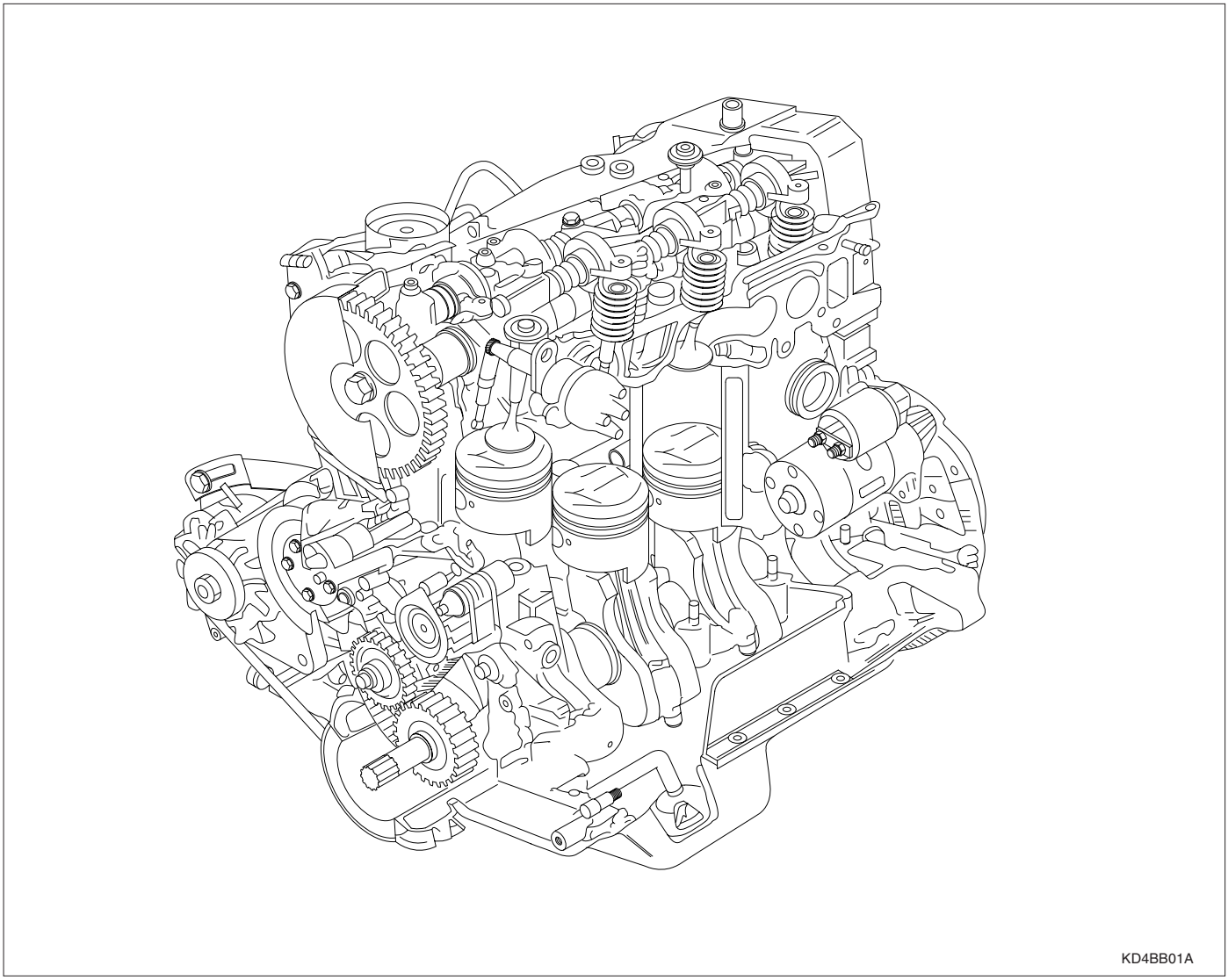
CONTENTS

1. OVERALL

1) ENGINE

Cylinder head is made of aluminum alloy and combustion chamber is a swirl type.
Valve is a SOHC type and the camshaft is operated by the Cog type timing belt.
Cylinder block is made of special cast iron and dry cylinder liner is press-fitted in the cylinder. Water jacket is a Siamese type and piston is made of aluminum alloy and connected with connecting rod by full floating piston pin.
Oil ring no.1 of the piston ring is made of steel, no.2 of special cast iron, piston ring no.1 of barrel face, no.2 of taper face and oil ring of bevel cutter and coil expander is attached.

ENGINE ASSEMBLY

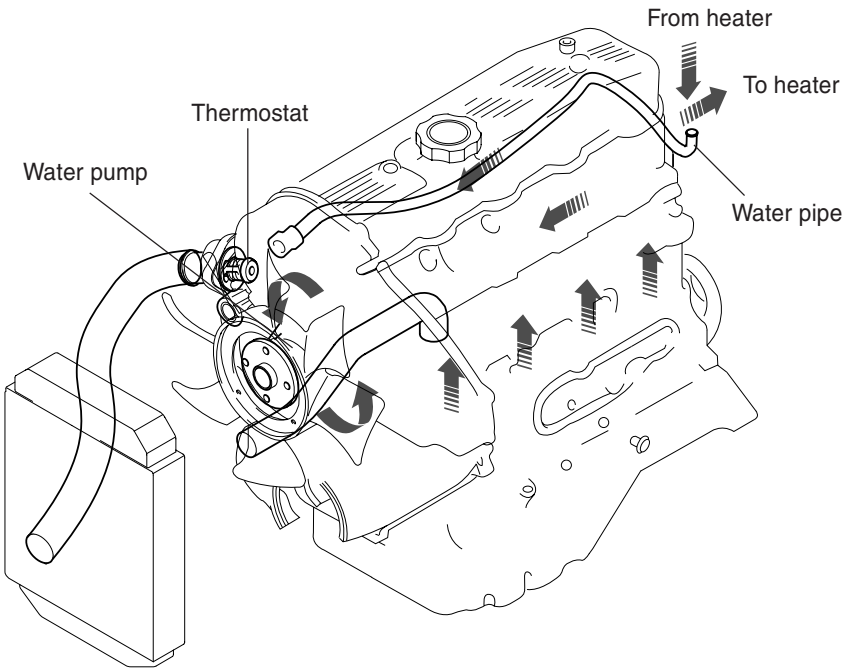


Crankshaft is made of forged steel and supported with main bearing. Pulley attached with torsional damper is installed in the front of crankshaft and flywheel in the rear of it. Silent shaft is installed to both ends of the cylinder block, operated with cog belt and rotated at a double speed of crankshaft.

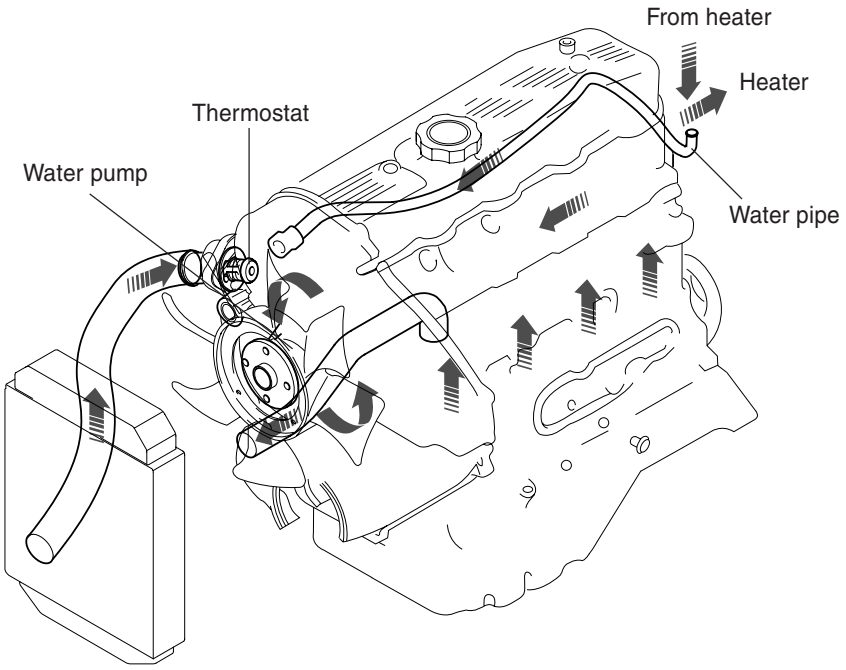
3) COOLING SYSTEM

Engine is cooled with the circulated coolant forced by the water pump.
This illustration shows the flow of coolant.

Cold engine



Hot engine



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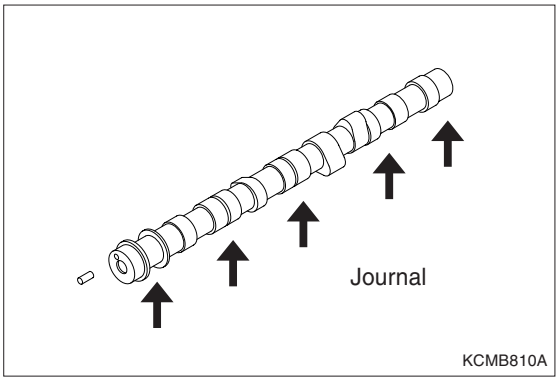
Description			Specification		Limit
Piston	O.D.		79.0 ~ 79.2 mm		
			TC	NA	
	Piston-to cylinder clearance		0.04 ~ 0.06	0.03 ~ 0.05	
	Ring groove width	No. 1 ring	2.601 ~ 2.603	2.02 ~ 2.04	
		No. 2 ring	2.100 ~ 2.102	2.07 ~ 2.09	
		Oil ring	4.010 ~ 4.035	3.01 ~ 3.035	
Piston ring	End gap	No. 1 ring	0.35 ~ 0.50	0.25 ~ 0.40	0.8 mm
		No. 2 ring	0.41 ~ 0.54	0.45 ~ 0.60	0.8 mm
		Oil ring	0.25 ~ 0.45	0.20 ~ 0.40	0.8 mm
	Ring-to-ring groove clearance	No. 1 ring	0.056 ~ 0.076	0.03 ~ 0.07	0.15 mm
		No. 2 ring	0.046 ~ 0.066	0.08 ~ 0.12	0.15 mm
		Oil ring	0.02 ~ 0.065	0.02 ~ 0.065	0.1 mm
Piston pin	O. D.		28.994 ~ 29.000 mm		
Connecting rod	Big end center-to small end center length bend		157.95 ~ 158.05 mm		
	Bend		0.05		
	Twist		0.1		
	Bing end side clearance		0.1 ~ 0.25 mm		
Crank shaft	End play		0.05 ~ 0.18 mm		0.2 mm
	Journal O.D.		66 mm		0.3 mm
	Pin O.D.		53 mm		
	Out of roundness of journal and pin		0.05 mm less than		
	Out-of taper of journal and pin		0.015 mm less than		
	Oil clelarance of journal		0.02 ~ 0.05 mm		0.1 mm
	Oil clearance of pin		0.02 ~ 0.05 mm		
	Journal	0.25 U.S.	65.735 ~ 65.750 mm		
		0.50 U.S.	65.485 ~ 65.500 mm		
		0.75 U.S.	65.235 ~ 65.250 mm		
	Pin	0.25 U.S.	52.735 ~ 52.750 mm		
		0.50 U.S.	52.485 ~ 52.500 mm		
		0.75 U.S.	52.235 ~ 52.250 mm		

INSPECTION

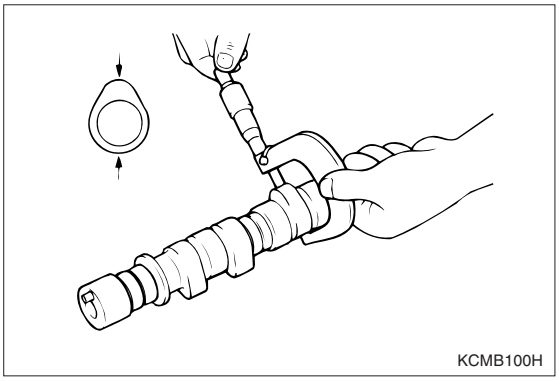
CAMSHAFT

1. Visually inspect the camshaft journals and replace them if they are damaged and burned.
   If the camshaft journals have burned, check the cylinder head bearing for damage and the cylinder head oil passage for clogging.



2. Measure the camshaft diameter and bearing inner diameter and if the oil clearance exceeds the limit value, replace the camshaft, cylinder head or both.

Standard	0.05 ~ 0.08 mm
Limit	0.13 mm



3. Check the cam surface for abnormal wear or damage and replace it if required.
   Measure the cam height (bigger diameter) and replace it if it exceeds the limit.

Standard	37.05 mm
Limit	36.55 mm

ROCKER ARM

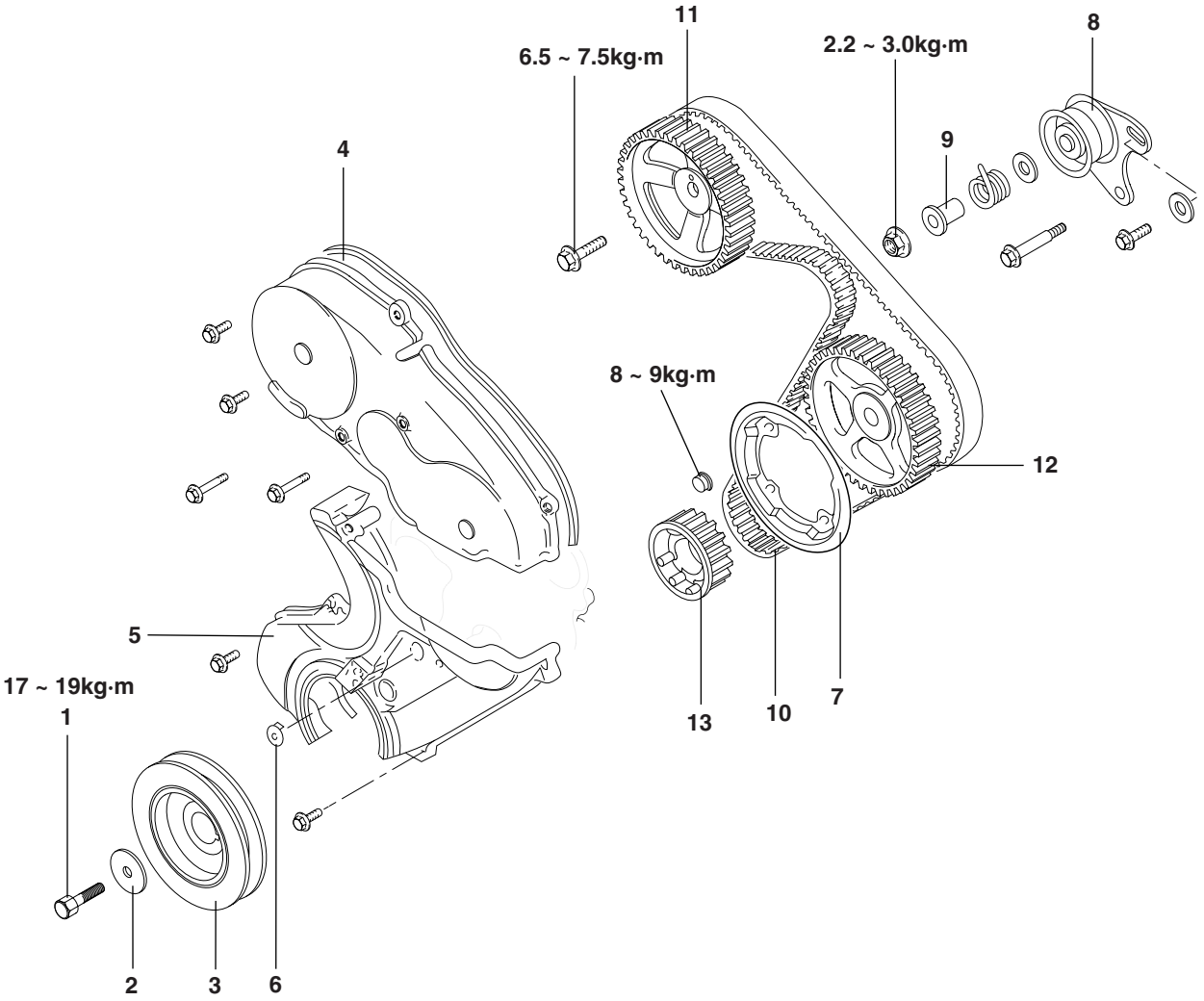
1. Check the contact surface with the cam and replace the rocker arm if it damaged and burned.
2. Visually check the inside for damage or burn and replace it if required.
3. Measure the inner and outer diameters and if the oil clearance exceeds the limit, replace the rocker arm, shaft or both.

Standard	0.01 - 0.04 mm
Limit	0.08 mm

2. TIMING SYSTEM

1) TIMING BELT

COMPONENTS



[DISASSEMBLY]

1. Crank shaft pully bolt
2. Washer
3. Crank shaft pully
4. Timing belt upper cover
5. Timing belt lower cover
6. Acess cover
7. Flange
8. Timing belt tensioner
9. Tensioner speacer
10. Timing belt
11. Camshaft sprocket
12. Injection pump sprocket
13. Crank shaft sprocket

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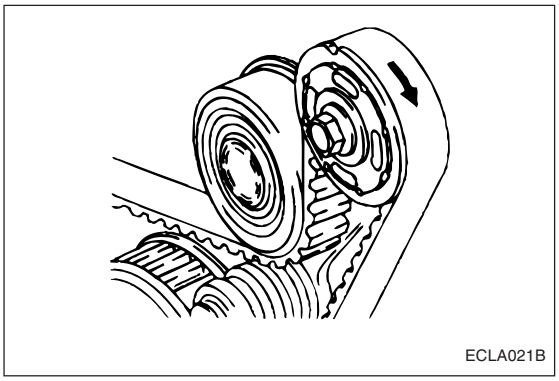
REMOVAL

TIMING BELT "B"

1. Remove the timing belt.
2. Using chalk or the like, put an arrow on the back of the timing belt "B" to indicate the direction of drive.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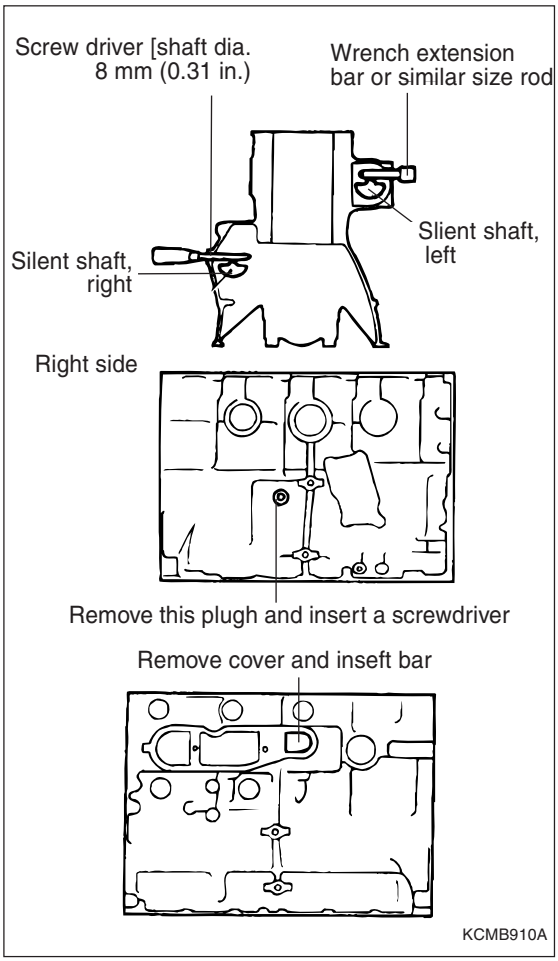
3. Slightly loosen the bolts and nuts securing the tensioner. Then, slide the tensioner toward the water pump and tighten the nuts to secure the tensioner in place temporarily.
4. Remove the timing belt "B".
5. Remove the crankshaft sprocket "B".
6. Remove the two silent shaft sprockets.

SILENT SHAFT SPROKCET(LEFT, RIGHT)

When loosening the nut and bolt for two silent shaft sprockets, be sure to lock the silent shaft as shown.

CAUTION
Water, oil, or grease on the belt shortens its life drastically. Use special care to ensure that the removed timing belt, sprockets, and tensioner are free from oil and grease.



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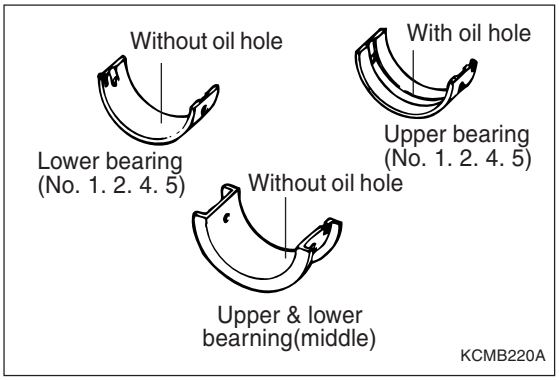
DRIVE PLATE (AUTOMATIC TRANSAXLE)

Check the drive plate for deformation, damage and crack and replace it if required.

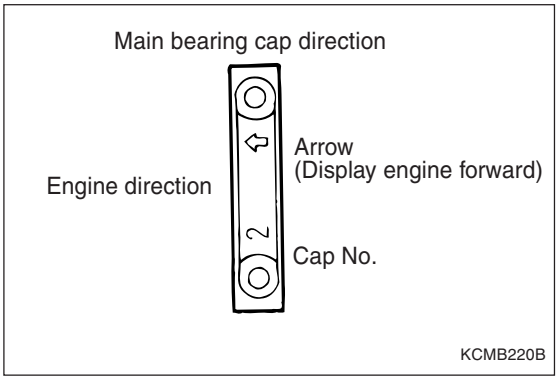
INSTALLATION

1. Install the upper crankshaft bearing to the cylinder block. There is oil hole in the upper crankshaft bearing.
2. Install the lower crankshaft bearings to each bearing cap and apply engine oil to the bearing surface.



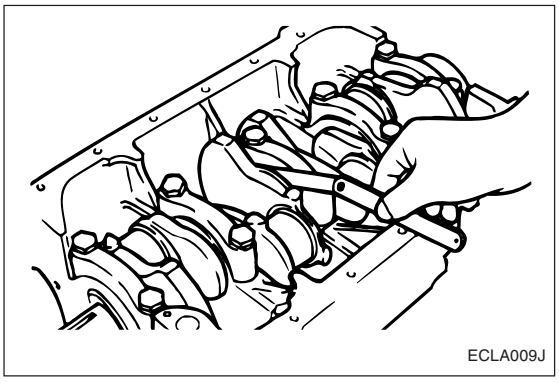
BEARING GAP

1. Install the main bearing to the cylinder block. Ensure the correct cap number and arrow mark direction.



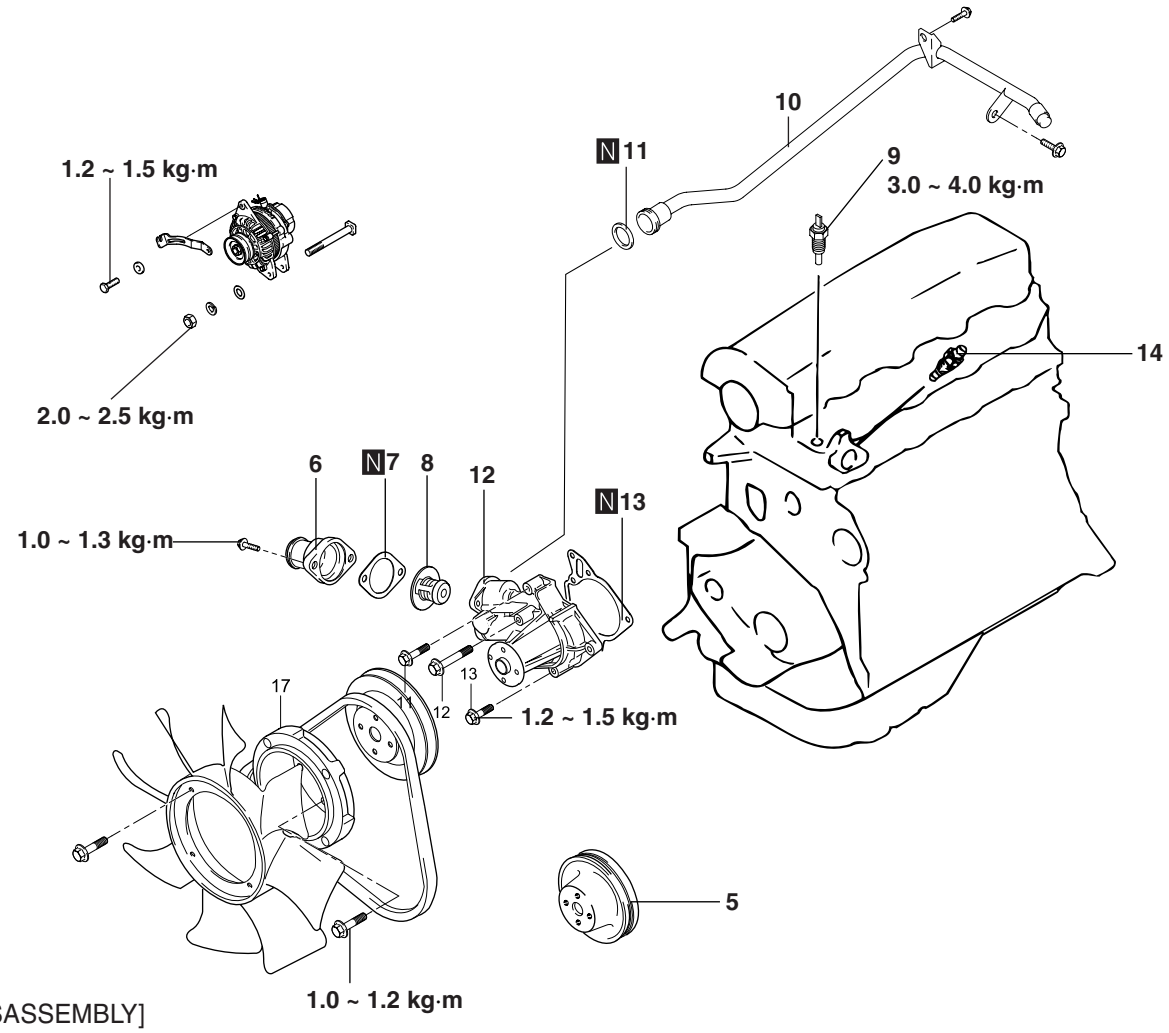
2. Check to ensure that the crankshaft turns smoothly and there is an adequate end play.

Standard	0.05 ~ 0.18 mm
Limit	0.25 mm



1. WATER PUMP AND WATER PIPE

COMPONENTS



[DISASSEMBLY]

1. Drive belt (V belt)
2. Cooling fan
3. Fan clutch
4. Water pump pully
   (Power steering pump pully adhere)
5. Water pump pully
6. Water inlet fitting
7. water inlet fitting gasket
8. Thermostat
9. Coolant temperature gauge unit
10. Water inlet pipe
11. O-ring
12. Water pump
13. Water pump gasket
14. Thermostat assembly

[Remarks]

(1) Assembly is the reverse of disassembly
(2) Do not reuse N marking parts

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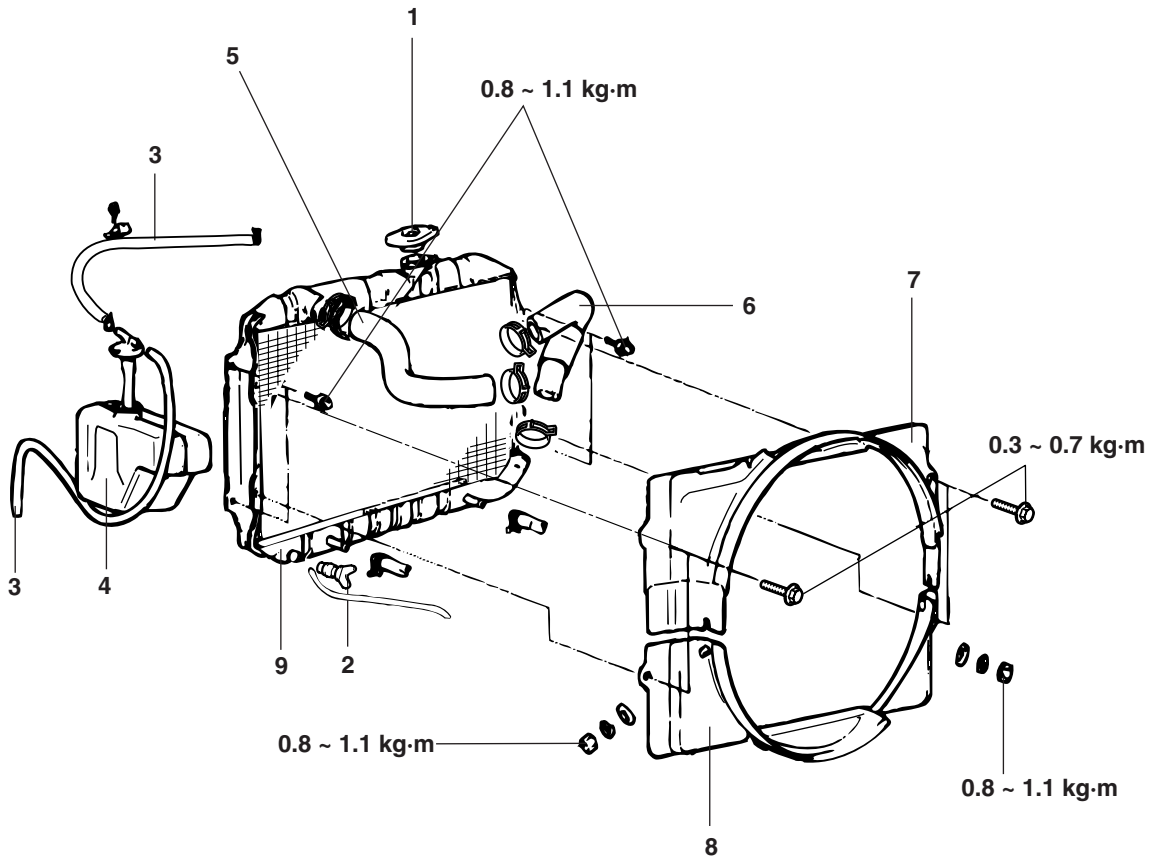
4. RADIATOR

COMPONENTS



[DISASSEMBLY]
1. Radiator cap
2. Drain plug
3. Over flow tube
4. Reserve tank
5. Radiator upper hose
6. Radiator lower hose
7. Radiator upper shroud
8. Radiator lower shroud
9. Radiator

[Remark]

(1) Installation is the reverse of removal.

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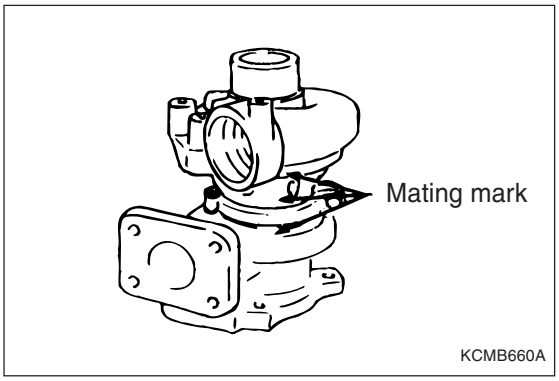
DISASSEMBLY

TURBINE HOUSING

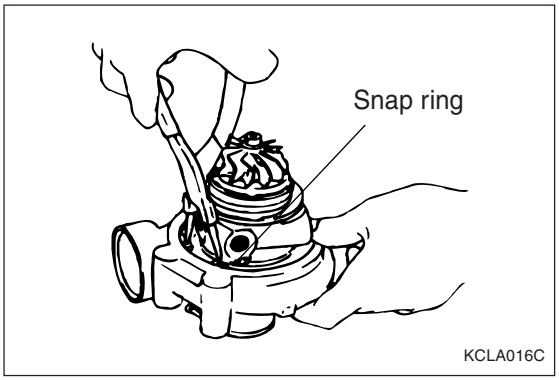
Before removal, make the mating mark on compressor cover bearing housing and turbine housing.

CAUTION
Be sure not to damage the compressor and turbine wheel blade.



SNAP RING

Remove the snap ring using snap ring filler.

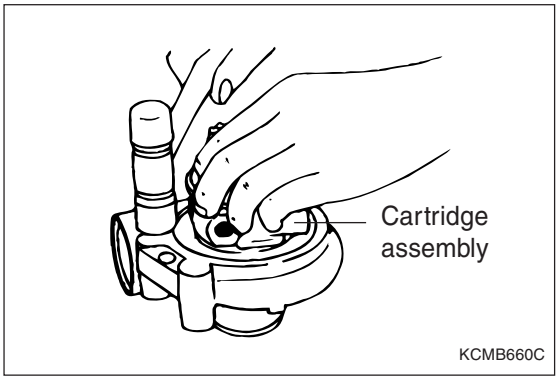


CARTRIDGE ASSEMBLY

Remover by tapping the compressor cover of cartridge assembly with plastic hammer.

NOTE
O-ring installed around the cartridge assembly may cause tight installation sometimes.

CAUTION
- ***Use a heavy duty carbon solvent to loosen the carbon from the parts.***
- ***Do not use caustic solutions, wire brushes, or wire wheels to remove carbon deposits from any turbo charger part.***

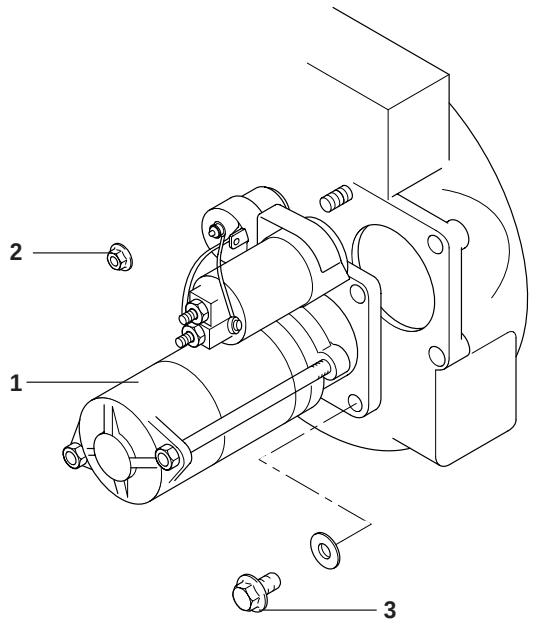


GLOW CONTROL SYSTEM

Trouble symptom	Probable cause	Remedy
Engine will not start below 50°C	Wiring connection loose or bad wiring	Repair or replace wiring
	ECT sensor malfunction	Replace ECT sensor
	Glow plug malfunction	Repair or replace glow plug
	Glow plug control unit failed	Replace glow control unit
After first combustion, engine stall or rough idle below 50°C	Wiring connection loose or bad wiring	Repair or replace wiring
	Glow plug malfunction	Check the resistance of glow plug and replace, if necessary
	Glow plug relay malfunction	Check the relay and replace, if necessary
	Glow plug control unit failed	Check the control unit and replace, if necessary
Yellow glow lamp will not turn-ON	Open lamp	Replace lamp
	Wiring connection loose or bad wiring	Repair or replace wiring
	Shorted wiring	Repair or replace wiring
	Glow plug control unit failed	Replace control unit, if necessary

7. STRATER MOTOR

COMPONENTS



1. Starter motor
2. Nut
3. Bolt

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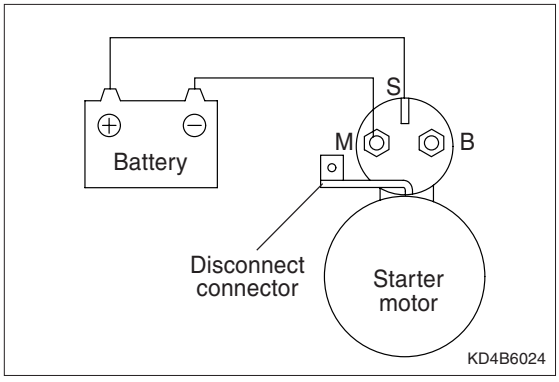
REMOVAL

Remove the starter at the engine room lower portion.



KD4B6024

INSPECTION

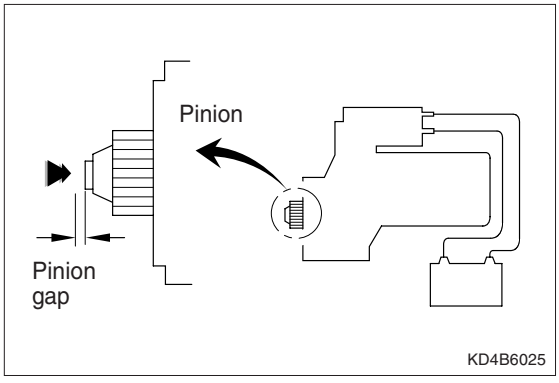
PINION GAP ADJUSTMENT

1. Disconnect the field coil wire from the terminal M of the magnetic switch.
2. Connect at 12V battery the terminal S and the terminal M.

   ⚠ ***CAUTION***
   This test must be performed quickly within 10 seconds to prevent the switch coil from burning.

3. When the battery is connected, the pinion moves out. Now, push back the pinion with a finger and measure the pinion stroke (the travel along which the pinion is pushed back). This is the pinion gap.
4. If the pinion gap is not up to specification, adjust by adding or removing fiber washers between the magnetic switch and front bracket. Using more washers makes the gap smaller.

Pinion gap	0.2 ~ 2.0 mm

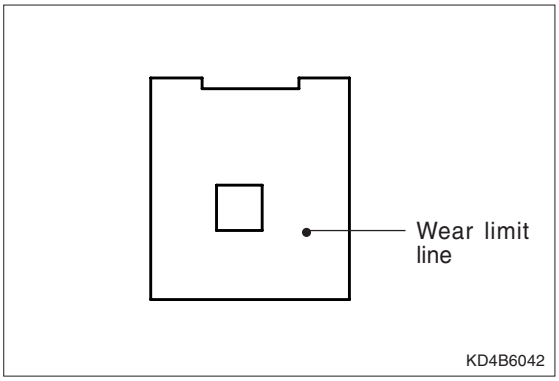


KD4B6025

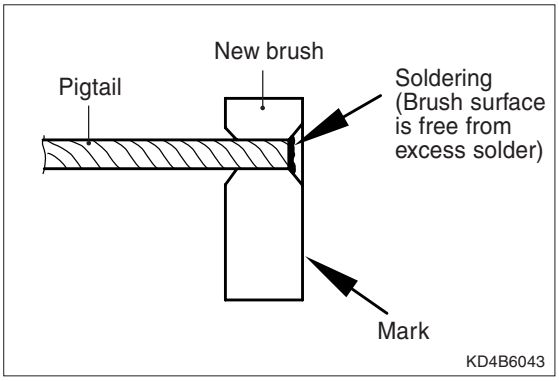
BURSHES

1. Check the brush surface in contact with the commutator for surface roughness. Check also the brush length.

Limit	Wear limit line



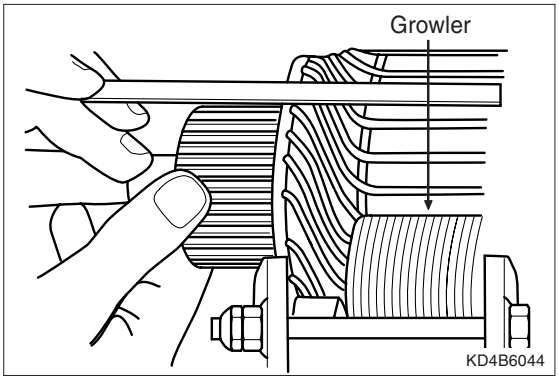
2. If the surface has been refaced or brush has been replaced, wrap sand paper around the commutator to correct its surface.
3. When removing a worn brush by breaking with pliers, use care to prevent damage to the pigtail.
4. Polish the pigtail end for battery soldering with sand paper.
5. Insert the pigtail into the hole in a new brush and solder. Make sure that the brush surface is free from excess solder.



ARMATURE COIL SHORT TEST

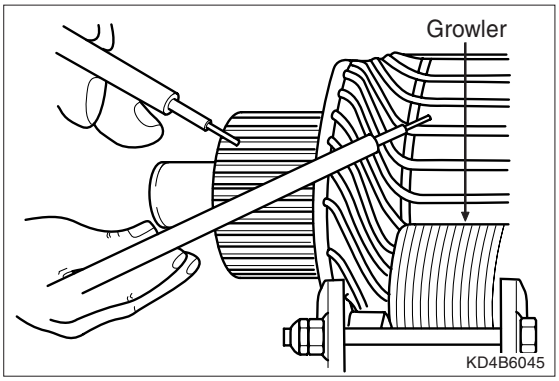
1. Place the armature on a growler.
2. Slowly turn the armature while a thin metal is held above it. The armature coil is not shorted if the metal does not vibrate.

CAUTION
Before this test, ensure that the armature surface if free from foreign substances.



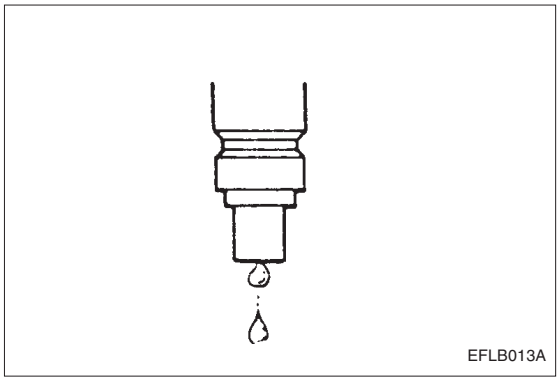
ARMATURE COIL GROUND TEST

Check for insulation between the commutator segment and armature coil core. There must be no continuity.



SPRAY

1. Check that the spray is good, as illustrated in the figure, in the test, the spray may be bolt shaped with a course mist and fuel may remain. This is phenomenon common in this type of inspection, and the nozzle function is normal.
2. Move nozzle tester handle at 4 to 6 strokes per second.
3. Confirm the spray is cone shaped with an angle of about 15°. This indicates a good condition.
4. If the injection is not good, disassemble nozzle and replace nozzle tip or entire assembly.
5. Confirm fuel does not drip after injection.
6. If dripping, disassemble injection nozzle and replace nozzle tip or entire assembly.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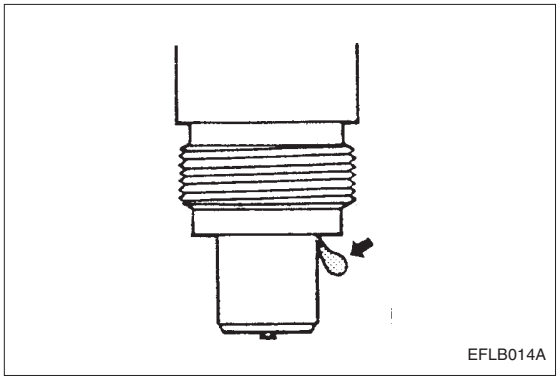
NOZZLE OIL-SEAL

1. Maintain internal nozzle pressure (pressure gauge indication value) with the nozzle tester at 10,000-11,000 kPa (100-110 kg/cm^2, 1,422-1,565 psi). Check for fuel leaking from nozzle tip in this condition.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2. If there is leakage, disassemble injection nozzle and replace nozzle tip or entire assembly.