

2005 ENGINE

Engine Mechanical System (G4EB-GSL 1.5L) - Accent

GENERAL

SPECIFICATIONS

GENERAL SPECIFICATION

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	SPEC	LIMIT
General		
Type	In-line, SOHC	
No. of cylinder	4	
Bore	75.5 mm (2.97 in.)	
Stroke	83.5 mm (3.29 in.)	
Total displacement	1495 cc	
Compression ratio	10.0	
Firing order	1 - 3 - 4 - 2	
Valve timing		
Intake valve opens (BTDC)	12°	
Intake valve closes (ABDC)	52°	
Exhaust valve opens (BBDC)	52°	
Exhaust valve closes (ATDC)	12°	
Valve overlap	24°	
Cylinder head		
Flatness of gasket surface	Max. 0.03 mm (0.0012 in.)	0.08 mm (0.00315 in.)
Flatness of manifold mounting surface	Max. 0.15 mm (0.0059 in.)	0.3 mm (0.0118 in.)
Dimension for reworking oversize		
Valve seat hole		
Intake		
0.03 O.S.	28.8 ~ 28.821 mm (1.134 ~ 1.135 in.)	
0.06 O.S.	29.1 ~ 29.121 mm (1.146 ~ 1.1467 in.)	
Exhaust		
0.03 O.S.	34.3 ~ 34.325 mm (1.350 ~ 1.351 in.)	
0.06 O.S.	34.6 ~ 34.625 mm (1.362 ~ 1.363 in.)	
Valve guide hole diameter		

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

(intake/exhaust)		
0.05 O.S.	11.05 ~ 11.068 mm (0.435 ~ 0.436 in.)	
0.25 O.S.	11.25 ~ 11.268 mm (0.443 ~ 0.4436in.)	
0.50 O.S.	11.50 ~ 11.518 mm (0.453 ~ 0.4535in.)	
Camshaft		
Cam height intake	42.8575 mm (1.687 in.)	42.3575 mm (1.667 in.)
Cam height exhaust	42.7354 mm (1.682 in.)	42.2624 mm (1.664 in.)
Journal diameter	30 mm (1.181 in.)	
Bearing oil clearance	0.045 ~ 0.085 mm (0.0018 ~ 0.0033 in.)	
End play	0.07 ~ 0.28 mm (0.0027 ~ 0.011 in.)	
Crankshaft		
Journal diameter	50 mm (1.97 in.)	
Pin diameter	45 mm (1.77 in.)	
Bend	0.03 mm (0.0018 in.)	
Out of roundness of journal and pin	Max. 0.005	
Taper of journal and pin	Max. 0.005	
End play	0.05 ~ 0.175 mm (0.002 ~ 0.007 in.)	0.25 mm (0.0098 in.)
Undersize of Pin		
0.25	44.725 ~ 44.740 mm (1.76 ~ 1.761 in.)	
0.50	44.475 ~ 44.490 mm (1.75 ~ 1.751 in.)	
0.75	44.225 ~ 44.240 mm (1.74 ~ 1.741 in.)	
Undersize of Journal		
0.25	49.727 ~ 49.742 mm (1.957 ~ 1.958in.)	
0.50	49.477 ~ 49.492 mm (1.948 ~ 1.9485in.)	
0.75	49.227 ~ 49.242 mm (1.938 ~ 1.9386in.)	
Main bearing oil clearance		
No. 1, 2, 4, 5	0.020 ~ 0.040 mm (0.0008 ~ 0.0016 in.)	0.1 mm (0.00394 in.)
No. 3.	0.028 ~ 0.046 mm (0.0011 ~ 0.0018 in.)	

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Valve

Stem diameter		
Intake	5.955 ~ 5.97 mm (0.2344 ~ 0.2350 in.)	
Exhaust	5.95 ~ 5.965 mm (0.2342 ~ 0.2348 in.)	
Face angle	45° ~ 45.5°	
Thickness of valve head (margin)		
Intake	1.1 mm (0.043 in.)	0.8mm (0.031 in.)
Exhaust	1.4 mm (0.055 in.)	1.1 mm (0.043 in.)
Valve stem to valve guide clearance		
Intake	0.03 ~ 0.06 mm (0.0012 ~ 0.0024 in.)	0.1 mm (0.0039 in.)
Exhaust	0.035 ~ 0.065 mm (0.0014 ~ 0.0026 in.)	0.15 mm (0.006 in.)

Valve guide

Length		
Intake	47.2 mm (1.681 in.)	
Exhaust	39.1 mm (1.539 in.)	
Service oversize	0.05, 0.25, 0.50	

Valve seat

Width of seat contact		
Intake	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	
Exhaust	1.3 ~ 1.7mm (0.051 ~ 0.067 in.)	
Seat angle	45°	
Service oversize	0.3, 0.6	

Valve spring

Free length (Installed height)	42.03 mm (1.655 in.)	
Load	24.7kg/34.5mm	
Out of squareness	Max 1.5	

Cylinder block

Cylinder bore	75.5 ~ 75.53 mm (2.9724 ~ 2.9736 in.)	
Out of roundness of cylinder bore	Max. 0.01	
Taper of cylinder bore	-	
Flatness of gasket surface	Max. 0.05	0.1 mm (0.0039 in.)

Piston

Diameter	75.47 ~ 75.50 mm (2.9713 ~ 2.9724 in.)	
Piston to cylinder clearance	0.02 ~ 0.04 mm (0.0078 ~ 0.00157 in.)	

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Piston ring

No. of rings per piston	3	
Compression ring	2	
Oil ring	1	
Compression ring type		
No. 1	Inside bevel type, steel	
No. 2	Taper type	
Oil ring type	3 - piece type	
Side clearance		
No. 1	0.04 ~ 0.085 mm (0.0016 ~ 0.0033 in.)	0.1 mm (0.00394 in.)
No. 2	0.04 ~ 0.085 mm (0.0016 ~ 0.0033 in.)	0.1 mm (0.00394 in.)
Oil ring	0.06 ~ 0.15 mm (0.0023 ~ 0.006 in.)	
End gap		
No. 1	0.20 ~ 0.35 mm (0.0079 ~ 0.0138 in.)	1 mm (0.0394 in.)
No. 2	0.37 ~ 0.52 mm (0.015 ~ 0.02 in.)	1 mm (0.0394 in.)
Oil ring side rail	0.2 ~ 0.7 mm (0.008 ~ 0.028 in.)	1 mm (0.0394 in.)
Service oversize	0.25, 0.50	

Connecting rod

Bend	Max. 0.05 per 100 mm	
Twist	Max. 0.1 per 100 mm	
Connecting rod big end to crankshaft side clearance	0.10 ~ 0.25 mm (0.004 ~ 0.01 in.)	0.4mm (0.016in.)
Piston pin press in load	1000 +/- 500 kg	
Bearing oil clearance	0.018 ~ 0.036 mm (0.0007 ~ 0.0014 in.)	0.1mm (0.0039in.)

Flywheel

Runout	0.1mm (0.0014 in.)	0.13mm (0.005in.)
Oil pressure at curb idle speed (oil temp. 90~110°C)	1.5kg/cm ²	

Oil pump

Clearance between outer circumference and front	0.12 ~ 0.18 mm (0.0047 ~ 0.0071 in.)	
Clearance between rotor axial side and front case	0.04 ~ 0.065 mm (0.0016 ~ 0.0026 in.)	
Tip clearance between outer and inner rotor	0.025 ~ 0.069 mm (0.0010 ~ 0.0027 in.)	

Relief spring

Free length	46.6 mm (1.8346 in.)	
Load	6.1kg at 40.1 mm (13.4216 at	

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

	1.578 in.)	
Cooling method	Water-cooled, Pressurized, Forced circulation with electrical fan	
Cooling system Quantity	6.5 lit (6.87 U.S. qts, 5.72 Imp qts)	
Thermostat		
Type	Wax pellet type with jiggle valve	
Normal opening temp.	82°C	
Opening temp. range	80.5 ~ 83.5°C	
Wide opening temp.	95°C	
Radiator cap		
Main valve opening pressure	86.1 ~ 124.5 kPa	
Main valve closing pressure	83.4 kPa	
Vacuum valve opening pressure	-86.6 kPa	
Air cleaner		
Type	Dry type	
Element	Unwoven cloth type	
Exhaust pipe		
Muffler	Expansion resonance type	
Suspension system	Rubber hanger type	

TIGHTENING TORQUE

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Item	Nm	kg.cm	lb.ft
Cylinder Block			
Left engine support bracket bolt	30 ~ 42	300 ~ 420	22 ~ 31
Oil pressure switch	13 ~ 15	130 ~ 150	9.6 ~ 11
Cylinder head			
Cylinder head bolt	(23 ~ 27) + 60° + 60°	(230 ~ 270) + 60° + 60°	(17 ~ 20) + 60° + 60°
Intake/manifold bolts or nuts	15 ~ 20	150 ~ 200	11 ~ 15
Exhaust manifold nut	15 ~ 20	150 ~ 200	11 ~ 15
Rocker cover bolt	8 ~ 10	80 ~ 100	6 ~ 7
Rocker arm shaft bolt	20 ~ 27	200 ~ 270	15 ~ 20
Rear plate bolt	8 ~ 10	80 ~ 100	6 ~ 7
Main Moving parts			
Connecting rod cap nut	32 ~ 35	320 ~ 350	24 ~ 26
Crankshaft bearing cap bolt	55 ~ 60	550 ~ 600	41 ~ 44
Flywheel M/T bolt	130 ~ 140	1300 ~ 1400	96 ~ 103
Drive plate A/T bolt	130 ~ 140	1300 ~ 1400	96 ~ 103

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Timing Belt

Crankshaft sprocket bolt	140 ~ 150	1400 ~ 1500	103 ~ 111
Camshaft sprocket bolt	80 ~ 100	800 ~ 1000	59 ~ 74
Timing belt tensioner bolt	20 ~ 27	200 ~ 270	15 ~ 20
Timing belt cover bolt	10 ~ 12	100 ~ 120	7 ~ 9
Front case bolt	12 ~ 15	120 ~ 150	9 ~ 11

Engine Mounting

Engine mounting insulator bolt	90 ~ 110	900 ~ 1100	66.4 ~ 81.1
Engine mounting bracket to engine nuts and bolts	50 ~ 65	500 ~ 650	36.9 ~ 48.0
Transaxle mount insulator bolt	90 ~ 110	900 ~ 1100	66.4 ~ 81.1
Transaxle insulator bracket to side member bolts	30 ~ 40	300 ~ 400	22.1 ~ 29.5
Front roll stopper insulator bolt	45 ~ 60	450 ~ 600	33.2 ~ 44.3
Front roll stopper bracket to sub-frame bolt	30 ~ 40	300 ~ 400	22.1 ~ 29.5
Rear roll stopper insulator bolt	45 ~ 60	4520 ~ 600	33.2 ~ 44.3
Rear roll stopper bracket to sub-frame bolt	30 ~ 40	300 ~ 400	22.1 ~ 29.5
Oil filter	12 ~ 16	120 ~ 160	9 ~ 12
Oil pan bolts	10 ~ 12	100 ~ 120	7 ~ 9
Oil pan drain plug	40 ~ 45	400 ~ 450	30 ~ 33
Oil screen bolts	15 ~ 22	150 ~ 220	11 ~ 16
Timing belt upper cover bolts	10 ~ 12	100 ~ 120	7 ~ 9
Timing belt lower cover bolts	10 ~ 12	100 ~ 120	7 ~ 9
Surge tank to inlet manifold nuts and bolts	15 ~ 20	150 ~ 200	11 ~ 15
Alternator support and nut	20 ~ 25	200 ~ 250	15 ~ 18
Alternator lock bolt	15 ~ 22	150 ~ 220	11 ~ 16
Alternator brace mounting bolt	20 ~ 28	200 ~ 280	15 ~ 21

Cooling system

Coolant pump pulley	8 ~ 10	80 ~ 100	6 ~ 7
Coolant pump bolt	12 ~ 15	120 ~ 150	9 ~ 11
Coolant temperature gauge unit	10 ~ 12	100 ~ 120	7 ~ 9

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Coolant temperature sensor	15 ~ 20	150 ~ 200	11 ~ 15
Coolant outlet fitting bolt	17 ~ 20	170 ~ 200	13 ~ 15
Thermostat housing bolt	15 ~ 20	150 ~ 200	11 ~ 15
Intake and Exhaust system			
Air cleaner body mounting bolts	8 ~ 10	80 ~ 100	6 ~ 7
Resonator mounting bolts	4 ~ 6	40 ~ 60	2.9 ~ 4.3
Throttle body to surge tank bolts	15 ~ 20	150 ~ 200	11 ~ 15
Oxygen sensor to exhaust manifold	50 ~ 60	500 ~ 600	37 ~ 44
Front exhaust pipe to exhaust manifold nuts	30 ~ 40	300 ~ 400	22 ~ 30
Front exhaust pipe bracket bolts	30 ~ 40	300 ~ 400	22 ~ 30
Front exhaust pipe to catalytic converter bolts	40 ~ 60	400 ~ 600	30 ~ 44
M/T: Manual Transaxle A/T: Automatic Transaxle			

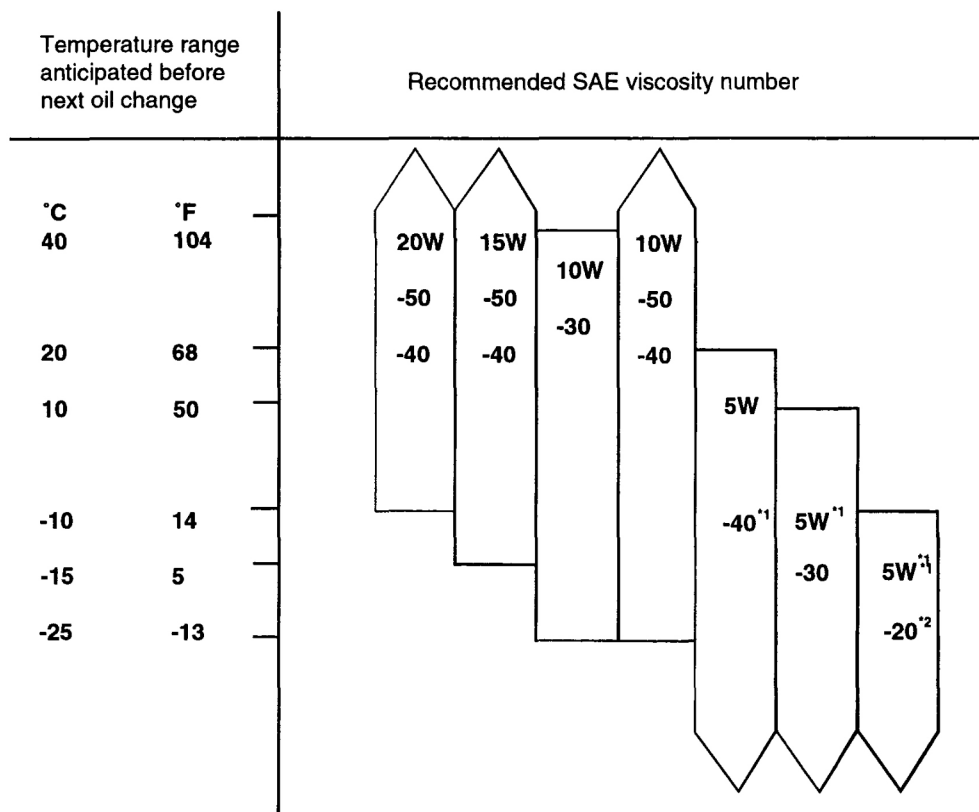
SELECTION OF ENGINE OIL

Recommended API classification: SH OR ABOVE

Recommended SAE viscosity grades:

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent



*1 Restricted by driving condition and environment.

*2 SAE5W-20 Not recommended for sustained high speed vehicle operation

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Fig. 1: Engine Oil SAE Viscosity Number

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

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

MAINTENANCE

CHECKING ENGINE OIL

1. Position the vehicle on a level surface.

2. Warm up the engine.

NOTE: If a vehicle has been out of service for a prolonged period of time, warm up the engine for approximately 20 minutes.

3. Turn off the engine, and wait 2 or 3 minutes, then check the oil level.
4. Check that the engine oil level is within the level range indicated on the oil dipstick if the oil level is found to have fallen to the lower limit (the "L" mark), refill to the "F" mark.

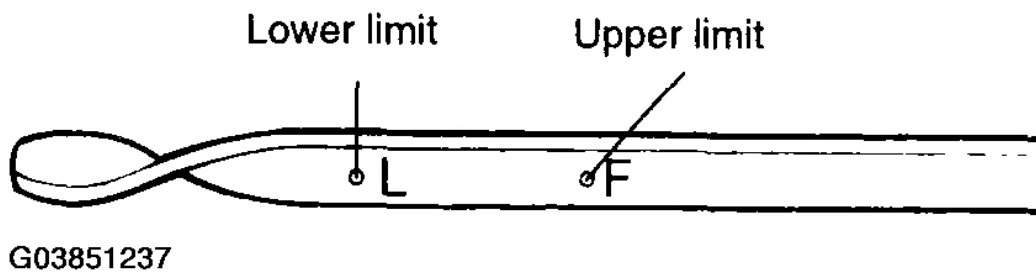


Fig. 2: Identifying Engine Oil Level
Courtesy of HYUNDAI MOTOR CO.

NOTE: When refilling, use the same type of engine oil.

5. Check that the oil is not dirty or contaminated with coolant or gasoline and that it has proper viscosity.

CHANGING ENGINE OIL

WARNING: Be careful not to burn yourself, the engine oil is hot.

1. Run the engine until it reaches normal operating temperature.
2. Turn off the engine.
3. Remove the oil filler cap and the engine oil drain plug. Drain the engine oil.

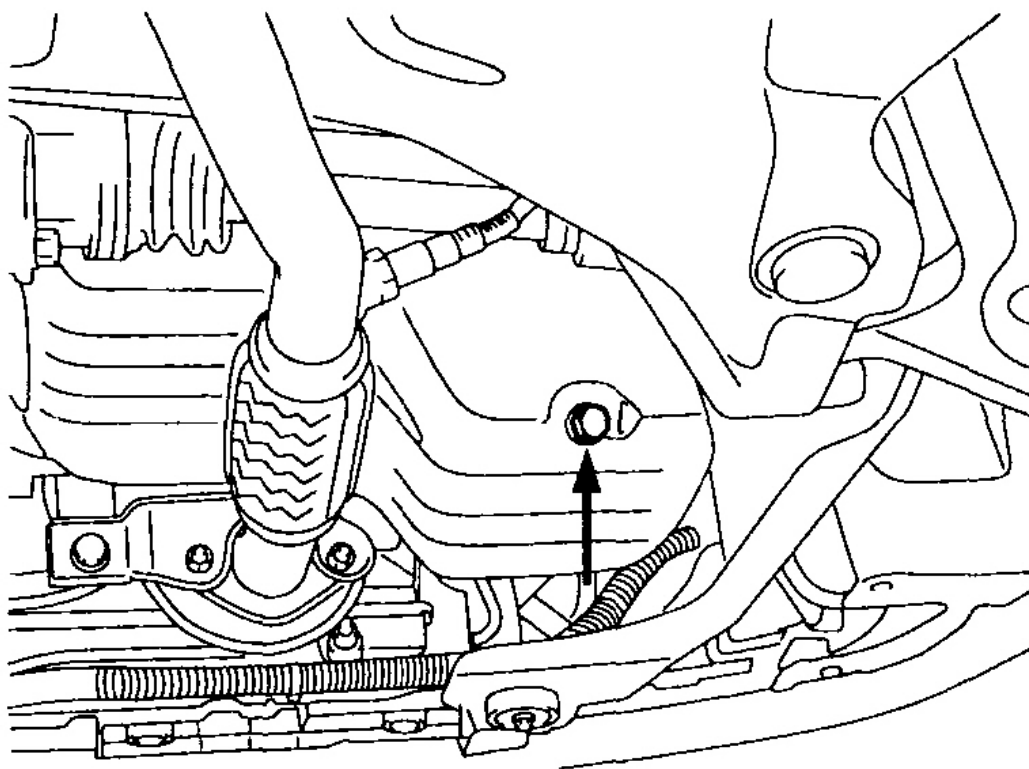
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Fig. 3: Removing Drain Plug
Courtesy of HYUNDAI MOTOR CO.

4. Install and tighten the drain plug to the specified torque.

Tightening torque

Drain plug: 40 ~ 45 Nm (400 ~ 450 kg.cm, 30 ~ 33 lb.ft)

NOTE: **Whenever tightening the oil drain plug, use a new drain plug gasket.**

5. Fill the crankcase with fresh engine oil through the oil filler cap opening.

Drain and Refill Without oil filter:

3.0 liter (3.17 U.S. qts., 2.64 Imp. qts.)

Drain and Refill With oil filter:

3.3 liter (3.48 U.S. qts., 2.90 Imp. qts.)

6. Install the oil filler cap.
7. Start and run the engine.
8. Turn off the engine and then check the oil level. Add oil if necessary.

FILTER SELECTION

All Hyundai engines are equipped with a high quality, disposable oil filter. This filter is recommended as a replacement filter on all vehicles. The quality of replacement filters varies considerably. Only high quality filters should be used to assure the most efficient service. Make sure that the rubber gasket from the old oil filter is completely removed from the contact surface on the engine block or front case before installing the new filter.

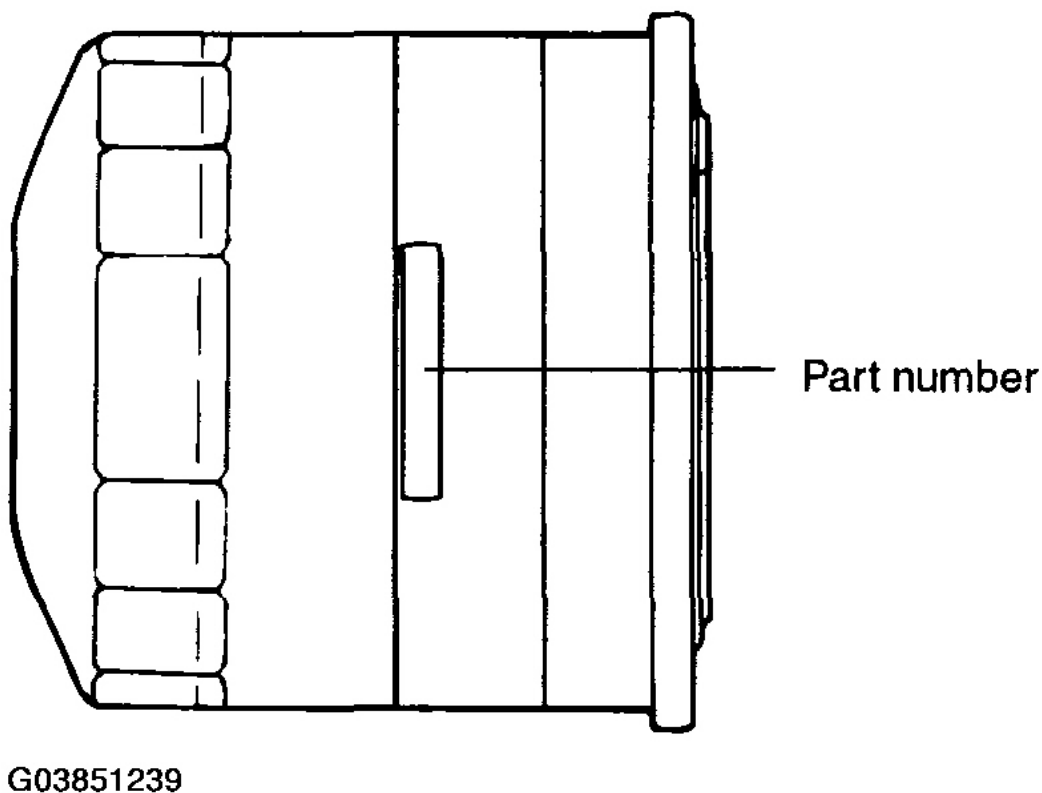


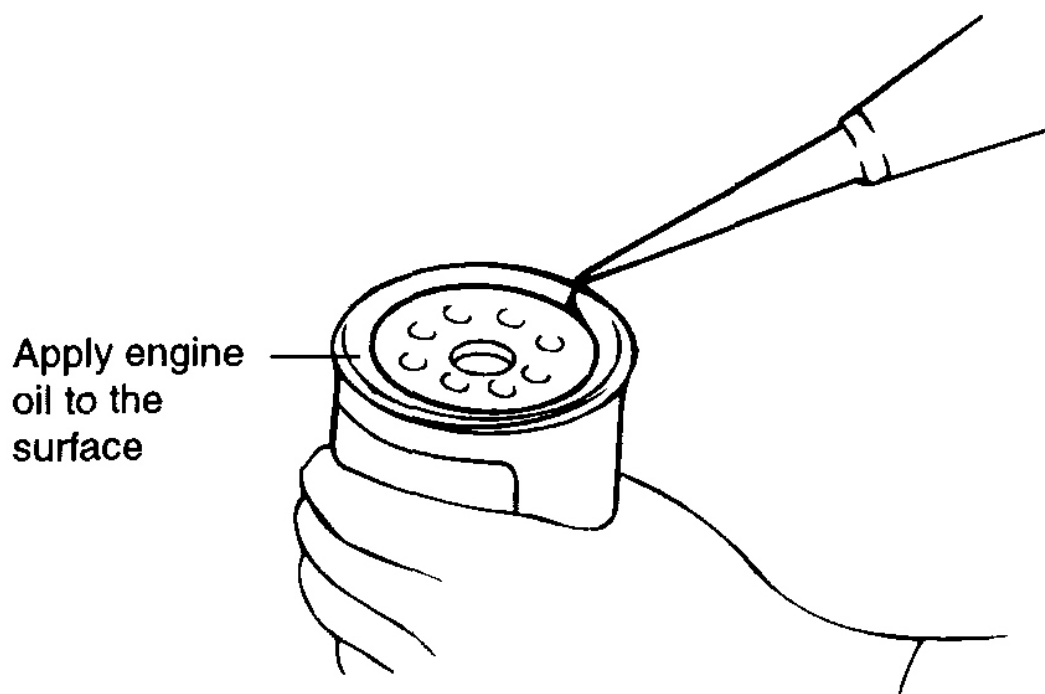
Fig. 4: Identifying Oil Filter Number
Courtesy of HYUNDAI MOTOR CO.

PROCEDURE FOR REPLACING THE OIL FILTER

CAUTION: Be careful not to burn yourself the engine and engine oil are hot.

1. Use a filter wrench to remove the oil filter.
2. Before installing the new oil filter on the engine, clean oil filter sealing base plate with shop towel.

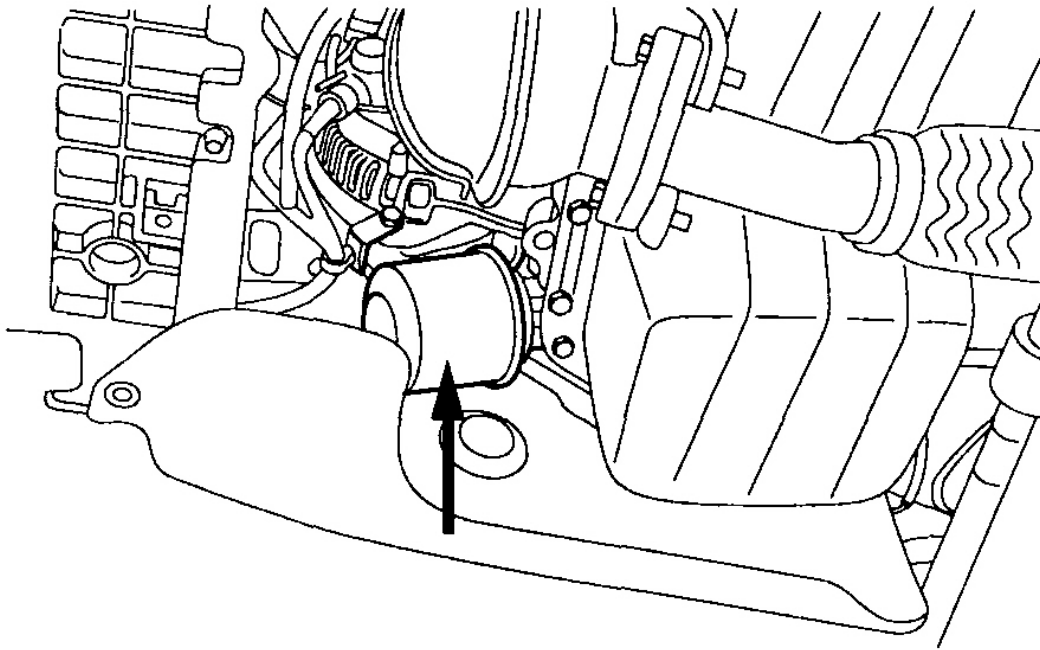
Apply engine oil to the surface of rubber packing.



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Fig. 5: Applying Clean Engine Oil To Surface Of Rubber Gasket
Courtesy of HYUNDAI MOTOR CO.

3. Tighten the oil filter to the specified torque.



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Fig. 6: Tightening Oil Filter To Specified Torque
Courtesy of HYUNDAI MOTOR CO.

Tightening torque

Oil filter: 12 ~ 16 Nm (120 ~ 160 kg.cm, 9 ~ 12 lb.ft)

4. Run the engine to check for engine oil leaks.
5. After turning off the engine, check the oil level and add oil as necessary.

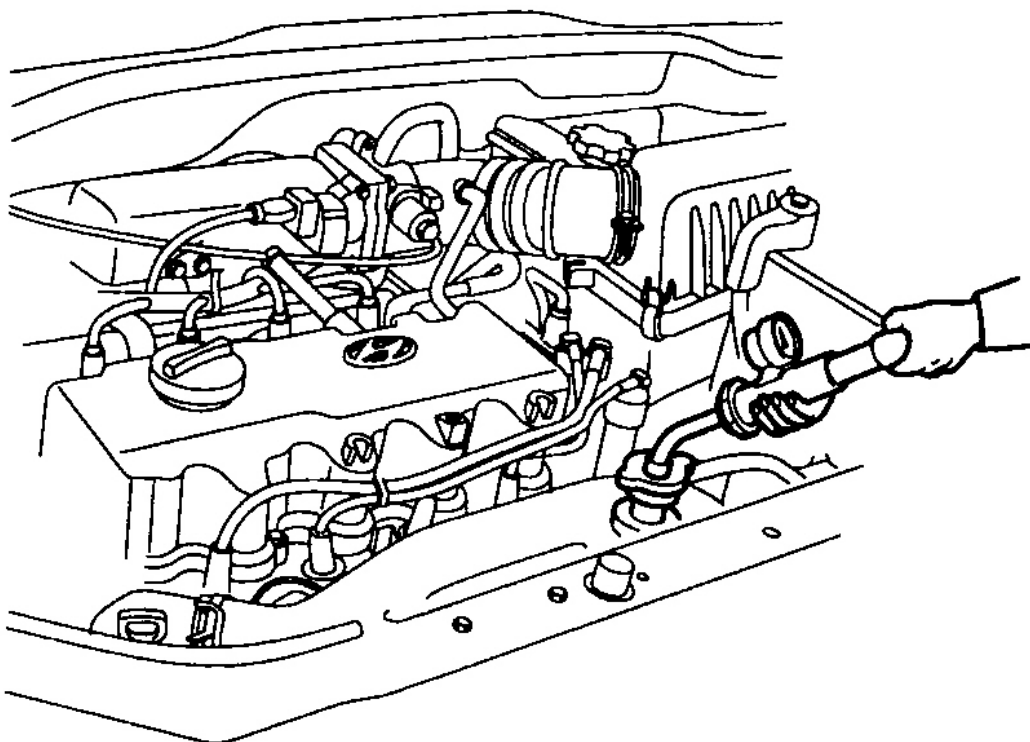
CHECKING COOLANT LEAK

1. Wait until the engine is cool, then carefully remove the radiator cap.
2. Confirm that the coolant level is up to the filler neck.
3. Install a radiator cap tester to the radiator filler neck and apply 140 kPa (1.4 kg/cm², 20 psi) pressure. Hold it for two minutes in that condition, while checking for leakage from the radiator, hoses or connections.

NOTE:

1. **Radiator coolant may be extremely hot. Do not open the system because hot, or scalding water could gush out causing personal injury. Allow the vehicle to cool before servicing this system.**

2. Be sure to clean away any moisture from the places checked completely.
 3. When the tester is removed, be careful not to spill any coolant.
 4. Be careful when installing and removing the tester and when testing do not deform the filler neck of the radiator.
4. If there is leakage, repair or replace with the appropriate part.



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Fig. 7: Installing And Removing Tester
Courtesy of HYUNDAI MOTOR CO.

RADIATOR CAP PRESSURE TEST

1. Remove the radiator cap. Wet its seal with engine coolant, then install it on the tester.
2. Increase the pressure until the gauge stops moving.

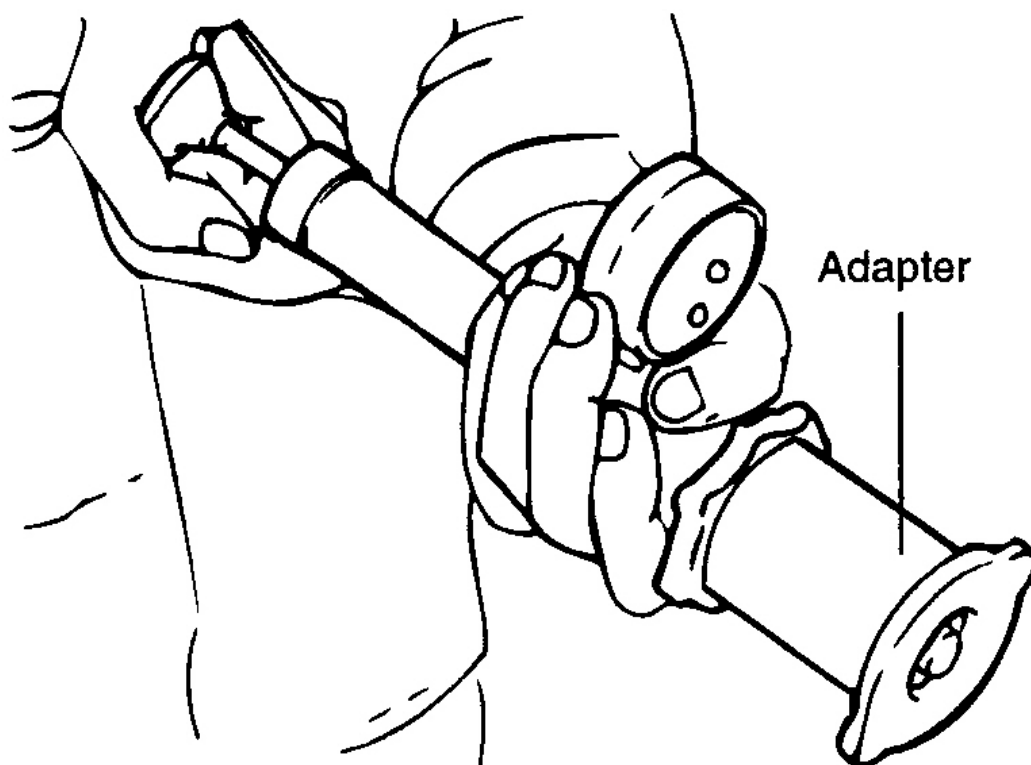
Main valve opening pressure:

78 ~ 108 kPa (0.8 ~ 1.1 kg/cm² , 11.3 ~ 15.6 psi)

Limit: 65 kPa (0.66 kg/cm² , 9.2 psi)

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

NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an incorrect reading.



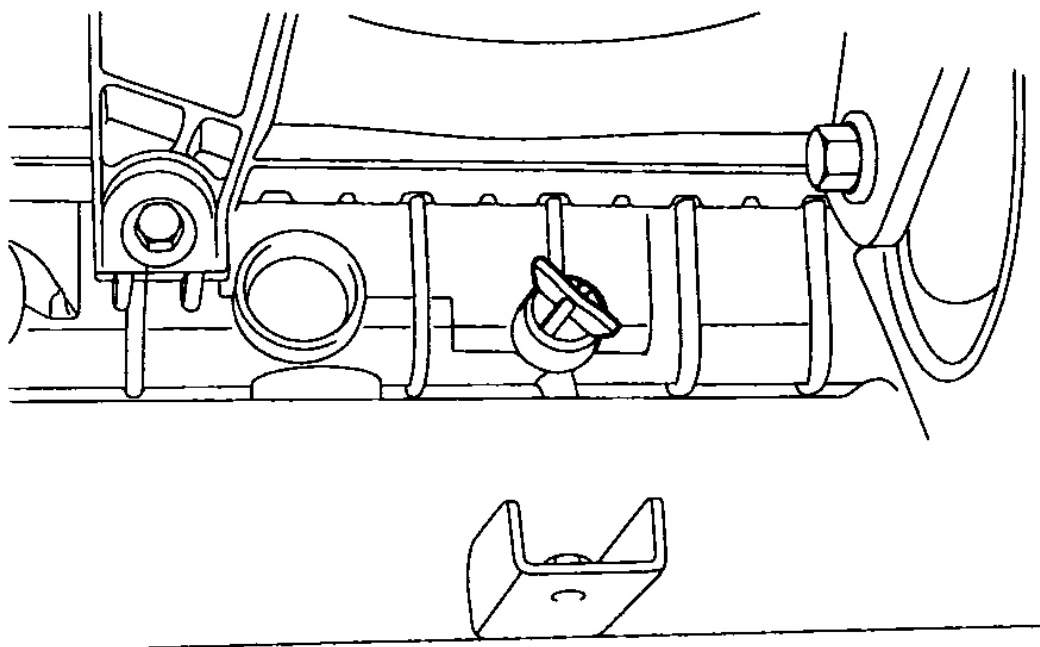
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Fig. 8: Identifying Radiator Cap Pressure Test
Courtesy of HYUNDAI MOTOR CO.

CHANGING ENGINE COOLANT

CAUTION: When pouring engine coolant, be sure to shut the relay box lid and not to let coolant spill on 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 the radiator cap.
3. Loosen the drain plug and drain the coolant.



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Fig. 9: Loosening Drain Plug**Courtesy of HYUNDAI MOTOR CO.**

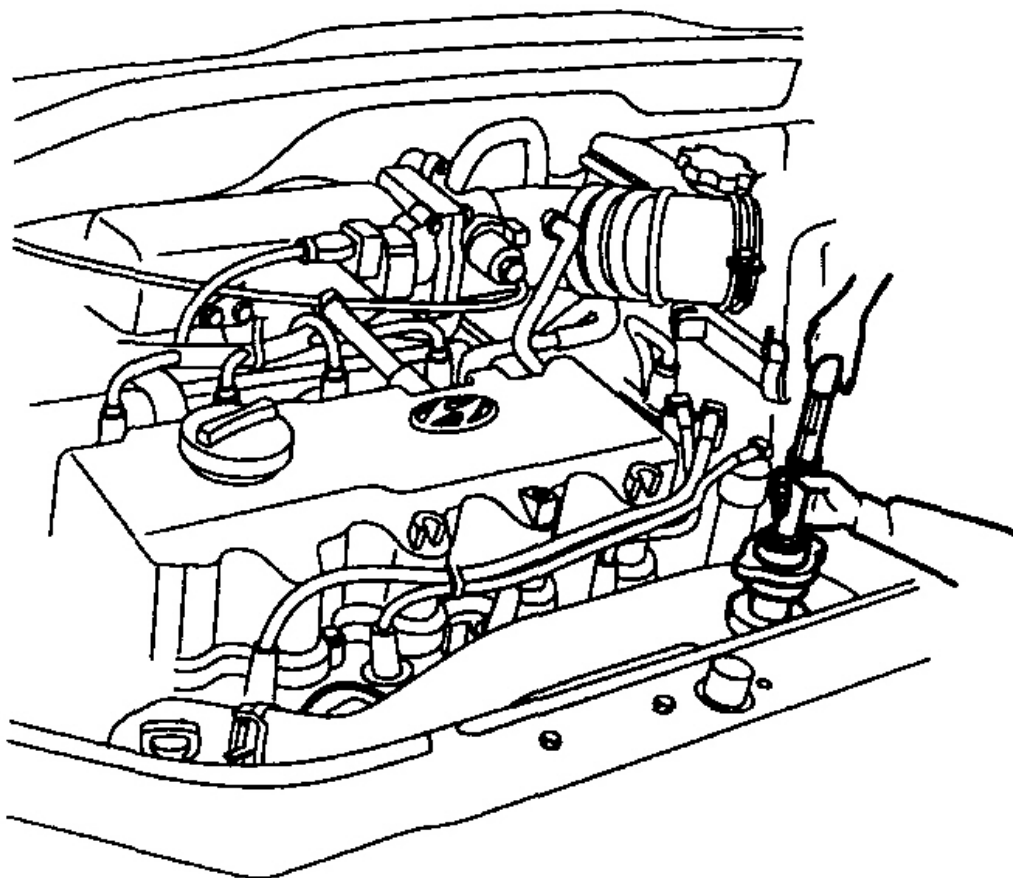
4. Tighten the radiator drain plug securely.
5. Remove, drain and reinstall the reservoir.

Fill the tank halfway to the MAX mark with water, then up to the MAX mark with antifreeze.

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

SPECIFIC GRAVITY TEST

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



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Fig. 10: Measuring Specific Gravity Of Coolant With A Hydrometer
 Courtesy of HYUNDAI MOTOR CO.

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

RELATION BETWEEN COOLANT CONCENTRATION AND SPECIFIC GRAVITY

RELATION BETWEEN COOLANT CONCENTRATION AND SPECIFIC GRAVITY

Coolant temperature °C (°F) and specific gravity					Freezing temperature °C (°F)	Safe operating temperature °C (°F)	Coolant concentration (Specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)	°C (°F)	°C (°F)	
1.054	1.050	1.046	1.042	1.036	-16 (3.2)	-11 (12.2)	30%

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

1.063	1.058	1.054	1.049	1.044	-20 (-4)	-15 (5)	35%
1.071	1.067	1.062	1.057	1.052	-25 (-13)	-20 (-4)	40%
1.079	1.074	1.069	1.064	1.058	-30 (-22)	-25 (-13)	45%
1.087	1.082	1.076	1.070	1.064	-36 (-32.8)	-31 (-23.8)	50%
1.095	1.090	1.084	1.077	1.070	-42 (-44)	-37 (-35)	55%
1.103	1.098	1.092	1.084	1.076	-50 (-58)	-45 (-49)	60%

Example

The safe operating temperature is -15°C (5°F) when the measured specific gravity is 1.058 at coolant temperature of 20°C (68°F)

CAUTION:

- If the concentration of the coolant is below 30%, its anti-corrosion properties will be adversely affected.
- If the concentration is above 60%, both the antifreeze and engine cooling property will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.
- Do not mix with another brand's product.

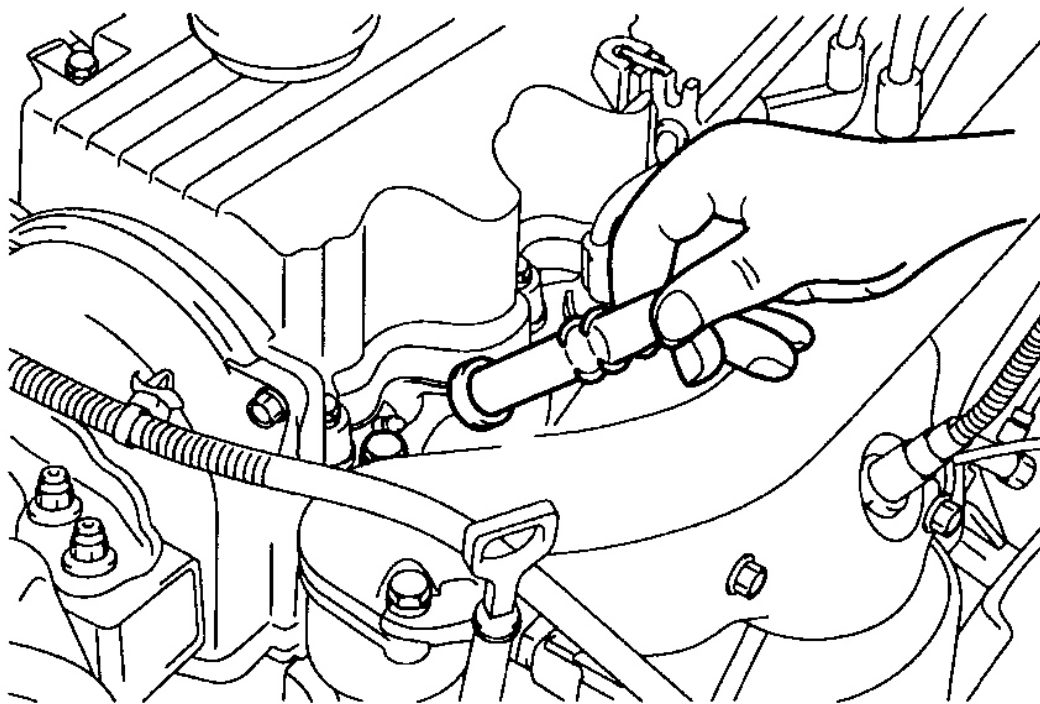
RECOMMENDED COOLANT

COOLANT SPECIFICATIONS

Anti-Freeze	Mixture Ratio Of Anti Freeze In Coolant
ETHYLENE GLYCOL BASE FOR ALUMINUM	50% [Except tropical areas]
	40% [Tropical areas]

CHECKING COMPRESSION PRESSURE

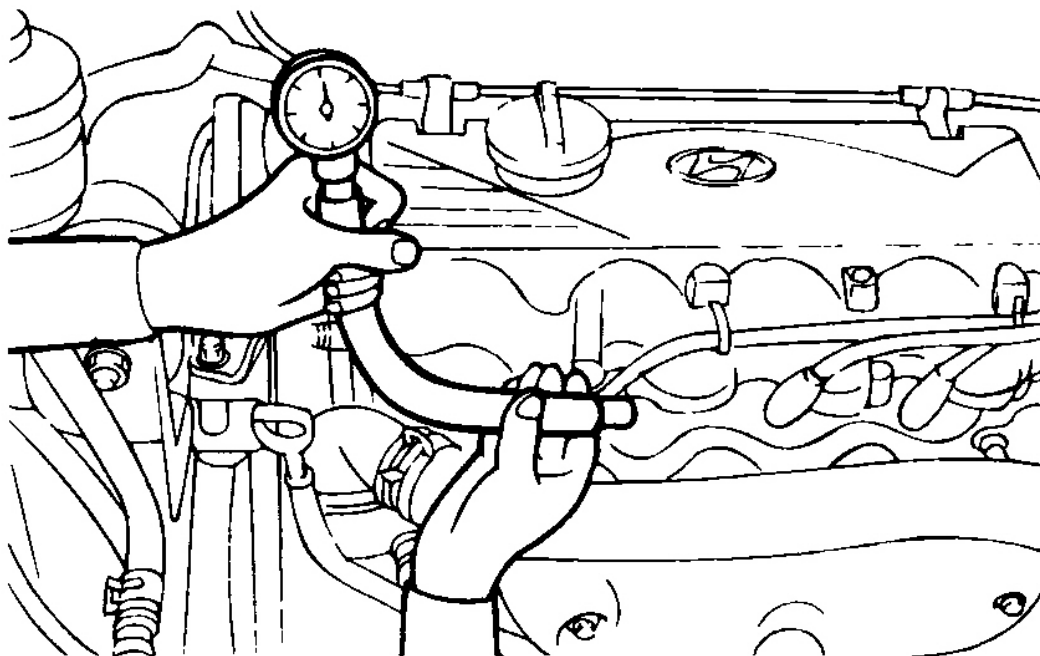
1. Before checking engine compression, check the engine oil level. Also check that the starter motor and battery are all in normal operating condition.
2. Check the DTC's. Resetting the ECM will erase any stored DTC's.
3. Start the engine and wait until engine coolant temperature reaches 80~95°C (176~205°F).
4. Disconnect the fuel pump connector.
5. Turn off engine and disconnect the spark plug cables.



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Fig. 11: Disconnecting Spark Plug Cables
Courtesy of HYUNDAI MOTOR CO.

6. Remove the spark plug.
7. Disconnect the Ignition coil connector.
8. Crank the engine to remove any foreign material in the cylinders.
9. Insert the compression gauge into the spark plug hole.



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Fig. 12: Inserting Compression Gauge Into Spark Plug Hole
Courtesy of HYUNDAI MOTOR CO.

10. Depress the accelerator pedal to open the throttle fully.
11. Crank the engine and read the gauge.

Standard value: 1500 kPa (15.5 kg/cm² , 220 psi)

Limit: 1200 kPa (12.5 kg/cm² , 178 psi)

12. Repeat steps 9 to 11 on all cylinders, ensuring that the pressure differential for each of the cylinders is within the specified limit.

Limit:

Max. 150 kPa (1.5 kg/cm² , 21 psi) between cylinders

13. If a cylinder's compression or pressure differential is outside the specification, add a small amount of oil through the spark plug hole, and repeat steps 9 to 12 .
 1. If the addition of oil makes the compression to increase, it is likely that there may be wear between the piston ring and cylinder wall.

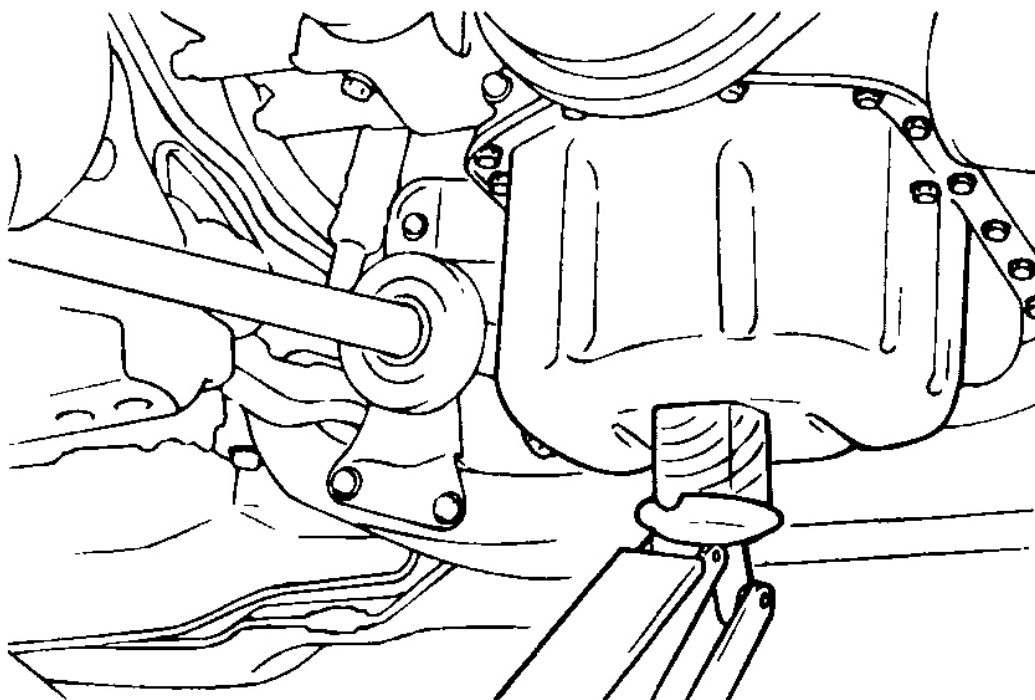
2. If compression remains the same, valve seizure, poor valve seating or a compression leak from the cylinder head gasket are all possible causes.

Tightening torque

Spark plug: 20~30 Nm (200~300 kg.cm, 14~22 lb.ft)

ADJUSTING TIMING BELT TENSION

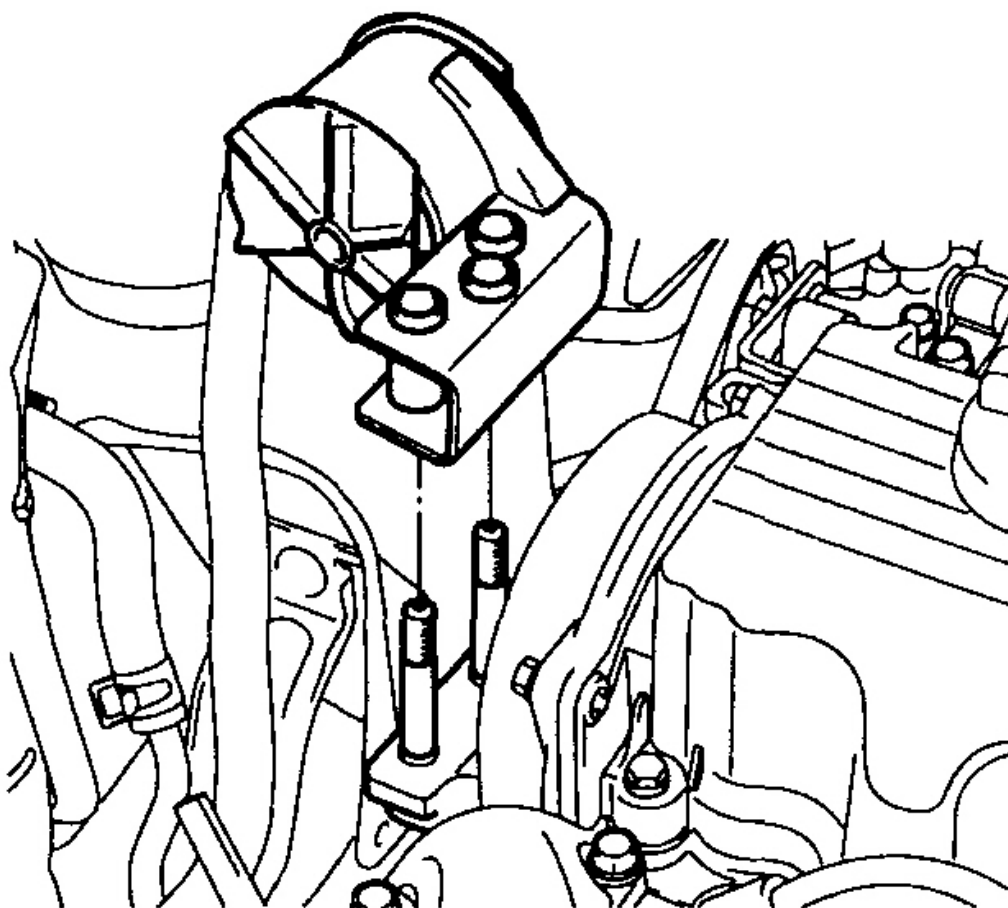
1. Turn the steering wheel fully counter clock wise.
2. Lift the vehicle by using of jack.



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Fig. 13: Lifting Vehicle By Using Of Jack
Courtesy of HYUNDAI MOTOR CO.

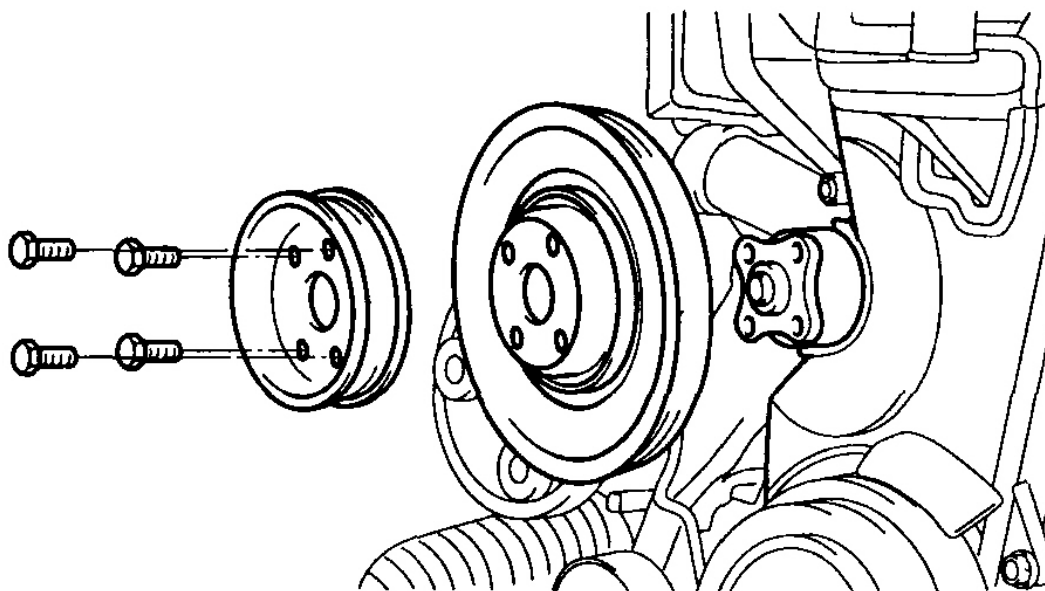
3. Remove the engine support bracket.



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Fig. 14: Removing Engine Support Bracket
Courtesy of HYUNDAI MOTOR CO.

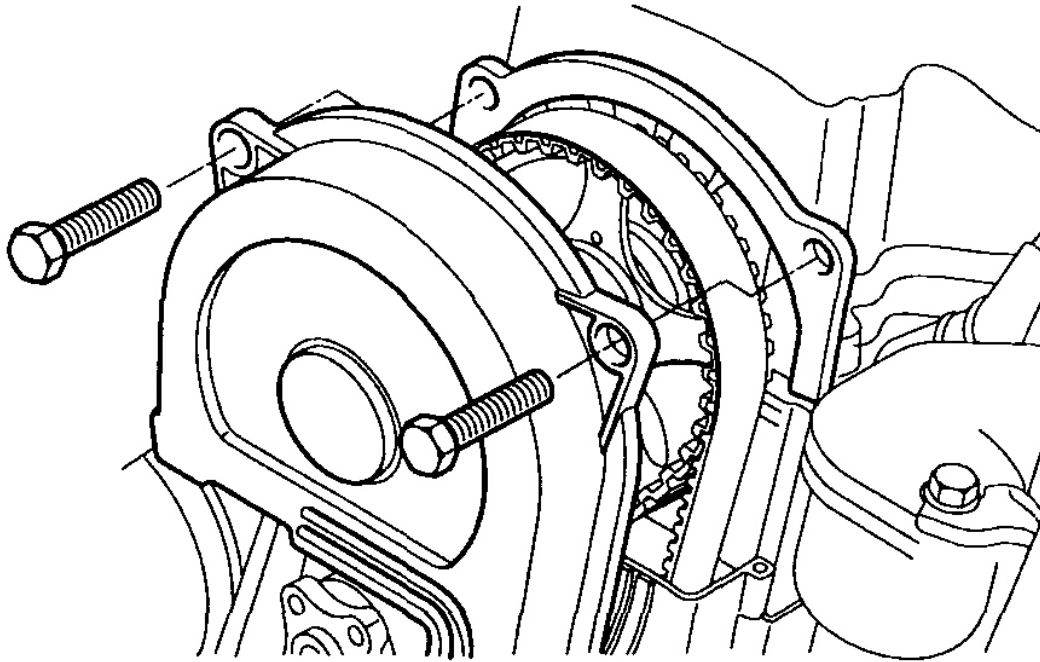
4. Loosen the coolant pump pulley mounting bolt and loosen the generator belt tension adjustment bolt.



G03851250

Fig. 15: Removing Coolant Pump Pulley Mounting Bolt
Courtesy of HYUNDAI MOTOR CO.

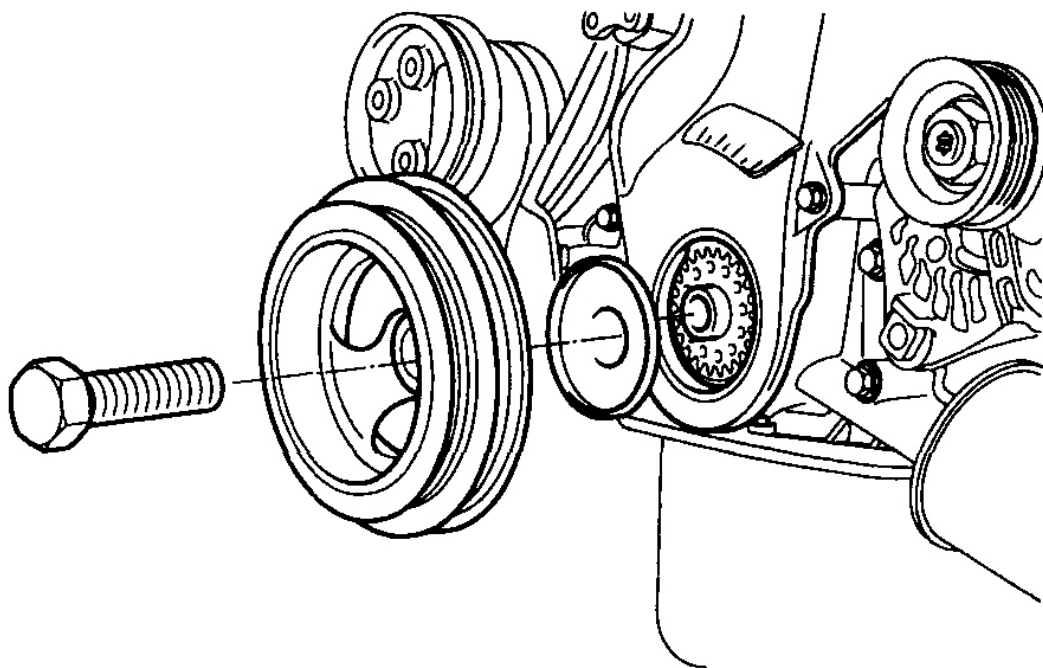
5. Remove the coolant pump pulley, generator belt, power steering pulley and power steering belt.
6. Remove the timing cover upper side mounting bolt.



G03851251

Fig. 16: Removing Timing Cover Upper Side Mounting Bolt
Courtesy of HYUNDAI MOTOR CO.

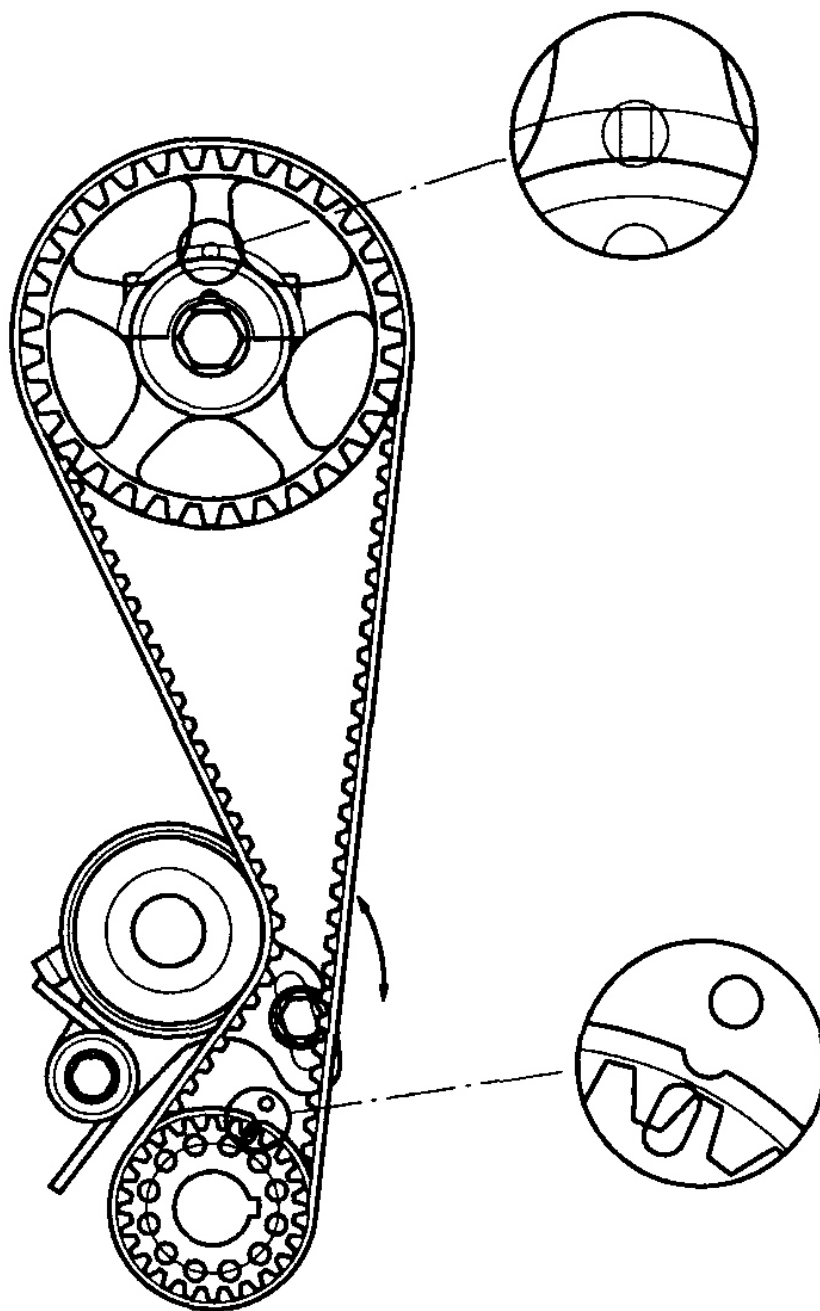
7. Remove the crankshaft pulley.



G03851252

Fig. 17: Removing Crankshaft Pulley
Courtesy of HYUNDAI MOTOR CO.

8. Turn crankshaft clockwise until cylinder number 1 is at top head center of its compression stroke.



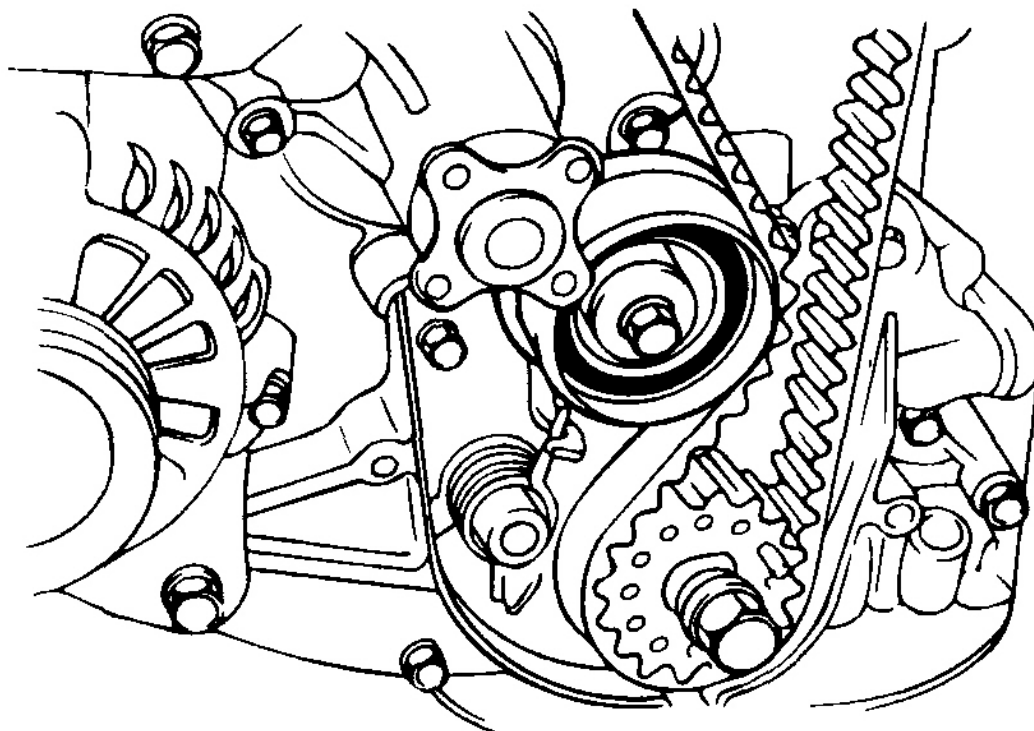
G03851253

Fig. 18: Identifying Cylinder Number 1 Is At Top Dead Center Of Its Compression Stroke
Courtesy of HYUNDAI MOTOR CO.

NOTE: Turn the crankshaft clockwise. If turned counter clockwise, tension is not

set.

9. Loosen the tensioner bolt 1 ~ 2 turns and allow tensioner spring to tension the belt.

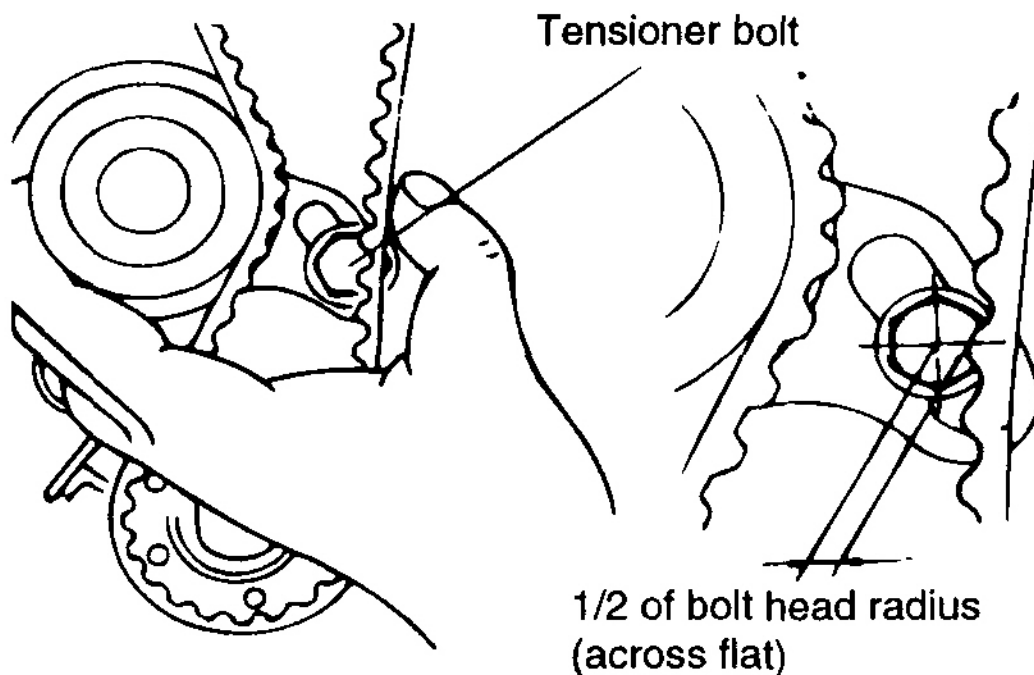


G03851254

Fig. 19: Loosening Tensioner Bolt
Courtesy of HYUNDAI MOTOR CO.

10. Turn crankshaft clockwise as much as two camshaft sprocket teeth.
11. Tighten the tensioner bolt of slot side of first and then tighten the bolt of pivot side.
12. Check to make sure timing marks line up.
13. Check the tension of timing belt.

When the tensioner and the tension side of the timing belt are pushed in horizontally with a moderate force [approx. 49N (11 lb)], the timing belt log end is approx. half of the tensioner mounting bolt head radius away from the bolt head center.



G03851255

Fig. 20: Checking Tension Of Timing Belt
Courtesy of HYUNDAI MOTOR CO.

14. Install the timing belt cover.

Tightening torque:

10 ~ 12 Nm (100 ~ 120 kg.cm, 7.2 ~ 8.7 lb.ft)

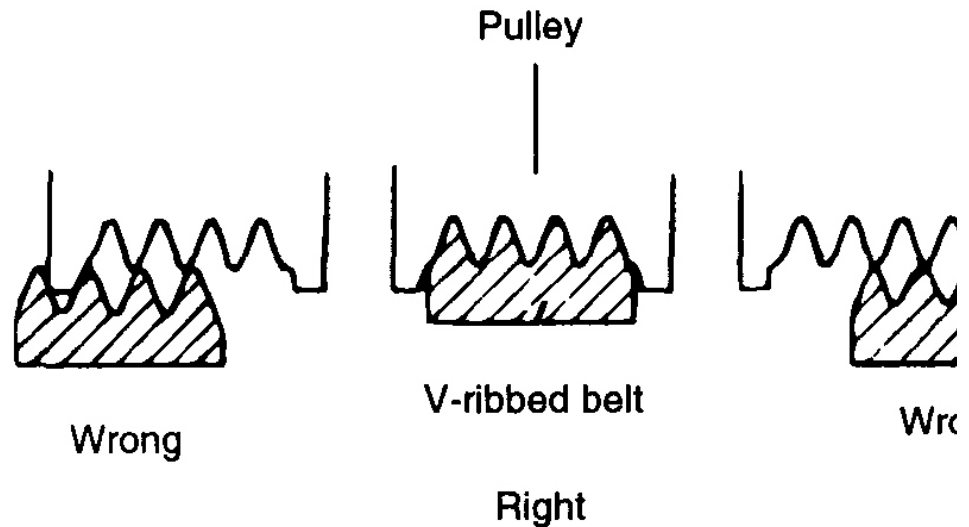
15. Install the crankshaft pulley.
16. Install the coolant pump pulley.
17. Install V-belt and adjust the belt tension.

ADJUSTING DRIVE BELT TENSION

1. Check that the belts are not damaged and are properly fit for the pulley grooves.
2. Apply 100 N (22 lbs.) force to the back and midway portion of the belt between the pulleys as shown in the illustration. Measure the amount of deflection with a tension gauge.

CAUTION: • When installing the V-ribbed belt, check that the V-ribs are properly aligned.

- If noise or slippage is detected, check the belt for wear, damage, breakage on the pulley contact surface, and check the pulley for : Also check the amount that the belt is deflected.



G03851256

Fig. 21: Identifying V-Ribs Are Properly Aligned
 Courtesy of HYUNDAI MOTOR CO.

BELT ADJUSTMENT SPECIFICATIONS

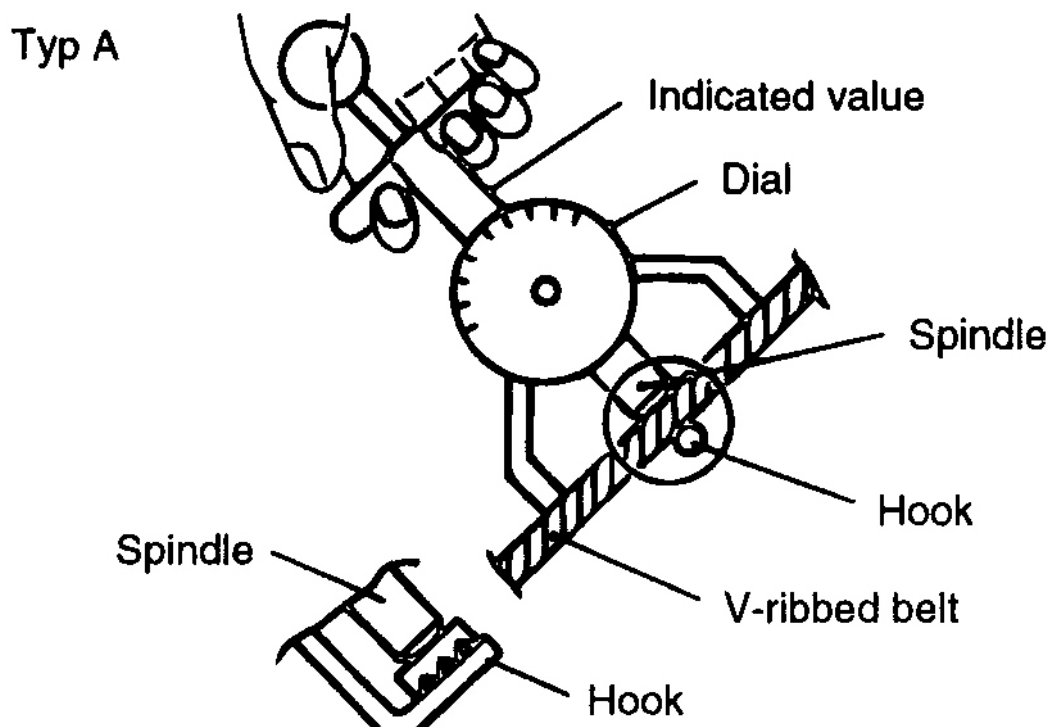
Items		Adjustment	
		New	Used
For alternator	Deflection mm (in.)	7.5 ~ 9.0 (0.29 ~ 0.35)	10 (0.39)

NOTE:

- The belt tension must be measured half - way between the specified pulleys.
- When a new belt is installed, adjust the tension to the central value of the standard range indicated under "New" in the above table. Let the engine idle for 5 minutes or more, and check the standard value indicated under "Inspection".
- When adjusting a belt which has been used, or newly installed, after 5 minutes or more of operation, refer to the standard value indicated under "Used" in the above table.
- Refer to the standard value indicated under "Inspection" for periodic inspections.

TYPE A TENSION GAUGE

Do not let the dial section of the tension gauge contact other objects during measurement.

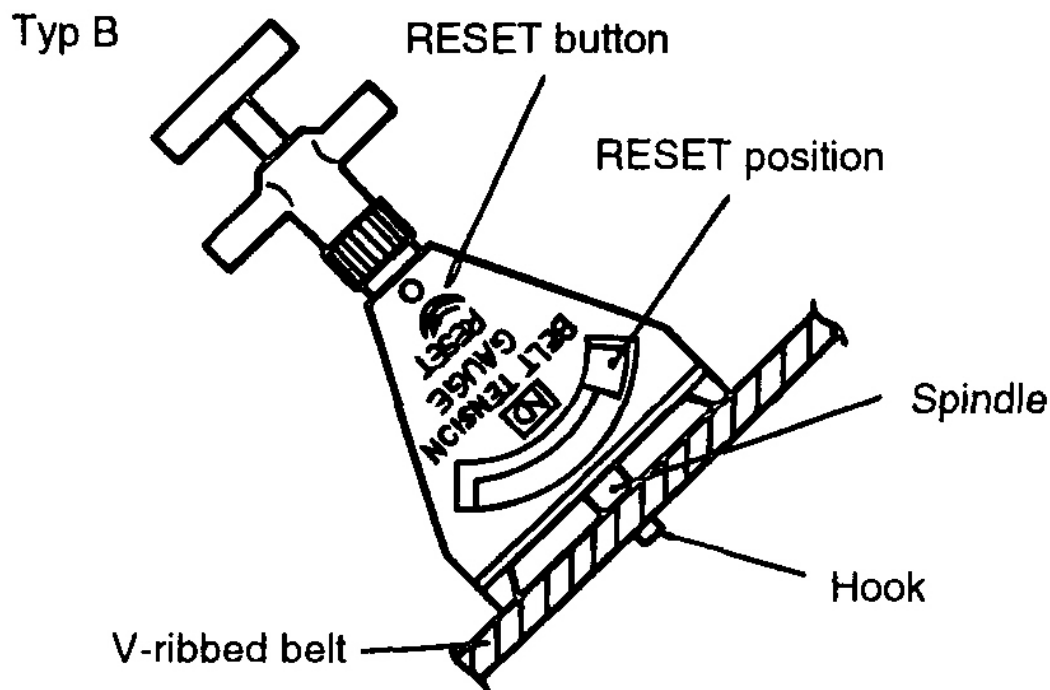


G03851257

Fig. 22: Precaution For Type A Tension Gauge
Courtesy of HYUNDAI MOTOR CO.

TYPE B TENSION GAUGE

1. When measuring, turn the reset button in the direction of the arrow and set the gauge needle to the RESET position.
2. If the tension gauge is removed from the belt, the needle will still indicate the tension. Read the tension value after removing the gauge.



G03851258

Fig. 23: Precaution For Type B Tension Gauge
Courtesy of HYUNDAI MOTOR CO.

ADJUSTING THE ALTERNATOR BELT

CAUTION: If the belt is too loose, it will cause noise or sudden wear.
If the belt is too tight, the engine coolant pump bearing or the alternator can get damaged.

1. Loosen the alternator nut "A" and the tension adjuster lock bolt "B"
2. Using the tension adjuster bolt, adjust the belt tension to the specification.
3. Tighten the adjuster lock bolt "B".
4. Tighten the alternator nut "A".
5. Check the tension or the deflection of belt, readjust if necessary.

Tightening torque

Alternator support nut A:

20 ~ 25 Nm (200 ~ 250 kg.cm, 15 ~ 18 lb.ft)

Alternator lock bolt B:

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

Alternator brace mounting bolt:

20 ~ 28 Nm (200 ~ 280 kg.cm, 15 ~ 21 lb.ft)

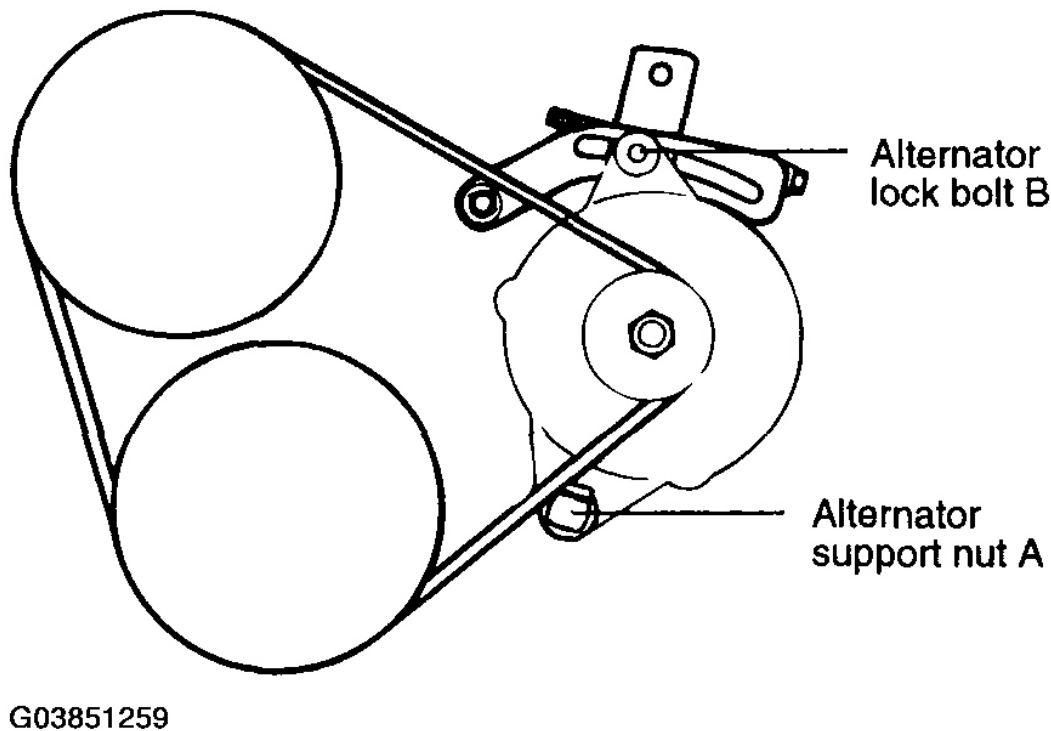


Fig. 24: Tightening Adjuster Lock Bolt "B" And Alternator Nut "A"
 Courtesy of HYUNDAI MOTOR CO.

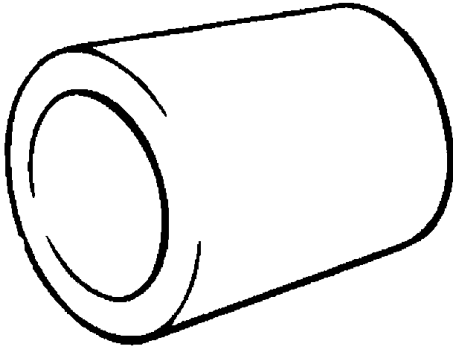
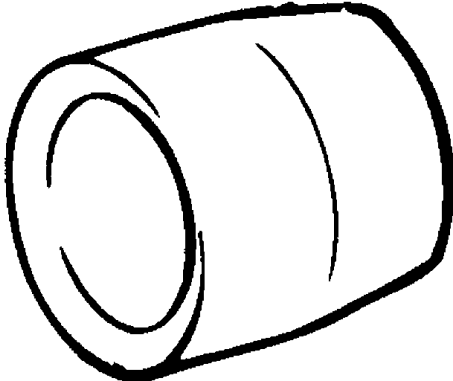
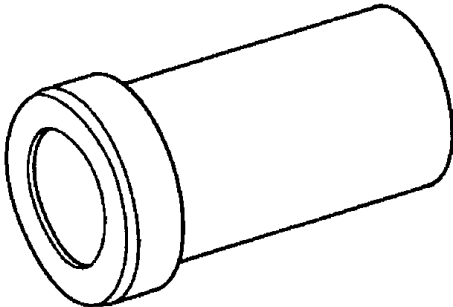
SPECIAL TOOLS

SPECIAL TOOLS CHART

Tool (Number and name)	Illustration	Use
Crankshaft front oil seal installer 09231 - 22000		Installation of the crankshaft front oil seal (use with 09231 - 22100)

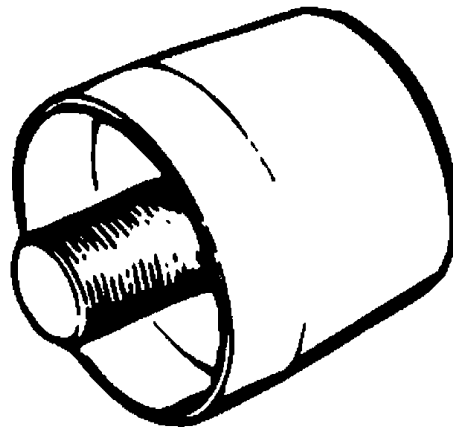
2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

	 G03851260	
Crankshaft front oil seal guide 09231 - 22100	 G03851261	Installation of the crankshaft front oil seal (use with 09231 - 22000)
Camshaft oil seal installer 09221 - 21000	 G03851262	Installation of the camshaft oil seal (use with 09221 - 21100)
Camshaft oil seal guide 09221 - 21100		Used as a guide when pressing in the camshaft oil seal (use with 09221 - 21000)

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

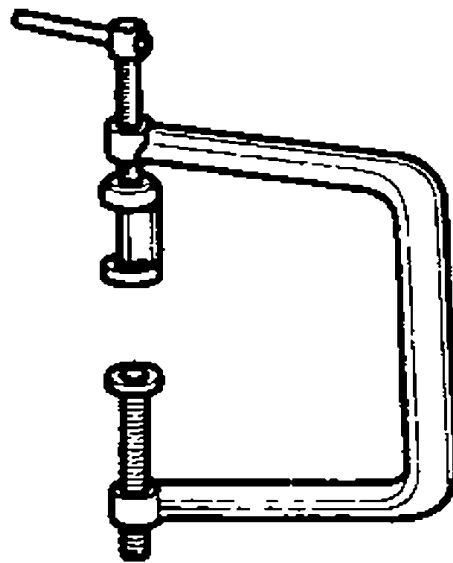


G03851263

Valve spring remover and installer

09222 - 28000

09222 - 28100

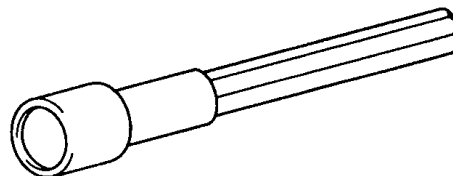


G03851264

Removal and installation of the inlet or exhaust valve

Valve stem oil seal installer

09222 - 22001



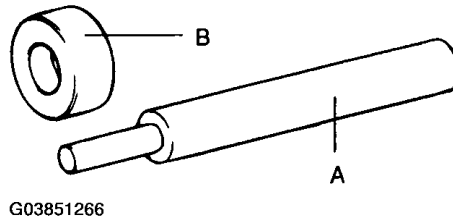
G03851265

Installation of the valve stem oil seal

2005 Hyundai Accent GLS

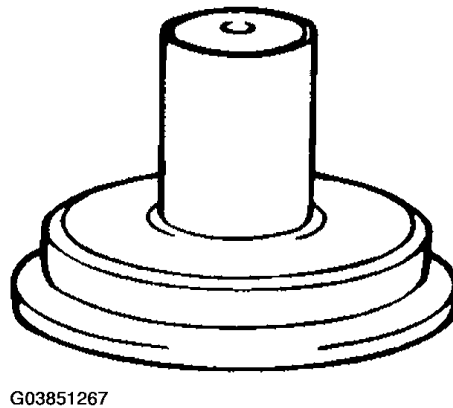
2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Valve guide installer
09221 - 3F100 A/B



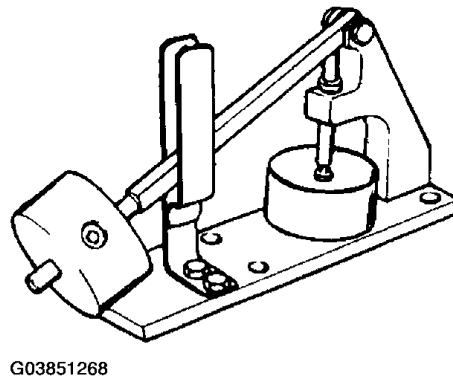
Removal and installation to the
valve guide

Crankshaft rear oil seal installer
09231 - 21000



1. Installation of the engine
rear oil seal
2. Installation of the
crankshaft rear oil seal

Leak down tester
09246 - 32000



Leak down test of auto lash
adjuster

TROUBLE SHOOTING

TROUBLESHOOTING CHART

Symptom	Probable cause	Remedy
Low compression	Blown cylinder head gasket	Replace gasket
	Worn or damaged piston rings	Replace rings

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

	Worn piston or cylinder	Repair or replace the piston and/or cylinder block
	Worn or damaged valve seat	Repair or replace the valve and/or seat ring
Low oil pressure	Low engine oil level	Check engine oil level
	Faulty oil pressure switch	Replace
	Clogged oil filter	Replace
	Worn oil pump gears or cover	Replace
	Thin or diluted engine oil	Change and find out cause
	Oil relief valve stuck (open)	Repair
	Excessive bearing clearance	Replace
High oil pressure	Oil relief valve stuck (closed)	Repair
Excessive engine vibration	Loose engine roll stopper (front, rear)	Retighten
	Loose transaxle mount bracket	Retighten
	Loose engine mount bracket	Retighten
	Loose center member	Retighten
	Broken transaxle mount insulator	Replace
	Broken engine mount insulator	Replace
	Broken engine roll stopper insulator	Replace
Noisy valves	Thin or diluted engine oil (Low oil pressure)	Change
	Worn or damaged valve stem or valve guide	Replace
Connecting rod and main bearing noise	Insufficient oil supply	Check engine oil level
	Thin or diluted engine oil	Change and find out cause
	Excessive bearing clearance	Replace
Timing belt noise	Incorrect belt tension	Adjust belt tension
Low coolant level	Leakage of coolant	
	1. Heater or radiator hose	Repair or replace parts
	2. Faulty radiator cap	Tighten or replace clamps
	3. Thermostat housing	Replace the gasket or housing
	4. Radiator	Repair or replace
	5. Engine coolant pump	Replace parts
Clogged radiator	Foreign material in coolant	Replace coolant
Abnormally high coolant temperature	Faulty thermostat	Replace parts
	Faulty radiator cap	Replace parts
	Restricted flow in cooling system	Clear restriction or replace parts
	Loose or missing drive belt	Adjust or replace
	Faulty water pump	Replace
	Faulty temperature sensor or	Repair or replace

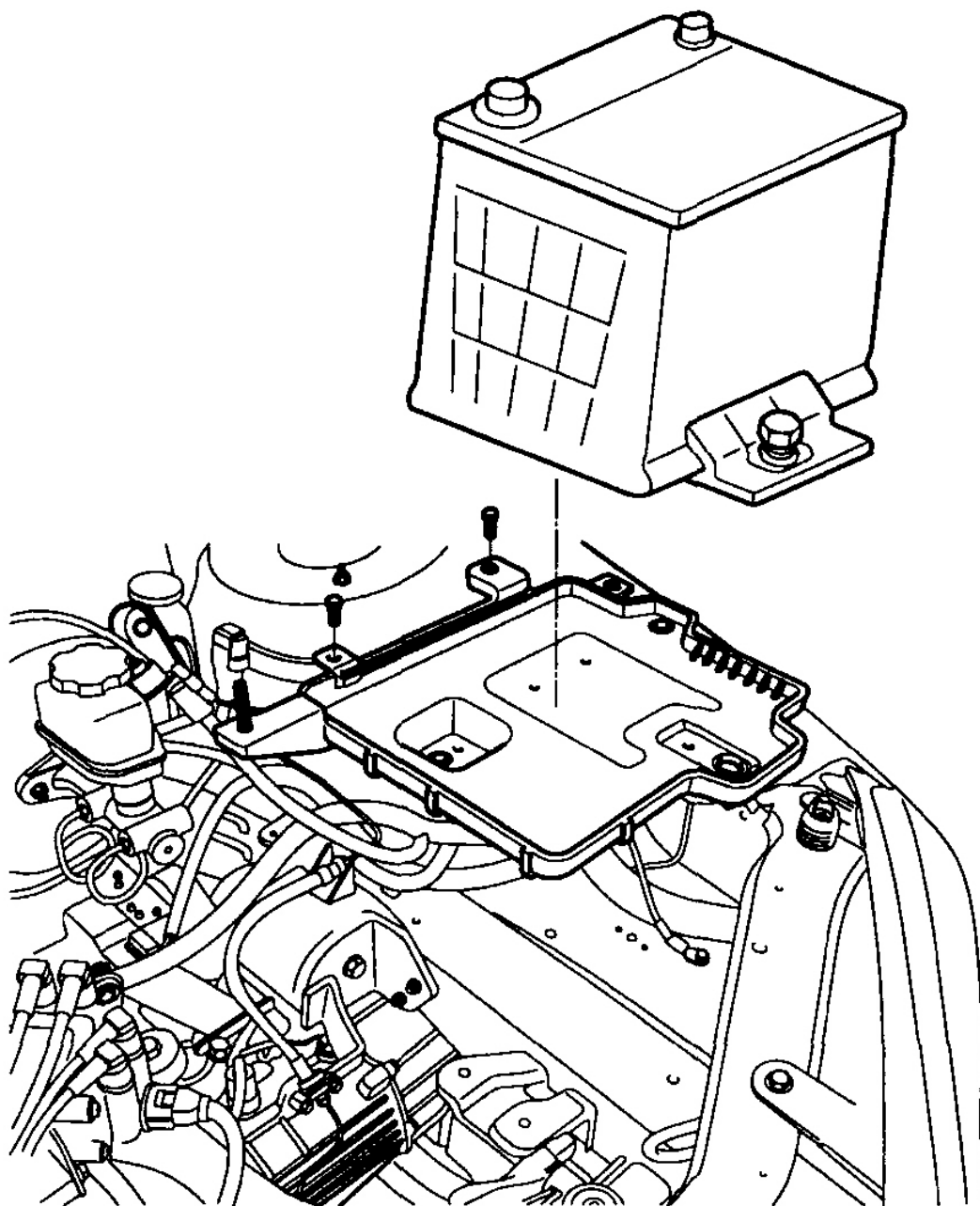
2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

	wiring	
	Faulty electric fan	Repair or replace
	Insufficient coolant	Refill coolant
Abnormally low coolant temperature	Faulty thermostat	Replace
	Faulty temperature sensor or wiring	Replace or repair
Leakage from oil cooling system	Loose connections	Replace
	Cracked or damaged; hoses, pipes or oil cooler	Replace or repair
Inoperative electrical cooling fan	Damaged : Thermo sensor, Electrical motor, Radiator fan relay, Wiring	Replace or repair
Exhaust gas leakage	Loose connections	Retighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Detached baffle plate in muffler	Replace
	Broken rubber hanger	Replace
	Pipe or muffler contacting vehicle body	Correct
	Broken pipe or muffler	Repair or replace

ENGINE AND TRANSAXLE ASSEMBLY**REMOVAL**

1. Remove the battery.



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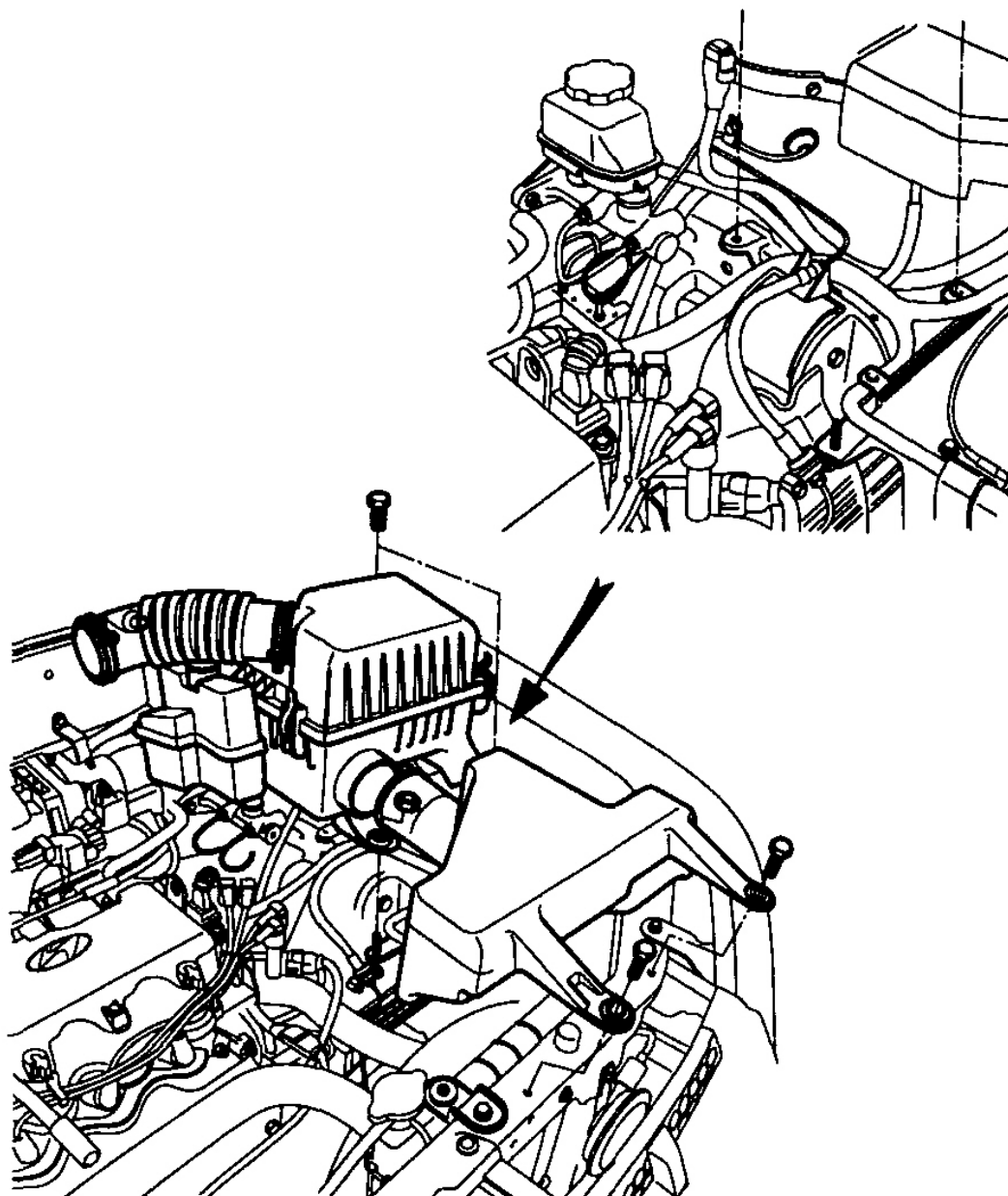
Fig. 25: Removing Battery

Courtesy of HYUNDAI MOTOR CO.

WARNING: Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct position on the engine.

CAUTION: Use fender covers to avoid damaging painted surface.

2. Detach the air cleaner.

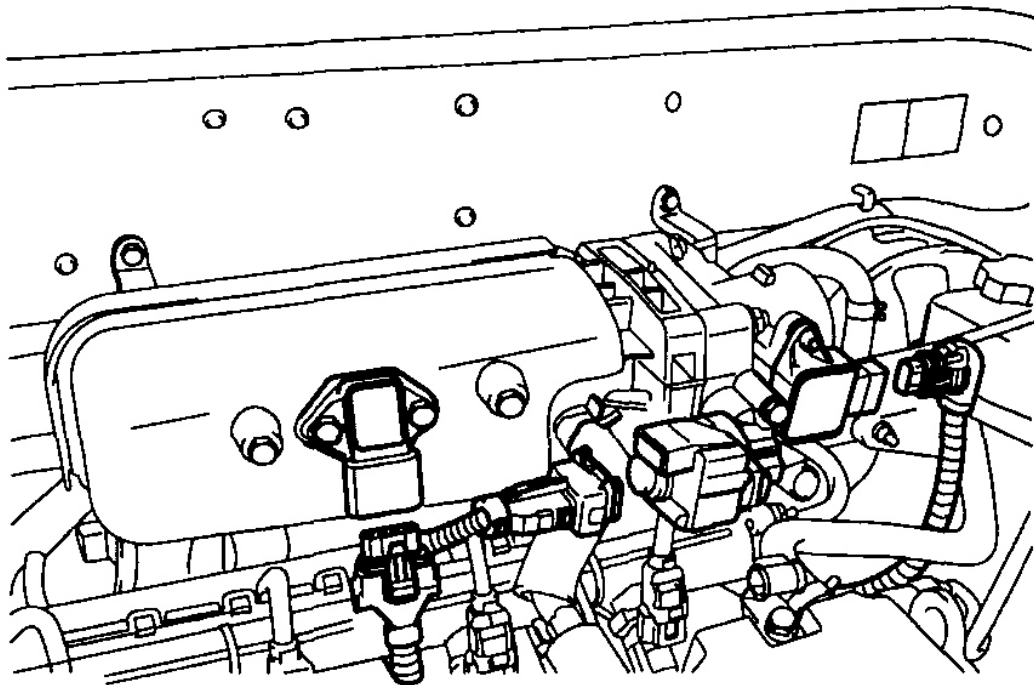


G03851270

Fig. 26: Detaching Air Cleaner

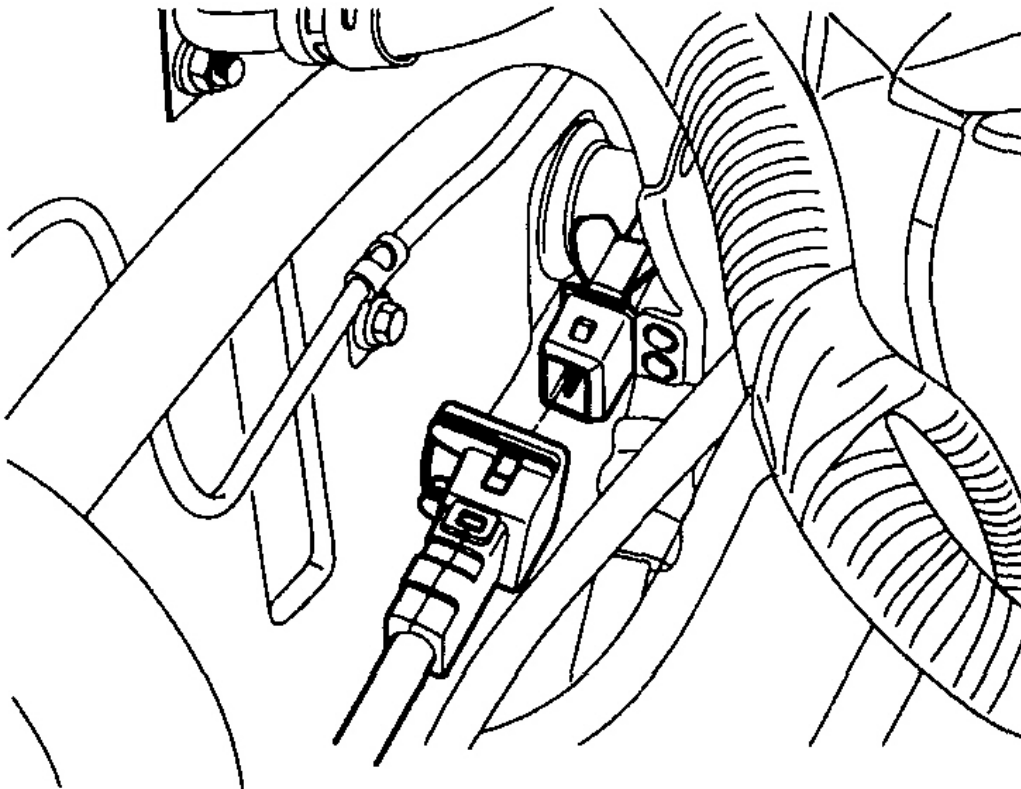
Courtesy of HYUNDAI MOTOR CO.

3. Disconnect the backup lamp and engine harness connectors.



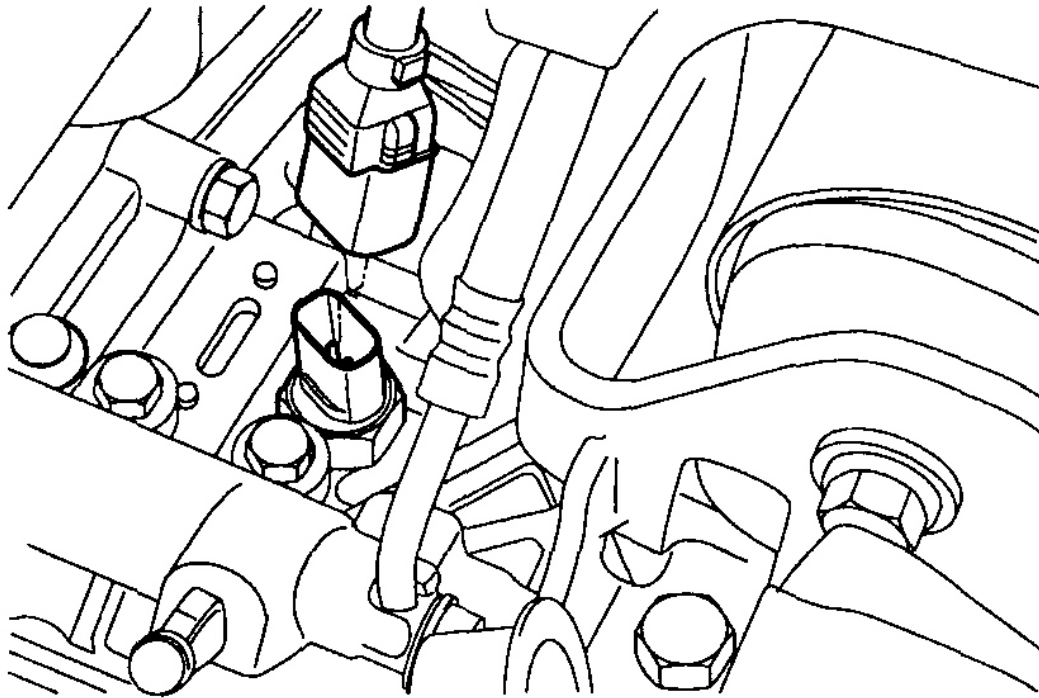
G03851271

Fig. 27: Disconnecting Backup Lamp And Engine Harness Connectors (1 Of 3)
Courtesy of HYUNDAI MOTOR CO.



G03851272

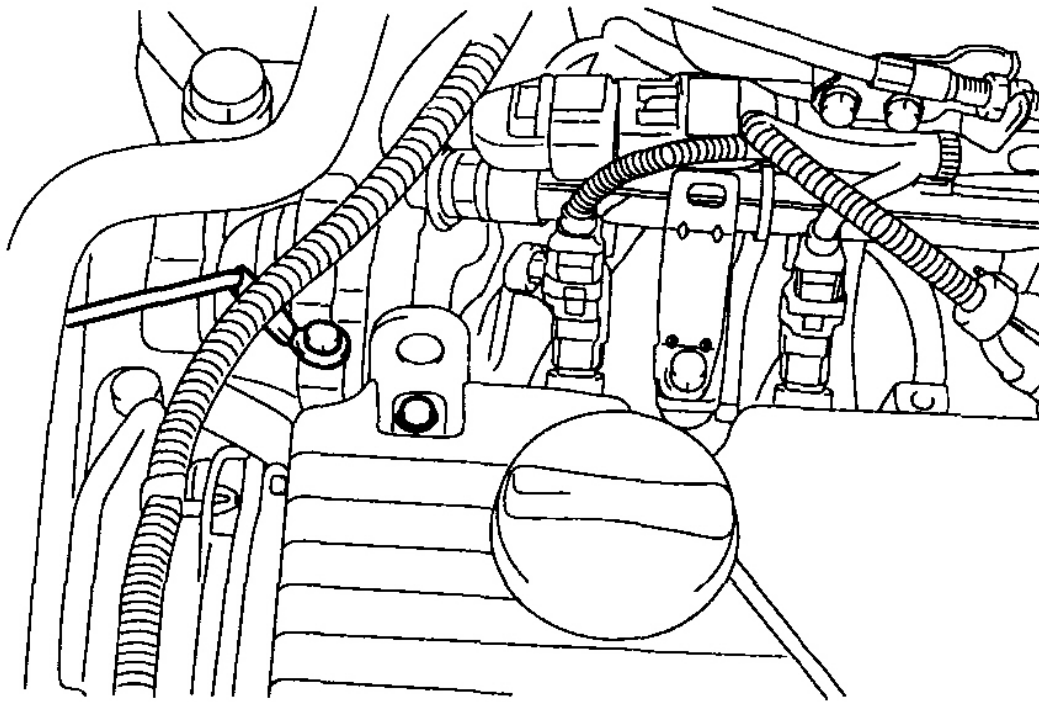
Fig. 28: Disconnecting Backup Lamp And Engine Harness Connectors (2 Of 3)
Courtesy of HYUNDAI MOTOR CO.



G03851273

Fig. 29: Disconnecting Backup Lamp And Engine Harness Connectors (3 Of 3)
Courtesy of HYUNDAI MOTOR CO.

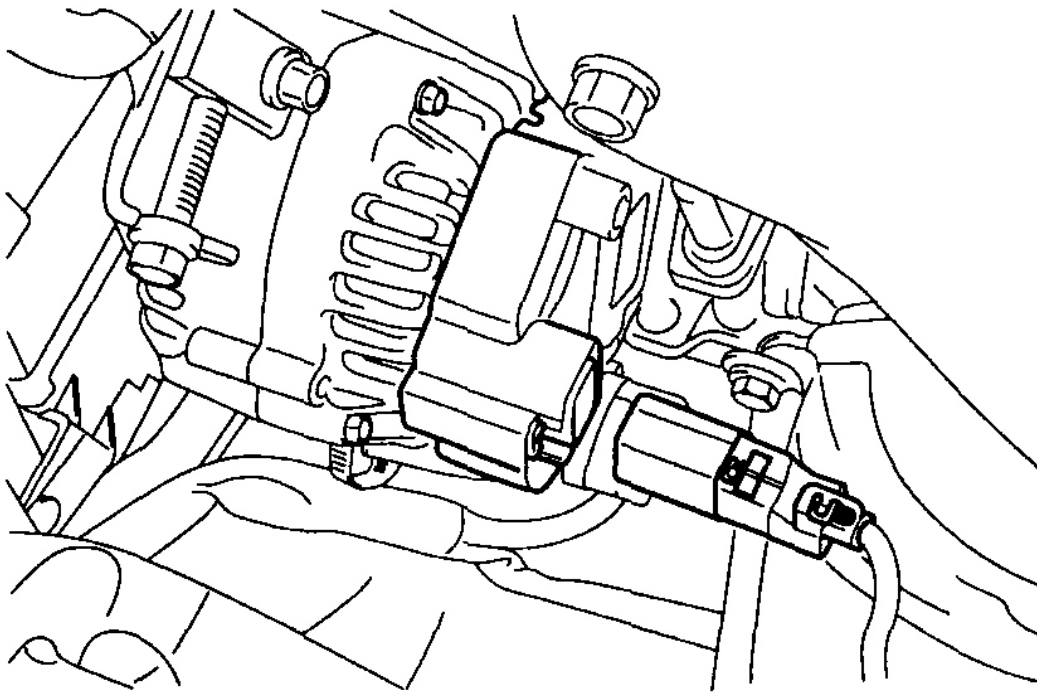
4. Disconnect the engine ground.



G03851274

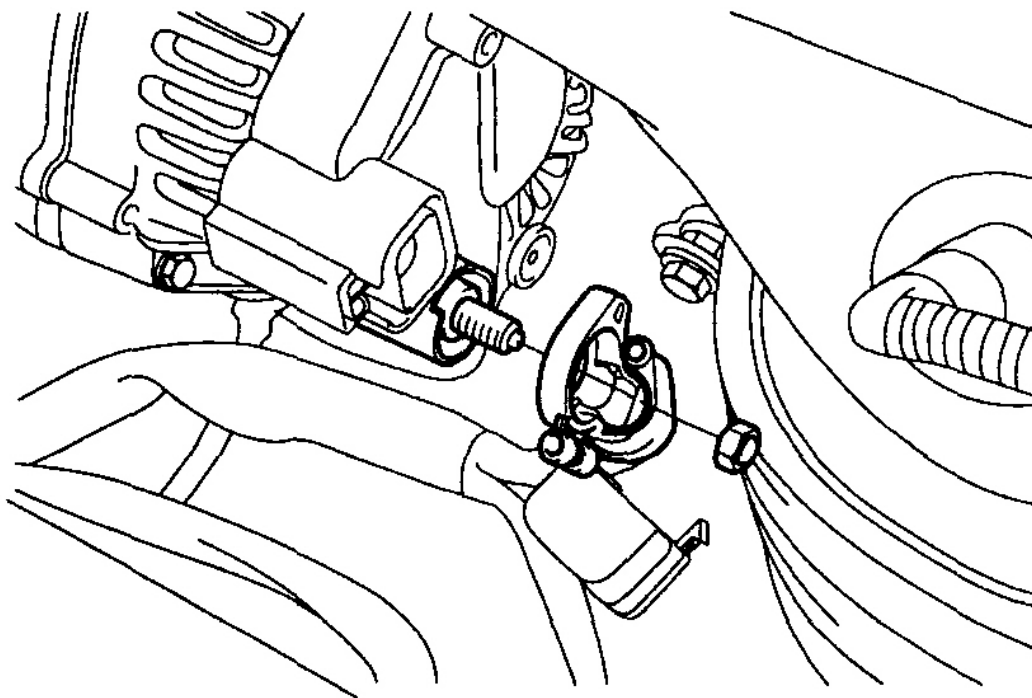
Fig. 30: Disconnecting Engine Ground
Courtesy of HYUNDAI MOTOR CO.

5. Disconnect the alternator connector.



G03851275

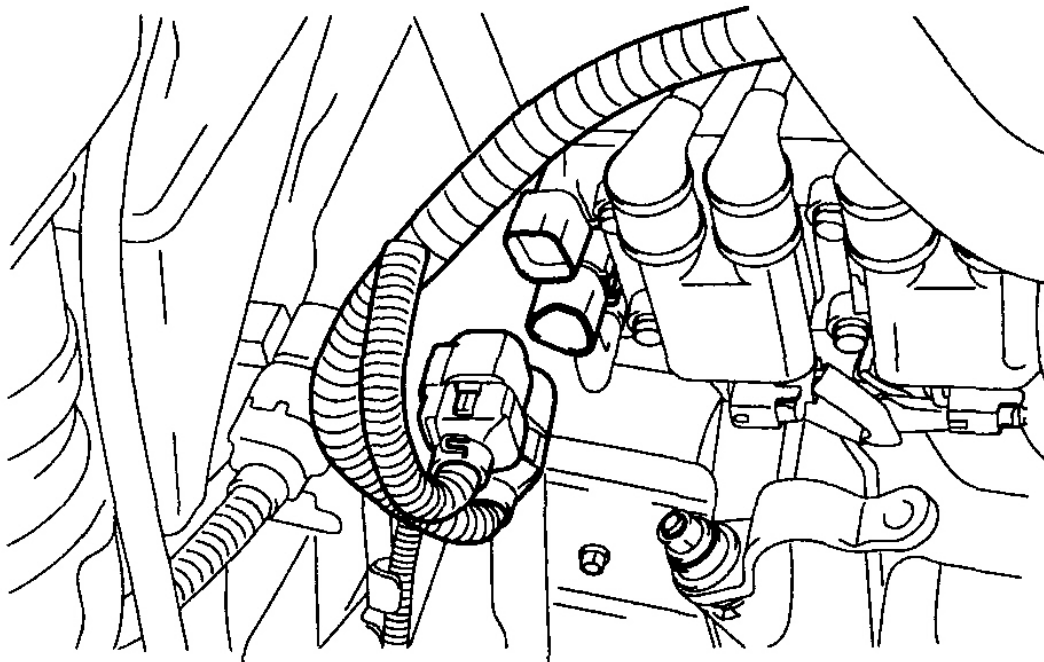
Fig. 31: Disconnecting Alternator Connector (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



G03851276

Fig. 32: Disconnecting Alternator Connector (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

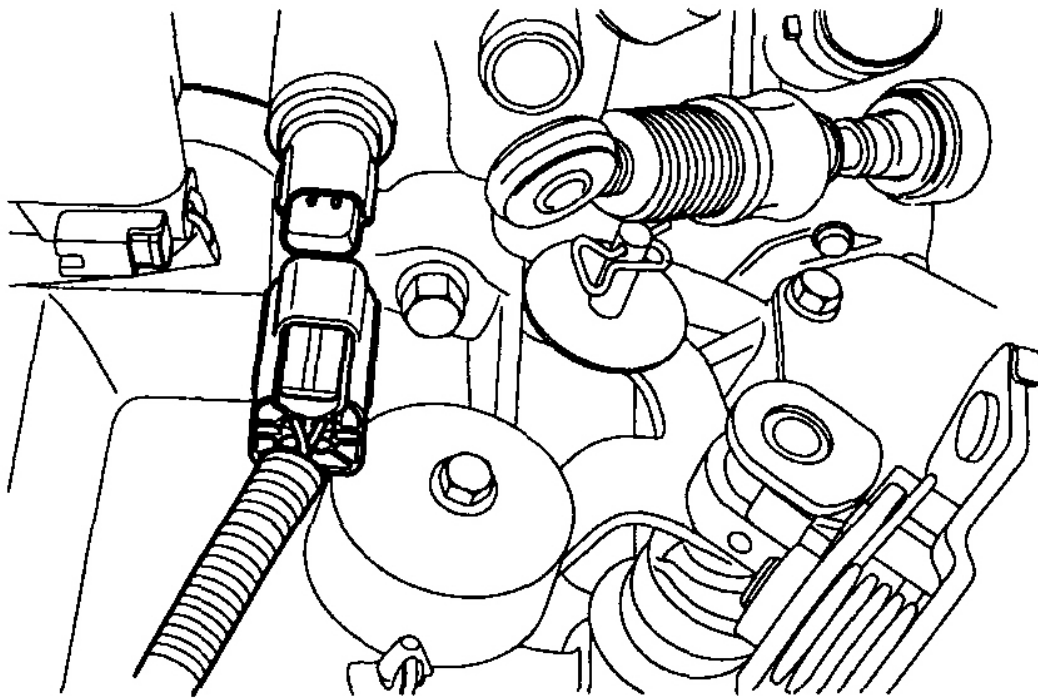
6. Disconnect the connectors for the rear Oxygen sensor harness and the ignition coil harness.



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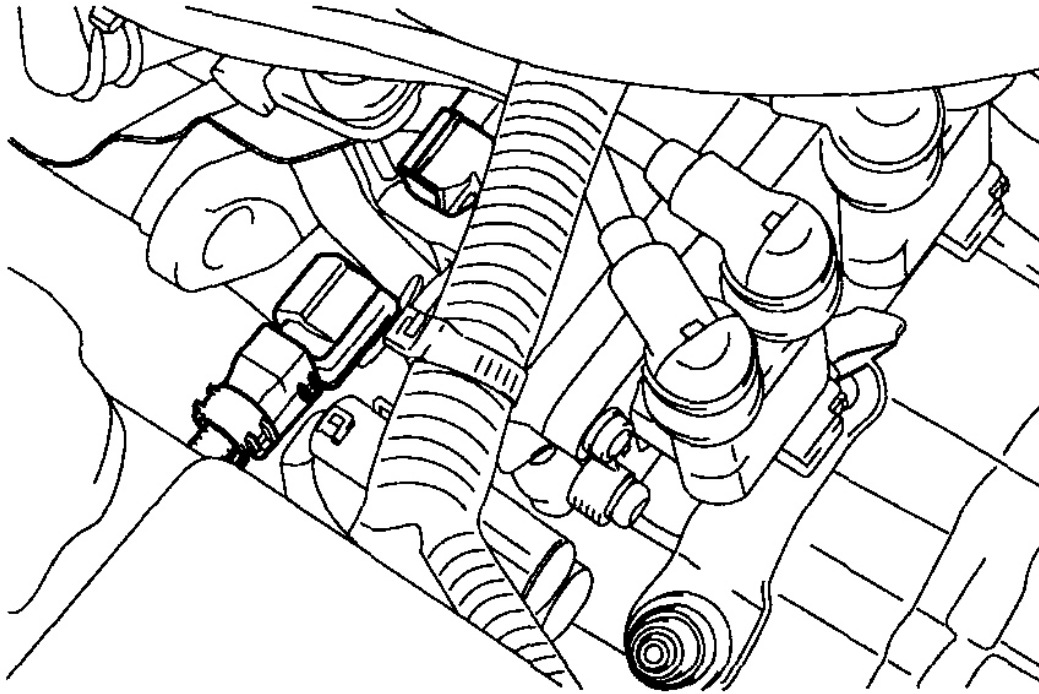
Fig. 33: Disconnecting Connectors For Rear Oxygen Sensor Harness And Ignition Coil Harness
Courtesy of HYUNDAI MOTOR CO.

7. Disconnect the coolant temperature sensor and No.1 TDC sensor connector.



G03851278

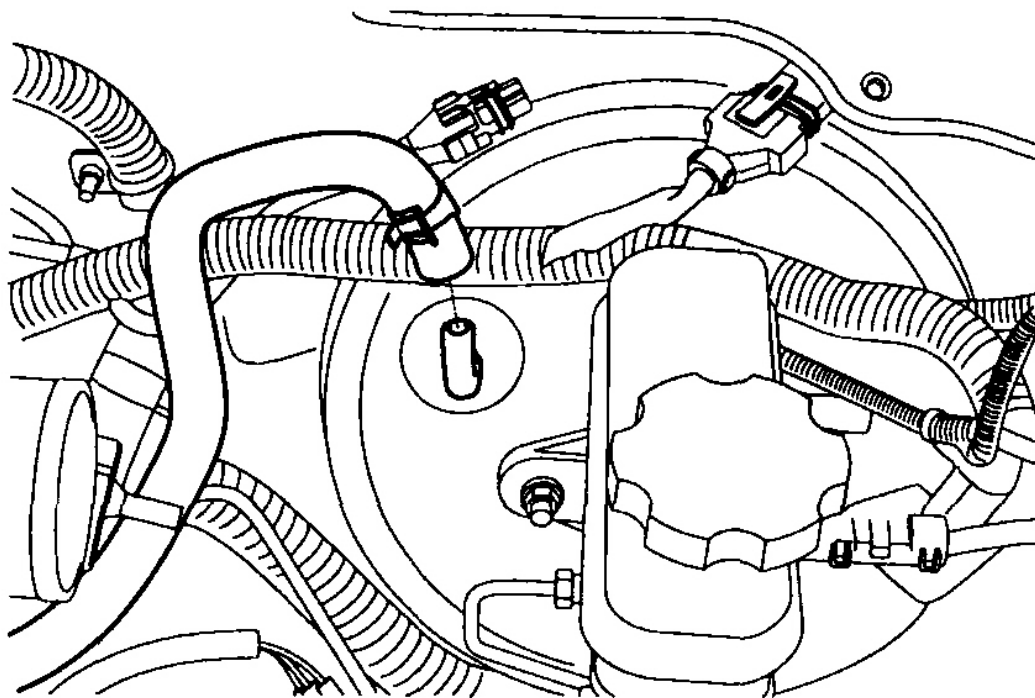
Fig. 34: Disconnecting Coolant Temperature Sensor
Courtesy of HYUNDAI MOTOR CO.



G03851279

Fig. 35: Disconnecting No.1 TDC Sensor Connector
Courtesy of HYUNDAI MOTOR CO.

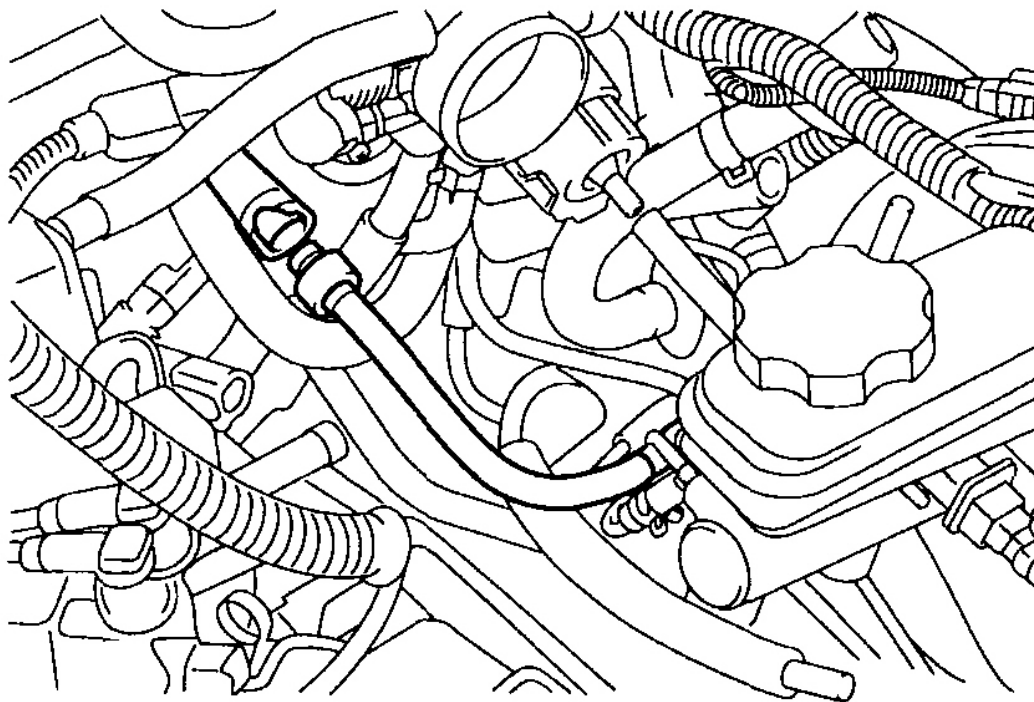
8. Disconnect the brake booster vacuum hose.



G03851280

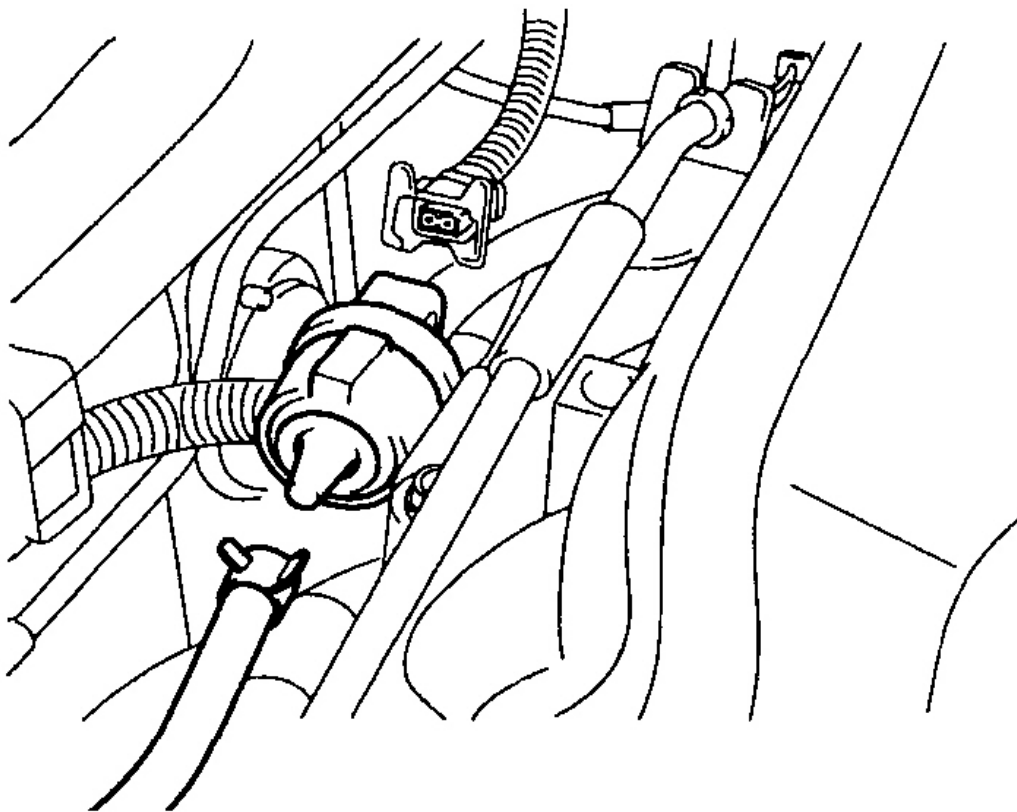
Fig. 36: Disconnecting Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

9. Remove the main fuel line and the return and vapor hoses form the engine side.



G03851281

Fig. 37: Removing Main Fuel Line, Return And Vapor Hoses From Engine Side (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.

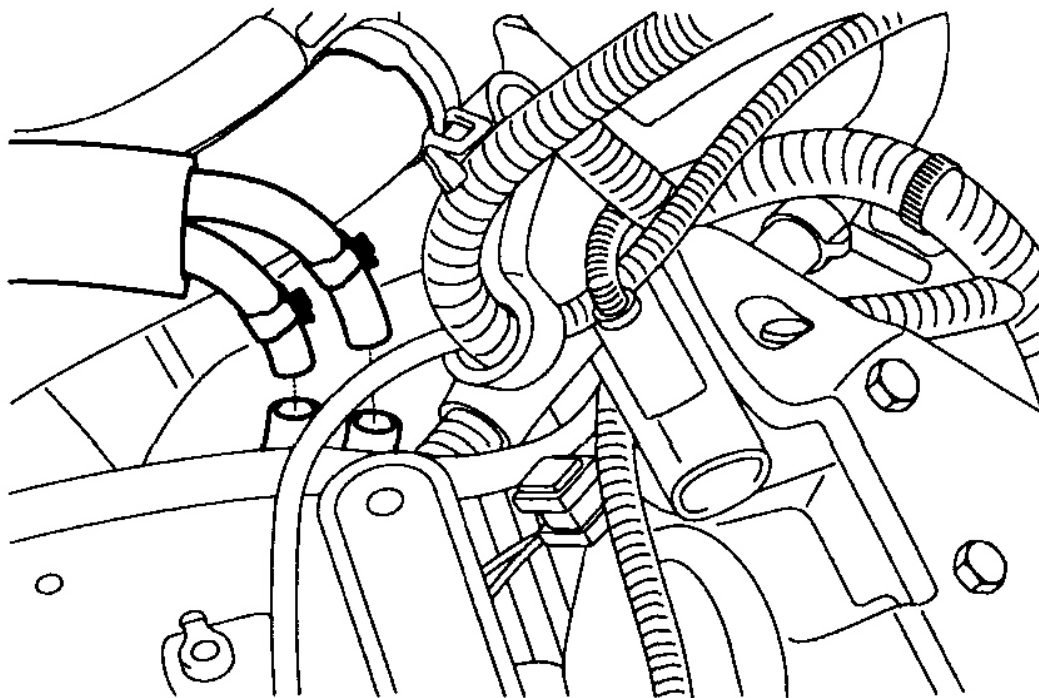


G03851282

Fig. 38: Removing Main Fuel Line, Return And Vapor Hoses From Engine Side (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

CAUTION: To reduce the residual pressure in the hoses, refer to **FUEL FILTER AND PUMP REPLACEMENT** .

10. For vehicles with automatic transaxles, disconnect transaxle oil cooler hoses.



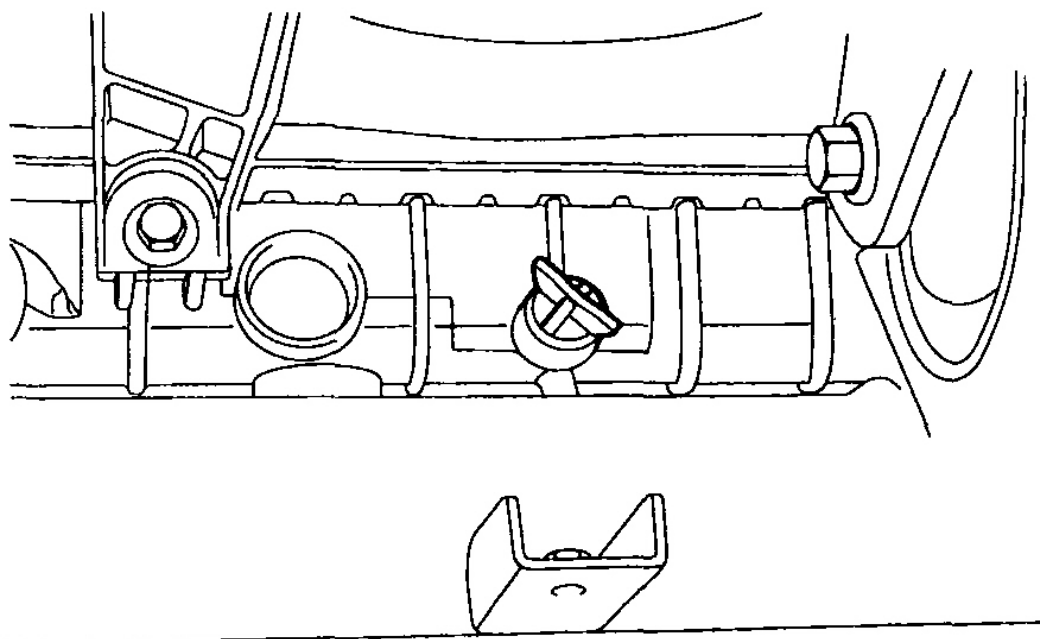
G03851283

Fig. 39: Disconnecting Transaxle Oil Cooler Hoses (Automatic Transaxes)
Courtesy of HYUNDAI MOTOR CO.

NOTE: When disconnecting the hoses, make identification marks to avoid making mistakes when reconnecting them.

CAUTION: Be careful not to spill oil or fluid from hoses, plug the openings to prevent foreign material from entering.

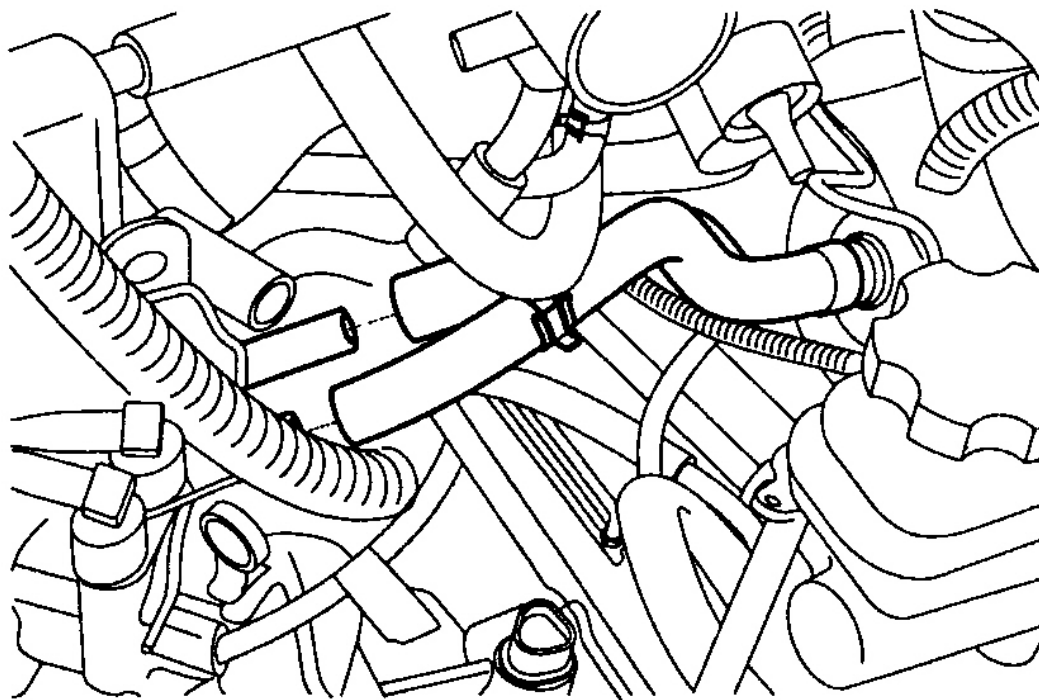
11. Drain the engine coolant from the radiator.



G03851284

Fig. 40: Identifying Engine Coolant Drain Plug
Courtesy of HYUNDAI MOTOR CO.

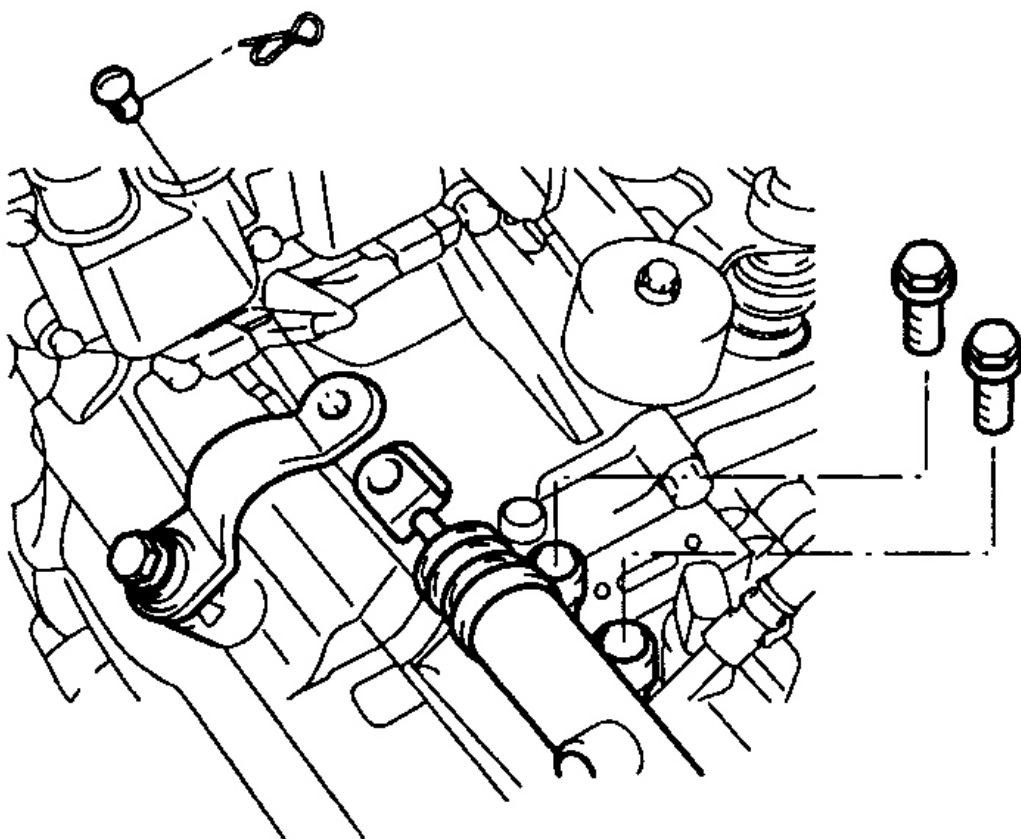
12. Disconnect the radiator upper and lower hoses on the engine side, then remove the radiator assembly.
13. Disconnect the heater hoses (inlet and outlet) on the engine side.



G03851285

Fig. 41: Disconnecting Heater Hoses (Inlet And Outlet) On Engine Side
Courtesy of HYUNDAI MOTOR CO.

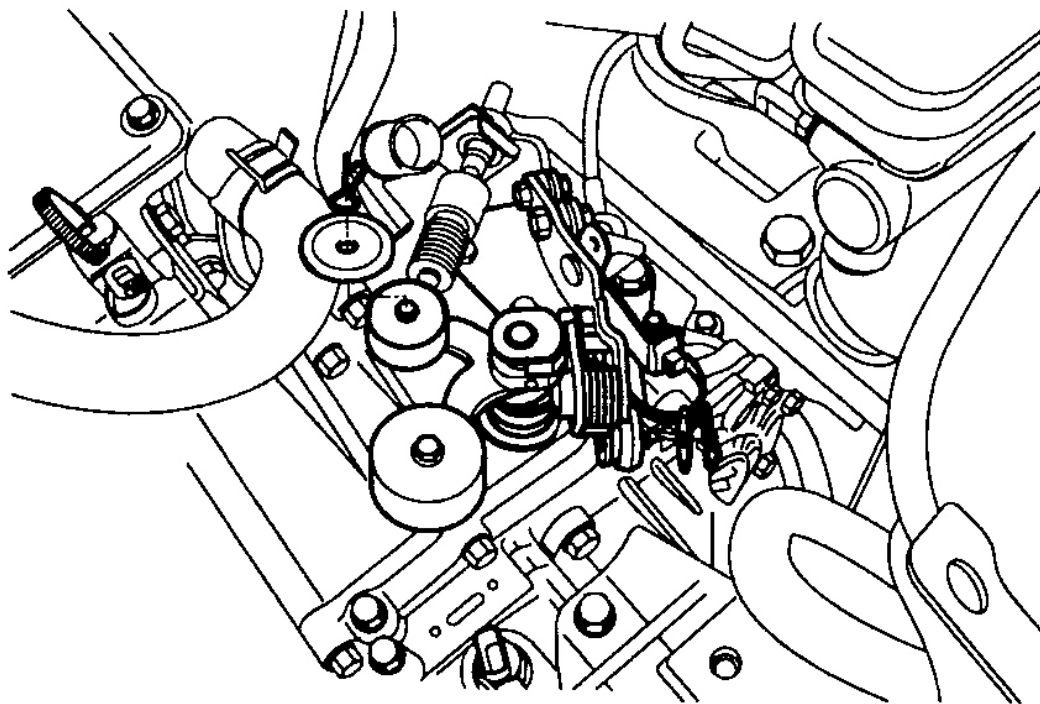
14. Disconnect the accelerator cable at the engine side.
15. For vehicles with 5-speed manual transaxles, remove the clutch release cylinder.



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Fig. 42: Removing Clutch Release Cylinder
Courtesy of HYUNDAI MOTOR CO.

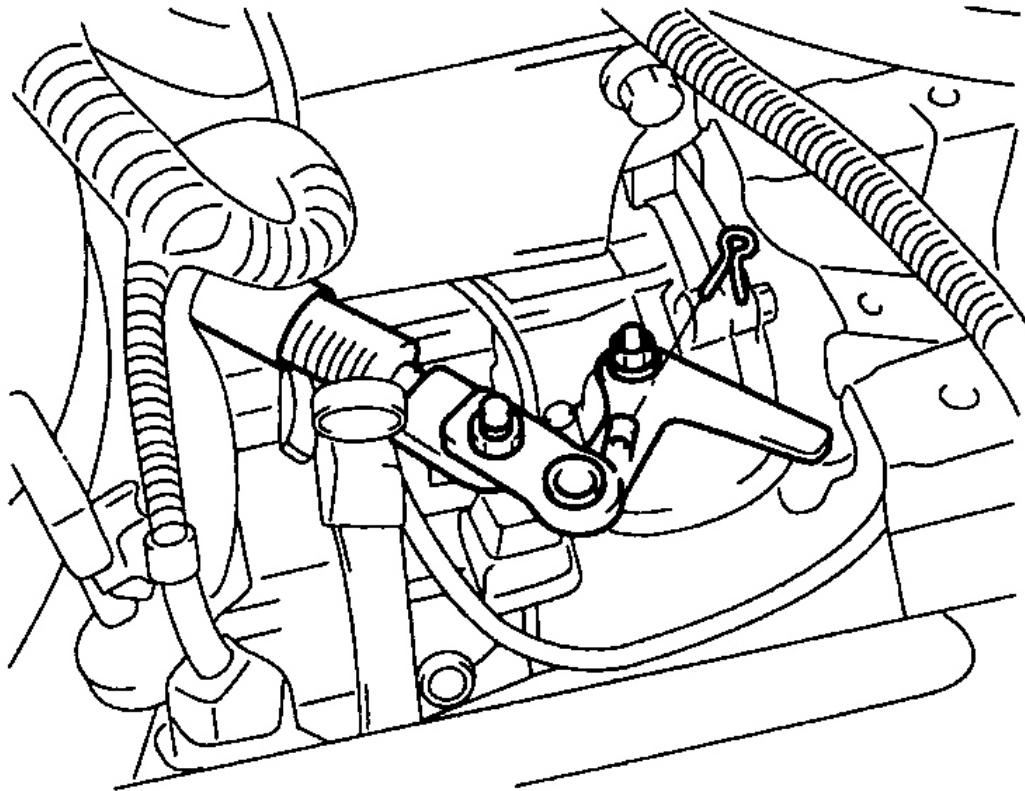
16. For vehicles with manual transaxles, remove the shift control cable from the transaxle.



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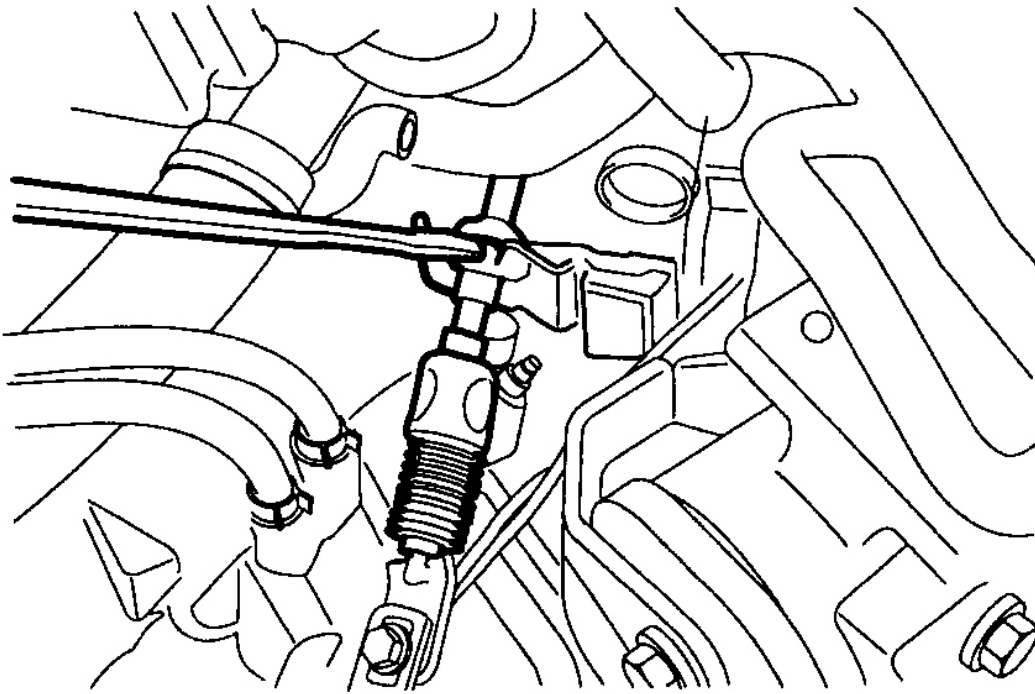
Fig. 43: Removing Shift Control Cable From Transaxle
Courtesy of HYUNDAI MOTOR CO.

17. For vehicles with automatic transaxles, remove the control cable from the transaxle.



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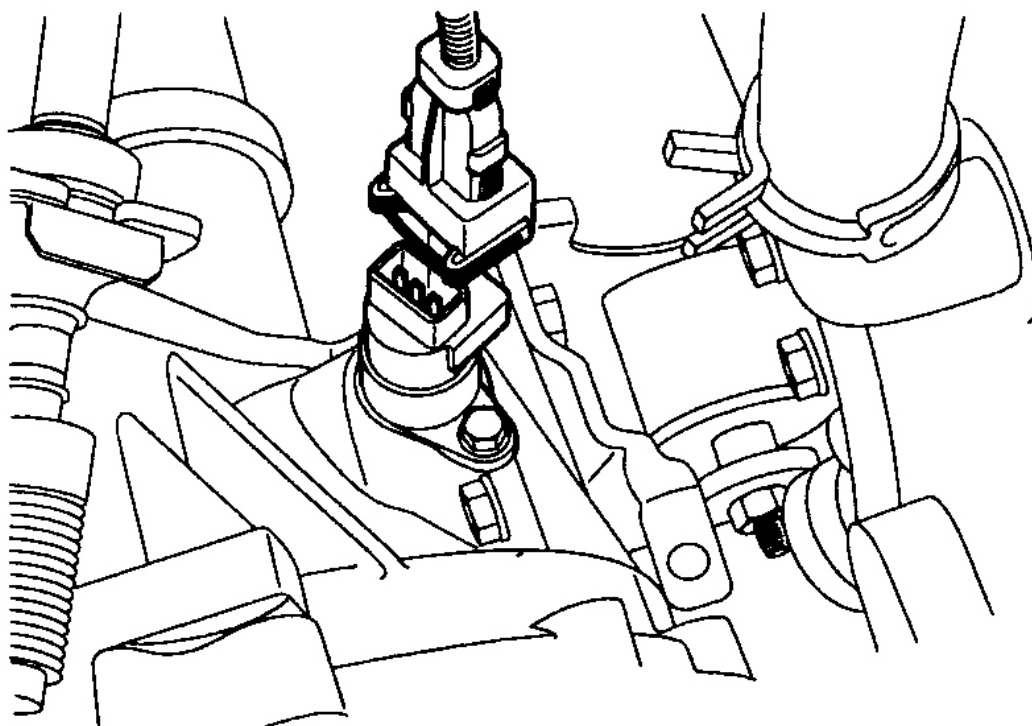
Fig. 44: Removing Control Cable From Transaxle (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



G03851289

Fig. 45: Removing Control Cable From Transaxle (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

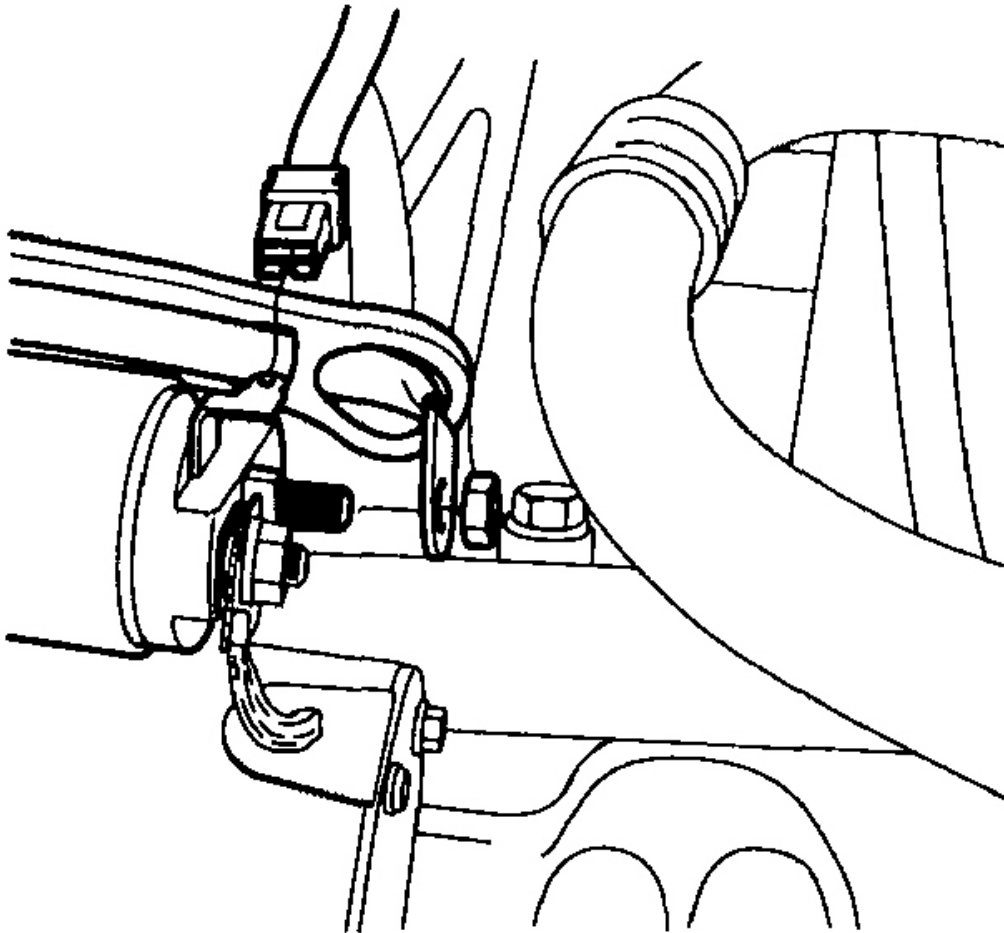
18. Disconnect the speedometer cable from the transaxle.



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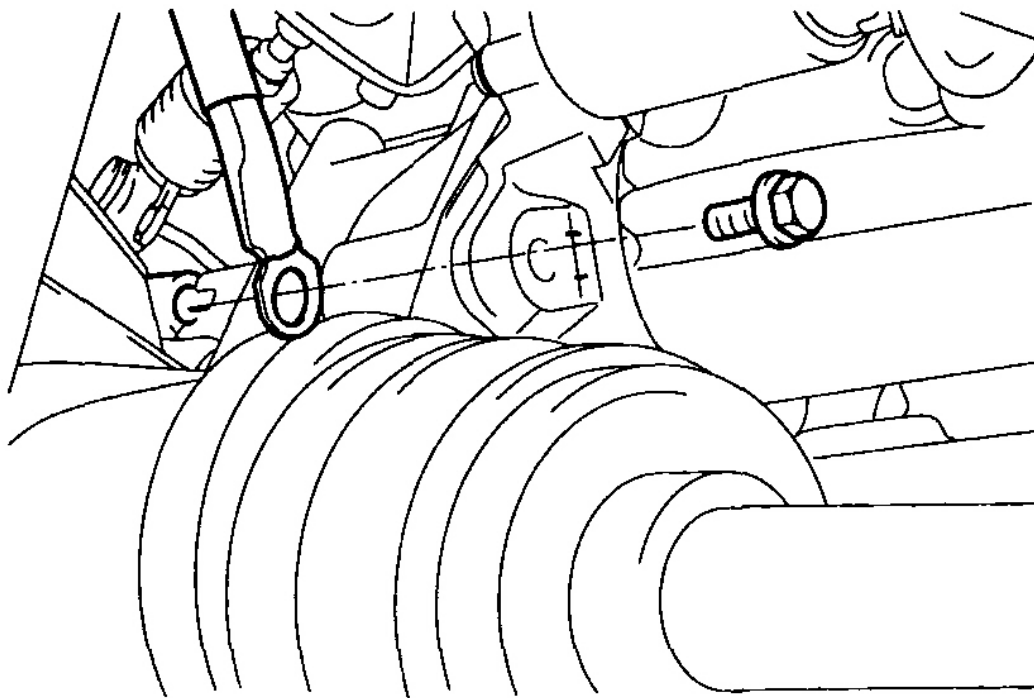
Fig. 46: Disconnecting Speedometer Cable From Transaxle
Courtesy of HYUNDAI MOTOR CO.

19. Disconnect the air conditioning compressor from the mounting bracket.
20. Disconnect the starter motor connector and ground.



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Fig. 47: Disconnecting Starter Motor Connector
Courtesy of HYUNDAI MOTOR CO.

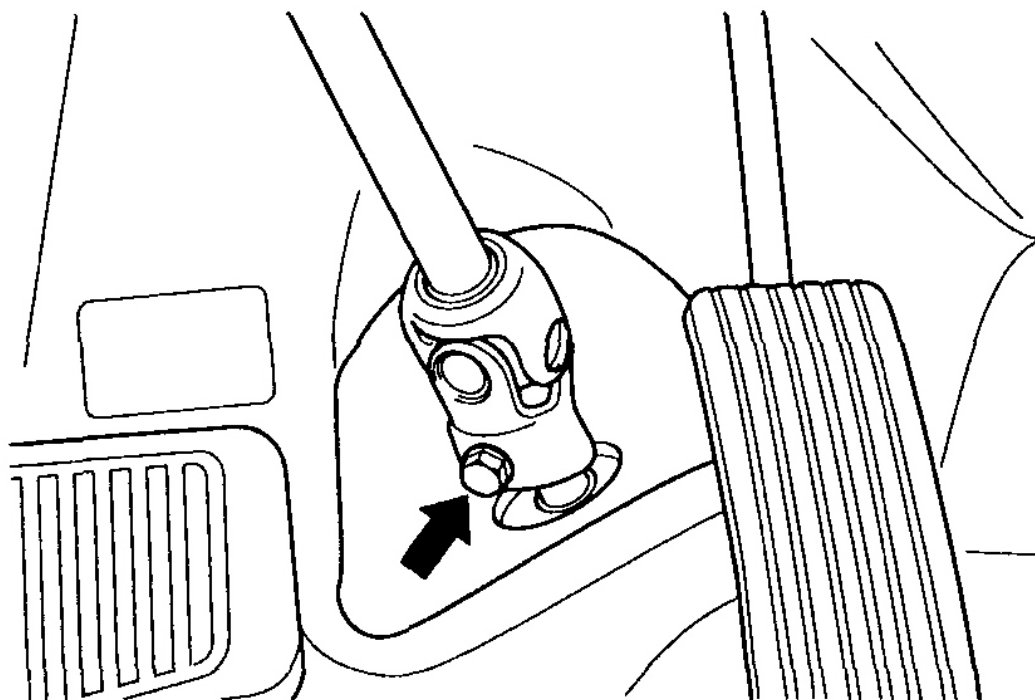


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Fig. 48: Disconnecting Starter Motor Ground
Courtesy of HYUNDAI MOTOR CO.

21. Remove the steering dust cover, the U-joint bolt and the gear box assembly.

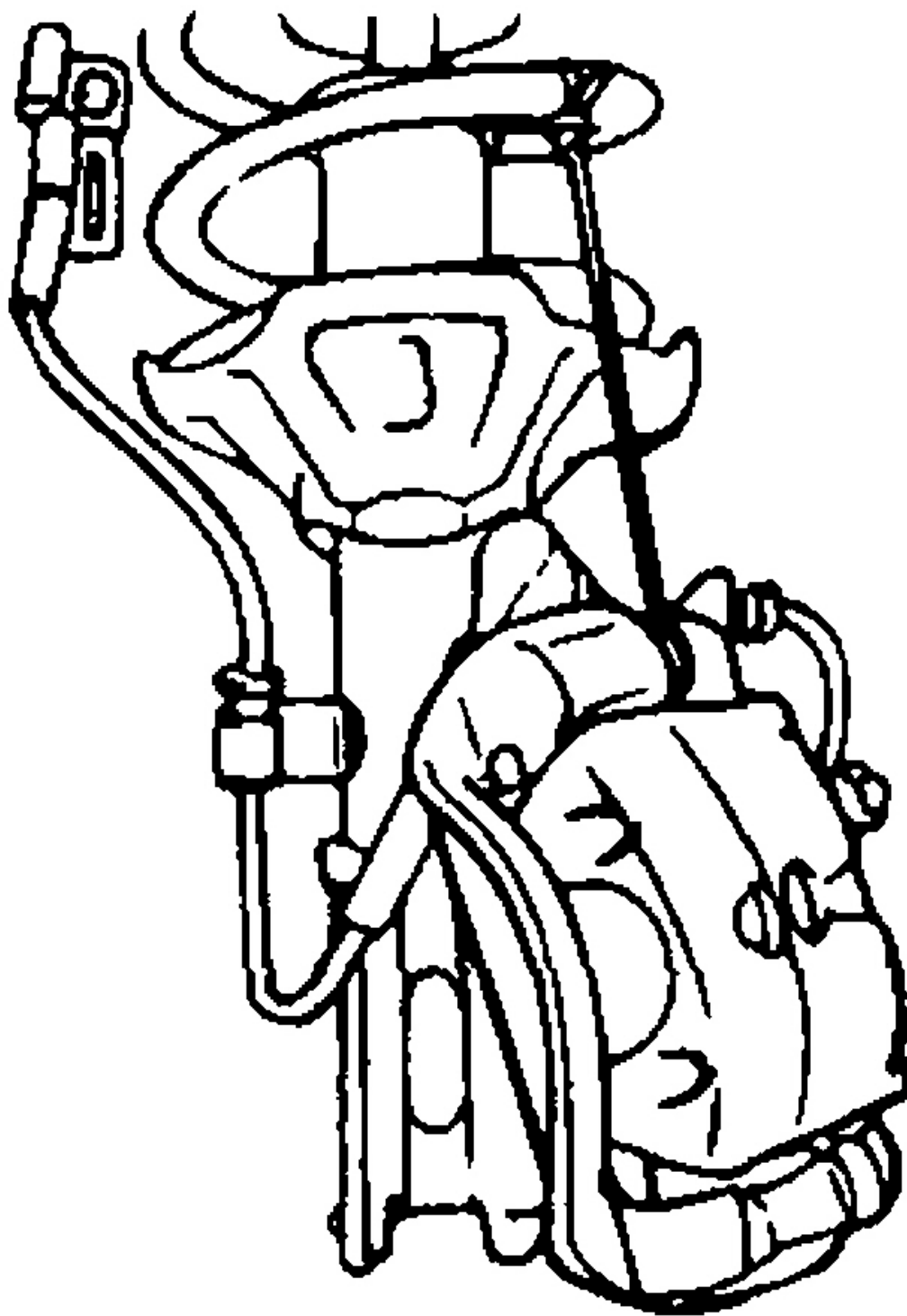
NOTE: Mark between U-joint and gear box before disassembling.



G03851293

Fig. 49: Removing Steering U-Joint Bolt
Courtesy of HYUNDAI MOTOR CO.

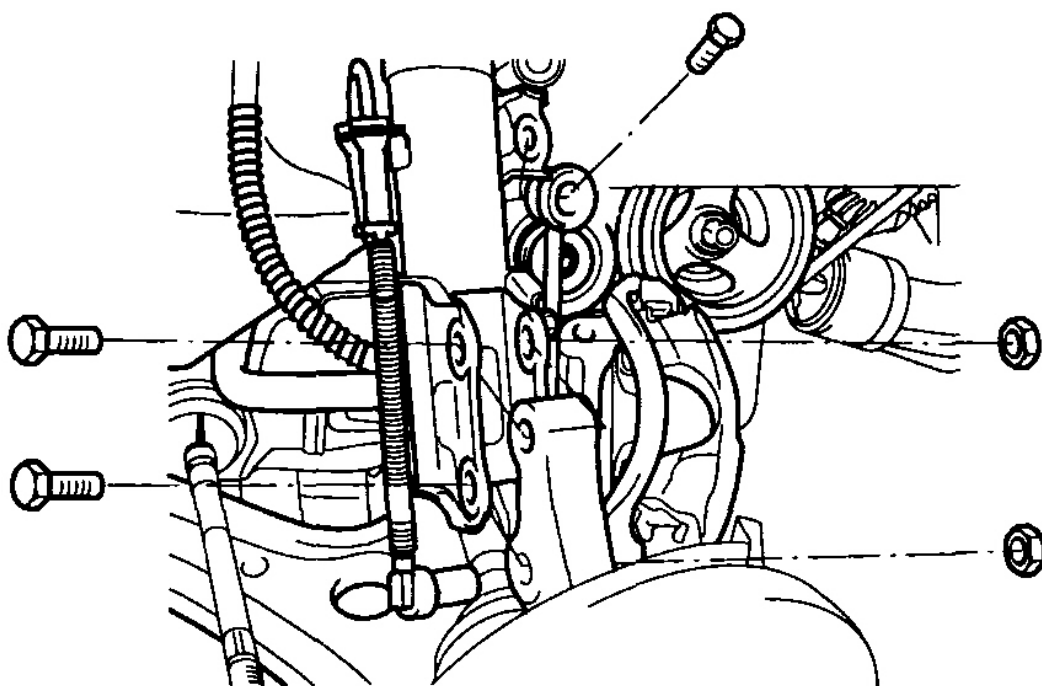
22. Jack up the vehicle and remove the front tire.
23. Remove the caliper assembly from knuckle and hold the upper side.



G03851294

Fig. 50: Removing Caliper Assembly From Knuckle And Holding Upper Side
Courtesy of HYUNDAI MOTOR CO.

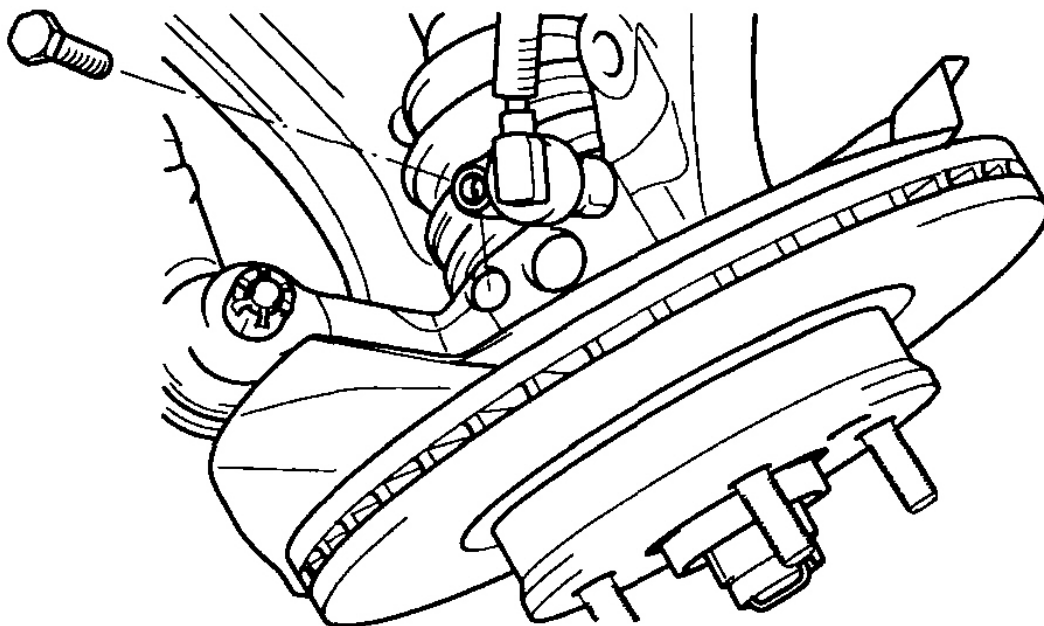
24. Loosen the strut lower bolt and separate from the knuckle.



G03851295

Fig. 51: Loosening Strut Lower Bolt And Separating From The Knuckle
Courtesy of HYUNDAI MOTOR CO.

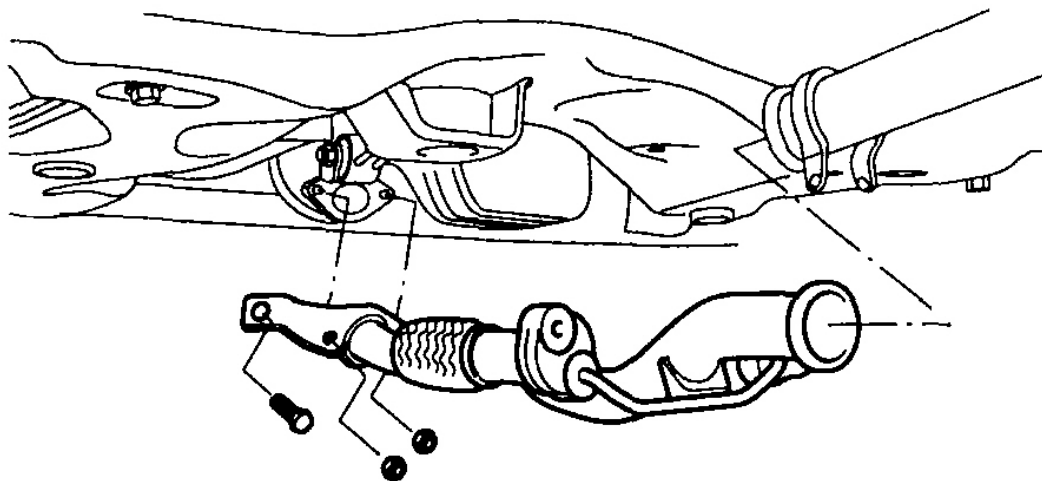
25. Remove the wheel speed sensor from the knuckle, (with ABS)



G03851296

Fig. 52: Removing Wheel Speed Sensor From Knuckle, (With ABS)
Courtesy of HYUNDAI MOTOR CO.

26. Disconnect the front exhaust pipe from the manifold.



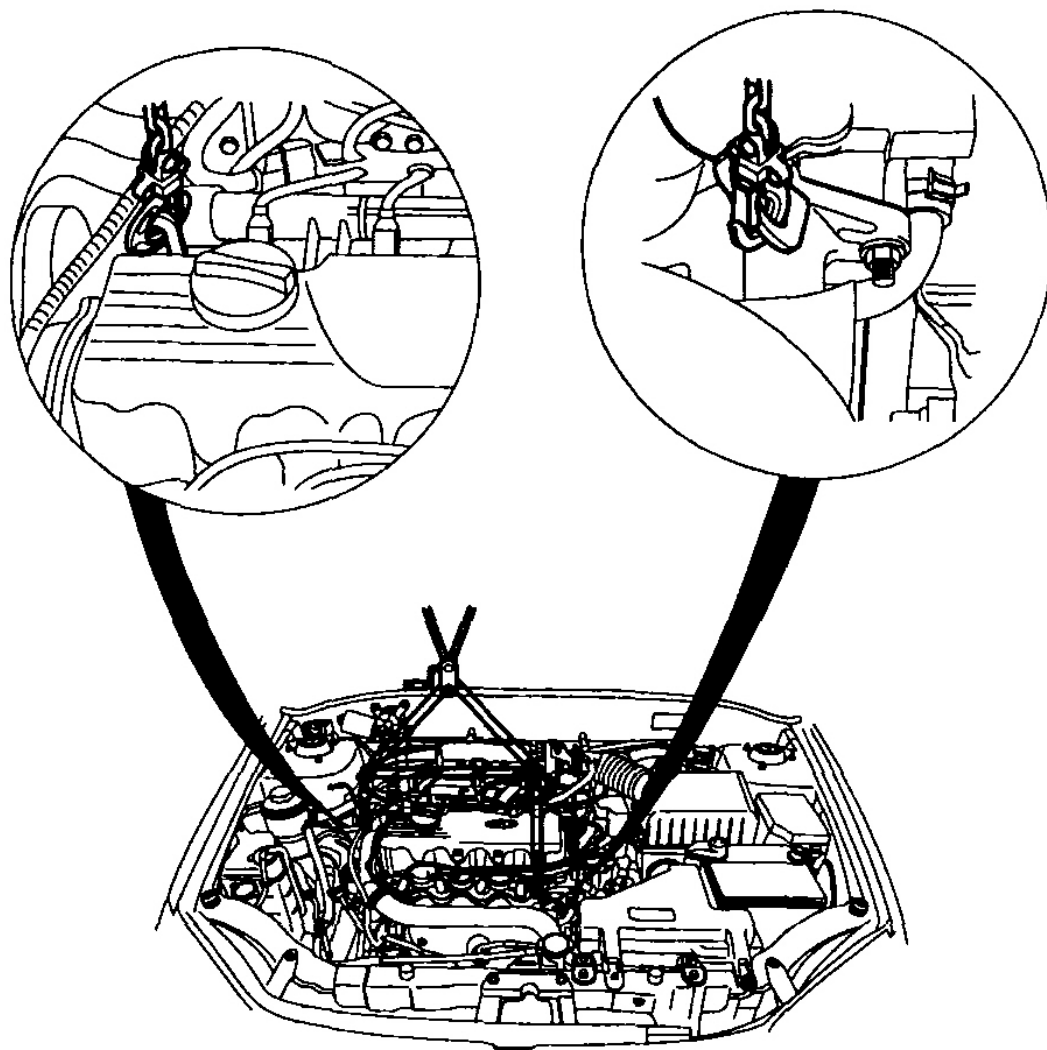
G03851297

Fig. 53: Disconnecting Front Exhaust Pipe From Manifold
Courtesy of HYUNDAI MOTOR CO.

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

27. Attach chains or cables to the engine.

Use an engine hoist or a chain hoist to slightly raise the engine (enough to support the engine's weight while containing with the following steps.)



G03851298

Fig. 54: Attaching Chains Or Cables To Engine
Courtesy of HYUNDAI MOTOR CO.

28. Remove the engine mounting bracket from the engine.

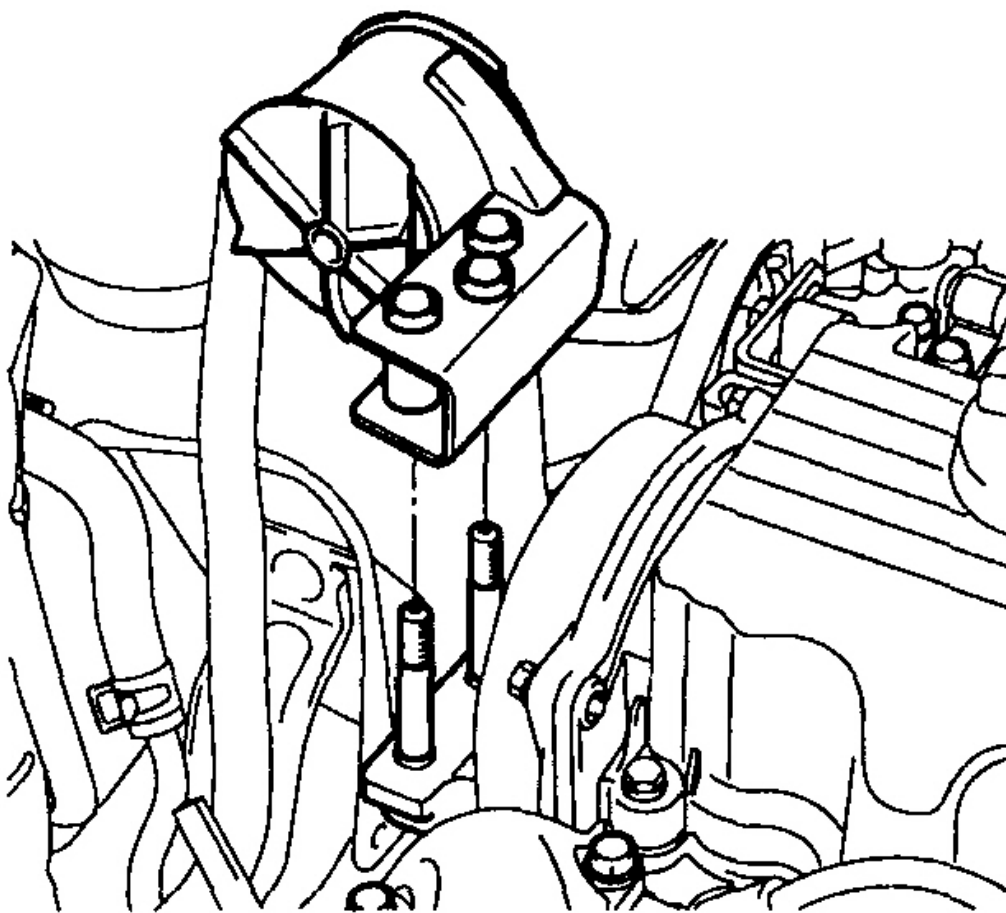
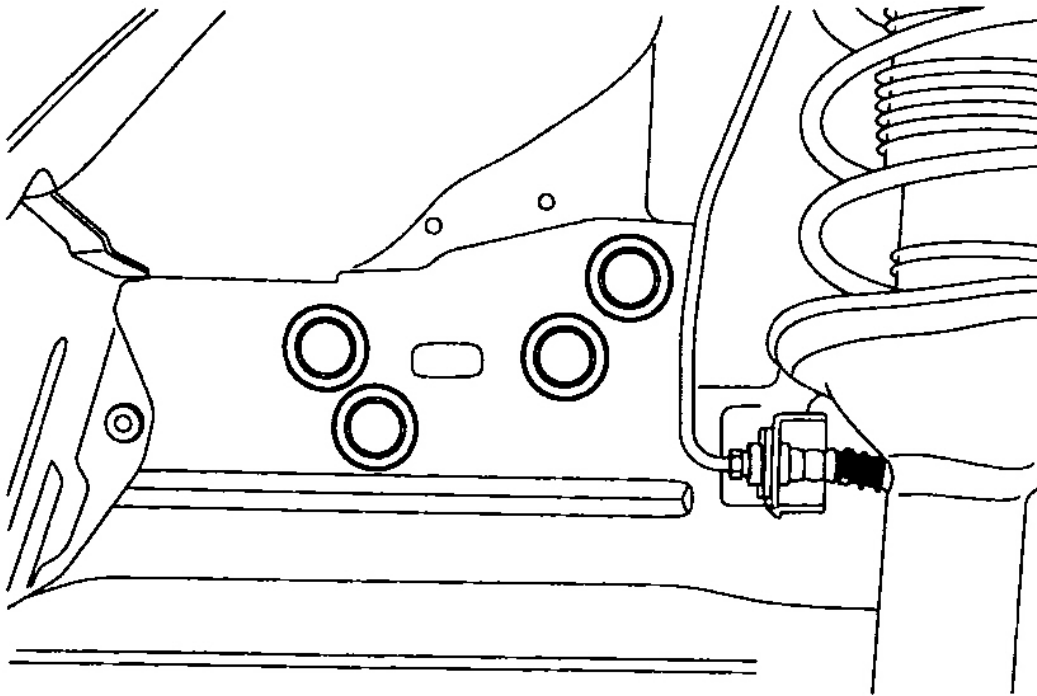
**G03851299**

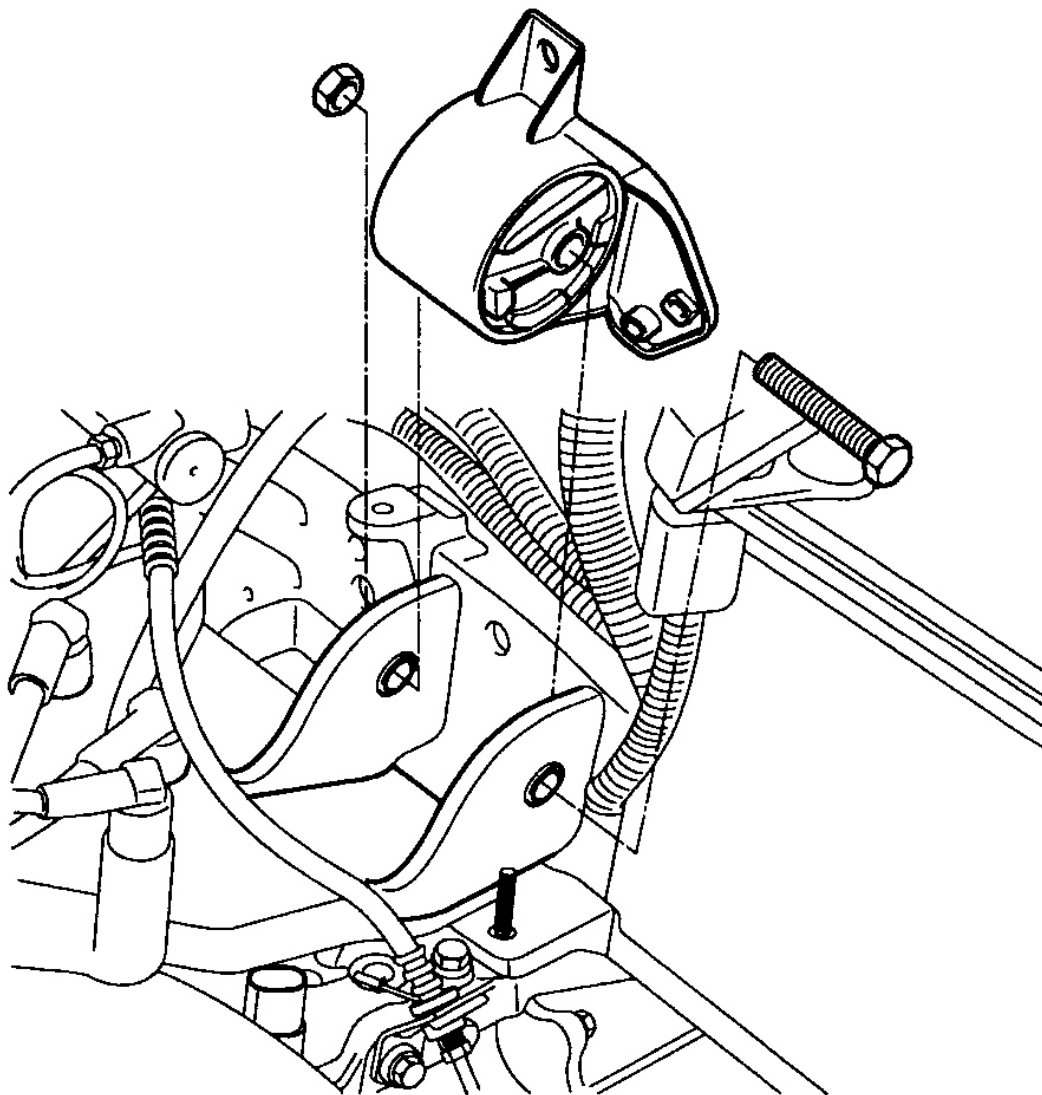
Fig. 55: Removing Engine Mounting Bracket From Engine
Courtesy of HYUNDAI MOTOR CO.

29. Slowly raise the engine (to the extent that the weight of the engine and transmission assembly is not applied to the mounting portions) and temporarily hold it in the raised position.
30. Remove the caps from the inside of the right fender shield and remove the transaxle mount bracket bolts.



G03851300

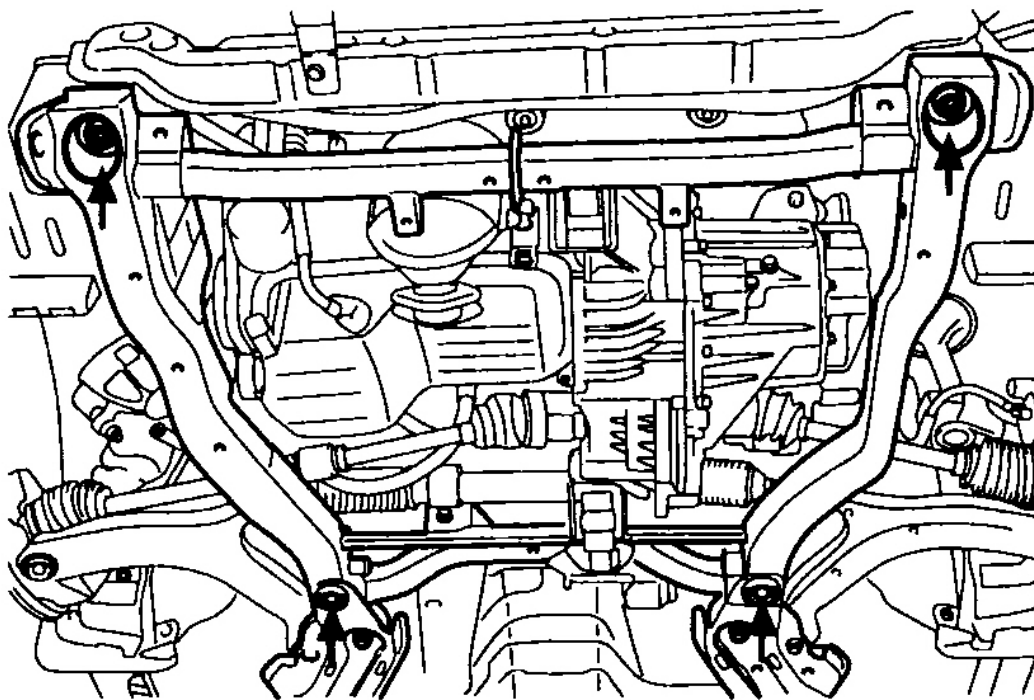
Fig. 56: Removing Caps From Inside Of Right Fender Shield
Courtesy of HYUNDAI MOTOR CO.



G03851301

Fig. 57: Removing Transaxle Mount Bracket Bolts
Courtesy of HYUNDAI MOTOR CO.

31. Remove the cross member fixing bolts and nuts.



G03851302

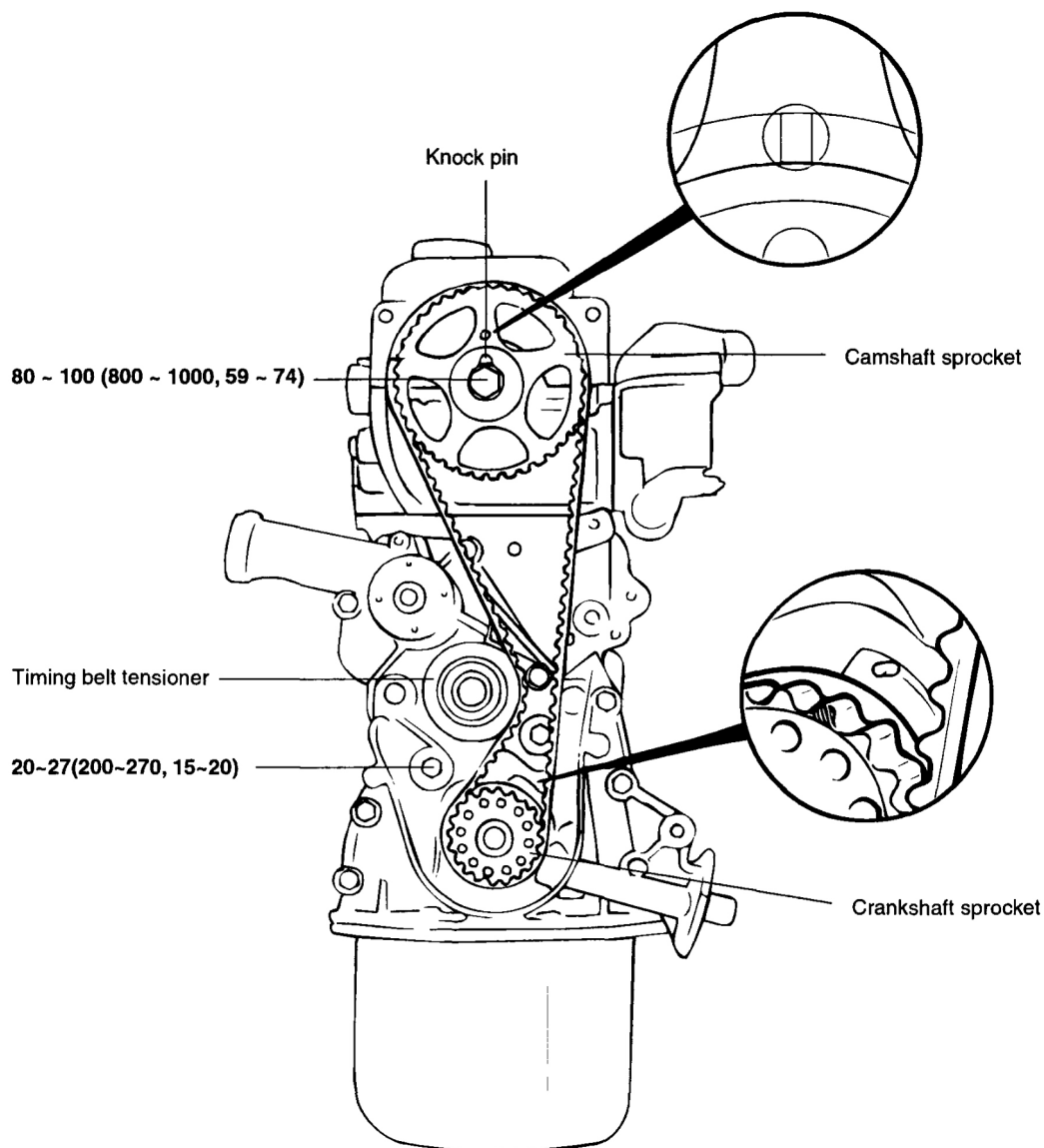
Fig. 58: Removing Cross Member Fixing Bolts And Nuts
Courtesy of HYUNDAI MOTOR CO.

32. While directing the transmission side downward, lift the engine and transmission assembly down and out of the vehicles.

TIMING SYSTEM

TIMING BELT

COMPONENTS



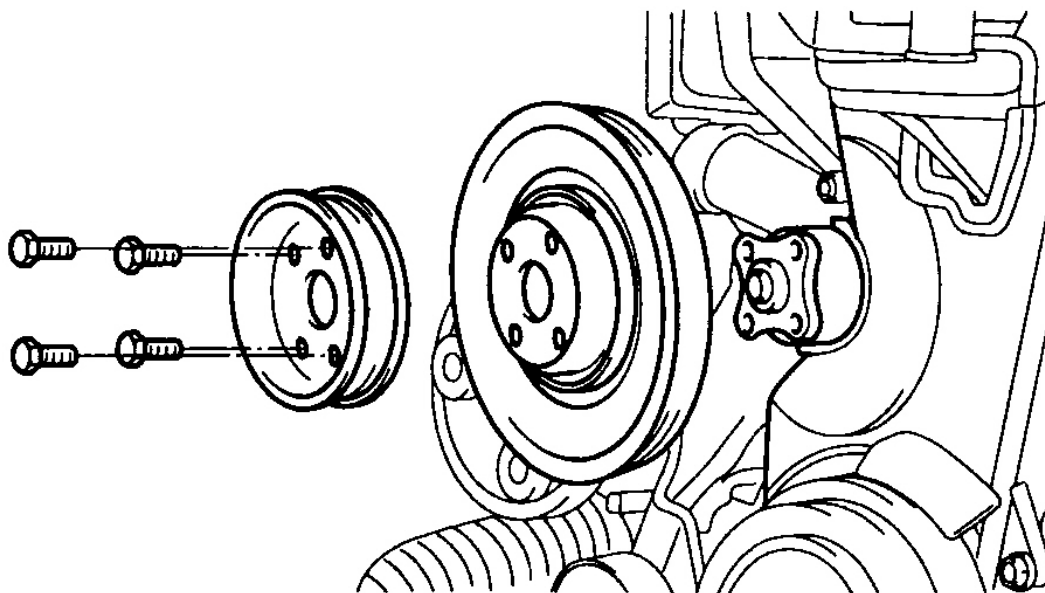
TORQUE : Nm (kg.cm, lb.ft)

G03851303

Fig. 59: Identifying Timing Belt Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

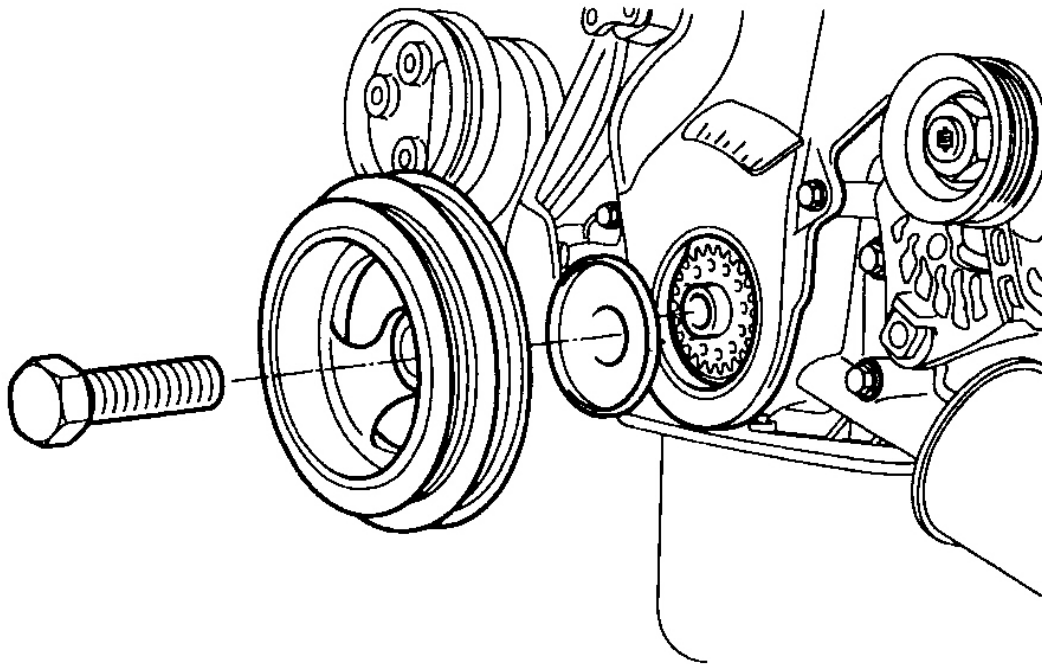
1. Loosen the coolant pump pulley bolts.



G03851304

Fig. 60: Removing Coolant Pump Pulley Bolts
Courtesy of HYUNDAI MOTOR CO.

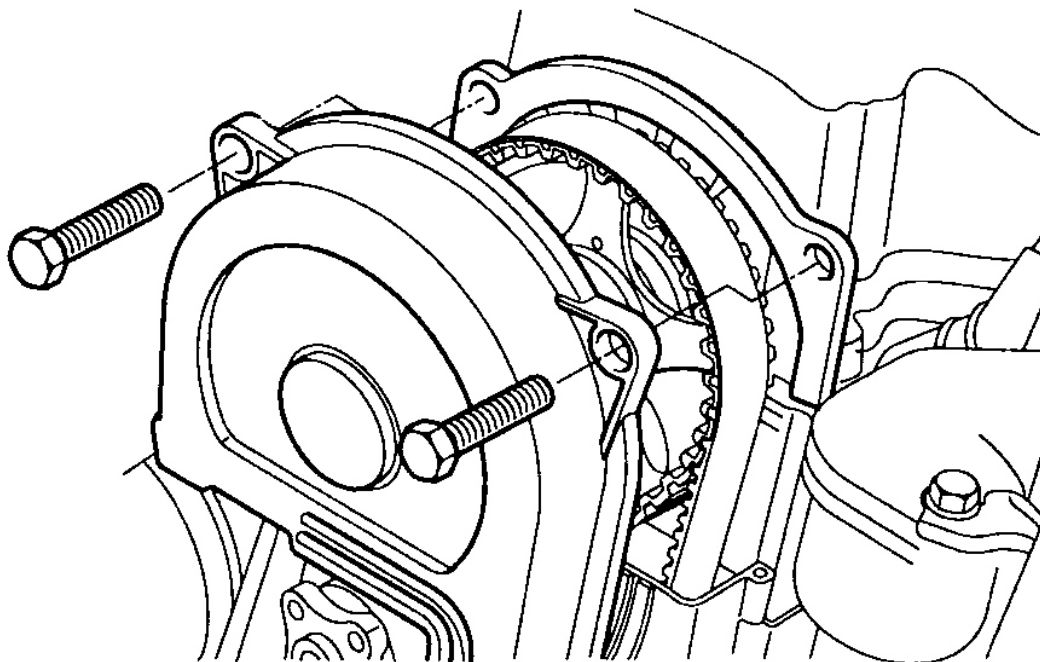
2. Loosen the alternator bolt.
3. Remove the coolant pump pulley and belt.
4. Remove the crankshaft pulley.



G03851305

Fig. 61: Removing Crankshaft Pulley
Courtesy of HYUNDAI MOTOR CO.

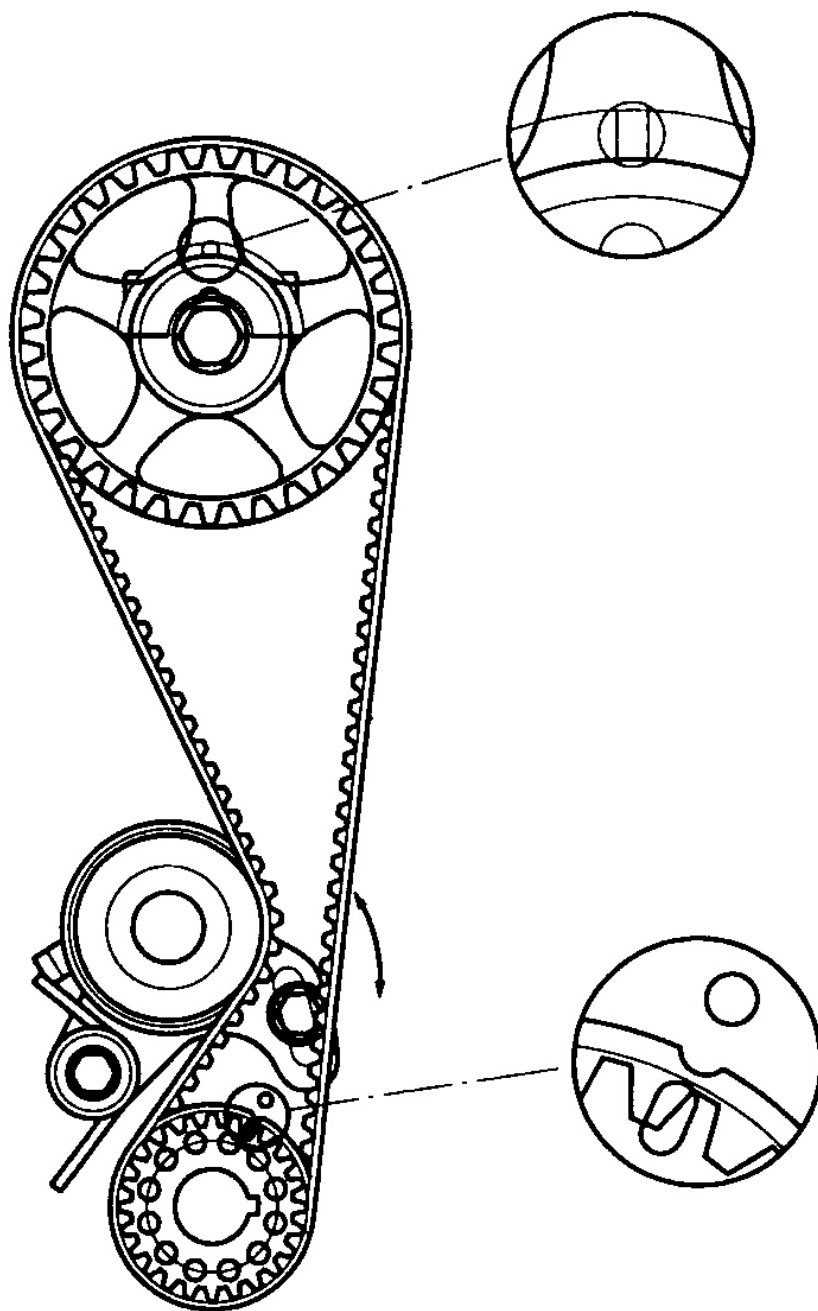
5. Remove the timing belt cover.



G03851306

Fig. 62: Removing Timing Belt Cover
Courtesy of HYUNDAI MOTOR CO.

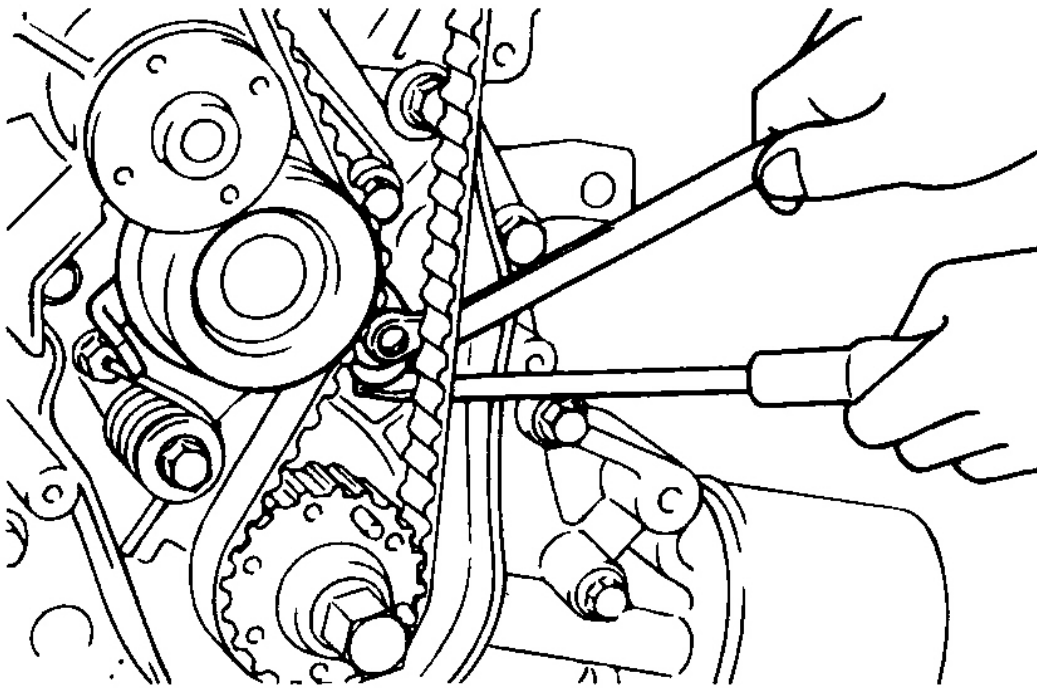
6. Align the timing marks of the camshaft sprocket and crankshaft sprocket, with the No.1 piston placed at top dead center on its compression stroke.



G03851307

Fig. 63: Identifying Cylinder Number 1 Is At Top Dead Center Of Its Compression Stroke
Courtesy of HYUNDAI MOTOR CO.

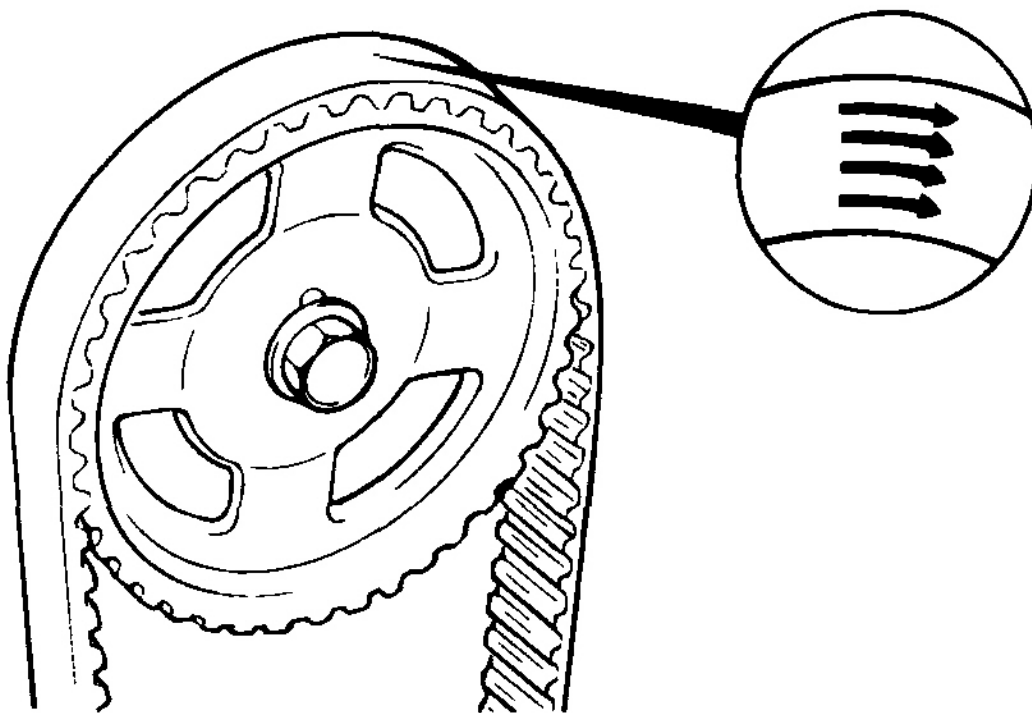
7. Move the timing belt tensioner pulley toward the coolant pump and temporarily secure it.



G03851308

Fig. 64: Moving Timing Belt Tensioner Pulley Toward The Coolant Pump
Courtesy of HYUNDAI MOTOR CO.

8. Remove the timing belt.



G03851309

Fig. 65: Removing Timing Belt
 Courtesy of HYUNDAI MOTOR CO.

9. Remove the camshaft sprocket.
10. Remove the crankshaft sprocket bolts. Remove the crankshaft sprocket and flange.
11. Remove the timing belt tensioner.

INSPECTION

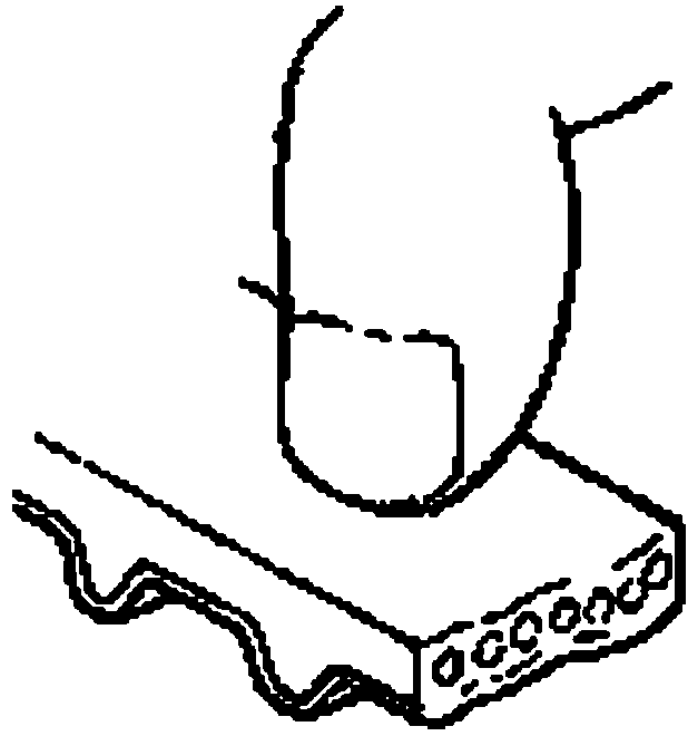
TIMING BELT

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, carefully check the belt. If any of the following flaws are evident, replace the belt.

DESCRIPTION CHART

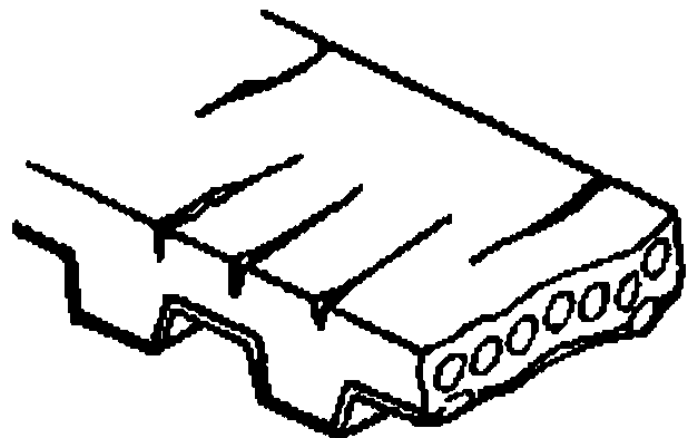
Description	Flaw Conditions
1. Hardened back surface Back surface glossy. Non-elastic and so hard	

that when your fingernail is pressed into it, no mark is produced.



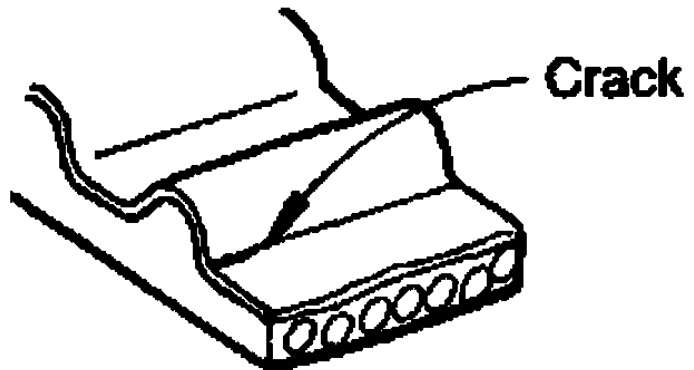
G03851310

2. Cracked back surface rubber

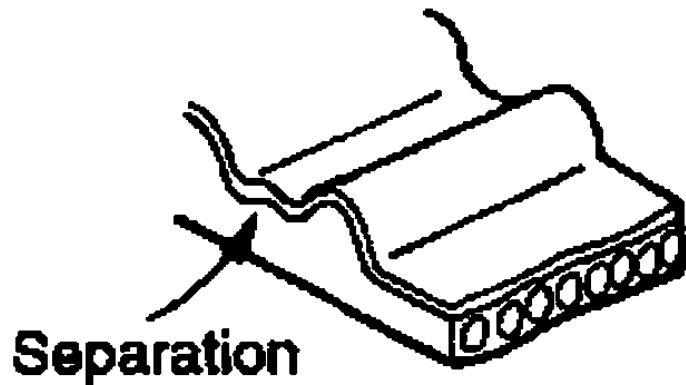


G03851311

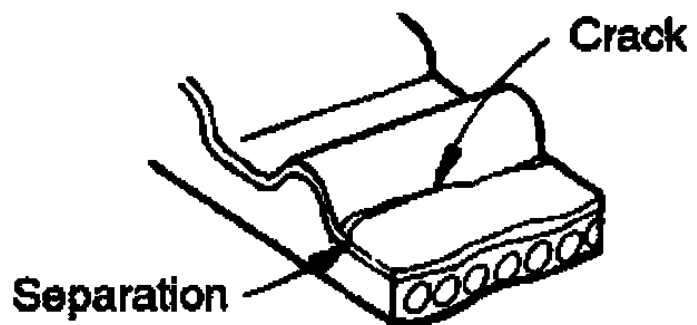
3. Cracked or separating canvas



G03851312



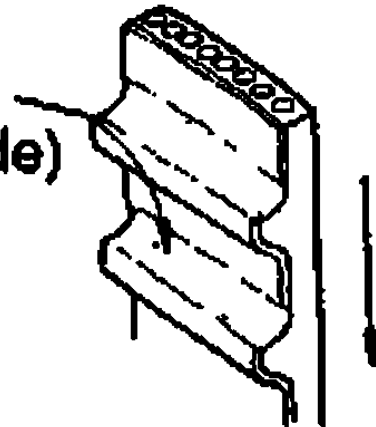
G03851313



G03851314

4. Badly worn teeth (initial stage)
Canvas on load side tooth flank worn (Fluffy canvas fibers, rubber gone and color changed to white, and unclear canvas texture)

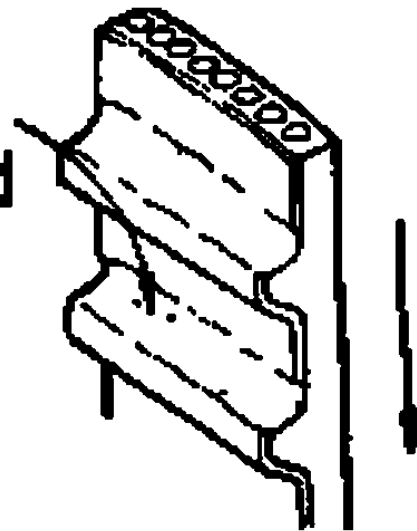
**Flank worn
(On load side)**



G03851315

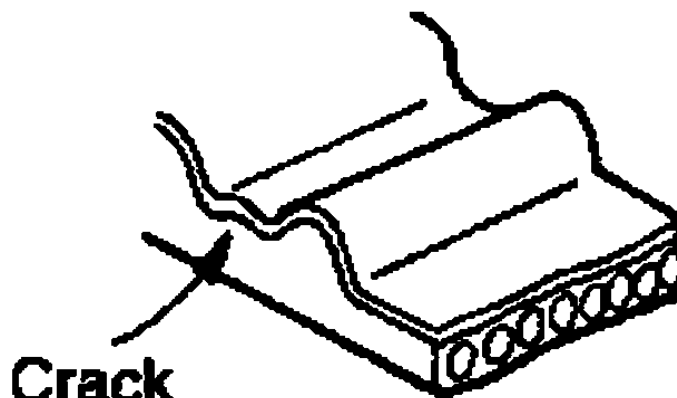
5. Badly worn teeth (last stage)
Canvas on load side tooth flank worn down and rubber exposed (tooth width reduced)

**Rubber
exposed**



G03851316

6. Cracked tooth bottom

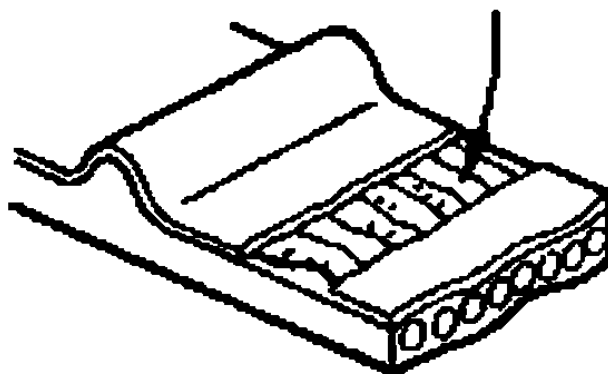


Crack

G03851317

7. Missing tooth

**Tooth missing and
canvas fiber exposed**



G03851318

8. Side of belt badly worn

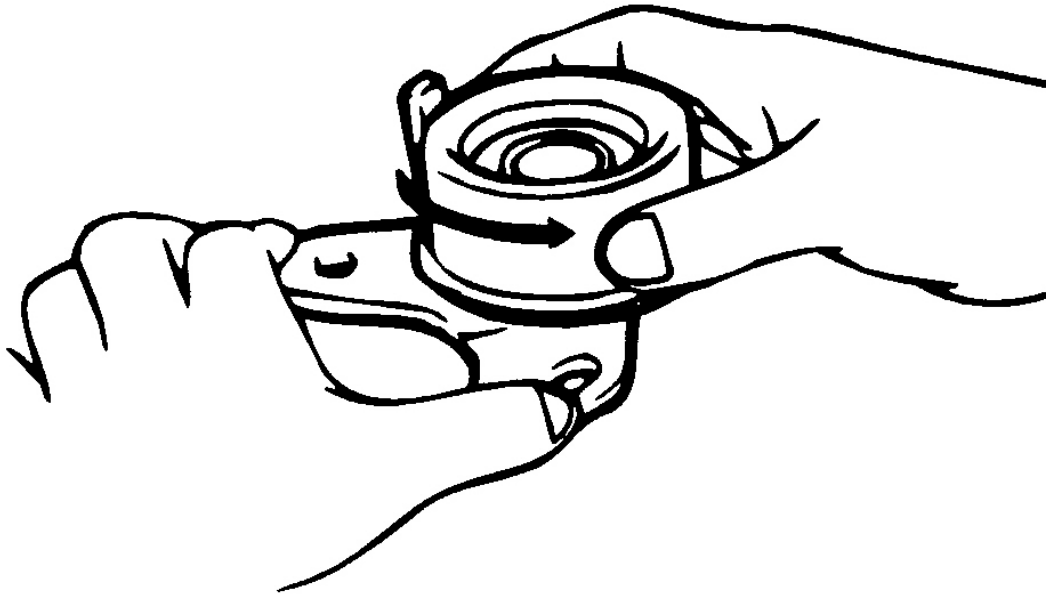
NOTE:

**A normal belt should have precisely out
sides as if cut by a sharp knife.**

9. Side of belt cracked

SPROCKETS AND TENSIONER

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 pulley rotation, play or noise. Replace as necessary.



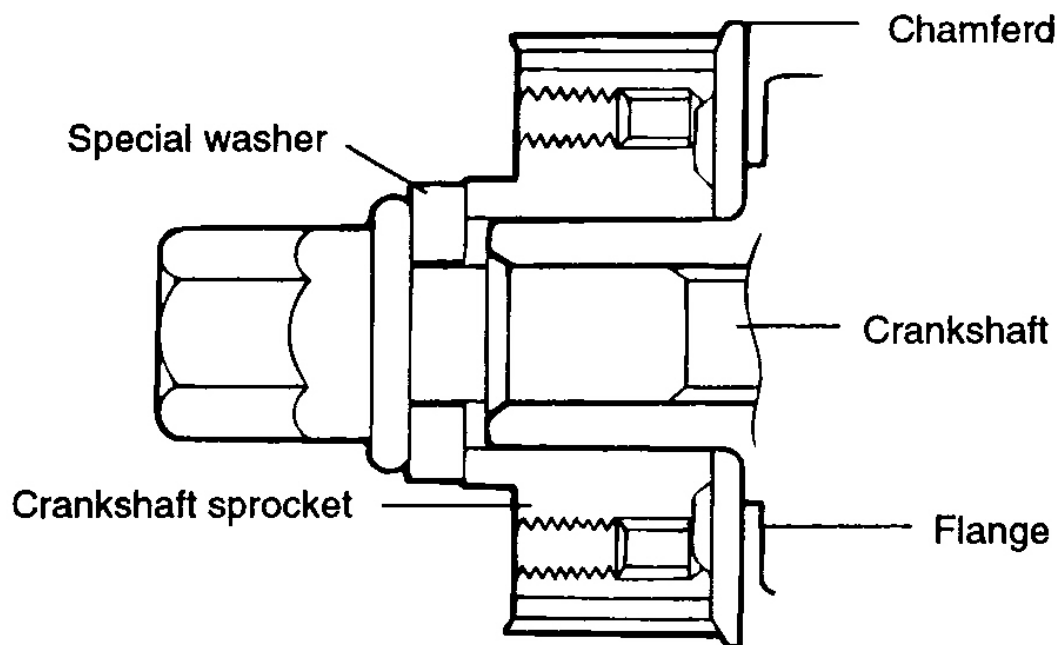
G03851319

Fig. 66: Inspecting Tensioner Pulley And Idler Pulley For Easy And Smooth Pulley Rotation, Play Or Noise

Courtesy of HYUNDAI MOTOR CO.

REASSEMBLY

1. Install the flange and crankshaft sprocket as shown. Pay close attention to their mounting directions.



G03851320

Fig. 67: Installing Flange And Crankshaft Sprocket
Courtesy of HYUNDAI MOTOR CO.

Tightening torque

Crankshaft sprocket bolt:

140 ~ 150Nm (1400 ~ 1500kg.cm, 103 ~ 111 lb.ft)

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

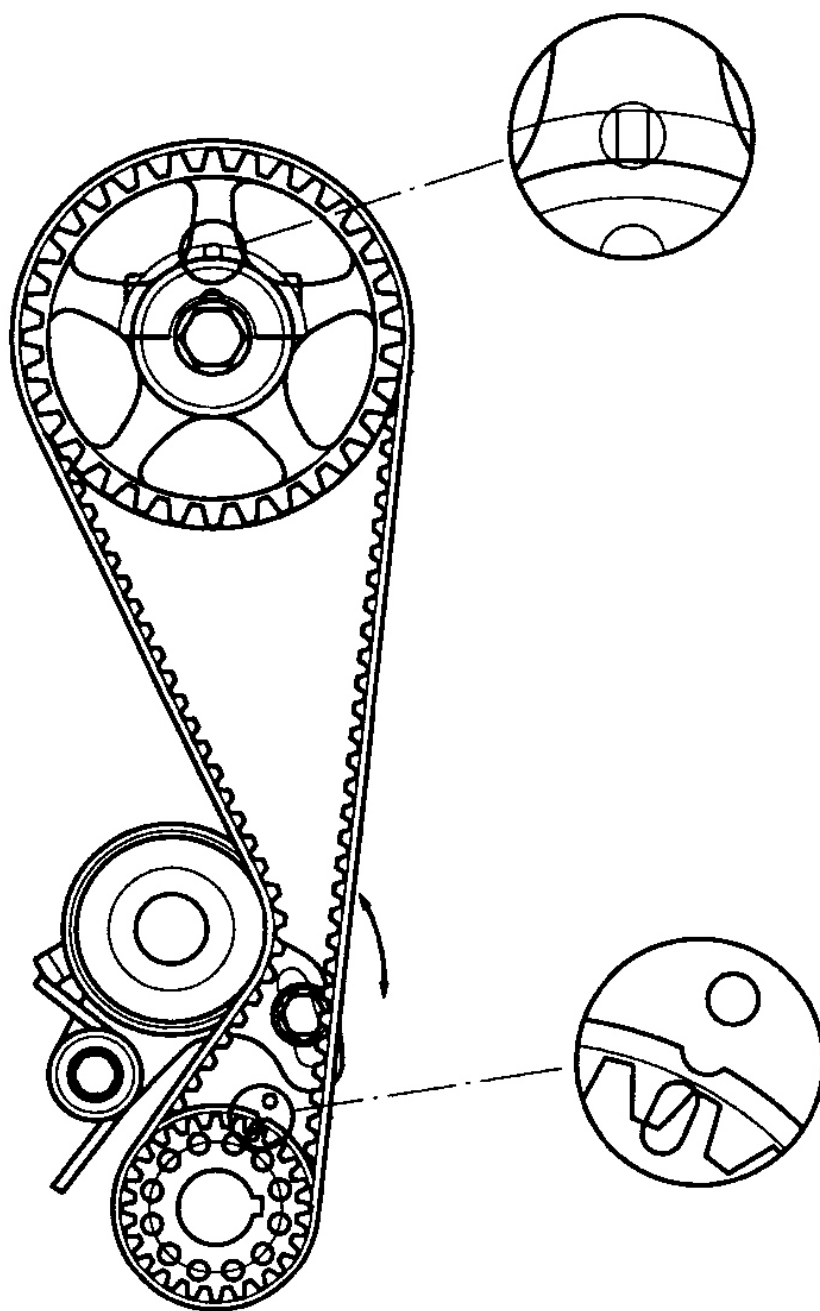
Tightening torque

Camshaft sprocket bolt:

80 ~ 100 Nm (800 ~ 1000 kg.cm, 59 ~ 74 lb.ft)

3. Align the timing marks of the camshaft sprocket and crank shaft sprocket, with the No.1 piston placed at top dead center on its compression stroke.

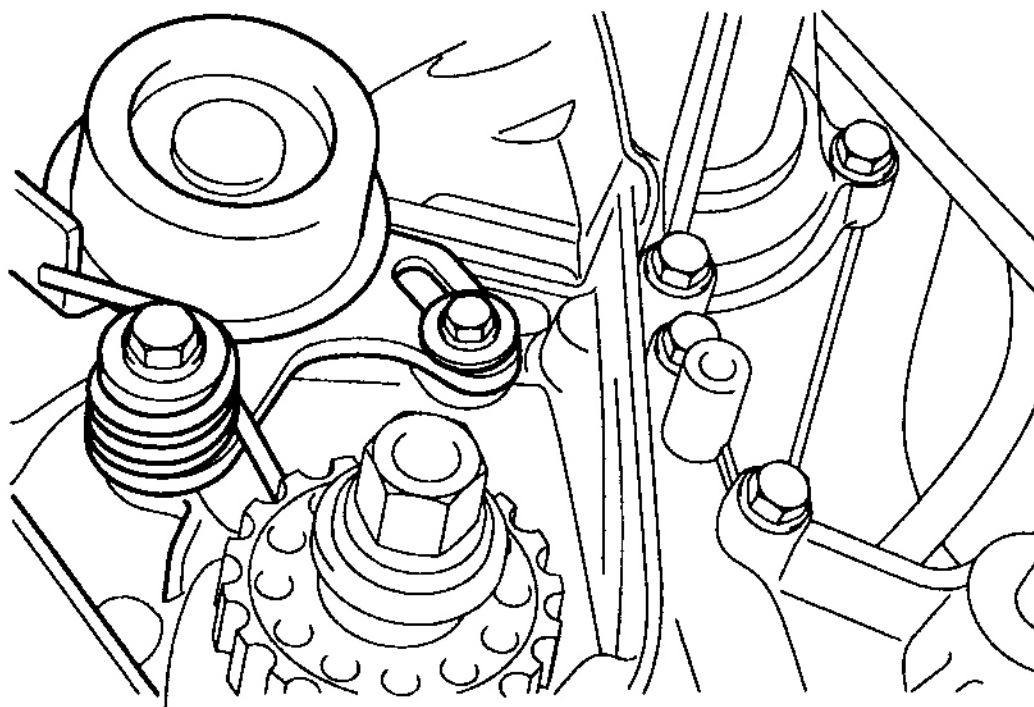
NOTE: When installing camshaft sprocket.
Make sure that camshaft sprocket knock pin fits small hole in pulley as shown.



G03851321

Fig. 68: Identifying Camshaft Sprocket Knock Pin Fits Small Hole In Pulley
Courtesy of HYUNDAI MOTOR CO.

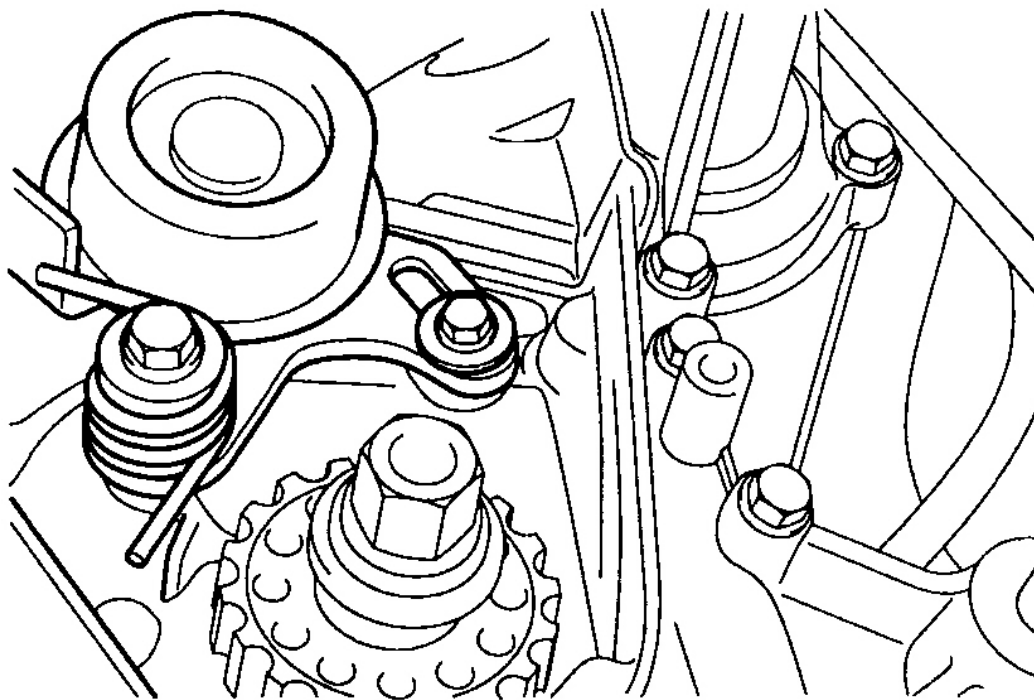
4. Tentatively fasten the timing belt tensioner where its pulley is nearest the water pump body.



G03851322

Fig. 69: Identifying Timing Belt Tensioner
Courtesy of HYUNDAI MOTOR CO.

5. Hang the tensioner spring on the tensioner bracket and insert the other side into the front case using a screw driver.

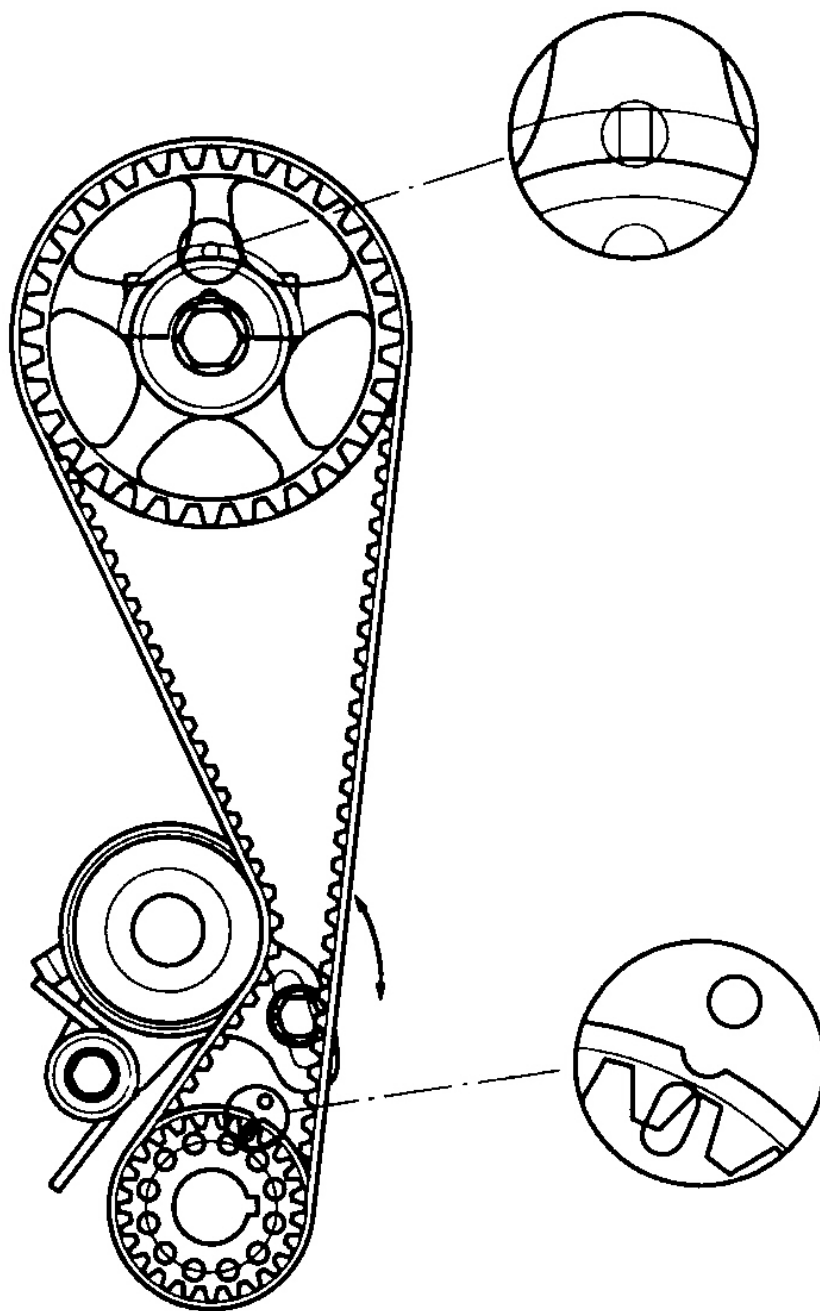


G03851323

Fig. 70: Hanging Tensioner Spring On Tensioner Bracket
Courtesy of HYUNDAI MOTOR CO.

6. Install the timing belt tightly in the sequence shown.

(1) Crankshaft sprocket --> (2) Camshaft sprocket --> (3) Timing belt tensioner.



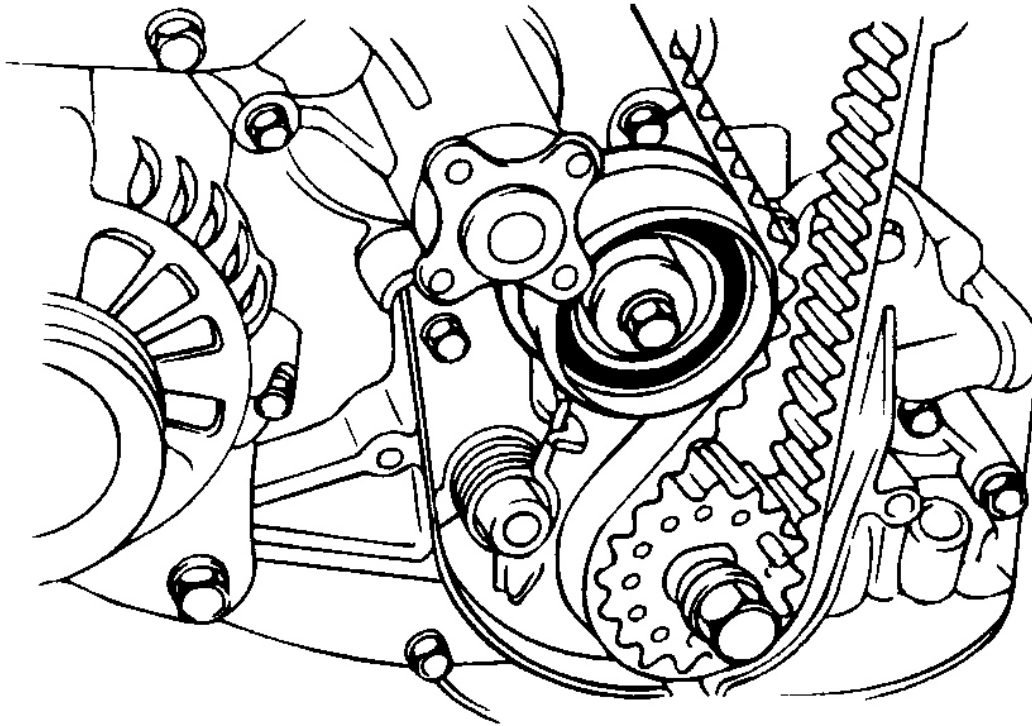
G03851324

Fig. 71: Installing Timing Belt Tightly In Sequence
Courtesy of HYUNDAI MOTOR CO.

7. Install timing belt so as not to give slack to tension side.

NOTE: Then make sure that timing marks are at correct position respectively with tension side in strained state by applying force to camshaft sprocket in reversing direction.

8. Loosen the tensioner mounting bolt in the order as shown to give the timing belt spring tension.



G03851325

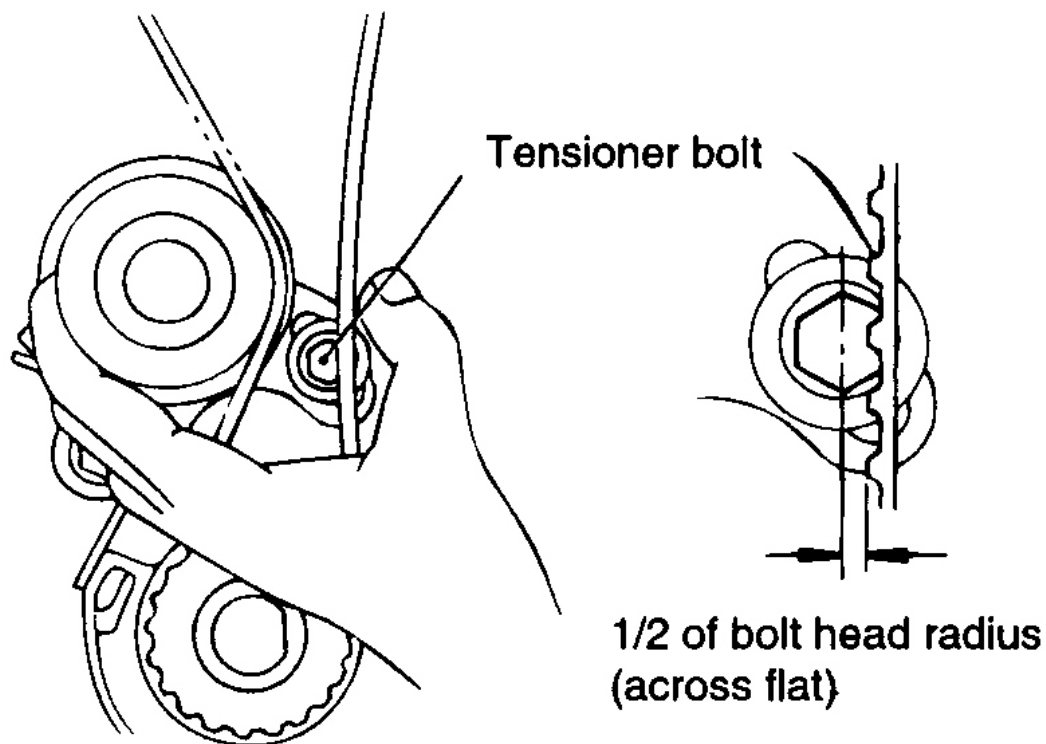
Fig. 72: Loosening Tensioner Mounting Bolt
Courtesy of HYUNDAI MOTOR CO.

9. Rotate crankshaft in regular direction (clockwise view from front) through angle equivalent to two teeth (15°) of camshaft sprocket.
10. Add force to tensioner in direction of regular rotation (--> direction) to bring belt teeth in perfect contact with sprocket teeth without a gap.
11. After making sure of this state.

Fix tensioner so that only the tensioner spring is movable.

12. Rotate the crankshaft pulley two or four turns counter clockwise so that the timing belt positions itself on the sprockets.

13. Recheck the belt tension. Verify that when the tensioner and the tension side of the timing belt are pushed in horizontally with a moderate force [approx. 49N (11 lb)], the timing belt is half of the tensioner mounting bolt head radius away from the bolt head center.



G03851326

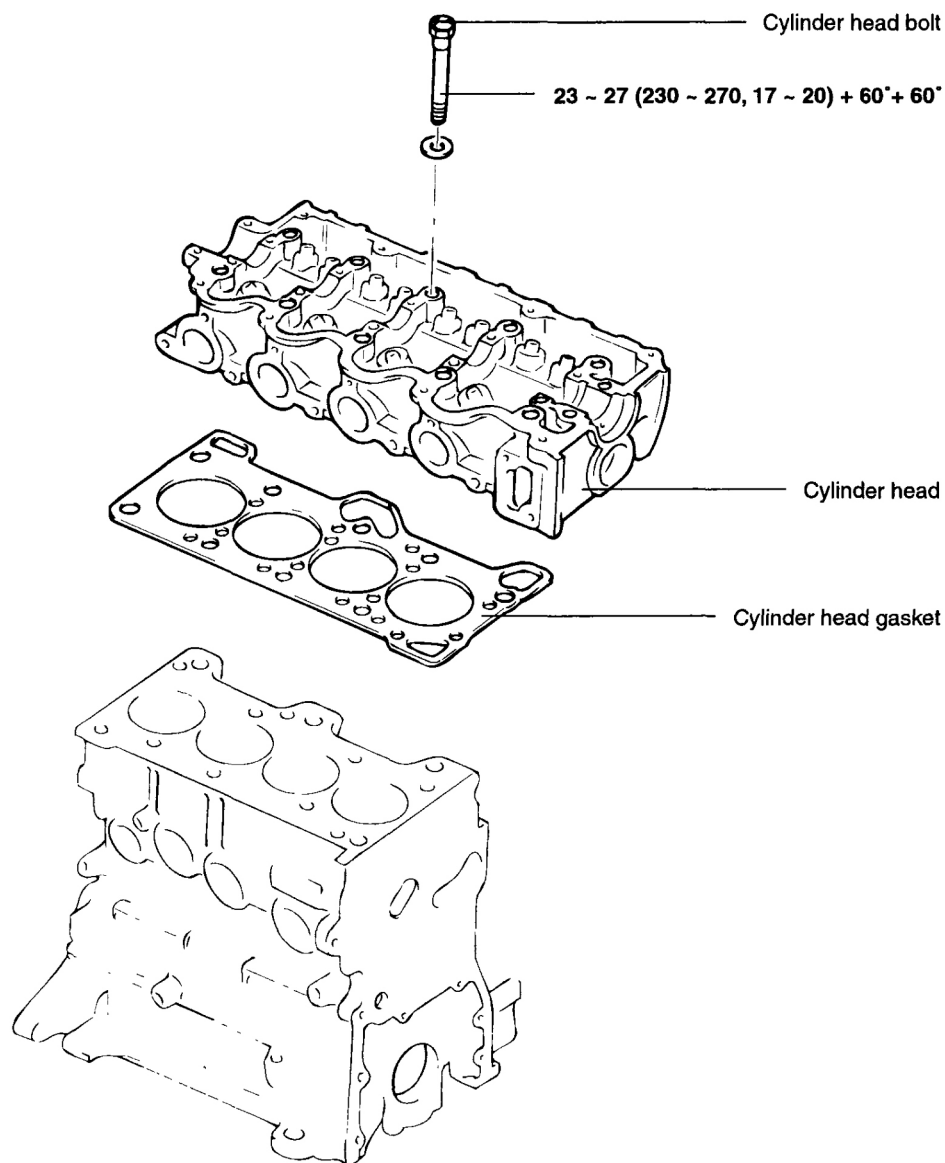
Fig. 73: Rechecking Belt Tension
Courtesy of HYUNDAI MOTOR CO.

14. Install the timing belt cover.
15. Install the crankshaft pulley.
16. Install the A/C compressor belt and adjust the belt tension.
17. Install the coolant pump pulley.
18. Install the V-belt and adjust the belt tension.

CYLINDER HEAD ASSEMBLY

CYLINDER HEAD

COMPONENTS



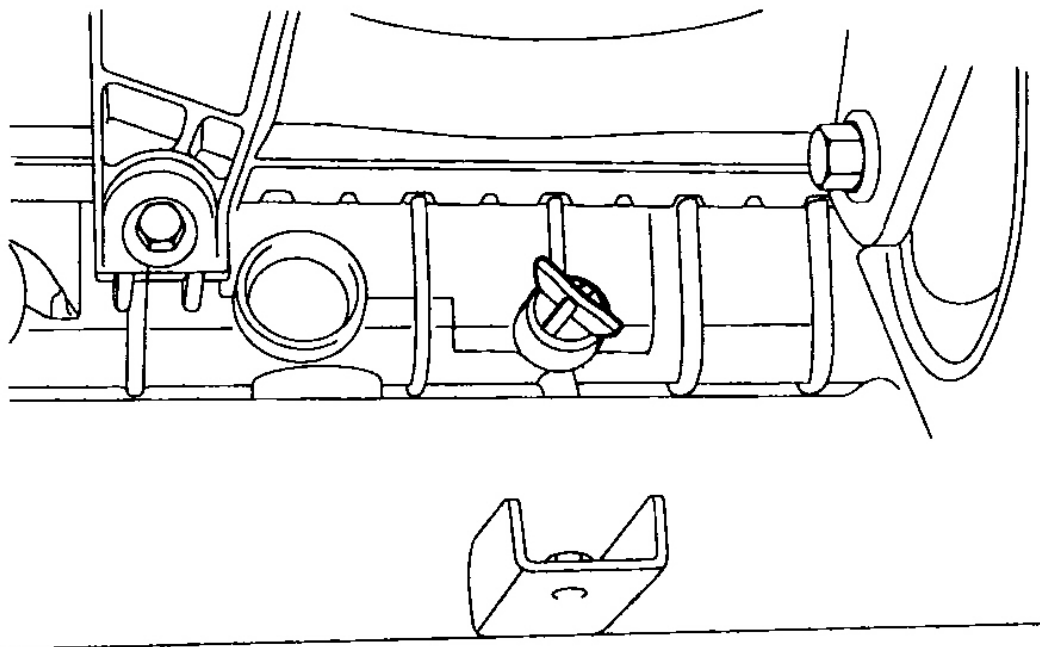
TORQUE : Nm (kg.cm, lb.ft)

G03851327

Fig. 74: Identifying Cylinder Head Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

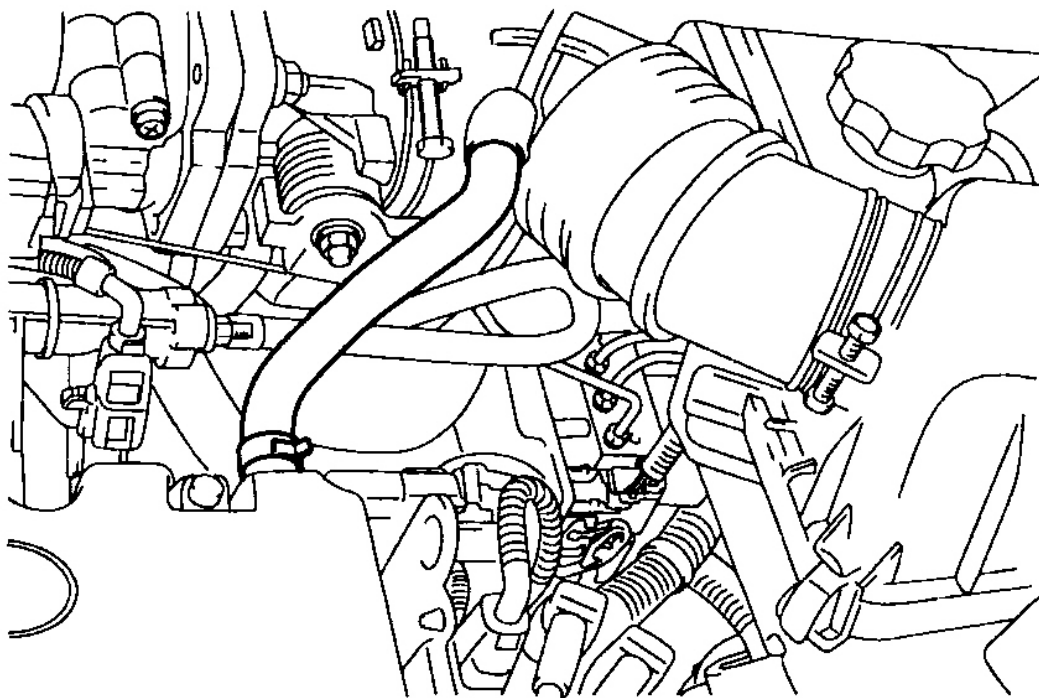
1. Drain the coolant and disconnect the upper radiator hose.



G03851328

Fig. 75: Identifying Drain Plug
Courtesy of HYUNDAI MOTOR CO.

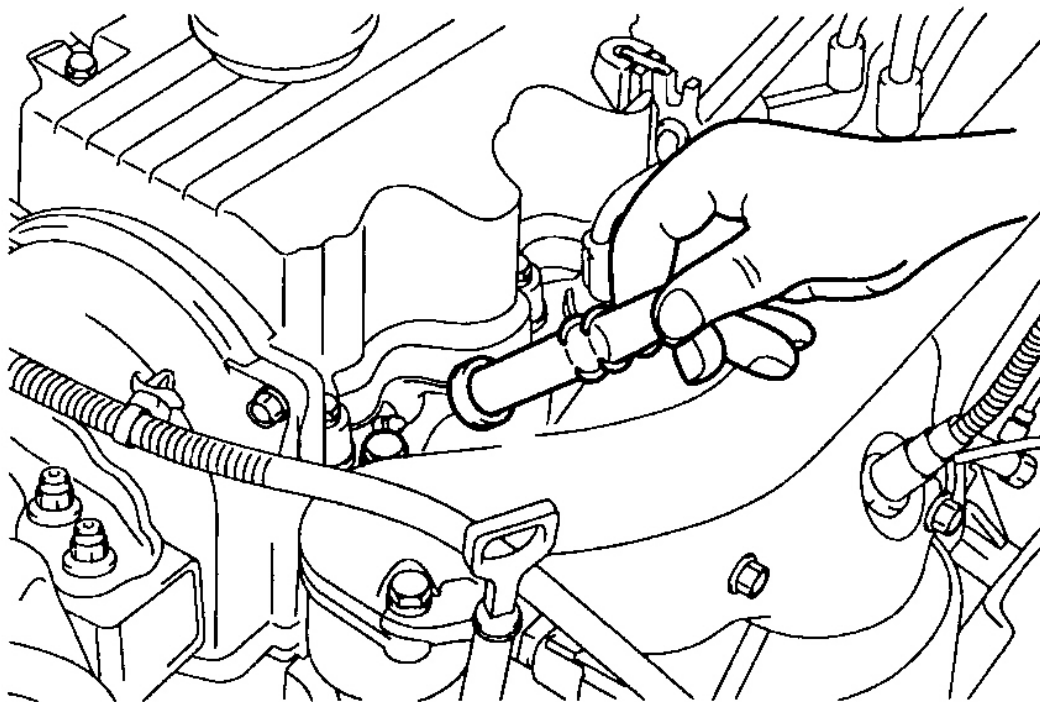
2. Remove the breather hose (between the air cleaner and the rocker cover).



G03851329

Fig. 76: Removing Breather Hose
Courtesy of HYUNDAI MOTOR CO.

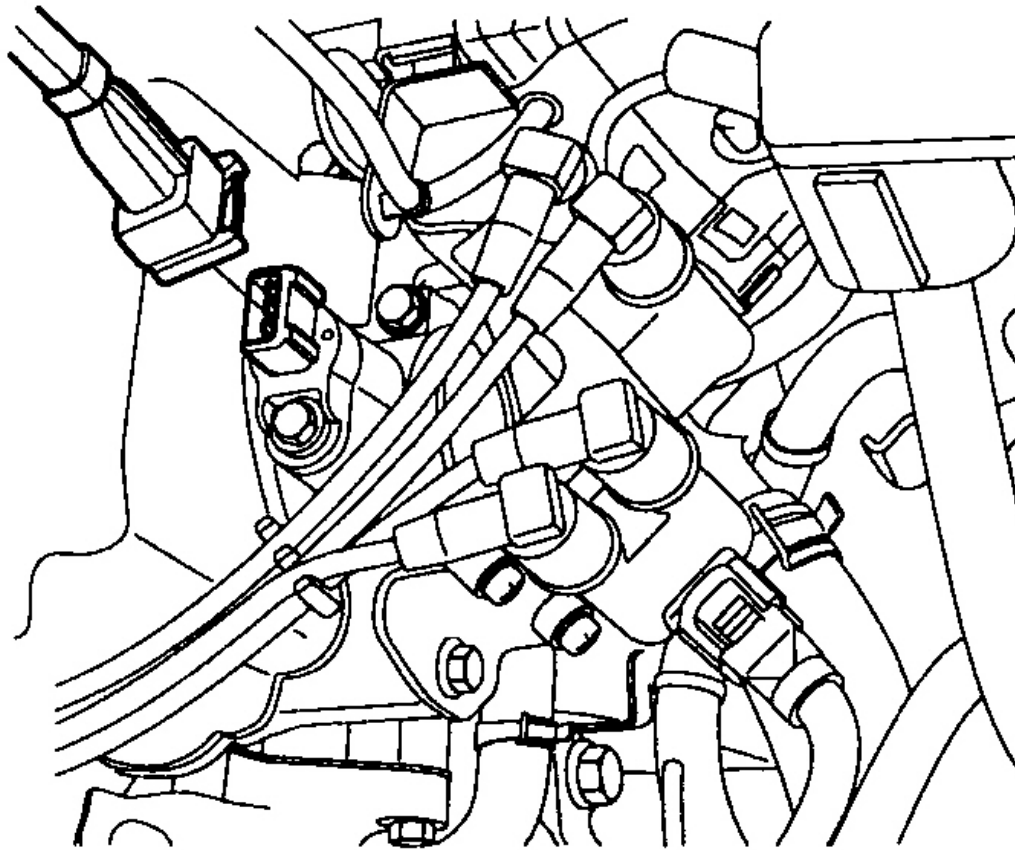
3. Remove the air intake hose.
4. Remove the vacuum hose, fuel hose and coolant hose.
5. Remove the cables from the spark plugs. The cables should be removed by holding the boot portion.



G03851330

Fig. 77: Removing Cables From Spark Plugs
Courtesy of HYUNDAI MOTOR CO.

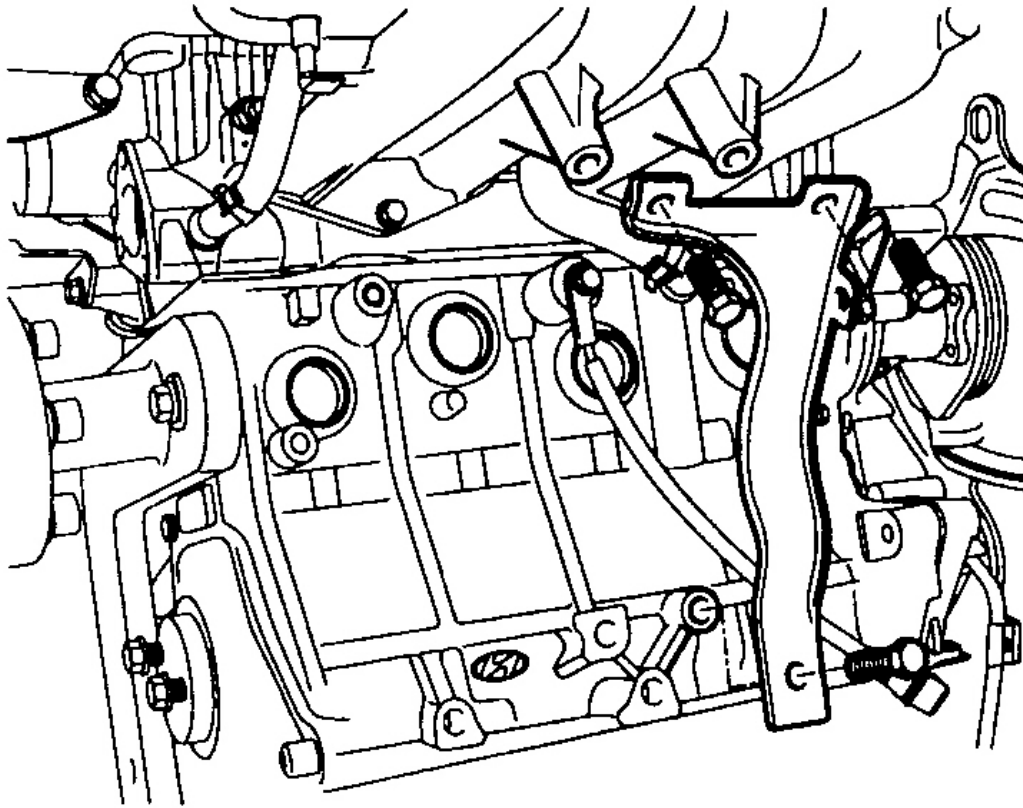
6. Remove the ignition coil.



G03851331

Fig. 78: Removing Ignition Coil
Courtesy of HYUNDAI MOTOR CO.

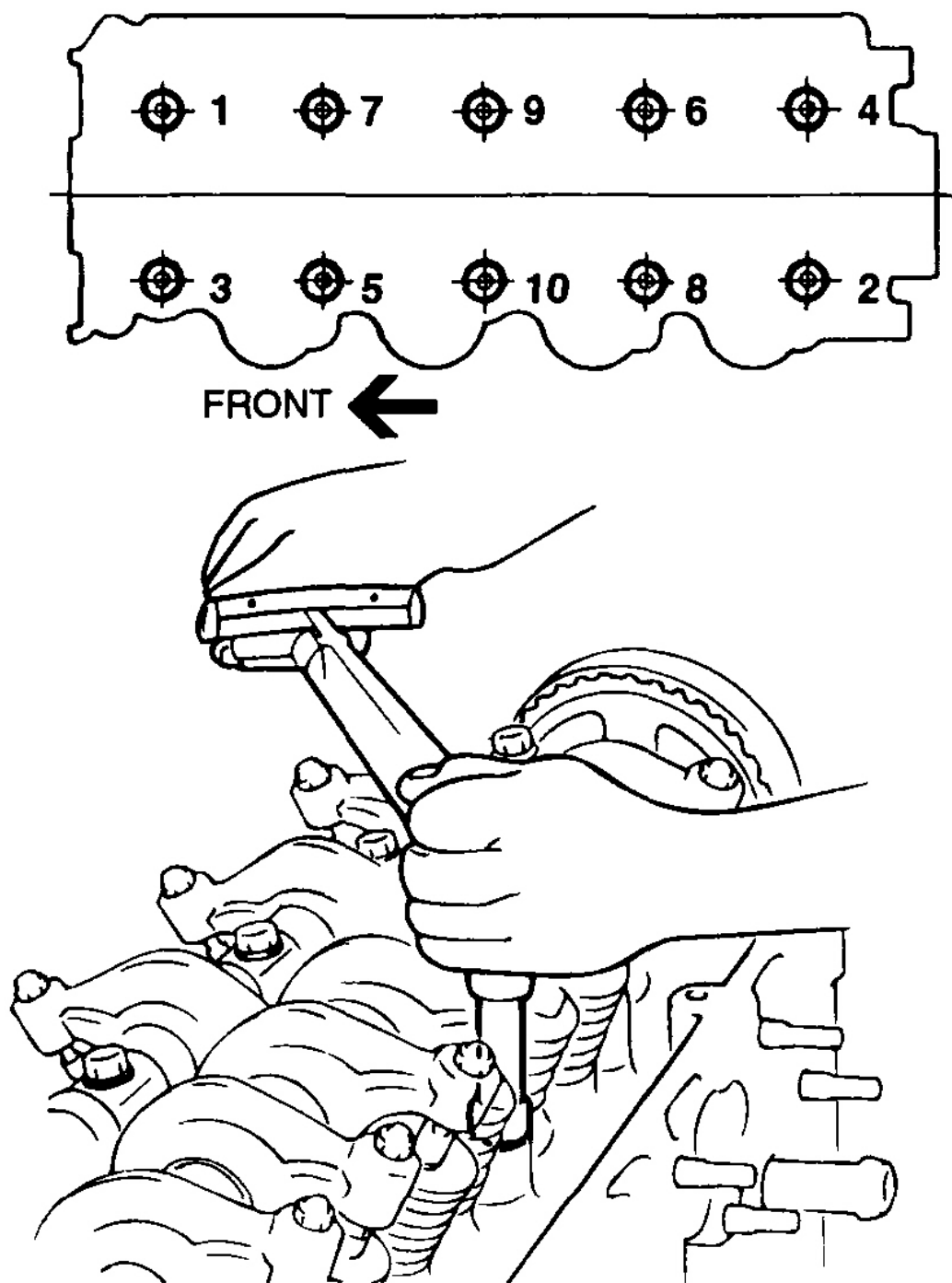
7. Remove the surge tank stay.



G03851332

Fig. 79: Removing Surge Tank Stay
Courtesy of HYUNDAI MOTOR CO.

8. Remove the intake manifold.
9. Remove the heat protector and exhaust manifold assembly.
10. Remove the coolant pump pulley and the crankshaft pulley.
11. Remove the timing belt cover.
12. Move the timing belt tensioner pulley toward the coolant pump and temporarily secure it.
13. Remove the timing belt.
14. Remove the rocker cover.
15. Remove the cylinder head assembly. The cylinder head bolts should be removed using Cylinder Head Bolt Wrench, in the sequence as shown in the illustration.



G03851333

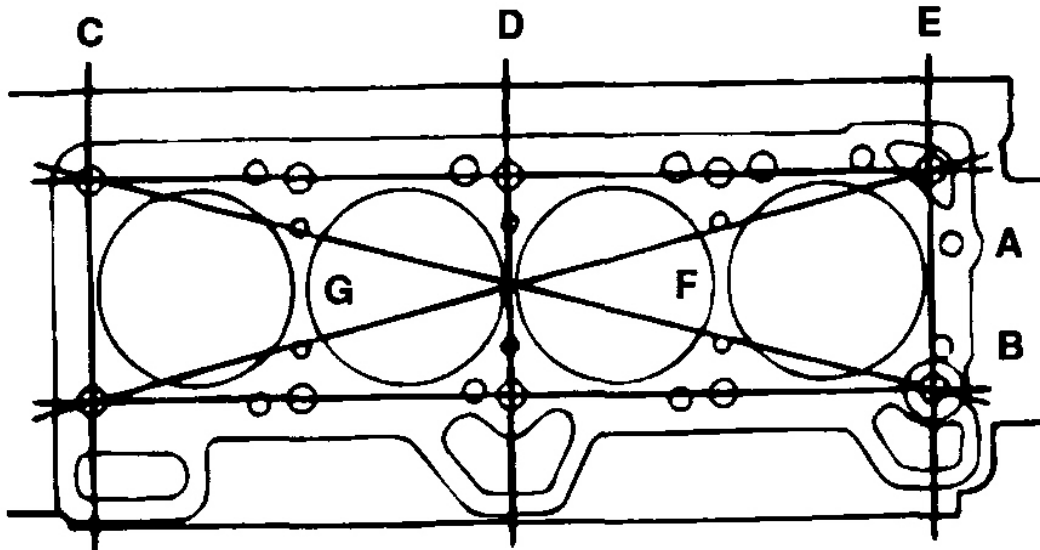
Fig. 80: Removing Cylinder Head Bolts In Sequence Using Cylinder Head Bolt Wrench
 Courtesy of HYUNDAI MOTOR CO.

16. Remove the gasket pieces from the cylinder block top surface and cylinder head bottom surface.

NOTE: Make sure that the gasket pieces do not fall in to the engine.

INSPECTION

1. Check the cylinder head for cracks, damage and coolant leakage.
2. Remove scale, sealing compound and carbon deposits completely. After cleaning oil passages, apply compressed air to make certain that the passages are not clogged.
3. Check the cylinder head surface for flatness using a straight edge in the direction of A, B,... as shown.



G03851334

Fig. 81: Checking Cylinder Head Surface For Flatness Using A Straight Edge
Courtesy of HYUNDAI MOTOR CO.

If flatness exceeds service limit in any direction, replace the cylinder head, or lightly machine the cylinder head surface.

Cylinder head flatness

Standard value: Less than 0.03 mm (0.012 in.)

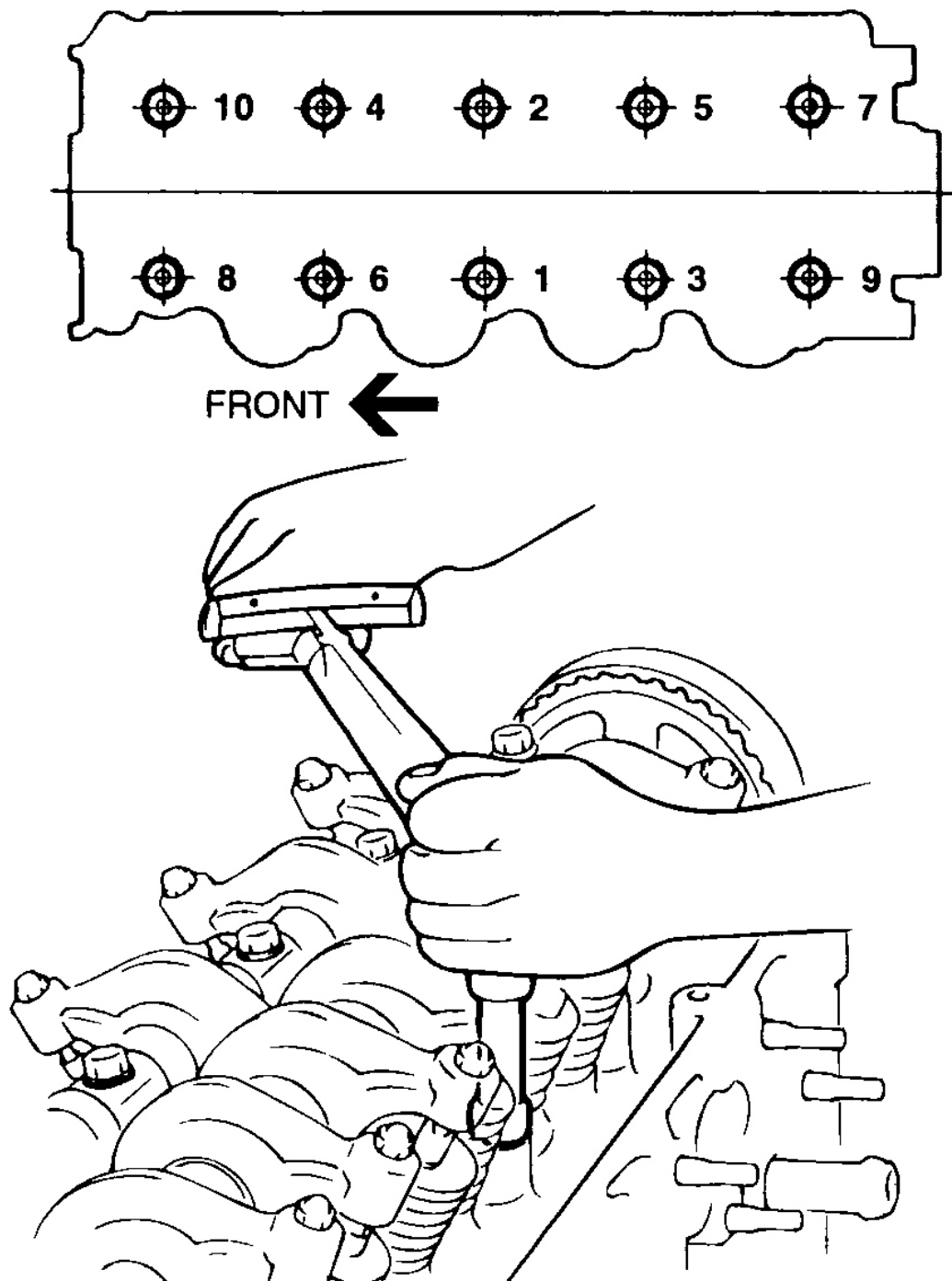
Limit: 0.08 mm (0.0031 in.)

REASSEMBLY

1. Clean all gasket surfaces of the cylinder block and the cylinder head.
2. Install a new cylinder head gasket onto the cylinder head assembly. Do not apply sealant to the gasket and do not reuse the old cylinder head gasket.
3. Install the cylinder head bolts. Starting at top center. Tighten all cylinder head bolts in sequence as shown in illustration, using the Cylinder Head Bolt Wrench. Repeat the procedure, retightening all cylinder head bolt to the specified torque.

Tightening torque

23~27Nm (230~270kg.cm, 17~20lb.ft)+60°+60°



G03851335

Fig. 82: Tightening Cylinder Head Bolts In Sequence Using The Cylinder Head Bolt Wrench
 Courtesy of HYUNDAI MOTOR CO.

4. Move the timing belt tensioner pulley toward the coolant pump and temporarily secure it.
5. Install the timing belt on the camshaft sprocket, making sure that the tension side is tightened by turning the camshaft sprocket in reverse. Make sure all timing marks are in alignment.
6. Adjust the timing according to the "**TIMING BELT**".
7. Install the rocker cover and tighten the bolts to the specified torque.

Tightening torque

Rocker cover bolt:

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

8. Install the timing belt cover.
9. Install the new intake manifold gasket and the intake manifold. Tighten the nuts and bolts to the specified torque.

Tightening torque

Manifold nuts and bolts (both intake and exhaust):

15 ~ 20 Nm (150 ~ 200 kg.cm, 11 ~ 15 lb.ft)

10. Install the new exhaust manifold gasket and the exhaust manifold. Tighten the exhaust manifold attaching nuts to the specified torque.
11. Install the surge tank and tighten the nuts and bolts to the specified torque.

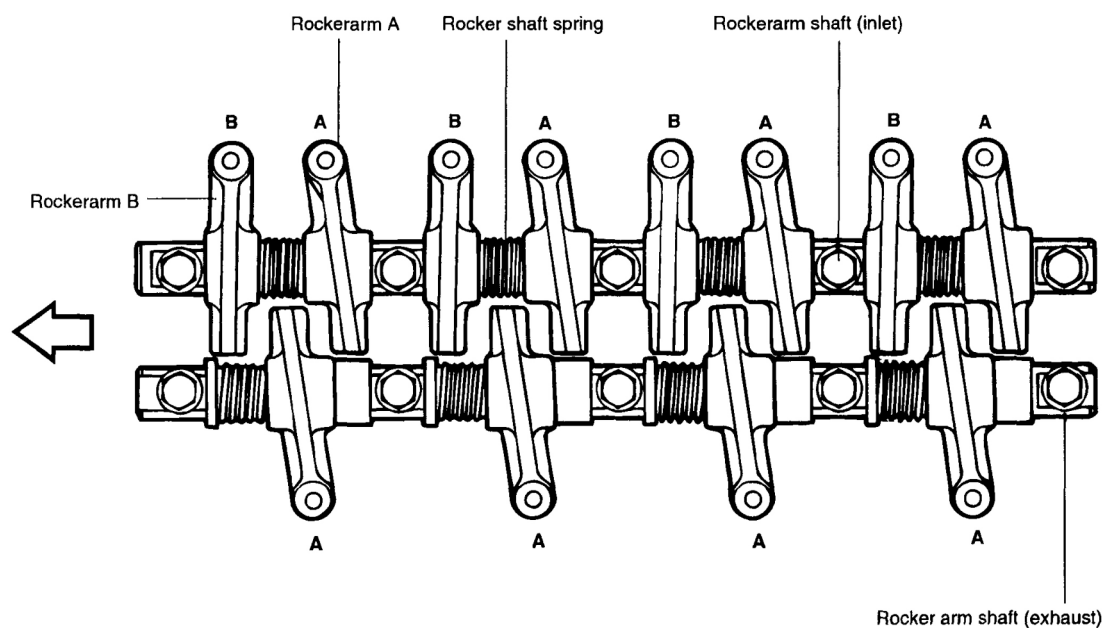
Tightening torque

Surge tank to inlet manifold nuts and bolts:

15 ~ 20 Nm (250 ~ 200 kg.cm, 11 ~ 15 lb.ft)

12. Install the ignition coil.
13. Install the air intake hose.
14. Connect the vacuum hose, fuel hose and coolant hose.
15. Install breather hose.

ROCKER ARM**COMPONENTS**



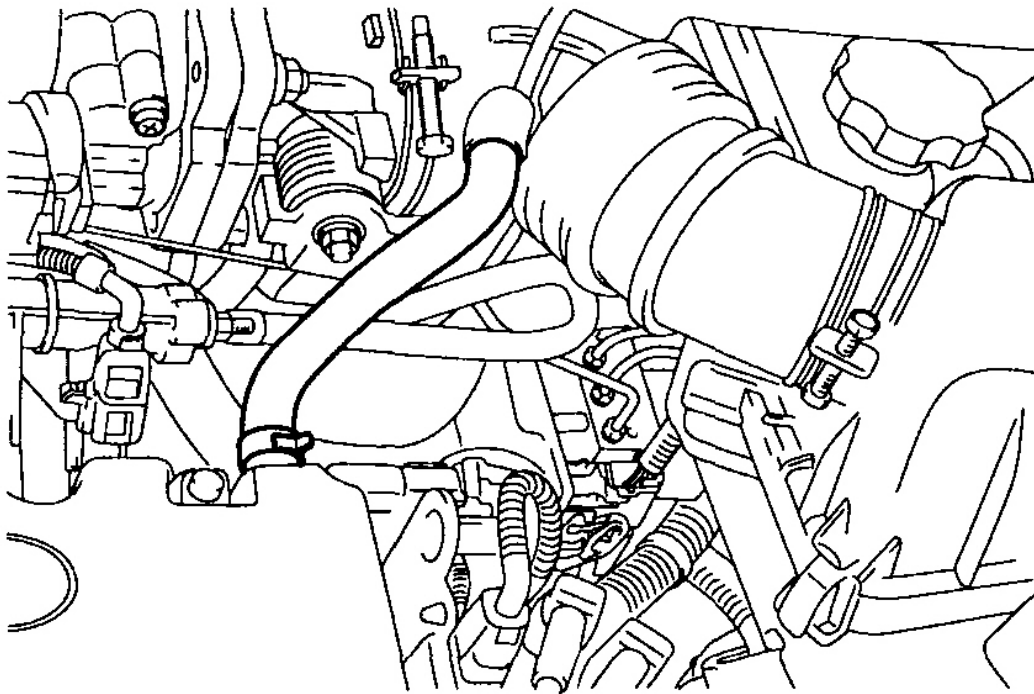
TORQUE : Nm (kg-cm, lb-ft)

G03851336

Fig. 83: Identifying Rocker Arm Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the breather hose and PCV valve.



G03851337

Fig. 84: Removing Breather Hose And PCV Valve
Courtesy of HYUNDAI MOTOR CO.

2. Remove the timing belt cover.
3. Remove the rocker cover.
4. Loosen the flange bolts and remove the rocker arm shaft, rocker arms and rocker arm shaft springs as an assembly.
5. Remove the bolts, the rocker arms and arm shaft springs from the rocker arm shaft.

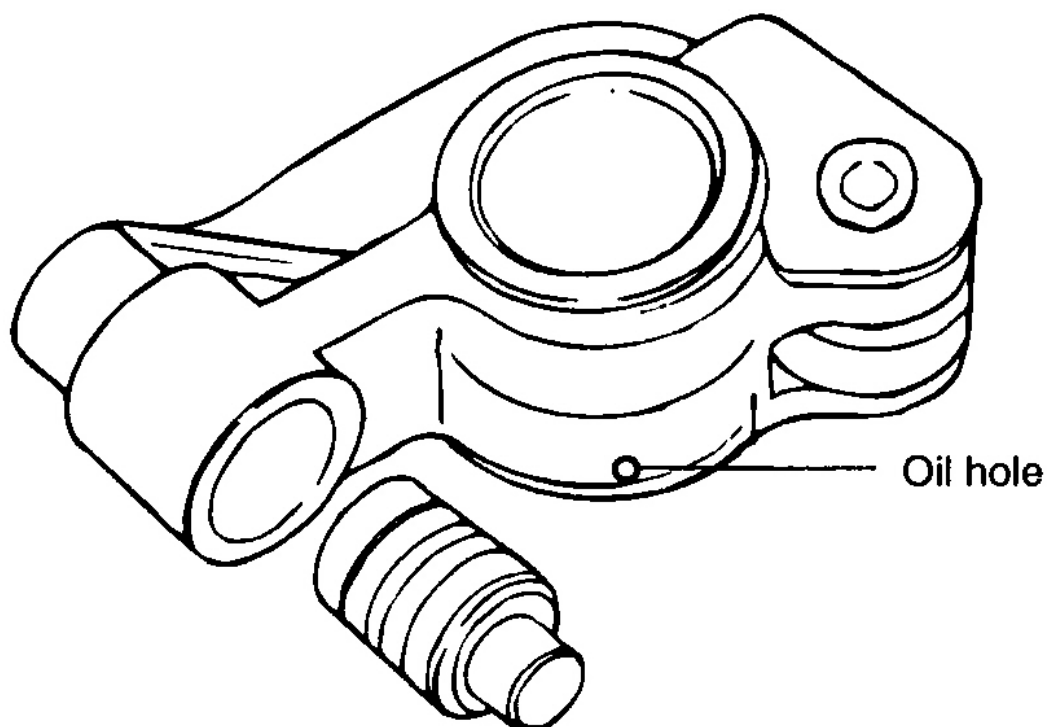
INSPECTION

ROCKER ARM

1. Check the rocker face.

Replace if damaged or pressed.

2. Check the contact surface on the cam and valve stem. If badly worn or damaged, replace it.
3. Check the hydraulic lash adjuster (HLA) face that contacts the valve stem. If badly worn or damaged, replace the HLA.

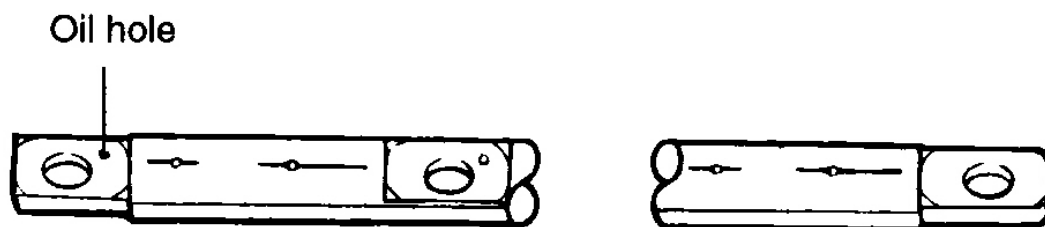


G03851338

Fig. 85: Checking Hydraulic Lash Adjuster (HLA) Face That Contacts The Valve Stem
Courtesy of HYUNDAI MOTOR CO.

ROCKER ARM SHAFT

1. Check the rocker arm shafts for damage. Replace as necessary.
2. Check the oil hole for any restriction.

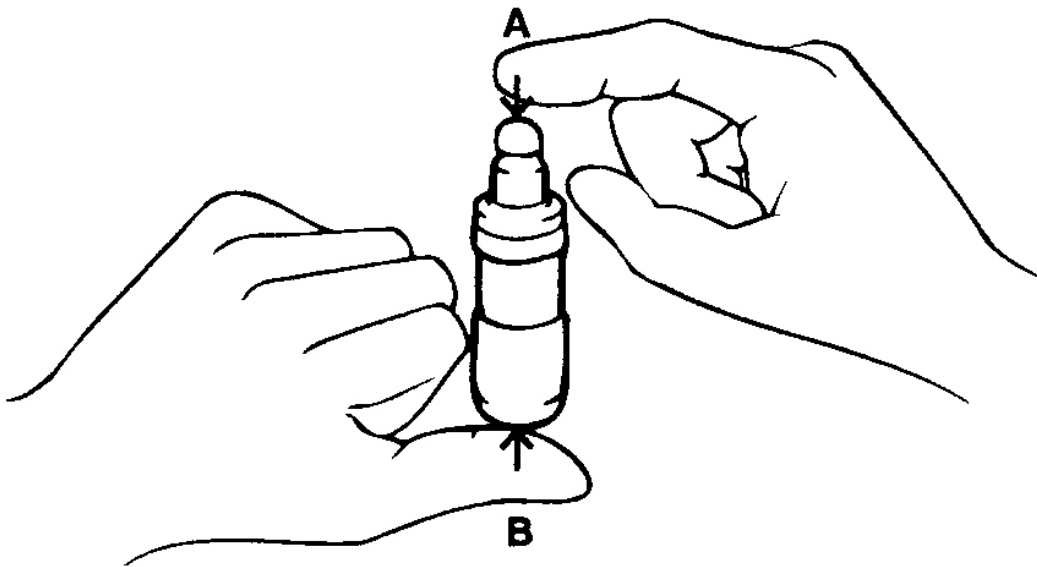


G03851339

Fig. 86: Checking Oil Hole For Any Restriction
 Courtesy of HYUNDAI MOTOR CO.

HLA

With the HLA filled with engine oil, hold A and press B by hand. If B moves, replace the HLA. For other specific troubleshooting regarding HLA, refer to the **HLA TROUBLESHOOTING** below.



G03851340

Fig. 87: Checking HLA
 Courtesy of HYUNDAI MOTOR CO.

HLA TROUBLESHOOTING

Problem	Possible cause	Action
Temporary noise on starting a cold engine	Normal	This noise will disappear after the oil in the engine has reached normal pressure.
Continuous noise when engine is started after longer than 48 hours parking.	Oil drain out of the high pressure chamber on HLA, allowing air to get in.	Noise will disappear within 15 minutes of engine running at 2000~3000 RPM. If not, refer to item 7 below.
Continuous noise when engine is first started after rebuilding cylinder head.	Insufficient oil in cylinder head oil gallery.	
Continuous noise when engine is after excessive	Oil drain out of the high-pressure chamber in HLA, allowing air to	

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

cranking the engine by starter motor or band.	get in.	
Continuous noise after changing HLA.		CAUTION: Do not run engine at a speed higher than 3000 RPM as this may damage HLA.
Continuous noise during idle after high speed running.	Engine oil level too high or too low.	Check oil level. Drain or add oil as necessary.
	Excessive amount of air in the oil at high engine speed.	Check oil supply system
	Deteriorated oil	Check oil quality. If deteriorated, replace with specified type and amount of oil.
Noise continues more than 15 minutes.	Low oil pressure	Check oil pressure and oil supply system of each part of engine.
	Faulty HLA.	Remove the cylinder head over and press down HLA by band. If it moves, replace HLA. CAUTION: Be careful of hot HLA.

NOTE: HLA noise could occur to your engine due to malfunction of HLA if you use additives besides engine oil regulated to HMC.

REASSEMBLY

1. Install the rocker arms and rocker arm shaft springs to the rocker arm shafts, install the rocker arm shaft to the cylinder head.

Tighten the rocker arm shaft mounting bolts to the specified torque.

Tightening torque

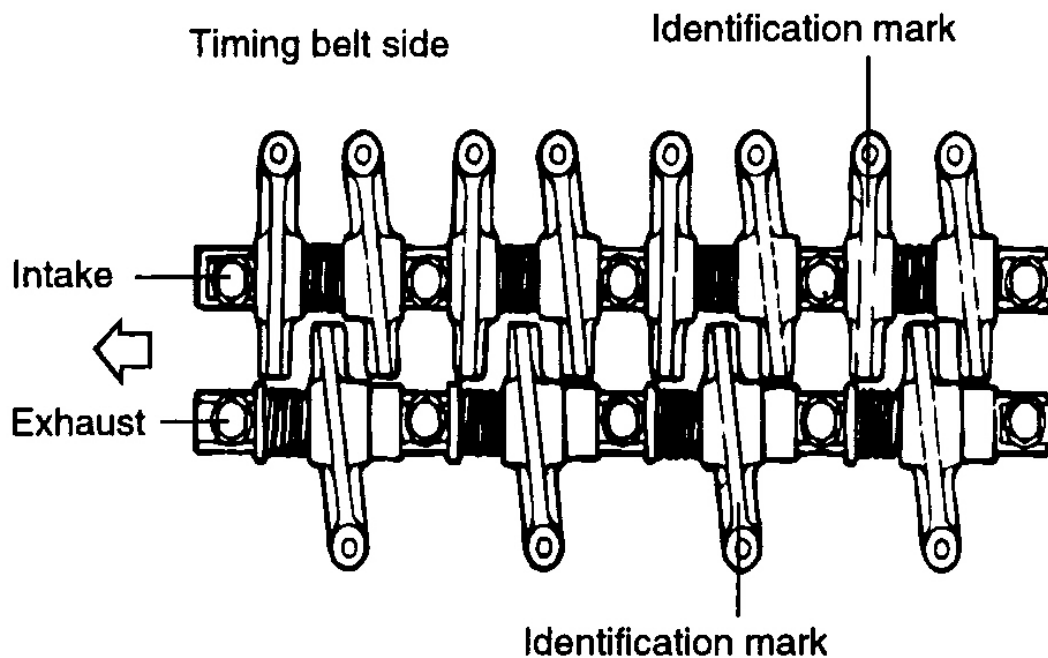
Rocker arm shaft mounting bolt:

20 ~ 27 Nm (200 ~ 270 kg.cm, 15 ~ 20 lb.ft)

2. When installing the rocker arm, shaft and spring, mark the difference between left and right parts.

Use the springs without distinction of intake and exhaust valve.

Must set the parts that have smaller chamfers between rocker arm shafts.



G03851341

Fig. 88: Marking Difference Between Left And Right Parts
Courtesy of HYUNDAI MOTOR CO.

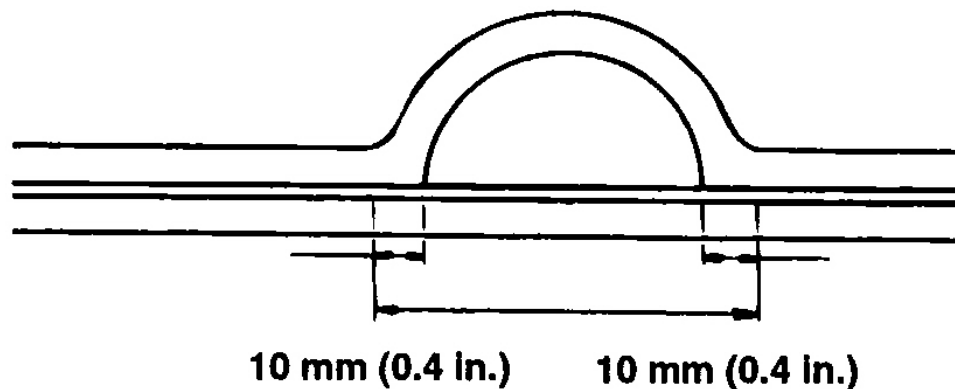
3. Install the rocker cover and tighten the bolts to the specified torque.

Tightening torque

Rocker cover bolt:

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

- CAUTION:**
1. Sealant must be applied to the top surface of cylinder head and c
Area of application is shown in figure.
 2. The proper amount of sealant must be used to prevent the sealar
squeezing out the sides.
 3. Use sealant of specified brands or equivalent.
 4. Sealant (Three bond No. 1212D aluminum color or equivalent).



G03851342

**Fig. 89: Identifying Proper Amount Of Sealant To The Top Surface
Cylinder Head And Cam Caps**
Courtesy of HYUNDAI MOTOR CO.

4. Install the timing belt cover.

Tightening torque

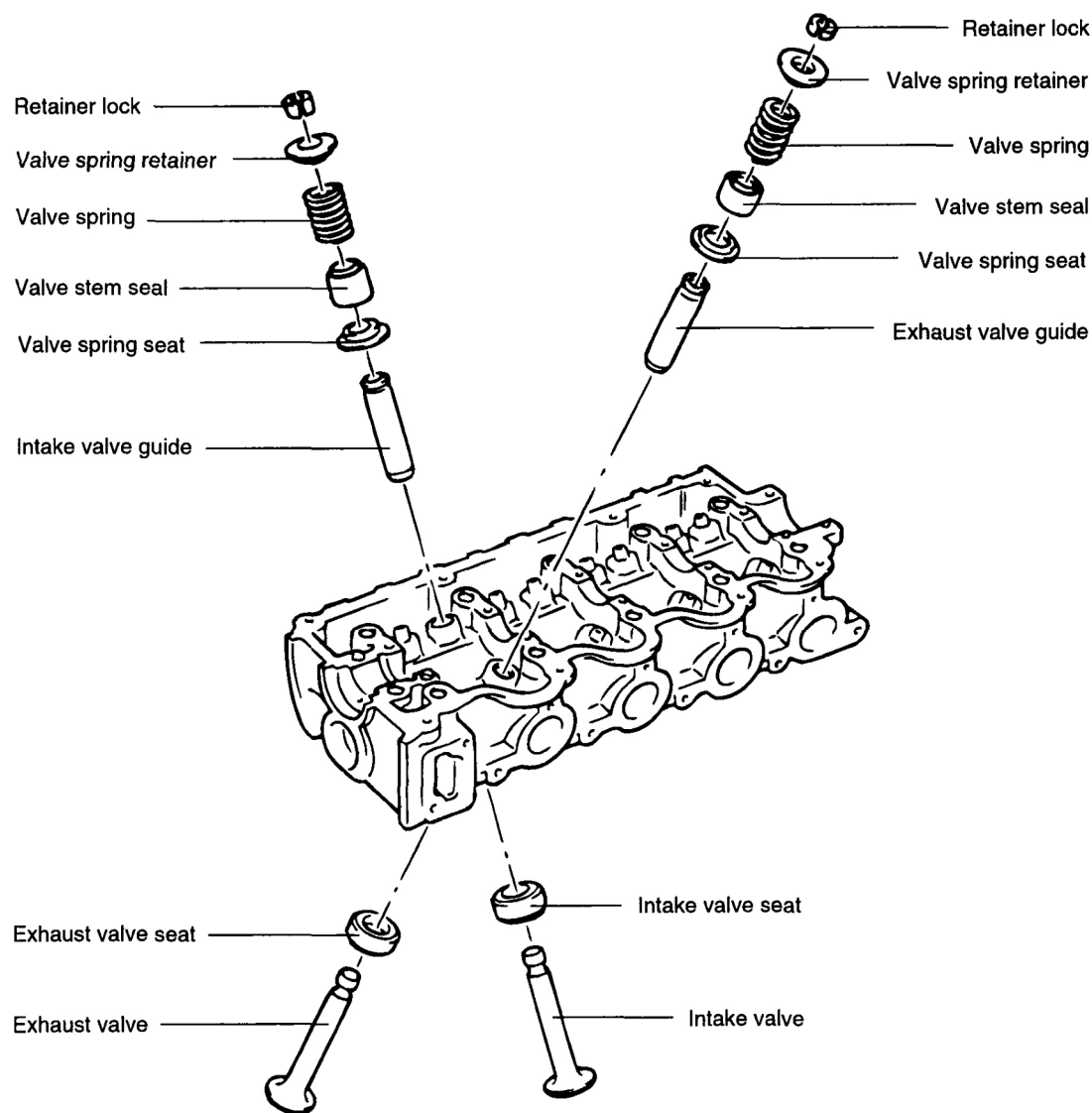
Timing belt cover bolt:

10 ~ 12 Nm (100 ~ 120 kg.cm, 7 ~ 9 lb.ft)

5. Install the breather hose, PCV hose, blow by hose and spark plug cable.
6. Install the air intake hose and air duct.

VALVES

COMPONENTS

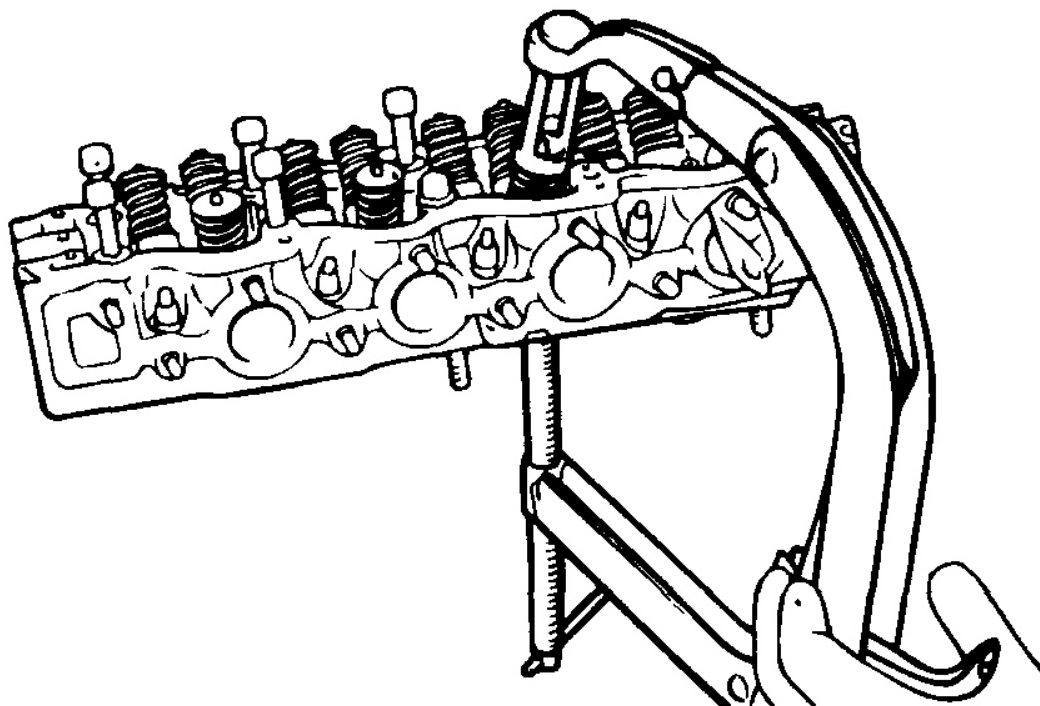


G03851343

Fig. 90: Identifying Valves Components
 Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Using the special tool, valve spring remover and installer, remove the retainer lock. Next, remove the spring retainer, valve spring, spring seat and valve.



G03851344

Fig. 91: Removing Spring Retainer, Valve Spring, Spring Seat And Valve Using Special Tool
Courtesy of HYUNDAI MOTOR CO.

NOTE: Keep these parts in order so that they can be reinstalled in their original positions.

2. Remove the valve stem seals with pliers, and discard them.

NOTE: Do not reuse the valve stem seals.

INSPECTION

VALVE SPRING

1. Check the valve spring free length and tension. If they exceed the service limit, replace the spring.
2. Using a square, test the squareness of each spring. If a spring is excessively out of square, replace it.

VALVE SPRING

Standard value

Free height: 42.03 mm (1.655 in.)

Load: 24.7kg at 34.5 mm

Out of square: 1.5° or less

VALVE GUIDES

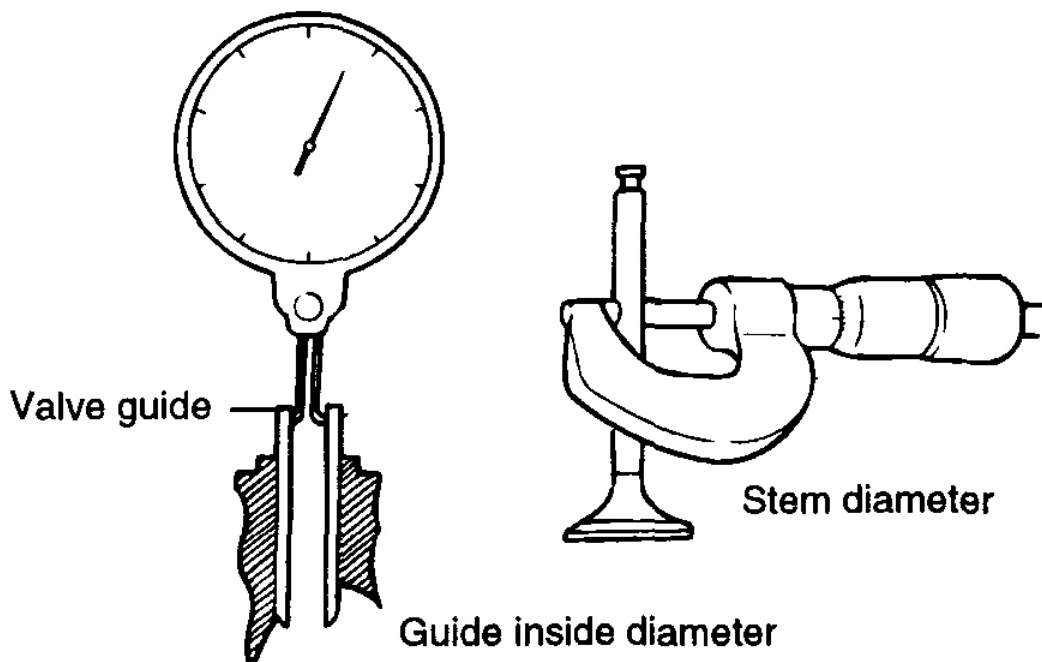
Check the valve stem-to-guide clearance. If the clearance exceeds the service limit, replace the valve guide with the next oversize part.

VALVE STEM-TO-GUIDE CLEARANCE

Standard value

Intake: 0.030 ~ 0.060 mm (0.0012 ~ 0.0024 in.)

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



G03851345

Fig. 92: Measuring Valve Stem-To-Guide Clearance
Courtesy of HYUNDAI MOTOR CO.

VALVE GUIDE OVERSIZES

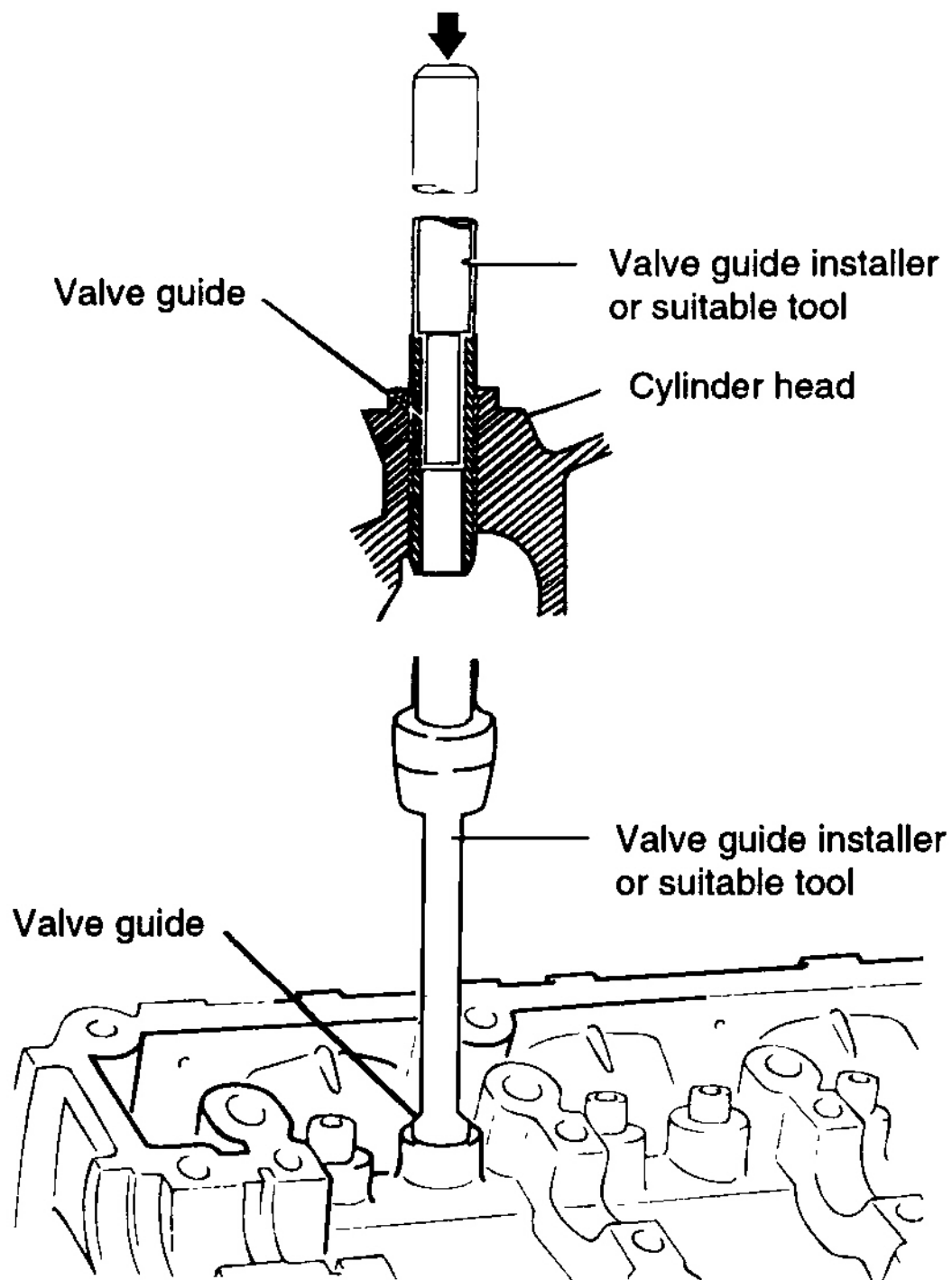
VALVE GUIDE OVERSIZES CHART

Size mm (in.)	Size mark	Cylinder head hole size mm (in.)
0.05 (0.002) O.S.	5	11.05 ~ 11.068 (0.435 ~ 0.4357)
0.25 (0.010) O.S.	25	11.25 ~ 11.268 (0.4429 ~ 0.4436)
0.50 (0.020) O.S.	50	11.50 ~ 11.518 (0.4528 ~ 0.4534)

VALVE GUIDE REPLACEMENT PROCEDURES

The valve guide is installed using a press fit. Using Valve guide installer (09221 - 3F100 A/B) or suitable tool, replace the valve guide described in the following procedure.

1. Using the valve guide installer push rod, push the valve guide out toward the cylinder block with a press.

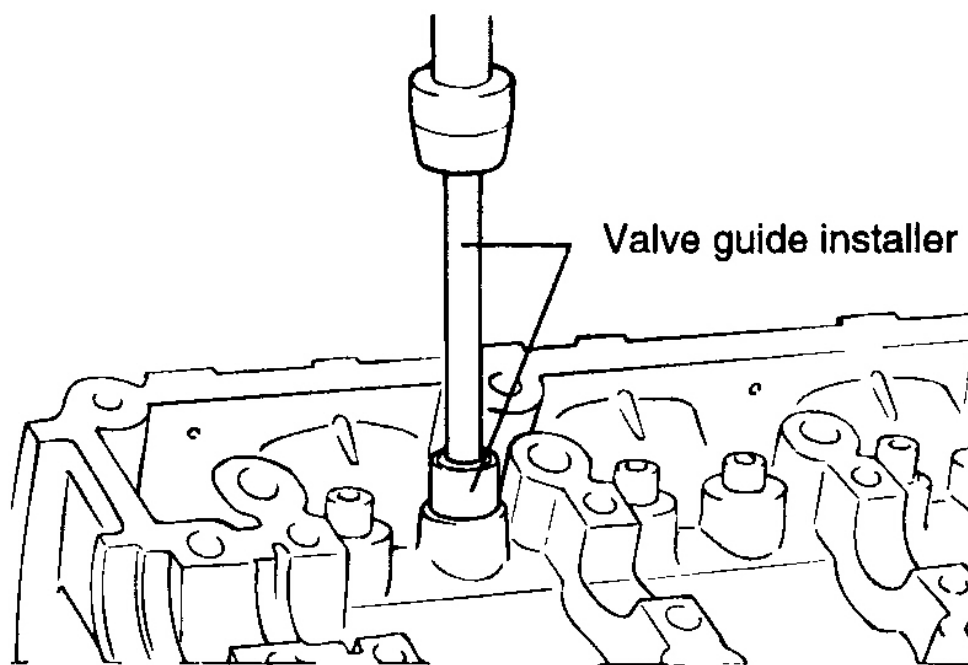
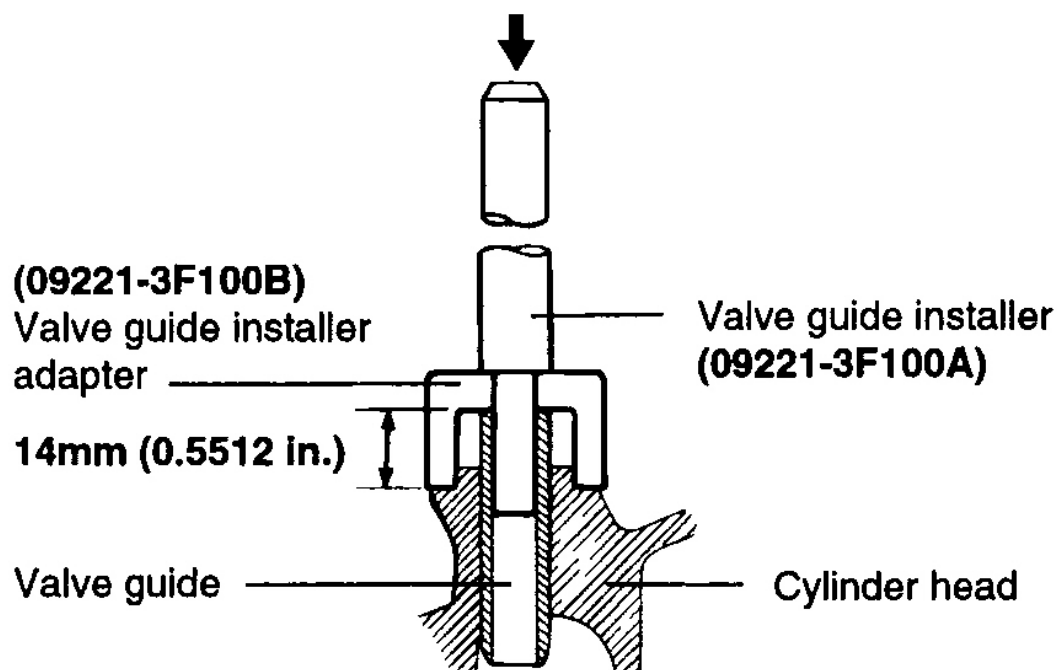


G03851346

Fig. 93: Removing Valve Guide Using Valve Guide Installer Push Rod

Courtesy of HYUNDAI MOTOR CO.

2. Machine the valve guide insert hole in the cylinder head to the specified oversize of the new valve guide.
3. Using the valve guide installer or suitable tool, press fit the valve guide. Using the valve guide installer makes it possible to press fit the valve guide to a predetermined height. Install the valve guide from the top of the cylinder head. Note that intake and exhaust valve guides differ in length.
4. After installing the valve guides, insert new valves and check the clearance.



G03851347

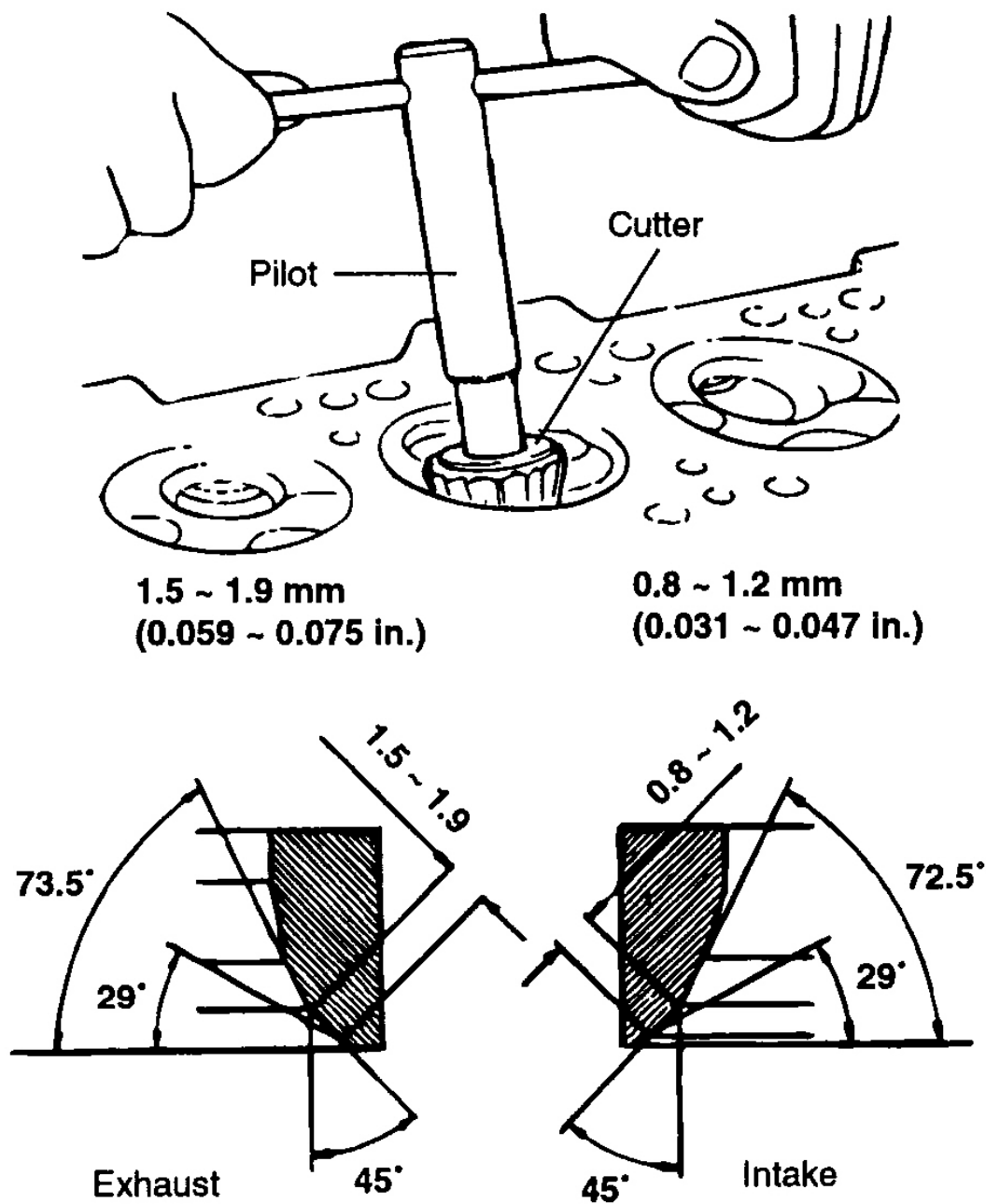
Fig. 94: Installing Valve Guide And Insert New Valves
Courtesy of HYUNDAI MOTOR CO.

5. Whenever valve guides are replaced, check for valve-to-seat contact, and recondition the valve seats as necessary.

VALVE SEAT INSERT

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



G03851348

Fig. 95: Reconditioning Valve Seat Using Valve Cutter
 Courtesy of HYUNDAI MOTOR CO.

VALVE SEAT INSERT REPLACEMENT PROCEDURE

1. Any valve seat insert that has been worn over the service limit should be removed at normal temperature

after cutting away most of the insert wall, using valve seat cutters, as shown in **Fig. 96** .

2. After removing the seat insert, machine the seat insert bore using a reamer or a cutter. Cut to the size shown in the table.
3. Heat the cylinder head to about 250°C (480°F) and press in the oversize seat insert. The oversize seat insert should be at normal room temperature for installation. After installing a new valve seat insert, resurface the valve seat using the same procedure described in the first paragraph of "Valve Seat Insert" (above).

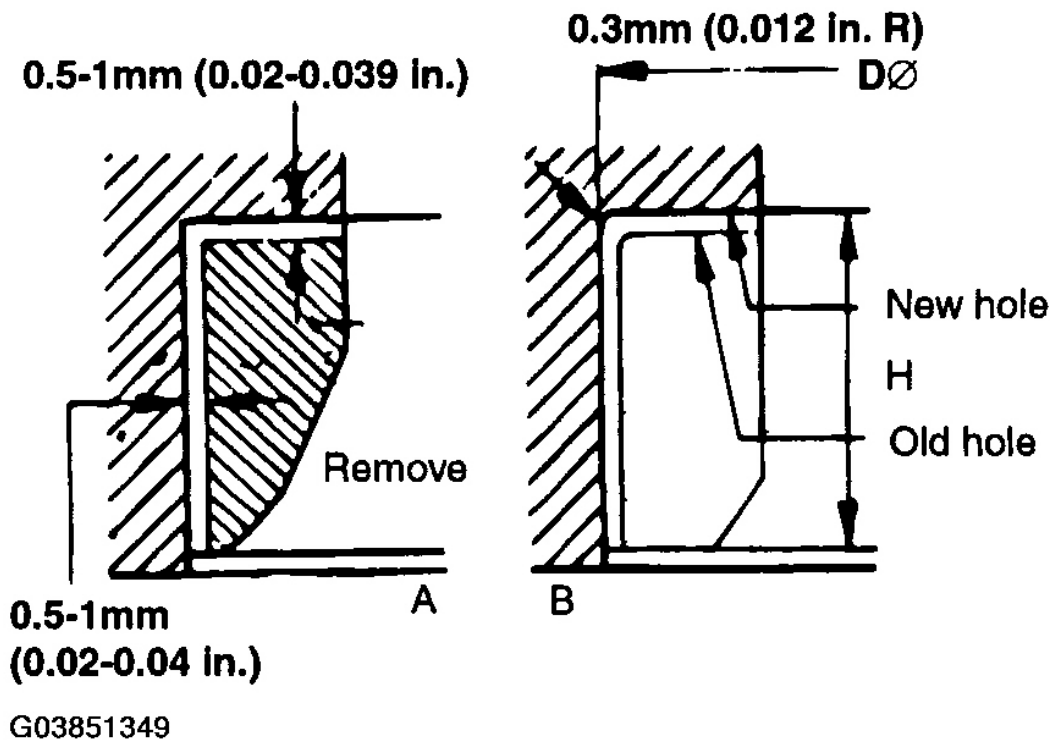


Fig. 96: Identifying Seat Bore Dimensions
Courtesy of HYUNDAI MOTOR CO.

VALVE SEAT INSERT OVERSIZES

VALVE SEAT INSERT OVERSIZES CHART

Description	Size mm (in.)	Size mark	Seat insert height H mm (in.)	Cylinder head I.D. mm (in.)
Intake valve seat insert	0.3 (0.012) O.S.	30	5.1~5.3 (0.201~0.2069)	28.80~28.821 (1.134~1.135)
	0.6 (0.024) O.S.	60	5.4~5.6 (0.213~0.220)	29.10~29.121 (1.146~1.147)
	0.3 (0.012) O.S.	30	5.9~6.1	34.30~34.325

2005 Hyundai Accent GLS

2005 ENGINE Engine Mechanical System (G4EB-GSL 1.5L) - Accent

Exhaust valve seat insert			(0.232~0.240)	(1.350~1.351)
	0.6 (0.024) O.S.	60	6.2~6.4 (0.244~0.252)	34.60~34.625 (1.362~1.363)

VALVES

Check each valve for wear, damage and distortion of head and stem (B). Repair or correct, if necessary. If stem end (A) is pitted or worn, resurface. This correction must be limited to a minimum. Also resurface the valve face.

Replace the valve if the margin has decreased to less than the service limit.

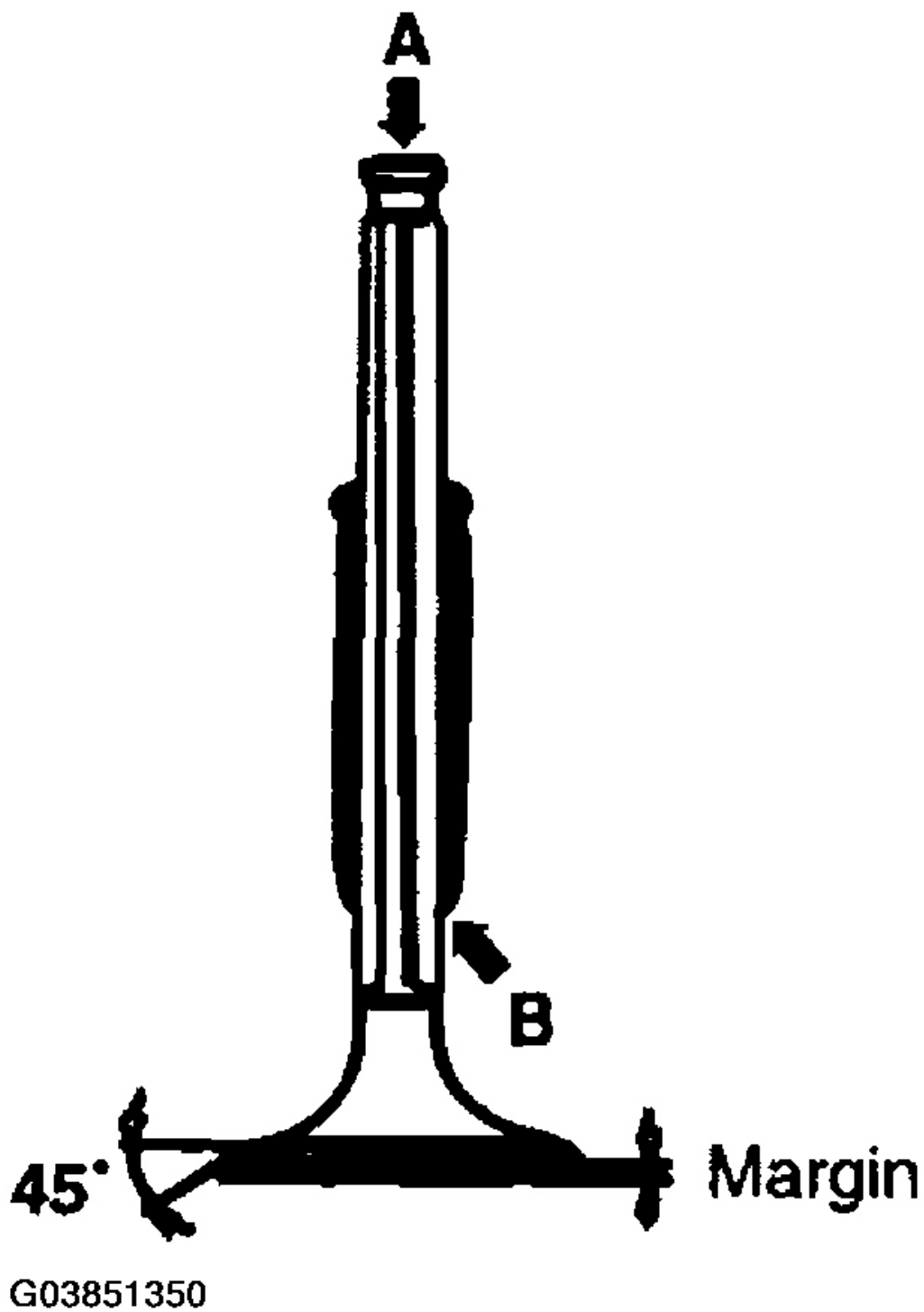


Fig. 97: Inspecting Valve For Wear, Damage And Distortion Of Head And Stem And Stem End

Courtesy of HYUNDAI MOTOR CO.

MARGIN

Standard value

Intake: 1.1 mm (0.043 in.)

Exhaust: 1.4 mm (0.055 in.)

Limit

Intake: 0.8 mm (0.031 in.)

Exhaust: 1.1 mm (0.043 in.)

REASSEMBLY**NOTE:**

- 1. Thoroughly clean each part before assembly.**
- 2. Apply engine oil to sliding and rotating parts.**

1. After installing the spring seat, fit the stem seal into the valve guide.

To install, fit the seal in by lightly tapping the Special Tool, Valve Stem Oil Seal Installer.

The seal is installed in the specified position by means of the special tool. Incorrect installation of the seal will adversely affect the lip I.D. and eccentricity, resulting in oil leaking down the valve guides. Therefore, when installing, be careful not to twist the seal. Do not reuse old stem seals.

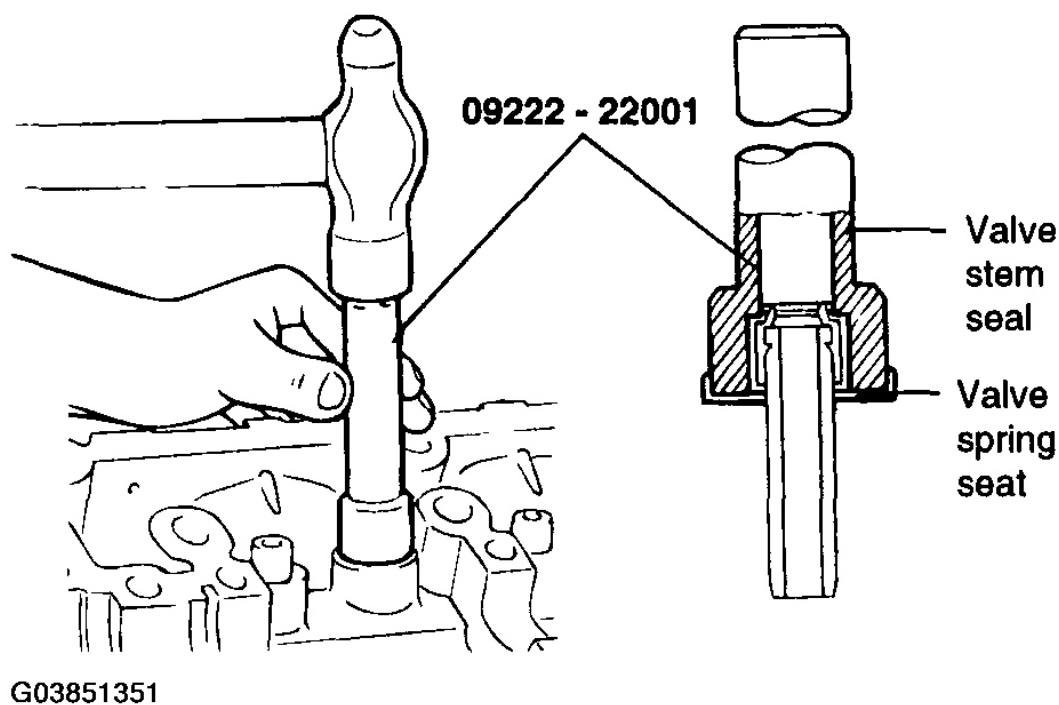
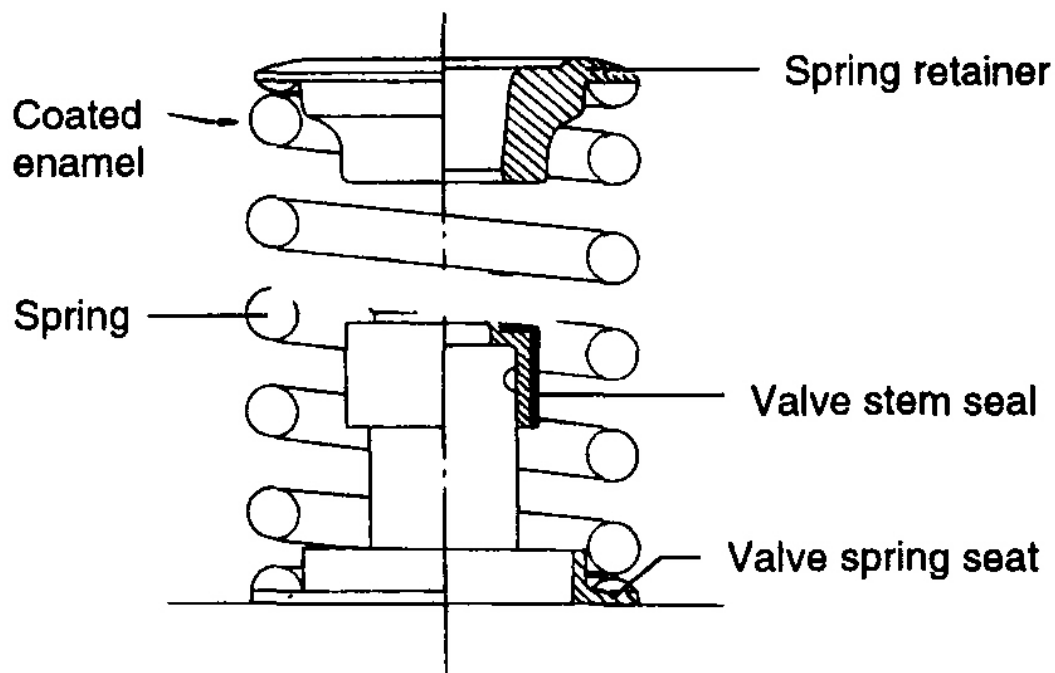


Fig. 98: Installing Stem Seal Into The Valve Guide By Lightly Tapping Valve Stem Oil Seal Installer

Courtesy of HYUNDAI MOTOR CO.

2. Apply engine oil to each valve. Insert the valves into the valve guides. Avoid using force when inserting the valve into the seal. After insertion, check to see if the valve moves smoothly.
3. Install springs and spring retainers. Valve springs should be installed with the enamel coated side toward the valve spring retainer.

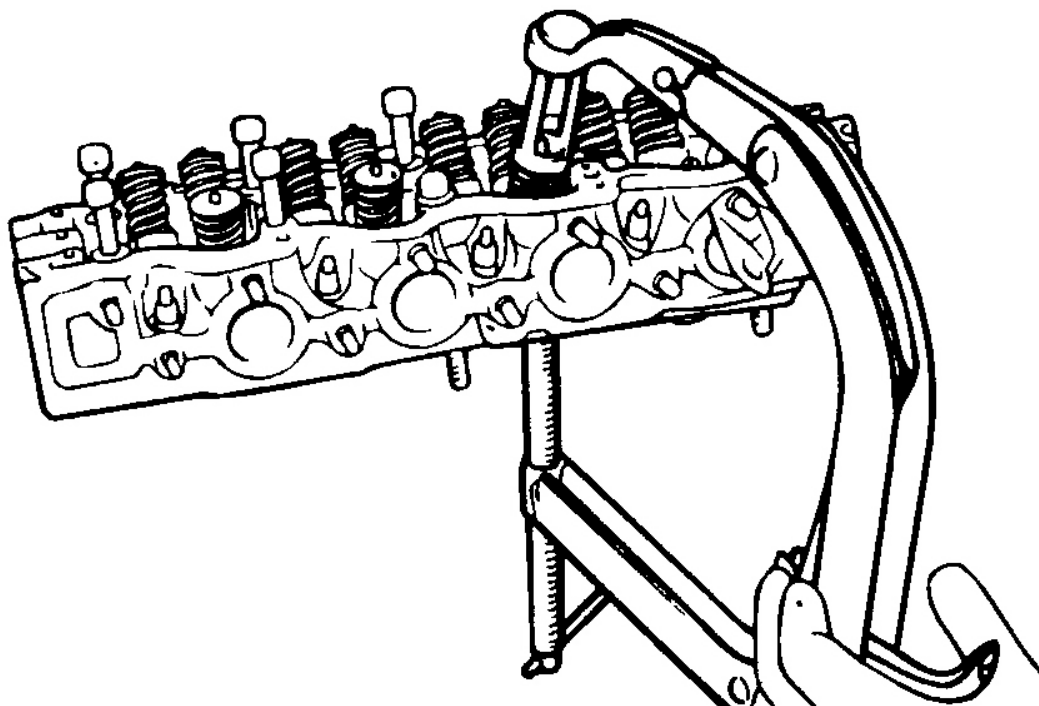
Valve springs should be installed with the enamel coated side toward the valve spring retainer.



G03851352

Fig. 99: Installing Springs And Spring Retainers
Courtesy of HYUNDAI MOTOR CO.

4. Using special tool, valve spring remover and installer, compress the spring. Be careful that the valve stem seal is not distorted by the bottom of the retainer. Then install the retainer locks. After installation of the valves, make certain that the retainer locks are properly installed.



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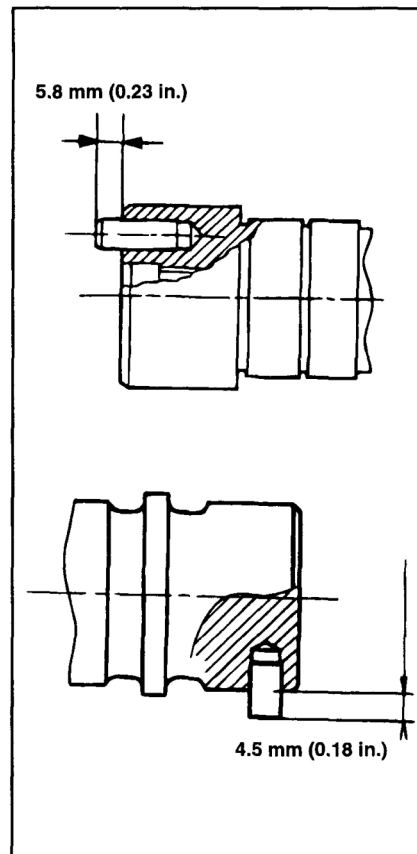
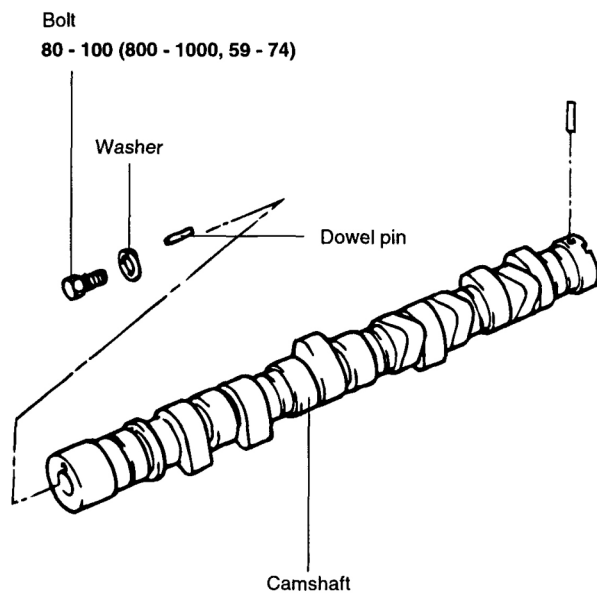
Fig. 100: Compressing Spring Using Valve Spring Remover And Installer
Courtesy of HYUNDAI MOTOR CO.

5. Install the cylinder head. Refer to "CYLINDER HEAD "

MAIN MOVING SYSTEM

CAM SHAFT

COMPONENTS



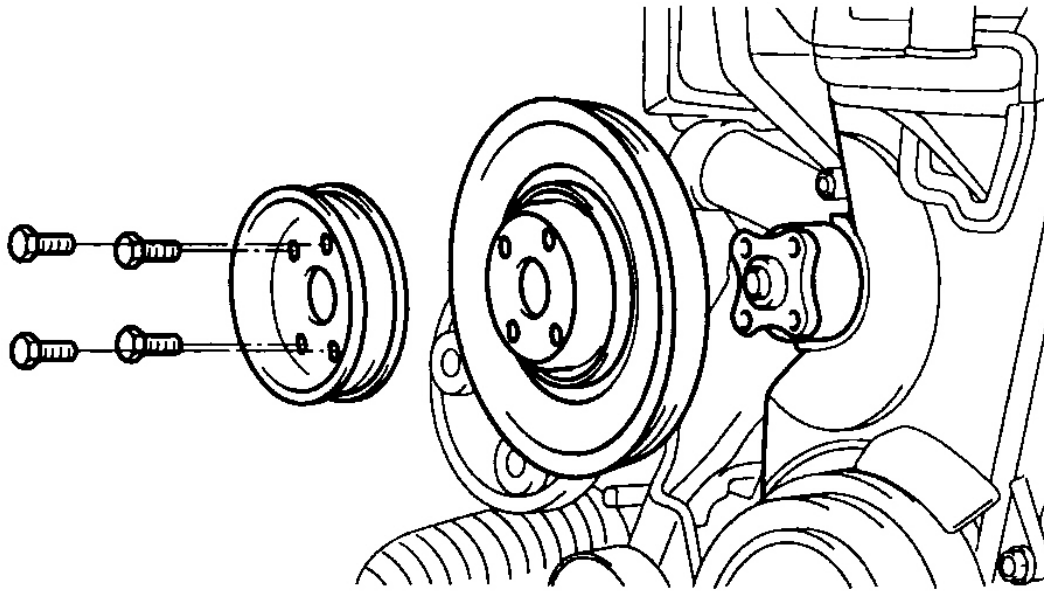
TORQUE : Nm (kg.cm,lb.ft)

G03851354

Fig. 101: Identifying Cam Shaft Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

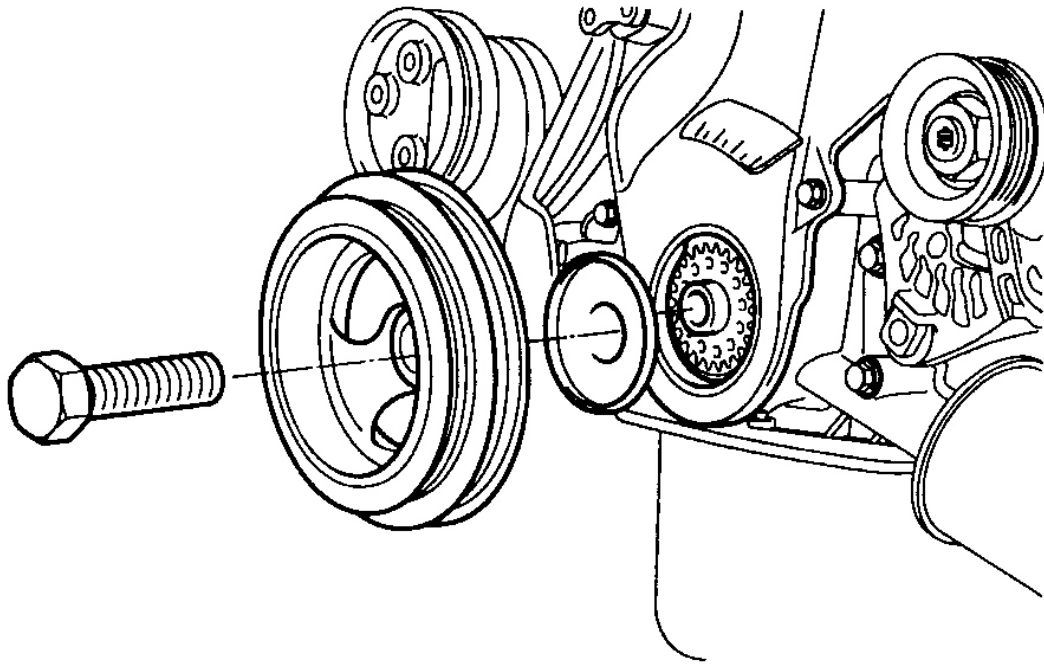
DISASSEMBLY

1. Disconnect the breather hose and the PCV hose.
2. Remove the coolant pump pulley and crankshaft pulley.



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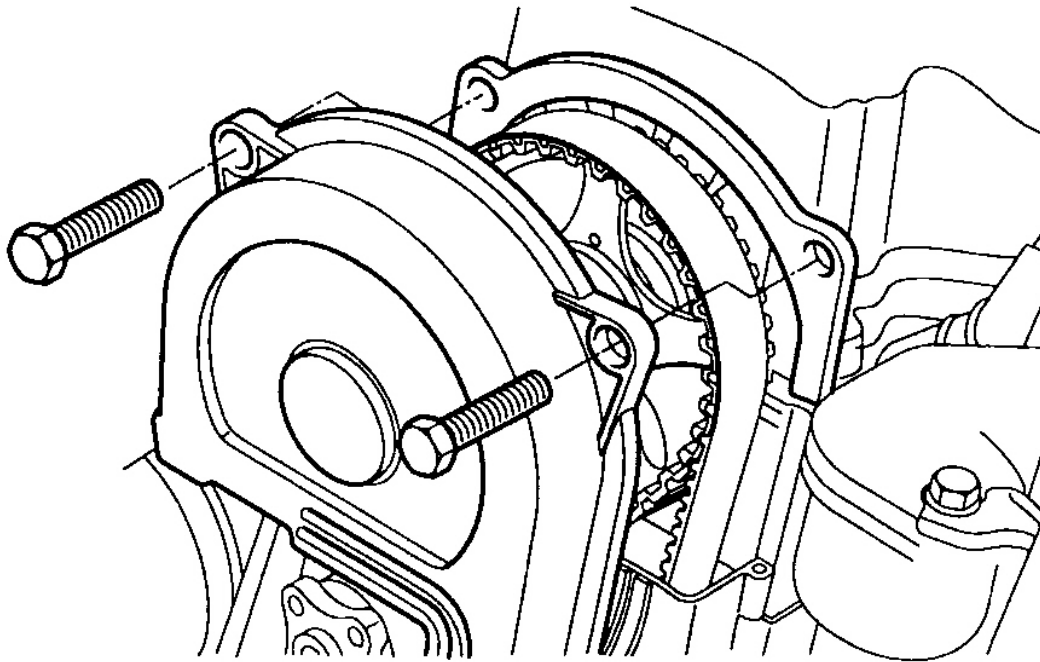
Fig. 102: Removing Coolant Pump Pulley
Courtesy of HYUNDAI MOTOR CO.



G03851356

Fig. 103: Removing Crankshaft Pulley
Courtesy of HYUNDAI MOTOR CO.

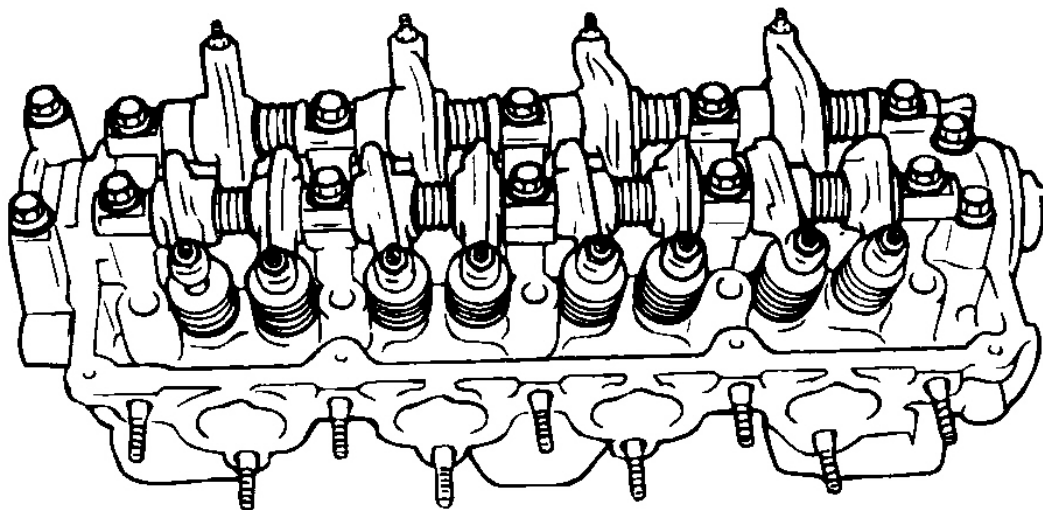
3. Remove the timing belt cover.



G03851357

Fig. 104: Removing Timing Belt Cover
Courtesy of HYUNDAI MOTOR CO.

4. Move the timing belt tensioner pulley toward the coolant pump and temporarily secure it.
5. Remove the timing belt from the camshaft sprocket.
6. Remove the camshaft sprocket.
7. Remove the rocker cover.
8. Remove the rocker arm shaft assembly, Refer to "**ROCKER ARMS** and **ROCKER ARM SHAFTS**".



G03851358

Fig. 105: Removing Rocker Arm Shaft Assembly
Courtesy of HYUNDAI MOTOR CO.

9. Remove the camshaft bearing caps.
10. Remove the camshaft.

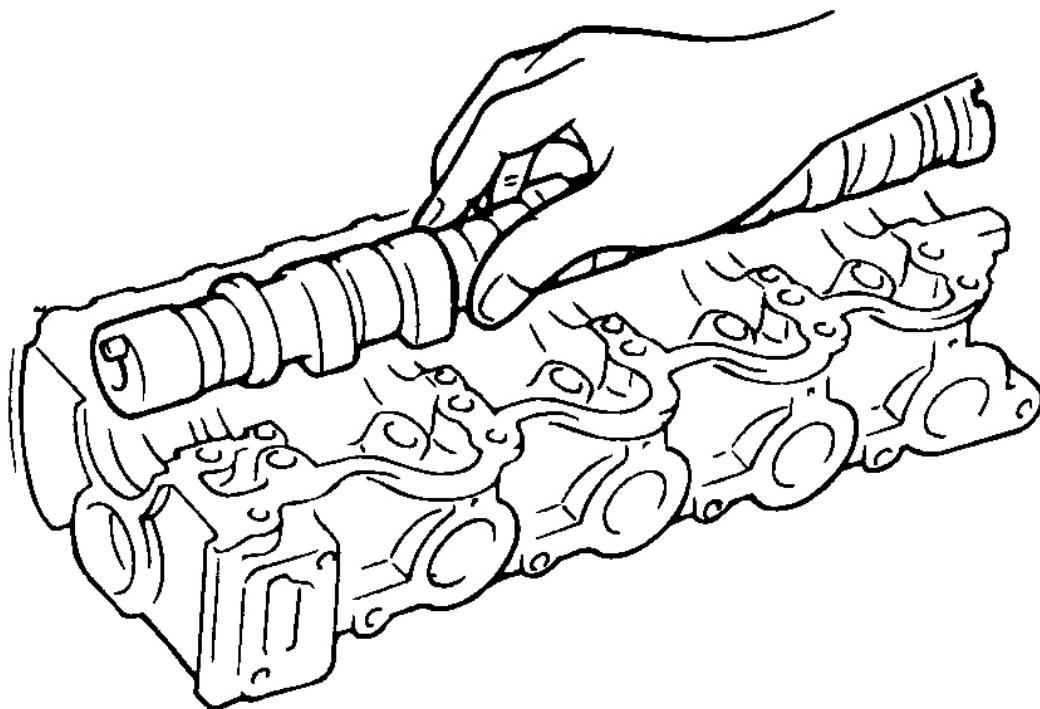
**G03851359**

Fig. 106: Removing Camshaft
Courtesy of HYUNDAI MOTOR CO.

INSPECTION**CAMSHAFT**

1. Check the camshaft journals for wear. If the journals are badly worn, replace the camshaft.
2. Check the cam lobes for damage. If the lobe is damaged or worn excessively, replace the camshaft.

Cam height

Standard value

Intake: 42.8575 mm (1.6873 in.)

Exhaust: 42.7354 mm (1.6825 in.)

Limit

Intake: 42.3575 mm (1.6676 in.)

Exhaust: 42.2353 mm (1.6628 in.)

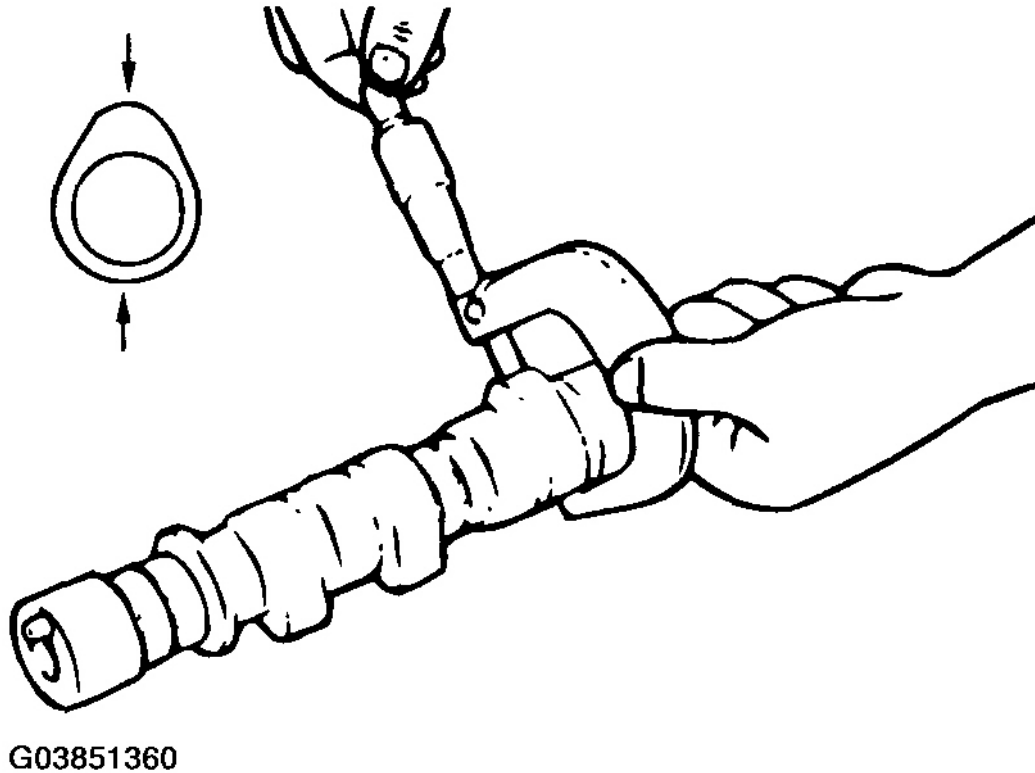


Fig. 107: Measuring Cam Height
Courtesy of HYUNDAI MOTOR CO.

3. Check the cam surface for abnormal wear or damage, and replace if necessary.
4. Check each bearing for damage. If the bearing surface is excessively damaged, Replace the cylinder head assembly or camshaft bearing cap, as necessary.

OIL SEAL (CAMSHAFT FRONT)

1. Check the lips for wear. If lip threads are worn, replace.
2. Check the oil seal lip contacting surface of the camshaft. If it is worn in stages, replace the camshaft.

Camshaft end play:

0.07 ~ 0.28 mm (0.0003 ~ 0.0011 in.)

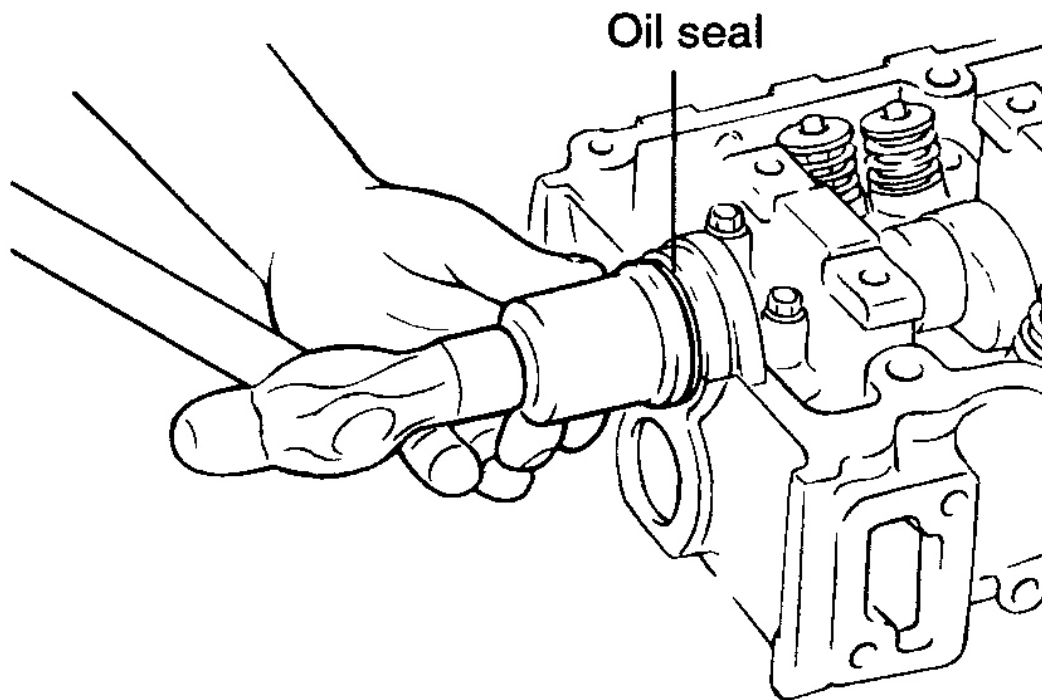
REASSEMBLY

1. Install the camshaft after lubricating the journal of the camshaft with engine oil.
2. Install the camshaft bearing caps.
3. Install the rocker arm and rocker arm shaft.

Refer to "**ROCKER ARMS** and **ROCKER ARM SHAFTS**".

4. Using the Special Tools, Camshaft Oil Seal Installer (09221-21000), press and fit the camshaft oil seal. Be sure to apply engine oil to the external surface of the oil seal.

Insert the oil seal along the camshaft front end and install by driving the installer with a hammer until the oil seal is fully seated.



G03851361

Fig. 108: Pressing And Fitting Camshaft Oil Seal Using Special Tools, Camshaft Oil Seal Installer
Courtesy of HYUNDAI MOTOR CO.

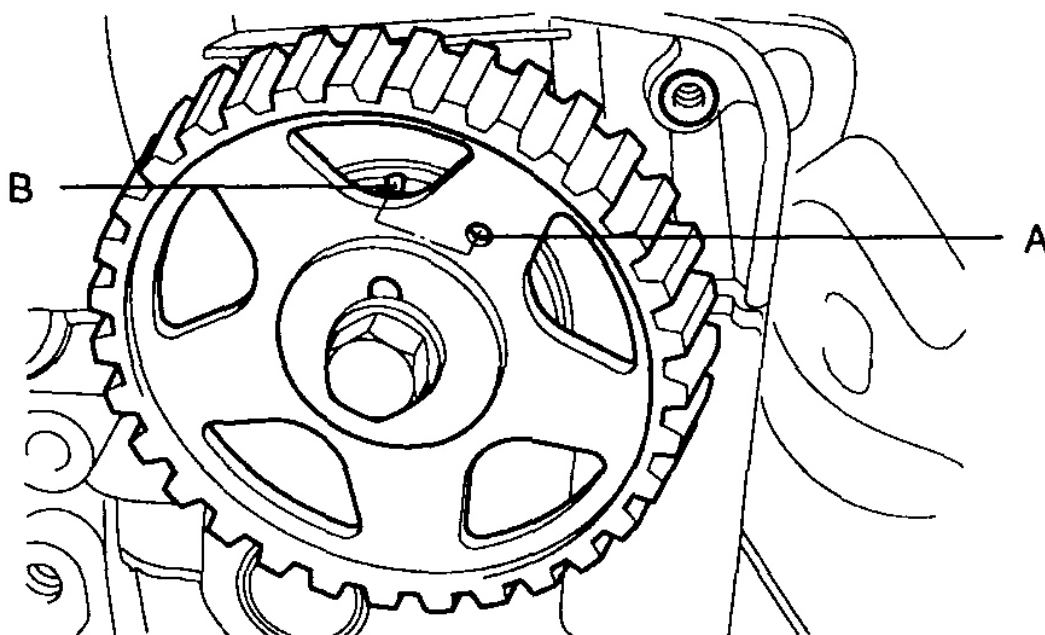
5. Install the camshaft sprocket and tighten the bolts to the specified torque.

Tightening torque

Camshaft sprocket bolt:

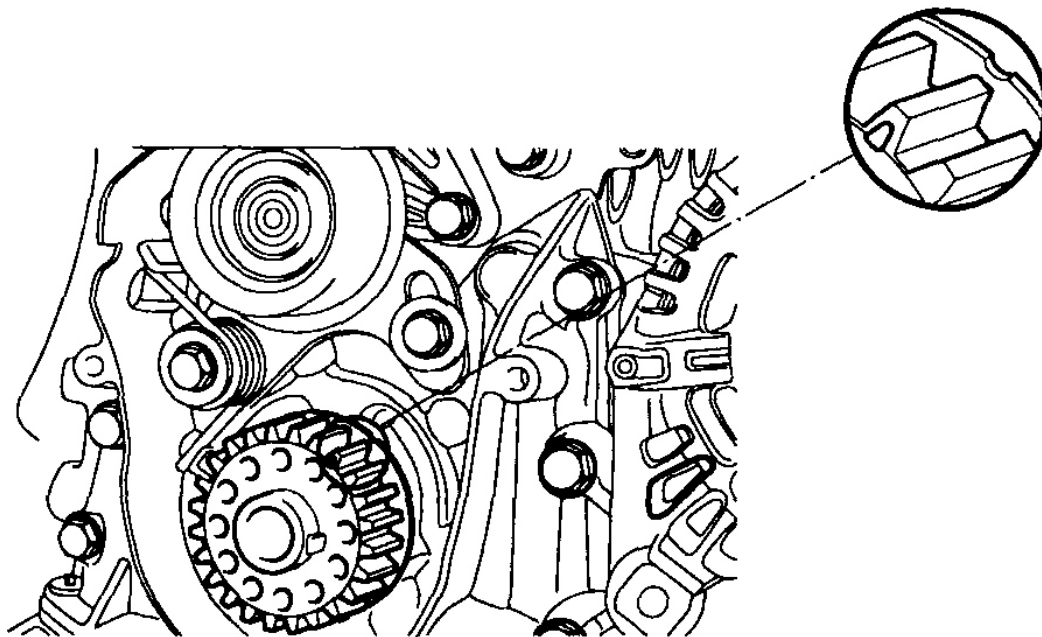
80 ~ 100 Nm (800 ~ 1000 kg.cm, 59 ~ 74 lb.ft)

6. Align the camshaft sprocket and crankshaft sprocket timing marks. The piston in the No. 1 cylinder will then be at top dead center on the compression stroke.



G03851362

Fig. 109: Aligning Camshaft Sprocket And Crankshaft Sprocket Timing Marks
Courtesy of HYUNDAI MOTOR CO.



G03851363

Fig. 110: Aligning Camshaft Sprocket And Crankshaft Sprocket Timing Marks
Courtesy of HYUNDAI MOTOR CO.

7. Install a gasket in the rocker cover groove.
8. Temporarily install the rocker cover.
9. Start the engine and run at idle.
10. Install the rocker cover and tighten the bolts to the specified torque.

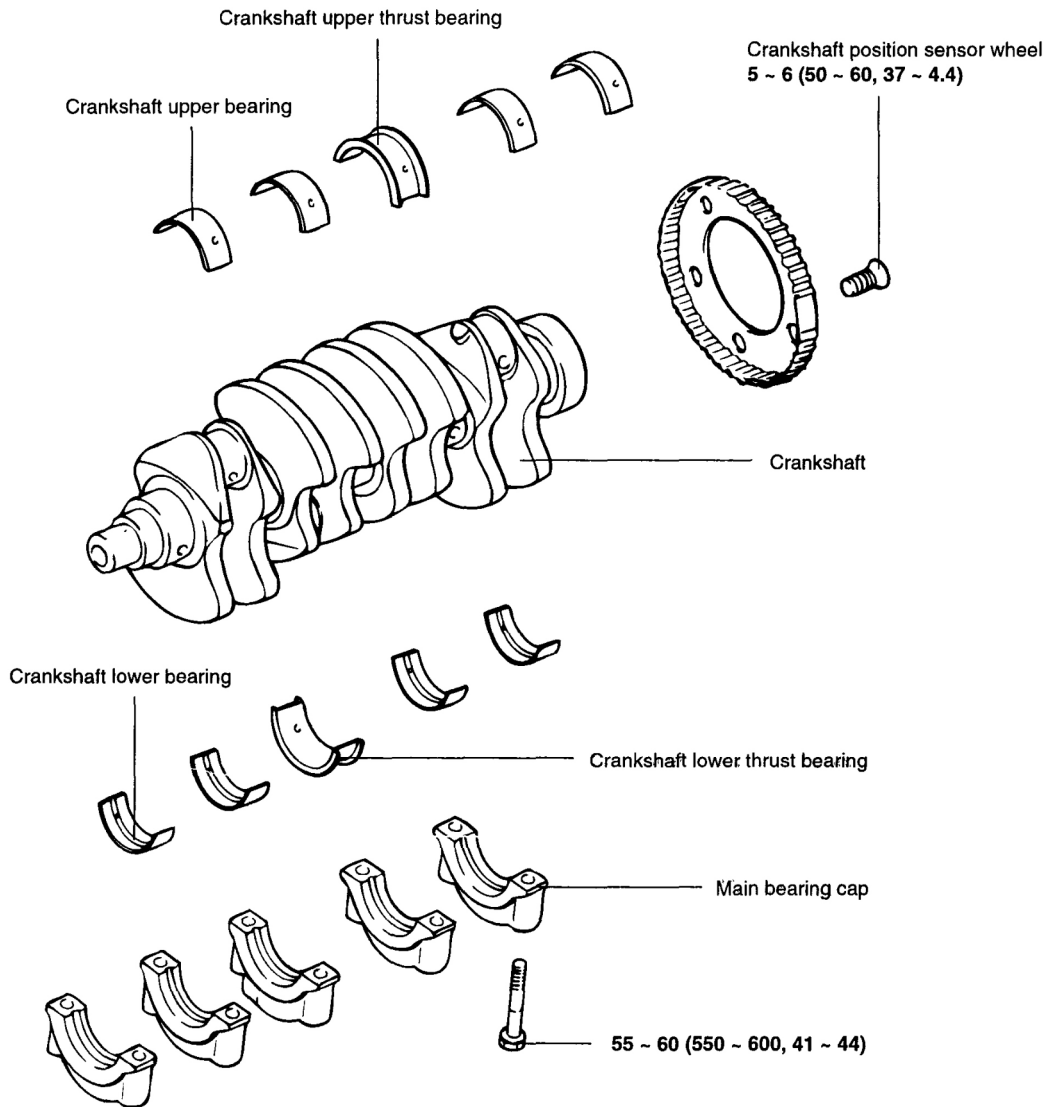
Tightening torque

Rocker cover bolt: 8~10 Nm (80~100 kg.cm, 6~7 lb.ft)

11. Install the timing belt cover.
12. Install the coolant pump pulley and crankshaft pulley.

CRANK SHAFT

COMPONENTS



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

G03851364

Fig. 111: Exploded View Of Crank Shaft And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the timing belt train, front case, flywheel cylinder head assembly and oil pan. For details, refer to related chapters.
2. Remove the rear plate and the rear oil seal.
3. Remove the connecting rod caps.
4. Remove the main bearing caps and remove the crankshaft. Keep the bearings in order according to the

cap number.

5. Remove the crankshaft position sensor wheel.

CAUTION: Mark the main bearing caps to permit reassembly in the original position and direction.

INSPECTION

CRANKSHAFT

1. Check the crankshaft journals and pins for damage, uneven wear and cracks. Also check oil holes for clogging. Correct or replace any defective part.
2. Inspect out-of-roundness and taper of crankshaft journal and pin.

Standard value

Crankshaft journal O.D: 50 mm (1.9685 in.)

Crankshaft pin O.D: 45 mm (1.7717 in.)

Crankshaft journal, pin out-of-roundness and taper:

0.01 mm (0.0004 in.) or less

MAIN BEARINGS AND CONNECTING ROD BEARINGS

Visually inspect each bearing for peeling, melting, seizure and improper contact. Replace the defective bearings.

OIL CLEARANCE MEASUREMENT

To check the oil clearance, measure outside diameter of the crankshaft journal and the crank pin and inside diameter of the bearing. The clearance measurement is the difference between the measured outside and inside diameters.

Standard value

Journal oil clearance No. 1, 2, 4, 5:

0.020 ~ 0.040 mm (0.0008 ~ 0.0016 in.)

Journal oil clearance No. 3 (center):

0.028 ~ 0.046 mm (0.0011 ~ 0.0018 in.)

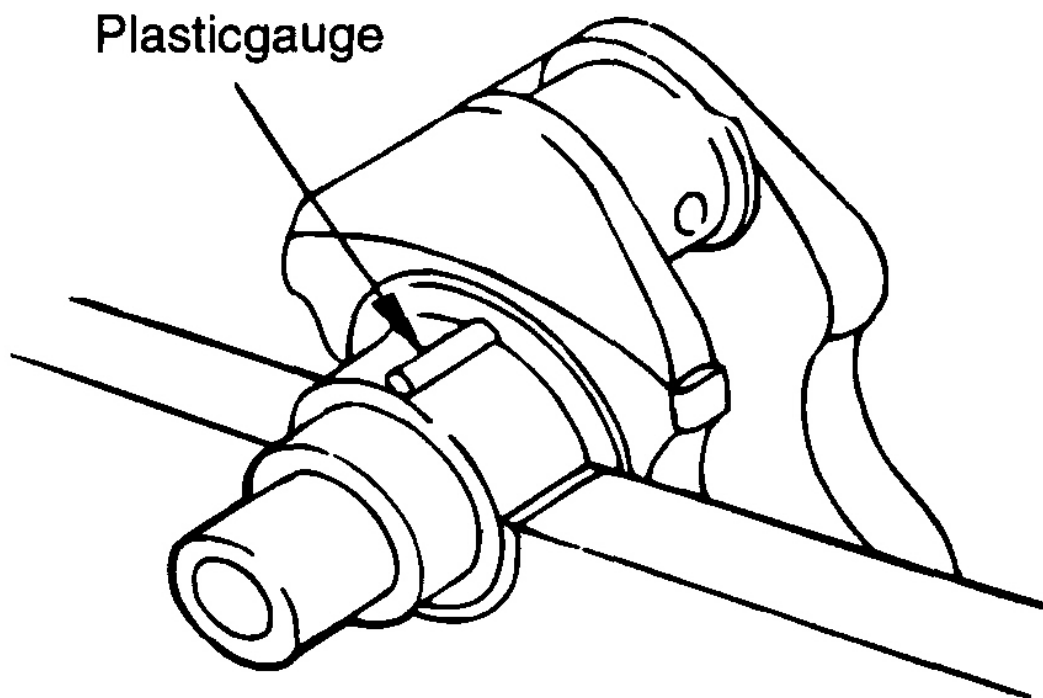
Pin oil clearance:

0.018 ~ 0.036 mm (0.0007 ~ 0.0014 in.)

PLASTIC GAUGE METHOD

A plastic gauge may be used to measure the clearance.

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



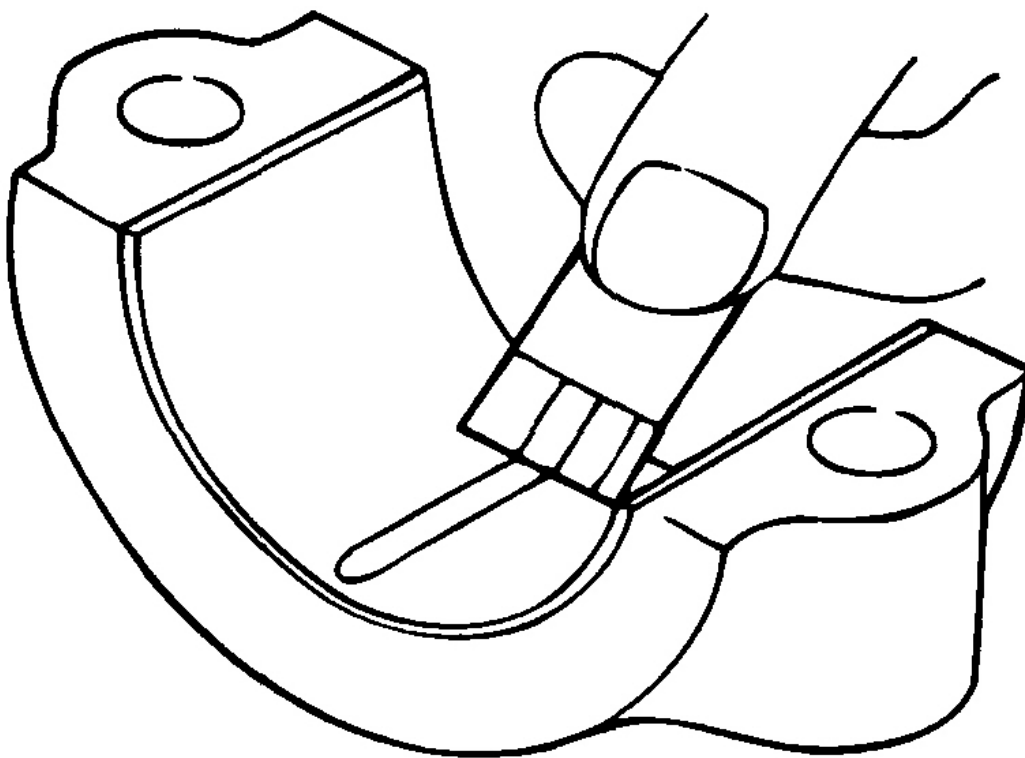
G03851365

Fig. 112: Measuring Clearance Using Plastic Gauge
Courtesy of HYUNDAI MOTOR CO.

3. Install the crankshaft, bearings, and caps. Tighten them to the specified torque. During this operation, do not turn the crankshaft. Remove the caps.

Measure the width of the plastic gauge at the widest point using the scale printed on the gauge package. If the clearance exceeds the repair limit, replace the bearing.

Should the standard clearance not be obtained even after bearing replacement, the journal should be machined to a recommended undersize, and a bearing of the same size should be installed.



G03851366

Fig. 113: Measuring Width Of Plastic Gauge At Widest Point Using Scale
Courtesy of HYUNDAI MOTOR CO.

OIL SEAL

Check front and rear oil seals for damage or worn lips. Replace any seal that is defective.

CRANKSHAFT POSITION SENSOR WHEEL

1. Remove the crankshaft position sensor wheel.
2. Check the crankshaft position sensor wheel for damage, cracks and wear. Replace if necessary.
3. Check the clearance between the crankshaft position sensor wheel and the crankshaft position sensor with a depth gage.

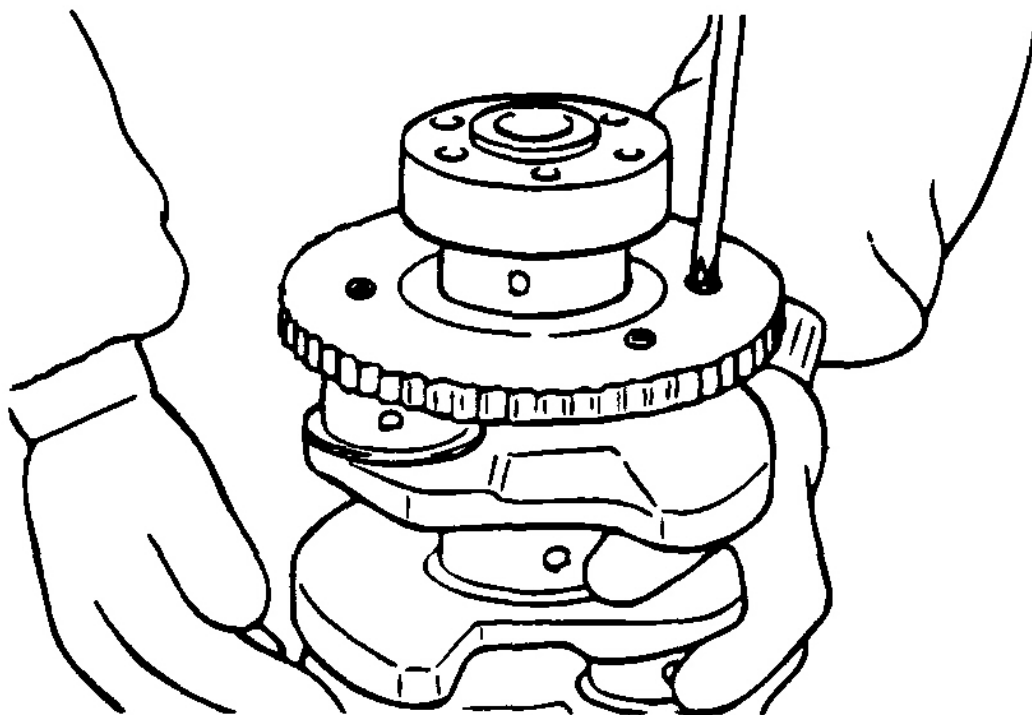
Standard value

Clearance between the crankshaft position sensor wheel and crankshaft position sensor:

0.5 ~ 1.5 mm (0.020 ~ 0.059 in.)

NOTE:

1. Measure the depth of the top of the crankshaft position sensor wheel teeth and the outside of transaxle housing.
2. Measure the difference between the crankshaft position sensor length and depth.



G03851367

Fig. 114: Measuring Difference Between Crankshaft Position Sensor Length And Depth

Courtesy of HYUNDAI MOTOR CO.

3. The crankshaft position sensor length is the distance between the end of crankshaft position sensor and inner point of contacting face.

REPLACEMENT

1. Check the cylinder block stamping crankshaft bore size code.

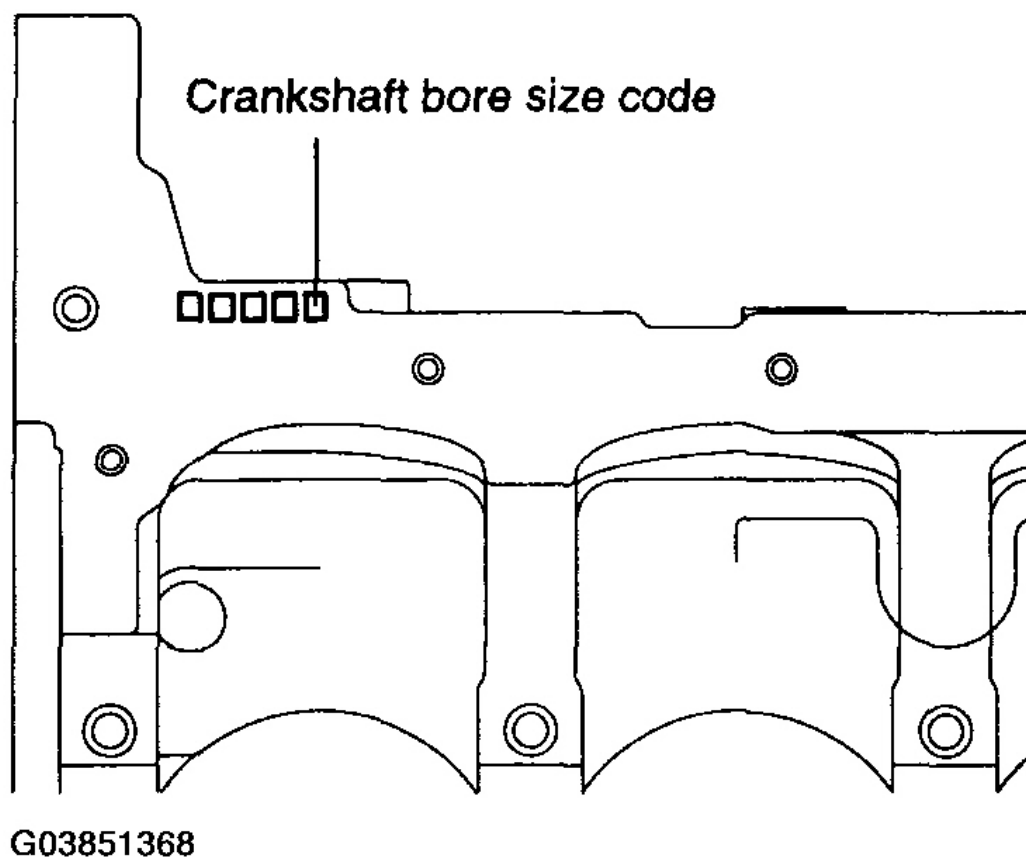


Fig. 115: Identifying Cylinder Block Stamping Crankshaft Bore Size Code
 Courtesy of HYUNDAI MOTOR CO.

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

CYLINDER BLOCK CRANKSHAFT BORE DIAMETER

Class	Cylinder Block Crankshaft Bore Diameter	Size Code.
a	54 ~ 54.006 mm (2.1259 ~ 2.1262 in.)	/
b	54.006 ~ 54.012 mm (2.1262 ~ 2.1264 in.)	b
c	54.012 ~ 54.016 mm (2.1264 ~ 2.1266 in.)	c

2. Check the crankshaft main journal

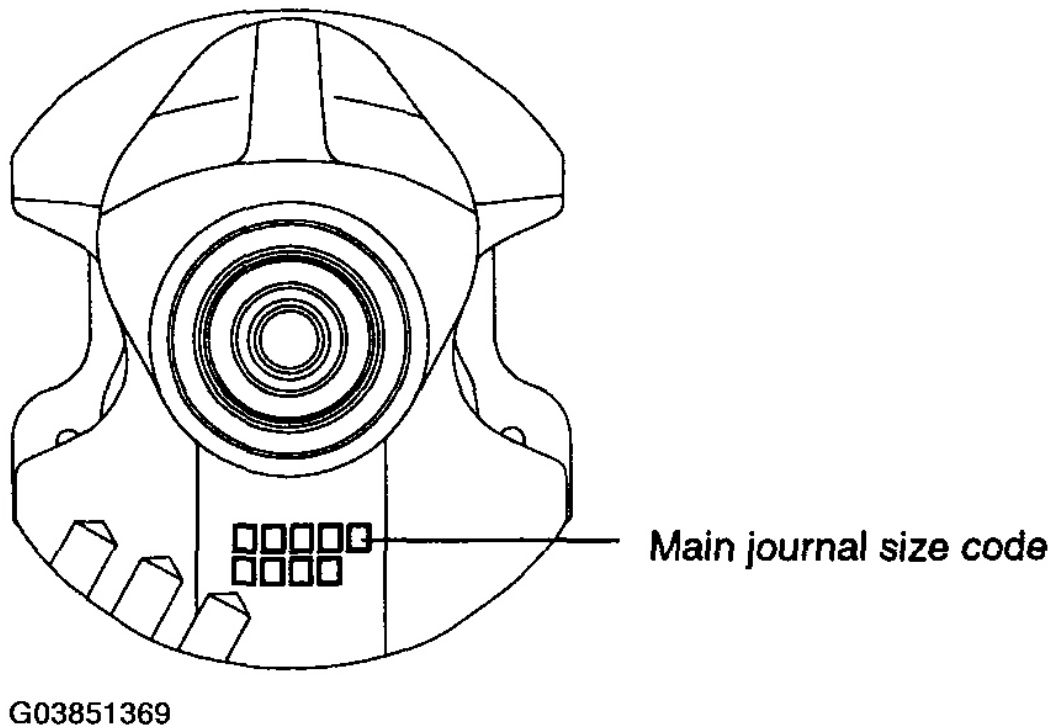


Fig. 116: Identifying Crankshaft Main Journal Size Code
 Courtesy of HYUNDAI MOTOR CO.

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

CRANKSHAFT MAIN JOURNAL DIAMETER

CRANKSHAFT MAIN JOURNAL DIAMETER

Class	Main Journal Diameter	Size Code.
I	49.968 ~ 49.962 mm (1.9672 ~ 1.9670 in.)	/
II	49.962 ~ 49.956 mm (1.9670 ~ 1.9667 in.)	b
III	49.956 ~ 49.950 mm (1.9667 ~ 1.9665 in.)	c

MAIN JOURNAL BEARING THICKNESS**No. 1, 2, 4, 5****MAIN JOURNAL BEARING THICKNESS**

Color	Main journal bearing thickness
Yellow	2.002~2.005mm (0.0788~0.0789in.)
Green	2.005~2.008mm (0.0789~0.0790in.)
No color	2.008~2.011mm (0.0790~0.0791in.)
Black	2.011~2.014mm (0.0791~0.0793in.)
Blue	2.014~2.017mm (0.0793~0.0794in.)

No.3 (CENTER BEARING)**MAIN JOURNAL BEARING THICKNESS**

Color	Main journal bearing thickness
Yellow	1.999~2.002mm (0.0787~0.0788in.)
Green	2.002~2.005mm (0.0788~0.0789in.)
No color	2.005~2.008mm (0.0789~0.0790in.)
Black	2.008~2.011mm (0.0790~0.0791in.)
Blue	2.011~2.014mm (0.0791~0.0793in.)

3. Choose proper main journal bearing in table.

REASSEMBLY

1. Install the upper main bearing inserts in the cylinder block.

When reusing the main bearings, remember to install them by referring to the location marks made at the time of disassembly.

2. Install the crankshaft. Apply engine oil to the journals.
3. Install bearing caps and tighten cap bolts to the specified torque in the sequence of the center, No.2, 4, front and rear caps.

Cap bolts should be tightened evenly in 2 to 3 stages before they are tightened to the specified torque.

The caps should be installed with the arrow mark directed toward the crank pulley side of engine. Cap numbers must be correct.

Tightening torque

Main bearing cap bolt:

55 ~ 60 Nm (550 ~ 600 kg.cm, 41 ~ 44 lb.ft)

Connecting rod cap bolt:

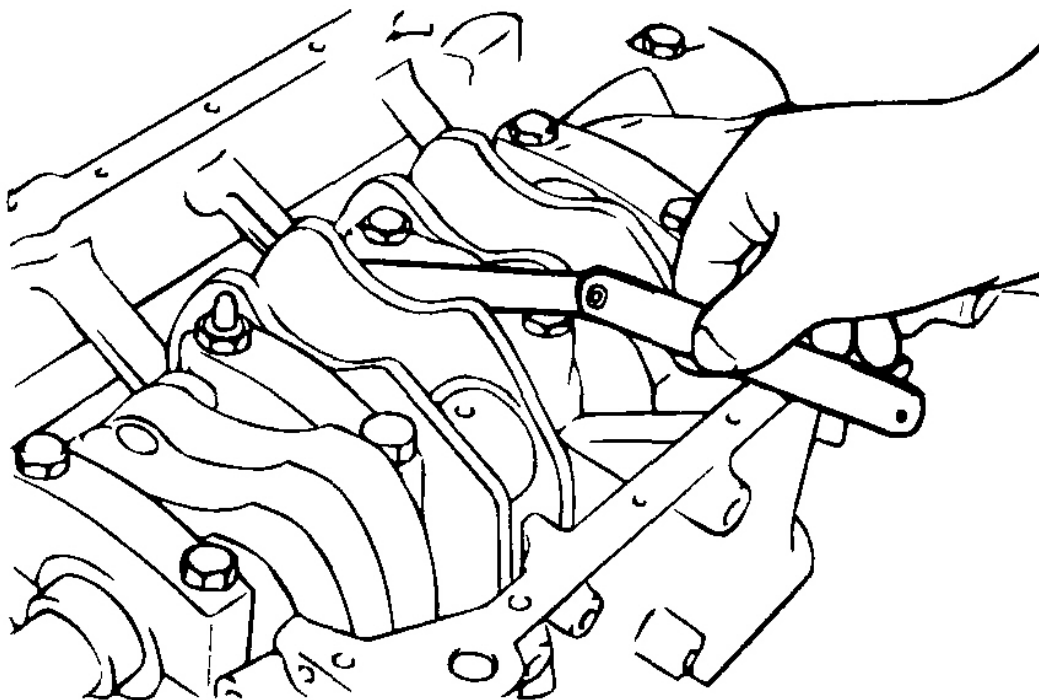
32 ~ 35 Nm (320 ~ 350 kg.cm, 24 ~ 26 lb.ft)

4. Make certain that the crankshaft turns freely and has the proper clearance between the center main bearing thrust flange and the connecting rod big end bearing.

Standard value

Crankshaft end play:

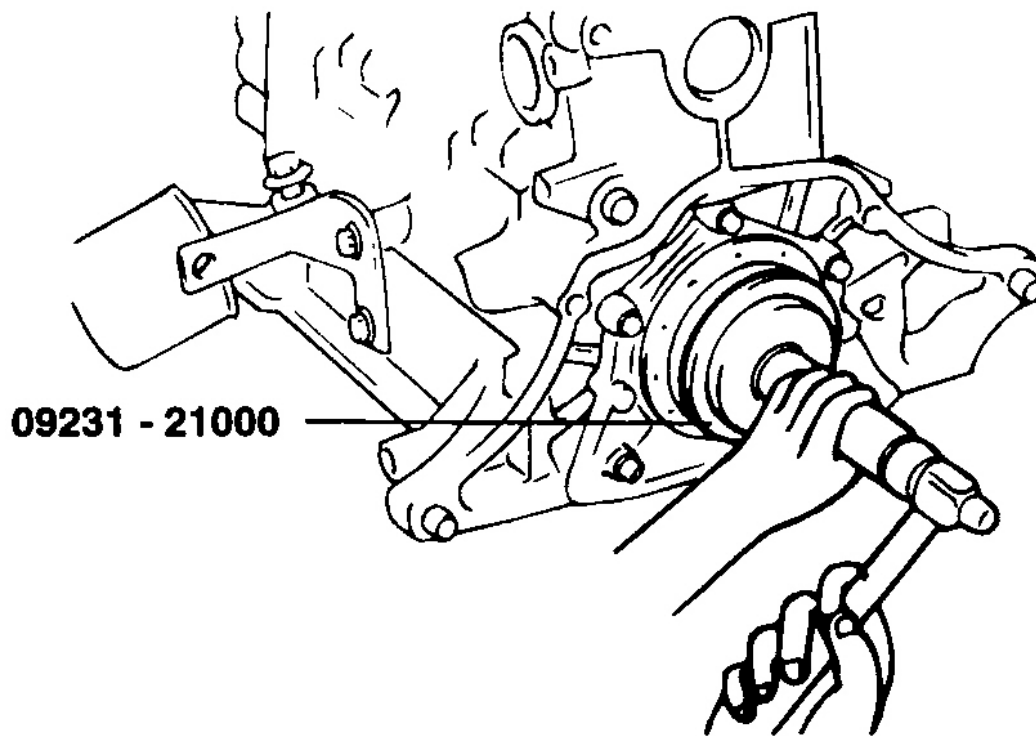
0.05 ~ 0.175 mm (0.002 ~ 0.005 in.)



G03851370

Fig. 117: Measuring Crankshaft End Play
Courtesy of HYUNDAI MOTOR CO.

5. Install the oil seal in the crankshaft rear oil seal case. Use the special tool, crankshaft rear oil seal installer (09231 - 21000) as shown. Press and fit the oil seal in all the way, being careful not to misalign it.



G03851371

Fig. 118: Installing Crankshaft Rear Oil Seal
Courtesy of HYUNDAI MOTOR CO.

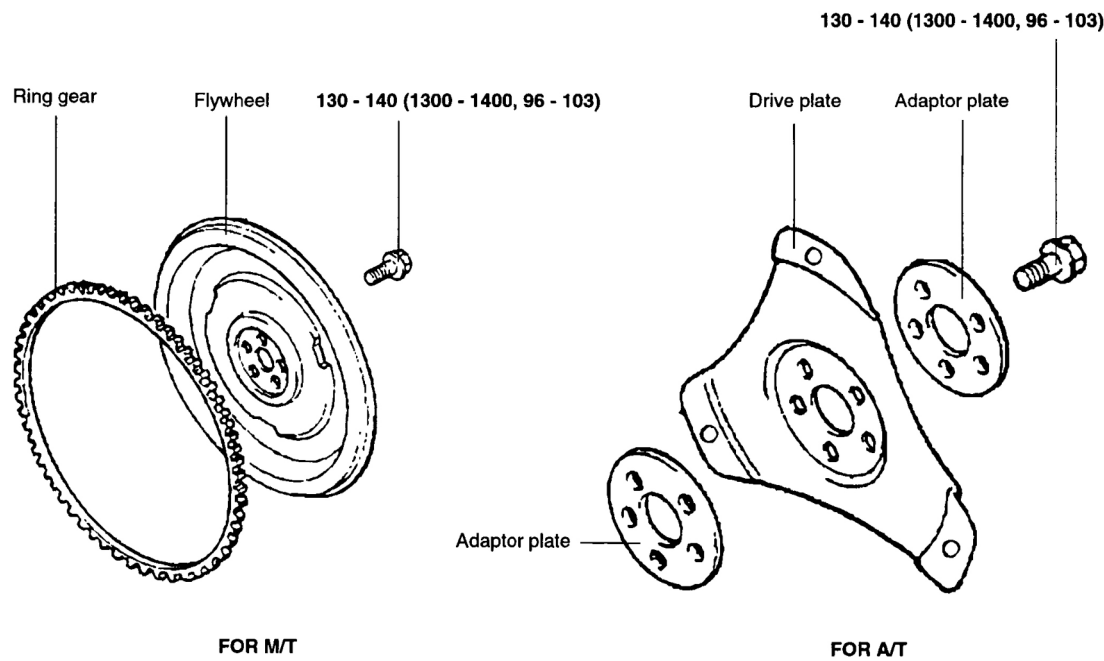
6. Install the rear oil seal case and gasket. Tighten the five bolts.

Apply engine oil to the oil seal lips and crankshaft at the time of installation.

7. Install the rear plate and tighten the bolts.
8. Install the connecting rod caps. Refer to the "**PISTON** and **CONNECTING RODS**".
9. Install the flywheel, front case, oil pan and timing belt. For further details, refer to the respective chapters.

FLY WHEEL

COMPONENTS



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

G03851372

Fig. 119: Identifying Fly Wheel Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the transaxle and clutch.
2. Remove the flywheel.

INSPECTION

1. Check the clutch disc contacting surface of the fly wheel for damage and wear. Replace the flywheel if excessively damaged or worn.
2. Check the clutch disc contacting surface of the fly wheel for runout.

Standard value

Flywheel run-out: 0.1 mm (0.004 in.)

3. Check the ring gear for damage, crack and wear, and replace if necessary.

REASSEMBLY

Install the flywheel assembly and tighten the bolts to the specified torque.

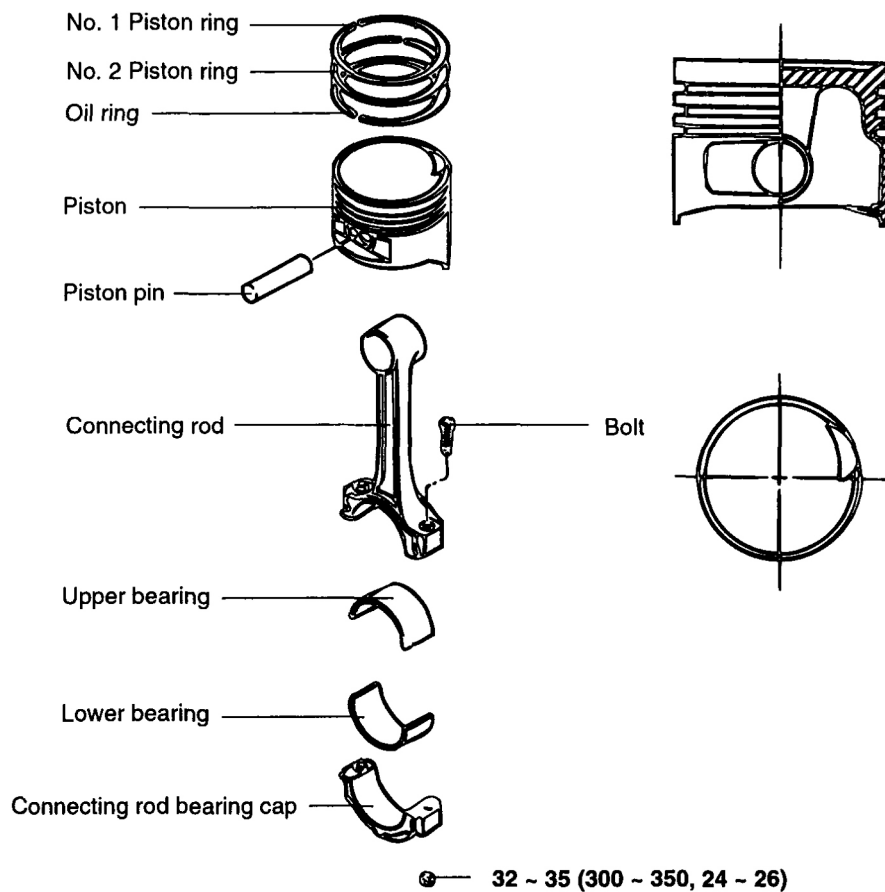
Tightening torque

Flywheel bolt:

130 ~ 140 Nm (1300 ~ 1400 kg.cm, 96 ~ 103 lb.ft)

PISTON

COMPONENTS



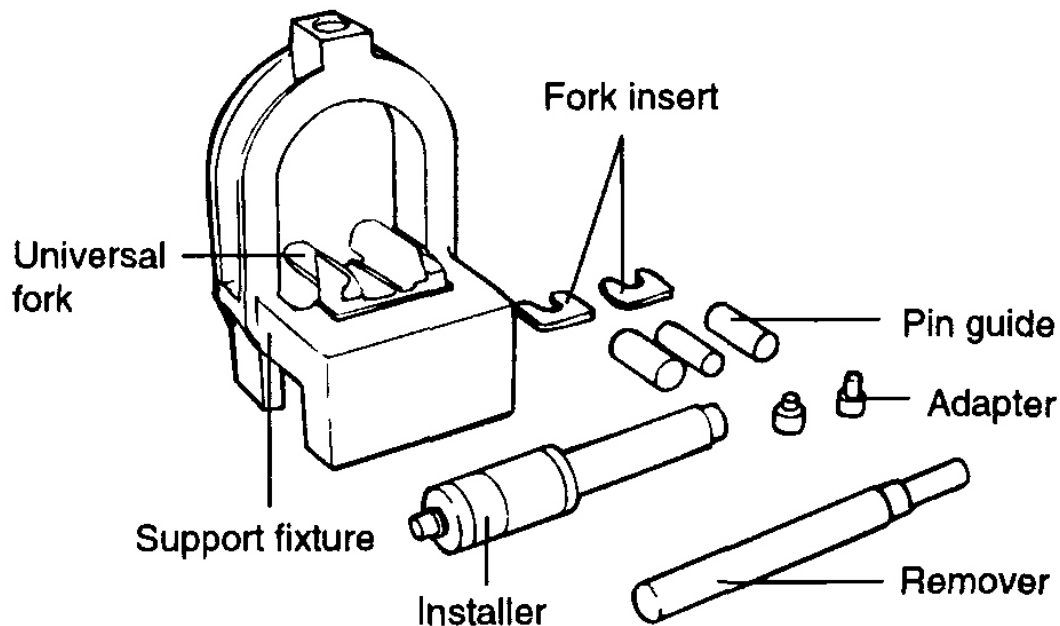
TORQUE : Nm (kg.cm, lb.ft)

G03851373

Fig. 120: Identifying Piston Components Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Use the Special Tools to disassemble and reassemble the piston and connecting rod.



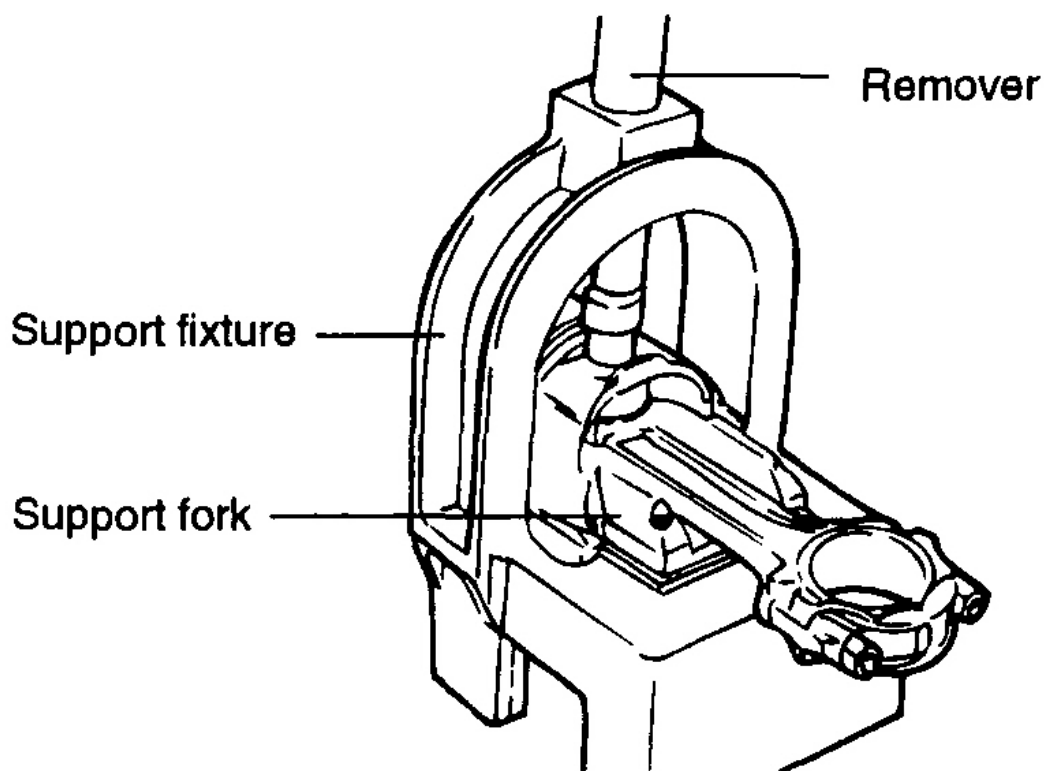
G03851374

Fig. 121: Disassembling Piston And Connecting Rod Using The Special Tools
Courtesy of HYUNDAI MOTOR CO.

2. Place the proper fork inserts in the fork of the tool. Between the connecting rod and the piston.
3. Insert the proper removal tool through the hole in the arch of the tool.

NOTE: Center the piston, rod and pin assembly with the removal arbor.

4. Press the piston pin out of the connecting rod.



G03851375

Fig. 122: Pressing Piston Pin Out Of Connecting Rod
Courtesy of HYUNDAI MOTOR CO.

INSTALLATION

1. Install proper pin guide through piston and into connecting rod. Hand tap pin guide into piston for proper retention. Drop piston pin into the other side of the piston.

NOTE: The pin guide centers the connecting rod in the piston. When the piston, connecting rod, piston pin and pin guide assembly are positioned on the fork of the tool, the pin guide will also center this assembly in the tool. If too small a pin guide is used, the piston assembly will not be located centrally in the tool, and damage may occur to the fork and/or insert of the tool.

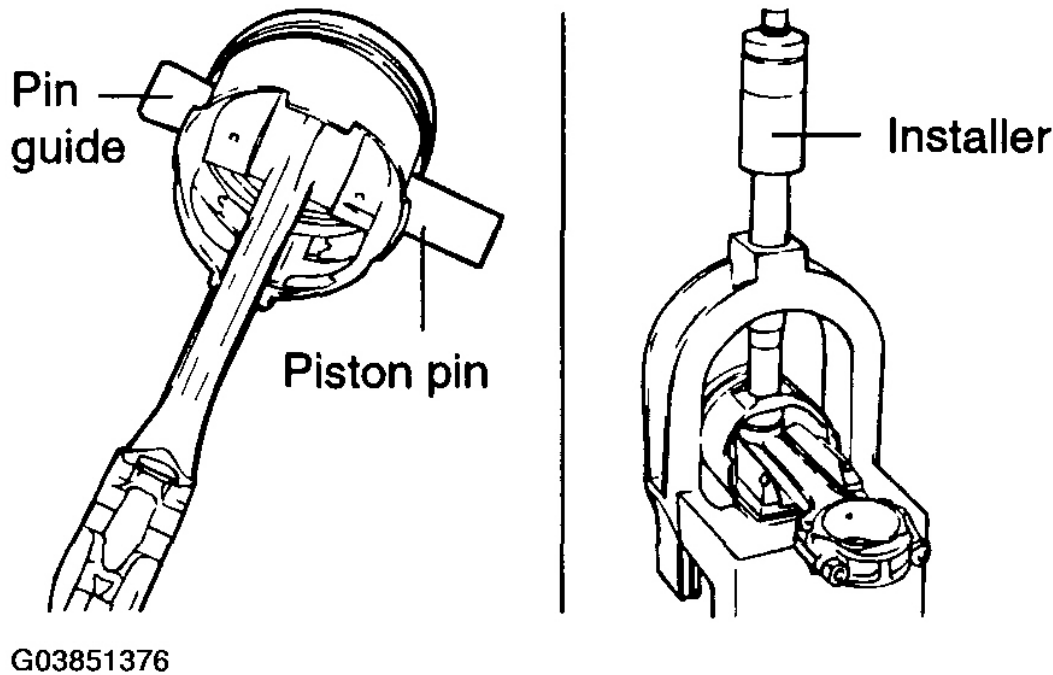


Fig. 123: Installing Pin Guide Through Piston And Into Connecting Rod
Courtesy of HYUNDAI MOTOR CO.

2. Install piston assembly onto fork assembly of tool. Tool will support connecting rod at the piston pin. Be sure to slide the piston assembly into the fork until the pin guide contacts the fork insert.
3. Adjust the installing arbor to the proper length by turning the numbered sleeve on the lettered shaft until the specified alpha-numeric setting from the application chart is obtained. Turn knurled nut to lock numbered sleeve on shaft.
4. Insert the installing arbor through the hole in the arch of the tool. Press the piston pin into the connecting rod until the sleeve on the installing arbor contacts the top of the tool arch. The pin guide will fall out of the connecting rod as the piston pin is pressed in.

CAUTION: Do not exceed 5000 pounds of force when stopping the installing arbor sleeve against the arch.

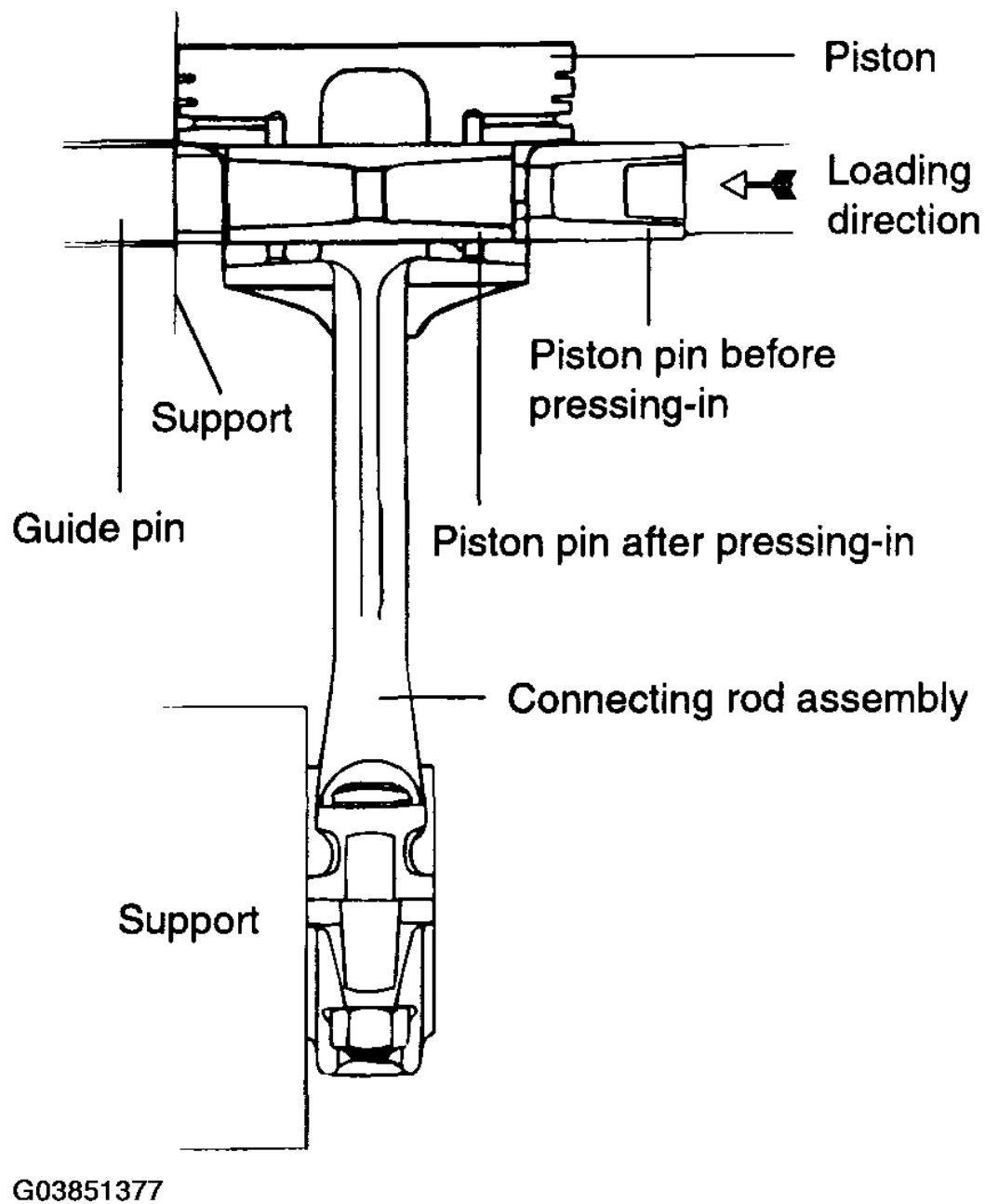


Fig. 124: Pressing Piston Pin Into Connecting Rod Until The Sleeve On Installing Arbor Contacts The Top Of The Tool Arch
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

PISTON AND PISTON PINS

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

PISTON RINGS

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

Piston ring side clearance

Standard value

No. 1: 0.04 ~ 0.085 mm (0.0016 ~ 0.0033 in.)

No.2: 0.04 ~ 0.085 mm (0.0016 ~ 0.0033 in.)

Limit

No. 1: 0.1 mm (0.004 in.)

No. 2: 0.1 mm (0.004 in.)

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

PISTON RING GAP SPECIFICATIONS

Item	Standard - mm (in.)	Limit - mm (in.)
Piston ring end gap No.1	0.20 ~ 0.35 (0.0079 ~ 0.0138)	1 (0.039)
Piston ring end gap No.2	0.37 ~ 0.52 (0.015 ~ 0.02)	1 (0.039)
Oil ring side rail end gap	0.20 ~ 0.70 (0.0078 ~ 0.0275)	1 (0.039)

When replacing the ring without correcting the cylinder bore, check the gap with the ring positioned at the bottom of the ring travel.

When replacing a ring, use a ring of the same size.

Piston ring service size and mark

STD: None

0.25 mm (0.010 in.) O.S.: 25

0.50 mm (0.020 in.) O.S.: 50

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

REPLACEMENT

1. Check the cylinder bore size code on the cylinder block top face.

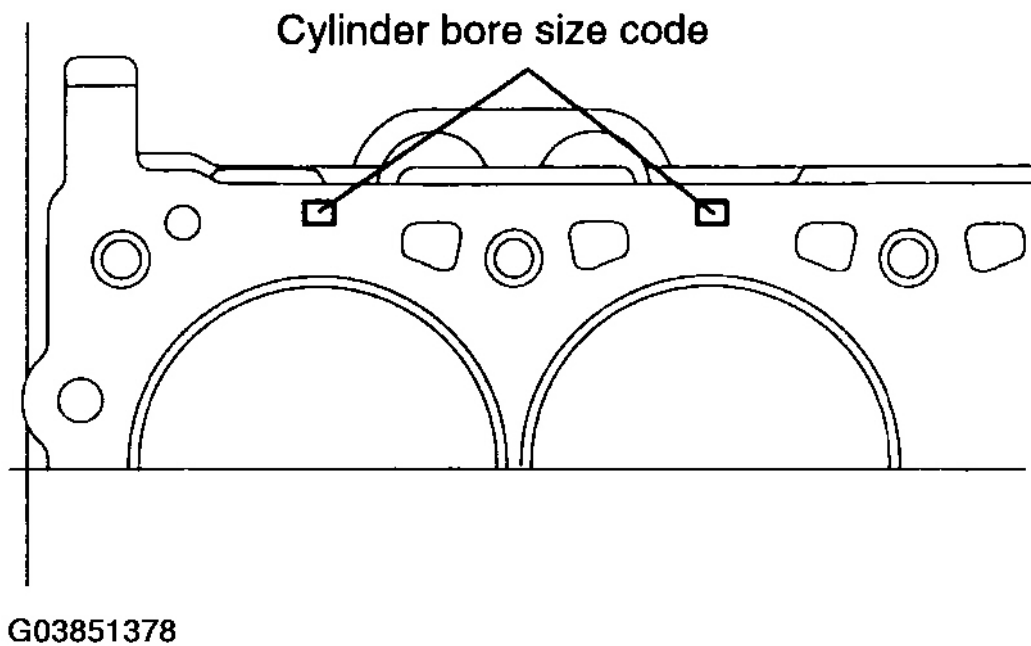
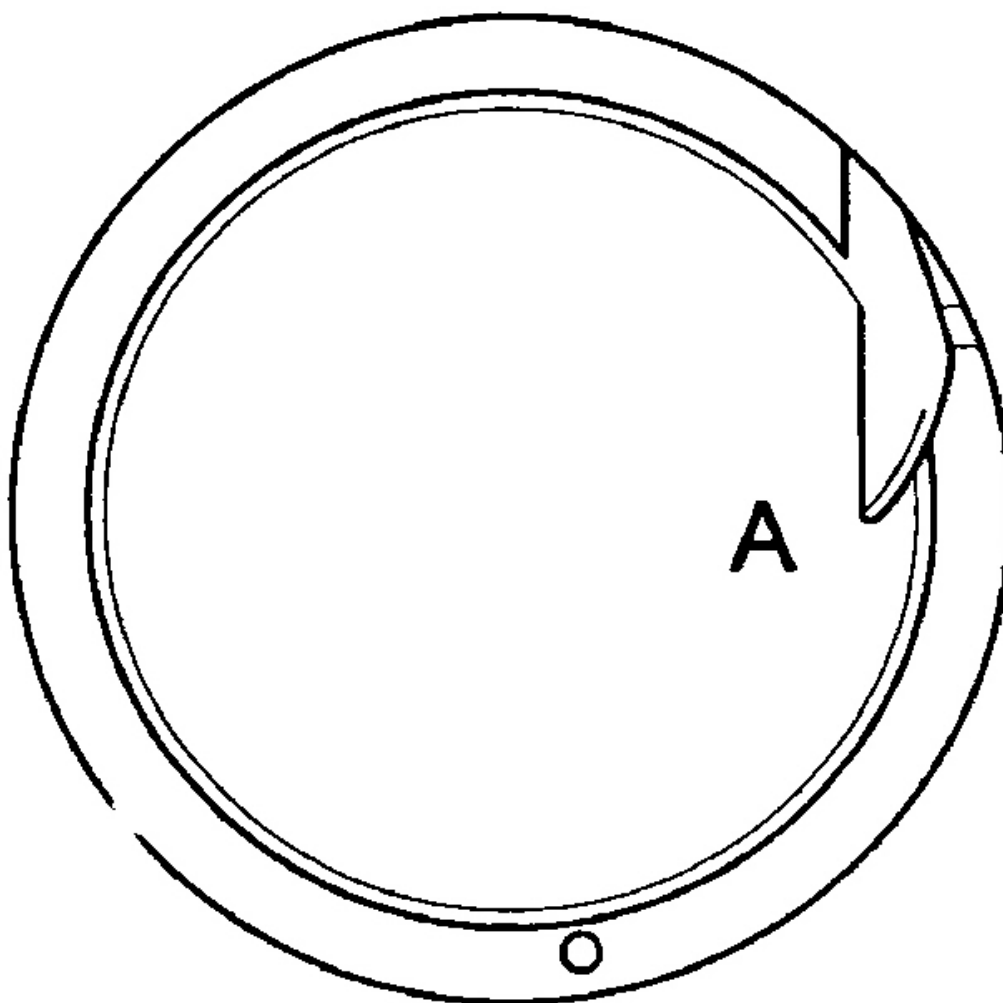


Fig. 125: Identifying Cylinder Bore Size Code
Courtesy of HYUNDAI MOTOR CO.

IDENTIFYING CYLINDER BORE SIZE CODES

Class	Cylinder Bore Inner Diameter	Size code
A	75.5 ~ 75.51 mm (2.9724 ~ 2.9728 in.)	A
B	75.51 ~ 75.52 mm (2.9728 ~ 2.9732 in.)	None
C	75.52 ~ 75.53 mm (2.9732 ~ 2.9736 in.)	C

2. Check the piston size code on the piston top face.



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Fig. 126: Identifying Piston Size Code On Piston Top Face
Courtesy of HYUNDAI MOTOR CO.

IDENTIFYING PISTON SIZE CODES

Class	Piston Outer Diameter	Size Code
A	75.47 ~ 75.48 mm (2.9712 ~ 2.9716 in.)	A
B	75.48 ~ 75.49 mm (2.9716 ~ 2.9720 in.)	None
C	75.49 ~ 75.50 mm (2.9720 ~	C

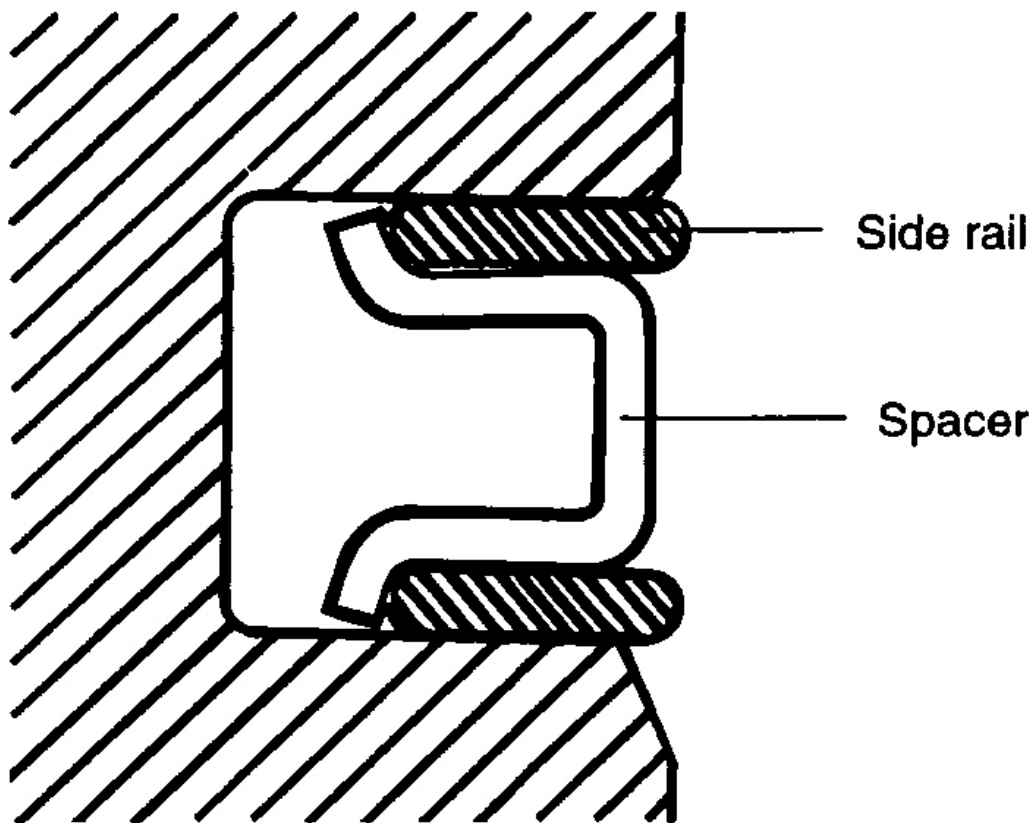
2.9724 in.)

3. Select the piston related to cylinder bore class.

Oil clearance: 0.02 ~ 0.04 mm (0.00078 ~ 0.00157 in.)

REASSEMBLY

1. Install the spacer.

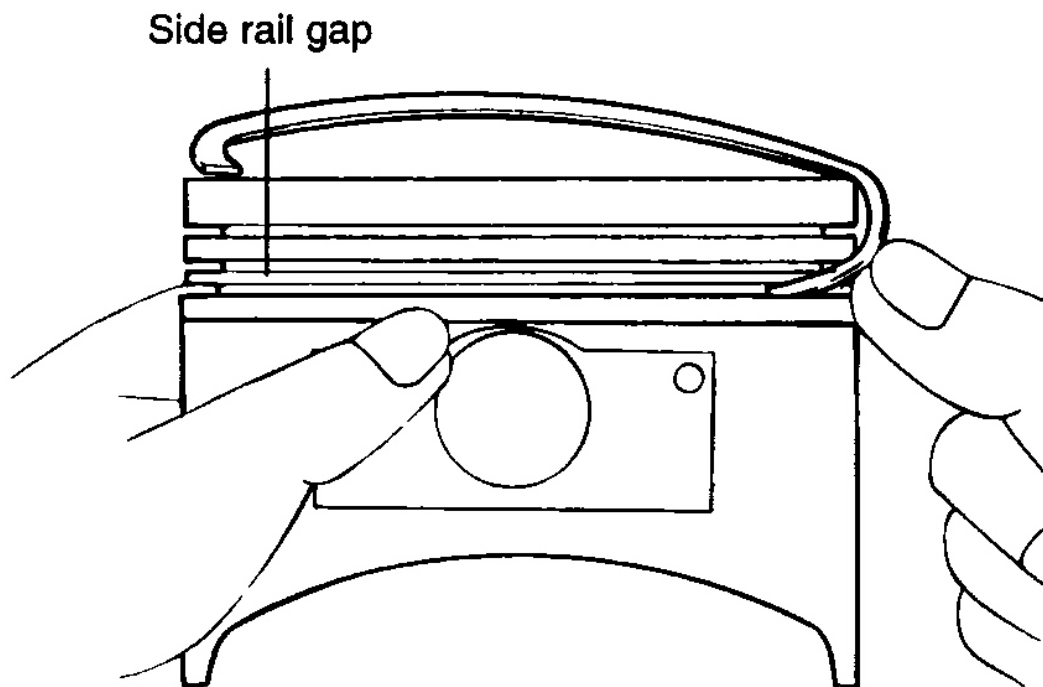


G03851380

Fig. 127: Installing Spacer

Courtesy of HYUNDAI MOTOR CO.

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

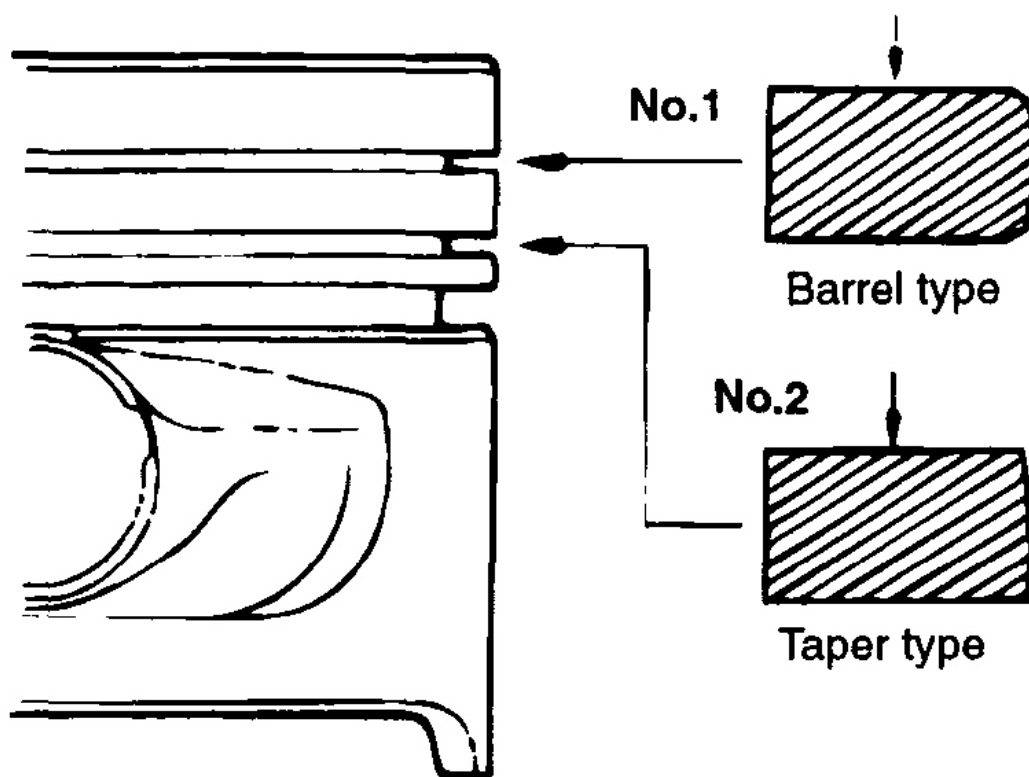


G03851381

Fig. 128: Installing Upper Side Rail
Courtesy of HYUNDAI MOTOR CO.

NOTE: Do not use piston ring expander when installing side rail.

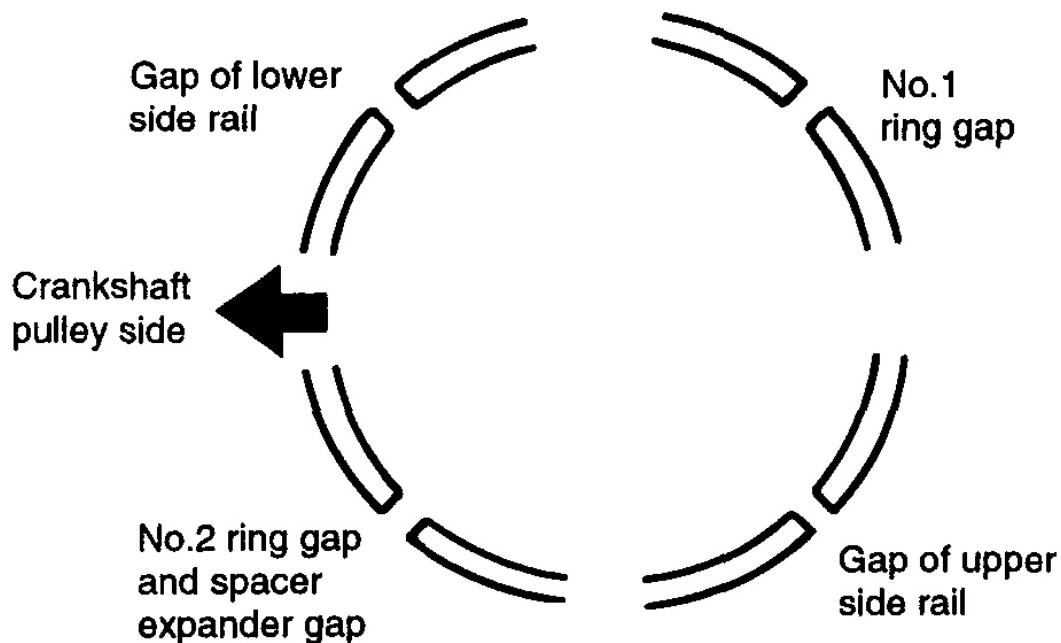
3. Install lower side rail using same procedure as Step 2 .
4. Using piston ring expander, install No. 2 piston ring.
5. Install No. 1 piston ring.



G03851382

Fig. 129: Using Piston Ring Expander To Install No. 2 And 1 Piston Ring
Courtesy of HYUNDAI MOTOR CO.

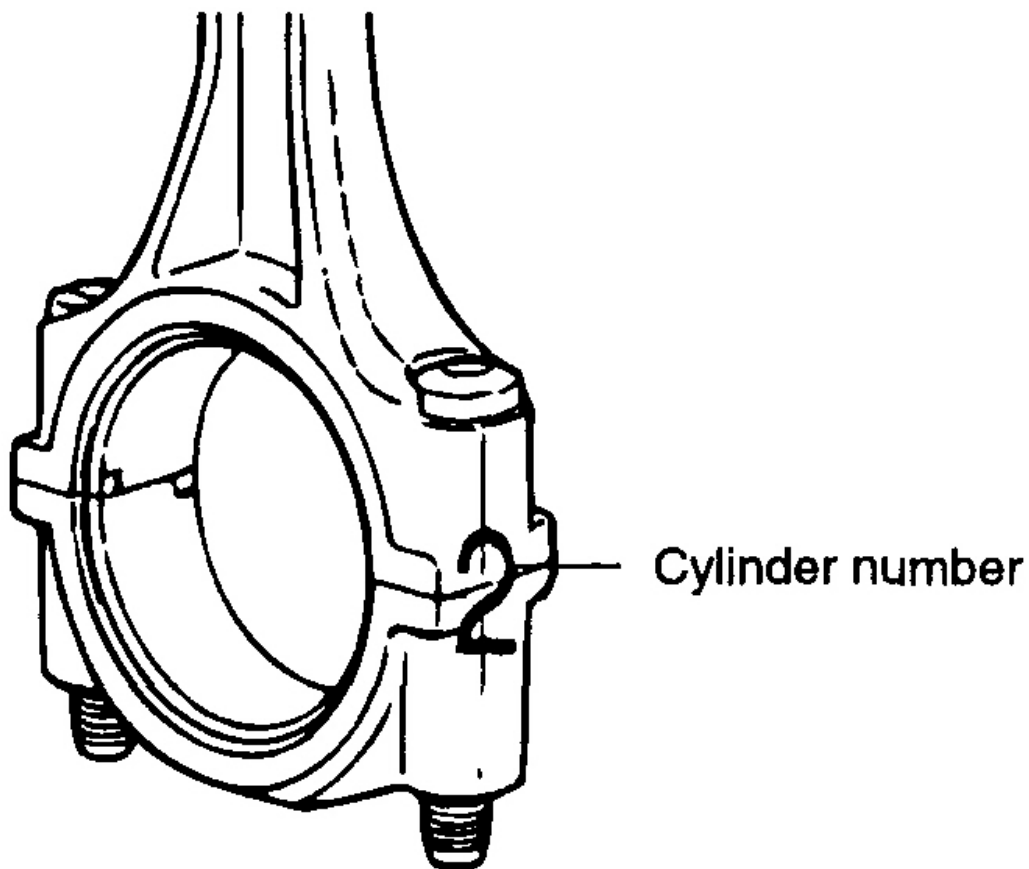
6. Apply engine oil around piston and piston rings.
7. Position each piston ring end gap as far apart from neighboring gaps as possible. Make sure that gaps are not positioned in side rail thrust and pin directions.
8. Hold piston rings firmly in a piston ring compressor as you insert them into cylinder.



G03851383

Fig. 130: Identifying Piston Rings Gap Position
Courtesy of HYUNDAI MOTOR CO.

9. Make sure that the front mark of piston and the front mark (identification mark) of connecting rod are directed toward front of engine.
10. When connecting rod cap is installed, make sure that cylinder numbers put on rod and cap at disassembly match each other.



G03851384

Fig. 131: Identifying Cylinder Number
Courtesy of HYUNDAI MOTOR CO.

11. When new connecting rod is installed, make sure that notches for holding bearing in place are on same side.
12. Tighten the connecting rod cap nuts.

Tightening torque

Connecting rod cap nuts

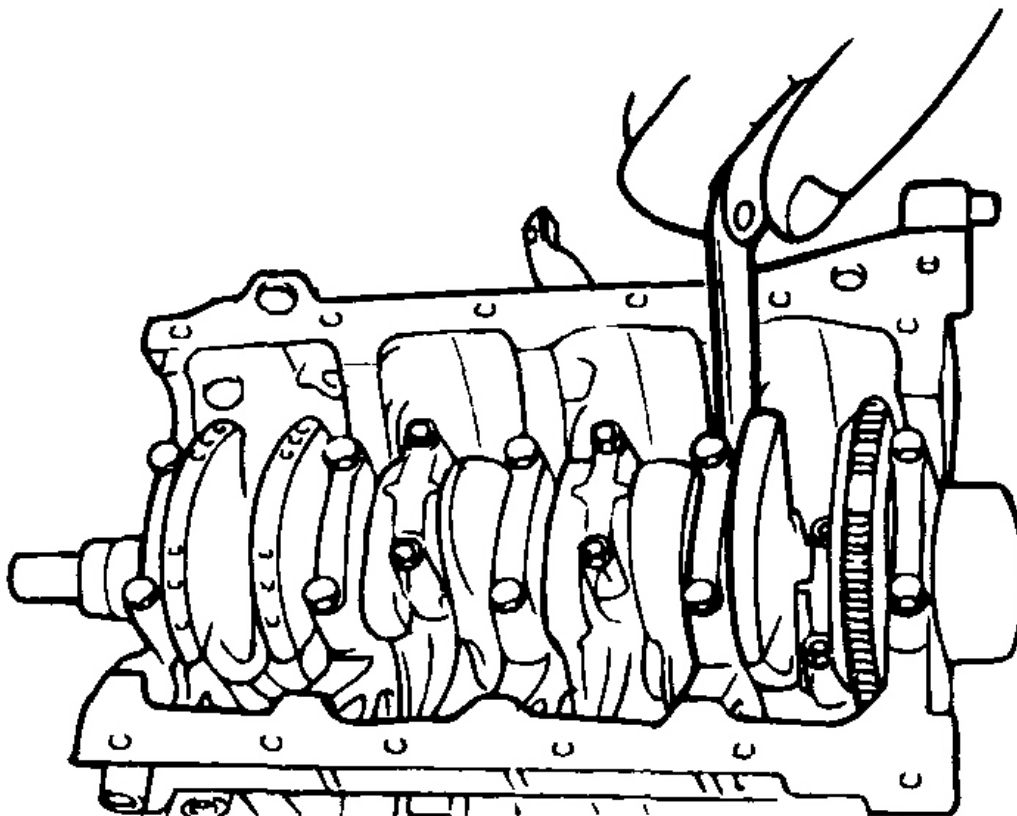
32 ~ 35 Nm (320 ~ 350 kg.cm, 24 ~ 26 lb.ft)

13. Check connecting rod side clearance.

Connecting rod side clearance

Standard value: 0.10 ~ 0.25 mm (0.004 ~ 0.0098 in.)

Limit: 0.4 mm (0.0157 in.)



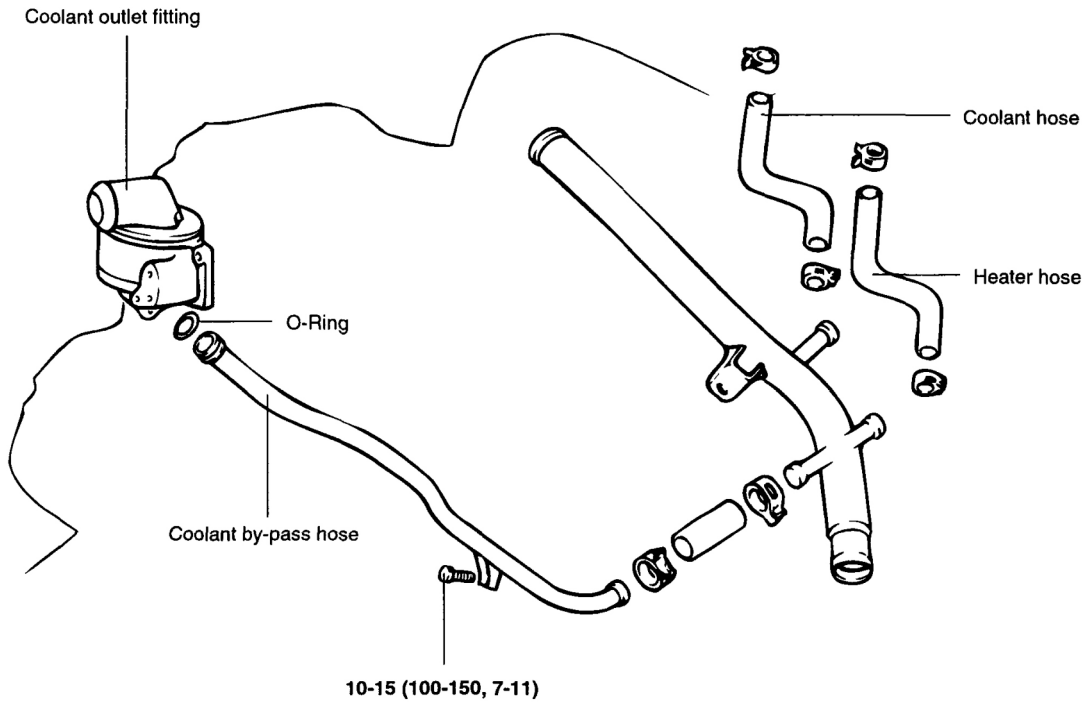
G03851385

Fig. 132: Measuring Connecting Rod Side Clearance
Courtesy of HYUNDAI MOTOR CO.

COOLING SYSTEM

ENGINE COOLANT HOSE/PIPES

COMPONENTS



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

G03851386

Fig. 133: Identifying Engine Coolant Hose/Pipes Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

INSPECTION

1. Check the coolant pipes and hoses for cracks, damage, or restrictions.
2. Replace if necessary.

REASSEMBLY

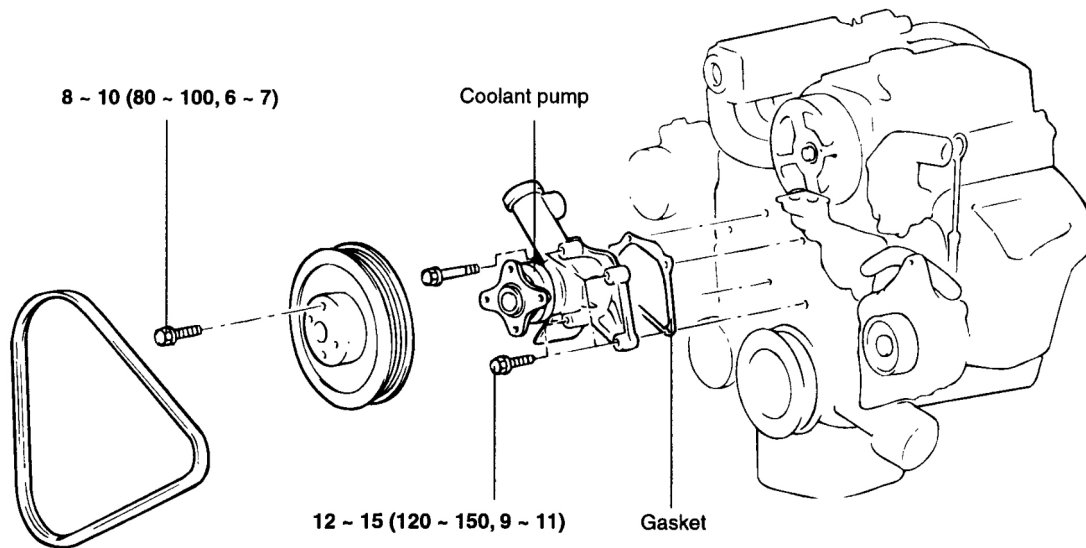
1. Fit the O-ring in the groove provided at the coolant inlet pipe end, wet the O-ring with coolant and insert into the coolant inlet pipe.
2. Make sure that there is a yellow mark on the inlet coolant hose and while keeping the yellow mark toward of the coolant inlet pipe, fit the hose to the pipe to the end of the yellow mark.

NOTE:

1. Do not apply oil or grease to the coolant pipe O-ring
2. Keep the coolant pipe connections free of sand, dust, etc.
3. Insert the coolant pipe fully into the coolant pump.
4. Do not reuse the O-ring, replace it with a new one.

ENGINE COOLANT PUMP

COMPONENTS



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

G03851387

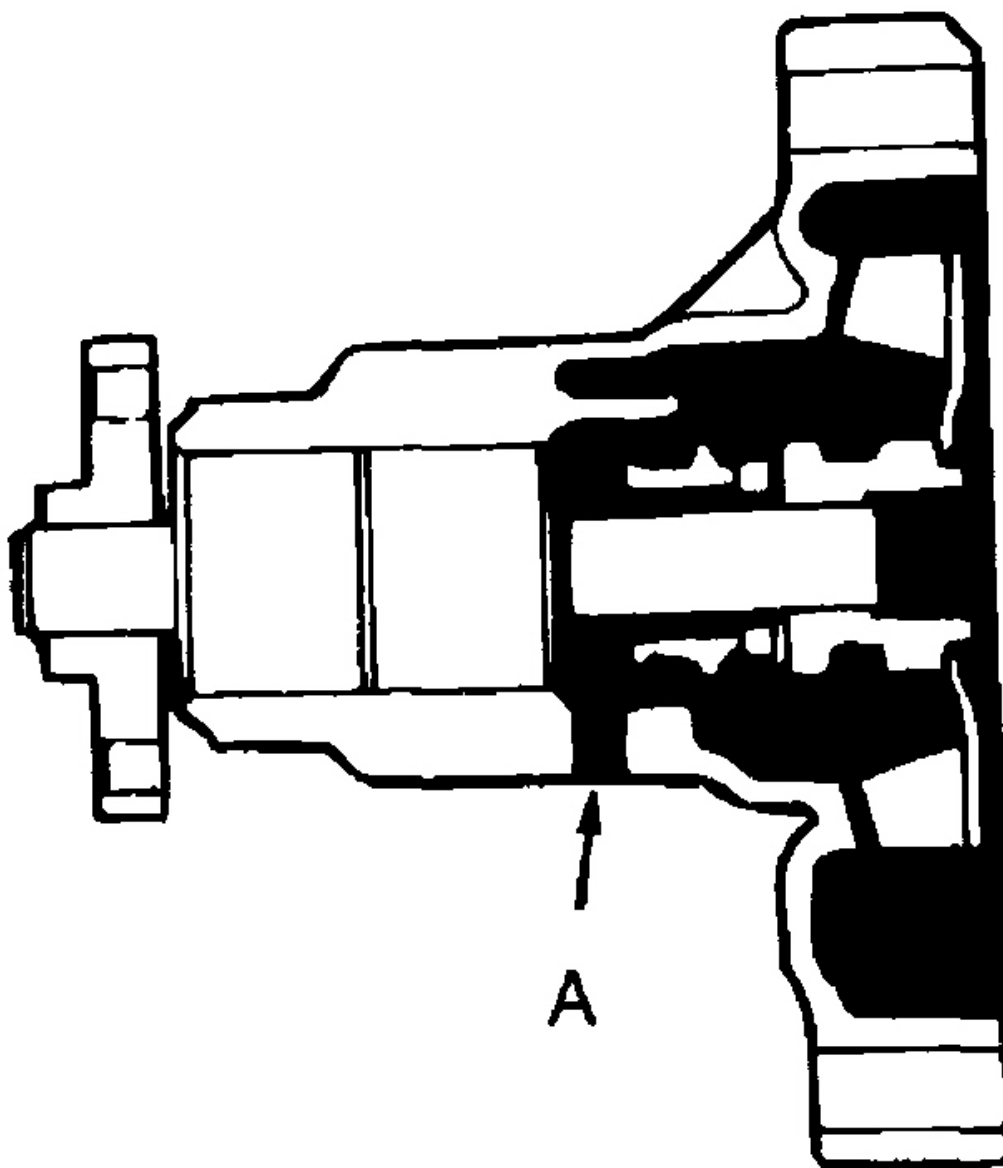
Fig. 134: Identifying Engine Coolant Pump Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Drain the coolant and disconnect the coolant outlet pipe connection hose from the coolant pump.
2. Remove the drive belt and engine coolant pump pulley.
3. Remove the timing belt covers and the timing belt idler.
4. Remove the coolant pump mounting bolts, then remove the generator brace.
5. Remove the coolant pump assembly from the cylinder block.

INSPECTION

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

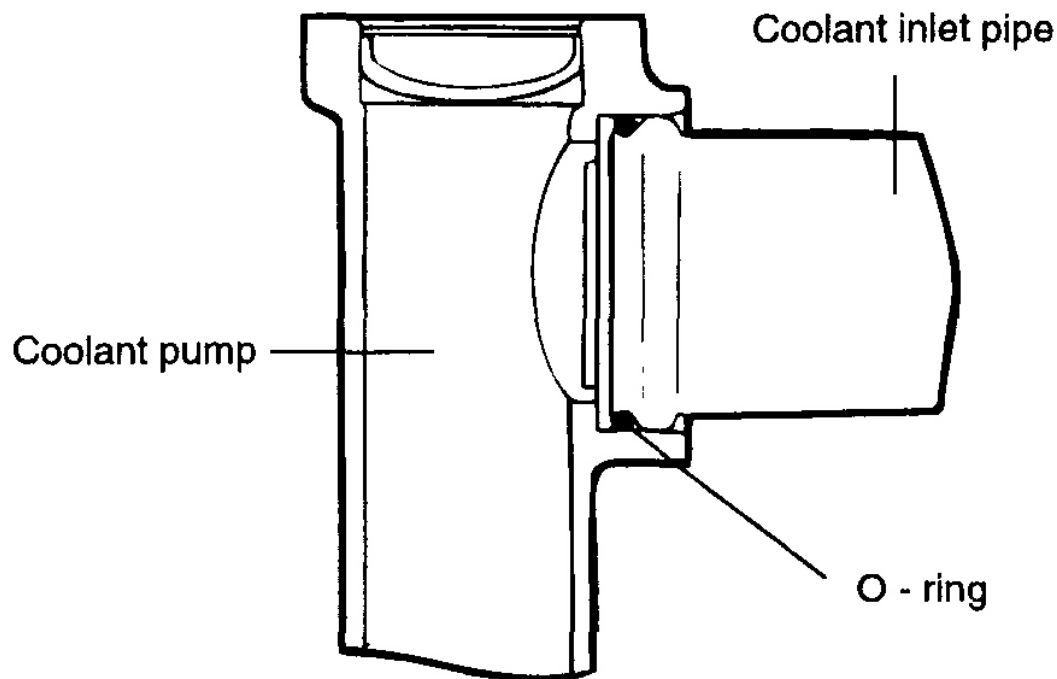


G03851388

Fig. 135: Identifying Coolant Leaks Form Hole "A"
Courtesy of HYUNDAI MOTOR CO.

REASSEMBLY

1. Clean the gasket surfaces of the coolant pump body and the cylinder block.



G03851389

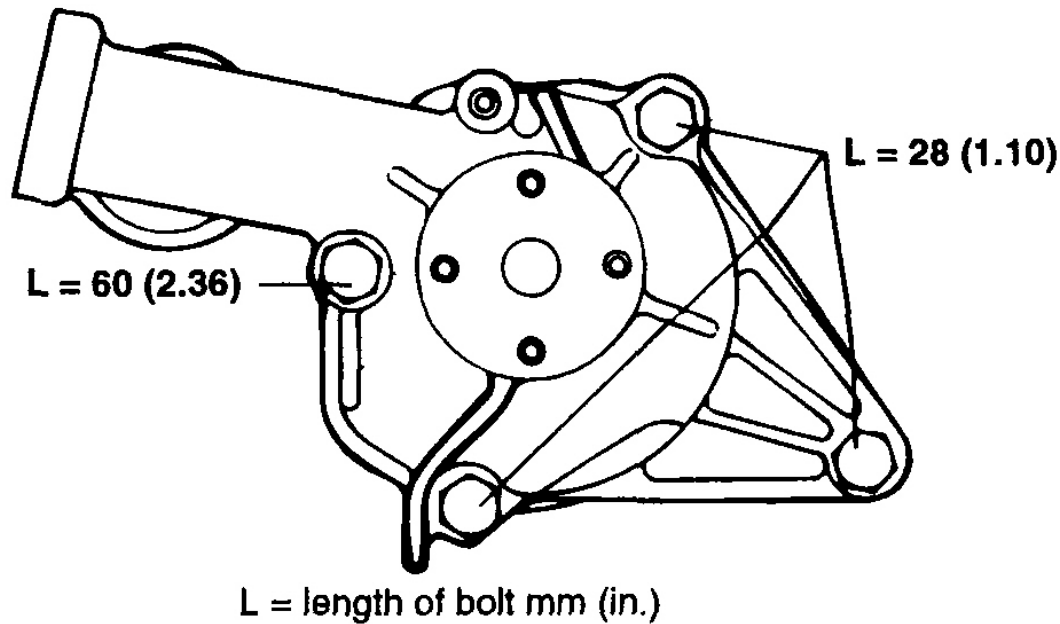
Fig. 136: Identifying Coolant Pump Body
Courtesy of HYUNDAI MOTOR CO.

2. Install a new coolant pump gasket to the coolant pump and tighten the bolts to the specified torque.

Tightening torque

Coolant pump bolt to cylinder block:

12 ~ 15 Nm (120 ~ 150 kg.cm, 9 ~ 11 lb.ft)



G03851390

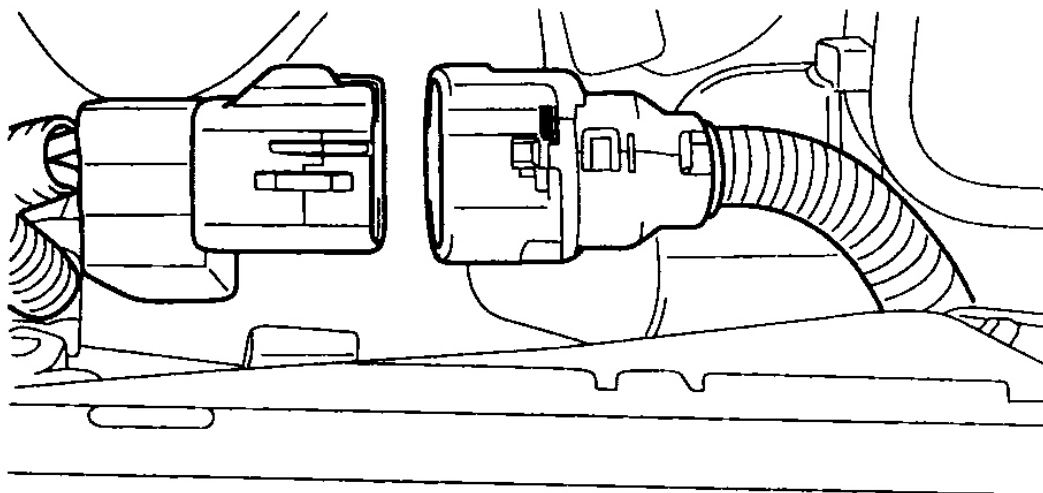
Fig. 137: Tightening Coolant Pump Bolts
Courtesy of HYUNDAI MOTOR CO.

3. Install the timing belt idler and timing belt. Adjust the timing belt tension. Refer to the "**TIMING SYSTEM**".
4. Install the timing belt covers.
5. Install the coolant pump pulley, drive belt and adjust the belt tension.
6. Refill the system with clean coolant.
7. Run the engine and check for leaks.

RADIATOR

DISASSEMBLY

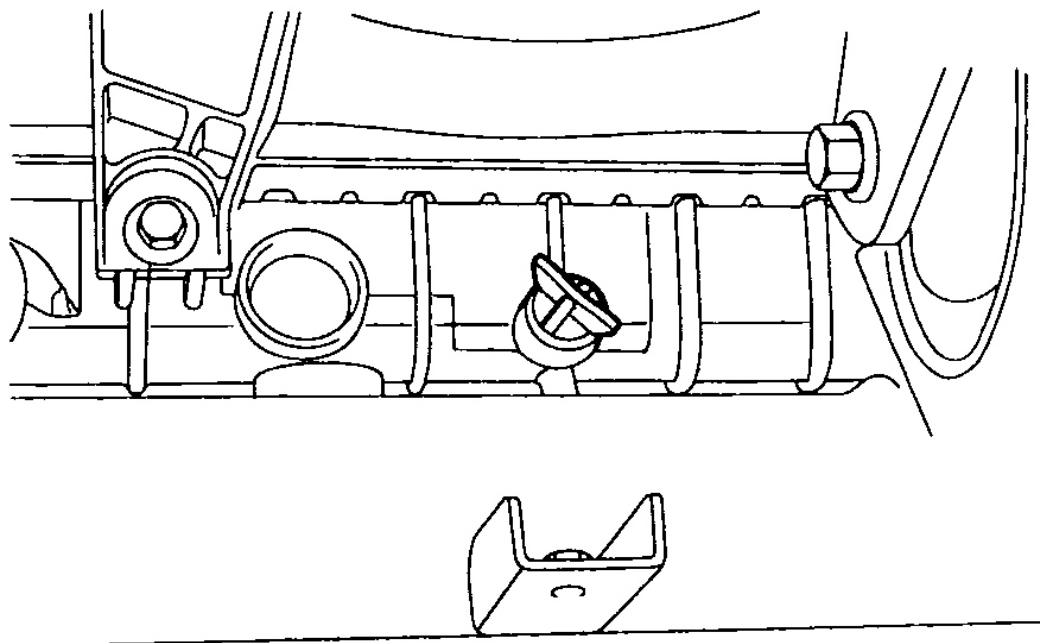
1. Disconnect the radiator fan motor connector.



G03851391

Fig. 138: Disconnecting Radiator Fan Motor Connector
Courtesy of HYUNDAI MOTOR CO.

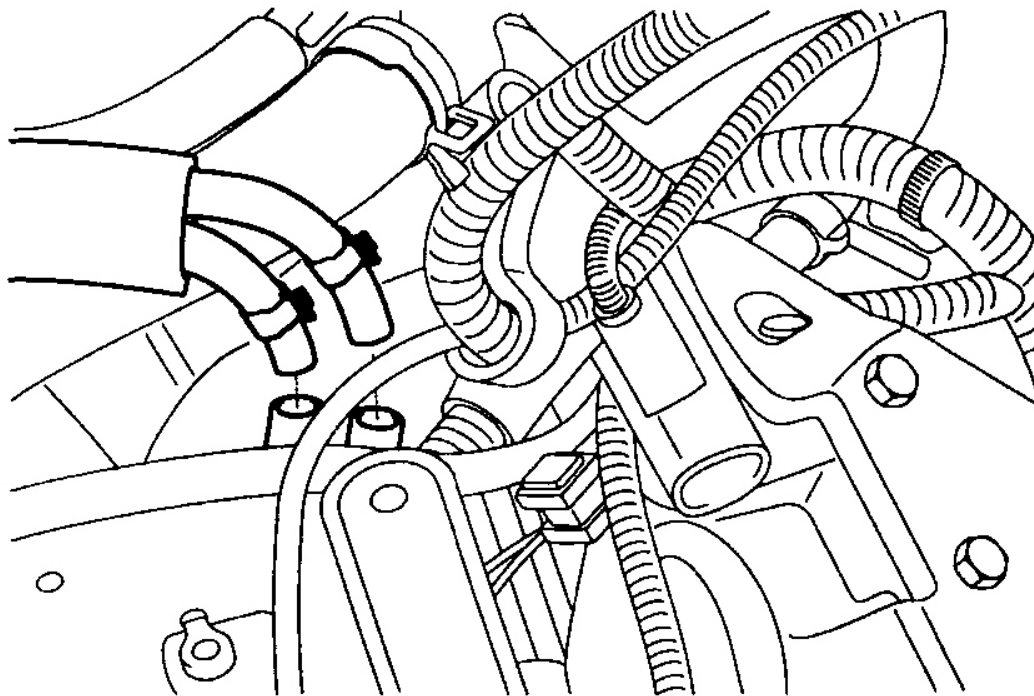
2. Set the temperature of the heater control to the hot position.
3. Loosen the radiator drain plug to drain coolant.



G03851392

Fig. 139: Identifying Radiator Drain Plug
Courtesy of HYUNDAI MOTOR CO.

4. Disconnect the upper and lower hose and overflow tube.
5. For vehicles with automatic transaxles, disconnect the oil cooler hoses from the automatic transaxle.

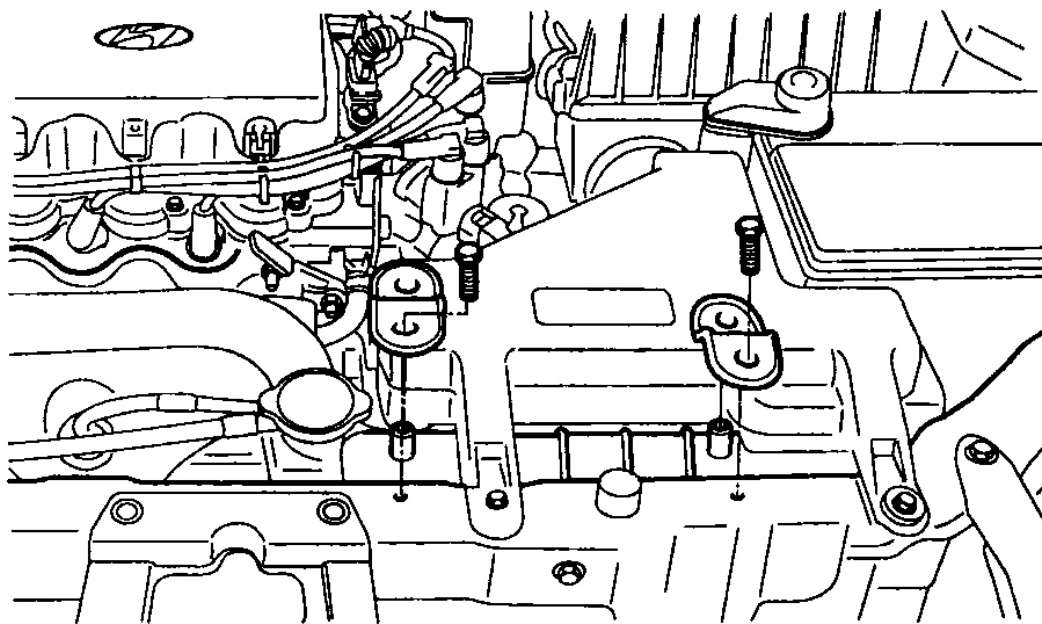


G03851393

Fig. 140: Disconnecting Oil Cooler Hoses From The Automatic Transaxle
Courtesy of HYUNDAI MOTOR CO.

CAUTION: Plug the ends of the oil cooler hoses and the automatic transaxle fittings to prevent transaxle fluid from spilling out and foreign material from entering.

6. Remove the radiator mounting bolts.



G03851394

Fig. 141: Removing Radiator Mounting Bolts
Courtesy of HYUNDAI MOTOR CO.

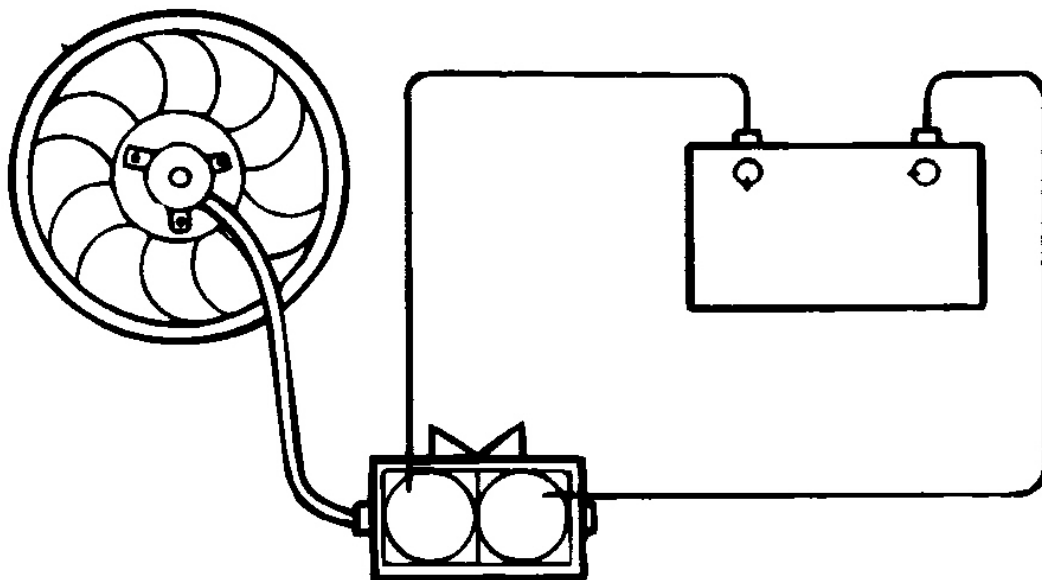
7. Remove the radiator together with the fan motor.
8. Remove the fan motor from the radiator.

INSPECTION

1. Check the radiator for bent, broken or plugged fins.
2. Check the radiator for corrosion, damage, rust or scale.
3. Check the radiator hoses for cracks, damage or deterioration.
4. Check the reservoir tank for damage.
5. Check the radiator cap spring for damage.
6. Test the pressure of the cap using a cooling system checker
7. Check the radiator cap seal for cracks or damage.

RADIATOR FAN MOTOR

1. Check that the radiator fan rotates when battery voltage is applied to the terminals (as shown in figure).



G03851395

Fig. 142: Checking Radiator Fan Rotates When Battery Voltage Is Applied To Terminals
 Courtesy of HYUNDAI MOTOR CO.

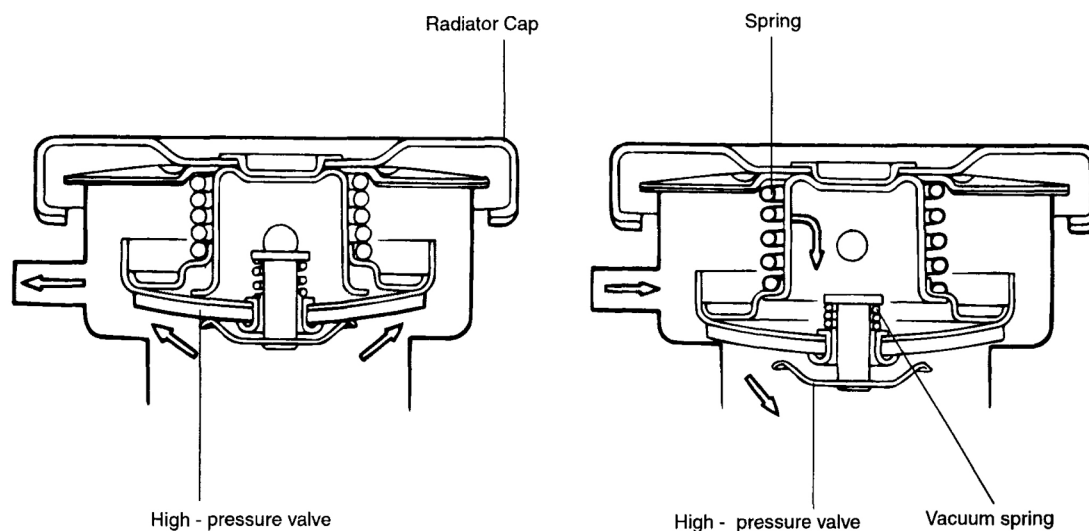
2. Check that abnormal noises are not produced while the motor is turning.

REASSEMBLY

1. Fill the radiator and reservoir tank with clean coolant mixture.
2. Run the engine until the thermostat opens, and then stop the engine.
3. Remove the radiator cap, and add coolant up to the filler neck of the radiator, and then fill the reservoir tank to the upper level.
4. Check that there is no leakage from the radiator, hoses or connections.

RADIATOR CAP

COMPONENTS



When the pressure is peduced to the specified level
[81.4 - 108 Kpa (0.83 - 1.1 kg/cm, 11.8 - 15.6 psi)]

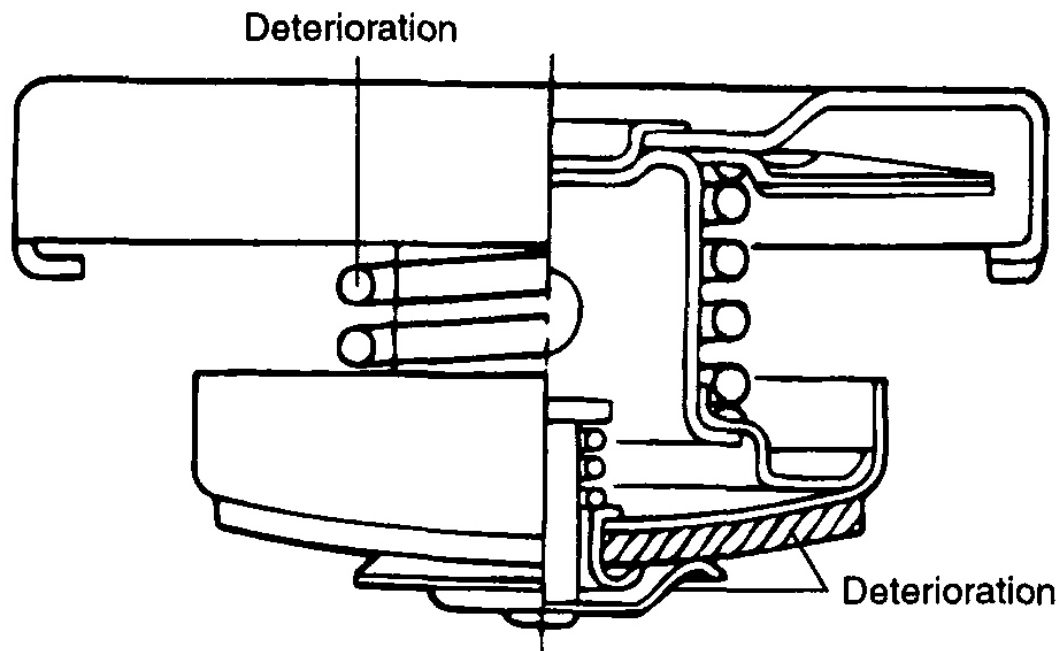
G03851396

When the pressure is peduced to the specified level
[-6.86 Kpa (- 0.07 kg/cm, -1.00 psi)]

Fig. 143: Identifying Radiator Cap Components
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

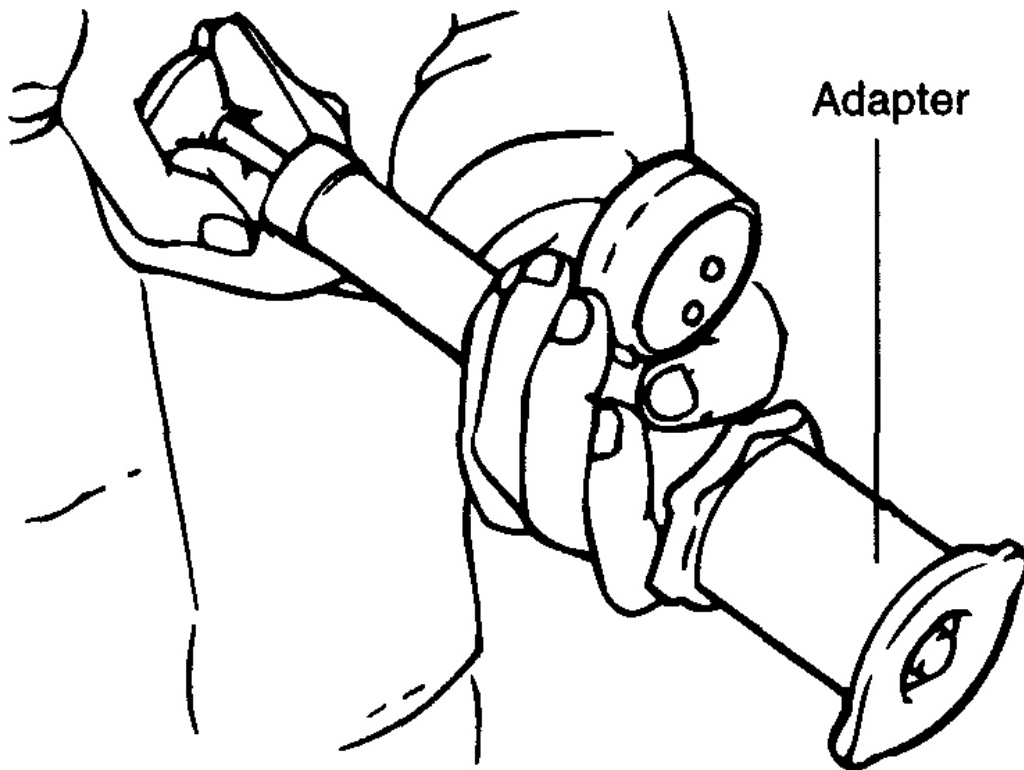
1. Check the radiator cap for damage, cracks and deterioration.



G03851397

Fig. 144: Checking Radiator Cap For Damage, Cracks And Deterioration
Courtesy of HYUNDAI MOTOR CO.

2. Attach a radiator cap tester to the radiator.
3. Pump the tester until the pointer stabilizes.
4. If the pointer stays constant for 10 seconds at a point exceeding the service limit, the radiator cap is good.

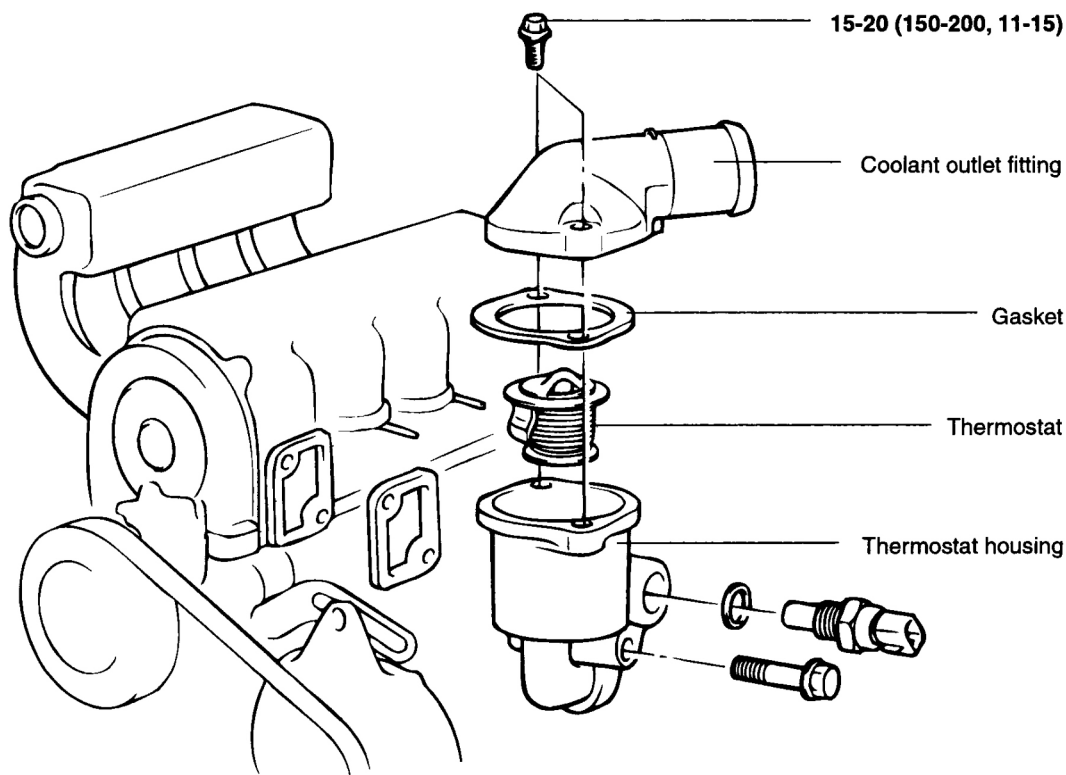


G03851398

Fig. 145: Pumping Tester Until Pointer Stabilizes
Courtesy of HYUNDAI MOTOR CO.

THERMOSTAT

COMPONENTS



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

G03851399

Fig. 146: Identifying Thermostat Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

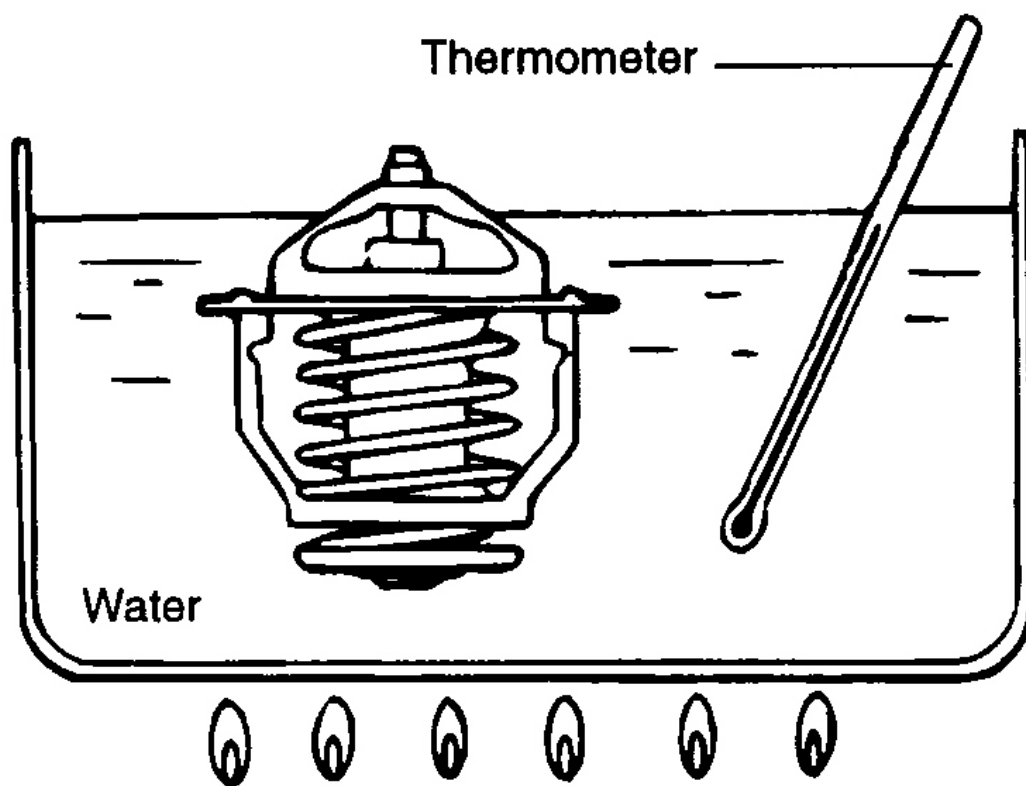
INSPECTION

1. Drain the coolant down to thermostat level or below.
2. Remove the coolant outlet fitting and gasket.
3. Remove the thermostat.
4. Immerse the thermostat in hot coolant to check proper valve opening temperature. Replace if necessary.

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

Full opening temperature: 95° C (205 F)

Valve lift (at full open): 8.5 mm (0.33 in.) or more



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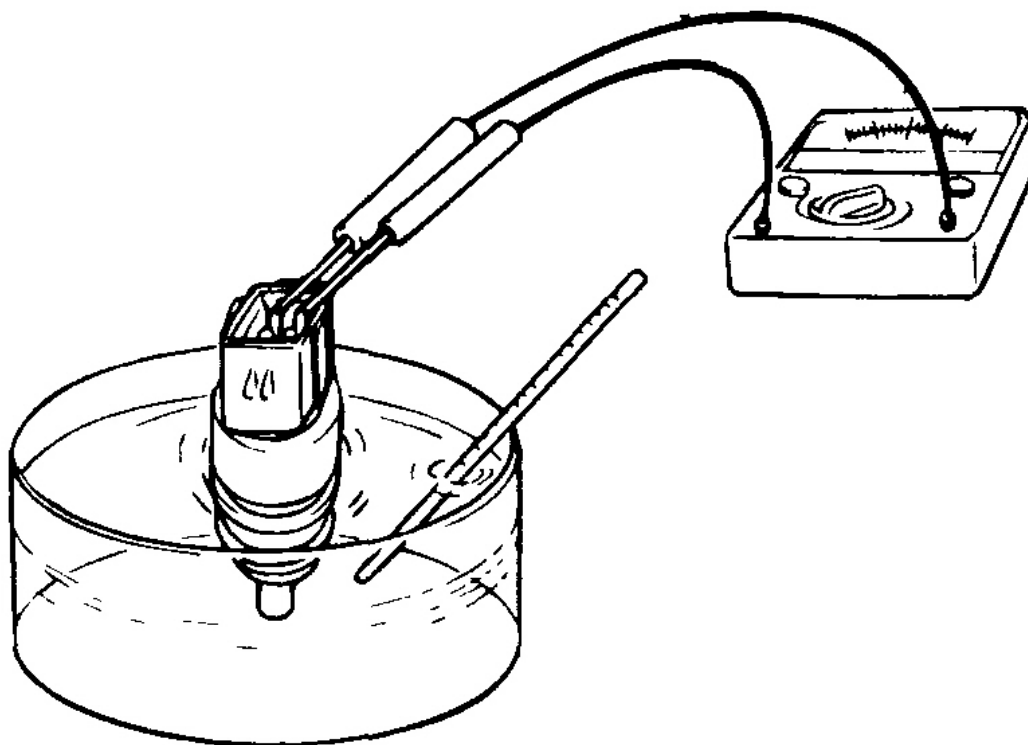
Fig. 147: Immersing Thermostat In Hot Coolant To Check Proper Valve Opening Temperature
Courtesy of HYUNDAI MOTOR CO.

COOLANT TEMPERATURE SENDER

1. Heat the engine coolant temperature sender by submerging it in hot water.
2. Check that the resistance is within the specified range.

Resistance: 123.8 ~ 172.8 ohm at 60°C (140°F)

23.5 ~ 29.5 ohm at 115°C (239°F)



G03851401

Fig. 148: Checking Resistance Is Within Specified Range
Courtesy of HYUNDAI MOTOR CO.

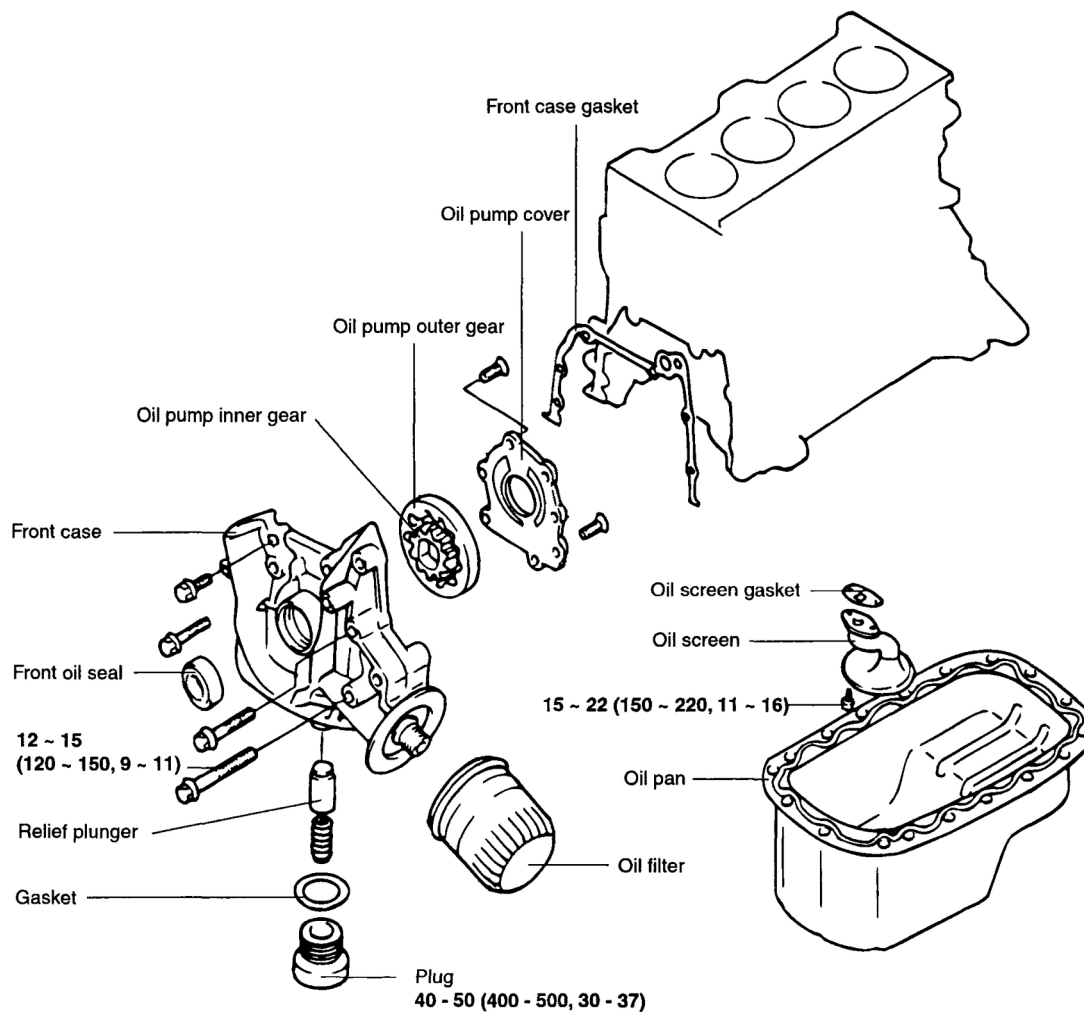
REASSEMBLY

1. Verify that the flange of the thermostat is correctly seated in the socket of the thermostat housing. If the thermostat is installed in the wrong direction, the bottom of the thermostat will touch the rib inside the intake manifold, making it impossible for the thermostat to operate properly.
2. Install a new gasket and the coolant outlet fitting.
3. Refill the system with clean coolant.

LUBRICATION SYSTEM

OIL PUMP

COMPONENTS



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

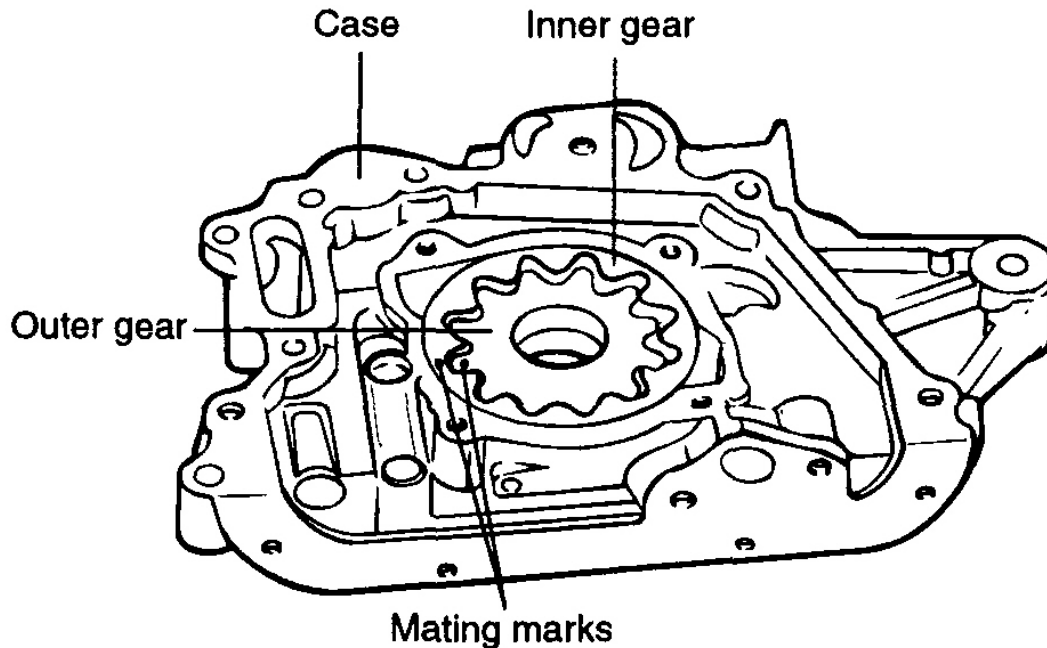
G03851402

Fig. 149: Identifying Oil Pump Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

DISASSEMBLY

1. Remove the timing belt. Refer to the "**TIMING BELT**".
2. Remove all the oil pan bolts.
3. Remove the oil pan.
4. Remove the oil screen.
5. Remove the front case assembly.
6. Remove the oil pump cover.

7. Remove the inner and outer gears from the front case. The mating marks on the inner and outer gears indicate the direction of installation. Make sure that the inner and outer gears are installed as shown.



G03851403

Fig. 150: Identifying Mating Marks On Inner And Outer Gears
 Courtesy of HYUNDAI MOTOR CO.

8. Remove the plug and remove the relief spring and relief plunger.

INSPECTION

OIL PAN AND OIL SCREEN

1. Check the oil pan for failure, damage or cracks. Replace if defective.
2. Check the oil screen for failure, damage and cracks and replace if defective.

FRONT CASE AND OIL PUMP COVER

Check for worn (especially stepped) or damaged surfaces contacting gears.

OIL PUMP GEARS

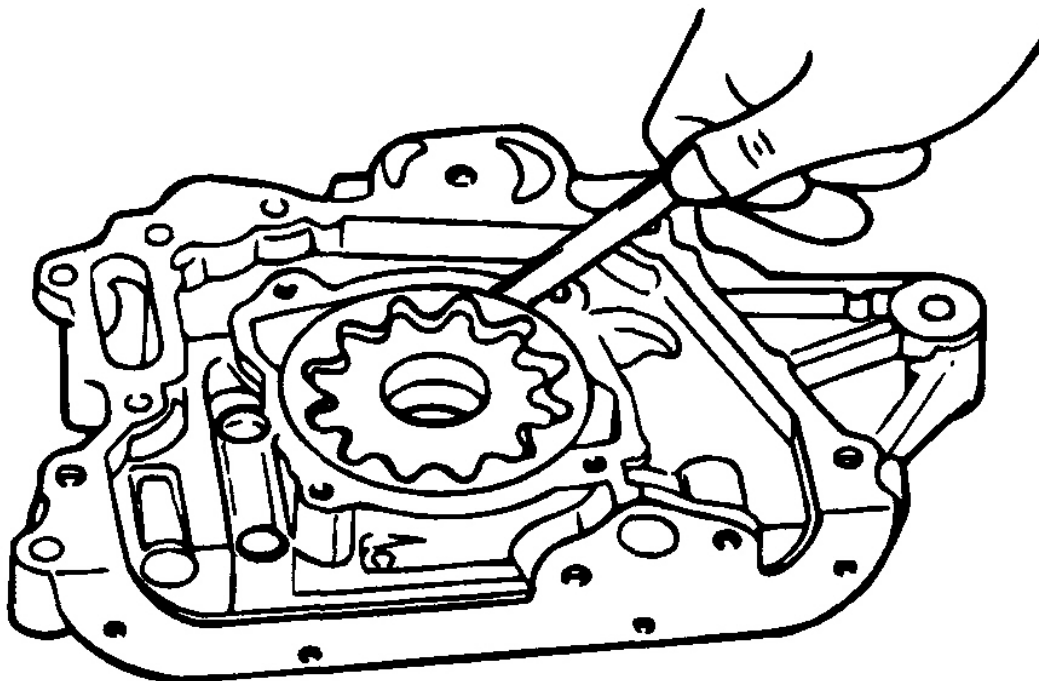
1. Check for worn or damaged gear teeth surfaces.
2. Check for clearance between outer gear and front case.

Outer gear

Clearance between outer circumference

and front case:

0.12 ~ 0.18 mm (0.005 ~ 0.007 in.)



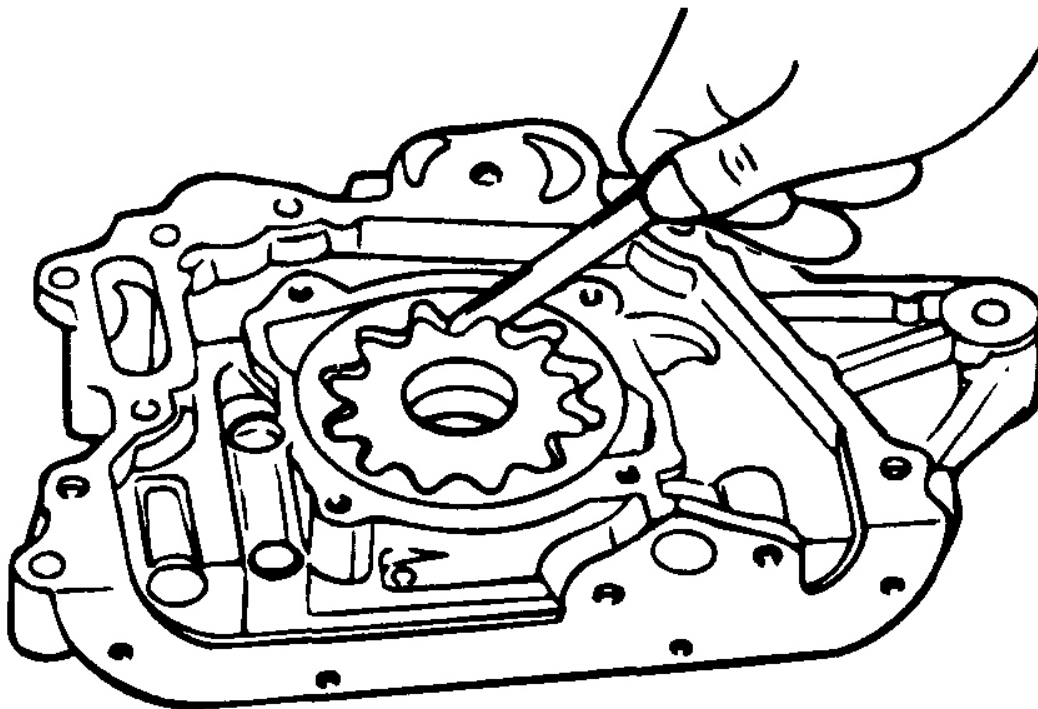
G03851404

Fig. 151: Checking Clearance Between Outer Gear And Front Case
Courtesy of HYUNDAI MOTOR CO.

3. Check the tip clearance on the pump rotor.

Standard value:

0.025 ~ 0.069 mm (0.001 ~ 0.003 in.)



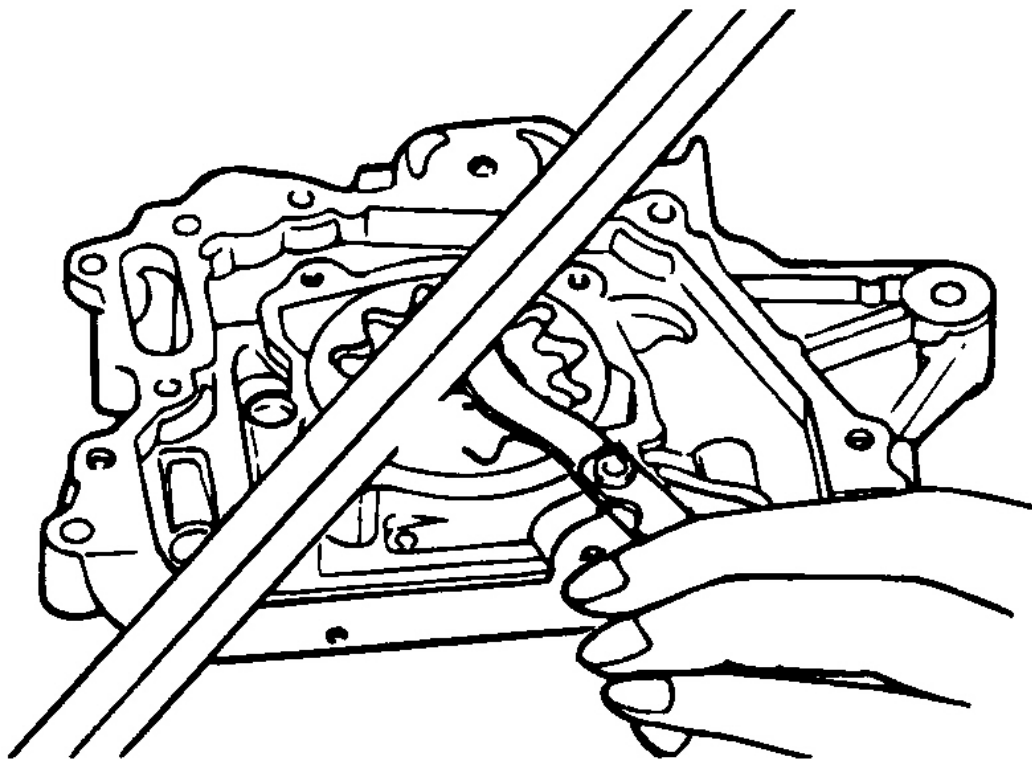
G03851405

Fig. 152: Checking Tip Clearance On Pump Rotor
Courtesy of HYUNDAI MOTOR CO.

4. Check the axial clearance on the outer pump rotor.

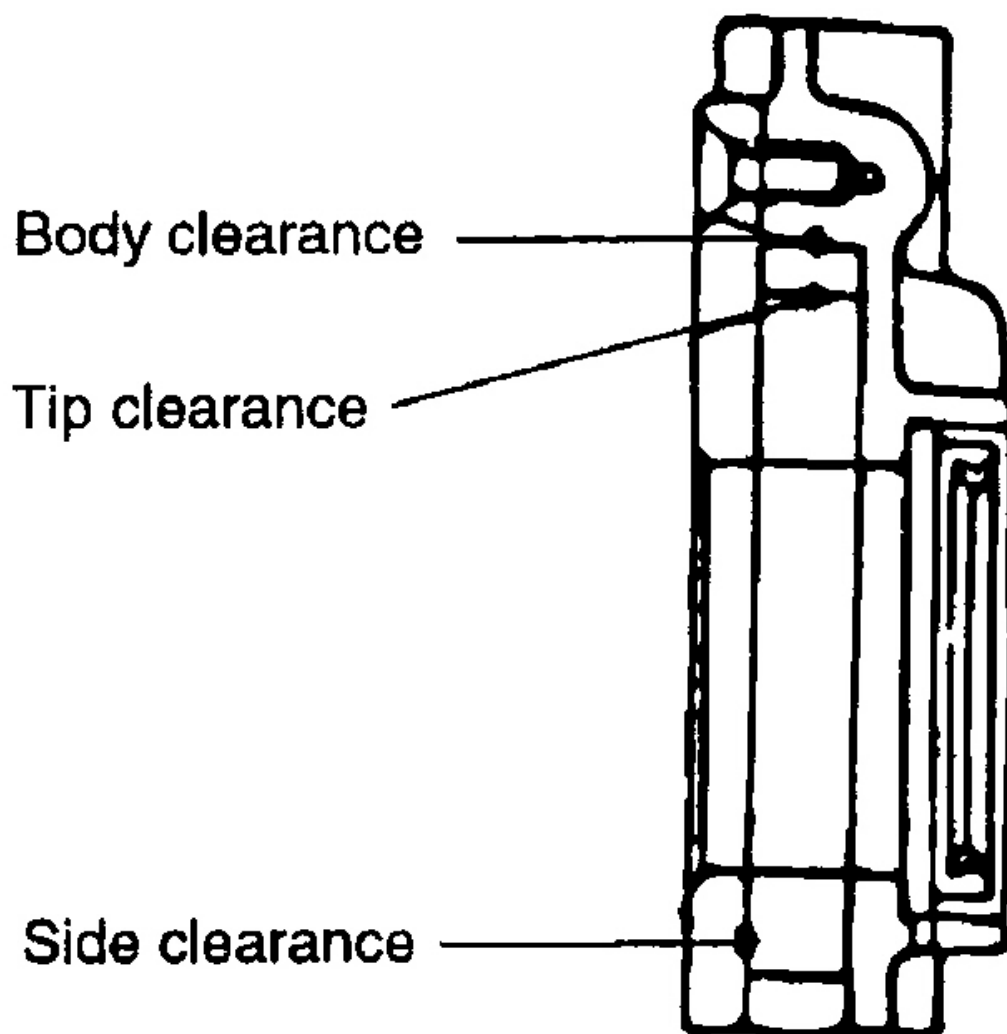
Standard value:

0.04 ~ 0.087 mm (0.0016 ~ 0.0034 in.)



G03851406

Fig. 153: Checking Axial Clearance On Outer Pump Rotor (1 Of 2)
Courtesy of HYUNDAI MOTOR CO.



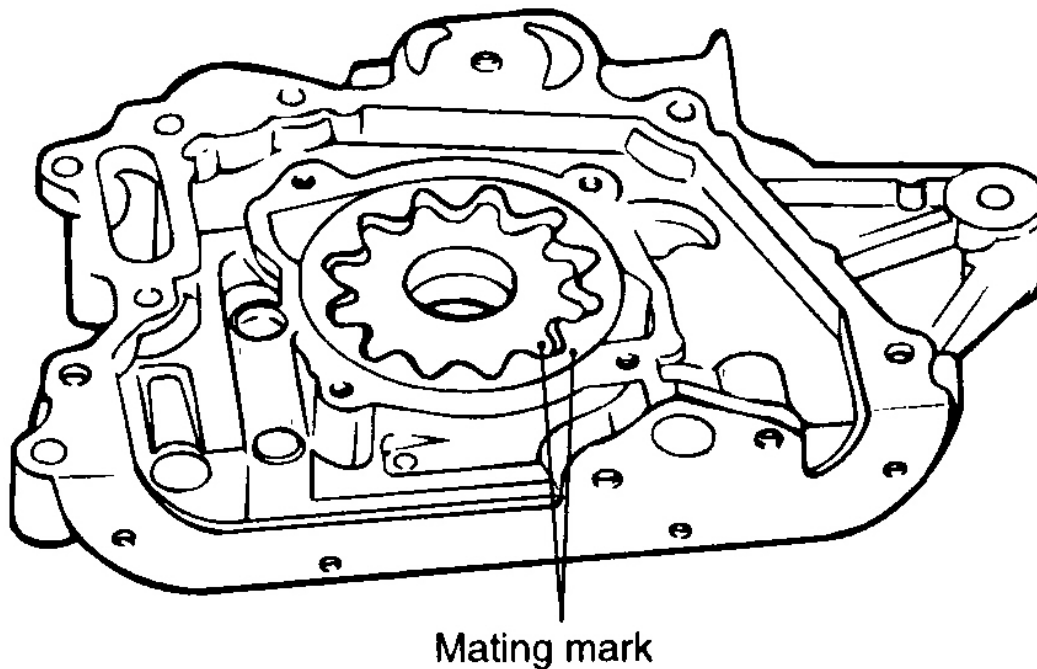
G03851407

Fig. 154: Checking Axial Clearance On Outer Pump Rotor (2 Of 2)
Courtesy of HYUNDAI MOTOR CO.

REASSEMBLY

OIL PUMP

1. Install the outer and inner gears into the front case. Make sure that the inner and outer gears are installed in the same direction as shown.



G03851408

Fig. 155: Identifying Inner And Outer Gears Are Installed In The Same Direction
Courtesy of HYUNDAI MOTOR CO.

2. Install the oil pump cover and tighten the bolts to the specified torque. After the bolts have been tightened, check to ensure that the gear turns smoothly.

Tightening torque

Oil pump cover bolt:

8 ~ 12 Nm (80 ~ 120 kg.cm, 6 ~ 8.8 lb.ft)

3. Install the relief valve and spring. Tighten the plug to the specified torque. Apply engine oil to the relief valve.

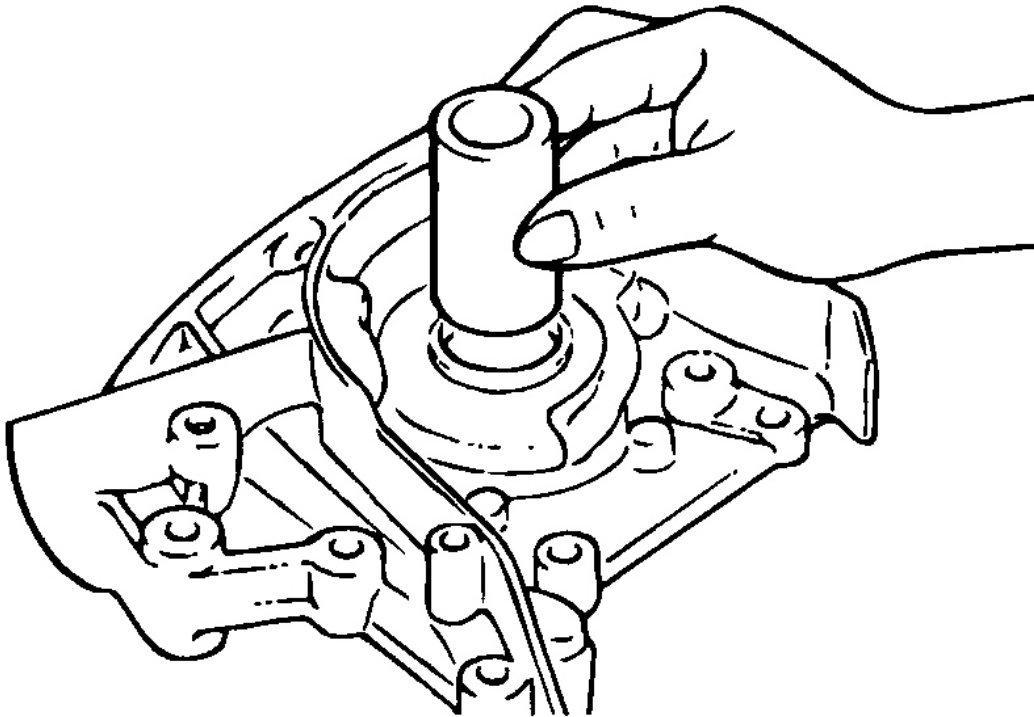
Tightening torque

Relief valve plug:

40 ~ 50 Nm (400 ~ 500 kg.cm, 30 ~ 37 lb.ft)

OIL SEAL

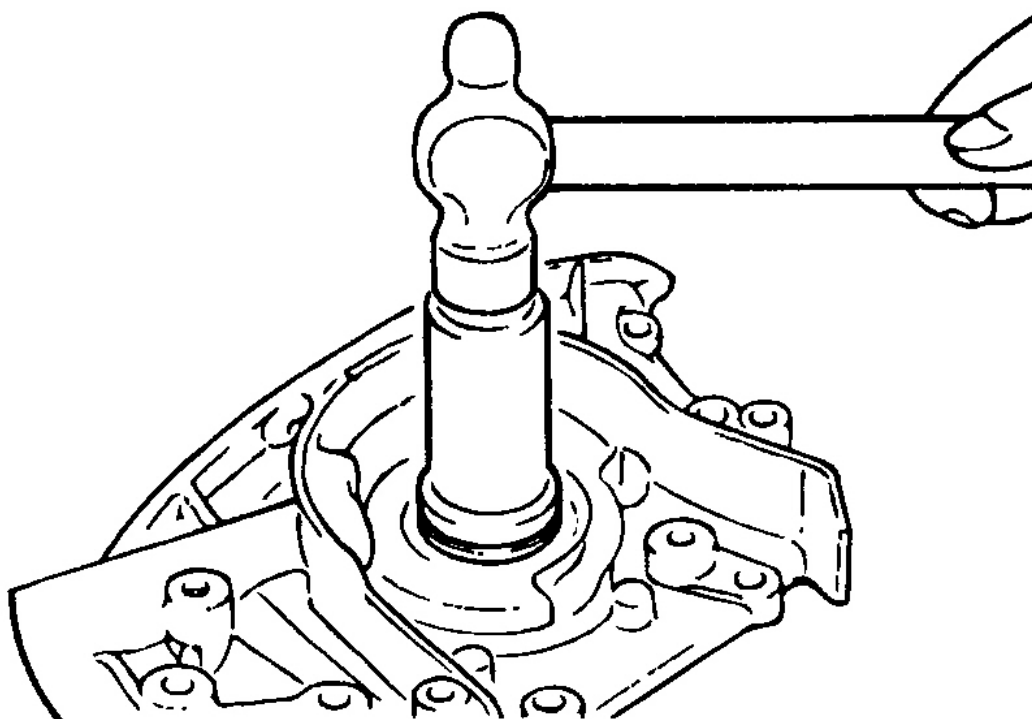
1. Inspect for worn, distorted or damaged lips.
2. Check for elongated spring ring.
3. Install the Special Tool, Crankshaft Front Oil Seal Guide (09231 - 22100), to the front end of the crankshaft. Apply engine oil to the outer surface of the oil seal guide, and install the new oil seal along the guide by hand, until it touches front case. Always use a new oil seal when reassembling.



G03851409

Fig. 156: Installing Crankshaft Front Oil Seal Guide To Front End Of Crankshaft
Courtesy of HYUNDAI MOTOR CO.

4. Use the Special Tool, Crankshaft Front Oil Seal Installer (09231 - 22000), to install the oil seal.



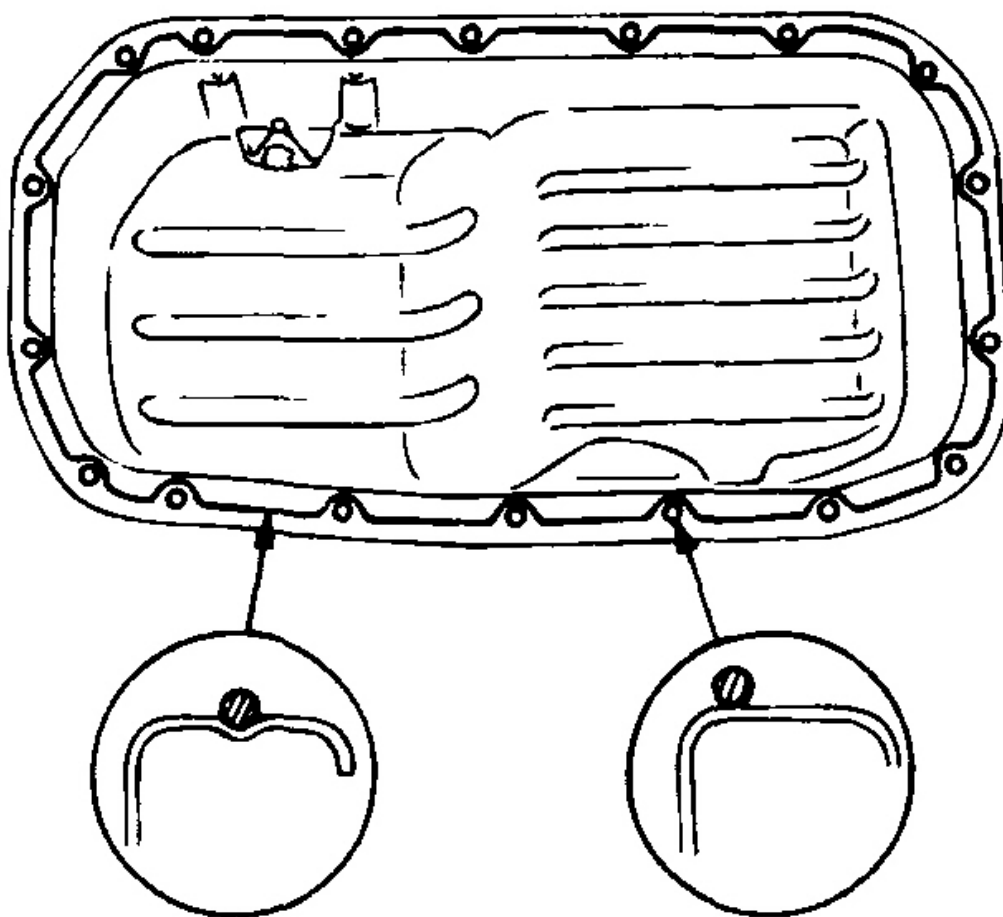
G03851410

Fig. 157: Using Crankshaft Front Oil Seal Installer To Install Oil Seal
Courtesy of HYUNDAI MOTOR CO.

5. Install the crankshaft sprocket, timing belt and crankshaft pulley. Refer to the "**TIMING BELT**".
6. Install the oil screen.
7. Clean both gasket surfaces of the oil pan and the cylinder block.
8. Apply sealant into the groove of the oil pan flange as shown.

CAUTION:

1. Apply sealant approx. 4 mm (0.16 in.) in thickness.
2. After application of sealant, do not exceed 15 minutes before installing the oil pan.



G03851411

Fig. 158: Applying Sealant Into The Groove Of The Oil Pan Flange
Courtesy of HYUNDAI MOTOR CO.

9. Install the oil pan and tighten the bolts to the specified torque.

Tightening torque

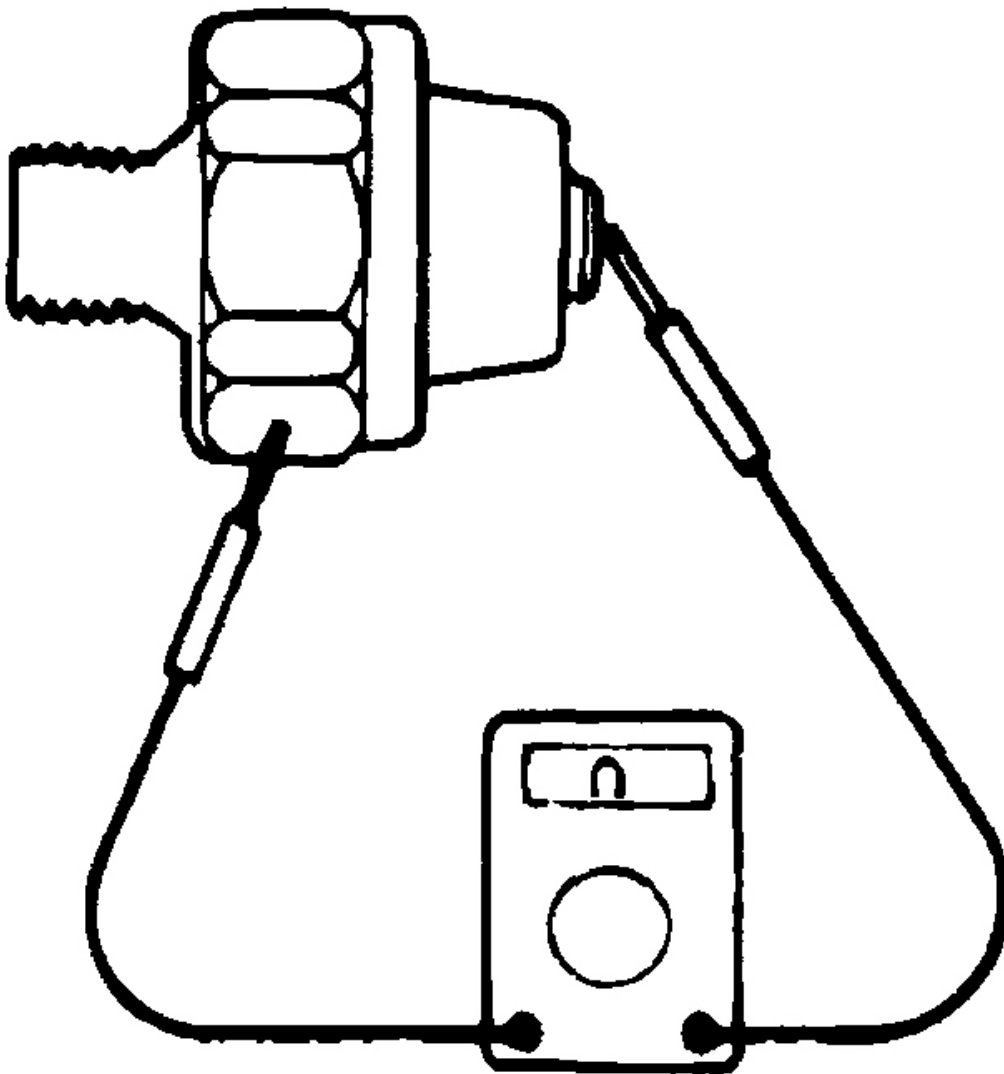
Oil pan bolt:

10 ~ 12 Nm (100 ~ 120 kg.cm, 7 ~ 9 lb.ft)

OIL PRESSURE SWITCH

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

If there is non-continuity, replace the oil pressure switch.



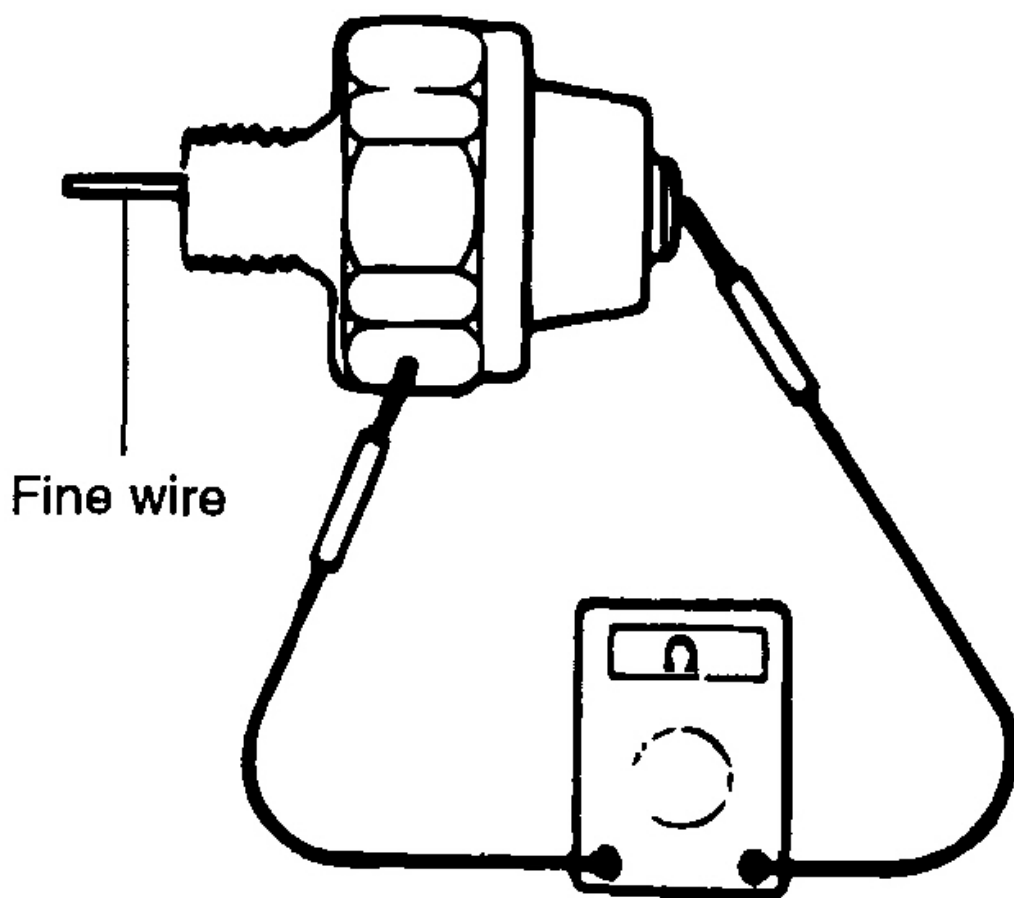
G03851412

Fig. 159: Checking Continuity Between Terminal And Body With An Ohmmeter
Courtesy of HYUNDAI MOTOR CO.

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

continuity eve when the fine wire is pushed, replace it.

3. However, if there is non continuity when a 50 kPa (70 psi) vacuum is applied through the oil hole, the switch is operating properly. Check to see that air doesn't leak. If air leaks, the diaphragm is broken. Replace the switch.



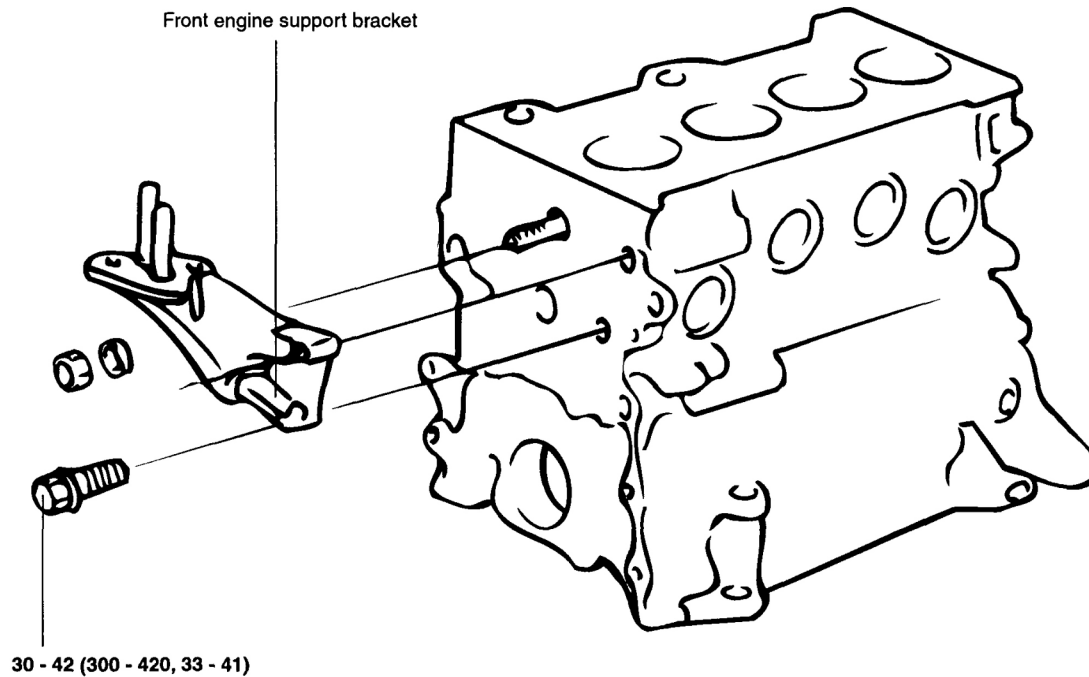
G03851413

Fig. 160: Checking Continuity Between Terminal And Body When Fine Wedge Is Pushed
Courtesy of HYUNDAI MOTOR CO.

ENGINE BLOCK

ENGINE BLOCK

COMPONENTS



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

G03851414

Fig. 161: Identifying Engine Block Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

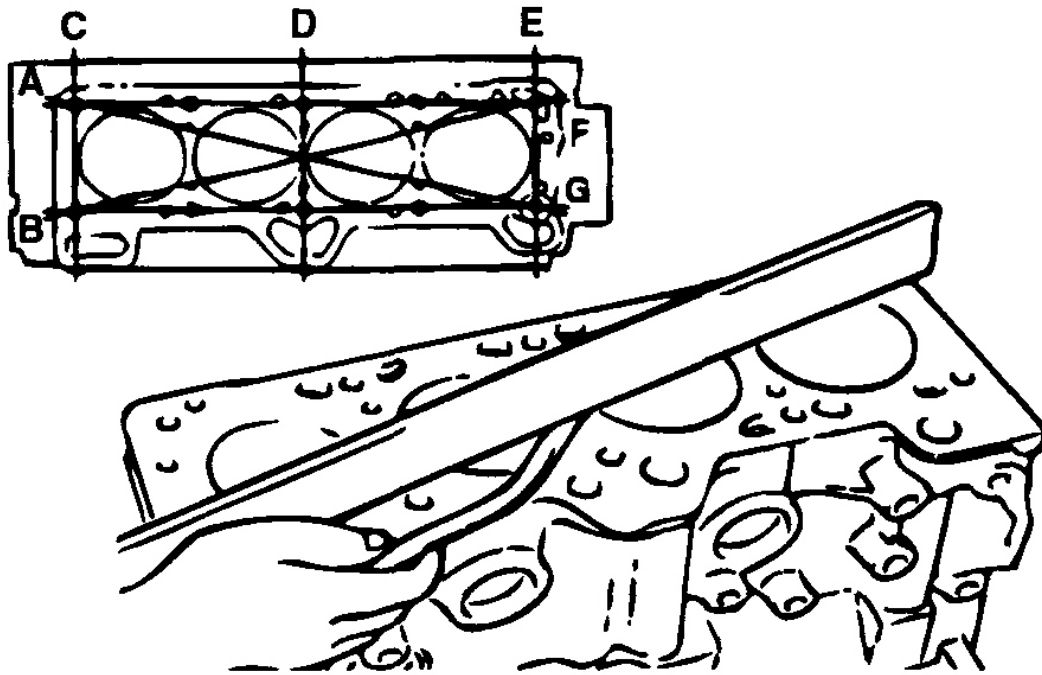
INSPECTION

CYLINDER BLOCK

1. Visually check the engine block for scores, rust and corrosion. Also check for cracks or any other defects. Repair or replace the block if defective.
2. Using a straight edge and feeler gauge, check the block top surface for warpage. Make sure that the surface is free from gasket chips and other foreign matter.

Standard: 0.05 mm (0.0020 in.) or less

Limit: 0.1 mm (0.0039 in.)



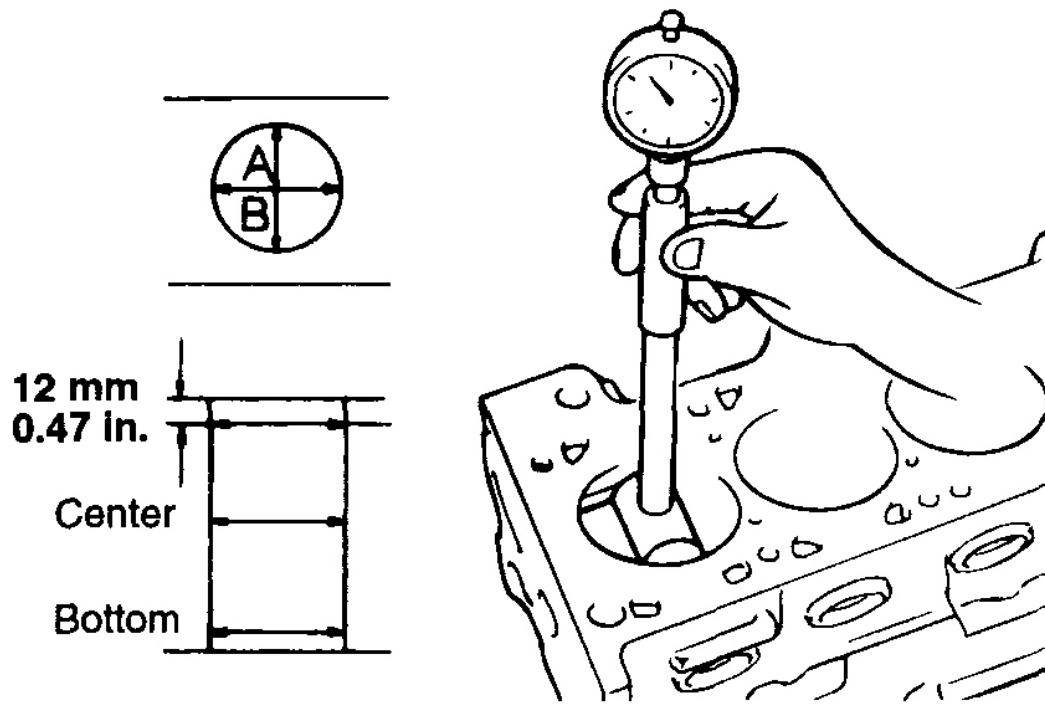
G03851415

Fig. 162: Using Straight Edge And Feeler Gauge To Check Block Top Surface For Warpage
Courtesy of HYUNDAI MOTOR CO.

3. Measure the cylinder bore with a cylinder gauge at three levels in the directions A and B. If the cylinder bores show more than the specified out-of-roundness or taper or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed. New oversize pistons and rings must be fitted. Measuring points are as shown.

Cylinder I.D: 75.5 mm (2.9724 in.)

Cylinder I.D. taper: 0.02 mm (0.0008 in.,) or less



G03851416

Fig. 163: Measuring Cylinder Bore With A Cylinder Gauge At Three Levels In The Directions A And B

Courtesy of HYUNDAI MOTOR CO.

4. If a cylinder ridge exists, cut away with a ridge reamer.
5. Oversize pistons are available in four sizes

Piston service size and mark mm (in.)

0.25 (0.010) O.S.: 25

0.50 (0.020) O.S.: 50

6. When boring the cylinder bore to oversize, keep the specified clearance between the oversize piston and the bore. Make sure that all pistons used are of the same oversize.

The standard measurement of the piston outside diameter is taken at a level 12 mm (0.47 in.) above the bottom of the piston skirt and across the thrust faces.

Piston-to-cylinder wall clearance:

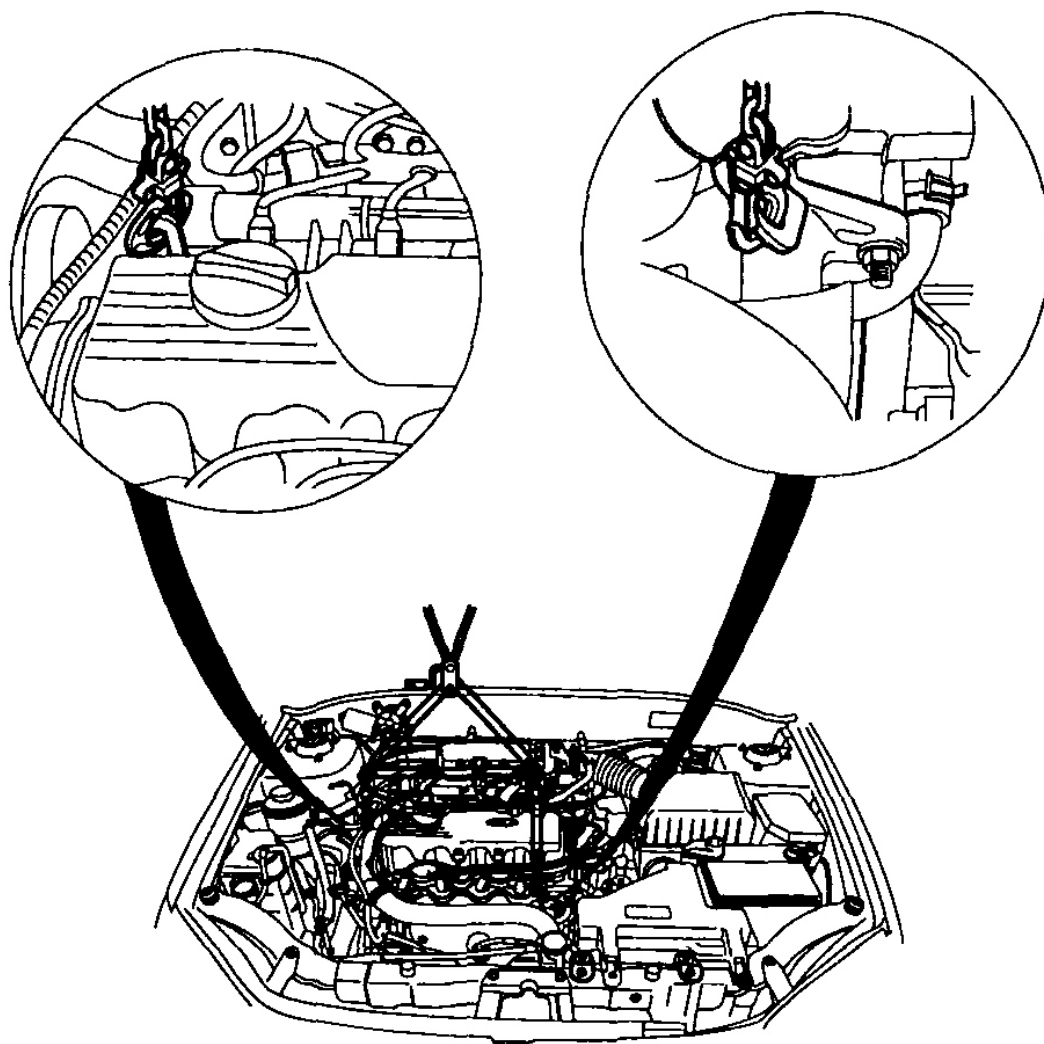
COMPONENTS



Fig. 164: Identifying Engine Mounts Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

REMOVAL

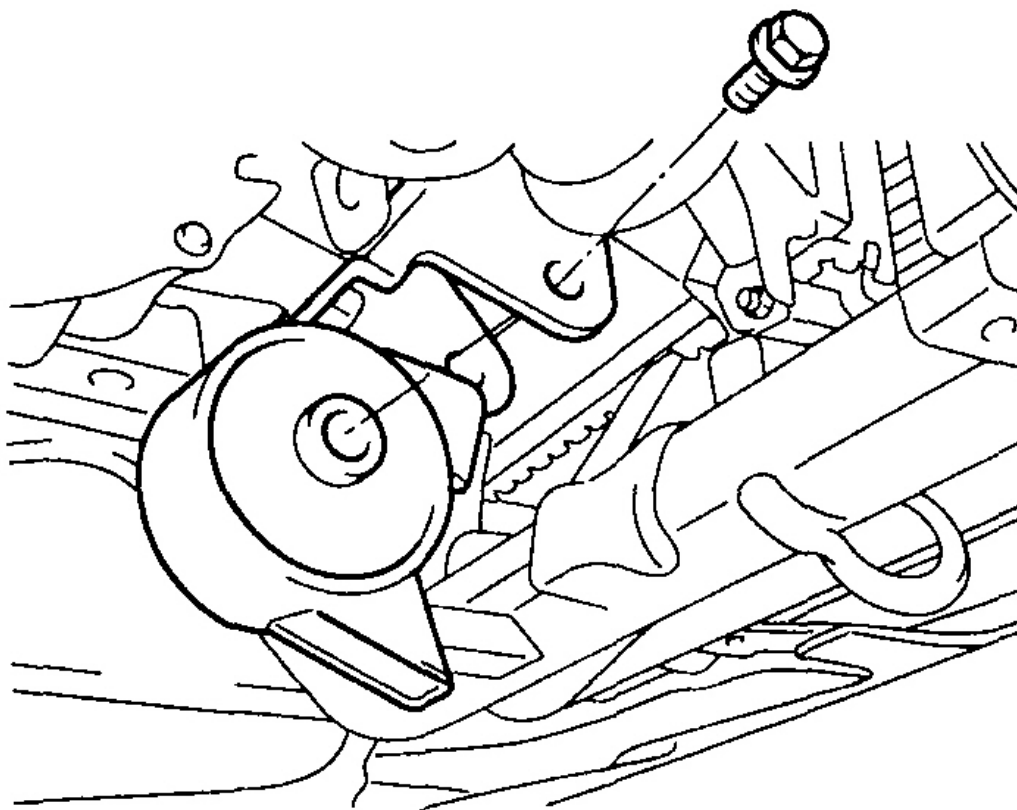
Attach an engine hoist to the engine hooks, and raise the engine just enough so that there is no pressure on the insulators.



G03851418

Fig. 165: Attaching Engine Hoist To Engine Hooks
Courtesy of HYUNDAI MOTOR CO.

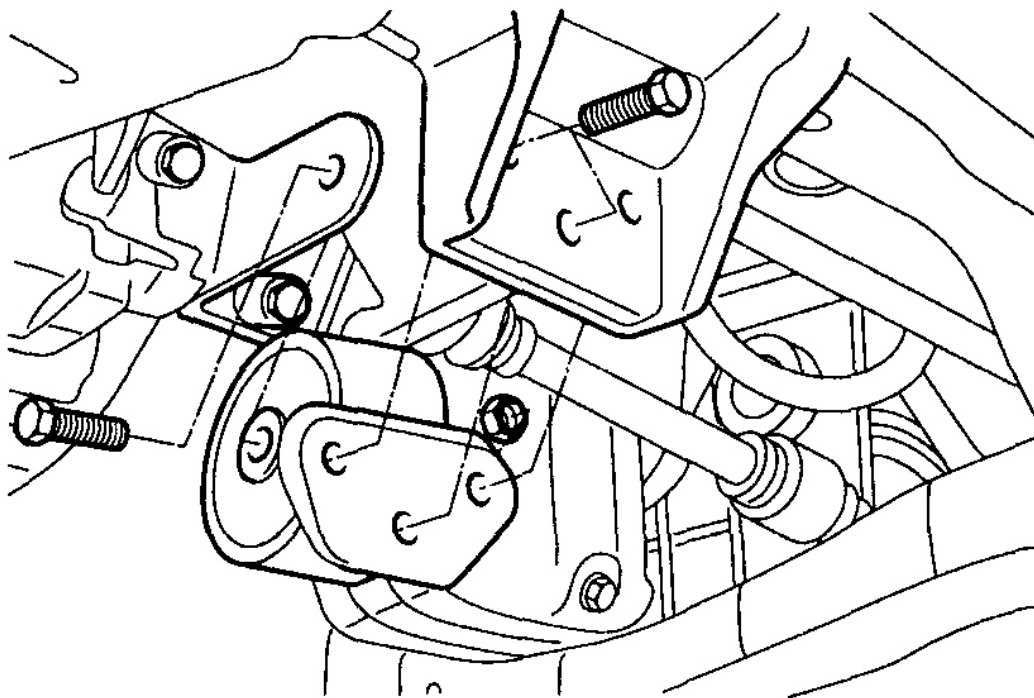
1. Remove the front roll stopper bracket from the subframe. (14 mm bolt and nut, 17 mm bolt.)



G03851419

Fig. 166: Removing Front Roll Stopper Bracket From Subframe
Courtesy of HYUNDAI MOTOR CO.

2. Remove the rear roll stopper bracket from the subframe.

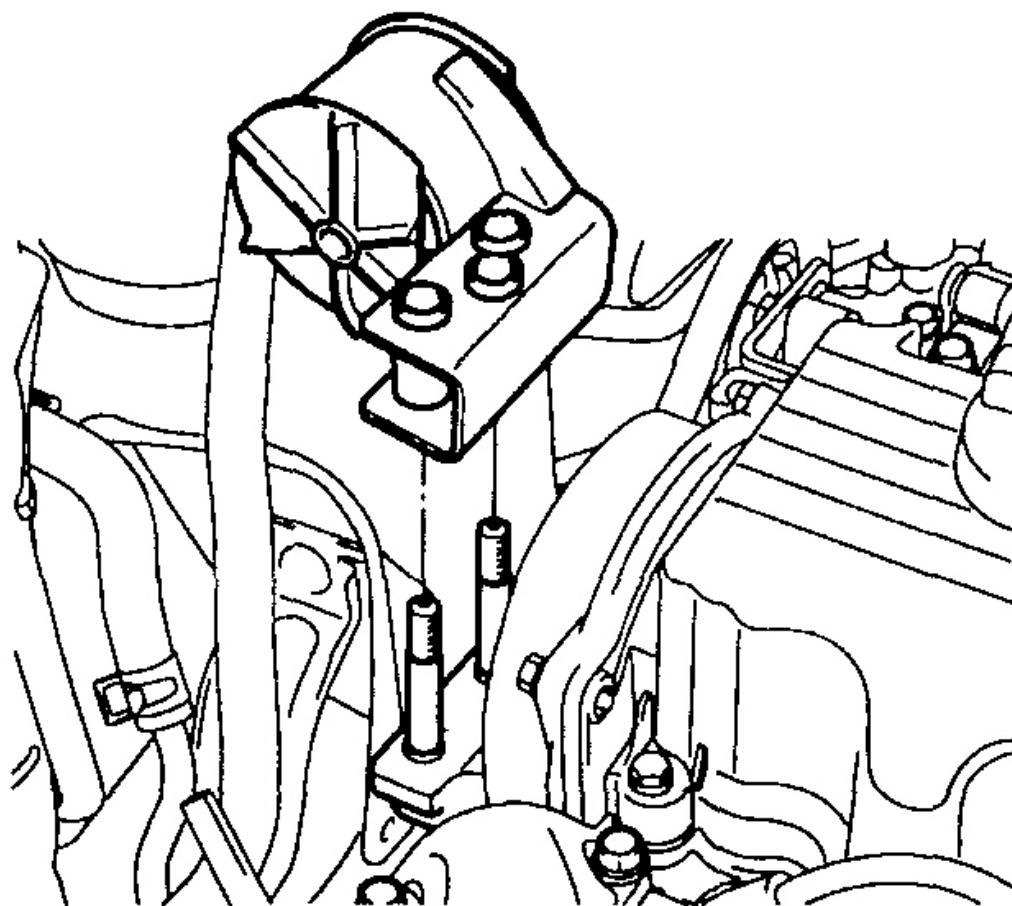


G03851420

Fig. 167: Removing Rear Roll Stopper Bracket From Subframe
Courtesy of HYUNDAI MOTOR CO.

3. Engine

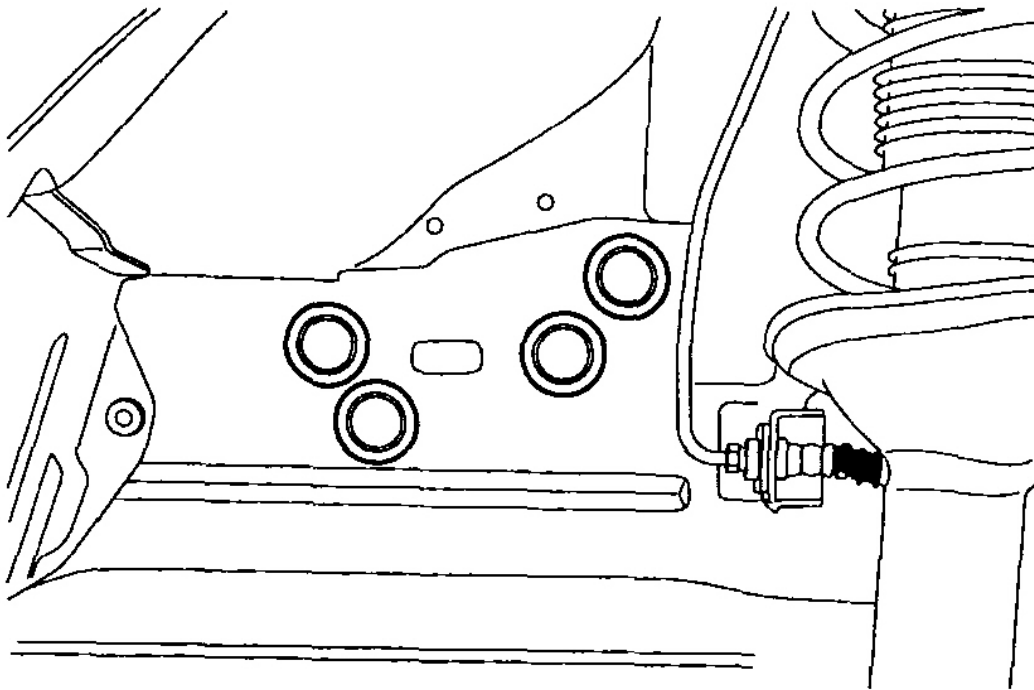
1. Remove the engine mount bracket from the engine. (14 mm, 17 mm)



G03851421

Fig. 168: Removing Engine Mount Bracket From The Engine
Courtesy of HYUNDAI MOTOR CO.

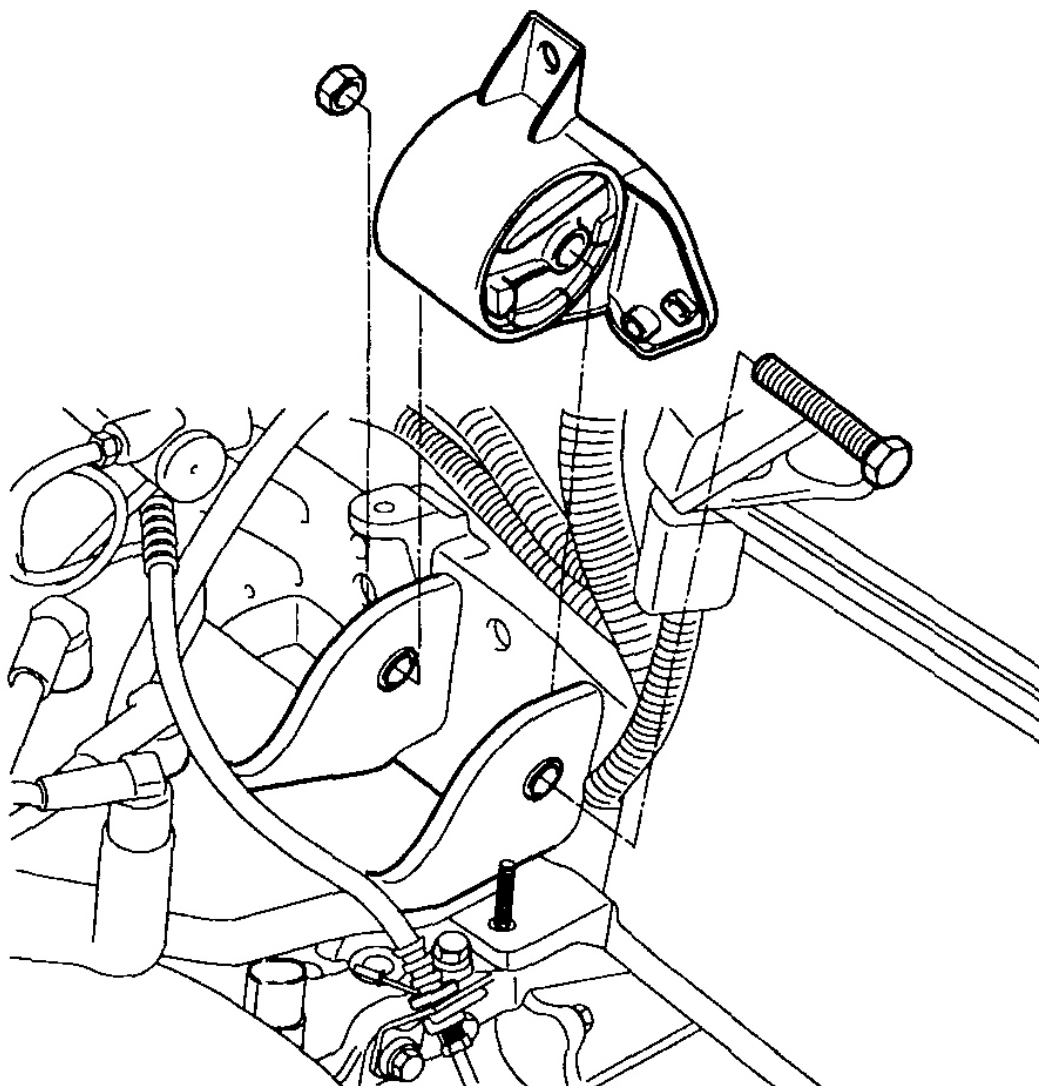
2. Remove the engine mount insulator.
4. Transaxle
 1. Remove the transaxle mount bolt. (17 mm)
 2. Detach the cap from inside the right fender shield. Remove the transaxle mount bolts.



G03851422

Fig. 169: Removing Transaxle Mount Bolts
Courtesy of HYUNDAI MOTOR CO.

3. Remove the transaxle mount bracket.



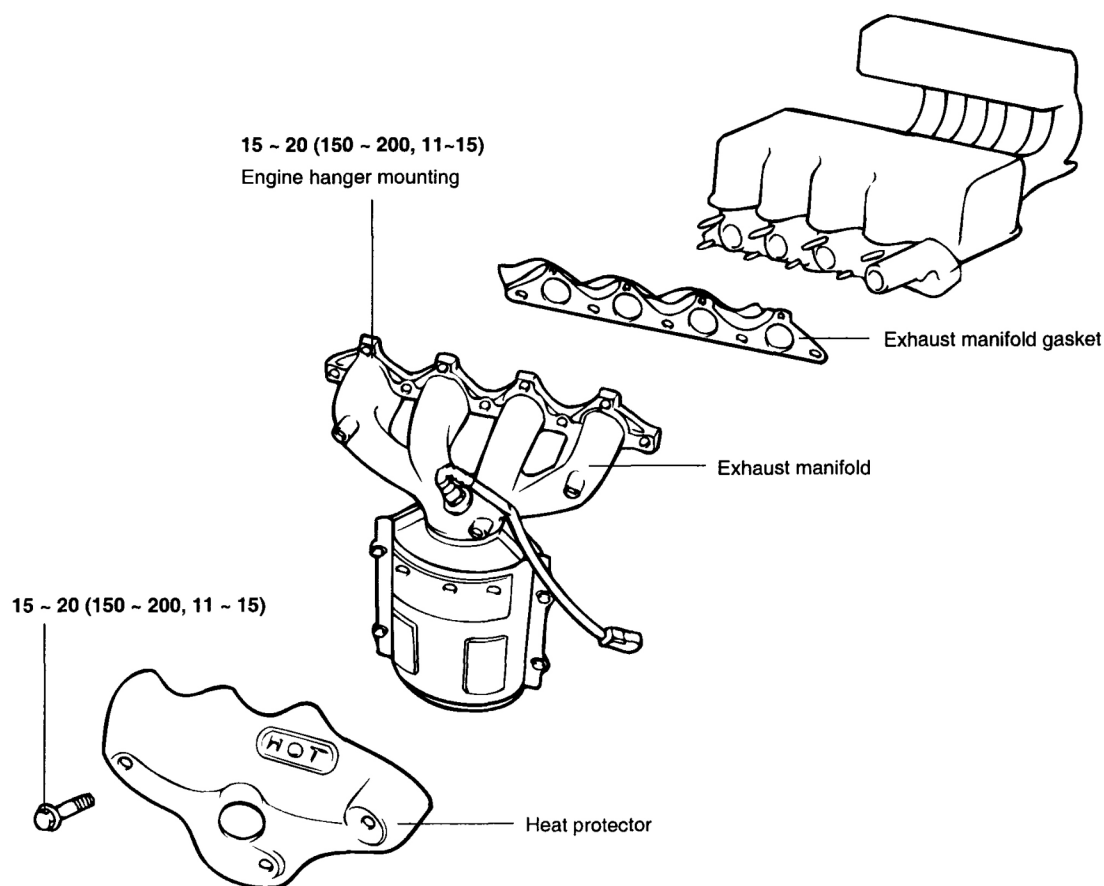
G03851423

Fig. 170: Removing Transaxle Mount Bracket
Courtesy of HYUNDAI MOTOR CO.

INTAKE AND EXHAUST SYSTEM

EXHAUST MANIFOLD

COMPONENTS



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

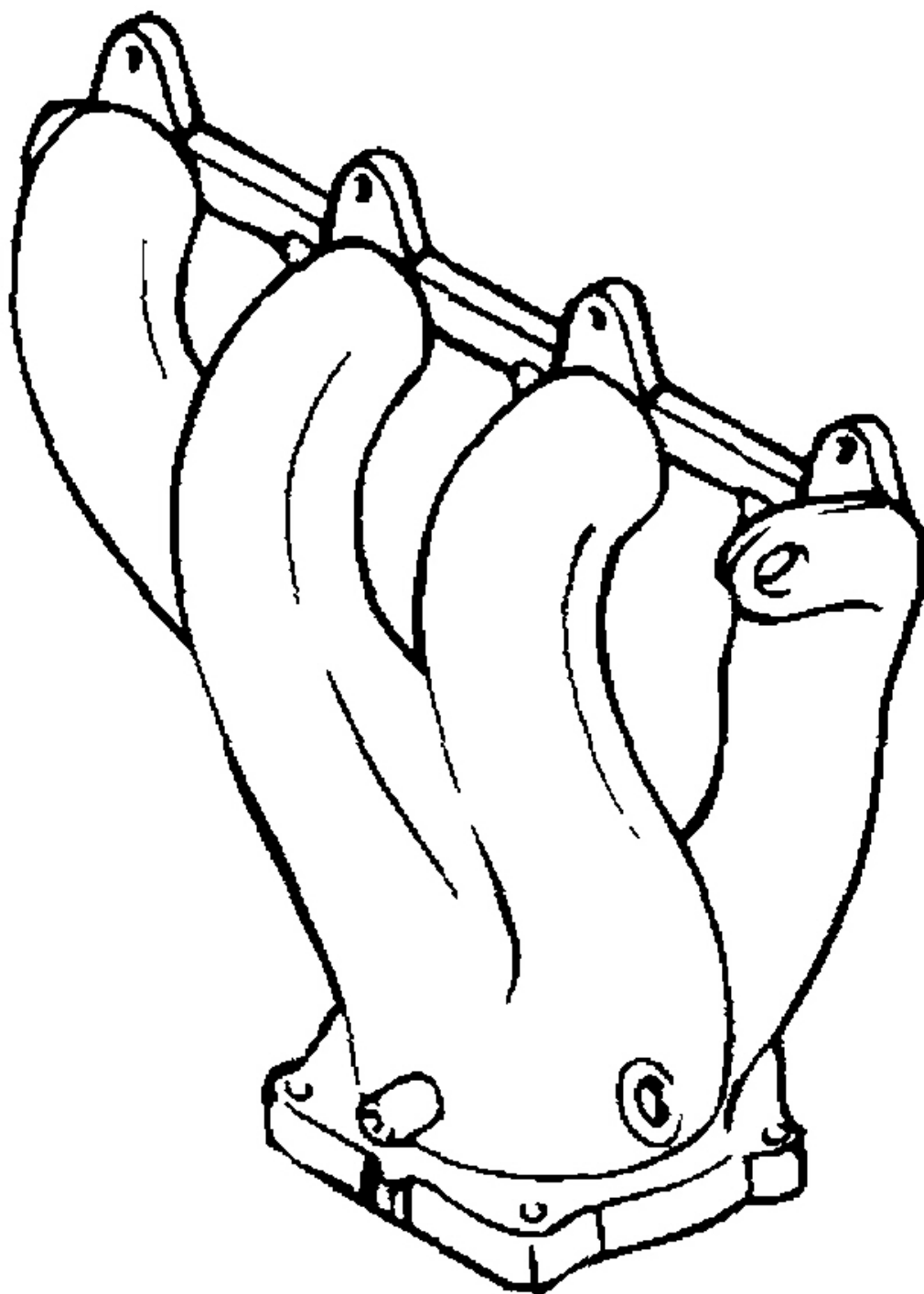
G03851424

Fig. 171: Identifying Exhaust Manifold Components And Torque Specifications
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

EXHAUST MANIFOLD

Check for damage or cracking.

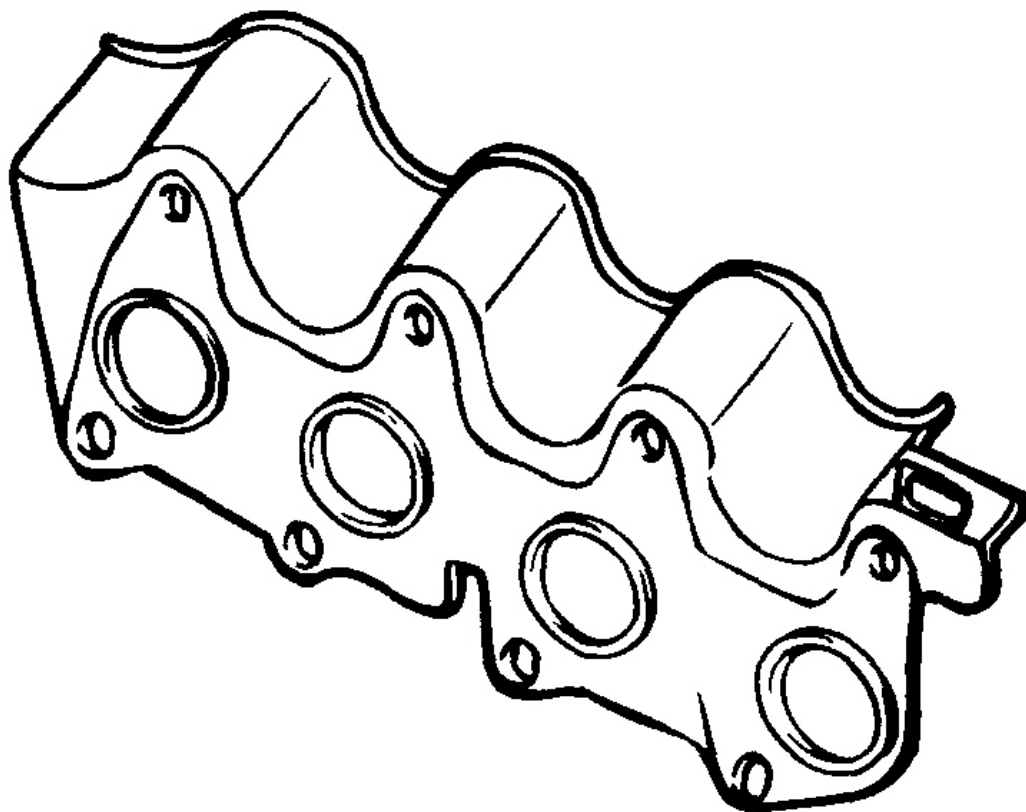


G03851425

Fig. 172: Inspecting Exhaust Manifold For Damage Or Cracking
Courtesy of HYUNDAI MOTOR CO.

EXHAUST MANIFOLD GASKET

Check for flaking or damage of the gasket.

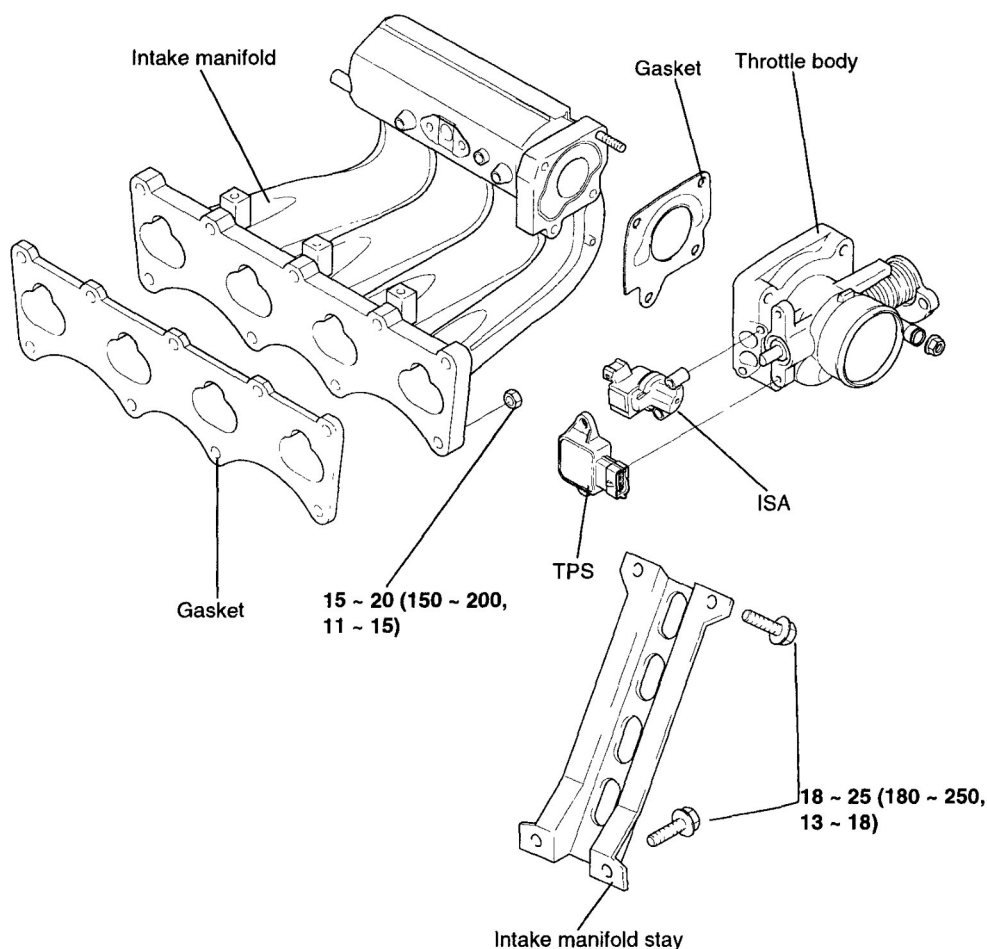


G03851426

Fig. 173: Inspecting Exhaust Manifold Gasket For Flaking Or Damage
Courtesy of HYUNDAI MOTOR CO.

INTAKE MANIFOLD

COMPONENTS



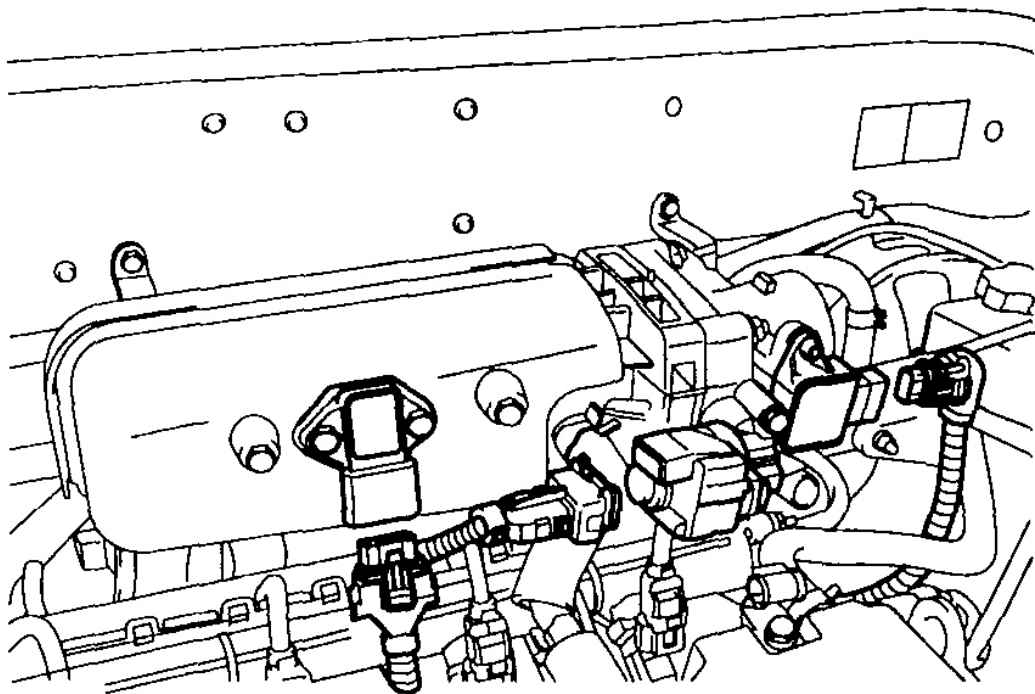
TORQUE : Nm (kg.cm, lb.ft)

G03851427

Fig. 174: Identifying Intake Manifold Components And Torque Specifications
 Courtesy of HYUNDAI MOTOR CO.

REMOVAL

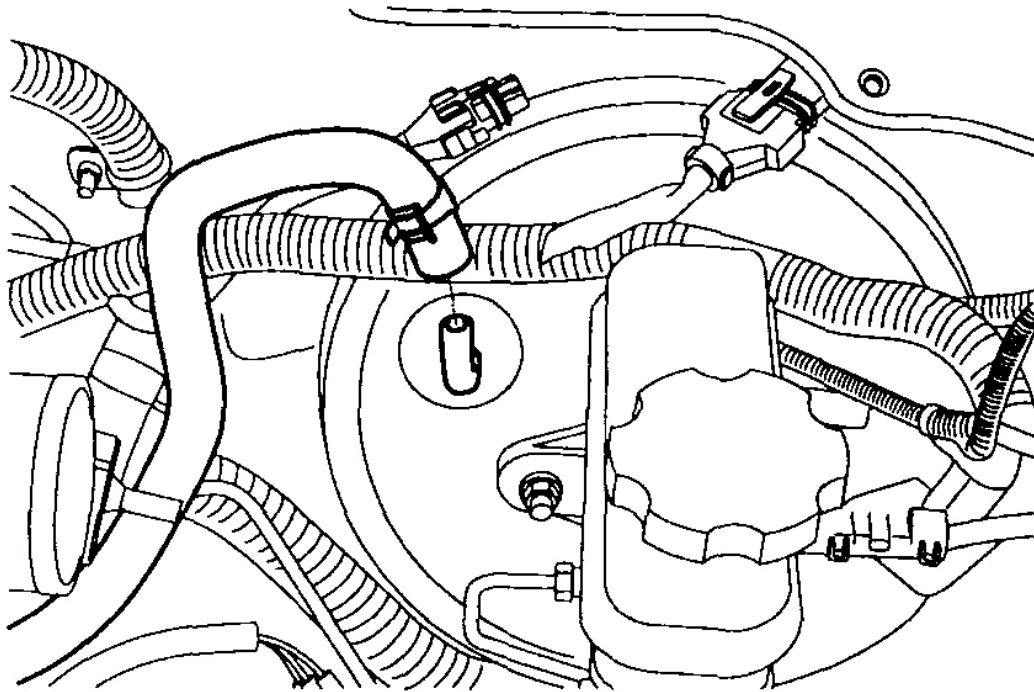
1. Disconnect the ISA, TPS and MAP sensor.



G03851428

Fig. 175: Disconnecting ISA, TPS And MAP Sensor
Courtesy of HYUNDAI MOTOR CO.

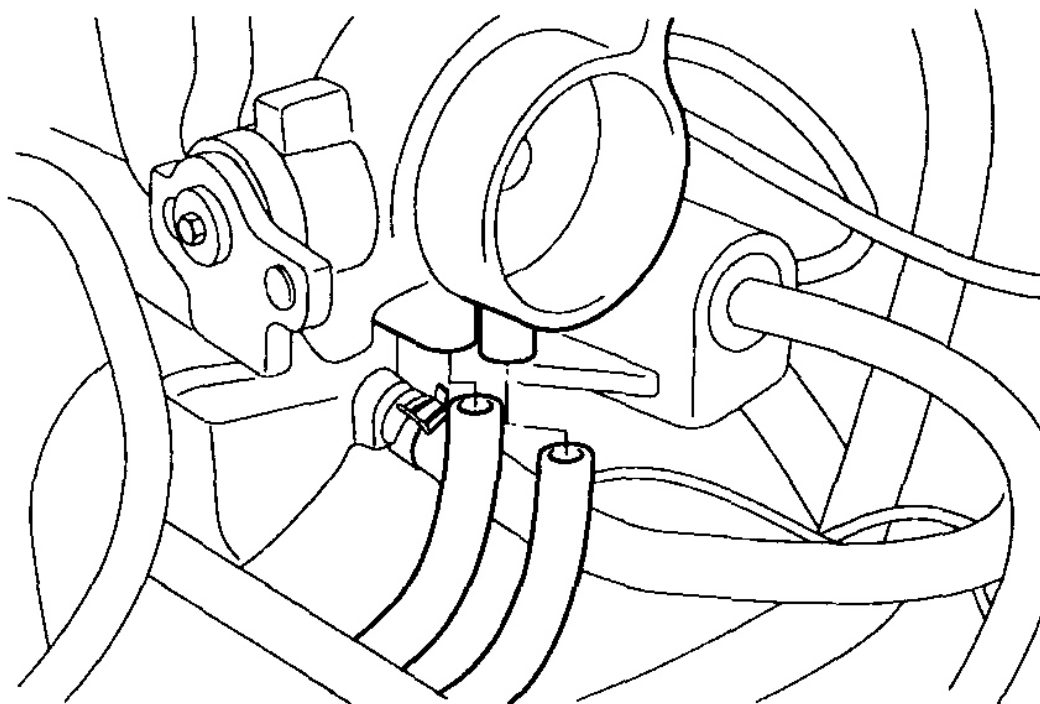
2. Remove the intake air hose connected to the throttle body.
3. Remove the accelerator cable.
4. Remove the P.C.V. hose and brake booster vacuum hose.



G03851429

Fig. 176: Removing P.C.V. Hose And Brake Booster Vacuum Hose
Courtesy of HYUNDAI MOTOR CO.

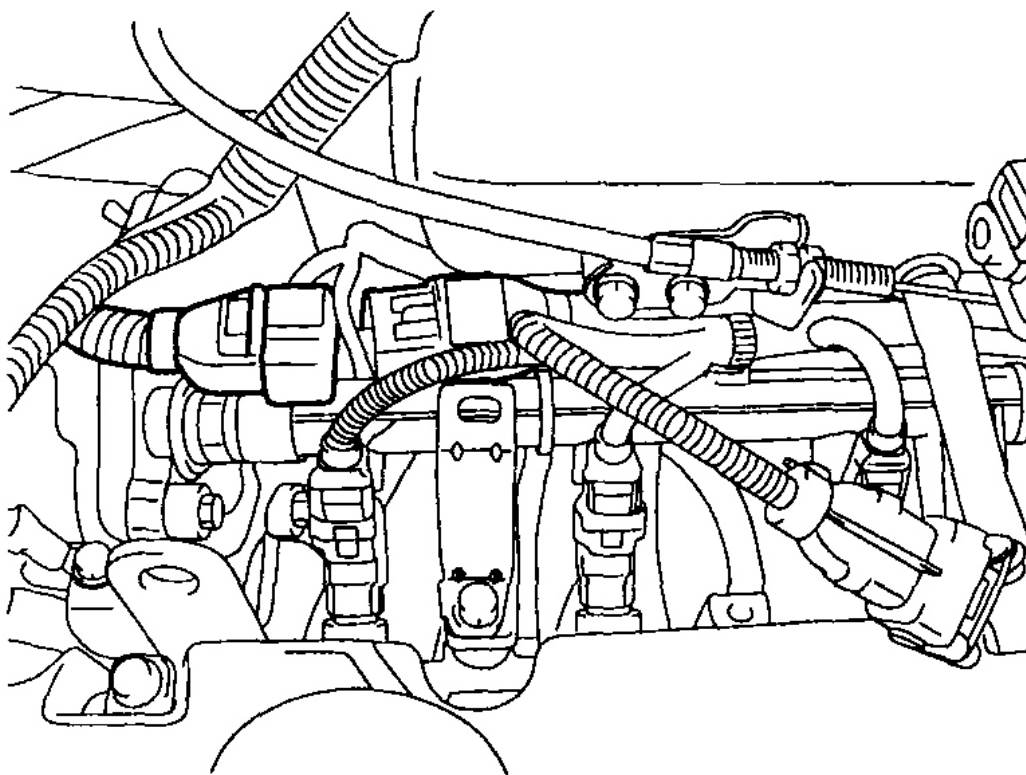
5. Remove the coolant hose connections from the throttle body.



G03851430

Fig. 177: Removing Coolant Hose Connections From Throttle Body
Courtesy of HYUNDAI MOTOR CO.

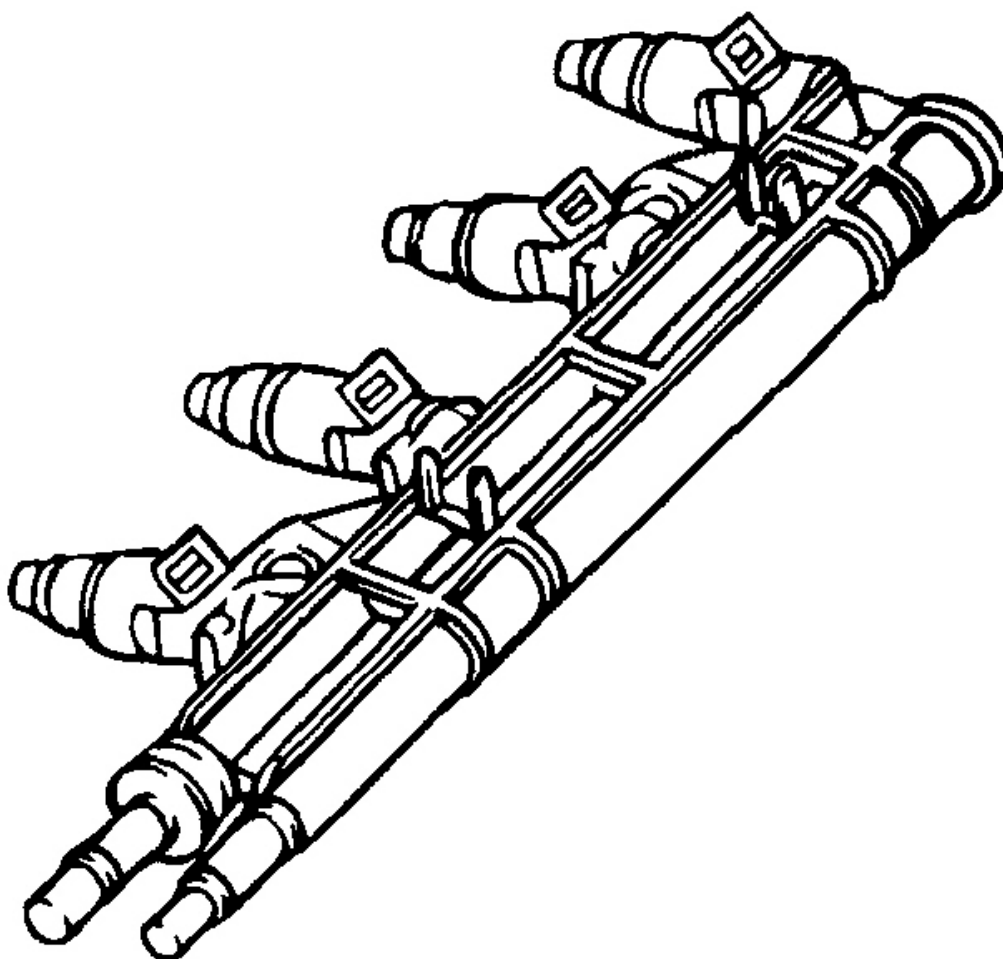
6. Disconnect the fuel injector harness connector.



G03851431

Fig. 178: Disconnecting Fuel Injector Harness Connector
Courtesy of HYUNDAI MOTOR CO.

7. Remove the delivery pipe and fuel injectors from the intake manifold.



G03851432

Fig. 179: Removing Delivery Pipe And Fuel Injectors From Intake Manifold
Courtesy of HYUNDAI MOTOR CO.

8. Remove the surge tank stay.

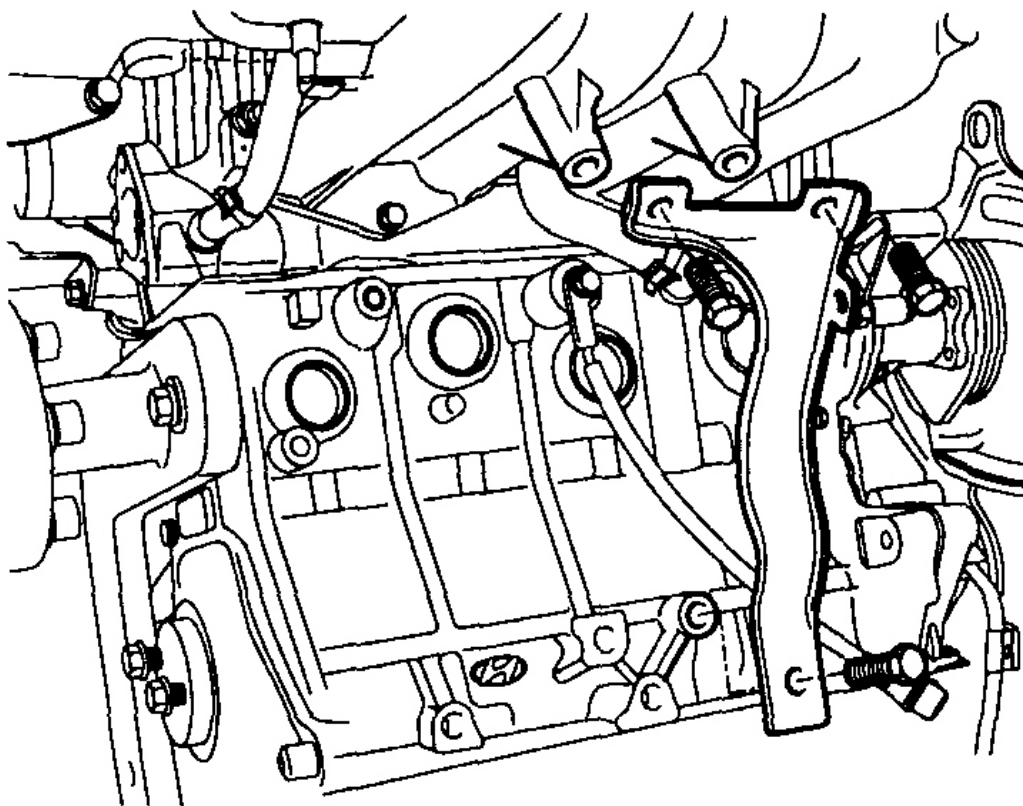
**G03851433**

Fig. 180: Removing Surge Tank Stay
Courtesy of HYUNDAI MOTOR CO.

9. Remove the intake manifold.

INSPECTION

SURGE TANK

Check the surge tank for defects or cracks. Replace if necessary.

INTAKE MANIFOLD

Check for damage or cracking of any part.

AIR HOSE

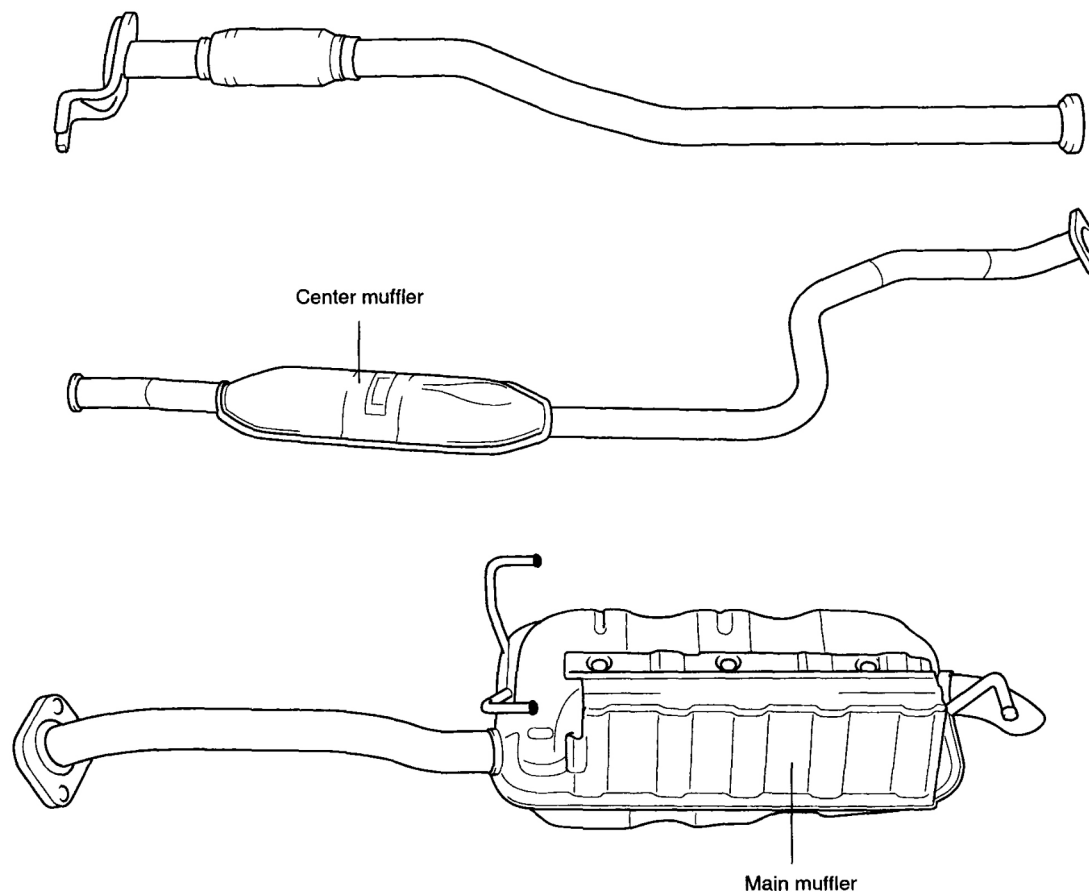
Check for damage or cracking of any part.

INSTALLATION

1. Install the delivery pipe with the fuel injectors attached.

CAUTION: Be careful not to drop the injectors when removing the delivery pipe.

2. Ensure that insulators are correctly inserted into the delivery pipe hole.

MUFFLER**COMPONENTS**

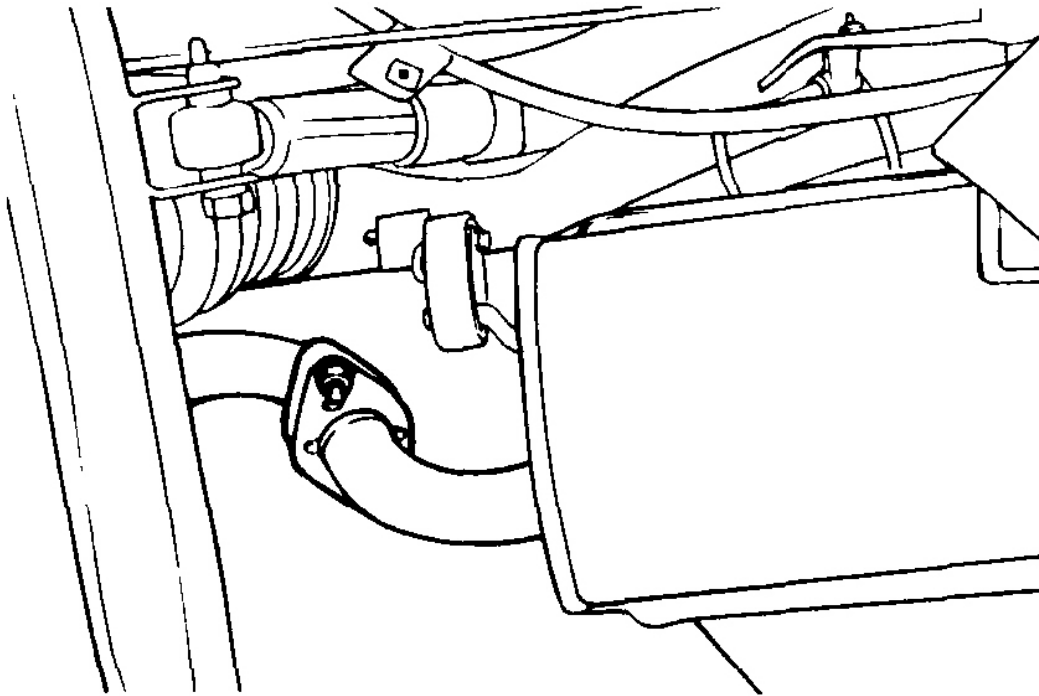
G03851434

Fig. 181: Identifying Muffler Components
Courtesy of HYUNDAI MOTOR CO.

REMOVAL**TAIL PIPE**

CAUTION: Before removing or inspecting the exhaust system, ensure that it has cooled sufficiently.

1. Disconnect the tail pipe muffler from the center muffler.



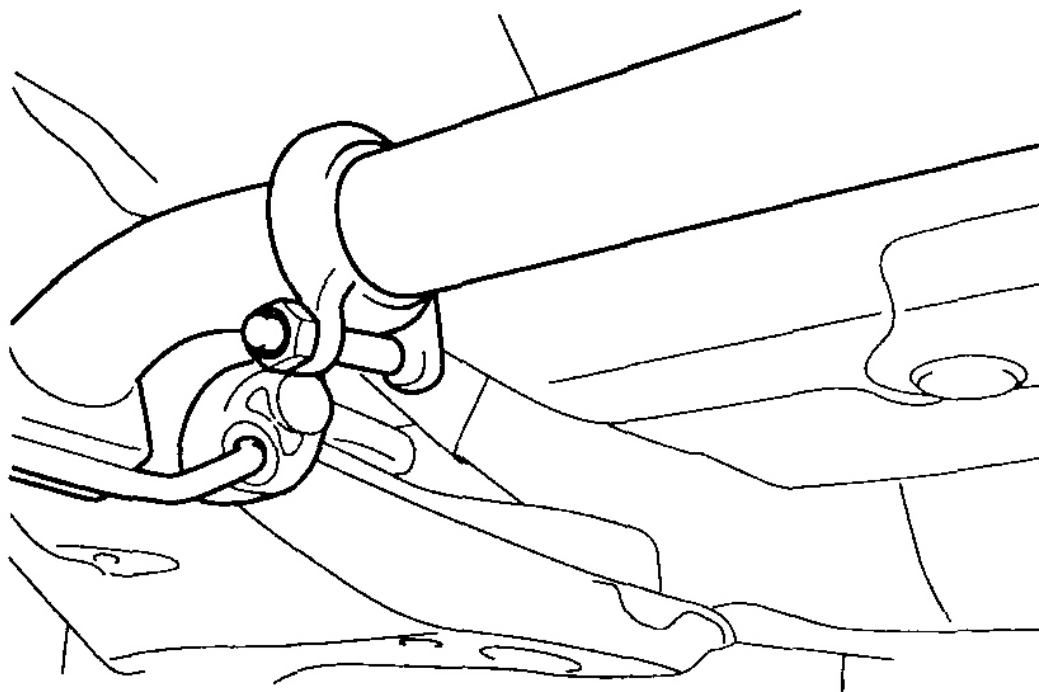
G03851435

Fig. 182: Disconnecting Tail Pipe Muffler From Center Muffler
Courtesy of HYUNDAI MOTOR CO.

2. Remove the rubber hangers and take out the tail pipe.

CENTER PIPE

1. Remove the center muffler assembly from the tail pipe.
2. Remove the rubber hanger, then remove the center muffler.



G03851436

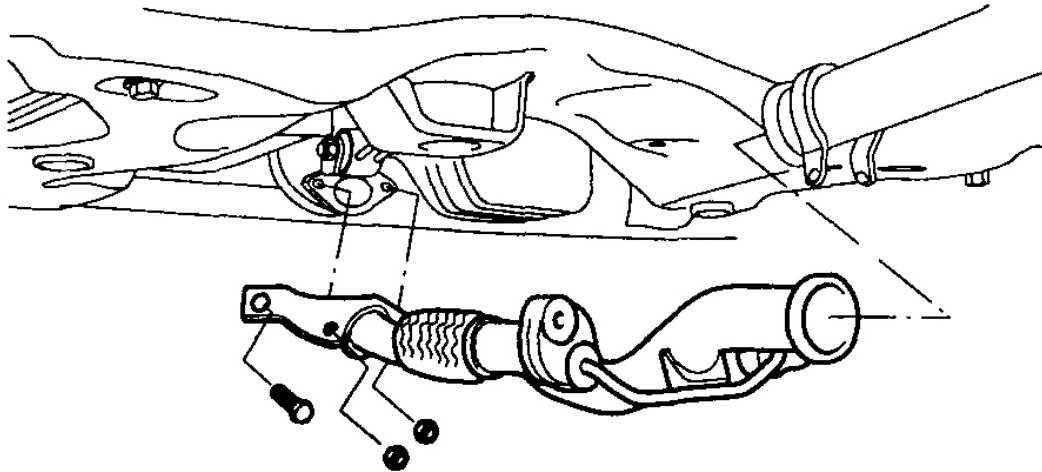
Fig. 183: Removing Rubber Hanger
Courtesy of HYUNDAI MOTOR CO.

CATALYTIC CONVERTER

Remove the catalytic converter from the front exhaust.

FRONT EXHAUST PIPE

1. Remove the front exhaust pipe from the catalytic converter (unleaded vehicle) or exhaust manifold (leaded vehicle).



G03851437

Fig. 184: Removing Front Exhaust Pipe From Catalytic Converter
Courtesy of HYUNDAI MOTOR CO.

2. Remove the front exhaust pipe clamp bolt and remove the center muffler mounting nut.

INSPECTION

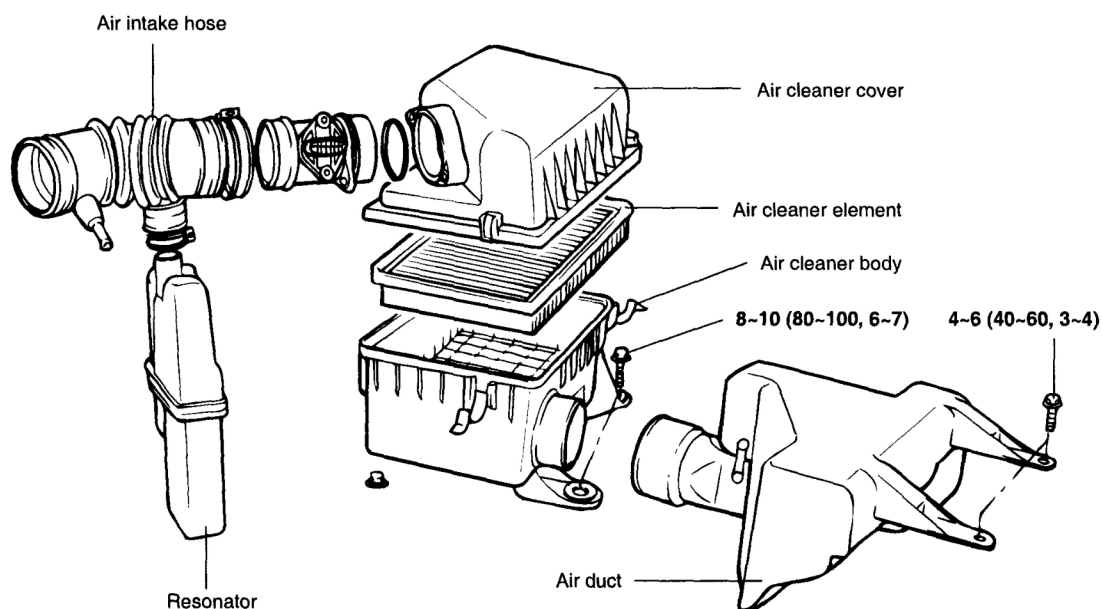
1. Check the mufflers and pipes for corrosion and damage.
2. Check the rubber hanger and bands for deterioration and cracks.

INSTALLATION

1. Install the catalytic converter assembly, front exhaust pipe, center exhaust pipe and the tail pipe. In that specific order.
2. Tighten the parts securely. Make sure there is no interference with any body components.

AIR CLEANER (ACL)

COMPONENTS



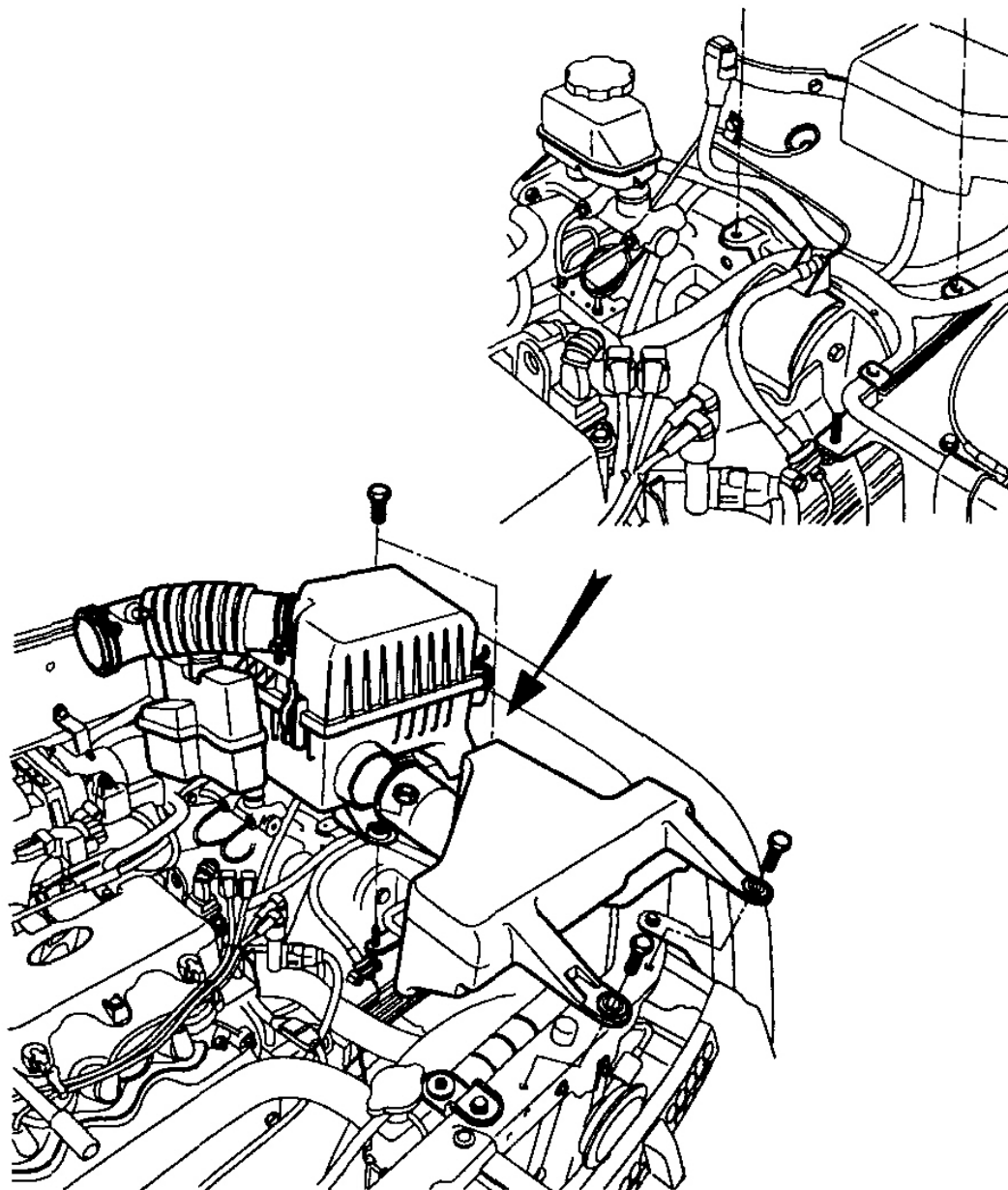
TORQUE : Nm (kg.cm, lb.ft)

G03851438

Fig. 185: Exploded View Of Air Cleaner (ACL)
 Courtesy of HYUNDAI MOTOR CO.

REMOVAL

1. Remove the air duct connected to the air cleaner.
2. Remove the air intake hose from the air cleaner side.
3. Remove the air cleaner cover and filter.
4. Remove the air cleaner mounting bolts and remove the air cleaner.



G03851439

Fig. 186: Removing Air Cleaner Mounting Bolts And Removing Air Cleaner
Courtesy of HYUNDAI MOTOR CO.

INSPECTION

1. Check the air cleaner body, cover and filter for distortion, corrosion or damage.

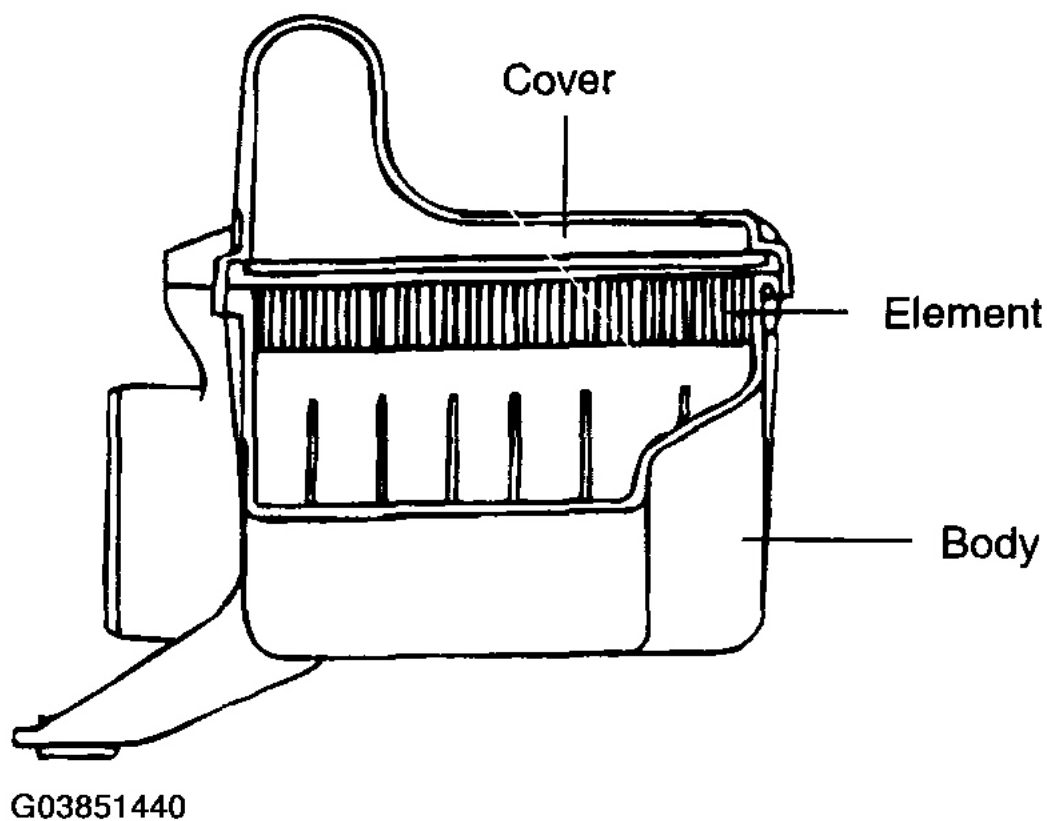
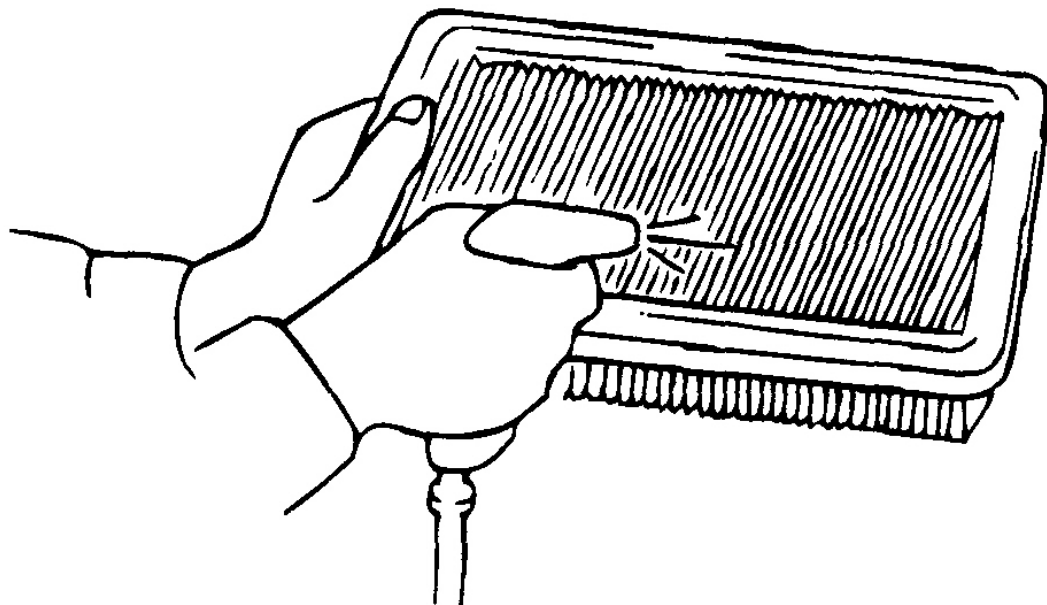


Fig. 187: Identifying Air Cleaner Body, Cover And Filter
Courtesy of HYUNDAI MOTOR CO.

2. Check the air duct for damage.
3. Check the resonator for distortion or damage.
4. Check the air cleaner filter for restrictions, contamination or damage.

If the filter is slightly restricted, remove dust and other contaminants by blowing air from the upper side through the filter.



G03851441

Fig. 188: Removing Dust And Other Contaminants By Blowing Air
Courtesy of HYUNDAI MOTOR CO.

5. Check the air cleaner housing for restrictions, contamination or damage.

INSTALLATION

Installation is the reverse order of removal.