

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

5. Steering Gearbox

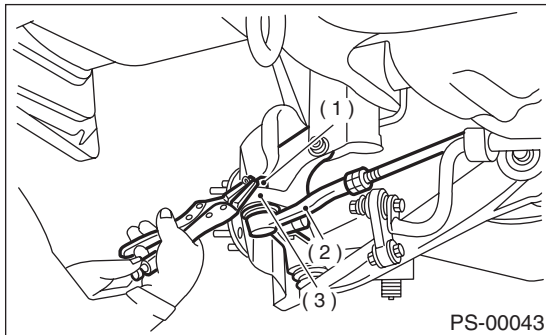
A: REMOVAL

- 1) Set the vehicle on the lift.
- 2) Disconnect the battery ground terminal.
- 3) Loosen the front wheel nuts.
- 4) Lift the vehicle and remove the front wheels.
- 5) Remove the under cover.
- 6) Remove the sub frame. <Ref. to FS-16, REMOVAL, Sub Frame.>
- 7) Remove the front exhaust pipe assembly. (Non-TURBO model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>

WARNING:

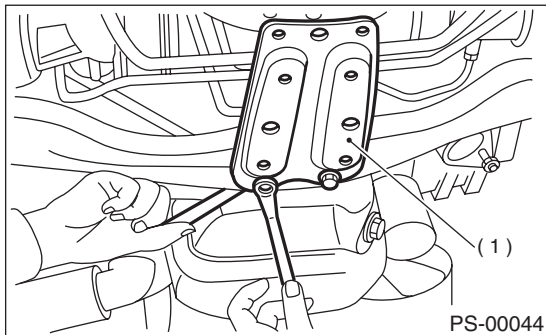
Be careful, exhaust pipe is hot.

- 8) Using a puller, remove the tie-rod end from the knuckle arm after pulling off cotter pin and removing castle nut.



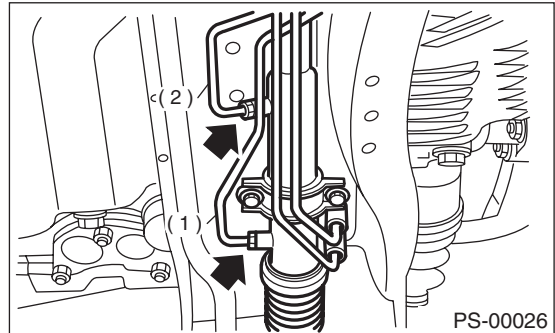
- (1) Castle nut
- (2) Tie-rod end
- (3) Knuckle arm

- 9) Remove the jack-up plate and front stabilizer.



- (1) Jack-up plate

- 10) Remove the one pipe joint at the center of gearbox, and connect the vinyl hose to the pipe and joint. Discharge the fluid by turning steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from the other pipe.



- (1) Pipe A
- (2) Pipe B

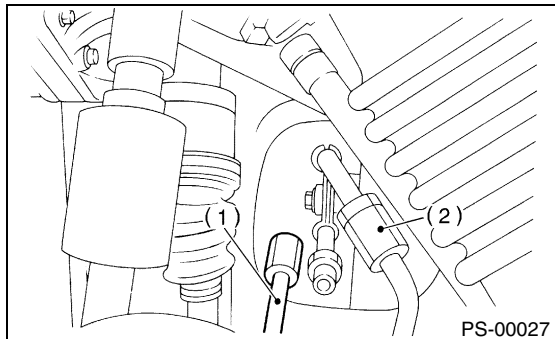
- 11) Remove the universal joint. <Ref. to PS-19, REMOVAL, Universal Joint.>
- 12) Disconnect the pipes C and D from the pipe of gearbox.

CAUTION:

Be careful not to damage these pipes.

NOTE:

Disconnect the upper pipe D first, and lower pipe C second.

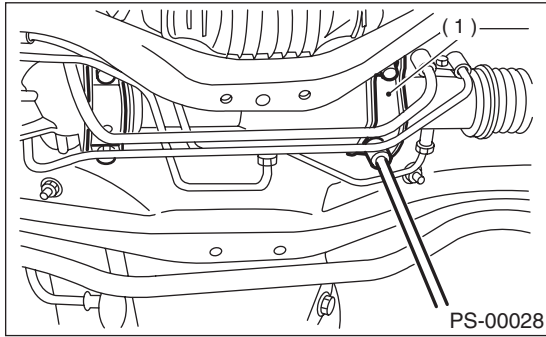


- (1) Pipe C
- (2) Pipe D

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- 13) Remove the clamp bolts securing gearbox to the crossmember, and remove the gearbox.



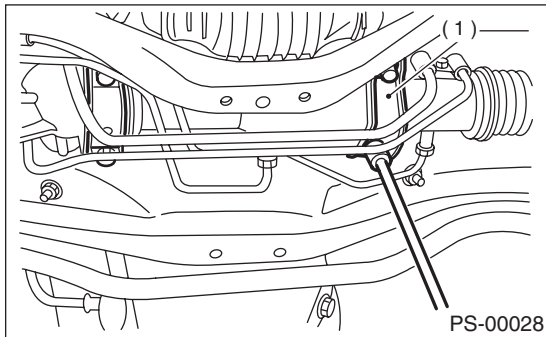
(1) Clamp

B: INSTALLATION

- 1) Insert the gearbox into the crossmember, being careful not to damage gearbox boot.
2) Tighten the gearbox to the crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:

59 N·m (6.0 kgf-m, 43 ft-lb)



(1) Clamp

- 3) Install the four pipes on the gearbox.
(1) Connect the pipes A and B to the four pipe joints of gearbox. Connect the upper pipe B first, and lower pipe A.

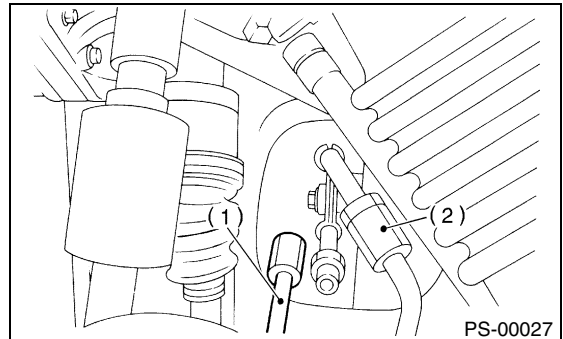
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

- (2) Connect the pipes C and D to the gearbox. Connect the upper pipe D first, and lower pipe C second.

Tightening torque:

15 N·m (1.5 kgf-m, 10.8 ft-lb)



(1) Pipe C

(2) Pipe D

- 4) Install the universal joint. <Ref. to PS-19, INSTALLATION, Universal Joint.>

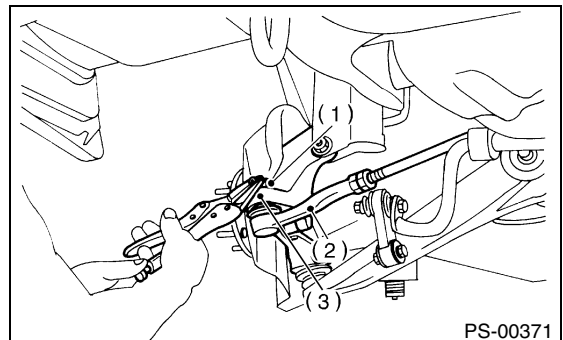
- 5) Connect the tie-rod end and knuckle arm, and tighten with castle nut. Fit the cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:

Tighten to 27.0 N·m (2.75 kgf-m, 19.9 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:

When connecting, do not hit cap at the bottom of tie-rod end with hammer.



(1) Castle nut

(2) Tie-rod end

(3) Knuckle arm

- 6) Install the front stabilizer to vehicle.
7) Install the front exhaust pipe assembly.
8) Install the sub frame. <Ref. to FS-16, INSTALLATION, Sub Frame.>

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9) Align the center of roll connector. <Ref. to AB-17, ADJUSTMENT, Roll Connector.>

CAUTION:

Ensure that front wheels are set in straight forward direction.

10) Install the steering wheel. <Ref. to PS-18, INSTALLATION, Steering Wheel.>

11) Install the tires.

12) Tighten the wheel nuts to the specified torque.

Tightening torque:

90 N·m (9.1 kgf-m, 66 ft-lb)

13) Connect the ground terminal to battery.

14) Pour the fluid into the oil tank, and bleed air.

<Ref. to PS-71, Power Steering Fluid.>

15) Check for fluid leaks.

16) Install the jack-up plate.

17) Lower the vehicle.

18) Check the fluid level in oil tank.

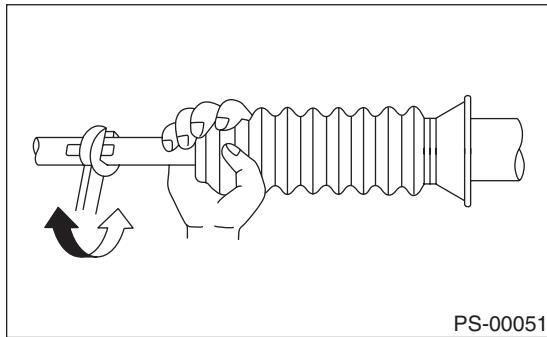
19) After adjusting toe-in and steering angle, tighten the lock nut on tie-rod end.

Tightening torque:

83 N·m (8.5 kgf-m, 61.5 ft-lb)

CAUTION:

When adjusting toe-in, hold the boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



C: DISASSEMBLY

NOTE:

Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1. RACK HOUSING ASSEMBLY

1) Disconnect the four pipes from the gearbox.

NOTE:

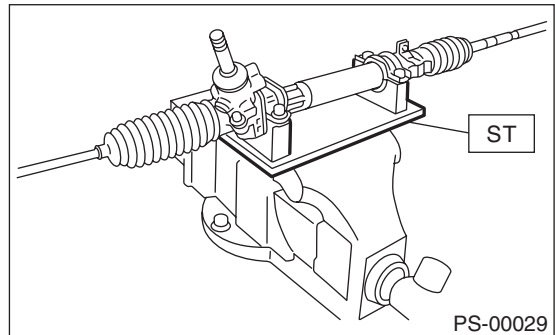
Remove the pipes E and F as a single unit being fixed at the clamp plate.

2) Secure the gearbox removed from the vehicle in vice using ST.

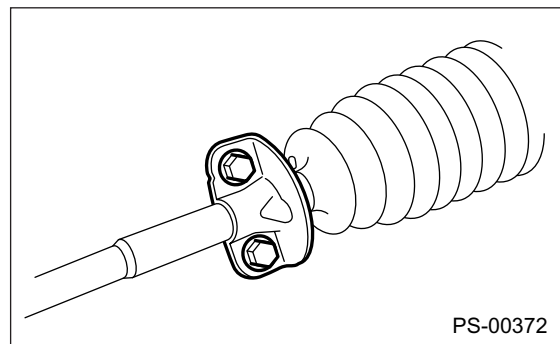
ST 926200000 STAND

CAUTION:

Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.

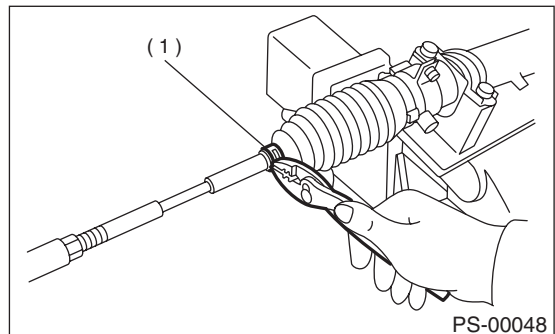


3) Remove the tie-rod end plate.



4) Remove the tie-rod end and lock nut from the gearbox.

5) Remove the small clip from the boot using pliers, and move the boot to the tie-rod end side.

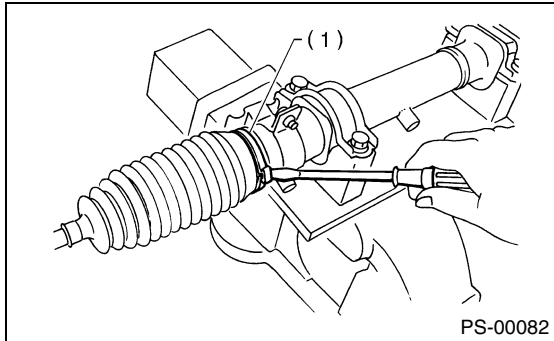


(1) Clip

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6) Using standard screwdriver, remove the band from the boot.

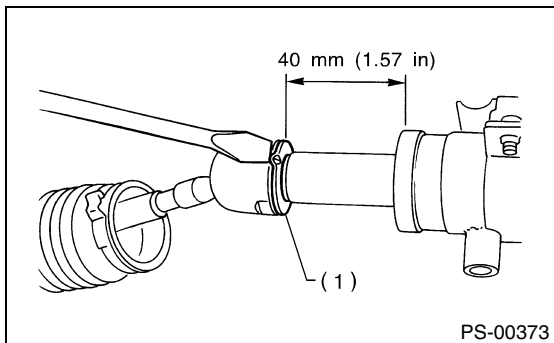


(1) Band

7) Extend the rack approximately 40 mm (1.57 in) out. Unlock the lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

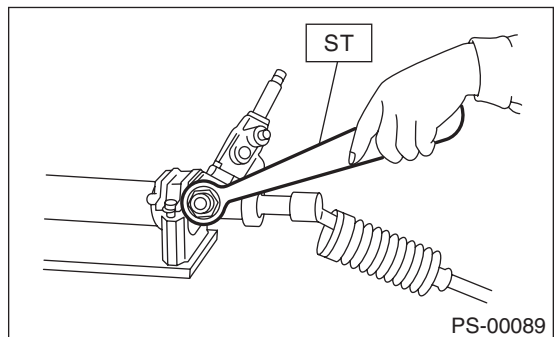
CAUTION:

Be careful not to scratch rack surface as oil leaks may result.

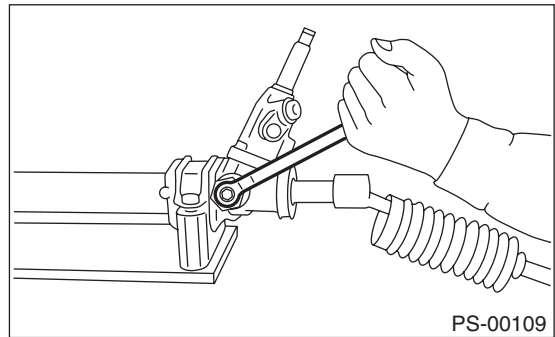


(1) Lock washer

8) Using ST, loosen the lock nut.
ST 926230000 SPANNER



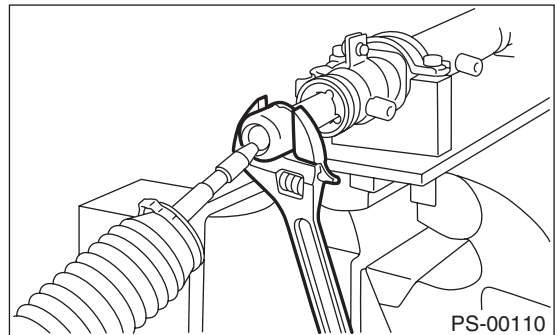
9) Tighten the adjusting screw until it no longer tightens.



10) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove the tie-rod.

CAUTION:

- Check ball joint for free play, and tie-rod for bends. Replace if necessary.
- Check dust seals used with tie-rod end ball joint for damage or deterioration. Replace if necessary.

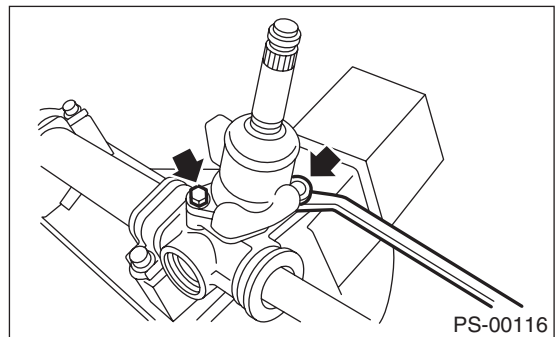


11) Loosen the adjusting screw and remove the spring and sleeve.

CAUTION:

Replace spring and/or sleeve if damaged.

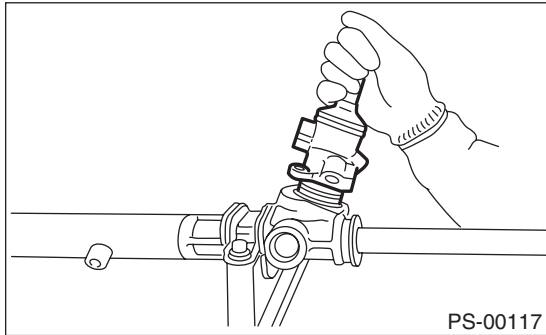
12) Remove the two bolts securing valve assembly.



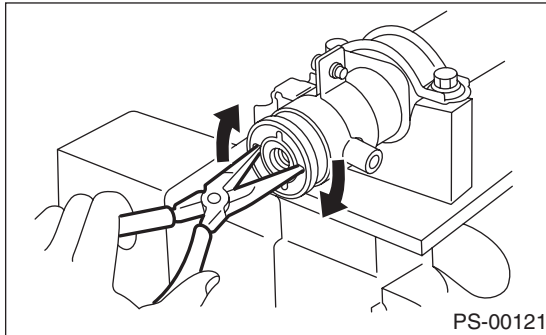
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13) Carefully draw out the input shaft and remove the valve assembly.



14) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.

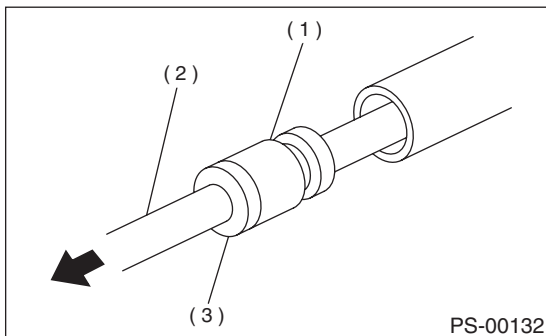


(1) Rack stopper

15) Pull the rack assembly from the cylinder side, and draw out the rack bushing and rack stopper together with the rack assembly.

CAUTION:

Be careful not to contact rack to inner wall of cylinder when drawing out. Any scratch on cylinder inner wall will cause oil leakage.



- (1) Rack bushing
- (2) Rack ASSY
- (3) Rack stopper

16) Remove the rack bushing and rack stopper from the rack assembly.

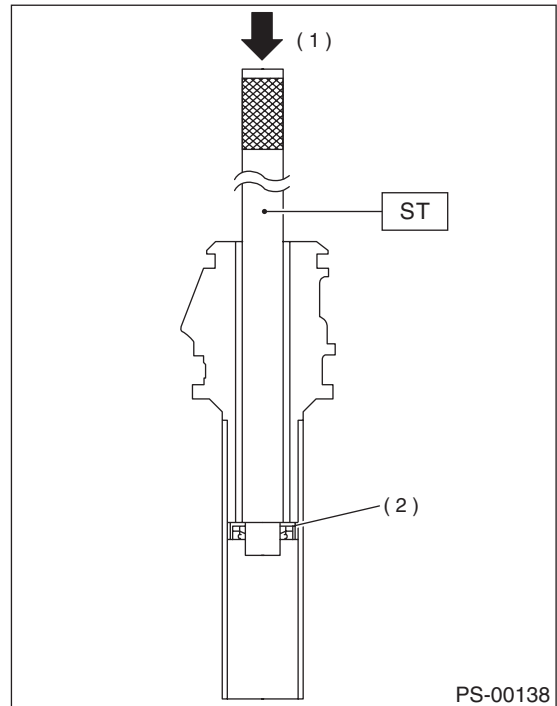
CAUTION:

Do not reuse removed rack bushing and circlip.

17) Remove the oil seal from rack.

18) Insert ST from the pinion housing side and remove the oil seal using a press.

ST 34099FA110 INSTALLER



- (1) Press
- (2) Oil seal

NOTE:

Discard the removed the oil seal.

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2. CONTROL VALVE

1) Disconnect the four pipes from the gearbox.

NOTE:

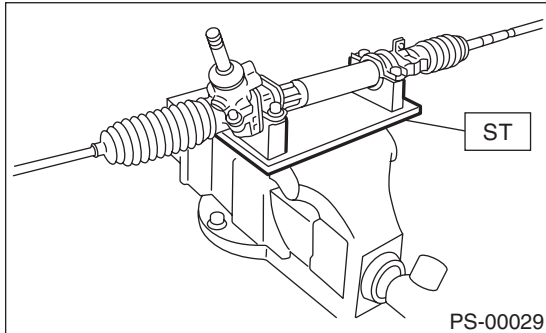
Remove the pipes E and F as a single unit being fixed at the clamp plate.

2) Secure the gearbox removed from the vehicle in vice using ST.

ST 926200000 STAND

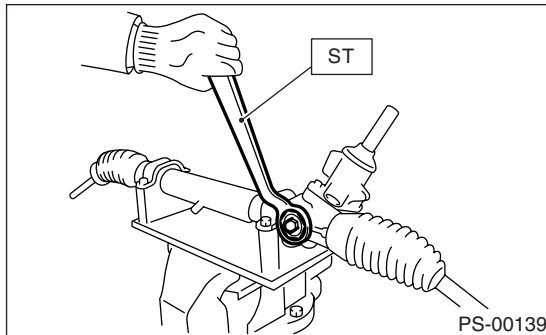
CAUTION:

Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.

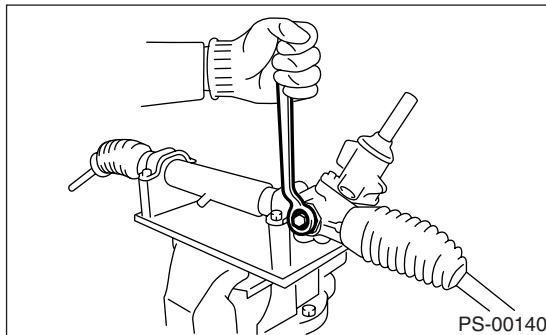


3) Using ST, loosen the lock nut.

ST 926230000 SPANNER



4) Tighten the adjusting screw until it no longer tightens.

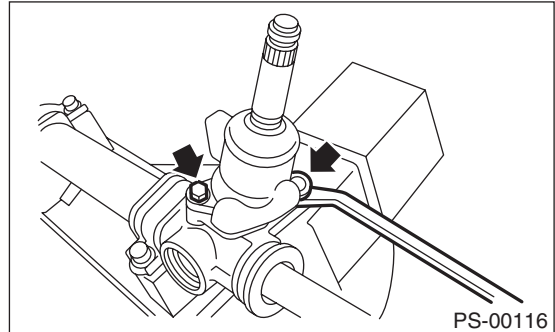


5) Loosen the adjusting screw and remove the spring and sleeve.

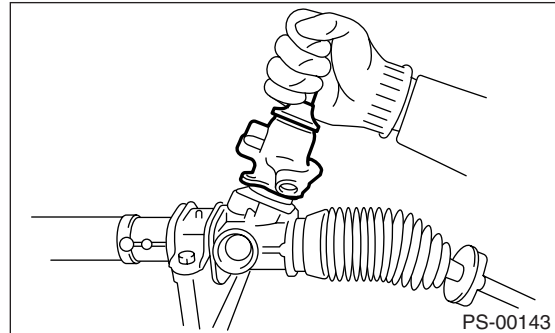
CAUTION:

Replace the spring and/or sleeve if damaged.

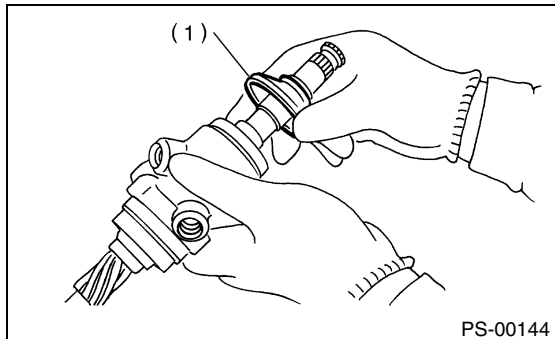
6) Remove the two bolts securing valve assembly.



7) Carefully draw out the input shaft and remove the valve assembly.



8) Slide the dust cover out.

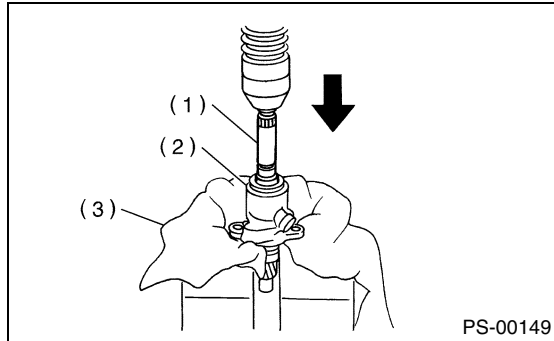


(1) Dust cover

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9) Using a press remove pinion and valve assembly from the valve housing.

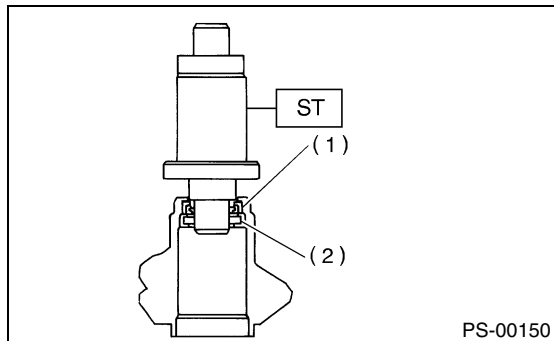


- (1) Valve ASSY
- (2) Valve housing
- (3) Cloth

10) Using ST and press, remove the dust seal, oil seal and special bearing from the valve housing.
ST 34099FA120 INSTALLER & REMOVER
SEAL

CAUTION:

- Do not apply a force to end surface of valve housing.
- Do not reuse oil seal after removal.

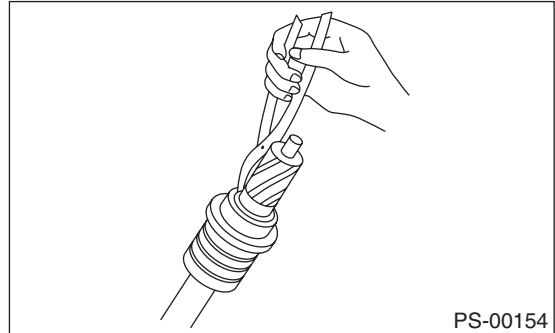


- (1) Oil seal
- (2) Special bearing

11) Remove the snap ring using snap ring pliers.

CAUTION:

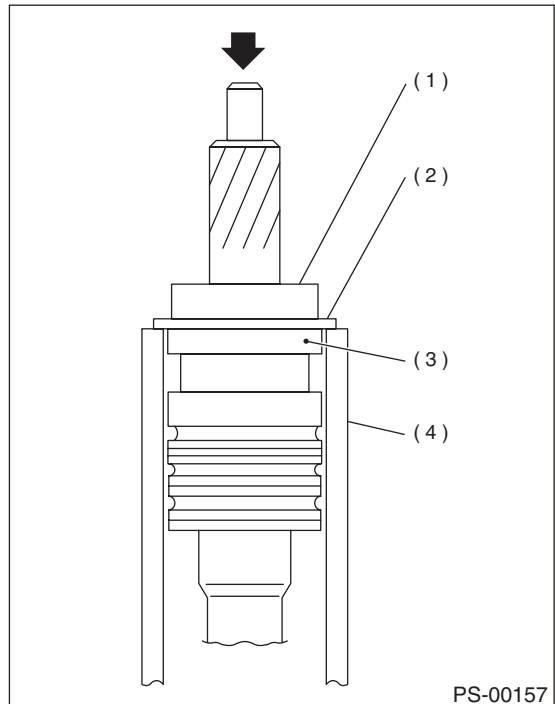
- Do not reuse removed snap ring.
- Be careful not to scratch pinion and valve assembly.



12) Press out the bearing together with the back up washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.

CAUTION:

Do not reuse removed bearing.



- (1) Bearing
- (2) Backing washer
- (3) Oil seal
- (4) Pipe

13) Remove the oil seal.

CAUTION:

Do not reuse removed oil seal.

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D: ASSEMBLY

1. RACK HOUSING ASSEMBLY

CAUTION:

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

VALIANT GREASE M2 (Part No. 003608001)

1) Clean all parts and tools before reassembling.

2) Force-fit oil seal using ST.

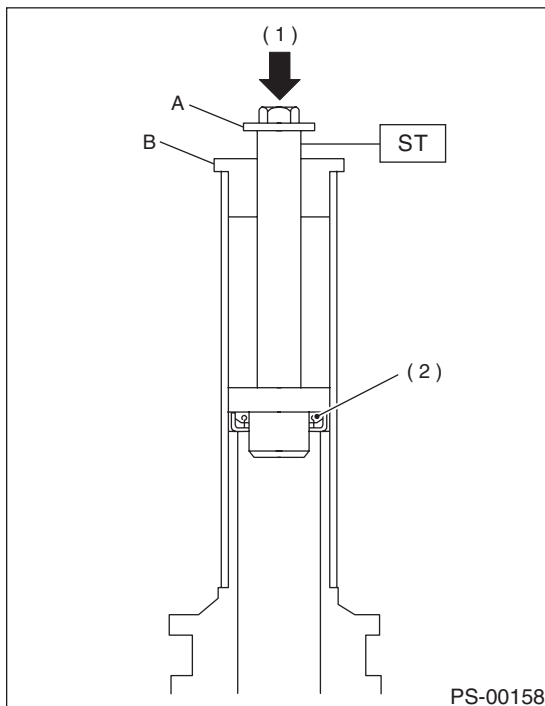
ST 34099FA110 INSTALLER

CAUTION:

Be careful not to damage or scratch cylinder inner wall.

NOTE:

- Apply specified power steering fluid to oil seal.
- Pay special attention not to install oil seal in wrong direction.
- Push oil seal until the stepped portion of A contacts end face of B.



(1) Press

(2) Oil seal

3) Apply grease to the teeth of rack so that the grease applied is about as high as teeth, and also apply a thin film of grease to the sliding portion of rack shaft.

CAUTION:

- When moving rack to stroke end without tie-rod attached, prevent shocks from being applied at the end.

- Do not apply grease to threaded portion at end of rack shaft.

- Move rack shaft to stroke end two (2) or three (3) times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

4) Apply grease to the sleeve insertion hole.

5) Apply grease to the dust seal insertion hole.

CAUTION:

Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

6) Fixing rack housing

Fix the rack housing in vice using ST.

ST 926200000 STAND

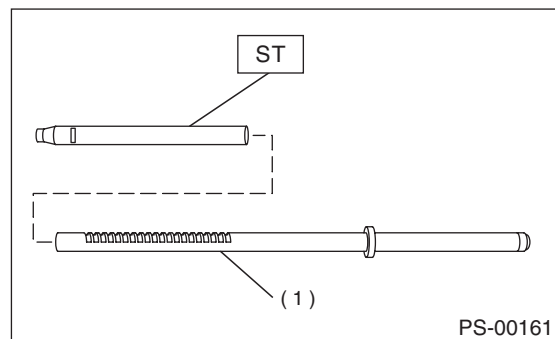
CAUTION:

- When fixing rack housing in vice, be sure to use this special tool. Do not fix rack housing in vice using pad such as aluminum plates, etc.
- When using old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.

7) Install the oil seal to rack.

8) Fit ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.

ST 926390001 COVER & REMOVER



(1) Rack ASSY

9) Apply genuine grease to the teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.

CAUTION:

- Be careful not to block air passage with grease. Remove excessive grease.
- After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.
- Check rack shaft for damage.
- Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.

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10) Insert the rack assembly into the rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

NOTE:

Before inserting rack assembly, apply a coat of specified power steering fluid to surfaces of ST and rack piston.

ST 926390001 COVER & REMOVER

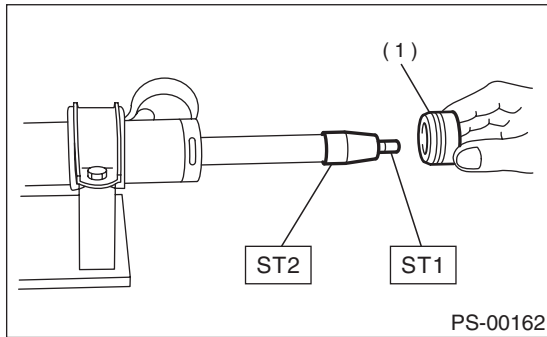
11) Fit ST1 and ST2 over the end of rack, and install rack bushing.

ST1 926400000 GUIDE

ST2 927660000 GUIDE

CAUTION:

- If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.
- Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.



(1) Rack bushing ASSY

12) Insert the rack stopper into the cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn the rack stopper with ST so that the rack stopper hole is seen through cylinder slits.

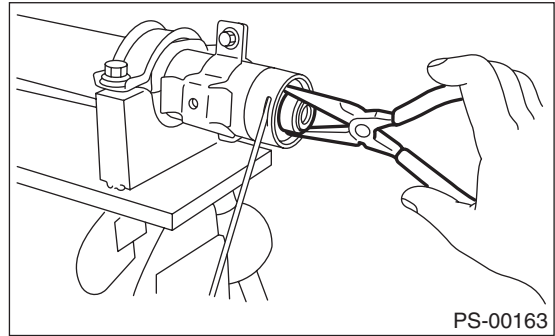
13) Insert the rack stopper into the rack housing, and wrap the circlip using a sharp pointed pliers to secure the rack stopper in position.

CAUTION:

Be careful not to scratch rack while winding circlip.

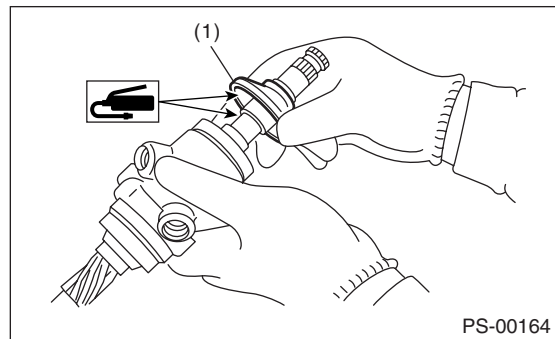
NOTE:

Rotate the wrench another 90 to 180° after the end of circlip has been wrapped in.



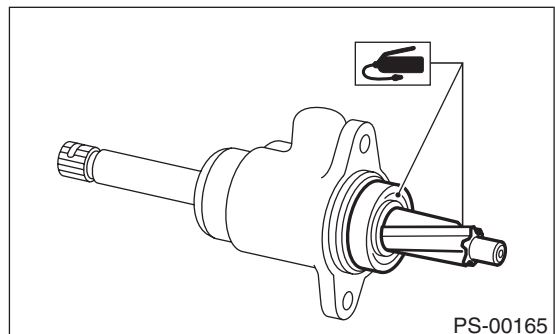
14) Fit the mounting rubber onto the rack housing.

15) Apply the specified grease to the dust cover.



16) Install the dust cover on the valve assembly.

17) Apply genuine grease to the pinion gear and bearing of valve assembly.



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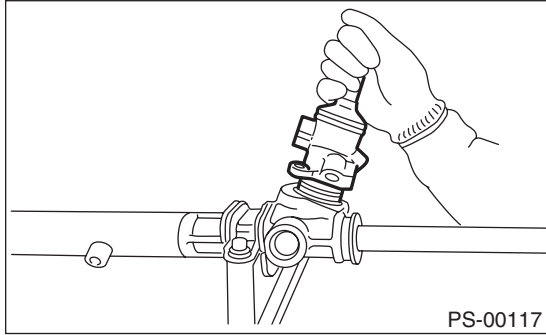
18) Install the gasket on the valve assembly. Insert the valve assembly into the place while facing rack teeth toward pinion.

CAUTION:

Be sure to use a new gasket.

NOTE:

Do not allow packing to be caught when installing valve assembly.



19) Tighten the bolts alternately to secure the valve assembly.

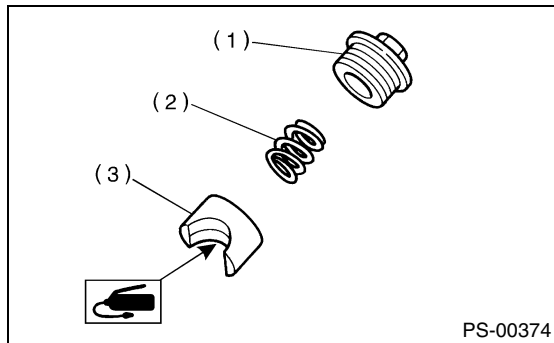
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:

Be sure to alternately tighten bolts.

20) Apply grease to the sliding surface of sleeve and spring seat, then insert the sleeve into the pinion housing. Fit the spring into the sleeve screw, pack grease inside of screw, then install the screw.



- (1) Adjusting screw
- (2) Spring
- (3) Sleeve

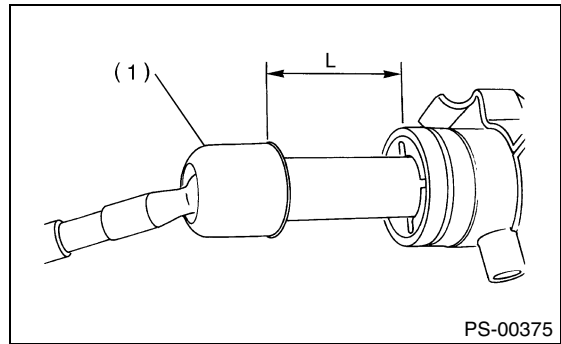
21) Install the lock washers and tighten the left and right tie-rods into the rack ends.

On condition

L: Approximately 40 mm (1.57 in)

Tightening torque:

78 N·m (8.0 kgf-m, 58 ft-lb)

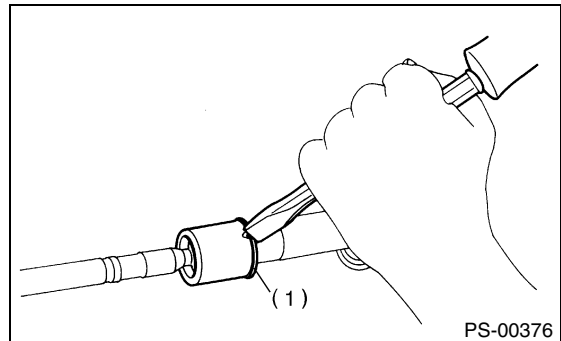


- (1) Tie-rod

22) Bend the lock washer using a chisel.

CAUTION:

Be careful not to scratch rack when bending lock washer.



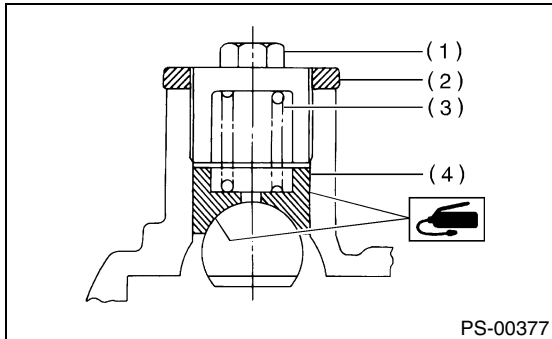
- (1) Lock washer

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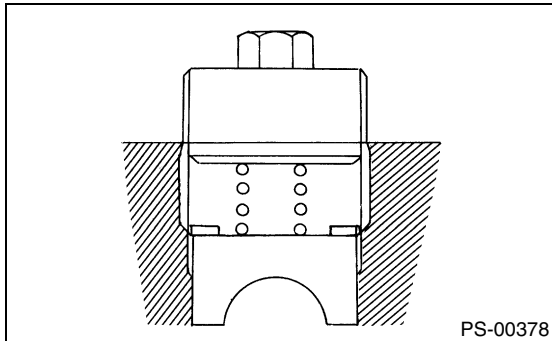
23) Rack and pinion backlash adjustment

- (1) Loosen the adjusting screw.
- (2) Rotate the input shaft so that the rack is in the straight ahead direction.
- (3) Apply grease to the sleeve.



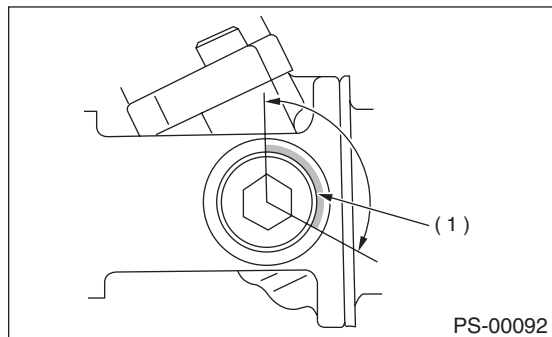
- (1) Adjusting screw
- (2) Lock nut
- (3) Spring
- (4) Sleeve

(4) Tighten the adjusting screw by two threads.



- (5) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.

Liquid packing:
THREE BOND 1141



- (1) Apply liquid packing to at least 1/3 of entire perimeter.

- (6) Tighten the adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.

- (7) Install the lock nut. While holding adjusting screw with a wrench, tighten the lock nut using ST.

ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

NOTE:

- Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that the steering wheel can be rotated fully from lock to lock without binding.

24) Check for service limit as per article of "Service limit".<Ref. to PS-41, INSPECTION, Steering Gearbox.> Make replacement and adjustment if necessary.

- 25) Install the boot to the housing.

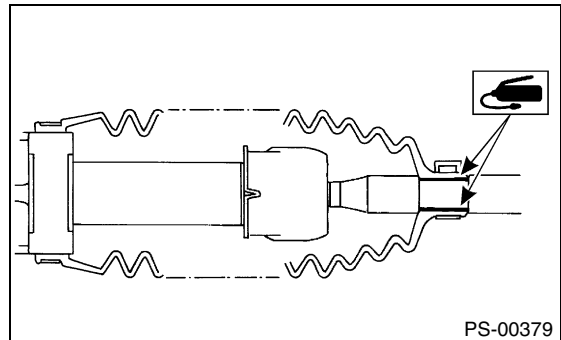
NOTE:

- Before installing boot, be sure to apply grease to the groove of tie-rod.
- Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.

The groove on gearbox

The groove on the rod

- Make sure that the boot is installed without unusual inflation or deflation.



STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

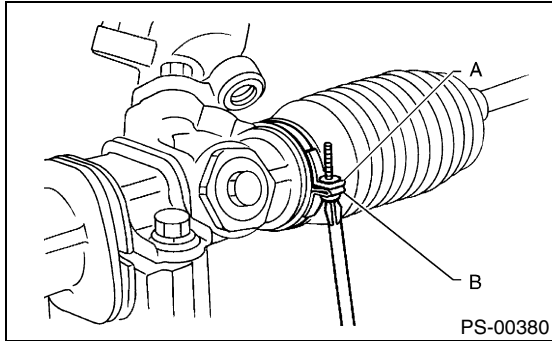
26) Using a screwdriver, tighten the screw until the ends "A" and "B" of the band come into contact with each other.

CAUTION:

Use a new band.

NOTE:

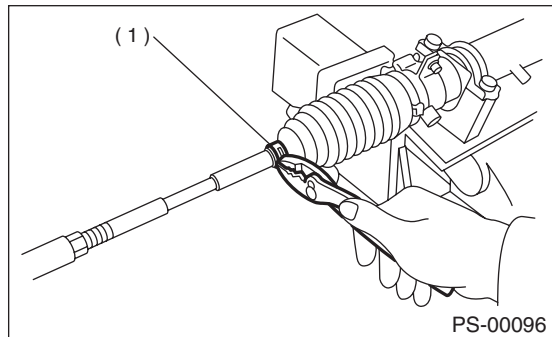
Always tighten the band from the underside of the gear box.



27) Fix the boot end with clip (small).

CAUTION:

After installing, check boot end is positioned into groove on tie-rod.

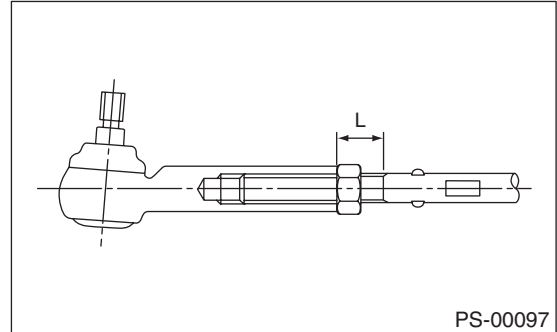


(1) Clip

28) If the tie-rod end was removed, screw in lock nut and tie-rod end to the screwed portion of tie-rod, and tighten the lock nut temporarily in a position as shown in figure.

Installed tie-rod length: L

15 mm (0.59 in)



29) Install the tie-rod end plate.

Tightening torque:

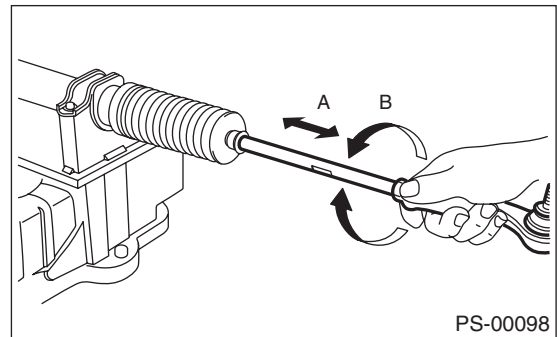
13 N·m (1.3 kgf-m, 9.4 ft-lb)

30) Inspect the gearbox as follows:

"A" Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.

"B" Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.

After all, make sure that the boot is installed in the specified position without deflation.



31) Remove gearbox from ST.

ST 926200000 STAND

32) Install the four pipes on gearbox.

(1) Connect the pipe A and B to the four pipe joints of gearbox.

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Connect the pipe E and F to the gearbox.

Tightening torque:

Pipe E: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

Pipe F: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

STEERING GEARBOX

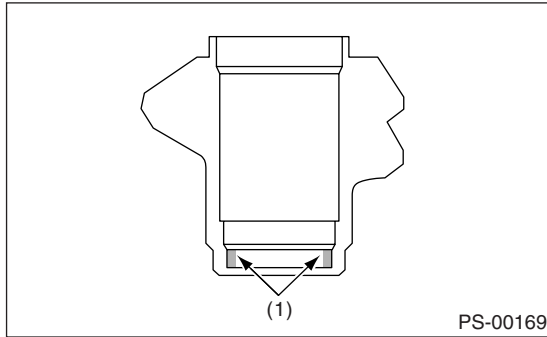
POWER ASSISTED SYSTEM (POWER STEERING)

2. CONTROL VALVE ASSEMBLY

Specified steering grease:

VALIANT GREASE M2 (Part No. 003608001)

- 1) Clean all parts and tools before reassembling.
- 2) Apply a coat of specified power steering fluid to the inner wall of valve housing.

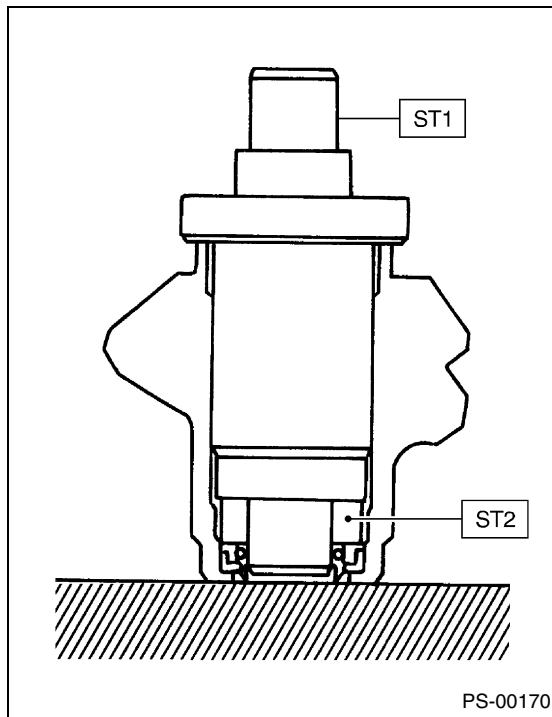


- 3) Attach ST2 to ST1, and press the oil seal into the place using a press.

ST1 34099FA120 INSTALLER & REMOVER SEAL

ST2 34099FA130 INSTALLER SEAL

- (1) Face oil seal in the direction shown in figure when installing.
- (2) To avoid scratching oil seal, apply a coat of grease to the contact surface of installer and oil seal.
- (3) To facilitate installation, attach oil seal to the installer and position in valve housing before pressing into place.

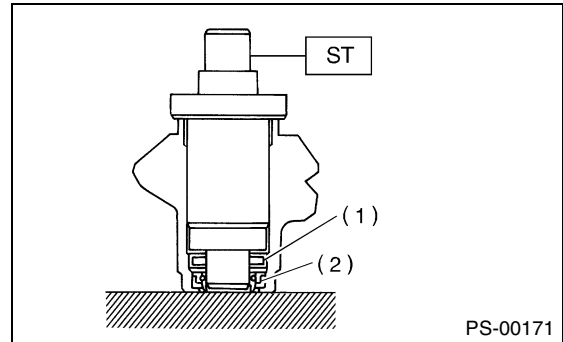


- 4) Using ST and press, install the special bearing in valve housing.

ST 34099FA120 INSTALLER & REMOVER SEAL

NOTE:

To facilitate installation, attach the ball bearing to the remover and position in valve housing before pressing it into place.



- (1) Special bearing
- (2) Oil seal

- 5) Put vinyl tape around pinion shaft splines to protect oil seal from damage.

- 6) Fit pinion and valve assembly into valve housing.

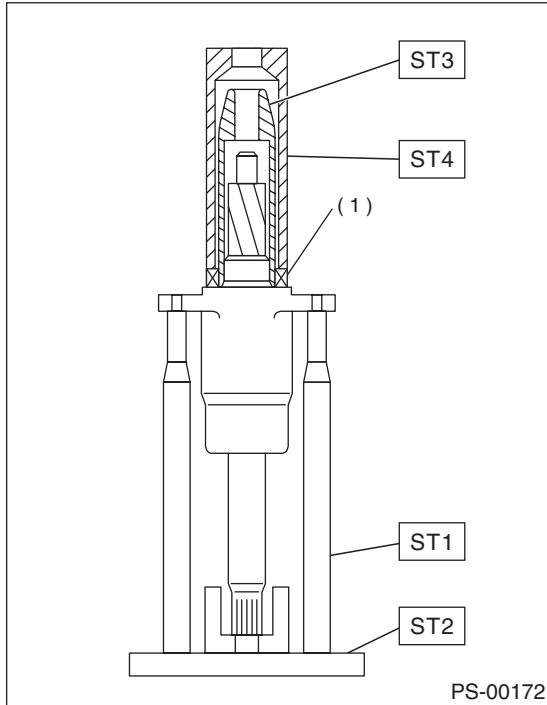
- 7) Secure valve assembly to ST1 and ST2.

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

8) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.

ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B



(1) Oil seal

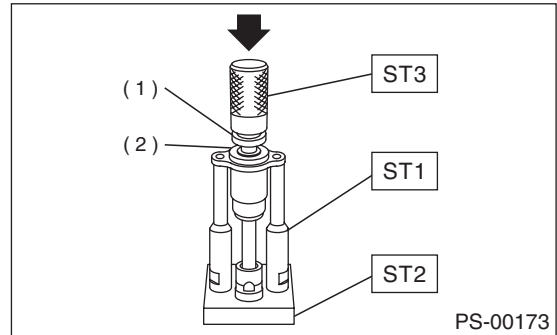
NOTE:

- Apply the specified power steering fluid to the oil seal and ST3, being careful not to damage oil seal lip.
- Push the oil seal until ST3 contacts housing end face.

9) Remove ST3, and fit backing washer.

10) Force-fit ball bearing using ST3.

ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 927640000 INSTALLER B



- (1) Ball bearing
(2) Backing washer

NOTE:

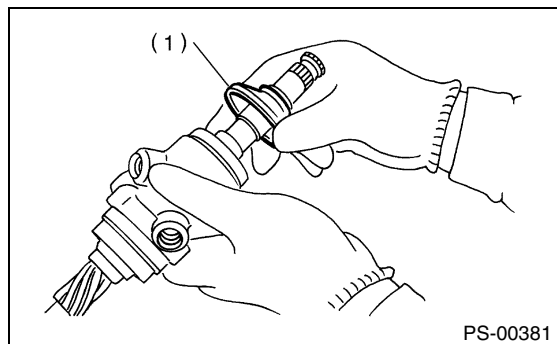
Be careful not to tilt ball bearing during installation.

11) Install the snap ring using snap ring pliers.

NOTE:

Rotate the snap ring to check for proper installation.

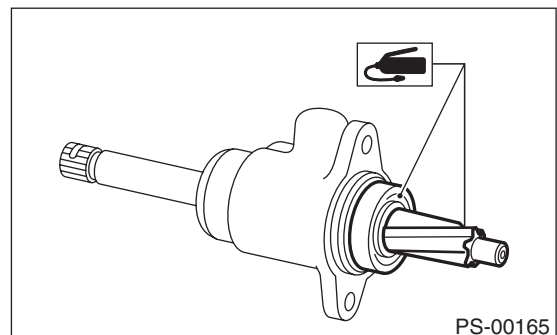
12) Apply the specified grease to the dust cover.



(1) Dust cover

13) Install the dust cover on the valve assembly.

14) Apply genuine grease to the pinion gear and bearing of valve assembly.



STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

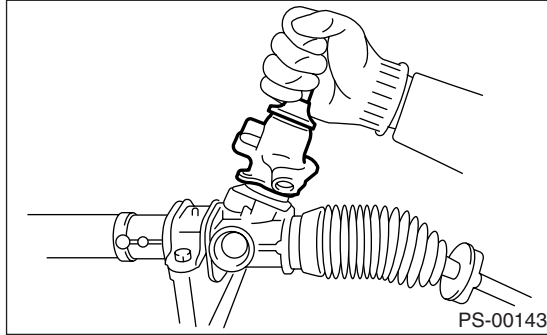
15) Install the gasket on the valve assembly. Insert the valve assembly into the place while facing rack teeth toward pinion.

CAUTION:

Be sure to use a new gasket.

NOTE:

Do not allow packing to be caught when installing valve assembly.



16) Tighten the bolts alternately to secure the valve assembly.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:

Be sure to alternately tighten bolts.

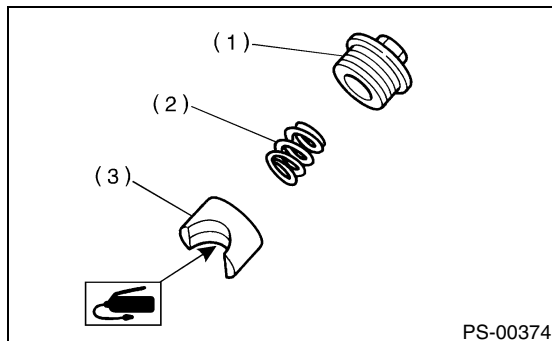
17) Apply grease to the sleeve insertion hole.

18) Apply grease to the dust seal insertion hole.

CAUTION:

Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

19) Apply grease to the sliding surface of sleeve and spring seat, then insert the sleeve into the pinion housing. Fit the spring into the sleeve the screw, pack grease inside of screw, then install the screw.



(1) Adjusting screw

(2) Spring

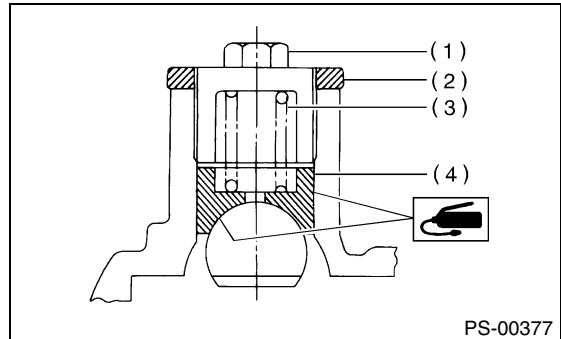
(3) Sleeve

20) Rack and pinion backlash adjustment

(1) Loosen the adjusting screw.

(2) Rotate the input shaft so that the rack is in the straight ahead direction.

(3) Apply grease to the sleeve.



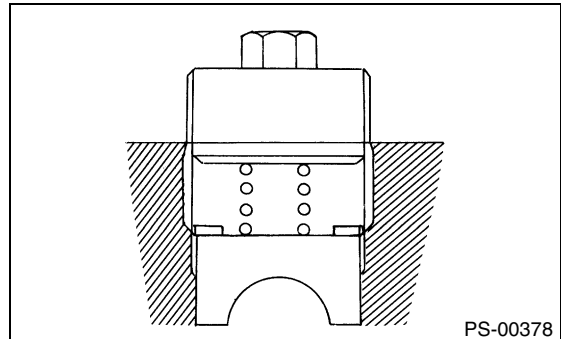
(1) Adjusting screw

(2) Lock nut

(3) Spring

(4) Sleeve

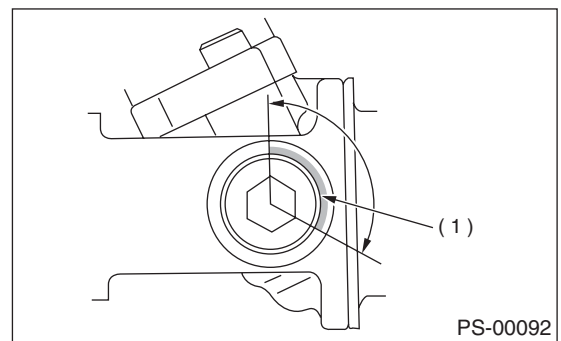
(4) Tighten the adjusting screw by two threads.



(5) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.

Liquid packing:

THREE BOND 1141



(1) Apply liquid packing to at least 1/3 of entire perimeter.

(6) Tighten the adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

(7) Install the lock nut. While holding adjusting screw with a wrench, tighten the lock nut using ST.

ST 926230000 SPANNER

Tightening torque (Lock nut):

39 N·m (4.0 kgf-m, 29 ft-lb)

NOTE:

- Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that the steering wheel can be rotated fully from lock to lock without binding.

21) Check for service limit as per article of "Service limit".<Ref. to PS-41, INSPECTION, Steering Gearbox.> Make replacement and adjustment if necessary.

22) Take off the gearbox from ST.

23) Install the four pipes on the gearbox.

(1) Connect the pipe A and B to the gearbox.

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Connect the pipe E and F to the gearbox.

Tightening torque:

Pipe E: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

Pipe F: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

E: INSPECTION

1. BASIC INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.

2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, the lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to "Service limit".) (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace the gearbox with new one.
		(4) Wear or damage on rack bush	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox with new one. (Refer to "Service limit".)
		(5) Wear on input shaft bearing	If the free plays of input shaft in radial and axial directions are out of the specified ranges, replace the gearbox with new one. (Refer to "Service limit".)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

2. SERVICE LIMIT

Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

NOTE:

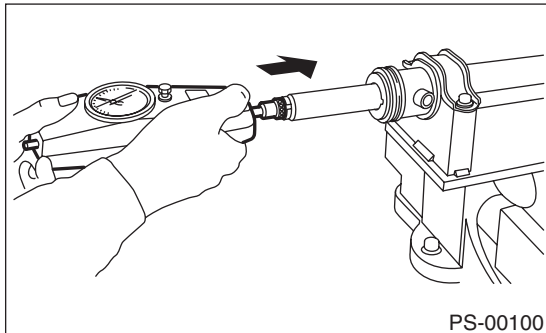
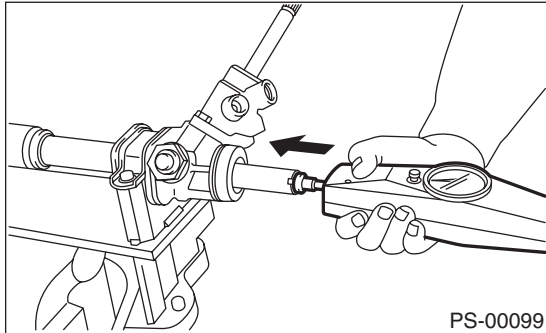
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit

340 N (35 kgf, 76 lb) or less



3. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

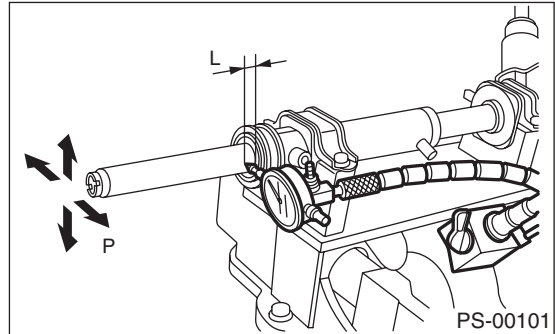
Service limit

0.19 mm (0.0075 in) or less

On condition

L: 5 mm (0.20 in)

P: 122.6 N (12.5 kgf, 27.6 lb)



Left-turn steering:

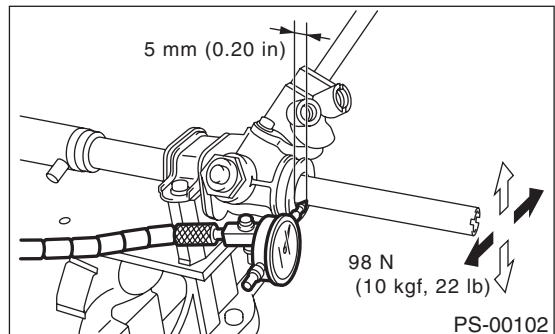
Service limit

Direction 

0.3 mm (0.012 in) or less

Direction 

0.15 mm (0.0059 in) or less



STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

4. INPUT SHAFT PLAY

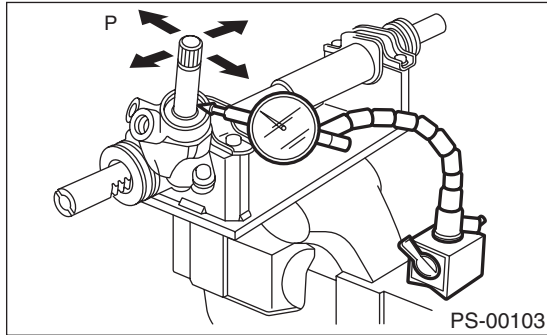
In radial direction:

Service limit

0.18 mm (0.0071 in) or less

On condition

P: 98 N (10 kgf, 22 lb)



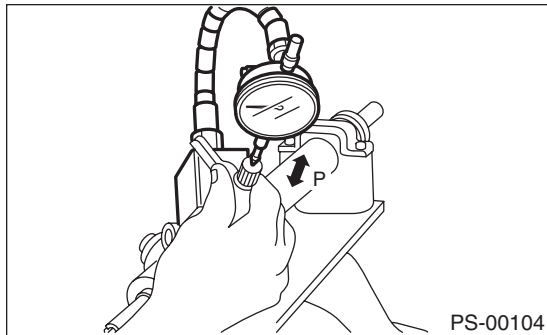
In axial direction:

Service limit

0.5 mm (0.020 in) or less

On condition

P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



5. TURNING RESISTANCE OF GEARBOX

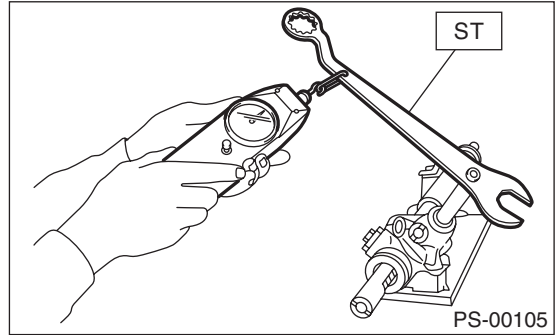
Using ST, measure gearbox turning resistance.

ST 34099PA100 SPANNER

Service limit

Maximum allowable resistance

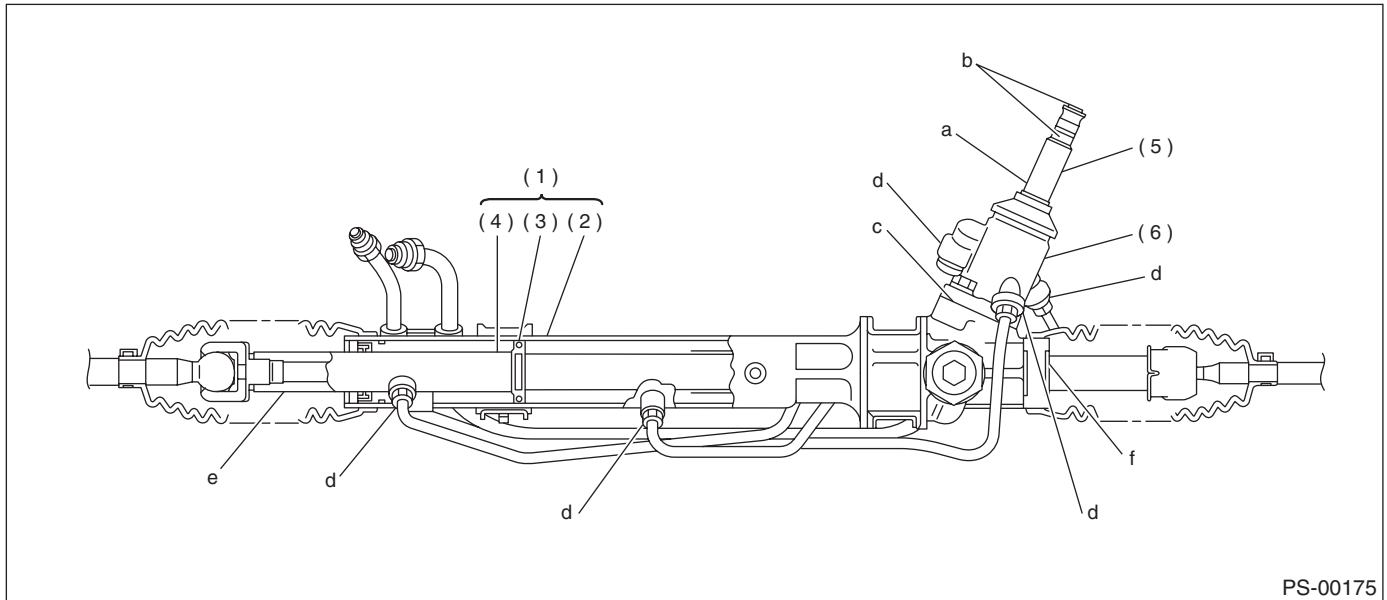
Less than 12 N (1.2 kgf, 2.7 lb)



STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

6. OIL LEAKING



- (1) Power cylinder
- (2) Cylinder

- (3) Rack piston
- (4) Rack axle

- (5) Input shaft
- (6) Valve housing

NOTE:

If the gearbox is dismantled without confirming where the leak is, it must be mounted again to locate the leak point.

1) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.

2) Inspect leakage from "a"

The oil seal is damaged. Replace the valve assembly with a new one.

3) Inspect leakage from "b"

The torsion bar O-ring is damaged. Replace the valve assembly with a new one.

4) Inspect leakage from "c"

The oil seal is damaged. Replace the valve assembly or oil seal with a new one.

5) Inspect leakage from "d"

The pipe is damaged. Replace the faulty pipe or O-ring.

STEERING GEARBOX

POWER ASSISTED SYSTEM (POWER STEERING)

6) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

(1) Leakage from “e”

The cylinder seal is damaged. Replace the rack bush with a new one.

(2) Leakage from “f”

There are two possible causes. Take the following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

CAUTION:

- If leakage from “f” is noted again:

The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.

- If oil stops leaking from “f”:

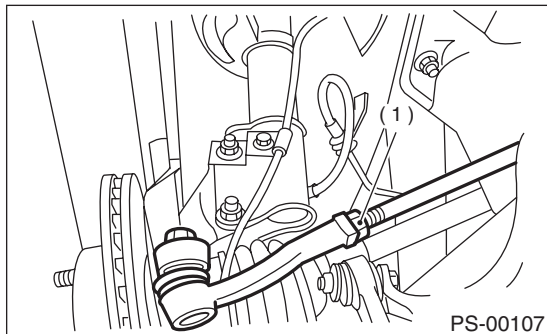
The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

F: ADJUSTMENT

1) Adjust the front toe.

Standard of front toe:

IN 3 — OUT 1 mm (IN 0.12 — OUT 0.039 in)



PS-00107

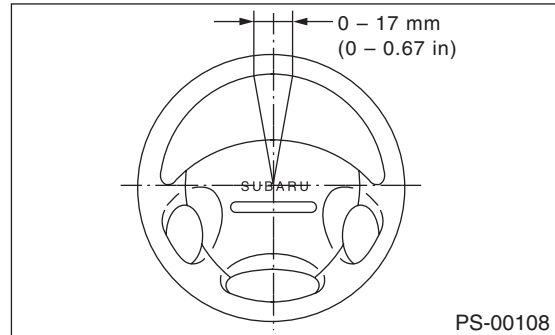
(1) Lock nut

2) Adjust the steering angle of wheels.

Standard of steering angle:

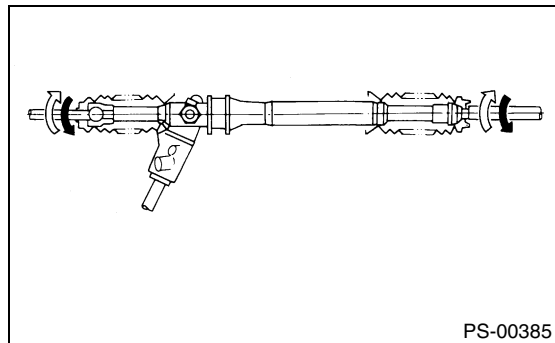
Model	TURBO, Sedan, OUTBACK	Others
Inner wheel	34°05' ± 1.5°	36°55' ± 1.5°
Outer wheel	29°35' ± 1.5°	31°35' ± 1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



PS-00108

4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same turns.



PS-00385