

2010 Hyundai Genesis 3.8

2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

2010 ENGINE**General Information (Engine (G8BA - GSL 4.6)) - Genesis****SPECIFICATIONS****GENERAL SPECIFICATIONS**

Description		Specifications	Limit
General			
Type		V-type, DOHC	
Number of cylinders		8	
Bore		92mm (3.6220in)	
Stroke		87mm (3.4252in)	
Total displacement		4,627 cc (282.4 cu.in)	
Compression ratio		10.4: 1	
Firing order		1-2-7-8-4-5-6-3	
Valve timing			
Intake valve	Opens (ATDC)	8°	
	Closes (ABDC)	74°	
Exhaust valve	Opens (BBDC)	62°	
	Closes (ATDC)	4°	
Cylinder head			
Flatness of gasket surface		Less than 0.05mm (0.0020in) Less than 0.02mm (0.0008in)/100 x 100	
Flatness of manifold mounting surface		Less than 0.1mm (0.0039in) Less than 0.03mm (0.0012in)/110 x 110	
Camshaft			
Camheight	Intake	41.6mm (16.4in)	
	Exhaust	41.5mm (16.3in)	
Camshaft bearing oil clearance (Intake/Exhaust)	No. 1 journal	0.025 ~ 0.057mm (0.0010 ~ 0.0022in)	
	No. 2, 3, 4, 5 journal	0.020 ~ 0.057mm (0.0008 ~ 0.0022in)	
Camshaft journal outer diameter (Intake/Exhaust)	No. 1 journal	35.964 ~ 35.980mm (1.4159 ~ 1.4165in)	
	No. 2, 3, 4, 5 journal	25.964 ~ 25.980mm (1.0222 ~ 1.0228in)	
Camshaft journal bore inner diameter (Intake/Exhaust)	No. 1 journal	36.005 ~ 36.021mm (1.4175 ~ 1.4181in)	
	No. 2, 3, 4, 5 journal	26.000 ~ 26.021 mm (1.0236 ~ 1.0244in)	
End play		RH-In : 0.12 ~ 0.22mm (0.0047 ~ 0.0086in) RH-Ex. LH-In, LH-Ex: 0.1 ~ 0.2mm (0.0039 ~ 0.0078in)	
Valve			

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Valve length	Intake	107.77mm (4.2429in)	
	Exhaust	107.75mm (4.2421 in)	
Stem outer diameter	Intake	5.965 ~ 5.980mm (0.2348 ~ 0.2354in)	
	Exhaust	5.958 ~ 5.970mm (0.2346 ~ 0.2350in)	
Face angle (Intake/Exhaust)		45.25° ~ 45.75°	
Thickness of valve head (margin)	Intake	1.2mm (0.0472in)	
	Exhaust	1.2mm (0.0472in)	
Valve stem to valve guide clearance	Intake	0.020 ~ 0.047mm (0.0008 ~ 0.0018in)	
	Exhaust	0.030 ~ 0.054mm (0.0012 ~ 0.0021 in)	
Valve guide			
Inner diameter	Intake	6.000 ~ 6.012mm (0.2362 ~ 0.2367in)	
	Exhaust	6.000 ~ 6.012mm (0.2362 ~ 0.2367in)	
Valve seat			
Width of seat contact	Intake	1.15 ~ 1.45mm (0.0453 ~ 0.0571in)	
	Exhaust	1.35 ~ 1.65mm (0.0531 ~ 0.0650in)	
Seat angle	Intake	44.75° ~ 45.10°	
	Exhaust	44.75° ~ 45.10°	
Valve spring			
Free length		47.8mm (1.8819in)	
Load		27.0 ± 1.4kg/38mm (59.6 ± 3.0 lb/1.496in)	
		69.3 ± 2.4kg/28mm (152.85.4 lb/1.102in)	
Out of squareness		Less than 1.5°	
Cylinder block			
Cylinder bore		92.000 ~ 92.030mm (3.6220 ~ 3.6232in)	
Flatness of gasket surface		Total: Less than 0.05mm (0.0020in)	
		Bore to bore : Less than 0.02mm (0.0008in)	
Piston			
Piston outer diameter		91.945 ~ 91.975mm (3.6199 ~ 3.6211 in)	
Piston to cylinder clearance		0.045 ~ 0.065mm (0.0018 ~ 0.0026in)	
Ring groove width	No. 1 ring groove	1.23 ~ 1.25mm (0.0484 ~ 0.0492in)	
	No. 2 ring groove	1.23 ~ 1.25mm (0.0484 ~ 0.0492in)	
	Oil ring groove	2.01 ~ 2.03mm (0.0791 ~ 0.0799in)	
Piston ring			
Ring width	No. 1 ring	1.17 ~ 1.19mm (0.0461 ~ 0.0469in)	
	No. 2 ring	1.17 ~ 1.19mm (0.0461 ~ 0.0469in)	
	Oil ring	1.88 ~ 1.95mm (0.0740 ~ 0.0768in)	
Side clearance	No. 1 ring	0.04 ~ 0.08mm (0.0016 ~ 0.0031in)	
	No. 2 ring	0.04 ~ 0.08mm (0.0016 ~ 0.0031 in)	

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End gap	Oil ring	0.06 ~ 0.15mm (0.0024 ~ 0.0059in)	
	No. 1 ring	0.17 ~ 0.32mm (0.0067 ~ 0.0126in)	
	No. 2 ring	0.37 ~ 0.52mm (0.0146 ~ 0.0205in)	
	Oil ring	0.20 ~ 0.70mm (0.0079 ~ 0.0276in)	
Piston pin			
Piston pin outer diameter		21.995 ~ 22.000mm (0.8659 ~ 0.8661 in)	
Piston pin hole inner diameter		22.004 ~ 22.010mm (0.8663 ~ 0.8665in)	
Piston pin hole clearance		0.004 ~ 0.015mm (0.0002 ~ 0.0006in)	
Connecting rod small end hole inner diameter		22.007 ~ 22.018mm (0.8664 ~ 0.8668in)	
Connecting rod small end hole clearance		0.007 ~ 0.023mm (0.0003 ~ 0.0009in)	
Connecting rod			
Connecting rod big end inner diameter		55.000 ~ 55.018mm (2.1654 ~ 2.1661in)	
Connecting rod bearing oil clearance		0.018 ~ 0.036mm (0.0007 ~ 0.0014in)	
Side clearance		0.1 ~ 0.3mm (0.0039 ~ 0.0118in)	
Crankshaft			
Main journal outer diameter		64.982 ~ 65.000mm (2.5583 ~ 2.5591 in)	
Pin journal outer diameter		51.982 ~ 52.000mm (2.0465 ~ 2.0472in)	
Main bearing oil clearance		0.004 ~ 0.022mm (0.0002 ~ 0.0009in)	
End play		0.10 ~ 0.28mm (0.0039 ~ 0.0110in)	
Drive plate			
Runout		0.25mm (0.0098in)	
Oil pump			
Relief valve opening pressure		530 ± 49kpa (5.5 ± 0.5kg/cm ² , 78.2±7psi)	
Engine oil			
Oil quantity (Total)		7.5L (7.92US qt, 6.59lmp qt)	
Oil quantity (Oil pan)		6.0L (6.34US qt, 5.27lmp qt)	
Oil quantity (Oil filter)		0.5L (0.53US qt, 0.44lmp qt)	
Oil quantity (Drain and refill including)		6.5L (6.86U.S.qts, 5.71lmp.qts)	
Oil quality		Above SJ or SL	
Oil pressure (at 6000 RPM)		350kpa (3.57kg/cm ² , 50.76psi)	
Cooling system			
Cooling method		Forced circulation with water pump	
Coolant quantity		11.5L (12.15USqt, 10.11lmp qt)	
Thermostat	Type	Wax pellet type	
	Opening temperature	82 ± 2°C (179.6 ± 35.6°F)	
	Pull opening temperature	95°C (203°F)	

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Radiator cap	Main valve opening pressure	93.16 ~ 122.58kpa (0.95 ~ 1.25kg/cm ² , 13.51 ~ 17.78psi)	
	Vacuum valve opening pressure	0.98 ~ 4.90 kpa (0.01 ~ 0.05kg/cm ² , 0.14 ~ 0.71 psi)	
Water temperature sensor			
Type		Thermistor type	
Resistance	20°C (68°F)	2.45 ± 0.14 kohms	
	80°C (176°F)	0.3222 kohms	

TIGHTENING TORQUES

TIGHTENING TORQUES

Item	Quantity	Nm	kgf.m	lb-ft
Cylinder head				
Cylinder head cover bolt (RH)	17	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder head cover bolt (LH)	18	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder head bolt (long bolt) (LH/RH)	20	32.4 ~ 36.3 + 88° ~ 92° + 118° ~ 122°	3.3 ~ 3.7 + 88° ~ 92° + 118° ~ 122°	23.9 ~ 26.8 + 88° ~ 92° + 118° ~ 122°
Cylinder head bolt (flange bolt) (LH/RH)	4	32.4 ~ 36.3	3.3 ~ 3.7	23.9 ~ 26.8
Camshaft bearing cap bolt (LH/RH)	44	13.7 ~ 14.7	1.4 ~ 1.5	10.1 ~ 10.8
Pressure relief valve (LH/RH)	2	21.6 ~ 25.	2.2 ~ 2.6	15.9 ~ 18.8
Ignition coil bolt (LH/RH)	8	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Spark plug (LH/RH)	8	24.5 ~ 29.4	2.5 ~ 3.0	18.1 ~ 21.7
Oil control valve bolt (LH/RH)	4	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
OCV (oil control valve) filter (LH/RH)	2	53.9 ~ 63.7	5.5 ~ 6.5	39.8 ~ 47.0
CWT assembly fixing bolt (LH/RH)	4	73.5 ~ 83.4	7.5 ~ 8.5	54.2 ~ 61.5
Water temperature sensor wiring bracket bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Water temperature sensor	1	19.6 ~ 39.2	2.0 ~ 4.0	14.5 ~ 28.9
Oil pressure switch wiring bracket bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Oil pressure switch	1	14.7 ~ 21.6	1.5 ~ 2.2	10.8 ~ 15.9
Timing system				
Timing chain lower cover bolt	14	23.5 ~ 27.5	2.4 ~ 2.8	17.4 ~ 20.3
Timing chain upper cover (LH/RH)	14	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Timing chain guide bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8

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Tensioner adapter bolt	3	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain tensioner arm bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain guide mounting bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain tensioner bolt (LH/RH)	2	78.5 ~ 88.3	8.0 ~ 9.0	57.9 ~ 65.1
Cam to cam guide bolt (LH/RH)	4	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Crankshaft pulley bolt	1	392.3 ~ 402.1	40.0 ~ 41.0	289.3 ~ 296.6
Drive belt tensioner bolt	3	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Drive belt idler bolt	1	37.3 ~ 41.2	3.8 ~ 4.2	27.5 ~ 30.4
Alternator mounting bolt	2	29.4 ~ 41.2	3.0 ~ 4.2	21.7 ~ 30.4
Alternator bracket bolt (10X50)	4	29.4 ~ 41.2	3.0 ~ 4.2	21.7 ~ 30.4
Alternator bracket bolt (8X40)	1	19.6 ~ 26.5	2.0 ~ 2.7	14.5 ~ 19.5
Cooling fan clutch	1	58.8	6.0	43.4
Cooling fan bolt	3	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder block				
Drain plug	1	96.1 ~ 100.0	9.8 ~ 10.2	70.9 ~ 73.8
Piston oil jet	4	24.5 ~ 29.4	2.5 ~ 3.0	18.1 ~ 21.7
Connecting rod cap bolt	16	22.6 ~ 26.5 + 98° ~ 102°	2.3 ~ 2.7 + 98° ~ 102°	16.6 ~ 19.5 + 98° ~ 102°
Lower crankcase assembly bolt (main bearing cap bolt)	20	37.3 ~ 41.2 + 120°	3.8 ~ 4.2 + 120°	27.5 ~ 30.4 + 120°
Lower crankcase assembly bolt (flange bolt)	15	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Cylinder block rear cover bolt	12	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder block bank cover bolt	12	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Drive plate bolt	8	98.1 ~ 107.9	10.0 ~ 11.0	72.3 ~ 79.6
Cooling system				
Water pump pulley bolt	4	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Water pump bolt	9	19.6 ~ 24.5	2.0 ~ 2.5	14.5 ~ 18.1
Water temperature control assembly bolt	4	16.7 ~ 19.6	1.7 ~ 2.0	12.3 ~ 14.5
Water outlet fitting assembly bolt	2	16.7 ~ 19.6	1.7 ~ 2.0	12.3 ~ 14.5
Water inlet pipe bolt	3	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Water outlet pipe bolt	3	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Lubrication system				
Oil level gauge guide bolt	1	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Oil filter assembly bolt	4	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Lower oil pan bolt	18	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Upper oil pan bolt	27	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7

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Oil pump assembly bolt	4	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Oil pump sprocket bolt	1	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Intake and exhaust system				
Air cleaner assembly bolt	3	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Intake manifold module nut	10	19.6 ~ 26.5	2.0 ~ 2.7	14.5 ~ 19.5
Exhaust manifold nut (LH/RH)	24	49.0 ~ 53.9	5.0 ~ 5.5	36.2 ~ 39.8
Exhaust manifold heat protector A bolt (LH/RH)	6	8.8 ~ 10.8	0.9 ~ 1.1	6.5 ~ 8.0
Exhaust manifold heat protector B bolt (LH/RH)	4	14.7 ~ 21.6	1.5 ~ 2.2	10.8 ~ 15.9
Front muffler nut (LH/RH)	8	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Center muffler	4	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Main muffler (LH/RH)	4	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Engine mounting				
Engine mounting bracket and engine fixing bolt (LH/RH)	8	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Engine mounting insulator and engine mounting bracket fixing nut (LH/RH)	2	88.3 ~ 107.9	9.0 ~ 11.0	65.1 ~ 79.6
Engine mounting insulator and frame fixing nut (LH/RH)	6	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Transmission mounting insulator and transmission fixing bolt	4	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Transmission mounting insulator and frame fixing nut	4	29.4 ~ 39.2	3.0 ~ 4.0	21.7 ~ 28.9

SPECIFICATIONS (REVISED)

GENERAL SPECIFICATIONS

Description		Specifications	Limit
General			
Type		V-type, DOHC	
Number of cylinders		8	
Bore		92mm (3.6220in)	
Stroke		87mm (3.4252in)	
Total displacement		4,627 cc (282.4 cu.in)	
Compression ratio		10.4: 1	
Firing order		1-2-7-8-4-5-6-3	
Valve timing			
Intake valve	Opens (ATDC)	9°	
	Closes (ABDC)	85°	
Exhaust valve	Opens (BBDC)	65°	

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	Closes (ATDC)	5°	
Cylinder head			
Flatness of gasket surface		Less than 0.05mm (0.0020in) Less than 0.02mm (0.0008in)/100 x 100	
Flatness of manifold mounting surface		Less than 0.1mm (0.0039in) Less than 0.03mm (0.0012in)/110 x 110	
Camshaft			
Camheight	Intake	41.77329mm (16.446in)	
	Exhaust	41.55202mm (1.6359in)	
Camshaft bearing oil clearance (Intake/Exhaust)	No. 1 journal	0.025 ~ 0.057mm (0.0010 ~ 0.0022in)	
	No. 2, 3, 4, 5 journal	0.020 ~ 0.057mm (0.0008 ~ 0.0022in)	
Camshaft journal outer diameter (Intake/Exhaust)	No. 1 journal	35.964 ~ 35.980mm (1.4159 ~ 1.4165in)	
	No. 2, 3, 4, 5 journal	25.964 ~ 25.980mm (1.0222 ~ 1.0228in)	
Camshaft journal bore inner diameter (Intake/Exhaust)	No. 1 journal	36.005 ~ 36.021mm (1.4175 ~ 1.4181in)	
	No. 2, 3, 4, 5 journal	26.000 ~ 26.021 mm (1.0236 ~ 1.0244in)	
End play		RH-In : 0.12 ~ 0.22mm (0.0047 ~ 0.0086in) RH-Ex. LH-In, LH-Ex: 0.12 ~ 0.22mm (0.0047 ~ 0.0086in)	
Valve			
Valve length	Intake	107.77mm (4.2429in)	
	Exhaust	107.75mm (4.2421 in)	
Stem outer diameter	Intake	5.965 ~ 5.980mm (0.2348 ~ 0.2354in)	
	Exhaust	5.958 ~ 5.970mm (0.2346 ~ 0.2350in)	
Face angle (Intake/Exhaust)		45.25° ~ 45.75°	
Thickness of valve head (margin)	Intake	1.2mm (0.0472in)	
	Exhaust	1.2mm (0.0472in)	
Valve stem to valve guide clearance	Intake	0.020 ~ 0.047mm (0.0008 ~ 0.0018in)	
	Exhaust	0.030 ~ 0.054mm (0.0012 ~ 0.0021 in)	
Valve guide			
Inner diameter	Intake	6.000 ~ 6.012mm (0.2362 ~ 0.2367in)	
	Exhaust	6.000 ~ 6.012mm (0.2362 ~ 0.2367in)	
Valve seat			
Width of seat contact	Intake	1.15 ~ 1.45mm (0.0453 ~ 0.0571in)	
	Exhaust	1.35 ~ 1.65mm (0.0531 ~ 0.0650in)	
Seat angle	Intake	44.75° ~ 45.10°	

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	Exhaust	44.75° ~ 45.10°	
Valve spring			
Free length		48.44mm (1.9070in)	
Load		22.5 ± 1.1kg/38.3mm (49.7 ± 2.5 lb/1.5078in)	
		55.0 ± 1.9kg/28.0mm (121.2 ± 4.3 lb/1.1023in)	
Out of squareness		Less than 1.5°	
Cylinder block			
Cylinder bore		92.000 ~ 92.030mm (3.6220 ~ 3.6232in)	
Flatness of gasket surface		Total: Less than 0.05mm (0.0020in)	
		Bore to bore : Less than 0.02mm (0.0008in)	
Piston			
Piston outer diameter		91.945 ~ 91.975mm (3.6199 ~ 3.6211 in)	
Piston to cylinder clearance		0.045 ~ 0.065mm (0.0018 ~ 0.0026in)	
Ring groove width	No. 1 ring groove	1.23 ~ 1.25mm (0.0484 ~ 0.0492in)	
	No. 2 ring groove	1.23 ~ 1.25mm (0.0484 ~ 0.0492in)	
	Oil ring groove	2.01 ~ 2.03mm (0.0791 ~ 0.0799in)	
Piston ring			
Ring width	No. 1 ring	1.17 ~ 1.19mm (0.0461 ~ 0.0469in)	
	No. 2 ring	1.17 ~ 1.19mm (0.0461 ~ 0.0469in)	
	Oil ring	1.88 ~ 1.95mm (0.0740 ~ 0.0768in)	
Side clearance	No. 1 ring	0.04 ~ 0.08mm (0.0016 ~ 0.0031in)	
	No. 2 ring	0.04 ~ 0.08mm (0.0016 ~ 0.0031 in)	
	Oil ring	0.06 ~ 0.15mm (0.0024 ~ 0.0059in)	
End gap	No. 1 ring	0.17 ~ 0.32mm (0.0067 ~ 0.0126in)	
	No. 2 ring	0.37 ~ 0.52mm (0.0146 ~ 0.0205in)	
	Oil ring	0.20 ~ 0.70mm (0.0079 ~ 0.0276in)	
Piston pin			
Piston pin outer diameter		21.995 ~ 22.000mm (0.8659 ~ 0.8661 in)	
Piston pin hole inner diameter		22.004 ~ 22.010mm (0.8663 ~ 0.8665in)	
Piston pin hole clearance		0.004 ~ 0.015mm (0.0002 ~ 0.0006in)	
Connecting rod small end hole inner diameter		22.007 ~ 22.018mm (0.8664 ~ 0.8668in)	
Connecting rod small end hole clearance		0.007 ~ 0.023mm (0.0003 ~ 0.0009in)	
Connecting rod			
Connecting rod big end inner diameter		55.000 ~ 55.018mm (2.1654 ~	

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		2.1661in)	
Connecting rod bearing oil clearance		0.018 ~ 0.036mm (0.0007 ~ 0.0014in)	
Side clearance		0.1 ~ 0.3mm (0.0039 ~ 0.0118in)	
Crankshaft			
Main journal outer diameter		64.982 ~ 65.000mm (2.5583 ~ 2.5591 in)	
Pin journal outer diameter		51.982 ~ 52.000mm (2.0465 ~ 2.0472in)	
Main bearing oil clearance		0.004 ~ 0.022mm (0.0002 ~ 0.0009in)	
End play		0.10 ~ 0.28mm (0.0039 ~ 0.0110in)	
Drive plate			
Runout		0.25mm (0.0098in)	
Oil pump			
Relief valve opening pressure		530 ± 49kpa (5.5 ± 0.5kg/cm ² , 78.2±7psi)	
Engine oil			
Oil quantity	Total	7.5L (7.92US qt, 6.59Imp qt)	When replacing a short engine or a block assembly
	Oil pan	6.0L (6.34US qt, 5.27Imp qt)	
	Drain and refill	6.5L (6.86US qt, 5.71Imp qt)	Including oil filter
Oil grade	Recommendation	5W-20/GF4 & SM	If not available, refer to the recommended API or ILSAC classification and SAE viscosity number
	Classification	API SL, SM or above ILSAC GF3, GF4 or above	Refer to the "Lubrication System"
Oil pressure (at 1000 RPM)		156.91kpa (1.6kg/cm ² , 22.76psi) or above	Oil temperature in oil pan: 110±2°C (230±35.6°F)
Cooling system			
Cooling method		Forced circulation with water pump	
Coolant quantity		11.5L (12.15USqt, 10.11Imp qt)	
Thermostat	Type	Wax pellet type	
	Opening temperature	82 ± 2°C (179.6 ± 35.6°F)	
	Pull opening temperature	95°C (203°F)	
Radiator cap	Main valve opening pressure	93.16 ~ 122.58kpa (0.95 ~	

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		1.25kg/cm ² , 13.51 ~ 17.78psi)	
	Vacuum valve opening pressure	0.98 ~ 4.90 kpa (0.01 ~ 0.05kg/cm ² , 0.14 ~ 0.71 psi)	
Water temperature sensor			
Type		Thermistor type	
Resistance	20°C (68°F)	2.45 ± 0.14 kohms	
	80°C (176°F)	0.3222 kohms	

TIGHTENING TORQUES (REVISED)

TIGHTENING TORQUES

Item	Quantity	Nm	kgf.m	lb-ft
Cylinder head				
Cylinder head cover bolt (RH)	17	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder head cover bolt (LH)	18	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder head bolt (long bolt) (LH/RH)	20	32.4 ~ 36.3 + 88° ~ 92° + 118° ~ 122°	3.3 ~ 3.7 + 88° ~ 92° + 118° ~ 122°	23.9 ~ 26.8 + 88° ~ 92° + 118° ~ 122°
Cylinder head bolt (flange bolt) (LH/RH)	4	32.4 ~ 36.3	3.3 ~ 3.7	23.9 ~ 26.8
Camshaft bearing cap bolt (LH/RH)	44	13.7 ~ 14.7	1.4 ~ 1.5	10.1 ~ 10.8
Pressure relief valve (LH/RH)	2	21.6 ~ 25.	2.2 ~ 2.6	15.9 ~ 18.8
Ignition coil bolt (LH/RH)	8	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Spark plug (LH/RH)	8	24.5 ~ 29.4	2.5 ~ 3.0	18.1 ~ 21.7
Oil control valve bolt (LH/RH)	4	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
OCV (oil control valve) filter (LH/RH)	2	53.9 ~ 63.7	5.5 ~ 6.5	39.8 ~ 47.0
CVVT assembly fixing bolt (LH/RH)	4	73.5 ~ 83.4	7.5 ~ 8.5	54.2 ~ 61.5
Water temperature sensor wiring bracket bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Water temperature sensor	1	19.6 ~ 39.2	2.0 ~ 4.0	14.5 ~ 28.9
Oil pressure switch wiring bracket bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Oil pressure switch	1	14.7 ~ 21.6	1.5 ~ 2.2	10.8 ~ 15.9
Timing system				
Timing chain lower cover bolt	14	23.5 ~ 27.5	2.4 ~ 2.8	17.4 ~ 20.3
Timing chain upper cover (LH/RH)	14	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Timing chain guide bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8

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2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

Tensioner adapter bolt	3	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain tensioner arm bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain guide mounting bolt (LH/RH)	2	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Timing chain tensioner bolt (LH/RH)	2	78.5 ~ 88.3	8.0 ~ 9.0	57.9 ~ 65.1
Cam to cam guide bolt (LH/RH)	4	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Crankshaft pulley bolt	1	392.3 ~ 402.1	40.0 ~ 41.0	289.3 ~ 296.6
Drive belt tensioner bolt	3	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Drive belt idler bolt	1	37.3 ~ 41.2	3.8 ~ 4.2	27.5 ~ 30.4
Alternator mounting bolt	2	29.4 ~ 41.2	3.0 ~ 4.2	21.7 ~ 30.4
Alternator bracket bolt (10X50)	4	29.4 ~ 41.2	3.0 ~ 4.2	21.7 ~ 30.4
Alternator bracket bolt (8X40)	1	19.6 ~ 26.5	2.0 ~ 2.7	14.5 ~ 19.5
Cylinder block				
Drain plug	1	96.1 ~ 100.0	9.8 ~ 10.2	70.9 ~ 73.8
Piston oil jet	4	24.5 ~ 29.4	2.5 ~ 3.0	18.1 ~ 21.7
Connecting rod cap bolt	16	22.6 ~ 26.5 + 98° ~ 102°	2.3 ~ 2.7 + 98° ~ 102°	16.6 ~ 19.5 + 98° ~ 102°
Lower crankcase assembly bolt (main bearing cap bolt)	20	37.3 ~ 41.2 + 120°	3.8 ~ 4.2 + 120°	27.5 ~ 30.4 + 120°
Lower crankcase assembly bolt (flange bolt)	15	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Cylinder block rear cover bolt	12	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Cylinder block bank cover bolt	12	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Drive plate bolt	8	98.1 ~ 107.9	10.0 ~ 11.0	72.3 ~ 79.6
Cooling system				
Water pump pulley bolt	4	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Water pump bolt	9	19.6 ~ 24.5	2.0 ~ 2.5	14.5 ~ 18.1
Water temperature control assembly bolt	4	16.7 ~ 19.6	1.7 ~ 2.0	12.3 ~ 14.5
Water outlet fitting assembly bolt	2	16.7 ~ 19.6	1.7 ~ 2.0	12.3 ~ 14.5
Water inlet pipe bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Water outlet pipe bolt	2	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Lubrication system				
Oil level gauge guide bolt	1	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Oil filter & cooler assembly bolt	5	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Lower oil pan bolt	18	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Upper oil pan bolt	27	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Baffle plate Bolt	4	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Oil pump assembly bolt	4	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4

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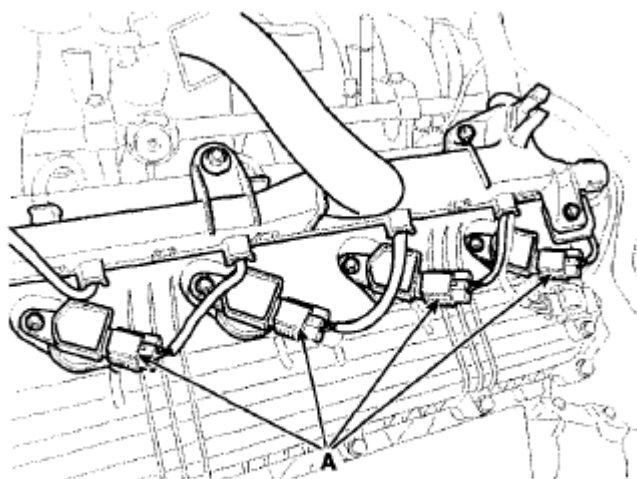
2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

Oil pump sprocket bolt	1	21.6 ~ 25.5	2.2 ~ 2.6	15.9 ~ 18.8
Intake and exhaust system				
Air cleaner assembly bolt	3	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Intake manifold module nut	10	19.6 ~ 26.5	2.0 ~ 2.7	14.5 ~ 19.5
Exhaust manifold nut (LH/RH)	24	49.0 ~ 53.9	5.0 ~ 5.5	36.2 ~ 39.8
Exhaust manifold heat protector A bolt (LH/RH)	6	8.8 ~ 10.8	0.9 ~ 1.1	6.5 ~ 8.0
Exhaust manifold heat protector B bolt (LH/RH)	4	14.7 ~ 21.6	1.5 ~ 2.2	10.8 ~ 15.9
Front muffler nut (LH/RH)	8	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Center muffler	4	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Main muffler (LH/RH)	4	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4
Engine mounting				
Engine mounting bracket and engine fixing bolt (LH/RH)	8	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Engine mounting insulator and engine mounting bracket fixing nut (LH/RH)	2	88.3 ~ 107.9	9.0 ~ 11.0	65.1 ~ 79.6
Engine mounting insulator and frame fixing nut (LH/RH)	6	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Transmission mounting insulator and transmission fixing bolt	4	49.0 ~ 63.7	5.0 ~ 6.5	36.2 ~ 47.0
Transmission mounting insulator and frame fixing nut	4	29.4 ~ 39.2	3.0 ~ 4.0	21.7 ~ 28.9

COMPRESSION PRESSURE INSPECTION

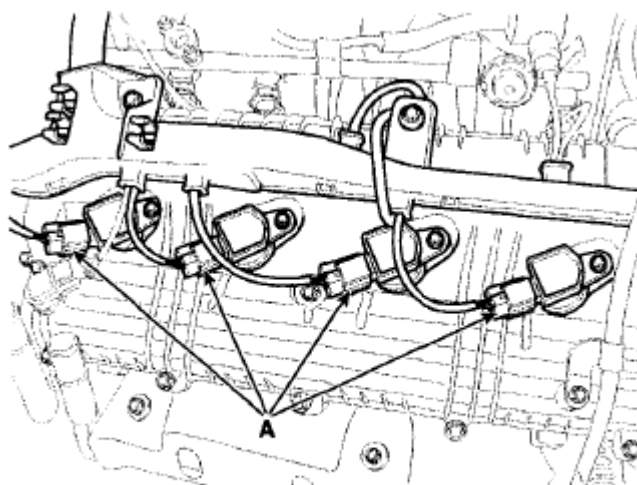
NOTE: If the there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. Warm up engine to normal operating temperature (80 ~ 95°C (176 ~ 203°F)).
2. Remove the ignition coil connectors (A) and ignition coils (B).



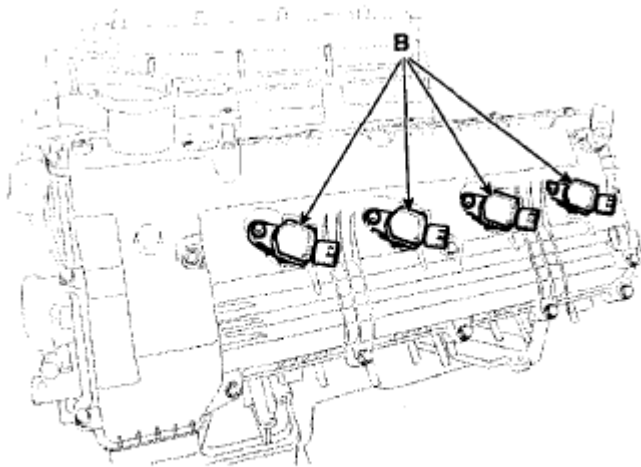
SHMM19336N

Fig. 1: Identifying LH Ignition Coil Connectors (A)
Courtesy of HYUNDAI MOTOR CO.



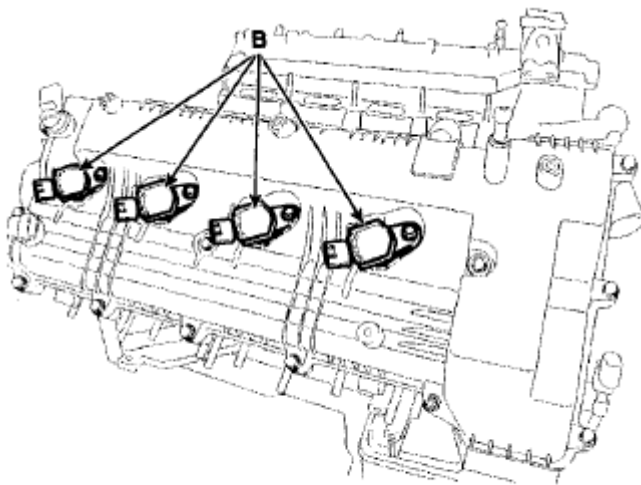
SHMM19337N

Fig. 2: Identifying RH Ignition Coil Connectors (A)
Courtesy of HYUNDAI MOTOR CO.



SHMM19338N

Fig. 3: Identifying LH Ignition Coils (B)
Courtesy of HYUNDAI MOTOR CO.



SHMM19339N

Fig. 4: Identifying RH Ignition Coils (B)
Courtesy of HYUNDAI MOTOR CO.

3. Remove the spark plugs.

Using a 16mm plug wrench, remove the 8 spark plugs.

4. Check cylinder compression pressure.
 1. Insert a compression gauge into the spark plug hole.
 2. Fully open the throttle.
 3. Crank the engine over 7 times to measure compression pressure.

NOTE: Always use a fully charged battery to obtain engine speed of 250 RPM or more.

4. Repeat step 1) through 3) for each cylinder.

NOTE: This measurement must be done in as short a time as possible.

Compression pressure :

1,078kPa (11.0kg/cm² , 156psi)

Minimum pressure :

931kPa (9.5kg/cm² , 135psi)

Difference between each cylinder :

98kPa (1.0kg/cm² , 14psi) or less

5. If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat step 1) through 3) for cylinders with low compression.
 - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
 - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.
5. Reinstall the spark plugs.
6. Install the ignition coils and ignition connectors.

TROUBLESHOOTING

Symptom	Suspect area	Remedy
Engine misfire with abnormal internal lower engine noises.	Worn crankshaft bearings. Loose or damaged engine drive plate.	Replace the crankshaft and bearings as required. Repair or replace the drive plate as required.
	Worn piston rings. (Oil consumption may or may not cause the engine to misfire.)	Inspect the cylinder for a loss of compression. Repair or replace as required.
	Worn crankshaft thrust bearings	Replace the crankshaft and bearings as required.
	Stuck valves. (Carbon buildup on the valve stem)	Repair or replace as required.
	Excessive worn or mis-aligned timing chain.	Replace the timing chain and sprocket as required.

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2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

Engine misfire with abnormal valve train noise.	Worn camshaft lobes.	Replace the camshaft and valve lifters.
	HLA sponge	Run the engine at 2500 ~ 3000 RPM within 15 minutes. If it doesn't disappear, refer to <u>CYLINDER HEAD ASSEMBLY (G8BA - GSL 4.6)</u> .
Engine misfire with coolant consumption.	- Faulty cylinder head gasket and/or cranking or other damage to the cylinder head and engine block cooling system. - Coolant consumption may or may not cause the engine to overheat.	- Inspect the cylinder head and engine block for damage to the coolant passages and/or a faulty head gasket. - Repair or replace as required.
Engine misfire with excessive oil consumption.	Worn valves, guides and/or valve stem oil seals.	Repair or replace as required.
	Worn piston rings. (Oil consumption may or may not cause the engine to misfire)	- Inspect the cylinder for a loss of compression. - Repair or replace as required.
Engine noise on start-up, but only lasting a few seconds.	Incorrect oil viscosity.	- Drain the oil. - Install the correct viscosity oil.
	Worn crankshaft thrust bearing.	- Inspect the thrust bearing and crankshaft. - Repair or replace as required.
Upper engine noise, regardless of engine speed.	Low oil pressure.	Repair or replace as required.
	Broken valve spring.	Replace the valve spring.
	Worn or dirty valve lifters.	Replace the valve lifters.
	Stretched or broken timing chain and/or damaged sprocket teeth.	Replace the timing chain and sprocket-s.
	Worn timing chain tensioner, if applicable.	Replace the timing chain tensioner as required.
	Worn camshaft lobes.	- Inspect the camshaft lobes. - Replace the timing camshaft and valve lifters as required.
	Worn valve guides or valve stems.	Inspect the valves and valve guides, then repair as required.
	Stuck valves. Carbon on the valve stem or valve seat may cause the valve to stay open.	Inspect the valves and valve guides, then repair as required.
	Worn drive belt, idler, tensioner and bearing.	Replace as required.
	Low oil pressure.	Repair as required.
	Loose or damaged drive plate.	Repair or replace the drive plate.
		Inspect the oil pan.

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2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

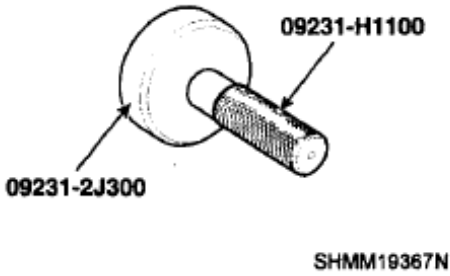
Lower engine noise, regardless of engine speed.	Damaged oil pan, contacting the oil pump screen.	- Inspect the oil pump screen. - Repair or replace as required.
	Oil pump screen loose, damaged or restricted.	- Inspect the oil pump screen. - Repair or replace as required.
	Excessive piston-to-cylinder bore clearance.	- Inspect the piston, piston pin and cylinder bore. - Repair as required.
	Excessive piston pin-to-piston clearance.	- Inspect the piston, piston pin and the connecting rod. - Repair or replace as required.
	Excessive connecting rod bearing clearance	Inspect the following components and repair as required. - The connecting rod bearings. - The connecting rods. - The crankshaft pin journals.
	Excessive crankshaft bearing clearance.	Inspect the following components, and repair as required. - The crankshaft bearings. - The crankshaft main journals. - The cylinder block.
	Incorrect piston, piston pin and connecting rod installation	- Verify the piston pins and connecting rods are installed correctly. - Repair as required.
Engine noise under load.	Low oil pressure	Repair or replace as required.
	Excessive connecting rod bearing clearance.	Inspect the following components and repair as required: - The connecting rod bearings. - The connecting rods. - The crankshaft.
	Excessive crankshaft bearing clearance.	Inspect the following components, and repair as required. - The crankshaft bearings. - The crankshaft main journals. - The cylinder block.
		Remove spark plugs and check for fluid.

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2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

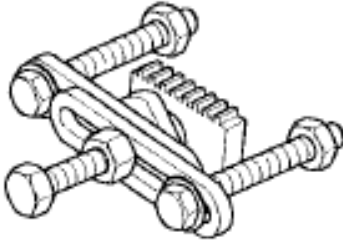
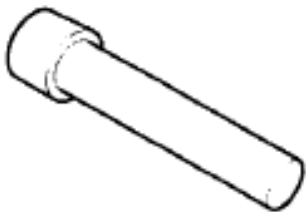
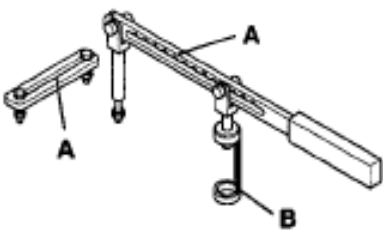
Engine will not crank- crankshaft will not rotate.	Hydraulically locked cylinder. • Coolant/antifreeze in cylinder. • Oil in cylinder. • Fuel in cylinder.	• Inspect for broken head gasket. • Inspect for cracked engine block or cylinder head. • Inspect for a sticking fuel injector and/or leaking fuel regulator.
	Broken timing chain and/or timing chain and/or timing chain gears.	• Inspect timing chain and gears. • Repair as required.
	Material in cylinder. • Broken valve • Piston material • Foreign material	• Inspect cylinder for damaged components and/or foreign materials. • Repair or replace as required.
	Seized crankshaft or connecting rod bearings.	• Inspect crankshaft and connecting rod bearing. • Repair as required.
	Bent or broken connecting rod.	• Inspect connecting rods. • Repair as required.
	Broken crankshaft.	• Inspect crankshaft. • Repair as required.

SPECIAL SERVICE TOOLS

Tool (Number and name)	Illustration	Use
Crankshaft front oil seal installer (09231-2J300) (09231-H1100)		Installation of the front oil seal
Flywheel stopper (09231-2B100)		Removal and installation of the flywheel and crankshaft pulley

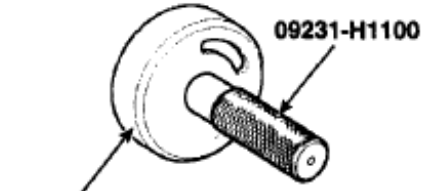
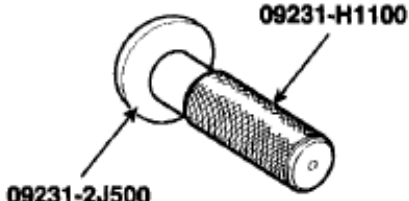
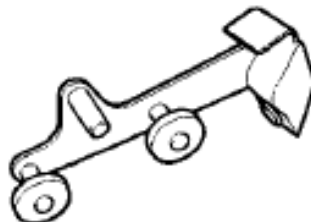
2010 Hyundai Genesis 3.8

2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

	 SHDEM6201D	
Torque angle adapter (09221-4A000)	 LCAC030A	Installation of bolts & nuts needing an angular method
Valve stem seal installer (09222-28200)	 SHMM19368N	Installation of the valve stem seal
Valve spring compressor & holder (09222-3K000) (09222-3C300)	 ECRF003A	Removal and installation of the intake or exhaust valves A: 09222-3K000 B : 09222-3C300 (holder)
Crankshaft rear oil seal installer (09231-2J400) 09231-H1100		Installation of the crankshaft rear oil seal

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2010 ENGINE General Information (Engine (G8BA - GSL 4.6)) - Genesis

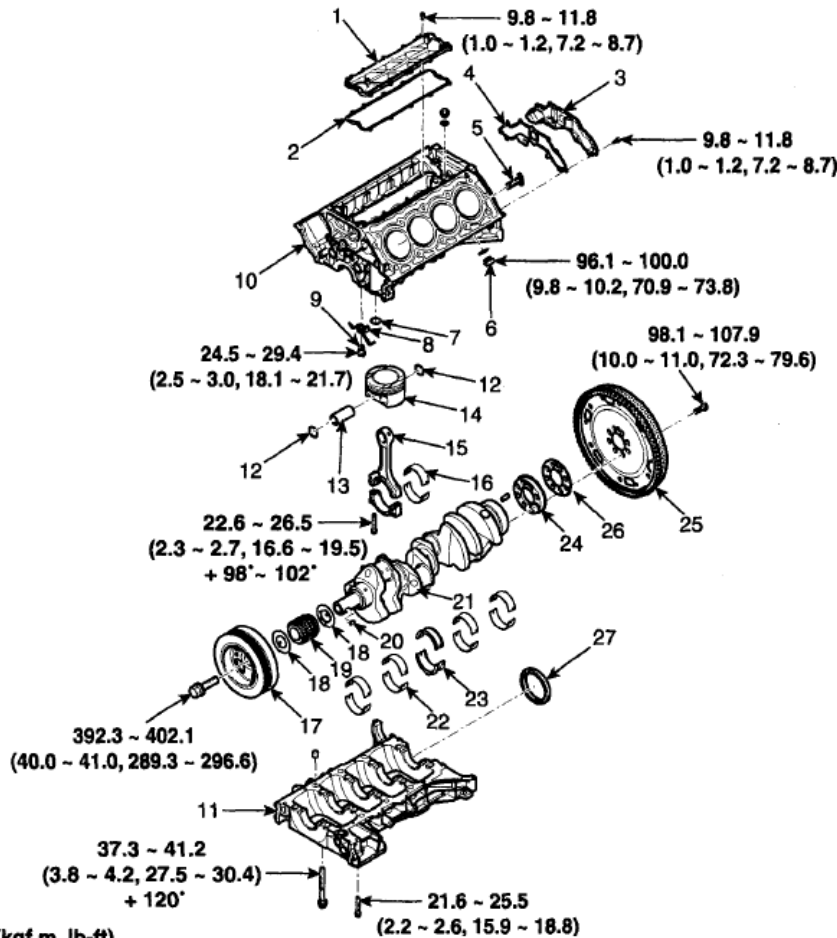
	 09231-2J400 09231-H1100 SHMM19369N	
Oil pan remover (09215-3C000)	 ACJF125A	Removal of oil pan
Oil seal installer (09231-2J500) (09231-H1100)	 09231-2J500 09231-H1100 SHMM19370N	Installation of the cylinder head cover oil seal & timing chain upper cover oil seal.
Timing chain locking tool (09231-2J600)	 SHMM19371N	Holds the timing chain with timing chain guide & timing chain tensioner arm during installation.

2010 ENGINE

Cylinder Block (Engine (G8BA - GSL 4.6)) - Genesis

CYLINDER BLOCK

COMPONENTS



SBHM19307N

- | | | |
|-------------------------------------|------------------------------|------------------------------------|
| 1. Cylinder block bank cover | 10. Cylinder block | 19. Crankshaft sprocket |
| 2. Cylinder block bank cover gasket | 11. Lower crankcase assembly | 20. Key |
| 3. Cylinder block rear cover | 12. Snap ring | 21. Crankshaft |
| 4. Cylinder block rear cover gasket | 13. Piston pin | 22. Crankshaft main bearing |
| 5. Separator | 14. Piston | 23. Crankshaft center main bearing |
| 6. Drain plug | 15. Connecting rod | 24. Crankshaft adapter |
| 7. O-ring | 16. Connecting rod bearing | 25. Drive plate |
| 8. Piston oil jet | 17. Crankshaft pulley | 26. Adapter plate |
| 9. Check valve | 18. Friction plate | 27. Crankshaft rear oil seal |

Fig. 1: Exploded View Of Cylinder Block

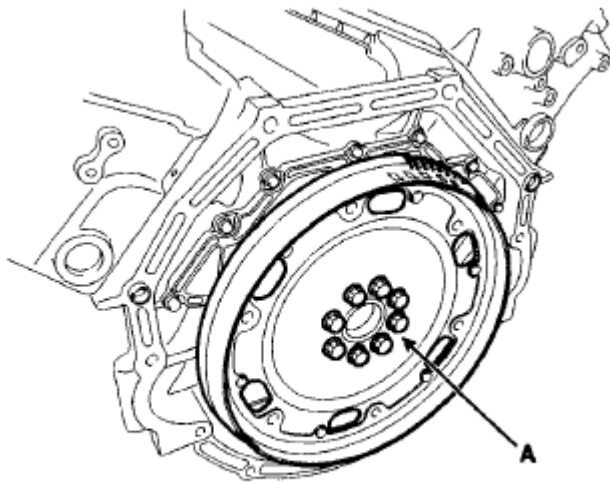
Courtesy of HYUNDAI MOTOR CO.

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.
 - Inspect the timing chain before removing the cylinder head.
 - Turn the crankshaft pulley so that the No. 1 piston is at top dead center.
 - Engine removal is required for this procedure.

1. Remove the engine assembly from the vehicle. (Refer to ENGINE AND TRANSAXLE ASSEMBLY)
2. Install the engine to engine stand for disassembly.
3. Remove the intake manifold and exhaust manifold. (Refer to INTAKE AND EXHAUST SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS)
4. Remove the cylinder head. (Refer to CYLINDER HEAD ASSEMBLY (ENGINE (G8BA - GSL 4.6)))
5. Remove the timing chain. (Refer to TIMING SYSTEM (ENGINE (G8BA - GSL 4.6)))
6. Remove the water temperature control assembly. (Refer to COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS)
7. Remove the oil pump. (Refer to LUBRICATION SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS)
8. Remove the adapter plate (A) and the drive plate (B).



SHMM10109N

Fig. 2: Identifying Drive Plate
Courtesy of HYUNDAI MOTOR CO.

9. Remove the crankshaft adapter (A).

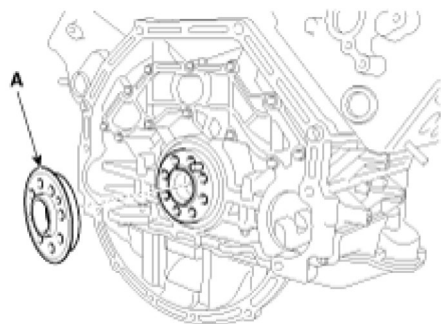
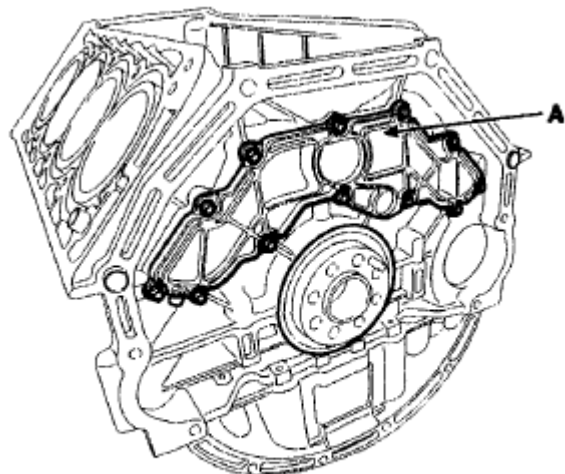


Fig. 3: Identifying Crankshaft Adapter
Courtesy of HYUNDAI MOTOR CO.

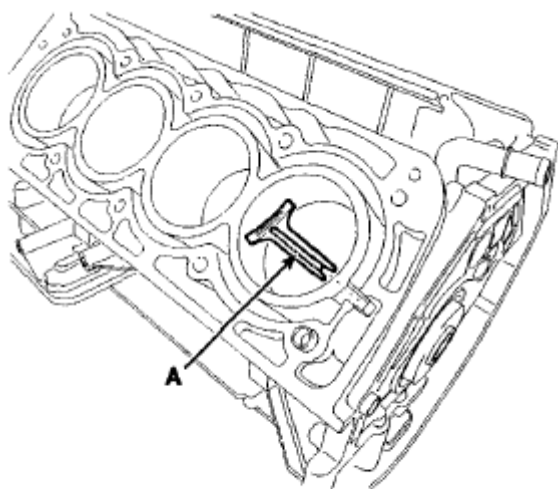
10. Remove the cylinder block rear cover (A).



SHMM19113N

Fig. 4: Identifying Cylinder Block Rear Cover
Courtesy of HYUNDAI MOTOR CO.

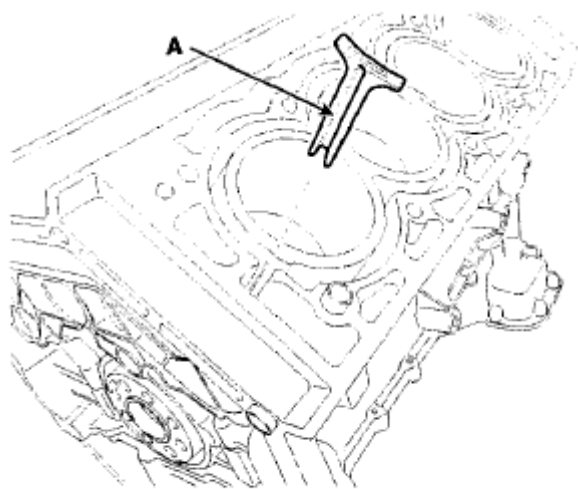
11. Remove the separator (A).



SHMM19110N

Fig. 5: Identifying Separator

Courtesy of HYUNDAI MOTOR CO.



SHMM19111N

Fig. 6: Identifying Separator

Courtesy of HYUNDAI MOTOR CO.

12. Remove the cylinder block bank cover (A) and the gasket (B).

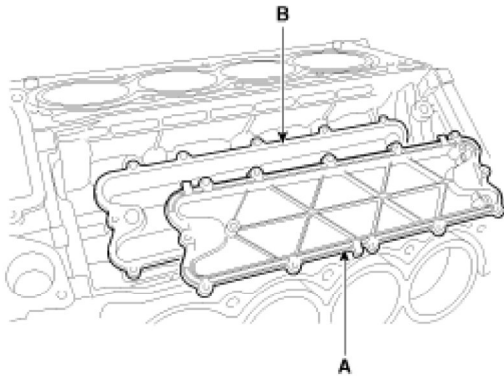


Fig. 7: Identifying Cylinder Block Bank Cover & Gasket
Courtesy of HYUNDAI MOTOR CO.

13. Check the connecting rod end play.
14. Check the connecting rod cap oil clearance.
15. Remove the piston and connecting rod assemblies.
 1. Using a ridge reamer, remove all the carbon from the top of the cylinder.
 2. Remove the connecting rod cap (A).

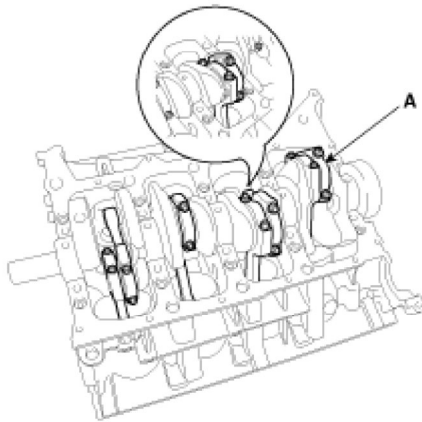


Fig. 8: Identifying Connecting Rod Cap
Courtesy of HYUNDAI MOTOR CO.

3. 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.**

16. Check the main bearing oil clearance.
17. Check the crankshaft end play.
18. Remove the lower crankcase assembly (A).

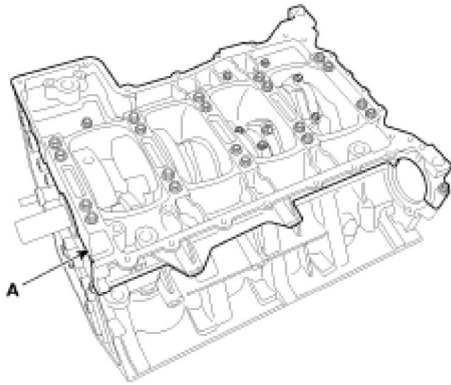
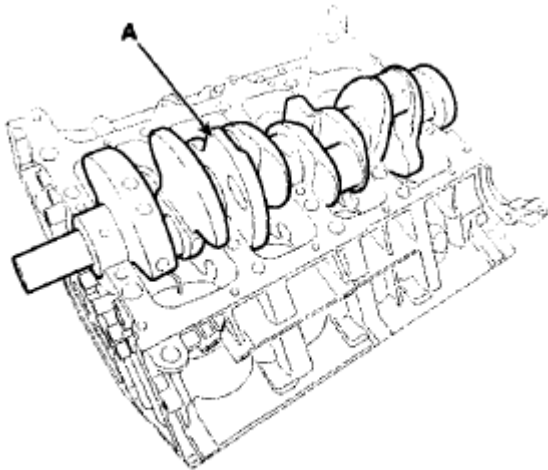


Fig. 9: Identifying Lower Crankcase Assembly
Courtesy of HYUNDAI MOTOR CO.

19. Lift the crankshaft (A) out of engine, being careful not to damage journals.



SHMM19117N

Fig. 10: Lifting Crankshaft Out Of Engine
Courtesy of HYUNDAI MOTOR CO.

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

20. 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.

21. Remove the 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.

22. Disconnect connecting rod from piston.
 1. Remove the snap rings from piston.
 2. Remove the piston pin.
 3. Remove the connecting rod and the piston.

INSPECTION

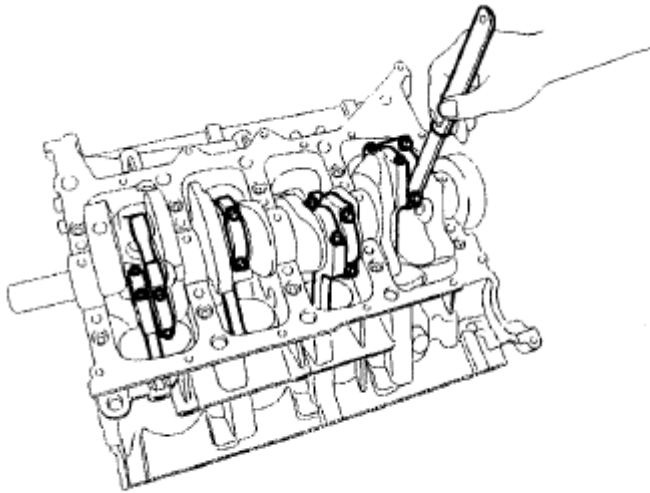
Connecting Rod And Crankshaft

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:

0.10 ~ 0.28mm (0.0039 ~ 0.0110m)



SHMM19317N

Fig. 11: Measuring End Play
Courtesy of HYUNDAI MOTOR CO.

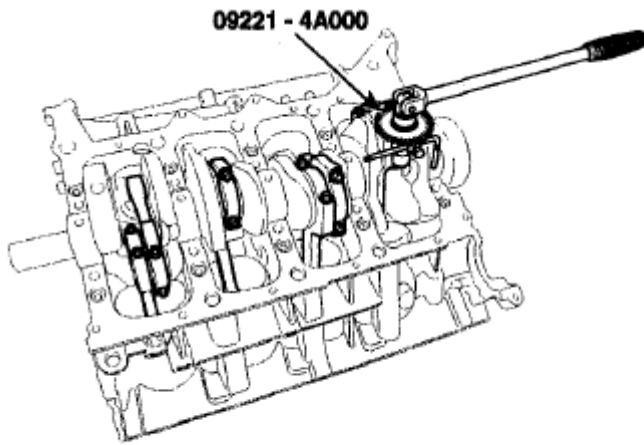
1. If out-of-tolerance, install a new connecting rod.
2. If still out-of-tolerance, replace the crankshaft.
2. Check the connecting rod bearing oil clearance.
 1. Check the match marks on the connecting rod and cap are aligned to ensure correct reassembly.
 2. Remove 2 connecting rod cap bolts.
 3. Remove 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:

22.6 ~ 26.5Nm (2.3 ~ 2.7kgf.m, 16.6 ~ 19.5lb-ft) + 98 ~ 102°

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



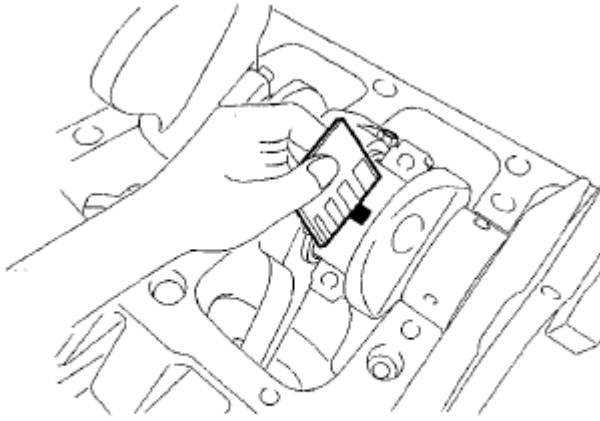
SHMM18318N

Fig. 12: Tightening Crankshaft Bearing Bolts
Courtesy of HYUNDAI MOTOR CO.

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

Standard oil clearance:

0.018 ~ 0.036mm (0.0007 ~ 0.0014in)



SHMM19130N

Fig. 13: Measuring Plastigage Widest Point
Courtesy of HYUNDAI MOTOR CO.

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

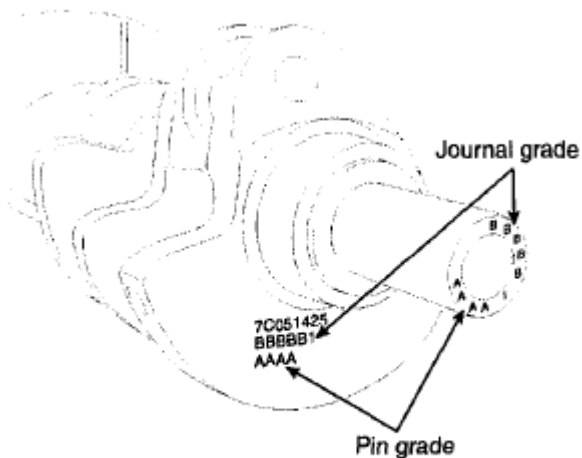


Fig. 14: Identifying Connecting Rod Mark Location
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Connecting Rod

Class	Mark	Connecting Rod Big-end Inner Diameter
a	A	55.000 ~ 55.006mm (2.1654 ~ 2.1656in)
b	B	55.006 ~ 55.012mm (2.1656 ~ 2.1658in)
c	C	55.012 ~ 55.018mm (2.1658 ~ 2.1661in)

Crankshaft Pin Mark Location



SHMM19131N

Fig. 15: Identifying Crankshaft Pin Mark Location
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Crankshaft Pin Journal

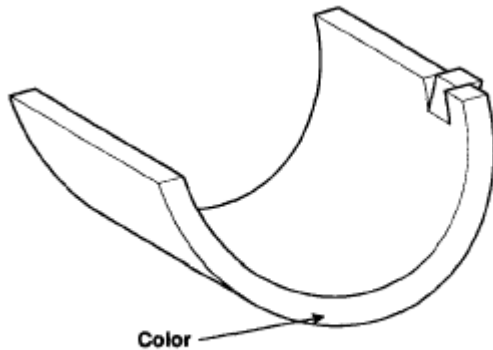
Class	Mark	Crankshaft Pin Journal outer Diameter

2010 Hyundai Genesis 3.8

2010 ENGINE Cylinder Block (Engine (G8BA - GSL 4.6)) - Genesis

I	A	51.994 ~ 52.000mm (2.0470 ~ 2.0472in)
II	B	51.988 ~ 51.994mm (2.0468 ~ 2.0470in)
III	C	51.982 ~ 51.988mm (2.0465 ~ 2.0468in)

Connecting Rod Bearing Mark Location



ECRF021A

Fig. 16: Identifying Connecting Rod Bearing Mark Location
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Connecting Rod Bearing

Class	Color	Connecting Rod Bearing Thickness
A	Blue	1.500 ~ 1.503mm (0.0591 ~ 0.0592in)
B	Black	1.497 ~ 1.500mm (0.0589 ~ 0.0591 in)
C	None	1.494 ~ 1.497mm (0.0588 ~ 0.0589in)
D	Green	1.491 ~ 1.494mm (0.0587 ~ 0.0588in)
E	Yellow	1.488 ~ 1.491mm (0.0586 ~ 0.0587in)

11. Select the bearing by using selection table.

CONNECTING ROD BEARING SELECTION

Connecting Rod Bearing		Connecting Rod Mark		
		a (A)	b (B)	c (C)
Crank shaft pin journal mark	I (A)	E (Yellow)	D (Green)	C (None)
	II (B)	D (Green)	C (None)	B (Black)
	III (C)	C (None)	B (Black)	A (Blue)

3. Check the 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 projections (A) and the front mark (B) of the rod and the cap.

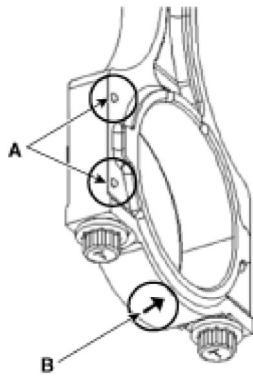


Fig. 17: Identifying Connecting Rod Projections & Front Mark
Courtesy of HYUNDAI MOTOR CO.

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 :

0.05mm / 100mm (0.0020 in/3.94 in) or less

Allowable twist of connecting rod :

0.1mm / 100mm (0.0039 in/3.94 in) or less

NOTE: **The unevenness between the rod and the cap is not allowed when assembling without the bearings.**

4. Check the crankshaft bearing oil clearance.
 1. To check main bearing-to-journal oil clearance, remove the lower crankcase assembly 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 the lower crankcase assembly, and then torque the bolts.

Tightening torque:

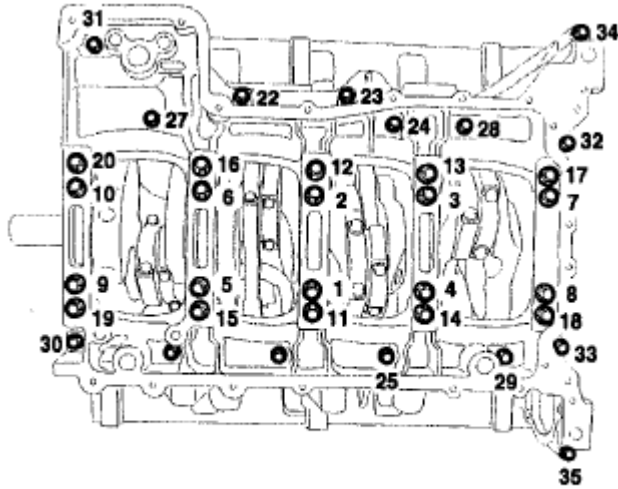
Main bearing cap bolts (1 ~ 20)

37.3 ~ 41.2 N.m (3.8 ~ 4.2 kgf.m, 27.5 ~ 30.4 lb-ft) + 120°

Flange bolts (21 ~ 35)

21.6 - 25.5 N.m (2.2 - 2.6 kgf.m, 15.9 ~ 18.8 lb-ft)

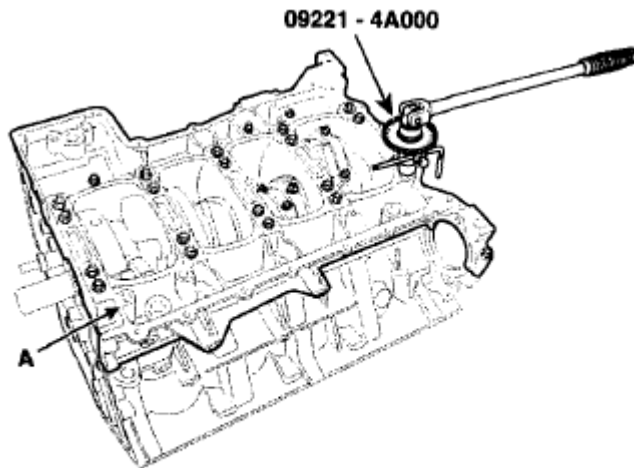
NOTE: Do not turn the crankshaft.



SHMM19115N

Fig. 18: Identifying Main Bearing Cap Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

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



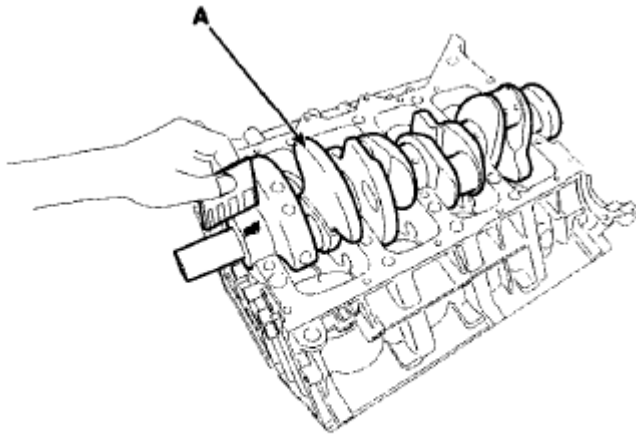
SHMM19324N

Fig. 19: Tightening Main Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

5. Remove the lower crankcase assembly and bearing again, and measure the widest part of the plastigage.

Standard oil clearance:

0.004 ~ 0.022mm (0.0002 ~ 0.0009in)



SHMM19322N

Fig. 20: Measuring Widest Part Of Plastigage
Courtesy of HYUNDAI MOTOR CO.

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.

Cylinder block crankshaft journal 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.

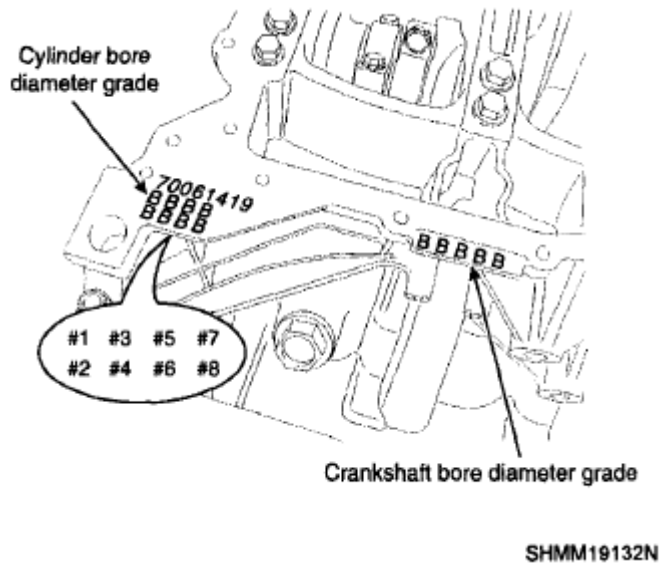
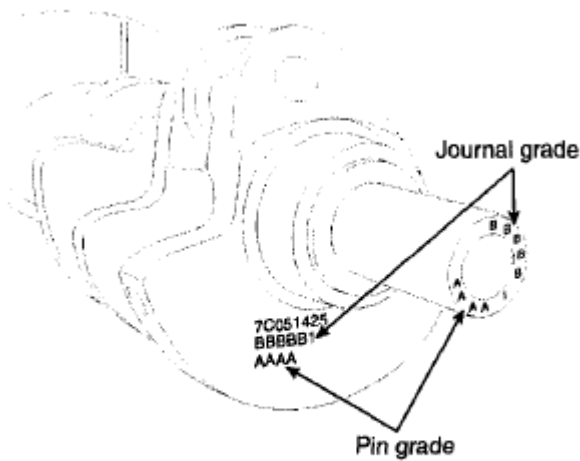


Fig. 21: Identifying Cylinder Bore Diameter Grade
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Cylinder Block Crankshaft Journal Bore

Class	Mark	Cylinder Block Crankshaft journal Bore Inner Diameter
a	A	70.000 ~ 70.006mm (2.7559 ~ 2.7561 in)
b	B	70.006 ~ 70.012mm (2.7561 ~ 2.7564in)
c	C	70.012 ~ 70.018mm (2.7564 ~ 2.7566in)

Crankshaft Main Journal Mark Location



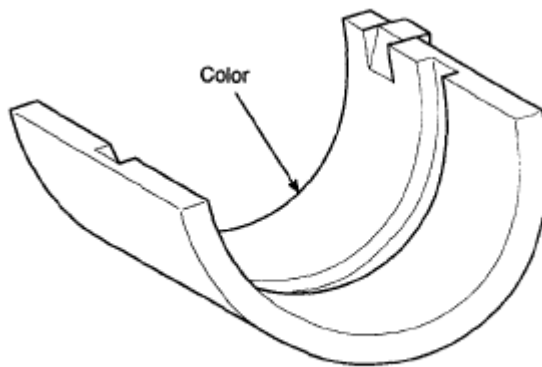
SHMM19131N

Fig. 22: Identifying Crankshaft Main Journal Mark Location
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Crankshaft Main Journal

Class	Mark	Crankshaft Main Journal outer Diameter
I	A	64.994 ~ 65.000mm (2.5588 ~ 2.5591 in)
II	B	64.988 ~ 64.994mm (2.5586 ~ 2.5588in)
III	C	64.982 ~ 64.988mm (2.5583 ~ 2.5586in)

Crankshaft Main Bearing Mark Location



ECRF022A

Fig. 23: Identifying Crankshaft Main Bearing Mark Location
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Crankshaft Main Journal

2010 Hyundai Genesis 3.8

2010 ENGINE Cylinder Block (Engine (G8BA - GSL 4.6)) - Genesis

Class	Color	Crankshaft Main Bearing Thickness
A	Blue	2.507 ~ 2.510mm (0.0987 ~ 0.0988in)
B	Black	2.504 ~ 2.507mm (0.0986 ~ 0.0987in)
C	None	2.501 ~ 2.504mm (0.0985 ~ 0.0986in)
D	Green	2.498 ~ 2.501mm (0.0983 ~ 0.0985in)
E	Yellow	2.495 ~ 2.498mm (0.0982 ~ 0.0983in)

8. Select the bearing by using selection table.

CRANKSHAFT MAIN BEARING SELECTION

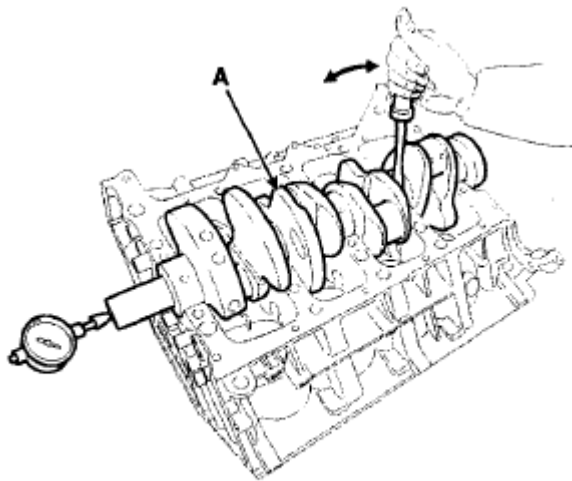
Crankshaft Main Bearing		Cylinder Block Crankshaft Journal Bore Mark		
		A (a)	B (b)	C (c)
Crank shaft main journal mark	A (I)	E (Yellow)	D (Green)	C (None)
	B (II)	D (Green)	C (None)	B (Black)
	C (III)	C (None)	B (Black)	A (Blue)

5. 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 ~ 0.28mm (0.0039 ~ 0.0110in)



SHMM19364N

Fig. 24: Prying Crankshaft Back And Forth
Courtesy of HYUNDAI MOTOR CO.

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

Thrust bearing thickness (center bearing)

2.36 ~ 2.40mm (0.0929 ~ 0.0945in)

6. Inspect main journals and crank pins.

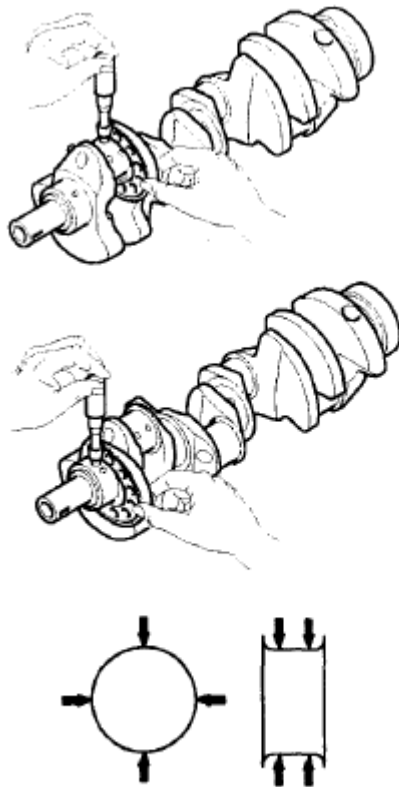
Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

64.982 ~ 65.000mm (2.5583 ~ 2.5591 in)

Crank pin diameter:

51.982 ~ 52.000mm (2.0465 ~ 2.0472in)



SHMM19354N

Fig. 25: Measuring Diameter Of Each Main Journal And Crank Pin
Courtesy of HYUNDAI MOTOR CO.

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 :

0.05mm/100mm (0.0020 in/3.94 in) or less

Allowable twist of connecting rod :

0.1mm/100mm (0.0039 in/3.94 in) or less

Cylinder Block

1. Remove the gasket material.

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

2. Clean the cylinder block.

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

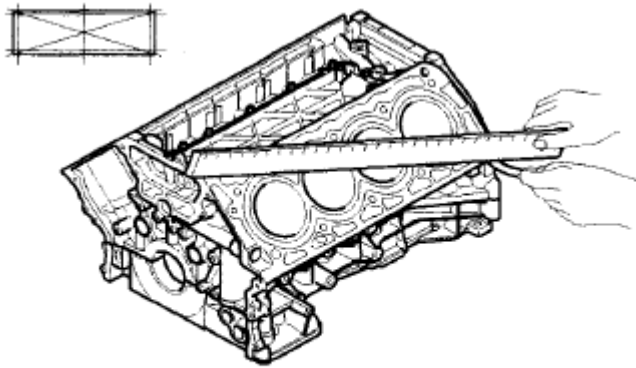
3. Inspect the top surface of the cylinder block for flatness.

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 0.05mm (0.0020 in),

Less than 0.02mm (0.0008in) /150 x 150



SHMM19355N

Fig. 26: Measuring Surface Contacting Cylinder Head Gasket For Warpage
Courtesy of HYUNDAI MOTOR CO.

4. Inspect cylinder bore diameter.

Visually check the cylinder for vertical scratches.

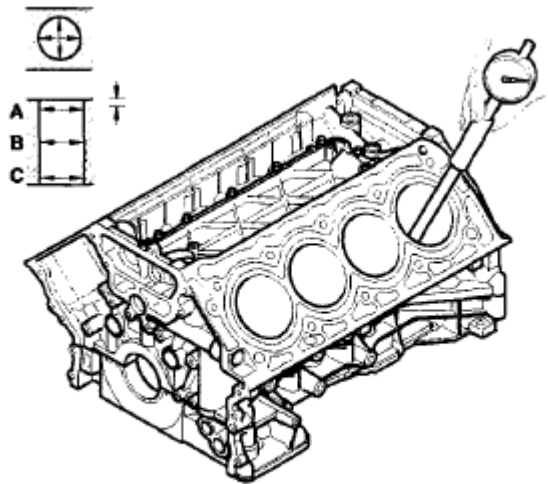
If deep scratches are present, replace the cylinder block

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

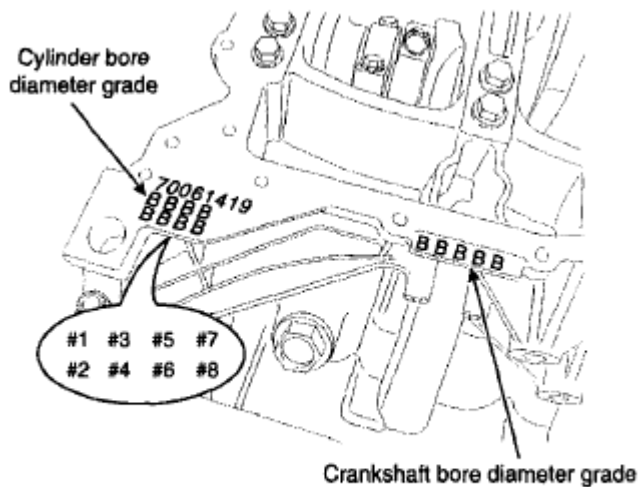
92.000 ~ 92.030mm (3.6220 ~ 3.6232in)



SHMM19356N

Fig. 27: Measuring Cylinder Bore Diameter Position In Thrust And Axial
Courtesy of HYUNDAI MOTOR CO.

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



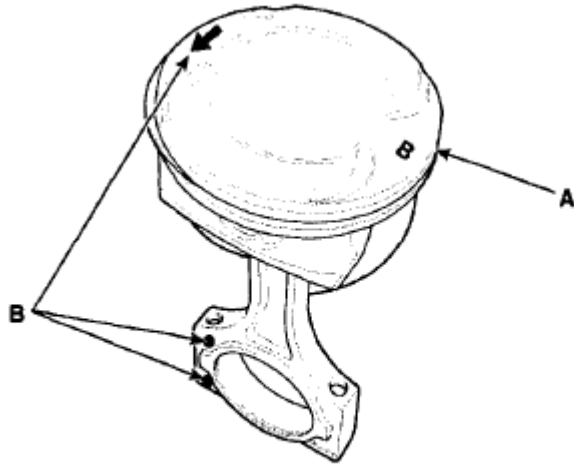
SHMM19132N

Fig. 28: Identifying Cylinder Bore Diameter Grade
Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Cylinder Bore Size

Class	Size code	Cylinder Bore Inner Diameter
A	A	92.000 ~ 92.010mm (3.6220 ~ 3.6224in)
B	B	92.010 ~ 92.020mm (3.6224 ~ 3.6228in)
C	C	92.020 ~ 92.030mm (3.6228 ~ 3.6232in)

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



SHMM19133N

Fig. 29: Identifying Piston Size Code And Front Mark On Piston Top Face
 Courtesy of HYUNDAI MOTOR CO.

Discrimination Of Piston Outer Diameter

Class	Size code	Piston Outer Diameter
A	A	91.945 ~ 91.955mm (3.6199 ~ 3.6203in)
B	B	91.955 ~ 91.965mm (3.6203 ~ 3.6207in)
C	C	91.965 ~ 91.975mm (3.6207 ~ 3.6211in)

8. Select the piston related to cylinder bore class.

Clearance: 0.045 ~ 0.065mm (0.0018 ~ 0.0026in)

Piston And Rings

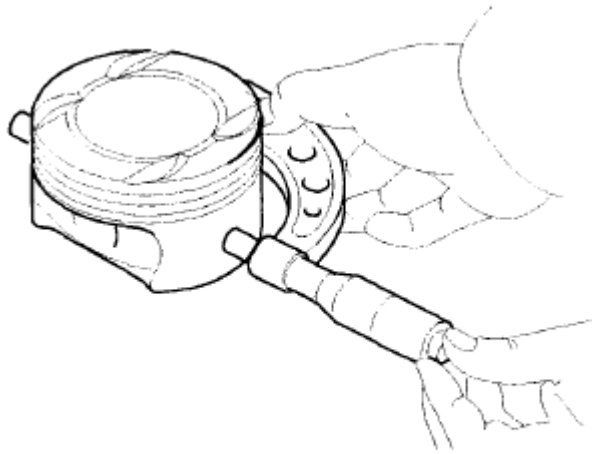
1. Clean piston
 1. Using a gasket scraper, remove the carbon from the piston top.
 2. Using a groove cleaning tool, clean the piston ring grooves.
 3. Using solvent and a brush, thoroughly clean the piston.

NOTE: Do not use a wire brush.

2. The standard measurement of the piston outside diameter is taken 15 mm (0.5906 in) from the bottom of the piston.

Standard diameter

91.945 ~ 91.975mm (3.6199 ~ 3.6211 in)



SHMM19357N

Fig. 30: Measuring Of Piston Outside Diameter
Courtesy of HYUNDAI MOTOR CO.

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

Piston-to-cylinder clearance :

0.045 ~ 0.065mm (0.0018 ~ 0.0026in)

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 groove width

No. 1 : 1.23 ~ 1.25mm (0.0484 ~ 0.0492in)

No. 2 : 1.23 ~ 1.25mm (0.0484 ~ 0.0492in)

Oil ring : 2.01 ~ 2.03mm (0.0791 ~ 0.0799in)

Piston ring width

No. 1 : 1.17 ~ 1.19mm (0.0461 ~ 0.0469in)

No. 2 : 1.17 ~ 1.19mm (0.0461 ~ 0.0469in)

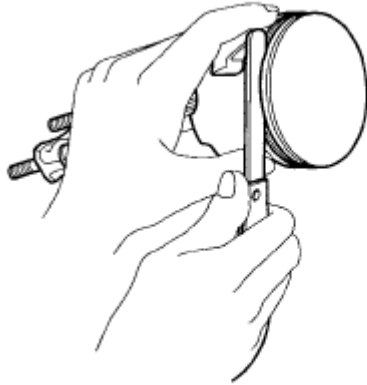
Oil ring : 1.88 ~ 1.95mm (0.0740 ~ 0.0768in)

Piston ring side clearance

No. 1 : 0.04 ~ 0.08mm (0.0016 ~ 0.0031in)

No. 2 : 0.04 ~ 0.08mm (0.0016 ~ 0.0031in)

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



ECKD001G

Fig. 31: Measuring Clearance Between Piston Ring And Wall Of Ring Groove
Courtesy of HYUNDAI MOTOR CO.

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

5. Inspect piston ring end gap.

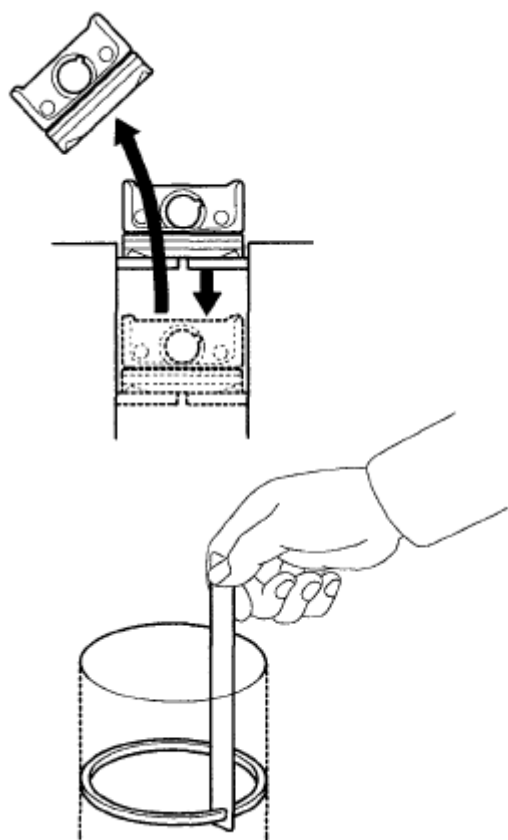
To measure the piston ring end gap, insert a piston ring into the cylinder bore. Position the ring at right angles to the cylinder wall by gently pressing it down with a piston. Measure the gap with a feeler gauge. If the gap exceeds the service limit, replace the piston ring. If the gap is too large,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

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

No. 2 : 0.37 ~ 0.52mm (0.0146 ~ 0.0205in)

Oil ring : 0.20 ~ 0.70mm (0.0079 ~ 0.0276in)



ECKD001K

Fig. 32: Measuring Piston Ring End Gap
Courtesy of HYUNDAI MOTOR CO.

Piston Pins

1. Measure the diameter of the piston pin.

Piston pin outer diameter :

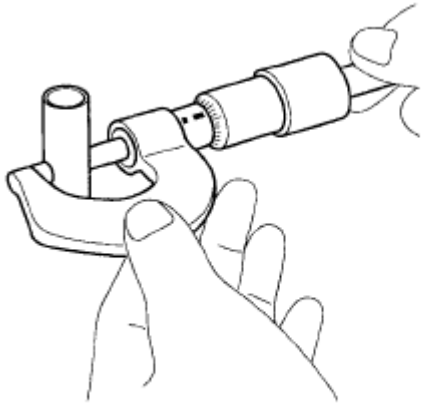
21.995 ~ 22.000mm (0.8659 ~ 0.8661in)

Piston pin hole inner diameter:

22.004 ~ 22.010mm (0.8663 ~ 0.8665in)

Connecting rod small end inner diameter :

22.007 ~ 22.018mm (0.8664 ~ 0.8668in)



ECKD001Z

Fig. 33: Measuring Diameter Of Piston Pin
Courtesy of HYUNDAI MOTOR CO.

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

Piston pin-to-piston clearance:

0.004 ~ 0.015mm (0.0002 ~ 0.0006in)

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

Piston pin-to-connecting rod interference :

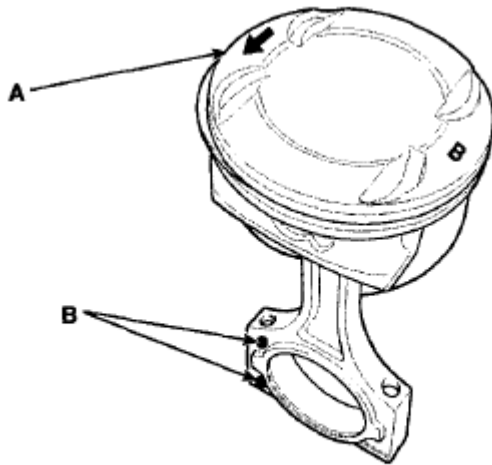
0.007 ~ 0.023mm (0.0003 ~ 0.0009in)

REASSEMBLY

NOTE:

- Thoroughly clean all parts to be 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 the piston and the connecting rod.
 1. Install the snap ring in one side of the piston pin hole.
 2. Align the piston front mark and the connecting rod front mark.



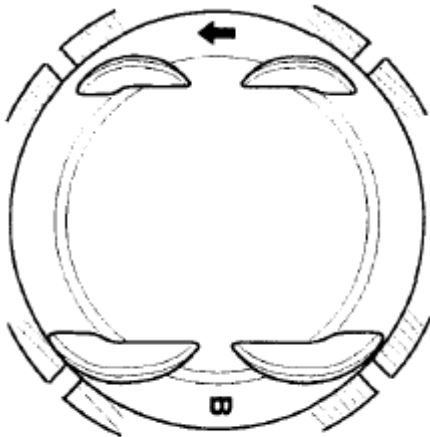
SHMM19347N

Fig. 34: Aligning Piston Front Mark And Connecting Rod Front Mark
Courtesy of HYUNDAI MOTOR CO.

3. Insert the piston pin into the piston pin hole and the small end bore of connecting rod.
4. Install the snap ring in the other side after inserting the piston pin.

NOTE: **Apply a sufficient amount of engine oil to outer surface of the piston, inner surface of piston pin hole and small end bore of the connecting rod before inserting the piston pin.**

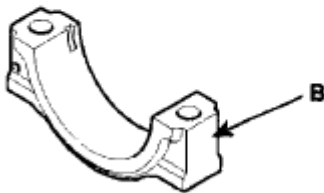
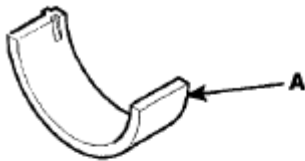
2. Install the piston rings.
 1. Install the oil ring spacer and 2 side rails by hand.
 2. Using a piston ring expander, install the 2 compression rings with the code mark facing upward.
 3. Position the piston rings so that the ring ends are as shown.



SHMM19346N

Fig. 35: Identifying Piston Rings Position
Courtesy of HYUNDAI MOTOR CO.

3. Install the 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).



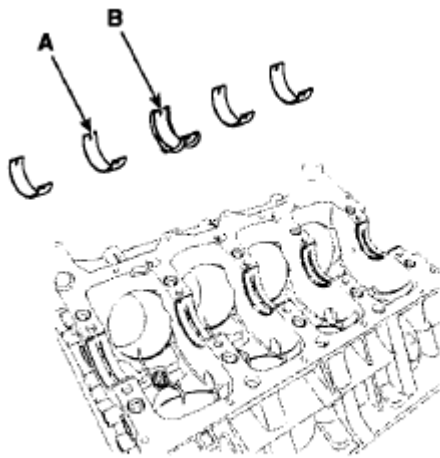
SHMM19356N

Fig. 36: Identifying Connecting Rod Cap With Bearing
Courtesy of HYUNDAI MOTOR CO.

4. Install the main bearings (A) (No. 1,2,4,5 journal) and the center bearings (B) (No. 3 journal).

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

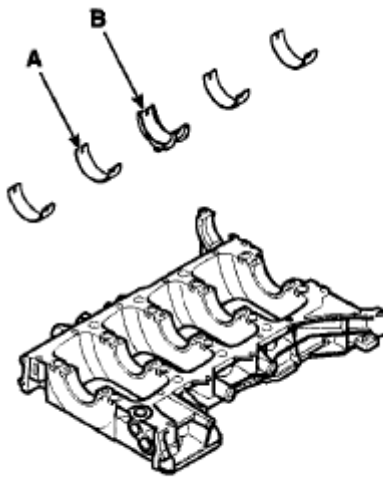
1. Align the bearing claw with the claw groove of the cylinder block, push in the 5 upper bearings.



SHMM19134N

Fig. 37: Aligning Bearing Claw With Claw Groove Of Cylinder Block
Courtesy of HYUNDAI MOTOR CO.

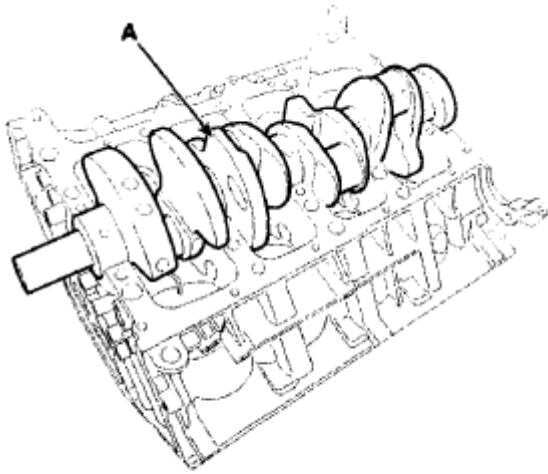
2. Align the bearing claw with the claw groove of the lower crankcase and push in the 5 lower bearings.



SHMM19365N

Fig. 38: Aligning Bearing Claw With Claw Groove Of Lower Crankcase
Courtesy of HYUNDAI MOTOR CO.

5. Place the crankshaft (A) on the cylinder block.



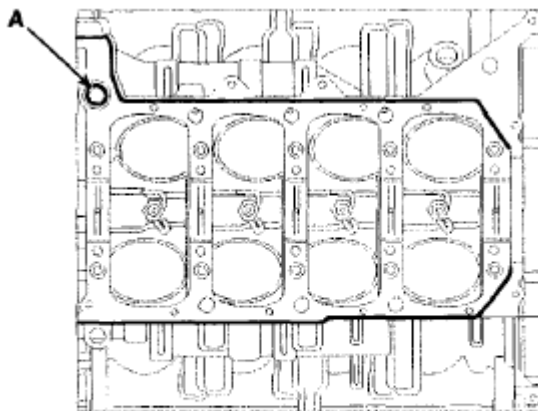
SHMM19117N

Fig. 39: Placing Crankshaft On Cylinder Block
Courtesy of HYUNDAI MOTOR CO.

6. Place the lower crankcase assembly on cylinder block.
 1. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
 2. Install the O-ring (A) to cylinder block.
 3. Before assembling the lower crankcase assembly, the liquid sealant LT 5900H or TB1217 should be applied on cylinder block bottom.

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

Bead width: 2.5mm (0.1in)



SHMM19368N

Fig. 40: Identifying O-Ring On Cylinder Block
Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Clean the sealing face before assembling two parts.
- Remove harmful foreign materials on the sealing face before applying sealant.
- When applying sealant gasket, sealant must not protrude into the inside of cylinder block.
- To prevent leakage of oil, apply sealant gasket to the inner threads of the bolt holes.

4. Install the lower crankcase assembly.

7. Install the lower crankcase assembly bolts.

1. Install and uniformly tighten the lower crankcase assembly bolts, in several passes, in the sequence shown.

Tightening torque

Main bearing cap bolts (1 ~ 20)

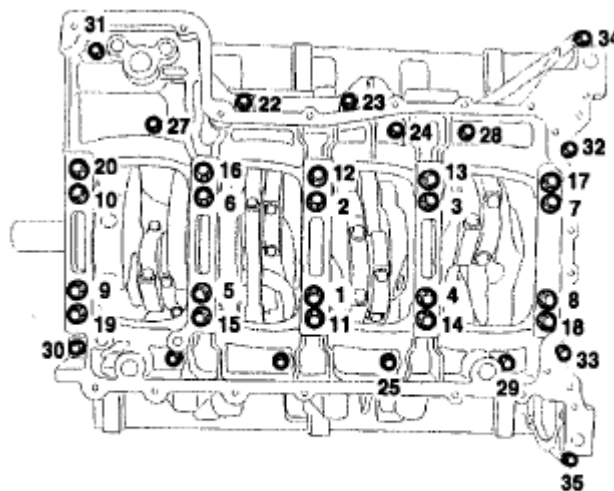
37.3 ~ 41.2 N.m (3.8 ~ 4.2 kgf.m, 27.5 ~ 30.4 lb-ft) + 120°

Flange bolts (21 ~ 35)

21.6 ~ 25.5 N.m (2.2 ~ 2.6 kgf.m, 15.9 ~ 18.8 lb-ft)

NOTE:

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

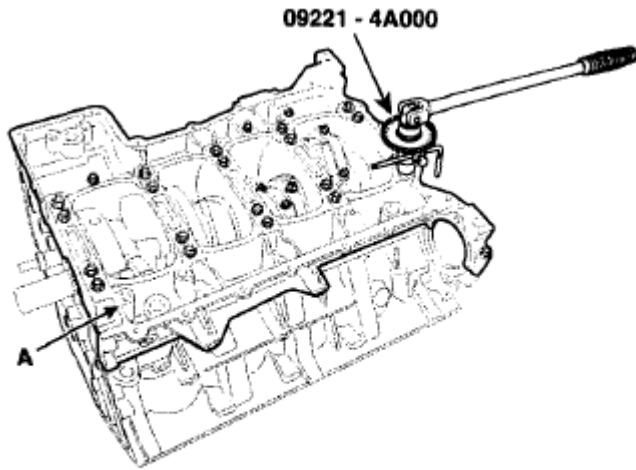


SHMM19115N

Fig. 41: Identifying Main Bearing Cap Bolts Tightening

Sequence**Courtesy of HYUNDAI MOTOR CO.**

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



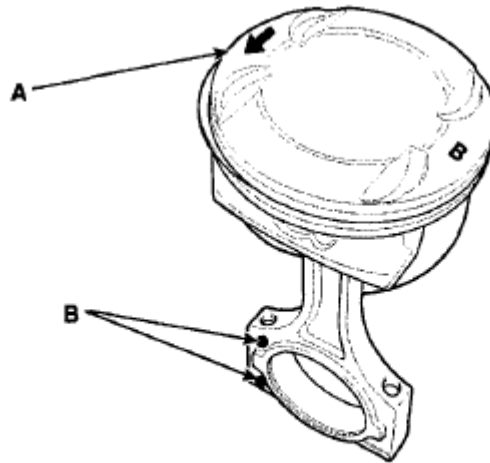
SHMM18324N

Fig. 42: Tightening Main Bearing Cap Bolts**Courtesy of HYUNDAI MOTOR CO.**

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

NOTE:

- Before installing the pistons, apply a coat of engine oil to the ring grooves and cylinder bores.
- The piston front mark (A) and the connecting rod front mark (B) must face the timing chain side of the engine.



SHMM19347N

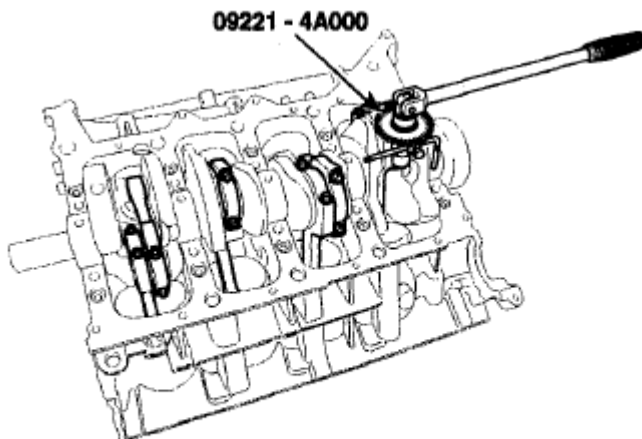
Fig. 43: Identifying Piston Installation Position
Courtesy of HYUNDAI MOTOR CO.

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 :

22.6 ~ 26.5Nm (2.3 ~ 2.7kgf.m, 16.6 ~ 19.5lb-ft) + 98 ~ 102°

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

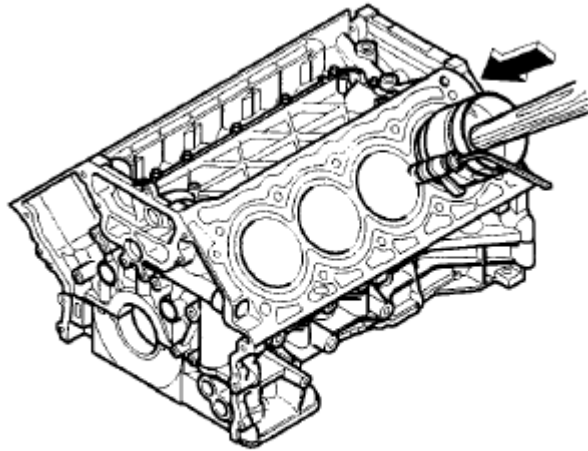


SHMM19318N

Fig. 44: Tightening Crankshaft Bearing Bolts
Courtesy of HYUNDAI MOTOR CO.

NOTE:

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



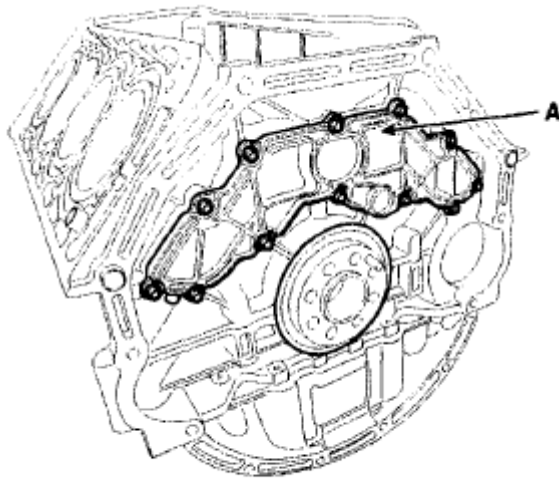
SHMM19374N

Fig. 45: Installing Piston To Cylinder Bore
Courtesy of HYUNDAI MOTOR CO.

10. Check the connecting rod end play.
11. Install the cylinder block rear cover (A) and a new gasket.

Tightening torque :

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19113N

Fig. 46: Identifying Cylinder Block Rear Cover
Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Clean the sealing face before assembling two parts.
- Remove harmful foreign materials on the sealing face before applying sealant.
- Before assembling oil drain cover, the liquid sealant LT 5900H or TB1217 should be applied to the 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.

12. Install the crankshaft adapter plate (A).

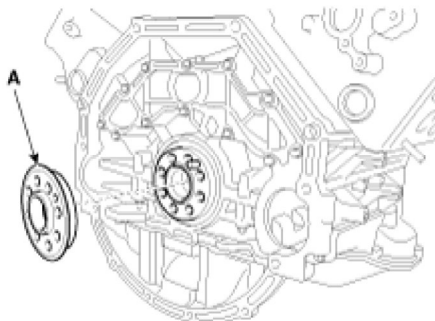
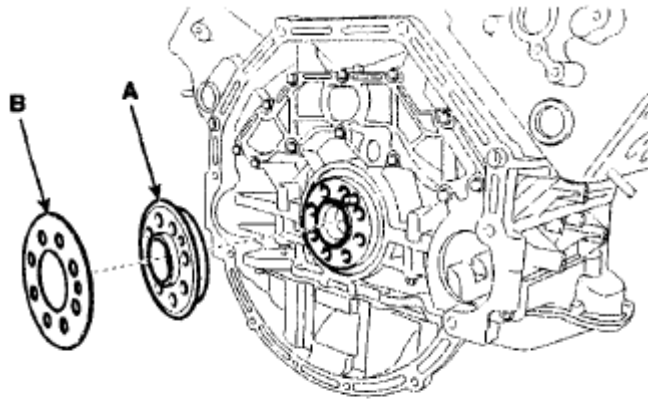


Fig. 47: Identifying Crankshaft Adapter Plate
Courtesy of HYUNDAI MOTOR CO.



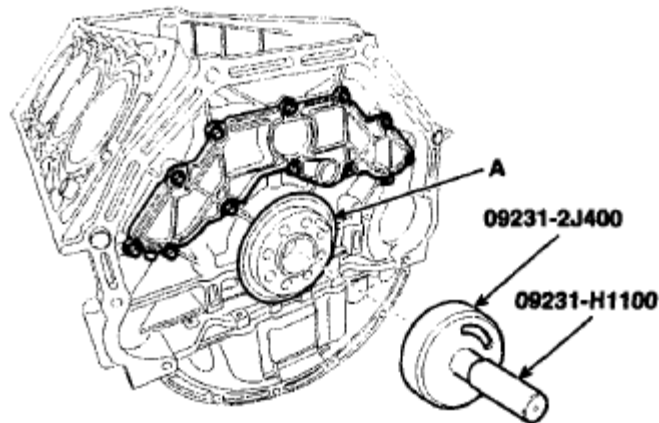
SHMM19159N

Fig. 48: Identifying Crankshaft Adapter Plate

Courtesy of HYUNDAI MOTOR CO.

13. Using the SST (09231-2J400, 09231-H1100) and a plastic hammer, tap in a new oil seal (A) until SST surface is flush with the cylinder block.

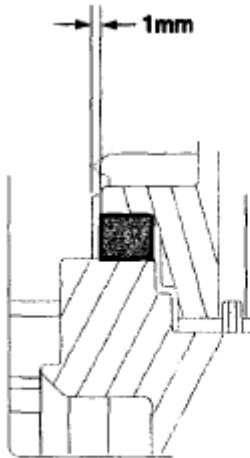
At this time, the depth of the oil seal (A) from the cylinder block surface is 1 mm (0.039in).



SHMM19319N

Fig. 49: Installing Oil Seal

Courtesy of HYUNDAI MOTOR CO.



SHMM19140N

Fig. 50: Identifying Oil Seal Gap
Courtesy of HYUNDAI MOTOR CO.

NOTE:

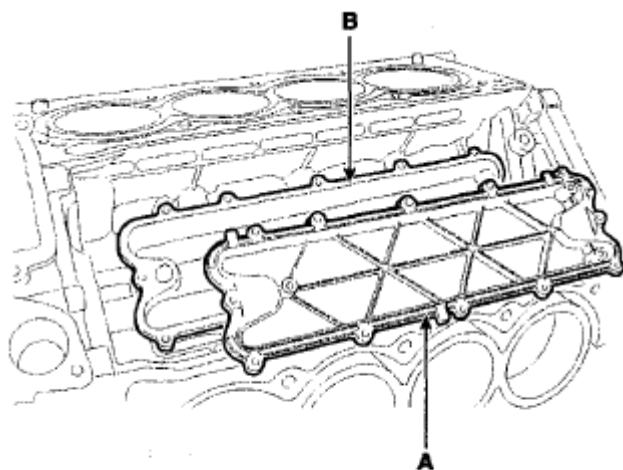
- Before assembling oil seal, the hardened sealant or injurious material located on the boundary area between cylinder block and lower crankcase must be removed.
- Apply engine oil to a new oil seal lip.
- When pressing oil seal, confirm to direction and take care not to damage oil seal.

14. Install the cylinder block bank cover (A) and a new gasket (B).

Tightening torque:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

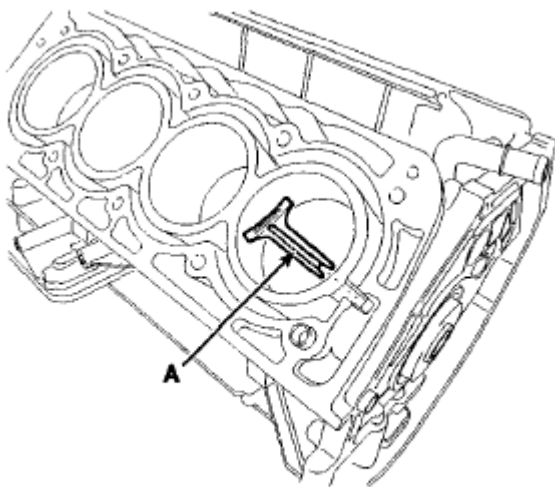
NOTE: The "F" mark of the gasket must be face the front of the engine.



SHMM19104N

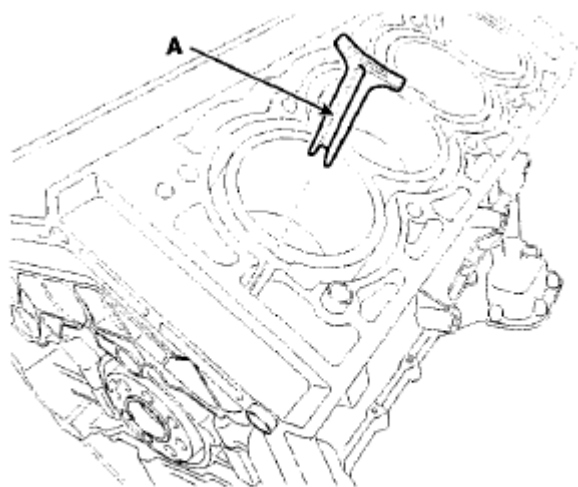
Fig. 51: Identifying Cylinder Block Bank Cover And Gasket
Courtesy of HYUNDAI MOTOR CO.

15. Install the separator (A).



SHMM19110N

Fig. 52: Identifying Separator
Courtesy of HYUNDAI MOTOR CO.



SHMM19111N

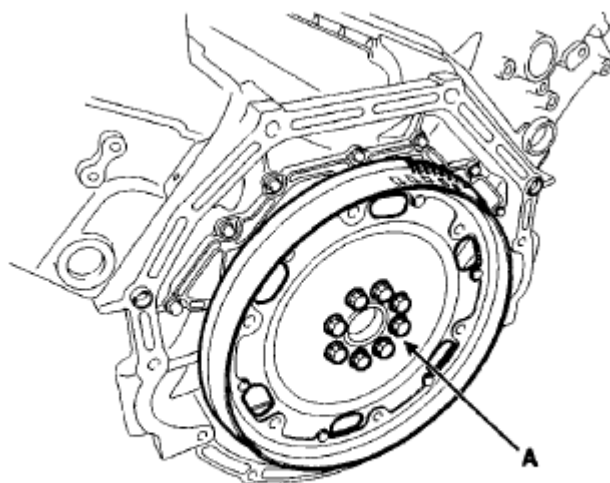
Fig. 53: Identifying Separator

Courtesy of HYUNDAI MOTOR CO.

16. Install the drive plate (B) and the adapter plate (A).

Tightening torque:

98.1 ~ 107.9 N.m (10.0 ~ 11.0kgf.m, 72.3 ~ 79.6lb-ft)



SHMM19109N

Fig. 54: Identifying Drive Plate

Courtesy of HYUNDAI MOTOR CO.

17. Install the oil pump. (Refer to LUBRICATION SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS)

18. Install the water temperature control assembly. (Refer to **COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
19. Install the timing chain. (Refer to **TIMING SYSTEM (ENGINE (G8BA - GSL 4.6))**)
20. Install the cylinder head. (Refer to **CYLINDER HEAD ASSEMBLY (ENGINE (G8BA - GSL 4.6))**)
21. Install the intake manifold and exhaust manifold. (Refer to **INTAKE AND EXHAUST SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
22. Remove the engine from engine stand.
23. Install the engine assembly to the vehicle. (Refer to **ENGINE AND TRANSAXLE ASSEMBLY**)

2010 ENGINE

Cylinder Head Assembly (Engine (G8BA - GSL 4.6)) - Genesis

CYLINDER HEAD

COMPONENTS

[RH]

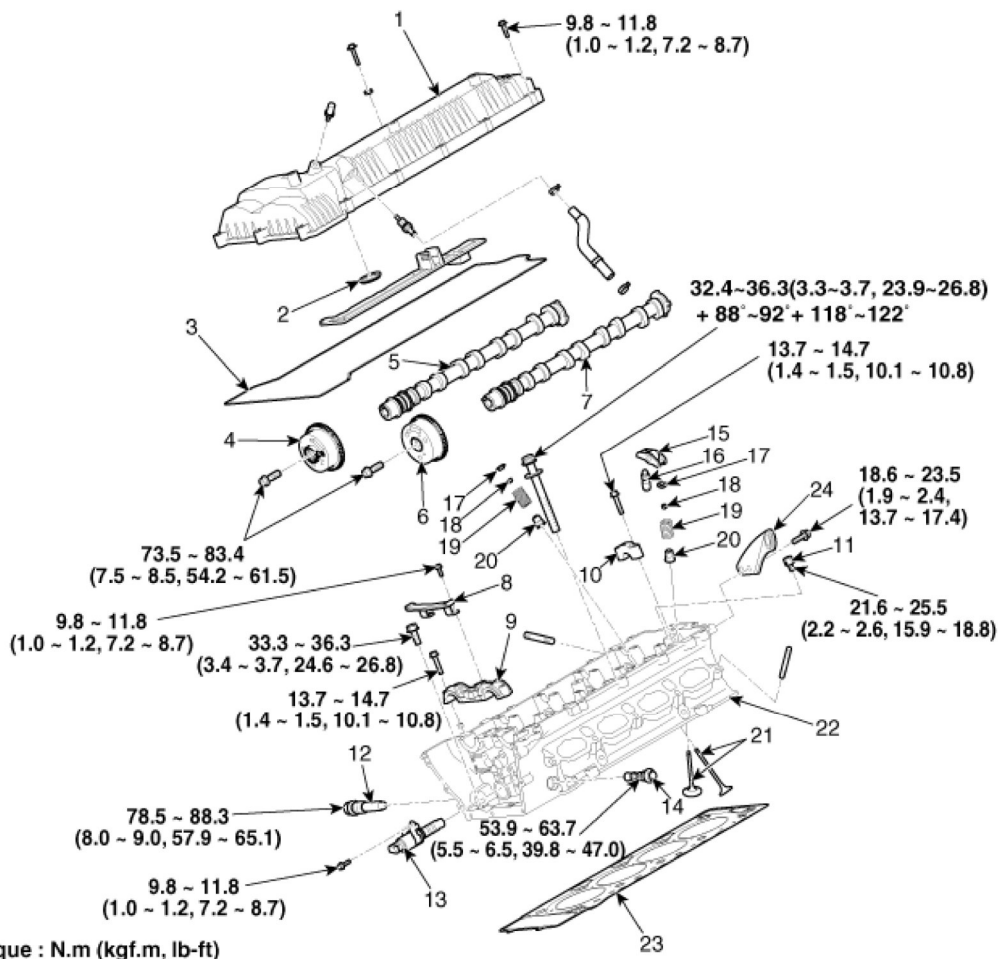


Fig. 1: Exploded View Of RH Cylinder Head Assembly With Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

1. Cylinder head cover	9. Camshaft thrust bearing cap	17. Valve spring retainer
2. Cylinder head cover oil seal	10. Camshaft bearing cap	18. Valve spring retainer lock
3. Cylinder head cover gasket	11. Pressure relief valve	19. Valve spring
4. Exhaust CVVT assembly	12. Timing chain tensioner	20. Valve stem seal
5. Exhaust camshaft, RH	13. Oil control valve	21. Valve
6. Intake CVVT assembly	14. OCV filter	22. Cylinder head, RH
7. Intake camshaft, RH	15. Roller finger follower	23. Cylinder head gasket, RH

2010 Hyundai Genesis 3.8

2010 ENGINE Cylinder Head Assembly (Engine (G8BA - GSL 4.6)) - Genesis

8. Cam to cam guide

16. Hydraulic lash adjuster
assembly

24. Engine hanger

[LH]

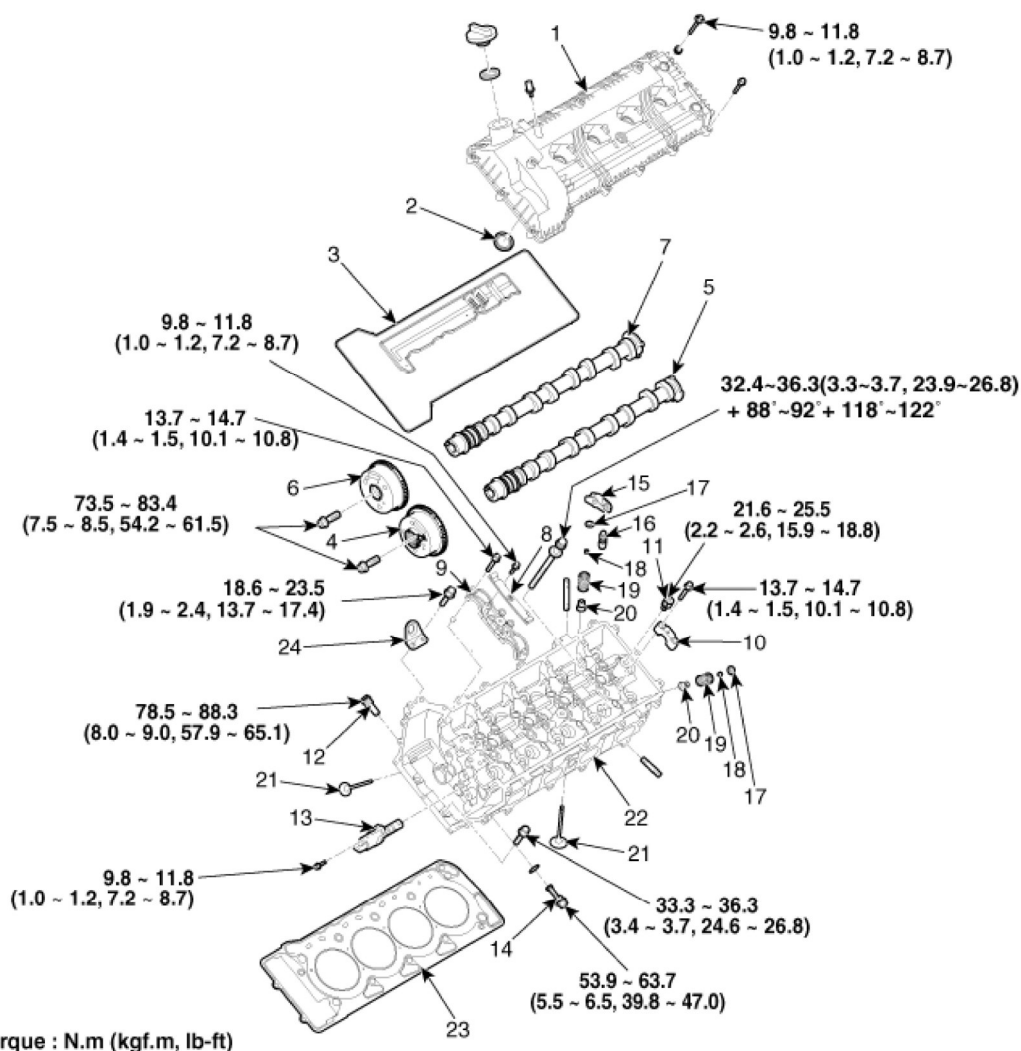


Fig. 2: Exploded View Of LH Cylinder Head Assembly With Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

1. Cylinder head cover	9. Camshaft thrust bearing cap	17. Valve spring retainer
2. Cylinder head cover oil seal	10. Camshaft bearing cap	18. Valve spring retainer lock
3. Cylinder head cover gasket	11. Pressure relief valve	19. Valve spring
4. Exhaust CVVT assembly	12. Timing chain tensioner	20. Valve stem seal
5. Exhaust camshaft, LH	13. Oil control valve	21. Valve
6. Intake CVVT assembly	14. OCV filter	22. Cylinder head, LH
7. Intake camshaft, LH	15. Roller finger follower	23. Cylinder head gasket, LH
8. Cam to cam guide	16. Hydraulic lash adjuster assembly	24. Engine hanger

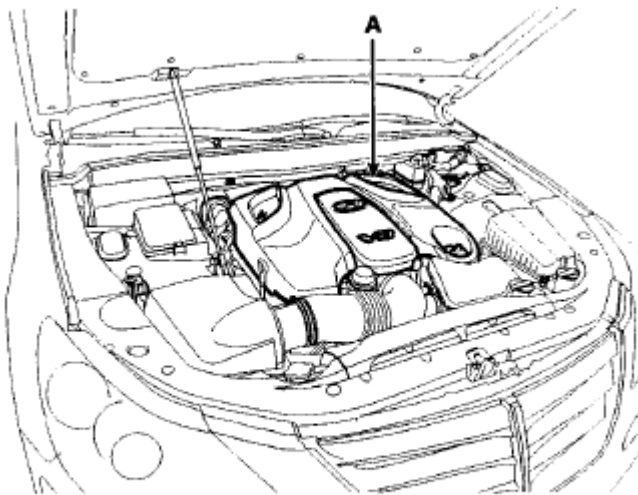
REMOVAL**CAUTION:**

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

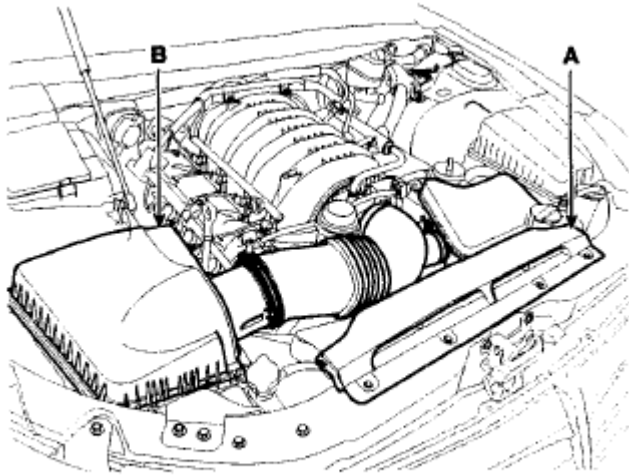
1. Disconnect the negative terminal from the battery.
2. Remove the engine cover (A).



SBHM19001N

Fig. 3: Identifying Engine Cover
Courtesy of HYUNDAI MOTOR CO.

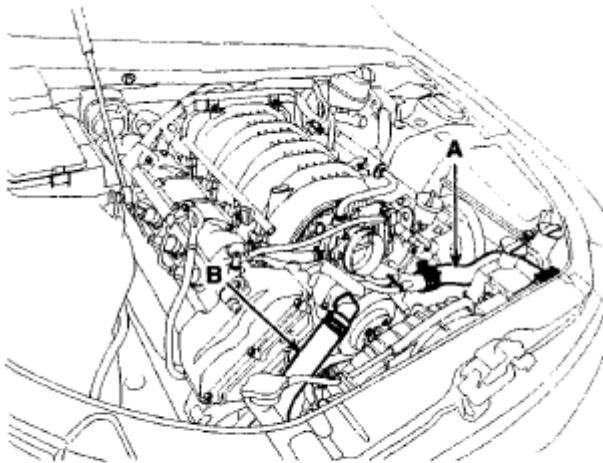
3. Remove the engine side cover.
4. Loosen the drain plug and drain the engine coolant.
5. Remove the air duct (A), and the air cleaner assembly (B).



SBHM19002N

Fig. 4: Identifying Air Duct And Air Cleaner Assembly
Courtesy of HYUNDAI MOTOR CO.

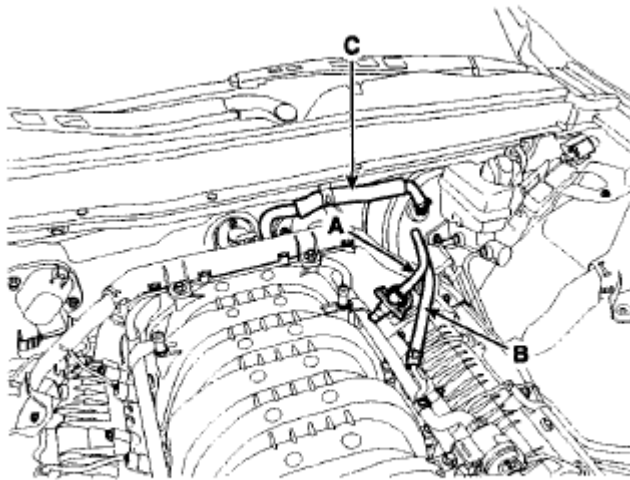
6. Disconnect the radiator upper hose (A) and lower hose (B).



SBHM19003N

Fig. 5: Identifying Radiator Upper Hose And Lower Hose
Courtesy of HYUNDAI MOTOR CO.

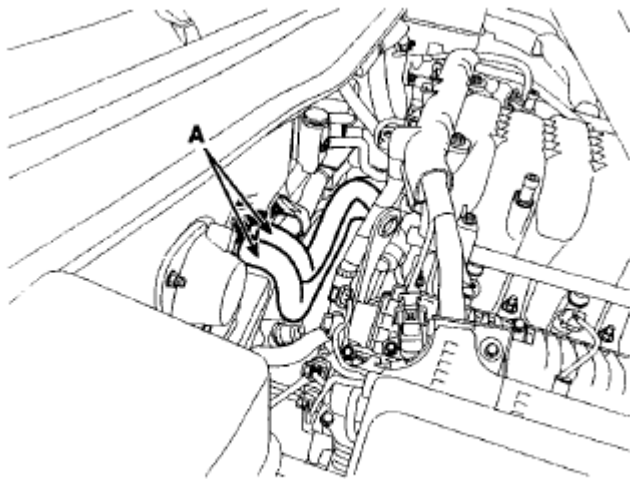
7. Remove the fuel hose (A), the purge control solenoid valve (PCSV) hose (B) and the brake booster vacuum hose (C).



SBHM19005N

Fig. 6: Identifying Fuel Hose, Purge Control Solenoid Valve Hose And Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

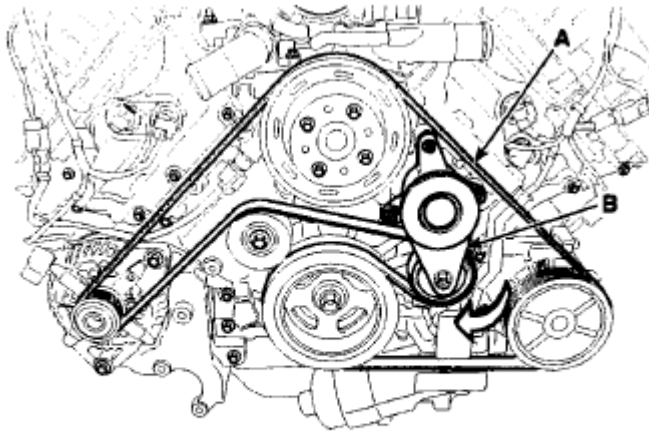
8. Disconnect the heater hoses (A),



SBHM19004N

Fig. 7: Identifying Heater Hoses
Courtesy of HYUNDAI MOTOR CO.

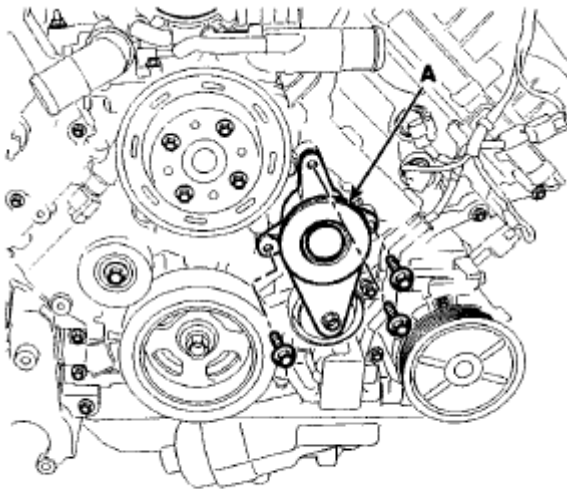
9. Remove the radiator & cooling fan assembly from the vehicle. (Refer to **COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
10. Turn the tensioner (B) clockwise and loosen, then remove the drive belt (A).



SBHM19013N

Fig. 8: Identifying Drive Belt
Courtesy of HYUNDAI MOTOR CO.

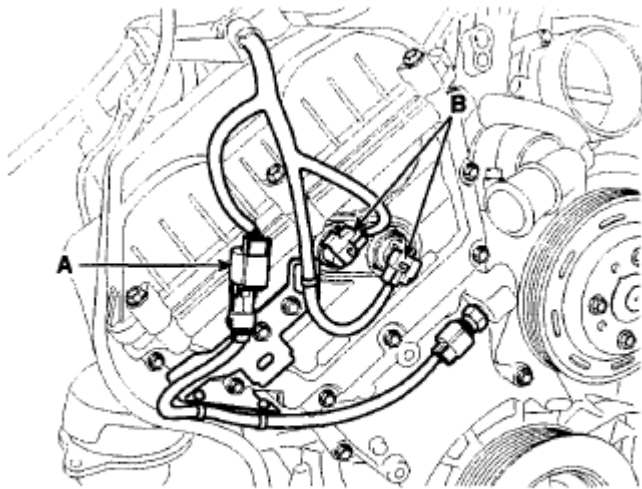
11. Remove the drive belt tensioner (A).



SBHM19014N

Fig. 9: Identifying Drive Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

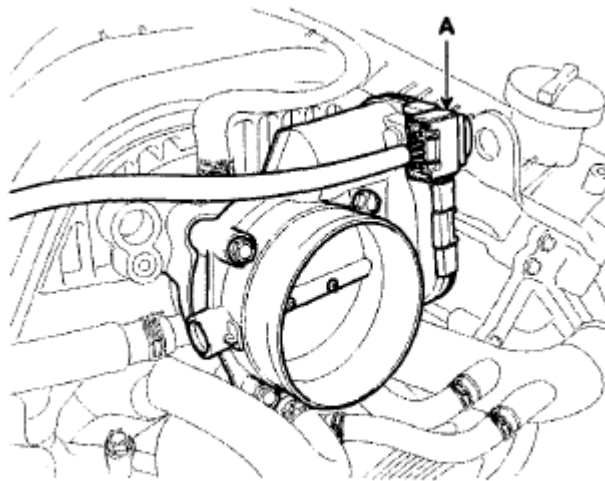
12. Remove the engine wiring harness from the cylinder head.
 1. Disconnect the water temperature sensor connector (A) and the CVVT oil control valve connectors (B).



SHMM19069N

Fig. 10: Identifying Water Temperature Sensor And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

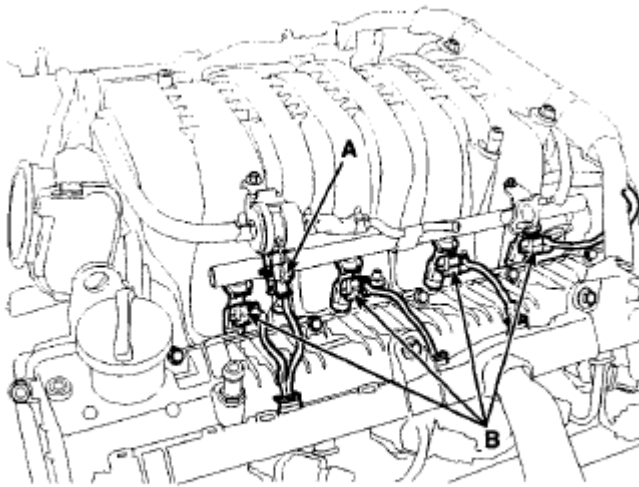
2. Disconnect the ETC module connector (A).



SBHM19015N

Fig. 11: Identifying ETC Module Connector
Courtesy of HYUNDAI MOTOR CO.

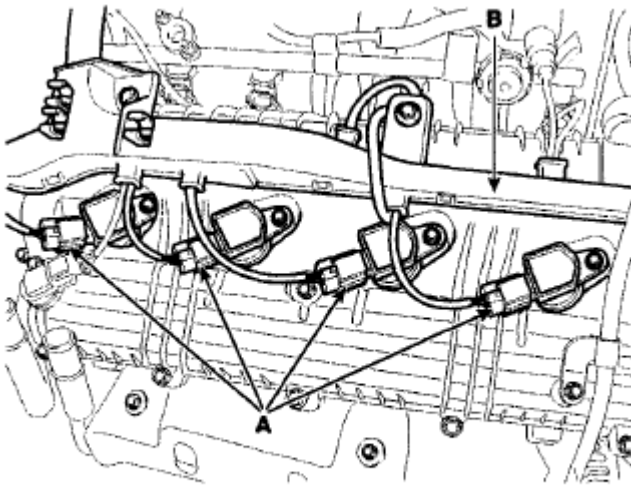
3. Disconnect the PCSV connector (A) and the injector connectors (B).



SBHM19009N

Fig. 12: Identifying PCSV And Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

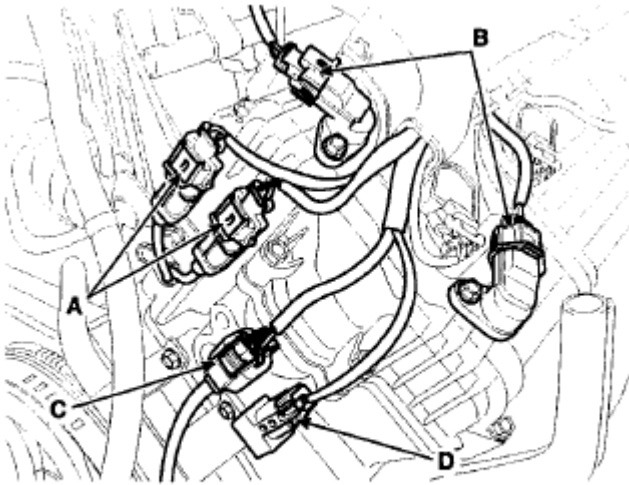
4. Disconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19072N

Fig. 13: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

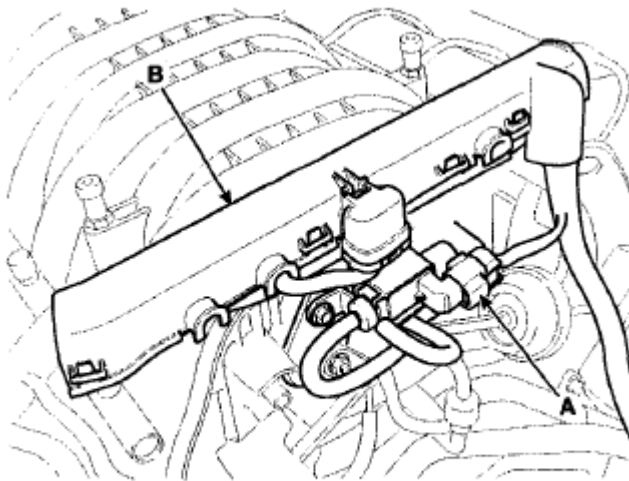
5. Disconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the oxygen sensor connector (C) and the condenser connector (D).



SHMM19073N

Fig. 14: Identifying Knock Sensor And Camshaft Position Sensor Connectors
Courtesy of HYUNDAI MOTOR CO.

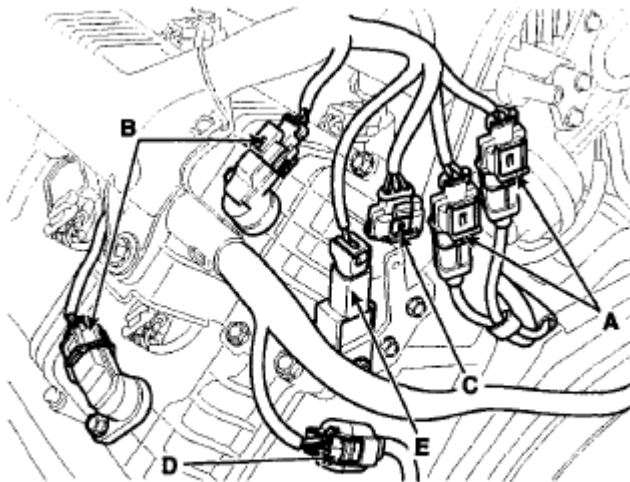
6. Disconnect the variable intake system solenoid valve connector (A) and the wiring harness protector (B).



SBHM19016N

Fig. 15: Identifying Variable Intake System Solenoid Valve Connector And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

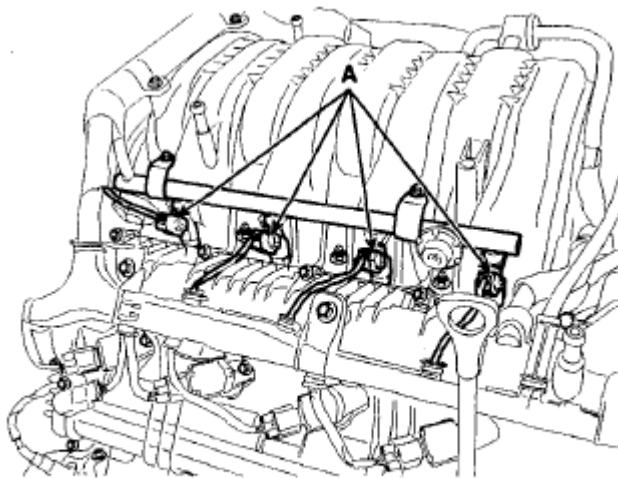
7. Disconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the crankshaft position sensor connector (C), the oxygen sensor connector (D) and the condenser connector (E).



SHMM19075N

Fig. 16: Identifying Knock Sensor Connectors And Camshaft Position Sensor Connectors
Courtesy of HYUNDAI MOTOR CO.

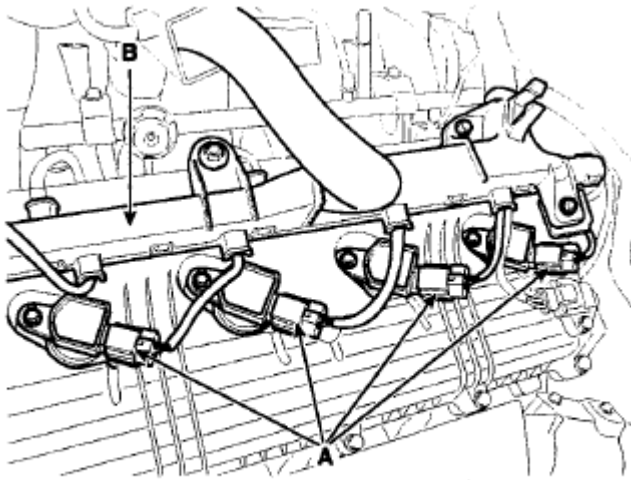
8. Disconnect the injector connectors (A).



SBHM19010N

Fig. 17: Identifying Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

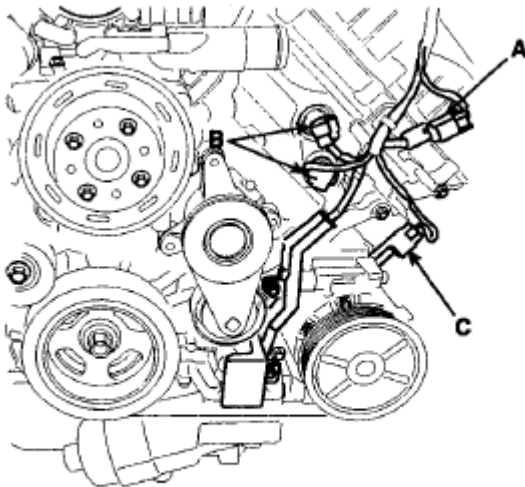
9. Disconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19077N

Fig. 18: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

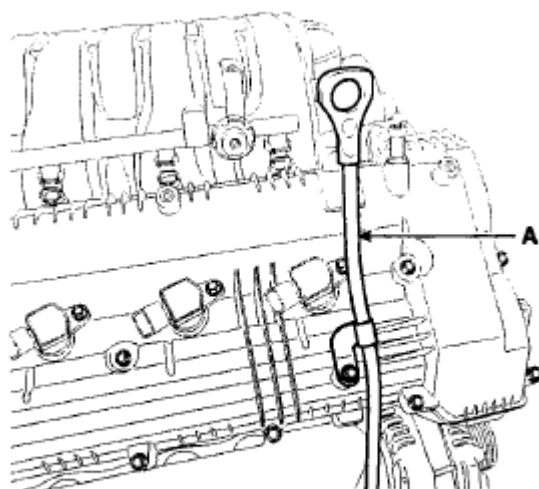
10. Disconnect the oil pressure switch connector (A), the CVVT oil control valve connectors (B) and the air conditioner compressor switch connector (C).



SBHM19301N

Fig. 19: Identifying Oil Pressure Switch Connector And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

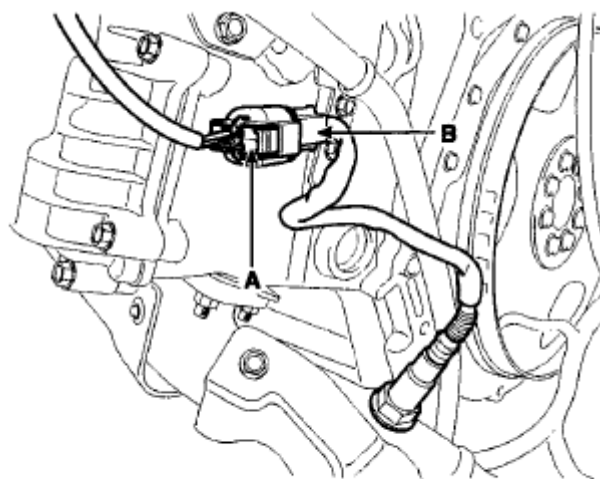
13. Remove the oil level gauge (A).



SHMM19001N

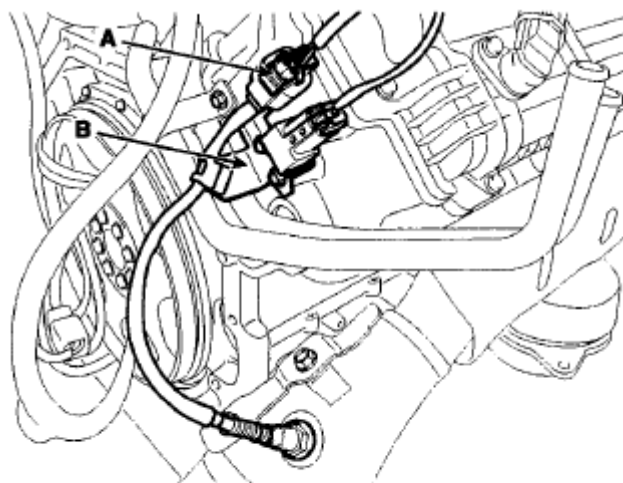
Fig. 20: Identifying Oil Level Gauge
Courtesy of HYUNDAI MOTOR CO.

14. Disconnect the oxygen sensor connector (A) and remove the oxygen sensor connector bracket (B).



SHMM19079N

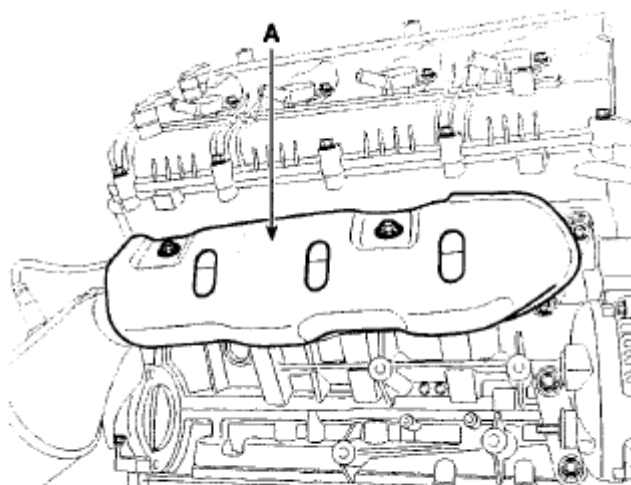
Fig. 21: Identifying Oxygen Sensor Connector And Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.



SHMM19080N

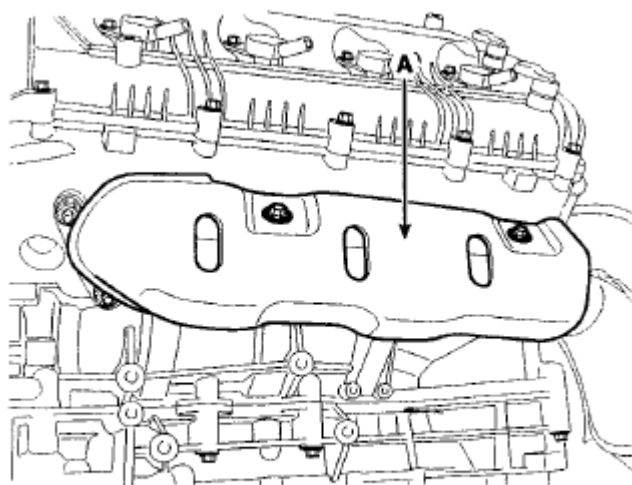
Fig. 22: Identifying Oxygen Sensor Connector And Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.

15. Remove the exhaust manifold heat protector (A).



SHMM19002N

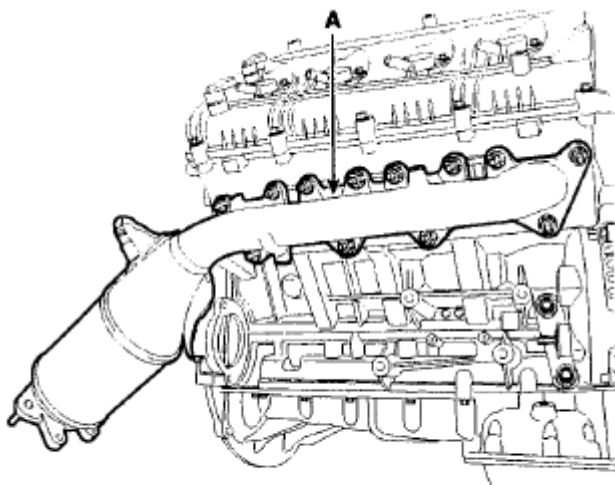
Fig. 23: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.



SHMM19003N

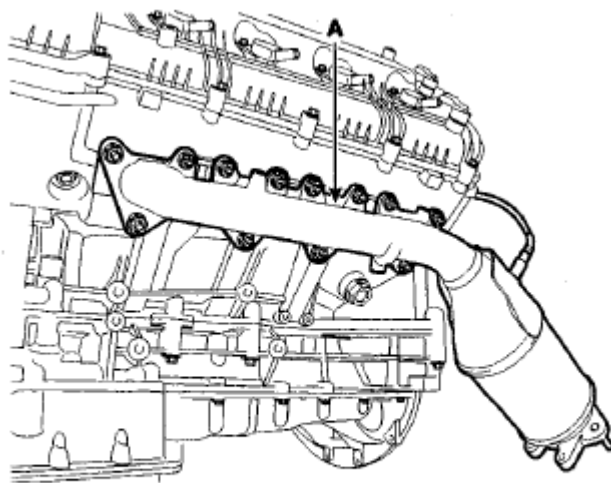
Fig. 24: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.

16. Remove the exhaust manifold (A).



SHMM19004N

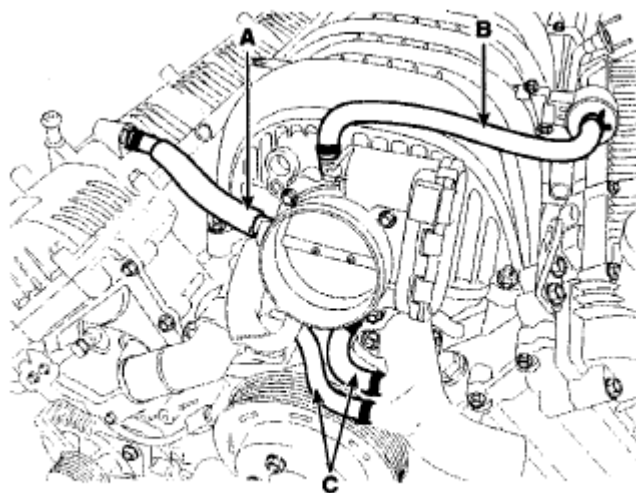
Fig. 25: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.



SHMM19005N

Fig. 26: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

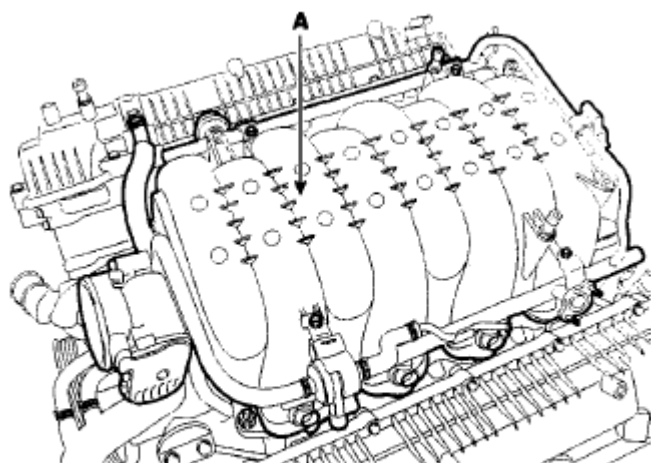
17. Disconnect the PCV hose (A), the PCSV hose (B) and the water hoses (C) from the intake manifold module and the throttle body.



SHMM19006N

Fig. 27: Identifying Hoses
Courtesy of HYUNDAI MOTOR CO.

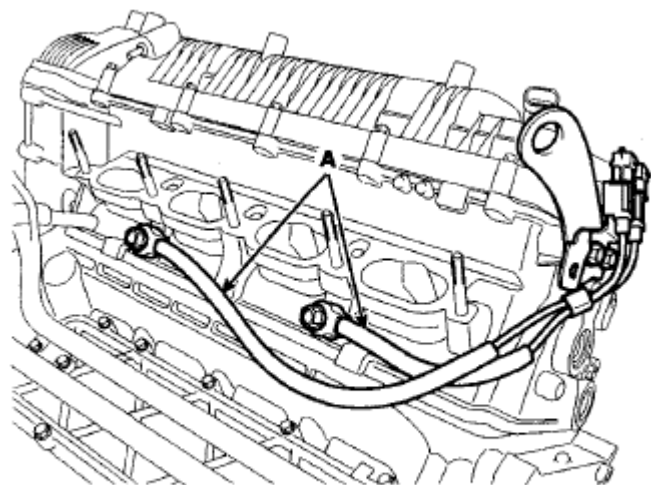
18. Remove the intake manifold module (A).



SHMM19007N

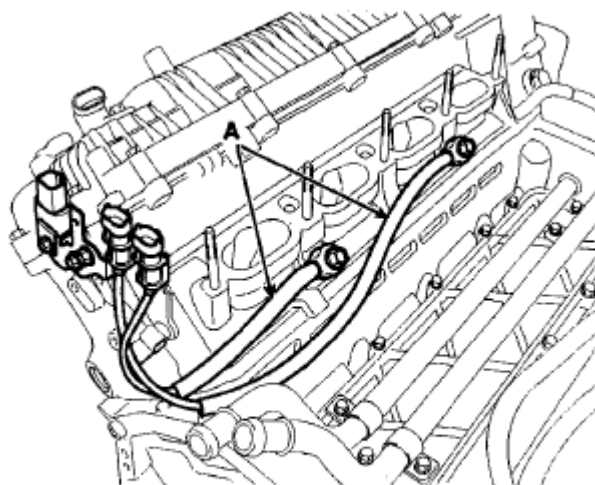
Fig. 28: Identifying Intake Manifold Module
Courtesy of HYUNDAI MOTOR CO.

19. Remove the knock sensors (A).



SHMM19008N

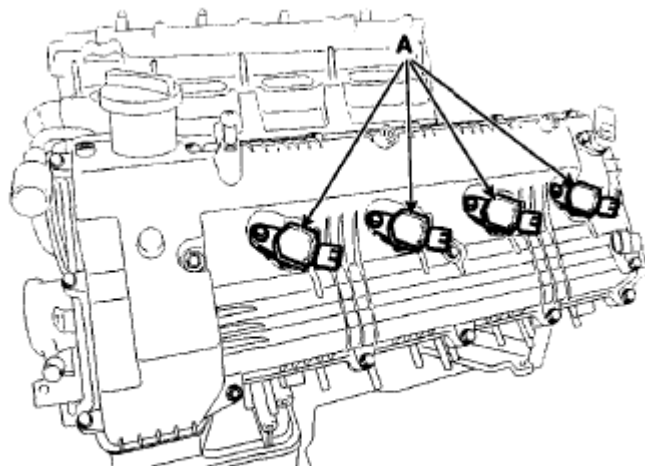
Fig. 29: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.



SHMM19009N

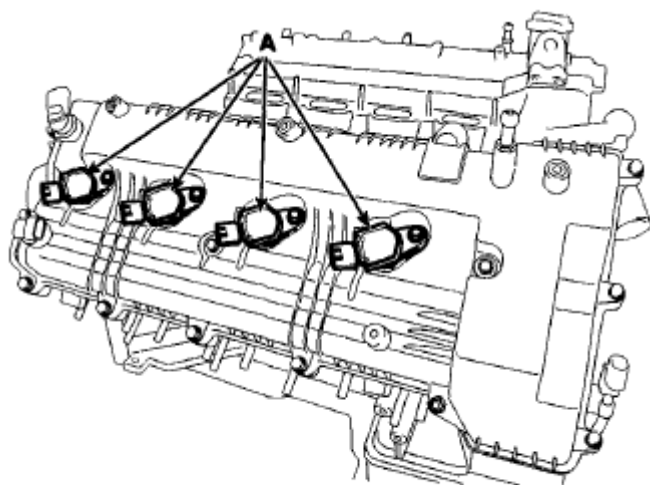
Fig. 30: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.

20. Remove the ignition coils (A).



SHMM19010N

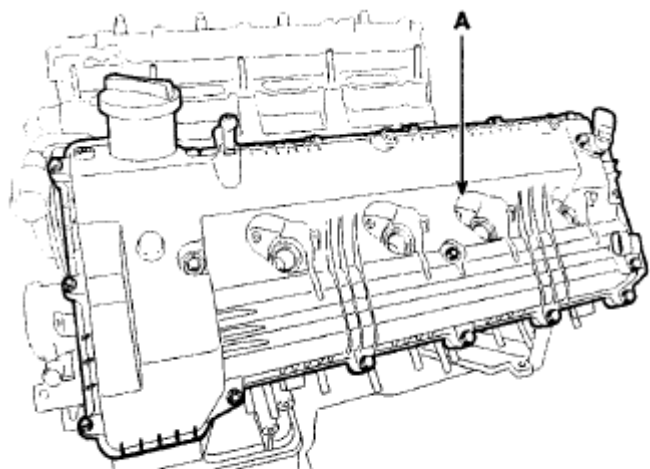
Fig. 31: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.



SHMM19011N

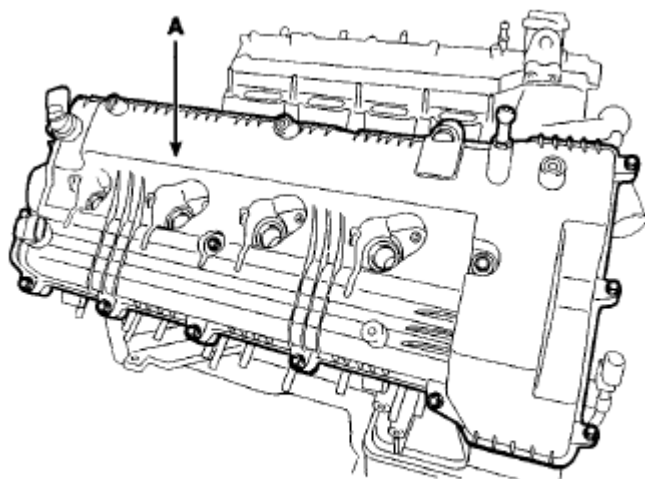
Fig. 32: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.

21. Remove the cylinder head cover (A).



SHMM19012N

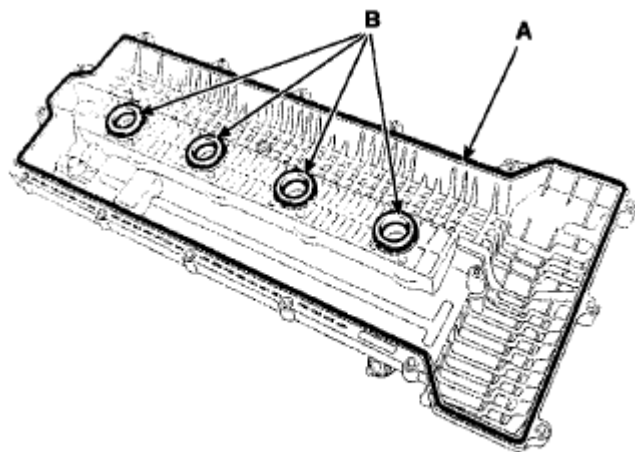
Fig. 33: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19013N

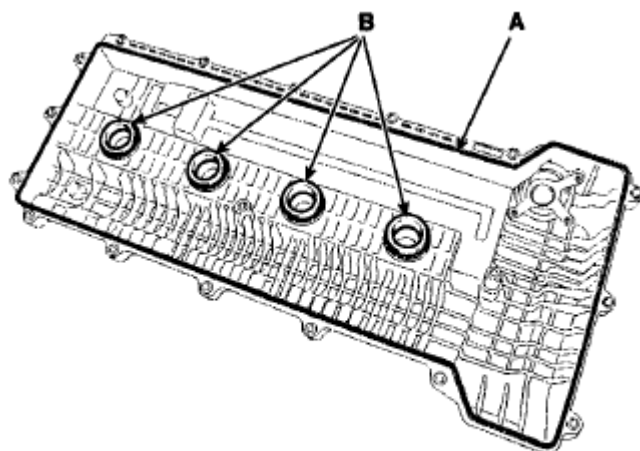
Fig. 34: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

22. Remove the cylinder head cover gasket (A) and oil seal (B).



SHMM19018N

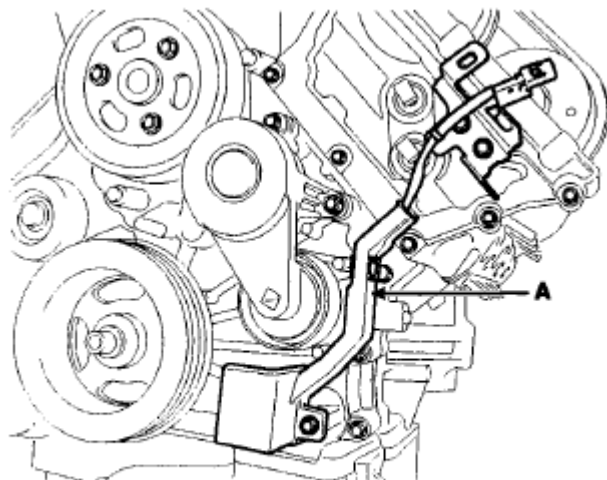
Fig. 35: Identifying Cylinder Head Cover Gasket And Oil Seal
Courtesy of HYUNDAI MOTOR CO.



SHMM19017N

Fig. 36: Identifying Cylinder Head Cover Gasket And Oil Seal
Courtesy of HYUNDAI MOTOR CO.

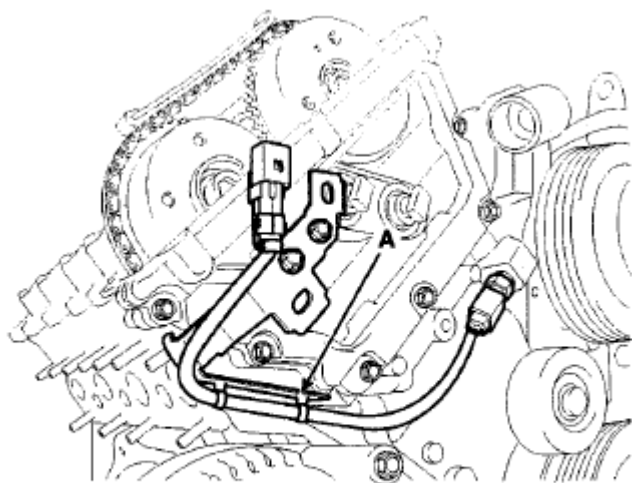
23. Remove the oil pressure switch wiring assembly and bracket (A).



SHMM19018N

Fig. 37: Identifying Oil Pressure Switch Wiring Assembly And Bracket
Courtesy of HYUNDAI MOTOR CO.

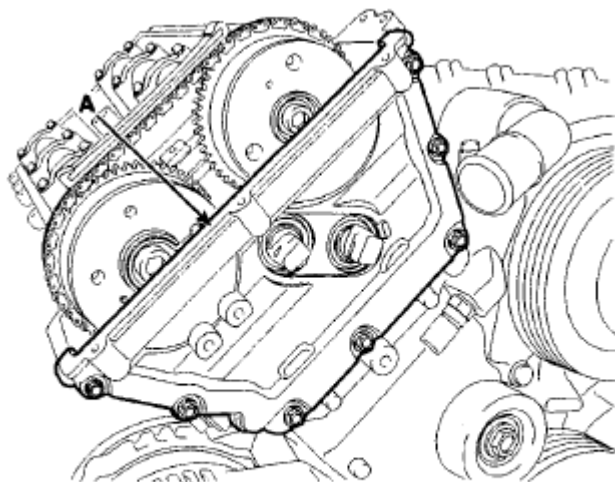
24. Remove the water temperature sensor wiring assembly and bracket (A).



SHMM19019N

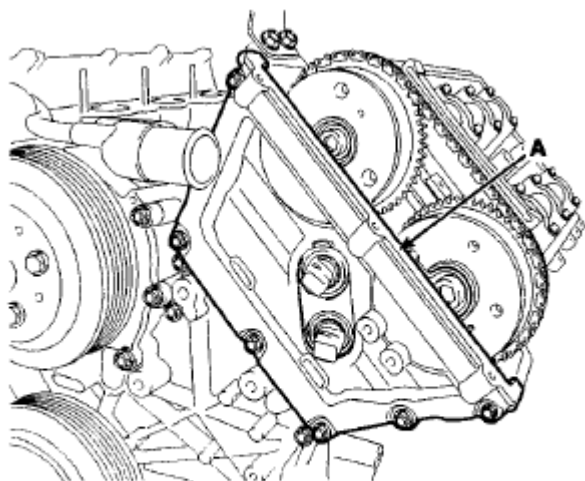
Fig. 38: Identifying Water Temperature Sensor Wiring Assembly
Courtesy of HYUNDAI MOTOR CO.

25. Remove the timing chain upper cover (A).



SHMM19020N

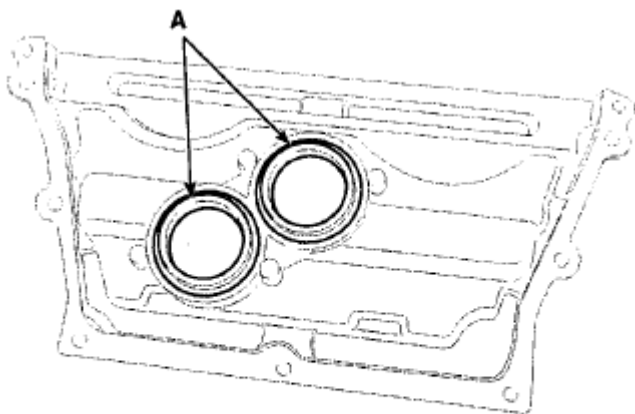
Fig. 39: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19021N

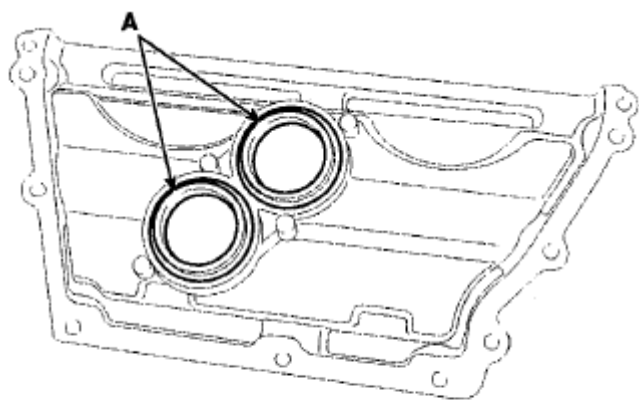
Fig. 40: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

26. Remove the timing chain upper cover oil seal (A).



SHMM19022N

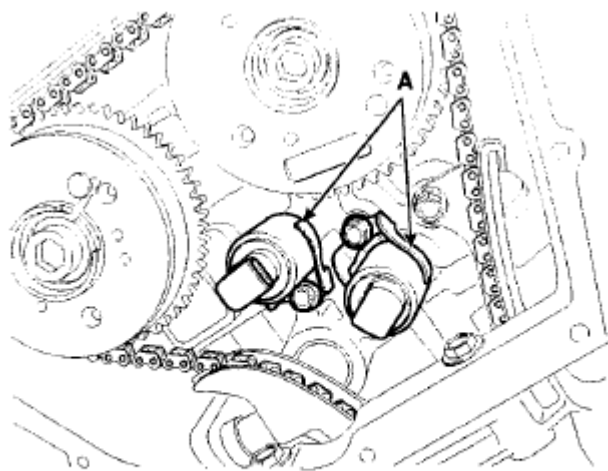
Fig. 41: Identifying Timing Chain Upper Cover Oil Seal
Courtesy of HYUNDAI MOTOR CO.



SHMM19023N

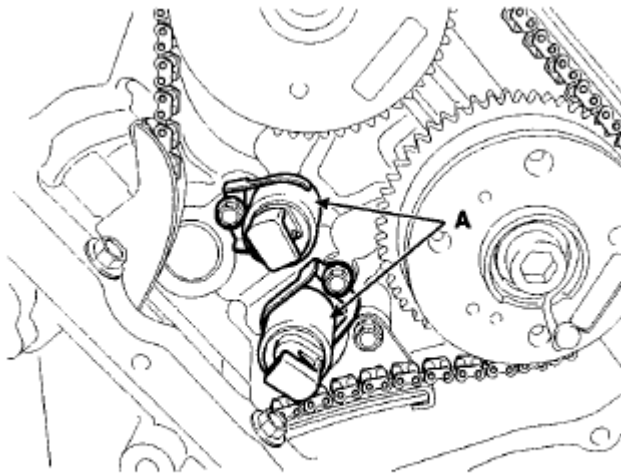
Fig. 42: Identifying Timing Chain Upper Cover Oil Seal
Courtesy of HYUNDAI MOTOR CO.

27. Remove the oil control valve (A).



SHMM19024N

Fig. 43: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.



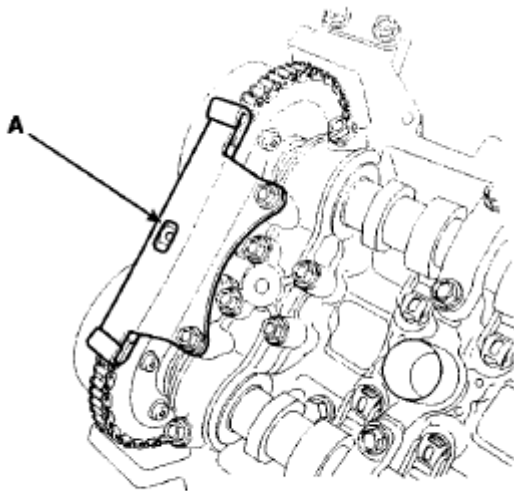
SHMM19025N

Fig. 44: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

NOTE:

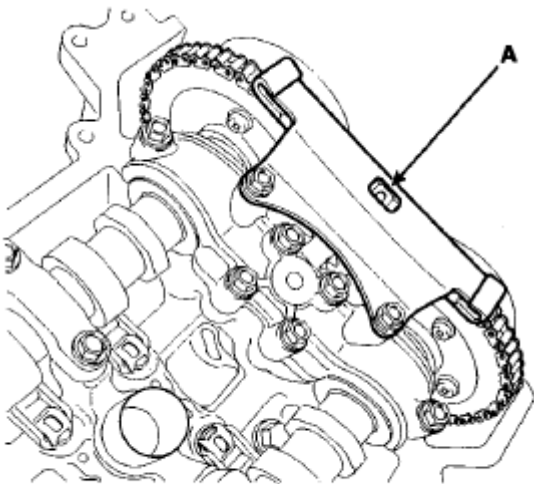
- Do not reuse the OCV when dropped.
- Keep the OCV clean.
- Do not hold the OCV sleeve during servicing.
- When the OCV is installed on the engine, do not move the engine while holding the OCV yoke.

28. Remove the cam to cam guide (A).



SHMM19026N

Fig. 45: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

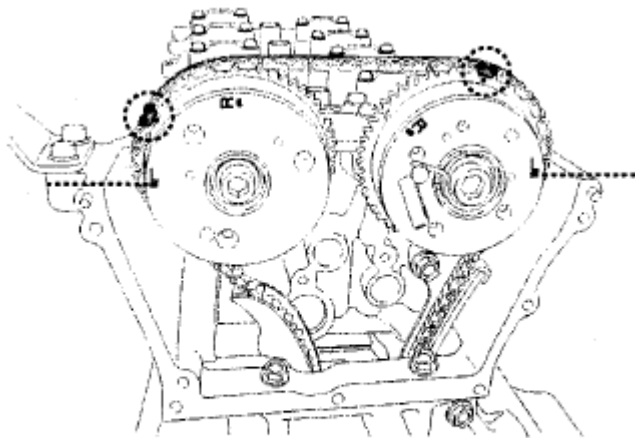


SHMM19027N

Fig. 46: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

29. Align the timing mark of camshaft sprocket.

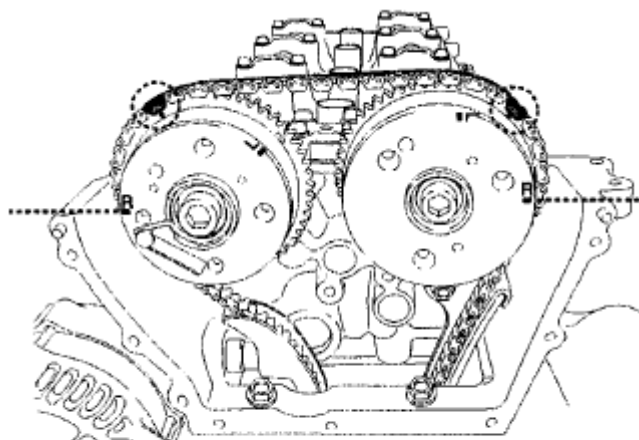
[LH]



SHMM19028N

Fig. 47: Aligning Timing Mark Of LH Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

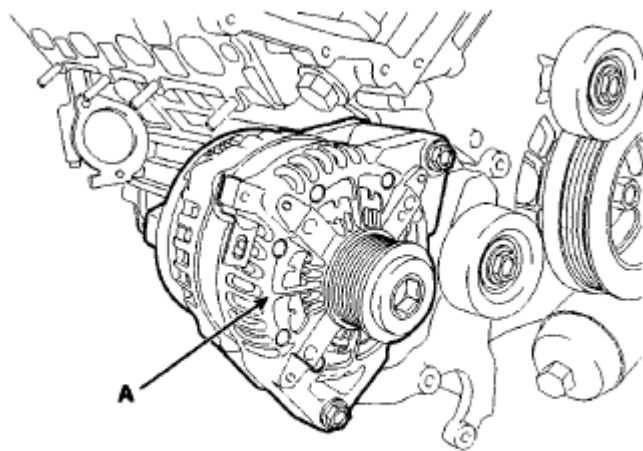
[RH]



SHMM19029N

Fig. 48: Aligning Timing Mark Of RH Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

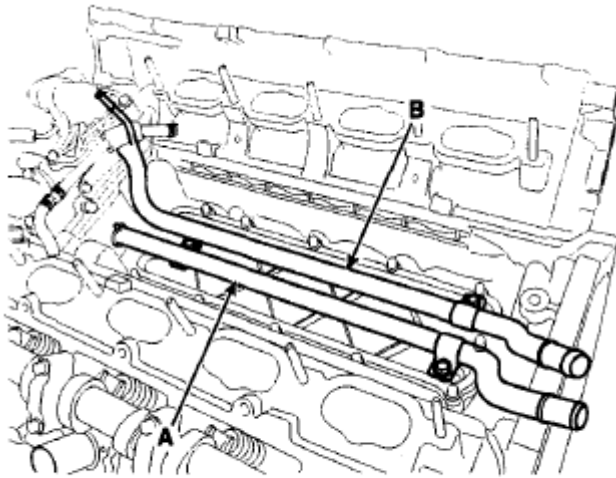
30. Remove the alternator (A).



SHMM19030N

Fig. 49: Identifying Alternator
Courtesy of HYUNDAI MOTOR CO.

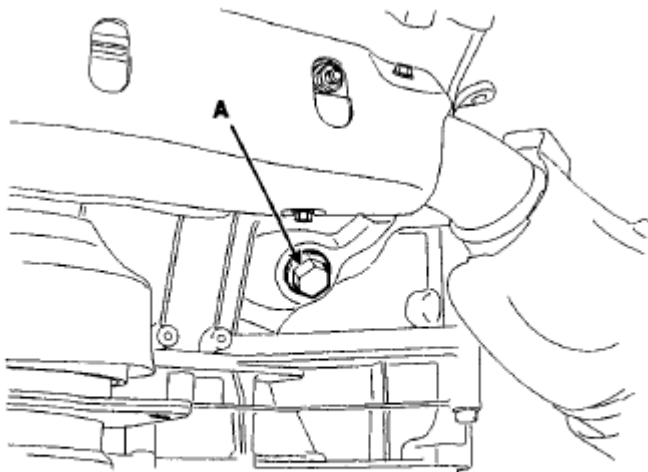
31. Remove the water outlet pipe (A) and the water inlet pipe (B).



SHMM19032N

Fig. 50: Identifying Water Outlet Pipe And Water Inlet Pipe
Courtesy of HYUNDAI MOTOR CO.

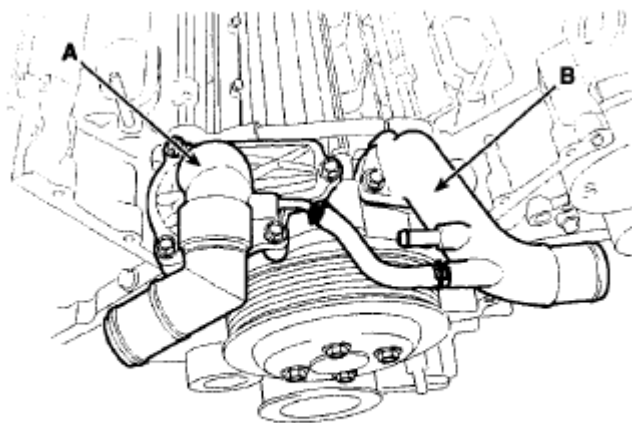
NOTE: Remove the drain plug (A) and drain the engine coolant.



SHMM19085N

Fig. 51: Identifying Drain Plug
Courtesy of HYUNDAI MOTOR CO.

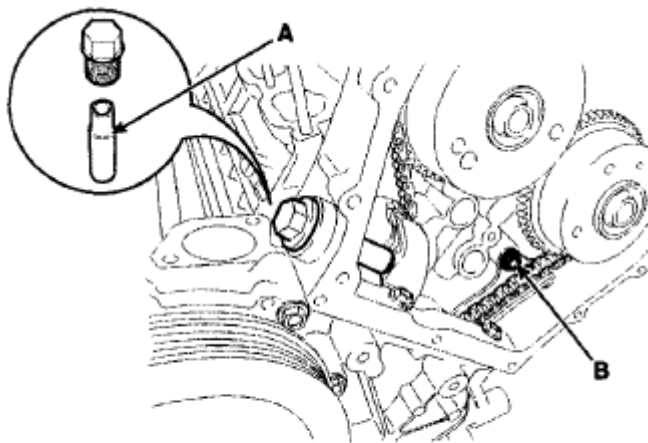
32. Remove the water temperature control assembly (A) and the water outlet fitting assembly (B).



SHMM19033N

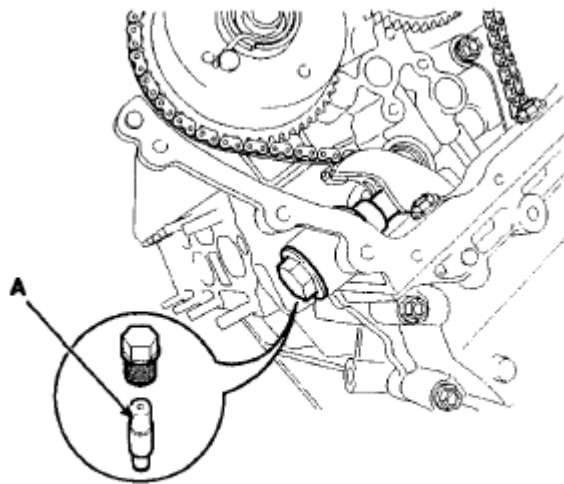
Fig. 52: Identifying Water Temperature Control Assembly And Water Outlet Fitting Assembly
Courtesy of HYUNDAI MOTOR CO.

33. Remove the timing chain tensioner (A).



SHMM19034N

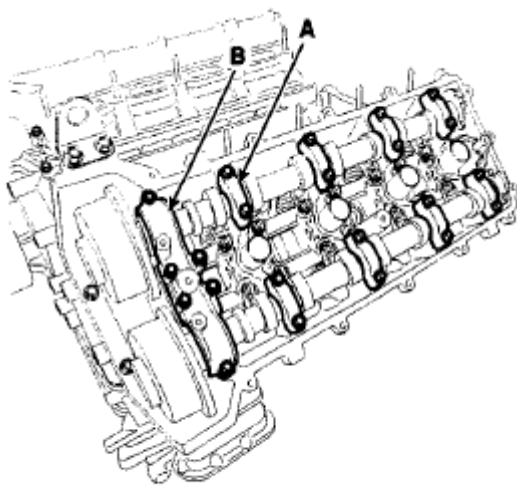
Fig. 53: Identifying Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19035N

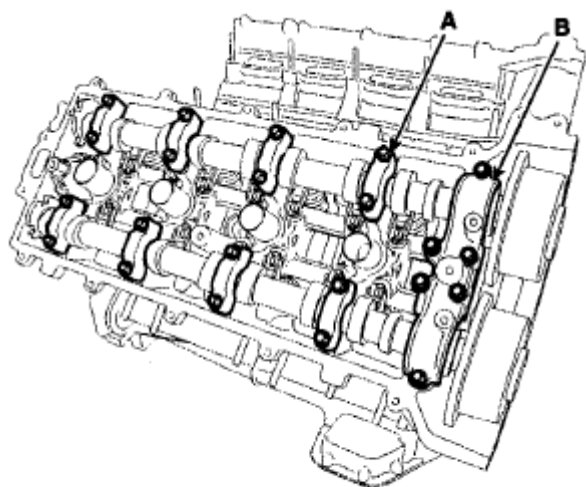
Fig. 54: Identifying Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.

34. Remove the camshaft bearing caps (A) and the camshaft thrust bearing cap (B).



SHMM19036N

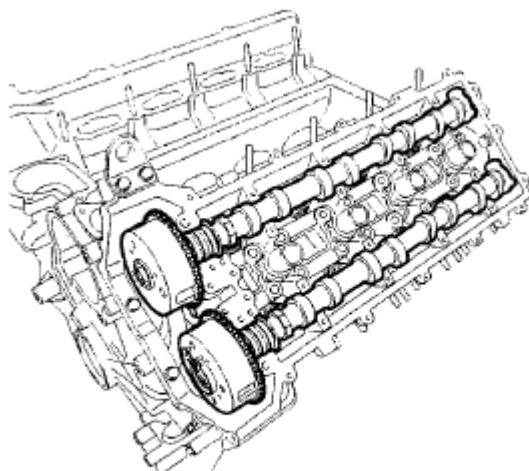
Fig. 55: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

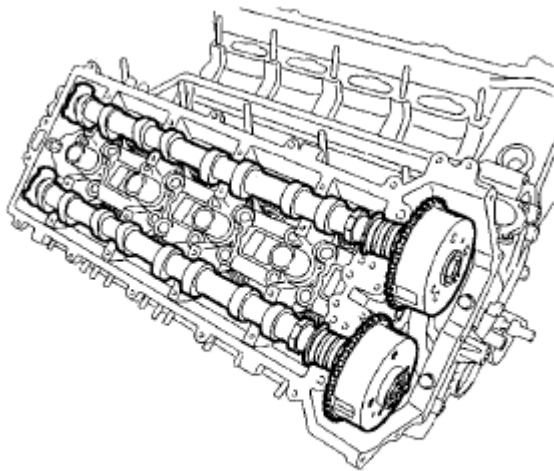
Fig. 56: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

35. Remove the camshaft.



SHMM19160N

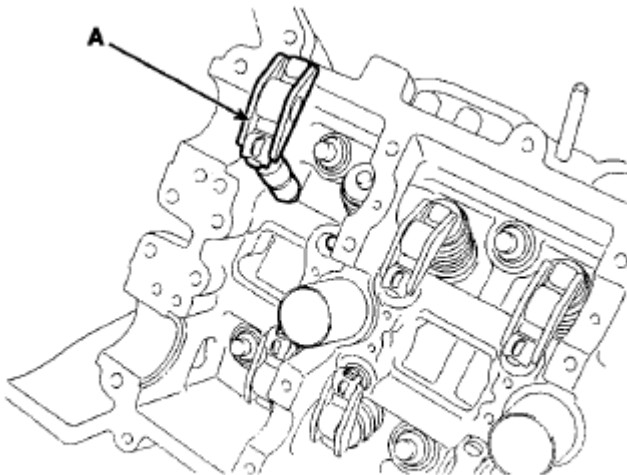
Fig. 57: Identifying Camshaft
Courtesy of HYUNDAI MOTOR CO.



SHMM19181N

Fig. 58: Identifying Camshaft
Courtesy of HYUNDAI MOTOR CO.

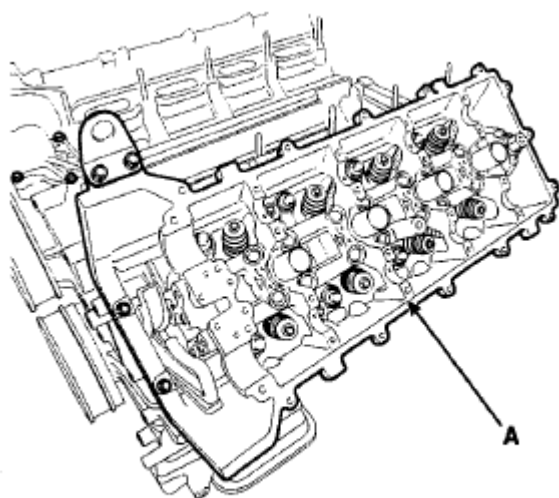
36. Remove the roller finger follower and the hydraulic lash adjuster assembly (A).



SHMM19040N

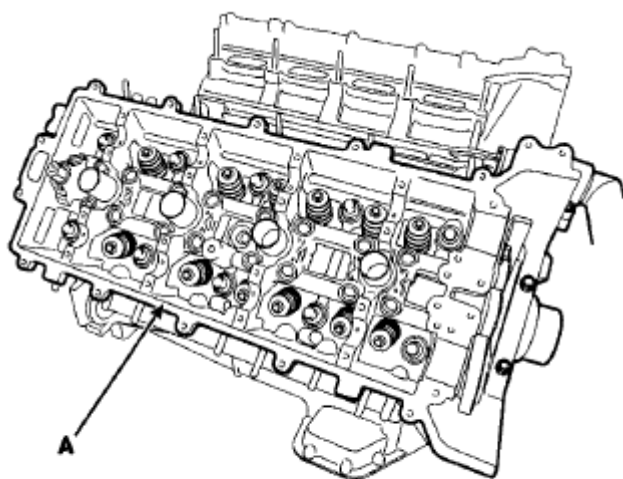
Fig. 59: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

37. Remove the cylinder head (A).
1. Uniformly loosen and remove the cylinder head bolts, in several passes, in the sequence shown.



SHMM19041N

Fig. 60: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

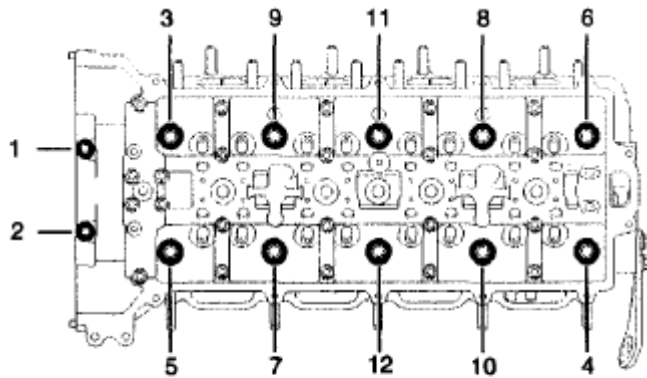


SHMM19042N

Fig. 61: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

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

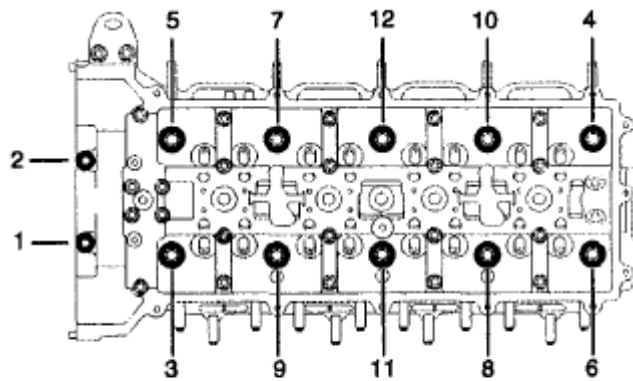
[RH]



SHMM19349N

Fig. 62: Identifying RH Cylinder Head Bolt Removal Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH]



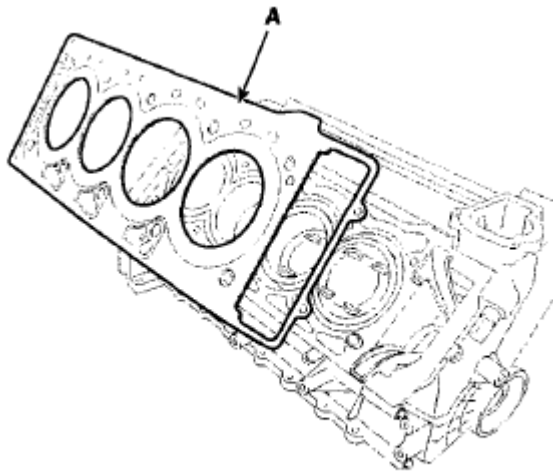
SHMM19350N

Fig. 63: Identifying LH Cylinder Head Bolt Removal Sequence
Courtesy of HYUNDAI MOTOR CO.

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

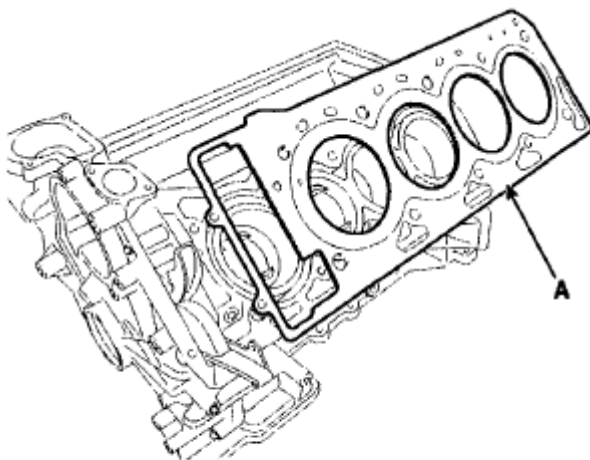
NOTE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

38. Remove the cylinder head gasket (A).



SHMM19359N

Fig. 64: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.



SHMM19360N

Fig. 65: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

REMOVAL (REVISED)

CAUTION:

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

1. Disconnect the negative terminal from the battery.

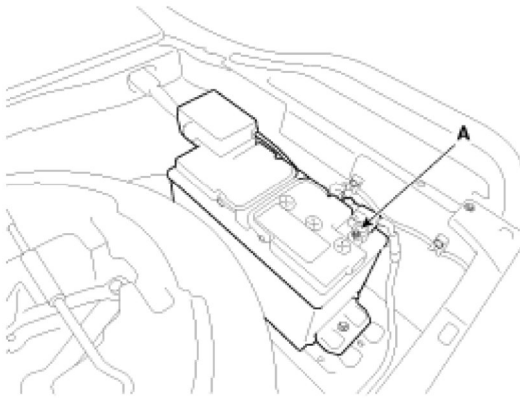
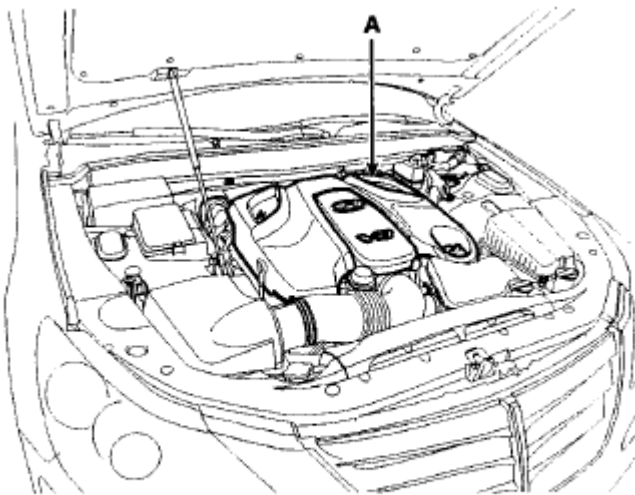


Fig. 66: Identifying Negative Battery Terminal
Courtesy of HYUNDAI MOTOR CO.

2. Remove the engine cover (A).

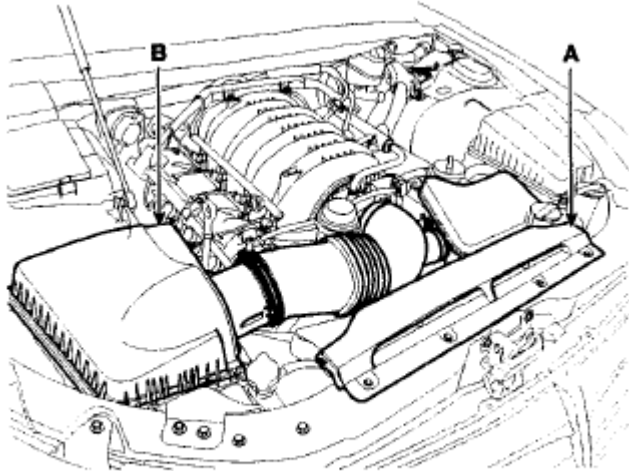


SBHM19001N

Fig. 67: Identifying Engine Cover
Courtesy of HYUNDAI MOTOR CO.

3. Remove the engine side cover.

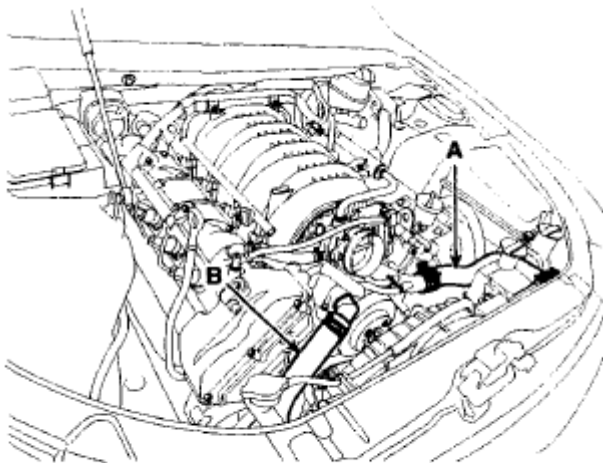
4. Loosen the drain plug and drain the engine coolant.
5. Remove the air duct (A), and the air cleaner assembly (B).



SBHM19002N

Fig. 68: Identifying Air Duct And Air Cleaner Assembly
Courtesy of HYUNDAI MOTOR CO.

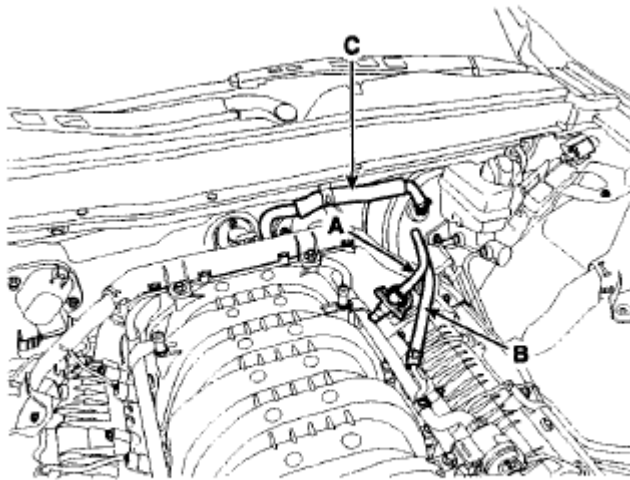
6. Disconnect the radiator upper hose (A) and lower hose (B).



SBHM19003N

Fig. 69: Identifying Radiator Upper Hose And Lower Hose
Courtesy of HYUNDAI MOTOR CO.

7. Remove the fuel hose (A), the purge control solenoid valve (PCSV) hose (B) and the brake booster vacuum hose (C).

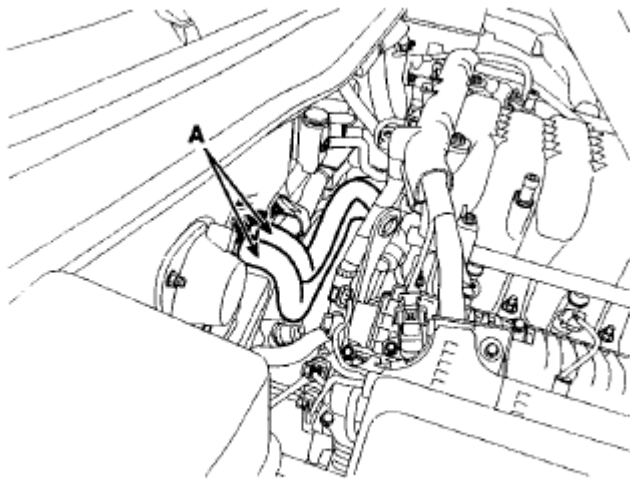


SBHM19005N

Fig. 70: Identifying Fuel Hose, Purge Control Solenoid Valve Hose And Brake Booster Vacuum Hose

Courtesy of HYUNDAI MOTOR CO.

8. Disconnect the heater hoses (A),

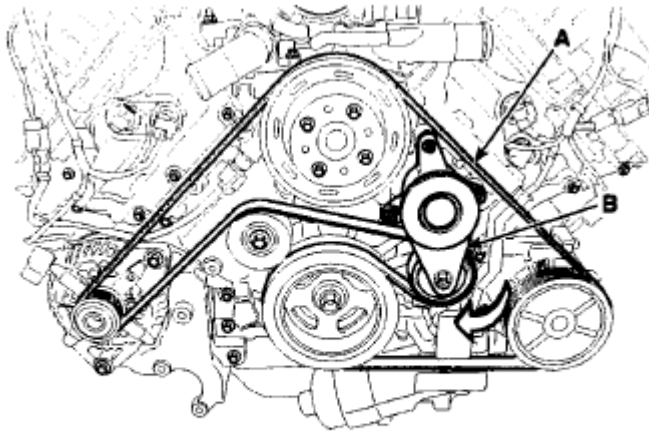


SBHM19004N

Fig. 71: Identifying Heater Hoses

Courtesy of HYUNDAI MOTOR CO.

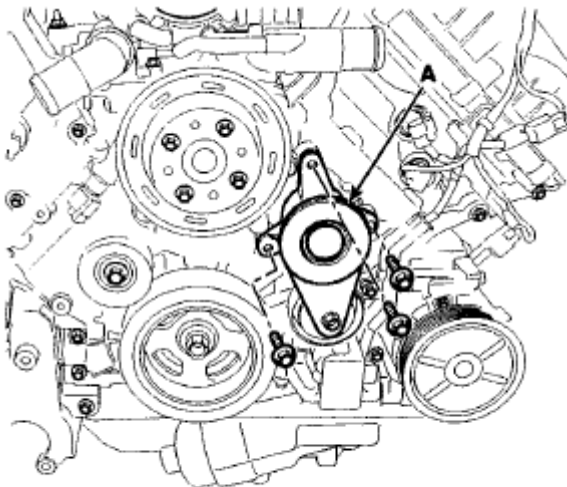
9. Remove the radiator & cooling fan assembly from the vehicle. (Refer to **COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
10. Turn the tensioner (B) clockwise and loosen, then remove the drive belt (A).



SBHM19013N

Fig. 72: Identifying Drive Belt
Courtesy of HYUNDAI MOTOR CO.

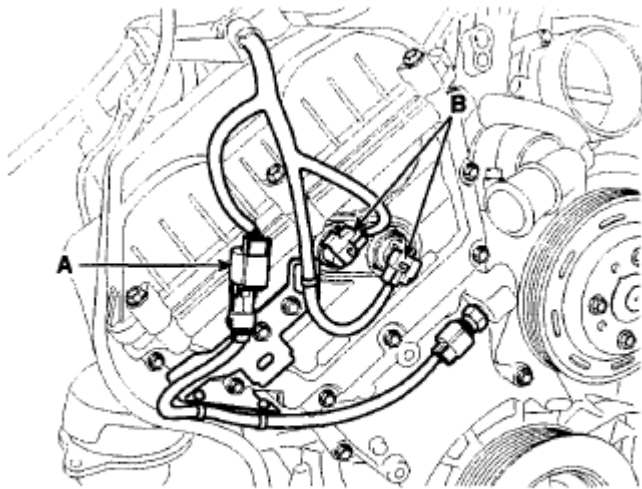
11. Remove the drive belt tensioner (A).



SBHM19014N

Fig. 73: Identifying Drive Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

12. Remove the engine wiring harness from the cylinder head.
 1. Disconnect the water temperature sensor connector (A) and the CVVT oil control valve connectors (B).



SHMM19069N

Fig. 74: Identifying Water Temperature Sensor And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

2. Disconnect the alternator connector (A).

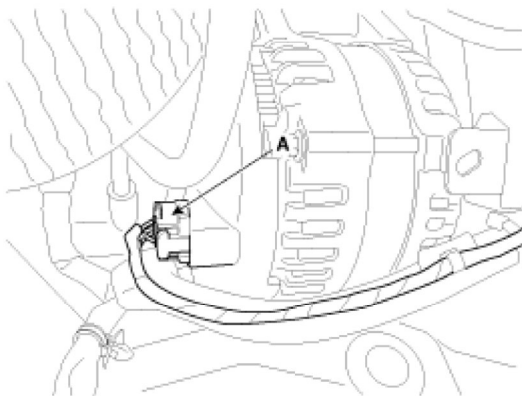
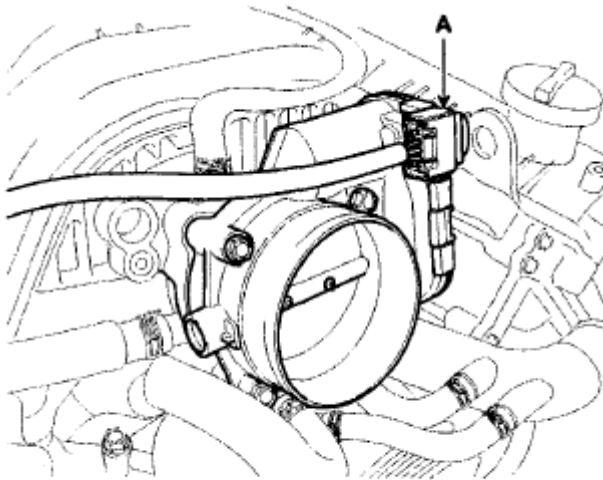


Fig. 75: Identifying Alternator Connector
Courtesy of HYUNDAI MOTOR CO.

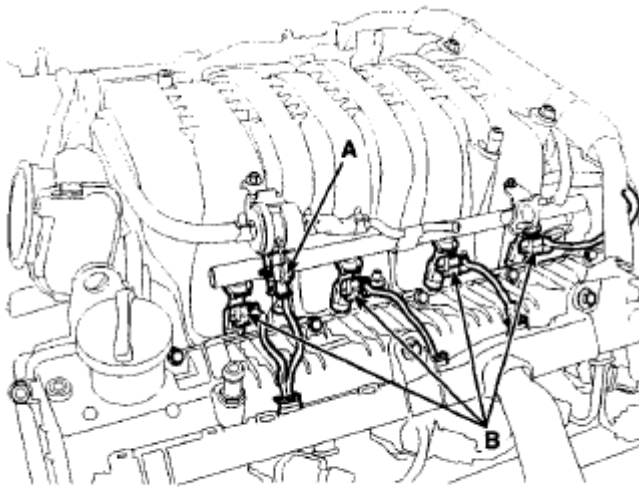
3. Disconnect the ETC module connector (A).



SBHM19015N

Fig. 76: Identifying ETC Module Connector
Courtesy of HYUNDAI MOTOR CO.

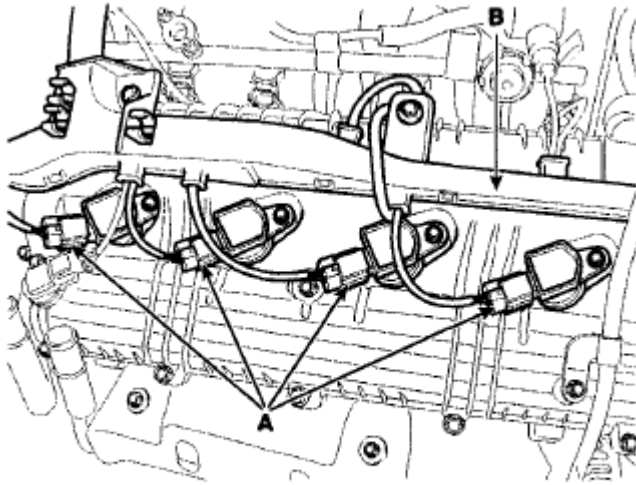
4. Disconnect the PCSV connector (A) and the injector connectors (B).



SBHM19009N

Fig. 77: Identifying PCSV And Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

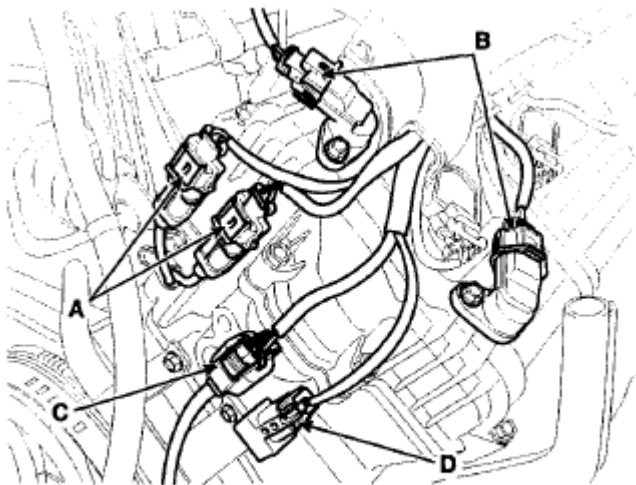
5. Disconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19072N

Fig. 78: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

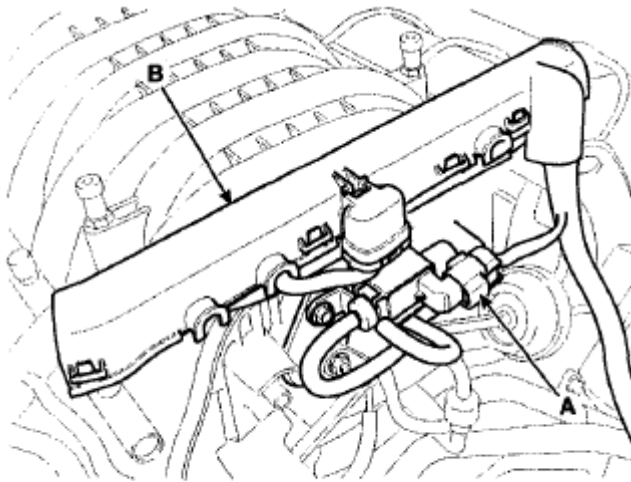
6. Disconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the oxygen sensor connector (C) and the condenser connector (D).



SHMM19073N

Fig. 79: Identifying Knock Sensor And Camshaft Position Sensor Connectors
Courtesy of HYUNDAI MOTOR CO.

7. Disconnect the variable intake system solenoid valve connector (A) and the wiring harness protector (B).

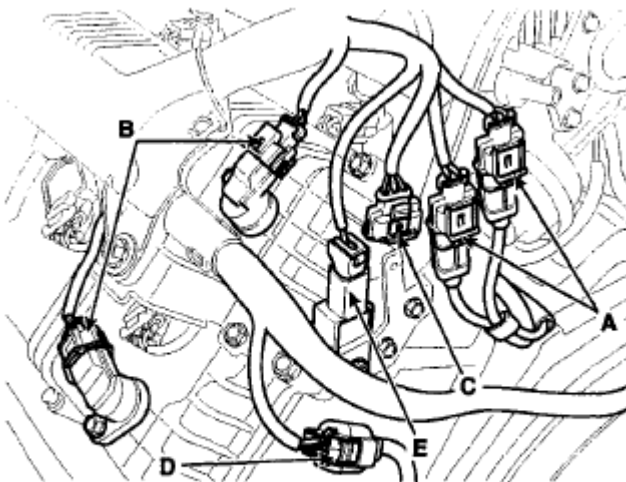


SBHM19016N

Fig. 80: Identifying Variable Intake System Solenoid Valve Connector And Wiring Harness Protector

Courtesy of HYUNDAI MOTOR CO.

8. Disconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the crankshaft position sensor connector (C), the oxygen sensor connector (D) and the condenser connector (E).

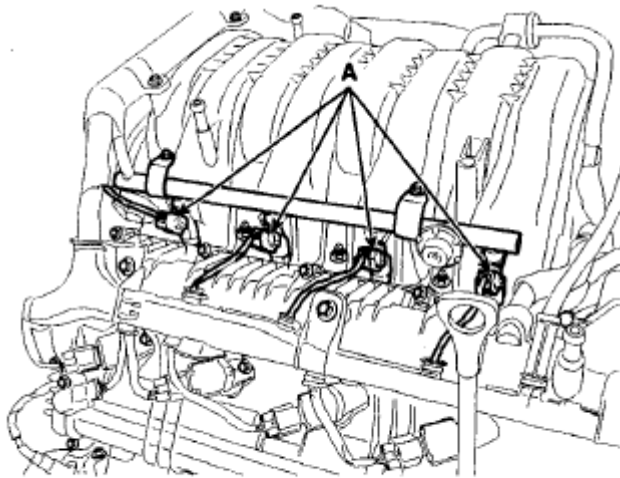


SHMM19075N

Fig. 81: Identifying Knock Sensor Connectors And Camshaft Position Sensor Connectors

Courtesy of HYUNDAI MOTOR CO.

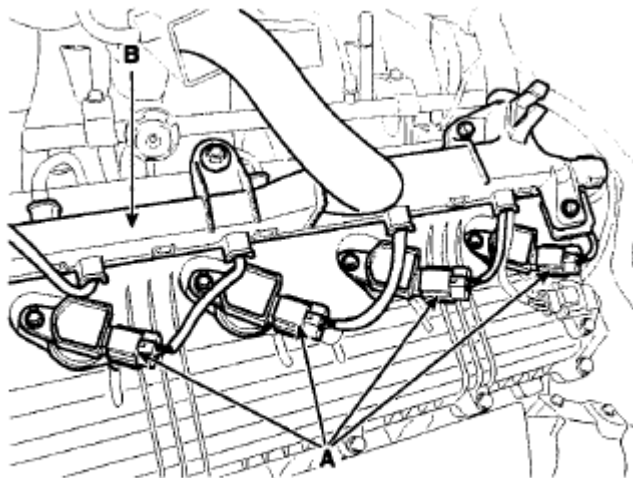
9. Disconnect the injector connectors (A).



SBHM19010N

Fig. 82: Identifying Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

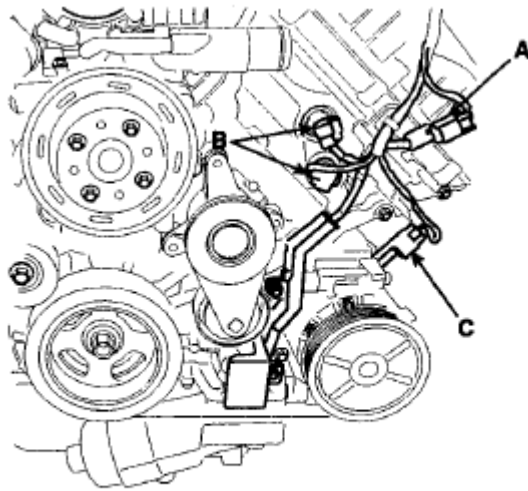
10. Disconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19077N

Fig. 83: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

11. Disconnect the oil pressure switch connector (A), the CVVT oil control valve connectors (B) and the air conditioner compressor switch connector (C).

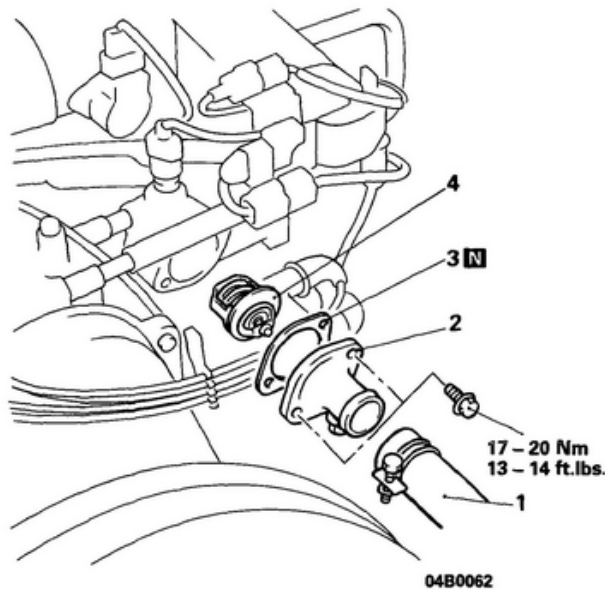


SBHM19301N

Fig. 84: Identifying Oil Pressure Switch Connector And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

13. Remove the oil level gauge (A).

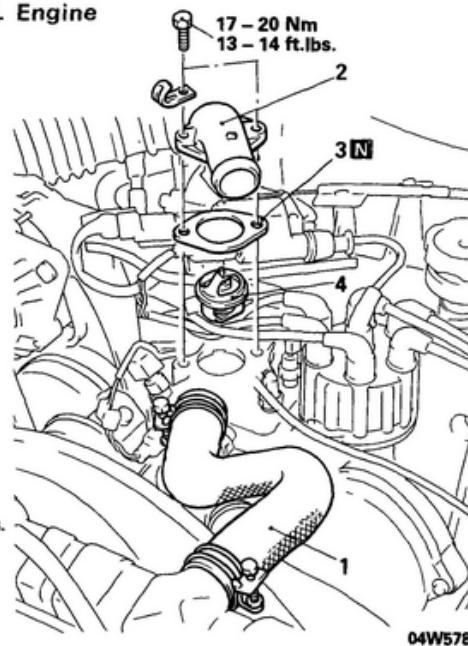
2.4 L Engine



Removal steps

1. Radiator upper hose connection
2. Water outlet fitting
3. Water outlet fitting gasket
4. Thermostat

3.0L Engine



Post-installation and Post-installation Operation

- Draining and Supplying of Engine Coolant (Refer to GROUP 00 - Maintenance Service.)

Fig. 85: Identifying Oil Level Gauge
Courtesy of HYUNDAI MOTOR CO.

14. Remove the oxygen sensor connector bracket (A).

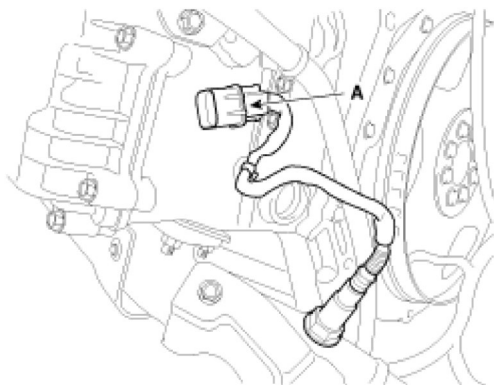


Fig. 86: Identifying Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.

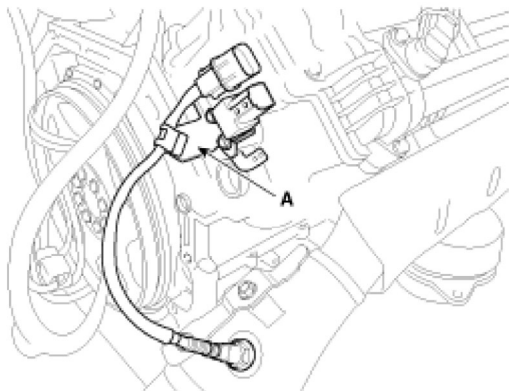
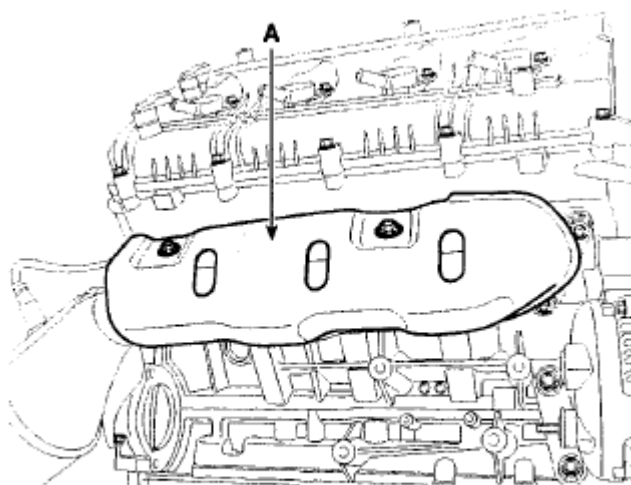


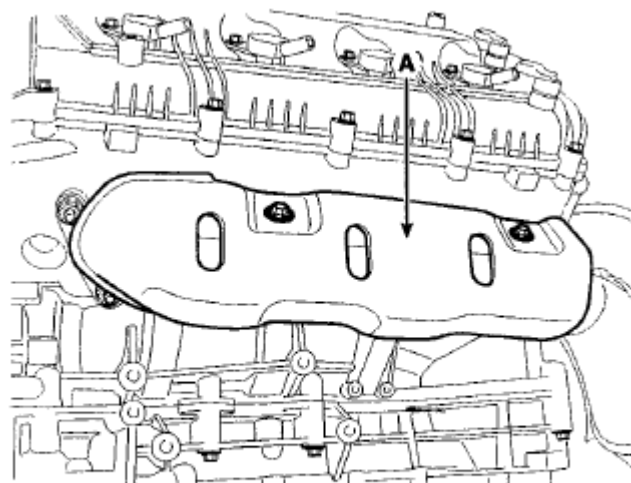
Fig. 87: Identifying Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.

15. Remove the exhaust manifold heat protector (A).



SHMM19002N

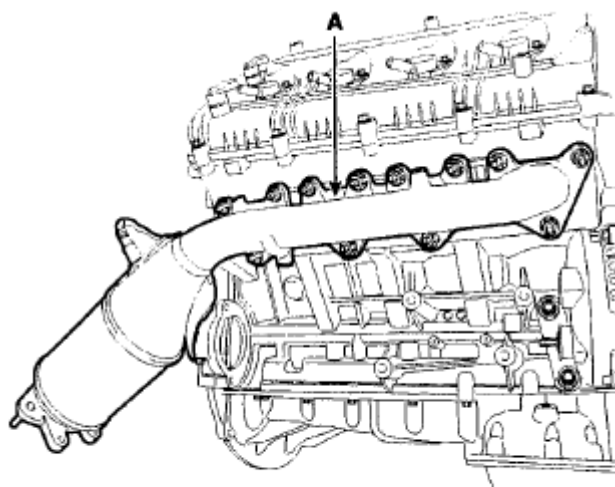
Fig. 88: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.



SHMM19003N

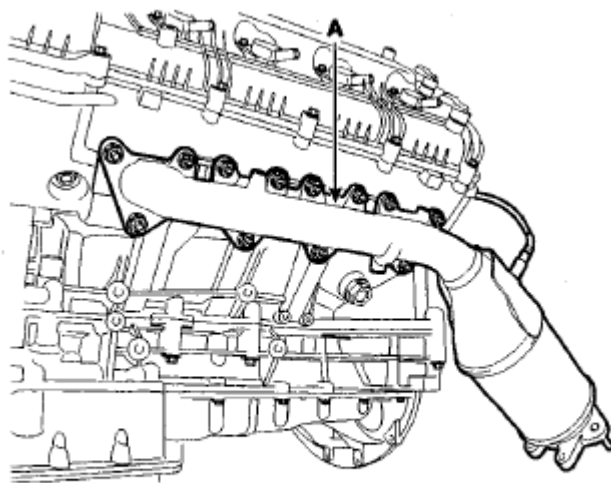
Fig. 89: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.

16. Remove the exhaust manifold (A).



SHMM19004N

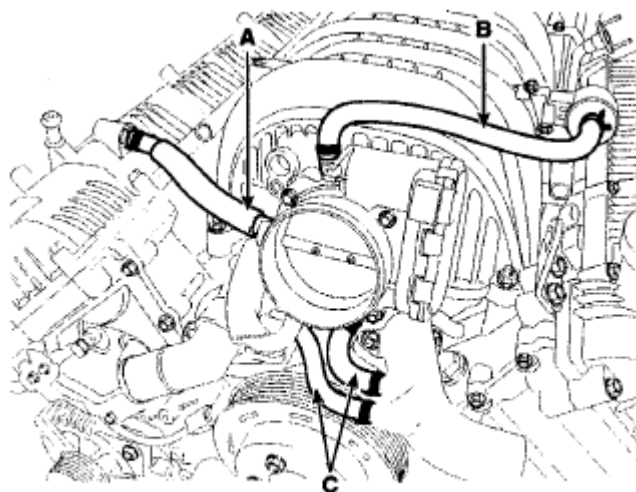
Fig. 90: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.



SHMM19005N

Fig. 91: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

17. Disconnect the PCV hose (A), the PCSV hose (B) and the water hoses (C) from the intake manifold module and the throttle body.

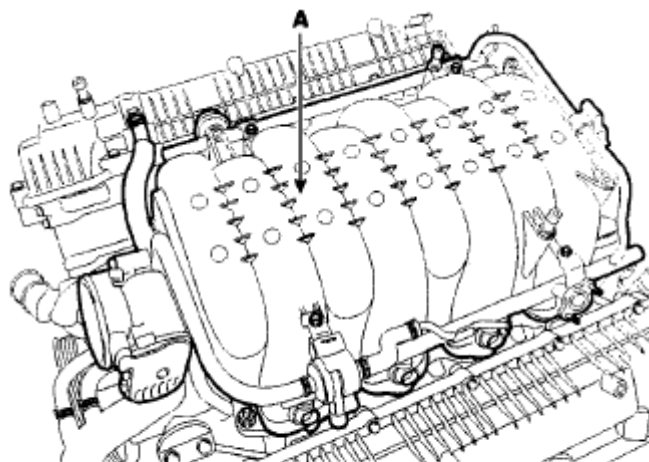


SHMM19006N

Fig. 92: Identifying Hoses

Courtesy of HYUNDAI MOTOR CO.

18. Remove the intake manifold module (A).

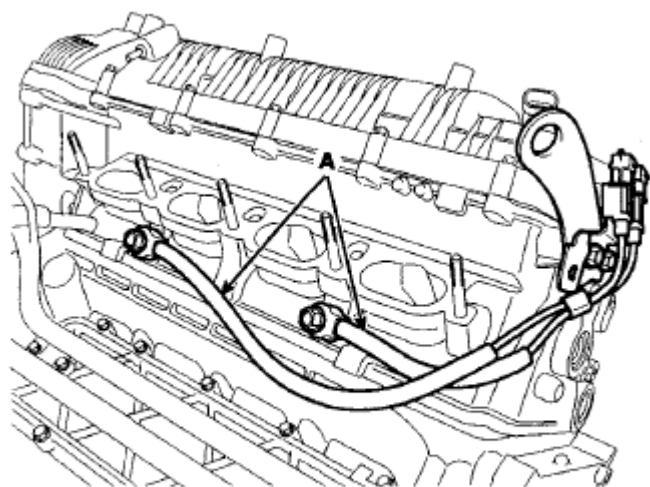


SHMM19007N

Fig. 93: Identifying Intake Manifold Module

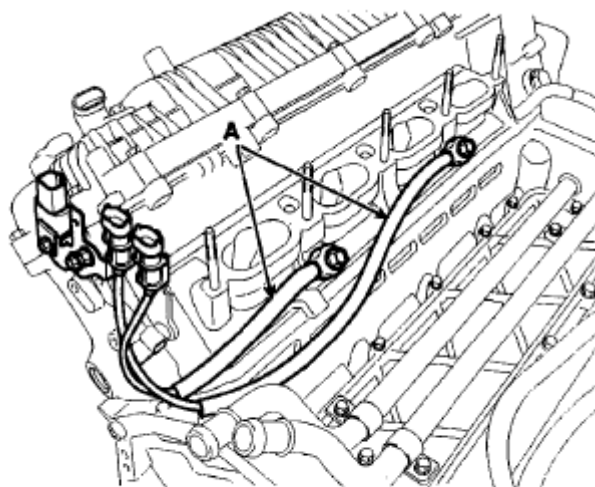
Courtesy of HYUNDAI MOTOR CO.

19. Remove the knock sensors (A).



SHMM19008N

Fig. 94: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.



SHMM19009N

Fig. 95: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.

20. Remove the water hose (A).

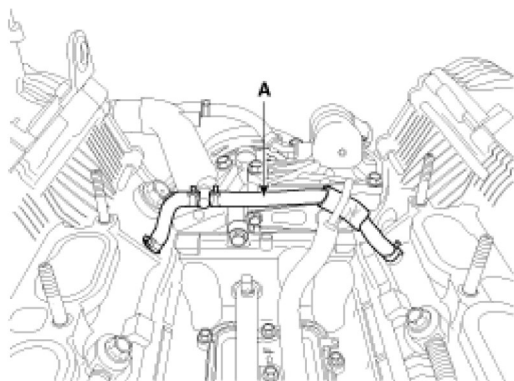
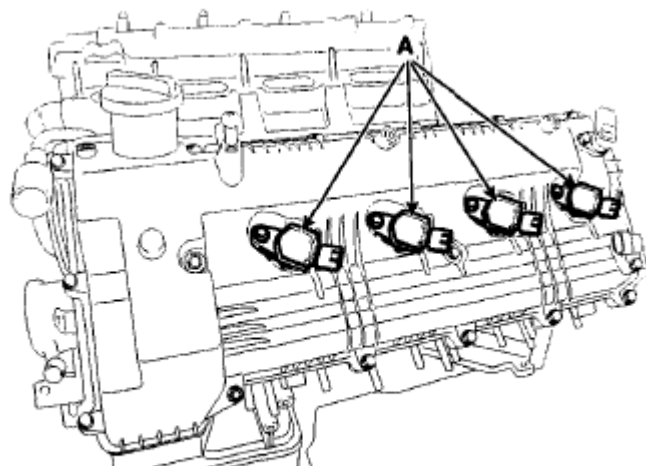


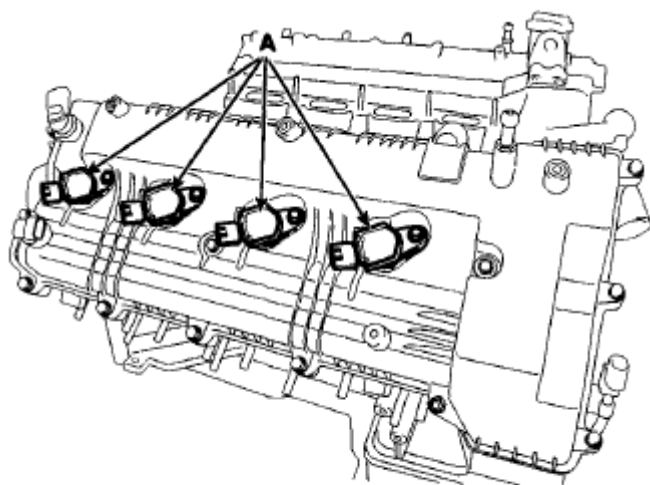
Fig. 96: Identifying Water Hose
Courtesy of HYUNDAI MOTOR CO.

21. Remove the ignition coils (A).



SHMM19010N

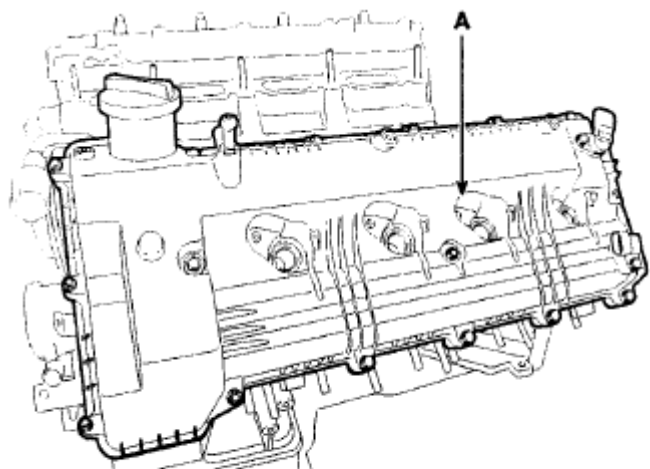
Fig. 97: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.



SHMM19011N

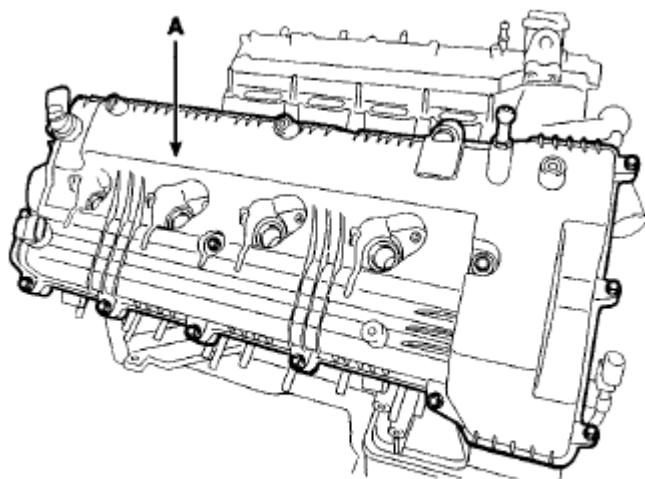
Fig. 98: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.

22. Remove the cylinder head cover (A).



SHMM19012N

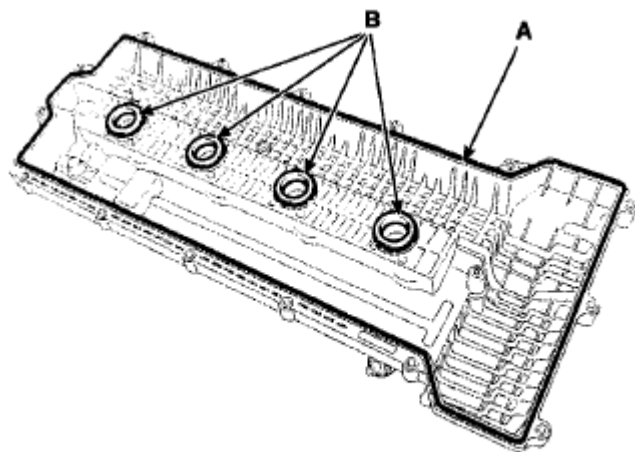
Fig. 99: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19013N

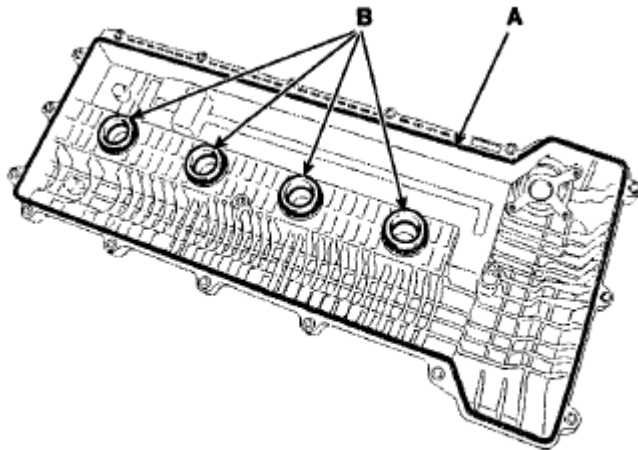
Fig. 100: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

23. Remove the cylinder head cover gasket (A) and oil seal (B).



SHMM19018N

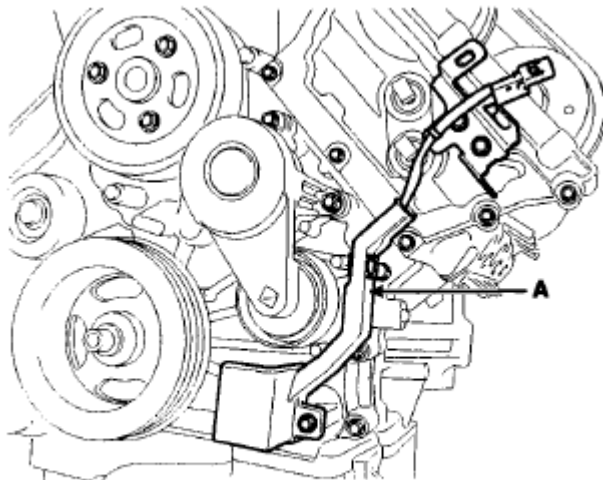
Fig. 101: Identifying Cylinder Head Cover Gasket And Oil Seal
Courtesy of HYUNDAI MOTOR CO.



SHMM19017N

Fig. 102: Identifying Cylinder Head Cover Gasket And Oil Seal
Courtesy of HYUNDAI MOTOR CO.

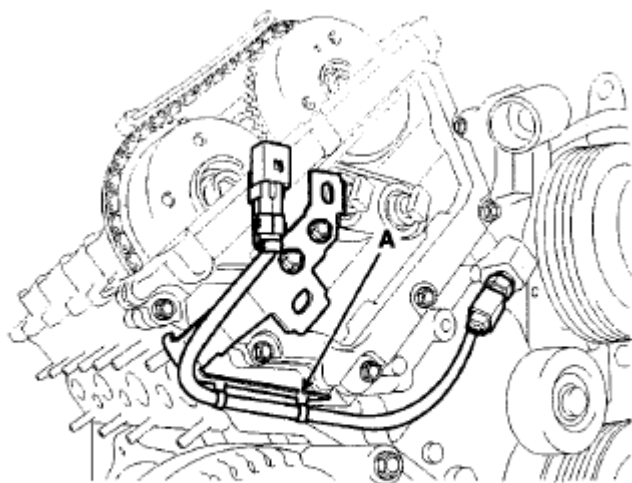
24. Remove the oil pressure switch wiring assembly and bracket (A).



SHMM19018N

Fig. 103: Identifying Oil Pressure Switch Wiring Assembly And Bracket
Courtesy of HYUNDAI MOTOR CO.

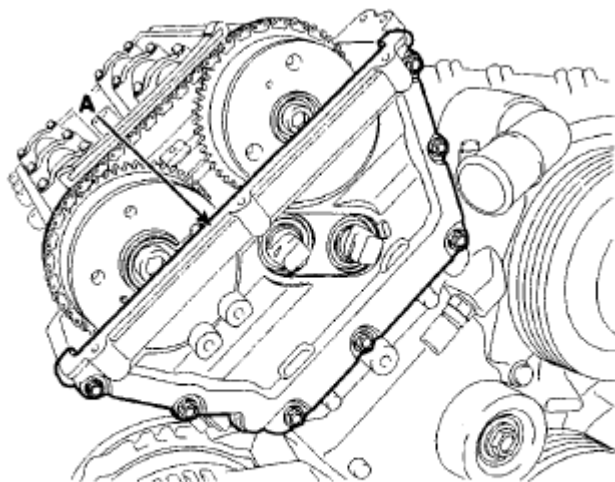
25. Remove the water temperature sensor wiring assembly and bracket (A).



SHMM19019N

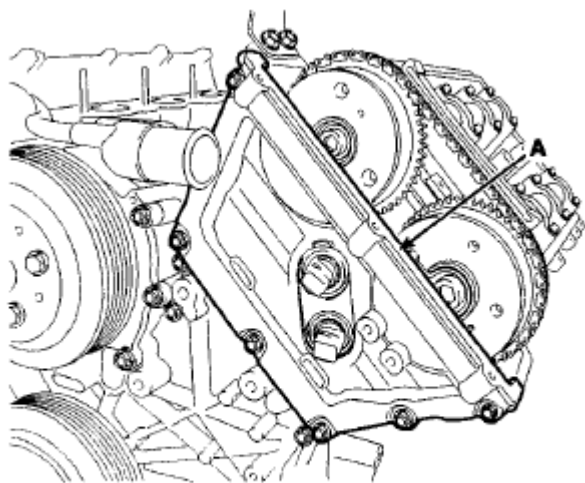
Fig. 104: Identifying Water Temperature Sensor Wiring Assembly
Courtesy of HYUNDAI MOTOR CO.

26. Remove the timing chain upper cover (A).



SHMM19020N

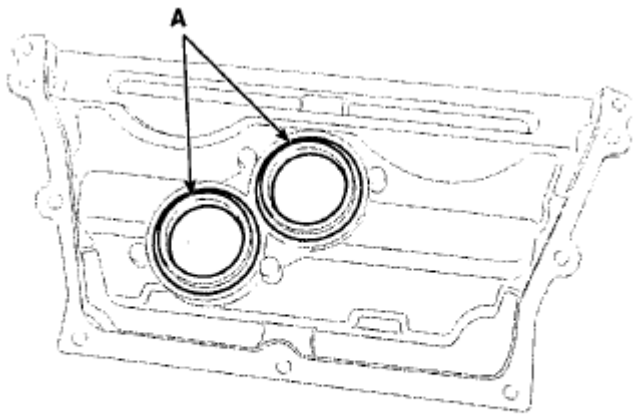
Fig. 105: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19021N

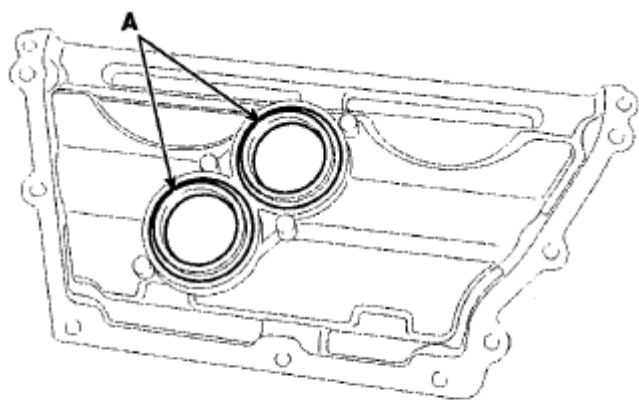
Fig. 106: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

27. Remove the timing chain upper cover oil seal (A).



SHMM19022N

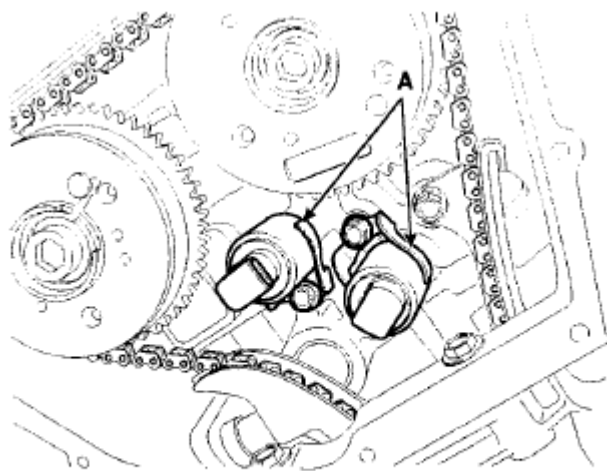
Fig. 107: Identifying Timing Chain Upper Cover Oil Seal
Courtesy of HYUNDAI MOTOR CO.



SHMM19023N

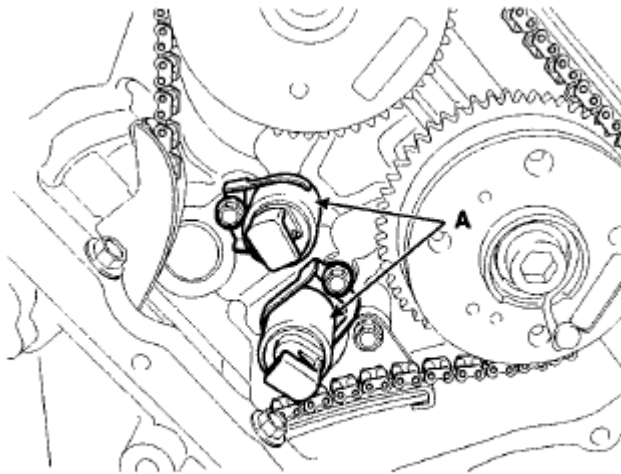
Fig. 108: Identifying Timing Chain Upper Cover Oil Seal
Courtesy of HYUNDAI MOTOR CO.

28. Remove the oil control valve (A).



SHMM19024N

Fig. 109: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.



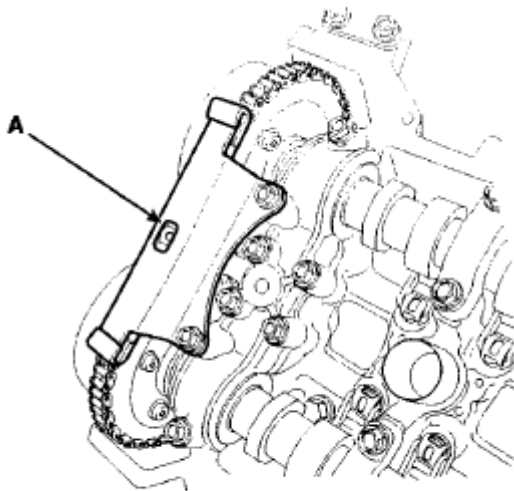
SHMM19025N

Fig. 110: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

NOTE:

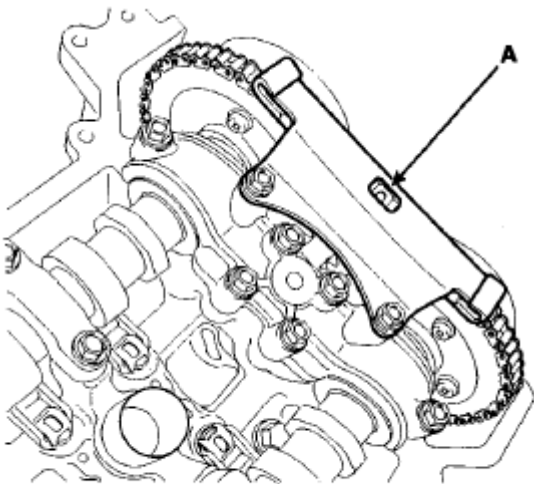
- Do not reuse the OCV when dropped.
- Keep the OCV clean.
- Do not hold the OCV sleeve during servicing.
- When the OCV is installed on the engine, do not move the engine while holding the OCV yoke.

29. Remove the cam to cam guide (A).



SHMM19026N

Fig. 111: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

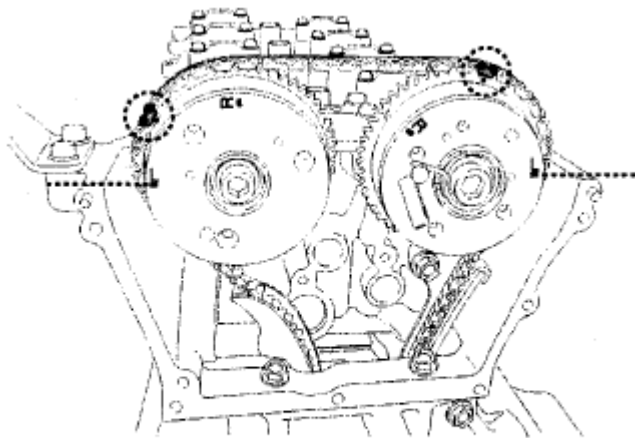


SHMM19027N

Fig. 112: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

30. Align the timing mark of camshaft sprocket.

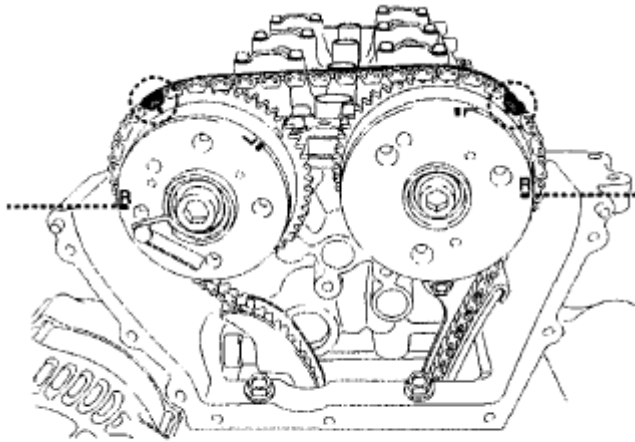
[LH]



SHMM19028N

Fig. 113: Aligning Timing Mark Of LH Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

[RH]

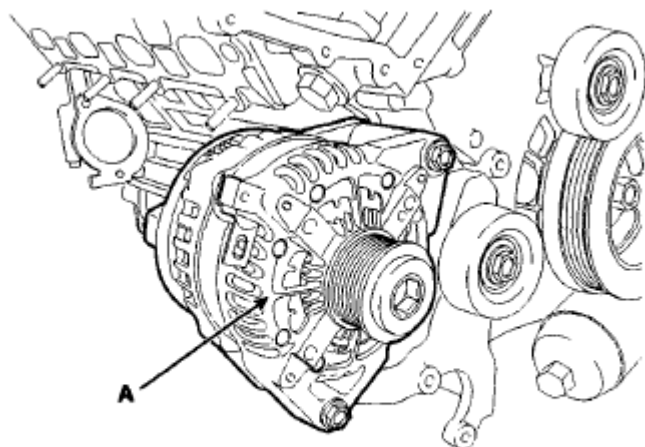


SHMM19029N

Fig. 114: Aligning Timing Mark Of RH Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

NOTE: In case that the timing system has been disassembled wholly, the timing chain can be installed with all of chain installation mark of the sprocket and timing marked chain links aligned without additional marking. However, in case of on-vehicle repair (for cylinder head assembly, timing chain tensioner, CVVT, camshaft, HLA or etc.), which is not necessary to remove the timing chain completely, mark the timing chain links corresponding to the chain installation marks on the sprocket with an identification when the No. 1 piston is at TDC position because it is very difficult to align all of the chain installation mark of the sprocket and the timing marked chain links.

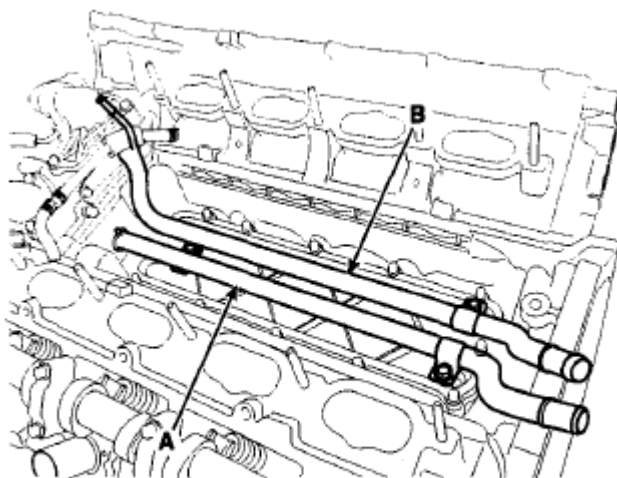
31. Remove the alternator (A).



SHMM19030N

Fig. 115: Identifying Alternator
Courtesy of HYUNDAI MOTOR CO.

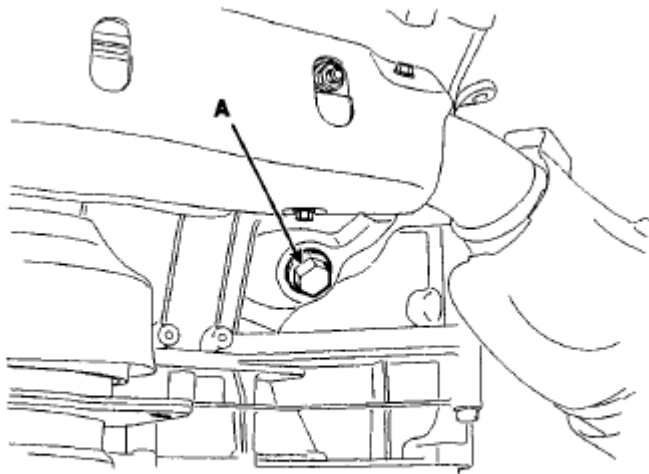
32. Remove the water outlet pipe (A) and the water inlet pipe (B).



SHMM19032N

Fig. 116: Identifying Water Outlet Pipe And Water Inlet Pipe
Courtesy of HYUNDAI MOTOR CO.

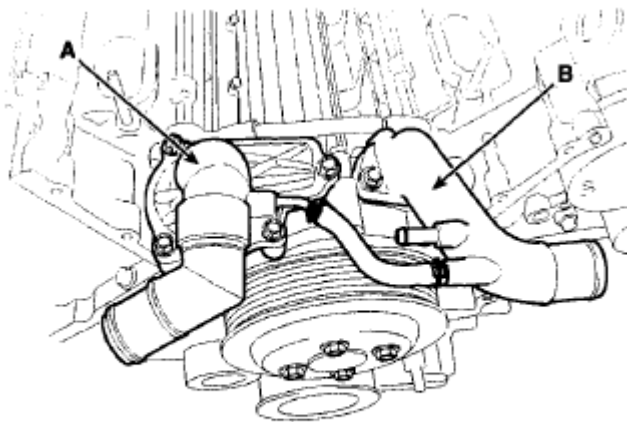
NOTE: Remove the drain plug (A) and drain the engine coolant.



SHMM19085N

Fig. 117: Identifying Drain Plug
Courtesy of HYUNDAI MOTOR CO.

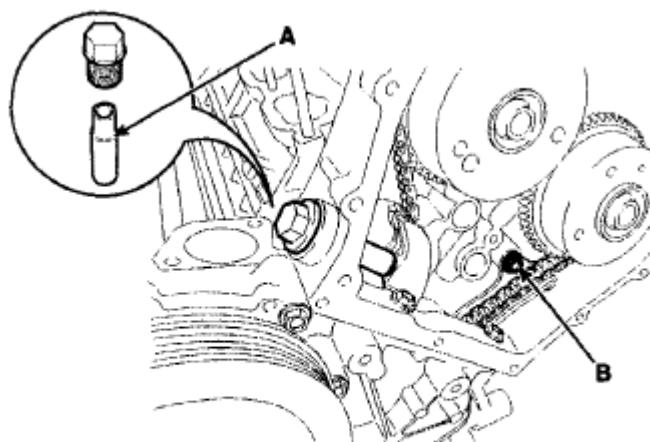
33. Remove the water temperature control assembly (A) and the water outlet fitting assembly (B).



SHMM19033N

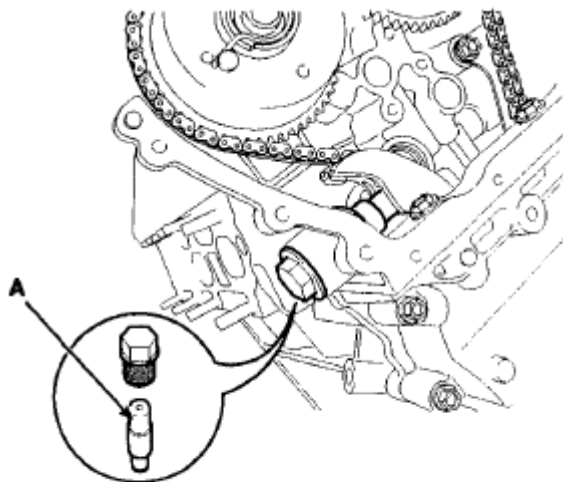
Fig. 118: Identifying Water Temperature Control Assembly And Water Outlet Fitting Assembly
Courtesy of HYUNDAI MOTOR CO.

34. Remove the timing chain tensioner (A).



SHMM19034N

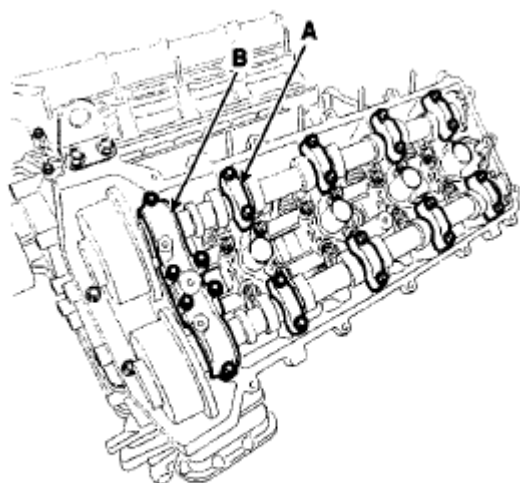
Fig. 119: Identifying Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19035N

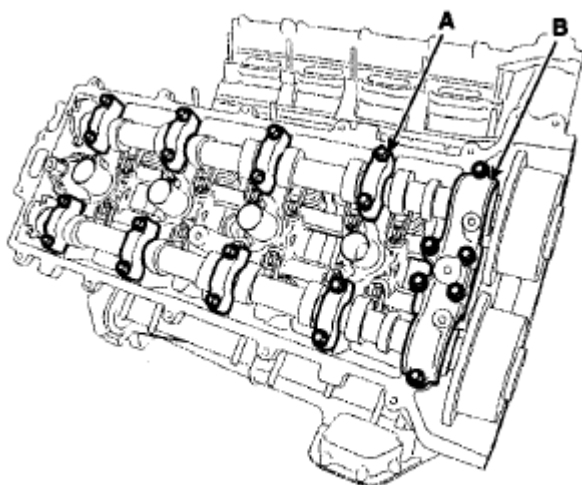
Fig. 120: Identifying Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.

35. Remove the camshaft bearing caps (A) and the camshaft thrust bearing cap (B).



SHMM19036N

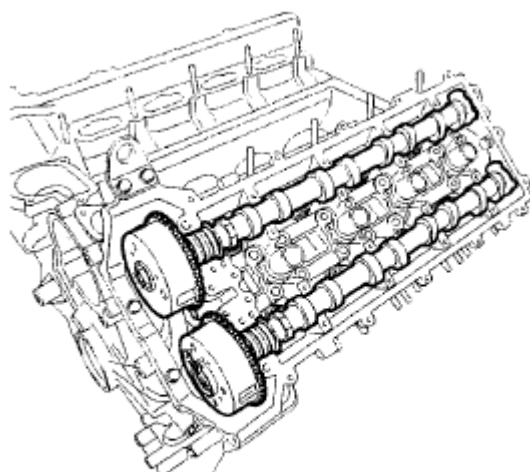
Fig. 121: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

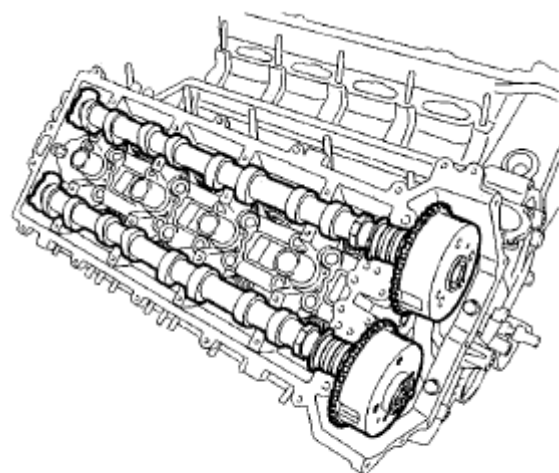
Fig. 122: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

36. Remove the camshaft.



SHMM19160N

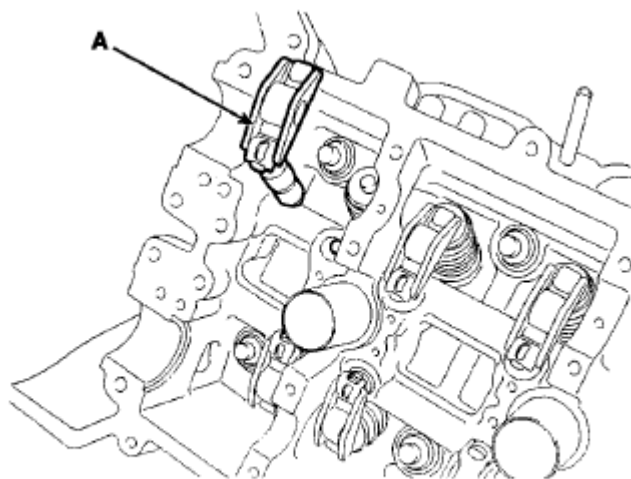
Fig. 123: Identifying Camshaft
Courtesy of HYUNDAI MOTOR CO.



SHMM19161N

Fig. 124: Identifying Camshaft
Courtesy of HYUNDAI MOTOR CO.

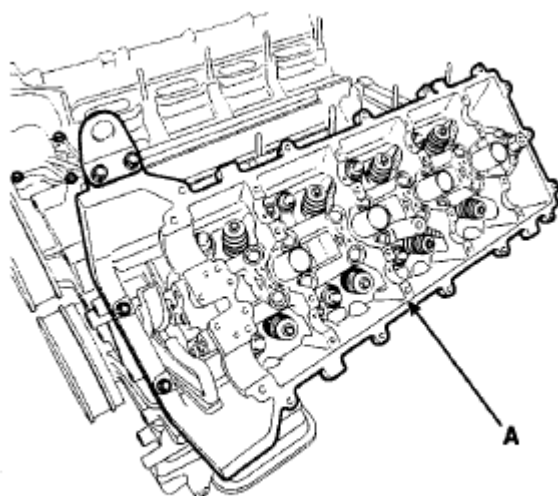
37. Remove the roller finger follower and the hydraulic lash adjuster assembly (A).



SHMM19040N

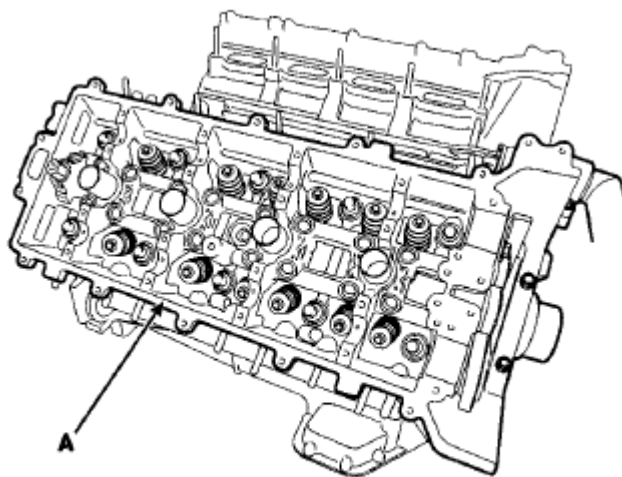
Fig. 125: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

38. Remove the cylinder head (A).
 1. Uniformly loosen and remove the cylinder head bolts, in several passes, in the sequence shown.



SHMM19041N

Fig. 126: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

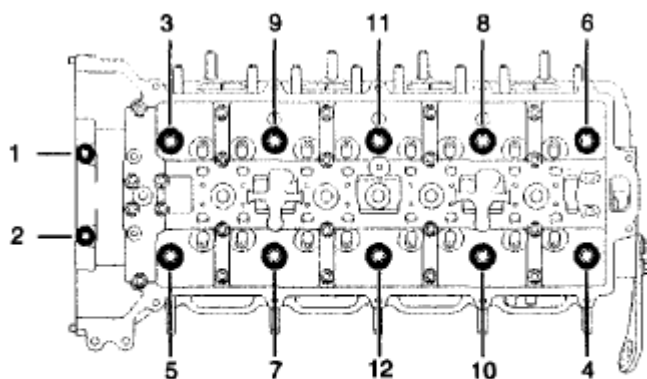


SHMM19042N

Fig. 127: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

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

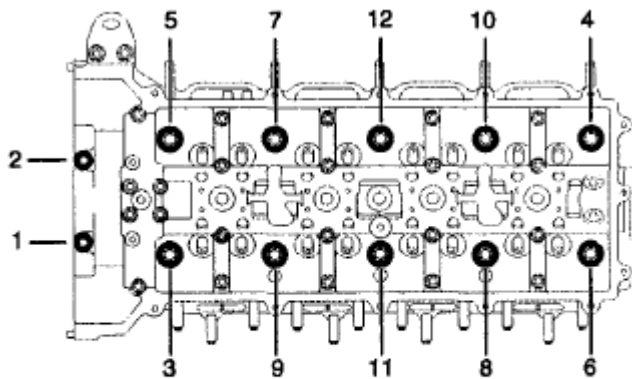
[RH]



SHMM19349N

Fig. 128: Identifying RH Cylinder Head Bolt Removal Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH]



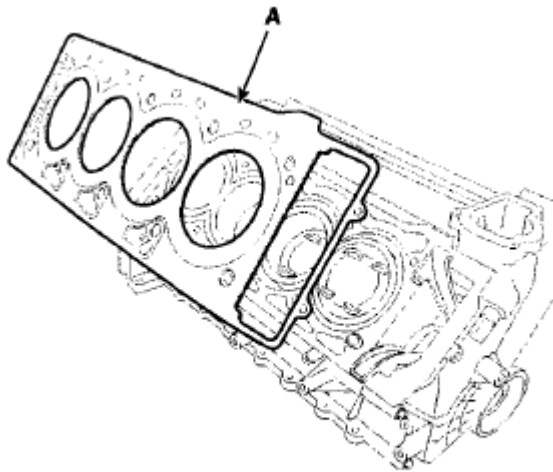
SHMM19350N

Fig. 129: Identifying LH Cylinder Head Bolt Removal Sequence
Courtesy of HYUNDAI MOTOR CO.

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

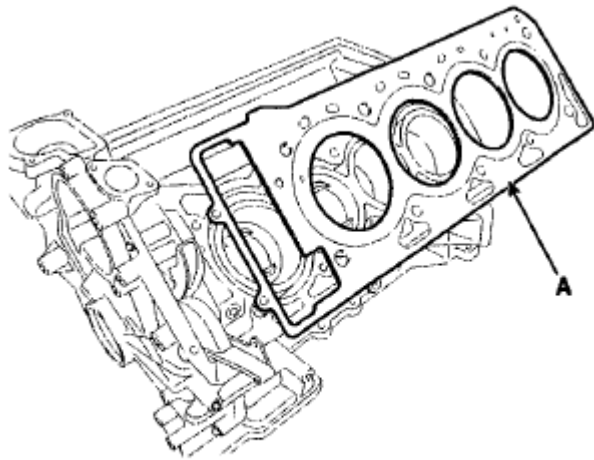
NOTE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

39. Remove the cylinder head gasket (A).



SHMM19359N

Fig. 130: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

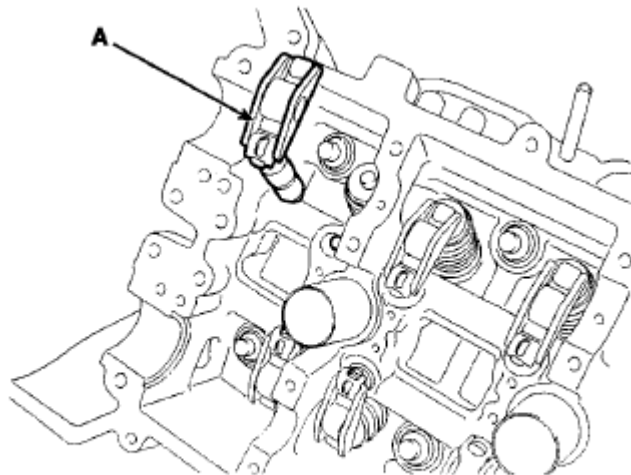


SHMM19360N

Fig. 131: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the roller finger follower and the hydraulic lash adjuster assembly (A).



SHMM19040N

Fig. 132: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

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

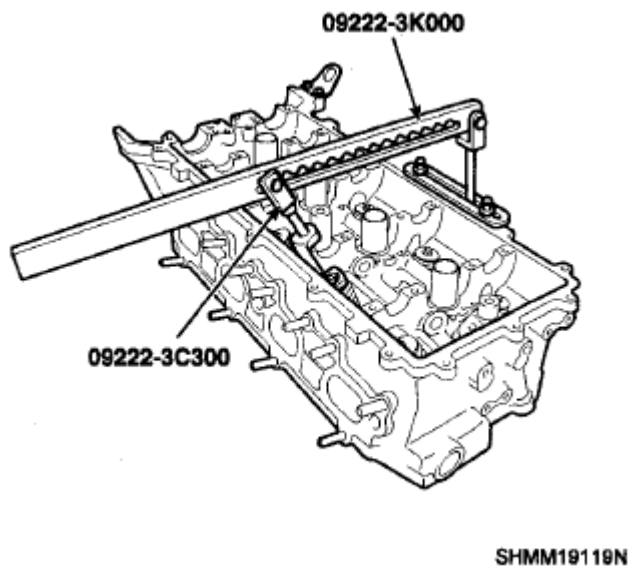


Fig. 133: Compressing Valve Spring
Courtesy of HYUNDAI MOTOR CO.

2. Remove the spring retainer.
3. Remove the valve spring.
4. Remove the valve.
5. Remove the valve stem seal.

NOTE: Do not reuse old valve stem seals.

3. Remove the OCV filter (A).

[LH]

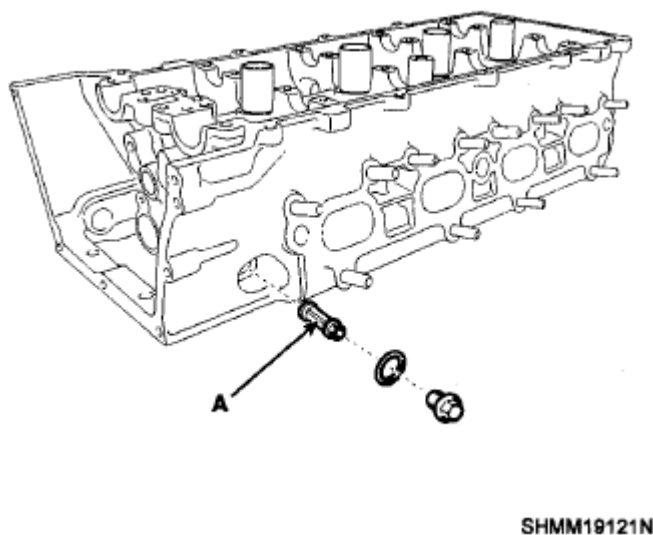
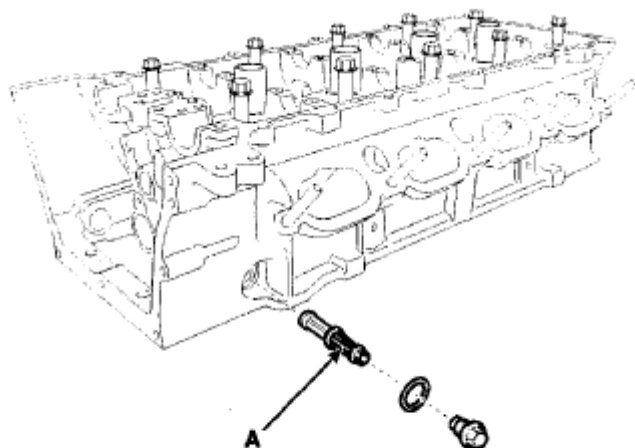


Fig. 134: Identifying LH OCV Filter
Courtesy of HYUNDAI MOTOR CO.

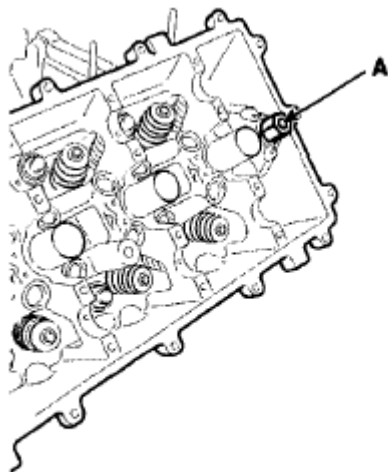
[RH]



SHMM19122N

Fig. 135: Identifying RH OCV Filter
Courtesy of HYUNDAI MOTOR CO.

4. Remove the pressure relief valve.



SHMM19312N

Fig. 136: Identifying Pressure Relief Valve
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

Cylinder Head

1. Inspect for flatness.

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

Flatness of cylinder head gasket surface

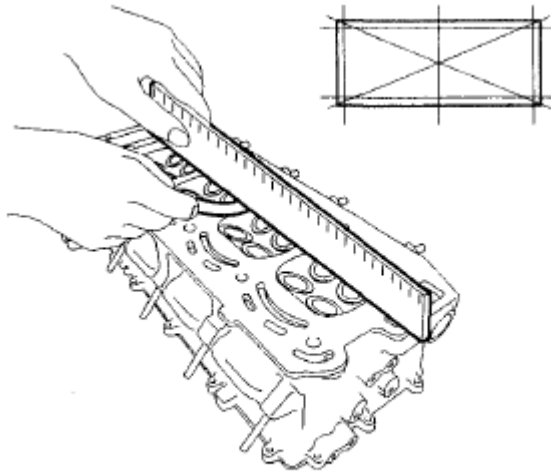
Standard: Less than 0.05mm (0.002in)

[Less than 0.02mm (0.0008in)/100x100]

Flatness of manifold gasket surface

Standard: Less than 0.1mm (0.004in)

[Less than 0.03mm (0.0012in)/110x110]



SHMM19123N

Fig. 137: Measuring Surface Contacting Cylinder Block And Manifolds For Warpage
Courtesy of HYUNDAI MOTOR CO.

2. Inspect for cracks.

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

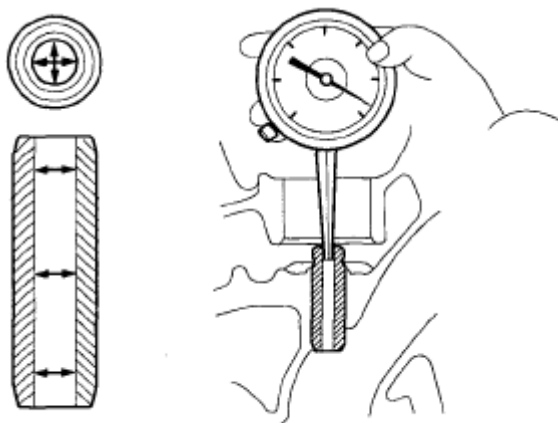
Valve And Valve Spring

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:

6.000 ~ 6.012mm (0.2362 ~ 0.2367in)



ECBF034A

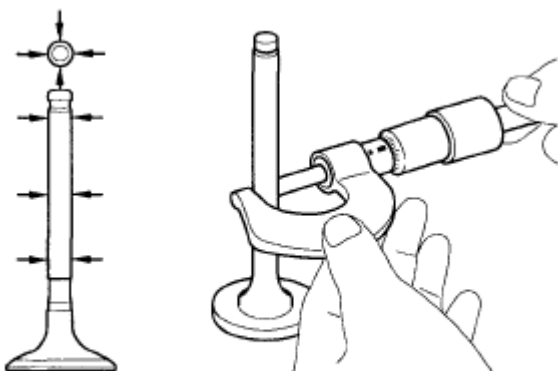
Fig. 138: Measuring Inside Diameter Of Valve Guide
Courtesy of HYUNDAI MOTOR CO.

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

Valve stem O.D.

Intake: 5.965 ~ 5.980mm (0.2348 ~ 0.2354in)

Exhaust: 5.958 ~ 5.970mm (0.2346 ~ 0.2350in)



KCRF227A

Fig. 139: Measuring Diameter Of Valve Stem
Courtesy of HYUNDAI MOTOR CO.

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

Valve stem-to-guide clearance

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

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

2. Inspect valves.

1. Check the valve is ground to the correct valve face angle.

Valve face angle:

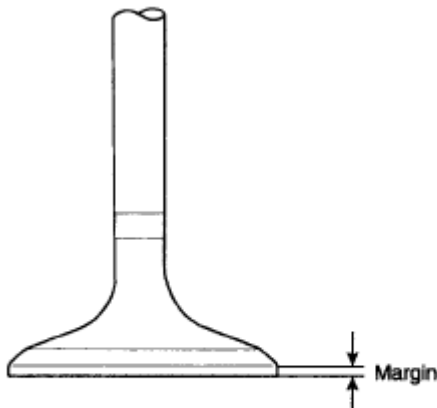
Intake/Exhaust: 45.25° ~ 45.75°

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

Intake: 1.2mm (0.0472in)

Exhaust: 1.2mm (0.0472in)



ECK0221A

Fig. 140: Checking Surface Of Valve For Wear
Courtesy of HYUNDAI MOTOR CO.

4. Check the valve length.

Length

Intake: 107.77mm (4.2429in)

Exhaust: 107.75mm (4.2421 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.
 1. Check the valve seat for evidence of overheating and improper contact with the valve face.

If the valve seat is worn, replace cylinder head.

2. Before reconditioning the seat, check the valve guide for wear. If the valve guide is worn, replace cylinder head.
3. 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.

Valve seat contact width:

Intake: 1.15 ~ 1.45mm (0.0453 ~ 0.0571in)

Exhaust: 1.35 ~ 1.65mm (0.0531 ~ 0.0650in)

Valve seat angle:

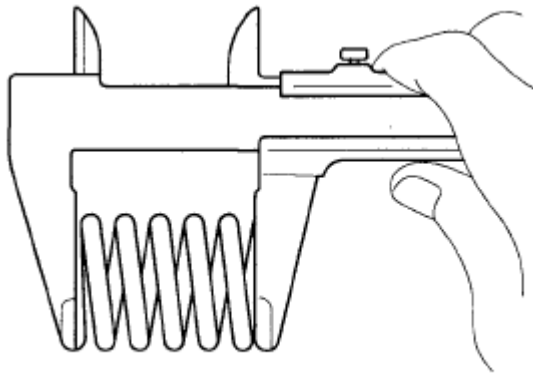
Intake/Exhaust: 44.75° ~ 45.10°

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

Valve spring

Free height: 47.8mm (1.8819in)

Out-of-square: 1.5°



KCRF205A

Fig. 141: Measuring Free Length Of Valve Spring
Courtesy of HYUNDAI MOTOR CO.

Camshaft

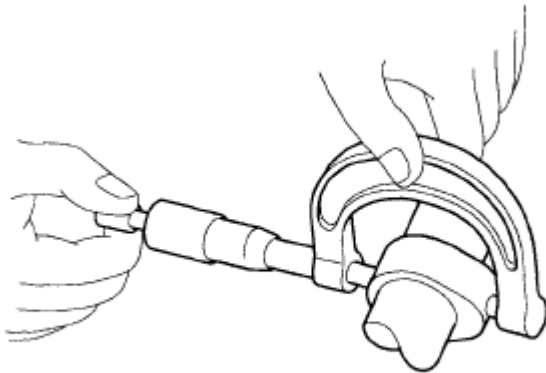
1. Inspect cam lobes.

Using a micrometer, measure the cam lobe height.

Cam height

Intake: 41.6mm (16.4in)

Exhaust: 41.5mm (16.3in)



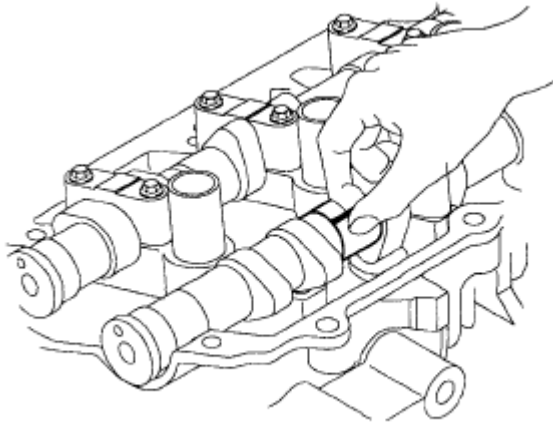
KCRF206A

Fig. 142: Measuring Cam Lobe Height
Courtesy of HYUNDAI MOTOR CO.

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

2. Inspect the 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 journals.



KCRF207A

Fig. 143: Inspecting Camshaft Journal Clearance
Courtesy of HYUNDAI MOTOR CO.

4. Install the bearing cap (A) and thrust bearing cap (B) with specified torque.

Tightening torque:

1st step:

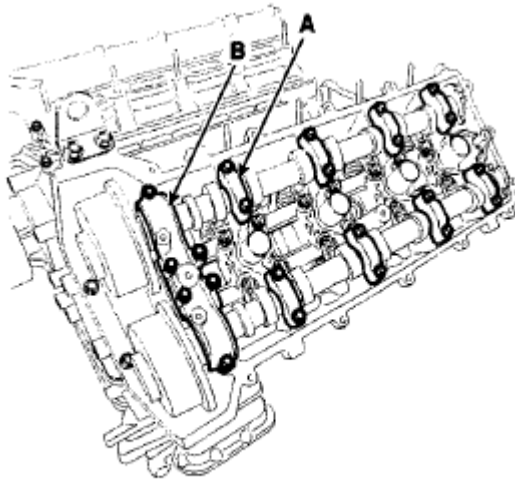
6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)

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

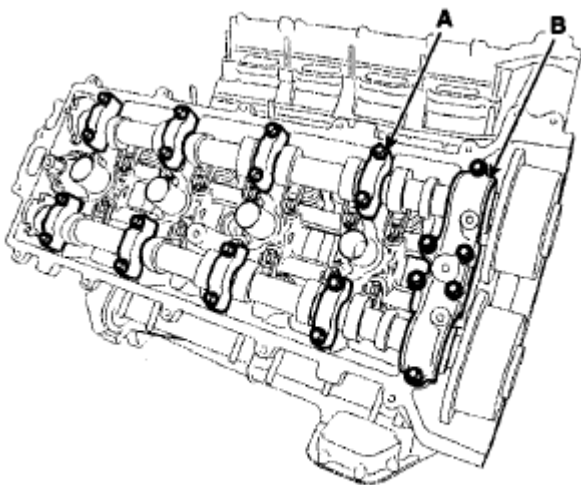
[LH]



SHMM19036N

Fig. 144: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

[RH]



SHMM19037N

Fig. 145: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

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

Camshaft bearing oil clearance

Intake/Exhaust:

No. 1 journal:

0.025 ~ 0.057mm (0.0010 ~ 0.0022in)

No. 2, 3, 4, 5 journal:

0.020 ~ 0.057mm (0.0008 ~ 0.0022in)

Camshaft journal outer diameter

Intake/Exhaust:

No. 1 journal:

35.964 ~ 35.980mm (1.4159 ~ 1.4165in)

No. 2, 3, 4, 5 journal:

25.964 ~ 25.980mm (1.0222 ~ 1.0228in)

Camshaft journal bore inner diameter

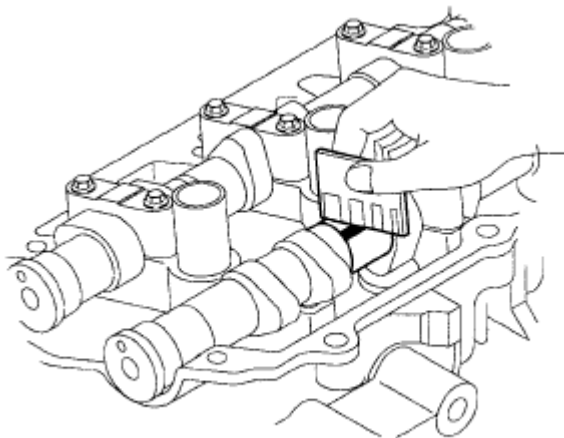
Intake/Exhaust:

No. 1 journal:

36.005 ~ 36.021mm (1.4175 ~ 1.4181 in)

No. 2, 3, 4, 5 journal:

26.000 ~ 26.021mm (1.0236 ~ 1.0244in)



KCRF208A

Fig. 146: Measuring Plastigage Widest Point

Courtesy of HYUNDAI MOTOR CO.

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 the camshaft end play.
 1. Install the camshafts.
 2. Install the bearing cap (A) and thrust bearing cap (B) with specified torque.

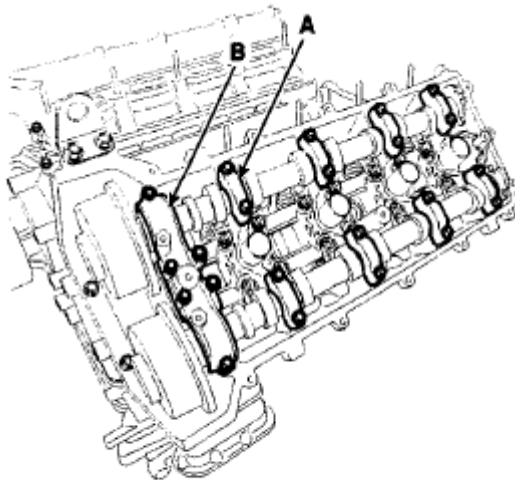
Tightening torque:

1st step:

6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

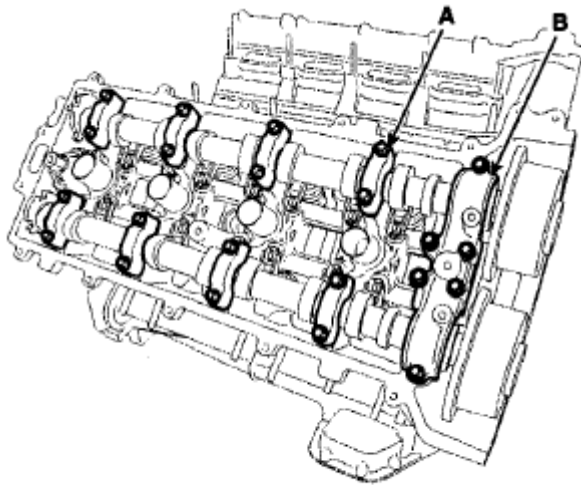
2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)



SHMM19036N

Fig. 147: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

Fig. 148: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

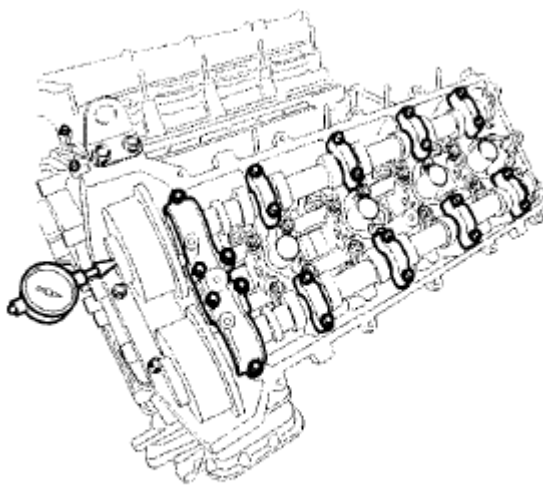
3. Using a dial indicator, measure the end play while moving the camshaft back and forth.

Camshaft end play:

RH-In: 0.12 ~ 0.22mm (0.0047 ~ 0.0086in)

RH-Ex, LH-In, LH-Ex:

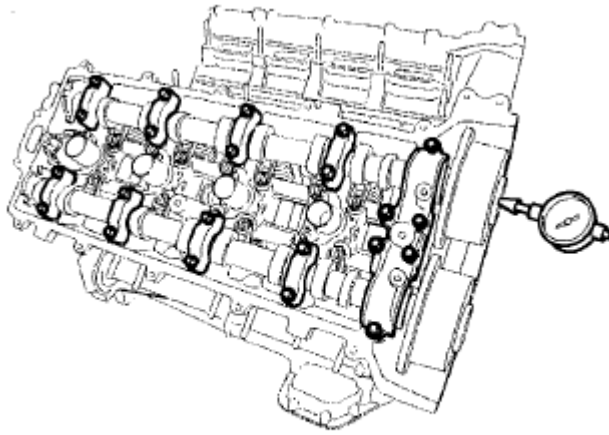
0.1 ~ 0.2mm (0.0039 ~ 0.0079in)



SHMM19301N

Fig. 149: Measuring Camshaft End Play

Courtesy of HYUNDAI MOTOR CO.



SHMM19302N

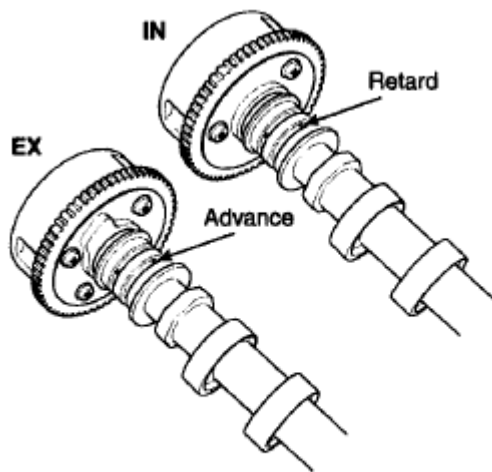
Fig. 150: Measuring Camshaft End Play
Courtesy of HYUNDAI MOTOR CO.

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

4. Remove the camshafts.

CVVT Assembly

1. Inspect the 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.
 3. Apply vinyl tape to the advance hole except the one indicated by the arrow in the illustration.



SHMM18124N

Fig. 151: Applying Vinyl Tape To Retard Hole
Courtesy of HYUNDAI MOTOR CO.

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

In-default: Max retard

Ex-default: Max advance

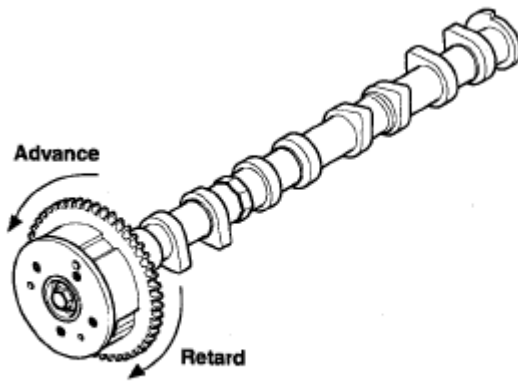
NOTE: When the oil splashes, wipe it off with a shop rag.

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

Depending on the air pressure, the In-CVVT assembly will turn to the advance side without applying force by hand.

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

Depending on the air pressure, the Ex-CVVT assembly will turn to the retard side without applying force by hand.



SGHEM7010N

Fig. 152: Turning Ex-CVVT Assembly To Advance Angle Side With Your Hand
Courtesy of HYUNDAI MOTOR CO.

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

Standard:

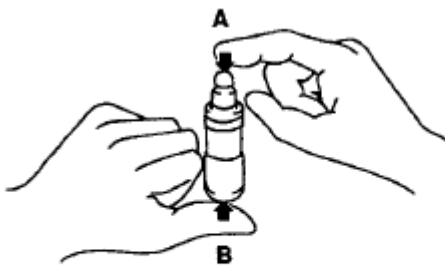
Movable smoothly in the range about 22.5°

7. Turn the In-CVVT assembly with your hand and lock it at the maximum retard angle position (clockwise).

Turn the Ex-CVVT assembly with your hand and lock it at the maximum advance angle position.

HLA (Hydraulic Lash Adjuster)

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



EDB9030D

Fig. 153: Checking Hydraulic Lash Adjuster
Courtesy of HYUNDAI MOTOR CO.

PROBLEM CHART

2010 Hyundai Genesis 3.8

2010 ENGINE Cylinder Head Assembly (Engine (G8BA - GSL 4.6)) - Genesis

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 Flours.	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: Do not run engine at a speed higher than 3000 RPM, as this may damage the HLA.
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: Be careful with the hot HLAS.

INSPECTION (REVISED)

Cylinder Head

1. Inspect for flatness.

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

Flatness of cylinder head gasket surface

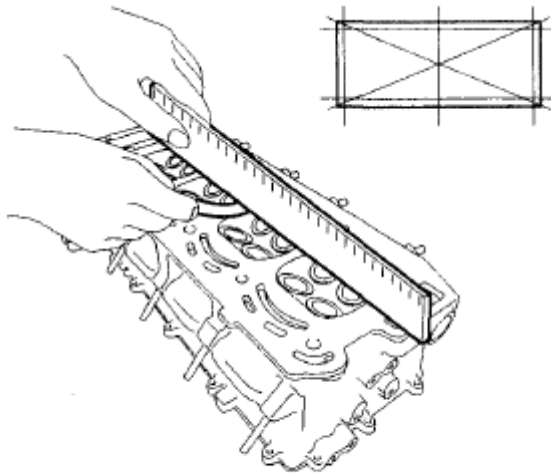
Standard: Less than 0.05mm (0.002in)

[Less than 0.02mm (0.0008in)/100x100]

Flatness of manifold gasket surface

Standard: Less than 0.1mm (0.004in)

[Less than 0.03mm (0.0012in)/110x110]



SHMM19123N

Fig. 154: Measuring Surface Contacting Cylinder Block And Manifolds For Warpage
Courtesy of HYUNDAI MOTOR CO.

2. Inspect for cracks.

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

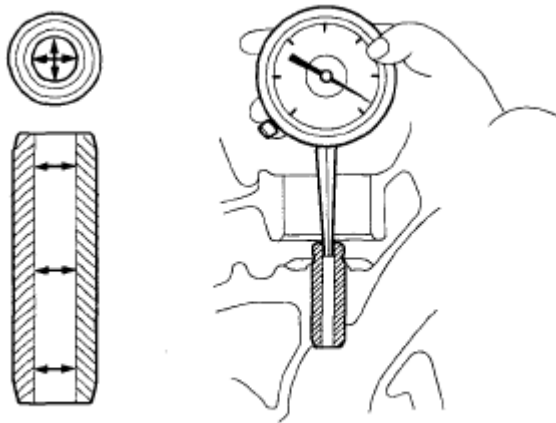
Valve And Valve Spring

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:

6.000 ~ 6.012mm (0.2362 ~ 0.2367in)



ECBF034A

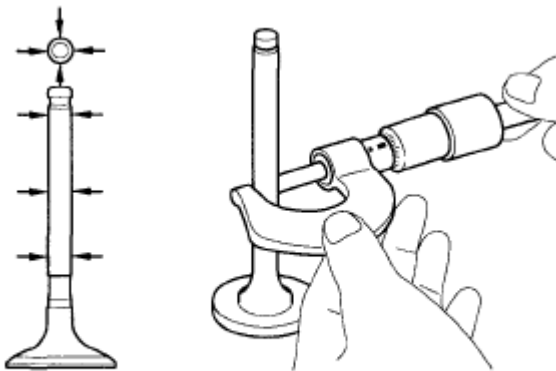
Fig. 155: Measuring Inside Diameter Of Valve Guide
Courtesy of HYUNDAI MOTOR CO.

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

Valve stem O.D.

Intake: 5.965 ~ 5.980mm (0.2348 ~ 0.2354in)

Exhaust: 5.958 ~ 5.970mm (0.2346 ~ 0.2350in)



KCRF227A

Fig. 156: Measuring Diameter Of Valve Stem
Courtesy of HYUNDAI MOTOR CO.

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

Valve stem-to-guide clearance

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

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

2. Inspect valves.

1. Check the valve is ground to the correct valve face angle.

Valve face angle:

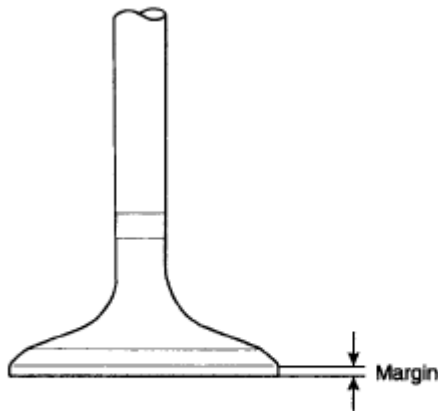
Intake/Exhaust: 45.25° ~ 45.75°

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

Intake: 1.2mm (0.0472in)

Exhaust: 1.2mm (0.0472in)



ECKD221A

Fig. 157: Checking Surface Of Valve For Wear
Courtesy of HYUNDAI MOTOR CO.

4. Check the valve length.

Length

Intake: 107.77mm (4.2429in)

Exhaust: 107.75mm (4.2421 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.

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

If the valve seat is worn, replace cylinder head.

2. Before reconditioning the seat, check the valve guide for wear. If the valve guide is worn, replace cylinder head.
3. 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.

Valve seat contact width:

Intake: 1.15 ~ 1.45mm (0.0453 ~ 0.0571in)

Exhaust: 1.35 ~ 1.65mm (0.0531 ~ 0.0650in)

Valve seat angle:

Intake/Exhaust: 44.75° ~ 45.10°

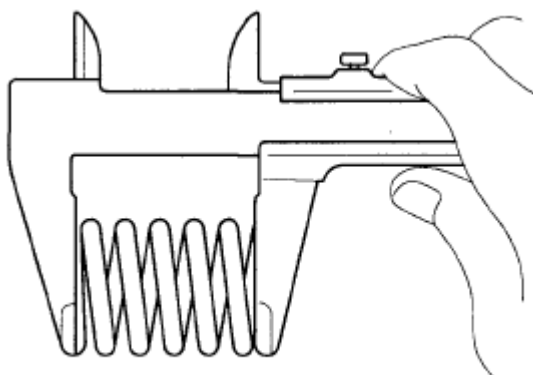
4. Inspect valve springs.

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

Valve spring

Free height: 47.8mm (1.8819in)

Out-of-square: 1.5°



KCRF205A

Fig. 158: Measuring Free Length Of Valve Spring
Courtesy of HYUNDAI MOTOR CO.

Camshaft

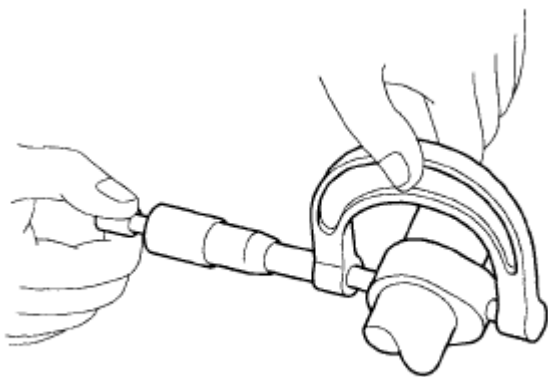
1. Inspect cam lobes.

Using a micrometer, measure the cam lobe height.

Cam height

Intake: 41.77329mm (1.6446in)

Exhaust: 41.55202mm (1.6359in)

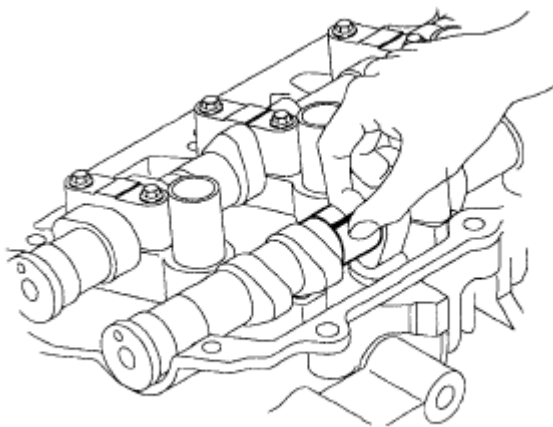


KCRF208A

Fig. 159: Measuring Cam Lobe Height
Courtesy of HYUNDAI MOTOR CO.

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

2. Inspect the 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 journals.



KCRF207A

Fig. 160: Inspecting Camshaft Journal Clearance
Courtesy of HYUNDAI MOTOR CO.

4. Install the bearing cap (A) and thrust bearing cap (B) with specified torque.

Tightening torque:

1st step:

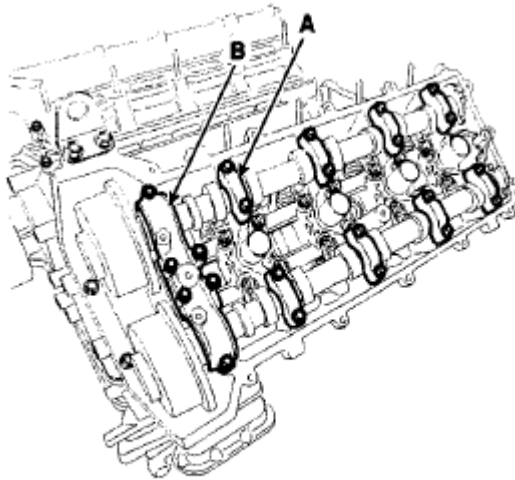
6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)

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

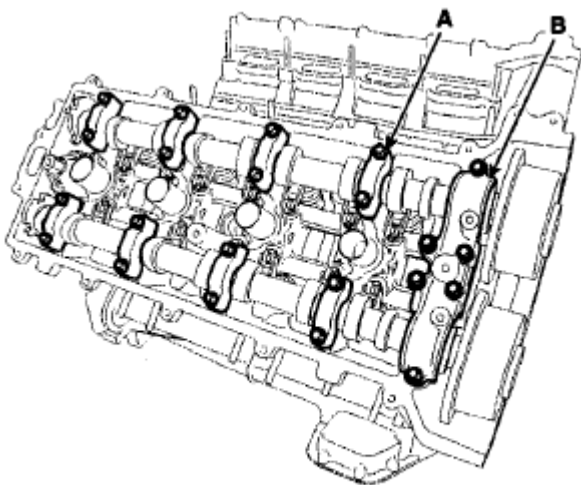
[LH]



SHMM19036N

Fig. 161: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

[RH]



SHMM19037N

Fig. 162: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

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

Camshaft bearing oil clearance

Intake/Exhaust:

No. 1 journal:

0.025 ~ 0.057mm (0.0010 ~ 0.0022in)

No. 2, 3, 4, 5 journal:

0.020 ~ 0.057mm (0.0008 ~ 0.0022in)

Camshaft journal outer diameter

Intake/Exhaust:

No. 1 journal:

35.964 ~ 35.980mm (1.4159 ~ 1.4165in)

No. 2, 3, 4, 5 journal:

25.964 ~ 25.980mm (1.0222 ~ 1.0228in)

Camshaft journal bore inner diameter

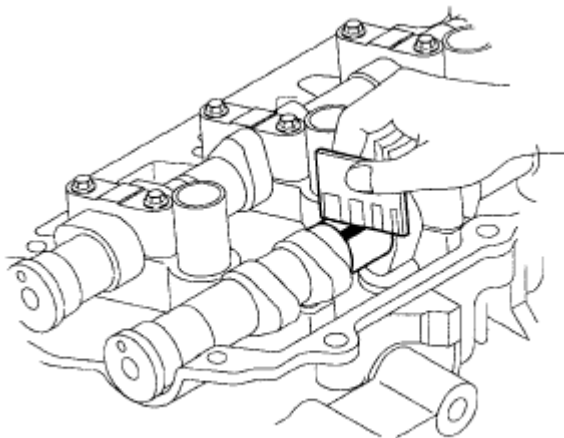
Intake/Exhaust:

No. 1 journal:

36.005 ~ 36.021mm (1.4175 ~ 1.4181 in)

No. 2, 3, 4, 5 journal:

26.000 ~ 26.021mm (1.0236 ~ 1.0244in)



KCRF208A

Fig. 163: Measuring Plastigage Widest Point

Courtesy of HYUNDAI MOTOR CO.

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 the camshaft end play.
 1. Install the camshafts.
 2. Install the bearing cap (A) and thrust bearing cap (B) with specified torque.

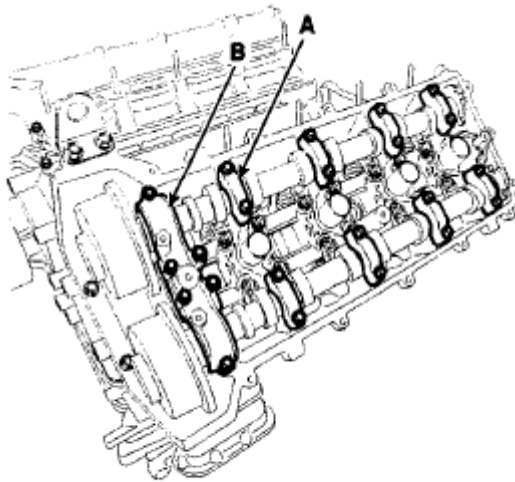
Tightening torque:

1st step:

6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

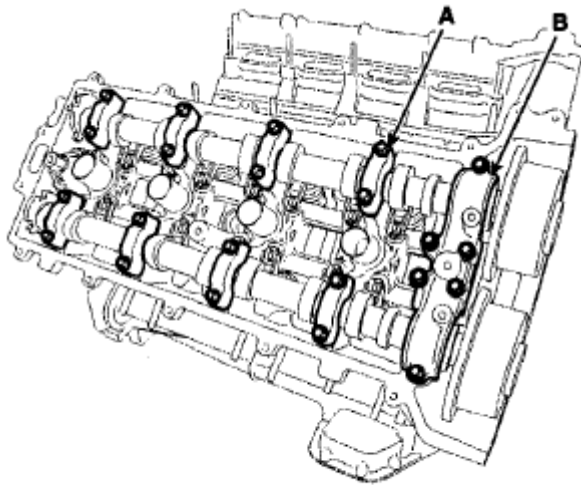
2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)



SHMM19036N

Fig. 164: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

Fig. 165: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

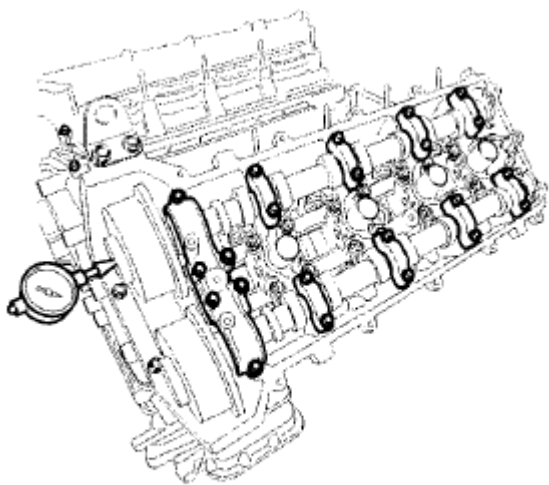
3. Using a dial indicator, measure the end play while moving the camshaft back and forth.

Camshaft end play:

RH-In: 0.12 ~ 0.22mm (0.0047 ~ 0.0086in)

RH-Ex, LH-In, LH-Ex:

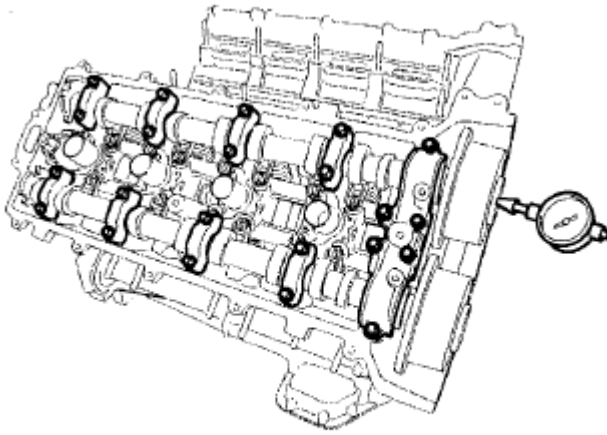
0.1 ~ 0.2mm (0.0039 ~ 0.0079in)



SHMM19301N

Fig. 166: Measuring Camshaft End Play

Courtesy of HYUNDAI MOTOR CO.



SHMM19302N

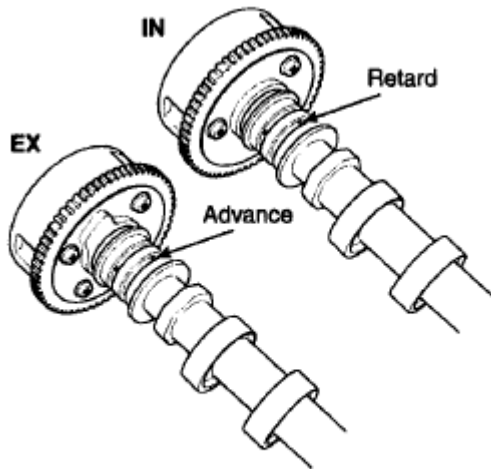
Fig. 167: Measuring Camshaft End Play
Courtesy of HYUNDAI MOTOR CO.

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

4. Remove the camshafts.

CVVT Assembly

1. Inspect the 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.
 3. Apply vinyl tape to the advance hole except the one indicated by the arrow in the illustration.



SHMM18124N

Fig. 168: Applying Vinyl Tape To Retard Hole
 Courtesy of HYUNDAI MOTOR CO.

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

In-default: Max retard

Ex-default: Max advance

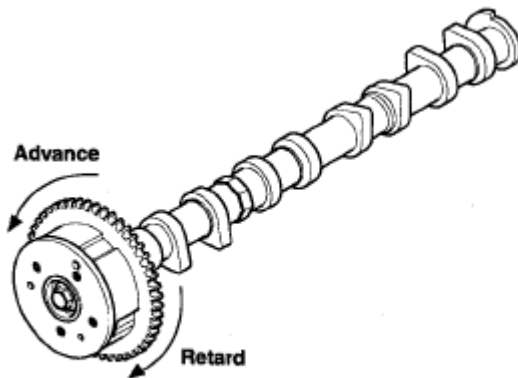
NOTE: When the oil splashes, wipe it off with a shop rag.

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

Depending on the air pressure, the In-CVVT assembly will turn to the advance side without applying force by hand.

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

Depending on the air pressure, the Ex-CVVT assembly will turn to the retard side without applying force by hand.



SGHEM7010N

Fig. 169: Turning Ex-CVVT Assembly To Advance Angle Side With Your Hand
Courtesy of HYUNDAI MOTOR CO.

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

Standard:

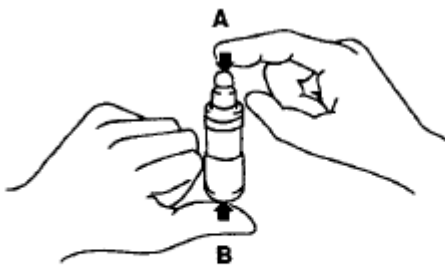
Movable smoothly in the range about 22.5°

7. Turn the In-CVVT assembly with your hand and lock it at the maximum retard angle position (clockwise).

Turn the Ex-CVVT assembly with your hand and lock it at the maximum advance angle position.

HLA (Hydraulic Lash Adjuster)

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



EDB9030D

Fig. 170: Checking Hydraulic Lash Adjuster
Courtesy of HYUNDAI MOTOR CO.

PROBLEM CHART

2010 Hyundai Genesis 3.8

2010 ENGINE Cylinder Head Assembly (Engine (G8BA - GSL 4.6)) - Genesis

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 Flours.	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: Do not run engine at a speed higher than 3000 RPM, as this may damage the HLA.
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: Be careful with the hot HLAS.

REASSEMBLY

NOTE:

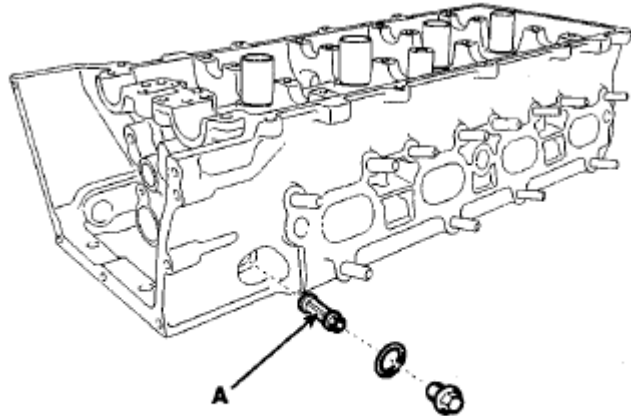
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace oil seals with new ones.

1. Install the OCV filter (A).

Tightening torque:

53.9 ~ 63.7Nm (5.5 ~ 6.5kgf.m, 39,8 ~ 47.0lb-ft)

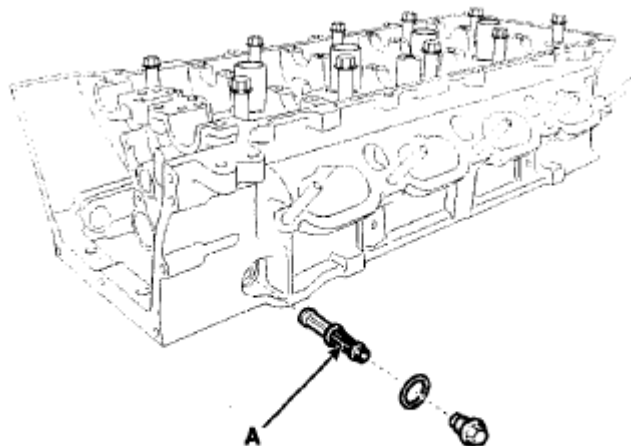
[LH]



SHMM19121N

Fig. 171: Identifying LH OCV Filter
Courtesy of HYUNDAI MOTOR CO.

[RH]



SHMM19122N

Fig. 172: Identifying RH OCV Filter
Courtesy of HYUNDAI MOTOR CO.

2. Install the valves.
 1. Using the SST (09222-28200), 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.

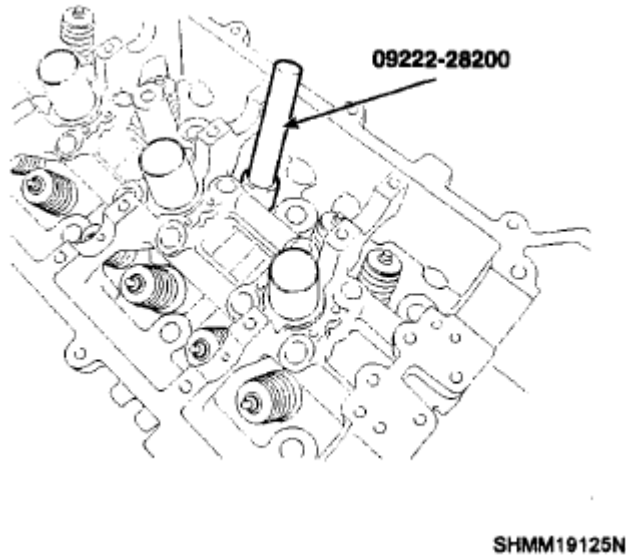


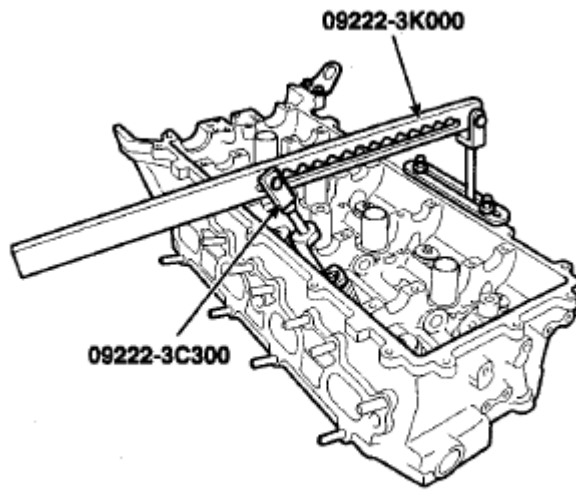
Fig. 173: Pushing Oil Seal
Courtesy of HYUNDAI MOTOR CO.

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 install the retainer.

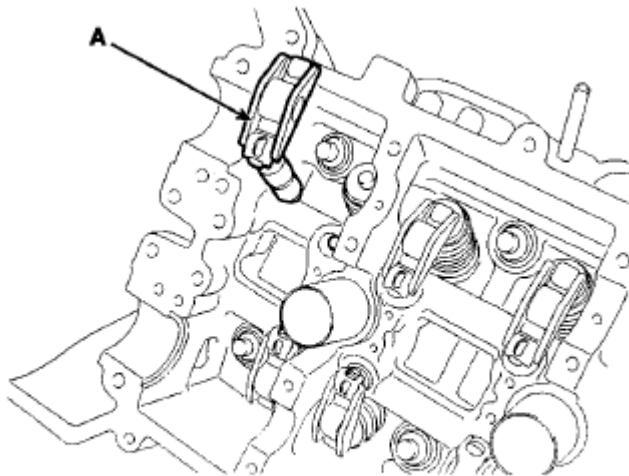
3. Using the SST (09222 - 3K000, 09222-3C300), compress the spring and install the retainer locks. After installing the valves, ensure that the retainer locks are correctly in place before releasing the valve spring compressor.



SHMM19119N

Fig. 174: Compressing Valve Spring
Courtesy of HYUNDAI MOTOR CO.

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.
3. Install the roller finger follower and the hydraulic lash adjuster assembly (A).

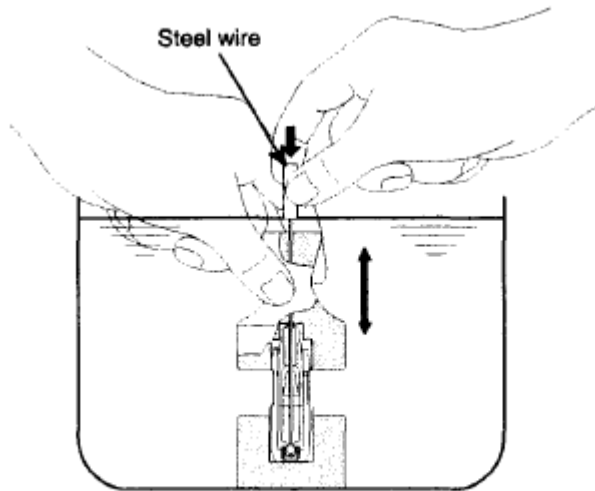


SHMM19040N

Fig. 175: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

1. Until installing HLA shall be held upright so that engine oil in HLA should not spill and assured that dust does not adhere to HLA.
2. HLA shall be inserted tenderly to the cylinder head not to spill engine oil from HLA. In case of spilling, air vent shall be done in accordance with the air bent procedure.

NOTE: Stroke HLA in engine oil 4~5 times by pushing its cap while pushing the ball down slightly by hard steel wire.
(Take care not to severely push hard steel wire down since ball is several grames.)



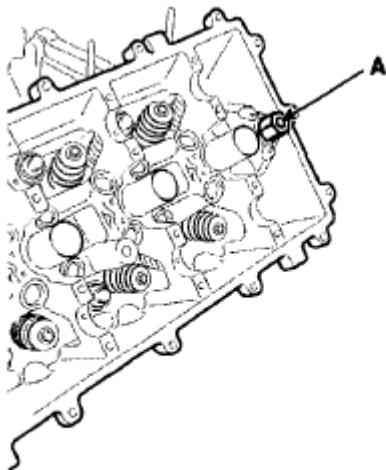
LCGF133A

Fig. 176: Pushing Ball Down Slightly By Hard Steel Wire
Courtesy of HYUNDAI MOTOR CO.

4. Install the pressure relief valve.

Tightening torque:

21.6 ~ 25.5Nm (2.2 ~ 2.6kgf.m, 15.9 ~ 18.8lb-ft)



SHMM19312N

Fig. 177: Identifying Pressure Relief Valve
Courtesy of HYUNDAI MOTOR CO.

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 gasket (A).

1. The sealant locations on cylinder head gasket, cylinder block and timing chain lower case must be free of engine oil and ETC.
2. Before assembling the cylinder head gasket, the liquid sealant TB 1217H should be applied on the gap between cylinder block and timing chain lower case.

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

NOTE: **Refer to below illustration to apply the sealant.**

Bead width:

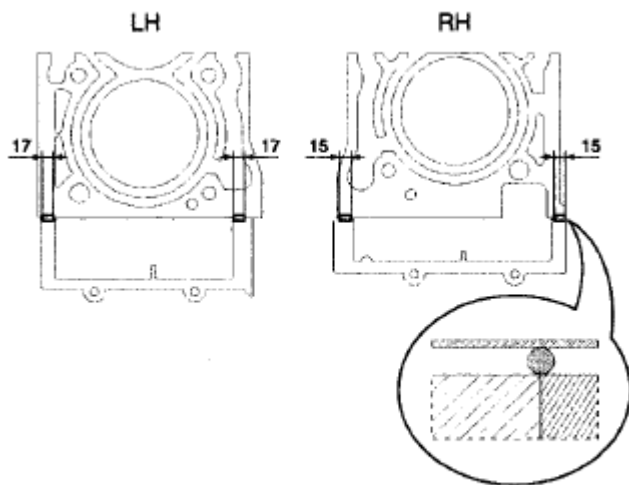
3.5 ~ 4.5 mm (0.1378 ~ 0.1772 in)

Sealant locations:

1.5 ~ 2.5mm (0.0591 ~ 0.0984 in)

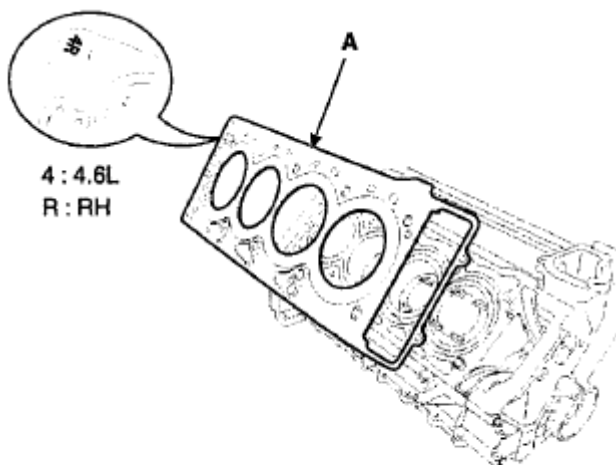
from timing chain lower case inner surface

Recommended sealant: Liquid sealant LT5900H or equivalent



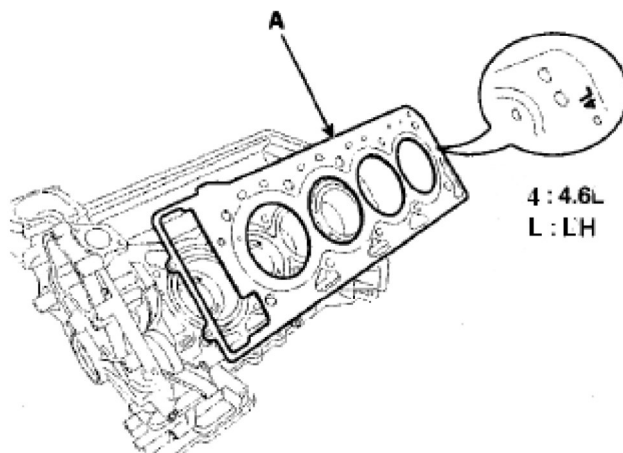
SHMM19150N

Fig. 178: Identifying Liquid Sealant Applying Area
Courtesy of HYUNDAI MOTOR CO.



SHMM19162N

Fig. 179: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.



SHMM19163N

Fig. 180: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

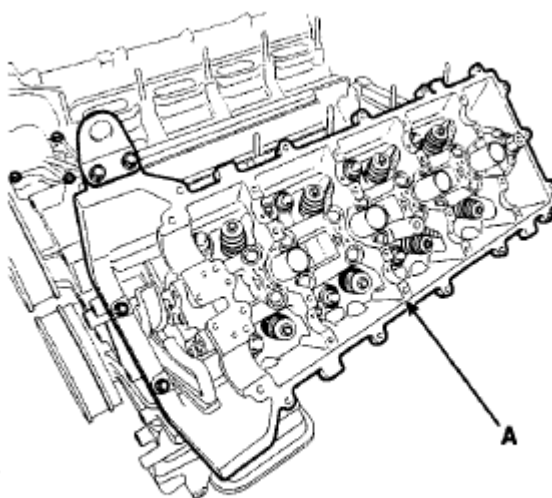
3. Apply sealant on cylinder head gaskets after assembling cylinder head gaskets on cylinder block.

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

NOTE: Be careful of the installation direction.

4. Install the cylinder head.

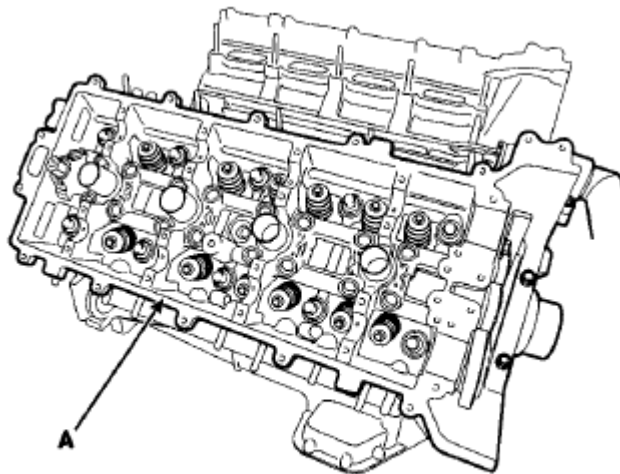
NOTE: Remove the extruded sealant after assembling cylinder heads.



SHMM19041N

Fig. 181: Identifying Cylinder Head

Courtesy of HYUNDAI MOTOR CO.



SHMM19042N

Fig. 182: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

2. Install the 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:

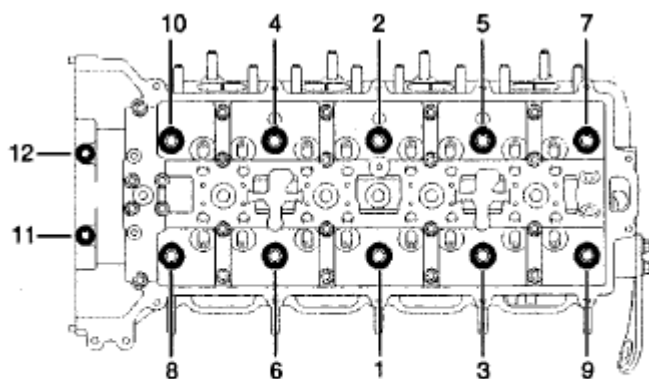
Cylinder head bolts (1-10):

32.4 ~ 36.3 N.m (3.3 ~ 3.7kgf.m, 23.9 ~ 26.8lb-ft) + 88° ~ 92° + 118° ~ 122°

Flange bolts (11 ~ 12):

33.3 ~ 36.3 N.m (3.4 ~ 3.7kgf.m, 24.6 ~ 26.8lb-ft)

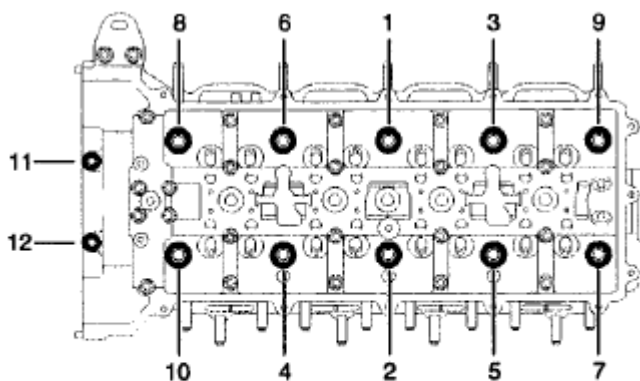
[RH]



SHMM19148N

Fig. 183: Identifying RH Cylinder Head Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH]



SHMM19149N

Fig. 184: Identifying LH Cylinder Head Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

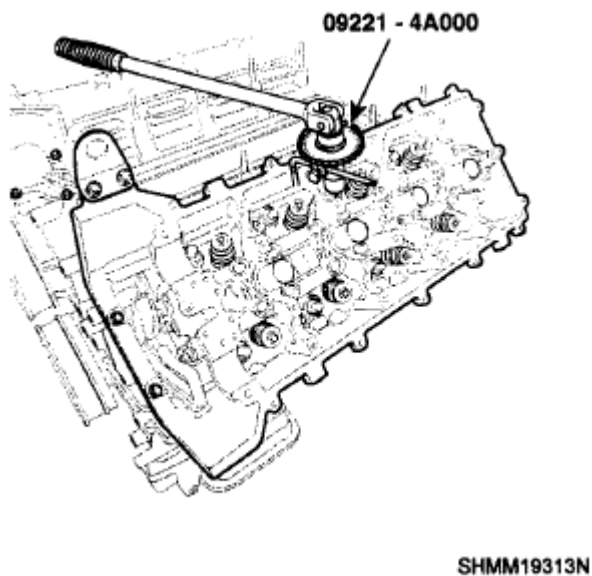


Fig. 185: Tightening Cylinder Head Bolts
Courtesy of HYUNDAI MOTOR CO.

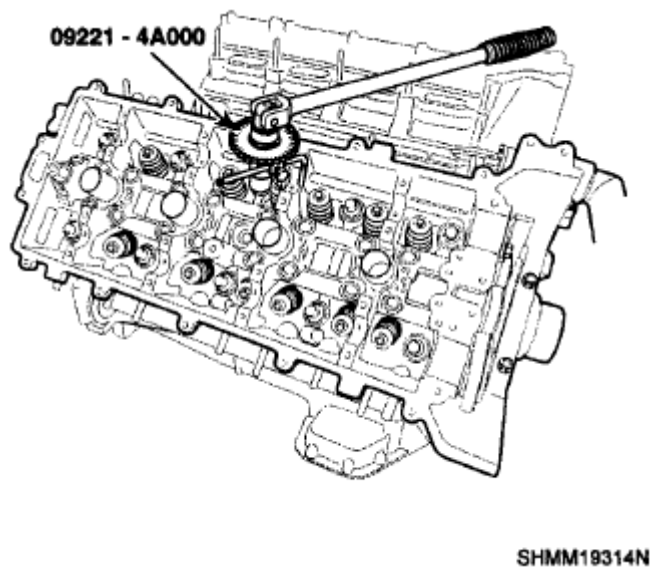
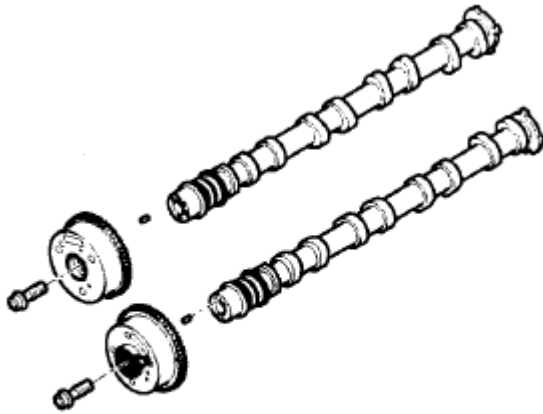


Fig. 186: Tightening Cylinder Head Bolts
Courtesy of HYUNDAI MOTOR CO.

3. Assemble the CVVT and camshaft assembly.

Tightening torque:

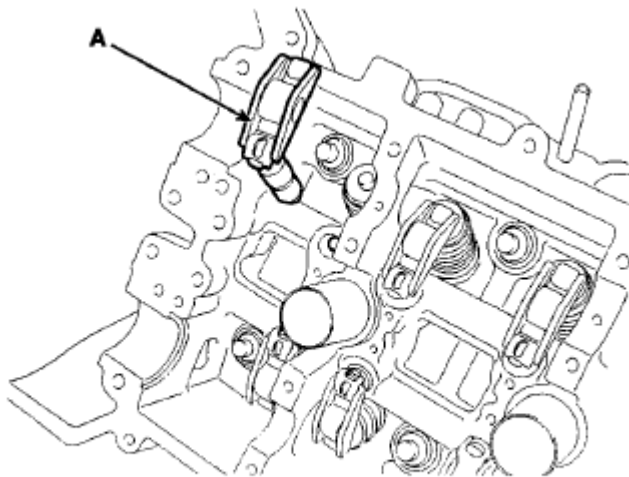
73.5 ~ 83.4 N.m (7.5 ~ 8.5kgf.m, 54.2 ~ 61.5lb-ft)



SHMM19373N

Fig. 187: Identifying CVVT Assembly
Courtesy of HYUNDAI MOTOR CO.

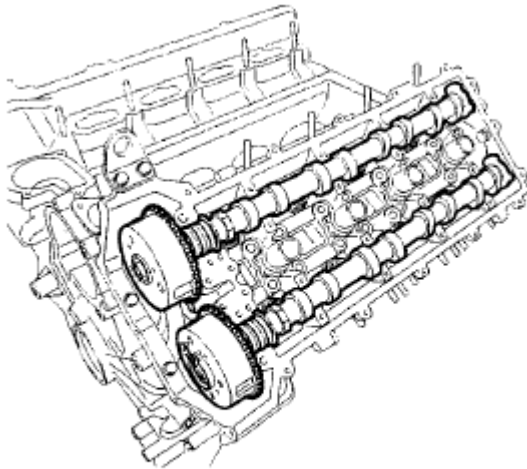
- Assemble the camshaft to the dowel pin of CVVT assembly. At this time, attend not to be installed to oil hole of camshaft.
 - Hold the hexagonal head wrench portion of the camshaft with a vise, and install the bolt and CVVT assembly.
 - Do not rotate CVVT assembly when camshaft is assembled to the dowel pin of CVVT assembly.
4. Install the roller finger follower and the hydraulic lash adjuster assembly (A).



SHMM19040N

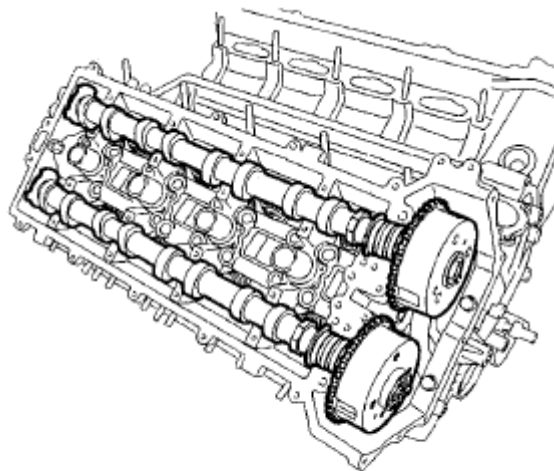
Fig. 188: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

5. Install the LH/RH camshaft assembly (A).



SHMM19160N

Fig. 189: Identifying LH/RH Camshaft Assembly
Courtesy of HYUNDAI MOTOR CO.



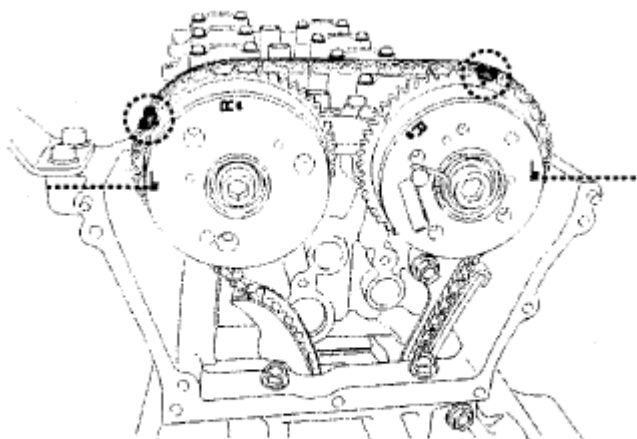
SHMM19161N

Fig. 190: Identifying LH/RH Camshaft Assembly
Courtesy of HYUNDAI MOTOR CO.

NOTE:

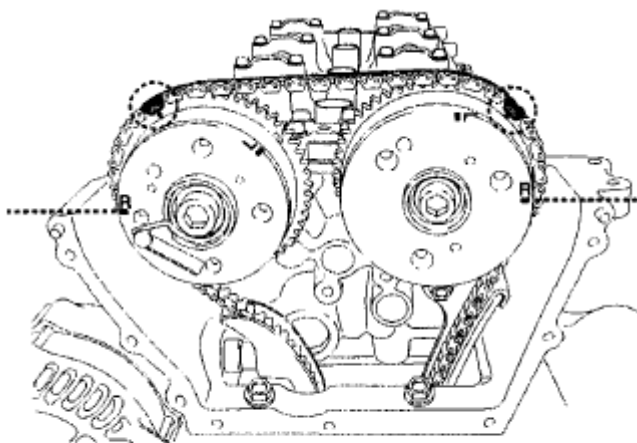
- Apply a light coat of engine oil on camshaft journals.
- Assemble the timing mark of CVVT to the same level of cylinder head top surface.
- Be careful the right, left bank, intake, exhaust side before assembling.
- Turn the crankshaft to set the No. 1 piston at TDC position.

6. Install the timing chain to the camshaft sprocket.



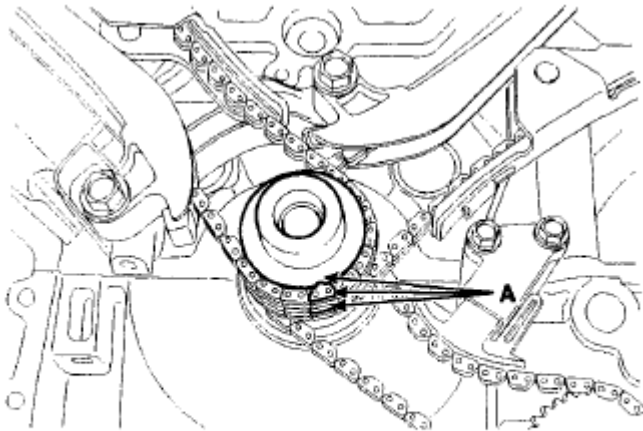
SHMM19028N

Fig. 191: Identifying Timing Mark Location (1 Of 3)
Courtesy of HYUNDAI MOTOR CO.



SHMM19029N

Fig. 192: Identifying Timing Mark Location (2 Of 3)
Courtesy of HYUNDAI MOTOR CO.



SHMM19128N

Fig. 193: Identifying Timing Mark Location (3 Of 3)

Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Make sure the crankshaft is at TDC position.
- Align the chain installation mark (A) of the crankshaft sprocket and the timing mark (A) of the chain link, and then install the chain.

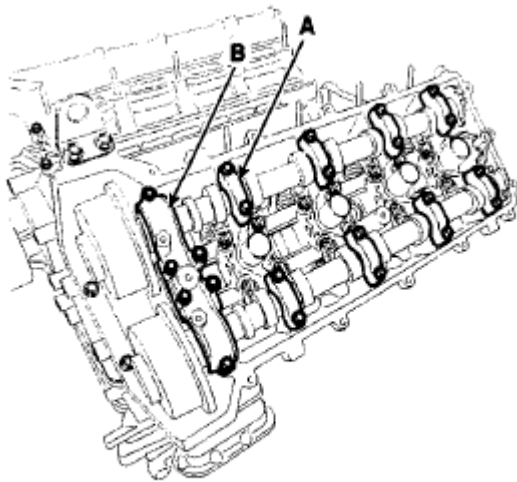
NOTE:

In case of marking the timing chain links corresponding to the chain installation marks on the sprocket with an identification for on-vehicle repair (for cylinder head assembly, timing chain tensioner, CVVT, camshaft, HLA or etc.), align all of the chain installation mark of the sprocket and the timing marked chain links for reassembly.

NOTE:

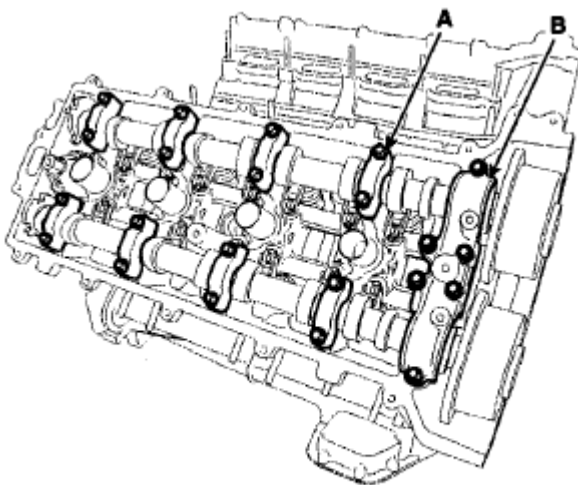
To install the timing chain with no slack between each shaft (cam, crank), follow the below procedure.
Crankshaft sprocket --> Timing chain guide --> Exhaust camshaft sprocket --> Intake camshaft sprocket. (LH Bank)
Crankshaft sprocket --> Timing chain guide --> Intake camshaft sprocket --> Exhaust camshaft sprocket. (RH Bank)
When reassembling the timing chain, make sure all of the chain installation mark of the sprocket and the timing marked chain links are aligned.

7. Install the camshaft bearing caps and the camshaft thrust bearing cap.



SHMM19036N

Fig. 194: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

Fig. 195: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

Tighten the bolts in order to below sequence.

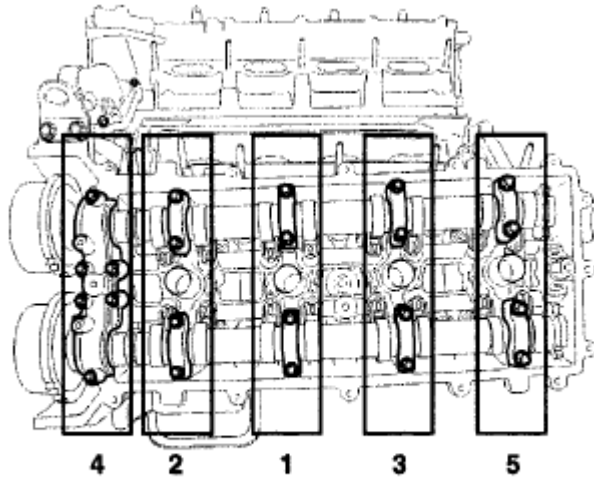
Tightening torque:

1st step:

6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

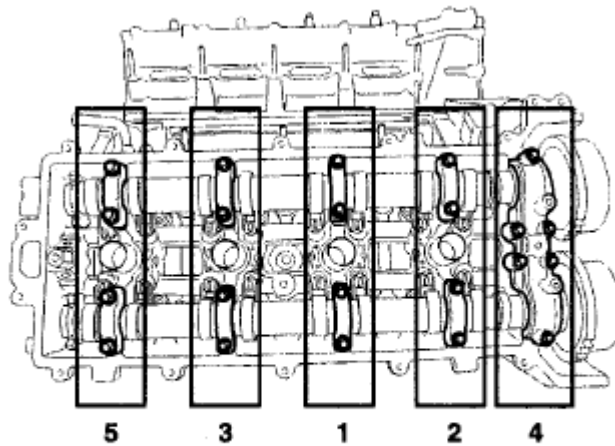
2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)



SHMM19038N

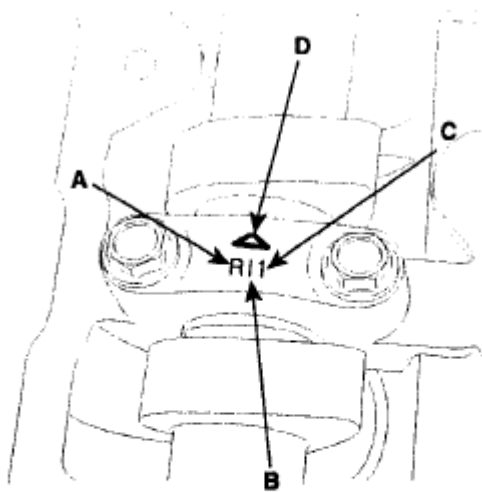
Fig. 196: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.



SHMM19039N

Fig. 197: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

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



ECBF036A

A : L(LH),R(RH)

B : I(Intake), E(Exhaust)

C : Journal number

D : Front mark

Fig. 198: Identifying Camshaft Marking

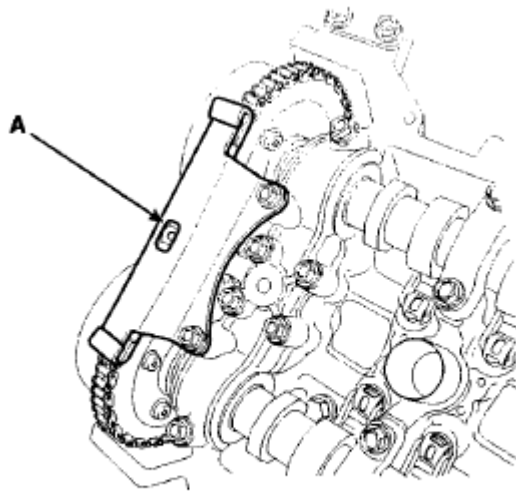
Courtesy of HYUNDAI MOTOR CO.

CAUTION: Be sure to install the thrust bearing cap and bearing cap bolts in the correct places.

8. Install the cam to cam guide (A).

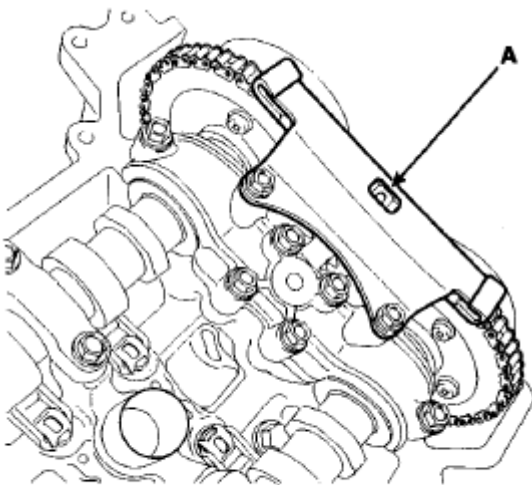
Tightening torque :

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19026N

Fig. 199: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.



SHMM19027N

Fig. 200: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

9. Install the LH timing chain guide bolt (B) and then the LH timing chain tensioner (A).
 1. Install the timing chain tensioner & plug bolt in the hole on the cylinder head by hand.
 2. Tighten the plug bolt with the specified torque while pressing the timing chain on the LH intake CVVT.

Tightening torque:

Timing chain guide bolt:

21.6 ~ 25.5Nm (2.2 ~ 2.6kgf.m, 15.9 ~ 18.8lb-ft)

Timing chain tensioner plug bolt:

78.5 ~ 88.3 N.m (8.0 ~ 9.0kgf.m, 57.9 ~ 65.1lb-ft)

NOTE:

1. Do not reuse the timing chain tensioner.
2. Make sure the timing chain tensioner is at compressed transport position state.
3. Install the timing chain tensioner with the oil hole facing the plug bolt.

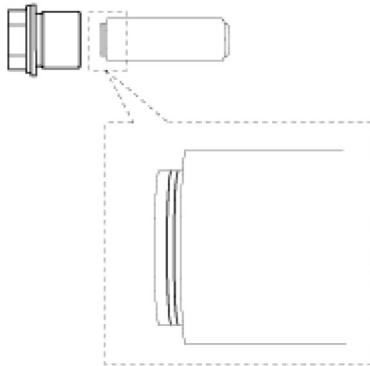
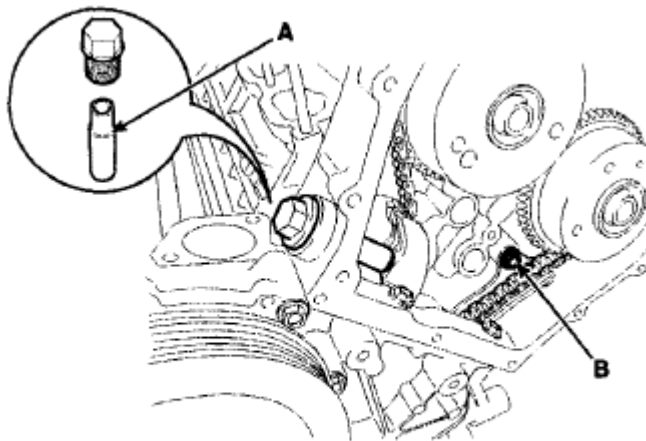


Fig. 201: Installing Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19034N

Fig. 202: Identifying LH Timing Chain Guide Bolt
Courtesy of HYUNDAI MOTOR CO.

10. Install the RH timing chain guide bolt (B) and then the RH timing chain tensioner (A).

1. Install the timing chain tensioner & plug bolt in the hole on the cylinder head by hand.
2. Tighten the plug bolt with the specified torque while pressing the timing chain on the RH intake CVVT.

Tightening torque:

Timing chain guide bolt:

21.6 ~ 25.5Nm (2.2 ~ 2.6kgf.m, 15.9 ~ 18.8lb-ft)

Timing chain tensioner plug bolt:

78.5 ~ 88.3 N.m (8.0 ~ 9.0kgf.m, 57.9 ~ 65.1lb-ft)

NOTE:

1. **Do not reuse the timing chain tensioner.**
2. **Make sure the timing chain tensioner is at compressed transport position state.**
3. **Install the timing chain tensioner with the oil hole facing the plug bolt.**

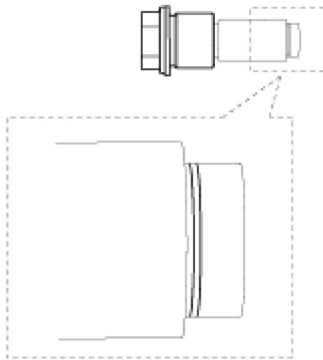
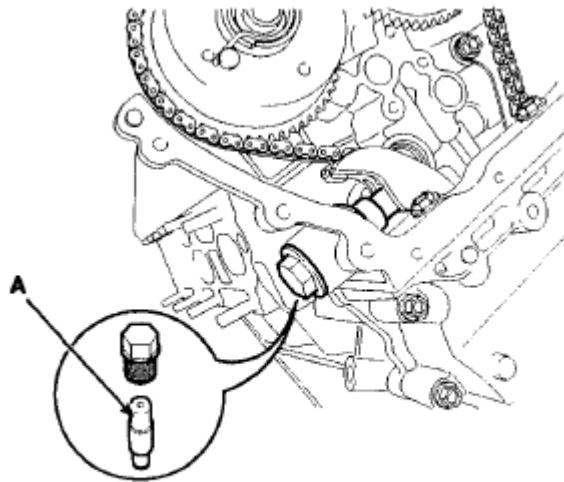


Fig. 203: Installing Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19035N

Fig. 204: Identifying RH Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.

11. Set tension of the timing chain tensioner.
 1. LH Bank
 - A. Press the timing chain on the LH intake CVVT by hand with the timing mark "L" on the LH intake and exhaust CVVT and the LH cylinder head upper surface aligned.

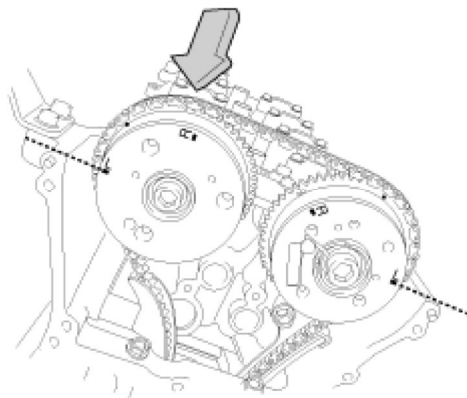


Fig. 205: Locating LH Timing Mark
Courtesy of HYUNDAI MOTOR CO.

- B. To set tension of the timing chain tensioner, push the timing chain tensioner arm outward with a force about 150N (15.3kgf, 33.7lbf).

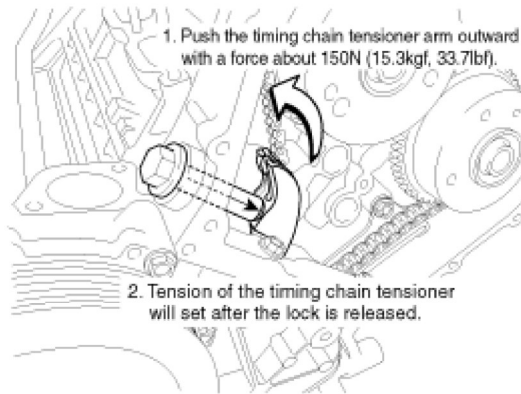


Fig. 206: Pushing Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR CO.

- C. To check the tension of the timing chain tensioner, push the timing chain tensioner arm outward strongly. The distance between the cylinder head surface and end of tensioner plunger should be about 20mm (0.79inch).

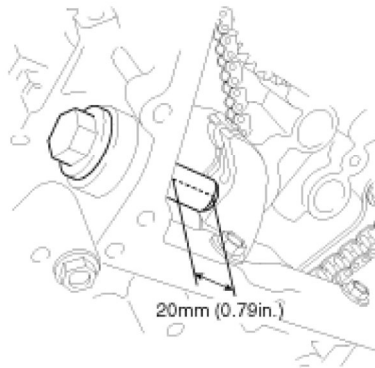


Fig. 207: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

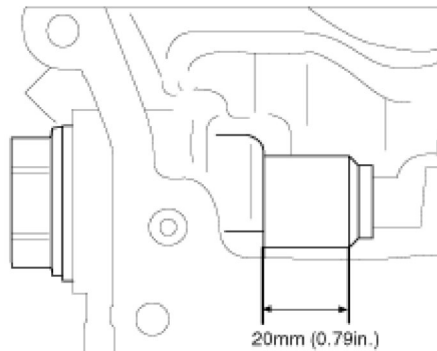


Fig. 208: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (2 Of 2)

Courtesy of HYUNDAI MOTOR CO.

2. RH Bank

- A. To align the timing mark "R" on the RH intake and exhaust CVVT and the RH cylinder head upper surface, turn the exhaust CVVT about 20° counterclockwise while pressing the timing chain on the intake CVVT by hand with all of the chain installation mark of the sprocket and the timing marked chain links aligned.

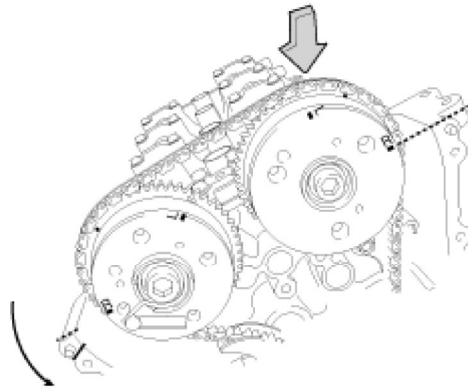


Fig. 209: Locating RH Timing Mark
Courtesy of HYUNDAI MOTOR CO.

- B. To set tension of the timing chain tensioner, push the timing chain tensioner arm outward with a force about 150N (15.3kgf, 33.7lbf).

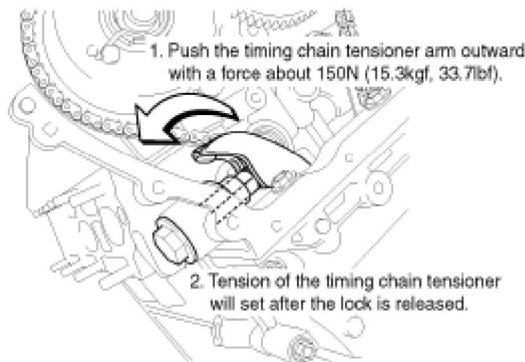


Fig. 210: Pushing Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR CO.

- C. To check the tension of the timing chain tensioner, push the timing chain tensioner arm outward strongly. The distance between the tensioner body and end of tensioner plunger should be about 3.5mm (0.14inch).

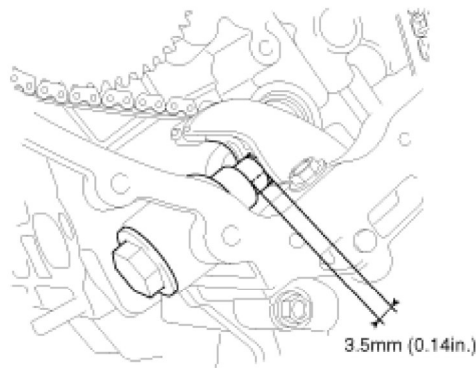


Fig. 211: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

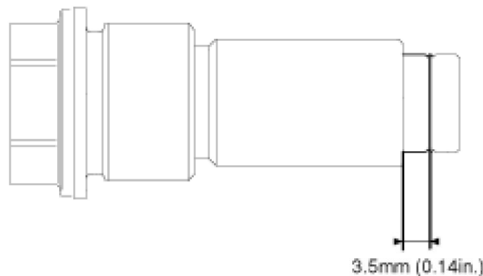


Fig. 212: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

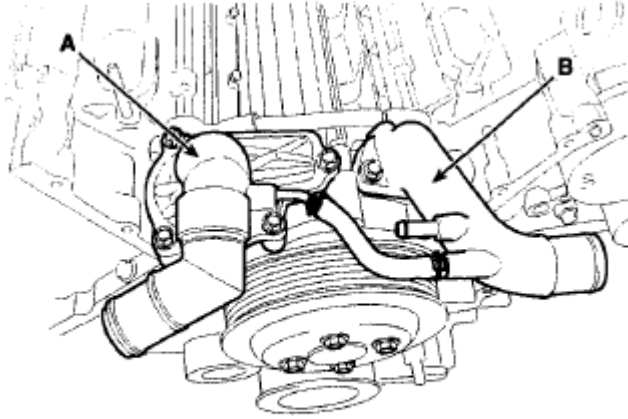
3. After setting tension of the LH, RH timing chain tensioner, check timing again.
 - A. Make sure the chain installation mark of the sprocket and the timing marked chain links are aligned.
 - B. Rotate the crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing marks on the LH, RH intake and exhaust CVVT and the RH cylinder head upper surfaces are aligned.
12. After rotating the crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing mark.

NOTE: Always turn the crankshaft clockwise.
Turning the crankshaft counter clockwise before building up oil pressure in the hydraulic timing chain tensioner may result in the chain disengaging from the sprocket teeth.

13. Install the water temperature control assembly (A) and the water outlet fitting assembly (B) with new O-ring and new gasket.

Tightening torque:

16.7 ~ 19.6 N.m (1.7 ~ 2.0kgf.m, 12.3 ~ 14.5lb-ft)



SHMM19033N

Fig. 213: Identifying Water Temperature Control Assembly And Water Outlet Fitting Assembly
Courtesy of HYUNDAI MOTOR CO.

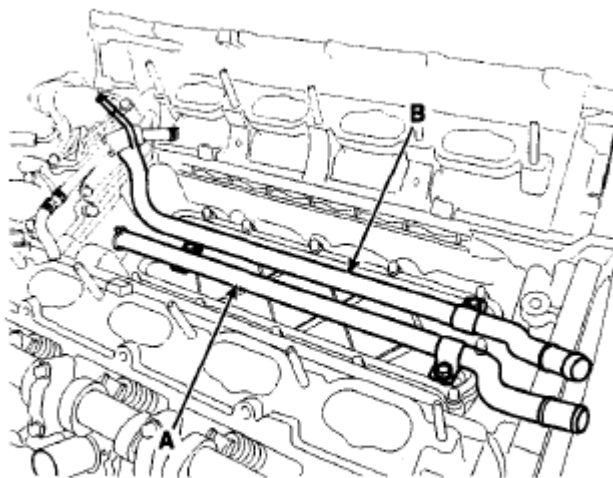
14. Install the water outlet pipe (A) and the water inlet pipe (B).

Tightening torque:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

NOTE:

- Use new O-rings when reassembling.
- Never apply sort of oil on O-ring and O-ring groove of pipe end.
- O-ring must be free from scratching damage.
- Make clean the contact face before assembly.
- Insert pipe after to be wetting O-ring or inside of attaching hole by water or antifreeze.



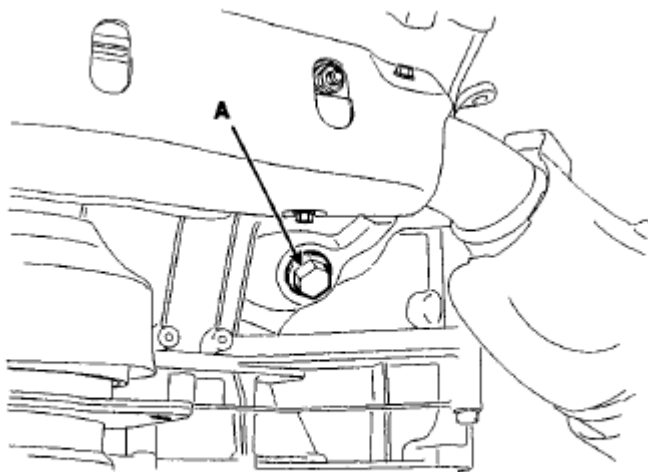
SHMM19032N

Fig. 214: Identifying Water Outlet Pipe And Water Inlet Pipe
Courtesy of HYUNDAI MOTOR CO.

NOTE: Install the drain plug (A).

Tightening torque:

96.1 ~ 100.0 N.m (9.8 ~ 10.2kgf.m, 70.9 ~ 73.8lb-ft)



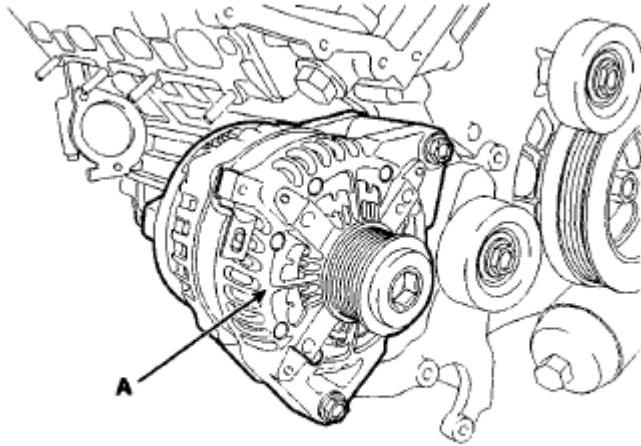
SHMM19085N

Fig. 215: Identifying Drain Plug
Courtesy of HYUNDAI MOTOR CO.

15. Install the alternator (A).

Tightening torque:

29.4 ~ 41.2 N.m (3.0 ~ 4.2kgf.m, 21.7 ~ 30.4lb-ft)



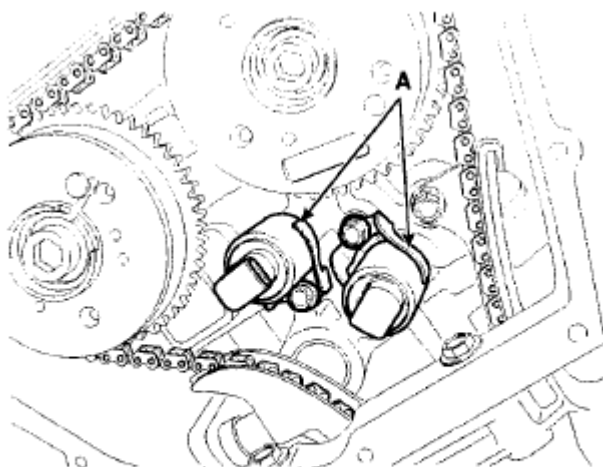
SHMM19030N

Fig. 216: Identifying Alternator
Courtesy of HYUNDAI MOTOR CO.

16. Install the oil control valve (A).

Tightening torque:

9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19024N

Fig. 217: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

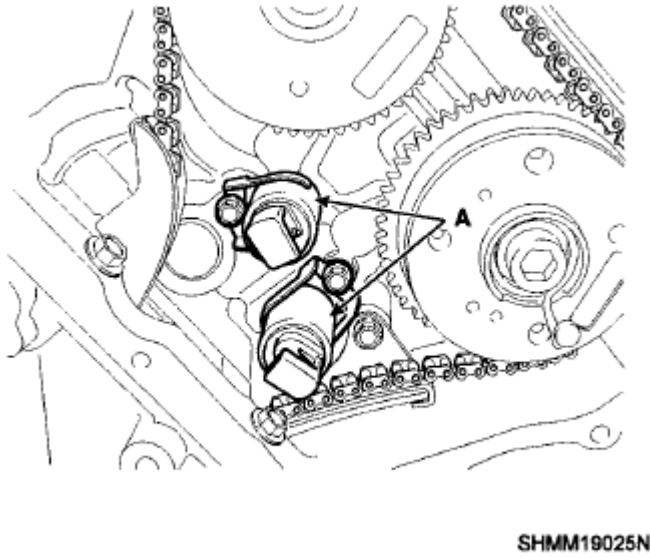


Fig. 218: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

NOTE:

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

17. Use the SST (09231-2J500, 09231-H1100) install the timing chain upper cover oil seal (A).

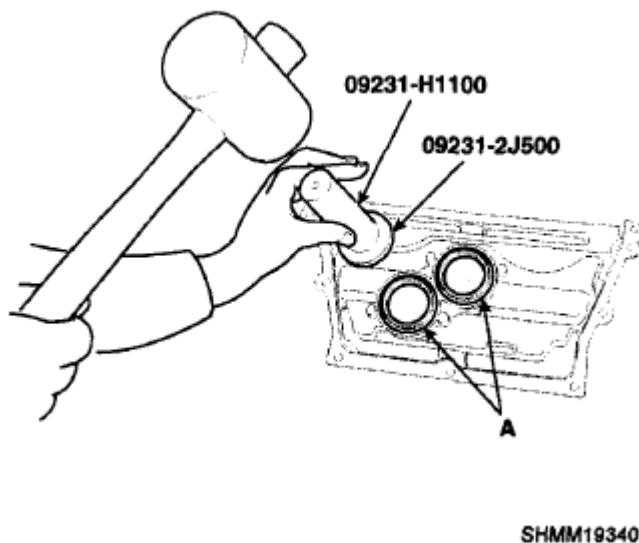
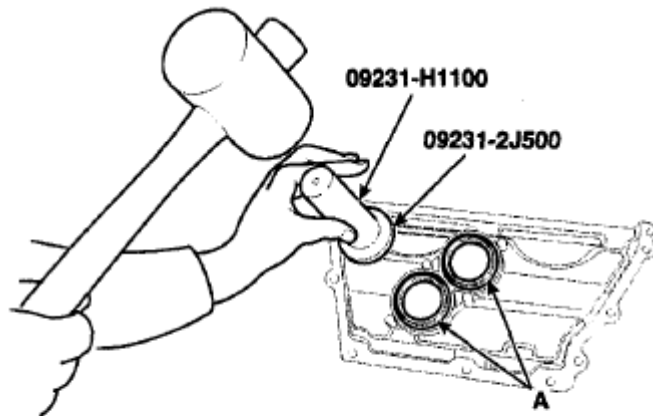
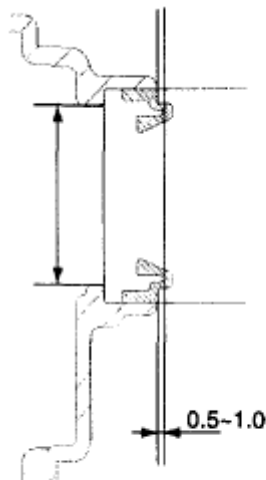


Fig. 219: Tapping Timing Chain Upper Cover Oil Seal (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



SHMM19341N

Fig. 220: Tapping Timing Chain Upper Cover Oil Seal (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.



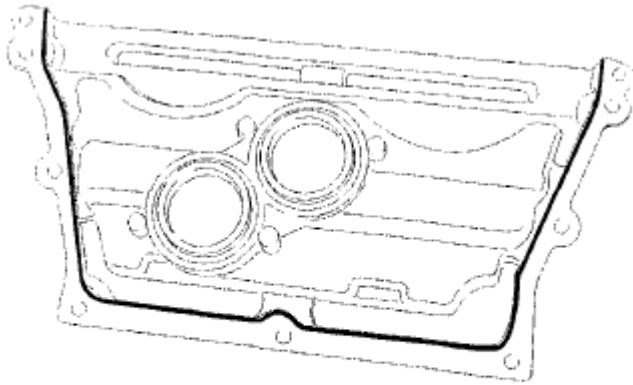
SHMM19141N

Fig. 221: Identifying Timing Chain Upper Cover Oil Seal Height
Courtesy of HYUNDAI MOTOR CO.

18. Apply sealant to the timing chain upper cover.
 1. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
 2. Before assembling the timing chain upper cover, the liquid sealant LT5900H or equivalent should be applied on upper cover.

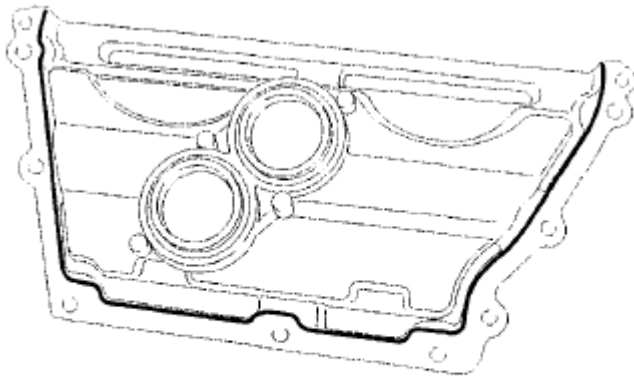
The part must be assembled within 5 minutes after the sealant was applied.

Bead width: $\varnothing 2.5 \pm 0.5\text{mm}$ ($0.1 \pm 0.002\text{in}$)



SHMM19361N

Fig. 222: Applying Sealant To Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19362N

Fig. 223: Applying Sealant To Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

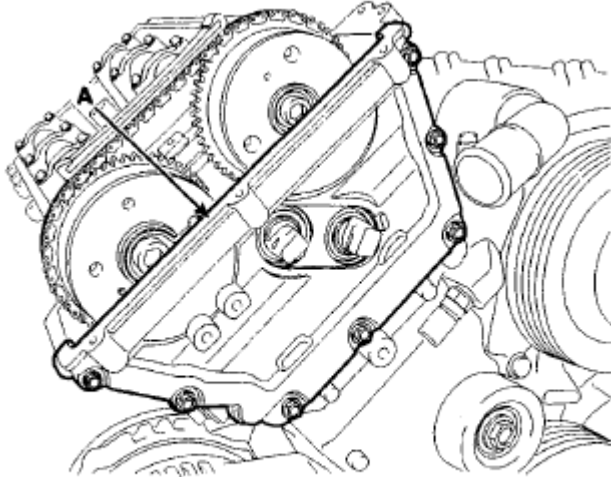
NOTE:

- Clean the sealing face before assembling two parts.
- Remove harmful foreign materials on the sealing face before applying sealant.
- When applying sealant gasket, sealant must not protrude into the inside of upper cover.
- To prevent leakage of oil, apply sealant gasket to the inner threads of the bolt holes.

19. Install the timing chain upper cover (A).

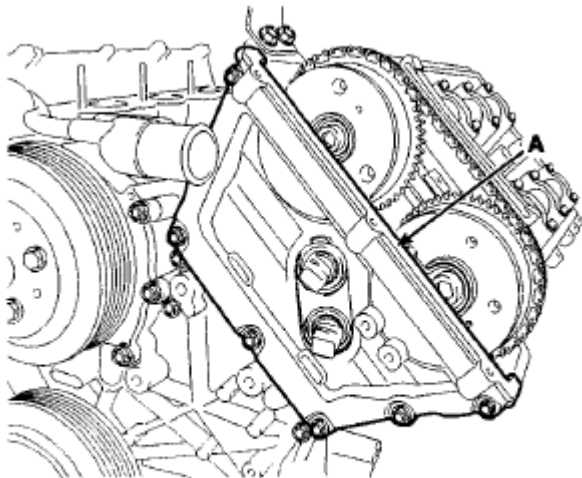
Tightening torque:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19020N

Fig. 224: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19021N

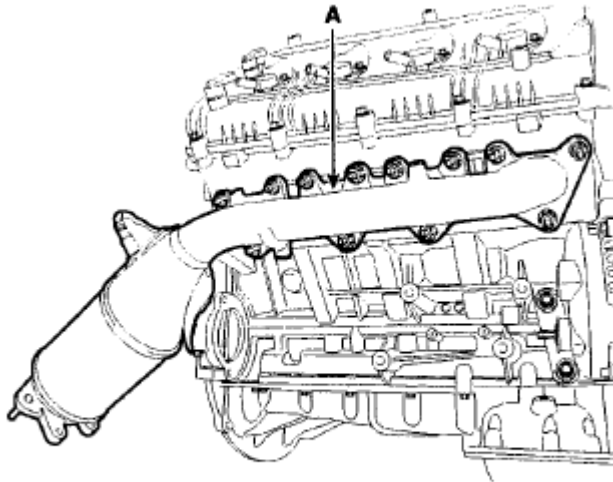
Fig. 225: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

20. Install the exhaust manifold (A) tighten the nuts as following method.

Tightening torque:

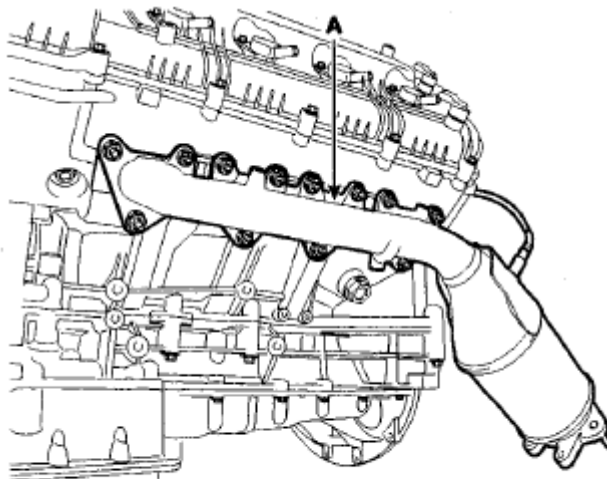
49.0 ~ 53.9 N.m (5.0 ~ 5.5kgf.m, 36.2 ~ 39.8lb-ft)

NOTE: The "TOP" mark of the gasket must face the exhaust manifold.



SHMM19004N

Fig. 226: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

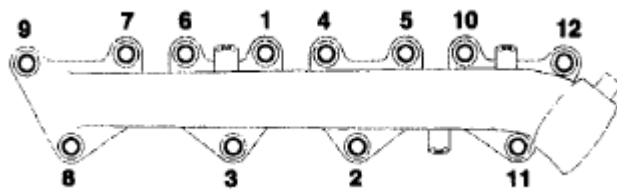


SHMM19005N

Fig. 227: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

NOTE: Tighten the exhaust manifold nuts as following method.

[LH] - With engine assembly removal



SHMM19154N

Fig. 228: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH] - Without engine assembly removal

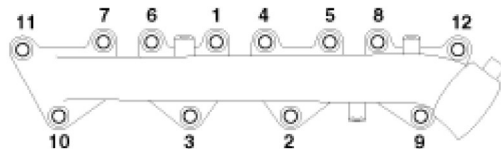
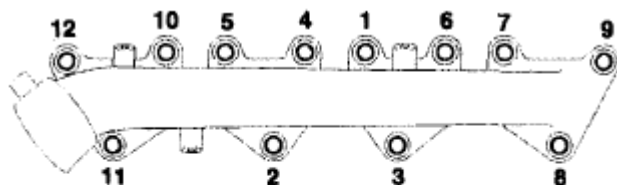


Fig. 229: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[RH]



SHMM19363N

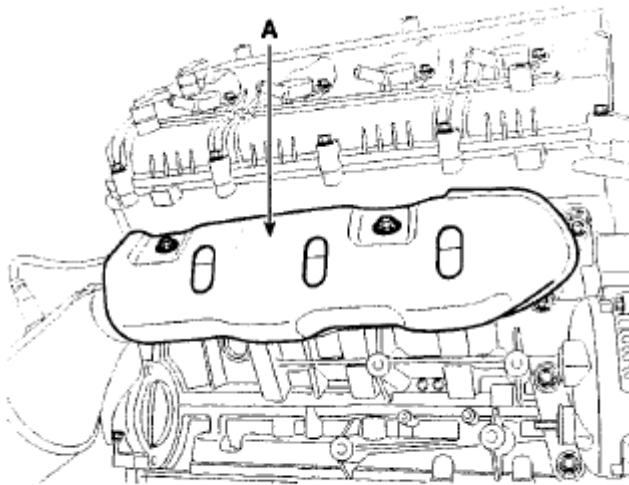
Fig. 230: Identifying RH Exhaust Manifold Nuts Tightening Sequence

Courtesy of HYUNDAI MOTOR CO.

21. Install the exhaust manifold heat protector (A).

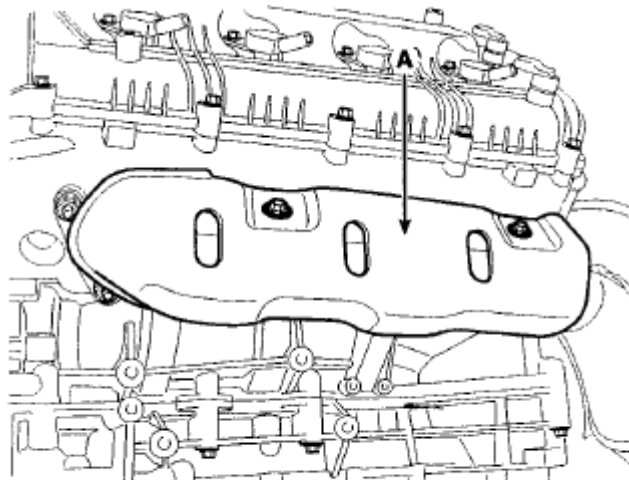
Tightening torque:

8.8 ~ 10.8 N.m (0.9 ~ 1.1kgf.m, 6.5 ~ 8.0lb-ft)



SHMM19002N

Fig. 231: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.



SHMM19003N

Fig. 232: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.

22. Install the engine coolant temperature sensor (ECTS) wiring assembly and bracket (A).

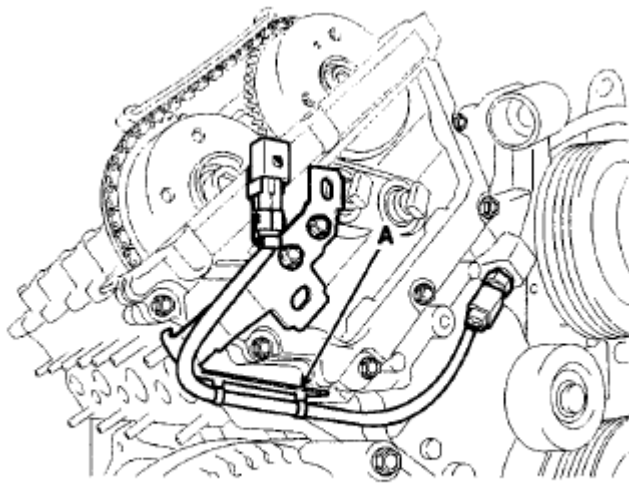
Tightening torque:

Wiring bracket bolts:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

Engine coolant temperature sensor:

19.6 ~ 39.2Nm (2.0 ~ 4.0kgf.m, 14.5 ~ 28.9lb-ft)



SHMM19019N

Fig. 233: Identifying Engine Coolant Temperature Sensor Wiring Assembly And Bracket
Courtesy of HYUNDAI MOTOR CO.

23. Install the oil pressure switch wiring assembly and bracket (A).

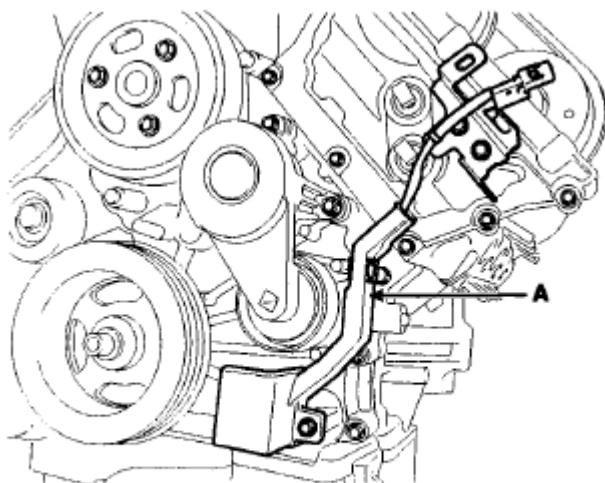
Tightening torque:

Wiring bracket bolts:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

Oil pressure switch:

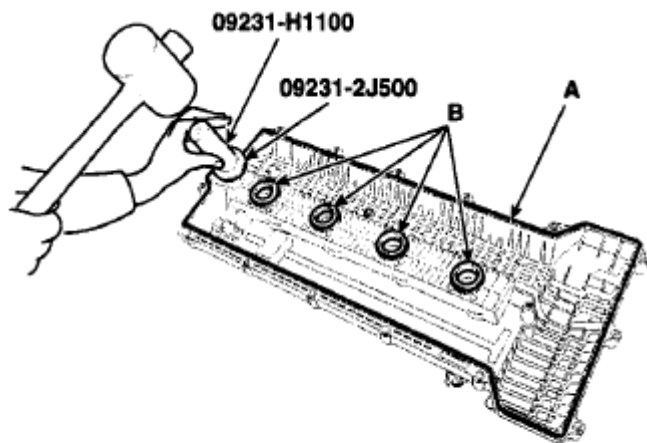
14.7 ~ 21.6Nm (1.5 ~ 2.2kgf.m, 10.8 ~ 15.9lb-ft)



SHMM19018N

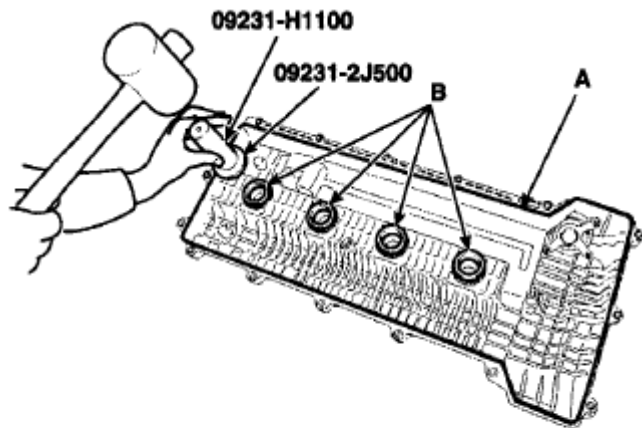
Fig. 234: Identifying Oil Pressure Switch Wiring Assembly And Bracket
Courtesy of HYUNDAI MOTOR CO.

24. Use the SST (09231-2J500, 09231-H1100), install the oil seal (B) and the gasket (A).



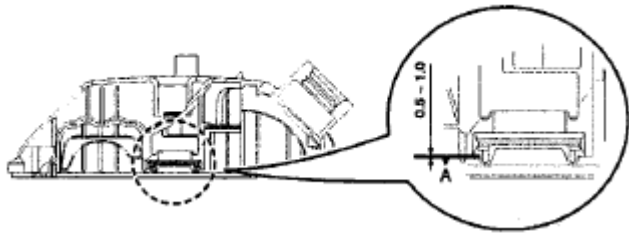
SHMM19342N

Fig. 235: Tapping Oil Seal
Courtesy of HYUNDAI MOTOR CO.



SHMM19343N

Fig. 236: Tapping Oil Seal
Courtesy of HYUNDAI MOTOR CO.

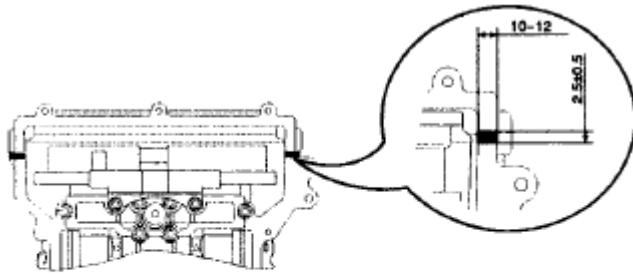


SHMM19152N

Fig. 237: Identifying Sealant Applying Area
Courtesy of HYUNDAI MOTOR CO.

25. Install the cylinder head cover.
 1. The sealant locations on cylinder head and timing chain upper case must be free of engine oil and ETC.
 2. Before assembling the cylinder head cover, the liquid sealant LT5900H or equivalent should be applied on the gap between cylinder head and timing chain upper case.

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



SHMM19151N

Fig. 238: Applying Sealant To Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

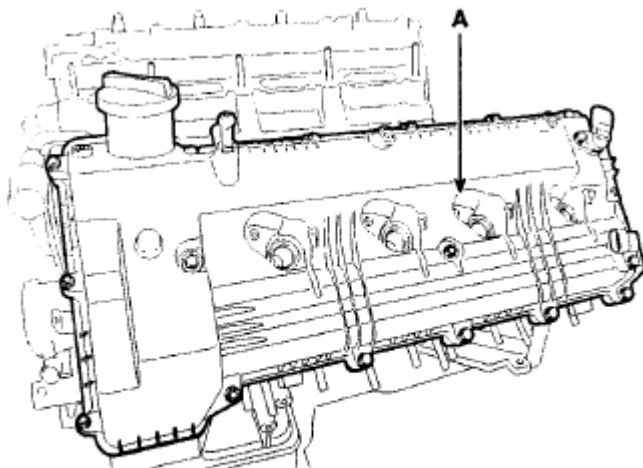
3. Install the cylinder head cover (A).

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

Tightening torque:

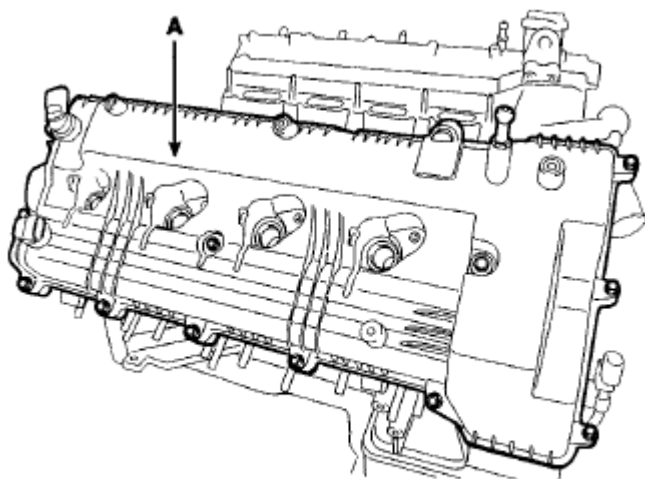
1st step: 4.9 ~ 5.9 N.m (0.5 ~ 0.6kgf.m, 3.6 ~ 4.3lb-ft)

2nd step: 9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19012N

Fig. 239: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

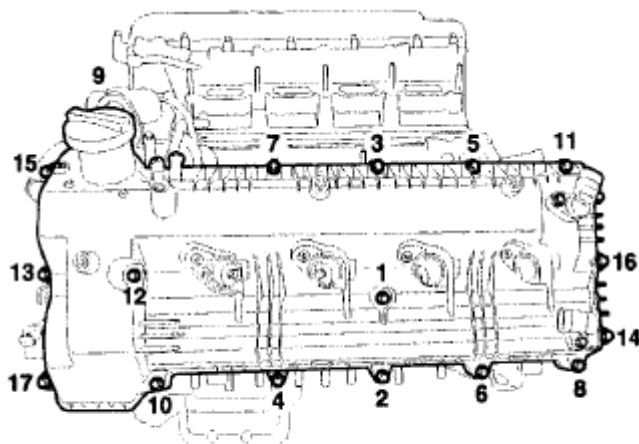


SHMM19013N

Fig. 240: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

NOTE: Tighten the cylinder head cover bolts as following method.

[RH]



SHMM19014N

Fig. 241: Identifying RH Cylinder Head Cover Bolts
Courtesy of HYUNDAI MOTOR CO.

[LH]

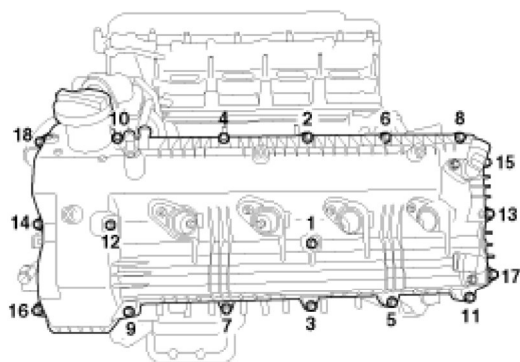
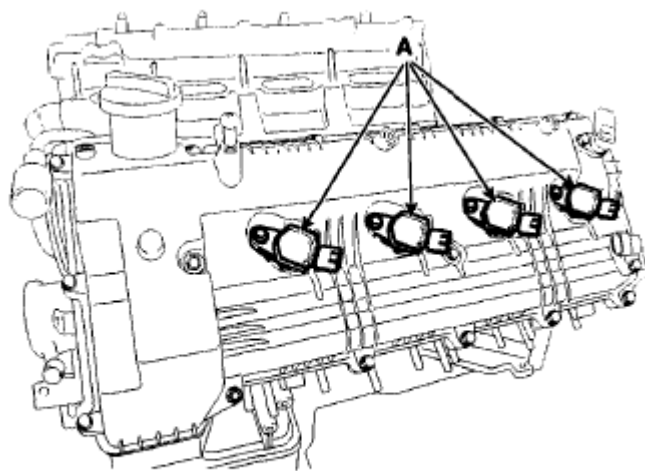


Fig. 242: Identifying LH Cylinder Head Cover Bolts
Courtesy of HYUNDAI MOTOR CO.

26. Install the ignition coils (A).

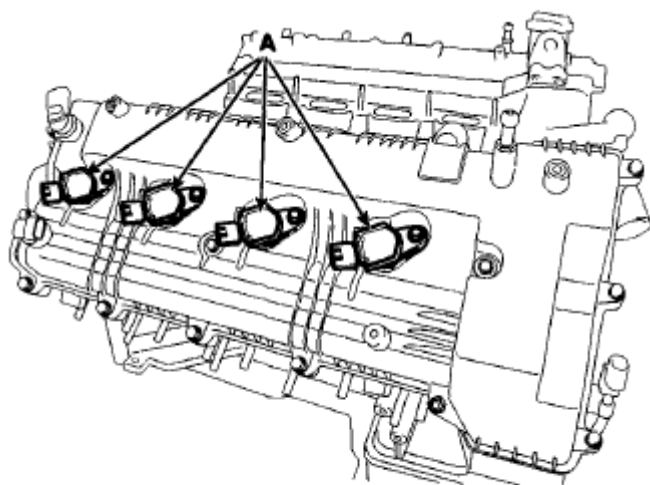
Tightening torque:

9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19010N

Fig. 243: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.



SHMM19011N

Fig. 244: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.

27. Reconnect the water hose (A).

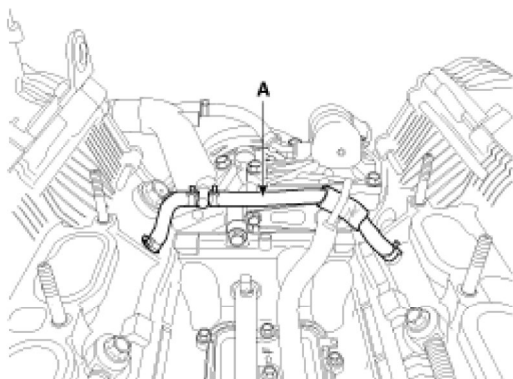
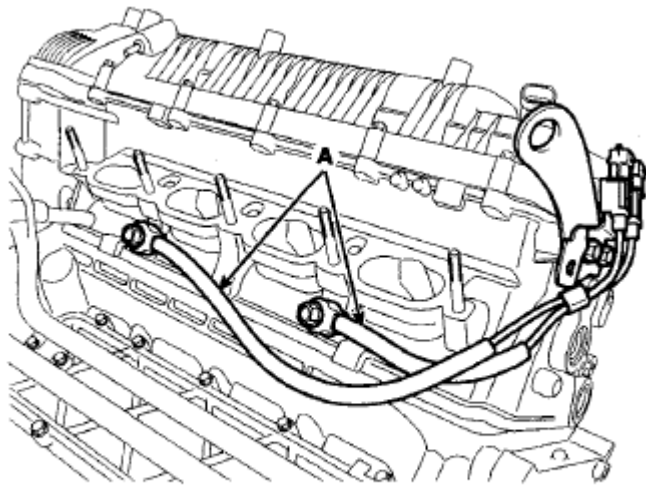


Fig. 245: Identifying Water Hose
Courtesy of HYUNDAI MOTOR CO.

28. Install the knock sensors (A).

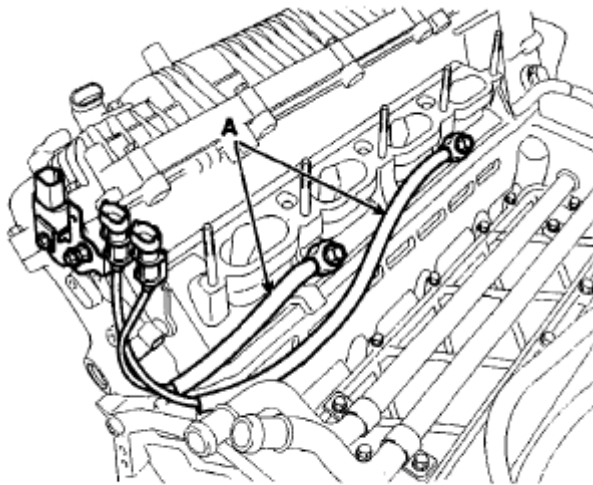
Tightening torque:

64.7 ~ 76.5 N.m (6.6 ~ 7.8kgf.m, 47.7 ~ 56.4lb-ft)



SHMM19008N

Fig. 246: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.



SHMM19009N

Fig. 247: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.

29. Install the intake manifold module (A) tighten the nuts as following method.

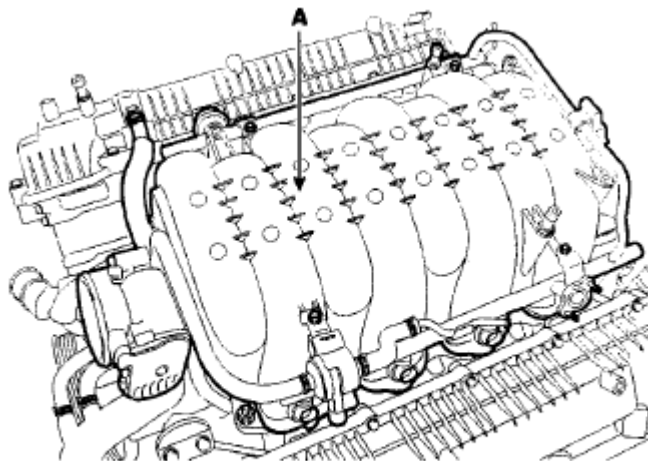
Tightening torque:

1st step:

4.9 ~ 7.8 N.m (0.5 ~ 0.8kgf.m, 3.6 ~ 5.8lb-ft)

2nd step:

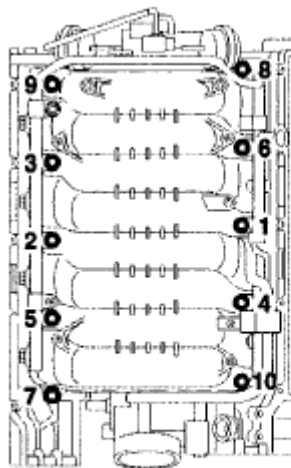
19.6 ~ 26.5 N.m (2.0 ~ 2.7kgf.m, 14.5 ~ 19.5lb-ft)



SHMM19007N

Fig. 248: Identifying Intake Manifold Module
Courtesy of HYUNDAI MOTOR CO.

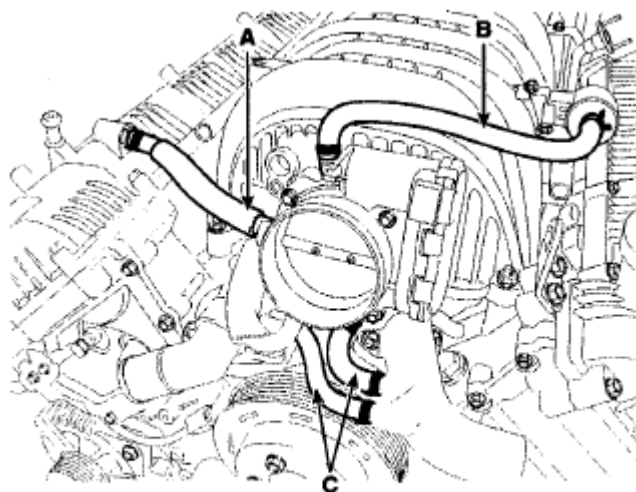
NOTE: Tighten the intake manifold nuts as following method.



SHMM19153N

Fig. 249: Identifying Intake Manifold Nut Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

30. Reconnect the PCV hose (A) to the intake manifold module.



SHMM19006N

Fig. 250: Identifying Hoses

Courtesy of HYUNDAI MOTOR CO.

31. Install the oxygen sensor connector bracket (A).

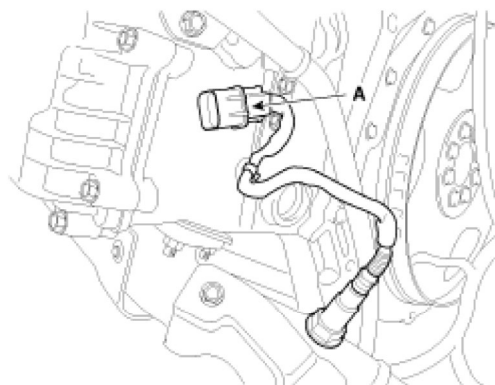


Fig. 251: Identifying Oxygen Sensor Connector Bracket

Courtesy of HYUNDAI MOTOR CO.

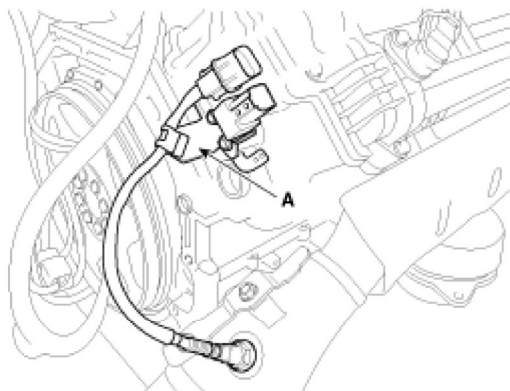
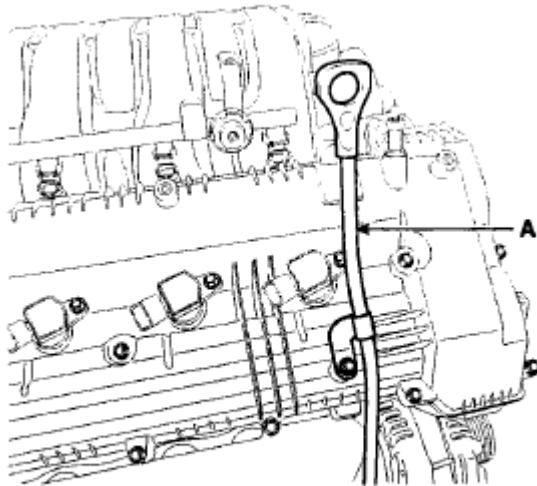


Fig. 252: Identifying Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.

32. Install the oil level gauge (A).

Tightening torque:

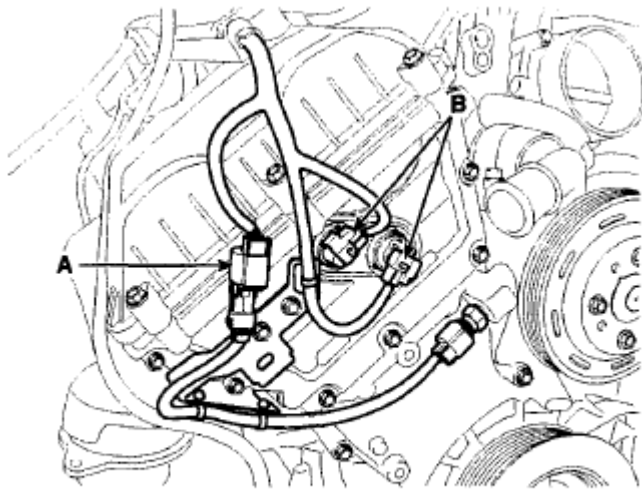
9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19001N

Fig. 253: Identifying Oil Level Gauge
Courtesy of HYUNDAI MOTOR CO.

33. Install the engine wiring harness to the cylinder head.
1. Reconnect the engine coolant temperature sensor connector (A) and the CVVT oil control valve connectors (B).



SHMM19069N

Fig. 254: Identifying Water Temperature Sensor And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

2. Reconnect the alternator connector (A).

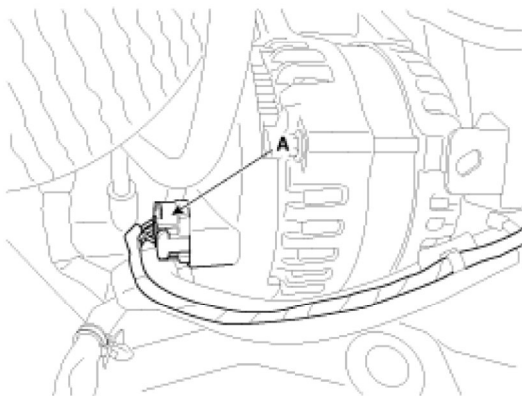
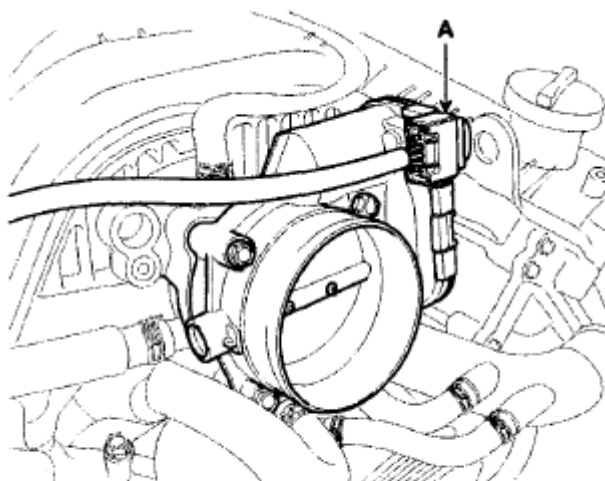


Fig. 255: Identifying Alternator Connector
Courtesy of HYUNDAI MOTOR CO.

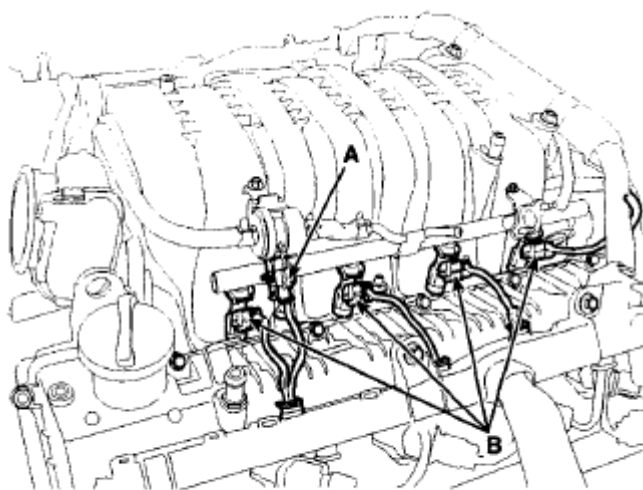
3. Reconnect the ETC module connector (A).



SBHM19015N

Fig. 256: Identifying ETC Module Connector
Courtesy of HYUNDAI MOTOR CO.

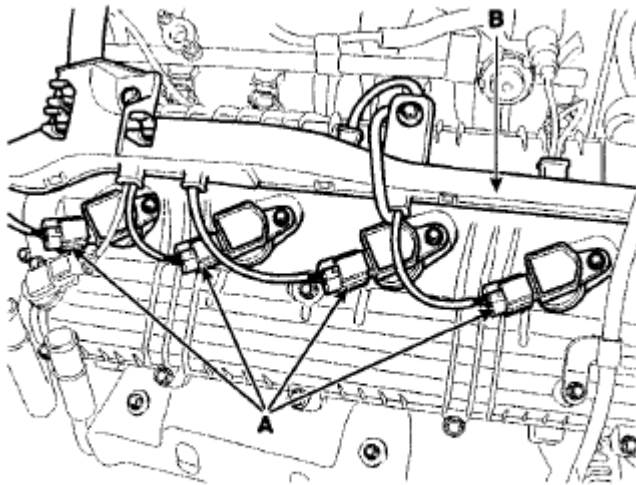
4. Reconnect the PCSV connector (A) and the injector connectors (B).



SBHM19009N

Fig. 257: Identifying PCSV And Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

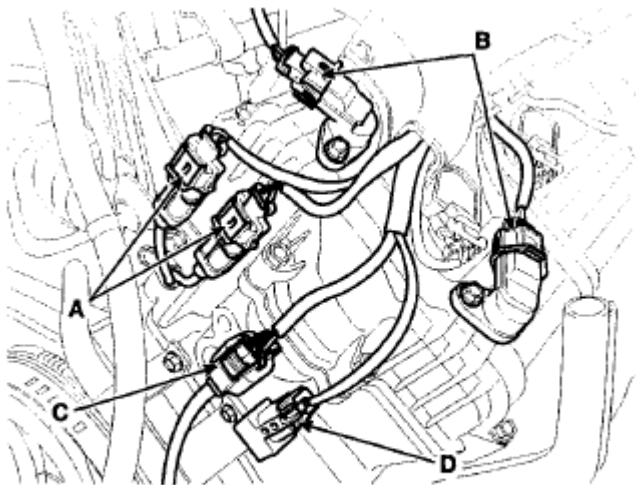
5. Reconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19072N

Fig. 258: Identifying Ignition Coil Connectors And Wiring Harness Protector
 Courtesy of HYUNDAI MOTOR CO.

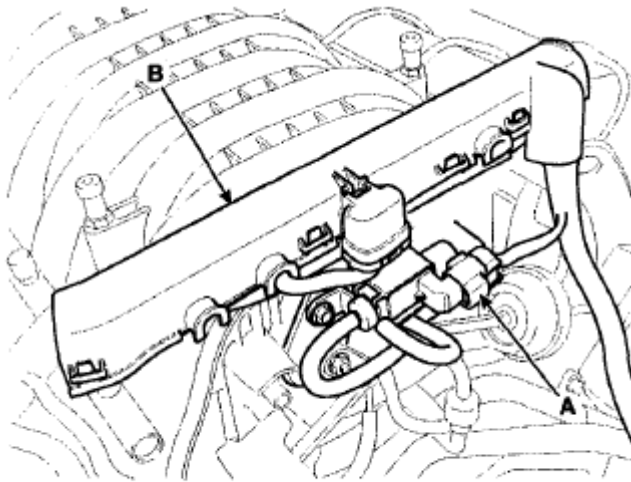
6. Reconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the oxygen sensor connector (C) and the condenser connector (D).



SHMM19073N

Fig. 259: Identifying Knock Sensor And Camshaft Position Sensor Connectors
 Courtesy of HYUNDAI MOTOR CO.

7. Reconnect the variable intake system solenoid valve connector (A) and the wiring harness protector (B).



SBHM19016N

Fig. 260: Identifying Variable Intake System Solenoid Valve Connector And Wiring Harness Protector

Courtesy of HYUNDAI MOTOR CO.

8. Reconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the crankshaft position sensor connector (C), the oxygen sensor connector (D), the condenser connector (E) and the ground line (F).

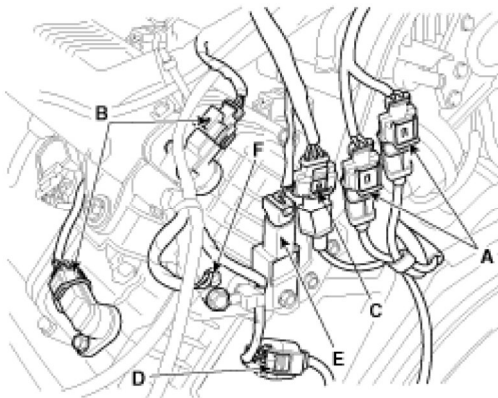
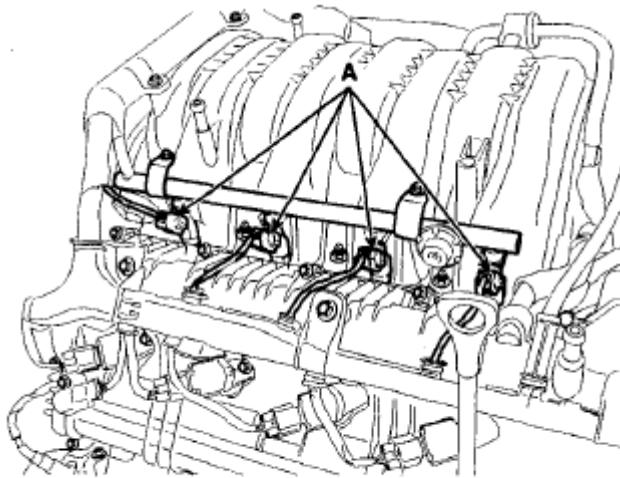


Fig. 261: Identifying Connectors & Ground Line

Courtesy of HYUNDAI MOTOR CO.

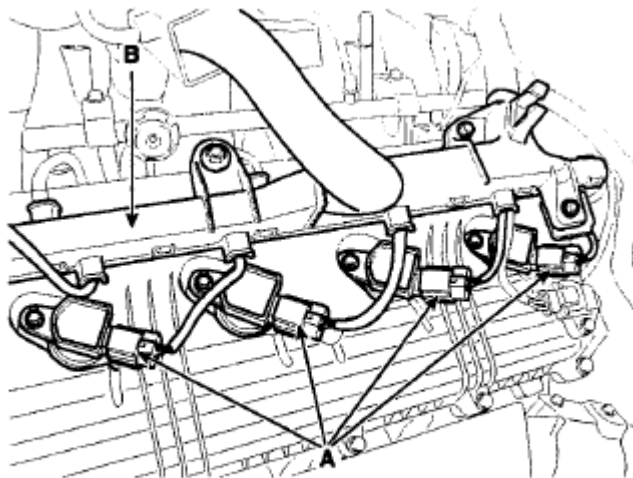
9. Reconnect the injector connectors (A).



SBHM19010N

Fig. 262: Identifying Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

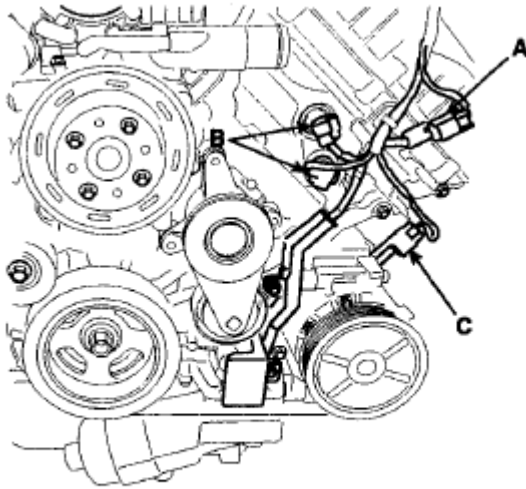
10. Reconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19077N

Fig. 263: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

11. Reconnect the oil pressure switch connector (A), the CVVT oil control valve connectors (B) and the air conditioner compressor switch connector (C).



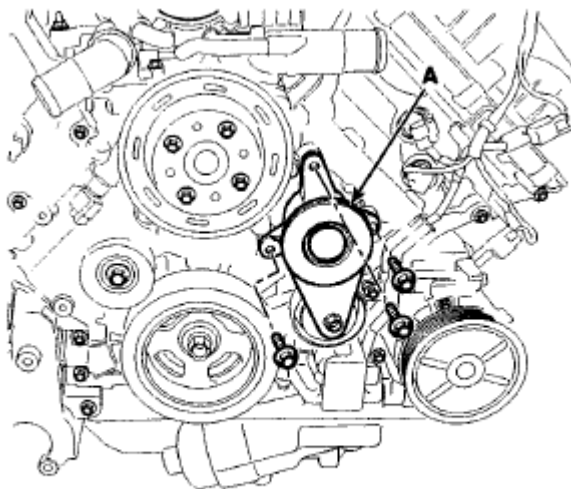
SBHM19301N

Fig. 264: Identifying Oil Pressure Switch Connector And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

34. Install the drive belt tensioner (A).

Tightening torque:

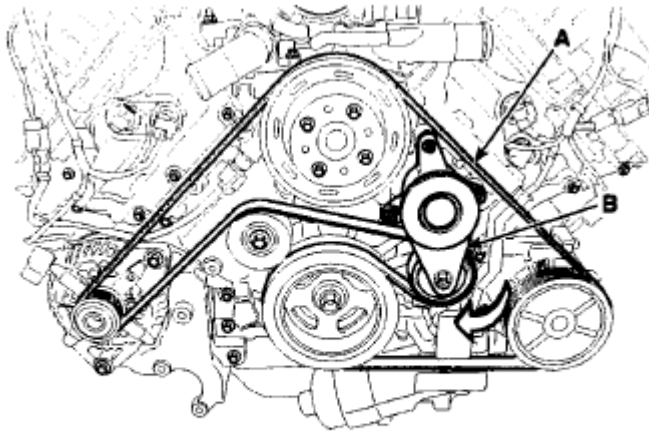
19.6 ~ 23.5 N.m (2.0 ~ 2.4kgf.m, 14.5 ~ 17.4lb-ft)



SBHM19014N

Fig. 265: Identifying Drive Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

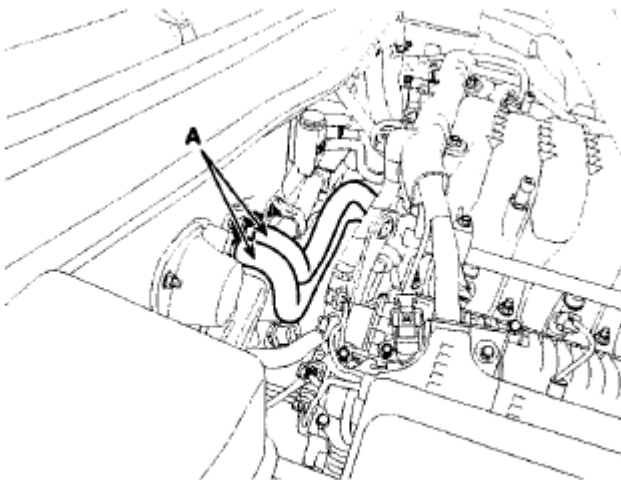
35. Turn the tensioner (B) clockwise and loosen, then install the drive belt (A).



SBHM19013N

Fig. 266: Identifying Drive Belt
Courtesy of HYUNDAI MOTOR CO.

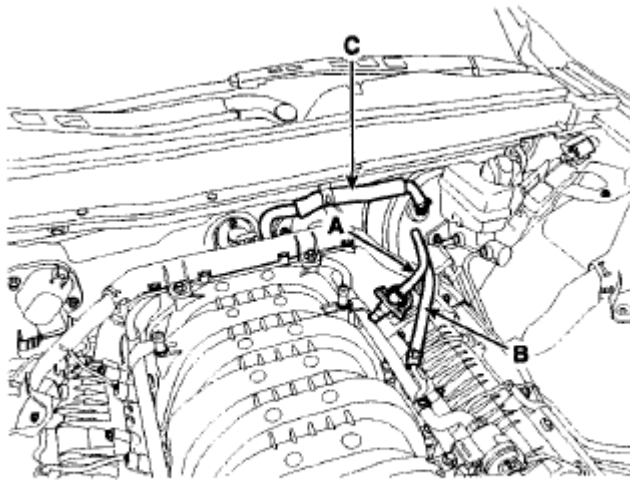
36. Install the radiator & cooling fan assembly. (Refer to **COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
37. Connect the heater hoses (A),



SBHM19004N

Fig. 267: Identifying Heater Hoses
Courtesy of HYUNDAI MOTOR CO.

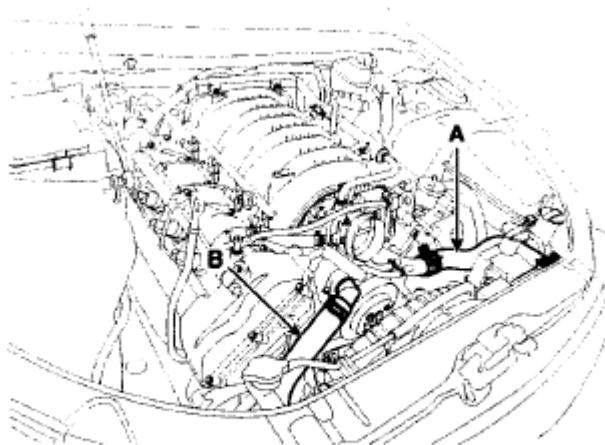
38. Connect the fuel hose (A), the purge control solenoid valve (PCSV) hose (B) and the brake booster vacuum hose (C).



SBHM19005N

Fig. 268: Identifying Fuel Hose, Purge Control Solenoid Valve Hose And Brake Booster Vacuum Hose
 Courtesy of HYUNDAI MOTOR CO.

39. Connect the radiator upper hose (A) and lower hose (B).



SBHM19003N

Fig. 269: Identifying Radiator Upper Hose And Lower Hose
 Courtesy of HYUNDAI MOTOR CO.

40. Install the air cleaner assembly.
 1. Install the resonator (F), the intake air hose (E) and air cleaner assembly (D).
 2. Reconnect the breather hose (B).
 3. Reconnect the air flow sensor (AFS) connector (C).
 4. Install the air duct (A).

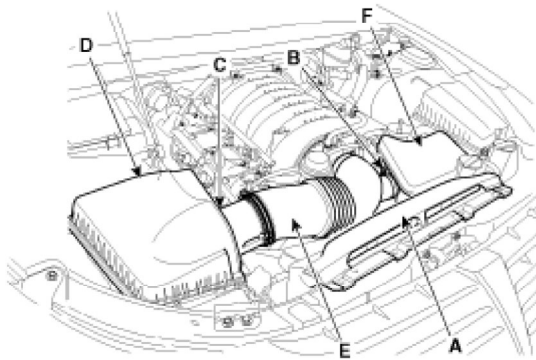


Fig. 270: Identifying Air Duct Components
Courtesy of HYUNDAI MOTOR CO.

41. Install the engine room cover (A), the engine cover (B) and the radiator grill upper cover (C).

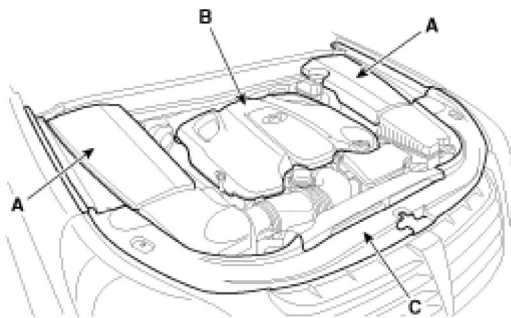


Fig. 271: Identifying Covers
Courtesy of HYUNDAI MOTOR CO.

42. Connect the battery negative terminal.

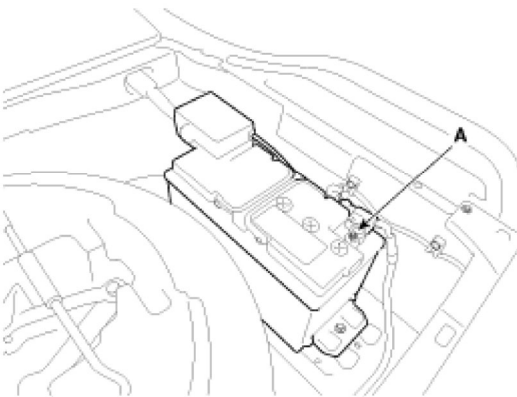


Fig. 272: Identifying Negative Battery Terminal
Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Refill engine oil.
- Clean the battery posts and cable terminals with sandpaper assemble them, and then apply grease to prevent corrosion.
- Inspect for fuel leakage.
 - After assembling the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.
 - Repeat this operation two or three times, and then check for fuel leakage at any point in the fuel lines.
- Refill radiator and reservoir tank with engine coolant.
- Bleed air from the cooling system.
 - Start engine and let it run until it warms up. (Until the radiator fan operates 3 or 4 times.)
 - Turn Off the engine. Check the level in the radiator, add coolant if needed. This will allow trapped air to be removed from the cooling system.
 - Put radiator cap on tightly, then run the engine again and check for leaks.

INSTALLATION (REVISED)**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 gasket (A).

1. The sealant locations on cylinder head gasket, cylinder block and timing chain lower case must be free of engine oil and ETC.
2. Before assembling the cylinder head gasket, the liquid sealant TB 1217H should be applied on the gap between cylinder block and timing chain lower case.

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

NOTE: Refer to below illustration to apply the sealant.

Bead width:

3.5 ~ 4.5 mm (0.1378 ~ 0.1772 in)

Sealant locations:

1.5 ~ 2.5mm (0.0591 ~ 0.0984 in)

from timing chain lower case inner surface

Recommended sealant: Liquid sealant LT5900H or equivalent

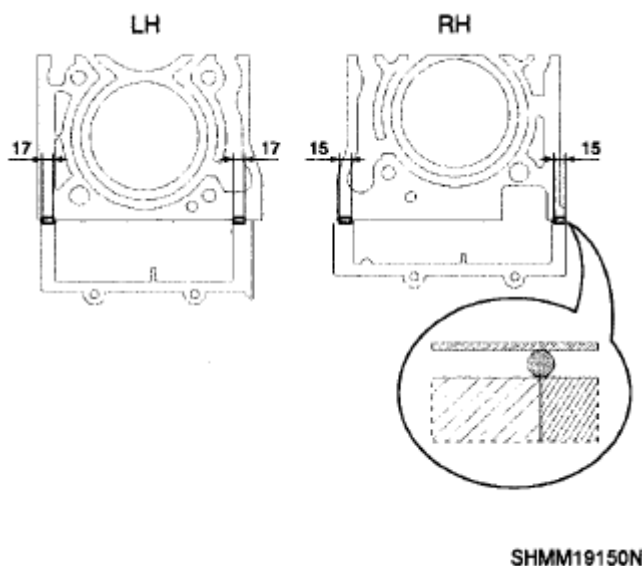


Fig. 273: Identifying Liquid Sealant Applying Area
Courtesy of HYUNDAI MOTOR CO.

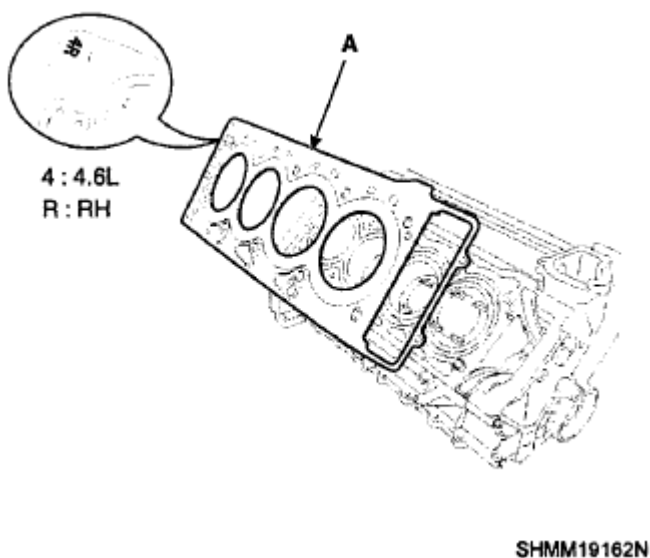
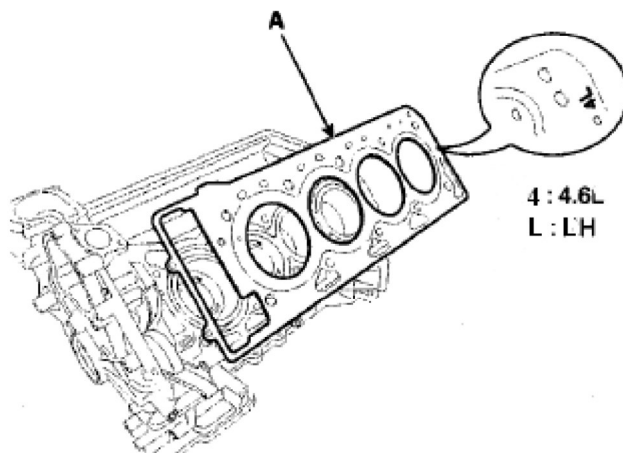


Fig. 274: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.



SHMM19163N

Fig. 275: Identifying Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

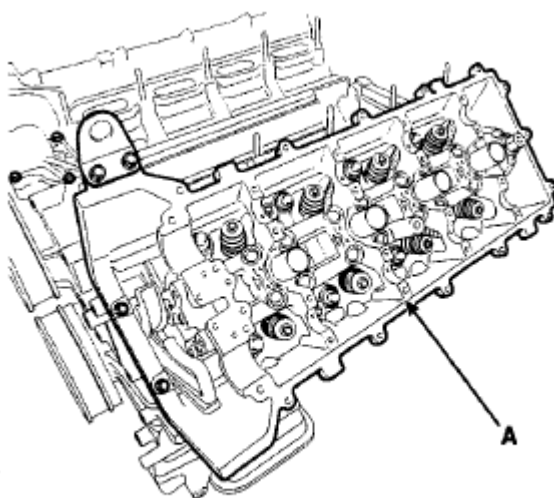
3. Apply sealant on cylinder head gaskets after assembling cylinder head gaskets on cylinder block.

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

NOTE: Be careful of the installation direction.

4. Install the cylinder head.

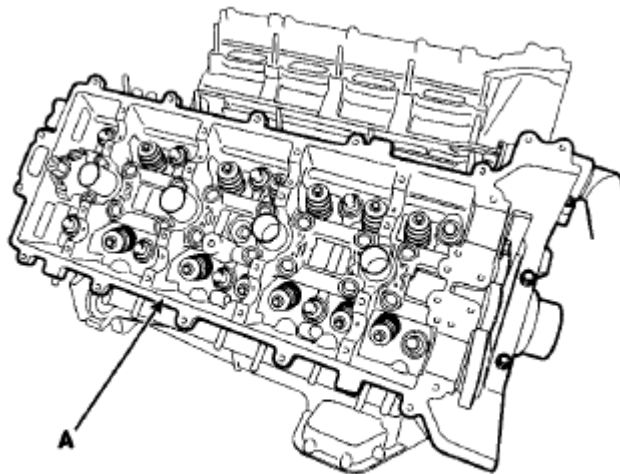
NOTE: Remove the extruded sealant after assembling cylinder heads.



SHMM19041N

Fig. 276: Identifying Cylinder Head

Courtesy of HYUNDAI MOTOR CO.



SHMM19042N

Fig. 277: Identifying Cylinder Head
Courtesy of HYUNDAI MOTOR CO.

2. Install the 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:

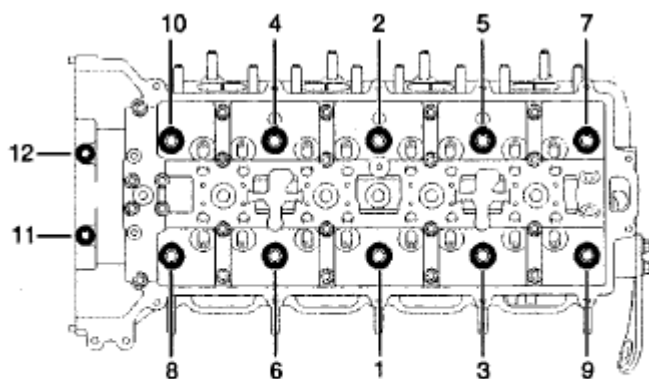
Cylinder head bolts (1-10):

32.4 ~ 36.3 N.m (3.3 ~ 3.7kgf.m, 23.9 ~ 26.8lb-ft) + 88° ~ 92° + 118° ~ 122°

Flange bolts (11 ~ 12):

33.3 ~ 36.3 N.m (3.4 ~ 3.7kgf.m, 24.6 ~ 26.8lb-ft)

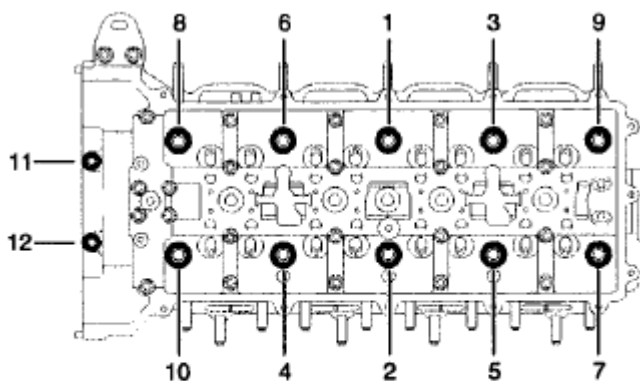
[RH]



SHMM19148N

Fig. 278: Identifying RH Cylinder Head Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH]



SHMM19149N

Fig. 279: Identifying LH Cylinder Head Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

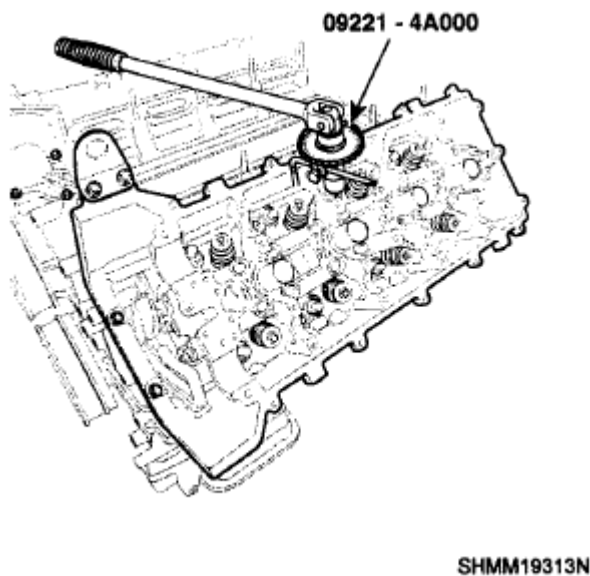


Fig. 280: Tightening Cylinder Head Bolts
Courtesy of HYUNDAI MOTOR CO.

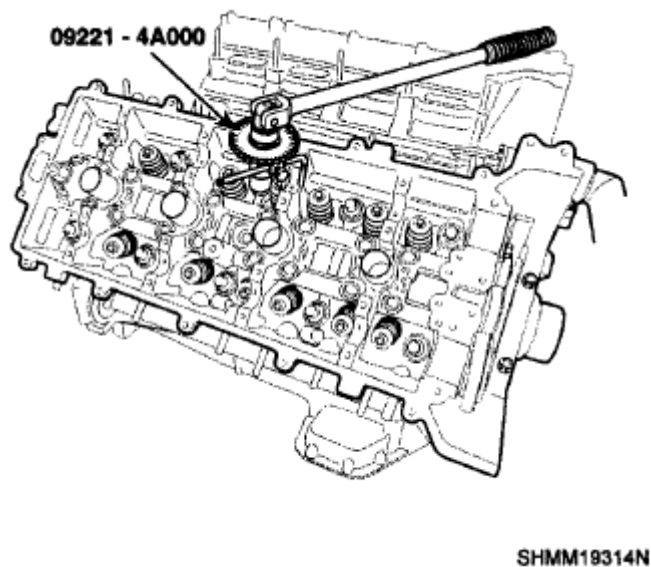
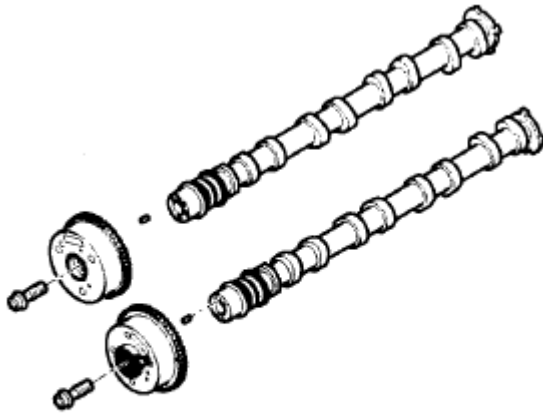


Fig. 281: Tightening Cylinder Head Bolts
Courtesy of HYUNDAI MOTOR CO.

3. Assemble the CVVT and camshaft assembly.

Tightening torque:

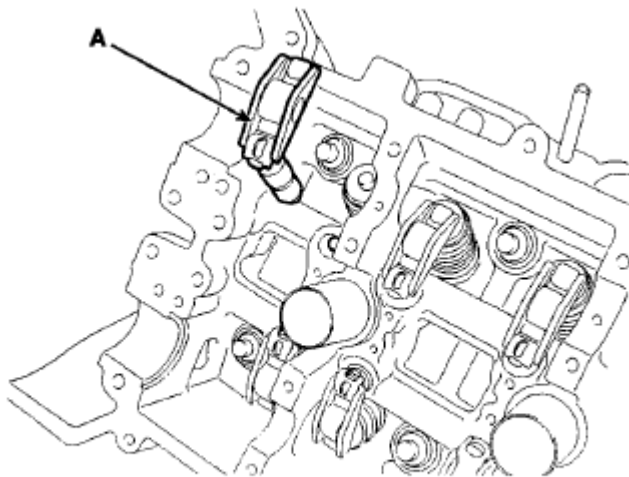
73.5 ~ 83.4 N.m (7.5 ~ 8.5kgf.m, 54.2 ~ 61.5lb-ft)



SHMM19373N

Fig. 282: Identifying CVVT Assembly
Courtesy of HYUNDAI MOTOR CO.

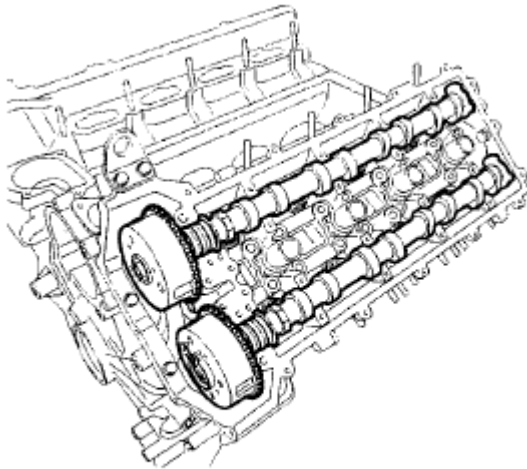
- Assemble the camshaft to the dowel pin of CVVT assembly. At this time, attend not to be installed to oil hole of camshaft.
 - Hold the hexagonal head wrench portion of the camshaft with a vise, and install the bolt and CVVT assembly.
 - Do not rotate CVVT assembly when camshaft is assembled to the dowel pin of CVVT assembly.
4. Install the roller finger follower and the hydraulic lash adjuster assembly (A).



SHMM19040N

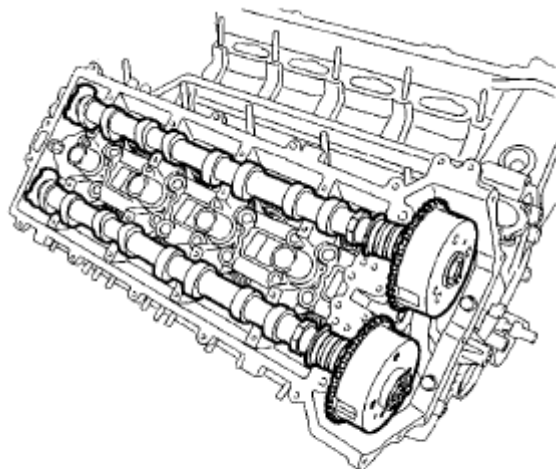
Fig. 283: Identifying Hydraulic Lash Adjuster Assembly
Courtesy of HYUNDAI MOTOR CO.

5. Install the LH/RH camshaft assembly (A).



SHMM19160N

Fig. 284: Identifying LH/RH Camshaft Assembly
Courtesy of HYUNDAI MOTOR CO.



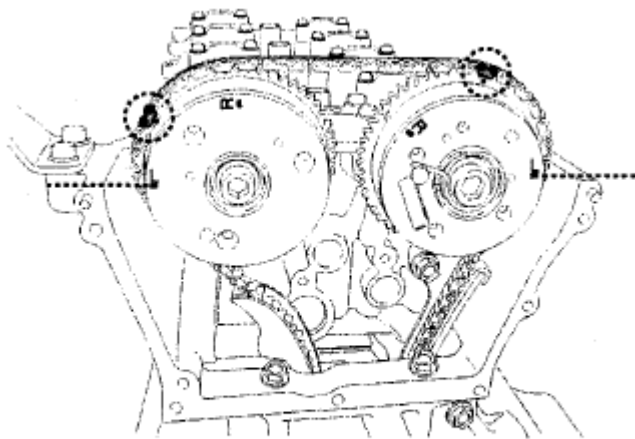
SHMM19161N

Fig. 285: Identifying LH/RH Camshaft Assembly
Courtesy of HYUNDAI MOTOR CO.

NOTE:

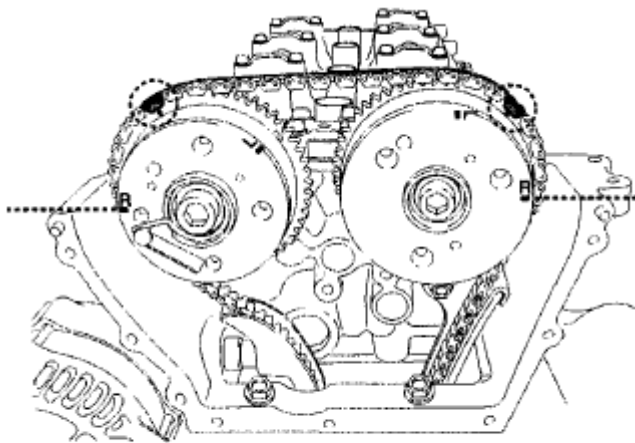
- Apply a light coat of engine oil on camshaft journals.
- Assemble the timing mark of CVVT to the same level of cylinder head top surface.
- Be careful the right, left bank, intake, exhaust side before assembling.
- Turn the crankshaft to set the No. 1 piston at TDC position.

6. Install the timing chain to the camshaft sprocket.



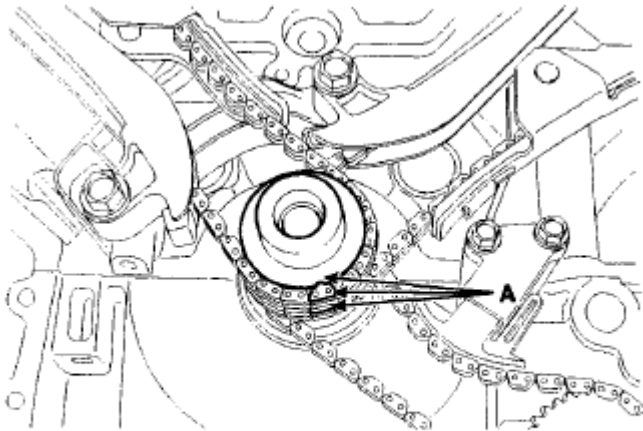
SHMM19028N

Fig. 286: Identifying Timing Mark Location (1 Of 3)
Courtesy of HYUNDAI MOTOR CO.



SHMM19029N

Fig. 287: Identifying Timing Mark Location (2 Of 3)
Courtesy of HYUNDAI MOTOR CO.



SHMM19128N

Fig. 288: Identifying Timing Mark Location (3 Of 3)

Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Make sure the crankshaft is at TDC position.
- Align the chain installation mark (A) of the crankshaft sprocket and the timing mark (A) of the chain link, and then install the chain.

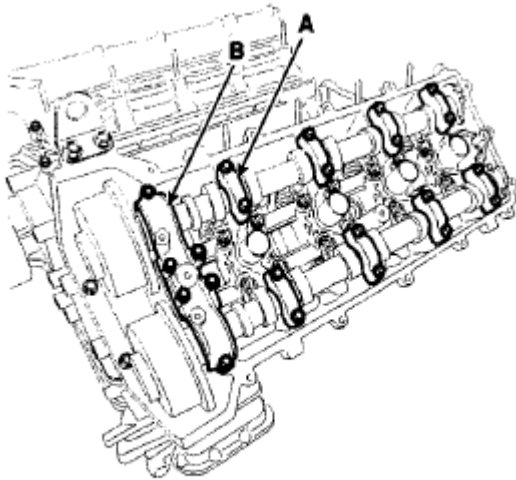
NOTE:

In case of marking the timing chain links corresponding to the chain installation marks on the sprocket with an identification for on-vehicle repair (for cylinder head assembly, timing chain tensioner, CVVT, camshaft, HLA or etc.), align all of the chain installation mark of the sprocket and the timing marked chain links for reassembly.

NOTE:

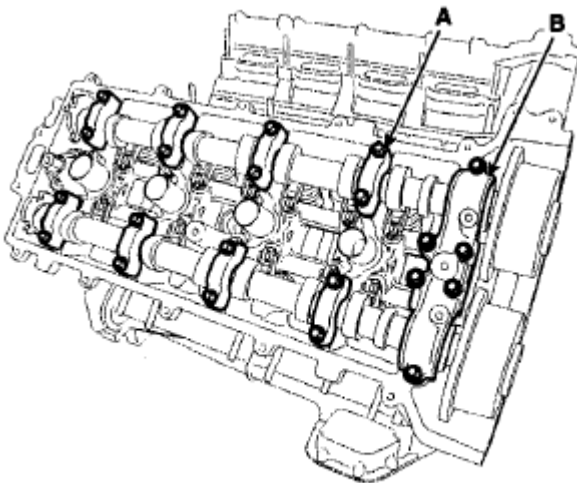
To install the timing chain with no slack between each shaft (cam, crank), follow the below procedure.
Crankshaft sprocket --> Timing chain guide --> Exhaust camshaft sprocket --> Intake camshaft sprocket. (LH Bank)
Crankshaft sprocket --> Timing chain guide --> Intake camshaft sprocket --> Exhaust camshaft sprocket. (RH Bank)
When reassembling the timing chain, make sure all of the chain installation mark of the sprocket and the timing marked chain links are aligned.

7. Install the camshaft bearing caps and the camshaft thrust bearing cap.



SHMM19036N

Fig. 289: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.



SHMM19037N

Fig. 290: Identifying Camshaft Bearing Caps And Camshaft Thrust Bearing Cap Bolts
Courtesy of HYUNDAI MOTOR CO.

Tighten the bolts in order to below sequence.

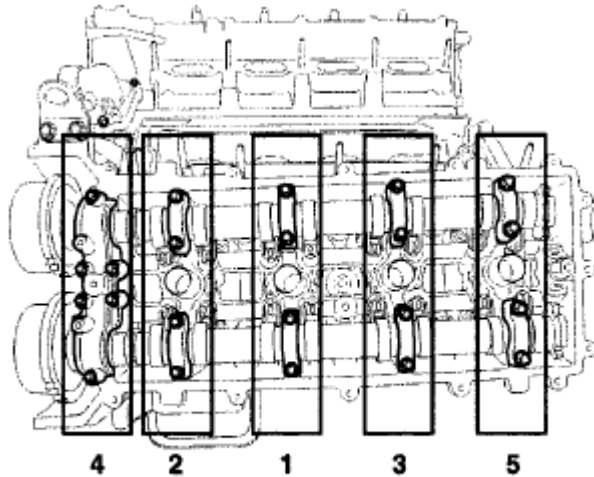
Tightening torque:

1st step:

6.9 ~ 7.8 N.m (0.7 ~ 0.8kgf.m, 5.1 ~ 5.8lb-ft)

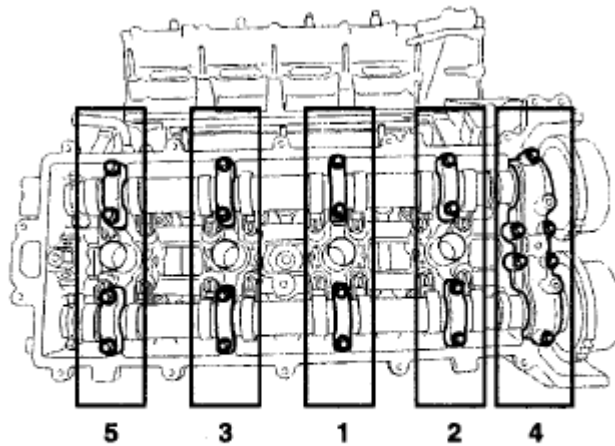
2nd step:

13.7 ~ 14.7 N.m (1.4 ~ 1.5kgf.m, 10.1 ~ 10.8lb-ft)



SHMM19038N

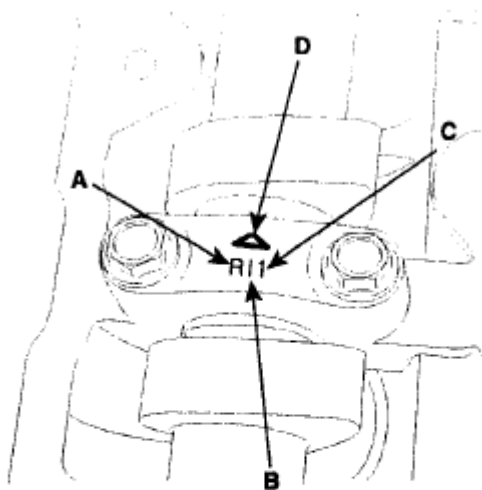
Fig. 291: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.



SHMM19039N

Fig. 292: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

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



ECBF036A

A : L(LH),R(RH)

B : I(Intake), E(Exhaust)

C : Journal number

D : Front mark

Fig. 293: Identifying Camshaft Marking

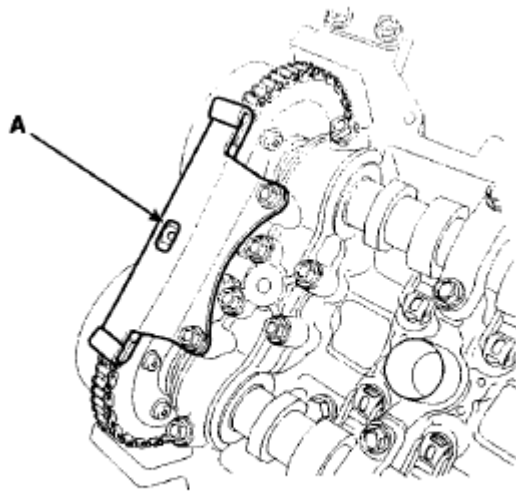
Courtesy of HYUNDAI MOTOR CO.

CAUTION: Be sure to install the thrust bearing cap and bearing cap bolts in the correct places.

8. Install the cam to cam guide (A).

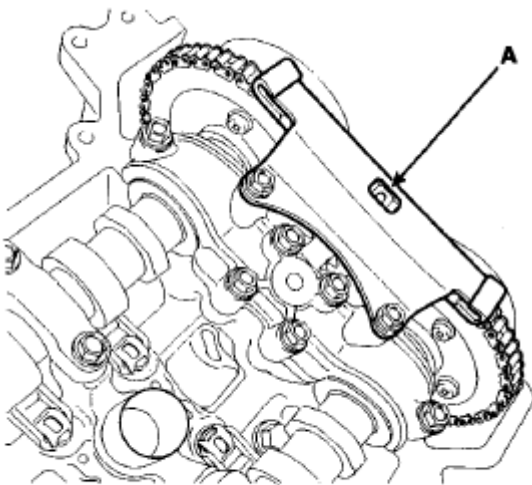
Tightening torque :

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19026N

Fig. 294: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.



SHMM19027N

Fig. 295: Identifying Cam Guide
Courtesy of HYUNDAI MOTOR CO.

9. Install the LH timing chain guide bolt (B) and then the LH timing chain tensioner (A).
 1. Install the timing chain tensioner & plug bolt in the hole on the cylinder head by hand.
 2. Tighten the plug bolt with the specified torque while pressing the timing chain on the LH intake CVVT.

Tightening torque:

Timing chain guide bolt:

21.6 ~ 25.5Nm (2.2 ~ 2.6kgf.m, 15.9 ~ 18.8lb-ft)

Timing chain tensioner plug bolt:

78.5 ~ 88.3 N.m (8.0 ~ 9.0kgf.m, 57.9 ~ 65.1lb-ft)

NOTE:

1. Do not reuse the timing chain tensioner.
2. Make sure the timing chain tensioner is at compressed transport position state.
3. Install the timing chain tensioner with the oil hole facing the plug bolt.

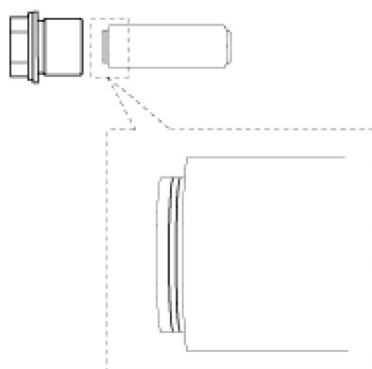
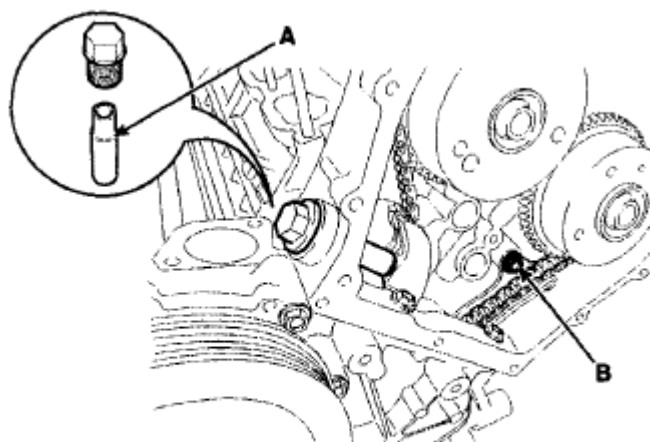


Fig. 296: Installing Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19034N

Fig. 297: Identifying LH Timing Chain Guide Bolt
Courtesy of HYUNDAI MOTOR CO.

10. Install the RH timing chain guide bolt (B) and then the RH timing chain tensioner (A).

1. Install the timing chain tensioner & plug bolt in the hole on the cylinder head by hand.
2. Tighten the plug bolt with the specified torque while pressing the timing chain on the RH intake CVVT.

Tightening torque:

Timing chain guide bolt:

21.6 ~ 25.5Nm (2.2 ~ 2.6kgf.m, 15.9 ~ 18.8lb-ft)

Timing chain tensioner plug bolt:

78.5 ~ 88.3 N.m (8.0 ~ 9.0kgf.m, 57.9 ~ 65.1lb-ft)

NOTE:

1. **Do not reuse the timing chain tensioner.**
2. **Make sure the timing chain tensioner is at compressed transport position state.**
3. **Install the timing chain tensioner with the oil hole facing the plug bolt.**

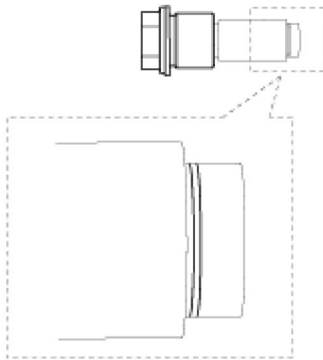
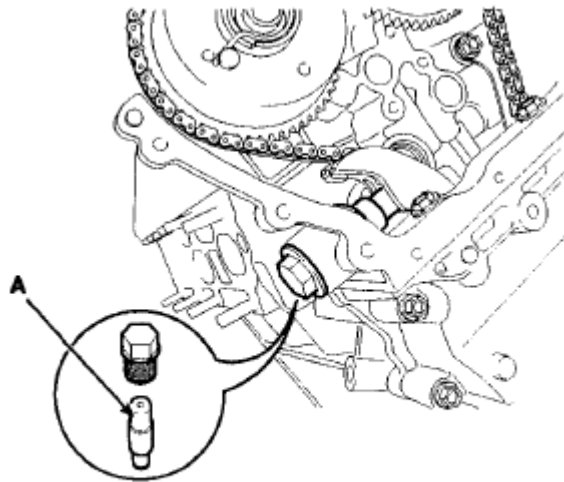


Fig. 298: Installing Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.



SHMM19035N

Fig. 299: Identifying RH Timing Chain Tensioner
Courtesy of HYUNDAI MOTOR CO.

11. Set tension of the timing chain tensioner.
 1. LH Bank
 - A. Press the timing chain on the LH intake CVVT by hand with the timing mark "L" on the LH intake and exhaust CVVT and the LH cylinder head upper surface aligned.

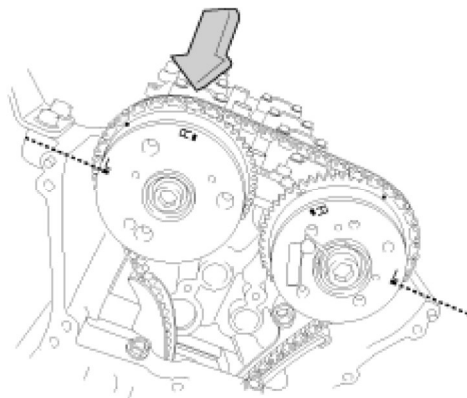


Fig. 300: Locating LH Timing Mark
Courtesy of HYUNDAI MOTOR CO.

- B. To set tension of the timing chain tensioner, push the timing chain tensioner arm outward with a force about 150N (15.3kgf, 33.7lbf).

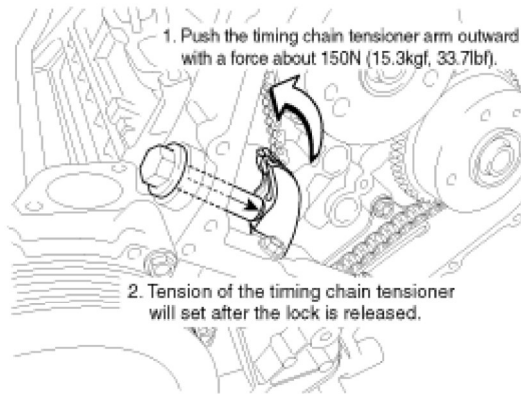


Fig. 301: Pushing Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR CO.

- C. To check the tension of the timing chain tensioner, push the timing chain tensioner arm outward strongly. The distance between the cylinder head surface and end of tensioner plunger should be about 20mm (0.79inch).

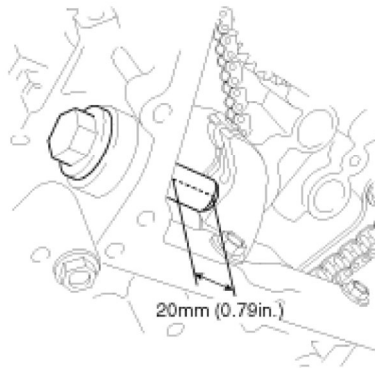


Fig. 302: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

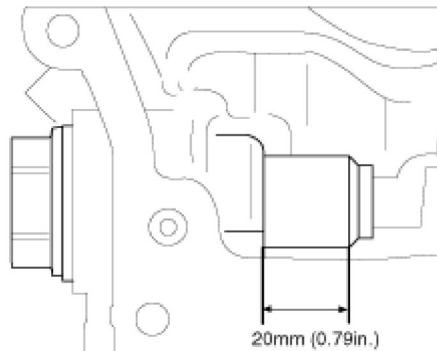


Fig. 303: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (2 Of 2)

Courtesy of HYUNDAI MOTOR CO.

2. RH Bank

- A. To align the timing mark "R" on the RH intake and exhaust CVVT and the RH cylinder head upper surface, turn the exhaust CVVT about 20° counterclockwise while pressing the timing chain on the intake CVVT by hand with all of the chain installation mark of the sprocket and the timing marked chain links aligned.

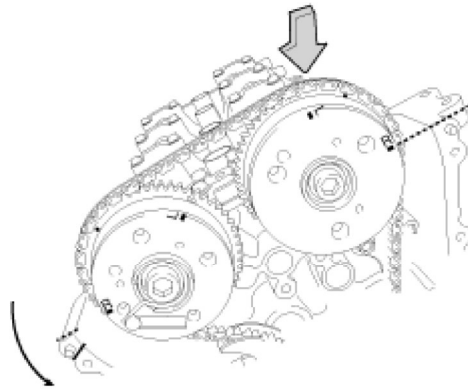


Fig. 304: Locating RH Timing Mark
Courtesy of HYUNDAI MOTOR CO.

- B. To set tension of the timing chain tensioner, push the timing chain tensioner arm outward with a force about 150N (15.3kgf, 33.7lbf).

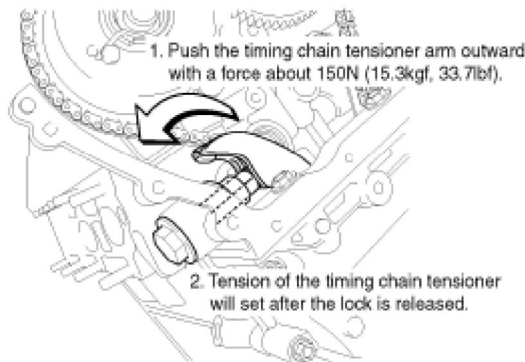


Fig. 305: Pushing Timing Chain Tensioner Arm
Courtesy of HYUNDAI MOTOR CO.

- C. To check the tension of the timing chain tensioner, push the timing chain tensioner arm outward strongly. The distance between the tensioner body and end of tensioner plunger should be about 3.5mm (0.14inch).

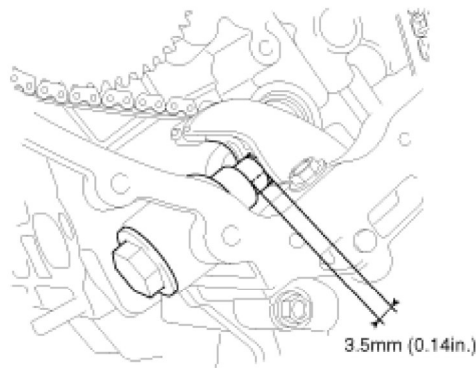


Fig. 306: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

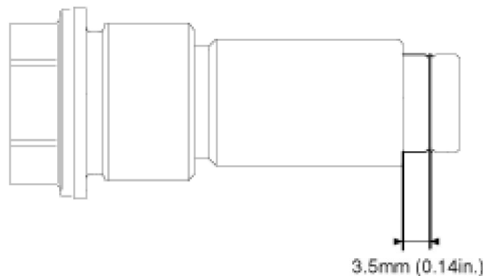


Fig. 307: Identifying Distance Between Cylinder Head Surface & End Of Tensioner Plunger (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

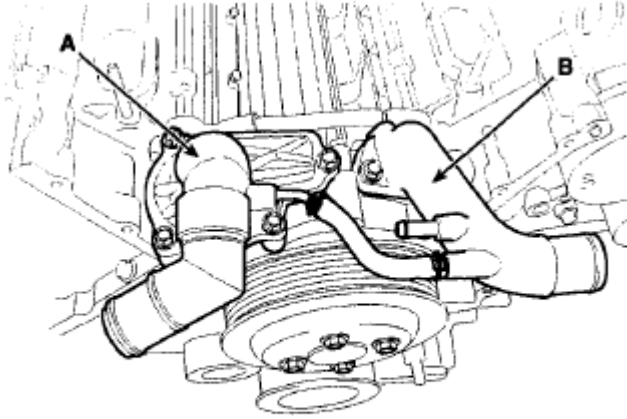
3. After setting tension of the LH, RH timing chain tensioner, check timing again.
 - A. Make sure the chain installation mark of the sprocket and the timing marked chain links are aligned.
 - B. Rotate the crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing marks on the LH, RH intake and exhaust CVVT and the RH cylinder head upper surfaces are aligned.
12. After rotating the crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing mark.

NOTE: Always turn the crankshaft clockwise.
Turning the crankshaft counter clockwise before building up oil pressure in the hydraulic timing chain tensioner may result in the chain disengaging from the sprocket teeth.

13. Install the water temperature control assembly (A) and the water outlet fitting assembly (B) with new O-ring and new gasket.

Tightening torque:

16.7 ~ 19.6 N.m (1.7 ~ 2.0kgf.m, 12.3 ~ 14.5lb-ft)



SHMM19033N

Fig. 308: Identifying Water Temperature Control Assembly And Water Outlet Fitting Assembly
Courtesy of HYUNDAI MOTOR CO.

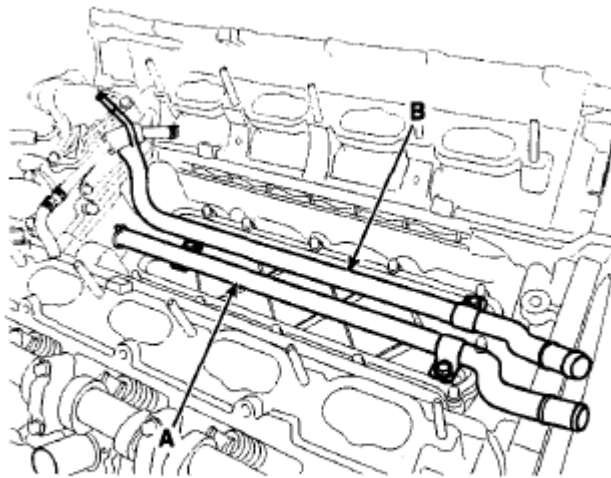
14. Install the water outlet pipe (A) and the water inlet pipe (B).

Tightening torque:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

NOTE:

- Use new O-rings when reassembling.
- Never apply sort of oil on O-ring and O-ring groove of pipe end.
- O-ring must be free from scratching damage.
- Make clean the contact face before assembly.
- Insert pipe after to be wetting O-ring or inside of attaching hole by water or antifreeze.



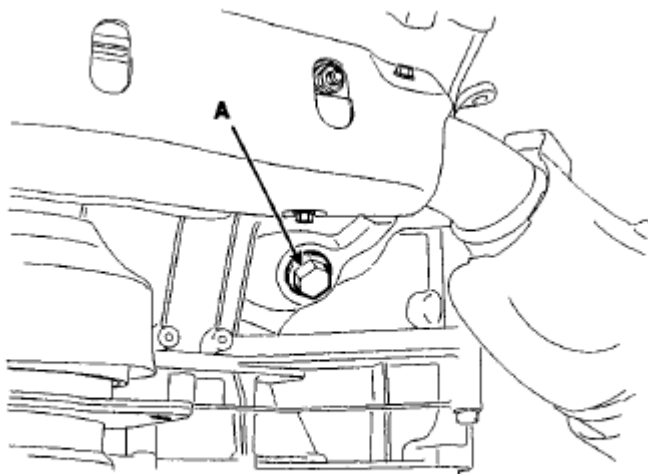
SHMM19032N

Fig. 309: Identifying Water Outlet Pipe And Water Inlet Pipe
Courtesy of HYUNDAI MOTOR CO.

NOTE: Install the drain plug (A).

Tightening torque:

96.1 ~ 100.0 N.m (9.8 ~ 10.2kgf.m, 70.9 ~ 73.8lb-ft)



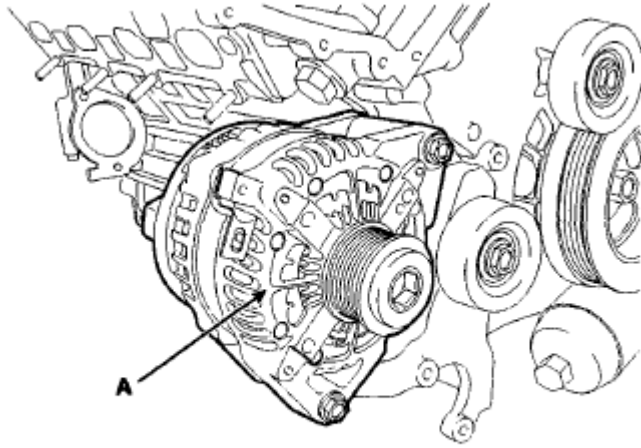
SHMM19085N

Fig. 310: Identifying Drain Plug
Courtesy of HYUNDAI MOTOR CO.

15. Install the alternator (A).

Tightening torque:

29.4 ~ 41.2 N.m (3.0 ~ 4.2kgf.m, 21.7 ~ 30.4lb-ft)



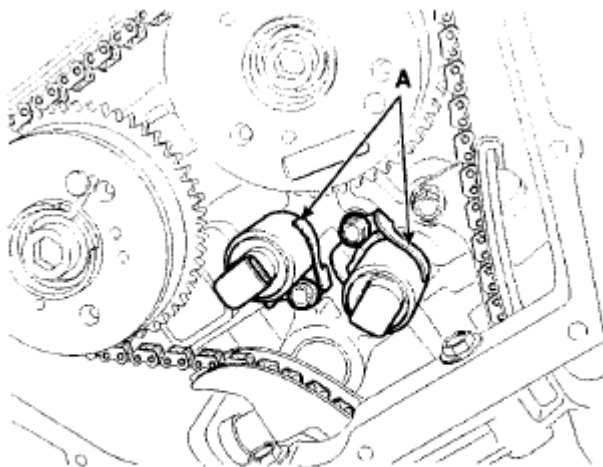
SHMM19030N

Fig. 311: Identifying Alternator
Courtesy of HYUNDAI MOTOR CO.

16. Install the oil control valve (A).

Tightening torque:

9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19024N

Fig. 312: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

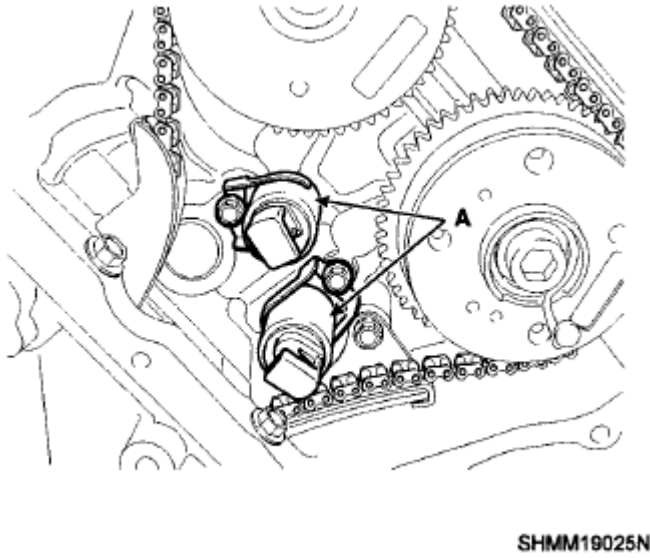


Fig. 313: Identifying Oil Control Valve
Courtesy of HYUNDAI MOTOR CO.

NOTE:

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

17. Use the SST (09231-2J500, 09231-H1100) install the timing chain upper cover oil seal (A).

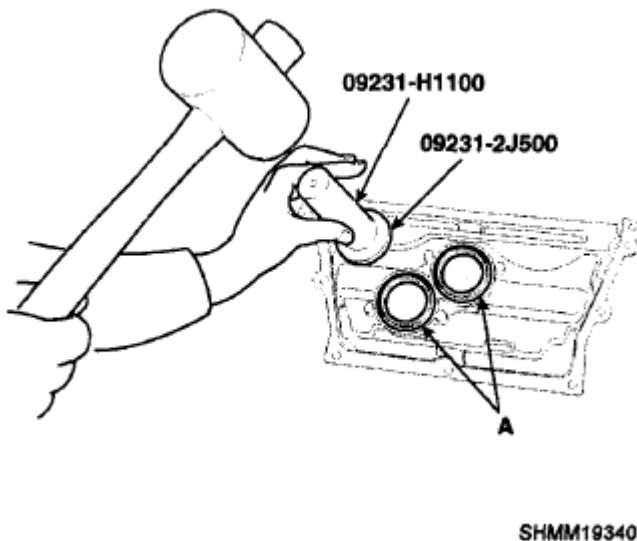
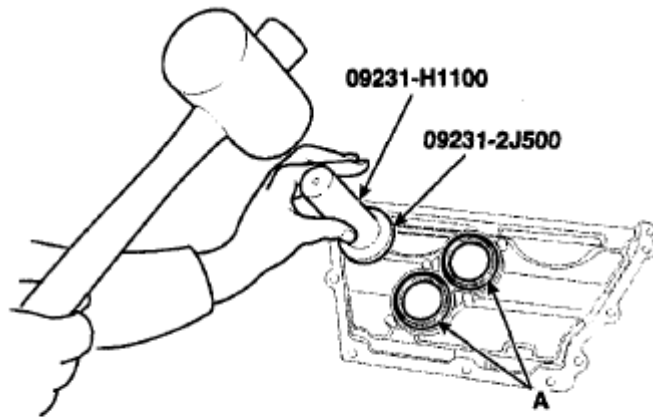
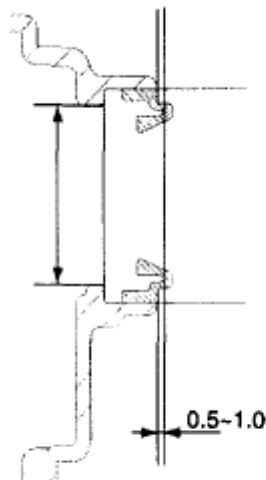


Fig. 314: Tapping Timing Chain Upper Cover Oil Seal (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



SHMM19341N

Fig. 315: Tapping Timing Chain Upper Cover Oil Seal (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.



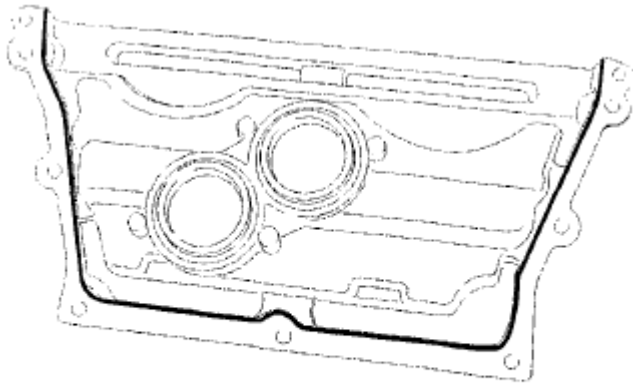
SHMM19141N

Fig. 316: Identifying Timing Chain Upper Cover Oil Seal Height
Courtesy of HYUNDAI MOTOR CO.

18. Apply sealant to the timing chain upper cover.
 1. Using a gasket scraper, remove all the old packing material from the gasket surfaces.
 2. Before assembling the timing chain upper cover, the liquid sealant LT5900H or equivalent should be applied on upper cover.

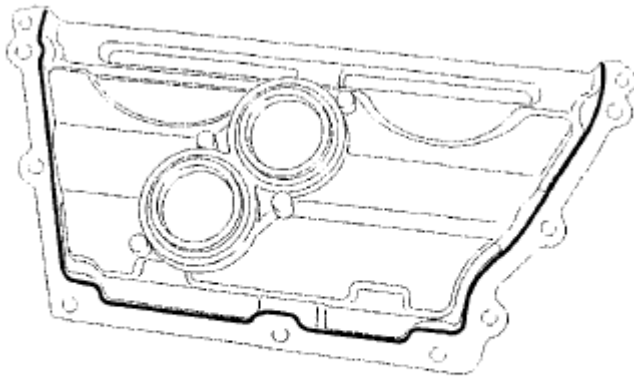
The part must be assembled within 5 minutes after the sealant was applied.

Bead width: $\varnothing 2.5 \pm 0.5\text{mm}$ ($0.1 \pm 0.002\text{in}$)



SHMM19361N

Fig. 317: Applying Sealant To Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19362N

Fig. 318: Applying Sealant To Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

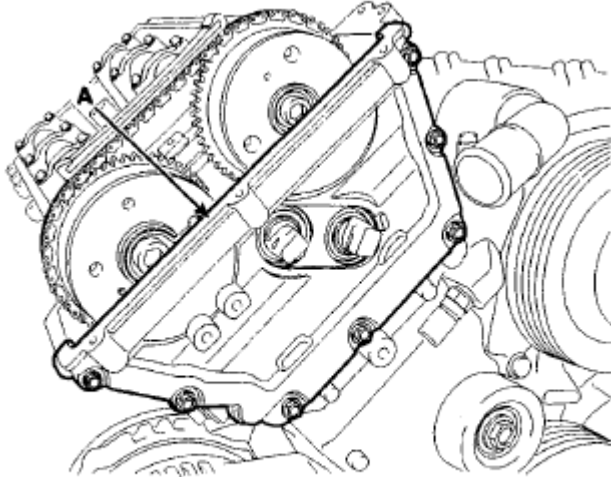
NOTE:

- Clean the sealing face before assembling two parts.
- Remove harmful foreign materials on the sealing face before applying sealant.
- When applying sealant gasket, sealant must not protrude into the inside of upper cover.
- To prevent leakage of oil, apply sealant gasket to the inner threads of the bolt holes.

19. Install the timing chain upper cover (A).

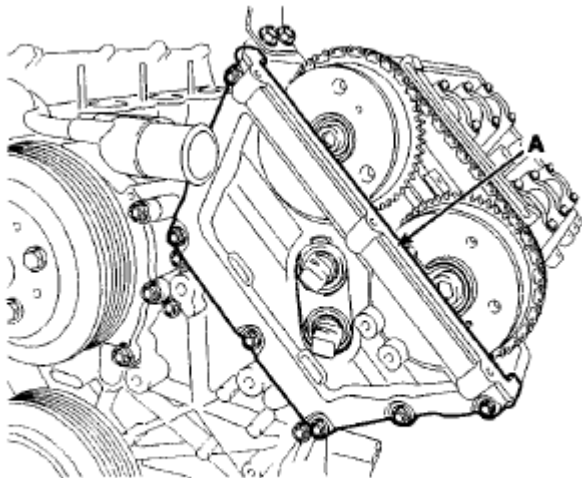
Tightening torque:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19020N

Fig. 319: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19021N

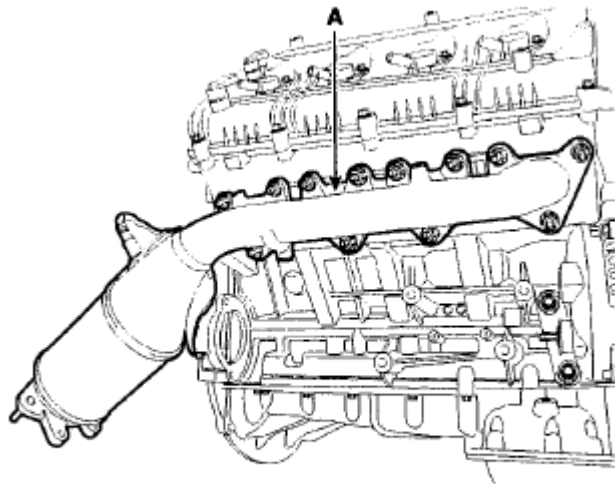
Fig. 320: Identifying Timing Chain Upper Cover
Courtesy of HYUNDAI MOTOR CO.

20. Install the exhaust manifold (A) by tightening the nuts as following method. (Refer to intake and exhaust system)

Tightening torque:

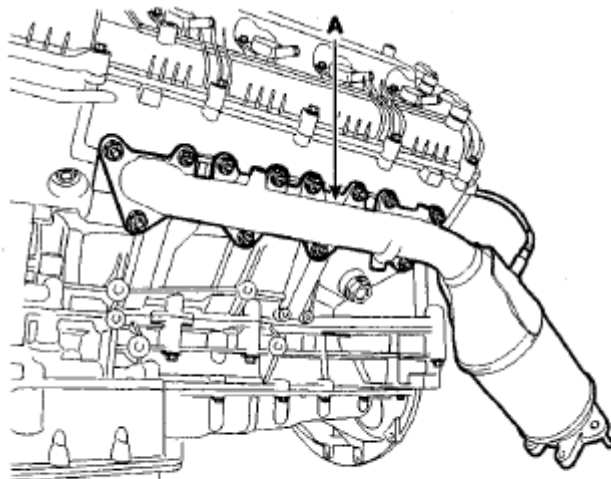
49.0 ~ 53.9 N.m (5.0 ~ 5.5kgf.m, 36.2 ~ 39.8lb-ft)

NOTE: The "TOP" mark of the gasket must face the exhaust manifold.



SHMM19004N

Fig. 321: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

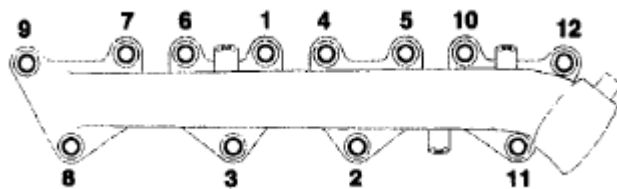


SHMM19005N

Fig. 322: Identifying Exhaust Manifold
Courtesy of HYUNDAI MOTOR CO.

NOTE: Tighten the exhaust manifold nuts as following method.

[LH] - With engine assembly removal



SHMM19154N

Fig. 323: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[LH] - Without engine assembly removal

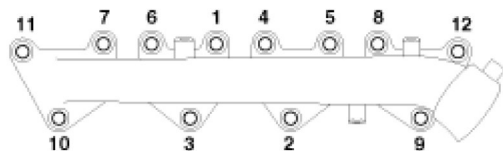
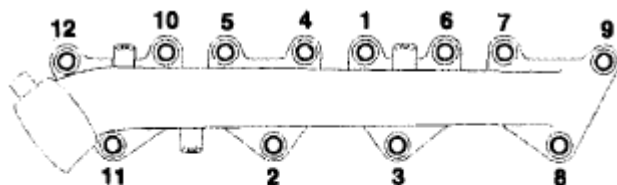


Fig. 324: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

[RH]



SHMM19363N

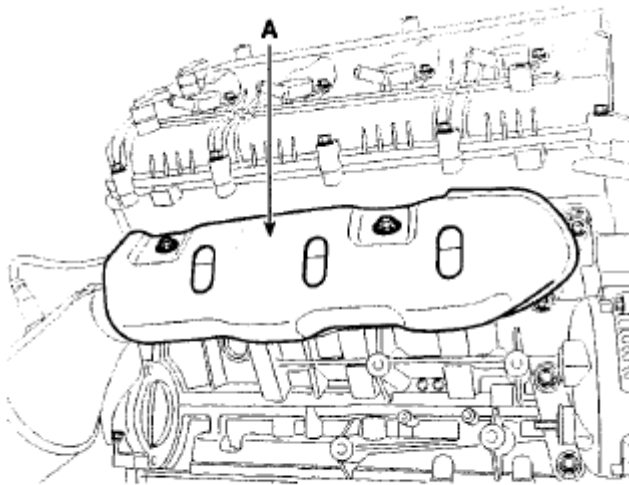
Fig. 325: Identifying RH Exhaust Manifold Nuts Tightening Sequence

Courtesy of HYUNDAI MOTOR CO.

21. Install the exhaust manifold heat protector (A).

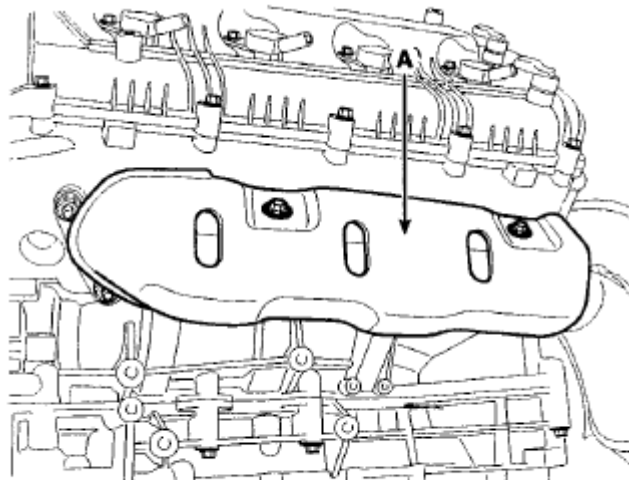
Tightening torque:

8.8 ~ 10.8 N.m (0.9 ~ 1.1kgf.m, 6.5 ~ 8.0lb-ft)



SHMM19002N

Fig. 326: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.



SHMM19003N

Fig. 327: Identifying Exhaust Manifold Heat Protector
Courtesy of HYUNDAI MOTOR CO.

22. Install the engine coolant temperature sensor (ECTS) wiring assembly and bracket (A).

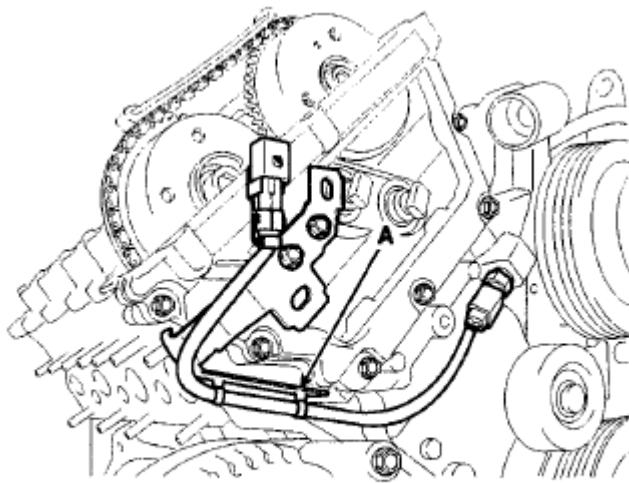
Tightening torque:

Wiring bracket bolts:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

Engine coolant temperature sensor:

19.6 ~ 39.2Nm (2.0 ~ 4.0kgf.m, 14.5 ~ 28.9lb-ft)



SHMM19019N

Fig. 328: Identifying Engine Coolant Temperature Sensor Wiring Assembly And Bracket
Courtesy of HYUNDAI MOTOR CO.

23. Install the oil pressure switch wiring assembly and bracket (A).

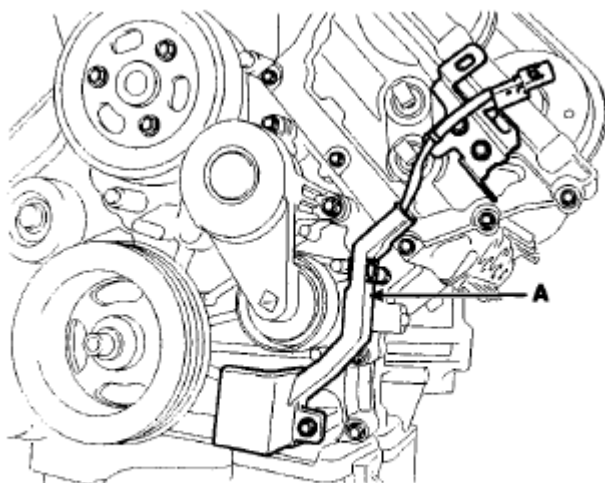
Tightening torque:

Wiring bracket bolts:

9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)

Oil pressure switch:

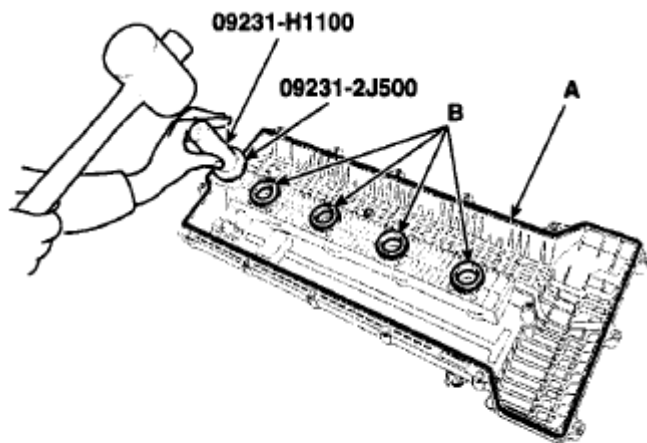
14.7 ~ 21.6Nm (1.5 ~ 2.2kgf.m, 10.8 ~ 15.9lb-ft)



SHMM19018N

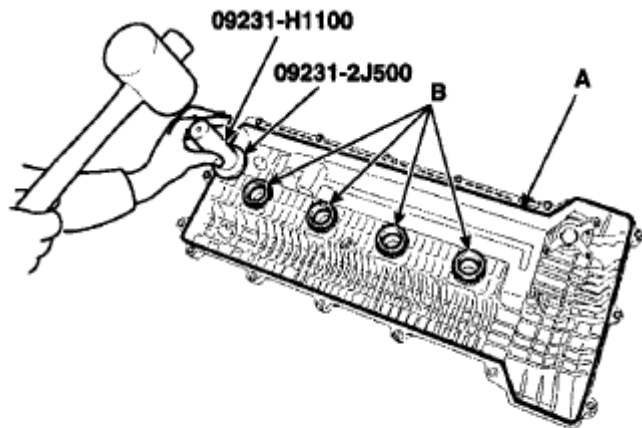
Fig. 329: Identifying Oil Pressure Switch Wiring Assembly And Bracket
 Courtesy of HYUNDAI MOTOR CO.

24. Use the SST (09231-2J500, 09231-H1100), install the oil seal (B) and the gasket (A).



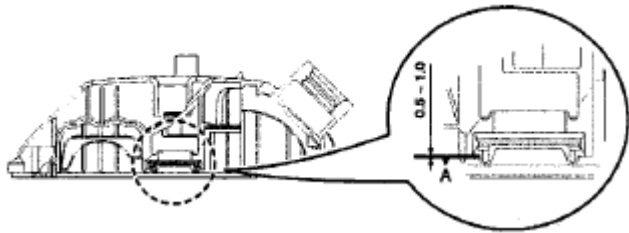
SHMM19342N

Fig. 330: Tapping Oil Seal
 Courtesy of HYUNDAI MOTOR CO.



SHMM19343N

Fig. 331: Tapping Oil Seal
Courtesy of HYUNDAI MOTOR CO.

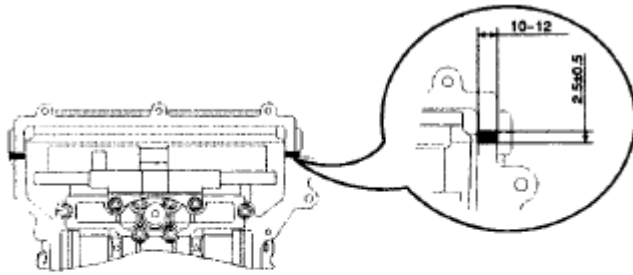


SHMM19152N

Fig. 332: Identifying Sealant Applying Area
Courtesy of HYUNDAI MOTOR CO.

25. Install the cylinder head cover.
 1. The sealant locations on cylinder head and timing chain upper case must be free of engine oil etc.
 2. Before assembling the cylinder head cover, the liquid sealant LT5900H or equivalent should be applied on the gap between cylinder head and timing chain upper case.

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



SHMM19151N

Fig. 333: Applying Sealant To Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

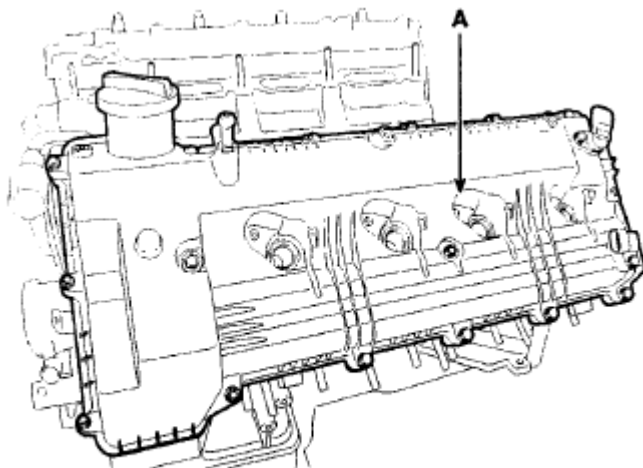
3. Install the cylinder head cover (A).

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

Tightening torque:

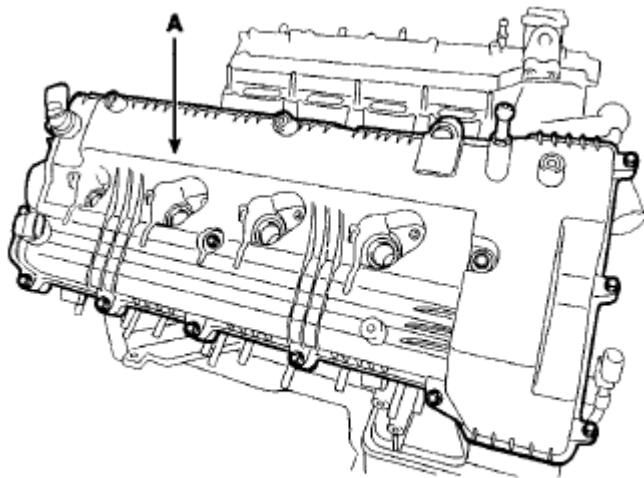
1st step: 4.9 ~ 5.9 N.m (0.5 ~ 0.6kgf.m, 3.6 ~ 4.3lb-ft)

2nd step: 9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19012N

Fig. 334: Identifying Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.



SHMM19013N

Fig. 335: Identifying Cylinder Head Cover
 Courtesy of HYUNDAI MOTOR CO.

NOTE: Tighten the cylinder head cover bolts as following method.

[RH]

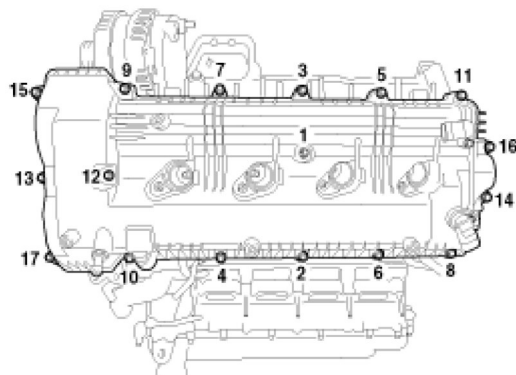


Fig. 336: Identifying RH Cylinder Head Cover Bolt Tightening Sequence
 Courtesy of HYUNDAI MOTOR CO.

[LH]

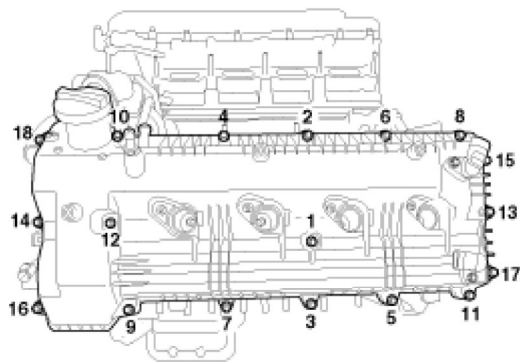
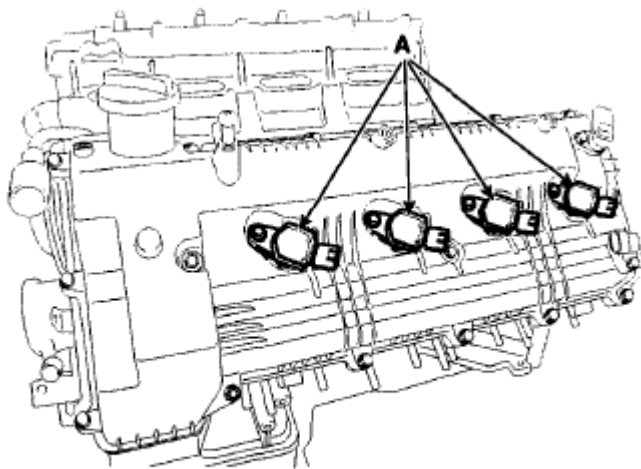


Fig. 337: Identifying LH Cylinder Head Cover Bolt Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

26. Install the ignition coils (A).

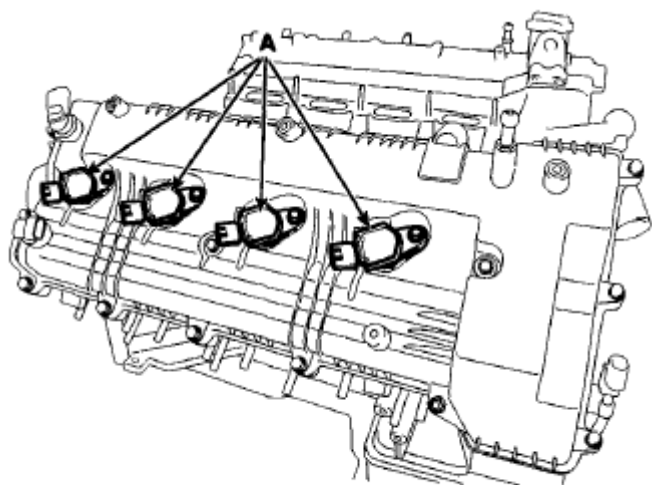
Tightening torque:

9.8 ~ 11.8 N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19010N

Fig. 338: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.



SHMM19011N

Fig. 339: Identifying Ignition Coils
Courtesy of HYUNDAI MOTOR CO.

27. Reconnect the water hose (A).

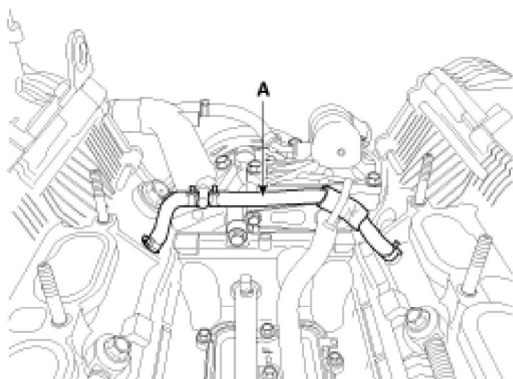
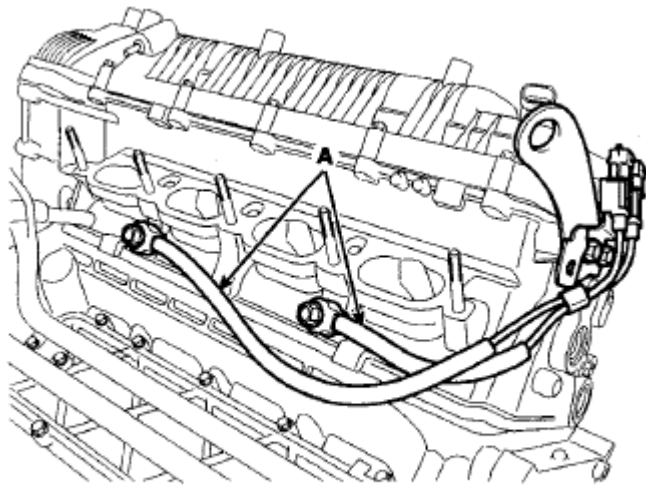


Fig. 340: Identifying Water Hose
Courtesy of HYUNDAI MOTOR CO.

28. Install the knock sensors (A).

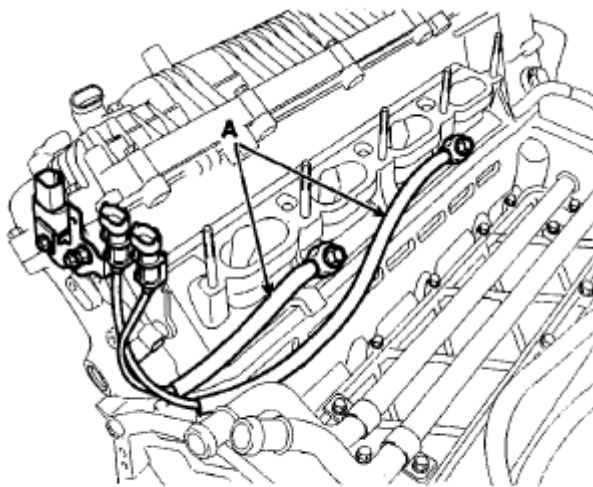
Tightening torque:

64.7 ~ 76.5 N.m (6.6 ~ 7.8kgf.m, 47.7 ~ 56.4lb-ft)



SHMM19008N

Fig. 341: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.



SHMM19009N

Fig. 342: Identifying Knock Sensors
Courtesy of HYUNDAI MOTOR CO.

29. Install the intake manifold module (A) tighten the nuts as following method.

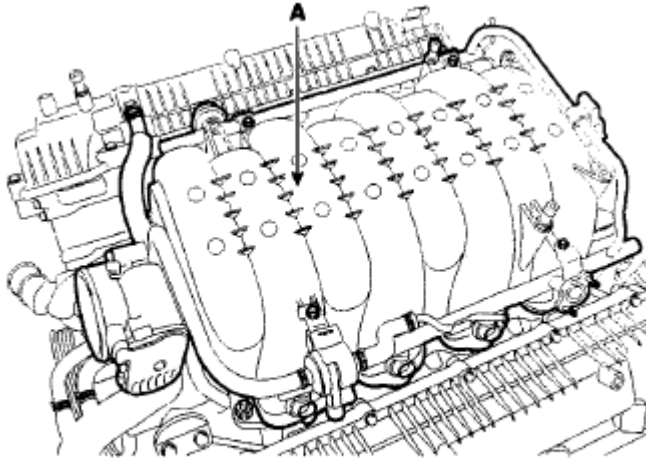
Tightening torque:

1st step:

4.9 ~ 7.8 N.m (0.5 ~ 0.8kgf.m, 3.6 ~ 5.8lb-ft)

2nd step:

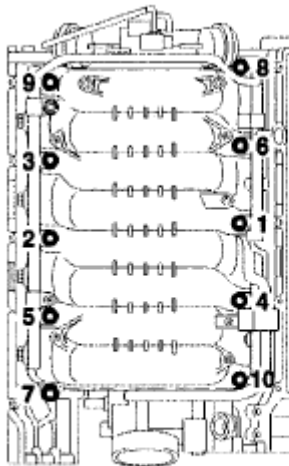
19.6 ~ 26.5 N.m (2.0 ~ 2.7kgf.m, 14.5 ~ 19.5lb-ft)



SHMM19007N

Fig. 343: Identifying Intake Manifold Module
Courtesy of HYUNDAI MOTOR CO.

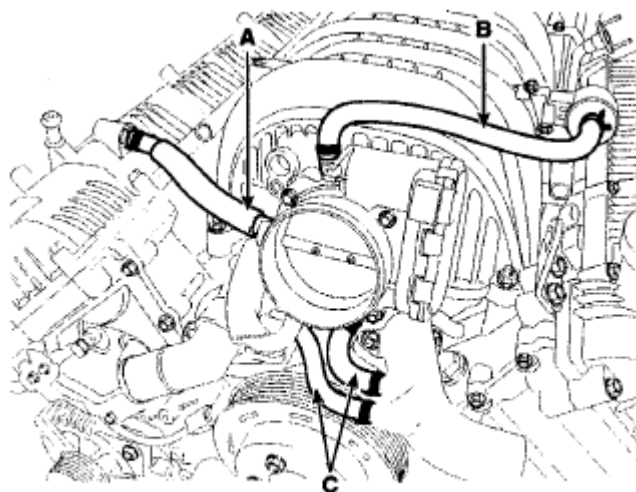
NOTE: Tighten the intake manifold nuts as following method.



SHMM19153N

Fig. 344: Identifying Intake Manifold Nut Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

30. Reconnect the PCV hose (A)), the PCSV hose (B) and water hoses (C) to the intake manifold module.



SHMM19006N

Fig. 345: Identifying Hoses

Courtesy of HYUNDAI MOTOR CO.

31. Install the oxygen sensor connector bracket (A).

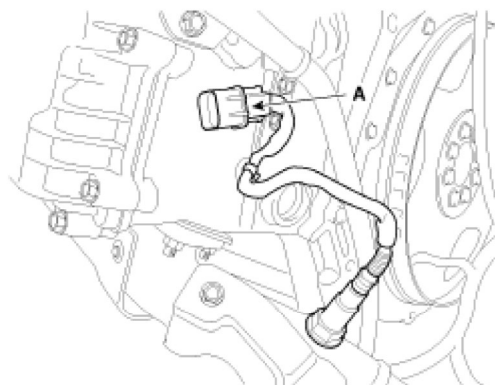


Fig. 346: Identifying Oxygen Sensor Connector Bracket

Courtesy of HYUNDAI MOTOR CO.

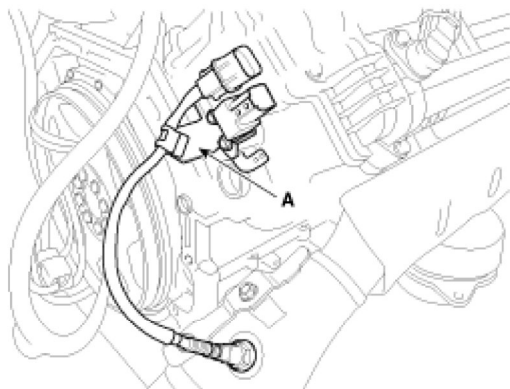
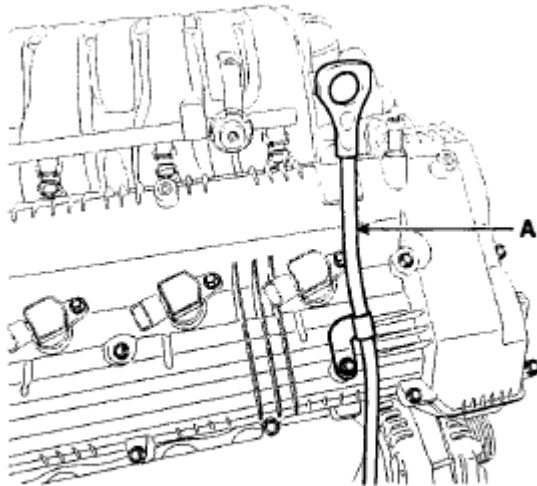


Fig. 347: Identifying Oxygen Sensor Connector Bracket
Courtesy of HYUNDAI MOTOR CO.

32. Install the oil level gauge (A).

Tightening torque:

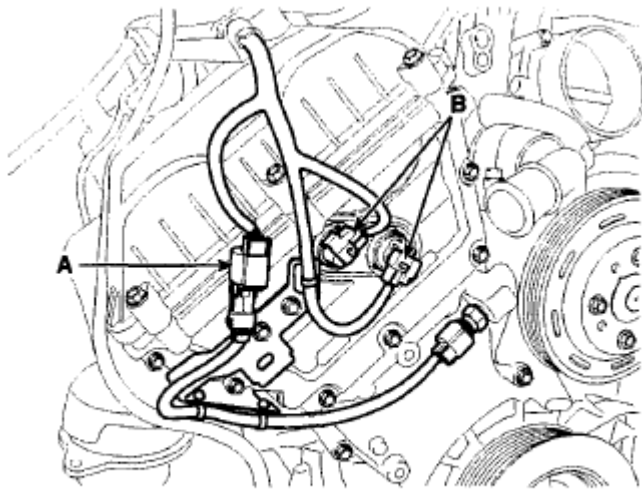
9.8 ~ 11.8Nm (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



SHMM19001N

Fig. 348: Identifying Oil Level Gauge
Courtesy of HYUNDAI MOTOR CO.

33. Install the engine wiring harness to the cylinder head.
1. Reconnect the engine coolant temperature sensor connector (A) and the CVVT oil control valve connectors (B).



SHMM19069N

Fig. 349: Identifying Water Temperature Sensor And CVVT Oil Control Valve Connectors
Courtesy of HYUNDAI MOTOR CO.

2. Reconnect the alternator connector (A).

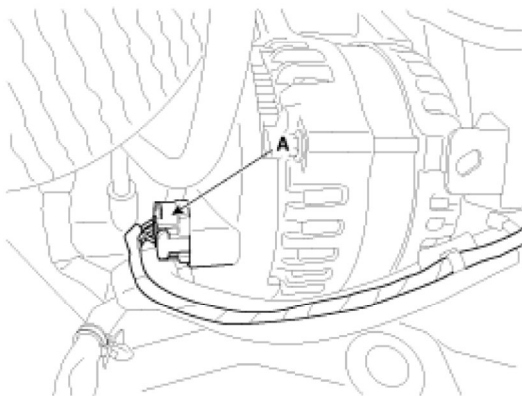
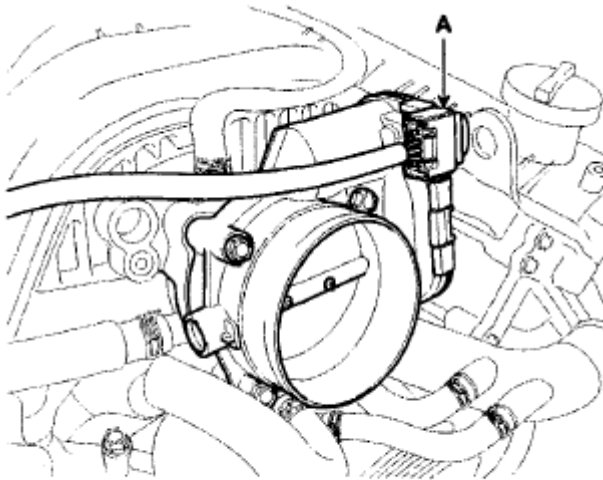


Fig. 350: Identifying Alternator Connector
Courtesy of HYUNDAI MOTOR CO.

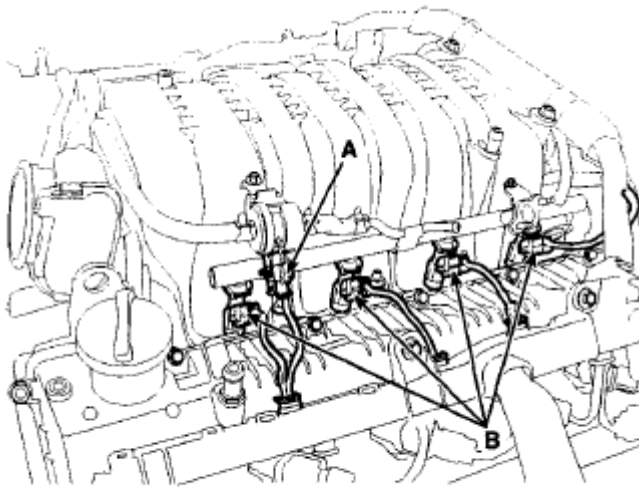
3. Reconnect the ETC module connector (A).



SBHM19015N

Fig. 351: Identifying ETC Module Connector
Courtesy of HYUNDAI MOTOR CO.

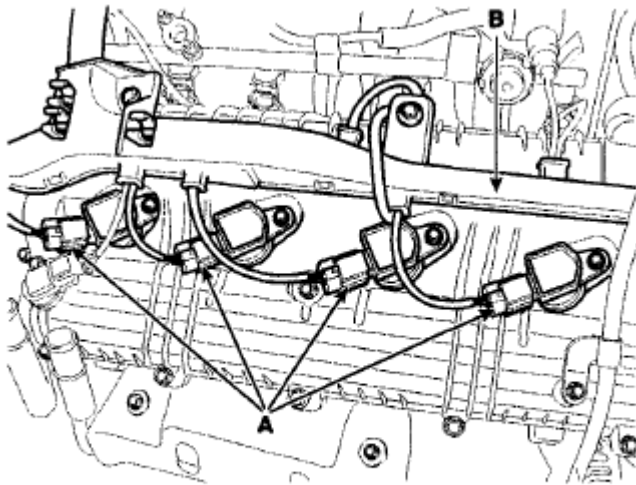
4. Reconnect the PCSV connector (A) and the injector connectors (B).



SBHM19009N

Fig. 352: Identifying PCSV And Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

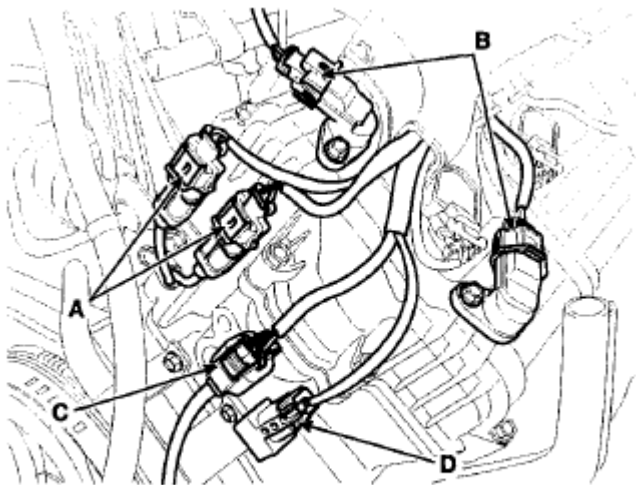
5. Reconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19072N

Fig. 353: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

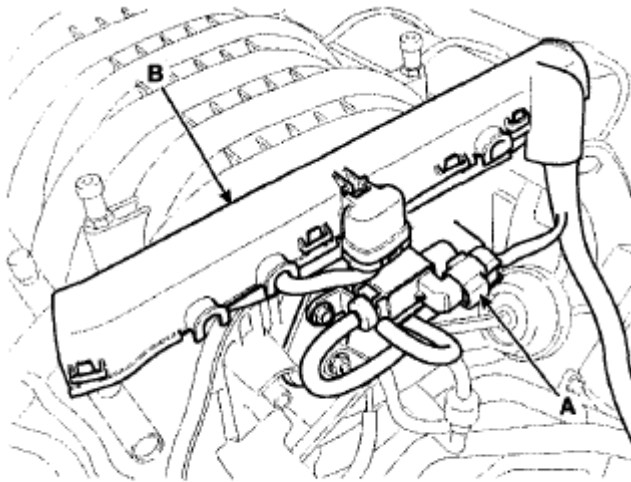
6. Reconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the oxygen sensor connector (C) and the condenser connector (D).



SHMM19073N

Fig. 354: Identifying Knock Sensor And Camshaft Position Sensor Connectors
Courtesy of HYUNDAI MOTOR CO.

7. Reconnect the variable intake system solenoid valve connector (A) and the wiring harness protector (B).



SBHM19016N

Fig. 355: Identifying Variable Intake System Solenoid Valve Connector And Wiring Harness Protector

Courtesy of HYUNDAI MOTOR CO.

8. Reconnect the knock sensor connectors (A), the camshaft position sensor connectors (B), the crankshaft position sensor connector (C), the oxygen sensor connector (D), the condenser connector (E) and the ground line (F).

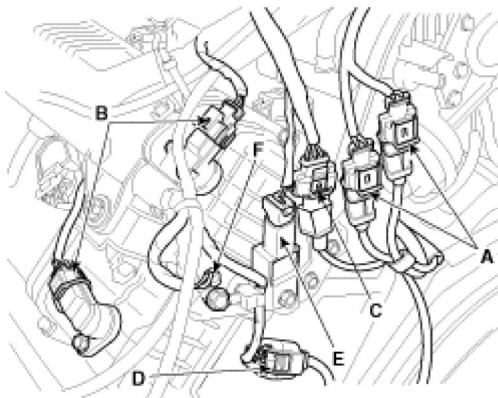
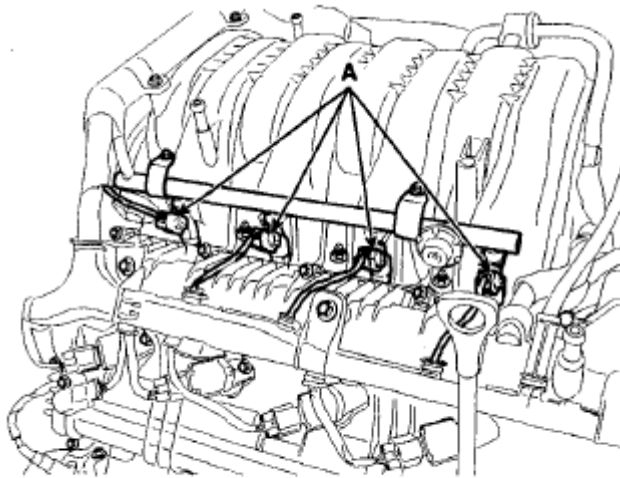


Fig. 356: Identifying Connectors & Ground Line

Courtesy of HYUNDAI MOTOR CO.

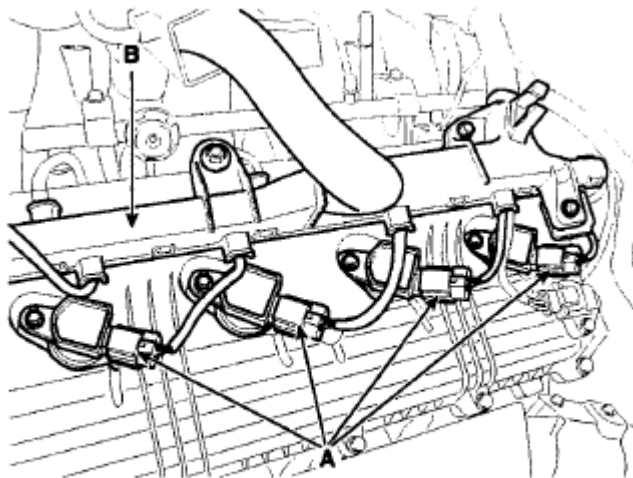
9. Reconnect the injector connectors (A).



SBHM19010N

Fig. 357: Identifying Injector Connectors
Courtesy of HYUNDAI MOTOR CO.

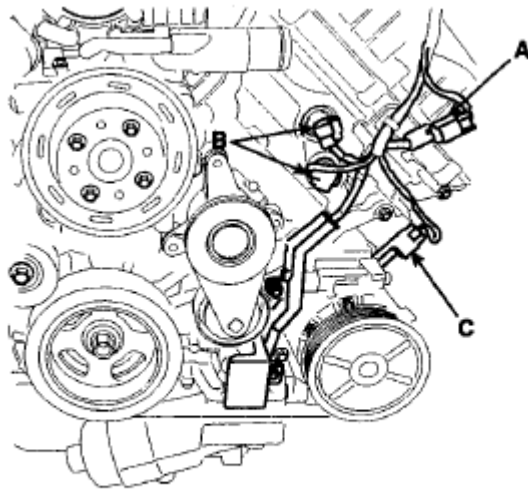
10. Reconnect the ignition coil connectors (A) and the wiring harness protector (B).



SHMM19077N

Fig. 358: Identifying Ignition Coil Connectors And Wiring Harness Protector
Courtesy of HYUNDAI MOTOR CO.

11. Reconnect the oil pressure switch connector (A), the CVVT oil control valve connectors (B) and the air conditioner compressor switch connector (C).



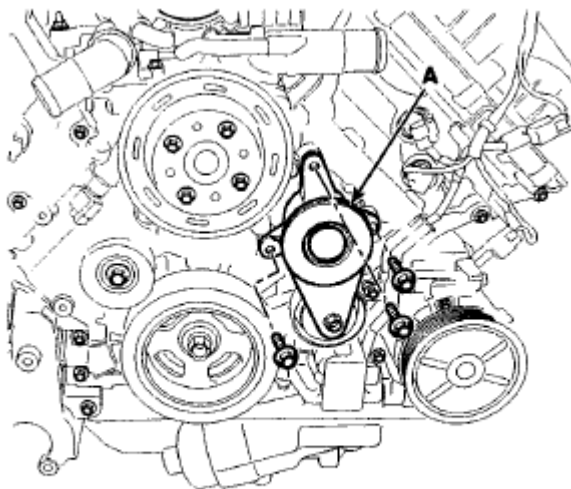
SBHM19301N

Fig. 359: Identifying Oil Pressure Switch Connector And CVVT Oil Control Valve Connectors
 Courtesy of HYUNDAI MOTOR CO.

34. Install the drive belt tensioner (A).

Tightening torque:

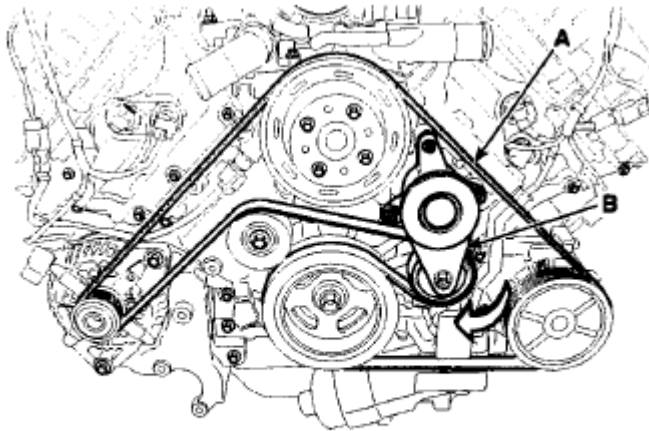
19.6 ~ 23.5 N.m (2.0 ~ 2.4kgf.m, 14.5 ~ 17.4lb-ft)



SBHM19014N

Fig. 360: Identifying Drive Belt Tensioner
 Courtesy of HYUNDAI MOTOR CO.

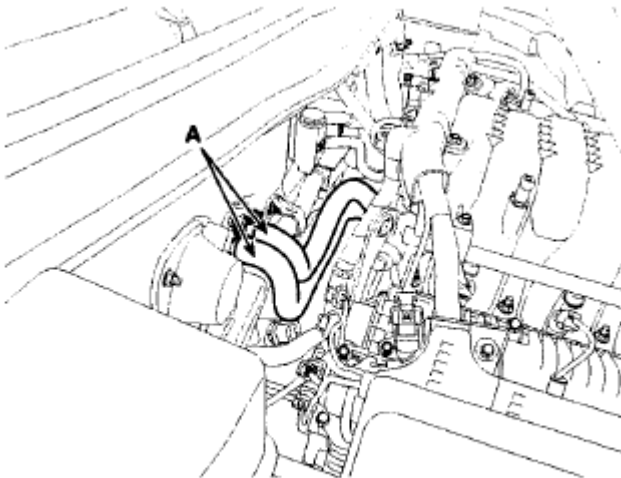
35. Turn the tensioner (B) clockwise and loosen, then install the drive belt (A).



SBHM19013N

Fig. 361: Identifying Drive Belt
Courtesy of HYUNDAI MOTOR CO.

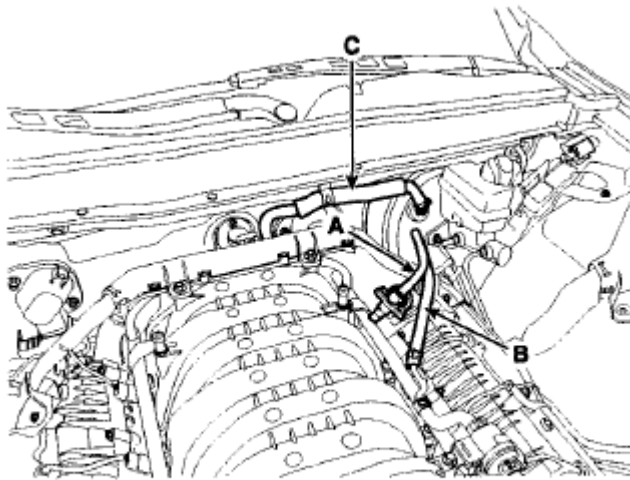
36. Install the radiator & cooling fan assembly. (Refer to **COOLING SYSTEM (ENGINE (G8BA - GSL 4.6)) -- GENESIS**)
37. Connect the heater hoses (A),



SBHM19004N

Fig. 362: Identifying Heater Hoses
Courtesy of HYUNDAI MOTOR CO.

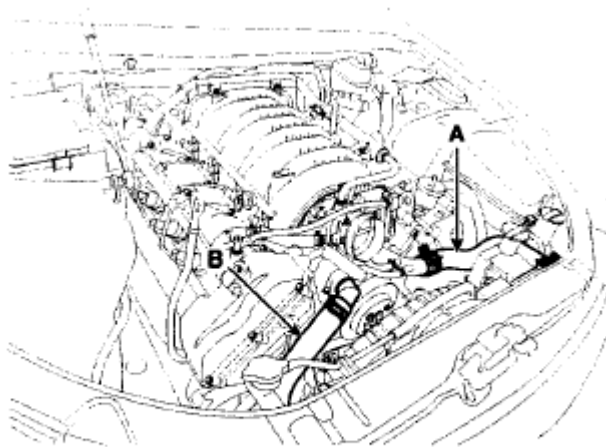
38. Connect the fuel hose (A), the purge control solenoid valve (PCSV) hose (B) and the brake booster vacuum hose (C).



SBHM19005N

Fig. 363: Identifying Fuel Hose, Purge Control Solenoid Valve Hose And Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

39. Connect the radiator upper hose (A) and lower hose (B).



SBHM19003N

Fig. 364: Identifying Radiator Upper Hose And Lower Hose
Courtesy of HYUNDAI MOTOR CO.

40. Install the air cleaner assembly.
1. Install the resonator (F), the intake air hose (E) and air cleaner assembly (D).
 2. Reconnect the breather hose (B).
 3. Reconnect the air flow sensor (AFS) connector (C).
 4. Install the air duct (A).

Tightening torque

Hose clamp bolt: 2.9 ~ 4.9N.m (0.3 ~ 0.5kgf.m, 2.2 ~ 3.6lb-ft)

Air cleaner assembly bolts: 7.8 ~ 9.8N.m (0.8 ~ 1.0kgf.m, 5.8 ~ 7.2lb-ft)

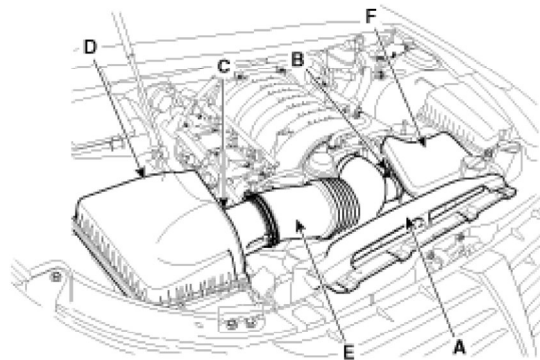


Fig. 365: Identifying Air Duct Components
Courtesy of HYUNDAI MOTOR CO.

41. Install the engine room cover (A), the engine cover (B) and the radiator grill upper cover (C).

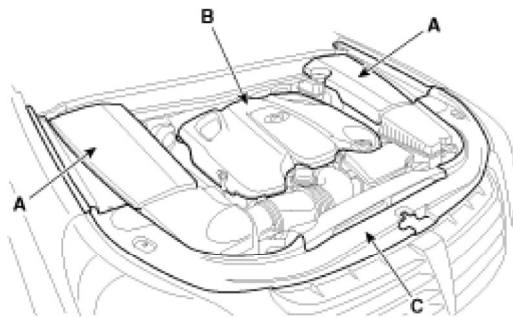


Fig. 366: Identifying Covers
Courtesy of HYUNDAI MOTOR CO.

42. Connect the battery negative terminal (A).

Tightening torque : 4.0~6.0N.m (0.4~0.6kgf.m, 3.0~4.4lb-ft)

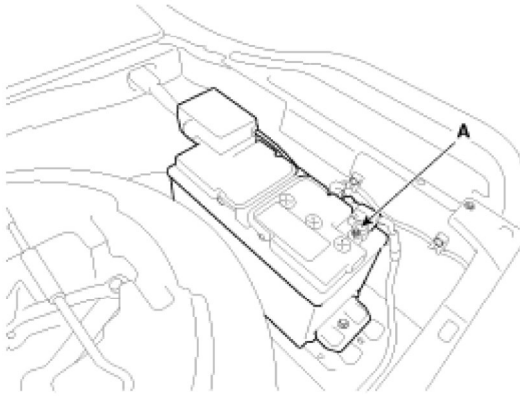


Fig. 367: Identifying Negative Battery Terminal
Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Refill engine oil.
- Clean the battery posts and cable terminals with sandpaper assemble them, and then apply grease to prevent corrosion.
- Inspect for fuel leakage.
 - After assembling the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.
 - Repeat this operation two or three times, and then check for fuel leakage at any point in the fuel lines.
- Refill radiator and reservoir tank with engine coolant.
- Bleed air from the cooling system.
 - Start engine and let it run until it warms up. (Until the radiator fan operates 3 or 4 times.)
 - Turn Off the engine and let it cool down. Check the level in the radiator, add coolant if needed. This will allow trapped air to be removed from the cooling system.
 - Put radiator cap on tightly, then run the engine again and check for leaks.