

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

2004-05 ENGINES

3.5L V6 - Sedona

GENERAL

ANTIFREEZE COOLANT

Antifreeze coolant	Ethylene glycol for aluminum radiator
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Fig. 1: Antifreeze Coolant

Courtesy of KIA MOTORS AMERICA, INC.

Standard	
Antifreeze coolant concentration	40 ~ 50%

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Fig. 2: Service Standard

Courtesy of KIA MOTORS AMERICA, INC.

SEALANT

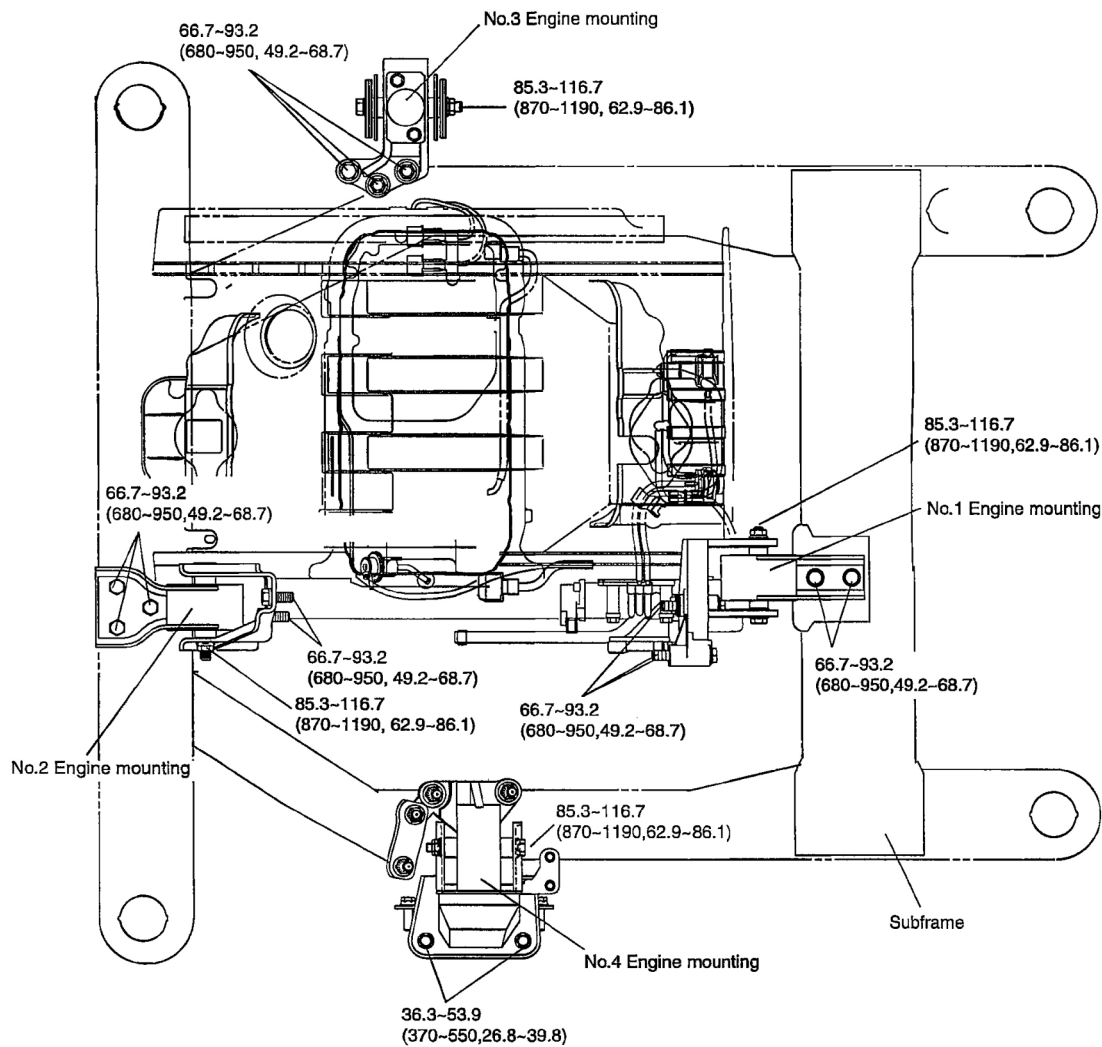
Water temperature sensor and gauge unit	No.2310 of Three Bond Co. or equivalent
Rocker cover	Roctite No.5699 or Three Bond No. 1141E
PCV valve	Loctite No. 242 or equivalent

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Fig. 3: Sealant

Courtesy of KIA MOTORS AMERICA, INC.

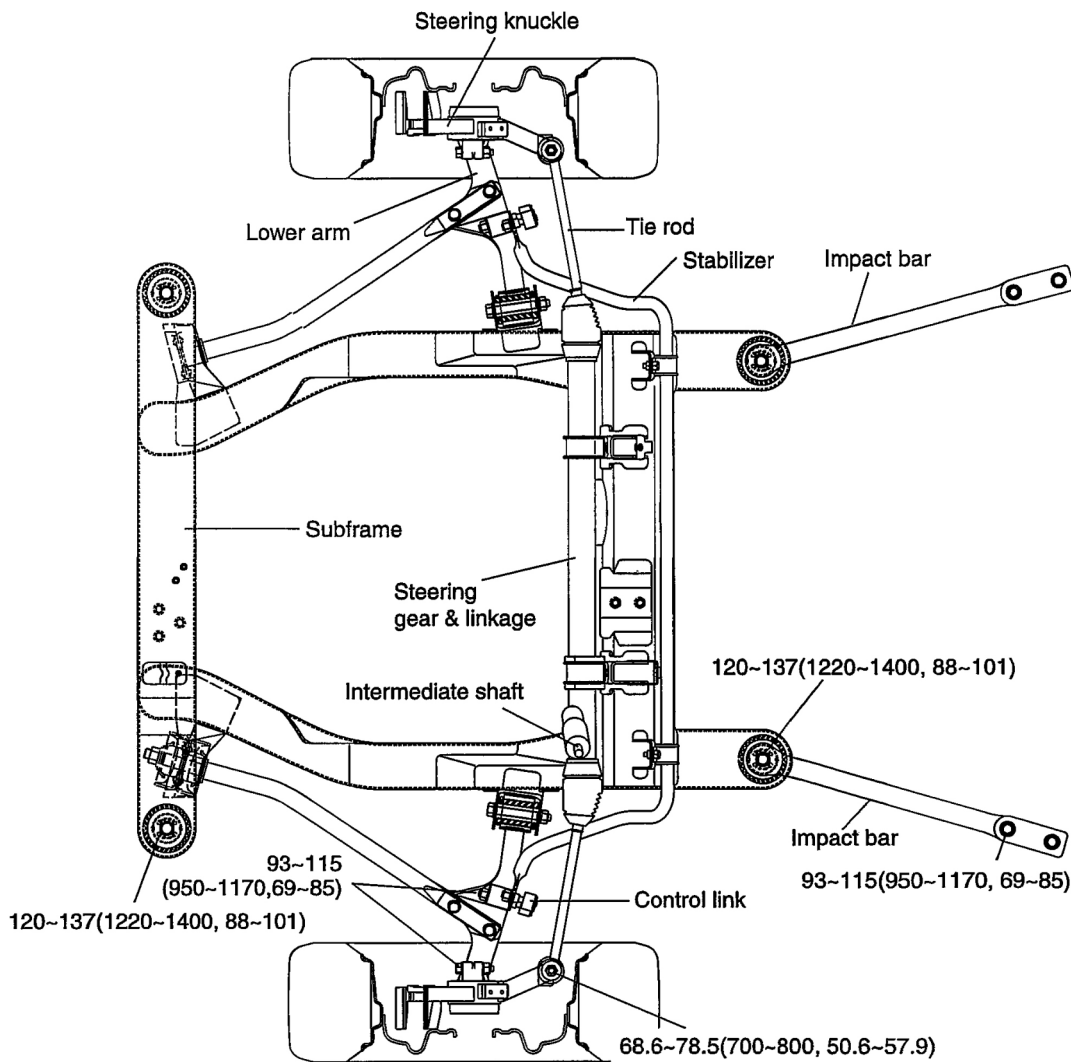
ENGINE MOUNTS



TORQUE : N·m (kg·cm, lb·ft)

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Fig. 4: Engine Mounts Components (1 Of 2)
 Courtesy of KIA MOTORS AMERICA, INC.



TORQUE : N·m (kg·cm, lb·ft)

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Fig. 5: Engine Mounts Components (2 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

SERVICE & ADJUSTMENTS

SPECIFICATIONS

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Description	Specifications-3.5	Limit
General		
Type	DOHC V-type	
Number of cylinders	6	
Bore	93 mm (3.66 in)	
Stroke	85.8 mm (3.38 in)	
Total displacement	3497 cc (213.3 cu.in)	
Compression ratio	10.0	
Firing order	1-2-3-4-5-6	
Idle R.P.M	700±100	
Ignition timing at idling speed	BTDC 10°±5°	
Valve timing		
Intake valve		
Opens (BTDC)	16.5°	
Close (ABDC)	55.5°	
Exhaust valve		
Opens (BBDC)	48.5°	
Close (ATDC)	15.5°	
Camshaft		
Cam height		
Intake	35.098 ~ 35.298mm(1.38 - 1.39 in)	
Exhaust	34.81 ~ 35.01mm(1.37 - 1.38 in)	
Journal O.D.	25.951 ~ 25.970mm(1.02 - 1.022 in)	
Bearing oil clearance	0.05 ~ 0.09mm(0.002 - 0.0035 in)	
End play	0.1 ~ 0.2mm(0.0039 - 0.0079 in)	
Cylinder head		
Flatness of gasket surface	0.03mm (0.0012 in)	
Flatness of manifold mounting surface		
Intake	Max 0.5mm (0.0197 in)	
Exhaust	Max 0.15mm (0.0059 in)	
Diameter of valve guide hole		
0.05 OS	12.05 - 12.068mm (0.474 - 0.475 in)	
0.25 OS	12.25 - 12.268mm (0.482 - 0.483 in)	
0.50 OS	12.50 - 12.518mm (0.492 - 0.493 in)	
Diameter of seat ring hole of intake valve		
0.3 OS	36.30 - 36.325mm (1.429 -1.430 in)	

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Fig. 6: Specifications (1 Of 4)
Courtesy of KIA MOTORS AMERICA, INC.

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2004-05 ENGINES 3.5L V6 - Sedona

Description	Specifications-3.5	Limit
0.6 OS	36.60 - 36.625mm (1.441 - 1.442 in)	
Diameter of seat ring hole of exhaust valve		
0.3 OS	33.30 - 33.325mm (1.311 - 1.312 in)	
0.6 OS	33.60 - 33.625mm (1.323 - 1.324 in)	
Valve		
Valve length		
Intake	106.28mm (4.18 in)	105.78mm (4.165 in)
Exhaust	105.4mm (4.15 in)	104.9mm (4.129 in)
Outer diameter of stem		
Intake	6.565 - 6.580mm (0.258 - 0.259 in)	
Exhaust	6.530 - 6.550mm (0.257 - 0.258 in)	
Face angle	45°- 45.5°	
Seat width (Margin)		
Intake	1.0mm (0.039 in)	0.5mm (0.02 in)
Exhaust	1.5mm (0.059 in)	1.0mm (0.039 in)
Clearance (Between stem and guide)		
Intake	0.02 - 0.05mm (0.0009 - 0.0020 in)	0.1mm (0.0039 in)
Exhaust	0.05 - 0.085mm (0.0020 - 0.0033 in)	0.15mm (0.0059 in)
Valve spring		
Free length	46.4mm (1.8268 in)	45.4mm (1.7874 in)
Load	24.0kgf / 37.9mm (53lb / 1.492 in)	
Rectangularity	2°	4°
Piston		
Outer diameter	92.97 - 92.98mm (3.6602 - 3.6606 in)	
Clearance (Between piston and cylinder)	0.03 - 0.05mm (0.0012 - 0.0020 in)	
Width of ring groove		
No. 1	1.53 - 1.55mm (0.0602 - 0.0610 in)	
No. 2	1.51 - 1.53mm (0.0594 - 0.0602 in)	
Oil ring	3.010 - 3.030mm (0.1185 - 0.1193 in)	
Rings for Service	0.25mm (0.010 in), 0.50mm (0.020 in) Oversize	
Piston Ring		
Number of rings per piston	3	
Compression ring	2	
Oil ring	1	
Compression ring type		
No. 1	Barrel & innerbevel type	
No. 2	Taper & undercut type	

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Fig. 7: Specifications (2 Of 4)
Courtesy of KIA MOTORS AMERICA, INC.

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Description	Specifications-3.5	Limit
Oil ring type	3-piece type	
Ring end gap		
No.1	0.20 - 0.30mm (0.0079 - 0.0118 in)	0.8mm (0.031 in)
No.2	0.45 - 0.60mm (0.0177 - 0.0236 in)	0.8mm (0.031 in)
Oil ring side rail	0.2 - 0.7mm (0.0079 - 0.0276 in)	1mm (0.039 in)
Ring side clearance		
No.1	0.04 - 0.08mm (0.0016 - 0.0315 in)	0.1mm (0.0039 in)
No.2	0.02 - 0.06mm (0.0008 - 0.0024 in)	0.1mm (0.0039 in)
Rings for Service	0.25mm (0.010 in), 0.50mm (0.020 in), Oversize	
Connecting rod		
Side clearance	0.1 - 0.25 mm (0.00394 - 0.00984 in)	0.4mm (0.016 in)
Bend	0.05 or less/100 mm (0.002 in or less/3.937 in)	
Bearing oil clearance	0.022 - 0.040 mm (0.0009 - 0.0016 in)	0.1mm (0.0039 in)
Crankshaft		
Journal O.D	63.982 - 64.00mm (2.5190 - 2.5197 in)	
Pin O.D.	54.982 - 55.000 mm (2.1650 - 2.1654in)	
Out-of-roundness of journal and pin	0.03mm (0.0012 in)	
End play	0.05 - 0.25mm (0.002 - 0.01 in)	0.3mm (0.012 in)
Main bearing oil clearance	0.018 - 0.036mm (0.0071 - 0.0014 in)	
Cylinder block		
Cylinder bore	93.0mm (3.6614 in)	
Flatness of gasket surface	0.05mm (0.002 in)	
Out -of-roundness Roundness	ø0.02mm (0.00079 in)	0.05mm (0.002 in)
Oil pump		
Side clearance		
Body clearance	0.1 - 0.181mm (0.0039 - 0.0071 in)	
Side clearance	0.04 - 0.095mm (0.0016 - 0.0037 in)	
Tip clearance	0.06 - 0.018mm (0.0024 - 0.0071 in)	
Relief Spring		
Free length	46.3mm (1.823 in)	
Load	6.9kg/39.1mm (15.2 lb/1.54 in)	
Oil filter type	Catridge, Full flow	
Engine oil pressure	80kPa (0.8 bar, 11.6 psi) at idle [Conditions : Oil temperature is 75 to 90°C (167 to 194°F)]	
Engine oil quantity	4.3liters (4.51 US.qts, 3.78 imp.qts)	
Cooling method	Engine coolant cooling, forced circulation with electric fan	
Cooling system quantity	8.2liters (8.61 US.qts, 7.2 imp.qts)	

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Fig. 8: Specifications (3 Of 4)

Courtesy of KIA MOTORS AMERICA, INC.

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Description	Specificaitons-3.5	Limit
Thermostat		
Type	Wax pellet type with jiggle valve	
Normal opening temperature (°C)	82 (179.6°F)	
Opening temperature range (°C)	80 - 84 (176 - 83.2°F)	
Wide open temperature (°C)	95 (2.3°F)	
Radiator		
Main valve opening pressure	93.2 - 122.6 kPa (0.95 - 1.25kg/cm², 13.5 - 17.8psi)	
Vaccum valve opening pressure	-0.98 - 4.90 kPa (-0.01 - 0.05kg/cm², -0.14 - 0.71 psi)	
Air cleaner		
Type	Dry type	
Element	Unwoven cloth type	
Exhaust pipe		
Muffler	Expansion resonance type	
Suspension system	Rubber hanger	

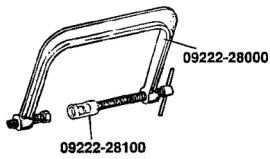
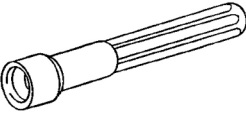
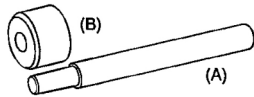
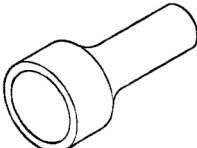
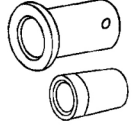
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Fig. 9: Specifications (4 Of 4)
Courtesy of KIA MOTORS AMERICA, INC.

SPECIAL SERVICE TOOLS

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

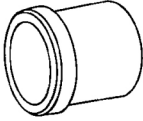
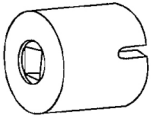
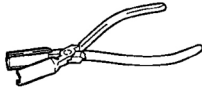
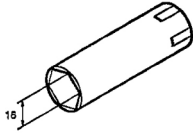
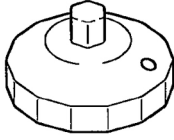
Tool (Number and name)	Illustration	Use
Valve spring compressor (09222-28000) Valve spring compressor adapter (09222-28100)	 LCDD8601	Removal and installation of intake and exhaust valve
Valve stem oil seal installer (09222-28200)	 BCAE001D	Installation of valve stem oil seal
Valve guide remover (09221-3F000(A)) Valve guide installer (09221-3F000(B))	 BCAE001C	Removal and installation of valve guide
09231-33000 Crankshaf rear oil seal installer	 BCAE001F	Installation of crankshaft rear oil seal
09214-33000 Crankshaf front oil seal installer	 BCAE001A	Installation of crankshaft front oil seal

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Fig. 10: Special Service Tools (1 Of 2)
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Tool (Number and name)	Illustration	Use
09221-21000 Camshaft oil seal installer		Installation of camshaft oil seal
09231-33100 Crankshaft wrench		Used if the crankshaft needs to be rotated to attach the timing belt, etc.
09222-29000 Valve stem oil seal remover		Removal of valve stem oil seal
09188-38000 Spark plug socket wrench		Installation and removal of spark plug
09263-38000 Oil filter wrench		Removal of oil filter

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Fig. 11: Special Service Tools (2 Of 2)
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CHECKING COMPRESSION PRESSURE

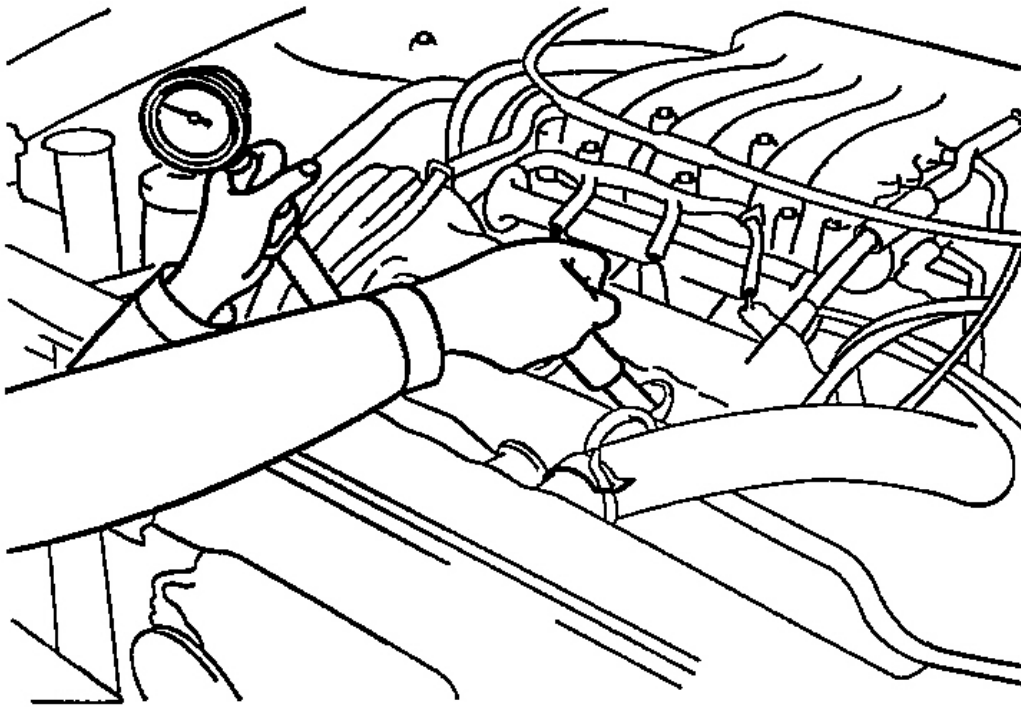
1. Before checking compression, check the engine oil level and that the starter motor and battery are all in normal operating condition.
2. Start the engine and wait until engine coolant temperature has risen to 80-95°C
3. Stop the engine and disconnect the spark plug cables.

4. Remove the spark plugs.
5. Turn over the engine to remove any foreign objects in the cylinders.
6. Attach the compression gauge to the spark plug hole.
7. Depress the accelerator pedal to fully open the throttle valve.
8. Turn over the engine and read the gauge.

Standard value:

1,275 kPa (13.0 kg / cm² , 185 psi).

Limit: 1,128 kPa (11.5 kg / cm² , 164 psi).



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Fig. 12: Checking Compression Pressure
Courtesy of KIA MOTORS AMERICA, INC.

9. Repeat steps 6 - 8 on all cylinders, making sure ensuring that the pressure difference for each of the cylinders is within the specified limit.

Limit:

Max 100 kPa (1.0 kg/cm² , 14 psi) for all cylinders.

10. If a cylinder's compression or pressure difference is below the specification, add a small amount of oil through the spark plug hole and repeat steps 6 - 9 .
 1. If the addition of oil causes the compression to rise, it is possible that there is wear between the piston ring and cylinder wall.
 2. If the compression doesn't rise, valve seizure, poor valve seating or a compression leak from the cylinder head gasket are all possible causes.

Tightening torque:

Spark plug:

20-30 N.m

(200-300 kg. cm, 14.75-22.13 lb. ft)

TROUBLESHOOTING

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Symptom	Probable cause	Remedy
Knocking of crankshaft and bearing	Worn main bearing	Replace
	Seized bearing	Replace
	Bent crankshaft	Replace
	Excessive crankshaft end play	Replace thrust bearing
Piston and connecting rod knock	Worn bearing	Replace
	Seized bearing	Replace
	Worn piston pin	Replace piston and pin or connecting rod
	Worn piston in cylinder	Recondition cylinder
	Broken piston ring	Repair or replace
	Improper connecting rod alignment	Replace
Noisy valves	Faulty auto-lash adjuster	Replace
	Thin or diluted engine oil (low oil pressure)	Change
	Worn or damaged valve stem or valve guide	Replace
Excessively worn cylinder and piston	Shortage of engine oil	Add or replace Check oil level on daily basis
	Dirty engine oil	Replace
	Poor quality of engine oil	Use proper oil
	Improperly assembled piston and connecting rod	Repair or replace
	Improper piston ring end clearance	Replace
	Dirty air cleaner	Clean air cleaner assembly and replace the air filter
Connecting rod and main bearing noise	Insufficient oil supply	Check engine oil level
	Thin or diluted engine oil	Change and determine cause
	Excessive bearing clearance	Replace
Damaged crankshaft bearing	Shortage of engine oil	Add or replace Check oil level on daily basis
	Low oil pressure	Adjust or repair
	Poor quality of engine oil	Use proper engine oil
	Worn or out-of-round of crankshaft journal	Replace
	Restricted oil passage in crankshaft	Clean
	Worn bearing	Replace bearing and check engine oil and lubrication system
	Bearing improperly installed	Replace
	Non-concentric crankshaft or bearing	Replace
Timing belt noise	Incorrect belt tension	Replace

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Fig. 13: Troubleshooting (1 Of 3)
Courtesy of KIA MOTORS AMERICA, INC.

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Symptom	Probable cause	Remedy
Low compression	Blown cylinder head gasket	Replace gasket
	Worn or damaged piston rings	Replace rings
	Worn piston or cylinder	Repair or replace piston and/or cylinder block
	Worn or damaged valve seat	Repair or replace valve and/or seat ring
Oil pressure drop	Low engine oil level	Check engine oil level
	Faulty oil pressure switch	Replace
	Clogged oil filter	Replace
	Worn oil pump gears or cover	Replace
	Thin or diluted engine oil	Change and determine cause
	Oil relief valve stuck (open)	Repair
	Excessive bearing clearance	Replace
High oil pressure	Oil relief valve stuck (closed)	Repair
Excessive engine rolling and vibration	Loose engine roll stopper (front, rear)	Re-tighten
	Loose transaxle mount bracket	Re-tighten
	Loose engine mount bracket	Re-tighten
	Loose center member	Re-tighten
	Broken transaxle mount insulator	Replace
	Broken engine mount insulator	Replace
	Broken engine roll stopper insulator	Replace
Low coolant level	Leakage of coolant	
	Damaged radiator core joint	Replace
	Corroded or cracked hoses (Radiator hose, heater hose, etc)	Replace
	Faulty radiator cap valve or setting of spring	Replace
	Faulty thermostat	Replace
	Faulty engine coolant pump	Replace
Clogged radiator	Foreign material in coolant	Replace
Abnormally high coolant temperature	Faulty thermostat	Replace parts
	Faulty radiator cap	Replace
	Restriction of flow in cooling system	Replace
	Loose or missing drive belt	Adjust or replace
	Faulty engine coolant pump	Replace
	Faulty temperature gauge or wiring	Repair or replace
	Faulty electric fan	Repair or replace
	Faulty thermo-sensor on radiator	Replace
	Insufficient coolant	Refill coolant
Abnormally low coolant temperature	Faulty thermostat	Replace
	Faulty temperature gauge or wiring	Repair or replace

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Fig. 14: Troubleshooting (2 Of 3)

Courtesy of KIA MOTORS AMERICA, INC.

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Symptom	Probable cause	Remedy
Leakage from oil cooling system	Loose hose and pipe connection	Replace
	Blocked or collapsed hose and pipe	Repair or replace
Inoperative electrical cooling fan	Damaged	Replace or repair
Exhaust gas leakage	Loose connections	Re-tighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Detached baffle plate in muffler	Replace
	Broken rubber hanger	Replace
	Pipe or muffler contacting vehicle body	Correct
	Broken pipe or muffler	Repair or replace

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Fig. 15: Troubleshooting (3 Of 3)

Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL & INSTALLATION

ENGINE AND TRANSAXLE ASSEMBLY

REMOVAL

1. Remove the battery and engine cover.
2. Detach the air cleaner.
3. Disconnect the connectors for the engine harness.
4. Disconnect the connectors for the alternator harness, the oil pressure switch and the oil pressure sensor.
5. Disconnect the connector of starter motor harness.
6. Drain the engine coolant.
7. Disconnect transaxle oil cooler hose.

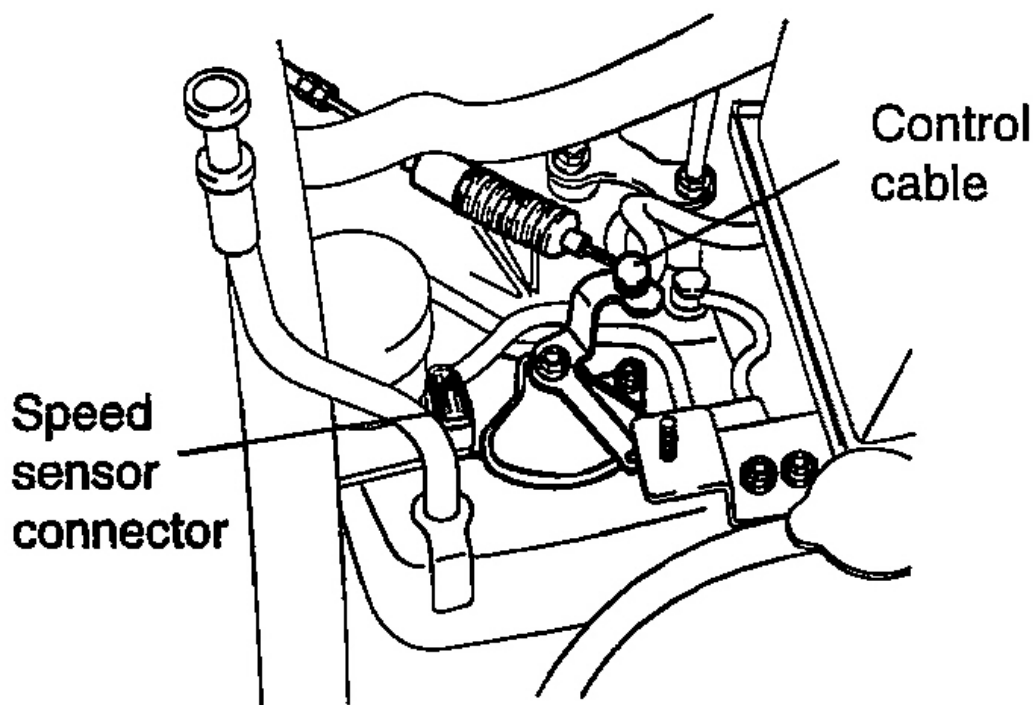
NOTE: When disconnecting the hoses, make identification marks to avoid making any mistakes when re-installing them.

CAUTION: Be careful not to spill any of the oil or fluid out of the hoses. Plug the openings to prevent the entry of foreign material.

8. Disconnect the radiator upper and lower hoses on the engine side, and then remove the radiator assembly.
9. Disconnect the high tension cable and all wires to the distributor and the ignition coil.
10. Disconnect the engine ground.
11. Disconnect the brake booster vacuum hose.
12. Disconnect the EVAP canister hose.
13. Remove the main fuel line, and the return and vapor hoses from the engine side.

CAUTION: To reduce the residual pressure in the hoses, see FUEL PUMP & FUEL FILTER ASSEMBLY REPLACEMENT .

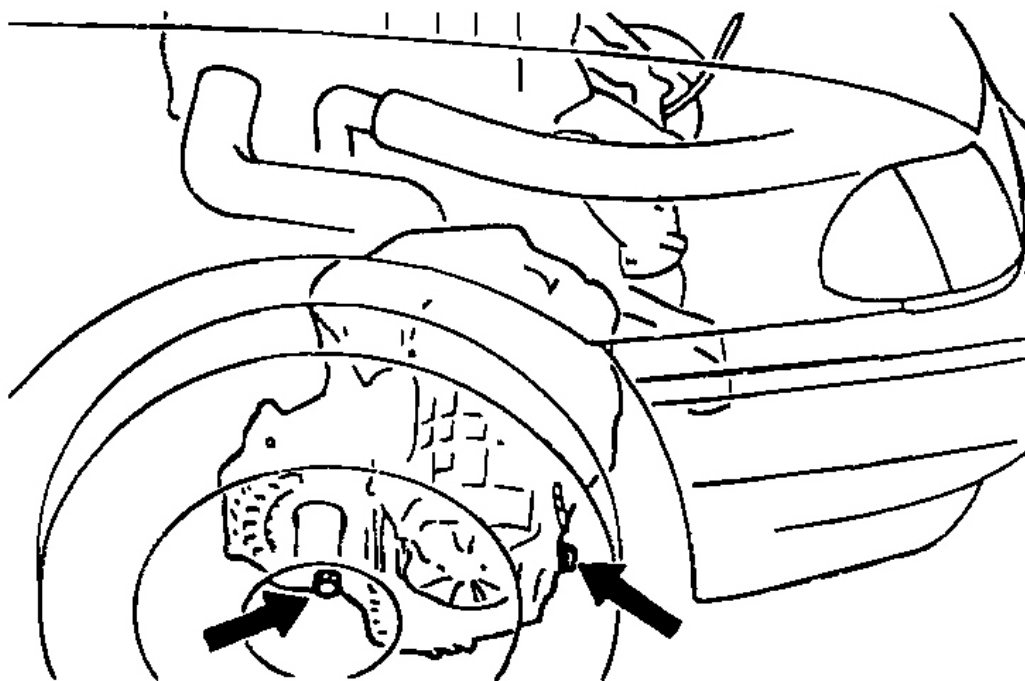
14. Disconnect the heater hose (Intake and exhaust) at the engine side.
15. The accelerator cable should be removed from the engine side.
16. The cruise control cable should be removed from the engine side.
17. Remove the control cable from the transaxle.
18. Disconnect the speed sensor connector from the transaxle.



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Fig. 16: Disconnecting Speed Sensor Connector From Transaxle
Courtesy of KIA MOTORS AMERICA, INC.

19. Remove the power steering oil pump hose.
20. Raise the vehicle.
21. Remove the oil pan shield.
22. Drain the transaxle oil.



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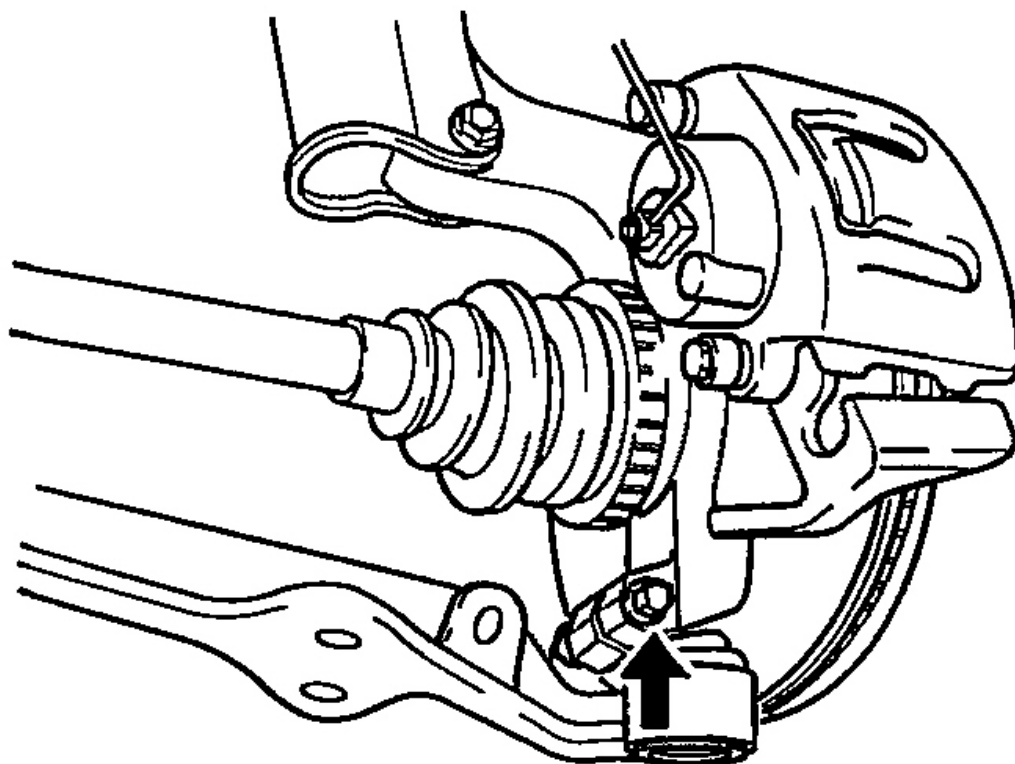
Fig. 17: Draining Transaxle Oil

Courtesy of KIA MOTORS AMERICA, INC.

23. Disconnect the front exhaust pipe from the manifold.

NOTE: Use a wire to suspend the exhaust pipe from the bottom of the vehicle.

24. Remove the tie rod end from steering knuckles.
25. Remove control link from stabilizer and lower arm.
26. Remove pinch bolt from knuckle. Separate lower arm from knuckle.



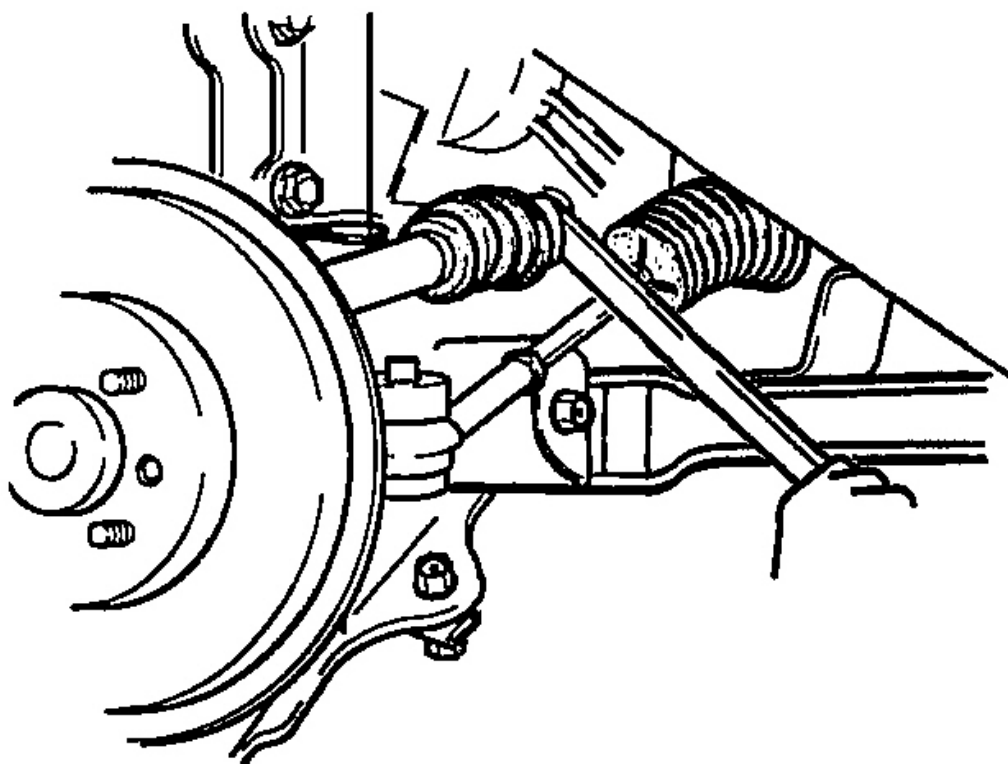
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Fig. 18: Separating Lower Arm From Knuckle
Courtesy of KIA MOTORS AMERICA, INC.

27. Remove the drive shaft from the transaxle housing.

CAUTION:

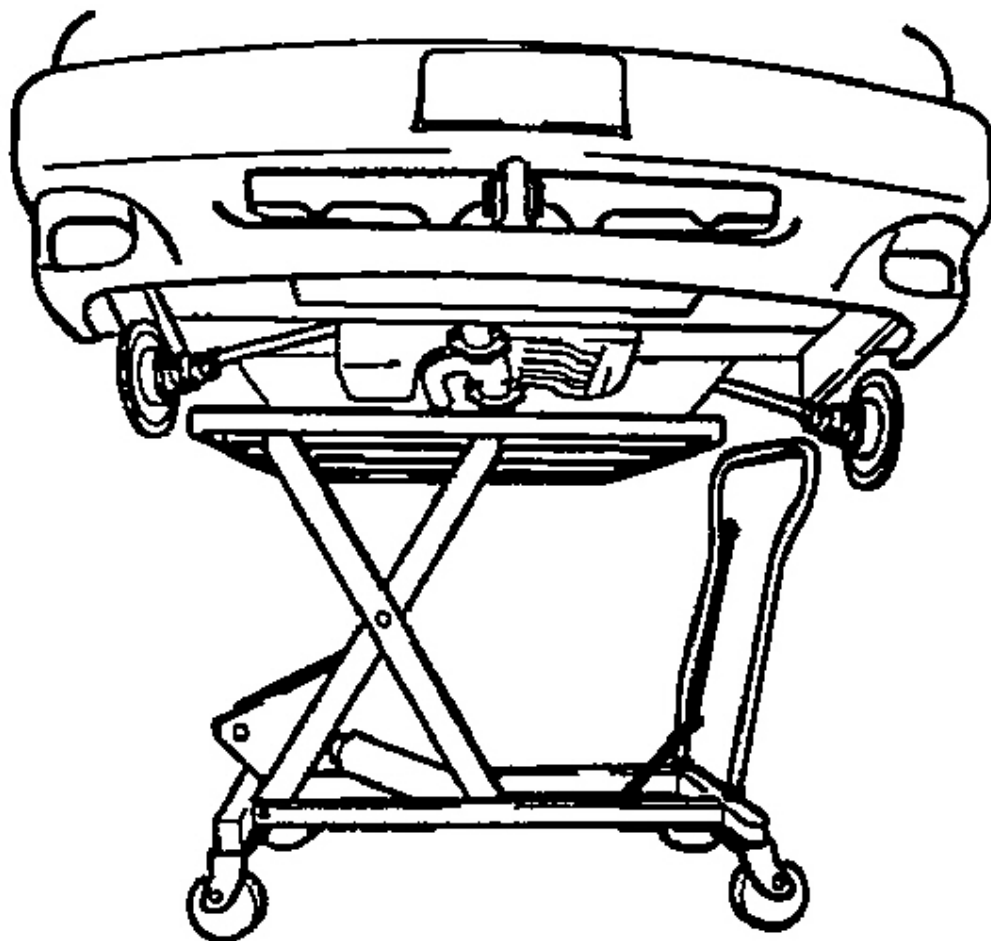
- Plug up the holes of the transaxle case to prevent entry of foreign material.
- The circlips on the drive shafts should be replaced whenever reinstalling.



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Fig. 19: Removing Drive Shaft From Transaxle Housing
Courtesy of KIA MOTORS AMERICA, INC.

28. Remove intermediate shaft bolt. See **STEERING SYSTEMS** .
29. Remove No. 3, No. 4 engine mounting.
30. Support auto transaxle, engine and subframe with a suitable floor jack.



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Fig. 20: Supporting Auto Transaxle
Courtesy of KIA MOTORS AMERICA, INC.

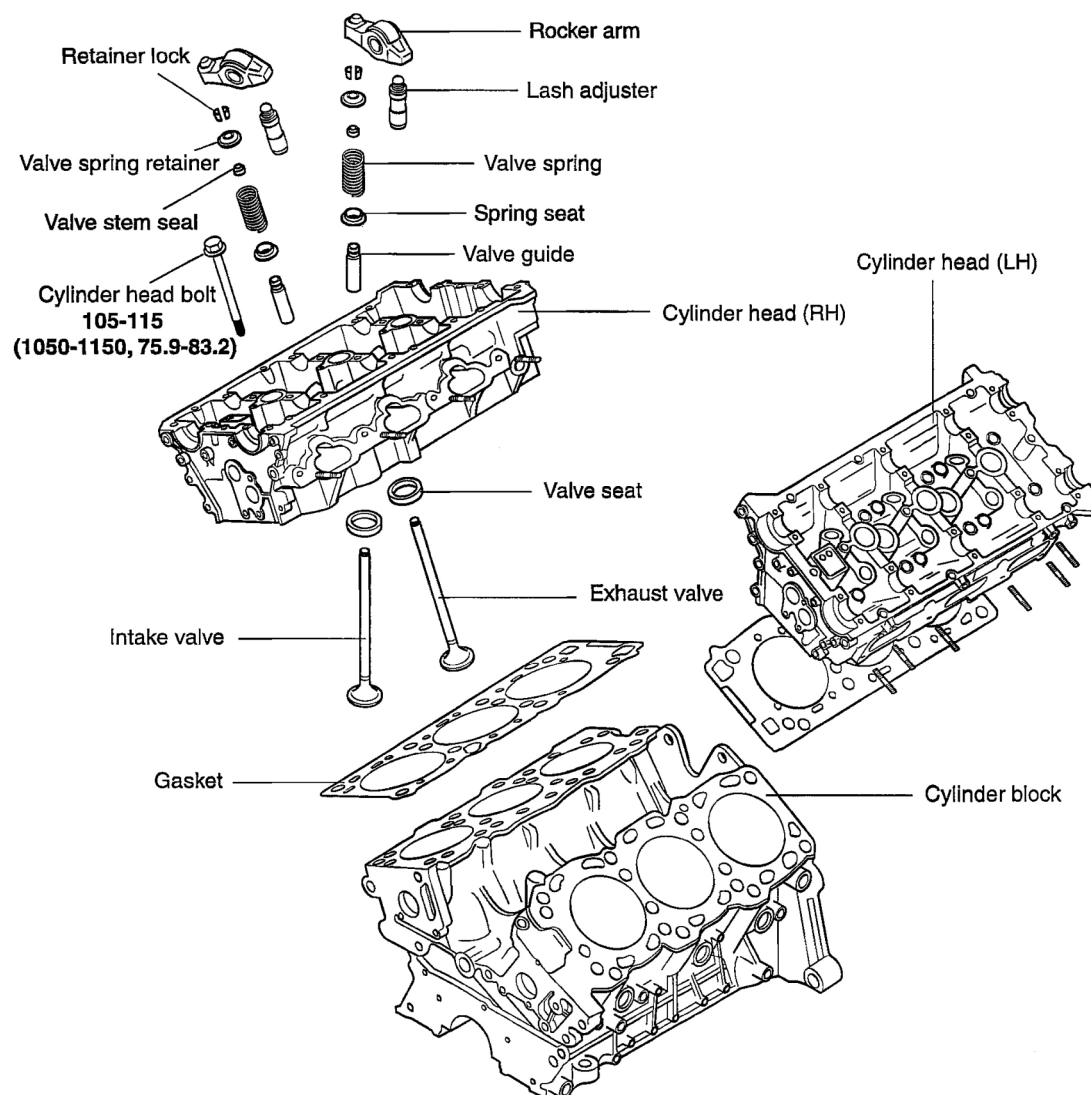
31. Remove nuts and bolts of impact bar and subframe.
32. Slowly lower engine, auto transaxle and subframe.
33. Remove No. 1, No. 2 engine mounting from subframe.
34. Separate auto transaxle from engine.

INSTALLATION

Installation procedure is reverse order of removal procedure.

CYLINDER HEAD

COMPONENTS



TORQUE : N·m (kg·cm, lb·ft)

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Fig. 21: Cylinder Head Components

Courtesy of KIA MOTORS AMERICA, INC.

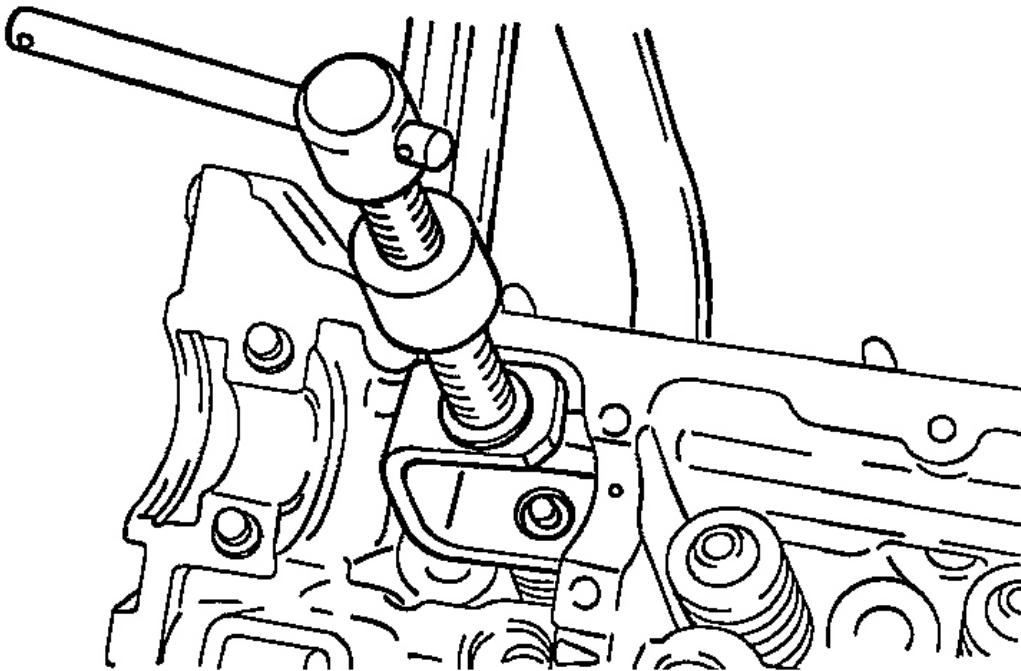
DISASSEMBLY

Removal of cylinder head bolts

Remove the cylinder head bolts using the hexagonal wrench.

Removal of the retainer lock

1. Compress the valve spring using SST (09222-28000, 09222-28100).



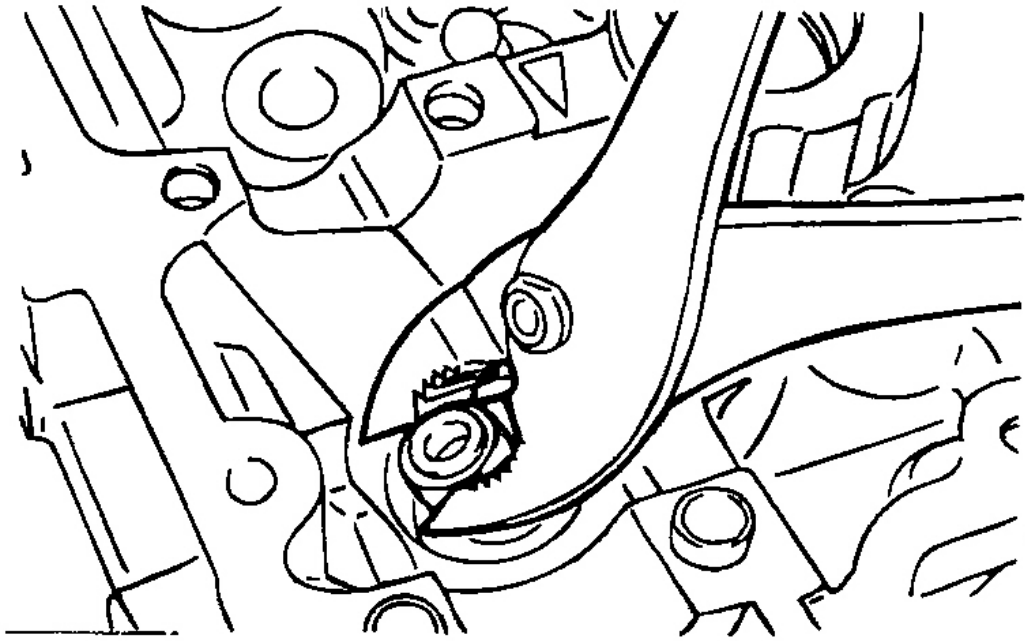
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Fig. 22: Compressing Valve Spring Using SST (09222-28000, 09222-28100)
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove the retainer lock.

Valve stem seal

Do not reuse the valve stem seal.



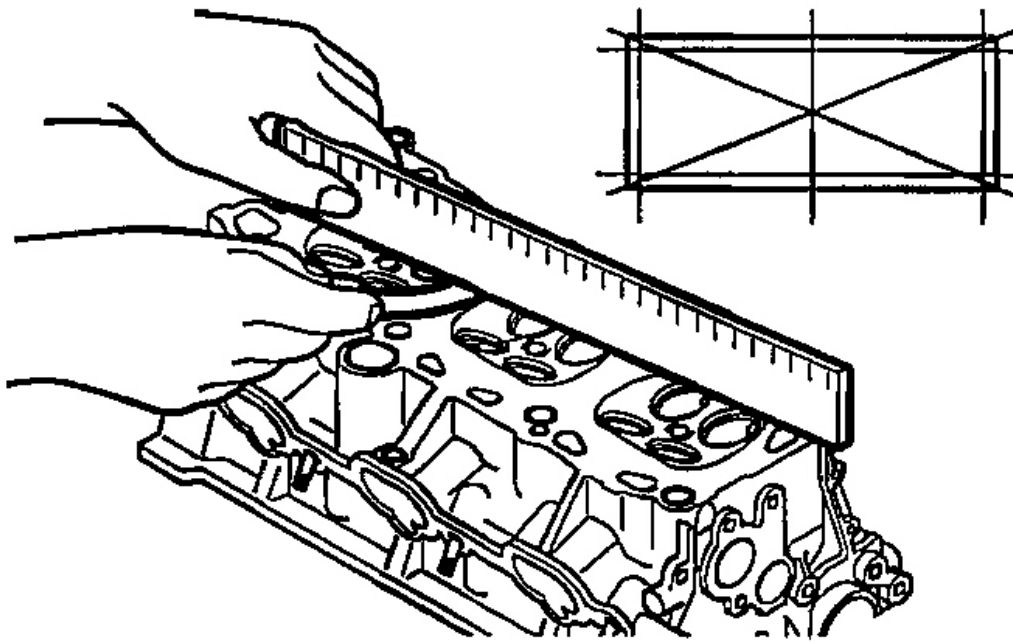
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Fig. 23: Removing Valve Stem Seal
Courtesy of KIA MOTORS AMERICA, INC.

Arrange removal parts according to cylinder numbers, intake and exhaust valves.

INSPECTION & REPAIR

1. Remove scale, sealing compound and carbon deposits completely. After cleaning oil passages, apply compressed air to make certain that the passages are not clogged.
2. Visually check the cylinder head for cracks, damage or water leakage.
3. Check the cylinder head gasket surface for flatness with a straight edge and feeler as shown in illustration.



G00320664

Fig. 24: Checking Cylinder Head Gasket Surface For Flatness With Straight Edge & Feeler
Courtesy of KIA MOTORS AMERICA, INC.

Flatness of cylinder head gasket:

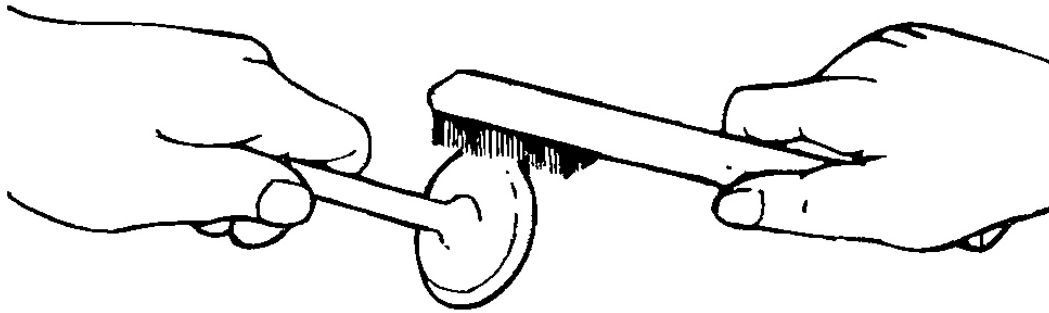
Standard dimension:

0.03 mm (0.0012 in) or lower.

Service limit: 0.2 mm (0.0079 in).

VALVES

1. Clean the valve with wire brush.



G00320667

Fig. 25: Cleaning Valve With Wire Brush
Courtesy of KIA MOTORS AMERICA, INC.

2. Inspect wear and damage of each valve, and bending of the head and stem at "If" part which is at the end of valve has hollow or wear, replace the valve. If margin is smaller than service standard, replace the valve.

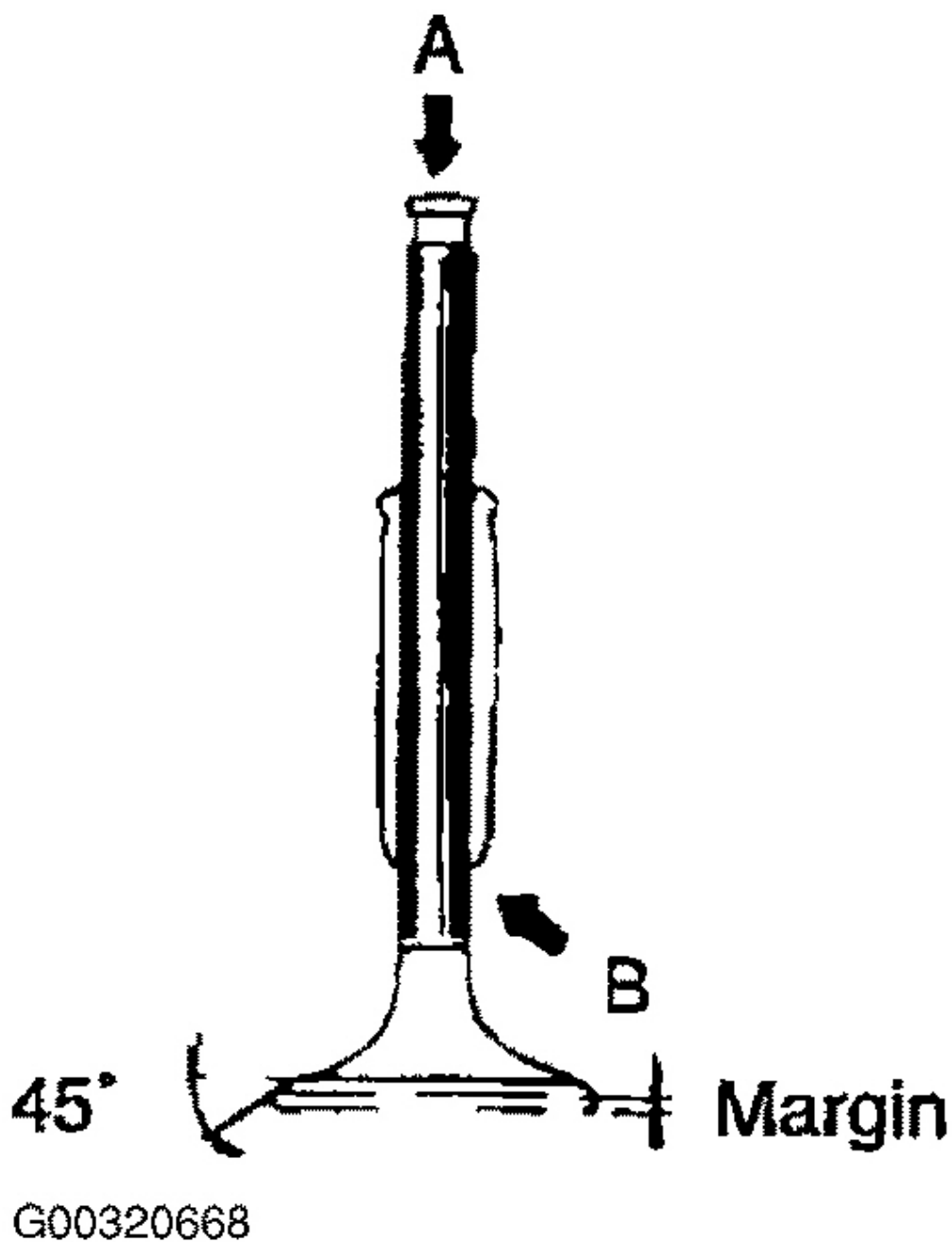


Fig. 26: Inspecting Valve For Wear &/Or Damage
Courtesy of KIA MOTORS AMERICA, INC.

Margin:

Standard value:

Intake: 1.0 mm (0.039 in).

Exhaust: 1.5 mm (0.059 in).

Limit value:

Intake: 0.5 mm (0.02 in).

Exhaust: 1.0 mm (0.039 in).

VALVE SPRINGS

1. Check free height of each valve spring and replace if necessary.
2. Using a square, test squareness of each valve spring. If spring is excessively out of square, replace it.

Valve spring:

Standard value:

Height with no load: 46.4 mm (1.8268 in.)

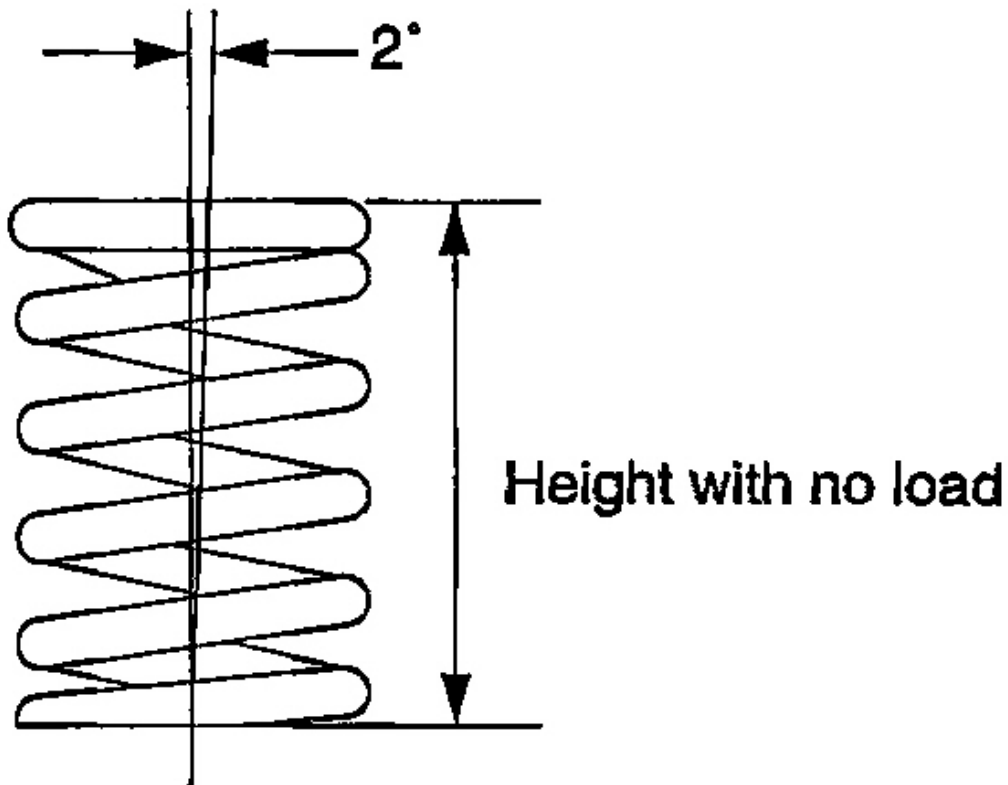
Weight: 24kg/37.9 mm (52.8 lb/1.49 in.)

Deviation of rectangularity: less than 2°.

Service limit:

Height with no load: 45.4 mm (1.7874 in.)

Deviation of rectangularity: 4°.



G00320669

Fig. 27: Checking Free Height Of Each Valve Spring
Courtesy of KIA MOTORS AMERICA, INC.

VALVE GUIDE

Check the valve stem-to-guide clearance. If the clearance exceeds the service limit, replace the valve guide with a new oversize guide.

Clearance between valve stem and guide:

Standard value:

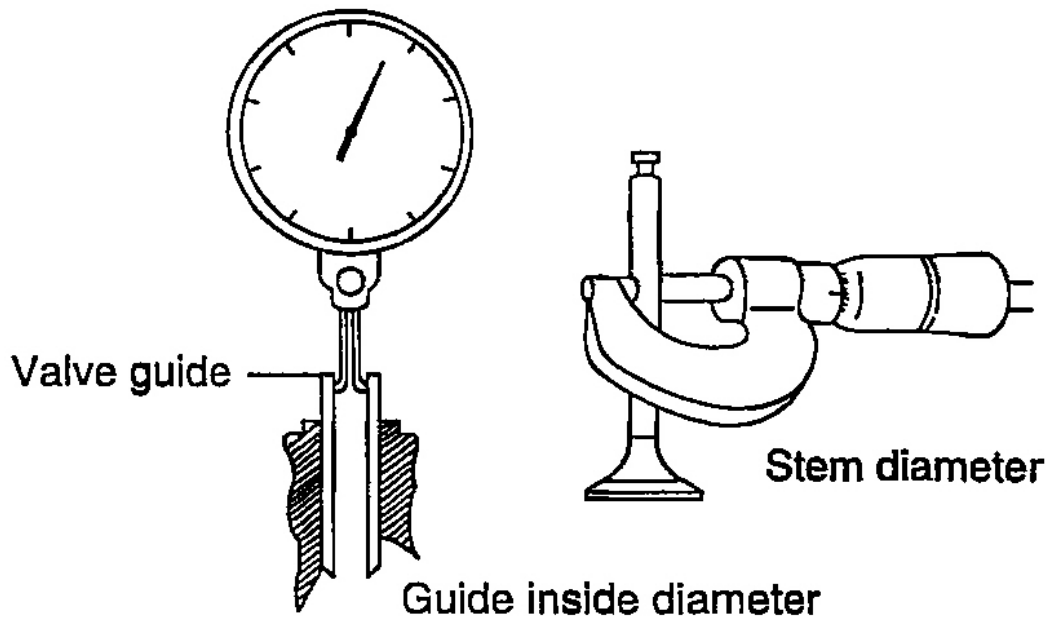
Intake: 0.02-0.05 mm (0.0009 - 0.0020 in).

Exhaust: 0.05-0.085 mm (0.0020 - 0.0033 in).

Service limit:

Intake: 0.1 mm (0.0039 in).

Exhaust: 0.15 mm (0.0059 in).



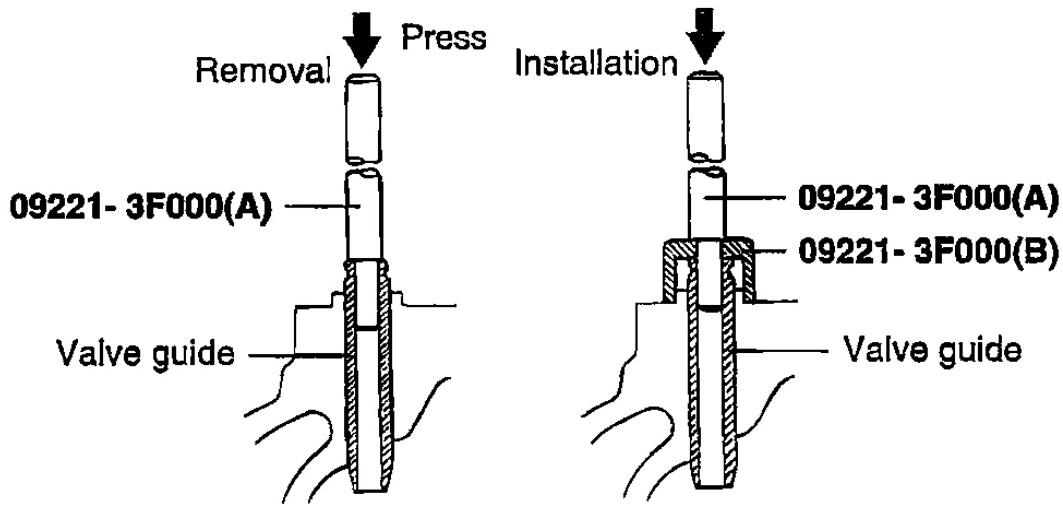
G00320670

Fig. 28: Checking Valve Stem-To-Guide Clearance
Courtesy of KIA MOTORS AMERICA, INC.

PROCEDURE FOR REPLACEMENT OF VALVE GUIDE

As the valve guide is tightly pressed in, replace the valve guide as following procedure, using the valve guide installer or appropriate tools.

1. Using the push rod of the valve guide installer, push it out of initial position by pushing it to the cylinder block side.
2. Machine insert hole of the cylinder head valve guide in the size of oversize valve guide.
3. Press in the valve guide using the valve guide installer or appropriate tools. By using the valve guide installer, it can be pressed in the specified height.



G00320675

Fig. 29: Pressing In The Valve Guide

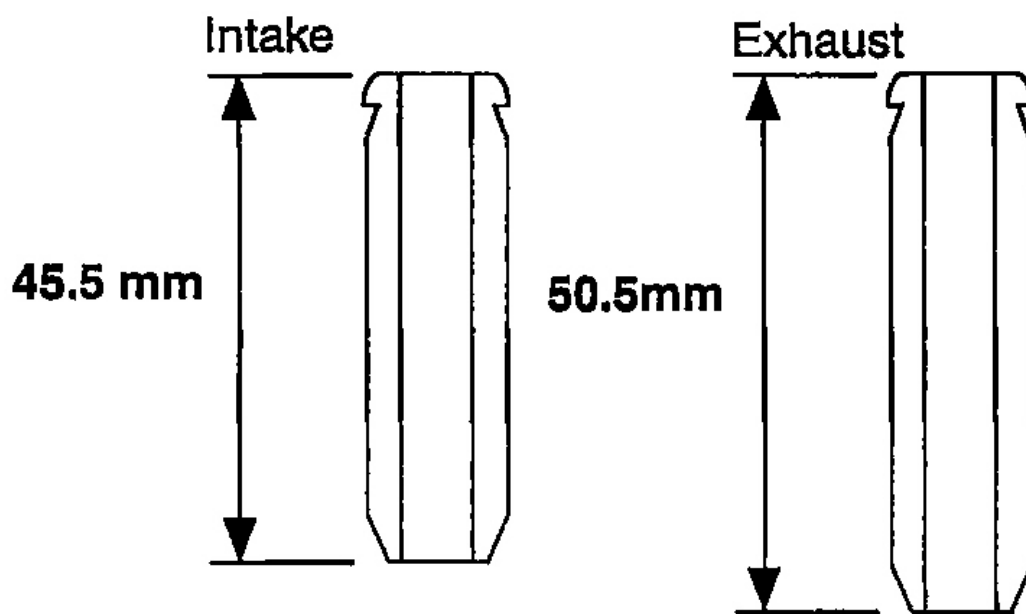
Courtesy of KIA MOTORS AMERICA, INC.

4. Valve guide is to be installed from the upside of the cylinder head.

As length of the intake valve guide is different from that of the exhaust valve guide, be careful. (The lengths of guide for intake valve and exhaust valve are 45.5 mm and 50.5 mm respectively.)

After installing the valve guide, insert the new valve and check sliding state.

5. When the valve guide is replaced, inspect for valve contact state. If necessary, adjust the valve seat.



G00320676

Fig. 30: Measuring Lengths Of Guide For Intake & Exhaust Valves
Courtesy of KIA MOTORS AMERICA, INC.

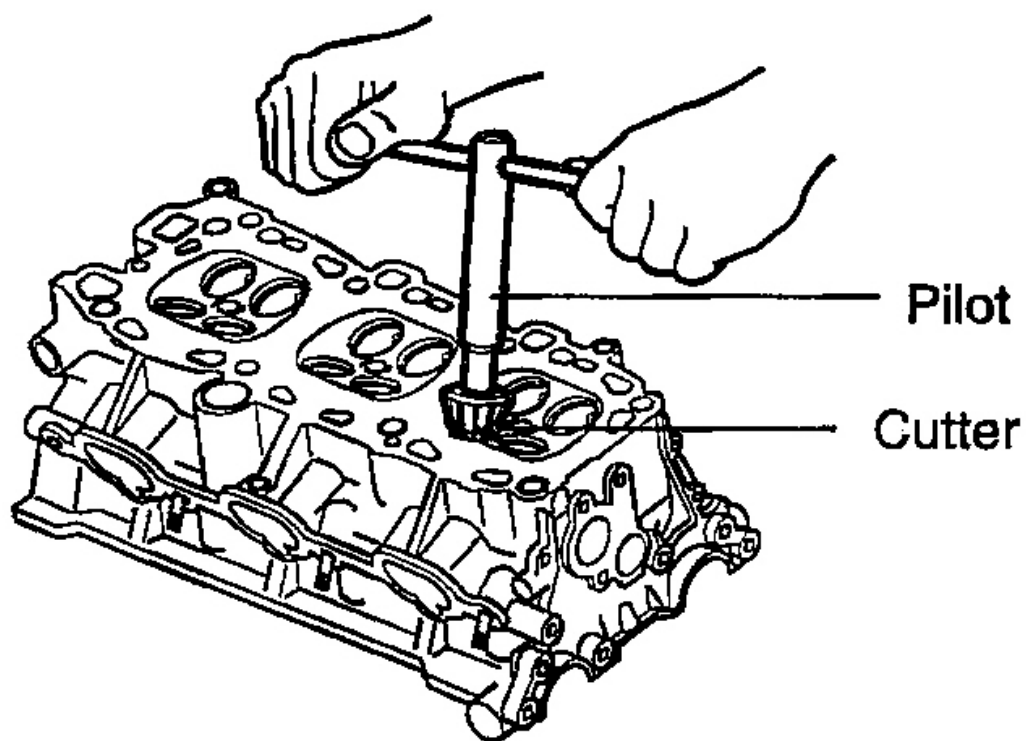
Size (mm)	Size mark	Inner diameter of hole for guide insertion
0.05 O.S.	5	12.05-12.068 mm (0.474 - 0.475 in)
0.25 O.S.	25	12.25-12.268 mm (0.482-0.483 in)
0.50 O.S.	50	12.50-12.518 mm (0.492-0.493 in)

G00320677

Fig. 31: Valve Guide Insert Oversize Table
 Courtesy of KIA MOTORS AMERICA, INC.

VALVE SEAT INSERT

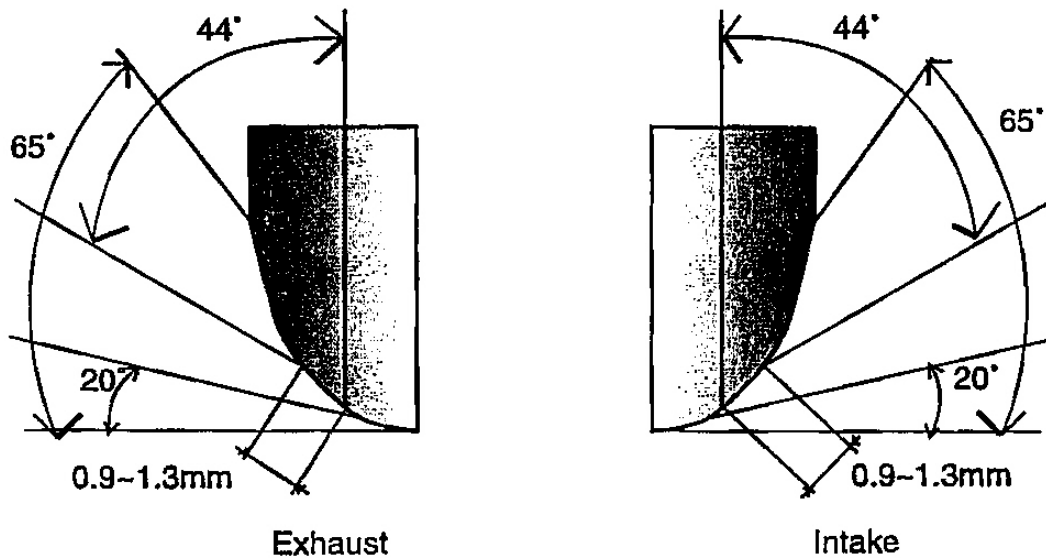
Inspect for any trace of overheating and the contact state of valve face. If necessary, repair or replace it. When repairing, inspect for wear in the valve guide. If the guide is worn, replace it and adjust the seat ring. Adjust the valve seat with grinder or cutter making valve seat contact width from the center of valve face be in the specified value. When adjusting the exhaust valve seat, use the valve seat cutter or pilot. After adjustment, lapping process be made by using applying compound on the valve and valve seat.



G00320671

Fig. 32: Adjusting Valve Seat

Courtesy of KIA MOTORS AMERICA, INC.

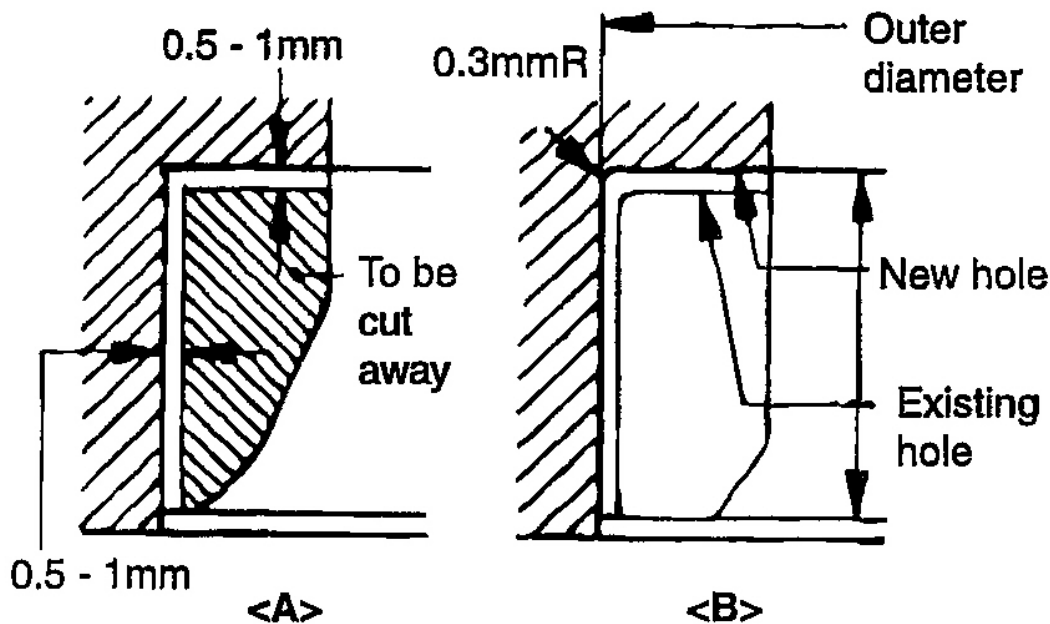


G00320672

Fig. 33: Inspecting Valve Seat Insert
Courtesy of KIA MOTORS AMERICA, INC.

PROCEDURE FOR REPLACEMENT OF VALVE SEAT INSERT

1. If the valve seat insert is excessively worn, cut out the insert wall using valve seat cover at normal temperature like "A" shown in the picture.



G00320673

Fig. 34: Cutting Out Insert Wall Using Valve Seat Cover
 Courtesy of KIA MOTORS AMERICA, INC.

- After removing the seat insert, match the seat insert bore using a reamer or cutter to the indicated size in the table below.

Description	Size (mm)	Size mark	Seat insert height H (mm)	Cylinder head I.D (mm)
Intake valve Seat insert	0.3 O.S.	30	7.5 - 7.7mm (0.2953 - 0.3031 in)	36.30 - 36.325 (1.429 - 1.430 in)
	0.6 O.S.	60	7.8 - 8.0mm (0.3071 - 0.3150 in)	36.60 - 36.625 (1.441 - 1.442 in)
Exhaust valve Seat insert	0.3 O.S.	30	8.0 - 8.2mm (0.3150 - 0.3228 in)	33.30 - 33.325 (1.311 - 1.312 in)
	0.6 O.S.	60	8.3 - 8.5mm (0.3268 - 0.3346 in)	33.60 - 33.625 (1.323 - 1.324 in)

G00320674

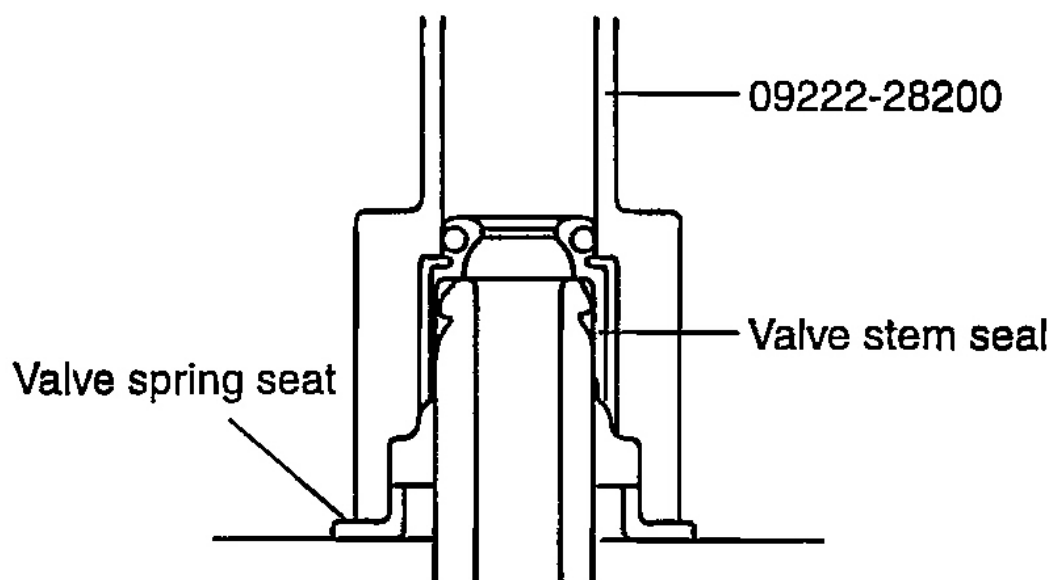
Fig. 35: Intake & Exhaust Valve Seat Insert Table
 Courtesy of KIA MOTORS AMERICA, INC.

- Heat the cylinder head up to 250°C and press in an oversize seat insert. At this time, the temperature of oversize seat insert must be the same as the room temperature. When new valve seat is installed, adjust the valve seat face. See **VALVE SEAT INSERT**.

REASSEMBLY

VALVE STEM SEAL

1. Install the valve spring seat.
2. Install a new stem seal on valve guide using the special tool (09222-28200).



G00320678

Fig. 36: Installing Valve Spring Seat
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: Valve stem seal should never be reused. Incorrect seal installation can cause oil leakage through lower part of the valve guide. When the valve stem seal is removed due to missing of valve spring seat, the stem seal cannot be reused.

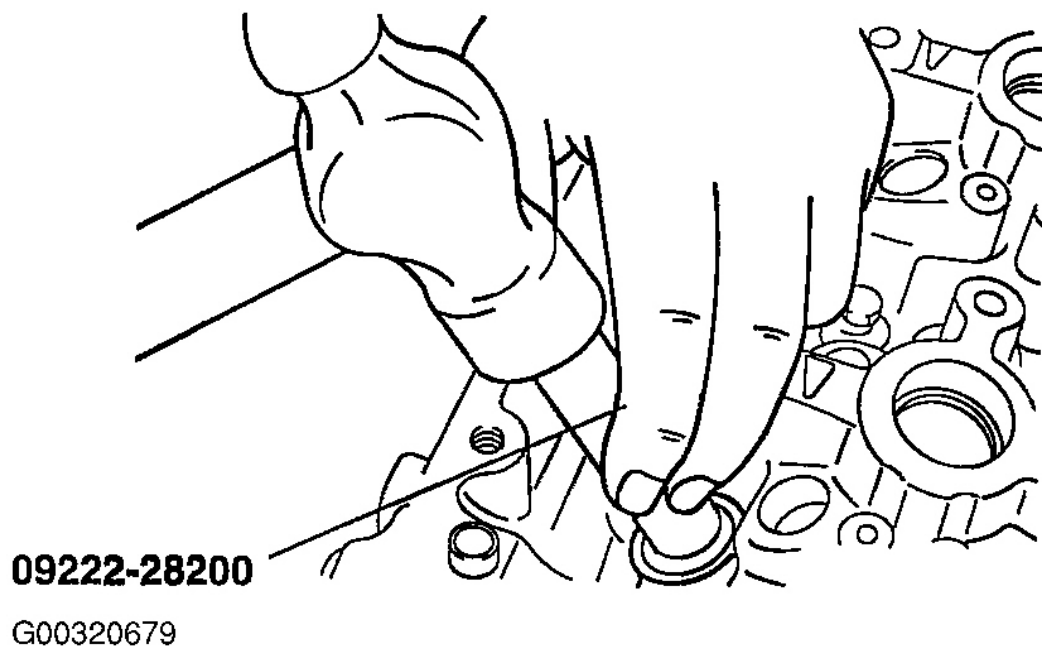
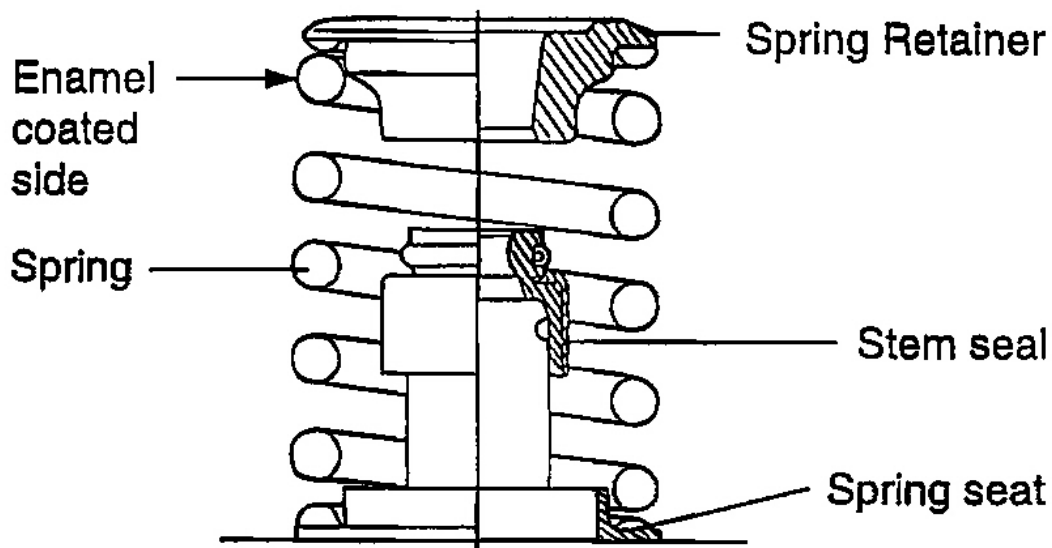


Fig. 37: Installing New Stem Seal On Valve Guide
Courtesy of KIA MOTORS AMERICA, INC.

VALVE SPRING

Install the valve spring so that the end part with identification mark is paced at the end of the spring retainer.



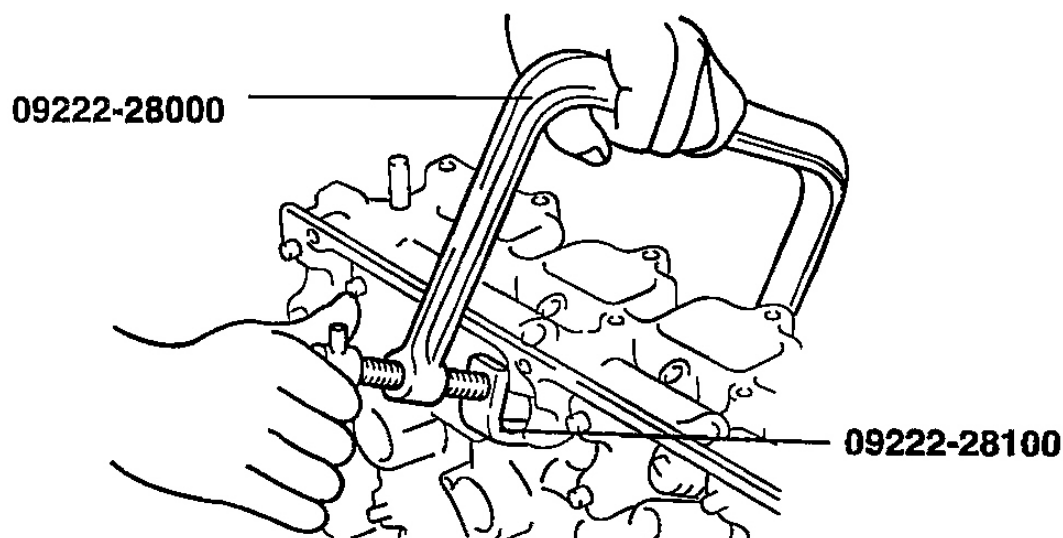
G00320680

Fig. 38: Installing Valve Spring

Courtesy of KIA MOTORS AMERICA, INC.

RETAINER LOCK

Insert the retainer lock by pressing down the valve spring with special tool (09222-28000).



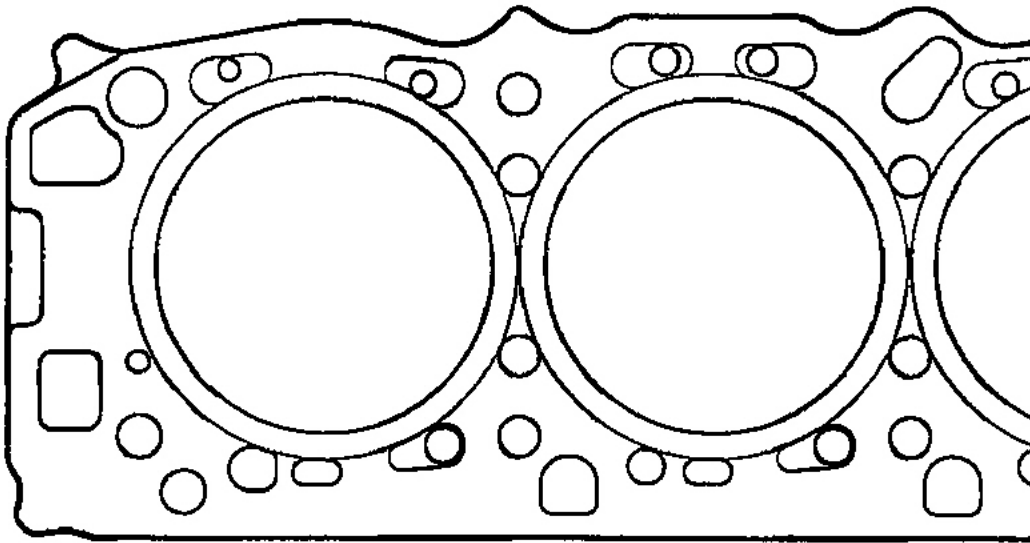
G00320681

Fig. 39: Inserting Retainer Lock

Courtesy of KIA MOTORS AMERICA, INC.

INSTALLATION**CYLINDER HEAD GASKET**

1. All mating faces for the gasket on the cylinder block and the cylinder head should be cleaned.
2. Install new cylinder head gasket on the cylinder head assembly. Do not smear the sealant on the gasket and only the new gasket must be used.



G00320665

Fig. 40: Installing Cylinder Head Gasket
Courtesy of KIA MOTORS AMERICA, INC.

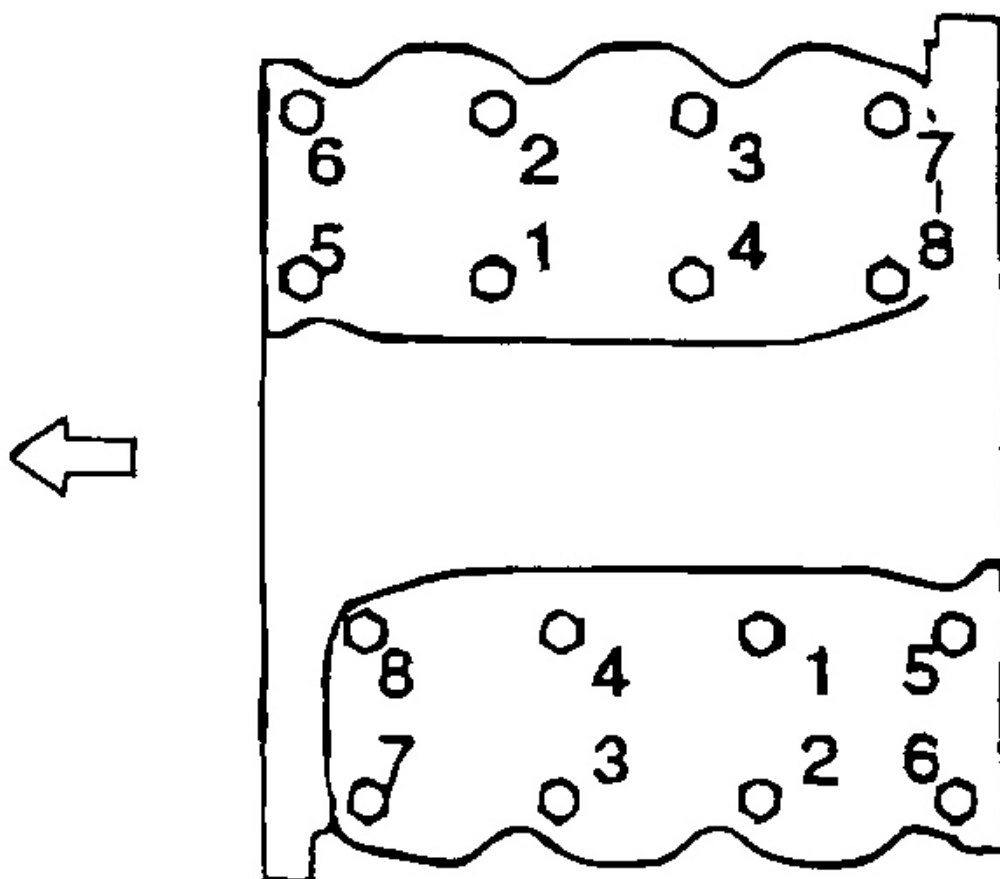
CYLINDER HEAD BOLT

1. Tighten the cylinder head bolt as shown in the picture using the so-called special tool "head bolt wrench".

Tightening torque:

105-115 N.m

(1050-1150 kg. cm, 75.9-83.2 lb. ft)

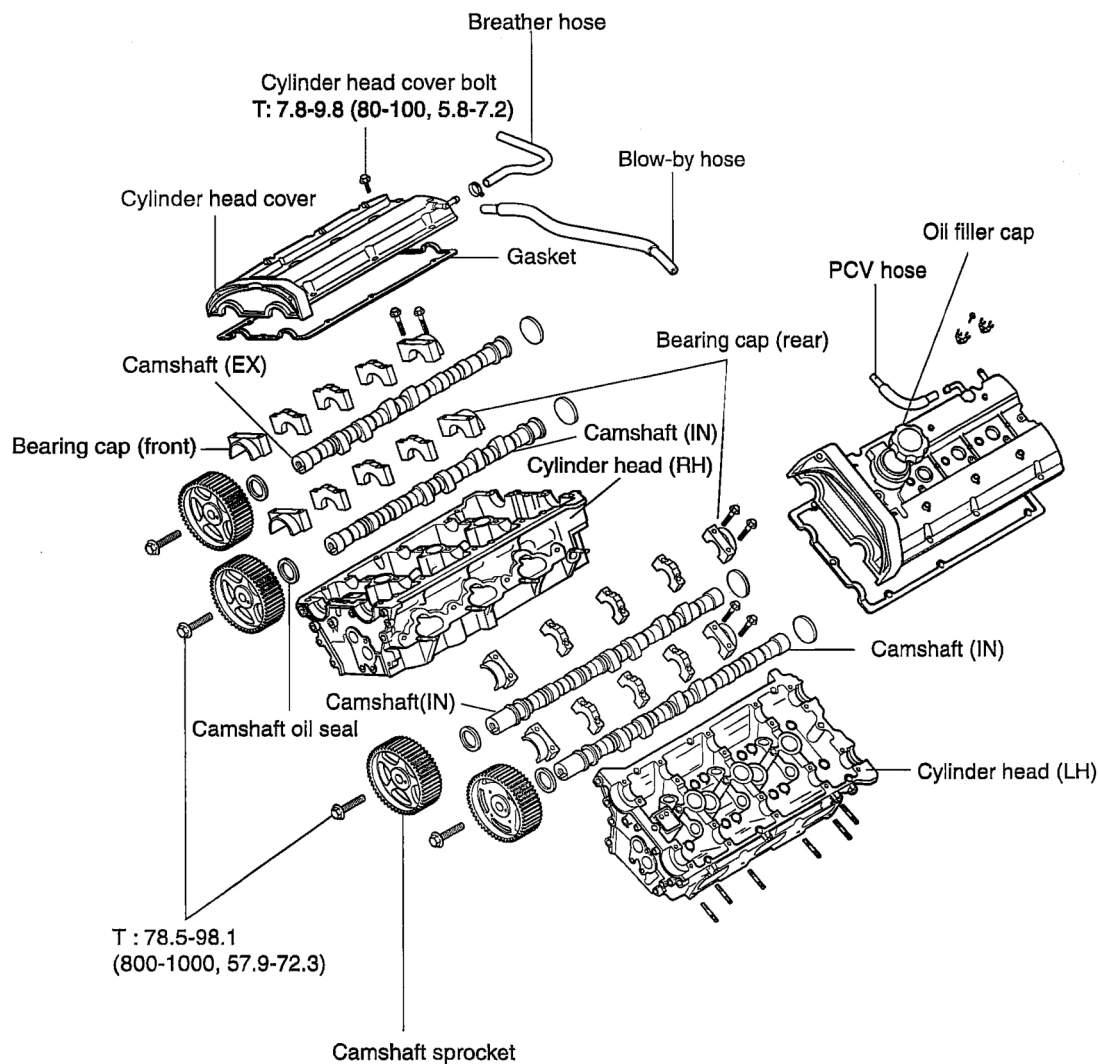


G00320666

Fig. 41: Tightening Cylinder Head Bolt
Courtesy of KIA MOTORS AMERICA, INC.

CAMSHAFT

COMPONENTS



TORQUE : N·m (kg·cm, lb·ft)

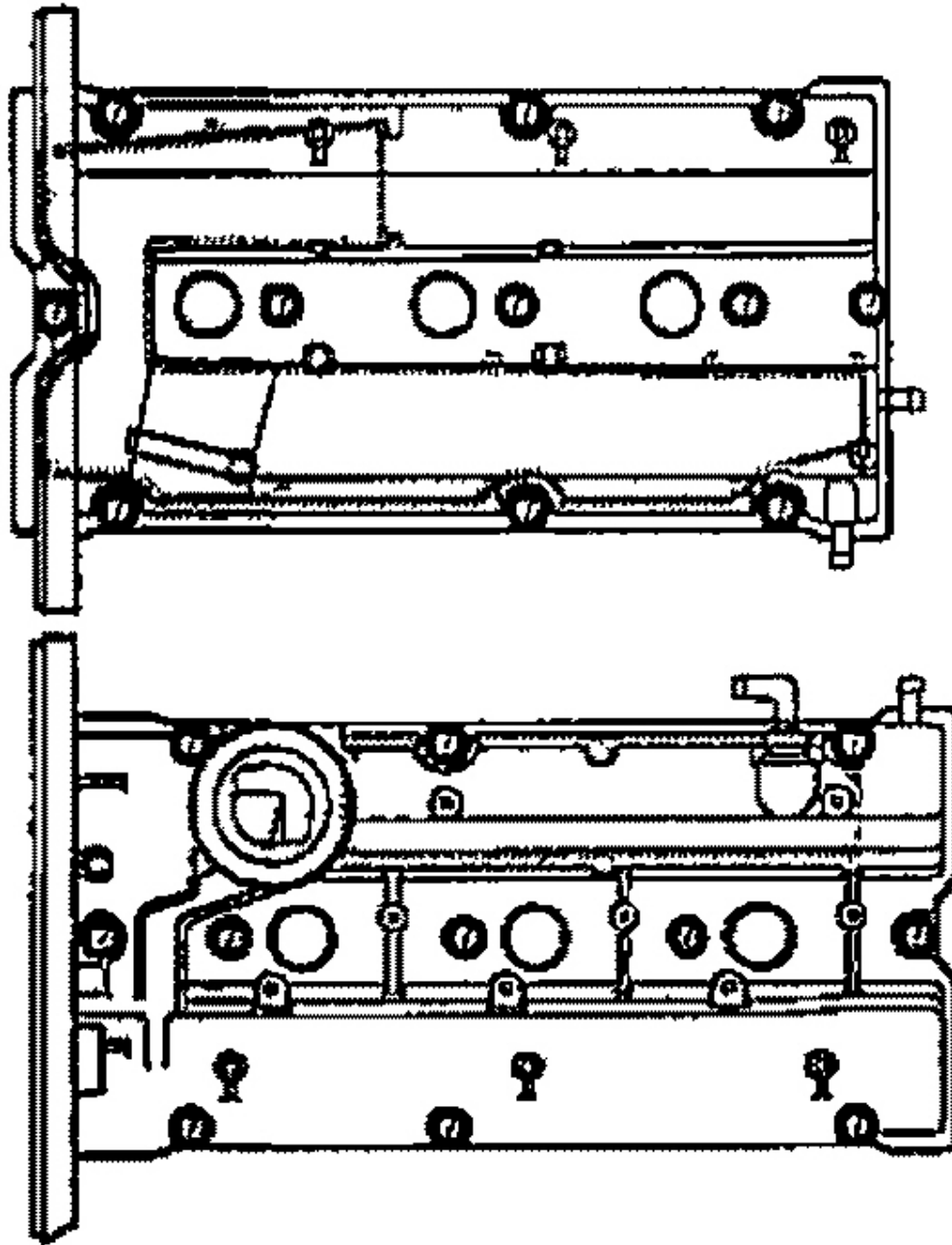
G00320536

Fig. 42: Cam Shaft Components

Courtesy of KIA MOTORS AMERICA, INC.

DISASSEMBLY

1. Remove the cylinder head cover.

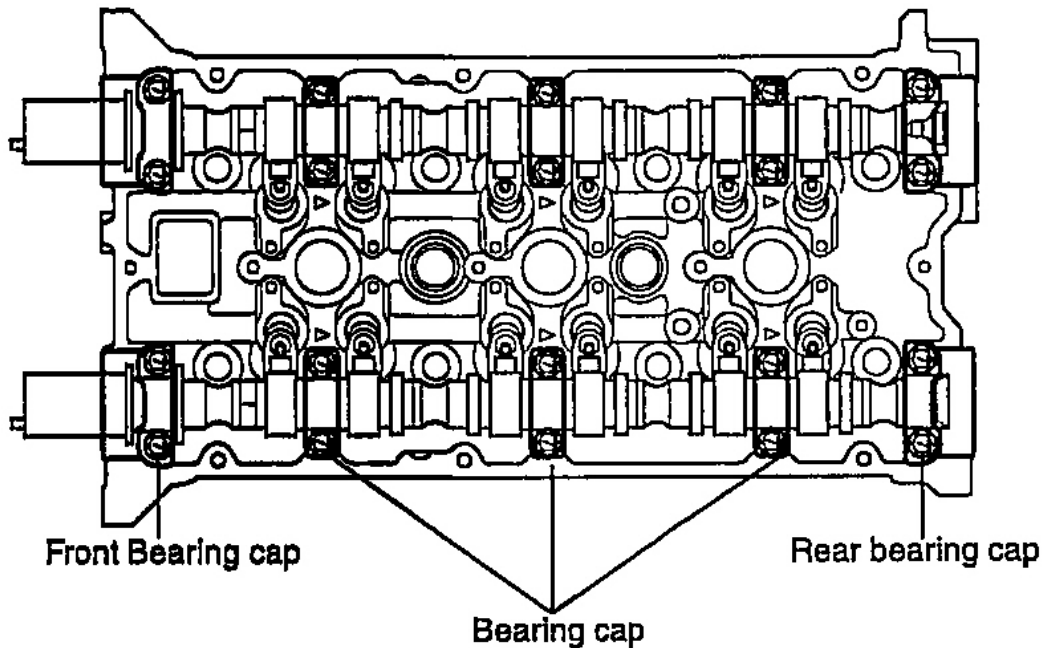


G00320537

Fig. 43: Removing Cylinder Head Cover

Courtesy of KIA MOTORS AMERICA, INC.

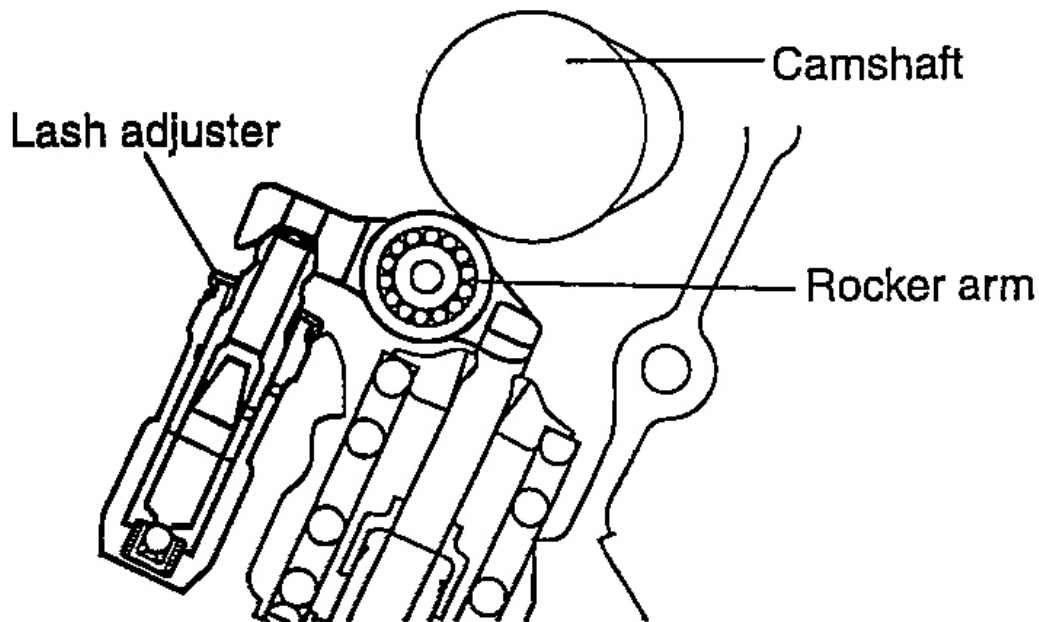
2. Remove the front bearing cap.



G00320538

Fig. 44: Removing Front Bearing Cap
Courtesy of KIA MOTORS AMERICA, INC.

3. Remove the rear bearing cap.
4. Remove the bearing cap.
5. Remove the camshaft oil seal.
6. Remove the camshaft.
7. Remove the rocker arm.
8. Remove the lash adjuster.



G00320539

Fig. 45: Removing Lash Adjustor
Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

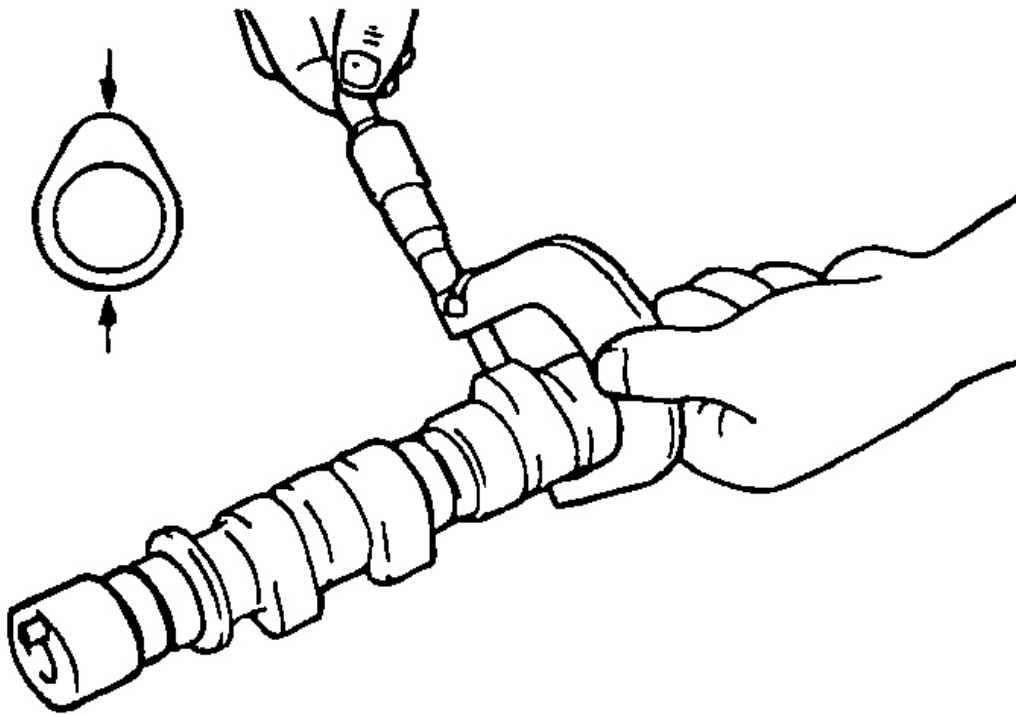
CAMSHAFT

1. If there is excessive wear or damage on the camshaft journal or/and cam lobe after checking, replace it with a new one. Measure the height of cam and if the readings are beyond the specification, replace it.

Standard value:

Intake: 35.198 mm (1.385 in).

Exhaust: 34.910 mm (1.375 in).



G00320540

Fig. 46: Measuring Height Of Cam
Courtesy of KIA MOTORS AMERICA, INC.

ROCKER ARM

1. Inspect the roller visually, if any damage or crack is found, replace it.
2. Check that the roller rotates smoothly. If there is excessive clearance, replace it.

LEAK DOWN TEST OF LASH ADJUSTER

CAUTION:

- As the lash adjuster is a precise part, take care not to let any dust and foreign object enter.
- Do not disassemble the lash adjuster.
- Only light oil should be used to clean the lash adjuster.

1. Immerse the lash adjuster in light oil.
2. Push out the steel ball in the lash adjuster softly using the special tool (Air bleed wire 09246-32200) and shake the plunger upward and downward 4 or 5 times. Using the special tool (09246-32100), release air

from the rocker arm installation type lash adjuster.

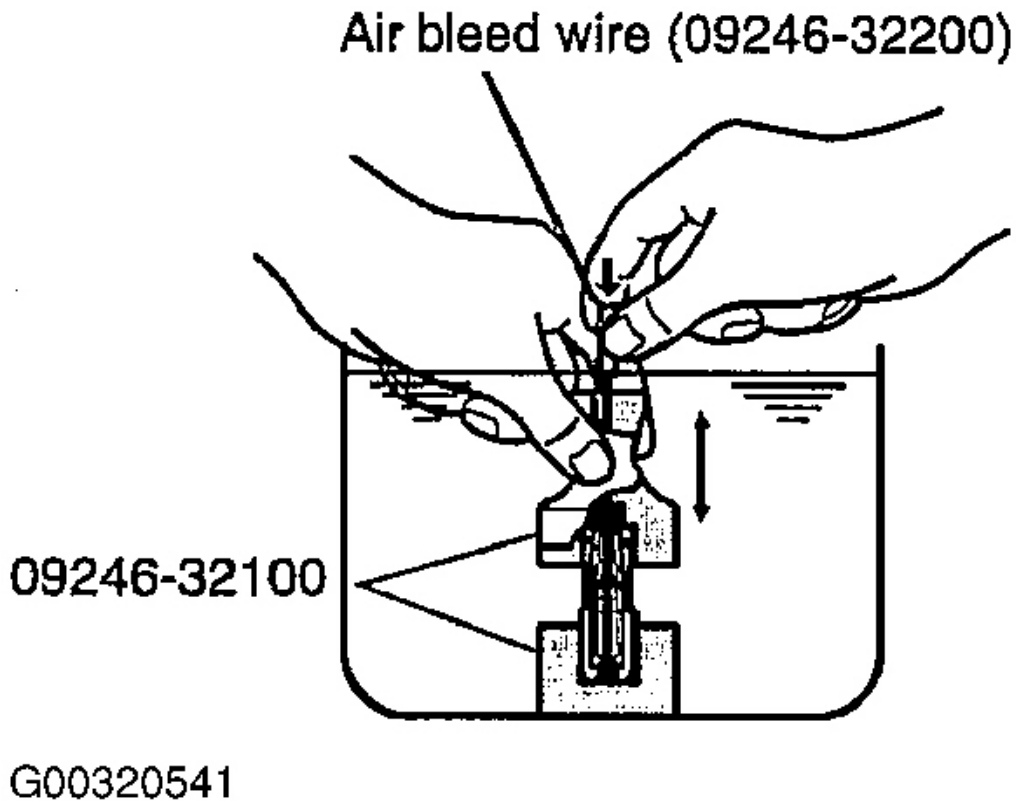


Fig. 47: Using Special Tool (09246-32100)
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: As the ball weight is very small (just a few grams), pushing the special tool excessively can damage the lash adjuster. Push it with care and appropriate force.

3. Take away the special tool (09246-32200) and push the plunger. If it feels tight, the lash adjuster is normal. If it feels soft and easy, then release air from plunger feels and test again. If the plunger feels still soft even after releasing air, replace it.

CAUTION: After releasing air, put the lash adjuster straight up not to spill the oil over, and make sure there is no dust or foreign material on it.

4. After finishing the air release, place the lash adjuster on the special tool (09246-32300).

5. After the plunger has gone down around 0.2~0.5 mm, measure the time for the plunger to go down additional 1 mm. Replace it if the time is out of standard range. Standard dropping down rate: 2-16.5 sec/mm (Light oil, oil temperature 20-30°C).

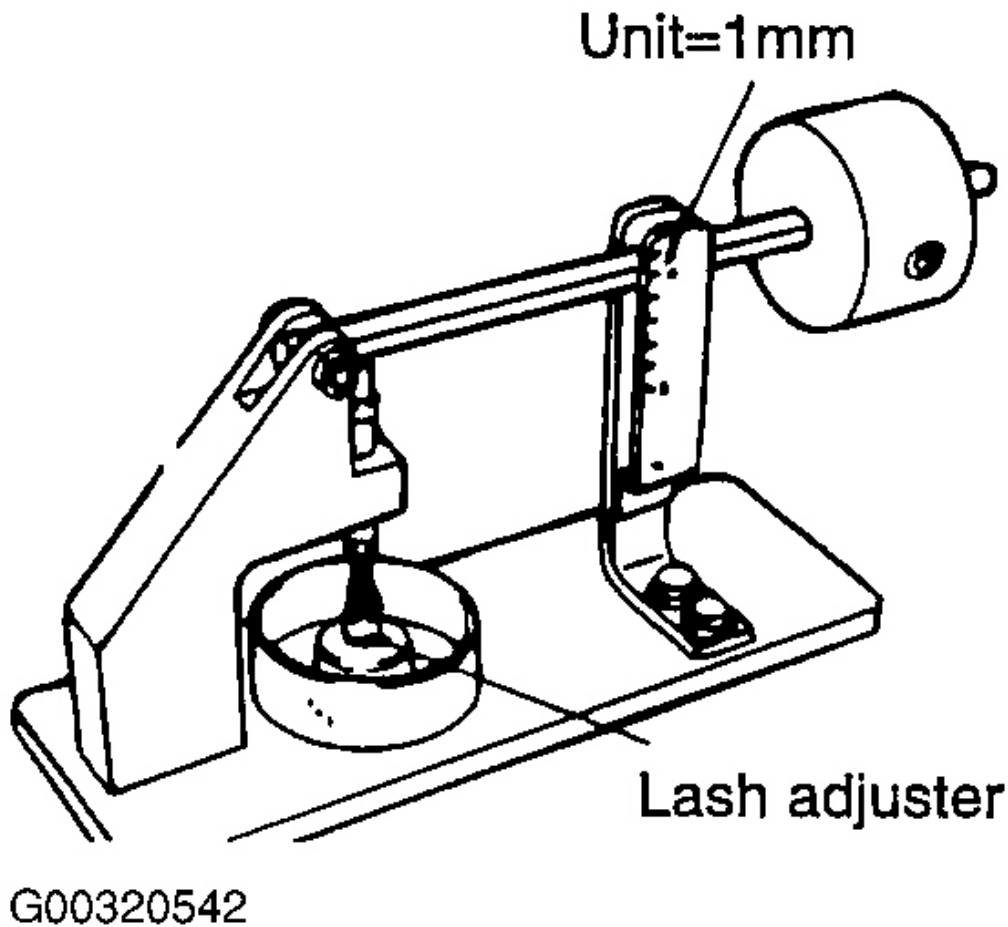


Fig. 48: Leak Down Test Of Lash Adjuster
Courtesy of KIA MOTORS AMERICA, INC.

ADJUSTMENT OF ROCKER ARM CLEARANCE

1. Replace the rocker arm with the one specially made for measurement.
2. After positioning the rocker arm roller on basic circle of camshaft, push down the ball lightly with special tool (09246-32200) and push down the rocker arm by hand. Maintaining that state, measure the thickness by inserting a thickness gauge between the camshaft and rocker arm.

Clearance between camshaft (Basic circle) and rocker arm (roller): 0.7 ± 0.25 mm (0.0276 ± 0.0098 in).

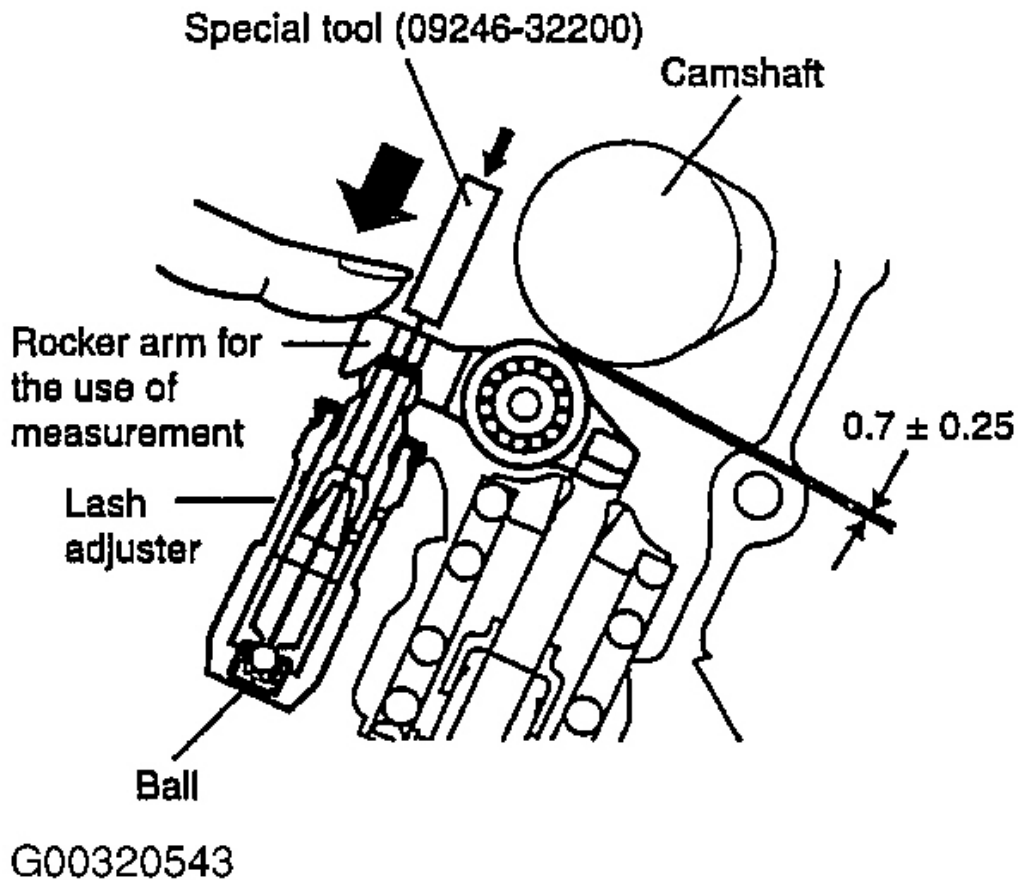
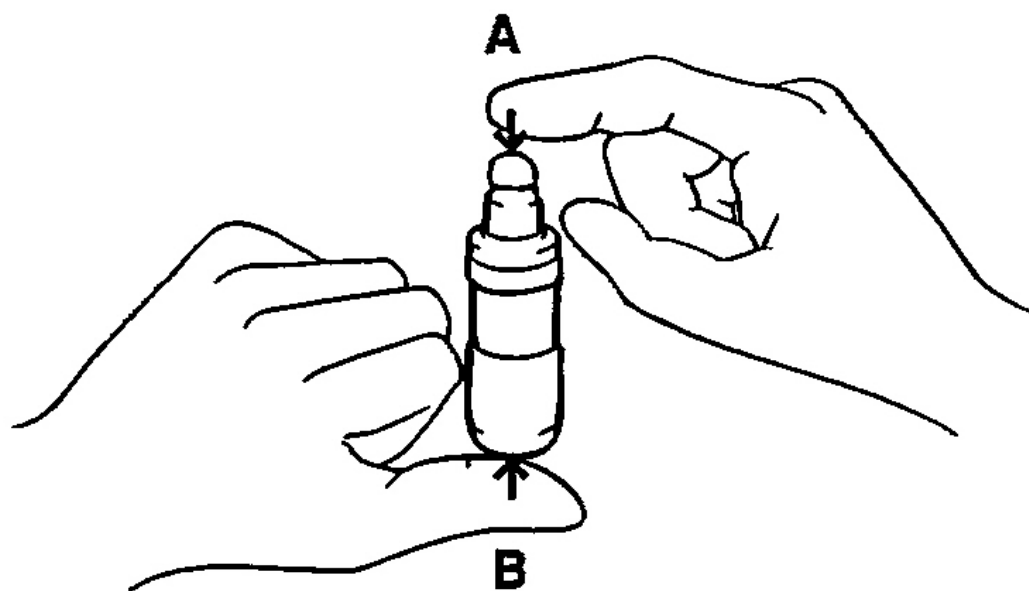


Fig. 49: Measuring Clearance Between Camshaft & Rocker Arm
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: As the ball weight is very small (just a few grams), pushing the special tool excessively can damage the lash adjuster. Push it with care and appropriate force.

HYDRAULIC LASH ADJUSTER (HLA)

With the HLA filled with engine oil, hold A and press B by hand. If B moves, replace the HLA.



G00320544

Fig. 50: Checking Hydraulic Lash Adjuster
Courtesy of KIA MOTORS AMERICA, INC.

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Problem	Possible cause	Action
1. Temporary noise when starting a cold engine	Normal	This noise will disappear after the oil in the engine reaches the normal pressure.
2. Continuous noise when the engine is started after parking more than 48 hours.	Oil leakage of the high pressure chamber on the HLA, allowing air to get in.	Noise will disappear within 15 minutes when engine runs at 2000-3000 rpm. If it doesn't disappear, refer to step 7 below.
3. Continuous noise when the engine is first started after rebuilding cylinder head.	Insufficient oil in cylinder head oil gallery.	
4. Continuous noise when the engine is started after excessively cranking the engine by the starter motor or band.	Oil leakage of the high-pressure chamber in the HLA, allowing air to get in. Insufficient oil in the HLA.	
5. Continuous noise when the engine is running after changing the HLA.		 CAUTION <i>Do not run engine at a speed higher than 3000 rpm, as this may damage the HLA.</i>
6. Continuous noise during idle after high engine speed.	Engine oil level too high or too low.	Check oil level. Drain or add oil as necessary.
	Excessive amount of air in the oil at high engine speed.	Check oil supply system.
	Deteriorated oil.	Check oil quality. If deteriorated, replace with specified type.
7. Noise continues for more than 15 minutes.	Low oil pressure.	Check oil pressure and oil supply system of each part of engine.
	Faulty HLA.	Remove the cylinder head cover and press HLA down by hand. If it moves, replace the HLA.  WARNING <i>Be careful with the hot HLAS.</i>

G00320545

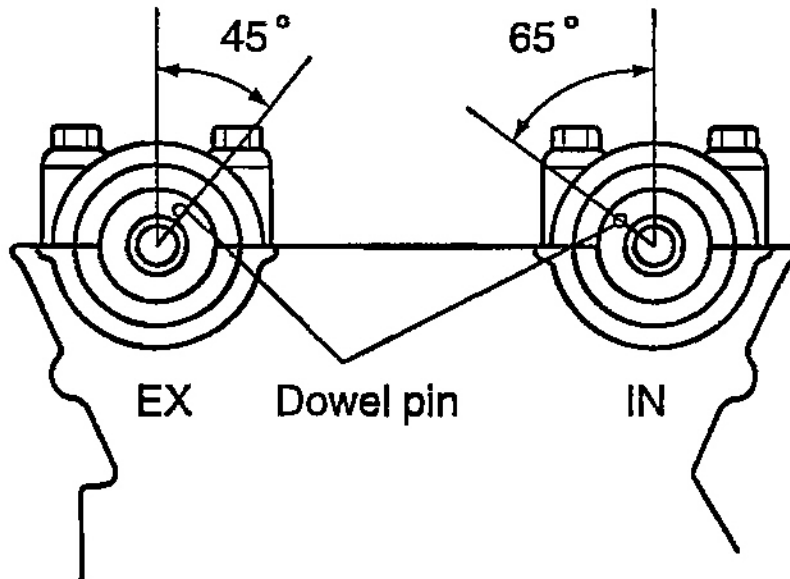
Fig. 51: Troubleshooting For Hydraulic Lash Adjuster
Courtesy of KIA MOTORS AMERICA, INC.

INSTALLATION

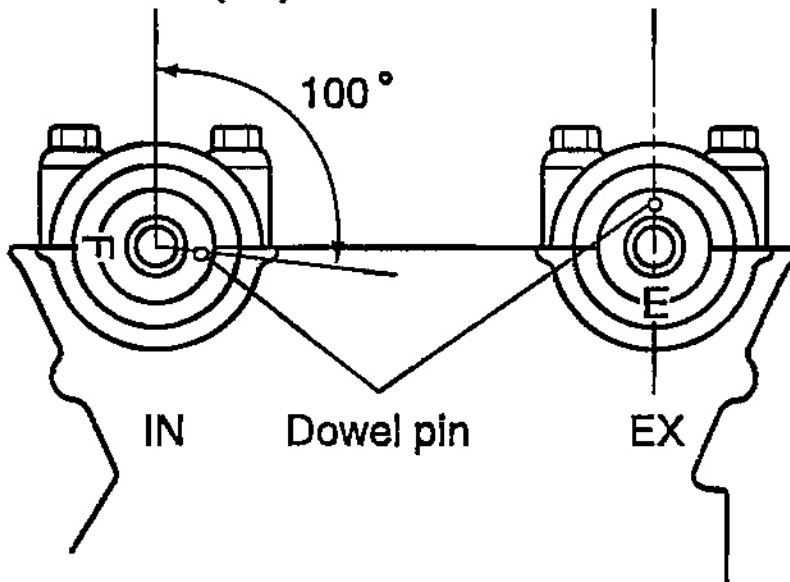
CAMSHAFT AND BEARING CAP

1. Rotate the crankshaft and No. 1 cylinder is in TDC. (Compression stroke).
2. Check the position of the rocker arm whether it is exactly installed on the lash adjuster and valve or not.
3. Install the camshaft dowel pin as illustrated.

Cylinder head(RH)



Cylinder head(LH)



G00320546

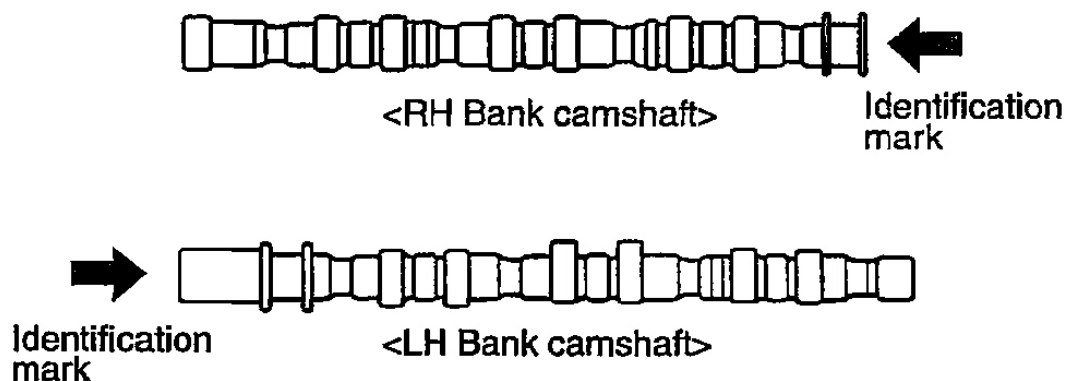
Fig. 52: Installing Camshaft Dowel Pin
Courtesy of KIA MOTORS AMERICA, INC.

4. The left and right banks of the camshafts are different and you should be careful not to confuse them.

Identification signal	
Left bank	
Intake(IN)	I
Exhaust(Ex)	E
Right bank	
Intake (IN)	J
Exhaust(Ex)	H

G00320547

Fig. 53: Identifying Left & Right Banks Of Camshafts
 Courtesy of KIA MOTORS AMERICA, INC.



G00320548

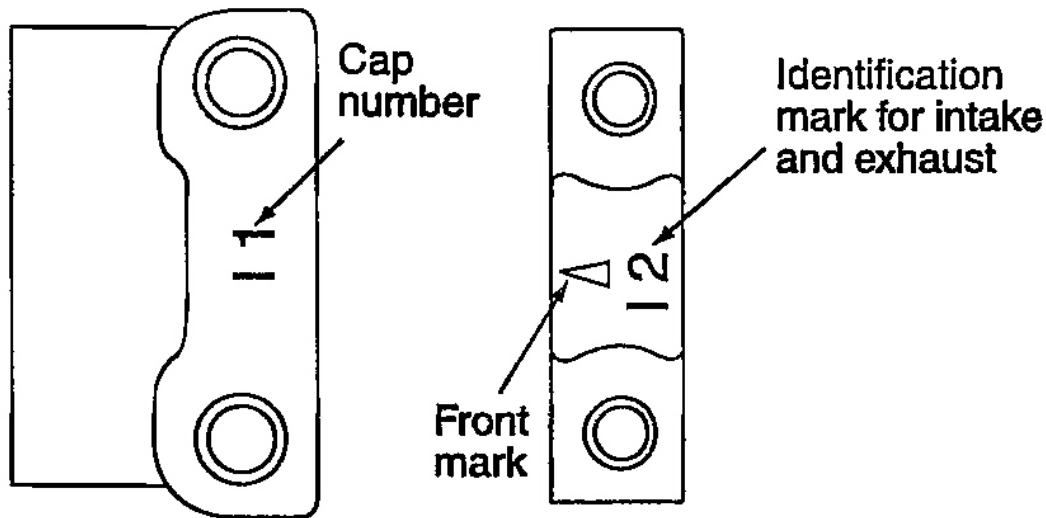
Fig. 54: Left & Right Bank Camshaft Identification Marks
 Courtesy of KIA MOTORS AMERICA, INC.

- Confirm the identification mark and the number. Bearing caps of No. 3, No. 4, and No. 5 have the front mark and arrange the front mark upon the cylinder head while installing the bearing caps.

Identification mark	
Intake (IN)	I
Exhaust(Ex)	E

G00320549

Fig. 55: Confirming Identification Mark & Number
 Courtesy of KIA MOTORS AMERICA, INC.



G00320550

Fig. 56: Identifying Intake & Exhaust Identification Marks
 Courtesy of KIA MOTORS AMERICA, INC.

6. Tighten the bearing cap in two or three steps. Tighten it to the standard torque at the last stage.

Bearing cap standard torque

Torque:

16 pieces at the both ends: 18.6-20.6 N.m

(190-210 kg. cm, 13.7-15.2 lb. ft)

24 pieces in the middle: 10-12 N.m

(100-120 kg. cm, 7.38-8.85 lb. ft)

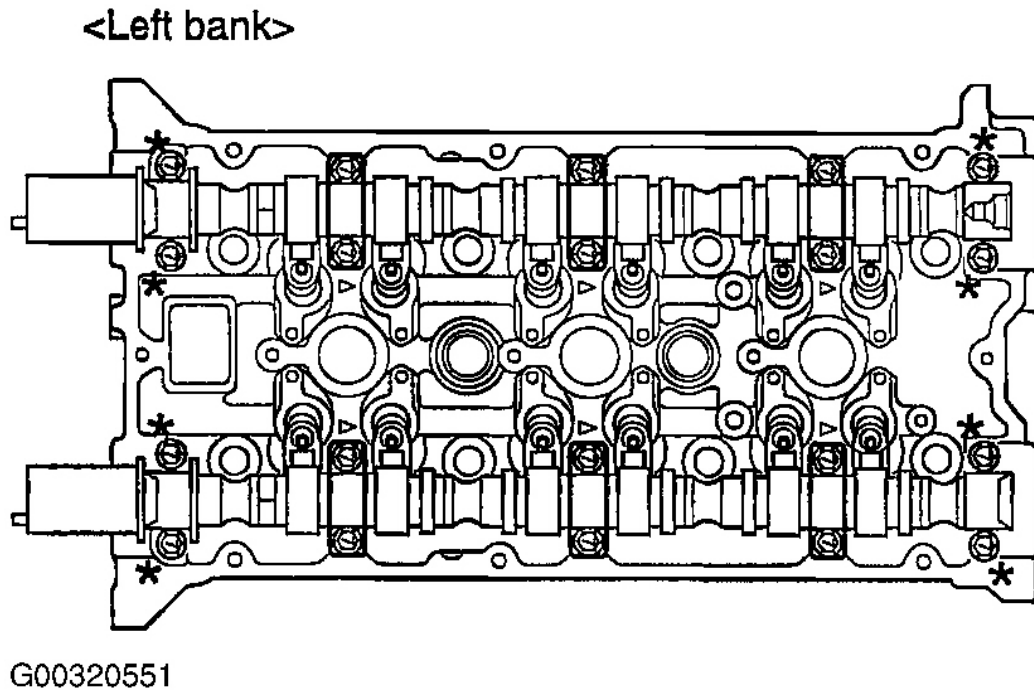


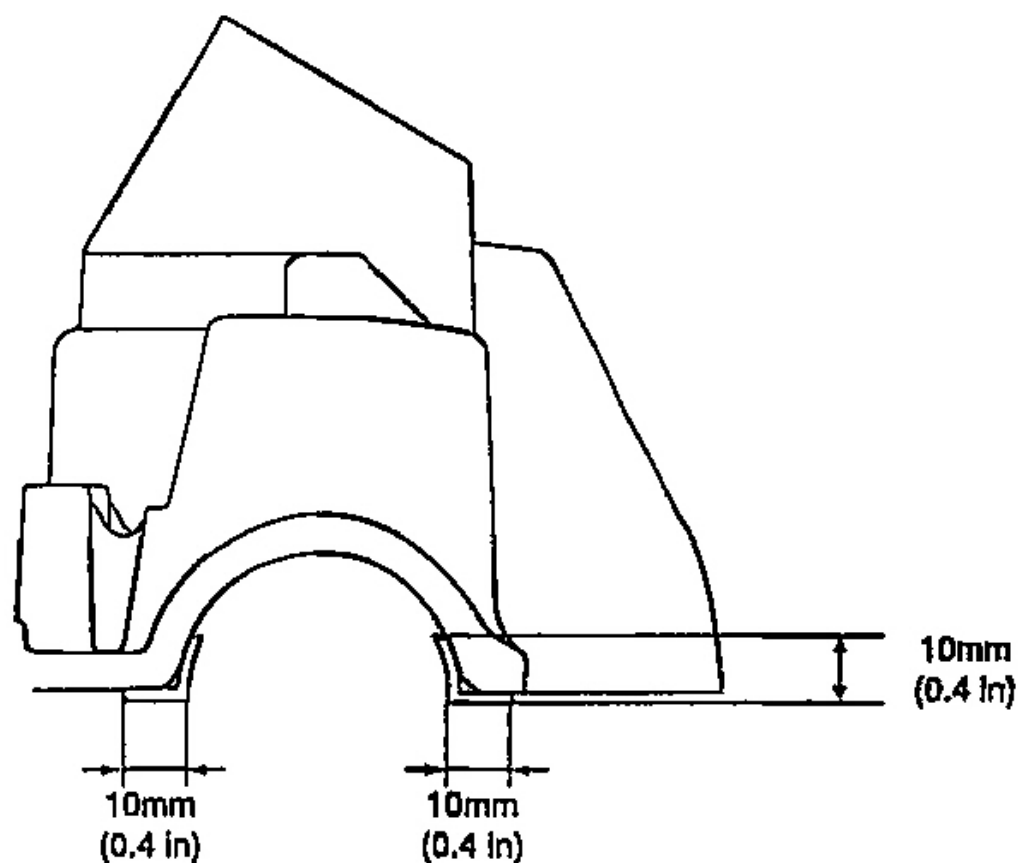
Fig. 57: Tightening Bearing Cap
Courtesy of KIA MOTORS AMERICA, INC.

7. Install the cylinder head cover.
 1. Install the gasket to the cylinder head cover correctly.
 2. Clean sealing surface on camshaft cap.

NOTE: Clean sealing surface with use plastic scraper, to prevent oil leak.

3. Apply sealant to the sealing surface on cylinder head cover and camshaft cap.

Sealant type: LT 5900.

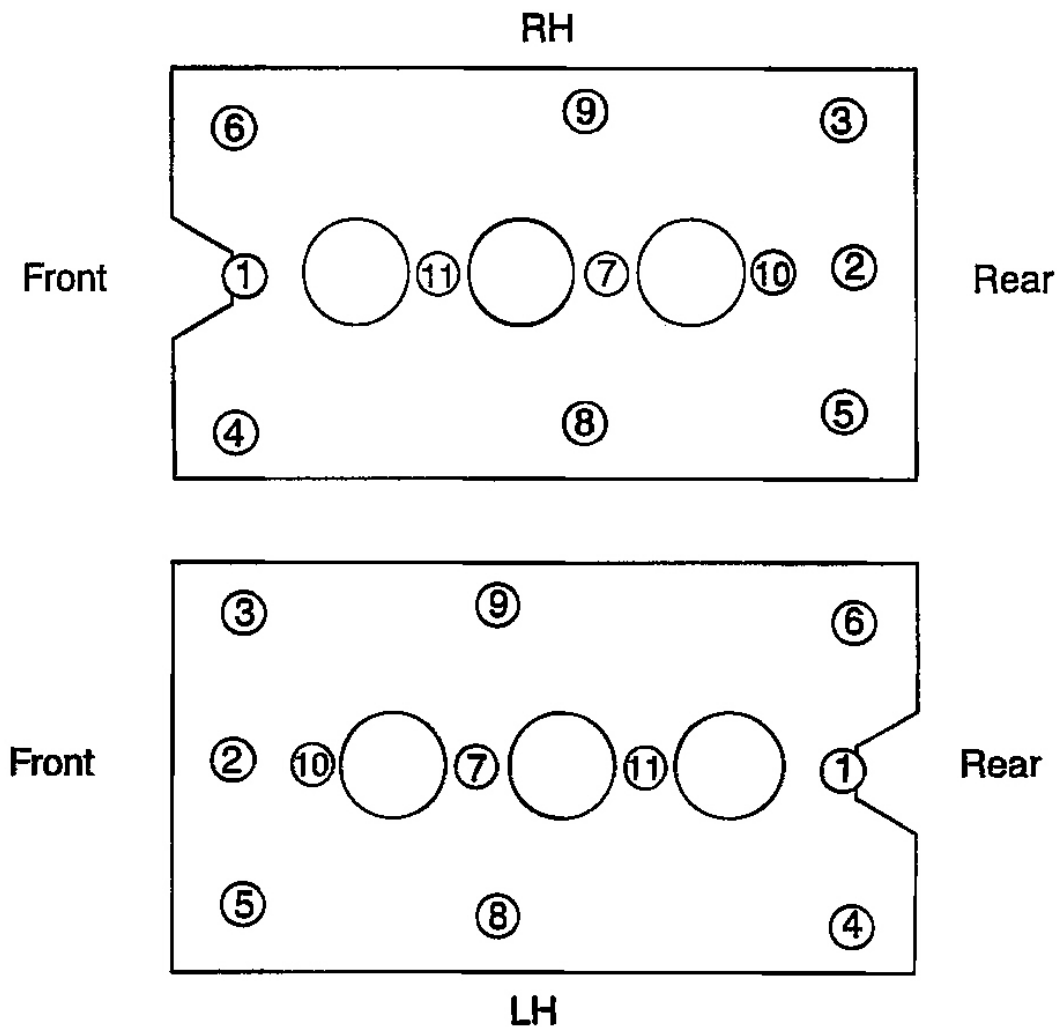


G00320552

Fig. 58: Applying Sealant To Sealing Surface On Cylinder Head Cover & Camshaft Cap
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the cylinder head cover to the cylinder head.

NOTE: Be careful of gasket escapement when installing the cylinder head cover. You must use the washer when installing the cylinder head cover bolts.

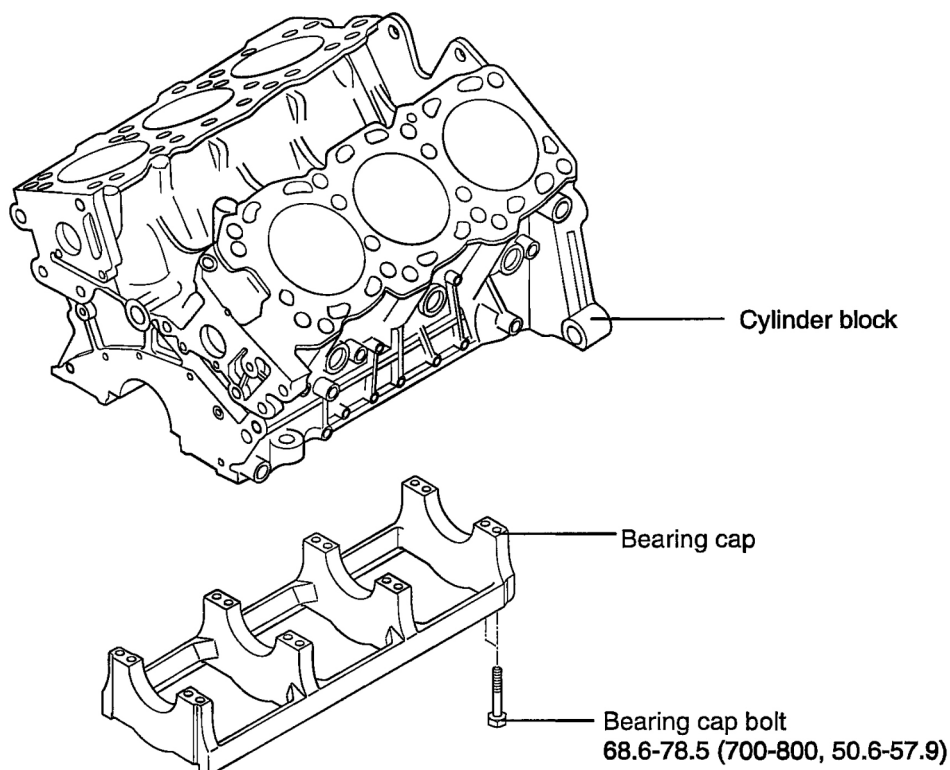


G00320553

Fig. 59: Installing Cylinder Head Cover To Cylinder Head
 Courtesy of KIA MOTORS AMERICA, INC.

ENGINE BLOCK COMPONENTS

COMPONENTS



TORQUE : N·m (kg·cm, lb·ft)

G00320524

Fig. 60: Engine Block Components
Courtesy of KIA MOTORS AMERICA, INC.

ENGINE BLOCK DISASSEMBLY, INSPECTION & REPAIR

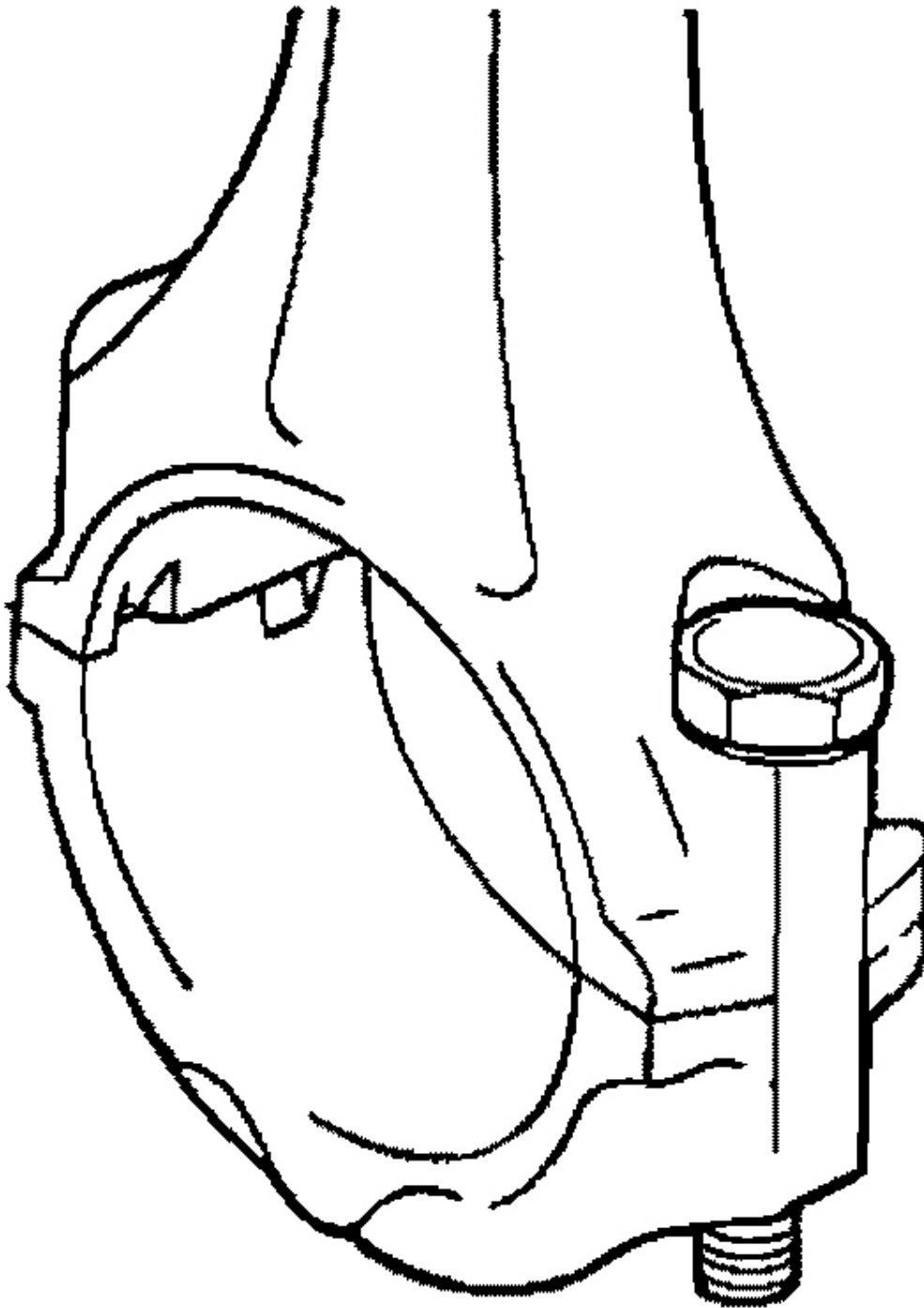
DISASSEMBLY

Remove the timing belt, cylinder head assembly, drive plate, transaxle mounting plate, oil pan and the oil pump case.

CAUTION: Keep the bearings in order with their corresponding connecting rods

(according to cylinder numbers) for proper reassembly.

1. Remove the connecting rod cap bolts, then remove the caps and the big end lower bearing mark for reassembly.
2. Push each piston connecting rod assembly toward the top of the cylinder.



G00320555

Fig. 61: Removing Connecting Rod Cap
Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

1. Visually check the cylinder block for scores, rust and corrosion, rust and corrosion.

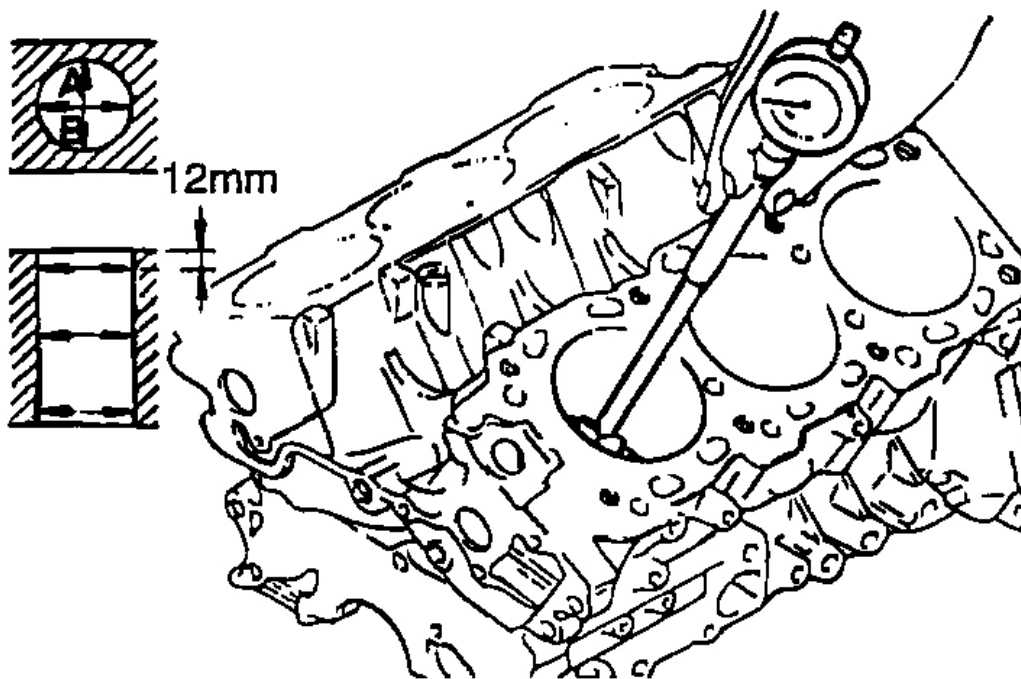
Also check for cracks or any other defects using a proper tool. Repair or replace the block if defective.

2. Measure the cylinder bore with a cylinder gauge at the three levels indicated in the directions of A and B.

Level 1: No. 1 piston ring position with piston at TDC.

Level 2: Center of cylinder.

Level 3: Bottom of cylinder.



G00320525

Fig. 62: Measuring Cylinder Bore With A Cylinder Gauge
Courtesy of KIA MOTORS AMERICA, INC.

3. If the cylinder bores show more than the specified out-of round or taper, or if the cylinder walls are badly

scuffed or scored, the cylinder block should be rebored and honed. New oversize pistons and rings should be installed.

Standard value:

Cylinder bore: 93.00-93.03 mm.

(3.66-3.663 in)

Deviation of concentricity and taper of cylinder bore:

0.02 mm (0.00079 in) or less.

4. If a ridge exists at the top of the cylinder, cut it way with a ridge reamer.
5. Oversize pistons are available in two sizes.

Oversize piston size:

0.25 O.S.: 0.25 mm (0.01 in)

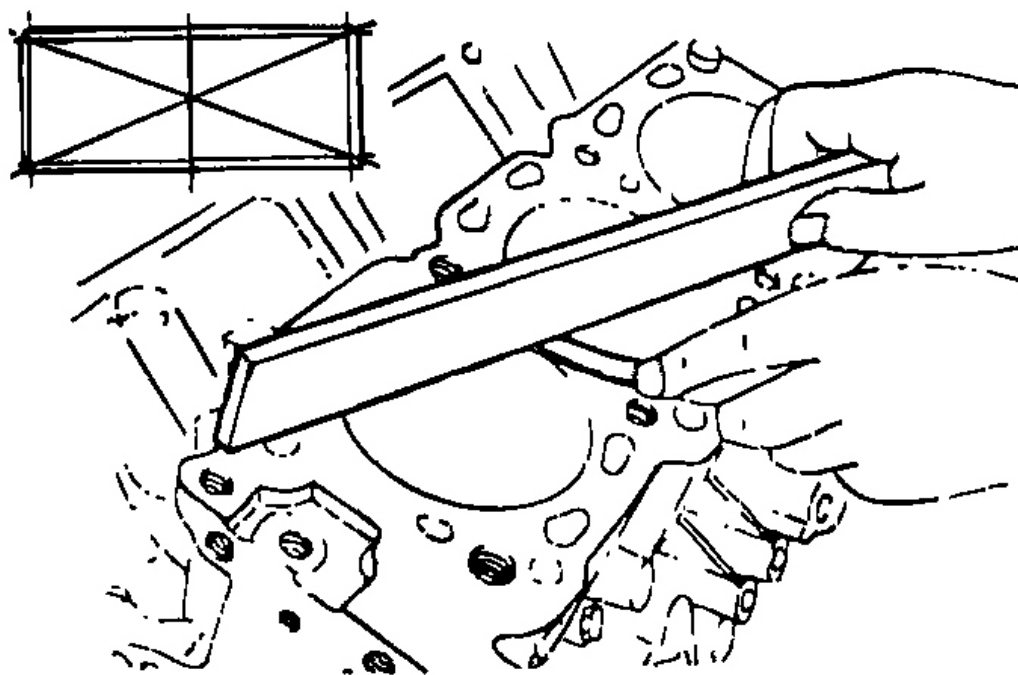
0.50 O.S.: 0.50 mm (0.02 in)

6. To rebore the cylinder to oversize, keep the specified clearance between the oversize piston and the bore, and make sure that all pistons used are of the same oversize. When measuring the piston outside diameter measure the section of the thrust surface at 10 mm (0.39 in) above the bottom of the piston skirt.

Clearance between piston and cylinder wall:

0.03-0.05 mm (0.001-0.002 in)

7. Check the flatness of the upper surface. If the top surface exceeds limits, grind it to a minimum limit value or replace. (Measuring method is same as that of cylinder head flatness.)



G00320526

Fig. 63: Checking Flatness Of Upper Surface
Courtesy of KIA MOTORS AMERICA, INC.

Standard value

Flatness of the gasket mating surface:

Less than 0.05 mm (0.002 in)

Limit Flatness of the gasket mating surface:

0.1 mm (0.0039 in)

CAUTION: When the cylinder head is assembled, grinding less than 0.2 mm is permissible. Grind the gasket surface of the cylinder block less than 0.2 mm.

REPAIR

BORING CYLINDER

1. Oversize pistons used should be determined on the basis of the largest bore cylinder.

Size	Identification mark
0.25mm O.S.	0.25
0.50mm O.S.	0.50

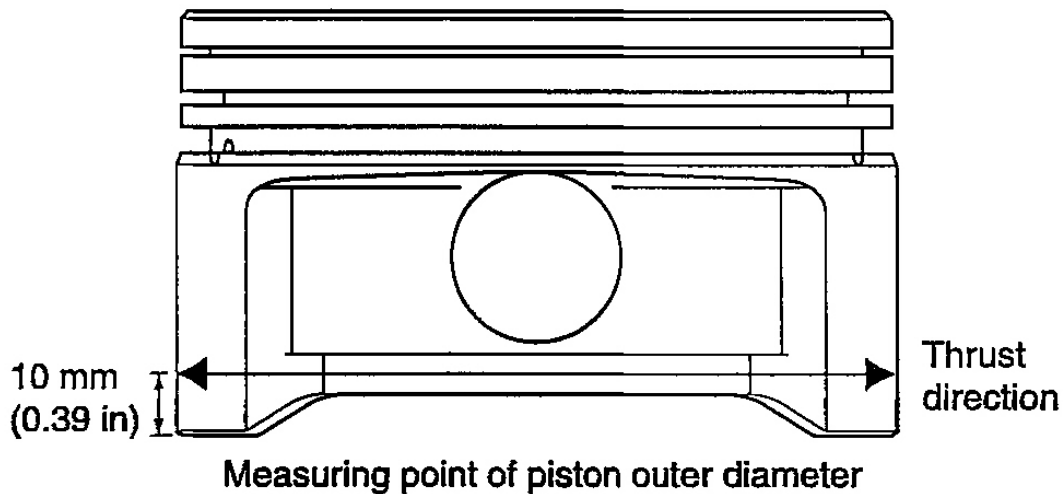
G00320527

Fig. 64: Identifying Boring Cylinder

Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Size mark is stamped on top of the piston.

2. Measure the outside diameter of the piston to be used.



G00320528

Fig. 65: Measuring Outside Diameter Of Piston

Courtesy of KIA MOTORS AMERICA, INC.

3. Based on the measured O.D., calculate the boring finish dimension.

Boring finish dimension = piston outer diameter + 0.02~0.04 mm (The clearance between piston outer diameter and cylinder) - 0.01 mm (Honing margin).

4. Bore each of the cylinders to the calculated size.

CAUTION: To prevent distortion that may result from temperature rise during honing, bore the cylinder holes in the firing order sequence.

5. Hone the cylinders, finishing them to the proper dimension (piston outside diameter + gap with cylinder).
6. Check the clearance between the piston and cylinder.

Standard value: 0.03-0.05 mm

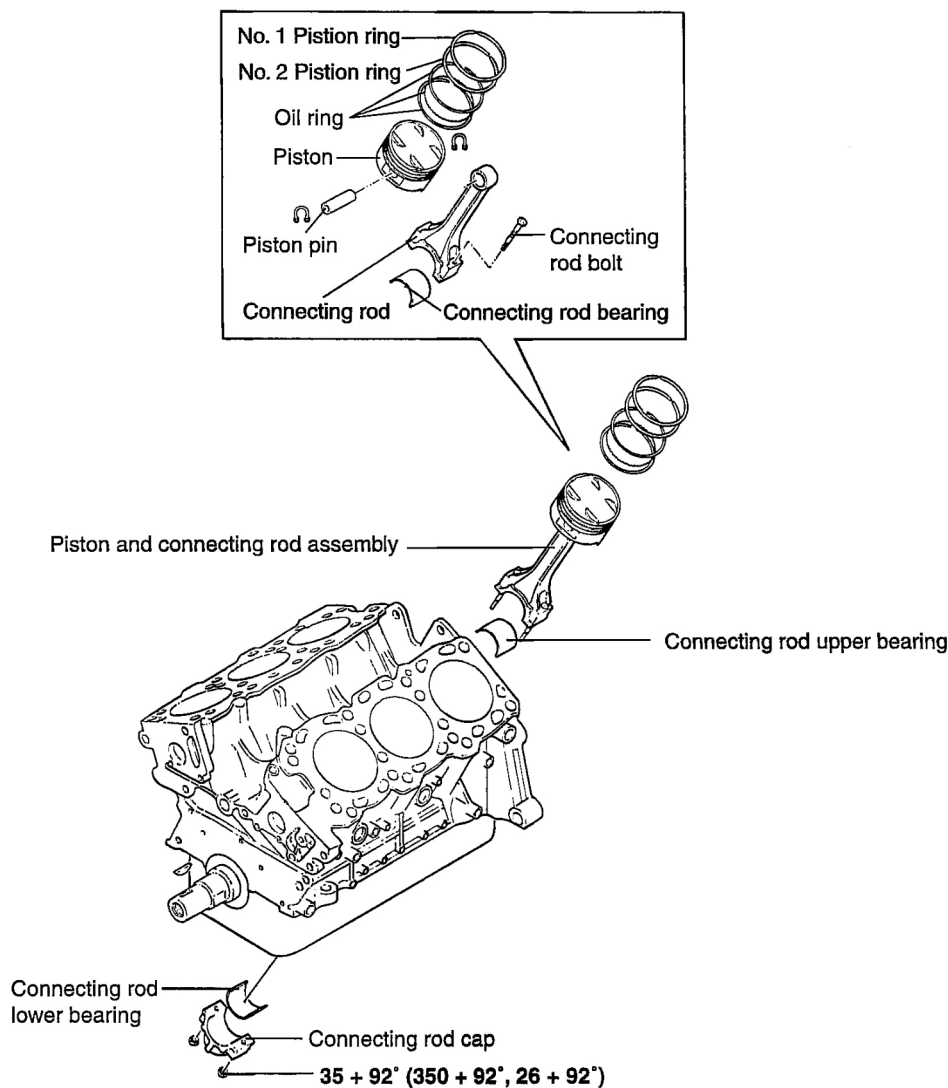
(0.0012 - 0.0020 in)

NOTE:

- Cylinders should be bored to the same oversize.
- Never bore only one cylinder to an oversize.

CONNECTING ROD & PISTON DISASSEMBLY & INSPECTION

COMPONENTS



TORQUE : N·m (kg·cm, lb·ft)

G00320554

Fig. 66: Connecting Rod & Piston Components
Courtesy of KIA MOTORS AMERICA, INC.

CONNECTING ROD DISASSEMBLY

1. When the connecting rod cap is installed, make sure that the cylinder numbers, marked on rod end cap at disassembly, match. When a new connecting rod is installed, make sure that the notches holding the bearing in place are on the same side.
2. Replace the connecting rod if it is damaged at either end of the thrust faces. If it has a stratified wear, or if

the surface of the inside diameter of the small end is severely rough, replace the rod.

PISTONS AND PISTON PINS INSPECTION

1. Check each piston for scuffing, scoring, wear and other defects. Replace any piston that is defective.
2. Check each piston ring for breakage, damage and abnormal wear. Replace the defective rings. When the piston requires replacement, its rings should also be replaced.
3. Check that the piston pin fits in the piston pin hole. Replace any piston and pin assembly that is defective. The piston pin must be pressed smoothly by hand into the pin hole (at room temperature).

PISTON RINGS

1. Measure the piston ring side clearance. If the measured value exceeds the service limit, insert a new ring in the ring groove the measure the side clearance. If the clearance still exceeds the service limit, replace the piston and rings together. If it is less than the service limit, replace only the piston rings.

Piston ring side clearance No. 1: 0.04-0.08 mm (0.0016-0.0031 in.)

No. 2: 0.02-0.06 mm (0.0008-0.0024 in.)

2. To measure the piston ring end gap, insert a piston ring into the cylinder bore. Position the ring at right angles to the cylinder wall by gently pressing it down with a piston. Measure the gap with a feeler gauge. If the gap exceeds the service limit, replace the piston ring.

Piston ring end gap:

[Standard dimensions]:

No. 1: 0.2-0.3 mm (0.0079-0.0118 in.)

No. 2: 0.45-0.60 mm (0.0177-0.236 in.)

Oil ring side rail: 0.2-0.7 mm (0.0079-0.0276 in.)

When replacing the ring without correcting the cylinder bore, check the gap with the ring situated at the lower part of cylinder that is less worn out.

PISTON RING SERVICE SIZE AND MARK

2004 Kia Sedona EX

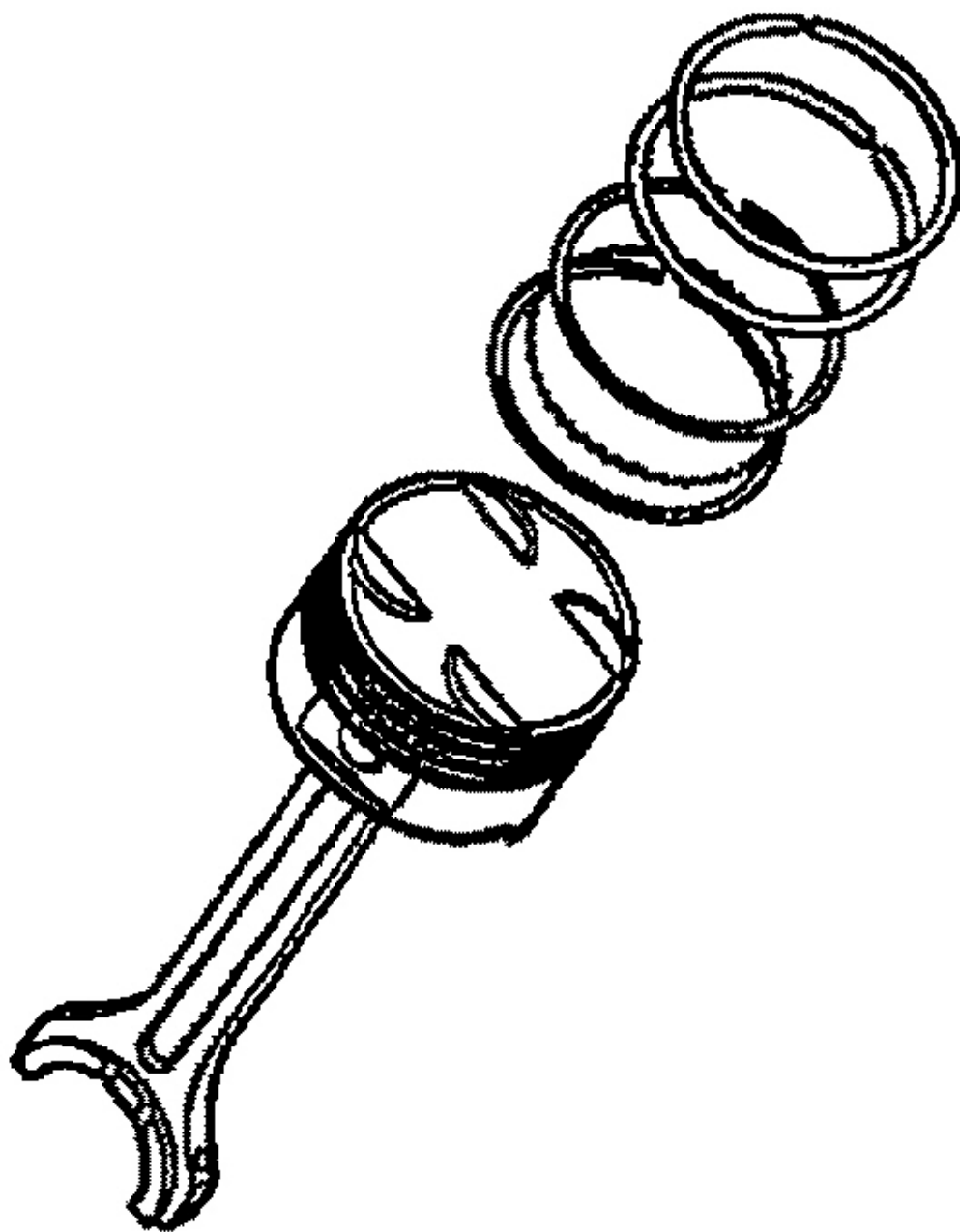
2004-05 ENGINES 3.5L V6 - Sedona

Standard	None
0.25 mm (0.010 in.) O.S	25
0.50 mm (0.020 in.) O.S	50

G00320556

Fig. 67: Identifying Piston Ring Service Size & Mark
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: The mark can be found on the upper side of the ring next to the end.

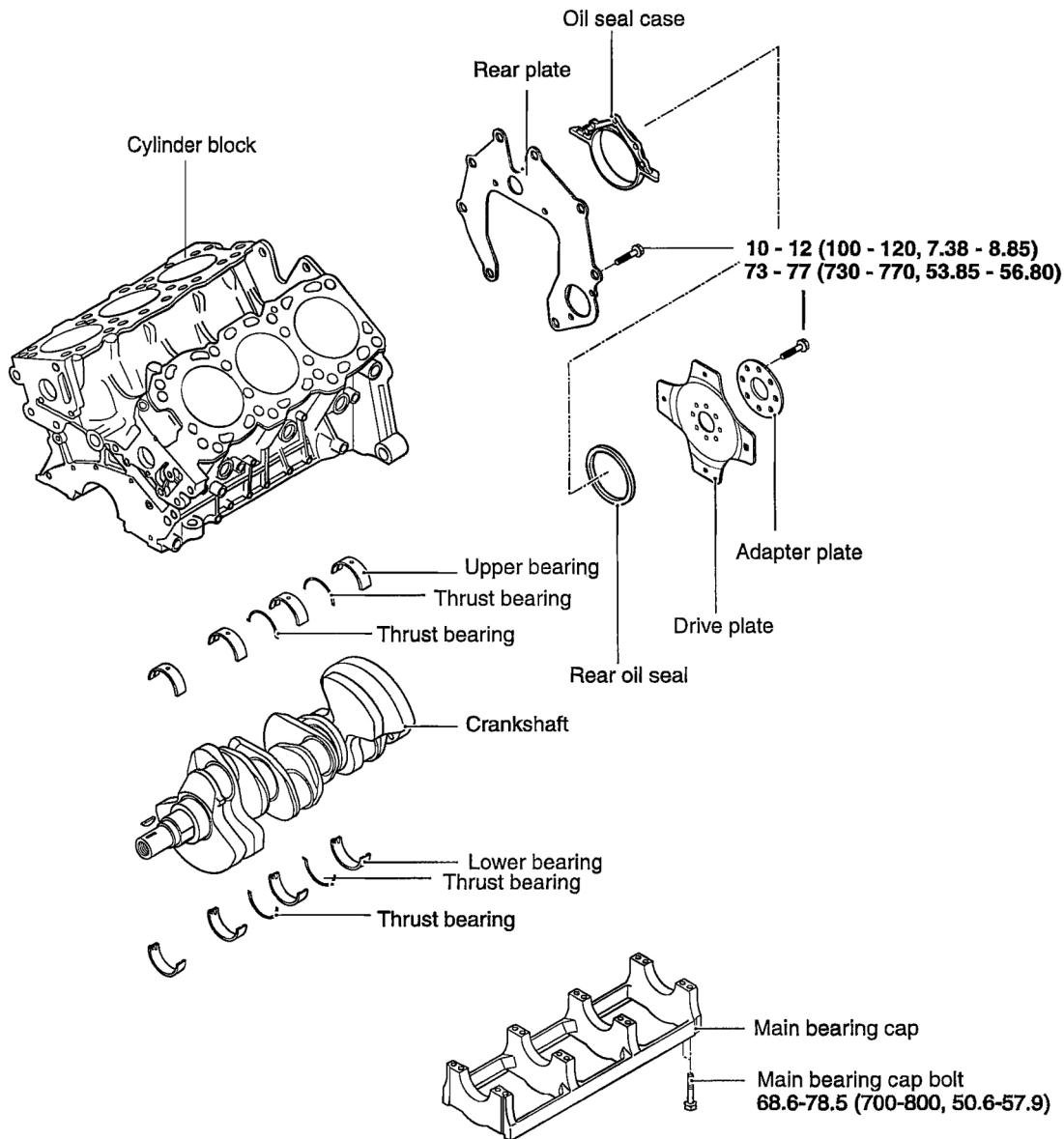


G00320557

Fig. 68: Identifying Piston Ring Service Mark
Courtesy of KIA MOTORS AMERICA, INC.

CRANKSHAFT DISASSEMBLY & INSPECTION

COMPONENTS



TORQUE : N·m (kg·cm, lb·ft)

G00320573

Fig. 69: Crank Shaft Components

Courtesy of KIA MOTORS AMERICA, INC.

DISASSEMBLY

1. Remove the timing belt, cylinder head assembly, drive plate, transaxle mounting plate oil pan.
2. Remove the oil seal case and the rear oil seal.
3. Remove the connecting rod caps.

NOTE: Mark the main bearing caps to reassemble in the original position and direction.

4. Remove the main bearing caps and remove the crankshaft.

Keep the bearings in order by cap number.

INSPECTION

1. Check the crankshaft journals and pins for damage, uneven wear and cracks. Also check the oil holes for restrictions.

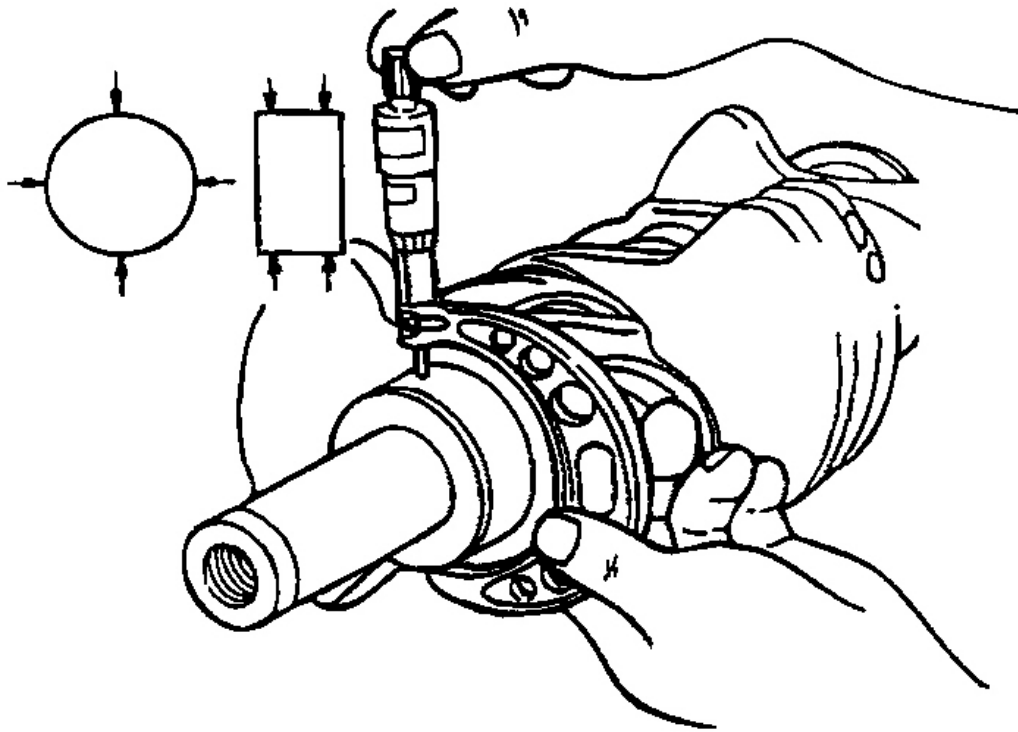
Repair or replace any defective part.

2. Inspect for out-of-roundness and taper of the crankshaft journal and pin.

Crankshaft journal O.D	Crankshaft pin O.D
63.982-64.000mm (2.519-2.520in)	54.982-55.000mm (2.164-2.165 in)

G00320574

Fig. 70: Checking Crankshaft Journals & Pins
Courtesy of KIA MOTORS AMERICA, INC.



G00320575

Fig. 71: Inspecting Out-Of-Roundness & Taper Of Crankshaft Journal & Pin
Courtesy of KIA MOTORS AMERICA, INC.

MAIN BEARING AND CONNECTING ROD BEARING

Visually inspect each bearing for peeling, melt, seizure and improper contact. Replace any defective bearings.

OIL CLEARANCE MEASUREMENT

Check for oil clearance by measuring the outside diameter of the crankshaft journal and the inside diameter of the bearing. The clearance can be obtained by calculating the difference between the measured outside and inside diameter.

Standard value:

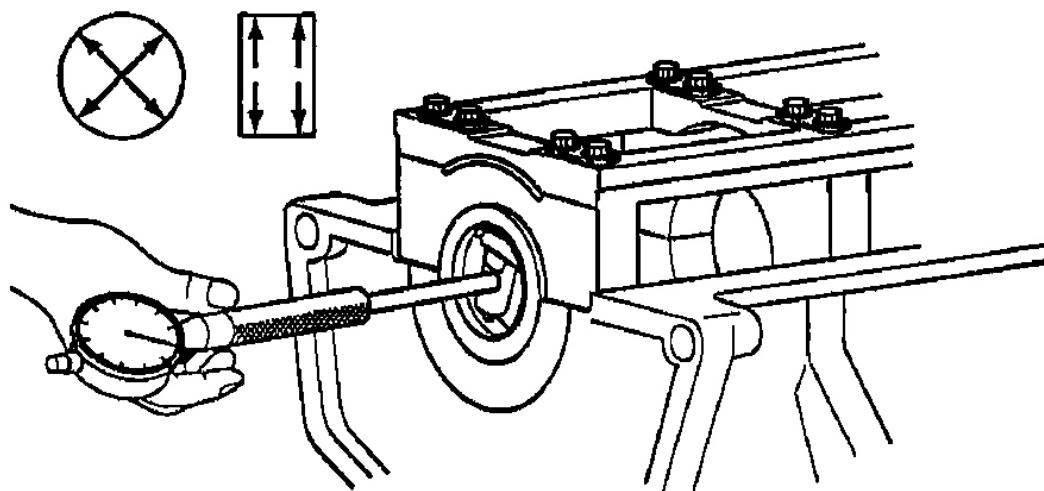
Oil clearance:

Crankshaft main bearing:

0.018-0.036 mm (0.0007-0.0014 in)

Connecting rod bearing:

0.022-0.040 mm (0.0009-0.0016 in)



G00320576

Fig. 72: Checking Oil Clearance

Courtesy of KIA MOTORS AMERICA, INC.

PLASTIGAUGE METHOD

Plastigauge may be used to measure the clearance.

1. Remove oil and grease and any other dirt from the bearings and journals.
2. Cut the plastigauge to the same length as the width of the bearing and place it in parallel with the journal, avoiding the oil holes.

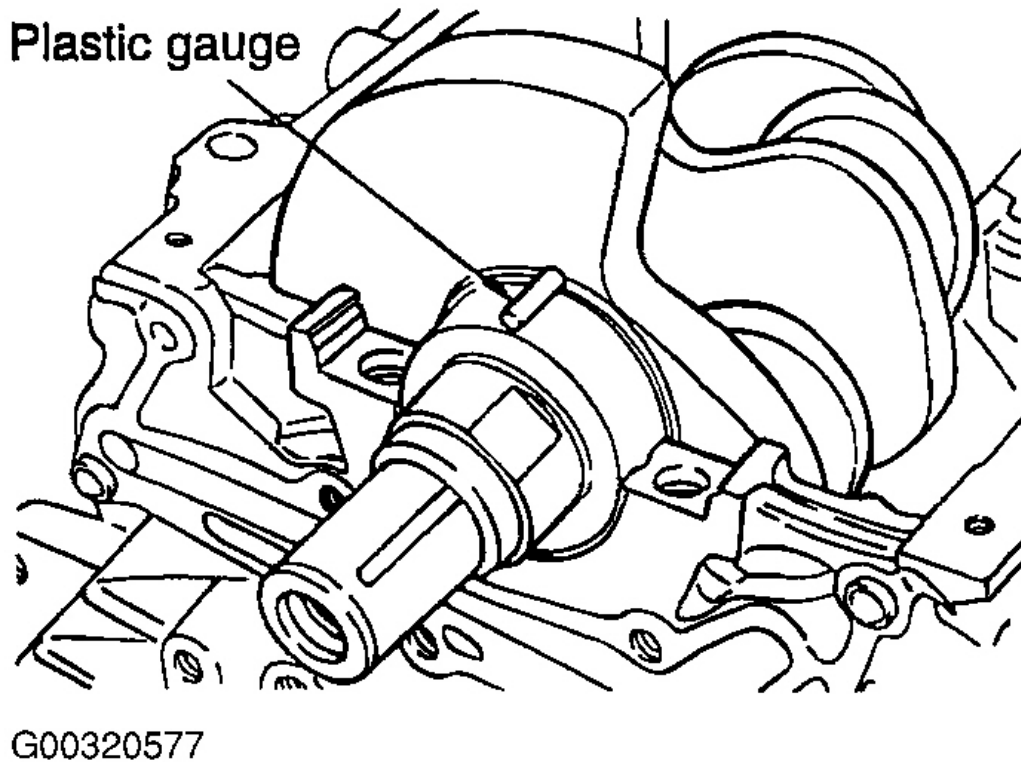


Fig. 73: Measuring Clearance With Plastigauge Method
Courtesy of KIA MOTORS AMERICA, INC.

3. Install the crankshaft, bearings and caps and tighten them to the specified torques. During this operation, do not turn the crankshaft. Remove the caps. Measure the width of the widest part by using the scale printed on the gauge package.

If the clearance exceeds the repair limit, the bearing should be replaced or an undersize bearing should be used.

When installing a new crankshaft, be sure to use standard size bearings.

Should the standard clearance not be obtained even after bearing replacement, the journal and pin should be ground to undersize and a bearing of the corresponding undersize should be installed.

OIL SEAL

Check the front and rear oil seals for damage or worn surfaces.

Replace any seal that is defective.

DRIVING PLATE

Replace the distorted, damaged, or cracked drive plates.

COMPONENT REPLACEMENT**CONNECTING ROD BEARING (3.5)**

1. Check the connecting rod big-end bore size code.

NOTE: Record the connecting rod big-end bore size code letters on connecting rod cap as shown.

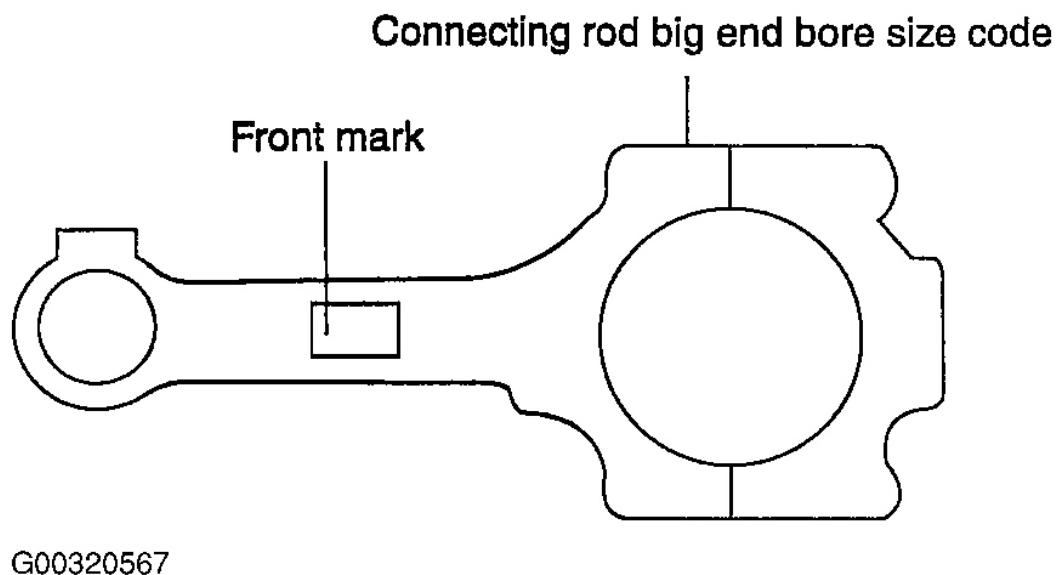


Fig. 74: Checking Connecting Rod Big-End Bore Size Code
Courtesy of KIA MOTORS AMERICA, INC.

CONNECTING ROD BIG-END DIAMETER

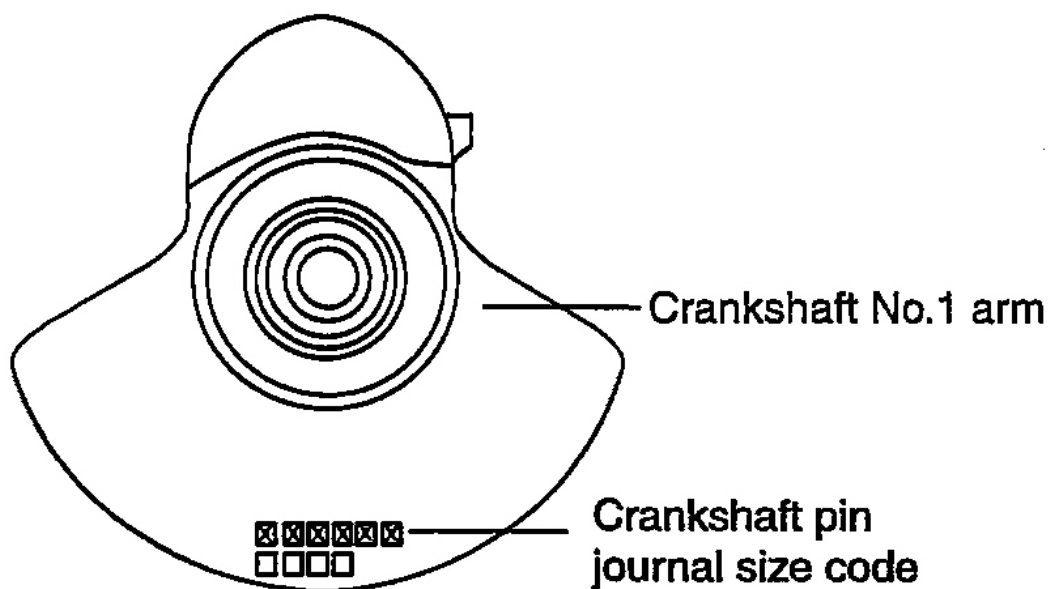
Code	Connecting rod big-end diameter mm (in)
0	58.000 - 58.006 (2.2835 ~ 2.2837)
1	58.006 - 58.012 (2.2837 ~ 2.2839)
2	58.012 - 58.018 (2.2839 ~ 2.2842)

G00320568

Fig. 75: Connecting Rod Big-End Diameter Chart
Courtesy of KIA MOTORS AMERICA, INC.

2. Check the crankshaft pin journal size code.

NOTE: Record the pin journal size code letters on the crankshaft balance weight. Reading order is from left to right as shown, with No. 1 pin journal size code shown first.



G00320569

Fig. 76: Checking Crankshaft Pin Journal Size Code
 Courtesy of KIA MOTORS AMERICA, INC.

CRANKSHAFT PIN JOURNAL DIAMETER

Code	Crankshaft pin journal diameter mm (in)
I	54.994 - 55.000 (2.1651 ~ 2.1654)
II	54.988 - 54.994 (2.1649 ~ 2.1651)
III	54.982 - 54.988 (2.1646 ~ 2.1649)

G00320570

Fig. 77: Crankshaft Pin Journal Diameter
 Courtesy of KIA MOTORS AMERICA, INC.

3. Choose proper connecting rod bearing in below table.

CONNECTING ROD BEARING SELECTION TABLE

		Connecting rod big-end bore size code		
		0	1	2
Crankshaft pin journal size code	I	Pink	Red	None
	II	Red	None	Black
	III	None	Black	Brown

G00320571

Fig. 78: Connecting Rod Bearing Table
Courtesy of KIA MOTORS AMERICA, INC.

Connecting rod bearing oil clearance:

0.026-0.044 mm (0.0010-0.0017 in)

CONNECTING ROD BEARING THICKNESS (REFERENCE DATA)

Color	Connecting rod bearing thickness mm(in)
Pink	1.484 - 1.487 (0.0584- 0.0585)
Red	1.487 - 1.490 (0.0585 - 0.0587)
None	1.490 - 1.493 (0.0587 - 0.0588)
Black	1.493 - 1.496 (0.0588 - 0.0589)
Brown	1.496 - 1.499 (0.0589 - 0.0590)

G00320572

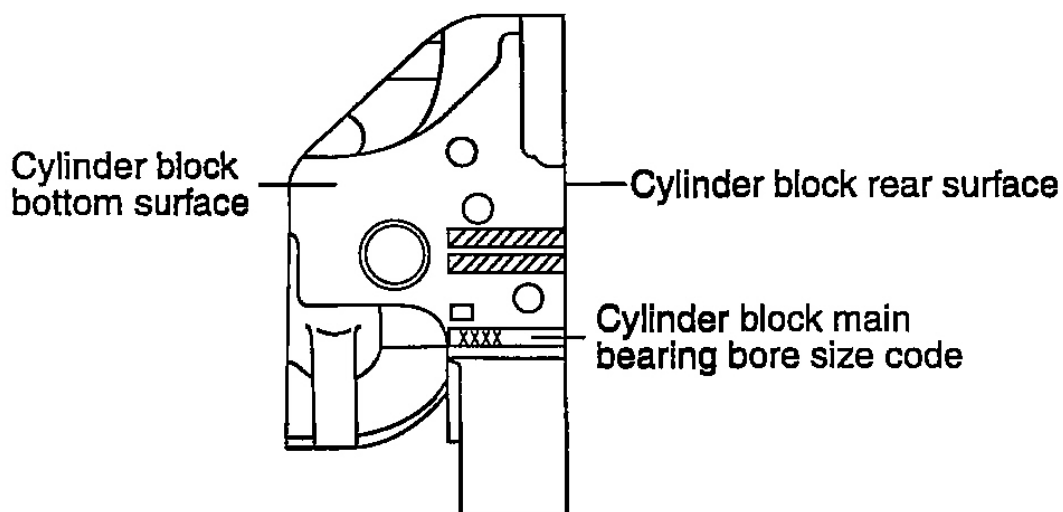
Fig. 79: Connecting Rod Bearing Thickness Table

Courtesy of KIA MOTORS AMERICA, INC.

CRANKSHAFT MAIN BEARING (3.5)

1. Check the cylinder block main bearing bore size code.

NOTE: Record the cylinder block main bearing bore size code letters on cylinder block as shown. Reading order is from left to right with front main bearing bore size code shown first.



G00320583

Fig. 80: Checking Cylinder Block Main Bearing Bore Size Code
Courtesy of KIA MOTORS AMERICA, INC.

CYLINDER BLOCK MAIN BEARING BORE DIAMETER

Code	Cylinder block main bearing bore diameter mm (in)
A	68.000 ~ 68.006 (2.6772 ~ 2.6774)
B	68.006 ~ 68.012 (2.6774 ~ 2.6776)
C	68.012 ~ 68.018 (2.6776 ~ 2.6779)

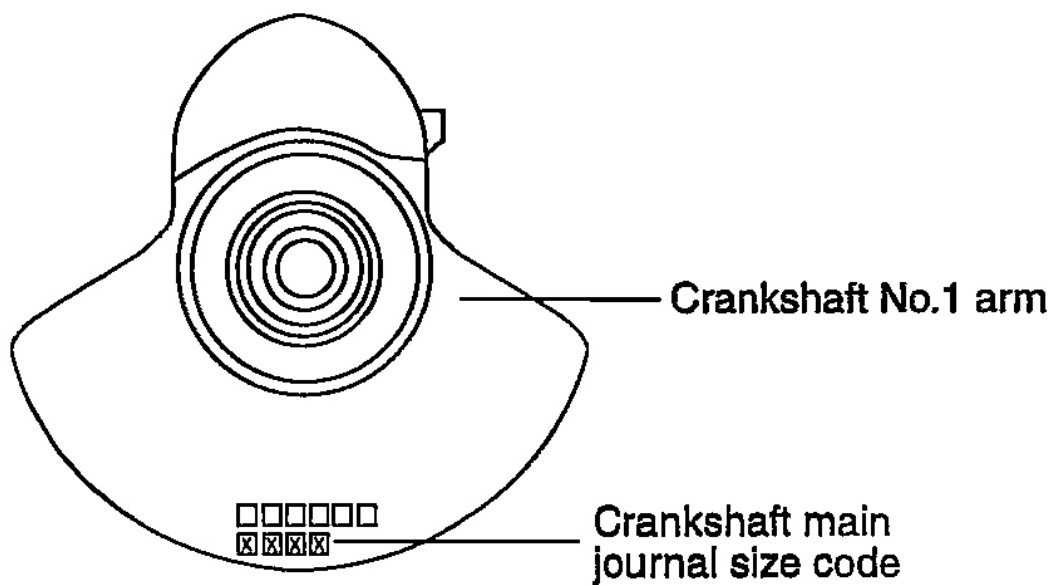
G00320584

Fig. 81: Cylinder Block Main Bearing Bore Diameter

Courtesy of KIA MOTORS AMERICA, INC.

2. Check the crankshaft main journal size code.

NOTE: Record the main journal size code letters on the crankshaft balance weight. Reading order is from left to right as shown, with No. 1 main journal size code shown first.



G00320585

Fig. 82: Checking Crankshaft Main Journal Size Code
Courtesy of KIA MOTORS AMERICA, INC.

CRANKSHAFT MAIN JOURNAL DIAMETER

Code	Crankshaft main journal diameter mm (in)
1	63.994 ~ 64.000 (2.5194 ~ 2.5197)
2	63.988 ~ 63.994 (2.5192 ~ 2.5194)
3	63.982 ~ 63.988 (2.5190 ~ 2.5192)

G00320586

Fig. 83: Crankshaft Main Journal Diameter
Courtesy of KIA MOTORS AMERICA, INC.

3. Choose proper main journal bearing in below table.

MAIN JOURNAL BEARING SELECTION TABLE

		Cylinder block main bearing bore size code		
		A	B	C
Crankshaft main journal size code	1	Pink	Red	None
	2	Red	None	Black
	3	None	Black	Brown

G00320587

Fig. 84: Main Journal Bearing Selection Table
Courtesy of KIA MOTORS AMERICA, INC.

Main journal bearing oil clearance:

0.022-0.040 mm (0.0009-0.0016 in.)

MAIN JOURNAL BEARING THICKNESS (REFERENCE DATA)

Color	Main journal bearing thickness mm (in)
Pink	1.986 ~1.989 (0.0782 ~ 0.0783)
Red	1.989 ~ 1.992 (0.0783 ~ 0.0784)
None	1.992 ~ 1.995 (0.0784 ~ 0.0785)
Black	1.995 ~ 1.998 (0.0785 ~ 0.0787)
Brown	1.998 ~ 2.001 (0.0787 ~ 0.0788)

G00320588

Fig. 85: Main Journal Bearing Thickness Table
Courtesy of KIA MOTORS AMERICA, INC.

ENGINE BLOCK REASSEMBLY**MAIN BEARING**

1. Install the grooved main bearing (upper bearing) on the cylinder block side.

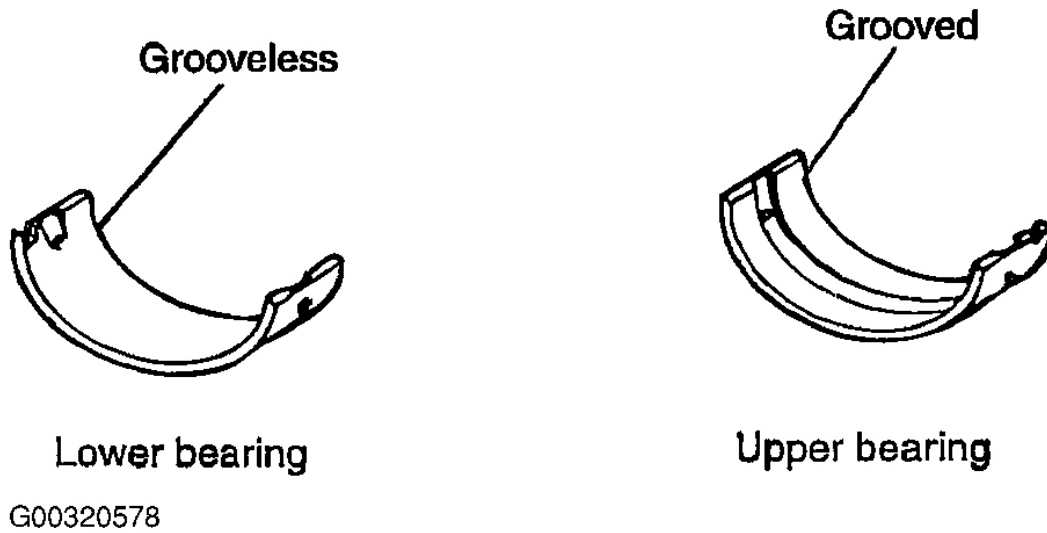


Fig. 86: Installing Main Bearing
 Courtesy of KIA MOTORS AMERICA, INC.

2. Install the grooveless main bearing (lower bearing) on the main bearing cap side.
3. Install the crankshaft. Apply engine oil to the journal and pin.
4. Caps should be installed with the arrow mark directed toward the front of the engine. The cap number sequence must be correct.
5. Tighten all cap bolts to the specified torque according to the order as shown in the picture.

Tightening torque:

Main bearing cap bolt: 68.6-78.5 N.m

(700-800 kg. cm, 50.6-57.9 lb. ft)

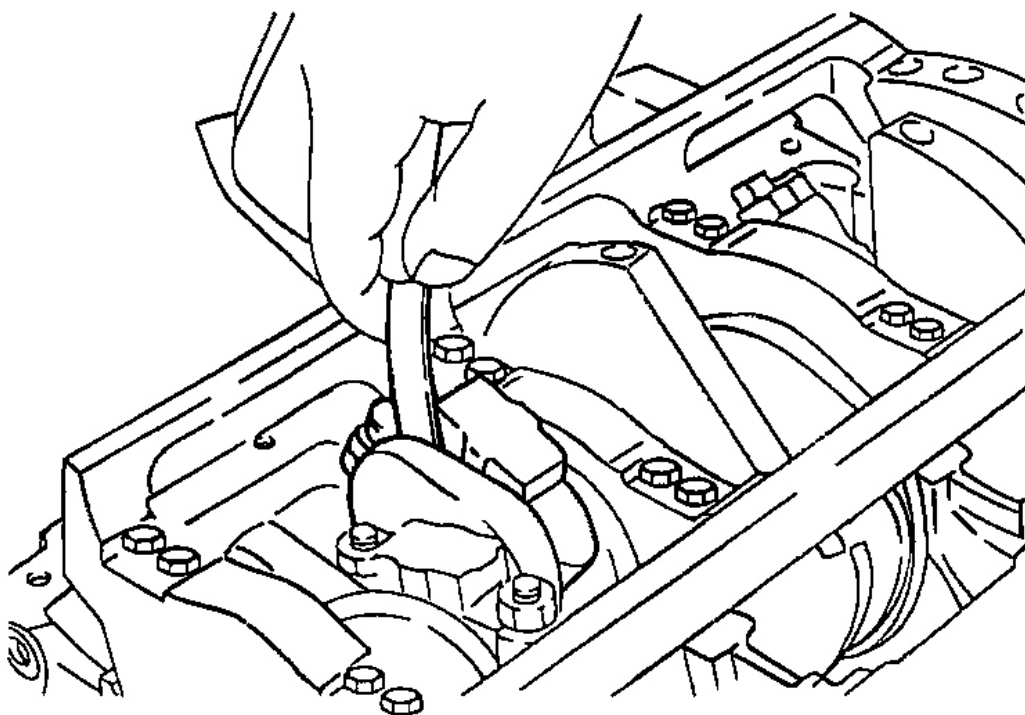
6. Cap bolt should be tightened to specified torque in 4-5 steps before being tightened to the specified torque.
7. Make certain that the crankshaft turns freely and has the proper crankshaft end play.

Crankshaft end play:

Standard value: 0.050-0.250 mm

(0.00197-0.0098 in.)

Limit: 0.35 mm (0.014 in.)



G00320579

Fig. 87: Measuring Crankshaft End Play
Courtesy of KIA MOTORS AMERICA, INC.

8. Assemble the rear oil seal to oil case using the special tool (09231-33000).

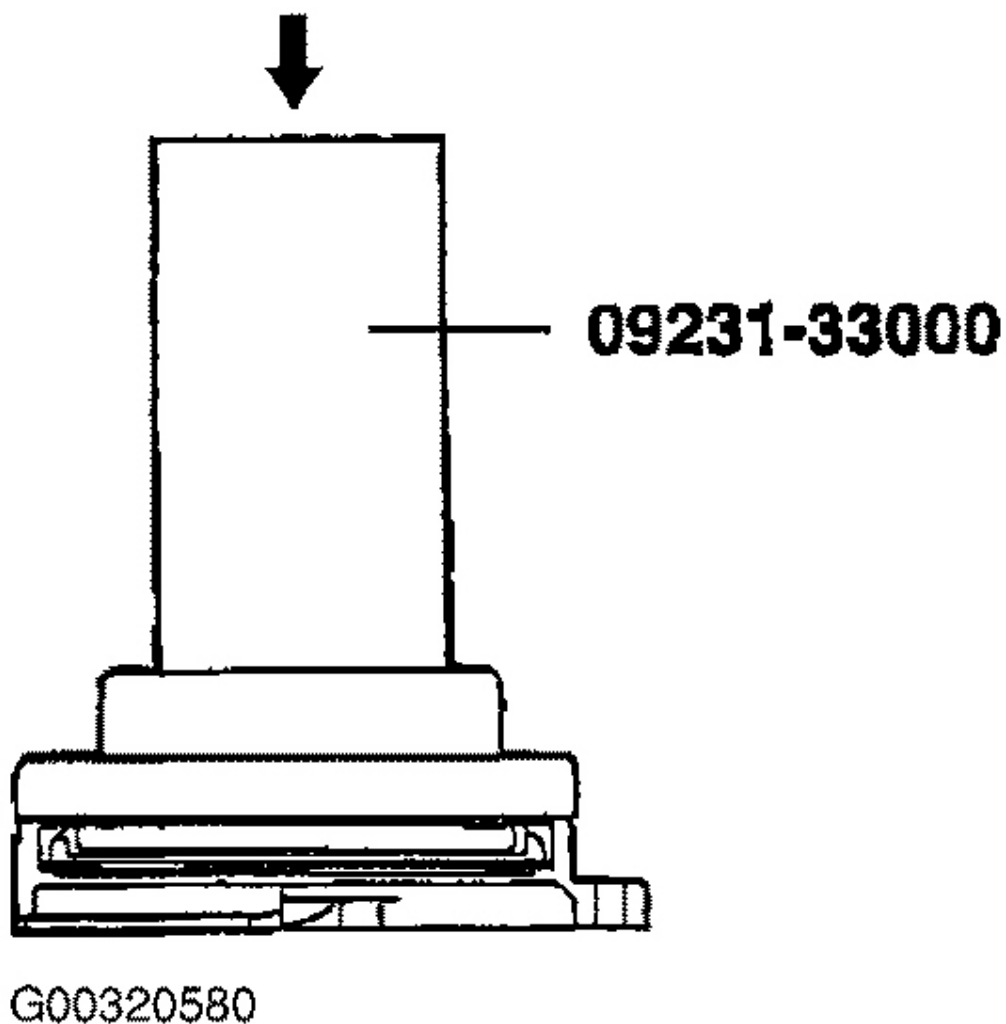
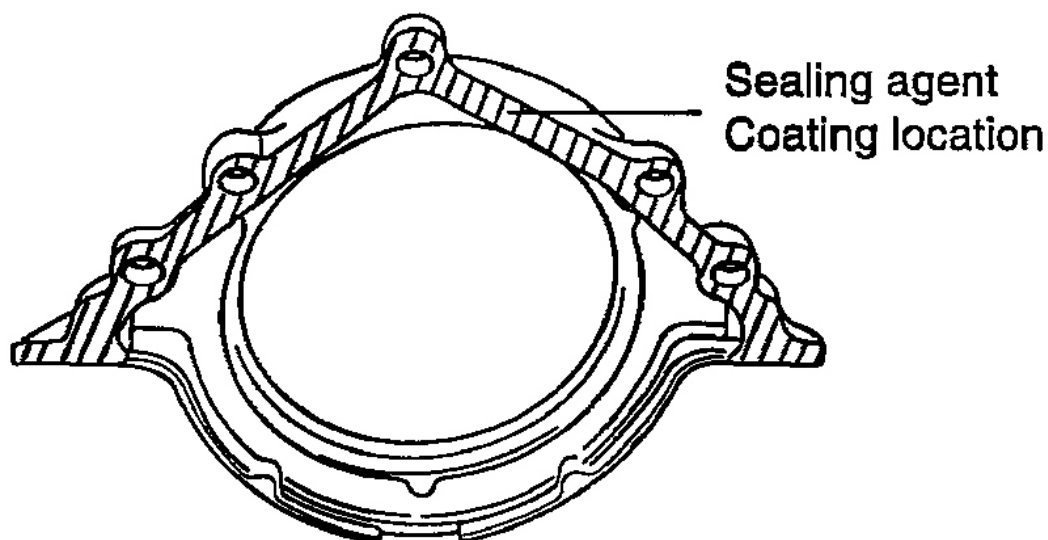


Fig. 88: Using Special Tool (09231-33000)
Courtesy of KIA MOTORS AMERICA, INC.

9. Smear sealant on area indicated in the figure and install the oil seal case in the cylinder block.



G00320581

Fig. 89: Install Oil Seal Case In Cylinder Block
 Courtesy of KIA MOTORS AMERICA, INC.

Tightening torque:

Oil seal case bolt: 10-12 N.m

(100-120 kg. cm, 7.38-8.85 lb. ft)

10. Install the rear plate to the specified torque.

Tightening torque:

Rear plate: 10-12 N.m

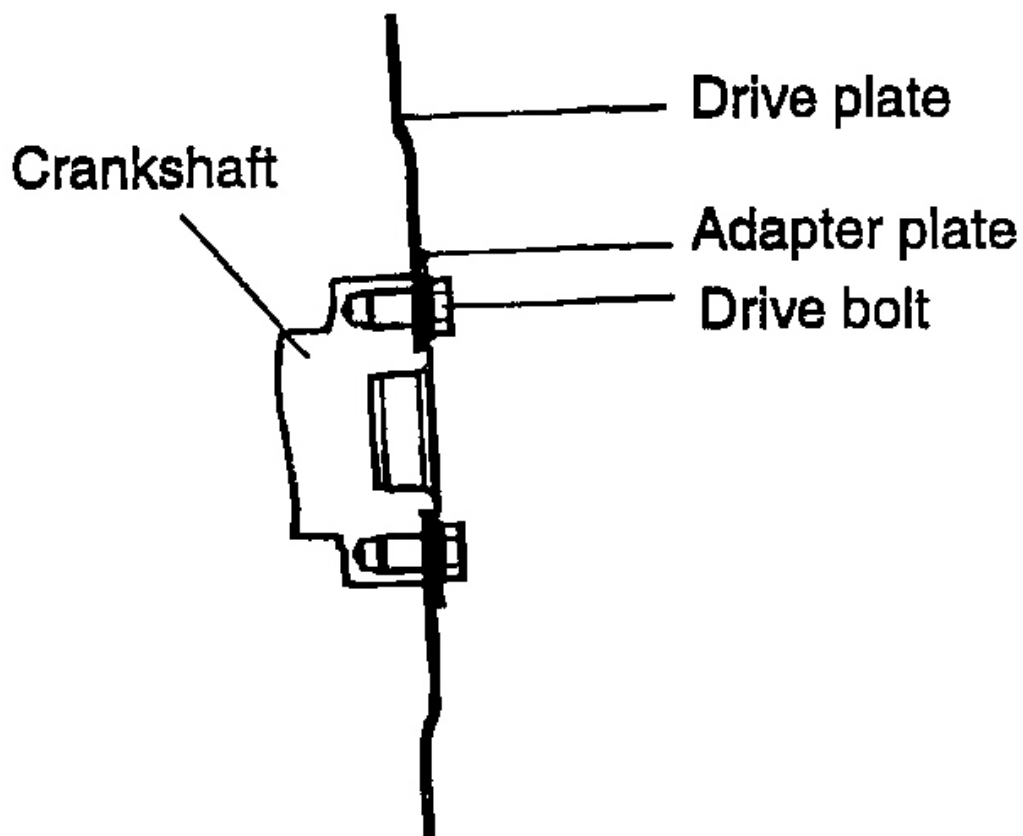
(100-120 kg. cm, 7.38-8.85 lb. ft)

11. Install the drive plate and the adapter plate.

Tightening torque:

Drive bolt: 73-77 N.m

(730-770 kg. cm, 53.85-56.80 lb. ft)

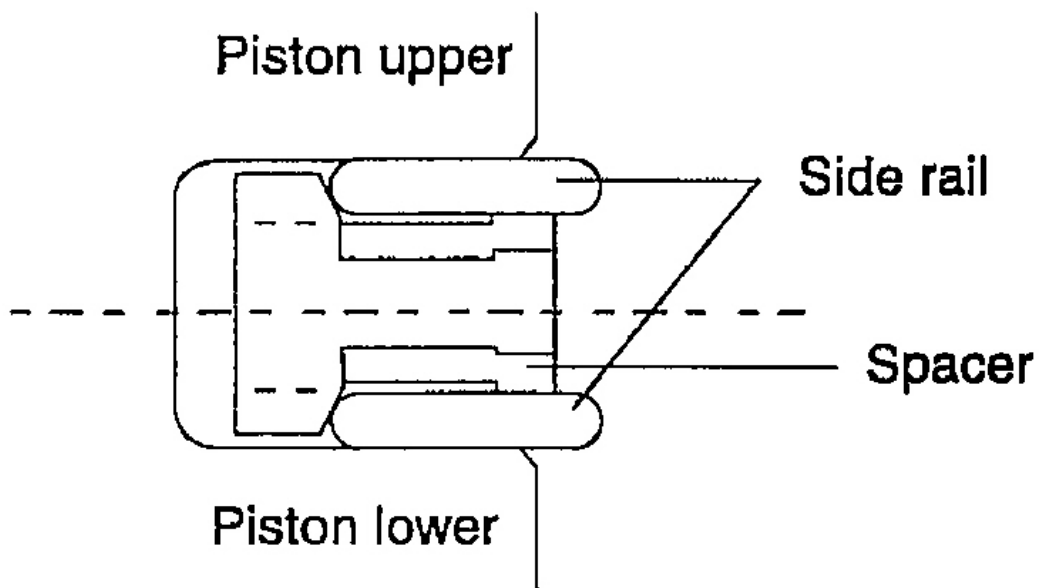


G00320582

Fig. 90: Installing Drive Plate & Adapter Plate
Courtesy of KIA MOTORS AMERICA, INC.

CONNECTING ROD & PISTONS

1. Install the expander.



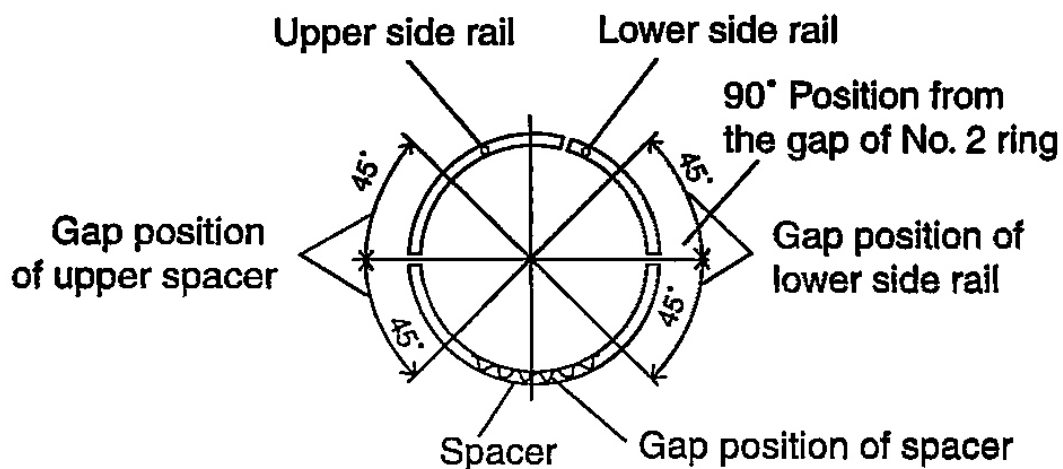
G00320559

Fig. 91: Installing Expander

Courtesy of KIA MOTORS AMERICA, INC.

2. Install the upper side rail. To install the side rail, first put one end of the side rail between the piston ring groove and spacer, hold it firmly, and press down with finger on the portion to be inserted into the groove (as illustrated).

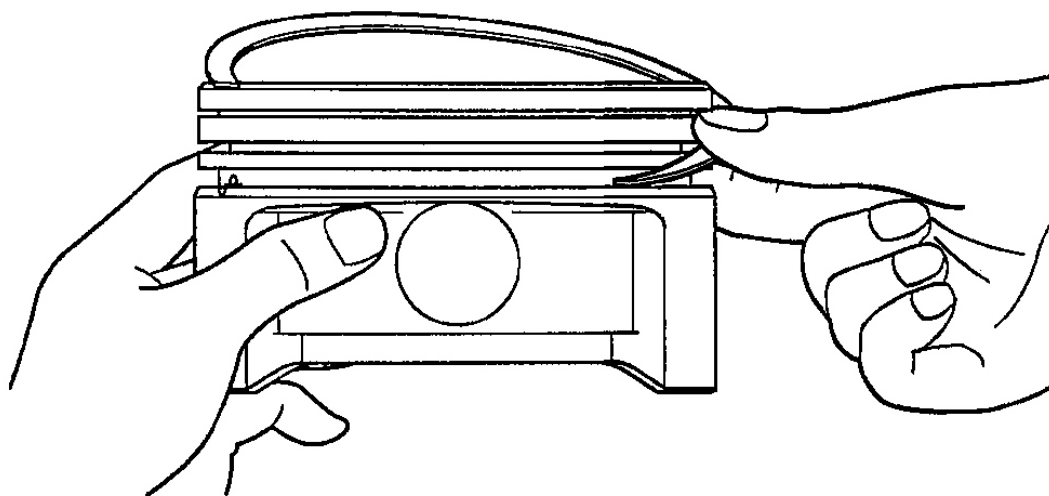
CAUTION: Do not use a piston ring expander when installing the side rail.



G00320560

Fig. 92: Installing Upper Side Rail
Courtesy of KIA MOTORS AMERICA, INC.

3. Install the lower side rail by the same procedure described in Step 2.

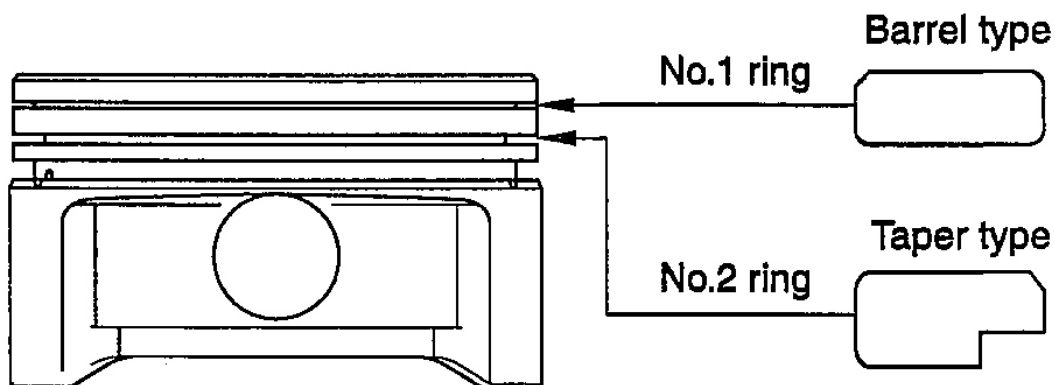


G00320561

Fig. 93: Installing Lower Side Rail
Courtesy of KIA MOTORS AMERICA, INC.

4. Apply engine oil around the piston and piston grooves.

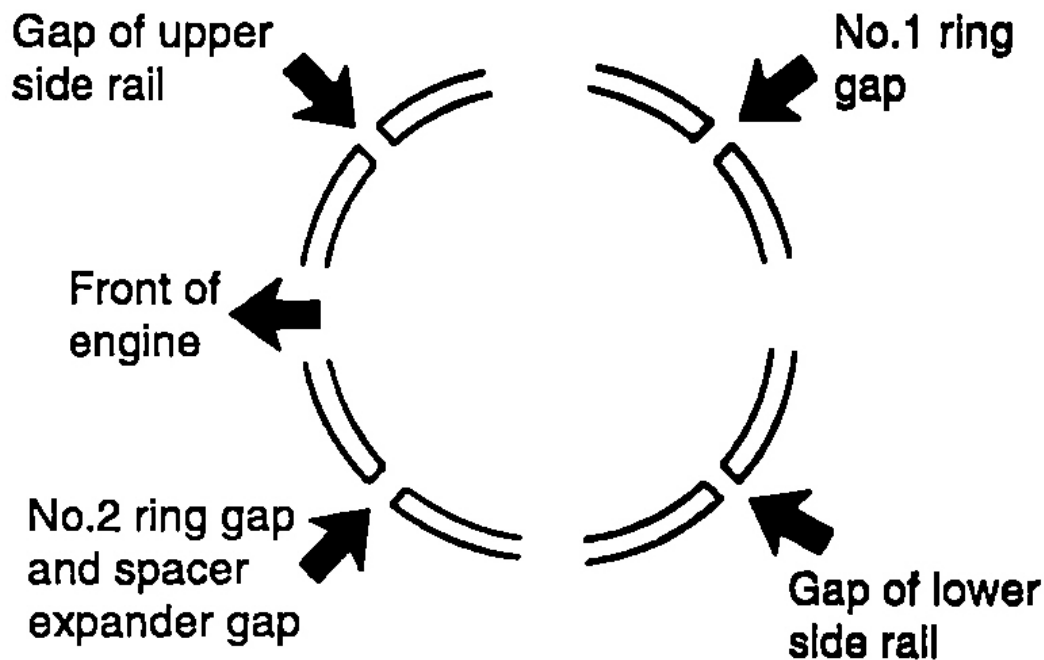
5. Using a piston ring expander, install the No. 2 piston ring.
6. Install the No. 1 piston ring.



G00320562

Fig. 94: Installing No. 1 Piston Ring
Courtesy of KIA MOTORS AMERICA, INC.

7. Position each piston ring end gap as far away from its neighboring gaps as possible. Make sure that the gaps are not positioned in the thrust and pin directions.
8. Hold the piston rings firmly with a piston ring compressor as they are inserted into cylinder.



G00320563

Fig. 95: Holding Piston Rings With A Piston Ring Compressor
 Courtesy of KIA MOTORS AMERICA, INC.

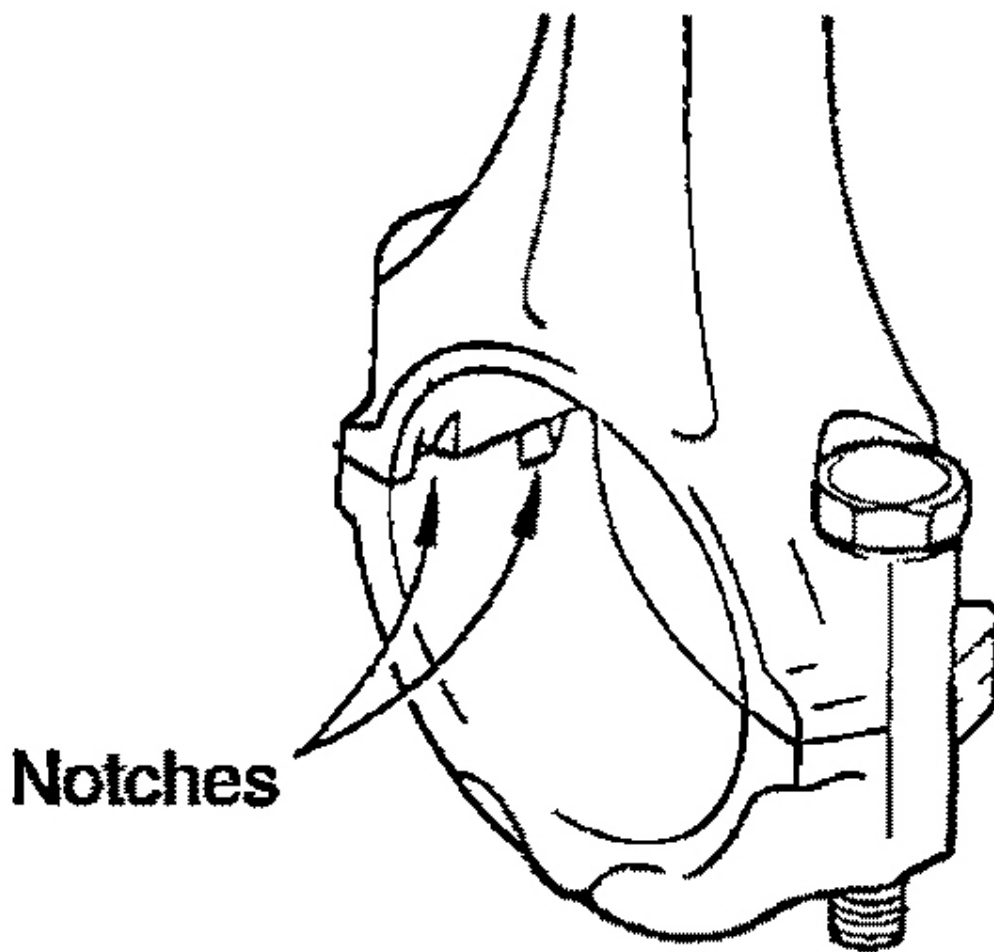
9. Install the upper connecting rod bearings in the connecting rod.
10. Install the lower connecting rod bearings in the connecting rod bearing caps.
11. Make sure that the front mark of the piston and the front mark (identification mark) of the connecting rod are directed toward the front of the engine.
12. When the connecting rod cap is installed, make sure that any cylinder numbers placed on the rod and cap at disassembly match.
13. When a new connecting rod is installed, make sure that the notches for holding the bearing in place are on the same side.
14. When assembling, bolts should be fastened using the plastic angle technique as follows.
 1. Apply oil to the threads and matching areas.
 2. Tighten the connecting rod bolt.

Tightening torque:

Connecting rod bolt:

35 Nm + 92° (350 kg-cm + 92°, 26 lb. ft + 92°)

CAUTION: After removing the connecting rod bolt, do not use it again. When using a new bolt, do not tighten the bolt more than 3 times.



G00320564

Fig. 96: Removing Connecting Rods
Courtesy of KIA MOTORS AMERICA, INC.

15. Check the bearing clearance as follows:
 1. Remove oil and dirt from the bearings and journals.
 2. Cut plastigauge to the same length as the width of the bearing and place it in parallel with the journal, avoiding the oil holes.

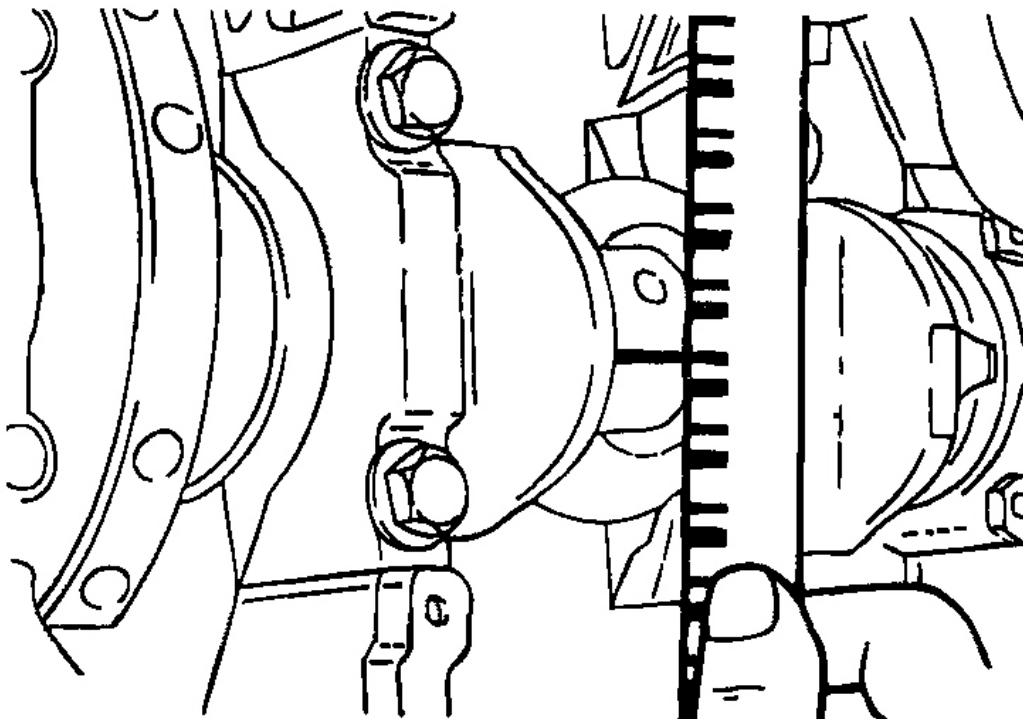
3. Install the bearing and cap. Tighten to the specified torque. During this operation, do NOT turn the crankshaft.
4. Remove the cap, measure at the widest part by using the scale printed on the plastigauge package.

Connecting rod cap bearing clearance:

Standard value:

0.022-0.040 mm (0.0009-0.0016 in)

Limit: 0.1 mm (0.0039 in)



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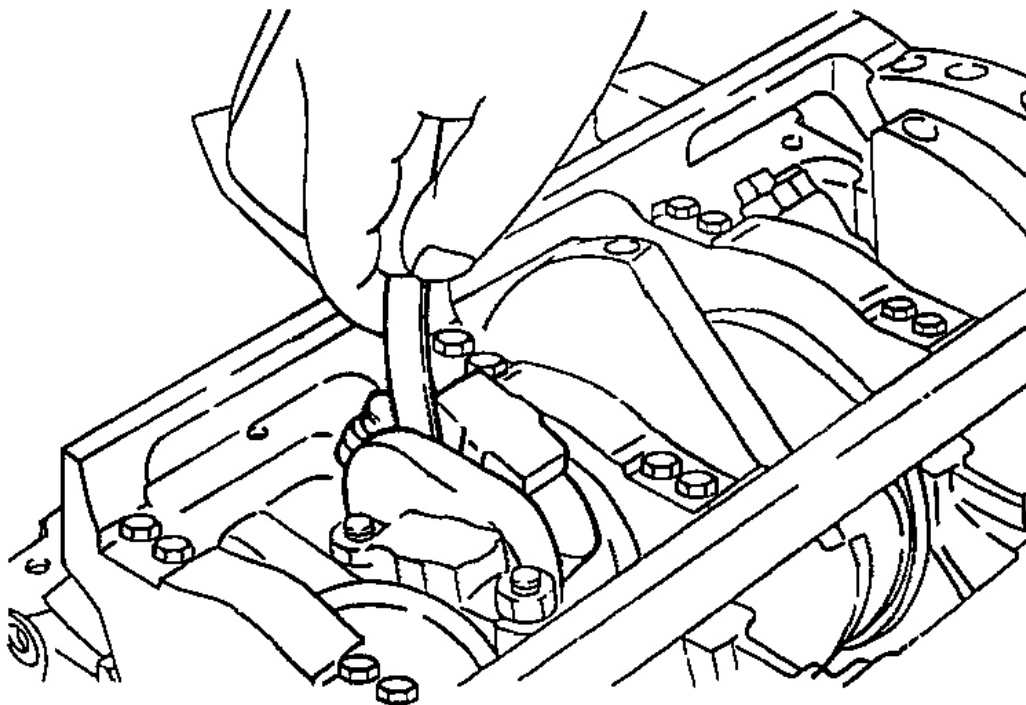
Fig. 97: Checking Bearing Clearance
Courtesy of KIA MOTORS AMERICA, INC.

16. Check the connecting rod side clearance.

Connecting rod side clearance:

Standard: 0.10-0.25 mm (0.0039-0.0098 in.)

Limit: 0.4 mm (0.0157 in.)



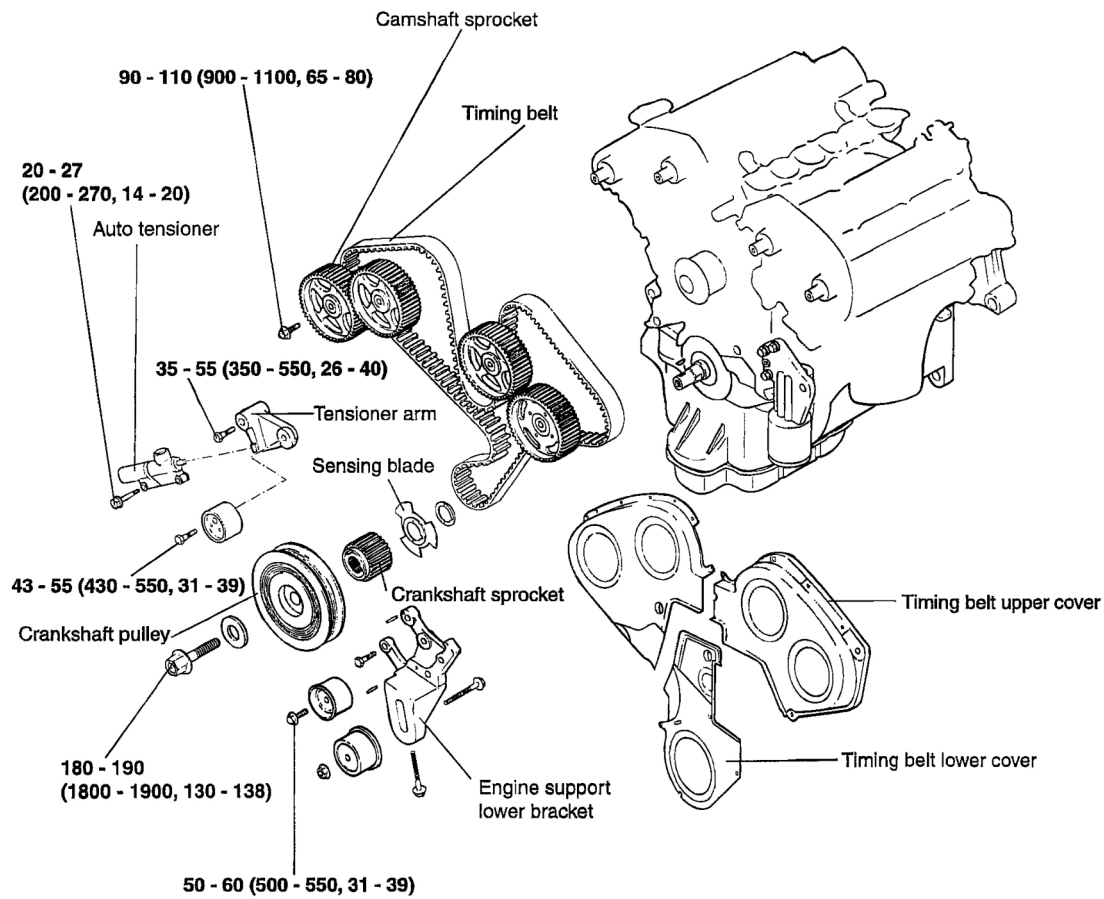
G00320566

Fig. 98: Checking Connecting Rod Side Clearance
Courtesy of KIA MOTORS AMERICA, INC.

TIMING SYSTEM

TIMING BELT

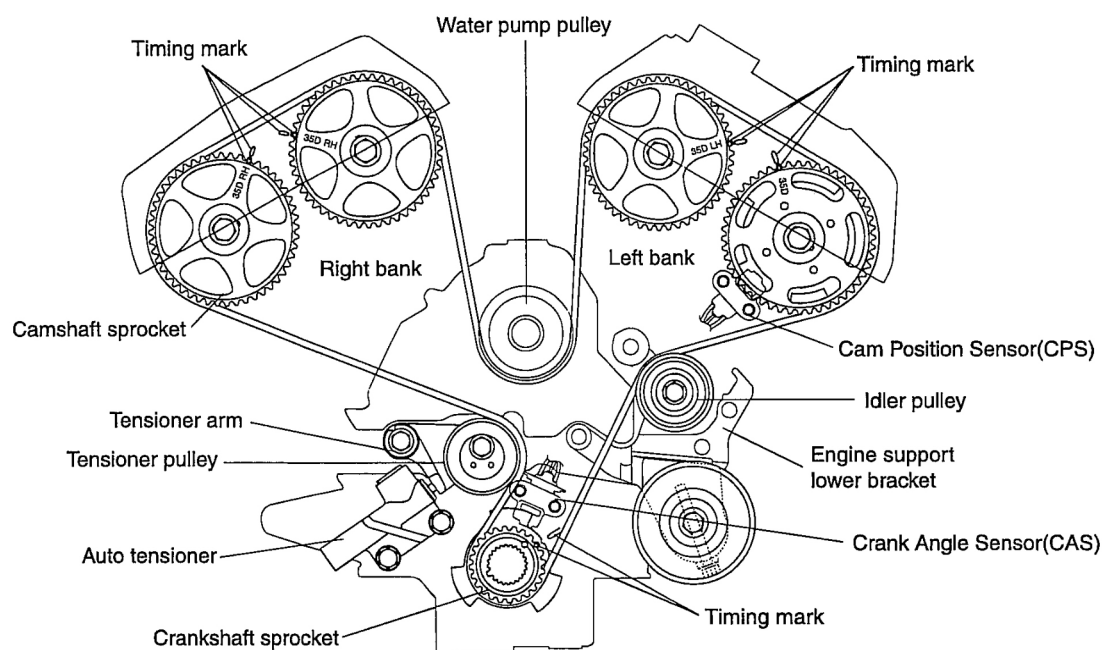
COMPONENTS



TORQUE : Nm (kg.cm, lb.ft)

G00320682

Fig. 99: Timing Belt Components (1 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

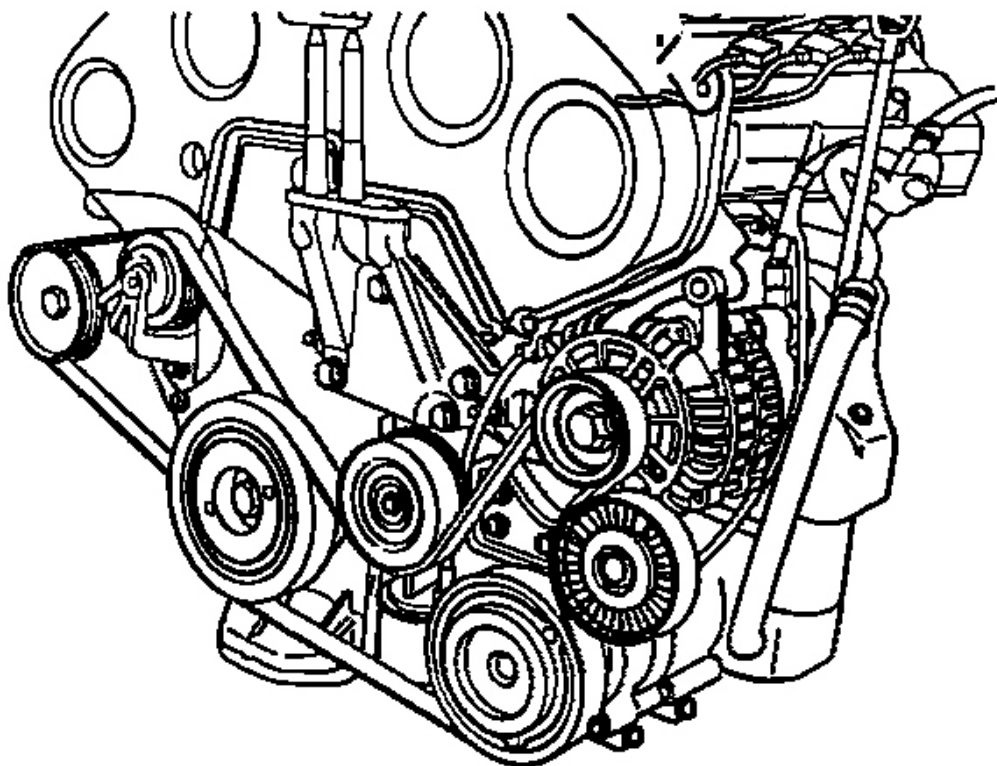


G00320683

Fig. 100: Timing Belt Components (2 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

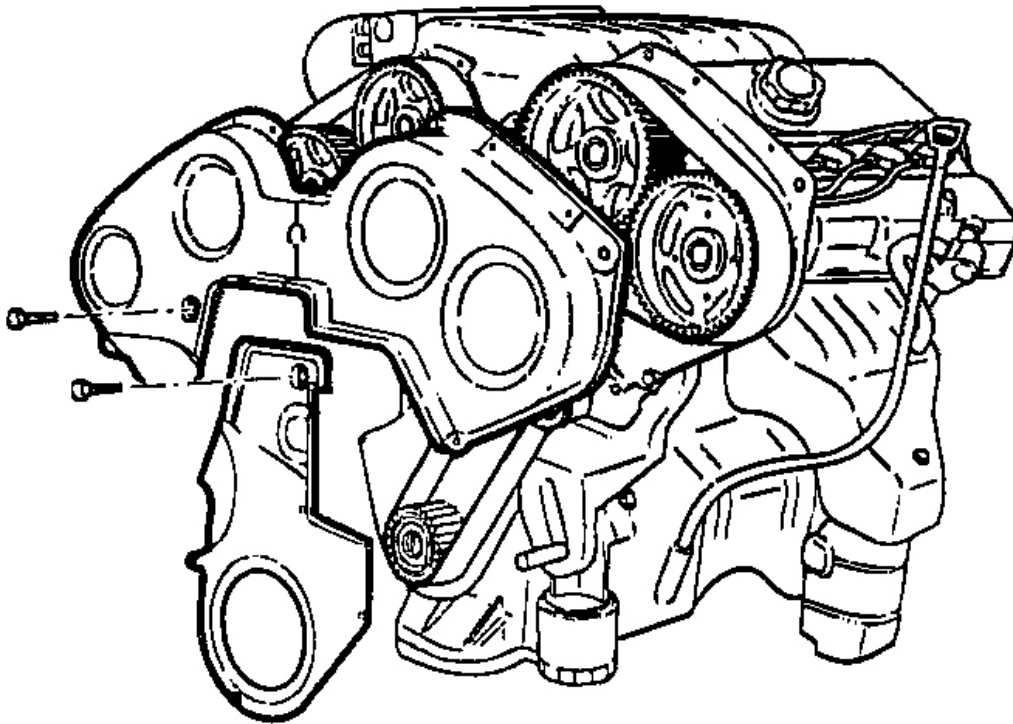
1. Remove the engine cover.
2. Remove the drive belt.
3. Remove the idler pulley, crankshaft pulley, power steering pulley and tensioner pulley.



G00320684

Fig. 101: Removing Idler Pulley, Crankshaft Pulley, Power Steering Pulley & Tensioner Pulley
Courtesy of KIA MOTORS AMERICA, INC.

4. Remove the upper and lower timing belt cover.



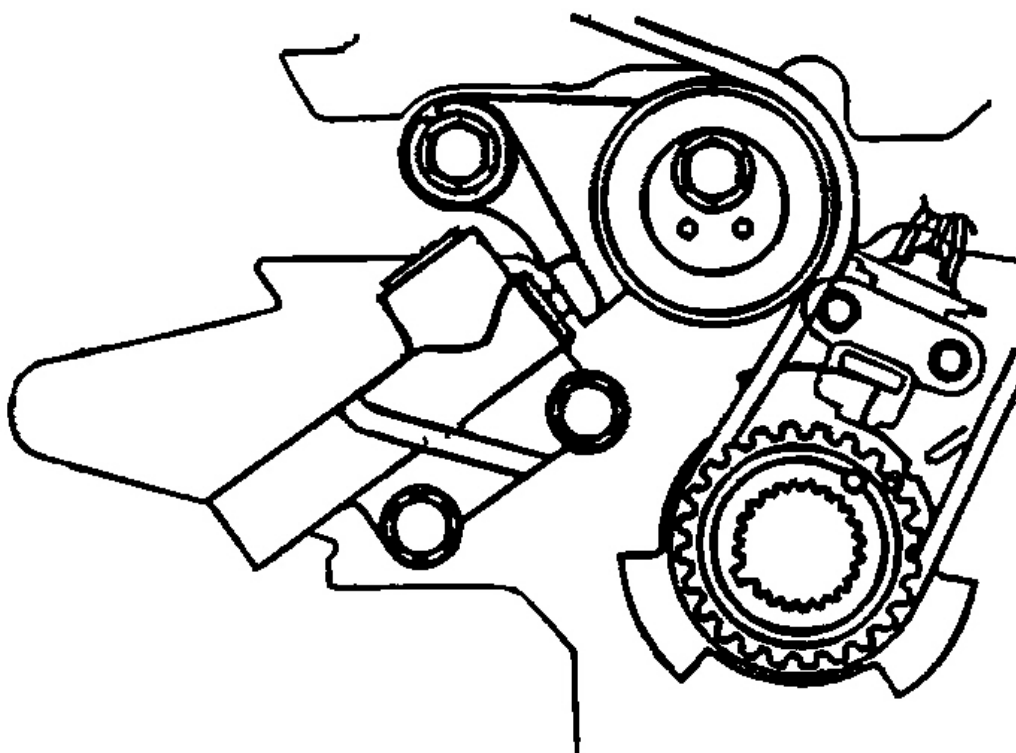
G00320685

Fig. 102: Removing Upper & Lower Timing Belt Cover
Courtesy of KIA MOTORS AMERICA, INC.

5. Support the engine with garage jack or special tool, and then remove the engine mounting insulator.

CAUTION: Take care not to deform the engine oil pan.

6. Remove the auto tensioner.

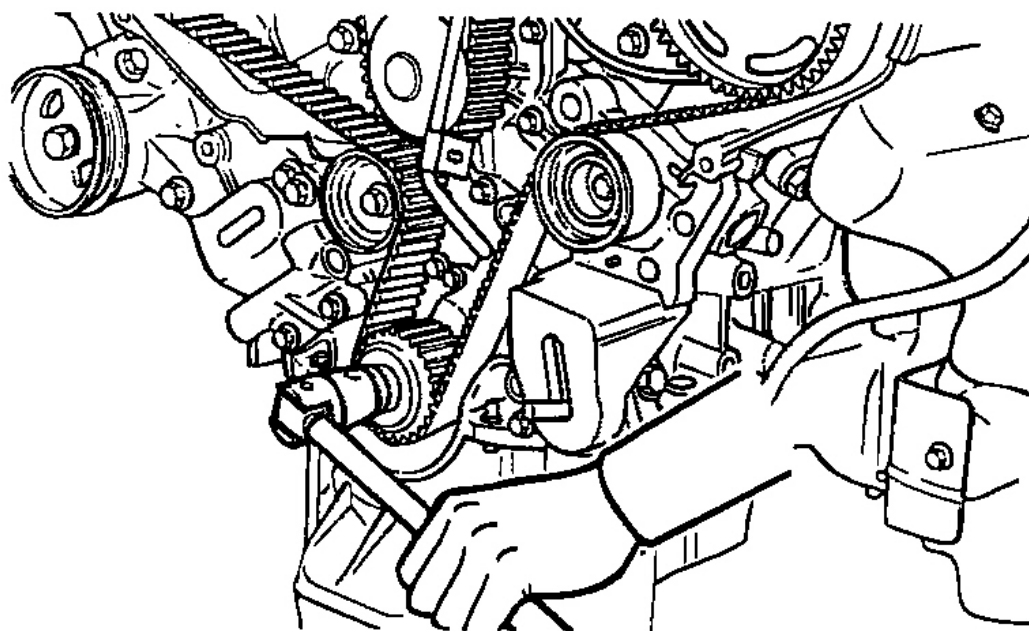


G00320686

Fig. 103: Removing Auto Tensioner
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Rotate the crankshaft clockwise and align the timing mark to get the No. 1 cylinder's piston be in TDC position (compression stroke). At this time, the timing marks of the camshaft sprocket and cylinder head cover should coincide with each other.

7. Remove the timing belt.



G00320687

Fig. 104: Removing Timing Belt

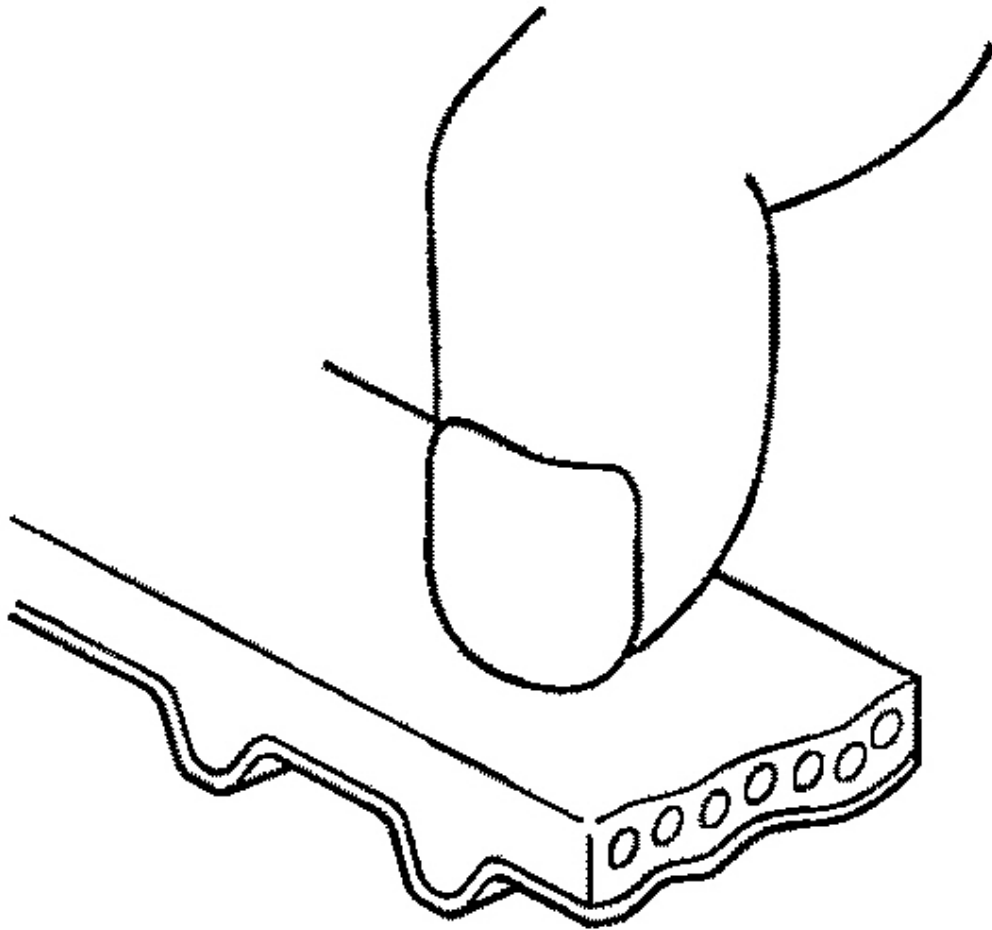
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: When re-using timing belt, make sure of marking the rotating direction on the belt so as to install correctly.

INSPECTION

1. Check the belt carefully and if any damage is found, exchange it with a new one.
 1. Vulcanization of the rubber backside.

The backside is glossy and non-elastic so that, even if a finger nail is forced into it, no mark is produced.



G00320688

Fig. 105: Checking Rubber Backside
Courtesy of KIA MOTORS AMERICA, INC.

2. Crack on the rubber belt surface.

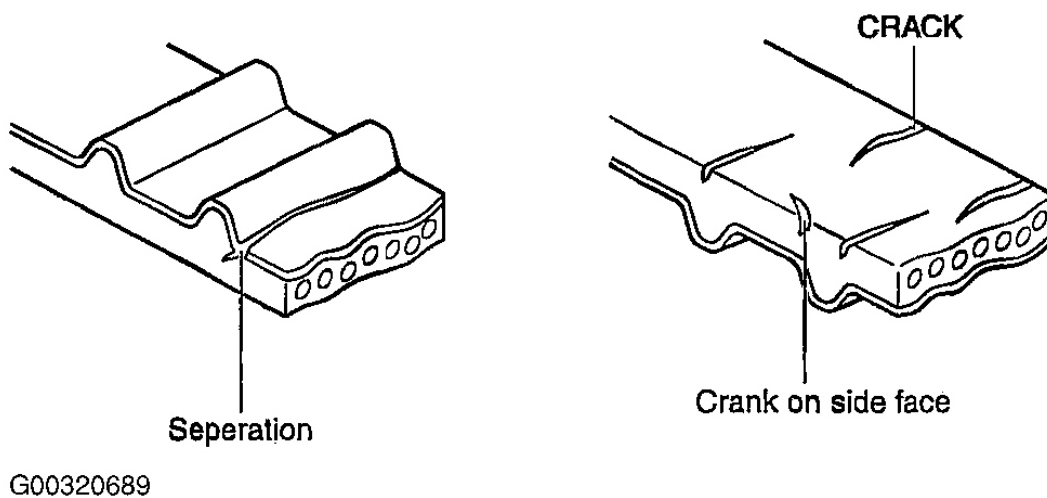
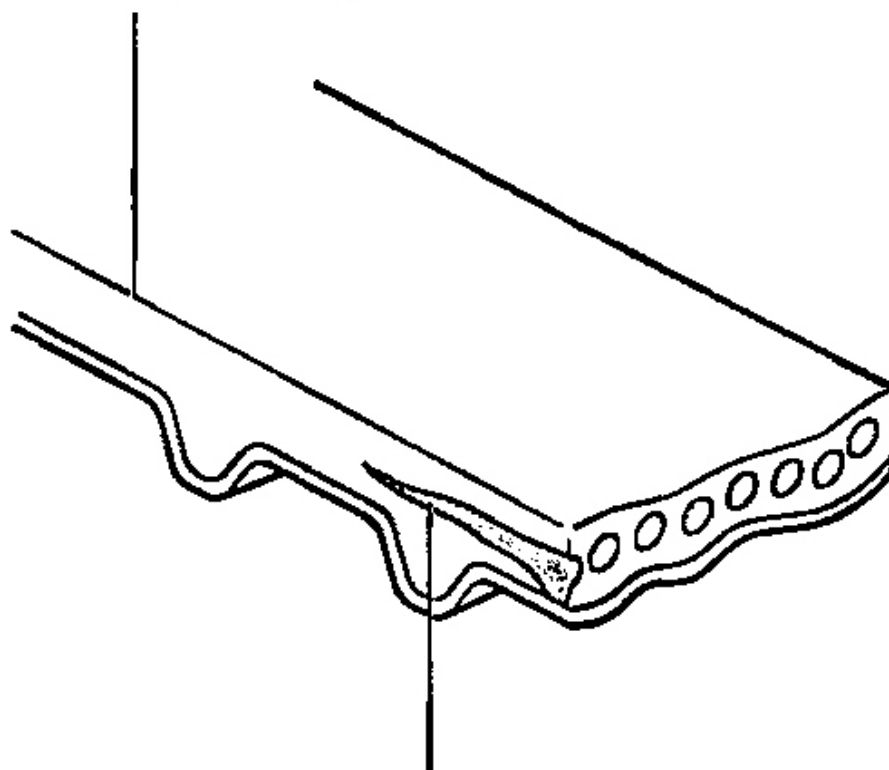


Fig. 106: Checking Crack On Rubber Belt Surface
Courtesy of KIA MOTORS AMERICA, INC.

3. Abnormal wearing of side face of belt.

CAUTION: Belts in good condition seem to be cut by a sharp knife.

Round shaped edge

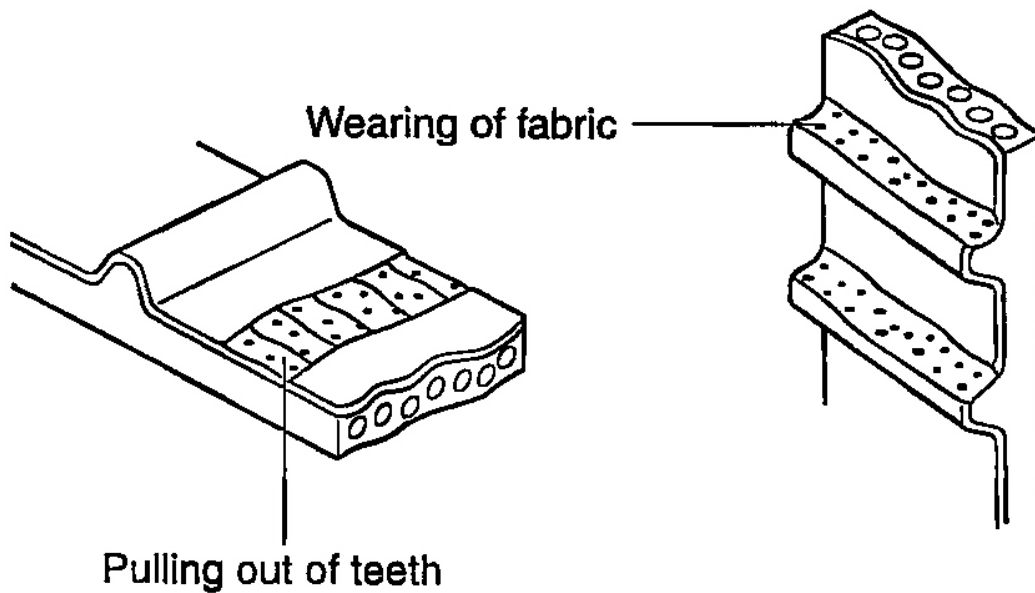


Abnormal wearing

G00320690

Fig. 107: Checking For Abnormal Wearing Of Side Face Of Timing Belt
Courtesy of KIA MOTORS AMERICA, INC.

4. Abnormal tooth wearing.



G00320691

Fig. 108: Checking For Abnormal Tooth Wearing
Courtesy of KIA MOTORS AMERICA, INC.

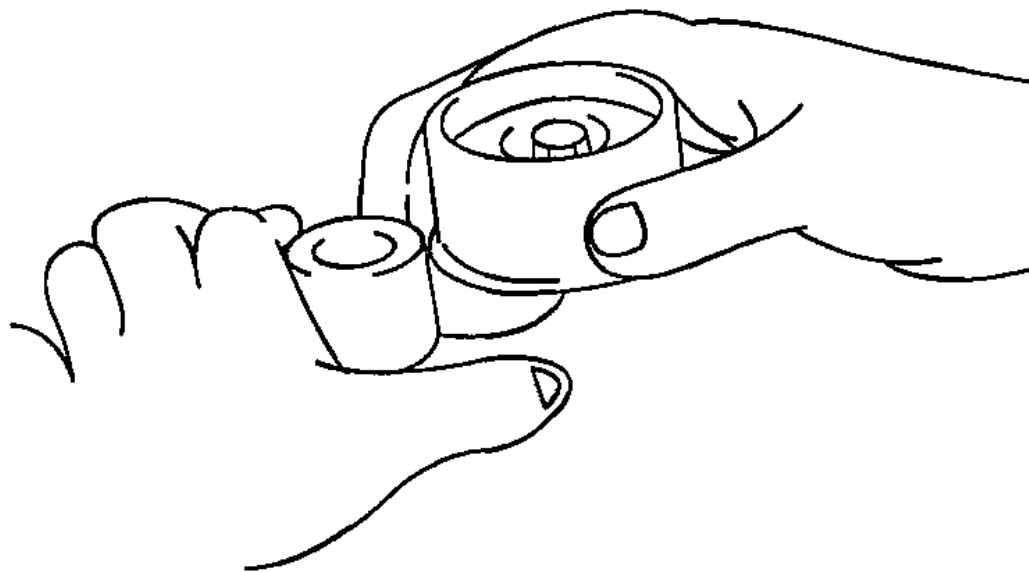
Initial stage

Wearing of side face of load exerting tooth (Fabric puff up, rubber material peel off with color changing to white and fabric become uneven and rough).

Last stage

Fabric wearing of side face of load exerting tooth occurs and rubber is exposed (Length between teeth decrease).

5. Missing tooth.
2. If any abnormal noise or difficulty in rotating the pulley by hand is noticed, replace the timing belt tensioner and idler pulley.



G00320692

Fig. 109: Replacing Timing Belt Tensioner & Idler Pulley
Courtesy of KIA MOTORS AMERICA, INC.

INSTALLATION

1. Install the idler pulley to the engine support lower bracket.

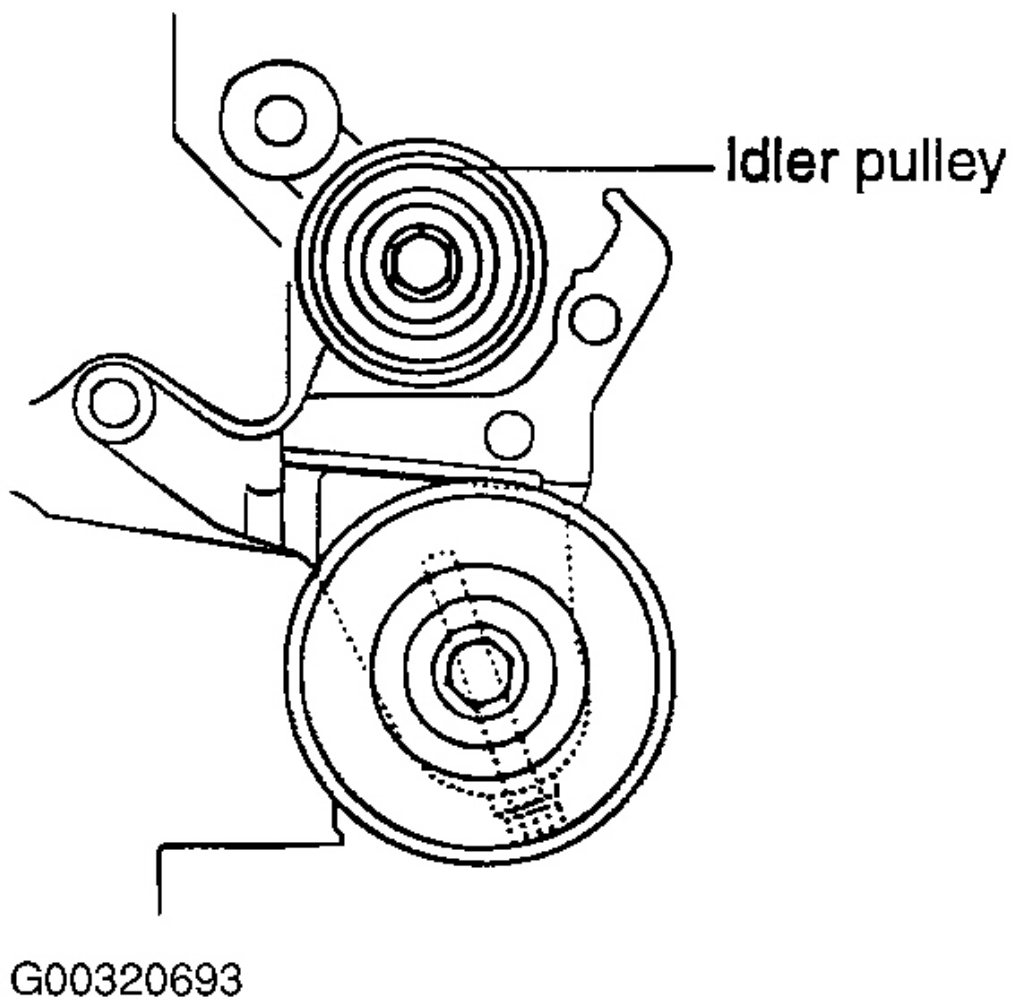
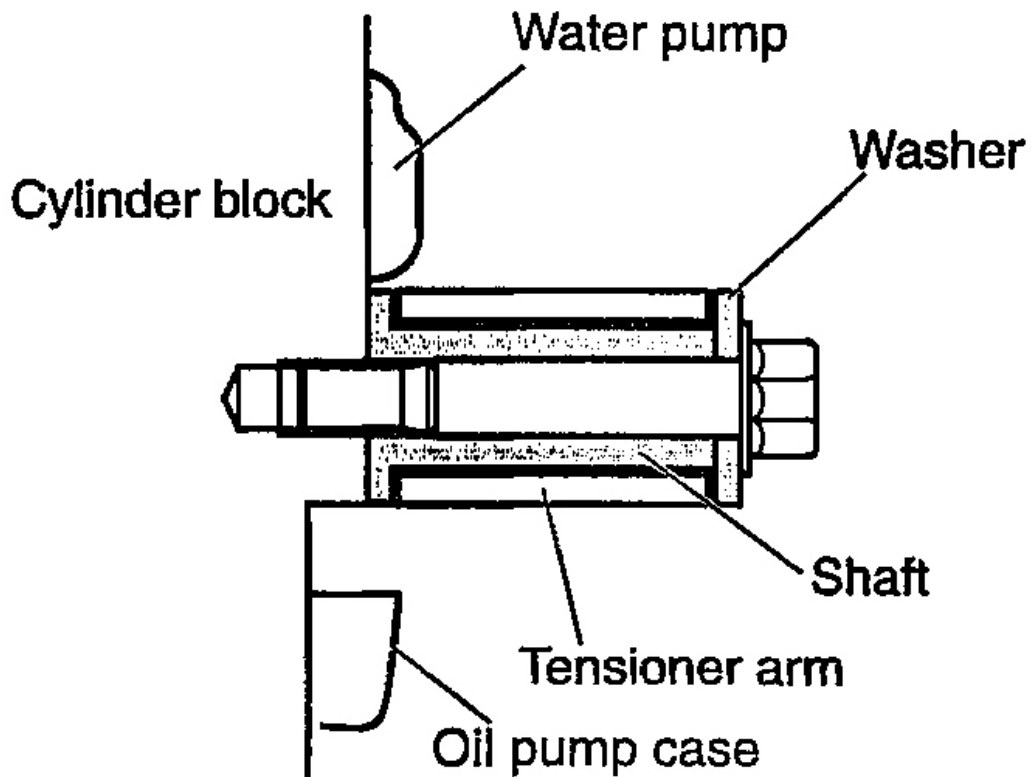


Fig. 110: Installing Idler Pulley To Engine Support Lower Bracket
Courtesy of KIA MOTORS AMERICA, INC.

2. Install the tensioner arm, shaft and plain washer to the cylinder block.

Tightening torque:

35-55 N.m (350-550 kg. cm, 25.82-40.57 lb. ft)

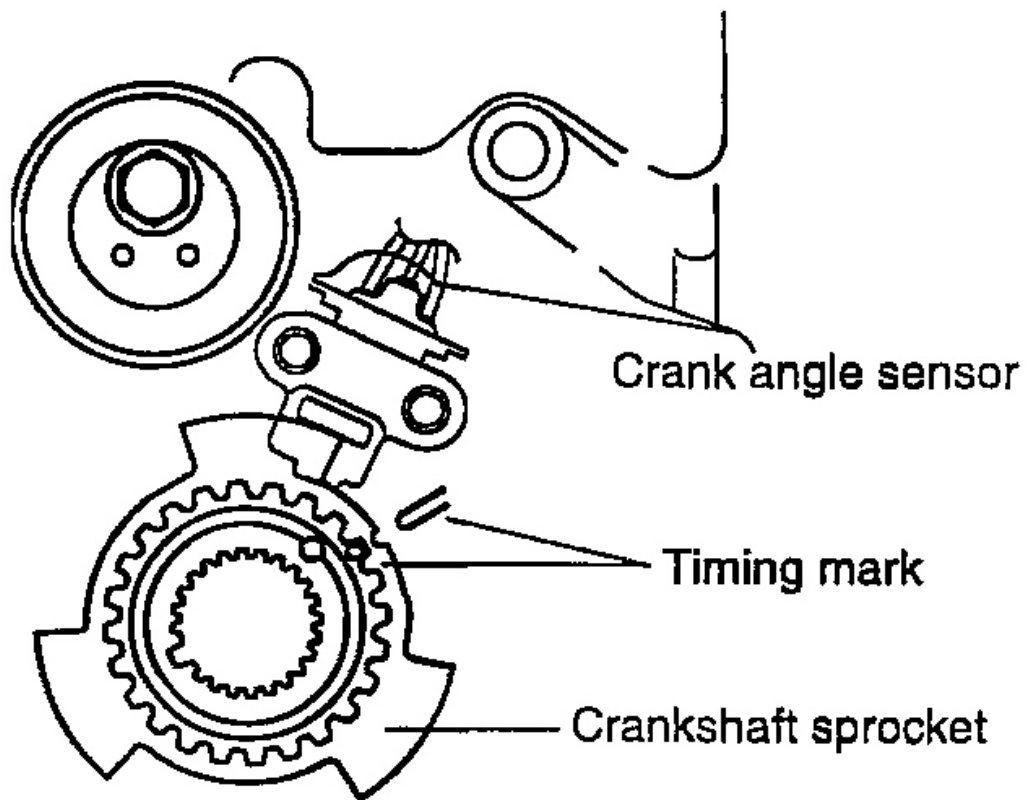


G00320694

Fig. 111: Installing Tensioner Arm, Shaft & Plain Washer To Cylinder Block
Courtesy of KIA MOTORS AMERICA, INC.

3. Install the crankshaft sprocket.

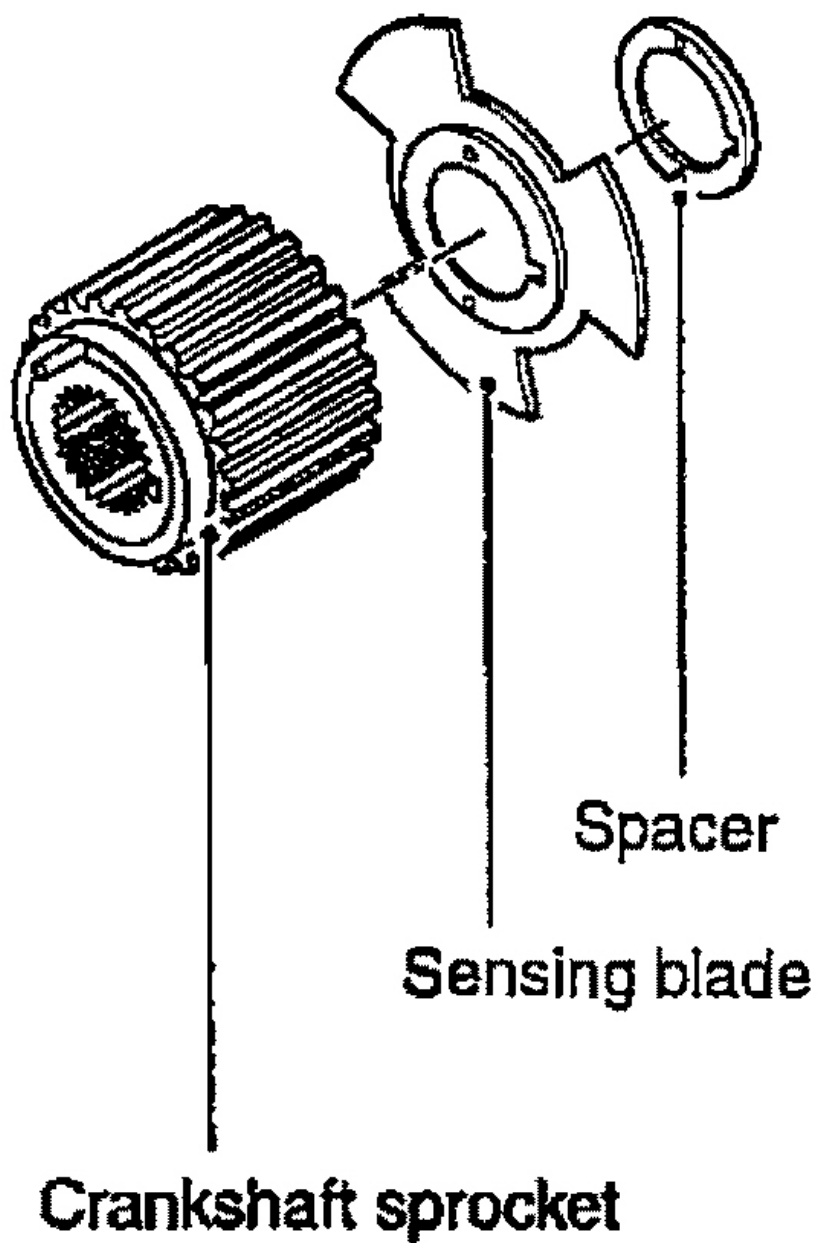
NOTE: Confirm if timing marks coincide with.



G00320695

Fig. 112: Installing Crankshaft Sprocket
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: Align the spacer with a pin, and assemble it exerting even force not to deform the crankshaft sensing blade.



G00320696

Fig. 113: Aligning Spacer With A Pin
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the camshaft sprocket.

Align it like initial state as shown on the picture.

CAUTION: When installing camshaft sprocket, tighten the bolt holding hexagonal part of camshaft to prevent it from turning.

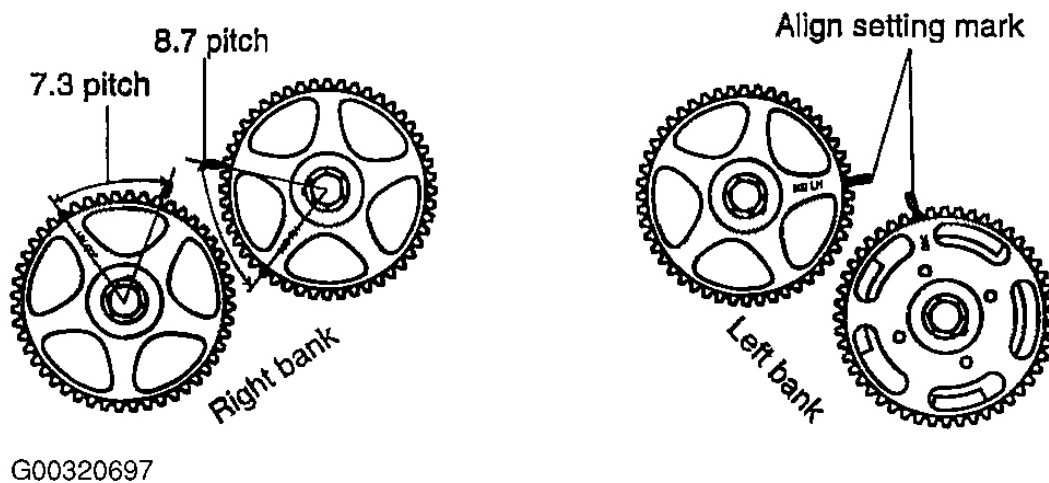
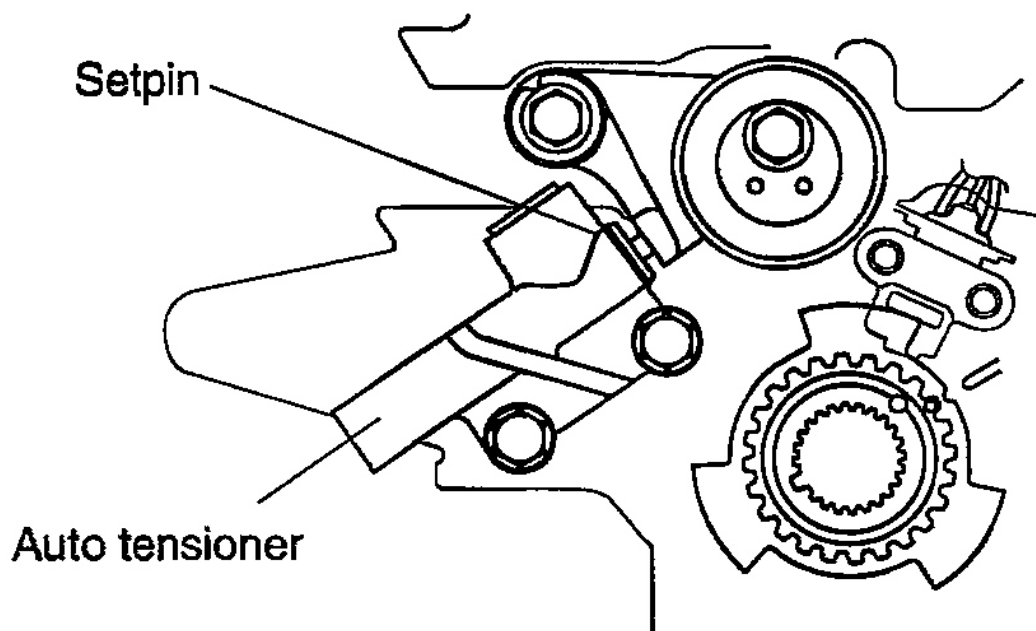


Fig. 114: Installing Camshaft Sprocket
Courtesy of KIA MOTORS AMERICA, INC.

5. Install the auto tensioner to the oil pump case.

CAUTION: At this time the auto tensioner's set pin should be assembled completely.

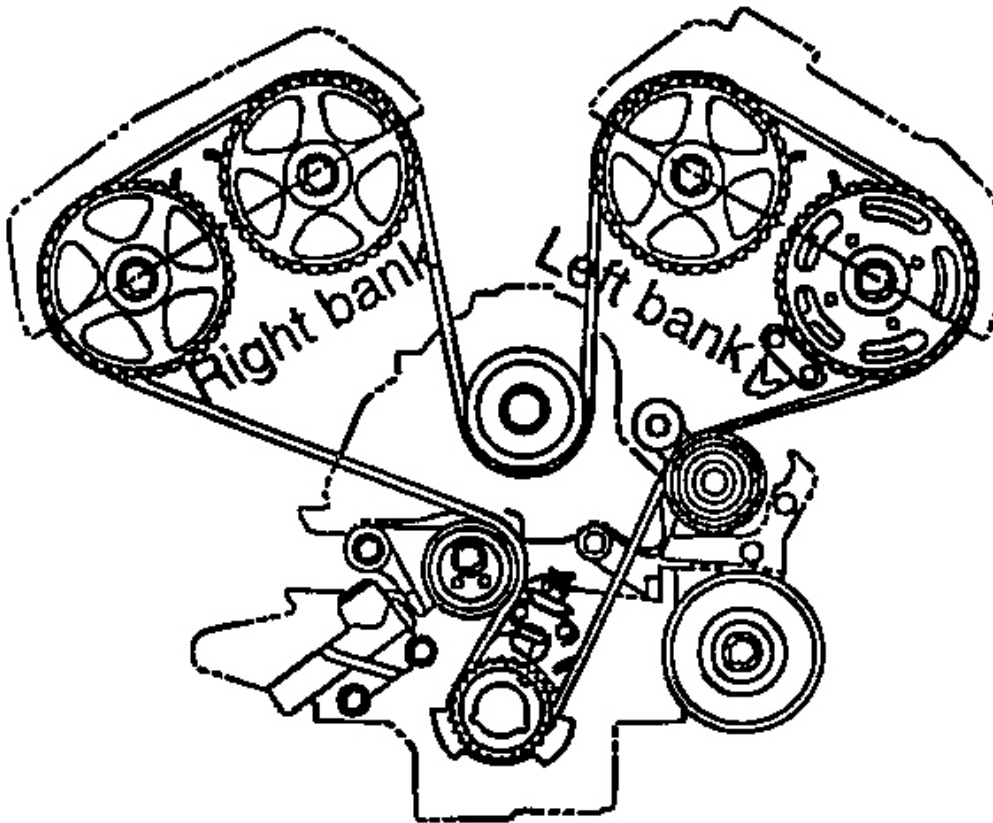


G00320698

Fig. 115: Installing Auto Tensioner To Oil Pump Case
Courtesy of KIA MOTORS AMERICA, INC.

6. Align the timing marks of each sprocket and install the timing belt, maintaining the proper belt tension between each shaft in this order.

Crankshaft sprocket --> Idler pulley --> Left bank exhaust camshaft sprocket --> Left bank intake camshaft sprocket --> Water pump pulley --> Right bank intake camshaft sprocket --> Right bank exhaust camshaft sprocket --> Tensioner pulley.



G00320699

Fig. 116: Installing Timing Belt

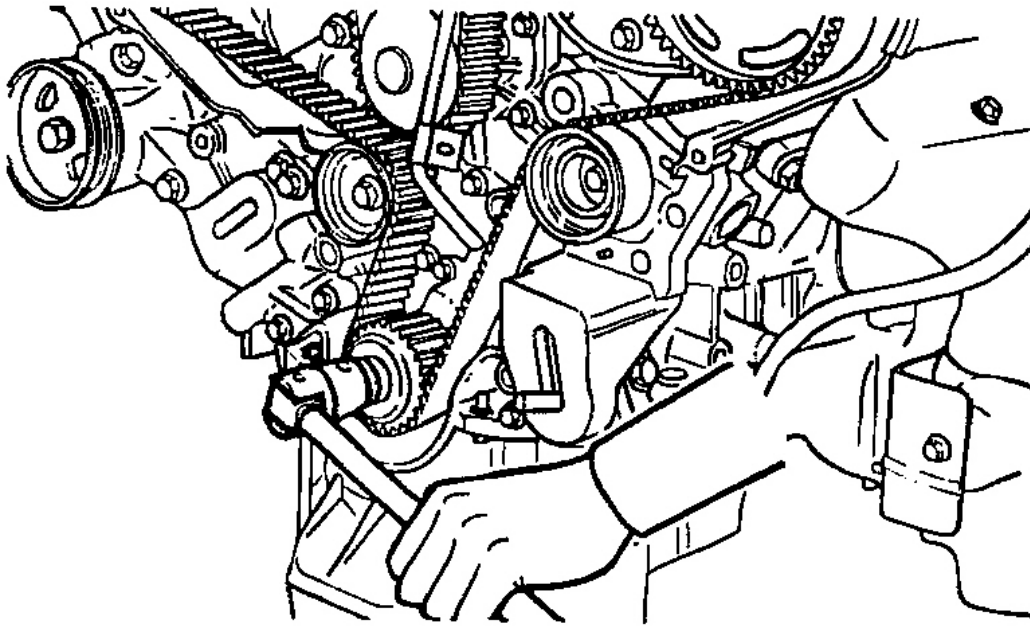
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION:

- As a result of this, position of No. 1 cylinder comes to compression TDC.
- As each camshaft sprocket tends to rotate by itself, pay attention not to injure fingers or other bodily part. Especially be careful with the right bank.
- In case the right bank camshaft sprocket rotates excessively, be cautious not to rotate more than the initial stable position. Always align timing mark of rotating sprocket by turning it reversely. In this case, pay attention not to rotate it reversely from the initial position. (If, with one sprocket fixed at No. 1 compression TDC position, the other sprocket is rotated one

revolution clockwise or counter clockwise, then the intake and exhaust valve might interfere each other.)

7. After installing the timing belt, exert the reverse-directed force to the right bank exhaust camshaft sprocket to give tension on the belt. Holding this state, recheck if each timing mark is correctly positioned.
8. With tensioner pulley slightly pushing the belt down, tighten the center bolts lightly.



G00320700

Fig. 117: Tightening Center Bolts
Courtesy of KIA MOTORS AMERICA, INC.

9. Pull out the auto tensioner set pin.

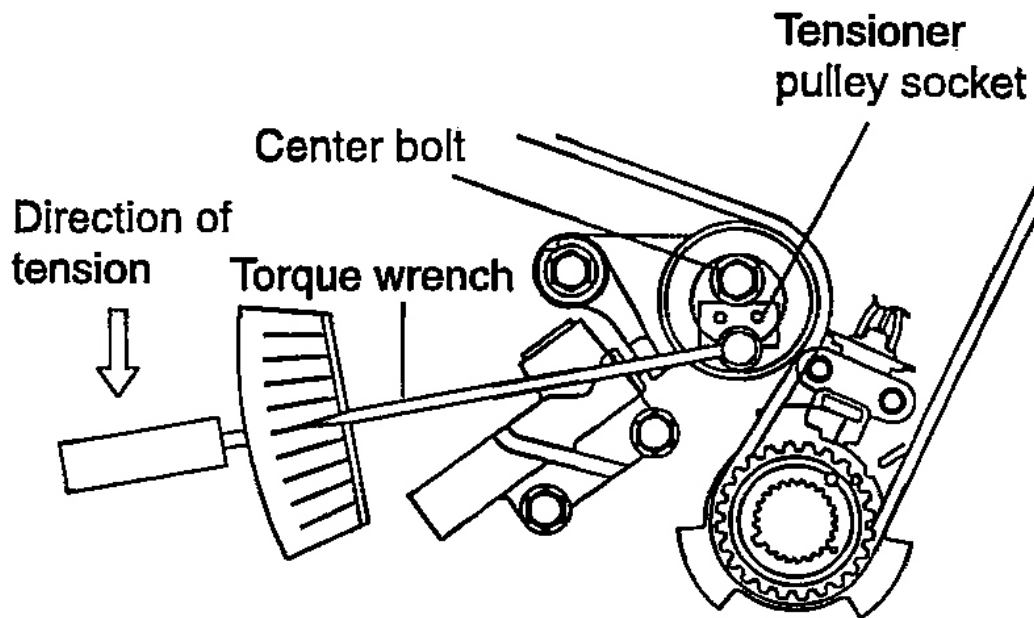
ADJUSTMENTS

1. Tension setting (While auto tensioner is not operating: And set pin being kept installed).
 1. After rotating crankshaft 1/4 revolution reversely, rotate it clockwise to position No. 1 cylinder at TDC.

Then, loosen the center bolt and give the belt 50 kg-cm of tension with tensioner pulley socket (Two pins are attached) and torque wrench. While maintaining this state, tighten the center bolt to the standard torque.

Center bolt standard torque:

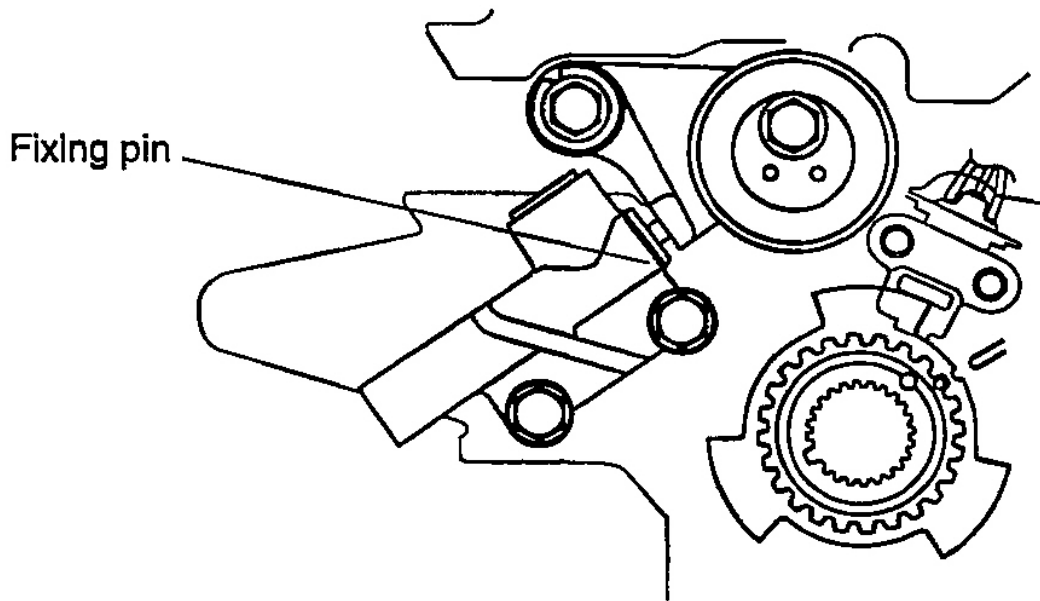
43-55 N.m (430-550 kg. cm, 31.72-40.57 lb. ft)



G00320701

Fig. 118: Rotating Crankshaft
Courtesy of KIA MOTORS AMERICA, INC.

2. Pull out the auto tensioner fixing pin.



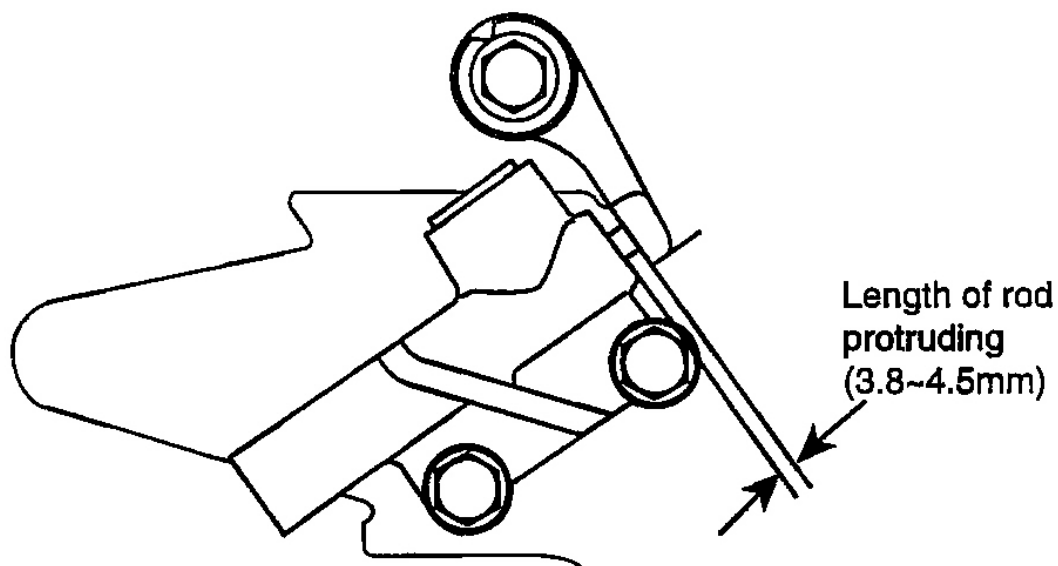
G00320702

Fig. 119: Pulling Out Auto Tensioner Fixing Pin
 Courtesy of KIA MOTORS AMERICA, INC.

2. How to check tension (While auto tensioner is operating: and fixing pin being uninstalled.)
 1. After rotating crankshaft 2 revolutions clockwise to position No. 1 cylinder at TDC, wait for about 5 minutes, and measure the amount of protruding of the auto tensioner rod.

CAUTION: This is "leak down" time for the auto tensioner rod to protrude 1 mm when tension caused by rotation of the crankshaft has changed.

2. Check if the amount of rod protruding is in the range of 3.8-4.5 mm.



G00320703

Fig. 120: Measuring Length Of Rod Protruding
Courtesy of KIA MOTORS AMERICA, INC.

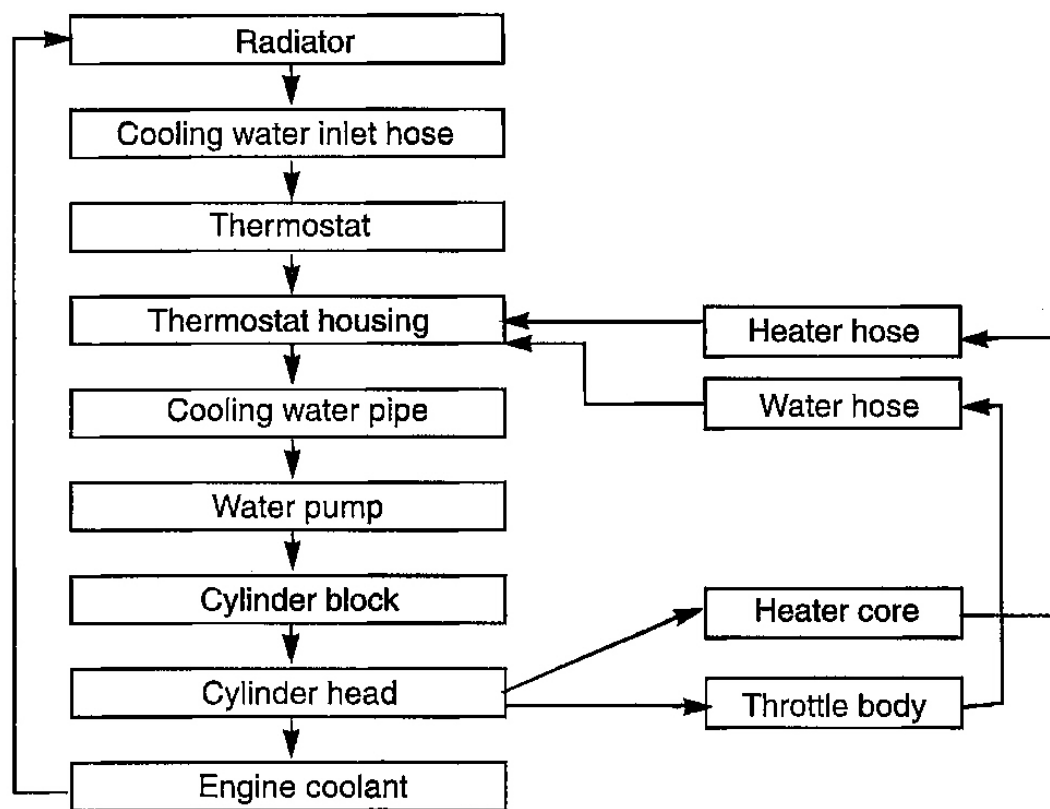
3. Recheck if each sprocket is within the specified range.

NOTE: If it is not within the specified range, repeat from procedure 6 as service procedure of timing belt and auto tensioner installation method.

COOLING SYSTEM

GENERAL

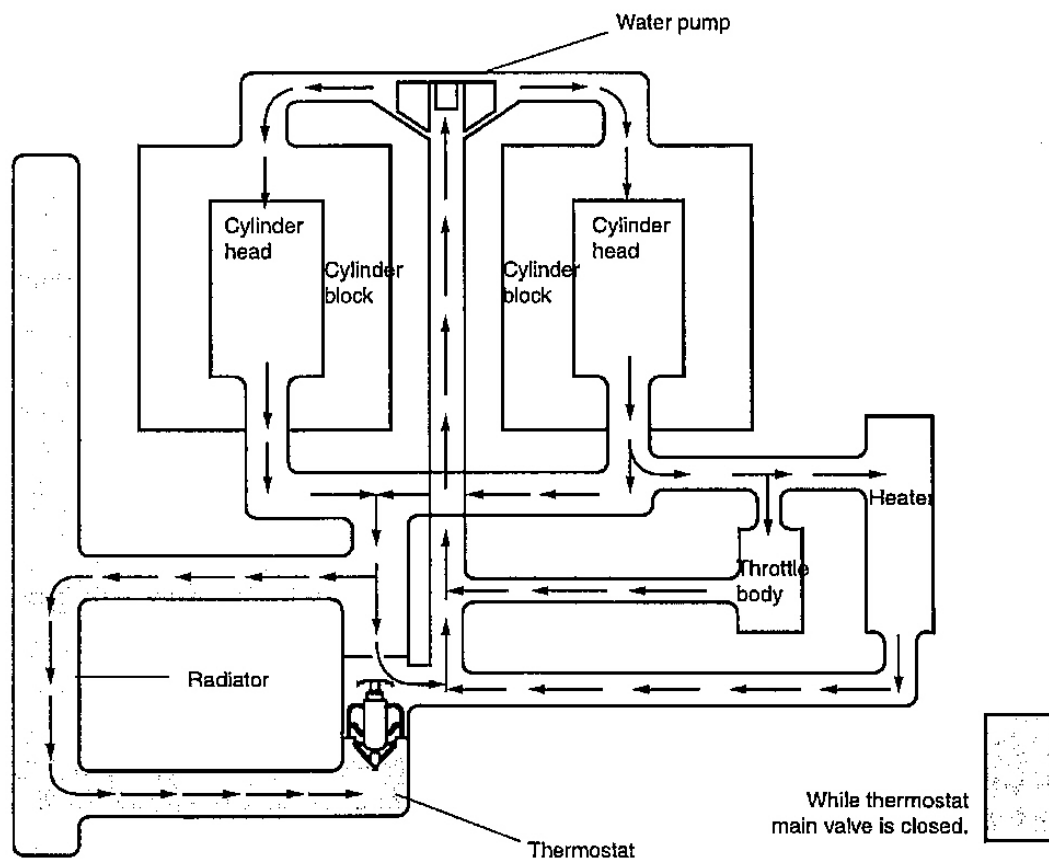
INLET CONTROL



G00320589

Fig. 121: Cooling System Inlet Control
Courtesy of KIA MOTORS AMERICA, INC.

FLOW CHART

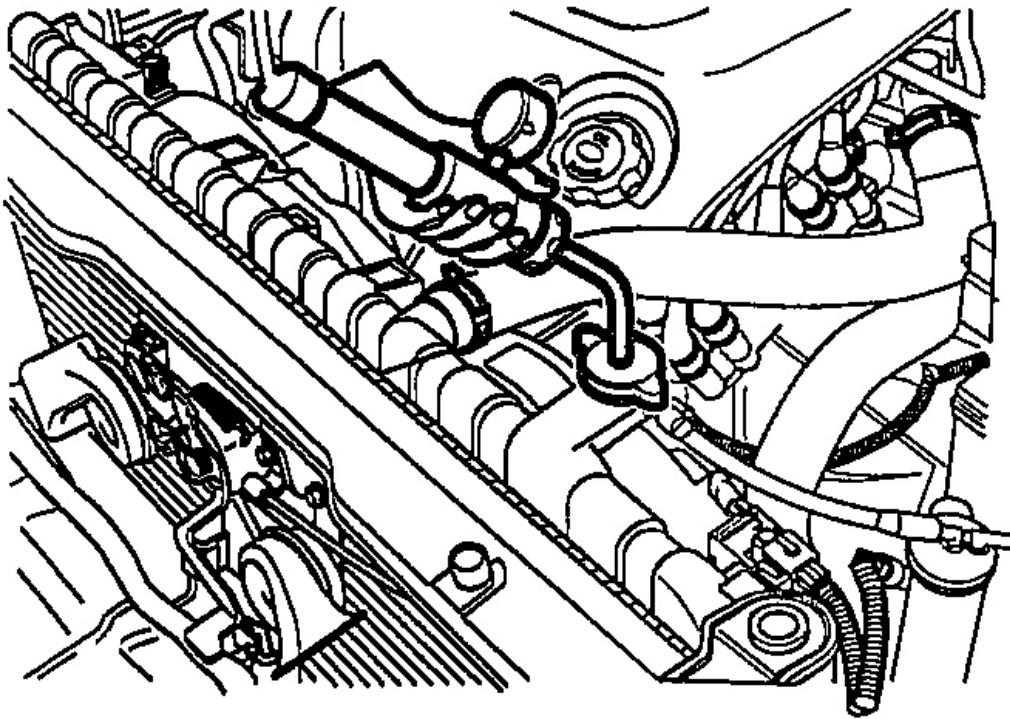


G00320590

Fig. 122: Cooling System Flow Chart
Courtesy of KIA MOTORS AMERICA, INC.

COOLANT LEAK CHECK

1. Loosen the radiator cap.
2. Confirm that the coolant level is up to the filler neck.
3. Install a radiator cap tester to the radiator filler neck and apply 21.76 psi (1.53 kg/cm²) pressure. Hold for two minutes in that condition, while checking, hose or connections.



G00320591

Fig. 123: Checking Coolant Leak

Courtesy of KIA MOTORS AMERICA, INC.

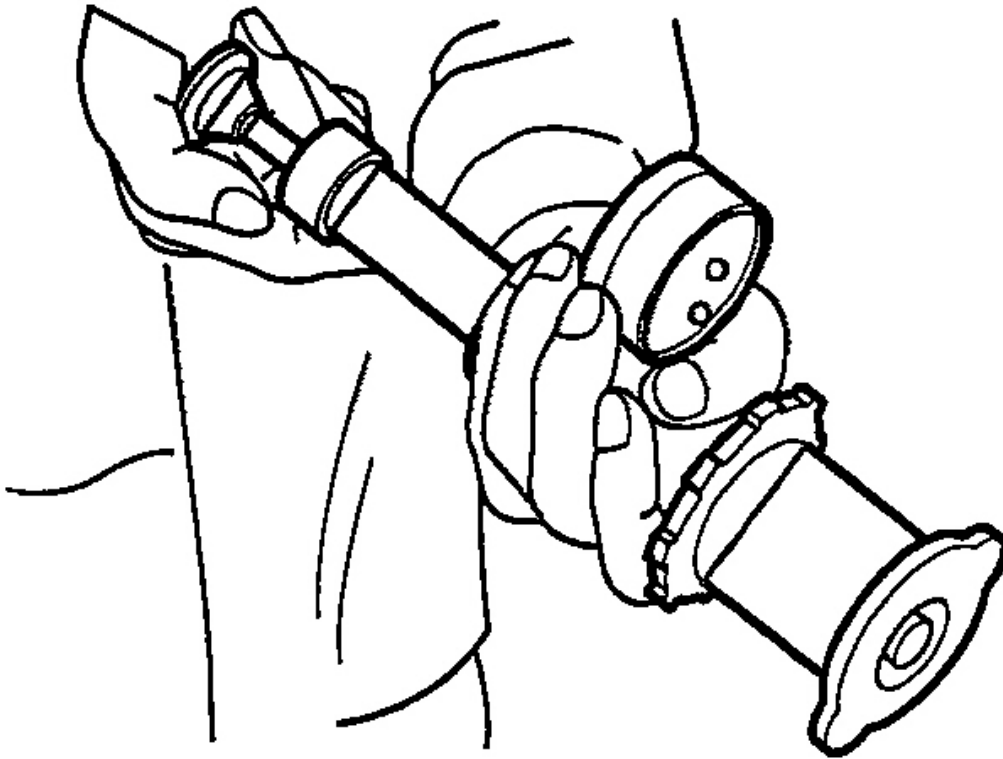
CAUTION:

- Radiator coolant may be extremely hot. Do not open the system while hot, or scalding Engine coolant could spray out causing personal injury. Allow the vehicle to cool before servicing this system.
- Be sure to completely clean away any moisture from the places checked.
- When the tester is removed, be careful not to spill any coolant from it.
- Be careful, when installing and removing the tester and when testing, not to deform the filler neck of the radiator.

4. If there is any leakage, repair or replace the appropriate part.

RADIATOR CAP PRESSURE TEST

1. Use an adapter to attach the cap to the tester.



G00320592

Fig. 124: Radiator Cap Pressure Test
Courtesy of KIA MOTORS AMERICA, INC.

2. Increase the pressure until the indicator of the gauge stops moving.

Main valve opening pressure:

86.1-124.5 kPa (0.98-1.27 kg/cm²

13.94-18.069 psi)

Main valve closing pressure:

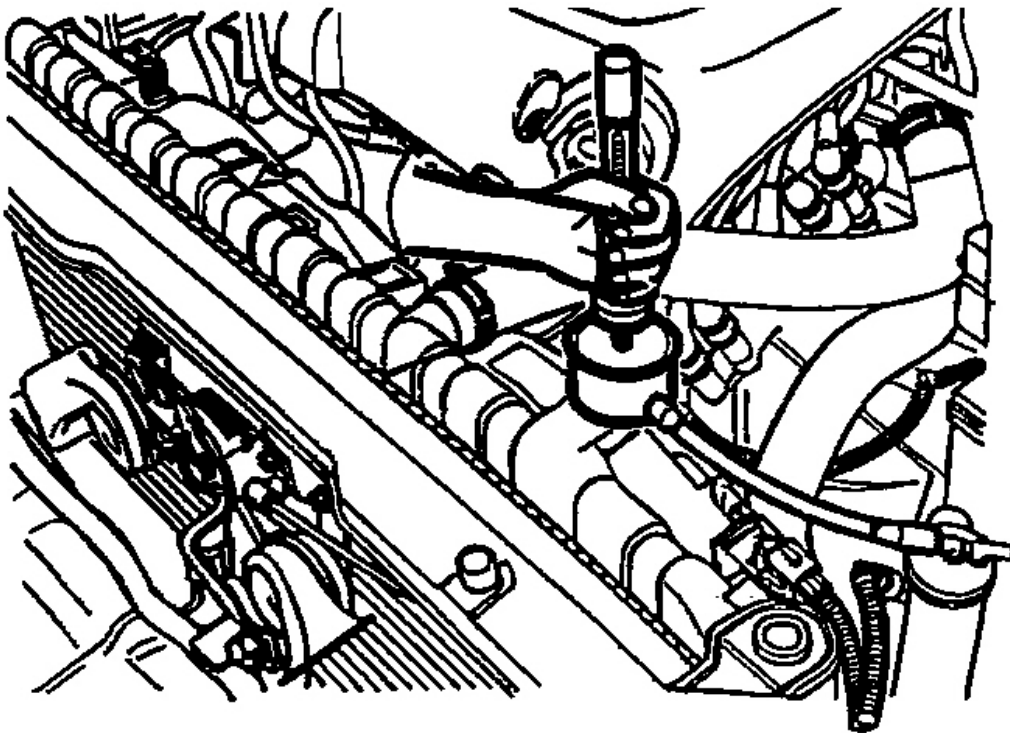
83.4 kPa (0.85 kg/cm² 12.1 psi)

3. Check that the pressure level is maintained at or above the limit.
4. Replace the radiator cap if the reading does not remain at or above the limit.

NOTE: Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.

SPECIFIC GRAVITY TEST

1. Measure the specific gravity of the coolant with a hydrometer.



G00320593

Fig. 125: Measuring Specific Gravity Of Coolant
Courtesy of KIA MOTORS AMERICA, INC.

2. Measure the coolant temperature, and calculate the concentration from the relation between the specific gravity and temperature, using the following table for reference.

RELATION BETWEEN CONCENTRATION AND SPECIFIC GRAVITY OF COOLANT

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

Coolant temperature (°C) and specific gravity					Freezing temperature (°C)	Safe operation temperature (°C)	Coolant concentration (specific volume)
10	20	30	40	50			
1.054	1.050	1.046	1.042	1.036	-16	-11	30%
1.063	1.059	1.054	1.049	1.044	-20	-15	35%
1.071	1.067	1.062	1.057	1.052	-25	-20	40%
1.079	1.074	1.069	1.064	1.058	-30	-25	45%
1.087	1.082	1.076	1.070	1.064	-36	-31	50%
1.095	1.090	1.084	1.077	1.070	-42	-37	55%
1.103	1.098	1.092	1.084	1.076	-50	-45	60%

G00320594

Fig. 126: Identifying Relation Between Concentration & Specific Gravity Of Coolant
Courtesy of KIA MOTORS AMERICA, INC.

Example

If specific gravity is 1.058 when coolant temperature is 20°C, the safe operating temperature is -15°C.

CAUTION: If the concentration of the coolant is below 30%, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60%, both the anti-freeze and engine cooling properties will decrease, affect the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range. Do not use together with another brand.

RECOMMENDED COOLANT

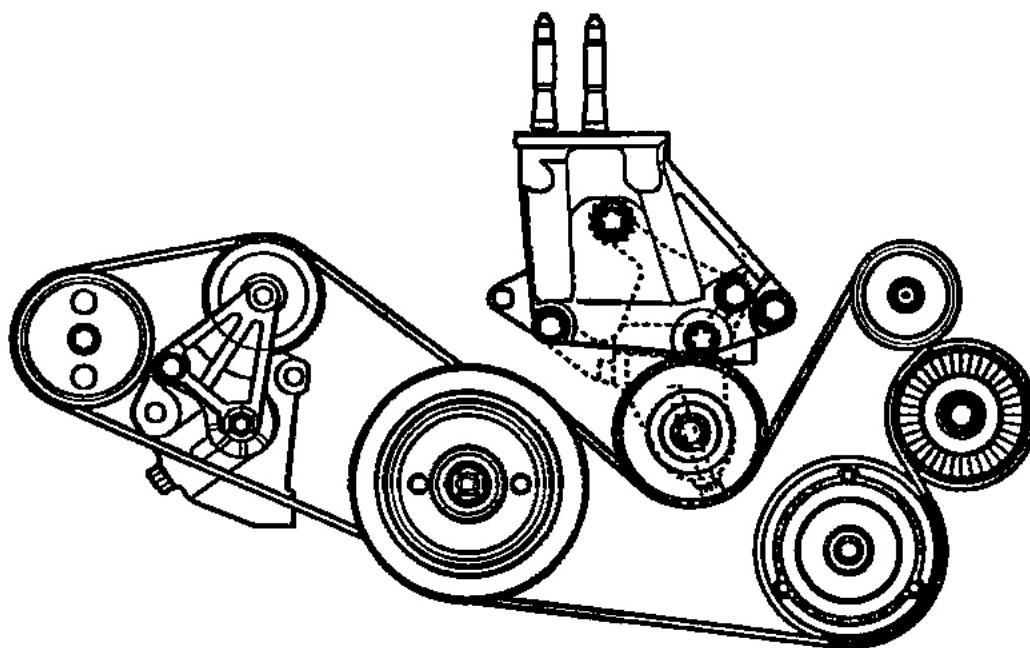
Anti-freezer	Concentration of anti-freezer in coolant
Ethylene glycol for aluminum	40 - 50 %

G00320595

Fig. 127: Recommended Coolant Table
Courtesy of KIA MOTORS AMERICA, INC.

ACCESSORY DRIVE BELTS

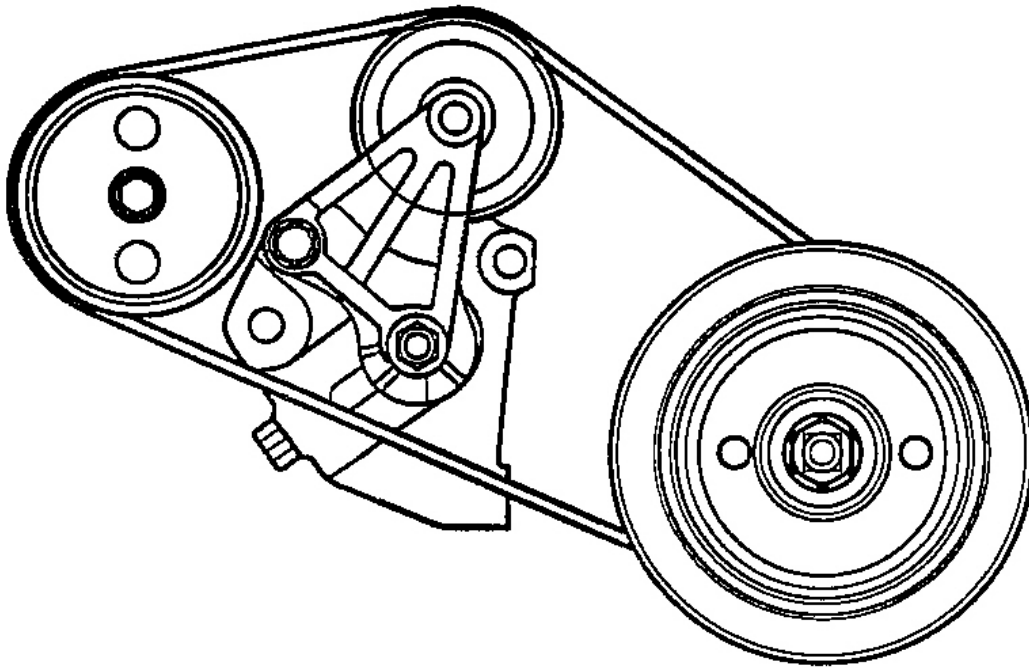
DRIVE BELT AND TENSION ADJUSTMENT



G00320596

Fig. 128: Adjusting Drive Belt & Tension
Courtesy of KIA MOTORS AMERICA, INC.

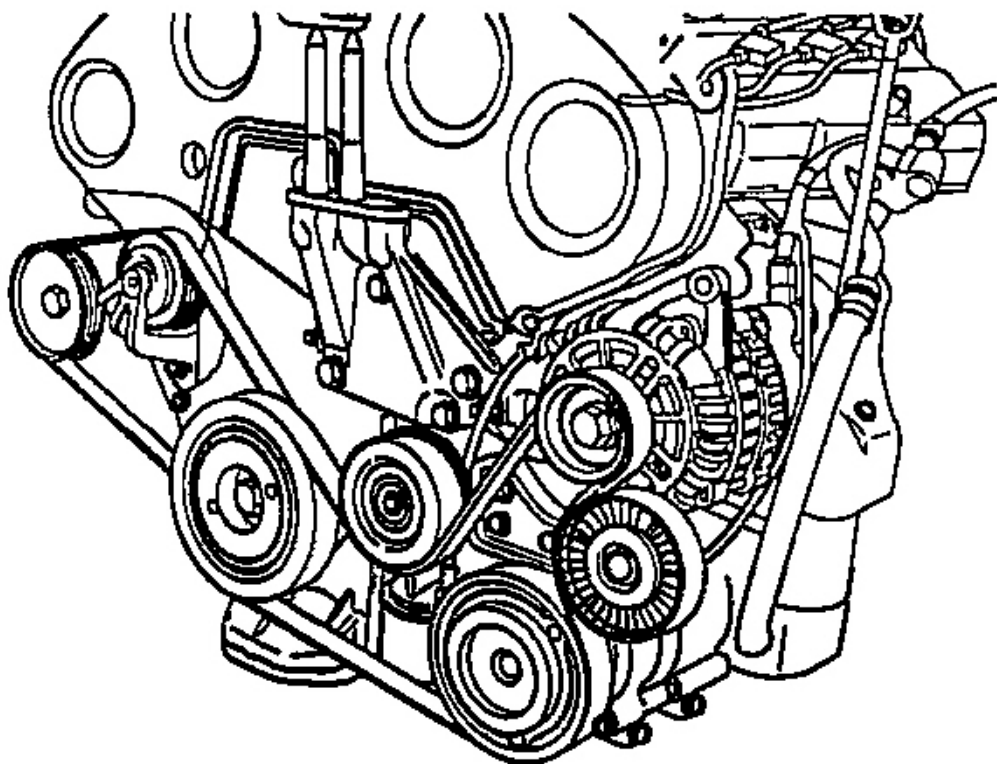
1. Install the power steering belt.



G00320597

Fig. 129: Installing Power Steering Belt
Courtesy of KIA MOTORS AMERICA, INC.

2. Install the drive belt.



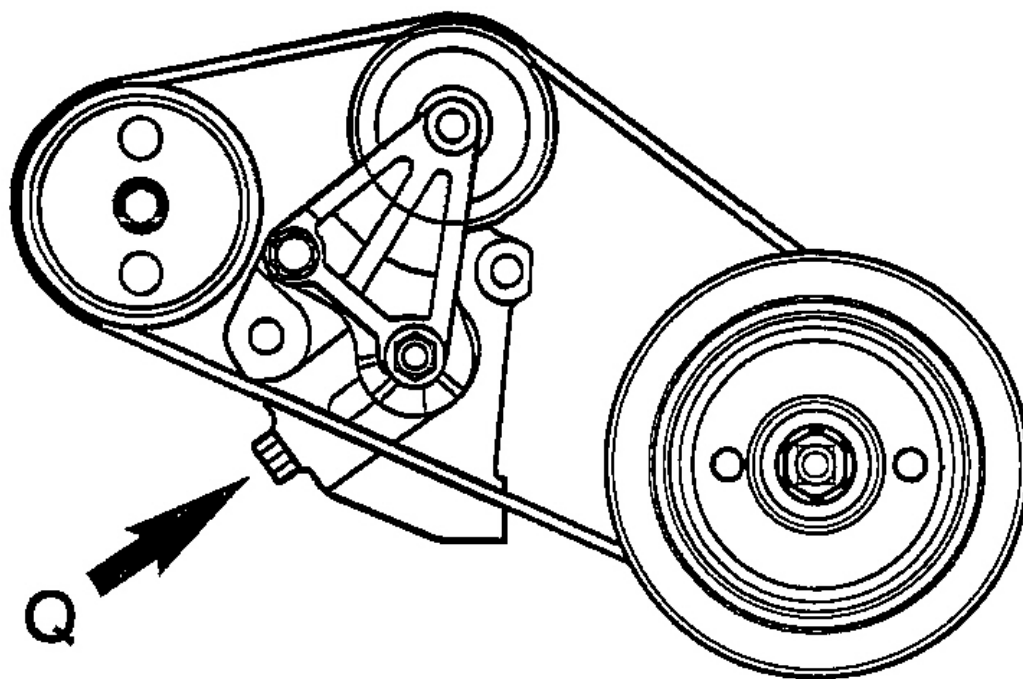
G00320598

Fig. 130: Installing Drive Belt

Courtesy of KIA MOTORS AMERICA, INC.

3. After installing the belt loosening the adjustment bolt counter clockwise at the "Q" arrow indication, apply tension to the belt by tightening the bolt clockwise.

NOTE: When adjusting belt tension, adjust it only after tightening the bolt lightly not making tension pulley eccentric.



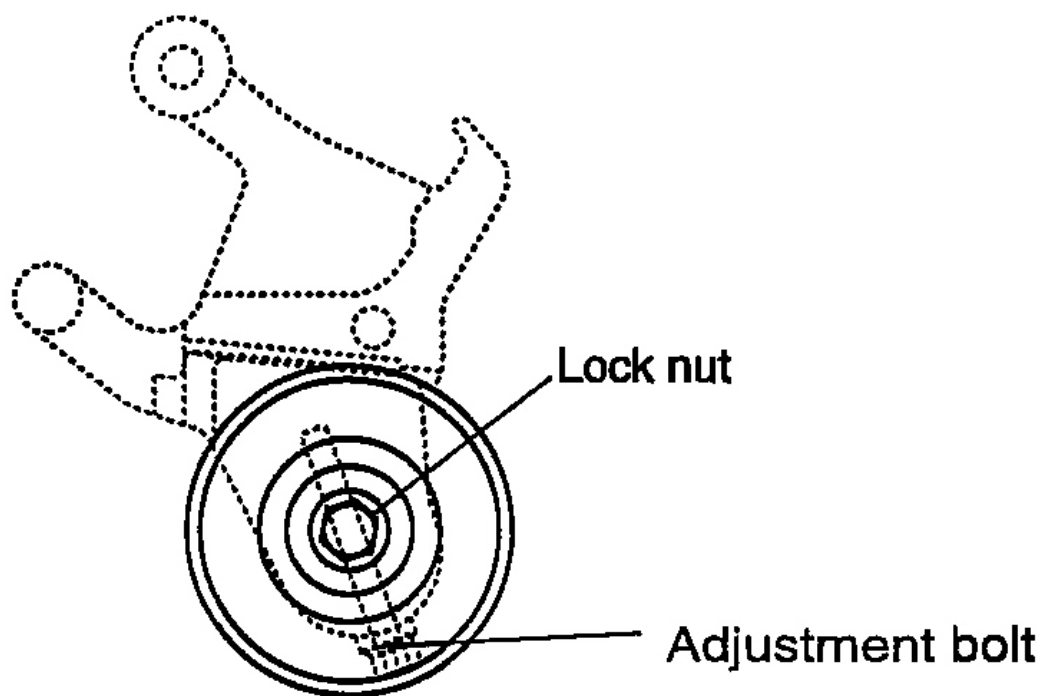
G00320599

Fig. 131: Applying Tension To Drive Belt
Courtesy of KIA MOTORS AMERICA, INC.

4. Adjusting drive belt tension.

Tightening torque:

45-50 N.m (450-500 kg. cm, 33.19-36.88 lb. ft)

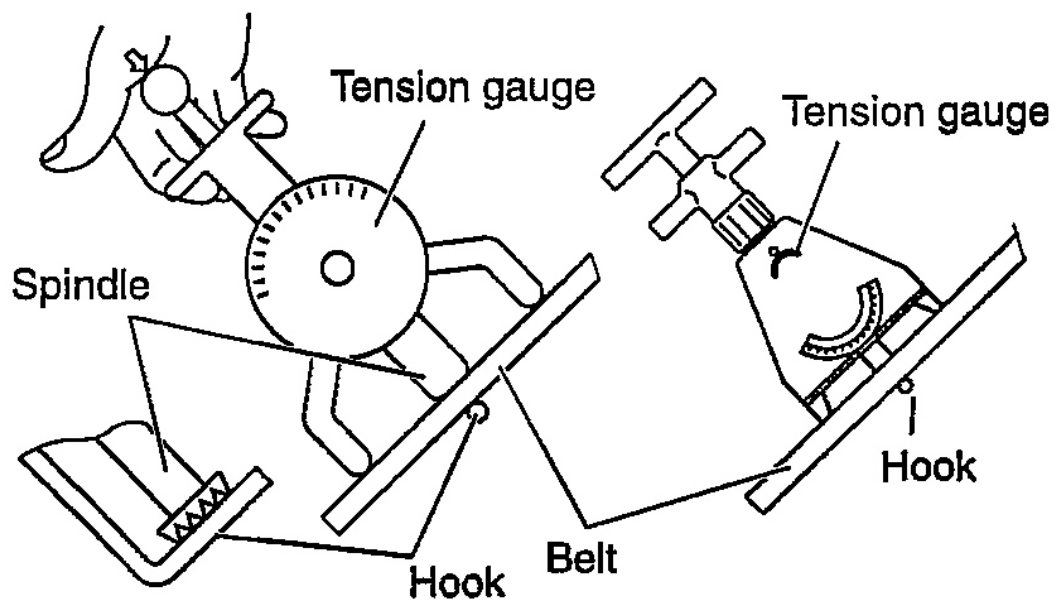


G00320600

Fig. 132: Adjusting Drive Belt Tension
Courtesy of KIA MOTORS AMERICA, INC.

MEASUREMENT METHOD OF BELT TENSION

Insert the belt between spindle and hook holding the tension gauge by hand. Then release the tension gauge and read the value.

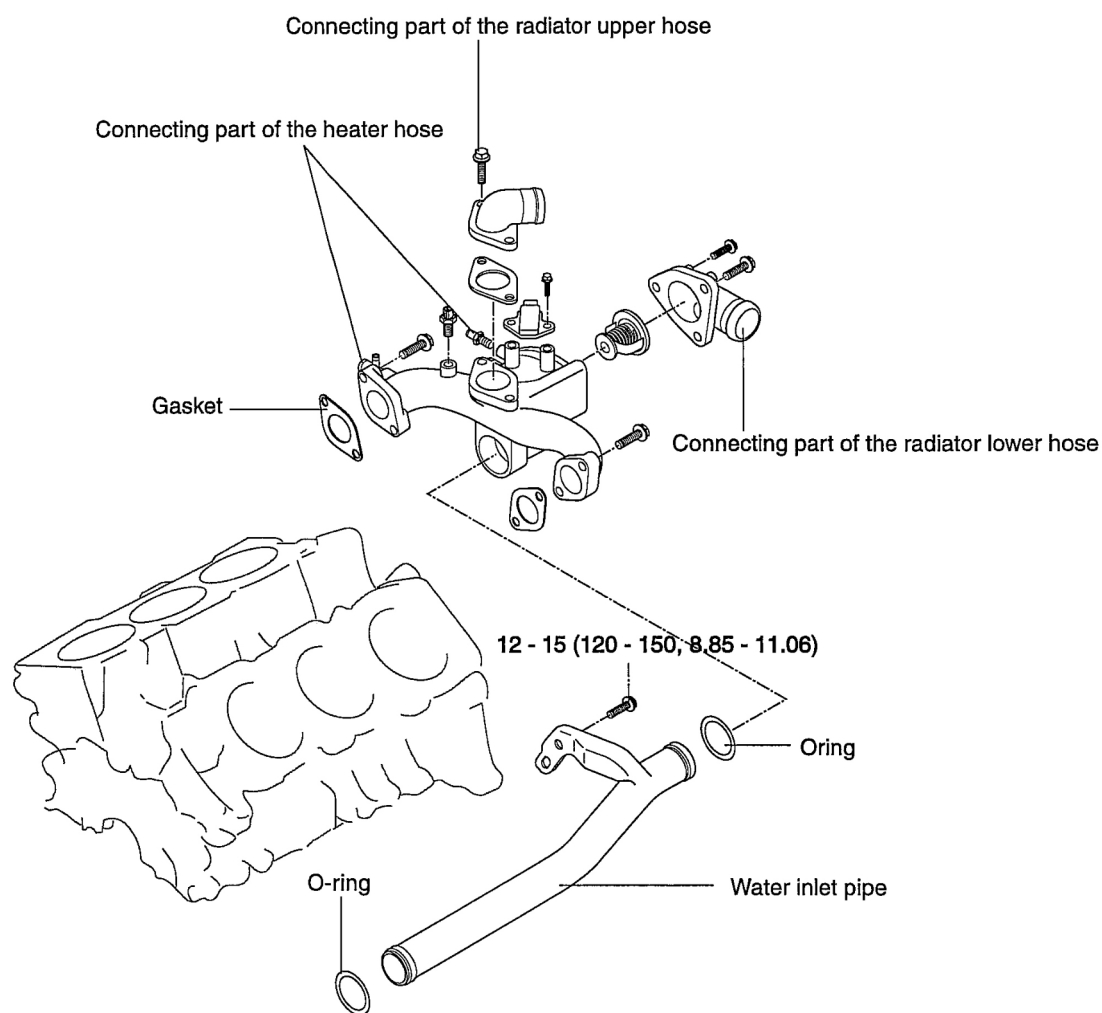


G00320601

Fig. 133: Measurement Method Of Belt Tension
Courtesy of KIA MOTORS AMERICA, INC.

ENGINE COOLANT HOSE/PIPES

COMPONENTS



TORQUE : N·m(kg·cm, lb·ft)

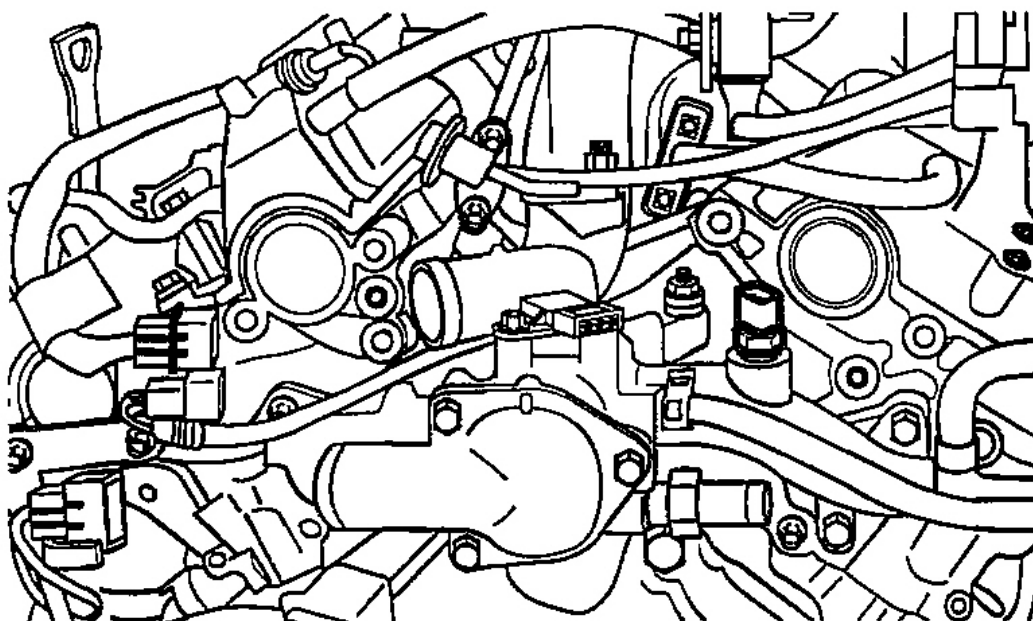
G00320602

Fig. 134: Engine Coolant Hose Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

WATER TEMPERATURE GAUGE UNIT AND SENSOR

1. Drain the cooling water to the bottom level of the gauge unit.
2. After disconnecting the battery ground cable, disconnect engine harness.
3. Remove the water temperature gauge unit and sensor.



G00320603

Fig. 135: Removing Water Temperature Gauge Unit & Sensor
Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

ENGINE COOLANT HOSE/PIPES

Check that there are cracks, damages, or blockage on the water hose and pipe, and replace if necessary.

WATER TEMPERATURE GAUGE UNIT AND SENSOR

1. Water temperature gauge unit.
 1. Heat up the water temperature gauge by immersing it in hot water.
 2. Check if the resistance is within the specified range.

Specified Value	60°C (140°F)	125Ω	Coil type
	85°C (185°F)	8.4±5.8Ω	
	110°C (230°F)	24 ^{+2.2} _{-1.9} Ω	
	125°C (257°F)	15.2Ω	

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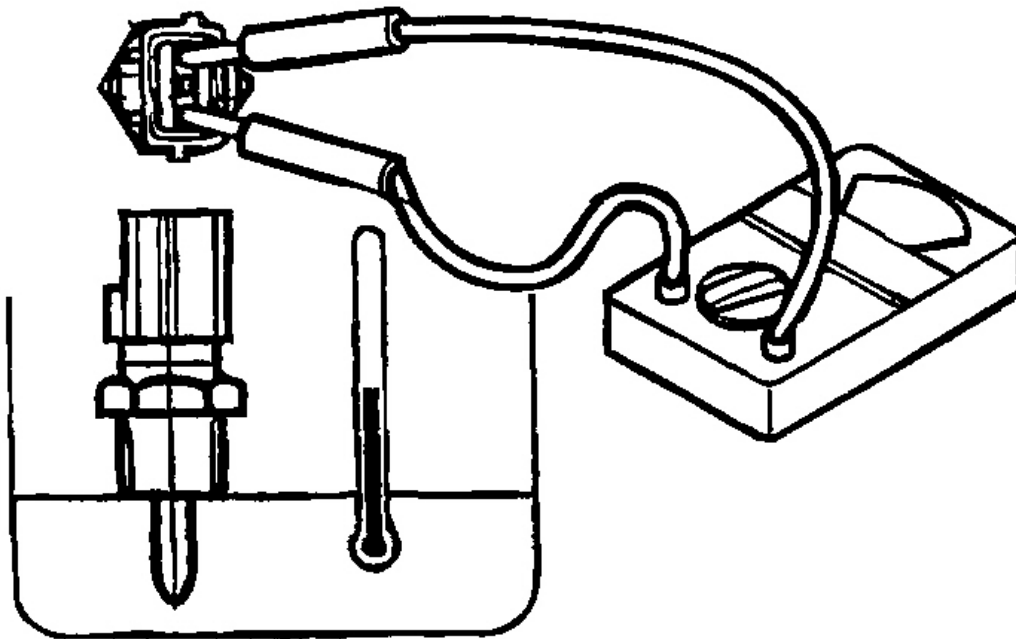
Fig. 136: Checking Water Temperature Gauge Unit Value
Courtesy of KIA MOTORS AMERICA, INC.

2. Water temperature sensor.
 1. Immerse the sensor in hot water.
 2. Check if the resistance is within the specified range.

Specified value	20°C(68°F)	2.45±0.14kΩ
	80°C(176°F)	0.322kΩ

G00320605

Fig. 137: Checking Water Temperature Sensor Value
Courtesy of KIA MOTORS AMERICA, INC.



G00320606

Fig. 138: Checking Water Temperature Sensor
Courtesy of KIA MOTORS AMERICA, INC.

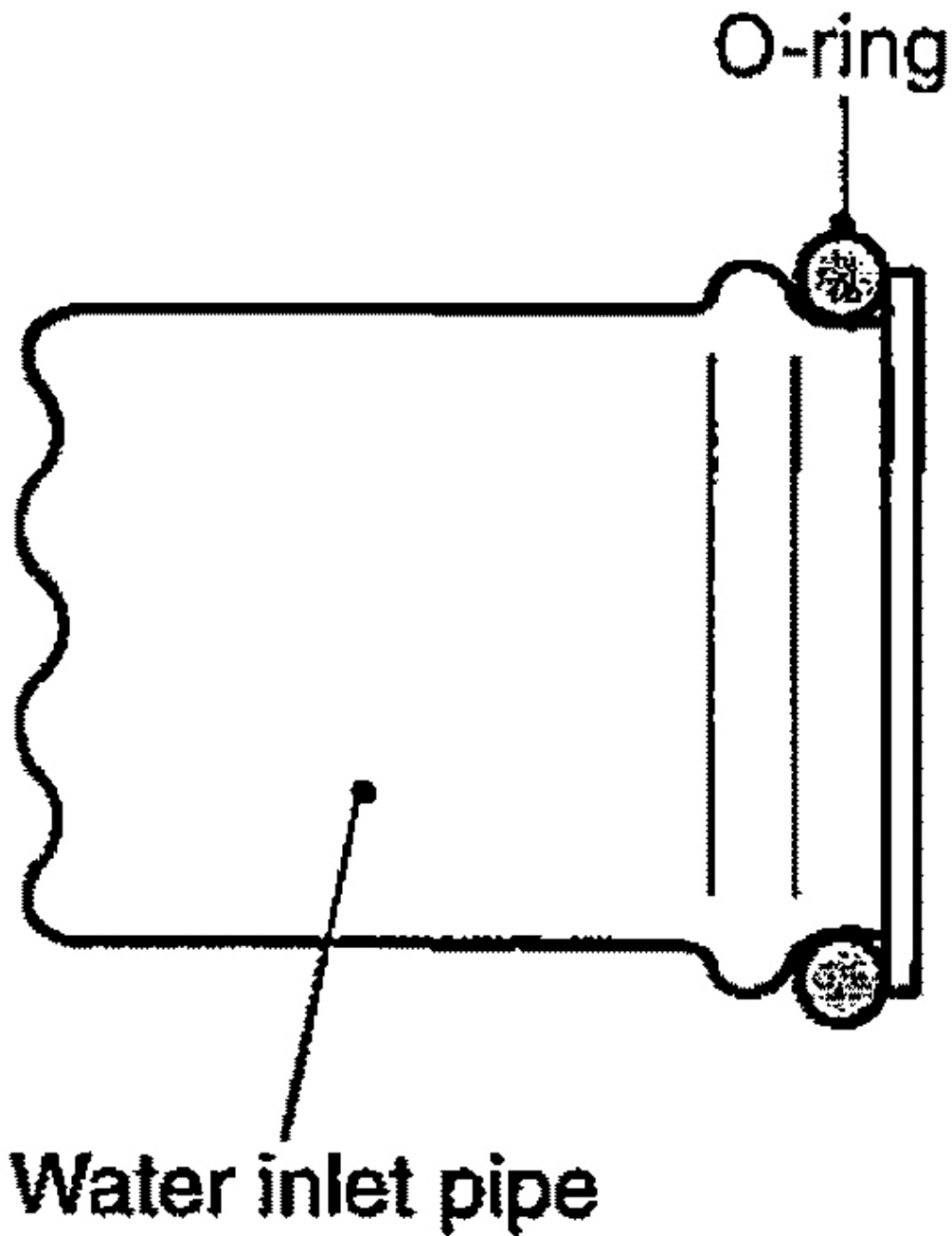
INSTALLATION

ENGINE COOLANT HOSE/PIPES

After inserting O-ring into a groove at the lower part of water inlet pipe, soak O-ring in water and insert it into the water inlet pipe.

CAUTION:

- Be careful not to smear oil or grease on the water pipe O-ring.
- Pay attention not to let a foreign object get into the connecting part of the water pipe.
- Insert the water pipe up to its end part.



G00320607

Fig. 139: Installing Water Inlet Pipe

Courtesy of KIA MOTORS AMERICA, INC.

WATER TEMPERATURE GAUGE UNIT AND SENSOR

1. Smear the sealant on thread and then tighten it to the specified torque.

Description	Recommended sealant	Tightening torque (N · m(kg · cm, lb · ft))
Water temperature sensor	Loctite 962T or equivalent	20-40 (200-400, 14.5-28.9)

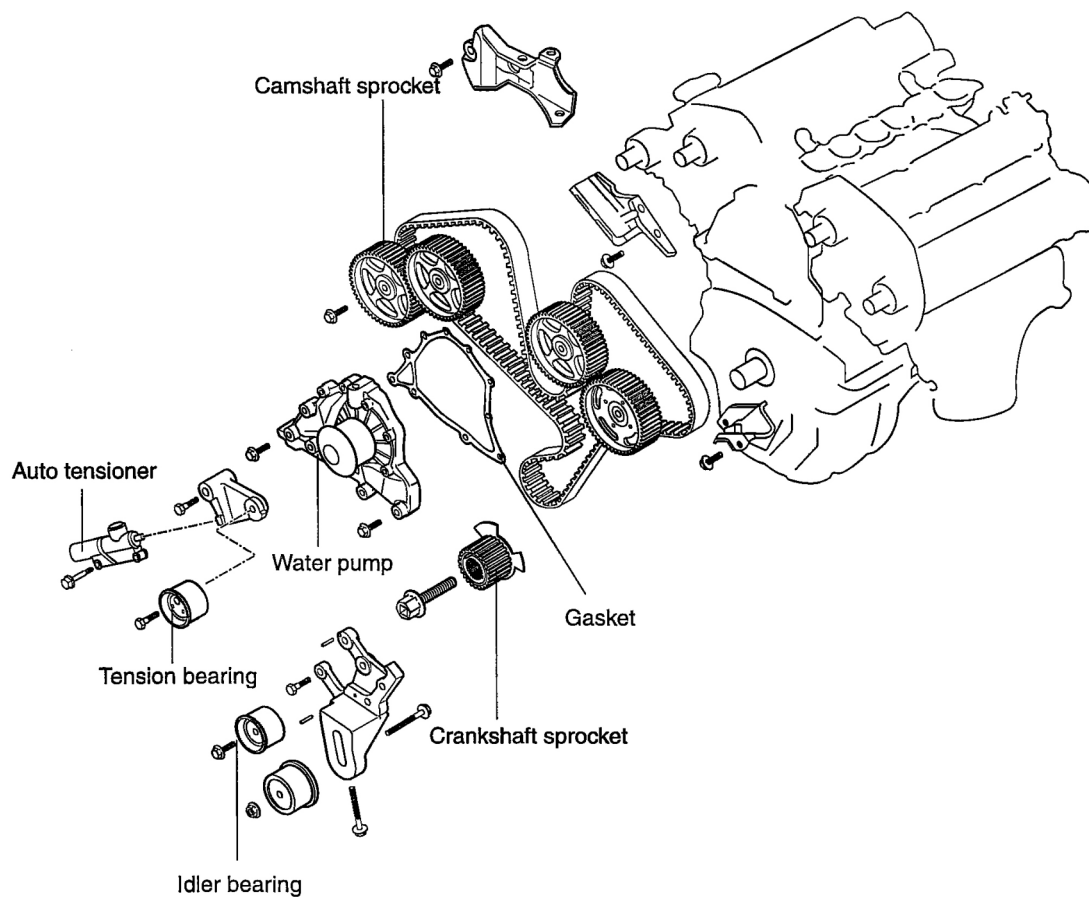
G00320608

Fig. 140: Installing Water Temperature Gauge Unit & Sensor
Courtesy of KIA MOTORS AMERICA, INC.

2. Connect the harness to water temperature gauge unit and cable.
3. Connect the battery ground cable.
4. Refill the coolant.

ENGINE COOLANT PUMP

COMPONENTS



G00320609

Fig. 141: Engine Coolant Pump Components
 Courtesy of KIA MOTORS AMERICA, INC.

INSTALLATION

1. Clean the gasket mating surface of the water pump body and cylinder block.
2. After installing new O-ring in the groove at front of the water pipe, soak it with water. At this time, do not soak it with oil or grease.
3. After installing a new water pump gasket and water pump assembly, tighten it to the specified torque.

Tightening torque:

(A) 5EA: 14.7-21.6 N.m

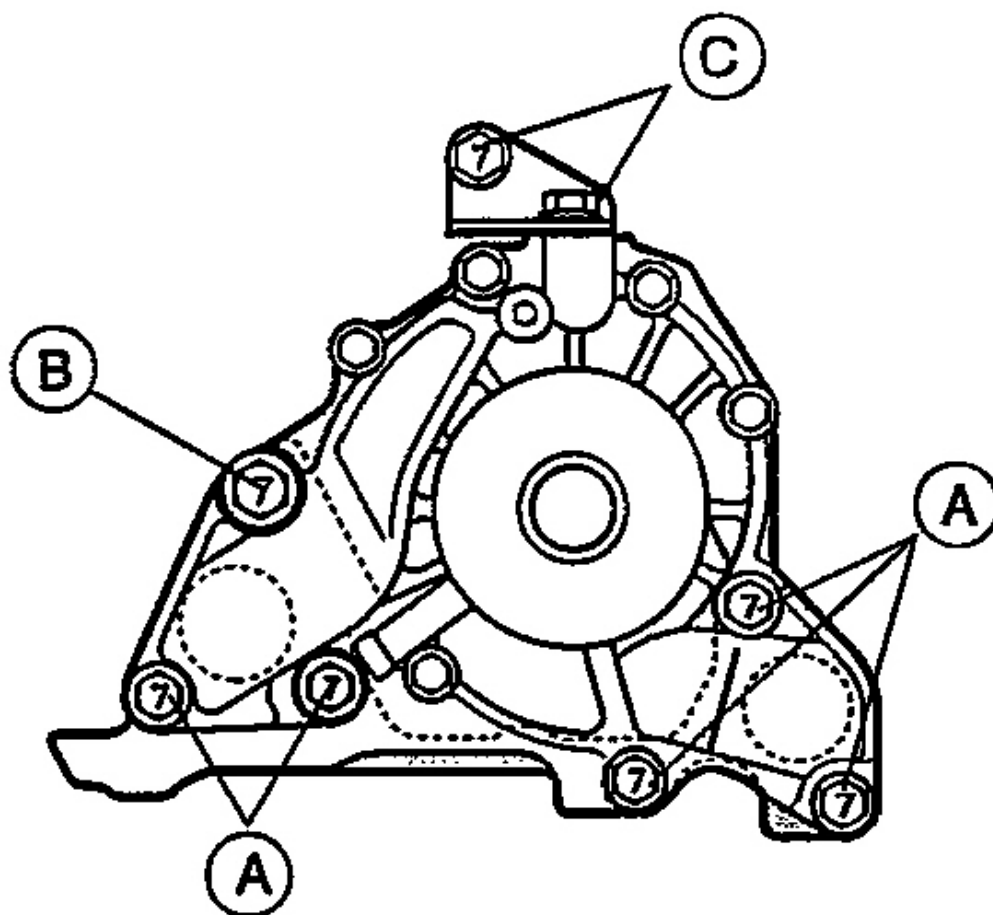
(150-220 kg. cm, 10.8-15.9 lb. ft)

(B) 1EA: 32.4-49.0 N.m

(330-500 kg. cm, 23.9-36.2 lb. ft)

(C) 2EA: 19.6-26.5 N.m

(200-270 kg. cm, 14.5-19.5 lb. ft)



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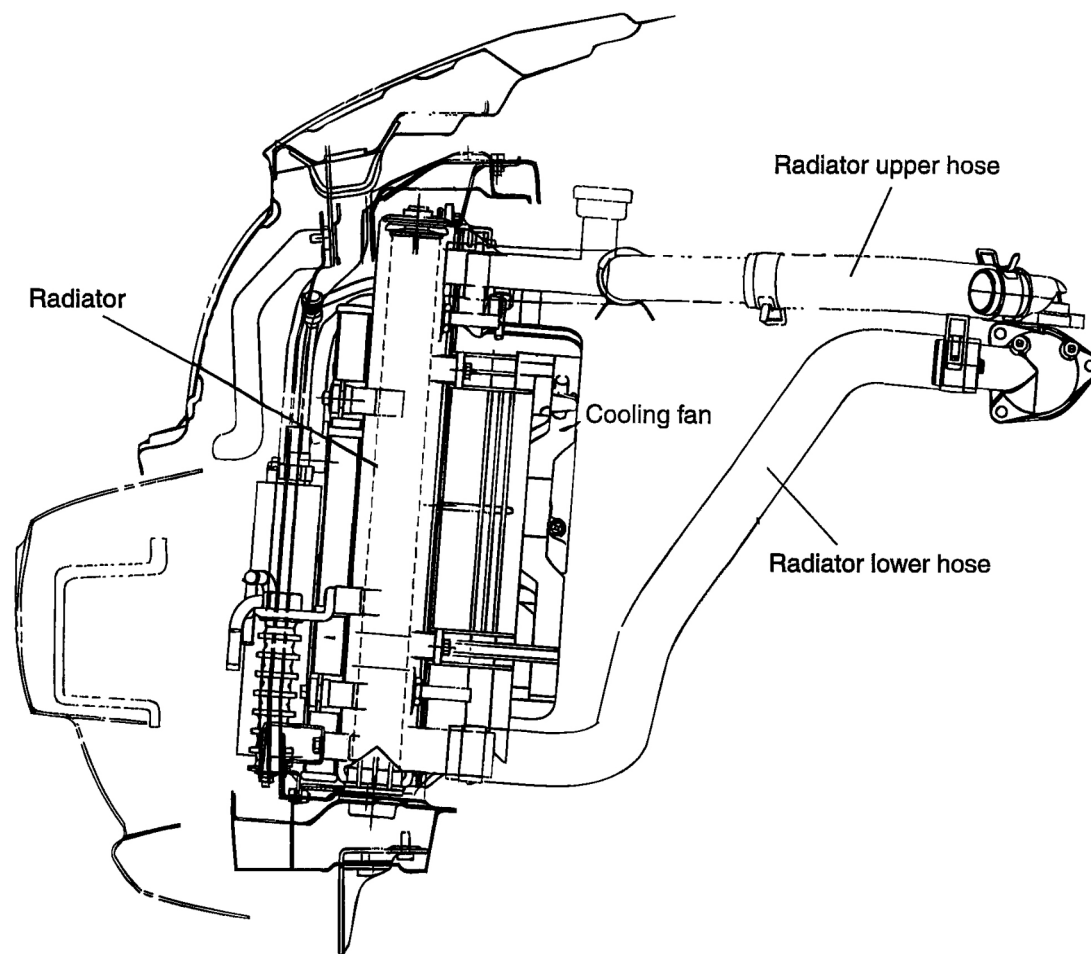
Fig. 142: Tightening Engine Coolant Pump
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the timing belt tensioner and timing belt. After adjusting the timing belt tension, install the timing belt cover.
5. After installing the water pump pulley and driving belt, adjust the belt tension.
6. Refill it with cooling water.

7. Check the leakage by running the engine.

RADIATOR

COMPONENTS



G00320611

Fig. 143: Radiator Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

1. Remove the air duct.
2. Remove the hood locker.
3. Disconnect the horn connector.
4. Remove the shroud upper member.
5. Disconnect the radiator fan motor connector and the condenser fan motor connector.
6. Remove the radiator fan and the condenser fan.

7. After marking on the radiator hose and clamp, disconnect the upper, lower hose and over flow hose.
8. Remove the radiator.

INSPECTION

1. Check if there are foreign objects among radiator pins.
2. Inspect the radiator pin for damage, if necessary, straighten them up.
3. Inspect the radiator for corrosion, damage and rust.
4. Inspect the radiator for crack, damage and any weakened part.

INSTALLATION

1. Fill the radiator reservoir tank with new cooling water.
2. Run the engine till cooling water temperature increases to open thermostat valve, and then stop the engine.
3. Remove the radiator cap and fill the radiator with water up to the filler neck, and fill the reservoir tank up to the specified level.
4. Check if there are any leakage from radiator, hose and connecting part.

RADIATOR FAN MOTOR

COMPONENTS

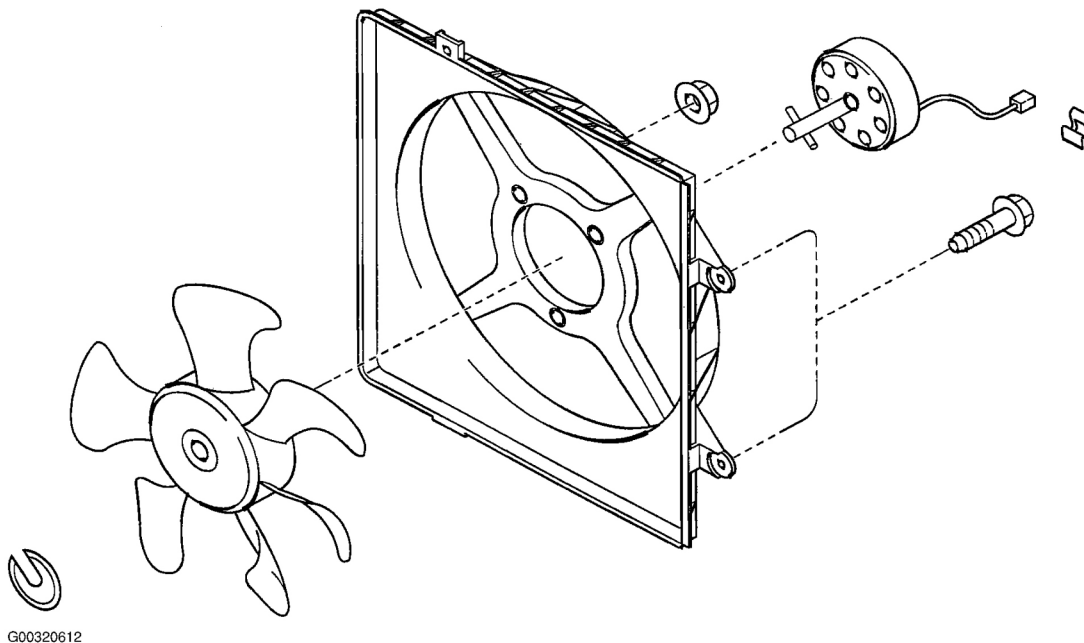


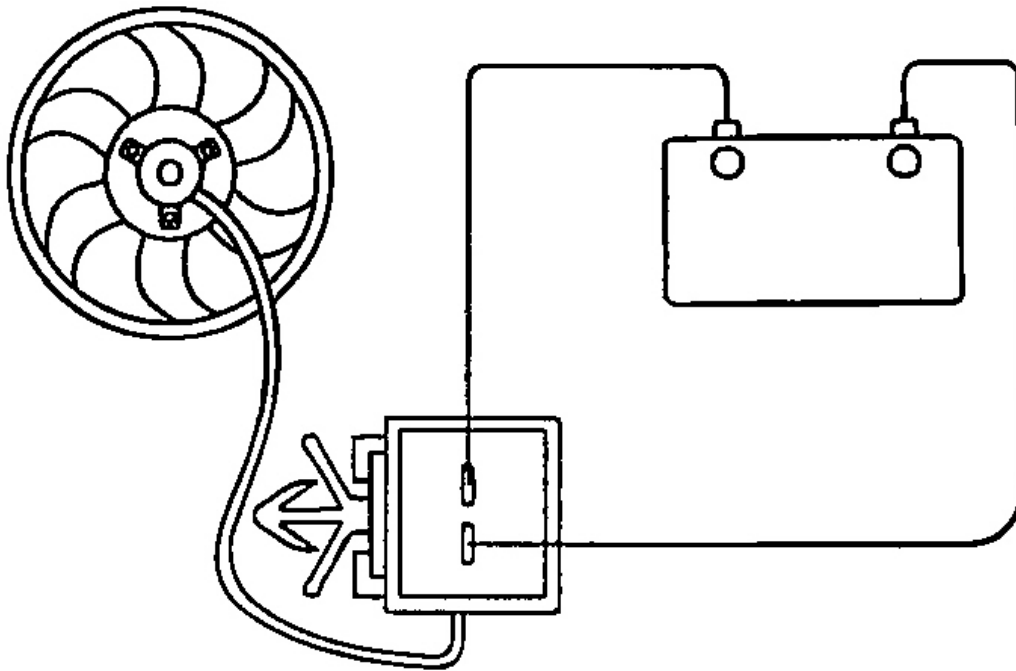
Fig. 144: Radiator Fan Motor Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

1. Remove the air duct.
2. Remove the hood locker.
3. Disconnect the horn connector.
4. Remove the shroud upper member.
5. Disconnect the radiator fan motor connector.
6. Remove the radiator fan.

INSPECTION

1. Radiator fan motor.
 1. Check if the radiator fan is rotating when the battery voltage is supplied to both terminals as shown in the figure.



G00320613

Fig. 145: Checking Radiator Fan Rotation
Courtesy of KIA MOTORS AMERICA, INC.

2. Check if there is abnormal noise while motor is rotating.

INSTALLATION

1. Installation is done in the reverse order of disassembly procedure.

CAUTION:

- When assembling the shroud, be cautious not to touch the cooling fan.
- After installing, while the fan is operating, check if there is abnormal noise and vibration.

RADIATOR CAP

COMPONENTS

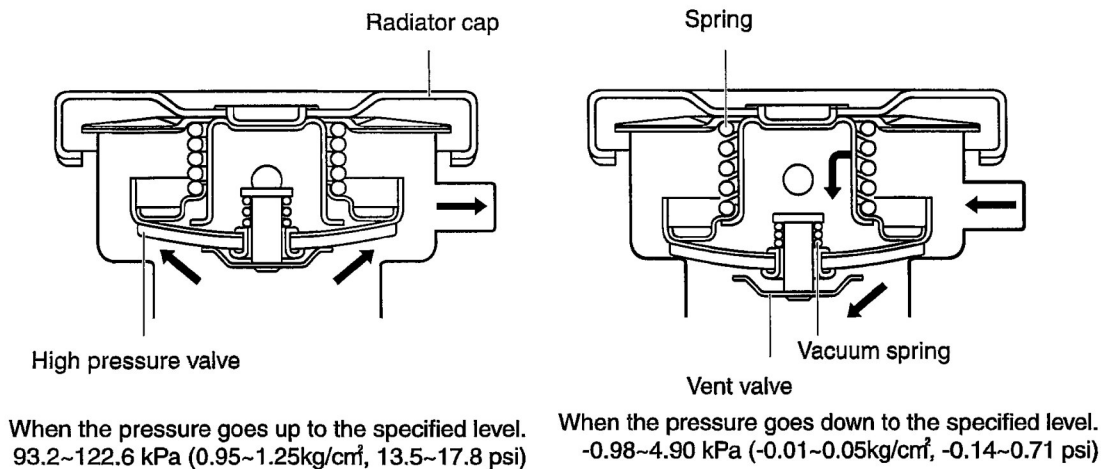
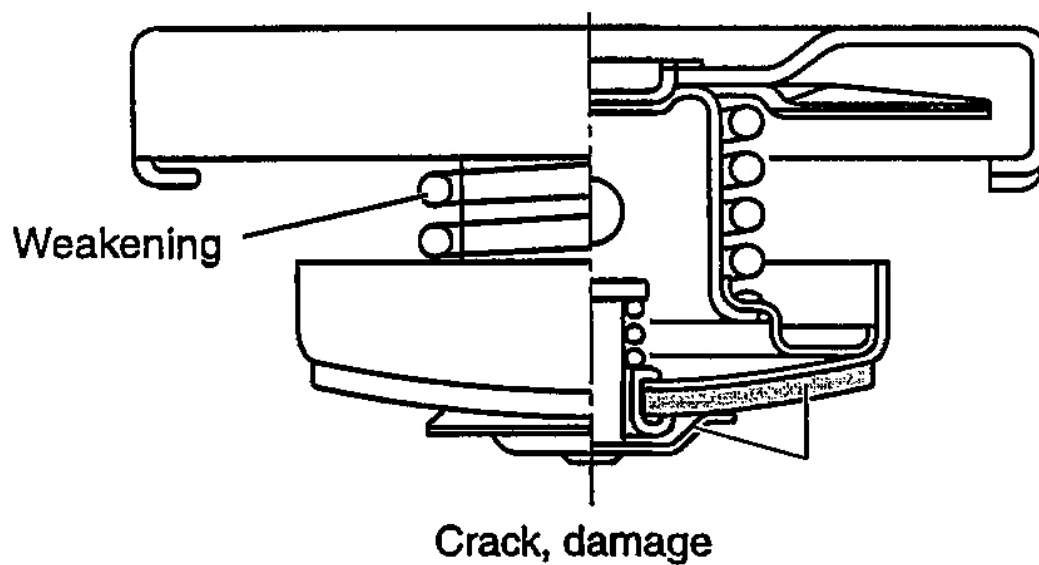


Fig. 146: Radiator Cap Components

Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

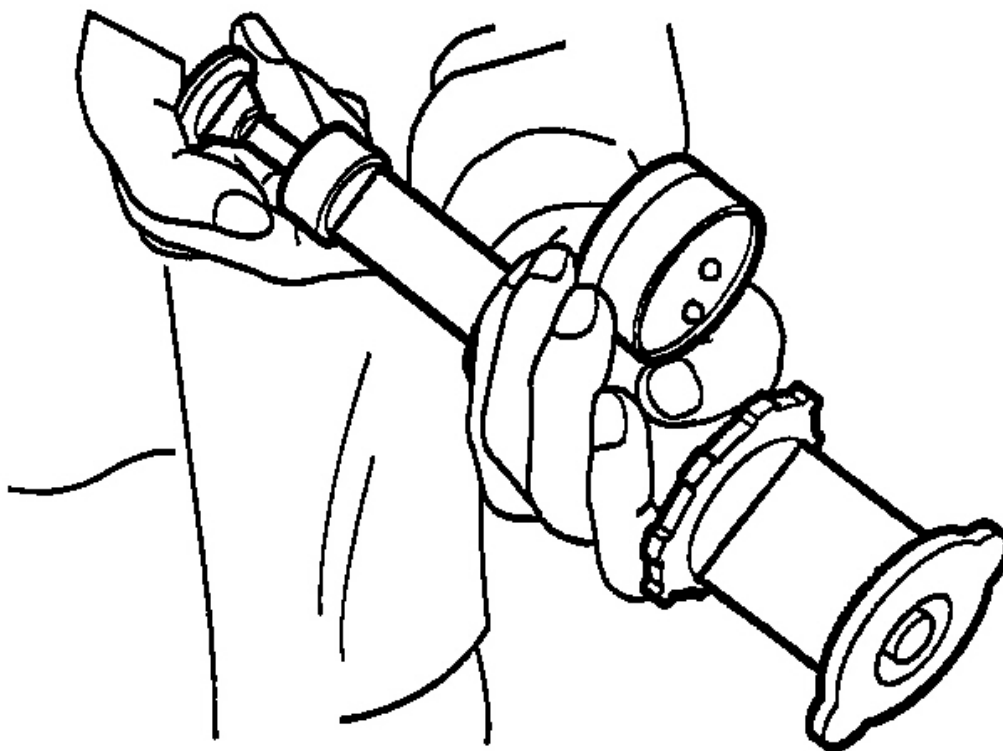
1. Inspect the radiator cap for damage, crack and weakening.



G00320615

Fig. 147: Inspecting Radiator Cap
Courtesy of KIA MOTORS AMERICA, INC.

2. Connect the radiator cap tester to the radiator cap.
3. Apply the pressure to the tester till the needle is fixed.



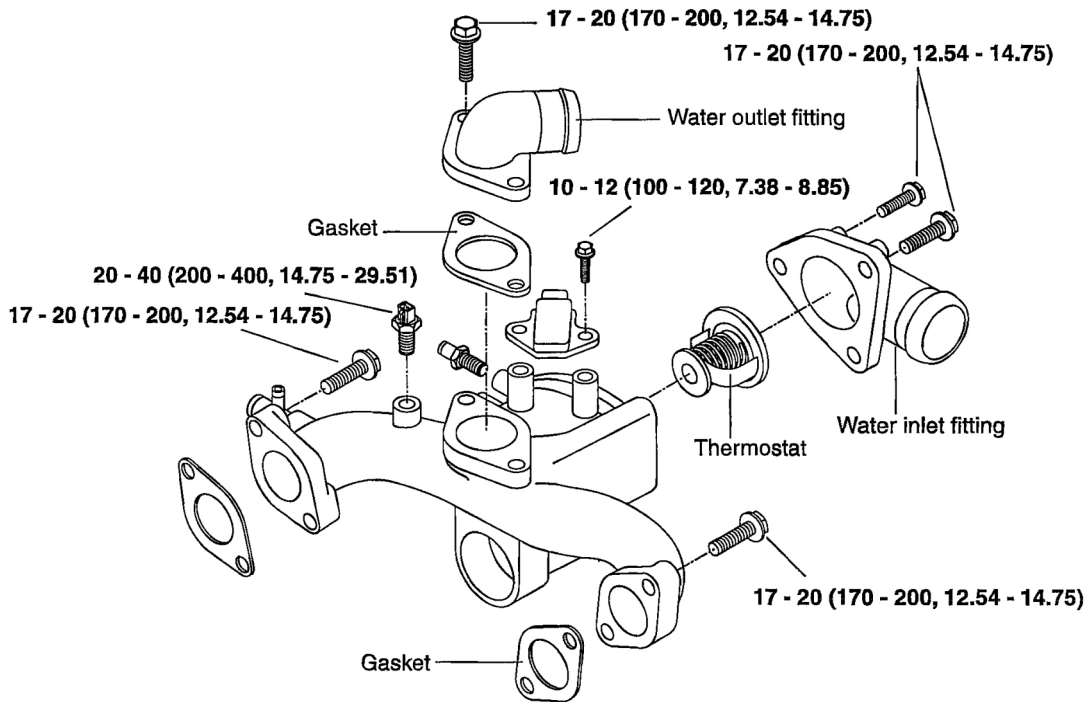
G00320616

Fig. 148: Applying Pressure To Tester Till
Courtesy of KIA MOTORS AMERICA, INC.

4. If the needle stays at the same position for 10 seconds, the radiator cap is in good condition.

THERMOSTAT

COMPONENTS



TORQUE : N·m(kg·cm, lb·ft)

G00320617

Fig. 149: Thermostat Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

1. Drain the cooling water to the bottom level of thermostat.
2. Remove the water outlet fitting.
3. Remove the thermostat.

INSPECTION

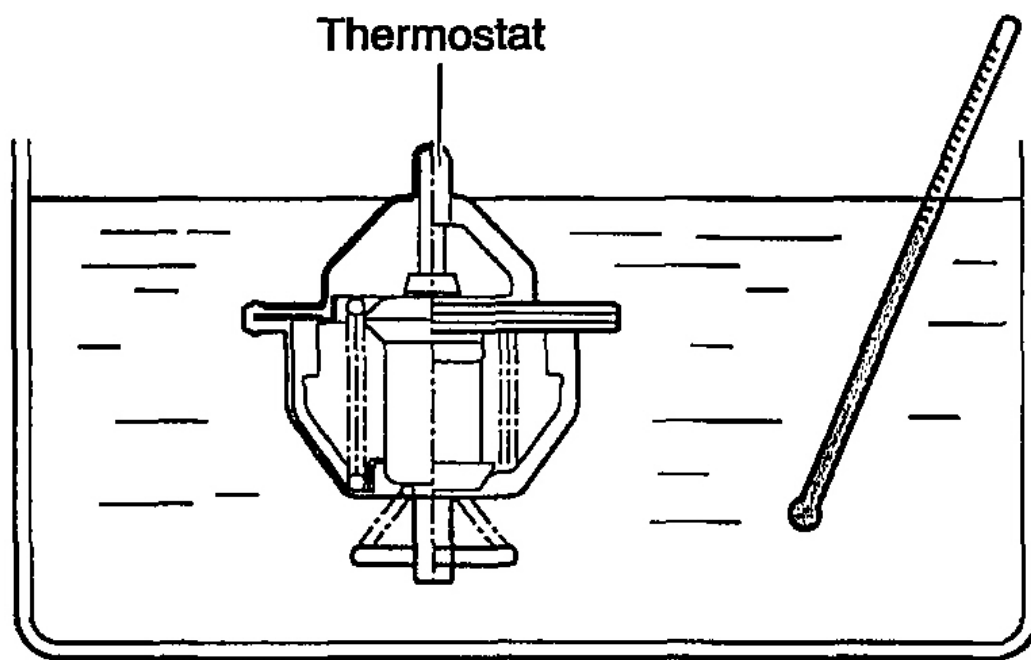
1. Heat the thermostat and check if the valve operates properly.
2. Check to determine the temperature at which the value begins to open and is completely opened.

Valve opening temperature:

80.0-84.0°C (176-183.2°F)

The temperature when the valve is completely opened:

95°C (203°F)



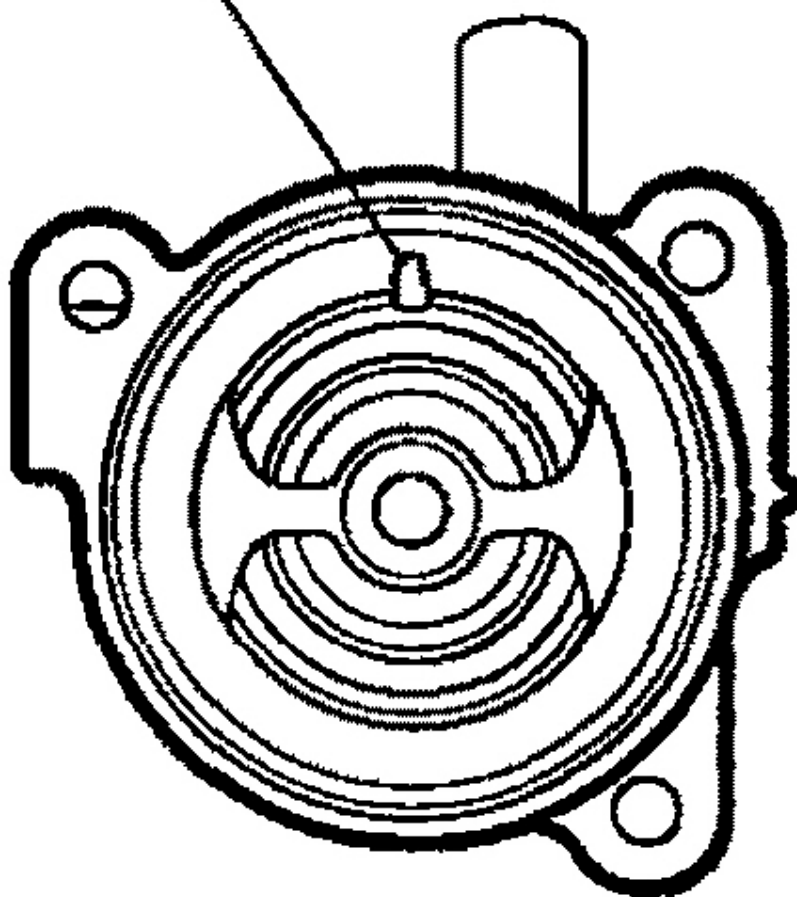
G00320618

Fig. 150: Checking Thermostat Valve
Courtesy of KIA MOTORS AMERICA, INC.

INSTALLATION

1. Align the arrangement mark of thermostat housing with the jiggle valve.

Jiggle valve



G00320619

Fig. 151: Installing Thermostat
Courtesy of KIA MOTORS AMERICA, INC.

2. Check to ensure that the flange of the thermostat at is correctly seated in the socket of the thermostat at

housing. If the thermostat is installed in the wrong direction, the bottom of the thermostat will touch the rib inside the intake manifold, making it impossible to seat flange in position.

3. Install a new gasket and engine coolant outlet fitting.

Tightening Torque:

Engine coolant outlet fitting bolt:

17-20 N.m (170-200 kg. cm, 12.54-14.75 lb. ft)

4. Refill the coolant.

LUBRICATION SYSTEM

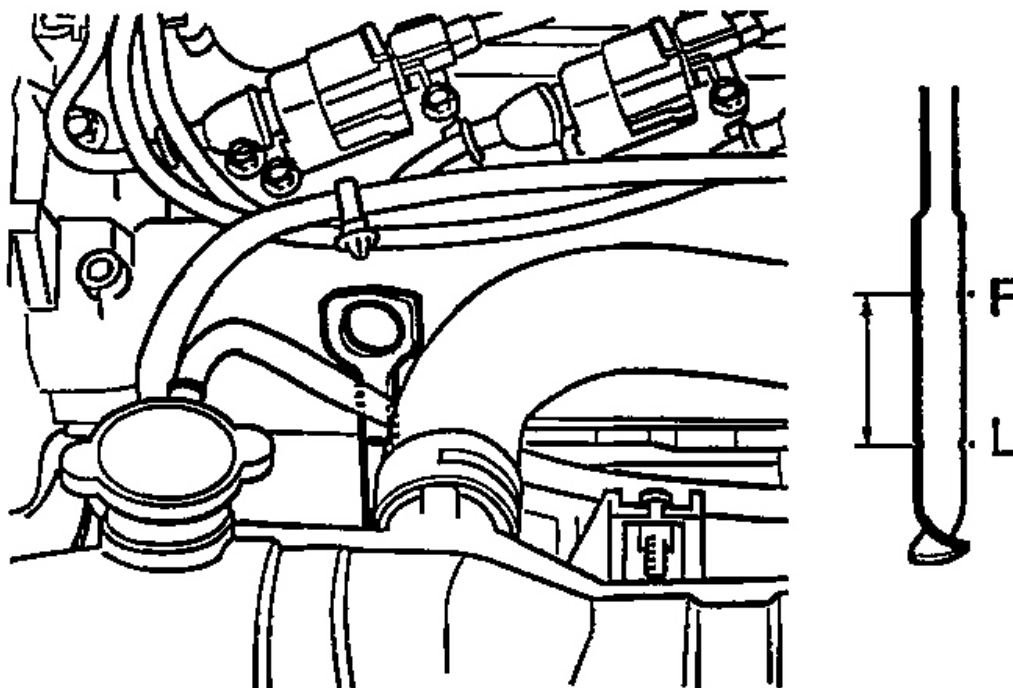
GENERAL

CHECKING ENGINE OIL

1. Position a vehicle on a level surface.
2. Stop the engine.

CAUTION: In the case of a vehicle that has been out of service for a prolonged period, run the engine for several minutes. Stop the engine and wait a few minutes at least, then check the oil level.

3. If the oil level is found to have fallen to the lower limit (the L mark), refill to the "F" mark.



G00320620

Fig. 152: Checking Engine Oil Level
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: When refilling, use the same type of engine oil as the one currently being used.

4. Check that the oil is not dirty or mixed with coolant or gasoline, and that it has the proper viscosity.

SELECTION OF ENGINE OIL

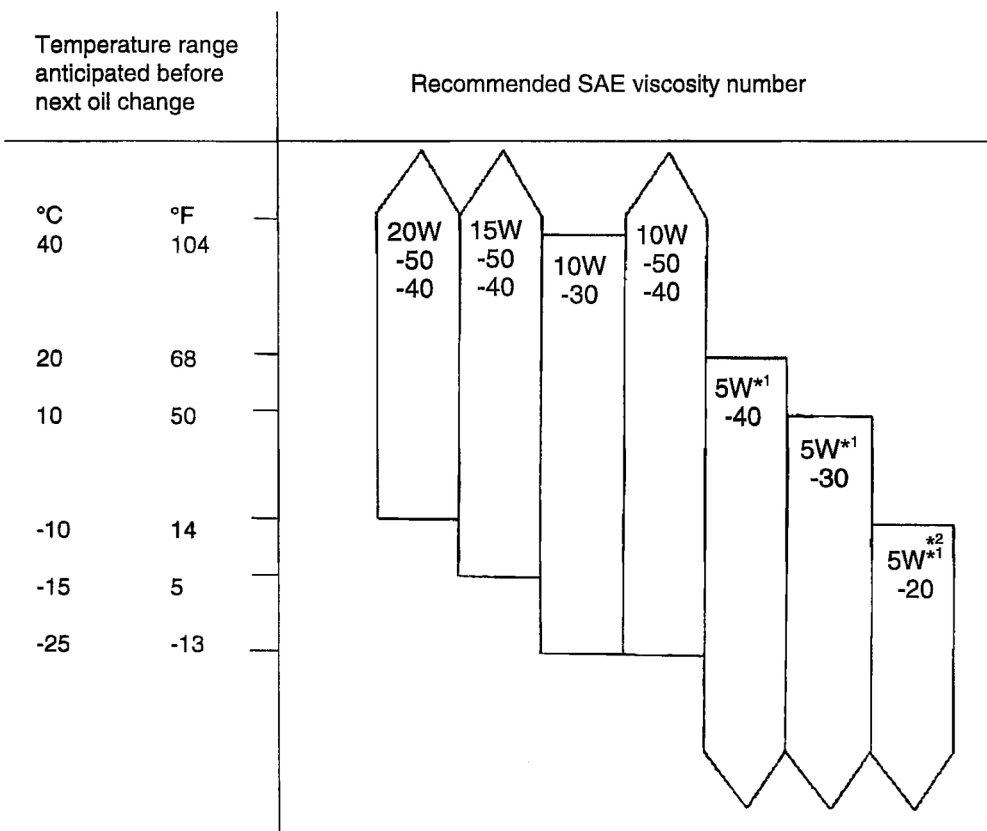
Recommended API classification: SE or above [For General]

Recommended API classification: SG or above [For North America, Europe]

Recommended SAE viscosity grades:

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona



***1 Restricted by driving condition and environment.**

***2 Not recommended for sustained high speed vehicle operation**

G00320621

Fig. 153: Selecting Engine Oil

Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: For best performance and for maximum protection for all types of operation, select only those lubricants which:

1. Confirm to the requirements of the API classification.
2. Have proper SAE grade number for expected ambient temperature range.

Lubricants which do not have both a SAE grade number and an API service classification on the container should not be used.

CHANGING ENGINE OIL

1. Run the engine until it reaches normal operating temperature.
2. Stop the engine.
3. Remove the oil filler cap (on rocker cover) and the drain plug (on the oil pan). Drain the engine oil.

4. Tighten the drain plug to the specified torque.

Tightening torque:

35-40 N.m (350-400 kg. cm, 25.82-29.51 lb)

CAUTION: Whenever tightening an oil drain plug, use a new drain plug gasket.

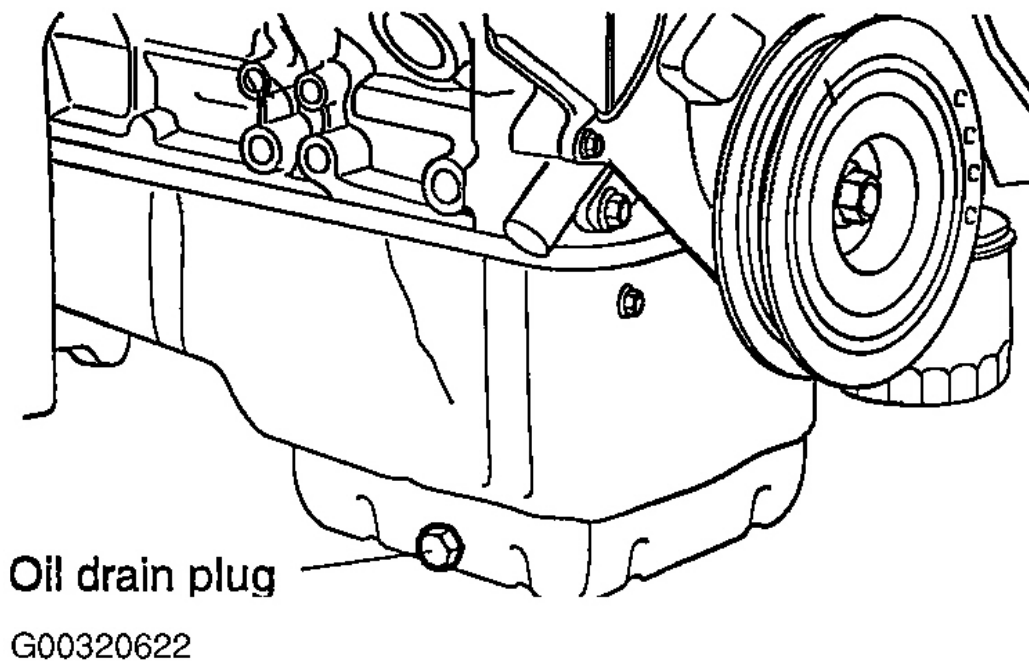


Fig. 154: Changing Engine Oil

Courtesy of KIA MOTORS AMERICA, INC.

5. Install oil filter.
6. Fill new engine oil through the oil filling hole.

Drain and filling

Amount of oil: 4.3l (4.55 US. qts, 3.78 imp. qts)

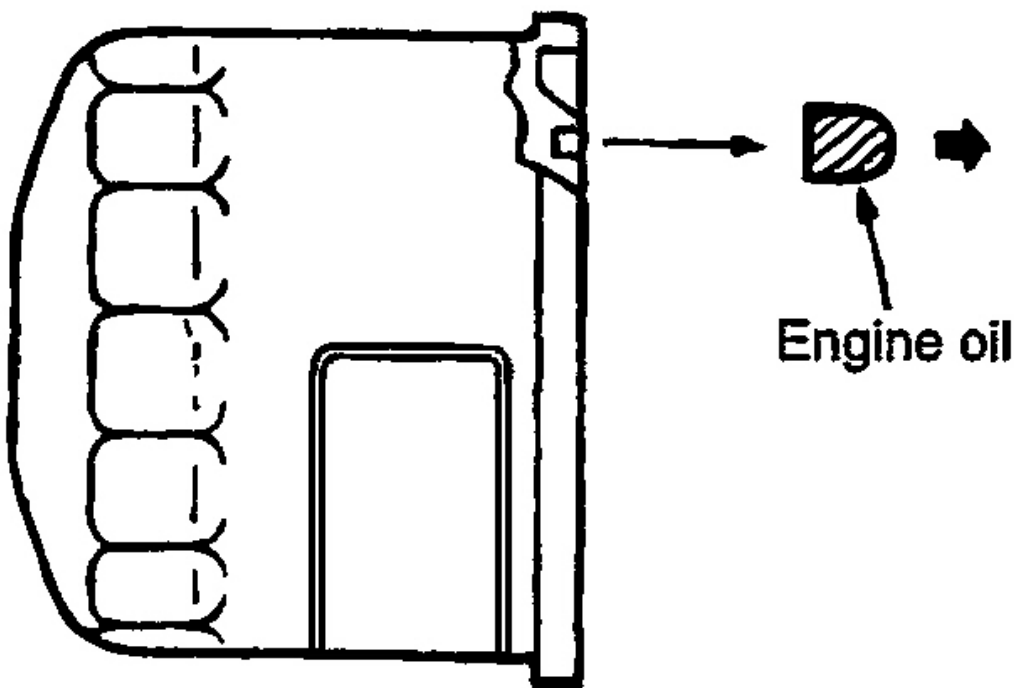
7. Close the oil filling hole cap.
8. Start the engine.
9. Stop the engine and check the oil level. If not sufficient, refill it.

FILTER SELECTION

All Kia Motor Company engines are equipped with a high quality, throw-away oil filter. This filter is recommended as a replacement filter on all vehicles. The quality of replacement filters varies considerably. Only high quality filters should be used to assure the most efficient service. Make sure that the rubber gasket from the old oil filter is completely removed from the mating surface on the engine block, before installing the new filter.

REPLACING OIL FILTER

1. Use a filter wrench to remove the oil filter.
2. Before installing the new oil filter on the engine, apply clean engine oil to the surface of the rubber gasket.



G00320623

Fig. 155: Applying Clean Engine Oil To Surface Of Rubber Gasket
Courtesy of KIA MOTORS AMERICA, INC.

3. Tighten the oil filter to the specified torque.

Tightening torque:

Oil filter: 11.8-15.7 N.m (120-160 kg. cm, 8.7-11.6 lb. ft)

4. Fill the engine with the engine oil.
5. Start and run the engine and check for engine oil leaks.
6. After stopping the engine, check the oil level and add oil as much as necessary.

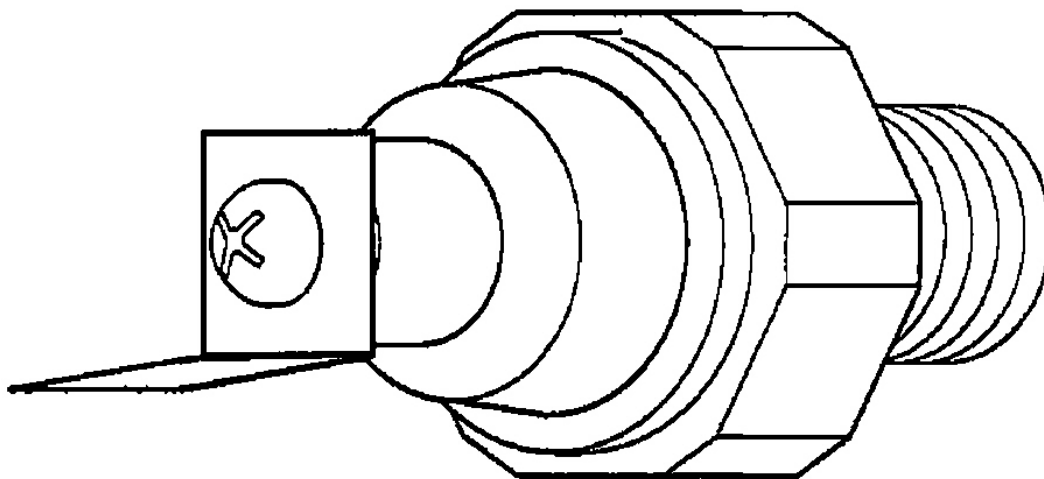
OIL PRESSURE SWITCH

1. If "OIL PRESSURE" indicating lamp lights when ignition switch is set to "ON" and goes out when engine is started and runs at idle, then everything is in order. If "OIL PRESSURE" lamp does not light when ignition switch is set to "ON" check switch, lamp and wiring.
2. If there is current flow when ignition switch is set to "ON" and if there is no current flow when engine is running at idle, switch is good.

If switch is good, check lamp and wiring.

Operating pressure of oil pressure switch

19.6-39.2 kPa (0.2-0.4 kg/cm² , 2.84-5.69 psi)



G00320624

Fig. 156: Checking Oil Pressure Switch
Courtesy of KIA MOTORS AMERICA, INC.

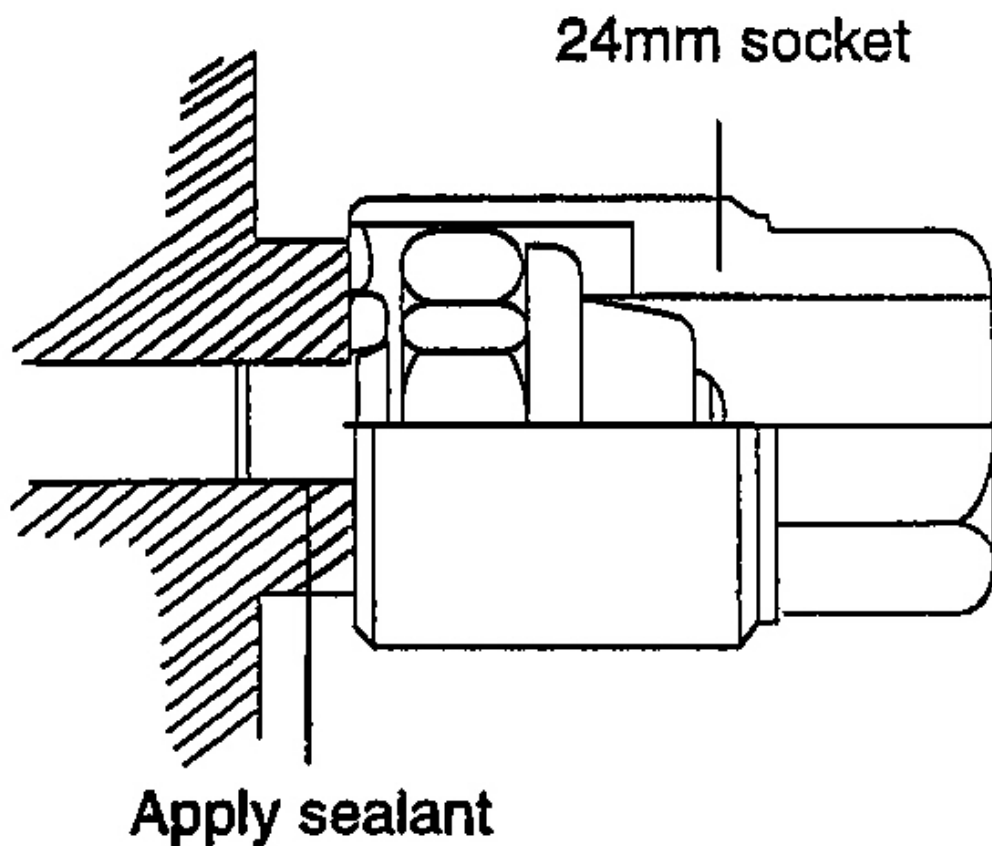
3. Using 24 mm deep socket, tighten the switch to the specified torque.

NOTE: Do not tighten the oil pressure switch to the excessive torque.

Tightening torque:

Oil pressure switch and sensor assembly:

8-12 N.m (80-120 kg. cm, 5.91-8.85 lb. ft)



G00320625

Fig. 157: Tightening Oil Pressure Switch
Courtesy of KIA MOTORS AMERICA, INC.

OIL PUMP

COMPONENTS



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Fig. 158: Oil Pump Components

Courtesy of KIA MOTORS AMERICA, INC.

DISASSEMBLY

1. Remove the oil pressure switch, using 24 mm deep socket.

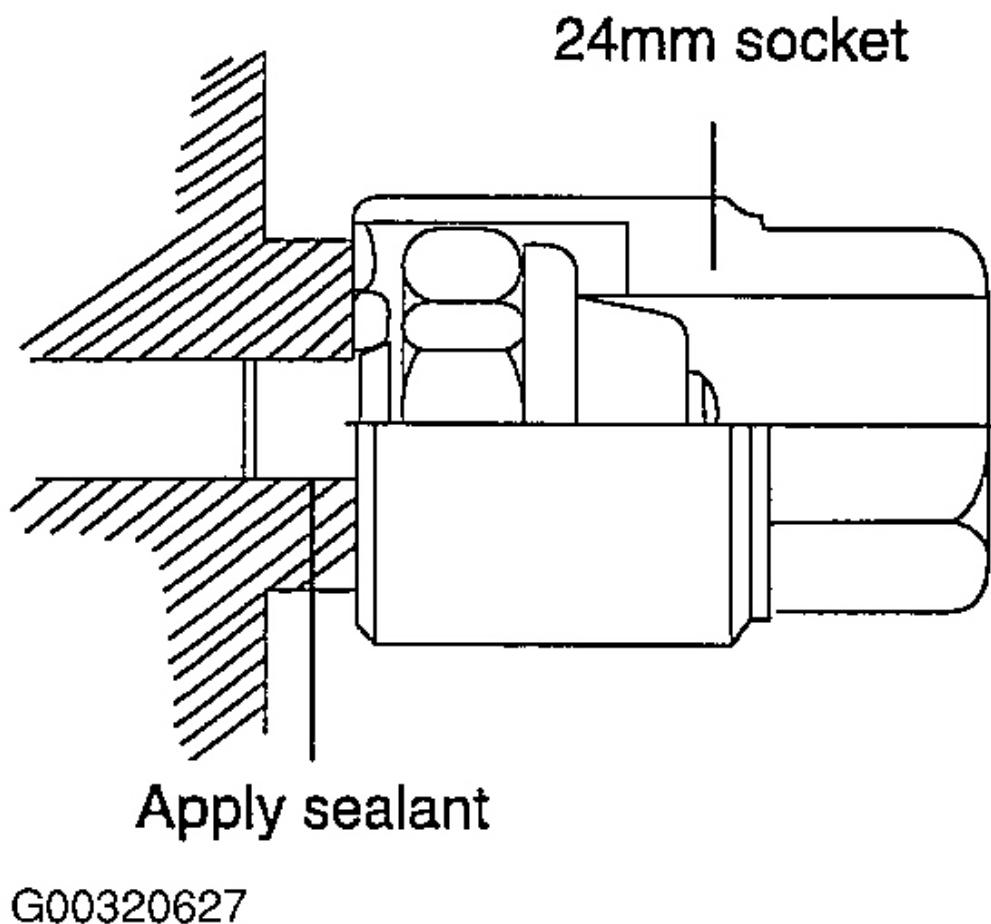


Fig. 159: Removing Oil Pressure Switch
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Since a sealant is used on the threaded area, be careful not to damage the oil pressure switch.

2. Remove the oil filter and the oil pan.
3. Remove the oil screen and gasket.
4. Remove the three bracket securing bolts and remove the oil filter bracket and gasket.
5. Remove the oil relief valve plug from the oil pump case.
6. Remove the oil pump case.

INSPECTION

OIL PUMP

1. Visually check the parts of the oil pump case for cracks and damage.
2. Assemble the rotor on the oil pump and then check the clearance with a thickness gauge.

Oil pump side clearance:

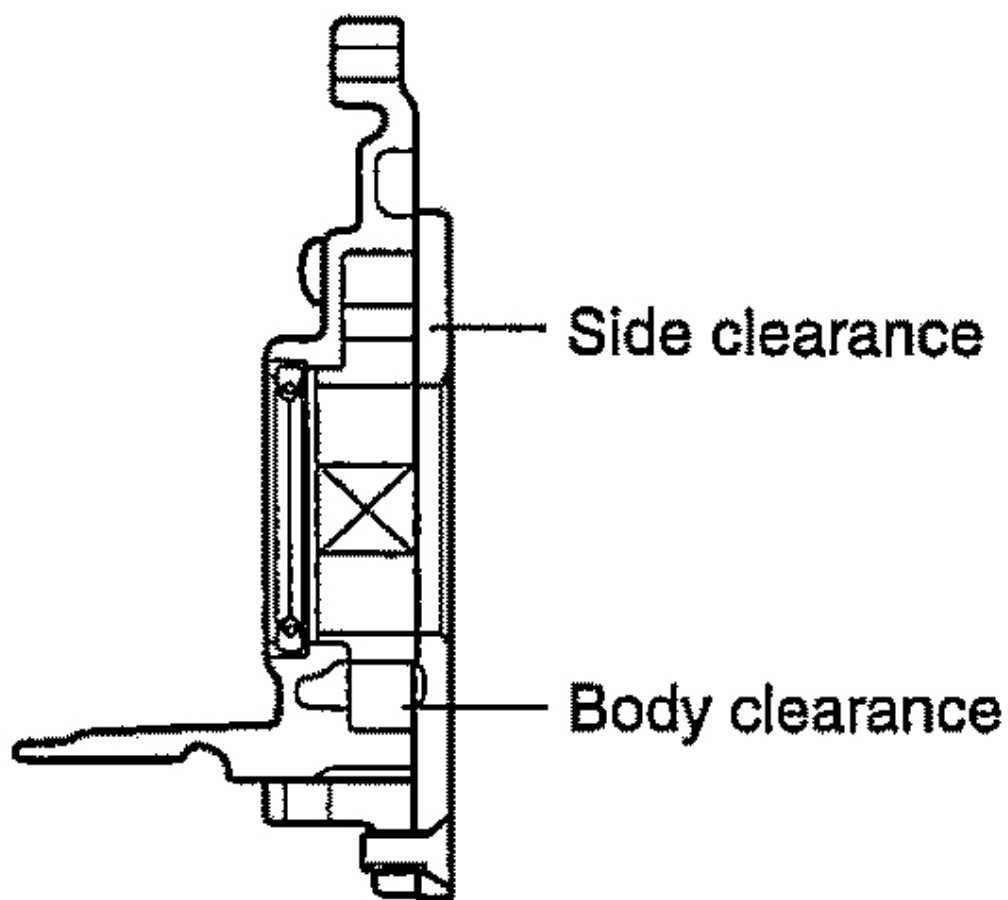
Standard value:

Body clearance: 0.100-0.181 mm

(0.0039-0.0071 in.)

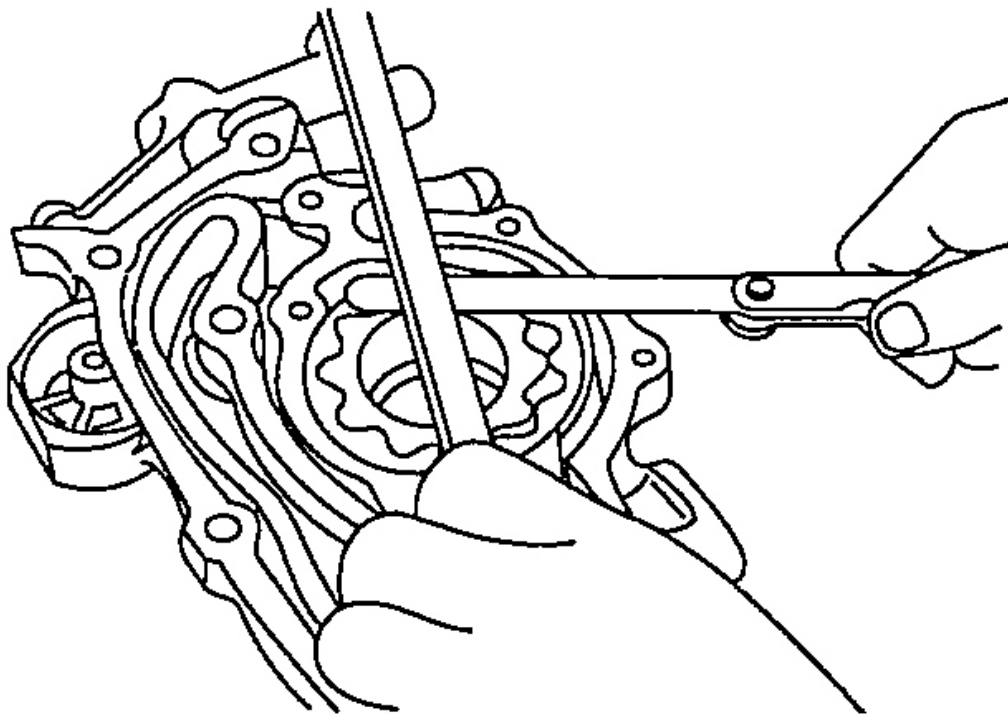
Side clearance: 0.040-0.095 mm

(0.0016-0.0037 in.)



G00320628

Fig. 160: Checking Parts Of Oil Pump Case For Cracks & Damage
Courtesy of KIA MOTORS AMERICA, INC.



G00320629

Fig. 161: Checking Clearance With A Thickness Gauge
Courtesy of KIA MOTORS AMERICA, INC.

RELIEF PLUNGER AND SPRING

1. Check the relief plunger for smooth operation.
2. Check the relief spring for the deformed or broken condition.

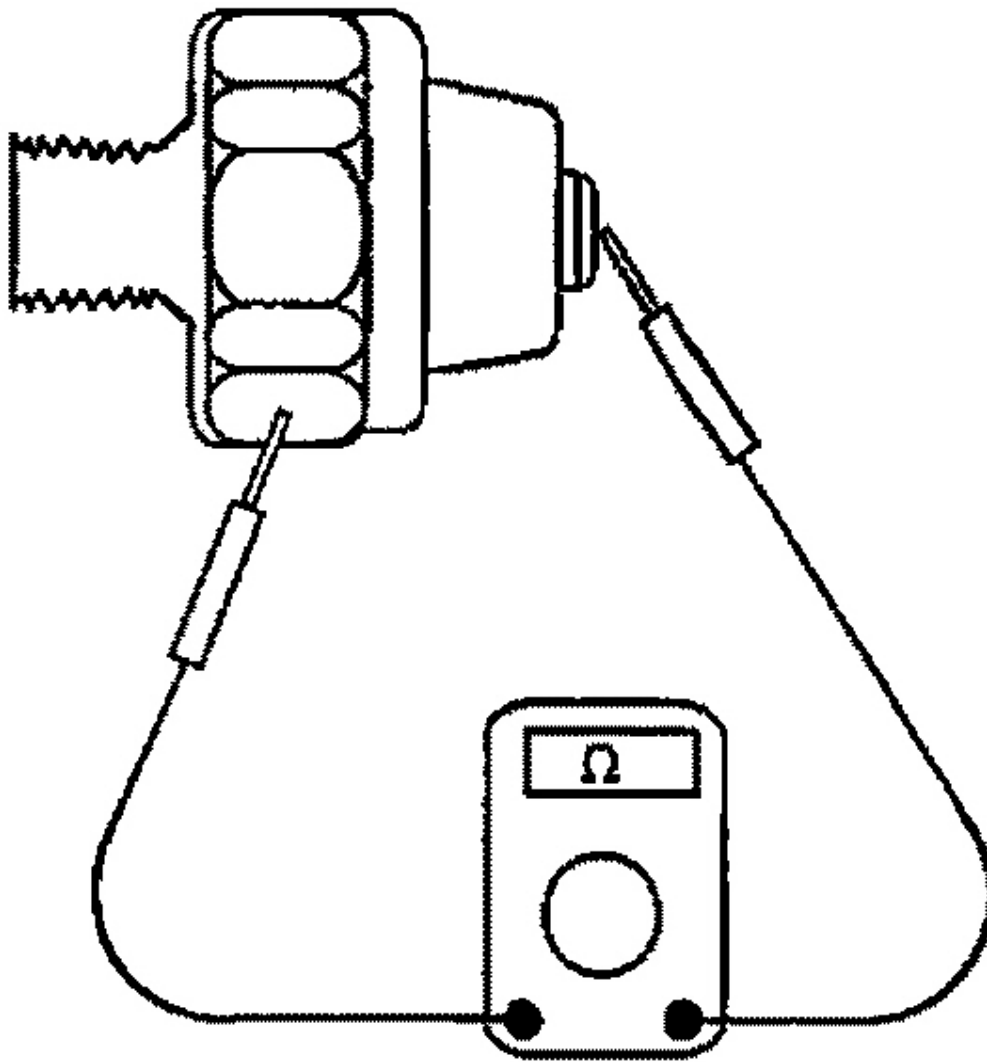
OIL FILTER BRACKET

1. Make sure that there is no damage on the oil filter installation surface.
2. Check the oil filter bracket for oil leaks or cracks.

OIL PRESSURE SWITCH

1. Check the continuity between terminal and body with an ohmmeter.

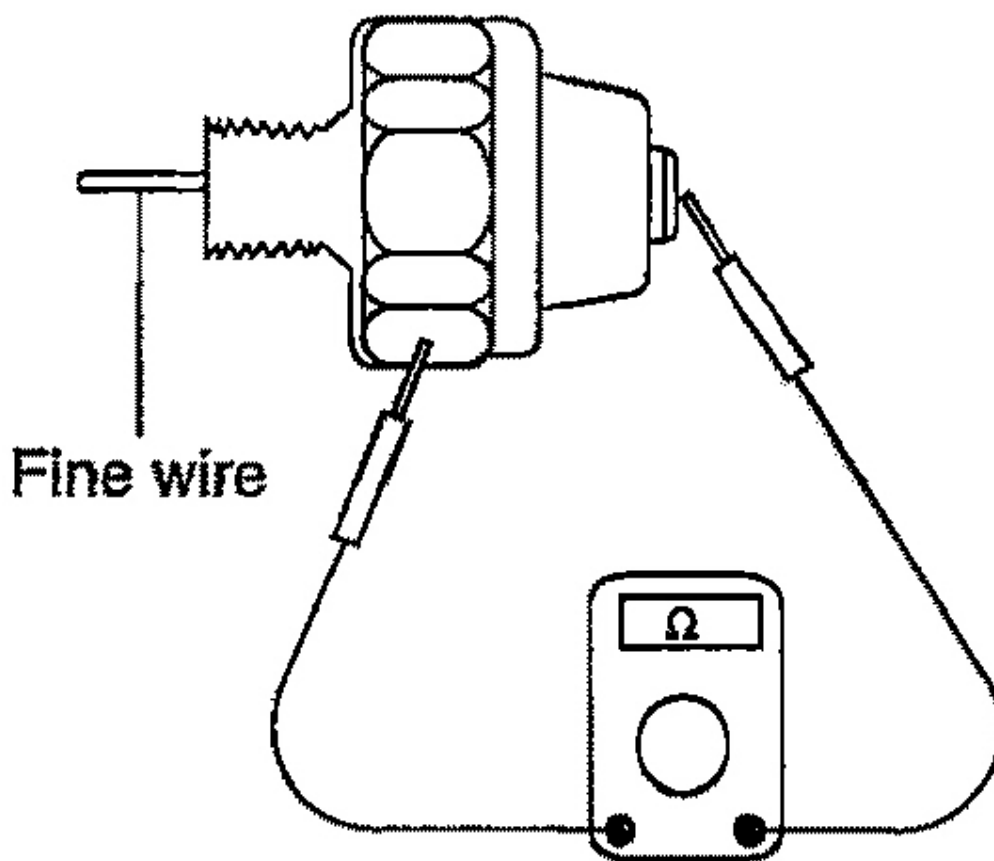
If there is continuity, replace the oil pressure switch.



G00320630

Fig. 162: Checking Continuity Between Terminal & Body With Ohmmeter
Courtesy of KIA MOTORS AMERICA, INC.

2. Check the continuity between the terminal and the body when the fine wedge is pushed. If there is continuity even when the fine wedge is pushed, replace it.



G00320631

Fig. 163: Checking Continuity Between Terminal & Body With Fine Wedge
Courtesy of KIA MOTORS AMERICA, INC.

3. Or, if there is no continuity when a 50 kPa (0.5 kg/cm² , 7 psi) vacuum is applied through the oil hole, the switch is operating properly. Check that air doesn't leak. If air leaks, the diaphragm is broken, and replace it.

REASSEMBLY

1. Install the oil pump case with the gasket.

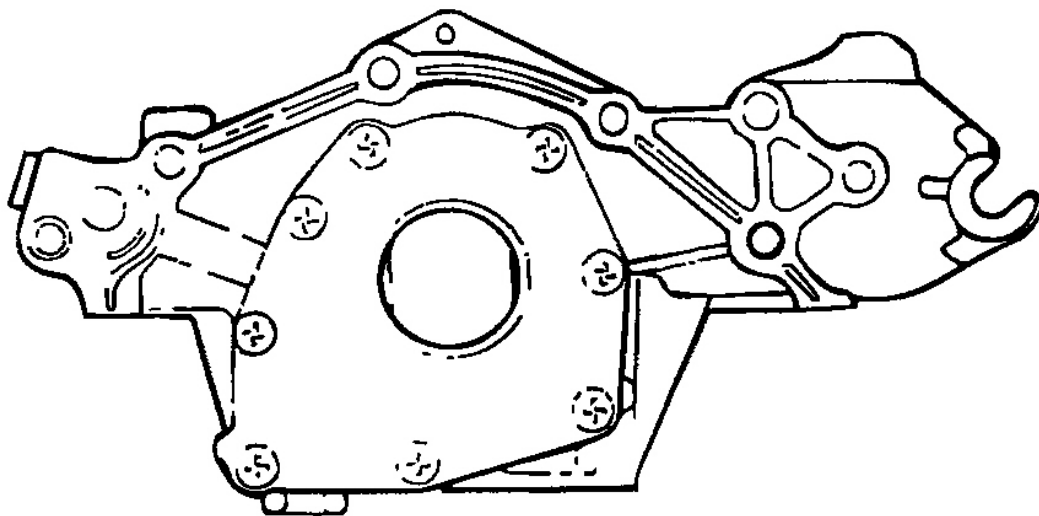
Tightening torque:

Oil pump case bolt: 12-15 N.m

(120-150 kg. cm, 8.85-11.06 lb. ft)

Oil pump cover screw: 8-12 N.m

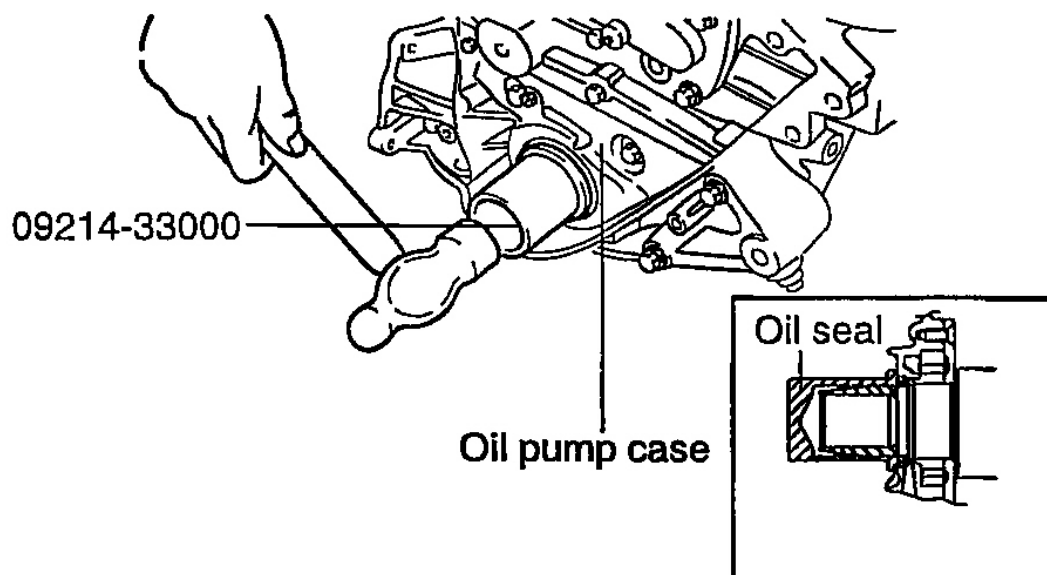
(80-120 kg. cm, 5.91-8.85 lb. ft)



G00320632

Fig. 164: Installing Oil Pump Case With Gasket
Courtesy of KIA MOTORS AMERICA, INC.

2. Install the oil seal in the oil pump case, using special tool (09214-33000).



G00320633

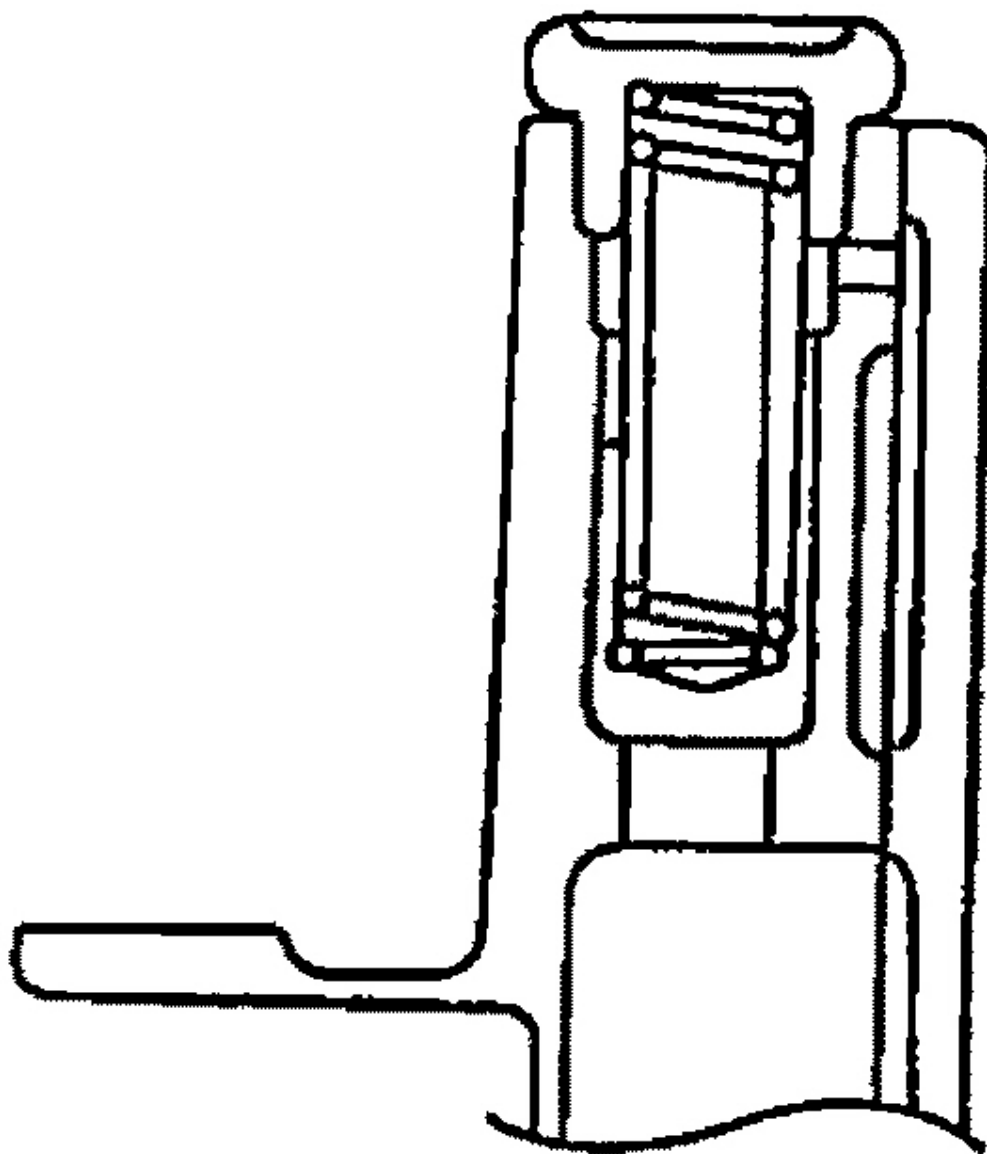
Fig. 165: Installing Oil Seal In Oil Pump Case, Using Special Tool (09214-33000)
Courtesy of KIA MOTORS AMERICA, INC.

3. Install the relief plunger and spring, and tighten the oil relief valve plug to the specified torque.

Tightening torque:

Oil relief valve plug: 40-50 N.m

(400-500 kg. cm, 29.5-36.88 lb. ft)



G00320634

Fig. 166: Installing Relief Plunger & Spring
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the oil screen with a new gasket.

Tightening torque:

Oil screen bolt: 15-22 N.m

(150-220 kg. cm, 11.06-16.23 lb. ft)

5. Clean the gasket surfaces of the cylinder block and the oil pan.
6. Apply sealant into the groove of the oil pan flange.

NOTE: **Make the first cut from the end of the nozzle furnished with the sealant approx. 4 mm. After application of the sealant, do not exceed 15 minutes before installing the oil pan.**

7. Install the upper oil pan and tighten the bolts to the specified torque. Tighten the oil pan bolts as shown in figure.

Tightening torque:

Upper oil pan bolt No. 1-14: 9.8-11.8 N.m

(100-120 kg. cm 7.2-8.7 lb. ft)

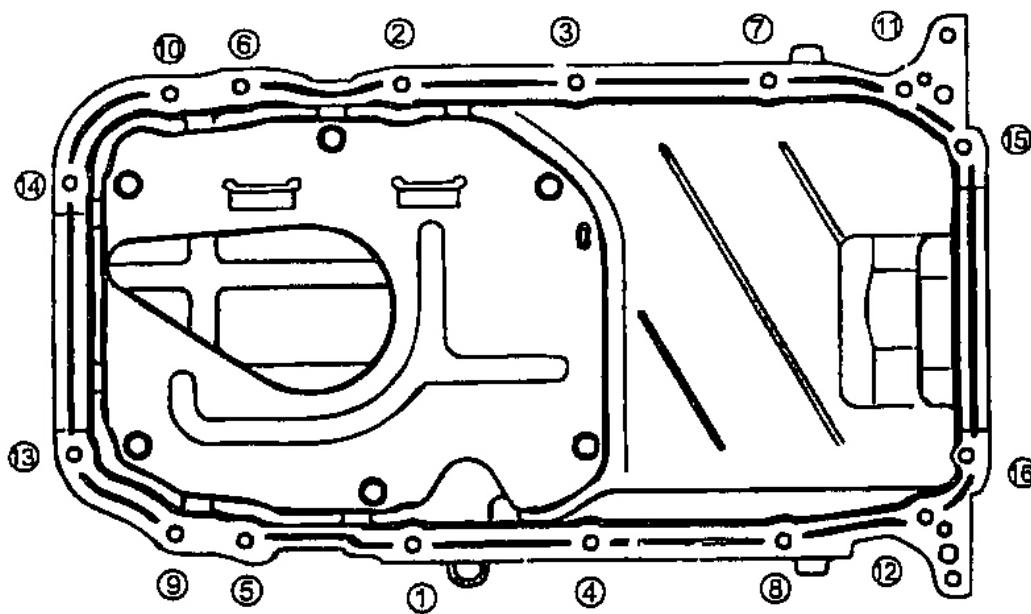
No.15-16: 5-7 N.m

(50-70 kg. cm 3.68-5.16 lb. ft)

Upper oil pan and transaxle mounting bolt (4EA).

30-42 N.m

(300-420 kg. cm, 22.13-30.98 lb. ft)



G00320635

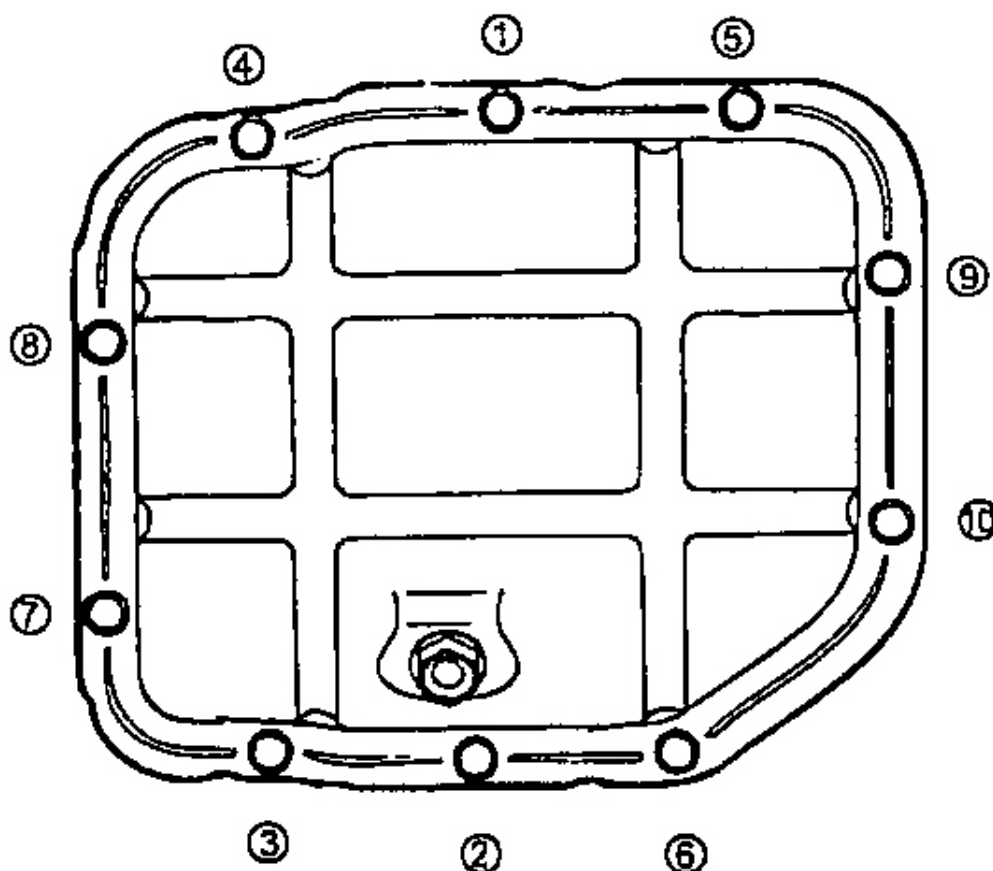
Fig. 167: Installing Upper Oil Pan
Courtesy of KIA MOTORS AMERICA, INC.

8. Install the lower oil pan and tighten the bolts to specified torque.

Tightening torque:

Lower oil pan bolt:

9.8-11.8 N.m (100-120 kg. cm, 7.2-8.7 lb. ft)



G00320636

Fig. 168: Installing Lower Oil Pan
Courtesy of KIA MOTORS AMERICA, INC.

9. Using 24 mm deep socket, install the oil pressure switch after applying sealant to the threaded area.

Sealant: Threebond 1104 or equivalent.

NOTE: Do not tighten the oil pressure switch to the excessive torque.

Tightening torque:

Oil pressure switch:

8-12 N.m (80-120 kg. cm, 5.91-8.85 lb. ft)

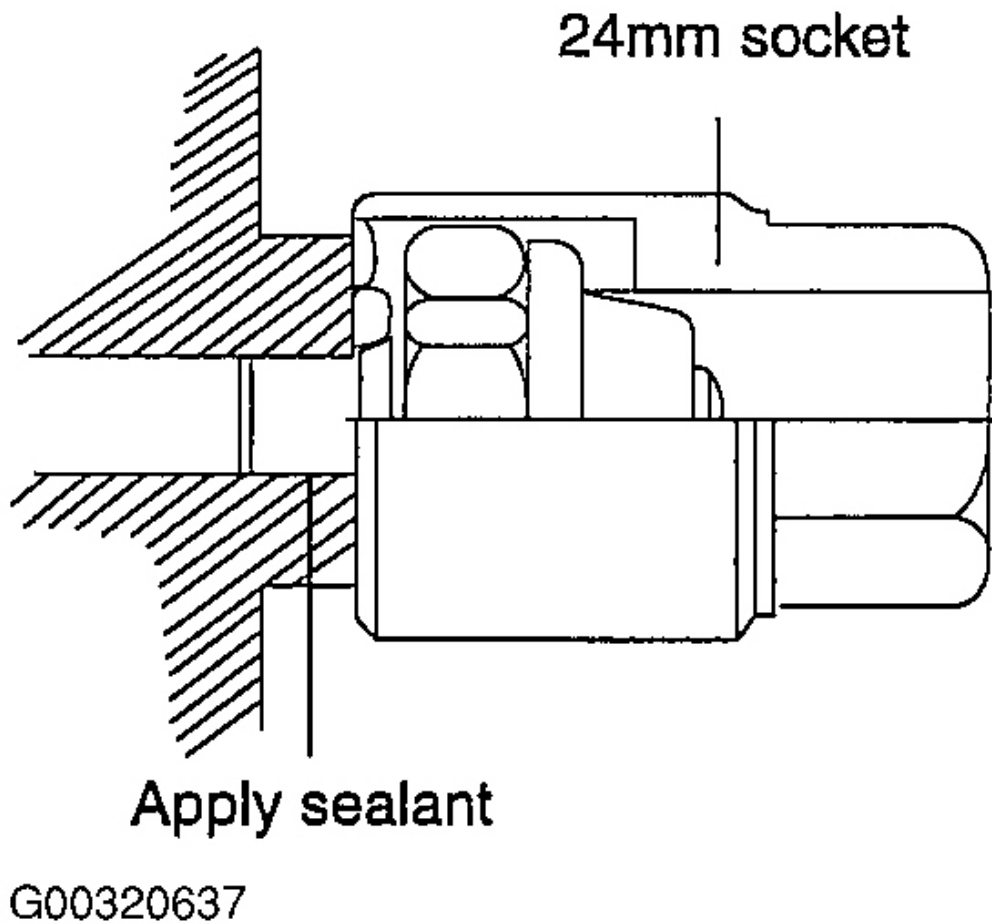
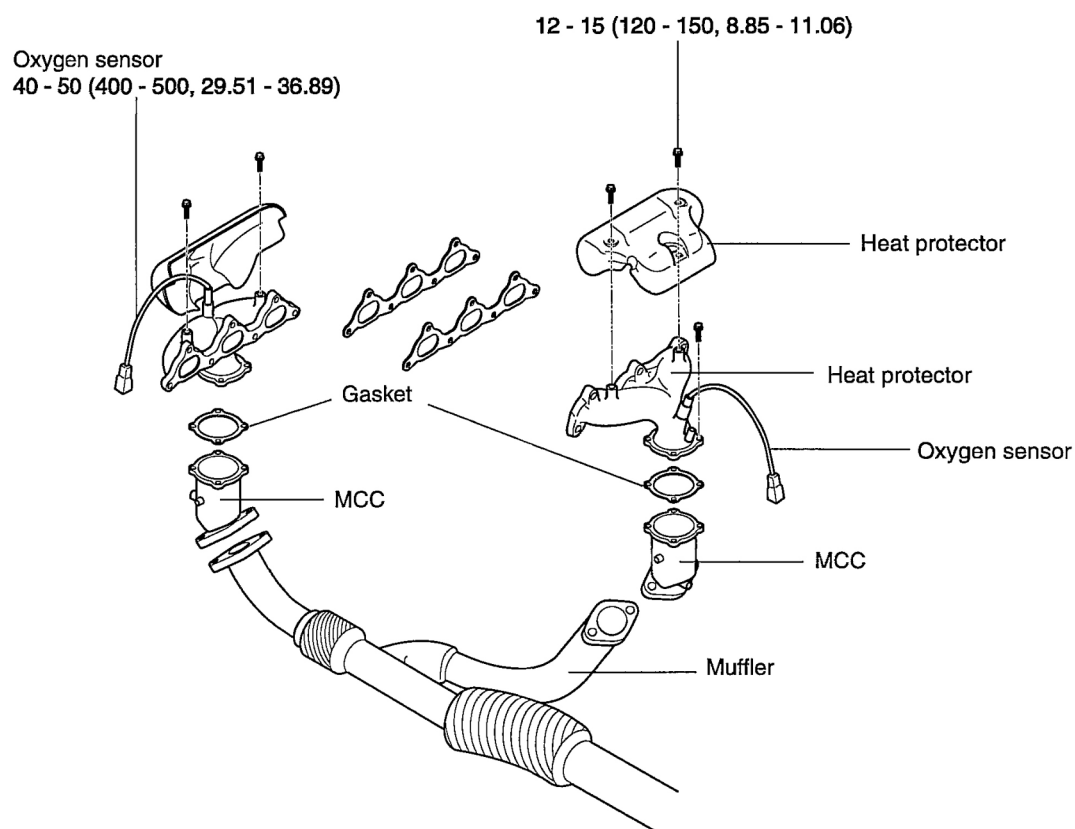


Fig. 169: Installing Oil Pressure Switch
Courtesy of KIA MOTORS AMERICA, INC.

INTAKE AND EXHAUST SYSTEM

EXHAUST MANIFOLD

COMPONENTS



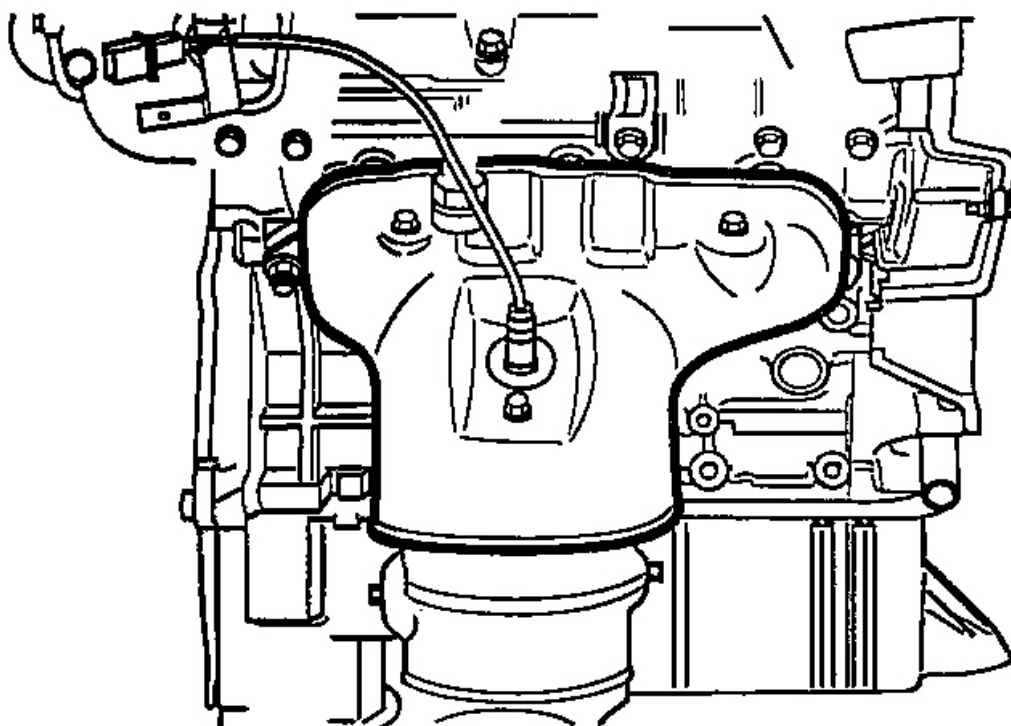
TORQUE : N·m(kg·cm, lb·ft)

G00320638

Fig. 170: Exhaust Manifold Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

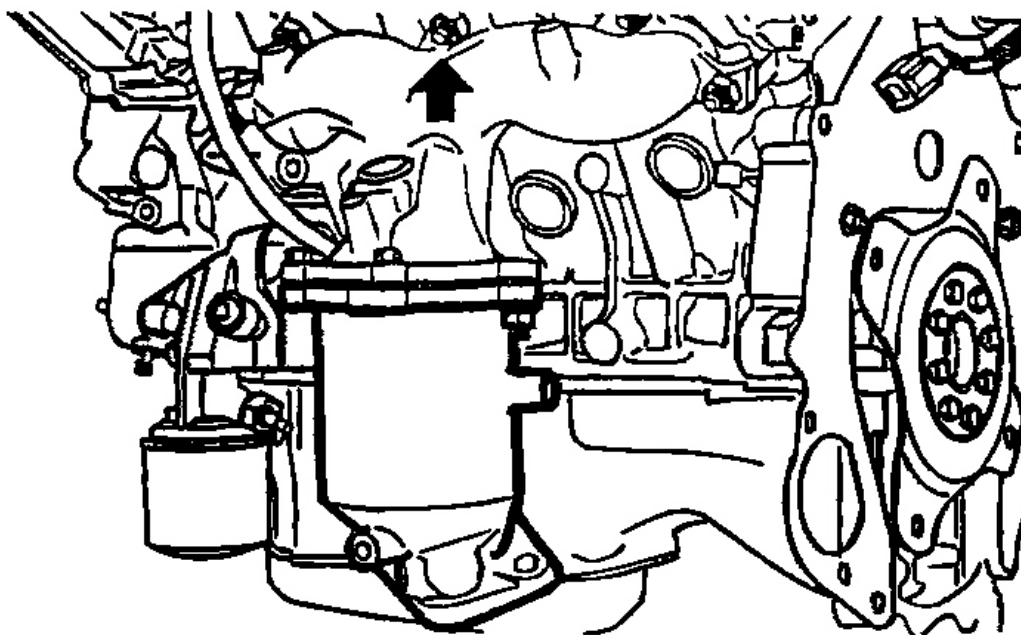
1. Remove the heat protector.



G00320639

Fig. 171: Removing Heat Protector
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove the exhaust manifold.



G00320640

Fig. 172: Removing Exhaust Manifold
Courtesy of KIA MOTORS AMERICA, INC.

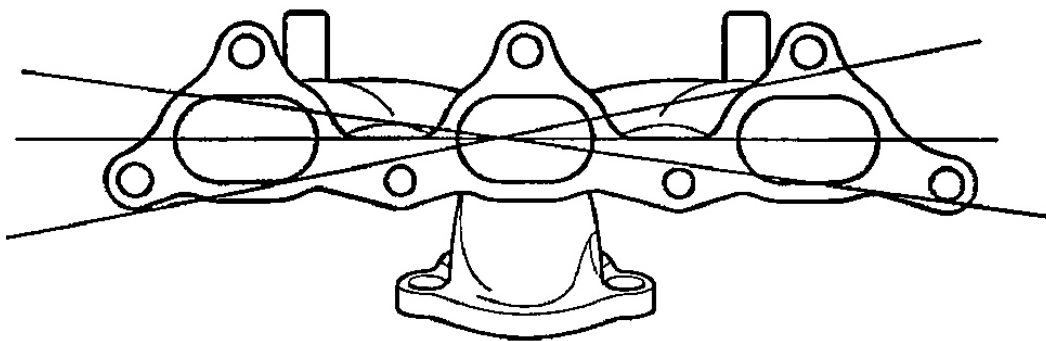
INSPECTION

1. Exhaust manifold.
 1. Check for cracks, replace if necessary.
 2. Check the distortion in mating surface with a straight edge and filler gauge.

Description	Torsion (mm)
Standard value	0.15 (0.006 in)
Limit	0.3 (0.012 in)

G00320641

Fig. 173: Checking Exhaust Manifold
Courtesy of KIA MOTORS AMERICA, INC.



G00320642

Fig. 174: Checking Distortion In Mating Surface With Straight Edge & Filler Gauge
Courtesy of KIA MOTORS AMERICA, INC.

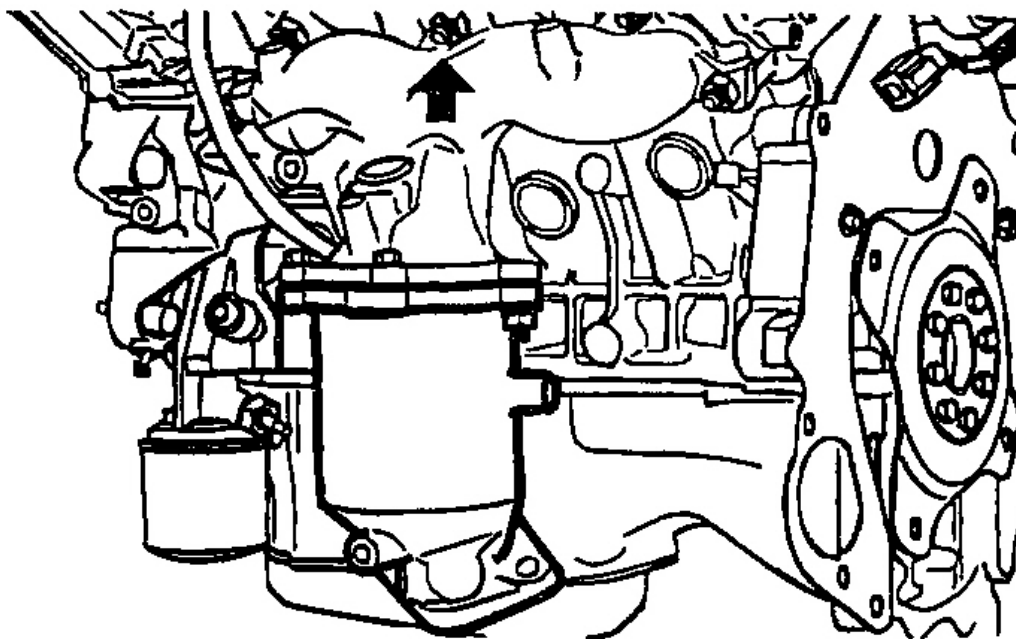
2. Heat protector, gasket.
 1. Check for damages and cracks in all parts, replace if necessary.

INSTALLATION

1. After installing the gasket, install the exhaust manifold.

Tightening torque:

40-50 N.m (400-500 kg. cm, 28.9-36.2 lb. ft)

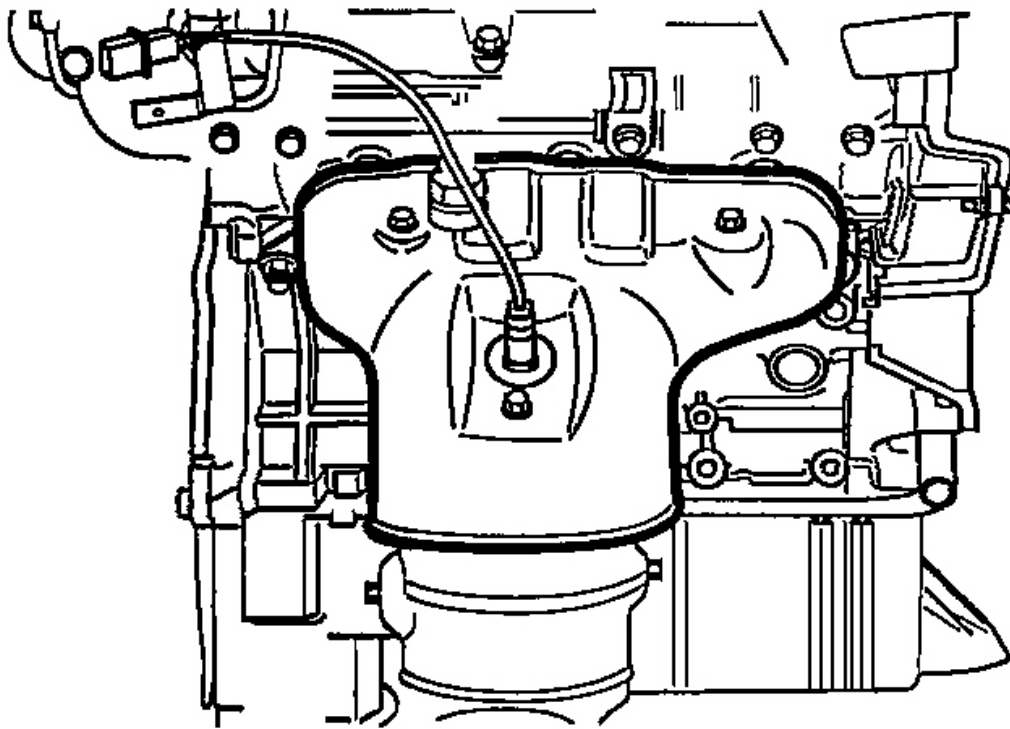


G00320643

Fig. 175: Installing Exhaust Manifold
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: Use only new exhaust manifold gaskets and nuts

2. Install the heat protector.

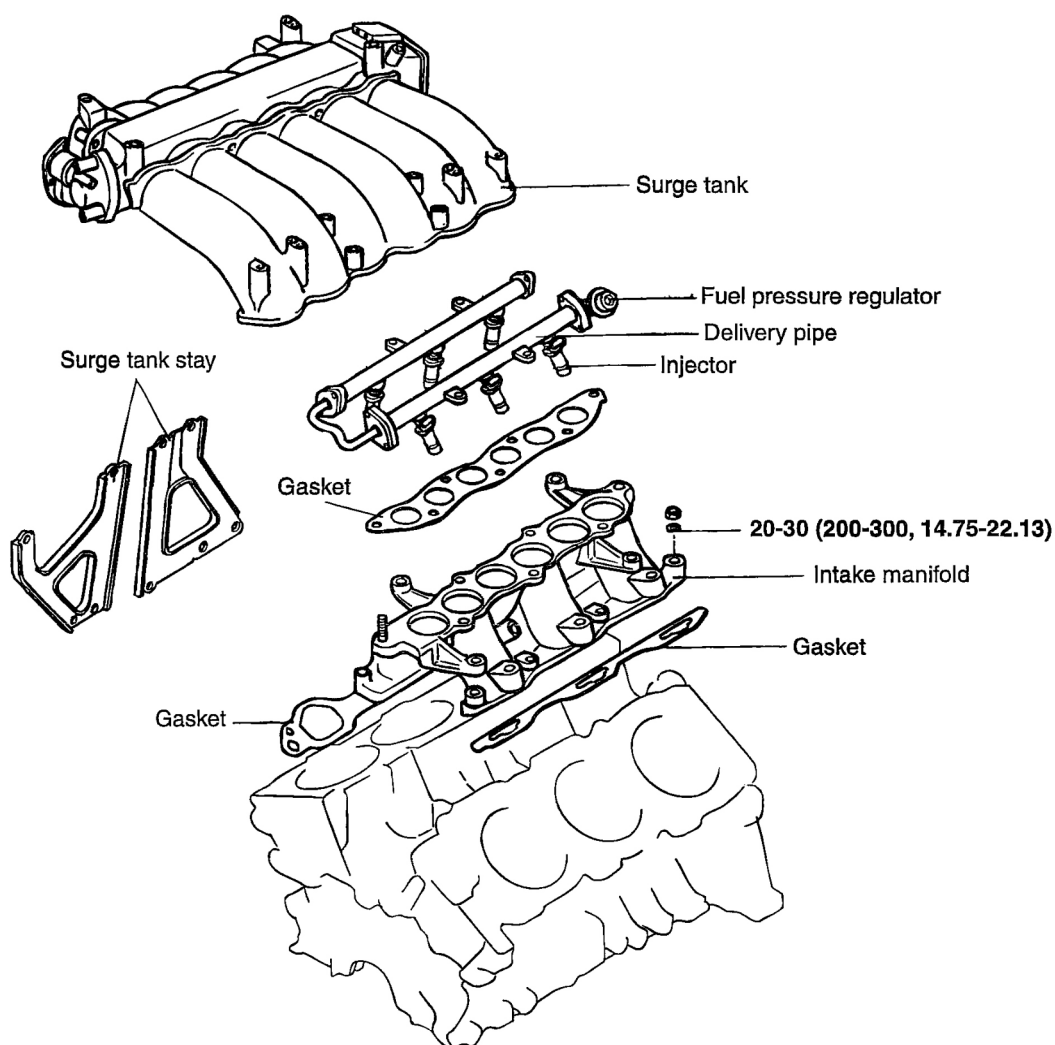


G00320644

Fig. 176: Installing Heat Protector
Courtesy of KIA MOTORS AMERICA, INC.

INTAKE MANIFOLD

COMPONENTS



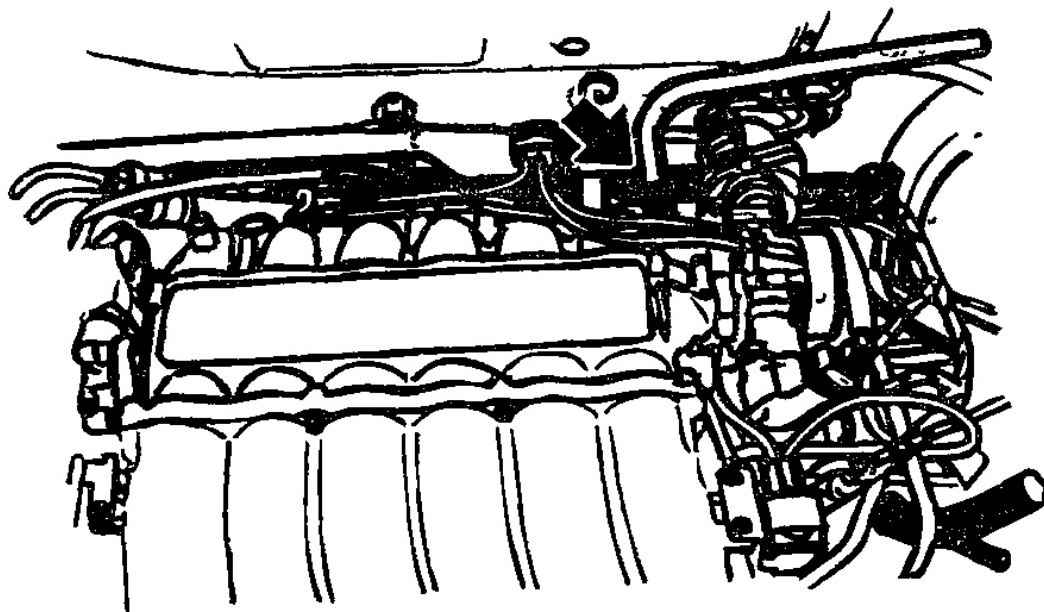
TORQUE : N·m (kg·cm, lb·ft)

G00320645

Fig. 177: Intake Manifold Components
 Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

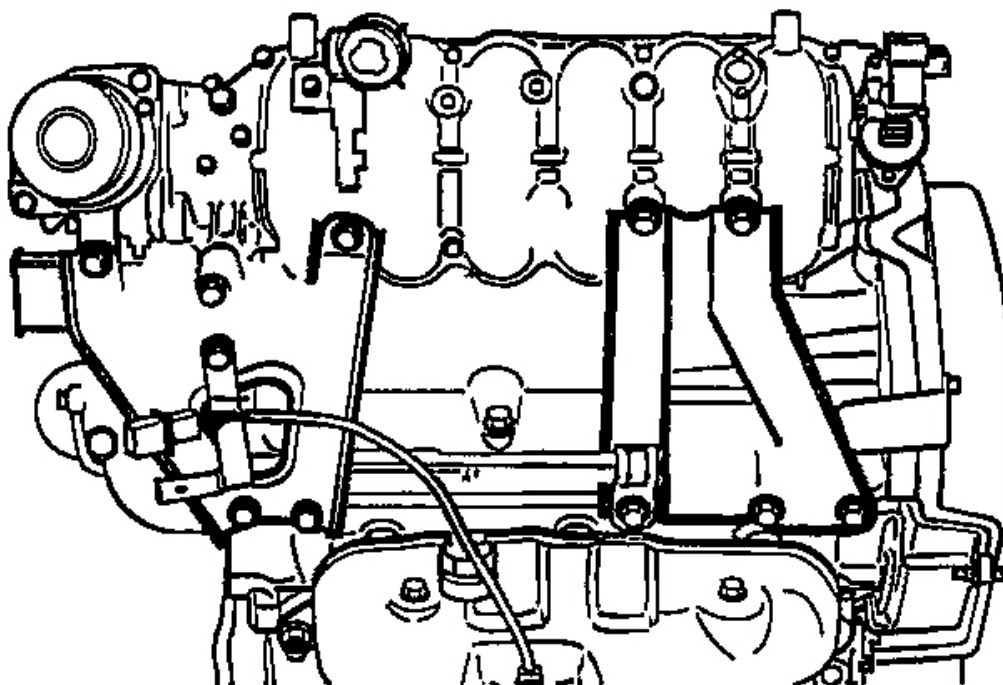
1. Detach the P.C.V. hose and brake booster vacuum hose.
2. Disconnect the connecting part of vacuum hose.



G00320646

Fig. 178: Disconnecting Connecting Part Of Vacuum Hose
Courtesy of KIA MOTORS AMERICA, INC.

3. Remove the surge tank stay.



G00320647

Fig. 179: Removing Surge Tank Stay
Courtesy of KIA MOTORS AMERICA, INC.

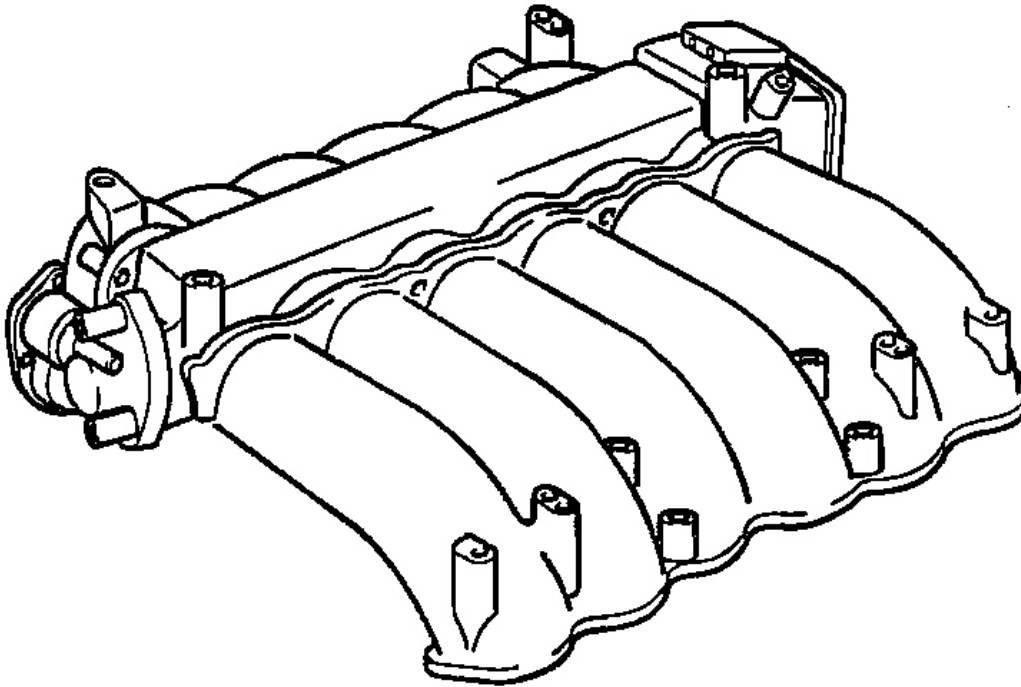
4. After reducing the pressure of fuel pipe line to prevent fuel overflow, disconnect the connecting part of the high pressure hose.



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Fig. 180: Disconnecting Connecting Part Of High Pressure Hose
Courtesy of KIA MOTORS AMERICA, INC.

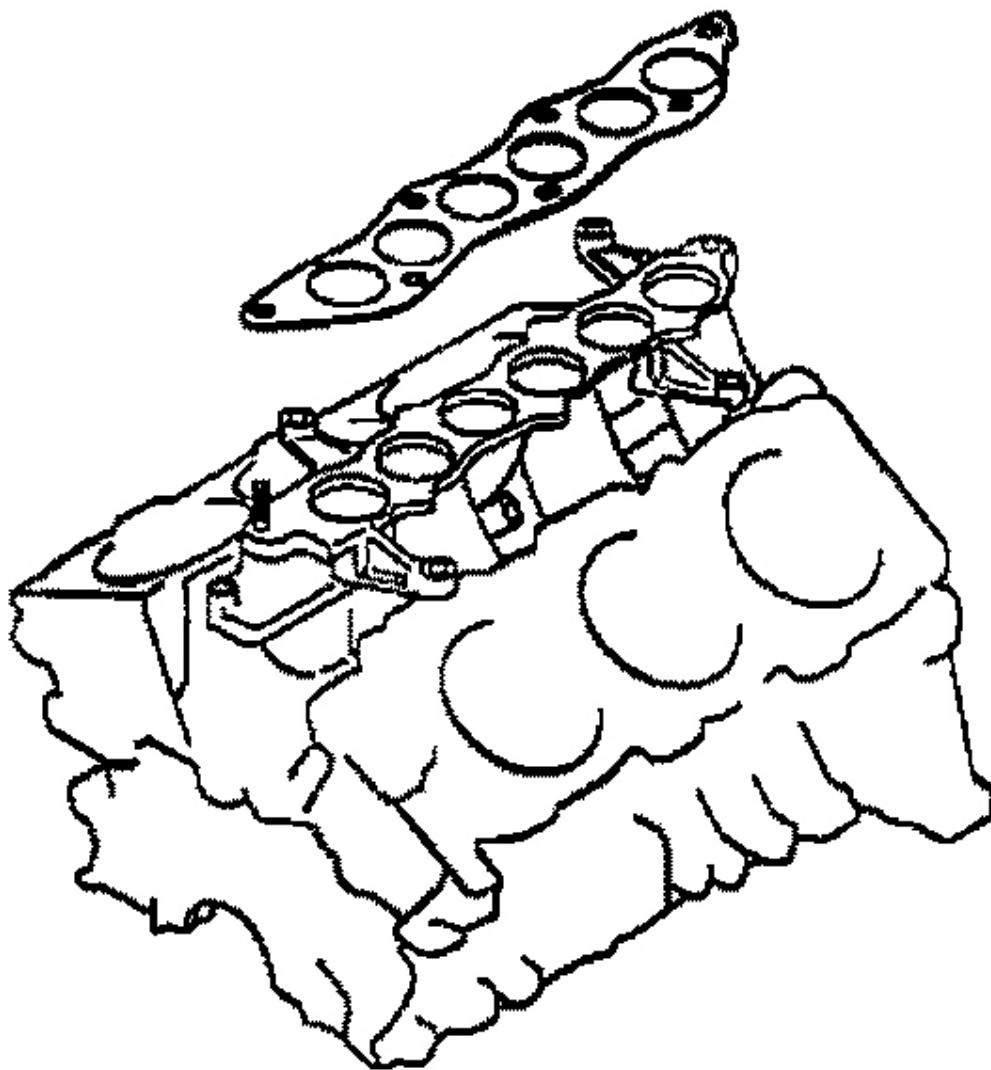
5. Remove the surge tank stay.



G00320649

Fig. 181: Removing Surge Tank Stay
Courtesy of KIA MOTORS AMERICA, INC.

6. After removing the surge tank, remove the gasket.



G00320650

Fig. 182: Removing Gasket

Courtesy of KIA MOTORS AMERICA, INC.

7. Disconnect the fuel injector harness connector.

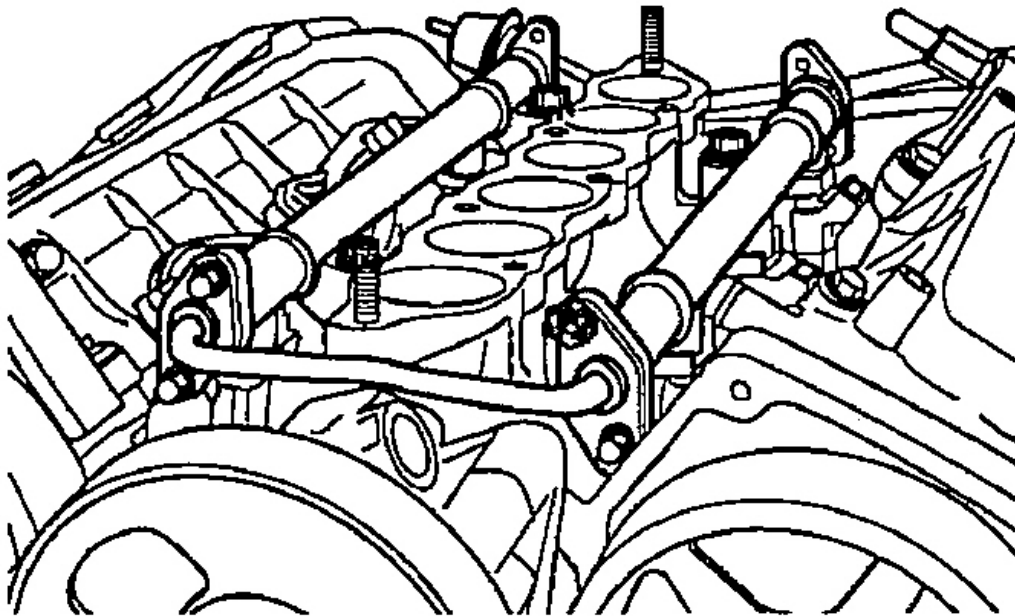


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Fig. 183: Disconnecting Fuel Injector
Courtesy of KIA MOTORS AMERICA, INC.

8. Remove the delivery pipe with fuel injector and pressure regulator attached.

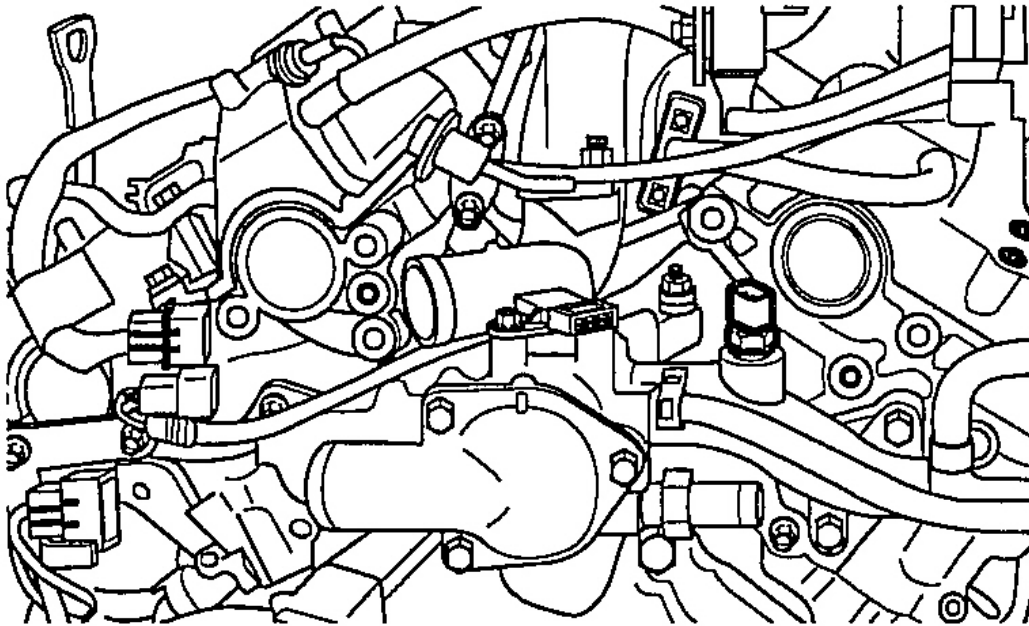
CAUTION: When removing the delivery pipe, be cautious not to drop the injectors.



G00320652

Fig. 184: Removing Delivery Pipe With Fuel Injector
Courtesy of KIA MOTORS AMERICA, INC.

9. Disconnect the wiring harness connector which is connected to the water temperature gauge unit and water temperature sensor assembly.



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Fig. 185: Disconnecting Wiring Harness Connector
Courtesy of KIA MOTORS AMERICA, INC.

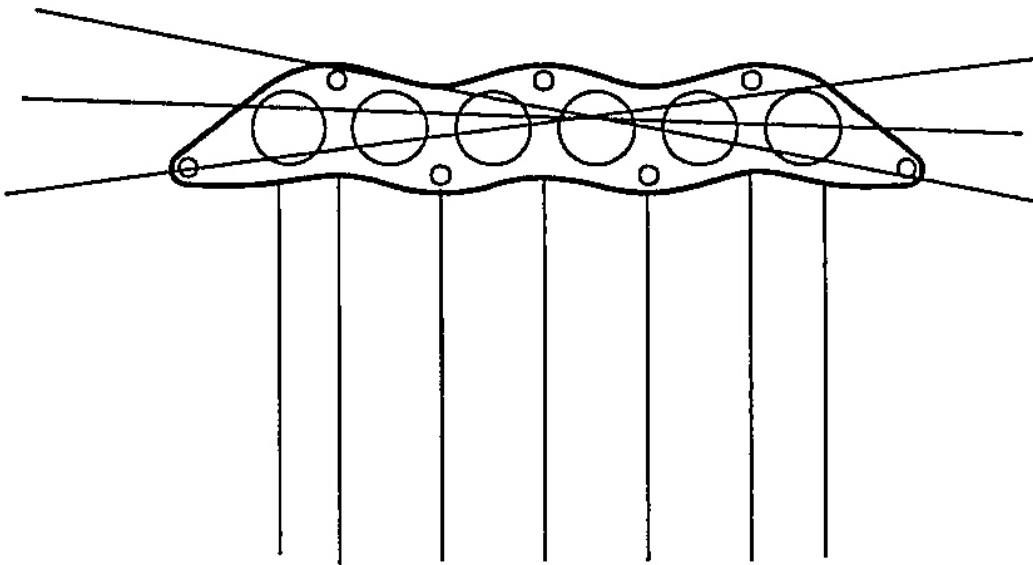
10. Remove the water outlet fitting and gasket.
11. Remove the thermostat.

INSPECTION

1. Surge tank
 1. Inspect the surge tank for damage and crack, if necessary, replace it.
 2. Check if cooling water passage is blocked.
 3. Inspect the mating surface for warpage using a straight edge or filler gauge.

Standard value: 0.15 mm (0.006 in.)

Service limit: 0.2 mm (0.008 in.)



G00320654

Fig. 186: Inspecting Mating Surface For Warpage With Using A Straight Edge Or Filler Gauge
Courtesy of KIA MOTORS AMERICA, INC.

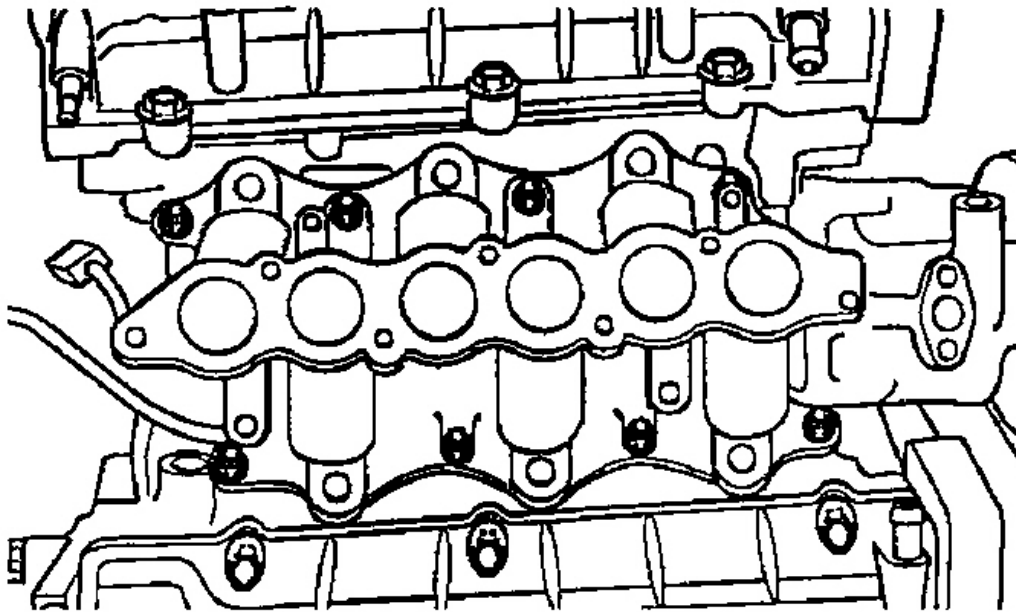
INSTALLATION

1. After replacing the intake manifold gasket, install the surge tank tightening the specified torque.

Tightening torque:

19.6-22.6 N.m

(200-230 kg-cm, 14.5-16.6 lb. ft)



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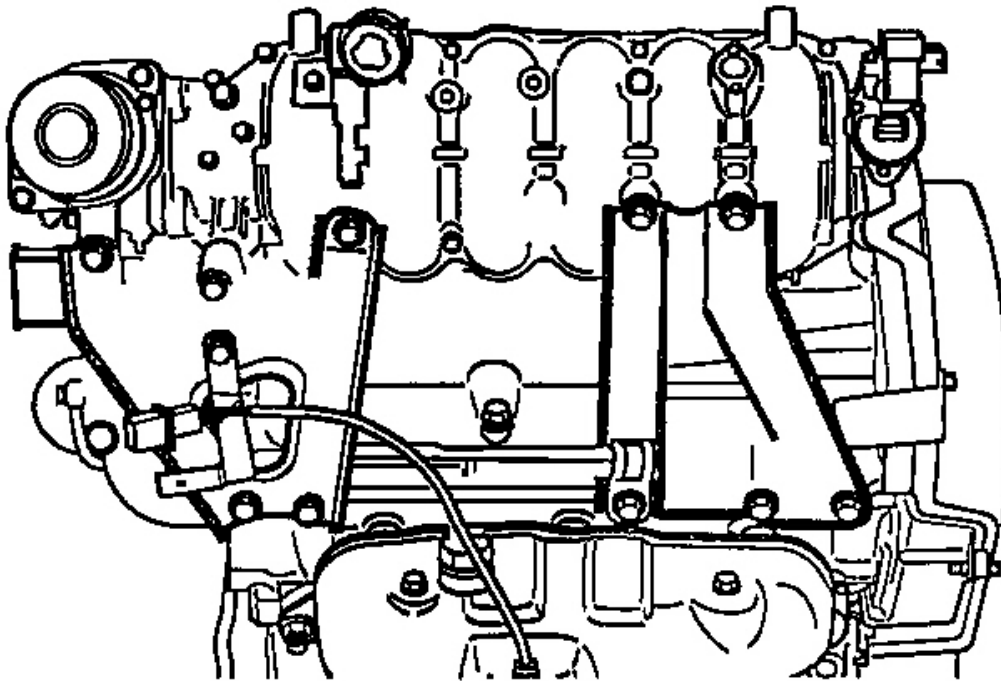
Fig. 187: Installing Surge Tank

Courtesy of KIA MOTORS AMERICA, INC.

2. Install the delivery pipe and injector assembly to the intake manifold.

CAUTION: Check the interference between the injector and injector hole in intake manifold.

3. Install the surge tank stay.



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Fig. 188: Installing Surge Tank Stay
Courtesy of KIA MOTORS AMERICA, INC.

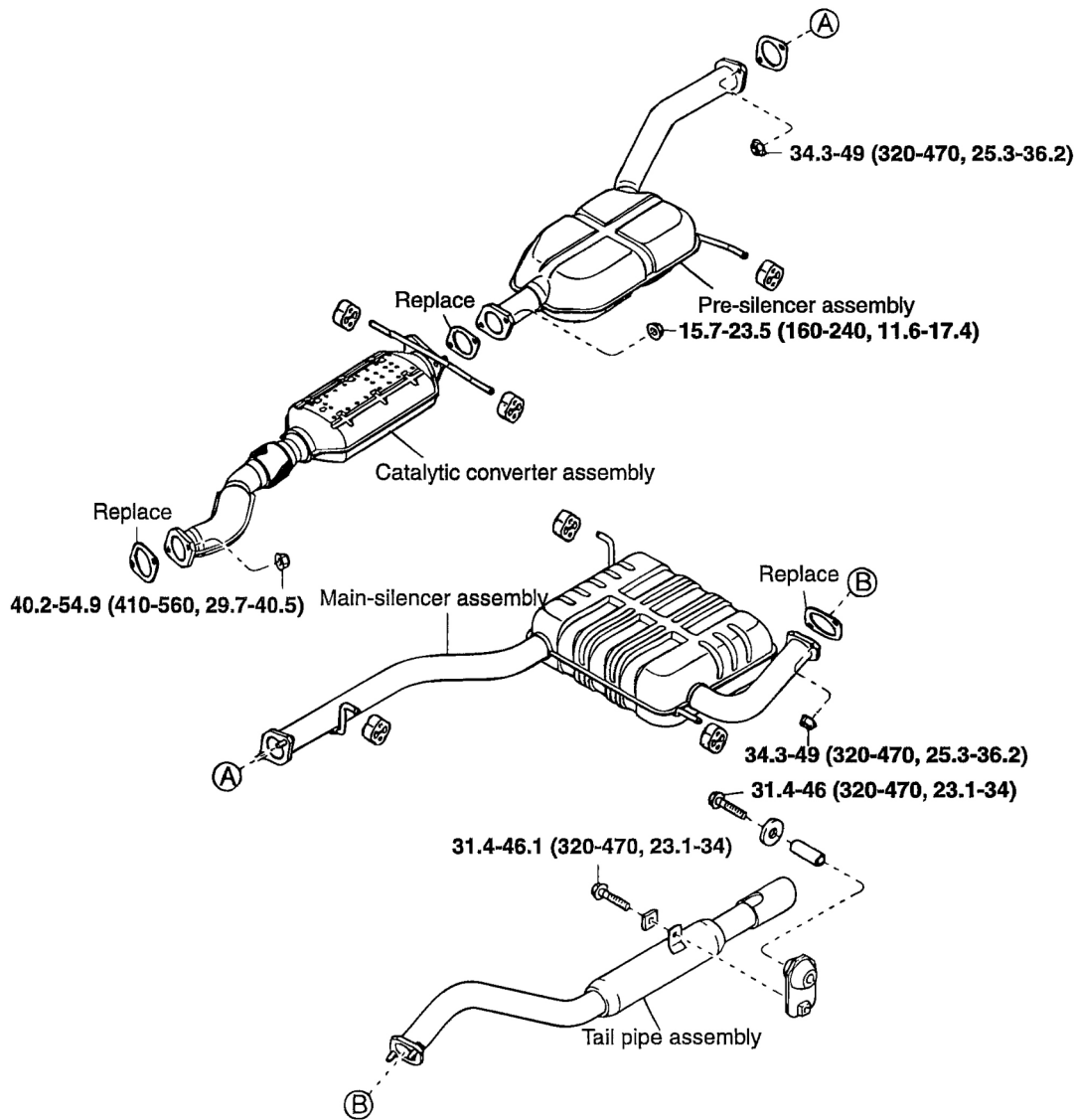
4. Install the fuel injector connector and wiring harness.
5. Connect the high pressure fuel hose.
6. Connect the various vacuum hose.
7. Connect the PCV valve hose and brake booster hose.
8. Install the idle speed actuator.
9. Installation of thermostat.
 1. Install the water outlet fitting gasket which is attached to thermostat at housing.

Align the arrangement mark on thermostat at housing with jiggle valve.

2. Smear the sealant on cooling water temperature sensor and cooling water temperature gauge unit.
10. Install the air hose.
11. Install the accelerator cable.

MUFFLER

COMPONENTS



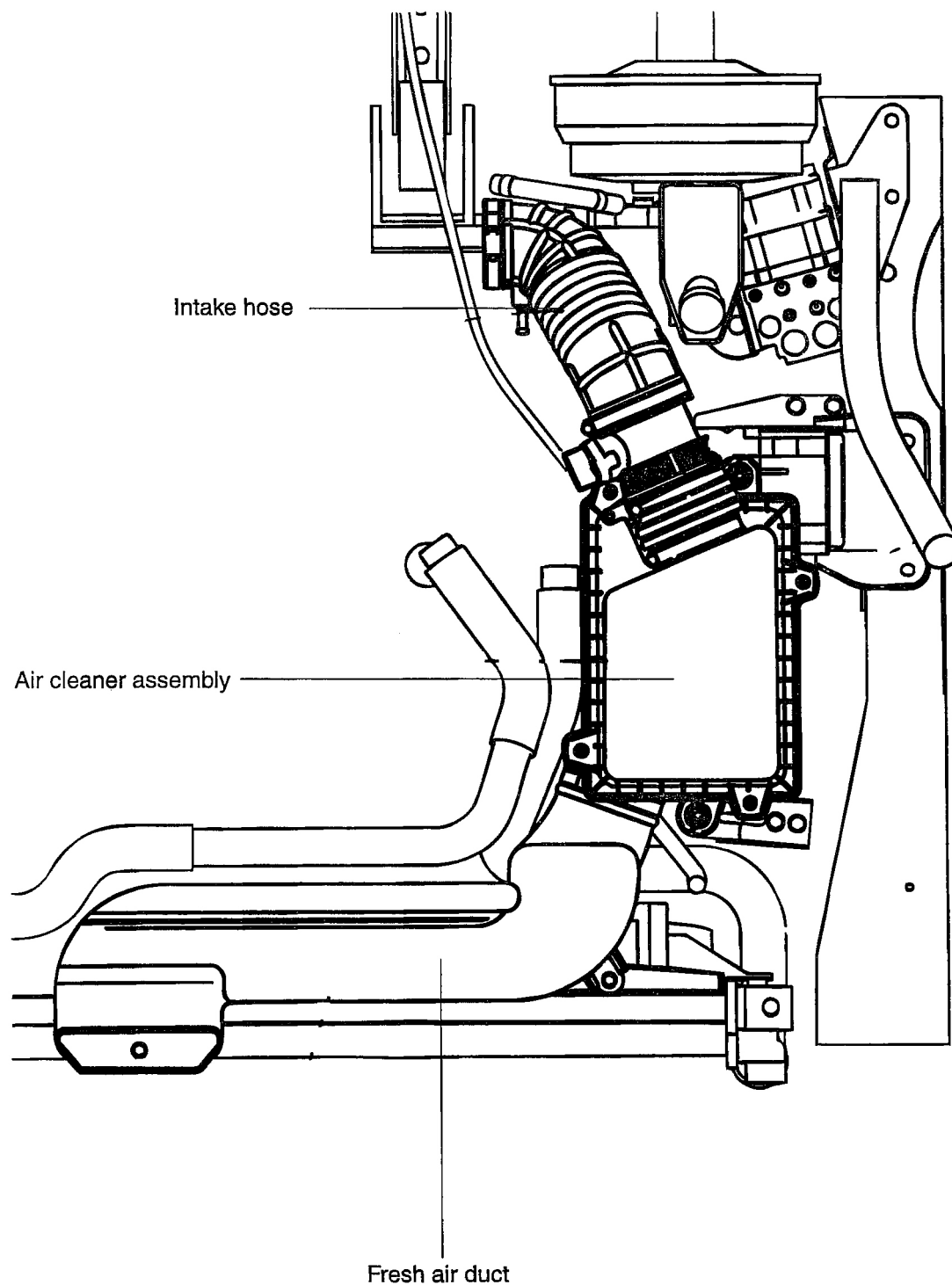
TORQUE : N·m (kg·m, lb·ft)

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Fig. 189: Muffler Components
Courtesy of KIA MOTORS AMERICA, INC.

AIR CLEANER (ACL)

COMPONENTS

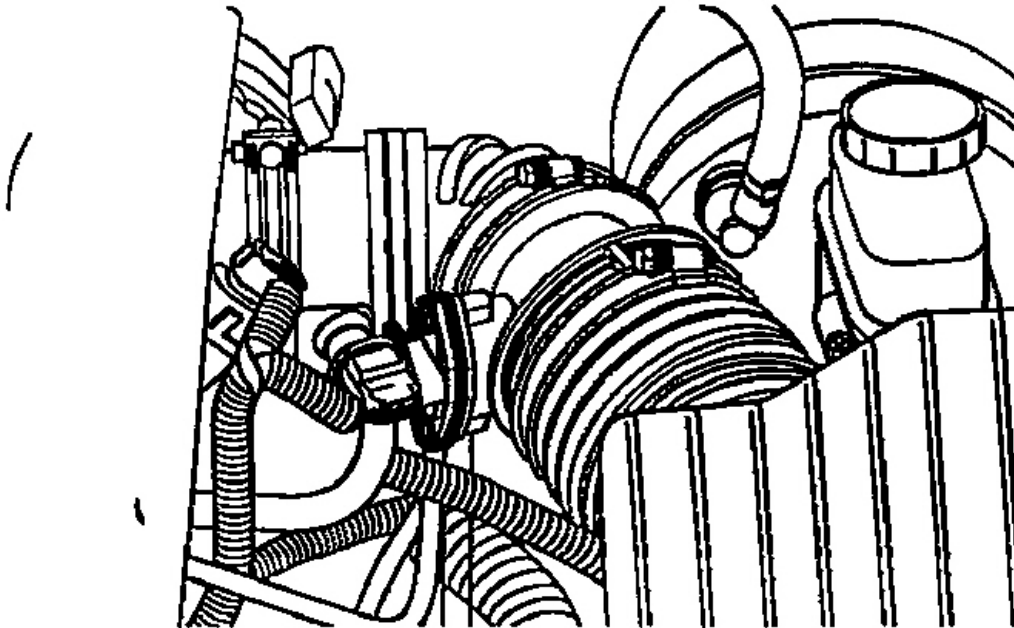


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Fig. 190: Air Cleaner Components
Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

1. Disconnect the A.F.S. connector.



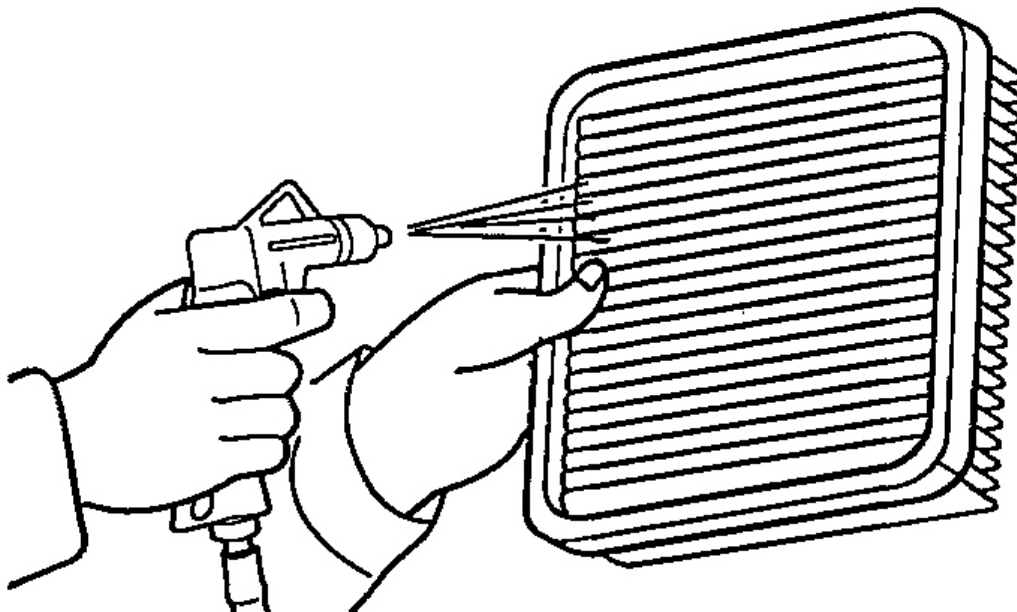
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Fig. 191: Disconnecting A.F.S. Connector
Courtesy of KIA MOTORS AMERICA, INC.

2. Pull out air duct which is connected to the air inlet hose and air cleaner.
3. Detach the air cleaner.

INSPECTION

1. Inspect the body, cover and packing of air cleaner for distortion, corrosion and damage.
2. Inspect the air duct for damage.
3. Inspect the air cleaner element for dirt, contamination and damage. If elements choked a little, blow air from inside of element to get rid of the dust or other foreign object. If it is contaminated too much, replace it. While replacing it, be cautious not to let foreign object get in.



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Fig. 192: Inspecting Air Cleaner
Courtesy of KIA MOTORS AMERICA, INC.

4. Inspect the air cleaner housing for dirt, contamination and damage.
5. If the inside of air cleaner housing is contaminated, eliminates the contaminated material.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Air Intake Surge Tank-To-Intake Manifold Bolt\Nut	11-15 (15-20)
Auto Tensioner Fixing Bolt	15-20 (20-27)
Camshaft Bearing Cap Bolt ⁽¹⁾	
Inner Bolt	(2)
Outer Bolt	14-15 (19-21)
Camshaft Sprocket Bolt	58-72 (79-98)
Catalytic Converter Nut	22-30 (30-40)
Center Exhaust Pipe Nut	22-30 (30-40)
Connecting Rod Nut	
Step 1	26 (35)

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

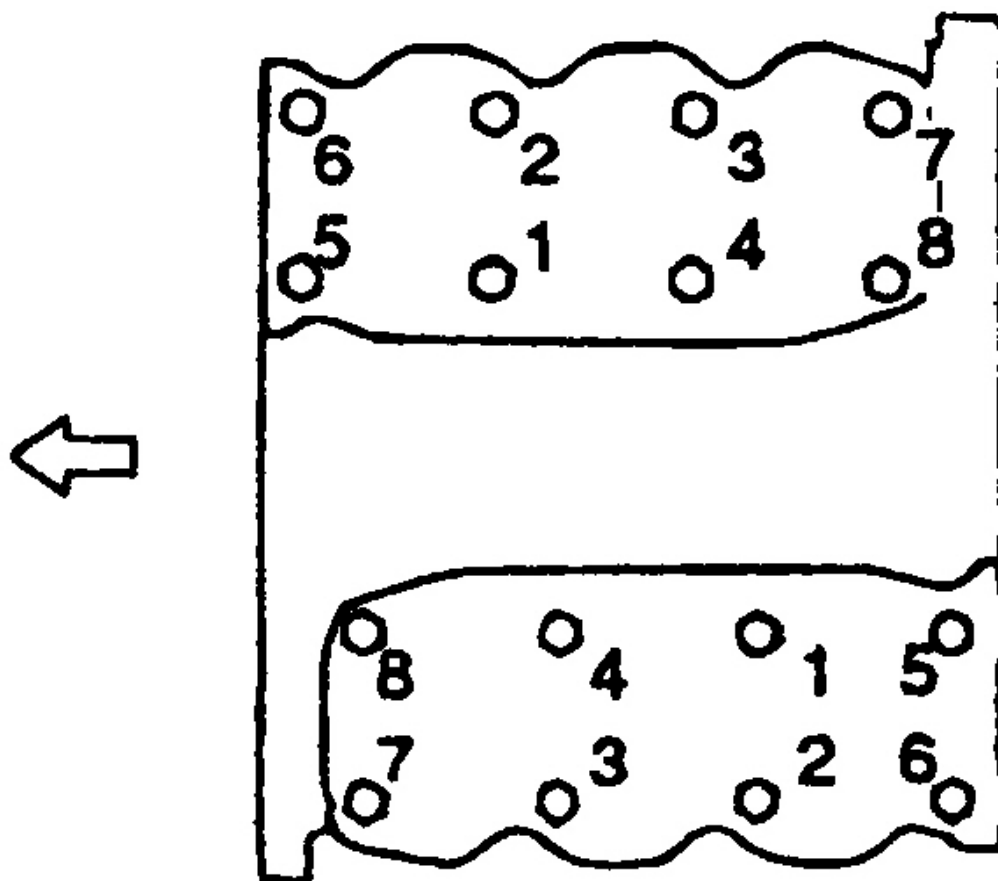
Step 2	Plus Torque Angle 92 Degrees
Crankshaft Main Bearing Cap Bolt ⁽¹⁾	51-58 (69-79)
Crankshaft Pulley Bolt	133-140 (180-190)
Cylinder Head Bolts ⁽³⁾	77-85 (105-115)
Drive Belt Pulley Bolt	26-41 (35-55)
Drive Belt Tensioner Nut	33-37 (45-50)
Drive Plate & Adapter Plate Bolt	54-57 (73-77)
Engine Cooling Inlet Fitting Attaching Bolt	13-15 (17-20)
Engine Coolant Pump Bolt	
M8	11-16 (15-22)
M10	24-37 (33-50)
Engine Coolant Temperature Sensor & Gauge Unit Bolt	15-30 (20-40)
Engine Hanger Bracket Bolt	20-26 (27-35)
Exhaust Manifold Nut	20-24 (27-32)
Front Exhaust Pipe-To-Converter Bolt	30-44 (40-60)
Front Exhaust Pipe-To-Manifold Nut	22-30 (30-40)
Generator Mount Bolt (Bracket Side)	15-22 (20-30)
Generator Mount Bracket-To-Engine Bolt	15-22 (20-30)
Generator Mount Nut (Engine Front Case Side)	15-22 (20-30)
Intake Manifold Surge Tank Stay Bolt	11-15 (15-20)
Intake Manifold-To-Cylinder Head Bolt ⁽⁴⁾	15-17 (20-23)
Oil Pan Drain Plug	26-33 (35-45)
Oil Relief Valve Plug	30-37 (40-50)
Oil Screen Bolt	11-16 (15-22)
Oxygen Sensor	30-37 (40-50)
Power Steering Oil Pump Bracket-To-Cylinder Head Bolt	13-19 (17-26)
Power Steering Oil Pump-To-Bracket Bolt	13-19 (17-26)
Starter-To-Engine Bolt	20-25 (27-34)
Starter-To-Engine Nut	15-22 (20-30)
Timing Belt Cover Bolt	
M6 Bolt	(2)
M8 Bolt	15-20 (20-27)
Timing Belt Idler Pulley Bolt	37-44 (50-60)
Timing Belt Tensioner Arm Fixing Bolt	26-41 (35-55)
Timing Belt Tensioner Pulley Bolt	32-41 (43-55)
Upper Oil Pan Bolt (10x38 mm) ⁽⁵⁾	22-31 (30-42)
Water Outlet Fitting Bolt	13-15 (17-20)
INCH Lbs. (N.m)	
Air Cleaner Mounting Bolt	71-106 (8-12)

2004 Kia Sedona EX

2004-05 ENGINES 3.5L V6 - Sedona

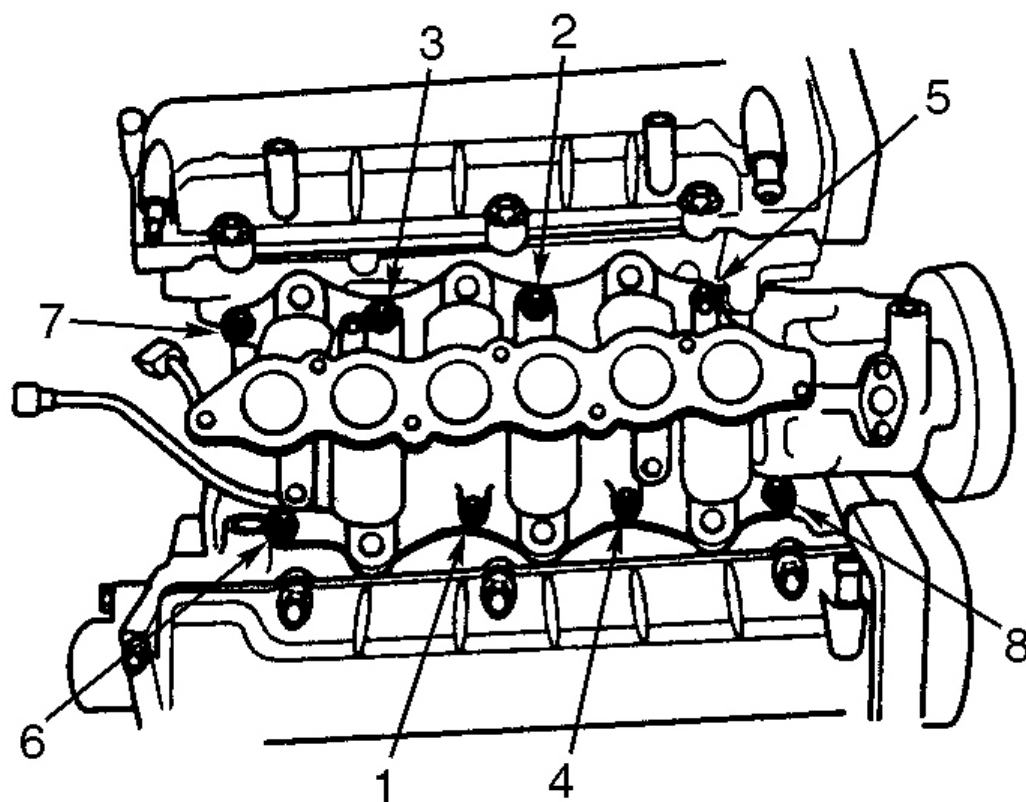
Crank Position Sensor Wheel Screw	44-53 (5-6)
Cylinder Head Cover Bolt ⁽⁶⁾	71-89 (8-10)
Delivery Pipe Installation Bolt	89-133 (10-15)
Fuel Hose Clamp	106-133 (12-15)
Generator Inlet Pipe-To-Front Cylinder Head Assembly Bolt	106-133 (12-15)
Heat Shield-To-Exhaust Manifold Bolt	106-133 (12-15)
Lower Oil Pan Bolt ⁽⁷⁾	89-106 (10-12)
Main Muffler Hanger Support Bracket Bolt	89-133 (10-15)
Oil Filter	106-142 (12-16)
Oil Level Gauge Guide-To-Engine Bolt	106-133 (12-15)
Oil Pressure Switch	71-106 (8-12)
Oil Pump Case Bolts	106-133 (12-15)
Oil Pump Cover Screw	71-133 (8-15)
Oil Seal Case Bolt	89-106 (10-12)
Upper Oil Pan Bolt	
171.5 mm	44-62 (5-7)
152.5 mm	44-62 (5-7)
Rear Plate Bolt	89-106 (10-12)
Throttle Body-To-Surge Tank Bolt	89-115 (10-13)
Transaxle Mounting Plate Bolt	89-106 (10-12)

- (1) Tighten bolts evenly in 3-4 steps to specification.
- (2) Tighten bolt to 89-106 INCH lbs. (10-12 N.m)
- (3) Tighten in sequence to specification. See **Fig. 193** .
- (4) Tighten in sequence to specification. See **Fig. 194** .
- (5) Tighten in sequence to specification. See **Fig. 195** .
- (6) Tighten in sequence to specification. See **Fig. 196** .
- (7) Tighten in sequence to specification. See **Fig. 197** .



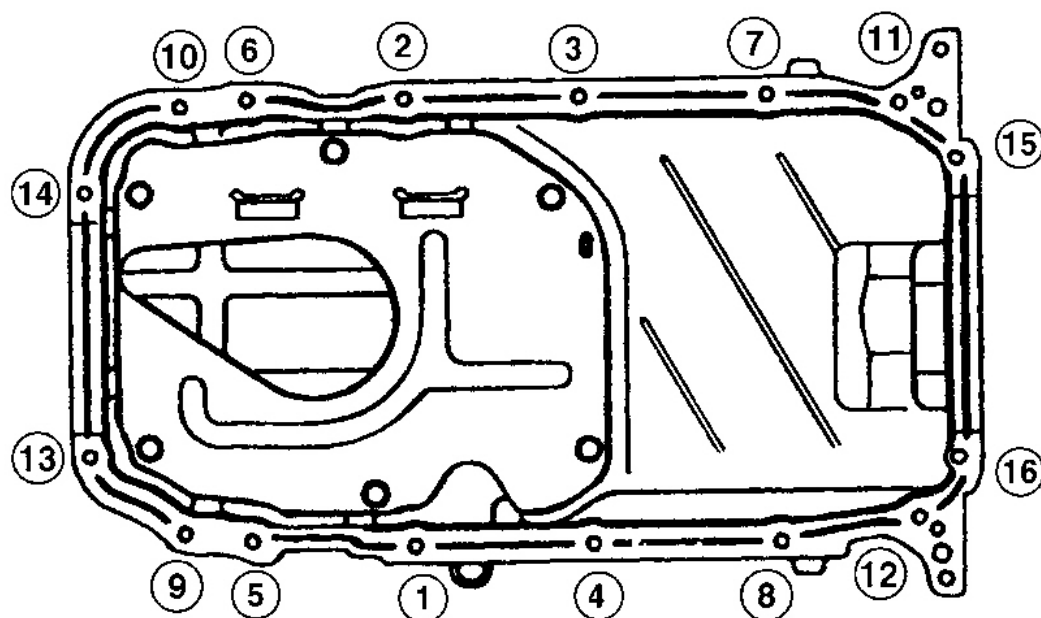
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Fig. 193: Cylinder Head Bolt Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 194: Intake Manifold Nut Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.



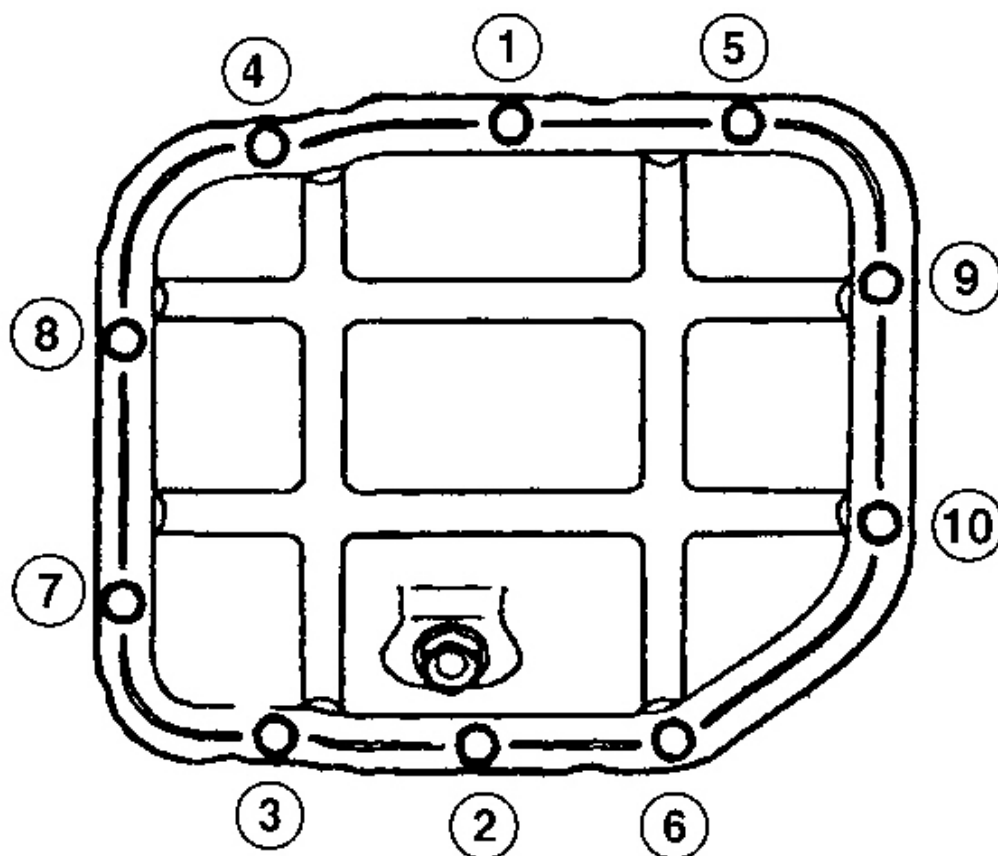
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Fig. 195: Upper Oil Pan Bolt Tightening Sequence
 Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 196: Cylinder Head Cover Bolt Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 197: Lower Oil Pan Bolt Tightening Sequence
 Courtesy of KIA MOTORS AMERICA, INC.