

2009 ENGINE

Cylinder Block - Sorento

COMPONENTS AND COMPONENTS LOCATION

COMPONENTS

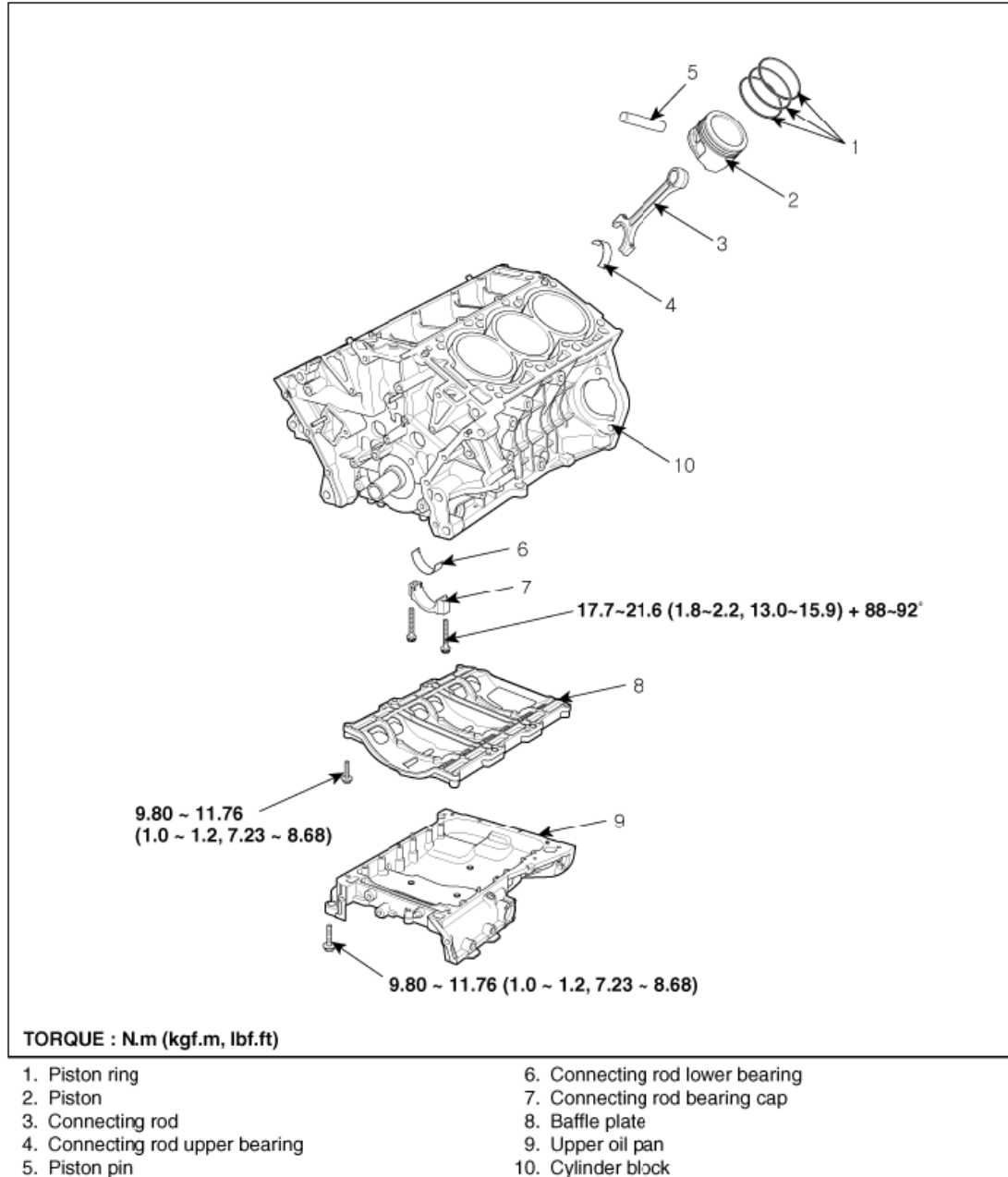


Fig. 1: Identifying Cylinder Block Components With Torque Specifications (1 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

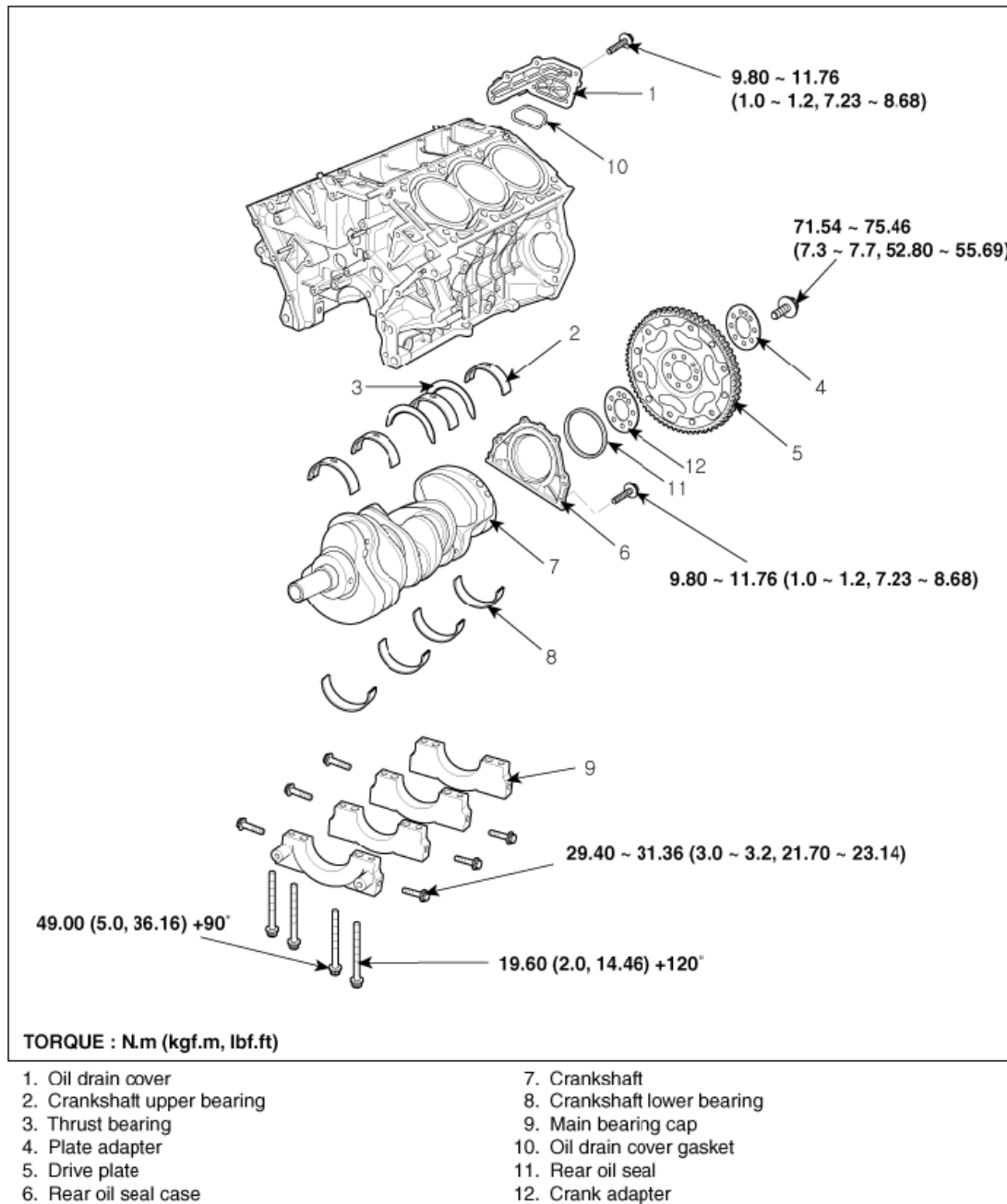


Fig. 2: Identifying Cylinder Block Components With Torque Specifications (2 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

REPAIR PROCEDURES

REMOVAL

- CAUTION:**
- Use fender covers to avoid damaging painted surfaces.
 - To avoid damage, unplug the wiring connectors carefully while

holding the connector portion.

NOTE:

- Mark all wiring and hoses to avoid misconnection.
- Inspection the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center.

1. Remove exhaust manifold.
2. Remove intake manifold.
3. Remove timing chain.
4. Remove water temperature control assembly.
5. Remove cylinder head.
6. Remove oil pump.
7. Remove oil filter assembly.
8. Remove A/C compressor (A) from engine.

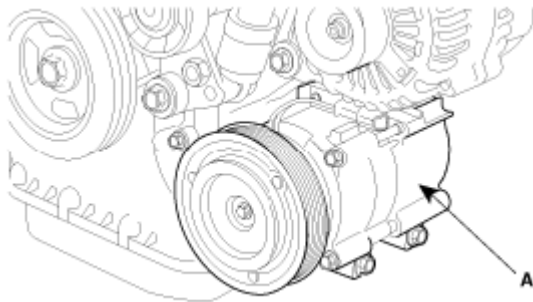


Fig. 3: Identifying A/C Compressor
Courtesy of KIA MOTORS AMERICA, INC.

9. Remove alternator (A) from engine.

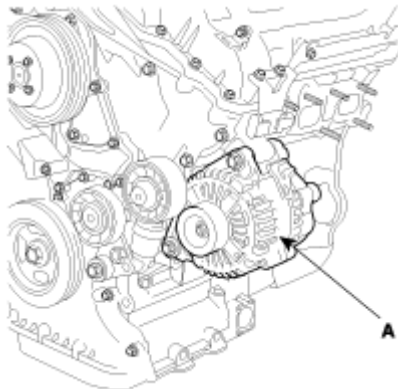


Fig. 4: Identifying Alternator
Courtesy of KIA MOTORS AMERICA, INC.

10. Remove power steering pump (A) from engine.

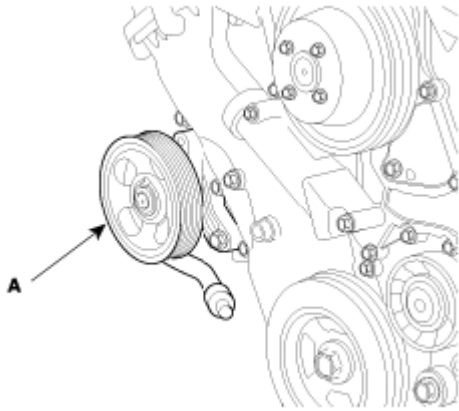


Fig. 5: Identifying Power Steering Pump
Courtesy of KIA MOTORS AMERICA, INC.

DISASSEMBLY

1. Remove drive plate.
2. Remove knock sensor (A).

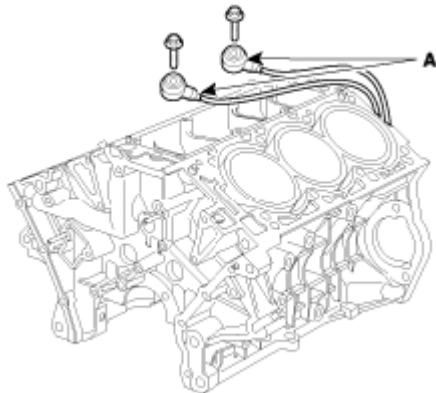


Fig. 6: Identifying Knock Sensor
Courtesy of KIA MOTORS AMERICA, INC.

3. Remove upper oil pan (A).

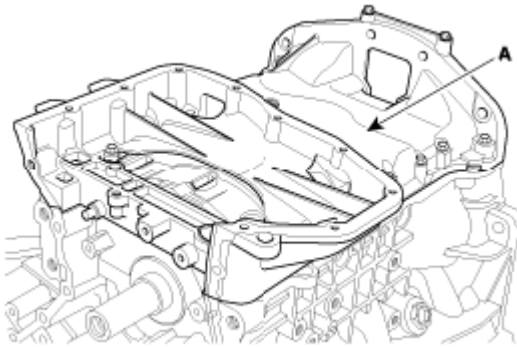


Fig. 7: Identifying Upper Oil Pan
Courtesy of KIA MOTORS AMERICA, INC.

4. Remove baffle plate (A).

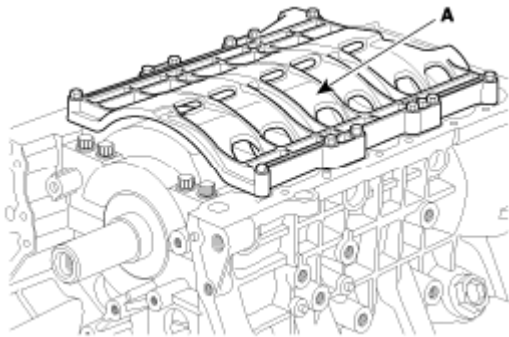


Fig. 8: Identifying Baffle Plate
Courtesy of KIA MOTORS AMERICA, INC.

5. Remove rear oil seal case (A).

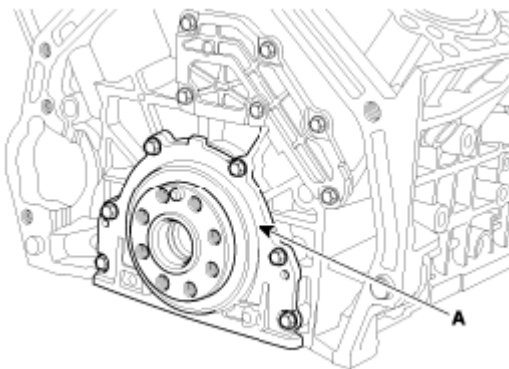


Fig. 9: Identifying Rear Oil Seal Case
Courtesy of KIA MOTORS AMERICA, INC.

6. Remove oil drain cover (A).

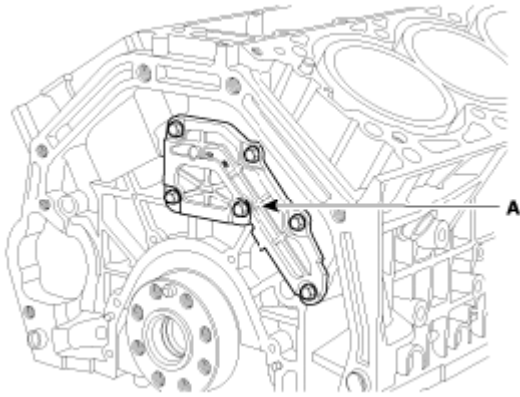


Fig. 10: Identifying Oil Drain Cover

Courtesy of KIA MOTORS AMERICA, INC.

7. Check the connecting rod end play.
8. Check the connecting rod oil clearance.
9. Remove piston and connecting rod assemblies.
 1. Using a ridge reamer, remove all the carbon from the top of the cylinder.
 2. Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

NOTE:

- **Keep the bearings, connecting rod and cap together.**
- **Arrange the piston and connecting rod assemblies in the correct order.**

10. Remove crankshaft main bearing cap and check oil clearance.
11. Check the crankshaft end play.
12. Lift the crankshaft (A) out of engine, being careful not to damage journals.

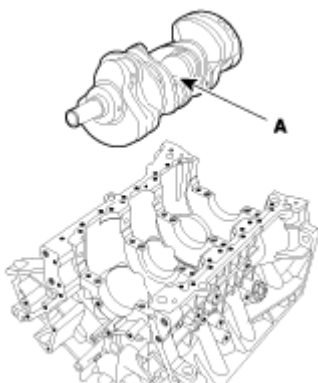


Fig. 11: Identifying Crankshaft

Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Arrange the main bearings and thrust bearings in the correct order.

13. Check fit between piston and piston pin.

Try to move the piston back and forth on the piston pin. If any movement is felt, replace piston and piston pin as a set.

14. Remove piston rings.
 1. Using a piston ring expander, remove the 2 compression rings.
 2. Remove 2 side rails and the spacer by hand.

NOTE: Arrange the piston rings in the correct order only.

15. Disconnect connecting rod from piston.

INSPECTION

CONNECTING ROD AND CRANKSHAFT

1. Check the connecting rod end play.

Using a feeler gauge, measure the end play while moving the connecting rod back and forth.

Standard end play: 0.1~ 0.25 mm (0.004 ~ 0.010 in.)

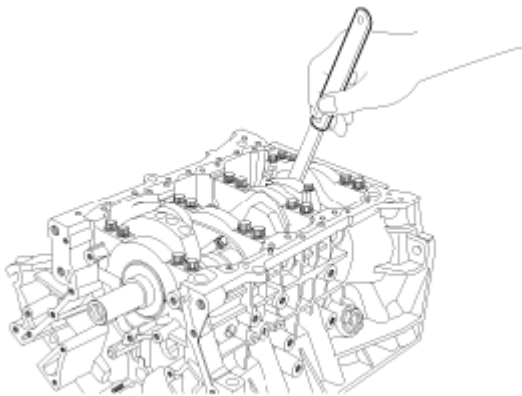


Fig. 12: Measuring Connecting Rod End Play
Courtesy of KIA MOTORS AMERICA, INC.

- A. If out-of-tolerance, install a new connecting rod.
- B. If still out-of-tolerance, replace the crankshaft.
2. Check the connecting rod bearing oil clearance.
 1. Check the matchmarks on the connecting rod and cap are aligned to ensure correct reassembly.
 2. Remove 2 connecting rod cap bolts.
 3. Remove the connecting rod cap and bearing half.
 4. Clean the crank pin and bearing.

5. Place plastigage across the crank pin.
6. Reinstall the bearing half and cap, and torque the bolts.

Tightening torque

17.7~21.6 Nm (1.8~2.2 kgf.m, 13.0~15.9 lb-ft) + 88~92°

NOTE: **Do not turn the crankshaft.**

7. Remove 2 bolts, connecting rod cap and bearing half.
8. Measure the plastigage at its widest point.

Standard oil clearance

0.038 ~ 0.056 mm (0.0015 ~ 0.0022 in)

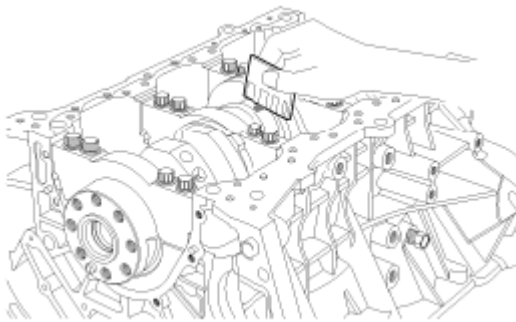


Fig. 13: Measuring Connecting Rod Bearing Oil Clearance
Courtesy of KIA MOTORS AMERICA, INC.

9. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color mark (select the color as shown in the next column), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

10. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

NOTE: **If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.**

CAUTION: If the marks are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

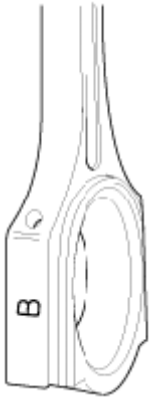
CONNECTING ROD MARK LOCATION

Fig. 14: Identifying Connecting Rod Mark Location
 Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CONNECTING ROD**CONNECTING ROD DISCRIMINATION REFERENCE**

CLASS	MARK	INSIDE DIAMETER
0	a	58.000 ~ 58.006 mm (2.2834 ~ 2.2837 in.)
1	b	58.006 ~ 58.012 mm (2.2837 ~ 2.2839 in.)
2	c	58.012 ~ 58.018 mm (2.2839 ~ 2.2842 in.)

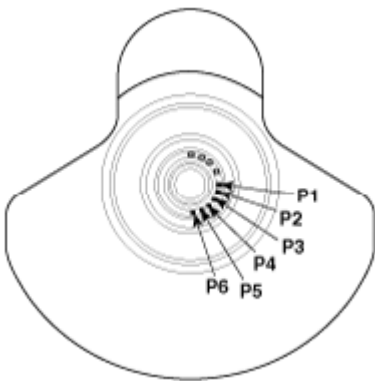
CRANKSHAFT PIN MARK LOCATION**DISCRIMINATION OF CRANKSHAFT**

Fig. 15: Identifying Crankshaft Pin Mark Location
 Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CRANKSHAFT**CRANKSHAFT DISCRIMINATION REFERENCE**

CLASS	MARK	OUTSIDE DIAMETER OF PIN
I	1 or A	54.966 ~ 54.972 mm (2.1640 ~ 2.1642 in.)
II	2 or B	54.960 ~ 54.966 mm (2.1638 ~ 2.1640 in.)
III	3 or C	54.954 ~ 54.960 mm (2.1635 ~ 2.1638 in.)

PLACE OF IDENTIFICATION MARK (CONNECTING ROD BEARING)

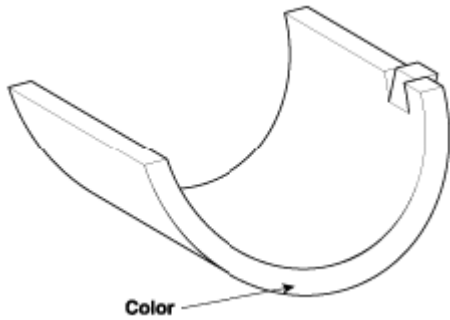


Fig. 16: Identifying Connecting Rod Bearing Identification Mark
Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CONNECTING ROD BEARING

CONNECTING ROD BEARING DISCRIMINATION REFERENCE

CLASS	MARK	THICKNESS OF BEARING
E	BLUE	1.514 ~ 1.517 mm (0.0596 ~ 0.0597 in.)
D	BLACK	1.511 ~ 1.514 mm (0.0595 ~ 0.0596 in.)
C	BROWN	1.508 ~ 1.511 mm (0.0594 ~ 0.0595 in.)
B	GREEN	1.505 ~ 1.508 mm (0.0593 ~ 0.0594 in.)
A	YELLOW	1.502 ~ 1.505 mm (0.0591 ~ 0.0593 in.)

(11) Selection

CONNECTING ROD IDENTIFICATION MARK REFERENCE

		CONNECTING ROD IDENTIFICATION MARK		
		0 (a)	1 (b)	2 (c)
CRANKSHAFT IDENTIFICATION MARK	1 or A	A (YELLOW)	B (GREEN)	C (BROWN)
	2 or B	B (GREEN)	C (BROWN)	D (BLACK)
	3 or C	C (BROWN)	D (BLACK)	E (BLUE)

3. Check the crankshaft bearing oil clearance.

1. To check main bearing-to-journal oil clearance, remove the main bearing caps and bearing halves.

2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and caps, then torque the bolts.

Tightening torque

49.00 Nm (5.0 kgf.m, 36.16 lb-ft) + 90°

19.60 Nm (2.0 kgf.m, 14.46 lb-ft) + 120°

29.40 ~ 31.36 Nm (3.0 ~ 3.2 kgf.m, 21.70 ~ 23.14 lb-ft)

NOTE: **Do not turn the crankshaft.**

5. Remove the cap and bearing again, and measure the widest part of the plastigage.

Standard oil clearance

0.022 ~ 0.040 mm (0.0009 ~ 0.0016 in)

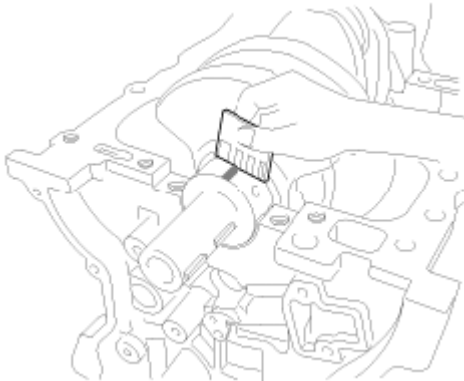


Fig. 17: Measuring Crankshaft Bearing Oil Clearance
Courtesy of KIA MOTORS AMERICA, INC.

6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color mark (select the color as shown in the next column), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

CAUTION: If the marks are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Crankshaft bore mark location

Letters have been stamped on the block as a mark for the size of each of the 5 main journal bores.

Use them, and the numbers or bar stamped on the crank (marks for main journal size), to choose the correct bearings.

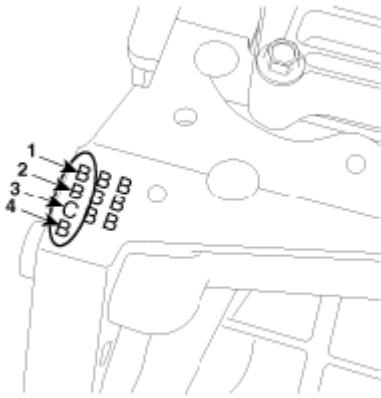


Fig. 18: Identifying Crankshaft Bore Mark Location
Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CYLINDER BLOCK

CYLINDER BLOCK DISCRIMINATION REFERENCE

CLASS	MARK	INSIDE DIAMETER
a	A	73.500 ~ 73.506 mm (2.8937 ~ 2.8939 in.)
b	B	73.506 ~ 73.512 mm (2.8939 ~ 2.8942 in.)
c	C	73.512 ~ 73.518 mm (2.8942 ~ 2.8944 in.)

CRANKSHAFT JOURNAL MARK LOCATION

DISCRIMINATION OF CRANKSHAFT

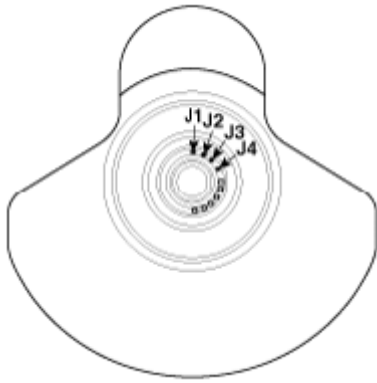


Fig. 19: Identifying Crankshaft Journal Mark Location
 Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CRANKSHAFT

CRANKSHAFT DISCRIMINATION REFERENCE

CLASS	MARK	OUTSIDE DIAMETER OF JOURNAL
I	A	68.954 ~ 68.960 mm (2.7147 ~ 2.7150 in.)
II	B	68.948 ~ 68.954 mm (2.7145 ~ 2.7147 in.)
III	C	68.942 ~ 68.948 mm (2.7142 ~ 2.7145 in.)

PLACE OF IDENTIFICATION MARK (CRANKSHAFT BEARING)

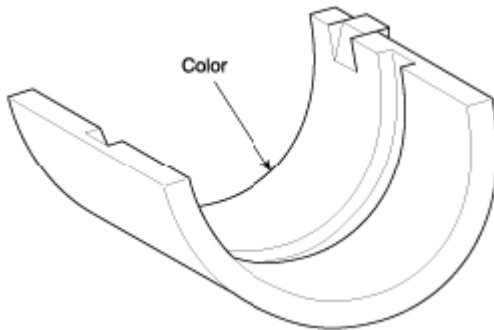


Fig. 20: Identifying Crankshaft Bearing Identification Mark
 Courtesy of KIA MOTORS AMERICA, INC.

DISCRIMINATION OF CRANKSHAFT BEARING

CRANKSHAFT BEARING DISCRIMINATION REFERENCE

CLASS	MARK	THICKNESS OF BEARING
E	BLUE	2.277 ~ 2.280 mm (0.0896 ~ 0.0897 in.)
D	BLACK	2.274 ~ 2.277 mm (0.0895 ~ 0.0896 in.)
C	BROWN	2.271 ~ 2.274 mm (0.0894 ~ 0.0895 in.)
B	GREEN	2.268 ~ 2.271 mm (0.0893 ~ 0.0894 in.)

A

YELLOW

2.265 ~ 2.268 mm (0.0892 ~ 0.0893 in.)

SELECTION**CRANKSHAFT BORE IDENTIFICATION MARK REFERENCE**

		CRANKSHAFT BORE IDENTIFICATION MARK		
		a (A)	b (B)	c (C)
CRANKSHAFT IDENTIFICATION MARK	1 or A	A (YELLOW)	B (GREEN)	C (BROWN)
	2 or B	B (GREEN)	C (BROWN)	D (BLACK)
	3 or C	C (BROWN)	D (BLACK)	E (BLUE)

4. Check crankshaft end play.

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard end play

0.10 ~ 0.28 mm (0.0039 ~ 0.0110 in.)

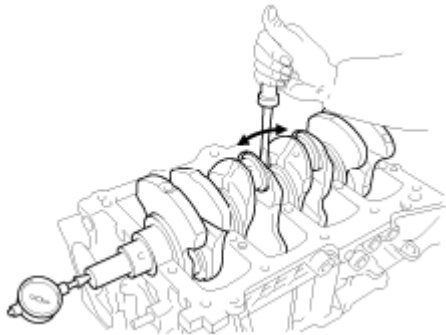


Fig. 21: Checking Crankshaft End Play
 Courtesy of KIA MOTORS AMERICA, INC.

If the end play is greater than maximum, replace the thrust bearings as a set.

Thrust bearing thickness

2.41 ~ 2.45 mm (0.0949 ~ 0.0964 in)

5. Inspect main journals and crank pins

Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter: 68.942 ~ 68.960 mm (2.7142 ~ 2.7149 in)

Crank pin diameter: 54.954 ~ 54.972 mm (2.1635 ~ 2.1642 in.)

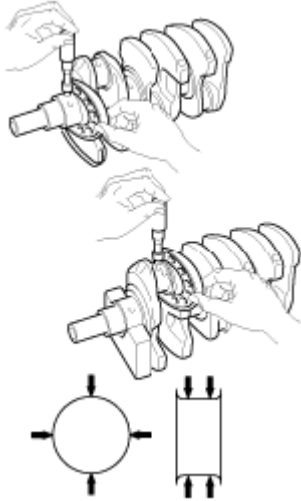


Fig. 22: Measuring Diameter Of Main Journal And Crank Pin
Courtesy of KIA MOTORS AMERICA, INC.

CONNECTING RODS

1. When reinstalling, make sure that cylinder numbers put on the connecting rod and cap at disassembly match. When a new connecting rod is installed, make sure that the notches for holding the bearing in place are on the same side.
2. Replace the connecting rod if it is damaged on the thrust faces at either end. Also if step wear or a severely rough surface of the inside diameter of the small end is apparent, the rod must be replaced as well.
3. Using a connecting rod aligning tool, check the rod for bend and twist. If the measured value is close to the repair limit, correct the rod by a press. Any connecting rod that has been severely bent or distorted should be replaced.

Allowable bend of connecting rod: 0.05 mm/100 mm (0.0020 in./3.94 in.) or less

Allowable twist of connecting rod: 0.1 mm/100 mm (0.0039 in./3.94 in.) or less

CYLINDER BLOCK

1. Remove gasket material.

Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

2. Clean cylinder block

Using a soft brush and solvent, thoroughly clean the cylinder block.

3. Inspect top surface of cylinder block for flatness.

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head gasket for warpage.

Flatness of cylinder block gasket surface

Standard: Less than 0.05 mm (0.0020 in.), Less than 0.02 mm (0.0008 in.)/150 x 150

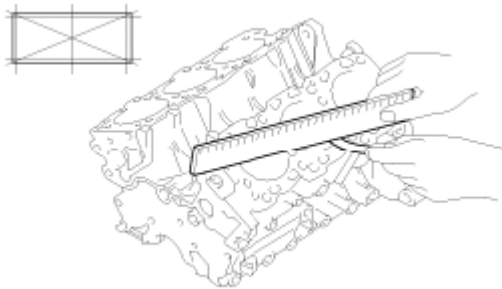


Fig. 23: Inspecting Flatness Of Cylinder Block Gasket Surface
Courtesy of KIA MOTORS AMERICA, INC.

4. Inspect cylinder bore diameter

Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.

5. Inspect cylinder bore diameter

Using a cylinder bore gauge, measure the cylinder bore diameter at position in the thrust and axial directions.

Standard diameter

92.00 ~ 92.03 mm (3.6220 ~ 3.6232 in) - 3.3 L

96.00 ~ 96.03 mm (3.7795 ~ 3.7807 in) - 3.8 L

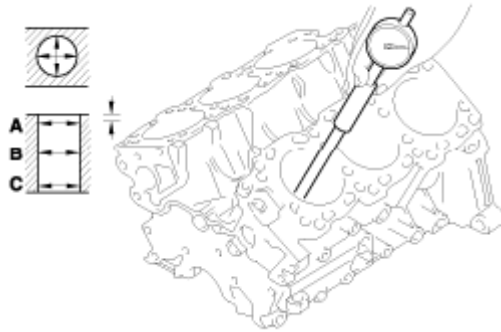


Fig. 24: Measuring Cylinder Bore Diameter
Courtesy of KIA MOTORS AMERICA, INC.

6. Check the cylinder bore size code on the cylinder block.

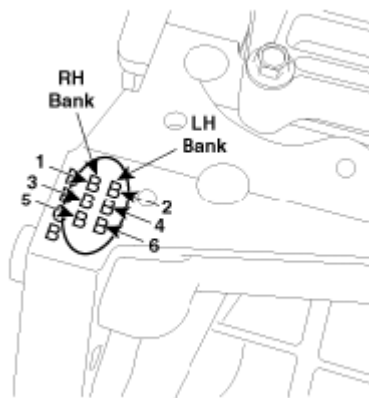


Fig. 25: Identifying Cylinder Bore Size Code On Cylinder Block
Courtesy of KIA MOTORS AMERICA, INC.

CYLINDER BORE INNER DIAMETER REFERENCE

Class	Size code	Cylinder bore inner diameter	
		3.3 L	3.8 L
A	A	92.00~92.01 mm (3.6220 ~ 3.6224 in)	96.00 ~ 96.01 mm (3.7795 ~ 3.7799 in)
B	B	92.01~92.02 mm (3.6224 ~ 3.6228 in)	96.01 ~ 96.02 mm (3.7799 ~ 3.7803 in)
C	C	92.02~92.03 mm (3.6228 ~ 3.6232 in)	96.02 ~ 96.03 mm (3.7803 ~ 3.7807 in)

7. Check the piston size code (A) and the front mark (B) on the piston top face.

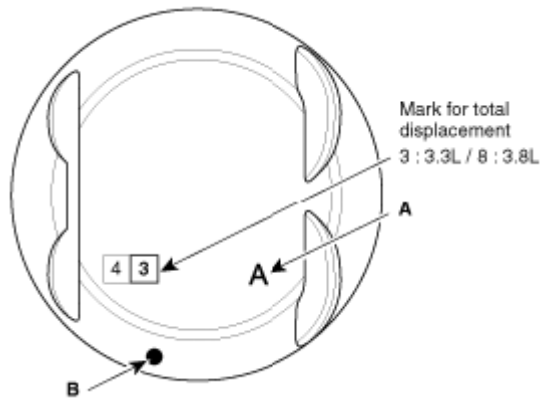


Fig. 26: Identifying Piston Size Code And Front Mark On Piston Top Face
 Courtesy of KIA MOTORS AMERICA, INC.

PISTON OUTER DIAMETER REFERENCE

Class	Size code	Piston outer diameter	
		3.3 L	3.8 L
A	A	91.96~91.97 mm (3.6205 ~ 3.6209 in.)	95.96 ~ 95.97 mm (3.7779 ~ 3.7783 in.)
B	B	91.97~91.98 mm (3.6209 ~ 3.6213 in.)	95.97 ~ 95.98 mm (3.7783 ~ 3.7787 in.)
C	C	91.98~91.99 mm (3.6213 ~ 3.6219 in.)	95.98 ~ 95.99 mm (3.7787 ~ 3.7791 in.)

8. Select the piston related to cylinder bore class.

Clearance:

0.03 ~ 0.05 mm (0.0012 ~ 0.0020 in)

PISTON AND RINGS

1. Clean piston
 1. Using a gasket scraper, remove the carbon from the piston top.
 2. Using a groove cleaning tool or broken ring, clean the piston ring grooves.
 3. Using solvent and a brush, thoroughly clean the piston.

NOTE: Do not use a wire brush.

2. The standard measurement of the piston outside diameter is taken 14 mm (0.5512 in.) from the bottom of the piston.

Standard diameter

91.96 ~ 91.99 mm (3.6205~ 3.6216 in) - 3.3 L

95.96 ~ 95.99 mm (3.7779 ~ 3.7791 in) - 3.8 L

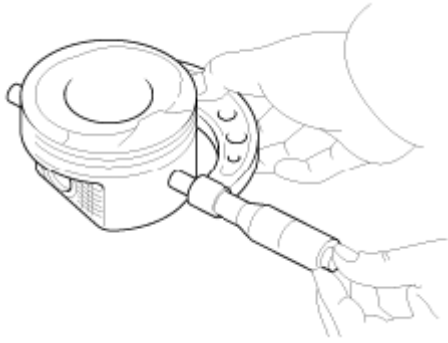


Fig. 27: Measuring Piston Outside Diameter
Courtesy of KIA MOTORS AMERICA, INC.

3. Calculate the difference between the cylinder bore diameter and the piston diameter.

Piston-to-cylinder clearance

0.03 ~ 0.05 mm (0.0012 ~ 0.0020 in)

4. Inspect the piston ring side clearance.

Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.

Piston ring side clearance

Standard

No. 1: 0.03 ~ 0.07 mm (0.0012 ~ 0.0027 in)

No. 2: 0.03 ~ 0.07 mm (0.0012 ~ 0.0027 in)

Oil ring: 0.06 ~ 0.15 mm (0.0024 ~ 0.0059 in)

Limit

No. 1: 0.1 mm (0.004 in)

No. 2: 0.1 mm (0.004 in)

Oil ring: 0.2 mm (0.008 in)



Fig. 28: Measuring Clearance Between Piston Ring And Wall Of Ring Groove
Courtesy of KIA MOTORS AMERICA, INC.

If the clearance is greater than maximum, replace the piston.

5. Inspect piston ring end gap.

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. If the gap is too large, recheck the cylinder bore diameter against the wear limits. If the bore is over the service limit, the cylinder block must be replaced.

Piston ring end gap

Standard

No. 1: 0.17 ~ 0.32 mm (0.0067 ~ 0.0126 in)

No. 2: 0.32 ~ 0.47 mm (0.0126 ~ 0.0185 in)

Oil ring: 0.20 ~ 0.70 mm (0.0079 ~ 0.0275 in)

Limit

No. 1: 0.6 mm (0.0236 in)

No. 2: 0.7 mm (0.0275 in)

Oil ring: 0.8 mm (0.0315 in.)

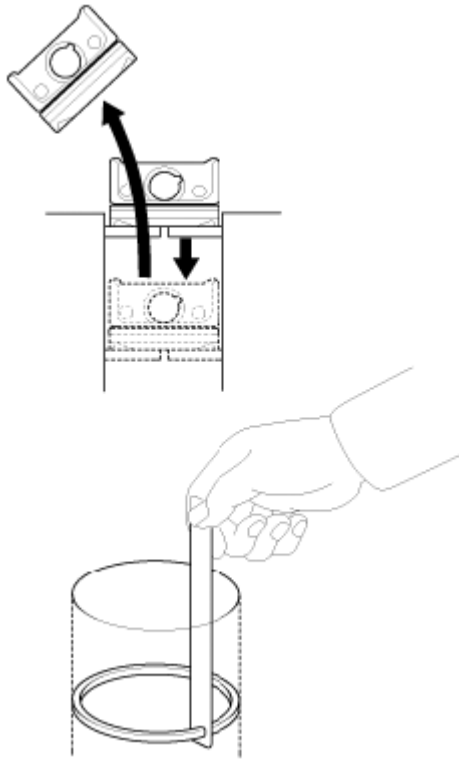


Fig. 29: Inspecting Piston Ring End Gap
Courtesy of KIA MOTORS AMERICA, INC.

PISTON PINS

1. Measure the diameter of the piston pin.

Piston pin diameter

23.001 ~ 23.006 mm (0.9055 ~ 0.9057 in)

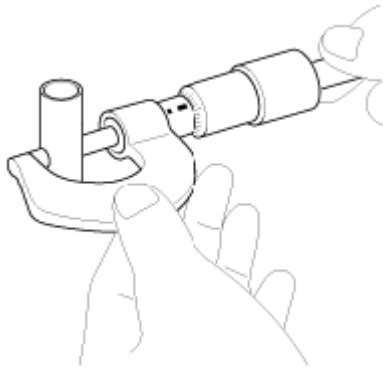


Fig. 30: Measuring Diameter Of Piston Pin
Courtesy of KIA MOTORS AMERICA, INC.

2. Measure the piston pin-to-piston clearance.

Piston pin-to-piston clearance

0.010 ~ 0.020 mm (0.0004 ~ 0.0008 in)

3. Check the difference between the piston pin diameter and the connecting rod small end diameter.

Piston pin-to-connecting rod interference

-0.032 ~ -0.016 mm (-0.0012 ~ -0.00063 in)

REASSEMBLY**NOTE:**

- Thoroughly clean all parts to assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

1. Assemble piston and connecting rod.
 1. Use a hydraulic press for installation.
 2. The piston front mark and the connecting rod front mark must face the timing belt side of the engine.

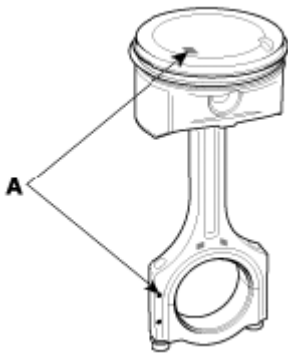


Fig. 31: Identifying Front Marks On Piston And Connecting Rod
Courtesy of KIA MOTORS AMERICA, INC.

2. Install piston rings.
 1. Install the oil ring spacer and 2 side rails by hand.
 2. Using a piston ring expander, install the 2 compression rings with the code mark facing upward.
 3. Position the piston rings so that the ring ends are as shown.

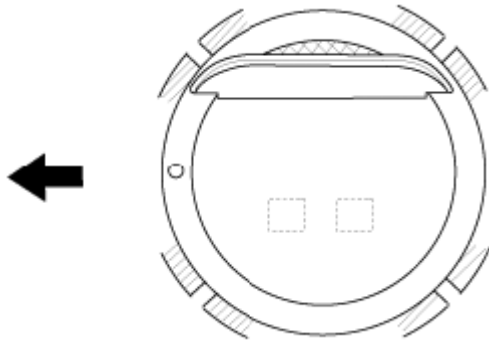


Fig. 32: Positioning Of Piston Rings
Courtesy of KIA MOTORS AMERICA, INC.

3. Install connecting rod bearings.
 1. Align the bearing claw with the groove of the connecting rod or connecting rod cap.
 2. Install the bearings (A) in the connecting rod and connecting rod cap (B).

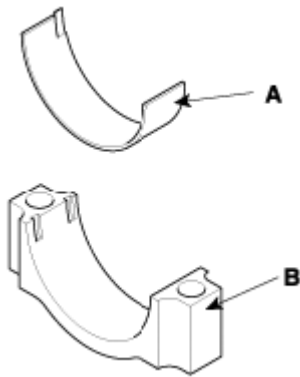


Fig. 33: Identifying Bearings And Connecting Rod Cap
Courtesy of KIA MOTORS AMERICA, INC.

4. Install main bearings.

NOTE: **Upper bearings have an oil groove of oil holes; Lower bearings do not.**

1. Align the bearing claw with the claw groove of the cylinder block, push in the 4 upper bearings (A).

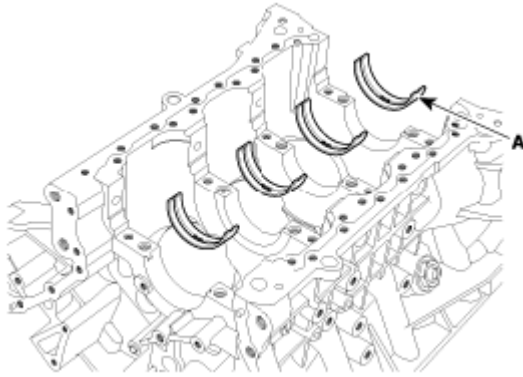


Fig. 34: Identifying Upper Bearings
Courtesy of KIA MOTORS AMERICA, INC.

2. Align the bearing claw with the claw groove of the main bearing cap, and push in the 4 lower bearings.
5. Install thrust bearings.

Install the 2 thrust bearings (A) under the No. 3 journal position of the cylinder block with the oil grooves facing outward.

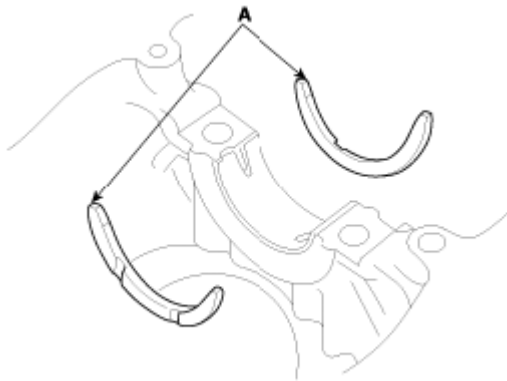


Fig. 35: Identifying Thrust Bearings
Courtesy of KIA MOTORS AMERICA, INC.

6. Place crankshaft on the cylinder block.

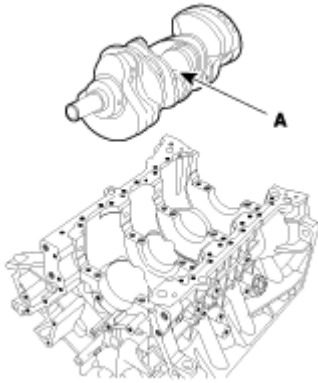


Fig. 36: Identifying Crankshaft

Courtesy of KIA MOTORS AMERICA, INC.

7. Place main bearing caps on cylinder block.
8. Install main bearing cap bolts.
 1. Install and uniformly tighten the bearing cap bolts, in several passes, in the sequence shown.

Tightening torque

Main bearing cap bolt

49.00 Nm (5.0 kgf.m, 36.16 lb-ft) + 90° (1 ~ 8)

19.60 Nm (2.0 kgf.m, 14.46 lb-ft) + 120° (9 ~ 16)

29.40 ~ 31.36 Nm (3.0 ~ 3.2 kgf.m, 21.70 ~ 23.14 lb-ft) (17 ~ 22)

NOTE:

- Always use new main bearing cap bolt.
- If any of the bearing cap bolts in broken or deformed, replace it.

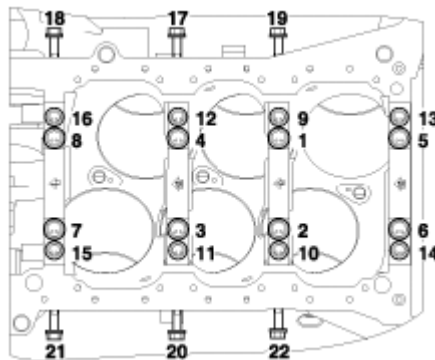


Fig. 37: Identifying Bearing Cap Bolts I Tightening Sequence

Courtesy of KIA MOTORS AMERICA, INC.

Use SST (09221-4A000), install main bearing cap bolts.

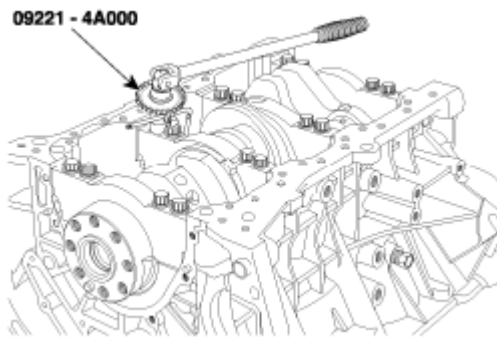


Fig. 38: Installing Main Bearing Cap Bolts Using SST (09221-4A000)
Courtesy of KIA MOTORS AMERICA, INC.

2. Check that the crankshaft turns smoothly.
9. Check crankshaft end play.
10. Install piston and connecting rod assemblies.

NOTE: Before installing the pistons, apply a coat of engine oil to the ring grooves and cylinder bores.

1. Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder, and tap it in using the wooden handle of a hammer.
2. Stop after the ring compressor pops free, and check the connecting rod-to-check journal alignment before pushing the piston into place.
3. Apply engine oil to the bolt threads. Install the rod caps with bearings, and torque the bolts.

Tightening torque

17.7~21.6 Nm (1.8~2.2 kgf.m, 13.0~15.9 lb-ft) + 88~92°

Use SST (09221-4A000), install connecting rod bearing cap bolts.

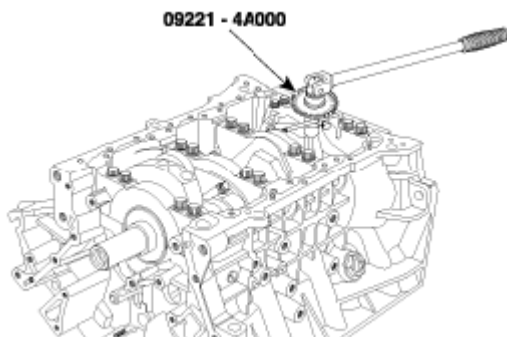


Fig. 39: Installing Connecting Rod Bearing Cap Bolts Using SST (09221-4A000)

Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Always use new connecting rod bearing cap bolt.
- Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.

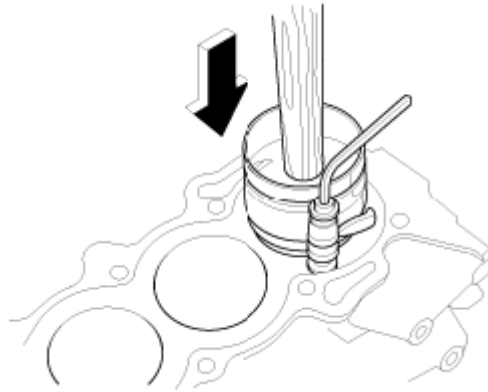


Fig. 40: Pushing Piston

Courtesy of KIA MOTORS AMERICA, INC.

11. Check the connecting rod end play.
12. Install oil drain cover.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.67 lb-ft)

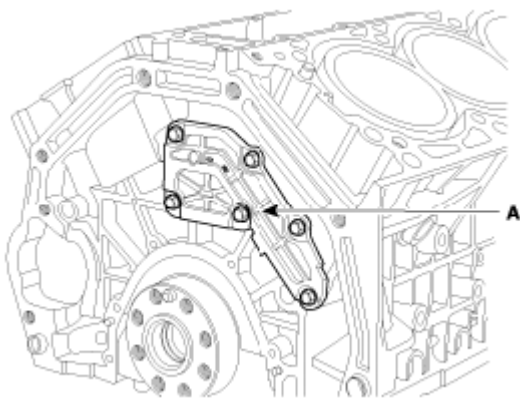


Fig. 41: Identifying Oil Drain Cover

Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Make clean the sealing face before assembling two parts.
- Remove harmful foreign matters on the sealing face before applying

sealant

- Be assembling oil drain cover, the liquid sealant TB1217H should be applied oil drain cover.
- The part must be assembled within 5 minutes after sealant was applied.
- Apply sealant to the inner threads of the bolt holes.

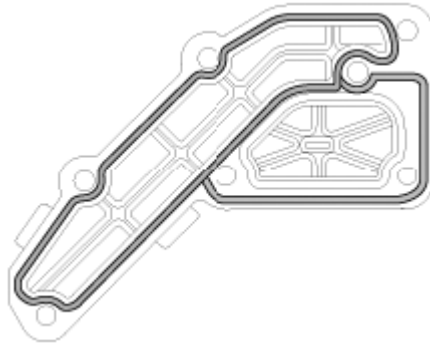


Fig. 42: Identifying Sealant Applying Area On Oil Drain Cover
Courtesy of KIA MOTORS AMERICA, INC.

13. Install rear oil seal case.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.67 lb-ft)

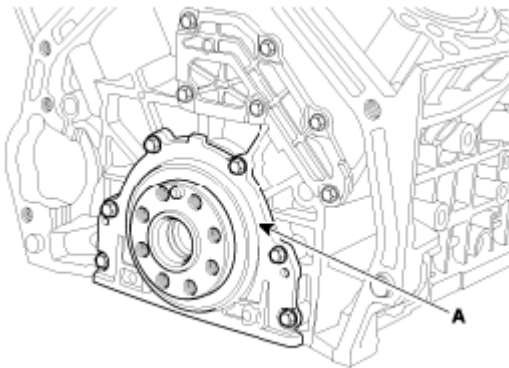


Fig. 43: Identifying Rear Oil Seal Case
Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Make clean the sealing face before assembling two parts.
- Remove harmful foreign matters on the sealing face before applying sealant
- Be assembling rear oil seal case, the liquid sealant TB1217H should

be applied rear oil seal case.

- The part must be assembled within 5 minutes after sealant was applied.
- Apply sealant to the inner threads of the bolt holes.

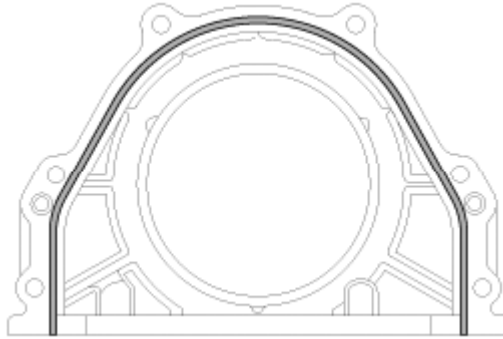


Fig. 44: Identifying Sealant Applying Area On Rear Oil Seal Case
Courtesy of KIA MOTORS AMERICA, INC.

14. Using SST (09231-3C200, 09231-H1100), install rear oil seal.

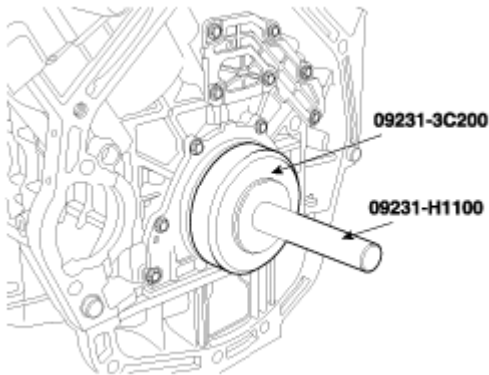


Fig. 45: Installing Rear Oil Seal Using SST (09231-3C200) And (09231-H1100)
Courtesy of KIA MOTORS AMERICA, INC.

15. Install baffle plate.

Install and uniformly tighten the baffle plate bolts, in several passes, in the sequence shown.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

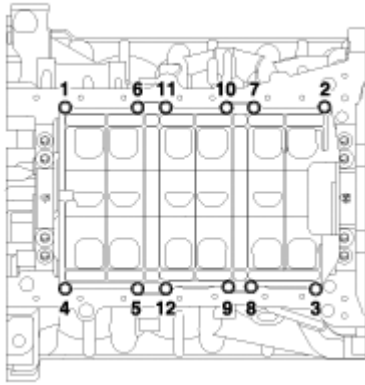


Fig. 46: Identifying Baffle Plate Bolts In Tightening Sequence
 Courtesy of KIA MOTORS AMERICA, INC.

16. Install upper oil pan.
 - A. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
 - B. Before assembling the oil pan, the liquid sealant TB1217H should be applied on upper oil pan.

The part must be assembled within 5 minutes after the sealant was applied.

Bead width: 2.5 mm (0.1 in.)

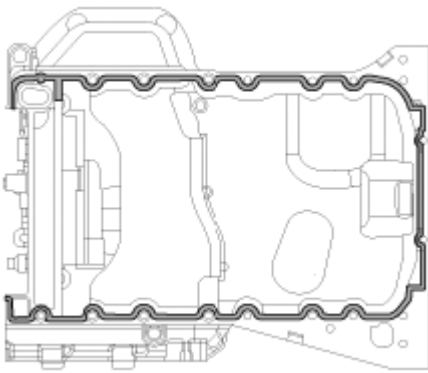


Fig. 47: Identifying Sealant Applying Area On Upper Oil Pan
 Courtesy of KIA MOTORS AMERICA, INC.

CAUTION:

- Make clean the sealing face before assembling two parts.
- Remove harmful foreign matters on the sealing face before applying sealant
- When applying sealant gasket, sealant must not be protruded into the inside of oil pan.
- To prevent leakage of oil, apply sealant gasket to the inner threads of the bolt holes.

C. Install oil pan.

Uniformly tighten the bolts in several passes.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)



Fig. 48: Identifying Oil Pan Bolts In Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.

D. After assembly, wait at least 30 minutes before filling the engine with oil.

17. Install knock sensor.

Tightening torque

15.68 ~ 23.52 Nm (1.6 ~ 2.4 kgf.m, 11.57 ~ 17.36 lb-ft)

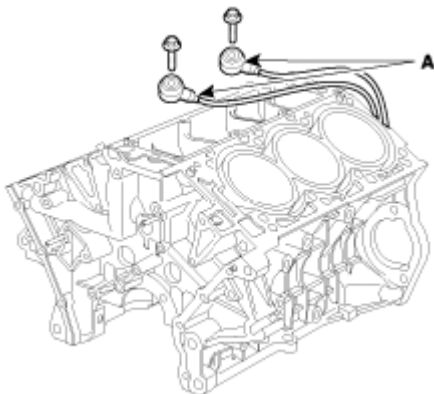


Fig. 49: Identifying Knock Sensor
Courtesy of KIA MOTORS AMERICA, INC.

18. Install drive plate.

Tightening torque

71.54 ~ 75.46 Nm (7.3 ~ 7.7 kgf.m, 52.80 ~ 55.69 lb-ft)

INSTALLATION

1. Install power steering pump.
2. Install alternator.
3. Install air compressor
4. Install oil filter assembly.
5. Install oil pump.
6. Install cylinder head.
7. Install water temperature control assembly.
8. Install timing chain.
9. Install intake manifold.
10. Install exhaust manifold.

2009 ENGINE

Cylinder Head Assembly - Sorento

COMPONENTS AND COMPONENTS LOCATION

COMPONENTS

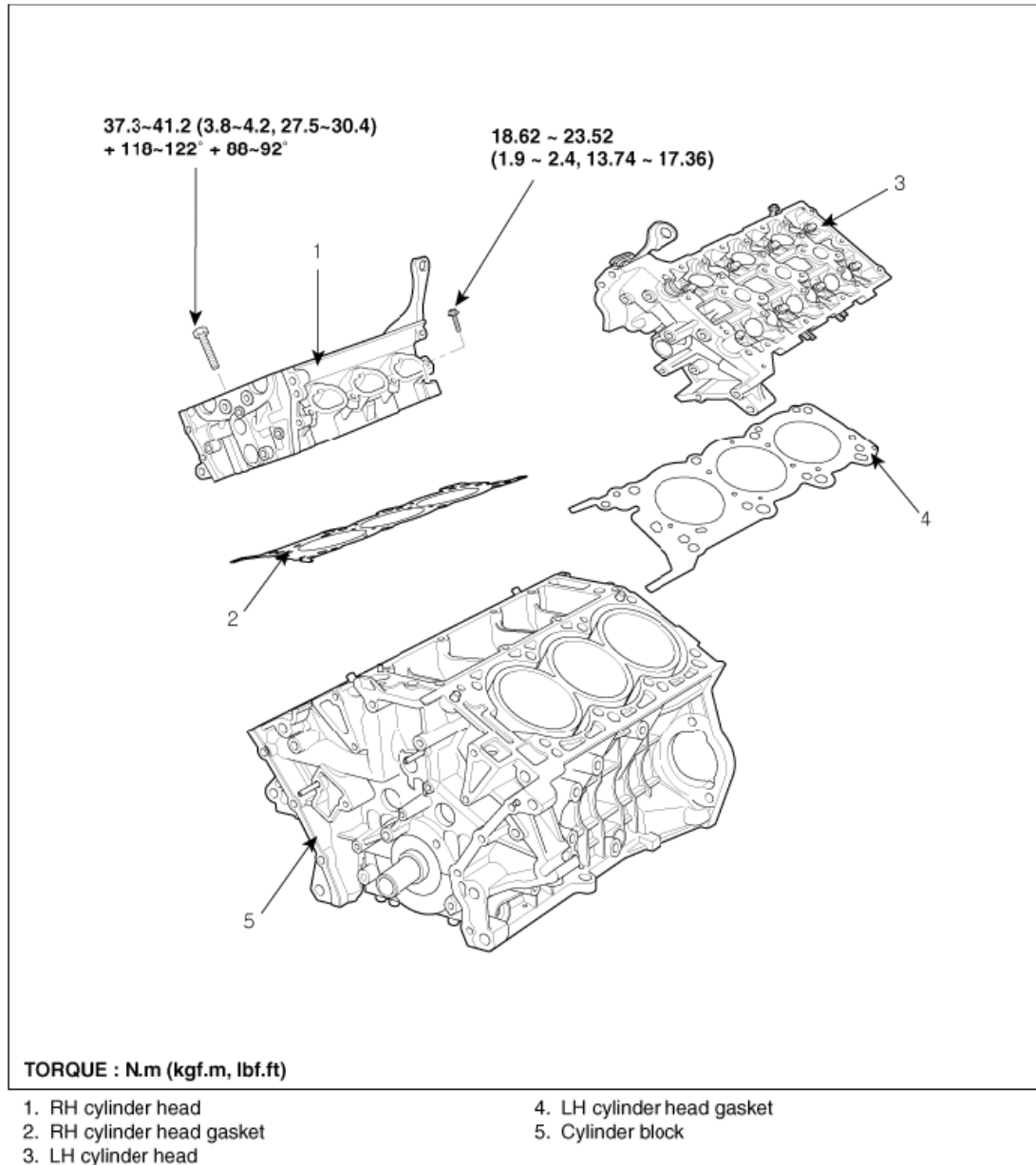


Fig. 1: Identifying Cylinder Head Assembly Components With Torque Specifications (1 Of 2)
Courtesy of KIA MOTORS AMERICA, INC.

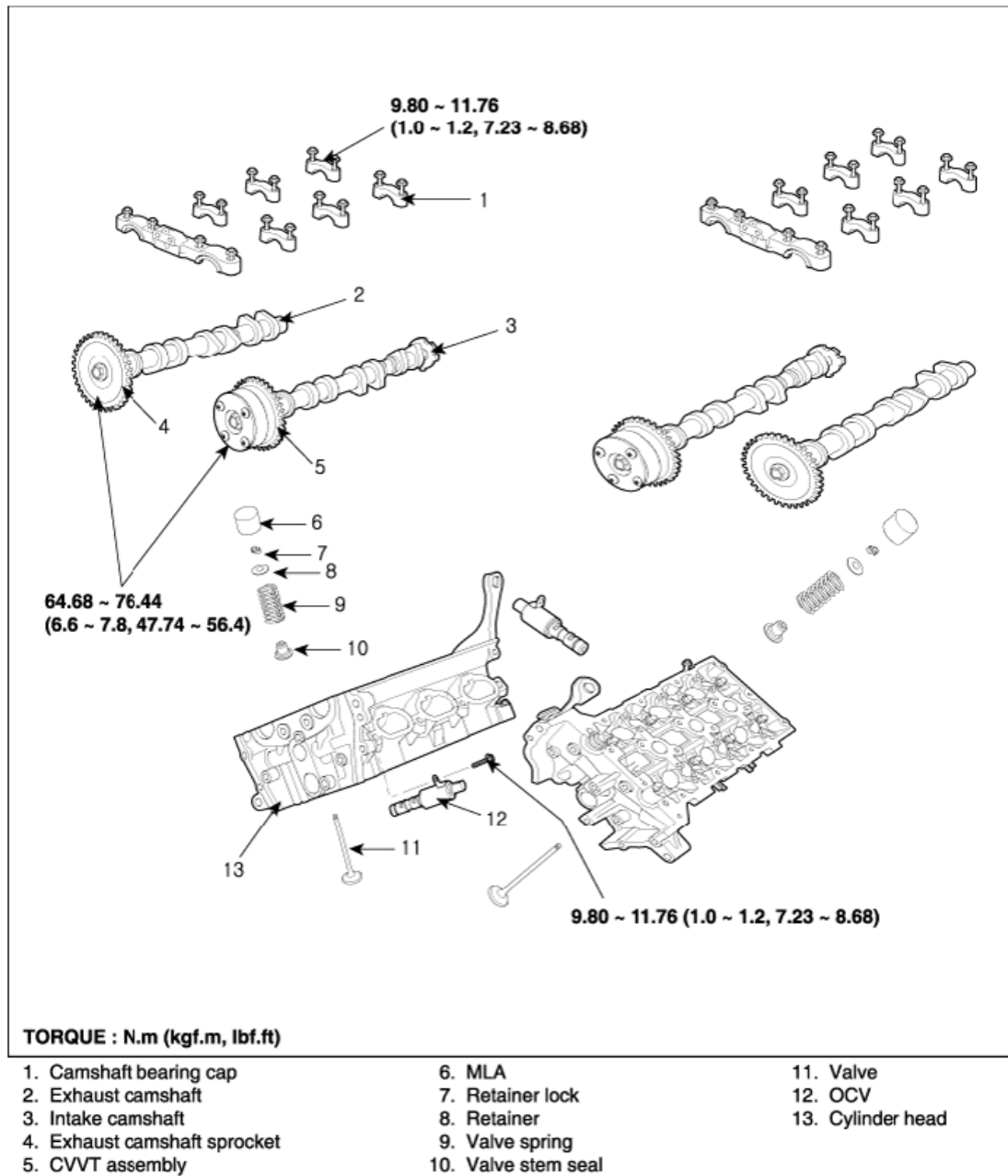


Fig. 2: Identifying Cylinder Head Assembly Components With Torque Specifications (2 Of 2)
 Courtesy of KIA MOTORS AMERICA, INC.

REPAIR PROCEDURES

REMOVAL

CAUTION:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below normal temperature before removing it.

- When handling a metal gasket, take care not to fold the gasket or damage the contact surface of the gasket.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

NOTE:

- Mark all wiring and hoses to avoid misconnection.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center.

Engine removal is required for this procedure.

1. Remove exhaust manifold.
2. Remove intake manifold.
3. Remove timing chain.
4. Remove water temperature control assembly.
5. Remove camshaft bearing cap (A).

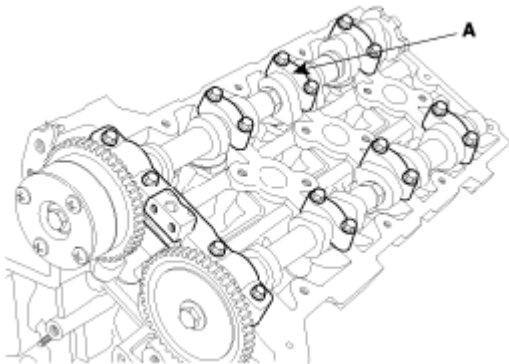


Fig. 3: Identifying Camshaft Bearing Cap
Courtesy of KIA MOTORS AMERICA, INC.

6. Remove camshaft assembly (A).

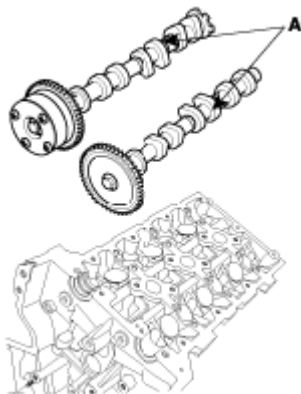


Fig. 4: Identifying Camshaft Assembly

Courtesy of KIA MOTORS AMERICA, INC.

7. Remove cylinder head bolts, then remove cylinder head.
 1. Uniformly loosen and remove the 16 cylinder head bolts, in several passes, in the sequence shown. Remove the 16 cylinder head bolts and plate washers.

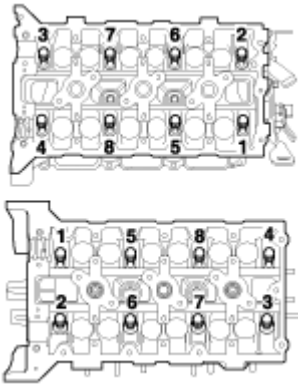


Fig. 5: Identifying Cylinder Head Bolts In Loosening Sequence

Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: Head warpage or cracking could result from removing bolts in an incorrect order.

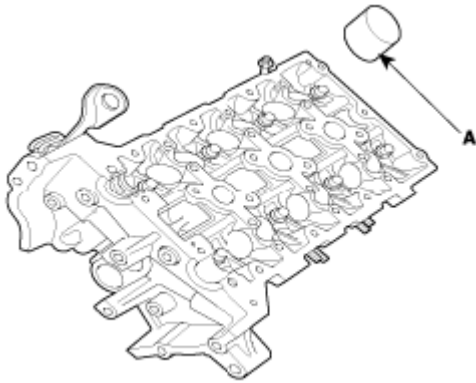
2. Lift the cylinder head from the dowels on the cylinder block and place the cylinder head on wooden blocks on a bench.

CAUTION: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

DISASSEMBLY

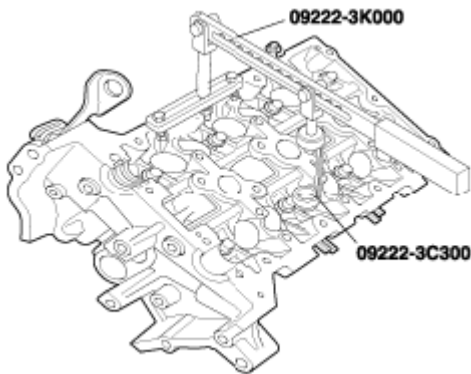
NOTE: Identify MLA, valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Remove MLAs (A).

**Fig. 6: Identifying MLAs**

Courtesy of KIA MOTORS AMERICA, INC.

2. Remove valves.
 1. Using SST (09222-3K000, 09222-3C300), compress the valve spring and remove retainer lock.

**Fig. 7: Compressing Valve Spring Using SST (09222-3K000) And (09222-3C300)**
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove the spring retainer.
3. Remove the valve spring.
4. Remove the valve.
5. Using SST (09222-29000), remove the valve stem seal.

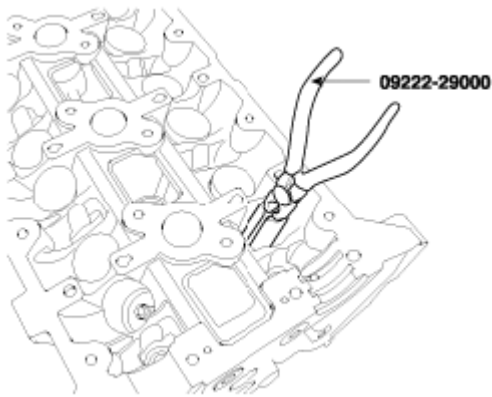


Fig. 8: Removing Valve Stem Seal Using SST (09222-29000)
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Do not reuse old valve stem seals.

3. Remove OCV (A).

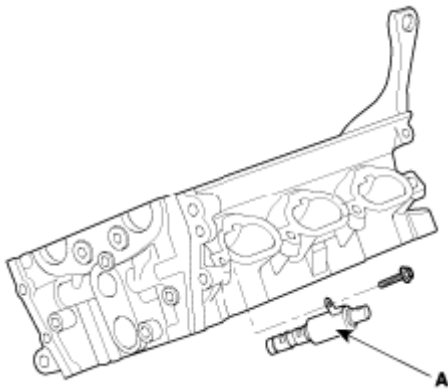


Fig. 9: Identifying OCV
Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

CYLINDER HEAD

1. Inspect for flatness.

Using a precision straight edge and feeler gauge, measure the surface the contacting the cylinder block and the manifolds for warpage.

Flatness of cylinder head gasket surface

Standard: Less than 0.05 mm (0.002 in.) [Less than 0.02 mm (0.0008 in.)/150 x 150]

Flatness of manifold gasket surface

Standard: Less than 0.03 mm (0.001 in)/110 x 110

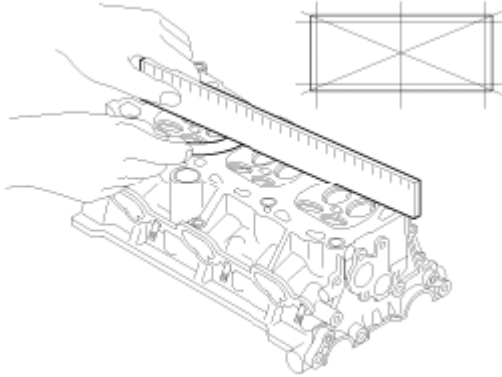


Fig. 10: Measuring Flatness Of Cylinder Head Gasket Surface
Courtesy of KIA MOTORS AMERICA, INC.

2. Inspect for cracks.

Check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks. If cracked, replace the cylinder head.

VALVE AND VALVE SPRING

1. Inspect valve stems and valve guides.

1. Using a caliper gauge, measure the inside diameter of the valve guide.

Valve guide I.D.

Intake/Exhaust: 5.500 ~ 5.512 mm (0.216 ~ 0.217 in.)

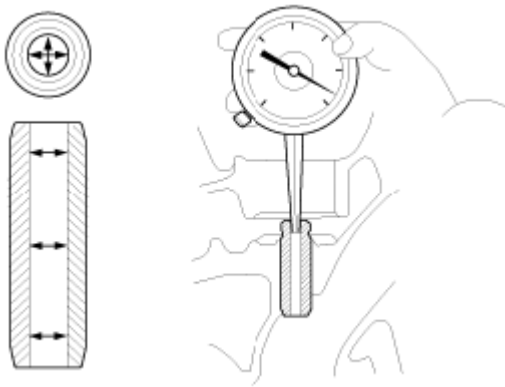


Fig. 11: Measuring Inside Diameter Of Valve Guide Using Caliper Gauge
Courtesy of KIA MOTORS AMERICA, INC.

2. Using a micrometer, measure the diameter of the valve stem.

Valve stem O.D.

Intake: 5.465 ~ 5.480 mm (0.2151 ~ 0.2157 in.)

Exhaust: 5.458 ~ 5.470 mm (0.2149 ~ 0.2153 in.)

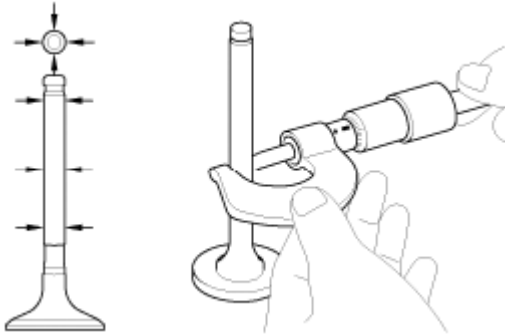


Fig. 12: Measuring Diameter Of Valve Stem Using Micrometer
Courtesy of KIA MOTORS AMERICA, INC.

3. Subtract the valve stem diameter measurement from the valve guide inside diameter measurement.

Valve stem-to-guide clearance

[Standard]

Intake: 0.020 ~ 0.047 mm (0.0008 ~ 0.0018 in.)

Exhaust: 0.030 ~ 0.054 mm (0.0012 ~ 0.0021 in.)

[Limit]

Intake: 0.07 mm (0.0027 in.)

Exhaust: 0.09 mm (0.0035 in.)

2. Inspect valves.
 1. Check the valve is ground to the correct valve face angle.
 2. Check that the surface of the valve for wear.

If the valve face is worn, replace the valve.

3. Check the valve head margin thickness.

If the margin thickness is less than minimum, replace the valve.

Margin

[Standard]

Intake: 1.56 ~ 1.86 mm (0.06142 ~ 0.07323 in.)

Exhaust: 1.73 ~ 2.03 mm (0.06811 ~ 0.07992 in.)

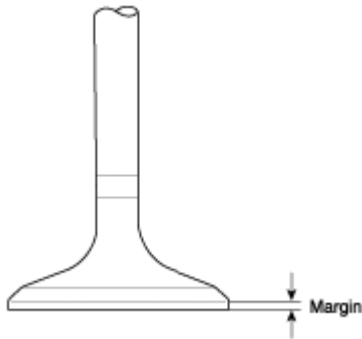


Fig. 13: Identifying Valve Head Margin Thickness
Courtesy of KIA MOTORS AMERICA, INC.

4. Check the valve length.

Length

Intake: 105.27 mm (4.1445 in)

Exhaust: 105.50 mm (4.1535 in)

5. Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, replace the valve.

3. Inspect valve seats

Check the valve seat for evidence of overheating and improper contact with the valve face.

If the valve seat is worn, replace cylinder head.

Before reconditioning the seat, check the valve guide for wear. If the valve guide is worn, replace cylinder head. Recondition the valve seat with a valve seat grinder or cutter. The valve seat contact width should be within specifications and centered on the valve face.

4. Inspect valve springs.
 1. Using a steel square, measure the out-of-square of the valve spring.
 2. Using a vernier calipers, measure the free length of the valve spring.

Valve spring

[Standard]

Free height: 43.86 mm (1.7267 in.)

Out-of-square: 1.5°

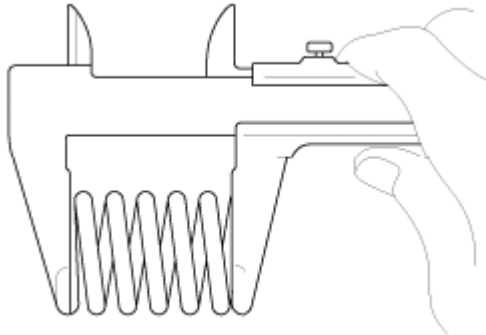


Fig. 14: Measuring Free Length Of Valve Spring Using Vernier Calipers
Courtesy of KIA MOTORS AMERICA, INC.

MLA

1. Inspect MLA.

Using a micrometer, measure the MLA outside diameter.

MLA O.D.

Intake/Exhaust: 34.964 ~ 34.980 mm (1.3765 ~ 1.3771 in.)

2. Using a caliper gauge, measure MLA tappet bore inner diameter of cylinder head.

Tappet bore I.D.

Intake/Exhaust: 35.000 ~ 35.025 mm (1.3779 ~ 1.3789 in.)

3. Subtract MLA outside diameter measurement from tappet bore inside diameter measurement.

MLA to tappet bore clearance

[Standard]

Intake/Exhaust: 0.020 ~ 0.061 mm (0.0008 ~ 0.0024 in.)

[Limit]

Intake/Exhaust: 0.07 mm (0.0027 in.)

CAMSHAFT

1. Inspect cam lobes.

Using a micrometer, measure the cam lobe height.

Cam height

[Standard value]

Intake:

46.3 mm (1.8228 in.) (3.3 L)

46.8 mm (1.8425 in.) (3.8 L)

Exhaust: 45.8 mm (1.8031 in.)

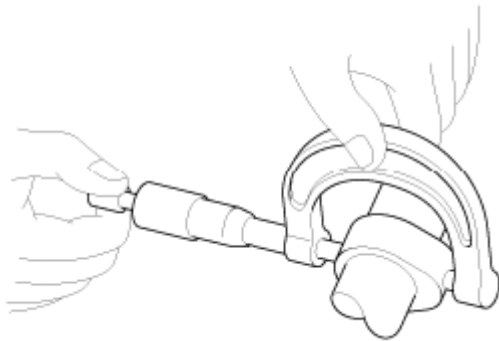


Fig. 15: Measuring Cam Lobe Height Using Micrometer
Courtesy of KIA MOTORS AMERICA, INC.

If the cam lobe height is less than standard, replace the camshaft.

2. Inspect camshaft journal clearance.
 1. Clean the bearing caps and camshaft journals.
 2. Place the camshafts on the cylinder head.
 3. Lay a strip of plastigage across each of the camshaft journal.

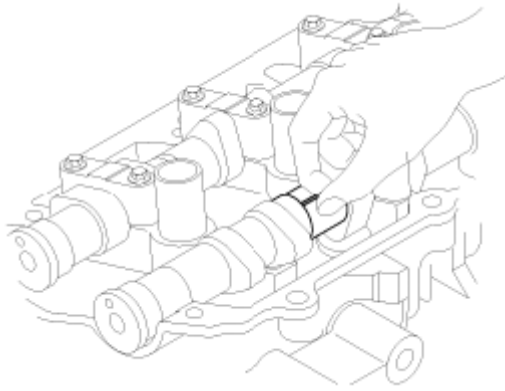


Fig. 16: Inspecting Camshaft Journal Clearance
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the bearing caps.

CAUTION: Do not turn the camshaft.

5. Remove the bearing caps.
6. Measure the plastigage at its widest point.

Bearing oil clearance

[Standard value]

Intake

No. 1 journal: 0.020 ~ 0.057 mm (0.0008 ~ 0.0022 in.)

No. 2, 3, 4, journal: 0.030 ~ 0.067 mm (0.0012 ~ 0.0026 in.)

Exhaust

No. 1 journal: 0.020 ~ 0.057 mm (0.0008 ~ 0.0022 in.)

No. 2, 3, 4, journal: 0.030 ~ 0.067 mm (0.0012 ~ 0.0026 in.)

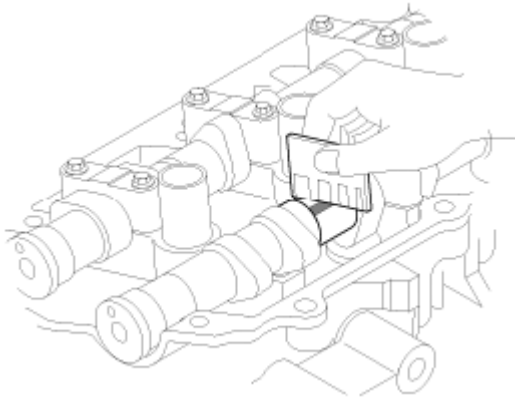


Fig. 17: Measuring Bearing Oil Clearance
Courtesy of KIA MOTORS AMERICA, INC.

If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace cylinder head.

7. Completely remove the plastigage.
8. Remove the camshafts.
3. Inspect camshaft end play.
 1. Install the camshafts.
 2. Using a dial indicator, measure the end play while moving the camshaft back and forth.

Camshaft end play

[Standard value]

0.056 ~ 0.064 mm (0.0022 ~ 0.0025 in) - 3.3 L

0.02 ~ 0.18 mm (0.0008 ~ 0.0071 in) - 3.8 L

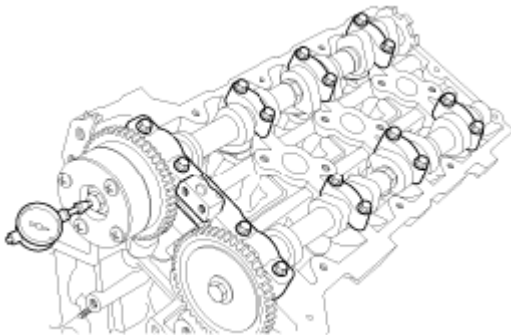


Fig. 18: Measuring End Play Using Dial Indicator
Courtesy of KIA MOTORS AMERICA, INC.

If the end play is greater than maximum, replace the camshaft. If necessary, replace cylinder head.

3. Remove the camshafts.

CVVT ASSEMBLY

1. Inspect CVVT assembly.
 1. Check that the CVVT assembly will not turn.
 2. Apply vinyl tape to the retard hole except the one indicated by the arrow in the illustration.

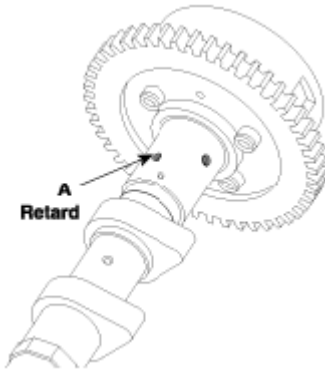


Fig. 19: Identifying Retard Hole In CVVT Assembly
Courtesy of KIA MOTORS AMERICA, INC.

3. Wind tape around the tip of the air gun and apply air of approx. 150 kpa (1.5 kgf/cm², 21 psi) to the port of the camshaft. (Perform this order to release the lock pin for the maximum delay angle locking.)

NOTE: When the oil splashes, wipe it off with a shop rag.

4. Under the condition of (3), turn the CVVT assembly to the advance angle side (the arrow marked direction in the illustration) with your hand.

Depending on the air pressure, the CVVT assembly will turn to the advance side without applying force by hand. Also, under the condition that the pressure can be hardly applied because of the air leakage from the port, there may be the case that the lock pin could be hardly released.

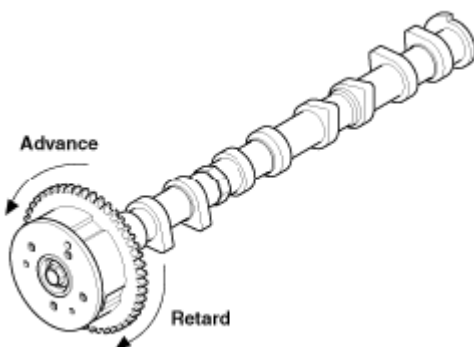


Fig. 20: Turning CVVT Assembly
Courtesy of KIA MOTORS AMERICA, INC.

5. Except the position where the lock pin meets at the maximum delay angle, let the CVVT assembly turn back and forth and check the movable range and that there is no disturbance.

Standard: Movable smoothly in the range about 22.5°

6. Turn the CVVT assembly with your hand and lock it at the maximum delay angle position (clockwise).

REASSEMBLY

NOTE: Thoroughly clean all parts to be assembled.
Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
Replace oil seals with new ones.

1. Install valves.
 1. Using SST (09222-3C100), push in a new oil seal.

NOTE: Do not reuse old valve stem seals.
Incorrect installation of the seal could result in oil leakage past the valve guides.

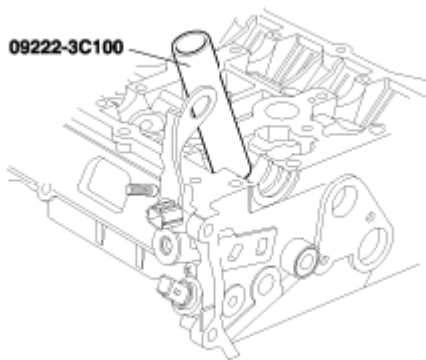


Fig. 21: Pushing Oil Seal Using SST (09222-3C100)
Courtesy of KIA MOTORS AMERICA, INC.

2. Install the valve, valve spring and spring retainer.

NOTE: Place valve springs so that the side coated with enamel faces toward the valve spring retainer and then installs the retainer.

3. Using the SST (09222-3K000, 09222-3C300), compress the spring and install the retainer locks.
After installing the valves, ensure that the retainer locks are correctly in place before releasing the

valve spring compressor.

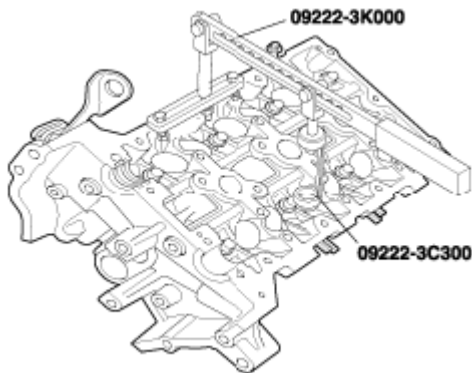


Fig. 22: Compressing Spring Using SST (09222-3K000) And (09222-3C300)
 Courtesy of KIA MOTORS AMERICA, INC.

4. Lightly tap the end of each valve stem two or three times with the wooden handle of a hammer to ensure proper seating of the valve and retainer lock.
2. Install MLAs.

Check that the MLA rotates smoothly by hand.

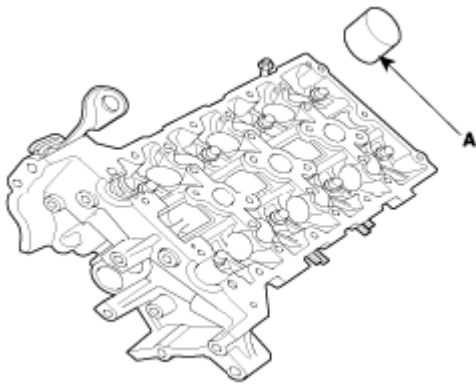


Fig. 23: Identifying MLAs
 Courtesy of KIA MOTORS AMERICA, INC.

NOTE: MLA can be reinstalled in its original position.

3. Install OCV (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

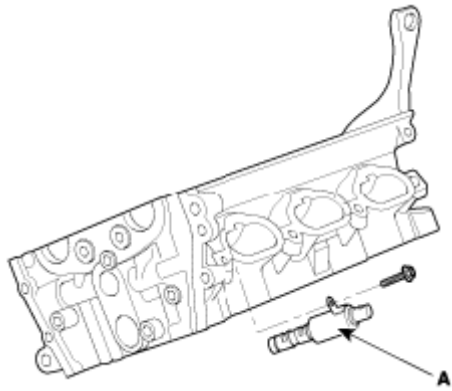


Fig. 24: Identifying OCV

Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- To install OCV with gray colored connector into RH bank.
- To install OCV with black colored connector into LH bank.

CAUTION:

- Do not reuse the OCV when dropped.
- Keep clean the OCV.
- Do not hold the OCV sleeve during servicing.
- When the OCV is installed on the engine, do not move the engine with holding the OCV yoke.

INSTALLATION

NOTE:

- Thoroughly clean all parts to be assembled.
- Always use a new head and manifold gasket.
- The cylinder head gasket is a metal gasket. Take care not to bend it.
- Rotate the crankshaft, set the No. 1 piston at TDC.

1. Install the cylinder head.

- A. The sealant locations on cylinder head and cylinder block must be free of engine oil and ETC.
- B. Apply sealant on cylinder block top face before assembling cylinder head gaskets.

The part must be assembled within 5 minutes after sealant was applied.

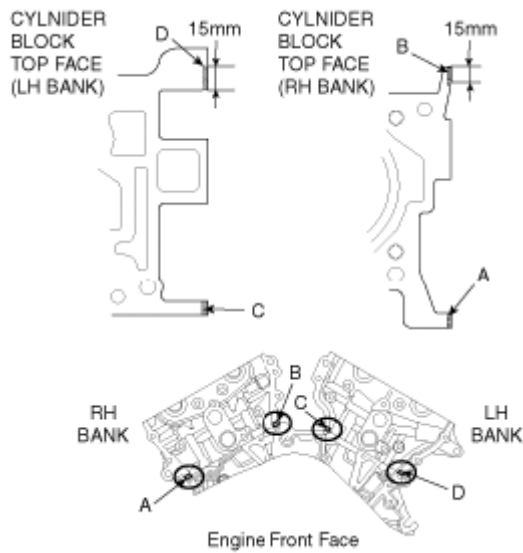


Fig. 25: Identifying Sealant Applying Area On Cylinder Head And Cylinder Block
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Refer to below illustration to apply the sealant.

Bead width: 2.0~3.0 mm

Sealant locations: 1.0~1.5 mm from block surface

Recommended sealant: Liquid sealant TB1217H

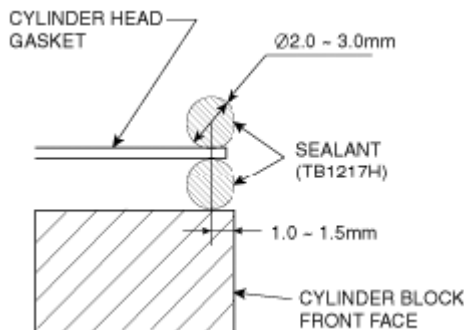


Fig. 26: Identifying Sealant Applying Area On Cylinder Block
Courtesy of KIA MOTORS AMERICA, INC.

- C. Apply sealant on cylinder head gaskets after assembling cylinder head gaskets on cylinder block.

The part must be assembled within 5 minutes after sealant was applied.

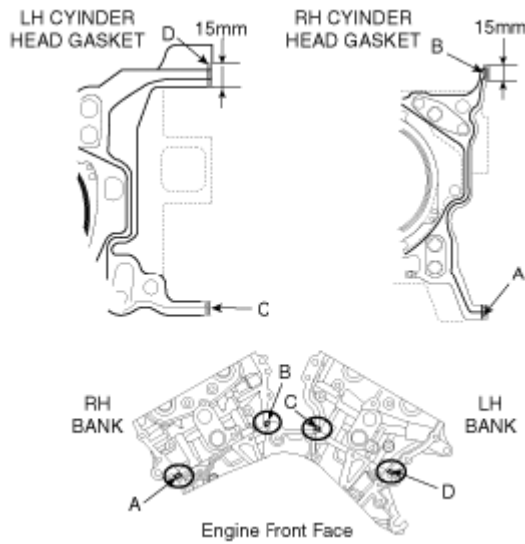


Fig. 27: Identifying Sealant Applying Area On Cylinder Head Gaskets
 Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Be careful of the installation direction.

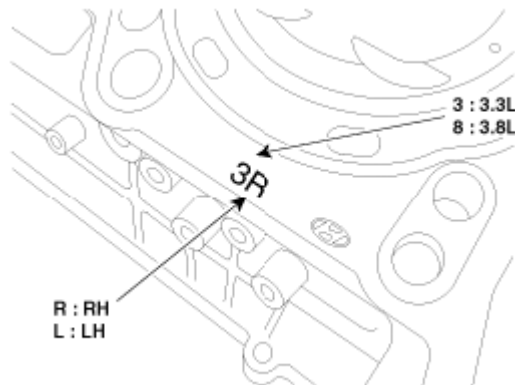


Fig. 28: Identifying Number On Cylinder Head Gasket
 Courtesy of KIA MOTORS AMERICA, INC.

D. Install the cylinder head.

NOTE: Remove the extruded sealant after assembling cylinder heads.

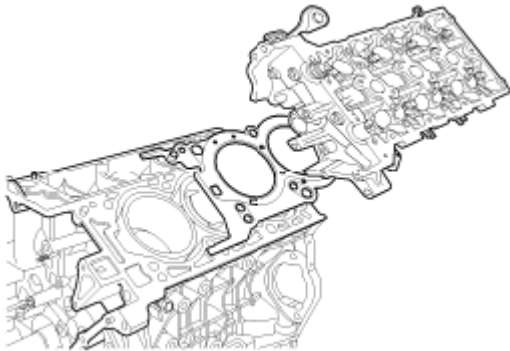


Fig. 29: Identifying Cylinder Head
Courtesy of KIA MOTORS AMERICA, INC.

2. Place the cylinder head carefully in order not to damage the gasket with the bottom part of the end.
3. Install cylinder head bolts.
 1. Do not apply engine oil on the threads and under the heads of the cylinder head bolts.
 2. Using SST (09221-4A000), install and tighten the cylinder head bolts and plate washers, in several passes, in the sequence shown.

Tightening torque

Head bolt: 37.3 ~ 41.2 Nm (3.8 ~ 4.2 kgf.m, 27.5 ~ 30.4 lb-ft) + 118 ~ 122° + 88 ~ 92°

Bolt (A): 18.62 ~ 23.52 Nm (1.9 ~ 2.4 kgf.m, 13.74 ~ 17.36 lb-ft)

NOTE: Always use new cylinder head bolt.

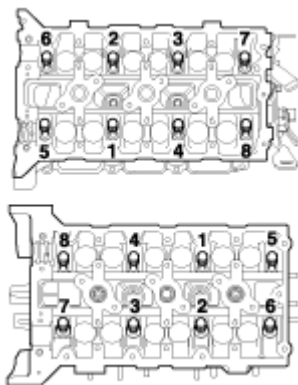


Fig. 30: Identifying Cylinder Head Bolts In Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.

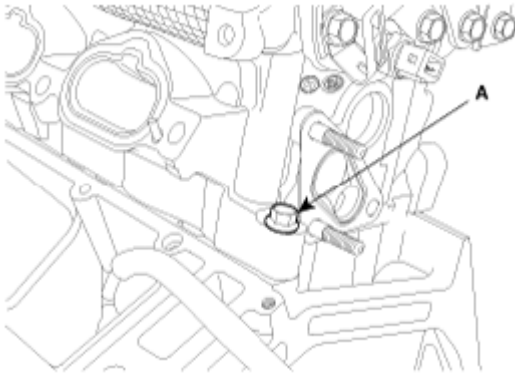


Fig. 31: Identifying Cylinder Head Bolt
Courtesy of KIA MOTORS AMERICA, INC.

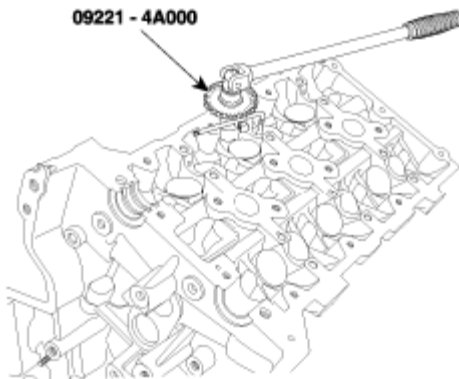


Fig. 32: Tightening Cylinder Head Bolt
Courtesy of KIA MOTORS AMERICA, INC.

4. Install the CVVT and camshaft sprocket.

Tightening torque

64.68 ~ 76.44 Nm (6.6 ~ 7.8 kgf.m, 47.74 ~ 56.4 lb-ft)

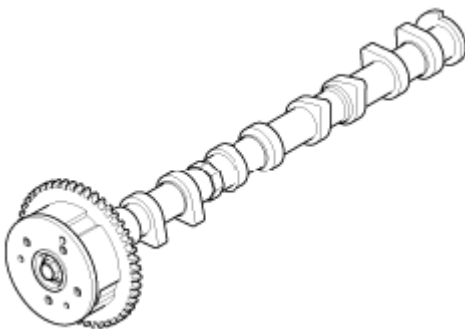


Fig. 33: Identifying CVVT And Camshaft Sprocket
Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Install camshaft-inlet to dowel pin of CVVT assembly.

At this time, attend not to be installed to oil hole of camshaft-inlet.

- Hold the hexagonal head wrench portion of the camshaft with a vise, and install the bolt and CVVT assembly.
- Do not rotate CVVT assembly when camshaft is installed to dowel pin of CVVT assembly.

5. Install camshafts (A).

NOTE:

- Apply a light coat of engine oil on camshaft journals.
- Assemble the key groove of camshaft rear side to the same level of head top surface.
- Be careful the right, left bank, intake, exhaust side before assembling.

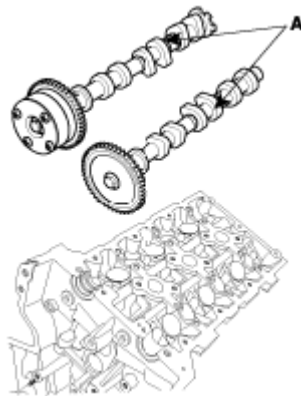


Fig. 34: Identifying Camshafts
Courtesy of KIA MOTORS AMERICA, INC.

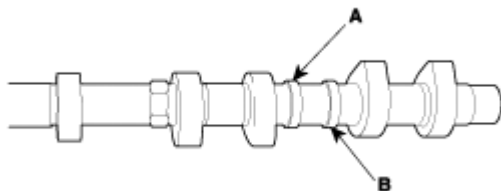
Intake camshaft

Fig. 35: Identifying Intake Camshaft
Courtesy of KIA MOTORS AMERICA, INC.

INTAKE CAMSHAFT REFERENCE

	LH	RH
--	----	----

3.3L	A: Ø27 mm (1.0630 in.)	A: Ø30 mm (1.1811 in.)
	B: Ø27 mm (1.0630 in.)	B: Ø30 mm (1.1811 in.)
3.8L	A: Ø30 mm (1.1811 in.)	A: Ø27 mm (1.0630 in.)
	B: Ø27 mm (1.0630 in.)	B: Ø30 mm (1.1811 in.)

Exhaust camshaft

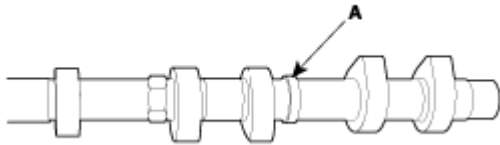


Fig. 36: Identifying Exhaust Camshaft
Courtesy of KIA MOTORS AMERICA, INC.

EXHAUST CAMSHAFT REFERENCE

	LH	RH
3.3L/3.8L	A: Ø27 mm (1.0630 in.)	A: Ø30 mm (1.1811 in.)

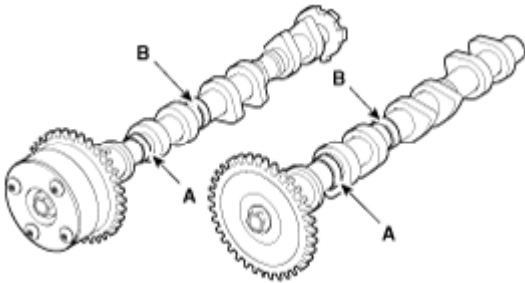


Fig. 37: Identifying Exhaust Camshaft
Courtesy of KIA MOTORS AMERICA, INC.

EXHAUST CAMSHAFT REFERENCE

	LH	RH
3.3L	A: Ø30 mm (1.1811 in.)	A: Ø30 mm (1.1811 in.)
	B: Ø27 mm (1.0630 in.)	B: Ø27 mm (1.0630 in.)
3.8L	A: Ø30 mm (1.1811 in.)	A: Ø30 mm (1.1811 in.)
	B: Ø27 mm (1.0630 in.)	B: Ø27 mm (1.0630 in.)

- Install camshaft bearing caps with the order below.

Tightening torque

1st step: 5.9 Nm (0.6 kgf.m, 4.3 lb-ft)

2nd step: 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

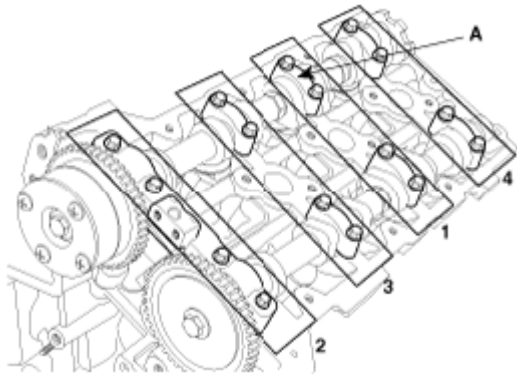


Fig. 38: Identifying Camshaft Bearing Caps
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Be careful the right, left bank, intake, exhaust side before assembling.

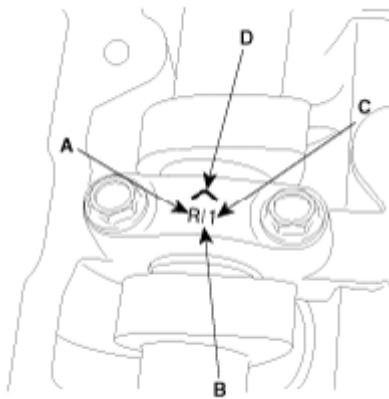


Fig. 39: Identifying Right, Left Bank, Intake And Exhaust Side Assembly
Courtesy of KIA MOTORS AMERICA, INC.

- A. L (LH), R (RH)
- B. I (Intake), None (Exhaust)
- C. Journal number
- D. Front mark

CAUTION: Rotate the crankshaft not to contact the valves to the pistons by making the pistons below 10 mm (0.3937 in.) from the top of cylinder block.

7. Install water temperature control assembly.
8. Install timing chain.
9. Check and adjust valve clearance.
10. Install the exhaust manifold.

11. Install the intake manifold.

2009 ENGINE

Timing System - Sorento

TIMING CHAIN

COMPONENTS

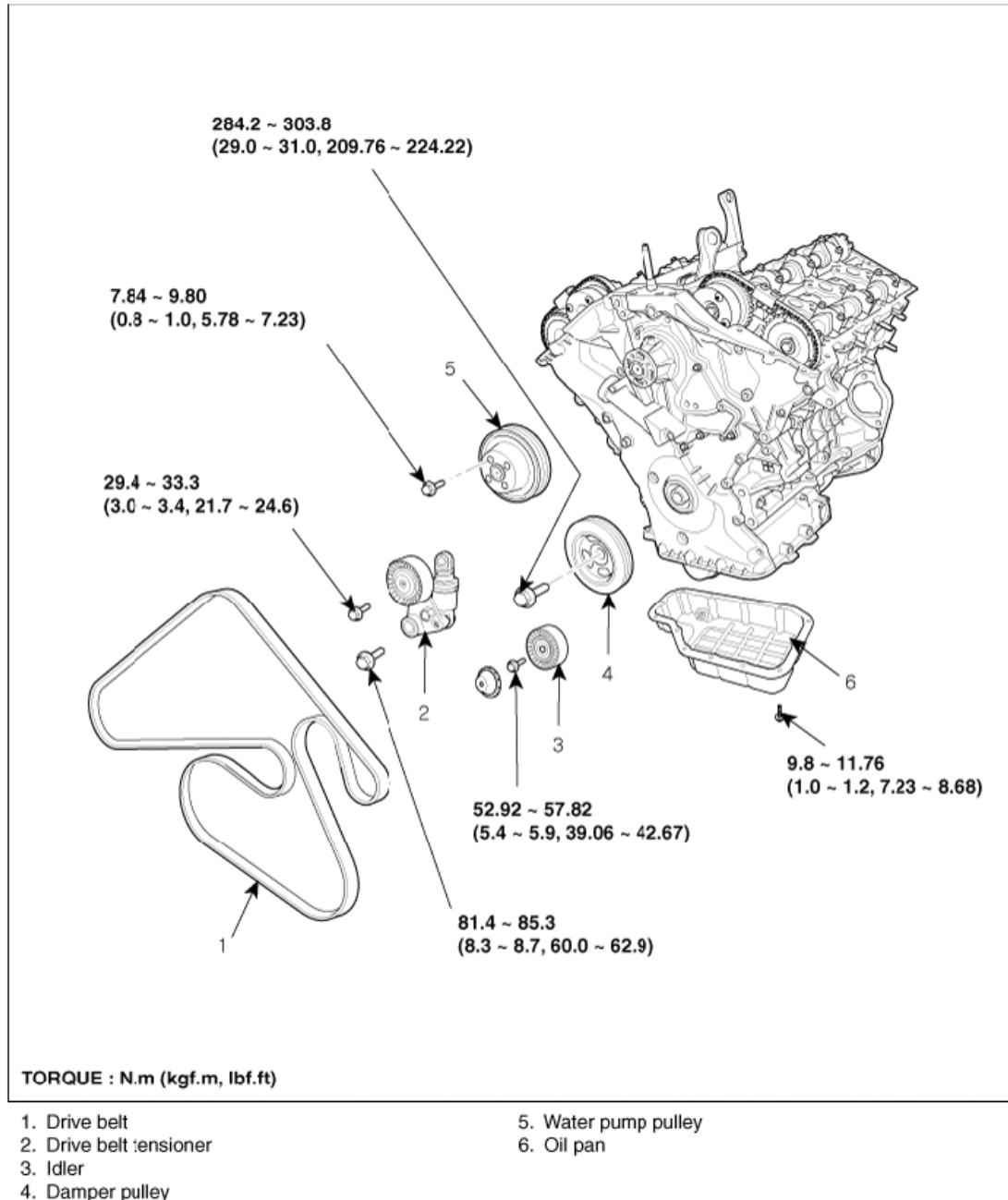


Fig. 1: Identifying Timing System Components With Torque Specifications (1 Of 2)
 Courtesy of KIA MOTORS AMERICA, INC.

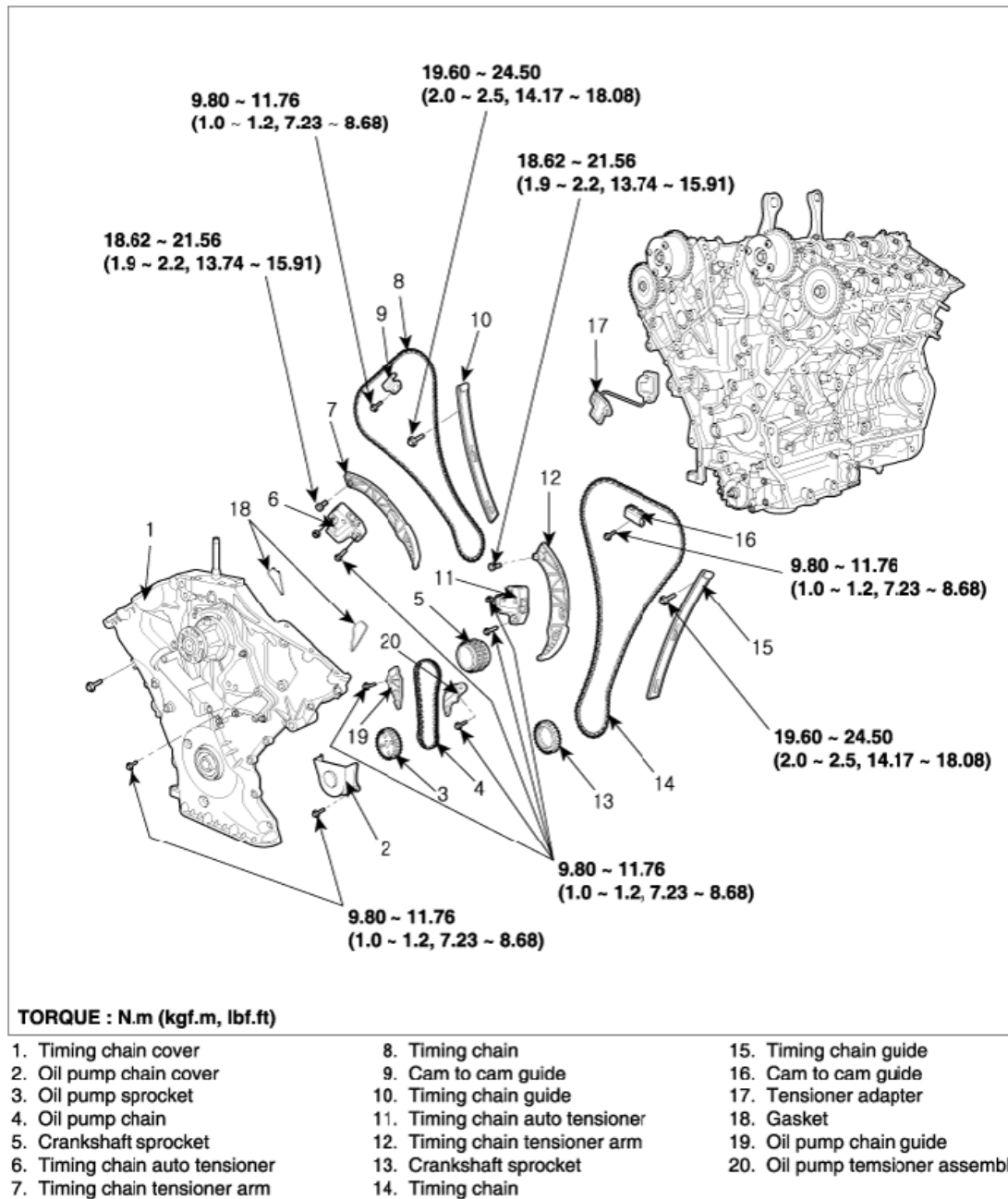


Fig. 2: Identifying Timing System Components With Torque Specifications (2 Of 2)
 Courtesy of KIA MOTORS AMERICA, INC.

REMOVAL

Radiator removal is required for this procedure. (Refer to **RADIATOR**)

1. Remove the drive belt (A).

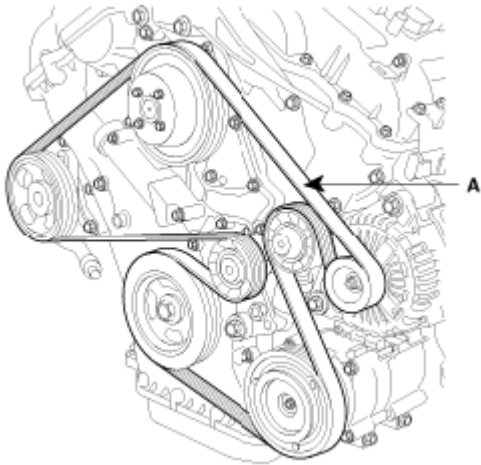


Fig. 3: Identifying Drive Belt
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove the power steering pump (A).

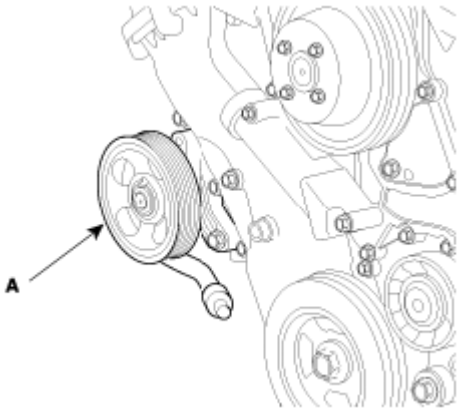


Fig. 4: Identifying Power Steering Pump
Courtesy of KIA MOTORS AMERICA, INC.

3. Remove the air compressor (A).



Fig. 5: Identifying Air Compressor
Courtesy of KIA MOTORS AMERICA, INC.

4. Remove the alternator (A).

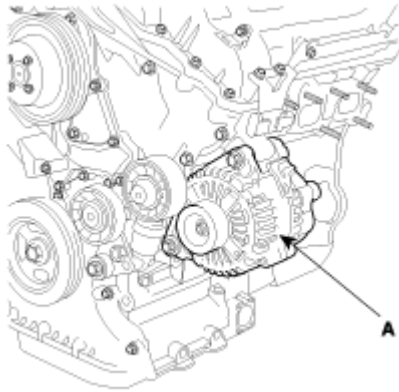


Fig. 6: Identifying Alternator
Courtesy of KIA MOTORS AMERICA, INC.

5. Remove drive belt idler (A).

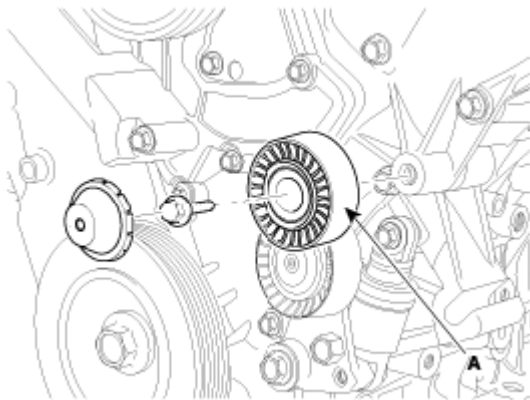


Fig. 7: Identifying Drive Belt Idler
Courtesy of KIA MOTORS AMERICA, INC.

6. Remove drive belt auto tensioner (A).

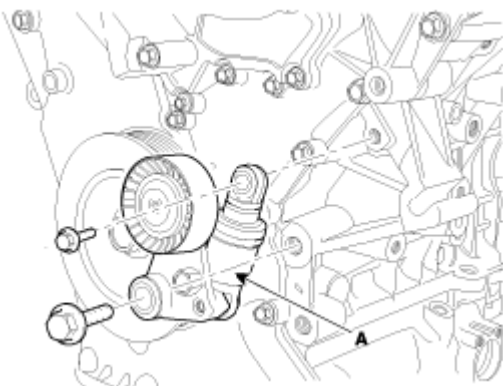


Fig. 8: Identifying Drive Belt Auto Tensioner
Courtesy of KIA MOTORS AMERICA, INC.

7. Remove water pump pulley (A).

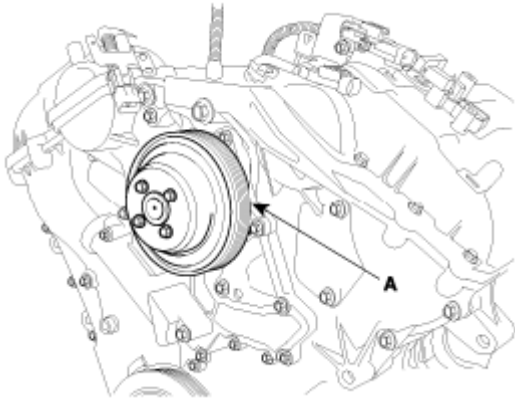


Fig. 9: Identifying Water Pump Pulley
Courtesy of KIA MOTORS AMERICA, INC.

8. Remove intake manifold.

DISASSEMBLY

1. Remove the engine cover.

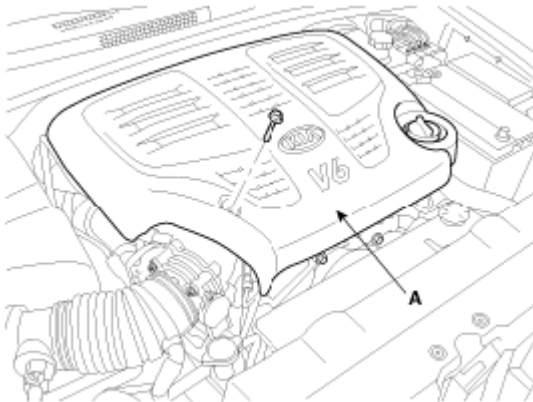


Fig. 10: Identifying Engine Cover
Courtesy of KIA MOTORS AMERICA, INC.

2. Remove the engine room resonator (A).

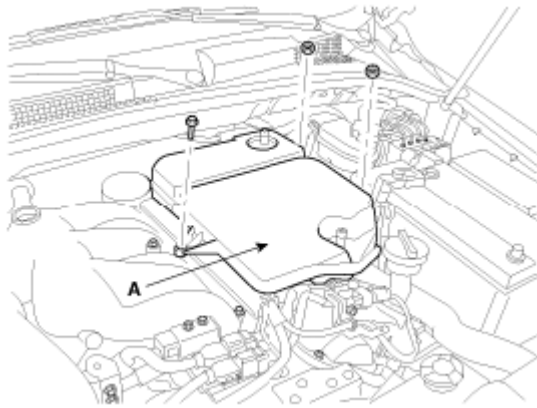


Fig. 11: Identifying Engine Room Resonator
Courtesy of KIA MOTORS AMERICA, INC.

3. After disconnecting the MAF sensor connector (A) and the breather hose (B), remove the air cleaner assembly (C).

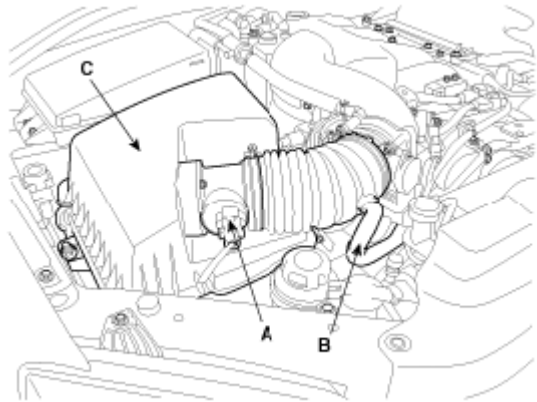


Fig. 12: Identifying MAF Sensor Connector, Breather Hose And Air Cleaner Assembly
Courtesy of KIA MOTORS AMERICA, INC.

4. After disconnecting the other breather hose (A), the Purge Control Solenoid Valve (PCSV) hose (B), the Positive Crankcase Ventilation (PCV) hose (C) and the Electronic Throttle Control (ETC) cooling hoses (D), remove the surge tank assembly (E).

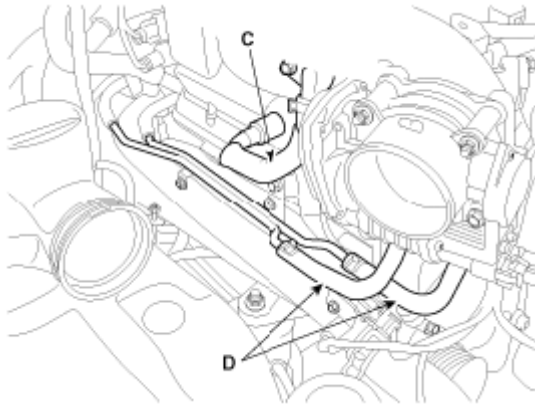


Fig. 13: Identifying Positive Crankcase Ventilation (PCV) Hose And Electronic Throttle Control (ETC) Cooling Hoses

Courtesy of KIA MOTORS AMERICA, INC.

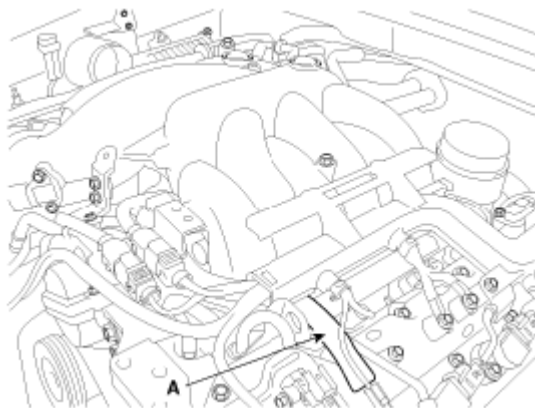


Fig. 14: Identifying Breather Hose

Courtesy of KIA MOTORS AMERICA, INC.

5. Remove the wiring over the surge tank.
 1. Disconnect the injection harness connector (A).
 2. Disconnect the camshaft position sensor (CMP) harness connector (B).
 3. Disconnect the ground lines (C).
 4. Disconnect the ignition coil harness connector (D).
 5. Disconnect the condenser connector (E).
 6. Disconnect the oil control valve (OCV) harness connector (F).

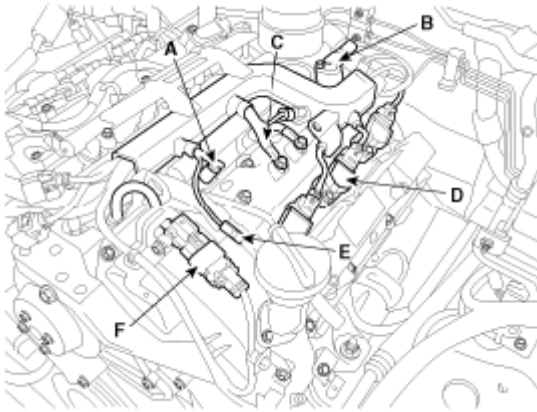


Fig. 15: Identifying Injection Harness Connector, Ground Lines, Ignition Coil Harness Connector, Condenser Connector And OCV Harness Connector
Courtesy of KIA MOTORS AMERICA, INC.

6. Loosen the cylinder head cover bolts and then remove the cover (A) and gasket.

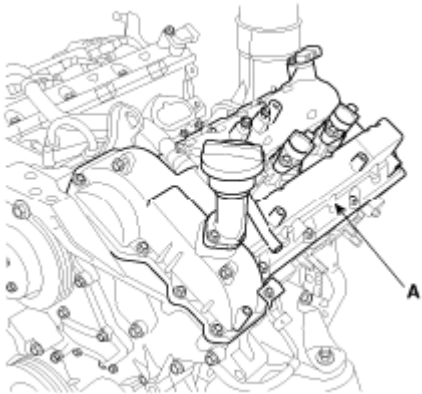


Fig. 16: Identifying Cylinder Head Cover
Courtesy of KIA MOTORS AMERICA, INC.

7. Set No. 1 cylinder to TDC/compression.
 - A. Turn the crankshaft pulley and align its groove with the timing mark "T" of the lower timing chain cover.

NOTE: Do not rotate engine counterclockwise.

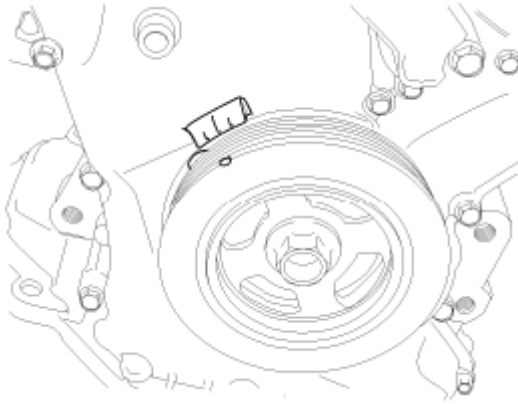


Fig. 17: Identifying Timing Mark T Of Lower Timing Chain Cover
Courtesy of KIA MOTORS AMERICA, INC.

- B. Check that the mark (A) of the camshaft timing sprockets are in straight line on the cylinder head surface as shown in the illustration.

If not, turn the crankshaft one revolution (360°).

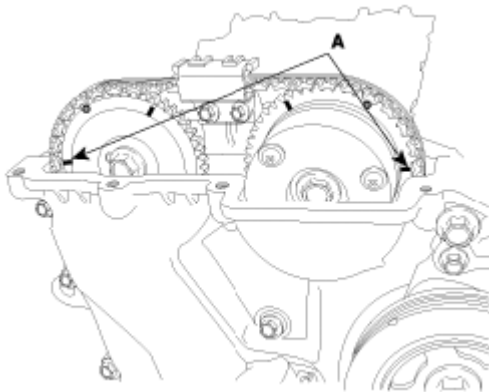


Fig. 18: Identifying Mark Of Camshaft Timing Sprockets And Cylinder Head
Courtesy of KIA MOTORS AMERICA, INC.

NOTE: Do not rotate engine counterclockwise.

8. Remove the lower oil pan (A).

Insert the blade of SST (09215-3C000) between the upper oil pan and lower oil pan, and cut off applied sealer and removed lower oil pan.

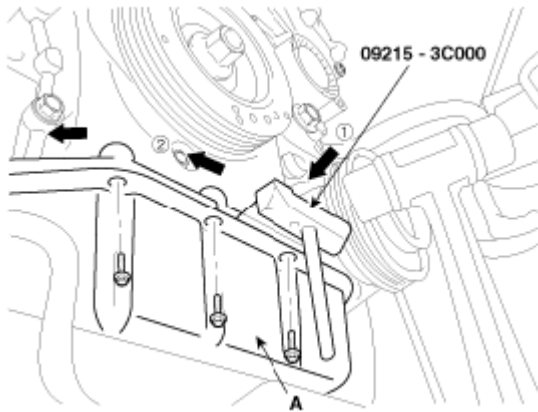


Fig. 19: Identifying Oil Pan And SST

Courtesy of KIA MOTORS AMERICA, INC.

CAUTION:

- Insert the SST between the oil pan and the ladder frame by tapping it with a plastic hammer in the direction of arrow.
- After tapping the SST with a plastic hammer along the direction of arrow around more than 2/3 edge of the oil pan, remove it from the ladder frame.
- Do not turn over the SST abruptly without tapping. It can result in damage of the SST.

9. Remove the crankshaft damper pulley (A).

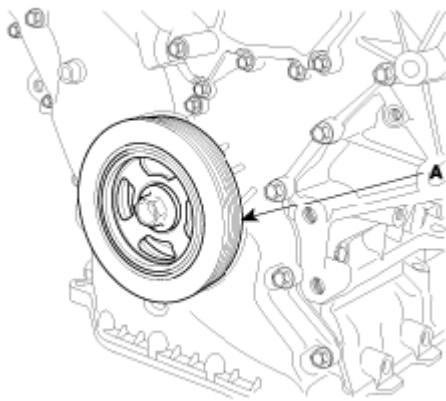


Fig. 20: Identifying Crankshaft Damper Pulley

Courtesy of KIA MOTORS AMERICA, INC.

10. Remove the timing chain cover (A).

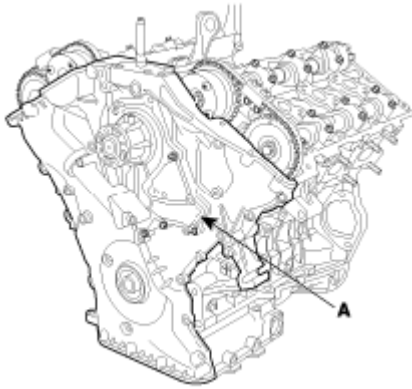


Fig. 21: Identifying Timing Chain Cover
Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Be careful not to damage the contact surfaces of cylinder block, cylinder head and timing chain cover.
- Mark on the timing chain on the basis of the marking on sprocket and CVVT.

11. Install a set pin after compressing the timing chain tensioner.

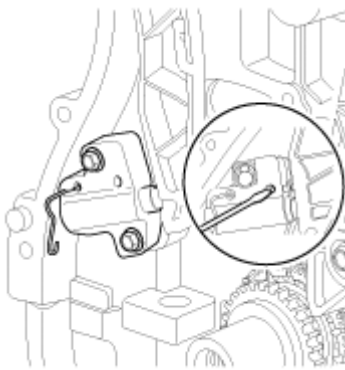


Fig. 22: Identifying Timing Chain Tensioner Set Pin
Courtesy of KIA MOTORS AMERICA, INC.

12. Remove RH cam-to-cam guide (A).

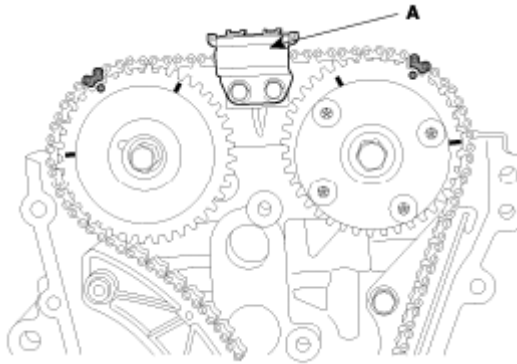


Fig. 23: Identifying RH Cam-To-Cam Guide
 Courtesy of KIA MOTORS AMERICA, INC.

13. Remove RH timing chain auto tensioner (A) and RH timing chain tensioner arm (B).

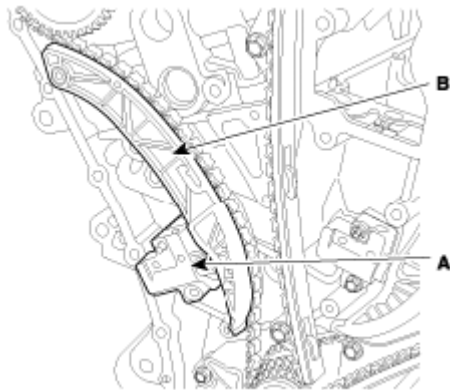


Fig. 24: Identifying RH Timing Chain Auto Tensioner And RH Timing Chain Tensioner Arm
 Courtesy of KIA MOTORS AMERICA, INC.

14. Remove oil pump chain cover (A).



Fig. 25: Identifying Oil Pump Chain Cover
 Courtesy of KIA MOTORS AMERICA, INC.

15. Remove oil pump chain tensioner assembly (A).

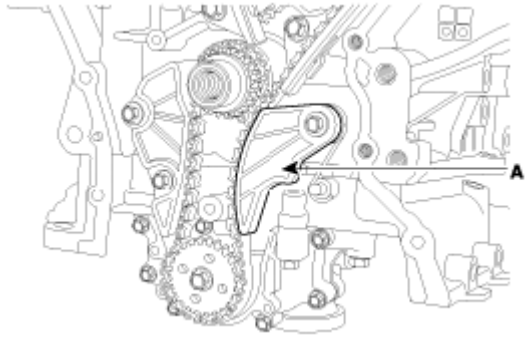


Fig. 26: Identifying Oil Pump Chain Tensioner Assembly
 Courtesy of KIA MOTORS AMERICA, INC.

16. Remove oil pump chain guide (A).

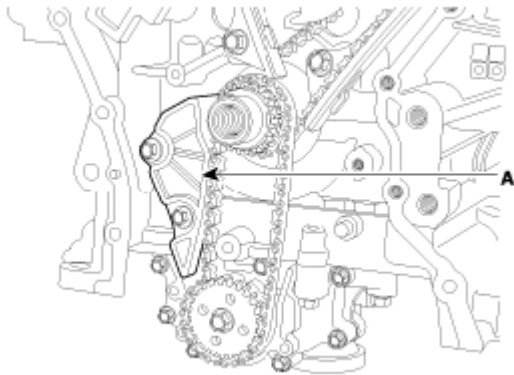


Fig. 27: Identifying Oil Pump Chain Guide
 Courtesy of KIA MOTORS AMERICA, INC.

17. Remove RH timing chain.
18. Remove RH timing chain guide (A).

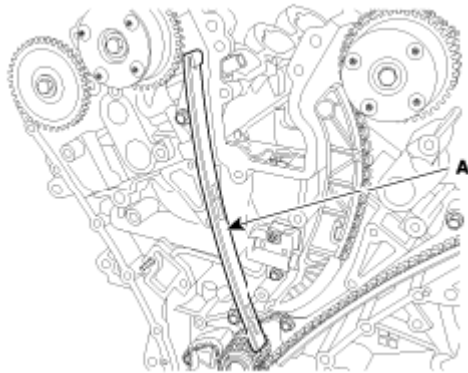


Fig. 28: Identifying RH Timing Chain Guide
 Courtesy of KIA MOTORS AMERICA, INC.

19. Remove oil pump chain sprocket (A) and oil pump chain (B).

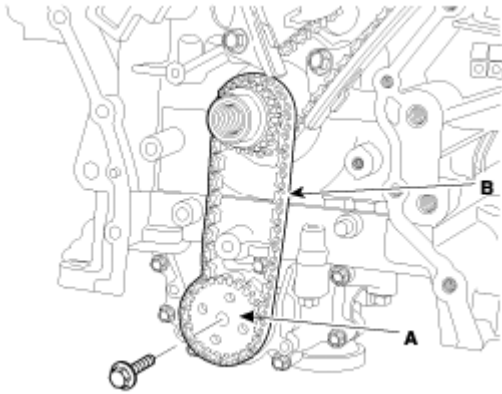


Fig. 29: Identifying Oil Pump Chain Sprocket And Oil Pump Chain
Courtesy of KIA MOTORS AMERICA, INC.

20. Remove crankshaft sprocket (A) (O/P & RH camshaft drive).

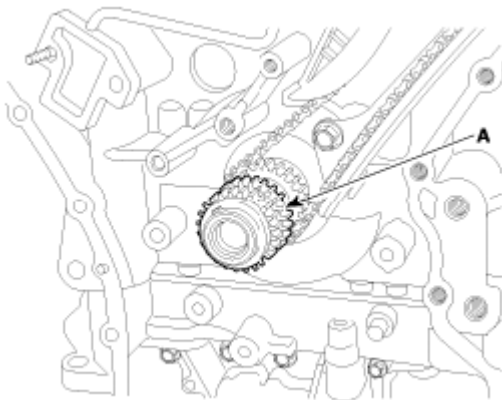


Fig. 30: Identifying Crankshaft Sprocket
Courtesy of KIA MOTORS AMERICA, INC.

21. Remove LH cam-to-cam guide (A).

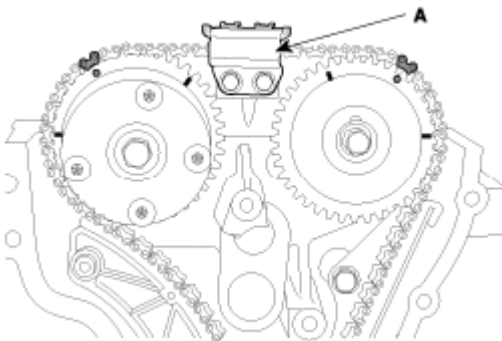


Fig. 31: Identifying LH Cam-To-Cam Guide

Courtesy of KIA MOTORS AMERICA, INC.

22. Remove LH timing chain auto tensioner (A) and LH timing chain tensioner arm (B).

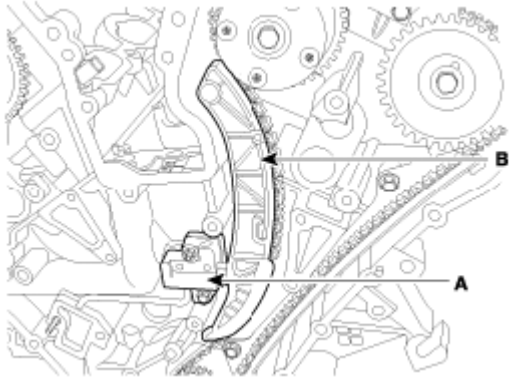


Fig. 32: Identifying LH Timing Chain Auto Tensioner And LH Timing Chain Tensioner Arm
Courtesy of KIA MOTORS AMERICA, INC.

23. Remove LH timing chain.
24. Remove LH timing chain guide (A).

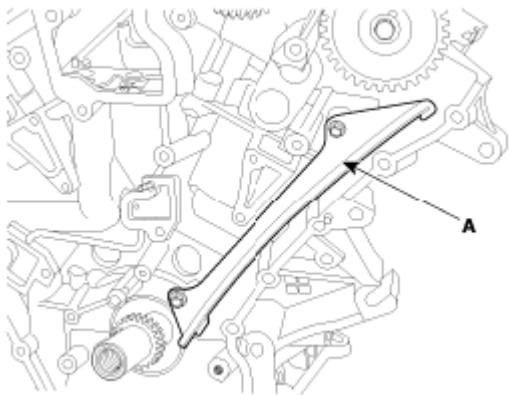


Fig. 33: Identifying LH Timing Chain Guide
Courtesy of KIA MOTORS AMERICA, INC.

25. Remove crankshaft sprocket (A) (LH camshaft drive).

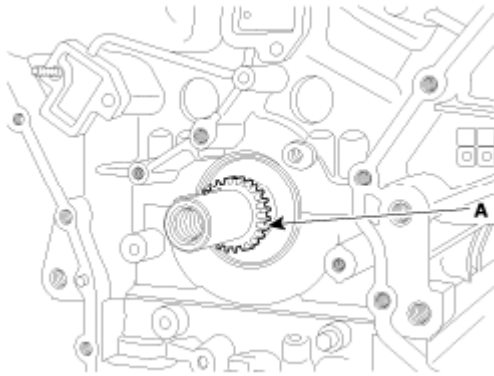


Fig. 34: Identifying Crankshaft Sprocket (LH Camshaft Drive)
 Courtesy of KIA MOTORS AMERICA, INC.

26. Remove tensioner adapter assembly (A).

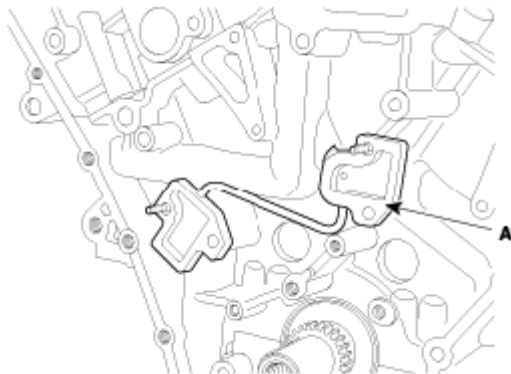


Fig. 35: Identifying Tensioner Adapter Assembly
 Courtesy of KIA MOTORS AMERICA, INC.

INSPECTION

SPROCKETS, CHAIN TENSIONER, CHAIN GUIDE, CHAIN TENSIONER ARM

1. Check the camshaft sprocket and crankshaft sprocket for abnormal wear, cracks, or damage. Replace as necessary.
2. Inspect the tensioner arm and chain guide for abnormal wear, cracks, or damage. Replace as necessary.
3. Check that the tensioner piston moves smoothly when the ratchet pawl is released with thin rod.

BELT, IDLER, BELT TENSIONER, PULLEY

1. Check the belt for oil or dust deposits.

Replace, if necessary.

Small deposits should be wiped away with a dry cloth or paper. Do not clean with solvent.

2. When the engine is overhauled or belt tension adjusted, check the belt carefully. If any of the following flaws are evident, replace the belt.

NOTE:

- Do not bend, twist or turn the timing belt inside out.
- Do not allow the timing belt to come into contact with oil, water and steam.

3. Inspect the idler for easy and smooth rotation and check for play or noise.

REASSEMBLY

1. The key (A) of crankshaft should be aligned with the timing mark (B) of timing chain cover. As a result of this, the piston of No. 1 cylinder is placed at the top dead center on compression stroke.

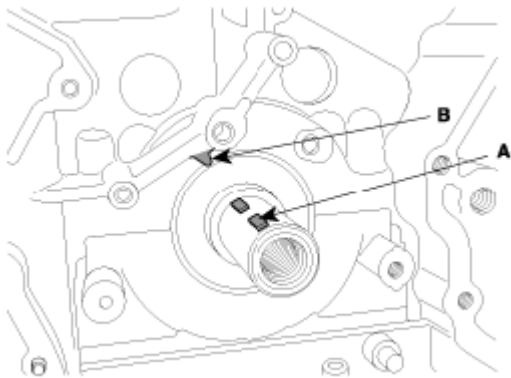


Fig. 36: Identifying Key Of Crankshaft And Timing Mark Of Timing Chain Cover
Courtesy of KIA MOTORS AMERICA, INC.

2. Install tensioner adapter assembly (A).

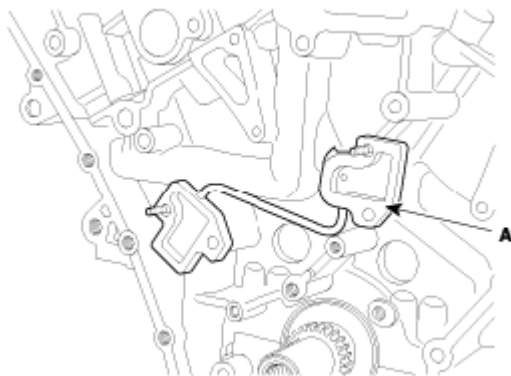


Fig. 37: Identifying Tensioner Adapter Assembly
Courtesy of KIA MOTORS AMERICA, INC.

3. Install crankshaft sprocket (A) (LH camshaft drive).

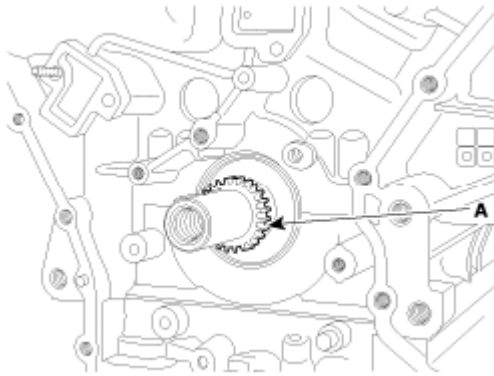


Fig. 38: Identifying Crankshaft Sprocket (LH Camshaft Drive)
Courtesy of KIA MOTORS AMERICA, INC.

4. Install LH timing chain guide (A).

Tightening torque

19.60 ~ 24.50 Nm (2.0 ~ 2.5 kgf.m, 14.17 ~ 18.08 lb-ft)

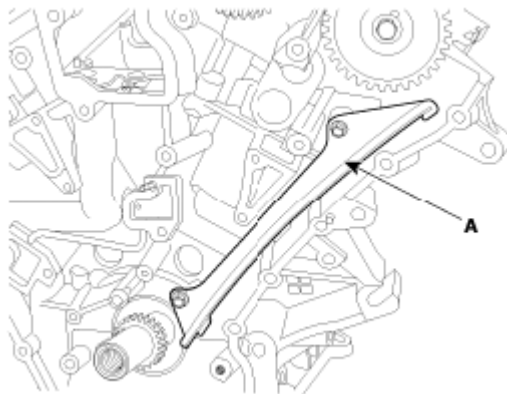


Fig. 39: Identifying LH Timing Chain Guide
Courtesy of KIA MOTORS AMERICA, INC.

5. Install LH timing chain.

To install the timing chain with no slack between each shaft (cam, crank), follow the below procedure.

Crankshaft sprocket (A) --> Timing chain guide (B) --> Exhaust camshaft sprocket (C) --> Intake camshaft sprocket (D).

The timing mark of each sprockets should be matched with timing mark (color link) of timing chain at installing timing chain.

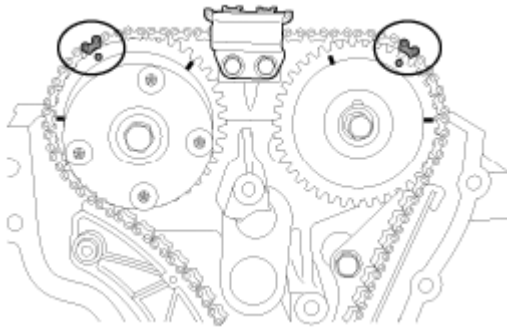


Fig. 40: Identifying LH Timing Chain
Courtesy of KIA MOTORS AMERICA, INC.

6. Install LH timing chain tensioner arm (B).

Tightening torque

18.62 ~ 21.56 Nm (1.9 ~ 2.2 kgf.m, 13.74 ~ 15.91 lb-ft)

7. Install chain tensioner (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

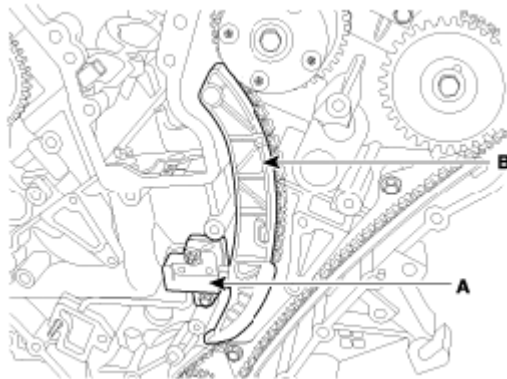


Fig. 41: Identifying Chain Tensioner And LH Timing Chain Tensioner Arm
Courtesy of KIA MOTORS AMERICA, INC.

8. Install LH cam-to-cam guide (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

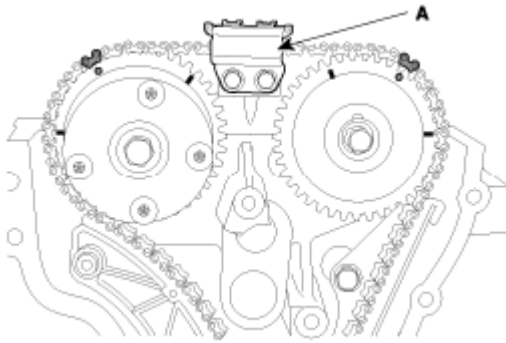


Fig. 42: Identifying LH Cam-To-Cam Guide
 Courtesy of KIA MOTORS AMERICA, INC.

9. Install crankshaft sprocket (A) (O/P & RH camshaft drive).

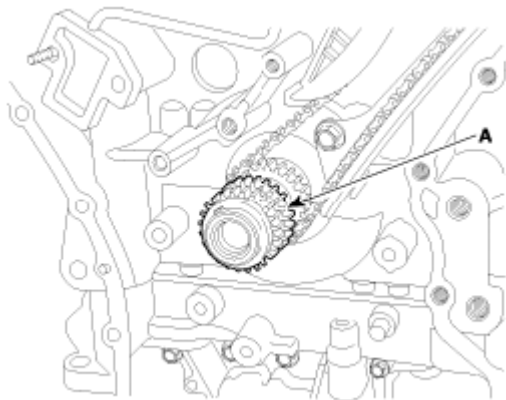


Fig. 43: Identifying Crankshaft Sprocket
 Courtesy of KIA MOTORS AMERICA, INC.

10. Install oil pump chain (B) and oil pump sprocket (A).

Tightening torque

18.62 ~ 21.56 Nm (1.9 ~ 2.2 kgf.m, 13.74 ~ 15.91 lb-ft)

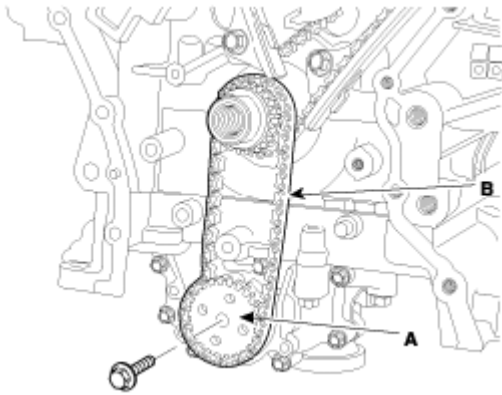


Fig. 44: Identifying Oil Pump Sprocket And Oil Pump Chain
Courtesy of KIA MOTORS AMERICA, INC.

11. Install RH timing chain guide (A).

Tightening torque

19.60 ~ 24.50 Nm (2.0 ~ 2.5 kgf.m, 14.17 ~ 18.08 lb-ft)

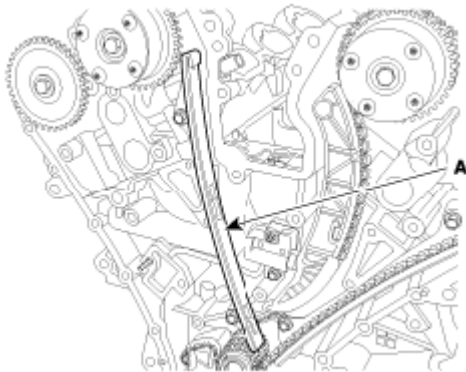


Fig. 45: Identifying RH Timing Chain Guide
Courtesy of KIA MOTORS AMERICA, INC.

12. Install RH timing chain.

To install the timing chain with no slack between each shaft (cam, crank), follow the below procedure.

Crankshaft sprocket (A) --> Intake camshaft sprocket (B) --> Exhaust camshaft sprocket (C).

The timing mark of each sprockets should be matched with timing mark (color link) of timing chain at installing timing chain.



Fig. 46: Identifying Timing Mark Of Timing Chain
 Courtesy of KIA MOTORS AMERICA, INC.

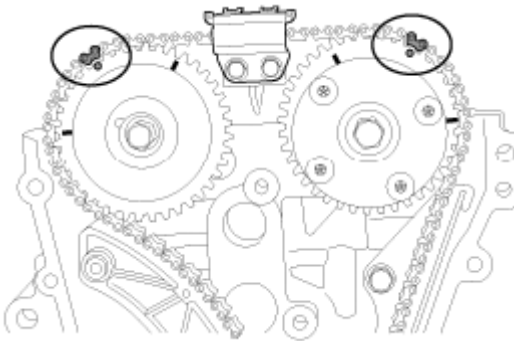


Fig. 47: Identifying Timing Mark Of Sprockets And Timing Chain
 Courtesy of KIA MOTORS AMERICA, INC.

13. Install RH timing chain tensioner arm (B).
14. Install RH timing chain auto tensioner (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

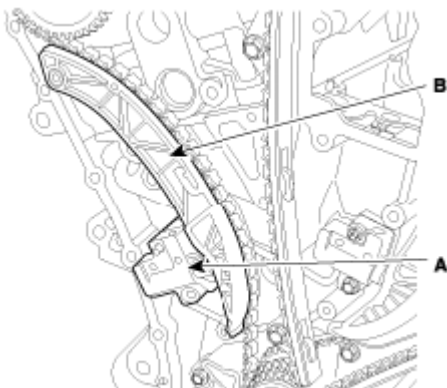


Fig. 48: Identifying RH Timing Chain Auto Tensioner And RH Timing Chain Tensioner Arm
Courtesy of KIA MOTORS AMERICA, INC.

15. Install RH cam-to-cam guide (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

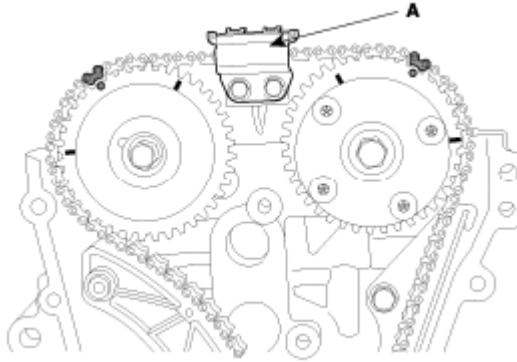


Fig. 49: Identifying RH Cam-To-Cam Guide
Courtesy of KIA MOTORS AMERICA, INC.

16. Install oil pump chain guide (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

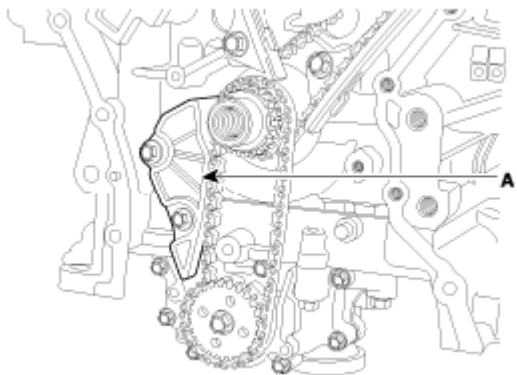


Fig. 50: Identifying Oil Pump Chain Guide
Courtesy of KIA MOTORS AMERICA, INC.

17. Install oil pump chain tensioner assembly (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

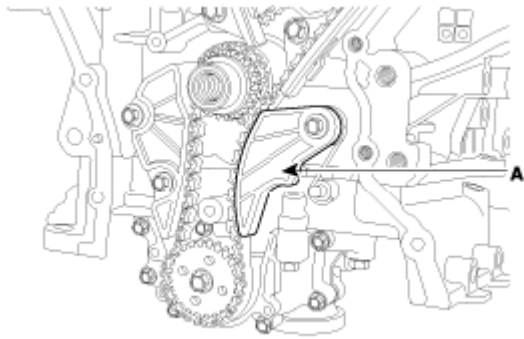


Fig. 51: Identifying Oil Pump Chain Tensioner Assembly
Courtesy of KIA MOTORS AMERICA, INC.

18. Pull out the pins of hydraulic tensioner (LH & RH).
19. Install oil pump chain cover (A).

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

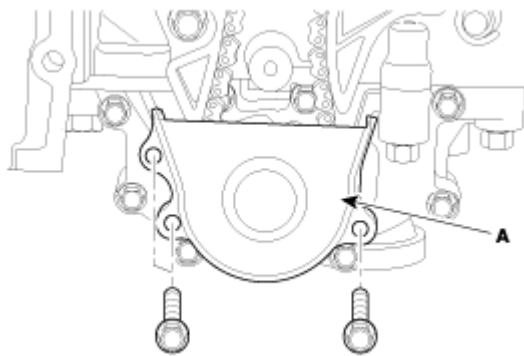


Fig. 52: Identifying Oil Pump Chain Cover
Courtesy of KIA MOTORS AMERICA, INC.

20. After rotating crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing mark.

NOTE: Always turn the crankshaft clockwise.

21. Install timing chain cover.
 - A. The sealant locations on chain cover and on counter parts (cylinder head, cylinder block, and lower oil pan) must be free of engine oil and ETC.
 - B. Before assembling the timing chain cover, the liquid sealant TB1217H should be applied on the gap between cylinder head and cylinder block

The part must be assembled within 5 minutes after sealant was applied.

Bead width: 2.5 mm (0.1 in.)

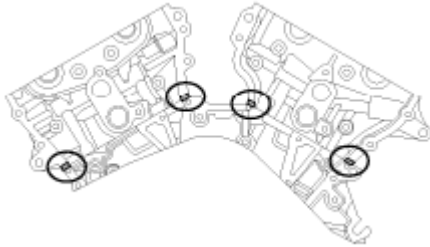


Fig. 53: Identifying Sealant Locations On Chain Cover
Courtesy of KIA MOTORS AMERICA, INC.

- C. After applying liquid sealant TB1217H on timing chain cover.

The part must be assembled within 5 minutes after sealant was applied.

Sealant should be applied without discontinuity.

Sealant should also be applied all around the two holes of the dowel pins.

Bead width: 2.5 mm (0.1 in.)

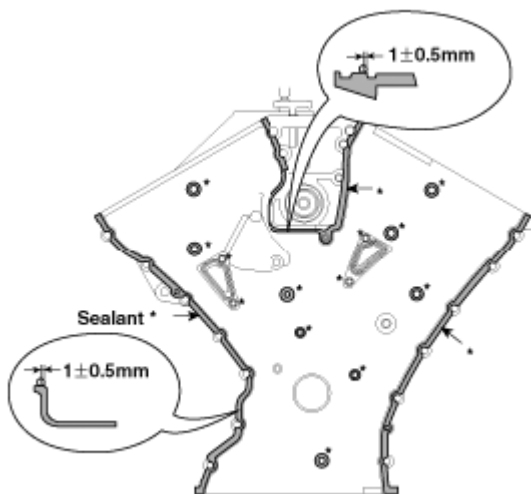


Fig. 54: Identifying Sealant Bead Width
Courtesy of KIA MOTORS AMERICA, INC.

- D. Install the new gasket (A) to the timing chain cover.

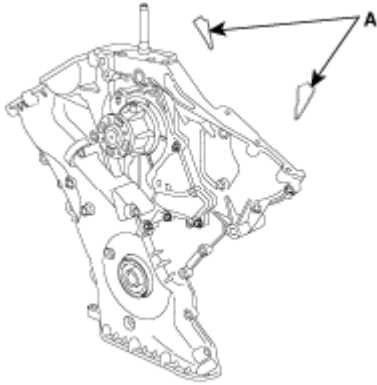


Fig. 55: Identifying Timing Chain Cover Gasket
Courtesy of KIA MOTORS AMERICA, INC.

- E. The dowel pins on the cylinder block and holes on the timing chain cover should be used as a reference in order to assemble the timing chain cover to be in exact position.

Tightening torque

B (17): 18.62 ~ 21.56 Nm (1.9 ~ 2.2 kgf.m, 13.74 ~ 15.91 lb-ft)

C (4): 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

D (1): 58.80 ~ 68.80 Nm (6.0 ~ 7.0 kgf.m, 43.40 ~ 50.63 lb-ft)

E (1): 58.80 ~ 68.80 Nm (6.0 ~ 7.0 kgf.m, 43.40 ~ 50.63 lb-ft)

F (2): 24.50 ~ 26.46 Nm (2.5 ~ 2.7 kgf.m, 18.08 ~ 19.53 lb-ft)

G (4): 21.56 ~ 23.52 Nm (2.2 ~ 2.4 kgf.m, 15.91 ~ 17.36 lb-ft)

H (1): 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

I (1): 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

J (1): 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

K (4): 9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

L (1): 21.56 ~ 26.46 Nm (2.2 ~ 2.7 kgf.m, 15.91 ~ 19.53 lb-ft) - New bolt

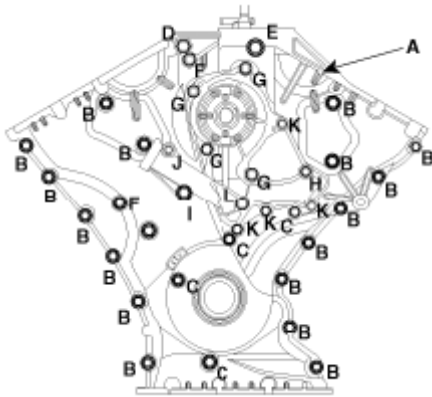


Fig. 56: Identifying Cylinder Block Dowel Pins And Holes On Timing Chain Cover
 Courtesy of KIA MOTORS AMERICA, INC.

F. The firing and/or blow out test should not be performed within 30 minutes after the timing chain cover was assembled.

22. Using SST (09231-3C100), install timing chain cover oil seal.

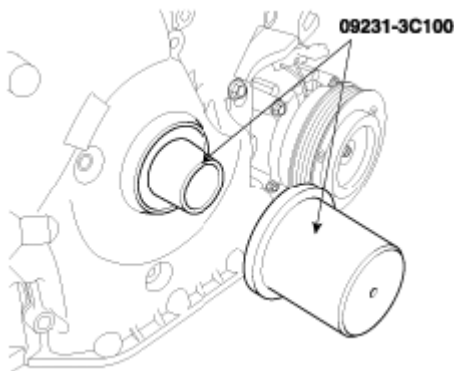


Fig. 57: Installing Timing Chain Cover Oil Seal Using SST (09231-3C100)
 Courtesy of KIA MOTORS AMERICA, INC.

23. Install lower oil pan.

- A. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
- B. Before assembling the oil pan, the liquid sealant TB1217H should be applied on oil pan.

The part must be assembled within 5 minutes after the sealant was applied.

Bead width: 2.5 mm (0.1 in.).

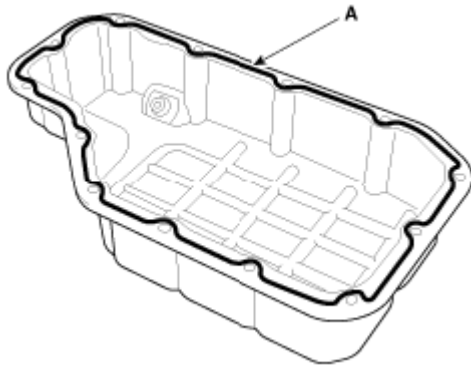


Fig. 58: Identifying Sealant Applying Area On Oil Pan

Courtesy of KIA MOTORS AMERICA, INC.

NOTE:

- Make clean the sealing face before assembling two parts.
- Remove harmful foreign matters on the sealing face before applying sealant.
- When applying sealant gasket, sealant must not be protruded into the inside of oil pan.
- To prevent leakage of oil, apply sealant gasket to the inner threads of the bolt holes.

C. Install oil pan (A).

Uniformly tighten the bolts in several passes.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

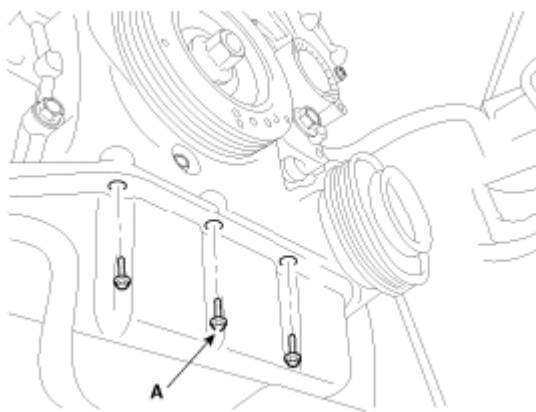


Fig. 59: Identifying Oil Pan

Courtesy of KIA MOTORS AMERICA, INC.

24. Using SST (09231-3C300) install crankshaft damper pulley (A).

Tightening torque

284.2 ~ 303.8 Nm (29.0 ~ 31.0 kgf.m, 209.76 ~ 224.22 lb-ft)

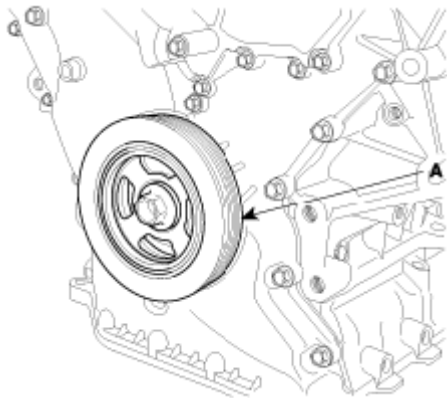


Fig. 60: Identifying Crankshaft Damper Pulley
Courtesy of KIA MOTORS AMERICA, INC.

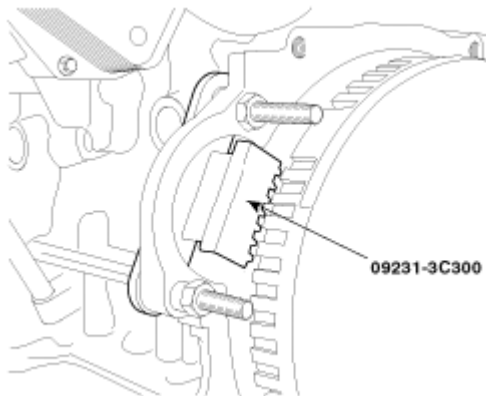


Fig. 61: Identifying SST (09231-3C300) On Crankshaft Damper Pulley
Courtesy of KIA MOTORS AMERICA, INC.

25. Install cylinder head cover.
- The hardening sealant located on the upper area between timing chain cover and cylinder head should be removed before assembling cylinder head cover.
 - After applying sealant (TB1217H), it should be assembled within 5 minutes. Bead width: 2.5 mm (0.1 in.)

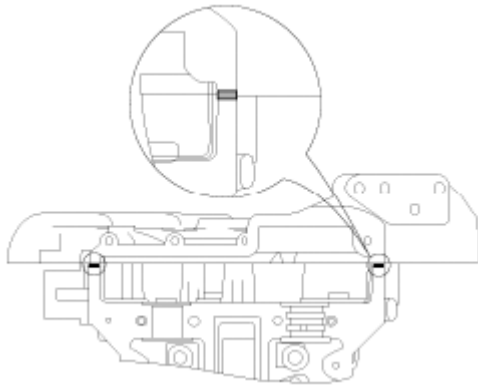


Fig. 62: Identifying Sealant Applying Area
Courtesy of KIA MOTORS AMERICA, INC.

- C. The firing and/or blow out test should not be performed within 30 minutes after the cylinder head cover was assembled.
- D. Install the cylinder head cover bolts as following method.

Tightening torque

9.80 ~ 11.76 Nm (1.0 ~ 1.2 kgf.m, 7.23 ~ 8.68 lb-ft)

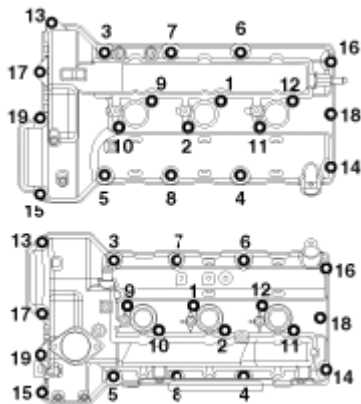


Fig. 63: Identifying Cylinder Head Cover Bolts
Courtesy of KIA MOTORS AMERICA, INC.

CAUTION: Do not reuse cylinder head cover gasket.

- E. Install ignition coil
- F. Connect RH ignition coil connector (A), condenser connector (B) and install wiring bracket (C).

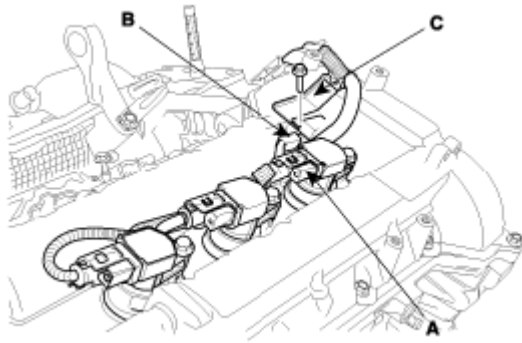


Fig. 64: Identifying RH Ignition Coil Connector, Condenser Connector And Wiring Bracket
 Courtesy of KIA MOTORS AMERICA, INC.

G. Install connector bracket from LH cylinder head cover.

INSTALLATION

1. Install intake manifold.
2. Install water pump pulley (A).

Tightening torque

7.84 ~ 9.80 Nm (0.8 ~ 1.0 kgf.m, 5.78 ~ 7.23 lb-ft)

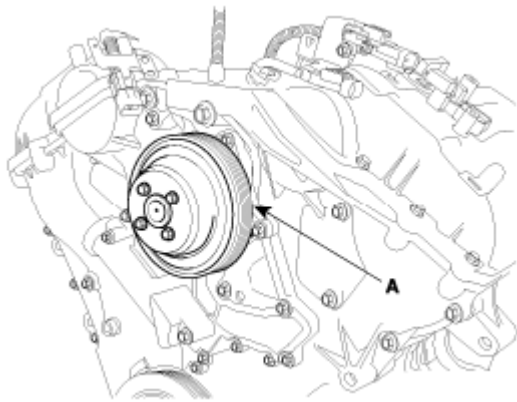


Fig. 65: Identifying Water Pump Pulley
 Courtesy of KIA MOTORS AMERICA, INC.

3. Install drive belt auto tensioner (A).

Tightening torque

81.4 ~ 85.3 Nm (8.3 ~ 8.7 kgf.m, 60.0 ~ 62.9 lb-ft)

29.4 ~ 33.3 Nm (3.0 ~ 3.4 kgf.m, 21.7 ~ 24.6 lb-ft)

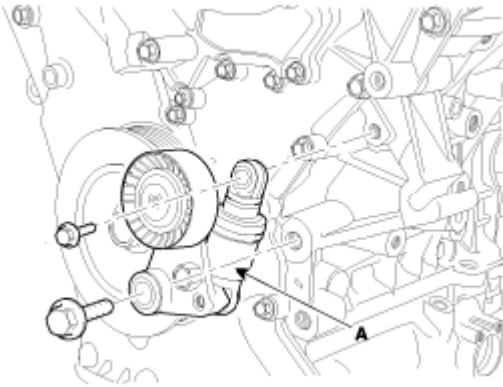


Fig. 66: Identifying Drive Belt Auto Tensioner
Courtesy of KIA MOTORS AMERICA, INC.

4. Install drive belt idler (A).

Tightening torque

52.92 ~ 57.82 Nm (5.4 ~ 5.9 kgf.m, 39.06 ~ 42.67 lb-ft)

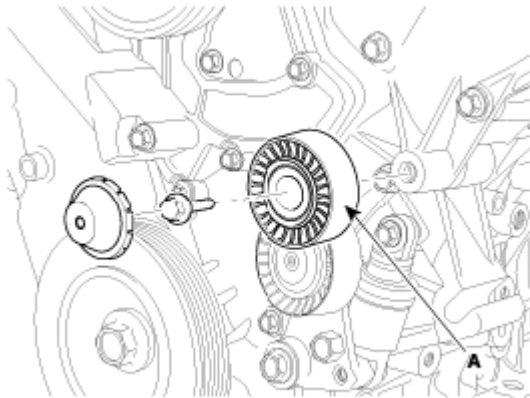


Fig. 67: Identifying Drive Belt Idler
Courtesy of KIA MOTORS AMERICA, INC.

5. Install alternator
6. Install air compressor
7. Install power steering pump.
8. Install drive belt (A).

Crankshaft pulley --> A/C pulley --> idler pulley --> alternator pulley --> water pump pulley --> P/S pump pulley --> tensioner pulley.

Rotate auto tensioner arm in the counter - clockwise moving auto tensioner pulley bolt with wrench.

After putting belt on auto tensioner pulley, release the auto tensioner pulley slowly.

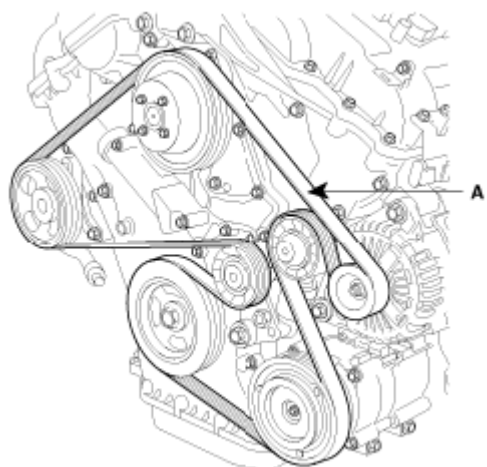


Fig. 68: Identifying Drive Belt
Courtesy of KIA MOTORS AMERICA, INC.