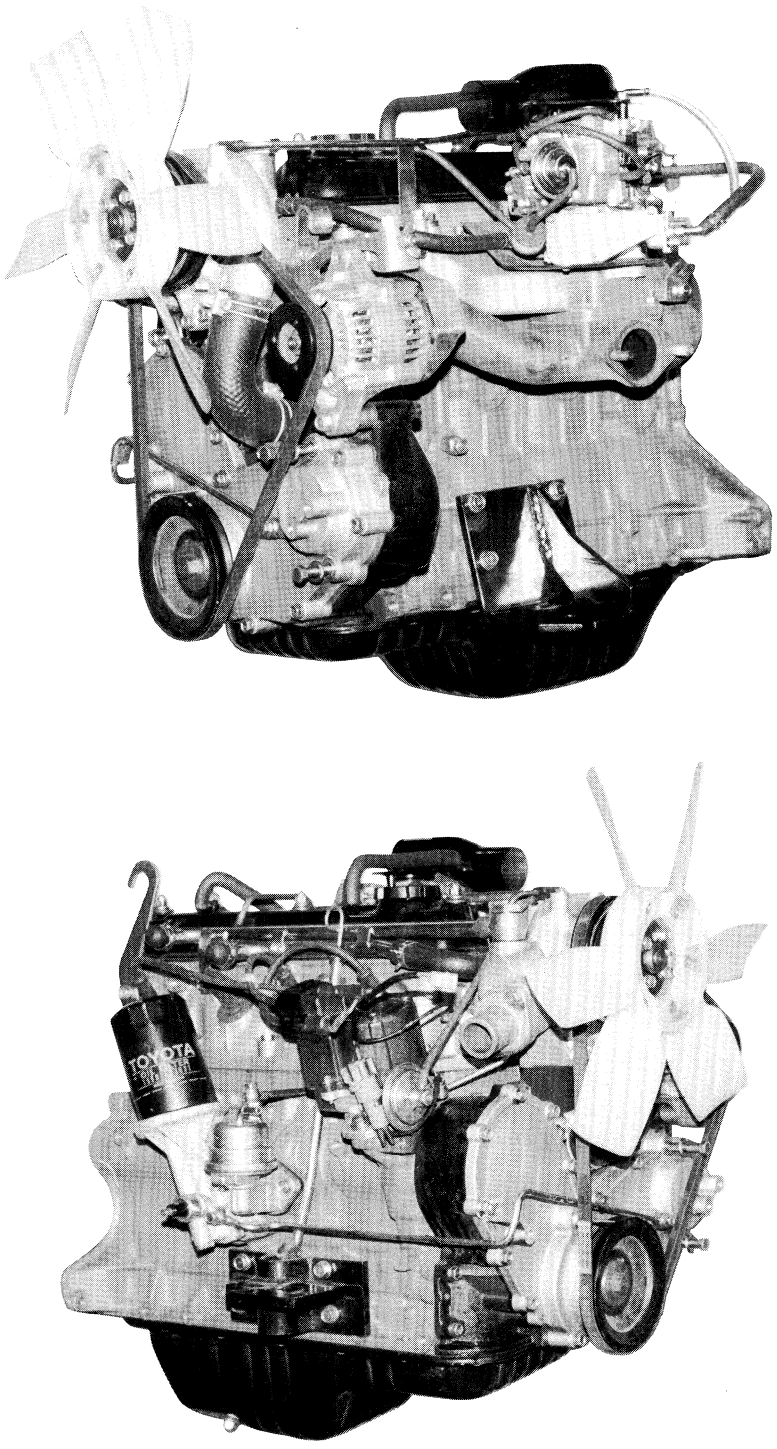
# SECTION INDEX

# ENGINE VIEWS



4Y Engine Exterior Views KAJ14-2,6

# ABBREVIATIONS

| Abbreviation (code) | Meaning | Abbreviation (code) | Meaning |
|---|---|---|---|
| ASSY | Assembly | O/S | Oversize |
| ABDC | After bottom dead center | OPT | Option |
| ATDC | After top dead center | RH | Right hand |
| BBDC | Before bottom dead center | rpm | Revolutions per minute |
| BTDC | Before top dead center | SST | Special service tool |
| BDC | Bottom dead center | STD | Standard |
| EX | Exhaust | SUB-ASSY | Sub-assembly |
| IIA | Integrated ignition assembly | T = | Tightening torque |
| IN | Intake | U/S | Undersize |
| LH | Left hand | | |

# GENERAL RULES OF SERVICING WORK

## PREPARATION BEFORE DISASSEMBLY

1. Prepare mechanic tools, necessary measuring instruments and SST before starting operation.
2. When disassembling a complicated assembly, put punch or matching marks at places not affecting function to facilitate reassembly operation. When repairing an electrical system, start operation after disconnecting the cable from the battery negative terminal.

## INSPECTION DURING DISASSEMBLY

1. Each time a part is removed, check the part installed state, deformation, damage, roughening state and scratching.

## ORDERLY ARRANGEMENT OF DISASSEMBLED PARTS

1. Disassembled parts shall be arranged orderly. Distinguish the parts to be replaced from the parts to be reused.

## CLEANING OF DISASSEMBLED PARTS

1. Parts to be reused shall be cleaned and washed thoroughly.

## INSPECTION AND MEASUREMENT

1. Detailed inspection and measurement shall be carried out as required for parts to be reused.

## INSTALLATION

1. Install good parts according to the correct procedure and observing the determined standards (tightening torques, adjustment values, etc.).
2. Always use genuine parts for replacement of existing parts.
3. Always use new packings, gaskets and cotter pins because they are not meant for reuse.
4. Coat seal packing on gaskets depending on the places, coat oil on the sliding contact places, coat oil or grease at specified places, and coat MP grease on oil seal lips before reassembly.

## ADJUSTMENTS AND OPERATION CHECK

1. Adjust to the service standard values by using gages, a multimeter, etc.

# IGNITION TIMING INSPECTION AND ADJUSTMENT

1. Engine warm up

   Standard:

   | | |
   |---|---|
   | Coolant temperature: | 80°C or more |
   | Engine oil temperature: | 70°C or more |
   | Hydraulic oil temperature: | 50°C or more |

2. Tachometer and timing light installation
   (1) Disconnect the test connector and connect the tachometer measuring lead to the black wire.
3. Idle speed inspection
   Standard: See repair manual for model
4. Ignition timing inspection and adjustment
   (1) Disconnect the vacuum hose from the Distributor (IIA).
   (2) Use the timing light and inspect the ignition timing.
   Standard: 7° BTDC/idle speed
   (3) If the standard is not satisfied, loosen the distributor set bolt and turn the distributor for adjustment to the standard value.
   (4) Tighten the set bolt and recheck the ignition timing.
   T = 1.85 kg-m (13.4 ft-lb)
   (5) After ignition timing adjustment, seal the distributor set bolt by using the sealing tape.

# IDLE-UP INSPECTION AND ADJUSTMENT

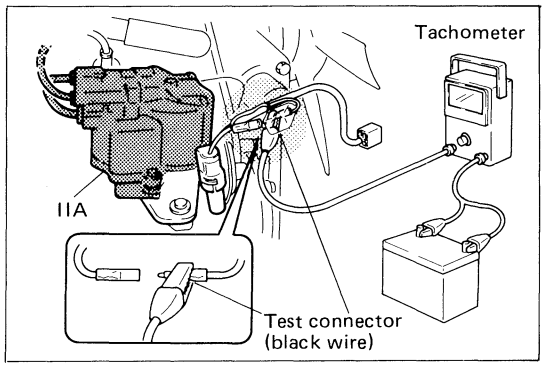
1. Engine warm up

   Standard:

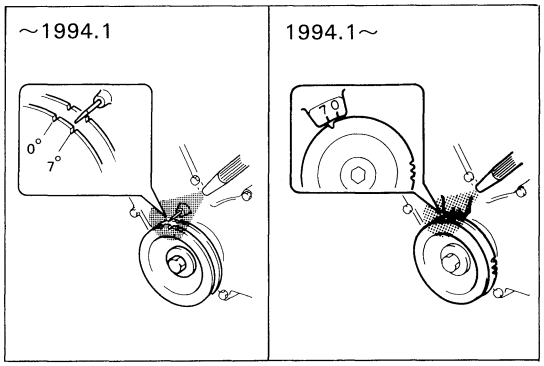
   | | |
   |---|---|
   | Coolant temperature: | 80°C or more |
   | Engine oil temperature: | 70°C or more |
   | Hydraulic oil temperature: | 50°C or more |

2. Tachometer installation (See above.)
3. Idle-up speed inspection and adjustment
   (1) Start the engine. Disconnect the vacuum hose ② from the idle-up actuator ① , and measure the engine speed.
   Standard: See repair manual for model
   If the standard is not satisfied, turn the adjusting screw ③ for adjustment.

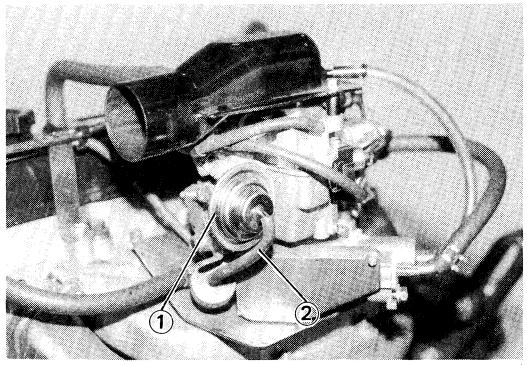
   **Caution:**
   **Clockwise turn of the adjusting screw increases the engine speed.**



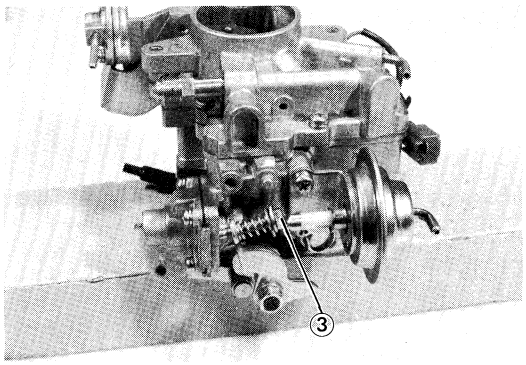

Installing the Tachometer KAJS5




Inspecting the Ignition Timing KAJS4



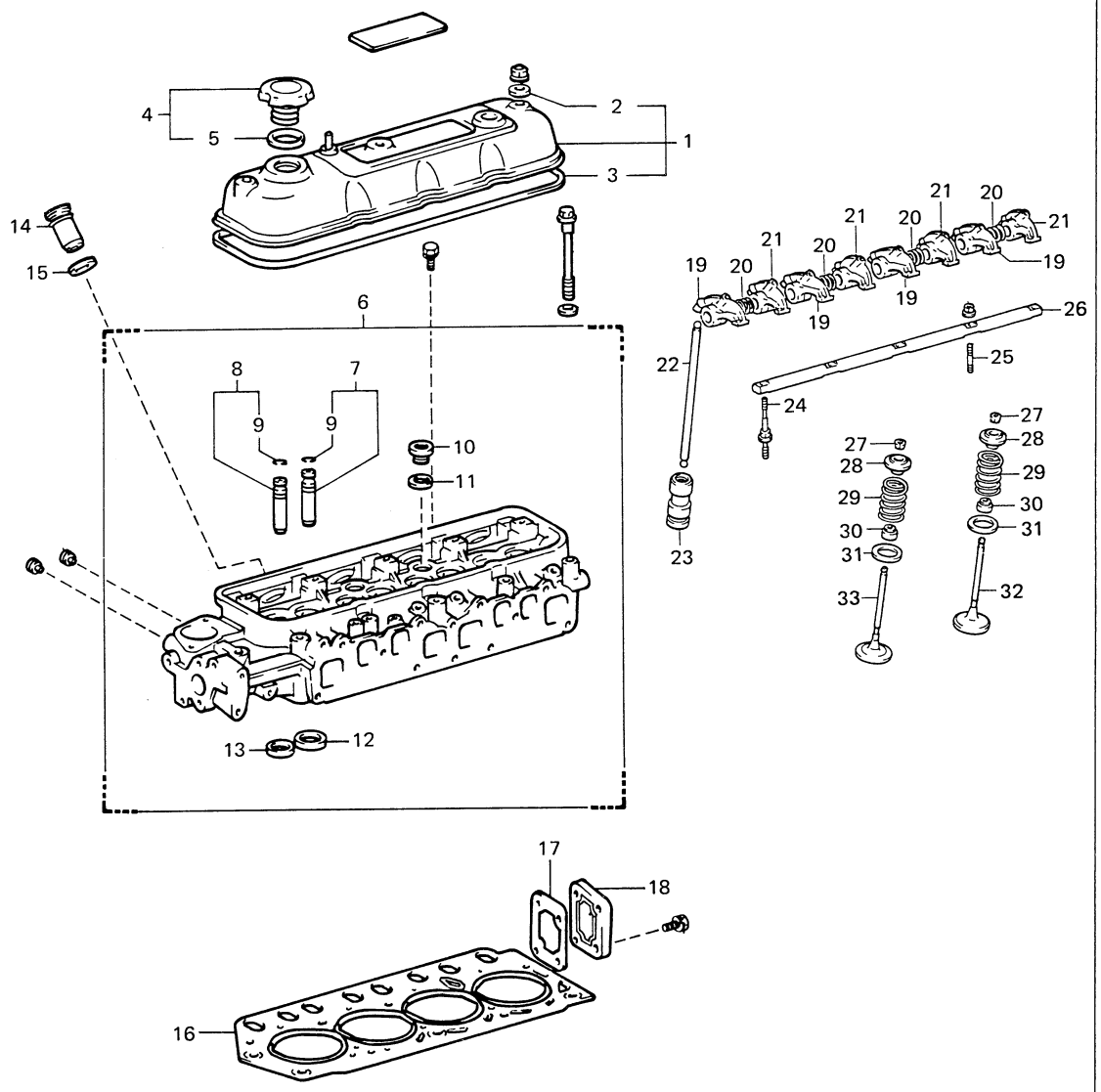

Idle-up Actuator KAJ14-12




Adjusting the Idle-up Speed KAJ20-9

# CYLINDER HEAD

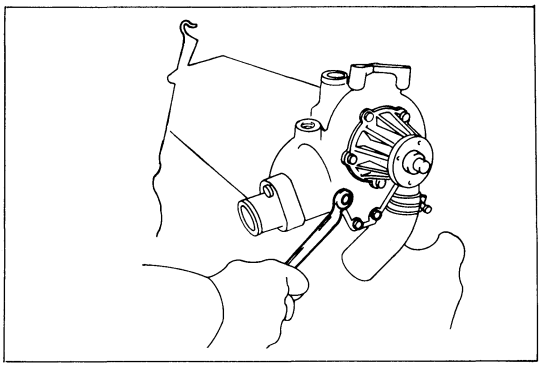
## COMPONENTS




1. Cylinder head cover SUB-ASSY
2. Seal washer
3. Cylinder head cover gasket
4. Oil filler cap SUB-ASSY
5. Gasket
6. Cylinder head SUB-ASSY
7. Intake valve guide bush
8. Exhaust valve guide bush
9. Shaft snap ring
10. Plug
11. Gasket
12. Intake valve seat
13. Exhaust valve seat
14. Ignition plug hole
15. Gasket
16. Cylinder head gasket
17. Gasket
18. Head rear plate
19. Valve rocker arm, No. 2
20. Spring
21. Valve rocker arm, No. 1
22. Valve push rod
23. Valve lifter
24. Stud bolt
25. Stud bolt
26. Valve rocker shaft No. 1
27. Valve spring retainer lock
28. Valve spring retainer
29. Valve spring
30. Valve stem oil seal
31. Spring seat
32. Intake valve
33. Exhaust valve

Cylinder Head Components KAJM3

14. Water pump ASSY removal
    (1) Water inlet hose disconnection
    (2) Set bolts (4 pcs.)
    (3) Water pump ASSY



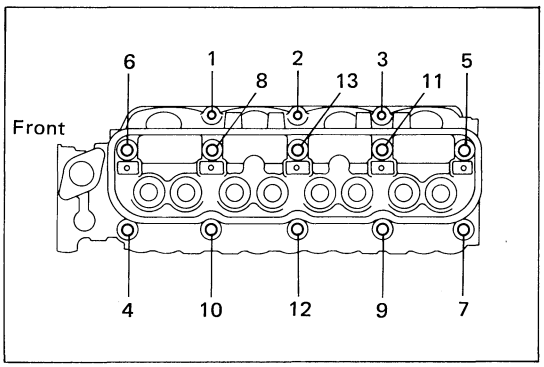
Removing the Water Pump ASSY KAJS6

15. Cylinder head removal
    (1) Evenly loosen 13 cylinder head bolts in the illustrated order in several steps.

    (2) Remove the set bolts and remove the rear engine hanger.

    (3) Remove the cylinder head from the cylinder block.

    **Caution:**
    **Carefully prevent the cylinder head installation surface from any damage.**



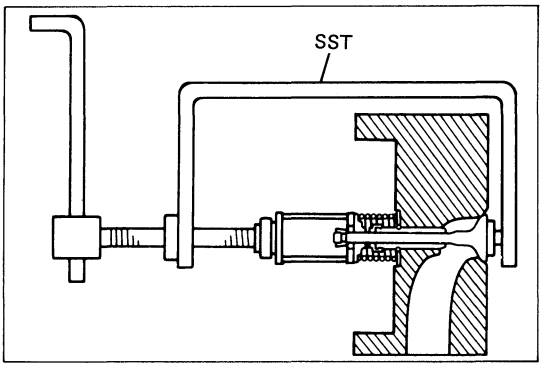

Removing the Cylinder Head EM2416

## CYLINDER HEAD DISASSEMBLY

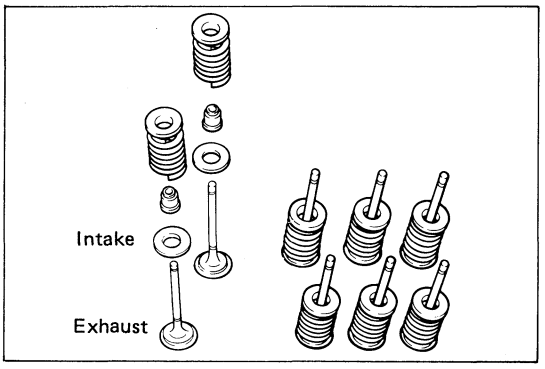
1. Valve removal
    (1) Set the SST to the valve to compress the valve spring, and remove two retainer locks.
    SST 09202-76001-71
    (SST 09202-43013)

    (2) Remove spring retainers, springs, seats, valves and oil seals.

    **Caution:**
    **Removed parts shall be arranged orderly for each cylinders.**




Removing the Valve EM2413

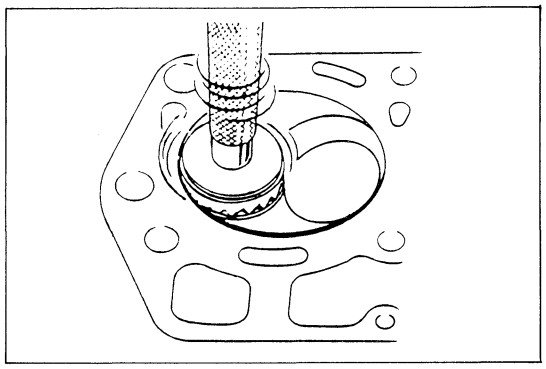



Valve Components EM0025

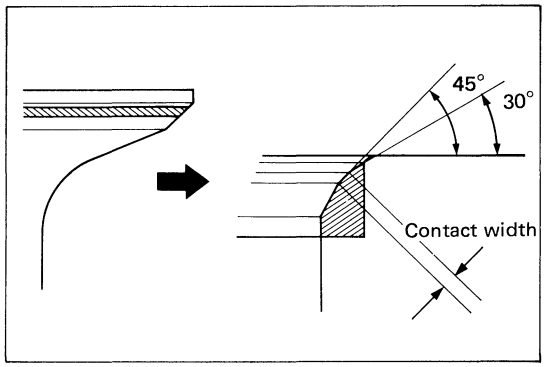
13. Valve seat correction

Caution:
- Use a cutter with cement carbide tip for the EX valve seats.
- Always inspect the valve contact position and width during the correction.
- Gradually release the force near the end of cutting to prevent stepping on the cut surface.
- Start the correcting operation after inspecting the valve guide bush.

(1) Use a 45° cutter and cut the minimum contact width to become wider than the standard.
(2) Cut so that the contact position comes to the center of the valve face.
   ① If the contact position is deviated to the outside, cut with a 30° cutter.

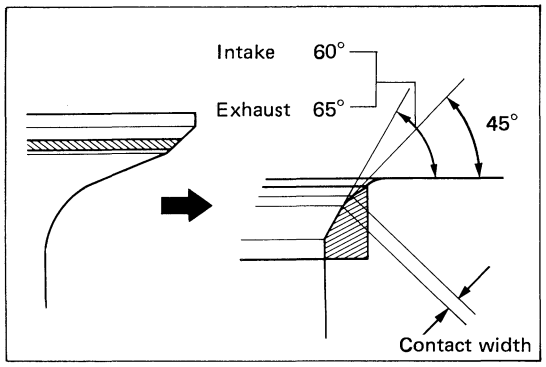


Correcting the Valve Seat (1) EM2535




Correcting the Valve Seat (2) EM0185

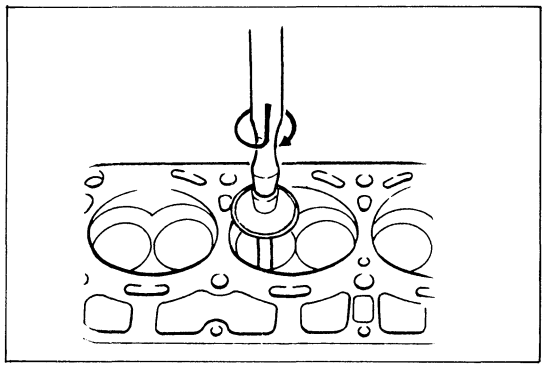
   ② If the contact position is deviated to the inside, cut with a 60° cutter (for IN) or 65° cutter (for EX).




Correcting the Valve Seat (3) EM0186

(3) Use a compound and lap the valve.
(4) After lapping, use red lead and check that the valve contact is uniform on the whole circumference.

Caution:
Thoroughly remove the compound after valve lapping.



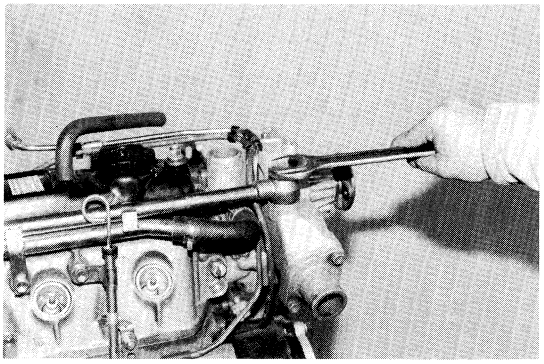
Lapping the Valve EM2400

~1998.7

9. Water outlet pipe installation
   (1) Install the water outlet pipe.
   (2) Install the water bypass hose.
   (3) Install 2 set bolts and the union bolt.
   Union bolt T = 3.5 kg-m (25 ft-lb)

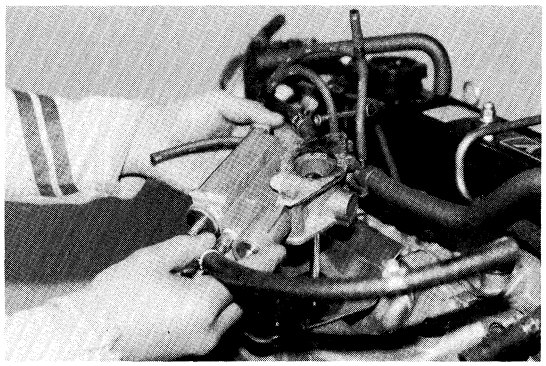
1998.8~

9. Water bypass hose installation
   (1) Install the water bypass hose and clamp.



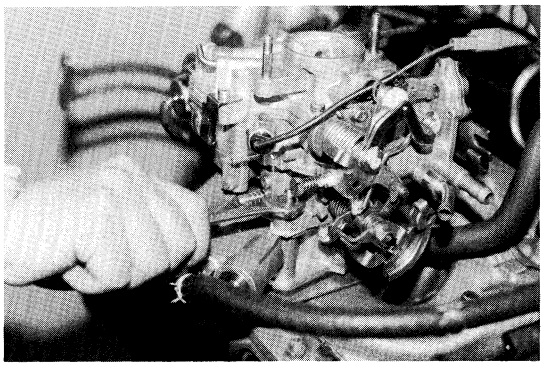
Installing the Water Outlet Pipe KAJ13-5

10. Air governor installation
   (1) Install the fuel insulator plate and heat insulator.
   (2) Install the air governor.
   (3) Install the water hose and ventilation hose.



Installing the Air Governor KAJ11-36

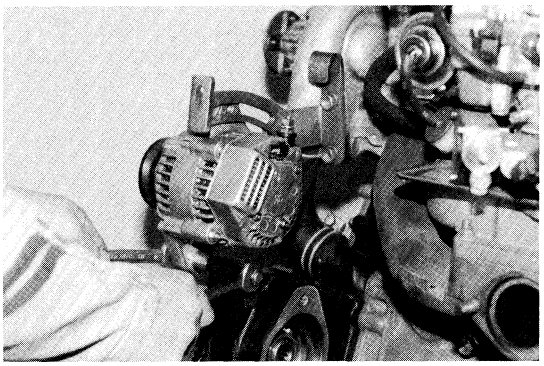
11. Carburetor installation
   (1) Install the carburetor and tighten 2 set nuts.
   T = 1.15 kg-m (8 ft-lb)
   (2) Install the fuel pipe.
   (3) Install the water hose.
   (4) Install the vacuum hose.



Installing the Carburetor KAJ11-28

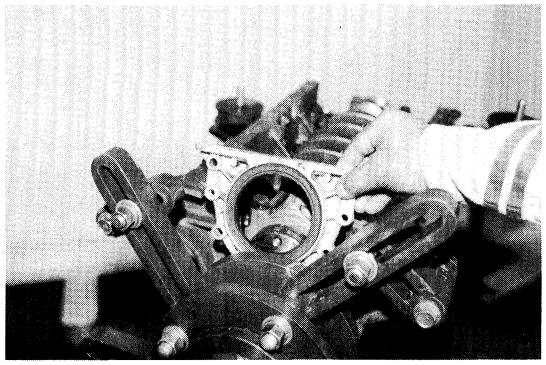
12. Air cleaner connector installation
   (1) Install the air cleaner connector and tighten two set bolts.
   (2) Install the ventilation hose.

13. Alternator installation
   (1) Install the alternator and temporarily tighten the fixing and adjusting bolts.
   (2) Install the V-belt and fan pulley.
   (3) Adjust the V-belt tension.
   See page 1-3 for the belt tension adjustment procedure.



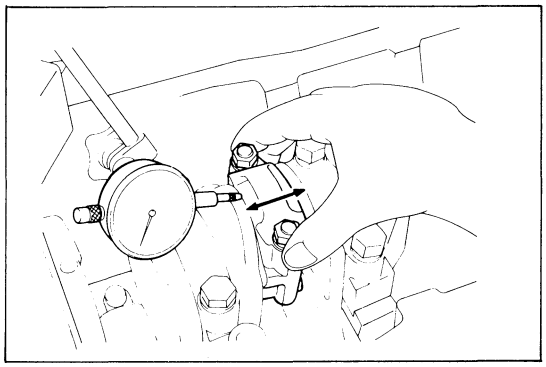
Installing the Alternator KAJ11-12

8. Rear oil seal retainer removal
   (1) Remove five set bolts.
   (2) Remove the rear oil seal retainer with dust seal and gasket.



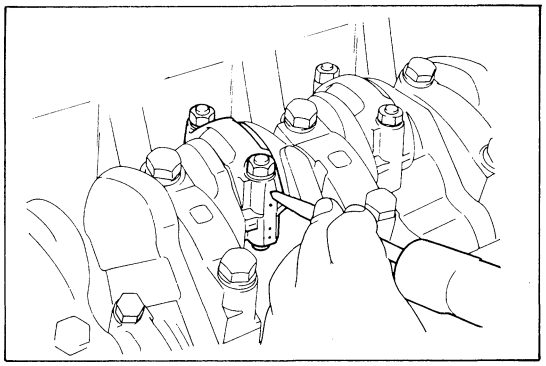
Removing the Rear Oil Seal Retainer KAJ5-29

9. Connecting rod thrust clearance inspection
   (1) Use a dial gauge and measure the thrust clearance by moving the connecting rod back and forth.
   **Standard: 0.160 – 0.312 mm (0.0063 – 0.00123 in.)**
   **Limit: 0.35 mm (0.0138 in.)**
   If the limit is exceeded, replace the connecting rod ASSY.



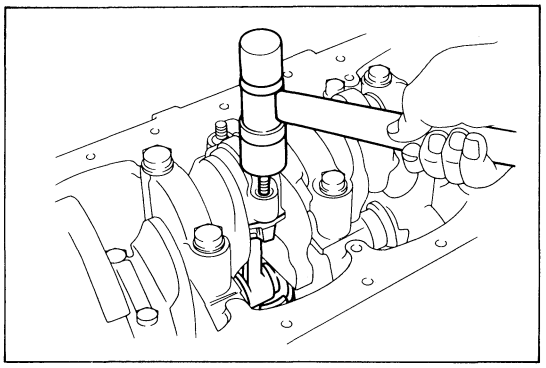
Inspecting the Connecting Rod Thrust Clearance EM0065

10. Connecting rod oil clearance inspection
    (1) Punch matching mark on the connecting rod and cap.



Punching the Matching Mark EM2539

   (2) Remove the connecting rod cap nuts.
   (3) Use a plastic hammer and tap the bolt lightly to remove the connecting rod cap and bearing.



Removing the Connecting Rod Cap EM0209

## CYLINDER BLOCK ASSEMBLY

Caution:
- Thoroughly clean the parts to be assembled.
- Coat engine oil on the sliding contact and rotating surfaces before assembly.
- Replace gaskets, oil seal and other non-reusable parts with new ones.

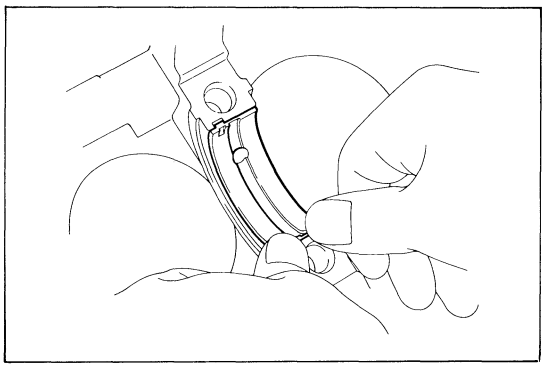
1. Crankshaft bearing installation

Caution:
Keep the bearing outer surfaces (in contact with the cylinder block or bearing caps) free from oil.

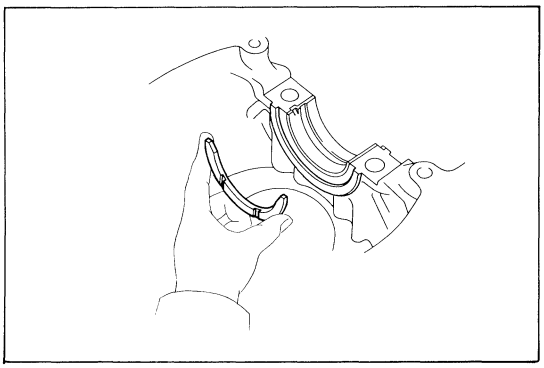
(1) Install the upper bearing having an oil groove on the whole periphery, with the cylinder block oil hole and lock groove as the guide.

(2) Install the lower bearing by fitting with the bearing cap lock groove.

(3) Install the upper thrust washer to the No. 3 journal supporting portion, with the oil grooves facing outward.



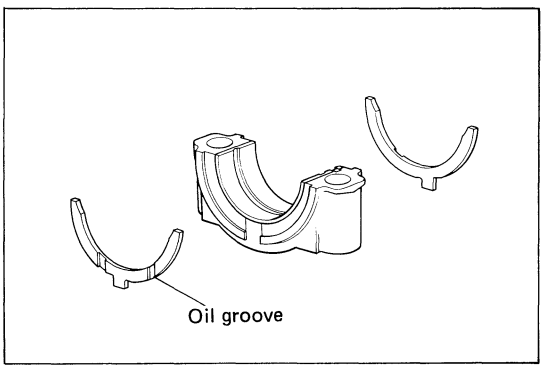
Crankshaft Bearing Installation EM0388



Installing the Upper Thrust Washer EM0247

(4) Install the lower thrust washer to the No. 3 bearing cap, with the oil grooves facing outward.

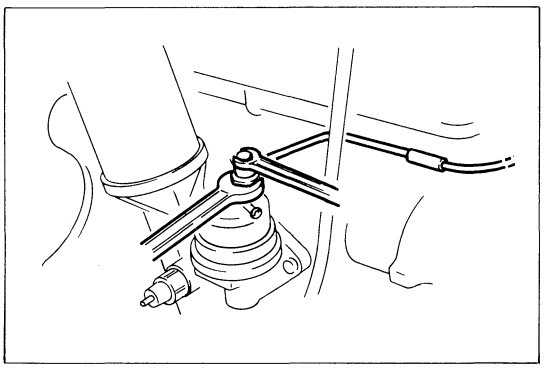
Reference:
Coat engine oil on the rear face of the thrust washer to prevent falling.




Installing the Lower Thrust Washer EM1703

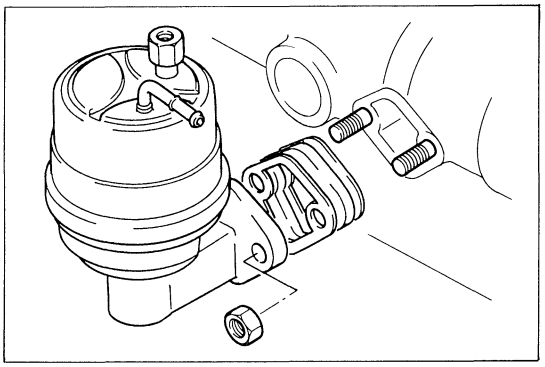
## REMOVAL

1. Fuel pump piping disconnection
   (1) Disconnect the fuel pump outlet and inlet pipes.



Disconnecting the Piping KAJS81

2. Fuel pump ASSY removal
   (1) Remove two fuel pump set nuts and the fuel pump ASSY.
   (2) Remove the insulator.

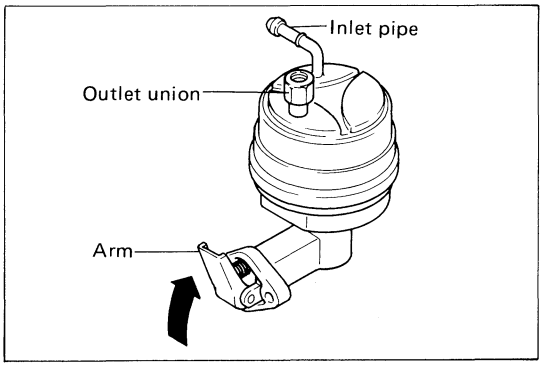


Removing the Fuel Pump ASSY KAJ556

## INSPECTION (AIRTIGHTNESS CHECK)

1. Preparation for inspection
   (1) Supply a small volume of gasoline to the fuel pump to keep the airtightness of the check valve.
   (2) Operate the arm without blocking the pipe, and check the arm travel and play.

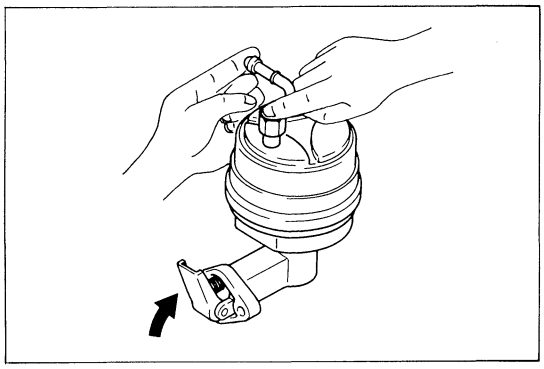
   Reference:
   **The arm travel and play checked in the preparation shall be used as the basis for later inspections.**




Preparing for Inspection KAJS57

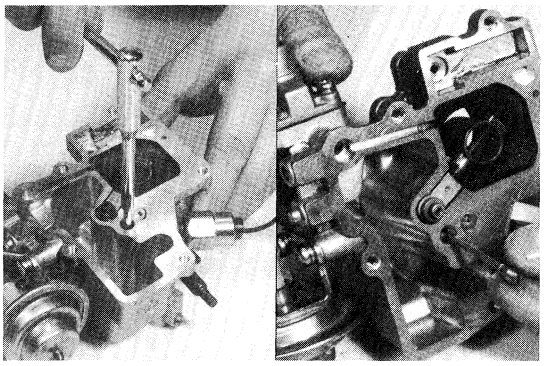
2. Diaphragm inspection
   (1) Block the inlet pipe and outlet union with fingers, and operate the arm to check that the arm movement becomes heavy.

   Caution:
   **Do not operate the arm forcibly.**



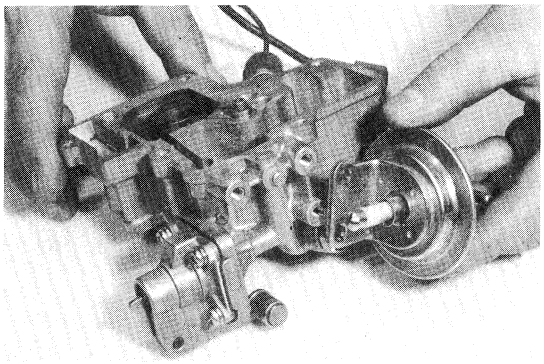
Inspecting the Diaphragm KAJS58

4. Slow jet removal



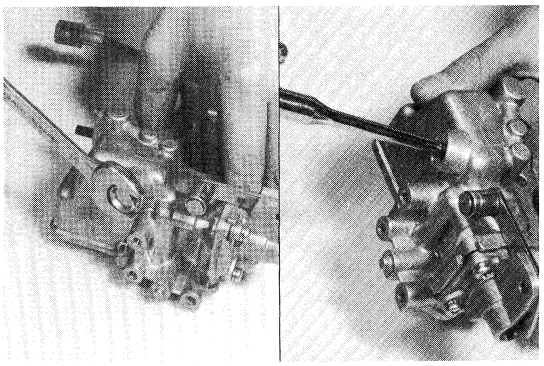
Removing the Slow Jet KAJ18-22,23

5. Idle-up actuator removal
   (1) Remove two set screws and remove the idle-up actuator.



Removing the Idle-up Actuator KAJ18-25

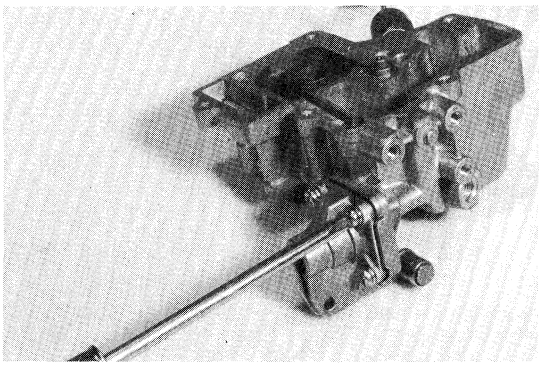
6. Main jet removal
   (1) Remove the main passage plug and gasket.
   (2) Remove the main jet and gasket from the main passage plug hole.



Removing the Main Jet KAJ18-26,28

7. Accelerating pump diaphragm removal
   (1) Remove four set screws, and remove the accelerating pump cover.
   (2) Remove the diaphragm and spring.

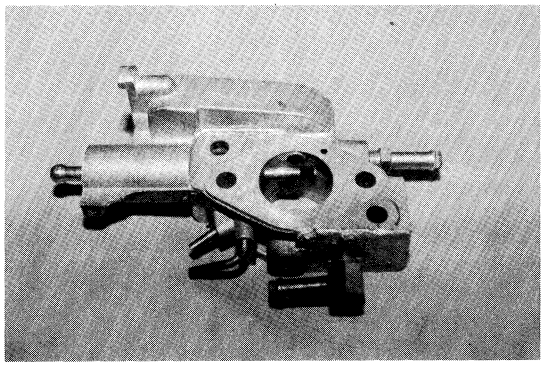
8. Throttle adjusting screw removal
   (1) Throttle adjusting screw
   (2) Spring



Removing the Throttle Adjusting Screw KAJ18-30

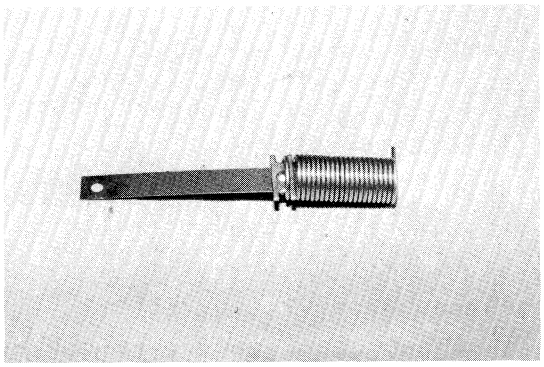
## INSPECTION

1. Governor body inspection
   (1) Inspect the governor body for any corrosion. Remove any or rusting with fine grained sandpaper.
   (2) Manually move the stabilizer piston. Check smooth sliding without sticking.
   (3) Inspect the body for distortion. Replace the body if distorted.



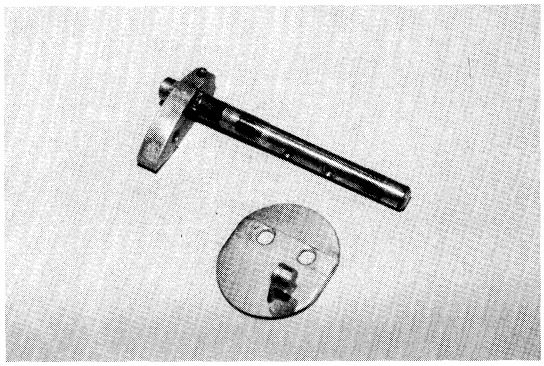
Inspecting the Governor Body KAF22-31

2. Governor spring and ribbon inspection
   (1) Replace the governor spring if any fatigue, deformation or other abnormality is found.
   (2) Replace the governor ribbon if any bending, deformation, crack, or other abnormality is found.



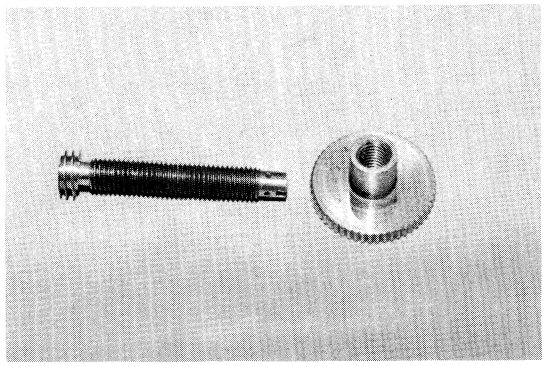
Inspecting the Governor Spring and Ribbon KAF22-33

3. Throttle valve and the valve shaft inspection
   (1) Damage and deformation of the throttle valve.
   (2) Assemble the throttle valve shaft to the governor body. Turn the cam manually and check any sticking or looseness caused by wear.
   (3) Wear (looseness during shaft insertion) or rusting of the governor body needle bearing.



Inspecting the Throttle Valve and Valve Shaft KAF22-32

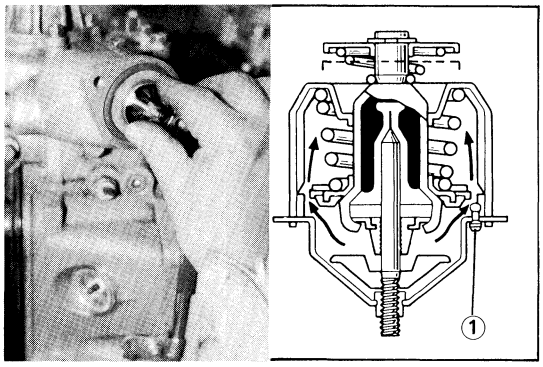
4. Adjusting screw and bush inspection
   (1) Bending of the adjusting screw, and damage of the thread.
   (2) Damage of the bush thread.



Inspecting the Adjust Screw and the Bush KAF22-34

## INSTALLATION

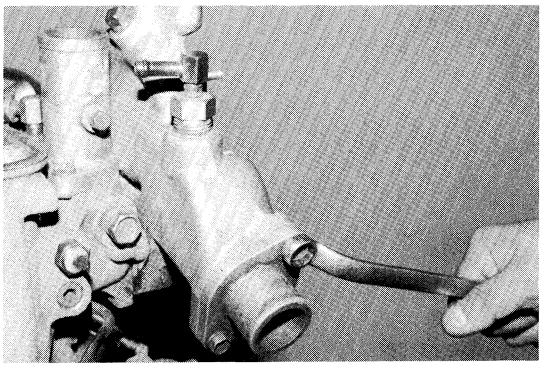
1. Thermostat installation
   (1) Install a new gasket to the thermostat, and insert them to the inlet. The jiggle valve ① of the thermostat shall be on the upper side.




Installing the Thermostat KAJ10-20, KAJS85

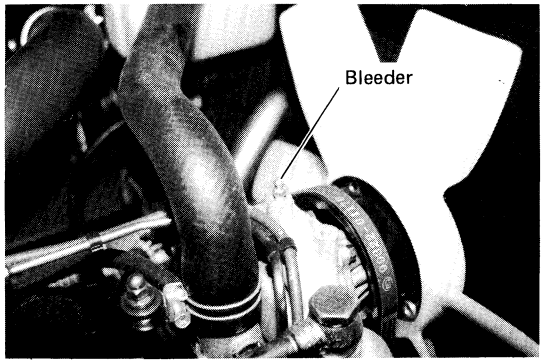
2. Water inlet installation
   (1) Install the water inlet by using two bolts. T = 1.85 kg-m (13 ft-lb)

3. Radiator outlet hose connection
   (1) Connect the radiator outlet hose to the water inlet.



Installing the Water Inlet KAJ4-35

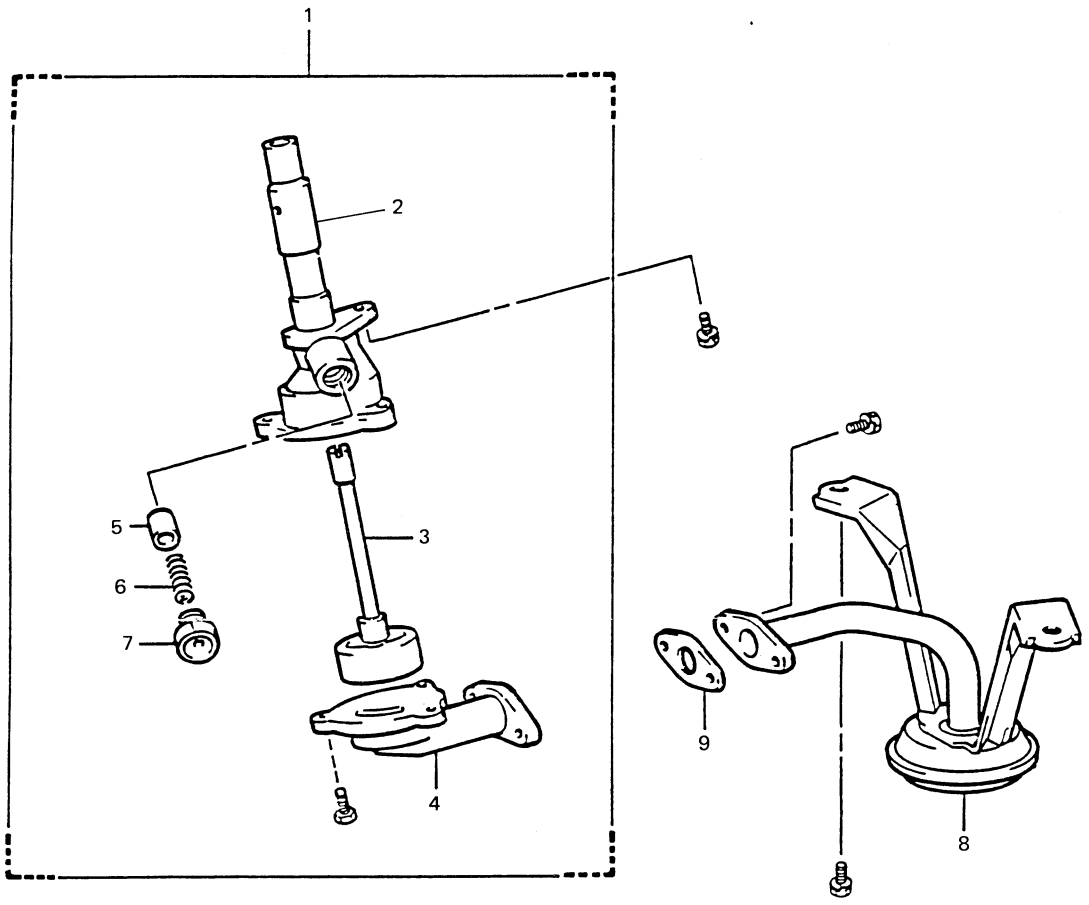
4. Coolant filling
   (1) After checking closing of the radiator drain cock and engine drain plug, fill coolant.
   (2) Start the engine and check that no leakage from the mounting place occurs.
   (3) Shut off the engine and perform bleeding of the air from the cooling system by unscrewing the bleeder plug located at the upper part of water pump.




Bleeding the Air from Water Pump LAO198-8

# OIL PUMP

## COMPONENTS




1. Oil pump ASSY
2. Oil pump body
3. Rotor set
4. Pump cover
5. Relief valve
6. Relief valve spring
7. Plug
8. Oil strainer SUB-ASSY
9. Gasket

Oil Pump Components KAJM18