

SECTION 6A

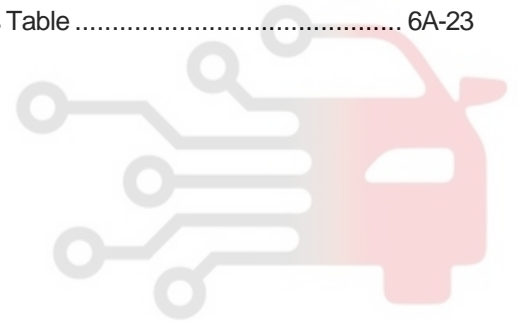
POWER STEERING

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دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



GENERAL DESCRIPTION AND OPERATION

SPECIFICATIONS

Steering Wheel	Number of spoke		4-Spoke Type
	Outer Diameter		390 mm
Steering Gear Box	Type		Rack and pinion
	Gear Ratio		∞
	Steering Angle	Inner	36° 17´
		Outer	32° 40´
Oil pump	Type		Vane
	MAX. Pressure		82 ~ 92 kgf/cm ²
	Outlet		10.5L/min
	Size		124mm
Tilt column Angle	Upper		4°
	Lower		4°
	Turning Radius		5.7 m
Oil	Type		ATF DEXRON II
	Capacity		1 L

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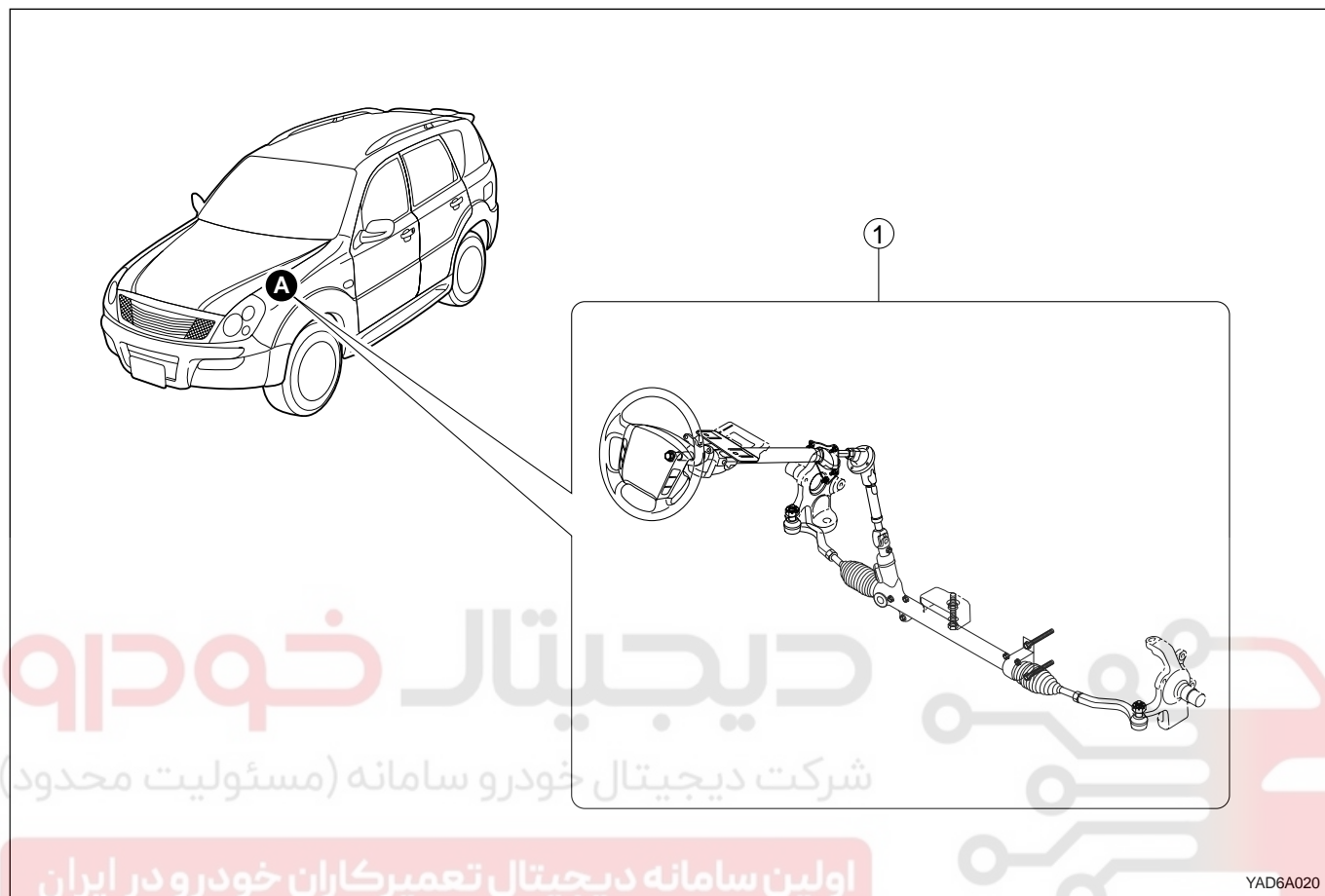


DIAGNOSTIC INFORMATION AND PROCEDURES

Phenomena	Checks	Action
Hard Steering	Lack of Lubrication	Lubricate
	Abnormal Wear or Binding of Steering Ball Joint	Replace
	Damaged or Faulty Steering Gear	Replace gear assembly
	Improper Preload of Steering Pinion	Adjust
	Faulty Steering Shaft Joint	Replace
	Steering Fluid Leaks	Repair or replace
	Lack of Fluid or Air-in System	Replenish or bleed
	Faulty Steering Oil Pump	Replace
Steering Pulls to One Side	Damaged or Loosened Pump Drive Belt	Adjust or replace
	Clogging Oil Line	Repair or replace
	Damaged Wheel or Tire	Repair or replace
	Faulty Suspension System	Repair or replace
	Damaged Steering Linkage	Repair
	Damaged Wheel and Tire	Repair or replace
	Faulty Brake System	Repair or replace
	Faulty Suspension System	Repair or replace
Excessive Wheel Play	Worn Steering Gear	Replace gear assembly
	Worn or Damaged Steering Ball Joint	Replace
	Loosened Steering Gearbox Bolts	Retighten
Poor Return of Steering Wheel	Damaged or Binding Steering Ball Joint	Replace
	Improper Preload of Steering Pinion	Replace gear assembly
	Damaged Wheel or Tire	Repair or replace
	Faulty Suspension System	Repair or replace
Steering Wheel Shimmy	Damaged Steering Linkage	Replace
	Loosened Steering Gearbox Mounting Bolt	Retighten
	Damaged or Binding Steering Ball Joint	Replace
	Worn or Damaged Front Wheel Bearing	Replace
	Damaged Wheel or Tire	Repair or replace
	Faulty Suspension System	Repair or replace
Abnormal Noise From Steering System	Loosened Steering Gearbox Mounting Bolt	Retighten
	Faulty Steering Gear	Replace gear assembly
	Steering Column Linterference	Replace
	Loosened Steering Linkage	Retighten
	Damaged or Loosened Oil Pump Drive Belt	Adjust or replace
	Loosened Oil Pump Bracket	Retighten
	Loosened Oil Pump Mounting Bolt	Retighten
	Air-in System	Bleed
	Faulty Oil Pump	Replace

COMPONENT LOCATOR

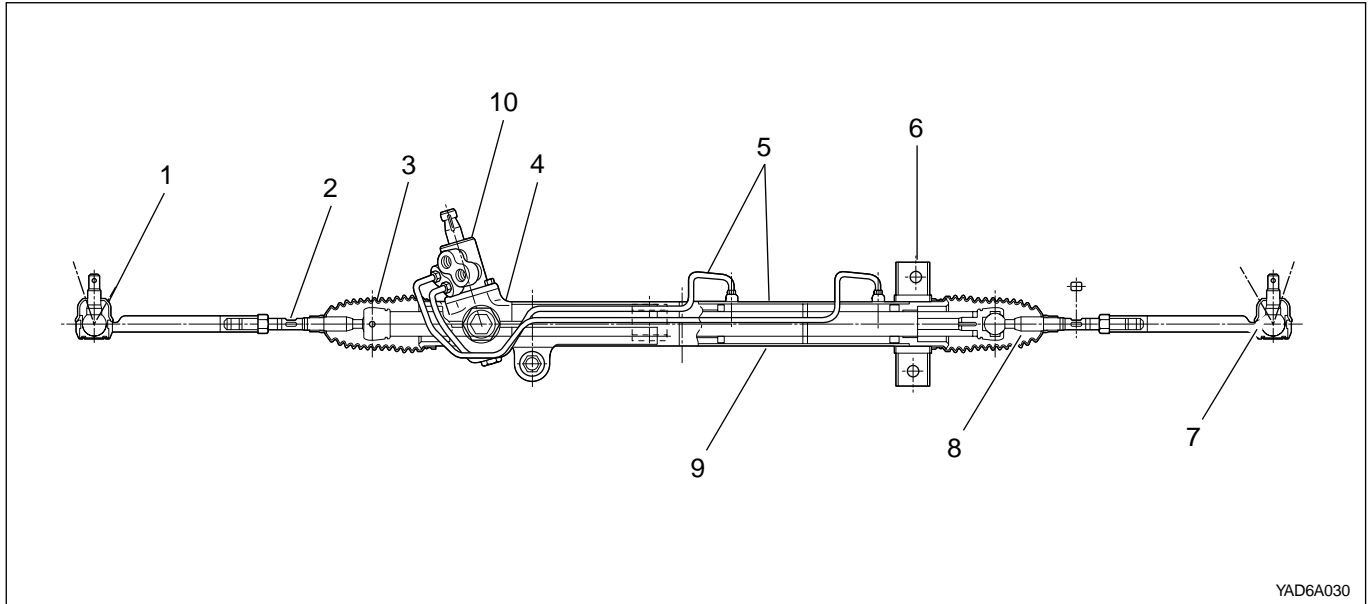
POWER STEERING SYSTEM LOCATOR



A Mounting Position

1 Steering Component

STEERING GEAR BOX CROSS SECTION



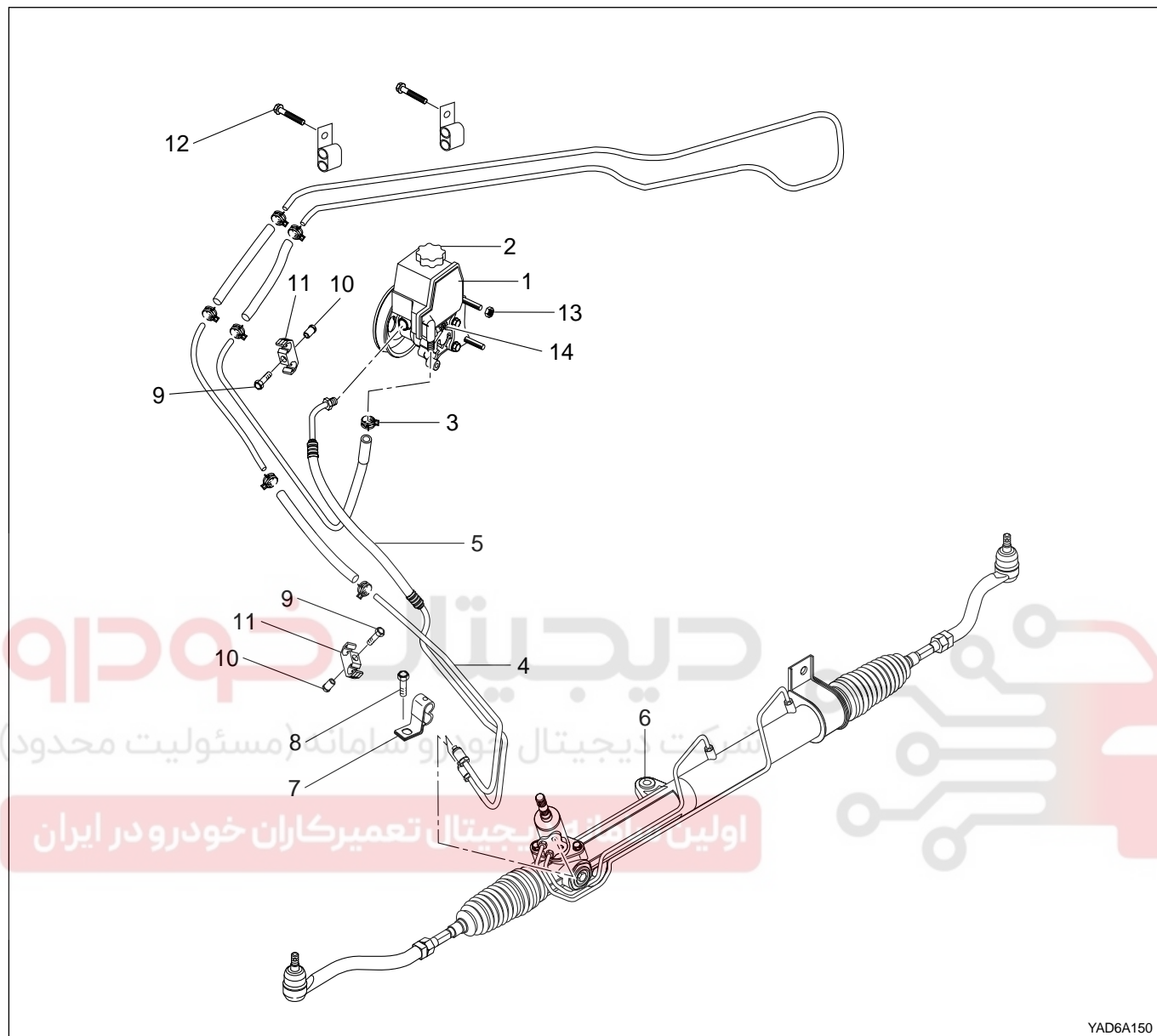
- 1 Tie Rod End
- 2 Tie Rod
- 3 Bellows
- 4 Rack Housing
- 5 Feed Tube

- 6 Mounting Bracket
- 7 Tie Rod End
- 8 Tie Rod End
- 9 Cylinder Tube
- 10 Valve Assembly

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

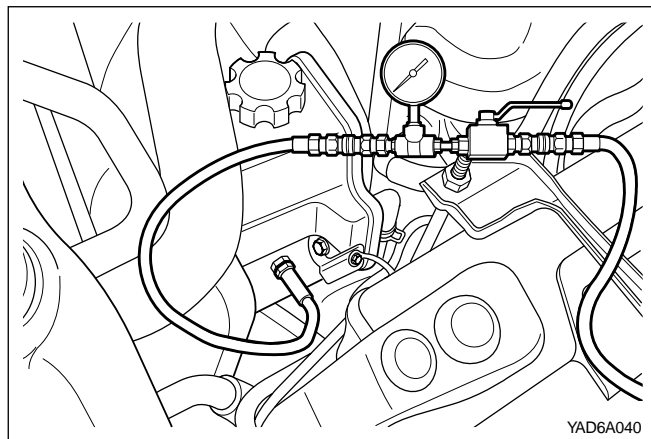
POWER STEERING ASSEMBLY



YAD6A150

- | | |
|--|------------------|
| 1 Power Steering Pump Reservoir Assembly | 8 Hexagon Bolt |
| 2 Power Steering Pump Cap Assembly | 9 Fan Screw (M5) |
| 3 Clip | 10 Welded Nut |
| 4 Return Line | 11 Pipe Clamp |
| 5 Pressure Line | 12 Hexagon Bolt |
| 6 Power Steering Gear | 13 Nut |
| 7 Power Steering Pipe Mounting Bracket Clip. | 14 Bolt |

GENERAL INSPECTION



OIL PUMP PRESSURE

Do the pressure checking followed to check the defect of power steering pump.

Notice: Before checking, check the power steering oil level and belt tension. When tightening or removing the fitting, prepare the oil container because the oil may drop down.

1. Remove the pressure line fitting of power steering pump.
2. Install the pressure check gauge between the power steering pump and power steering oil pressure line.
3. Put the transmission in neutral position.
4. Pull the lever of parking brake.
5. Open the installed pressure check gauge valve completely.
6. Start the engine and keep it to the idling.
7. Turn the steering wheel several times until the oil temperature is up to the normal operating temperature.
8. Close the pressure check gauge valve completely and then measure the oil pressure.

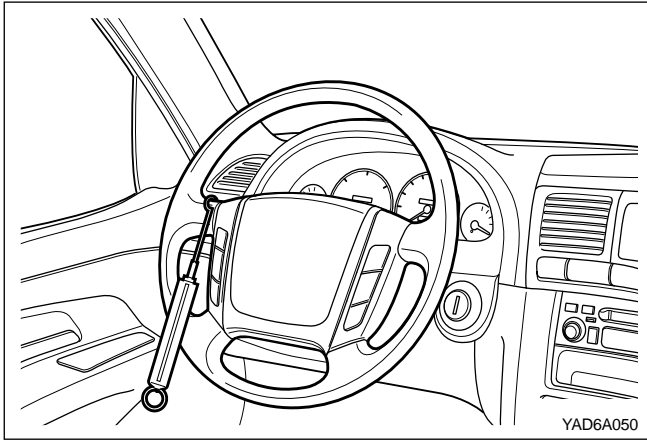
Notice: Do not keep the valve closed for more than 10 seconds to protect the damage of pump.

A	53 - 58 kgf/cm ²
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9. Open the gauge valve completely and then measure the oil pressure.

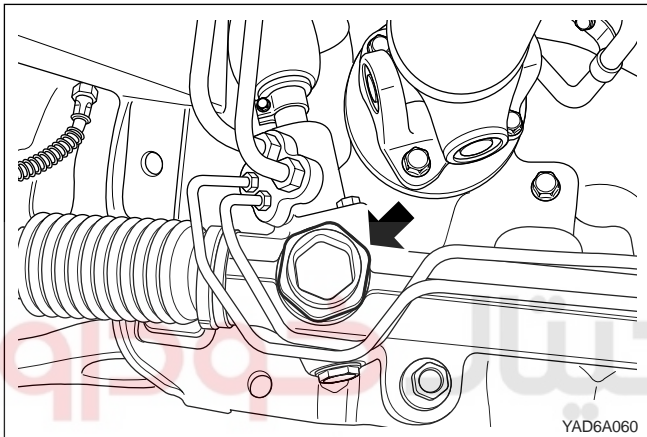
A	3 - 5 kgf/cm ²
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10. If the pressure is within specified value, the pump is normal. If not, replace the power steering pump.

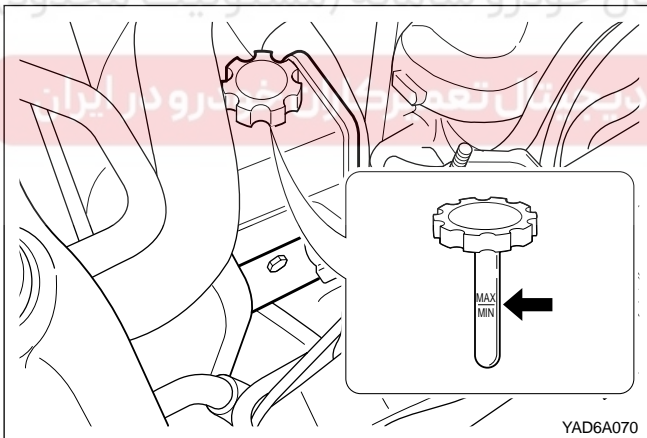


POWER STEERING GEAR PRELOAD ADJUSTMENT

1. Place the steering wheel in front direction.
2. Lift the vehicle using the lifter safely.
3. Remove the adjustment plug lock nut.
4. Measure the torque of adjustment plug.

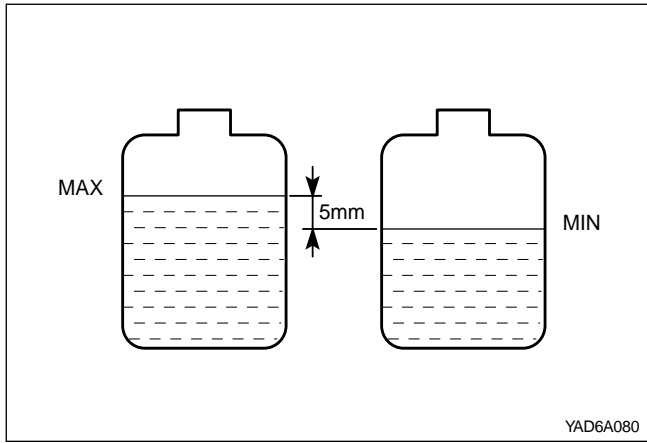


5. If torque is excessive or too little, adjust it as specified value.
 - Place the rack gear in center position.
 - Tighten the adjustment plug by 100 kg.cm
 - Turn the pinion gear in order that rack gear move to the left/right end five times.
 - Remove the adjustment plug.
 - Tighten the adjustment plug by 45 - 55 kg.cm
 - Tighten the adjustment plug by 67.5° to C.C.W direction.
6. Tighten the adjustment plug lock nut.



OIL CHANGE

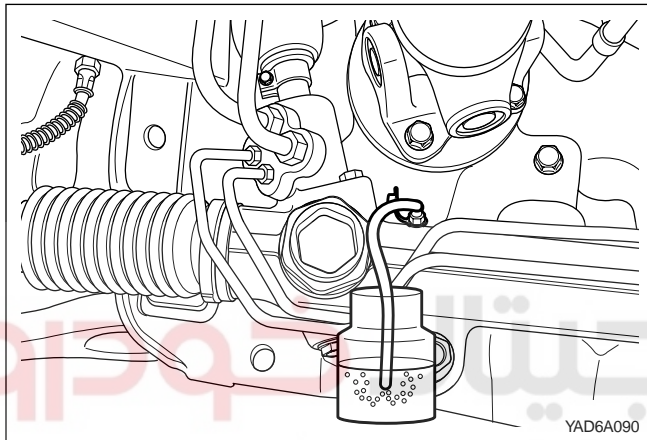
1. Lift the vehicle slightly using the lifter.
2. Separate the oil supply hose from the power steering pump.
3. Discharge the oil in the oil tank.
4. Connect the oil supply hose with the power steering pump.
5. Separate the oil return line from the oil tank.
6. Remove the high pressure cable in the ignition coil.
7. Operating the ignition motor periodically, turn the steering wheel from lock to lock and discharge the oil through the return line.
8. Connect the return line with the oil tank.
9. Charge the oil in the oil tank as specified quantity.
10. Do bleeding procedure.



OIL QUANTITY CHECK AND AIR BLEEDING

Oil Quantity Check

1. Place the vehicle on flat road and start the engine and keep it idling.
2. Turn the steering wheel from lock to lock several times until the oil temperature gets to the normal operating condition.
3. The oil level should be placed between MAX and MIN.

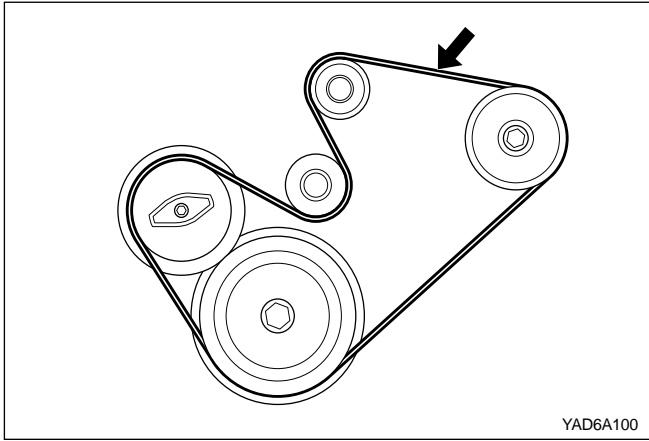


Air Bleeding

1. Disconnect the fuel line. Using a starter motor, crank the engine and turn the steering wheel from lock to lock several times.
2. Connect the fuel feed line and start the engine at idle speed.
3. Turn the steering wheel from lock to lock until there is no more air in oil reservoir.
4. Connect the oil lever is within specification.
5. By turning the steering wheel left to right, check the oil level change.

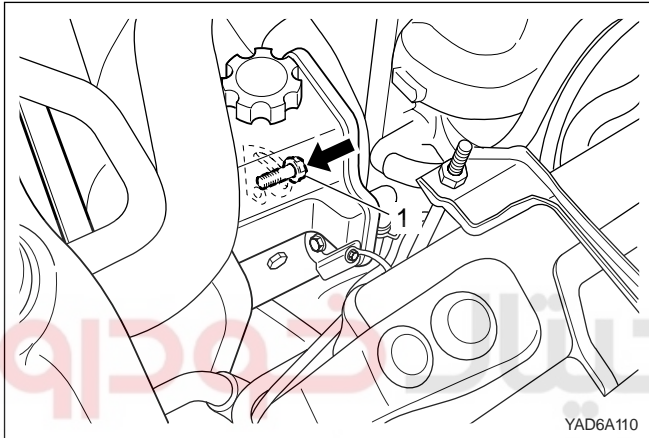
Notice:

- Do bleeding with engine cranking. If bleed with idling, there can be a air contact with oil.
- If oil is not changes more than 5mm, do bleeding again.
- If oil level rises suddenly when stopped engine, do bleeding again.

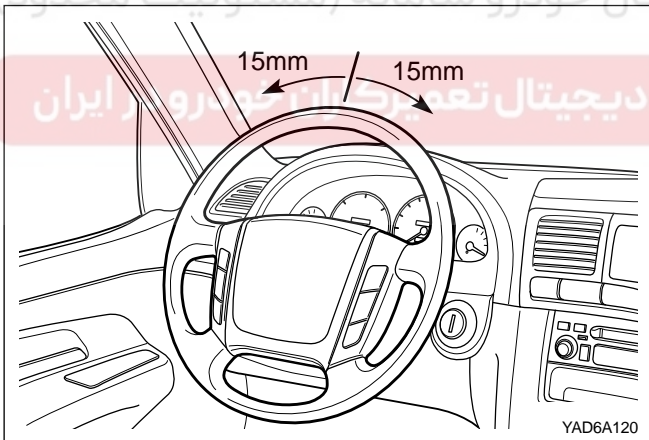


Belt tension Check/Adjustment

1. Check the wear, crack and damage of belt, and if necessary, replace it.
2. Push the center position of belt (10 kg) and then check the deflection of belt.



3. If the measurement value is not within the specified value, remove the bolt of power steering pump. Adjust the belt tension as moving the pump assembly.

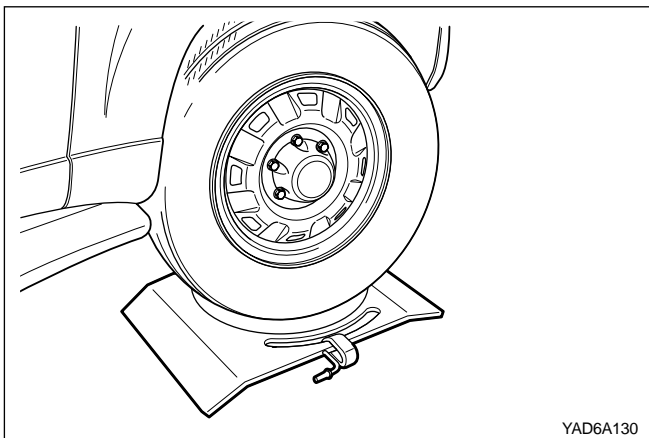


Power steering wheel Freeplay Check

1. Start the engine and place the wheels in straight ahead position.
2. Slightly move the steering wheel to the left/right and measure the steering wheel free play when the front wheel is start to move.

Standard	Max. 30 mm
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Notice: If exceeds standard, the steering column shaft and steering linkage clearance. Replace or repair if necessary.

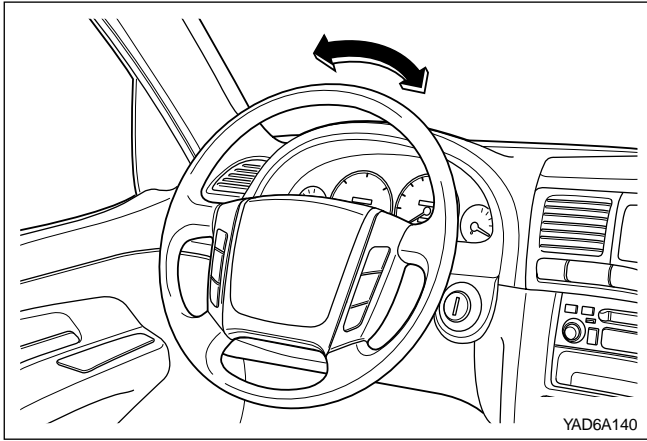


Steering Angle Check

1. Place the front wheel on a measuring tool.
2. Rotate steering wheel to the left/right direction and measure steering angle.

Standard	Inner	36° 17´
	Outer	32° 40´

Notice: If out of standard, check or adjust toe-in.



Steering Effort Check

1. Place a vehicle on the paved flat ground with front wheels in a straight ahead position.
2. Start the engine and run it at 1,000 rpm.
3. Using a scale, measure the steering effort in both directions.

Standard	Max. 3.0 kg
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Notice: The difference in steering effort of left/right should be within 0.6 kg.

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MAINTENANCE AND REPAIR

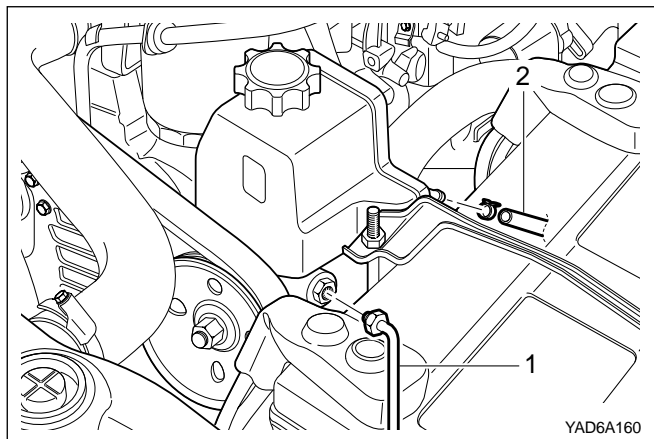
ON-VEHICLE SERVICE

POWER STEERING PIPE/HOSE

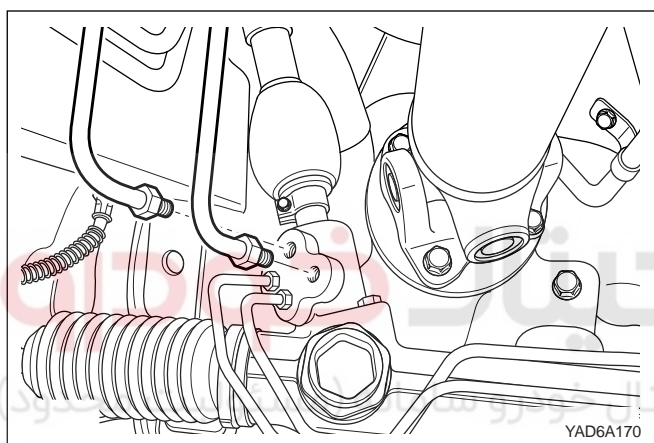
Removal

1. Remove the supply pipe (1) and return hose (2) which is installed in power steering pump.

Notice: When removing/installing the pipe and hose, prepare the oil container in order that the oil may not drop down.

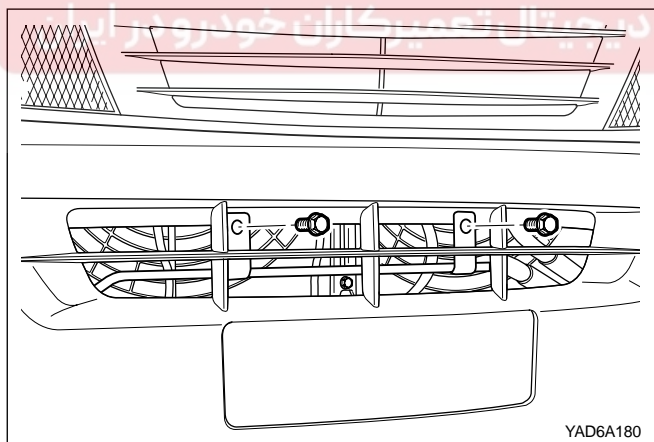


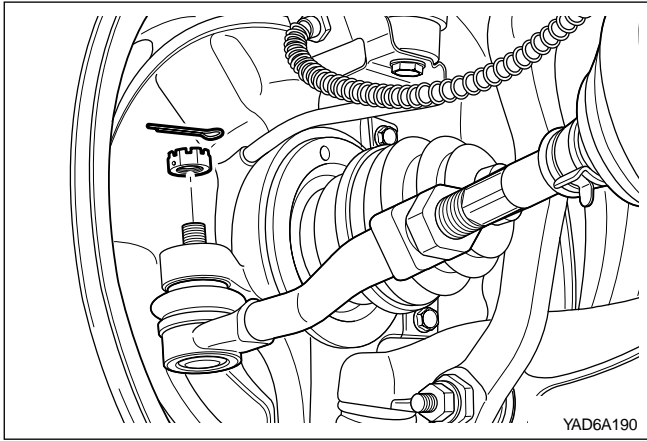
2. Remove the supply/return pipe installed in power steering gear box.



3. Remove the oil pipe bracket bolt installed in front bumper and pull off the oil pipe.

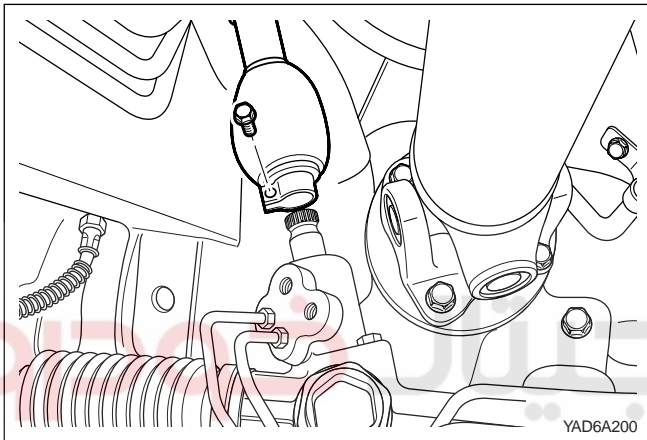
Notice: First, remove the pipe from the pipe clamp installed in front panel and then pull off the pipe.



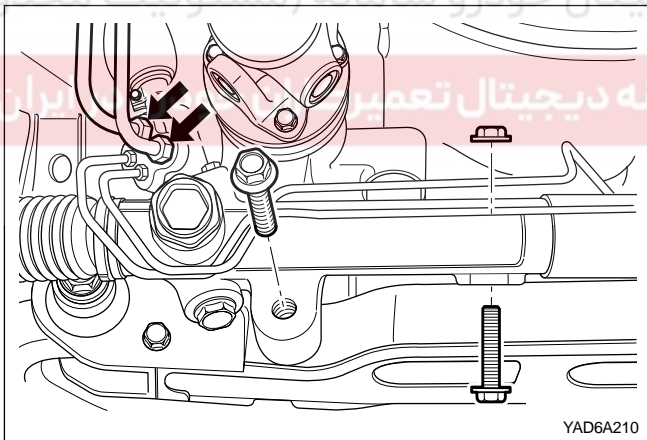


POWER STEERING GEAR BOX ASSEMBLY

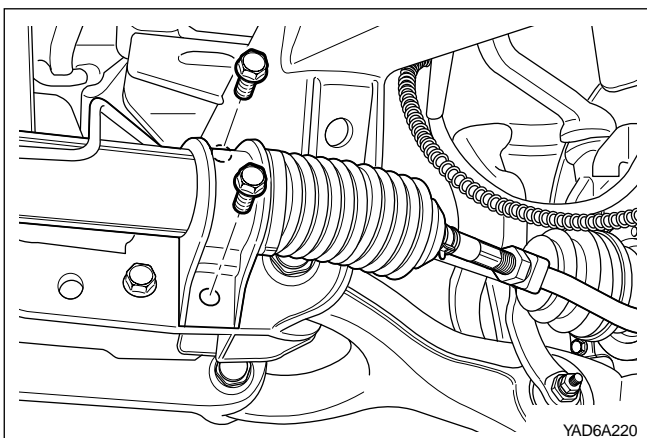
1. Remove the tie rod installed in steering knuckle. Disassembly the split pin and slotted nut in tie rod end and pull off the tie rod using the special tool.



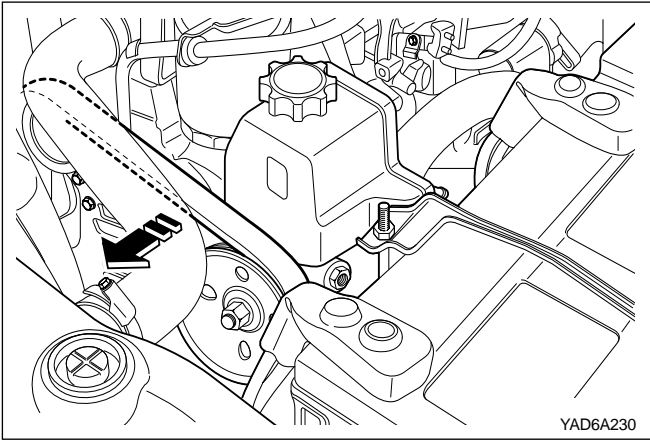
2. Remove the joint blot of steering lower shaft and separate the lower shaft from the gear box.



3. Remove the center bolt in gear box and left mounting bolt. Remove the supply/return pipe connection bolt.

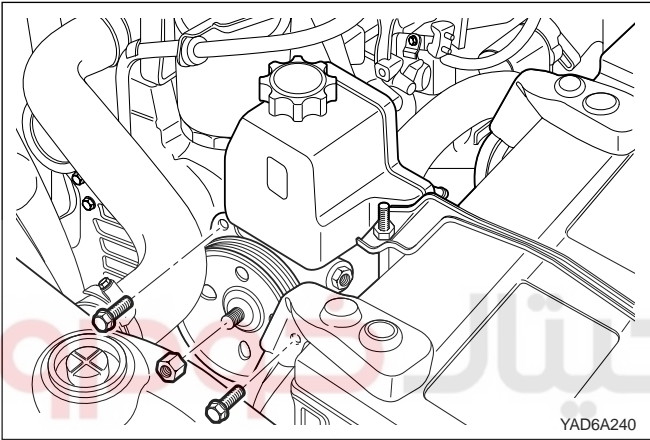


4. Remove the clamping bolt and pull off the steering gear box assembly.

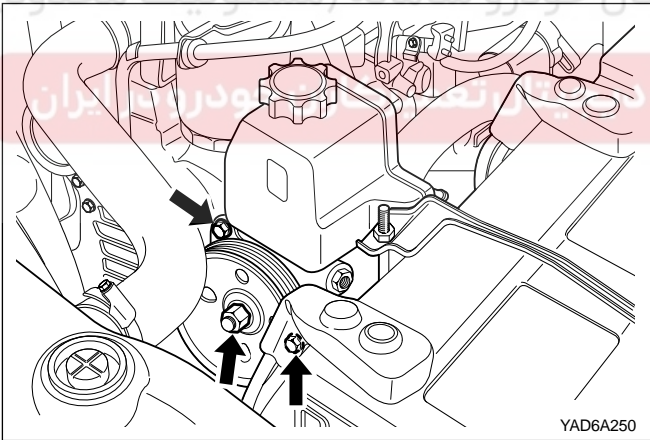


STEERING GEAR PUMP

- 1. Separate the drive belt from pump pulley after each pipe and hose is removed.



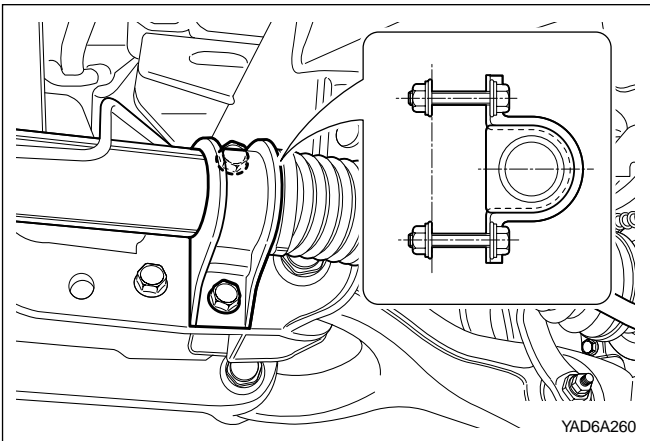
- 2. Remove the bolts/nuts in pump and pull off the pump assembly from engine.



ASSEMBLY INSTALLATION

- 1. Install the power steering pump in engine and tighten the bolt/nut as specified torque.

Nut		Torque
Bolt	Upper	23 N•m (17 lb-ft)
	Lower	23 N•m (17 lb-ft)

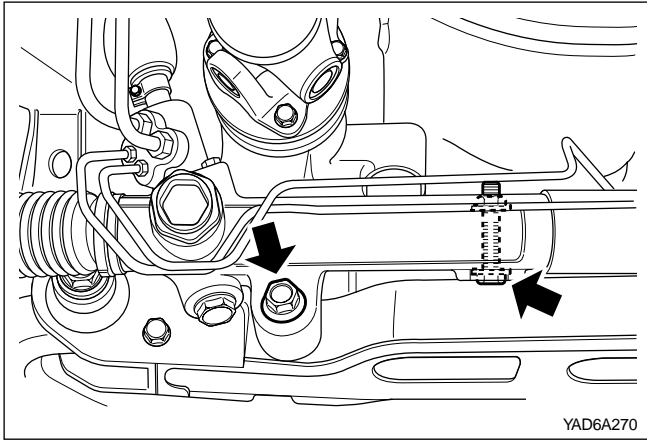


- 2. Install the power steering gear box in frame. Tighten the mounting bolts slightly and then install the gear box clamp in left. Tighten the bolt/nut as specified torque.

Notice: Because the length of bolt is same, install them after checking.

Installation Notice

95 mm Bolt/Nut (Upper)	70 - 90 N•m (52 - 66 lb-ft)
95 mm Bolt/Nut (Lower)	70 - 90 N•m (52 - 66 lb-in)

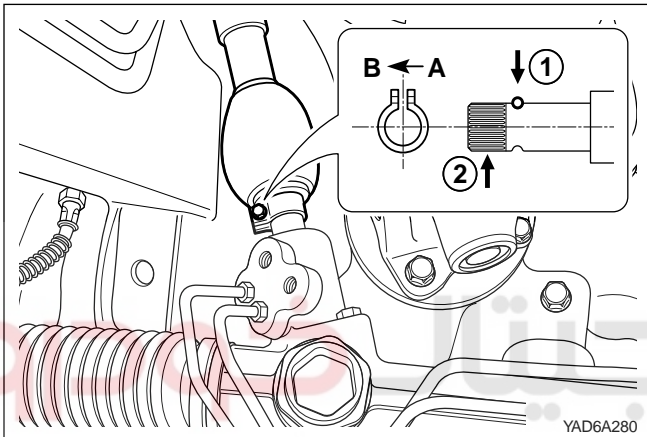


3. Completely tighten the mounting bolt/nut which is tightened slightly.

Notice: First tighten the center bolt/nut and then tighten bolt/nut as specified torque.

Installation Notice

Center Bolt/Nut	70 - 90 N•m (52 - 66 lb-ft)
Left Bolt/Nut	70 - 90 N•m (52 - 66 lb-in)

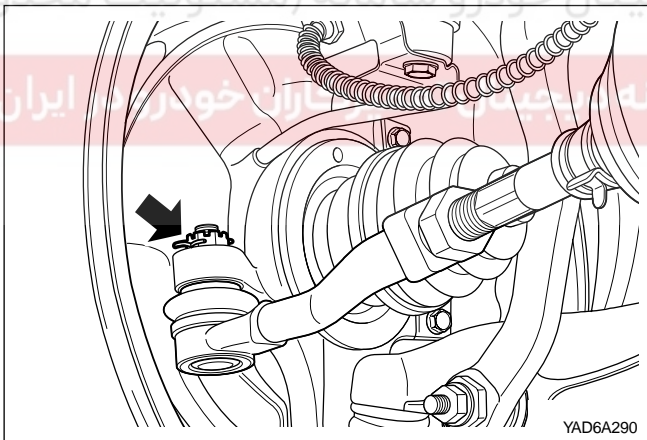


4. Install the steering lower shaft to the gearbox. The joint bolt on the lower shaft should be tightened toward 'B' (threaded) from 'A' (non-threaded).

Installation Notice

Tightening Torque	25 - 30 N•m (18 - 22 lb-ft)
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Notice: When installing the lower shaft to the gear box, the joint bolt (1) should be installed into the gearbox pinion shaft splines.



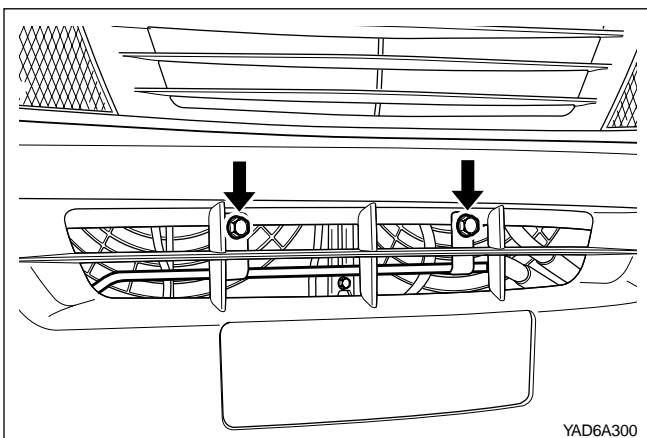
5. Install the tie rod end in steering knuckle. Tighten the slotted nut and then insert the new split pin.

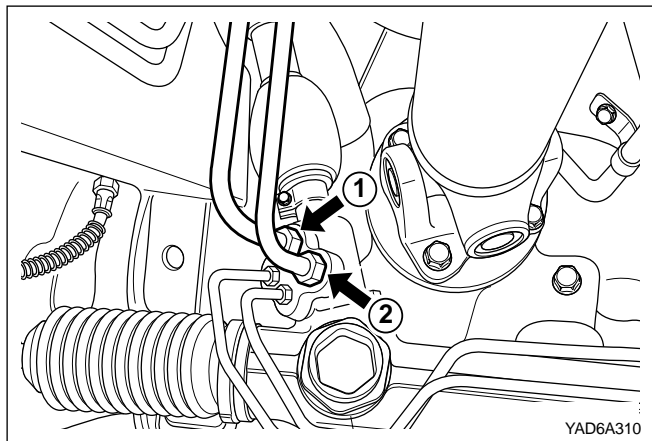
Tightening Torque	35 - 45 N•m (26 - 33 lb-ft)
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Installation Notice

6. Install the clamp of return pipe in front end panel.

Installation Notice Tightening Torque	7 - 10 N•m (62 - 89 lb-in)
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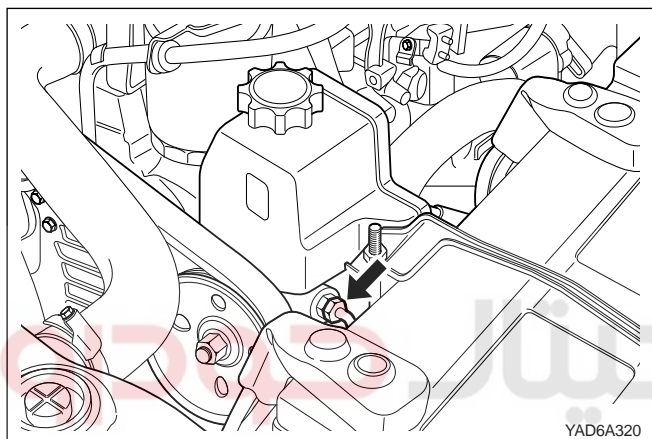




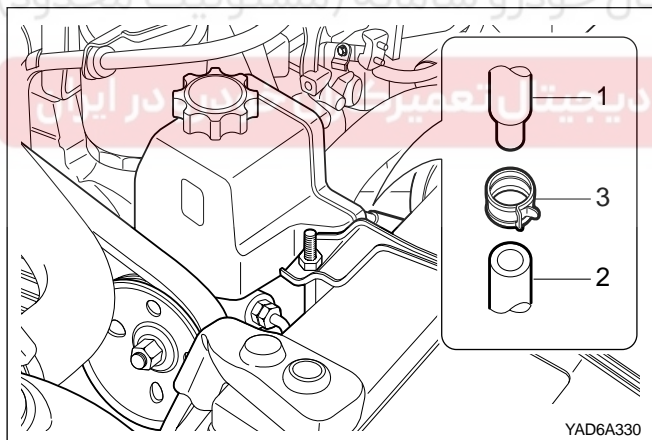
7. Install the supply/return pipe in gear box housing.

Installation Notice

Supply Pipe ②	12 - 18 N•m (9 - 13 lb-ft)
Return Pipe ①	12 - 18 N•m (9 - 13 lb-ft)



8. Install the supply pipe in steering gear pump.



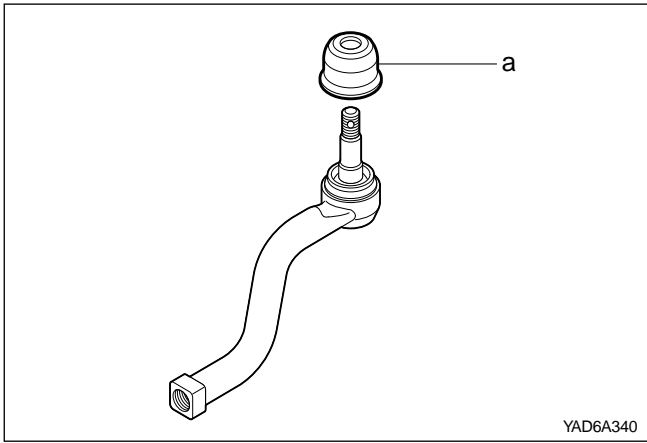
9. Insert the return hose (2) into the reservoir tank (1) and then insert the spring clamp (3) as like the picture.

Notice: After inserting the hose into the reservoir tank completely, install in order that the spring clamp is placed in the center of nipple.

10. After installing completely, do bleeding.

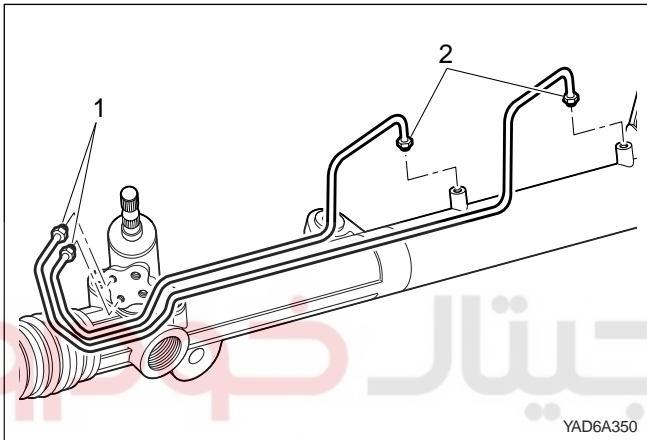
UNIT REPAIR**STEERING GEAR BOX****Disassembly**

1. Disassembly the tie rod end boot (a).

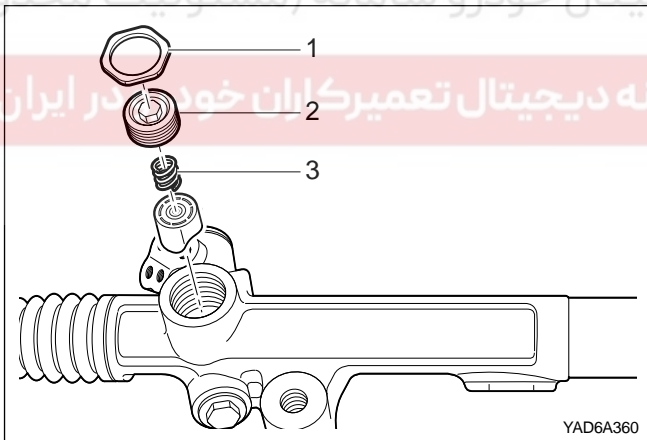


2. Remove the cylinder tube (2) in gear box.

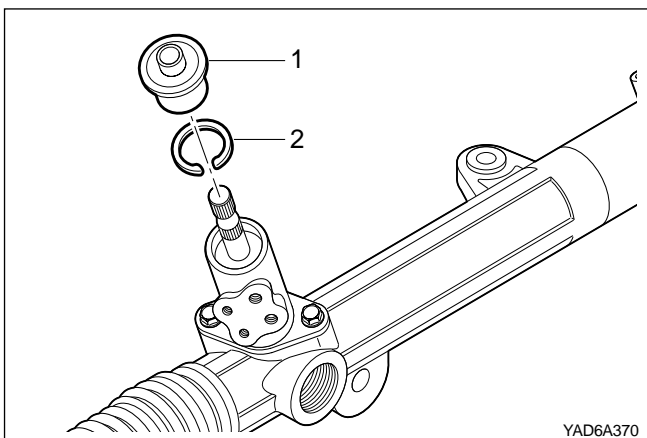
3. Remove the valve tube (1) in gear box.

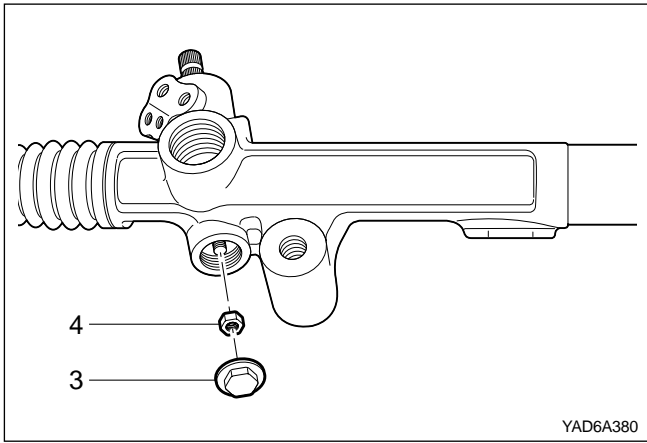


4. Remove the lock nut (1) and separate the plug (2) and spring (3).



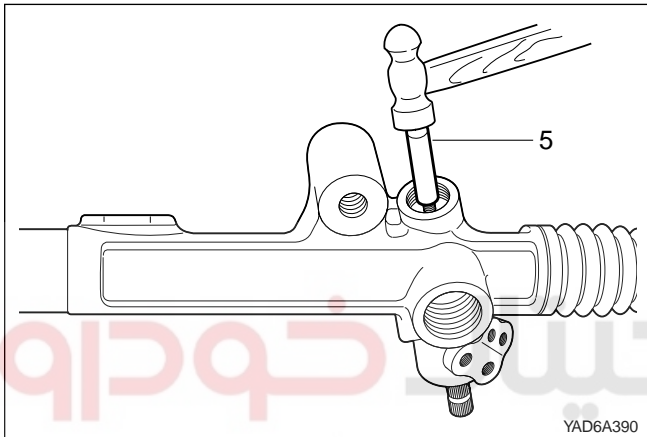
5. Remove the dust cover (1) and pull off the retainer ring (2).





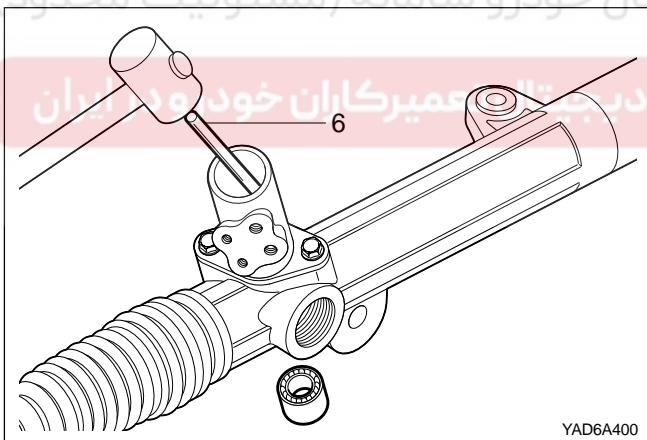
6. Remove the pinion dust cover (lower) (3) and remove the pinion lock nut (4).

Notice: When removing the steering pinion lock nut, be sure to fix the pinion gear in order to protect the damage of pinion gear.

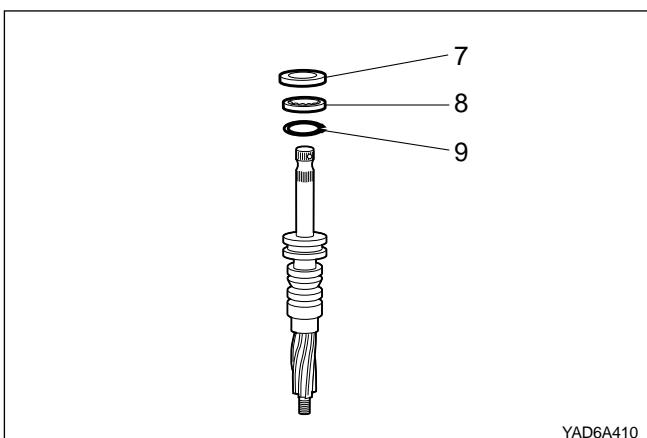


7. Tapping the pinion lower part carefully using the plane draft and hammer, remove the steering pinion (5) from the pinion bearing.

Notice: Tap the draft using the hammer as like the picture.

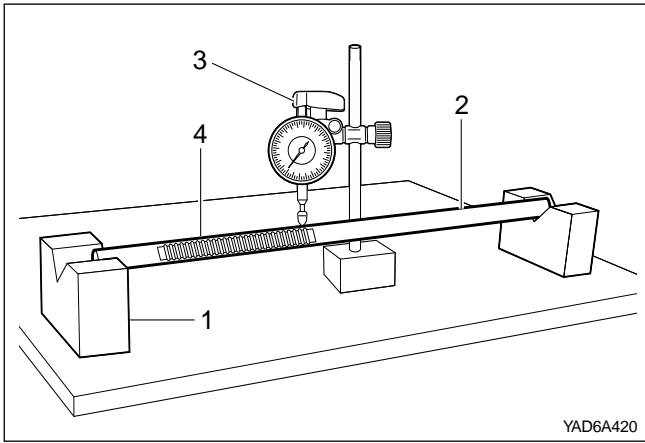


8. Tapping the pinion bearing softly using the plane and long draft and rubber hammer, remove the bearing.



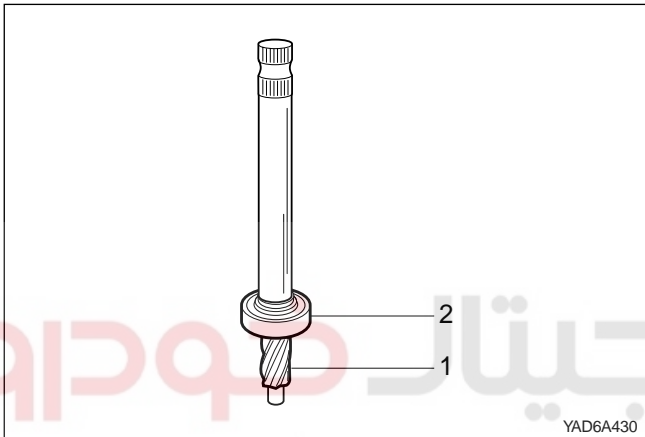
9. Remove the pinion shaft seal (7), needle bearing (8), retainer ring (9).

Notice: Do not overhaul the power steering gear housing and rack gear, if the damage happened, replace them with assembly.

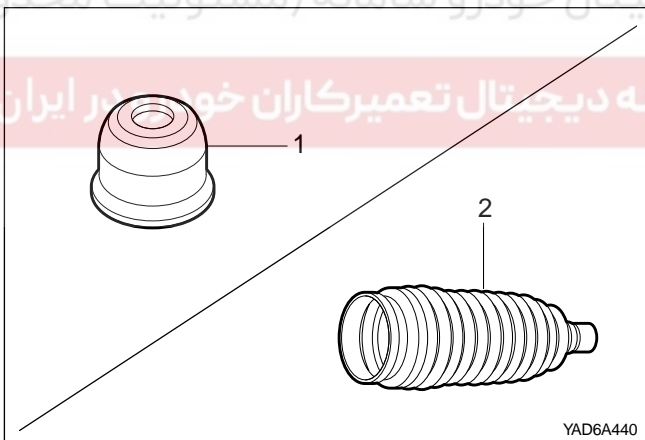


Rack Gear Shaft Checks

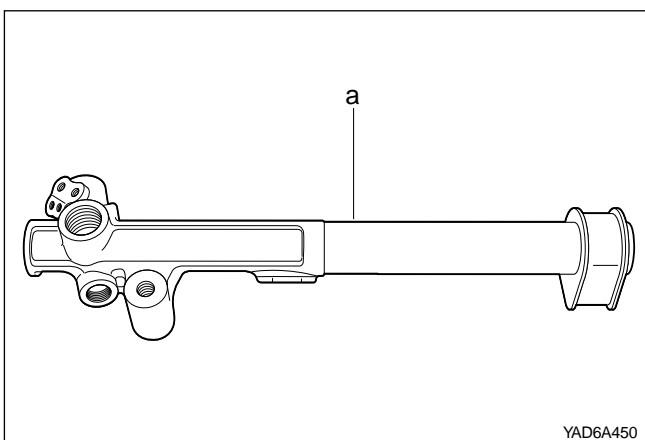
1. Check the rack gear damage.
 - Set up the v-block (1) on the plane table.
 - Put the rack gear (2, 4) on the V-block.
 - Measure the straightness of rack gear using the dial gauge (3).
 - Check the rack gear for the wear or damage.



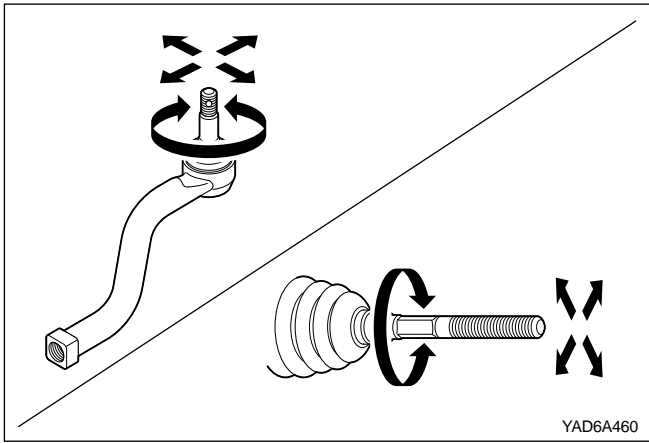
2. Check the steering pinion gear for the damage.
 - Check the pinion gear (1) for the wear or damage.
 - Check the looseness and normal operating of bearing (2).



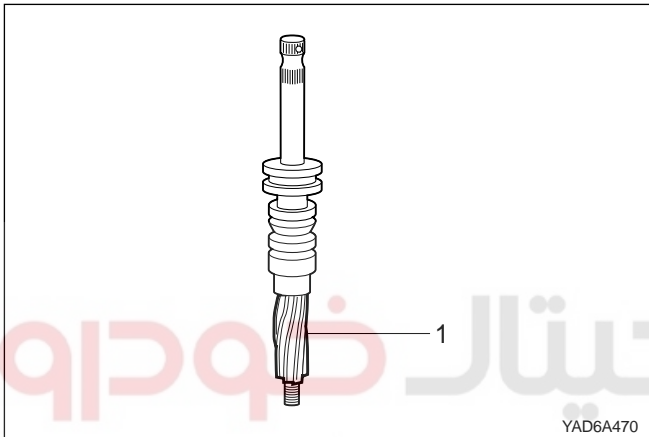
3. Check the tie rod end, rack and pinion bellows for the damage.
 - Check the tie rod end boot (1) for the crack or wear.
 - Check the rack and pinion boot for the crack or wear.



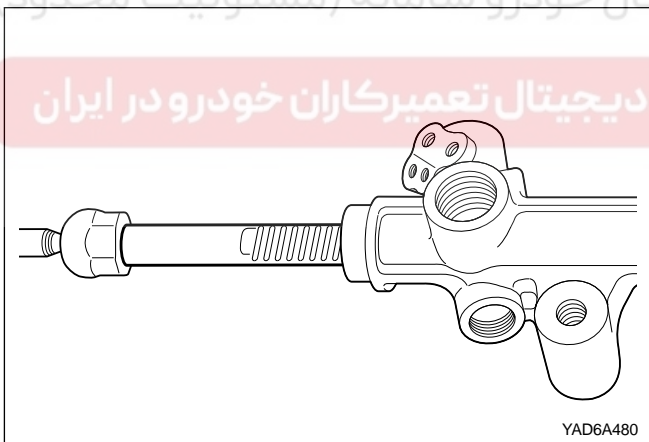
4. Check the steering gear housing for the crack, deformation and wear.



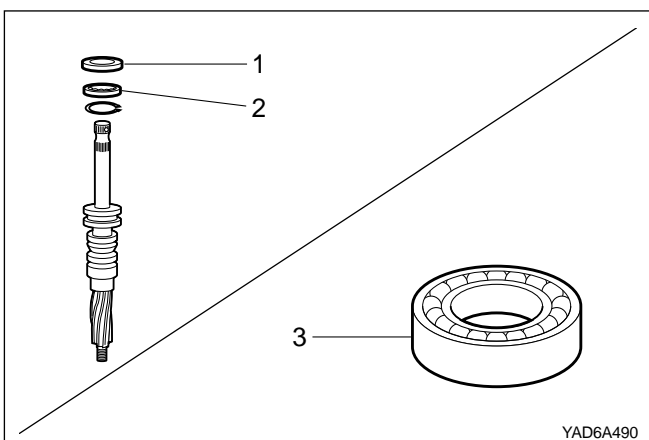
5. Check the tie rod end and ball joint for the damage.
 - Check the tie rod end ball joint for the normal operating,
 - Check the tie rod ball joint for the normal operating and the deflection by the self-weight of tie rod.
6. After checking, if out of specified value or damaged, replace them with the new one.



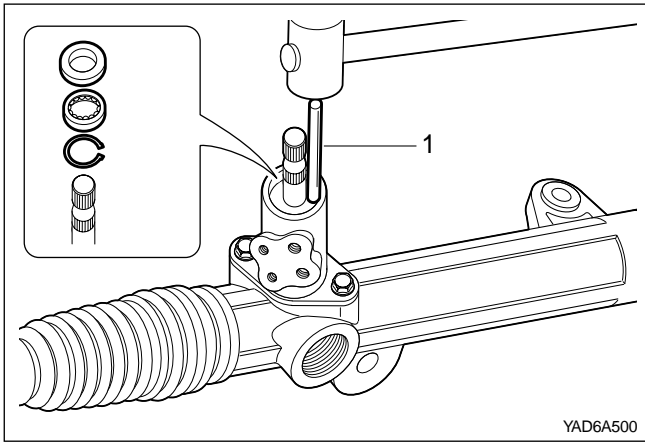
7. Check the tie rod end and the rotation part of ball joint for the damage.



8. Check the tie rod end and rack/pinion boot for the crack and wear.
9. Check the metal part for the damage.
 - Check the pinion gear for the damage or wear.
 - Check the rack gear for the damage or wear.
 - Check the steering gear housing for the damage or wear.

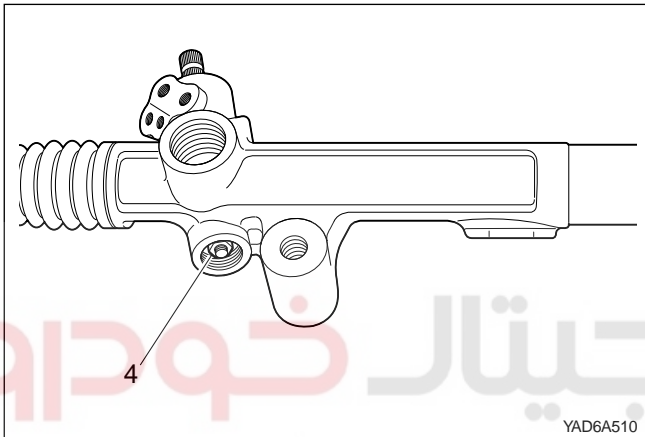


10. Check the bearing and oil seal for the damage.
 - Check the pinion shaft seal for the wear or leakage.
 - Check the needle bearing for the wear.
 - Check the steering pinion bearing for the wear.
11. After checking, if out of specified value or damaged, replace them with the new one.



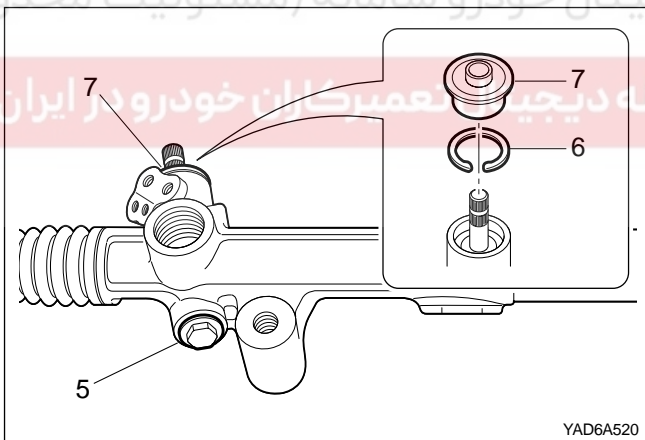
Assembly

1. Install the steering pinion assembly gear.
 - Install the retaining ring.
 - Install the needle bearing.
 - Tapping the pinion shaft seal carefully in diagonal direction using the thin draft (1), assemble them.

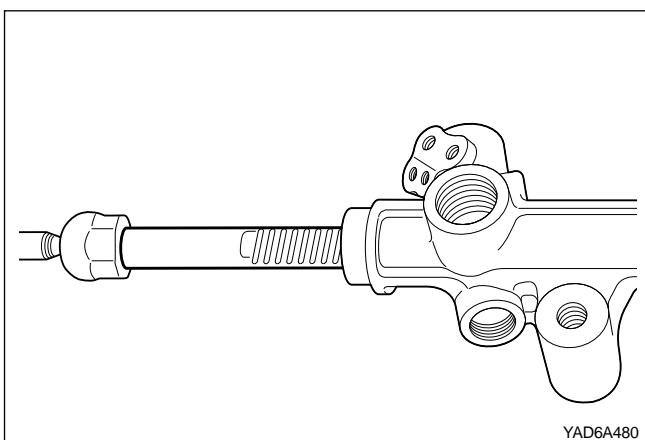


2. Tighten the steering pinion lock nut (4) as specified torque.

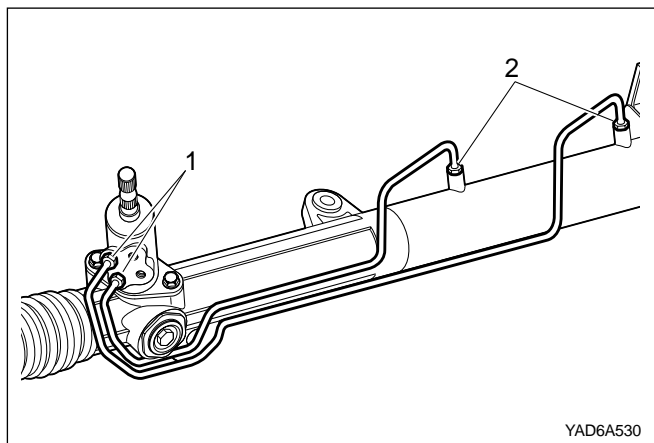
Notice: Because the pinion bearing is inserted into the pinion lock nut by force, be careful not to be eccentric.



3. Tighten the steering pinion dust cover (5) as specified torque.
 - Install the retaining ring (6).
 - Install the plastic dust cover (7).

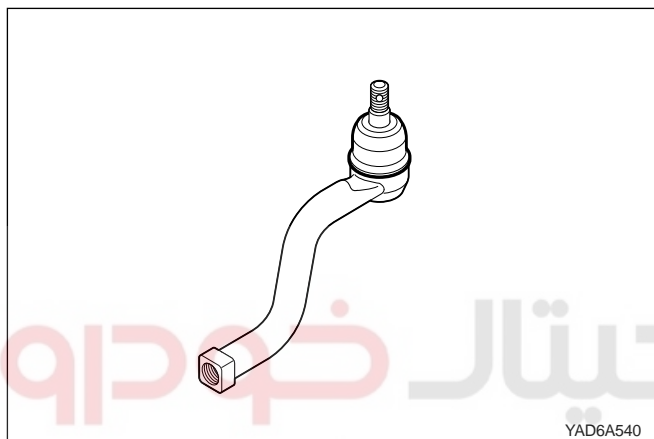


4. Install the rack bearing.
 - Install the adjustment spring.
 - Tighten the adjustment plug as specified torque.
 - Tighten the adjustment plug lock nut.
 - Adjust the steering gear preload.



5. Install the fluid pressure line in power steering gear and tighten them as specified torque.

- ① Tighten the fitting to the piston side.
- ② Tighten the fitting to the cylinder side.



6. Assemble the tie rod end boot.

Notice: Apply the grease to the tie rod end ball joint and boot.

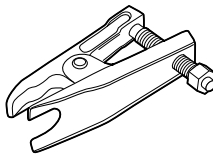


دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS TABLE

 YAD6A550	Tie Rod End Remover
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