

# Steering System

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## GENERAL

### SPECIFICATIONS E6E0FAC5

Item	Specification
Steering gear type	Rack and pinion
Rack stroke	132mm
Power steering pump type	Vane type
Oil pump displacement	9.6 cm <sup>3</sup> /rev.MAX. (0.59 in <sup>3</sup> /rev.MAX)

### SERVICE STANDARD

Item	Specification
Steering wheel free play	0~30 mm (0~1.1 in)
Steering angle	
Inner wheel	34°76' ± 2°
Outer wheel	30°19'
Stationary steering effort	29N (3.0kg, 6.5lbs)
Belt deflection	
New belt	8.8~11.0
Used belt	12.5~14.3
Oil pump relief pressure	8.3~8.8 MPa (85~90 kg/cm <sup>2</sup> , 1209~1280 psi)
Total pinion preload	0.6~1.3 Nm (6~13 kg·cm, 5.2~11.3 lb-in)
Tie rod swing resistance	2~5 Nm (20~50 kg·cm, 1.4~3.6 lb-ft)
Tie rod end ball joint starting torque	0.5~2.5 Nm (5~25 kg·cm, 0.36~1.78 lb-ft)

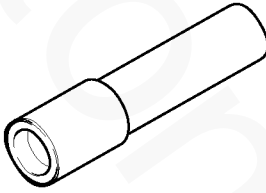
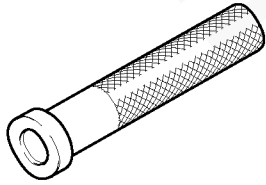
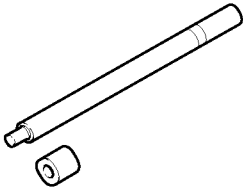
### TIGHTENING TORQUE

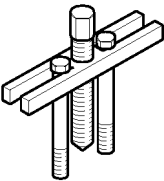
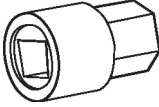
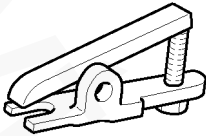
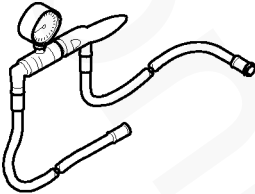
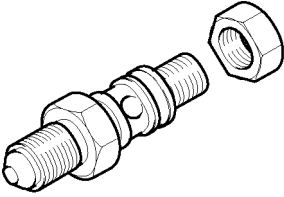
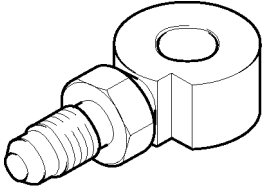
Item	Nm	kg-cm	lb-ft
<b>Power steering column and shaft</b>			
Steering column and shaft assembly mounting bolt	13 ~ 18	130 ~ 80	9.6 ~ 13.3
Power steering wheel lock nut	35 ~ 45	350 ~ 450	25.8 ~ 33.2
Pinion gear and joint assembly	15 ~ 20	150 ~ 200	11 ~ 15
Steering column shaft and universal joint assembly	18 ~ 20	180 ~ 200	13.3 ~ 15
Dust cover mounting bolt	17 ~ 26	170 ~ 260	125. ~ 19.2
<b>Power steering gear box</b>			
Gear box mounting bolt	60 ~ 80	600 ~ 800	44 ~ 59
Tie rod end lock nut	50 ~ 55	500 ~ 550	37 ~ 40.6
Tie rod end ball joint and knuckle arm mounting nut	24 ~ 34	240 ~ 340	17.7 ~ 25
Feed tube to gear box	10 ~ 16	100 ~ 160	7.4 ~ 11.8
Gear box to valve body	20 ~ 30	200 ~ 300	15 ~ 22
Yoke plug lock nut	50 ~ 70	500 ~ 700	37 ~ 52
<b>Power steering oil pump</b>			
Pressure hose to oil pump	55 ~ 65	550 ~ 650	40.6 ~ 47.9
Oil pump adjusting bolt	35 ~ 50	350 ~ 500	25.8 ~ 37
Oil pump mounting bolt	35 ~ 50	350 ~ 500	25.8 ~ 37
Oil pump bracket mounting bolt	35 ~ 50	350 ~ 500	25.8 ~ 37
<b>Power steering hose</b>			
Power steering reservoir mounting bolt	4 ~ 6	40 ~ 60	3.0 ~ 4.4
Power steering hose mounting bolt	4 ~ 6	40 ~ 60	3.0 ~ 4.4
Power steering tube mounting bolt	4 ~ 6	40 ~ 60	3.0 ~ 4.4

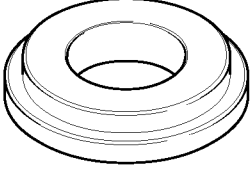
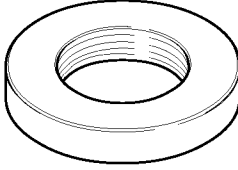
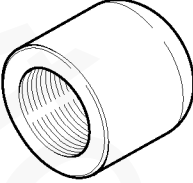
**GENERAL****ST -3****LUBRICANTS** EB2EEA0C

	<b>Recommended lubricant</b>	<b>Quantity</b>
Horn contact ring of steering wheel	CENTOPLX278 (KLUBER KOREA)	1.5g
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	1.5g
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** ECAE85D3

<b>Tool (Number and name)</b>	<b>Illustration</b>	<b>Use</b>
09222-32100 Valve stem oil seal installer	 HCT5802	<ol style="list-style-type: none"> <li>1. Installation of the ball bearing to rack housing</li> <li>2. Installation of the oil seal to oil pump</li> </ol>
09434-14200 Counter shaft bearing installer	 EPKB040A	Installation of the oil seal to rack bushing and valve body
09555-21000 Bar	 EPKB040B	Removal and installation the oil seal.

Tool (Number and name)	Illustration	Use
09561-11002 Steering wheel puller	 <p style="text-align: right; font-size: small;">HCT5607</p>	Removal of the steering wheel.
09565-31300 Yoke plug torque wrench socket	 <p style="text-align: right; font-size: small;">APCD002J</p>	Removal, installation and adjustment of steering gear yoke plug.
09568-31000 Tie rod end puller	 <p style="text-align: right; font-size: small;">EPOF003M</p>	Separation of the tie rod end ball joint.
09572-21000 Oil pressure gauge	 <p style="text-align: right; font-size: small;">EPA9005K</p>	Measurement of the power steering oil pressure. (use with 09572-22100, 09572-21200)
09572-21200 Oil pressure gauge adapter (Hose side)	 <p style="text-align: right; font-size: small;">EPA9005L</p>	Measurement of the power steering oil pressure. (use with 09572-21000, 09572-22100)
09572-22100 Oil pressure gauge adapter (Pump side)	 <p style="text-align: right; font-size: small;">EPA9005M</p>	Measurement of the power steering oil pressure. (use with 09572-21000, 09572-21200)

Tool (Number and name)	Illustration	Use
09573-21000 Oil seal installer guide	 <p style="text-align: right; font-size: small;">EPKB040C</p>	Installation of the oil seal (use with 09573-21100, 09573-21200, 09517-11000, 09555-21000)
09573-21100 Oil seal installer	 <p style="text-align: right; font-size: small;">EPKB040D</p>	Installation of the oil seal (use with 09573-21000, 09573-21200, 09555-21000)
09573-21200 Oil seal guide	 <p style="text-align: right; font-size: small;">EPKB040E</p>	Removal and installation of the oil seal

## TROUBLESHOOTING ED69292A

## POWER STEERING

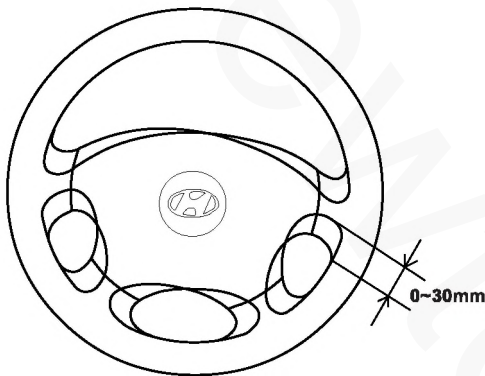
Symptom	Probable cause	Remedy
Excessive play in steering wheel	Loose yoke plug Loose steering gear mounting bolts Loose or worn tie rod end	Retighten Retighten Retighten or place as necessary
Steering wheel operation is not smooth (Insufficient power assist)	V-belt slippage Damaged V-belt Low fluid level 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 seal	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 tie-rod end Yoke plug excessively tight Inner tie rod and/or ball joint cannot turn smoothly Loose mounting of gear box and crossmember 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	Hissing Noise in Steering Gear 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.	
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

**SERVICE ADJUSTMENT****PROCEDURE** E6BBFE1D**CHECKING STEERING WHEEL FREE PLAY**

1. Start the engine with the steering wheel in the straight ahead position.
2. Measure the play at the circumference of the steering wheel.

**Standard value**

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



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3. If the play exceeds the standard value, inspect the connection between the steering shaft and steering linkage.

**CHECKING STEERING ANGLE**

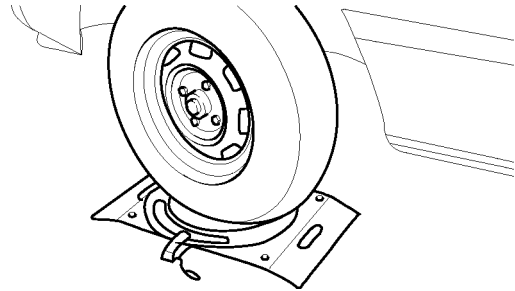
1. Place the front wheel on a turning radius gauge and measure the steering angle.

**Standard value**

Wheel angle

Inner wheel :  $34^{\circ}76' \pm 2^{\circ}$

Outer wheel :  $30^{\circ}19'$

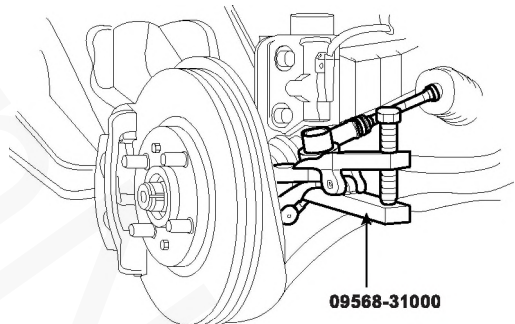


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2. If the measured value is not within the standard value, adjust the toe and inspect again.

**CHECKING THE TIE ROD END BALL JOINT STARTING TORQUE**

1. Disconnect the tie rod and knuckle by using the special tool.



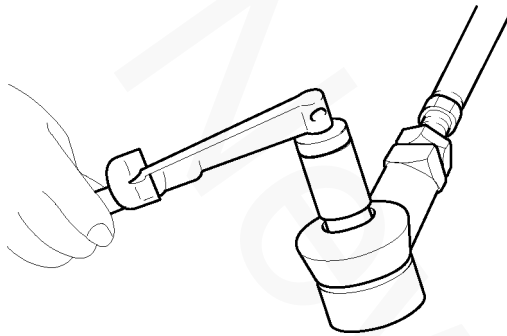
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2. Move the ball joint stud in a circular motion several times to check for looseness.

3. Mount the nuts on the ball joint, and then measure the ball joint starting torque.

**Standard value**

0.5~2.5 Nm (5~25 kg·cm, 0.36~1.78 lb-ft)



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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. Position 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 by turning the steering wheel clockwise and counterclockwise one and a half turns.

**Standard value**

Stationary steering effort : 29 N (3.0 kg, 6.5lbs)

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 and tie rod end ball joint.

- 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.

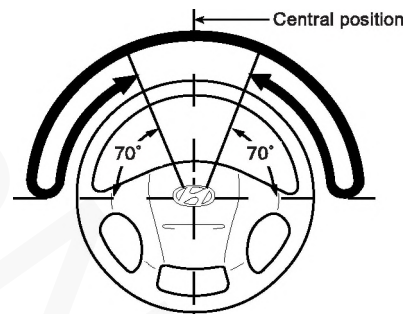
**CHECKING STEERING WHEEL RETURN**

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 at least 70° from the neutral position when it is released.

**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.



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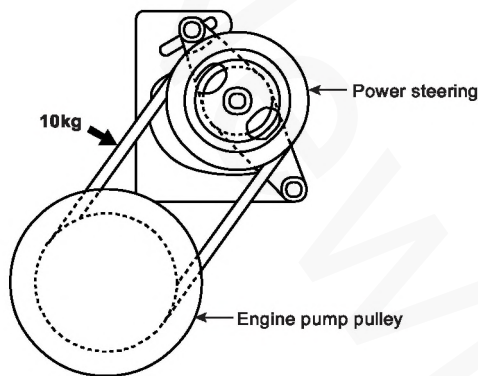
**CHECKING POWER STEERING BELT TENSION**

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****V belt deflection**

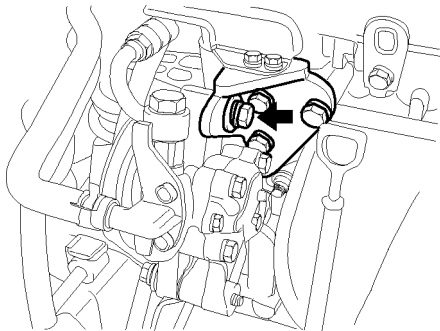
New belt : 8.8~11.0mm (0.35~0.43 in)

Used belt : 12.5~14.3mm (0.49~0.56 in)



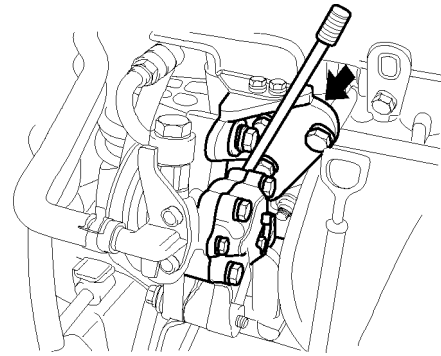
EPOF001C

2. If the belt deflection is beyond the standard value, adjust the belt tension as follows.
  - 1) Loosen the bolt adjusting the power steering "V" belt tension.



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



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

**CAUTION**

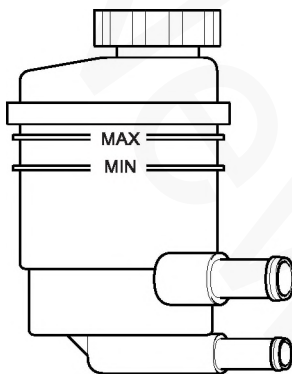
**After turning the V belt in the normal rotation direction more than once, recheck the belt deflection.**

**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 5mm (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.



EPOF011E

**REPLACING POWER STEERING FLUID**

1. Jack up the front wheels and support them with rigid racks.
2. Disconnect the return hose from the oil reservoir and plug the oil reservoir.
3. Connect a vinyl hose to the disconnected return hose, and drain the oil into a container.
4. Disconnect the high-tension cable at the ignition coil side.  
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 securely.
6. Fill the power steering fluid reservoir with the specified fluid.

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 PSF-3 : 0.75~0.8 lit.
 

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

**AIR BLEEDING**

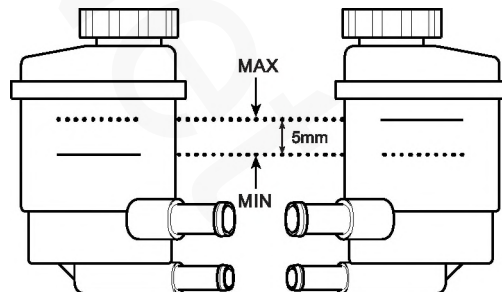
1. Disconnect the ignition coil high tension cable, and then, while operating the starter motor intermittently (for 15 to 20 seconds), turn the steering wheel all the way to the left and then to the right five or six times.

**NOTE**

1. During air bleeding, replenish with the fluid so that the level does not fall below the lower position 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.
2. Connect the high tension cable, and then start the engine (idling).
3. Turn the steering wheel to the left and then to the right, until there are no air bubbles in the oil reservoir.
4. Confirm that the fluid is not milky and that the level is between "MAX" and "MIN" marks on the reservoir.
5. Check that there is a little change in the fluid level when the steering wheel is turned left and right.

**NOTE**

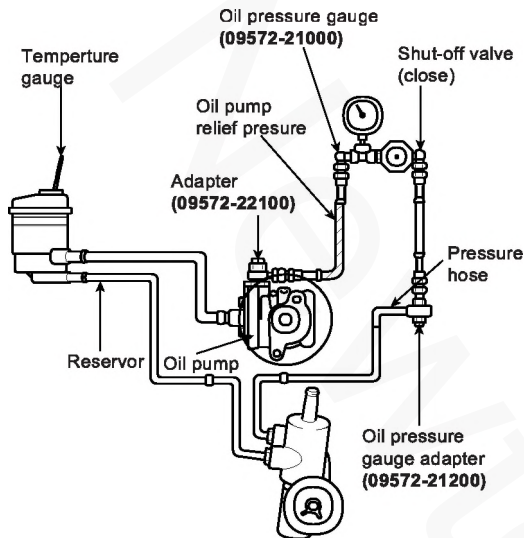
1. If the fluid level varies 5mm (0.2 in.) or more, bleed the system again.
2. If the fluid level suddenly rises after stopping the engine, further bleeding is required.
3. Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durability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



EPOF011F

## OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose from the pump. Connect the special tool between the pump and the pressure hose as illustrated.



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2. Bleed the air, and then start the engine and turn the steering wheel several times so that the fluid temperature can rise to approximately 50~60°C (122~132°F) operating temperature.
3. Increase the engine speed to 1,000 ± 100 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**

Relief pressure :  
8.3~8.8 MPa (85~90 kg.cm<sup>2</sup>, 1209~1280 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 to the specified torque.

**Tightening torque**

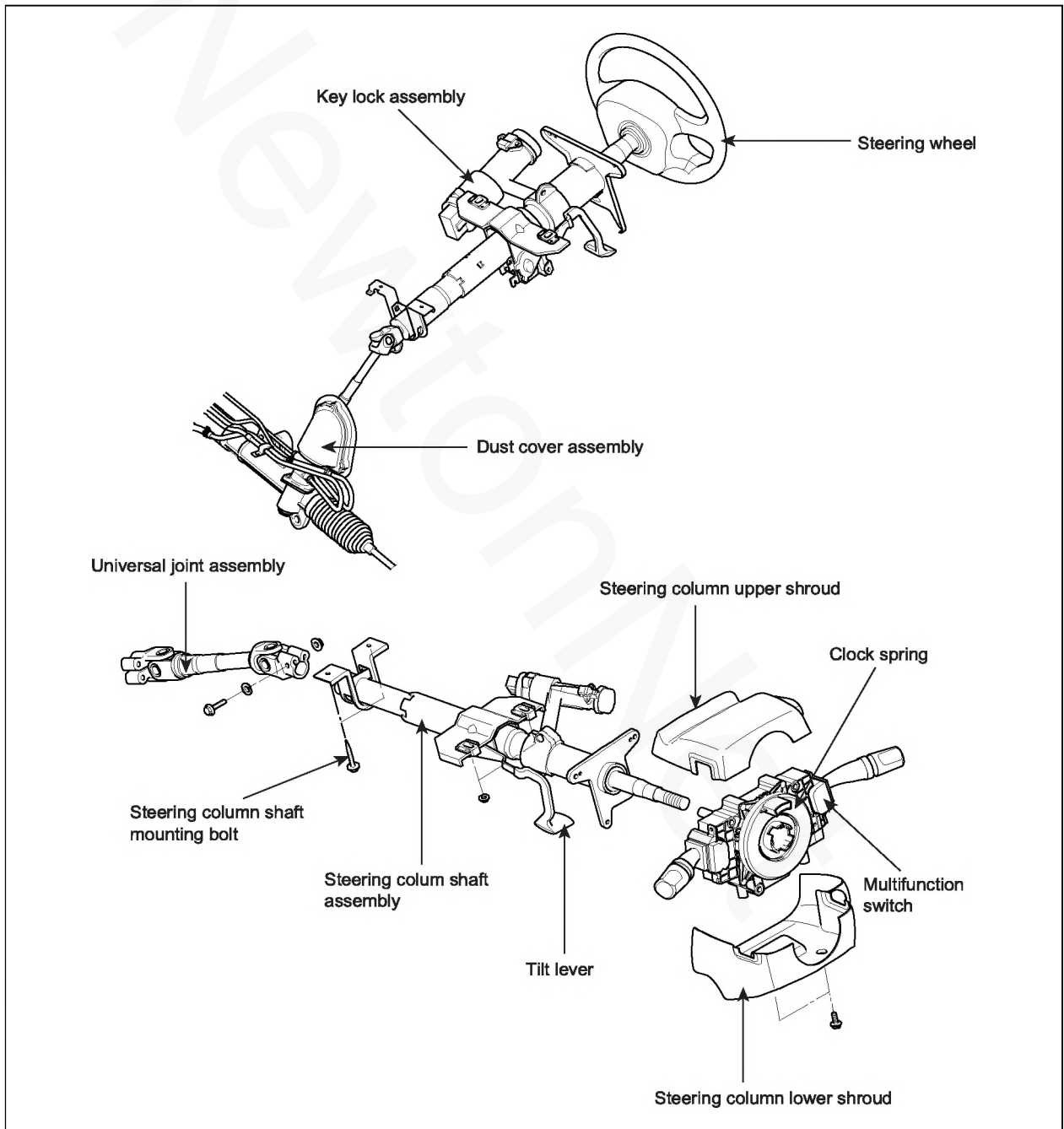
55~65 Nm (550~650 kg-cm, 40.6~47.9 lb-ft)

6. Bleed the system.

# STEERING COLUMN AND SHAFT

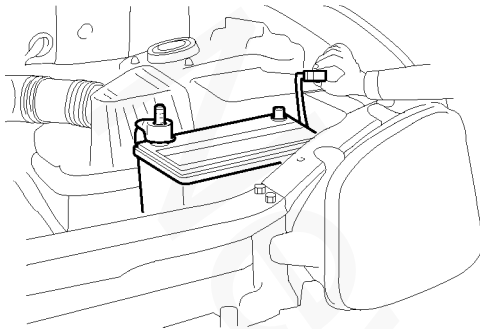
## STEERING COLUMN / SHAFT

### COMPONENTS EB6BCFE5



**REMOVAL** EBF7A8B6

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



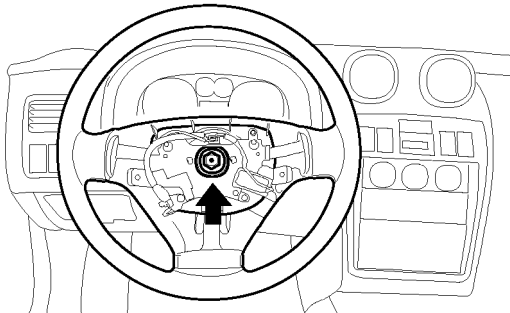
EPOF011G

2. After removing the bolts in the illustration, remove the driver's airbag module.

**NOTE**

*For the vehicles not equipped with SRS airbag, remove the horn cover assembly.*

3. Remove the steering wheel lock nut.

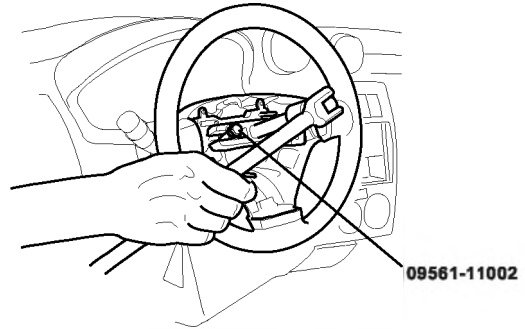


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4. After aligning the marks on the steering shaft and wheel, remove the steering wheel using the special tool.

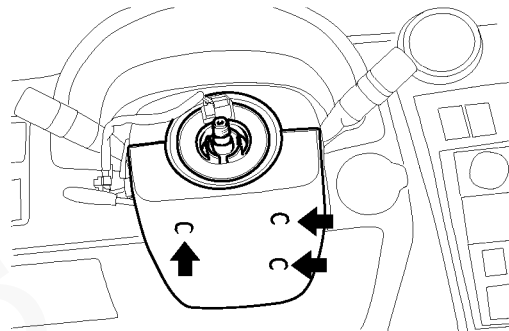
**NOTE**

*Do not hammer on the steering wheel to remove it. Doing so it may damage the steering column.*



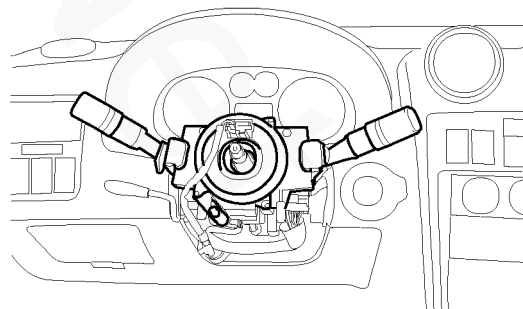
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5. After removing the 3 bolts in the illustration, remove the steering column shroud.



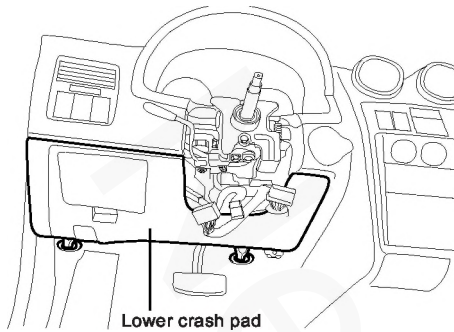
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6. Remove the connectors of the multifunction switch and the multifunction switch assembly.



EPOF001J

- Remove the lower crash pad after loosening the mounting bolts.



EPOF001K

- Remove the bolts connecting the steering column shaft, the universal joint and the pinion.



EPOF001L

- After removing the mounting bolts and nuts, remove the steering column and shaft assembly.

### INSPECTION E6B1069E

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

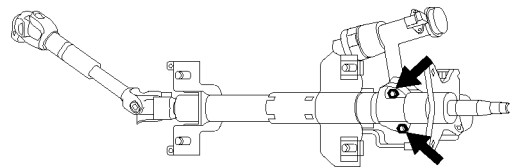
### INSTALLATION E66649F3

Assembly is the reverse of removal.

### DISASSEMBLY AND REASSEMBLY E413FF0D

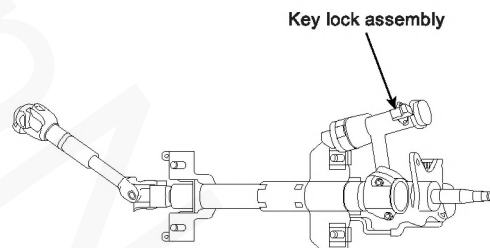
#### KEY LOCK ASSEMBLY

- If it is necessary to remove the key lock assembly, use a punch to make a groove on the head of the special bolt, and then use a screwdriver to remove the key lock assembly mounting bracket.



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- Disassemble the key lock assembly from the steering column and shaft assembly.

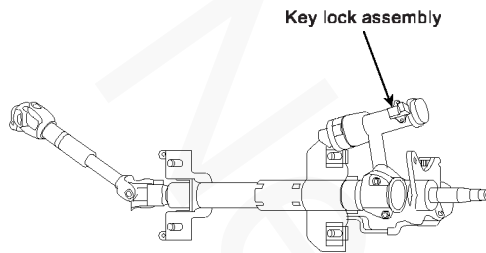


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- Reassembly is the reverse of disassembly.

**UNIVERSAL JOINT ASSEMBLY**

1. Remove the bolt connecting the universal joint assembly and the steering column and shaft assembly.



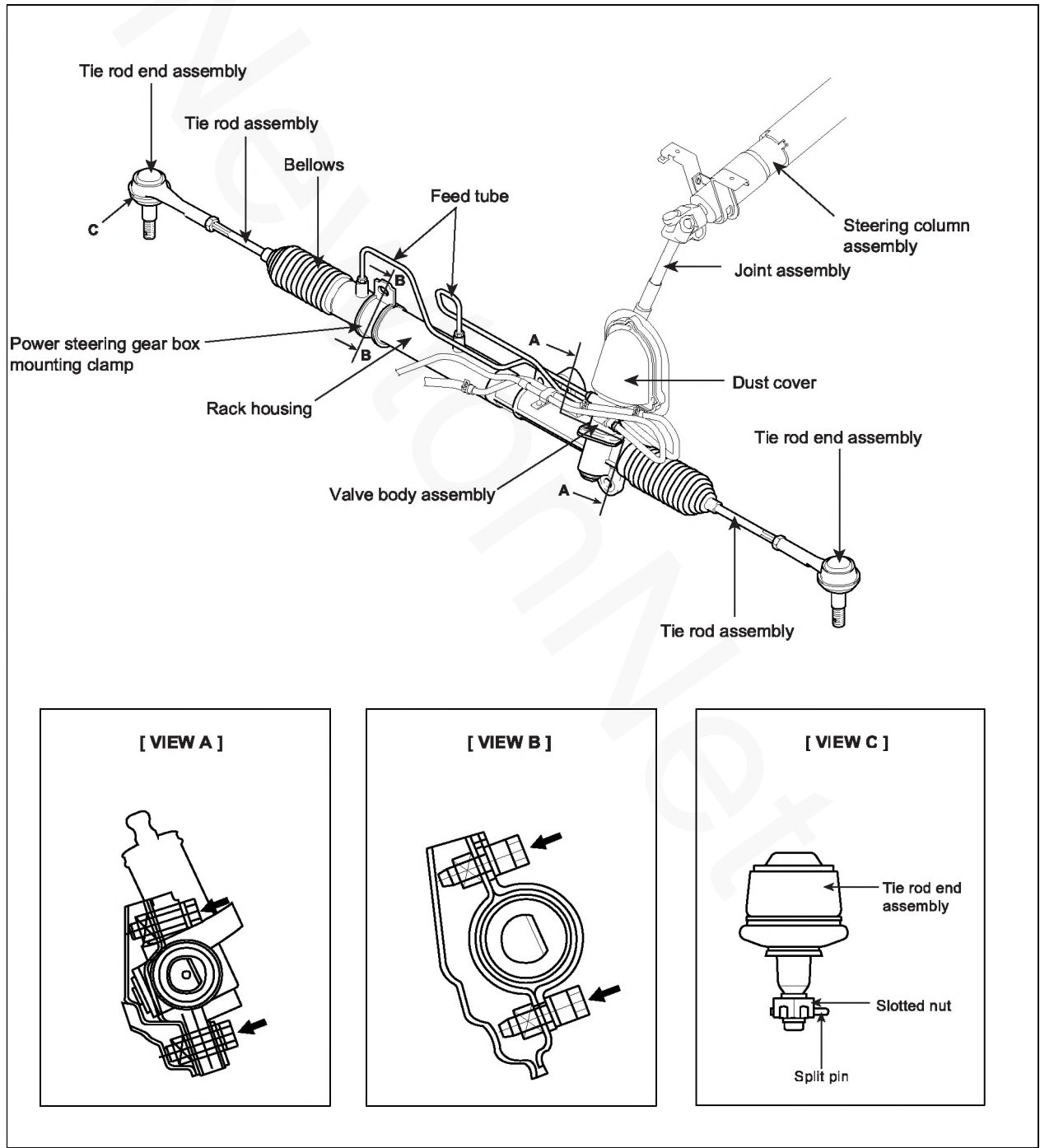
EPOF001N

2. Reassembly is the reverse of disassembly.

# MECHANICAL POWER STEERING SYSTEM

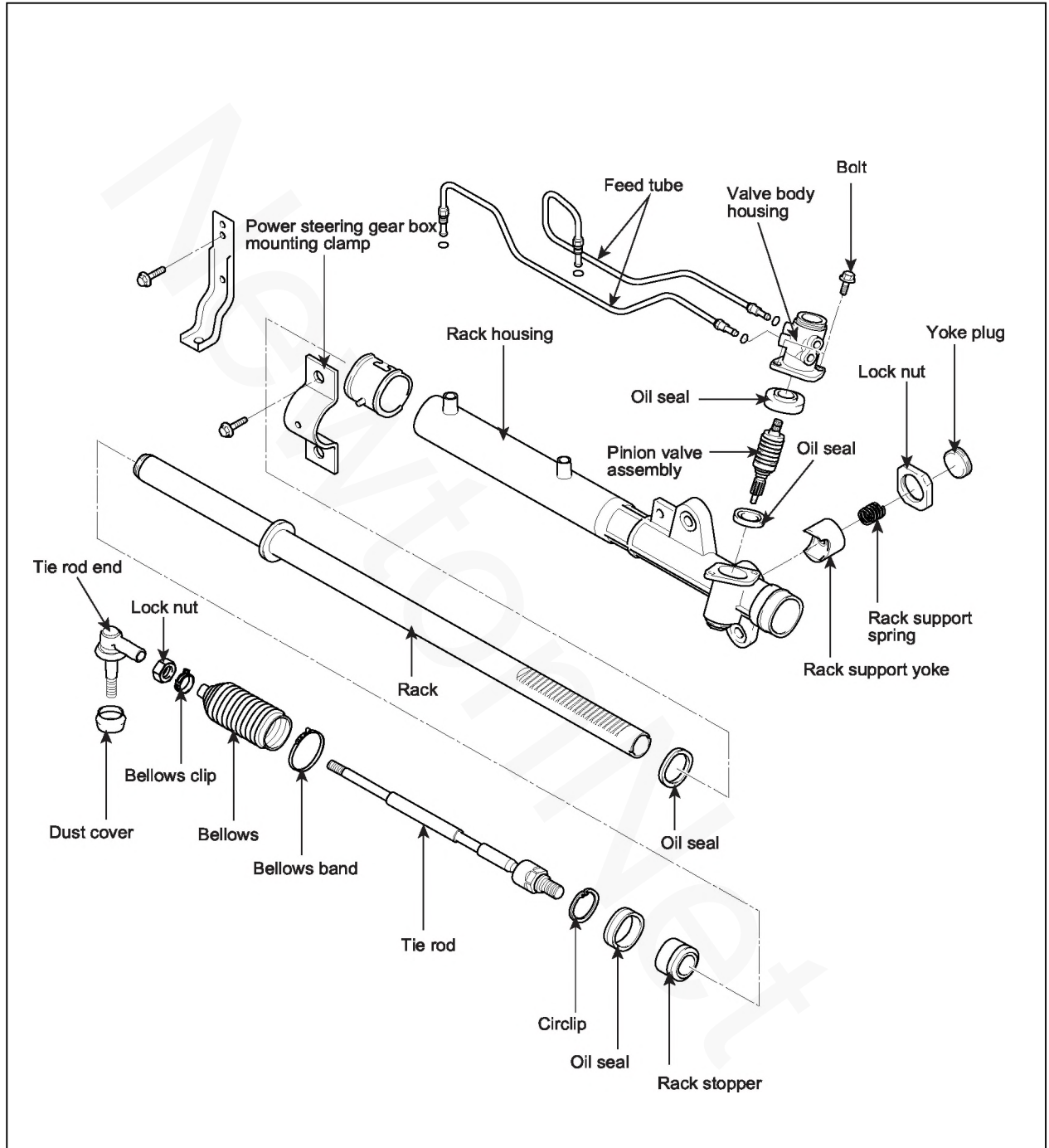
## POWER STEERING GEAR BOX

### COMPONENTS E935F827



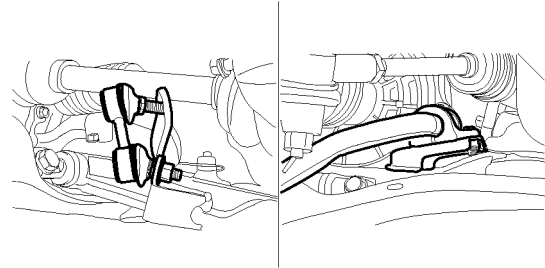


DISASSEMBLY AND ASSEMBLY E4833D6D



**REMOVAL** E5D340F0

1. Detach the power steering pressure hose mounting clamp and the return tube mounting clamp.
2. Drain the power steering fluid.
3. Disconnect the pressure tube and the return tube fittings from the gear box.
4. Disconnect the shaft assembly from the gear box inside the passenger compartment.



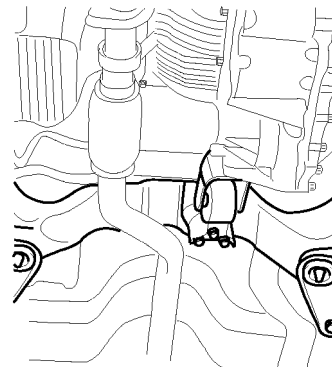
EPOF001P

10. After removing the rear roll stopper bracket mounting bolt from the sub frame, remove the rear roll stopper.



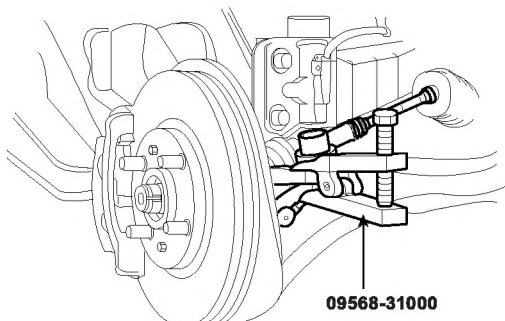
EPOF001O

5. Remove the strap and push out the dust cover and remove the dust cover mounting plate.
6. Raise up the vehicle.
7. Remove the front tires (RH/LH).
8. After removing the split pin, disconnect the tie rod from the knuckle by using the special tool (09568-31000).



EPOF001Q

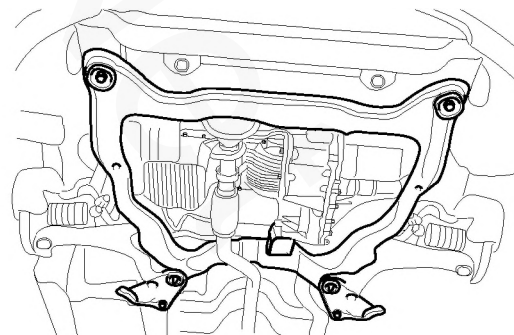
11. After loosening the sub frame mounting bolts a little so as to be the sub frame assembly hung down slightly.



09568-31000

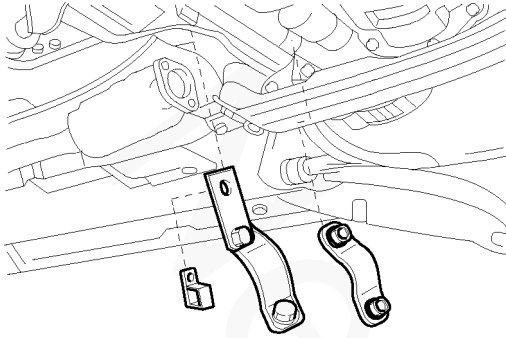
EPOF001B

9. Remove the stabilizer bar (RH side) mounting bracket and link nut.



EPOF001R

- Remove the power steering gear box mounting bolts, pressure tube and the return tube clamp.

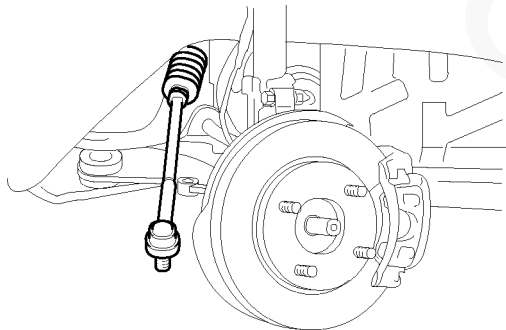


EPOF001S

- Pull the power steering gear box assembly toward the right side of the vehicle.

**NOTE**

*When removing the gear box, pull it out carefully and slowly to avoid damaging.*



EPOF011S

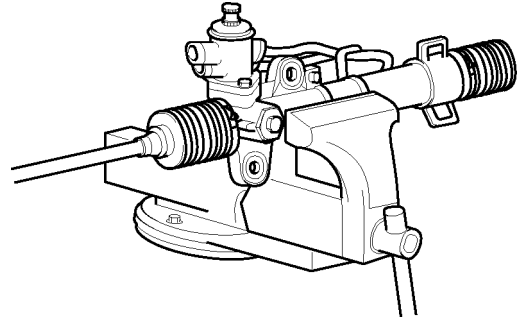
**INSPECTION AND ADJUSTMENT BEFORE DISASSEMBLY**

EF650ECD

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

**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.*



EPOF001T

**TOTAL PINION PRELOAD**

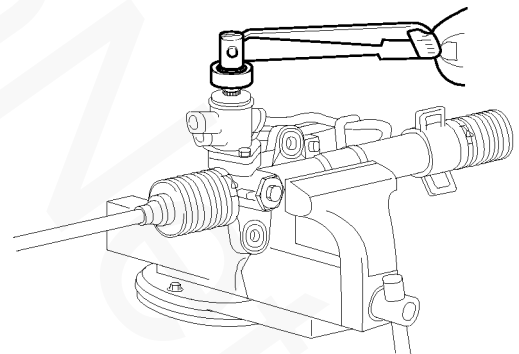
- Rotate the pinion gear for approximately 4 to 6 seconds for one rotation to measure the total pinion preload.

**Standard value**

Total pinion preload :  
0.6~1.3 Nm (6~13 kg-cm, 0.4~1.0 lb-ft)

**NOTE**

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



EPOF001U

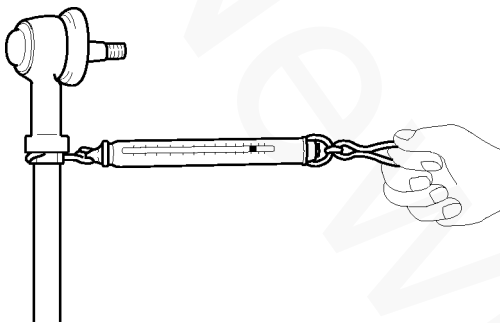
- If the measured value is out of specifications, first adjust the yoke plug, then recheck the total pinion preload.
- If not obtain the total pinion preload after adjusting the yoke plug check or replace the yoke plug components.

## TIE ROD SWING RESISTANCE

1. Rotate the tie rod severely ten times.
2. Measure the tie rod swing resistance with a spring scale.

**Standard value**

Total rod swing resistance :  
2~5 Nm (20~50 kg-cm, 1.4~3.6 lb-ft)



EPOF001V

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

**CAUTION**

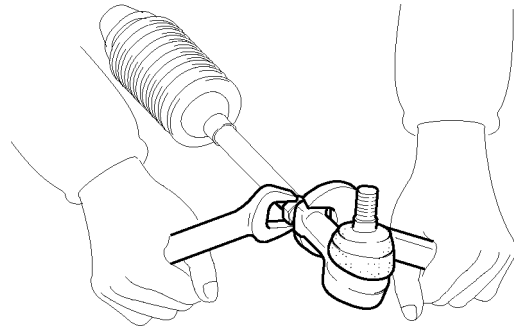
*Even if the measured value is below the standard value, the tie rod that swings smoothly without excessive play may be used. If the measured value is below 0.44 kg-cm, replace the tie rod.*

## 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.

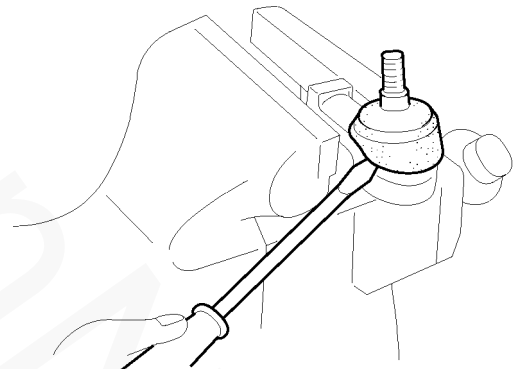
## DISASSEMBLY EB4351BB

1. Remove the tie rod end from the tie rod.



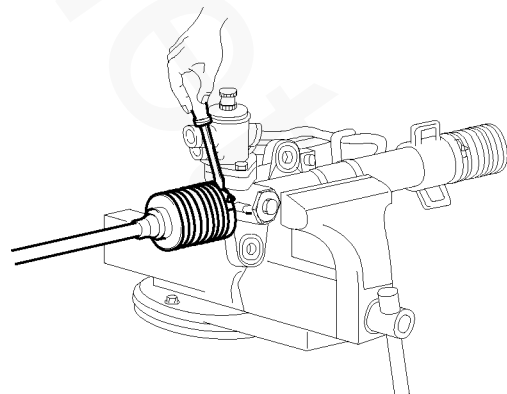
EPOF001W

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



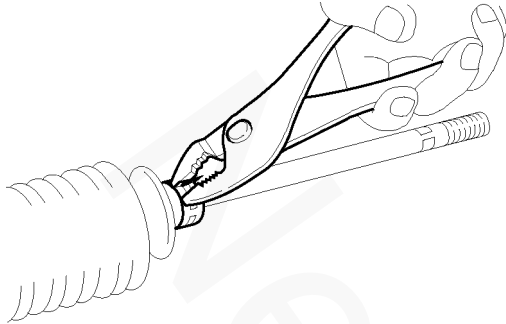
EPOF001X

3. Remove the bellows band.



EPOF001Y

4. Remove the bellows clip.



EPOF001Z

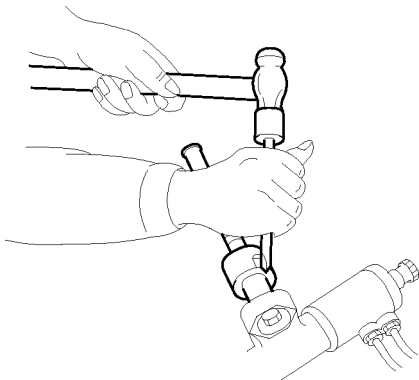
5. Pull the bellows out toward the tie rod.



**NOTE**

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

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 which fixes the tie rod and rack with a chisel.



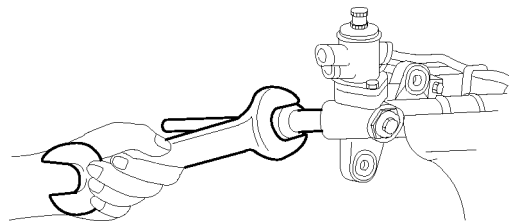
EPOF002A

9. Remove the tie rod from the rack.



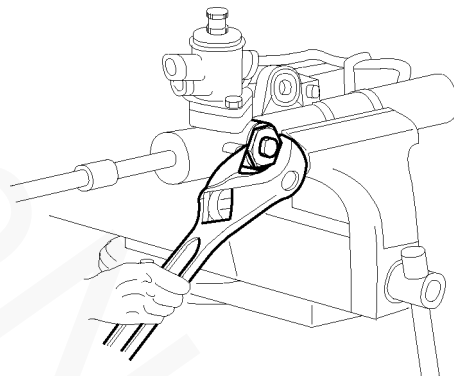
**CAUTION**

*Remove the tie rod from the rack, taking care not to twist the rack.*



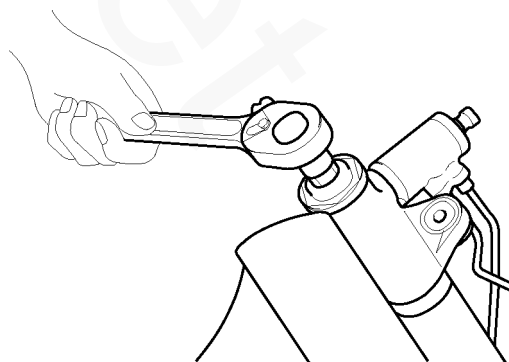
EPOF002B

10. Remove the yoke plug locking nut.



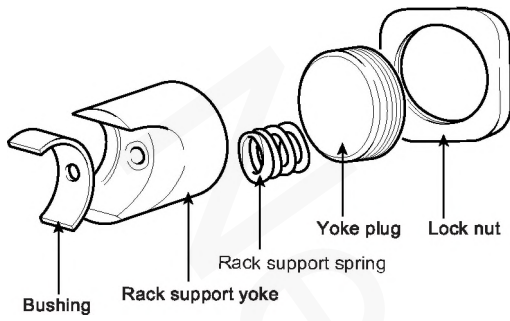
EPOF002C

11. Remove the yoke plug with a 14mm socket.



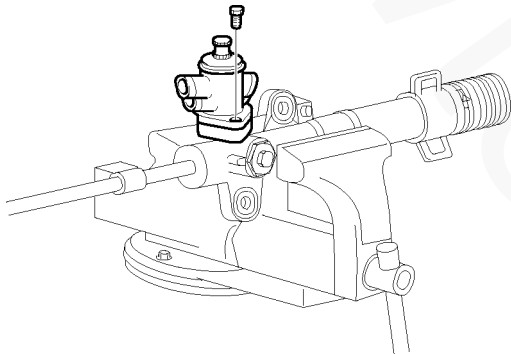
EPOF002D

12. Remove the lock nut, yoke plug, rack support spring, rack support yoke and bushing from the gear box.



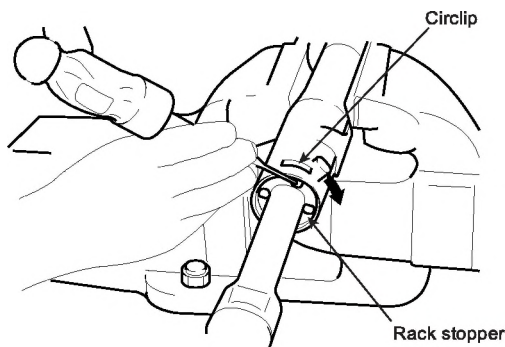
EPOF002E

13. Remove the valve body housing by loosening the two bolts.



EPOF002F

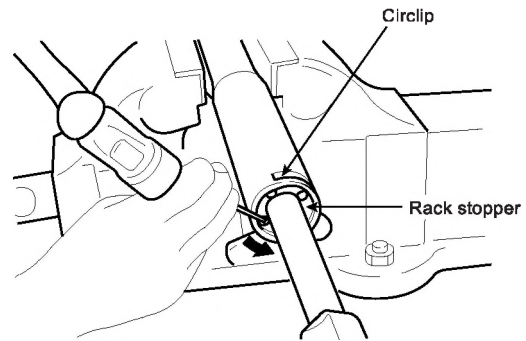
14. Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.



EPOF002G

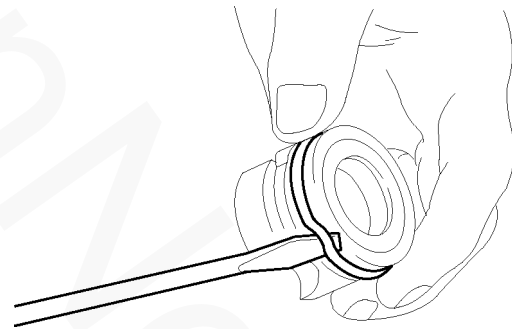
15. When the end of the circlip comes out of the notched hole of the housing rack cylinder, turn the rack stopper counterclockwise and remove the circlip.

**CAUTION**  
Be careful not to damage the rack.



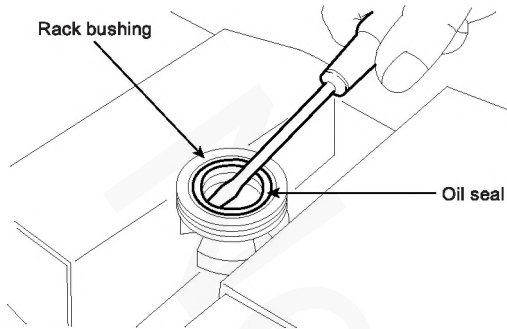
EPOF002H

16. Remove the rack stopper, rack bushing and rack from the rack housing.  
17. Remove the O-ring from the rack bushing.



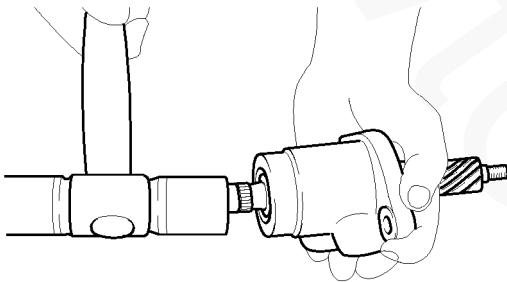
EPOF002I

18. Remove the oil seal from the rack bushing.



EPOF002J

19. Remove the valve body from the valve body housing with a soft hammer.



EPOF002K

20. Using the special tool, remove the oil seal and ball bearing from the valve body housing.

21. Remove the oil seal and O-ring from the rack housing.



**CAUTION**

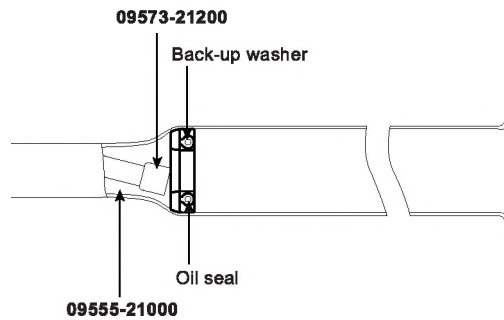
**Be careful not to damage the pinion valve cylinder bore of the rack housing.**

22. Using the special tool, remove the oil seal from the rack housing.



**CAUTION**

**Be careful not to damage the rack cylinder bore of the rack housing.**



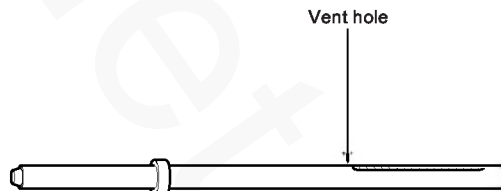
EPOF002L

**INSPECTION**

EB2&A729

**1. Rack**

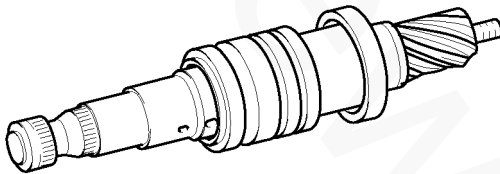
- 1) Check for rack tooth face damage or wear
- 2) Check for oil seal contact surface damage
- 3) Check for rack bending or twisting
- 4) Check for oil seal ring damage or wear
- 5) Check for oil seal damage or wear



EPOF002M

**2. Pinion valve**

- 1) Check for pinion 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



EPOF002P

**3. Bearing**

- 1) Check for seizure or abnormal noise during a bearing rotation
- 2) Check for excessive play
- 3) Check for missing needle bearing rollers

**4. Others**

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

**REASSEMBLY** E6FCFC24

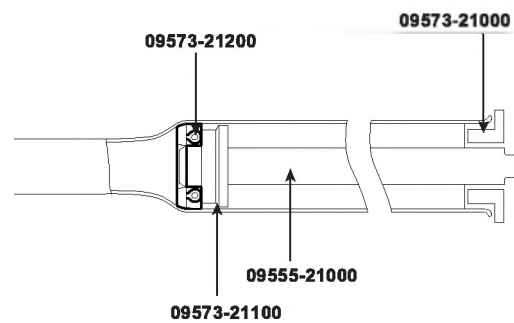
1. Apply the specified fluid to the entire surface of the rack oil seal.

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 Recommended fluid : PSF-3
 

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



EPOF002N

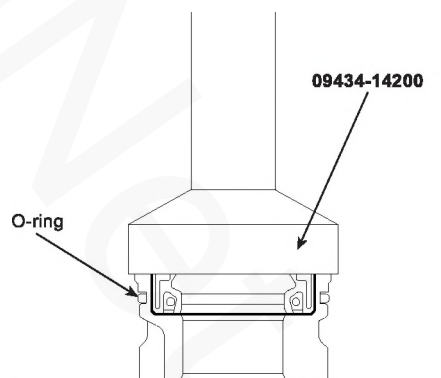
3. Apply the specified fluid to the entire surface of the rack bushing oil seal.

---

 Recommended fluid : PSF-3
 

---

4. Install the oil seal in the rack bushing.



EPOF002O

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

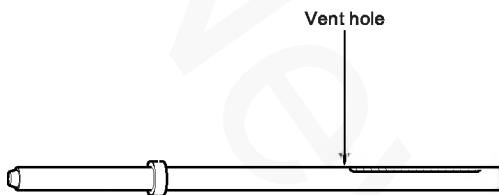


6. Apply the specified grease to the rack teeth.

**Recommended grease**  
Multipurpose grease SAE J310a, NLGI #2 EP

 **NOTE**

*Do not plug the vent hole in the rack with grease.*

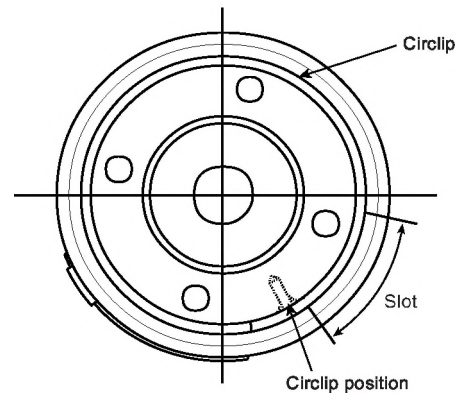


EPOF002M

8. Push in the rack stopper until the circlip groove of the rack stopper is aligned with the notched hole of the rack housing. Install the circlip while turning the rack stopper.

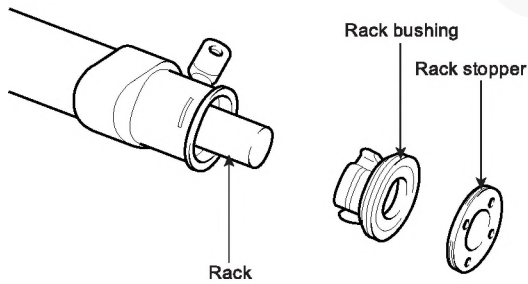
 **CAUTION**

*The circlip end should not be visible through the notched hole of the rack housing.*



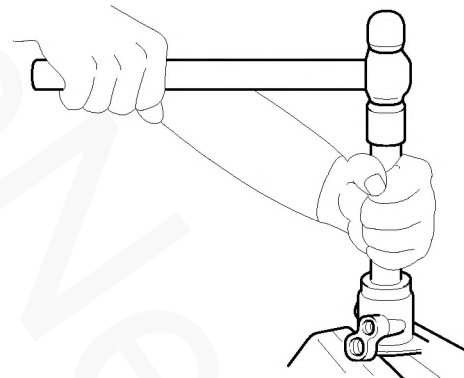
EPOF002R

7. Insert the rack into the rack housing and install the rack bushing and rack stopper.



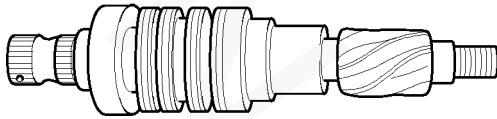
EPOF002Q

9. Using a special tool, install the oil seal and the ball bearing in the valve body housing.



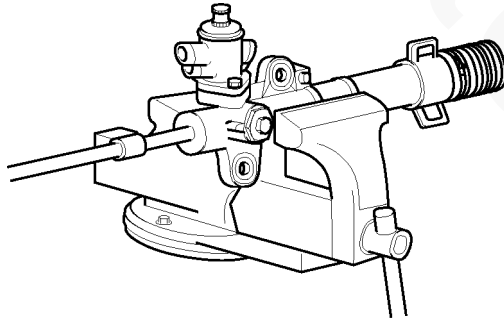
EPOF002S

10. After applying the specified fluid and grease to the pinion valve assembly, install it in the rack housing assembly.



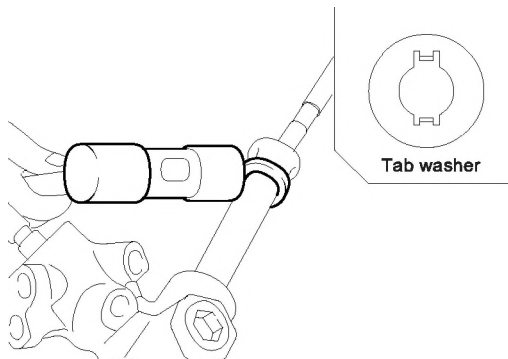
EPOF002T

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



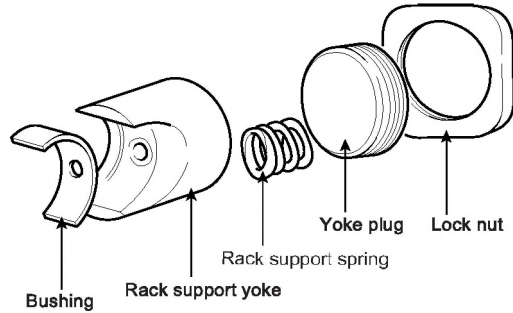
EPOF002U

12. Install the tab washer and the tie rod and stake the tab washer end at two points over the tie rod.



EPOF002V

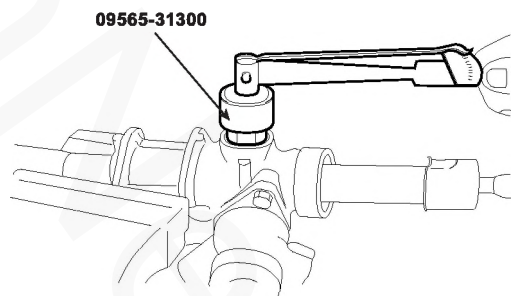
13. Install the bushing, rack support yoke, rack support spring and yoke plug in the order shown in the illustration. Apply semi-drying sealant to the threaded section of the yoke plug before installation.



EPOF002E

14. With the rack placed in the center position, attach the yoke plug to the rack housing. Tighten the yoke plug to 12 Nm (120 kg-cm, 8.9 lb-ft), with a 14mm socket. Loosen the yoke plug approximately from 30° to 60° and tighten the yoke nut to the specified torque.

**Tightening torque**  
50~70 Nm (500~700 kg-cm, 37~52 lb-ft)



EPOF002W

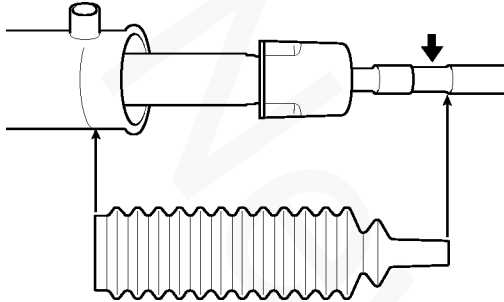
15. Tighten the feed tube to the specified torque and install the mounting rubber using adhesive.

## MECHANICAL POWER STEERING SYSTEM

ST -27

16. Apply the specified grease to the bellows mounting position (fitting groove) of the tie rod.

**Recommended grease** :Silicone grease

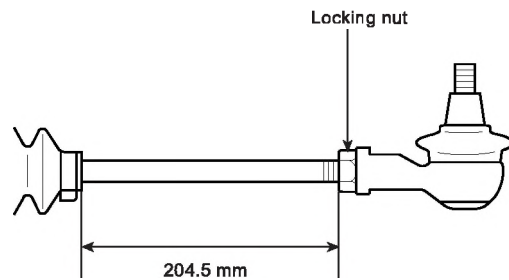


EPOF002X

20. 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 : 204.5mm



EPOF002Z

17. Install the new attaching band to the bellows.

**NOTE**

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

18. Install the bellows in position, taking care not to twist it.
19. 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.

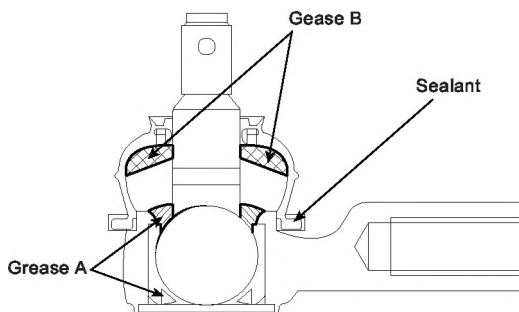
**Recommended grease**

A : POLY LUB GLY 801K or equivalent

B : SHOWA SUNLIGHT MB2 or equivalent

Dust cover inner side and lip : THREE BOND

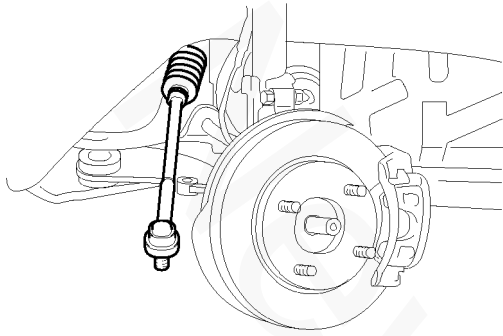
21. Check for total pinion preload.



EPOF002Y

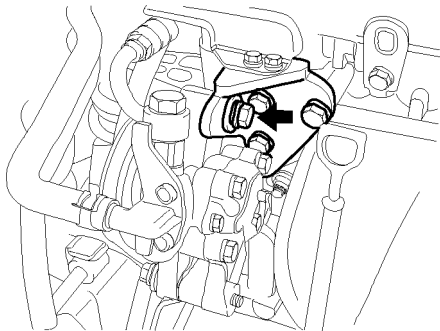
**INSTALLATION** EA73705C

1. Push in the power steering gear box assembly in the right side of the vehicle.



EPOF011S

2. Install the dust cover mounting plate.
3. Connect the dust cover to its mounting plate with a new strap.
4. Connect the steering gear box assembly to the steering column and shaft assembly.

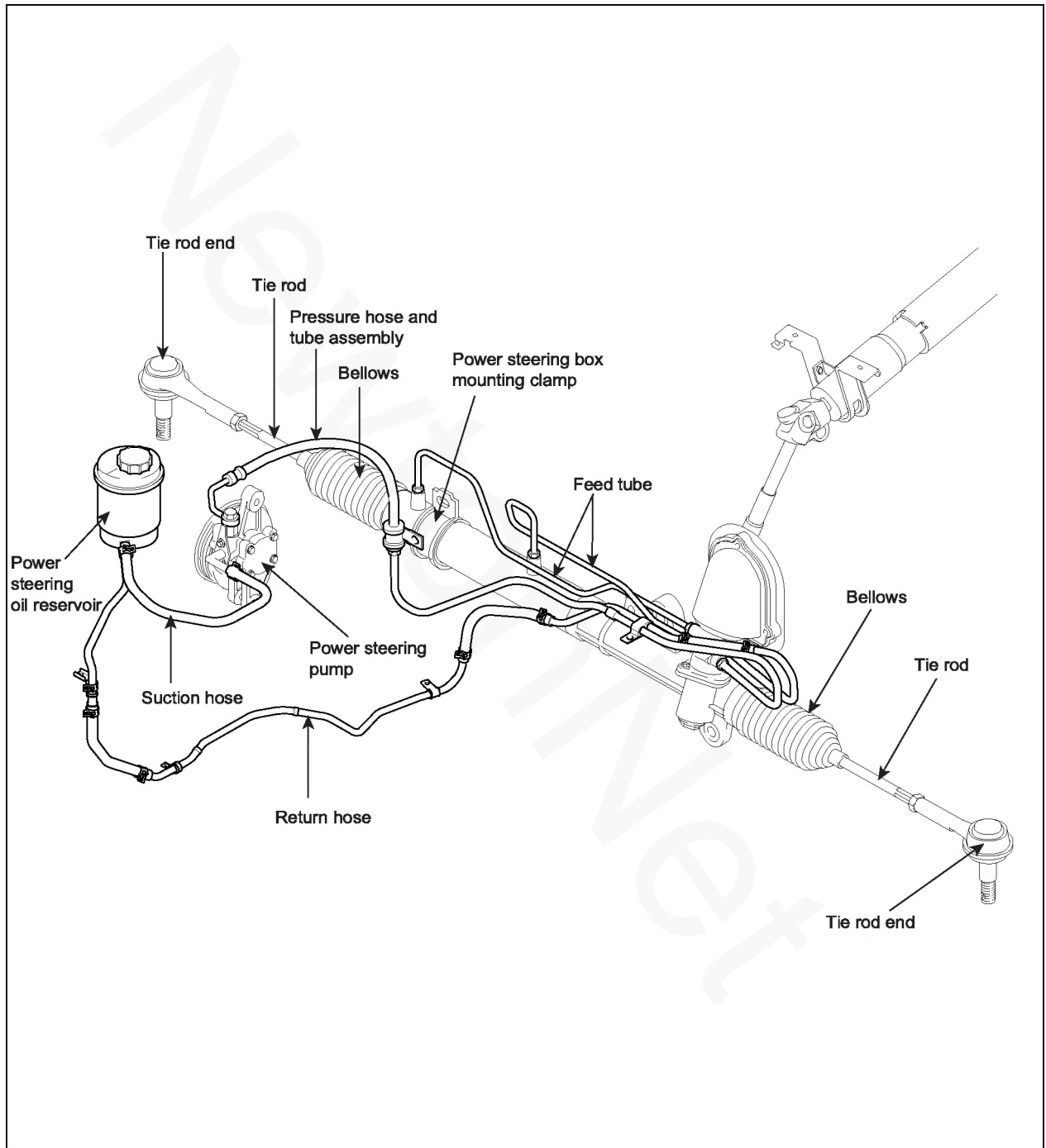


EPOF001D

5. Installation is the reverse of removal.
6. After installation, bleed the system.

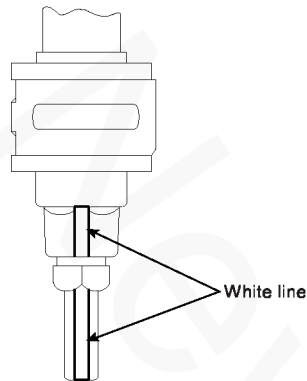
POWER STEERING HOSES

COMPONENTS EB5E7C5C



**REMOVAL AND INSTALLATION** E840C33A

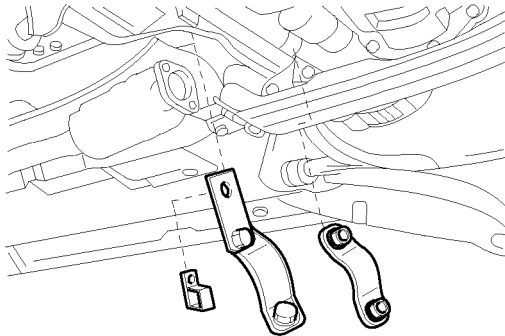
While installing the tube and hose assembly, be sure to align white marks on each fitting.



EPOF0030

**PRESSURE HOSE AND TUBE**

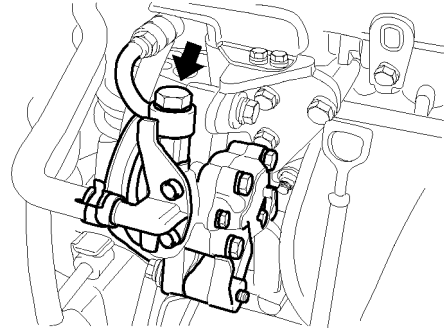
1. After draining the power steering fluid, remove the pressure hose mounting clamp.
2. Lift up the vehicle and remove the mounting clamp which is holding both the pressure tube and the return tube.



EPOF001S

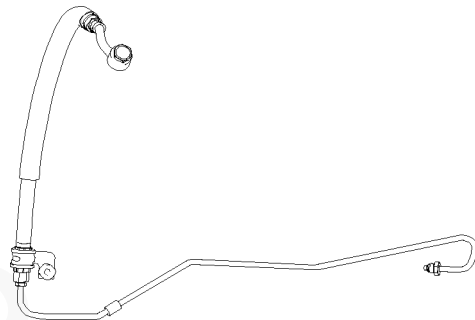
3. Detach the pressure tube fitting in the gear box.

4. Lower the vehicle and remove the connector.



EPOF003A

5. Remove the pressure hose and tube assembly.



EPOF003B

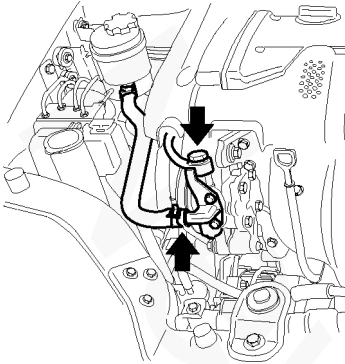
6. Installation is the reverse of removal.

**NOTE**

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

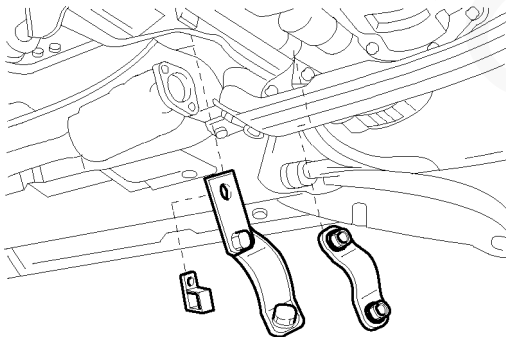
**RETURN TUBE AND HOSE**

1. Detach the hose from the power steering fluid reservoir.



EPOF003C

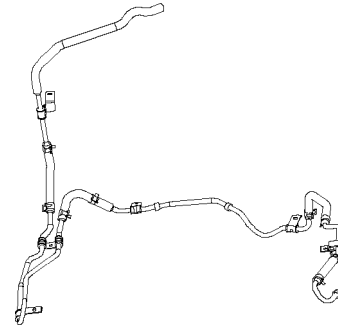
2. Remove the return tube and hose mounting clamps.
3. Raise the vehicle and remove the mounting clamp which is holding both the pressure tube and the return tube.



EPOF001S

4. Remove the pressure tube and the return tube fitting in the gear box.
5. Lower the vehicle and disconnect the clamp holding the return tube and hoses.

6. Remove the return tube and hoses.



EPOF003D

7. Installation is the reverse of removal.

**NOTE**

1. Install the return tube and hoses so that they are not twisted and they do not come in contact with any other parts.
2. After installation, air bleed the system.

**INSPECTION** E169AA01

1. Twisting the hose by hand, check for cracks.
2. Check that the hose does not contact with other components

**HOW TO FILL WITH POWER STEERING FLUID**

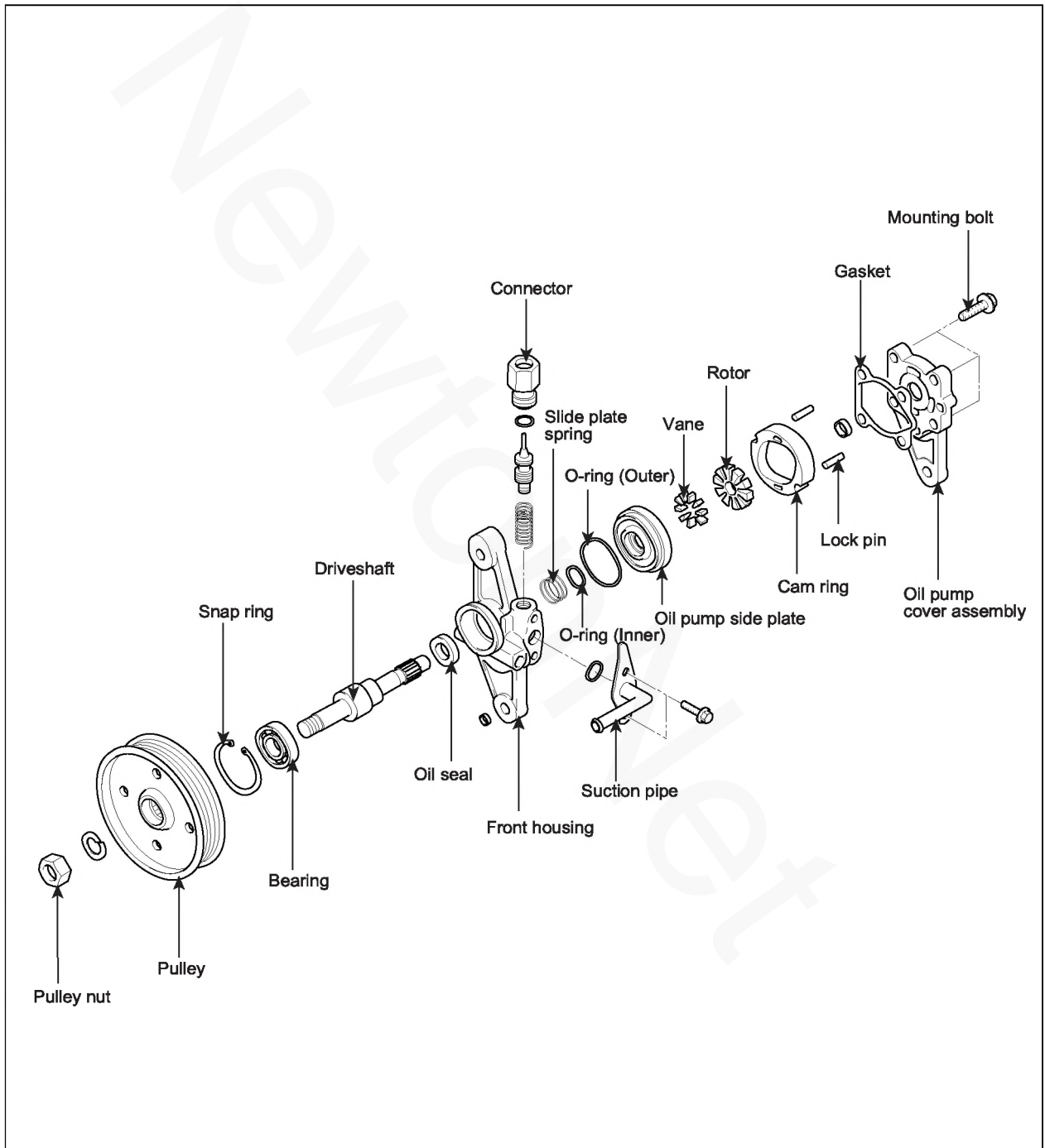
1. Fill the power steering reservoir with the power steering fluid to the "Max." position.
2. Lift the front wheels with a jack and turn the steering wheel fully to the left and right, 5~6 times for 15~20 sec., while driving the pulley only by operating the start motor.
3. Start the engine, let it idle and turn the steering wheel fully left and right several times until bubbles disappear from the power steering reservoir.
4. If the oil color does not become milk-white and the oil level is constant at the "MAX" position, fluid level is O.K.

**CAUTION**

*If the oil level changes when turning the steering wheel, and the oil overflows when stopping the engine, it shows that air bleeding wasn't performed perfectly. As it can cause noise and early damage, you must repeat the above procedures.*

# POWER STEERING OIL PUMP

## COMPONENTS E5C581AE



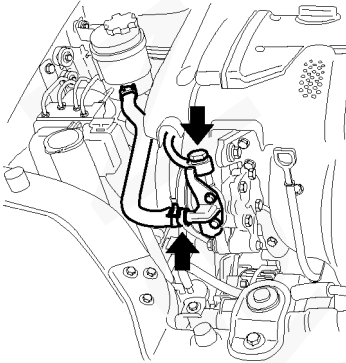


## MECHANICAL POWER STEERING SYSTEM

ST -33

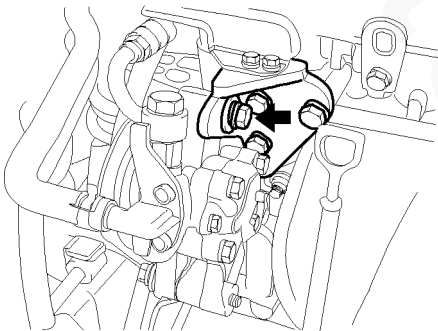
### REMOVAL EFA42E9A

1. Remove the pressure hose from the oil pump. Disconnect the suction hose from the suction connector and drain the fluid into a container.



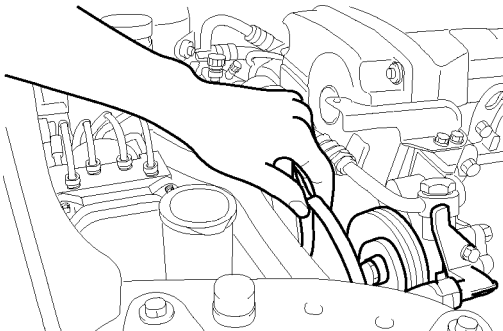
EPOF003C

2. Loosen the power steering "V" belt tension adjusting bolt.



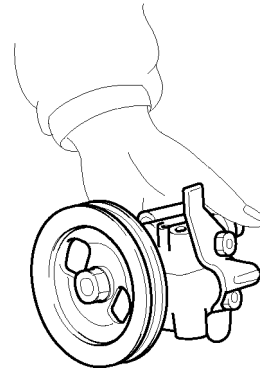
EPOF001D

3. Remove the "V" belt from the power steering oil pump pulley.



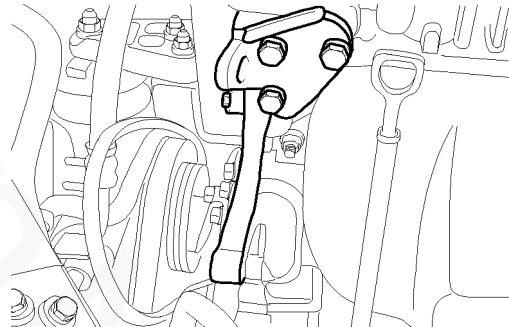
EPOF003G

4. After remove the power steering oil pump mounting bolts and the tension adjusting bolt, remove the power steering oil pump assembly.



EPOF003P

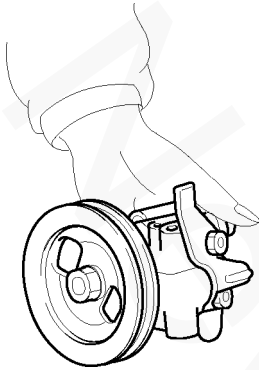
5. Remove the power steering oil pump mounting bracket.



EPOF003H

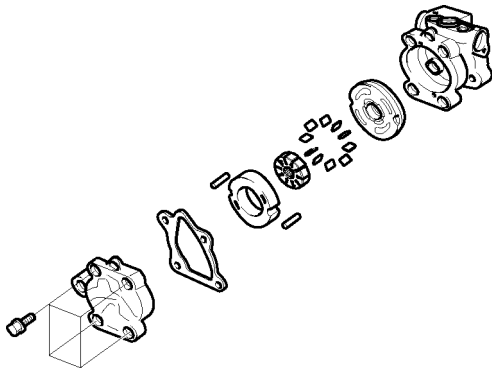
**DISASSEMBLY** E1CCCE2B

1. After removing the 2 bolts, remove the suction pipe and the O-ring from the oil pump body.



EPOF003P

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.

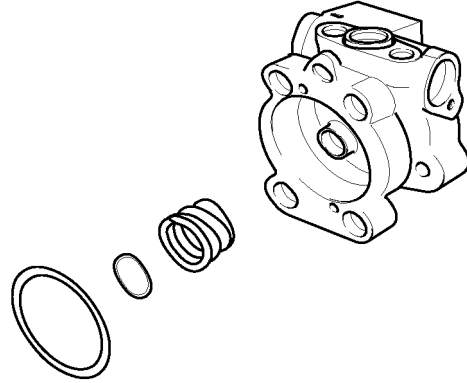


EPOF003Y

6. Remove the inner and outer O-ring.
7. Remove the side plate spring.

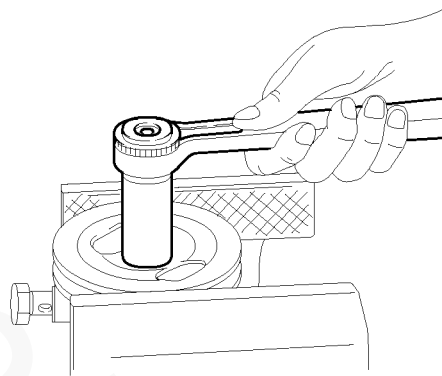
**NOTE**

When assembling, use a new gasket and O-ring.



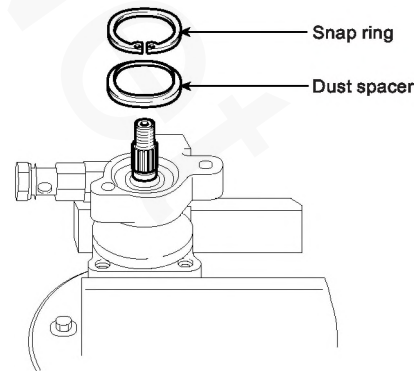
EPOF003S

8. Mount the pulley in a vise and remove the pulley nut and the spring washer.



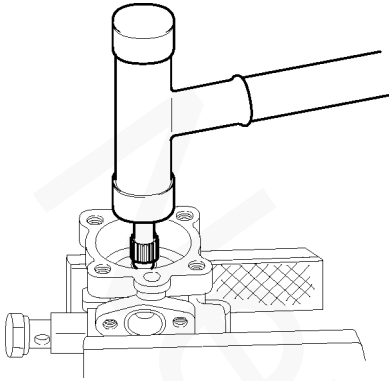
EPOF003I

9. Pull the pulley out.
10. After removing the snap ring of the shaft with snap ring pliers, remove the dust spacer.

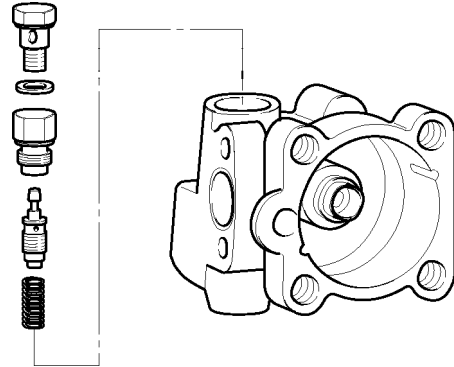


EPOF003T

11. Tap the rotor side of the shaft slightly with a plastic hammer to remove the shaft.



EPOF003U

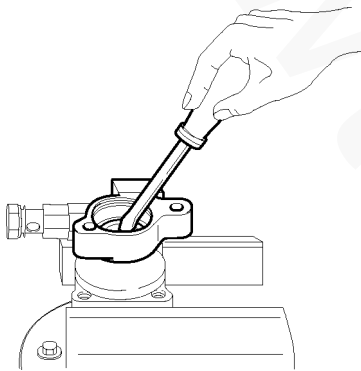


EPOF003X

**INSPECTION**

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12. Remove the oil seal from the oil pump body.

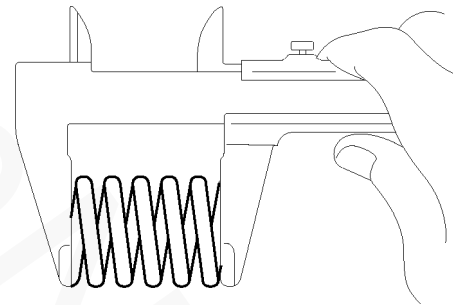


EPOF003W

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

Free length of the flow control spring : 36.5mm

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



EPOF003R

14. Remove the O-ring from the connector.

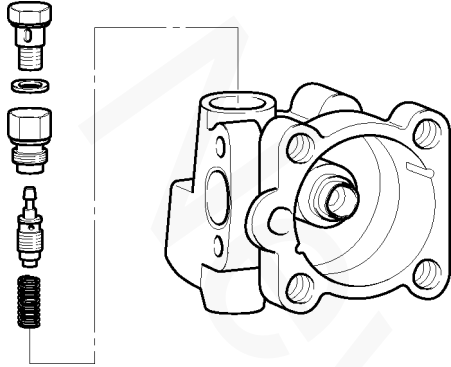
**CAUTION**

**Do not disassemble the flow control valve.**

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.

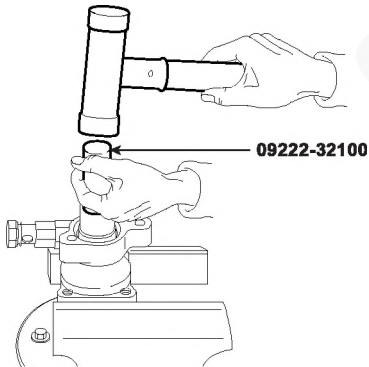
**REASSEMBLY** EFB7AD5E

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



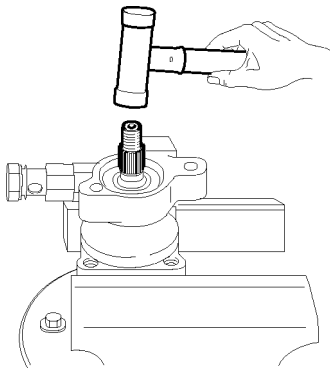
EPOF003X

2. Install the oil seal in the pump body by using the special tool.

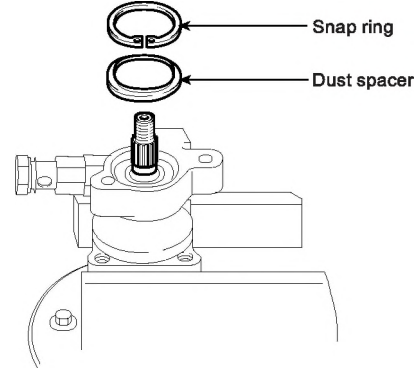


EPOF003Z

3. After inserting the shaft assembly into the pump body, install the dust spacer and snap ring.

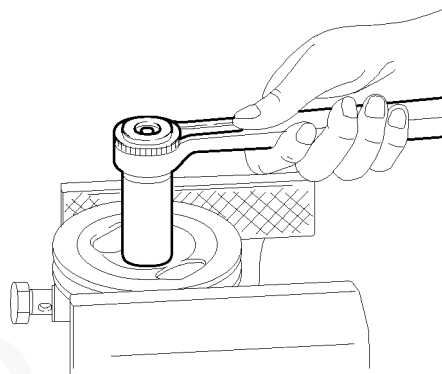


EPOF004A



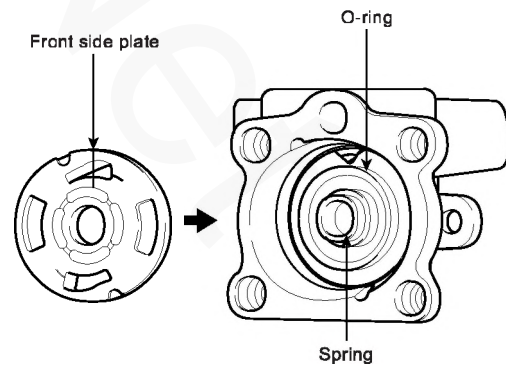
EPOF003T

4. Install the pump pulley.



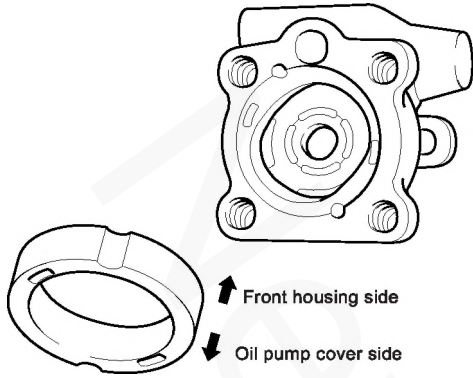
EPOF003I

5. Install the spring and inner O-ring.
6. Insert the outer O-ring in the oil pump side plate and then install it in the pump body.



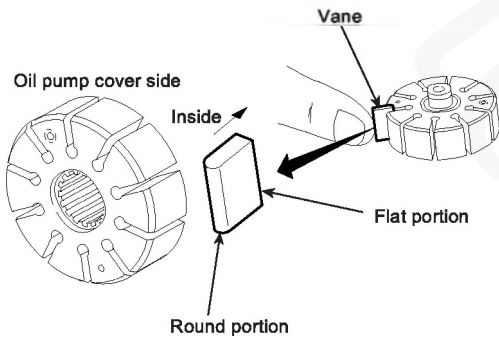
EPOF003J

- 7. After inserting the lock pin into the groove of the front housing, install the cam ring attending to the direction.



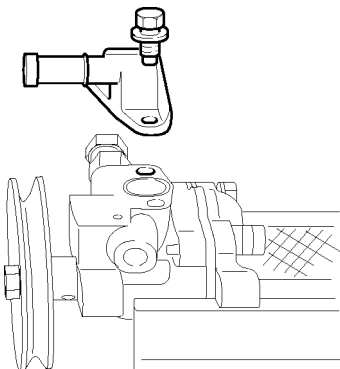
EPOF004C

- 8. Install the rotor.
- 9. Install vanes so that the rounded edges face outward.



EPOF003K

- 10. Install the gasket and oil pump cover assembly.
- 11. Install the suction pipe and O-ring.



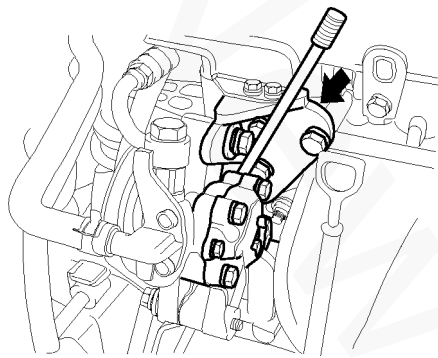
EPOF004D

**INSTALLATION** E03F90EC

1. After installing the oil pump to the oil pump bracket, install the "V" belt and tighten the bolt adjusting tension to the specified torque.
5. Air bleed the system.
6. Check the oil pump pressure.

**Standard value**

Oil pump adjusting bolt  
3.5~5.0 Nm (350~500 kg-cm, 25.8~37 lb-ft)



EPOF001E

2. Install the suction hose.

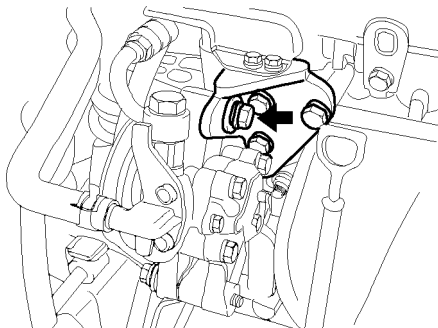
**CAUTION**

*Install the pressure hose to the oil pump, facing the painted part on the hose toward the oil pump.*

3. Install the pressure hose to the oil pump.

**NOTE**

*Install the pressure hose being careful so that it does not twist and come in contact with other components.*



EPOF001D

4. Add power steering fluid (PSF-3).