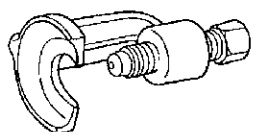
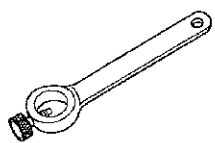
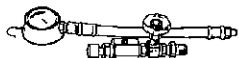


2004-05 STEERING**Steering Systems - Sedona****GENERAL****SPECIAL SERVICE TOOLS**

Tool (Number and Name)	Illustration	Use
OK130 283 021 Puller, ball joint		Used for removing tie rod end.
OK130 322 020 Attachment, steering worm bearing preload measuring		Used for measuring pinion pre-load.
OK210 323 AA0 Gauge set, power steering		Used for measuring fluid pressure.

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Fig. 1: Steering Systems Special Tools
Courtesy of KIA MOTORS AMERICA, INC.

SYMPTOM-RELATED DIAGNOSTIC PROCEDURE

2005 Kia Sedona EX

2004-05 STEERING Steering Systems - Sedona

Problem	Possible cause	Action
Movements of steering feels heavy	Looseness or damage of power steering belt Insufficient power steering fluid or air insertion Crushed or twisted hoses Pipe damage Leakage of power steering fluid Low fluid pressure Insufficient air pressure in tire Incorrect wheel alignment adjustment Steering gear linkage binding Interference between steering column and parts Steering column intermediate shaft coupling does not operate	Adjust or replace power steering belt Fluid fill up or air bleeding Replace hoses Replace pipes Repair or replace leaking parts Repair or replace power steering pump or gear Adjust tire air pressure Adjust wheel alignment Replace or repair steering gear linkage Repair or replace steering column Perform the turning effort
Poor returning of steering wheel	Insufficient air pressure in tire Incorrect wheel alignment adjustment Steering gear linkage binding Malfunction of steering gear Steering column intermediate shaft coupling does not operate Steering column is overweight, restricted or bent	Adjust tire air pressure Adjust wheel alignment Repair or replace steering gear linkage Replace steering gear Perform the turning effort Inspect steering column or replace
Irregular steering power	Looseness of power steering belt Malfunction of steering column or looseness of mounting bolt Steering gear linkage binding Malfunction of steering gear	Adjust power steering belt Repair or tightening of steering column Repair or replace steering linkage Replace steering gear
Steering wheel pulls to one side	Insufficient air pressure in tire Improper preload adjustment or worn of wheel bearing Incorrect wheel alignment Malfunction of steering gear Uneven tire wear Fatigued front coil spring Dragging brake(s) Damaged front wheel tie rod(s) Damaged front wheel knuckle Front suspension lower arm or stabilizer bar bushing worn or damaged Front suspension lower arm bent or loose	Adjust tire air pressure Adjust or replace wheel bearing Adjust wheel alignment Replace steering gear Replace tire or align Replace coil spring Adjust brake(s) Replace front wheel tie rod Inspect knuckle or replace Repair or replace Replace or tighten

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Fig. 2: Symptom-Related Diagnostic Procedure (1 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

2005 Kia Sedona EX

2004-05 STEERING Steering Systems - Sedona

Problem	Possible cause	Action
Leakage of power steering fluid	Problem with hose coupling	Repair or replace hose coupling
	Clogged or damaged hoses	Replace hoses
	Damage of power steering fluid reservoir	Replace reservoir
	Over flow	Air bleeding or adjust fluid level
	Malfunction of power steering pump	Replace power steering pump
	Malfunction of steering gear	Replace steering gear
Abnormal noise	Looseness of power steering pump	Tightening of power steering pump
	Looseness of steering gear	Tightening of steering gear
	Looseness of power steering pump bracket	Tightening of power steering pump bracket
	Looseness of power steering pump pulley nut	Tightening of power steering pump pulley nut
	Excessive tightness or looseness of belt	Adjust power steering pump belt
	Air insertion	Air bleeding
	Malfunction of steering gear	Replace steering gear
	Malfunction of power steering pump	Replace power steering pump
	Interference on steering column or pressure hose	Remove interference on steering column or repair/replace hoses
	Looseness or excessive tightness of steering linkage	Adjust tightness of steering linkage or replace steering linkage

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Fig. 3: Symptom-Related Diagnostic Procedure (2 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

SPECIFICATIONS

Item		Type	P/S
Steering wheel	Outer diameter	in (mm)	14.96 (380)
	Lock to lock turns		3.40
Steering column	Type		Collapsible
	Joint type		Universal joint
	Tilt stroke	(degree)	±4.7°
Steering rack	Type		Rack and pinion
	Gear ratio		19.24 : 1
	Rack travel	in (mm)	5.51 (140)
P/S fluid	Capacity	US qt (liter)	1.05 (1.0)
	Type		PSF-III

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Fig. 4: Steering System Specifications
Courtesy of KIA MOTORS AMERICA, INC.

POWER STEERING SYSTEM

MECHANICAL POWER STEERING SYSTEM

COMPONENT

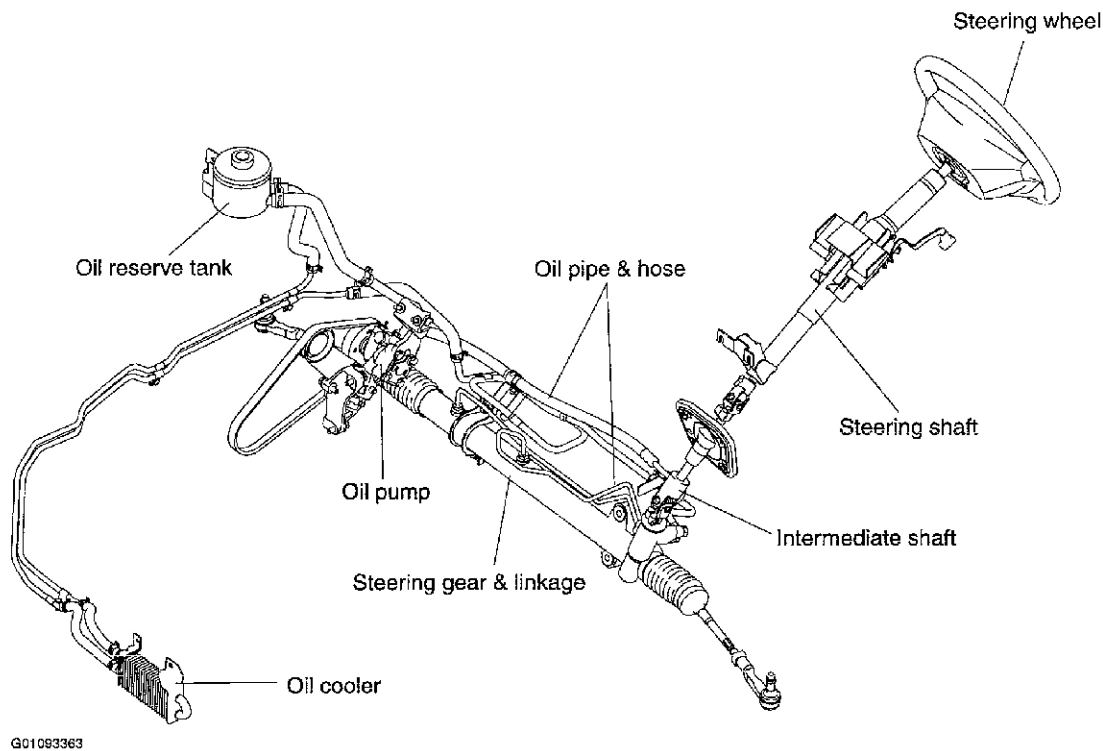


Fig. 5: Illustrating Mechanical Power Steering System Components
Courtesy of KIA MOTORS AMERICA, INC.

DESCRIPTION AND OPERATION

Power steering components

The power steering system has a rack and pinion design. The power steering system consists of the following components:

- Steering shaft.
- Steering gear and linkage.
- Tie rods and tie rod ends.
- Power steering pump.
- Power steering oil pump.
- Oil pipes and hoses.
- Power steering oil cooler.

Power steering pump

The power steering pump is mounted on the front of the engine. The power steering pump is a vane type design and is driven by the crankshaft through a P/S drive belt. Power steering fluid is drawn into the power steering pump from the power steering pump reservoir when engine is running.

The fluid is pressurized by the rotation of the rotor and vanes, then sent to the steering gear.

Power steering gear

The power steering gear input shaft and control is a one-piece unit.

It is the only valve assembly serviced within the steering gear housing.

Hoses, Pressure and return

Since most fluid leaks occur at the hose fittings and connections in a power steering hydraulic system, these parts

should be checked before any parts are replaced. Note the possible leak locations for the power steering system.

Hydraulic operation

The power steering pump, which is driven by the crank-shaft through a P/S drive belt and pulleys, develops the hydraulic pressure necessary to operate the system.

When the steering wheel is turned, the steering gear converts this hydraulic pressure and flow into mechanical motion that will move the front wheels in the direction of the turn.

Fluid is drawn into the vane type power steering pump from the power steering pump reservoir when the engine is running.

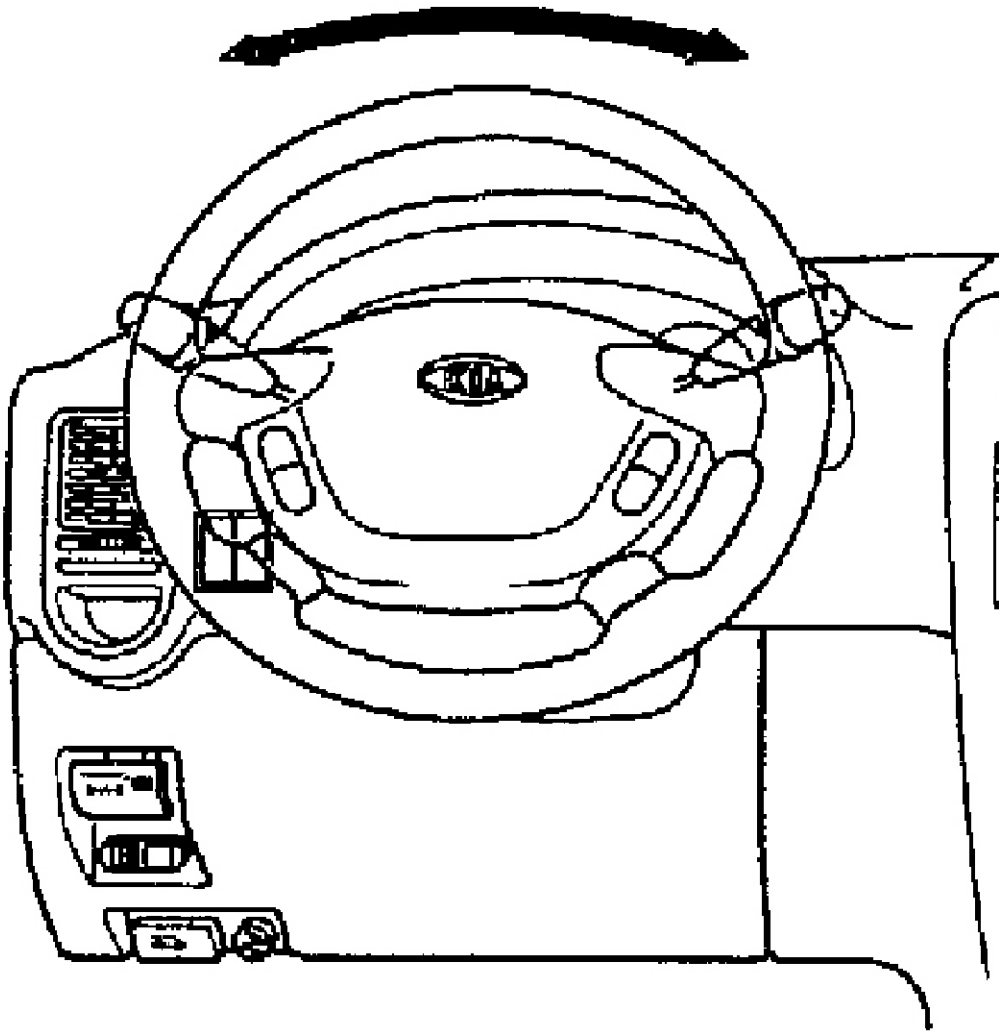
ON-VEHICLE SERVICE

STEERING WHEEL PLAY

1. With wheels in straight-ahead position, gently turn steering wheel left and right to determine if play is within specification. Play is measured at outer rim of wheel.

Play: 1.18 in. (30 mm) Max.

NOTE: If play exceeds specification, either steering joints are worn or backlash in steering rack is excessive.



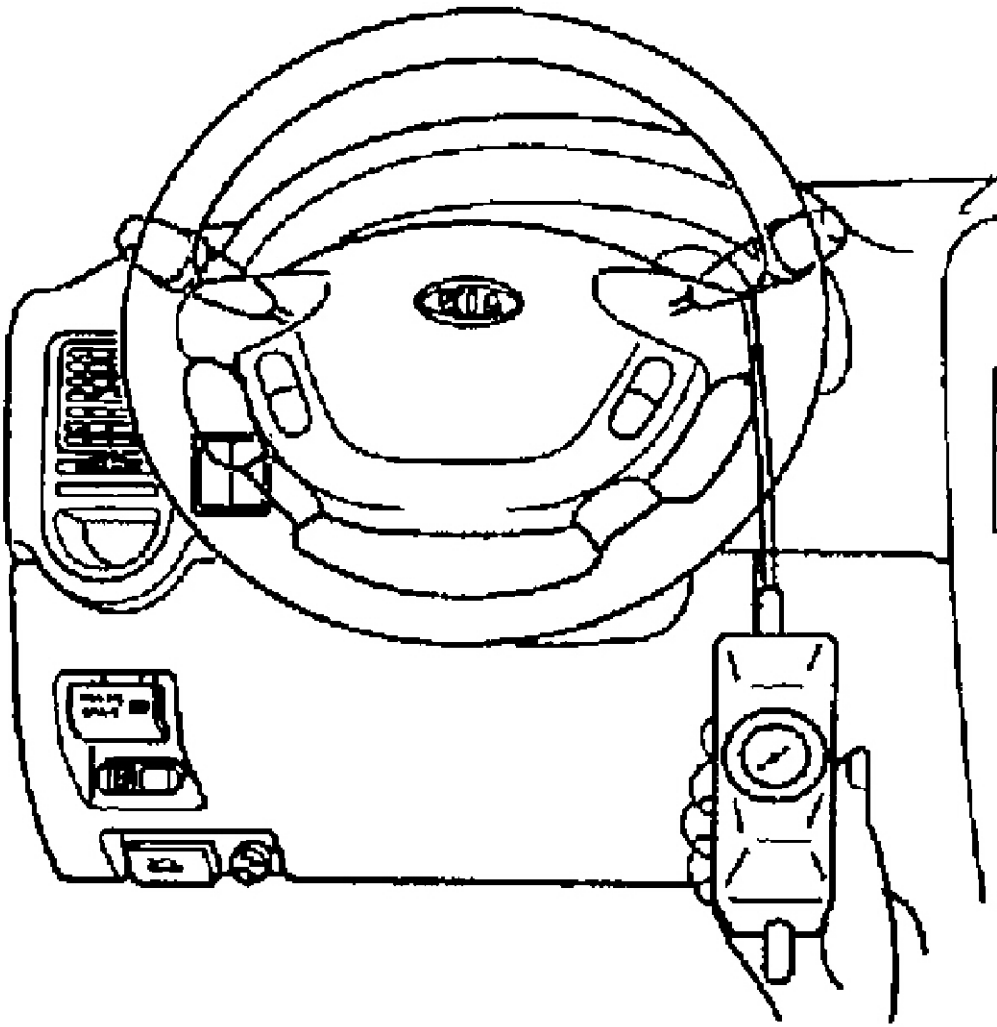
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Fig. 6: Testing Steering Wheel Play
Courtesy of KIA MOTORS AMERICA, INC.

STEERING WHEEL EFFORT

1. With vehicle on a hard level surface, point wheels in straight-ahead position.
2. Start engine and warm power steering fluid to 122-140°F (50-60°C). Turn steering wheel fully left and right several times to warm fluid.
3. With engine running at idle speed, attach a pull scale to outermost point of a steering wheel spoke. Then, beginning with wheels in straight-ahead position, check steering effort required to turn steering wheel to left and to right.
4. If measured effort exceeds specification, check the following: fluid level, air in system, fluid leakage at hose or its connections, function of P/S oil pump and steering gear, and tire pressures.

Steering wheel effort: 6.6 lbs (29 N.m, 3.0 kg) Max.



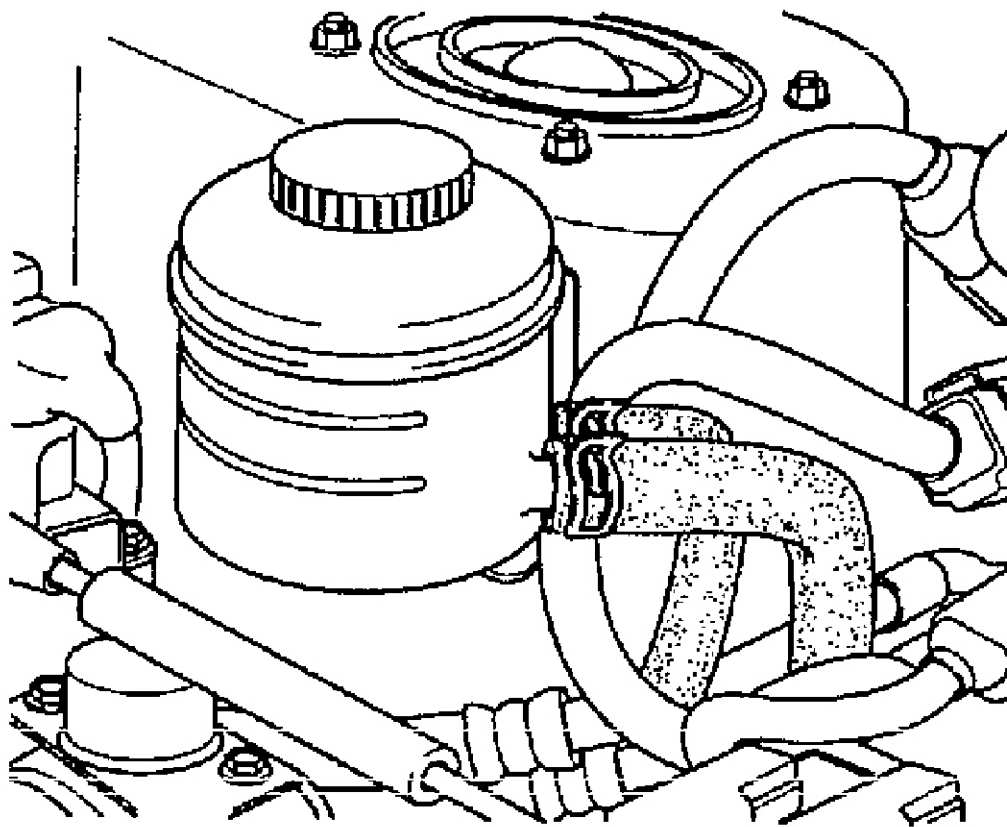
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Fig. 7: Testing Steering Wheel Effort
Courtesy of KIA MOTORS AMERICA, INC.

POWER STEERING FLUID LEVEL

NOTE: Add only specified power steering fluid.

1. Verify that the fluid level is between MAX and MIN marks.
2. Add or remove fluid if not within specification.



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Fig. 8: Checking Power Steering Fluid Level
Courtesy of KIA MOTORS AMERICA, INC.

POWER STEERING FLUID LEAKAGE

1. Clean the outside of the steering gear, the bottom surfaces of the power steering pump, and all lines and fittings. Be sure all dirt, oil, and grease is removed from areas where leaks may exist.
2. Start engine.
3. Remember to turn steering wheel fully left and right to build fluid pressure.
4. Check for fluid leakage.

NOTE:

- To prevent damage, do not keep steering wheel fully turned for more than 15 seconds.
- Points where fluid leakage might occur are indicated by arrows in figure.

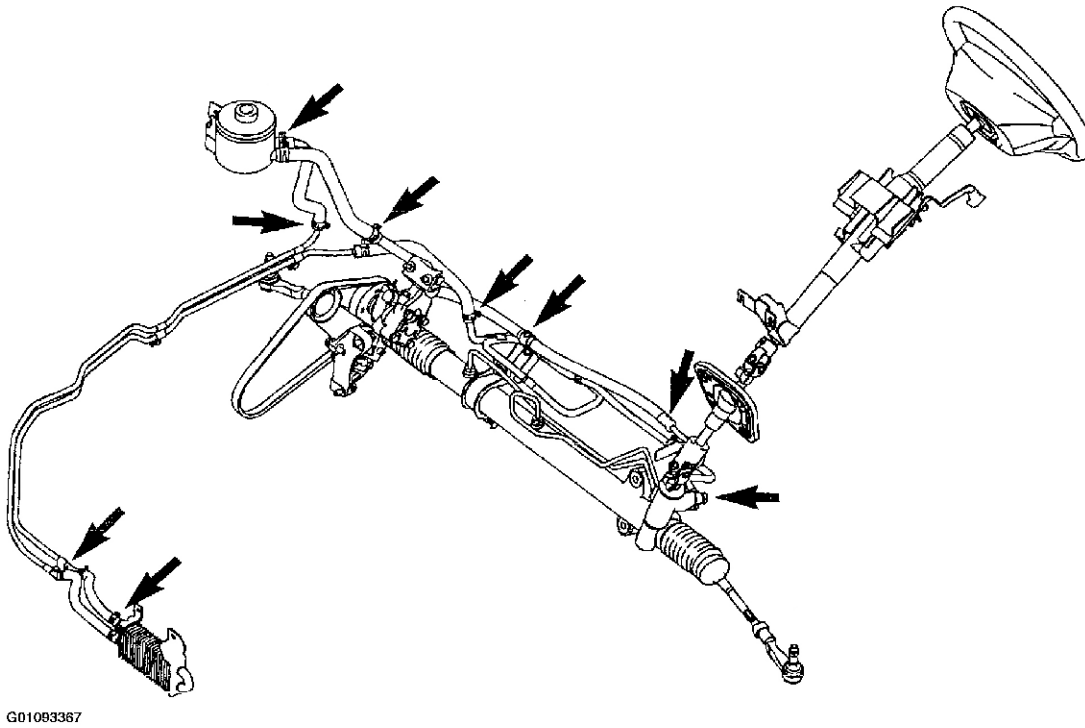


Fig. 9: Checking For Fluid Leaks
Courtesy of KIA MOTORS AMERICA, INC.

POWER STEERING AIR BLEEDING

- CAUTION:**
- Do not start engine.
 - Lift front of vehicle, and support with safety stands.

1. Check fluid level.
2. Turn steering wheel fully to left and right several times with engine not running.
3. Recheck fluid level. If level has lowered, add fluid.
4. Repeat steps 2 and 3 until fluid level stabilizes.
5. Start engine and let it idle.
6. Turn steering wheel fully to left and right several times.
7. Check that fluid has not foamed, and that fluid level has not dropped.
8. If necessary, add fluid and repeat steps 6 and 7.

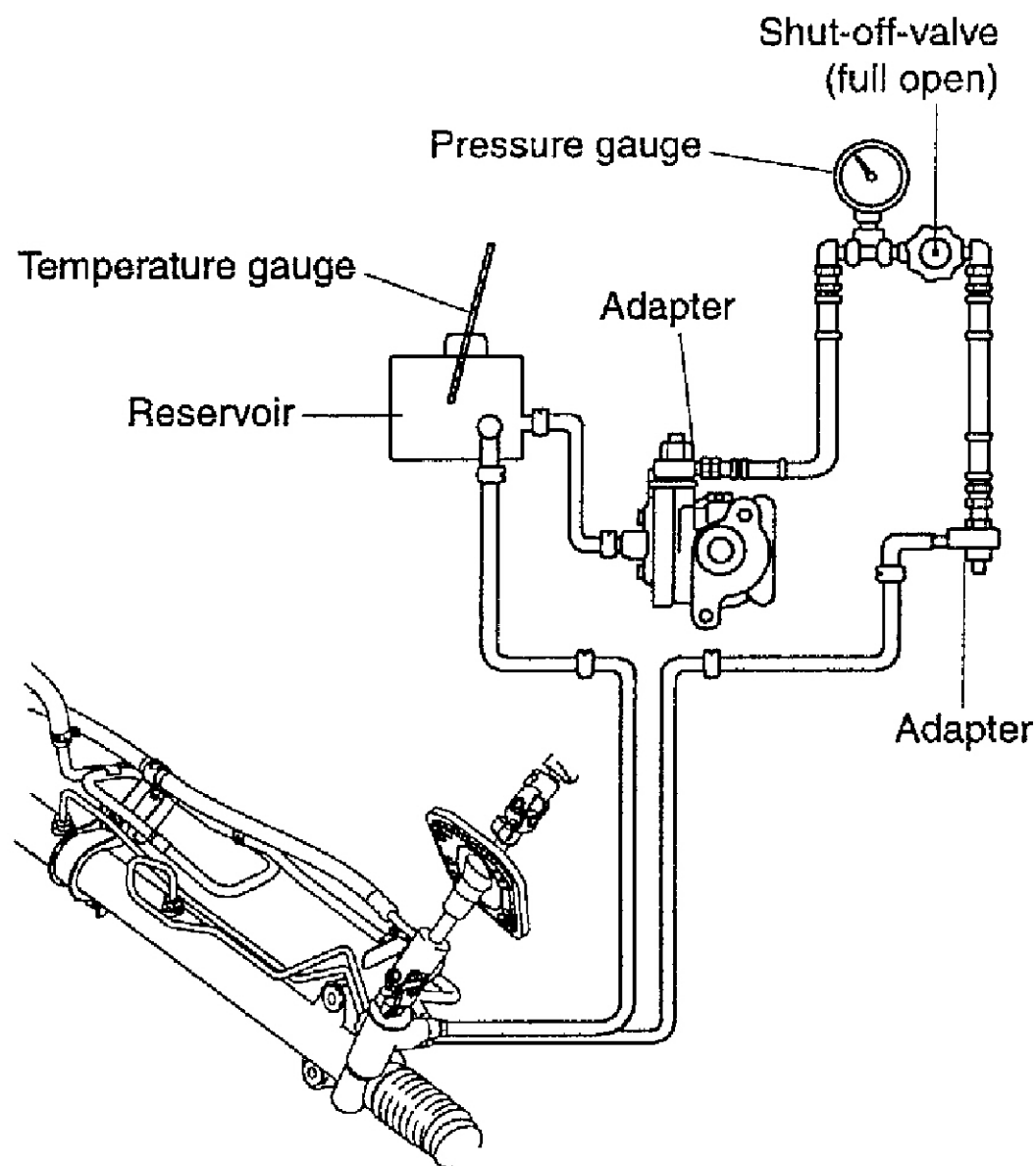
POWER STEERING FLUID PRESSURE CHECK

1. Assemble SST (0K210 323 AA0) and tighten its fittings.

Tightening torque:

39.7-47 lb. ft (54.0-63.7 N.m, 5.5-6.5 kg.m)

2. Disconnect high pressure hose from pump, and connect SST (0K210 323 AA0) between hose and pump as illustrated.



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Fig. 10: Installing Power Steering Fluid Pressure Testing Equipment
 Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Before disconnecting hose, place marks at connections for proper reinstallation.

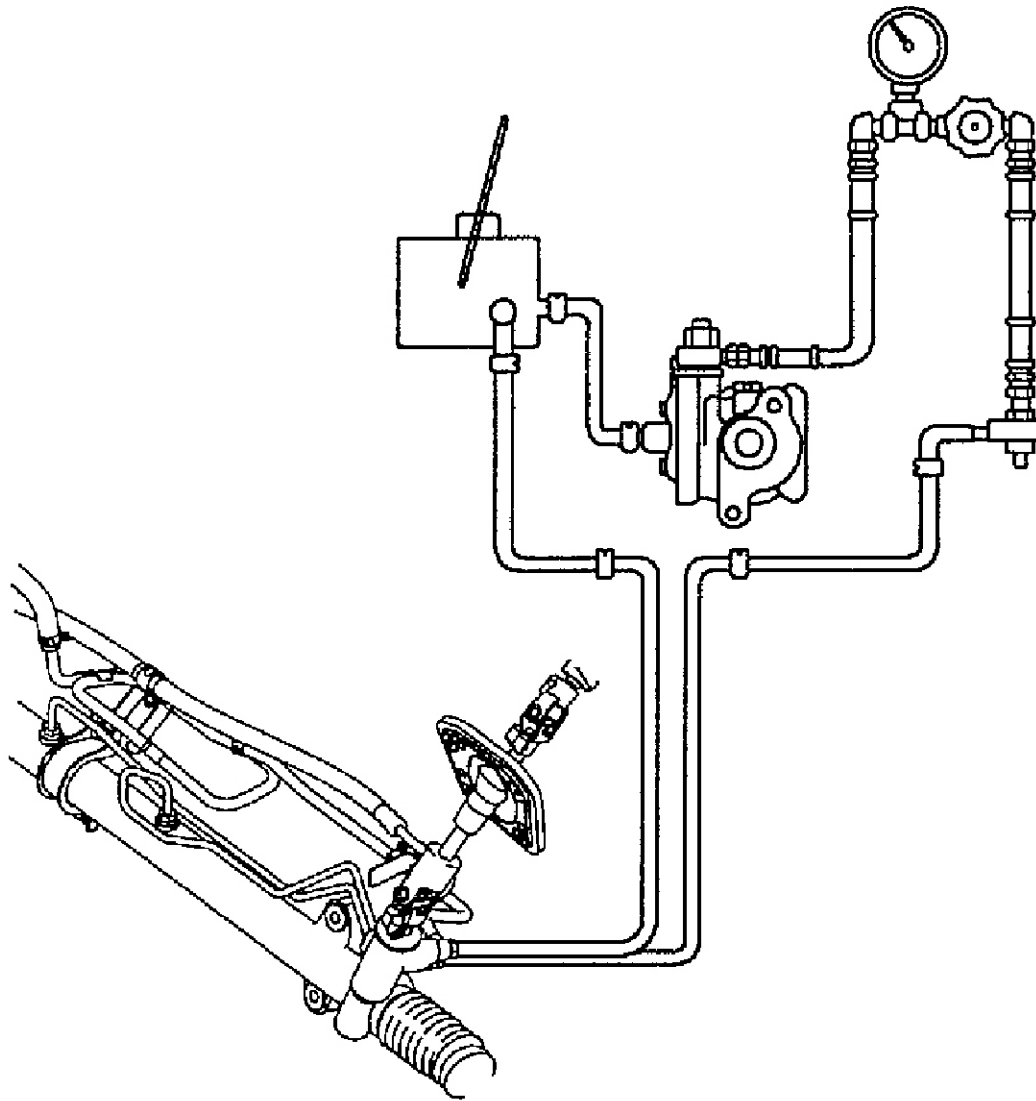
3. Bleed air from system. See **POWER STEERING AIR BLEEDING**.
4. Open gauge valve fully. Start engine and turn steering wheel fully left and right to raise fluid temperature to 122-140°F (50-60°C).

NOTE: If valve is left closed for more than 15 seconds, fluid temperature will increase excessively and damage oil pump.

5. Close gauge valve completely. Increase engine speed to 1,000-1,500 RPM and measure fluid pressure generated by power steering pump. If pressure is below specification, replace power steering pump assembly.

Power steering pump fluid pressure:

1,266-1,351 psi (8,728-9,316 kPa, 89-95 kg/cm²)



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Fig. 11: Testing Power Steering Fluid Pressures
Courtesy of KIA MOTORS AMERICA, INC.

6. Open gauge valve fully and again increase engine speed to 1,000-1,500 RPM.
7. Turn steering wheel fully to left and right and measure fluid pressure generated by gear housing. If pressure is below specifications, replace gear housing assembly.

Gear housing fluid pressure:

1,266-1,351 psi (8,728-9,316 kPa, 89-95 kg/cm²)

NOTE: If steering wheel is kept in fully turned position for more than 15 seconds, fluid temperature will rise excessively and damage oil pump.

8. Remove SST (0K210 323 AA0). Replace and tighten high-pressure hose. Tighten to specified torque.

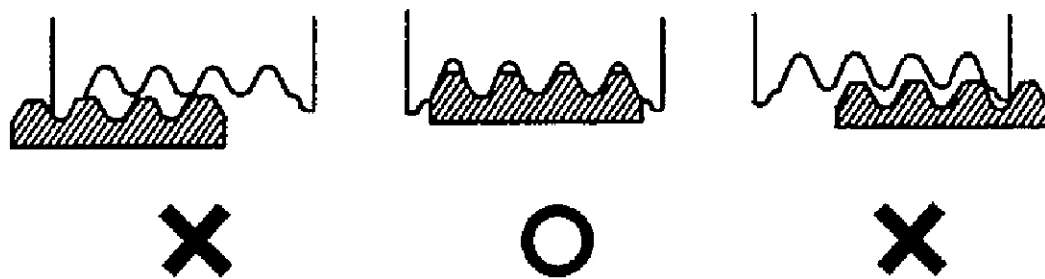
Tightening torque:

39.7-47.0 lb. ft (54.0-63.7 N.m, 5.5-6.5 kg.m)

9. Bleed air from system. See **POWER STEERING AIR BLEEDING** .

DRIVE BELT**INSPECTION**

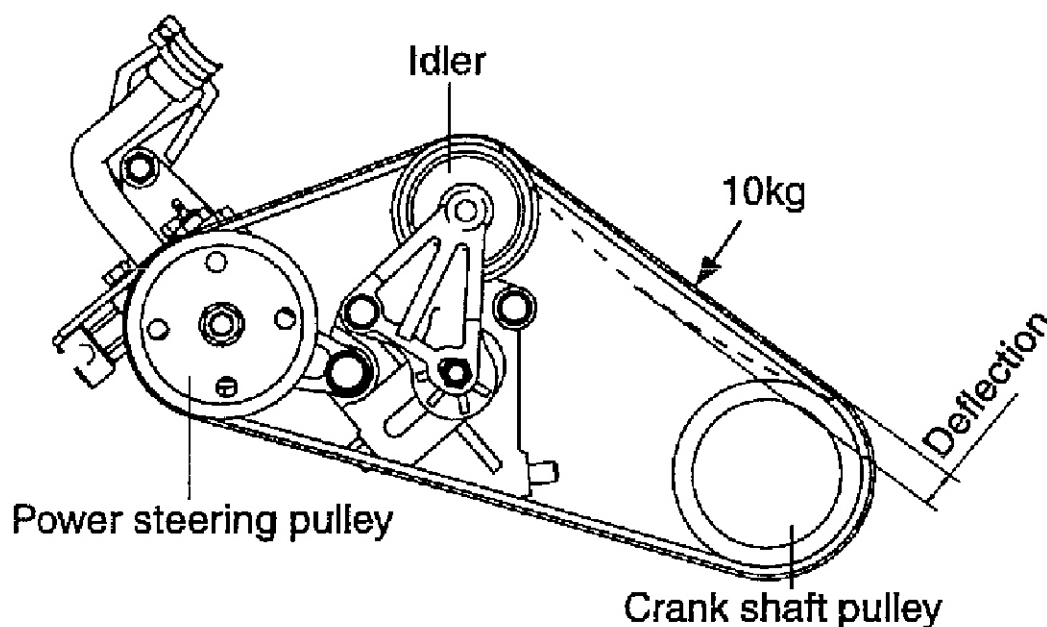
1. Check the drive belts for wear, cracks, and fraying. Replace if necessary.
2. Verify that the drive belts are correctly mounted on the pulleys.



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Fig. 12: Verifying That The Drive Belts Are Correctly Mounted On The Pulleys
Courtesy of KIA MOTORS AMERICA, INC.

3. Check the P/S drive belt deflection by applying moderate pressure (22 lbs, 98 N.m, 10 kg) midway between the pulleys.



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Fig. 13: Checking The P/S Drive Belt Deflection
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION:

- Measure the belt deflection between the pulleys.
- Consider the belt as a new one if it has been used on a running engine for less than five minutes.
- Check the belt deflection when the engine is cold or at least 30 minutes after the engine is stopped.

P/S drive belt deflection:

New one:

0.35-0.43 in. (8.8-11 mm)

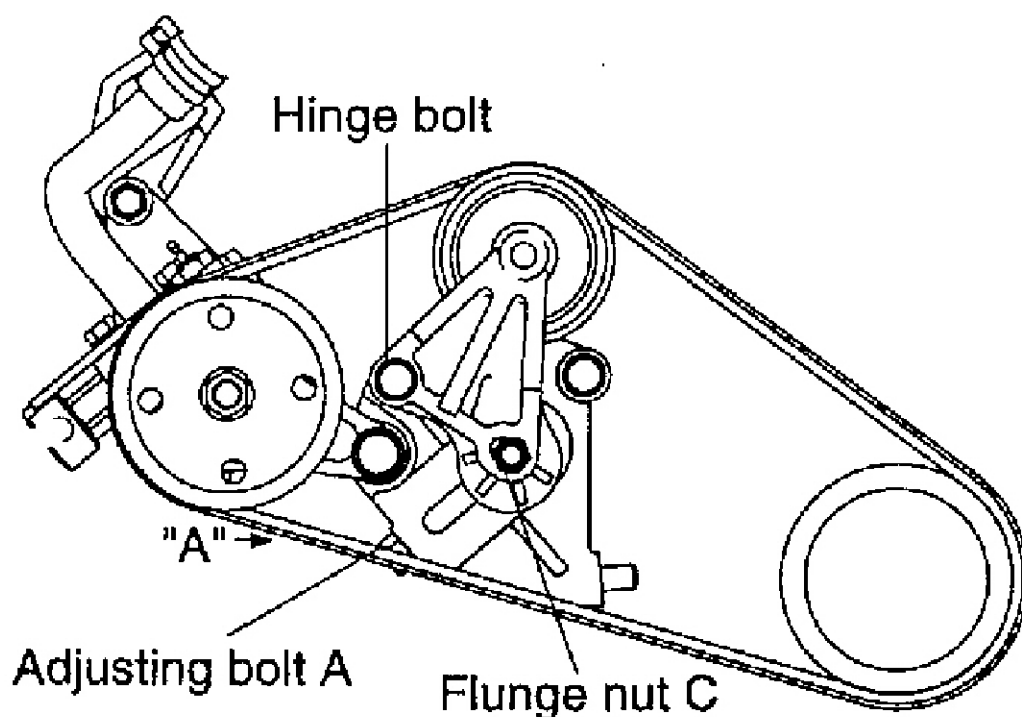
Used one (more than 5 minutes):

0.49-0.56 in. (12.5-14.3 mm)

Upon tension check:

0.46-0.60 in. (11.7-15.3 mm)

ADJUSTMENT



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Fig. 14: Adjusting Belt Tension

Courtesy of KIA MOTORS AMERICA, INC.

1. Loosen the adjusting bolt counterclockwise looking from "A" position.
2. Adjust the belt deflection by turning the adjusting bolt A.

Deflection (when applying 22 lbs, 98 N.m, 10 kg)

New one:

0.35-0.43 in. (8.8-11 mm)

Used one (more than 5 minutes):

0.49-0.56 in. (12.5-14.3 mm)

Upon tension check:

0.46-0.60 ins (11.7-15.3 mm)

3. After making the adjustment, tighten the hinge bolt B and the flange nut C.

Tightening torque:

Hinge: 23.8-40 lb. ft (32.3-54 N.m, 3.3-5.5 kg.m)

Flange: 13.7-20.2 lb. ft (18.6-27.4 N.m, 1.9-2.8 kg.m)

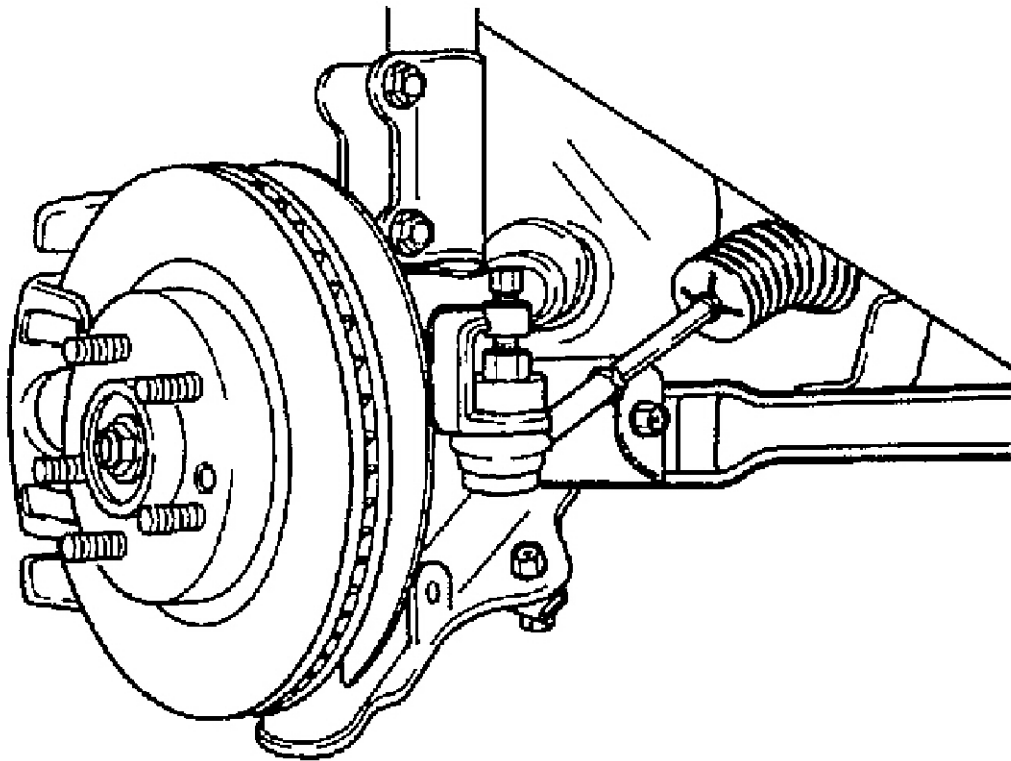
NOTE: In order to prevent the asymmetrical alignment of the tension pulley upon tension adjust, preliminary tight the hinge bolt B and the flange nut C before adjusting tension.

POWER STEERING GEAR BOX

REMOVAL

1. Raise front of vehicle and support with it safety stand.
2. Remove wheel and tire.
3. Pull out cotter pin and remove nut.
4. Separate tie rod from knuckle arm with SST (0K130 283 021).

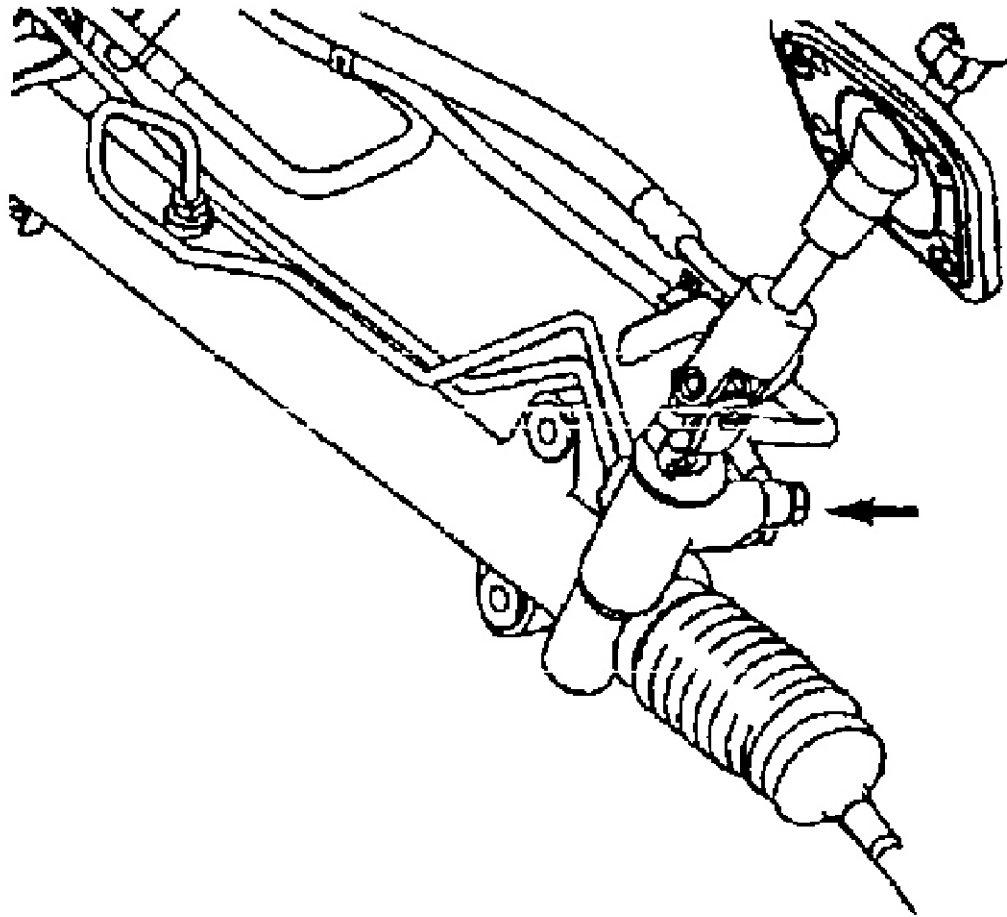
NOTE: Replace nut temporarily so that screw threads do not become damaged.



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Fig. 15: Separating Tie Rod From Knuckle
Courtesy of KIA MOTORS AMERICA, INC.

5. Loosen the bolts from the return oil pipe and pressure oil pipe and disconnect return oil pipe and pressure oil pipe.

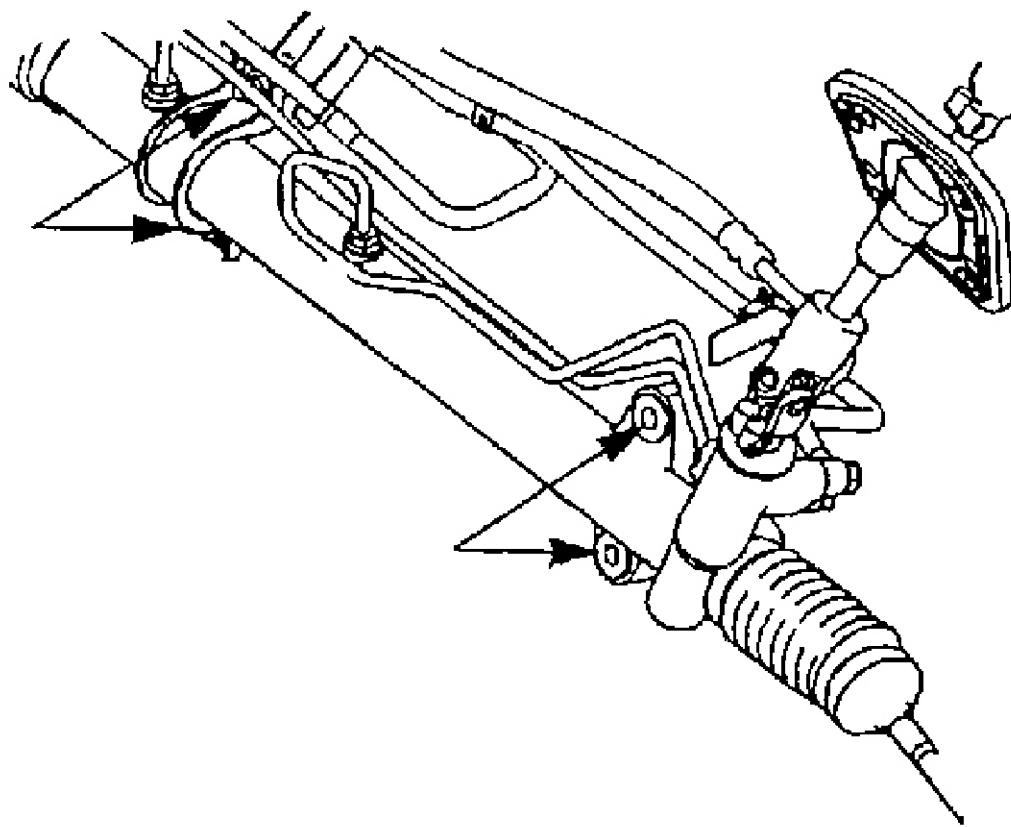


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Fig. 16: Loosening The Bolts From The Return Oil Pipe
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Use a container or rags to catch power steering fluid when disconnecting return oil pipe and/or pressure oil pipe.

6. Remove intermediate shaft from the steering rack and linkage.
7. Loosen the bolts and nuts from the steering rack brackets.



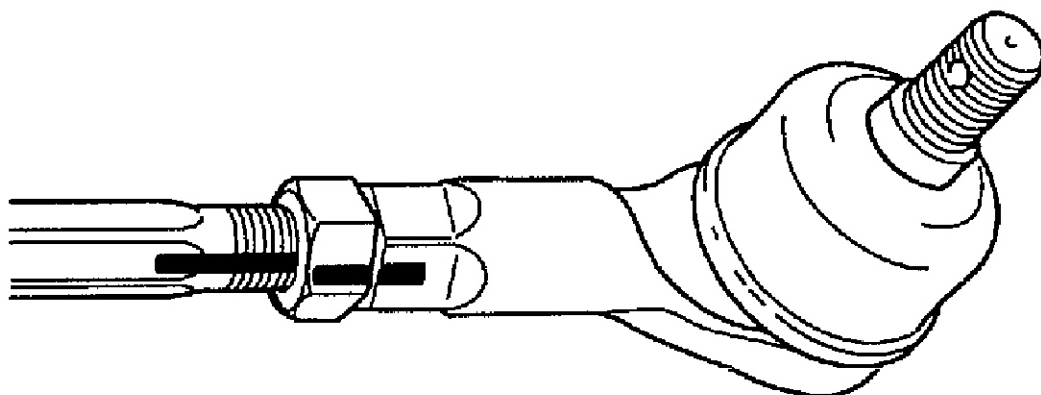
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Fig. 17: Loosening The Bolts & Nuts From The Steering Rack Brackets
Courtesy of KIA MOTORS AMERICA, INC.

8. Remove slowly steering rack from right side of vehicle if necessary. Replace rack and linkage entirely. Do not disassemble.

DISASSEMBLY

1. Mark alignment of tie rod, jam nut, and tie rod end as shown.



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Fig. 18: Marking Alignment Of Tie Rod, Jam Nut, & Tie Rod End
Courtesy of KIA MOTORS AMERICA, INC.

2. Loosen tie rod jam nut, and then remove tie rod.

REPLACEMENT

1. Install steering rack into right side of vehicle.
2. Tighten bolts and nuts to steering rack brackets.

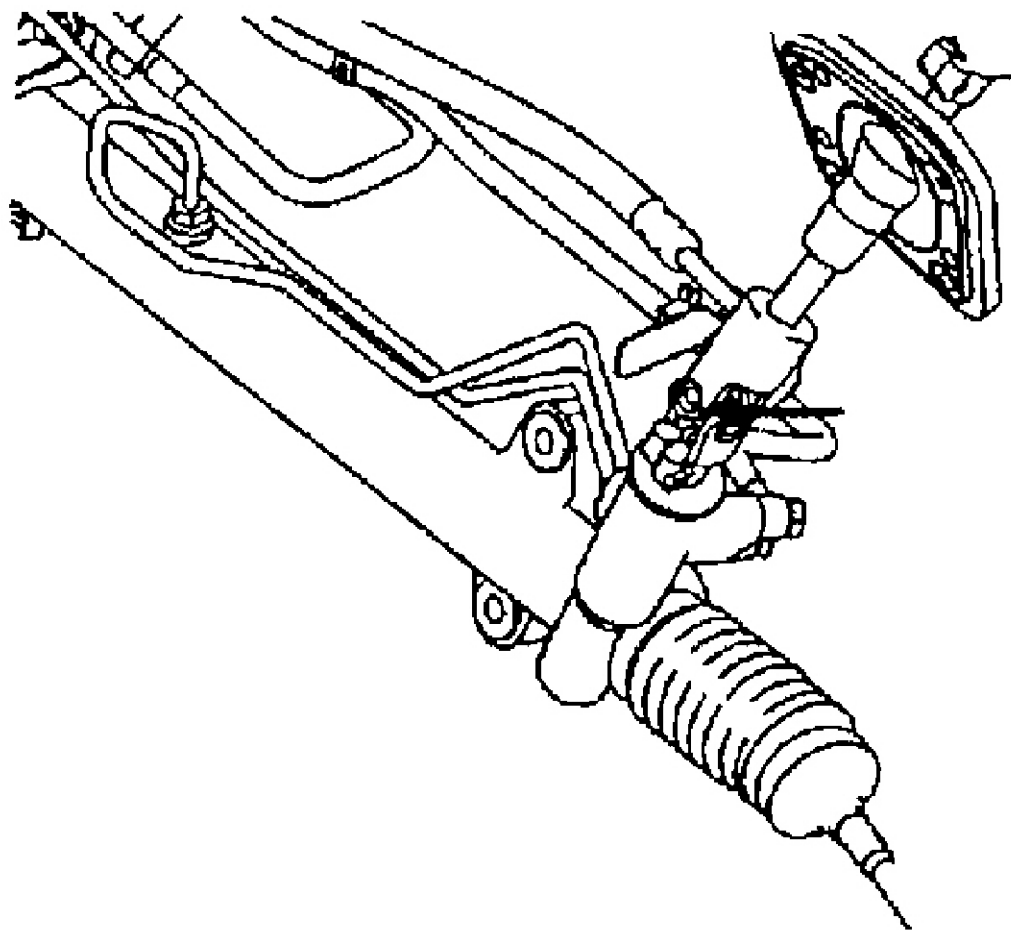
Tightening torque:

55-69 lb. ft (74-93 N.m, 7.5-9.5 kg.m)

3. Tightening intermediate shaft bolt.

Tightening torque:

16-20 lb. ft (21-26 N.m, 2.2-2.7 kg.m)



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Fig. 19: Tightening Intermediate Shaft Bolt
Courtesy of KIA MOTORS AMERICA, INC.

4. Connect return oil pipe and pressure oil pipe and tighten bolts from the return oil pipe and pressure oil pipe.

Tightening torque:

17-26 lb. ft (24-35 N.m, 2.4-3.6 kg.m)

5. Install tie-rod into steering knuckle arm.

6. Tighten nut and install new cotter pin.

Tightening torque:

43-58 lb. ft (59-78 N.m, 6.0-8.0 kg.m)

7. Install wheels and tires.
8. Lower vehicle.

ASSEMBLY

1. Install tie rod jam nut and align with mark made before disassembly.
2. Install tie rod end and rotate to align with mark made before disassembly.
3. Tighten tie rod jam nut.

Tightening torque:

50-58 lb. ft (69-78 N.m, 7.0-8.0 kg.m)

4. Install tie rod to knuckle arm.

POWER STEERING OIL PUMP**REMOVAL**

WARNING: Power steering oil, engine compartments and the exhaust system may be extremely hot, if engine has been running. Do not start engine with any loose or disconnected hoses. Do not allow hoses to touch hot exhaust manifold or catalyst.

1. Loosen the adjusting bolt counterclockwise looking from "A" position and then remove the P/S belt.

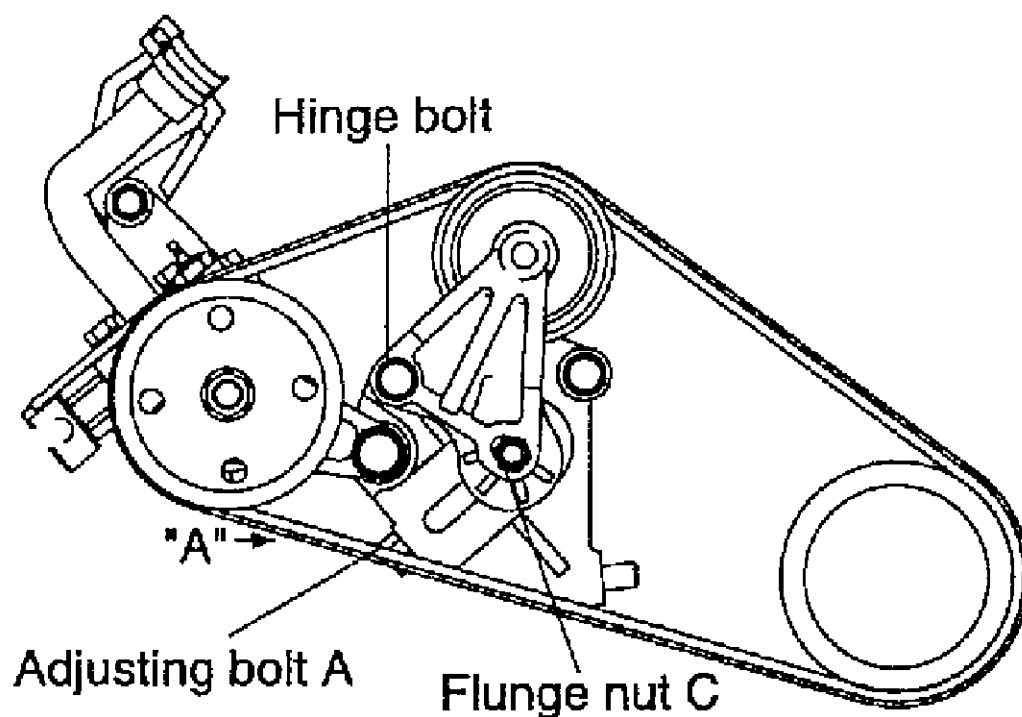
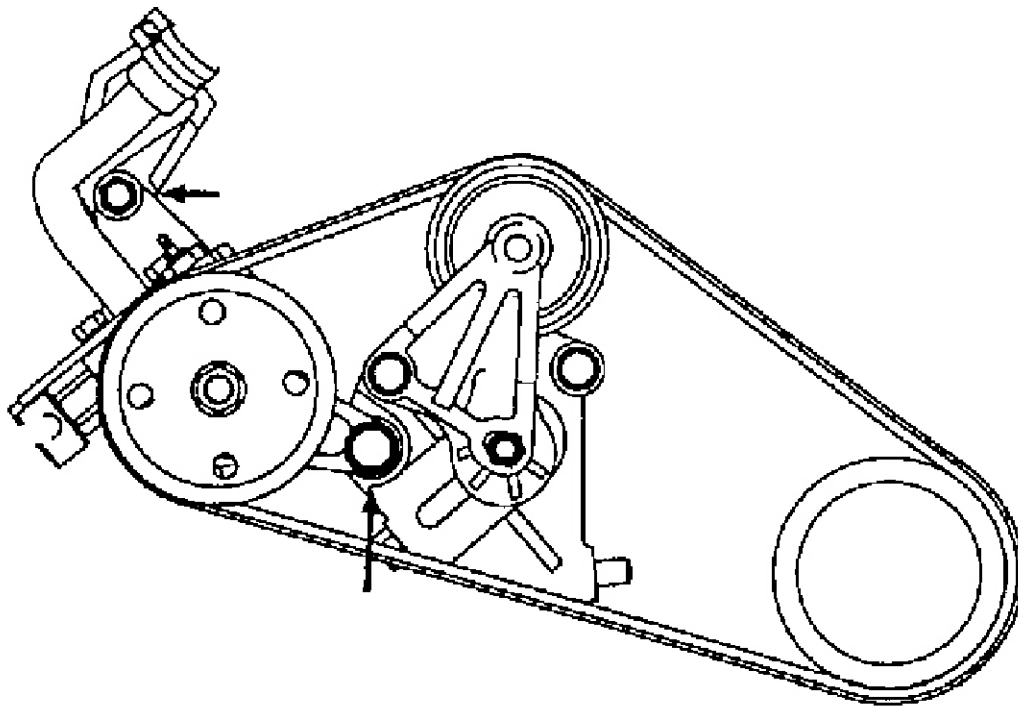


Fig. 20: Loosening The Adjusting Bolt
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove cap from power steering fluid reserve tank.
3. Using a siphon pump or suitable tool, reserve as much power steering fluid as possible from the reserve tank.
4. Disconnect the suction hose from power steering pump after removing clamps.
5. Remove the pressure hose from power steering pump after loosening bolt.

NOTE: Using container or rags to catch power steering fluid when disconnecting the suction hose and pressure hose.

6. Remove the power steering pump from the engine after loosening bolts.



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Fig. 21: Removing The Power Steering Pump From The Engine
Courtesy of KIA MOTORS AMERICA, INC.

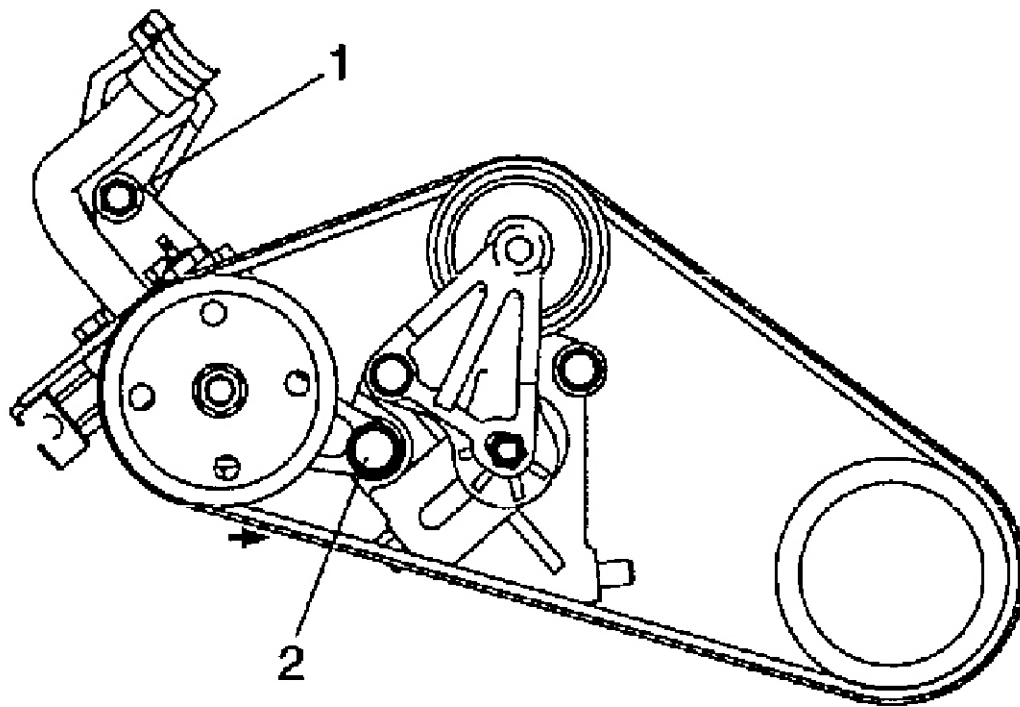
REPLACEMENT

1. Install the power steering pump to the right side of the engine and tighten the bolts to the power steering pump.

Tightening torque:

13.7-20.2 lb. ft (18.6-27.5 N.m, 1.9-2.8 kg.m)

50.6-68.7 lb. ft (68.6-93.1 N.m, 7.0-9.5 kg.m)



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Fig. 22: Installing The Power Steering Pump
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Before connecting the power steering hoses to the power steering pump, inspect the O-ring on the steering hoses for damage and replace if damaged.

2. Install the suction hose on the power steering pump and install hose clamps.
3. Install the pressure hose and tighten bolt.

Tightening torque:

39.7-47.0 lb. ft (54.0-63.7 N.m, 5.5-6.5 kg.m)

NOTE: Be sure hose clamps are properly reinstalled and suction hose is clear of all accessory drive belt.

4. Install the P/S belt to the power steering pump.
5. Adjust the belt deflection by turning the adjusting bolt.

New one:

0.35-0.43 in. (8.8-11 mm)

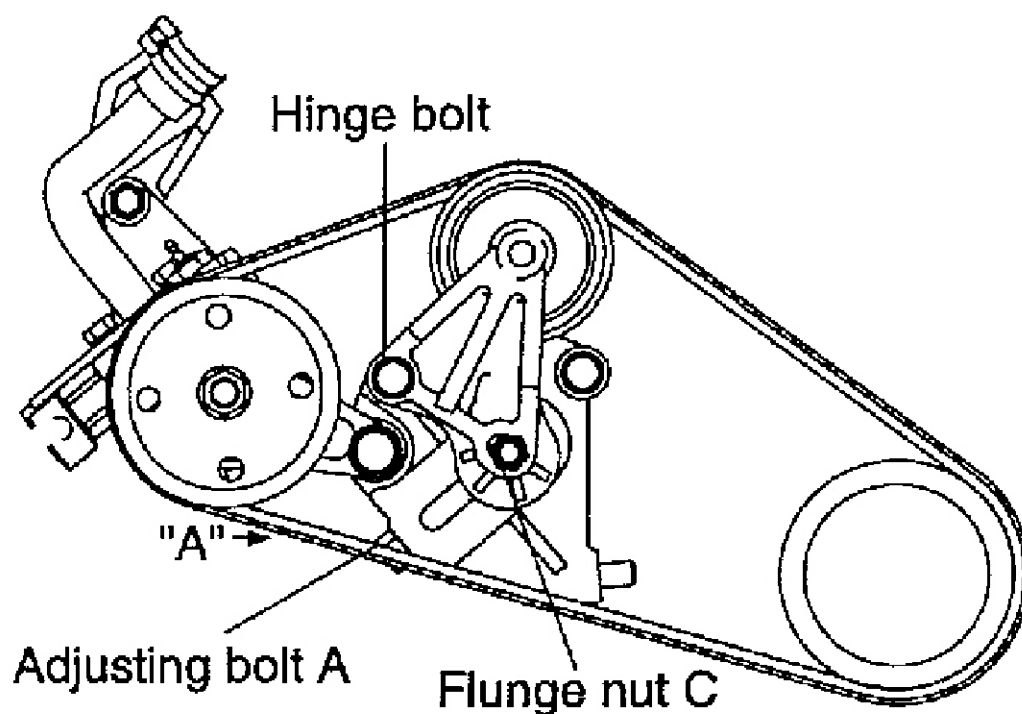
Used one (more than 5 minutes):

0.49-0.56 in. (12.5-14.3 mm)

Upon tension check:

0.46-0.60 in. (11.7-15.3 mm)

6. After making the adjustment, tighten the hinge bolt and the flange nut.



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Fig. 23: Tightening The Hinge Bolt & The Flange Nut
Courtesy of KIA MOTORS AMERICA, INC.

Tightening torque:

Hinge: 23.8-40 lb. ft (32.3-54 N.m, 3.3-5.5 kg.m)

Flange: 13.7-20.2 lb. ft (18.6-27.4 N.m, 1.9-2.8 kg.m)

NOTE: In order to prevent the asymmetrical alignment of the tension pulley upon tension adjust, preliminary tight the hinge bolt and the flange nut before adjusting tension.

7. Fill the steering pump reserve tank to correct fluid level.
8. Install cap on the power steering pump reserve tank.
9. Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level and inspect system for leaks.

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