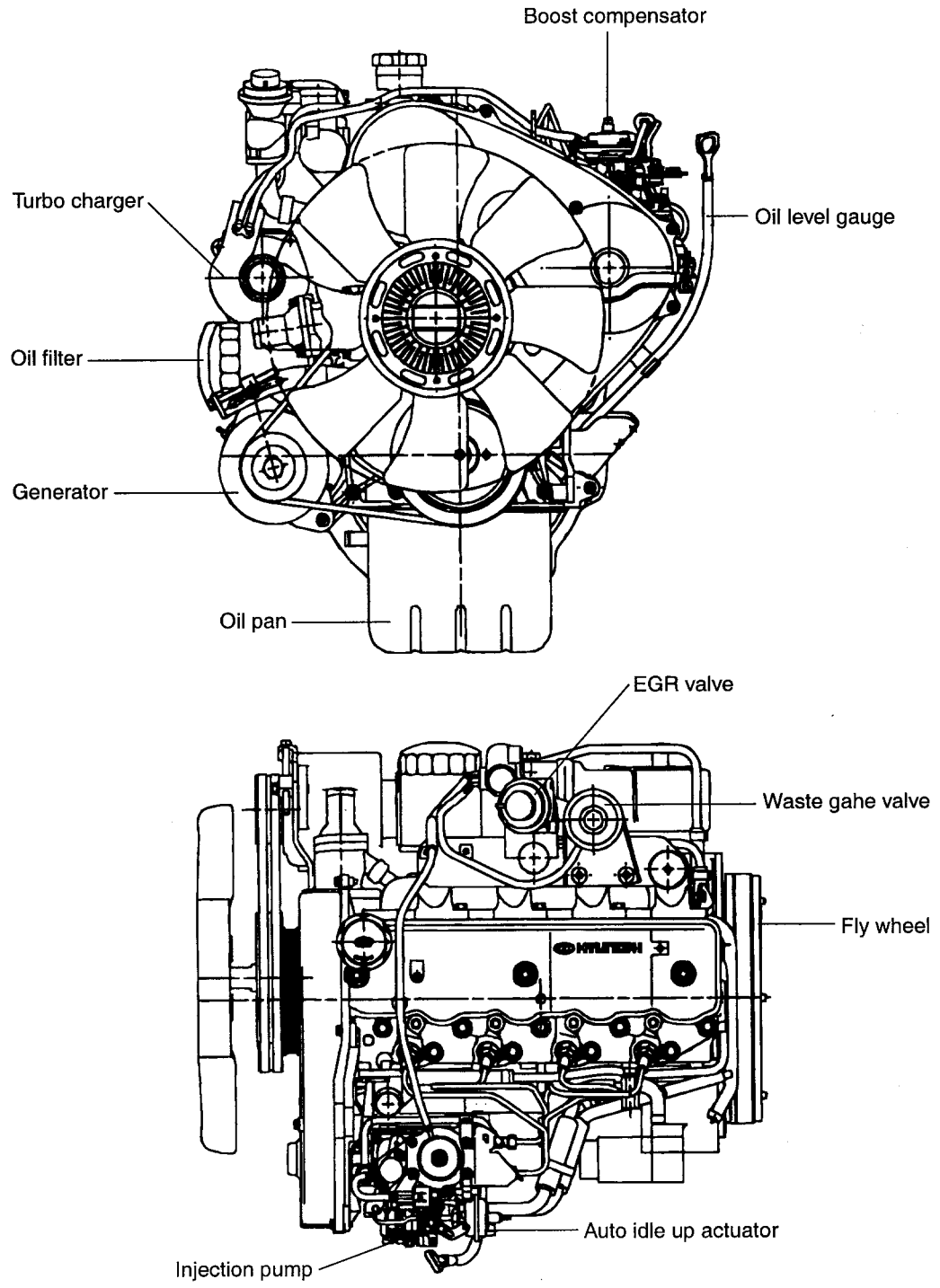
Engine Mechanical System [2.5 TCI]

GENERAL

GENERAL ELCB0010

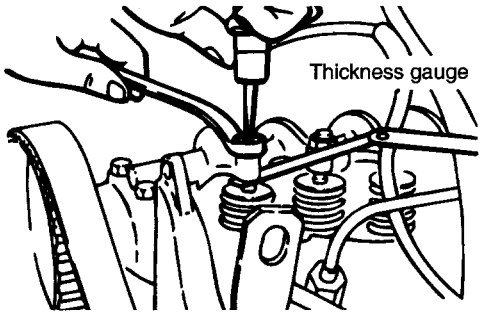
[2.5 TCI]



ECLA001B

Symptom	Probable cause	Remedy
Piston noise	Execssive clearance due to cylinder wear	Replace piston
	Piston or piston pin worn	Install new piston
	Burnt piston	Install new rings
	Piston ring damaged	
Oil leak	Oil pan drain plug loose	Tighten to torque
	Oil pan mounting bolt loose	Tighten to correct torque
	Oil pan gasket broken	Install new gasket
	Crankshaft front oil seal defective	Install new oil seal
	Crankshaft rear oil seal dective	Install new oil seal
	Rocker cover gasket broken	Install new gasket
	Oil filter loose	Tighten to correct torque
	Oil filter gasket broken	Install new gasket
Oil consumption	Worn, scuffed, or broken rings	Hone cylinder bores and install new rings
	Carbon in oil ring slot	Install new rings
	Rings fitted too tight in grooves	Remove the rings. Check grooves. If groove is not proper width, replace pistion
	Worn valve guides	Install new valve and / or new valve guides with O.S.
	Faulty valve stem seals	Install new valve stem seals
Oil pressure drop	Low oil level	Check engine oil level
	Slow idle speed	Set idle speed to specification
	Faulty oil pressure switch	Install new switch
	Colgged oil filter	Install new oil filter
	Worn parts in oil pump	Replace worn parts or pump
	Thin or diluted oil	Change oil to correct viscosity
	Excessive bearing clearance	Measure bearings for correct clearance
	Oil relief valve stuck	Remove valve and inspect, clean and reinstall
	Oil pump cover bent or cracked	Install new oil pump
	Oil screen loose or clogged	Clean or replace screen

7. If not within the standard value, loosen the adjusting screw locking nut and, while turning the adjusting screw, use a thickness gauge to adjust the valve clearance to the standard value.



ECLA003E

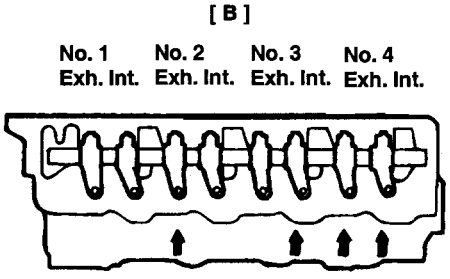
8. Block the adjusting screw with a screwdriver, so that it cannot move and tighten the locknut to the specified torque.

Tightening torque :

12 - 18 Nm (120 - 180 kg.cm, 9 - 13 lb,.ft)

9. Rotate clockwise the crankshaft one complete turn (360 degree).

10. Check that valve clearance indicated in the diagram (B) is at the standard value.



ECLA019K

Standard value : Hot engine
Intake : 0.25 mm (0.0098 in.)
Exhaust : 0.25 mm (0.0098 in.)
Cold engine
Intake : 0.15 mm (0.0059 in.)
Exhaust : 0.15 mm (0.0059 in.)

11. If not within the standard value, repeat steps 7 to 8 to adjust the valve clearance of remaining valves.

12. When installing the rocker cover assembly to the cylinder head, apply a coating of the specified sealant to the semicircular packing and cylinder head top surfaces, and then tighten at the specified torque

Specified sealant :

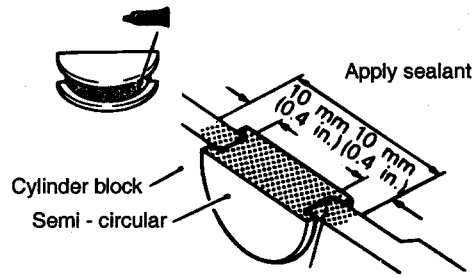
3M ART Part No. 8660 or equivalent

Tightening torque :

5 - 7 Nm (50 - 70 kg.cm, 4- 5 lb.ft)

⚠ ***CAUTION***

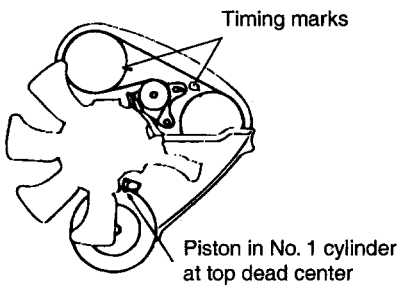
If they are overtorqued, a deformed rocker cover or oil leakage could result.



ECLA003F

ADJUSTMENT OF THE TIMING BELT TENSION ELCB0150

1. Remove the timing beklt upper cover and bring the pistion in No. 1 cylinder to top dead center on compression strocke. Check that the timing marks of sprockets are aligned.



ECLA005B

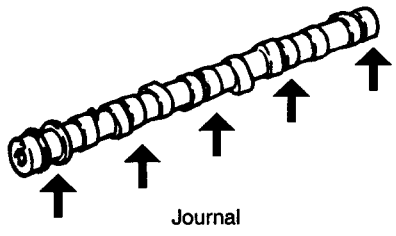
2. Loosen the timing belt tensioner mounting bolts.

⚠ ***CAUTION***

Do not loosen the belts more than necessary. They could drop in the lower cover.

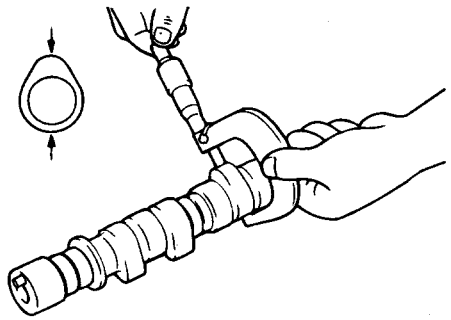
CAMSHAFT

1. Check the camshaft journal surfaces and, if damage or seizure is evident, replace the camshaft. If the camshaft journals are seized, check the cylinder head for damage. Check also the cylinder head oil holes for clogging.



ECLA019B

2. Check cam surfaces for abnormal wear and damage. If defects are evident, replace the camshaft, measure the lobe height and, if the limit is exceeded, replace the camshaft.



EDA9260A

Standard value :

Intake and exhaust : 37.05 mm (1.4587 in.)

Limit :

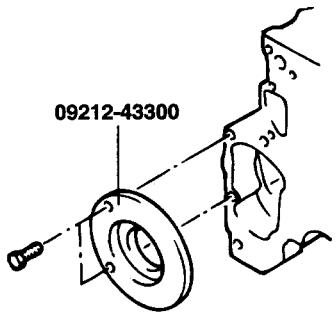
Intake and exhaust : 36.55 mm (1.4389 in.)

REPLACEMENT ELCB0280

SILENT SHAFT

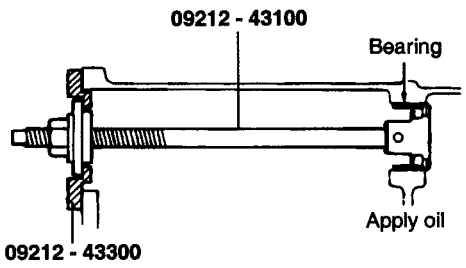
NOTE

Use Bearing Installer Stopper (special tool) only for removal and reinstallation of the right bearing.



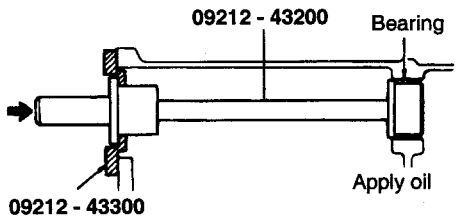
ECLA008A

1. Using Bearing Installer Stopper and Silent Shaft Bearing Puller (09212 - 43300, 09212 - 43100), remove two rear bearings from the cylinder block.



ECLA008B

2. Using Bearing Installer Stopper and Silent Shaft Bearing Installer (09212 - 43300, 09212 - 43200), press-fit bearing into cylinder block.

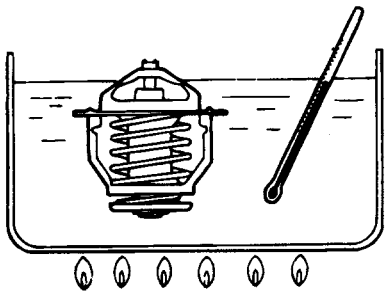


ECLA008C

INSPECTION ELCB0410

THERMOSTAT

1. Check that valve closes tightly at room temperature.
2. Check for defects or damage.
3. Check for rust on valve. Remove if any.
4. Immerse thermostat in container of water. Stir to raise water temperature and check that thermostat opening valve temperature and the temperature with valve fully open [valve liftover 8.5 mm (0.33 in.)] are at the standard value.



ECLA011C

Standard value :
Opening valve temperature 82° C (180° F)
Full - open temperature 95° C (203° F)

NOTE

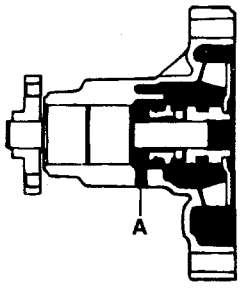
Measure valve heifht when fully close. Calculate lift by measuring the height when fully open.

BELT

1. Check the surface for damage, peeling or cracks.
2. Check the surface for presence of oil or grease.
3. Check the rubber for wear or hardening.

WATER PUMP

1. Check each part for cracks, damage or wear, and replace the water pump assembly if necessary.
2. Check the bearing for damage, abnormal noise and sluggish rotation, and replace the water pump assembly if necessary.
3. Check the seal unit for leaks, and replace the water pump assembly if necessary.
4. Check for water leakage. If water leaks from hole "A" seal unit is defective. Replace as an assembly.

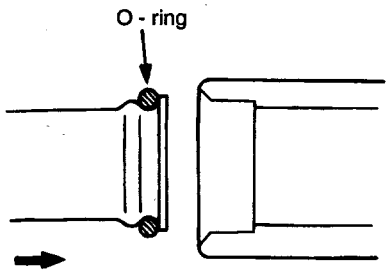


ECLA011B

INSTALLATION ELCB0420

WATER PIPE O - RING

Fit water pipe O-ring in the groove provided at water pipe end, wet the periphery of water pipe O-ring and insert water pipe.



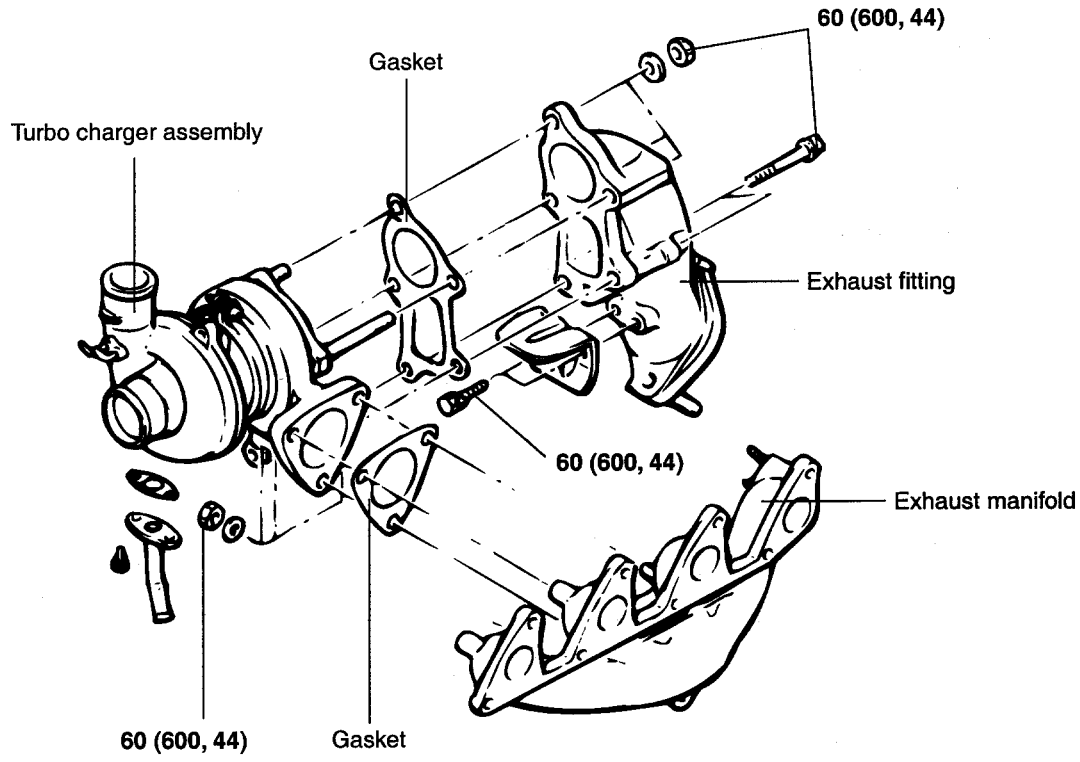
ECLA011E

CAUTION

1. ***Do not apply oil and grease to water pipe O-ring.***
2. ***Keep the water pipe connections free of sand, dust, etc.***
3. ***Insert water pipe until its end bottoms.***

COMPONENTS ELCB0610

[TCI]



*** Replace the gasket with new ones after removal.**

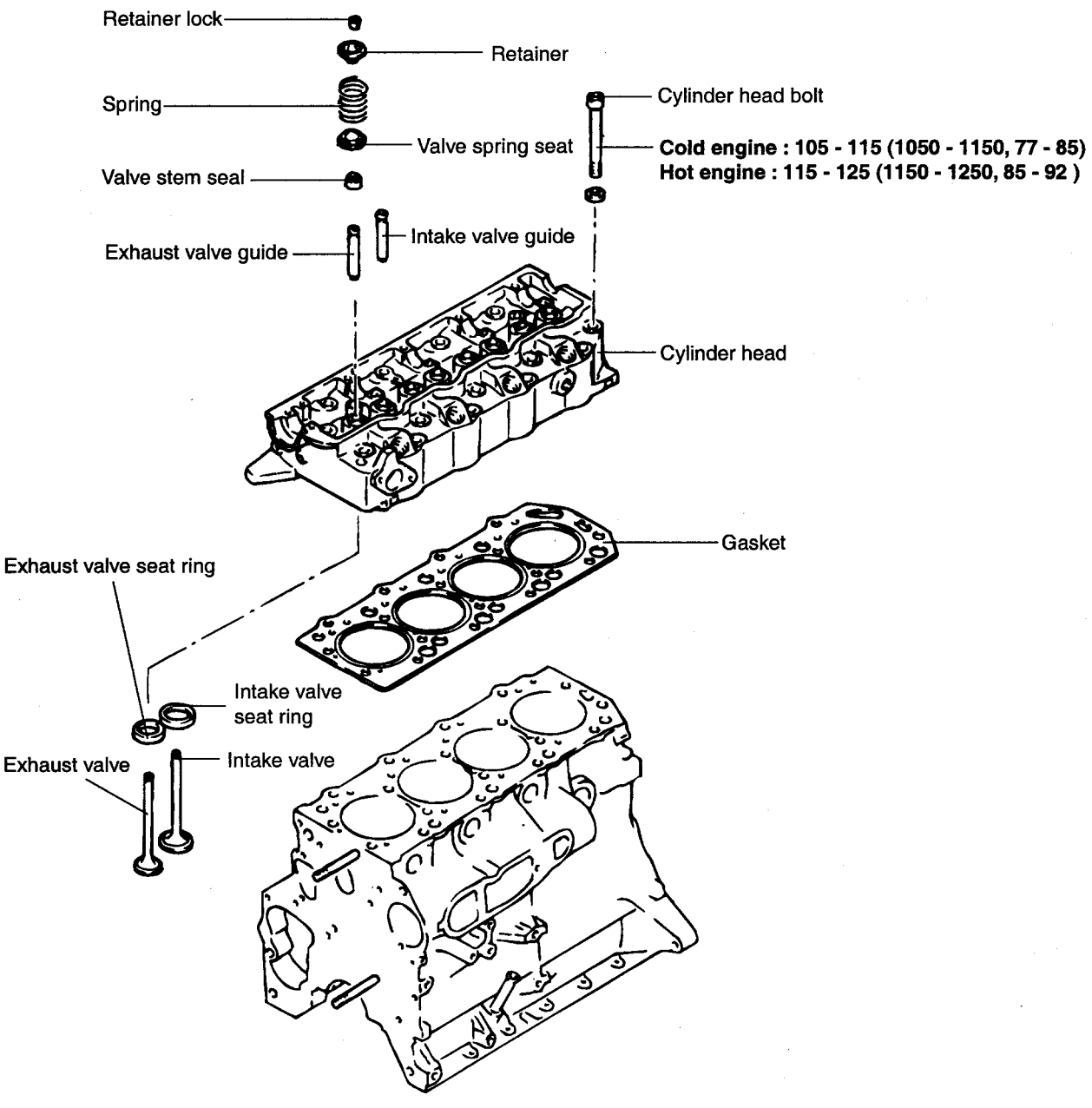
TORQUE : Nm (kg.cm,lb.ft)

ECLA015B

CYLINDER HEAD ASSEMBLY

CYLINDER HEAD

COMPONENTS ELCB0800



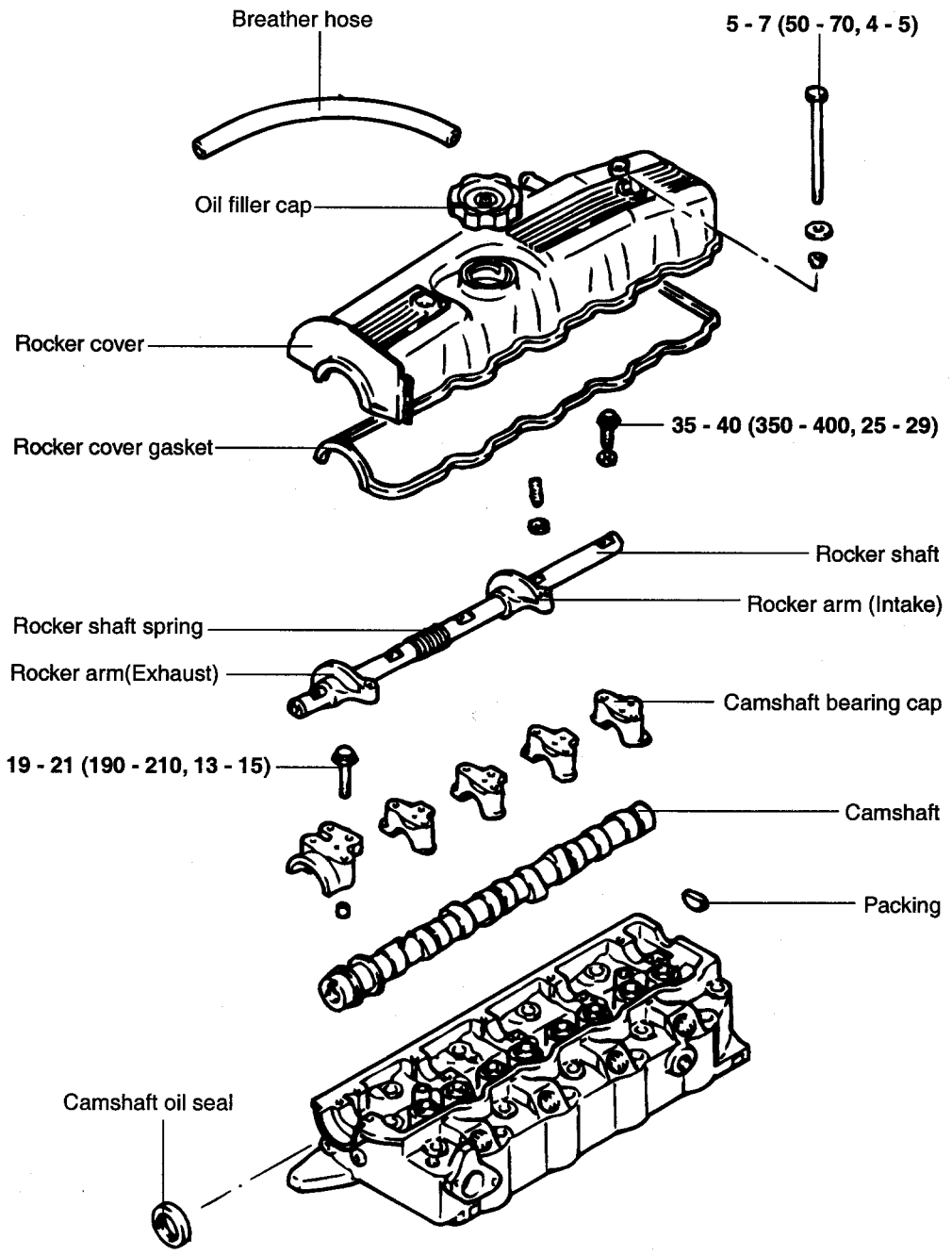
TORQUE : Nm (kg.cm, lb.ft)

*** Replace the gasket with new ones after removal**

ECLA018A

ROCKER ARM

COMPONENTS ELCB0840



*Replace the gasket with new ones after removal.

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

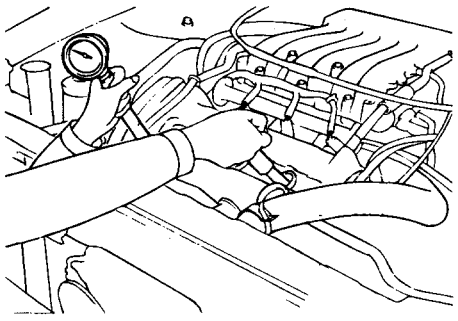
ECLA019A

CHECKING COMPRESSION PRESSURE EDHA1200

1. Before checking the engine compression, check the engine oil level. Also check that the starter motor and battery are all in normal operating condition.
2. Start the engine and wait until the engine coolant temperature reaches 80 - 95°C (176 - 205°F).
3. Stop the engine and disconnect the spark plug cables.
4. Remove the spark plugs.
5. Crank the engine to remove any foreign material in the cylinders.
6. Insert the compression gauge into the spark plug hole.
7. Depress the accelerator pedal to open the throttle fully.
8. Crank the engine and read the gauge.

Standard value : 1,200kpa(12.2 kg/cm², 170psi)

Limit : 1,050kpa(10.7kg/cm², 149psi)



EDHA015A

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

Limit : Max. 100kpa (1.0 kg/cm², 14psi)

between cylinders

10. 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 6 to 9.
    1) If the addition of oil causes the compression to rise, it is possible that the piston ring is be worn.
    2) If the compression remains the same, valve seizure, poor valve seating or a compression leak in the cylinder head gasket are all possible causes.

Tightening torque

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

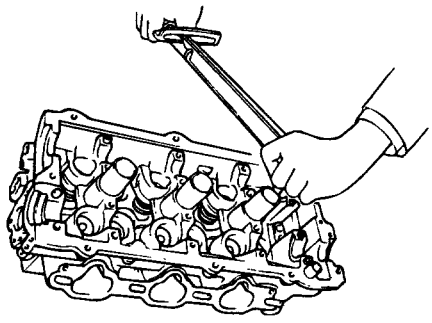
TIGHTENING CYLINDER HEAD BOLTS ECBB1300

1. First loosen slightly and then tighten to the specified torque.

Tightening torque

Cylinder head bolts cold [Engine temperature approximately 20°C (68°F)] :

105 - 115 Nm (1050 - 1150 kg.cm, 75 - 82 lb ft.)

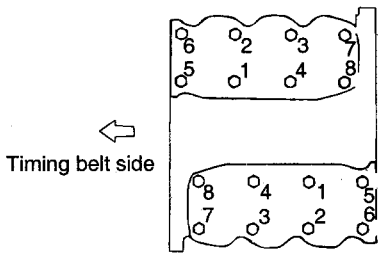


EDA9010A

2. Be sure to follow the specific torque sequence as shown in the illustration.

NOTE

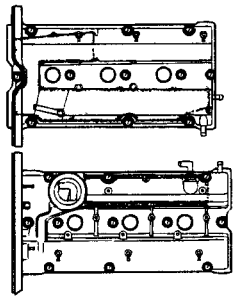
Run the engine to normal operating temperature and let it cool, then re-torque the bolts to specifications.



EDA9060B

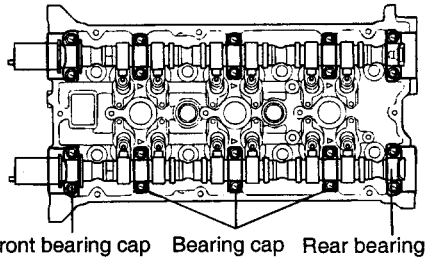
DISASSEMBLY EDMB0200

1. Remove intake manifold.
2. Disconnect the breather hose and the engine harness.
3. Remove the power steering pulley, air conditioner pulley, crankshaft pulley, idler pulley and tensioner pulley.
4. Remove the timing belt cover.
5. Loosen the auto tensioner.
6. Remove the timing belt from the camshaft sprocket.
7. Remove the spark plug cables.
8. Loosen the cylinder head cover bolts and then remove it.



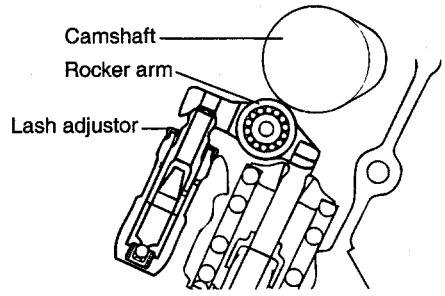
EDB9030A

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



EDB9030B

11. Remove the camshafts.



EDB9030C

INSPECTION EDMB0210

CAMSHAFTS

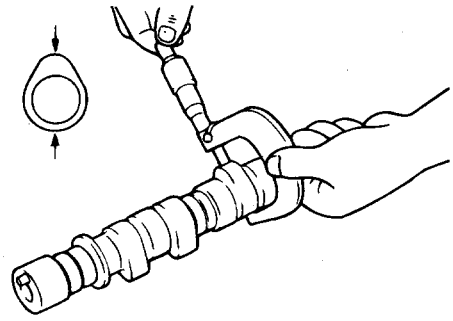
1. Check the camshaft journals for wear. If the journals are badly worn out, replace the camshaft.
2. Check the cam lobes for damage. If the lobe is damaged or excessively worn out, replace the camshaft.

Cam height

[Standard]

Intake : 35.098 - 35.298 mm (1.3818 - 1.3897 in.)

Exhaust : 34.81 - 35.01 mm (1.3705 - 1.3783 in.)



EDA9260A

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.

Camshaft end play : 0.1-0.15mm(0.0039-0.0059 in.)

OIL SEAL (CAMSHAFT FRONT)

1. Check the lips for wear. If lip threads are worn out, replace the oil seal with new one.
2. Check a contact surface of oil seal lip on camshaft. If there stratified wear, replace the camshaft.

⚠ *CAUTION*

Do not exceed 750 ± 1,750 kg (1,653 ± 3,858 lb) of force when the installing tool seats angainst the top of the arch.

INSPECTION ECBB3500

PISTONS 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, its rings should also be replaced.
3. Check that the piston pin fits in the piston pin hole. Replace any piston and pin assembly that is defective. The piston pin must be pressed smoothly by hand into the pin hole (at room temperature).

PISTON RINGS

1. Measure the piston ring side clearance. If the measured value exceeds the service limit, insert a new ring in the ring groove 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
No.1 : 0.04 - 0.08 mm (0.0016 - 0.0031 in.)
No.2 : 0.02 - 0.06 mm (0.0008 - 0.0024 in.)

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

Piston ring end gap
[Standard dimensions]
No.1 : 0.30 - 0.45 mm (0.012 - 0.018 in.)
No.2 : 0.45 - 0.60 mm (0.018 - 0.024 in.)
Oil ring side rail : 0.2-0.7 mm (0.0079 - 0.0276)

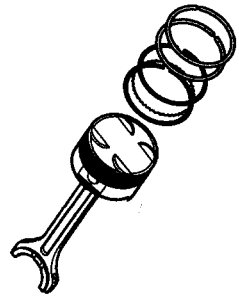
When replacing the ring without correcting the cylinder bore, check the gap with the ring situated at the lower part of cylinder that is less worn out.

PISTON RING SERVICE SIZE AND MARK

Standard	None
0.25 mm (0.010 in.) O.S	25
0.50 mm (0.020 in.) O.S	50
0.75 mm (0.030 in.) O.S	75
1.00 mm (0.040 in.) O.S	100

NOTE

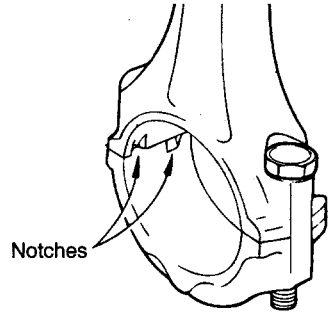
The mark can be found on the upper side of the ring next to the end.



KFW3037C

CONNECTING RODS

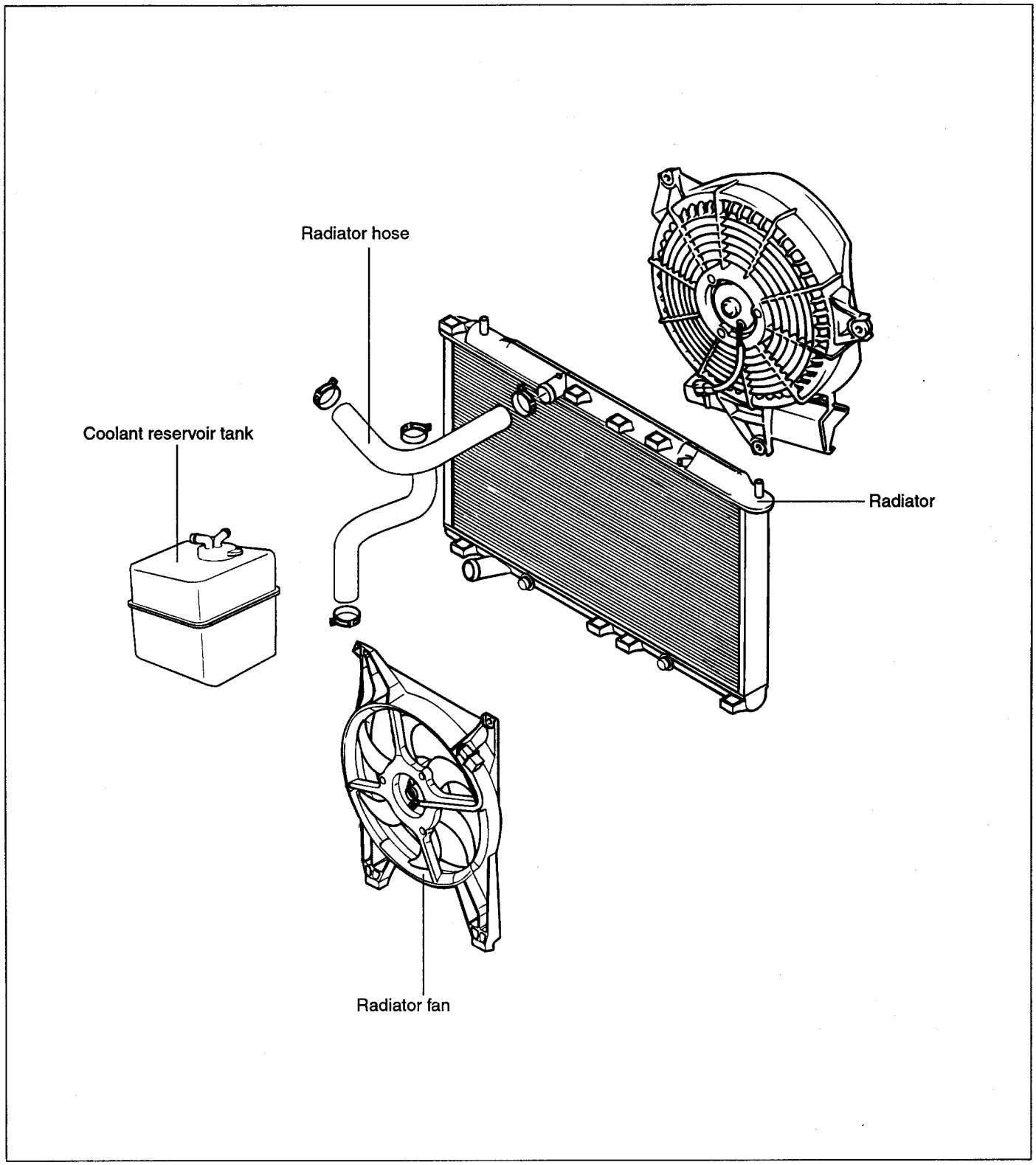
1. When the connecting rod cap is installed, make sure that the cylinder numbers, marked on rod end cap at disassembly, match. When a new connecting rod is installed, make sure that the notches holding the bearing in place are on the same side.
2. Replace the connecting rod if it is damaged at either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



EDA9047A

RADIATOR

COMPONENTS EDMB0300

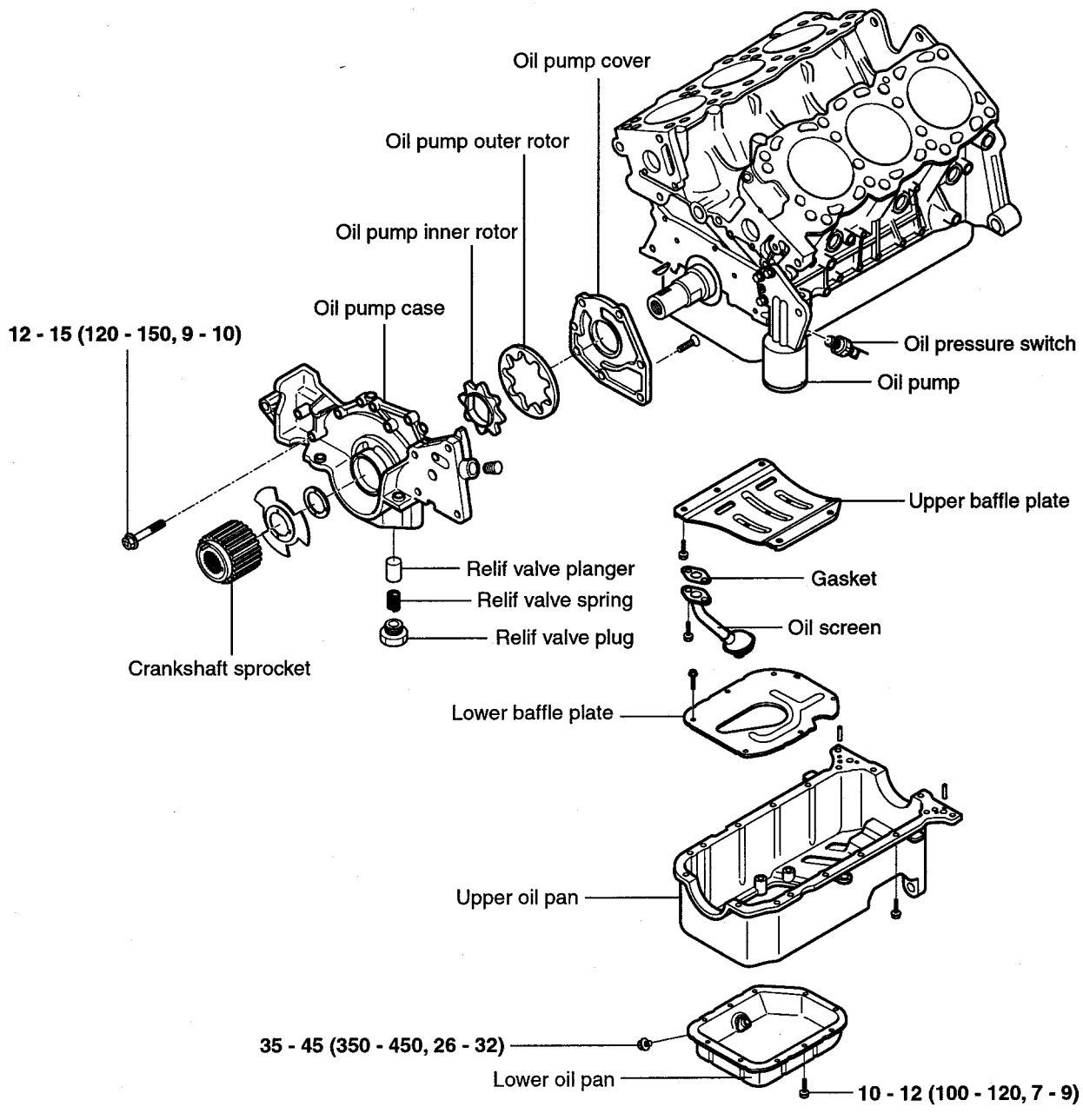


EDMB030A

LUBRICATION SYSTEM

OIL PUMP

COMPONENTS EDMB0400



TORQUE : Nm (kg·cm, lb.ft)

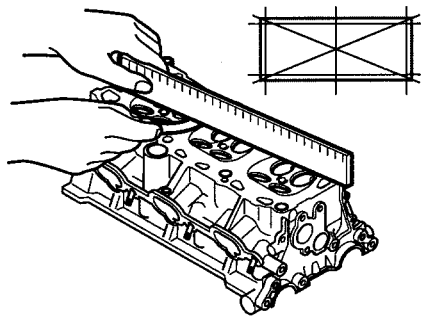
EDMB040A

INSPECTION EDMB0700

CYLINDER HEAD

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

Cylinder head flatness:
Standard dimensions : Max. 0.03mm(0.0059 in.)
Service limit : 0.05mm(0.0020 in.)

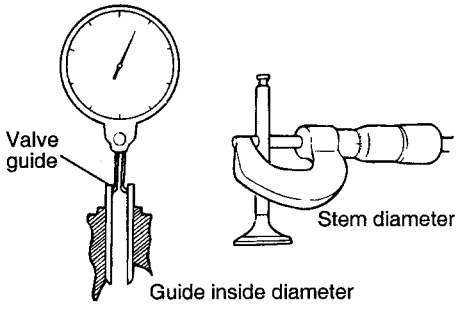


KFW3047A

VALVE GUIDES

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

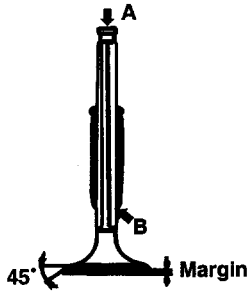
Valve stem-to-guide clearance
Standard value
Intake : 0.02 - 0.05 mm (0.0009 - 0.0020 in.)
Exhaust : 0.050 - 0.085 mm (0.0020 - 0.0033 in.)



ECA9281D

VALVE

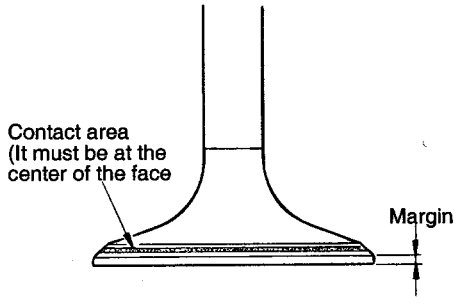
1. Replace the valve if its stem is bent, worn or damaged. Also replace it if the stem end (the surface contacting the hydraulic-lash adjuster) is hollowed out.
2. Check the valve face contact area, and recondition or replace as necessary.



ECA9281B

3. Replace the valve if the width of the margin (thickness of the valve head) is less than the minimum specified.

Valve margin
Standard value
Intake : 1.0mm (0.0394 in.)
Exhaust : 1.3mm (0.0512 in.)



EDA9300D

VALVE SPRING

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

Valve spring
Standard value
Free height : 46.4 mm (1.8268 in.)
Load : 24 kg / 37.9 mm (53 lb / 1.492 in.)
Out - of - square : Max. 2°
Service limit
Free height : .41.5 mm (1.6339 in.)
Load : 55.8 kg / 28.9 mm (123 lb / 1.1378 in.)