

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

2004 ENGINES**2.0L 4-Cylinder - Elantra****GENERAL****SPECIFICATIONS****General Engine Specifications****General Engine Specifications**

Description	Specifications	Limit
General		
Type	In-line, Double Overhead Camshaft	
Number of cylinder	4	
Bore	82 mm (3.228 in.)	
Stroke	93.5 mm (3.681 in.)	
Total displacement	1975cc (120.52cu.in.)	
Compression ratio	10.1	
Firing order	1 - 3 - 4 - 2	
Valve timing (W/O - CVVT)		
Intake valve		
Opens (BTDC)	9°	
Closes (ABDC)	43°	
Exhaust valve		
Opens (BBDC)	50°	
Closes (ATDC)	6°	
Valve timing (W/C VVT)		
Intake valve		
Opens (ATDC)	11°	
Closes (ABDC)	59°	
Exhaust		
Opens (BBDC)	42°	
Closes (ATDC)	6°	
Valve		
Valve length		
Intake	114.34 mm (4.5016 in.)	
Exhaust	116.8 mm (4.598 in.)	
Stem O.D.		
Intake	5.965 ~ 5.98 mm (0.2348 ~ 0.2354 in.)	
Exhaust	5.950 ~ 5.965 mm (0.2343 ~ 0.2348 in.)	

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Face angle thickness of valve head (Margin)		
Intake	1.15 mm (0.0452 in.)	0.8 mm (0.031 in.)
Exhaust	1.35 mm (0.0531 in.)	1.0 mm (0.039 in.)
Valve stem to valve guide clearance		
Intake	0.02 ~ 0.05 mm (0.0008 ~ 0.0019 in.)	0.10 mm (0.0039 in.)
Exhaust	0.035 ~ 0.065 mm (0.0014 ~ 0.0026 in.)	0.13 mm (0.0051 in.)
Valve guide		
Installed dimension O.D	46 mm (1.811 in.)	
Intake	54.5 mm (2.146 in.)	
Exhaust	0.05, 0.25, 0.50 mm (0.002, 0.010, 0.020 in.) oversize	
Service oversize		
Valve seat		
Width of seat contact		
Intake	1.1 ~ 1.5 mm (0.043 ~ 0.059 in.)	
Exhaust	1.3 ~ 1.7 mm (0.051 ~ 0.066 in.)	
Seat angle	45°	
Oversize	0.3, 0.6 mm (0.012, 0.024 in.) oversize	
Valve spring		
Free length	48.86 mm (1.9236 in.)	
Load	18.3 kg/39 mm (40.3lb/1.535 in.)	
Installed height	39 mm (1.5354 in.)	
Squareness	1.5° or less	
Valve clearance		
Cold (20°C [68°F])		
Intake	0.20 mm (0.0079 in.)	0.12 ~ 0.28 mm (0.0047 ~ 0.0110 in.)
Exhaust	0.28 mm (0.0110 in.)	0.20 ~ 0.38 mm (0.0079 ~ 0.0150 in.)
Hot (80° [176°F]): only for reference		
Intake	0.29 mm (0.0114 in.)	
Exhaust	0.34 mm (0.0134 in.)	
Cylinder head		
Flatness of gasket surface	Max. 0.03 mm (0.0012 in.)	0.06 mm (0.0024 in.)
Flatness of manifold mounting surface	Max. 0.15 mm (0.0059 in.)	0.03 mm (0.0012 in.)
Oversize rework dimensions of valve seat hole		

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Intake		
0.3 mm (0.012 in.) O.S.	33.300 ~ 33.325 mm (1.3110 ~ 1.3120 in.)	
0.6 mm (0.024 in.) O.S.	33.600 ~ 33.625 mm (1.3228 ~ 1.3238 in.)	
Exhaust		
0.3 mm (0.012 in.) O.S.	28.800 ~ 28.821 mm (1.1338 ~ 1.1346 in.)	
0.6 mm (0.024 in.) O.S.	29.100 ~ 29.121 mm (1.1456 ~ 1.1465 in.)	
Oversize rework dimensions of valve guide hole (both intake and exhaust)		
0.05 mm (0.002 in.) O.S.	11.05 ~ 11.068 mm (0.435 ~ 0.4357 in.)	
.25 mm (0.010 in.) O.S.	11.25 ~ 11.268 mm (0.443 ~ 0.4436 in.)	
0.50 mm (0.020 in.) O.S.	11.50 ~ 11.518 mm (0.453 ~ 0.4535 in.)	
Cylinder block		
Cylinder bore	82.00 ~ 82.03 mm (3.2283 ~ 3.2295 in.)	
Out-of-round and taper of cylinder bore	Less than 0.01 mm (0.0004 in.)	
Clearance with piston (To set limits to new parts)	0.02 ~ 0.04 mm (0.0008 ~ 0.0016 in.)	
Piston		
O.D (To set limits to new parts)	81.97 ~ 82.00 mm (3.2271 ~ 3.2283 in.)	
Service oversize	0.25, 0.50 mm (0.010, 0.020 in.) oversize	
Piston ring		
Side clearance		
No. 1	0.04 ~ 0.08 mm (0.0015 ~ 0.0031 in.)	0.1 mm (0.004 in.)
No. 2	0.03 ~ 0.07 mm (0.0012 ~ 0.0027 in.)	
End gap		
No. 1	0.23 ~ 0.38 mm (0.0090 ~ 0.0149 in.)	1 mm (0.039 in.)
No. 2	0.33 ~ 0.48 mm (0.0130 ~ 0.0189 in.)	1 mm (0.039 in.)
Oil ring side rail	0.20 ~ 0.60 mm (0.0078 ~ 0.0236 in.)	1 mm (0.039 in.)
Service oversize	0.25, 0.50 mm (0.010, 0.020 in.)	

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Connecting rod	oversize	
Bend	0.05 mm (0.0020 in.) or less	
Twist	0.1 mm (0.004 in.) or less	
Connecting rod big end to crankshaft side clearance	0.100 ~ 0.250 mm (0.0039 ~ 0.010 in.)	0.4 mm (0.0157 in.)
Connecting rod bearing		
Oil clearance (To seat limits to new parts)	0.024 ~ 0.044 mm (0.0009 ~ 0.0017 in.)	
Undersize	0.25, 0.50, 0.75 mm (0.01, 0.02, 0.03 in.)	
Camshaft (W/O - CVVT)		
Cam lobe height		
Intake	44.820 mm (1.7646 in.)	44.720 mm (1.7606 in.)
Exhaust	44.720 mm (1.7606 in.)	44.620 mm (1.7567 in.)
Camshaft (W/CVVT)		
Cam height		
Intake	44.618 mm (1.7566 in.)	44.518 mm (1.7527 in.)
Exhaust	44.518 mm (1.7527 in.)	44.418 mm (1.7487 in.)
Journal O.D.	28 mm (1.1023 in.)	
Bearing oil clearance	0.02 ~ 0.061 mm (0.0008 ~ 0.0024 in.)	0.1 mm (0.0039 in.)
End play	0.1 ~ 0.2 mm (0.004 ~ 0.008 in.)	
Crankshaft		
Pin O.D.	45 mm (1.77 in.)	
Journal O.D.	57 mm (2.244 in.)	
Bend	0.03 mm (0.0012 in.) or less	
Out-of-round, taper of journal and pin	0.01 mm (0.0004 in.) or less	0.030 mm (0.0012 in.)
End play	0.06 ~ 0.260 mm (0.0023 ~ 0.010 in.)	
Undersize rework dimension of pin		
0.25 mm (0.010 in.)	44.725 ~ 44.740 mm (1.7608 ~ 1.7614 in.)	
0.50 mm (0.020 in.)	44.475 ~ 44.490 mm (1.7509 ~ 1.7516 in.)	
0.75 mm (0.030 in.)	44.225 ~ 44.240 mm (1.7411 ~ 1.7417 in.)	
Undersize rework dimension of journal		
0.25 mm (0.010 in.)	56.727 ~ 56.742 mm (2.2333 ~ 2.2339 in.)	
0.50 mm (0.020 in.)	56.477 ~ 56.492 mm (2.2235 ~	

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0.75 mm (0.030 in.)	2.2240 in.) 56.227 ~ 56.242 mm (2.2136 ~ 2.2142 in.)	
Crankshaft bearing Oil clearance	0.028 ~ 0.046 mm (0.0011 ~ 0.0018 in.)	
Flywheel Runout	0.1 mm (0.0039 in.)	0.13 mm (0.0051 in.)
Cooling method	Water-cooled, pressurized. Forced circulation with electrical fan	
Coolant Quantity	6 liter (6.3U.S qts, 5.2 Imp. qts)	
Radiator Type	Pressurized corrugated fin type	
Radiator cap Main valve opening pressure Vacuum valve opening pressure	83 ~ 110 kpa (12 ~ 16 psi, 0.83 ~ 1.1 kg/cm ²) -7 kpa (-100 psi, -0.07 kg/cm ²) or less	
Thermostat Type Valve opening temperature Full-opening temperature	Wax pellet type with jiggle valve 82°C (177°F) 95°C (201°F)	
Coolant pump	Centrifugal type impeller	
Drive belt Type	V-ribbed belt	
Engine coolant temperature sensor Type Resistance	Heat-sensitive thermistor type 2.31 ~ 2.59Kohms at 20°C (68°F)	
Oil pump Clearance between outer circumference and front case. Front case tip clearance Side clearance Inner gear Outer gear Engine oil pressure at 1,500RPM [Oil temperature is 90 to 110°C 194 to 230°F]	0.120 ~ 0.185 mm (0.0049 ~ 0.0073 in.) 0.025 ~ 0.069 mm (0.0009 ~ 0.0027 in.) 0.04 ~ 0.085 mm (0.0016 ~ 0.0033 in.) 0.04 ~ 0.09 mm (0.0016 ~ 0.0035 in.) 245KPa (2.5kg/cm ² , 35.5psi)	
Relief spring		

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Free height Load	43.8 mm (1.725 in.) 3.7kg at 40.1 mm (3.15lb/1.578 in.)	
Air cleaner Type Element	Dry type Unwoven cloth type	
Exhaust pipe Muffler Suspension system	Expansion resonance type Rubber hangers	

Service Standards

Standard value	
Antifreeze	Mixture ratio of anti-freeze in coolant
ETHYLENE GLYCOL BASE FOR ALUMINUM	50%

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Fig. 1: Coolant Service Standard Table
Courtesy of HYUNDAI MOTOR CO.

Tightening Torque**TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Alternator Brace Bolt	15-20 (20-27)
Alternator Lock Bolt	
Camshaft Bearing Cap Bolt	10-11 (14-15)
Camshaft Sprocket Bolt	74-89 (100-120)
Connecting Rod Cap Nut	37-39 (50-53)
Coolant Inlet Fitting Nuts	11-15 (15-20)
Coolant Pump Bolt	15-20 (20-27)
Coolant Temperature Sensor	15-30 (20-40)
Crankshaft Bearing Cap Bolt	
Step 1	20-24 (27-33)
Step 2	Tighten An Additional 60-65 Degrees
Crankshaft Pulley Bolt	125-133 (170-180)
CVVT Unit-To-Exhaust Camshaft Bolt	49-58 (66-78)
Cylinder Head Bolt ⁽¹⁾	
M10	
Step 1	18 (25)
Step 2	Tighten An Additional

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	60-65 Degrees
Step 3	Tighten An Additional 60-65 Degrees
M12	
Step 1	22 (30)
Step 2	Tighten An Additional 60-65 Degrees
Step 3	Tighten An Additional 60-65 Degrees
Engine Mounts	
Front Engine Support Bracket Bolt & Nut	25-37 (35-50)
Front Roll Stopper Bracket Bolt	51-66 (70-90)
Front Roll Stopper Bracket-To-Center Member Bolts	30-37 (40-50)
Front Roll Stopper Insulator Nut	37-48 (50-65)
Rear Engine Stopper Bracket Bolt	25-37 (35-50)
Rear Roll Stopper Bracket Bolt	51-66 (70-90)
Rear Roll Stopper Bracket-To-Center Member Bolt	30-37 (40-50)
Rear Roll Stopper Insulator Nut	37-48 (50-65)
Right Mounting Bracket-To-Engine Nuts & Bolts	37-48 (50-65)
Right Mounting Insulator Nut (Large)	66-81 (90-110)
Right Mounting Insulator Nut (Small)	33-44 (45-60)
Transaxle Insulator Bracket-To-Side Member Bolts	30-37 (40-50)
Transaxle Mount Insulator Nut	66-81 (90-110)
Exhaust Components	
Exhaust Manifold Cover-To-Exhaust Manifold Bolts	11-14 (15-20)
Exhaust Manifold-To-Cylinder Head Nut	32-40 (43-55)
Exhaust Pipe-To-Manifold Nut	22-30 (30-40)
Front Exhaust Pipe Bracket Bolts	22-30 (30-40)
Front Exhaust Pipe-To-Catalytic Converter Bolts	29-43 (40-60)
Flexplate-To-Crankshaft Bolt	89-96 (120-130)
Flywheel-To-Crankshaft Bolt	89-96 (120-130)
Front Case Bolts	15-20 (20-27)
Heat Protector Bolts	11-15 (15-20)
Intake Manifold Bracket Bolts	13-18 (18-25)
Intake Manifold Nuts	13-18 (18-25)
Intake Manifold-To-Cylinder Head Nuts & Bolts	12-17 (16-23)
OCV Filter	30-38 (41-51)
Oil Drain Plug	30-33 (40-45)
Oil Filter	9-12 (12-16)
Oil Screen Bolt	11-16 (15-22)
Oxygen Sensors	36-43 (50-60)
Thermostat Housing	11-15 (15-20)

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Throttle Body-To-Surge Tank Nuts	11-15 (15-20)
Timing Belt Idler Bolt	31-40 (43-55)
Timing Belt Tensioner Bolt	31-40 (43-55)
INCH Lbs. (N.m)	
Air Cleaner Body Mounting Bolts	71-89 (8-10)
Alternator Lock Bolt	106-133 (12-15)
Coolant Pump Pulley Bolts	71-89 (8-10)
Cylinder Head Cover Bolts	71-89 (8-10)
Engine Cover	27-35 (4-6)
Main Muffler Hanger Support Bracket Bolts	89-133 (10-15)
Oil Control Valve Bolt	89-106 (10-12)
Oil Pan Bolt	89-106 (10-12)
Oil Pressure Switch	115-133 (13-15)
Rear Plate Bolts	71-89 (8-10)
Resonator Mounting Bolts	27-35 (4-6)
Timing Belt Cover Bolt	71-89 (8-10)
Water Pipe Bracket Bolts	106-133 (12-15)

(1) Tighten cylinder head bolts in sequence with engine cold. See **Fig. 2**.

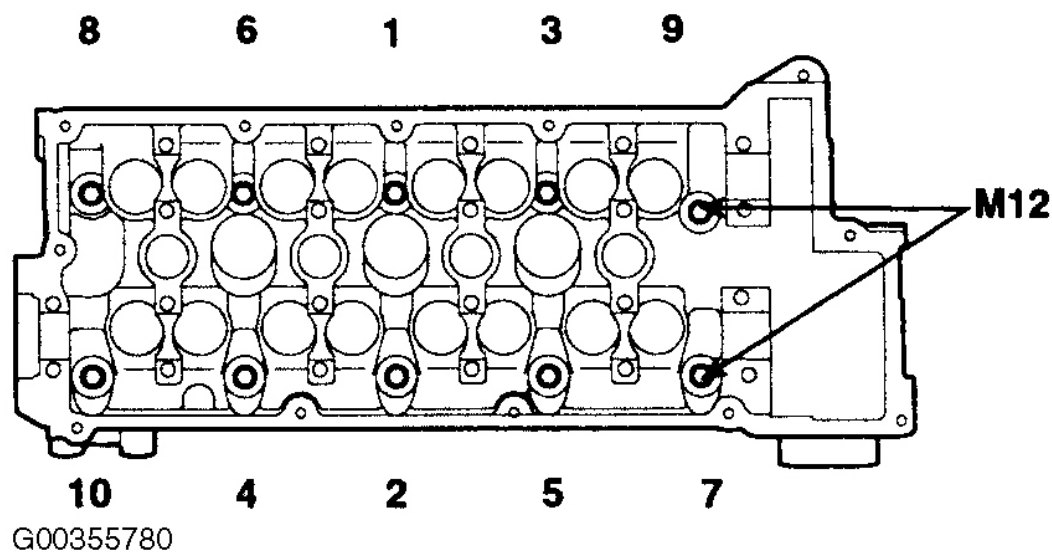


Fig. 2: Identifying Cylinder Head Bolt Tightening Sequence
Courtesy of HYUNDAI MOTOR CO.

Compression

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

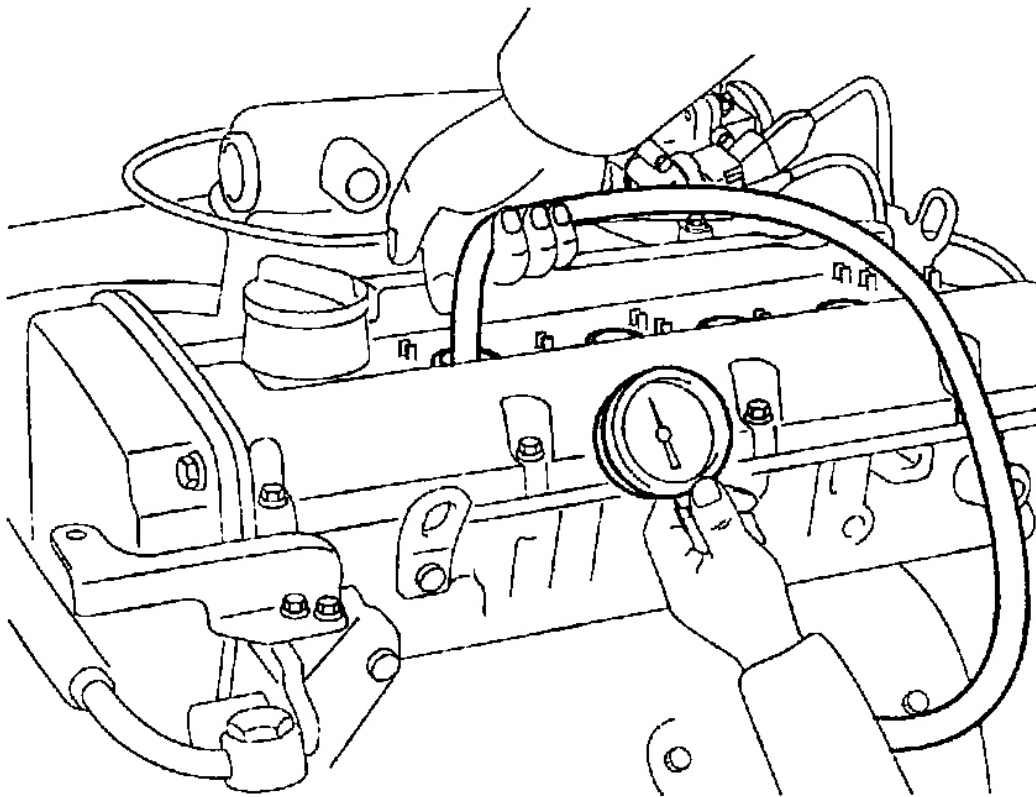
1. Warm up and stop engine.

Allow the engine to warm up to normal operating temperature.

2. Remove ignition coils. See **IGNITION SYSTEMS**.
3. Remove spark plugs.

Using a 16mm plug wrench, remove the 4 spark plugs.

4. Check cylinder compression pressure.
 - A. Insert a compression gauge into the spark plug hole.



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Fig. 3: Checking Engine Compression
Courtesy of HYUNDAI MOTOR CO.

- B. Fully open the throttle.
- C. while cranking the engine, measure the compression pressure.

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

- D. Repeat steps (a) through (c) for each cylinder.

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

Compression pressure:

1,500kPa (15.3kgf/cm² , 218psi)

Minimum pressure:

1,000kPa (10.2kgf/cm² , 145psi)

Difference between each cylinder:

100kPa (1.0kgf/cm² , 15psi) or less

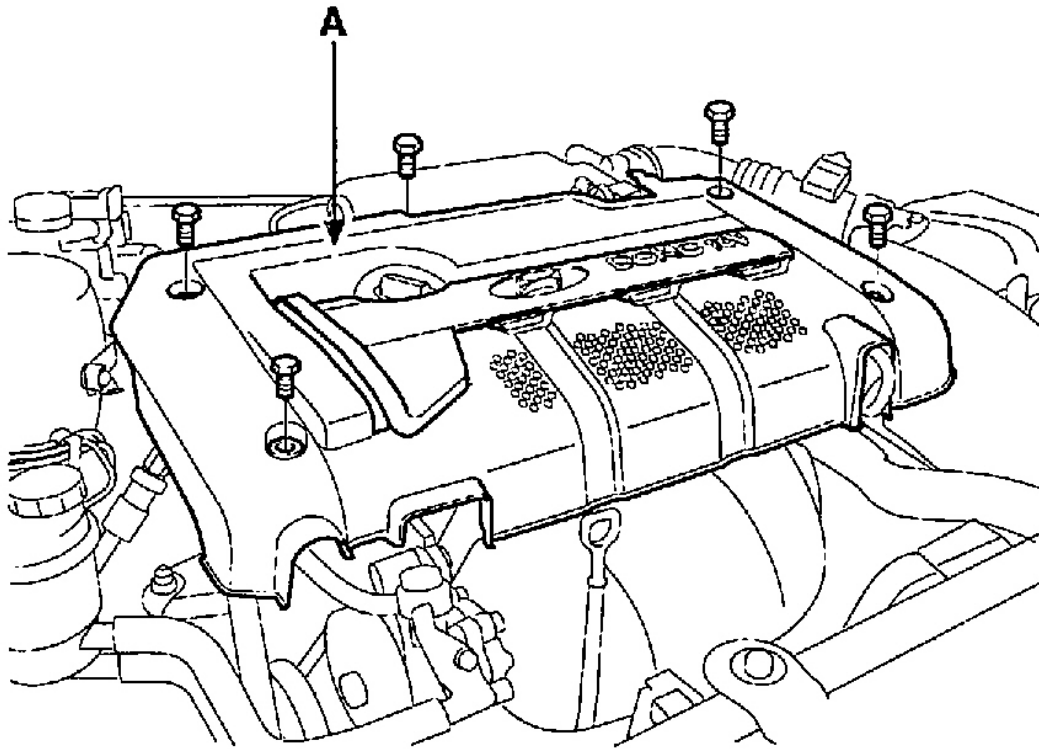
- E. If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.
 - If adding oil helps the compression, it is likely that the piston rings and/or cylinder 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 spark plugs.

- 6. Install ignition coils. See **IGNITION COIL** .

Timing Belt Tension Adjustment

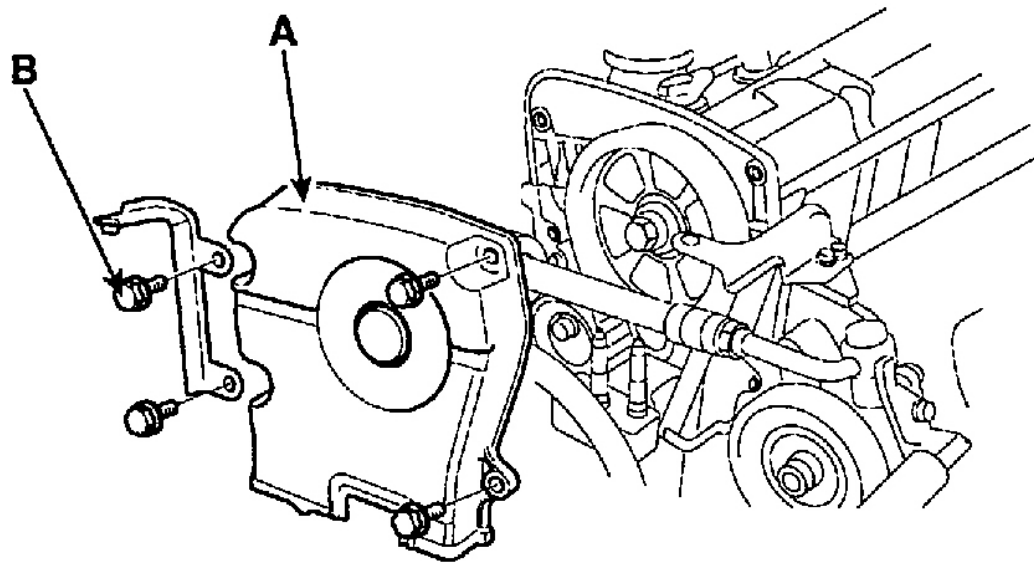
- 1. Remove the engine cover (A).



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Fig. 4: Removing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

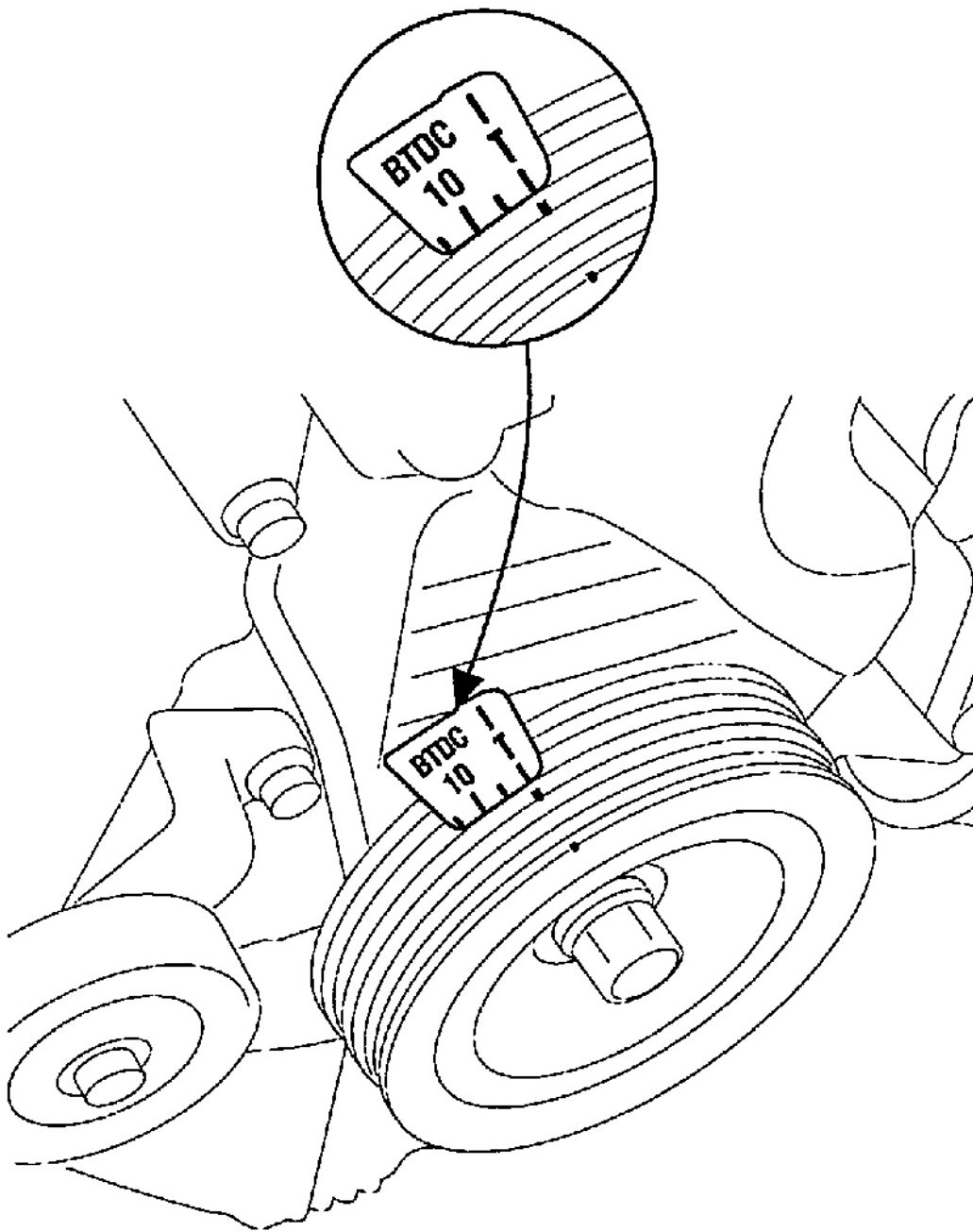
2. Remove RH front wheel.
3. Remove the 4bolts (B) and timing belt upper cover (A).



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Fig. 5: Removing Timing Belt Upper Cover
Courtesy of HYUNDAI MOTOR CO.

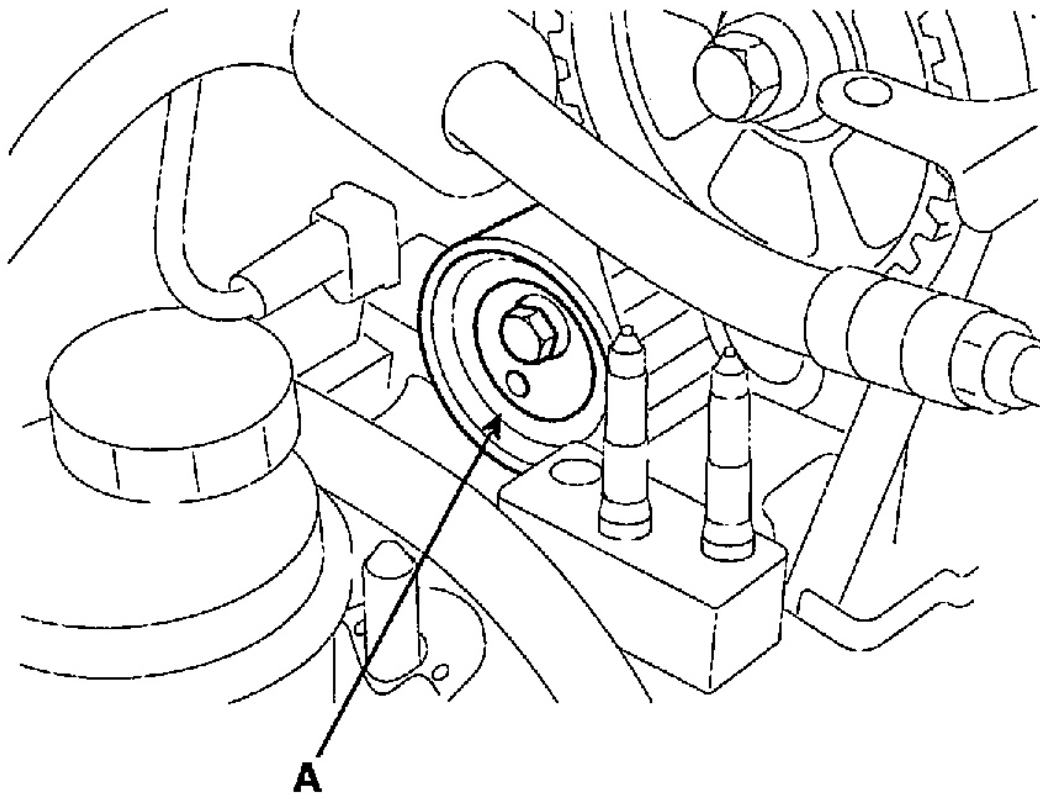
4. Turn the crankshaft pulley, and align its groove with timing mark "T" of the timing belt cover.



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Fig. 6: Aligning Crankshaft Pulley Timing Marks
Courtesy of HYUNDAI MOTOR CO.

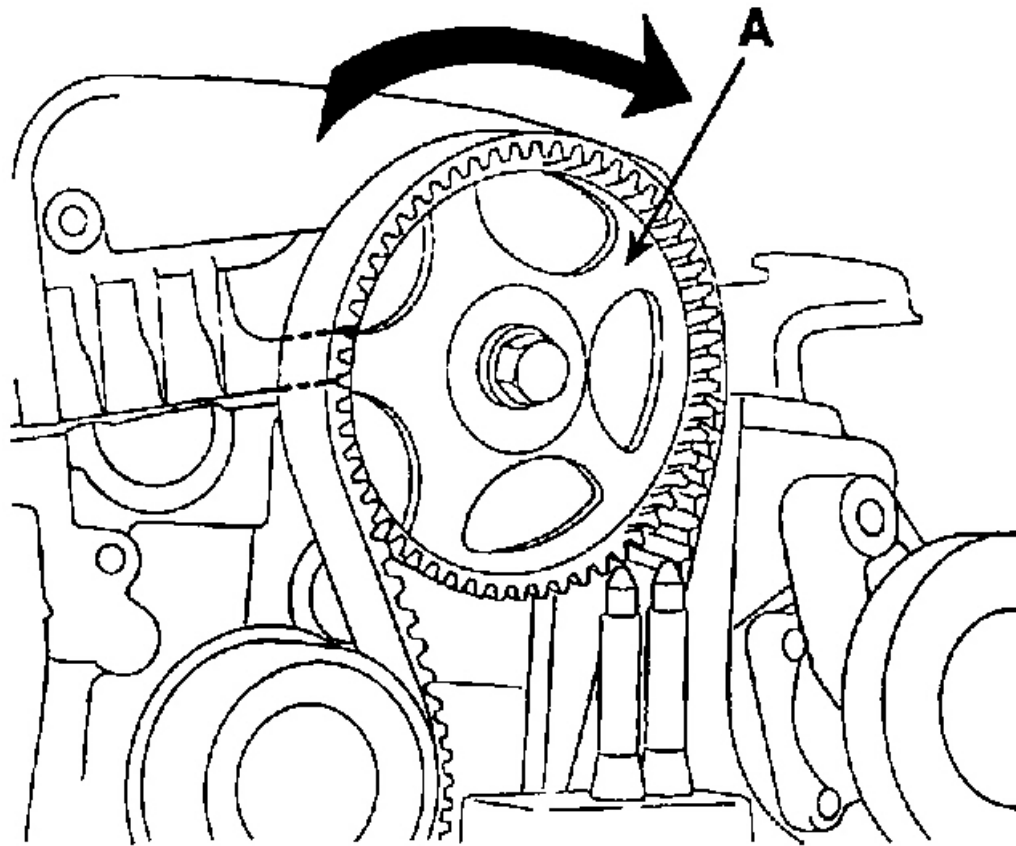
5. Temporarily loosen tensioner pulley (A) by center bolt.



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Fig. 7: Loosening Timing Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

6. Timing belt tension adjusting
 1. Rotate crankshaft in regular direction (clock wise view from front) through angle equivalent to two teeth (18°) of camshaft sprocket (A).



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Fig. 8: Tensioning Timing Belt
Courtesy of HYUNDAI MOTOR CO.

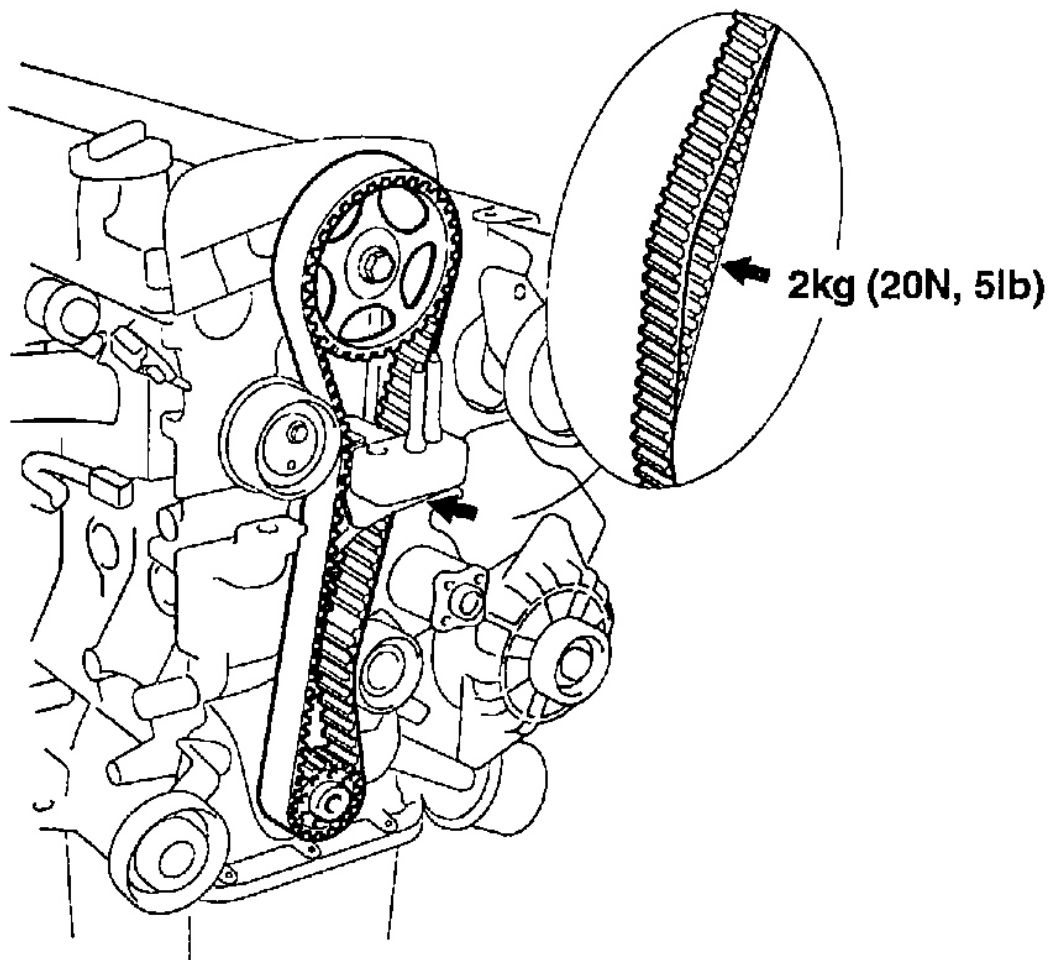
2. Give tension to timing belt rotating tensioner in arrow direction tool and set timing belt not to give slack to tension side.
3. Tightening tensioner bolt.

Tightening torque

Tensioner bolt:

43 ~ 55Nm (430 ~ 550kgf.cm, 32 ~ 40lb.ft)

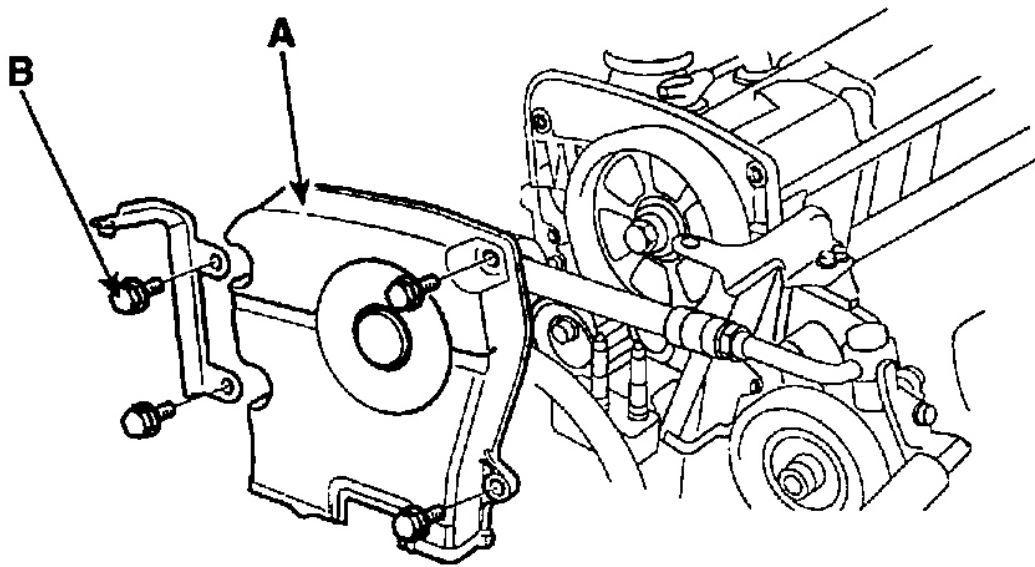
4. Recheck the belt tension, When the tension side of timing belt is pushed horizontally with a moderate force [approx. 2kg (20N, 5lb)], the timing belt cog end segs in approx. 4 ~ 6mm (0.16 ~ 0.24in.)



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Fig. 9: Checking Timing Belt Tension
Courtesy of HYUNDAI MOTOR CO.

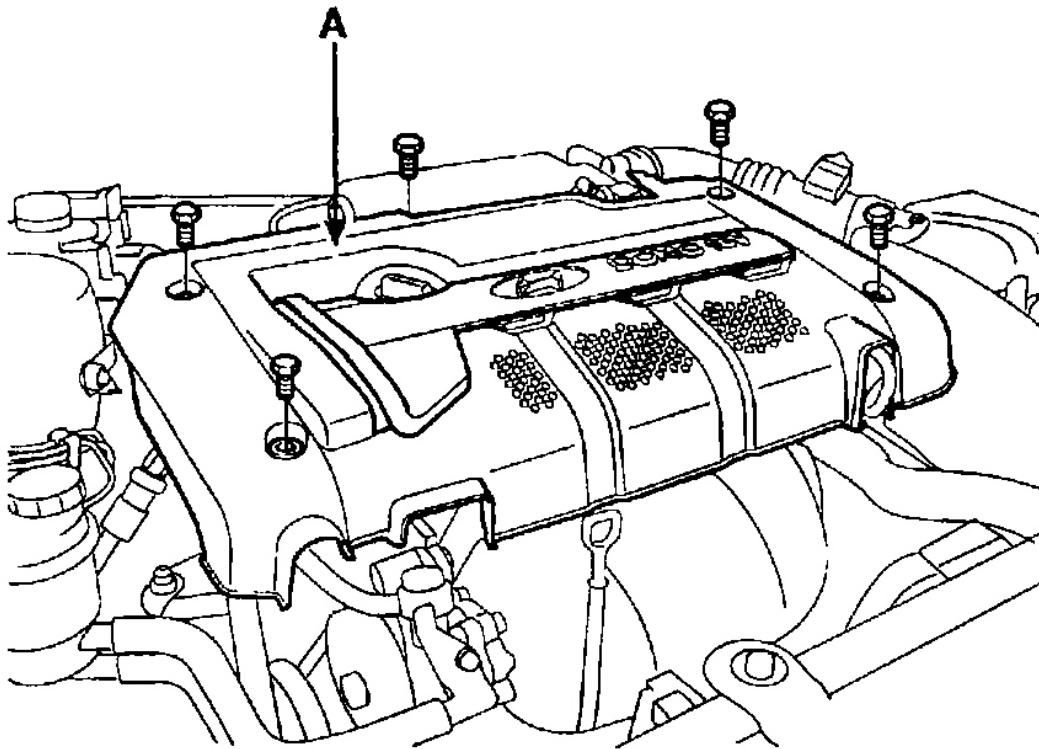
7. Turn the crankshaft two turns in the operating direction (clockwise) and realign crankshaft sprocket and camshaft sprocket timing mark.
8. Install the timing belt upper cover (A) with 4bolts (B).



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Fig. 10: Installing Timing Belt Upper Cover
Courtesy of HYUNDAI MOTOR CO.

9. Install RH front wheel.
10. Install engine cover (A) with 5bolts.



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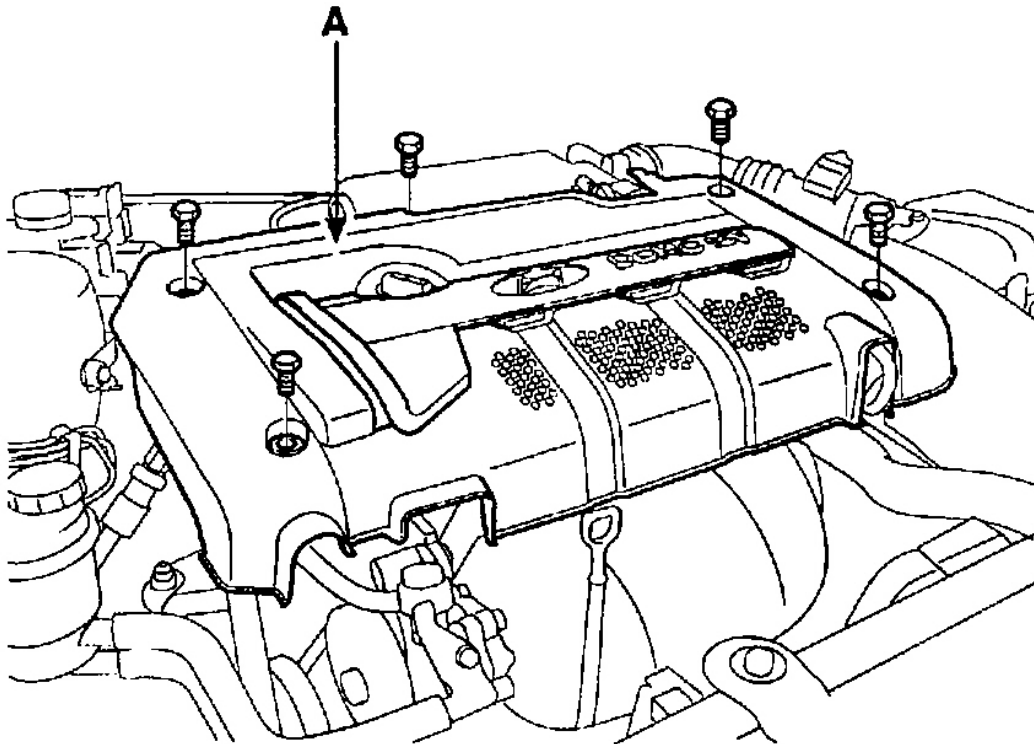
Fig. 11: Installing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

Valve Clearance Inspection And Adjustment

MLA (MECHANICAL LASH ADJUSTER)

NOTE: Inspect and adjust the valve clearance when the engine is cold (Engine coolant temperature: 20°C) and cylinder head is installed on the cylinder block.

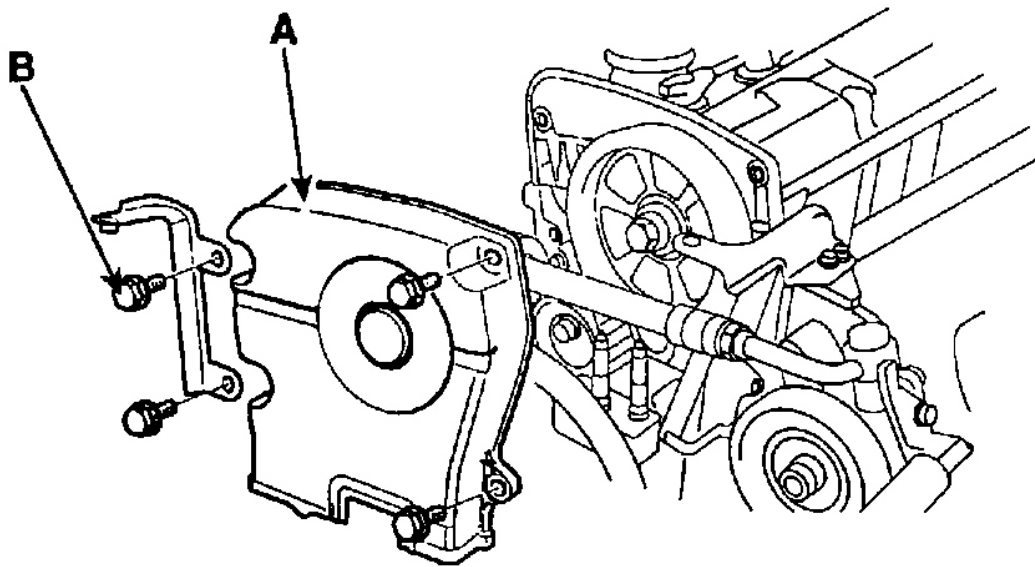
1. Remove the engine cover (A).



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Fig. 12: Removing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

2. Remove the upper timing belt cover (A).



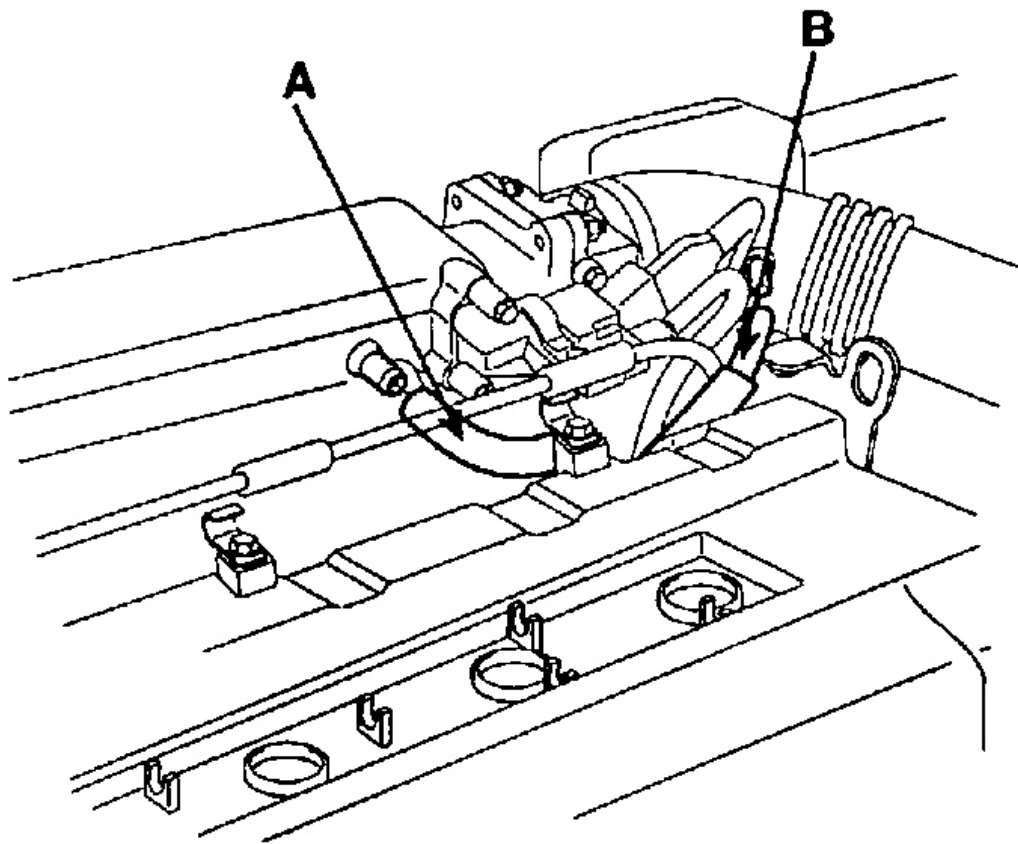
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Fig. 13: Removing Upper Timing Belt Cover
 Courtesy of HYUNDAI MOTOR CO.

- A. Loosen the upper timing cover bolts and then remove the cover.
- 3. Remove the cylinder head cover.
 - A. Disconnect the spark plug cables and do not pull on the spark plug by force.

NOTE: Pulling on or bending the cables may damage the conductor inside.

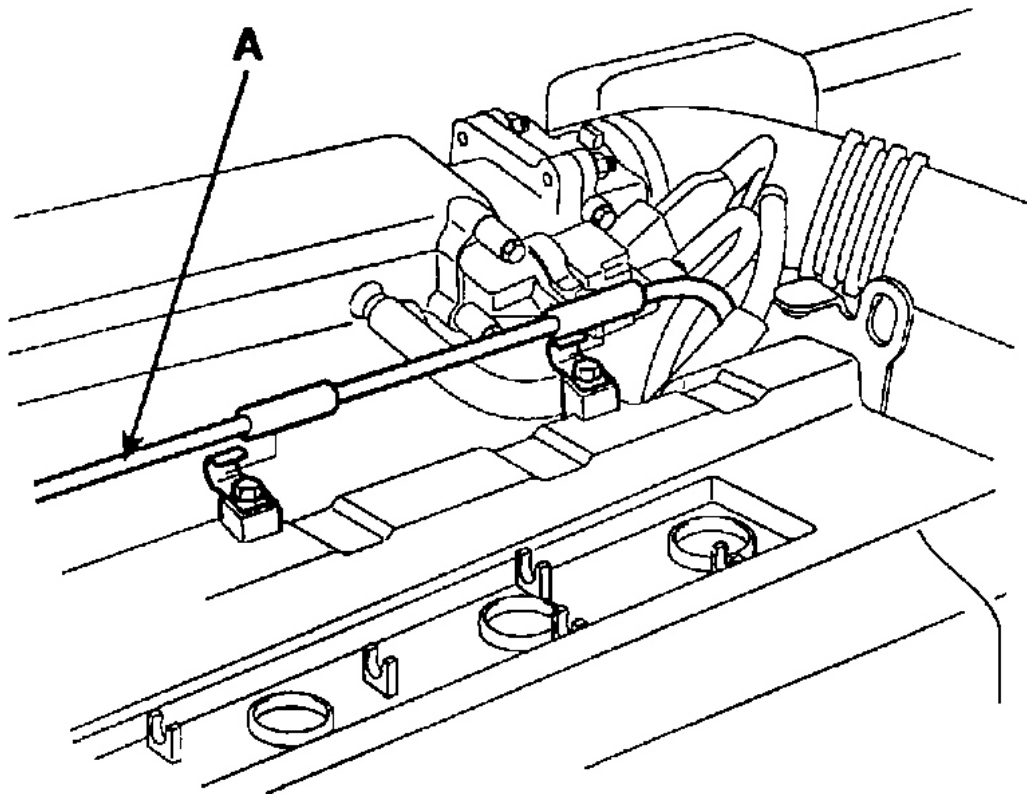
- B. Disconnect the P.C.V hose (A) and the breather hose (B) from the cylinder head cover.



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Fig. 14: Removing PCV & Breather Hoses
Courtesy of HYUNDAI MOTOR CO.

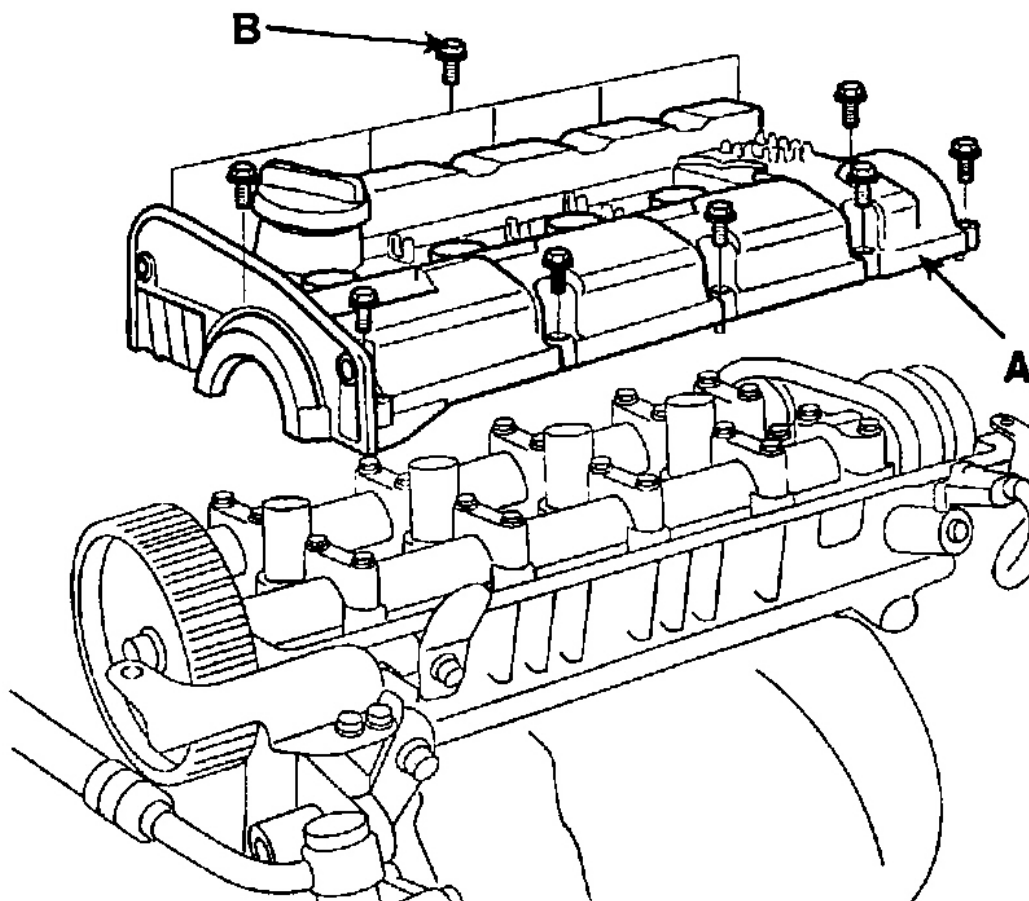
- C. Disconnect the accelerator cable (A) from the cylinder head cover.



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Fig. 15: Disconnecting Accelerator Cable
Courtesy of HYUNDAI MOTOR CO.

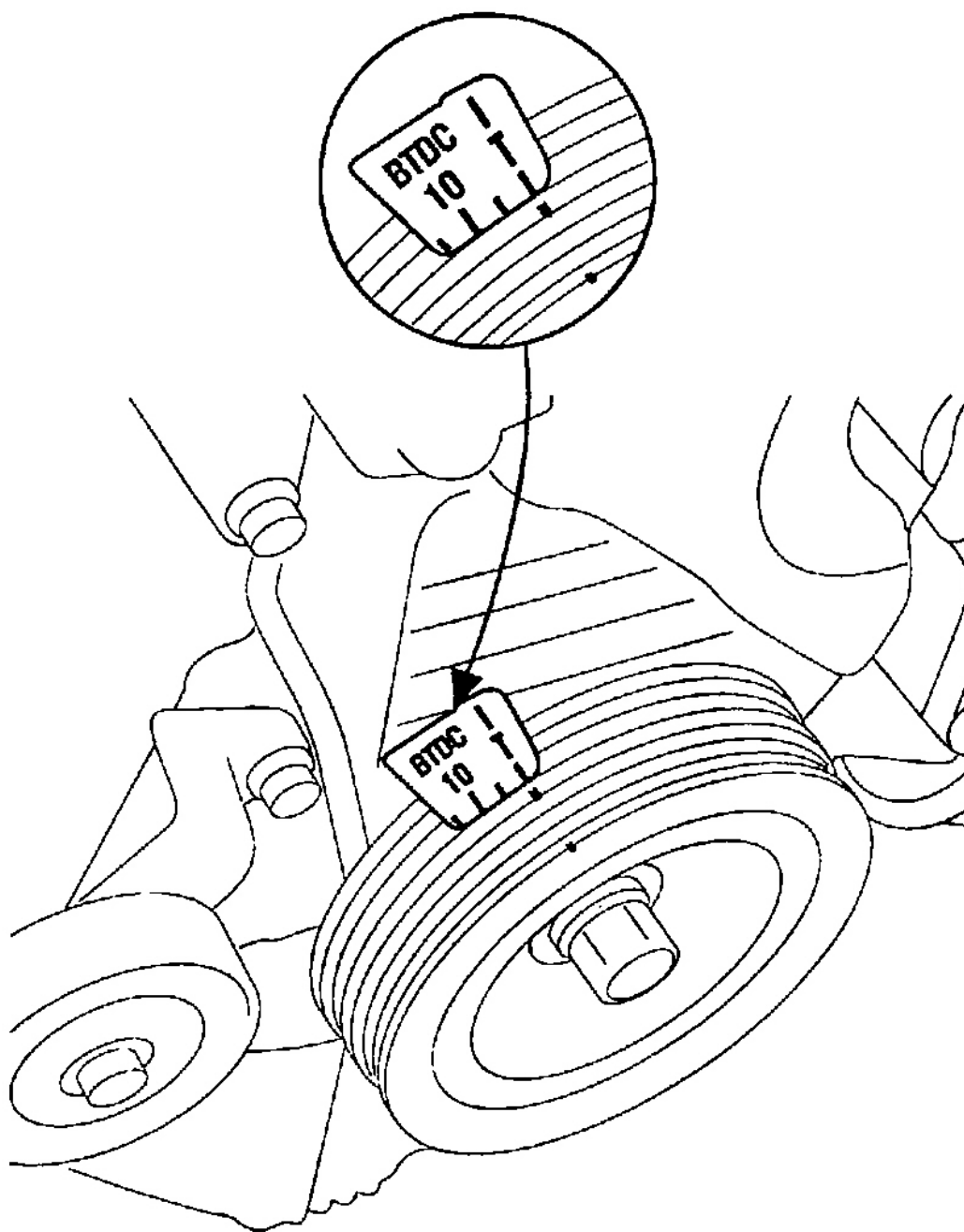
- D. Loosen the cylinder head cover bolts (B) and then remove the cover (A) and gasket.



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Fig. 16: Removing Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

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



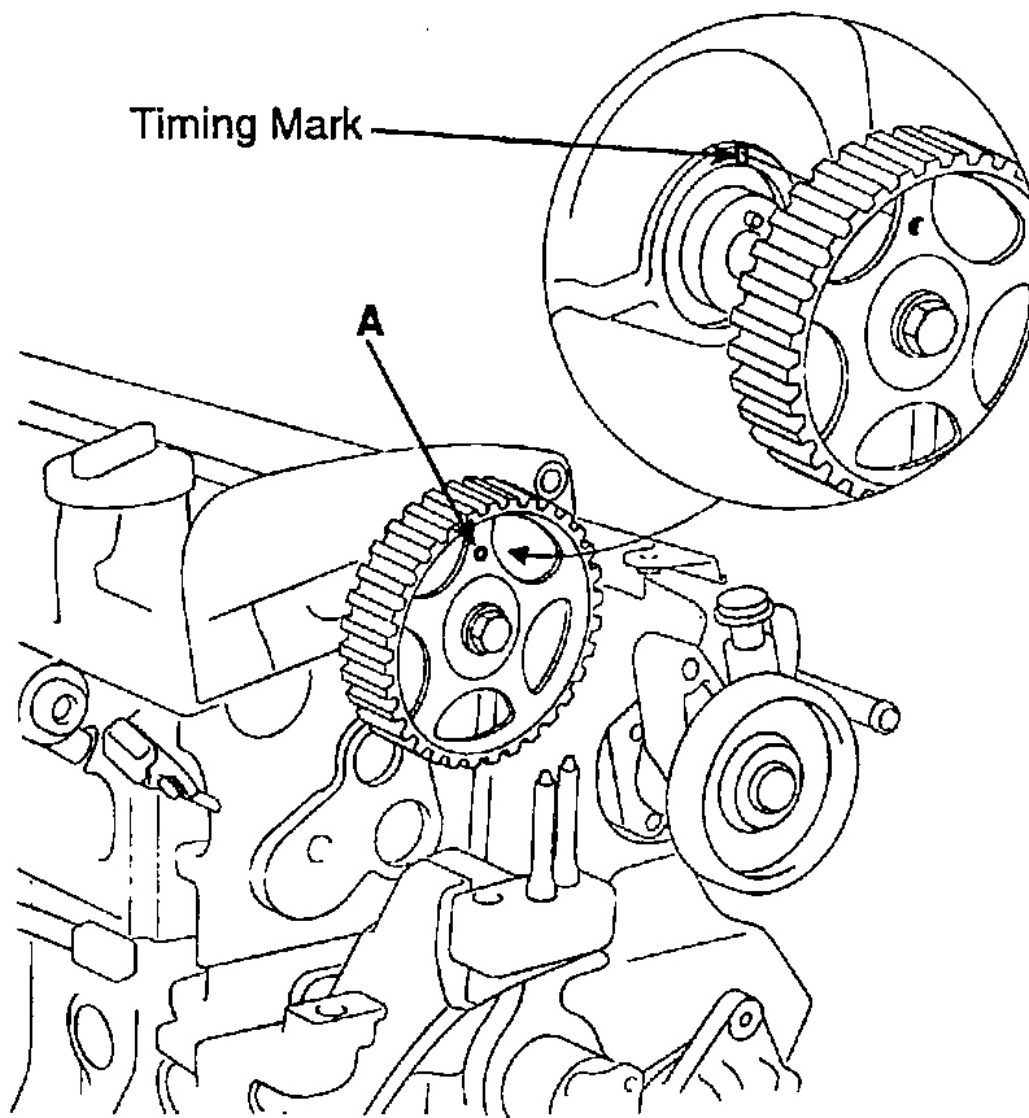
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Fig. 17: Aligning Crankshaft Pulley Timing Marks
Courtesy of HYUNDAI MOTOR CO.

- B. Check that the hole of the camshaft timing pulley (A) is aligned with the timing mark of the bearing

cap.

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



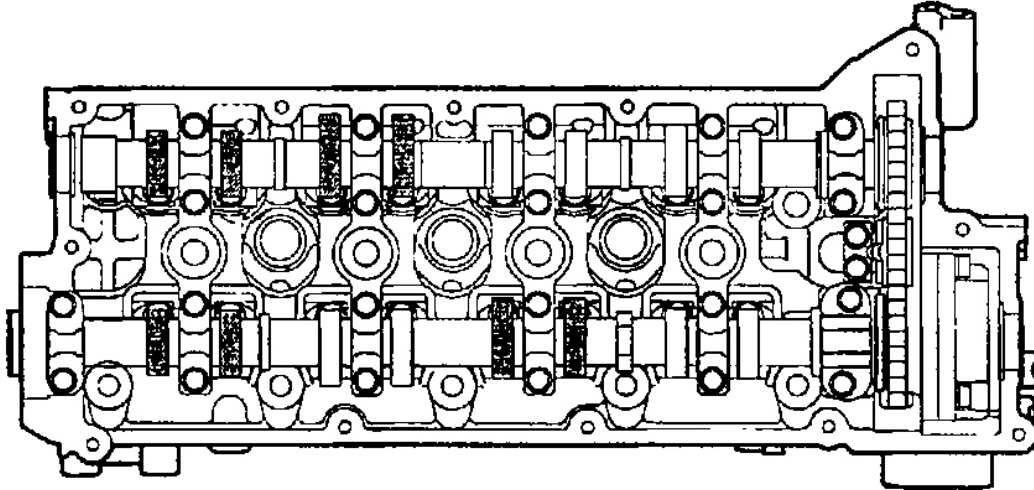
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Fig. 18: Aligning Camshaft Sprocket Timing Marks
Courtesy of HYUNDAI MOTOR CO.

5. Inspect the valve clearance

A. Check only the valve indicated as shown. [No. 1 cylinder: TDC/Compression] measure the valve

clearance



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Fig. 19: Checking Valve Clearances (Step 1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

- Using a thickness gauge, measure the clearance between the tappet shim and the base circle of camshaft.
- Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance

Specification

Engine coolant temperature: 20°C (68°F)

Intake : 0.20mm (0.0079in.)

Exhaust : 0.28mm (0.0110in.)

Engine coolant temperature : 80°C (176°F)

Intake : 0.29mm (0.0114in.)

Exhaust : 0.34mm (0.0134in.)

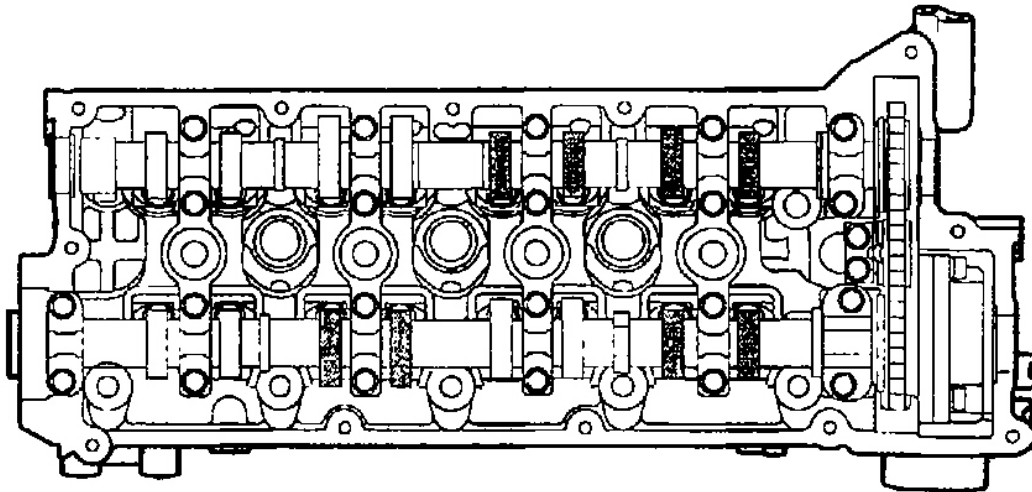
Limit

Intake : 0.12 ~ 0.28mm (0.0047 ~ 0.0110in.)

Exhaust : 0.20 ~ 0.38mm (0.0079 ~ 0.0150in.)

- Turn the crankshaft pulley one revolution (360°) and align the groove with timing mark "T" of the lower timing belt cover.
- Check only valves indicated as shown. [NO. 4 cylinder: TDC/compression]. Measure the valve

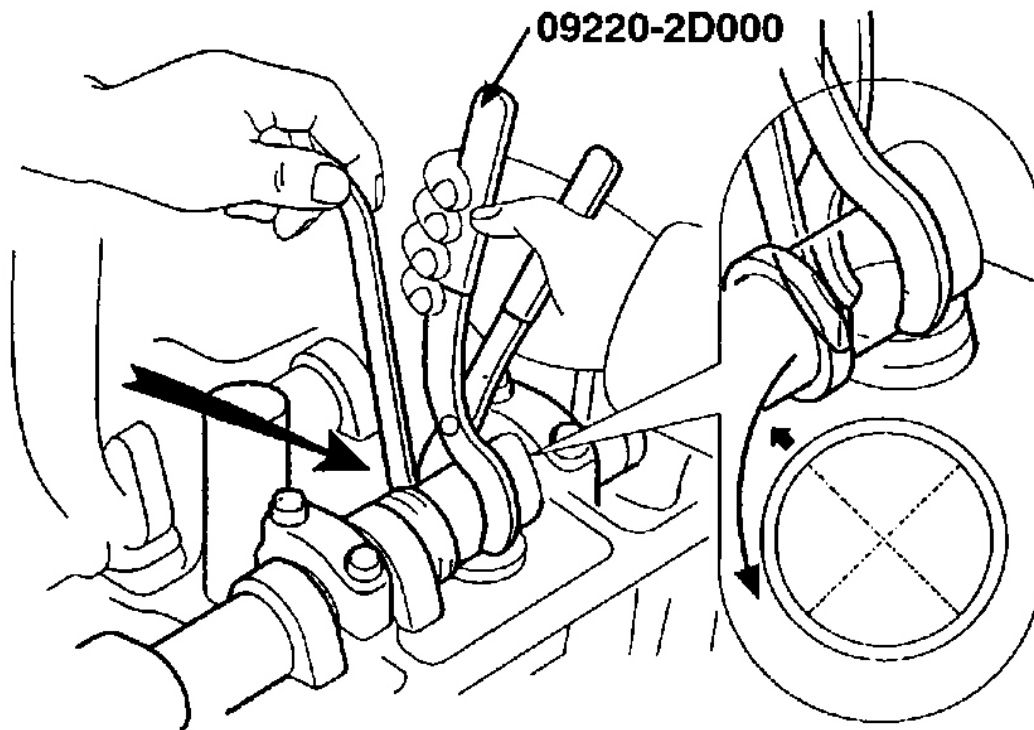
clearance. See procedure in next step.



G00747376

Fig. 20: Checking Valve Clearances (Step 2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

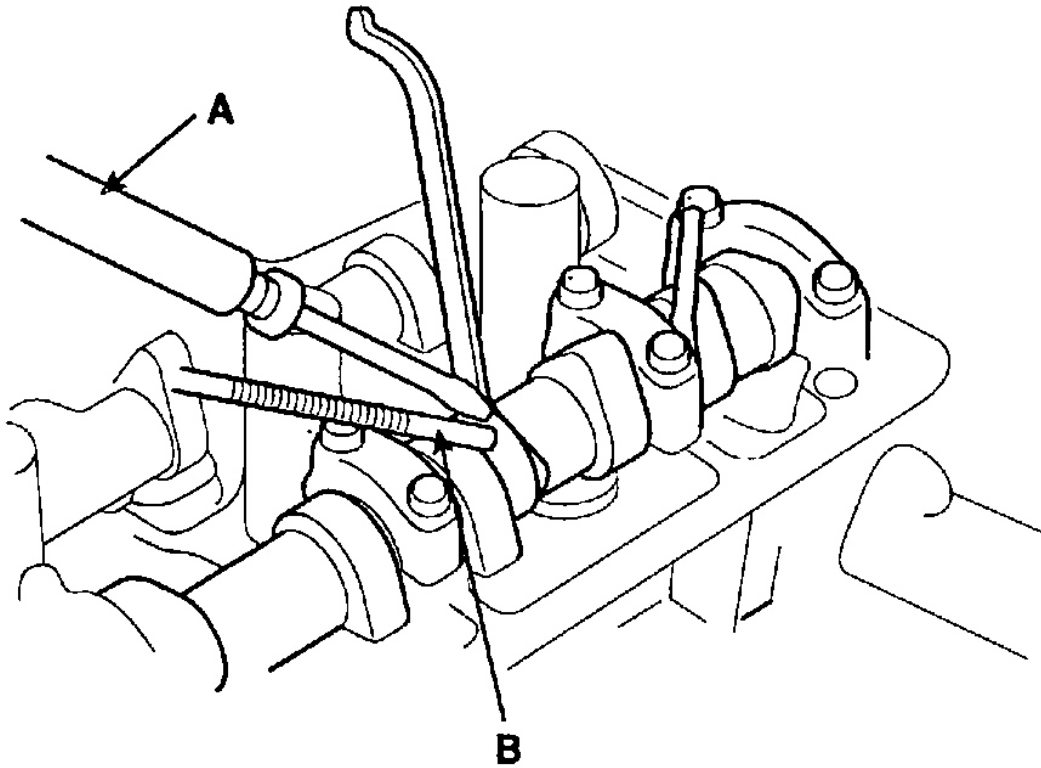
6. Adjust the intake and exhaust valve clearance.
 - A. Turn the crankshaft so that the cam lobe of the camshaft on the adjusting valve is upward.
 - B. Using the SST(09220 - 2D000), press down the valve lifter and place the stopper between the camshaft and valve lifter and remove the special tool.



G00747377

Fig. 21: Installing Stopper
Courtesy of HYUNDAI MOTOR CO.

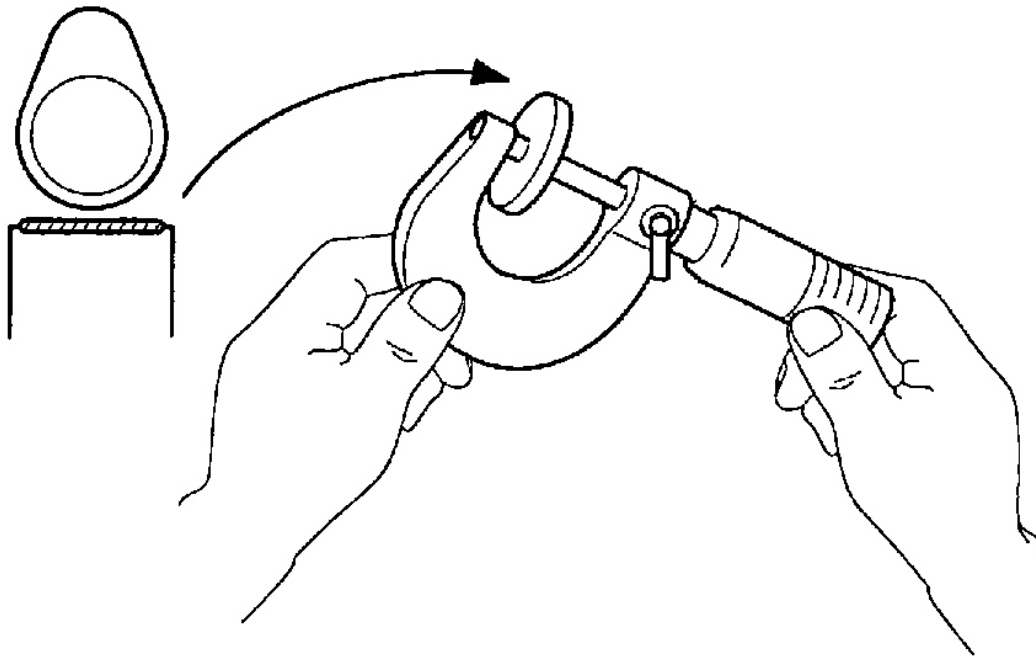
- C. Remove the adjusting shim with a small screw driver (A) and magnet (B).



G00747378

Fig. 22: Removing Adjusting Shim
Courtesy of HYUNDAI MOTOR CO.

- D. Measure the thickness of the removed shim using a micrometer.



G00747379

Fig. 23: Measuring Adjusting Shim
Courtesy of HYUNDAI MOTOR CO.

- E. Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

Valve clearance (Engine coolant temperature : 20°C)

T : Thickness of removed shim

A : Measured valve clearance

N : Thickness of new shim

Intake : $N = T + [A - 0.20\text{mm}(0.0079\text{in.})]$

Exhaust : $N = T + [A - 0.28\text{mm}(0.0110\text{in.})]$

- F. Select a new shim with a thickness as close as possible to the calculated value. See **Fig. 24** and/or **Fig. 25**.

NOTE: Shims are available in 20 size increments of 0.04mm (0.0016in.) from 2.00mm (0.079in.) to 2.76mm (0.108in.)

- G. Place a new adjusting shim on the valve lifter.
H. Using the SST (09220 - 2D000), press down the valve lifter and remove the stopper.
I. Recheck the valve clearance.

Valve clearance (Engine coolant temperature : 20°C)

2004 ENGINES 2.0L 4-Cylinder - Elantra

G00718964

TROUBLESHOOTING

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

Symptom	Suspect area	Remedy (See page)
Engine misfire with abnormal internal lower engine noises.	Loose or improperly installed engine flywheel.	Repair or replace the flywheel 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.
Engine misfire with abnormal valve train noise.	Stuck valves (Carbon buildup on the valve stem can cause the valve not to close properly.)	Repair or replace as required.
	Excessive worn or mis-aligned timing chain	Replace the timing chain and sprocket as required.
	Worn camshaft lobes.	Replace the camshaft and valve lifters.
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, valve 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 sprockets.
	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.

G00747382

Fig. 26: Troubleshooting Symptom Table (1 Of 3)
Courtesy of HYUNDAI MOTOR CO.

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

Symptom	Suspect area	Remedy (See page)
Lower engine noise, regardless of engine speed.	Low oil pressure.	Repair or replace damaged components as required.
	Loose or damaged flywheel.	Replair or relace the flywheel.
	Damaged oil pan, contacting the oil pump screen.	- Inspect the oil pan. - Inspect the oil pump screen. - Repair or replace as required.
	Oil pump screen loose, damaged or restrirted.	- Inspect the oil pump screen. - Repair or replace as required.
	Excessive piston-to-cylinder bore clearance.	- Inspect the piston and cylinder bore. - Repair as required.
	Excessive piston pin-to bore clearance	- Inspect the piston, piston pin and the connecting rod. - Repair or replace as required.
	Excessive connecting rod bearing clearnace	Inspect the following components and repair as required. - The connecting rod bearings. - The connecting rods. - The crankshaft. - The crankshaft journal.
	Excessive crankshaft bearing clearnace	Inspect the following components, and repair as required : - The crankshaft bearing. - The crankshaft journals.
	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 journals. - The cylinder block crankshaft bearing bore.

G00747383

Fig. 27: Troubleshooting Symptom Table (2 Of 3)
 Courtesy of HYUNDAI MOTOR CO.

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

Symptom	Suspect area	Remedy (See page)
Engine will not crank- crankshaft will not rotate	Hydraulically locked cylinder - Coolant/antifreeze in cylinder. - Oil in cylinder. - Fuel in cylinder	1. Remove spark plugs and check for fluid. 2. Inspect for broken head gasket. 3. Inspect for cracked engine block or cylinder head. 4. Inspect for a sticking fuel injector and/or leaking fuel regulator.
	Broken timing chain and/or timing chain gears.	1. Inspect timing chain and gears. 2. Repair as required.
	Material cylinder - Broken valve - Piston material - Foreign material	1. Inspect cylinder for damaged components and/or foreign materials. 2. Repair or replace as required
	Seized crankshaft or connecting rod bearings.	1. Inspect crankshaft and connecting rod bearing. 2. Repair as required.
	Bent or broken connecting rod.	1. Inspect connecting rods. 2. Repair as required.
	Broken crankshaft	1. Inspect crankshaft. 2. Repair as required.

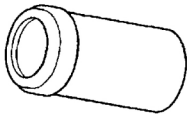
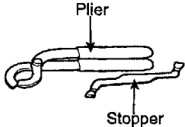
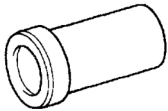
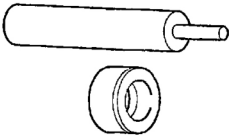
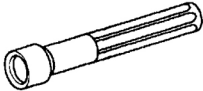
G00747384

Fig. 28: Troubleshooting Symptom Table (3 Of 3)
Courtesy of HYUNDAI MOTOR CO.

SPECIAL TOOLS

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

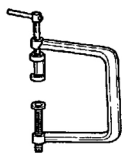
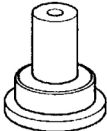
Tool (Number and name)	Illustration	Use
Crankshaft front oil seal installer (09214-33000)		Installation of the front oil seal
Valve clearance adjust tool set (09220-2D000)		Removal and installation of the tappet shim
Camshaft oil seal installer (09221-21000)		Installation of the camshaft oil seal
Valve guide installer (09221-3F100 A/B)		Remove and installation of the valve guide
Valve stem oil seal installer (09222-22001)		Installation of the valve stem oil seal

G00747385

Fig. 29: Special Tools (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

Tool (Number and name)	Illustration	Use
Valve spring compressor & adaptor (09222-28000, 09222-28100)		Removal and installation of the intake or exhaust valve
Crankshaft rear oil seal installer (09231-21000)		1. Installation of the engine rear oil seal 2. Installation of the crankshaft rear oil seal

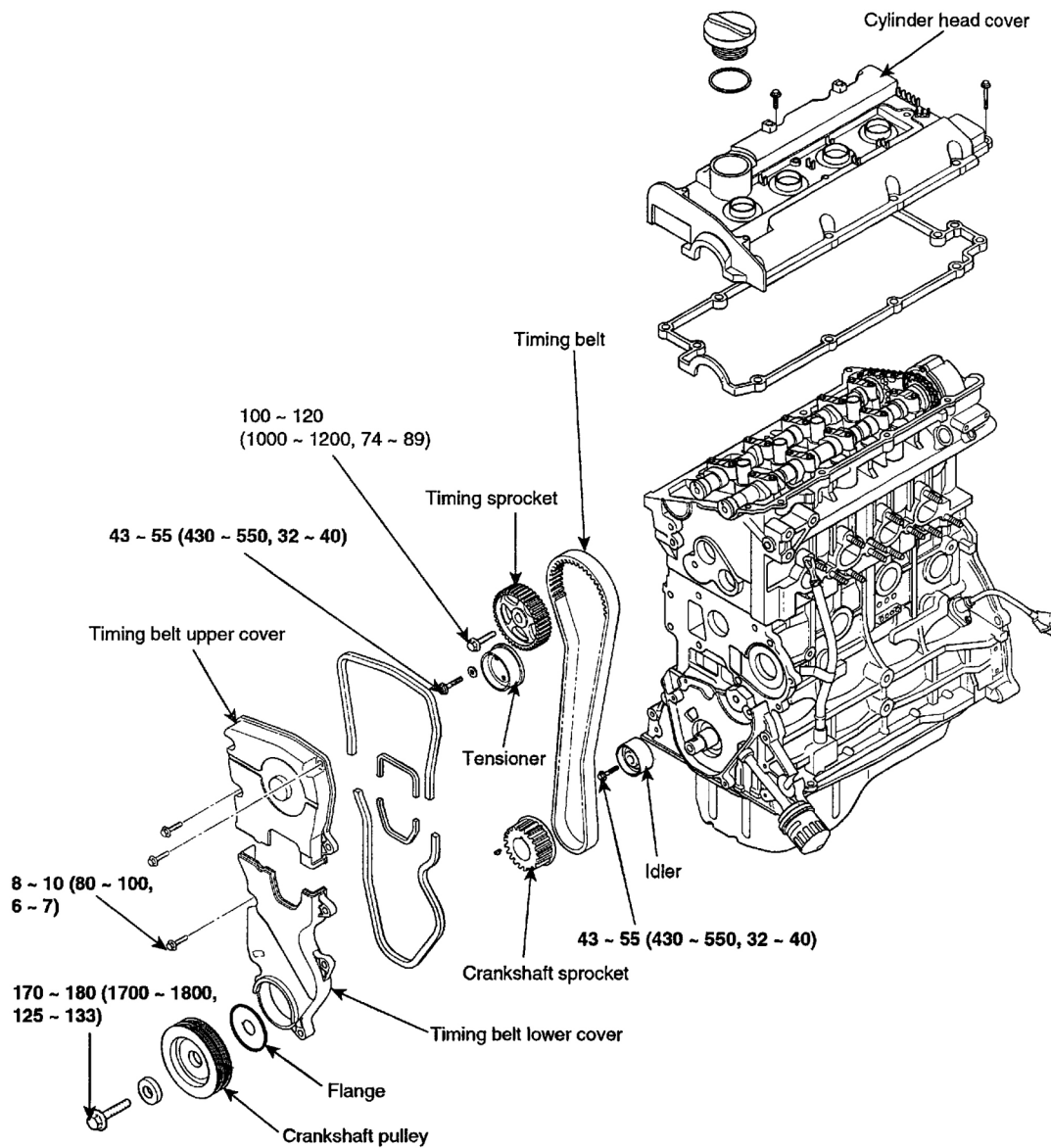
G00747386

Fig. 30: Special Tools (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

TIMING SYSTEM

TIMING BELT

COMPONENTS



TORQUE : Nm (kgf.cm, lbf.ft)

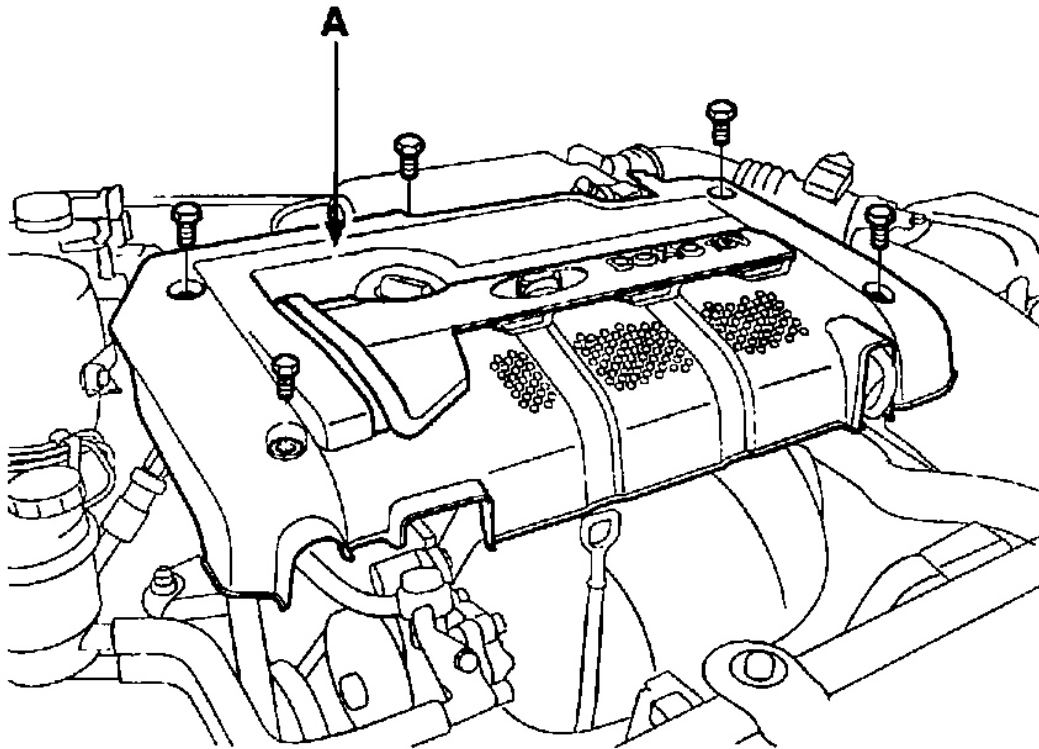
G00747387

Fig. 31: Identifying Timing System Components
Courtesy of HYUNDAI MOTOR CO.

REMOVAL

Engine removal is not required for this procedure.

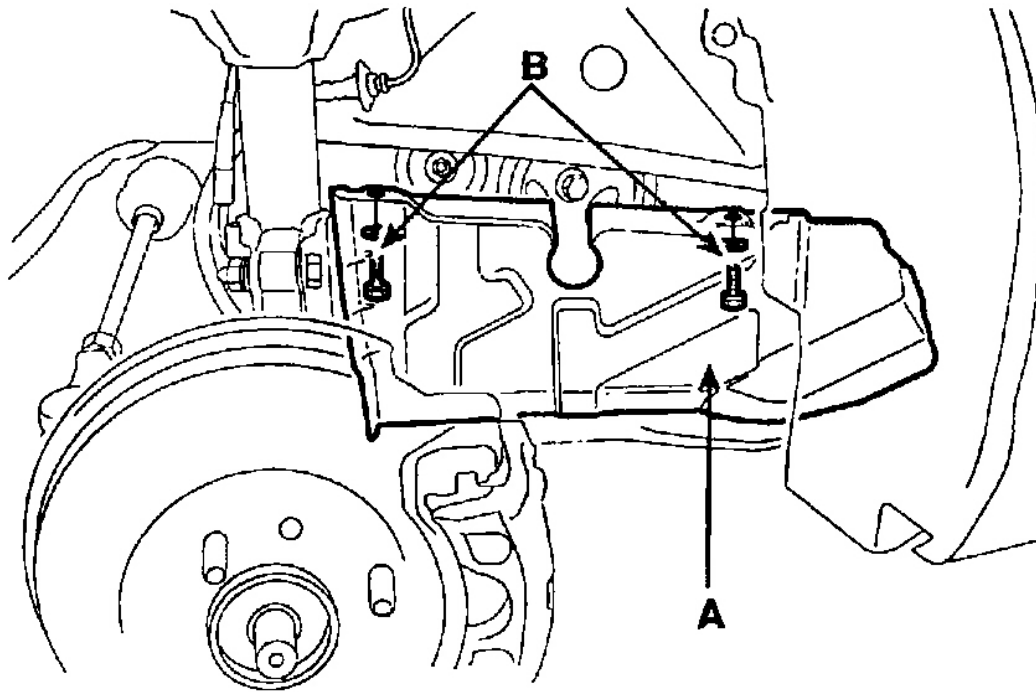
1. Remove the engine cover (A).



G00747388

Fig. 32: Removing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

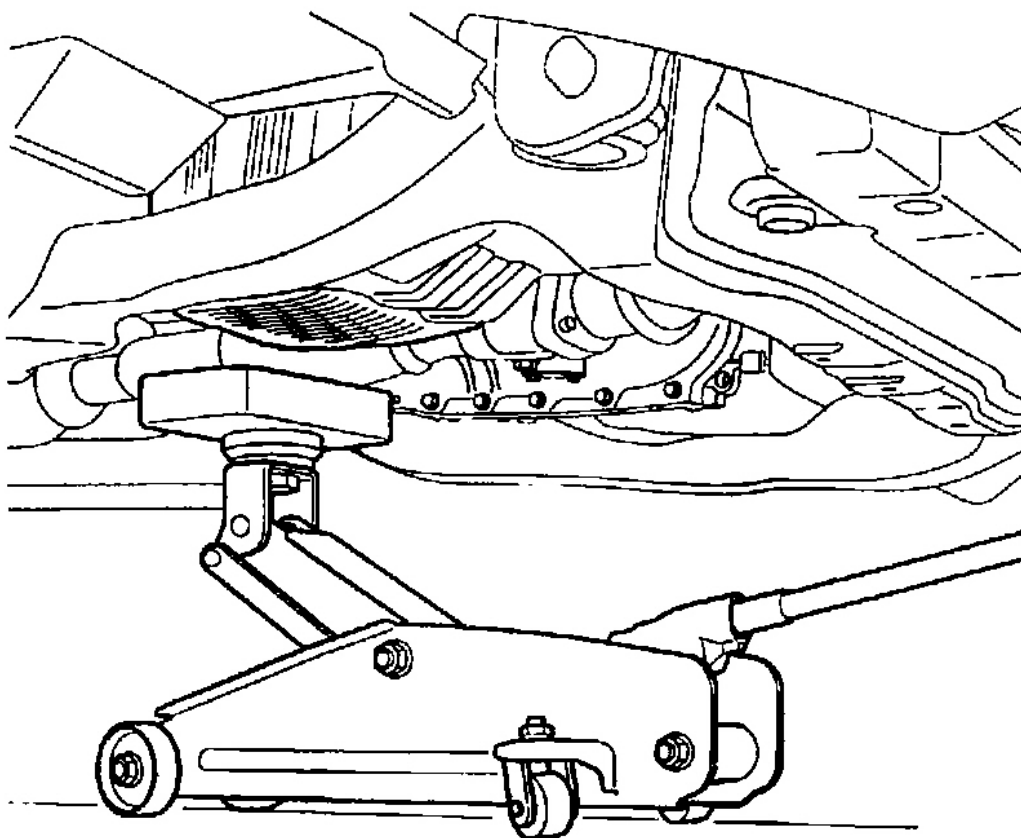
2. Remove RH front wheel.
 1. Remove 2 bolts (B) and RH side cover (A).



G00747389

Fig. 33: Removing Right Front Wheel Housing Cover
Courtesy of HYUNDAI MOTOR CO.

3. Remove the engine mount bracket.
 1. Set the jack to the engine oil pan.

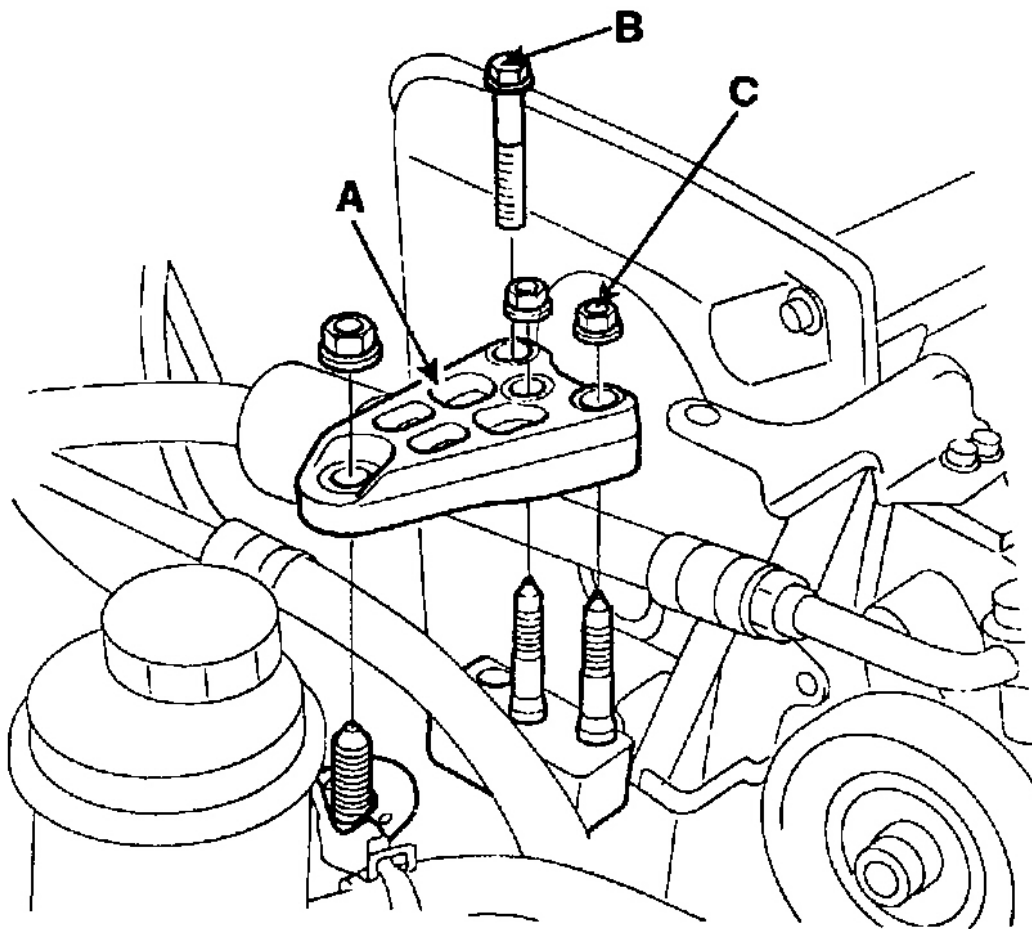


G00747390

Fig. 34: Supporting Engine With Jack
Courtesy of HYUNDAI MOTOR CO.

NOTE: Place wooden block between the jack and engine oil pan.

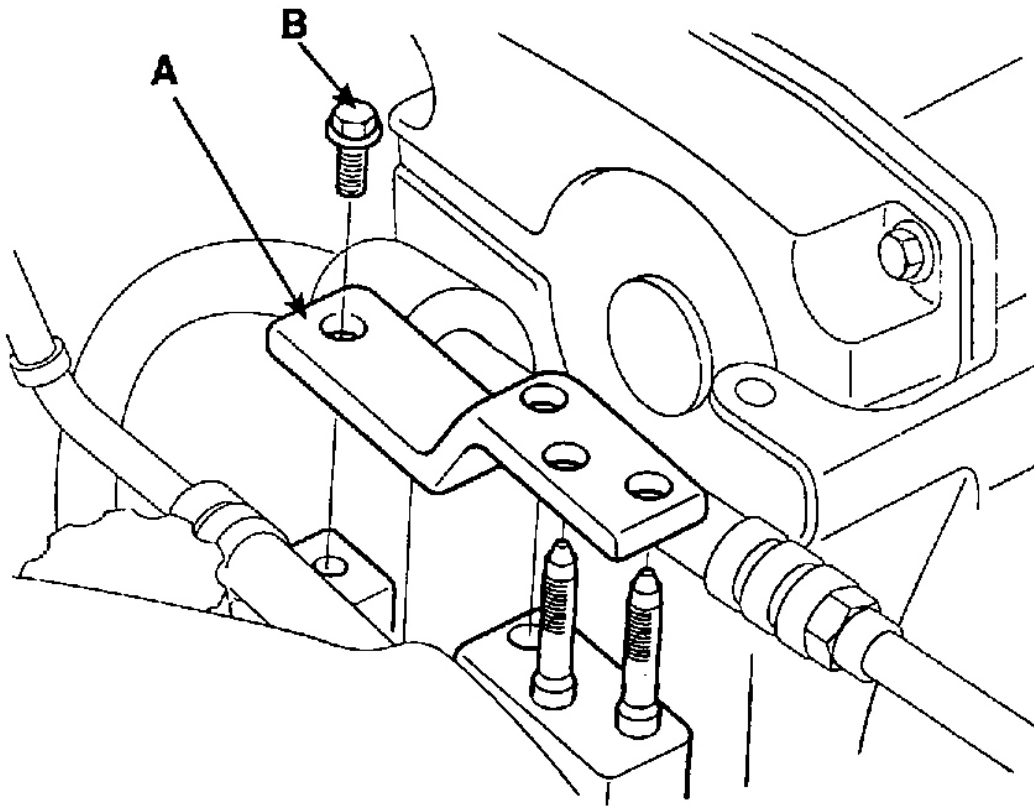
2. Remove the bolt (B), 3 nuts (C) and engine mount bracket (A).



G00747391

Fig. 35: Removing Engine Mount Bracket
Courtesy of HYUNDAI MOTOR CO.

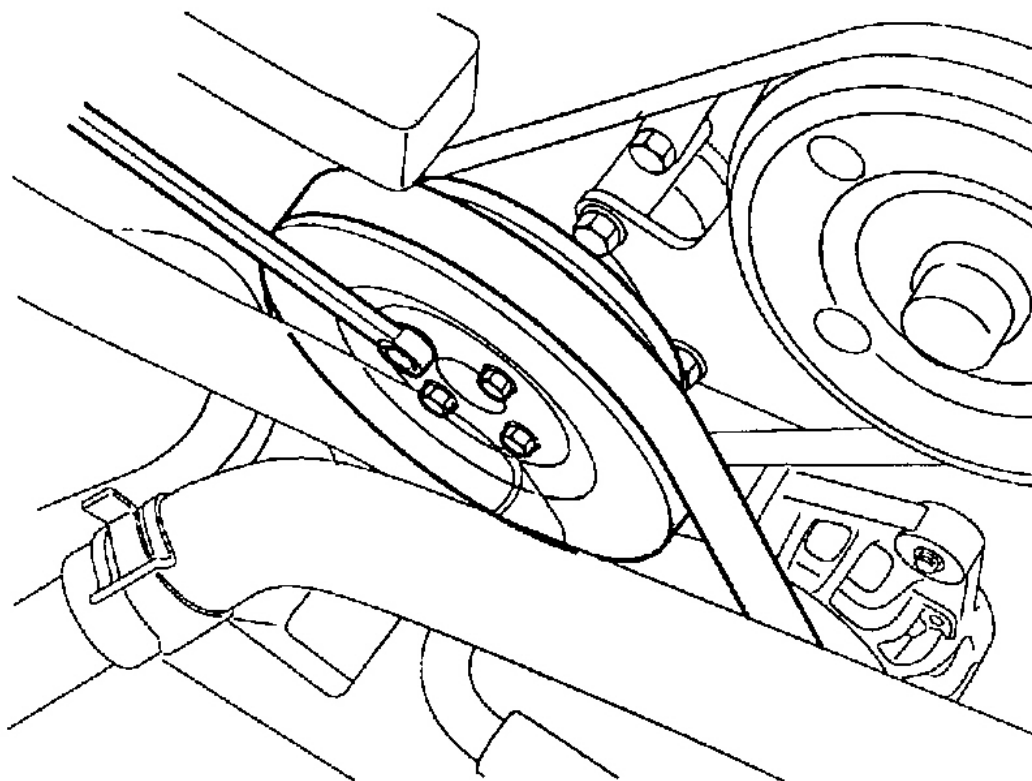
3. Remove the bolt (B) and stay plate (A).



G00747392

Fig. 36: Removing Stay Plate
Courtesy of HYUNDAI MOTOR CO.

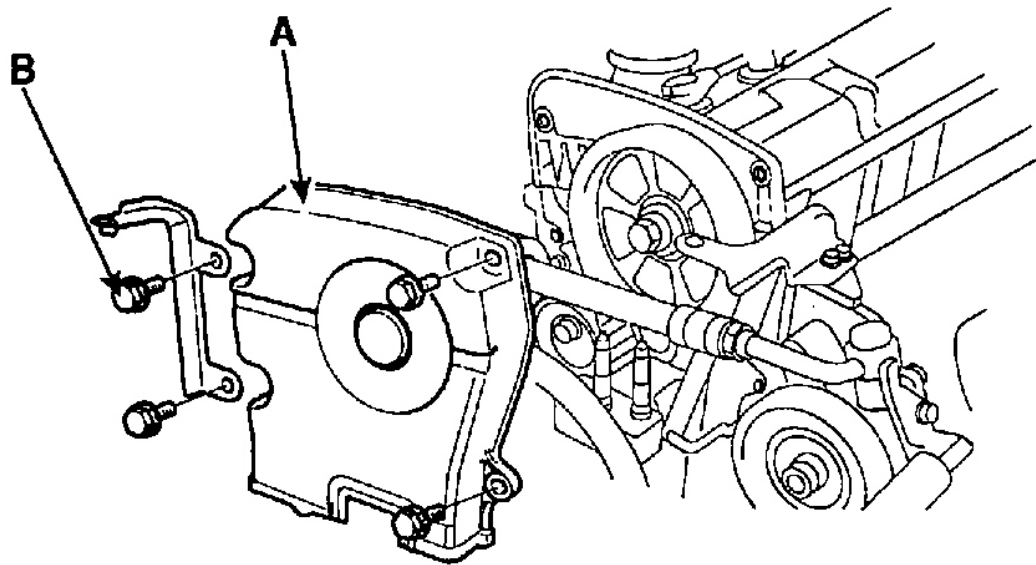
4. Temporarily loosen the water pump pulley bolts.



G00747393

Fig. 37: Loosening Water Pump Pulley Bolts
Courtesy of HYUNDAI MOTOR CO.

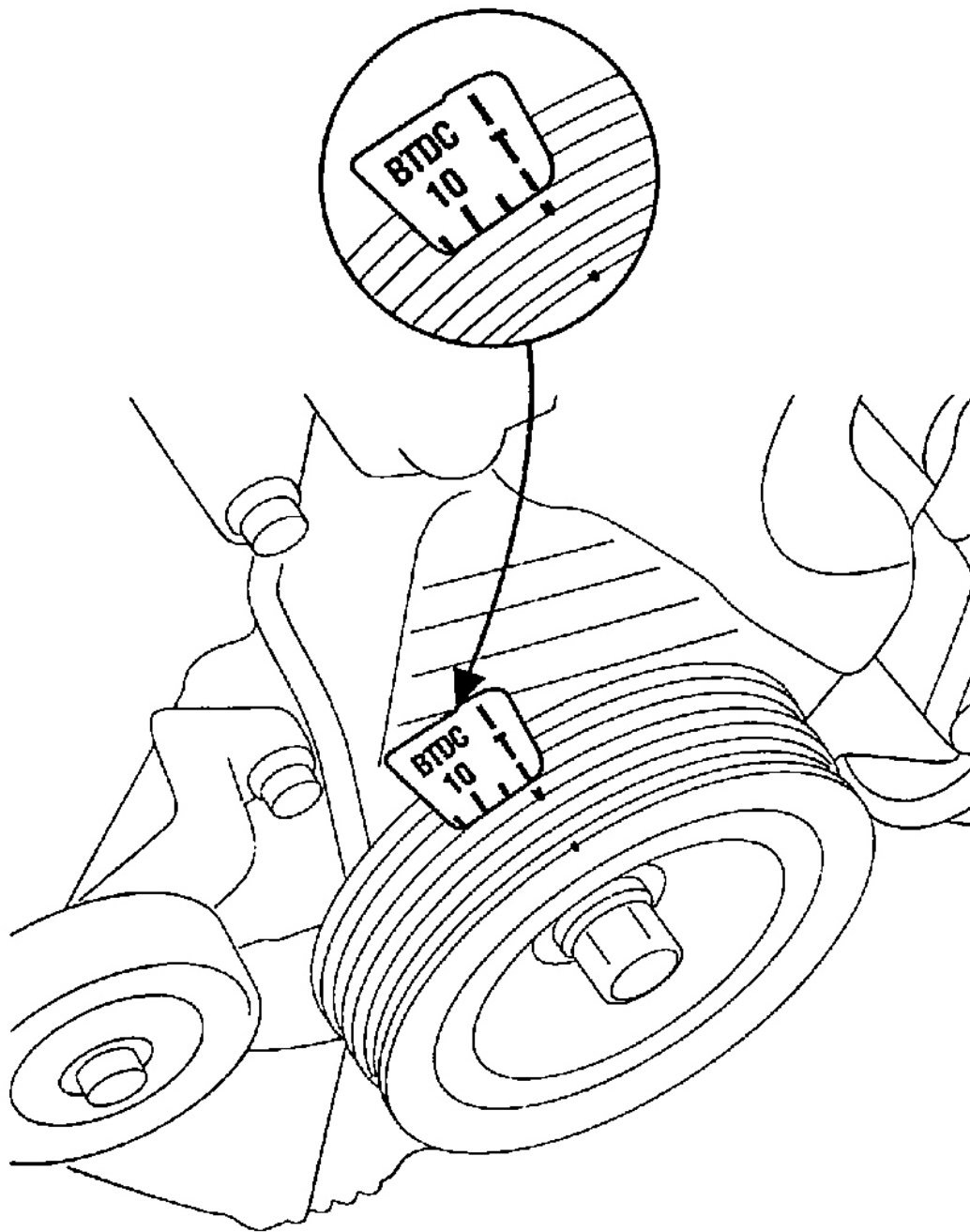
5. Remove alternator belt.
6. Remove air compressor belt.
7. Remove power steering belt.
8. Remove 4 bolts and water pump pulley.
9. Remove the 4 bolts (B) and timing belt upper cover (A).



G00747394

Fig. 38: Removing Upper Timing Belt Cover
Courtesy of HYUNDAI MOTOR CO.

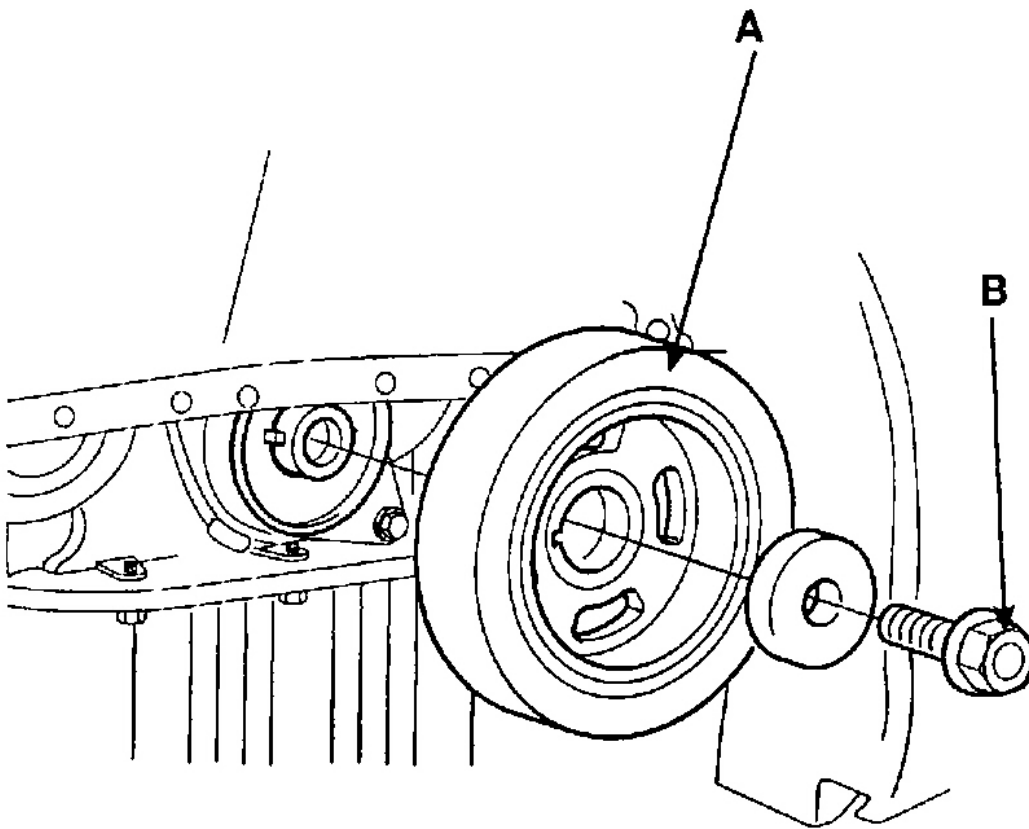
10. Turn the crankshaft pulley, and align its groove with timing mark "T" of the timing belt cover.



G00747395

Fig. 39: Aligning Crankshaft Pulley Timing Marks
Courtesy of HYUNDAI MOTOR CO.

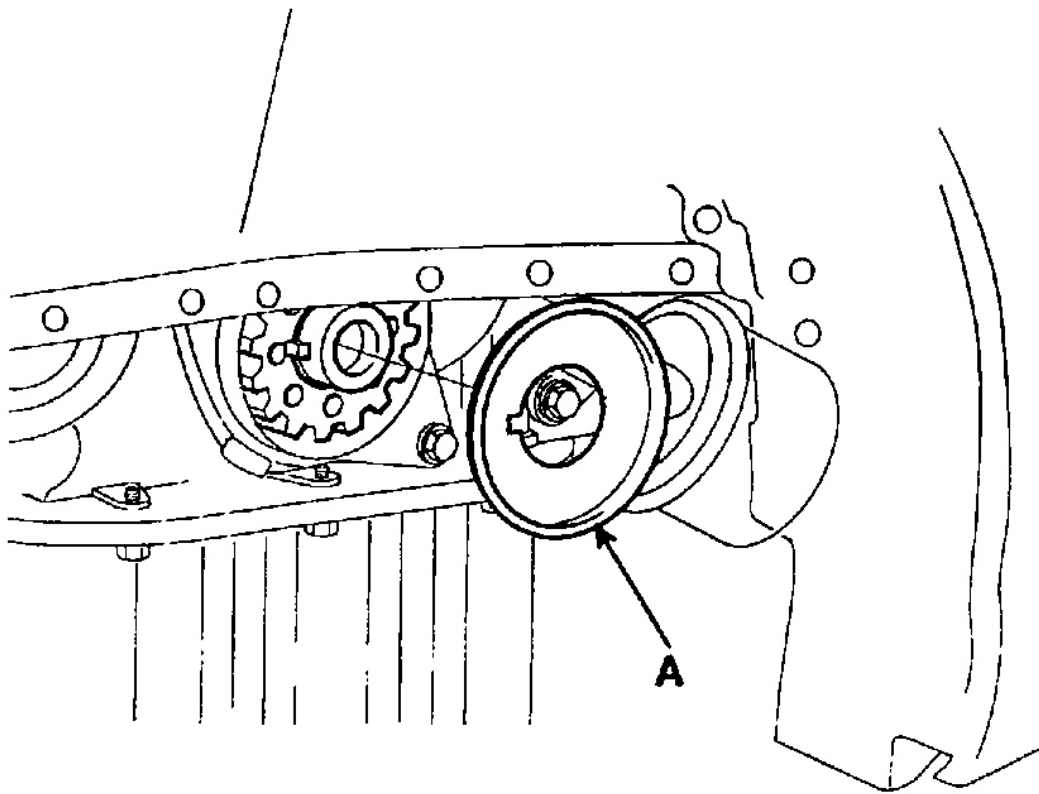
11. Remove the crankshaft pulley bolt (B) and crankshaft pulley (A).



G00747396

Fig. 40: Removing Crankshaft Pulley
Courtesy of HYUNDAI MOTOR CO.

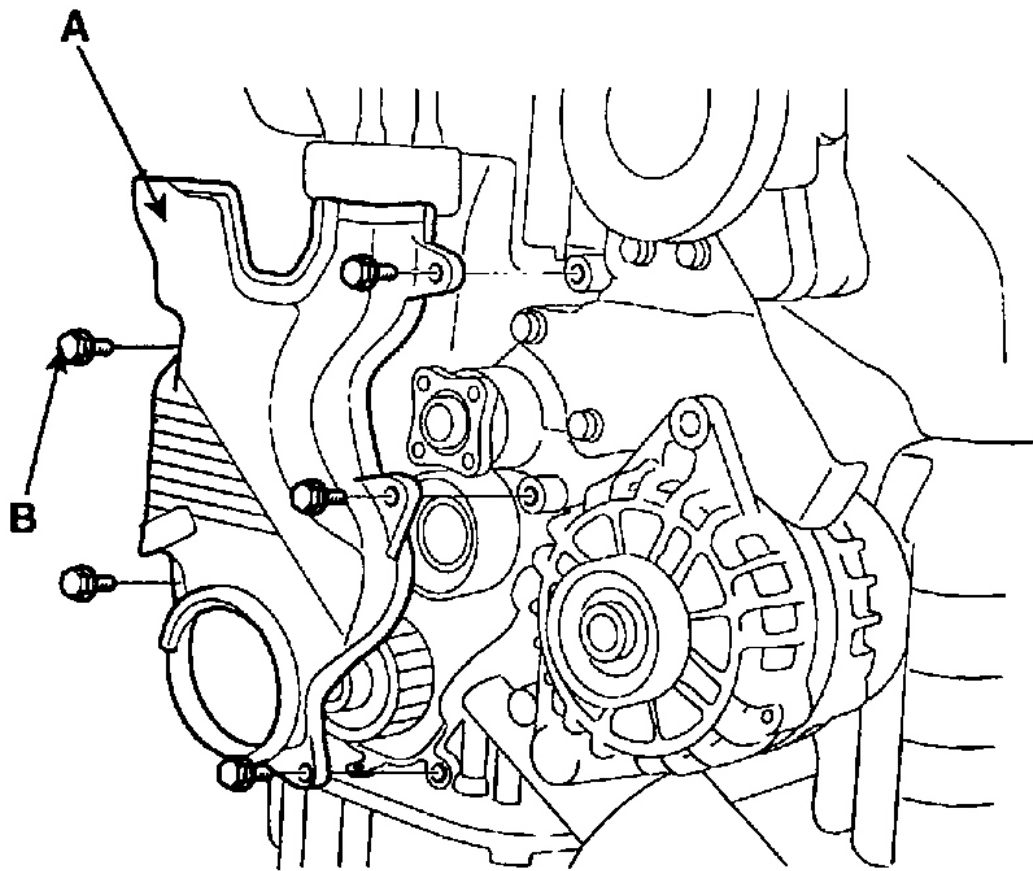
12. Remove the crankshaft flange (A).



G00747397

Fig. 41: Removing Crankshaft Flange
Courtesy of HYUNDAI MOTOR CO.

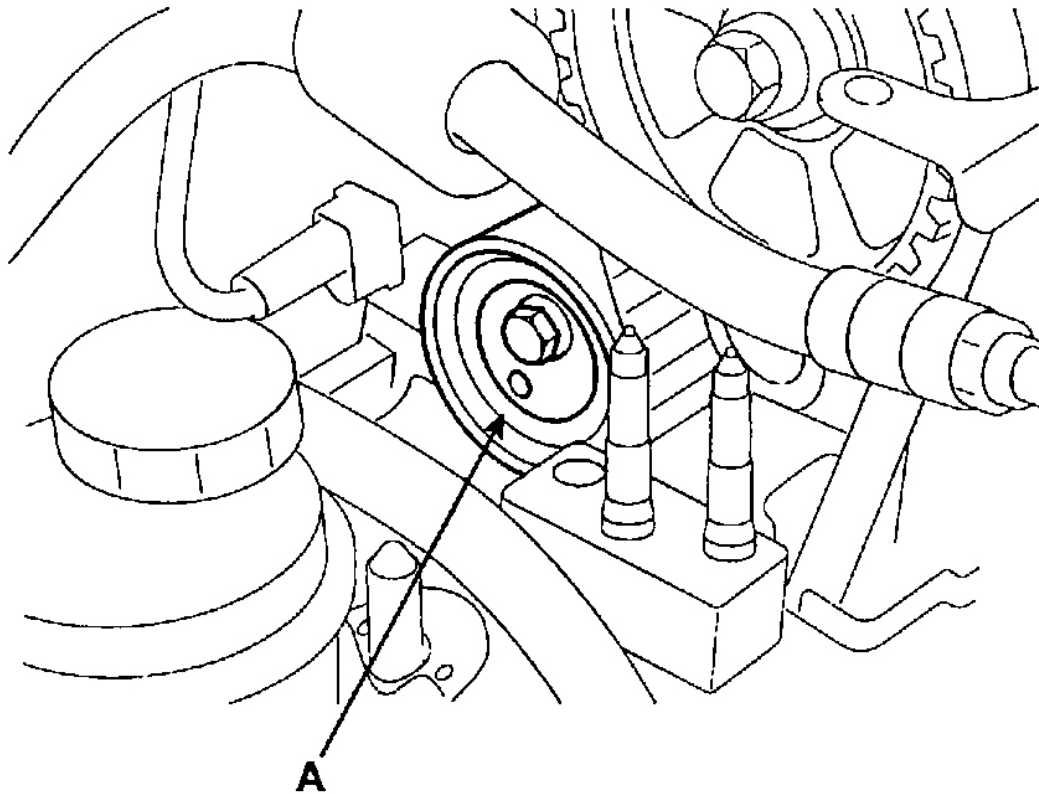
13. Remove the 5 bolts (B) and timing belt lower cover (A).



G00747398

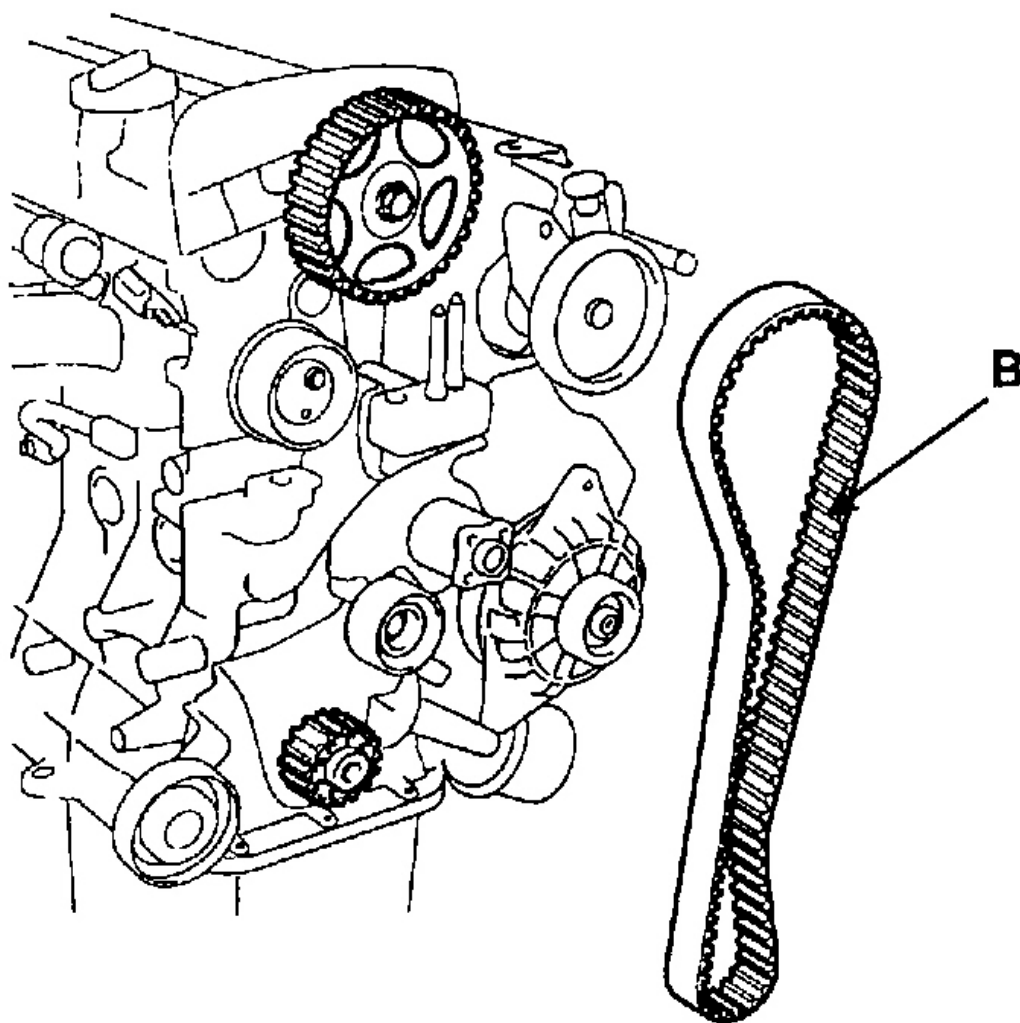
Fig. 42: Removing Lower Timing Belt Cover
Courtesy of HYUNDAI MOTOR CO.

14. Remove the timing belt tensioner (A) and timing belt (B).



G00747399

Fig. 43: Removing Timing Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

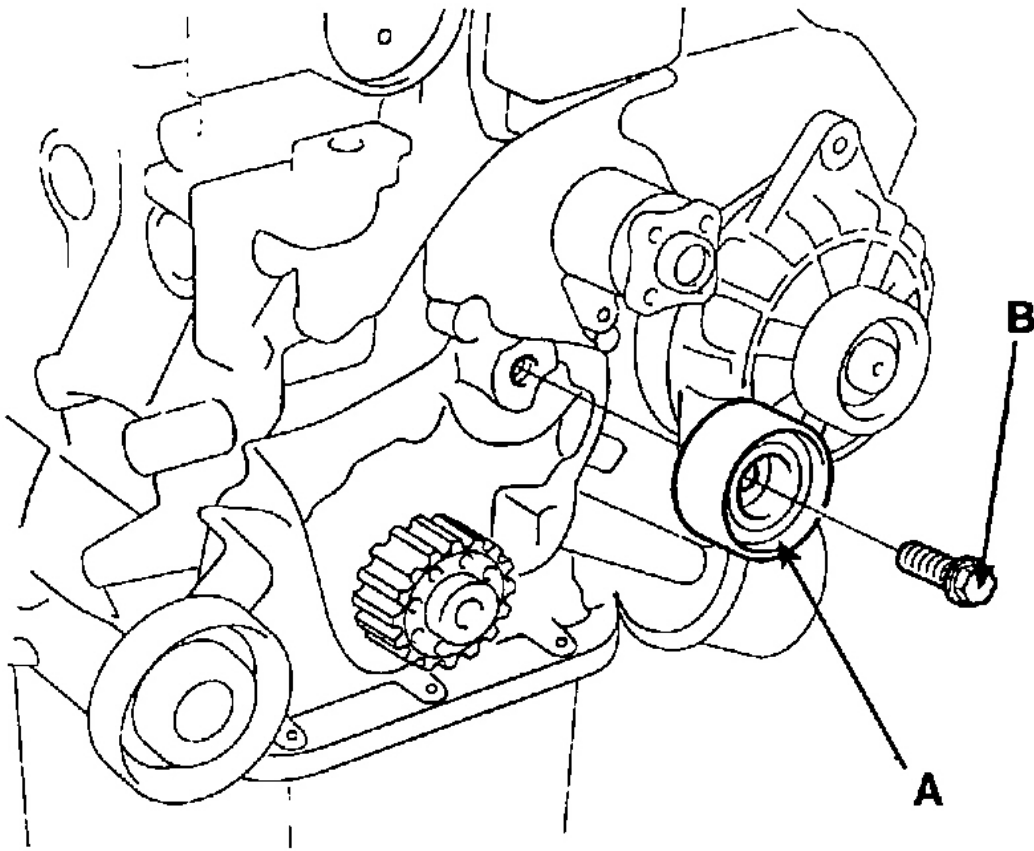


G00747400

Fig. 44: Removing Timing Belt
Courtesy of HYUNDAI MOTOR CO.

NOTE: If the timing belt is reused, make an arrow indicating the turning direction to make sure that the belt is reinstalled in the same direction as before.

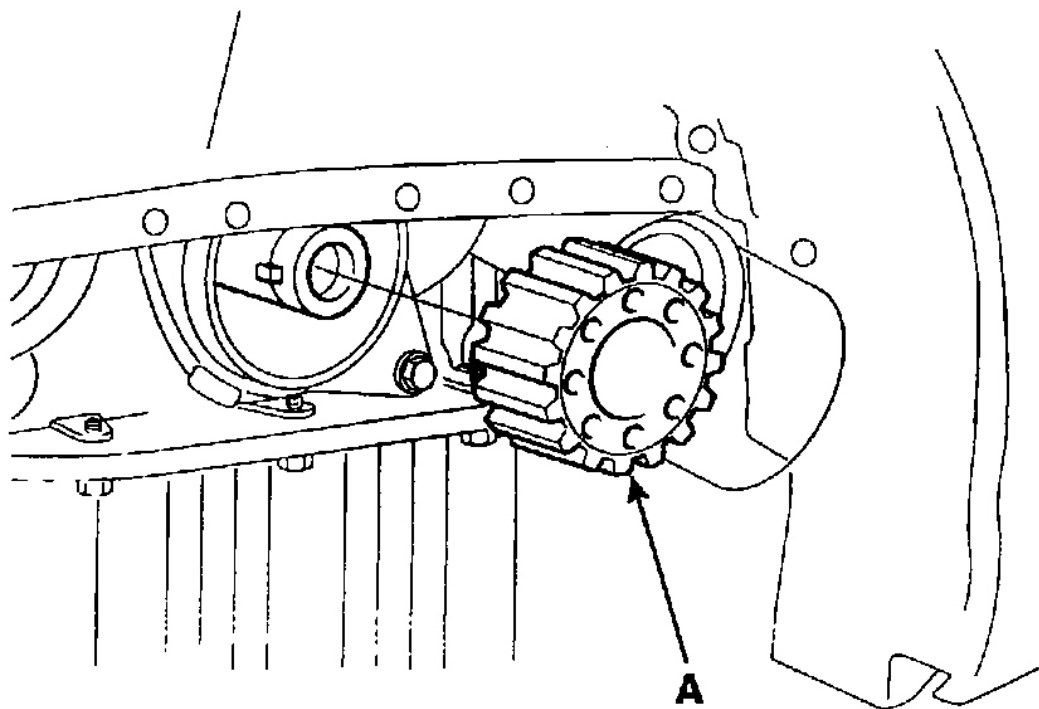
15. Remove the bolt (B) and timing belt idler (A).



G00747401

Fig. 45: Removing Timing Belt Idler
Courtesy of HYUNDAI MOTOR CO.

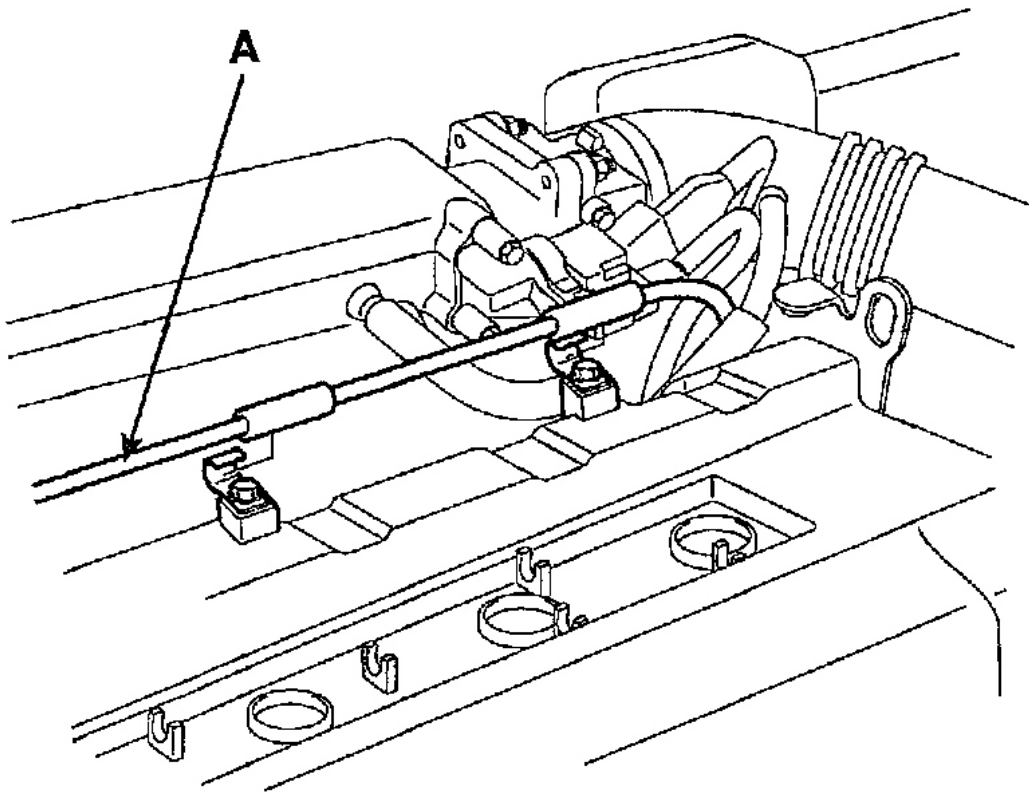
16. Remove the crankshaft sprocket (A).



G00747402

Fig. 46: Removing Crankshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

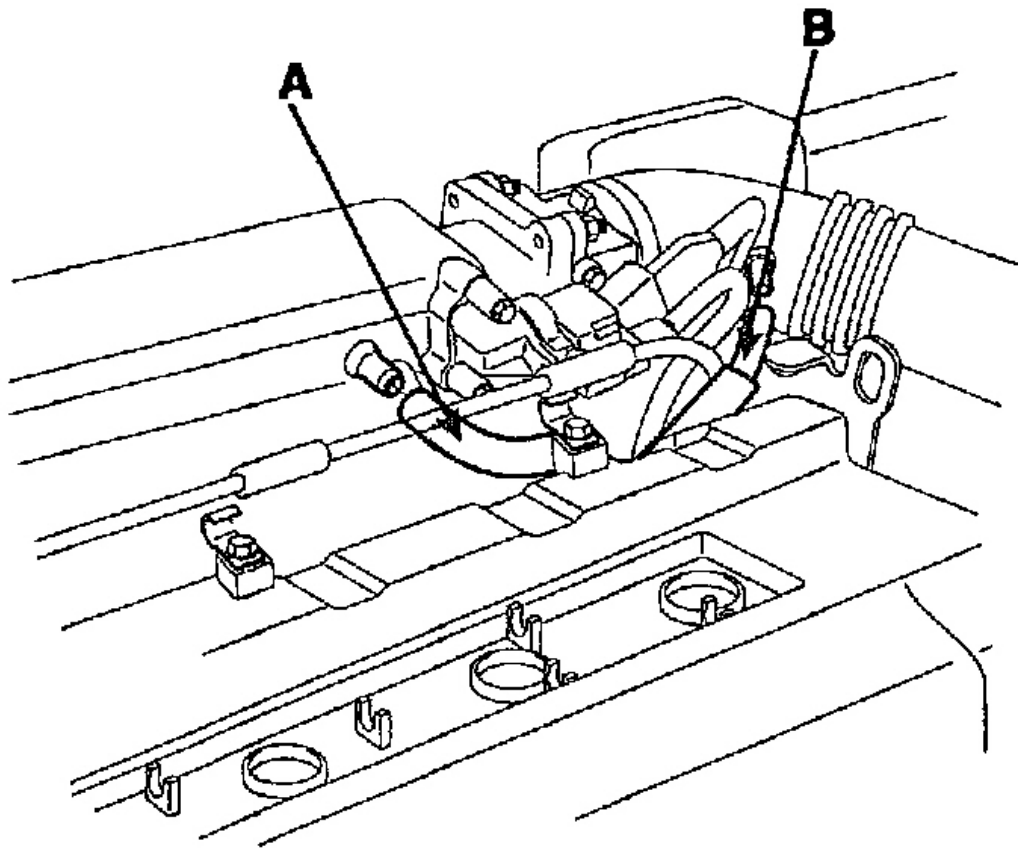
17. Remove the cylinder head cover.
 1. Remove the spark plug cable.
 2. Remove the accelerator cable (A) from the cylinder head cover.



G00747403

Fig. 47: Removing Accelerator Cable
Courtesy of HYUNDAI MOTOR CO.

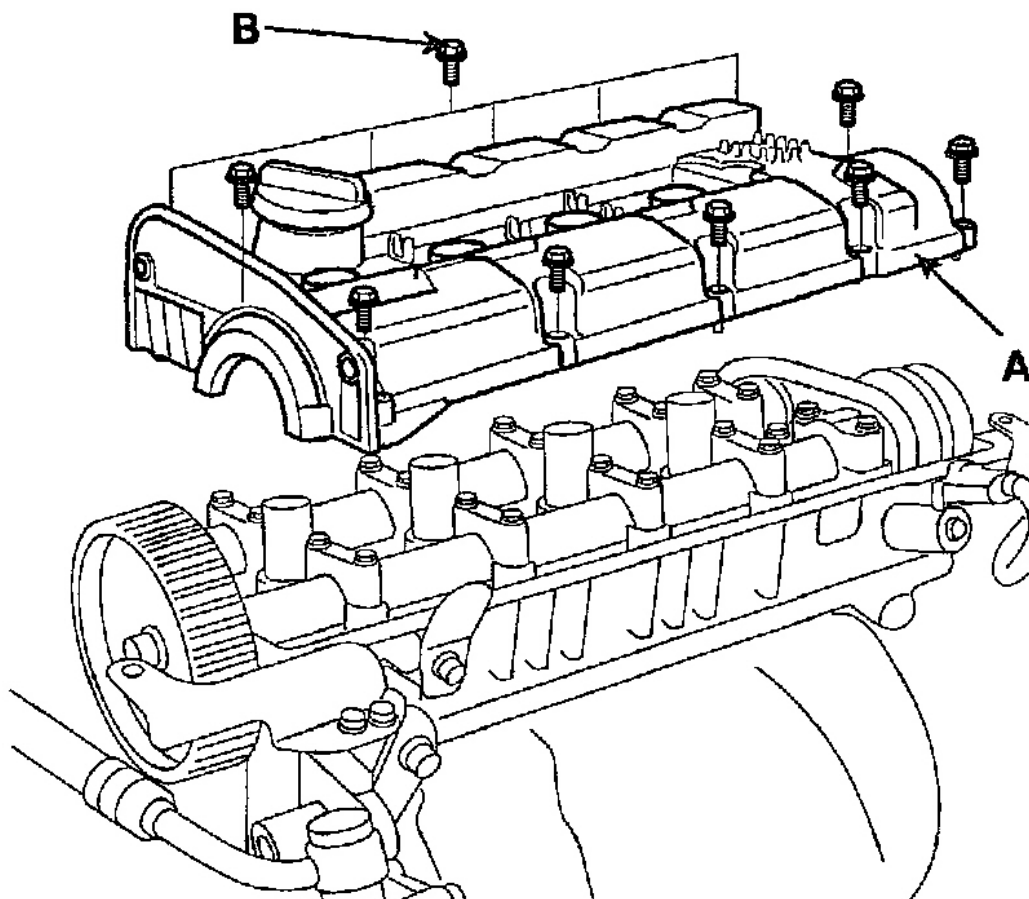
3. Remove the PCV (Positive Crankcase ventilation) hose (A) and breather hose (B).



G00747404

Fig. 48: Removing PCV & Breather Hoses
Courtesy of HYUNDAI MOTOR CO.

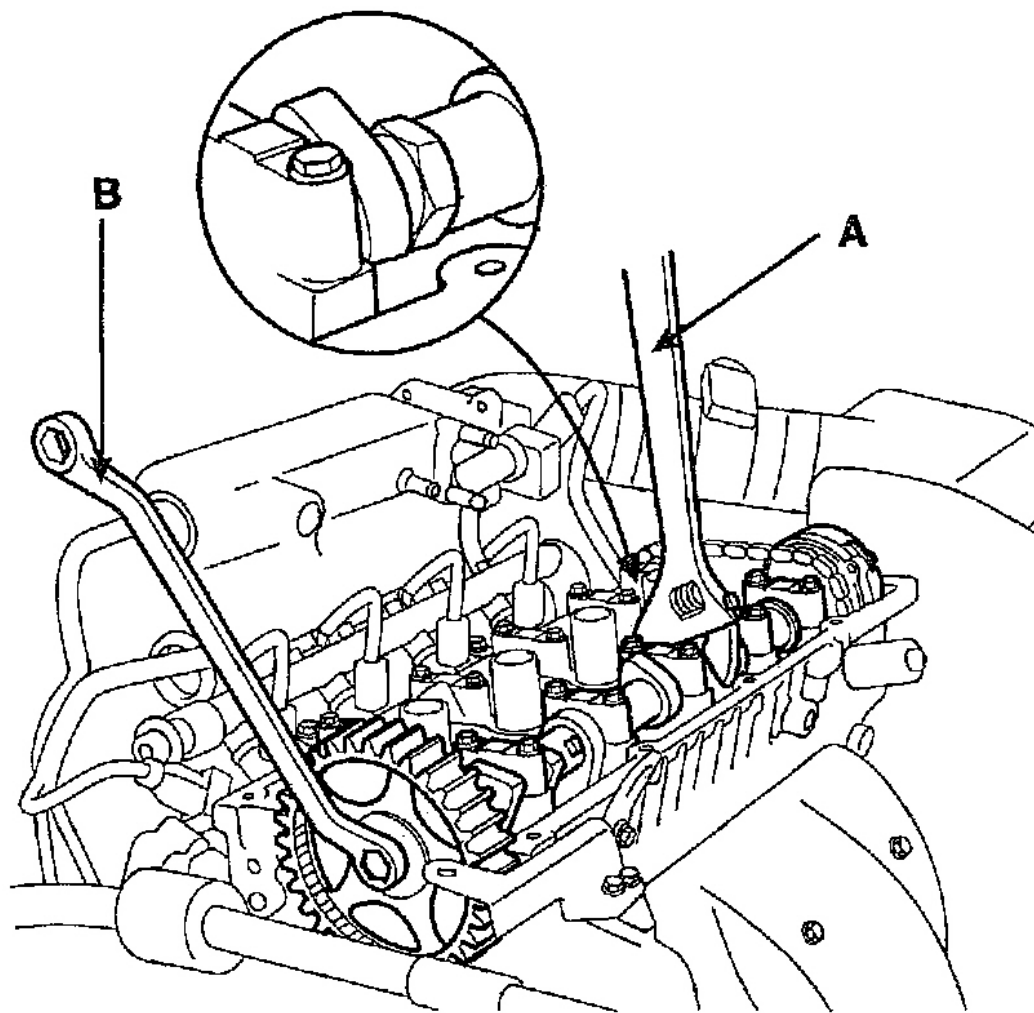
4. Remove the 12 bolts (B) and cylinder head cover (A).



G00747405

Fig. 49: Removing Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

18. Remove camshaft sprocket.
 1. Hold the hexagonal head wrench (A) portion of the camshaft with a wrench (B), and remove the bolt and camshaft sprocket (C).



G00747406

Fig. 50: Removing Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

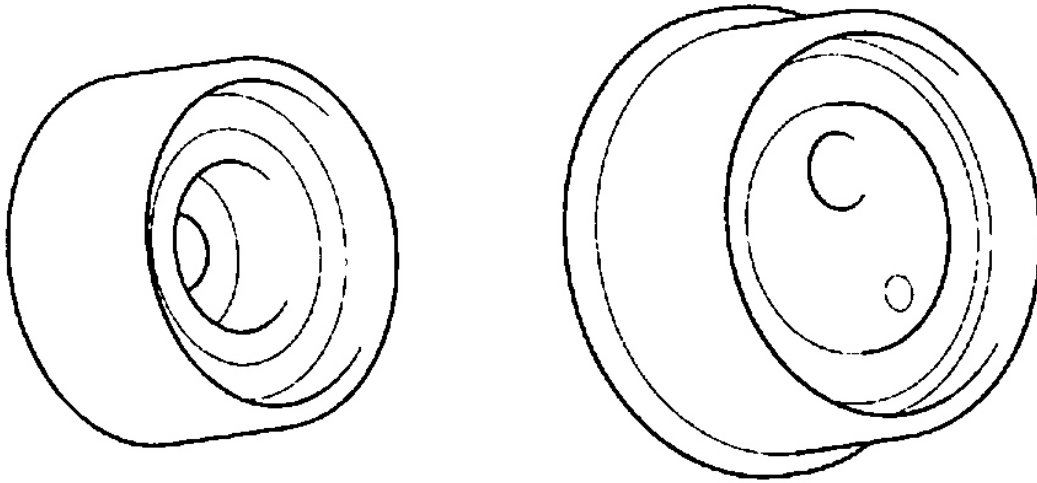
CAUTION: Be careful not to damage the cylinder head and valve lifter with the wrench.

INSPECTION

Sprockets, Tensioner, Idler

1. Check the camshaft sprocket, crankshaft sprocket, tensioner pulley, and idler pulley for abnormal wear, cracks, or damage. Replace as necessary.

2. Inspect the tensioner pulley and the idler pulley for easy and smooth rotation and check for play or noise. Replace as necessary.



G00747407

Fig. 51: Inspecting Timing Belt Tensioner & Idler Pulleys
Courtesy of HYUNDAI MOTOR CO.

3. Replace the pulley if there is a grease leak from its bearing.

Timing Belt

1. Check the belt for oil or dust deposits.

Replace, if necessary.

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

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

NOTE:

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

INSTALLATION

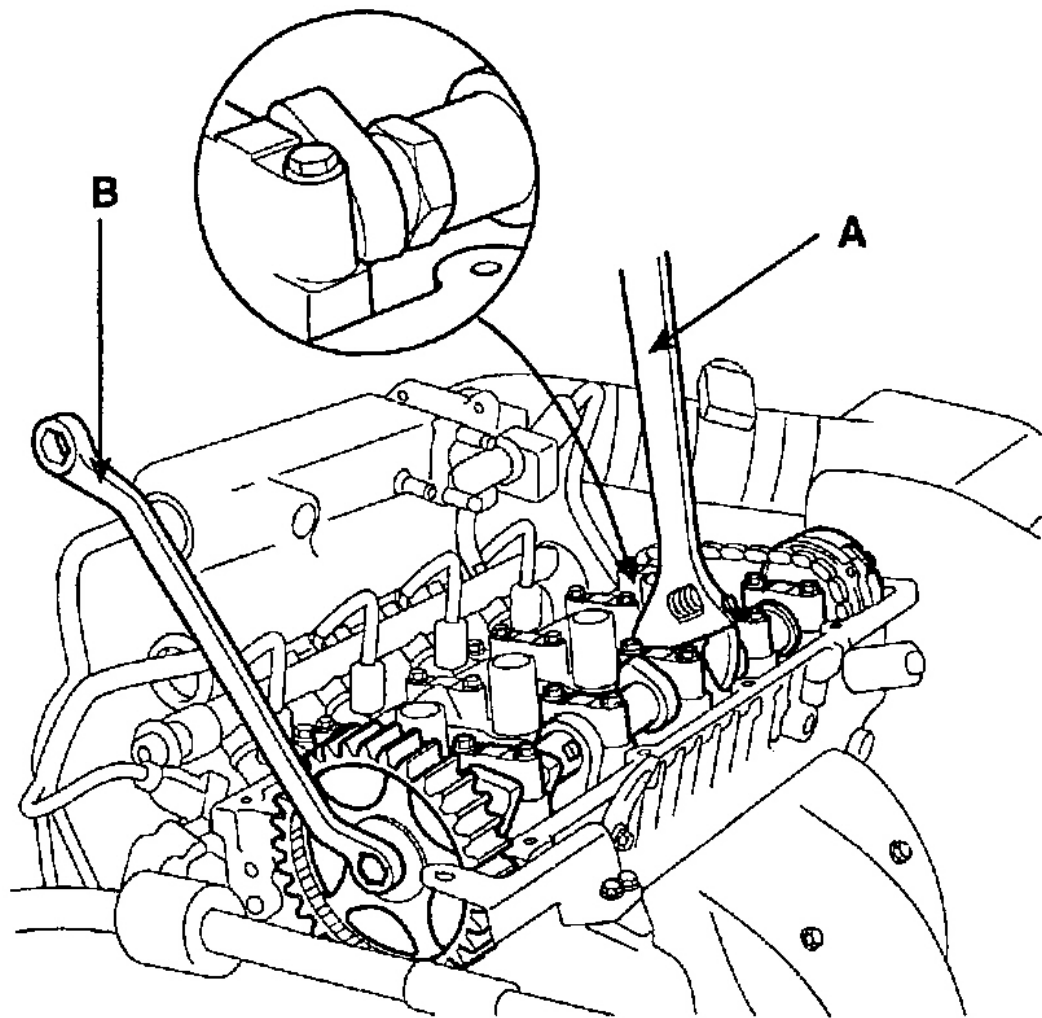
1. Install the camshaft sprocket and tighten the bolt to the specified torque

1. Temporarily install the camshaft sprocket bolt.
2. Hold the hexagonal head wrench (A) portion of the camshaft with a wrench (B), and tighten the camshaft sprocket (C) bolt.

Tightening torque

Camshaft sprocket bolt

100 ~ 120Nm (1000 ~ 1200kgf.cm, 74 ~ 89lbf.ft)

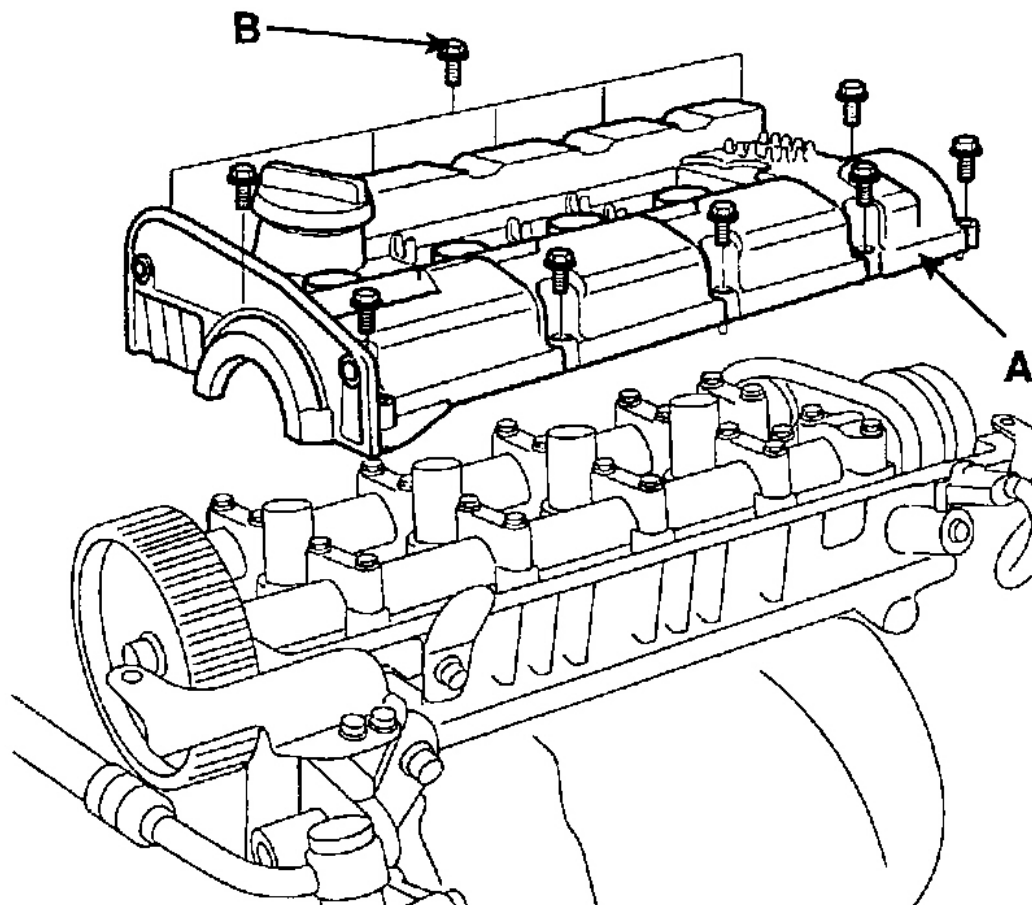


G00747408

Fig. 52: Installing Camshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

3. Install cylinder head cover.

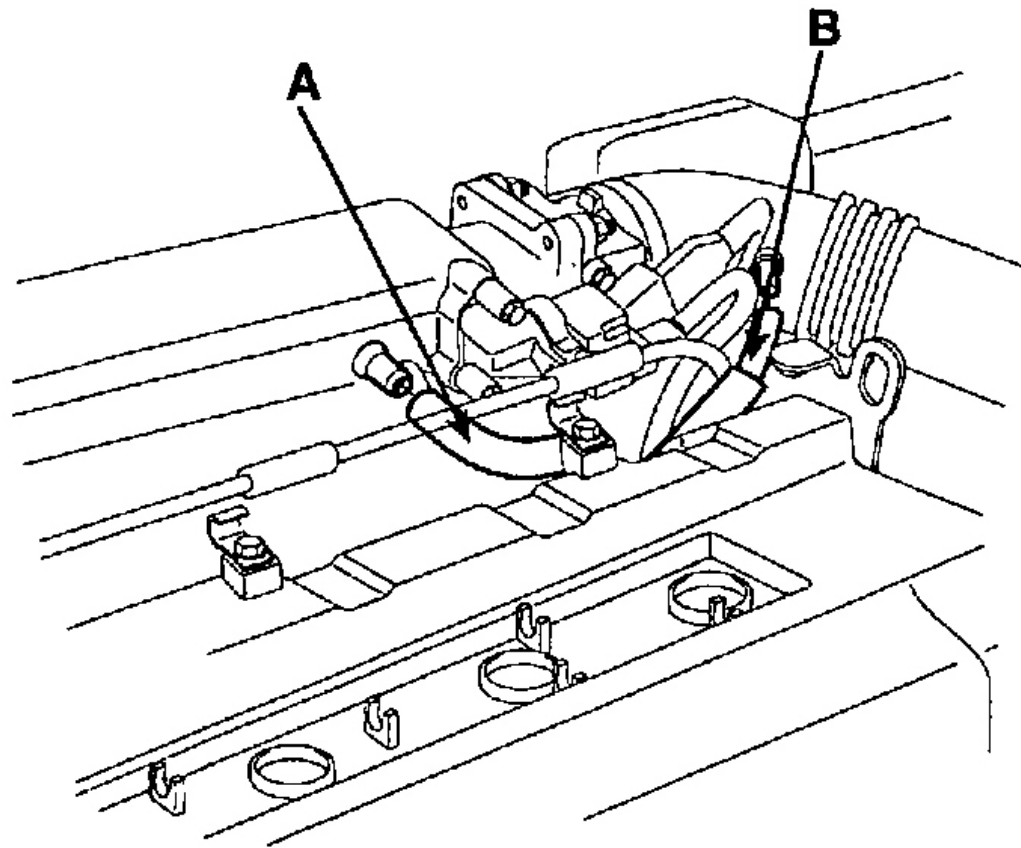
1. Install cylinder head cover (A) and 12 bolts (B).



G00747409

Fig. 53: Installing Cylinder Head Cover
Courtesy of HYUNDAI MOTOR CO.

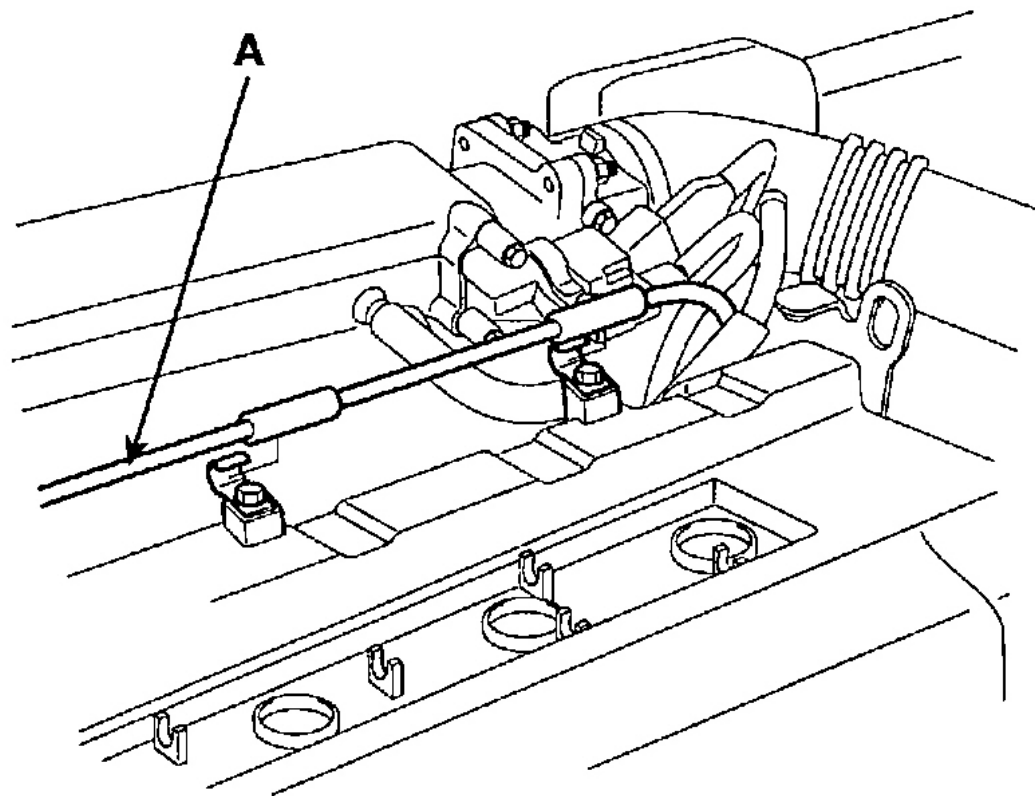
2. Install the PCV hose (A) and breather hose (B).



G00747410

Fig. 54: Installing PCV & Breather Hoses
Courtesy of HYUNDAI MOTOR CO.

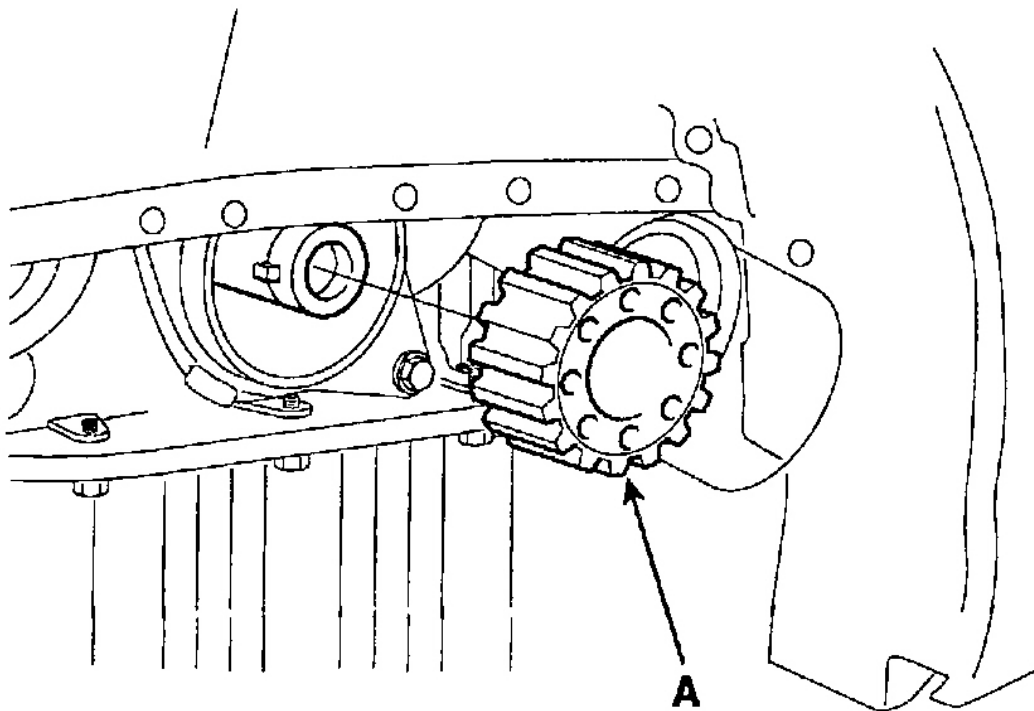
3. Install the accelerator cable (A) from the cylinder head cover.



G00747411

Fig. 55: Installing Accelerator Cable
Courtesy of HYUNDAI MOTOR CO.

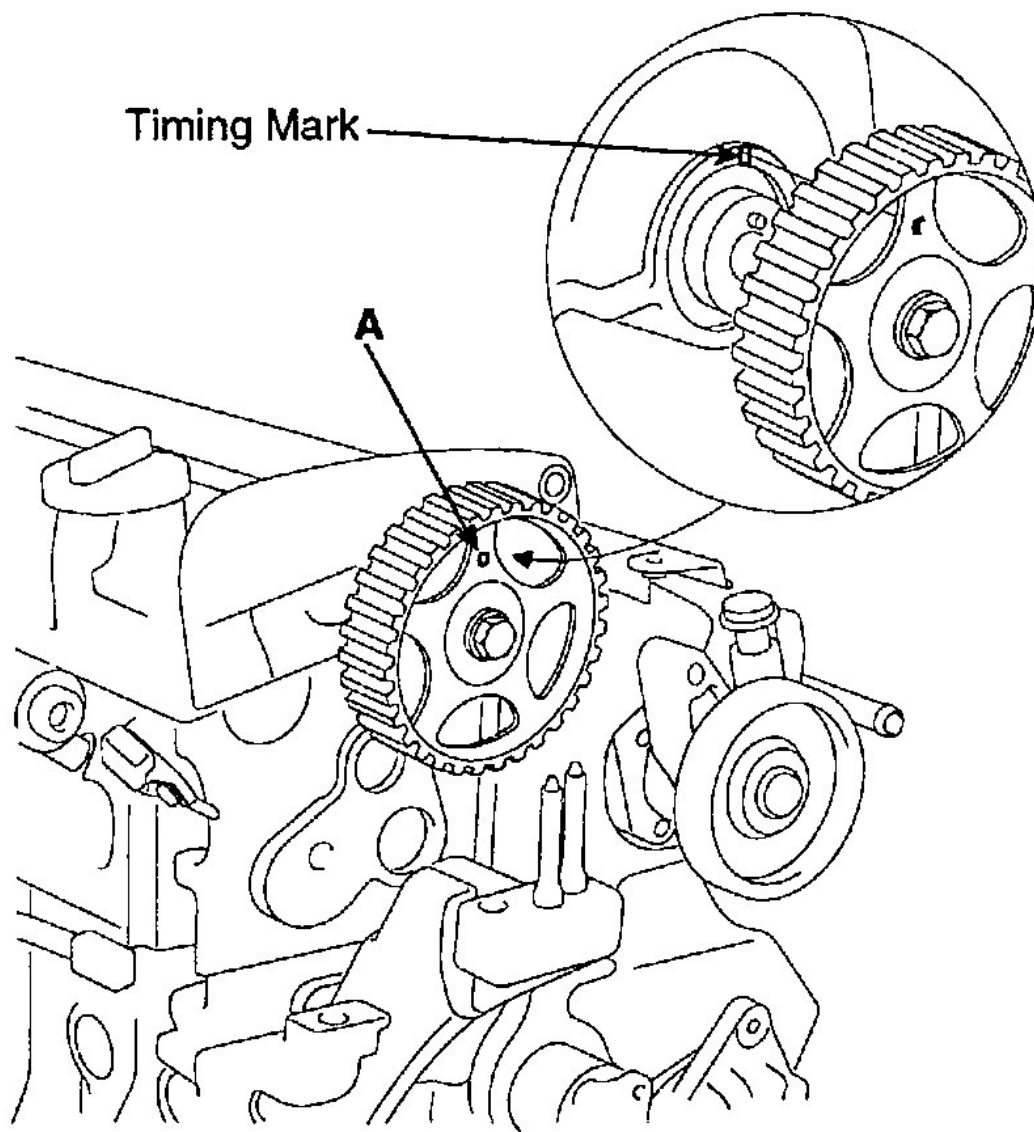
4. Install the spark plug cable.
4. Install the crankshaft sprocket (A).



G00747412

Fig. 56: Installing Crankshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

5. Align the timing marks of the camshaft sprocket (A) and crankshaft sprocket (B) with the No. 1 piston placed at top dead center and its compression stroke.



G00747413

Fig. 57: Aligning Camshaft Sprocket Timing Marks
Courtesy of HYUNDAI MOTOR CO.

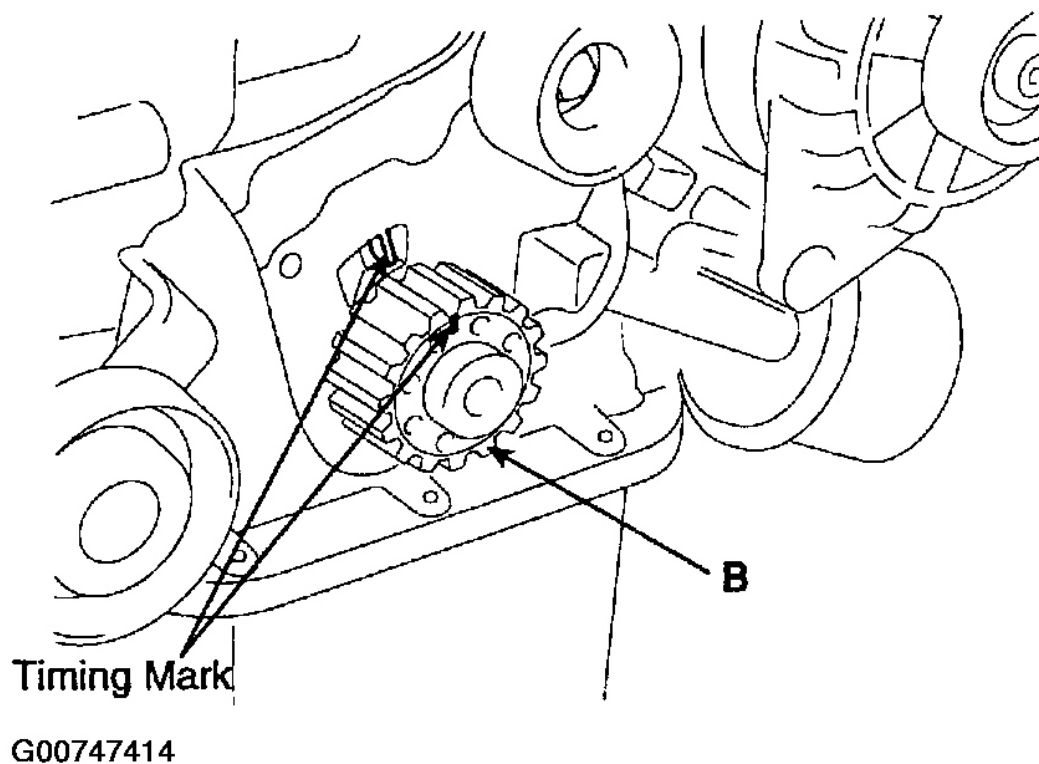


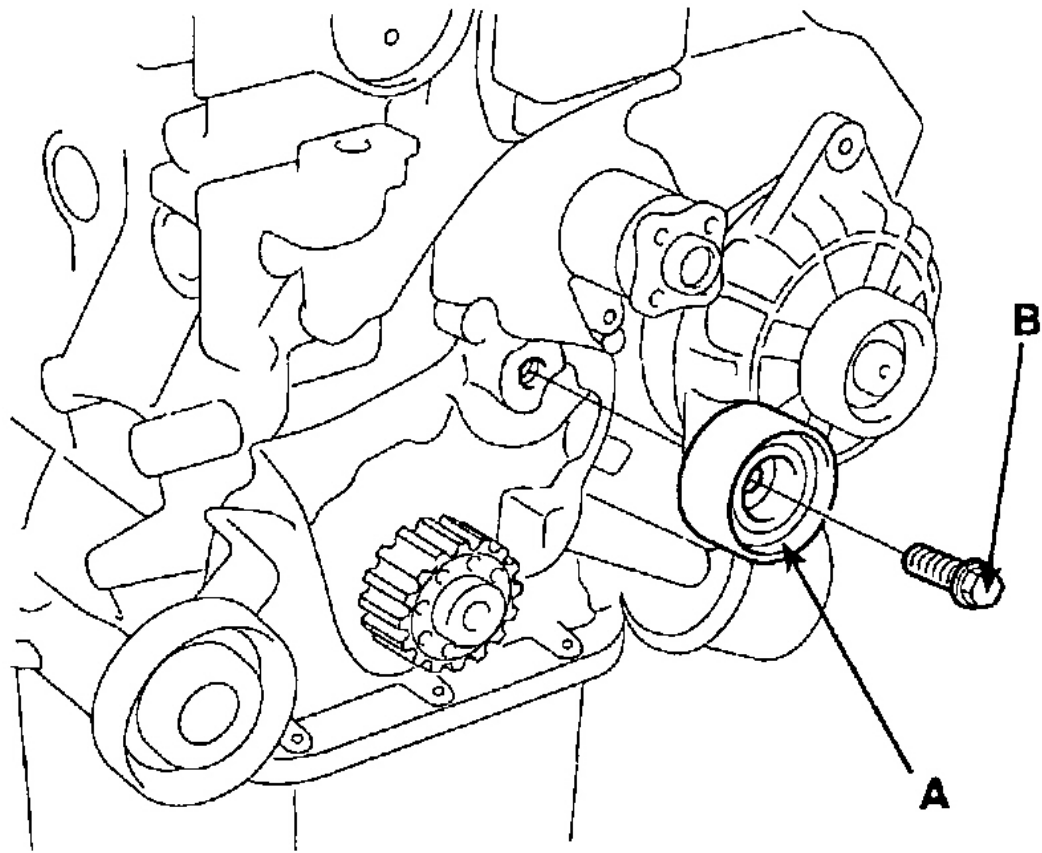
Fig. 58: Aligning Crankshaft Sprocket Timing Marks
Courtesy of HYUNDAI MOTOR CO.

6. Install the idler pulley (A) and tighten the bolt (B) to the specified torque.

Tightening torque

Idler pulley bolt :

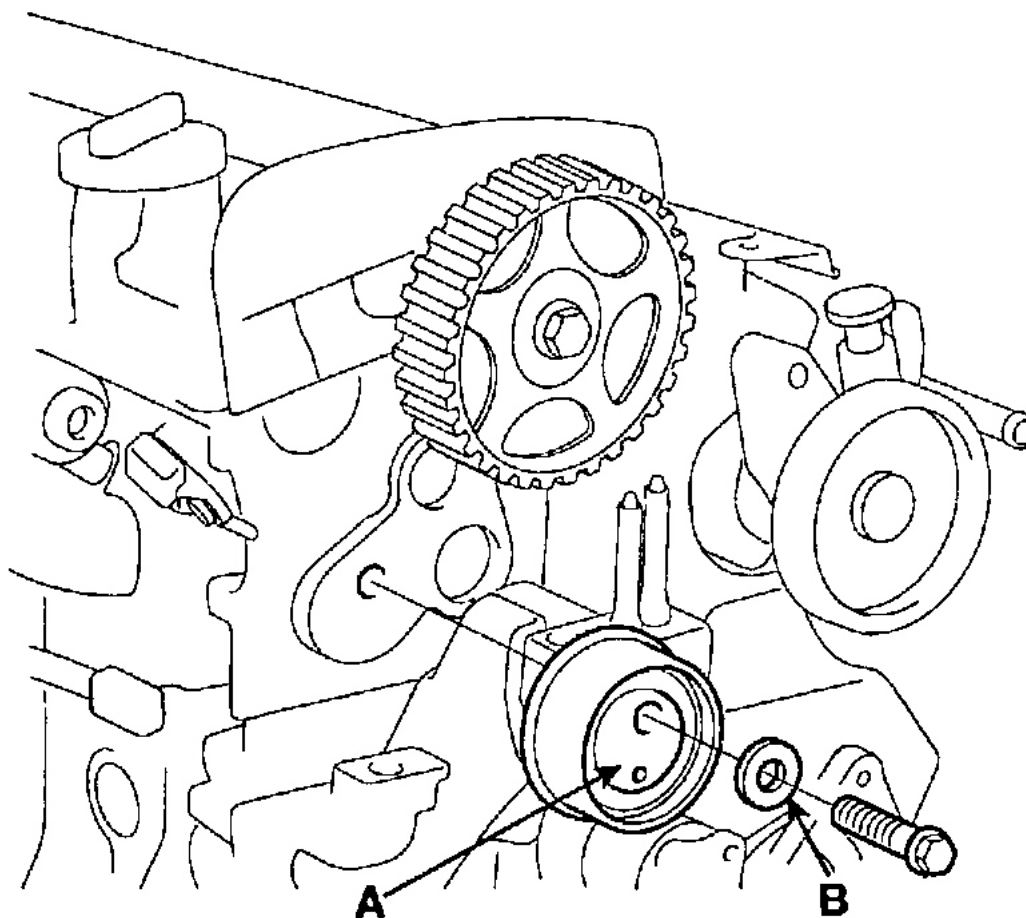
43 ~ 55Nm (430 ~ 550kgf.cm, 32 ~ 40lbf.ft)



G00747415

Fig. 59: Installing Timing Belt Idler Pulley
Courtesy of HYUNDAI MOTOR CO.

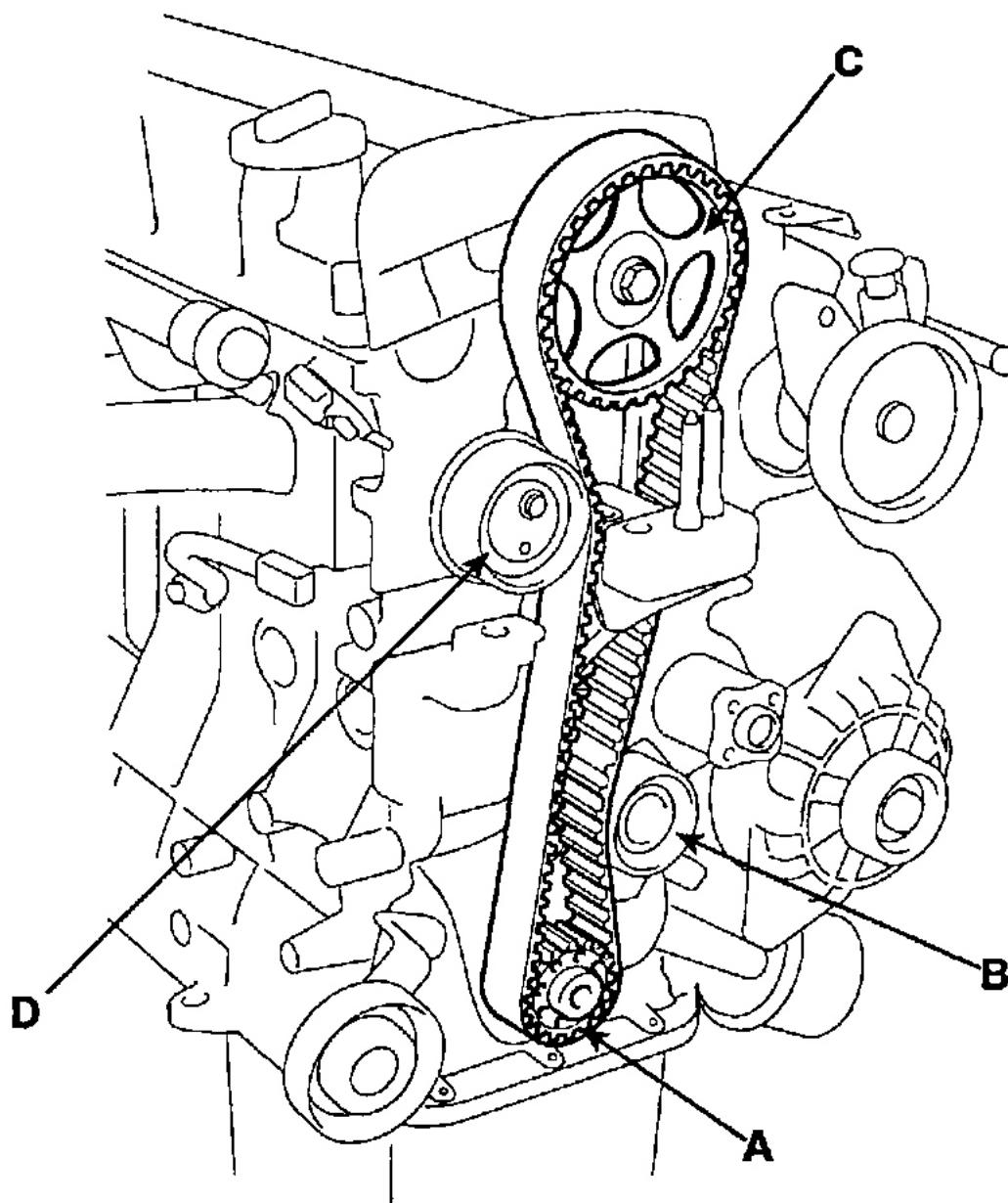
7. Temporarily install the timing belt tensioner (A) with plain washer (B).



G00747416

Fig. 60: Installing Timing Belt Tensioner (Temporarily)
 Courtesy of HYUNDAI MOTOR CO.

8. Belt so as not give slack at each center of shaft. Do as following procedures when installing timing belt. Crankshaft sprocket (A) -> Idler pulley (B) -> Camshaft sprocket (C) -> timing belt tensioner (D).

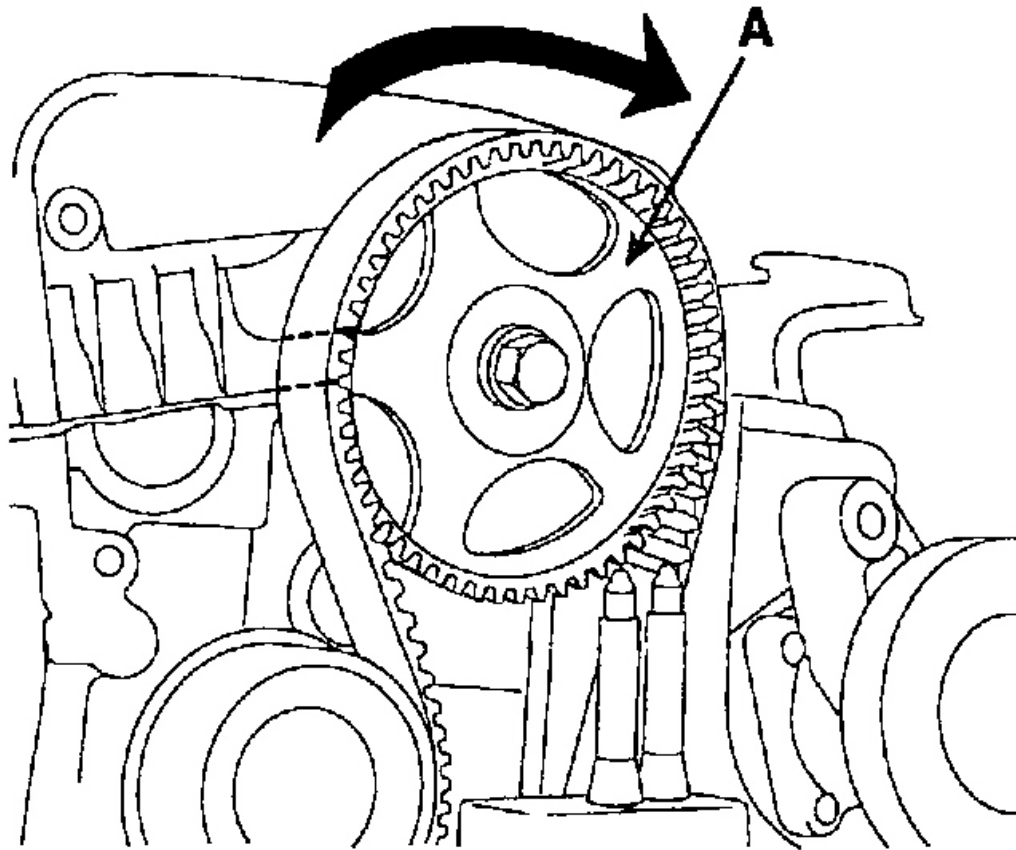


G00747417

Fig. 61: Installing Timing Belt
Courtesy of HYUNDAI MOTOR CO.

9. Temporarily fasten tensioner pulley by center bolt to add force at belt.
10. Timing belt tension adjusting
 1. Rotate crankshaft in regular direction (clock wise view from front) through angle equivalent

to two teeth (18°) of camshaft sprocket (A).



G00747418

Fig. 62: Tensioning Timing Belt
Courtesy of HYUNDAI MOTOR CO.

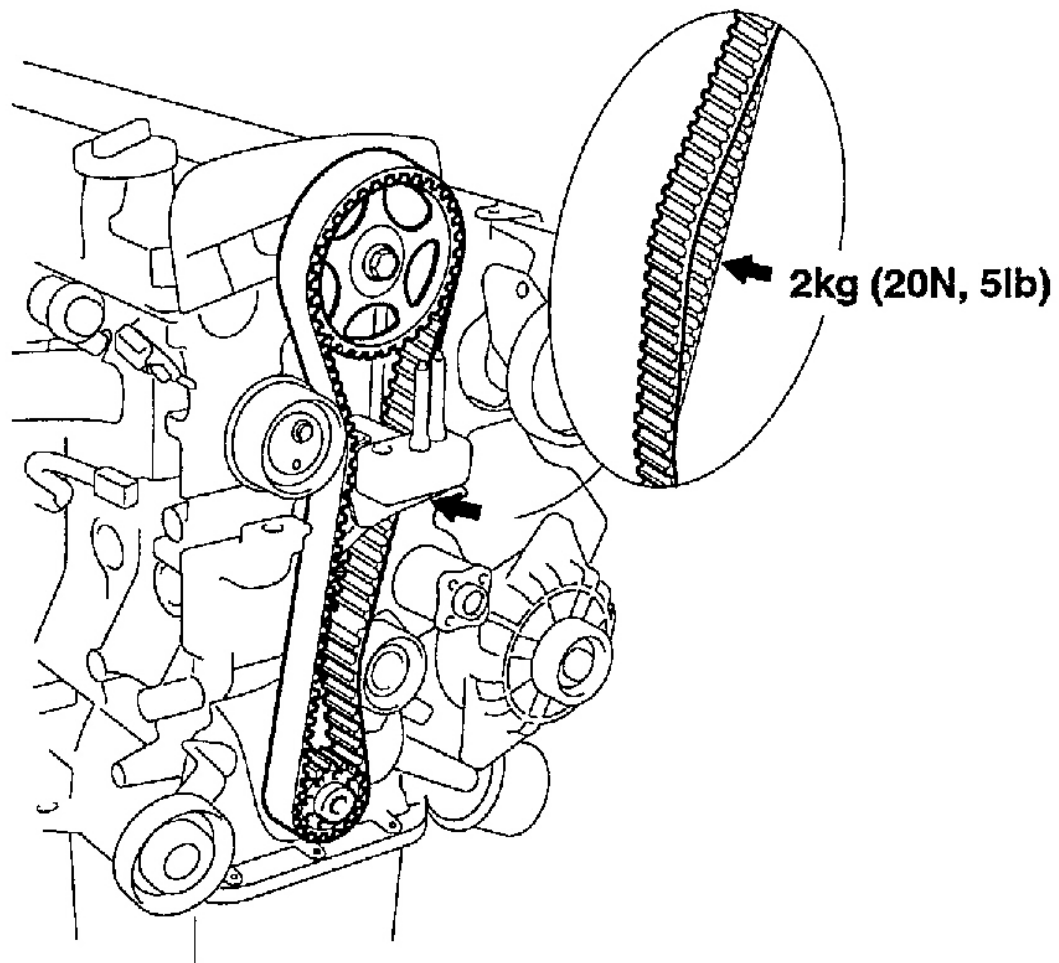
2. Give tension to timing belt by rotating tensioner in arrow direction with tool and set timing belt not to give slack to tension side
3. Tightening tensioner bolt.

Tightening torque

Tensioner bolt :

43 ~ 55Nm (430 ~ 550kgf.cm, 32 ~ 40lbf.ft)

4. Recheck the belt tension. When the tension side of timing belt is pushed horizontally with a moderate force [approx. 2kg (20N, 5lb)], the timing belt cog end sags in approx. 4 ~ 6mm (0.16 ~ 0.24in.)



G00747419

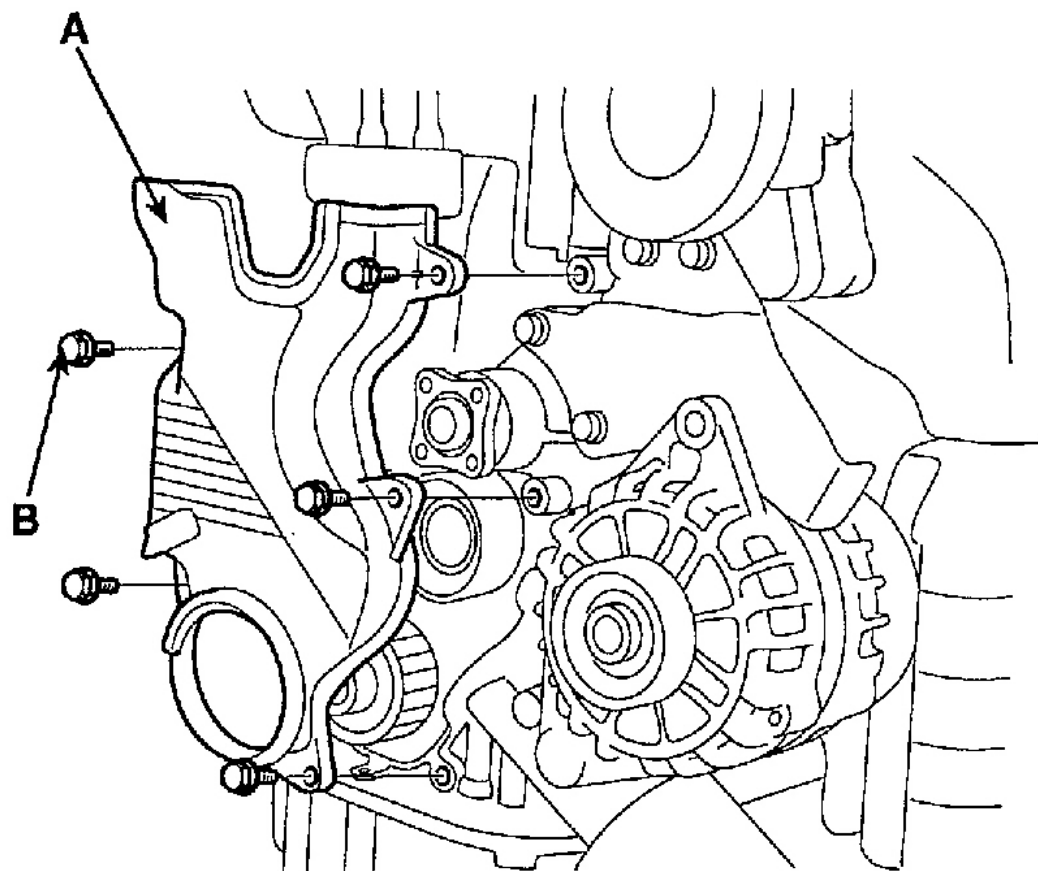
Fig. 63: Checking Timing Belt Tension
Courtesy of HYUNDAI MOTOR CO.

11. Turn the crankshaft two turns in the operating direction (clockwise) and realign crankshaft sprocket and camshaft sprocket timing mark.
12. Install the timing belt lower cover (A) with 5 bolts (B).

Tightening torque

Timing belt cover bolt :

8 ~ 10Nm (80 ~ 100kg.cm, 6 ~ 7lbf.ft)



G00747420

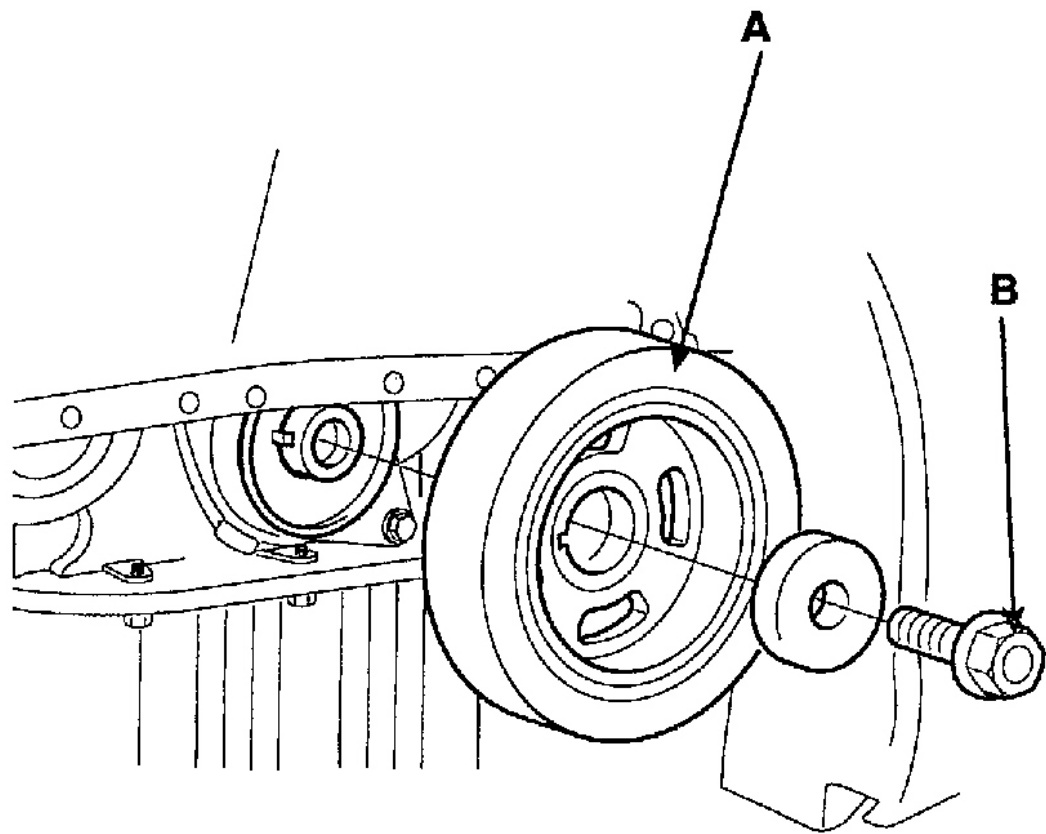
Fig. 64: Installing Timing Belt Lower Cover
 Courtesy of HYUNDAI MOTOR CO.

13. Install the flange and crankshaft pulley (A). Make sure that crankshaft sprocket pin fits the small hole in the pulley.

Tightening torque

Crankshaft pulley bolt :

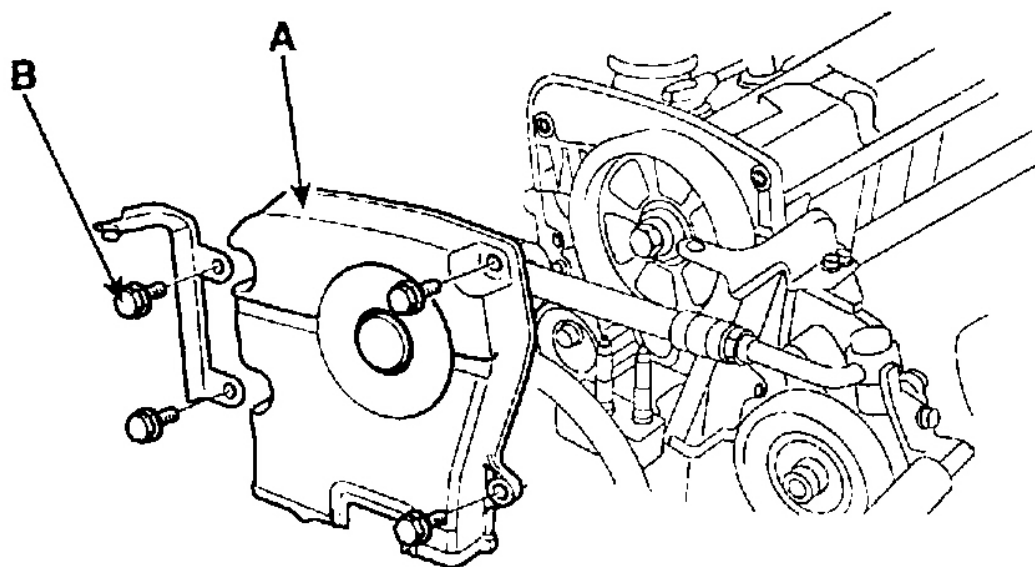
170 ~ 180Nm (1700 ~ 1800kgf.cm, 125 ~ 133lbf.ft)



G00747421

Fig. 65: Installing Crankshaft Pulley
Courtesy of HYUNDAI MOTOR CO.

14. Install the timing belt upper cover (A) with 4 bolts (B).



G00747422

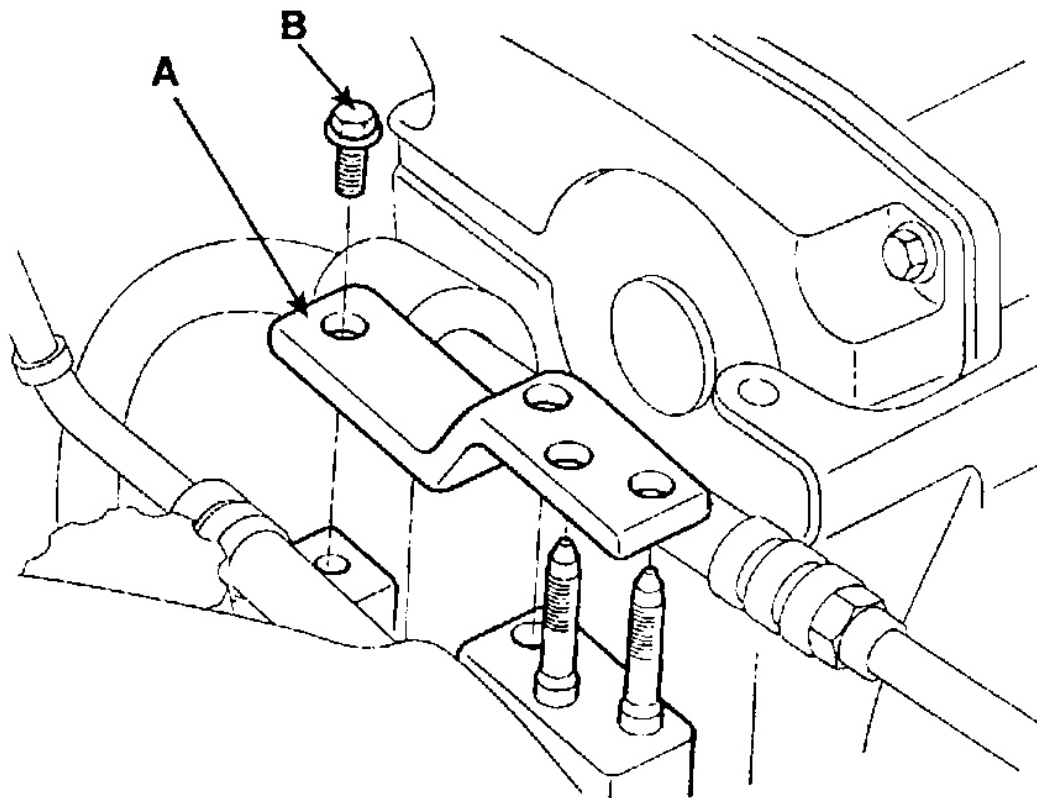
Fig. 66: Installing Timing Belt Upper Cover
Courtesy of HYUNDAI MOTOR CO.

15. Install the coolant pump pulley with 4bolts.
16. Install power steering belt. See **SPECIFICATIONS & DRIVE BELT ROUTING** .
17. Install air compressor belt. See **SPECIFICATIONS & DRIVE BELT ROUTING** .
18. Install alternator belt. See **SPECIFICATIONS & DRIVE BELT ROUTING** .
19. Install the engine mount bracket
 1. Install the stay plate (A) with bolt (B).

Tightening torque

Stay plate bolt :

43 ~ 55Nm (430 ~ 550kgf.cm, 32 ~ 40lbf.ft)



G00747423

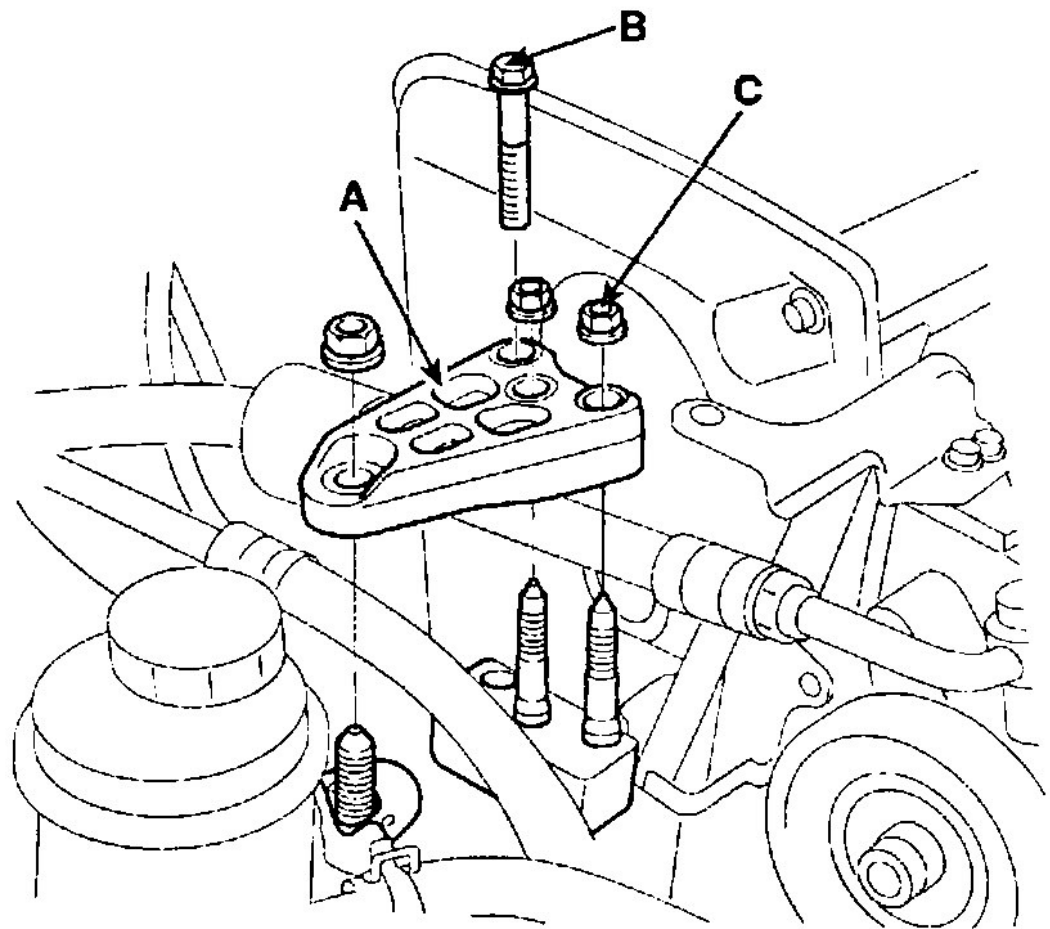
Fig. 67: Installing Stay Plate
Courtesy of HYUNDAI MOTOR CO.

2. Install engine mount bracket with 3nuts (C) and bolt (B).

Tightening torque

17mm nut : 60 ~ 80Nm (600 ~ 800kgf.cm, 44 ~ 59lbf.ft)

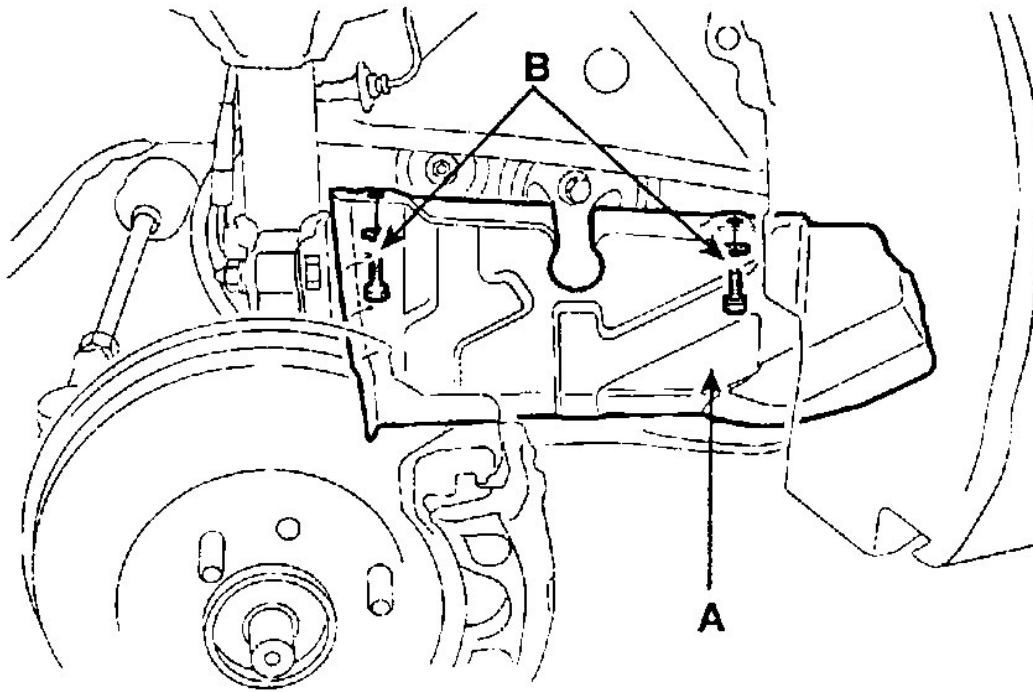
14mm nut : 50 ~ 65Nm (500 ~ 650kgf.cm, 37 ~ 48lbf.ft)



G00747424

Fig. 68: Installing Engine Mount Bracket
Courtesy of HYUNDAI MOTOR CO.

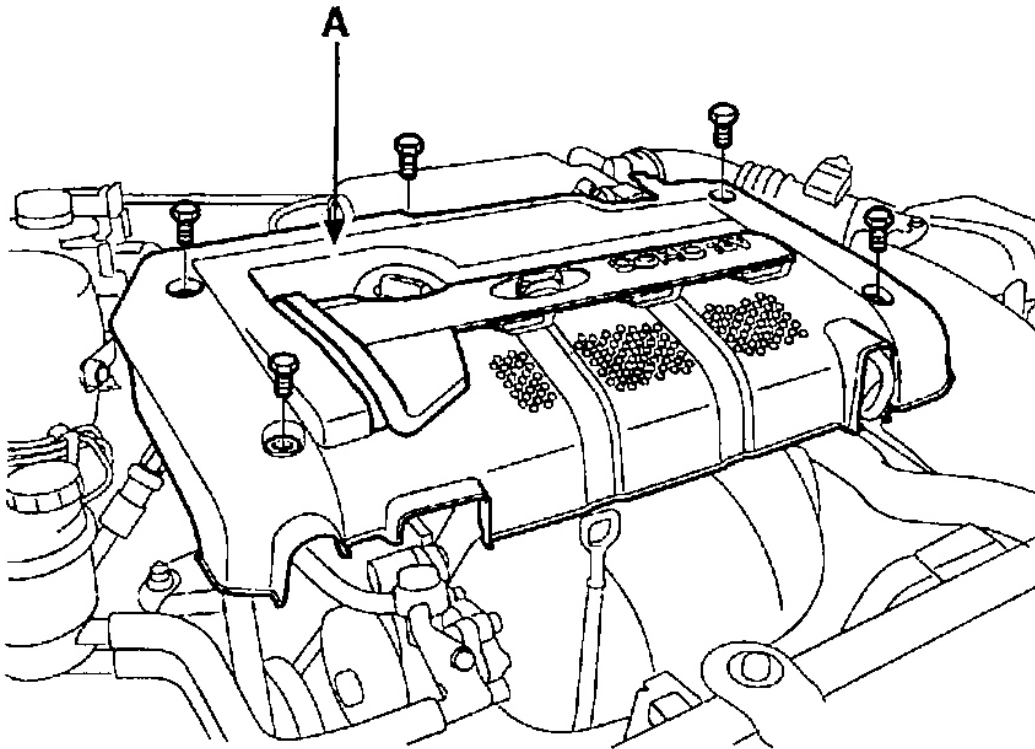
2. Install RH side cover (A) with 2 bolts (B).



G00747425

Fig. 69: Installing Right Front Wheel Housing Cover
Courtesy of HYUNDAI MOTOR CO.

3. Install RH front wheel.
4. Install engine cover (A) with 5 bolts.



G00747426

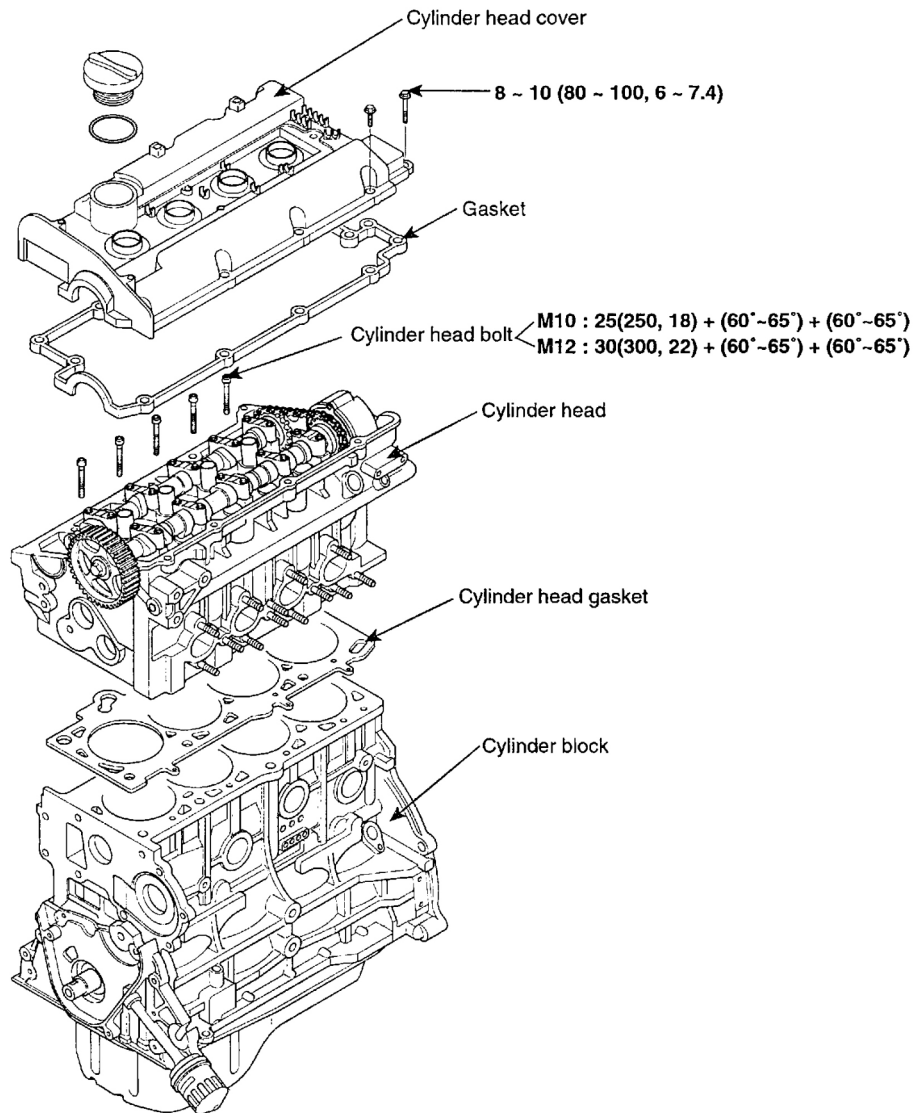
Fig. 70: Installing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

CYLINDER HEAD ASSEMBLY

COMPONENTS

2004 Hyundai Elantra GT

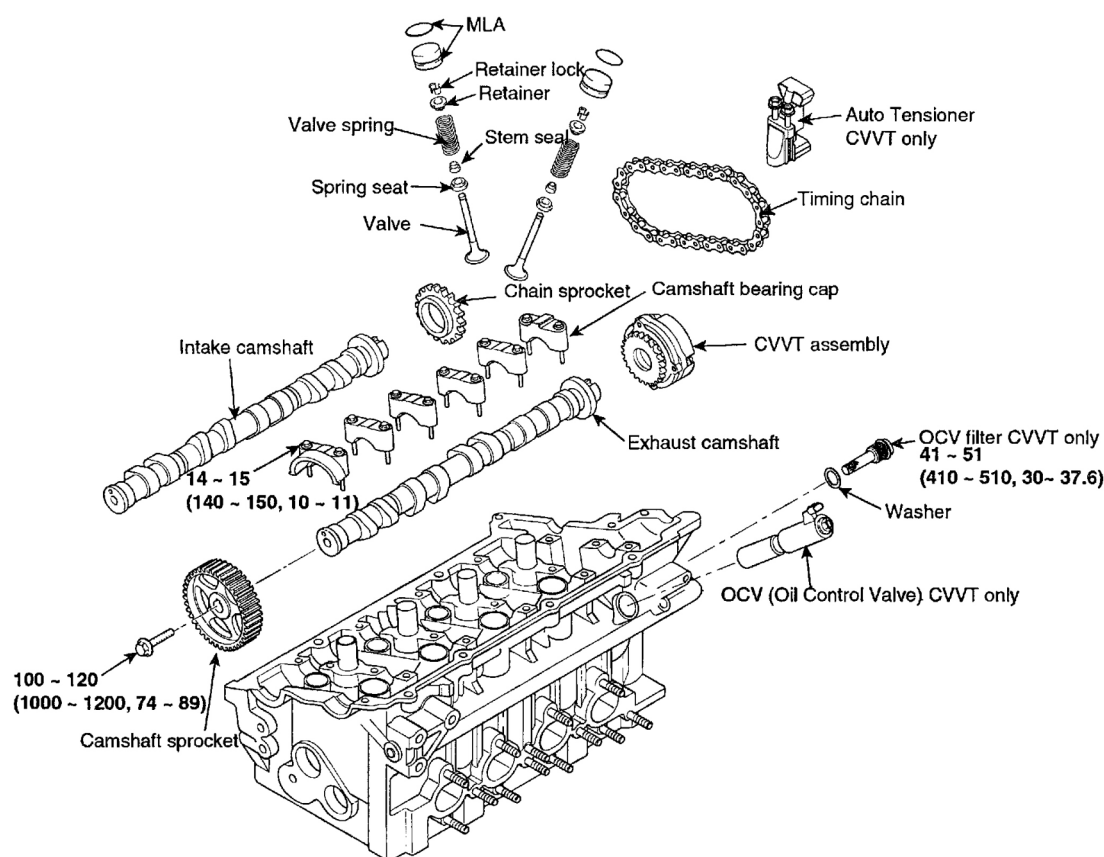
2004 ENGINES 2.0L 4-Cylinder - Elantra



TORQUE : Nm (kgf.cm, lbf.ft)

G00747427

Fig. 71: Identifying Cylinder Head Components (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



TORQUE : Nm (kgf.cm, lbf.ft)

G00747428

Fig. 72: Identifying Cylinder Head Components (2 Of 2)

Courtesy of HYUNDAI MOTOR CO.

REMOVAL

Engine removal is not required for this procedure.

CAUTION:

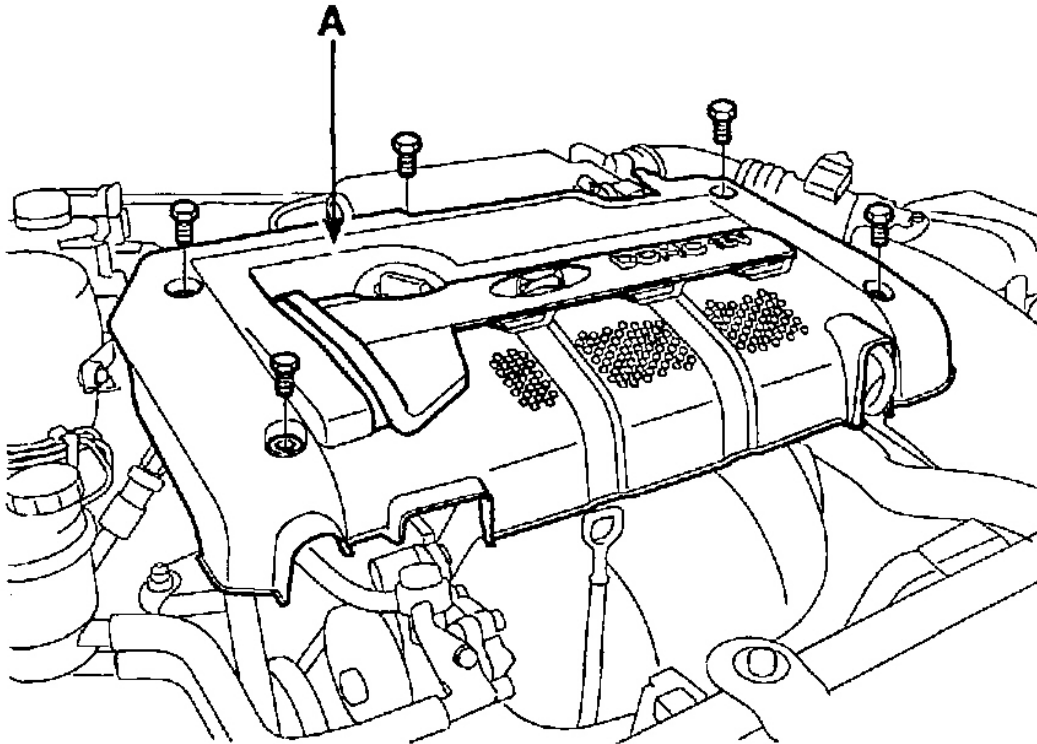
- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below normal temperature before removing it.
- When handling a metal gasket, take care not to fold the gasket or damage the contact surface of the gasket.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

NOTE:

- Mark all wiring and hoses to avoid misconnection.
- Inspect the timing belt before removing the cylinder head.

- Turn the crankshaft pulley so that the No. 1 piston is at top dead center. See Fig. 17.

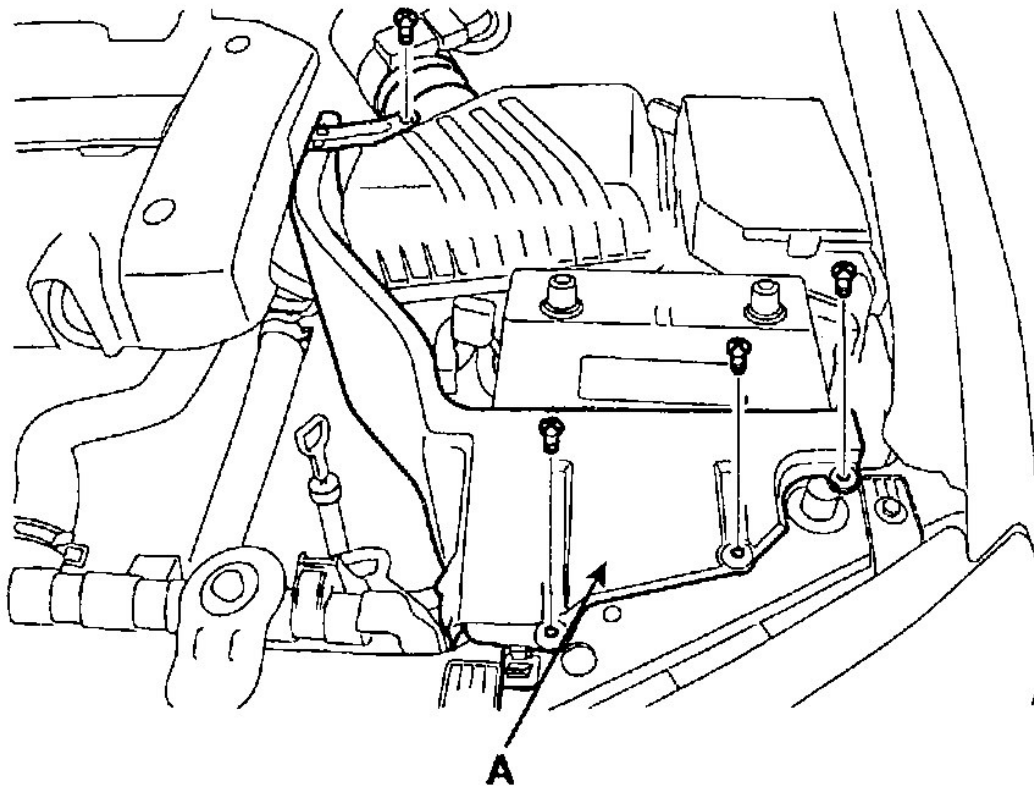
1. Disconnect the negative terminal from the battery.
2. Remove the engine cover (A).



G00747430

Fig. 73: Removing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

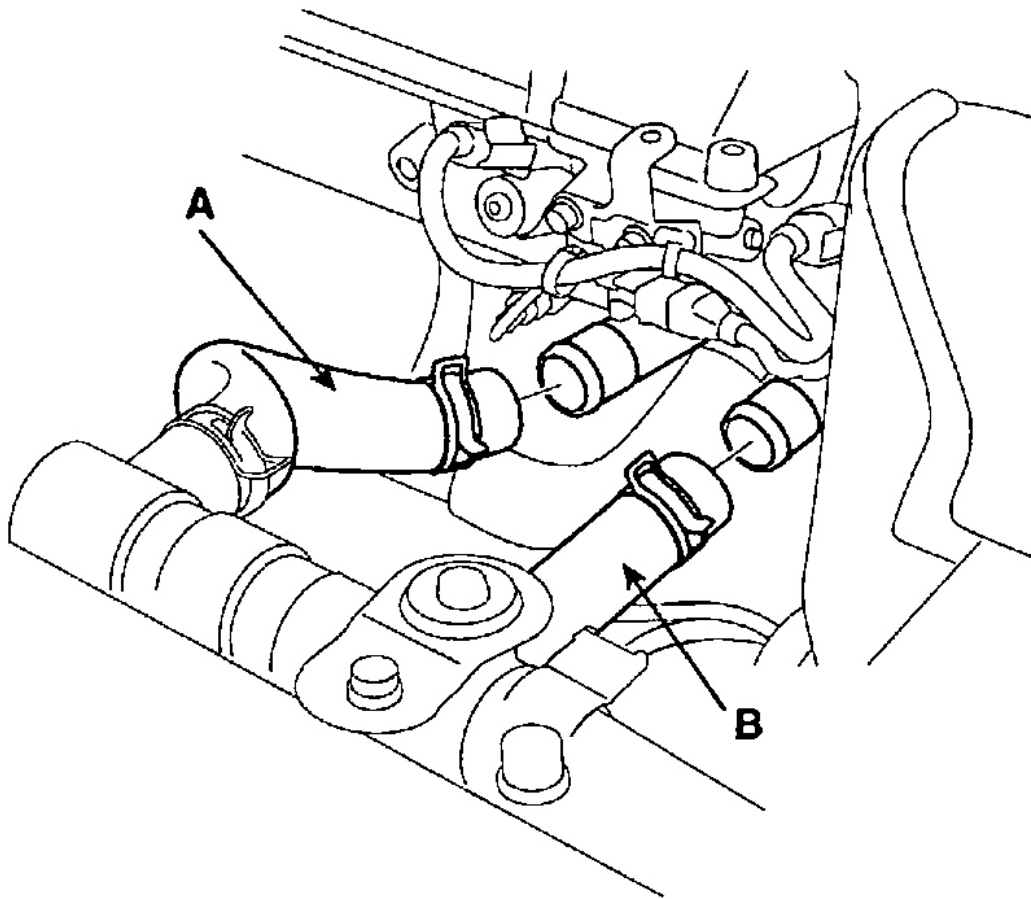
3. Drain the engine coolant. See ENGINE COOLANT REFILLING AND BLEEDING. Remove the radiator cap to speed draining.
4. Remove the intake air hose and air cleaner assembly.
 1. Remove the heat shield (A).



G00747431

Fig. 74: Removing Heat Shield
Courtesy of HYUNDAI MOTOR CO.

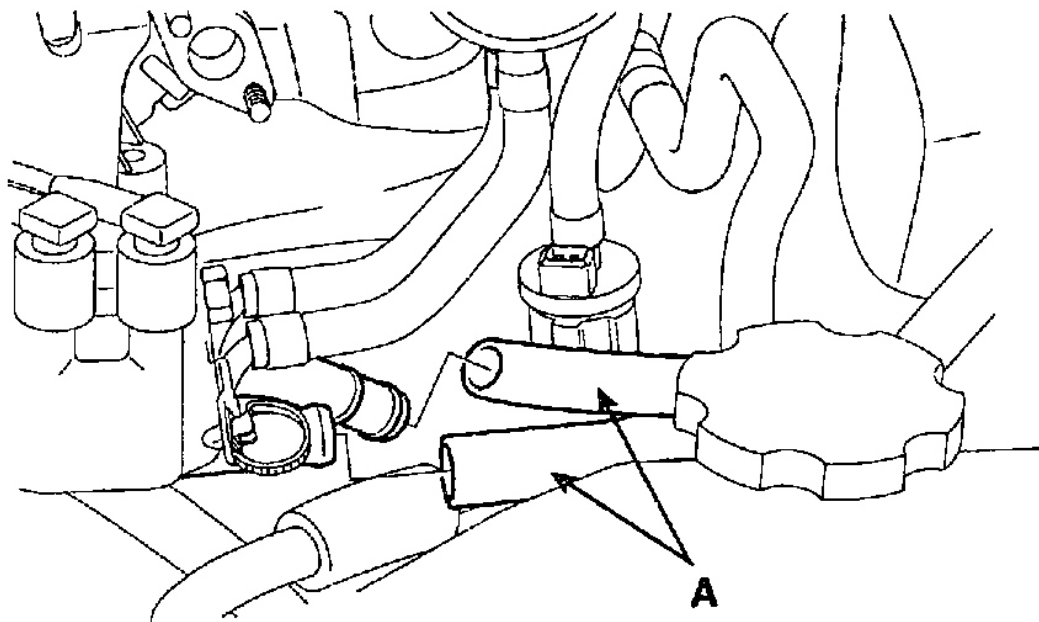
2. Disconnect the AFS connector.
3. Disconnect the breather hose from air cleaner hose.
4. Remove the intake air hose and air cleaner assembly.
5. Remove the upper radiator hose (A) and lower radiator hose (B).



G00747432

Fig. 75: Removing Upper & Lower Radiator Hoses
Courtesy of HYUNDAI MOTOR CO.

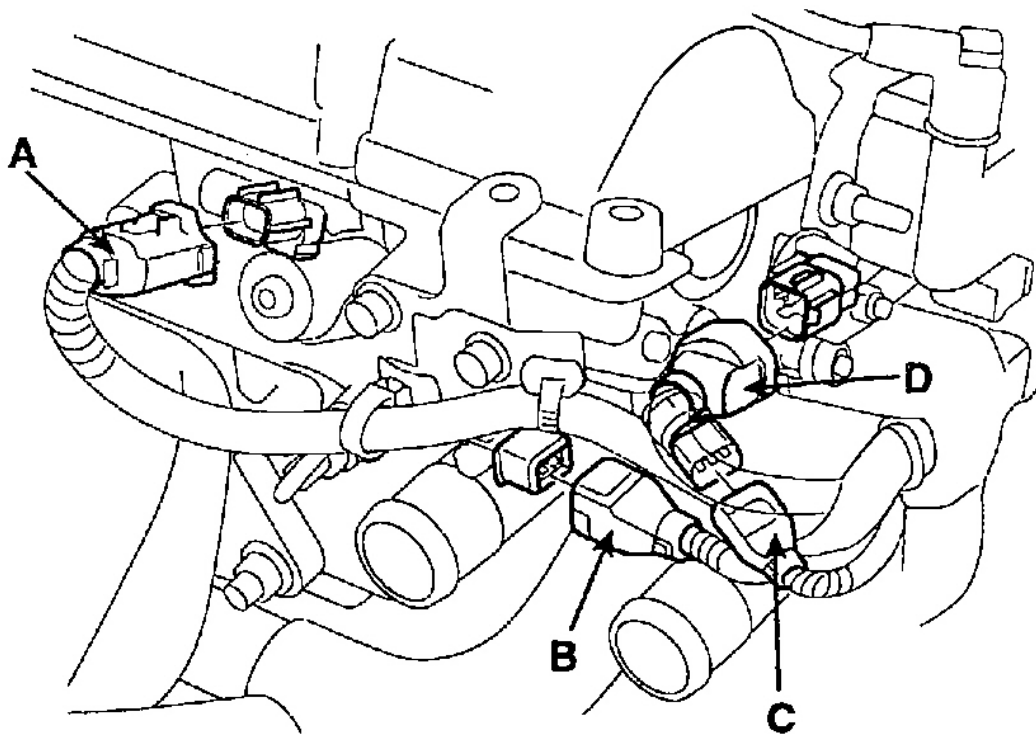
6. Remove the heater hoses (A).



G00747433

Fig. 76: Removing Heater Hoses**Courtesy of HYUNDAI MOTOR CO.**

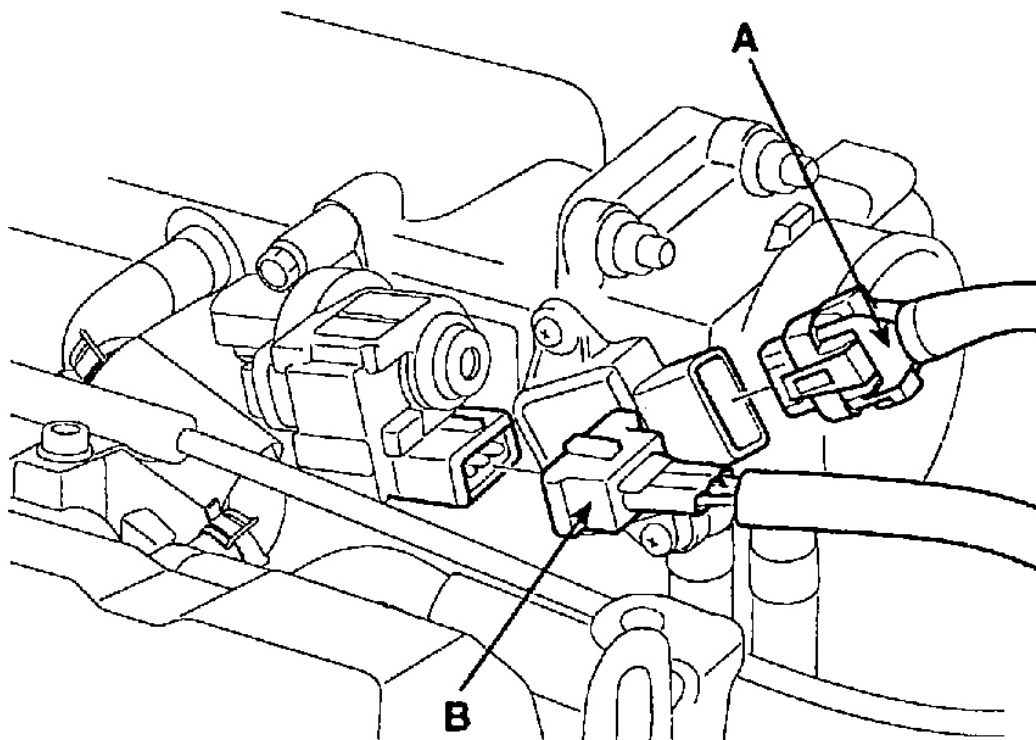
7. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.
 1. OCV (Oil control Valve) connector (A).
 2. Oil temperature sensor connector (B).
 3. ECT (Engine Coolant Temperature) sensor connector (C).
 4. Ignition coil connector (D).



G00747434

Fig. 77: Removing Engine Harness Connectors (1 Of 5)
Courtesy of HYUNDAI MOTOR CO.

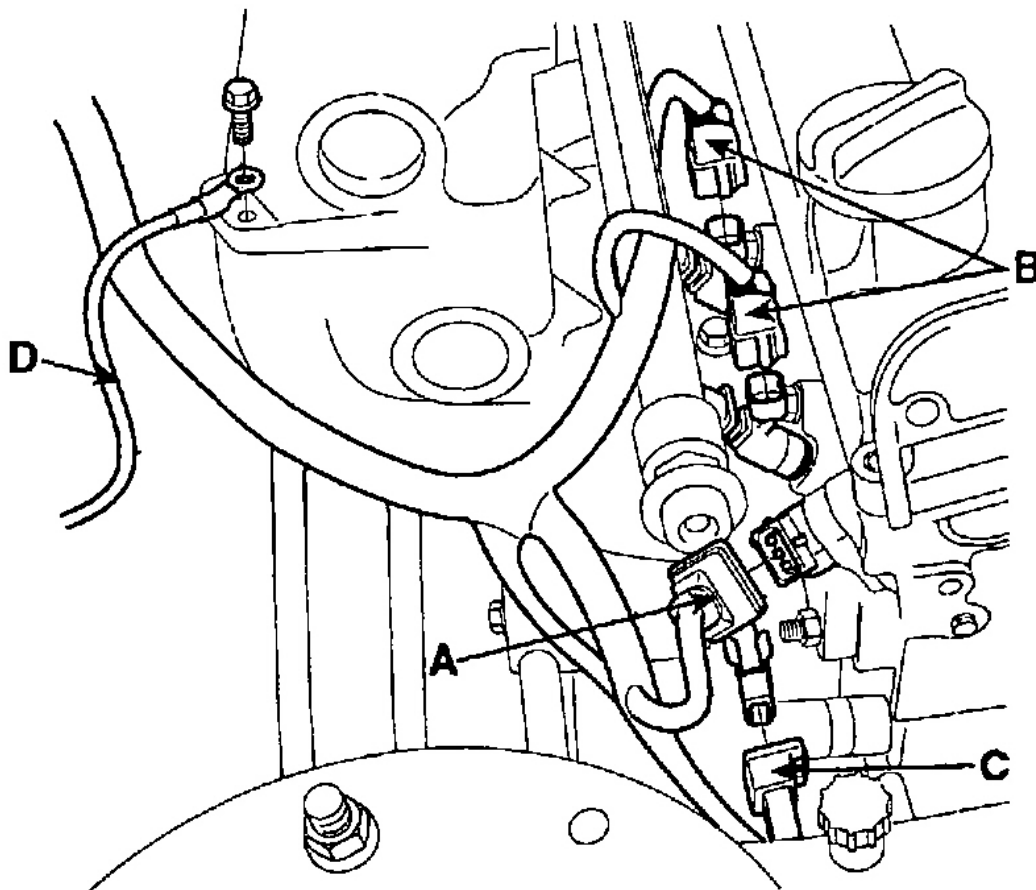
5. TPS (Throttle Position Sensor) connector (A).
6. ISA (Idle Speed Actuator) connector (B).



G00747435

Fig. 78: Removing Engine Harness Connectors (2 Of 5)
Courtesy of HYUNDAI MOTOR CO.

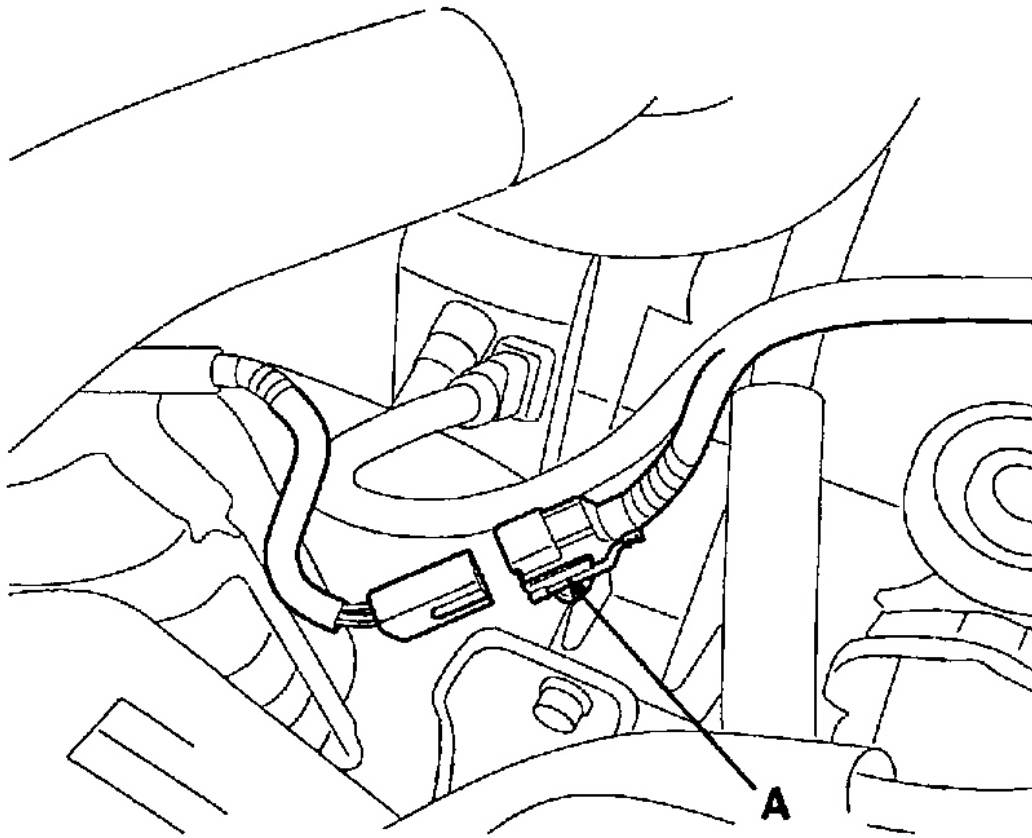
7. CMP (Camshaft Position Sensor) connector (A).
8. Four fuel injector connectors (B).
9. Knock sensor connector (C).
10. Disconnect ground cable (D) from the intake manifold.



G00747436

Fig. 79: Removing Engine Harness Connectors (3 Of 5)
Courtesy of HYUNDAI MOTOR CO.

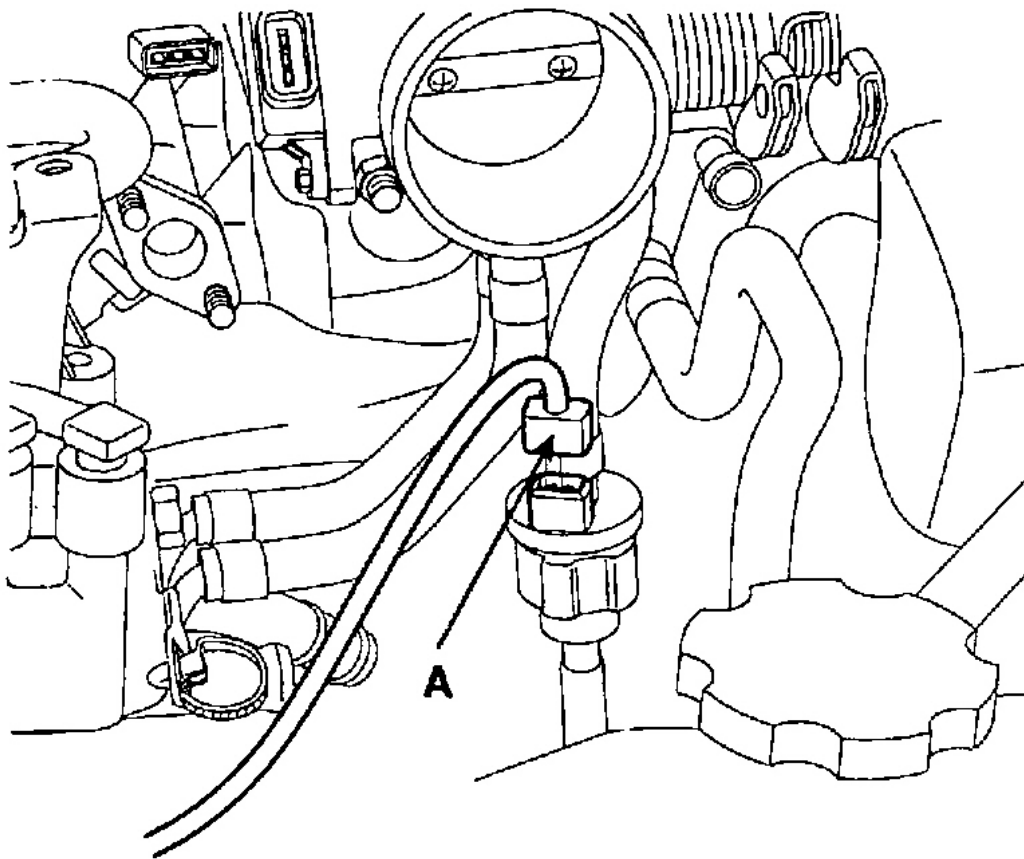
11. Front heated oxygen sensor connector (A).



G00747437

Fig. 80: Removing Engine Harness Connectors (4 Of 5)
Courtesy of HYUNDAI MOTOR CO.

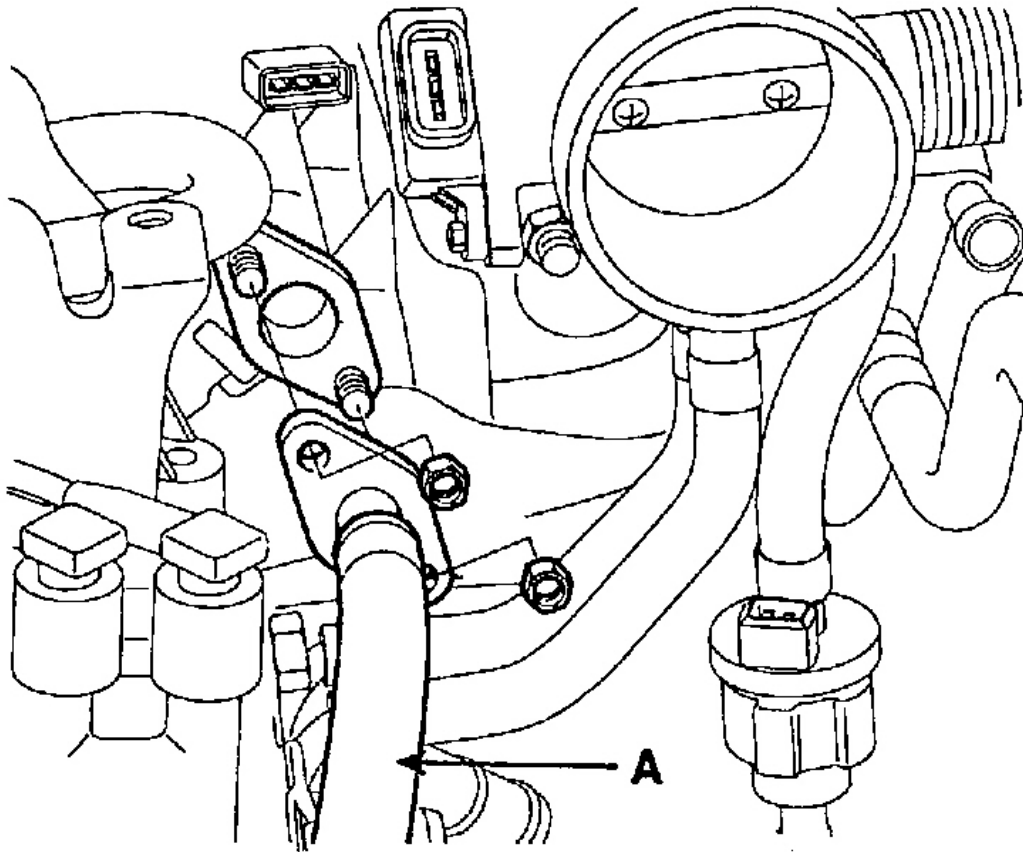
12. PCSV (Purge Control Solenoid Valve) connector (A).



G00747438

Fig. 81: Removing Engine Harness Connectors (5 Of 5)
Courtesy of HYUNDAI MOTOR CO.

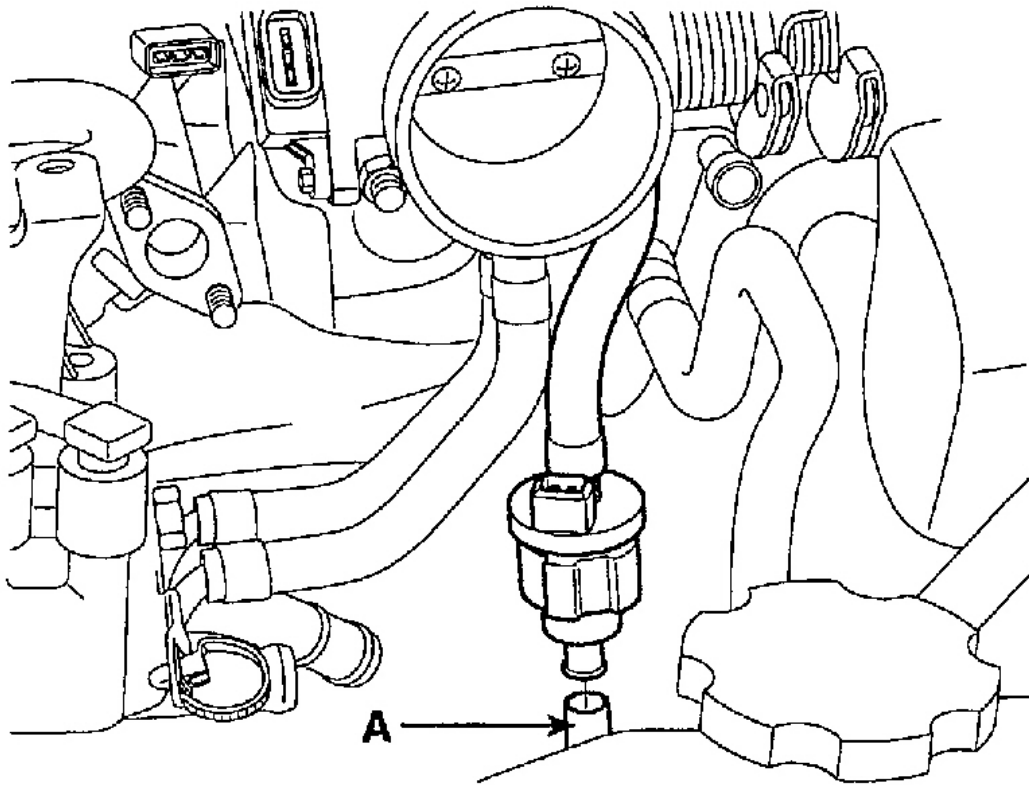
8. Remove the fuel inlet hose (A) from delivery pipe.



G00747439

Fig. 82: Removing Fuel Inlet Hose
Courtesy of HYUNDAI MOTOR CO.

9. Remove the PCSV hose (A).



G00747440

Fig. 83: Removing PCSV Hose
Courtesy of HYUNDAI MOTOR CO.

10. Remove the brake booster vacuum hose (A).

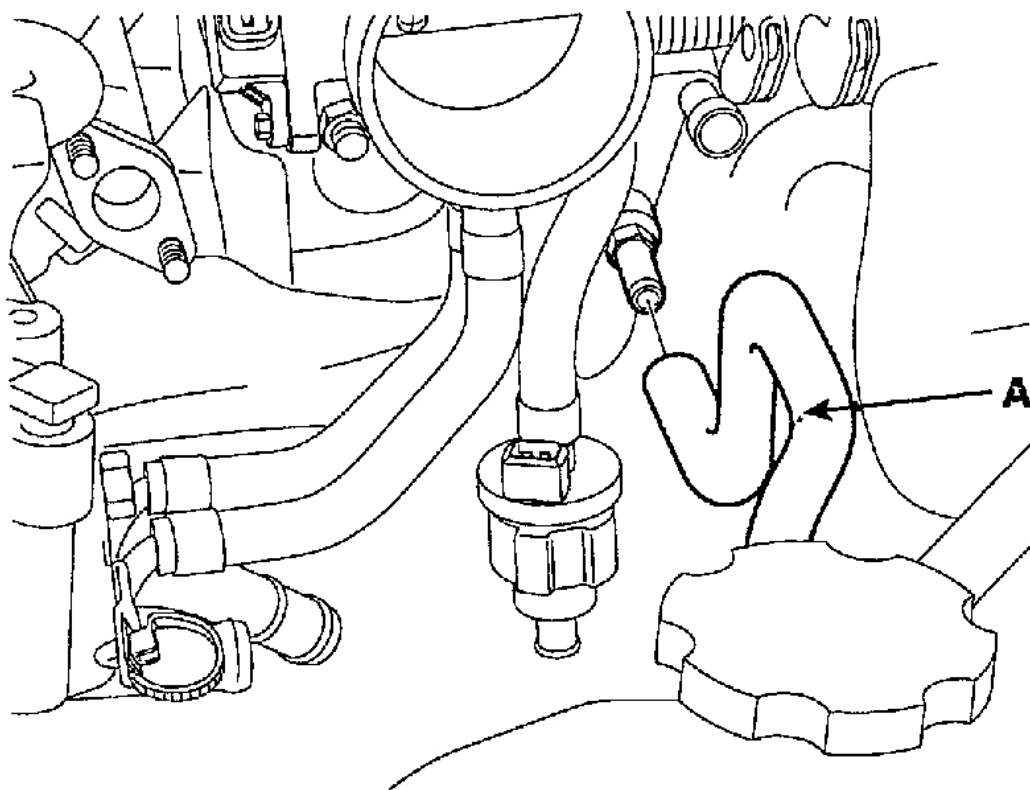
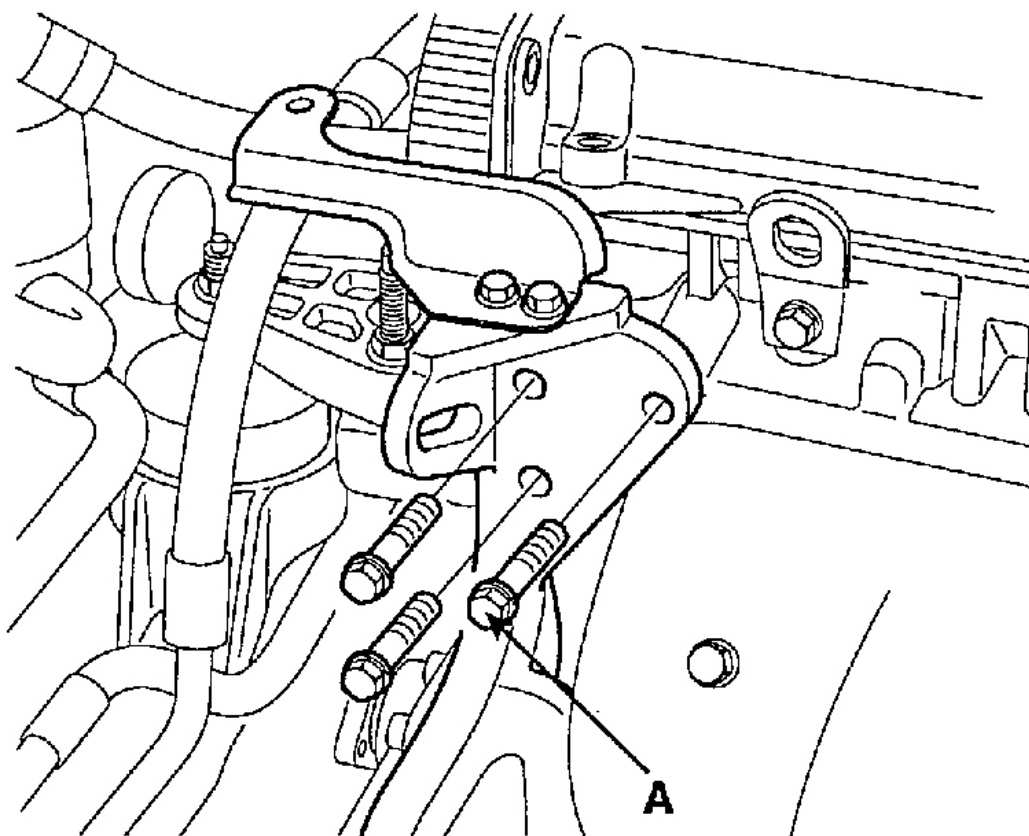
**G00747441**

Fig. 84: Removing Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

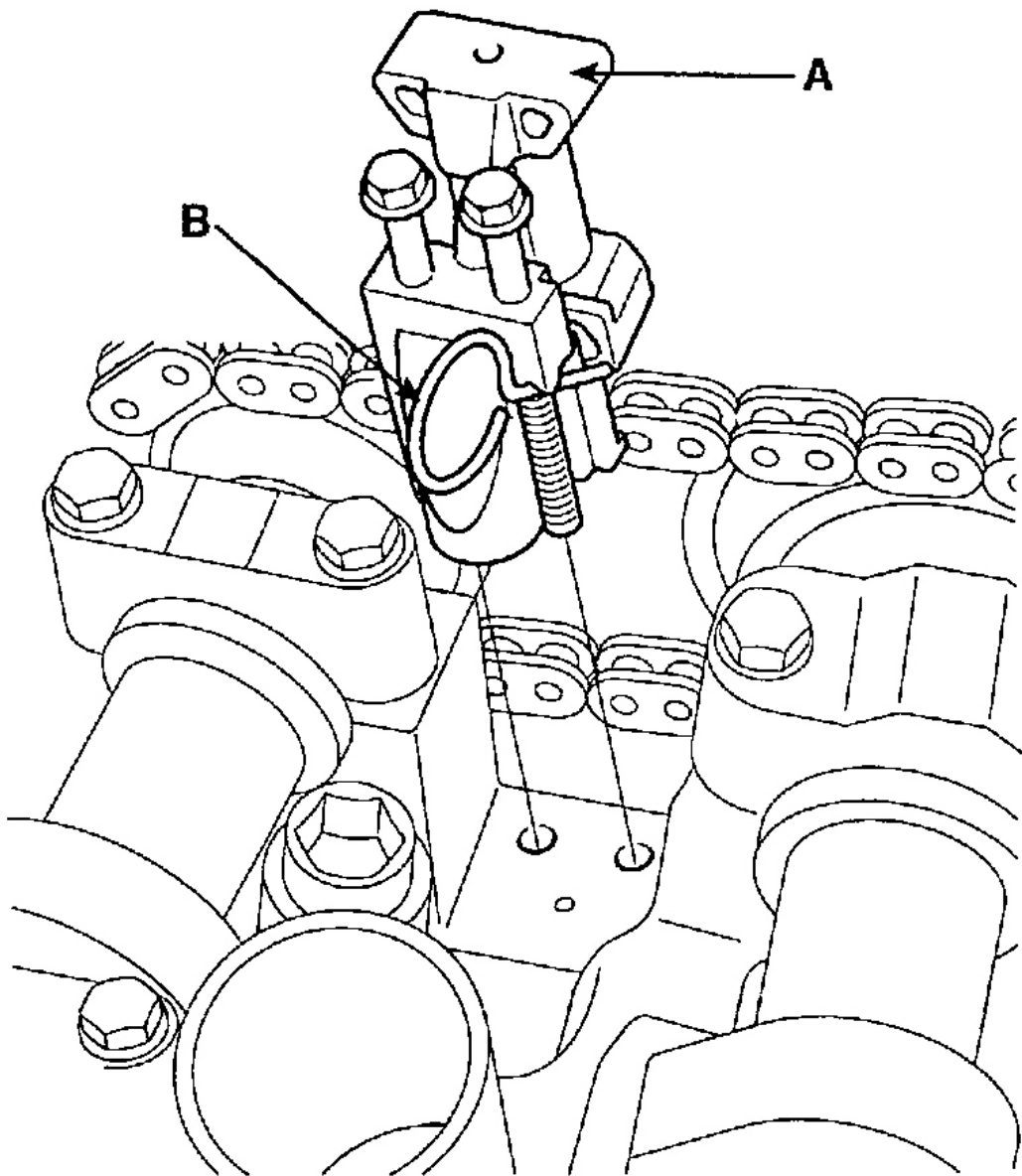
11. Remove the accelerator cable by loosening the lock nut, then slip the cable end out of the throttle linkage.
12. Remove the power steering pump. See POWER STEERING PUMP .
13. Remove the power steering pump bracket bolts (A).



G00747442

Fig. 85: Removing Power Steering Pump Bracket Bolts
Courtesy of HYUNDAI MOTOR CO.

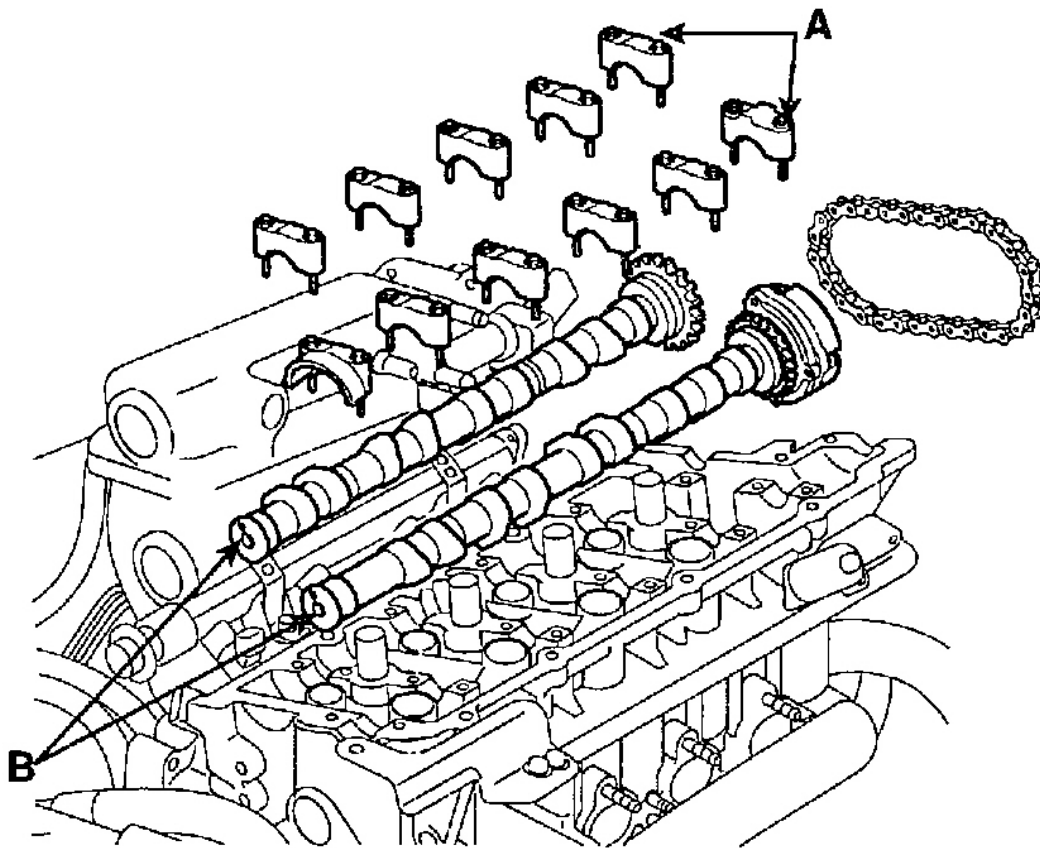
14. Remove the spark plug cable. See **IGNITION SYSTEMS** .
15. Remove the PCV hose. See **Fig. 14**.
16. Remove the cylinder head cover. See **Fig. 16**.
17. Remove the timing belt. See **REMOVAL** under TIMING SYSTEM.
18. Remove the exhaust manifold. See **Fig. 260**.
19. Remove the intake manifold. See **Fig. 259**.
20. Remove the camshaft sprocket. See **Fig. 50**.
21. Remove the timing chain auto tensioner (A).



G00747443

Fig. 86: Removing Timing Chain Auto Tensioner
Courtesy of HYUNDAI MOTOR CO.

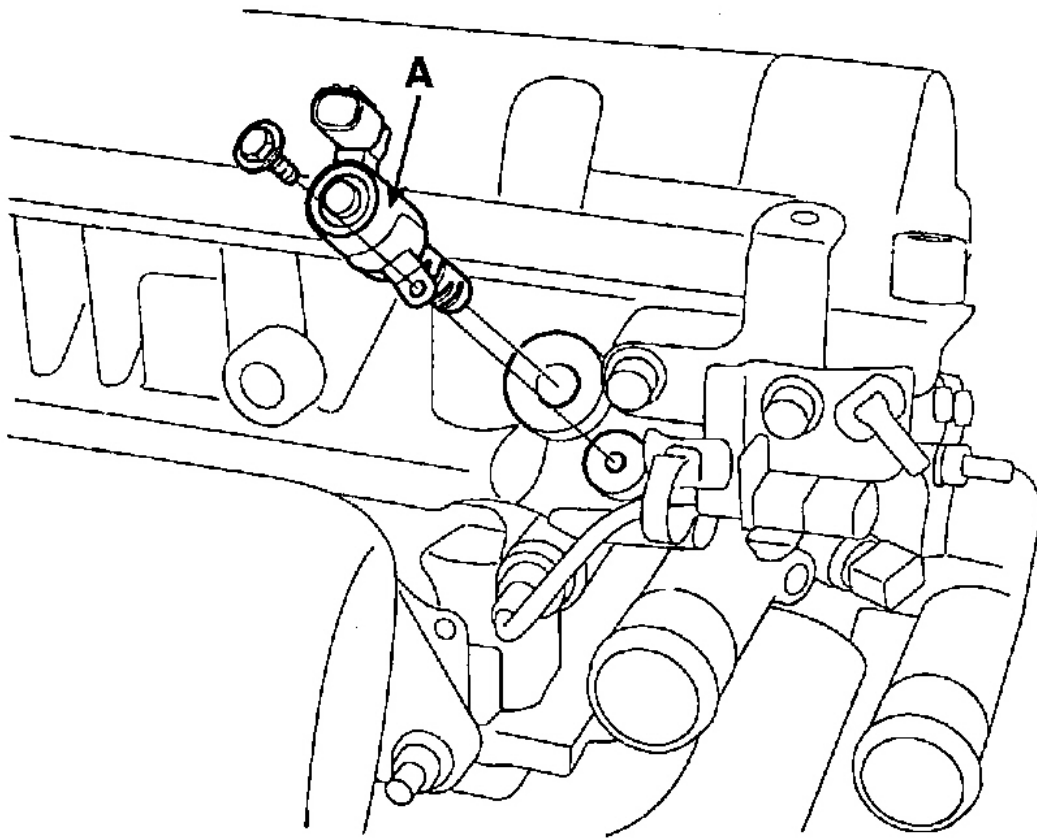
22. Remove the camshaft bearing caps (A) and camshafts (B).



G00747444

Fig. 87: Removing Camshafts
Courtesy of HYUNDAI MOTOR CO.

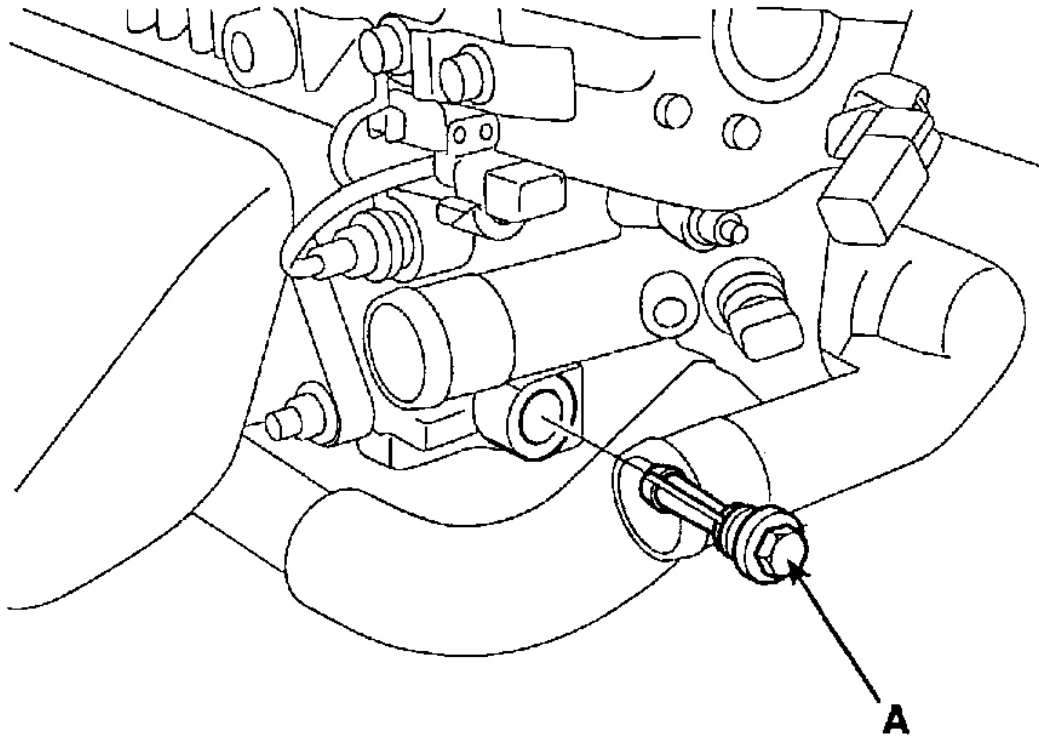
23. Remove the OCV (oil control valve) (A).



G00747445

Fig. 88: Removing OCV
Courtesy of HYUNDAI MOTOR CO.

24. Remove the OCV (oil control valve) filter (A).



G00747446

Fig. 89: Removing OCV Filter
Courtesy of HYUNDAI MOTOR CO.

25. Remove the cylinder head bolts, then remove the cylinder head.
 1. Using 8mm and 10mm hexagon wrench, uniformly loosen and remove the 10 cylinder head bolts, in several passes, in the sequence shown. Remove the 10 cylinder head bolts and plate washers.

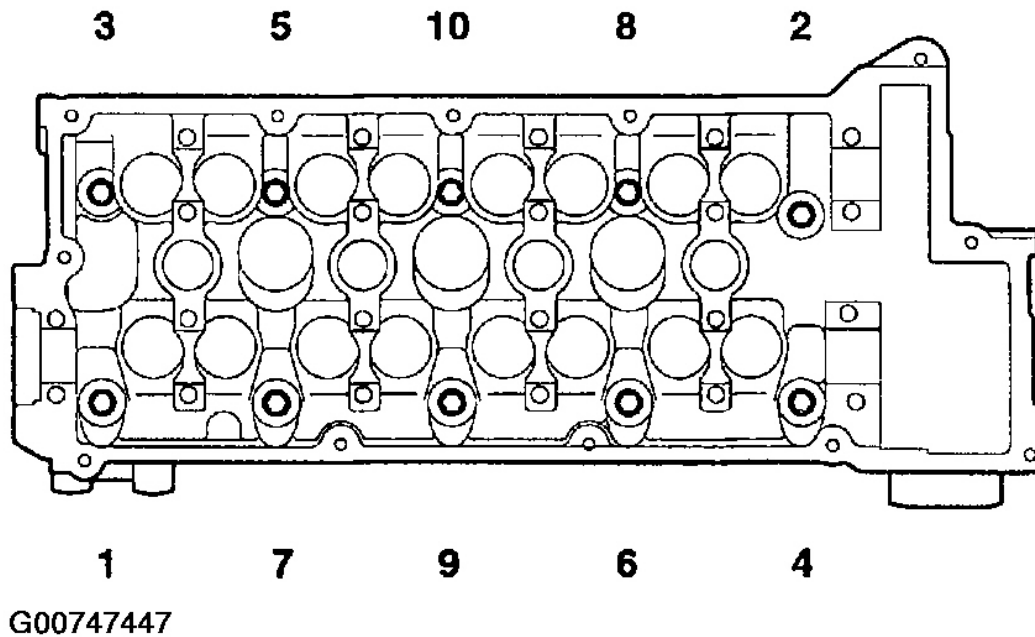


Fig. 90: Cylinder Head Bolt Removal Sequence
Courtesy of HYUNDAI MOTOR CO.

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

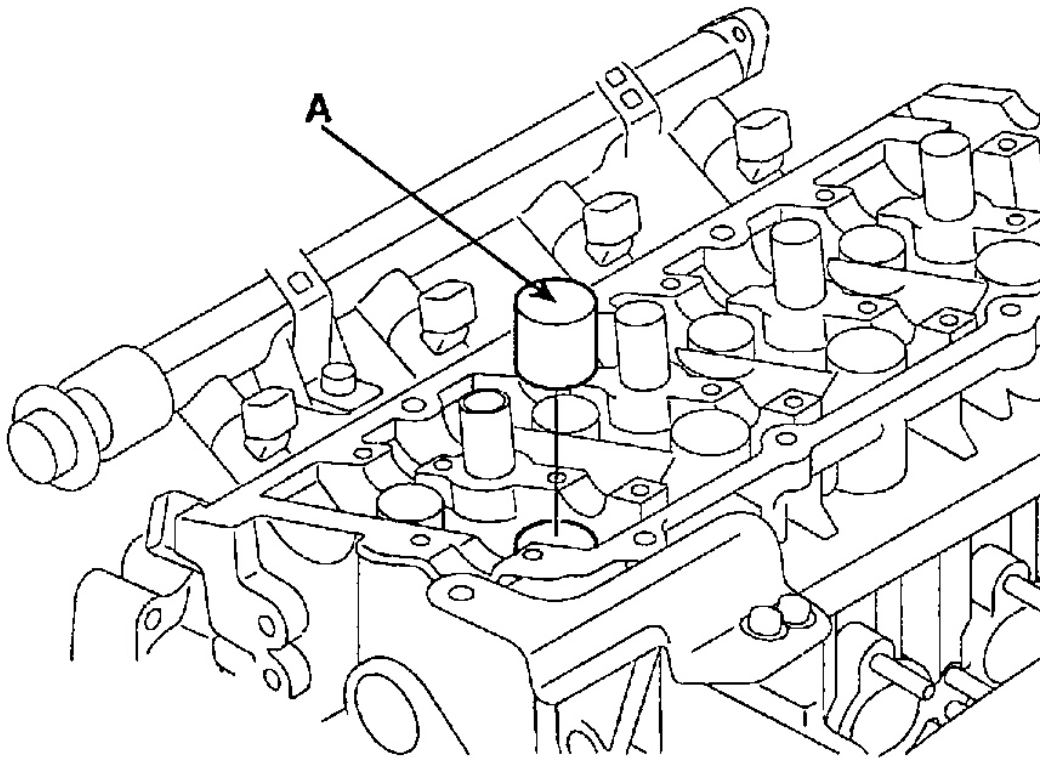
2. Lift the cylinder head from the dowels on the cylinder block and replace the cylinder head on wooden blocks on a bench.

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

DISASSEMBLY

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

1. Remove MLAs. (A)



G00747448

Fig. 91: Removing Mechanical Lash Adjusters
Courtesy of HYUNDAI MOTOR CO.

2. Remove valves.
 1. Using SST (09222-28000, 09222-28100), compress the valve spring and remove retainer lock.

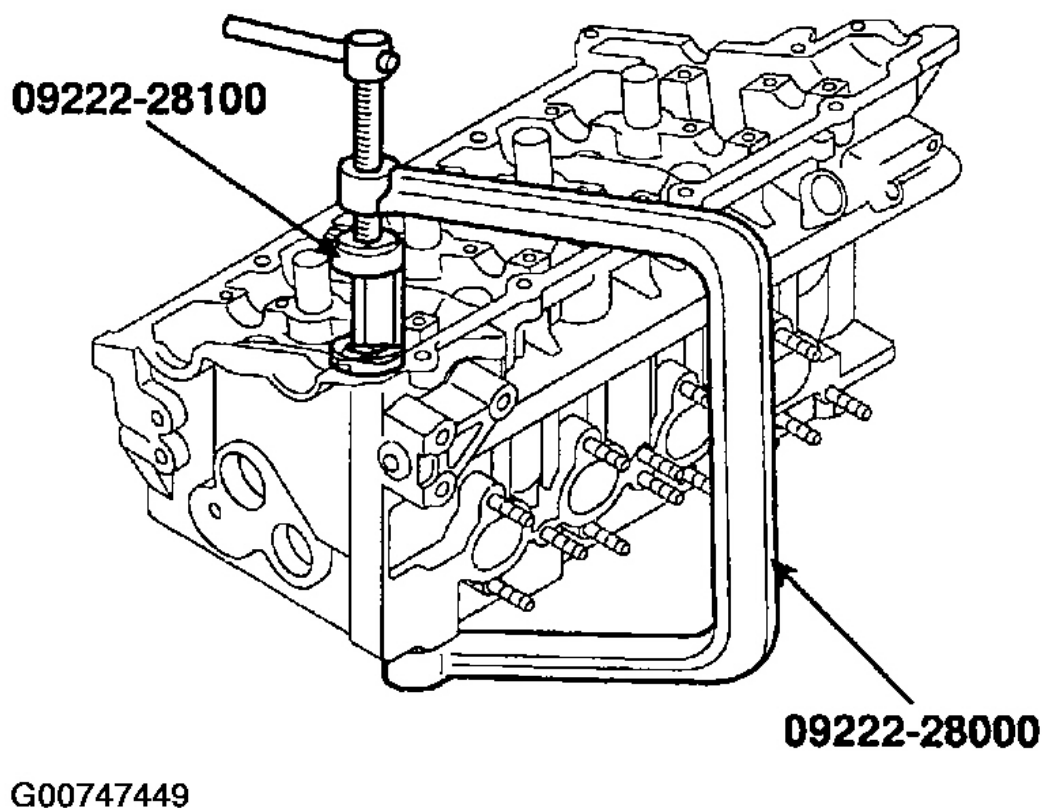


Fig. 92: Removing Valve Spring Retainer Locks
Courtesy of HYUNDAI MOTOR CO.

2. Remove the spring retainer.
3. Remove the valve spring.
4. Remove the valve.
5. Remove the using needle-nose pliers, remove the oil seal.
6. Using a magnetic finger, remove the spring seat.

INSPECTION

CYLINDER HEAD

1. Inspect for flatness.

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

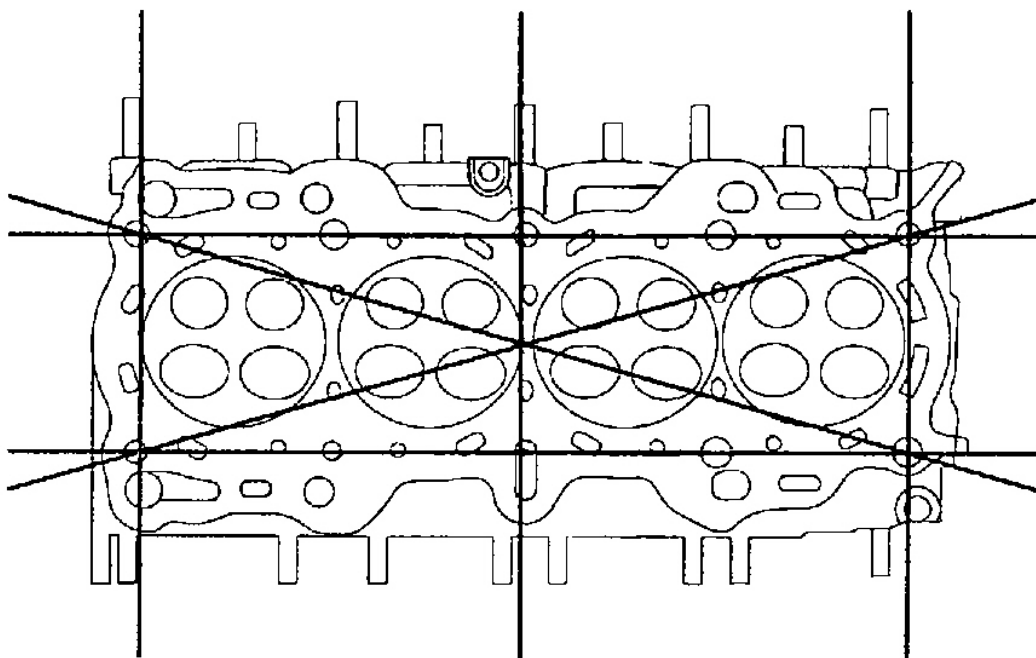
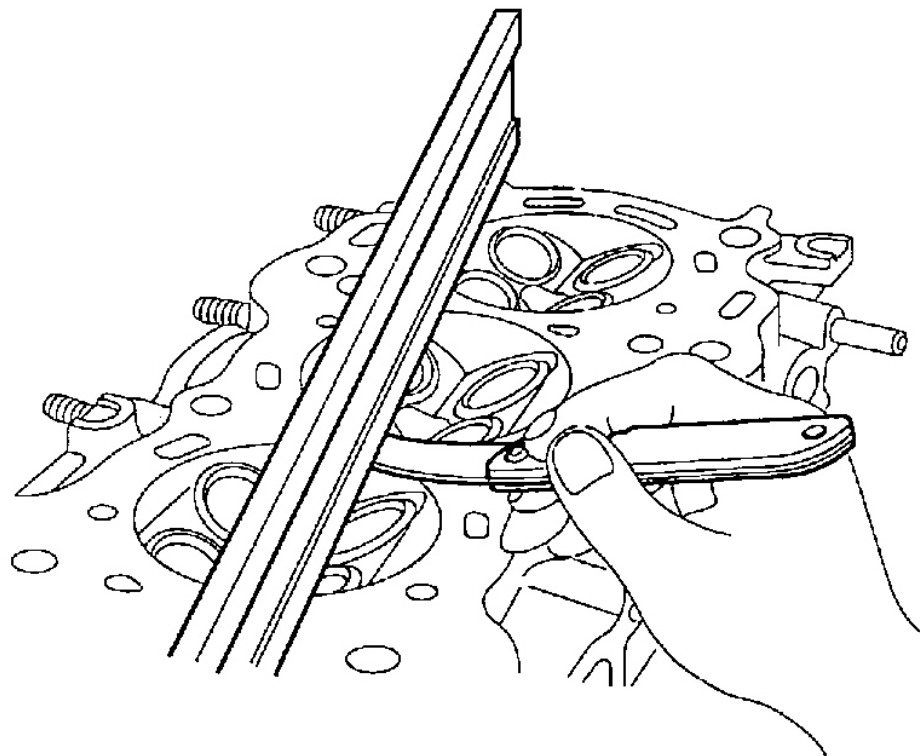
Flatness of cylinder head gasket surface

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra

Standard : Less than 0.03mm (0.0012 in.)

Limit : 0.06 mm (0.0024 in.)



G00747450

Fig. 93: Checking Cylinder Head Flatness
Courtesy of HYUNDAI MOTOR CO.

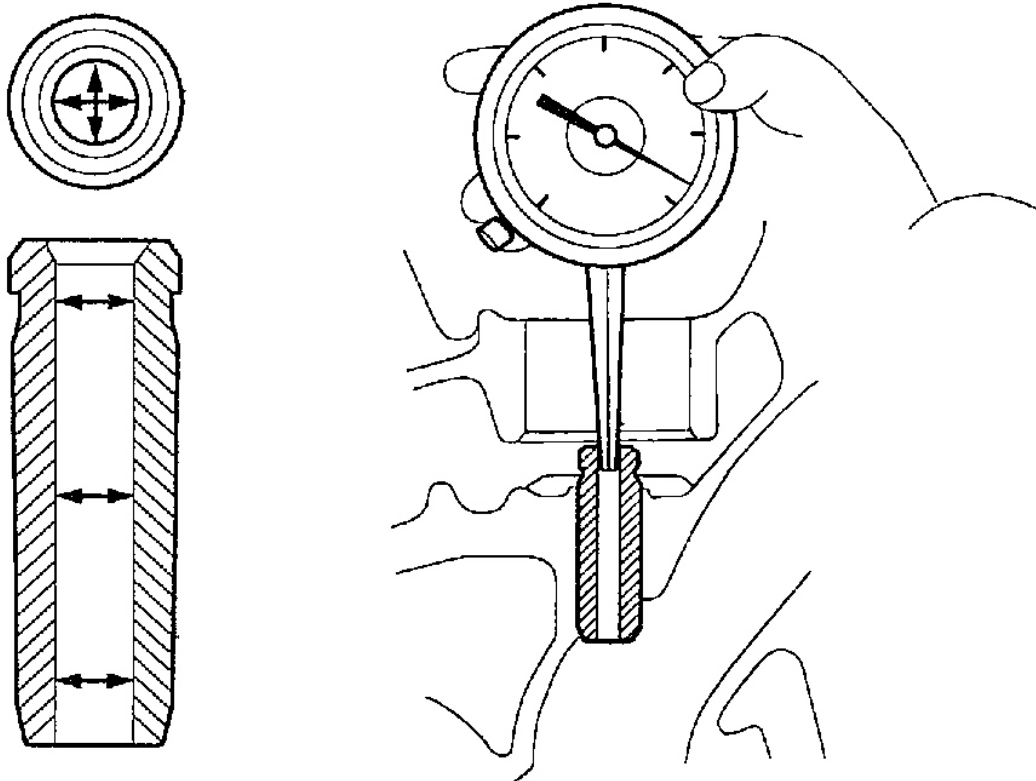
2. Inspect for cracks.

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.

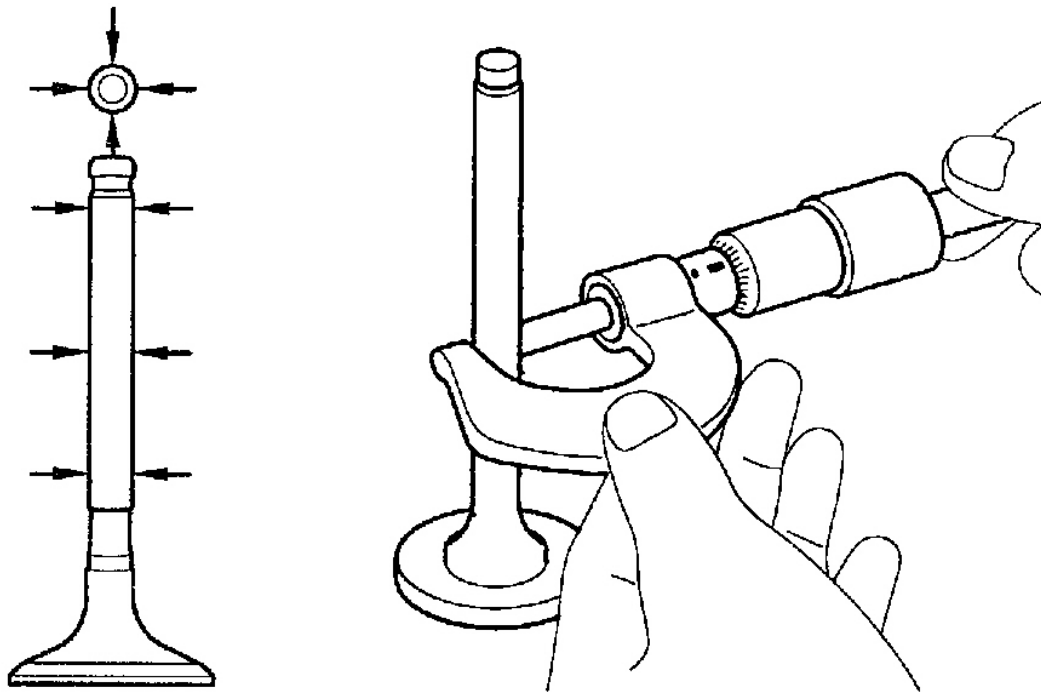
Valve guide inside.



G00747451

Fig. 94: Measuring Valve Guide Inside Diameter
Courtesy of HYUNDAI MOTOR CO.

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



G00747452

Fig. 95: Measuring Valve Stem Diameter
 Courtesy of HYUNDAI MOTOR CO.

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

Valve stem-to-guide clearance

[Standard]

Intake : 0.02 ~ 0.05mm (0.0008 ~ 0.0020in.)

Exhaust : 0.035 ~ 0.065mm (0.0014 ~ 0.0026in.)

[Limit]

Intake : 0.1mm (0.0040in.)

Exhaust : 0.13mm (0.0051in.)

If the clearance is greater than maximum, replace the valve and valve guide.

2. Inspect valves.
 1. Check the valve is ground to the correct valve face angle.
 2. Check that the surface of the valve for wear. If the valve face is worn, replace the valve.
 3. Check the valve head margin thickness. If the margin thickness is less than minimum, replace the

valve.

Margin

[Standard]

Intake : 1.15 mm (0.0453 in.)

Exhaust : 1.35 mm (0.0531 in.)

[Limit]

Intake : 0.8 mm (0.0315 in.)

Exhaust : 1.0mm (0.040 in.)

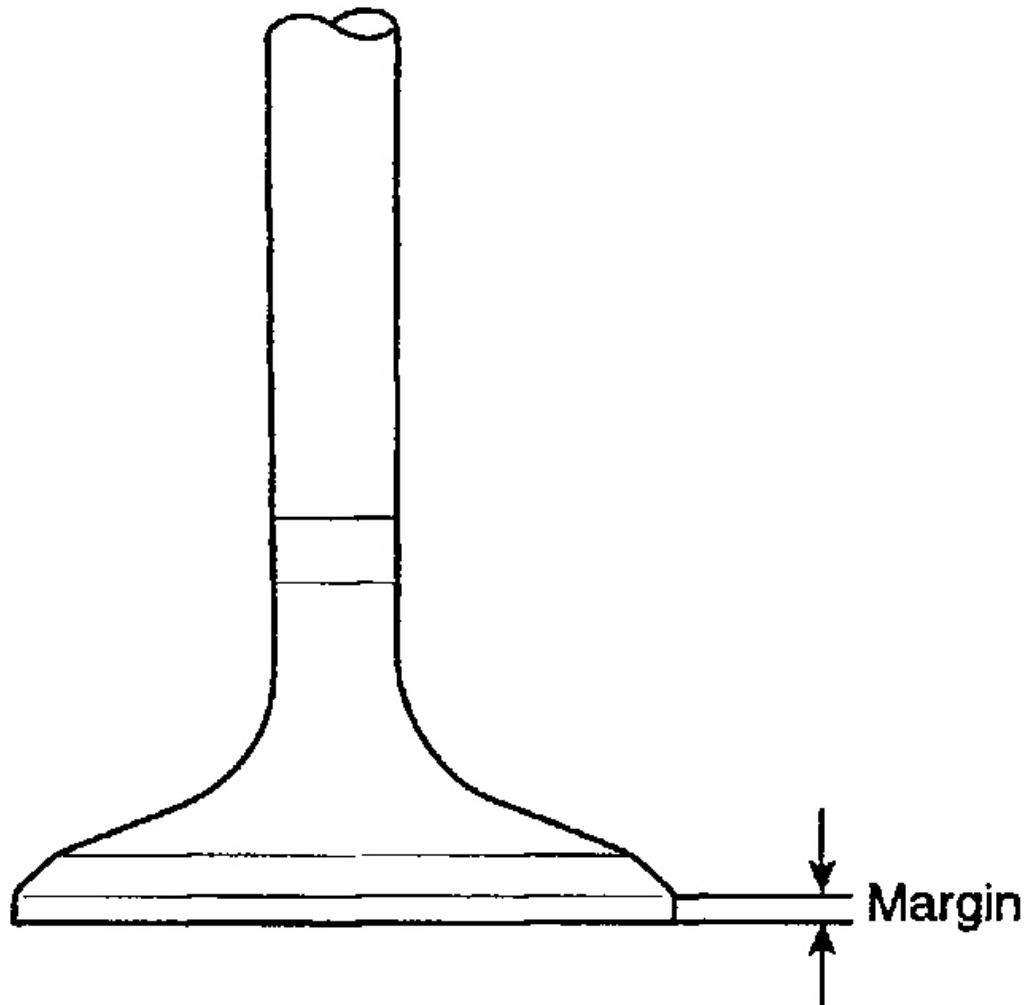
**G00747453**

Fig. 96: Measuring Valve Head Margin Thickness
Courtesy of HYUNDAI MOTOR CO.

4. Check the surface of the valve stem tip for wear. If the valve stem tip is worn, replace the valve.
3. Inspect valve seats

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

Replace the seat if necessary.

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

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

Valve spring

[Standard]

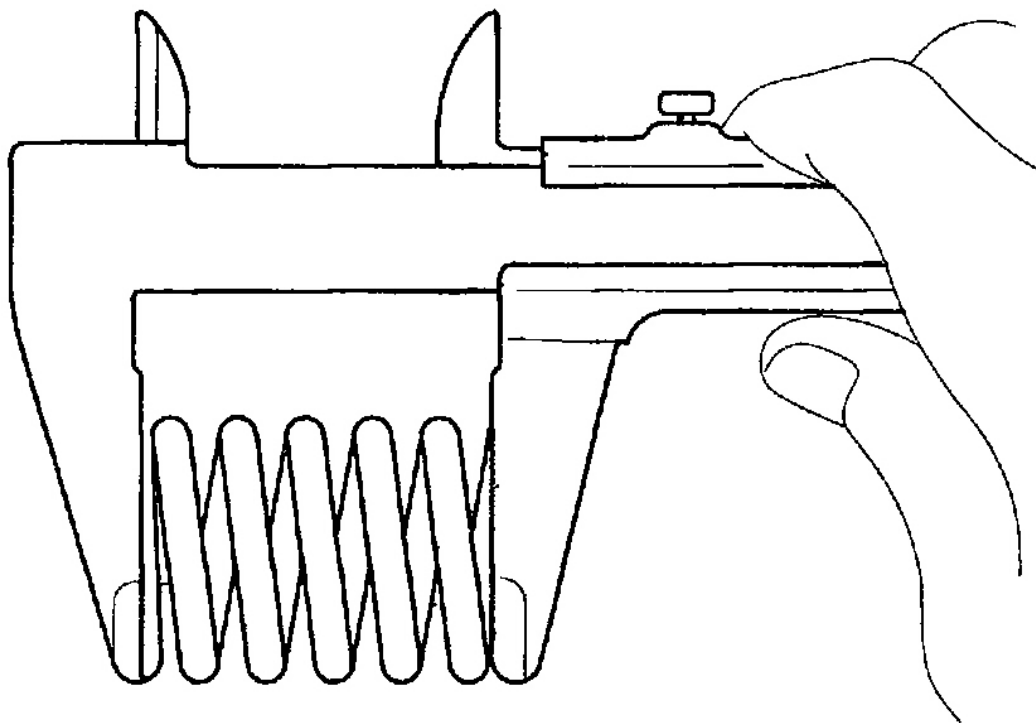
Free height : 48.86mm (1.9236 in.)

Load : 18.3kg / 39 mm (40.3lb /1.535in.)

[Limit]

Free height : -1.0 mm (-0.0394 in.)

Out-of-square : 3°



G00747454

Fig. 97: Measuring Valve Spring Free Length
Courtesy of HYUNDAI MOTOR CO.

If the free length is not as specified, replace the valve spring.

CAMSHAFT

1. Inspect cam lobes.

Using a micrometer, measure the cam lobe height.

Cam height

W/O CVVT

[Standard value]

Intake : 44.820 mm (1.7646 in.)

Exhaust : 44.720 mm (1.7606 in.)

[Limit]

Intake : 44.720 mm (1.7606 in.)

Exhaust : 44.620 mm (1.7567 in.)

W/CVVT

[Standard value]

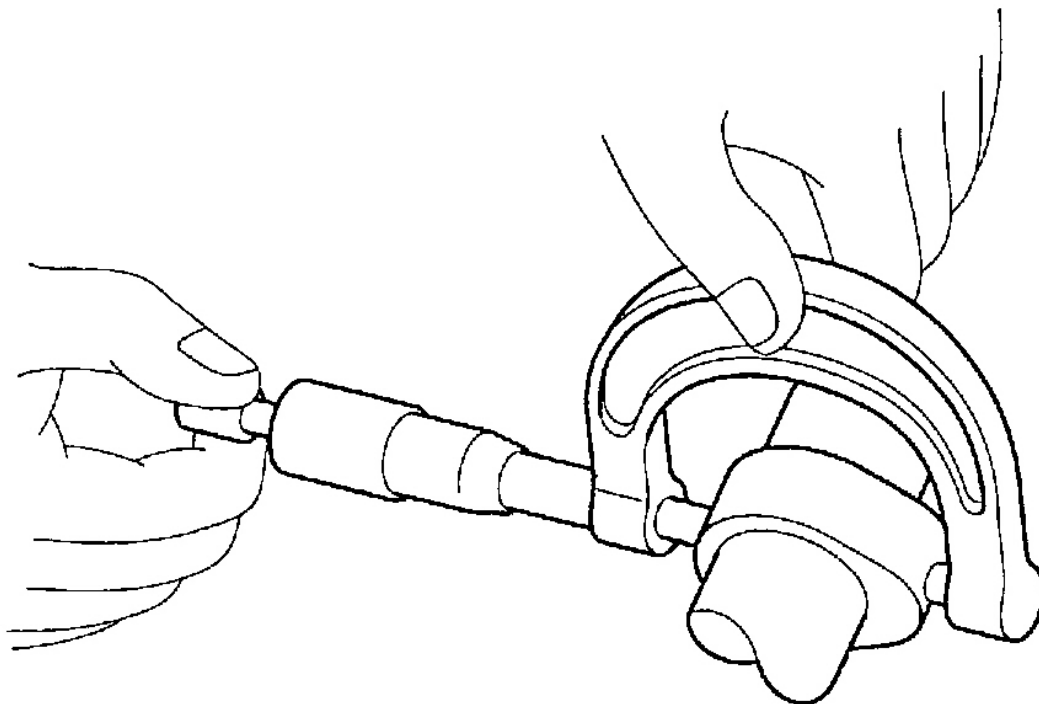
Intake : 44.618 mm (1.7566 in.)

Exhaust : 44.518 mm (1.7527 in.)

[Limit]

Intake : 44.518 mm (1.7527 in.)

Exhaust : 44.418 mm (1.7487 in.)

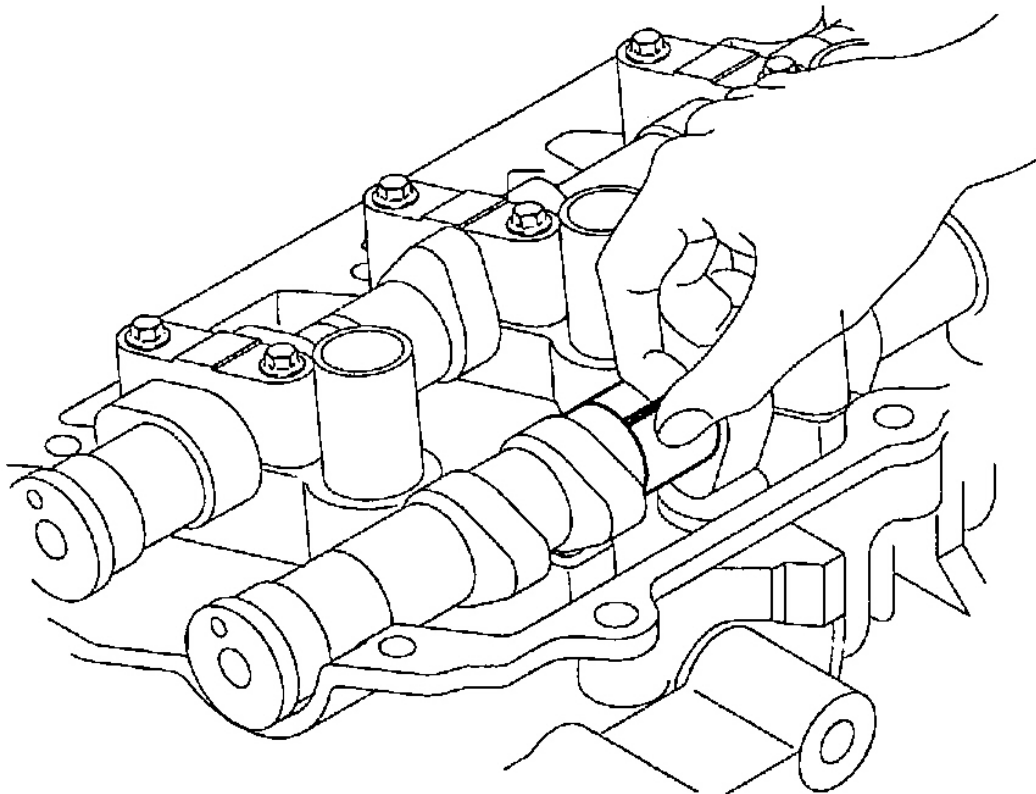


G00747455

Fig. 98: Measuring Camshaft Lobe Height
Courtesy of HYUNDAI MOTOR CO.

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

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



G00747456

Fig. 99: Measuring Camshaft Bearing Clearance With Plastigage
Courtesy of HYUNDAI MOTOR CO.

4. Install the bearing caps.

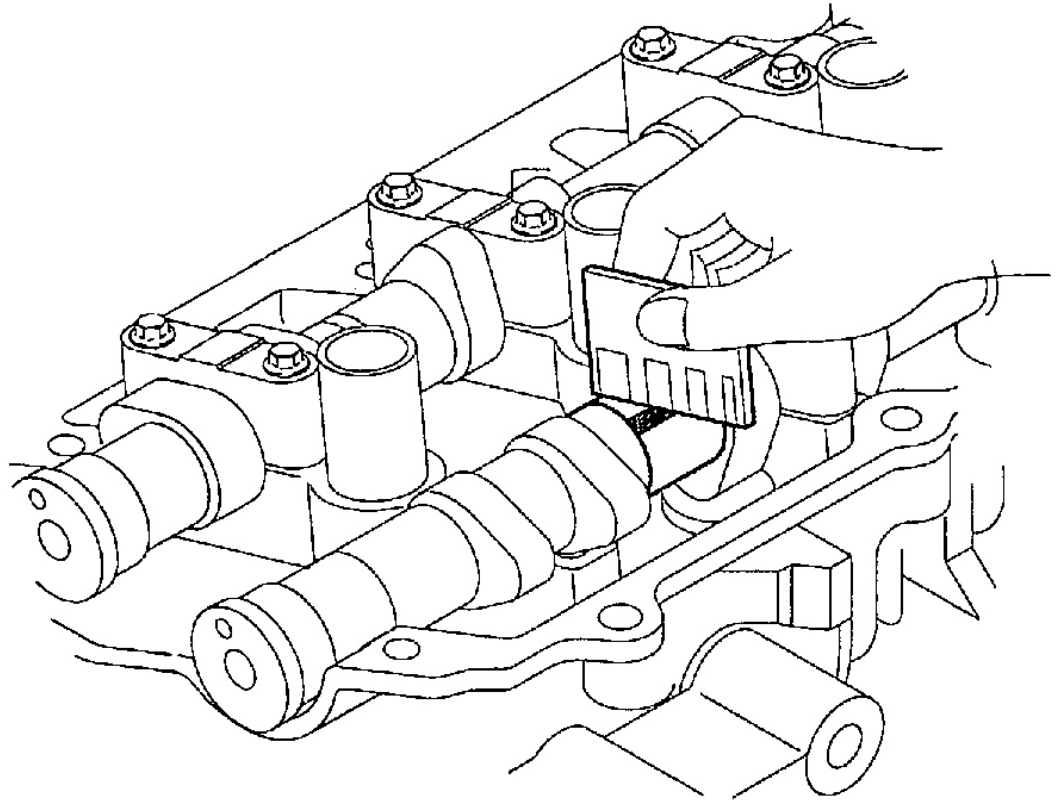
CAUTION: Do not turn the camshaft.

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

Bearing oil clearance :

[Standard value]: 0.02 ~ 0.061mm (0.0008 ~ 0.0024in.)

[Limit] : 0.1mm (0.0039in.)



G00747457

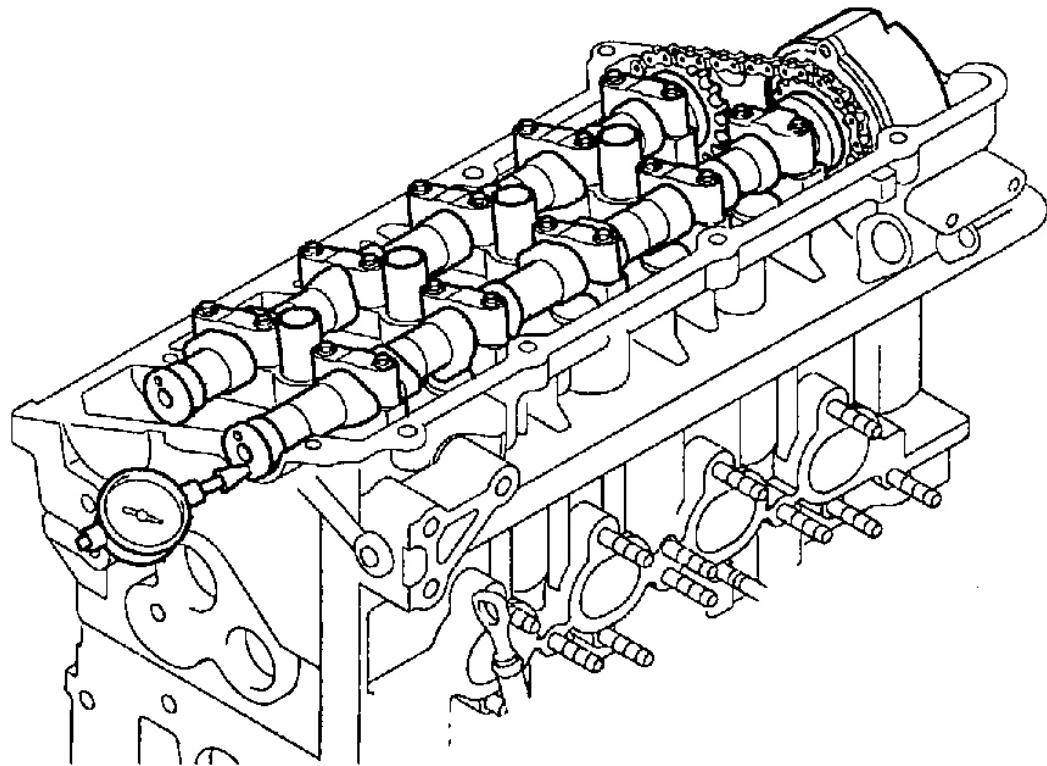
Fig. 100: Measuring Plastigage To Determine Camshaft Bearing Clearance
 Courtesy of HYUNDAI MOTOR CO.

If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

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

Camshaft end play

[Standard value]: 0.1 ~ 0.2mm (0.004 ~ 0.008in.)



G00747458

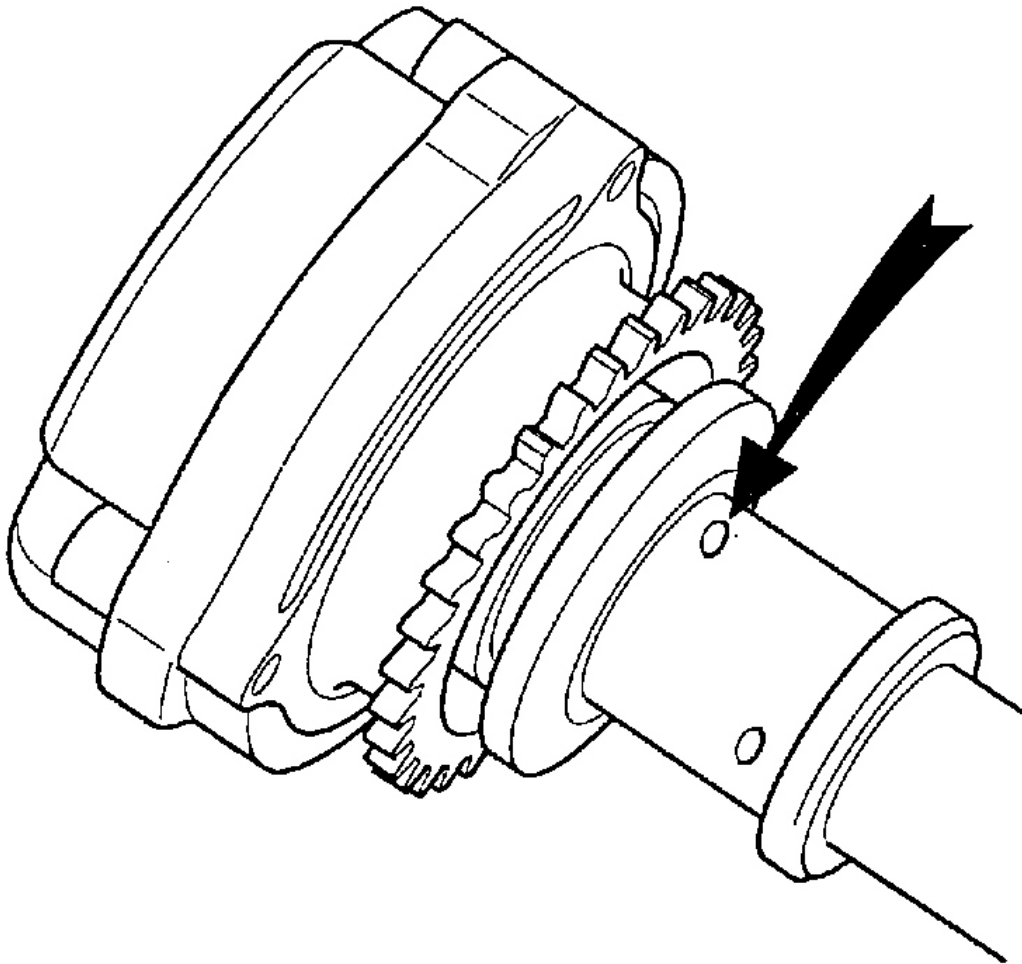
Fig. 101: Measuring Camshaft End Play
Courtesy of HYUNDAI MOTOR CO.

If the end play is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

3. Remove the camshafts.

CVVT ASSEMBLY

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



G00747459

Fig. 102: Checking CVVT Assembly
Courtesy of HYUNDAI MOTOR CO.

3. Wind tape around the tip of the air gun and apply air of approx. 100kpa (1kgf/cm² , 14psi) to the port of the camshaft.

(Perform this order to release the lock pin for the maximum delay angle locking.)

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

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

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

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

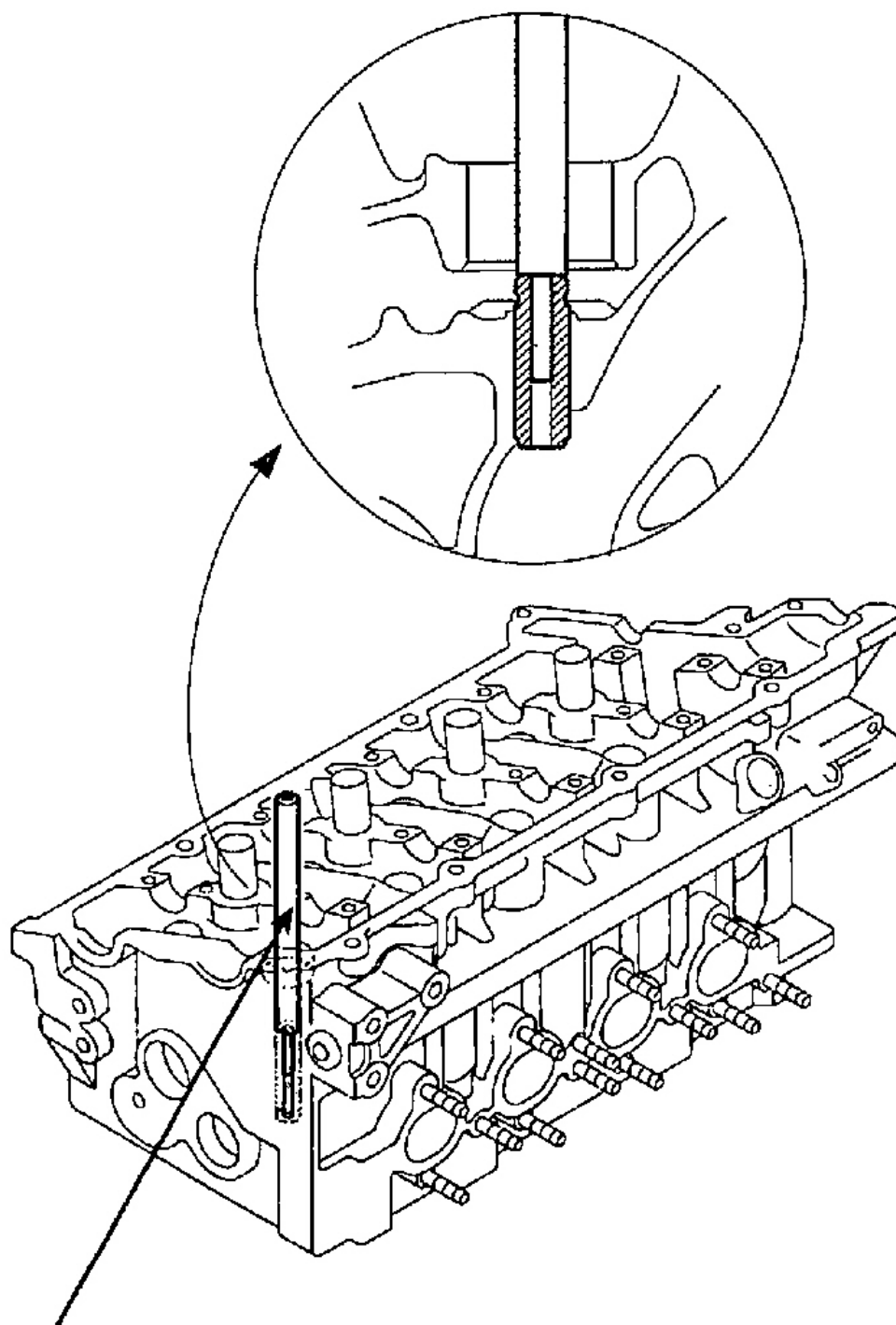
Standard: Movable smoothly in the range about 20°

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

REPLACEMENT

VALVE GUIDE

1. 1. Using the SST (09221-3F100A), withdraw the old valve guide toward the bottom of cylinder head.



09221-3F100A

G00747460

Fig. 103: Removing Valve Guide

Courtesy of HYUNDAI MOTOR CO.

2. Recondition the valve guide hole so that it can match the newly press-fitted oversize valve guide.
3. Using the SST (09221-3F100 A/B), press-fit the valve guide. The valve guide must be press-fitted from the upper side of the cylinder head. Keep in mind that the intake and exhaust valve guides are different in length.

Over size mm(in.)	Size mark	Oversize valve guide hole size mm(in.)
0.05 (0.002)	5	11.05 ~ 11.068 (0.4350 ~ 0.4357)
0.25 (0.010)	25	11.25 ~ 11.268 (0.4429 ~ 0.4436)
0.50 (0.020)	50	11.50 ~ 11.518 (0.4528 ~ 0.4535)

G00747461

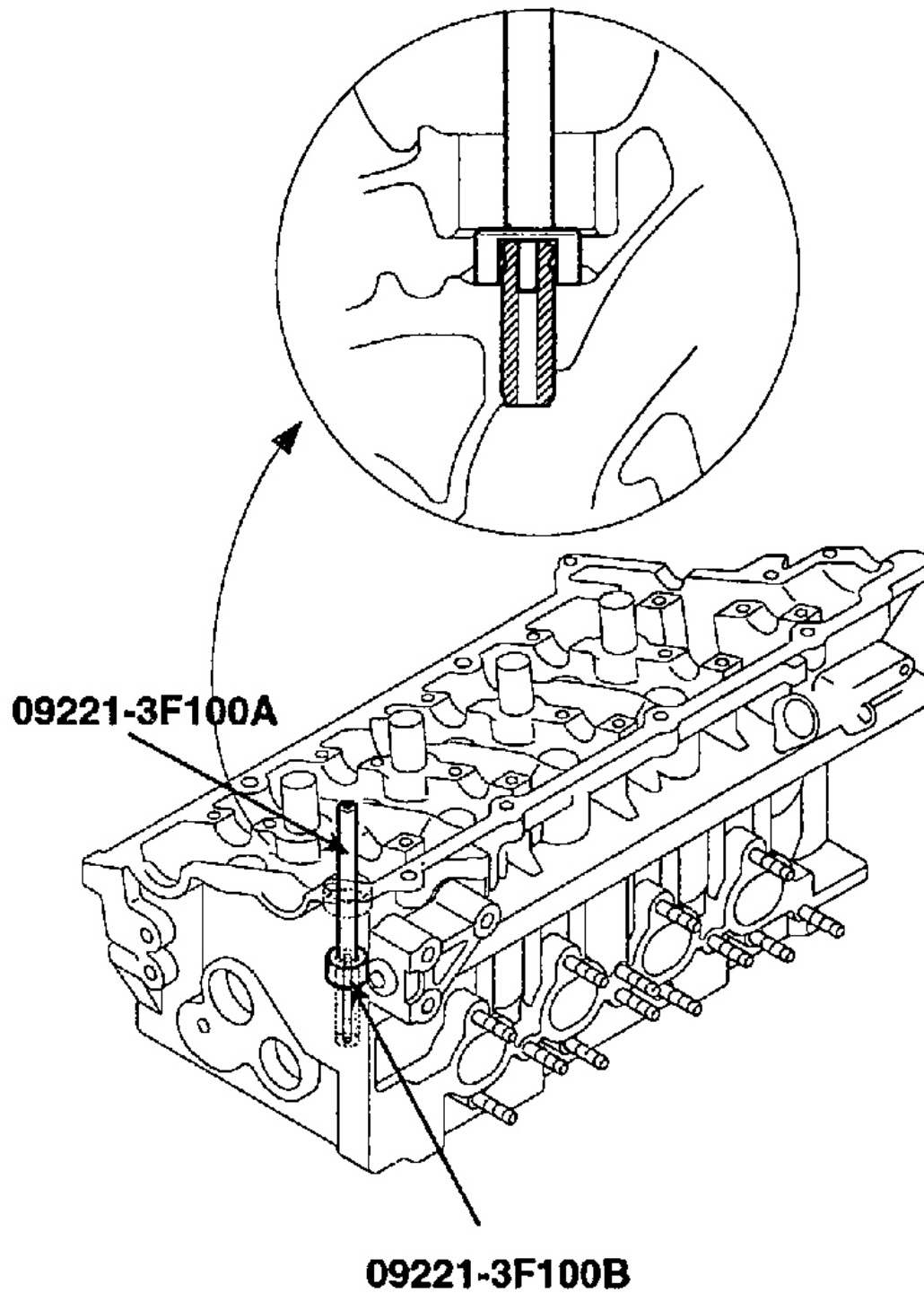
Fig. 104: Oversized Valve Guide Identification Table

Courtesy of HYUNDAI MOTOR CO.

Valve guide length

Intake : 46mm (1.8in.)

Exhaust : 54.5mm (2.15in.)



G00747462

Fig. 105: Installing Valve Guides
Courtesy of HYUNDAI MOTOR CO.

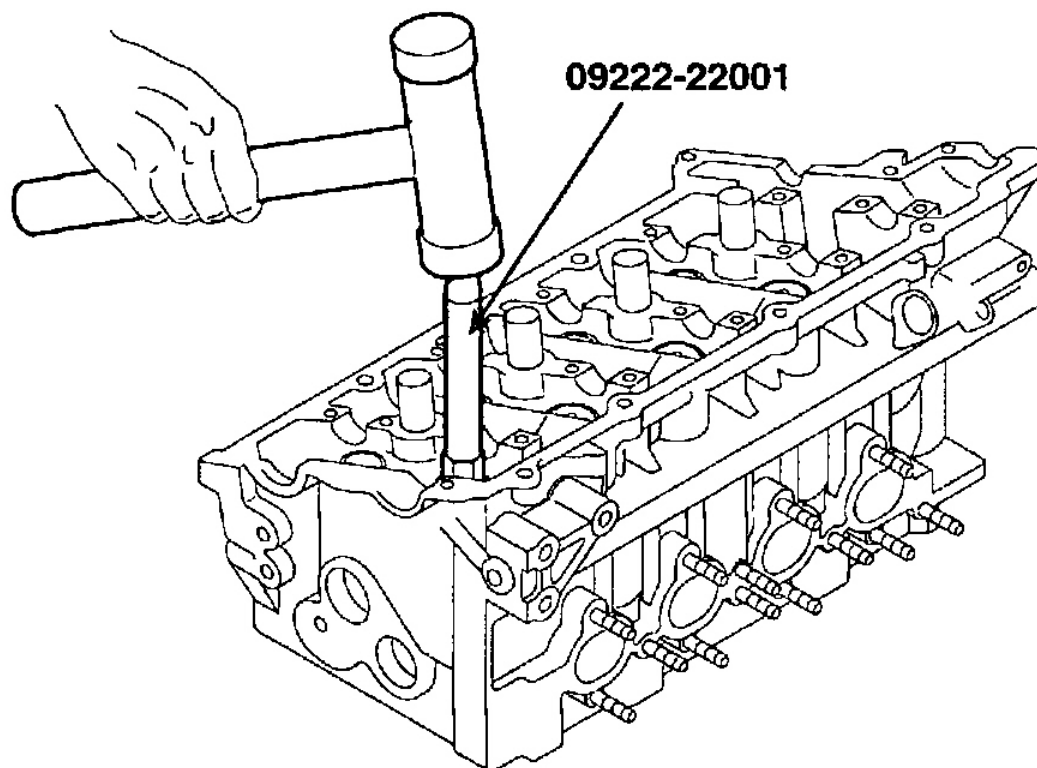
4. After the valve guide is press-fitted, insert a new valve and check for proper stem-to-guide clearance.
5. After the valve guide is replaced, check that the valve is seated properly. Recondition the valve seats as necessary.

REASSEMBLY

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

1. Install valves.
 1. Install the spring seats.
 2. Using SST (09222-22001), 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.



G00747463

Fig. 106: Installing Valve Guide Seals
Courtesy of HYUNDAI MOTOR CO.

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

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

4. Using the SST (09222-28000, 09222-28100), compress the spring and install the retainer locks. After installing the valves, ensure the retainer locks are correctly in place before releasing the valve spring compressor.

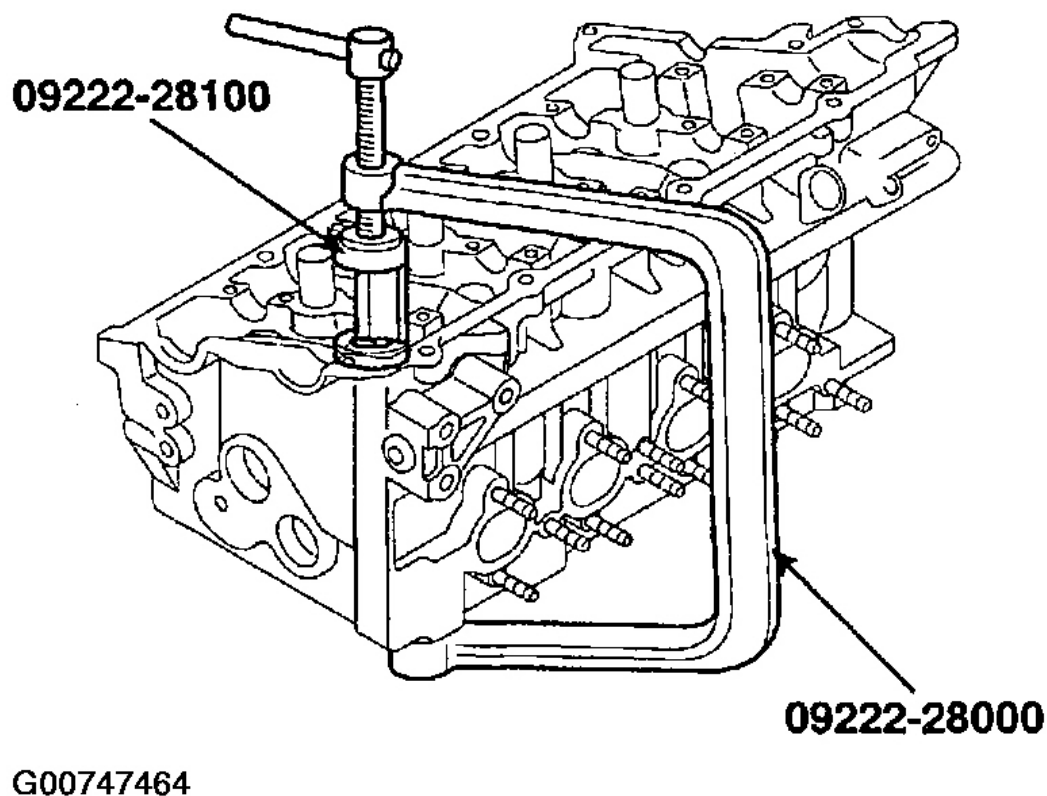
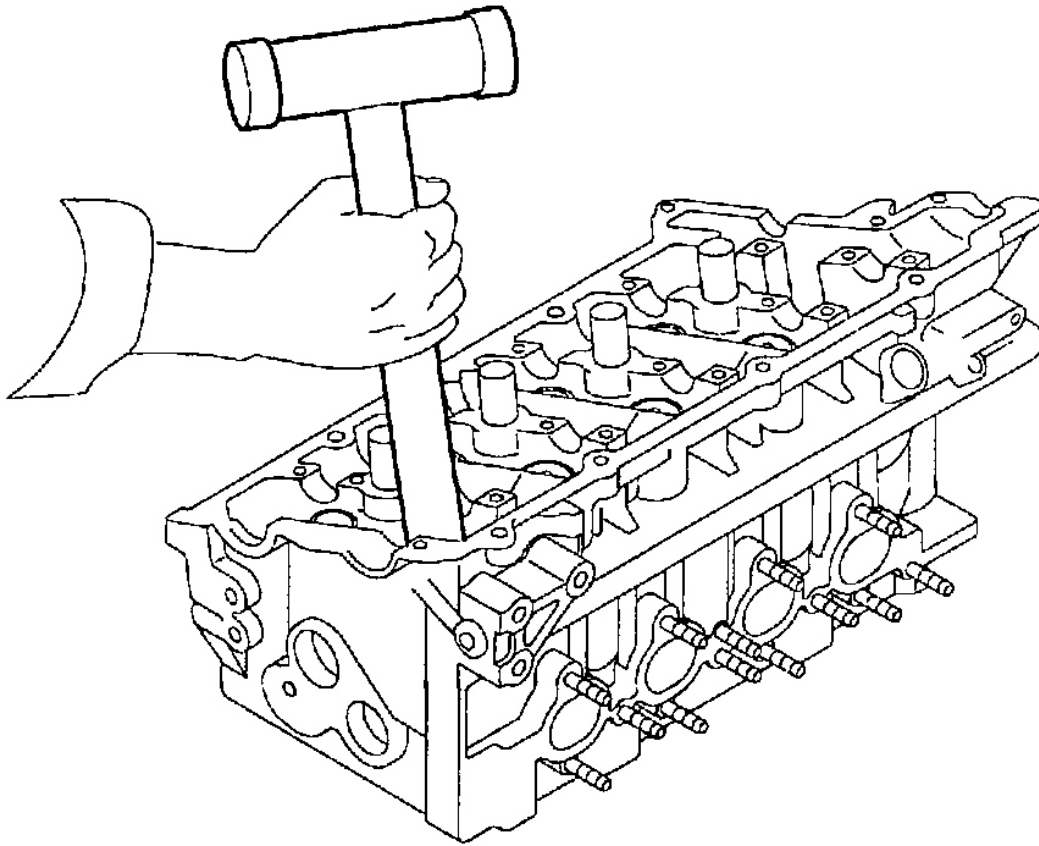


Fig. 107: Installing Valve Spring Retainer Locks
Courtesy of HYUNDAI MOTOR CO.

5. 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 retaining lock.

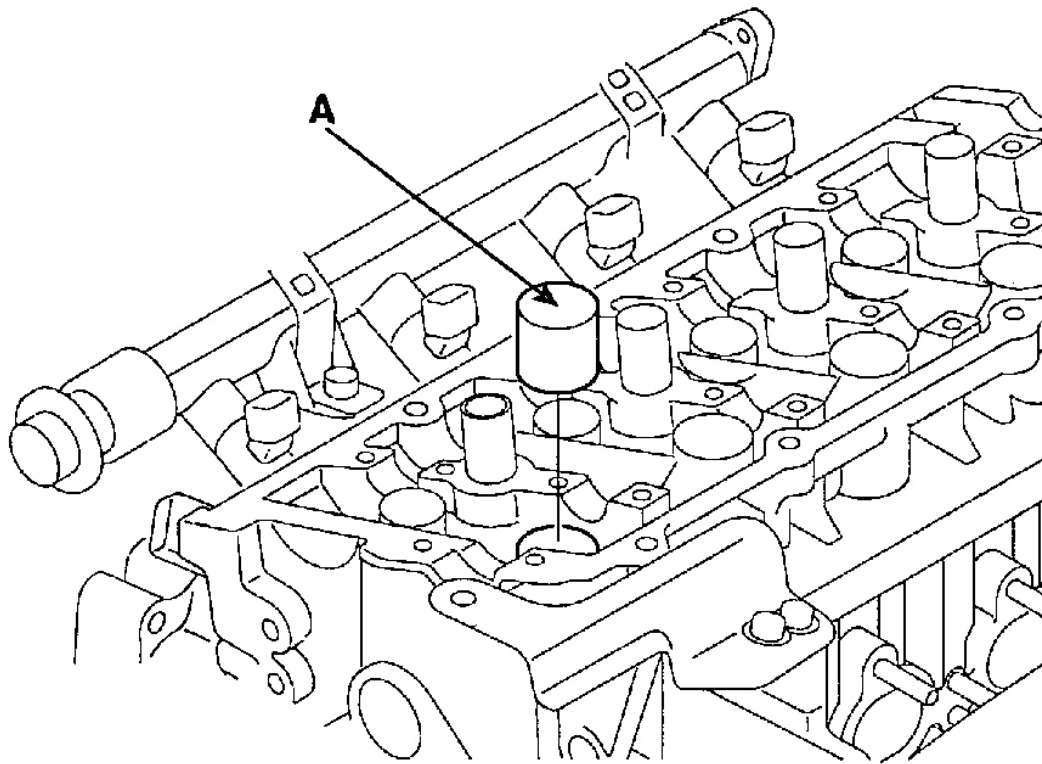


G00747465

Fig. 108: Seating Valve Spring Retaining Locks
Courtesy of HYUNDAI MOTOR CO.

2. Install MLAs.

Check that the MLA rotates smoothly by hand.



G00747466

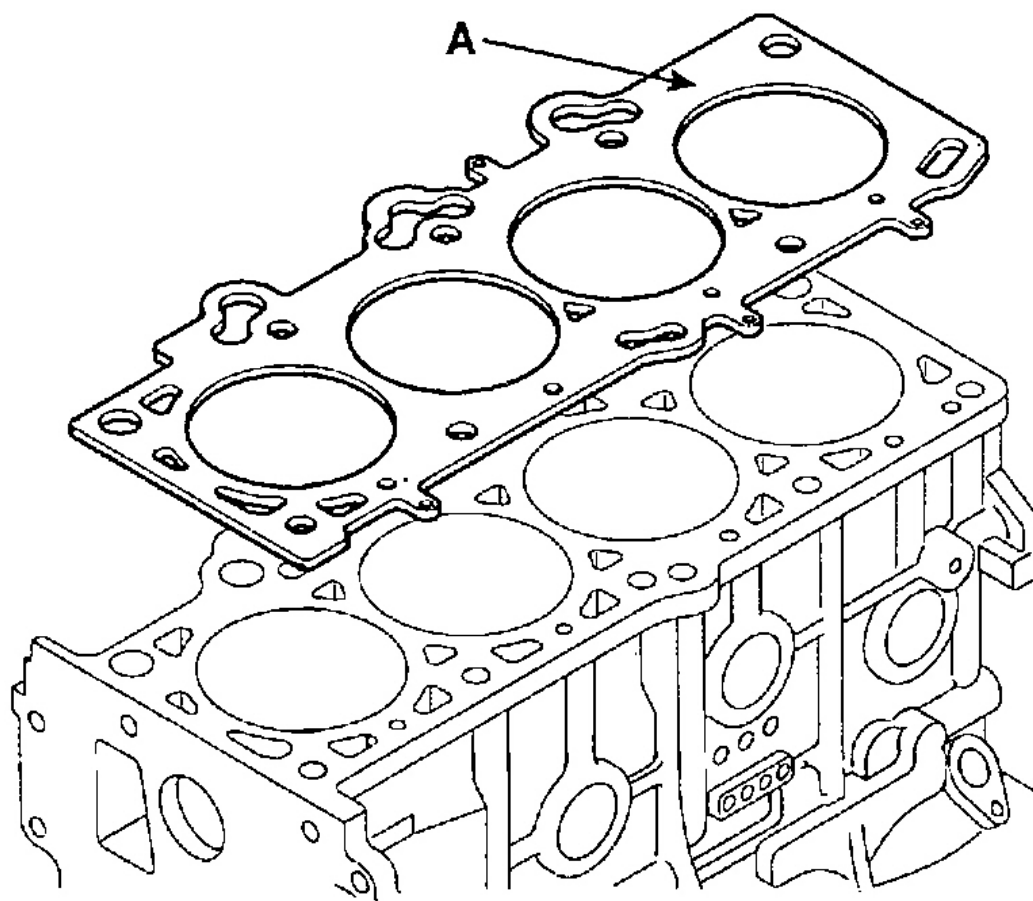
Fig. 109: Installing Mechanical Lash Adjusters
Courtesy of HYUNDAI MOTOR CO.

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. See Fig. 17.

1. Install the cylinder head gasket (A) on the cylinder block.



G00747467

Fig. 110: Installing Cylinder Head Gasket
Courtesy of HYUNDAI MOTOR CO.

NOTE: Be careful of the installation direction.

2. Place the cylinder head quietly in order not to damage the gasket with the bottom part of the end.
3. Install cylinder head bolts.
 1. Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
 2. Using 8mm and 10mm hexagon wrench, install and tighten the 10 cylinder head bolts and plate washers, in several passes, in the sequence shown.

Tightening torque

M10 :

25Nm (250kgf.cm, 18lbf.ft) + (60° ~ 65°) + (60° ~ 65°)

M12 :

30Nm (300kgf.cm, 22lbf.ft) + (60° ~ 65°) + (60° ~ 65°)

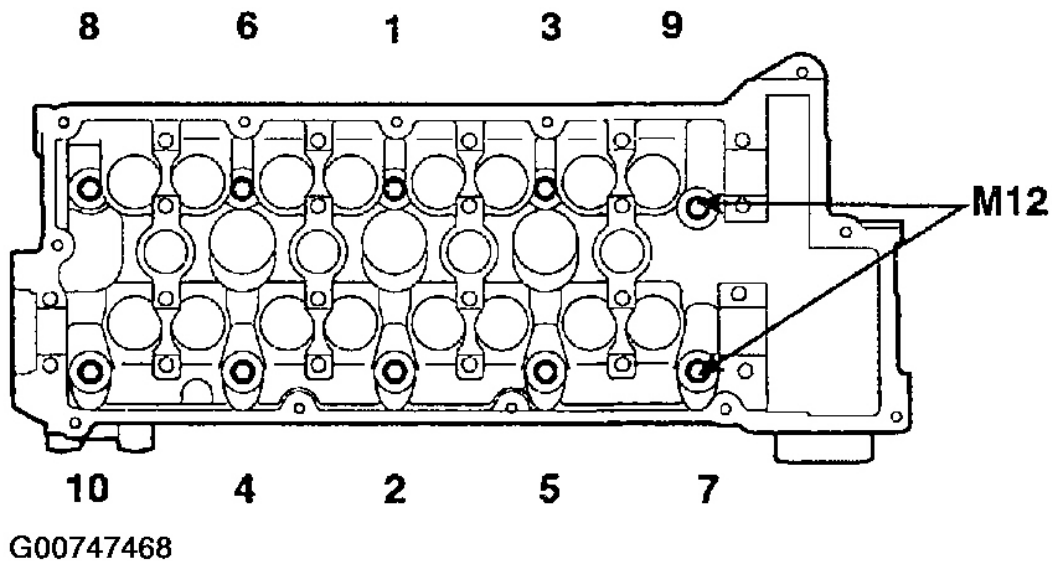
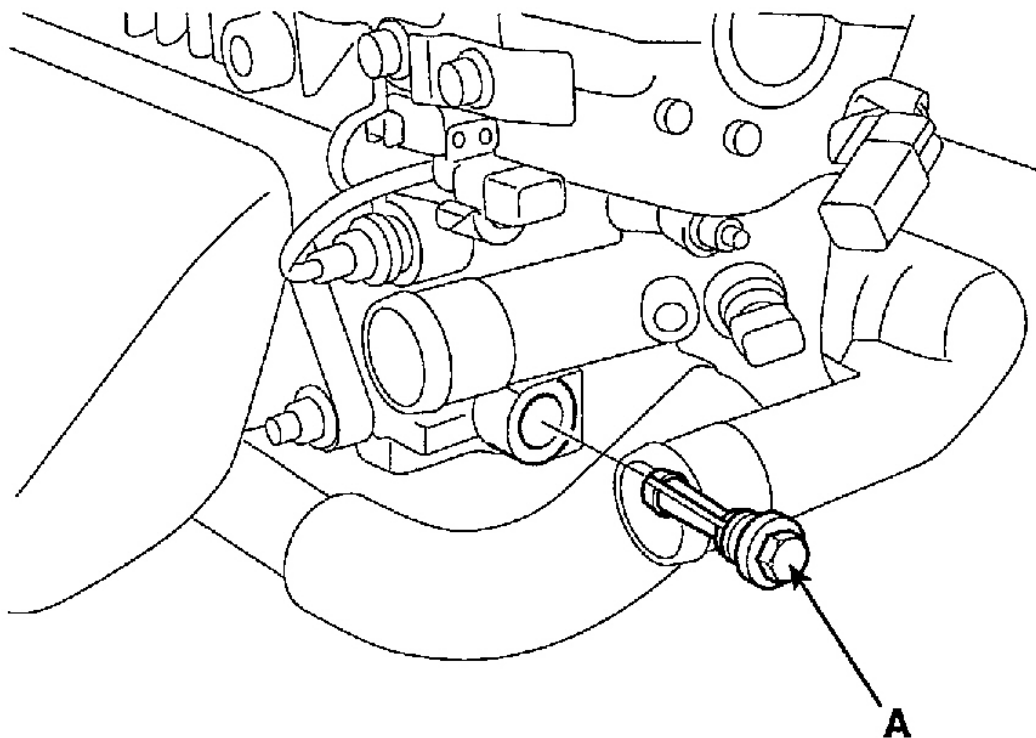


Fig. 111: Identifying Cylinder Head Bolt Tightening Sequence
 Courtesy of HYUNDAI MOTOR CO.

4. Install OCV filter (A).

Tightening torque

41 ~ 51Nm (410 ~ 510kgf.cm, 30 ~ 37.6lbf.ft)



G00747469

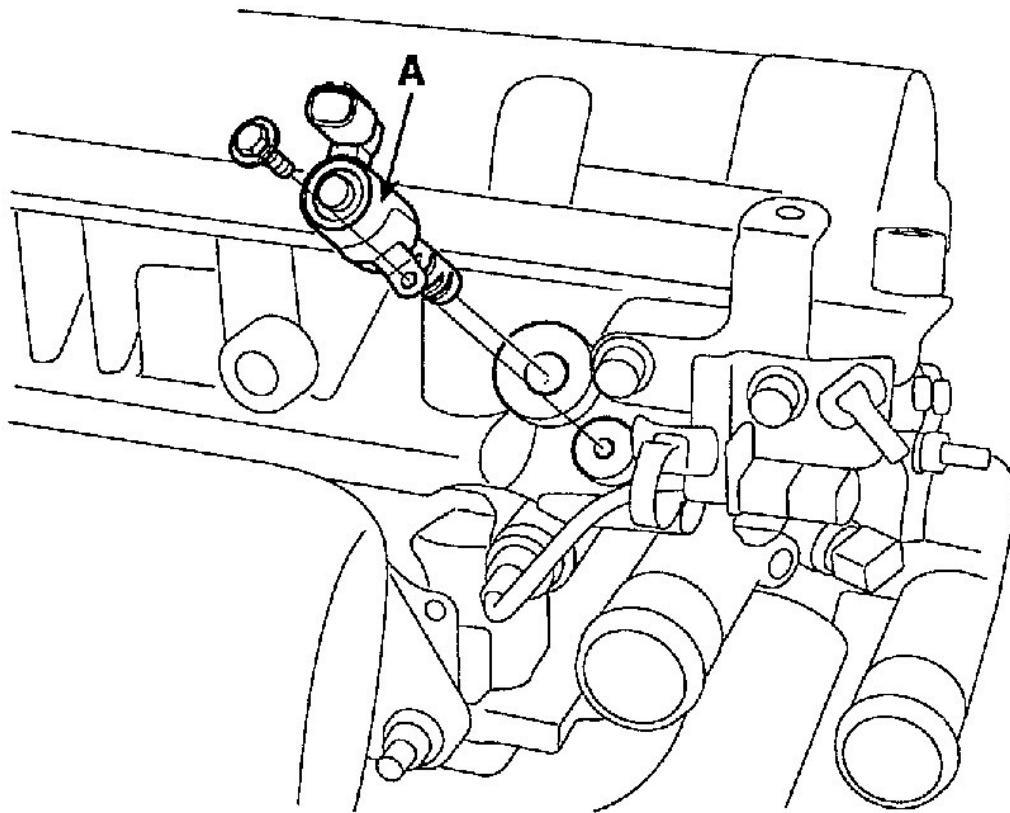
Fig. 112: Installing OCV Filter
Courtesy of HYUNDAI MOTOR CO.

NOTE: Always use a new OCV filter gasket. Keep clean the OCV filter.

5. Install OCV. (A)

Tightening torque

10 ~ 12Nm (100 ~ 120kgf.cm, 7.3 ~ 8.8lbf.ft)



G00747470

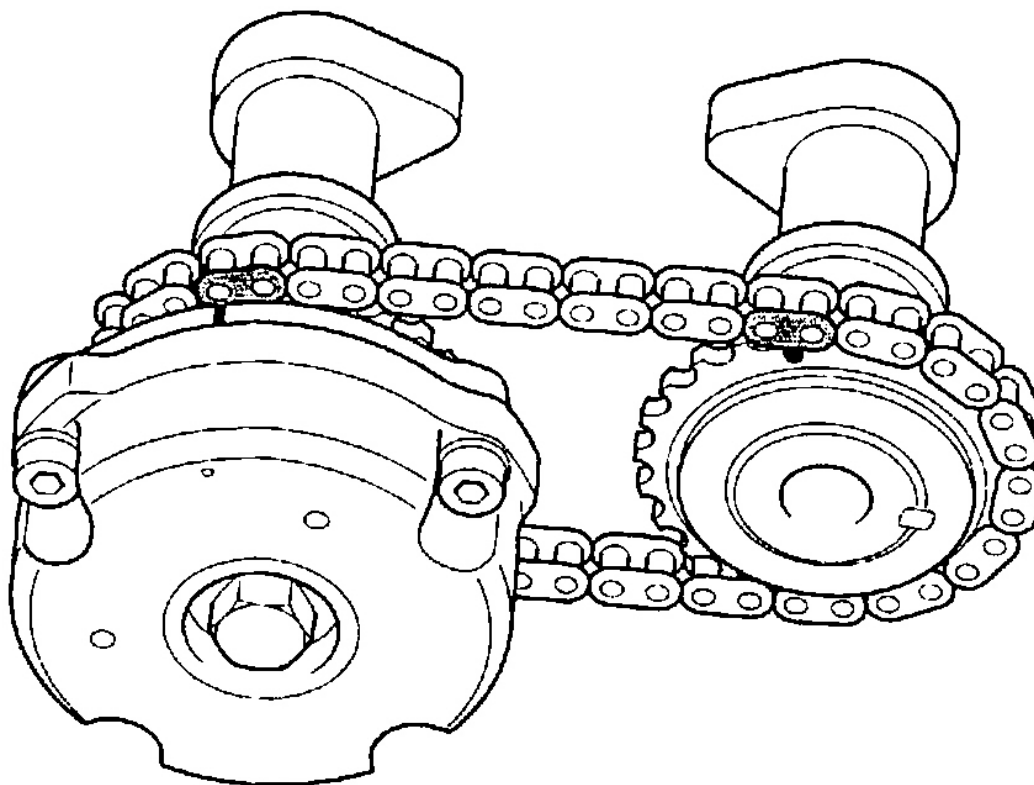
Fig. 113: Installing OCV
Courtesy of HYUNDAI MOTOR CO.

NOTE:

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

6. Install the camshafts.

1. Align the camshaft timing chain with the intake timing chain sprocket and exhaust timing chain sprocket as shown.



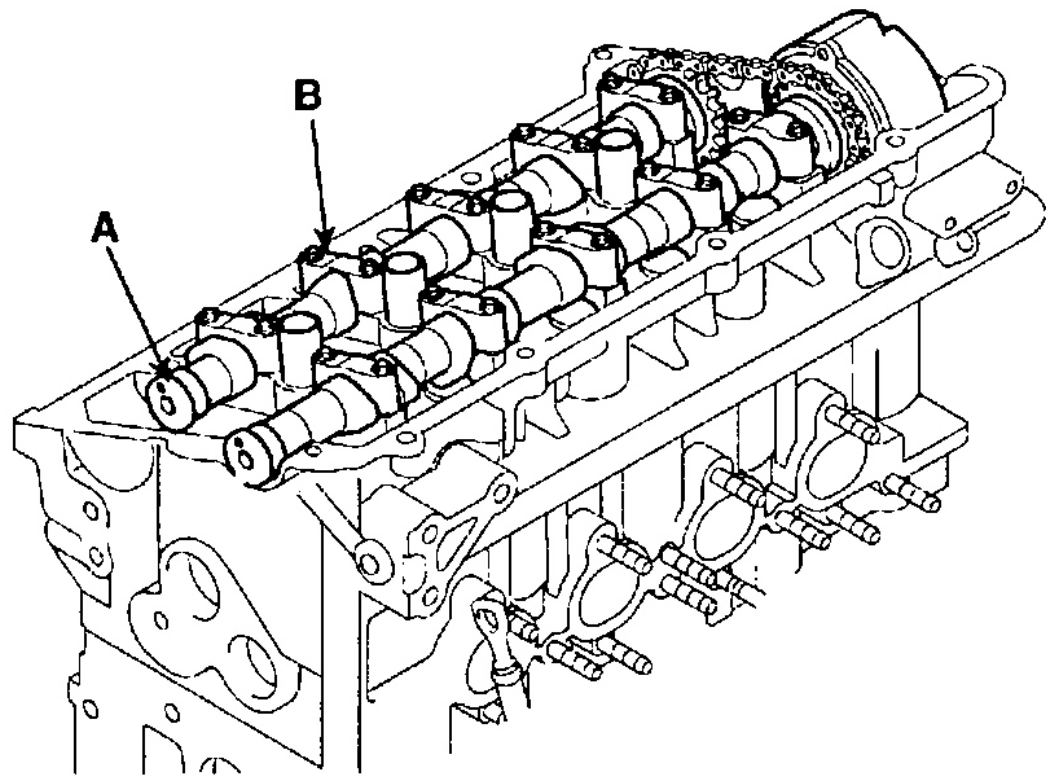
G00747471

Fig. 114: Aligning Camshaft Timing Marks
Courtesy of HYUNDAI MOTOR CO.

2. Install the camshafts (A) and bearing caps (B).

Tightening torque

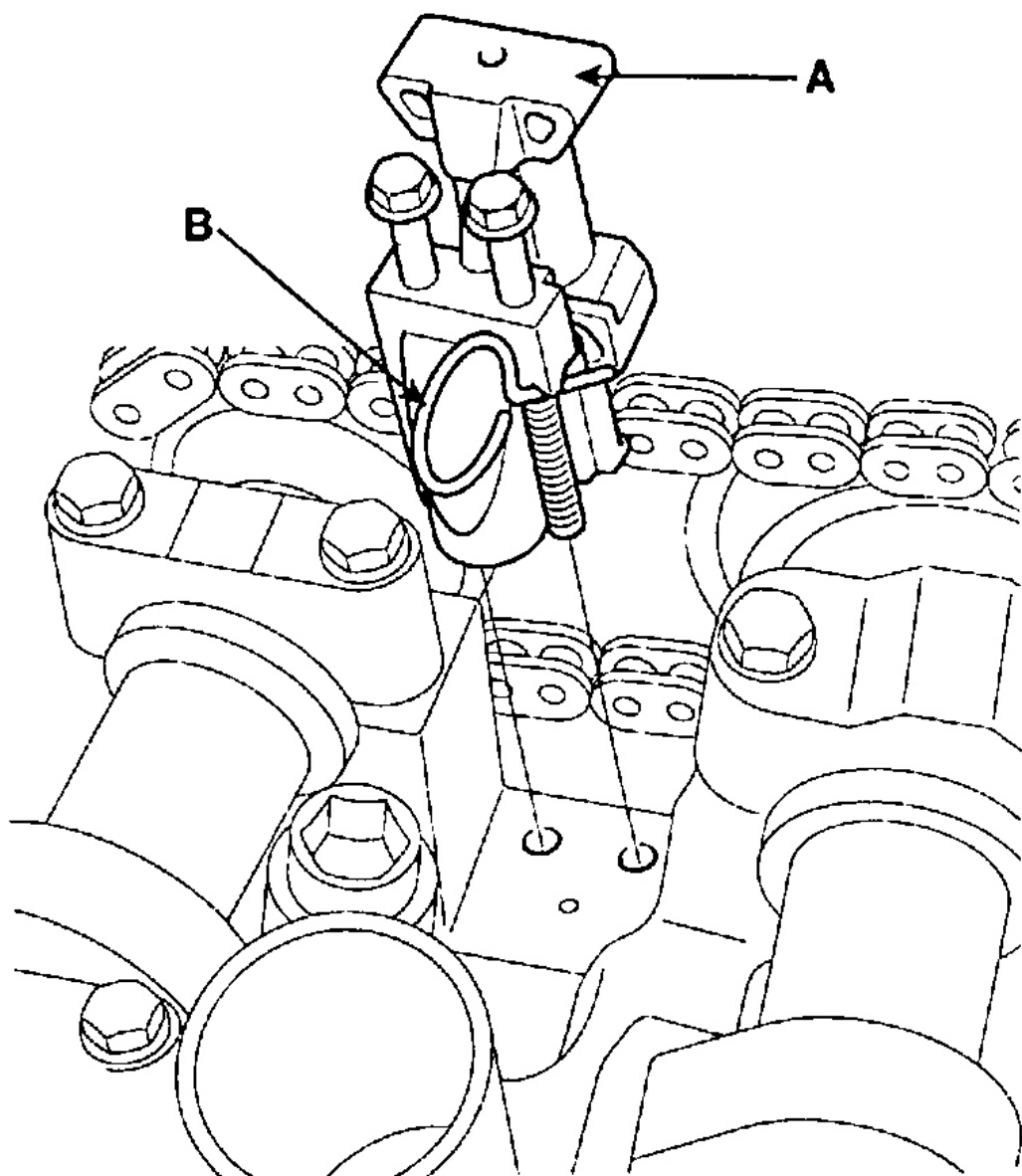
14 ~ 15Nm (140 ~ 150kgf.cm, 10 ~ 11lbf.ft)



G00747472

Fig. 115: Installing Camshaft Bearing Caps
Courtesy of HYUNDAI MOTOR CO.

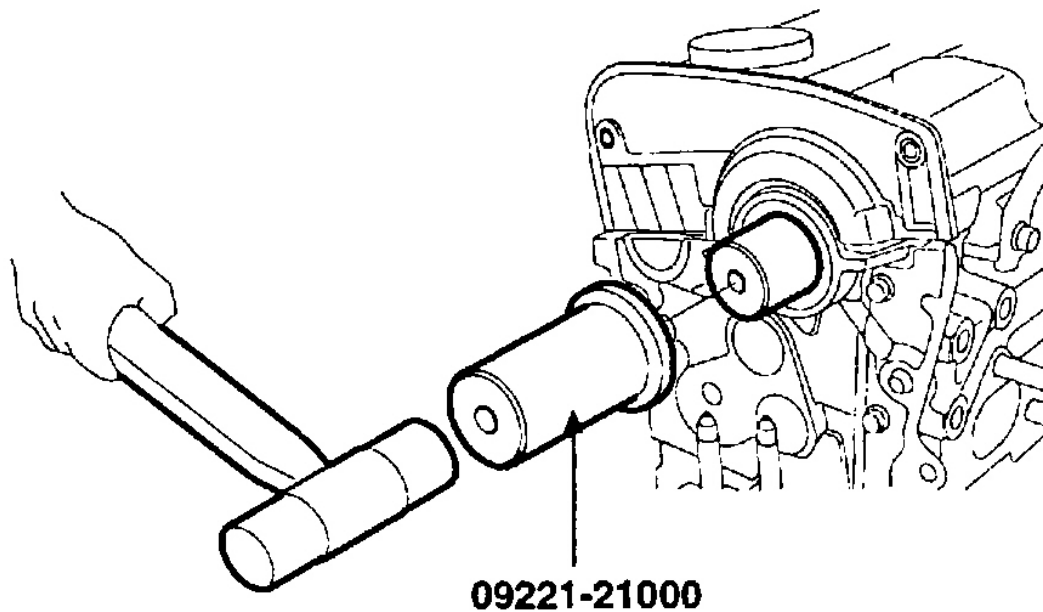
3. Install the timing chain auto tensioner (A).



G00747473

Fig. 116: Installing Timing Chain Auto Tensioner
Courtesy of HYUNDAI MOTOR CO.

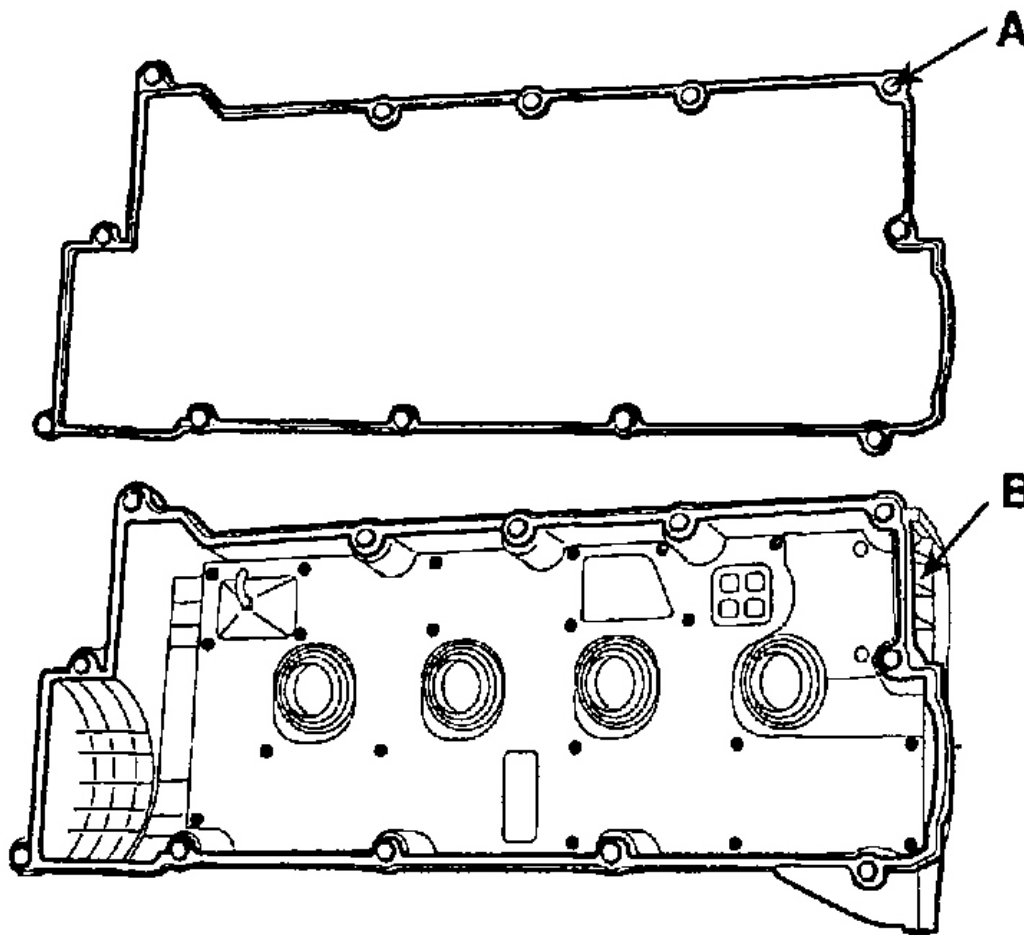
4. Remove the auto tensioner stopper pin (B).
7. Check and adjust valve clearance. See **Valve Clearance Inspection And Adjustment.**
8. Using the SST (09221-21000), install the camshaft bearing oil seal.



G00747474

Fig. 117: Installing Camshaft Bearing Oil Seal
Courtesy of HYUNDAI MOTOR CO.

9. Install the camshaft sprocket. See **Fig. 52**.
10. Install the timing belt. See **INSTALLATION** under TIMING SYSTEM.
11. Install the cylinder head cover.
 1. Install the cylinder head cover gasket (A) in the groove of the cylinder head cover (B).



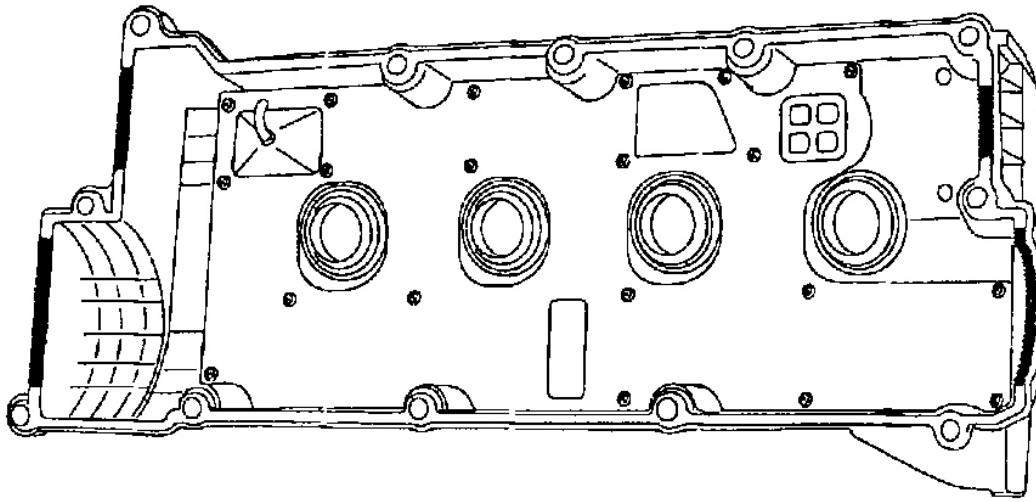
G00747475

Fig. 118: Installing Cylinder Head Cover Gasket
Courtesy of HYUNDAI MOTOR CO.

NOTE:

- Before installing the head cover gasket, thoroughly clean the head cover gasket and the groove.
- When installing, make sure the head cover gasket is seated securely in the corners of the recesses with no gap.

2. Apply liquid gasket to the head cover gasket at the corners of the recess.



G00747476

Fig. 119: Cylinder Head Cover Gasket Sealer Application Locations
Courtesy of HYUNDAI MOTOR CO.

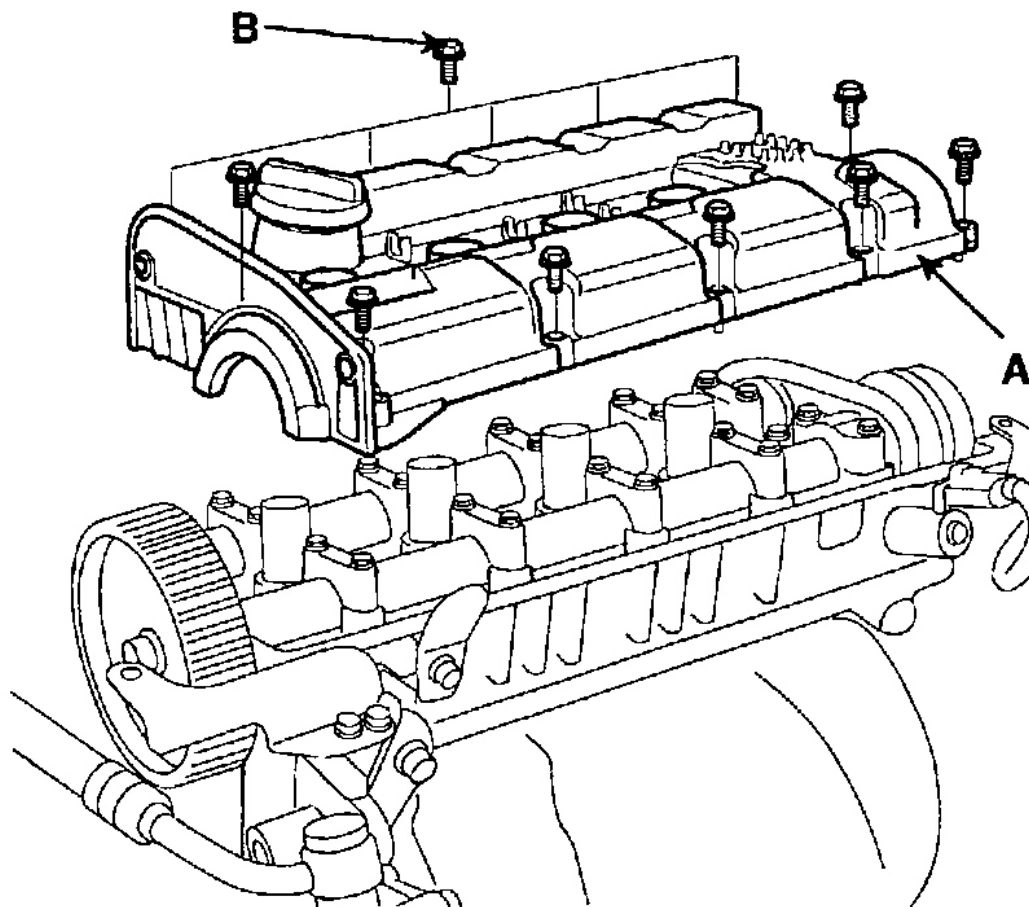
NOTE:

- Use liquid gasket, loctite No. 5999.
- Check that the mating surfaces are clean and dry before applying liquid gasket
- After assembly, wait at least 30 minutes before filling the engine with oil.

3. Install the cylinder head cover (A) with the 12bolts(B). Uniformly tighten the bolts in several passes.

Tightening torque

8 ~ 10Nm (80 ~ 100kgf.cm, 6 ~ 7.4 lbf. ft)



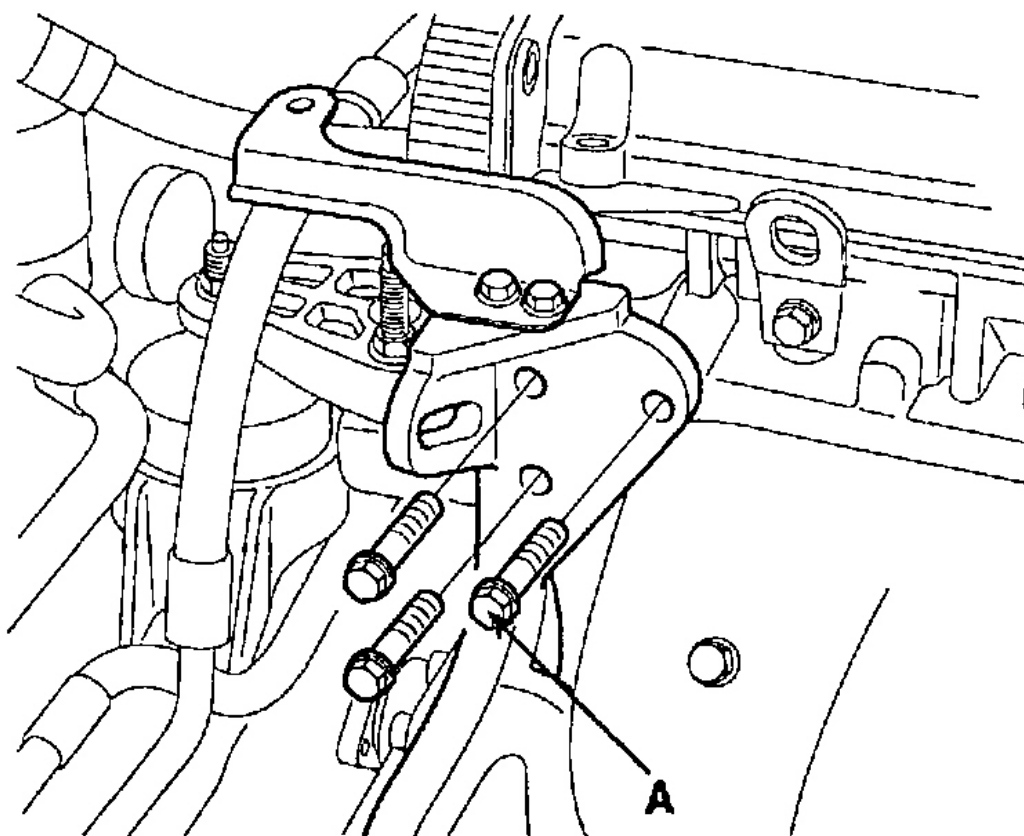
G00747477

Fig. 120: Installing Cylinder Head Cover
 Courtesy of HYUNDAI MOTOR CO.

12. Install the intake manifold. See **Fig. 259**.
13. Install the exhaust manifold. See **Fig. 260**.
14. Install the PCV. See **Fig. 54**.
15. Install the spark plug cable. See **IGNITION SYSTEMS**.
16. Install the power steering pump bracket bolts (A).

Tightening torque

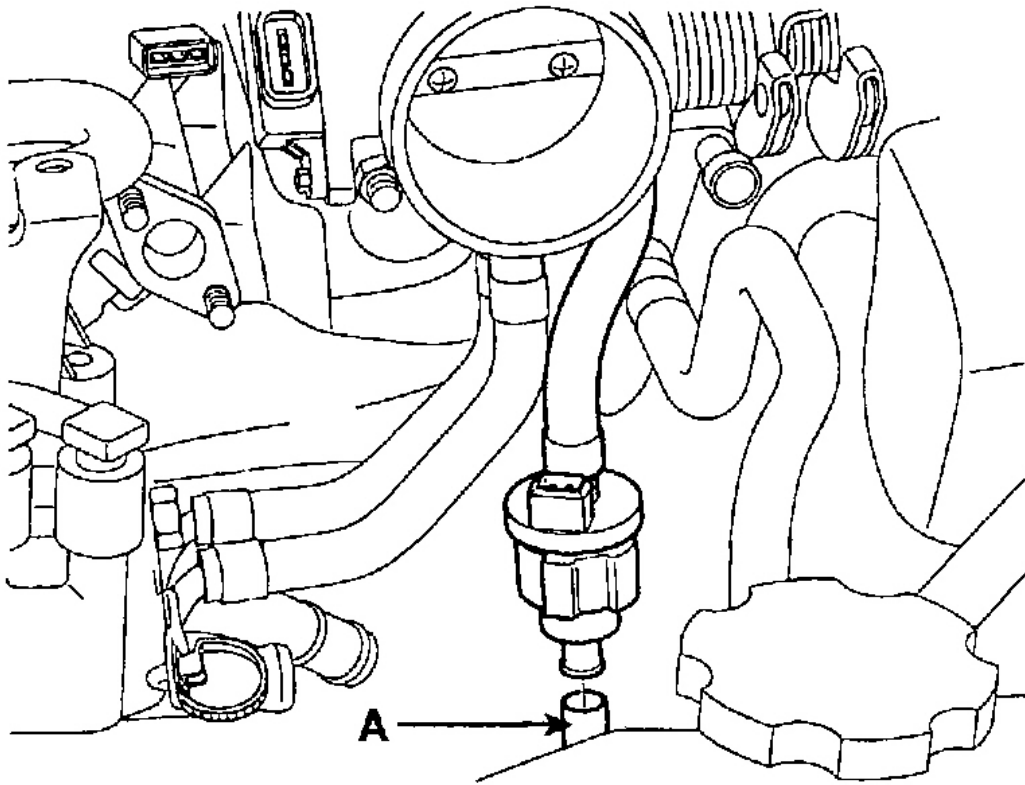
35 ~ 50Nm (350 ~ 500kgf.cm, 26 ~ 37lbf.ft)



G00747478

Fig. 121: Installing Power Steering Pump Bracket
Courtesy of HYUNDAI MOTOR CO.

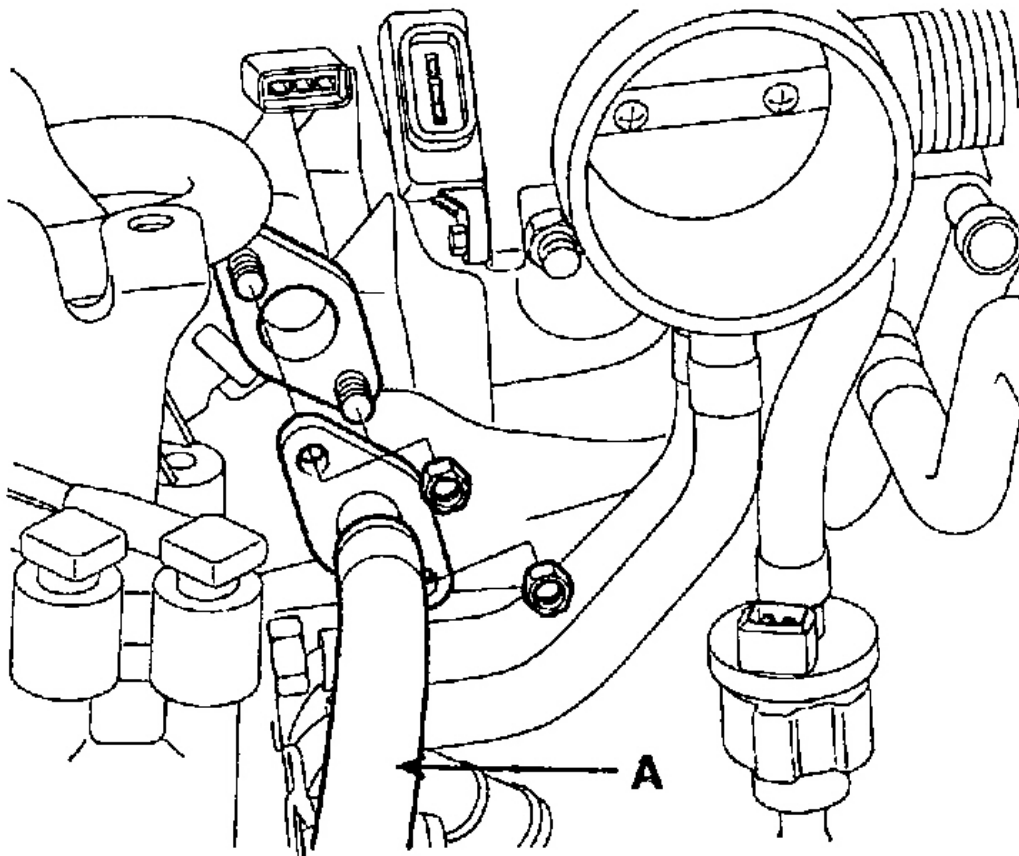
17. Install the power steering pump. See POWER STEERING PUMP .
18. Install the accelerator cable.
19. Install the brake booster hose.
20. Install the PCSV hose (A).



G00747479

Fig. 122: Installing PCSV Hose
Courtesy of HYUNDAI MOTOR CO.

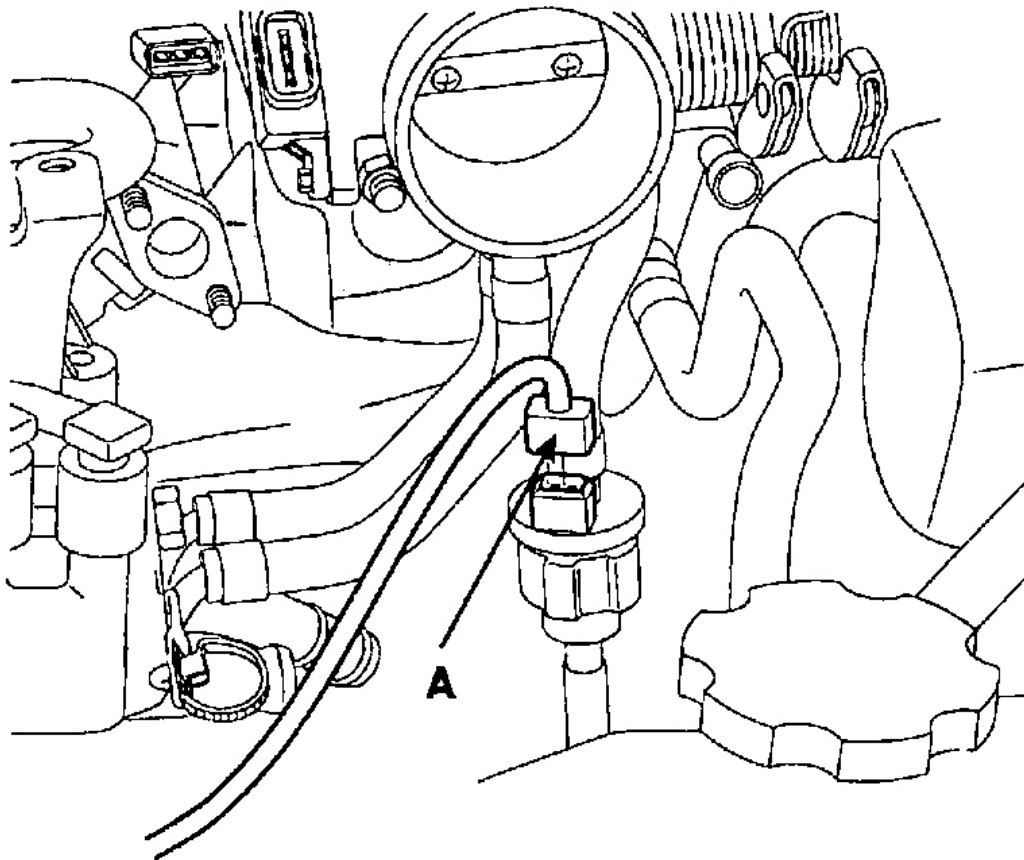
21. Install the fuel inlet hose (A).



G00747480

Fig. 123: Installing Fuel Inlet Hose
Courtesy of HYUNDAI MOTOR CO.

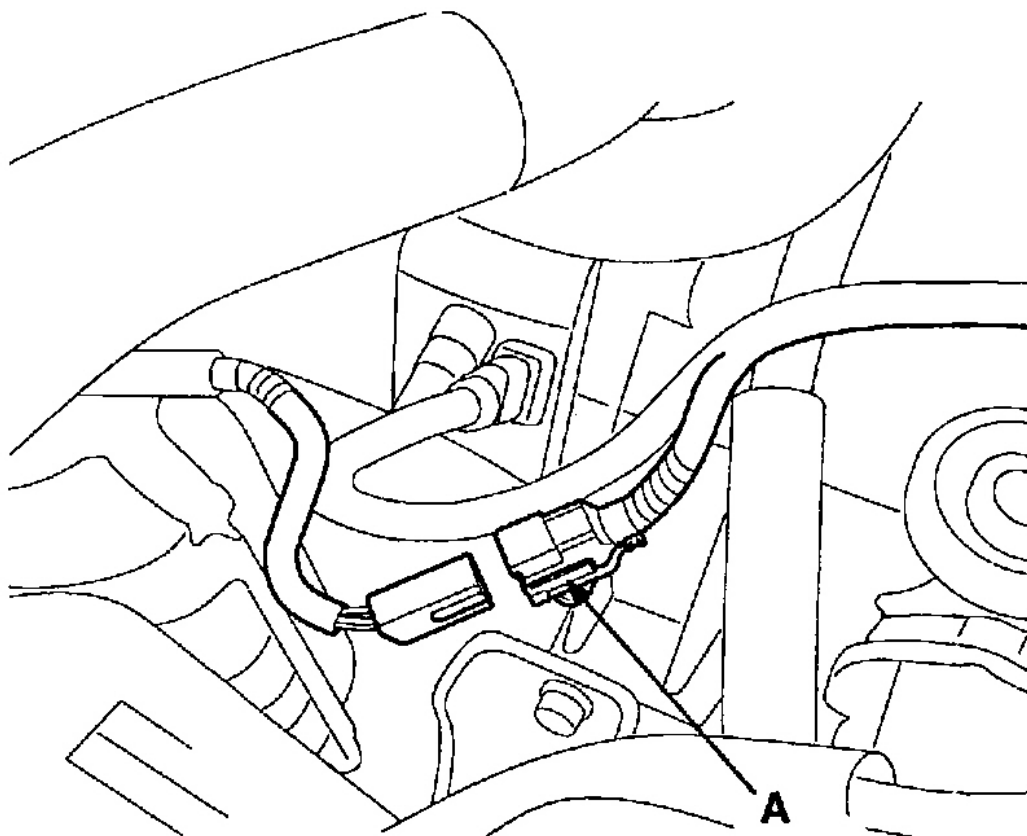
22. Install the engine wire harness connectors and wire harness clamps to the cylinder head and the intake manifold.
 1. PCSV connector (A).



G00747481

Fig. 124: Installing Engine Harness Connectors (1 Of 5)
Courtesy of HYUNDAI MOTOR CO.

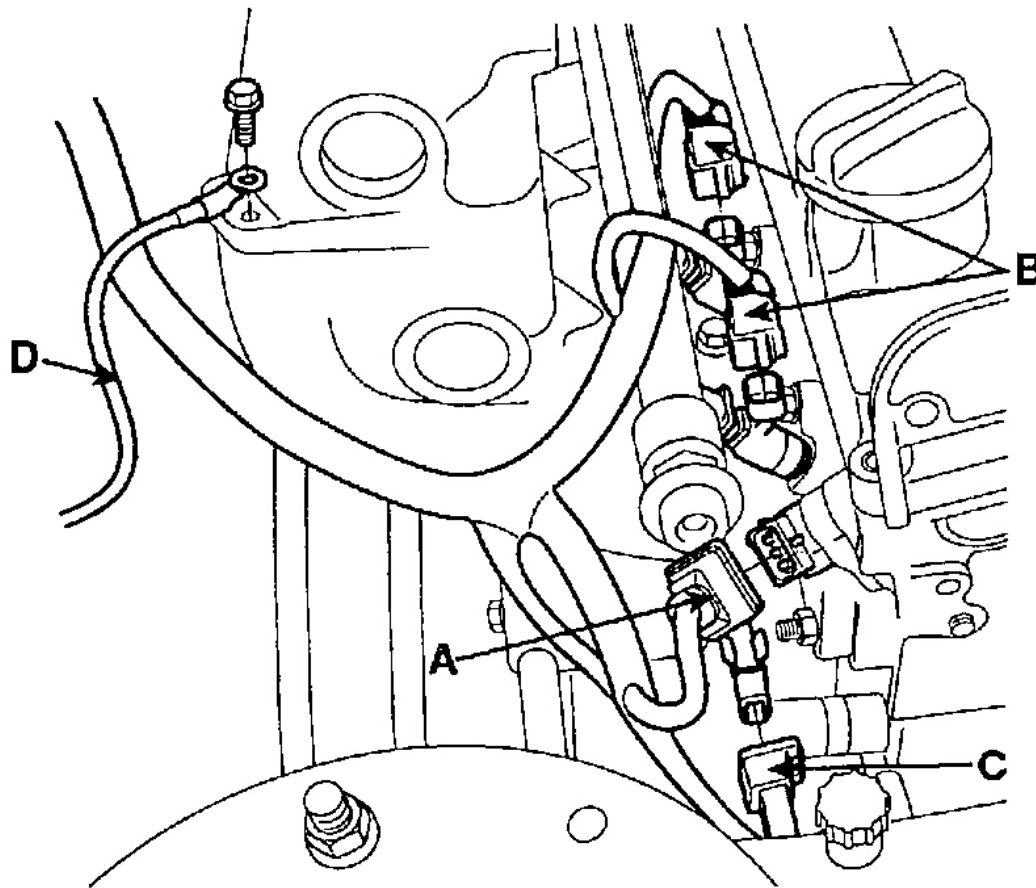
2. Front heated oxygen sensor connector (A).



G00747482

Fig. 125: Installing Engine Harness Connectors (2 Of 5)
Courtesy of HYUNDAI MOTOR CO.

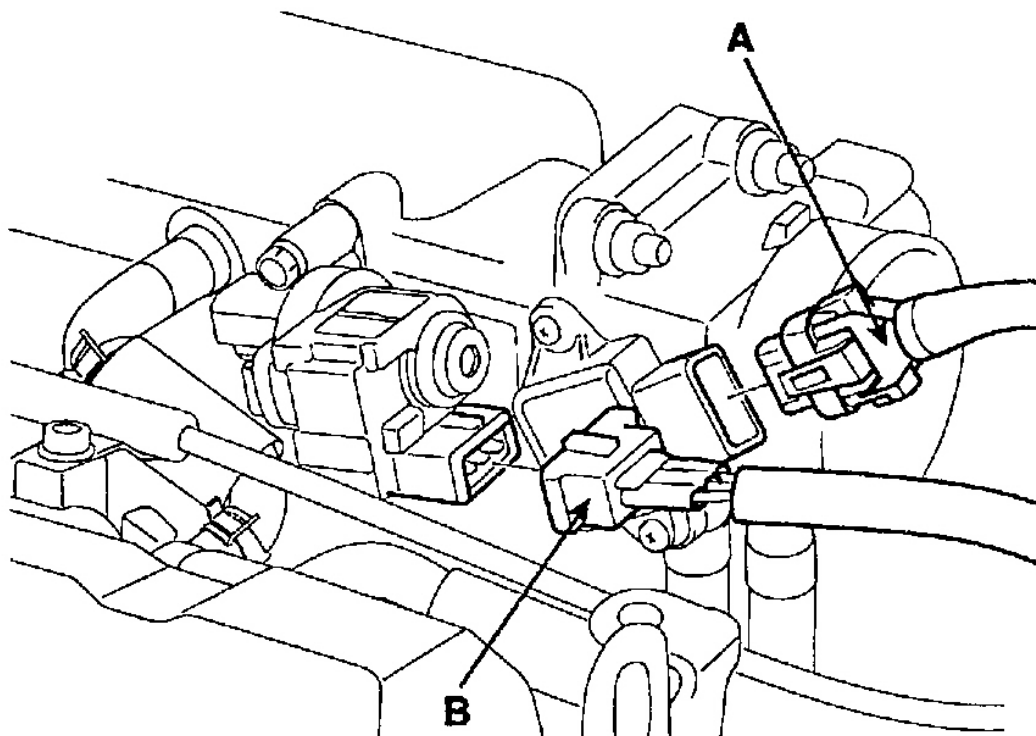
3. Connect the ground cable to the intake manifold (D).
4. Knock sensor connector (C).
5. Four fuel injector connectors (B).
6. CMP connector (A).



G00747483

Fig. 126: Installing Engine Harness Connectors (3 Of 5)
Courtesy of HYUNDAI MOTOR CO.

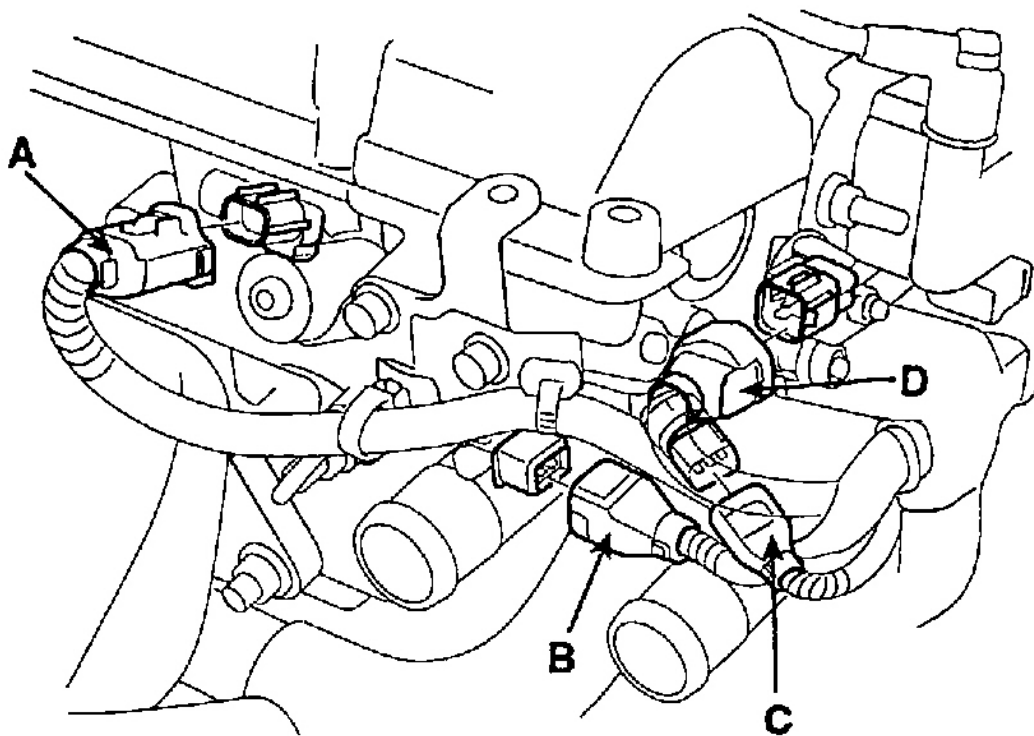
7. ISA connector (B).
8. TPS connector (A).



G00747484

Fig. 127: Installing Engine Harness Connectors (4 Of 5)
Courtesy of HYUNDAI MOTOR CO.

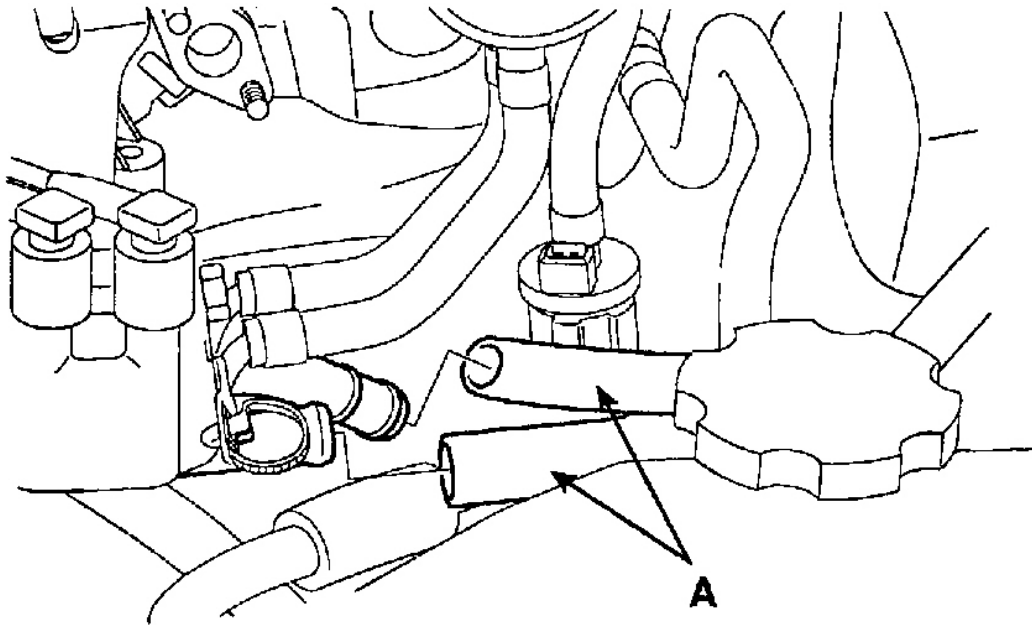
- 9. Ignition coil connector (D).
- 10. ECT sensor connector (C).
- 11. Oil temperature sensor connector (B).
- 12. OCV connector (A).



G00747485

Fig. 128: Installing Engine Harness Connectors (5 Of 5)
Courtesy of HYUNDAI MOTOR CO.

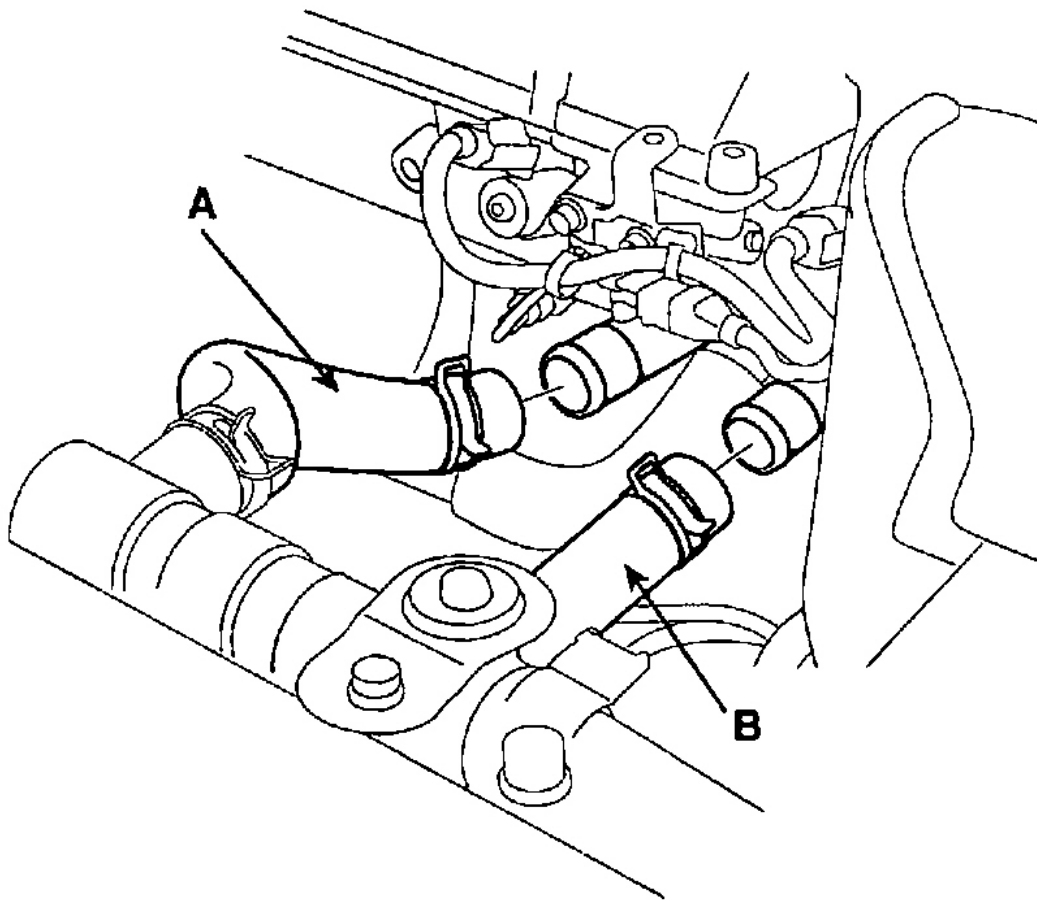
23. Install the heater hoses (A).



G00747486

Fig. 129: Installing Heater Hoses
Courtesy of HYUNDAI MOTOR CO.

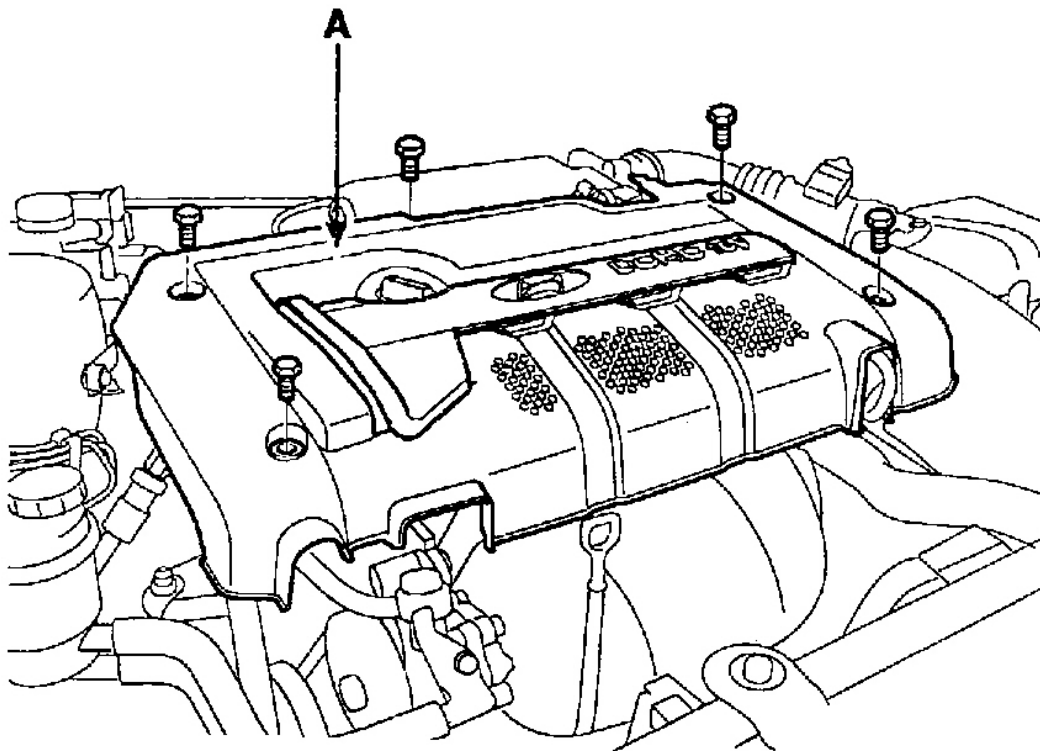
24. Install the upper radiator hose (A) and lower radiator hose (B).



G00747487

Fig. 130: Installing Upper & Lower Radiator Hoses
Courtesy of HYUNDAI MOTOR CO.

25. Install the intake air hose and air cleaner assembly.
26. Install the engine cover (A).



G00747488

Fig. 131: Installing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

27. Connect the negative terminal to the battery.
28. Fill with engine coolant.
29. Start the engine and check for leaks.
30. Recheck engine coolant level and oil level.

ENGINE AND TRANSAXLE ASSEMBLY

REMOVAL

CAUTION:

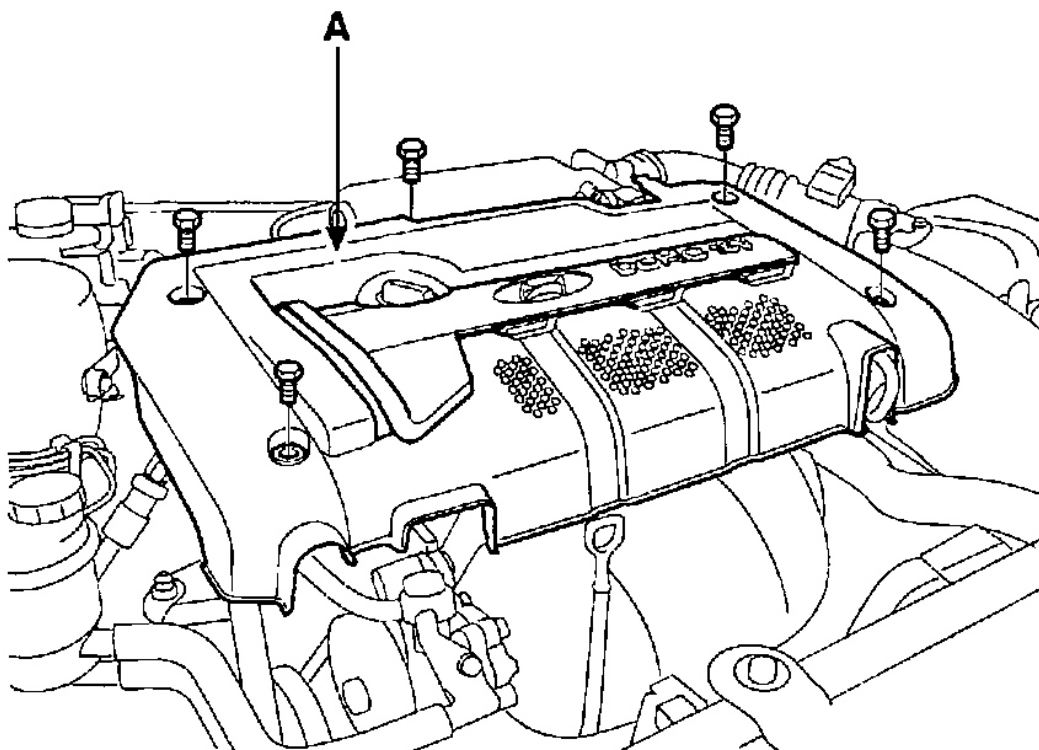
- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

NOTE:

- Mark all wiring and hoses to avoid misconnection.

- Inspection the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center. See Fig. 17.

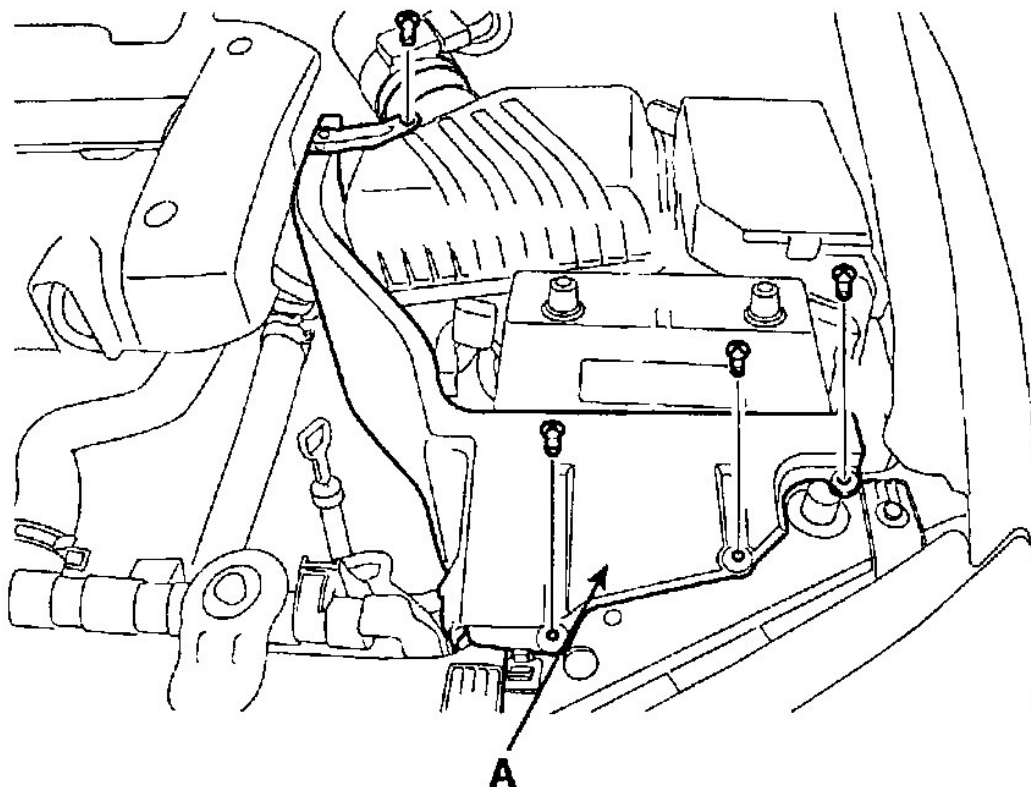
1. Disconnect the negative terminal from the battery.
2. Remove the engine cover.



G00747490

Fig. 132: Removing Engine Cover
Courtesy of HYUNDAI MOTOR CO.

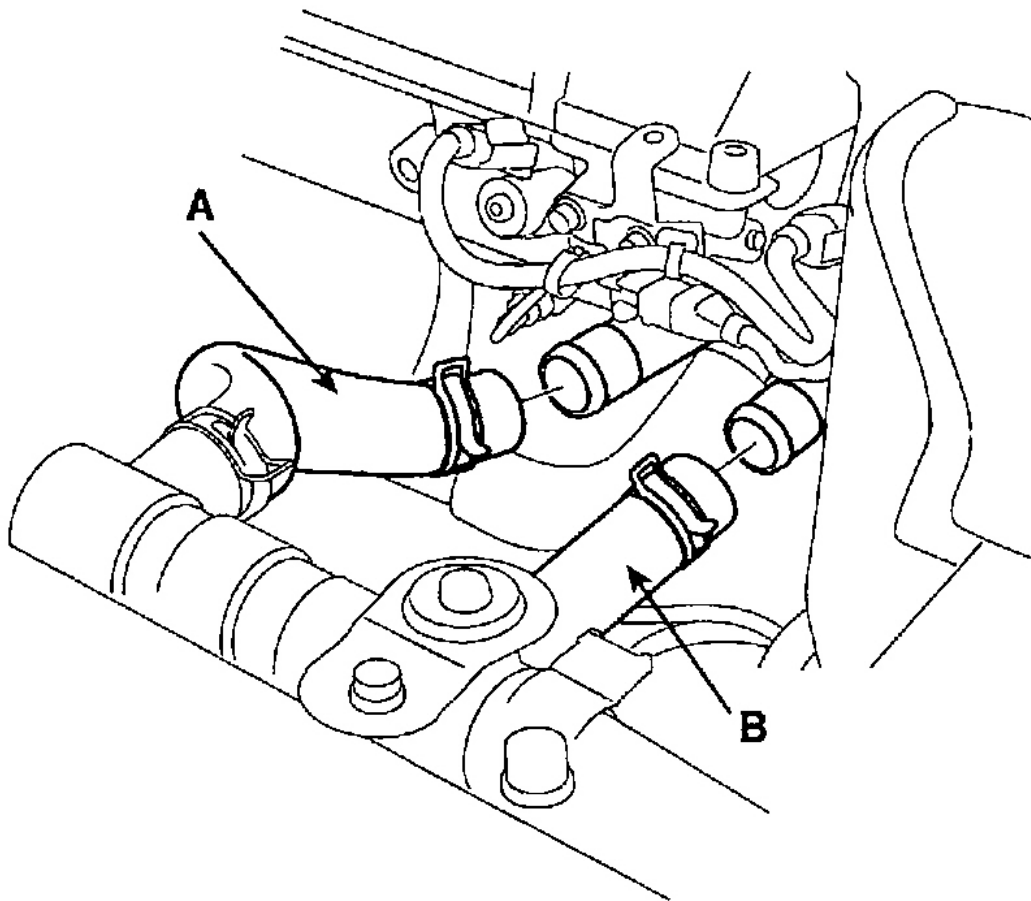
3. Drain the engine coolant. See ENGINE COOLANT REFILLING AND BLEEDING. Remove the radiator cap to speed draining.
4. Remove the intake air hose and air cleaner assembly.
 1. Remove the heat shield (A).



G00747491

Fig. 133: Removing Heat Shield
Courtesy of HYUNDAI MOTOR CO.

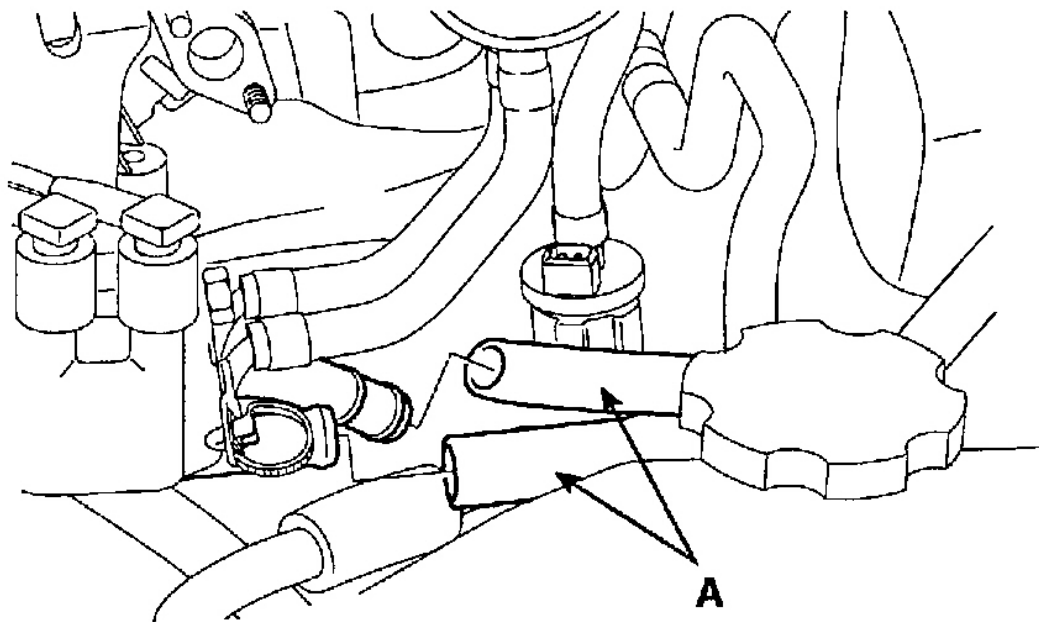
2. Disconnect the AFS connector.
3. Disconnect the breather hose from air cleaner hose.
4. Remove the intake air hose and air cleaner.
5. Remove the upper radiator hose (A) and lower radiator hose (B).



G00747492

Fig. 134: Removing Upper & Lower Radiator Hoses
Courtesy of HYUNDAI MOTOR CO.

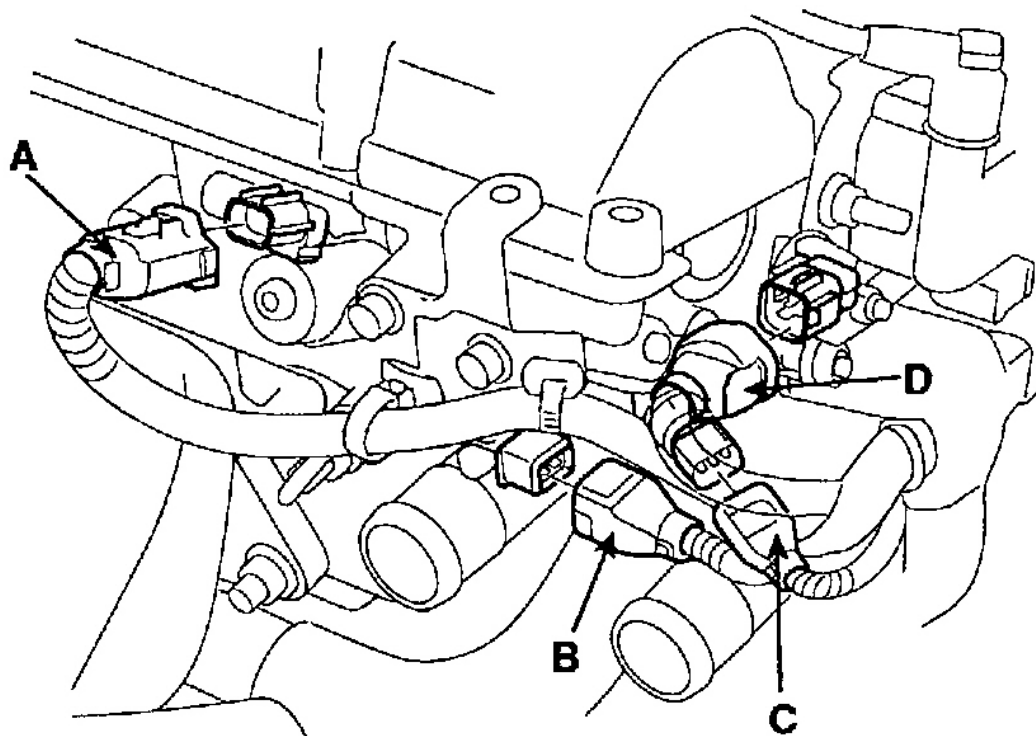
6. Remove the heater hoses (A).



G00747493

Fig. 135: Removing Heater Hoses
Courtesy of HYUNDAI MOTOR CO.

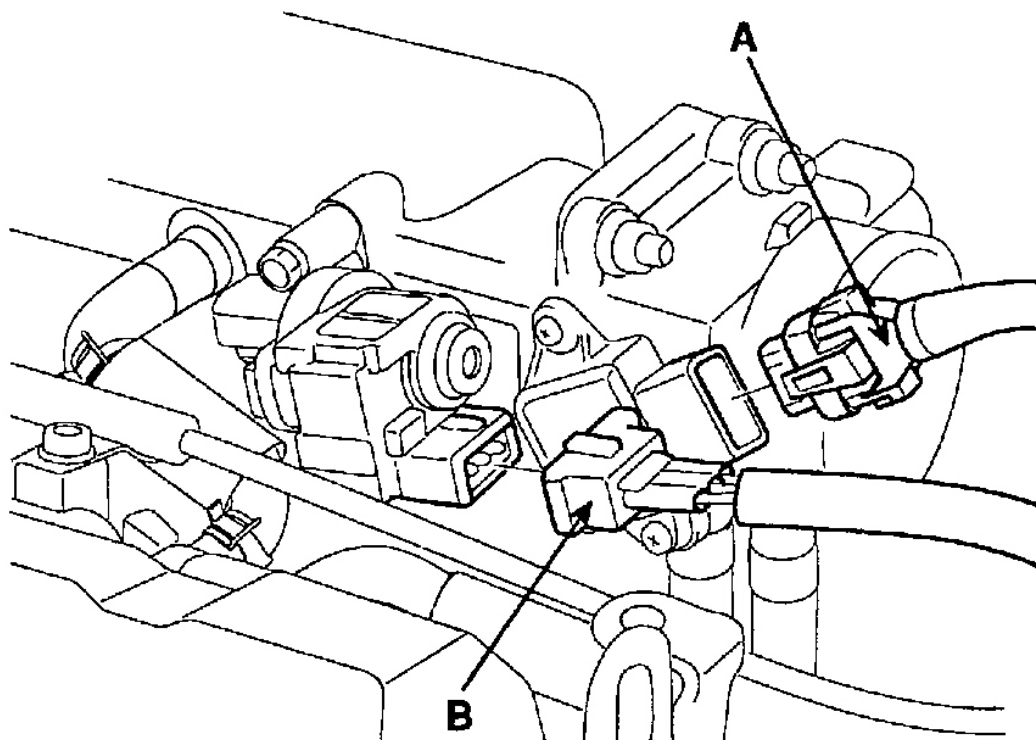
7. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.
 1. OCV (Oil Control Valve) connector (A).
 2. Oil temperature sensor connector (B).
 3. ECT (Engine Coolant Temperature) sensor (C) connector.
 4. Ignition coil connector (D).



G00747494

Fig. 136: Removing Engine Harness Connectors (1 Of 5)
Courtesy of HYUNDAI MOTOR CO.

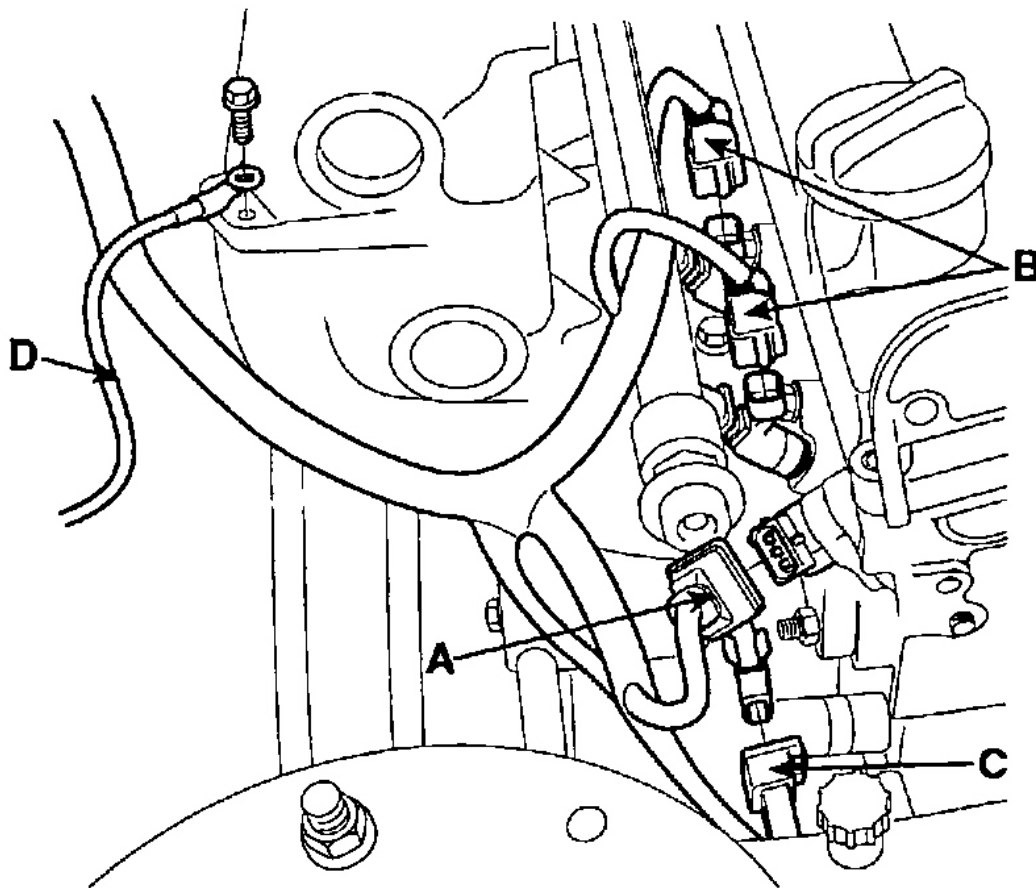
5. TPS (Throttle Position Sensor) connector (A).
6. ISA (Idle Speed Actuator) connector (B).



G00747495

Fig. 137: Removing Engine Harness Connectors (2 Of 5)
Courtesy of HYUNDAI MOTOR CO.

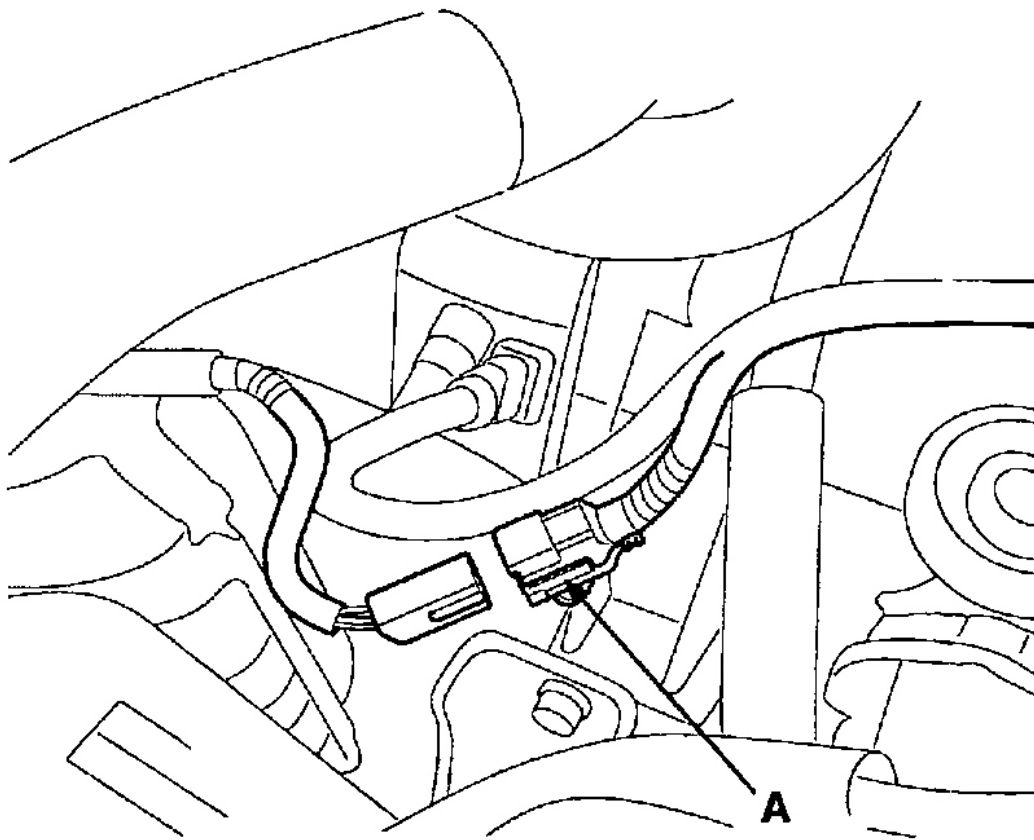
7. CMP (Camshaft Position Sensor) connector (A).
8. Four fuel injector connectors (B).
9. Knock sensor connector (C).
10. Disconnect ground cable (D) from the intake manifold.



G00747496

Fig. 138: Removing Engine Harness Connectors (3 Of 5)
Courtesy of HYUNDAI MOTOR CO.

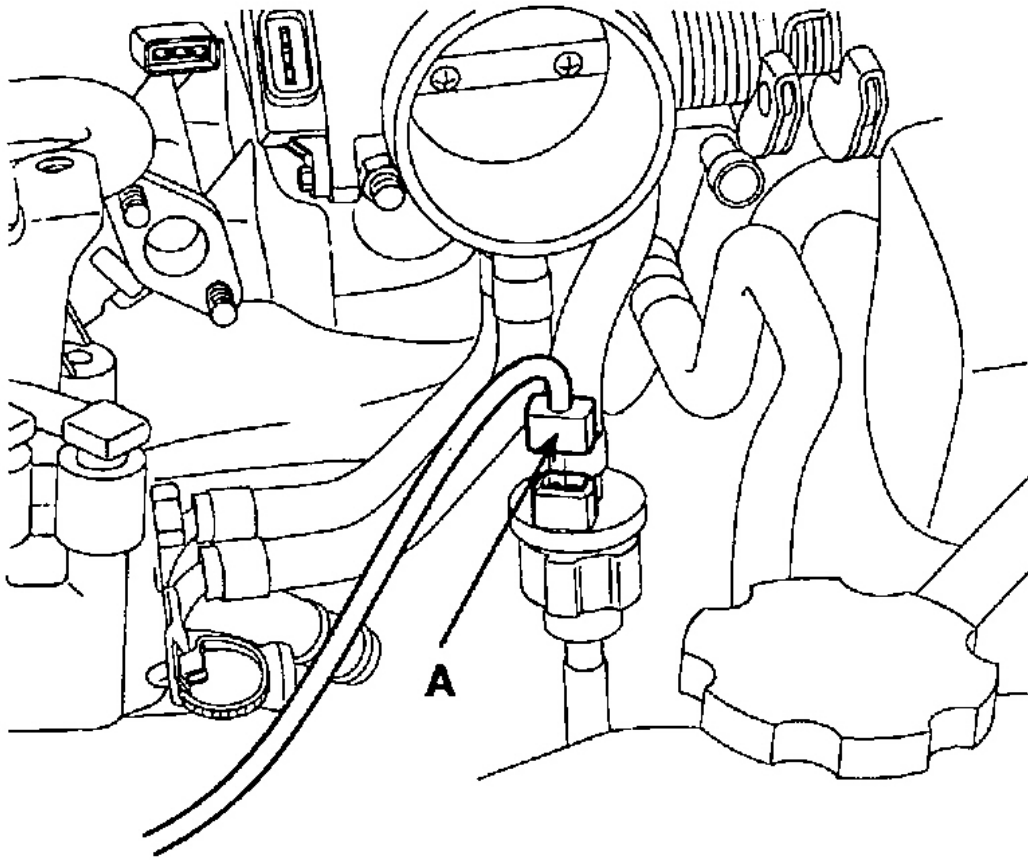
11. Front heated oxygen sensor (A) connector.



G00747497

Fig. 139: Removing Engine Harness Connectors (4 Of 5)
Courtesy of HYUNDAI MOTOR CO.

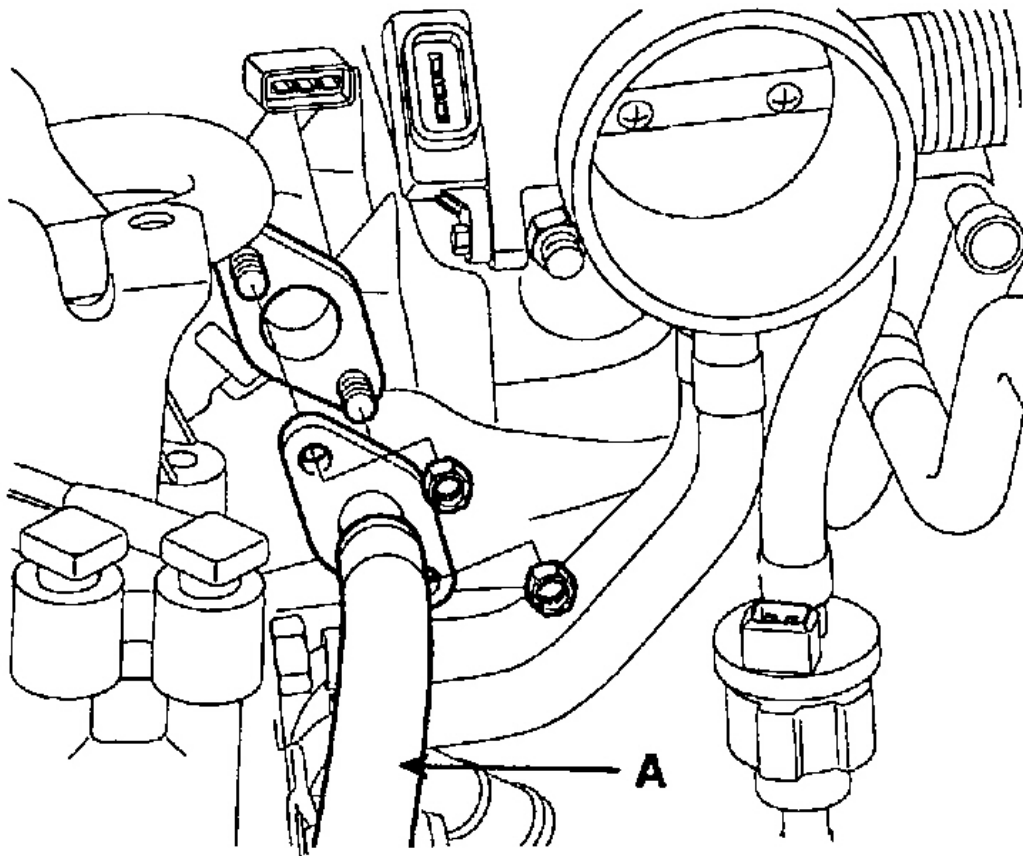
12. PCSV (Purge Control Solenoid Valve) (A) connector.



G00747498

Fig. 140: Removing Engine Harness Connectors (5 Of 5)
Courtesy of HYUNDAI MOTOR CO.

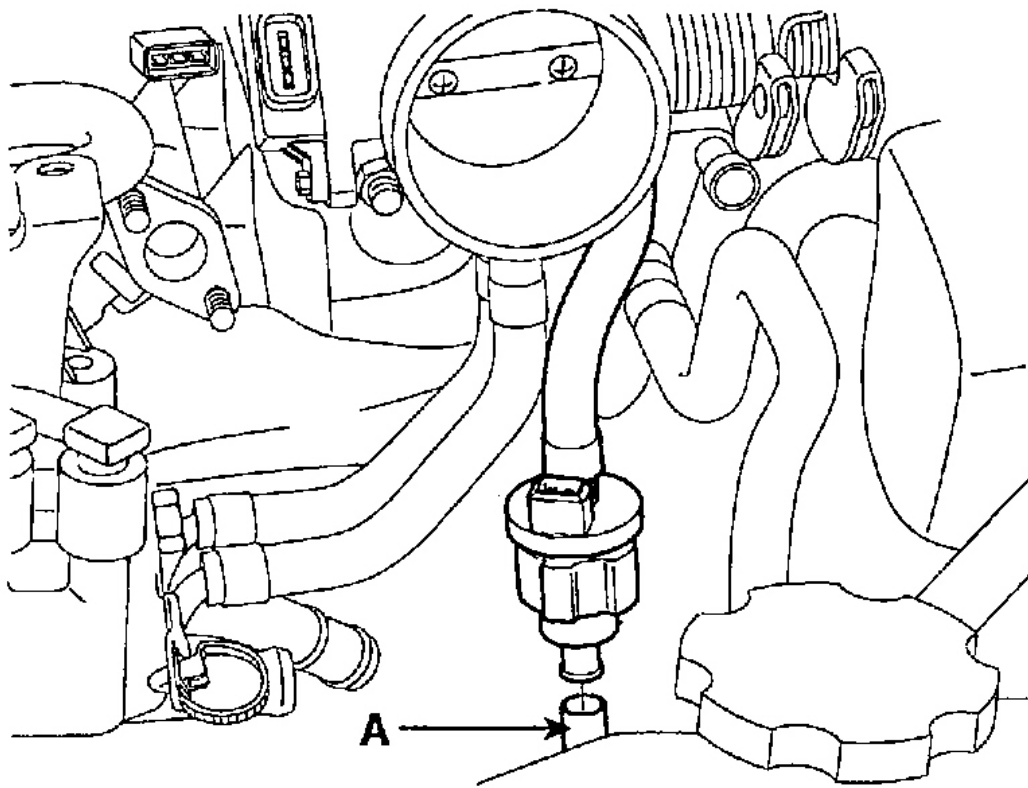
8. Remove the fuel inlet from delivery pipe (A).



G00747499

Fig. 141: Removing Fuel Inlet Hose
Courtesy of HYUNDAI MOTOR CO.

9. Remove the PCSV hose (A).



G00747500

Fig. 142: Removing PCSV Hose
Courtesy of HYUNDAI MOTOR CO.

10. Remove the brake booster vacuum hose (A).

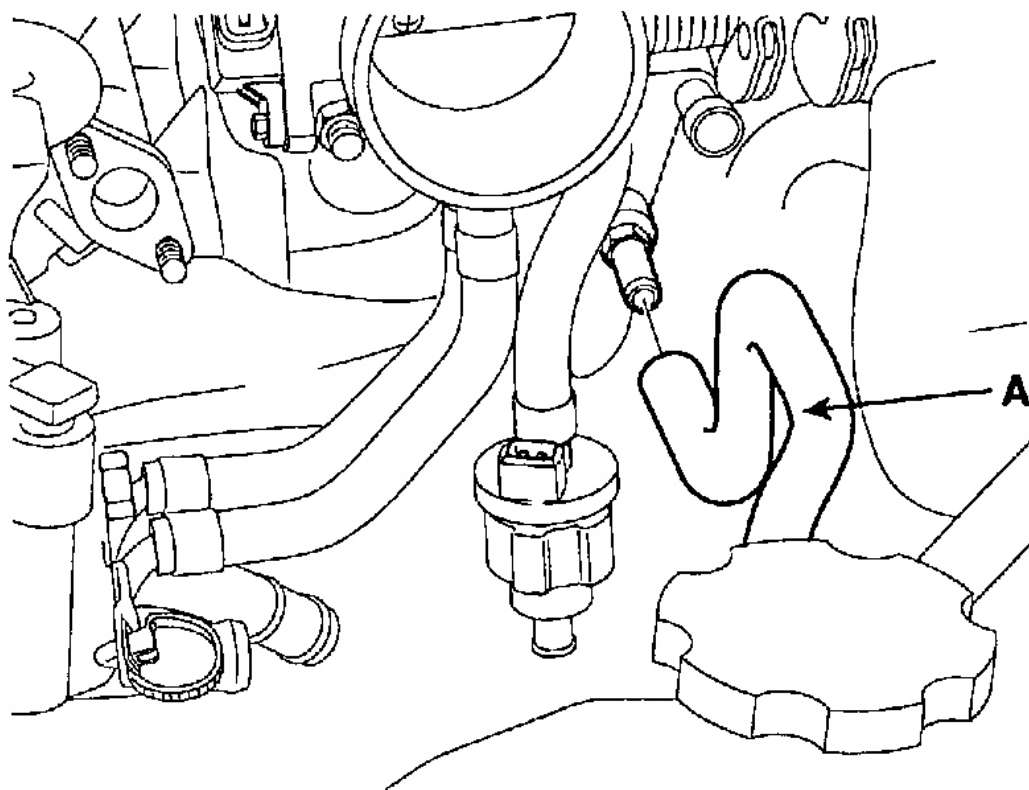
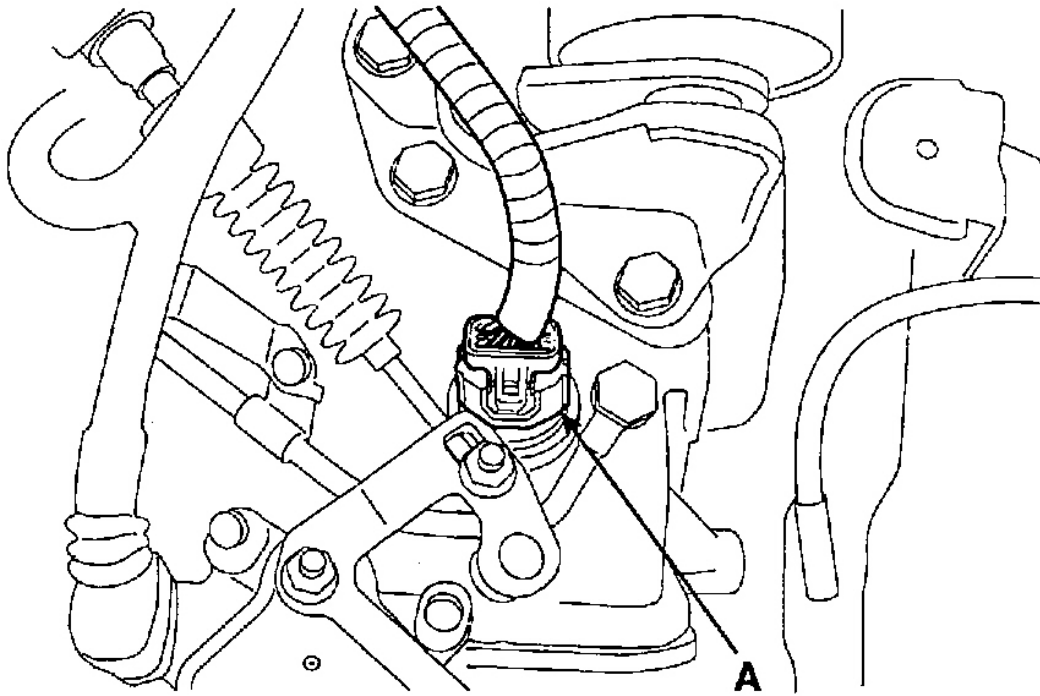
**G00747501**

Fig. 143: Removing Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

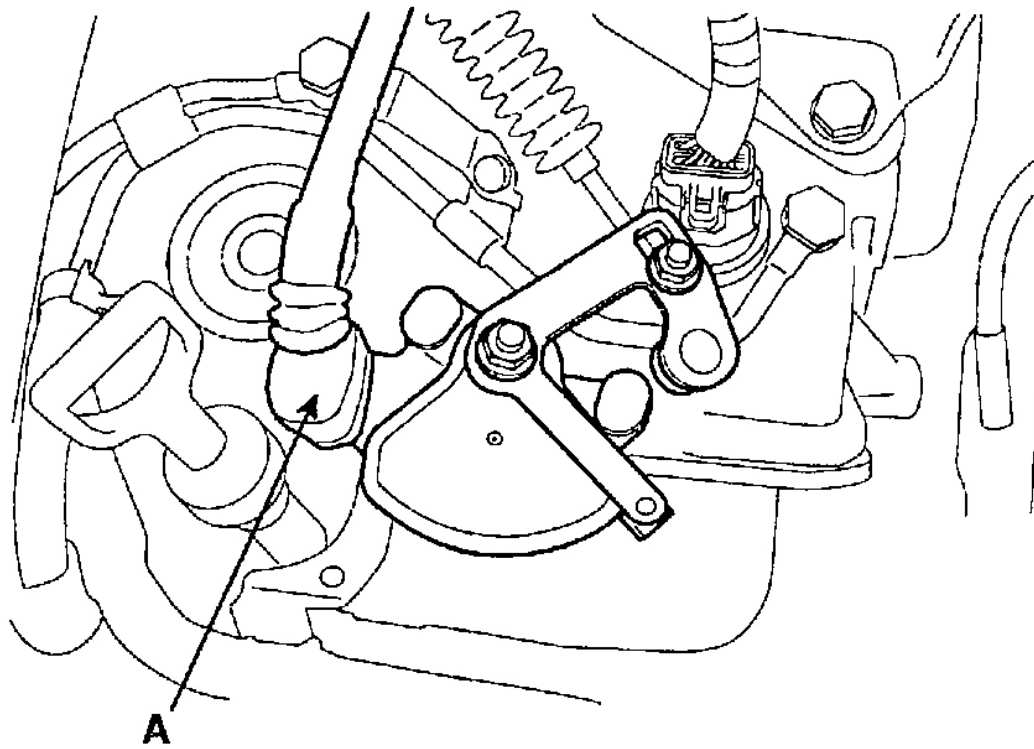
11. Remove the accelerator cable by loosening the lock nut, then slip the cable end out of the throttle linkage.
12. Remove the power steering pump. See power steering pump .
13. Disconnect the inhibitor switch and solenoid valve connector (A).



G00747502

Fig. 144: Disconnecting Inhibitor Switch
Courtesy of HYUNDAI MOTOR CO.

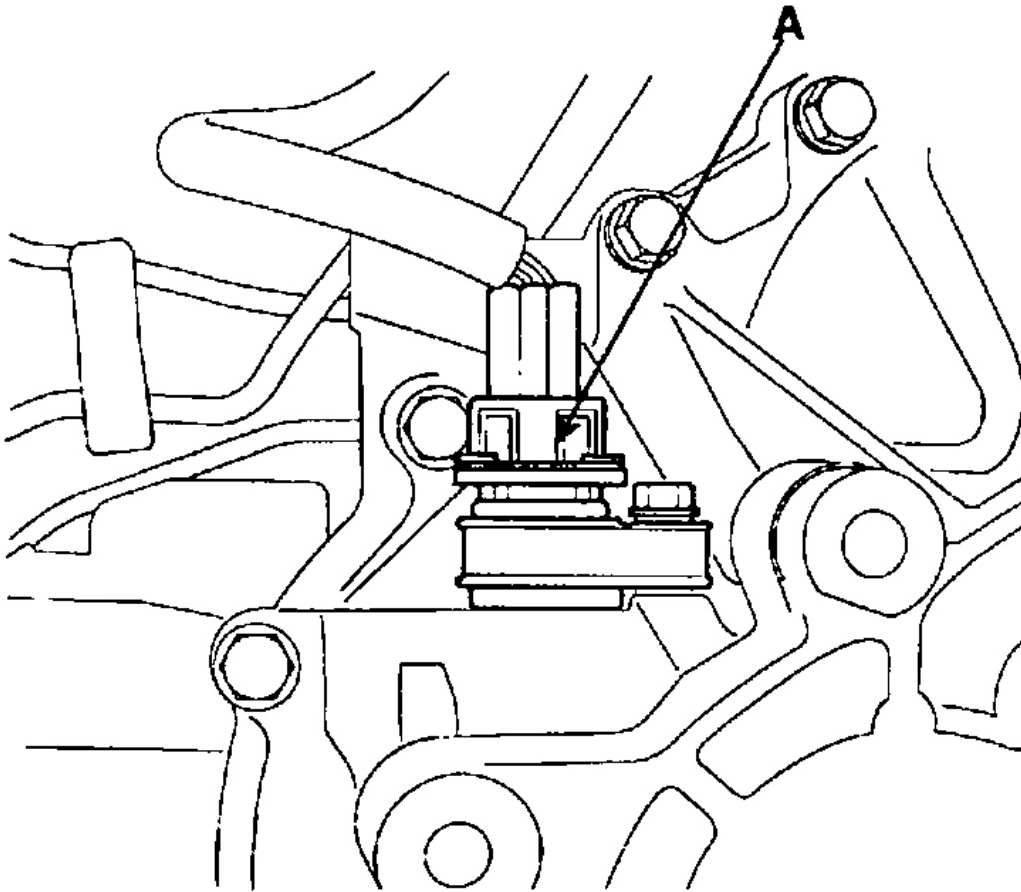
14. Remove the transaxle range switch connector (A).



G00747503

Fig. 145: Disconnecting Transaxle Range Switch
Courtesy of HYUNDAI MOTOR CO.

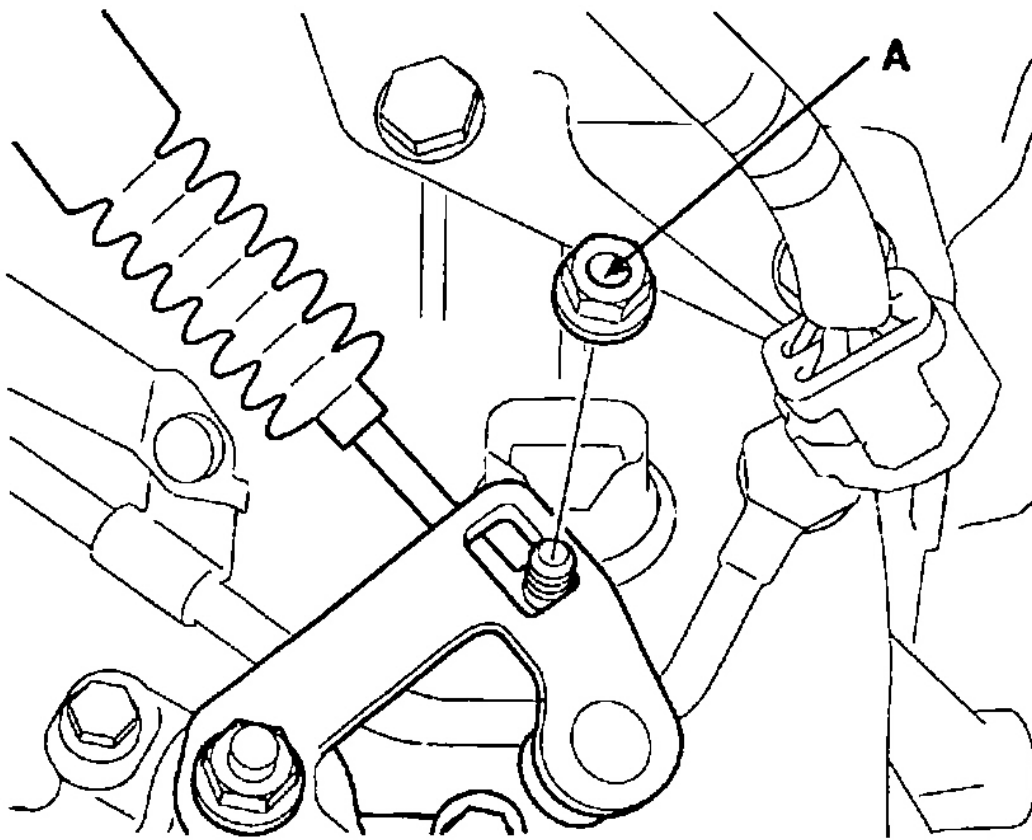
15. Remove the vehicle speed sensor connector (A).



G00747504

Fig. 146: Disconnecting Vehicle Speed Sensor Connector
Courtesy of HYUNDAI MOTOR CO.

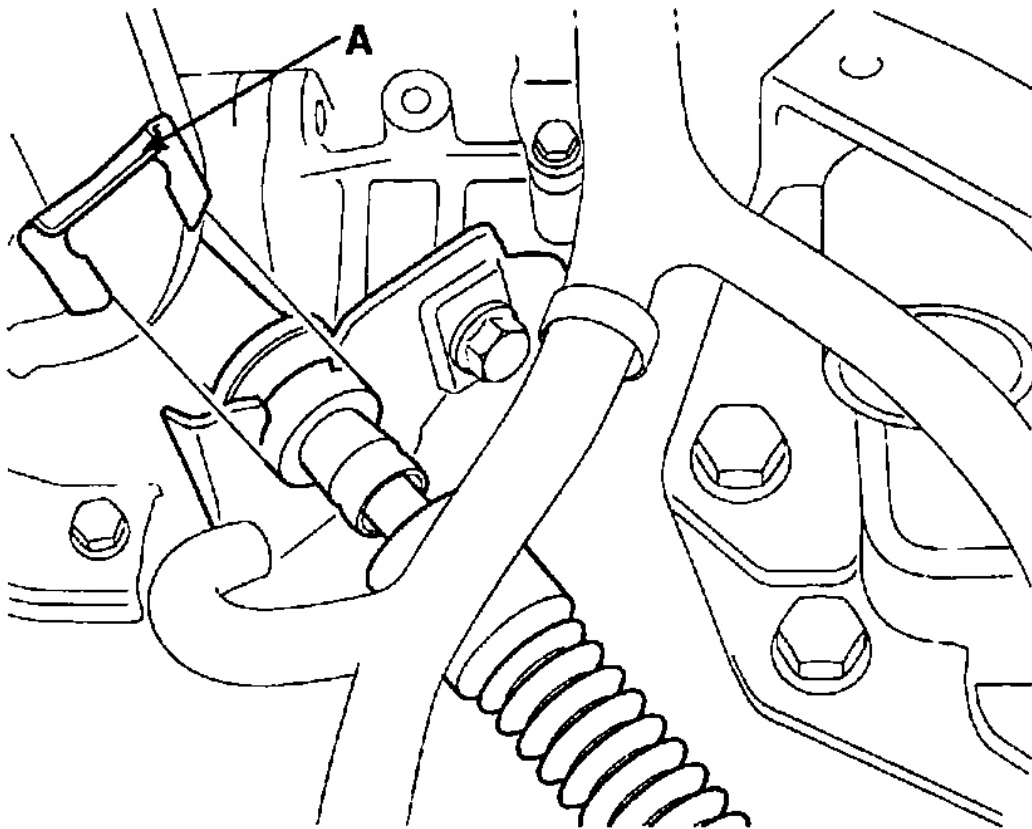
16. Remove the control cable transaxle range switch nut (A).



G00747505

Fig. 147: Removing Selector Cable Retaining Nut
Courtesy of HYUNDAI MOTOR CO.

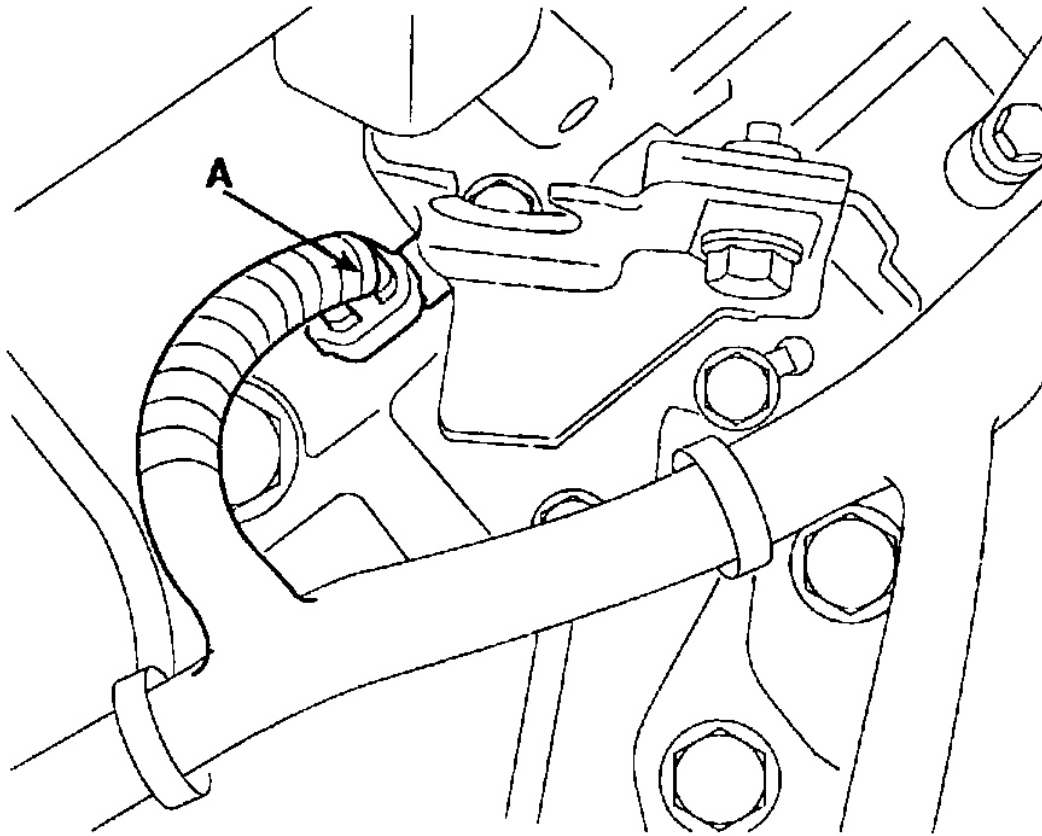
17. Remove the clip (A) of the control cable.



G00747506

Fig. 148: Remove Selector Cable Retaining Clip
Courtesy of HYUNDAI MOTOR CO.

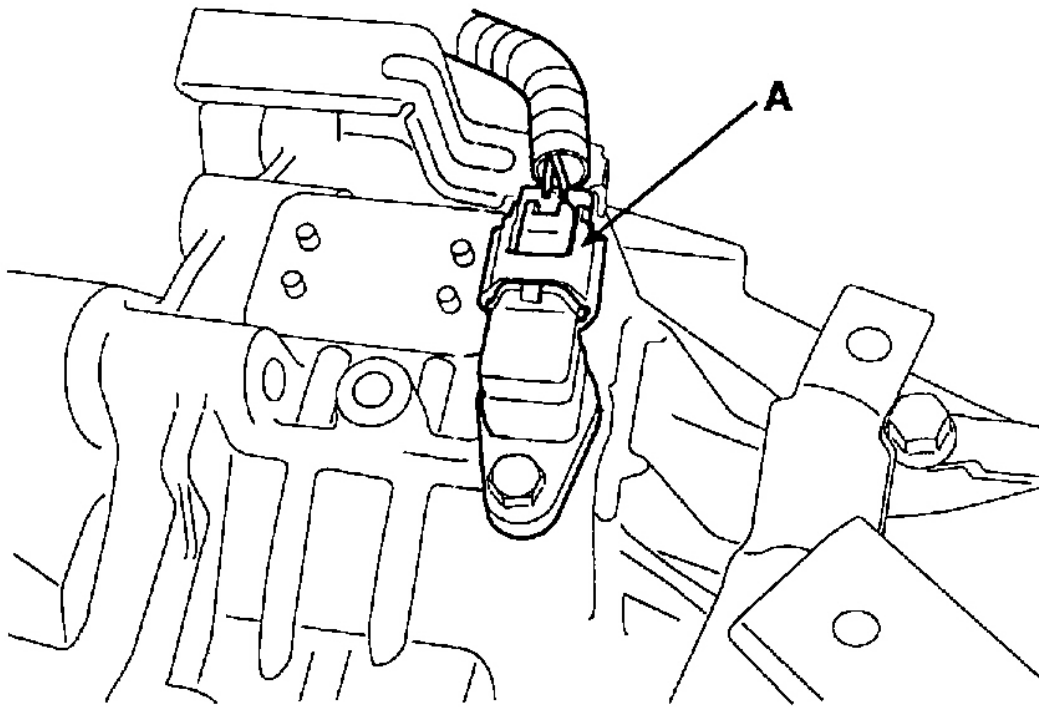
18. Remove the input shaft speed sensor connector (A).



G00747507

Fig. 149: Disconnecting Input Shaft Speed Sensor Connector
Courtesy of HYUNDAI MOTOR CO.

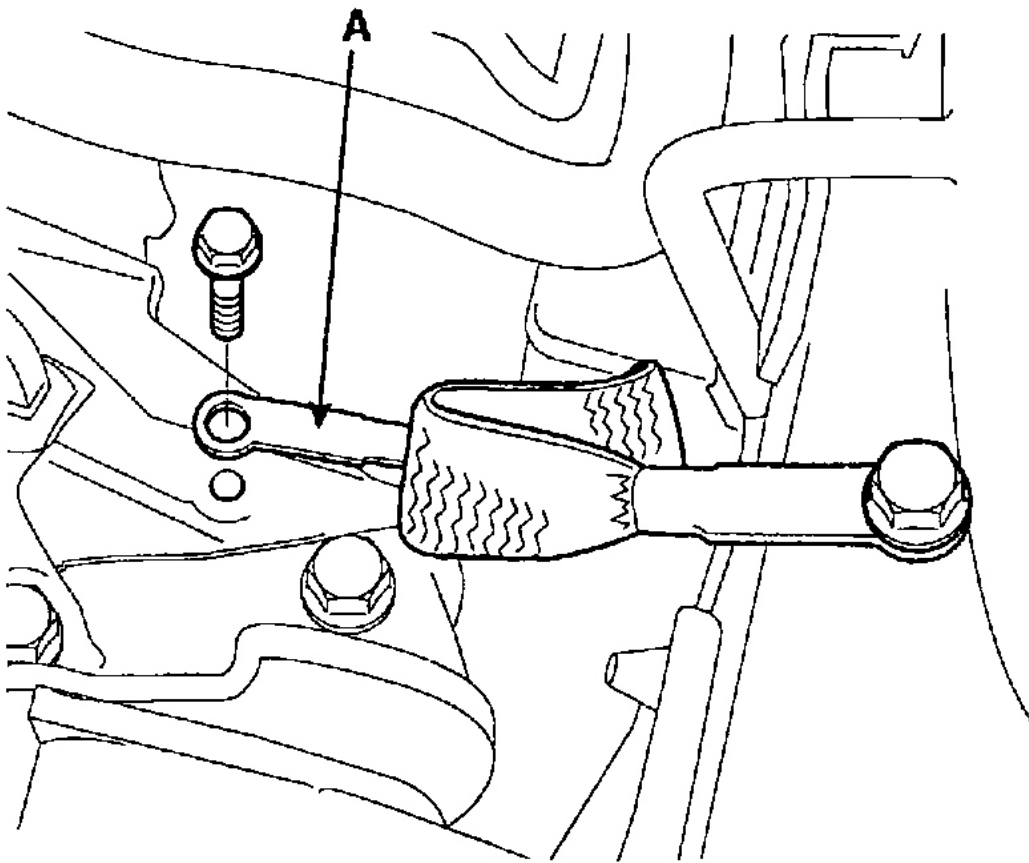
19. Remove the output shaft speed sensor connector (A).



G00747508

Fig. 150: Disconnecting Output Shaft Speed Sensor Connector
Courtesy of HYUNDAI MOTOR CO.

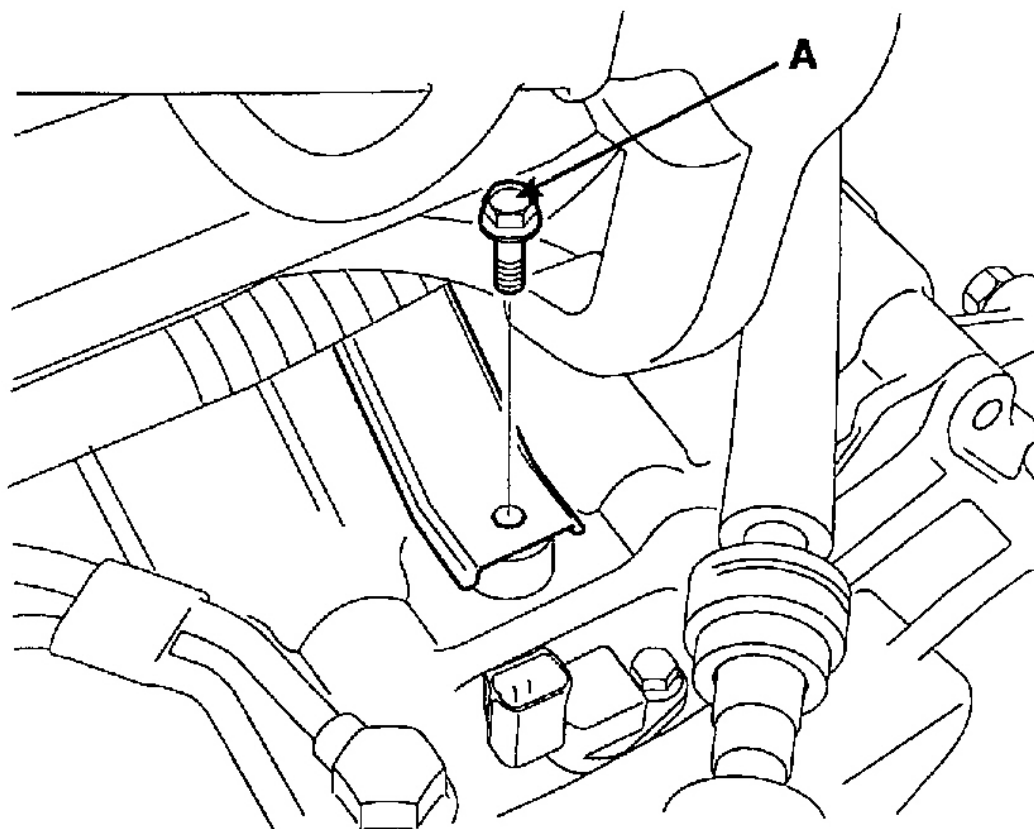
20. Remove the transaxle earth cable (A).



G00747509

Fig. 151: Removing Transaxle Ground Cable
Courtesy of HYUNDAI MOTOR CO.

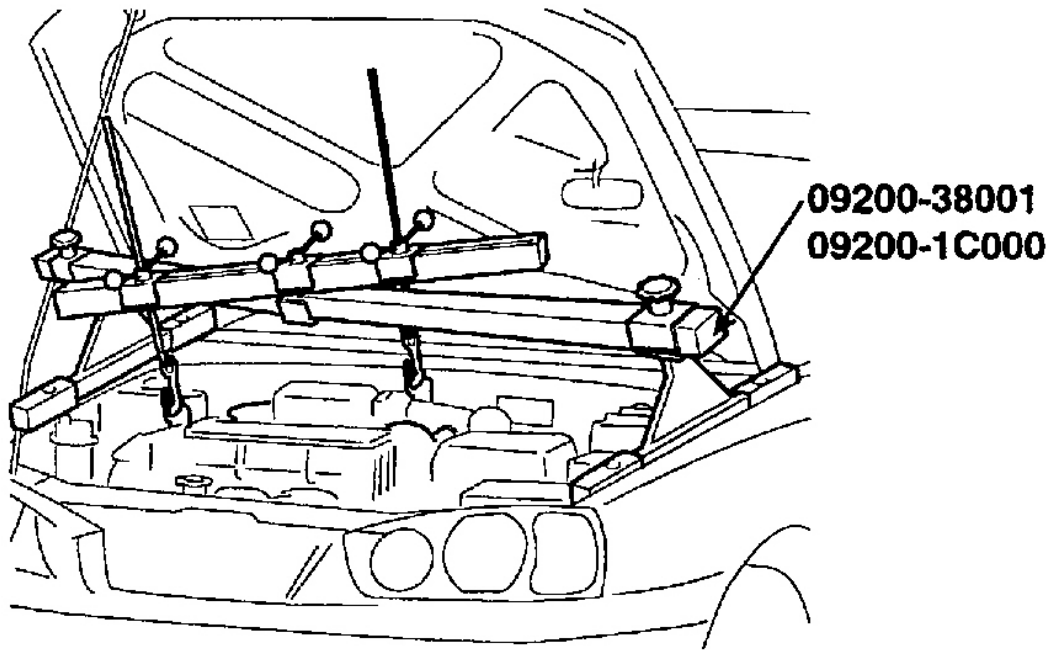
21. Remove the start motor cable mounting bolt (A).



G00747510

Fig. 152: Removing Start Motor Cable Mounting Bolt
Courtesy of HYUNDAI MOTOR CO.

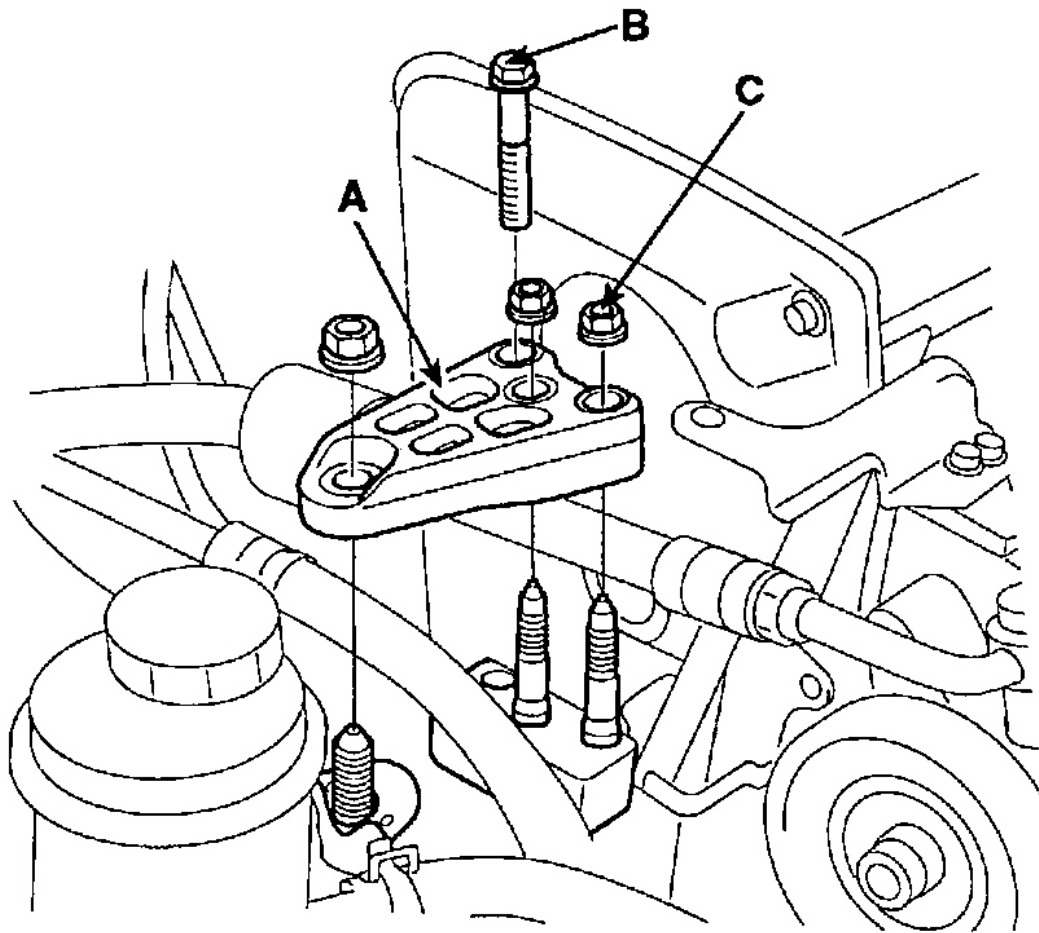
22. Remove the starting motor connector.
23. Remove the alternator connector.
24. Install the SST (09200-38001, 09200-1C000), the engine support fixture and the adapter, on the engine and transaxle assembly.



G00747511

Fig. 153: Installing Engine Supporting Fixture
Courtesy of HYUNDAI MOTOR CO.

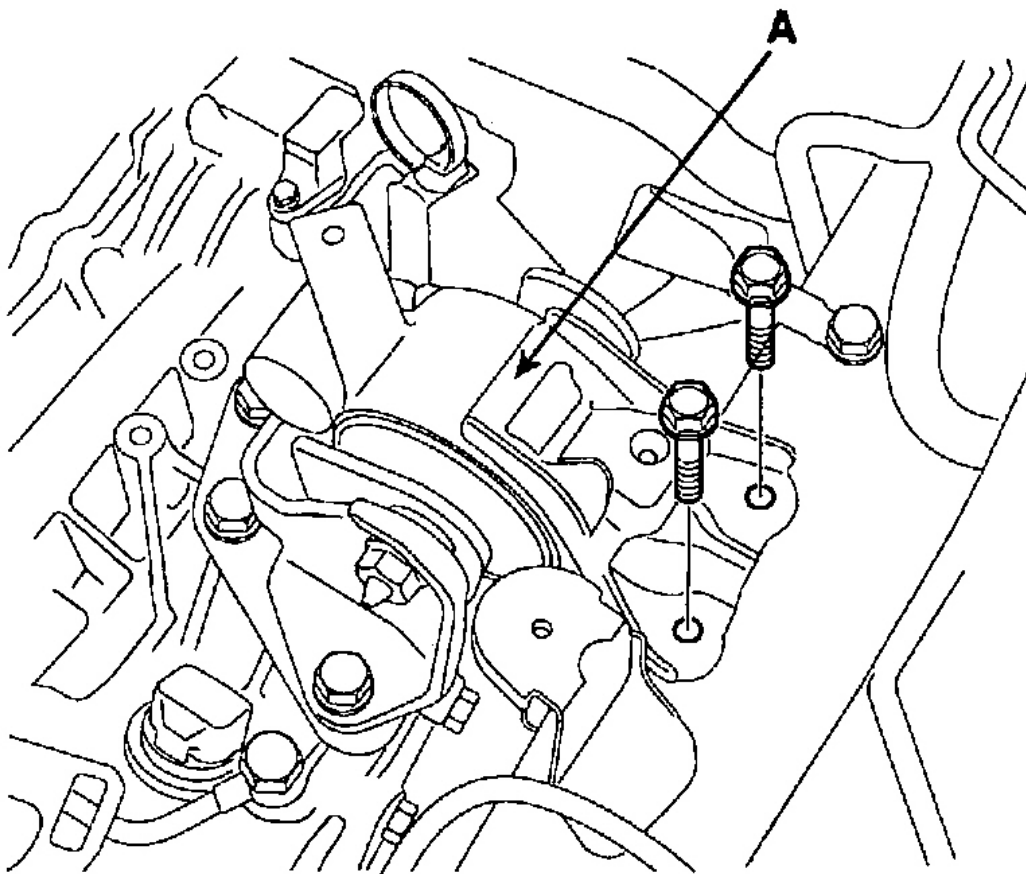
25. Remove the engine mounting bracket (A).



G00747512

Fig. 154: Removing Engine Mount Bracket
Courtesy of HYUNDAI MOTOR CO.

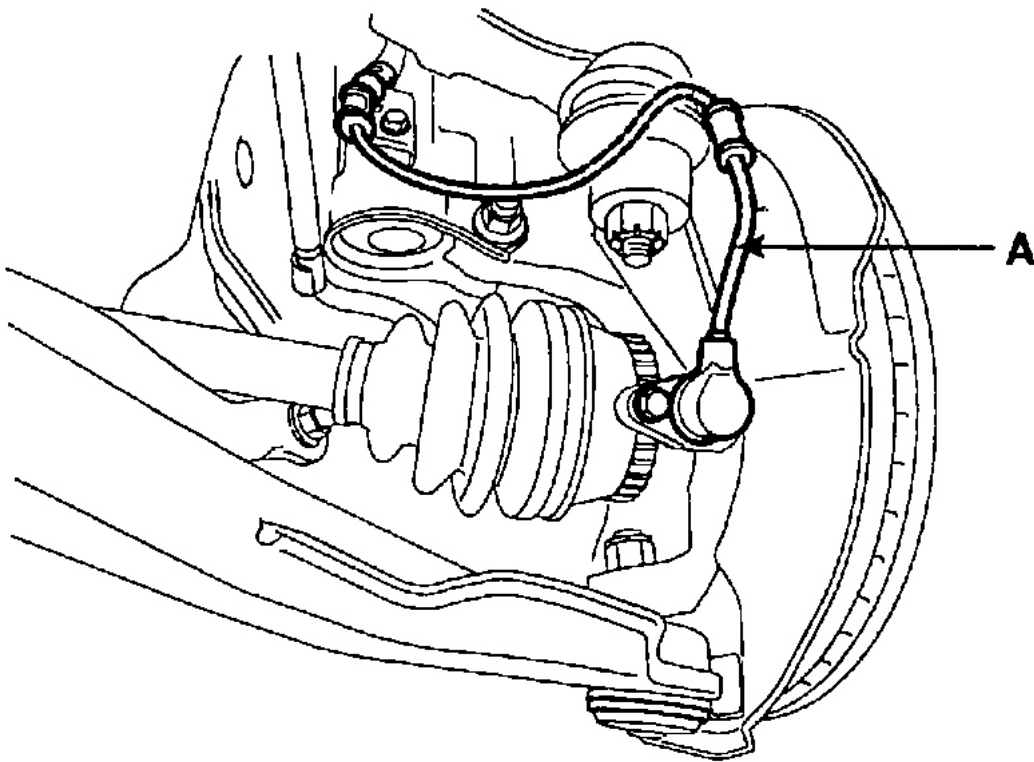
26. Remove the transaxle mounting bracket (A).



G00747513

Fig. 155: Removing Transaxle Mounting Bracket
Courtesy of HYUNDAI MOTOR CO.

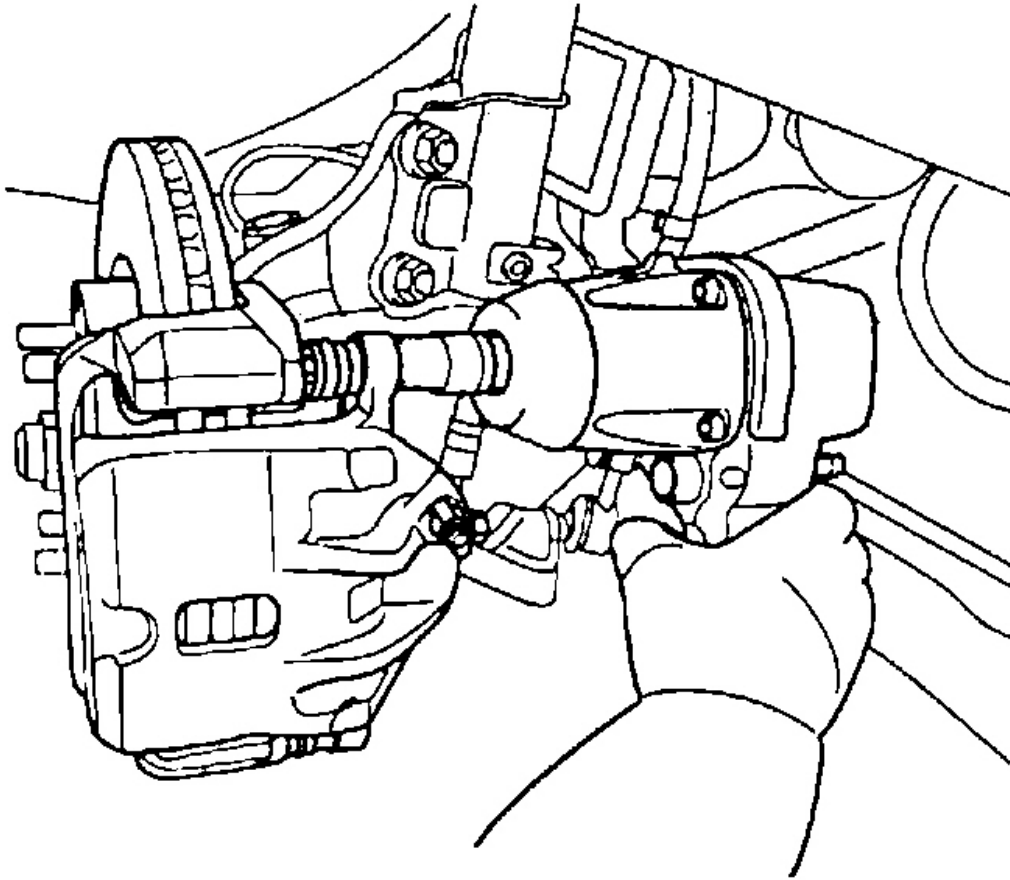
27. Remove the front tires.
28. Remove the ABS wheel speed sensor (A).



G00747514

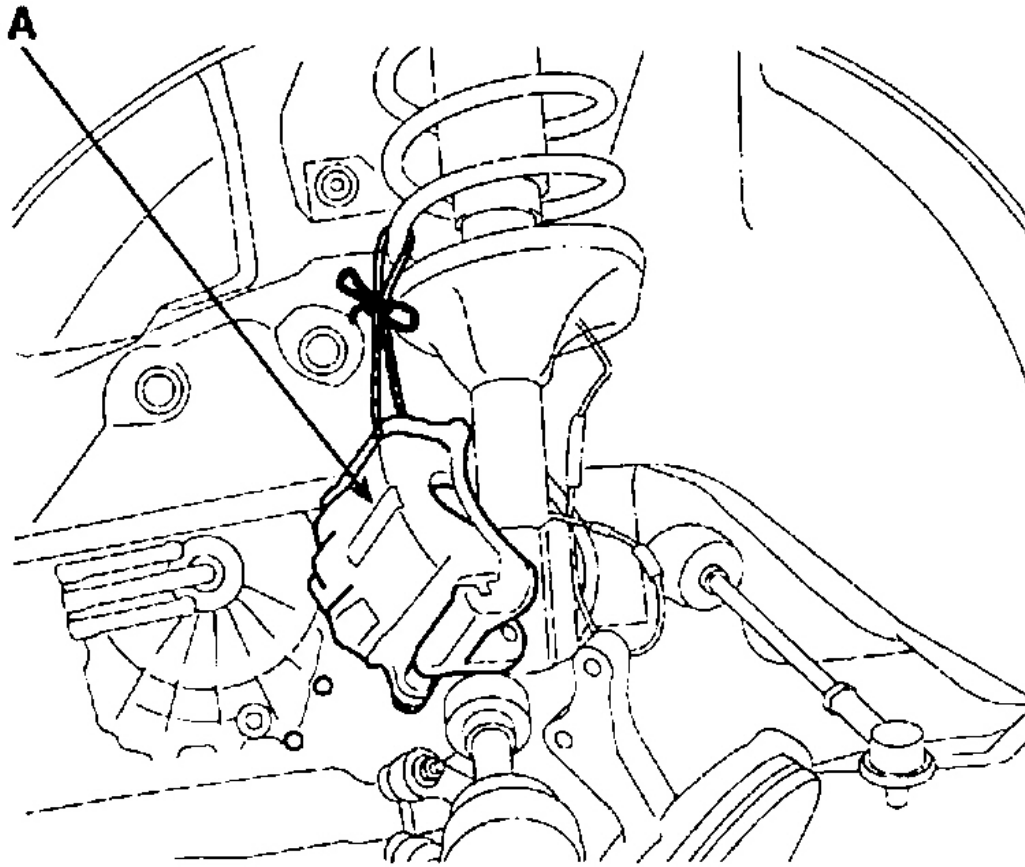
Fig. 156: Removing ABS Wheel Speed Sensor
Courtesy of HYUNDAI MOTOR CO.

29. Remove the caliper and hang the caliper assembly (A).



G00747515

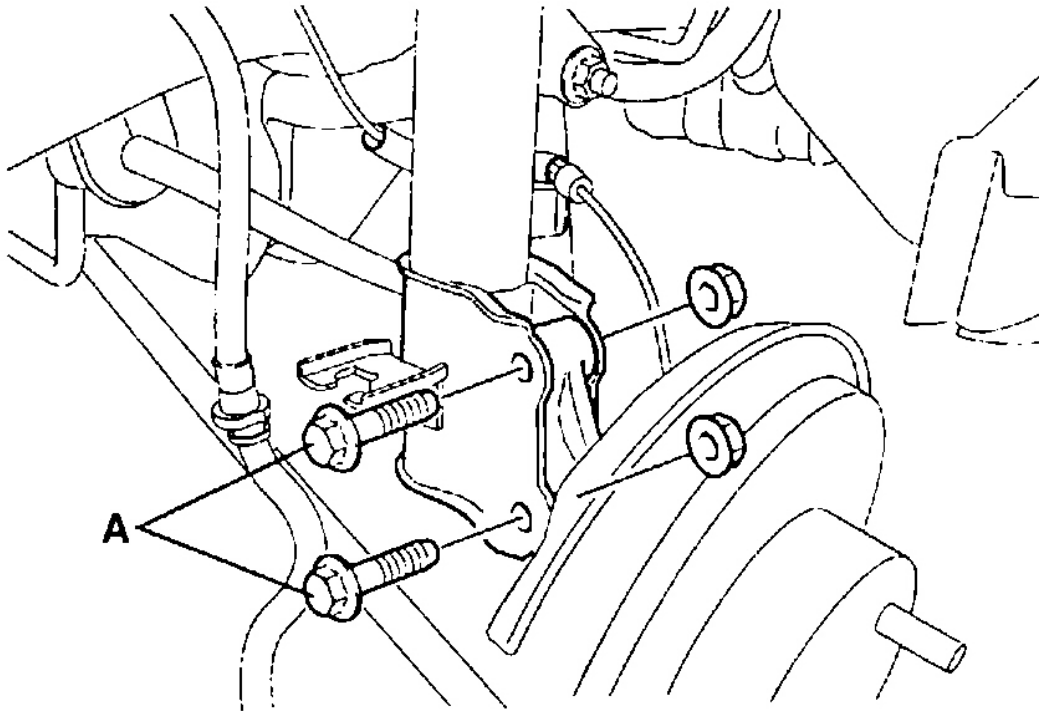
Fig. 157: Removing Caliper Assembly
Courtesy of HYUNDAI MOTOR CO.



G00747516

Fig. 158: Supporting Caliper Assembly
Courtesy of HYUNDAI MOTOR CO.

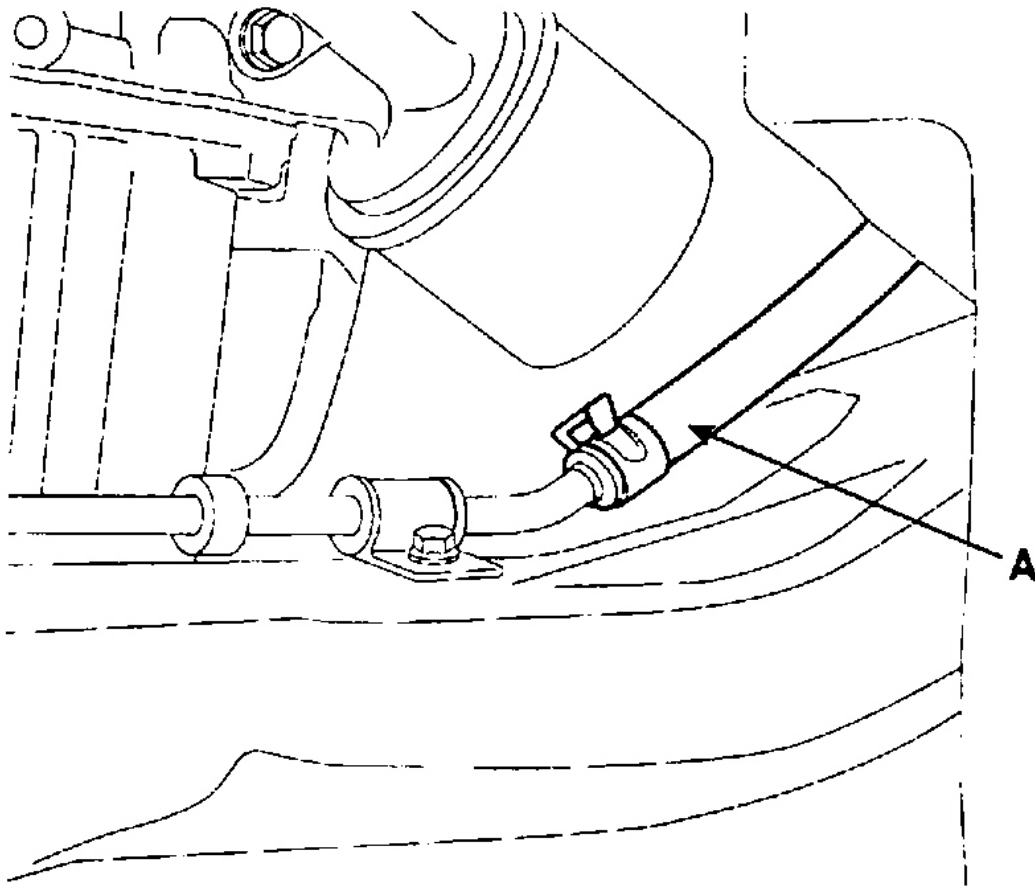
30. Remove the knuckle mounting bolts (A).



G00747517

Fig. 159: Removing Steering Knuckle Bolts
Courtesy of HYUNDAI MOTOR CO.

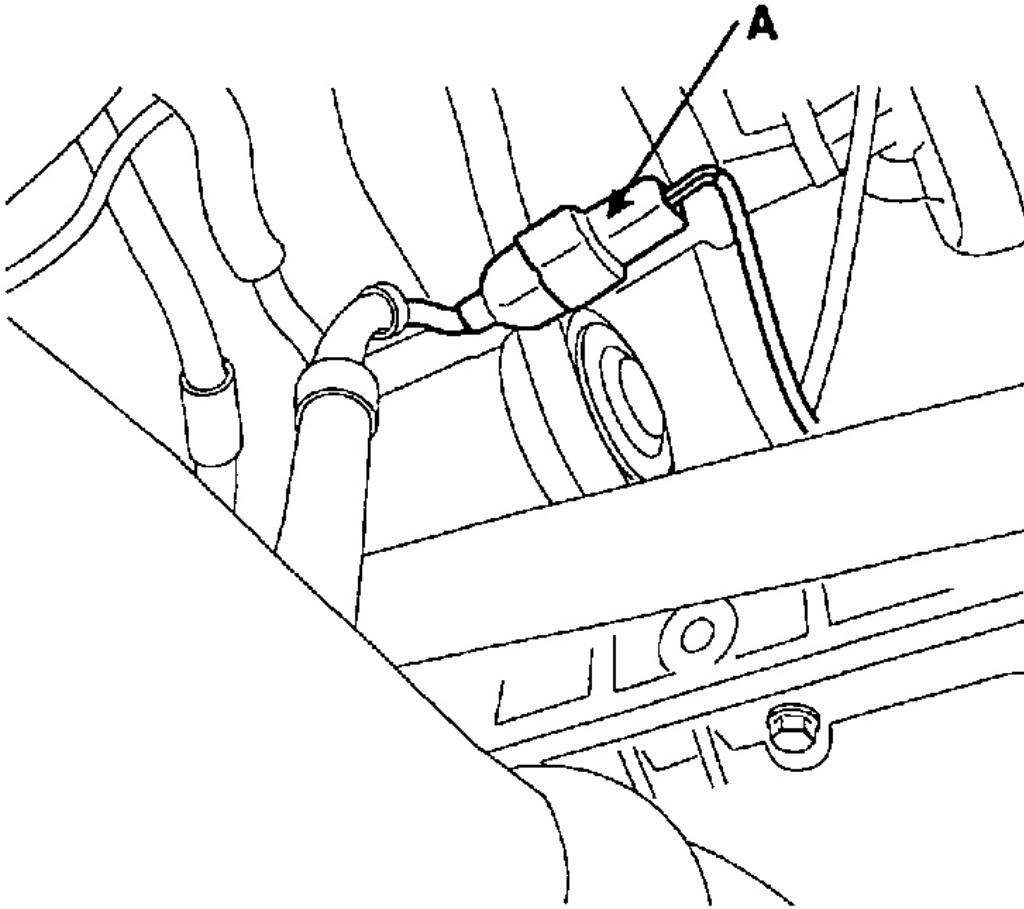
31. Remove the power steering return hose (A) and drain the power steering oil.



G00747518

Fig. 160: Removing Power Steering Return Hose
Courtesy of HYUNDAI MOTOR CO.

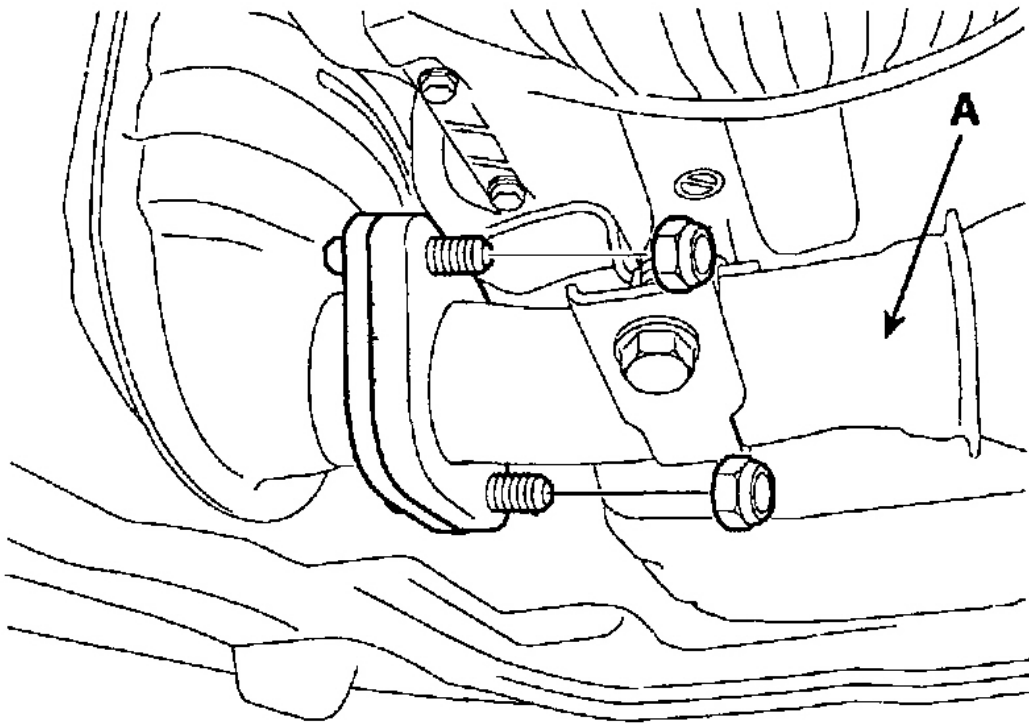
32. Disconnect the rear oxygen sensor connector (A).



G00747519

Fig. 161: Disconnecting Rear Oxygen Sensor Connector
Courtesy of HYUNDAI MOTOR CO.

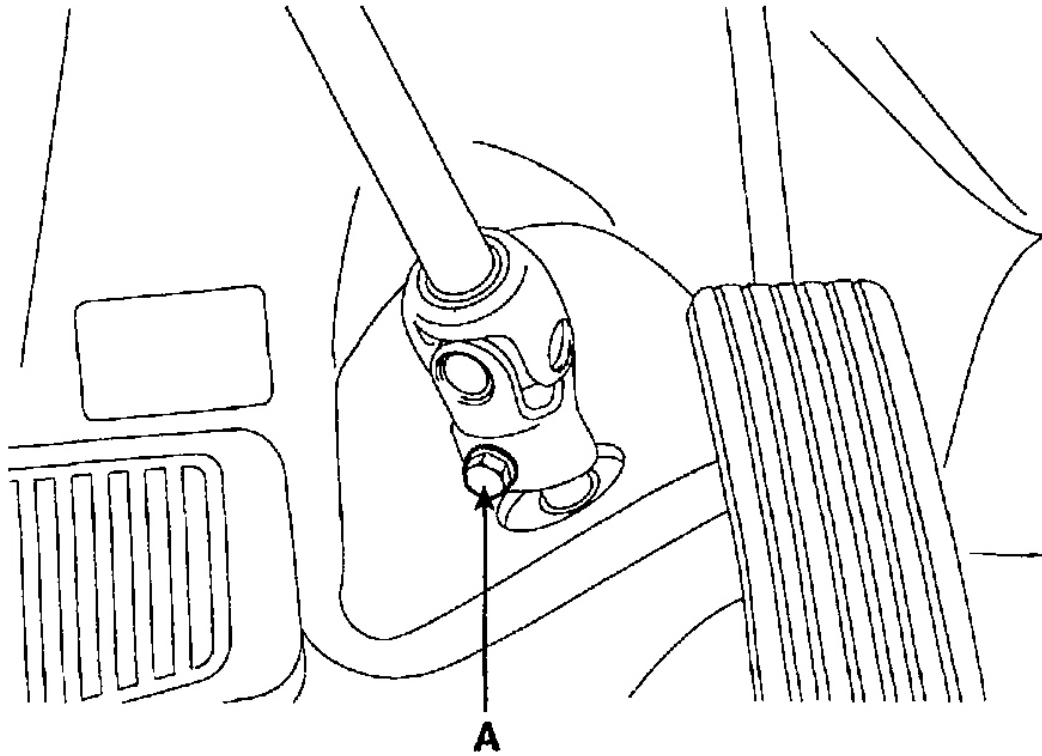
33. Remove the front muffler (A).



G00747520

Fig. 162: Removing Front Mufflers
Courtesy of HYUNDAI MOTOR CO.

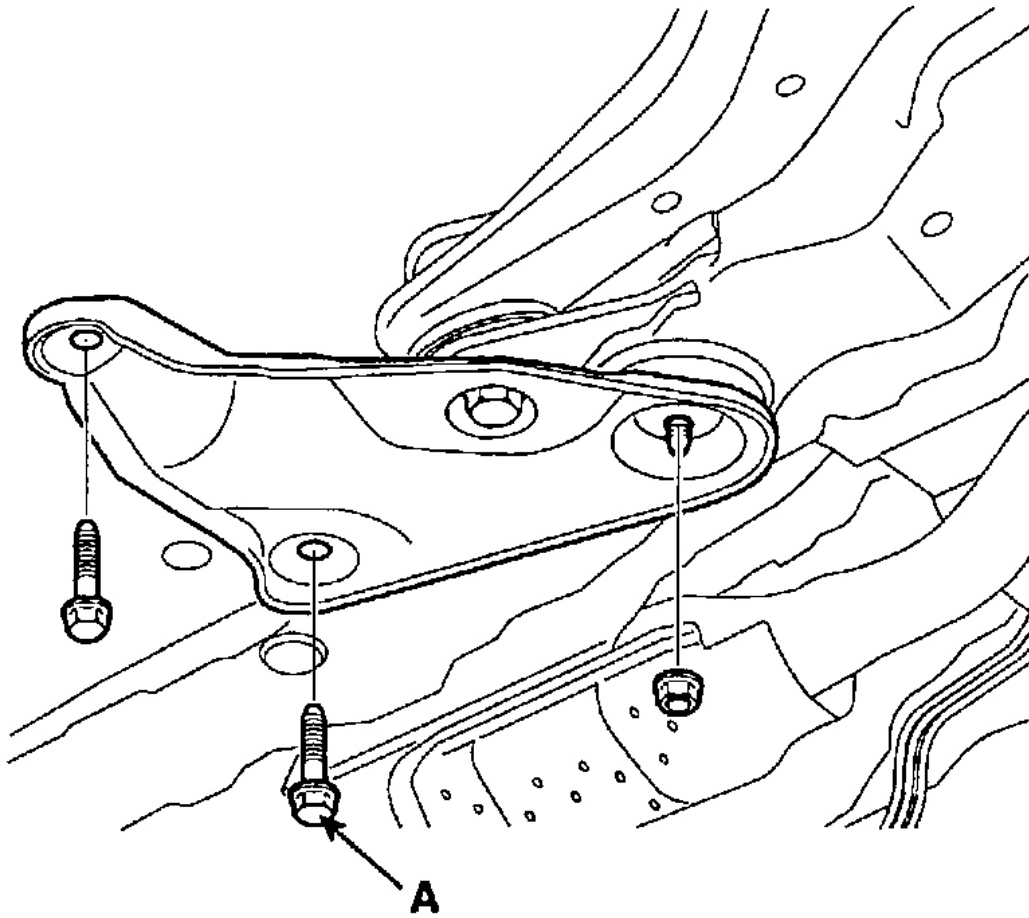
34. Remove the steering u-joint mounting bolt (A).



G00747521

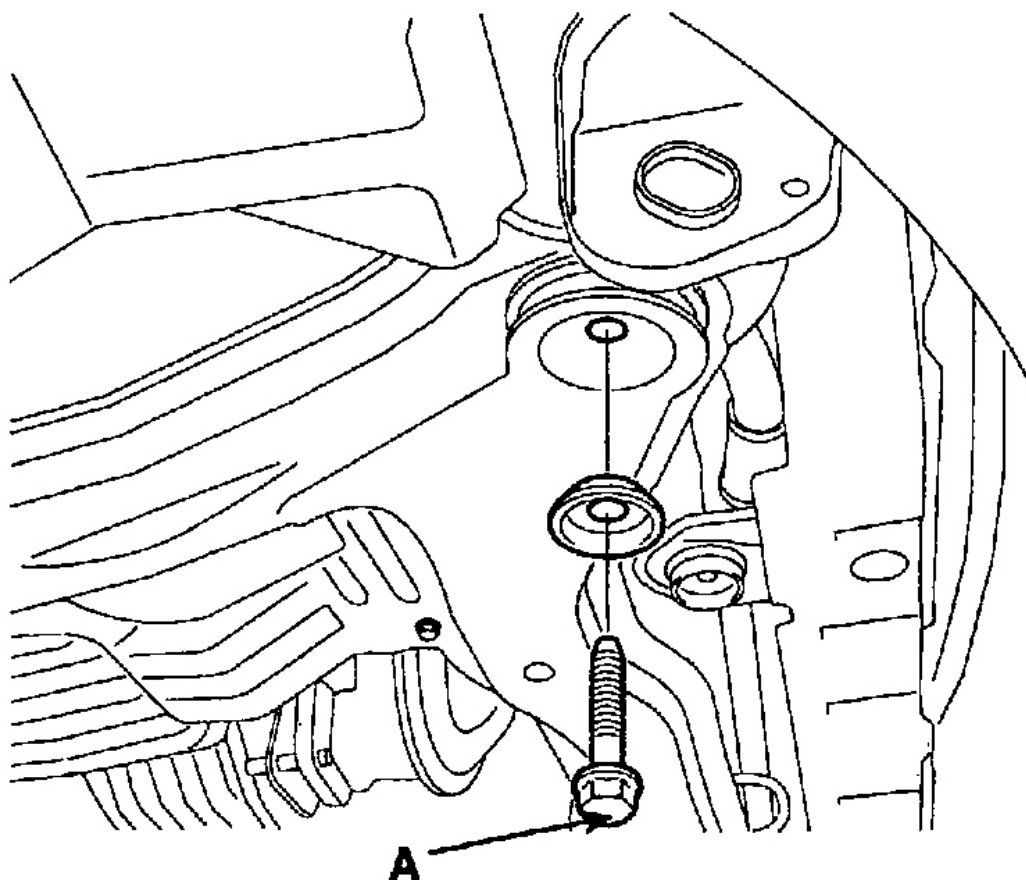
Fig. 163: Removing Steering U-Joint Bolt
Courtesy of HYUNDAI MOTOR CO.

35. Remove the sub frame bolts (A).



G00747522

Fig. 164: Removing Subframe Bolts (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



G00747523

Fig. 165: Removing Subframe Bolts (2 Of 2)

Courtesy of HYUNDAI MOTOR CO.

36. Remove the engine support fixture and the adapter.
37. Jack up the vehicle.

INSTALLATION

Installation is in the reverse order of removal.

Perform the following:

- Adjust the shift cable.
- Adjust the throttle cable.
- Refill the engine with engine oil.

- Refill the transaxle with fluid.
- Refill the radiator with engine coolant.
- Bleed air from the cooling system with the heater valve open.
- Clean the battery posts and cable terminals with sandpaper assemble them, 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, then check for fuel leakage at any point in the fuel line.

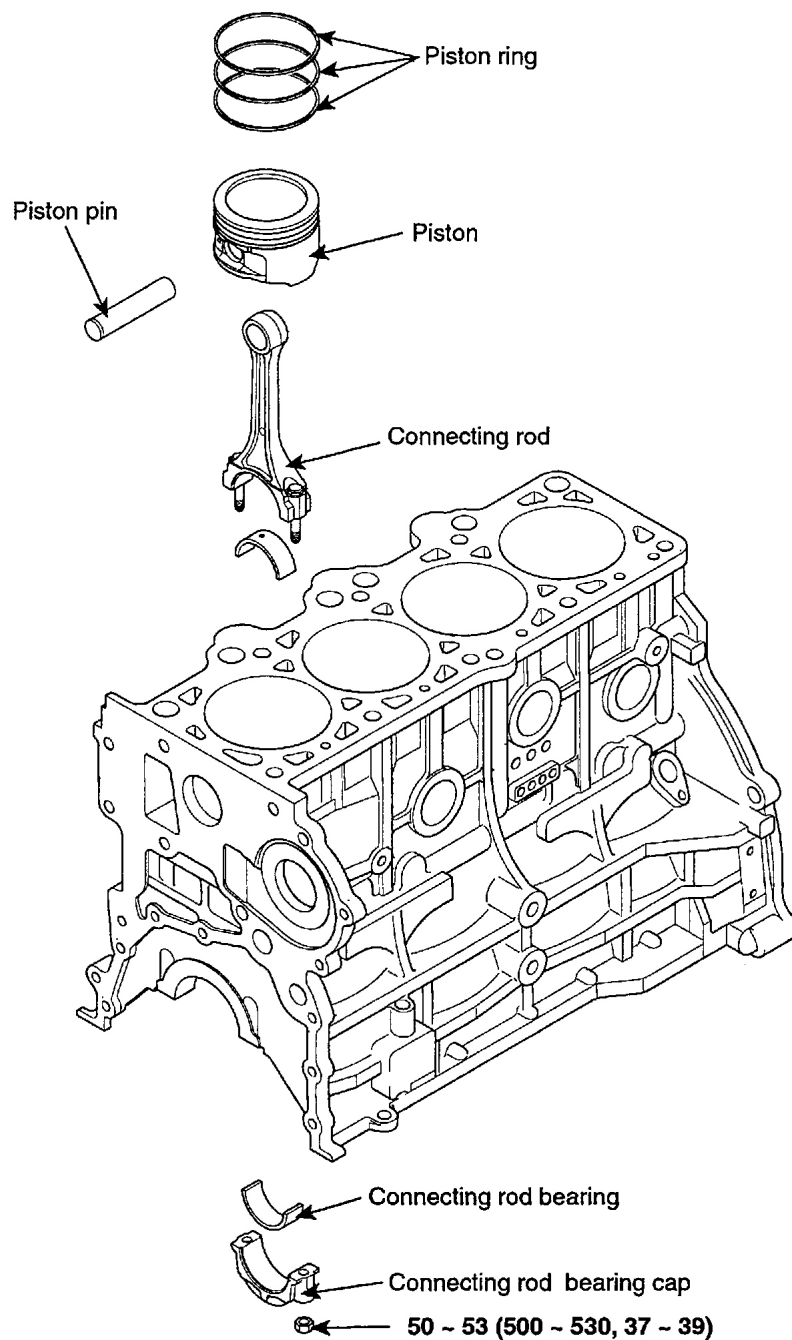
ENGINE BLOCK

COMPONENT

2004 ENGINES 2.0L 4-Cylinder - Elantra



viernes, 19 de febrero de 2021 07:47:28 a. m.



TORQUE : Nm (kgf.cm, lbf.ft)

G00747525

Fig. 167: Identifying Engine Block Components (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. M/T: remove flywheel.
2. A/T: remove drive plate.
3. Install engine to engine stand for disassembly.
4. Remove timing belt. See **REMOVAL** under TIMING SYSTEM.
5. Remove cylinder head. See **REMOVAL** under CYLINDER HEAD ASSEMBLY.
6. Remove oil level gauge assembly (A).

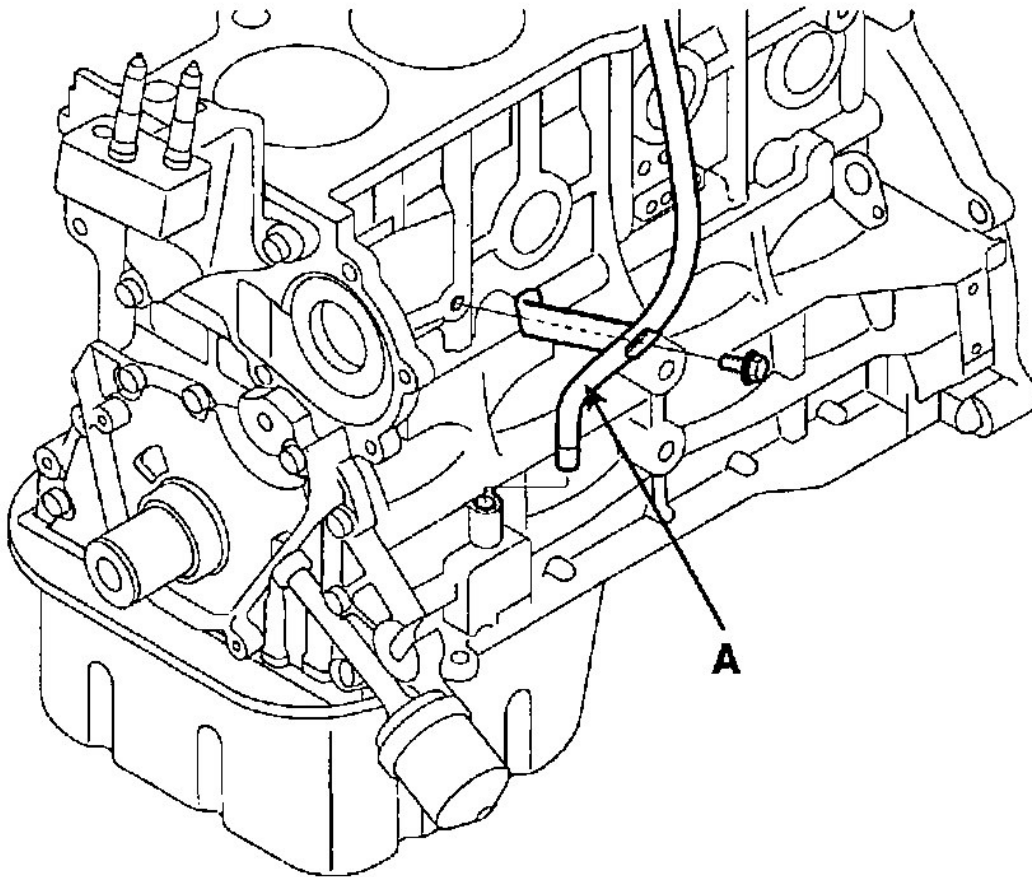
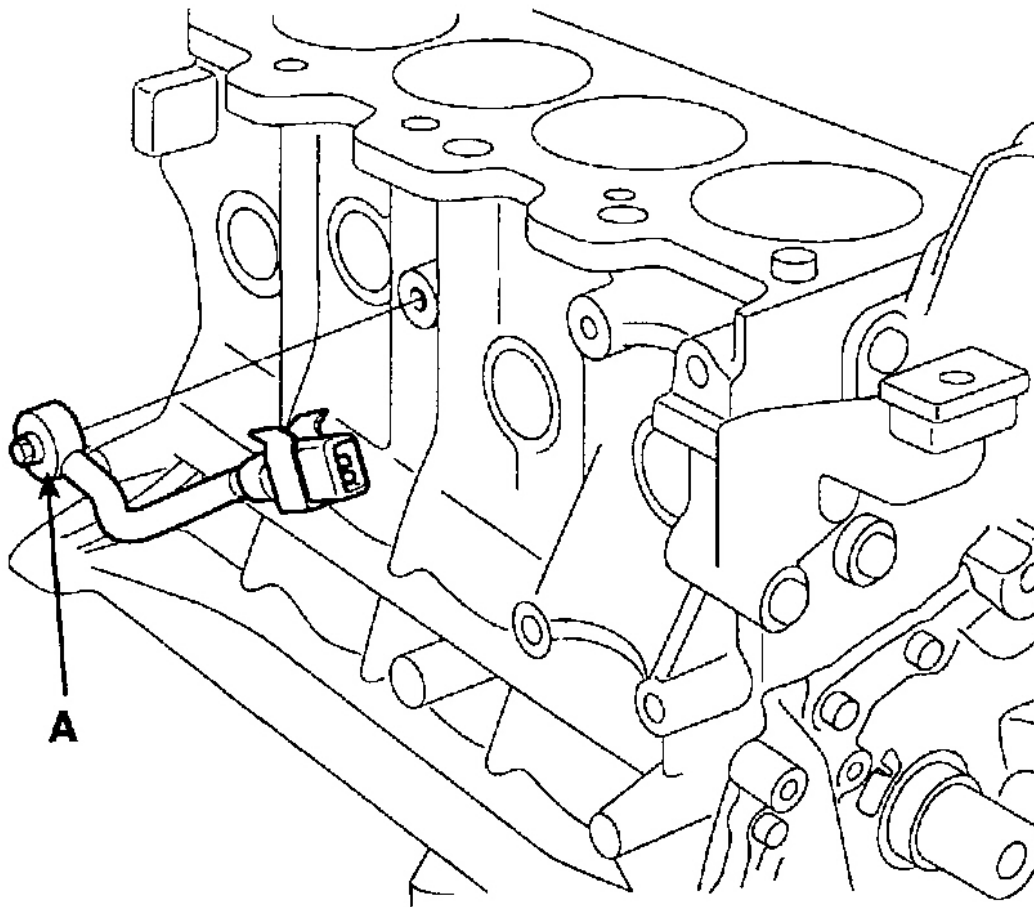
**G00747526**

Fig. 168: Removing Oil Level Gauge Assembly
Courtesy of HYUNDAI MOTOR CO.

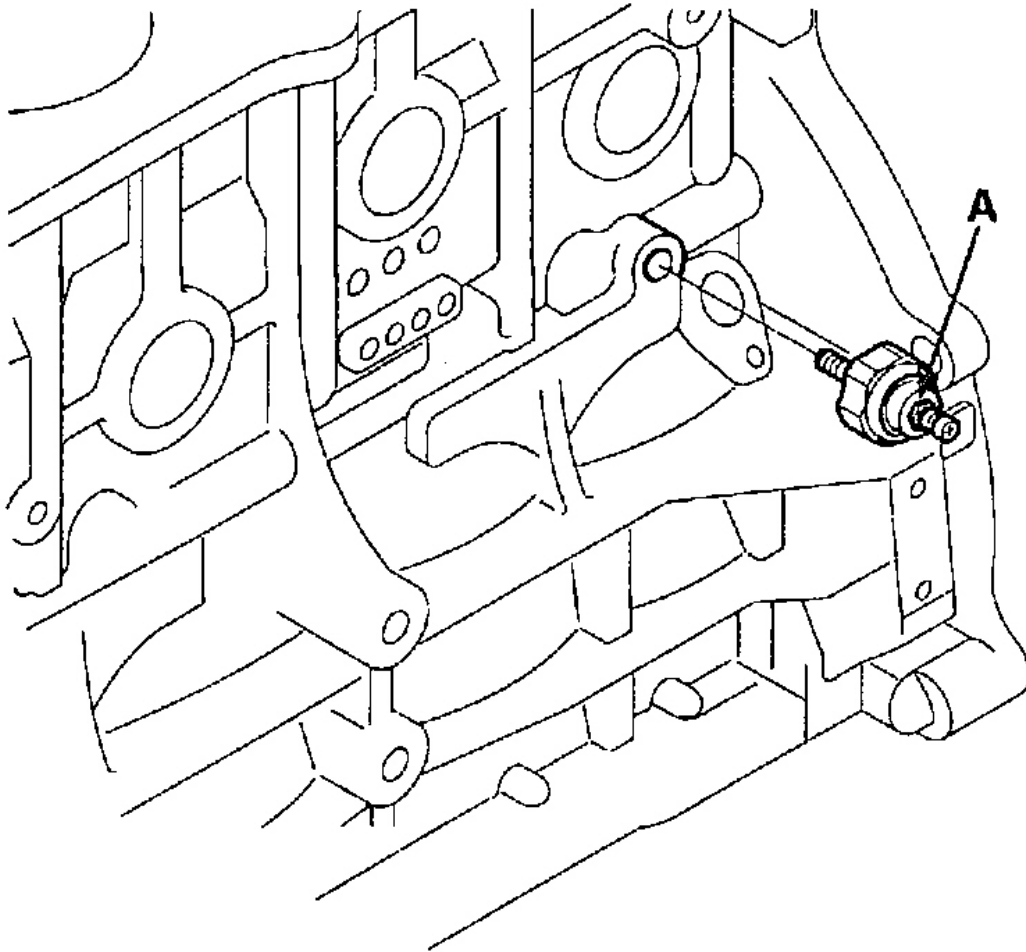
7. Remove knock sensor (A).



G00747527

Fig. 169: Removing Knock Sensor
Courtesy of HYUNDAI MOTOR CO.

8. Remove oil pressure sensor (A).



G00747528

Fig. 170: Removing Oil Pressure Sensor
Courtesy of HYUNDAI MOTOR CO.

9. Remove water pump. See **WATER PUMP**.
10. Remove oil pan (A).

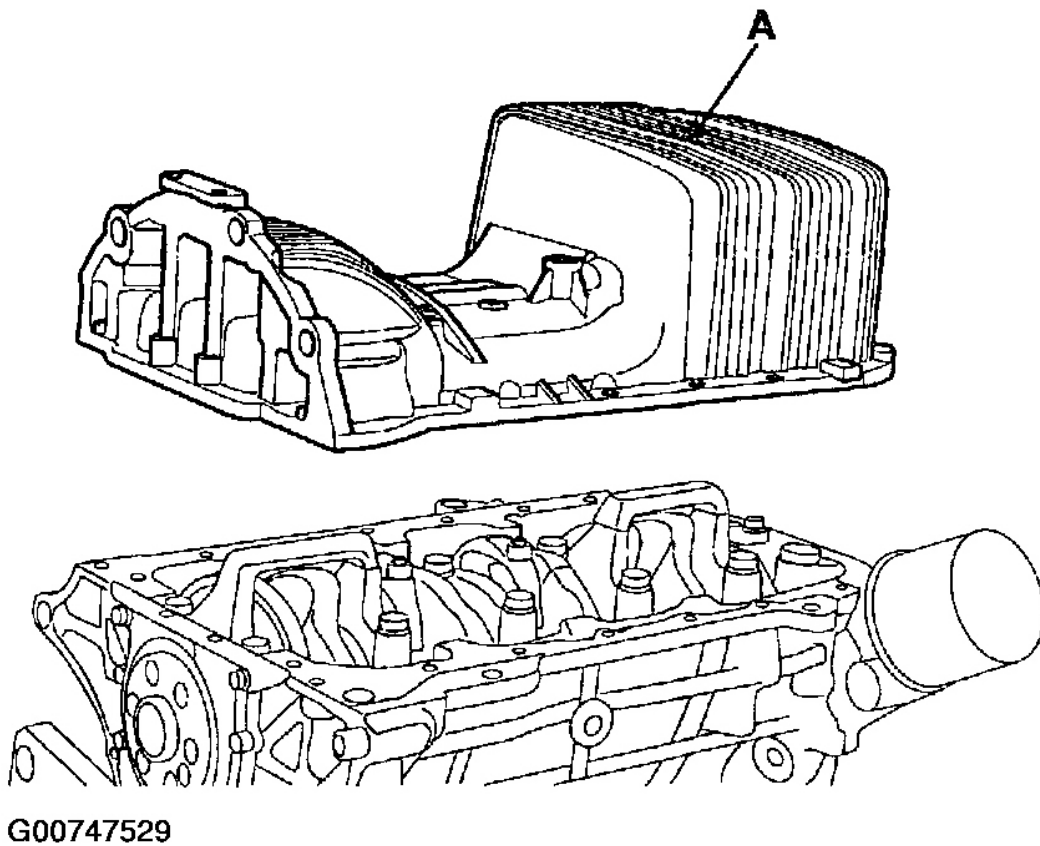
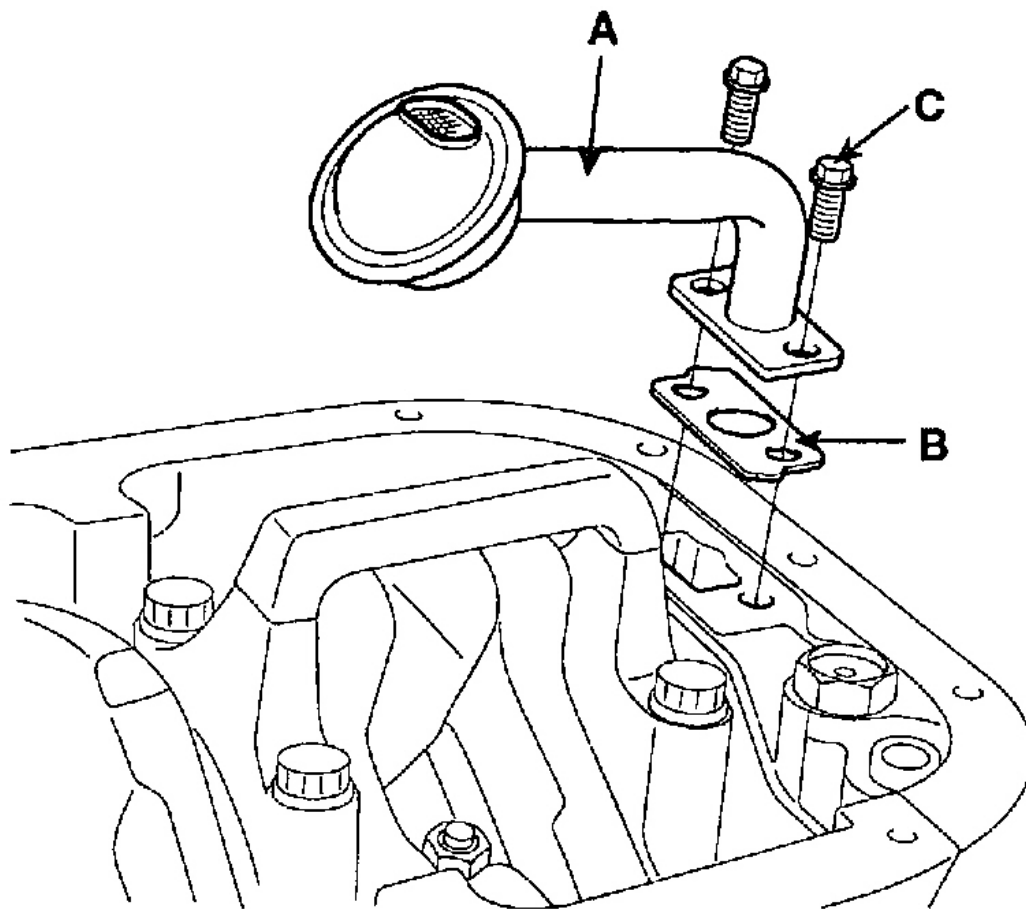


Fig. 171: Removing Oil Pan
Courtesy of HYUNDAI MOTOR CO.

11. Remove oil screen.

Remove the 2 bolts (C), oil screen (A) and gasket (B).



G00747530

Fig. 172: Removing Oil Screen

Courtesy of HYUNDAI MOTOR CO.

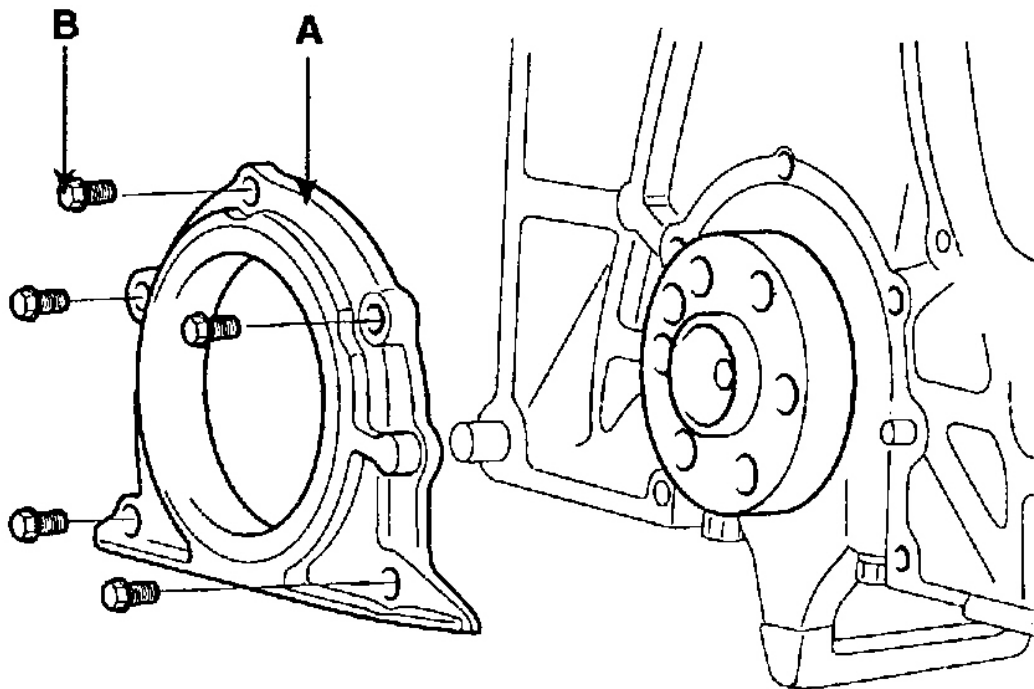
12. Check the connecting rod end play. See **Fig. 175**.
13. Remove the connecting rod caps and check oil clearance. See **Fig. 176**.
14. Remove piston and connecting rod assemblies.
 1. Using a ridge reamer, remove all the carbon from the top of the cylinder.
 2. Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

NOTE:

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

15. Remove front case. See **Fig. 257**.
16. Remove rear oil seal case.

Remove the 5 bolts (B) and rear oil seal case (A).

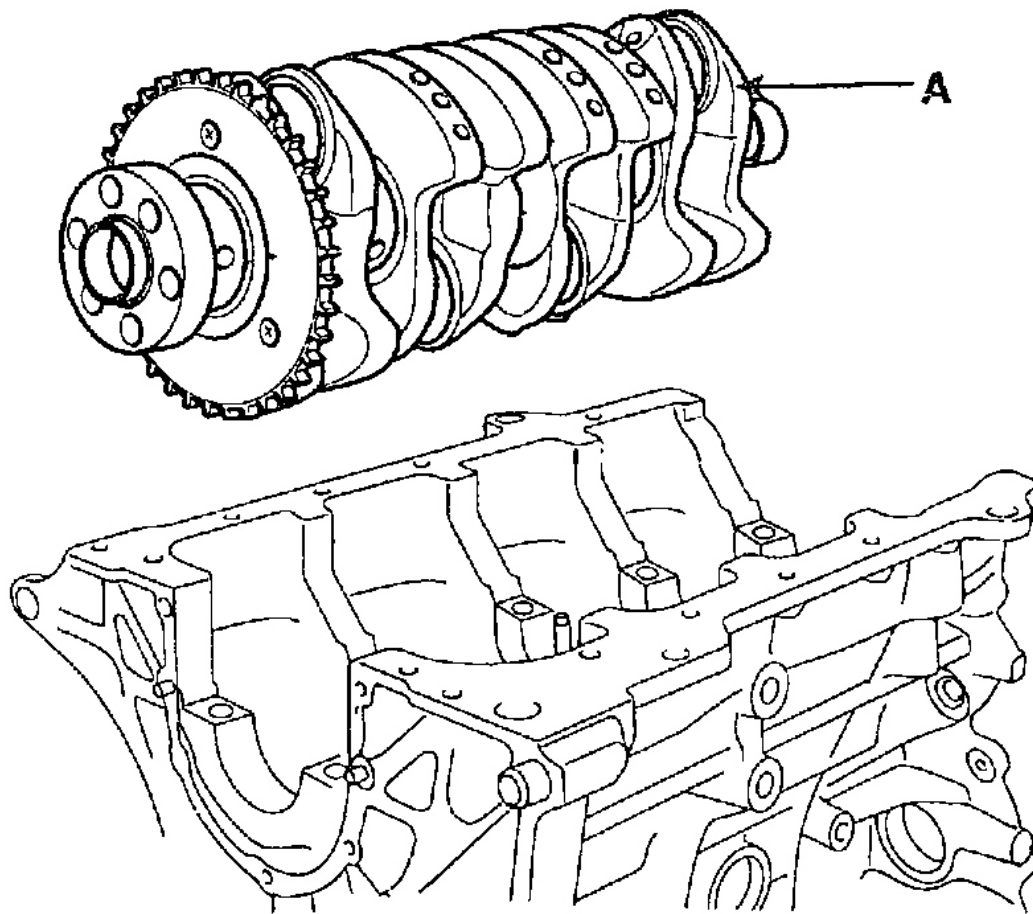


G00747531

Fig. 173: Removing Rear Oil Seal Case
Courtesy of HYUNDAI MOTOR CO.

17. Remove crankshaft bearing cap and check oil clearance. See **Fig. 185**.
18. Check the crankshaft end play. See **Fig. 193**.
19. Lift the crankshaft (A) out of the engine, being careful not to damage journals.

NOTE: Arrange the main bearings and trust washers in the correct order.



G00747532

Fig. 174: Removing Crankshaft
Courtesy of HYUNDAI MOTOR CO.

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 the piston and pin as a set.

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

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

22. Disconnect connecting rod from piston.

INSPECTION

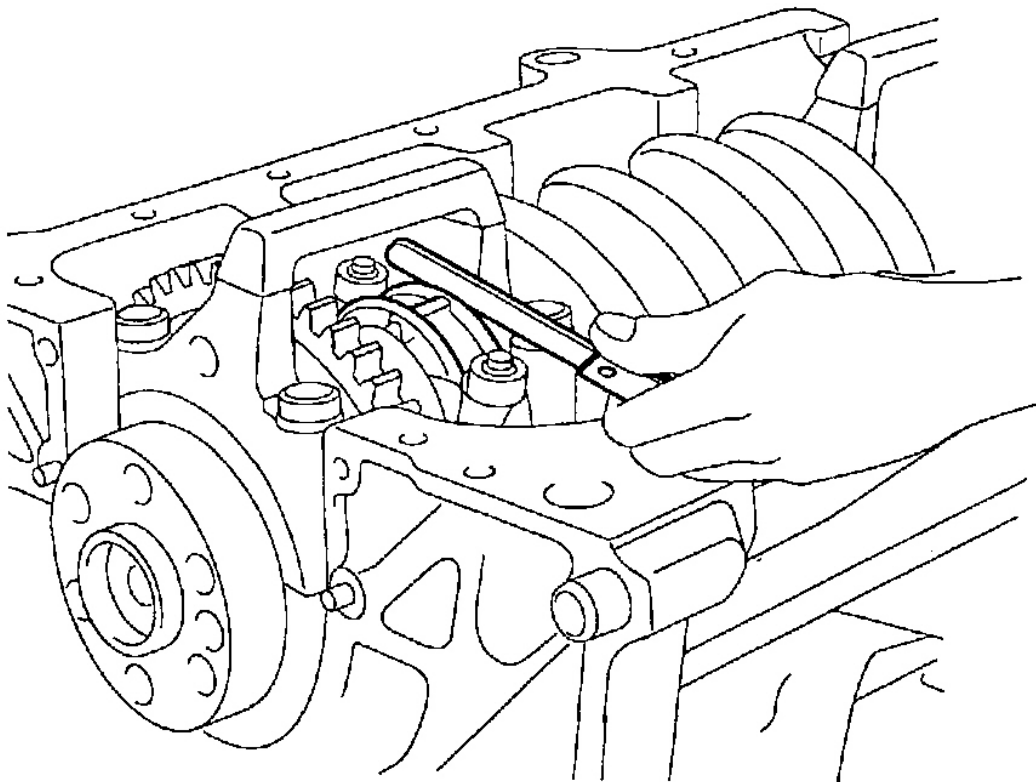
CONNECTING ROD AND CRANKSHAFT

1. Check the connecting rod end play.

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

Standard end play: 0.1~0.25mm (0.004~0.01in.)

Maximum end play: 0.4mm (0.016in.)



G00747533

Fig. 175: Checking Connecting Rod End Play
Courtesy of HYUNDAI MOTOR CO.

- If out-of-tolerance, install a new connecting rod.
- 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 the 2 connecting rod cap nuts.
 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 nuts.

Tightening torque

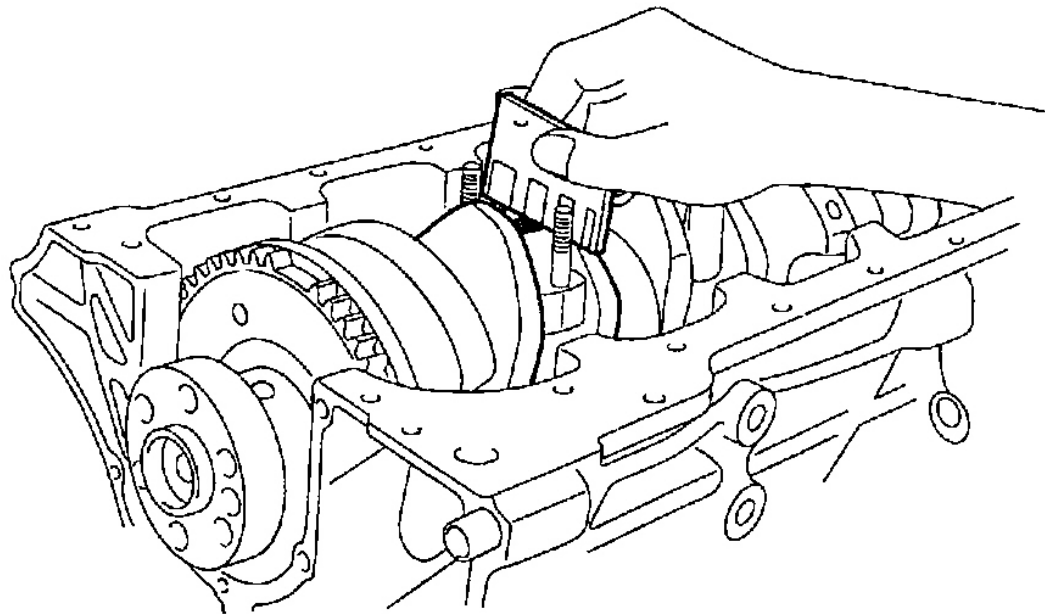
50~53 Nm (500~530kgf.cm, 36.9~39lbf.ft)

NOTE: Do not turn the crankshaft.

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

Standard oil clearance

0.024~0.042mm (0.0009~0.0017in.)



G00747534

Fig. 176: Measuring Connecting Rod Bearing Clearance Using Plastigage
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.

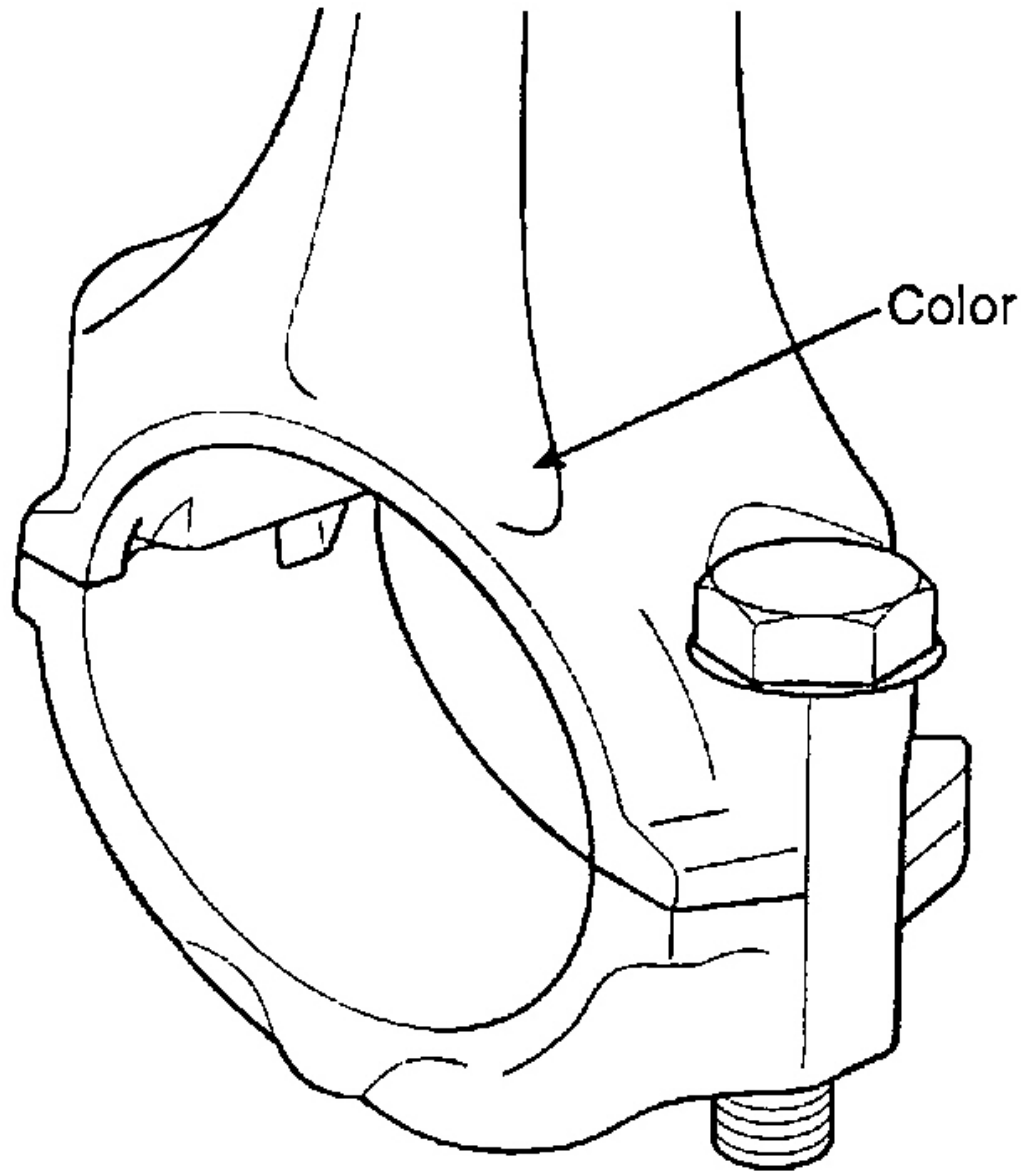
CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

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



G00747535

Fig. 177: Locating Connecting Rod Mark
Courtesy of HYUNDAI MOTOR CO.

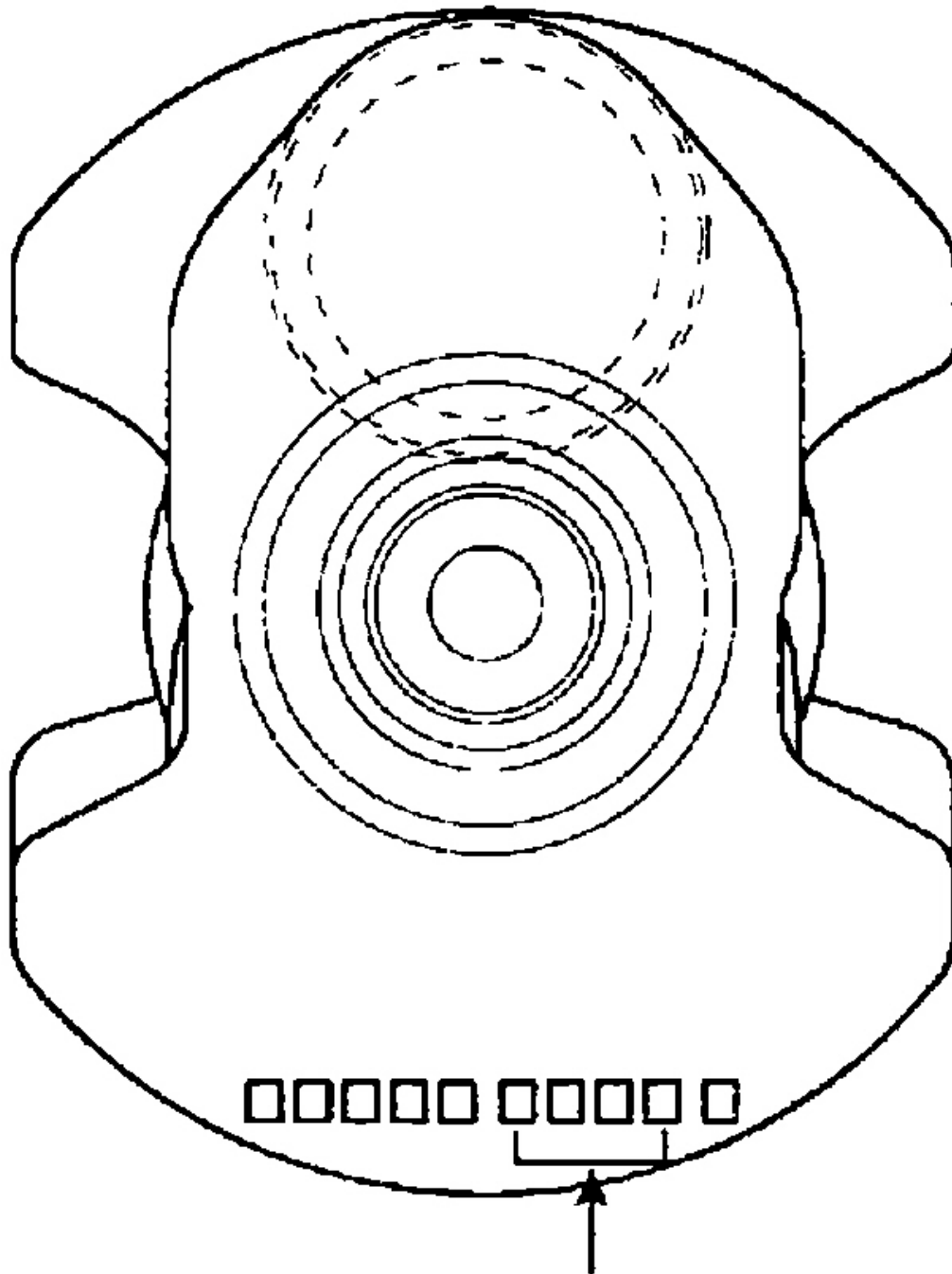
Discrimination of connecting rod

CLASS	MARK	INSIDE DIAMETER
a	WHITE	48.00 ~ 48.006mm (1.8896 ~ 1.8899in.)
b	NONE	48.006 ~ 48.012mm (1.8899 ~ 1.8902in.)
c	YELLOW	48.012 ~ 48.018mm (1.8902 ~ 1.8904in.)

G00747536

Fig. 178: Connecting Rod Mark Identification Table
Courtesy of HYUNDAI MOTOR CO.

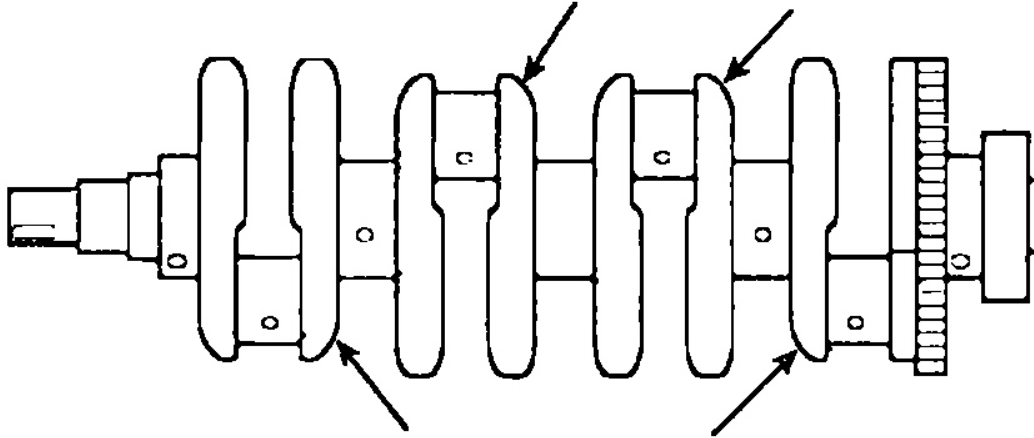
Crankshaft pin mark location



G00747537

Fig. 179: Locating Crankshaft Pin Mark (1 Of 2)

Courtesy of HYUNDAI MOTOR CO.



G00747538

Fig. 180: Locating Crankshaft Pin Mark (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

Discrimination of crankshaft

CLSASS	MARK	OUTSIDE DIAMETER OF PIN
I	YELLOW	44.960 ~ 44.966mm (1.7700 ~ 1.7703in.)
II	NONE	44.955 ~ 44.960mm (1.7698 ~ 1.7700in.)
III	WHITE	44.948 ~ 44.955mm (1.7696 ~ 1.7698in.)

G00747539

Fig. 181: Crankshaft Pin Mark Identification Table
Courtesy of HYUNDAI MOTOR CO.

Place of identification mark (Connecting rod bearing)

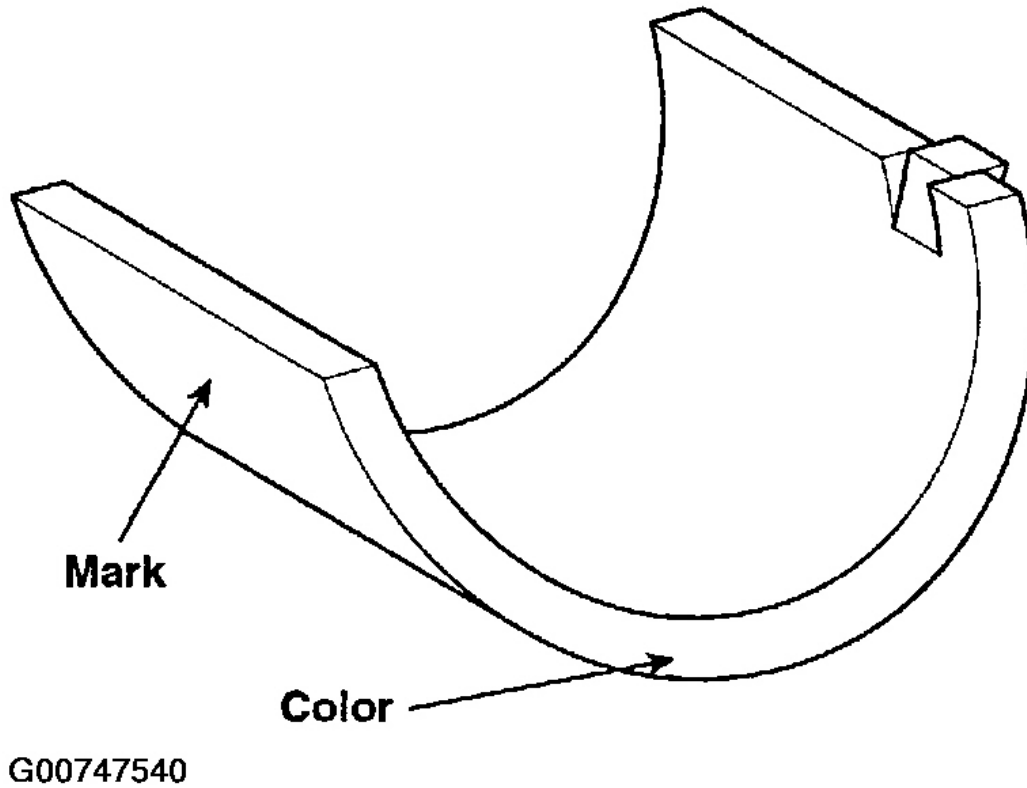


Fig. 182: Locating Connecting Rod Bearing Mark
Courtesy of HYUNDAI MOTOR CO.

Discrimination of connecting rod bearing

CLASS	MARK	THICKNESS OF BEARING
AA	BLUE	1.514 ~ 1.517mm (0.0596 ~ 0.0597in.)
A	BLACK	1.511 ~ 1.514mm (0.0595 ~ 0.0596in.)
B	NONE	1.508 ~ 1.511mm (0.0594 ~ 0.0595in.)
C	GREEN	1.505 ~ 1.508mm (0.0593 ~ 0.0594in.)
D	YELLOW	1.502 ~ 1.505mm (0.0591 ~ 0.0593in.)

G00747541

Fig. 183: Connecting Rod Bearing Mark Identification Table
 Courtesy of HYUNDAI MOTOR CO.

11. Selection

CRANKSHAFT IDENTIFICATION MARK	CONNECT- ING ROD IDENTIFICA- TION MARK	ASSEMBLING CLASSIFI- CATION OF BEARING
I (YELLOW)	a (WHITE)	D (YELLOW)
	b (NONE)	C (GREEN)
	c (YELLOW)	B (NONE)
II (NONE)	a (WHITE)	C (GREEN)
	b (NONE)	B (NONE)
	c (YELLOW)	A (BLACK)
III (WHITE)	a (WHITE)	B (NONE)
	b (NONE)	A (BLACK)
	c (YELLOW)	AA (BLUE)

G00747542

Fig. 184: Connecting Rod Bearing Selection Table
 Courtesy of HYUNDAI MOTOR CO.

3. Check the crankshaft bearing oil clearance.
 1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
 2. Clean each main journal and bearing half with a clean shop towel.
 3. Place one strip of plastigage across each main journal.
 4. Reinstall the bearings and caps, then torque the bolts.

Tightening torque

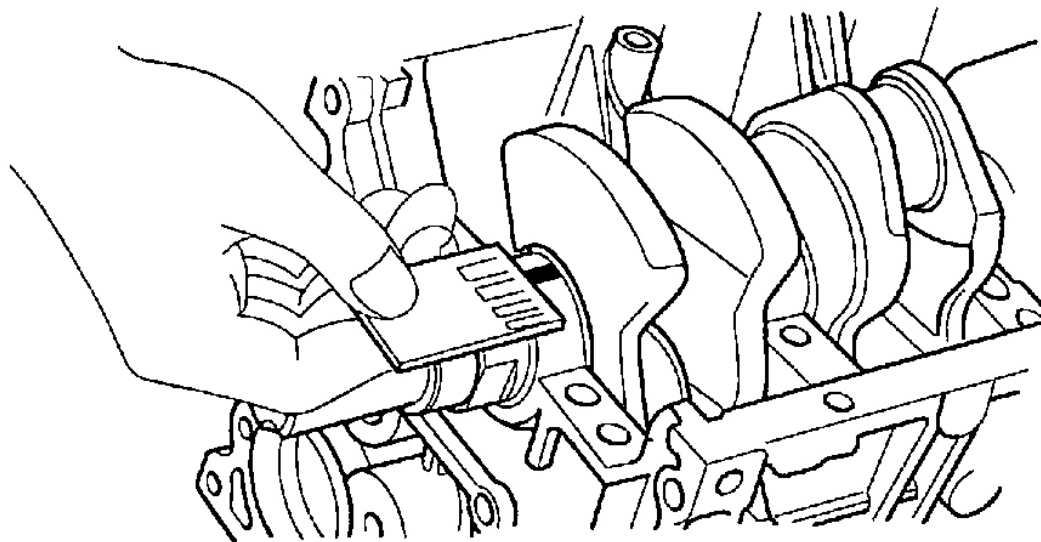
30Nm (300kgf.cm, 22lbf.ft) + 60°~65°

NOTE: Do not turn the crankshaft.

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

Standard oil clearance

0.028~0.046mm (0.0011~0.0018in.)



G00747543

Fig. 185: Measuring Crankshaft Bearing Clearance Using 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.

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

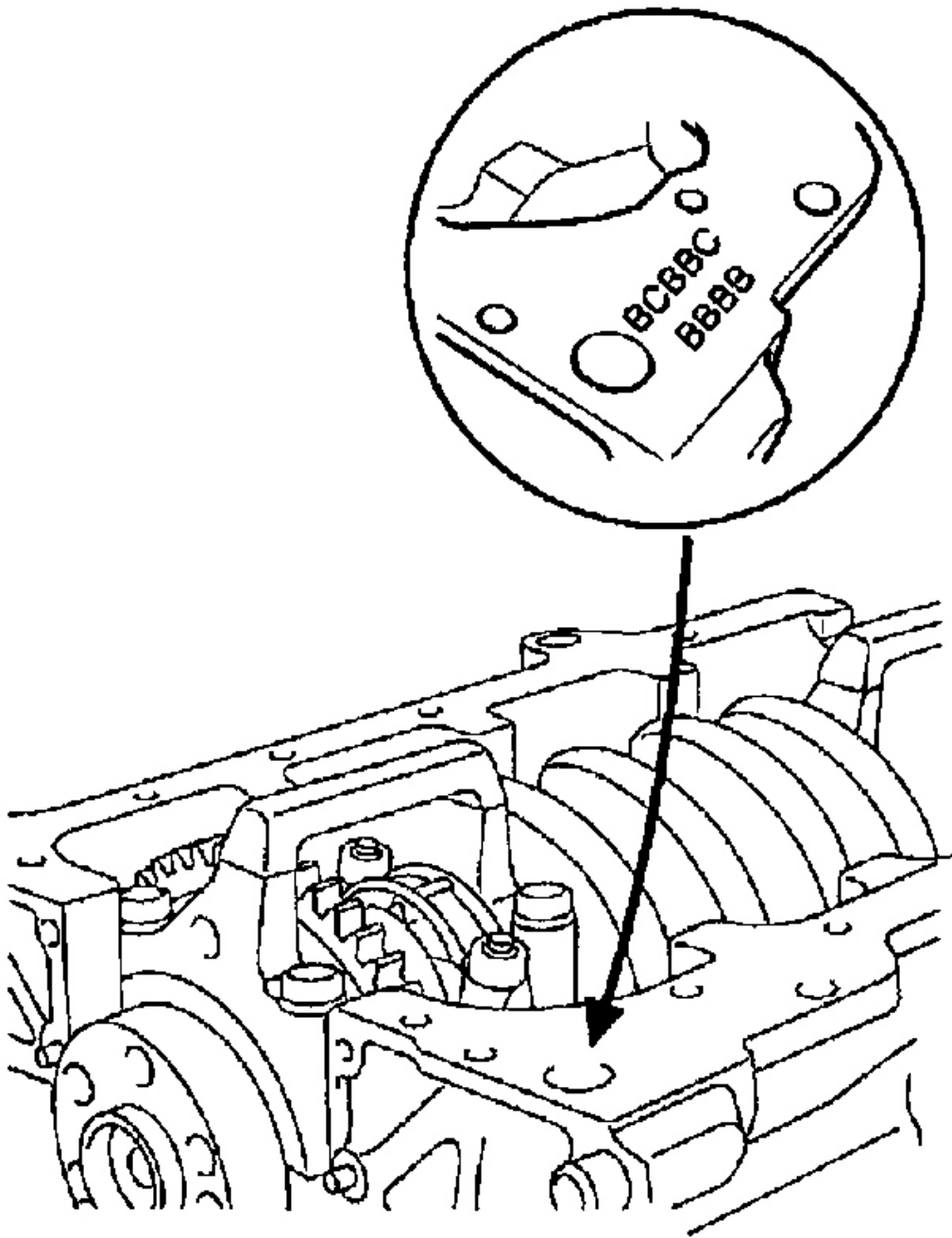
Allowable twist of connecting rod:

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

Crankshaft bore mark location

Letters have been stamped on the end of 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.



G00747544

Fig. 186: Locating Crankshaft Bore Mark
Courtesy of HYUNDAI MOTOR CO.

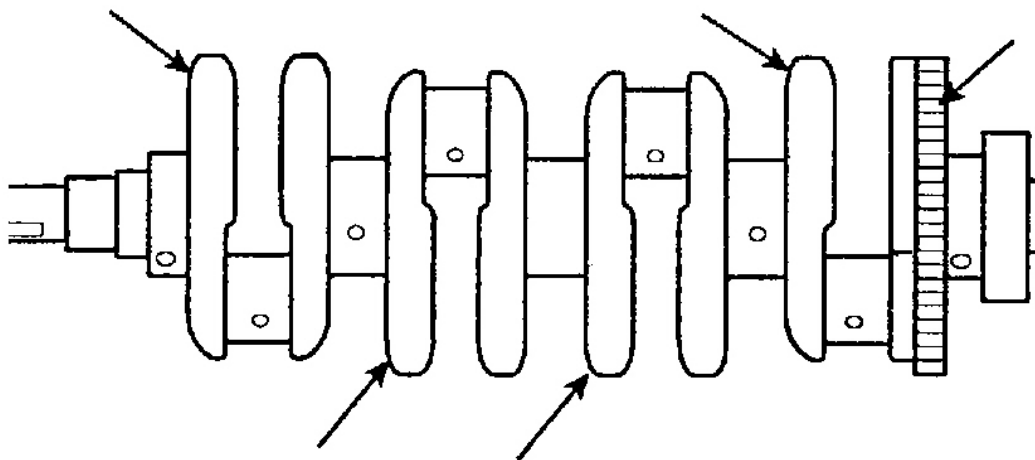
Discrimination of cylinder block

CALSS	MARK	INSIDE DIAMETER
a	A	59.000 ~ 59.006mm (2.3228 ~ 2.3230in.)
b	B	59.006 ~ 59.012mm (2.3230 ~ 2.3233in.)
c	C	59.012 ~ 59.018mm (2.3233 ~ 2.3235in.)

G00747545

Fig. 187: Crankshaft Bore Mark Identification Table
 Courtesy of HYUNDAI MOTOR CO.

Crankshaft journal mark location



G00747546

Fig. 188: Locating Crankshaft Journal Mark
 Courtesy of HYUNDAI MOTOR CO.

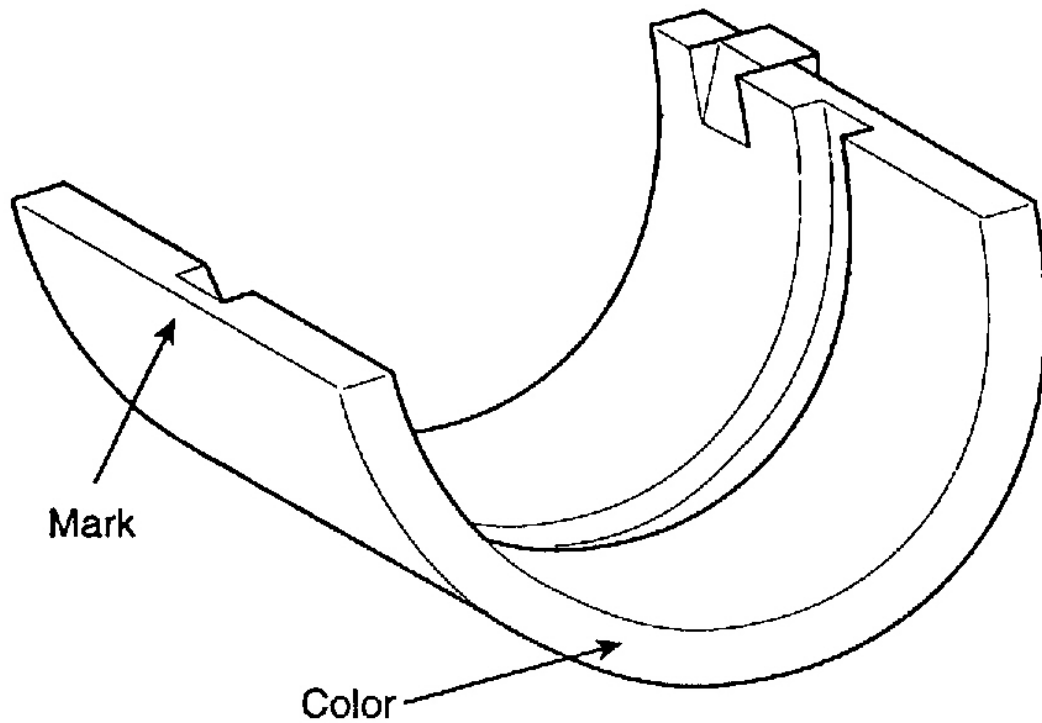
Discrimination of crankshaft

CLASS	MARK	OUTSIDE DIAMETER OF JOURNAL
I	YELLOW	54.956 ~ 54.962mm (2.1636 ~ 2.1638in.)
II	NONE	54.950 ~ 54.956mm (2.1633 ~ 2.1636in.)
III	WHITE	54.944 ~ 54.950mm (2.1631 ~ 2.1633in.)

G00747547

Fig. 189: Crankshaft Journal Mark Identification Table
 Courtesy of HYUNDAI MOTOR CO.

Place of identification mark (Crankshaft bearing)



G00747548

Fig. 190: Locating Crankshaft Journal Bearing Mark
Courtesy of HYUNDAI MOTOR CO.

Discrimination of crankshaft bearing

CLASS	MARK	THICKNESS OF BEARING
AA	BLUE	2.014 ~ 2.017mm (0.0793 ~ 0.0794in.)
A	BLACK	2.011 ~ 2.014mm (0.0791 ~ 0.0793in.)
B	NONE	2.008 ~ 2.011mm (0.0790 ~ 0.0791in.)
C	GREEN	2.005 ~ 2.008mm (0.0789 ~ 0.0790in.)
D	YELLOW	2.002 ~ 5.005mm (0.0788 ~ 0.0789in.)

G00747549

Fig. 191: Crankshaft Journal Bearing Mark Identification Table
 Courtesy of HYUNDAI MOTOR CO.

Selection

CRANKSHAFT IDENTIFICATION MARK	CRANK-SHAFT BORE IDENTIFICATION MARK	ASSEMBLING CLASSIFICATION OF BEARING
I (YELLOW)	a (A)	D (YELLOW)
	b (B)	C (GREEN)
	c (C)	B (NONE)
II (NONE)	a (A)	C (GREEN)
	b (B)	B (NONE)
	c (C)	A (BLACK)
III (WHITE)	a (A)	B (NONE)
	b (B)	A (BLACK)
	c (C)	AA (BLUE)

G00747550

Fig. 192: Crankshaft Journal Bearing Selection Table
 Courtesy of HYUNDAI MOTOR CO.

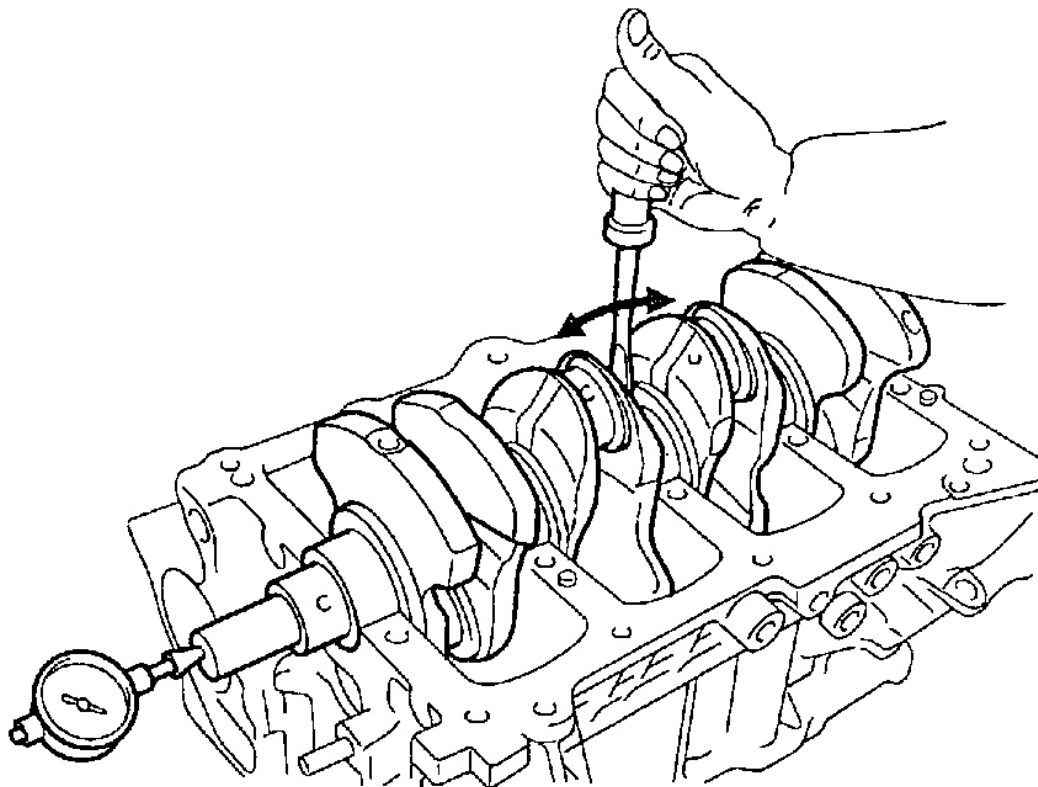
4. Check crankshaft end play.

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

Standard end play

0.06~0.26mm (0.0023~0.01in.)

Limit: 0.30mm (0.0118in.)



G00747551

Fig. 193: Measuring Crankshaft End Play
Courtesy of HYUNDAI MOTOR CO.

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

Thrust bearing thickness

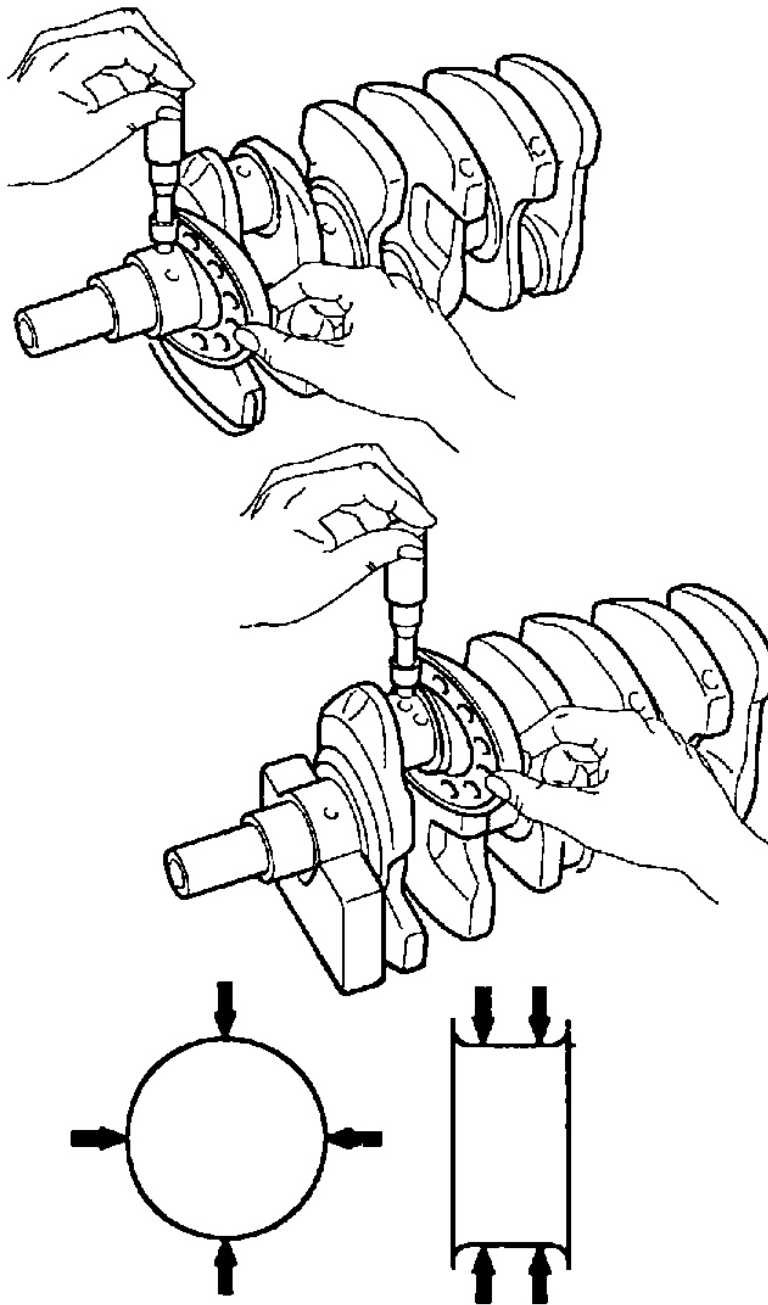
2.44~2.47mm (0.096~0.097in.)

5. Inspect main journals and crank pins

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

Main journal diameter: 57mm (2.244in.)

Crank pin diameter: 45mm (1.77in.)



G00747552

Fig. 194: Measuring Crankshaft Bearing Journals
Courtesy of HYUNDAI MOTOR CO.

CYLINDER BLOCK

1. Remove gasket material.

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

2. Clean cylinder block

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

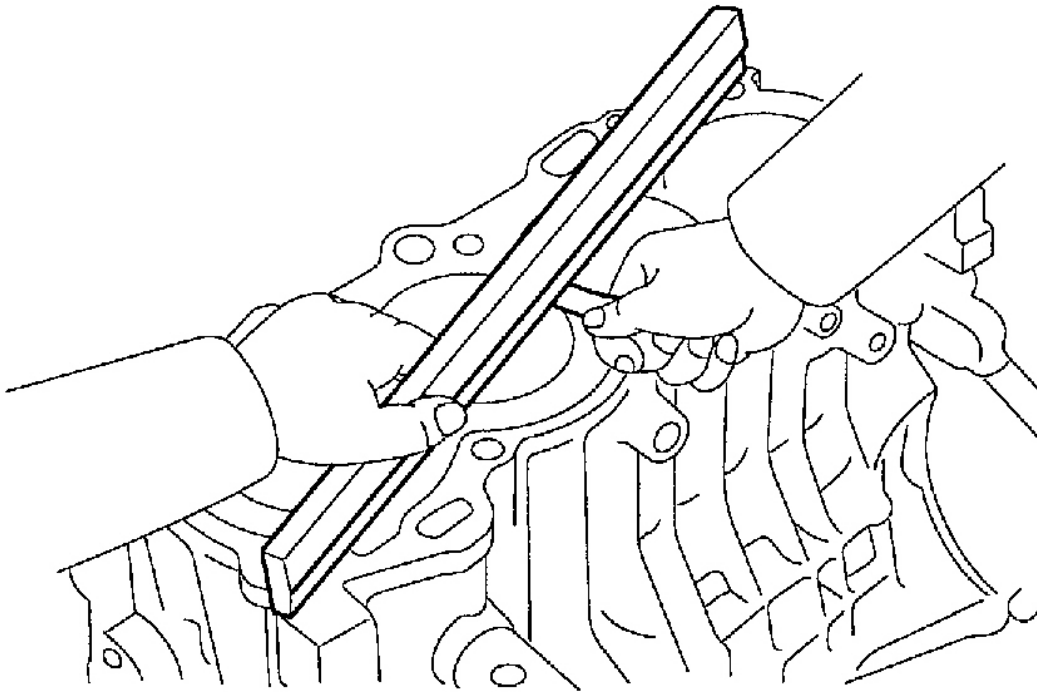
3. Inspect top surface of cylinder block for flatness.

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

Flatness of cylinder block gasket surface

Standard: Less than 0.03mm (0.0012 in.)

Limit: 0.05 mm (0.0020 in.)



G00747553

Fig. 195: Checking Cylinder Block Top Surface For Flatness
Courtesy of HYUNDAI MOTOR CO.

4. Inspect cylinder bore diameter

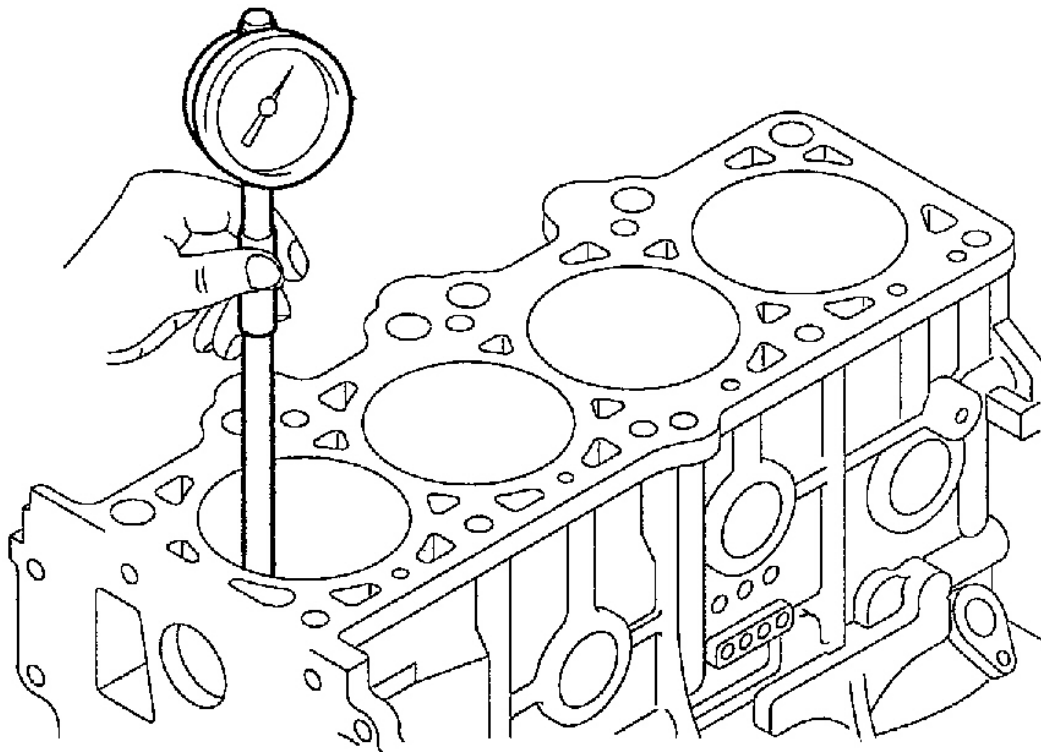
Visually check the cylinder for vertical scratches. If deep scratches are present, replace the cylinder block.

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

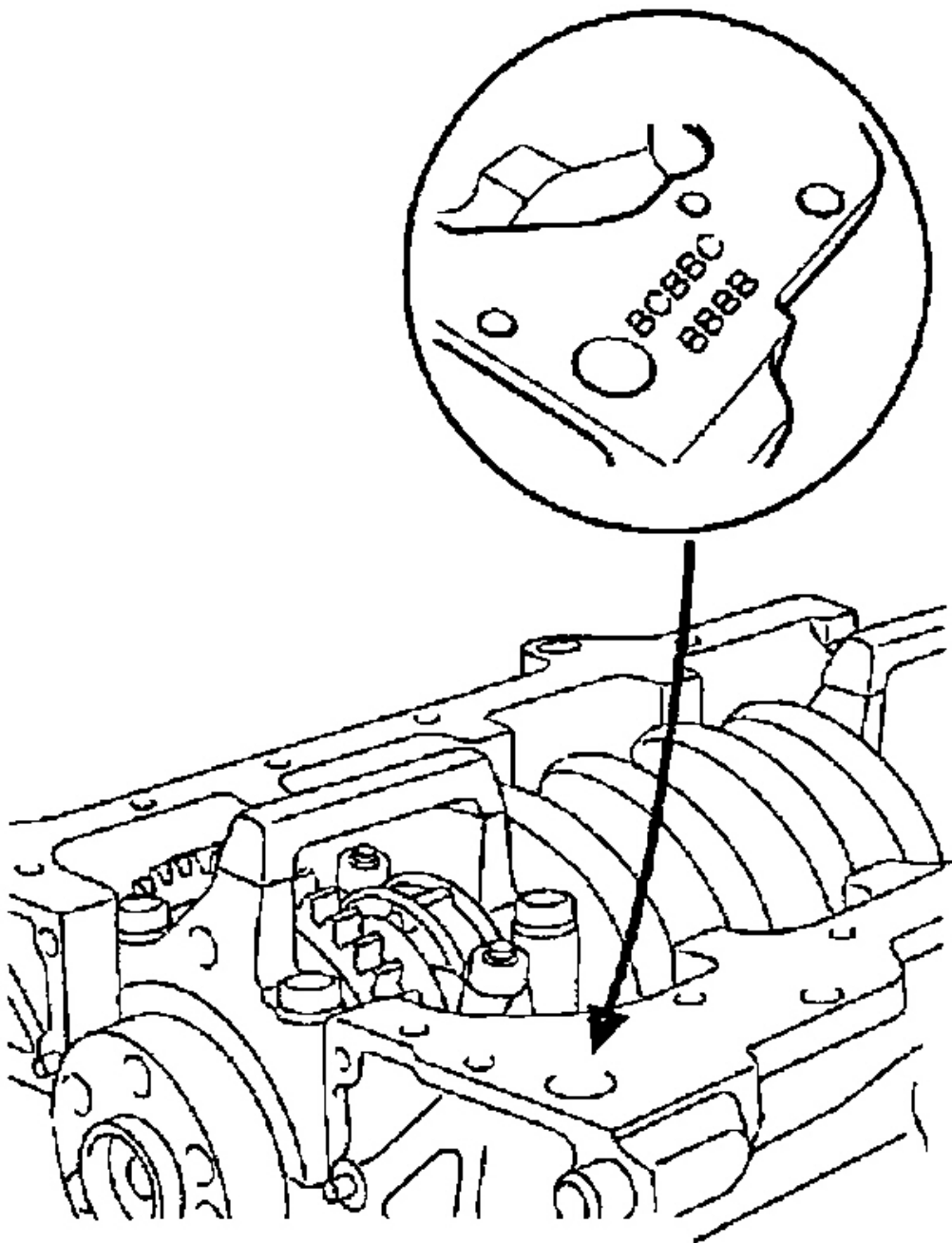
82.00~82.03mm (3.2283~3.2295in.)



G00747554

Fig. 196: Measuring Cylinder Bore
Courtesy of HYUNDAI MOTOR CO.

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



G00747555

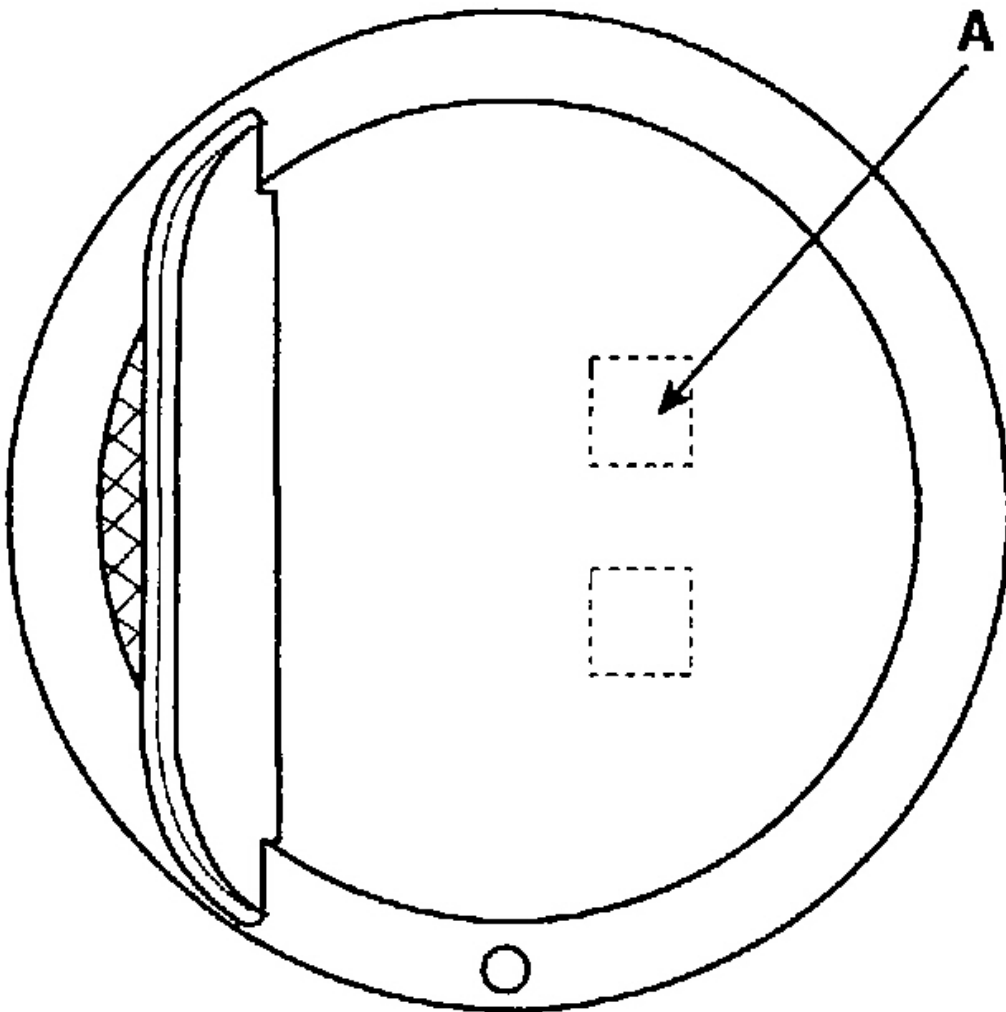
Fig. 197: Locating Cylinder Bore Size Code
Courtesy of HYUNDAI MOTOR CO.

Class	Cylinder bore inner diameter	Size code
A	82.00 ~ 82.01mm (3.2283 ~ 3.2287in.)	A
B	82.01 ~ 82.02mm (3.2287 ~ 3.2291in.)	B
C	82.02 ~ 82.03mm (3.2291 ~ 3.2295in.)	C

G00747556

Fig. 198: Cylinder Bore Size Code Table
Courtesy of HYUNDAI MOTOR CO.

7. Check the piston size code (A) on the piston top face



G00747557

Fig. 199: Locating Piston Size Code
Courtesy of HYUNDAI MOTOR CO.

NOTE: Stamp the grade mark of basic diameter with rubber stamp

Class	Cylinder bore inner diameter	Size code
A	81.97 ~ 81.98mm (3.2271 ~ 3.2275in.)	A
B	81.98 ~ 81.99mm (3.2275 ~ 3.2279in.)	None
C	81.99 ~ 82.00mm (3.2279 ~ 3.2283in.)	C

G00747558

Fig. 200: Piston Size Code Table
Courtesy of HYUNDAI MOTOR CO.

8. Select the piston related to cylinder bore class.

Clearance

0.02~0.04mm (0.00078~0.00157in.)

Boring cylinder

1. Oversize pistons should be selected according to the largest bore cylinder.

Identification Mark	Size
0.25	0.25mm (0.010in.)
0.50	0.50mm (0.020in.)

G00747559

Fig. 201: Oversized Piston Identification Table
Courtesy of HYUNDAI MOTOR CO.

NOTE: **The size of piston is stamped on top of the piston.**

2. Measure the outside diameter of the piston to be used.
3. According to the measured O.D., calculate the new bore size.

New bore size = Piston O.D + 0.02 to 0.04 mm

(0.0008 to 0.0016 in.) (clearance between piston and cylinder) - 0.01 mm (0.0004 in.) (honing margin.)

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

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

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

Standard: 0.02-0.04 mm (0.0008-0.0016 in.)

NOTE: **When boring the cylinders, finish all of the cylinders to the same oversize. Do not bore only one cylinder to the oversize.**

PISTON AND RINGS

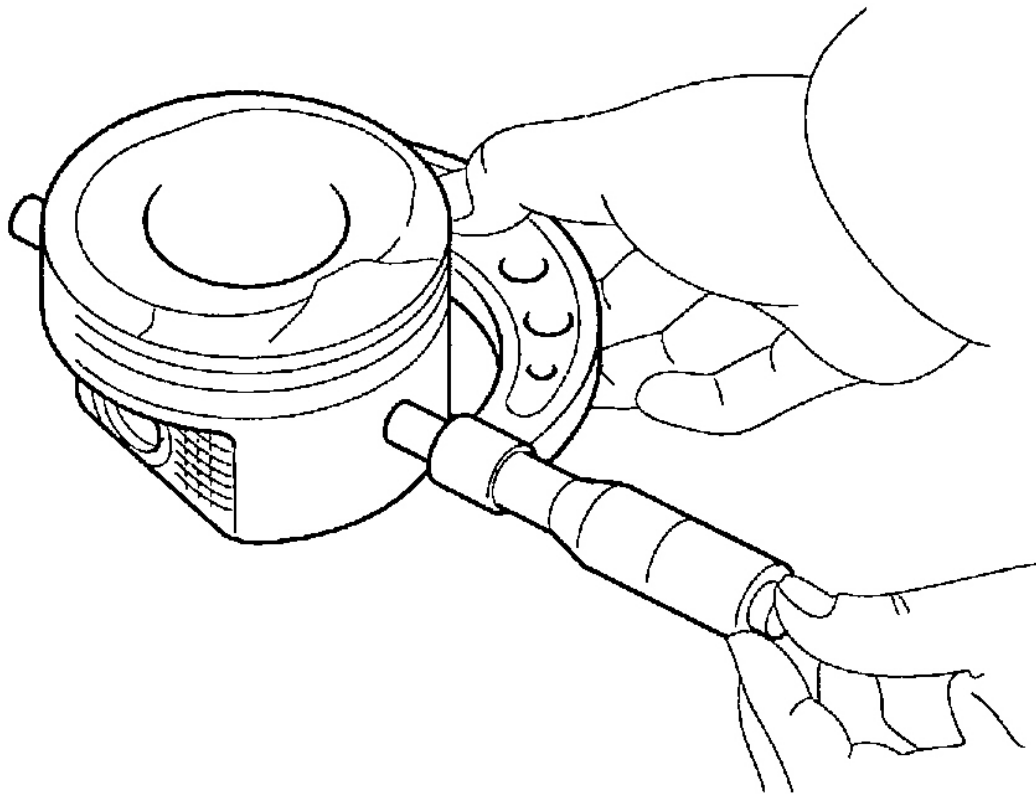
1. Clean piston
 1. Using a gasket scraper, remove the carbon from the piston top.
 2. Using a groove cleaning tool or broken ring, clean the piston ring grooves.
 3. Using solvent and a brush, thoroughly clean the piston.

NOTE: **Do not use a wire brush.**

2. The standard measurement of the piston outside diameter is taken 47 mm (1.85 in.) from the top land of the piston.

Standard diameter

81.97 ~ 82.00mm (3.2272 ~ 3.2283in.)



G00747560

Fig. 202: Measuring Piston Diameter
Courtesy of HYUNDAI MOTOR CO.

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

Piston-to-cylinder clearance

0.02 ~ 0.04mm (0.0008 ~ 0.0016in.)

4. Inspect the piston ring side clearance.

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

Piston ring side clearance

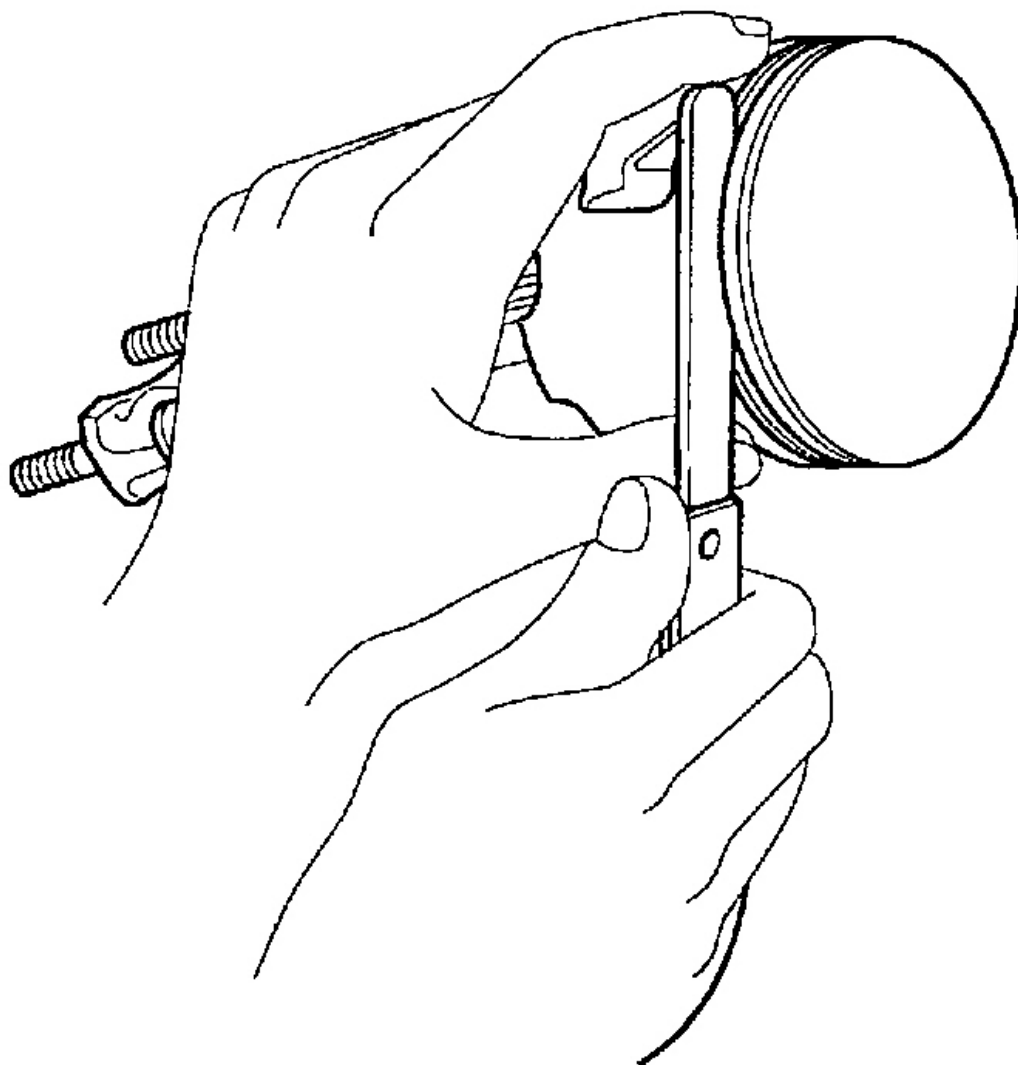
No. 1 : 0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)

No. 2 : 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)

Limit

No. 1 : 0.1mm (0.004in.)

No. 2 : 0.1mm (0.004in.)



G00747561

Fig. 203: Measuring Piston Ring Side Clearance
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 on page EM-86, if the bore is over the service limit, the cylinder block must be re-bored.

Piston ring end gap

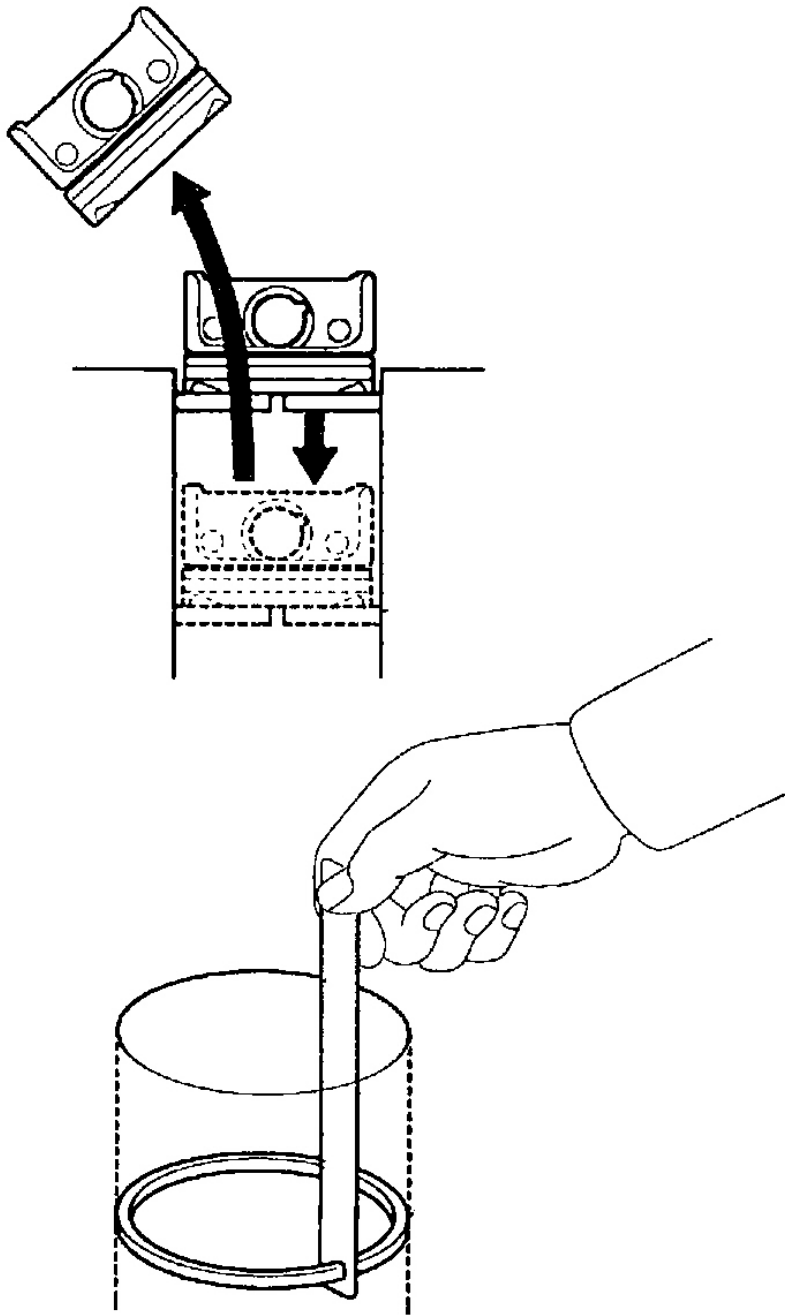
Standard

NO. 1 : 0.23 ~ 0.38mm (0.0091 ~ 0.0150in.)

No. 2 : 0.33 ~ 0.48mm (0.0130 ~ 0.0189in.)

Limit

No. 1, 2, oil ring : 1.0mm (0.039in.)



G00747562

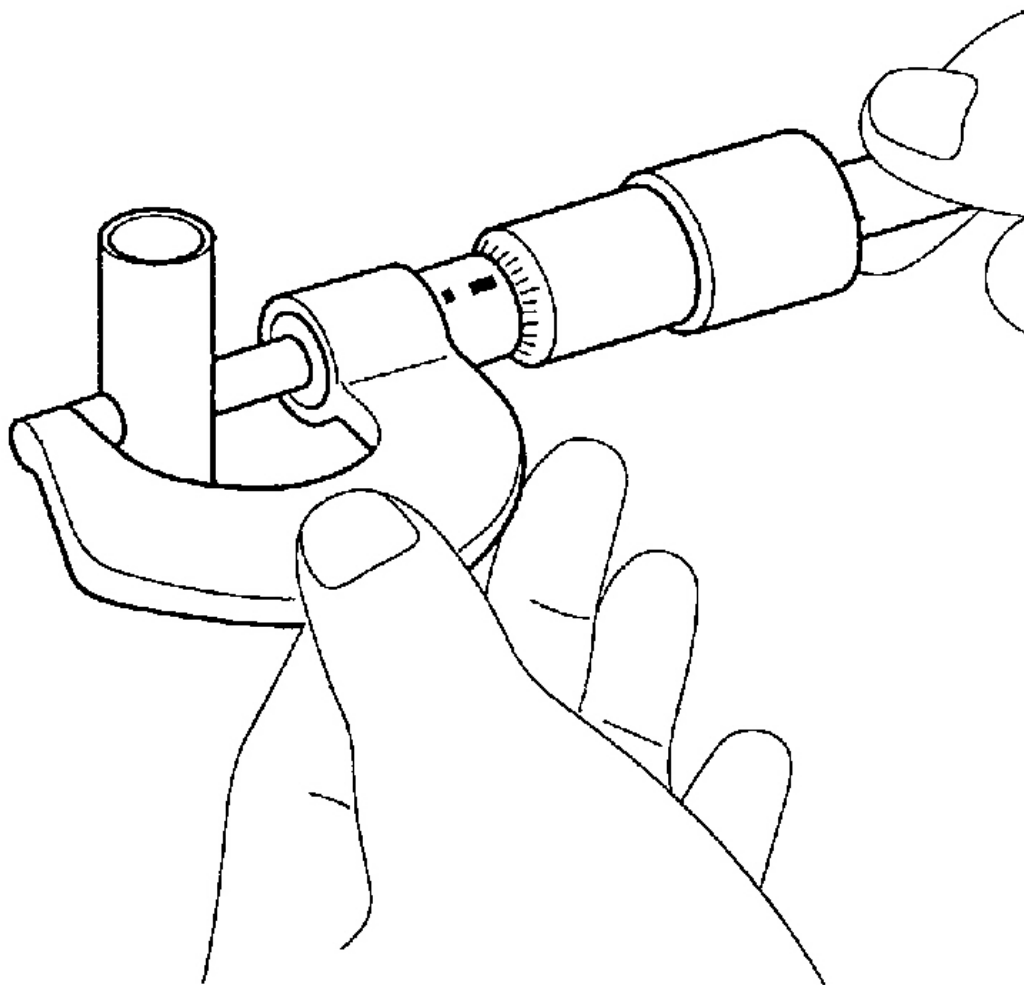
Fig. 204: Measuring Piston Ring End Gap
Courtesy of HYUNDAI MOTOR CO.

PISTON PINS

1. Measure the diameter of the piston pin.

Piston pin diameter

20.001 ~ 20.006mm (0.7874 ~ 0.7876in.)



G00747563

Fig. 205: Measuring Piston Pin Diameter
Courtesy of HYUNDAI MOTOR CO.

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

Piston pin-to-piston clearance

0.01 ~ 0.02mm (0.0004 ~ 0.008in.)

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

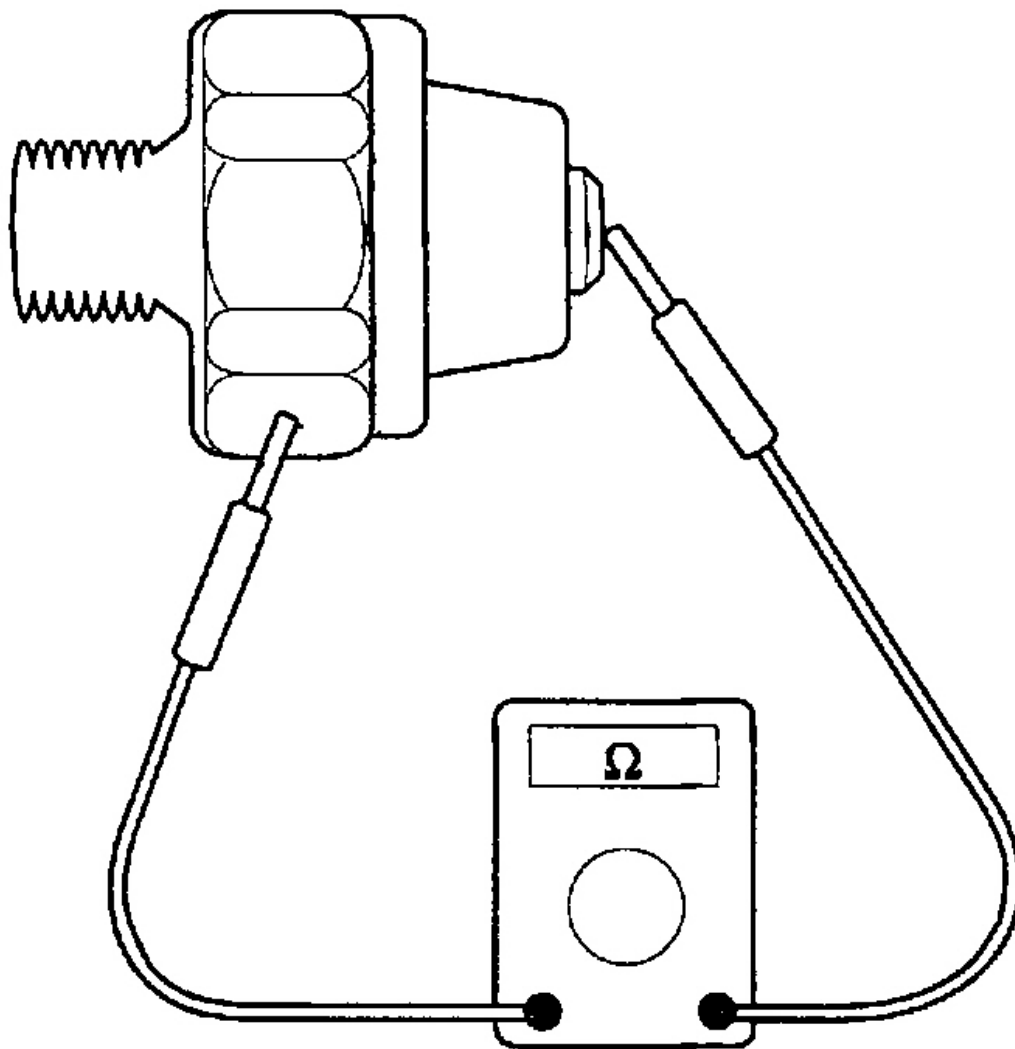
Piston pin-to-connecting rod interference

0.016 ~ 0.032mm (0.00063 ~ 0.00126in.)

OIL PRESSURE SWITCH

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

If there is no continuity, replace the oil pressure switch.

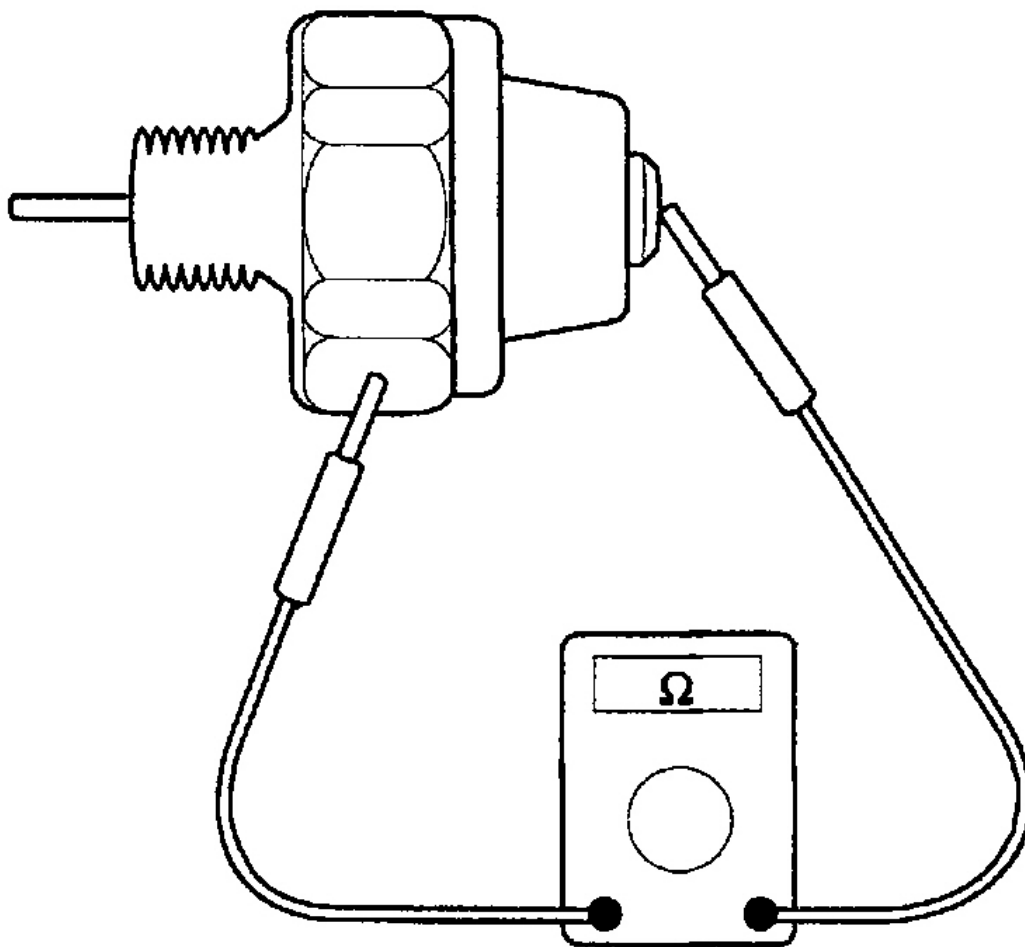


G00747564

Fig. 206: Checking Oil Pressure Switch Continuity (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

2. Check the continuity between the terminal and the body when the fine wire is pushed. If there is continuity even when the fine wire is pushed, replace the switch.
3. If there is no continuity when a 50kpa (7psi) vacuum is applied through the oil hole, the switch is operating properly.

Check for air leakage. If air leaks, the diaphragm is broken. Replace it



G00747565

Fig. 207: Locating Crankshaft Pin Mark (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

REASSEMBLY

NOTE:

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

1. Assemble piston and connecting rod.
 1. Use a hydraulic press for installation.

2. The piston front mark and the connecting rod front mark must face the timing belt side of the engine.

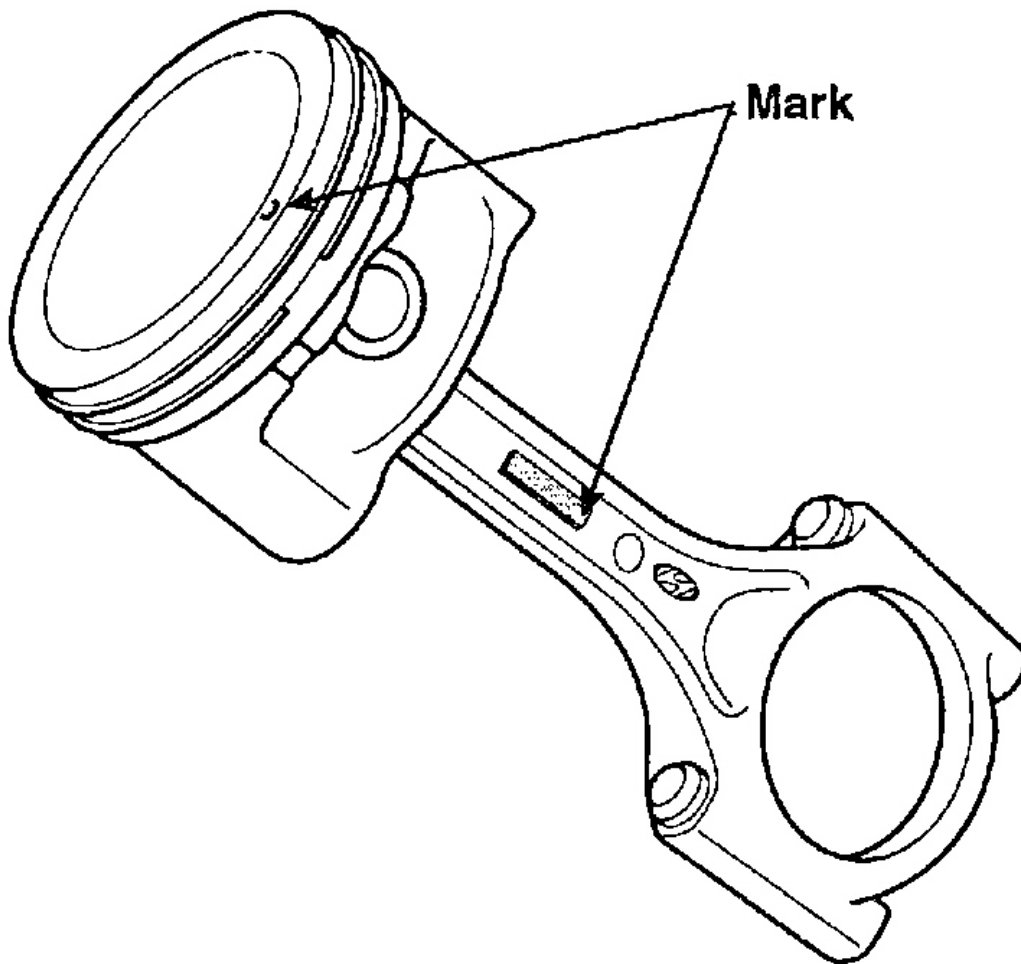
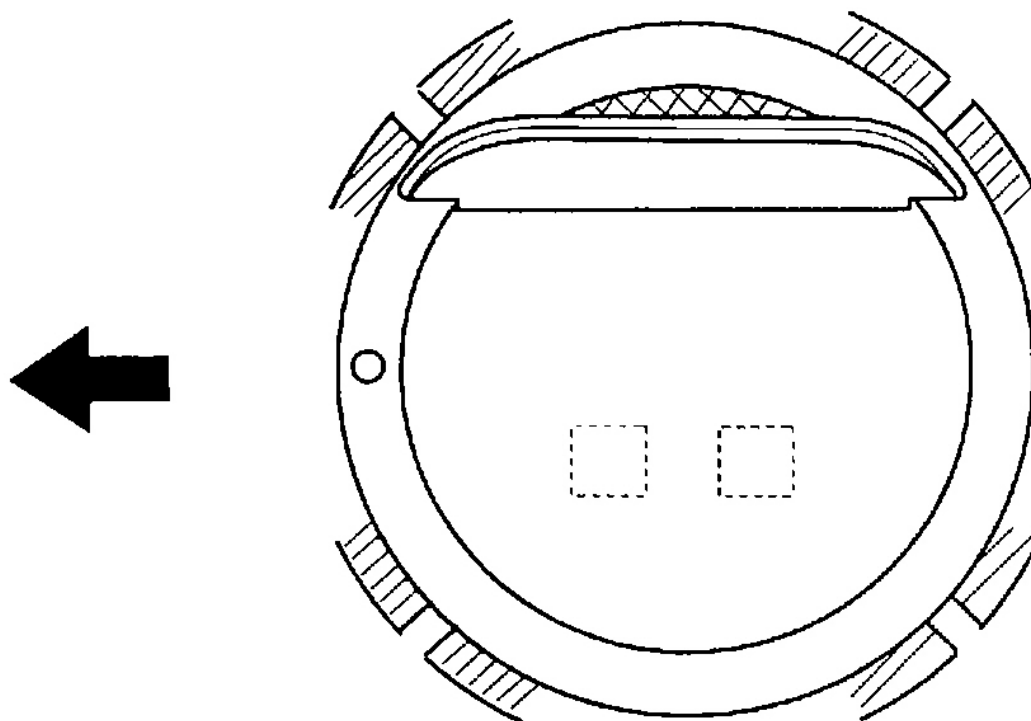
**G00747566**

Fig. 208: Identifying Piston & Connecting Rod Alignment Marks
Courtesy of HYUNDAI MOTOR CO.

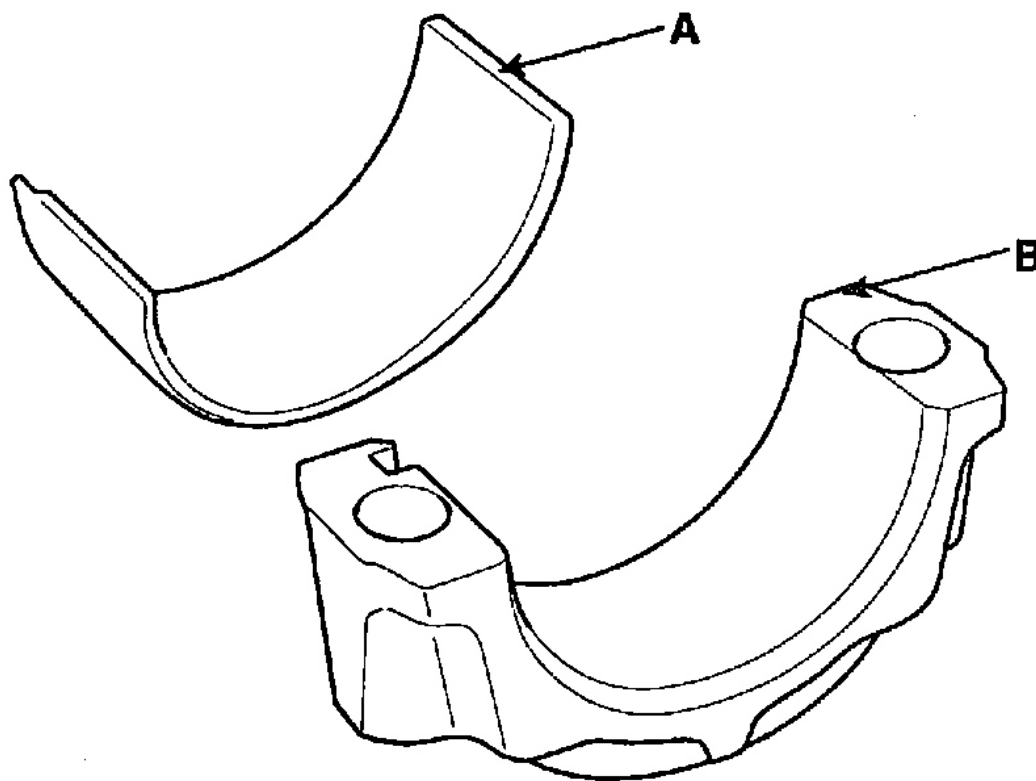
2. Install piston rings.
 1. Install the oil ring expander and 2 side rails by hand.
 2. Using a piston ring expander, install the 2 compression rings with the code mark facing upward.
 3. Position the piston rings so that the ring ends are as shown.



G00747567

Fig. 209: Locating Piston Ring Ends
Courtesy of HYUNDAI MOTOR CO.

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



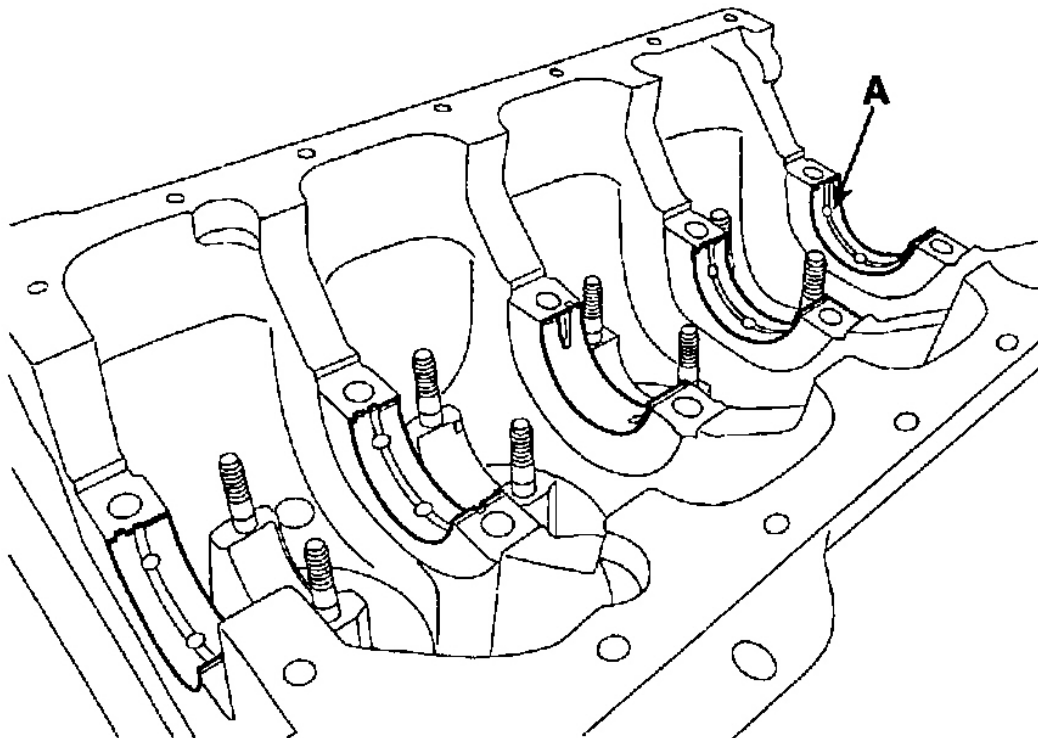
G00747568

Fig. 210: Installing Connecting Rod Bearings
Courtesy of HYUNDAI MOTOR CO.

4. Install main bearings.

NOTE: Upper 1,2,4,5 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 (A).

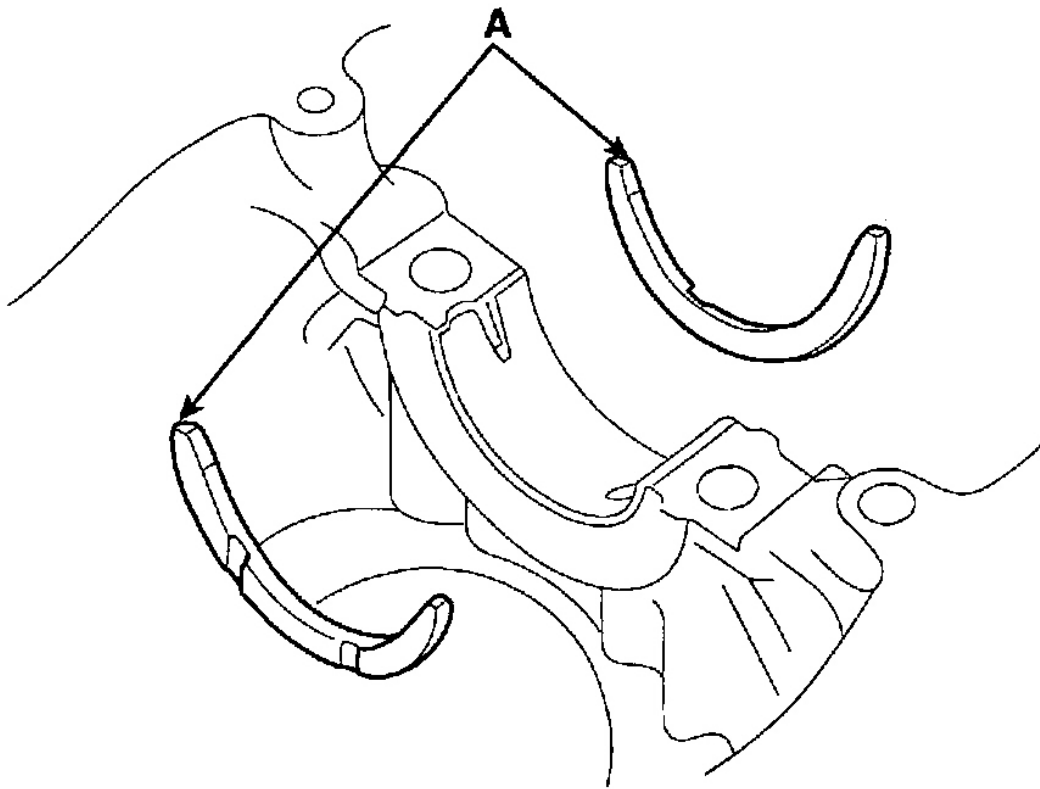


G00747569

Fig. 211: Installing Crankshaft Main Bearings
Courtesy of HYUNDAI MOTOR CO.

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

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



G00747570

Fig. 212: Installing Crankshaft Thrust Bearings
Courtesy of HYUNDAI MOTOR CO.

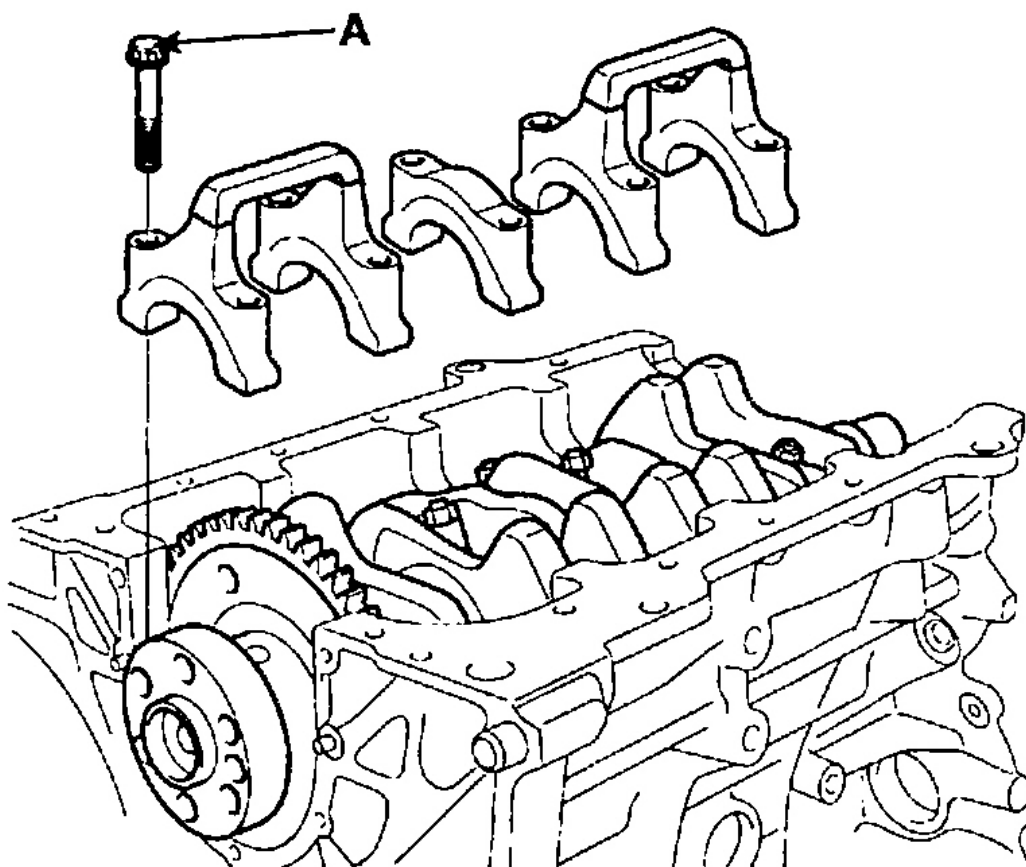
6. Place crankshaft on the cylinder block.
7. Place main bearing caps on cylinder block.
8. Install main bearing cap bolts.

NOTE:

- The main bearing cap bolts are tightened in 2 progressive steps.
- If any of the bearing cap bolts is broken or deformed, replace it.

1. Apply a light coat of engine oil on the threads and under the bearing cap bolts.
2. Install and uniformly tighten the 10 bearing cap bolts (A), in several passes, in the sequence shown.

Tightening torque: 30Nm (300kgf.cm, 22lbf.ft)



G00747571

Fig. 213: Installing Crankshaft Main Bearing Caps
Courtesy of HYUNDAI MOTOR CO.

3. Retighten the bearing cap bolts by 60° ~ 65° in the numerical order shown.

Tightening torque

Main bearing cap bolt:

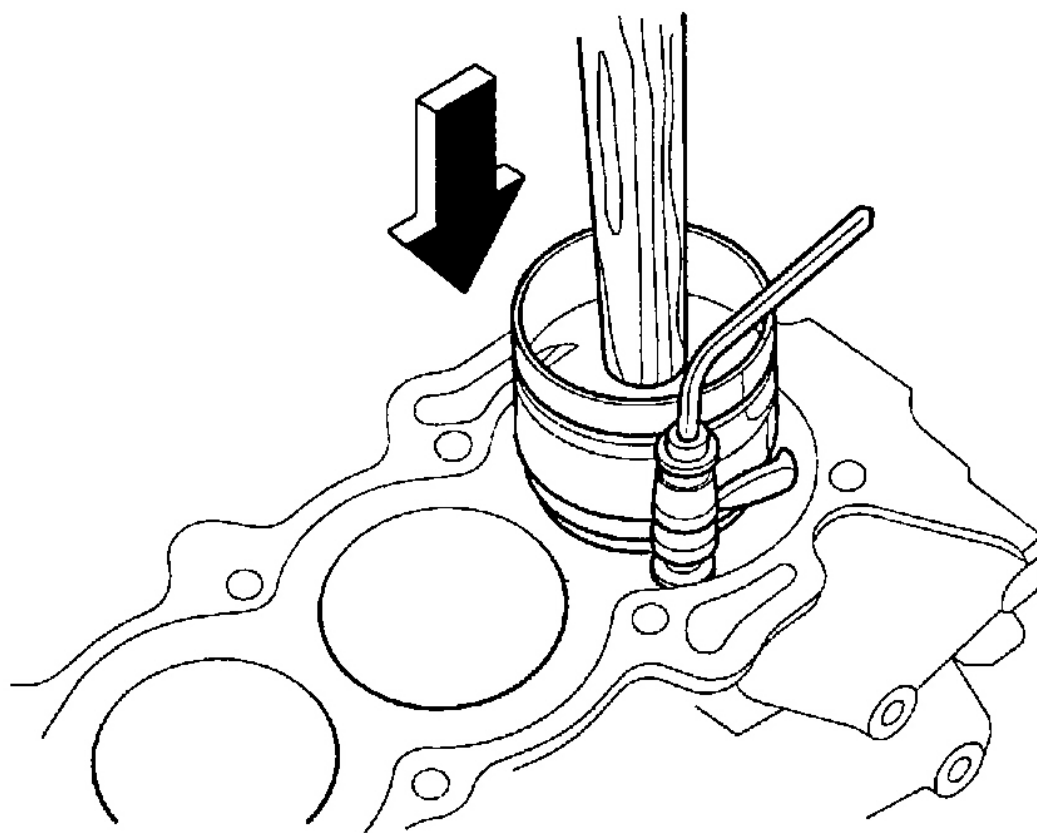
30Nm (300kgf.cm, 22lbf.ft) + 60° ~ 65°

4. Check that the crankshaft turns smoothly.
9. Check crankshaft end play. See **Fig. 193**.
10. Install piston and connecting rod assemblies.

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

1. Remove the connecting rod caps, and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
2. 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.
3. Stop after the ring compressor pops free, and check the connecting rod-to-check journal alignment before pushing the piston into place.
4. Apply engine oil to the bolt threads. Install the rod caps with bearings, and torque the nuts : 50 ~ 53Nm (500 ~ 530kgf.cm, 36.9 ~ 39lb.ft)

NOTE: Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.



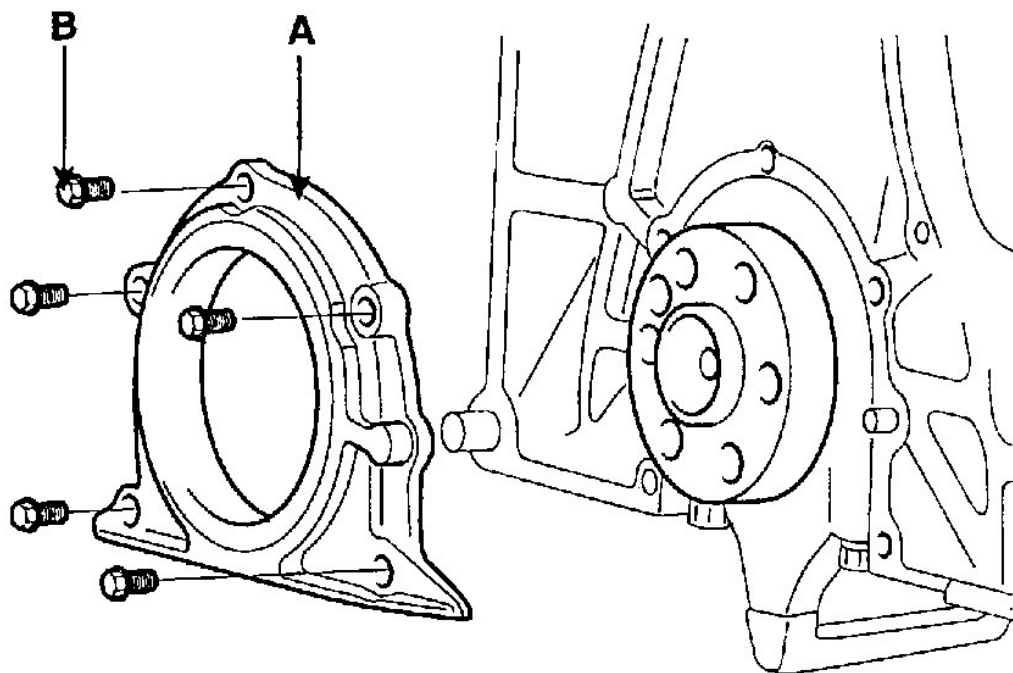
G00747572

Fig. 214: Installing Piston & Rod Assembly
Courtesy of HYUNDAI MOTOR CO.

11. Install a new gasket and rear oil seal case (A) with 5 bolts (B).

Tightening torque

10 ~ 12Nm (100 ~ 120kgf.cm, 7.3 ~ 8.8lbf.ft)



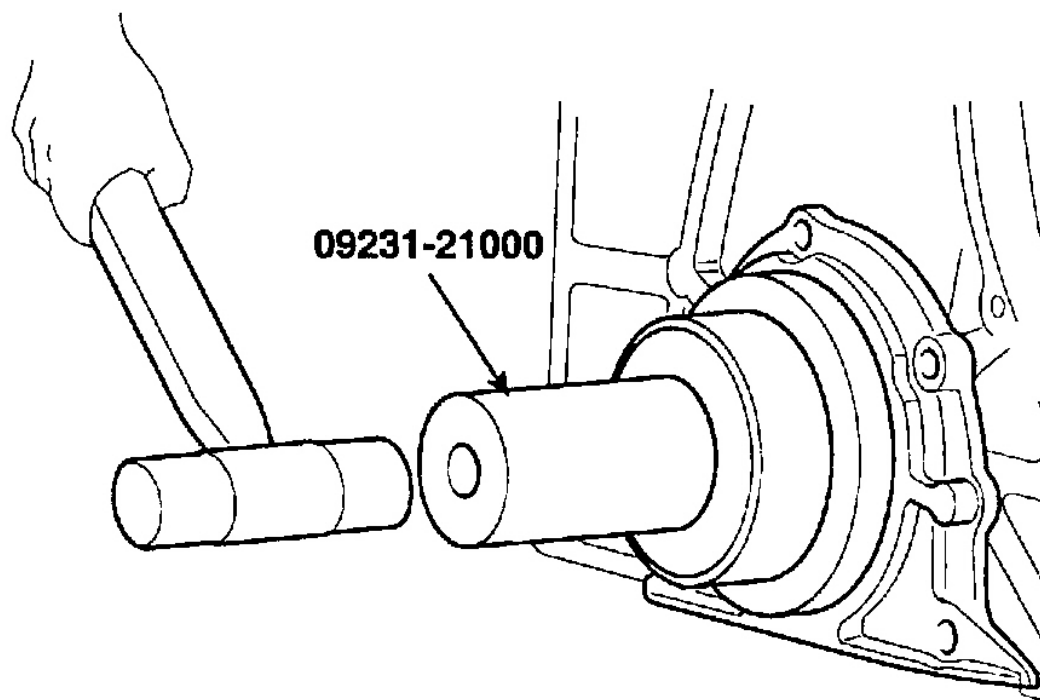
G00747573

Fig. 215: Installing Rear Oil Seal Case
Courtesy of HYUNDAI MOTOR CO.

NOTE: Check that the mating surfaces are clean and dry.

12. Install rear oil seal.

1. Apply engine oil to a new oil seal lip.
2. Using SST (09231-21000) and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.



G00747574

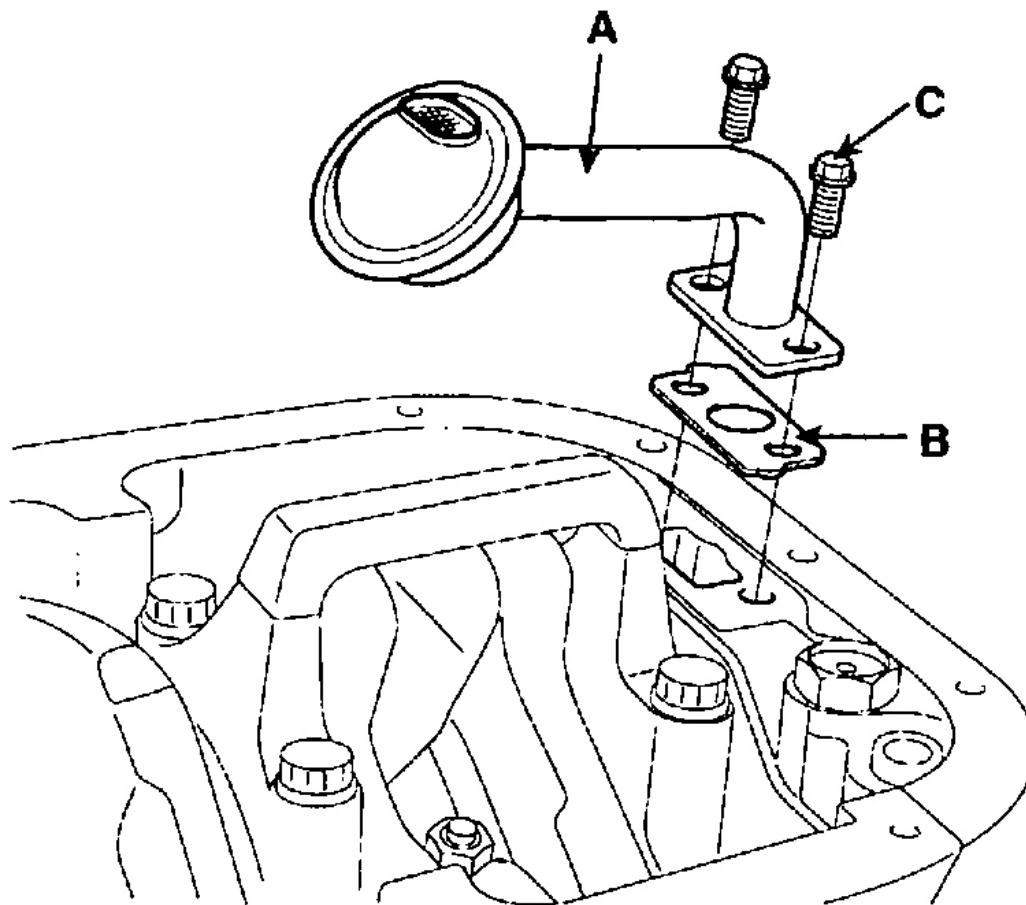
Fig. 216: Installing Rear Oil Seal
Courtesy of HYUNDAI MOTOR CO.

13. Install front case. See **Fig. 257**.
14. Install oil screen.

Install a new gasket (B) and oil screen (A) with 2 bolts (C).

Tightening torque

15 ~ 22Nm (150 ~ 220kgf.cm, 11 ~ 16lb.ft)



G00747575

Fig. 217: Installing Oil Screen
Courtesy of HYUNDAI MOTOR CO.

15. Install oil pan.

1. Using a razor blade and gasket scraper, remove all the old packing material from the gasket surfaces.

NOTE: Check that the mating surfaces are clean and dry before applying liquid gasket.

2. Apply liquid gasket as an even bead, centered between the edges of the mating surface.

Use liquid gasket MS 721-40A or equivalent.

NOTE:

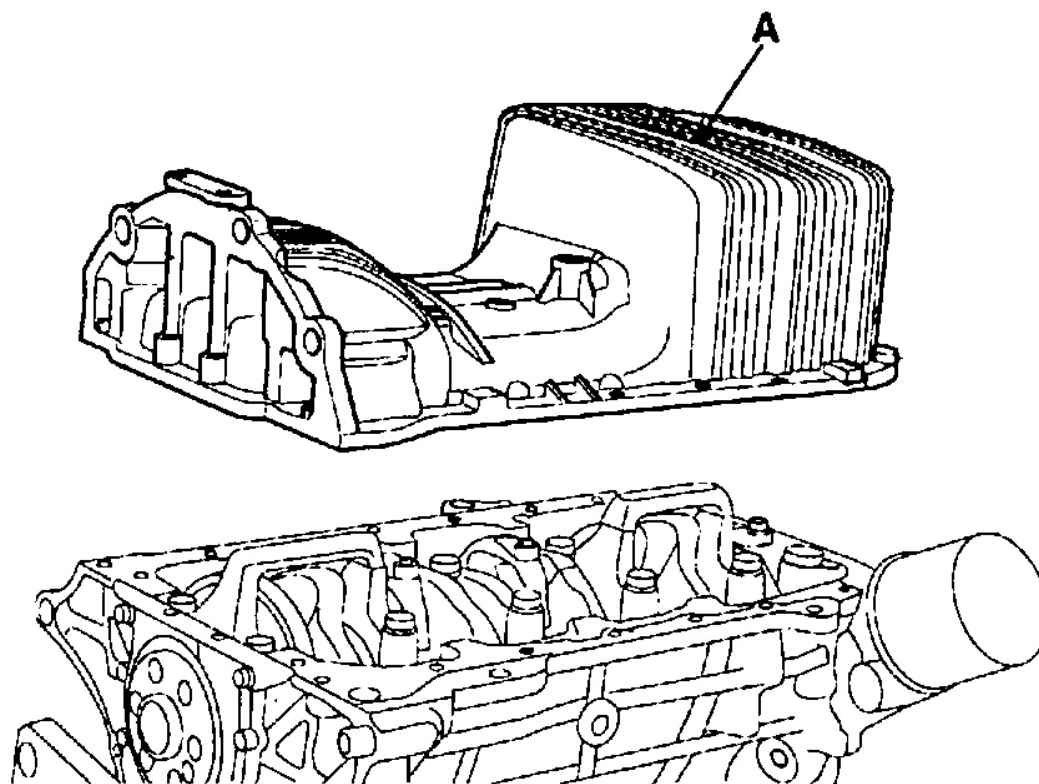
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

3. Install the oil pan (A) with the 19 bolts.

Uniformly tighten the bolts in several passes.

Tightening torque

10 ~ 12Nm (100 ~ 120kgf.cm, 7.3 ~ 8.8lbf.ft)



G00747576

Fig. 218: Installing Oil Pan
Courtesy of HYUNDAI MOTOR CO.

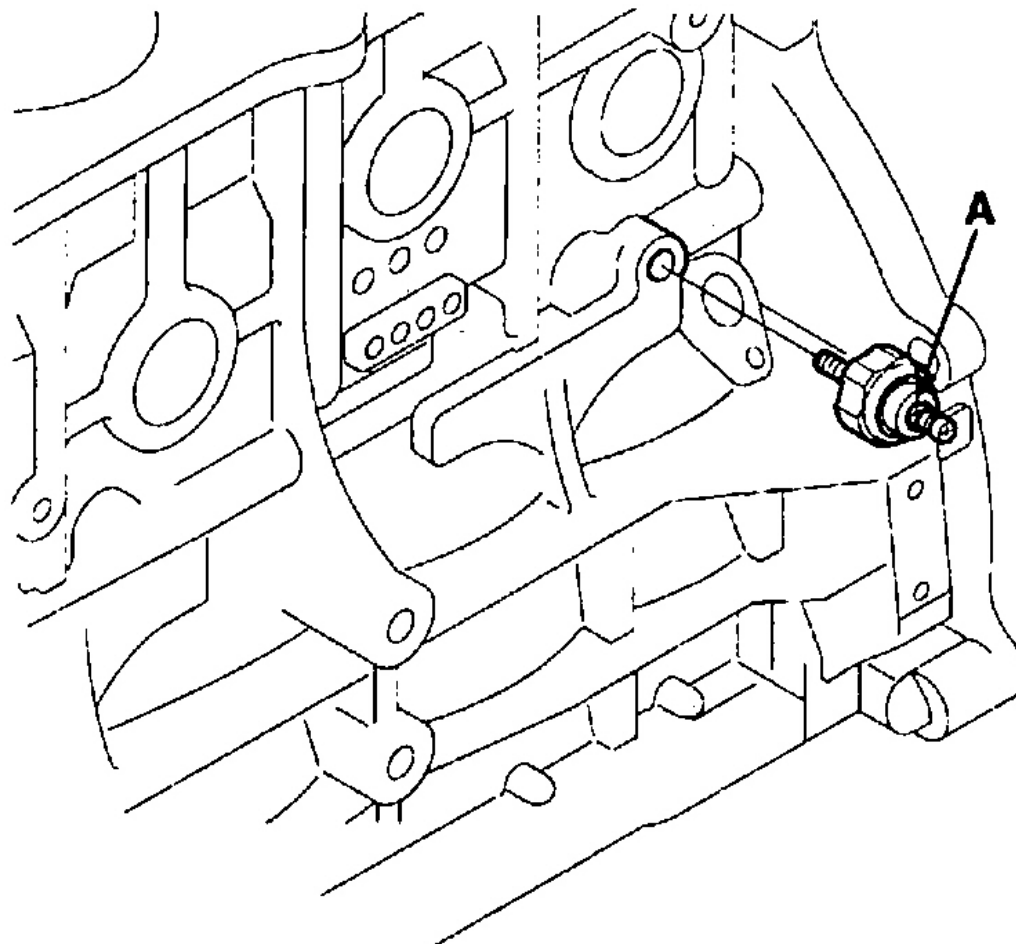
4. Install water pump. See **Water Pump**.
5. Install oil pressure sensor.
 1. Apply adhesive to 2 or 3 threads.

Adhesive : MS 721-39(B) or equivalent.

2. Install the oil pressure sensor (A).

Tightening torque

15 ~ 22Nm (150 ~ 220kgf.cm, 11 ~ 16lbf.ft)



G00747577

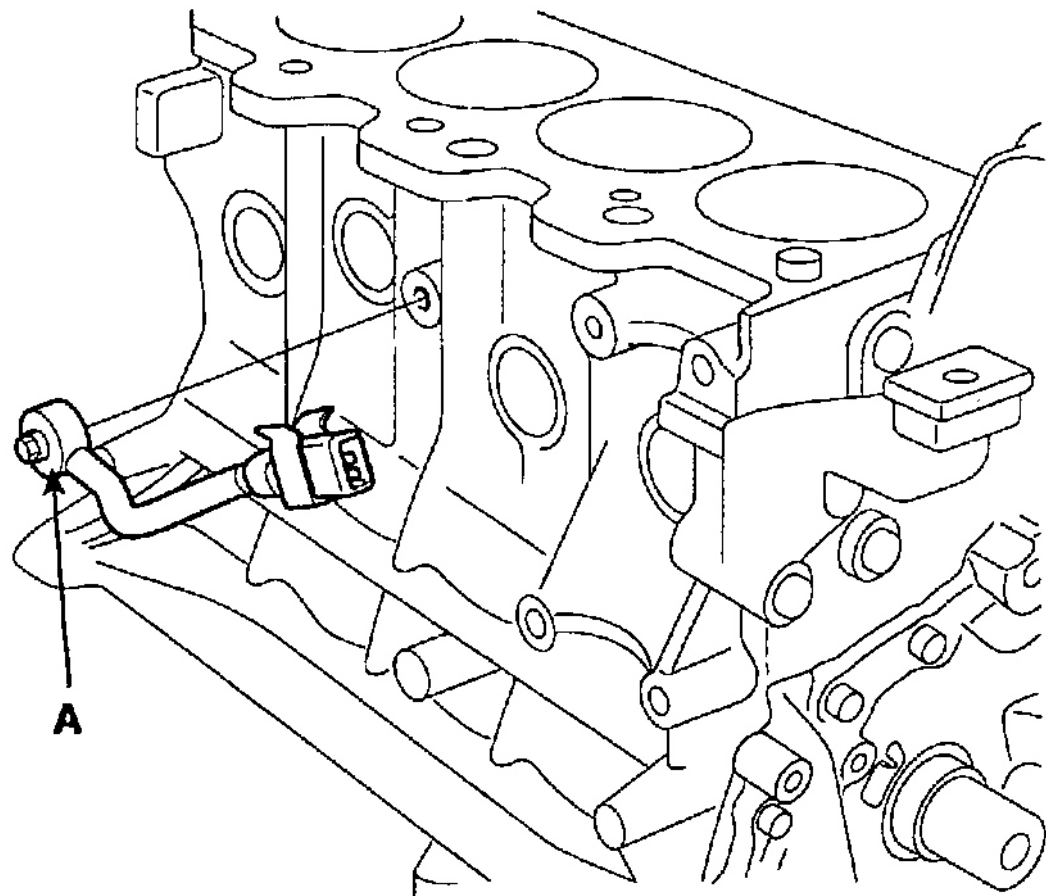
Fig. 219: Installing Oil Pressure Sensor

Courtesy of HYUNDAI MOTOR CO.

6. Install knock sensor (A).

Tightening torque

17 ~ 27Nm (170 ~ 270kgf.cm, 12.5 ~ 20lbf.ft)



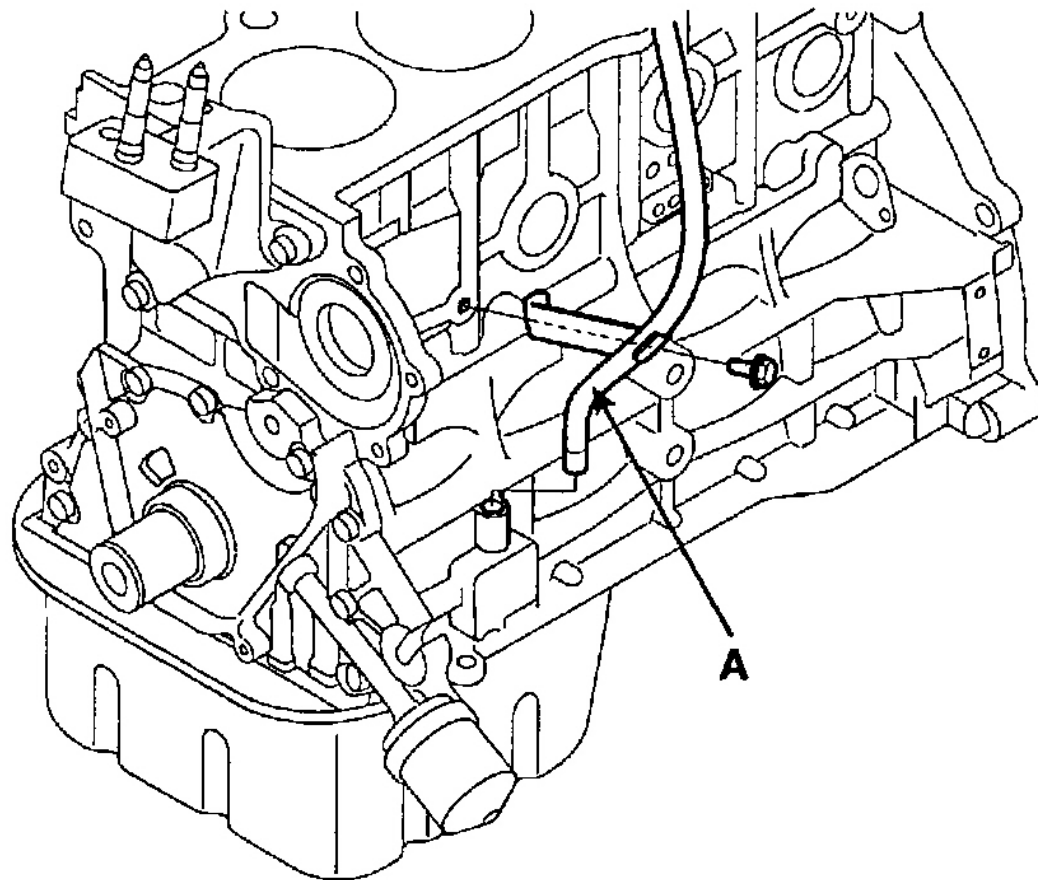
G00747578

Fig. 220: Installing Knock Sensor
Courtesy of HYUNDAI MOTOR CO.

7. Install oil level gauge assembly.
1. Install a new O-ring on the oil level gauge.
 2. Apply engine oil on the O-ring.
 3. Install the oil level gauge assembly (A) with the bolt.

Tightening torque

12 ~ 15Nm (120 ~ 150kgf.cm, 9 ~ 11lbf.ft)



G00747579

Fig. 221: Installing Oil Level Gauge Assembly
Courtesy of HYUNDAI MOTOR CO.

8. Install cylinder head. See **INSTALLATION** under CYLINDER HEAD ASSEMBLY.
9. Install timing belt. See **INSTALLATION** under TIMING SYSTEM.
10. Remove engine stand.
11. A/T : Install drive plate.

Tightening torque

120 ~ 130Nm (1200 ~ 1300kgf.cm, 89 ~ 96lbf.ft)

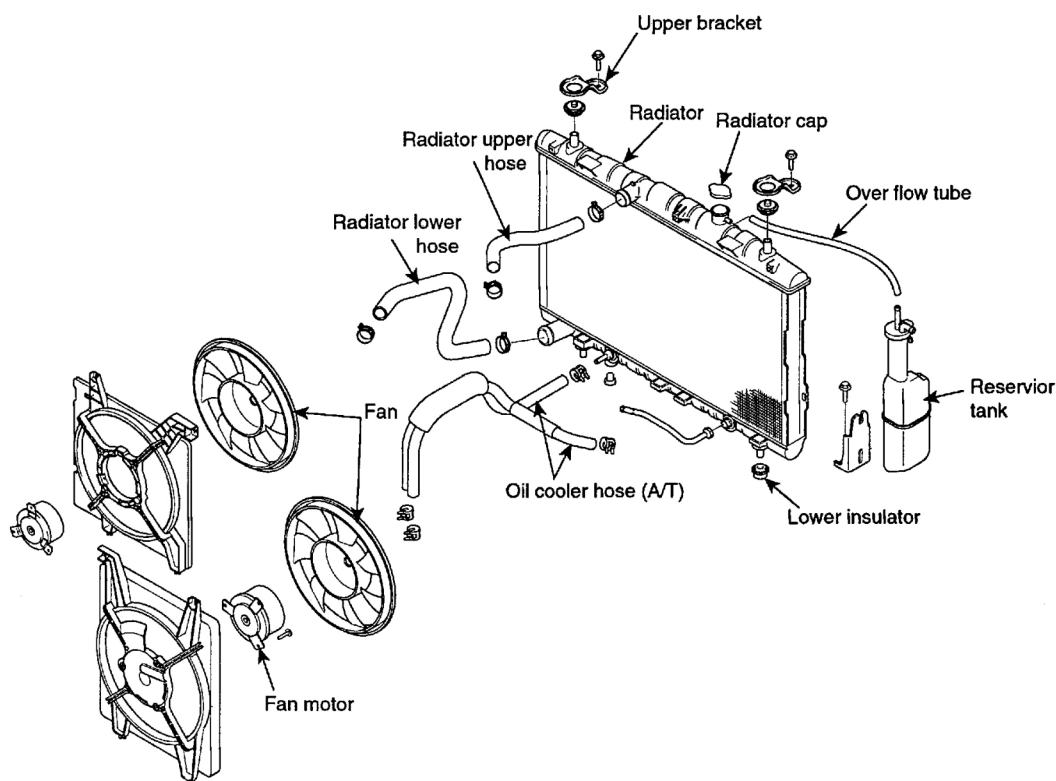
12. M/T : Install flywheel.

Tightening torque

120 ~ 130Nm (1200 ~ 1300kgf.cm, 89 ~ 96lbf.ft)

COOLING SYSTEM

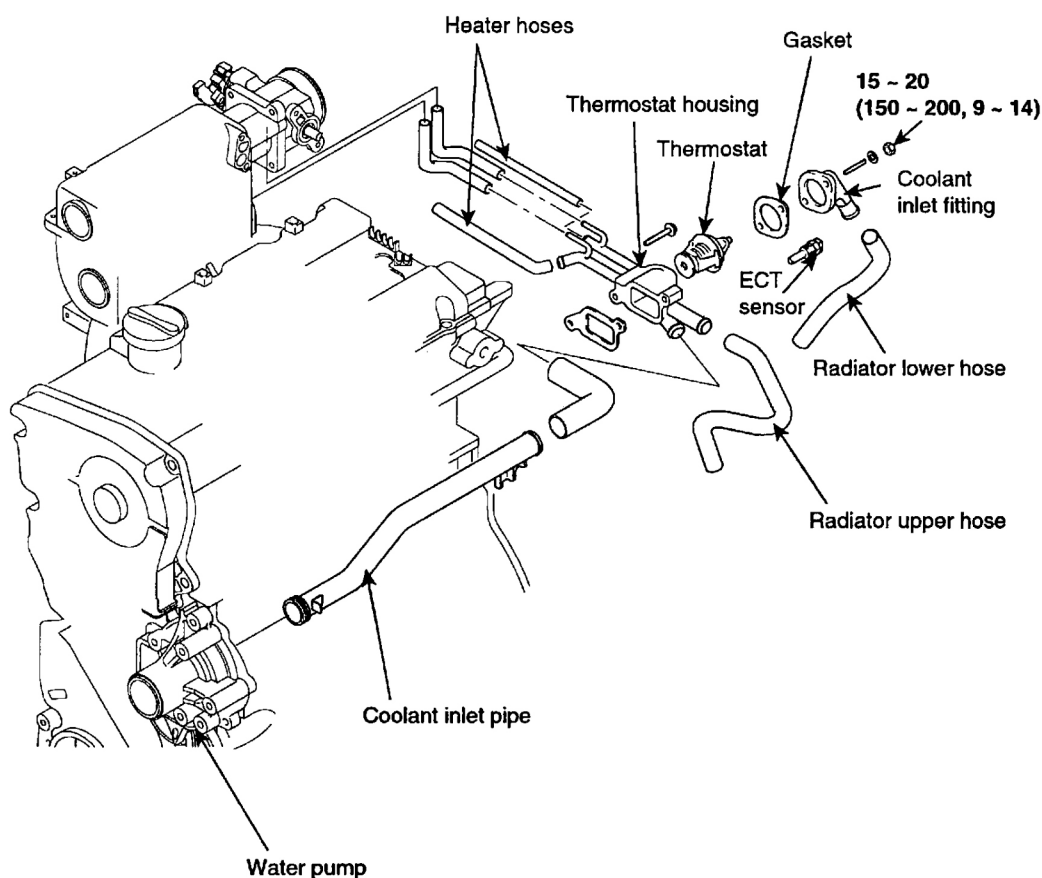
COMPONENT



TORQUE : Nm (kgf.cm, lbf.ft)

G00747580

Fig. 222: Identifying Cooling System Components (1 Of 2)
 Courtesy of HYUNDAI MOTOR CO.



TORQUE : Nm (kgf.cm, lbf.ft)

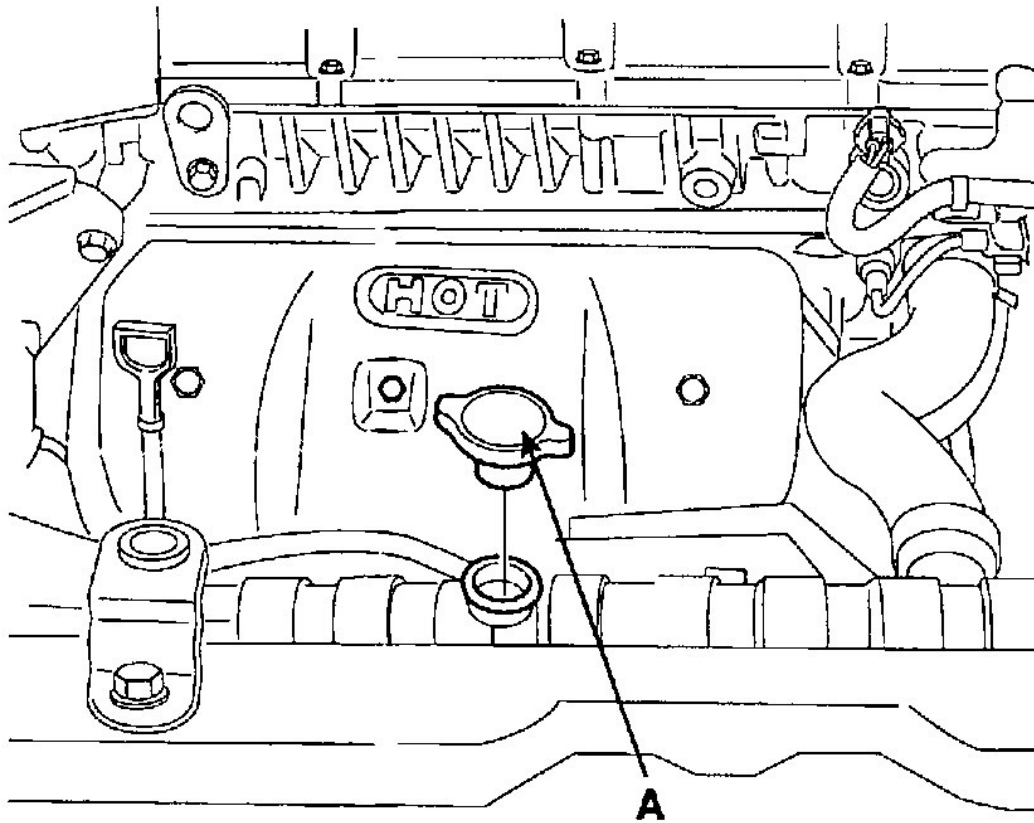
G00747581

Fig. 223: Identifying Cooling System Components (2 Of 2)
 Courtesy of HYUNDAI MOTOR CO.

ENGINE COOLANT REFILLING AND BLEEDING

CAUTION: When pouring engine coolant, be sure to shut the relay box lid and not to let coolant spill on the electrical parts or the paint. If any coolant spills, rinse it off immediately.

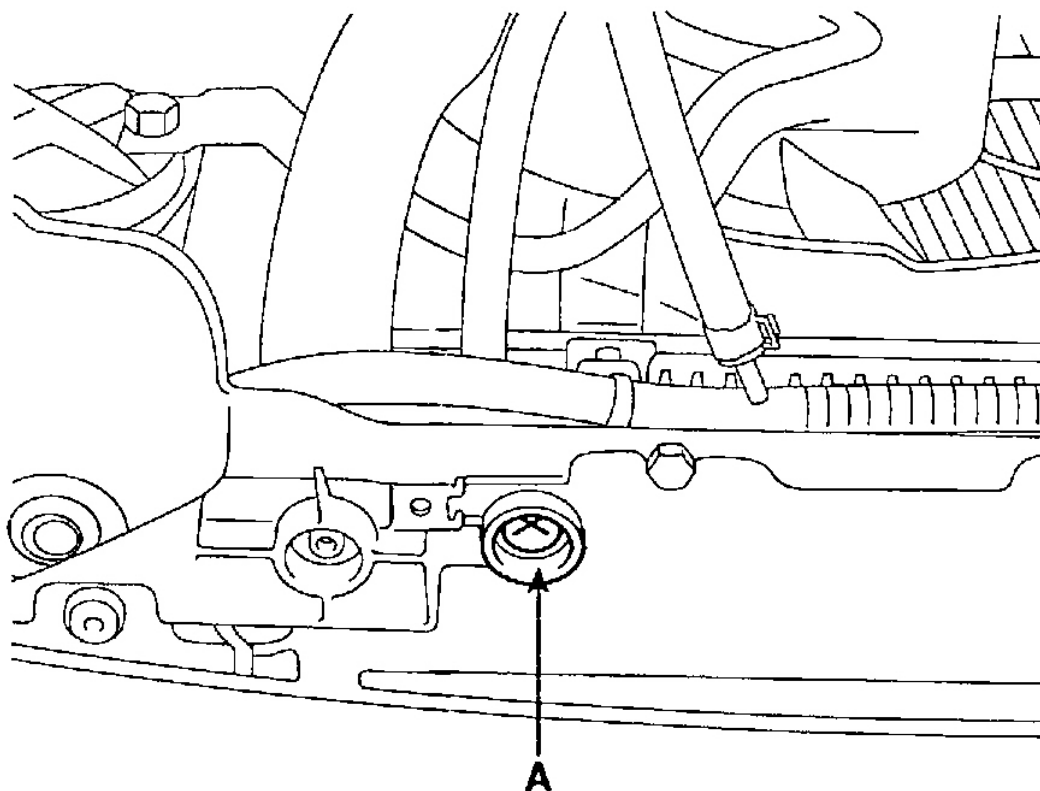
1. Slide the heater temperature control lever to maximum heat. Make sure the engine and radiator are cool to the touch.
2. Remove radiator cap (A).



G00747582

Fig. 224: Removing Radiator Cap
Courtesy of HYUNDAI MOTOR CO.

3. Loosen the drain plug, and drain the coolant.
4. Tighten the radiator drain plug (A) securely.



G00747583

Fig. 225: Locating Radiator Drain Plug
Courtesy of HYUNDAI MOTOR CO.

5. Remove, drain and reinstall the reservoir. Fill the tank halfway to the MAX mark with water, then up to the MAX mark with antifreeze.
6. Mix the recommended antifreeze with an equal amount of water in a clean container.

NOTE:

- Use only genuine antifreeze/coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% minimum. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.

CAUTION:

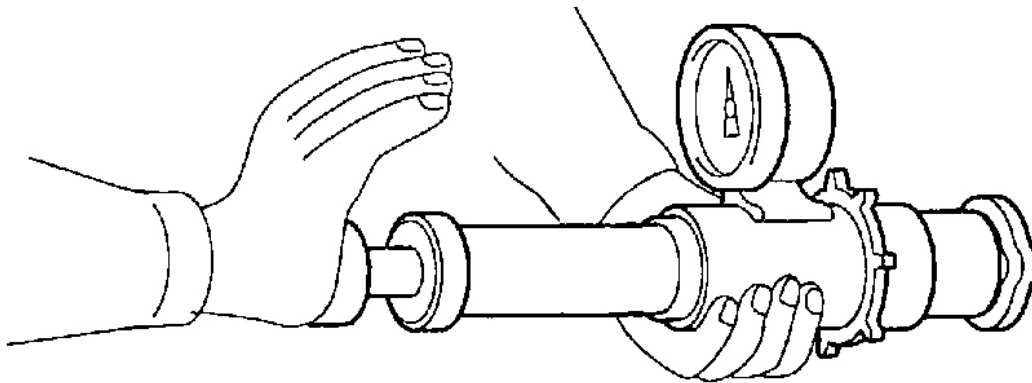
- Do not mix different brands of antifreeze / coolants.
- Do not use additional rust inhibitors or antirust products; they

may not be compatible with the coolant.

7. Pour coolant into the radiator up to base of the filler neck, and install the radiator cap loosely.
8. Start the engine and let it run until it warms up (the radiator fan comes on at least twice).
9. Turn off the engine. Check the level in the radiator, add coolant if needed.
10. Put the radiator cap on tightly, then run the engine again and check for leaks.

CAP TESTING

1. Remove the radiator cap, wet its seal with engine coolant, then install it no pressure tester.



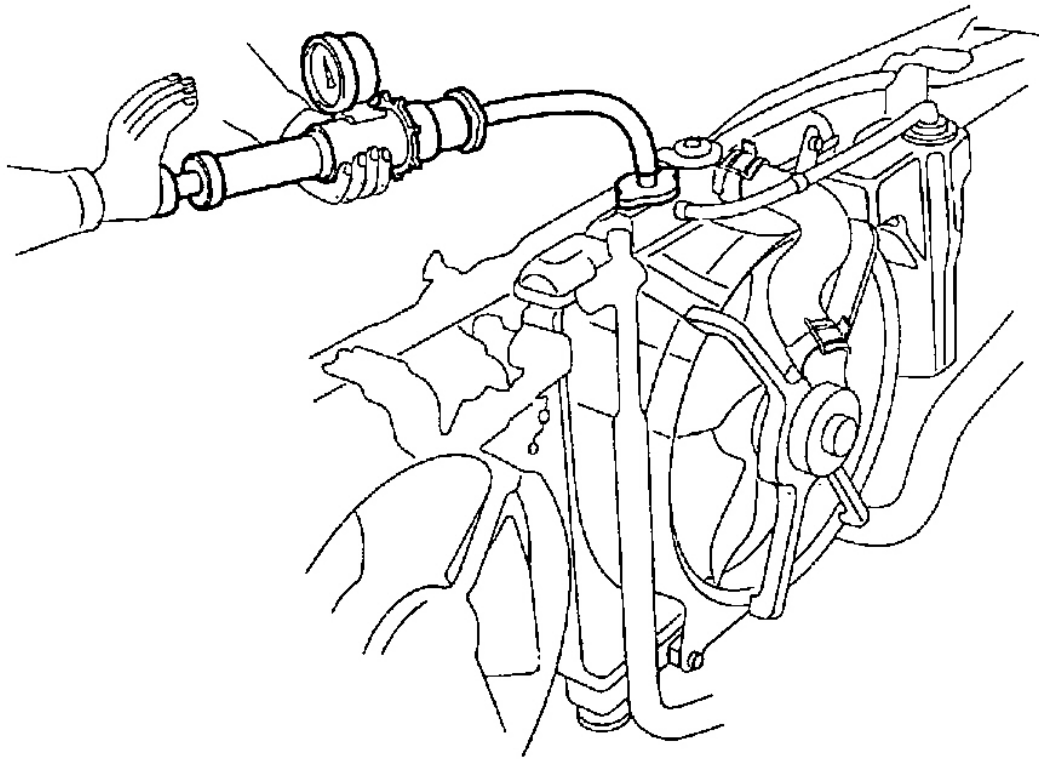
G00747584

Fig. 226: Pressure Testing Radiator Cap
Courtesy of HYUNDAI MOTOR CO.

2. Apply a pressure of 93 ~ 123kPa (0.95 ~ 1.25kgf/cm² , 14 ~ 19psi)
3. Check for a drop in pressure.
4. If the pressure drops, replace the cap.

TESTING

1. Wait until engine is cool, then carefully remove the radiator cap and fill the radiator with engine coolant, then install it on the pressure tester.
2. Apply a pressure tester to the radiator and apply a pressure of 93 ~ 123kPa (0.95 ~ 1.25kgf/cm² 14 ~ 19psi).



G00747585

Fig. 227: Pressure Testing Cooling System
Courtesy of HYUNDAI MOTOR CO.

3. Inspect for engine coolant leaks and a drop in pressure.
4. Remove the tester and reinstall the radiator cap.

NOTE: Check for engine oil in the coolant and/or coolant in the engine oil.

REMOVAL

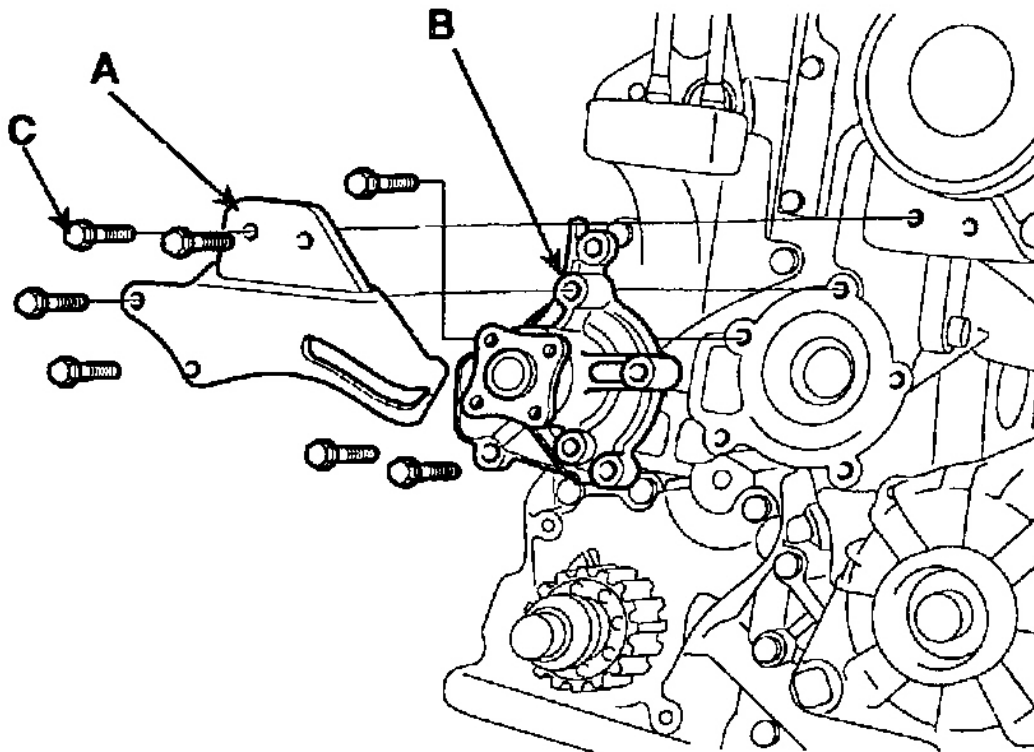
Water Pump

1. Drain the engine coolant.

WARNING: System is under high pressure when the engine is hot. To avoid danger of releasing scalding engine coolant, remove the cap only when the engine is cool.

2. Remove drive belts.

3. Remove the timing belt. See **REMOVAL** under TIMING SYSTEM.
4. Remove the timing belt idler. See **Fig. 45**.
5. Remove the water pump.
 1. Remove the 4 bolts and pump pulley.
 2. Remove the 2 bolts (C), then remove the alternator brace (A).
 3. Remove the water (B) pump and gasket.



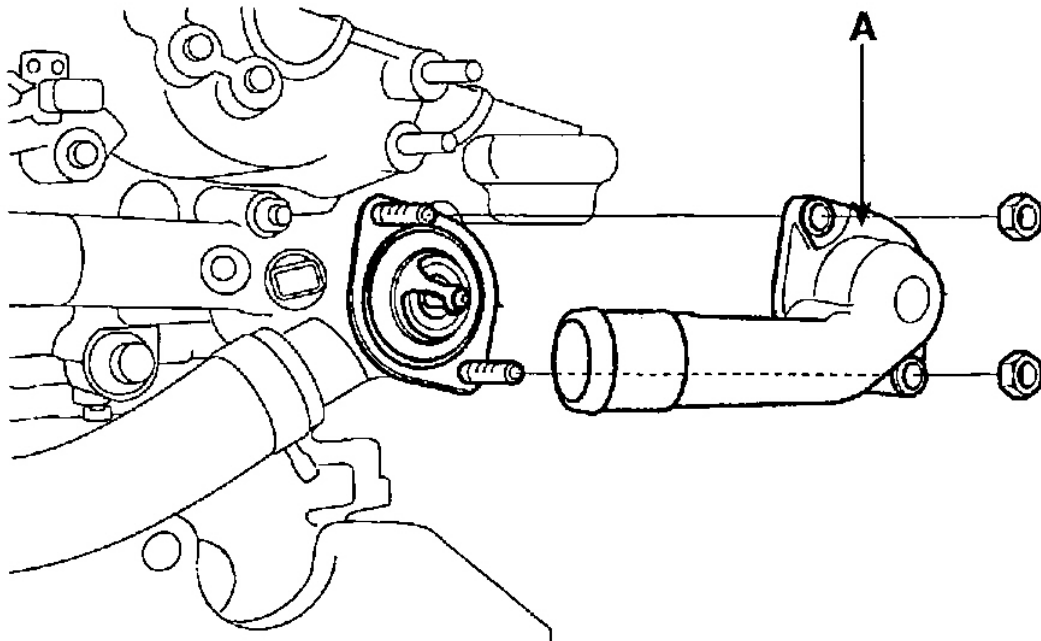
G00747586

Fig. 228: Removing Water Pump
 Courtesy of HYUNDAI MOTOR CO.

Thermostat

NOTE: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. Drain engine coolant so its level is below thermostat.
2. Remove water inlet (A), gasket and thermostat.

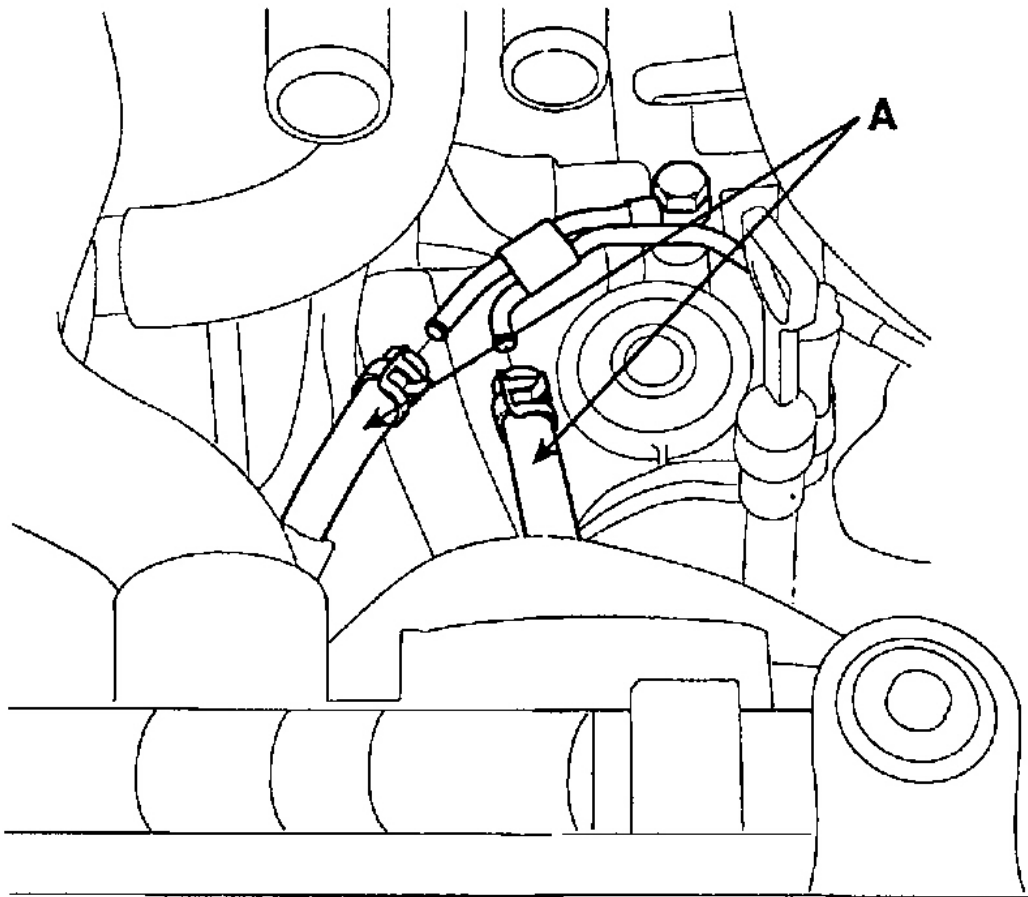


G00747587

Fig. 229: Removing Thermostat
Courtesy of HYUNDAI MOTOR CO.

Radiator

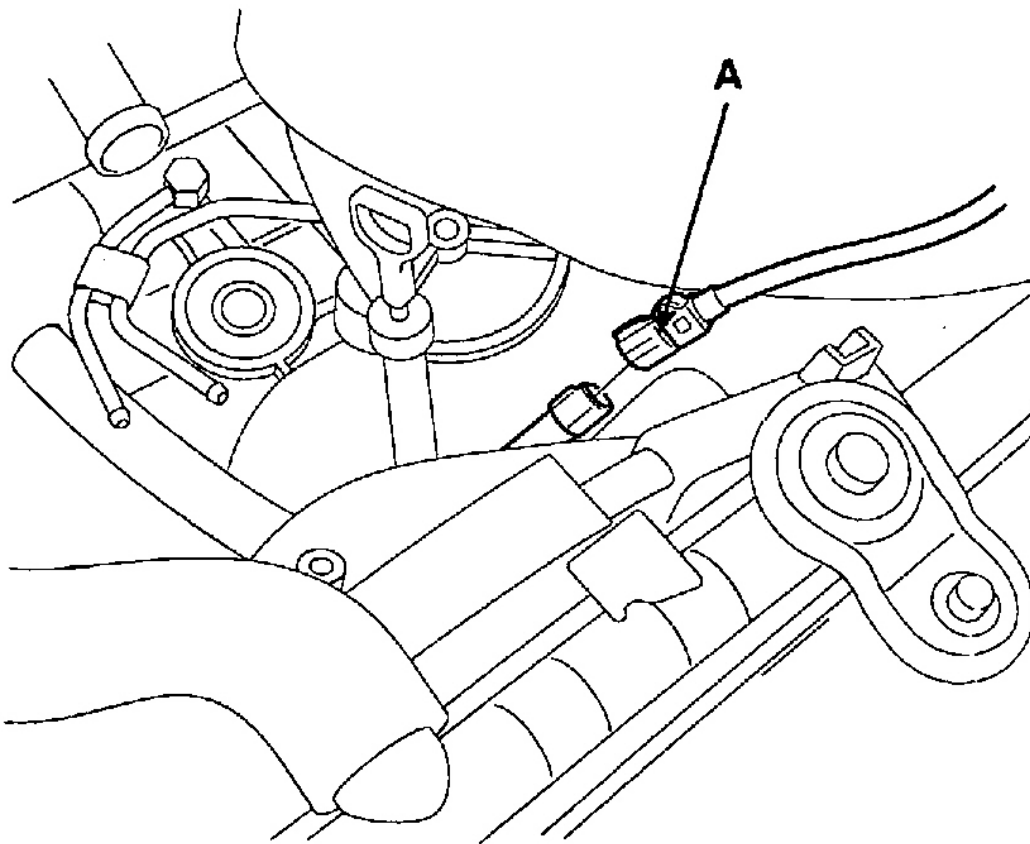
1. Drain the engine coolant.
2. Remove the upper and lower radiator hoses (A), and ATF cooler hoses.



G00747588

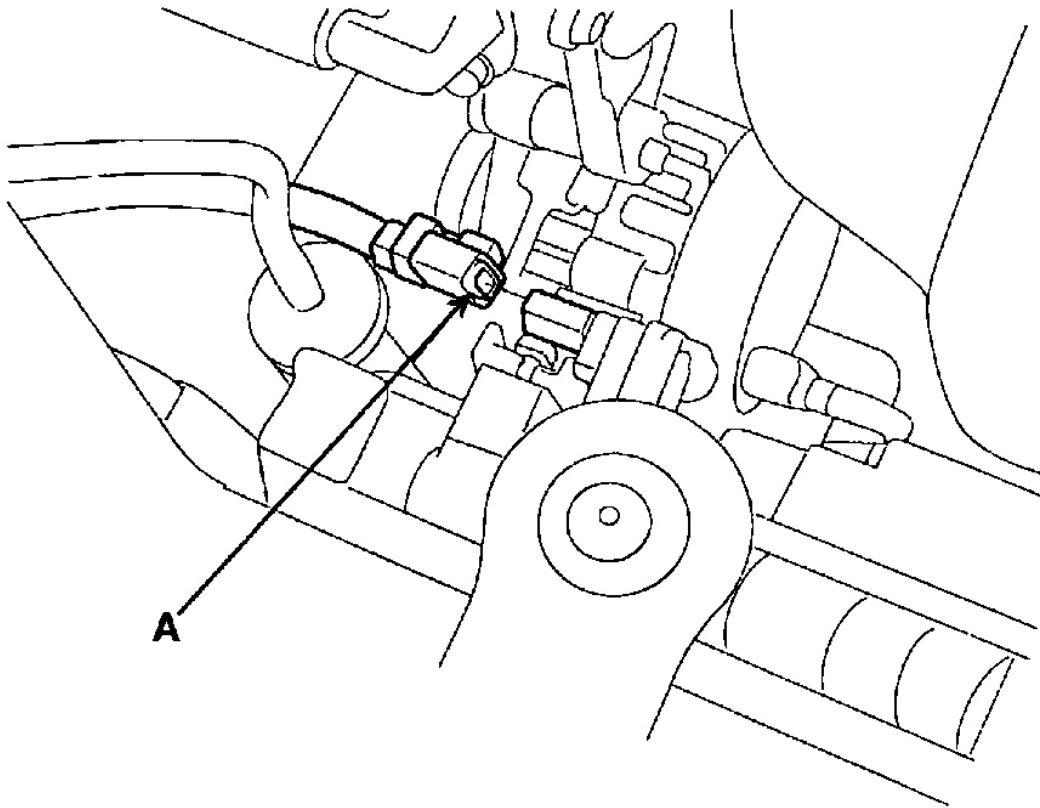
Fig. 230: Removing Upper & Lower Radiator Hoses
Courtesy of HYUNDAI MOTOR CO.

3. Disconnect the fan motor connector (A).



G00747589

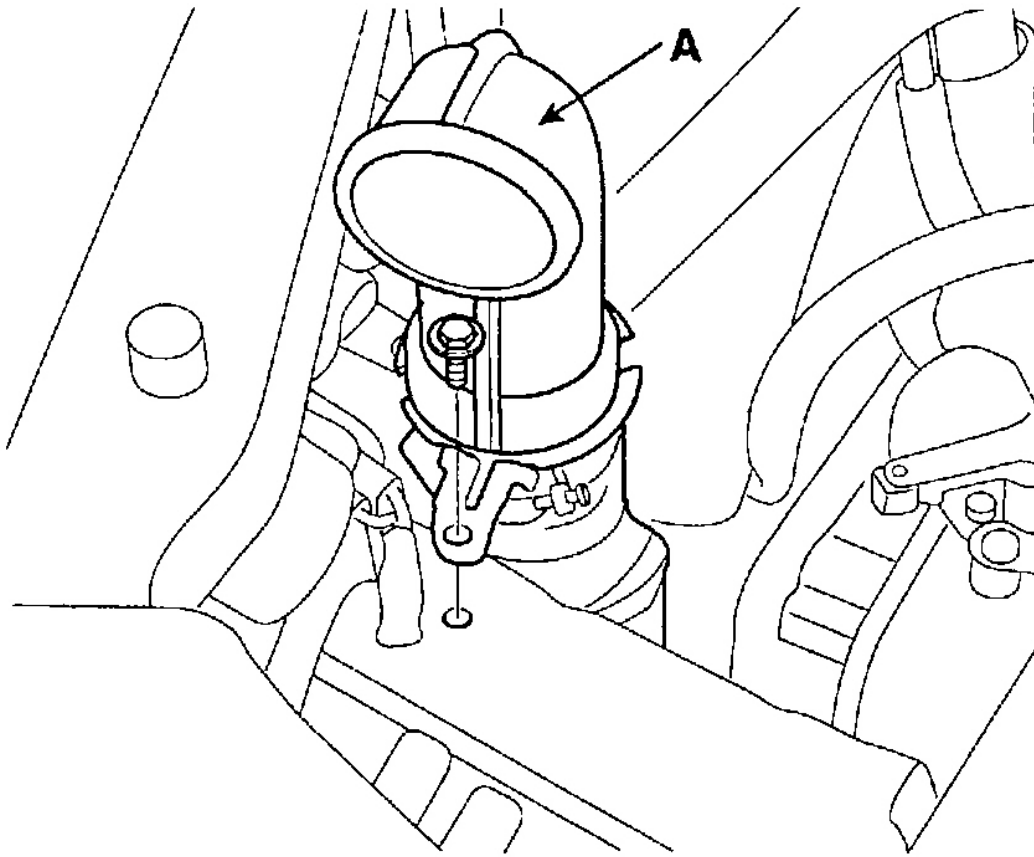
Fig. 231: Disconnection Radiator Fan Motor Connector (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



G00747590

Fig. 232: Disconnection Radiator Fan Motor Connector (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

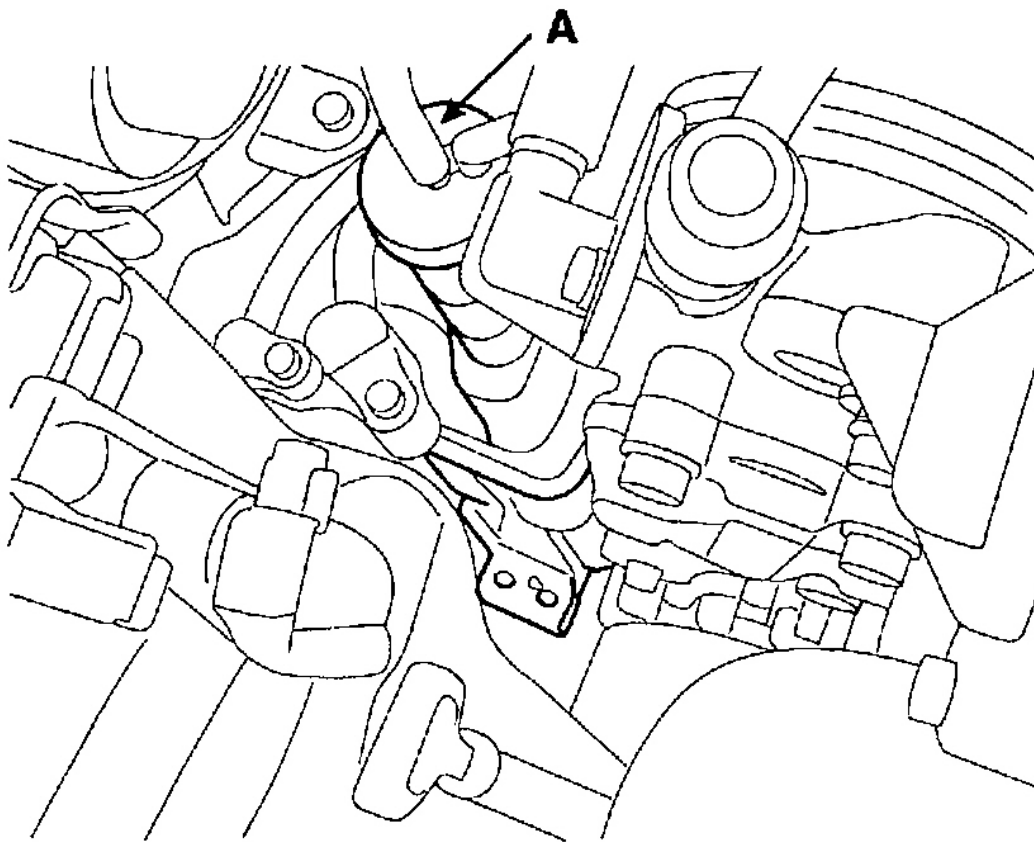
4. Separate the air conditioner condenser with radiator.
 1. Remove the heat shield.
 2. Remove the battery and battery tray.
 3. Remove the air duct (A) and make the mask space.



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Fig. 233: Removing Air Duct
Courtesy of HYUNDAI MOTOR CO.

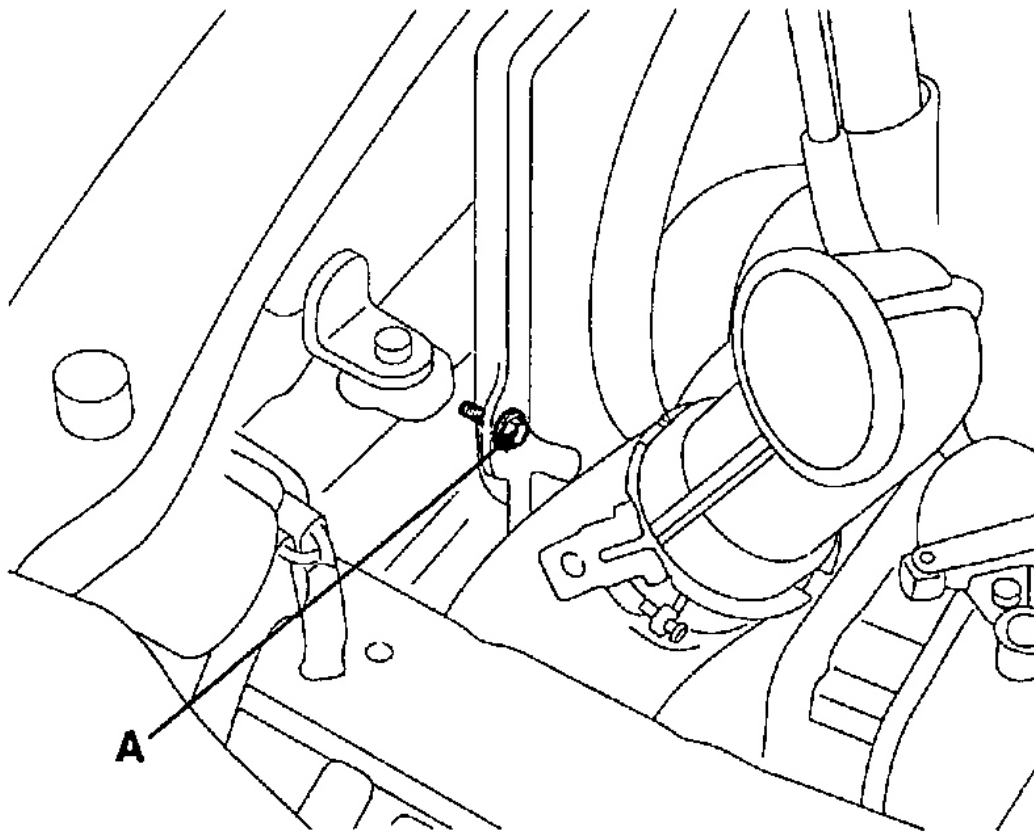
4. Remove the reservoir tank (A) and make the mask space.



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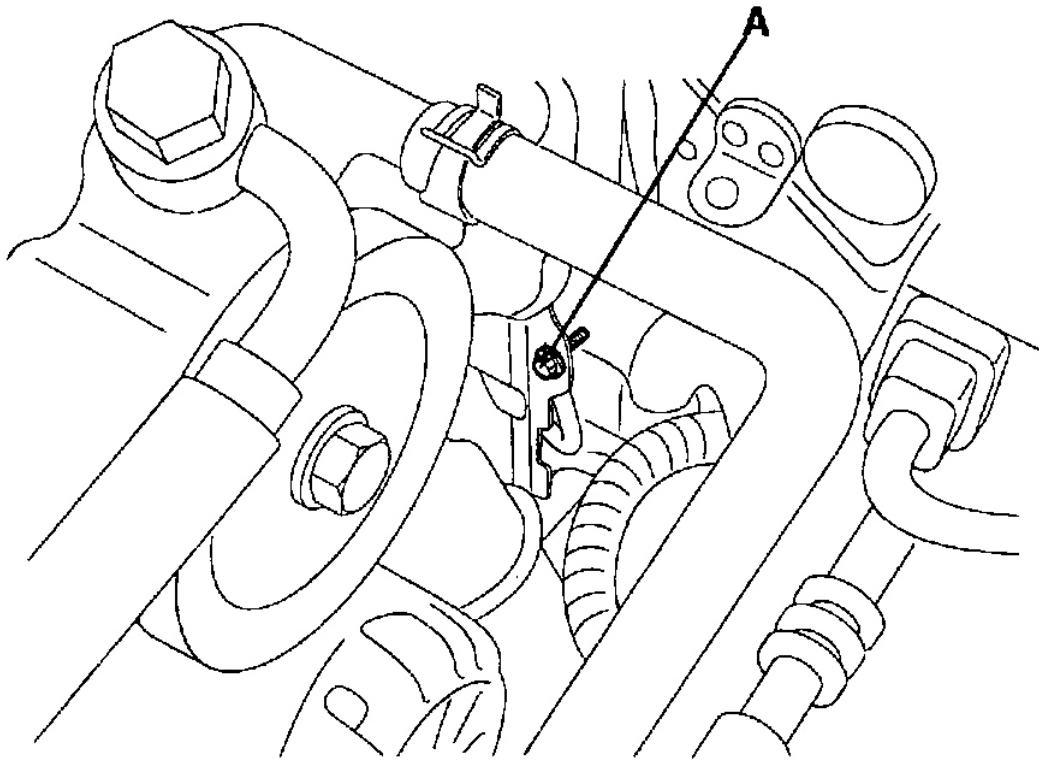
Fig. 234: Remove Reservoir Tank
Courtesy of HYUNDAI MOTOR CO.

5. Remove the 10mm bolt (A).



G00747593

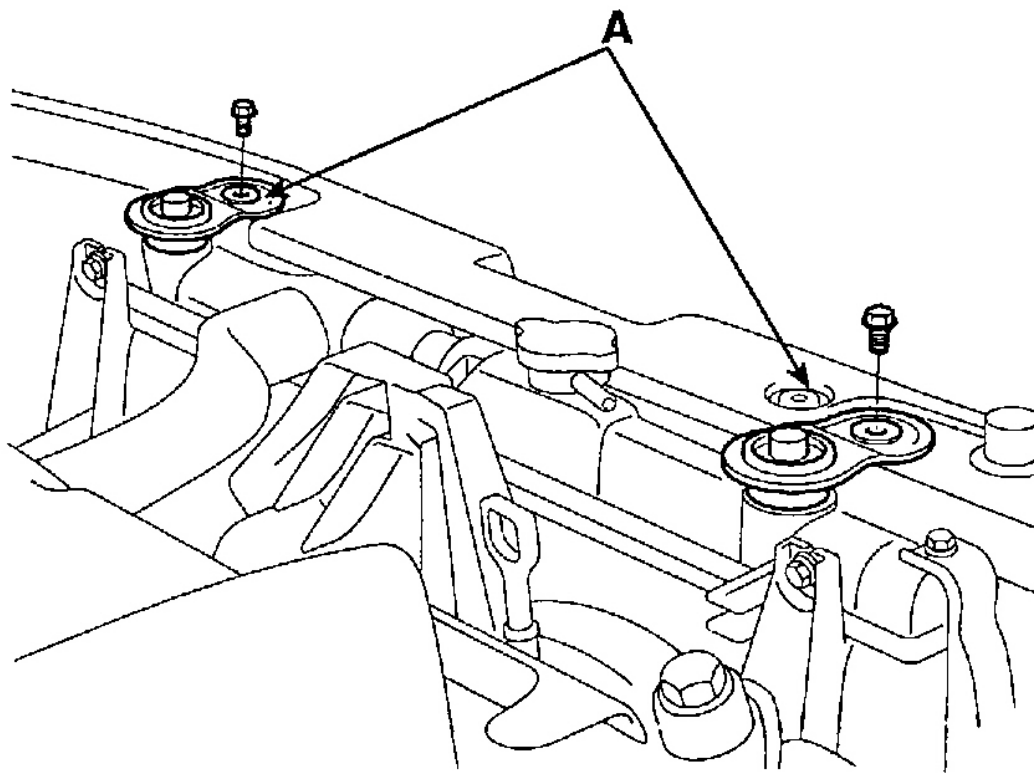
Fig. 235: Removing 10 mm Bolt (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



G00747594

Fig. 236: Removing 10 mm Bolt (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

5. Remove the radiator upper bracket (A), then pull up the radiator.



G00747595

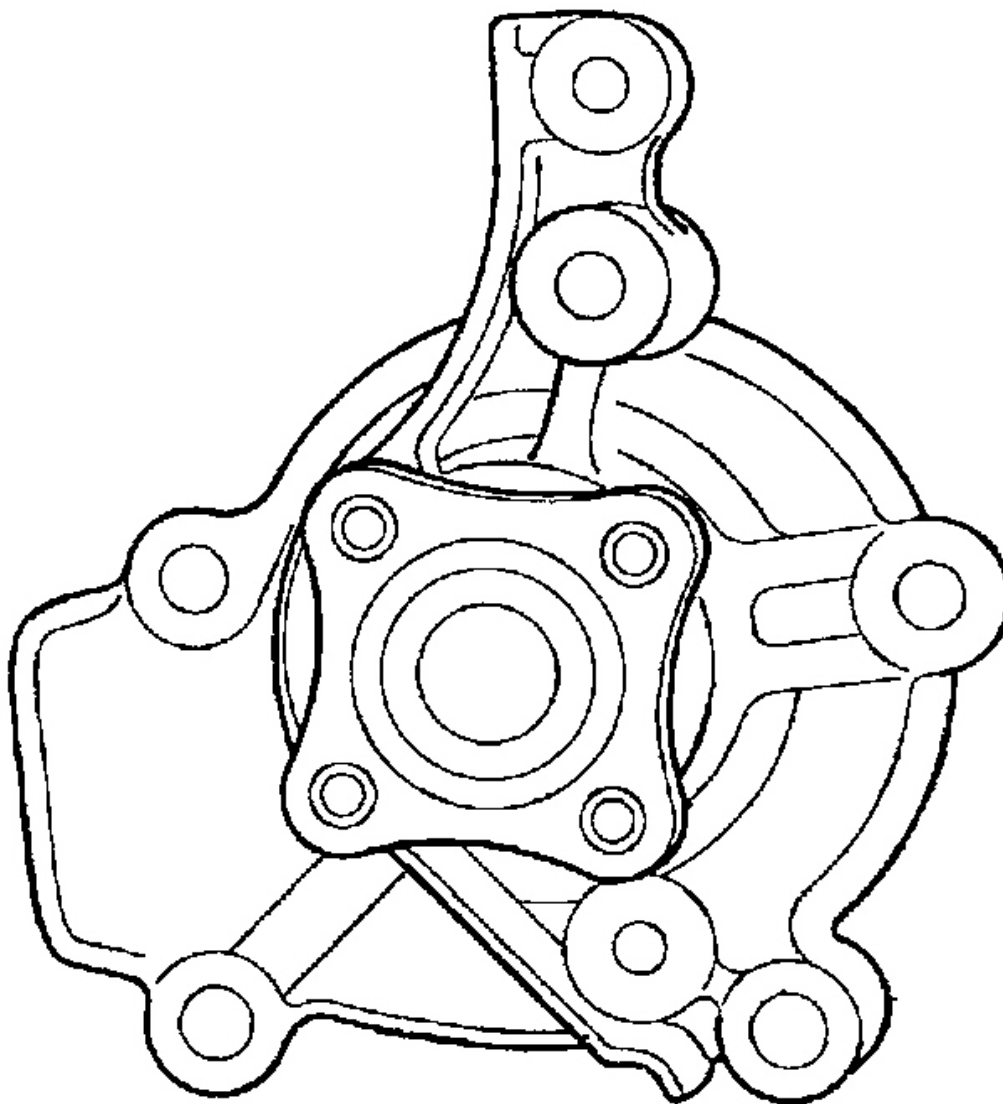
Fig. 237: Removing Upper Radiator Brackets
Courtesy of HYUNDAI MOTOR CO.

6. Remove the cooling fan from the radiator.

INSPECTION

Water Pump

1. Check each part for cracks, damage or wear, and replace the coolant pump assembly if necessary.
2. Check the bearing for damage, abnormal noise and sluggish rotation, and replace the coolant pump assembly if necessary.



G00747596

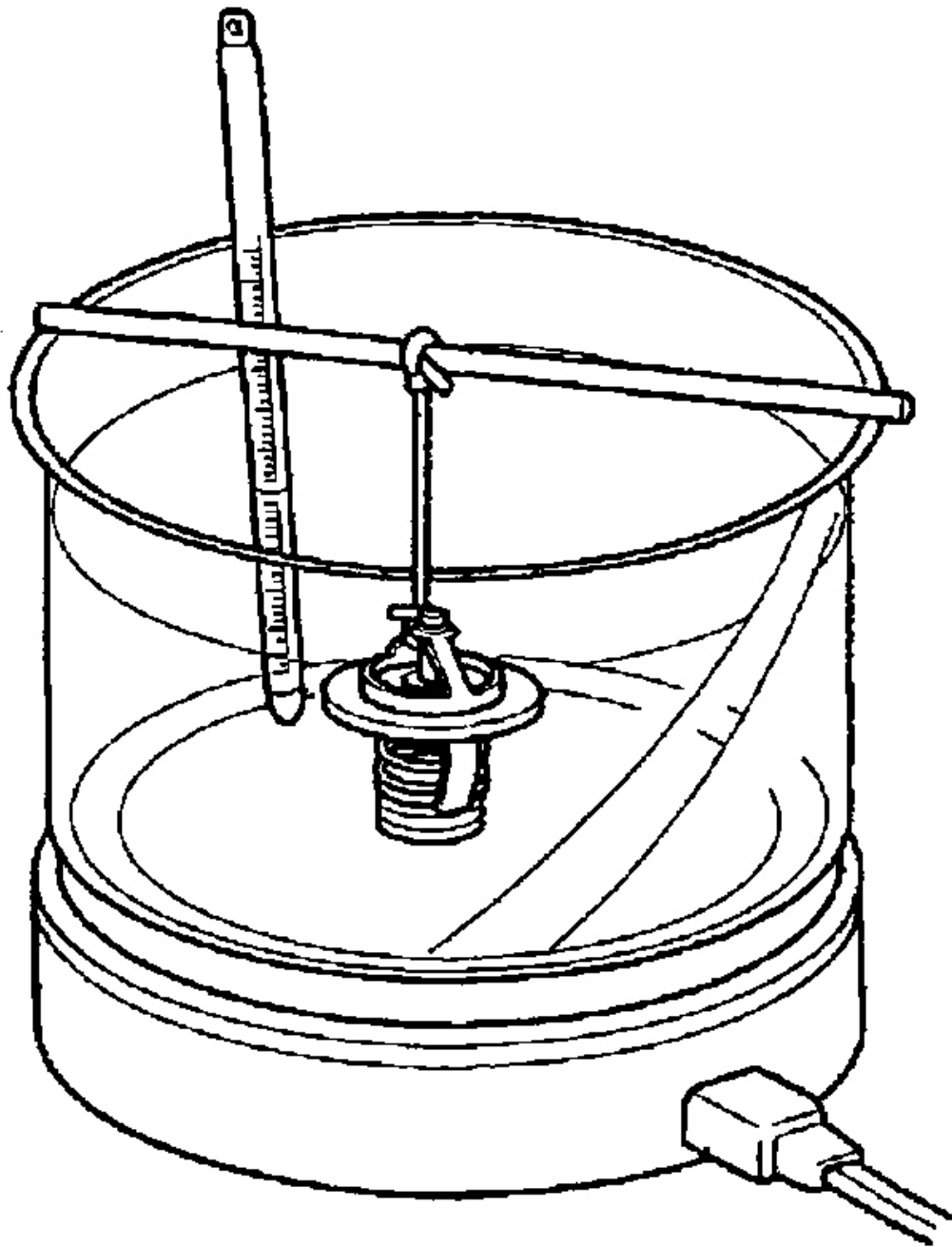
Fig. 238: Inspecting Water Pump
Courtesy of HYUNDAI MOTOR CO.

3. Check for coolant leakage. If coolant leaks from hole, the seal is defective. Replace the coolant pump assembly

NOTE: A small amount of "weeping" from the bleed hole is normal.

Thermostat

1. Immerse the thermostat in water and gradually heat the water.



G00747597

Fig. 239: Checking Thermostat Operation
Courtesy of HYUNDAI MOTOR CO.

2. Check the valve opening temperature.

Valve opening temperature : 82°C (177°F)

Full opening temperature : 95°C (205°F)

If the valve opening temperature is not as specified, replace the thermostat.

3. Check the valve lift.

Valve lift : 8mm (0.3in.) or more at 95°C (205°F)

If the valve lift is not as specified, replace the thermostat.

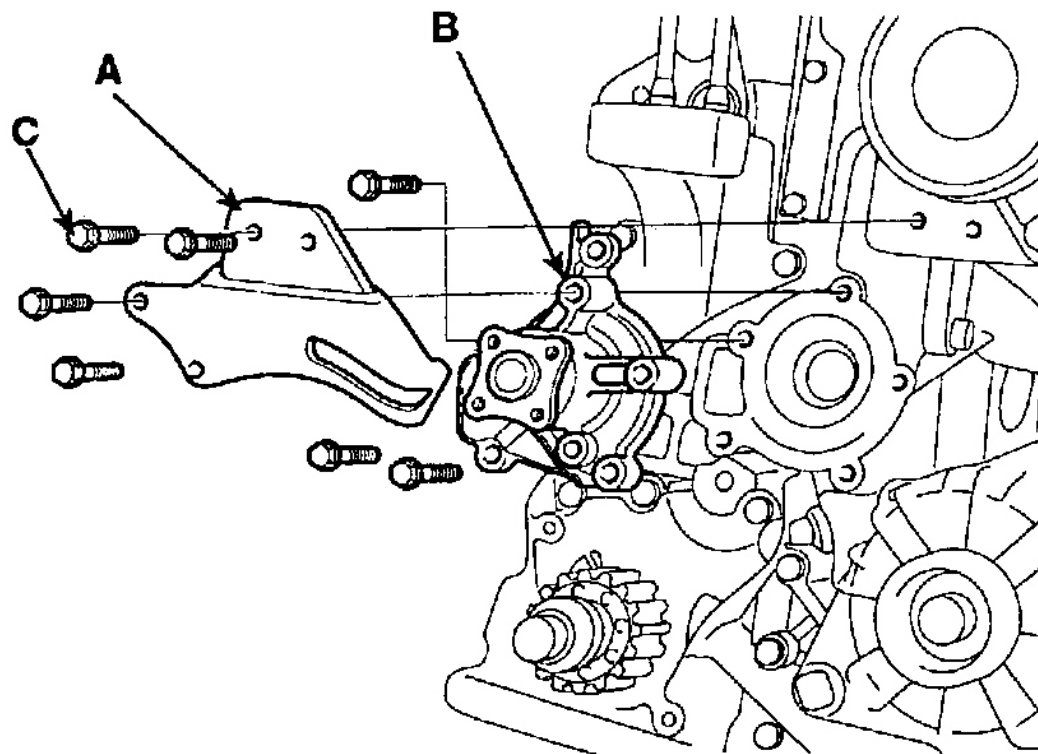
INSTALLATION

Water Pump

1. Install the water pump.
 1. Install the water pump (B) and a new gasket with the 3 bolts.

Tightening torque

20 ~ 27Nm (200 ~ 270kgf.cm, 15 ~ 20lbf.ft)



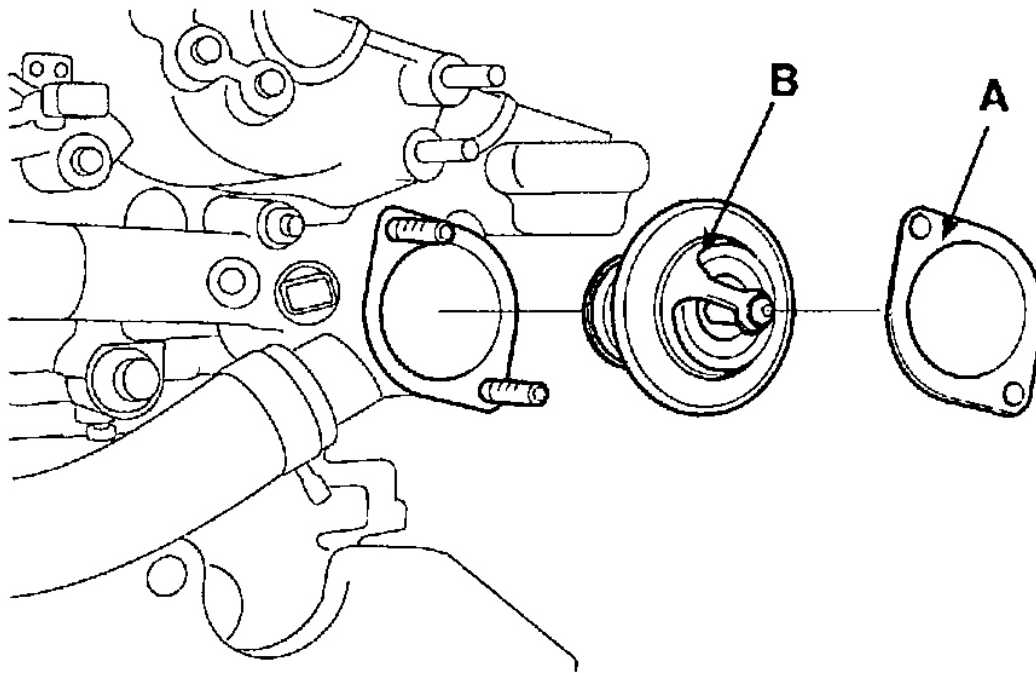
G00747598

Fig. 240: Installing Water Pump
Courtesy of HYUNDAI MOTOR CO.

2. Install the alternator brace (A) with the 2 bolts (C).
3. Install the 4 bolts and pump pulley.
2. Install the timing belt idler. See **Fig. 59**.
3. Install the timing belt. See **INSTALLATION** under TIMING SYSTEM.
4. Install drive belts.
5. Fill with engine coolant.
6. Start engine and check for leaks.
7. Recheck engine coolant level.

Thermostat

1. Place thermostat in thermostat housing.
 1. Install the thermostat with the jiggle valve upward.
 2. Install a new gasket (A) to the thermostat (B).



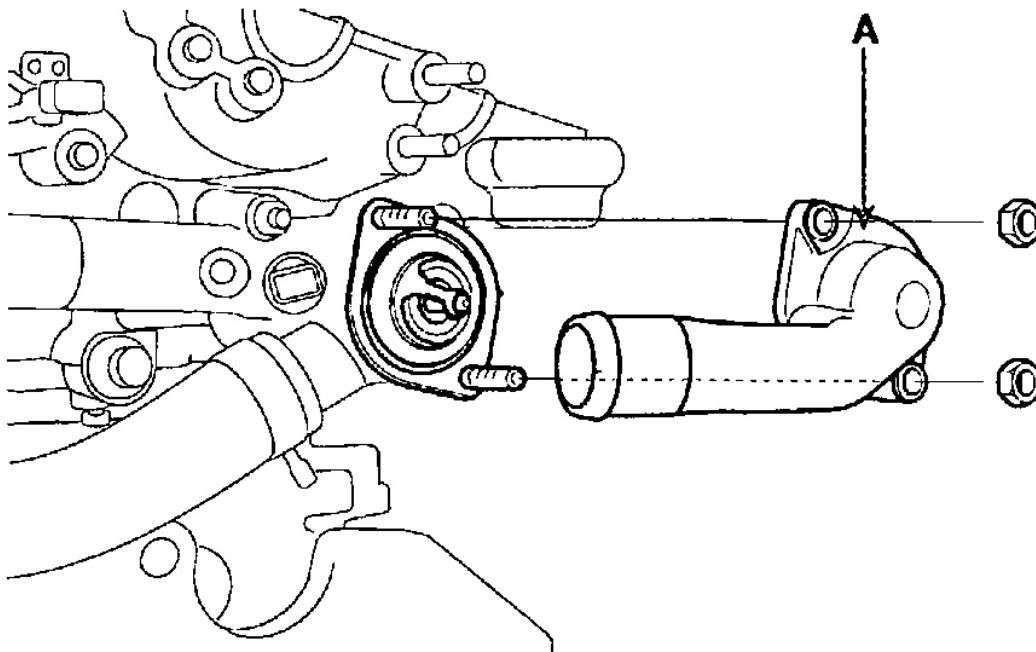
G00747599

Fig. 241: Installing Thermostat & Gasket
Courtesy of HYUNDAI MOTOR CO.

2. Install water inlet (A).

Tightening torque

15 ~ 20Nm (150 ~ 200kf.cm, 9 ~ 14lbf.ft)



G00747600

Fig. 242: Installing Water Inlet
Courtesy of HYUNDAI MOTOR CO.

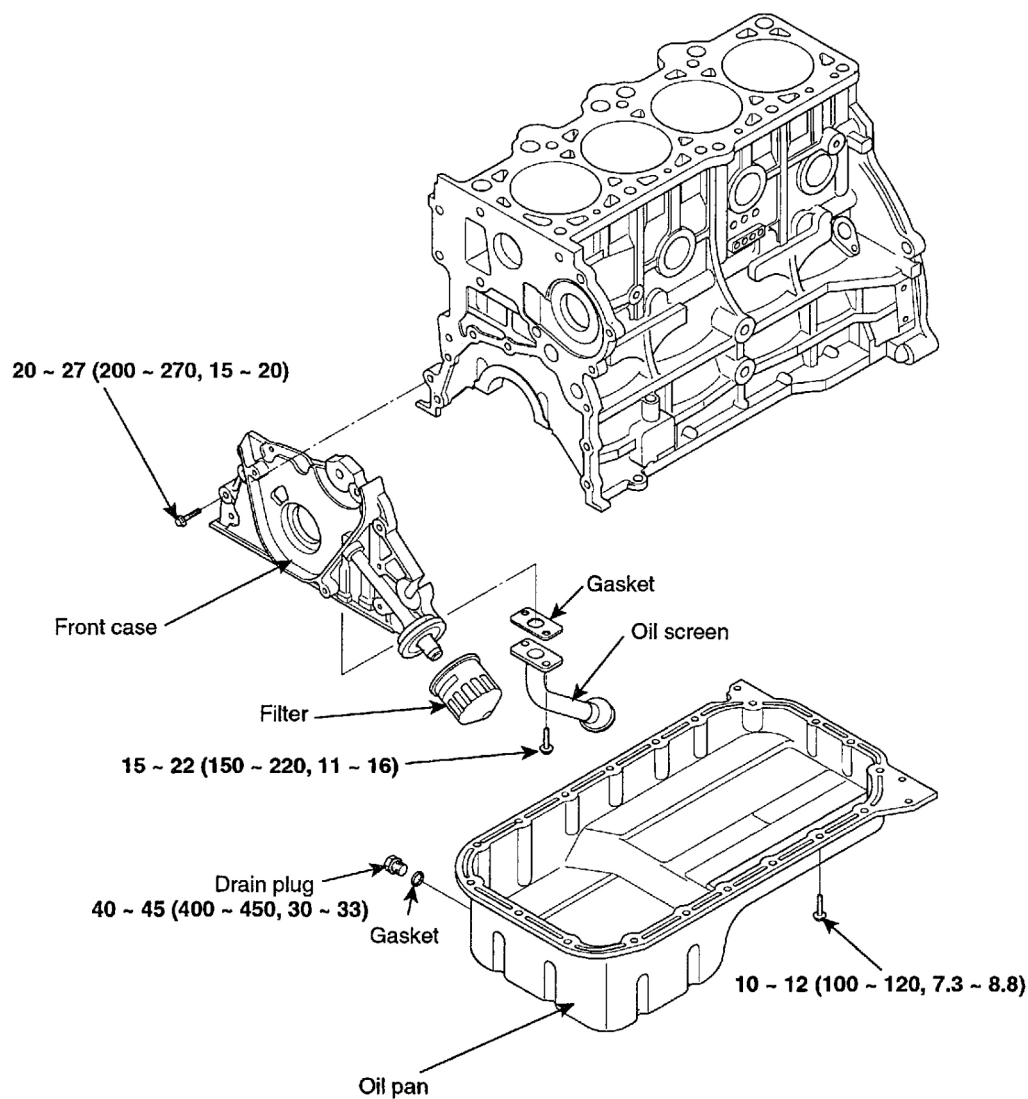
3. Fill with engine coolant.
4. Start engine and check for leaks.

Radiator

1. Install the cooling fan to the radiator.
2. Install the radiator at the air conditioner condenser. Installation is in the reverse order of removal.
3. Connect the fan motor connector.
4. Install the upper and lower radiator hoses, and ATF cooler hoses.
5. Fill with engine coolant.
6. Start engine and check for leaks.

LUBRICATION SYSTEM

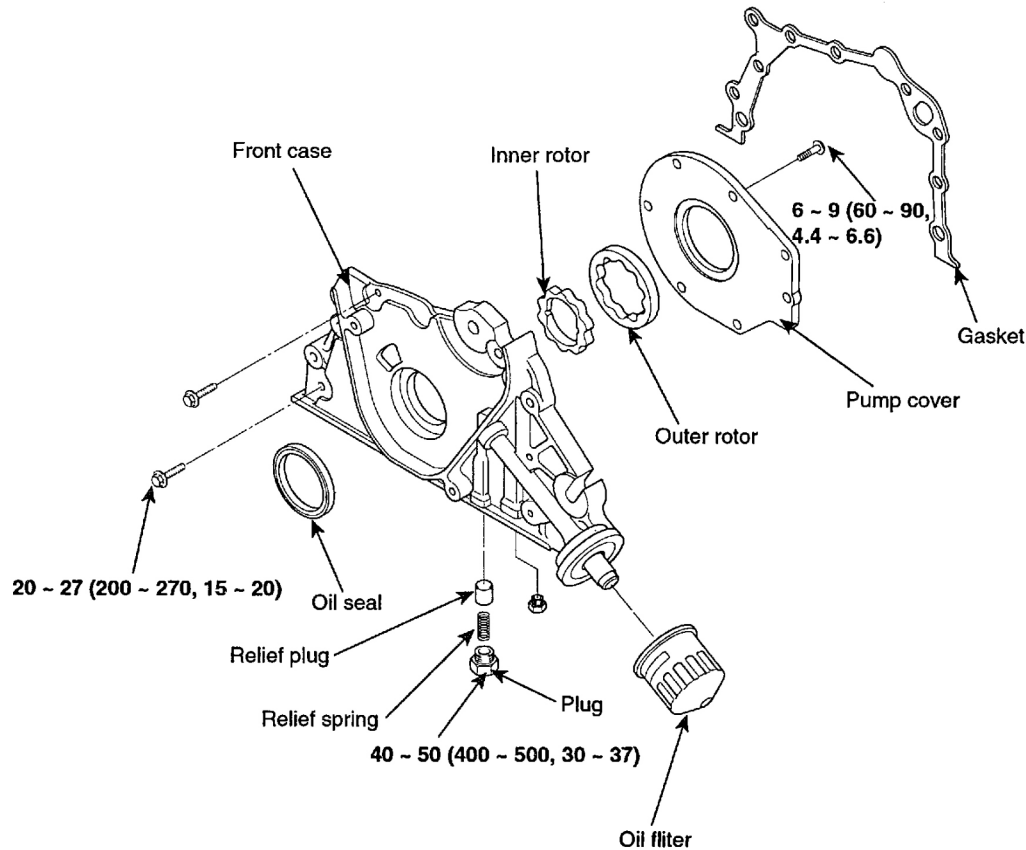
COMPONENT



TORQUE : Nm (kgf.cm, lbf.ft)

G00747601

Fig. 243: Identifying Lubrication System (1 Of 2)
 Courtesy of HYUNDAI MOTOR CO.



TORQUE : Nm (kgf.cm, lbf.ft)

G00747602

Fig. 244: Identifying Lubrication System (2 Of 2)
 Courtesy of HYUNDAI MOTOR CO.

OIL AND FILTER

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner, to remove any used engine oil. Do not use gasoline, thinner, or solvents.
- In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.

1. Drain engine oil.
 - a. Remove the oil filter cap.
 - b. Remove the oil drain plug, and drain the oil into a container.
2. Replace oil filter.
 - a. Remove the oil filter.
 - b. Check and clean the oil filter installation surface.
 - c. Check the part number of the new oil filter is as same as old one.
 - d. Apply clean engine oil to the gasket of a new oil filter.
 - e. Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
 - f. Tighten it an additional 3/4 turn.
3. Refill with engine oil filter.
 - a. Clean and install the oil drain plug with a new gasket.

Tightening torque

40 ~ 45Nm (400 ~ 450kgf.cm, 30 ~ 33lbf.ft)

- b. Fill with fresh engine oil

Capacity

Drain and refill :

W/Oil filter change : 3.85l (4.1U.S.qts, 3.4lmp qts)

W/O Oil filter change : 3.55l (3.75U.S. qts, 3.1lmp qts)

- c. Install the oil filter cap.
4. Start engine and check for oil leaks.
5. Recheck engine oil level.

INSPECTION

1. Check engine oil quality

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

After warming up the engine and then 5 minutes after the engine stop, oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to the "F" mark.

NOTE: Do not fill with engine oil above the "F" mark.

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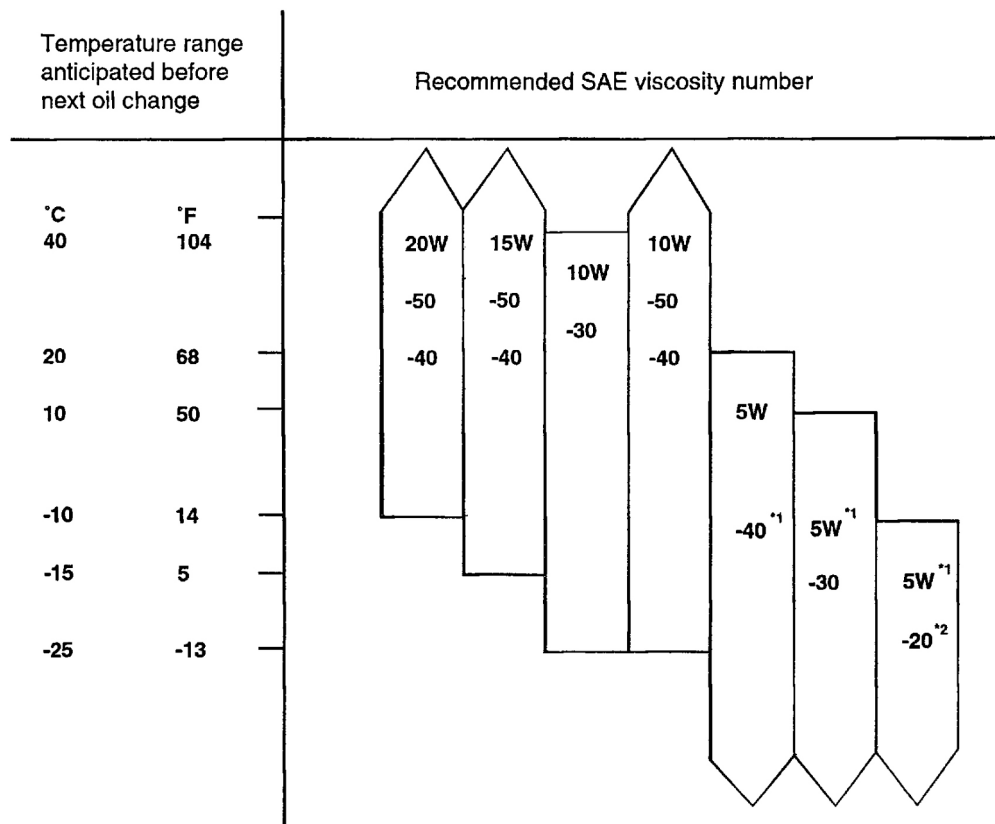
2004 ENGINES 2.0L 4-Cylinder - Elantra

SELECTION OF ENGINE OIL

Recommended API classification : SH OR ABOVE

Recommended SAE viscosity grades :

W/O-CVVT



^{*1} Restricted by driving condition and environment.

^{*2} Not recommended for sustained high speed vehicle operation

G00747603

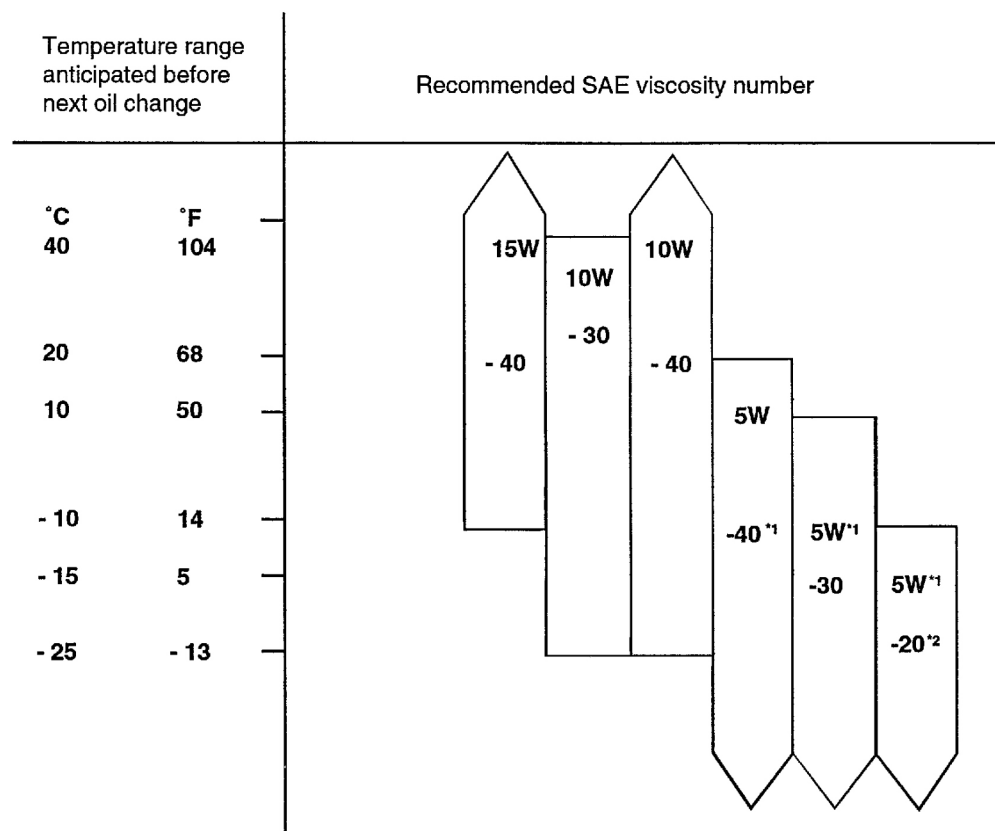
Fig. 245: Recommend Oil Viscosity (W/O-CVVT)

Courtesy of HYUNDAI MOTOR CO.

W/CVVT

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra



*1 Restricted by driving condition and environment.

*2 Not recommended for sustained high speed vehicle operation

G00747604

Fig. 246: Recommend Oil Viscosity (W/CVVT)

Courtesy of HYUNDAI MOTOR CO.

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

1. Satisfy the requirement of the API classification.
2. Have proper SAE grade number for expected ambient temperature range.

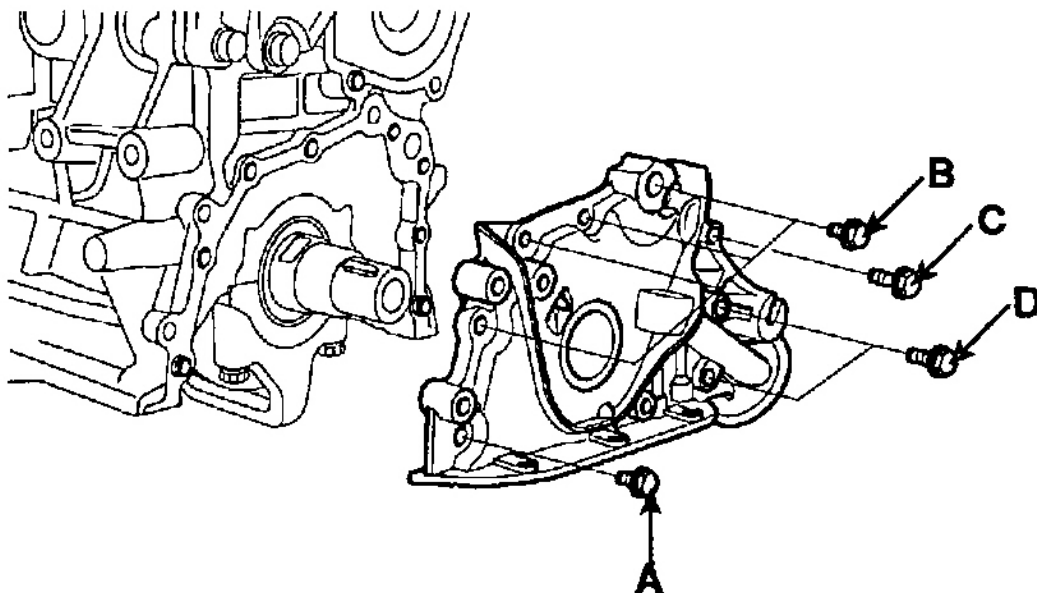
Lubricants that do not have both an SAE grade number and API service classification on the container should not be used.

REMOVAL

1. Drain engine oil.
2. Remove the drive belts.
3. Turn the crankshaft and align the white groove on the crankshaft pulley with the pointer on the lower

cover. See **Fig. 17**.

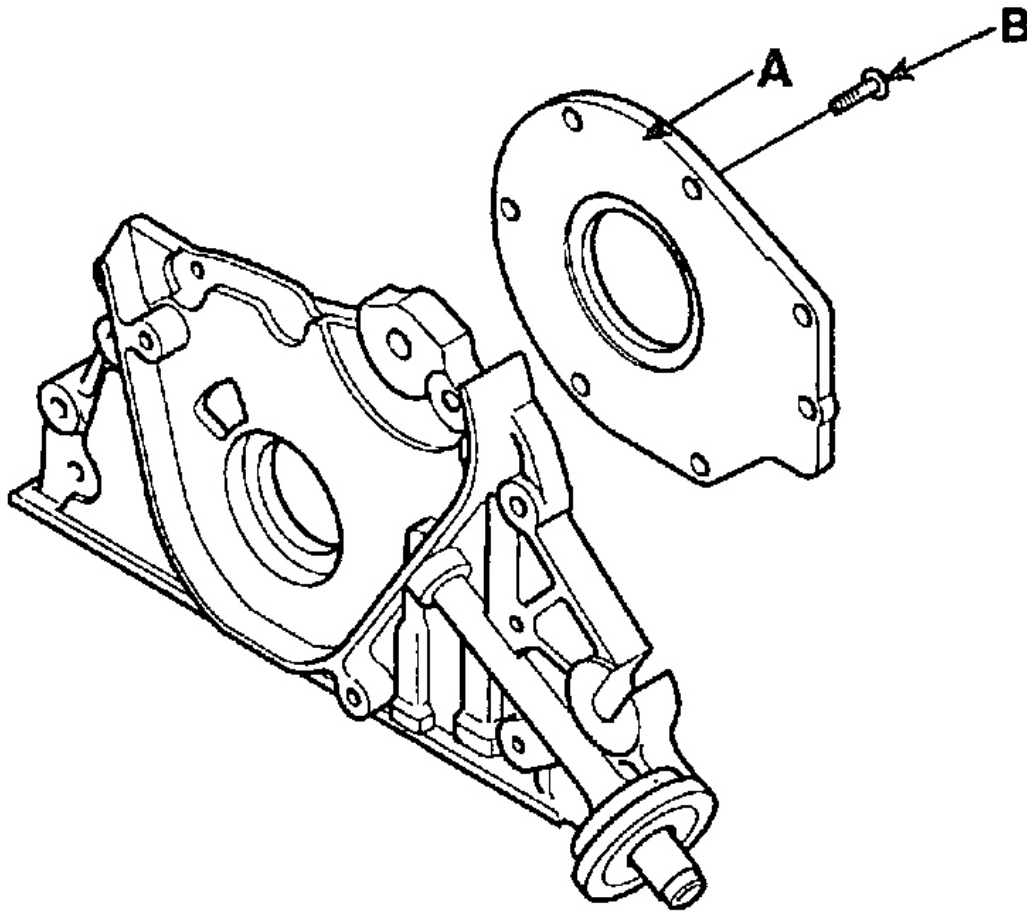
4. Remove the timing belt. See **REMOVAL** under TIMING SYSTEM..
5. Remove the oil pan and oil screen. See **Fig. 171** and **Fig. 172** .
6. Remove the front case.



G00747605

Fig. 247: Removing Front Case
Courtesy of HYUNDAI MOTOR CO.

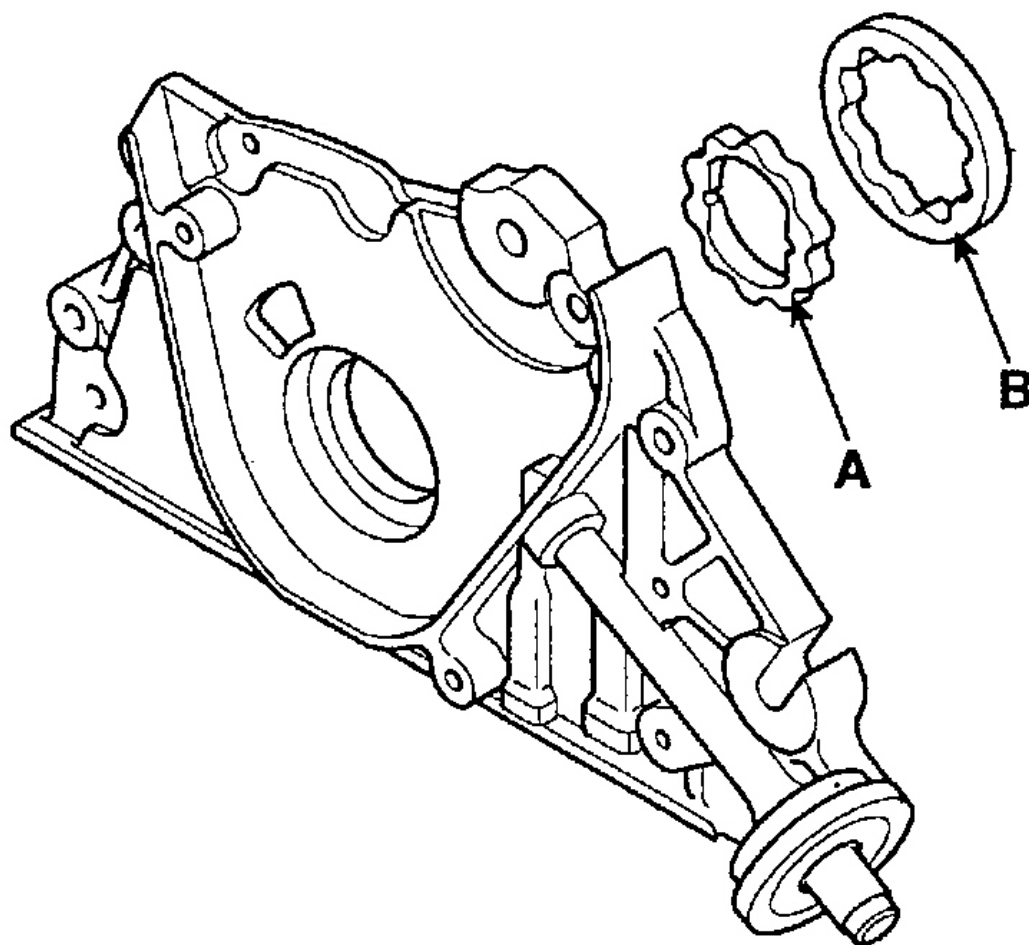
1. Remove the screws (B) from the pump housing, then separate the housing and cover (A).



G00747606

Fig. 248: Separating Housing & Cover
Courtesy of HYUNDAI MOTOR CO.

2. Remove the inner (A) and outer (B) rotors.



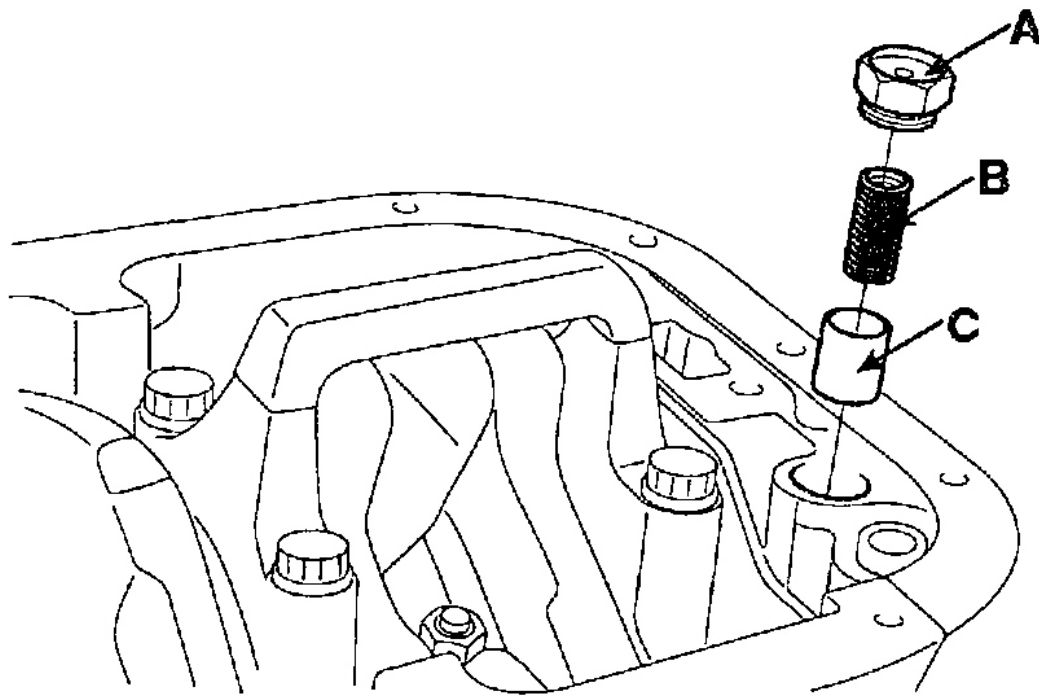
G00747607

Fig. 249: Removing Oil Pump Rotors
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the relief plunger.

Remove the plug (A), spring (B) and relief plunger (C).



G00747608

Fig. 250: Removing Relief Plunger
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

1. Inspect relief plunger.

Coat the valve with engine oil and check that it falls smoothly into the plunger hole by its own weight.

If it does not, replace the relief plunger. If necessary, replace the front case.

2. Inspect relief valve spring.

Inspect for distorted or broken relief valve spring.

Standard value

Free height : 43.8mm (1.724 in.)

Load : 3.7kg/40.1mm (8.14 lb/1.579 in.)

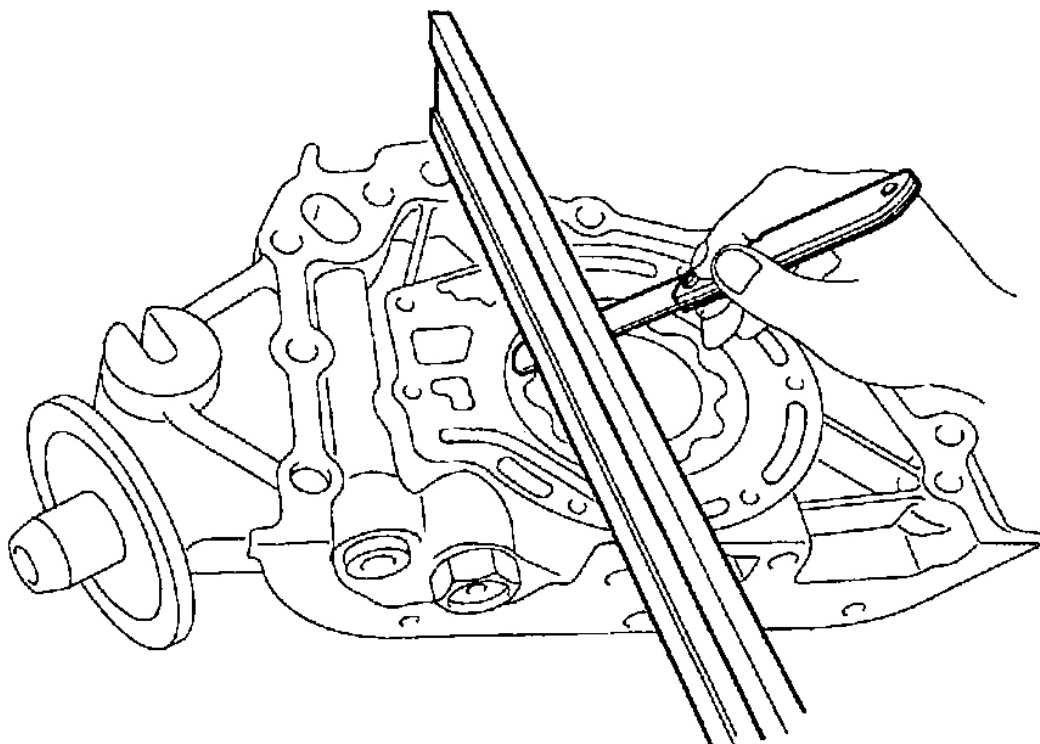
3. Inspect rotor side clearance.

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Side clearance	Outer gear	0.04 ~ 0.09mm (0.0016 ~ 0.0035in.)
	Inner gear	0.04 ~ 0.085mm (0.0016 ~ 0.0033in.)

G00747609

Fig. 251: Oil Pump Rotor Clearance Specification Table
Courtesy of HYUNDAI MOTOR CO.



G00747610

Fig. 252: Measuring Oil Pump Rotor Clearance

Courtesy of HYUNDAI MOTOR CO.

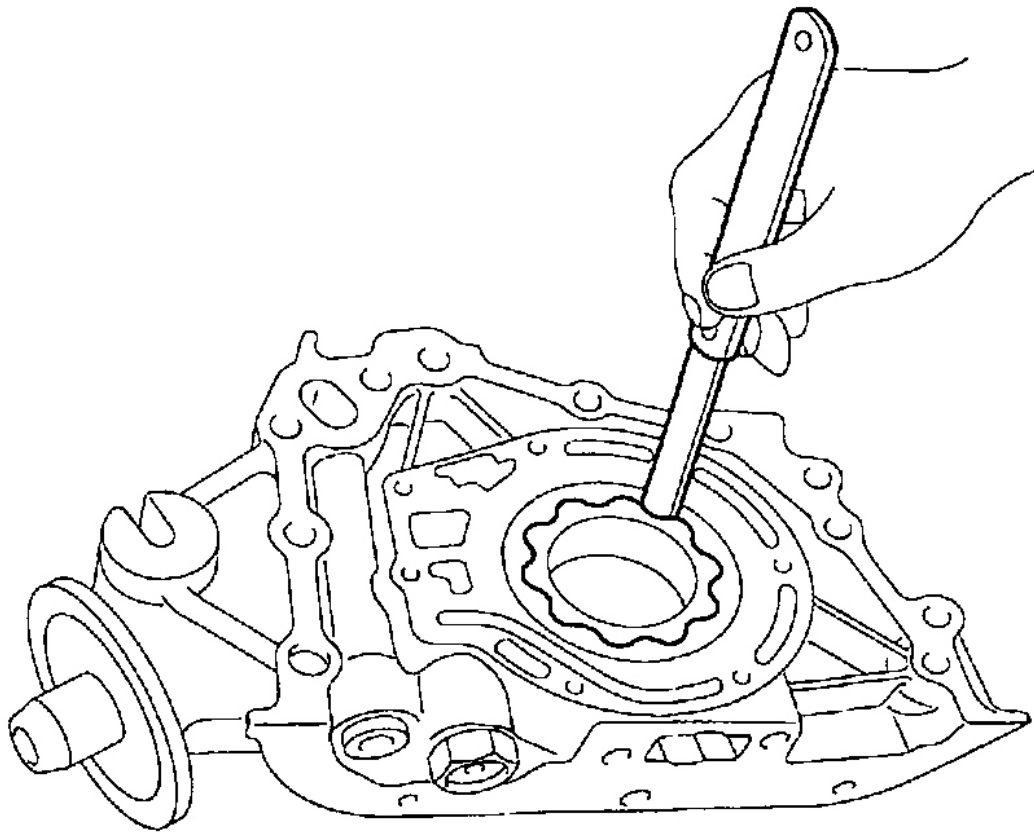
If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the front case.

4. Inspect rotor tip clearance.

Using a feeler gauge, measure the tip clearance between the inner and outer rotor tips.

Tip clearance

0.025 ~ 0.069 mm(0.0010 ~ 0.0027 in.)



G00747611

Fig. 253: Measuring Oil Pump Rotor Tip Clearance
Courtesy of HYUNDAI MOTOR CO.

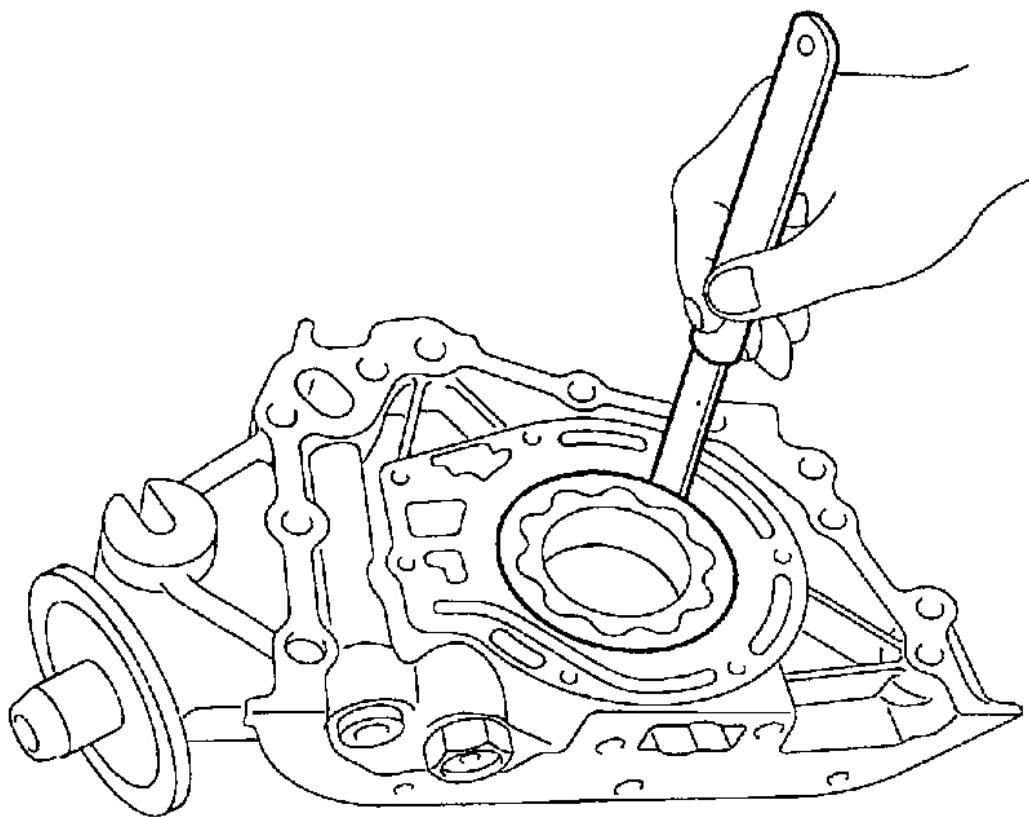
If the tip clearance is greater than maximum, replace the rotor as a set.

5. Inspect rotor body clearance.

Using a feeler gauge, measure the clearance between the outer rotor and body.

Body clearance

0.12 ~ 0.185 mm(0.0047 ~ 0.0073 in.)



G00747612

Fig. 254: Measuring Oil Pump Body Clearance
Courtesy of HYUNDAI MOTOR CO.

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the front case.

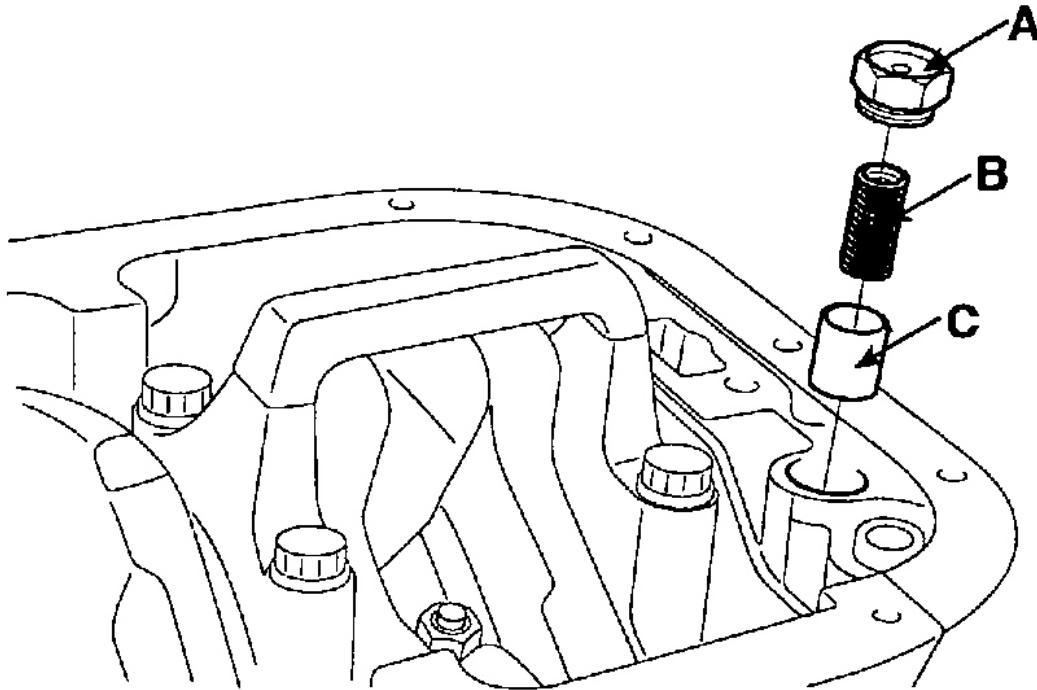
REASSEMBLY

1. Install relief plunger.

Install relief plunger (C) and spring (B) into the front case hole, and install the plug (A).

Tightening torque

40 ~ 50Nm (400 ~ 500kgf.cm, 30 ~ 37lbf.ft)



G00747613

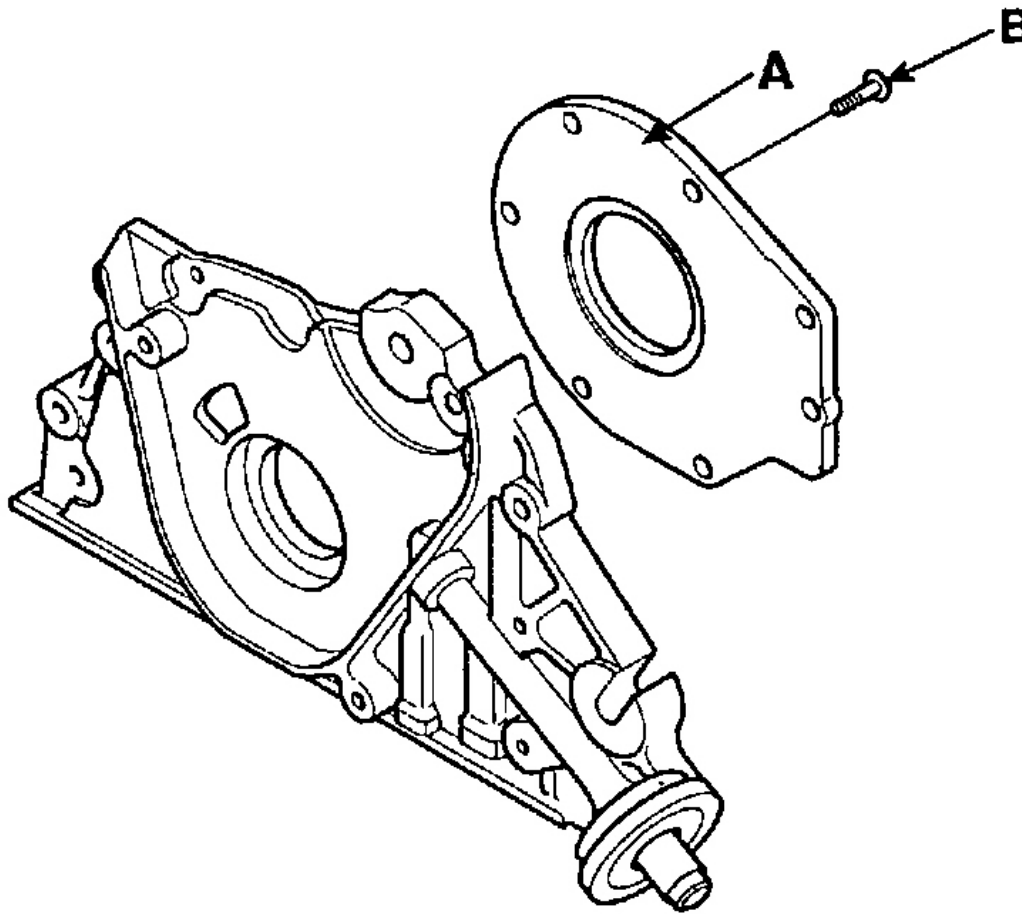
Fig. 255: Installing Relief Plunger
Courtesy of HYUNDAI MOTOR CO.

INSTALLATION

1. Install oil pump.
 1. Place the inner and outer rotors into front case with the marks facing the oil pump cover side.
 2. Install the oil pump cover (A) to front case with the 7 screws (B).

Tightening torque

6 ~ 9Nm (60 ~ 90kgf.cm, 4.4 ~ 6.6lbf.ft)

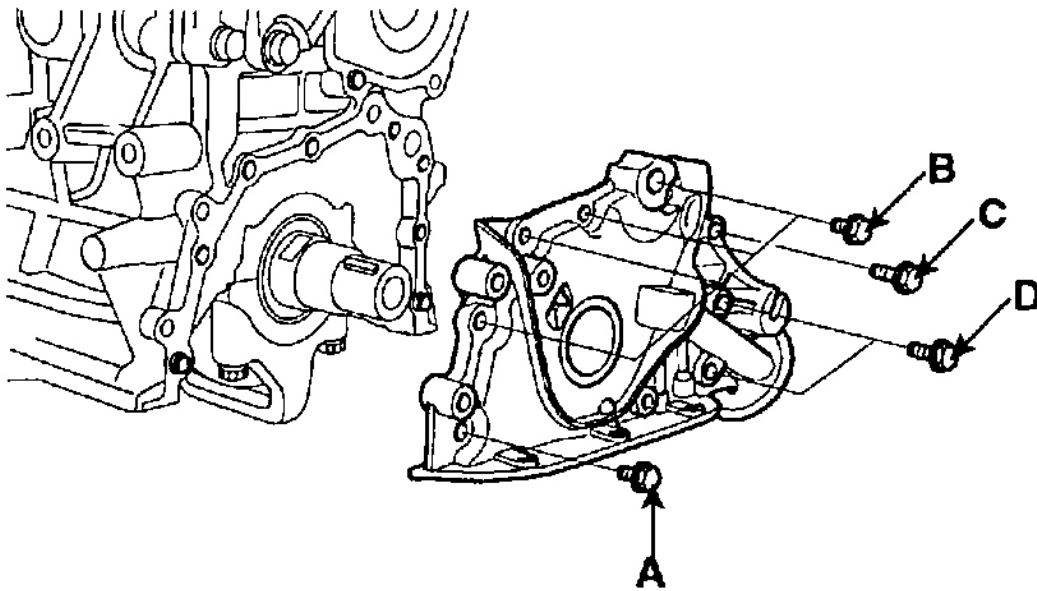


G00747614

Fig. 256: Installing Oil Pump Cover
Courtesy of HYUNDAI MOTOR CO.

2. Check that the oil pump turns freely.
3. Install the oil pump on the cylinder block.

Place a new front case gasket on the cylinder block. Apply engine oil to the lip of the oil pump seal. The install the oil pump onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.



Body length

(A) : 25mm (0.98 in)

(B) : 20mm (0.787 in)

(C) : 38mm (1.496 in)

(D) : 45mm (1.771 in)

G00747615

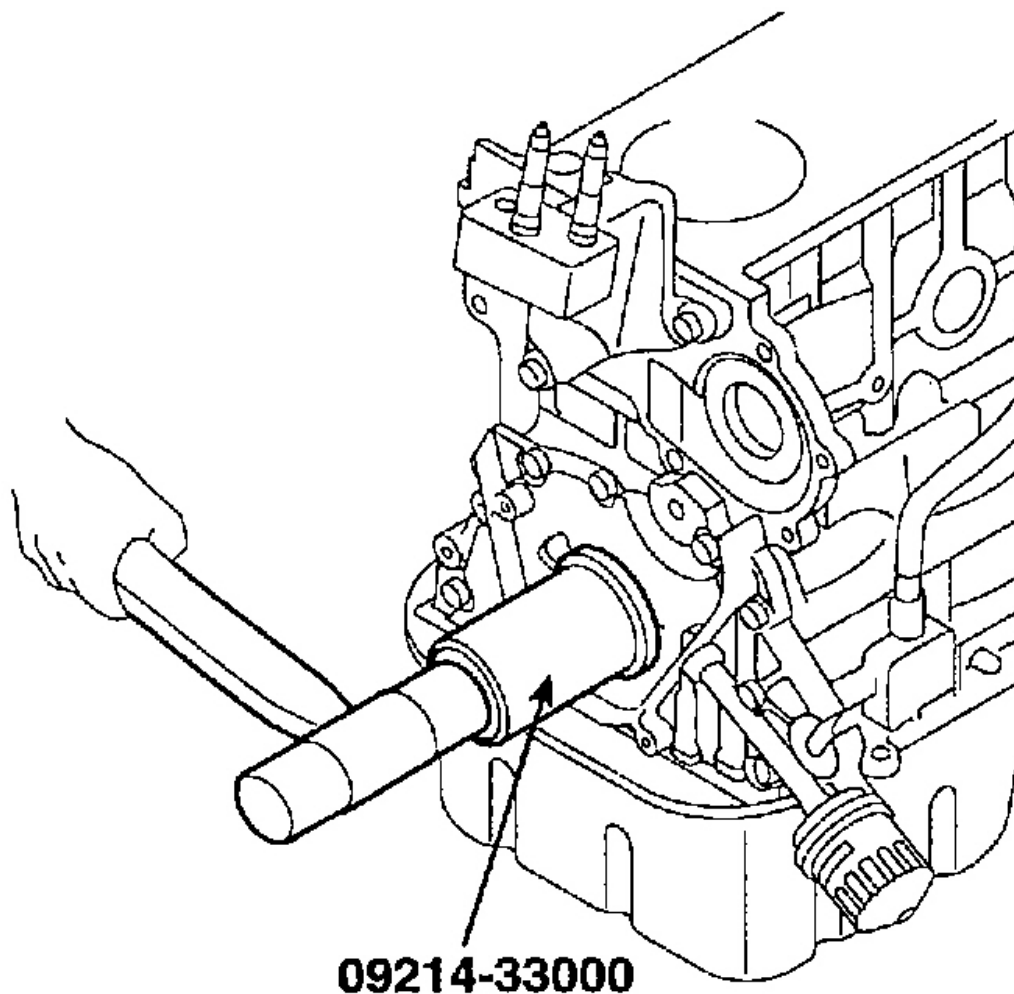
Fig. 257: Installing Front Case

Courtesy of HYUNDAI MOTOR CO.

Tightening torque

20 ~ 27Nm (200 ~ 270kg.cm, 14.5 ~ 19.8 lb. ft)

4. Apply a light coat of oil to the seal lip.
5. Using the SST (09214-33000), install the oil seal.



G00747616

Fig. 258: Installing Front Oil Seal
Courtesy of HYUNDAI MOTOR CO.

6. Install the oil screen. See **Fig. 217**.
7. Install the oil pan. See **Fig. 218**.

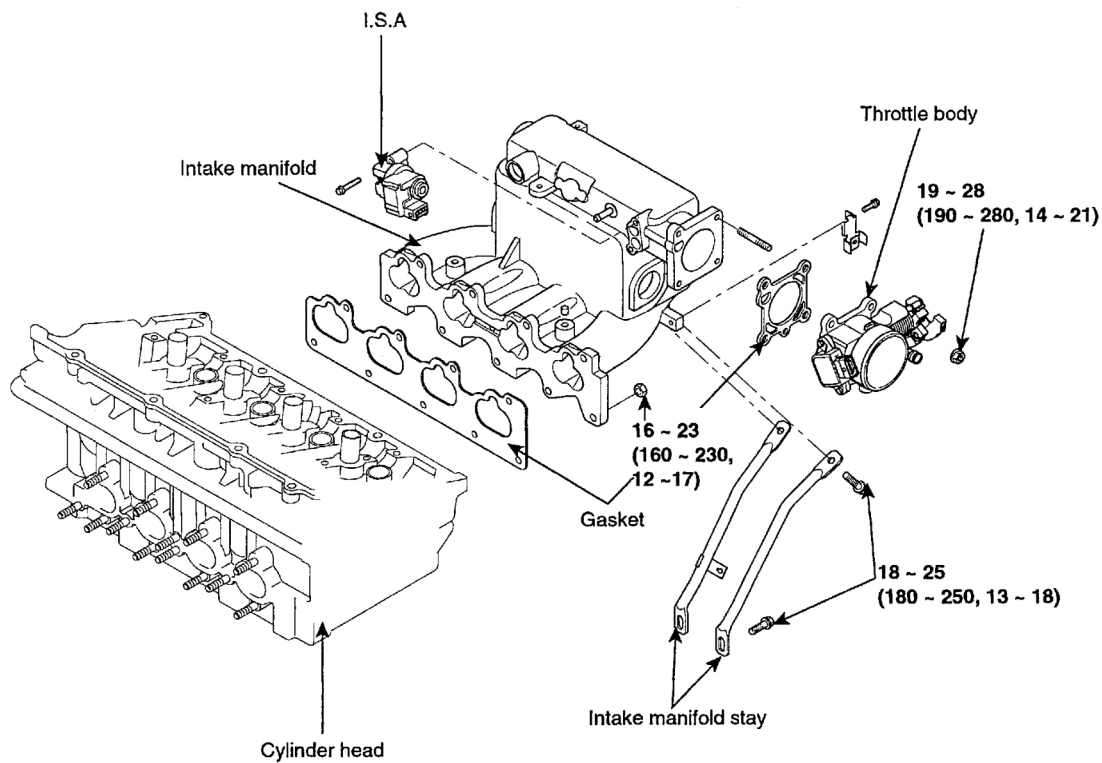
NOTE: Clean the oil pan gasket mating surfaces.

INTAKE AND EXHAUST SYSTEM

COMPONENT

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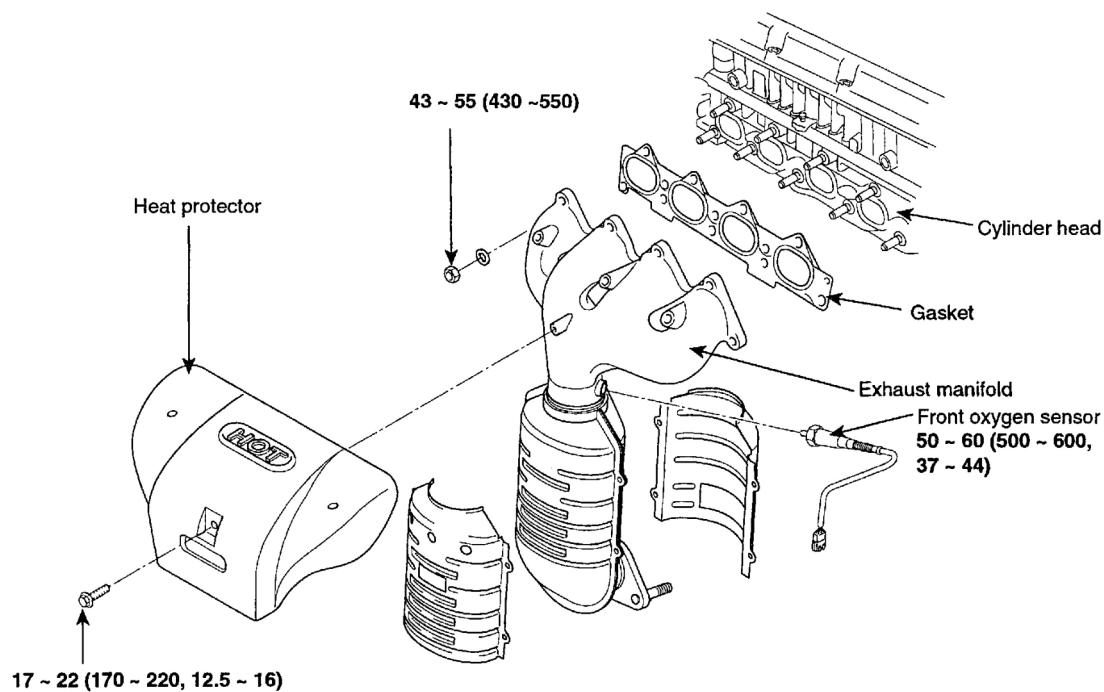
2004 ENGINES 2.0L 4-Cylinder - Elantra



TORQUE : Nm (kgf.cm, lbf.ft)

G00747617

Fig. 259: Identifying Intake Manifold Components
Courtesy of HYUNDAI MOTOR CO.



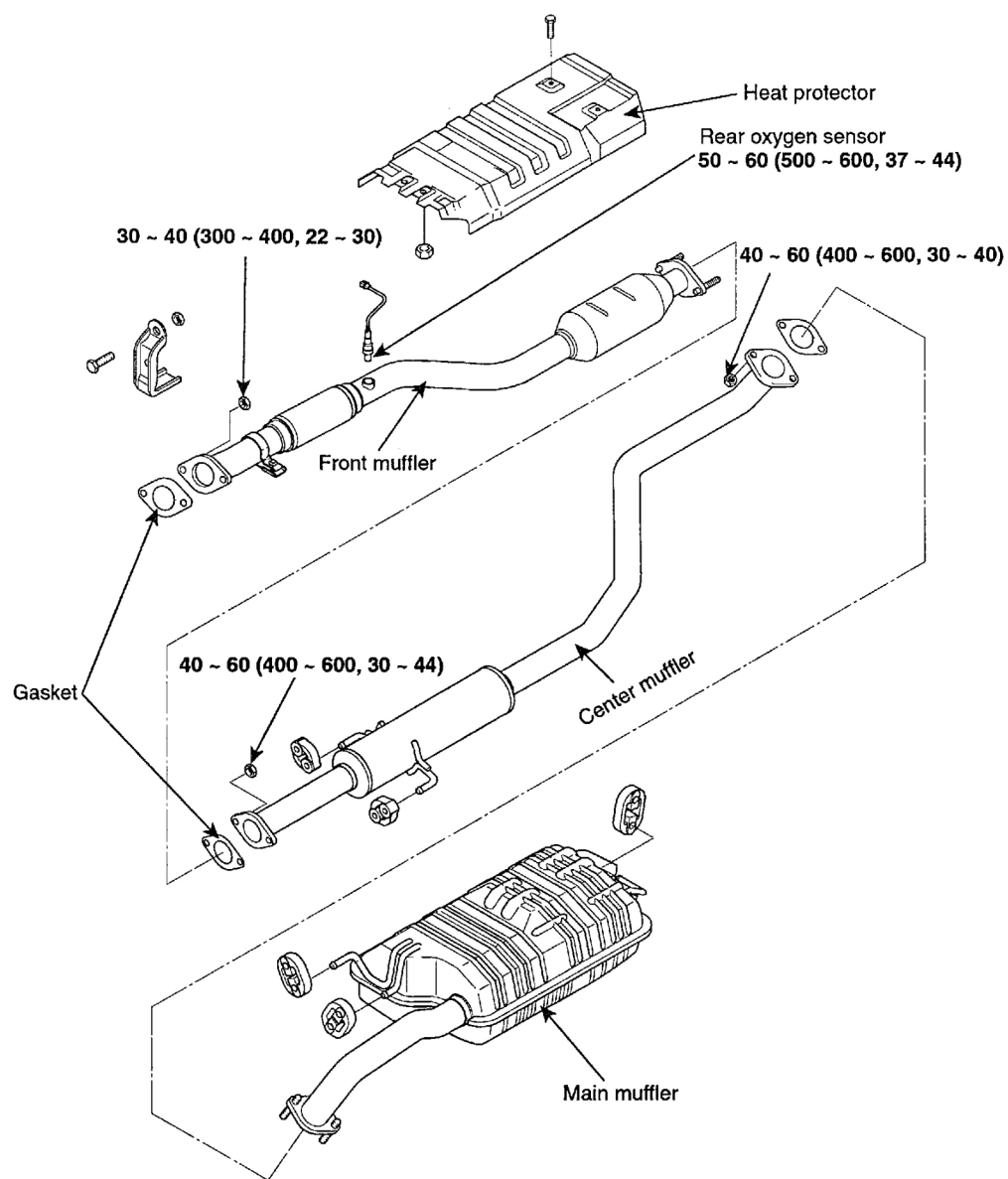
TORQUE : Nm (kgf.cm, lb.ft)

G00747618

Fig. 260: Identifying Exhaust Manifold Components
Courtesy of HYUNDAI MOTOR CO.

2004 Hyundai Elantra GT

2004 ENGINES 2.0L 4-Cylinder - Elantra



TORQUE : Nm (kgf.cm, lbf.ft)

G00747619

Fig. 261: Identifying Muffler Components
Courtesy of HYUNDAI MOTOR CO.