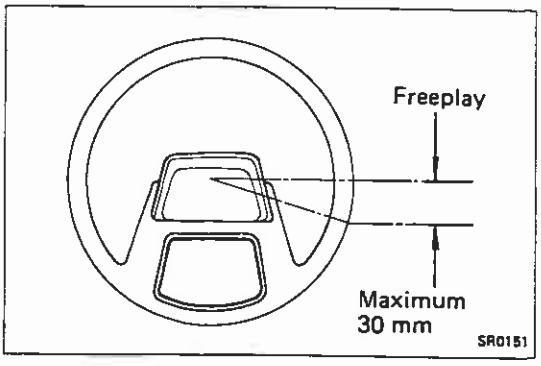
STEERING

PRECAUTIONS

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

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Hard steering	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Power steering belt loose	Tighten belt	SR-35
	Oil level in reservoir low	Check reservoir	SR-23
	Insufficient lubricant	Lubricate suspension and steering linkage	
	Excessive caster	Check front end alignment	FA-3
	Lower arm ball joints worn	Replace lower arm ball joints	FA-15
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-13 SR-36
	Power steering unit faulty	Check power steering unit	SR-23
Poor return	Tires improperly inflated	Inflate tires to proper pressure	FA-3
	Insufficient lubricant	Lubricate suspension and steering linkage	
	Wheel alignment incorrect	Check front end alignment	FA-3
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-13 SR-36
Excessive play	Steering gear loose	Tighten gear bolts	
	Main shaft worn	Replace main shaft	SR-5
	Lower arm ball joints worn	Replace lower arm ball joints	FA-15
	Steering gear out of adjustment or broken	Adjust or repair steering gear	SR-13 SR-36



ON-VEHICLE INSPECTION

1. CHECK THAT STEERING WHEEL FREEPLAY IS CORRECT

With the vehicle stopped and pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure. Freeplay should not exceed the maximum limit.

Maximum play: 30 mm (1.18 in.)

If incorrect, repair as required.

2. CHECK STEERING LINKAGE AND GEAR HOUSING

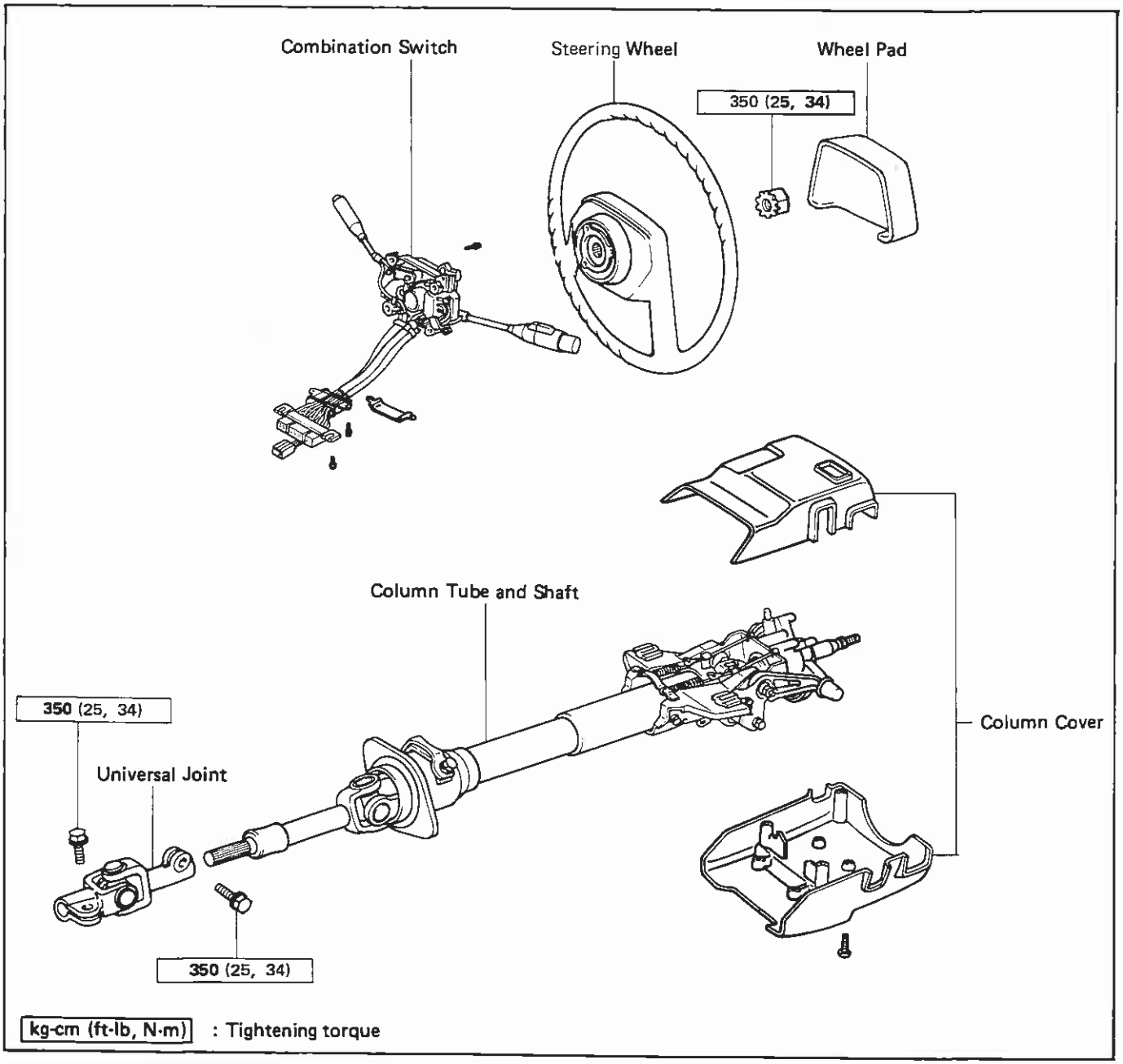
(a) Check the gear housing for looseness or damage. Check that:

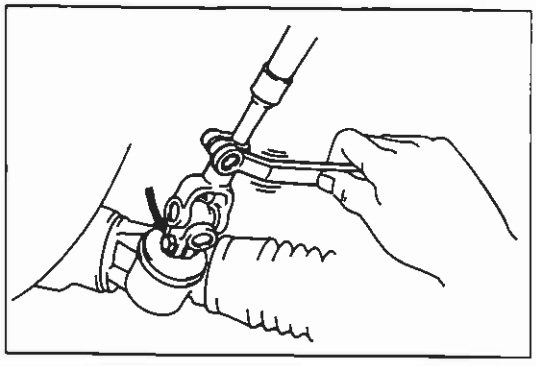
- Tie rod ends do not have excessive play.
- Boots are not damaged.
- Boot clamps are not loose.

(b) Check the gear housing for grease leakage or oozing.

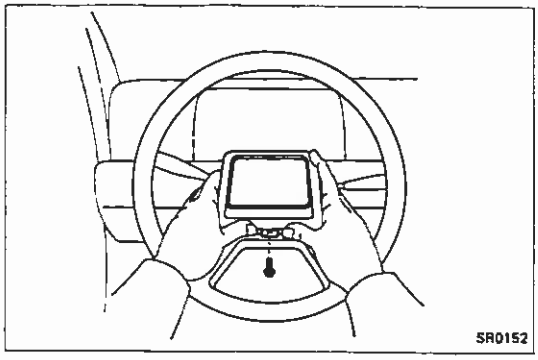
STEERING COLUMN ASSEMBLY WITH TILT STEERING

REMOVAL OF STEERING COLUMN ASSEMBLY





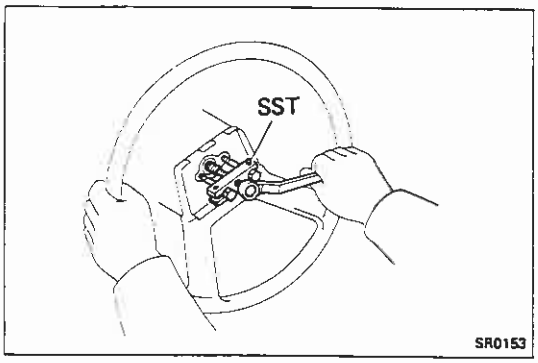
1. REMOVE NEGATIVE CABLE FROM BATTERY
2. REMOVE UNIVERSAL JOINT
   (a) Remove two set bolts.
   (b) Remove the universal joint.



3. REMOVE STEERING WHEEL

(a) Remove the screw at the lower portion of the steering wheel pad and pull the pad out upward.

(b) Remove the steering wheel nut.

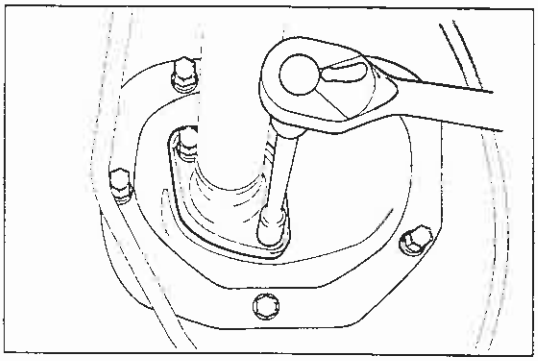


(c) Using SST, remove the steering wheel.

SST 09609-20011

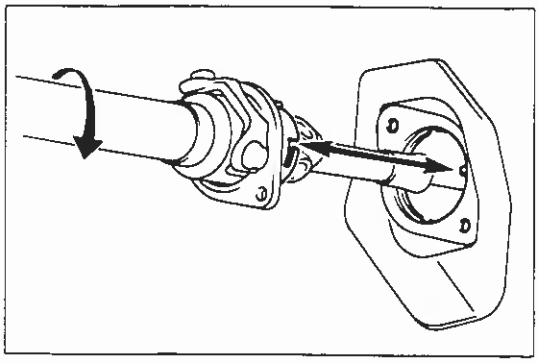
4. REMOVE INSTRUMENT LOWER PANEL AND AIR DUCT

5. REMOVE COLUMN COVER AND COMBINATION SWITCH



6. REMOVE TWO MOUNTING BOLTS FROM COLUMN HOLE COVER PLATE

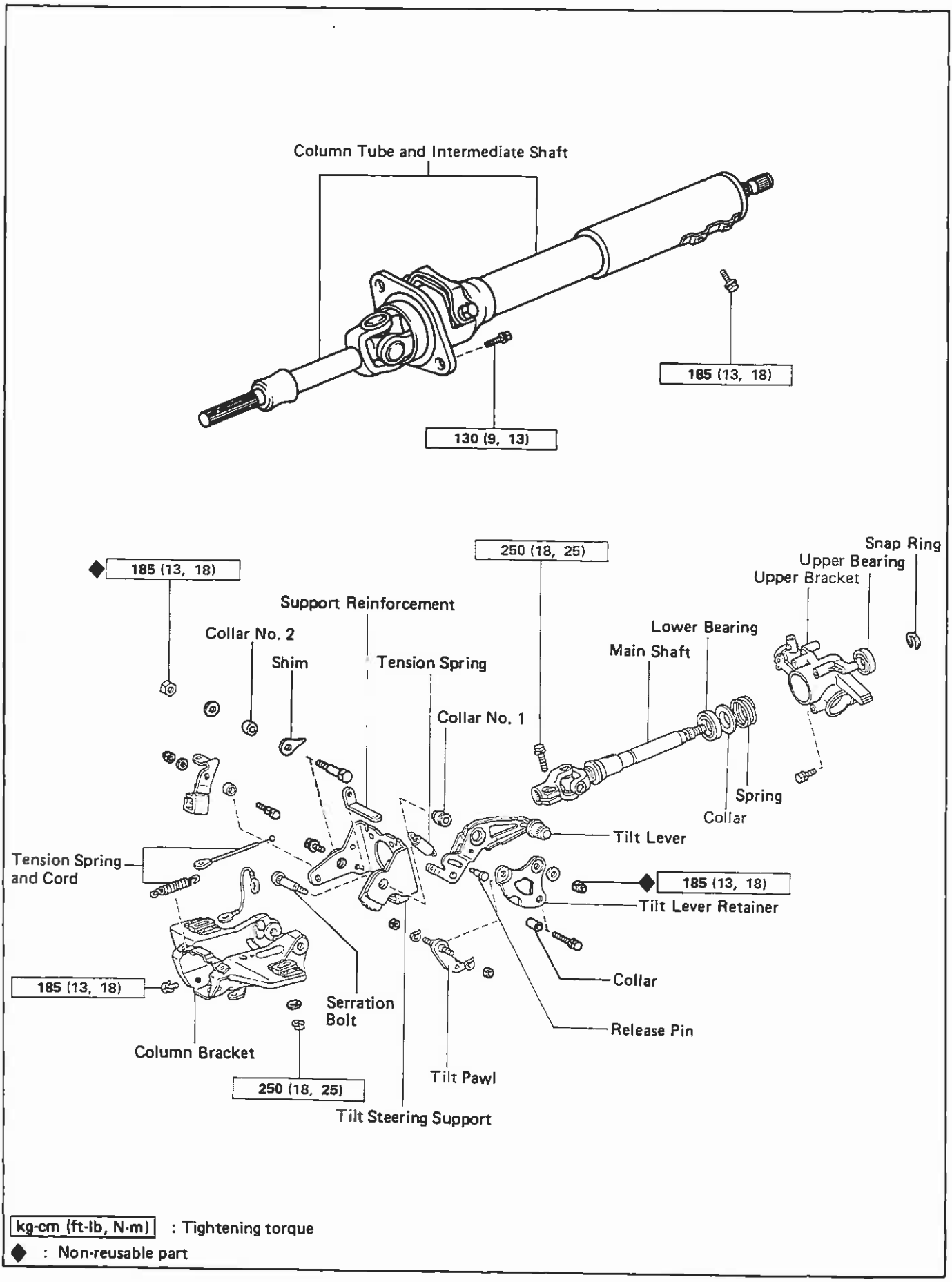
7. REMOVE TWO COLUMN BRACKET MOUNTING NUTS



8. PULL OUT COLUMN TUBE AND SHAFT

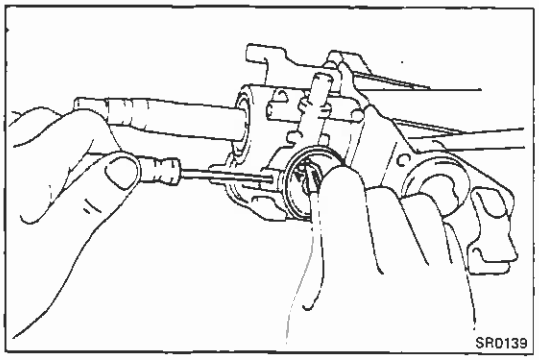
Turn the column tube as shown and pull out the shaft.

COMPONENTS



kg-cm (ft-lb, N·m) : Tightening torque

◆ : Non-reusable part



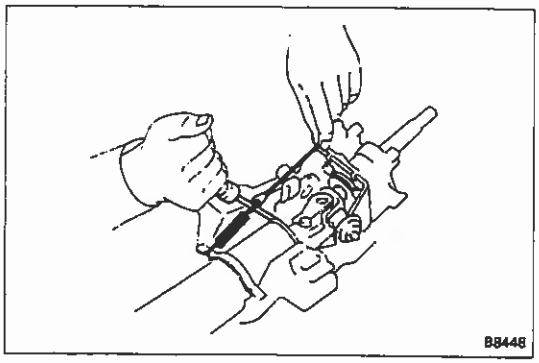
DISASSEMBLY OF STEERING COLUMN ASSEMBLY AND TILT MECHANISM

(See page SR-5)

1. REMOVE IGNITION KEY CYLINDER

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

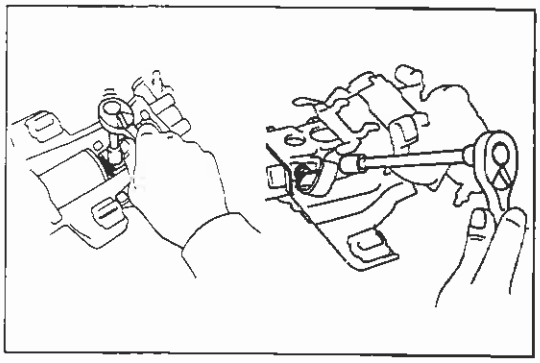
(b) Push down the stop key with a thin rod, and pull out the key cylinder.



2. REMOVE TENSION SPRINGS AND CORDS

(a) Fully tilt the main shaft upward.

(b) Pry the spring and remove the cord and spring.



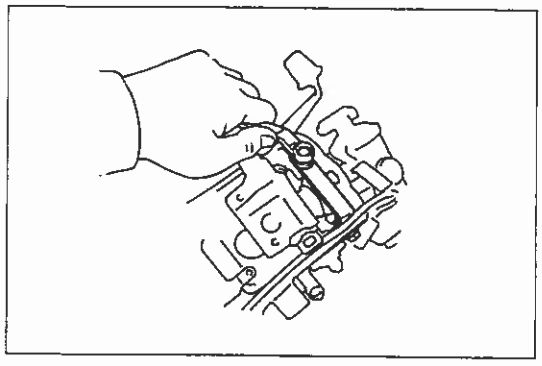
3. DISCONNECT INTERMEDIATE SHAFT AND MAIN SHAFT

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

(b) Remove one joint bolt.

(c) Remove four bracket bolts.

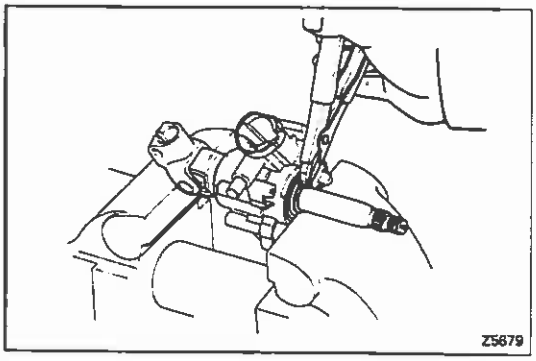
(d) Separate the tilt mechanism from the column tube.



4. DISCONNECT UPPER BRACKET FROM TILT STEERING SUPPORT

(a) Remove the support reinforcement.

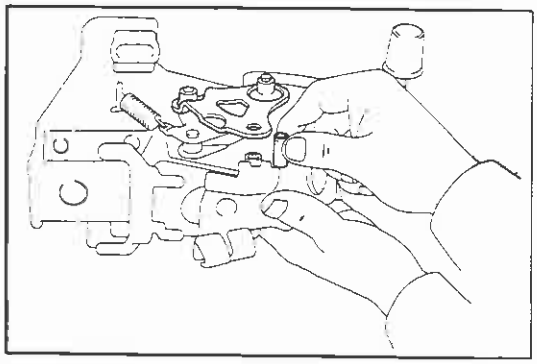
(b) Remove three bolts and disconnect the bracket from the support.



5. REMOVE MAIN SHAFT FROM UPPER BRACKET

(a) Using a soft jaw vise and snap ring pliers, remove the snap ring.

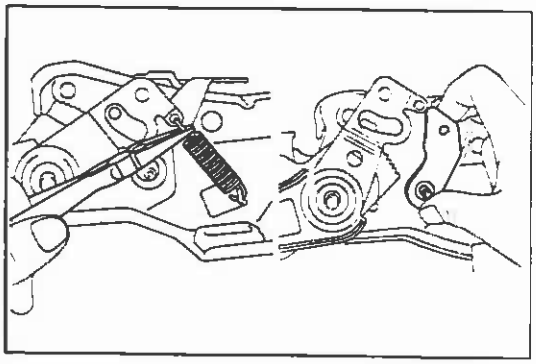
(b) Pull out the main shaft from the bracket.



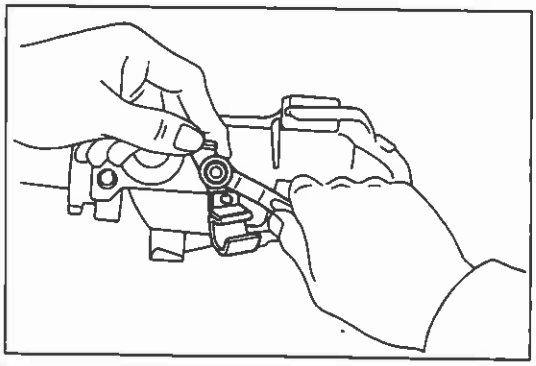
6. DISASSEMBLE TILT STEERING SUPPORT AND COLUMN BRACKET

(a) Remove two nuts, bolt and retainer.

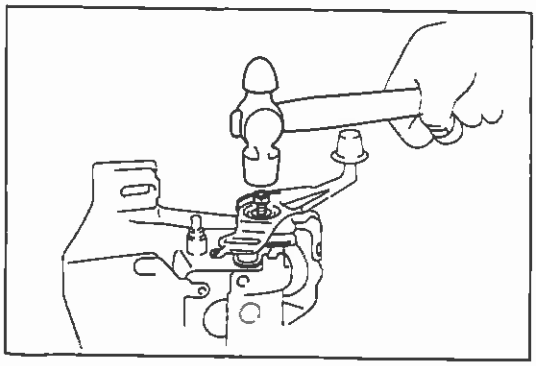
(b) Take out collar and release pin.



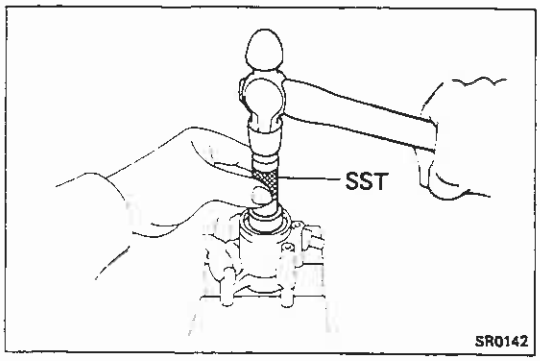
(c) Remove the tension spring and take out the tilt pawl.



(d) Remove the guide pin bolt, support bolt and shim.



(e) Using a hammer, remove the serration bolt and tilt lever.

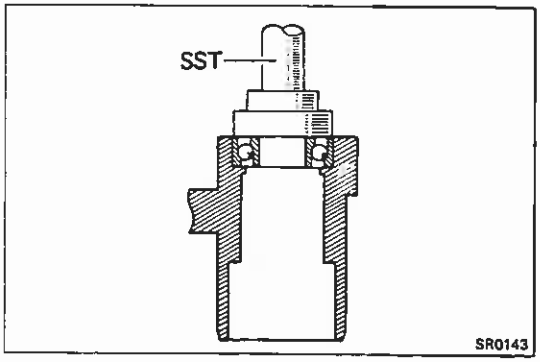


INSPECTION AND REPAIR OF STEERING COLUMN ASSEMBLY

1. IF NECESSARY, REPLACE BEARING IN UPPER BRACKET

(a) Using SST and a hammer, remove the bearing.

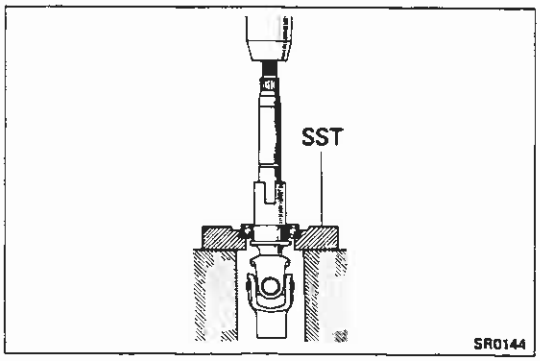
SST 09620-30010



(b) Pack MP grease into the bearing.

(c) Using SST and a hammer, drive the bearing into the bracket.

SST 09620-30010

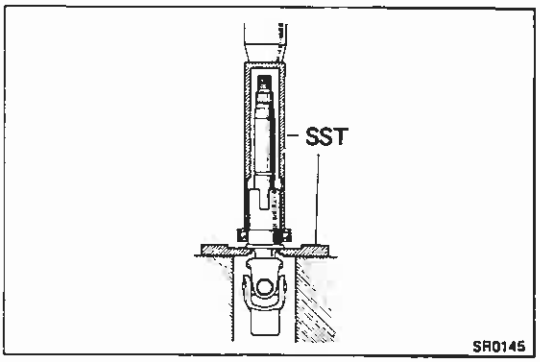


2. IF NECESSARY, REPLACE LOWER BEARING

(a) Using SST and a press, remove the lower bearing from the main shaft.

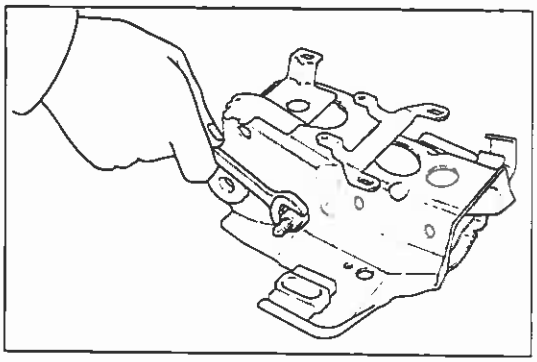
SST 09527-20011

(b) Pack MP grease into the bearing.



(c) Using SST and a press, assemble the lower bearing and main shaft.

SST 09236-00101 and 09612-22011

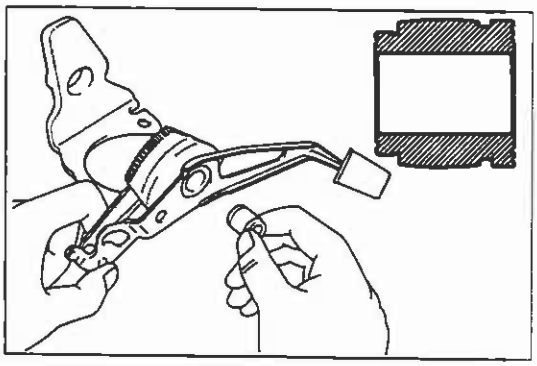


ASSEMBLY OF STEERING COLUMN ASSEMBLY AND TILT MECHANISM

(See page SR-5)

1. COAT ALL RUBBING PARTS WITH MP GREASE
2. ASSEMBLE PAWL SET BOLT

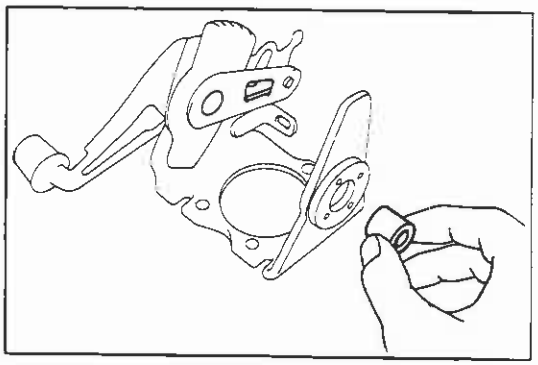
   Torque: 185 kg-cm (13 ft-lb, 18 N·m)



3. ASSEMBLE TILT LEVER TO SUPPORT

   (a) Select a collar No. 1 which will eliminate all play.

Outer diameter	mm (in.)
17.989 – 17.996	(0.7082 – 0.7085)
17.996 – 18.003	(0.7085 – 0.7088)
18.003 – 18.010	(0.7088 – 0.7091)
18.010 – 18.017	(0.7091 – 0.7093)
18.017 – 18.024	(0.7093 – 0.7096)

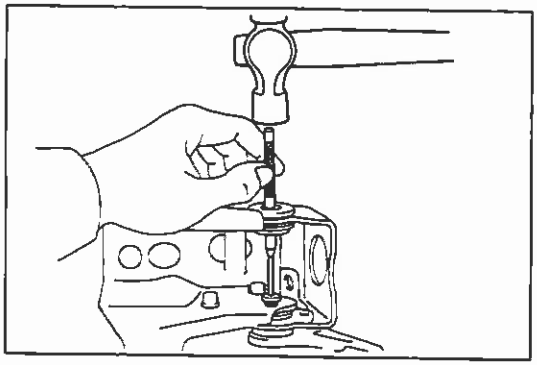


   (b) Install tilt lever and collar No. 1 to the support.

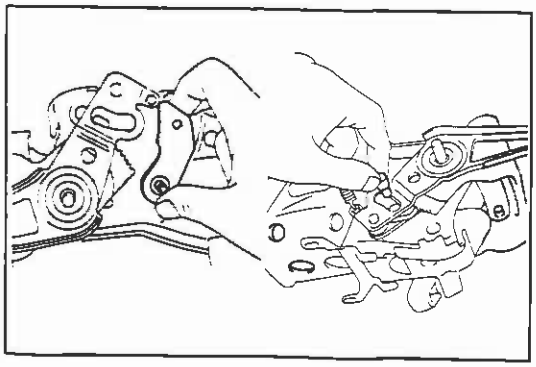
   (c) Select a collar No. 2 which will eliminate all play.

Outer diameter	mm (in.)
17.982 – 18.000	(0.7080 – 0.7087)
18.000 – 18.018	(0.7087 – 0.7094)

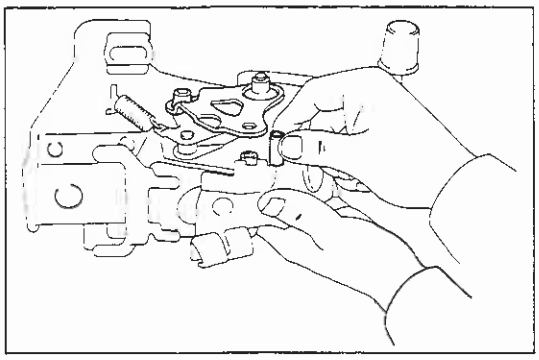
   (d) Install collar No. 2 to the support.



   (e) Drive in the serration bolt to the support.

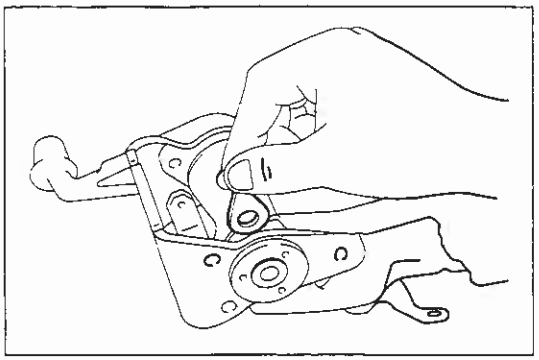


   (f) Install the tilt pawl, tension spring and the release pin.



(g) Assemble the collar and tilt lever retainer.

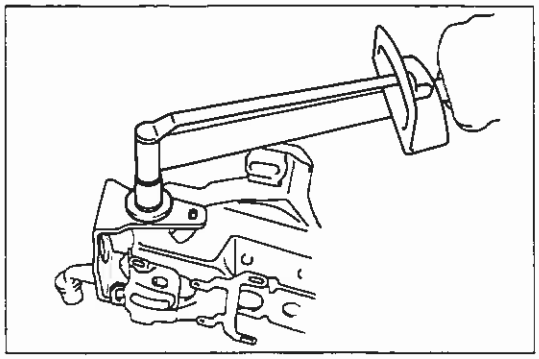
Torque: 185 kg-cm (13 ft-lb, 18 N·m)



4. INSTALL SHIM, BOLT AND NUT

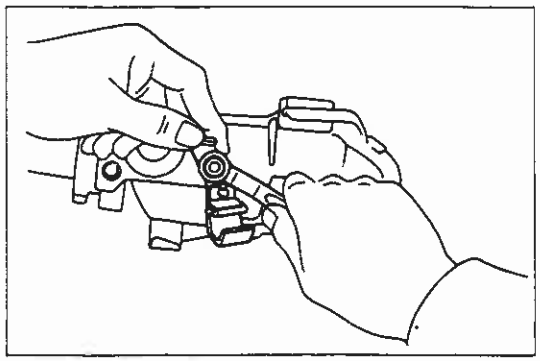
(a) Select a shim which fits snugly when pressed in by hand.

Thickness mm (in.)	Thickness mm (in.)
0.2 (0.008)	1.4 (0.055)
0.5 (0.020)	1.8 (0.071)
0.8 (0.031)	



(b) Install the shim, bolt, washer and a lock nut.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)

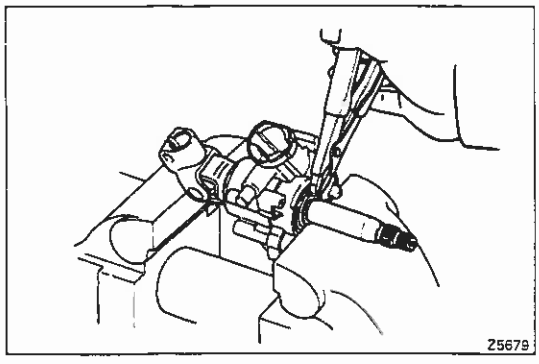


5. INSTALL TILT STEERING SUPPORT STOPPER BOLT

(a) Install the stopper bolt, bracket, washer and nut.

(b) Tighten the nut by holding the bracket with fingers as shown.

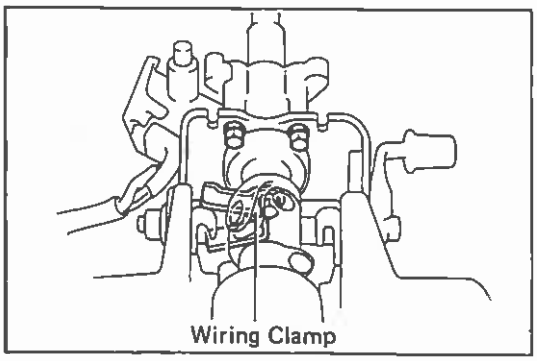
Torque: 100 kg-cm (7 ft-lb, 10 N·m)



6. ASSEMBLE MAIN SHAFT AND UPPER BRACKET

(a) Assemble the collar, spring and main shaft, and insert them into the bracket.

(b) Using a soft jaw vise and a snap ring pliers, install a new snap ring by pressing the main shaft and upper bearing.



7. ASSEMBLE UPPER BRACKET AND SUPPORT

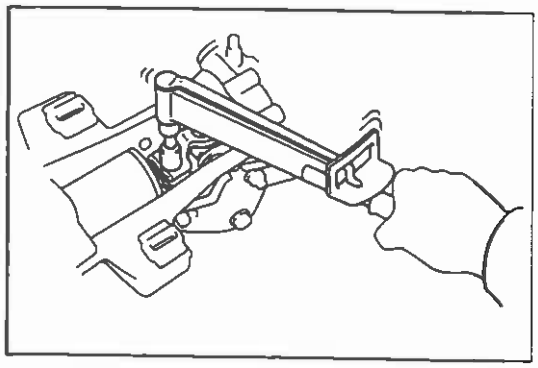
(a) Apply anaerobic adhesive and sealant [THREE BOND 1324 (Part No. 08833-00070) or equivalent] to 1 or 2 threads of the bolt end.

NOTE: This adhesive will not harden while exposed to air. It will act as a sealer or binding agent only when applied to threads, etc. and air is cut off.

(b) Install the two bolts; one with a wiring clamp.

Torque: 75 kg-cm (65 in.-lb, 7.4 N·m)

(c) Install the support reinforcement.



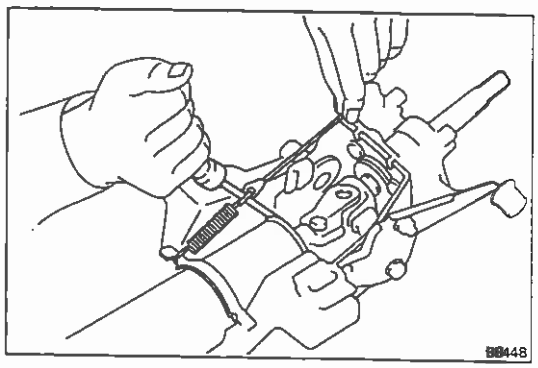
8. ASSEMBLE COLUMN BRACKET TO COLUMN TUBE

Torque: 185 kg-cm (13 ft-lb, 18 N·m)

9. CONNECT MAIN SHAFT AND INTERMEDIATE SHAFT

Align the marks on the joint flange and intermediate shaft and tighten the bolt.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



10. INSTALL TWO SPRINGS AND TWO CORDS

(a) Connect the tension spring and cord, and hook the spring to the hanger.

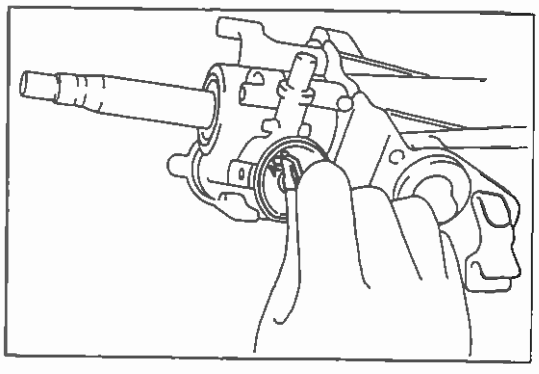
(b) Pry the spring end and hook the cord end to the support.

(c) Hook the cords to the cord guides.

11. CHECK OPERATION OF TILT STEERING LEVER AND SUPPORT

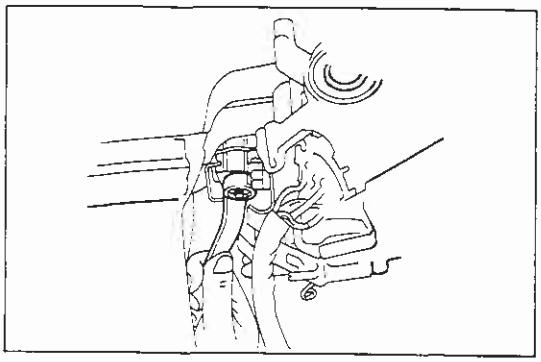
(a) Check that there is no axial or horizontal play at the end of the main shaft.

(b) Check that the main shaft lock securely in all six positions.



12. INSTALL IGNITION SWITCH

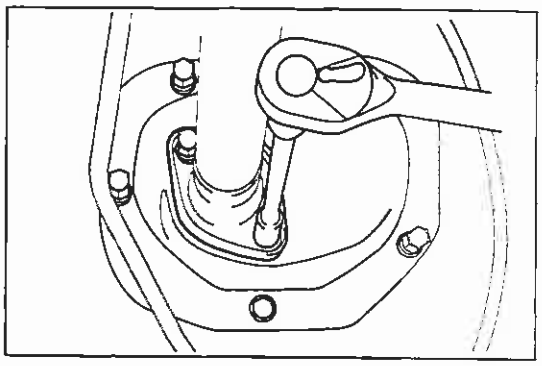
Turn the ignition key plate to the ACC position, and install the key cylinder into the upper bracket.



INSTALLATION OF STEERING COLUMN ASSEMBLY

(See page SR-3)

1. PLACE COLUMN AND SHAFT IN INSTALLED POSITION
2. INSTALL COLUMN BRACKET MOUNTING NUTS BY HAND



3. INSTALL STEERING COLUMN HOLE COVER PLATE

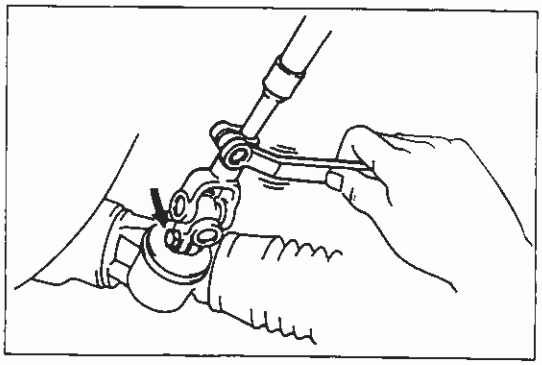
   Tighten the bolts.

   Torque: 130 kg-cm (9 ft-lb, 13 N·m)

4. TORQUE TWO COLUMN BRACKET MOUNTING NUTS

   Torque: 250 kg-cm (18 ft-lb, 25 N·m)

5. INSTALL COMBINATION SWITCH AND COLUMN COVER
6. INSTALL AIR DUCT AND INSTRUMENT LOWER PANEL

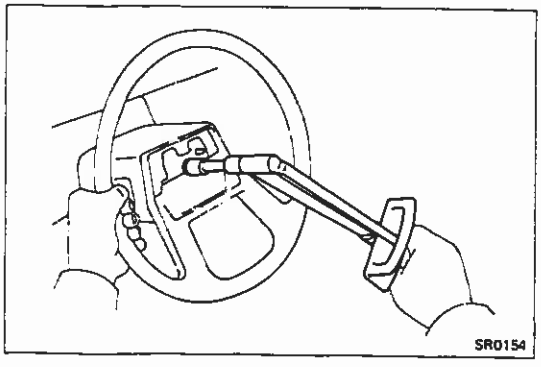


7. INSTALL UNIVERSAL JOINT

   Tighten the bolts.

   Torque: 350 kg-cm (25 ft-lb, 34 N·m)

8. CONNECT NEGATIVE CABLE TO BATTERY



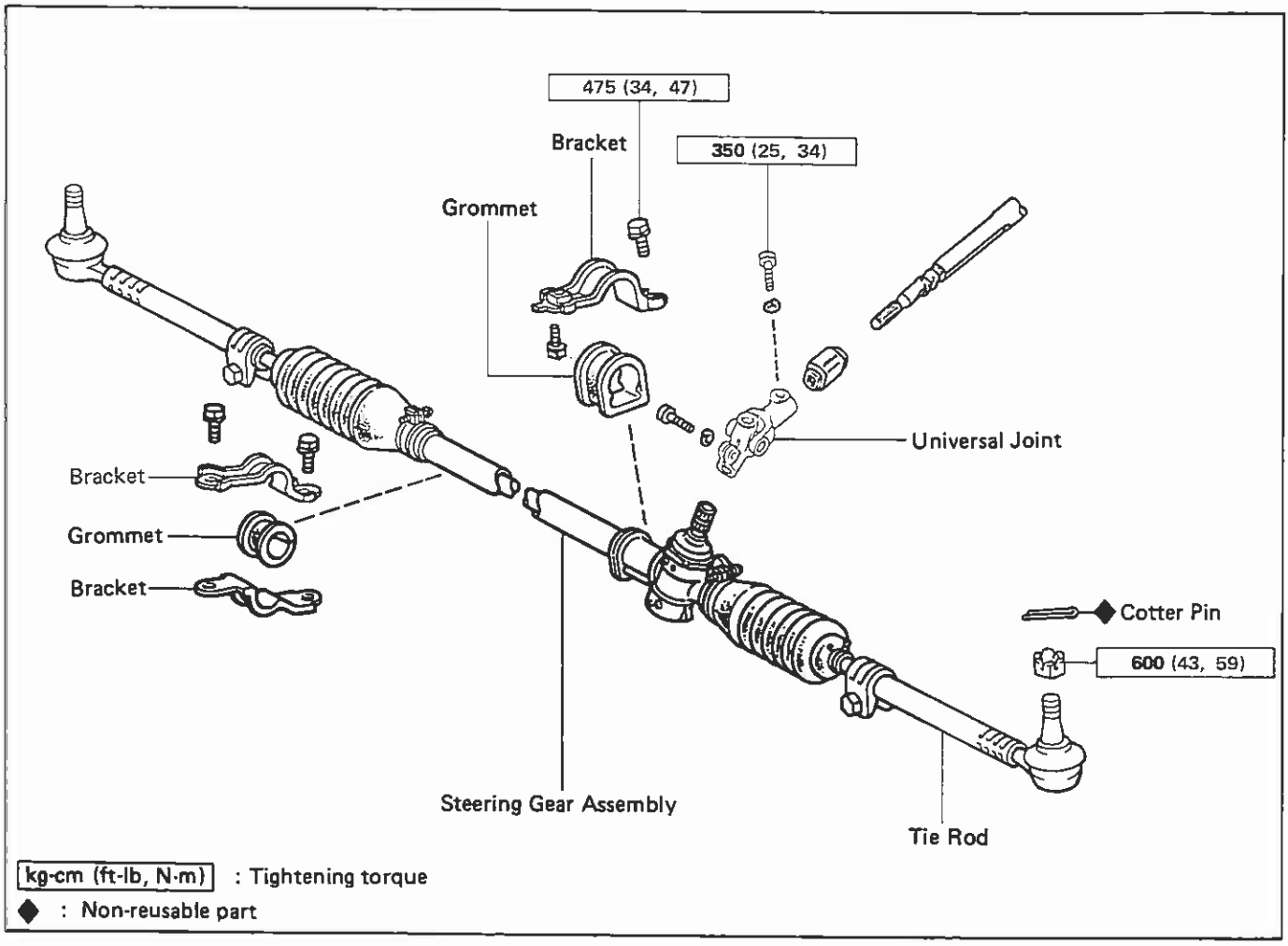
9. INSTALL STEERING WHEEL
   (a) Position the front wheels straight ahead and install the steering wheel in the neutral position.
   (b) Tighten the nut.

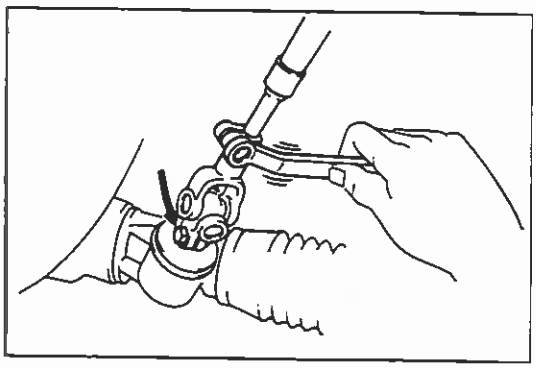
   Torque: 350 kg-cm (25 ft-lb, 34 N·m)

   (c) Install the steering wheel pad.

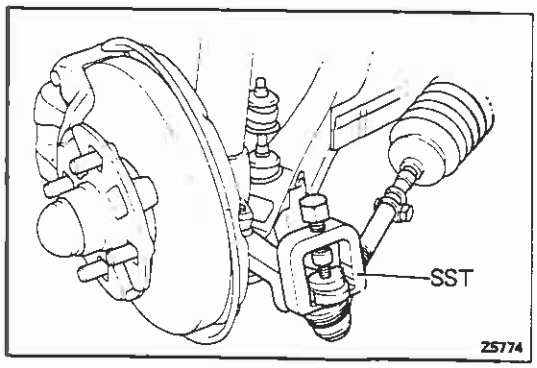
STEERING GEAR HOUSING

REMOVAL OF GEAR HOUSING





1. REMOVE UNIVERSAL JOINT
   (a) Remove the two set bolts.
   (b) Remove the universal joint.

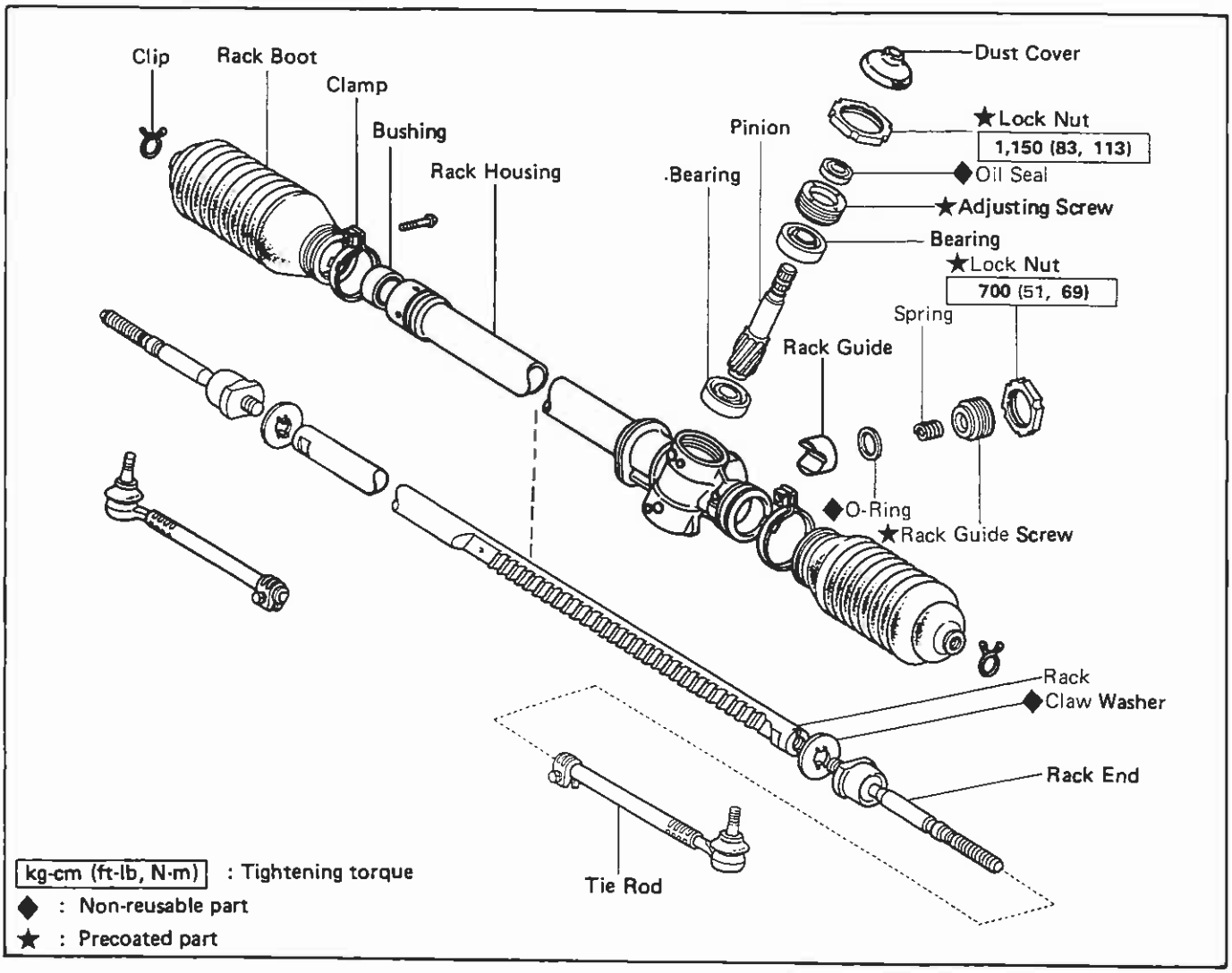


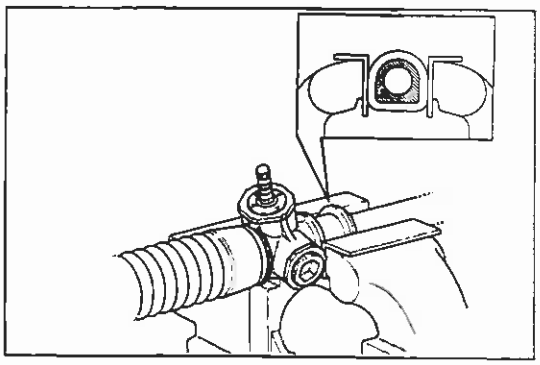
2. DISCONNECT TIE ROD ENDS
   (a) Remove the cotter pin and nut holding the knuckle arm to the tie rod end.
   (b) Using SST, disconnect the knuckle arm from the tie rod end.

   SST 09611-22012

3. REMOVE GEAR HOUSING ASSEMBLY
   (a) Remove the gear housing bracket set bolts.
   (b) Remove the gear housing assembly.

COMPONENTS



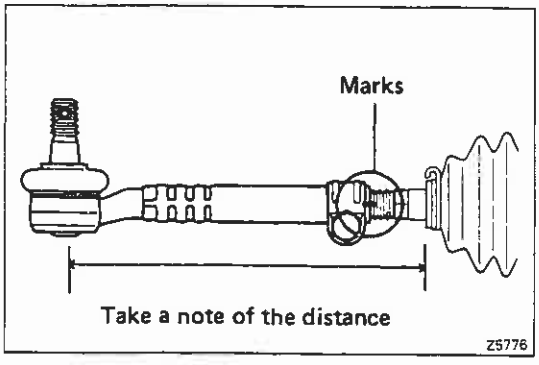


DISASSEMBLY OF GEAR HOUSING

1. CLAMP GEAR HOUSING IN VISE

(a) The rack housing is made of aluminum so always use soft jaws on the vise and clamp onto the part shown in the figure.

(b) If clamping onto the center tube, wrap a piece of cloth around the tube and be careful not to damage the tube.



2. REMOVE TIE RODS

(a) Place matchmarks on the tie rod end and rack end.

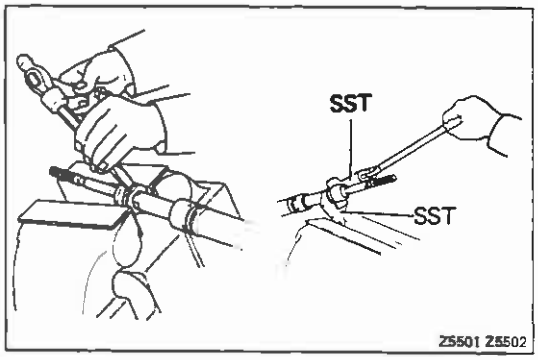
(b) Take a note of the distance between the boots end and center of the tie rod end.

(c) Loosen the clamp and remove the tie rod from the rack end.

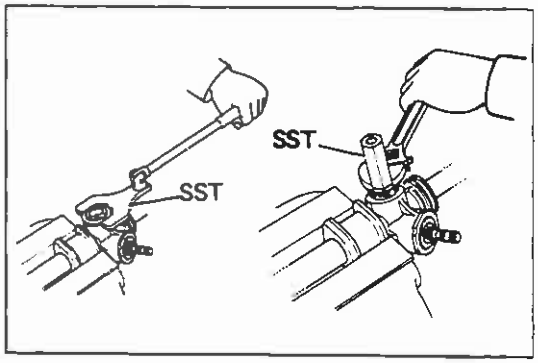
3. REMOVE RACK BOOTS

(a) Remove the clip and clamp.

(b) Remove the boot.

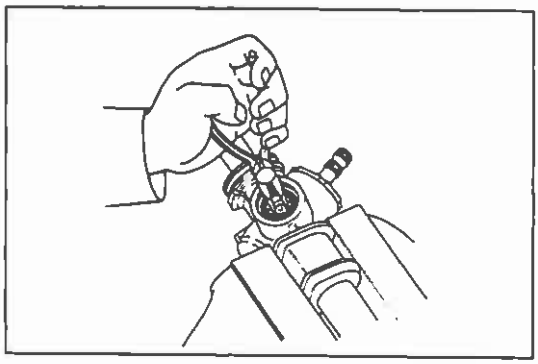


4. **REMOVE RACK ENDS AND CLAW WASHER**
   (a) Unstake the claw washer.
   CAUTION: Avoid any impact to the rack.
   (b) Using SST, remove the rack ends.
   SST 09612-24012
   NOTE: Mark the left and right rack ends.
   (c) Remove the claw washer.



5. **REMOVE RACK GUIDE SCREW LOCK NUT**
   Using SST, remove the rack guide screw lock nut.
   SST 09612-24012

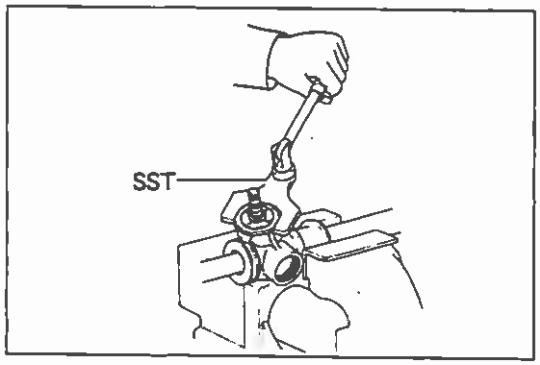
6. **REMOVE RACK GUIDE SCREW**
   Using SST, remove the rack guide screw.
   SST 09612-24012



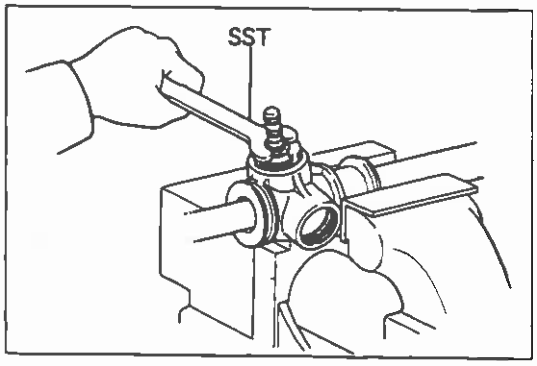
7. **REMOVE RACK GUIDE SPRING**

8. **REMOVE RACK GUIDE WITH O-RING**

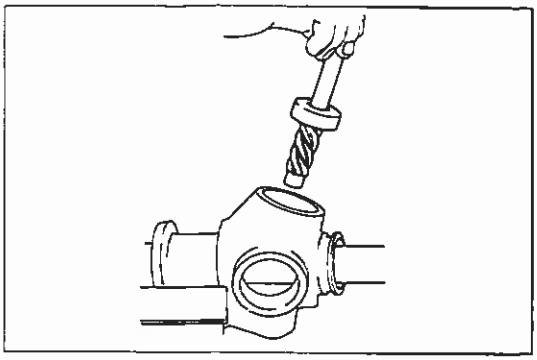
9. **REMOVE DUST COVER**



10. **REMOVE PINION BEARING ADJUSTING SCREW LOCK NUT**
    Using SST, remove the pinion bearing adjusting screw lock nut.
    SST 09612-24012



11. **REMOVE PINION BEARING ADJUSTING SCREW**
    Using SST, remove the pinion bearing adjusting screw.
    SST 09612-24012

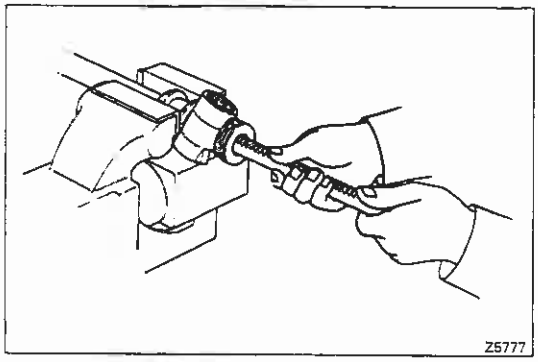


12. REMOVE PINION WITH UPPER BEARING

NOTE: 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.

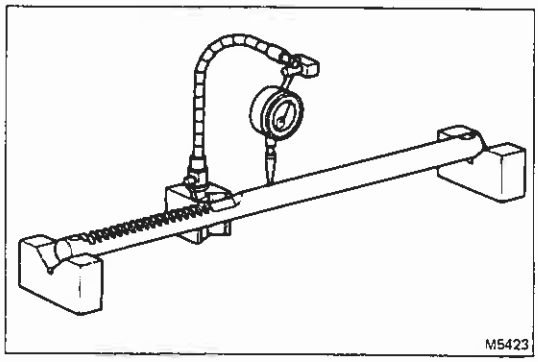
(b) Remove the pinion together with upper bearing.



13. REMOVE RACK

Remove the rack from the housing side without revolving it.

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



INSPECTION OF GEAR HOUSING

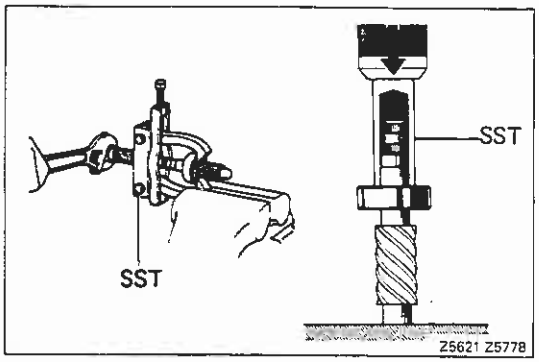
1. INSPECT PINION BEARINGS

If necessary, replace the bearing.

2. INSPECT RACK RUNOUT

Runout: Limit 0.3 mm (0.012 in.)

NOTE: Do not use a wire brush when cleaning.



REPLACEMENT OF GEAR HOUSING

IF NECESSARY, REPLACE FOLLOWING PARTS:

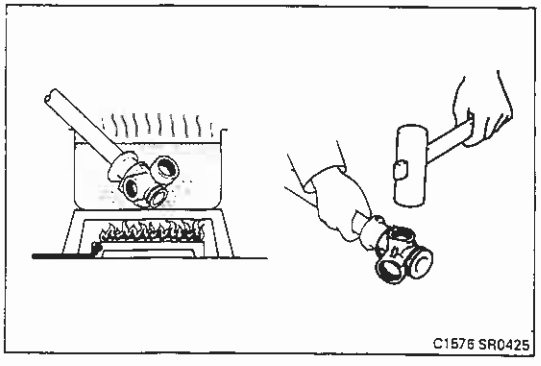
1. PINION UPPER BEARING

(a) Using SST, remove the upper bearing.

SST 09950-22016

(b) Using SST, install the upper bearing.

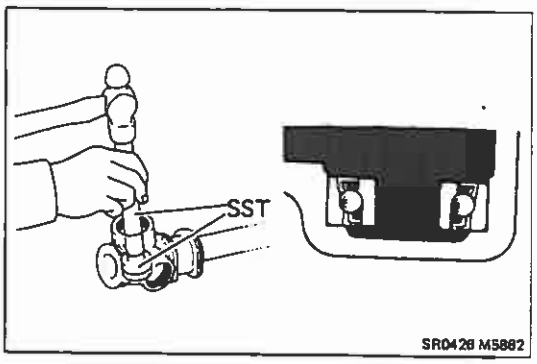
SST 09612-24012



2. 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 and remove the lower bearing by recoil.

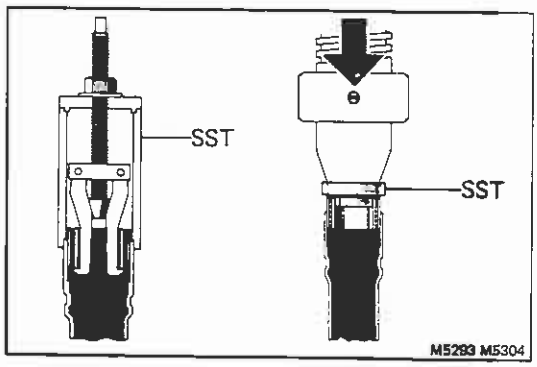


(c) Heat the rack housing to above 80°C (176°F).

(d) Using SST, install the lower bearing.

SST 09620-30010

NOTE: Observe the correct bearing direction.



3. RACK BUSHING

(a) Using SST, remove the rack bushing.

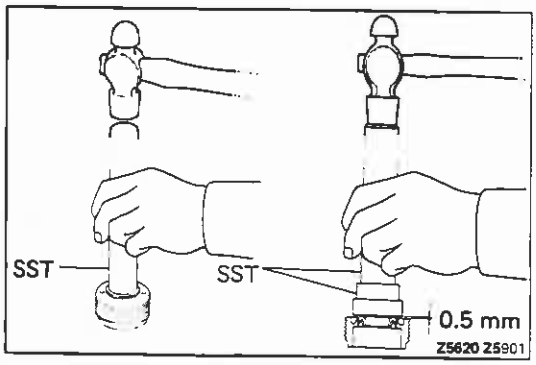
SST 09612-24012

NOTE: Be careful not to damage the teflon rack bushing.

(b) Using SST, install the rack bushing.

SST 09612-24012

Press in until the rack tube edge surface is even with the SST surface.



4. PINION OIL SEAL

(a) Using SST, remove the pinion oil seal.

SST 09620-30010

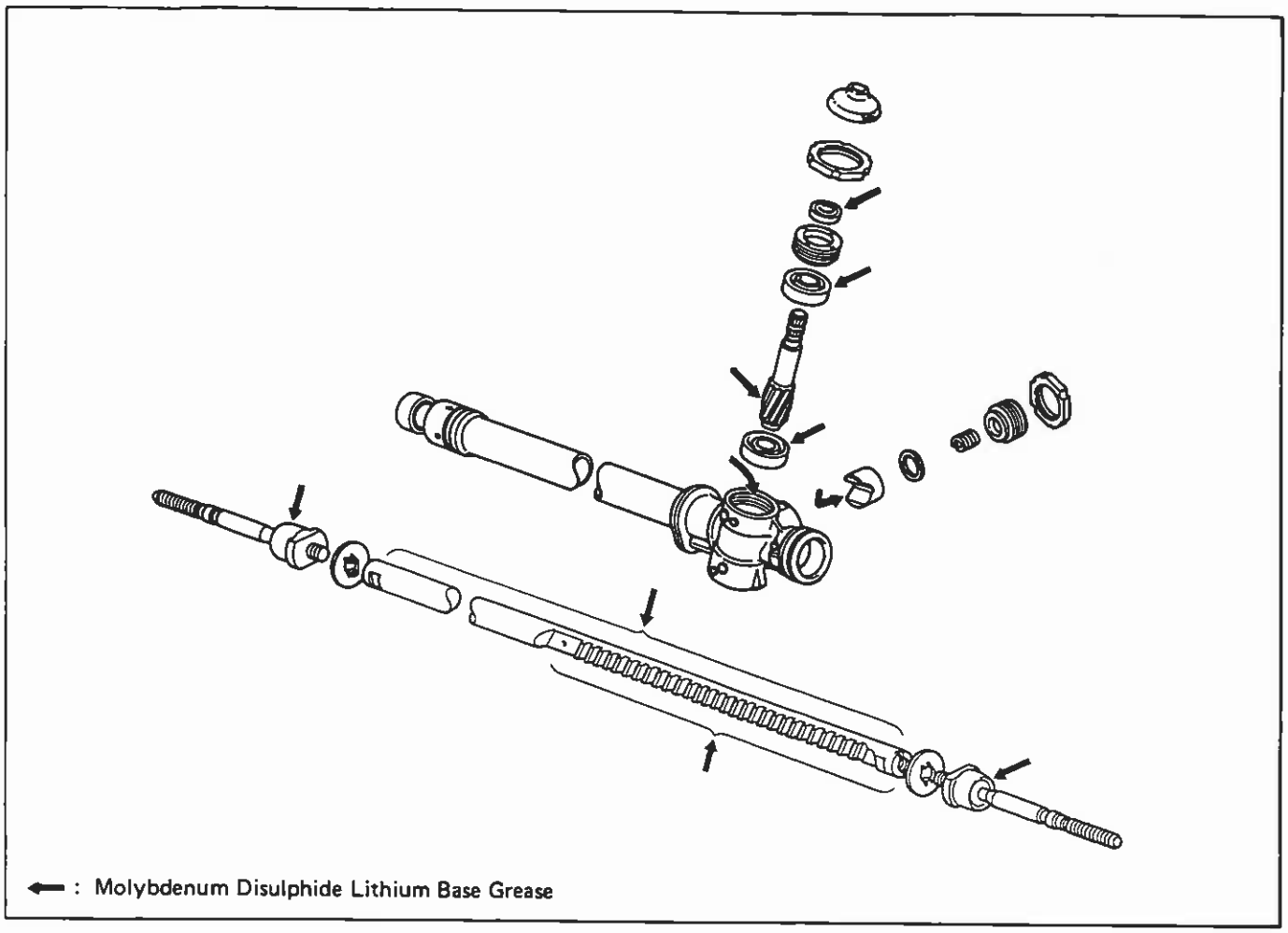
(b) Using SST, drive in the pinion oil seal until it is protruding 0.5 mm (0.020 in.).

SST 09620-30010

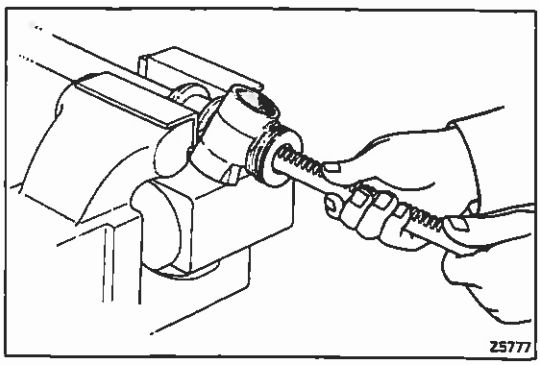
ASSEMBLY OF GEAR HOUSING

(See page SR-14)

1. PACK GREASE ON FOLLOWING PARTS:



⬅ : Molybdenum Disulphide Lithium Base Grease

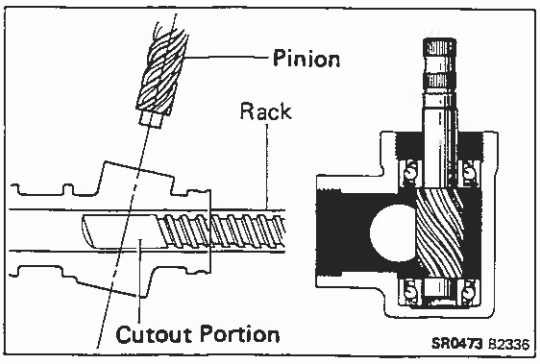


2. INSTALL RACK INTO RACK HOUSING

(a) Install the rack from the pinion side into the rack housing.

(b) Set the rack notched portion so that the pinion can be positioned inside.

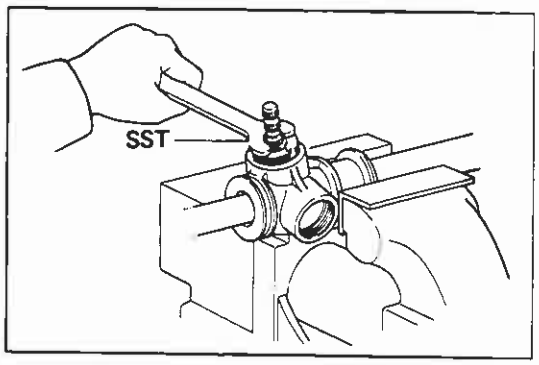
(c) During assembly, guide the rack end with fingers.



3. INSTALL PINION INTO HOUSING

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

(b) Insure that the pinion end is securely in the lower bearing.



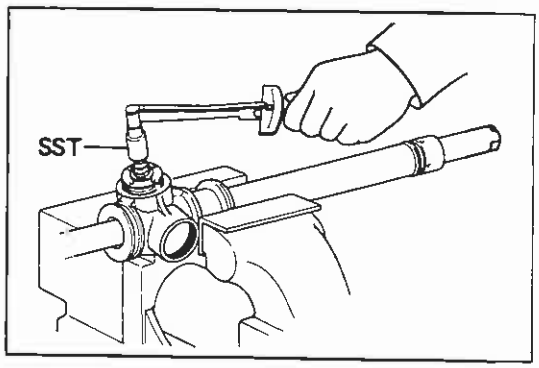
4. INSTALL PINION BEARING ADJUSTING SCREW

(a) Coat liquid sealer onto the screw threads surface.

(b) Using SST, install the pinion bearing adjusting screw.

SST 09612-24012

NOTE: Adjust so the pinion and rack are not meshed.

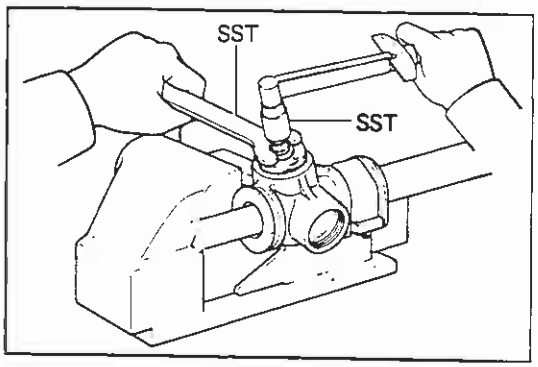


5. ADJUST PINION PRELOAD

(a) Tighten the pinion bearing adjusting screw to the point where the following pinion turning torque occurs with SST.

SST 09612-24012

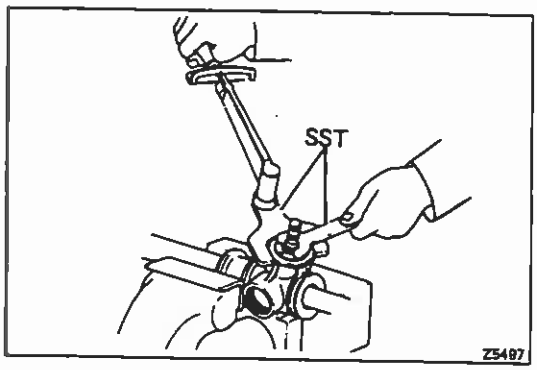
Preload (turning): 3.7 kg-cm (3.2 in.-lb, 0.4 N·m)



(b) Loosen the pinion bearing adjusting screw to the point where the following pinion turning torque occurs with SST.

SST 09612-24012

Preload (turning): 2.3 – 3.3 kg-cm (2.0 – 2.9 in.-lb, 0.2 – 0.3 N·m)



6. INSTALL PINION BEARING ADJUSTING SCREW LOCK NUT

(a) Coat liquid sealer onto the lock nut and housing contact surface.

(b) Install the lock nut and torque it with SST.

SST 09612-24012

Torque: 1,150 kg-cm (83 ft-lb, 113 N·m)

(c) Recheck the pinion preload.

If incorrect, readjust.

Preload (turning): 2.3 – 3.3 kg-cm (2.0 – 2.9 in.-lb, 0.2 – 0.3 N·m)

7. INSTALL RACK GUIDE WITH O-RING

8. INSTALL RACK GUIDE SPRING

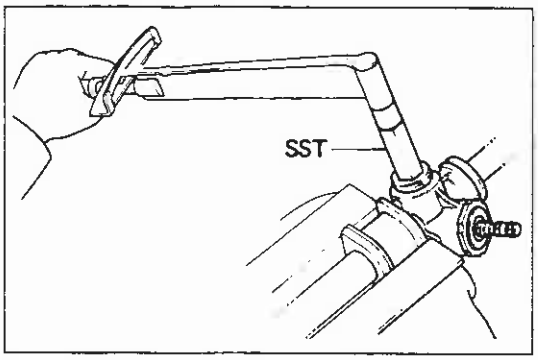
9. INSTALL RACK GUIDE SCREW

(a) Coat liquid sealer onto the guide screw threads surface.

(b) Align the pinion and rack.

(c) Using SST, install the rack guide screw.

SST 09612-24012



10. ADJUST TOTAL PRELOAD

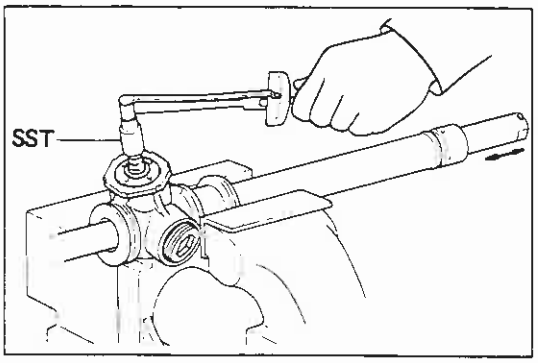
(a) Tighten the rack guide screw and torque it with SST.

SST 09612-24012

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

(b) Using SST, return the rack guide screw 90°.

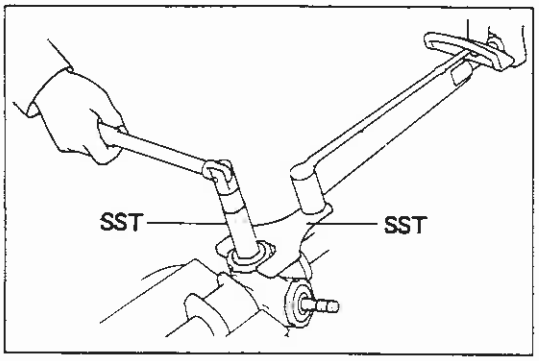
SST 09612-24012



(c) Using SST, measure the total preload.

SST 09612-24012

Preload (turning): 10 – 13 kg-cm (8.7 – 11.3 in.-lb, 1.0 – 1.3 N·m)



11. INSTALL RACK GUIDE SCREW LOCK NUT

(a) Coat liquid sealer onto the lock nut thread and housing surface.

(b) Tighten the lock nut and torque it with SST.

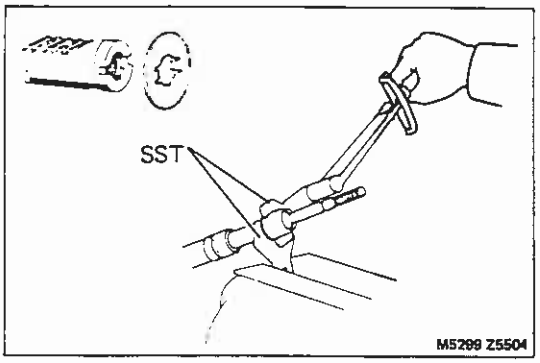
SST 09612-24012

Torque: 700 kg-cm (51 ft-lb, 69 N·m)

(c) Recheck the total preload.

If incorrect, readjust.

Preload (turning): 10 – 13 kg-cm (8.7 – 11.3 in.-lb, 1.0 – 1.3 N·m)



12. INSTALL DUST COVER

13. INSTALL CLAW WASHER AND RACK ENDS

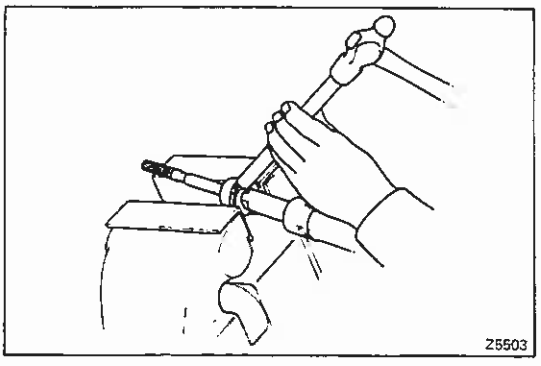
(a) Install the claw washer.

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

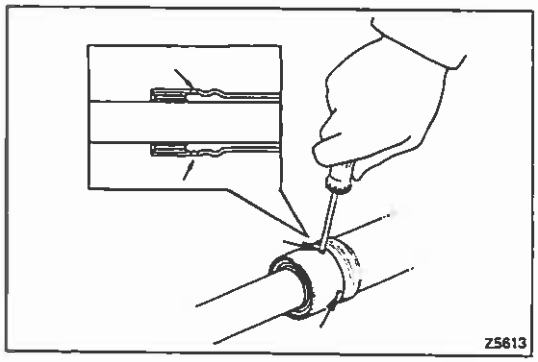
(b) Tighten the rack end and torque it with SST.

SST 09612-24012

Torque: 1,050 kg-cm (76 ft-lb, 103 N·m)



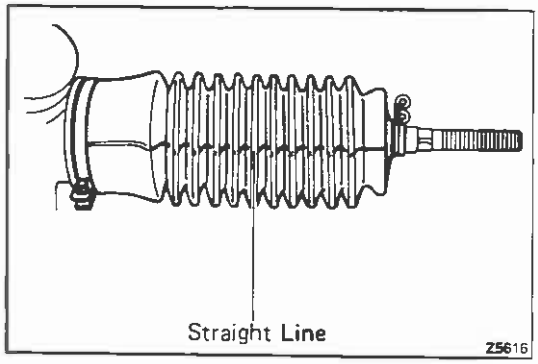
(c) Stake the claw washer.



14. INSTALL RACK BOOTS, CLAMPS AND CLIPS

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

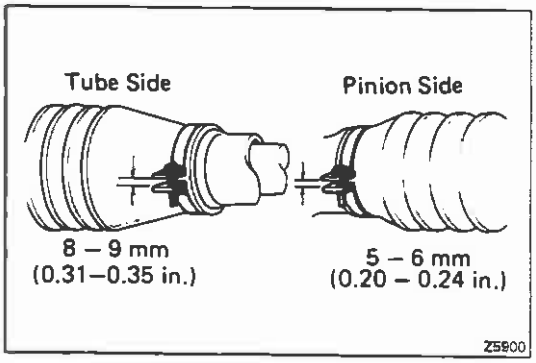
NOTE: If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the handle turned.



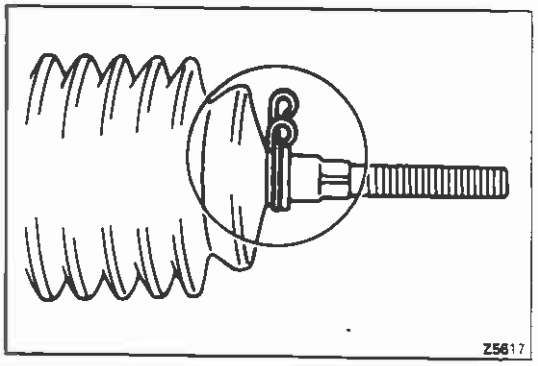
(b) Install boots.

NOTE:

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



(c) Install the rack boot clamps as shown in the figure.



(d) Install the rack boot clips.

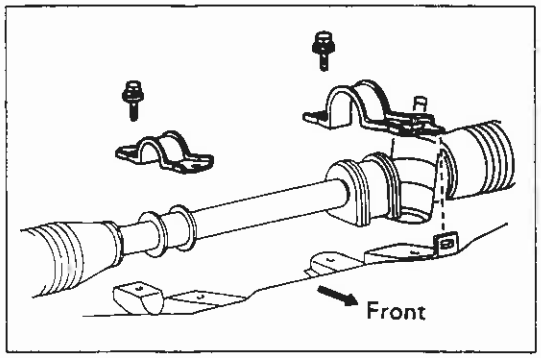
NOTE: Face the open ends outward, as shown to avoid damage to the boots.

15. INSTALL TIE RODS

(a) Align the matchmarks on the tie rod end and rack end.

(b) Tighten the nuts and torque them.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)



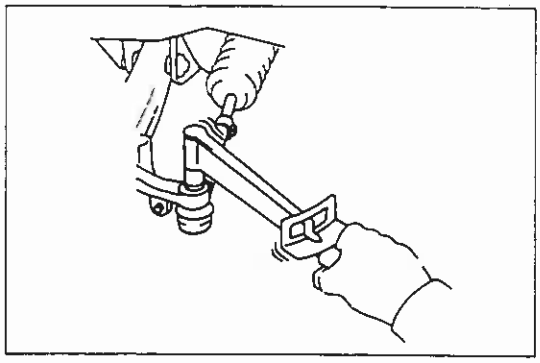
INSTALLATION OF GEAR HOUSING

(See page SR-13)

1. INSTALL GEAR HOUSING ASSEMBLY

NOTE: Be careful not to damage the boots. Install four bolts and torque them.

Torque: 475 kg-cm (34 ft-lb, 47 N·m)

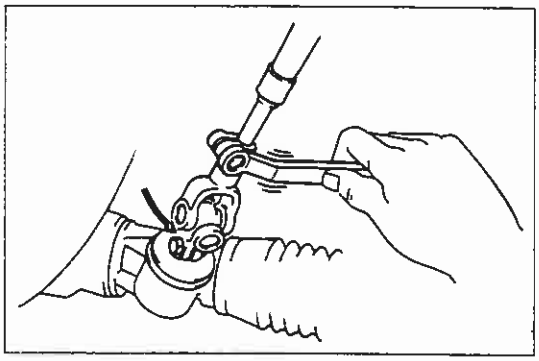


2. CONNECT TIE ROD ENDS

(a) Install the tie rod end set nut and torque it.

Torque: 600 kg-cm (43 ft-lb, 59 N·m)

(b) Install a new cotter pin.



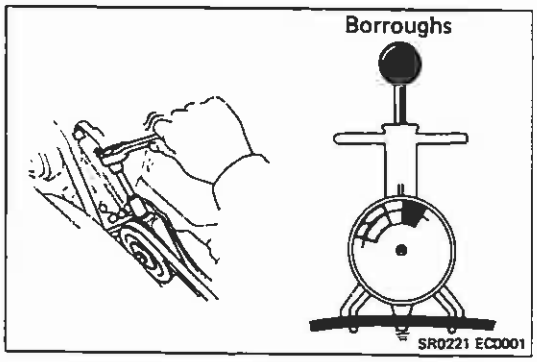
3. INSTALL UNIVERSAL JOINT

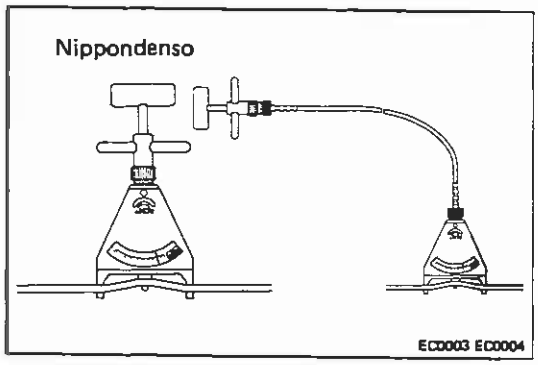
Install the two bolts and torque them.

Torque: 350 kg-cm (25 ft-lb, 34 N·m)

4. ADJUST TOE-IN (See page FA-5)

5. CHECK STEERING WHEEL CENTER POINT





POWER STEERING

On-Vehicle Inspection

CHECK OF DRIVE BELT TENSION

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

Belt tension gauge:

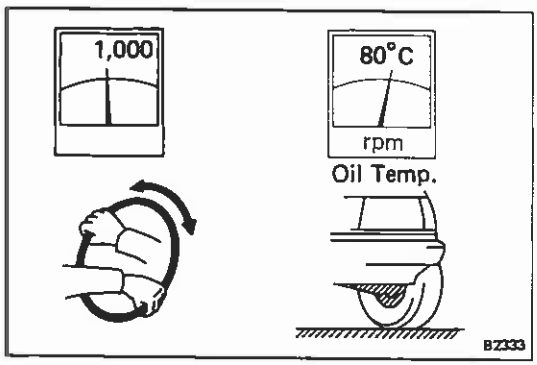
Nippondenso BTG-20 (95506-00020) or
Borroughs No. BT-33-73F

Drive belt tension:

New belt 125 ± 25 lb
Used belt 80 ± 20 lb

NOTE:

- "New belt" refers to a brand new belt which has never before been used.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.



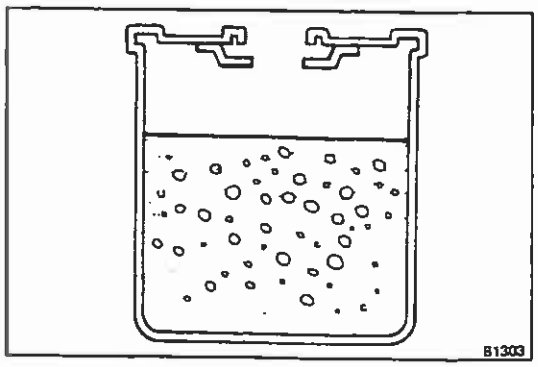
FLUID LEVEL CHECK

1. KEEP VEHICLE LEVEL

2. BOOST FLUID TEMPERATURE

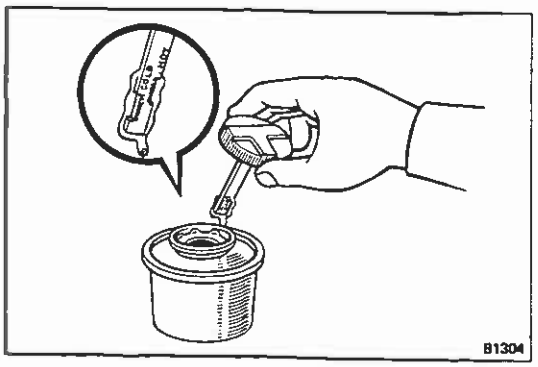
With the engine idling at 1,000 rpm or less, turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80°C (176°F)



3. CHECK FOR FOAMING OR EMULSIFICATION

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

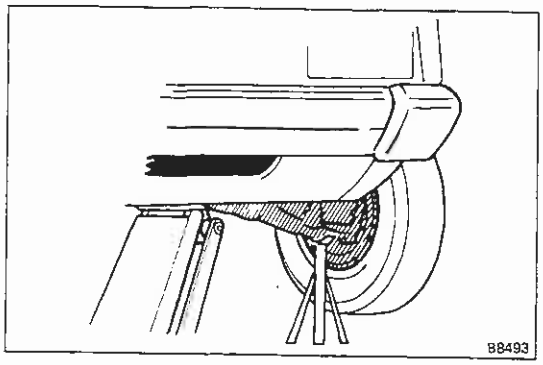


4. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.

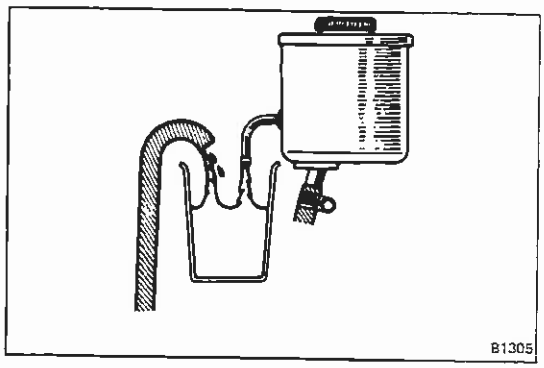
Fluid: ATF DEXRON® or DEXRON® II

NOTE: 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.

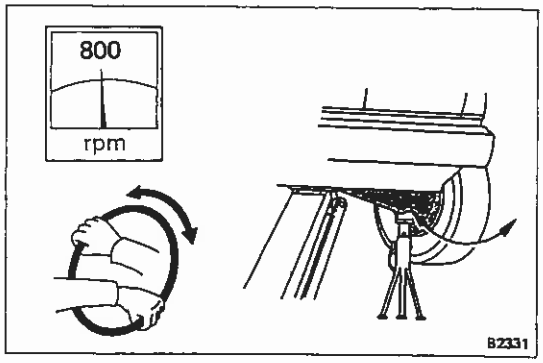


REPLACEMENT OF POWER STEERING FLUID

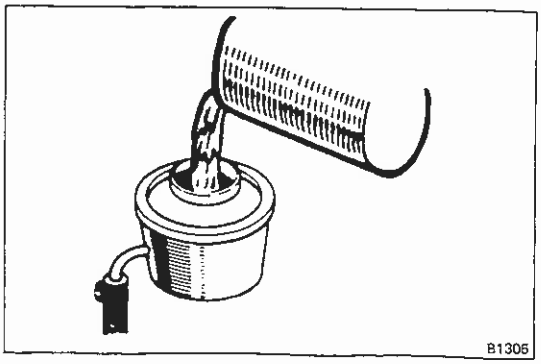
1. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS



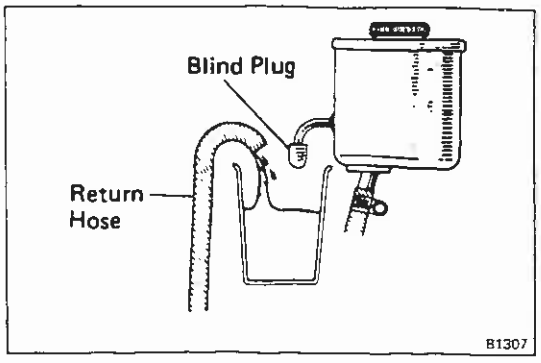
2. REMOVE FLUID RETURN HOSE FROM OIL RESERVOIR AND DRAIN FLUID INTO A CONTAINER



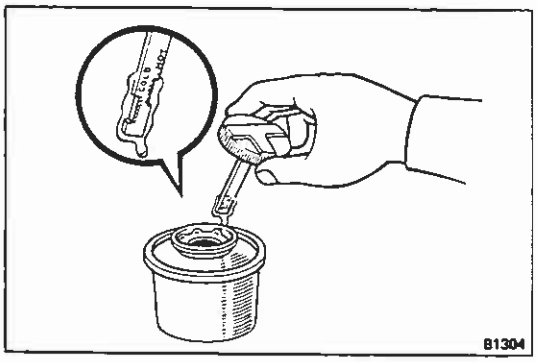
3. WITH ENGINE IDLING, TURN STEERING WHEEL FROM LOCK TO LOCK WHILE DRAINING FLUID
4. STOP ENGINE



5. FILL RESERVOIR WITH FRESH FLUID
   Fluid: ATF DEXRON® or DEXRON® II



6. START ENGINE AND RUN IT AT 1,000 RPM
   After 1 or 2 seconds, fluid will begin to discharge from the return hose. Stop the engine immediately at this time.
7. REPEAT STEPS 5 AND 6 FOUR OR FIVE TIMES
8. CONNECT RETURN HOSE TO RESERVOIR TANK
9. BLEED POWER STEERING SYSTEM



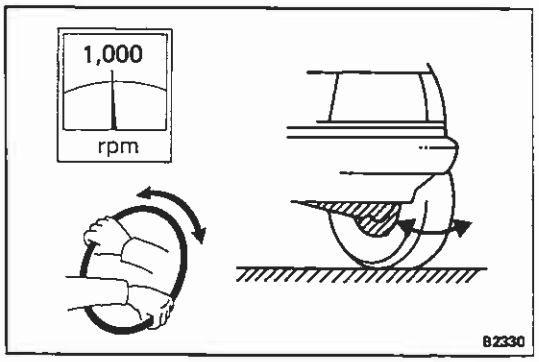
Bleeding of Power Steering System

1. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.

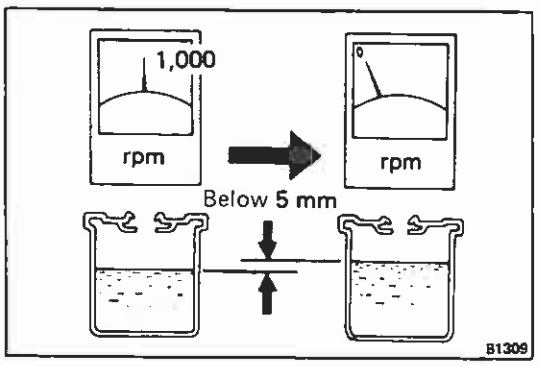
Fluid: ATF DEXRON® or DEXRON® II

NOTE: 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.



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

Run the engine at 1,000 rpm or less.

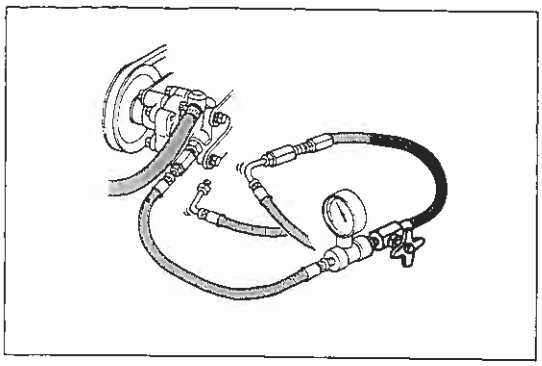


3. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED

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

Maximum rise: 5 mm (0.20 in.)

If a problem is found, repeat steps 2 and 3. Repair the vane pump if the problem persists.



Oil Pressure Check

1. CONNECT PRESSURE GAUGE

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

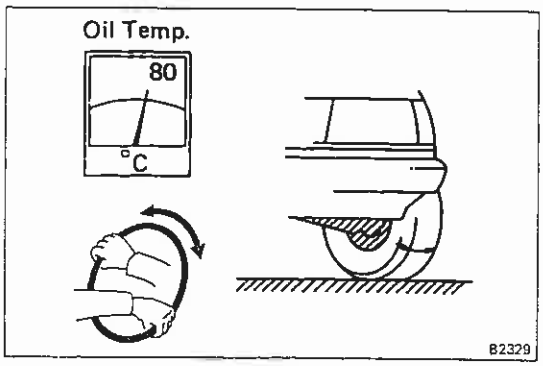
   SST 09631-22020

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

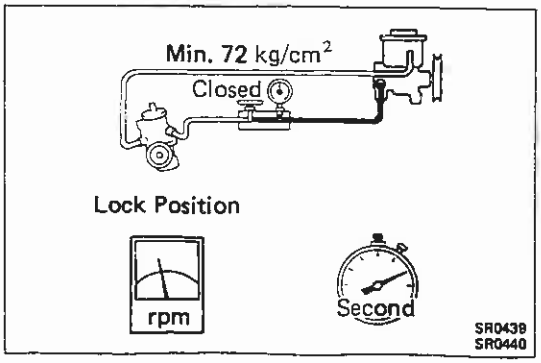
   (c) Connect the valve side of the pressure gauge to the pressure line.

   (d) Bleed the system. Start the engine and turn the wheel fully in both directions two or three times.

   (e) Check that the fluid level is correct.



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



3. START ENGINE AND RUN IT AT IDLE

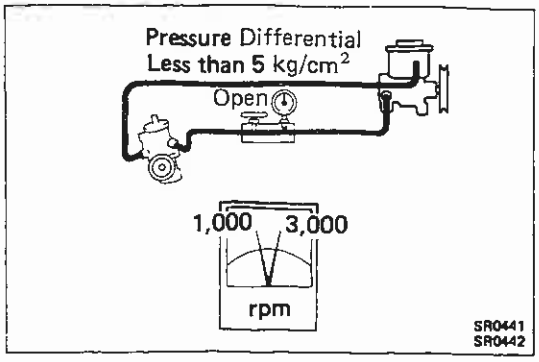
4. CHECK FLUID PRESSURE READING WITH VALVE CLOSED

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

   Minimum pressure: 72 kg/cm² (1,024 psi, 7,061 kPa)

   NOTE: Do not keep the valve closed for more than 10 seconds.

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

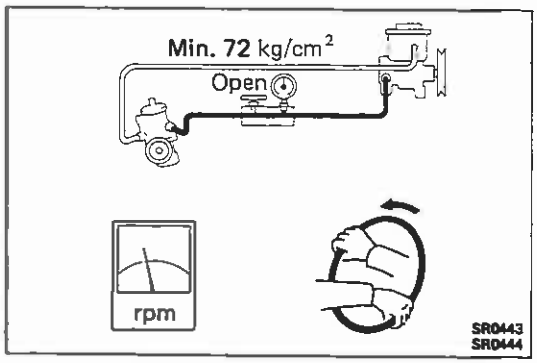


5. OPEN VALVE FULLY

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

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

   Check that there is less than 5 kg/cm² (71 psi, 490 kPa) difference in pressure between the 1,000 rpm and 3,000 rpm checks.
   If the difference is greater, repair or replace the PS pump flow control valve.

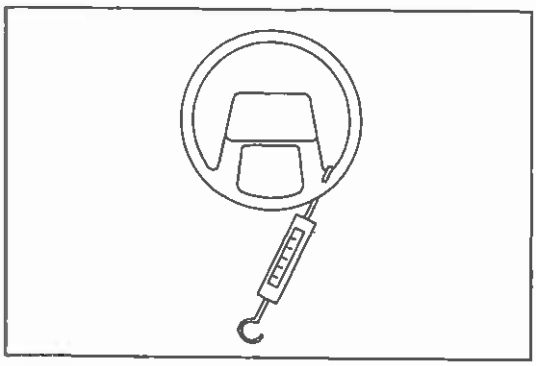


8. CHECK PRESSURE READING WITH STEERING WHEEL TURNED TO FULL LOCK

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

Minimum pressure: 72 kg/cm² (1,024 psi, 7,061 kPa)

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



9. MEASURE STEERING EFFORT

Center the steering wheel and run the engine at idle.

Using a scale, measure the steering effort in both directions.

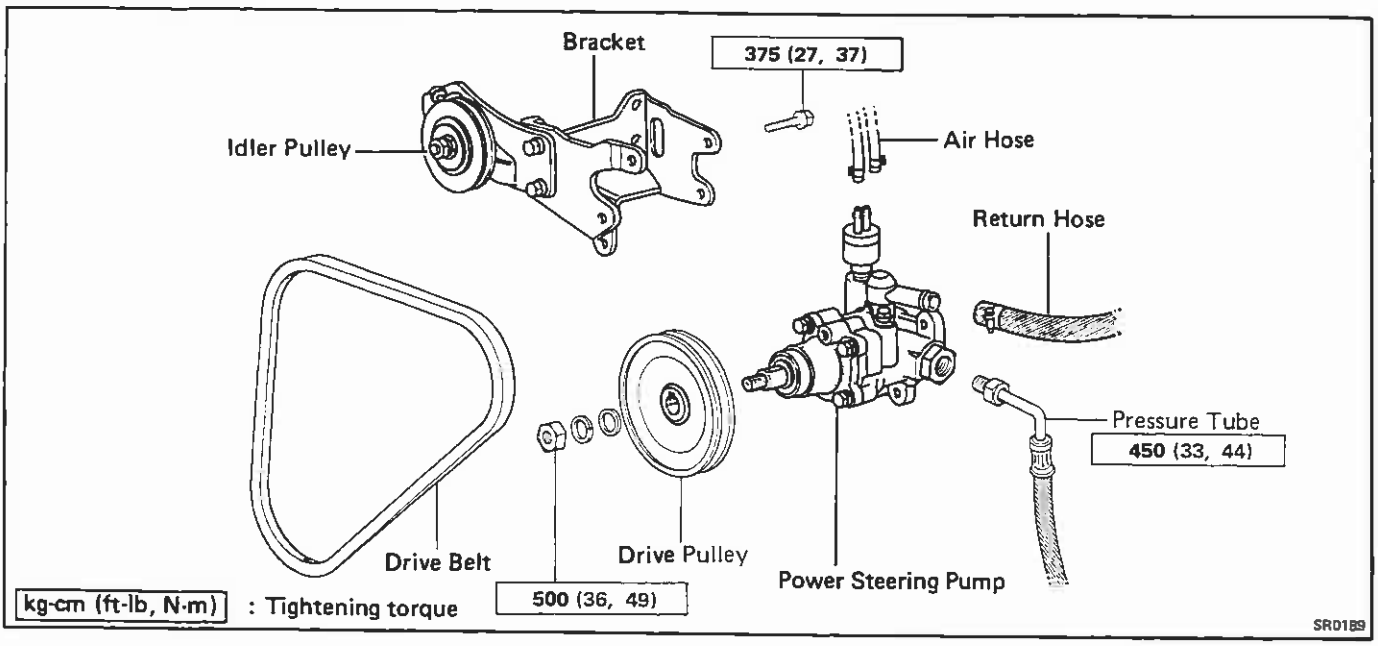
Maximum steering effort: 4 kg (8.8 lb, 39 N)

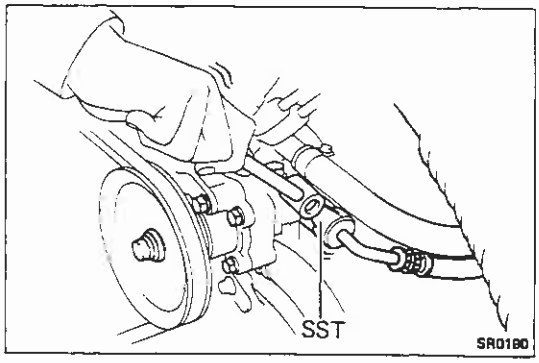
If steering effort is excessive, repair the power steering unit.

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

Power Steering Pump

REMOVAL OF POWER STEERING PUMP



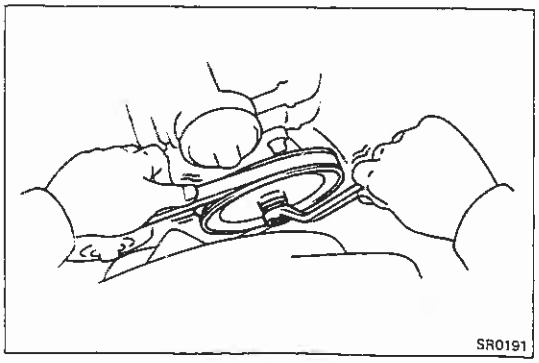


1. **DISCONNECT AIR HOSES FROM AIR CONTROL VALVE**
   (a) Disconnect the high tension cords from distributor.
   (b) Disconnect the air hoses from air control valve.

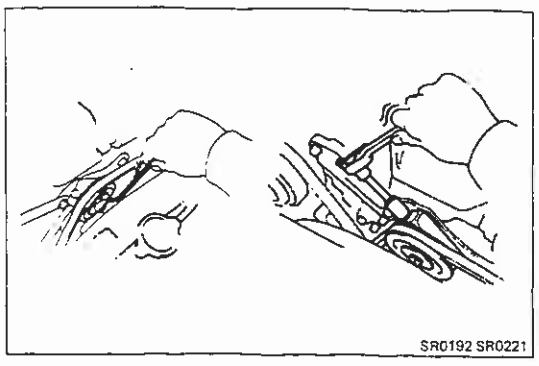
2. **DRAIN FLUID FROM RESERVOIR TANK**

3. **DISCONNECT RETURN HOSE FROM POWER STEERING PUMP**

4. **DISCONNECT PRESSURE TUBE FROM POWER STEERING PUMP**
   Using SST, loosen and disconnect the pressure tube.
   SST 09631-22020



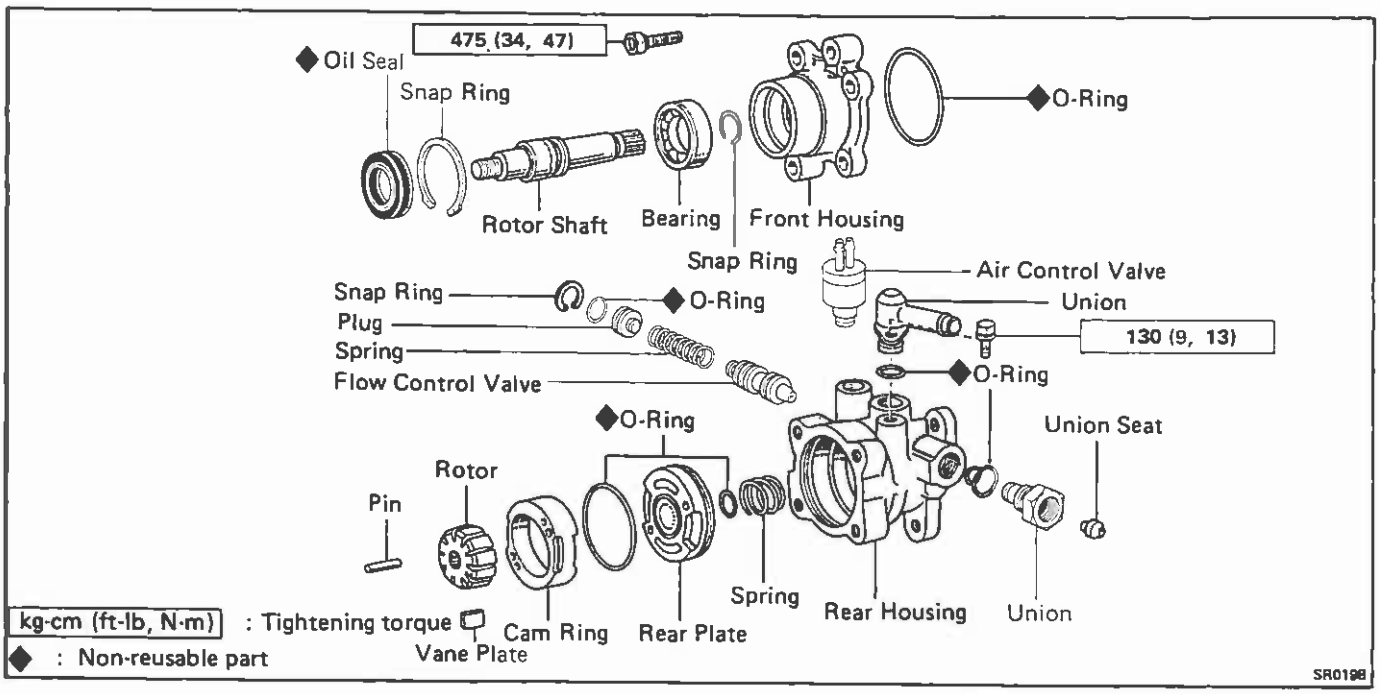
5. **REMOVE DRIVE BELT AND PULLEY**
   (a) Push on the drive belt to hold the pulley in place and remove the pulley set nut.

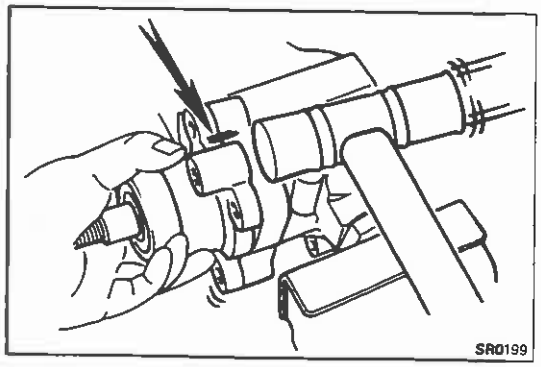


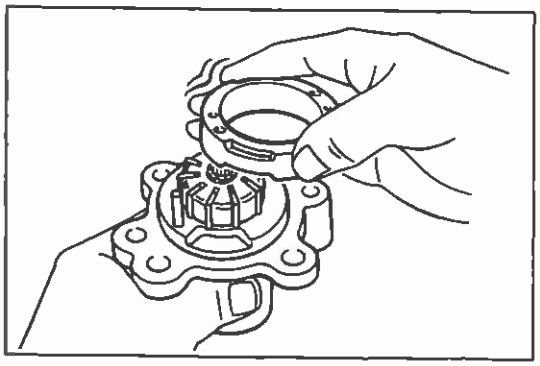
   (b) Loosen the drive belt adjust bolt.
   (c) Remove the drive belt.
   (d) Remove the pulley and woodruff key.

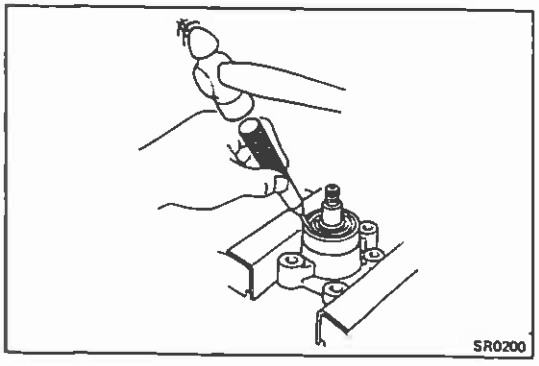
6. **REMOVE POWER STEERING PUMP**
   Remove the PS pump mount bolts, and remove the PS pump from the bracket.

COMPONENTS









DISASSEMBLY OF POWER STEERING PUMP

1. CLAMP POWER STEERING PUMP IN VISE

   CAUTION: Do not tighten the vise too tight.

2. REMOVE AIR CONTROL VALVE FROM REAR HOUSING

3. REMOVE UNION FROM REAR HOUSING

4. MARK FRONT AND REAR HOUSINGS

   Mark these parts to ensure correct reassembly.

5. REMOVE FRONT HOUSING

   (a) Remove the four front housing bolts.

   (b) Using a plastic hammer, tap off the front housing.

   CAUTION: Be careful that the vane plates, rotor and cam ring do not fall out.

6. REMOVE CAM RING, ROTOR AND VANE PLATES

   CAUTION: Be careful not to scratch the cam ring, rotor or vane plates.

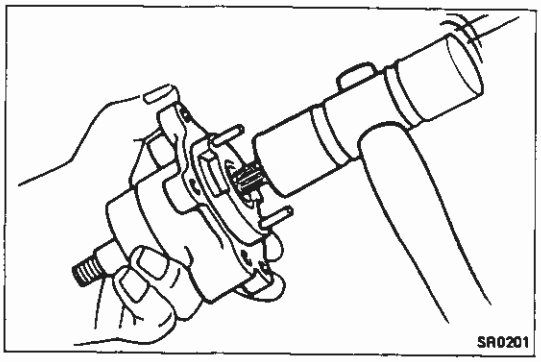
7. REMOVE ROTOR SHAFT

   (a) Clamp the front housing in a vise.

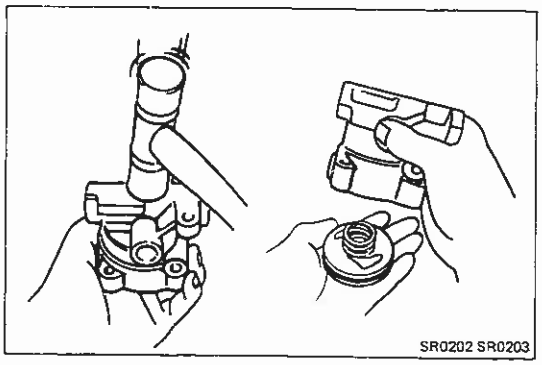
   CAUTION: Do not tighten the vise too tight.

   (b) Using a chisel and hammer, pry off the oil seal.

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



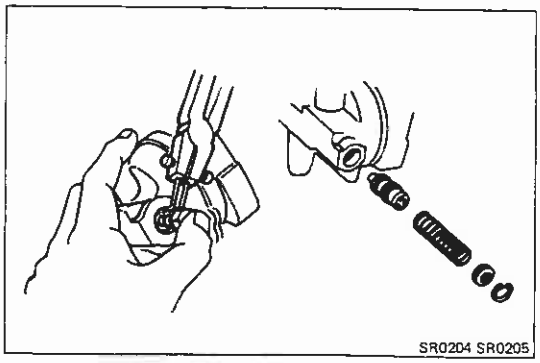
(d) Using a plastic hammer, lightly tap the rotor shaft out of the front housing.



8. REMOVE REAR PLATE AND SPRING

Using a plastic hammer, tap the bottom end of the rear housing, and remove the rear plate and spring.

CAUTION: Avoid gripping the rear plate with pliers as this could damage it.



9. REMOVE FLOW CONTROL VALVE

(a) Temporarily install a bolt to the plug.

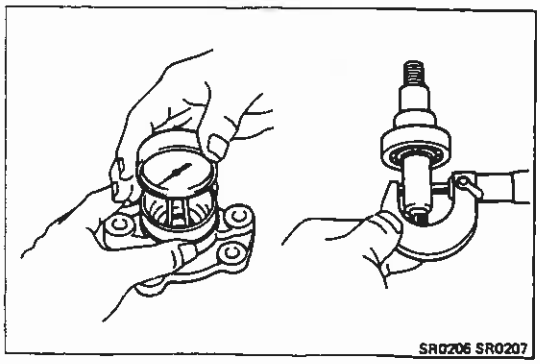
(b) Push the bolt and remove the snap ring with snap ring pliers.

(c) Pull out the bolt and remove the plug.

(d) Remove the spring and flow control valve by hand.

CAUTION: Use care not to drop, scratch or nick this valve.

INSPECTION OF POWER STEERING PUMP



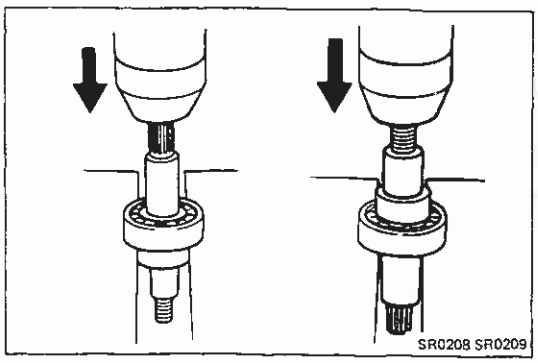
1. INSPECT BUSHING AND MEASURE BUSHING OIL CLEARANCE

(a) Check the bushing for wear or damage. The bushing cannot be replaced separately.

If wear or damage is found, replace entire housing.

(b) Check the oil clearance between the bushing and rotor shaft.

Maximum oil clearance: 0.07 mm (0.0028 in.)



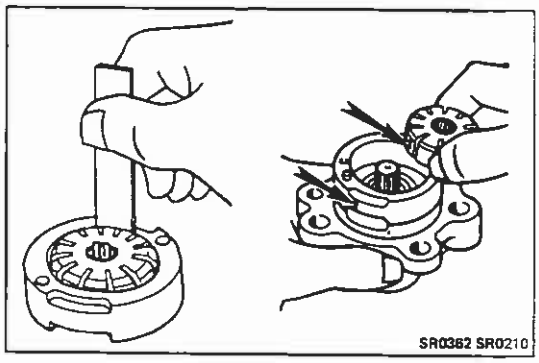
2. IF NECESSARY, REPLACE ROTOR SHAFT BEARING

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

(b) Using a press, press out the bearing.

(c) Using a press, press in a new bearing.

(d) Using snap ring pliers, install a new snap ring.

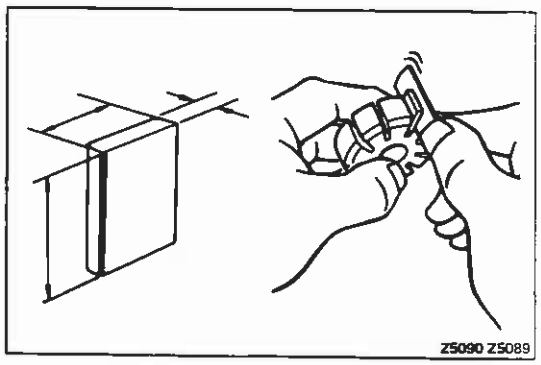


3. INSPECT ROTOR AND CAM RING

Measure the cam ring thickness. Check that the difference between the rotor and cam ring measurement is less than maximum.

Maximum difference: 0.06 mm (0.0024 in.)

If the difference is excessive, replace the cam ring with one stamped with the same letter as on the rotor.



4. INSPECT AND MEASURE VANE PLATES

(a) Check the vane plates for wear or scratches.

(b) Measure the length, height and thickness of the vane plates.

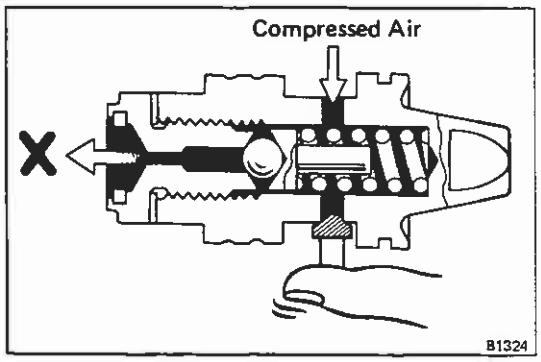
Minimum length: 14.97 mm (0.5894 in.)
Minimum height: 7.8 mm (0.307 in.)
Minimum thickness: 1.7 mm (0.067 in.)

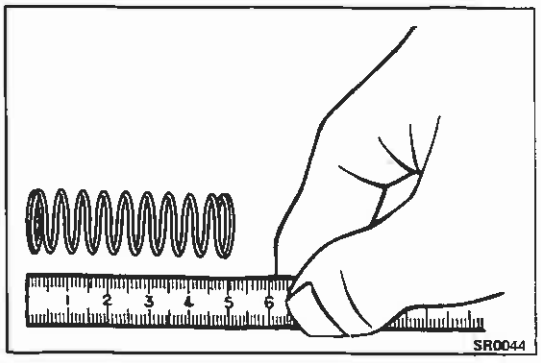
(c) Measure the clearance between the vane plate and rotor groove.

Maximum clearance: 0.06 mm (0.0024 in.)

NOTE: There are five vane lengths with the following rotor and cam ring numbers:

Rotor and cam ring number	Vane length mm (in.)
None	14.996 – 14.998 (0.5904 – 0.5905)
1	14.994 – 14.996 (0.5903 – 0.5904)
2	14.992 – 14.994 (0.5902 – 0.5903)
3	14.990 – 14.992 (0.59016 – 0.59024)
4	14.988 – 14.990 (0.5901 – 0.5902)





5. INSPECT FLOW CONTROL VALVE AND MEASURE SPRING

(a) Check the flow control valve for wear or damage.

(b) Apply fluid to the valve and check that it falls smoothly into the valve hole by its own weight.

(c) Check the flow control valve for leakage.

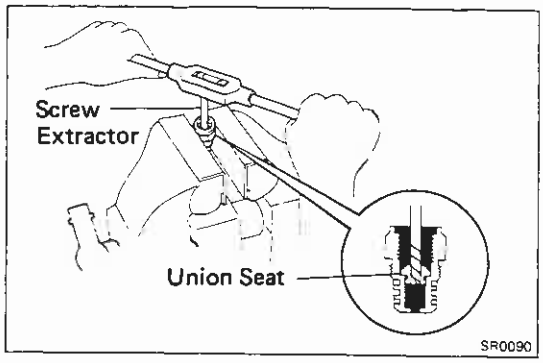
- Close one of the holes and apply compressed air [4 or 5 kg/cm² (57 or 71 psi, 392 or 490 kPa)] into the opposite side.
- Confirm that air does not come out from the end hole.

If necessary, replace the valve with one stamped with the same letter on the rear housing.

(d) Measure the spring is length.

Minimum spring length: 47 mm (1.85 in.)

If the spring length is less than minimum, replace the spring.



6. IF NECESSARY, REPLACE UNION SEAT

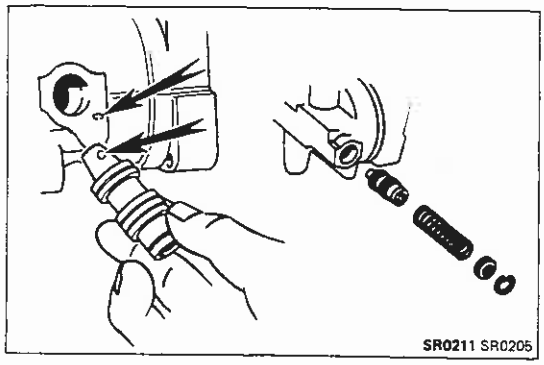
(a) Using a screw extractor wrench, remove the union seat.

(b) Install a new floating type union seat.

NOTE: Only floating type parts are available.

ASSEMBLY OF POWER STEERING PUMP

(See page SR-28)

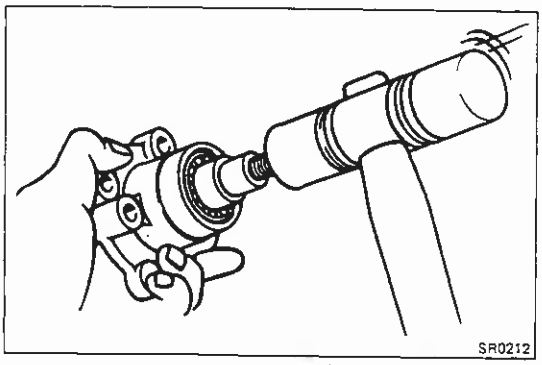


1. INSTALL FLOW CONTROL VALVE

NOTE: Be sure the letter inscribed on the flow control valve matches the letter stamped on the rear of the pump body.

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

Install the flow control valve, spring, plug and snap ring.

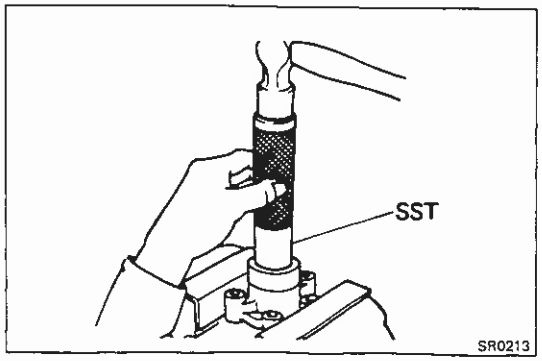


2. INSTALL ROTOR SHAFT TO FRONT HOUSING

Install the rotor shaft into the front housing by tapping it in with a plastic hammer.

3. INSTALL SNAP RING

Using snap ring pliers, install the snap ring to the front housing.

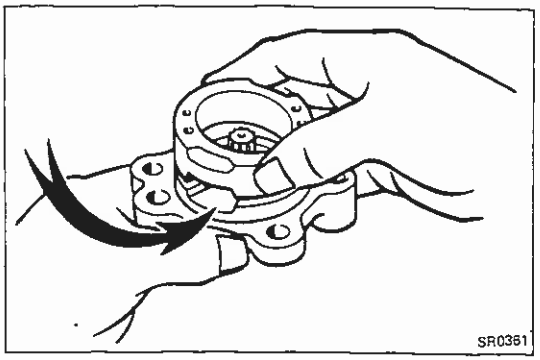


4. INSTALL OIL SEAL

(a) Apply a light coat of MP grease to the oil seal lip.

(b) Using SST and hammer, install a new oil seal.

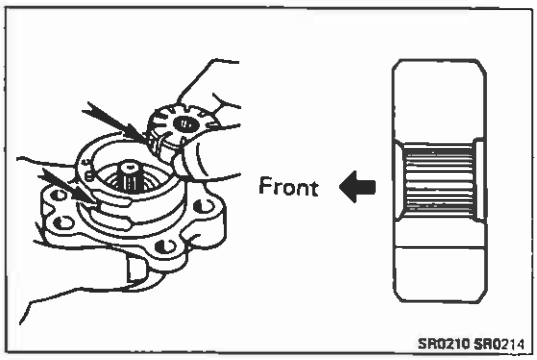
SST 09608-30011



5. INSTALL O-RING

6. INSTALL CAM RING

Align the fluid passages of the cam ring and front housing, and install the cam ring.

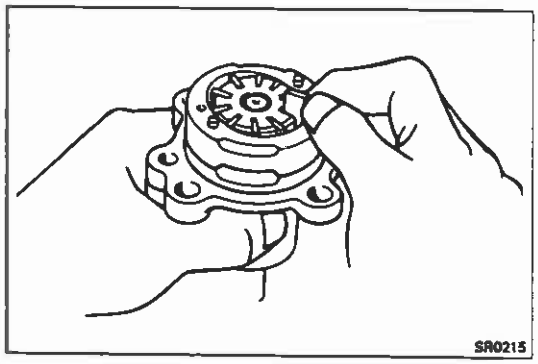


7. INSTALL ROTOR

Install the rotor with the chamfered end facing toward the front.

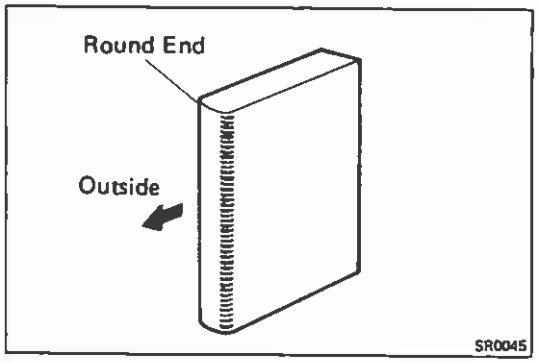
NOTE: Be sure the letters inscribed on the cam ring and rotor are matching.

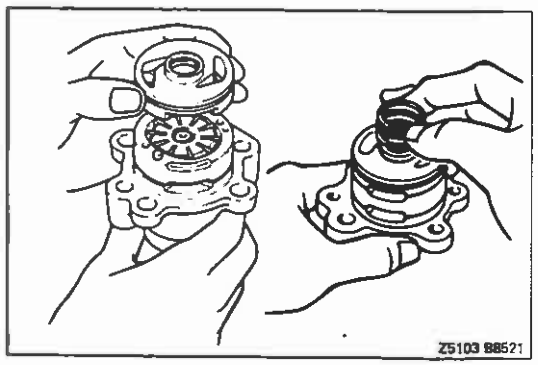
Inscribed mark: 1, 2, 3, 4 or None



8. INSTALL VANE PLATES

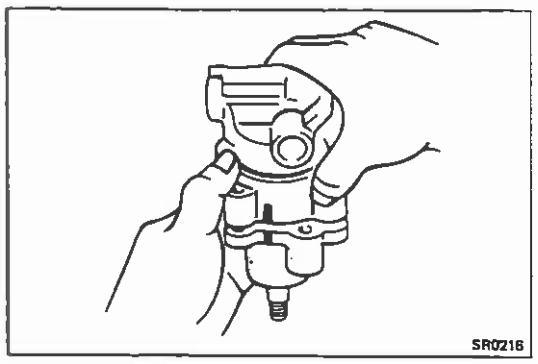
Install the vane plates with the round end facing outward.





9. INSTALL REAR PLATE AND SPRING

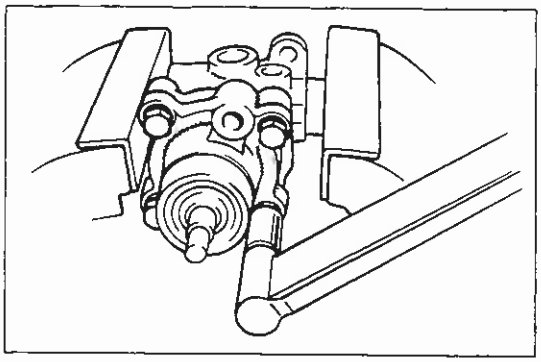
Align the fluid passages of the rear plate and cam ring, and install the rear plate with the spring.



10. INSTALL REAR HOUSING

(a) Align the matchmarks on the front and rear housing, and assemble them.

(b) Tighten the front and rear housing mounting bolts by hand.



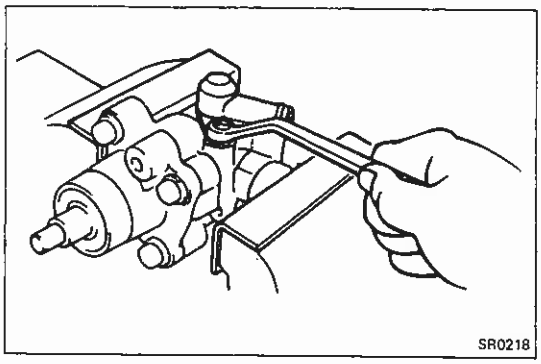
11. TIGHTEN FOUR HOUSING BOLTS

(a) Clamp the rear housing in a vise.

CAUTION: Do not tight the vise too tight.

(b) Tighten the four housing bolts evenly in 3 or 4 passes.

Torque: 475 kg-cm (34 ft-lb, 47 N·m)

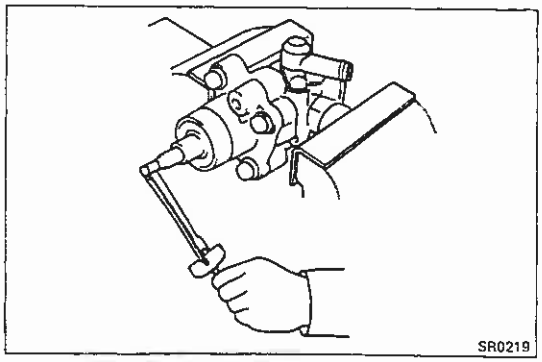


12. INSTALL UNION TO REAR HOUSING

Insert and tighten the union.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

13. INSTALL AIR CONTROL VALVE TO REAR HOUSING

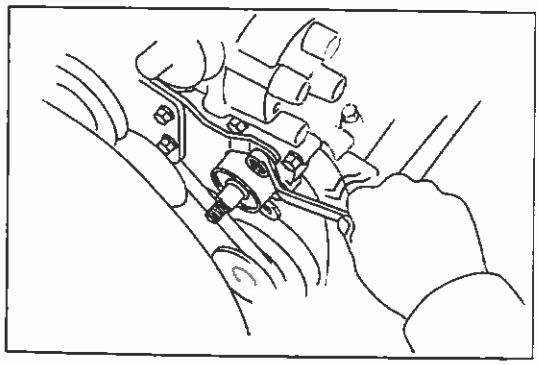


14. CHECK ROTOR SHAFT ROTATION CONDITION

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

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

Rotating torque: Less than 2.8 kg-cm (2.4 in.-lb, 0.3 N·m)



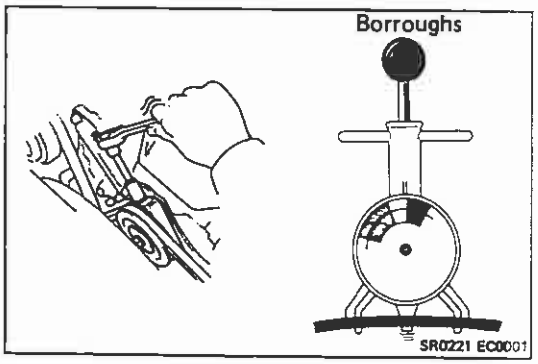
INSTALLATION OF POWER STEERING PUMP

(See page SR-27)

1. INSTALL POWER STEERING PUMP

Place the PS pump in position and torque the mount bolts.

Torque: 375 kg-cm (27 ft-lb, 37 N·m)



2. INSTALL PULLEY AND DRIVE BELT

(a) Install the woodruff key, pulley and set nut.

(b) Install the drive belt.

(c) Turn the adjusting bolt until the belt tension is at specified value.

Belt tension gauge:

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

Drive belt tension:

New belt	**125 ± 25 lb**
Used belt	**80 ± 20 lb**

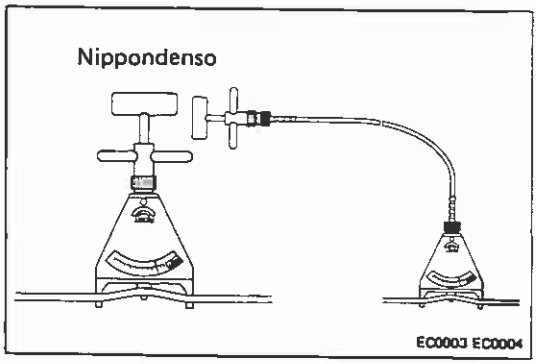
NOTE:

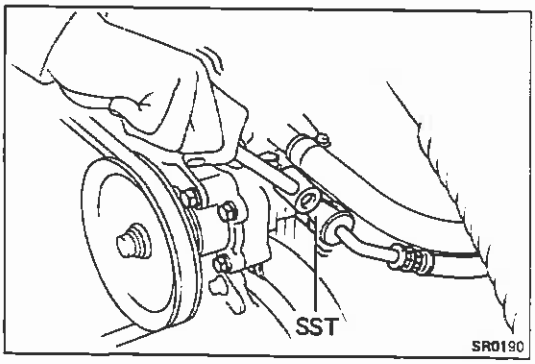
- "New belt" refers to a brand new belt which has never before been used.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.

(d) Tighten the idler pulley nut and adjusting bolt.

(e) Push down on the drive belt to hold the pulley in place and torque the pulley set nut.

Torque: 500 kg-cm (36 ft-lb, 49 N·m)





3. CONNECT PRESSURE TUBE TO PS PUMP

Using SST, torque the flare nut.

SST 09631-22020

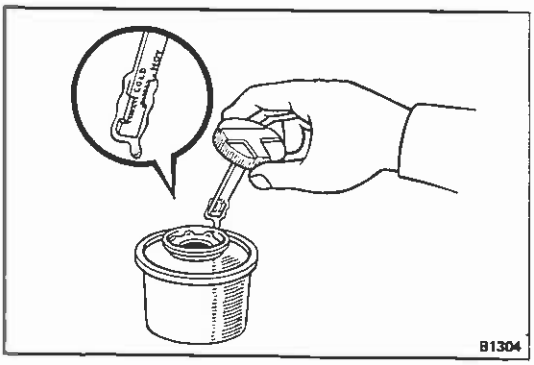
Torque: 450 kg-cm (33 ft-lb, 44 N·m)

4. CONNECT RETURN HOSE TO RESERVOIR TANK

5. CONNECT AIR HOSES TO AIR CONTROL VALVE

(a) Connect the air hoses to the air control valve.

(b) Connect the high tension cords to the distributor.



6. FILL RESERVOIR WITH FLUID

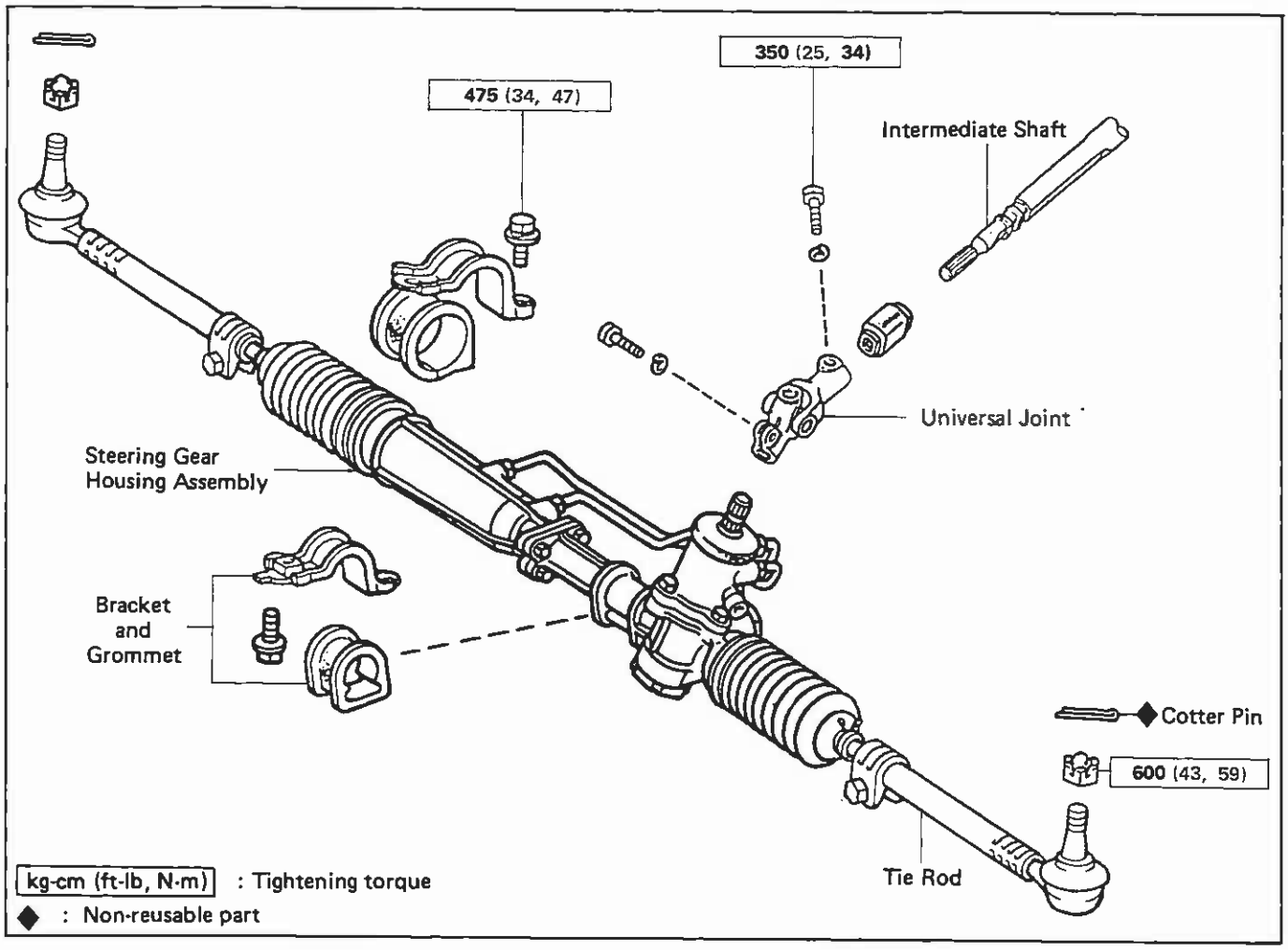
Fluid: ATF DEXRON® or DEXRON® II

7. BLEED POWER STEERING

8. CHECK FOR FLUID LEAKS

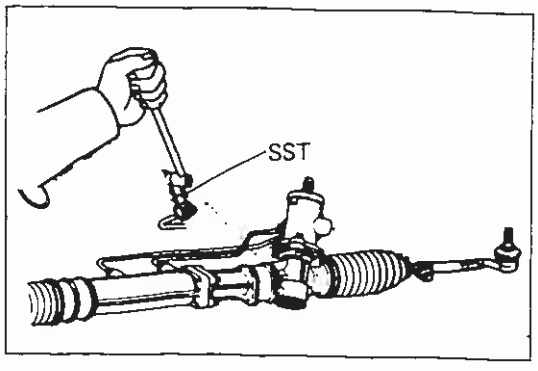
Gear Housing

REMOVAL OF GEAR HOUSING



1. **REMOVE UNIVERSAL JOINT**
(See step 1 on page SR-13)

2. **DISCONNECT TIE ROD ENDS**
(See step 2 on page SR-13)



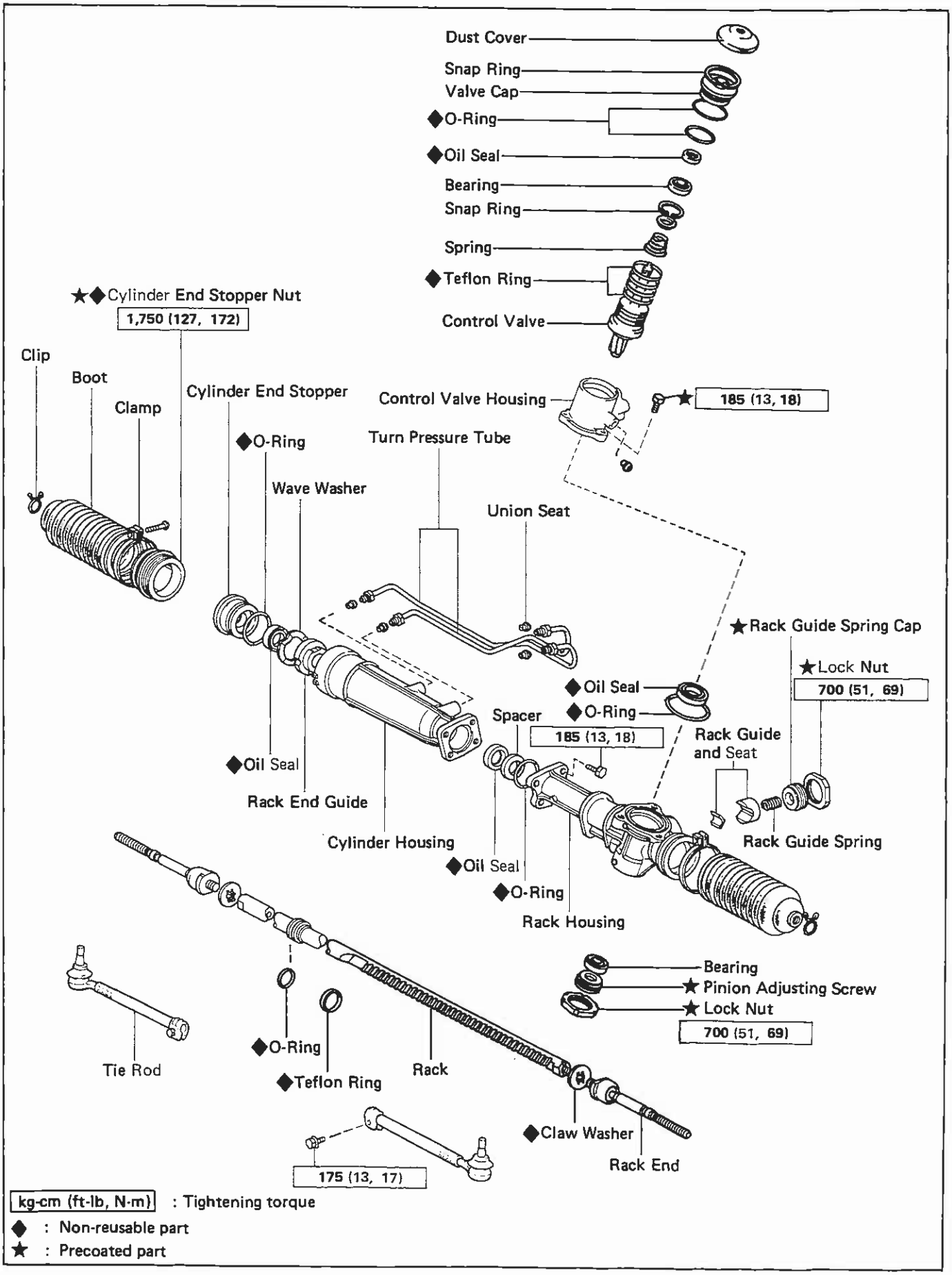
3. **DISCONNECT RETURN LINE AND PRESSURE LINE**

Using SST, disconnect return and pressure lines. Use a container to catch the power steering fluid.

SST 09631-22020

4. **REMOVE GEAR HOUSING ASSEMBLY**
(See step 3 on page SR-13)

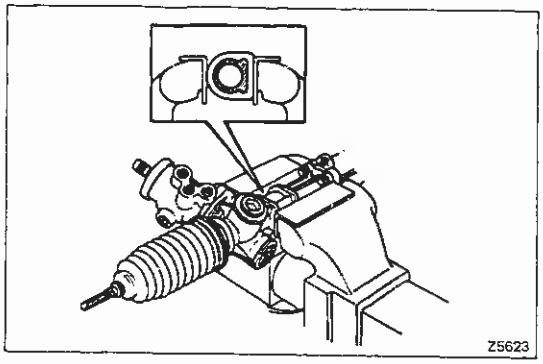
COMPONENTS



kg-cm (ft-lb, N-m) : Tightening torque

◆ : Non-reusable part

★ : Precoated part



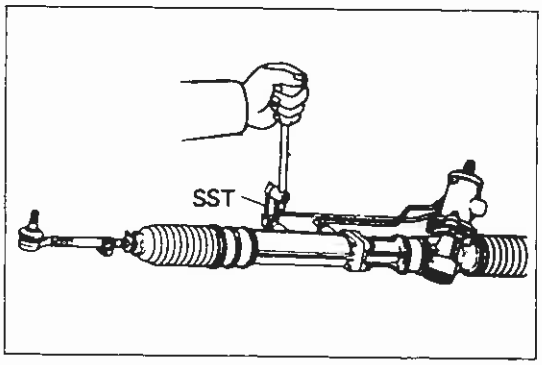
DISASSEMBLY OF GEAR HOUSING

1. CLAMP GEAR HOUSING IN VISE

NOTE:

(1) The rack housing is made of aluminum, so always use soft jaws on the vise and clamp onto the part shown in the figure.

(2) If clamping onto the center tube, wrap a piece of cloth around it and be careful not to damage the tube.

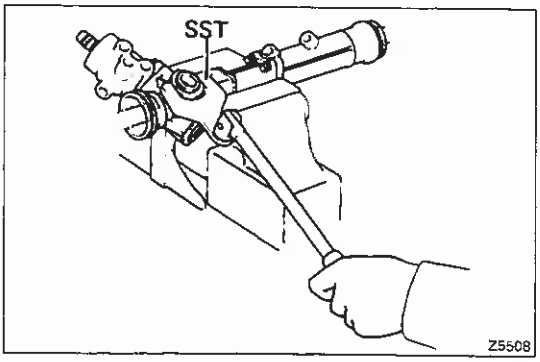


2. REMOVE TURN PRESSURE RIGHT AND LEFT TUBES AND UNION SEATS

(a) Using SST, remove the turn pressure tubes.

SST 09631-22020

(b) Remove the union seats.



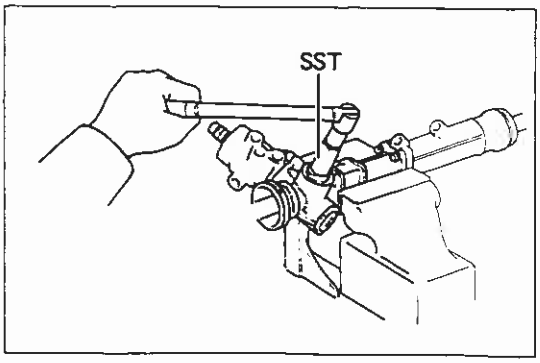
3. REMOVE TIE RODS
(See step 2 on page SR-14)

4. REMOVE RACK BOOTS

5. REMOVE RACK GUIDE SPRING CAP LOCK NUT

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

SST 09612-24012



6. REMOVE RACK GUIDE SPRING CAP

Using SST, remove the rack guide spring cap.

SST 09612-24012

7. REMOVE RACK GUIDE SPRING

8. REMOVE RACK GUIDE AND SEAT

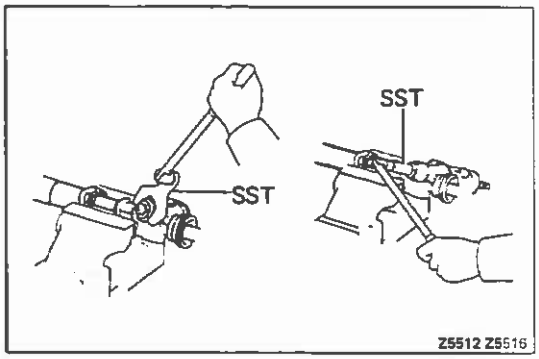
9. REMOVE DUST COVER

10. REMOVE CONTROL VALVE HOUSING

(a) Remove the three bolts.

(b) Remove the control valve housing.

(c) Remove the O-ring.



11. REMOVE PINION ADJUSTING SCREW LOCK NUT

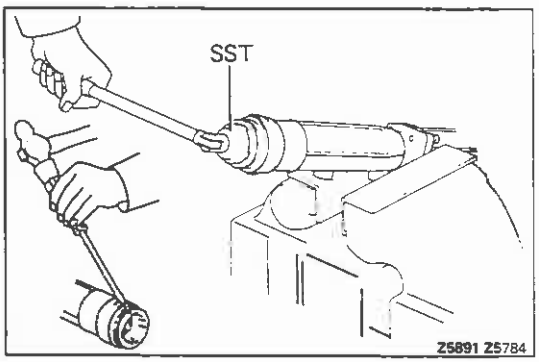
Using SST, remove the pinion adjusting lock nut.

SST 09612-24012

12. REMOVE PINION ADJUSTING SCREW

Using SST, remove the pinion adjusting screw.

SST 09612-24012



13. REMOVE RACK ENDS AND CLAW WASHER
(See step 4 on page SR-15)

14. REMOVE CYLINDER END STOPPER NUT

(a) Unstake the staked part of cylinder housing.

(b) Remove the cylinder end stopper nut with SST.

SST 09630-24013

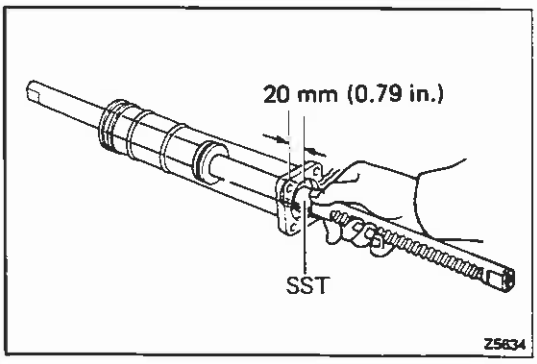
15. REMOVE RACK HOUSING

(a) Remove the four bolts.

(b) Remove the rack housing.

(c) Remove the O-ring.

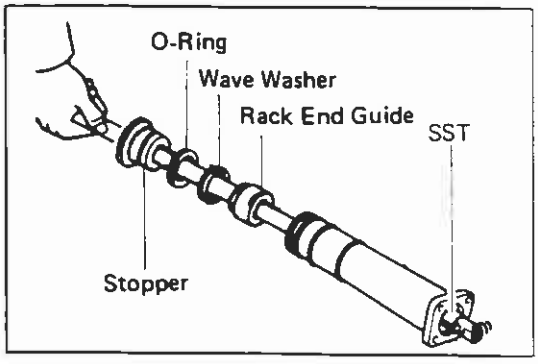
16. REMOVE SPACER FROM RACK HOUSING



17. REMOVE STEERING RACK WITH CYLINDER END STOPPER, O-RING, RACK END GUIDE AND WAVE WASHER FROM CYLINDER HOUSING

(a) Insert SST into the cylinder housing until oil seal lip.

SST 09630-24013

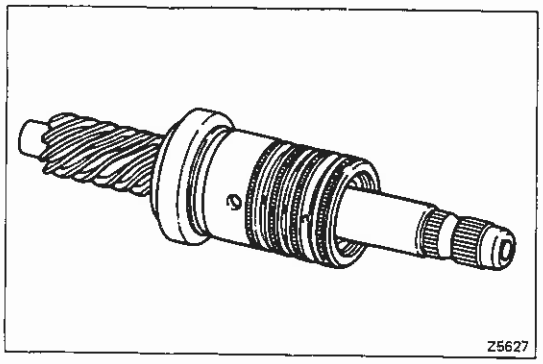


(b) Remove the steering rack with the stopper, O-ring, wave washer and rack end guide.

(c) Remove each part from the rack.

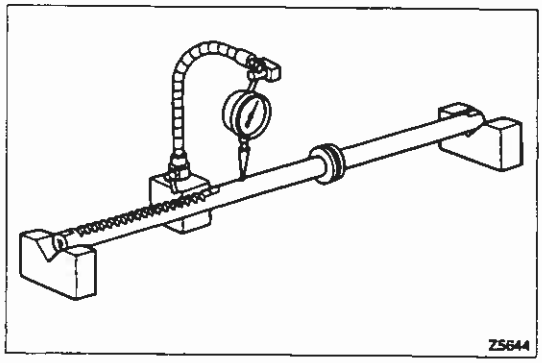
(d) Remove SST from rack housing.

SST 09630-24013

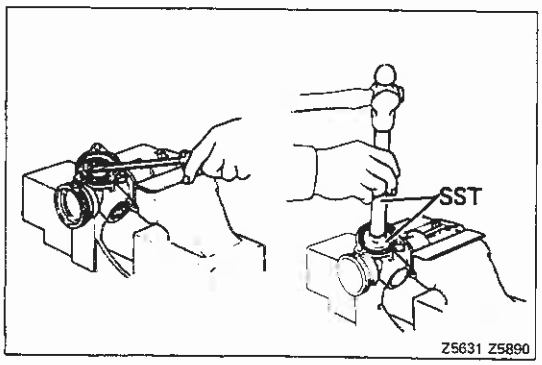


INSPECTION OF GEAR HOUSING

1. INSPECTION CONTROL VALVE
   (a) Remove the control valve with pinion from the yoke housing.
   (b) If necessary, replace the control valve assembly.



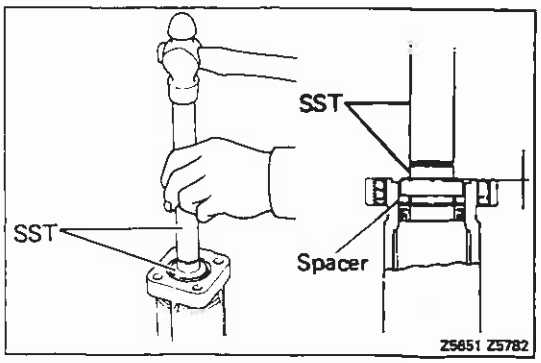
2. INSPECT STEERING RACK RUNOUT
   Runout: Limit 0.3 mm (0.012 in.)



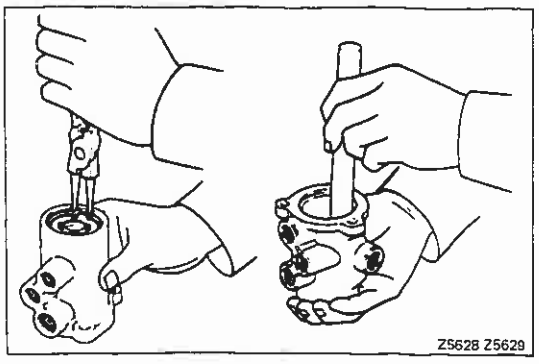
REPLACEMENT OF GEAR HOUSING

IF NECESSARY, REPLACE FOLLOWING PARTS:

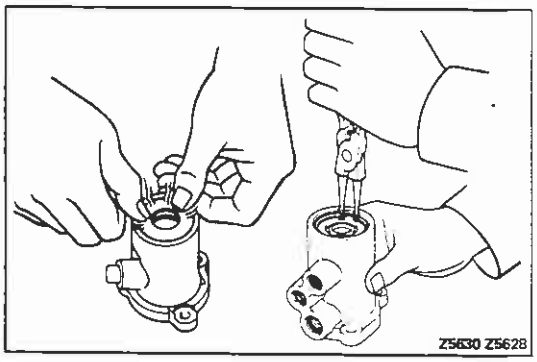
1. OIL SEAL FOR RACK HOUSING
   (a) Remove the oil seal with a screwdriver.
   (b) Using SST, install a new oil seal.
   SST 09620-30010 and 09630-24013



2. OIL SEAL FOR CYLINDER HOUSING
   (a) Using SST, drive out the oil seal.
   (b) Using SST and a hammer, install a new oil seal.
   SST 09620-30010
   - Install the new oil seal.
   - Place the spacer on the oil seal.
   - Drive in the oil seal over the spacer until the round surface of SST is flush with the housing surface.

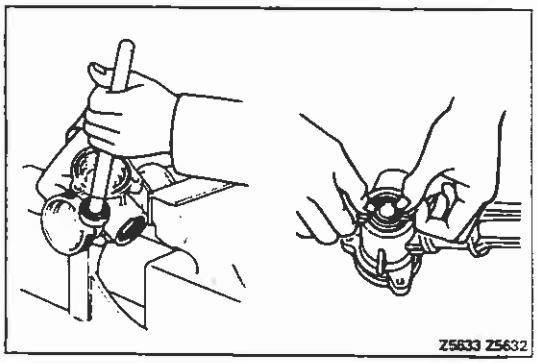


3. OIL SEAL AND BEARING FOR CONTROL VALVE HOUSING
   (a) Remove the snap ring.
   (b) Remove the bearing and oil seal with brass bar.



(c) Install a new bearing and oil seal.

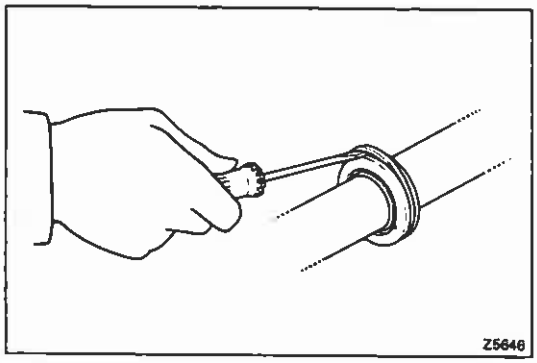
(d) Install the snap ring.



4. PINION LOWER BEARING

(a) Remove the bearing with a brass bar.

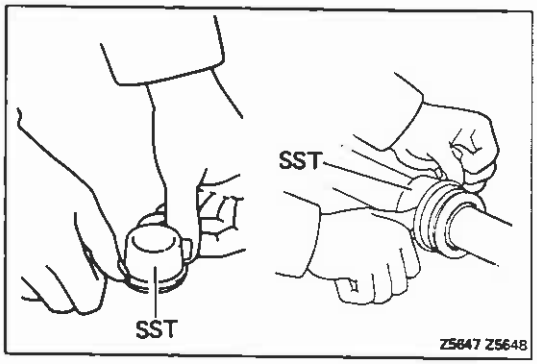
(b) Install a new bearing.



5. TEFLON RING AND O-RING

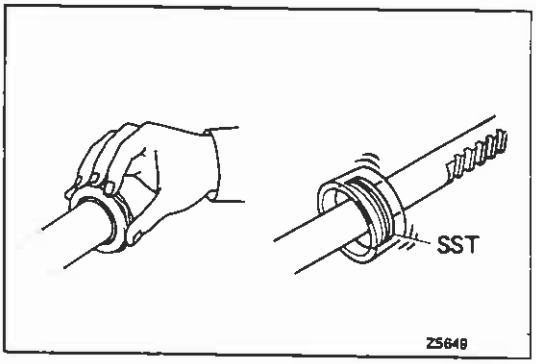
(a) Remove the teflon ring and O-ring.

(b) Install a new O-ring.



(c) Install a new teflon ring to SST and install it to the steering rack.

SST 09630-24013

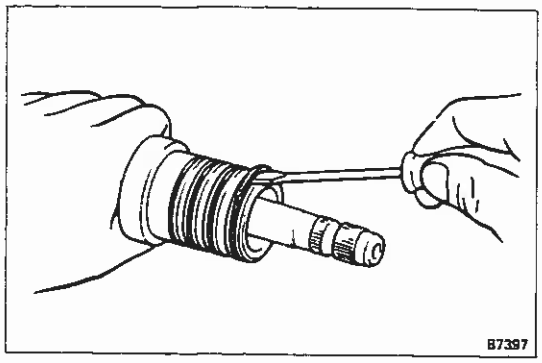


(d) Coat the teflon ring with power steering fluid and snug it down with your fingers.

(e) Carefully slide the tapered end of SST over the teflon ring to seat the ring.

SST 09630-24013

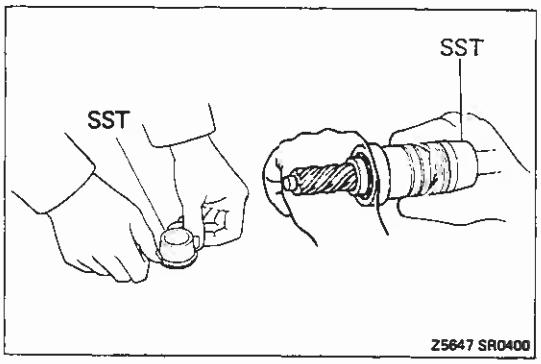
NOTE: Make sure the seal is uniformly spaced around the perimeter of the piston.



6. TEFLON RING FOR CONTROL VALVE

(a) Remove the teflon rings.

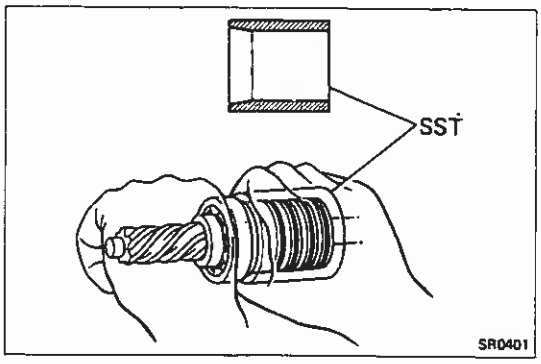
CAUTION: Be careful not to damage the control valve.



(b) Install a new teflon ring to SST and install it to the control valve.

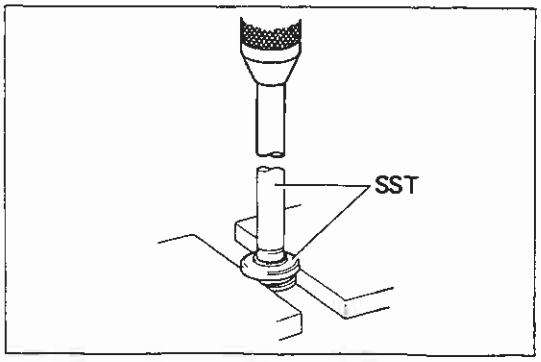
SST 09630-24013

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



(d) Carefully slide the tapered end of the SST over the teflon ring to seat the ring.

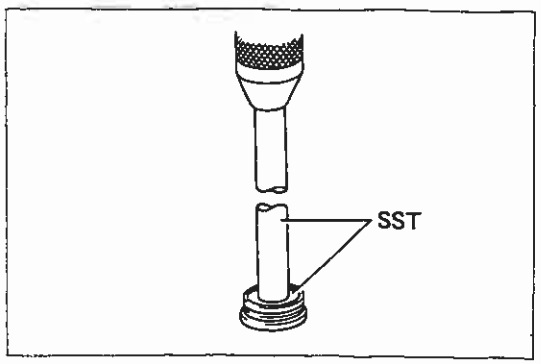
SST 09630-24013



7. OIL SEAL AND BEARING FOR VALVE CAP

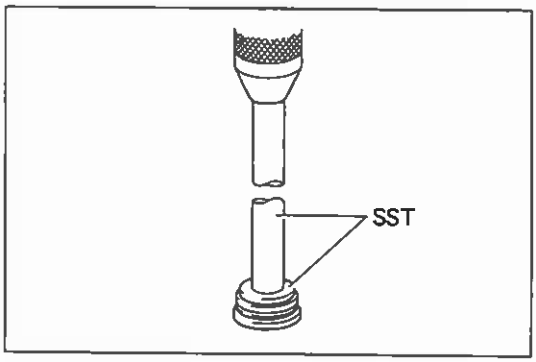
(a) Using SST, press out the oil seal and bearing from the valve cap.

SST 09620-30010 and 09630-24013



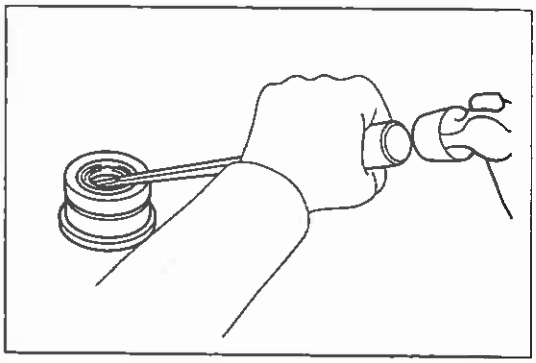
(b) Using SST, press a new oil seal into the valve cap.

SST 09620-30010 and 09630-24013



(c) Using SST, press the bearing into the valve cap.

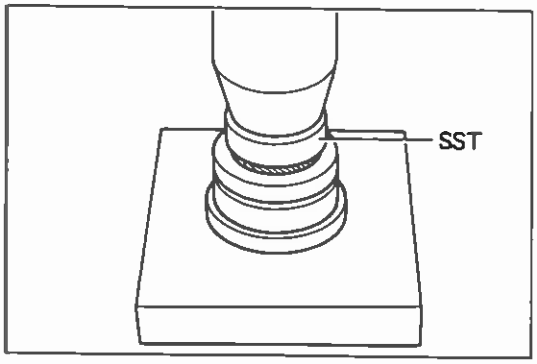
SST 09620-30010 and 09630-24013



8. OIL SEAL FOR CYLINDER END STOPPER

(a) Tap out the oil seal from the cylinder end stopper.

CAUTION: When tapping out the oil seal, be careful not to damage the inside of cylinder end stopper.



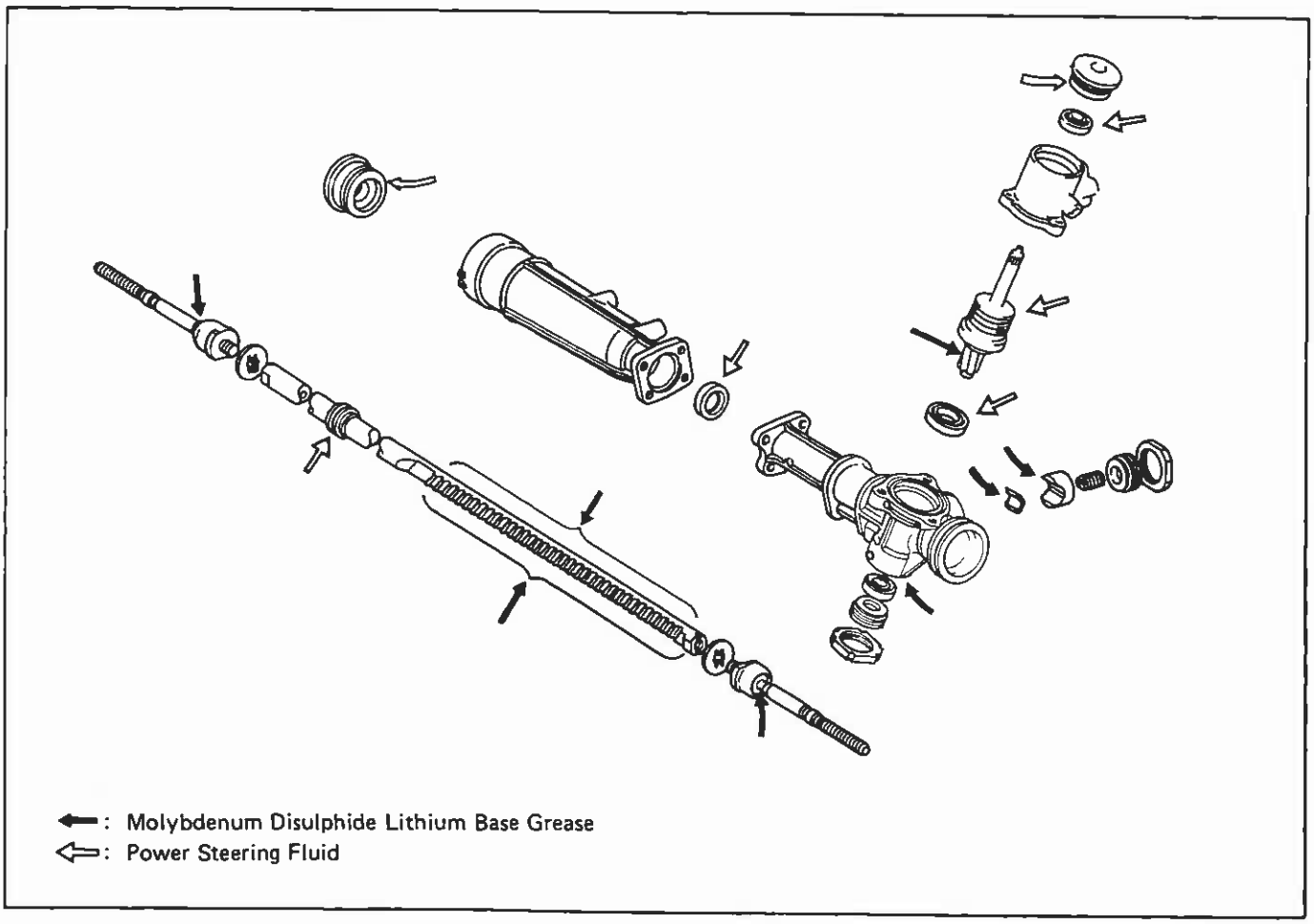
(b) Using SST, press a new oil seal into the cylinder end stopper.

SST 09631-20040

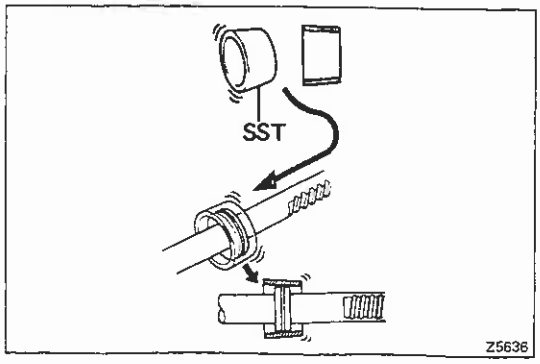
ASSEMBLY OF GEAR HOUSING

(See page SR-36)

1. COAT POWER STEERING FLUID ON FOLLOWING PARTS:



⬅: Molybdenum Disulphide Lithium Base Grease
⇦: Power Steering Fluid



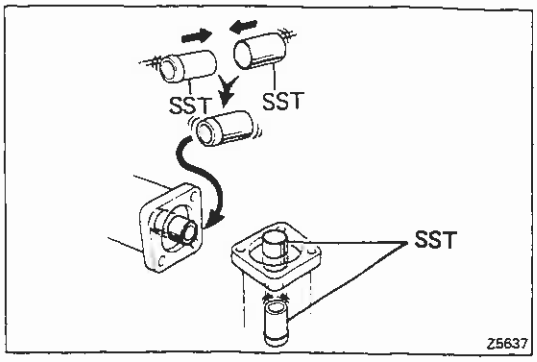
2. INSTALL SEAT AND SPACER

3. INSTALL STEERING RACK ASSEMBLY

(a) Insert SST into the teflon ring of the piston.

SST 09630-24013

NOTE: Protect the teflon ring from damage.

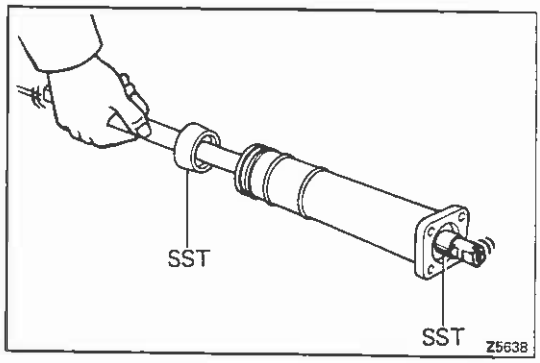


(b) Insert SST into the oil seal of the cylinder housing.

- Install one SST into the other.
- Insert two SST into the oil seal.
- Remove one SST from the other.

SST 09630-24013

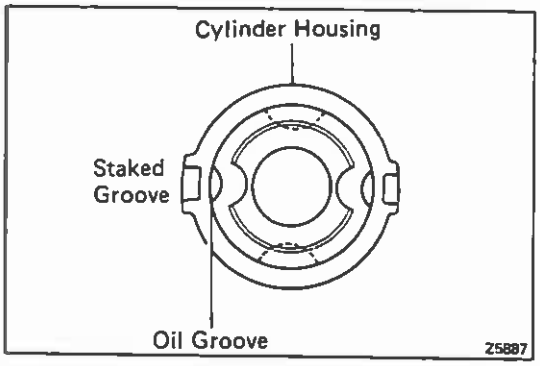
NOTE: Protect the oil seal lip from damage.



(c) Install the steering rack to the cylinder housing.

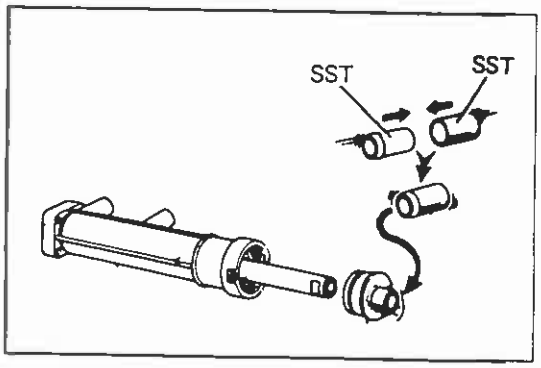
(d) Remove SST.

SST 09630-24013



4. INSTALL RACK END GUIDE AND WAVE WASHER

Install the rack end guide with oil groove facing toward the staked groove.



5. INSTALL CYLINDER END STOPPER WITH O-RING

(a) Insert SST to the oil seal of the cylinder end stopper.

- Install one SST into the other.
- Install two SST into the oil seal.
- Remove one SST from the other.

(b) Install the cylinder end stopper to the cylinder housing.

(c) Remove SST.

SST 09630-24013

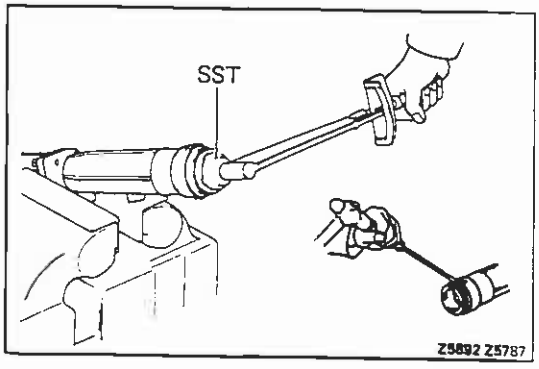
6. INSTALL RACK HOUSING TO CYLINDER HOUSING

NOTE: Make sure that the O-ring, spacer and seal are installed between the rack housing and the cylinder housing.

(a) Install the rack housing.

(b) Install the four bolts and torque them.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)



7. INSTALL CYLINDER END STOPPER NUT

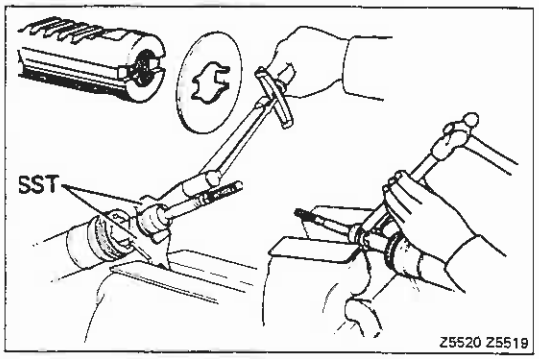
(a) Coat liquid sealer onto the screw surface of the nut.

(b) Install the cylinder end stopper nut with SST and torque the nut.

SST 09630-24013

Torque: 1,750 kg-cm (127 ft-lb, 172 N·m)

(c) Stake the end stopper nut to the cylinder housing flange.



8. INSTALL CLAW WASHER AND RACK ENDS

(a) Install a new claw washer.

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

(b) Tighten the rack end and torque it with SST.

SST 09612-24012

Torque: 1,050 kg-cm (76 ft-lb, 103 N·m)

(c) Stake the claw washer.

9. INSTALL CONTROL VALVE ASSEMBLY INTO CONTROL VALVE HOUSING

10. INSTALL CONTROL VALVE SPRING SEAT

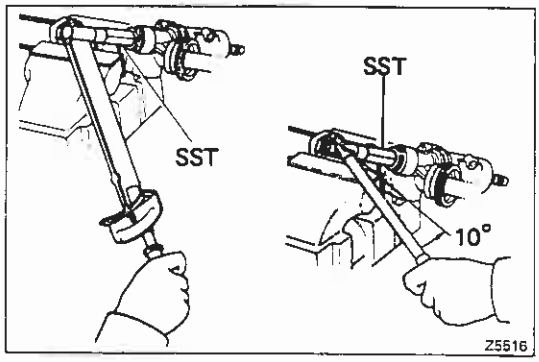
11. INSTALL COMPRESSION SPRING

12. INSTALL O-RING AND CONTROL VALVE HOUSING TO RACK HOUSING

(a) Coat liquid sealer onto the screw surface of the bolt.

(b) Install the three bolts and torque them.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)



13. ADJUST CONTROL VALVE SHAFT PRELOAD

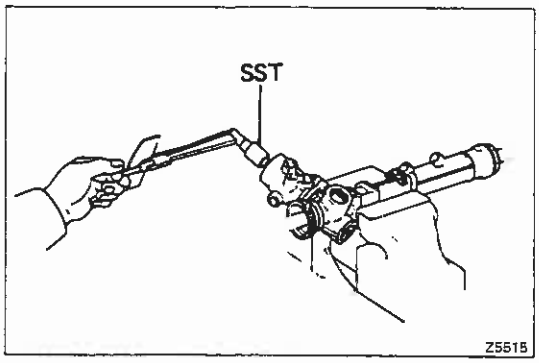
(a) Coat liquid sealer onto the screw surface of the bolt.

(b) Tighten the pinion adjusting screw and torque with SST.

SST 09612-24012

Torque: 150 kg-cm (11 ft-lb, 15 N·m)

(c) Return the pinion adjusting screw 10°.

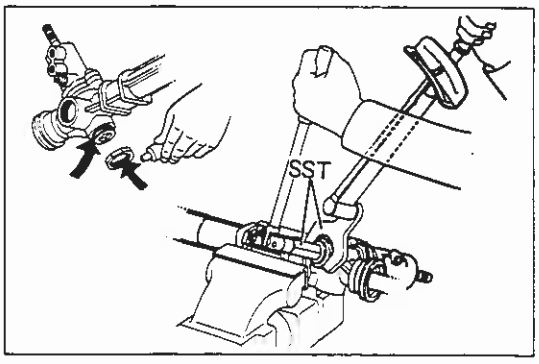


(d) Using SST, measure the preload.

SST 09616-00010

Preload (turning): 4.5 – 6.5 kg-cm (3.9 – 5.6 in.-lb, 0.4 – 0.6 N·m)

If incorrect, readjust.



14. INSTALL PINION ADJUSTING SCREW LOCK NUT

(a) Coat liquid sealer onto the lock nut and gear housing contact surfaces.

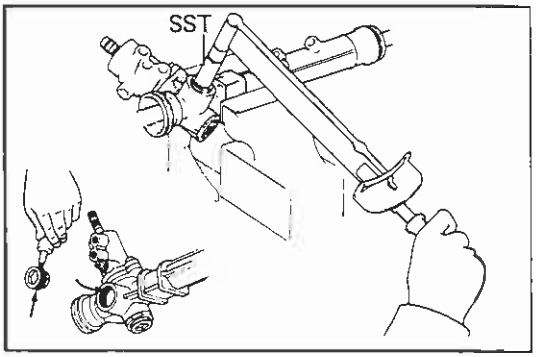
(b) Install the pinion adjusting screw lock nut and torque it with SST.

SST 09612-24012

Torque: 700 kg-cm (51 ft-lb, 69 N·m)

(c) Recheck the control valve shaft preload.

Preload (turning): 4.5 – 6.5 kg-cm (3.9 – 5.6 in.-lb, 0.4 – 0.6 N·m)



15. INSTALL SEAT AND RACK GUIDE

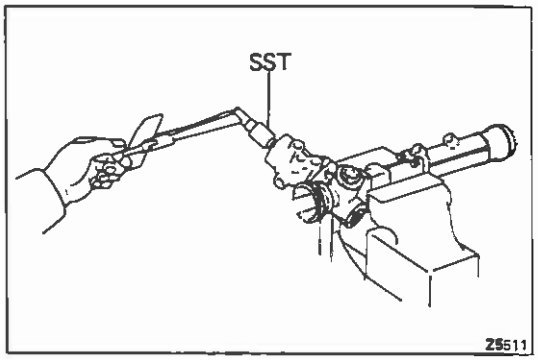
16. INSTALL RACK GUIDE SPRING AND CAP

(a) Install the rack guide spring.

(b) Coat liquid sealer onto the screw surface of the cap.

(c) Using SST, install the rack guide spring cap.

SST 09612-24012



17. ADJUST TOTAL PRELOAD

(a) Tighten the rack guide spring cap with SST and torque it.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

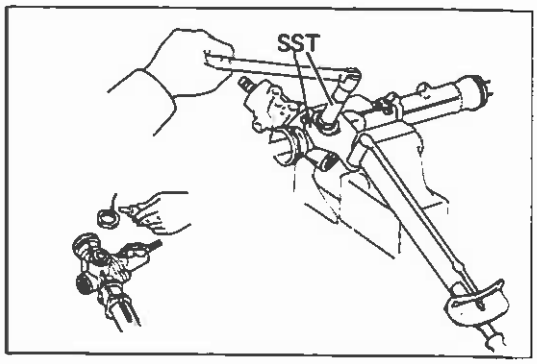
(b) Using SST, return the rack guide spring cap 90°.

(c) Using SST, measure the preload.

SST 09616-00010

Preload (turning): 9 – 12 kg-cm (7.8 – 10.4 in.-lb, 0.9 – 1.2 N·m)

If incorrect, readjust.



18. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Coat liquid sealer onto the lock nut and gear housing contact surfaces.

(b) Tighten the rack guide spring cap lock nut and torque it with SST.

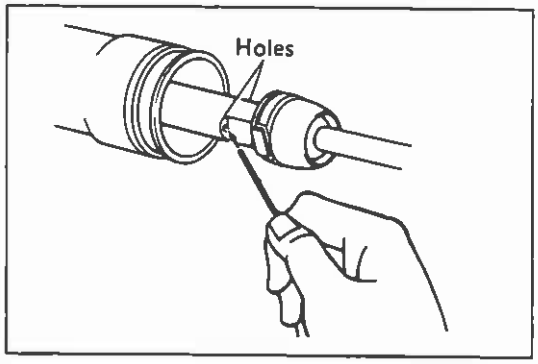
SST 09612-24012

Torque: 700 kg-cm (51 ft-lb, 69 N·m)

(c) Recheck the total preload.

If incorrect, readjust.

Preload (turning): 9 – 12 kg-cm (7.8 – 10.4 in.-lb, 0.9 – 1.2 N·m)

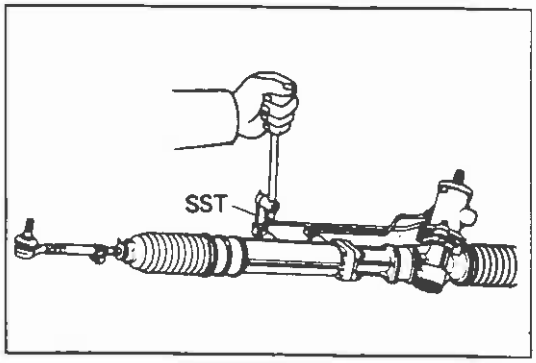


19. INSTALL DUST COVER

20. INSTALL RACK BOOTS, CLAMPS AND CLIPS
(See step 14 on page SR-21)

Insure that the tube hole is not clogged with grease.

NOTE: If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the handle turned.



21. INSTALL TIE RODS
(See step 15 on page SR-21)

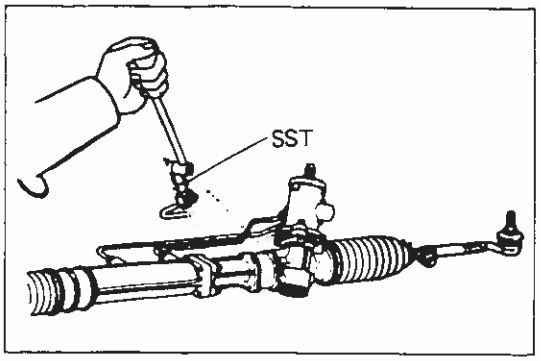
22. INSTALL TURN PRESSURE RIGHT AND LEFT TUBES

(a) Install the union seats.

(b) Using SST, tighten the tubes and torque them.

SST 09631-22020

Torque: 300 kg-cm (22 ft-lb, 29 N·m)



INSTALLATION OF GEAR HOUSING
(See page SR-35)

1. INSTALL GEAR HOUSING ASSEMBLY
(See step 1 on page SR-22)

2. CONNECT RETURN AND PRESSURE LINE
   (a) Install the union seat.
   (b) Using SST, connect the pressure line and torque it.
   SST 09631-22020
   Torque: 390 kg-cm (28 ft-lb, 38 N·m)

3. CONNECT TIE ROD ENDS
(See step 2 on page SR-22)

4. INSTALL UNIVERSAL JOINT
(See step 3 on page SR-22)

5. FILL WITH POWER STEERING FLUID
(See page SR-24)

6. BLEED SYSTEM (See page SR-25)

7. CHECK FOR FLUID LEAKS

8. ADJUST TOE-IN (See page FA-5)