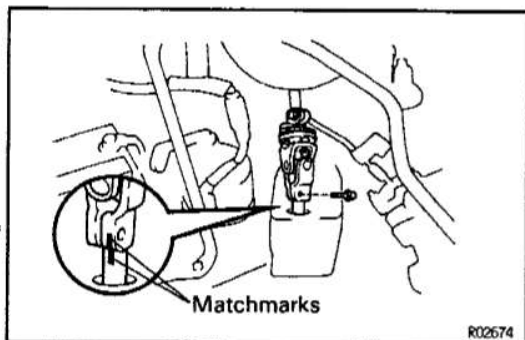
- (a) Set the gear housing so that it matches the dimensions shown below with the gear housing at the center point.

SR-20

STEERING - MANUAL STEERING GEAR HOUSING



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 pinion shaft and connect them.

4. 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.

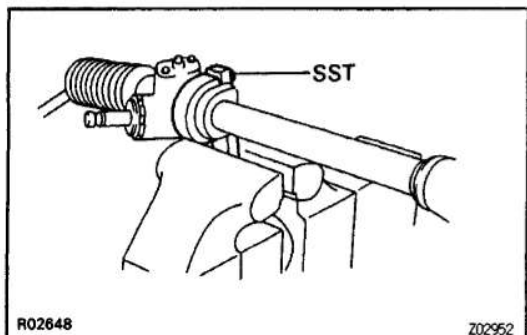
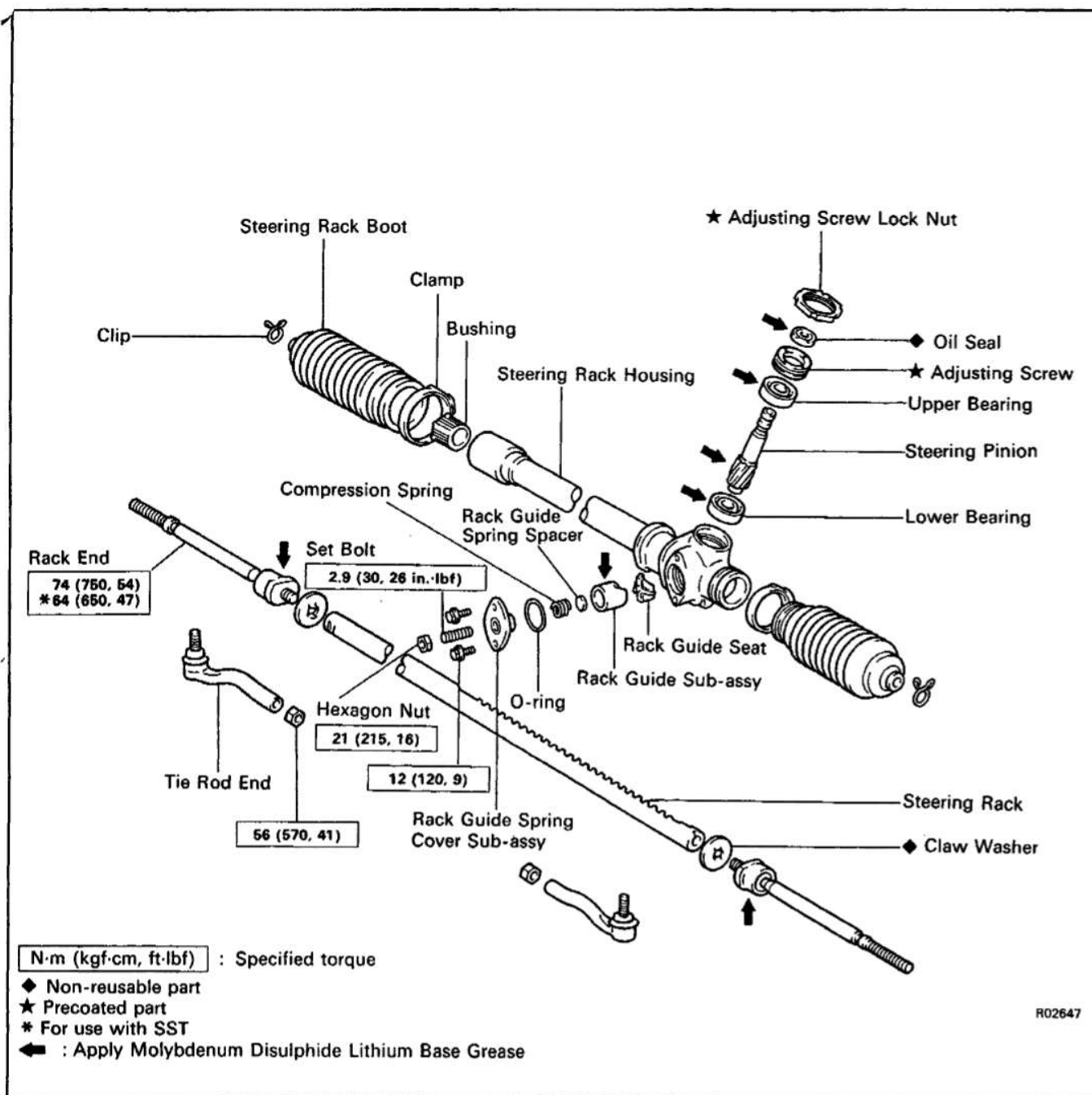
(See page [AB-17](#))

5. CHECK STEERING WHEEL CENTER POINT

6. CHECK TOE-IN

(See page [SA-4](#))

COMPONENTS



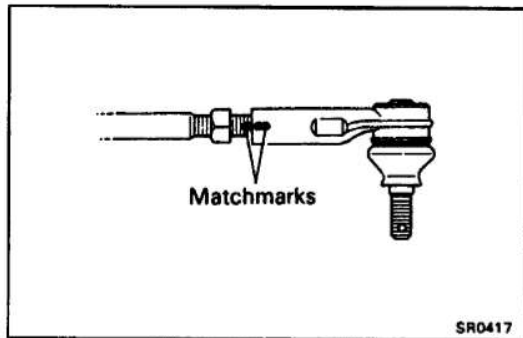
GEAR HOUSING DISASSEMBLY

1. CLAMP GEAR HOUSING IN VISE

Using SST, clamp the gear housing in a vise.
SST 09612-00012

SR-22

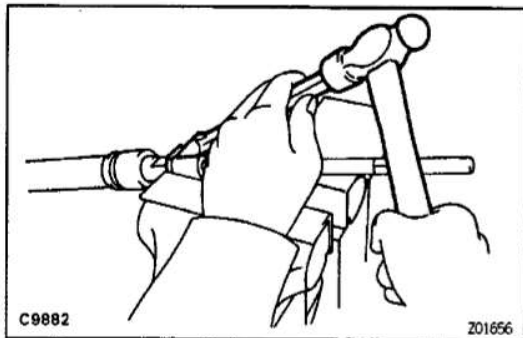
STEERING - MANUAL STEERING GEAR HOUSING

**2. REMOVE TIE ROD ENDS**

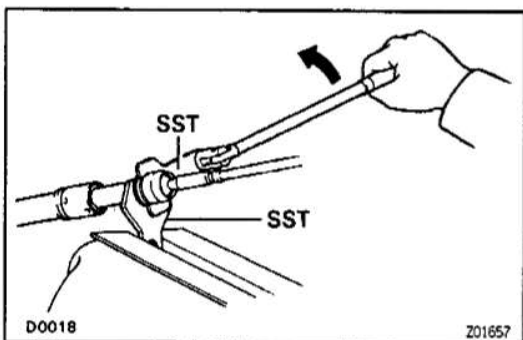
- (a) Loosen the lock nuts and place matchmarks on the tie rod ends and rack ends.
- (b) Remove the tie rod ends and lock nuts.

3. REMOVE RACK BOOTS

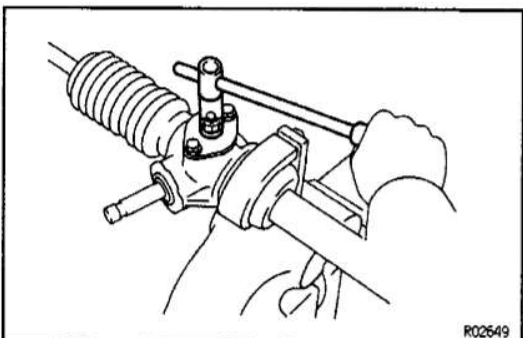
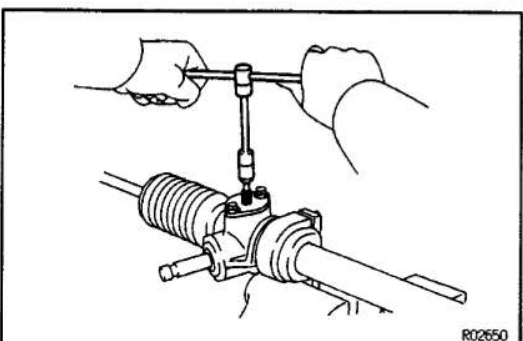
- (a) Remove the clips and clamps.
- (b) Remove the rack boots.
- (c) Mark the left and right boots accordingly.

**4. REMOVE RACK ENDS**

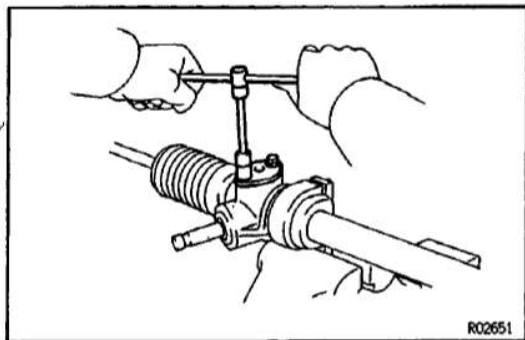
- (a) Unstake the claw washers.
- NOTICE:** Avoid any impact to the rack.



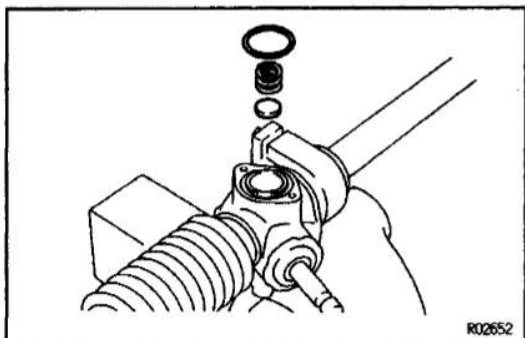
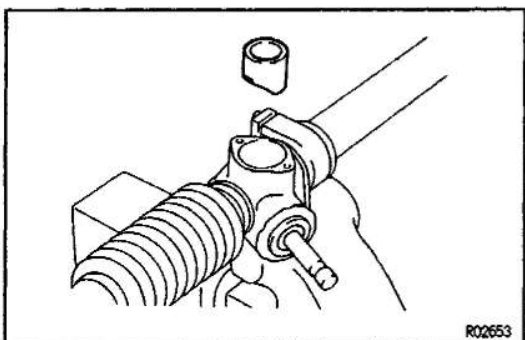
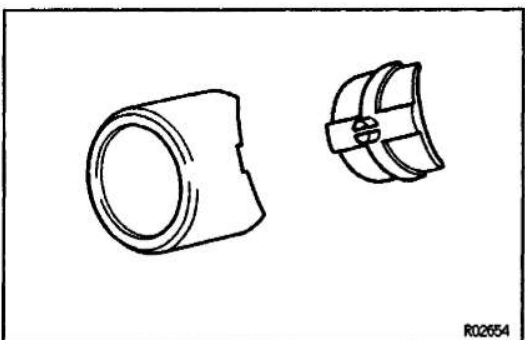
- (b) Using SST, remove the rack ends.
SST 09612-10093 (09628-10020),
09612-24014 (09617-24011)
- (c) Mark the left and right rack ends accordingly.
- (d) Remove the claw washers.

**5. REMOVE HEXAGON NUT****6. REMOVE SET BOLT**

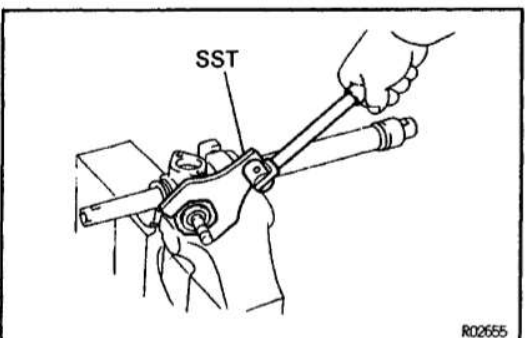
Using a hexagon wrench 4 mm, remove the set bolt.

**7. REMOVE RACK GUIDE SPRING COVER SUB –ASSY**

Remove two bolts and the rack guide spring cover sub – assy.

**8. REMOVE O – RING****9. REMOVE COMPRESSION SPRING****10. REMOVE RACK GUIDE SPRING SPACER****11. REMOVE RACK GUIDE SUB–ASSY****12. REMOVE RACK GUIDE SEAT**

Remove rack guide seat from the rack guide sub– assy.

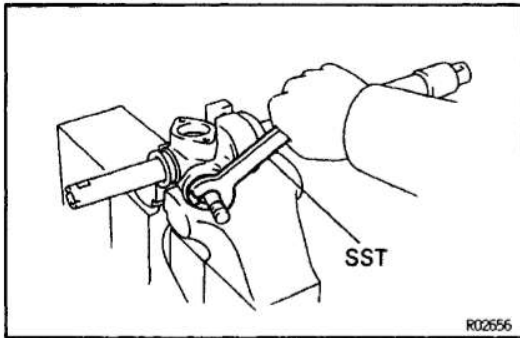
**13. REMOVE PINION BEARING ADJUSTING SCREW LOCK NUT**

Using SST, remove the pinion bearing adjusting screw lock nut.

SST 09612 –10093 (09617 –10010)

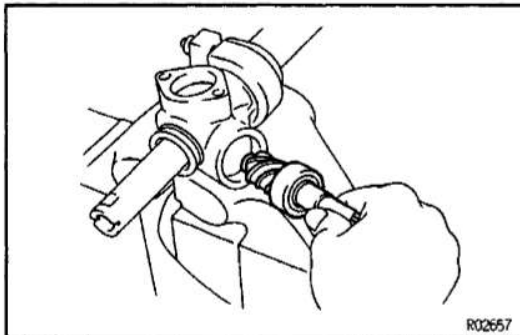
SR-24

STEERING - MANUAL STEERING GEAR HOUSING

**14. REMOVE PINION BEARING ADJUSTING SCREW**

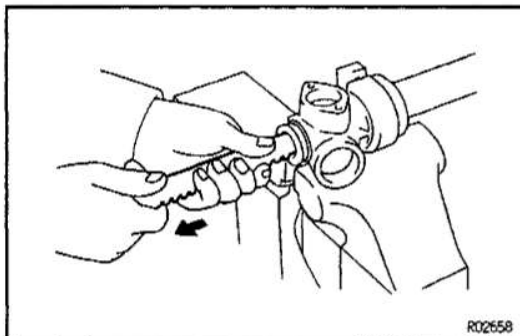
Using SST, remove the pinion bearing adjusting screw.

SST 09612-24014 (09616-10020)

**15. REMOVE PINION WITH UPPER BEARING**

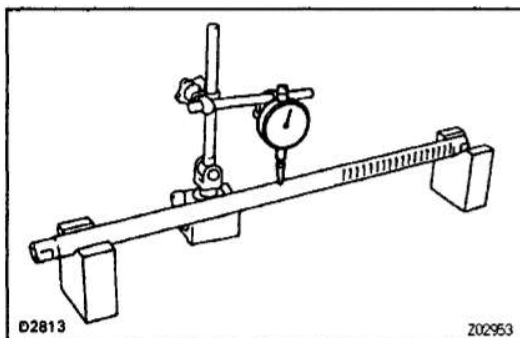
HINT: Be careful not to damage the serrations.

- (a) Fully pull the rack from the housing side and align the rack notched portion with the pinion.
- (b) Remove the pinion together with the upper bearing.

**16. REMOVE RACK**

Remove the rack from the pinion side without revolving it.

HINT: If the rack is pulled from the tube side, there is a possibility of damaging the bushing with the rack teeth surface.

**GEAR HOUSING COMPONENTS INSPECTION AND REPAIR**

09079-01

1. INSPECT RACK

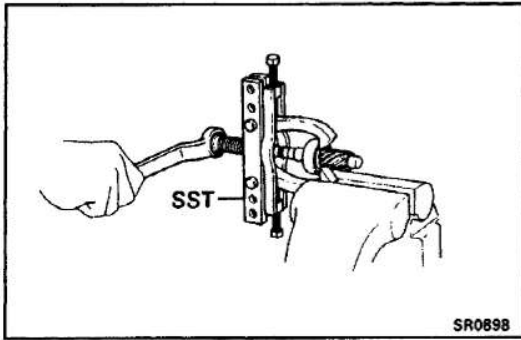
- (a) Check the rack for runout and for teeth wear or damage.

Maximum runout:

0.3 mm (0.012 in.)

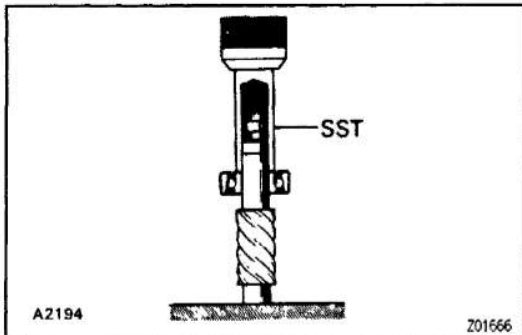
- (b) Check the back surface for wear or damage. If faulty, replace it.

NOTICE: Do not use a wire brush when cleaning.

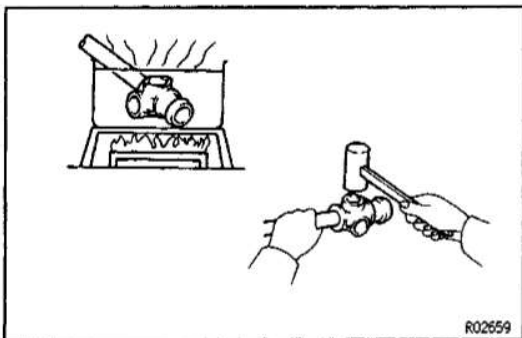


2. IF NECESSARY, REPLACE PINION UPPER BEARING

- (a) Using SST, remove the upper bearing.
SST 09950-20017

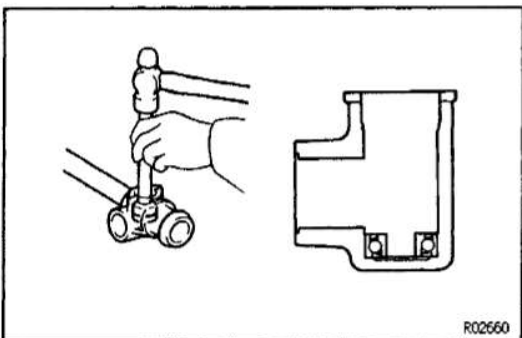


- (b) Using SST, install a new upper bearing.
SST 09612-24014 (09612-10061)



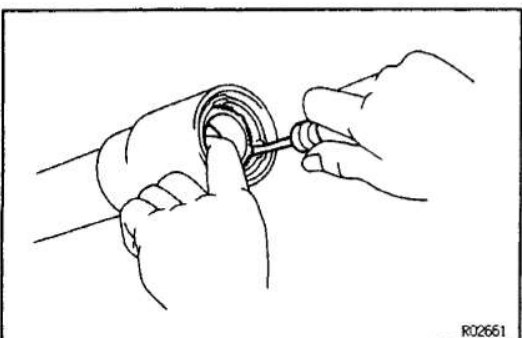
3. IF NECESSARY, REPLACE PINION LOWER BEARING .

- (a) Heat the rack housing to above 80°C (176°F).
(b) Tap the rack housing with a plastic hammer or such to remove the lower bearing by recoil.



- (c) Heat the rack housing to above 80°C (176°F).
(d) Using SST, install a new lower bearing.
SST 09620-30010 (09631-00020),
09630-24013 (09620-24030)

HINT: Observe the correct bearing direction.

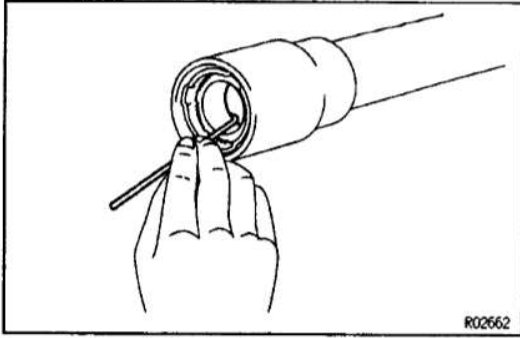


4. IF NECESSARY, REPLACE RACK BUSHING

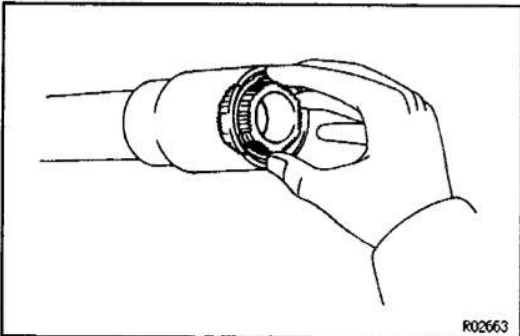
- (a) Using a screwdriver, loosen the three bushing claws and remove the rack bushing from the rack housing.

SR-26

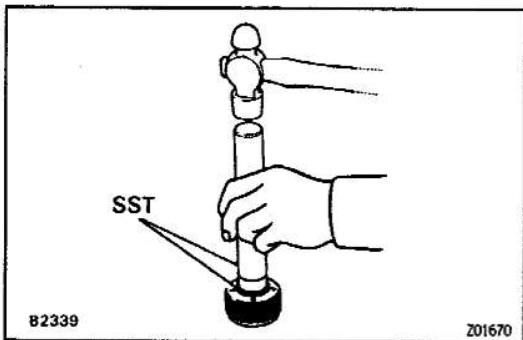
STEERING – MANUAL STEERING GEAR HOUSING



(b) Insure that the tube holes are not clogged with grease.
HINT: If the tube holes are clogged, the pressure inside the boot will

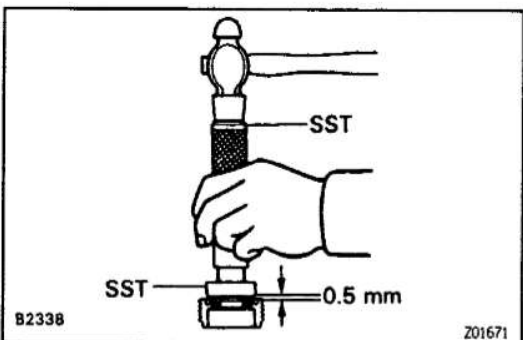


(c) Install a new bushing into the rack housing, making sure to align into the three holes.



5. IF NECESSARY, REPLACE PINION OIL SEAL

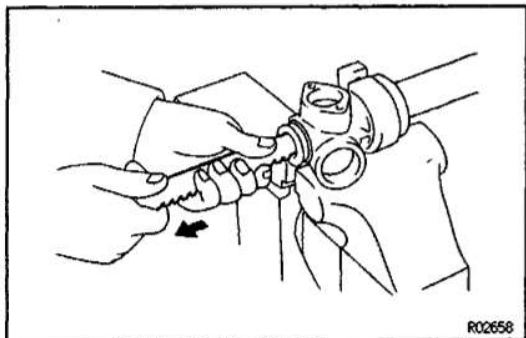
(a) Using SST, remove the pinion oil seal.
SST 09620-30010 (09631 -00020),
09630 - 24013 (09620 - 24010)



(b) Using SST, drive in a new oil seal until it is protruding 0.5 mm (0.020 in.)
SST 09620-30010 (09631 -00020),
09630-24013 (09620-24020)

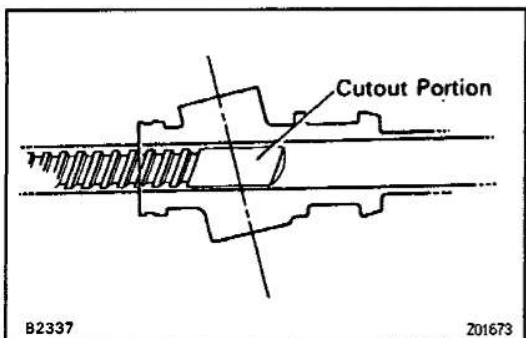
GEAR HOUSING ASSEMBLY

1. PACK MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE

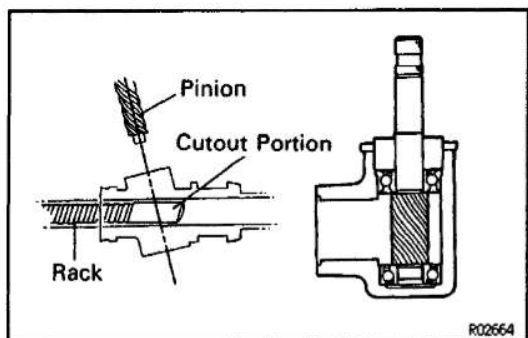


2. INSTALL RACK INTO RACK HOUSING

- (a) From the pinion side, install the rack into the rack housing.
- (b) Set the rack notched side so that the pinion can be positioned inside.

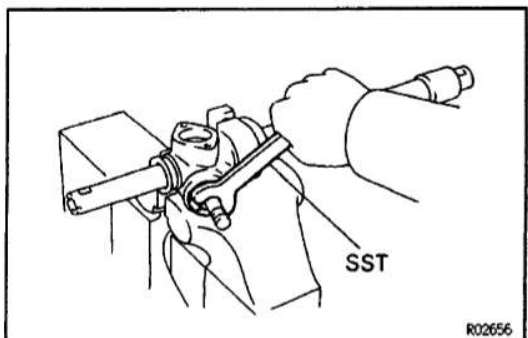


- (c) Line up the cutout portion of the rack with the pinion.



3. INSTALL PINION INTO HOUSING

Insure that the pinion end is securely in the lower bearing.



4. INSTALL PINION BEARING ADJUSTING SCREW

- (a) Coat sealant onto the screw threads.

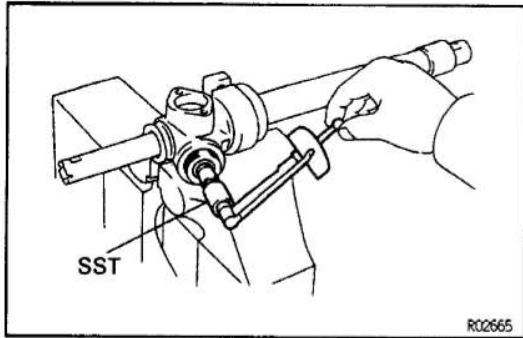
Sealant:

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

- (b) Using SST, install the pinion bearing adjusting screw.
SST 09612-24014 (09616-10020)

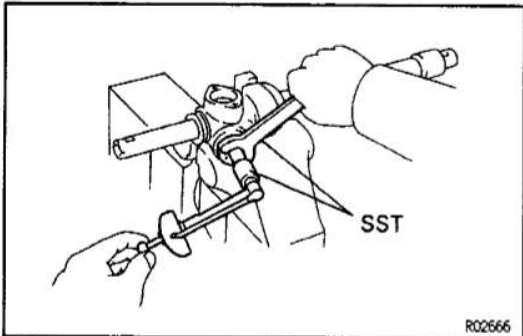
SR-28

STEERING - MANUAL STEERING GEAR HOUSING

**5. ADJUST PINION PRELOAD**

- (a) Line up the cutout portion of the rack with the pinion.
- (b) Using SST, tighten the pinion bearing adjusting screw to the point where the turning torque is 0.4 N-m (3.7 kgf-cm, 3.2 in.-lbf).

SST 09612 - 24014 (09616 - 10010)



- (c) Using SST, loosen the pinion bearing adjusting screw to the point where the turning torque is 0.2-0.3 N.m (2.3-3.3 kgf-cm, 2.0-2.9 in.-lbf)

SST 09612-24014 (09616-10010, 09616-10020)

Preload (turning):

0.2-0.3 N-m

(2.3-3.3 kgf-cm, 2.0-2.8 in.-lbf)

6. INSTALL PINION BEARING ADJUSTING SCREW 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 the lock nut.

SST 09612 - 10093 (09617 - 10010),

09612-24012 (09616-10020)

Torque: 91 N-m (830 kgf-cm, 67 ft-lbf)

HINT: Use a torque wrench with a fulcrum length of 425 mm (16.73 in.).

- (c) Recheck the pinion preload.

If incorrect, readjust.

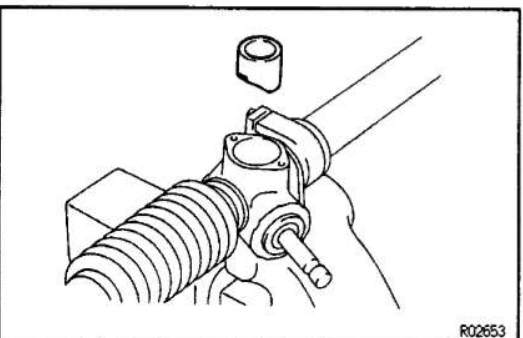
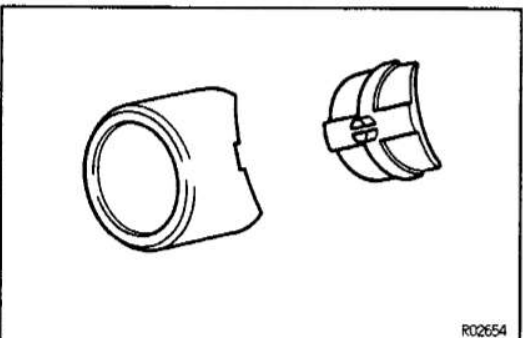
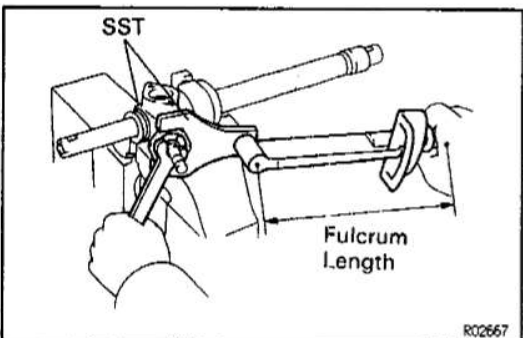
Preload (turning):

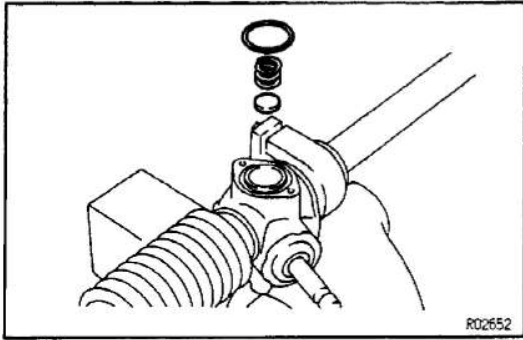
0.1 -0.2 N-m

(1.5-2.5 kgf-cm, 1.3-2.2 ft-lbf)

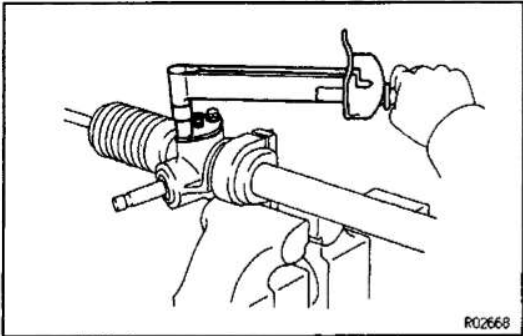
7. INSTALL RACK GUIDE SEAT

Install rack guide seat to the rack guide sub-assy.

**8. INSTALL RACK GUIDE SUB-ASSY**



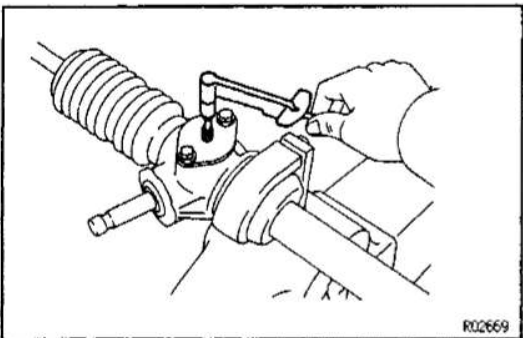
9. INSTALL RACK GUIDE SPRING SPACER
10. INSTALL COMPRESSION SPRING
11. INSTALL O-RING



12. INSTALL RACK GUIDE SPRING COVER SUB-ASSY

Install rack guide spring cover sub-assy with two bolts.

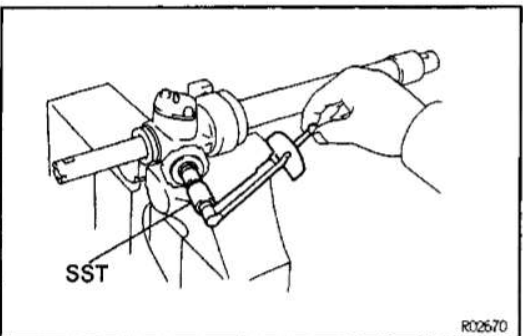
Torque: 12 N-m (120 kgf-cm, 9 ft-lbf)



13. ADJUST TOTAL PRELOAD

- (a) Using a hexagon wrench (4mm), tighten the set bolt.

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



- (b) Measure the total preload with SST.

SST 09612 - 24014 (09616 - 10010)

Preload (turning):

0.6-1.1 N-m

(6-11 kgf-cm, 5.2-9.5 in.-lbf)

- If preload is insufficient:
Retorque the rack guide spring cap, and return it 12° or slightly less.
- If there is excess preload:
Slightly return the rack guide spring cap.

14. INSTALL HEXAGON NUT

- (a) Install hexagon nut.

Torque: 21 N-m (215 kgf-cm, 16 ft-lbf)

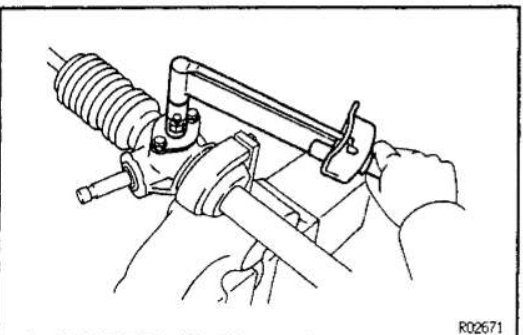
- (b) Recheck the total preload.

If incorrect, read just.

Preload (turning):

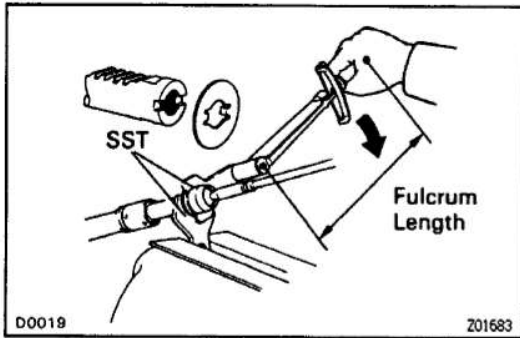
0.6-1.1 N-m

(6-11 kgf-cm, 5.2-9.5 in.-lbf)



SR-30

STEERING - MANUAL STEERING GEAR HOUSING

**15. INSTALL RACK ENDS**

(a) Install new claw washers.

HINT: Align the claw of the claw washer with the rack groove.

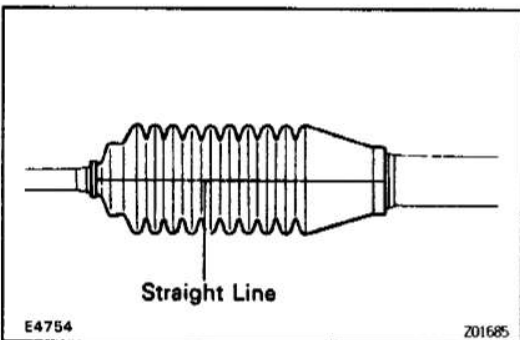
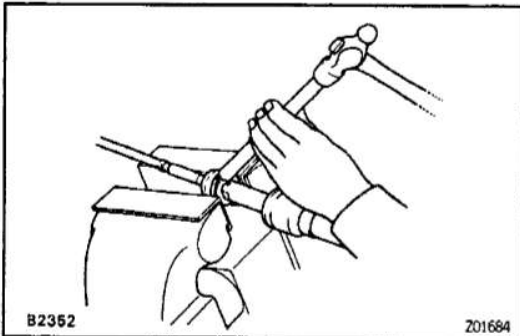
(b) Using SST, install the rack ends.

SST 09612-10093 (09628-10020),
09612-24014 (09617-24011)

Torque: 64 N-m (650 kgf-cm, 47 ft-lbf)

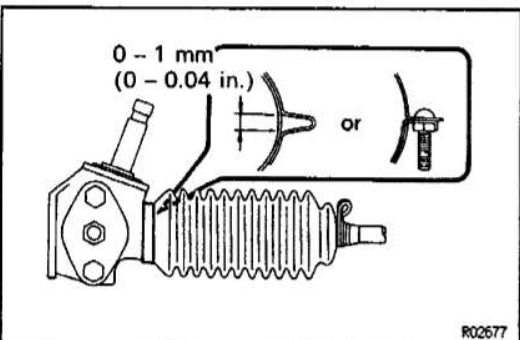
HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

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

**16. INSTALL RACK BOOTS**

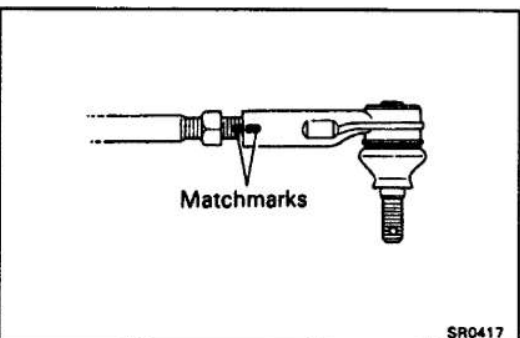
(a) Install the rack boots.

HINT: Be careful not to damage or twist the boot. The left and right boots are different. Be careful not to interchange them.



(b) Install the clamps and clips.

HINT: Face the open ends of the clip outward as shown, to avoid damage to the boot.

**17. INSTALL TIE ROD ENDS**

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

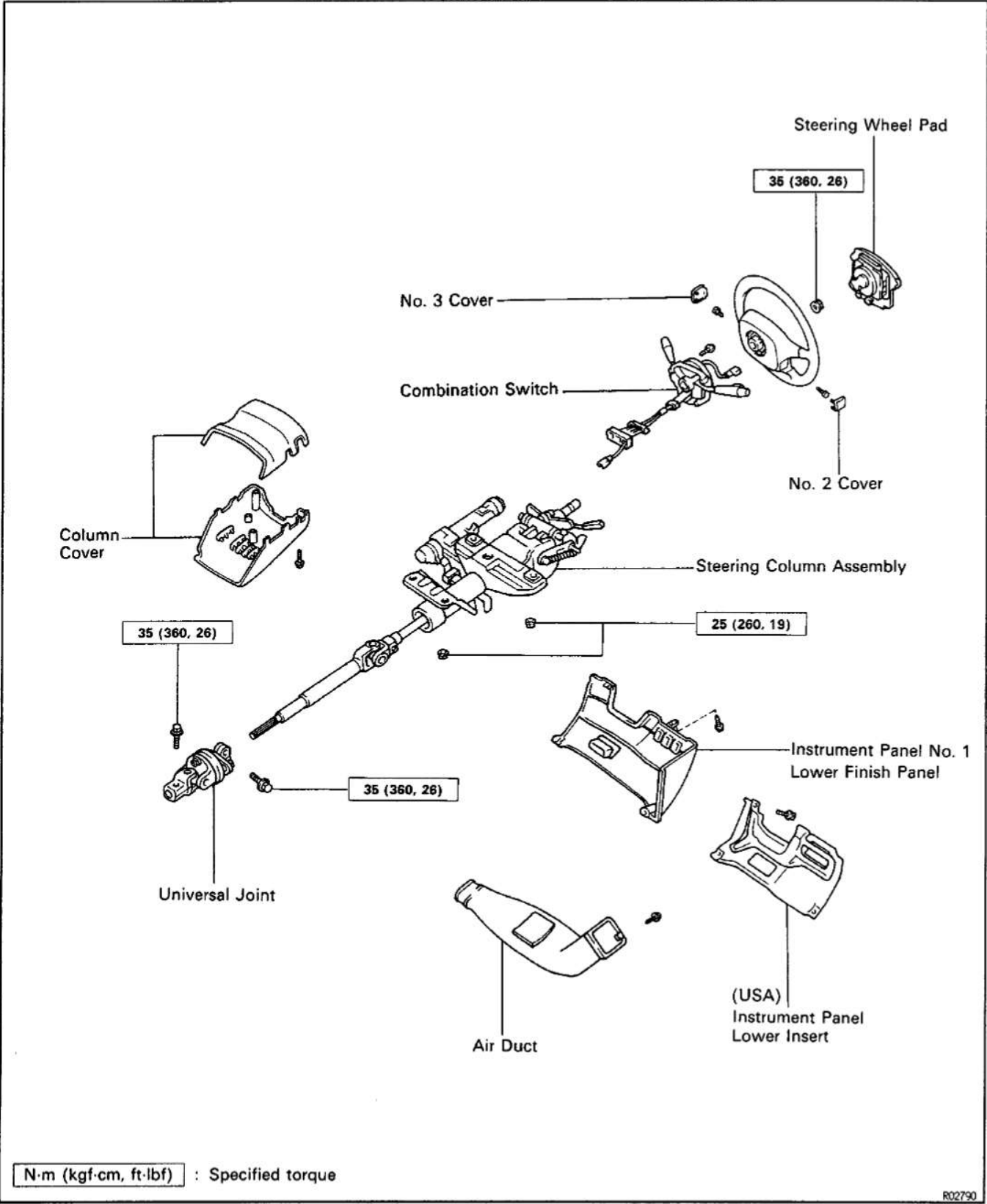
(b) After adjusting toe-in, torque the lock nuts.

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

ASSEMBLY REMOVAL AND INSTALLATION

Remove and install the parts as shown.

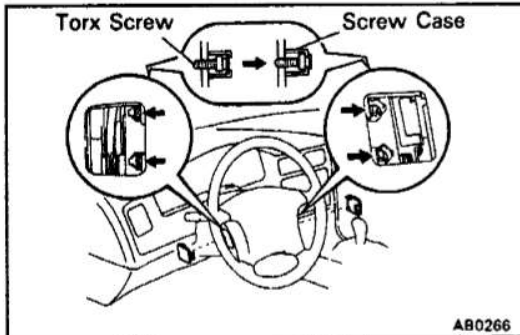
SR08Y-01



(MAIN POINTS OF REMOVAL AND INSTALLATION)

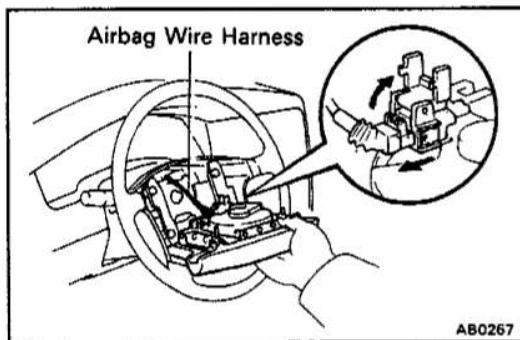
CAUTION: Work must be started after approx. 30 seconds or longer from the time the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery (See page AB-2).

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



1. REMOVE STEERING WHEEL PAD

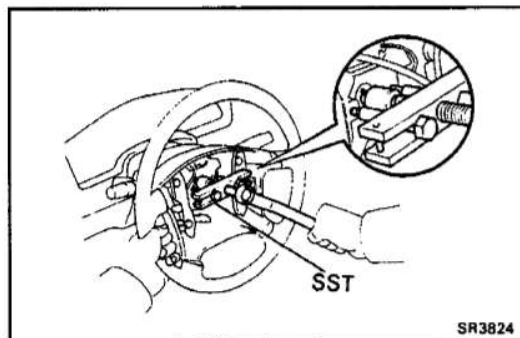
- Remove negative terminal (-) from the battery.
- Place the front wheels facing straight ahead.
- Using a torx wrench, loosen the four screws.
Torx wrench: T30 (Part No. 09042-00010 or locally manufactured tool)
- Loosen the torx screws until the groove along the screw circumference catches on the screw case.



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

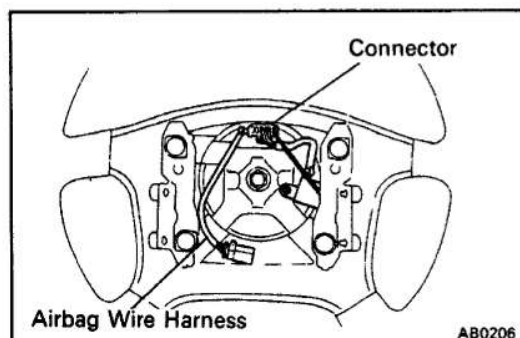
NOTICE: When removing the wheel pad, take care not to pull the airbag wire harness.

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



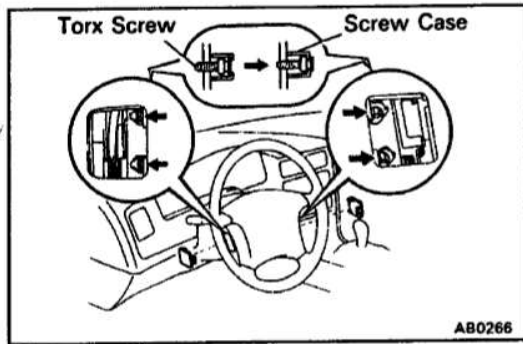
2. REMOVE STEERING WHEEL

- Disconnect the connector.
- Remove the set nut.
- Using SST, remove the steering wheel.
SST 09213-31021



3. INSTALL STEERING WHEEL AND WHEEL PAD

- Check that the front wheels are facing straight ahead.
- Center the spiral cable.
(See page AB-17)
- Install the steering wheel and torque the set nut.
Torque: 35 N-m (360 kgf-cm, 26 ft-lbf)
- 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: 7.4 N-m (7.5 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 connector, replace the wheel pad with a new one.
- When installing the wheel pad, take care that the wirings do not interfere with other parts and are not pinched between other parts.

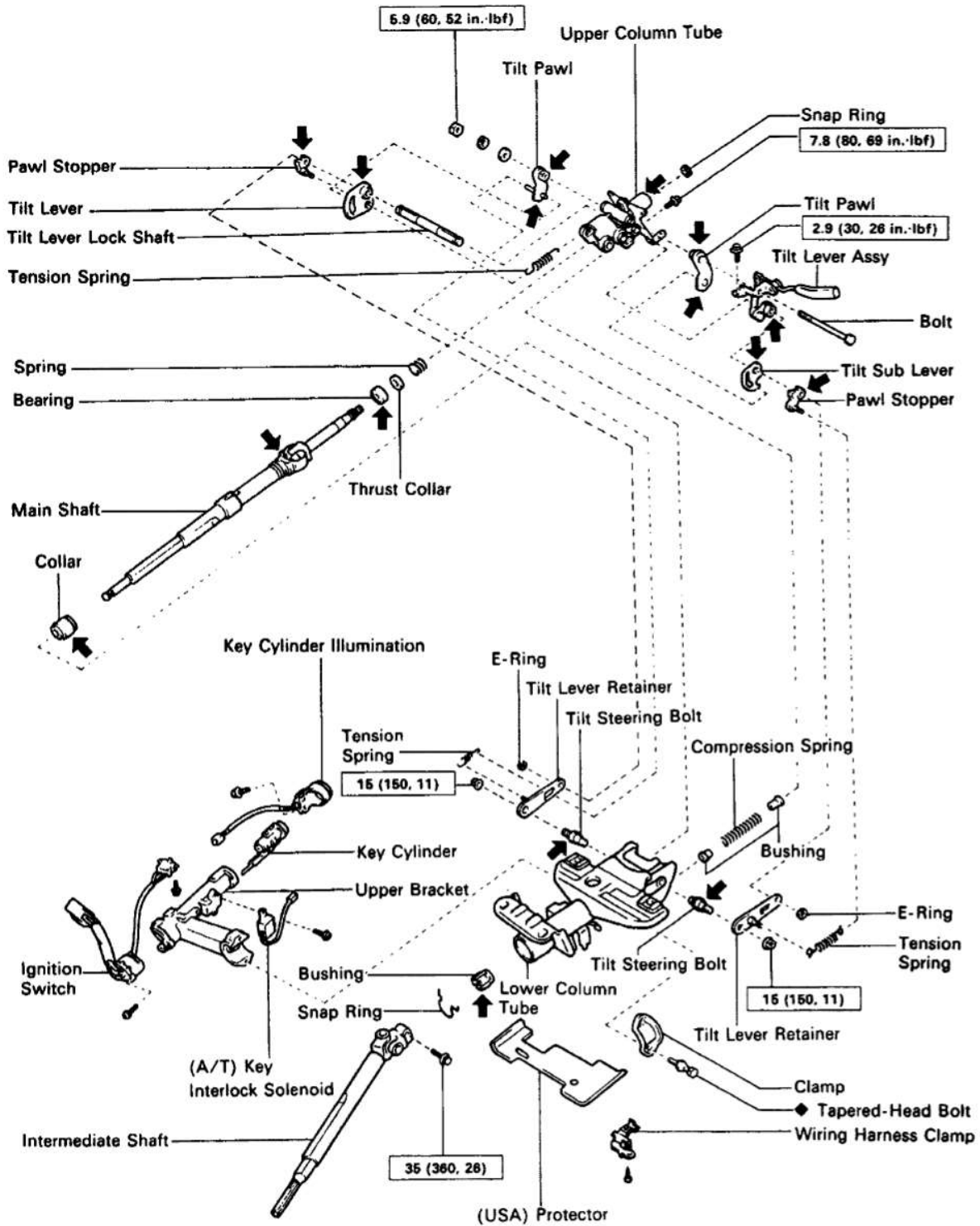
4. CHECK STEERING WHEEL CENTER POINT AFTER INSTALLING STEERING COLUMN

SR-8

STEERING - STEERING COLUMN

BR052-01

COMPONENTS

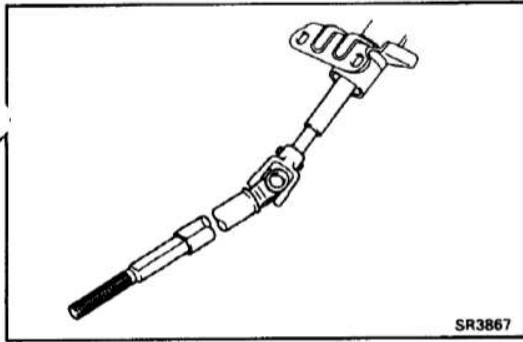


SR3912

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

◆ Non-reusable part

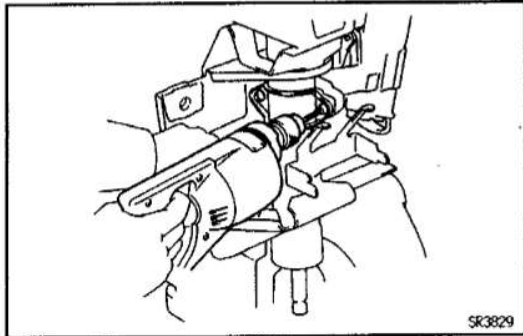
← : Apply Molybdenum Disulphide Lithium Base Grease



STEERING COLUMN DISASSEMBLY

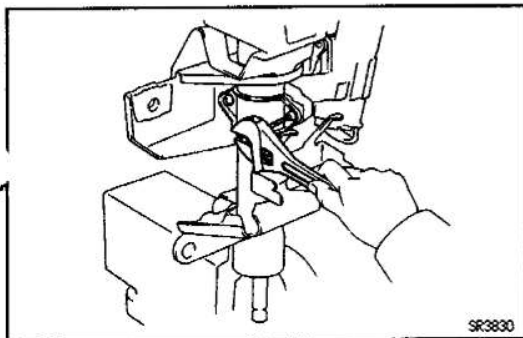
1. REMOVE IGNITION KEY CYLINDER ILLUMINATION
2. REMOVE INTERMEDIATE SHAFT
3. REMOVE WIRING HARNESS CLAMP
4. (USA)

REMOVE PROTECTOR

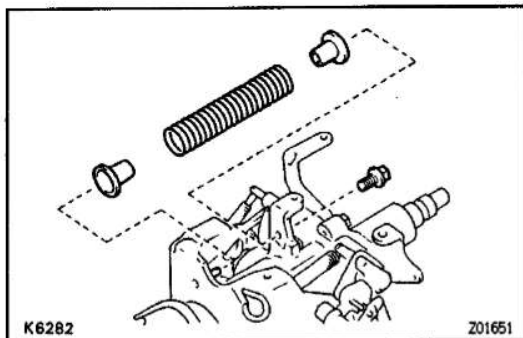


5. REMOVE UPPER BRACKET

- (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.

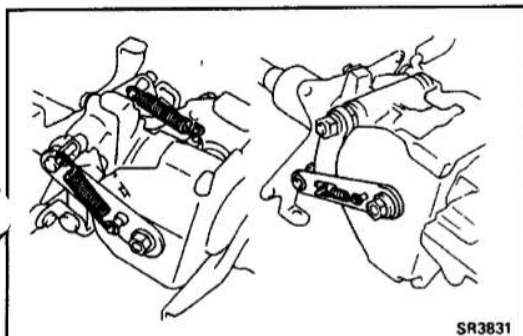


- (c) Using a screw extractor, remove the tapered-head bolts.
- (d) Remove the two bolts, and separate the upper bracket and the column tube.



6. REMOVE COMPRESSION SPRING

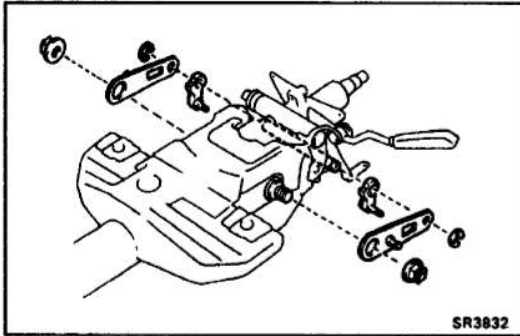
- (a) Remove the bolt and spring.
- (b) Remove the two bushings from the spring.



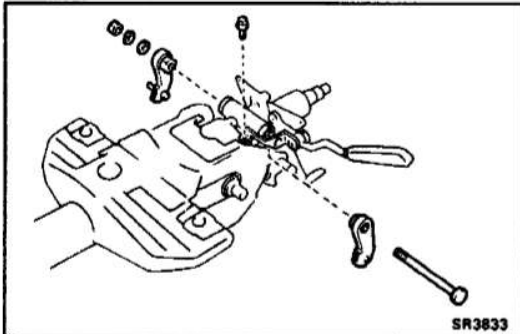
7. REMOVE THREE TENSION SPRINGS

SR-10

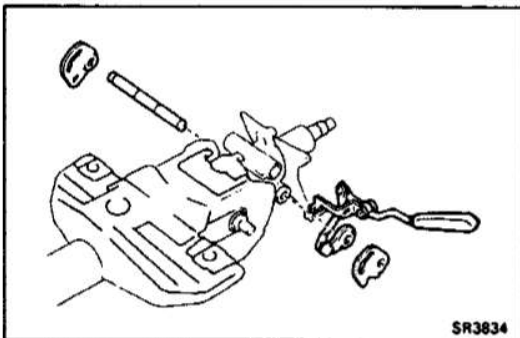
STEERING - STEERING COLUMN

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

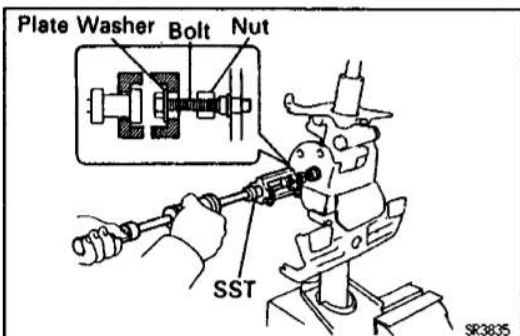
- (a) Remove the two E-rings from the tilt lever lock shaft.
- (b) Remove the two nuts from the tilt steering bolts.
- (c) Remove the two tilt lever retainers and two pawl stoppers.

**8. REMOVE TILT PAWLS**

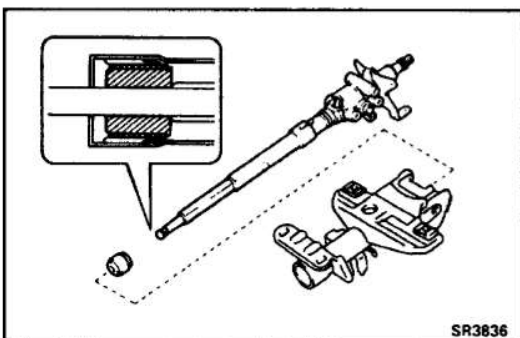
- (a) Remove the nut and two washers.
- (b) Pull out the bolt.
- (c) Remove the tilt lever assembly installation bolt.
- (d) Remove the two tilt pawls.

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

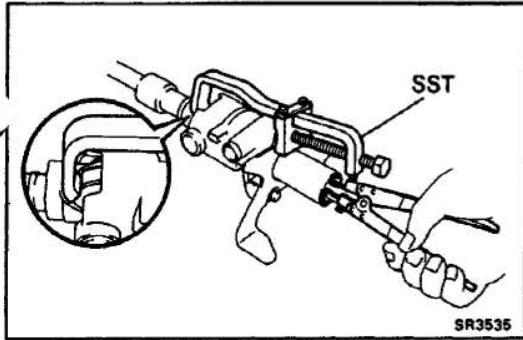
- (a) Remove the tilt lever, tilt sub lever and tilt lever assembly from the tilt lever lock shaft.
- (b) Pull out the tilt lever lock shaft.

**11. REMOVE UPPER COLUMN TUBE**

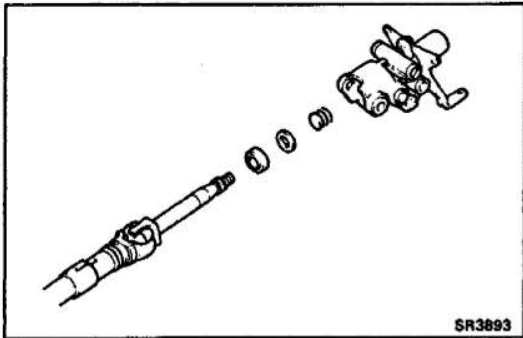
- (a) Set SST, the nut (10 mm diameter, 1.25 mm pitch), plate washer (36 mm outer diameter) and bolt (10 mm diameter, 1.25 mm pitch, 50 mm length) as shown. And then remove the two tilt steering bolts.
SST 09910-00015(09911-0001 1,09912-00010)
(Reference) Nut 90170-10004
Plate washer 90201-10201
Bolt 91111-51050



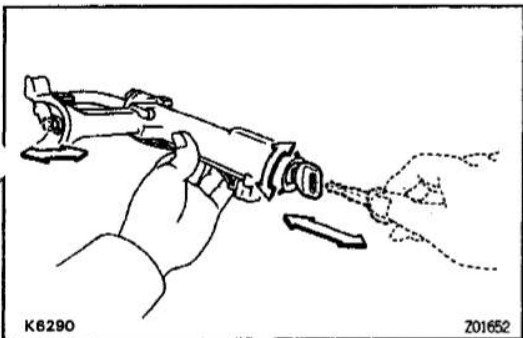
- (b) Remove the upper column tube from the lower column tube.
- (c) Remove the collar from the main shaft.

**12. REMOVE MAIN SHAFT**

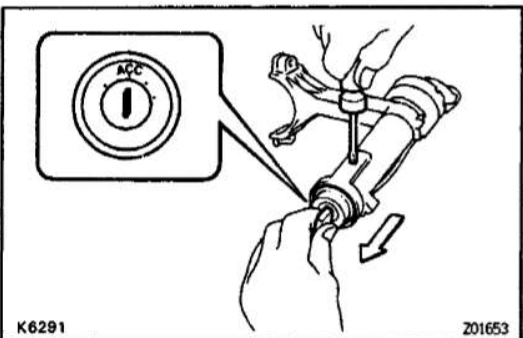
- (a) Using SST to compress the main shaft spring, remove the snap ring with snap ring pliers.
SST 09950-20017(09956-00010)



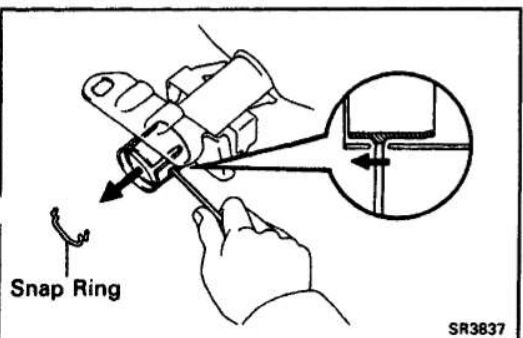
- (b) Remove the main shaft from the column tube.
(c) Remove the spring, thrust collar and bearing.

**STEERING COLUMN INSPECTION AND REPLACEMENT****1. INSPECT KEY CYLINDER**

Check that the steering lock mechanism operates properly.

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

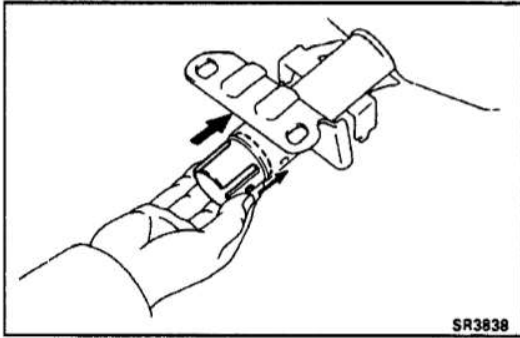
- (a) Place the ignition key at the ACC position.
(b) Push down the stop pin with a thin rod, and pull out the key cylinder.
(c) Make sure the ignition key is at the ACC position.
(d) Install a new key cylinder.

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

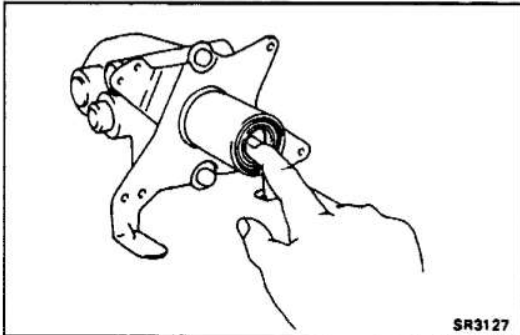
- (a) Remove the snap ring.
(b) Using a screwdriver, remove the bushing.

SR-12

STEERING - STEERING COLUMN



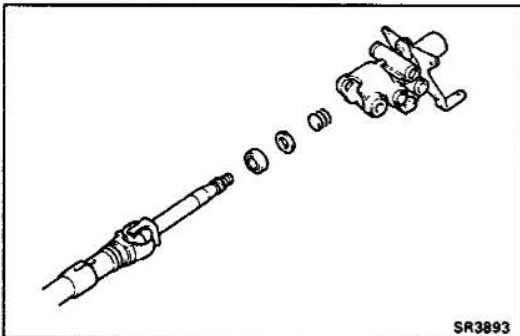
- (c) Align the holes of the tube and projections of a new bushing, and install the bushing in the column tube.
- (d) Install the snap ring.

**4. INSPECT UPPER BEARING**

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

5. (A/T)**INSPECT KEY INTERLOCK SOLENOID**

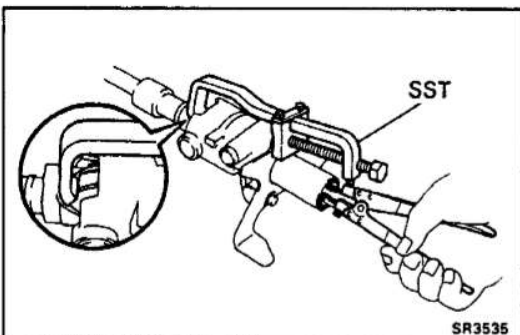
(See page AT-80)

**STEERING COLUMN ASSEMBLY**

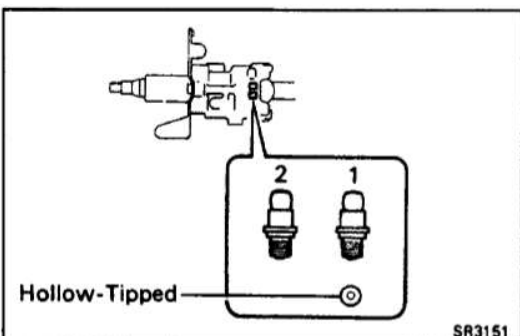
09072-01

1. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE**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.

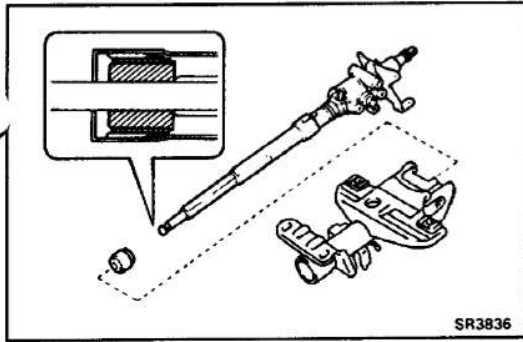


- (c) Using SST to compress the main shaft spring, install the snap ring with snap ring pliers.
SST 09950-20017

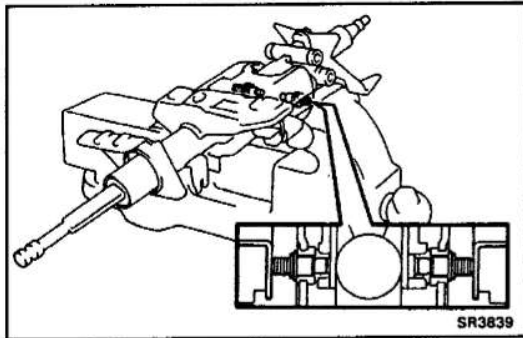
**3. SELECT TILT STEERING BOLTS**

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

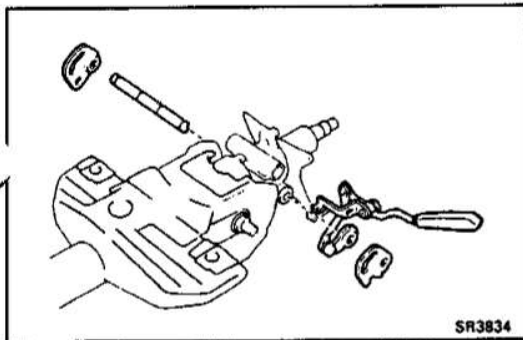
STEERING - STEERING COLUMN

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

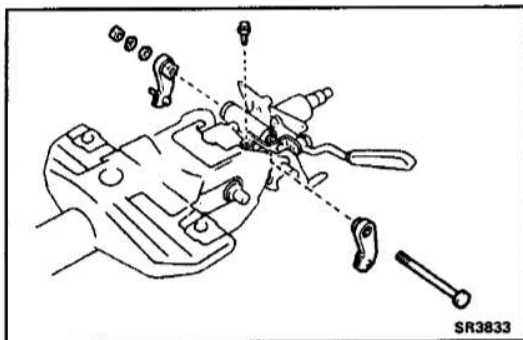
- (a) Install the collar to the main shaft.
- (b) Install the main shaft with the upper column tube into the lower column tube.



- (c) Using a vise, press in the two tilt steering bolts.
- HINT:** Make sure the upper tube turns smoothly.

**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.

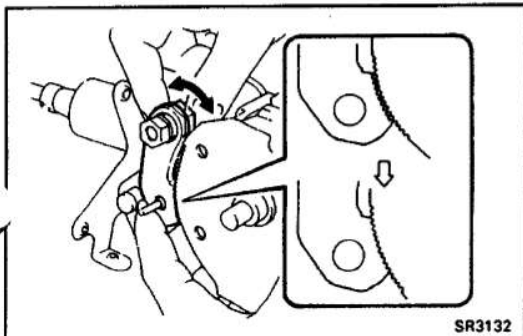
Torque: 2.9 N-m (30 kgf-cm, 26 in.-lbf)

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.

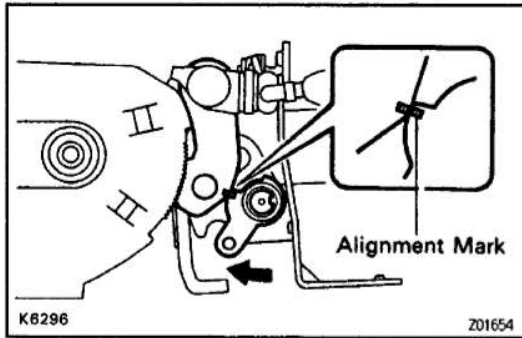
Torque: 5.9 N-m (60 kgf-cm, 52 in.-lbf)

- (d) Check that the pawls rotate smoothly.



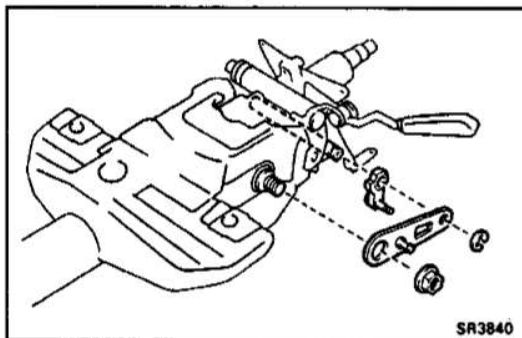
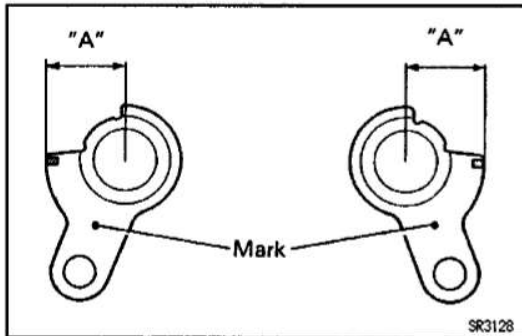
SR-14

STEERING - STEERING COLUMN

**8. SELECT PAWL STOPPERS**

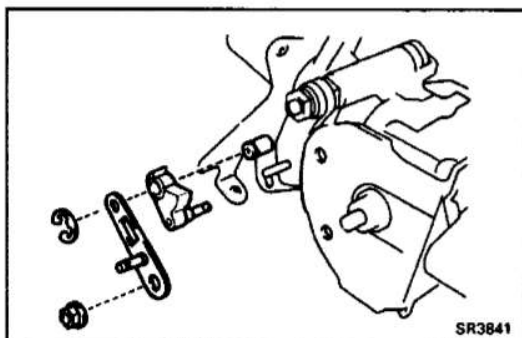
- With the tilt pawl and ratchet engaged, install two pawl stoppers.
- Check that the alignment marks on the stopper and pawl align when the stopper is rotated to the pawl side.
- If the alignment marks do not align, select pawl stoppers according to the following table.

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

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

- Install the tilt sub lever side pawl stopper and tilt lever retainer.
- Install the E-ring.
- Install and torque the nut.

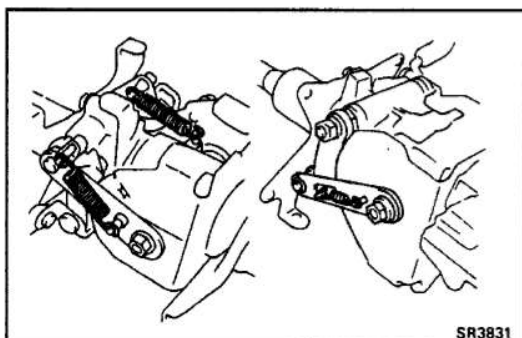
Torque: 15 N-m (150 kgf-cm, 11 ft-lbf)

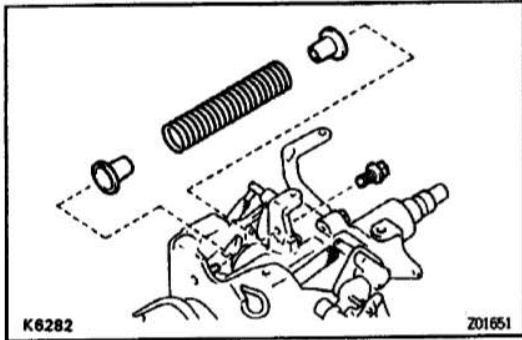


- Install the tilt lever side pawl stopper and tilt lever retainer.

- Install the E-ring.
- Install and torque the nut.

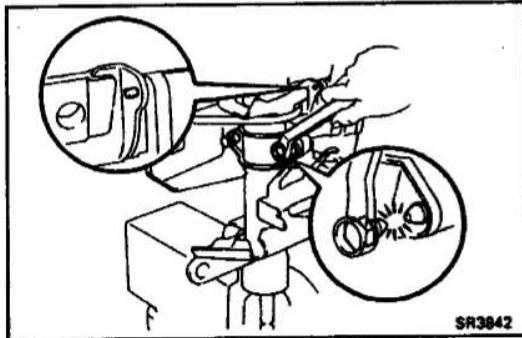
Torque: 15 N-m (150 kgf-cm, 11 ft-lbf)

**10. INSTALL THREE TENSION SPRINGS**

**11. INSTALL COMPRESSION SPRING**

- (a) Install the two bushings to the spring.
- (b) Install the spring and bolt.
- (c) Torque the bolt.

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

**12. INSTALL UPPER BRACKET**

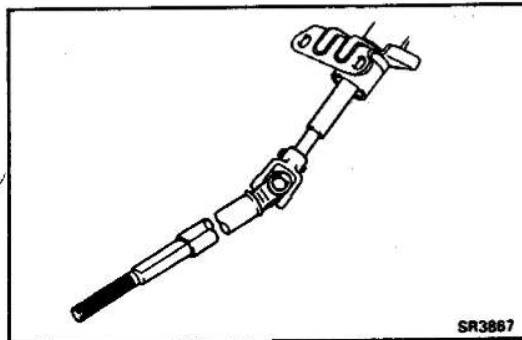
- (a) Install the upper bracket with new tapered – head bolts.

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

- (b) Tighten the tapered-head bolts until the bolt heads brake 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. 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.

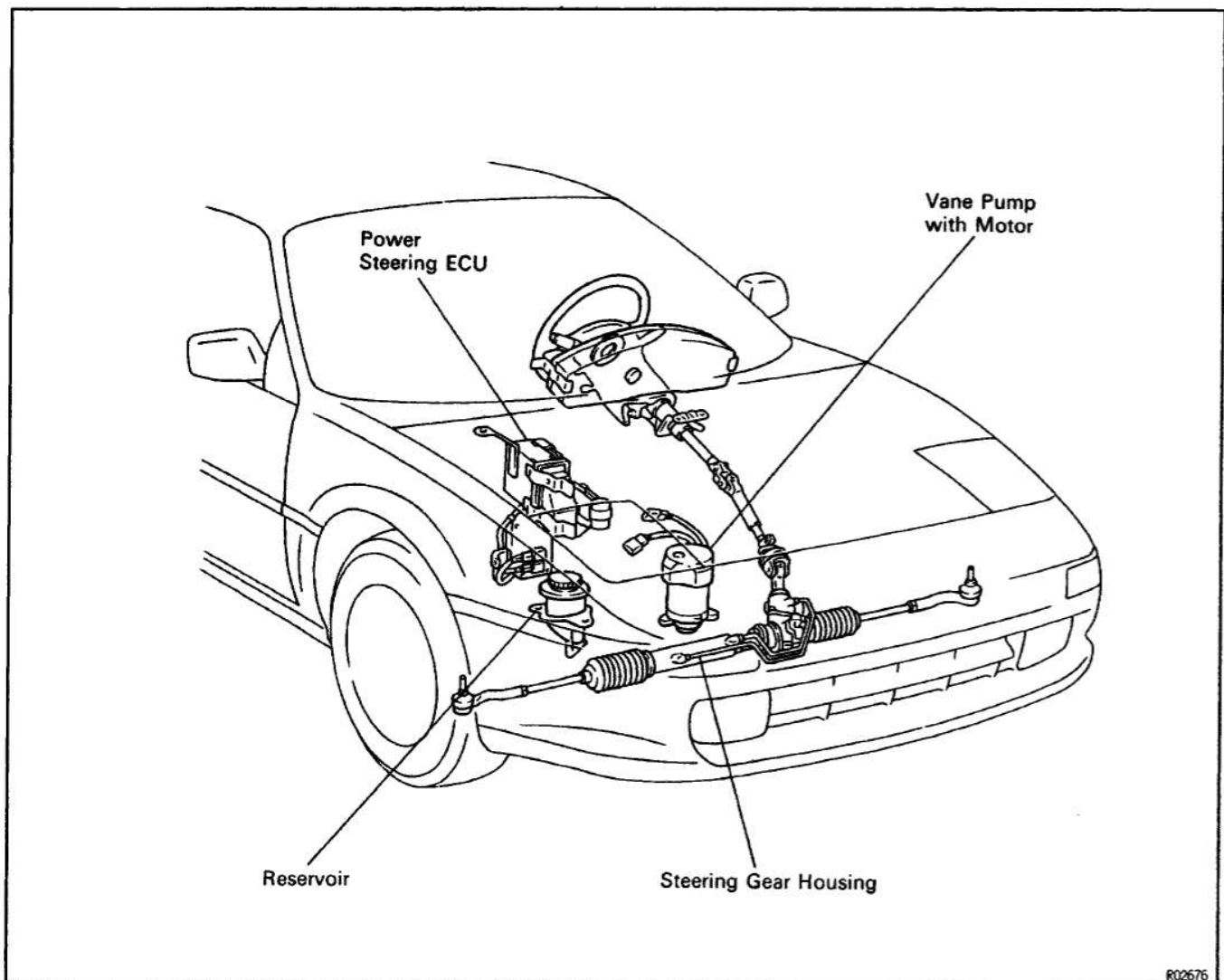
POWER STEERING

DESCRIPTION

EHPS (Electro-Hydraulic Power Steering)

In conventional and ordinary hydraulically-controlled power steering, hydraulic pressure needed for control is generated when the pump is turned by the engine. In the EHPS, the pump is turned by an electric motor.

The ECU controls the voltage acting on the pump motor according to the movement of the steering wheel and the vehicle speed. The pump motor speed is changed accordingly to modulate the hydraulic pressure being generated in the pump.



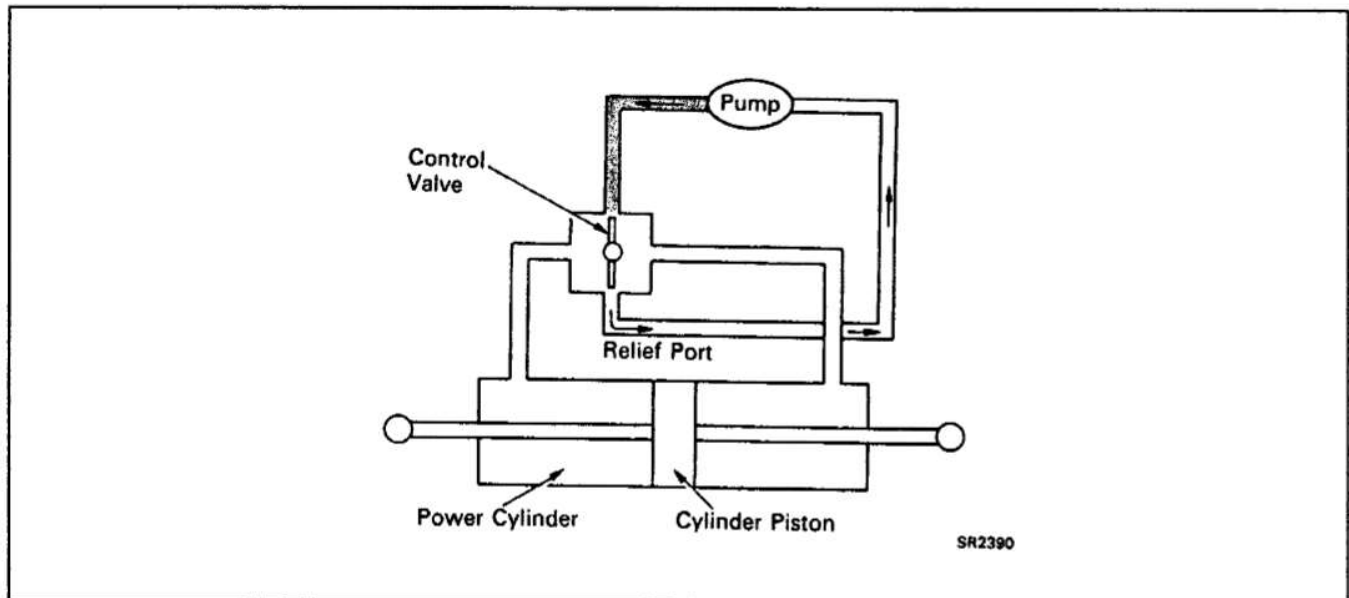
SR-32

STEERING - POWER STEERING

SR09G-01

NEUTRAL (STRAIGHT-AHEAD) POSITION

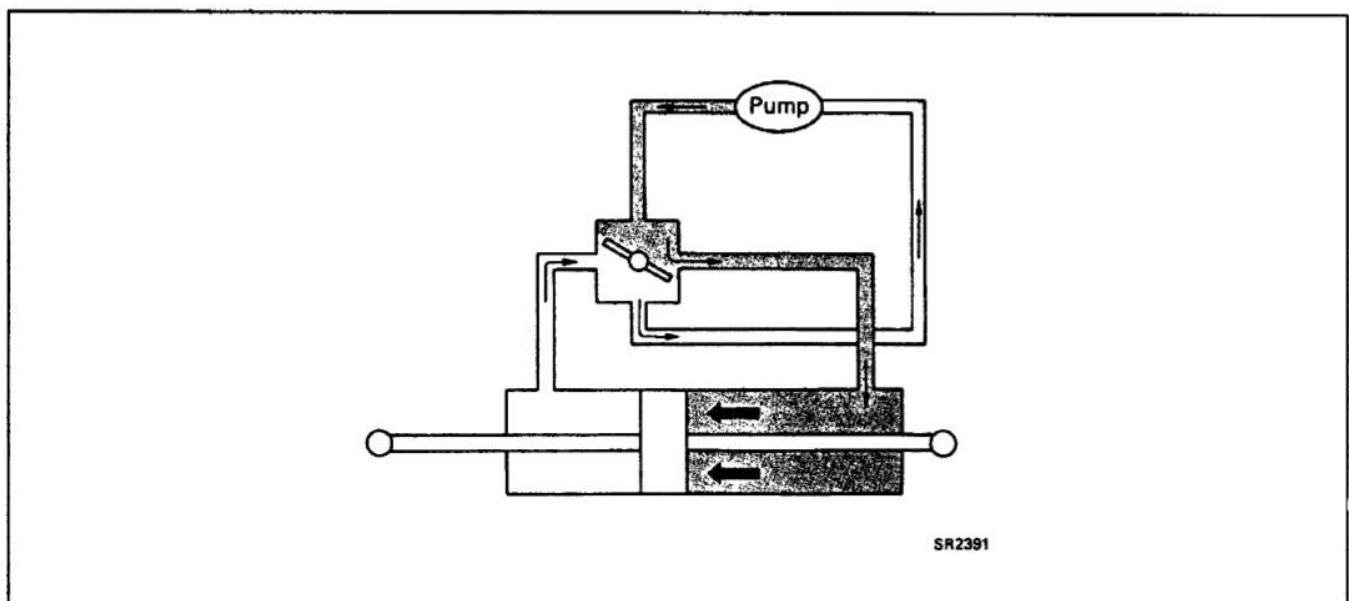
Fluid from the pump is sent to the control valve. If the control valve is in the neutral position, all the fluid will flow through the control valve into the relief port and back to the pump. At this time, hardly any pressure is created and because the pressure on the cylinder piston equal on both sides,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



SR09G-01

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.



SERVICE HINT

Trouble with the power steering system usually involves hard steering resulting from lack of assist. In such cases, before attempting to make repairs, you should determine whether the trouble lies with the pump or with the gear housing. To do this, use a pressure gauge to perform an on-vehicle inspection.

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.

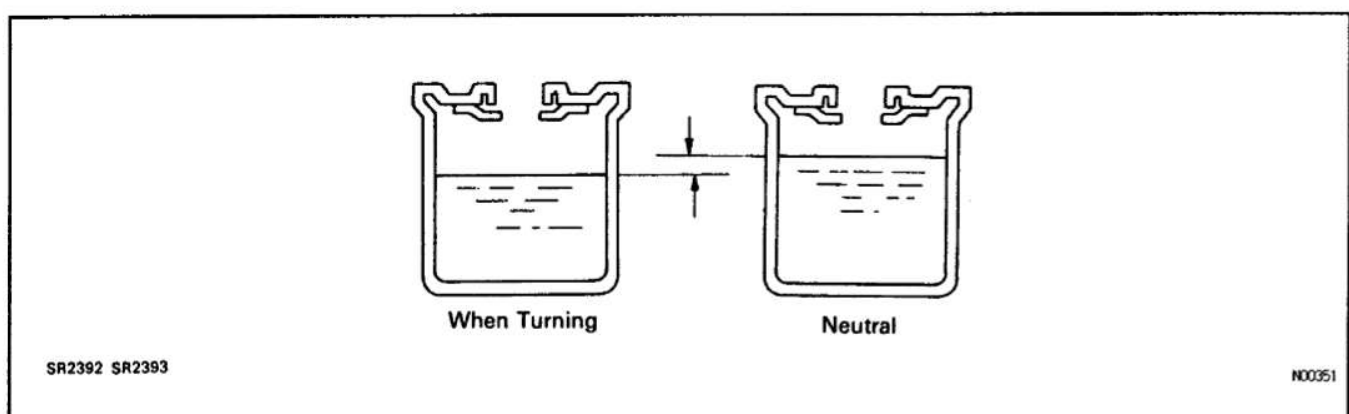
If the fault lies with the pump, the same symptoms will generally occur whether the steering wheel is turned fully to the right or left. On the other hand, if the fault lies with the control valve, there will generally be difference between the amount of assist when the steering wheel is turned to the 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 if there is a change of fluid level in the reservoir tank when the steering wheel is turned fully to the right or left.

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 small change in the fluid level is due to expansion of the hoses between the pump and gear housing when pressure rises.

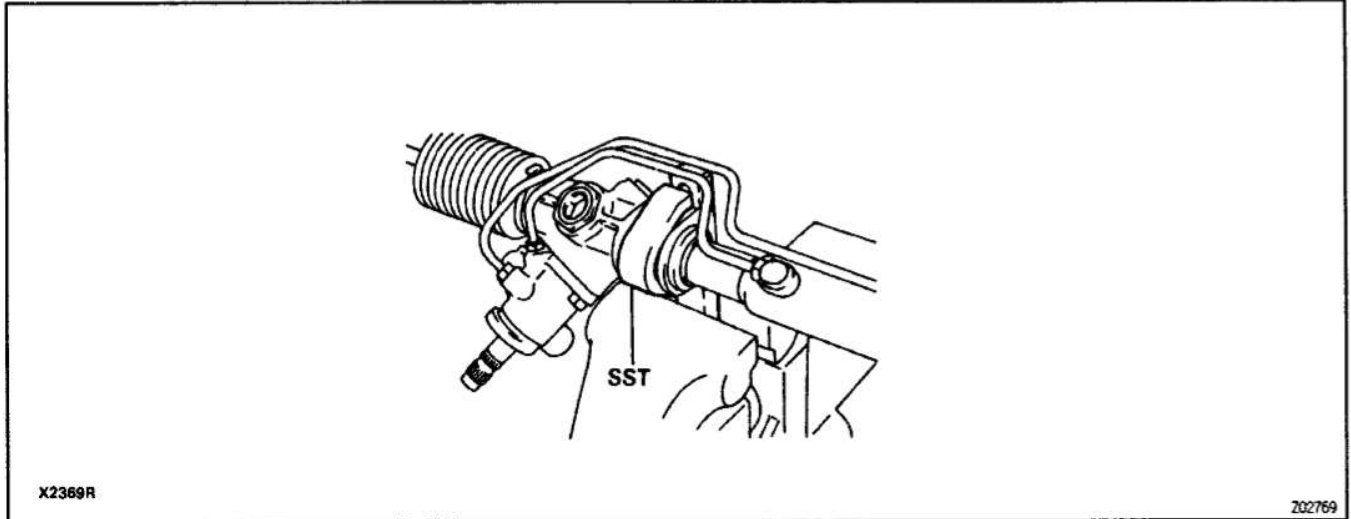
Also, air in the system sometimes causes abnormal noise in the pump or gear housing when the steering wheel is fully turned in either direction.

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



SR-34**STEERING – POWER STEERING****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.

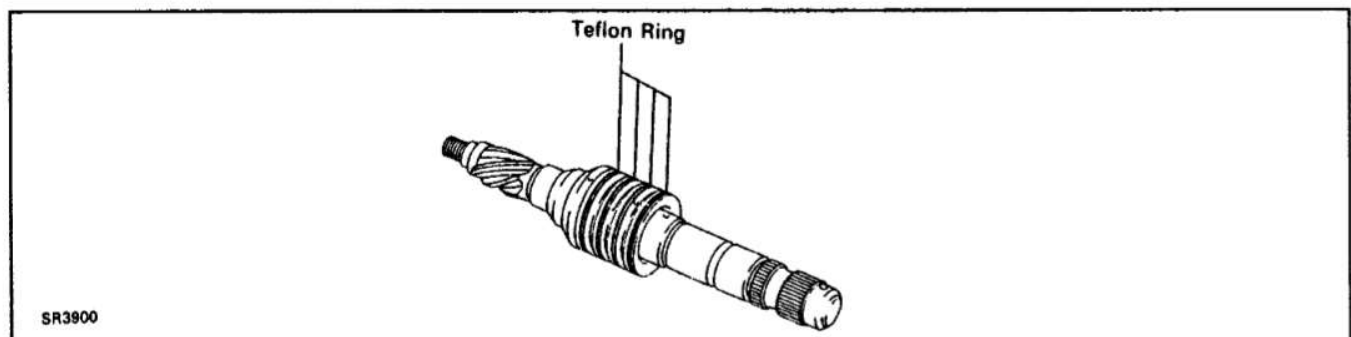


The oil seals on both sides of the power cylinder are for the prevention of leakage of the high pressure fluid which acts on the piston. Always use new oil seals when reassembling and be very careful not to scratch or damage them.

Because of the high pressure, even the slightest scratch will cause fluid leakage, resulting in an inoperative power steering system.

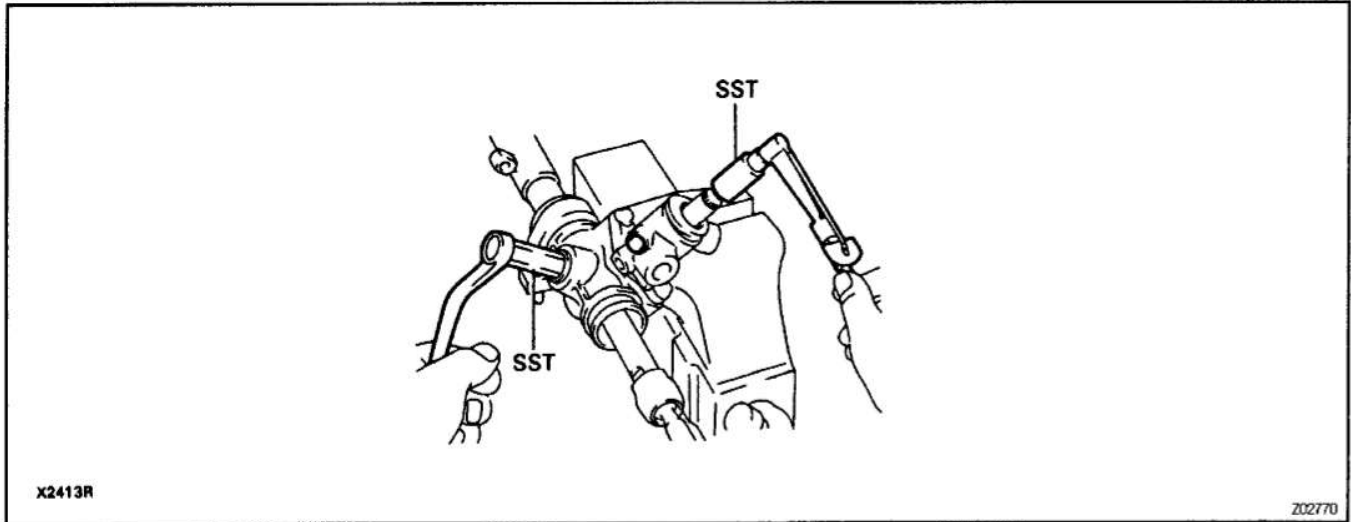
Also, be very careful not to scratch the sliding portion of the rack which makes contact with the oil seals. When removing the rack ends from the rack, it is very easy to cause a burr when holding the tip of the rack with a wrench. Therefore, before assembling the rack, first check the tip for burrs 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.



STEERING - POWER STEERING

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.



DIAGNOSIS SYSTEM

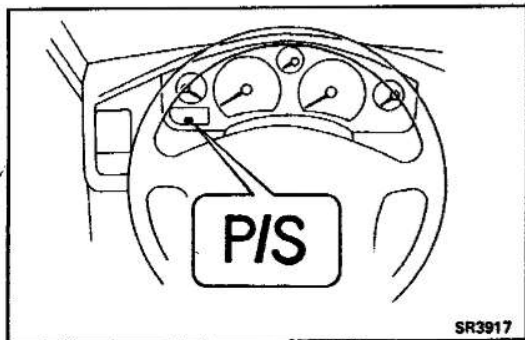
SR082-01

DESCRIPTION

When a malfunction exists, the corresponding code number is stored in memory until the ignition switch is turned off.

In case of a malfunction other than one identified by code No. 21, the P/S warning light is turned on to warn the driver.

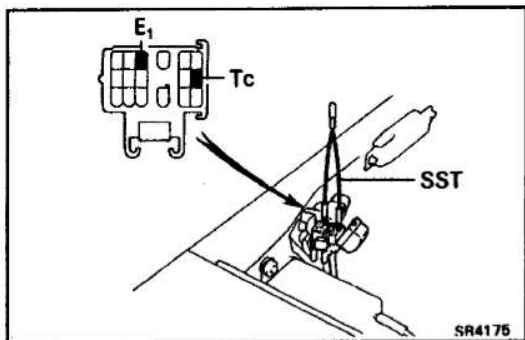
By connecting terminals Tc and E1 of the data link connector, malfunction codes that are stored in memory can be displayed by the way the light blinks.



P/S WARNING LIGHT CHECK

SR082-01

- Turn the ignition switch to ON and check that the P/S warning light lights up.
- Turn the ignition switch to ON and Check that the P/S warning light lights up.
- Check that the P/S warning light goes out after approx. 2 seconds.



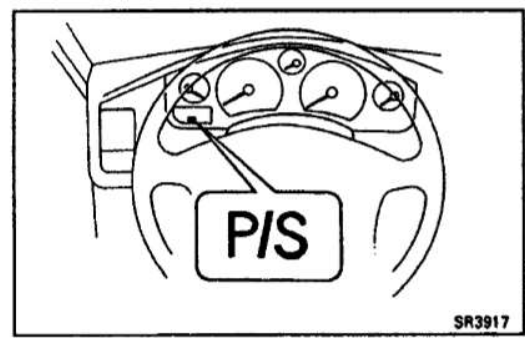
STEERING SENSOR CHECK

SR084-01

- Turn the ignition switch to ON.
- Using SST, connect terminals Tc and E1 of the data link connector.

SST 09843-18020

NOTICE: Never make a mistake with the terminal connection position as this will cause a malfunction.



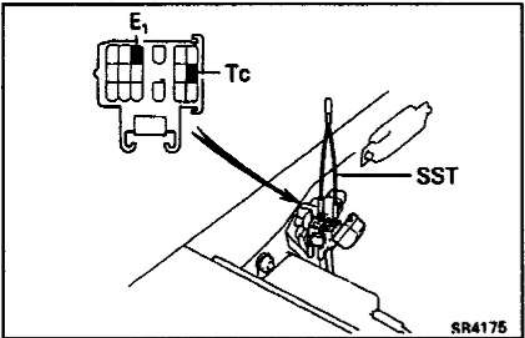
(c) Check that the warning light condition changes according to the steering angle and the vehicle speed, as shown below.

Vehicle Speed	Below 20 km/h (12 mph)	Above 20 km/h (12 mph)
Steering Angle		
Less than 36 degrees	BLINK	ON
More than 36 degrees	OFF	OFF

HINT:
The steering angle is defined as 0° at the steering position at which the ignition switch and terminals Tc and E1 are turned on simultaneously.
This check is not performed when a diagnostic code has been stored in memory.

V01011

SR086-01



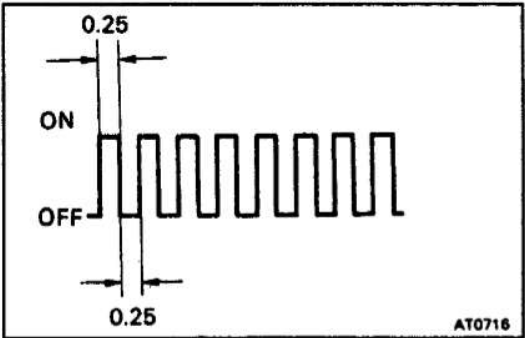
DIAGNOSTIC CODE CHECK

1. OUTPUT DIAGNOSTIC CODE

- (a) Turn the ignition switch to ON.
- (b) Using SST, connect terminals Te and E1 of the data link connector.

SST 09843-18020

NOTICE: Never make a mistake with the terminal connection position as this will cause a malfunction.



2. READ DIAGNOSTIC CODE

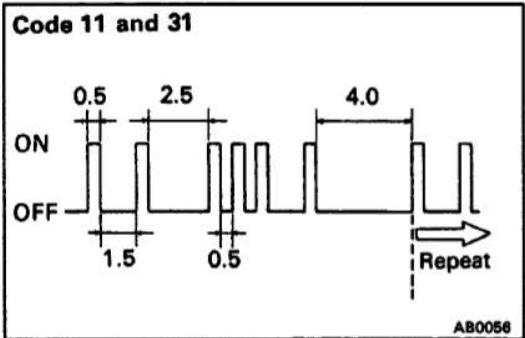
Read the diagnostic code as indicated by the number of times the P/S warning light blinks.

- Normal code indication
The light will blink 2 times per second.

• Malfunction code indication
In the event of a malfunction, the light will blink. The first number of the code No. will equal the first digit of a 2-digit diagnostic code, and after a 1.5 second pause, the 2nd number of the code No. will equal the 2nd digit. If there are two or more codes, there will be a 2.5 second pause between each.

After all the codes have been output, there will be a 4.0 second pause and they will all be repeated.

HINT: in the event of a number of trouble codes, indication will begin from the smaller numbered code to the larger.



DIAGNOSTIC CODES

Code No.	Blink Pattern	Diagnosis	Trouble Area	Warning Light	PS Operation
11	 AB0057	No electric current being supplied to power steering motor	- Wire harness and connector between battery and power steering motor - Wire harness and connector between ECU and power steering motor - Power steering relay - Power steering motor - ECU	ON	Stopped (*1)
12	 FI1389	Short-circuit in power steering relay coil circuit	- Wire harness and connector between ECU and power steering relay - Power steering relay - ECU	ON	Stopped (*1)
21	 FI1609	Power steering motor temperature is abnormally high	- Wire harness and connector between ECU and power steering motor - Power steering motor - ECU	OFF	Discontinued (.2)
22	 FI1392	Abnormally high current being supplied to power steering motor	- Wire harness and connector between ECU and power steering driver - Power steering driver - ECU	ON	Stopped (*1)
31	 FI1394	Wearing out of power steering motor brush	- Wire harness and connector between ECU and power steering motor - Power steering motor - ECU	ON	Continues

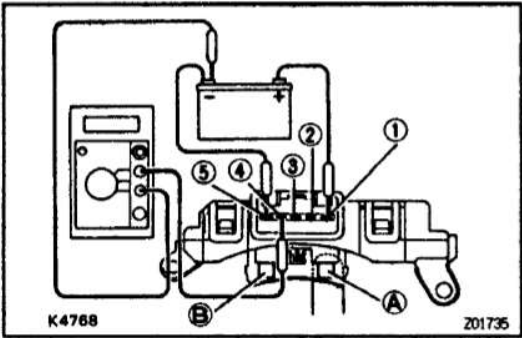
*1: Until fault is fixed and ignition is turned OFF, then ON.

*2: Returns when temp. of PS pump drops.

V01012

SR-66

STEERING – POWER STEERING



ELECTRONIC CONTROL COMPONENTS INSPECTION

STEERING SENSOR

SR078-01

- (a) Connect the positive (+) lead from the battery to terminal G) and the negative (–) lead to terminal ζ .
- (b) Connect the tester as shown in the illustration.
- (c) Using a thick card such as a postcard to obstruct light at (A) and (B), measure the resistance between ground and terminal (2) or (4) when the lights are exposed or obstructed according to the table below:

Light Exposure Condition	Terminal (2) – Ground	Terminal (4) – Ground
Ⓐ and Ⓑ exposed	Approx. 100 Ω	Approx. 100 Ω
Ⓐ and Ⓑ obstructed	∞	∞
Only Ⓐ is obstructed	∞	Approx. 100 Ω
Only Ⓑ is obstructed	Approx. 100 Ω	∞

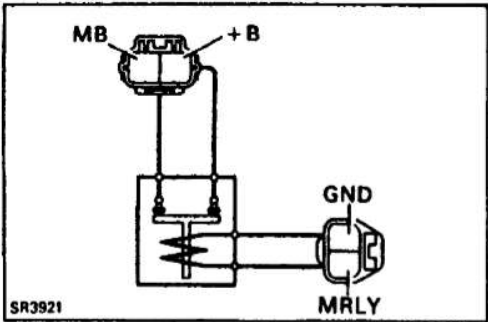
SPEED SENSOR

SR079-01

(See page [BE-81](#))

POWERTRAIN CONTROL MODULE ENGINE (PCME)

(See page [FI-406](#))



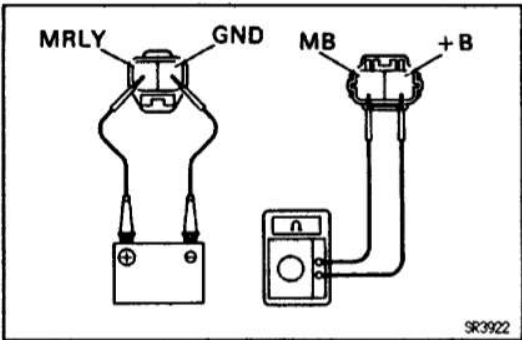
POWER STEERING RELAY

SR079-01

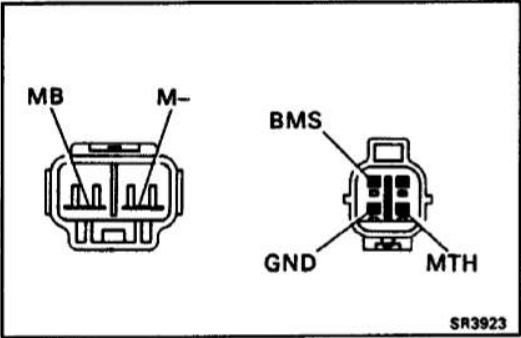
- (a) Inspect the relay continuity between terminals as shown.

MRLY	GND	+B	MB

V01014



- (b) Connect the positive (+) lead from the battery to terminal MRLY and the negative (–) lead to terminal GND.
- (c) Check that there is continuity between terminals +B and MB.

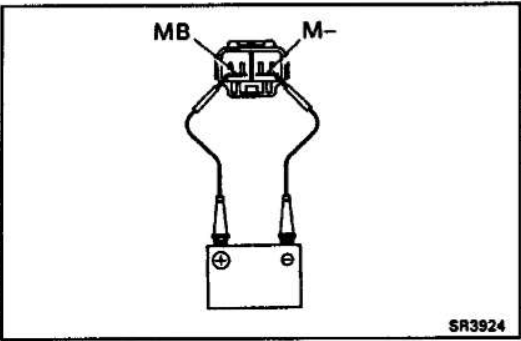


POWER STEERING MOTOR

(a) Inspect the motor continuity between terminals as shown.

Terminal	MB	M-	MTH	BMS	GND
Condition					
Motor brushes installed	○	○	○	○	○
Motor brushes removed	○	○	○		

V0105E

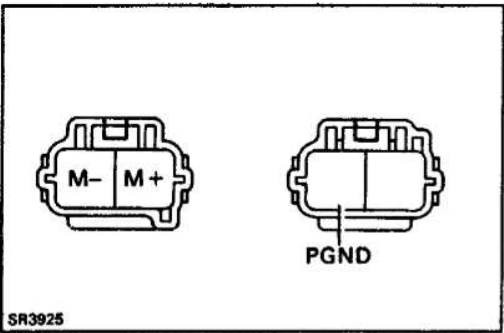


(b) Connect the positive (+) lead from the battery to terminal M B and the negative (-) lead to terminal M -, check that the motor turns.

NOTICE:

- Be careful about fluid flying about.
- Do not run the motor more than is necessary.

SR079-01



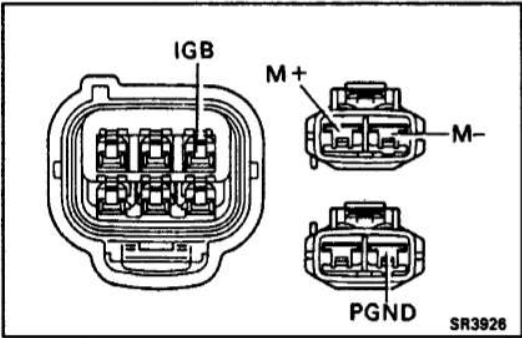
POWER STEERING DRIVER

(a) Inspect continuity between terminals on the driver side connector.

Terminal	M +	PGND
Condition		
Continuity	○	○

SR-68

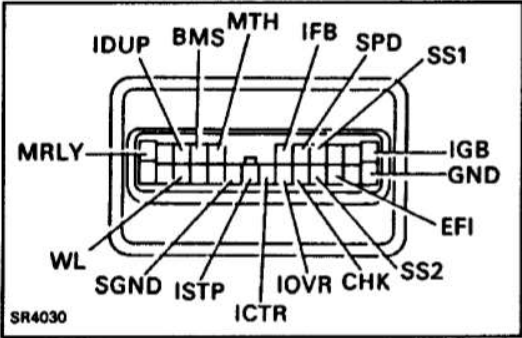
STEERING – POWER STEERING



(b) Disconnect the connectors and inspect the connectors on the wire harness side as shown.

Check for	Tester Connection	Condition		Specified Value
Continuity	PGND – Ground	Constant		Continuity
	M+ – M–	Constant		Continuity
Voltage	IGB – Ground	Ignition switch	OFF	0 V
			ON	Battery voltage

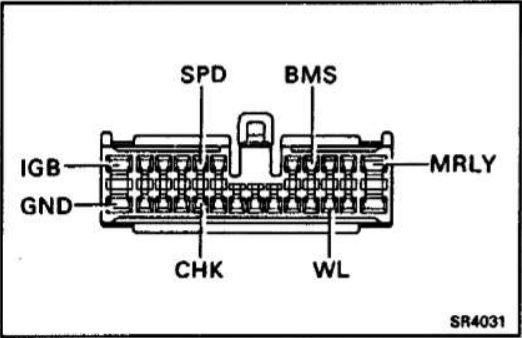
.X01016



POWER STEERING ECU

W0771-01

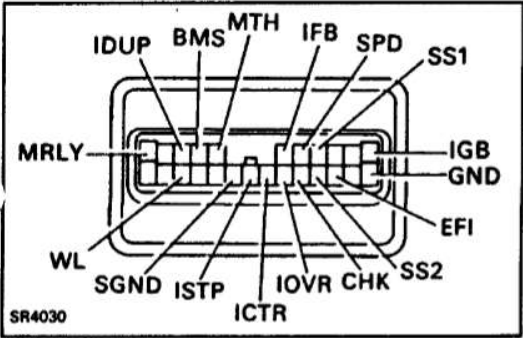
(a) Check that there is continuity between terminals GND and SGND.



(b) Disconnect the connector and inspect the connector on the wire harness die as shown.

Check for	Tester Connection	Condition		Specified Value
Continuity	G N D – Ground	Constant		Continuity
	MRLY – Ground	Constant		Continuity
	6MS – Ground	Power steering motor brushes installed		Continuity
		Power steering motor brushes removed		No continuity
	CHK – Ground	Normal		No continuity
		Connect terminals Te and E, of check connector		Continuity
Voltage	IG6 – Ground	Ignition switch	OFF	0 V
			ON	Battery voltage
	WL – Ground	Ignition switch	OFF	0 V
			ON	Battery voltage

W01017



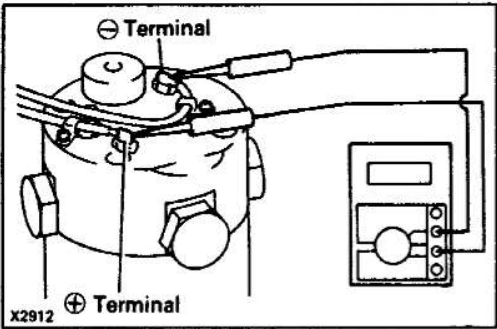
(c) Inspect the system circuit with the connector connected.

SR-70

STEERING – POWER STEERING

Tester Connection	Condition	Voltage
EFI – Ground	Ignition switch ON and engine stopped	1.5 V or less
	Engine running	4.5 V or more
MRLY – Ground	Engine running	5 V or more
6MS – Ground	Ignition switch ON and power steering motor brushes installed	1.5 V or less
	Ignition switch ON and power steering motor brushes removed	4.5 V or more
SPD – Ground	Ignition switch ON and spin slowly rear wheel	1.5 V or less ↑ 4.5 V or more
SS1 – Ground	Ignition switch ON and turn slowly steering wheel	1.5 V or less
SS2 – Ground		↑ 5 V or more
CHK – Ground	Connect terminals Tc and E, of check connector	1.5 V or less
	Normal	4.5 V or more
ICTR – SGND	Steering wheel operated with engine running and vehicle speed at 0 km/h (0 mph)	2.3 – 4.8 V
	Steering wheel operated with vehicle speed at 65 km/h (40 mph)	1.8 – 2.4 V

V01018



(d) Measure the output voltage (M +) of the power steering driver at the position on the power steering motor shown in the illustration.

Condition	Voltage
Steering wheel operated with engine running and vehicle speed at 0 km/h (0 mph)	9–11 V
Steering wheel operated with vehicle speed at 65 km/h (40 mph)	3–5V

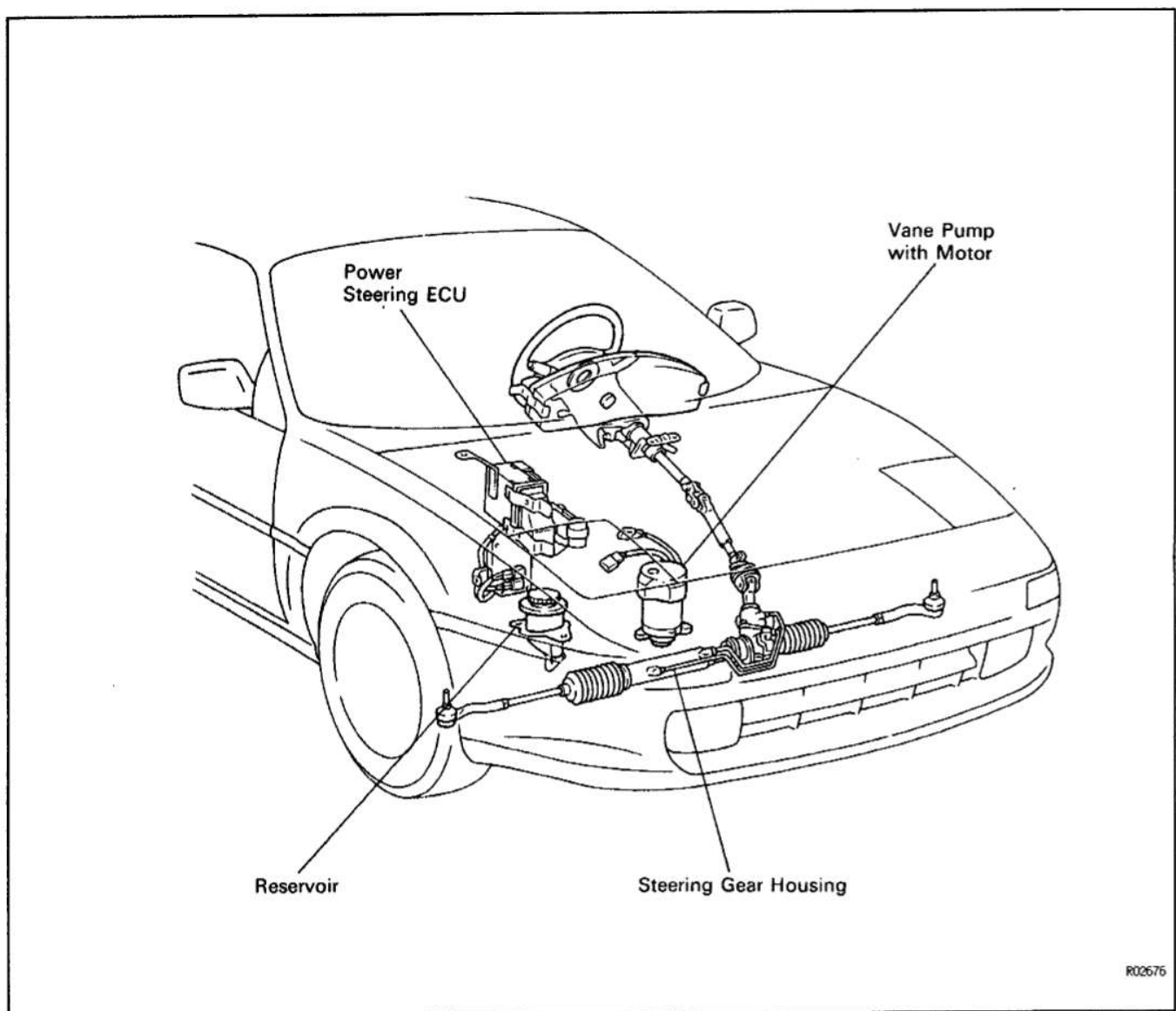
NOTICE: Do not bring the tester into contact with anything other than the terminals; if the tester causes a short between the terminals and the housing, this may result in a blown fuse or incorrect measurement.

V01019

ELECTRONIC CONTROL SYSTEM PRECAUTION

Do not open the cover or the case of the ECU and various computers unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

LOCATION OF COMPONENTS

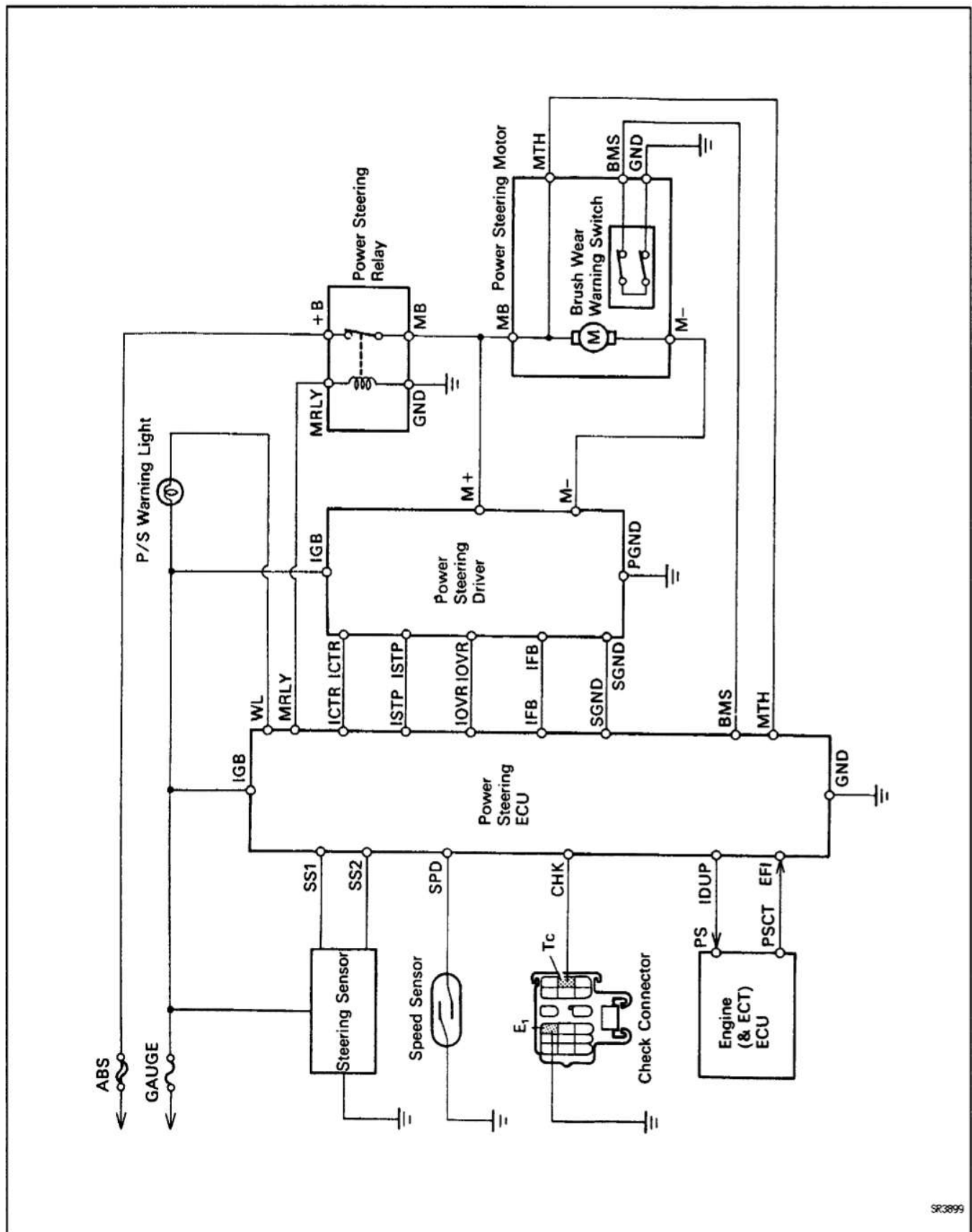


SR-62

STEERING – POWER STEERING

WIRING DIAGRAM

89061 -01

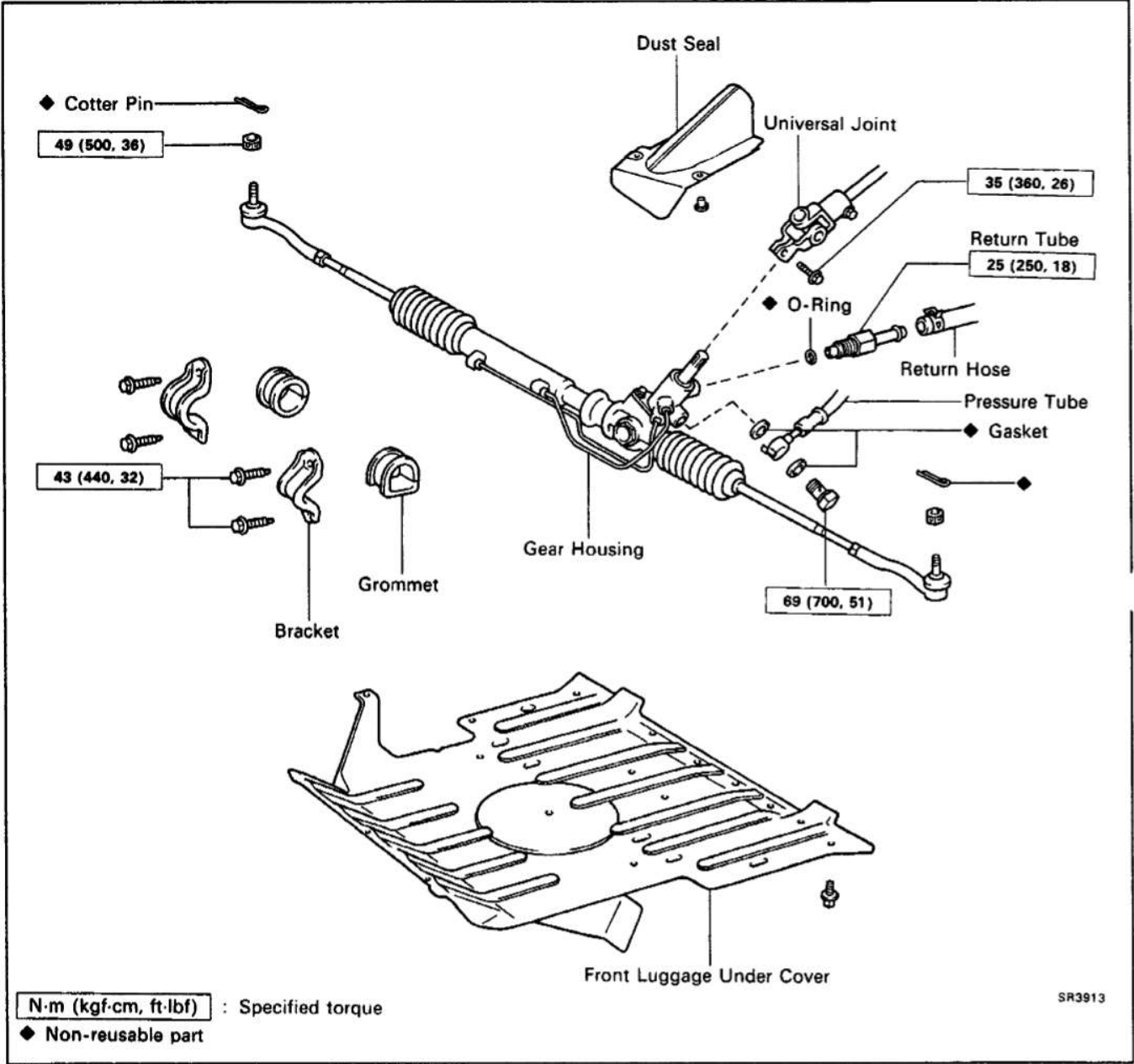


SR-44

STEERING – POWER STEERING

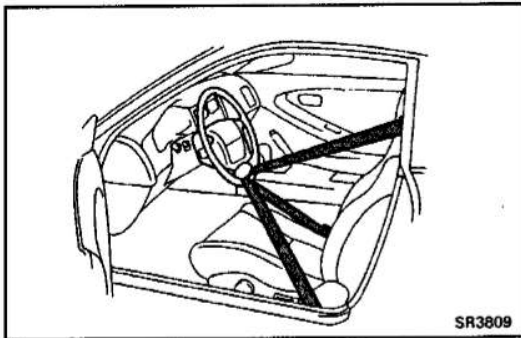
GEAR HOUSING STEERING GEAR HOUSING REMOVAL AND INSTALLATION

Remove and install the parts as shown.



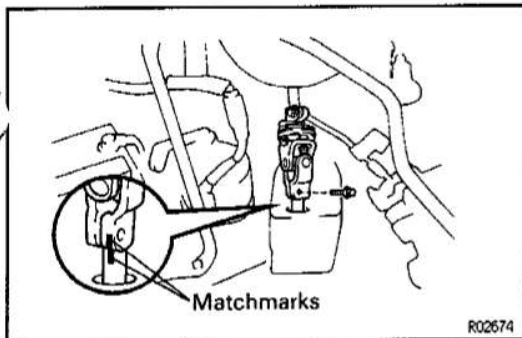
(MAIN POINTS OF REMOVAL AND INSTALLATION)

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-2) 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.

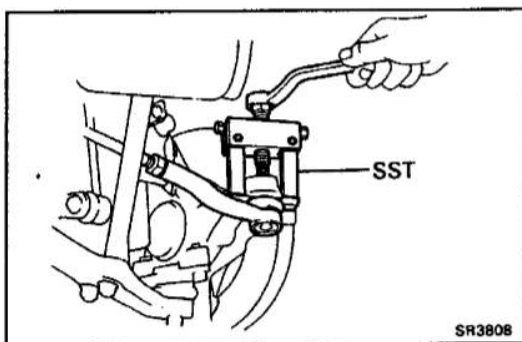


1. DISCONNECT UNIVERSAL JOINT

- (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.



- (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

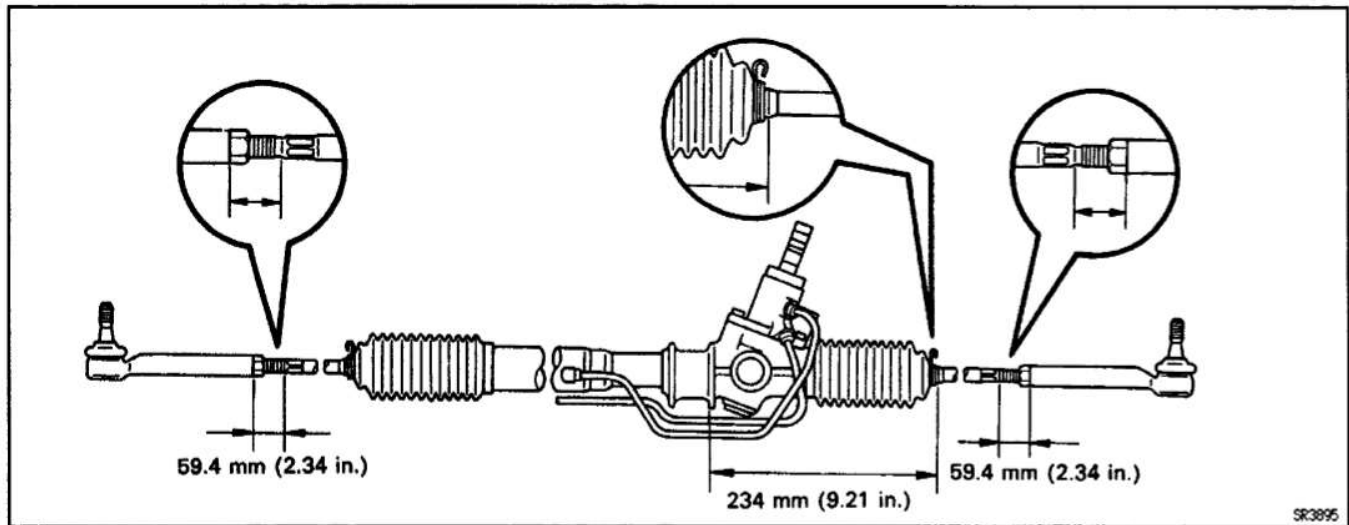
- (a) Remove the cotter pin and nut.
 - (b) Using SST, disconnect the tie rod end from the knuckle arm.
- SST 09628-62011

3. CONNECT UNIVERSAL JOINT

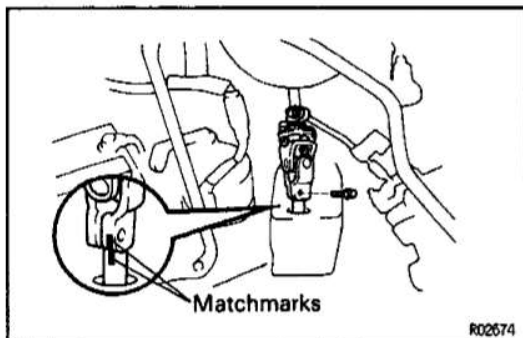
- (a) Set the gear housing so that it matches the dimensions shown below with the gear housing at the center point.

SR-46

STEERING - POWER STEERING



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.

4. 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.

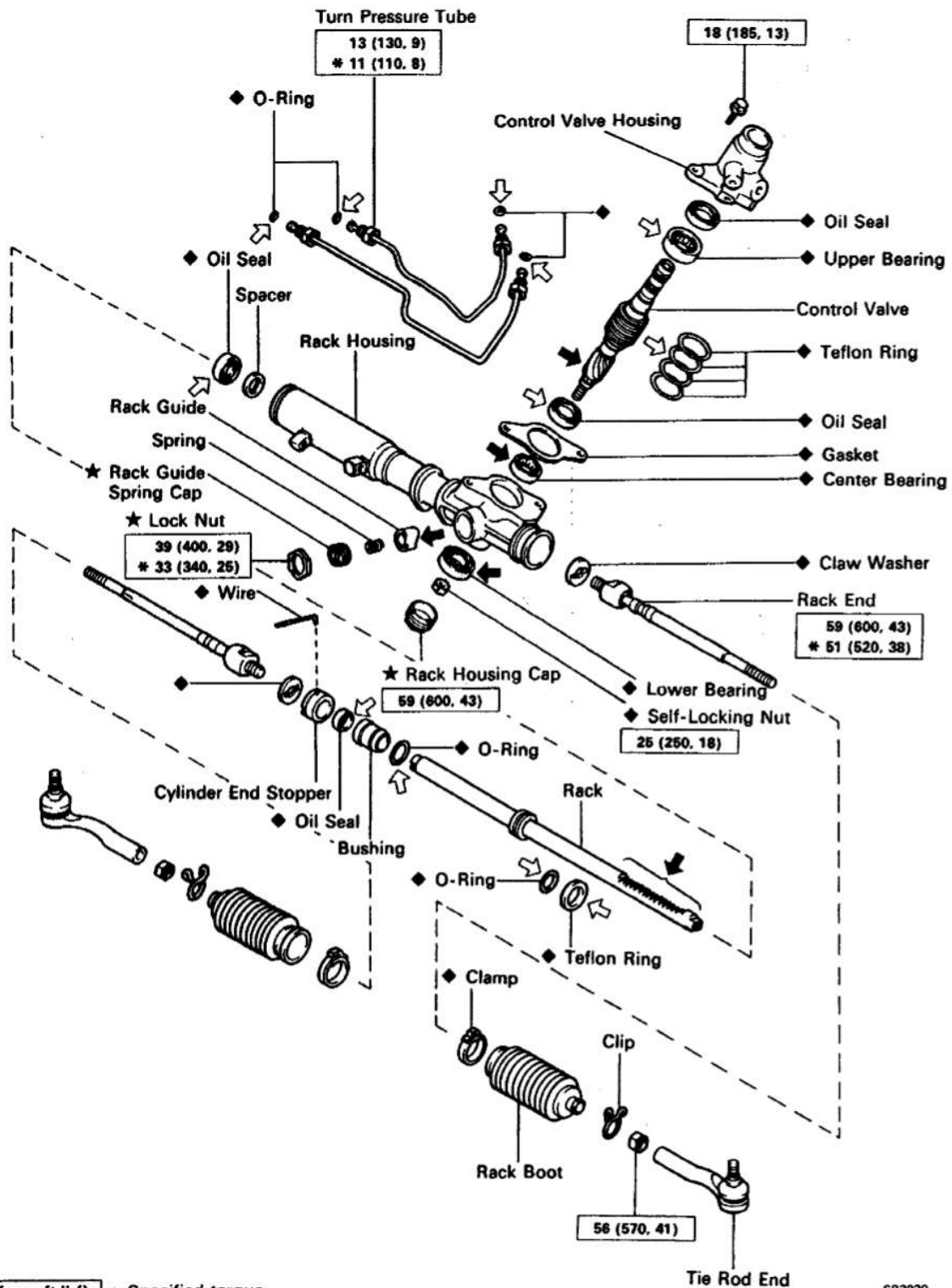
(See page [AB-17](#))

5. CHECK STEERING WHEEL CENTER POINT

6. CHECK TOE-IN (See page [SA-4](#))

STEERING – POWER STEERING

COMPONENTS



SR3920

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

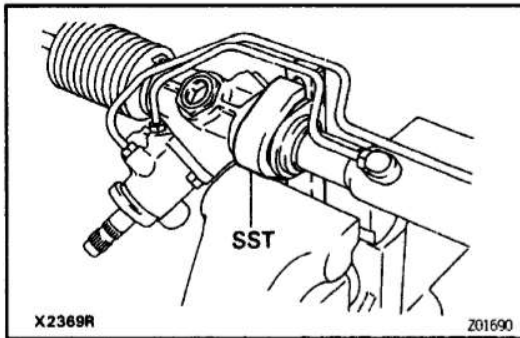
- ◆ Non-reusable part
- ★ Precoated part
- * For use with SST

 : Apply Molybdenum Disulphide Lithium Base Grease
 : Apply Power Steering Fluid EH

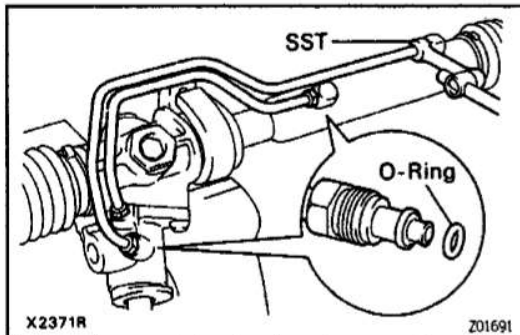
SR-48

STEERING - POWER STEERING

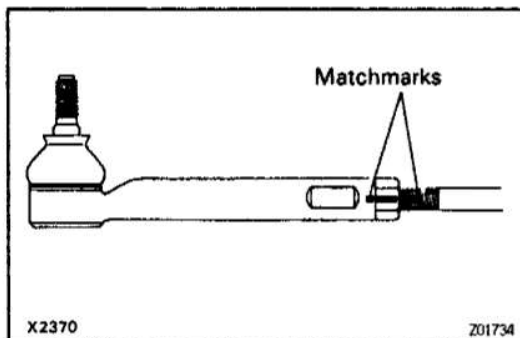
SR07W-01

**GEAR HOUSING DISASSEMBLY****1. CLAMP GEAR HOUSING IN VISE**

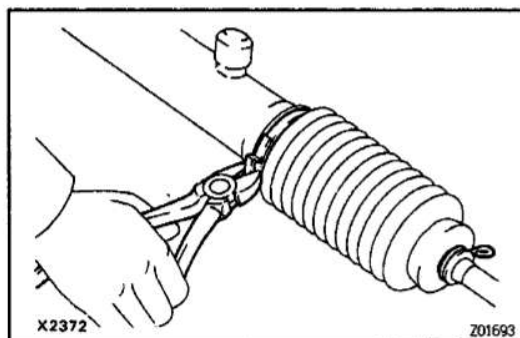
Using SST, secure the steering gear housing in a vise.
SST 09612-00012

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

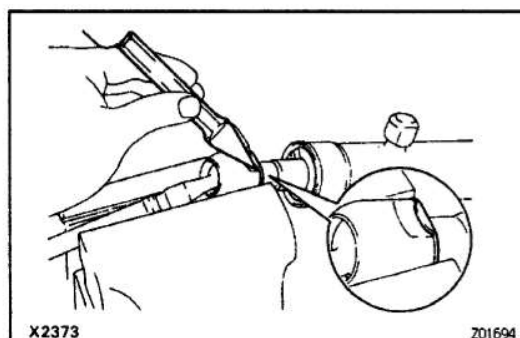
- (a) Using SST, remove the pressure tubes.
SST 09633-00020
- (b) Remove the O-rings from the tubes.

**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.

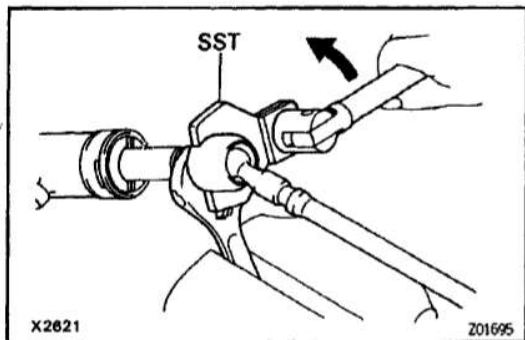
**4. REMOVE RACK BOOTS**

- (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.

STEERING - POWER STEERING

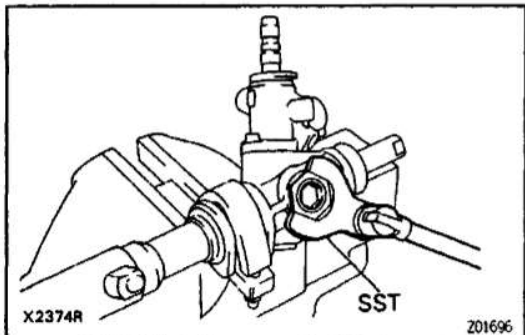


(b) Using SST, remove the rack ends.

SST 09617-10020

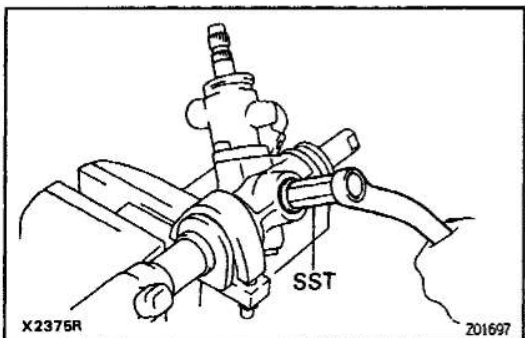
(c) Mark the left and right rack ends accordingly.

(d) Remove the claw washers.



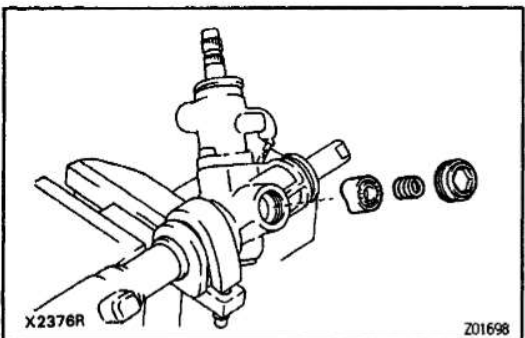
6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the rack guide spring cap lock nut.
SST 09612-24014 (09617-22030)

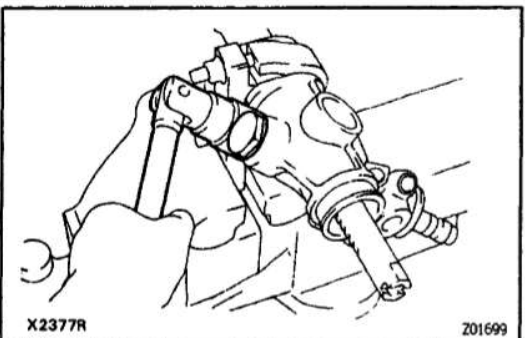


7. REMOVE RACK GUIDE SPRING

Using SST, remove the rack guide spring cap.
SST 09612-10131



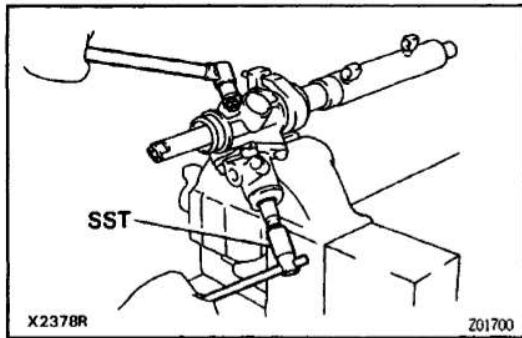
8. REMOVE RACK GUIDE SPRING AND RACK GUIDE



9. REMOVE RACK HOUSING CAP

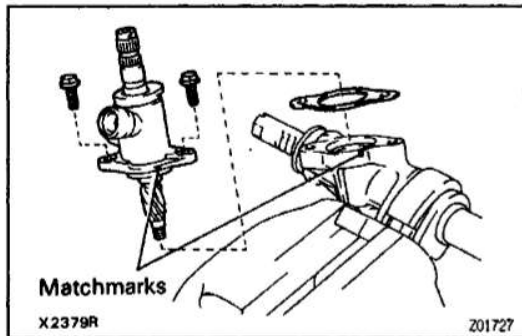
SR-50

STEERING - POWER STEERING

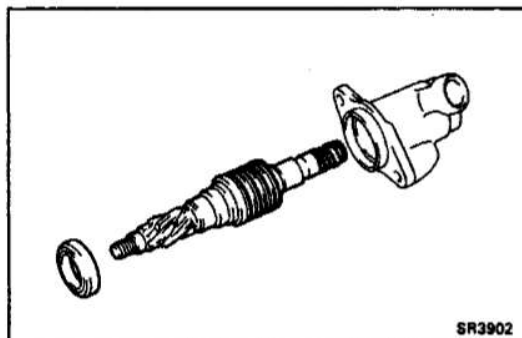
**10. REMOVE SELF-LOCKING NUT**

Using SST to hold the control valve, remove the self – locking nut.

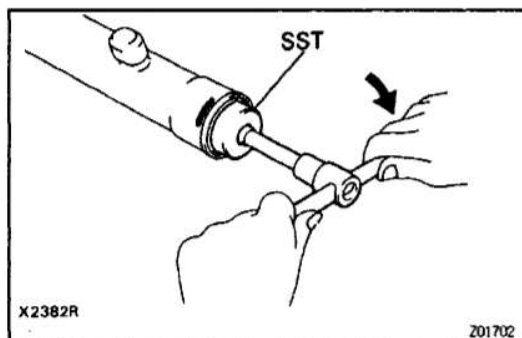
SST 09616 – 00010

**11. REMOVE CONTROL VALVE HOUSING**

- Place matchmarks on the valve housing and rack housing.
- Remove the two bolts.
- Pull out the valve housing with the control valve.
- Remove the gasket.

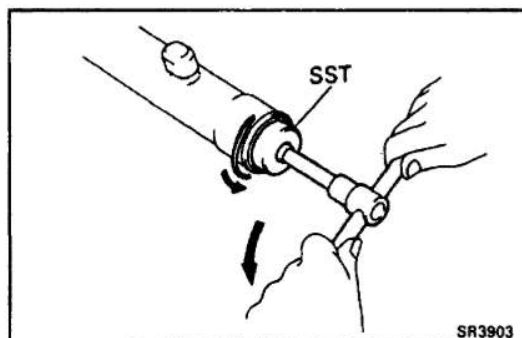
**12. REMOVE CONTROL VALVE FROM HOUSING**

- Tap out the control valve with the oil seal.
- Remove the oil seal from the control valve.

**13. REMOVE CYLINDER END STOPPER WIRE**

- Using SST, turn the cylinder end stopper clockwise until the wire end comes out.

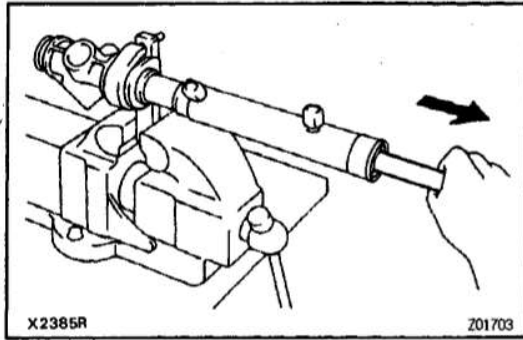
SST 09631 –10021



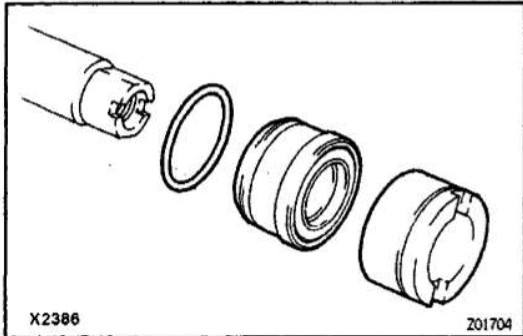
- Using SST, turn the cylinder end stopper counter-clockwise, and remove the wire.

SST 09631 –10021

STEERING - POWER STEERING

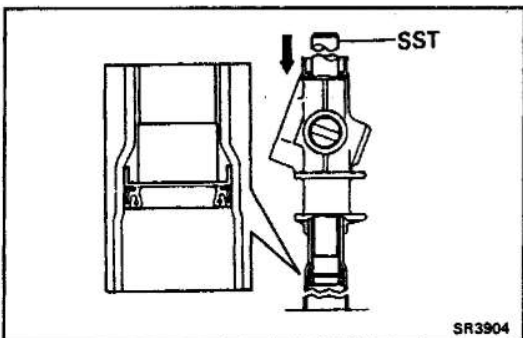
**14. REMOVE STEERING RACK**

(a) Pull out the steering rack.



(b) Remove the cylinder end stopper and rack bushing from the rack.

(c) Remove the O-ring from the bushing.

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

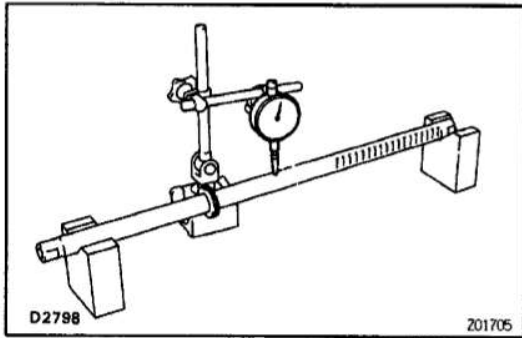
Using SST, drive out the spacer and oil seal.

SST 09631 -12020

SR-52

STEERING - POWER STEERING

W07X-01

**GEAR HOUSING COMPONENTS****INSPECTION AND REPAIR**

NOTICE: When coating the gear housing components with power steering fluid, use **TOYOTA POWER STEERING FLUID EH** or equivalent which is exclusively for EHPS use.

1. INSPECT RACK

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

Maximum thrust clearance:

0.3 mm (0.012 in.)

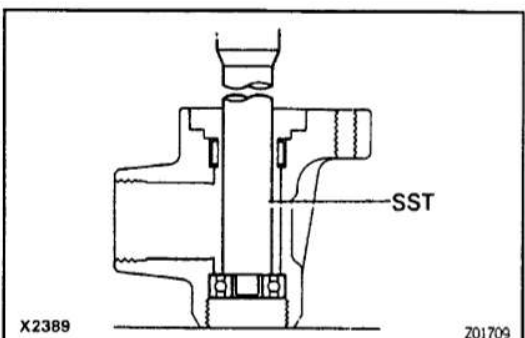
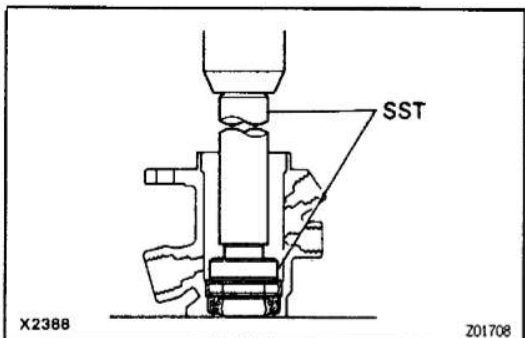
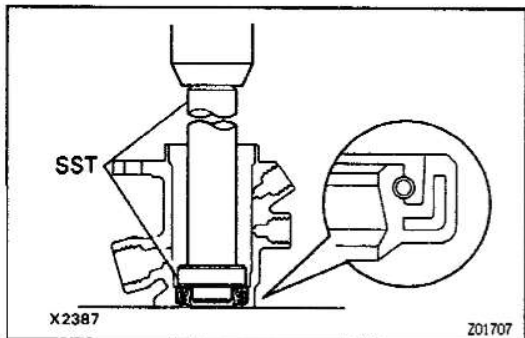
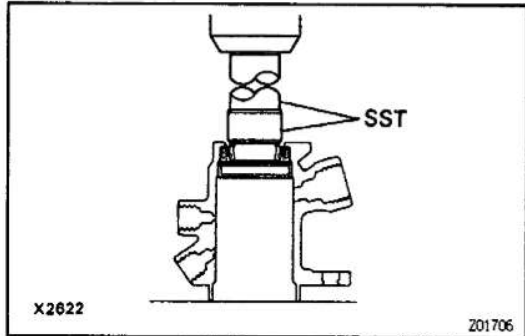
- (b) Check the rack surface for wear or damage.
If faulty, replace it.

2. IF NECESSARY, REPLACE CONTROL VALVE HOUSING OIL SEAL AND UPPER BEARING

- (a) Using SST, press out the oil seal with the bearing.
SST 09620-30010 (09631-00020),
09630-24013 (09620-24010)

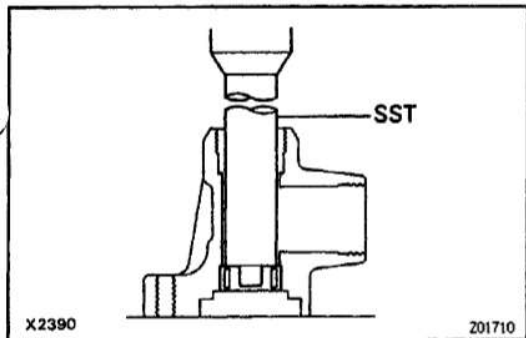
- (b) Using SST, press in a new oil seal.
SST 09620-30010 (09631-00020),
09630-24013 (09620-24013)

- (c) Using SST, press in a new bearing.
SST 09620-30010 (09631-00020),
09630-24013 (09620-24020)

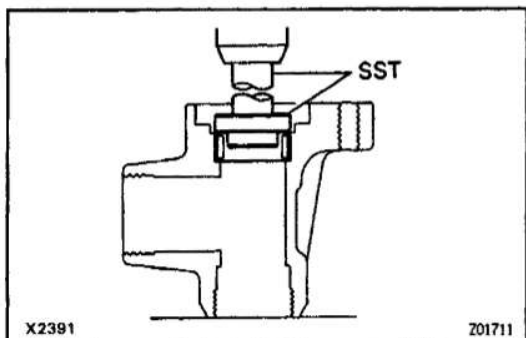
**3. IF NECESSARY, REPLACE CONTROL VALVE LOWER BEARING AND CENTER BEARING**

- (a) Using SST, press out the lower bearing.
SST 09620-30010 (09631-00020)

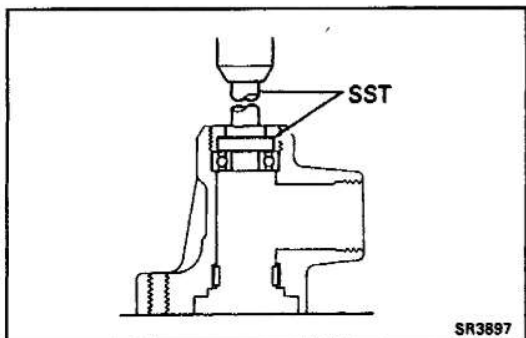
STEERING - POWER STEERING



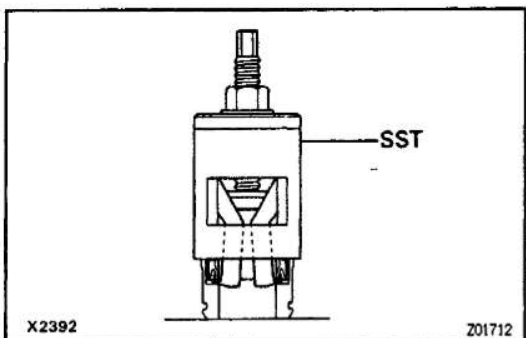
(b) Using SST, press out the center bearing.
SST 09631-12020



(c) Using SST, press in a new center bearing.
SST 09620-30010 (09631-00020),
09630-24013 (09620-24020)

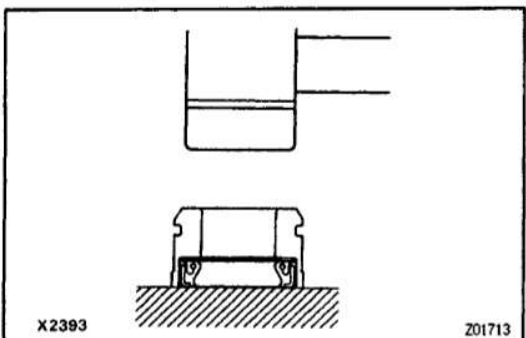


(d) Using SST, press in a new lower bearing.
SST 09620-30010 (09631-00020),
09631-20031



4. IF NECESSARY, REPLACE RACK BUSHING OIL SEAL

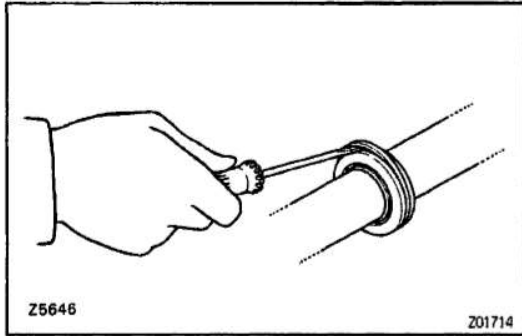
(a) Using SST, remove the oil seal.
SST 09612-24014 (09613-22011)



(b) Using a plastic hammer, tap in a new oil seal as shown.

SR-54

STEERING - POWER STEERING



5. IF NECESSARY, REPLACE STEERING RACK TEFLON RING AND O-RING

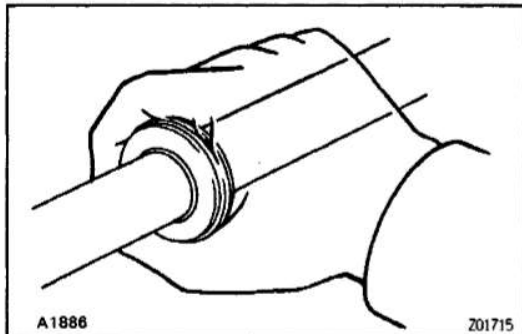
(a) Remove the teflon ring and O-ring.

NOTICE: Be careful not to damage the steering rack.

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

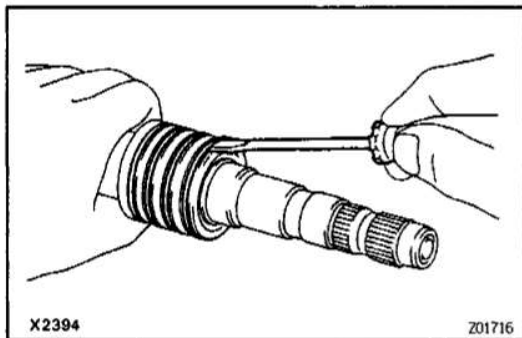
(c) Expand a new teflon ring with your fingers.

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



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

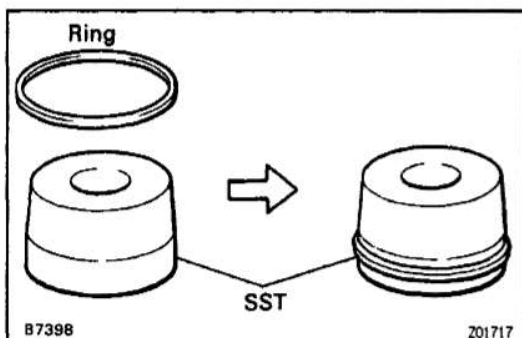
(e) Coat the teflon ring with power steering fluid and snug it down with your fingers.



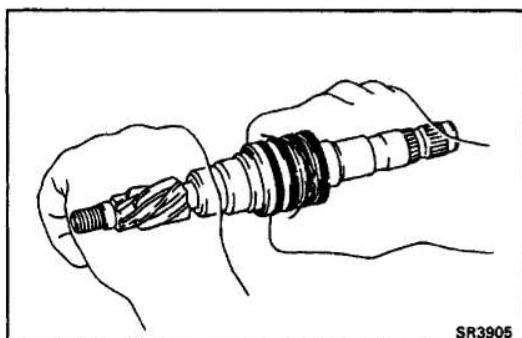
6. IF NECESSARY, REPLACE CONTROL VALVE TEFLON RINGS

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

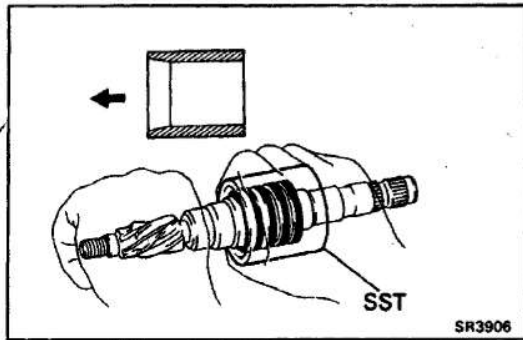
NOTICE: Be careful not to damage the control valve.



(b) install new teflon rings to SST and expand them.
SST 09631 - 20070



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



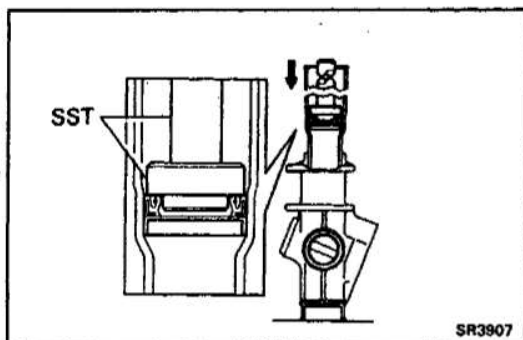
- (d) Coat the teflon rings with power steering fluid, and carefully slide the tapered end of SST over the teflon rings to seat the rings.
SST 09631- 20081

GEAR HOUSING ASSEMBLY

MO7Y-01

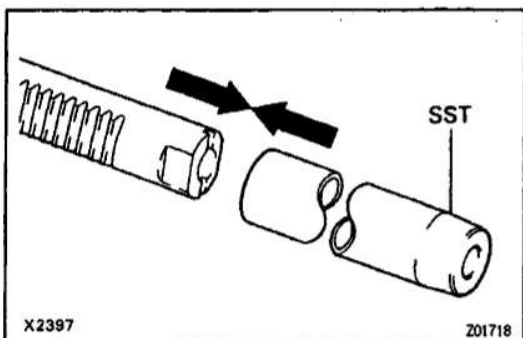
NOTICE: When coating the gear housing components with power steering fluid use **TOYOTA POWER STEERING FLUID EH** or equivalent which is exclusively for EHPS use.

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



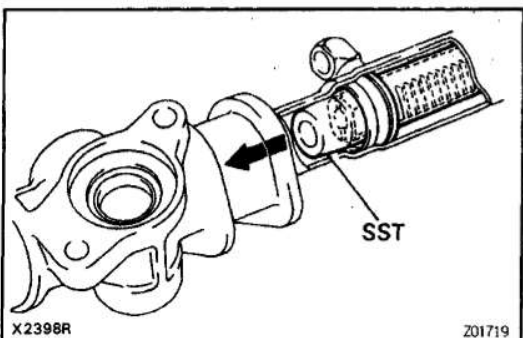
2. INSTALL RACK HOUSING OIL SEAL AND SPACER

- (a) Install the spacer into the rack housing.
(b) Using SST, drive in a new oil seal.
SST 09630-24013(09620-24030),
09631-12020



3. INSTALL RACK

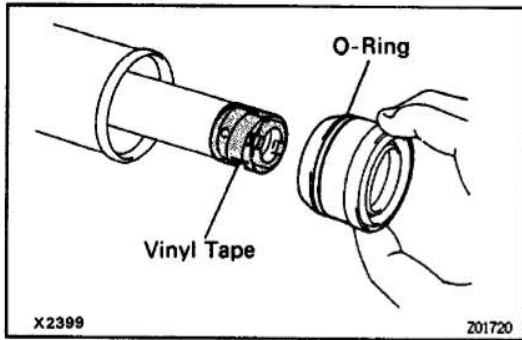
- (a) Install SST to the rack.
HINT: If necessary, scrape the burrs off the rack teeth end and burnish.
SST 09631 -10040



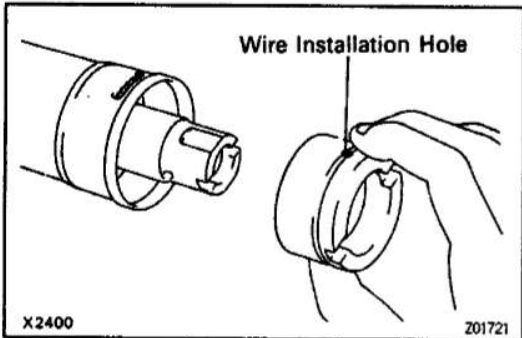
- (b) Coat SST with power steering fluid.
(c) Install the rack into the cylinder.
(d) Remove SST.

SR-56

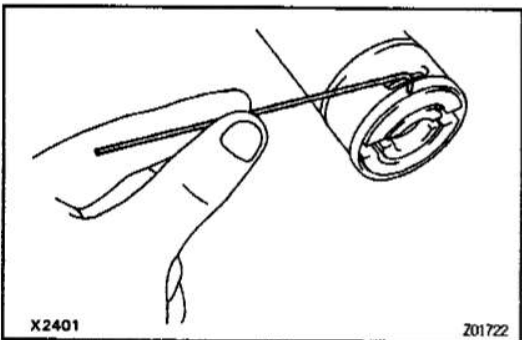
STEERING - POWER STEERING

**4. INSTALL RACK BUSHING**

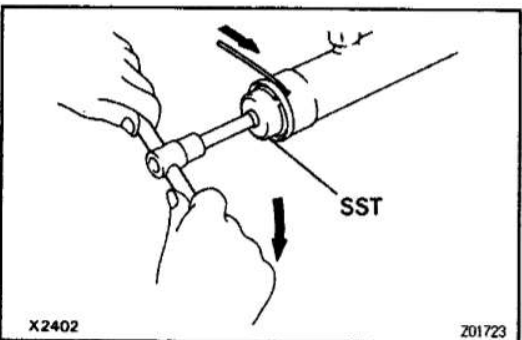
- (a) Coat a new O-ring with power steering fluid and install it to the bushing.
- (b) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
- (c) Install the bushing by pushing it into the cylinder in the direction shown in drawing, without tilting.

**5. INSTALL CYLINDER END STOPPER**

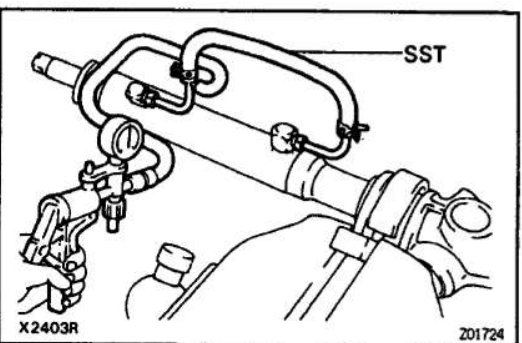
- (a) Push in the cylinder end stopper until the wire installation hole appears.



- (b) Install a new wire end into the hole.

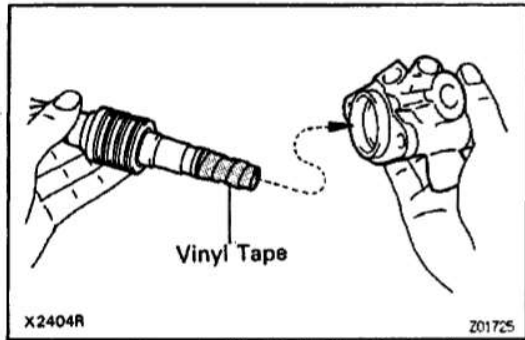


- (c) Using SST, turn the cylinder end stopper clockwise until the wire end disappears.
SST 09631-10021

**6. AIR TIGHTNESS TEST**

- (a) Install SST to the unions of the cylinder housing.
SST 09631-12071
- (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.

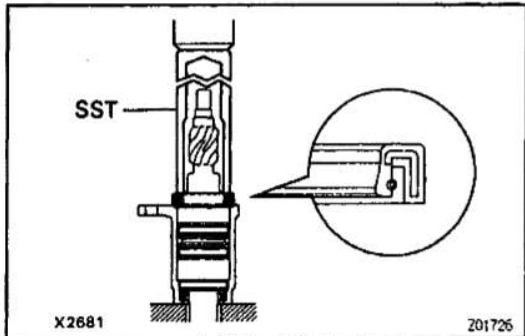
STEERING - POWER STEERING

**7. INSTALL CONTROL VALVE**

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

(b) Install the control valve into the housing.

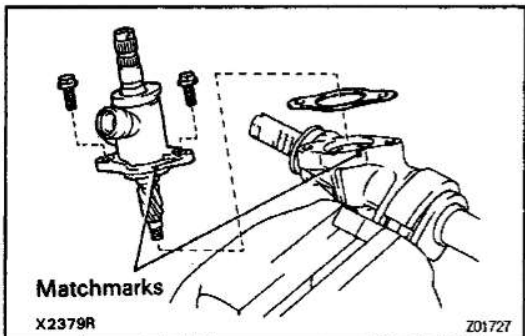
NOTICE: To prevent oil seal damage, wind vinyl tape on the serration part of the control valve shaft.

**8. INSTALL OIL SEAL**

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

(b) Using SST, install the oil seal as shown.

SST 09612-22011

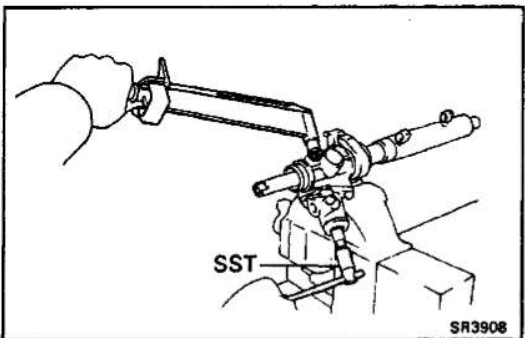
**9. INSTALL CONTROL VALVE HOUSING**

(a) Place a new gasket on the rack housing.

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

(c) Torque the two bolts.

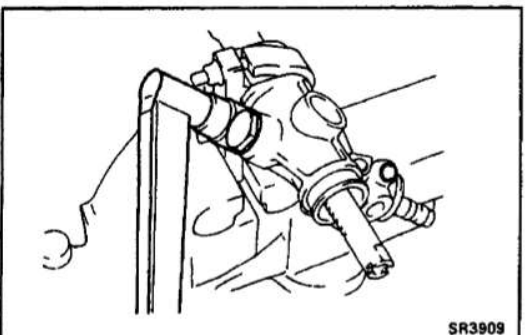
Torque: 18 N-m (185 kgf-cm, 13 ft-lbf)

**10. INSTALL SELF-LOCKING NUT**

Using SST to hold the control valve, install a new self-locking nut.

SST 09616 - 00010

Torque: 25 N-m (250 kgf-cm, 18 ft.lbf)

**11. INSTALL RACK HOUSING CAP**

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

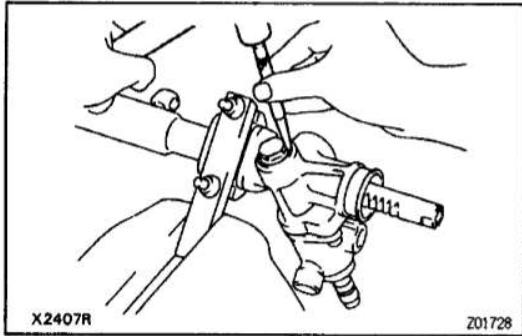
Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Install the rack housing cap.

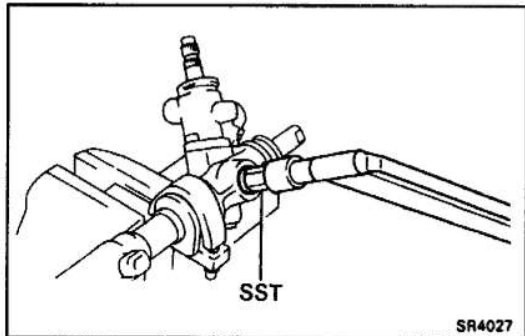
Torque: 59 N-m (600 kgf-cm, 43 ft-lbf)

SR-58

STEERING - POWER STEERING



- (c) Using a centering punch, stake the cap at two places.
- 12. INSTALL RACK GUIDE AND RACK GUIDE SPRING**

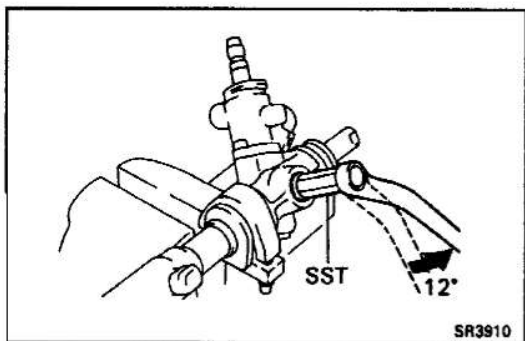
**13. ADJUST TOTAL PRELOAD**

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

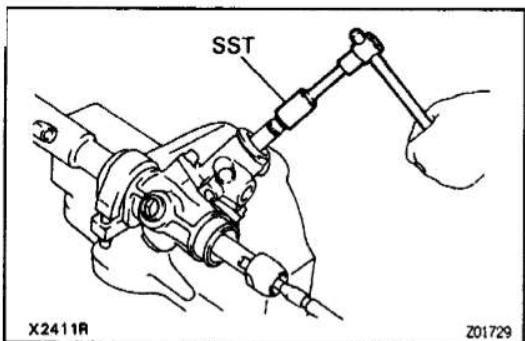
Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Using SST, install and torque the spring cap.
SST 09612-10131

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



- (c) Using SST, return the rack guide spring cap 12°.
SST 09612-10131

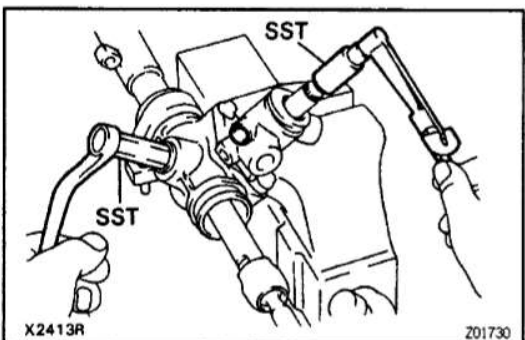


- (d) Turn the control valve shaft right and left one or two times.

SST 09616 - 00010

NOTICE: If the rack over strokes, the oil seal will be damaged by the teeth of the rack, so temporarily in stall the rack end so that it does not over stroke.

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



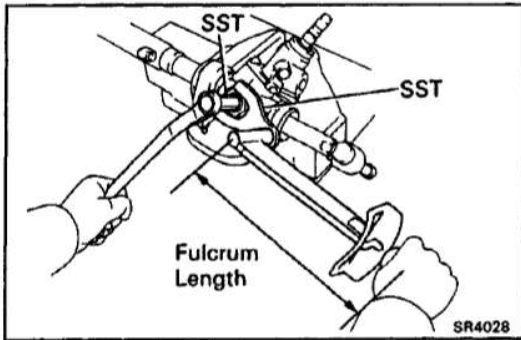
- (f) Using SST and a torque meter, tighten the rack guide spring cap until the preload is within specification.

SST 09612-10131 and 09616-00010

Preload (turning):

0.9-1.3 N-m

(9-13 kgf-cm, 7.8-11.3 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

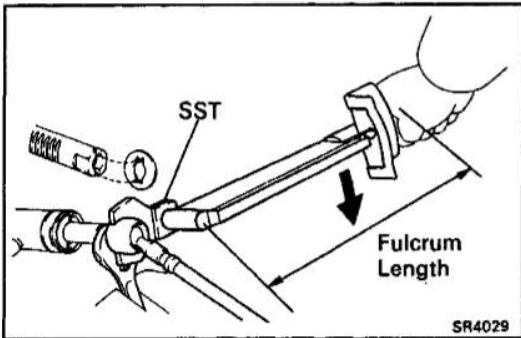
- (b) Using SST, install and torque the lock nut.

SST 09612-10131, 09612-24014 (09617-22030)

Torque: 33 N-m (340 kgf-cm, 25 ft-lbf)

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

- (c) Recheck the total preload.



15. INSTALL CLAW WASHERS AND RACK ENDS

- (a) Install new claw washers.

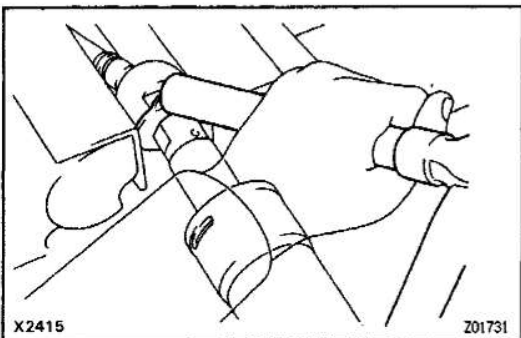
HINT: Align the claws of the claw washer with the rack grooves.

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

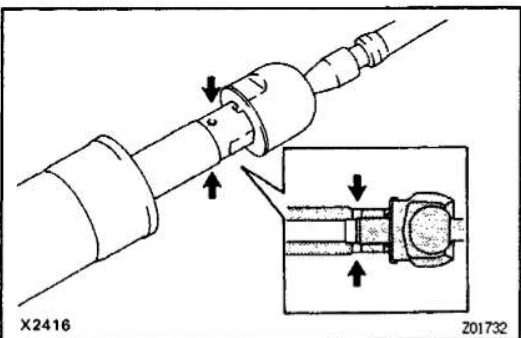
SST 09617-10020

Torque: 51 N-m (520 kgf-cm, 38 ft-lbf)

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



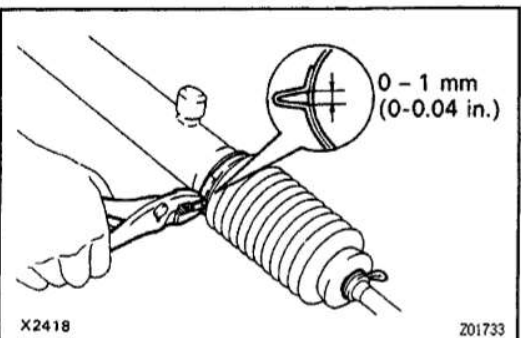
- (c) Using a brass bar and hammer, stake the claw washers.



16. INSTALL RACK BOOTS, CLAMPS AND CLIPS

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

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

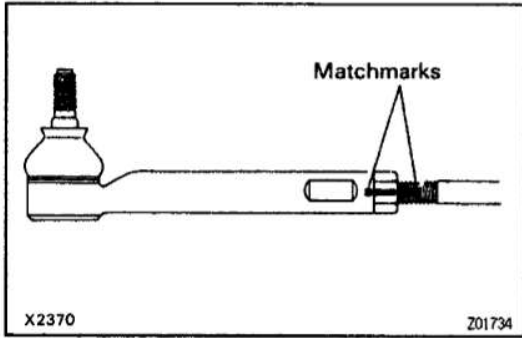


- (b) Install the boots.

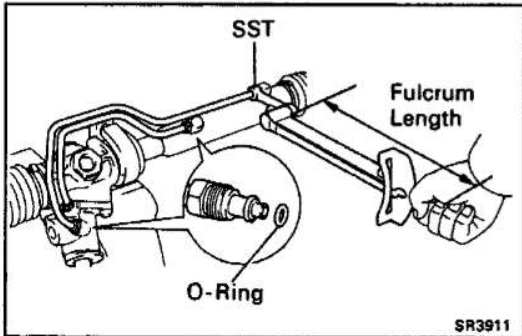
NOTICE: Be careful not to damage or twist the boots.

- (c) Install new clamps.

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

SR-60**STEERING – POWER STEERING****17. 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)**

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

- (a) Install four new O-rings to the tubes.
 - (b) Using SST, install the tubes.
- SST 09633-00020**

Torque: 11 N-m (110 kgf-cm, 8 ft-lbf)

HINT: Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

STEERING

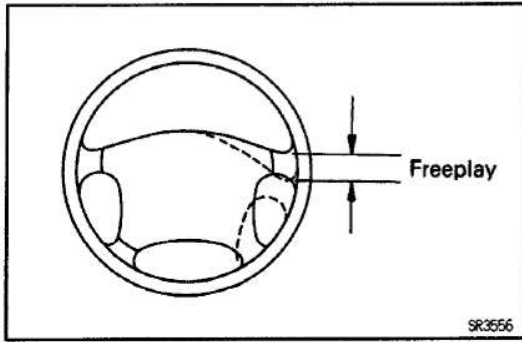
GENERAL DESCRIPTION

- Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- The 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

You will find the cause of trouble more easily by properly using the table shown below. In this table, the numbers indicate the priority of the probable cause of trouble. Check each part in the order shown. If necessary, repair or replace the part.

	SA-3	SA-4	SA-40		-	SA-27	-	-		SA-10
See page										
Parts Name	Tires (Improperly inflated)	Front wheel alignment (Incorrect)	Fluid level (Low)	Drive belt (Loose)	Steering system joints (Worn)	Suspension arm ball joints (Worn)	Steering column (Binding)	Sliding yoke (Worn)	Steering gear housing	Front wheel bearing (Worn)
Trouble										
Hand steering	1	4	2	3	5	6	7		8	
Poor return	1	2					3		4	
Excessive play					1	2		3	5	4
Abnormal noise			1		2				3	



ON-VEHICLE INSPECTION

CHECK THAT STEERING WHEEL FREEPLAY IS CORRECT

SR06V-81

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.

ON-VEHICLE INSPECTION

FLUID LEVEL CHECK

SR97P-01

1. KEEP VEHICLE LEVEL

2. BOOST FLUID TEMPERATURE

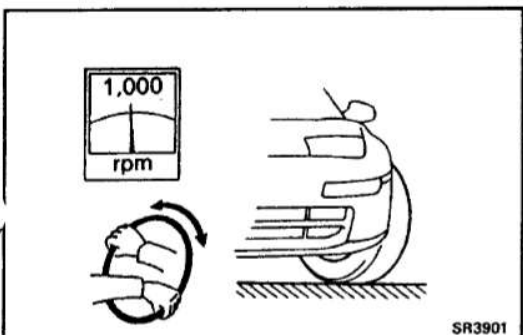
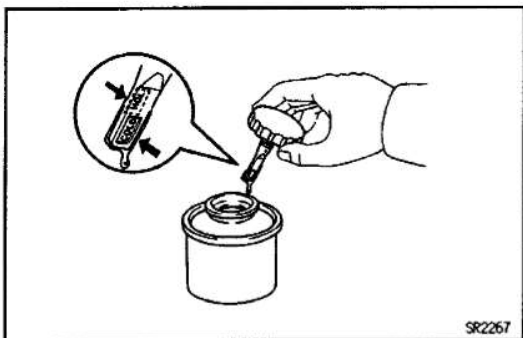
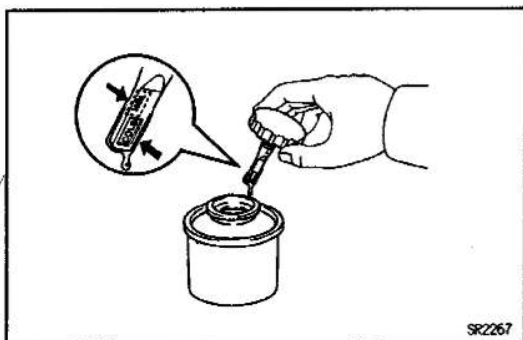
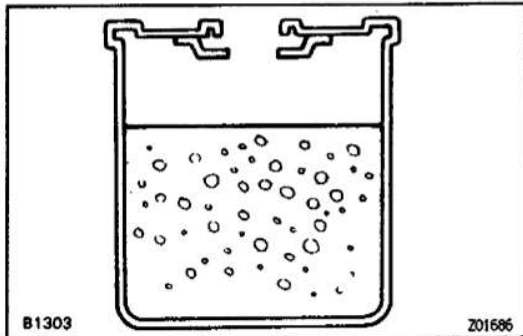
With the engine idling at 1,000 rpm or less, turn the steering wheel from lock to lock ten or more times to boost fluid temperature.

Fluid temperature:

40°C or more (104°F or more)

3. CHECK FOR FOAMING OR EMULSIFICATION

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



4. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.

Fluid:

TOYOTA POWER STEERING FLUID EH (Part No. 08886-01206) or equivalent

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

NOTICE: Use only TOYOTA PS fluid EH or equivalent.

Otherwise, you may not get expected power assist.

BLEEDING OF POWER STEERING SYSTEM

1. CHECK FLUID LEVEL IN RESERVOIR TANK

Check the fluid level and add fluid if necessary.

Fluid:

TOYOTA POWER STEERING FLUID EH (Part No. 08886-01206) or equivalent

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

NOTICE: Use only TOYOTA PS fluid EH or equivalent.

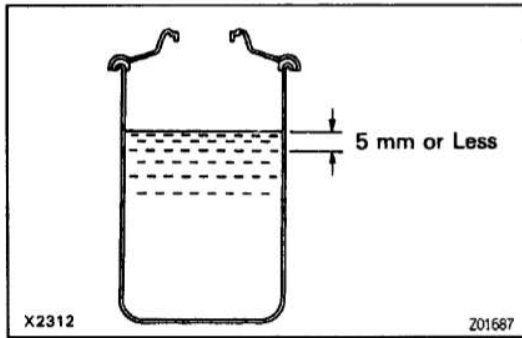
Otherwise, you may not get expected power assist.

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.

SR-40

STEERING - POWER STEERING

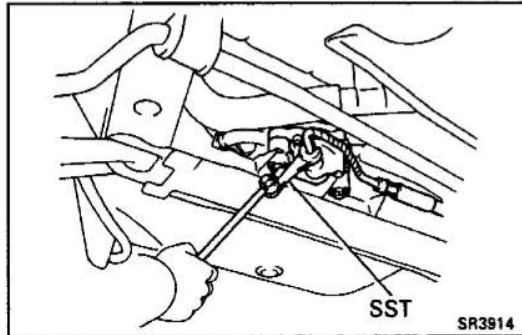


3. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED

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

Maximum rise:

5 mm (0.20 in.)



OIL PRESSURE CHECK

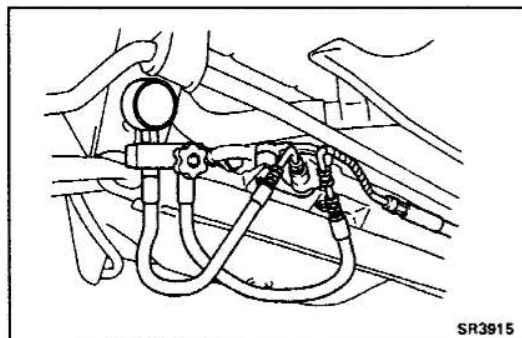
MR07R-01

NOTICE: When supplementing the power steering fluid, use **TOYOTA POWER STEERING FLUID EH** or equivalent which is exclusively for EHPS use.

1. CONNECT PRESSURE GAUGE

(a) Using SST, disconnect the pressure line from the PS pump.

SST 09631 -22020



(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.

2. CHECK THAT FLUID TEMPERATURE IS AT LEAST 40° C (140° 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 while turning the steering wheel.

Minimum pressure:

4,903 kPa (50 kgf/cm², 711 psi)

NOTICE:

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

5. CHECK PRESSURE READING WITH STEERING WHEEL TURNED TO FULL LOCK

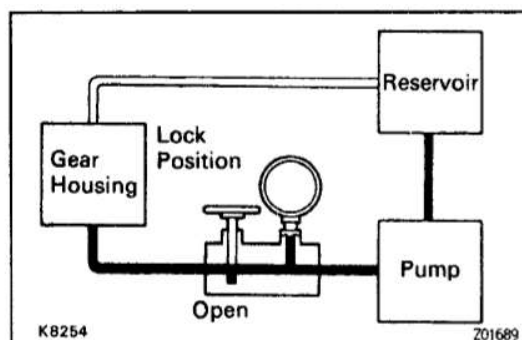
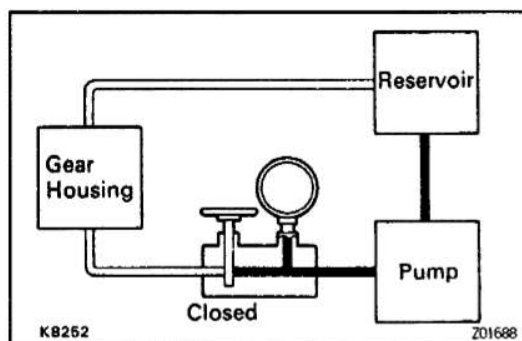
Be sure the pressure gauge valve is fully opened and the engine idling.

Minimum pressure:

4,903 kPa (50 kgf/cm², 711 psi)

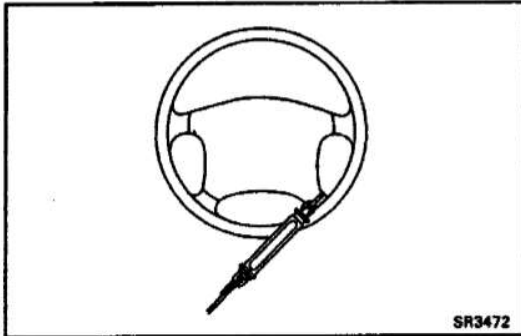
NOTICE:

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



STEERING – POWER STEERING

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

**6. MEASURE STEERING EFFORT**

- (a) Center the steering wheel and run the engine at idle:
- (b) Using a spring scale, measure the steering effort in both directions.

Maximum steering effort:

44 N (4.5 kgf, 9.9 lbf)

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

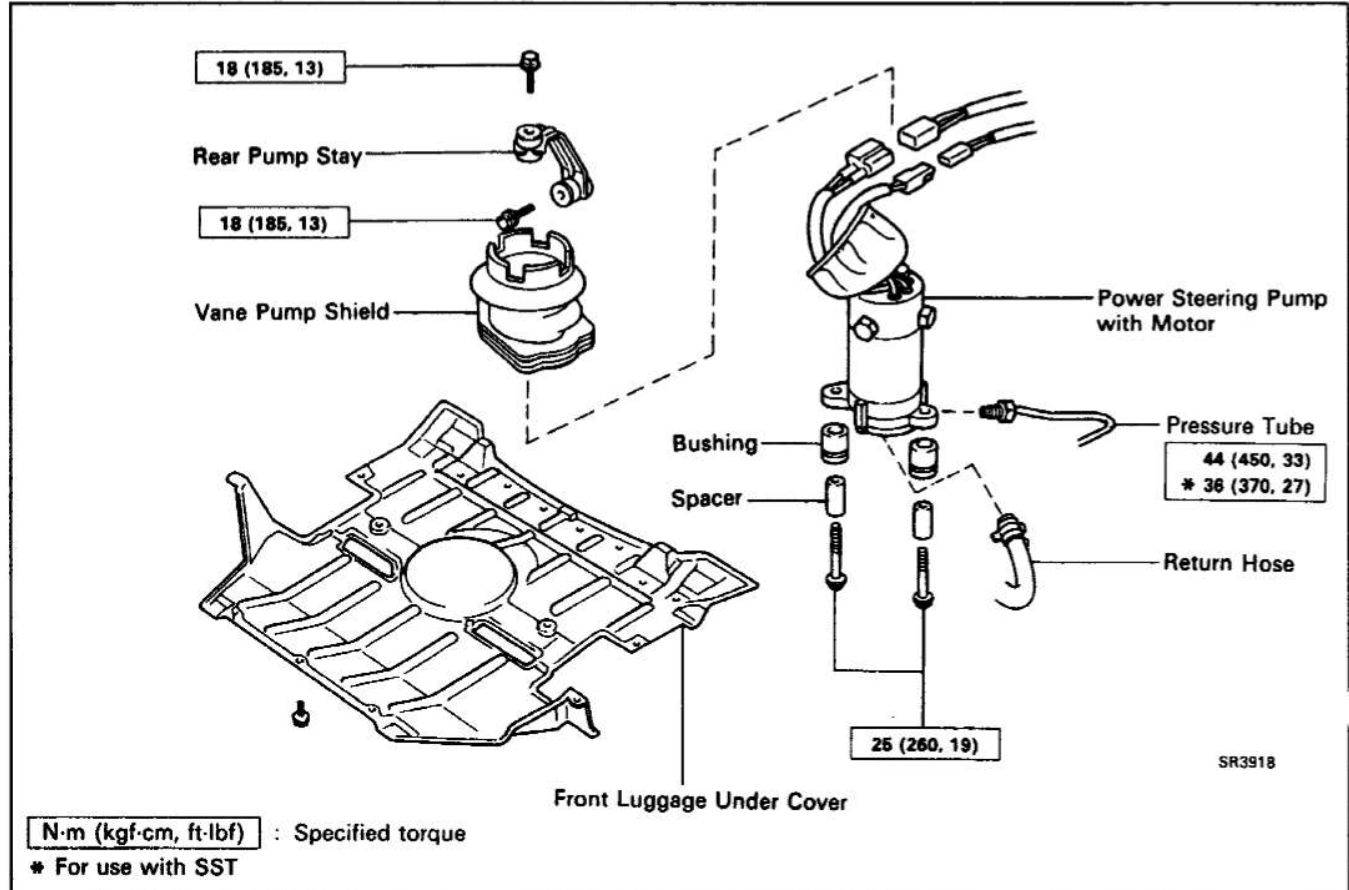
HINT: Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

SR-42

STEERING - POWER STEERING

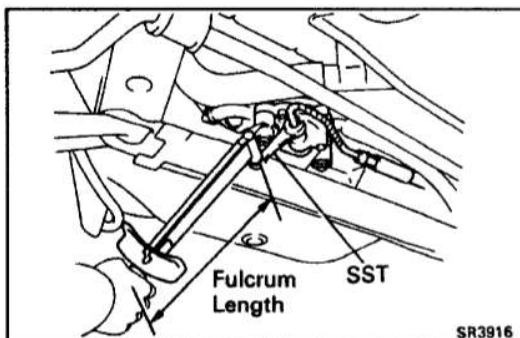
POWER STEERING PUMP**POWER STEERING PUMP REMOVAL AND INSTALLATION**

Remove and install the parts as shown.

**(MAIN POINTS OF REMOVAL AND INSTALLATION)**

NOTICE: When supplementing the power steering fluid, use **TOYOTA POWER STEERING FLUID EH** or equivalent which is exclusively for EHPS use.

HINT: The power steering pump is not to be disassembled, so if a malfunction occurs, replace it as an assembly.

**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)**

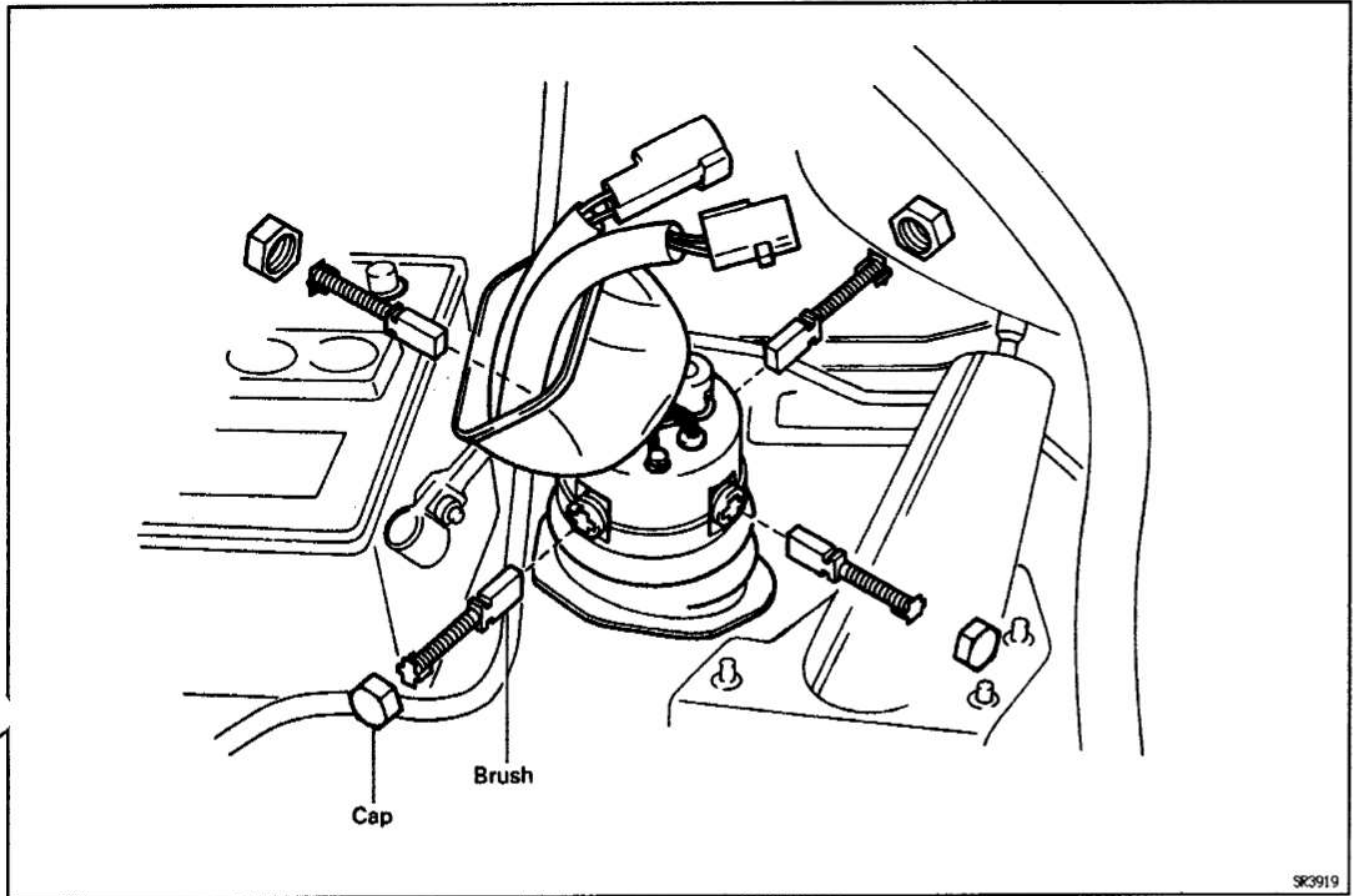
HINT: When connecting, use a torque wrench with a fulcrum length of 300 mm (111.81 in.).

2. BLEED POWER STEERING SYSTEM

(See page [SR-9](#))

POWER STEERING MOTOR BRUSHES REPLACEMENT

BROTT-01



- (a) Remove the four caps and brushes.
(b) install four new brushes.
HINT: Replace all four brushes at the same time.
(c) Install the four caps.

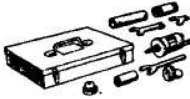
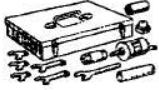
SR-16

STEERING - MANUAL STEERING GEAR HOUSING

MANUAL STEERING GEAR HOUSING

PREPARATION

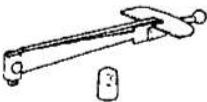
SST (SPECIAL SERVICE TOOLS)

	09612-00012 Rack & Pinion Steering Rack Housing Stand	
	09612-10093 Steering Gear Housing Overhaul Tool Set	
	(09617-10010) Steering Pinion Bearing Adjusting Screw Lock Nut Wrench	
	09612-24014 Steering Gear Housing Overhaul Tool Set	
	(09612-10061) Steering Pinion Bearing Replacer	
	(09616-10010) Steering Pinion Bearing Adjusting Socket	
	(09616-10020) Steering Pinion Bearing Adjusting Screw Wrench	
	(09617-24011) Steering Rack wrench	
	09620-30010 Steering Gear Box Replacer Set	
	(09631-00020) Handle	
	09628-62011 Ball Joint Puller	
	09630-24013 Steering Rack Oil Seal Tool Set	

STEERING – MANUAL STEERING GEAR HOUSING

	(09620-24010) Valve Cup Oil Seal Remover	
	(09620-24020) Valve Cup Oil Seal Replacer	
	(09620-24030) Valve Cup Bearing Replacer	
	09950-20017 Universal Puller	

RECOMMENDED TOOLS

	09025-00010 Small Torque Wrench	Total preload
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EQUIPMENT

Dial indicator	Steering rack
Torque wrench	

SSM (SPECIAL SERVICE MATERIALS)

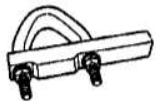
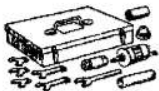
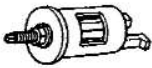
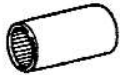
08833-00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Pinion bearing adjusting screw Pinion bearing adjusting screw lock nut Rack guide spring cap
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SR-36

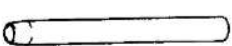
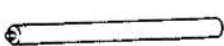
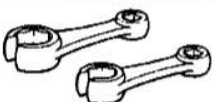
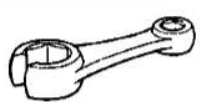
STEERING - POWER STEERING

PREPARATION**SST (SPECIAL SERVICE TOOLS)**

MR07J-01

	09612-00012 Rack & Pinion Steering Rack Housing Stand	
	09612-10131 Hexagon Wrench	
	09612-22011 Tilt Handle Bearing Replacer	
	09612-24014 Steering Gear Housing Overhaul Tool Set	
	(09617-22030) Steering Rack End Wrench	
	(09613-22011) Steering Rack Shaft Bushing Puller	
	09616-00010 Steering Worm Bearing Adjusting Socket	
	09617-10020 Steering Rack End Wrench	
	09620-30010 Steering Gear Box Replacer Set	
	(09631-00020) Handle	
	09628-62011 Ball Joint Puller	
	09630-24013 Steering Rack Oil Seal Tool Set	
	(09620-24010) Valve Cup Oil Seal Remover	

STEERING - POWER STEERING

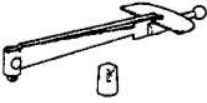
	(09620-24020) Valve Cup Oil Seal Replacer	
	(09620-24030) Valve Cup Bearing Replacer	
	09631-10021 Rack Stopper Wrench	
	09631-10040 Steering Rack Cover "D"	
	09631-12020 Handle	
	09631-12071 Steering Rack Oil Seal Test Tool	
	09631-20031 Oil Seal "B" Remover	
	09631-20070 Seal Ring Guide	
	09631-20081 Seal Ring Tool	
	09631-22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	
	09633-00020 Power Steering Hose Nut Wrench	
	09843-18020 Diagnosis Check Wire	

SR-38

STEERING - POWER STEERING

BH07K-01

RECOMMENDED TOOLS

	09025-00010 Small Torque Wrench	Total preload
	09904-00010 Expander set	
	(09904-00050) No. 4 Claw	

BH07L-01

EQUIPMENT

Dial indicator	Steering rack
Micrometer	Power steering pump
Oil pressure gauge	
Torque wrench	
Vacuum gauge	Gear housing

BH07M-01

LUBRICANT

Item	Capacity	Classification
Power steering fluid Total	0.8 1 liters (0.86 US qts, 0.71 Imp.qts)	ATF DEXRON [®] II

BH07N-01

SSM (SPECIAL SERVICE MATERIALS)

08833-00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Rack housing cap Rack guide spring cap Rack guide spring cap lock nut
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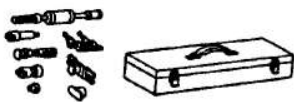
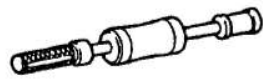
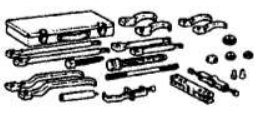
SR-4

STEERING - STEERING COLUMN

STEERING COLUMN

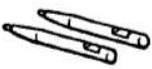
PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09609-20011 Steering Wheel Puller	
	09910-00015 Puller Set	
	(09911-00011) Puller Clamp	
	(09912-00010) Puller Slide Hammer	
	09950-20017 Universal Puller	
	(09956-00010) Tightening Piece	

SR074-01

RECOMMENDED TOOLS

	09904-00010 Expander Set	For removing and installing snap ring
	(09904-00050) No. 4 Claw	

SR075-01

EQUIPMENT

Torque wrench	
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SERVICE SPECIFICATIONS

SERVICE DATA

SR06W-01

Steering wheel freeplay (Maximum)	30 mm (1.18 in.)
Pawl stopper (Mark)	
1 or A	12.65 – 12.75 mm 0.4980 – 0.5020 in.
2 or B	12.55 – 12.65 mm 0.4941 – 0.4980 in.
3 or C	12.45 – 12.55 mm 0.4902 – 0.4941 in.
4 or D	12.35 – 12.45 mm 0.4862 – 0.4902 in.
5 or E	12.25 – 12.35 mm 0.4823 – 0.4862 in.
MANUAL STEERING GEAR HOUSING	
Steering rack runout (Maximum)	0.3 mm (0.012 in.)
Pinion preload (Turning)	0.2 – 0.3 N·m (2.3 – 3.3 kgf·cm, 2.0 – 2.9 in.-lbf)
Total preload (Turning)	0.6 – 1.2 N·m (6 – 12 kgf·cm, 5.2 – 10.4 in.-lbf)
PS ON – VEHICLE INSPECTION	
Maximum rise of oil level	5 mm (0.20 in.)
Maximum rise of oil level	5 mm (0.20 in.)
Oil pressure at idle speed with valve closed (Minimum)	4.903 – 5.394 kPa (50 – 55 kgf/cm ² , 711 – 782 psi)
Steering effort at idle speed (Maximum),	44 N (4.5 kgf, 9.9 lbf)
PS GEAR HOUSING	
Steering rack runout (Maximum)	0.3 mm (0.012 in.)
Control valve shaft bushing oil clearance (STD)	0.050 – 0.083 mm (0.0020 – 0.0033 in.)
Control valve shaft bushing oil clearance (Maximum)	0.125 mm (0.0049 in.)
Total preload (Turning)	0.9 – 1.5 N·m (9 – 15 kgf·cm, 7.8 – 13.0 in.-lbf)

SR06X-01

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
STEERING COLUMN			
Main shaft x Steering wheel	35	360	26
Steering wheel pad	7.4	75	65 in.-lbf
Column tube x Body	25	260	19
Universal joint bolt	35	360	26
Tilt lever assembly installation bolt	2.9	30	26 in.-lbf
Tilt pawl set nut	5.9	60	52 in.-lbf
Tilt lever retainer set nut	15	150	11
Compression spring bushing bolt	7.8	80	69 in.-lbf
Main shaft x Intermediate shaft	35	360	26
MANUAL STEERING GEAR HOUSING			
Gear housing bracket x Body	43	440	32
Tie rod end x Steering knuckle	49	500	36
Universal joint bolt	35	360	26
Pinion bearing adjusting screw lock nut	91	930	67
Rack guide spring cap lock nut	56	570	41

SR-72**STEERING – SERVICE SPECIFICATIONS**

Rack x Rack end	64	650	47
Tie rod end lock nut	56	570	41
POWER STEERING PUMP			
PS pump x Crossmember	25	260	19
Rear pump stay x PS pump	18	185	13
Rear pump stay x Body	18	185	13
Pressure tube union nut	36	370	27
POWER STEERING GEAR HOUSING			
Gear housing bracket x Body	43	440	32
Tie rod end x Steering knuckle	49	500	36
Universal joint bolt	35	380	26
Pressure tube union bolt	49	500	36
Return tube	25	250	18

GENERAL DESCRIPTION

- Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- The 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

You will find the cause of trouble more easily by properly using the table shown below. In this table, the numbers indicate the priority of the probable cause of trouble. Check each part in the order shown. If necessary, repair or replace the part.

See page	SA-3	SA-4	SA-40		-	SA-27	-	-		SA-10
	Tires (Improperly inflated)	Front wheel alignment (Incorrect)	Fluid level (Low)	Drive belt (Loose)	Steering system joints (Worn)	Suspension arm ball joints (Worn)	Steering column (Binding)	Sliding yoke (Worn)	Steering gear housing	Front wheel bearing (Worn)
Parts Name										
Trouble										
Hand steering	1	4	2	3	5	6	7		8	
Poor return	1	2					3		4	
Excessive play					1	2		3	5	4
Abnormal noise			1		2				3	