

Steering System

GENERAL

STEERING COLUMN AND SHAFT

STEERING COLUMN / SHAFT

MECHANICAL POWER STEERING SYSTEM

POWER STEERING GEAR BOX
POWER STEERING HOSES
POWER STEERING OIL PUMP

GENERAL

SPECIFICATIONS EB64DCC7

Items	Specifications
Steering gear type	Rack and pinion
Rack stroke	140 ± 1 mm (lock to lock : 3.06 turns)
Power steering pump type	Vane type
Oil pump displacement	9.6cc/rev. MAX. (0.59 in ³ /rev. MAX.)
2.0(I4), 2.0(D-ENG)	10.5cc/rev. MAX. (0.64 in ³ /rev. MAX.)
2.7(V6)	

SERVICE STANDARD

Items	Specifications
Steering wheel free play	0 ~ 30 mm (0 ~ 1.1 in)
Steering angle	
Inner wheel	37.15° ± 1°30´
Outer wheel	31.8°
Stationary steering effort	29 N (3.0 kg, 6.5 lbs) or less
Belt deflection [under 98N (10kg, 22lb) force]	
New belt	8.8 ~ 11.0 mm
Use belt	12.5 ~ 14.3 mm
Oil pump relief pressure	
2.0 (I4), 2.7 (V6)	8.6 ~ 9.1 MPa (88 ~ 93 kg/cm ² , 1251 ~ 1322 psi)
2.0 (D-ENG)	9.1 ~ 9.6 MPa (93 ~ 98 kg/cm ² , 1322 ~ 1393 psi)
Total pinion preload	0.6 ~ 1.3 Nm (0.06 ~ 0.13 kgf·m, 5.2 ~ 11.3 lbf-in)
Tie rod swing resistance	2 ~ 5 Nm (0.2 ~ 0.5 kgf·m, 1.4 ~ 3.6 lbf-ft)
Ball joint starting torque	0.5 ~ 2.5 Nm (0.05 ~ 0.25 kgf·m, 0.36 ~ 1.78 lbf-ft)

GENERAL

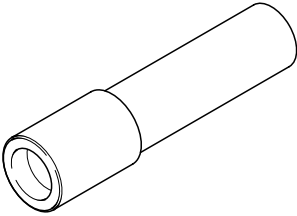
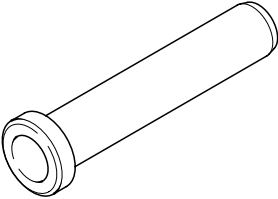
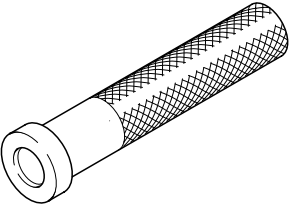
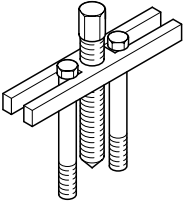
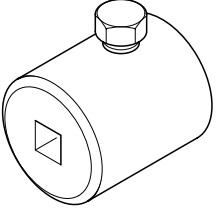
TIGHTENING TORQUE

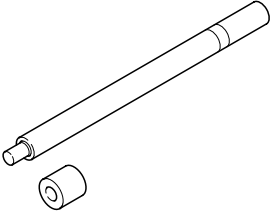
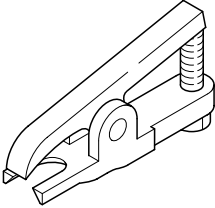
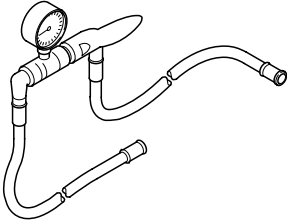
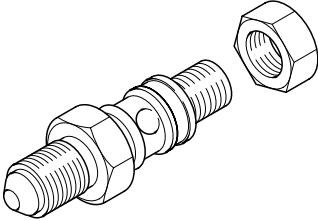
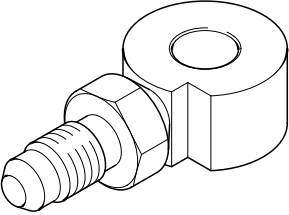
Item	Nm	kgf-m	lbf-ft
Power steering column and shaft			
Steering column and shaft mounting bolt	13 ~ 18	1.3 ~ 1.8	9.6 ~ 13.3
Power steering wheel lock nut	35 ~ 45	3.5 ~ 4.5	25.3 ~ 32.5
Pinion gear and joint assembly	15 ~ 20	1.5 ~ 2	10.8 ~ 14.8
Steering column shaft and universal joint assembly	15 ~ 20	1.5 ~ 2	10.8 ~ 14.8
Power steering gear box			
Gear box mounting bolt	60 ~ 80	6 ~ 8	44 ~ 59
Tie rod end ball joint and knuckle arm mounting nut	45 ~ 60	4.5 ~ 6	32.5 ~ 43.4
Feed tube to gear box	10 ~ 16	1 ~ 1.6	7.4 ~ 11.8
Gear box to valve body	20 ~ 30	2 ~ 3	14.8 ~ 21.7
Yoke plug lock nut	50 ~ 70	5 ~ 7	37 ~ 50
Power steering oil pump			
Pressure hose to oil pump	65 ~ 75	6.5 ~ 7.5	47.9 ~ 54.2
Oil pump adjusting bolt	35 ~ 50	3.5 ~ 5	25.3 ~ 37
Oil pump mounting bolt			
2.0 (D-ENG)	17 ~ 26	1.7 ~ 2.6	12.3 ~ 18.8
2.0 (I4), 2.7 (V6)	35 ~ 50	3.5 ~ 5	25.8 ~ 37
Oil pump bracket mounting bolt	35 ~ 50	3.5 ~ 5	25.8 ~ 37
Power steering hose			
Power steering reservoir mounting bolt	17 ~ 26	1.7 ~ 2.6	12.3 ~ 18.8
Power steering hose mounting bolt	4 ~ 6	0.4 ~ 0.6	3.0 ~ 4.0
Power steering tube mounting bolt	4 ~ 6	0.4 ~ 0.6	3.0 ~ 4.0

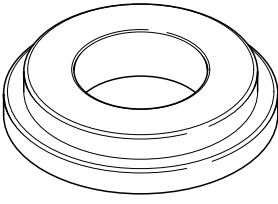
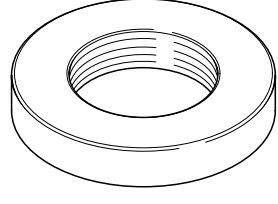
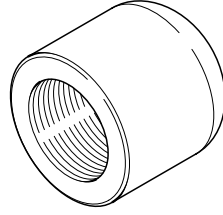
LUBRICANTS

Item	Recommended lubricant	Quantity
Bearing of steering shaft	ALVANIA #2 OR #3 (KEUK DONG SHELL, KOREA)	As required
Ball joint of tie rod end	SHOWA SUNLIGHT MB-2 OR equivalent	4 g
Steering gear housing	ONE-LUBER RP GREASE (KYODOYUSHI, JAPAN)	As required
Inner ball joint of gear box	LONG TIME PD2 (OPTIMOL, GERMAN)	As required
Contact area of gear box bellows & tie rod	SILICON GREASE (SPEC NO : MS511-41)	As required
Power steering fluid	PSF-3	0.75 ~ 0.8 liter (0.79 ~ 0.84 qts.)

SPECIAL TOOLS E37BE85B

Tool (Number and name)	Illustration	Use
09222-32100 Valve stem oil seal installer	 APIE001L	Installing the pinion gear bearing
09432-21600 Bearing installer	 APIE001K	Installing the pinion gear bearing
09434-14200 Counter shaft bearing installer	 APIE001M	Installing the gear box oil seal.
09561-11002 Steering wheel puller	 APIE001F	Removing the steering wheel.
09565-11100 Preload socket	 APIE001A	Measuring the mainshaft preload.

Tool (Number and name)	Illustration	Use
09555-21000 Bar	 <small>APIE001H</small>	Removing & installing the oil seal.
09568-34000 Ball joint puller	 <small>APIE001B</small>	Separating the tie rod end ball joint.
09572-21000 Oil pressure gauge	 <small>APIE001C</small>	Measuring the power steering oil pressure (use with 09572-21200, 09572-22100)
09572-21200 Oil pressure gauge adapter	 <small>APIE001E</small>	Measuring the power steering oil pressure (use with 09572-21000, 09572-22100)
09572-22100 Oil pressure gauge adapter	 <small>APIE001D</small>	Measuring the power steering oil pressure (use with 09572-21000, 09572-21200)

Tool (Number and name)	Illustration	Use
09573-21000 Oil seal installer gauge	 <small>APIE001I</small>	Installing the back-up washer and oil seal. (use with 09573-21100, 09573-21200, 09517-11000, 09555-21000)
09573-21100 Oil seal installer	 <small>APIE001J</small>	Installing the back-up washer and oil seal. (use with 09573-21000, 09573-21200, 09555-21000)
09573-21200 Oil seal guide	 <small>APIE001G</small>	<ol style="list-style-type: none">1. Removing the gear box oil seal and back washer (use with 09573-21000)2. Installing the gear box oil seal and back washer (use with 09555-21000, 09573-21000)

TROUBLESHOOTING

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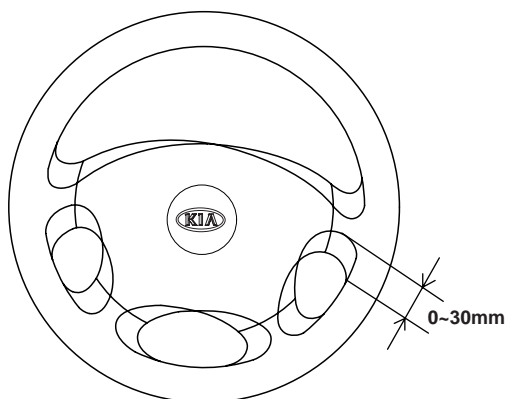
Symptom	Probable cause	Remedy
Excessive play in steering	Loose yoke plug Loose steering gear mounting bolts Loose or worn tie rod end	Retighten Retighten Retighten or replace as necessary
Steering wheel operation is not smooth (Insufficient power assist)	V-belt slippage Damaged V-belt Low fluid level Air in the fluid Twisted or damaged hoses Insufficient oil pump pressure Sticky flow control valve Excessive internal oil pump leakage Excessive oil leaks from rack and pinion in gear box Distorted or damaged gear box or valve body seals	Readjust Replace Replenish Bleed air Correct the routing or replace Repair or replace the oil pump Replace Replace the damaged parts Replace the damaged parts Replace
Steering wheel does not return properly	Excessive turning resistance of tierod end Yoke plug excessively tight Tie rod and/or ball joint cannot turn smoothly Loose mounting of gear box mounting bracket Worn steering shaft joint and/or body grommet Distorted rack Damaged pinion bearing Twisted or damaged hoses Damaged oil pressure control valve Damaged oil pump input shaft bearing	Replace Adjust Replace Retighten Correct or replace Replace Replace Reposition or replace Replace Replace
Noise	<p>Hissing Noise in Steering Gear</p> <p>There is some noise with all power steering systems. One of the most common is a hissing sound when the steering wheel is turned and the car is not moving. This noise will be most evident when turning the wheel while the brakes are being applied. There is no relationship between this noise and steering performance. Do not replace the valve unless the "hissing" noise becomes extreme. A replaced valve will also make a slight noise, and is not always a solution for the condition</p>	
Rattling or chucking noise in the rack and pinion	Interference with hoses from vehicle body Loose gear box bracket Loose tie rod end and/or ball joint Worn tie rod and/or ball joint	Reposition Retighten Retighten Replace
Noise in the oil pump	Low fluid level Air in the fluid Loose pump mounting bolts	Replenish Bleed air Retighten

GENERAL EAD565D9

CHECKING STEERING WHEEL FREE PLAY

1. Start the engine with the steering wheel in the straight ahead position, apply a force of 5 N (1.1 lb) to the steering wheel in the peripheral direction.
2. Measure the play at the circumference of the steering wheel.

Standard value :
Steering wheel free play : 0 ~ 30 mm (0 ~ 1.1 in)



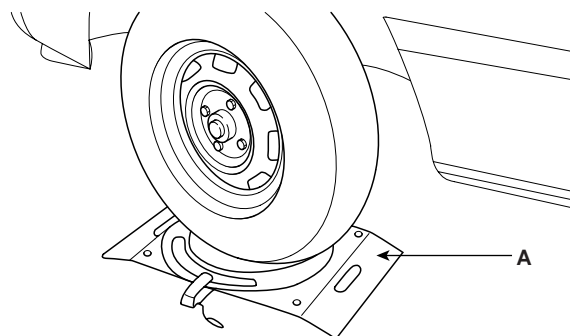
APIE101A

3. If the play exceeds the standard value, inspect the connection between the steering shaft and tie rod ends.

CHECKING STEERING ANGLE

1. Place the front wheel on a turning radius gauge and measure the steering angle.

Standard value :
Wheel angle
Inner wheel : $37.15^\circ \pm 1^\circ 30'$
Outer wheel : 31.8°

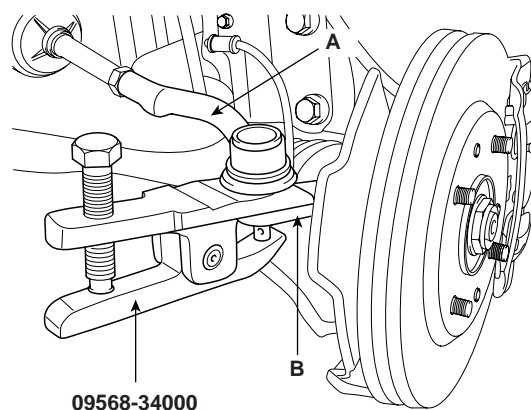


APIE101B

2. If the measured value is not within the standard value, adjust the linkage.

CHECKING THE TIE ROD END BALL JOINT STARTING TORQUE

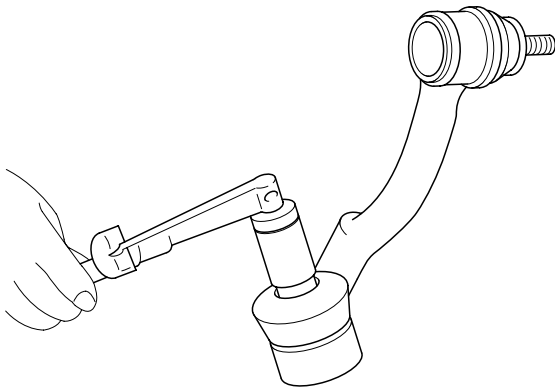
1. Disconnect the tie rod(A) and knuckle(B) by using the special tool (09568-34000).



APIE101C

2. Shake the ball joint stud several times to check for looseness.
3. Mount the nuts on the ball joint, and then measure the ball joint starting torque.

Standard value :
0.5 ~ 2.5 Nm (0.05 ~ 0.25 kgf-m, 0.36~1.78 lbf-ft)



APIE101D

4. If the starting torque exceeds the upper limit of the standard value, replace the tie rod end.
5. Even if the starting torque is below the lower limit of the standard value, check the play of the ball joint and replace if necessary.

CHECKING STATIONARY STEERING EFFORT

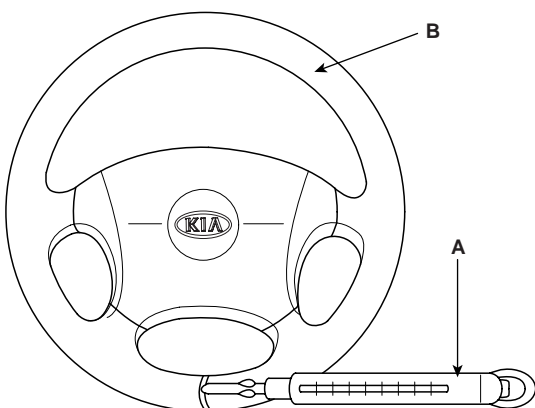
1. Place the vehicle on a level surface and place the steering wheel in the straight ahead position.
2. Increase the engine speed to 1000 ± 100 rpm.

NOTE

After checking, reset the engine speed to the standard value (idling speed).

3. Measure the turning force with a spring scale(A) by turning the steering wheel(B) clockwise and counter-clockwise one and a quarter turns.

Standard value :
Stationary steering effort :
29 N (3.0 kg, 6.5lbs) or less



APIE101E

4. Check that there is no sudden change of force while turning the steering wheel.
5. If the stationary steering effort is excessive, check and adjust the following points.
 - 1) Damage or cracks on the dust cover of the lower arm ball joint and tie rod end.
 - 2) Pinion preload of the steering gear box and starting torque of the tie rod end ball joint.
 - 3) Starting torque of the ball joint.

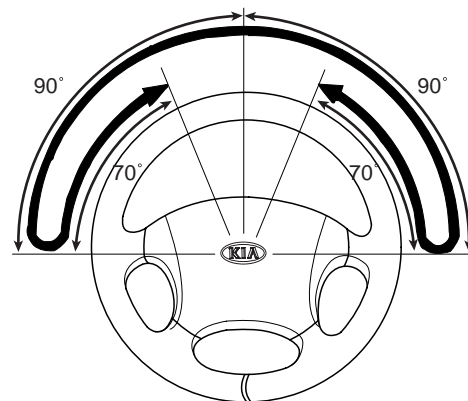
CHECKING STEERING WHEEL RETURN

Check the steering wheel return and confirm the following points :

1. The force required to turn the steering wheel and the wheel return should be the same for both left and right in case of moderate or sharp turns.
2. When the steering wheel is turned 90° and held for a couple of seconds while the vehicle is being driven at 35kph, the steering wheel should return 70° or more.

NOTE

If the steering wheel is turned very quickly, steering may be momentarily difficult. This is not a malfunction because the oil pump output will be somewhat decreased.

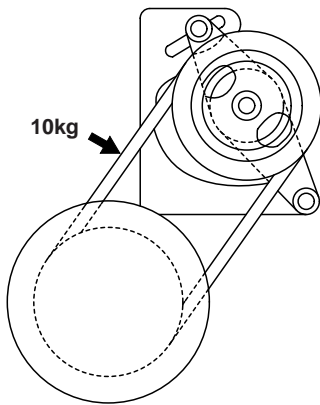


APIE101F

CHECKING POWER STEERING BELT TENSION

1. Press the V belt, applying a pressure of 98N (10kg, 22lb) at the specified point and measure the deflection to confirm that it is within the standard value.

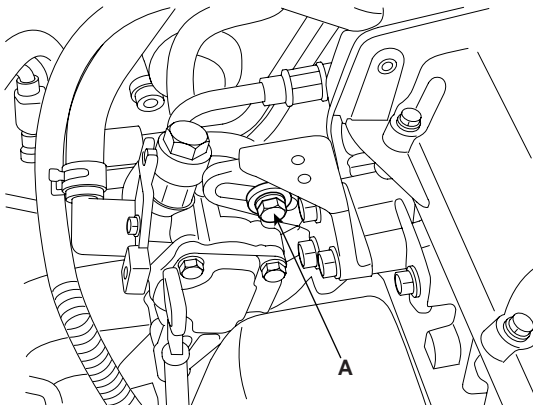
Standard value :
New belt : 8.8 ~ 11.0 mm
Used belt : 12.5 ~ 14.3 mm



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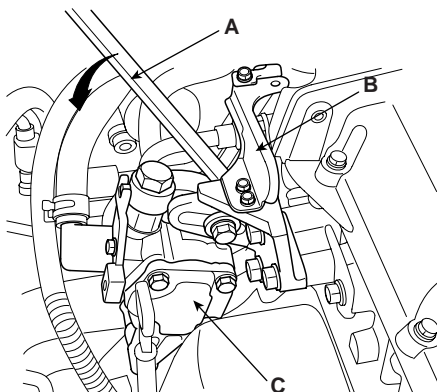
2. If the belt deflection is beyond the standard value, adjust the belt tension as follows.

- 1) Loosen the bolt adjusting(A) the power steering "V"belt tension.



LPIE101H

2) Put a bar(A) or equivalent, between the bracket(B) and the oil pump(C) and adjust the tension so that the belt deflection is within the standard value.



LPIE101I

- 3) Tighten the bolt adjusting the power steering "V"belt tension.
- 4) Check the belt deflection and adjust it again if necessary.

CAUTION

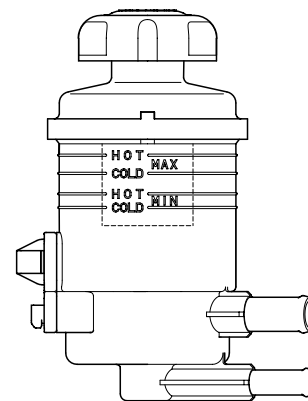
After turning the V belt in the normal rotation direction more than once, recheck the belt deflection.

CHECKING POWER STEERING FLUID LEVEL

1. Position the vehicle on a level surface.
2. Start the engine. With the vehicle kept stationary, turn the steering wheel several times continuously to raise the fluid temperature to 50 - 60°C(122 to 140°F).
3. With the engine at idle, turn the steering wheel fully clockwise and counterclockwise several times.
4. Make sure there is no foaming or cloudiness in the reservoir fluid.
5. Stop the engine to check for any difference in fluid level between a stationary and a running engine.

NOTE

1. If the fluid level varies 5 mm (0.2 in.) or more, bleed the system again.
2. If the fluid level suddenly rises after stopping the engine, further bleeding is required.
3. Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durability of the pump.



APIE101G

REPLACING POWER STEERING FLUID

1. Jack up the front wheels of the car and support them with jackstands.

2. Disconnect the return hose from the oil reservoir and plug the oil reservoir.
3. Connect a hose to the disconnected return hose, and drain the oil into a container.
4. Disconnect the high-tension cables and ignition coils. While operating the starter motor intermittently, turn the steering wheel all the way to the left and then to the right several times to drain the fluid.
5. Connect the return hose and fix it with a clip.
6. Fill the power steering fluid reservoir with the specified fluid.

PSF-3 : 0.75~0.8 lit.

7. Start the engine. Check for fluid leaks from the hose, then stop the engine.
8. Pour the fluid into the bottom of the oil filter in the power steering fluid reservoir.

9. Bleed the air.

AIR BLEEDING

1. Fill the power steering fluid reservoir up to the "MAX" position with specified fluid.
2. Jack up the front wheels.
3. Disconnect the ignition coil high tension cable, and then, while operating the starter motor intermittently (for 15 to 20 seconds), turn the steering wheel all the way to the left and then to the right five or six times.

NOTE

1. When bleeding fluid, replenish with the fluid so that the level does not fall below the bottom of the filter.
 2. If air bleeding is done while the vehicle is idling, the air will be broken up and absorbed into the fluid. Be sure to do the bleeding only while cranking.
4. Connect the high tension cable, and then start the engine (idling).
 5. Turn the steering wheel to the left and then to the right, until there are no air bubbles in the oil reservoir.

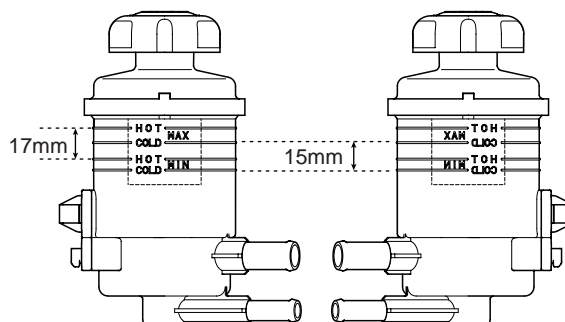
NOTE

Do not hold the steering wheel turned all the way to either side for more than ten seconds.

6. Confirm that the fluid is not milky and that the level is between "MAX" and "MIN" mark on the reservoir.
7. Check that there is a little change in the fluid level when the steering wheel is turned left and right.

NOTE

If the fluid level varies 5mm (0.2 in.) or more, bleed the system again.
If the fluid level suddenly rises after stopping the engine, further bleeding is required.
Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durability of the pump.



APIE1011

OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose(B) from the pump(A). Connect the special tool between the pump and the pressure hose as illustrated.
2. Bleed the air, and then start the engine and turn the steering wheel several times, measure the fluid temperature by Temperature gauge so that the fluid temperature can rise to approximately 50°C (122°F).
3. Increase the engine speed to 1,000 rpm.
4. Close the shut-off valve of the special tool and measure the fluid pressure to confirm that it is within the standard value range.

Standard value :

Oil pump pressure
Relief pressure :
2.0(I4), 2.7(V6) :
8.6 ~ 9.1 MPa (88 ~ 93 kg.cm², 1251 ~ 1322 psi)
2.0(D-ENG) :
9.1~9.6 MPa (93 ~ 98 kg.cm², 1322 ~ 1393 psi)

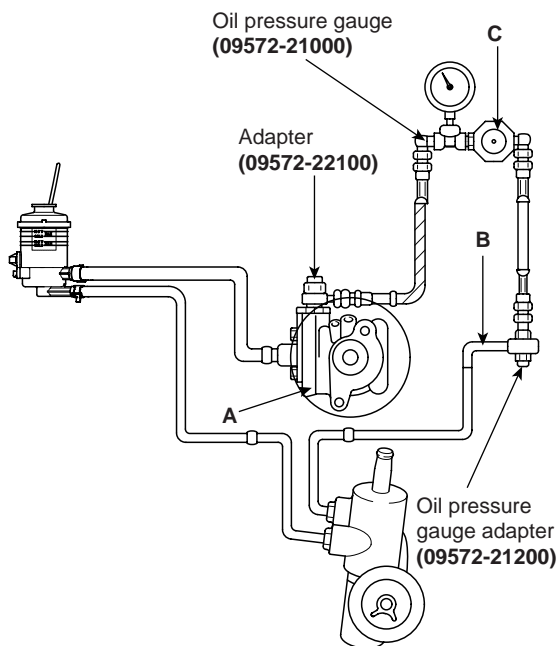
 **CAUTION**

Do not keep the shut-off valve on the pressure gauge closed for more than ten seconds.

5. Remove the special tools, and tighten the pressure hose(B) against the oil pump (A) using the specified torque.

Tightening torque :

65 ~ 75 Nm (6.5 ~ 7.5 kgf-m, 47.9 ~ 54.2 lbf-ft)



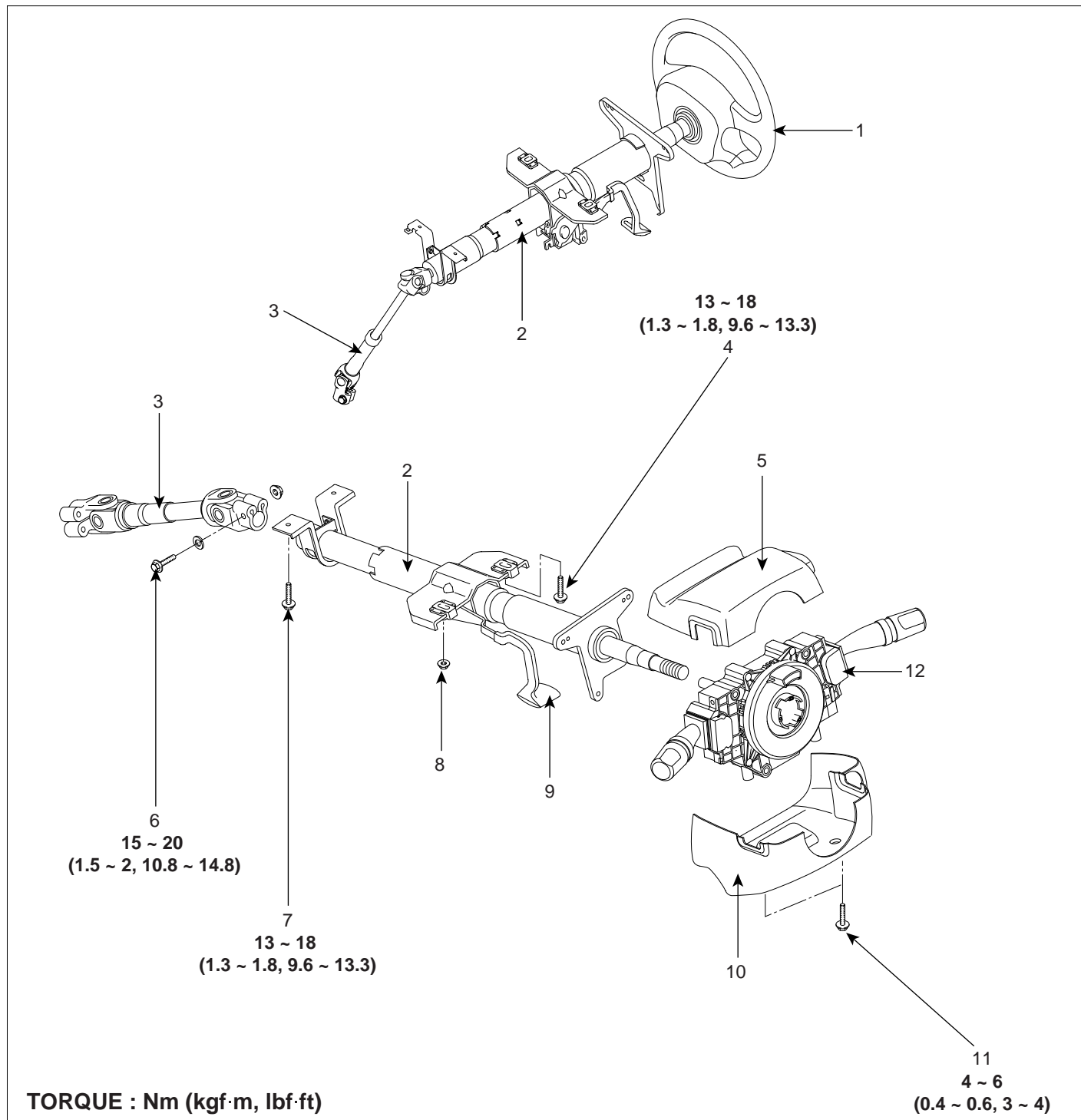
LPIE101J

6. Air bleed the system. (see page ST-11)

STEERING COLUMN AND SHAFT

STEERING COLUMN / SHAFT

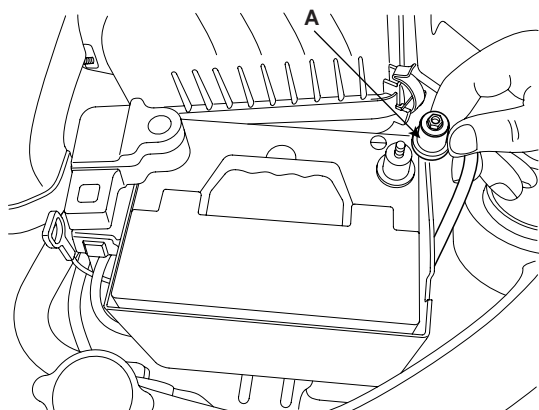
COMPONENTS E28878A5



- 1. Steering wheel
- 2. Steering column shaft assembly
- 3. Universal joint assembly
- 4. Steering column shaft mounting bolt
- 5. Steering column upper shroud
- 6. Universal joint mounting bolt
- 7. Steering column shaft mounting bolt
- 8. Steering column shaft mounting nut
- 9. Tilt lever
- 10. Steering column lower shroud
- 11. Steering column lower shroud mounting bolt
- 12. Multifunction switch

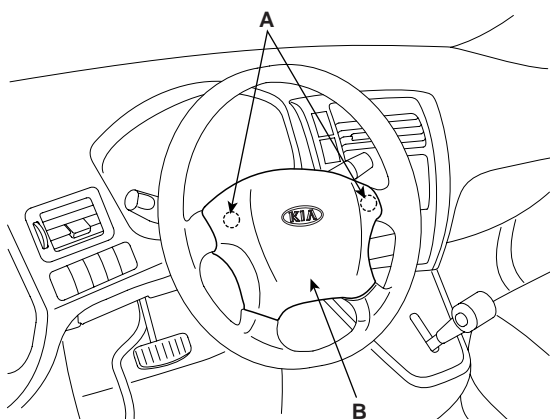
REMOVAL EADBD51A

1. Disconnect the negative (-) terminal(A) from the battery.



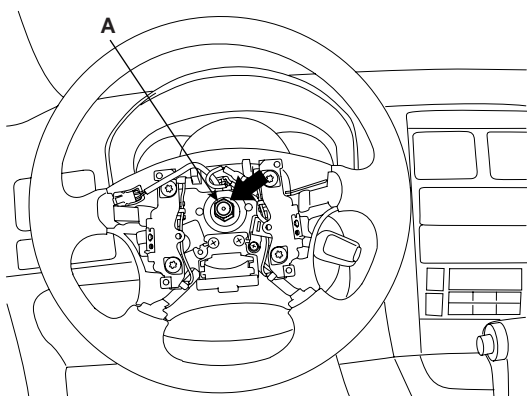
APIE102B

2. Take away the bolts (A) in the illustration, and then remove the driver's airbag module(B).



APIE102C

3. Remove the steering wheel lock nut(A).

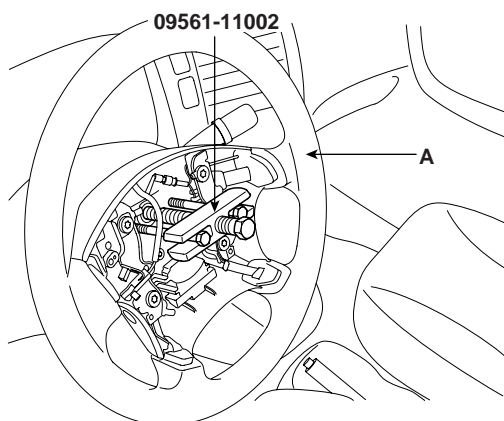


APIE102D

4. After aligning the marks on the steering shaft and wheel(A), remove the steering wheel using the special tool (09561-11002).

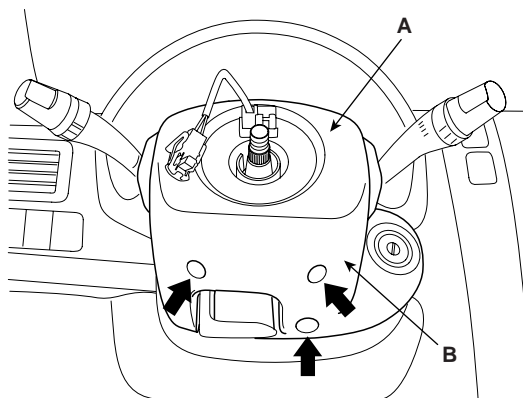
NOTE

Do not hammer on the steering wheel to remove it: it may damage the steering column.



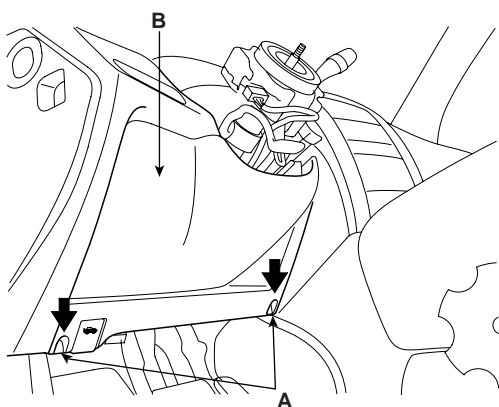
APIE102E

5. Remove the steering column upper(A) and lower shrouds(B).



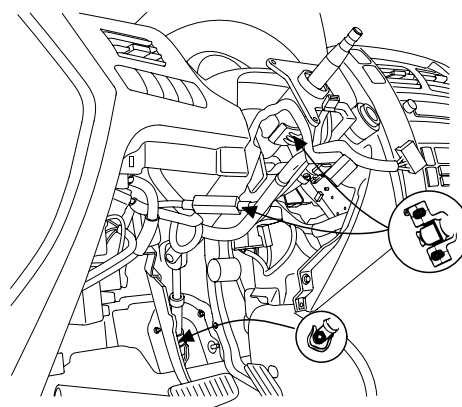
APIE102F

6. Disconnect two tightening bolt(A) and remove the lower crash pad(B).



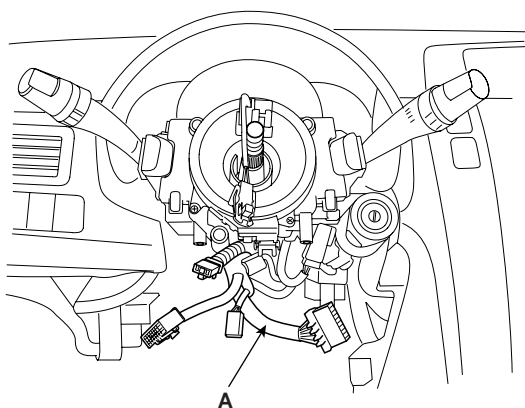
APIE102G

7. Remove the connectors of the multifunction switch(A).



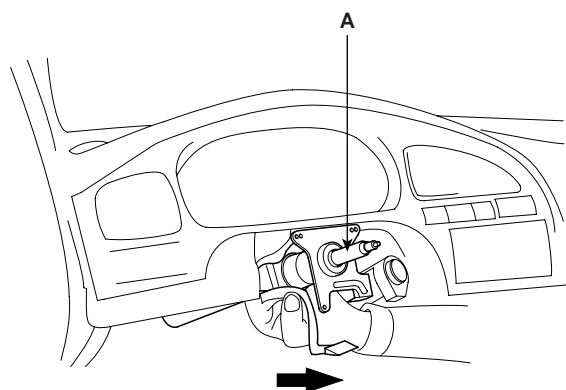
APIE102J

10. After removing the mounting bolts and nuts on the steering column and shaft assembly, remove the steering column and shaft assembly(A).



APIE102H

8. After removing three bolts(A) in the illustration, remove the multifunction switch assembly(B).



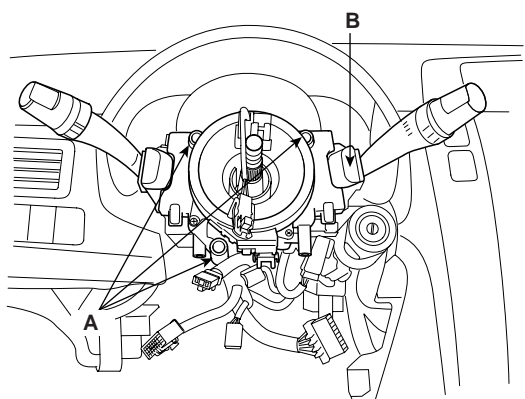
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DISASSEMBLY AND REASSEMBLY

EFF64AB5

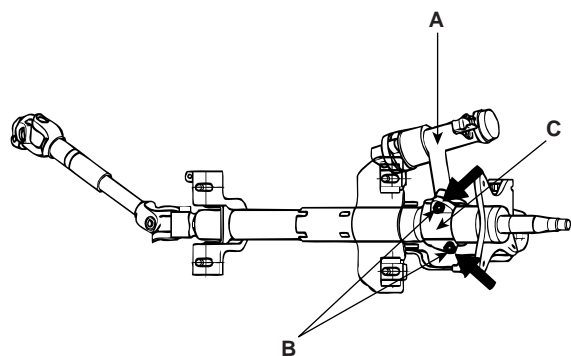
KEY LOCK ASSEMBLY

1. If it is necessary to remove the key lock assembly(A), use a punch to make a groove on the head of the special bolt(B), and then use a screwdriver to remove the key lock assembly mounting bracket(C).



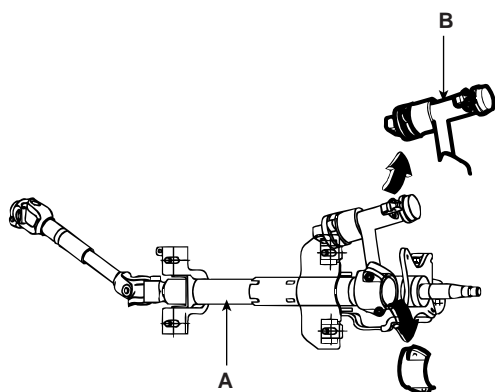
APIE102I

9. Remove the bolts connecting the steering column shaft(A) and the universal joint(B) as shown in the illustration.



APIE102K

2. Disassemble the key lock assembly(A) from the steering column and shaft assembly(B).

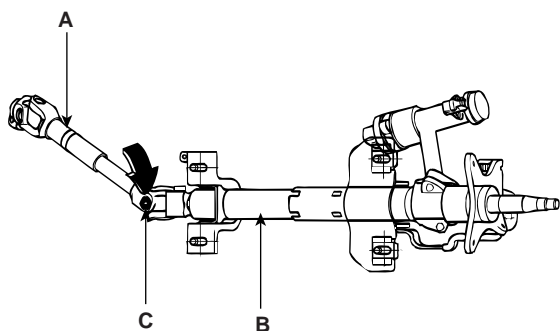


APIE102L

3. Reassembly is the reverse of disassembly.

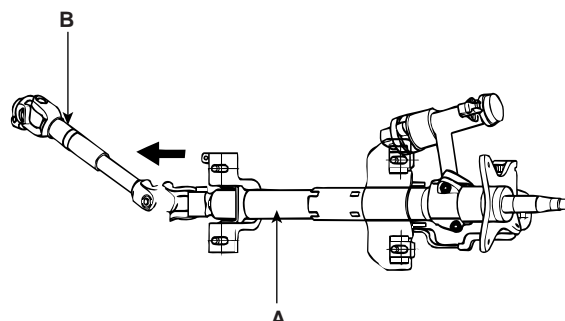
UNIVERSAL JOINT ASSEMBLY

1. Remove the bolt(C) connecting the universal joint assembly(A) and the steering column and shaft assembly(B).



APIE102M

2. Remove the universal joint assembly(B) from the steering column and shaft assembly(A).



APIE102N

3. Reassembly is the reverse of disassembly.

INSPECTION EDF31EB5

1. Check the steering column shaft for damage and deformation.
2. Check connections for play, damage and smooth operation.
3. Check the ball joint bearing for wear and damage.

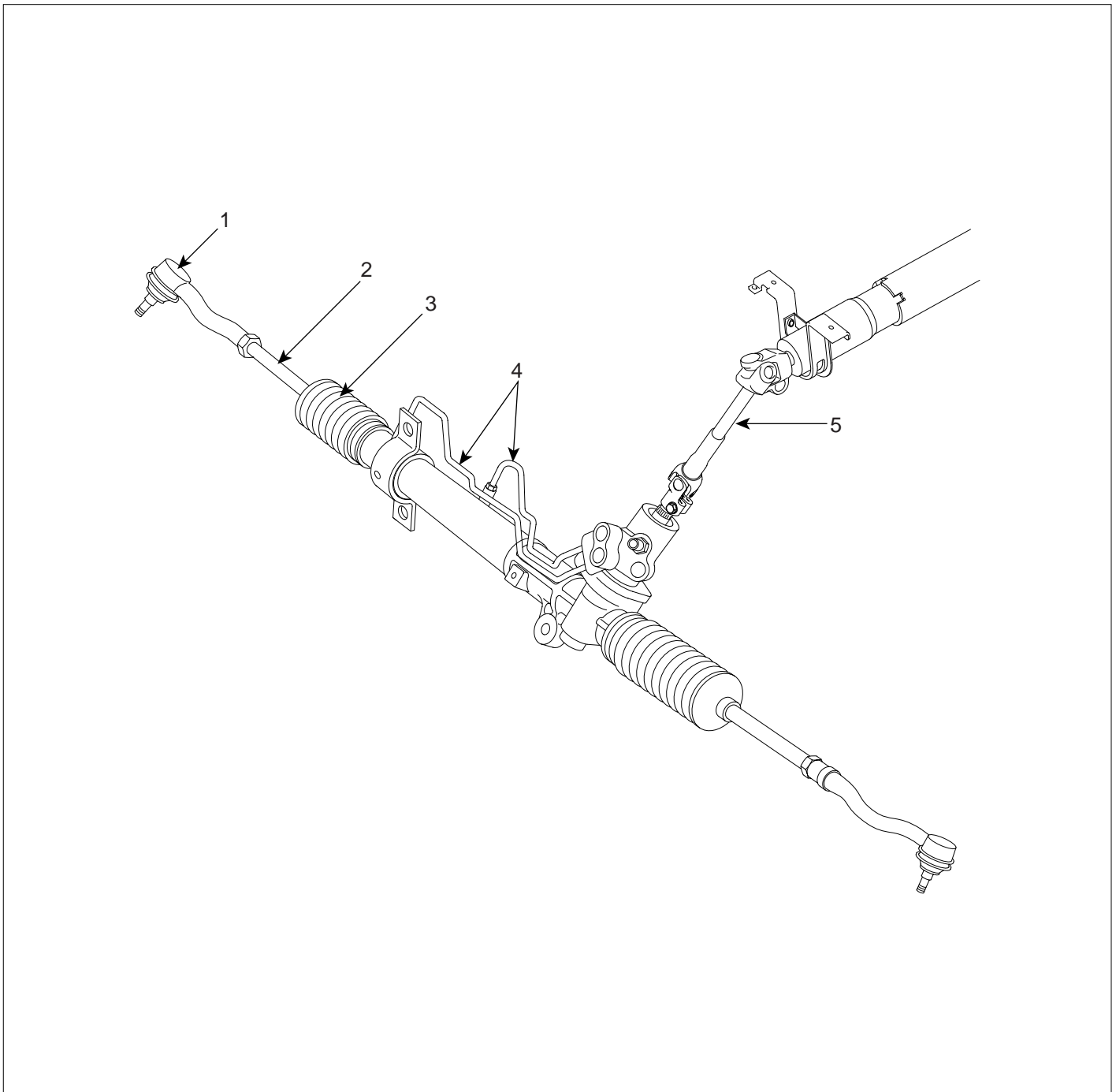
INSTALLATION EC8D9B1A

Assembly is the reverse of removal.

MECHANICAL POWER STEERING SYSTEM

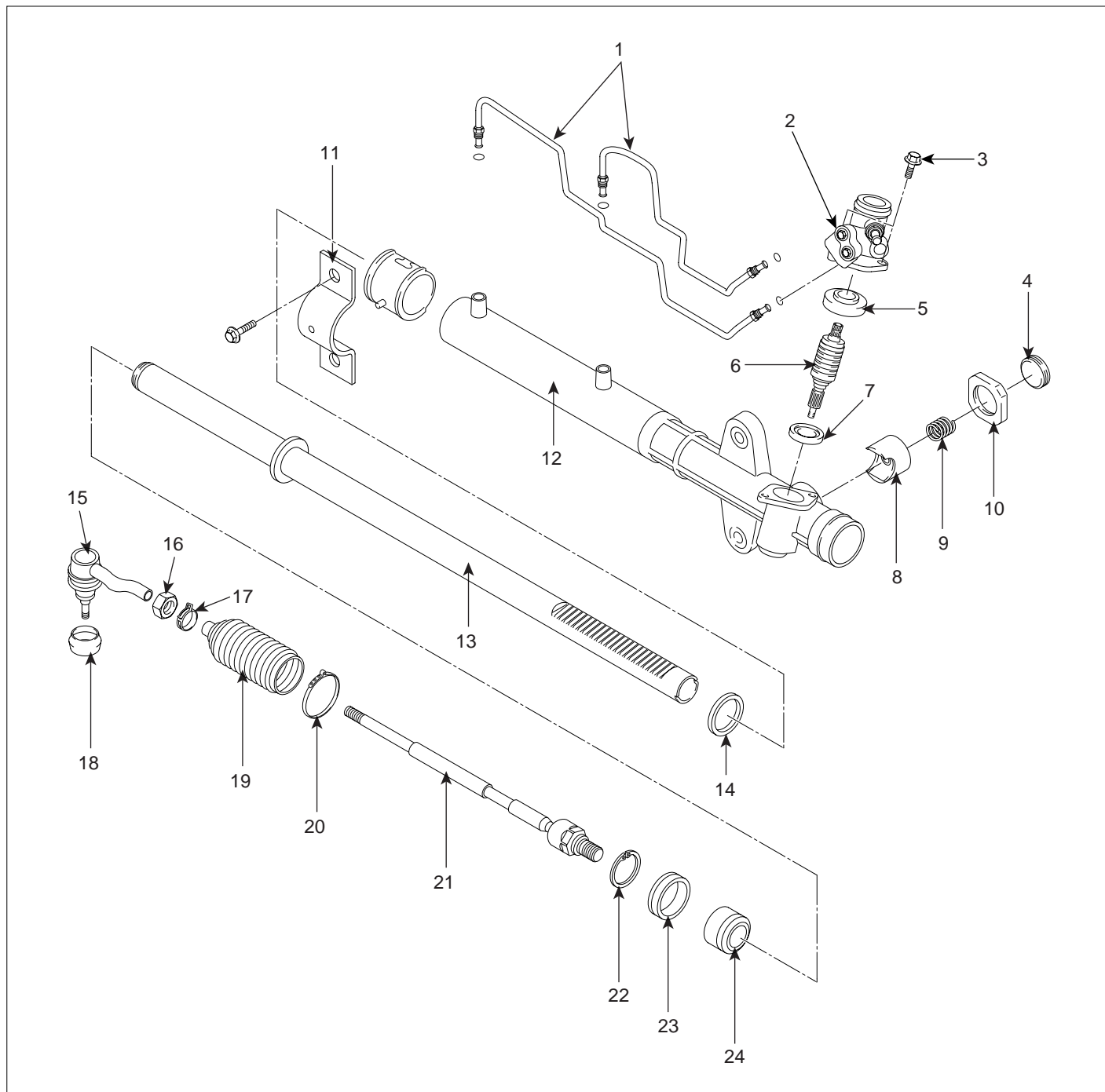
POWER STEERING GEAR BOX

COMPONENTS E4EF03E8



- 1. Tie rod end assembly
- 2. Tie rod assembly
- 3. Bellows

- 4. Feed tube
- 5. Joint assembly



- | | | |
|--------------------------|--|------------------|
| 1. Feed tube | 9. Rack support spring | 17. Bellows clip |
| 2. Valve body housing | 10. Lock nut | 18. Dust cover |
| 3. Bolt | 11. Power steering gear box mounting clamp | 19. Bellows |
| 4. Yoke plug | 12. Rack housing | 20. Bellows band |
| 5. Oil seal | 13. Rack | 21. Tie rod |
| 6. Pinion valve assembly | 14. Oil seal | 22. Circlip |
| 7. Oil seal | 15. Tie rod end | 23. Oil seal |
| 8. Rack support yoke | 16. Lock nut | 24. Rack stopper |

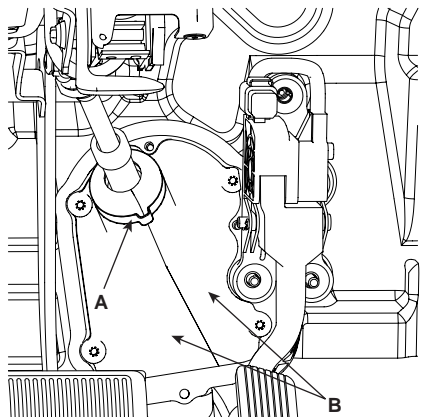
LPIE103B

MECHANICAL POWER STEERING SYSTEM

ST -19

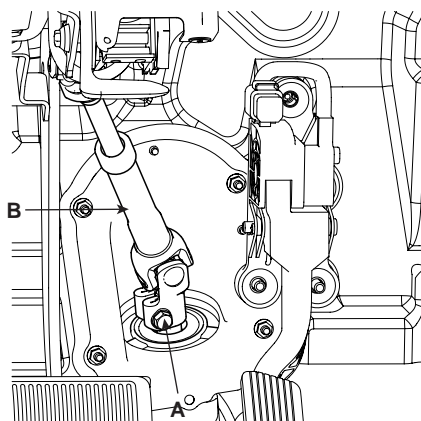
REMOVAL E99F50EB

1. Disconnect the cover fixing clip(A) on the universal joint indoor driver isde, loosen the noise covers(B).



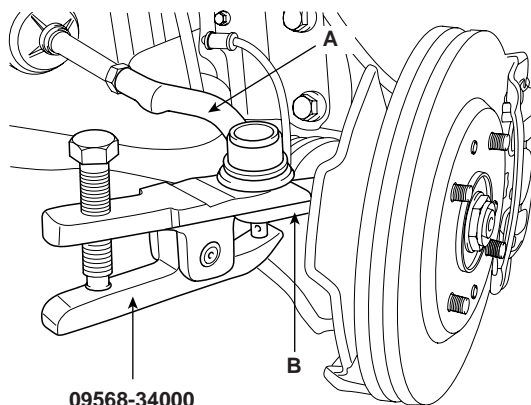
APIE103C

2. Loosen the iniversal joint and the gear box mounting bolt and disconnect the universal joint from the gear box.



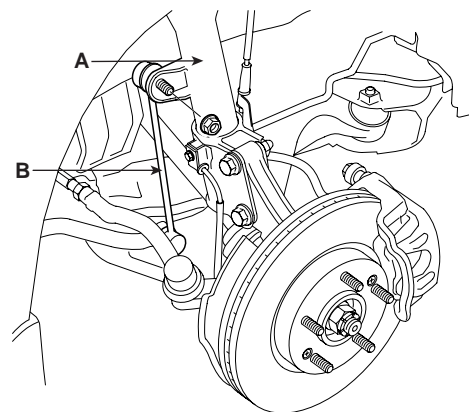
APIE103D

3. Lift up the vehicle.
4. Remove the front tires (RH/LH).
5. Remove the engine under cover.
6. After removing the split pin, disconnect the tie rod(A) from the knuckle(B) by using the special tool (09568-34000).



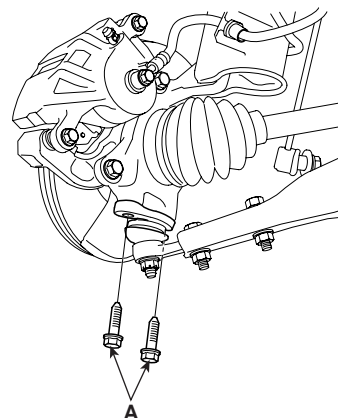
APIE101C

7. Remove the stabilizer link(B) from the strut assembly(A).



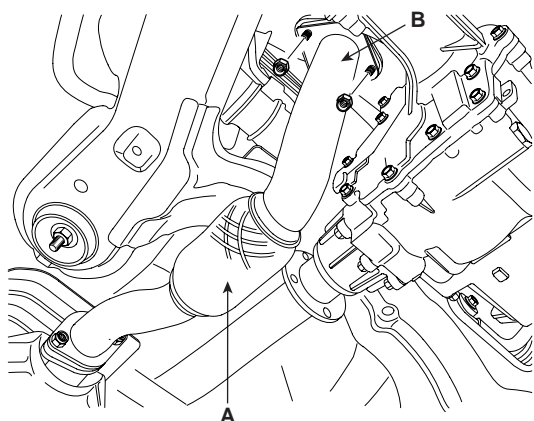
APIE103F

8. Remove the two bolts(A) for lower arm ball joint.



APIE103G

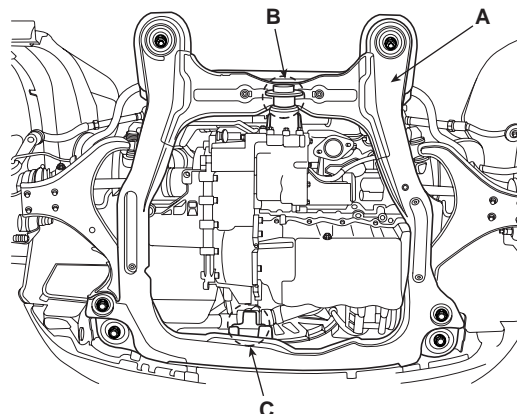
9. Disassemble the propeller shaft(A) to the front muffler assembly(B).



APIE103H

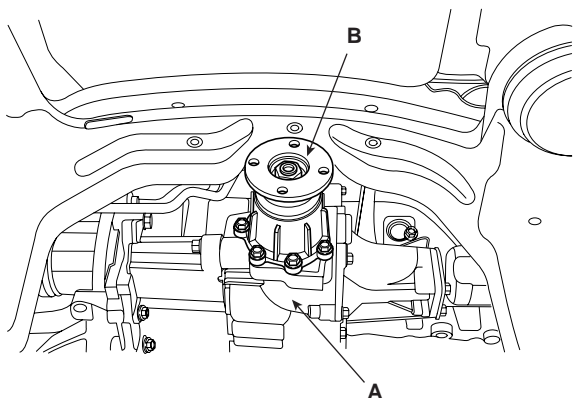
10. Drain oil from the transfer case(A). then remove the rear flange assembly(B).

Tightening torque :
engine mounting bolts
50 ~ 65 Nm (5 ~ 6.5 kgf-m, 37 ~ 47.8 lbf-ft)



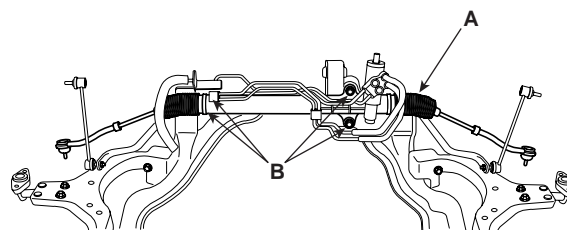
APIE103K

14. Remove the powersteering gearbox(A) after removing four mounting bolts(B) of the powersteering gearbox.

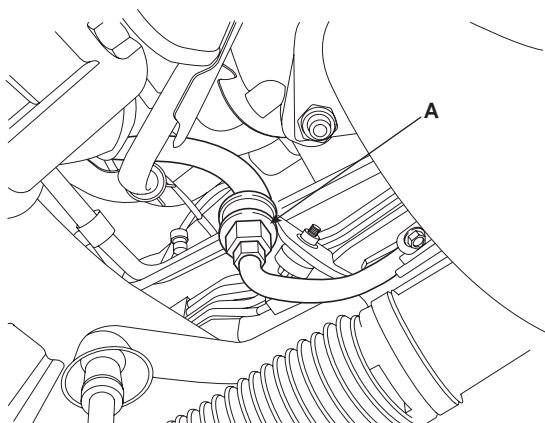


APIE103I

11. Drain power steering oil.
12. Remove the connecting bolt(A) for pressure tubes.



APIE103L



APIE103J

13. Remove two engine mounting bolts(B,C) and six sub-frame mounting bolts in order to remove the sub-frame(A).

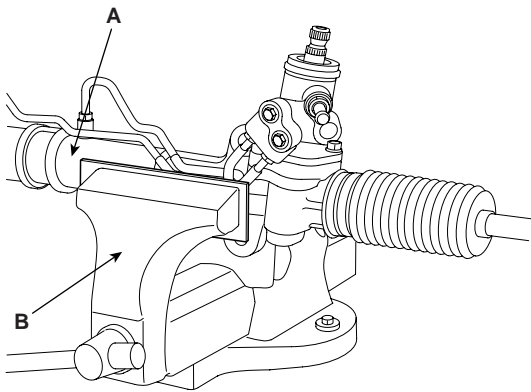
INSPECTION AND ADJUSTMENT BEFORE DISASSEMBLY

EC9FFBAD

Fix a brass plate or aluminum plate for protection to the jaws of a vise and mount the gear box(A) in a vise(B).

CAUTION

When mounting the gear box in a vise, let the installation section of it be fixed to the jaws. If other section is fixed the gear box may be damaged.



APIE104M

TOTAL PINION PRELOAD

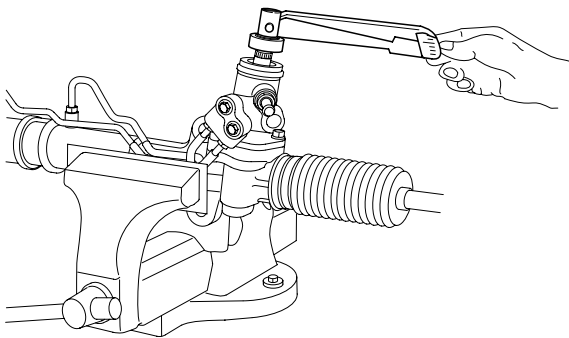
1. Rotate the pinion gear for approximately 4 to 6 seconds for one rotation to measure the total pinion preload.

Standard value :

Total pinion preload :
0.6 ~ 1.3 Nm (0.06 ~ 0.13 kgf-m, 0.4 ~ 1 lbf-ft)

NOTE

Measure the pinion preload through the entire stroke of the rack.



APIE104N

2. If the measured value is out of specifications, first adjust the yoke plug, then recheck the total pinion preload.
3. If you adjust the yoke plug but do not obtain the total pinion preload, check or replace the yoke plug components

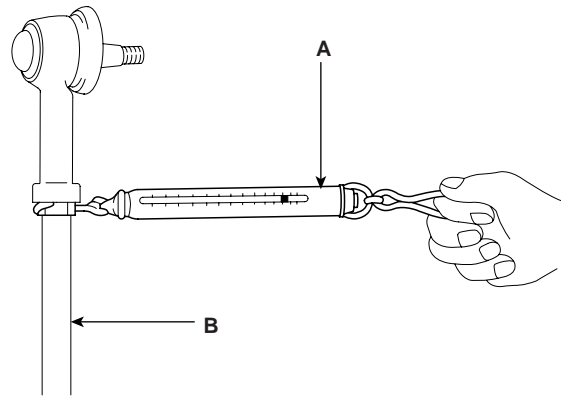
TIE ROD SWING RESISTANCE

1. Rotate the tie rod severely ten times.

2. Measure the tie rod(A) swing resistance with a spring scale(B).

Standard value :

Total rod swing resistance :
8 ~ 22 N (1.9~4.6 lb) [2 ~ 5 Nm (0.2 ~ 0.5 kgf-m, 17 ~ 43 lbf-in)]



APIE104O

3. If the measured value exceeds the standard value, replace the tie rod as ssembly.

CAUTION

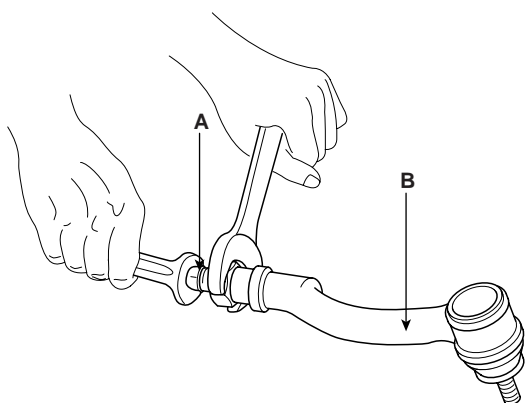
Even if the measured value is below the standard value, the tie rod that swings smoothly without excessive play may be used. If the measured value is below 4.3 N (0.9 lb) [100 Ncm (8.7 lb.in.)], replace the tie rod.

BELLOWS INSPECTION

1. Inspect the bellows for damage or deterioration.
2. Make sure the bellows are secured in the correct position.
3. If the bellows are defective, replace them with new ones.

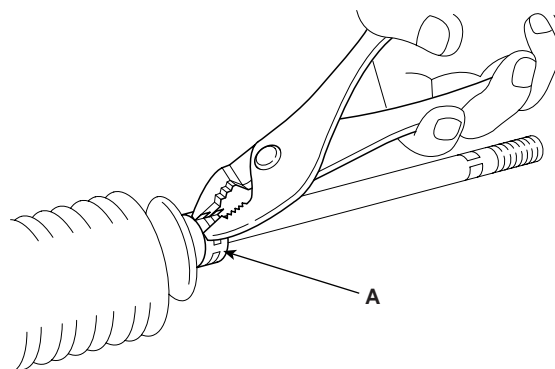
DISASSEMBLY EF3C358E

1. Remove the tie rod end(A) from the tie rod(B).



APIE103M

2. After mounting the tie rod end(A) in a vise, remove the dust cover(B) from the ball joint.

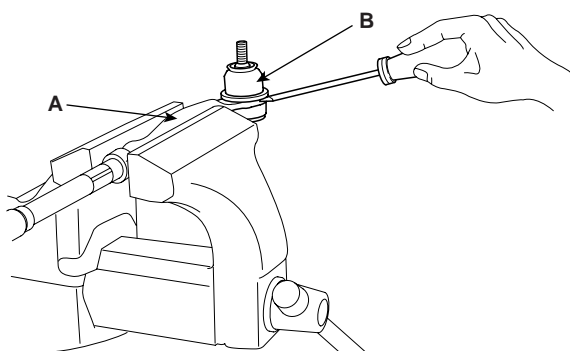


APIE103P

5. Pull the bellows out toward the tie rod.

 **NOTE**

Check for rust on the rack when the bellows are replaced.



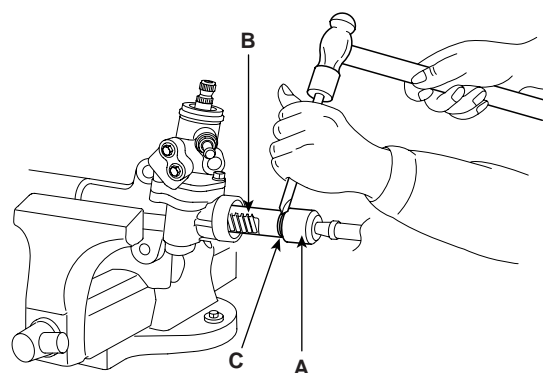
APIE103N

3. Remove the bellows band(A).

6. Remove the feed tube from the rack housing.

7. While moving the rack slowly, drain the fluid from the rack housing.

8. Unstake the tab washer(C) which fixes the tie rod(A) and rack(B) with a chisel.

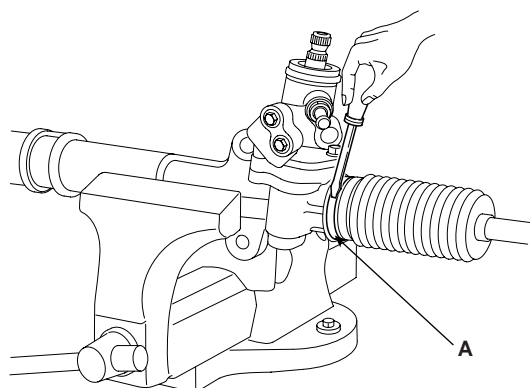


APIE103Q

9. Remove the tie rod(B) from the rack(A).

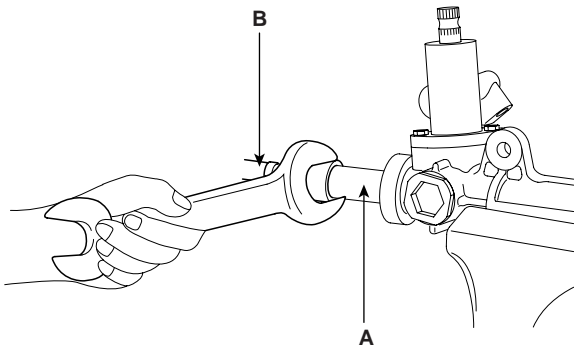
 **CAUTION**

Remove the tie rod(B) from the rack(A), taking care not to twist the rack.



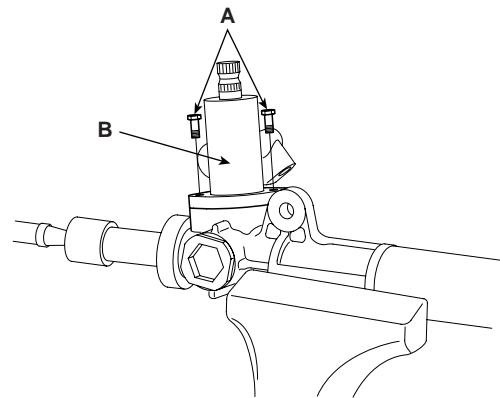
APIE103O

4. Remove the bellows clip(A).



APIE103R

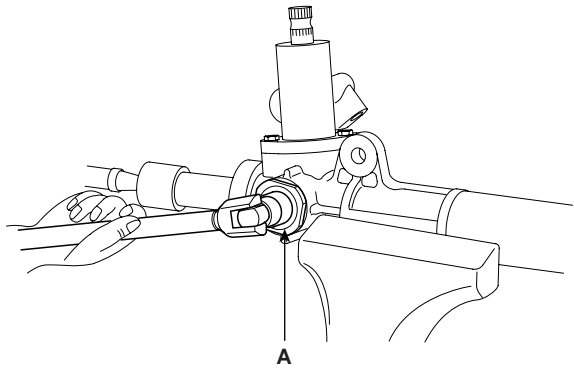
10. Remove the yoke plug locking nut(A), and then remove the yoke plug.



APIE103U

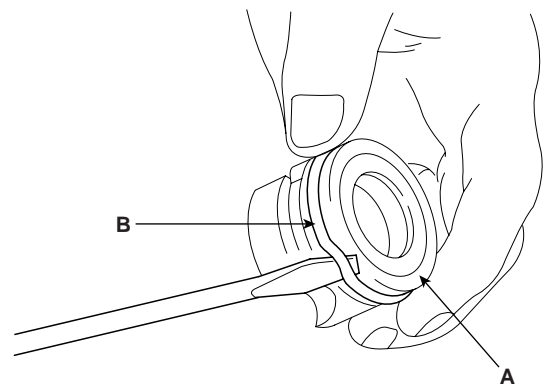
13. Remove the rack bushing and the rack from the rack housing.

14. Remove the O-ring(A) from the rack bushing(B).



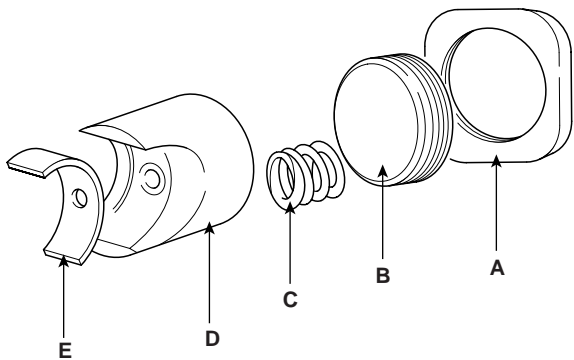
APIE103S

11. Remove the lock nut(A), yoke plug(B), rack support spring(C), rack support yoke(D) and bushing(E) from the gear box.



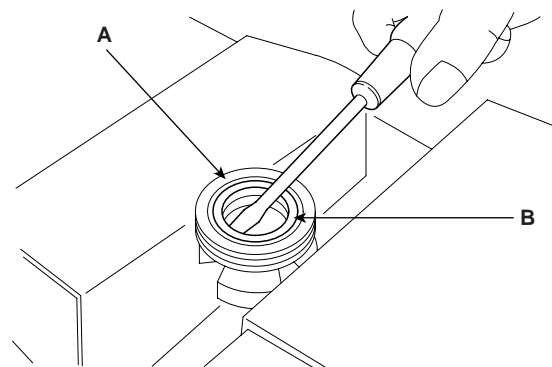
APIE103V

15. Remove the oil seal(B) from the rack bushing(A).



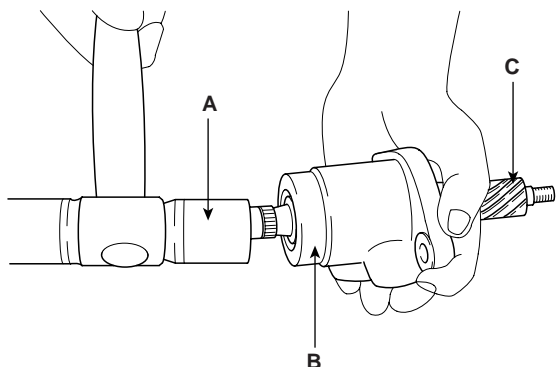
APIE103T

12. Remove the valve body housing(B) by loosening the two bolts(A).



APIE103W

16. Remove the pinion valve assembly(C) from the valve body housing(B) with a soft hammer(A).



APIE103X

17. Using the special tool, remove the oil seal and ball bearing from the valve body housing.
18. Remove the oil seal and O-ring from the rack housing.

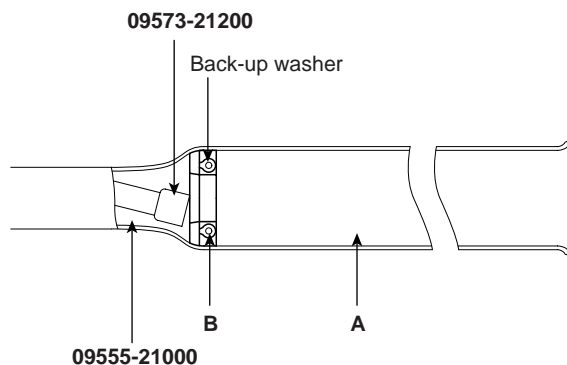
CAUTION

Be careful not to damage the pinion valve cylinder inside of the rack housing.

19. Using the special tool(06573-21200, 09555-21000), remove the oil seal(B) from the rack housing(A).

CAUTION

Be careful not to damage the rack cylinder inside of the rack housing.



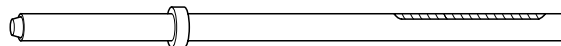
LPIE103Y

INSPECTION E5CFC62C

RACK

1. Check for rack tooth face damage or wear.
2. Check for oil seal contact surface damage.
3. Check for rack bending or twisting.

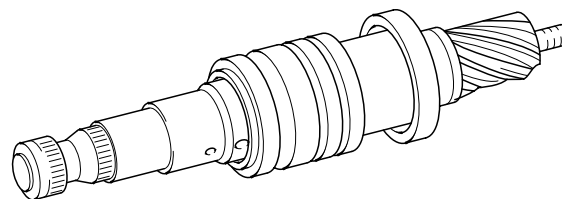
4. Check for oil seal ring damage or wear.
5. Check for oil seal damage or wear.



LPIE103Z

PINION VALVE

1. Check for pini on gear tooth face damage or wear.
2. Check for oil seal contact surface damage.
3. Check for seal ring damage or wear.
4. Check for oil seal damage or wear.



APIE104A

BEARING

1. Check for seizure or abnormal noise during rotating a bearing.
2. Check for excessive play.
3. Check for missing needle bearing rollers.

OTHERS

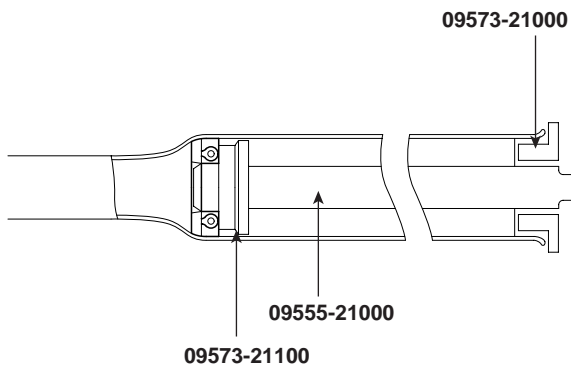
1. Check for damage of the rack housing cylinder bore.
2. Check for boot damage, cracking or aging.

REASSEMBLY E257EC9D

1. Apply the specified fluid to the entire surface of the rack oil seal.

Recommended fluid : PSF-3

2. Install the oil seal(A) to the specified position in the rack housing.

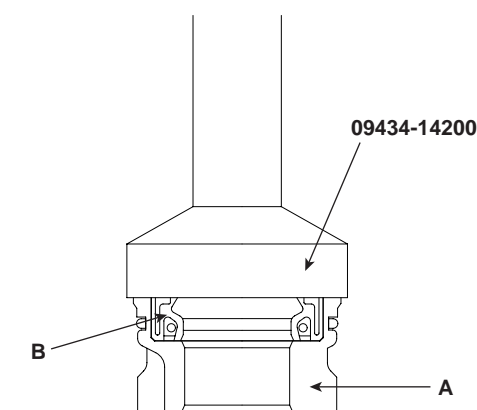


APIE104B

3. Apply the specified fluid to the entire surface of the rack bushing oil seal .

Recommended fluid : PSF-3

4. Install the oil seal(B) in the rack bushing(A).



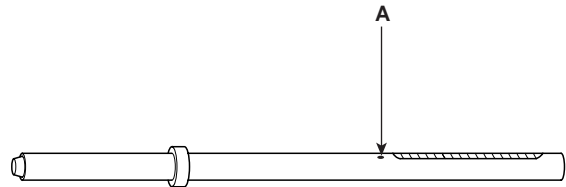
APIE104C

5. Apply the specified fluid to the entire surface of the O-ring and install it in the rack bushing.
6. Apply the specified grease to the rack teeth.

Recommended grease :
Multipurpose grease SAE J310, NLGI No.2

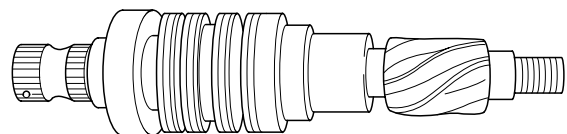
 **NOTE**

Do not plug the vent hole(A) in the rack with grease.



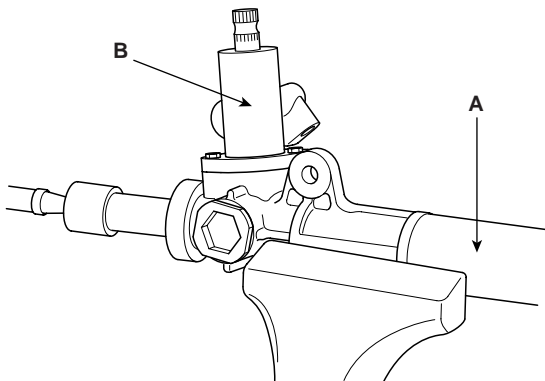
APIE104D

7. Insert the rack into the rack housing and install the rack bushing and rack stopper.
8. Install the oil seal and the ball bearing in the valve body.
9. After applying the specified fluid and grease to the pinion valve assembly(A), install it in the rack housing assembly.

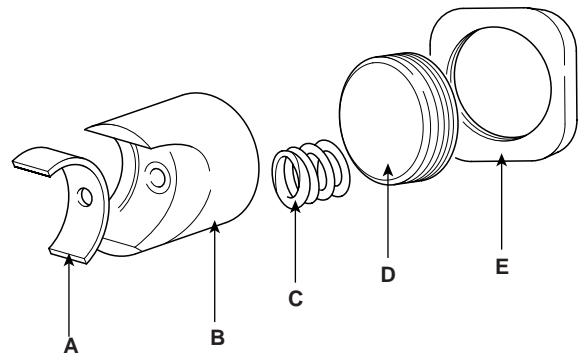


APIE104E

10. After applying the specified fluid to the oil seal, install it in the rack housing, and fix the valve body assembly(B) and O-ring in the gear box(A).



APIE104F

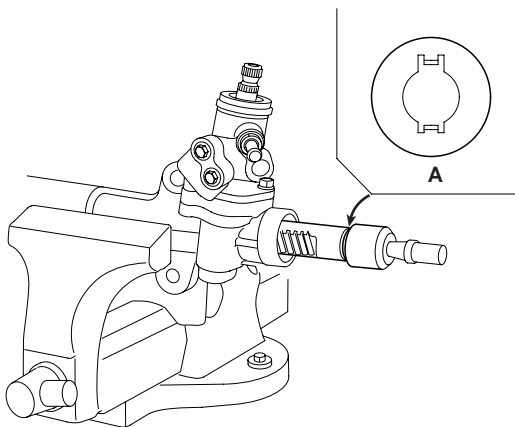


APIE104H

11. Install the tab washer and the tie rod and stake the tab washer(A) end at two points over the tie rod.

NOTE

1. Align the tab washer pawls with the rack grooves.
2. Always use a new tab washer.



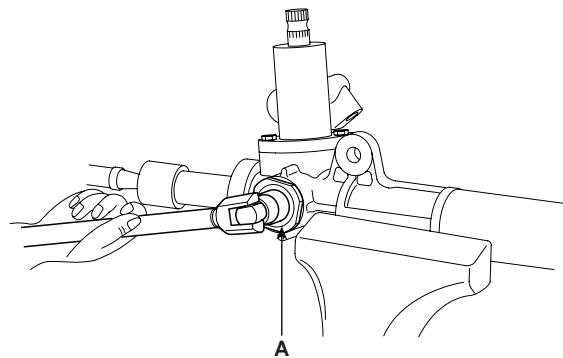
APIE104G

12. Install the bushing(A), rack support yoke(B), rack support spring(C), lock nut(E) and yoke plug(D) in the order shown in the illustration. Apply semi-drying sealant to the threaded section of the yoke plug before installation.

13. With the rack placed in the center position, attach the yoke plug to the rack housing. Tighten the yoke plug to 15 Nm (1.5 kgf·m, 11 lbf·ft). Loosen the yoke plug approximately from 30° to 60° and tighten the locking nut to the specified torque.

Tightening torque :

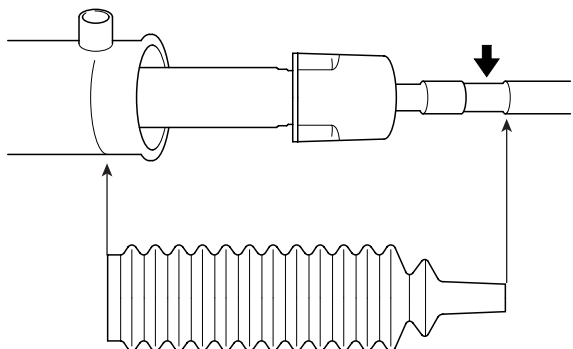
50 ~ 70 Nm (5 ~ 7 kgf·m, 37 ~ 52 lbf·ft)



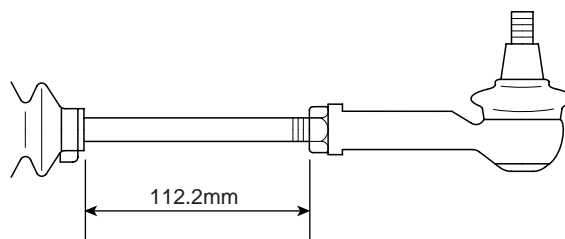
APIE104I

14. Tighten the feed tube to the specified torque and install the mounting rubber using adhesive.
15. Apply the specified grease to the bellows mounting position (fitting groove) of the tie rod.

Recommended grease: Silicone grease



APIE104J



APIE104L

16. Install the new attaching band to the bellows.

NOTE

When the bellows are installed, a new band must be used.

17. Install the bellows in position, taking care not to twist it.

18. Fill the dust cover inner side and lip with the specified grease, and fix the dust cover in position with the clip ring attached in the groove of the tie rod end.

Recommended greas :

A : POLY LUB GLY 801K or equivalent

B : SHOWA SUNLIGHT MB2 or equivalent

Dust cover inner side and lip : THREE BOND

20. Check for total pinion preload.

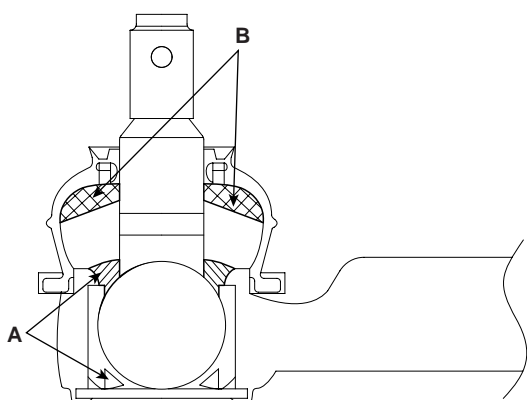
Total pinion preload :

0.6 ~ 1.3 Nm (0.06 ~ 0.13 kgf·m, 5.2 ~ 11.3 lbf·ft)

INSTALLATION

EDF72EE3

1. Installation is the reserve of removal.
2. Add power steering fluid.
3. Air bleed the system.



APIE104K

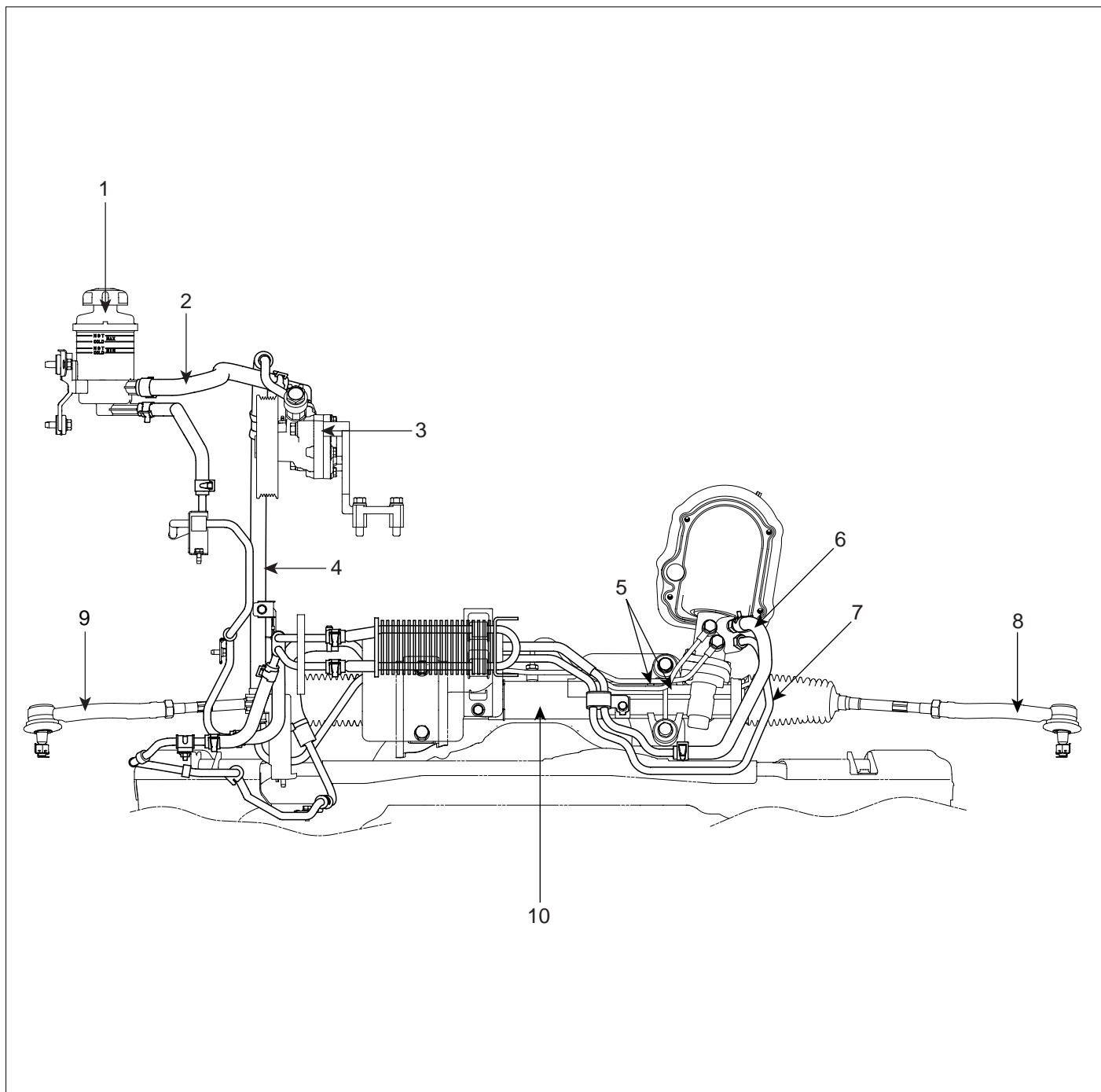
19. Install the tie rods so that the length of the left and right tie rods equals the standard value.

Standard value :

Tie rod free length : 112.2 mm

POWER STEERING HOSES

COMPONENTS E14975A7



- | | |
|-------------------------------------|--------------------------------------|
| 1. Power steering oil reservoir | 6. Return hose |
| 2. Suction hose | 7. Pressure tube |
| 3. Power steering gear box assembly | 8. Tie rod end |
| 4. Pressure hose and tube assembly | 9. Tie rod end |
| 5. Feed tube | 10. Power steering gear box assembly |

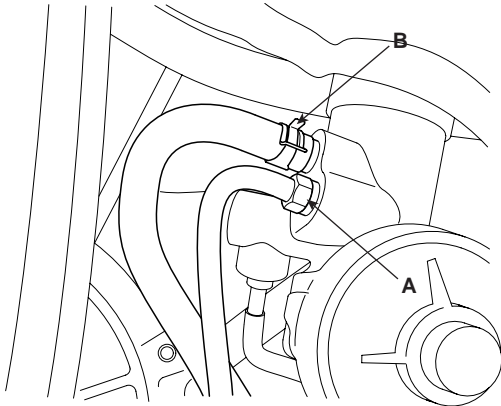
LPIE105A

MECHANICAL POWER STEERING SYSTEM

ST -29

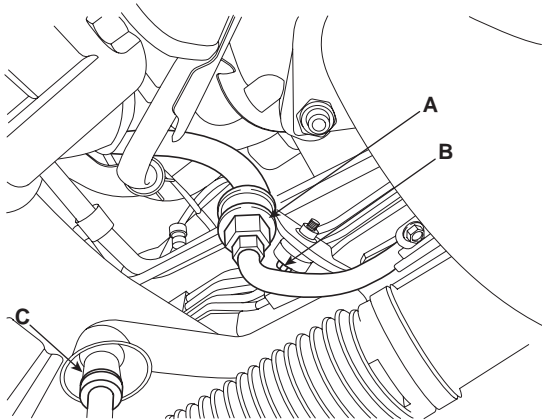
REMOVAL EDE2A3B6

1. Drain the power steering oil.
2. Remove both the pressure tube fitting(A) and the return hose clamp(B) from the gearbox, after lifting the vehicle.



APIE105B

3. Remove the pressure tube connecting bolt(A) and the pressure hose mounting bolt(B), then remove the return hose clamp(C).

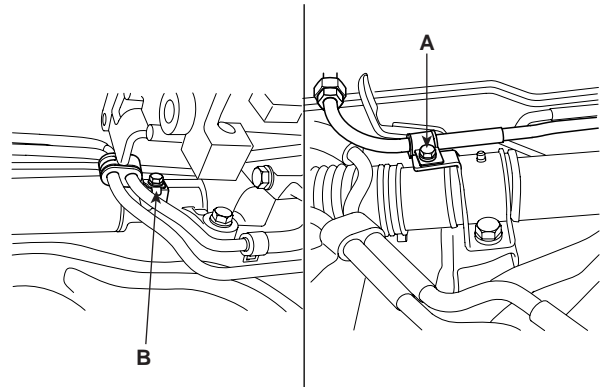


APIE105C

4. Remove the pressure tube mounting bolt(A) and the return tube mounting bolt(B).

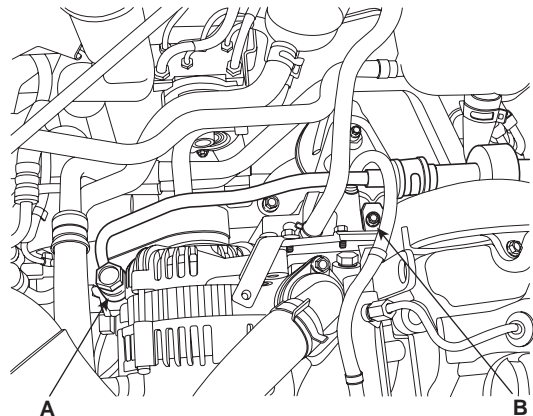
Tightening torque :

4 ~ 6 Nm (0.4 ~ 0.6 kgf·m, 3.0 ~ 4.0 lbf·ft)



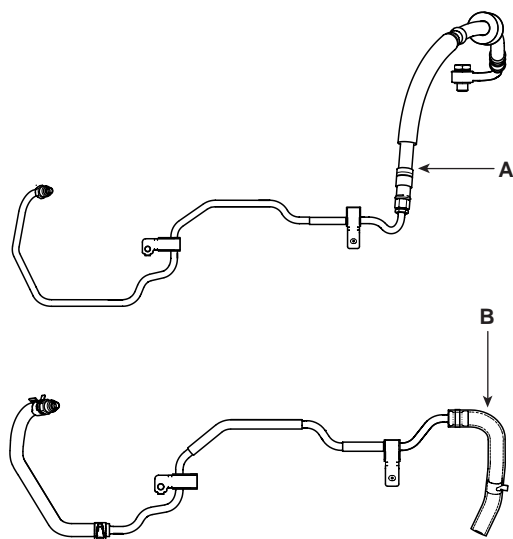
APIE105D

5. Remove the pressure tube bolt(A) and clamp(B), after lowering the vehicle.



APIE105E

6. Remove the pressure tube(A) and the return tube(B).



APIE105F

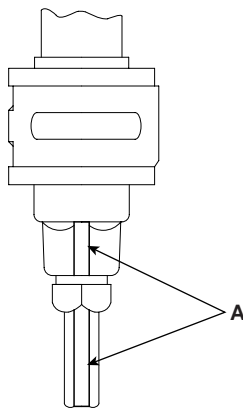
INSTALLATION EA836021

1. Installation is the reverse of removal.
2. Add power steering fluid.



CAUTION

- *While installing the tube and hose assembly, be sure to align white marks(A) on each fitting.*

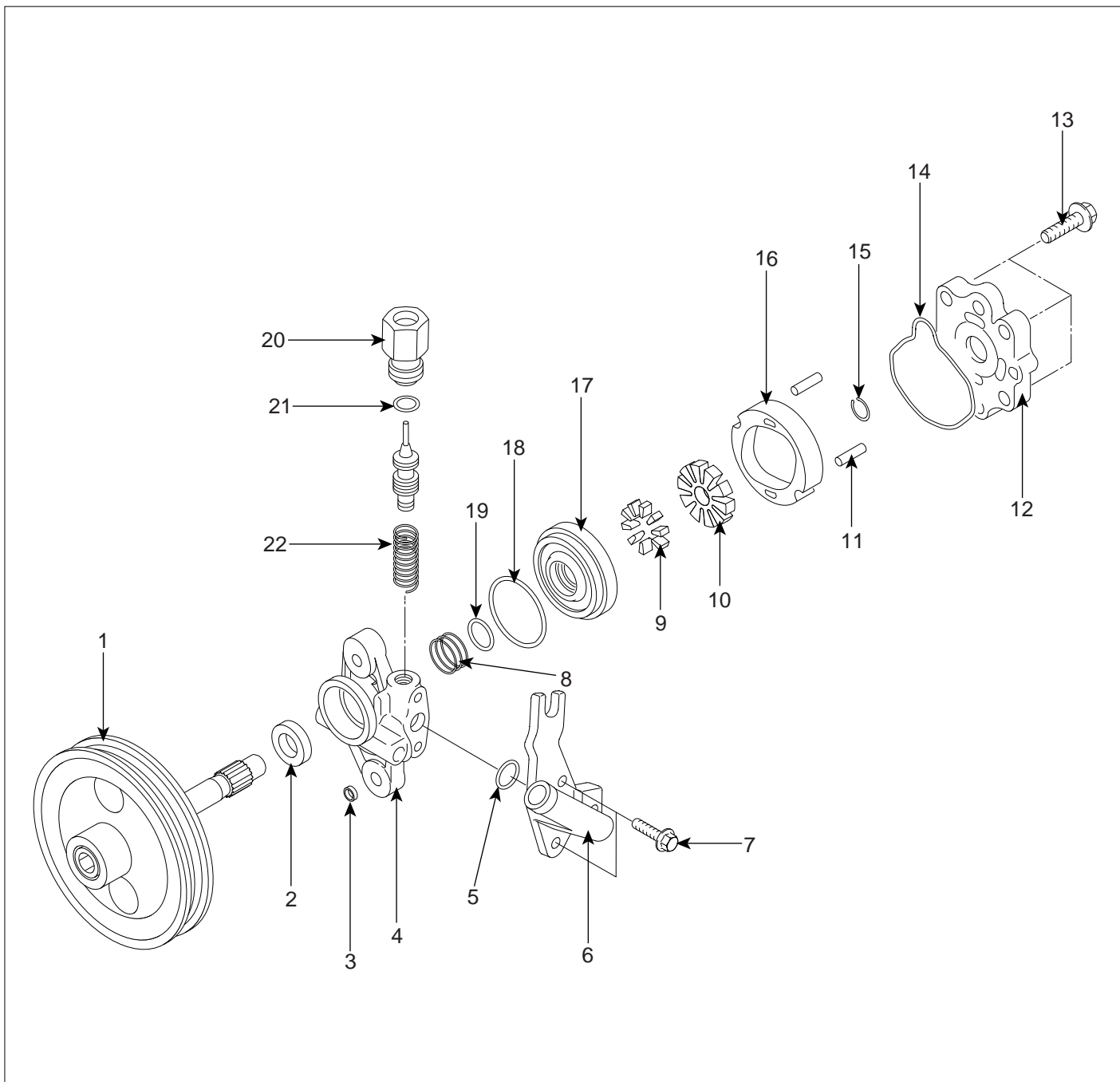


APIE105G

- *Install the pressure hose and tube so that they are not twisted and they do not come in contact with any other parts.*
- *After installation, air bleed the system.*

POWER STEERING OIL PUMP

COMPONENTS E67ABE3A



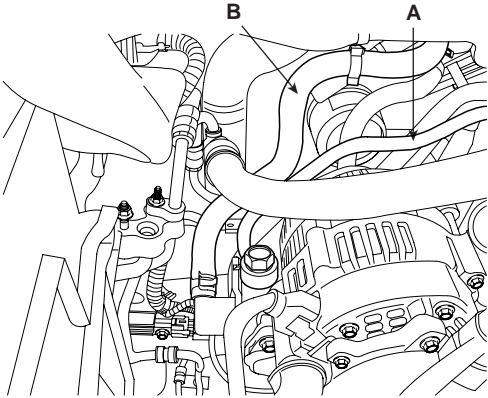
- 1. Pulley & driveshaft assembly
- 2. Oil seal
- 3. Bush
- 4. Front housing
- 5. O-ring
- 6. Suction pipe
- 7. Mounting bolt
- 8. Side plate spring

- 9. Vane
- 10. Rotor
- 11. Cam ring
- 12. Oil pump cover assembly
- 13. Mounting bolt
- 14. O-ring
- 15. Bush
- 16. Cam ring

- 17. Oil pump side plate
- 18. O-ring (Outer)
- 19. O-ring (Inner)
- 20. Connector
- 21. O-ring
- 22. Spring

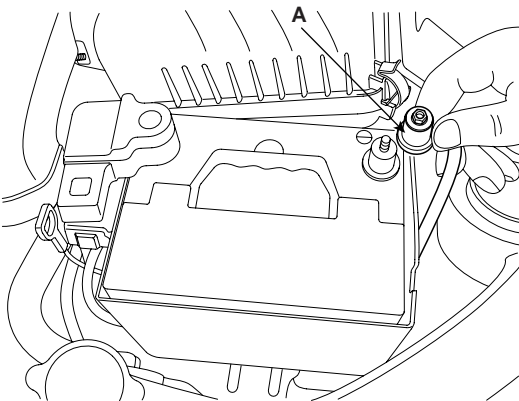
REMOVAL EFBE5C4

1. Remove the pressure hose(A) from the oil pump, then remove the suction hose(B) in order to drain the oil.



APIE106B

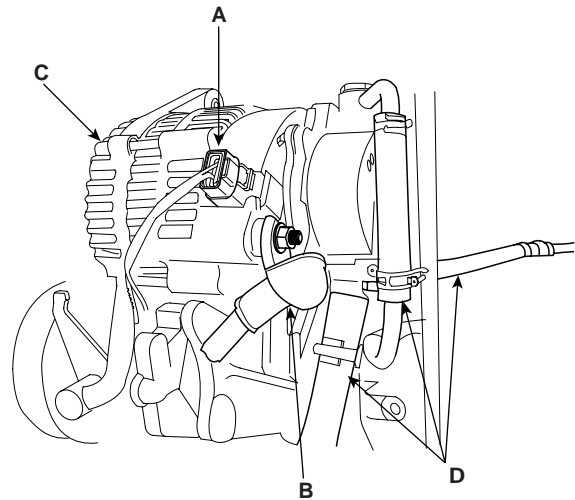
2. Disconnect the negative (-) terminal(A) from the battery.



APIE106C

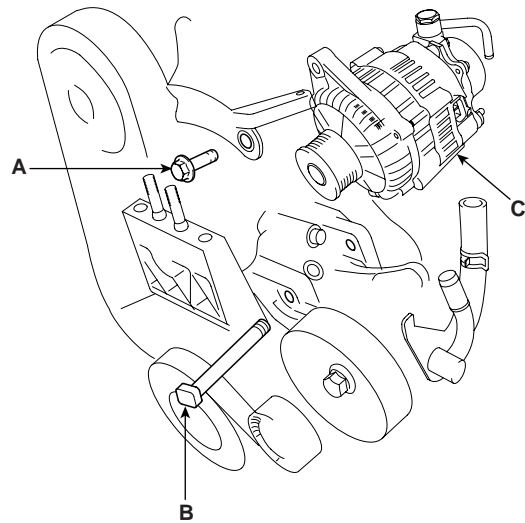
3. Remove the drive belt.

4. Remove both the alternator connector(A) and 'B' terminal cable(B), then remove the vacuum hose(D) and the oil tube(D).



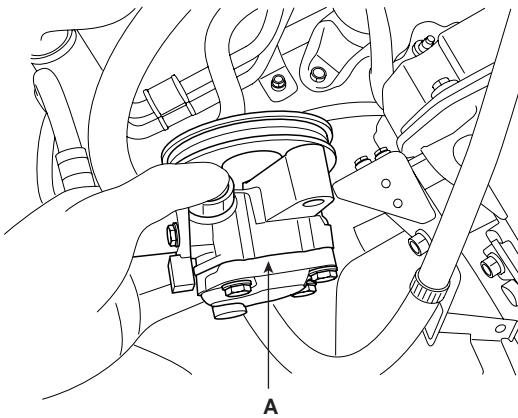
APIE106D

5. Remove the alternator(C) by removing the bolt(B), after removing the bolt(A).

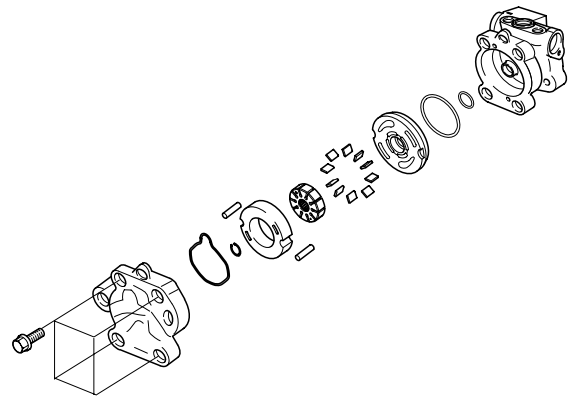


APIE106E

6. Loosen the power steering oil pump mounting bolt and the tension adjusting bolt, and then remove the steering oil pump assembly(A).



APIE106F

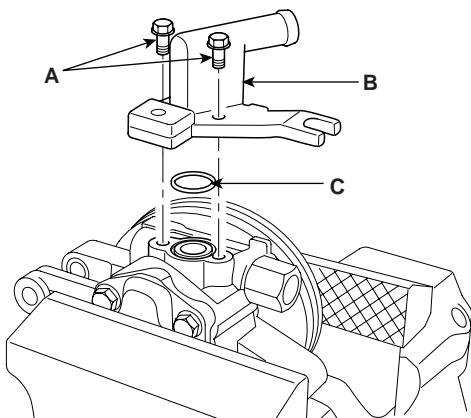


APIE106H

DISASSEMBLY

E86AB0CF

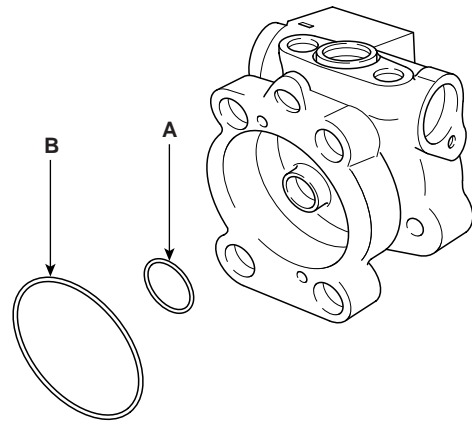
1. Remove two two bolts(A) from the oil pump body, and then remove the suction pipe(B) and O-ring(C).



APIE106G

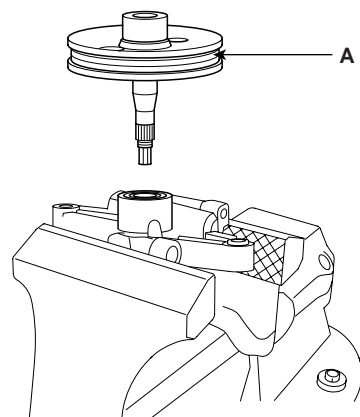
2. Loosen the four bolts and remove the oil pump cover assembly.
3. Remove the cam ring.
4. Remove the rotor and vanes.
5. Remove the oil pump side plate.

6. Remove the inner O-ring(A) and outer O-ring(B).



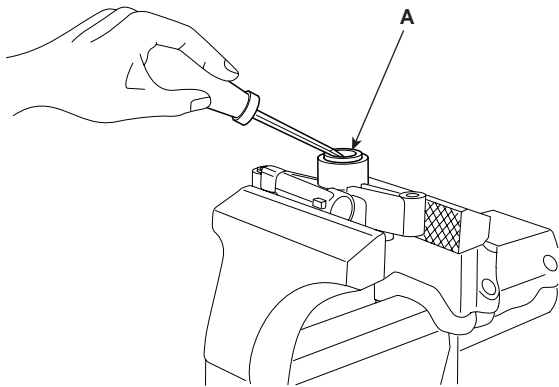
APIE106I

7. Remove the snap ring and take out the pulley and the drive shaft assembly(A).



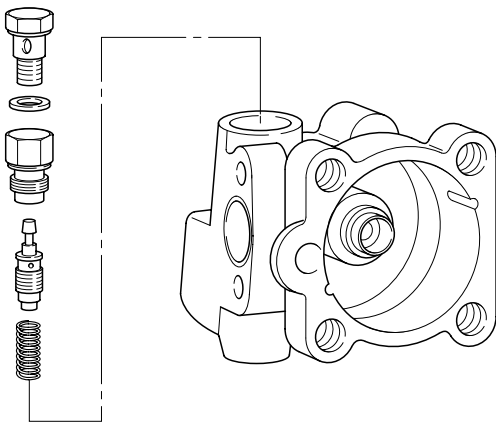
APIE106J

8. Remove the oil seal(A) from the oil pump body.



APIE106K

9. Remove the connector from the oil pump body, and take out the flow control valve and the flow control spring.



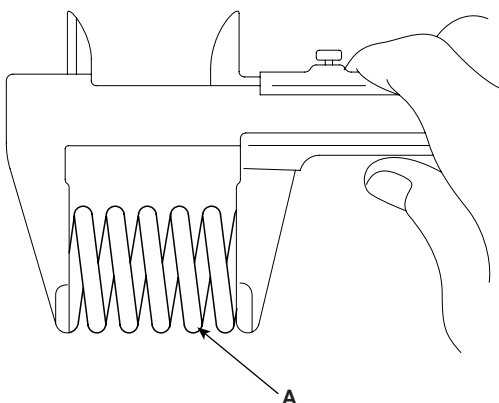
APIE106L

INSPECTION

E4D8FED8

1. Check the free length of the flow control spring.

Free length of the flow control spring : 36.5mm



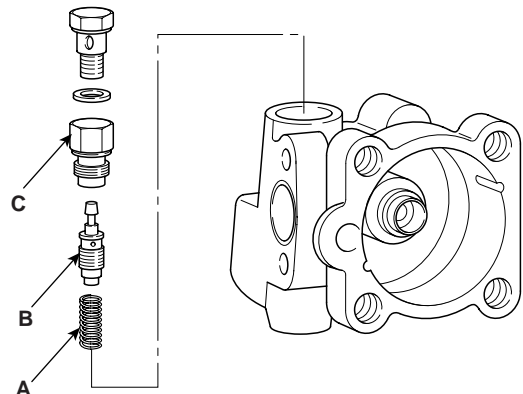
APIE106M

2. Check that the flow control valve is not bent.
3. Check the shaft for wear and damage.
4. Check the V-belt for wear and deterioration.
5. Check the grooves of the rotor and vanes for stratified abrasion.
6. Check the contact surface of the cam ring and vanes for stratified abrasion.
7. Check vanes for damage.
8. Check that there is no striped wear in the side plate or contacting part between the shaft and the pump cover surface.

REASSEMBLY

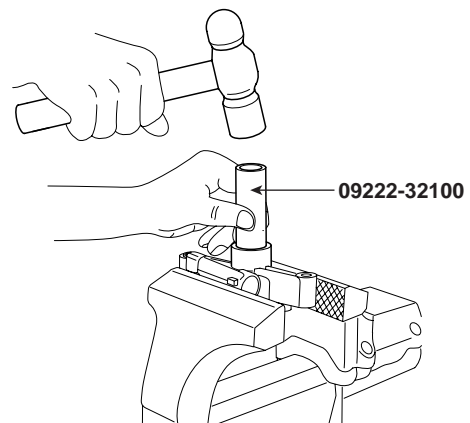
EE05A65B

1. Install the flow control spring, the flow control valve and the connector into the pump body.



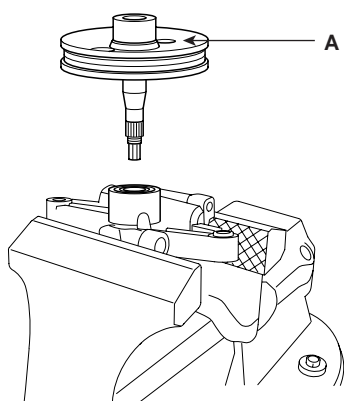
APIE106S

2. Install the oil seal in the pump body by using the special tool(09222-32100).



APIE106T

3. Install the pump pulley(A).



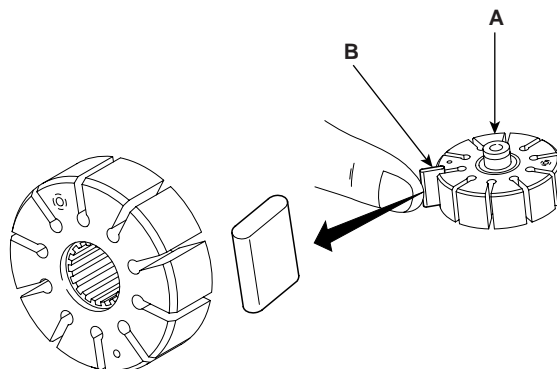
APIE106U

4. Assemble the inner O-ring and the outer O-ring and install the site plate(A).



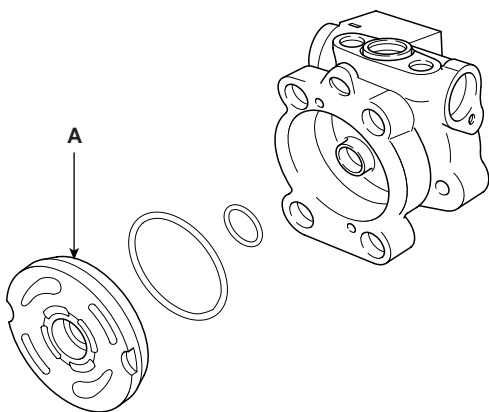
CAUTION

Be sure to place vanes with a round side out.



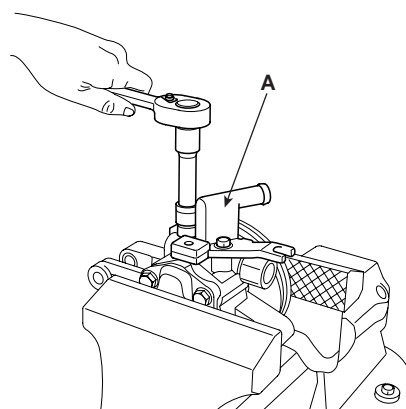
APIE106X

8. Install the O-ring and the oil pump cover assembly.
9. Install the suction pipe(A) and O-ring.

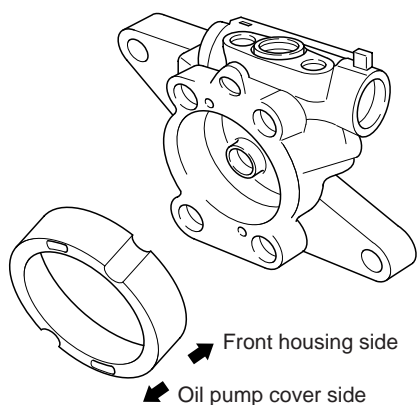


APIE106V

5. Install the cam ring attending to the groove and the direction of the front housing.



APIE106Y



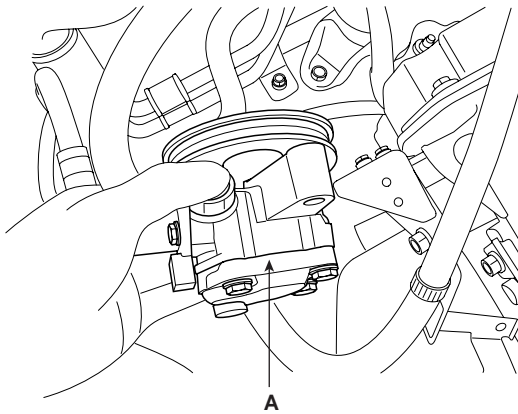
LPIE106W

6. Install the rotor.
7. Install vanes(A) to the rotor(B).

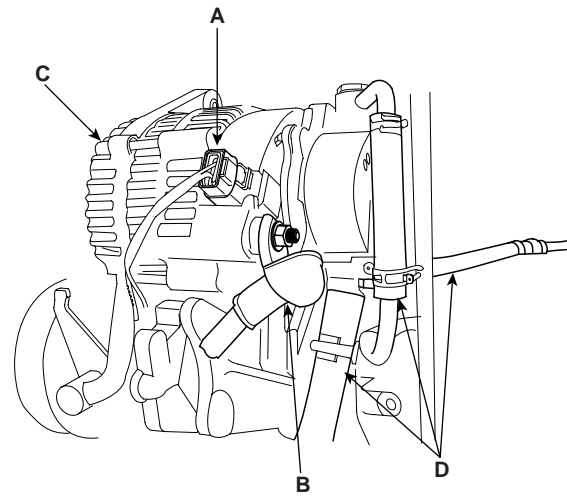
INSTALLATION

E3DAE343

1. Install the oil pump(A) to the oil pump bracket.



APIE106N

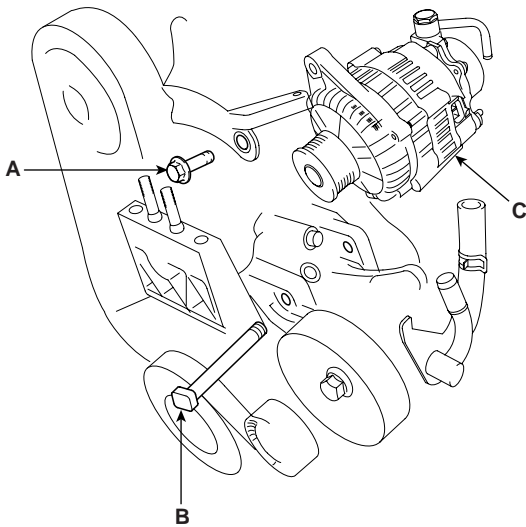


APIE106P

Tightening torque :

2.0(D-ENG) : 17 ~ 16 Nm (1.7 ~ 2.6 kgf-m,
12.3 ~ 18.8 lbf-ft)
2.0(I4), 2.7(V6) : 35 ~ 50 Nm (3.5 ~ 5 kgf-m,
25.8 ~ 37 lbf-ft)

2. Install the alternator(C) with the two bolts(A,B).



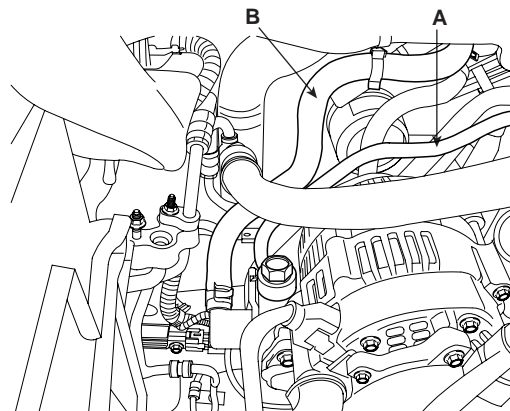
APIE106O

3. Install the alternator connector (A), the 'B' terminal cable(B), the vacuum hose(D), and the oil tube(D).

4. Install both the pressure hose(A) and the suction hose to the oil pump.

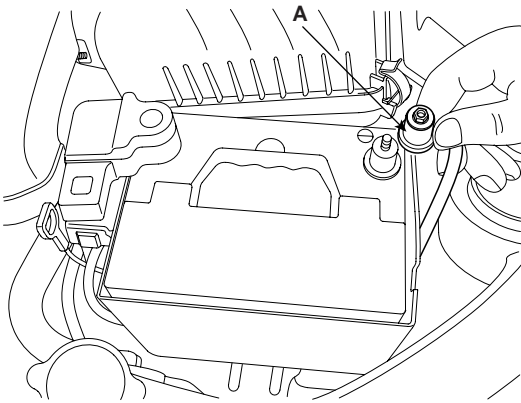
Tightening torque :

65 ~ 75 Nm (6.5 ~ 7.5 kgf-m, 47.9 ~ 54.2 lbf-ft)



APIE106Q

5. Install the drive belt to the pulley.
6. Connect the negative(-) cable to the battery.



APIE106C

7. Fill an appropriate amount of the powersteering oil(PSF-3).
8. Air bleed the system.
9. Inspect the oil pump pressure.