

SECTION 1A

ENGINE MECHANICAL

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GENERAL DESCRIPTION

F8C-TYPE ENGINE

The engine is 4 - cycle, water-cooled, in- line 3 cylinders with displacement of 796cc.

Bore \times Stroke = 68.5 \times 72.0(mm)

F8C type — SOHC — 2 Valves — Carburetor — 41PS

Engine model(Specifications)	F8C Type SOHC
	2 Valve-carburetor
Maximum power (PS/rpm)	41/5500
Maximum torque (kg \cdot m/rpm)	6/2500
Compression ratio	9.3

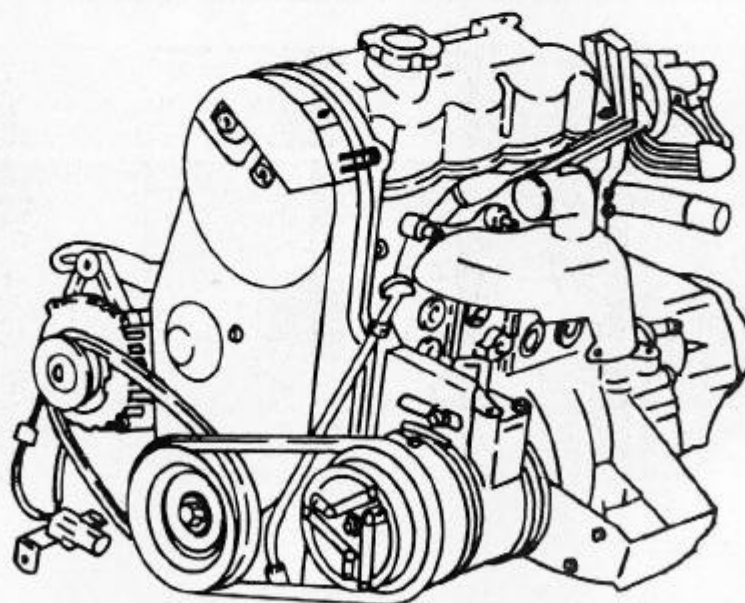


FIG. 1A — 1 ENGINE OUTLINE

ENGINE LUBRICATION

The engine lubrication is of the wetsump method to draw up the oil forced by the oil pump.

The oil pump is of a trochoid type, and mounted on crankshaft at crank shaft pulley side. Oil is drawn up through oil pump strainer and passed through pump to oil filter. The filtered oil flows into two paths in cylinder block.

In one path, oil reaches crankshaft journal bearings. Oil from crankshaft journal bearings is supplied to connecting rod bearings by means of intersecting passages drilled in crankshaft, and then injected from a small hole provided on big end of connecting rod to lubricate piston, rings, and cylinder wall. In another path, oil goes up to cylinder head and lubricates rocker arm, valve, camshaft, etc. through the oil hole provided on the rocker arm shaft.

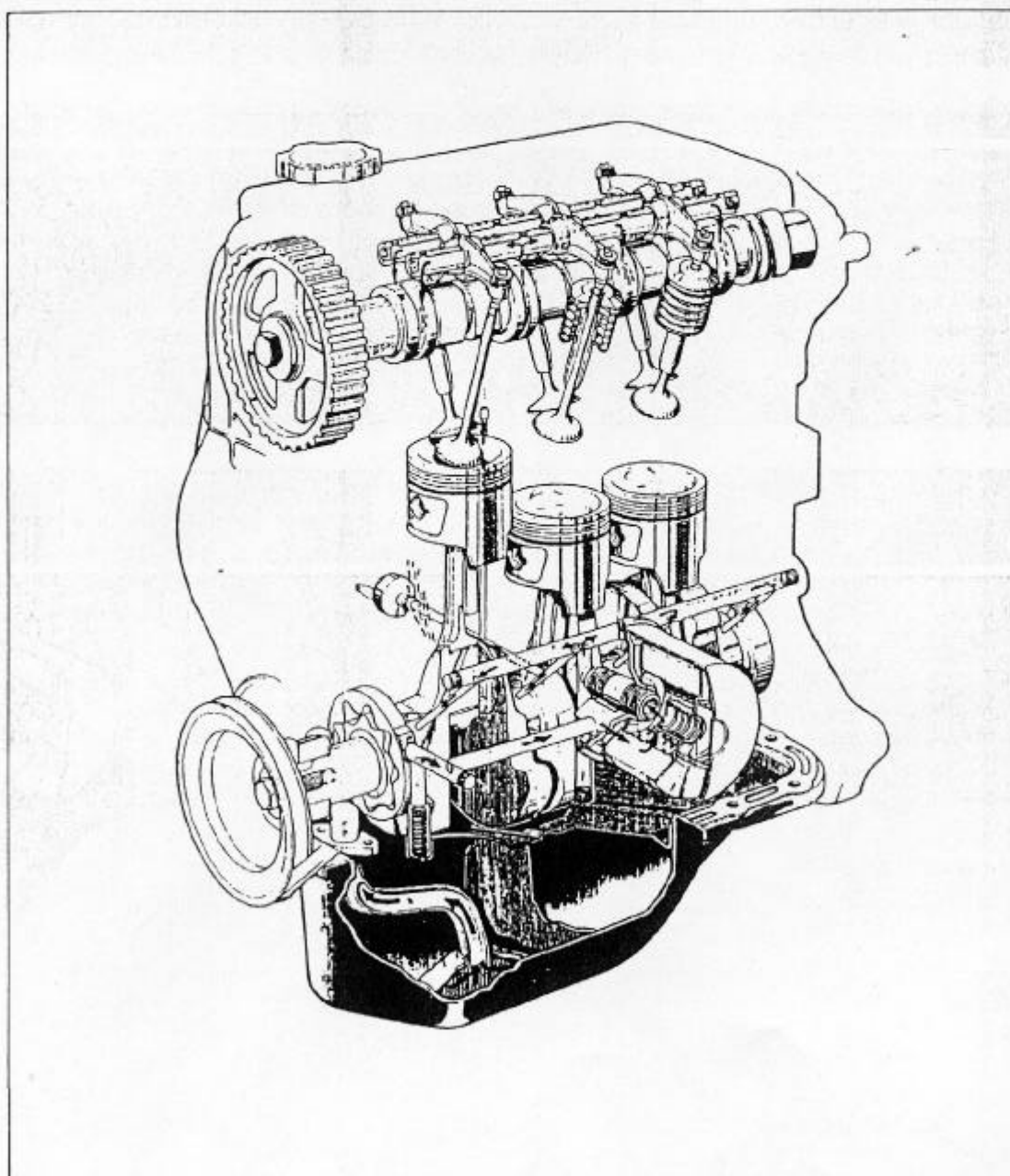


FIG. 1A — 2 ENGINE LUBRICATION

CYLINDER HEAD AND VALVE TRAIN

The cylinder head is made of cast aluminum alloy for better strength in hardness with light weight, and camshaft and rocker arm shaft arranged in-line support.

The combustion chambers are formed into the manifold combustion chambers with increased squish parts for better combustion efficiency and its intake and exhaust parts are installed in the cross flow arrangement.

The rocker arm operates in seesaw motion to close and open the intake and exhaust valves with camshaft by turning the rocker arm shaft of each intake and exhaust part.

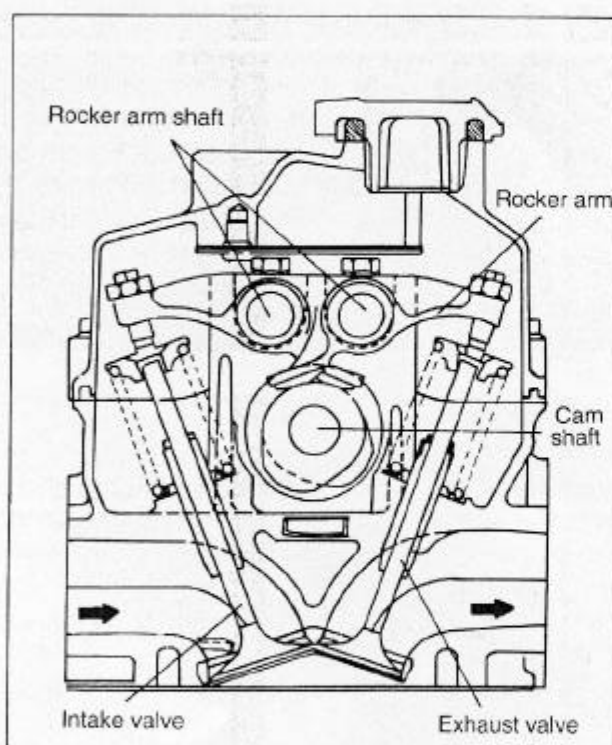


FIG. 1A — 3 CYLINDER HEAD AND VALVE TRAIN

CYLINDER BLOCK

As the largest part of the engine components, the block has all the necessary parts attached to outer surface of it. On the inside surface of block, there are bore surfaces by honing, which are cylinders, and on the periphery of the cylinders, there are the passages to prevent the over-heated and to lubricate the cylinder block. A high-grade cast iron is used for the material of the cylinder block.

CRANKSHAFT

This part is to convert the rectilinear motion into the rotation motion through the connecting rod which transmits the power generated by combustion.

On the one side of it, oil pump, crankshaft pulley and timing belt pulley are attached, and oil seal housing and flywheel are on the other side. A special steel of high grade cast iron is used for the material to stand the bending load and distortion.

A metal bearing of aluminum alloy is used for the material of the bearings. The split thrust bearings are inserted in the No.3 journal bearing part.

CONNECTING RODS

The connecting rods are made of forged steel, and its section is typed in "I" with its big end connected to crankshaft and its small end to piston pin to transmit the power.

The big end is detachable, and its upper and lower parts are fastened by bolting after the metal bearings are inserted.

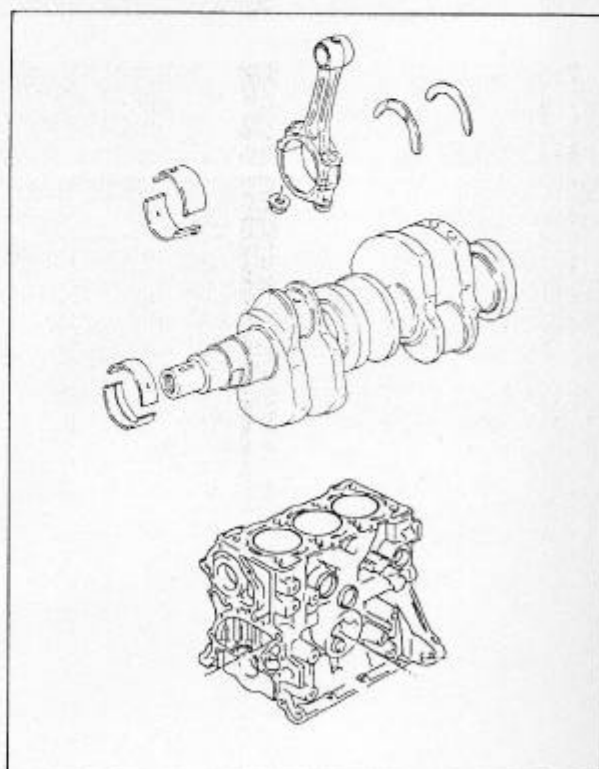


FIG. 1A — 4 CYLINDER BLOCK, CRANKSHAFT, CONNECTING ROD

PISTON, PISTON RING AND PISTON PIN

• Piston

The piston is of the open skirt type and its crown is exposed in the combustion chamber to generate power. Its land and skirt parts are made of cast aluminum alloy which is light and has excellent heat conductivity in order to meet its continuous and high speed reciprocating movement.

• Piston Ring

It is composed of two compression rings and one oil ring and installed between the grooves of the piston to make the high speed reciprocating movement maintaining a remarkable air-tightness as well as cylinders. It is a critical parts to affect the compression pressure, oil consumption, compression, blow-by pressure and engine performance.

• Piston Pin

The pin is not fixed to the piston or connecting rod and its both ends are assembled in the full floating type. The pin is used to transmit the power from the crown part of piston to connecting rod.

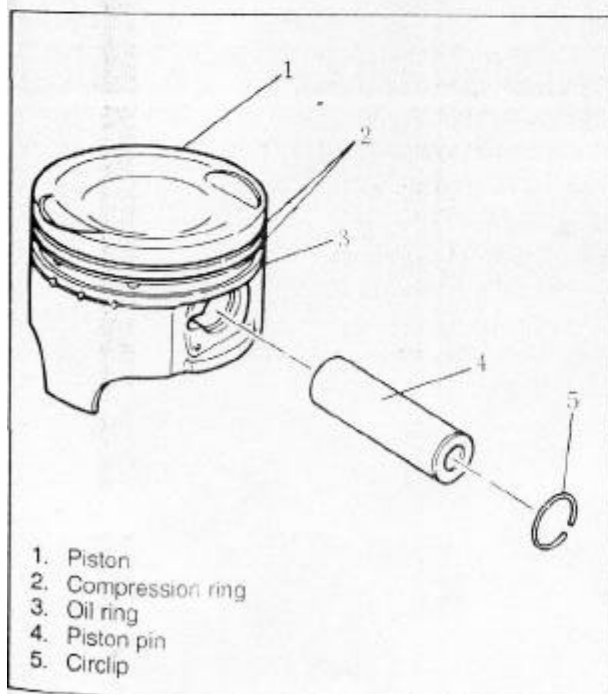


FIG. 1A — 5 PISTON, RING, PIN, CIRCLIP

TIMING BELT, PULLEY

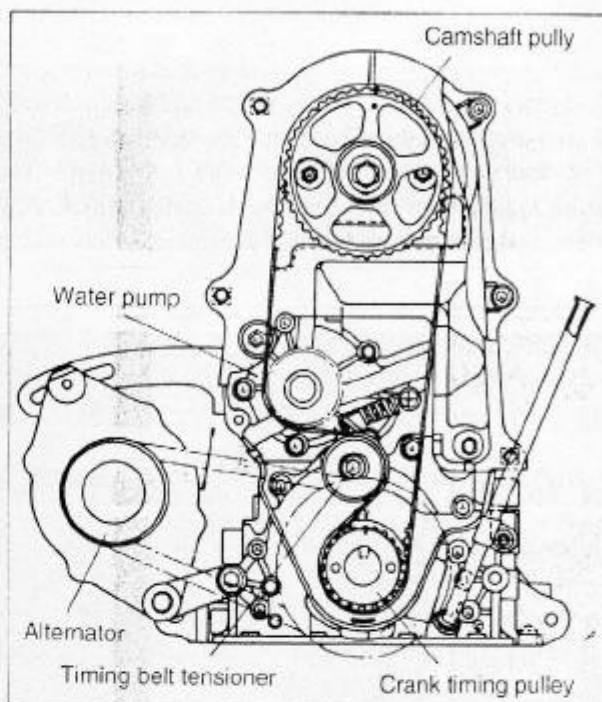


FIG. 1A — 6 TIMING BELT

Mounting

This is to absorb or reduce the engine vibration and impact from the wheeled road. Each mounting is attached to the intake and exhaust sides and two to the transmission part.

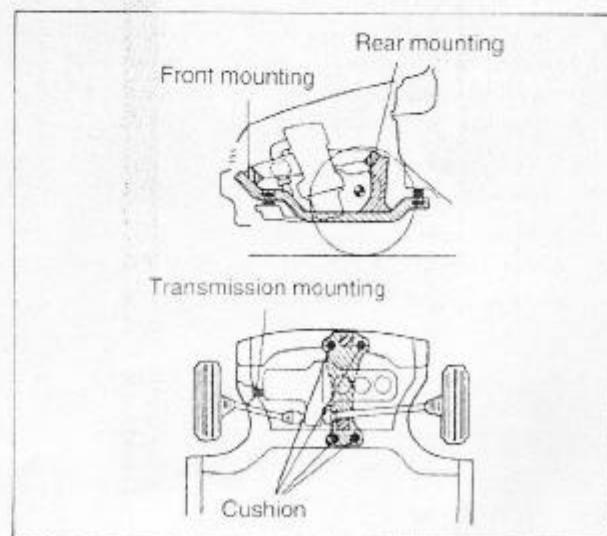


FIG. 1A — 7 LOCATION OF MOUNTING

ON-CAR SERVICE

COMPRESSION PRESSURE CHECK

Check the compression pressure in the following procedures.

1. After warming up engine up to the normal operating temperature.
2. Stop the engine.
3. Remove all spark plugs and lead wires of distributor (pull out with 10kg · f or less).
4. Remove the air cleaner.
5. Put the compression gauge in the hole of spark plug.

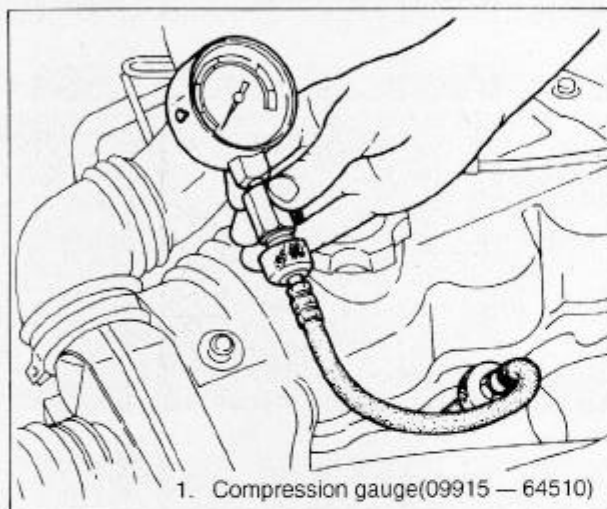


FIG. 1A — 8 INSTALLATION OF COMPRESSION PRESSURE GAUGE

6. Disengage the clutch (to lighten starting load on engine upon cranking), and depress the accelerator all the way to make the throttle fully open.
7. Crank the engine with the starting motor, and read the highest pressure on the compression pressure gauge.

Compression Pressure (kg/cm ²) 300~400rpm	Standard	12.5
	Limit	12—13
	Difference Between Cylinders	1.0 or less

8. Upon checking, make the connection perfectly airtight between the hole of spark plug and compression gauge.

ENGINE VACUUM CHECK

The vacuum that develops in the intake line is a good indicator of the condition of the engine, and its checking procedures are as follows:

1. Warm up engine up to the normal operating temperature.
2. Stop the engine, and connect the vacuum gauge to the vacuum hose on intake manifold.

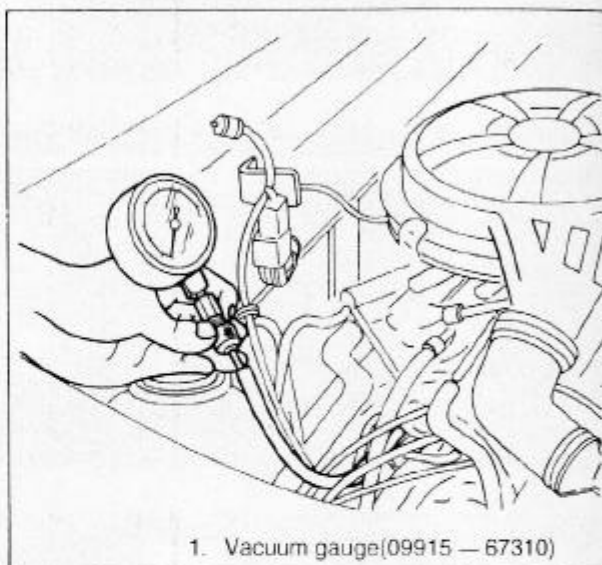


FIG. 1A — 9 CONNECTING VACUUM GAUGE

3. Run the engine at the specified idling speed, and under this running condition, read the vacuum gauge.

Standard vacuum(mm Hg)

460 ± 20

4. After checking, remove vacuum gauge and connect the hose again as it was.

OIL PRESSURE CHECK

CAUTION

Prior to check oil pressure, check the followings.

- Check oil level and add if required.
- Replace the discolored, deteriorated or diluted oil.
- Check any oil leakage and repair the defective part.

1. Remove the oil pressure switch from the cylinder block.

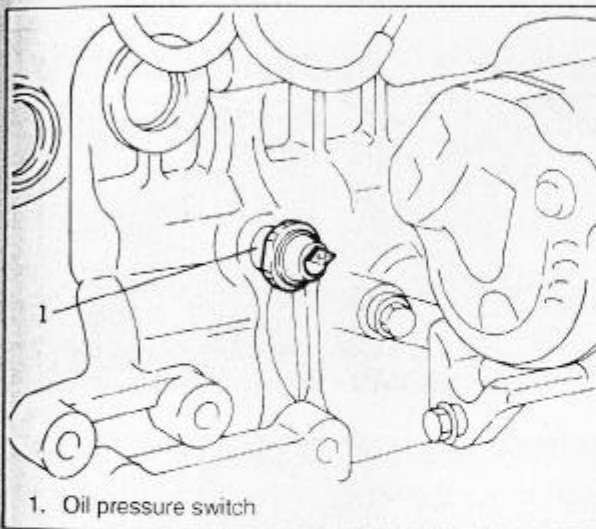


FIG. 1A — 10 OIL PRESSURE SWITCH

2. Install the oil pressure gauge to the mounting place of the pressure switch.
3. Start the engine and warm up to the normal operating temperature.
4. Raise the engine speed up to 2000rpm and then read oil pressure.

Oil pressure (kg/cm ²)	2.5 — 3.0
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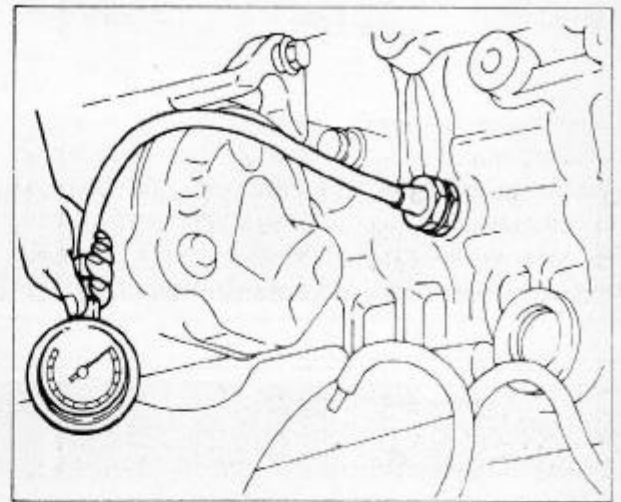


FIG. 1A — 11 INSTALLATION OF OIL PRESSURE GAUGE

5. After checking, wrap the threads of oil pressure switch with a seal tape and tighten it to the specified torque.
6. Start the engine and check oil pressure switch for oil leakage.

Oil pressure switch tightening torque(kg · cm)	120 — 160
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CAUTION

Cut off the seal tape edge bulged out from the threads of switch.

OIL FILTER CHANGE

Change the oil filter with oil filter wrench.

CAUTION

When installing oil filter, apply oil to its rubber seal.

Tightening torque for oil filter(kg • cm)	120 — 160
Replacement of oil filter	every 10,000km

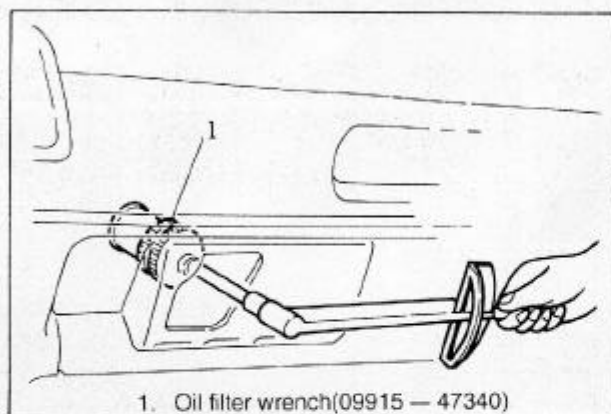
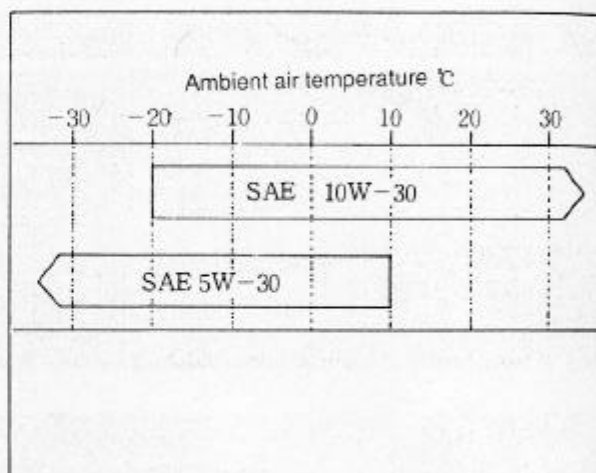


FIG. 1A — 12 MOUNTING OIL FILTER

ENGINE OIL CHANGE

1. Drain engine oil by removing drain plug of oil pan.
2. After draining oil, reinstall drain plug and tighten it securely.
3. Pour oil through the opening on the cylinder head cover.
4. Refer to the following table for the recommended oil and oil capacity :

Oil capacity(l)	Periodical change (Inc. oil filter)	2.5 (2.7)
	After engine overhauling	3.0

**CAUTION**

Be sure to use only the recommended oil.

ADJUSTMENT OF VALVE CLEARANCE

1. Remove the cylinder head cover.
2. Turn over the crankshaft to make No.1 cylinder matched with the compression top dead center.
(Check the compression top dead center after confirming the direction of the rotor of distributor is on the ignition sequence for No.1 cylinder).

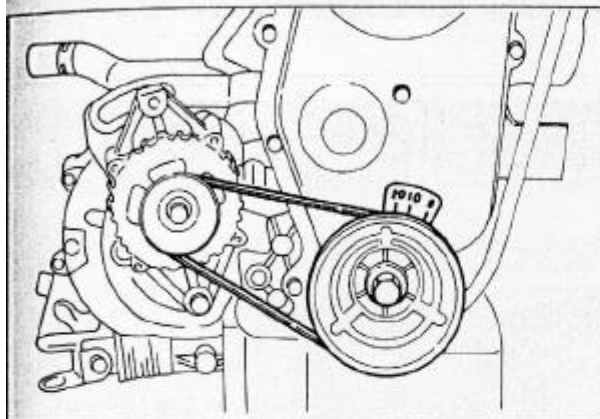


FIG. 1A-13 LOCATION OF COMPRESSION TOP DEAD CENTER

3. Check and adjust the valve clearance using thickness gauge.

CONDITION	CYL. NO.	CYL. NO.		
		1	2	3
Compression top dead center of No.1 cylinder	IN	O	O	
	EX	O		O
Exhaust top dead center of No.1 cylinder (one turn from the compression top dead center)	IN			O
	EX		O	

* O marks indicates the place where the valve clearance can be checked and adjusted.

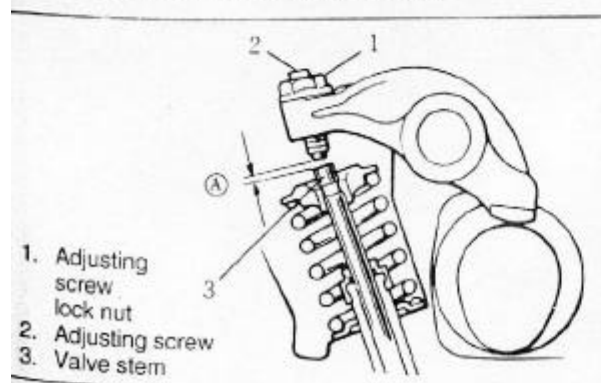


FIG. 1A-14 VALVE CLEARANCE

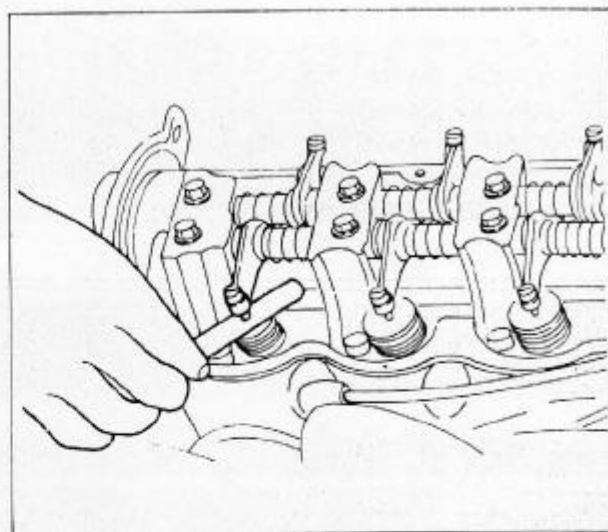


FIG. 1A-15 MEASURING VALVE CLEARANCE

Valve clearance (A)

Valve Clearance (mm)	COLD	IN	0.15 ± 0.02
		EX	0.20 ± 0.02
	HOT	IN	0.25 ± 0.02
		EX	0.30 ± 0.02

CAUTION

In case of hot engine, warm up the engine until the electric cooling fan begins to work and stop the engine to adjust the clearance with 20-30 minutes there from. It is recommendable to adjust the valve clearance while the engine is cold.

4. Loosen the lock nut first and adjust the valve clearance by turning the adjusting screw on the right or left. After setting the adjusting screws, tighten the lock nut to the specified torque and check again the valve clearance.

Tightening torque for lock nut(kg · cm)	150 — 200
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AIR CLEANER ELEMENT

In the air cleaner case, a dry-type air cleaner element is installed. Check the dirty and dusty element periodically, and clean or replace if needed.

Replacement of air cleaner element (Under the normal driving condition)	every 10,000km
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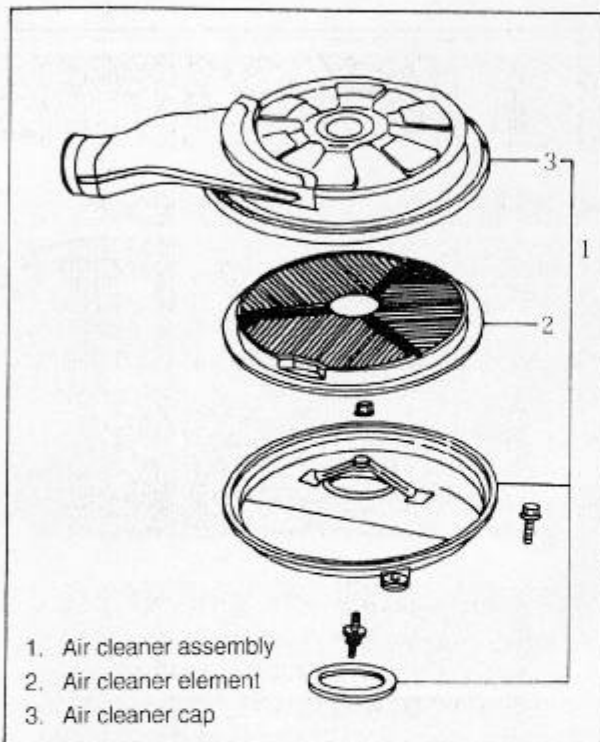


FIG. 1A — 16 REMOVAL OF ELEMENT

DISTRIBUTOR

Disassembly

1. Disconnect (—) terminal from the battery.
2. Remove distributor from the distributor housing.
3. Remove the fuel pump.
4. When the distributor housing is being removed, engine oil is dropping down, so place pieces of cloth under part.

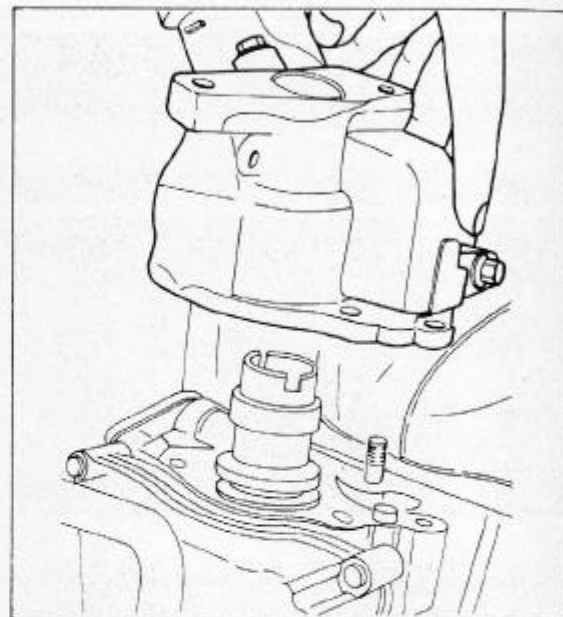


FIG. 1A — 17 DISTRIBUTOR,
DISTRIBUTOR HOUSING

Installation

It is the reverse of removal procedures. Take care of the followings.

- Use new gasket.
- Adjust the ignition timing with reference to the on-car service.

CARBURETOR AND INTAKE MANIFOLD

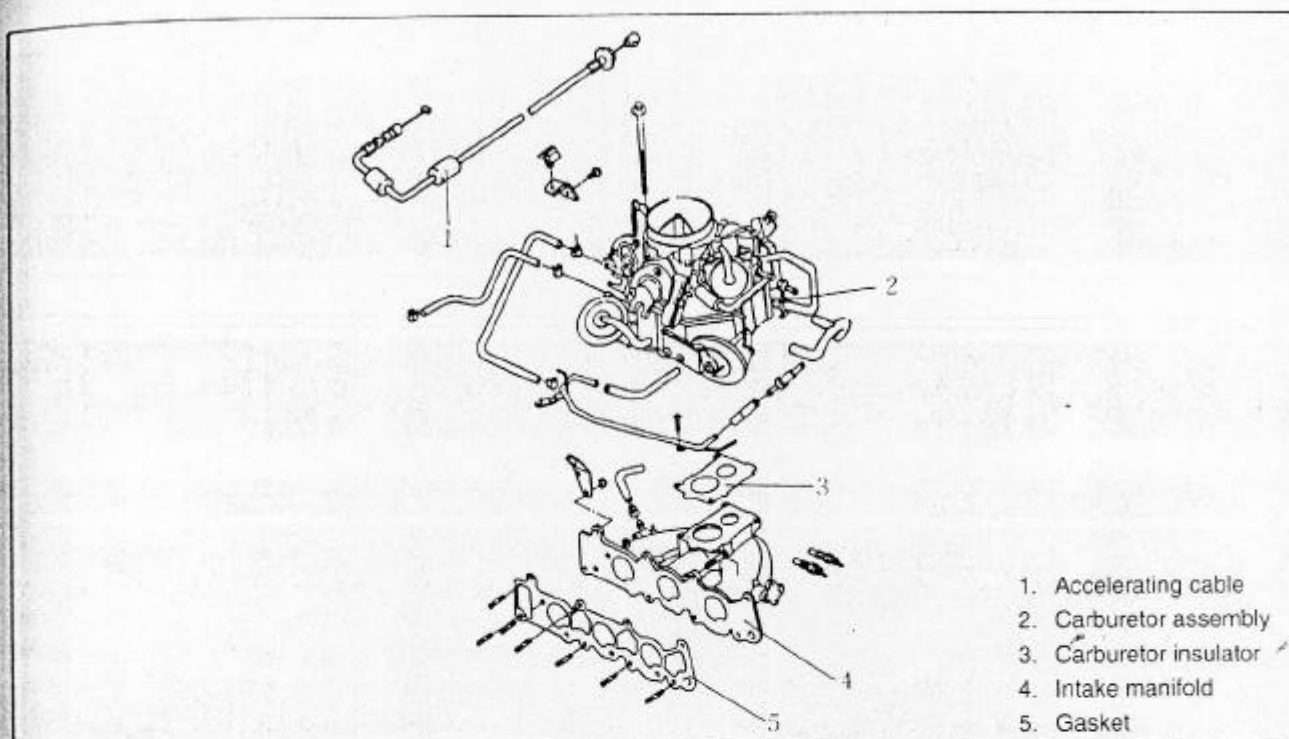


FIG. 1A — 18 CARBURETOR AND INTAKE MANIFOLD

Removal

1. Remove the lower hose of radiator and drain the coolant.
2. Remove the air cleaner housing.

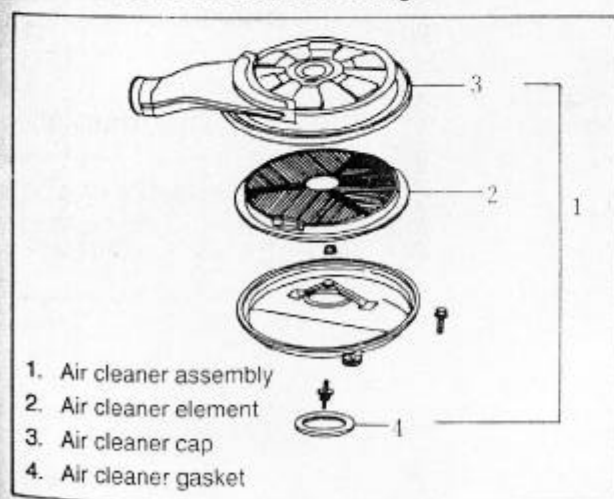


FIG. 1A — 19 REMOVAL OF AIR CLEANER HOUSING

3. Disconnect the accelerating cable from carburetor.
4. Remove the coolant hose.

5. Disconnect the fuel hose.
6. Disconnect the vacuum hose.
7. Remove the carburetor assembly.
8. Remove EGR valve from the intake manifold.
9. Disconnect the brake booster hose.
10. Disconnect the bypass hose of cooling water.
11. Remove the intake manifold.

Installation

It is the reverse of removal procedures. Take care of the followings.

- Tighten the mounting bolt of carburetor to the specified torque.

Tightening torque for carburetor(kg · cm)	180 — 280
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- Tighten the mounting bolt and nuts of intake manifold to the specified torque.

Tightening torque for intake manifold(kg · cm)	180 — 280
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EXHAUST MANIFOLD

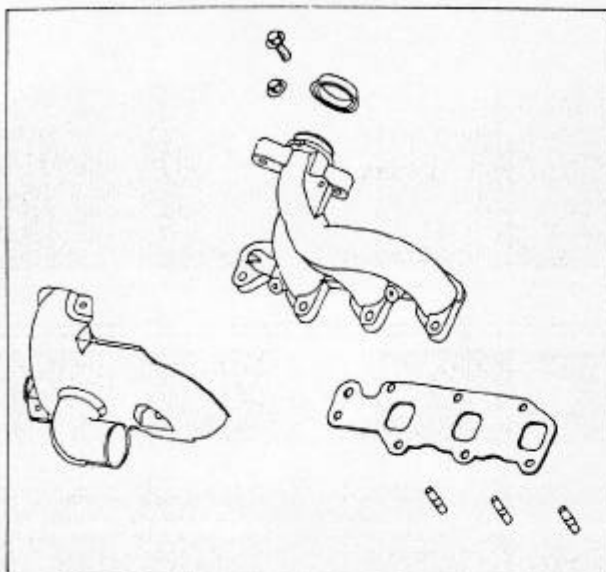


FIG. 1A — 20 EXHAUST MANIFOLD

Removal

1. Remove the exhaust manifold cover.
2. Remove the bolts from exhaust center pipe.
3. Remove the exhaust manifold from cylinder head.

Installation

It is the reverse of removal procedures. Take care of the followings.

- Check the gasket and replace the aging or damaged gasket with a new one.
- Install the exhaust manifold with the specified torque.

Tightening torque for exhaust manifold(kg • cm)	180 — 280
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INTAKE AIR SELECTOR LEVER

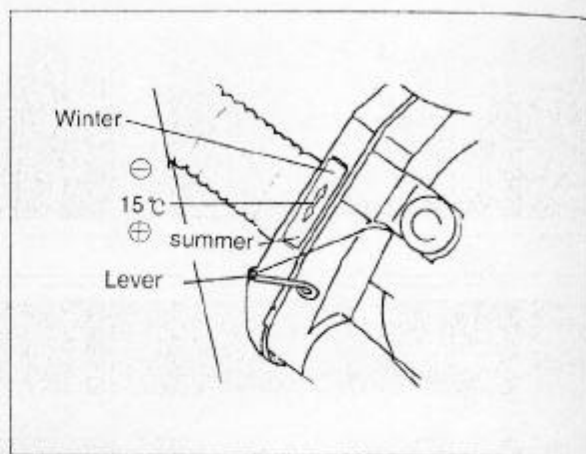


FIG. 1A — 21 INTAKE AIR SELECTOR LEVER

Select the intake air selector lever in front of the air cleaner at the standard degree of 15 °C by summer and winter alternately.

CAUTION

Selecting the intake air selector lever at the wrong position may cause the engine irregularity. Handle the lever in accordance with the ambient temperature.

TIMING BELT AND BELT TENSIONER

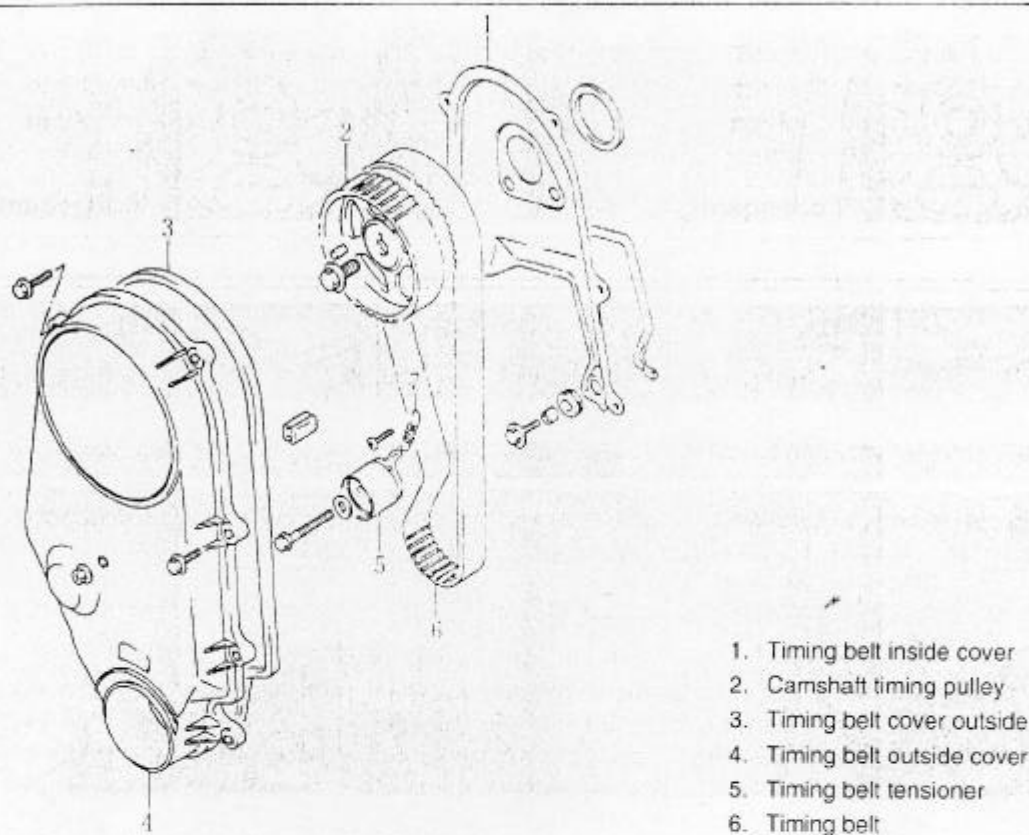


FIG. 1A — 22 TIMING BELT, TENSIONER, TIMING BELT COVER

Removal

1. Set the No. 1 cylinder to the exhaust top dead center by turning crank pulley.
2. Crank pulley
3. Outside cover
4. Timing belt tensioner
5. Timing belt

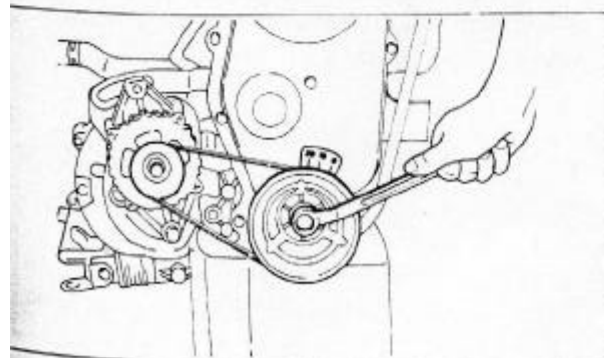


FIG. 1A — 23 REMOVAL OF CRANK PULLEY

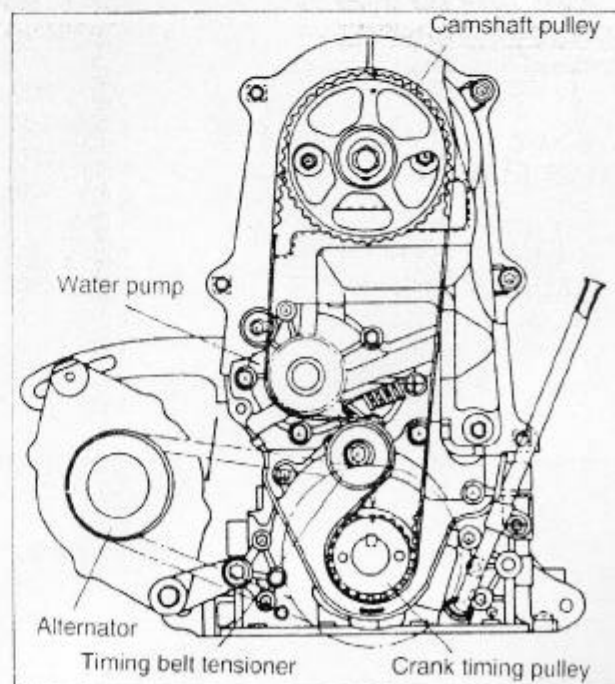


FIG. 1A — 24 REMOVAL OF TIMING BELT

CAUTION

Never turn the crankshaft or camshaft with timing belt removed.
The piston and valve are to be hit together when crankshaft turns 30° and more against the timing mark.

Inspection

- Replace the damaged or worn timing belt.
- Check the smooth operation of tensioner.

Installation

It is the reverse of the removal procedures. Take care of the followings.

- Handtighten bolt before installation of tensioner.

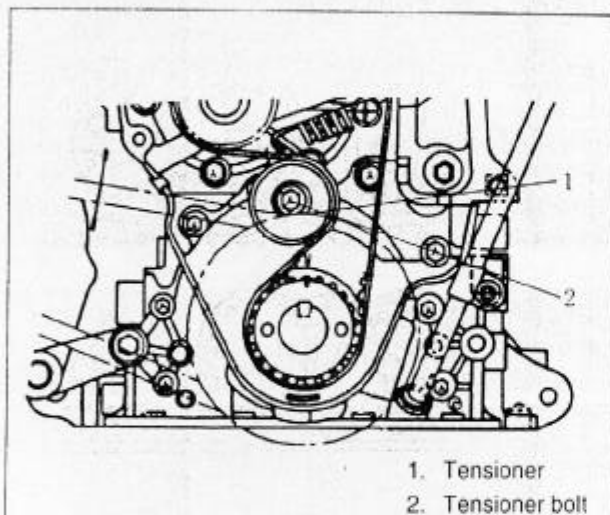


FIG. 1A—25 ATTACHMENT PARTS OF TENSIONER

CAUTION

Replace the old tensioner spring with a new one.

- The timing mark of camshaft pulley has to be matched with the timing mark of inside cover.

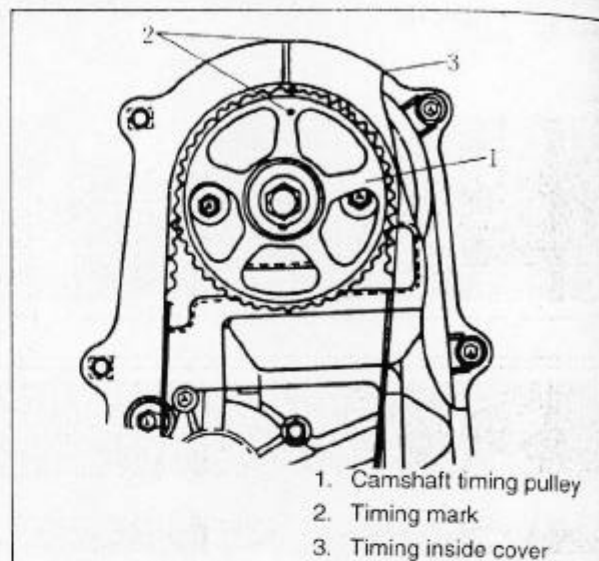


FIG. 1A—26 TIMING MARK(CAMSHAFT)

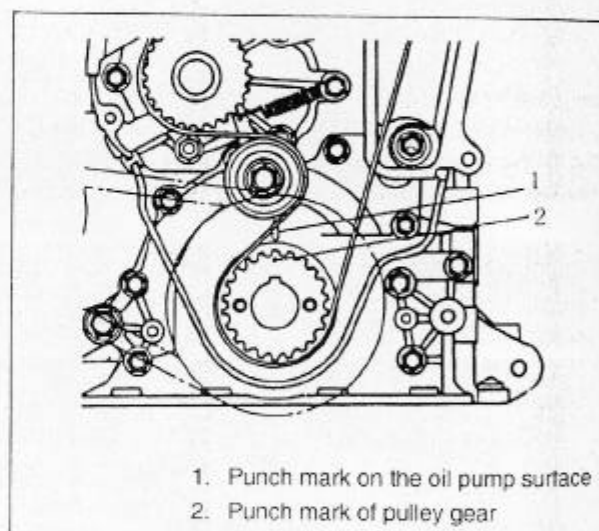


FIG. 1A—27 TIMING MARK(CRANKSHAFT PULLEY)

- Turn the crankshaft and adjust the punch mark of pulley gear to be matched with the mark on the oil pump surface.
- Make the timing marks of pulley on the cam side matched with crank side and then install timing belt and mount the tensioner spring with mounting screws.

CAUTION

Before installation of timing belt, check the arrow direction on the belt and install it on the same direction of turning.

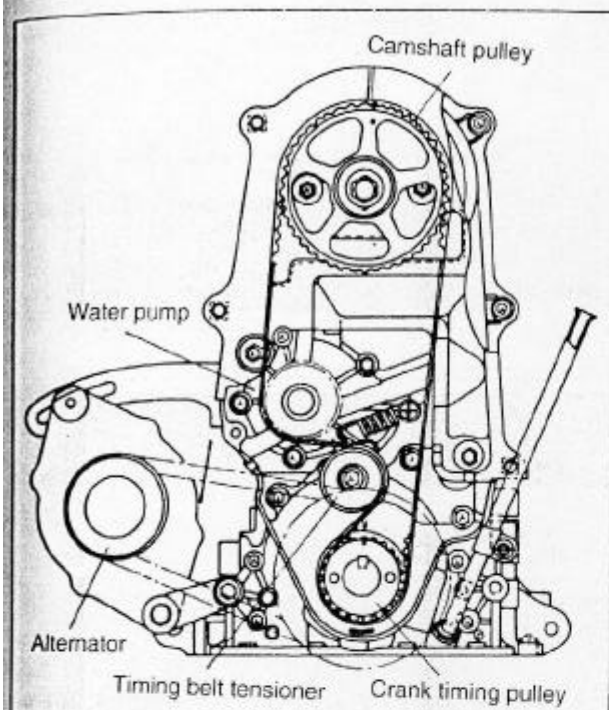


FIG. 1A-28 INSTALLATION OF TIMING BELT

- Install the belt and turn the crankshaft twice to its turning direction, then tighten the tensioner bolt to the specified torque.
Check again the corresponding line with the timing mark.

Tightening torque for tensioner bolt(kg · cm)	150 — 230
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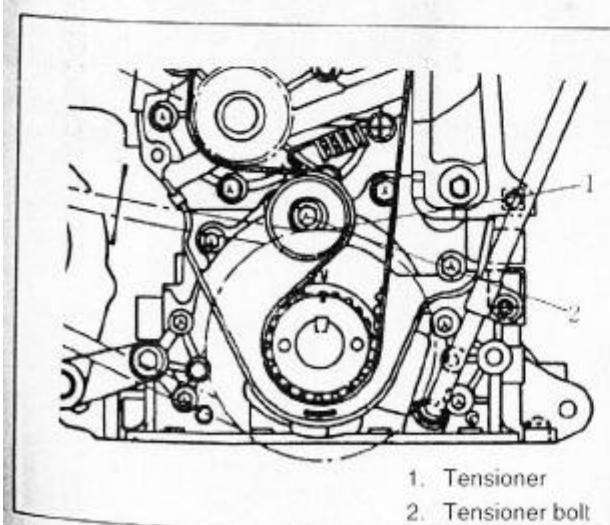


FIG. 1A-29 TIGHTENING OF TENSIONER BOLT

- Tighten crank pulley to the specified torque.

Tightening torque for crank pulley(kg · cm)	650 — 750
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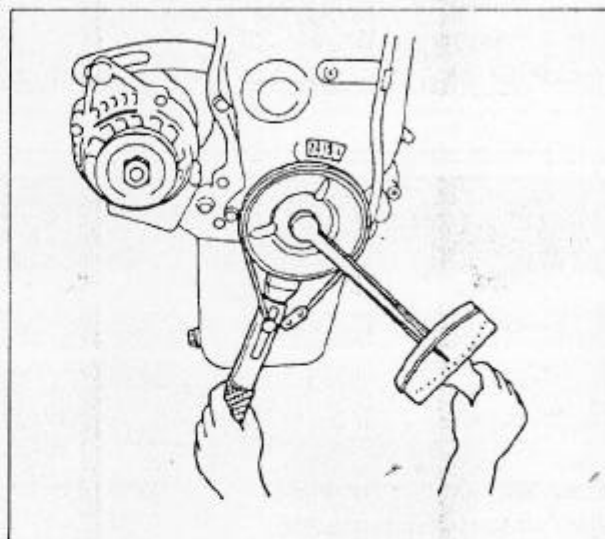


FIG. 1A-30 MOUNTING CRANK PULLEY

- Adjust the clearance of intake and exhaust valves referring to page 1A-29.

Oil Pump

Principles of Operation

Rotary pump

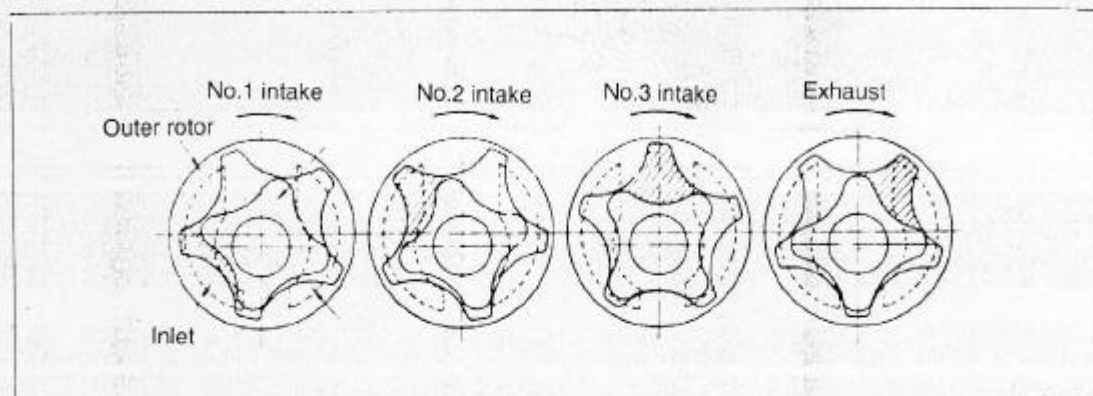


FIG. 1A — 31 ROTARY PUMP

The rotary pump is also called as trochoid pump and its structure is formed with the inner and outer rotors in accordance with the trochoid curve.

The teeth of inner rotor are one less than those of outer rotor. Both of the inner and outer rotors are joining the pump case to rotate the outer rotor in the same direction when the inner rotor is to rotate to the arrow direction by the crankshaft.

When the rotor turns, the lug of inner rotor is engaged into the dented parts of outer rotor one by one, and it makes different volumetric clearance between the inner and outer rotors. The oil is to be taken in the increased part of the clearance, and transported to the opposite side in the jammed space to be pressed out to the outlet due to the decreased clearance.

Specifications

Lubrication	Force-feed type
Oil capacity	Replaced with filter : 2.7 l Upon disassembling engine: 3.0 l
Oil replacement	Every 10,000km
Oil filter replacement	Every 10,000km
Usable oil	Above SE grade, SAE 10W-30
Oil pump type	Rotary (Trochoid) type
Oil filter type	Filter element
Operational pressure of oil pressure switch	$0.3 \pm 0.1 \text{ kg/cm}^2$
Oil pressure (2000 rpm)	2.5 ~ 3.0 kg/cm^2

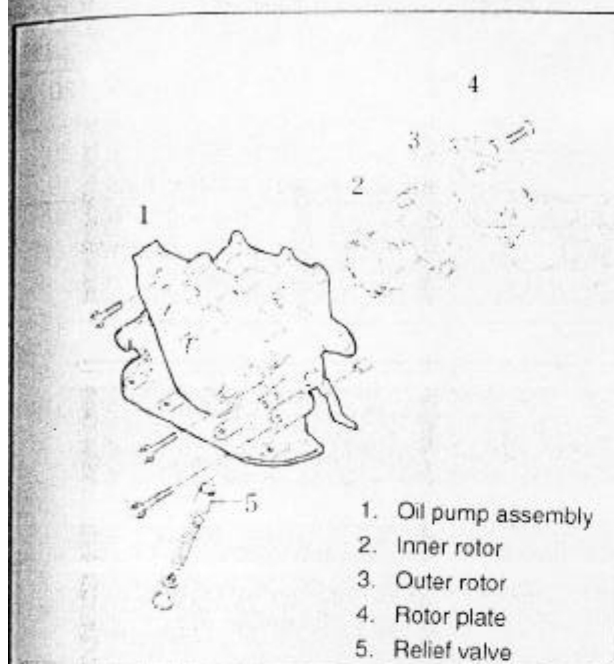


FIG. 1A — 32 OIL PUMP

Removal

1. Crank pulley, outside cover, timing belt tensioner
2. Timing belt pulley
3. Engine front mounting
4. Oil pan
5. Oil strainer
6. Oil pump

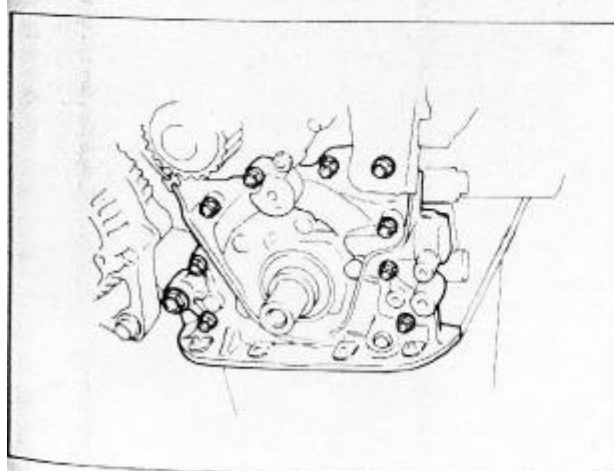


FIG. 1A — 33 REMOVAL BOLTS FOR OIL PUMP

Inspection

- Check the rib for damage and replace the damaged oil seal.
- Check the excessive wear or damage in the outer and inner rotors, rotor plate and oil pump case.

Measurement

Measure the clearance between outer rotor and its case using thickness gauge, and replace the outer rotor or case when its measurement is over the specified value.

Clearance between outer rotor and case(mm)	0.31 and less
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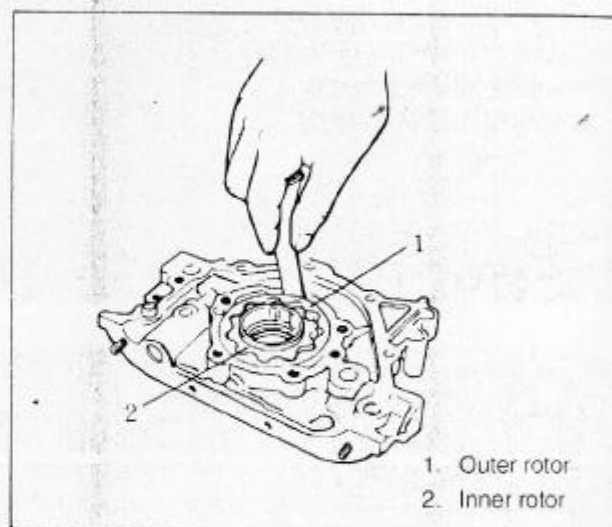


FIG. 1A — 34 CLEARANCE MEASURING

Side Clearance

Measure the side clearance using a straight ruler and thickness gauge.

Side clearance(mm)	0.15 and less
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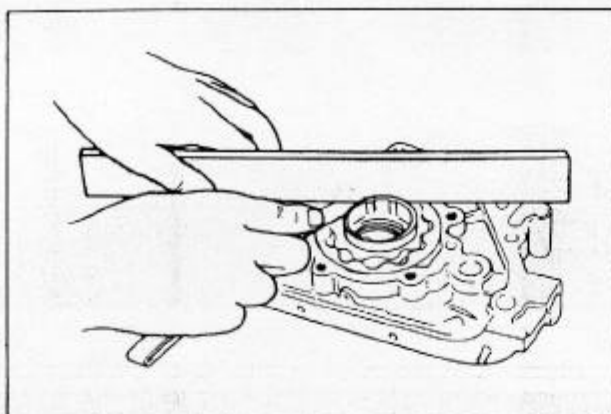


FIG. 1A — 35 MEASURING SIDE CLEARANCE

Installation

It is the reverse of removal procedures. Take care of the followings.

- Upon installation of oil pump case protect the oil seal rib using seal guide.

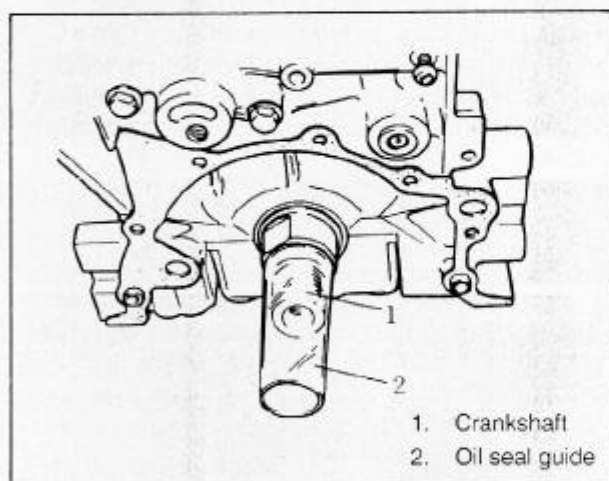


FIG. 1A — 36 INSTALLATION OF OIL SEAL GUIDE

- Install the oil pump to the specified torque.

Tightening torque for oil pump(kg • cm)

90 — 120

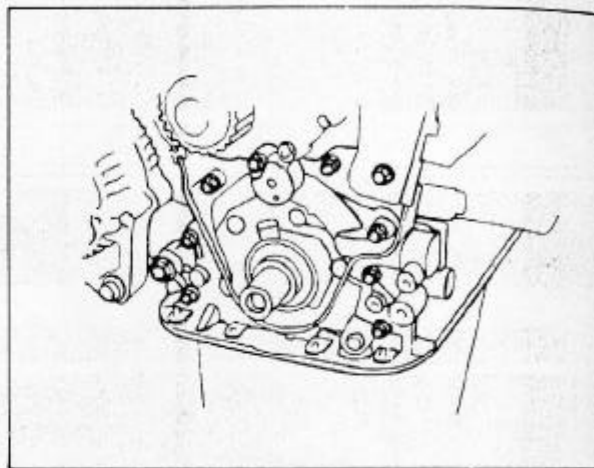
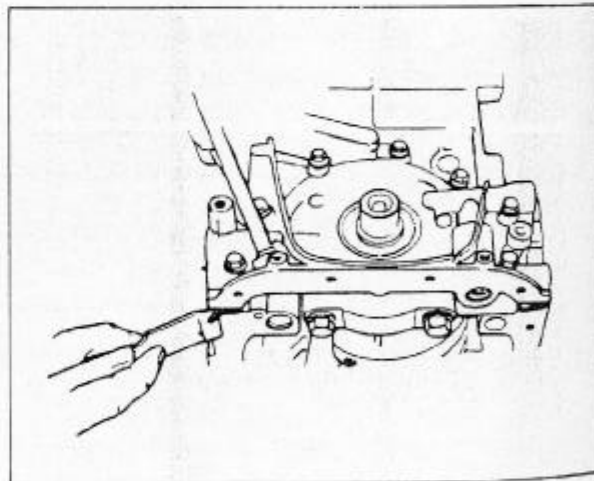


FIG. 1A — 37 ATTACHMENT OF OIL PUMP

- Cut off the projected edge of the oil pump gasket using a scraper, and make it to the same height as the section of cylinder block.

FIG. 1A — 38 CUTTING OFF THE
EDGE OF GASKET

- Refer to the preceding pages for installing timing belt.

CYLINDER HEAD, CAMSHAFT, VALVE, ROCKER ARM SHAFT

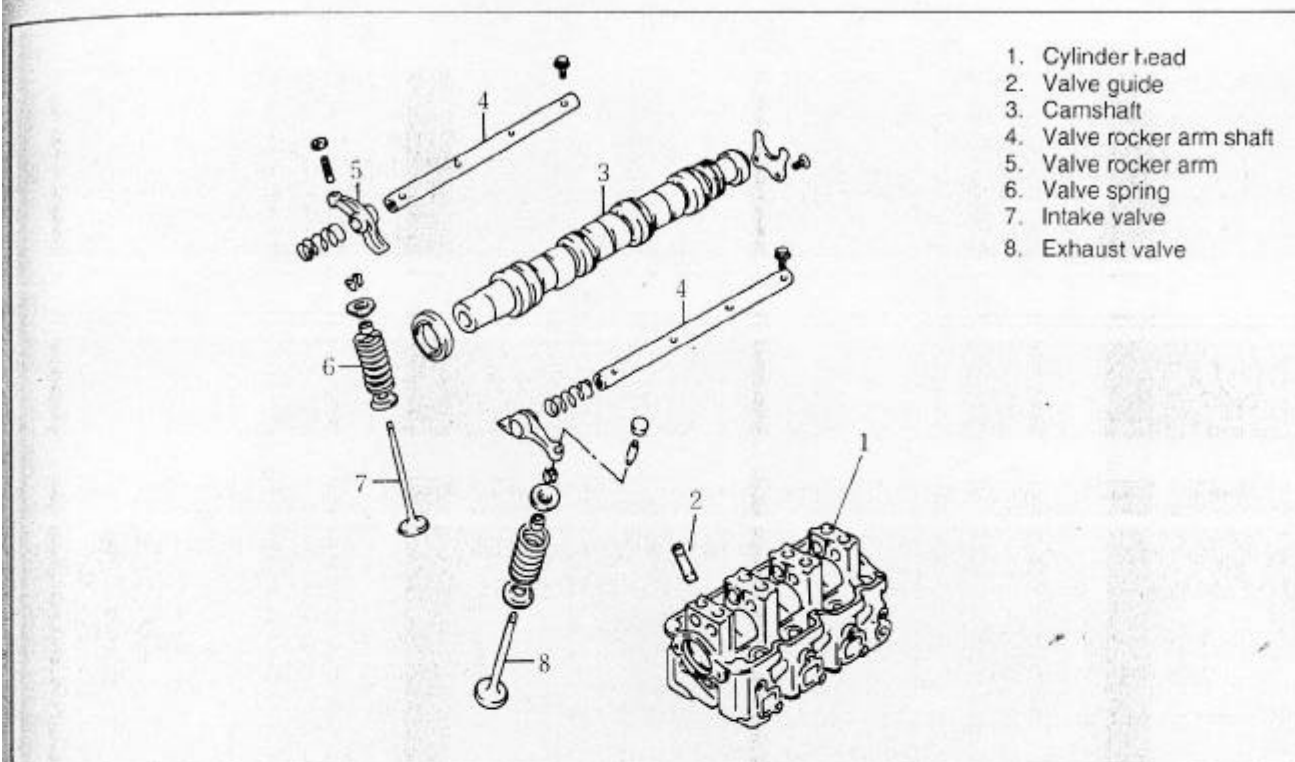


FIG. 1A — 39 CYLINDER HEAD, CAMSHAFT, ROCKER ARM SHAFT

Removal

1. Front bumper, front member
2. Disconnect radiator lower hose and drain coolant.
3. Air cleaner housing
4. Coolant hose
5. Vacuum hose
6. Fuel hose
7. Accelerator cable
8. Wiring harness
9. Timing belt outside cover and timing belt outside tensioner.
10. Timing belt inside cover
11. Exhaust center pipe
12. Exhaust manifold
13. Distributor
14. Cylinder head cover

15. Remove cylinder head bolts(8) and cylinder head assembly.

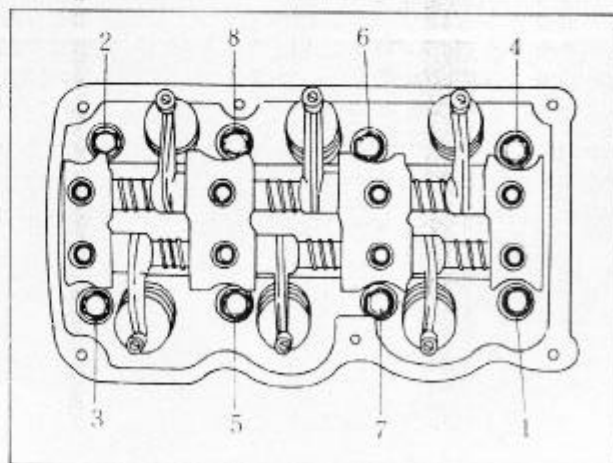


FIG. 1A — 40 REMOVAL OF CYLINDER HEAD BOLTS

Disassembly

1. Remove the distributor case and exhaust manifold for easy disassembling.
2. Rocker arm shaft bolt

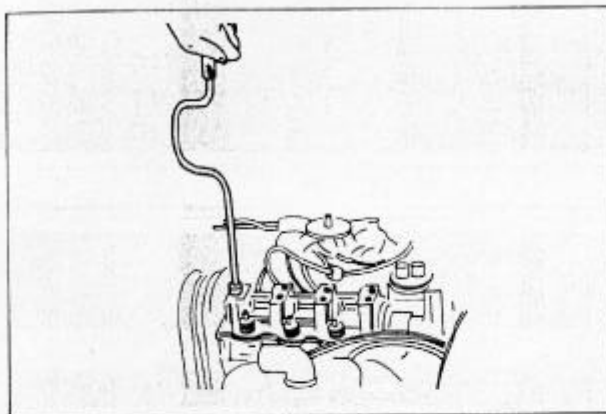


FIG. 1A-41 REMOVAL OF ROCKER ARM SHAFT BOLT

3. Remove the intake and exhaust rocker arm shaft, rocker arm and spring.

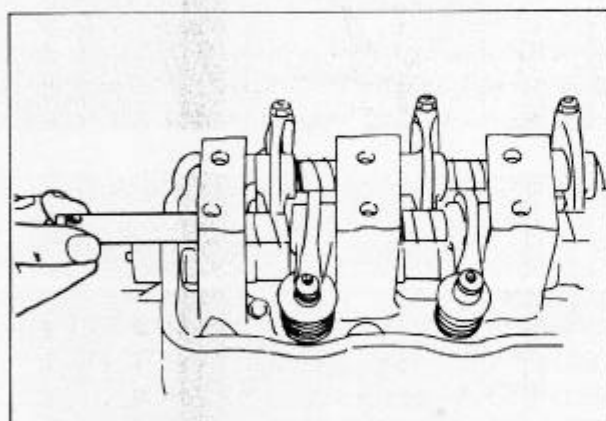


FIG. 1A-42 REMOVAL ROCKER ARM SHAFT

4. Remove the camshaft from cylinder head.

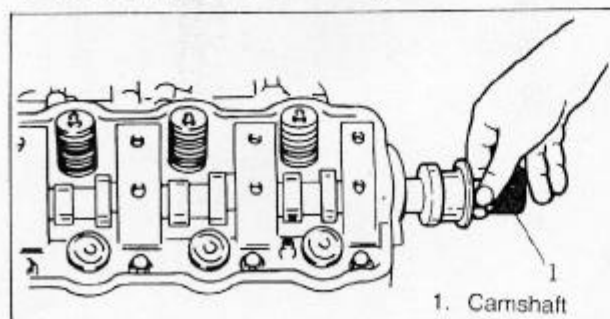


FIG. 1A-43 REMOVAL OF CAM SHAFT

5. Install valve lifter, compress the valve spring and remove the valve cotter.

1. Valve lifter(09916 — 14510)
2. Valve lifter attachment(09916 — 48210)

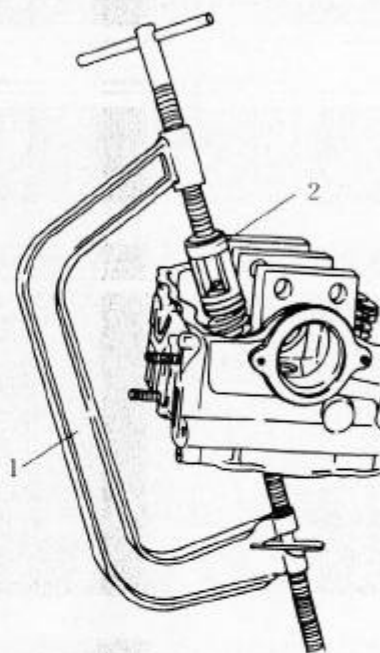
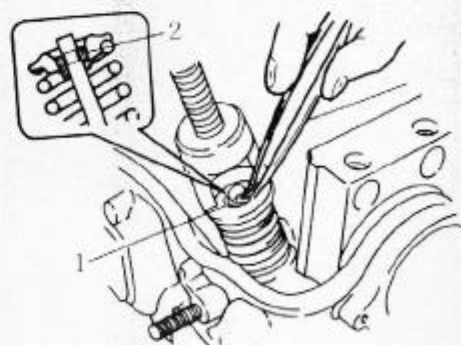


FIG. 1A-44 INSTALLATION OF VALVE LIFTER



1. Pincette(09916 — 84510)
2. Valve cotter

FIG. 1A-45 REMOVAL OF VALVE COTTER

6. Remove the valve lifter and then spring retainer and valve spring.
7. Pull out the valves.
8. Remove the valve stem oil seal and valve spring seat.

CAUTION

The removed oil seal should be replaced.
Do not reuse oil seal.

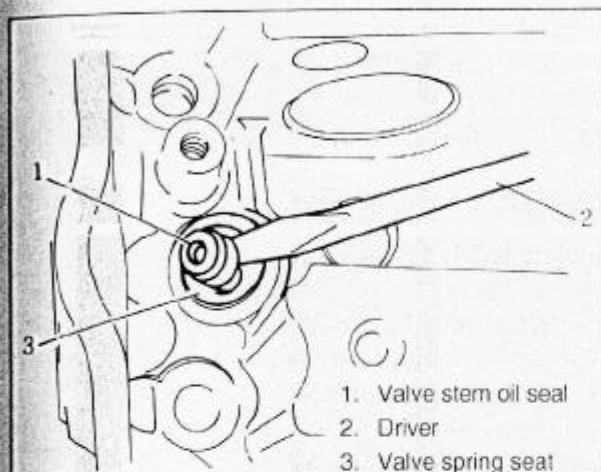


FIG. 1A — 46 REMOVAL OF VALVE STEM OIL SEAL

9. Hammer and remove the valve guide from the combustion chamber to the direction of the installed valve spring using valve guide remover.

CAUTION

The removed valve guide should be replaced by new one of oversized.
Do not reuse valve guide.

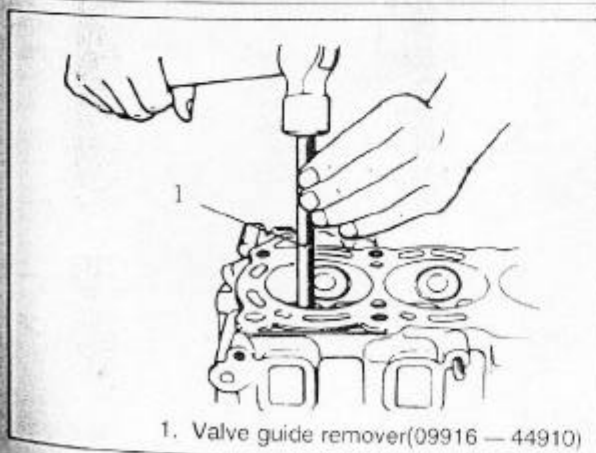


FIG. 1A — 47 REMOVAL OF VALVE GUIDE

Inspection**Abrasion of cam**

Measure the height of cam using a micrometer, and replace the camshaft when the measured value is less than the specified limit.

Item		Standard	Limit
Height of CAM(mm)	IN	36.132	36.10
	EX	36.135	36.11

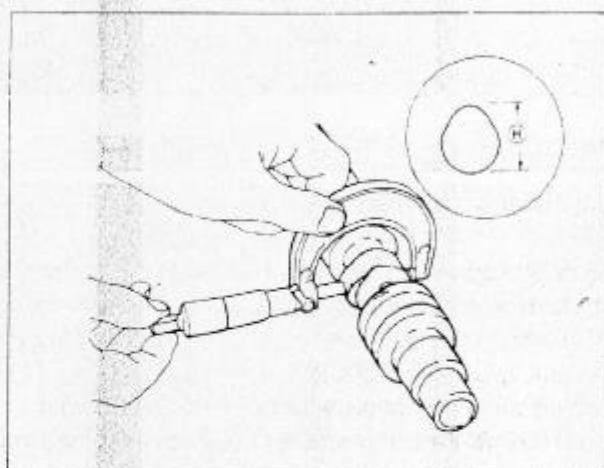


FIG. 1A — 48 MEASURING THE CAM HEIGHT

Measuring the bending camshaft

Measure the bending of camshaft using a dial gauge, and replace it when the measured value is over the specified limit.

Bending Limit(mm)	0.03 and less
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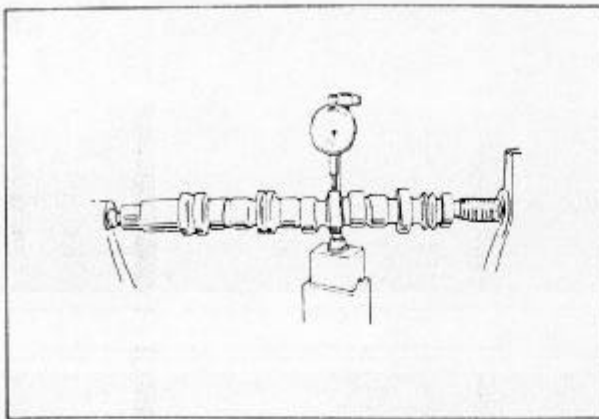


FIG. 1A — 49 MEASURING THE CAMSHAFT BENDING

Abrasion of camshaft journal

Measure the outer diameter of each journal at the 4 different places, and using a bore gauge, measure the inner diameter of cylinder head journal at the 4 places. The clearance of journal is measured by the difference between the journal diameter and bore diameter of the journal part. Replace the camshaft(or cylinder head, if necessary) of which limit is over the specified limit.

Item	Standard	Limit
Journal clearance(mm)	0.050~0.091	0.15

Item		Outer diameter, camshaft journal	Inner diameter, cylinder head journal part
a	Standard	43.450 — 43.425	43.500 — 43.516
	Limit	43.375	43.525
b	Standard	43.625 — 43.650	43.700 — 43.716
	Limit	43.575	43.725
c	Standard	43.825 — 43.850	43.900 — 43.916
	Limit	43.775	43.925
d	Standard	44.025 — 44.050	44.100 — 44.116
	Limit	43.975	44.125

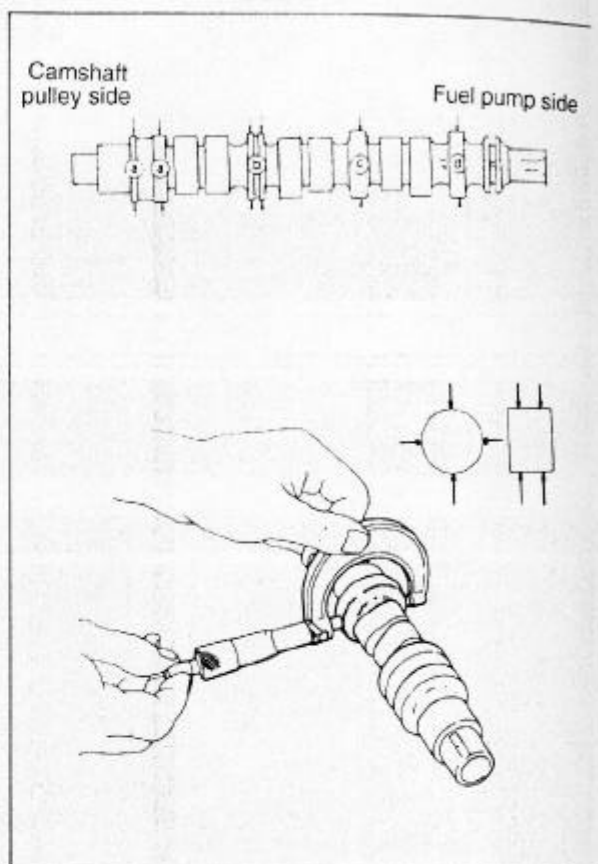


FIG. 1A — 50 MEASURING DIAMETER OF CAMSHAFT JOURNAL

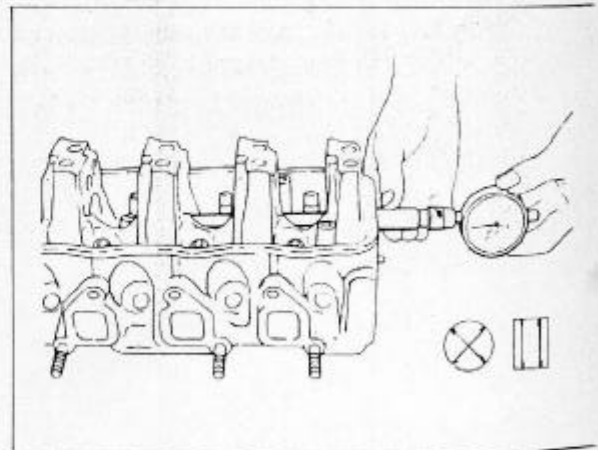


FIG. 1A — 51 MEASURING BORE DIAMETER OF JOURNAL PART

Bending of rocker arm shaft

Measure the bending by using of V block and dial gauge. Replace the rocker arm shaft of which bending is over the limit.

Bending limit(mm)	0.10
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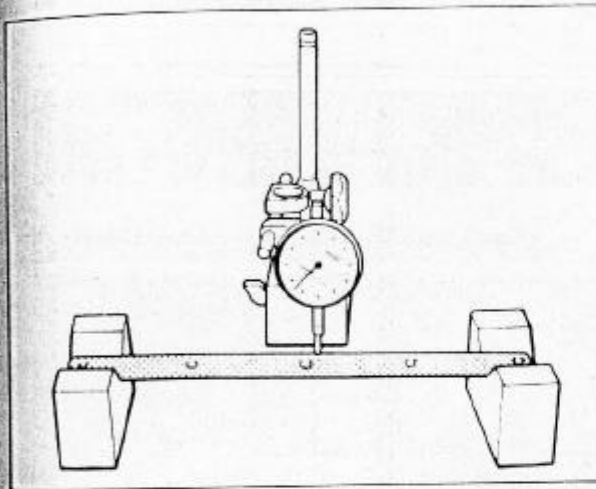


FIG. 1A — 52 MEASURING THE ROCKER ARMSHFT BENDING

Clearance between rocker arm and rocker arm shaft

Measure the diameter of rocker arm shaft and inner diameter of rocker arm using a micrometer and bore gauge. Replace the shaft or rocker arm, or both of them, if the difference is over the limit between the diameter and inner diameter.

Clearance between rocker arm and rocker arm shaft	Standard	Limit
	0.005 — 0.040	0.06

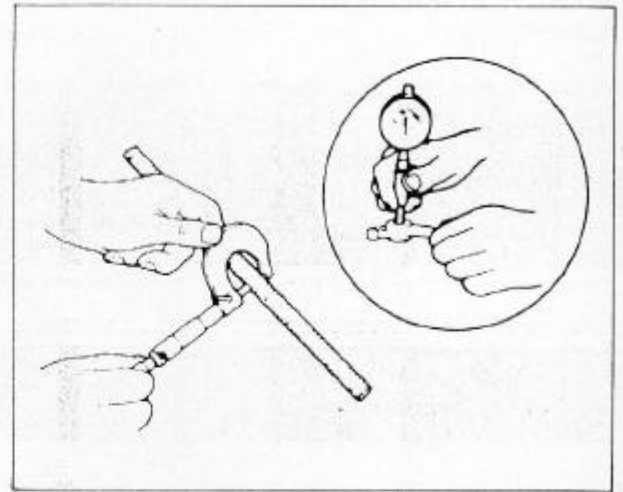


FIG. 1A — 53 MEASURING DIAMETER OF ROCKER ARM SHAFT AND INNER DIAMETER OF ROCKER ARM

Valve guide

Measure the diameter of valve stem and bore diameter of guide (at least 1 place in the direction to length), and calculate the clearance between stem and guide.

Item		Standard	Limit
Valve stem diameter(mm)	IN	5.465 — 5.480	—
	EX	5.440 — 5.455	—
Valve guide inner diameter(mm)	IN	5.500 — 5.512	5.53
	EX	5.500 — 5.512	5.53
Clearance between stem and guide(mm)	IN	0.020 — 0.047	0.07
	EX	0.045 — 0.072	0.09

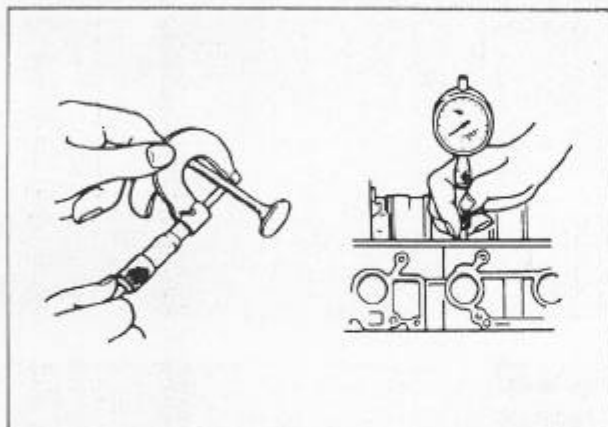


FIG. 1A — 54 MEASURING VALVE STEM DIAMETER AND VALVE GUIDE INNER DIAMETER

If a bore gauge is not available, measure the clearance using a dial gauge by moving the edge of stem to the directions of ①, ②.

Replace the valve stem or valve guide, if the measured value is over the limit.

Edge of valve ① → ② clearance limit(mm)	IN	0.14
	EX	0.18

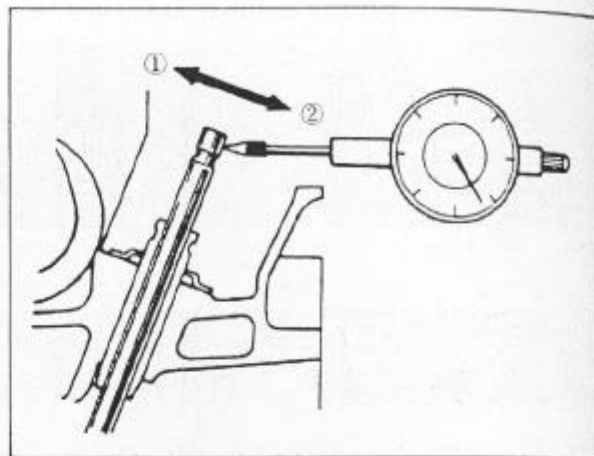


FIG. 1A — 55 MEASURING THE CLEARANCE OF VALVE STEM

Valve

- Remove all carbon from valve.
- Check the valve or stem for the abrasion, burn, bending and replace as necessary.
- Check the edge of each valve for abrasion. Some uneven abrasion would be made on the edge because the rocker arm gets contacted at this surface when operating. Repair the section within 0.5mm as required, or replace if some modification is required more than that.

Cutting edge of valve stem(mm)	0.5 and less
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Measure the deviation to the rotating direction using a dial gauge and V block by turning the valve slowly. Replace valve, if the measured value exceeds the limit.

Deviation limit of valve head to the rotating direction(mm)	0.08
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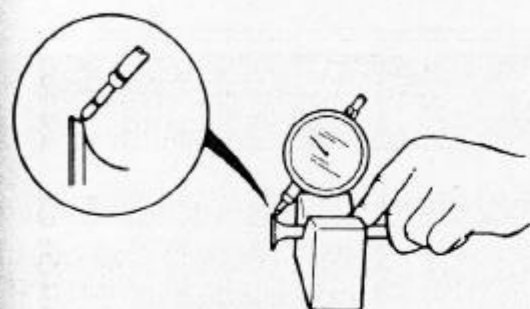
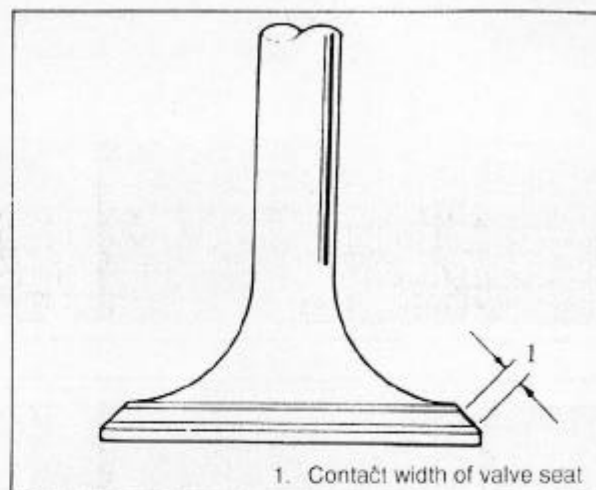


FIG. 1A — 56 MEASURING THE DEVIATION TO THE ROTATING DIRECTION

Checking the contact width

Clean valve and valve seat and apply red stamping ink only to the contacting surface of the valve seat. Check the fitness after installing the valve on it. A good contact shows the equal contact width within the specified.

Contact width on the surface of valve seat(mm)	IN	1.46 — 1.66
	EX	



1. Contact width of valve seat

FIG. 1A — 57 CONTACT WIDTH OF VALVE SEAT

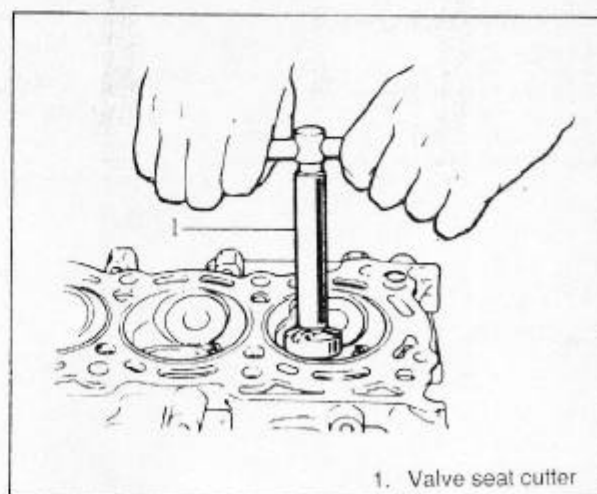
Valve seat repair

Repair by grinding and cutting off the valve seat, and lap it if its contacting width is not even or out of the specified.

- Upon applying a seat cutter, use the one of smaller angle first and increase the angle of the using cutter up to the light and final modification of the contact. And finish contact surface and its location with the cutter of 45°.

CAUTION

- Upon cutting take care of the contact width.
- Finish the cutting with gradually reduced power for no cutting mark on the surface.



1. Valve seat cutter

FIG. 1A — 58 CUTTING THE VALVE SEAT

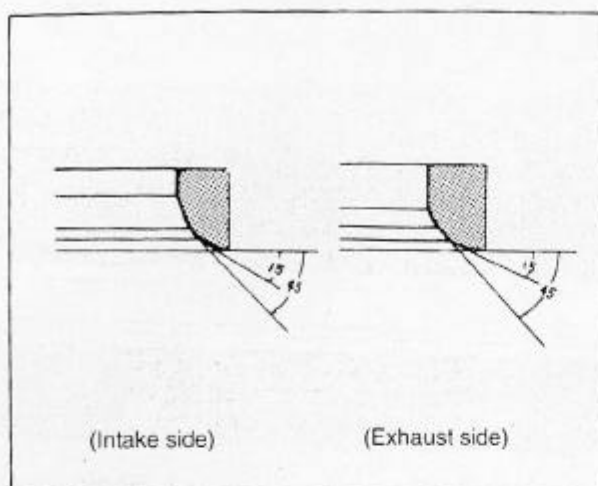


FIG. 1A-59 VALVE SEAT ANGLE

Valve lapping

Make lapping in two stages, first with normal lap and second with fine one for the both sides.

Cylinder head

- Remove carbon from the combustion chamber.
- Be sure not to make scratch on the intake and exhaust ports of cylinder head, combustion chamber, and head surface together with and valve seats.

CAUTION

All carbon should be wiped up on the head and make no scratch on the metallic surface together with valve and valve seat.

Flatness of cylinder head

Measure the flatness of the 6 different places using a straight ruler and thickness gauge. If the measurement is read over the limit of use, confirm the deformed area by placing it on the flat plate and repair it with fine abrasives. Replace the cylinder head of which repair is impossible.

The deformation of the cylinder head surface may cause the loss of power due to the leakage of the compression.

Deformation limit of flatness on the cylinder head surface(mm)	0.05
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CAUTION

Measure the flatness of cylinder head surface in the location of each 4 side and diagonal.

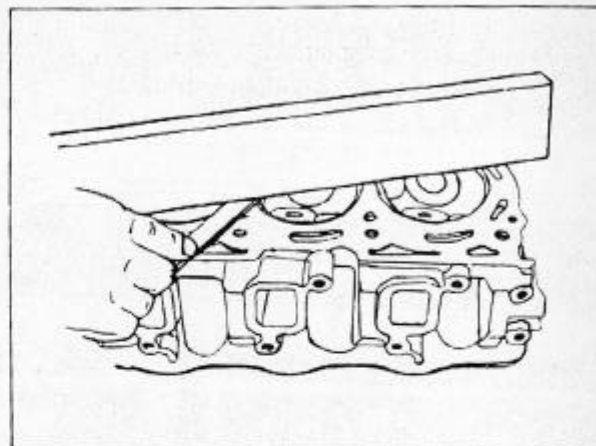


FIG. 1A-60 MEASURING OF CYLINDER HEAD

Deformation of the surface for manifold installation

Inspect the surface for installing manifold of cylinder head using a straight ruler and thickness gauge and repair the installing surface or replace the cylinder head if necessary.

Limit of manifold deformation(mm)	0.10
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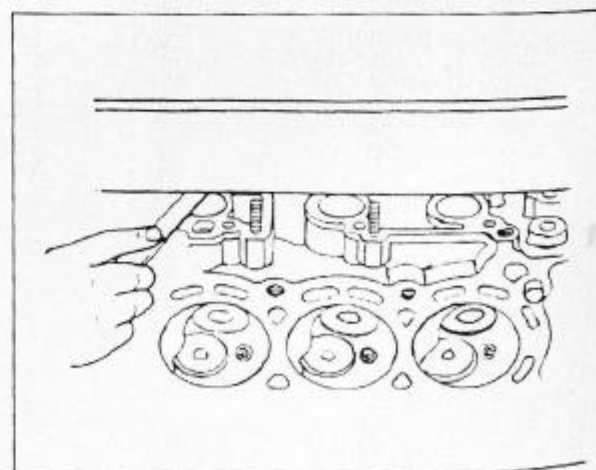


FIG. 1A-61 MEASURING THE DEFORMATION OF INSTALLING SURFACE FOR INTAKE MANIFOLD

PISTON, PISTON RING, CONNECTING ROD AND CYLINDER

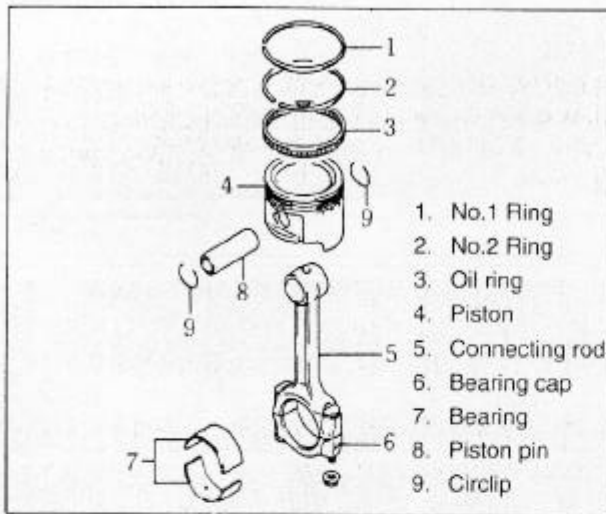


FIG. 1A — 75 DISASSEMBLY OF PISTON AND CONNECTING ROD

Removal

1. Remove the parts attached around cylinder block.
2. Turn over the cylinder block to remove oil pan and oil strainer.
3. Turn crankshaft slowly to make the big end of connecting rod come on the top side, and then loosen connecting rod bolts.
4. Separate the connecting rod cap.
5. Insert guide hose in the screw side of connecting bolt to prevent any damage on the crankshaft pin and cylinder wall side.

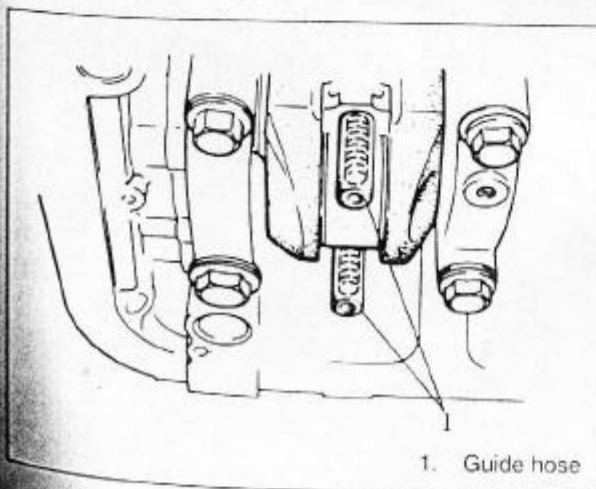


FIG. 1A — 76 INSERTION OF GUIDE HOSE

6. Remove piston and connecting rod from cylinder head by pressing connecting rod toward cylinder head.
7. Mark the cylinder number on the piston and connecting rod with marking pen.
8. Arrange the piston and connecting rod of No.2 and No.3 cylinders according to the sequence as above paragraphs 3 to 7.

Disassembly

- Remove the compressing rings and oil rings using the piston ring expander, and arrange it carefully not to be mixed together.
- Remove the circlip and pull out the piston pin to separate piston and connecting rod.

Cleaning

- Wipe out carbon on the piston and ring with soft cloth. In the cleaning process, no metal tool nor excess force be used.

Inspection

Cylinder

- Wipe out the wall side of cylinder and check any scratch or excess abrasion on it. Apply boring with * oversize when such damage is over the limits.
- Measure the bore diameter of cylinder with cylinder gauge in longitudinal and transverse directions. There are 3 measuring locations(see figure). Rebore to next oversize in following cases.
 1. Abrasion over the limit is found in the bore diameter of cylinder.
 2. The maximum taper deviation of the measured values obtained from the 3 checking locations are over the limit (perpendicularity).
 3. The measured values are over the out of round limit at the 3 checking locations.

Item	Limit
Bore diameter of cylinder(mm)	ø68.570
Taper(mm)	0.10 and less
Out of Round(mm)	0.05 and less

Assembly

1. Before installing new valve guide into cylinder head, ream guide hole with 11mm reamer to remove burrs. Make sure that the guide hole comes to a complete roundness.

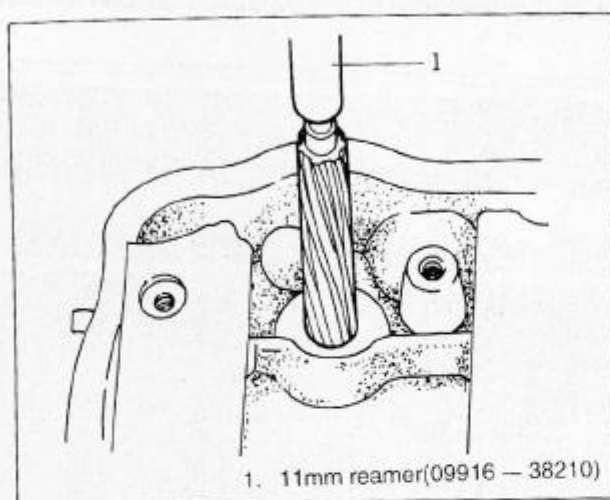


FIG. 1A — 65 REAMER TOOL

2. Install valve guide.
 - Heat cylinder head uniformly at a temperature 80-100 °C not to make the head deformed, and drive new valve guide completely into hole with special tools(guide installer).
 - After installation, check the protruded part of the guide from cylinder head.

CAUTION

Do not reuse valve guide once disassembled, replace it with new oversized valve guide.

Valve guide oversize(mm)	0.03
Valve guide protrusion(mm)	14

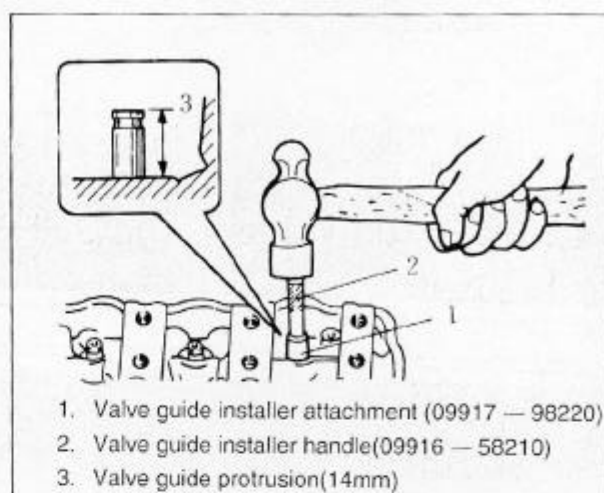


FIG. 1A — 66 INSTALLATION OF VALVE GUIDE

3. Repair the valve guide bore with 5.5mm reamer, and make the hole free from foreign material.

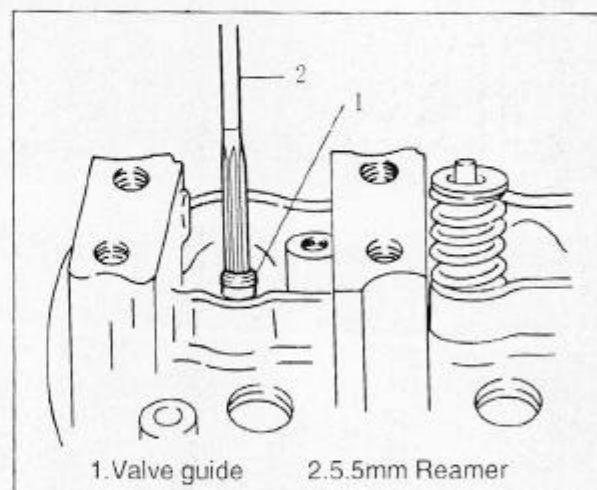


FIG. 1A — 67 MODIFICATION OF VALVE GUIDE

4. Install new valve stem seal to valve guide.
 - After applying engine oil to seal and installing seal to valve guide and make sure that seal is properly fixed to valve guide.

CAUTION

- Do not reuse disassembled oil seal and replace it with new one.
- When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool with hand. Tapping or hitting special tool may cause damage on seal.

5. Install valve to valve guide. Before installing it, apply engine oil to stem seal, valve guide bore and valve stem.

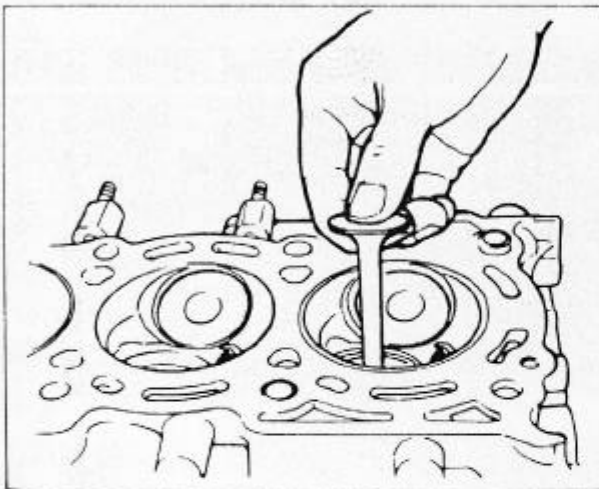


FIG. 1A - 68 INSTALLATION OF VALVE

6. Install valve spring and spring retainer.
 - Each valve spring has top end (large-pitch end) and bottom end (small-pitch end). Be sure to position spring in place with its bottom end (small-pitch end) down to valve spring seat side.

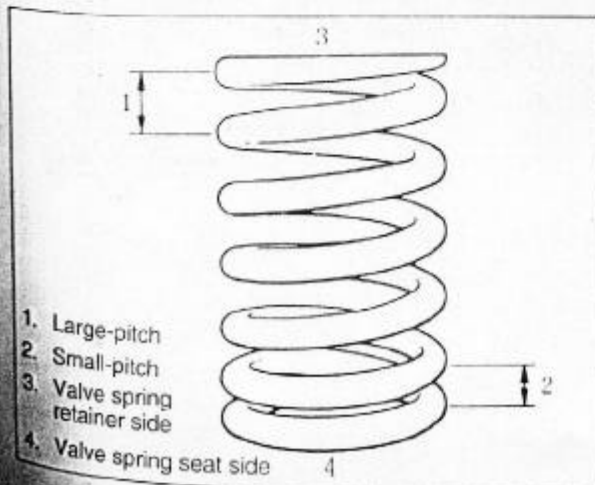


FIG. 1A - 69 VALVE SPRING

7. Using valve lifter, compress valve spring and insert valve cotters with pincettes into the valve stem groove.

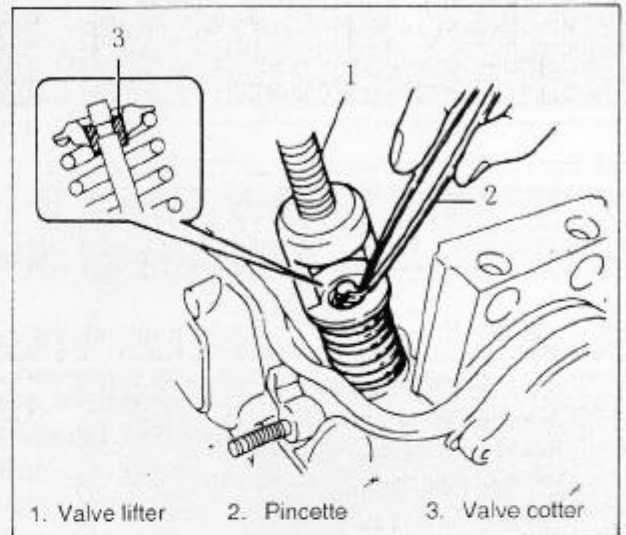


FIG. 1A - 70 INSERTION OF VALVE COTTERS

8. Apply engine oil to the parts for lubrication as cam and journals of camshaft.
9. Install camshaft from transmission case side.

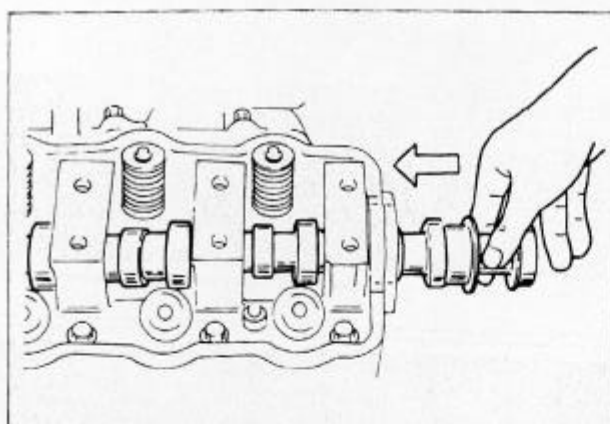


FIG. 1A - 71 INSTALLATION OF CAMSHAFT

10. Apply engine oil to rocker arms and rocker arm shafts, and install rocker arms, springs and rocker arm shafts. Rocker arm shafts for intake valves and exhaust valves are identical but their directions of installation are different.

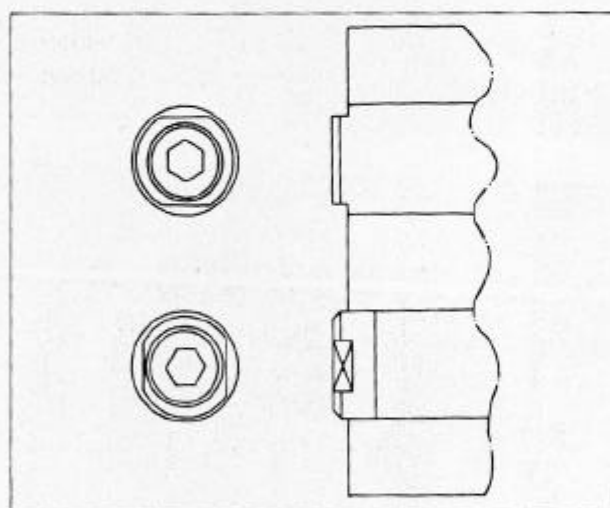


FIG. 1A - 72 INSTALLATION SIDES OF ROCKER ARMSHAFTS

Installation

It is the reverse of removal procedures. Take care of the followings.

Cylinder head and gasket

Replace the old with new gasket after confirming the oil holes. The oil hole on the gasket should be located on the crankshaft pulley side.

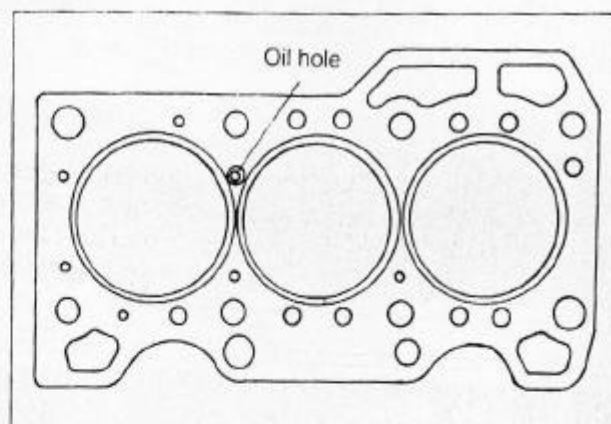


FIG. 1A - 73 INSTALLATION OF CYLINDER HEAD GASKET

Cylinder head

Apply engine oil to cylinder head bolts, and tighten the bolts in the sequence as shown in the figure to the specified torque.

Tightening torque for cylinder head bolts(kg · cm)	650 - 700
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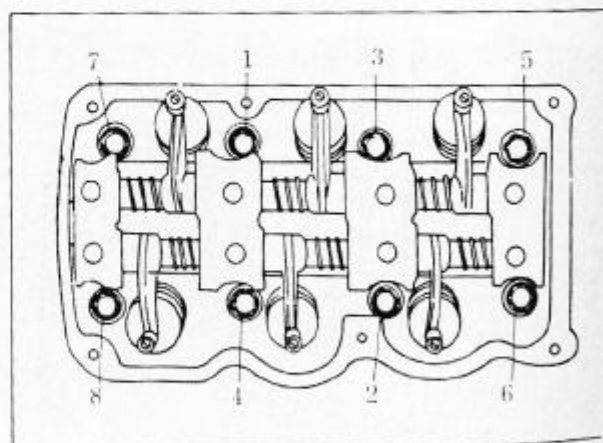


FIG. 1A - 74 TIGHTENING SEQUENCE FOR CYLINDER HEAD BOLTS

- Using the special tool(camshaft holder), tighten the camshaft pulley to the specified torque valve.

Tightening torque for camshaft pulley(kg · cm)	550 - 600
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- Refer to the preceding pages for adjusting the intake exhaust valve clearance.

PISTON, PISTON RING, CONNECTING ROD AND CYLINDER

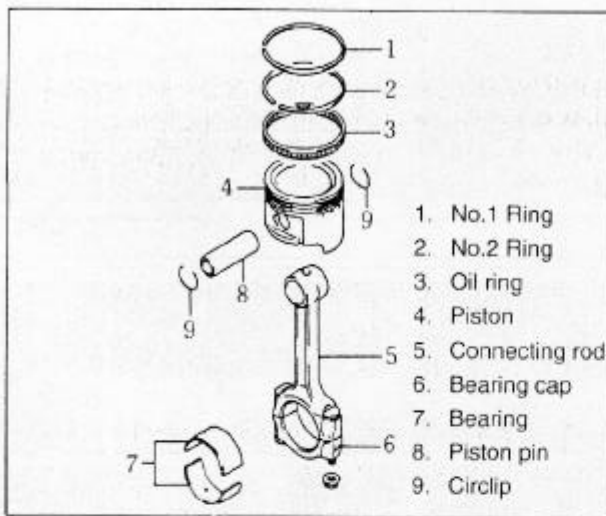


FIG. 1A — 75 DISASSEMBLY OF PISTON AND CONNECTING ROD

Removal

1. Remove the parts attached around cylinder block.
2. Turn over the cylinder block to remove oil pan and oil strainer.
3. Turn crankshaft slowly to make the big end of connecting rod come on the top side, and then loosen connecting rod bolts.
4. Separate the connecting rod cap.
5. Insert guide hose in the screw side of connecting bolt to prevent any damage on the crankshaft pin and cylinder wall side.

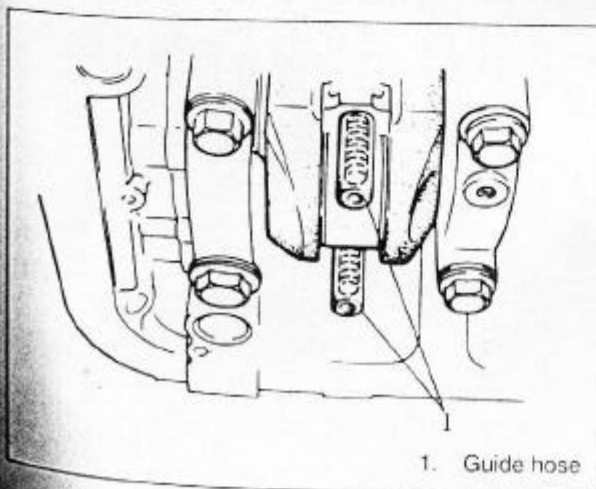


FIG. 1A — 76 INSERTION OF GUIDE HOSE

6. Remove piston and connecting rod from cylinder head by pressing connecting rod toward cylinder head.
7. Mark the cylinder number on the piston and connecting rod with marking pen.
8. Arrange the piston and connecting rod of No.2 and No.3 cylinders according to the sequence as above paragraphs 3 to 7.

Disassembly

- Remove the compressing rings and oil rings using the piston ring expander, and arrange it carefully not to be mixed together.
- Remove the circlip and pull out the piston pin to separate piston and connecting rod.

Cleaning

- Wipe out carbon on the piston and ring with soft cloth. In the cleaning process, no metal tool nor excess force be used.

Inspection

Cylinder

- Wipe out the wall side of cylinder and check any scratch or excess abrasion on it. Apply boring with * oversize when such damage is over the limits.
- Measure the bore diameter of cylinder with cylinder gauge in longitudinal and transverse directions. There are 3 measuring locations (see figure). Rebore to next oversize in following cases.
 1. Abrasion over the limit is found in the bore diameter of cylinder.
 2. The maximum taper deviation of the measured values obtained from the 3 checking locations are over the limit (perpendicularity).
 3. The measured values are over the out of round limit at the 3 checking locations.

Item	Limit
Bore diameter of cylinder(mm)	ø68.570
Taper(mm)	0.10 and less
Out of Round(mm)	0.05 and less

CAUTION

- When rebores to oversize, the same oversizes on the 3 cylinders should be maintained.
- Specification of oversizes shall be varied as 0.25, 0.50, 0.75 and 1.00, and the oversizes should be the same for cylinder, piston and rings upon boring and installing.

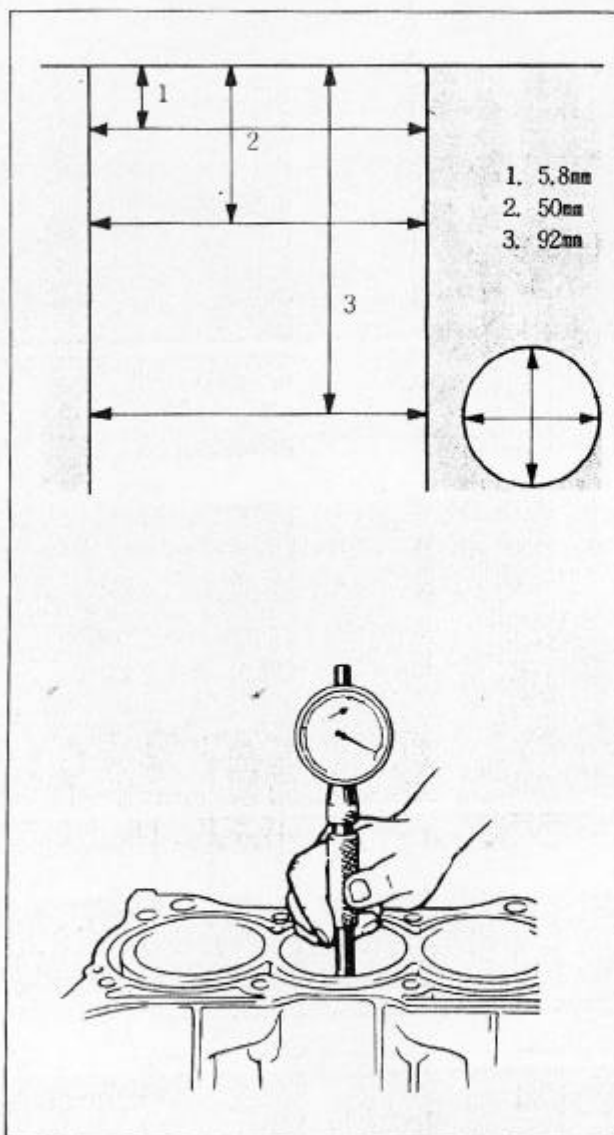


FIG. 1A — 77 MEASUREMENT AND MEASURING LOCATION OF CYLINDER BORE DIAMETER

Piston

- Clean piston with soft cloth and check any damage to determine whether to replace it.
- Use micrometer to measure the outer diameter of piston. Check the outer diameter of the piston in the perpendicular direction of the piston pin at 15 mm high from the skirt.

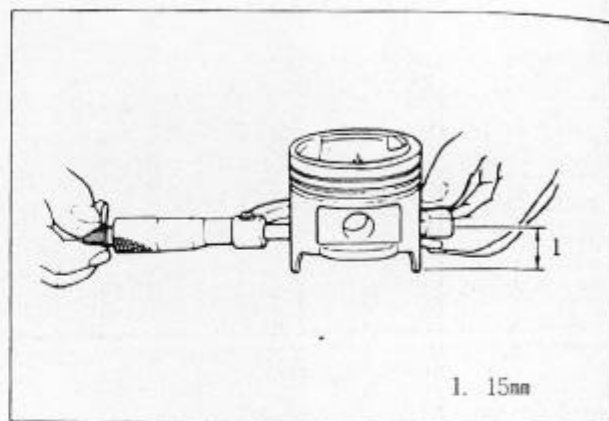


FIG. 1A — 78 MEASURING THE OUTER DIAMETER OF PISTON

Outer diameter of piston(mm)	Standard	$\phi 68.465 - \phi 68.485$
oversize	Oversize 0.25	$\phi 68.715 - \phi 68.735$
	Oversize 0.50	$\phi 68.965 - \phi 68.985$

Piston clearance

Calculate the different value of the measurement between cylinder inner diameter(50mm below the head surface) and piston outer diameter (15mm above the piston skirt).

Piston clearance(mm)	0.025 — 0.045
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CAUTION

Upon measuring of cylinder bore diameter and piston outer diameter, calculate the measured values both in the same directions of crankshaft and piston pin.

Piston ring clearance in the groove

De-carbon and make the groove clean before inserting the ring, and measure the clearance between ring and ring land with thickness gauge.

If the measured exceeds the limit, replace the piston.

Ring clearance in the groove (mm)	Piston ring	Standard	Limit
	No.1 ring	0.02 — 0.06	0.10
	No.2 ring	0.02 — 0.06	0.10
	Oil ring	0.06 — 0.1	

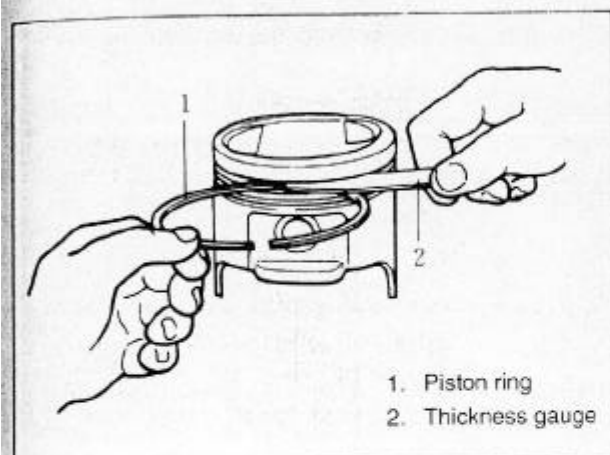


FIG. 1A — 79 MEASURING THE RING GROOVE

Piston ring gap

To measure the end gap, insert the piston ring into the cylinder bore with the piston, locating it at the lowest part of the bore, then use a filler gauge to measure the gap. If the gap measured exceeds the limit, replace the ring.

CAUTION

De-carbon the cylinder bore and insert the ring.

Piston ring gap(mm)	Piston ring	Standard	Limit
	No.1 ring	0.15 — 0.30	0.7
	No.2 ring	0.1 — 0.3	0.7
	Oil ring	0.2 — 0.7	1.8

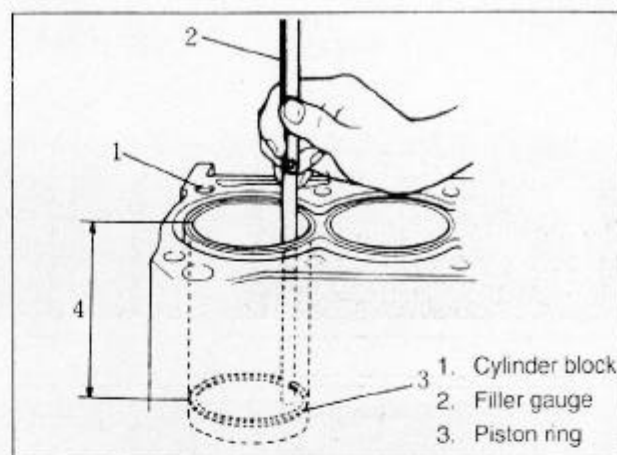


FIG. 1A — 80 MEASURING THE PISTON RING GAP

Piston pin

Measure the clearance between piston pin and piston boss part, and if the measured exceeds the standard, replace the piston pin.

Item	Standard
Outer diameter of piston pin	15.995 — 16.00
Inner diameter of piston pin boss	16.006 — 16.014
Piston pin clearance	0.006 — 0.019

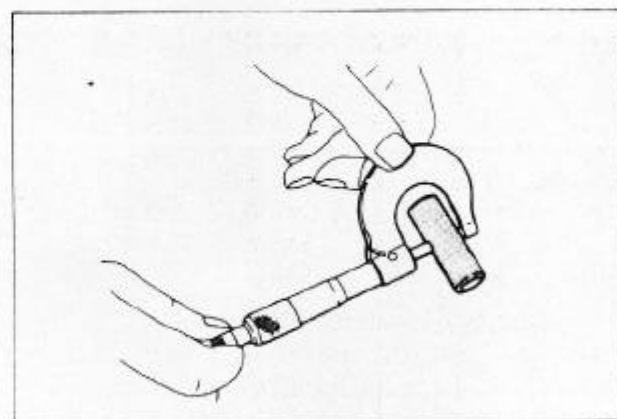


FIG. 1A — 81 MEASURING THE PISTON PIN

Connecting rods

• Big-end thrust clearance

Check the big end of each connecting rod for thrust clearance, with the rod fitted and connected to its crank pin in the normal manner. If the measured clearance is found to exceed the limit or any damage is found on the thrust surface of both ends, the responsible connecting rod or the crankshaft must be replaced.

Connecting rod big end thrust clearance(mm)	Standard	Limit
	0.10 — 0.20	0.35

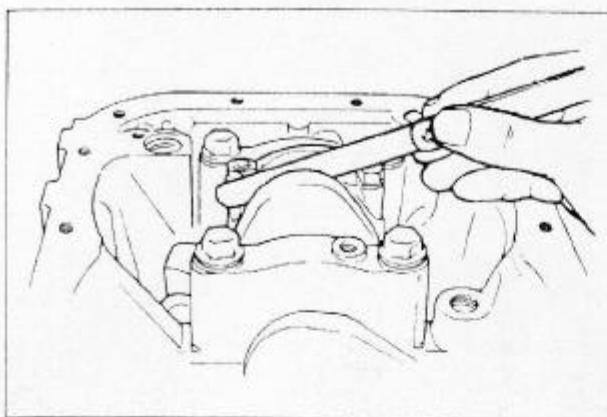


FIG. 1A — 82 MEASURING BIG-END THRUST CLEARANCE

Bow, Twist

Check the bow and twist of connecting rod with the connecting rod aligner, and if the limit is exceeded, replace it.

Item	Limit
Bow	0.05(in case of 100mm)
Twist	0.10(in case of 100mm)

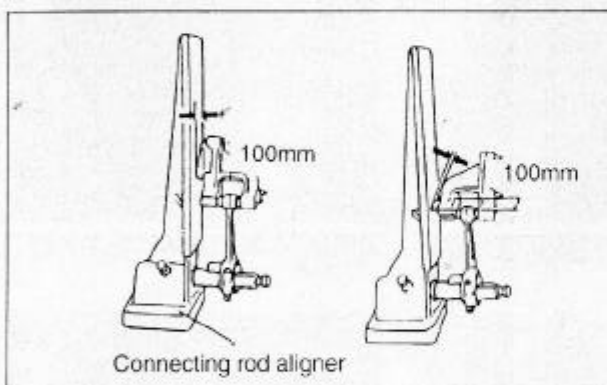


FIG. 1A — 83 MEASURING THE BOW, TWIST

Bearing clearance

Inspect the bearing shell for signs of damage, fusion, burn, etc. and observe the contact pattern. Bearings found in defective condition through this inspection must be replaced.

CAUTION

Bearing shells are not meant to be repaired by scraping or grinding with sandpaper or by any machining.

- Measure the oil clearance by using the plastigauge.

- Prepare, by cutting a length of plastigauge equal to bearing width and place it axially on crankpin, avoiding oil hole.
- Install connecting rod bearing and bearing cap and tighten to the specified torque. At this time, never turn or rotate the crankshaft.

Tightening torque for bearing cap(kg · cm)	310 — 350
--	-----------

- Remove the cap, and measure the width of plastigauge with the scale marked on the plastigauge case. This measurement must be taken at the widest part of the compression and attention should be also paid to the different values measured at the both ends of the plastigauge.

Bearing oil clearance(mm)	Standard	Limit
	0.020 — 0.040	0.065

If the oil clearance exceeds the limit, replace the bearings.

Bearing size	
Size	Outer diameter of crank pin (mm)
Standard	37.982 — 38.000

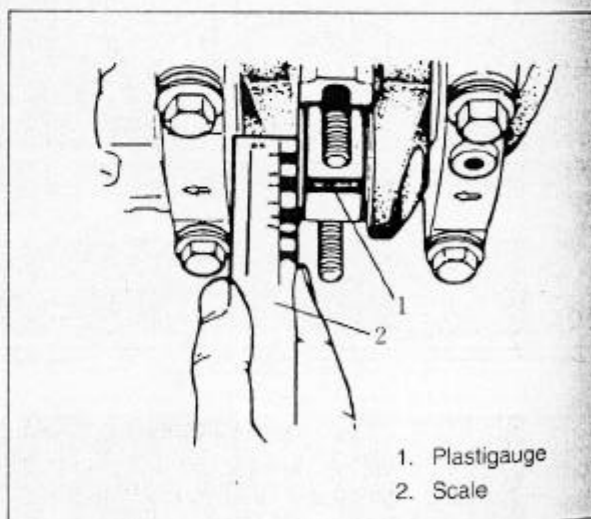


FIG. 1A — 84 MEASURING THE CONNECTING ROD BEARING OIL CLEARANCE

Installation

1. Apply engine oil to piston, ring, cylinder wall and bearing crank pin of connecting rod.
2. When install connecting rod and piston, install the guide hose to connecting rod bolt as shown in Fig. 1A — 76 to prevent damage to crank pin.
3. Insert piston into cylinder with the arrow pointing to wards crank pulley.

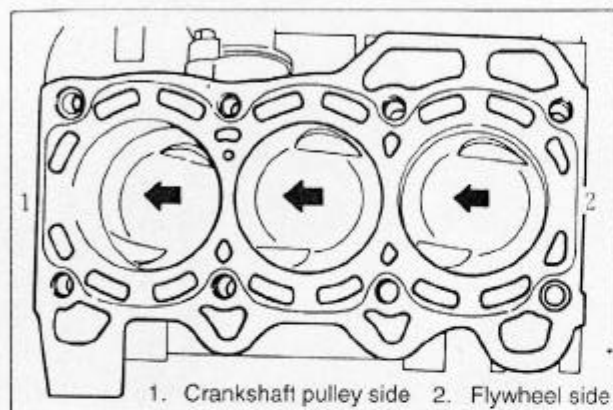


FIG. 1A — 88 MARK ON PISTON HEADS

4. Pucker piston ring with piston ring compressor and insert connecting rod and piston to cylinder properly. In this time, push the ring compressor against the cylinder block and insert the piston head into cylinder by striking the head of piston lightly.

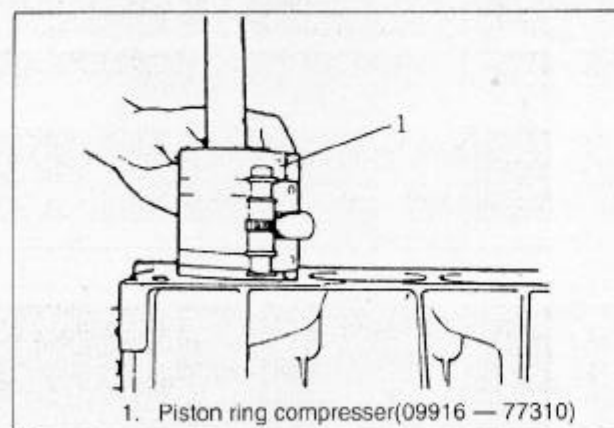


FIG. 1A — 89 INSERTION OF PISTON INTO CYLINDER

5. Install cap with the arrow on the cap towards crank shaft pulley and tighten the cap nut with specified torque.

Tightening torque for connecting rod bearing cap nut(kg · cm)

310 — 350

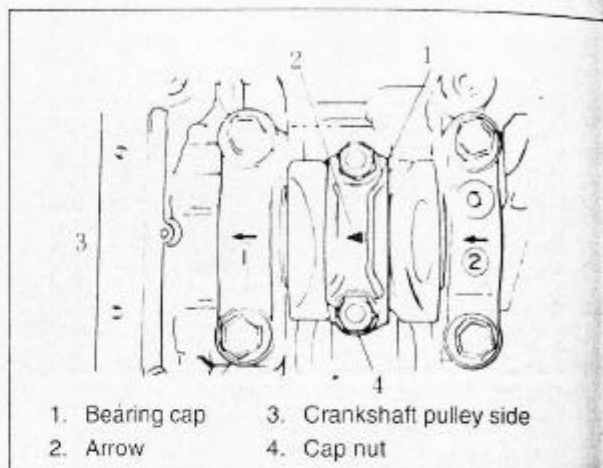


FIG. 1A — 90 INSTALLATION OF BEARING CAP

6. Assembly other parts with reverse procedures of disassembly. Refer to the para "Timing Belt and belt tensioner" in section 1A.
7. Add the oil to engine.
8. Referring to section 1B, refill the coolant.
9. Referring to "Ignition Timing in section 1E, check and adjust.
10. After completing installation, check the leakage of coolant, fuel and oil from each connection.

DISASSEMBLY

ENGINE ASSEMBLY

Removal

1. Bonnet
2. Battery
3. Battery bracket, bracket
4. Disconnect front bumper and wiring.
5. Drain cooling water out from the lower hose of radiator.

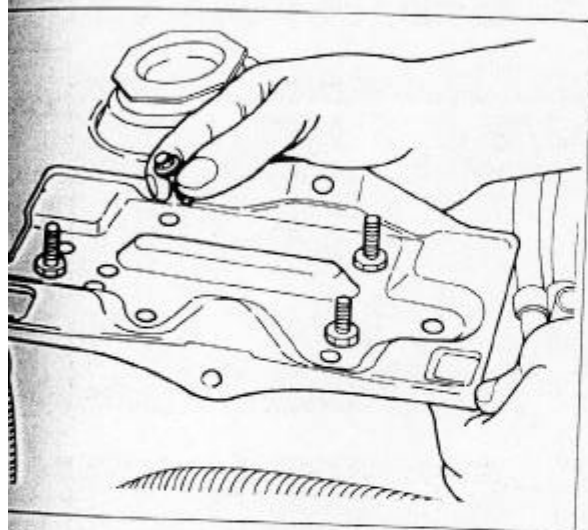


FIG. 1A — 91 REMOVAL OF BATTERY BRACKET

- Air cleaner case
- Radiator assembly
- Accelerator cable
- Hood lock
- Disconnect the front member and horn
- Brake booster hose
- Disconnect the following wiring connections
 - Engine main harness connector
 - Disconnect engine harness from main fuse
 - Transmission wiring
 - Starting motor
 - High tension cable
 - Back-up lamp switch connector
 - Fuel cut solenoid, BVSV connector

13. Heater hose, outer
14. Heater hose, inner
15. Fuel hose
16. Clutch cable
17. Exhaust pipe
18. Speedometer cable
19. Shift rod, select rod
20. Front wheel (left)
21. Brake hose

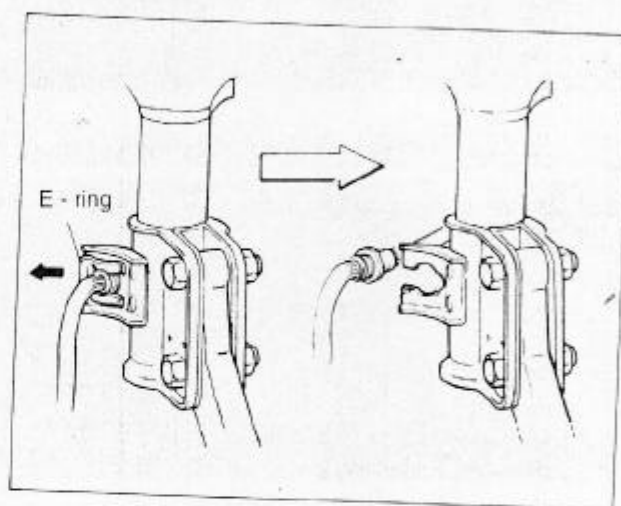


FIG. 1A — 92 DISCONNECTING BRAKE HOSE

22. Strut bracket bolts(upper)

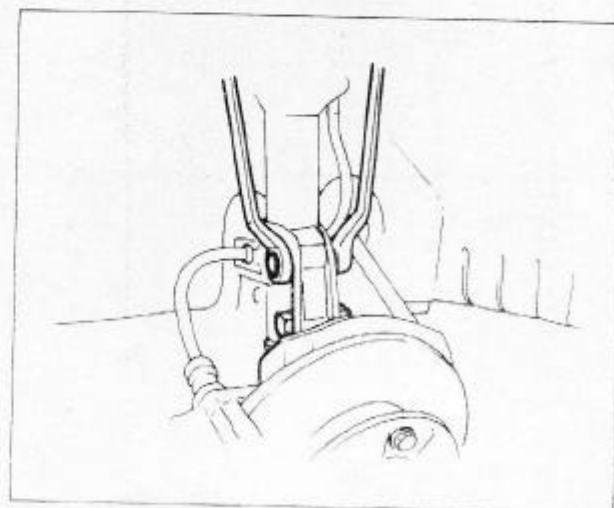


FIG. 1A — 93 DISCONNECTING THE UPPER BOLTS OF STRUT BRACKET

- 23. Drive shaft
- 24. Engine front mount

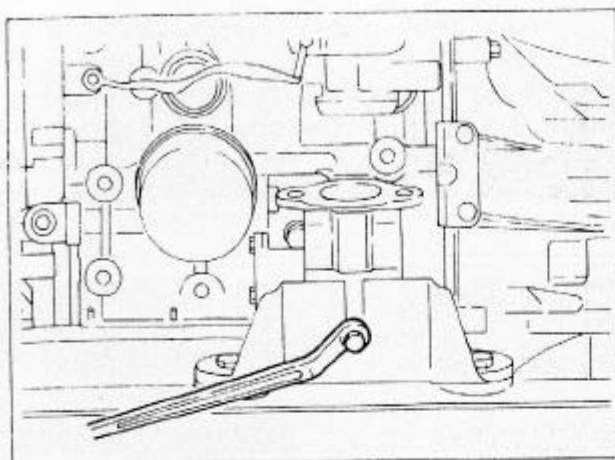


FIG. 1A — 94 ENGINE FRONT MOUNT

- 25. Engine rear mount
- 26. Transmission rear mount

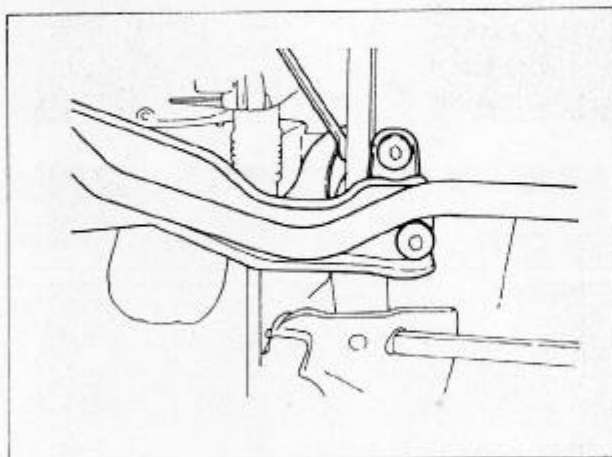


FIG. 1A — 95 TRANSMISSION REAR MOUNT

- 27. Transmission left mount

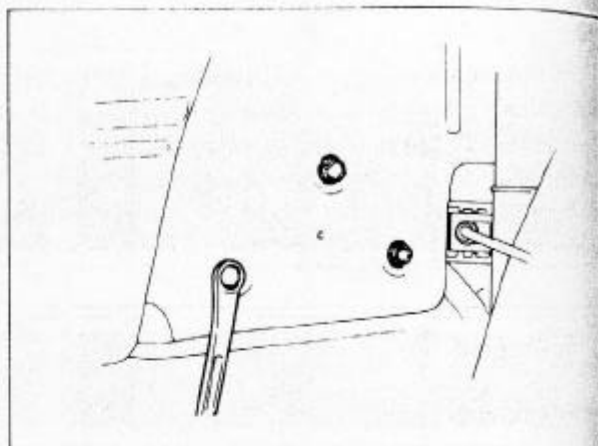


FIG. 1A — 96 TRANSMISSION LEFT MOUNT BOLTS

- 28. Installation of hoister on the engine assembly

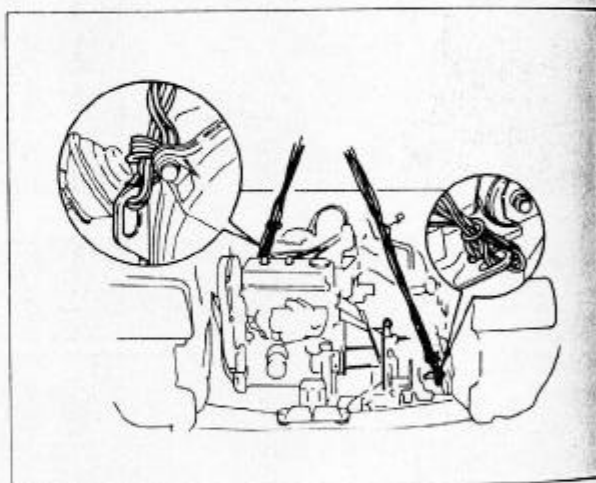


FIG. 1A — 97 LIFTING UP THE ENGINE ASSEMBLY

CAUTION

Before finally lifting engine assembly with hoister, recheck that all hoses and wirings around the engine assembly are disconnected and free.

Installation

is the reverse of removal procedures and its tightening is to be made on the specified torque.

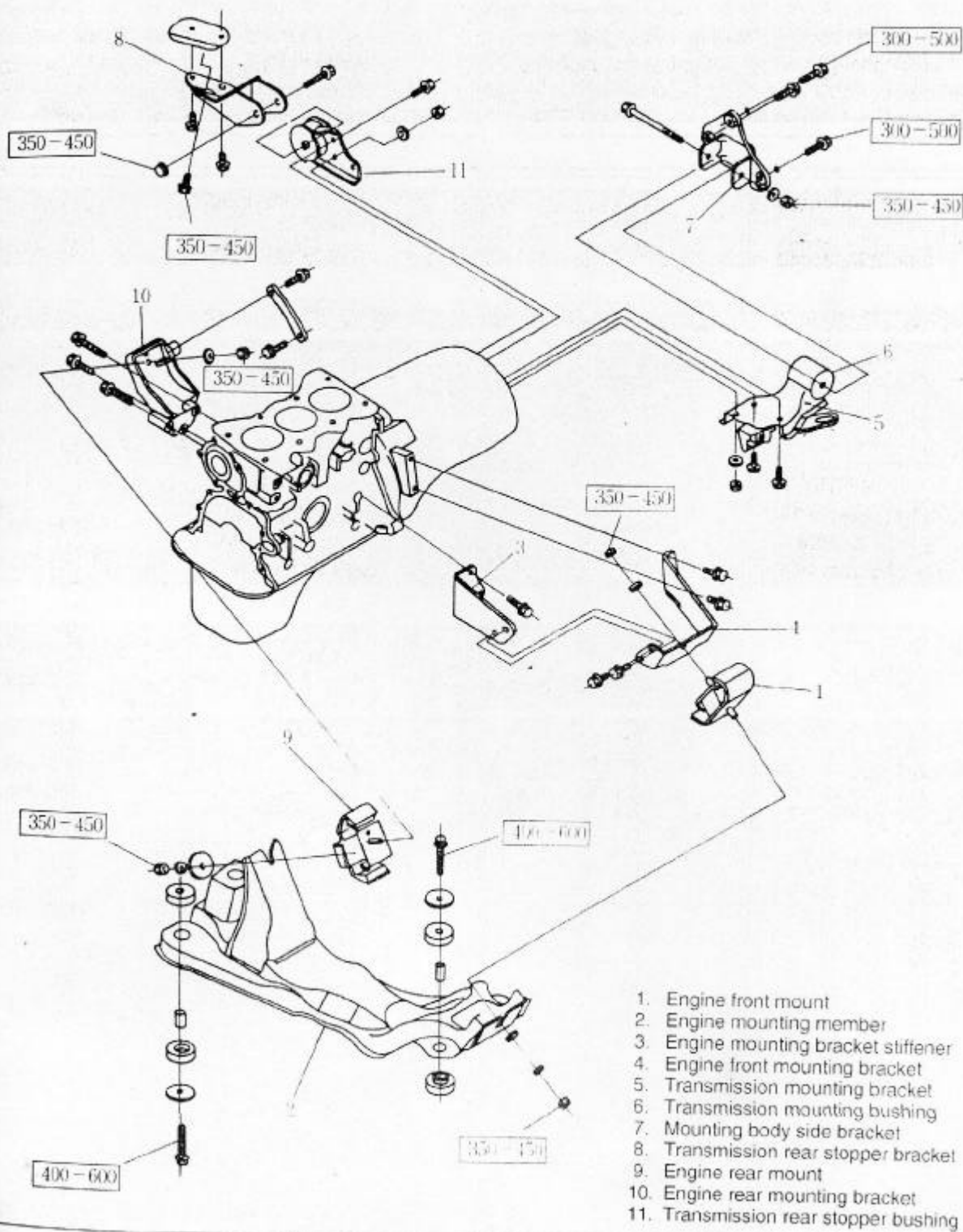
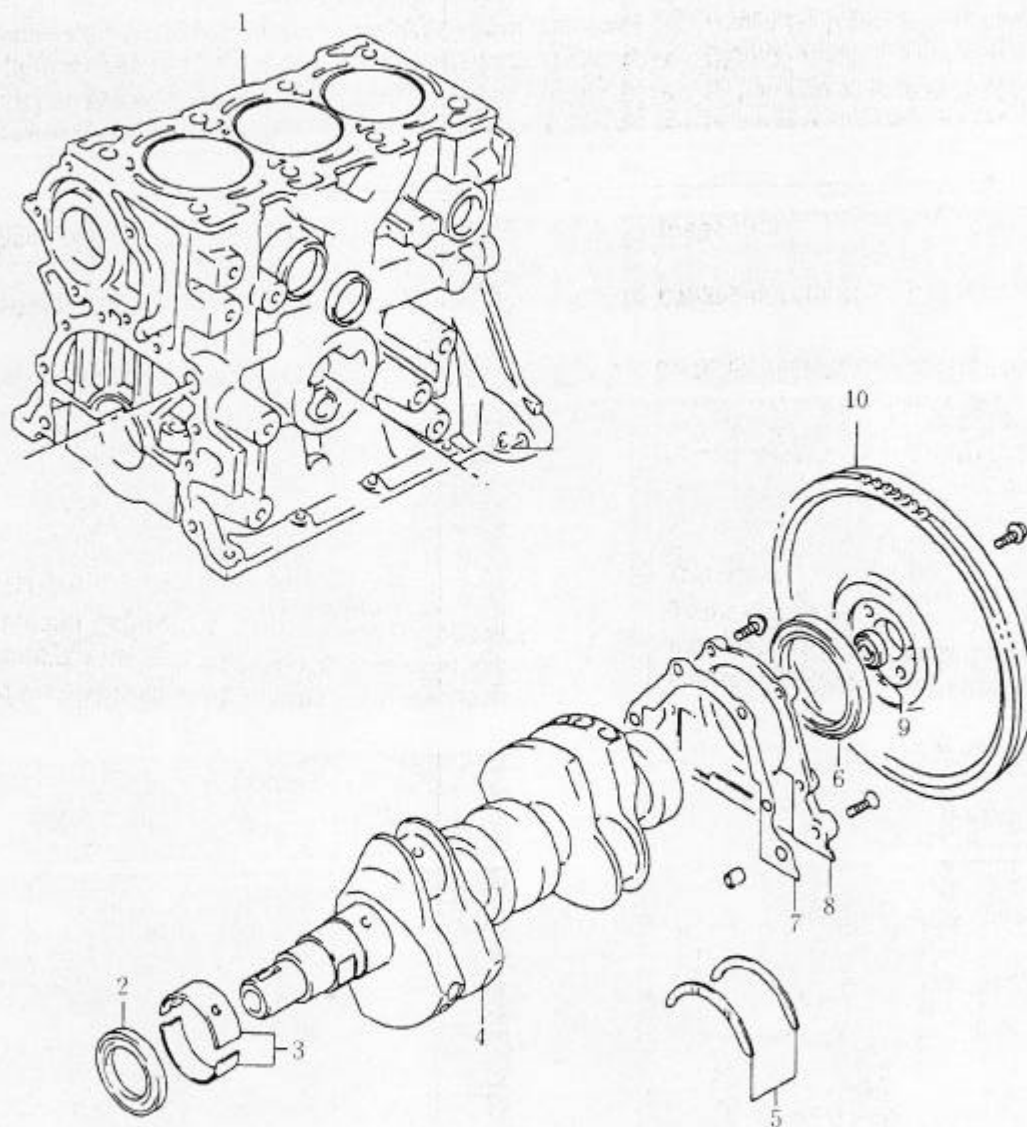


FIG. 1A — 98 INSTALLATION OF ENGINE MOUNT

MAIN BEARING, CRANK SHAFT, CYLINDER BLOCK



- | | |
|-------------------|----------------------------|
| 1. Cylinder block | 6. Rear oil seal |
| 2. Front oil seal | 7. Oil seal housing gasket |
| 3. Main bearing | 8. Oil seal housing |
| 4. Crankshaft | 9. Input shaft bearing |
| 5. Thrust bearing | 10. Flywheel |

FIG. 1A — 99 MAIN BEARING, CRANKSHAFT, CYLINDER BLOCK

Removal

1. Remove engine from body;
2. Disconnect transmission assembly.
3. Alternator bracket, crankshaft pulley, timing belt, crankshaft pulley
4. Cylinder head
5. Oil pan and oil strainer
6. Piston and connecting rod
8. Main bearing cap and crankshaft

Inspection

Crankshaft runout

Measure runout at center journal with block and dial gauge by turning crankshaft slowly. If runout exceeds the limit, replace the crankshaft.

Limit on runout(mm)	0.03
---------------------	------

CAUTION

To measure runout, turn crankshaft once to be matched with dial gage on the journal part, and read and take 1/2 value of the maximum gauge.

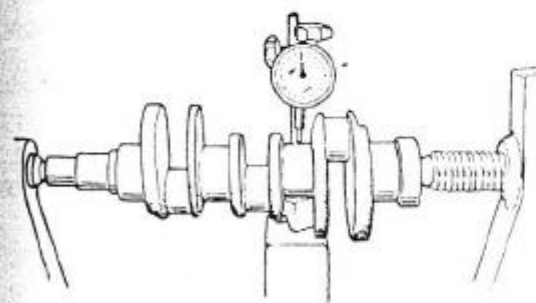


FIG. 1A — 100 MEASURING THE BOW OF CRANKSHAFT

Crankshaft thrust play

Install crankshaft thrust bearings and journal bearings on the cylinder block, and tighten bearing cap bolt to the specified torque, then measure the axial play of crankshaft. If the measured exceeds the limit, replace the thrust bearing with the new standard one or the one of the next oversize.

Tightening torque for main bearing cap bolt(kg • cm)	550 — 600
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Crankshaft thrust play(mm)	Standard	Limit
	0.11 — 0.31	0.4

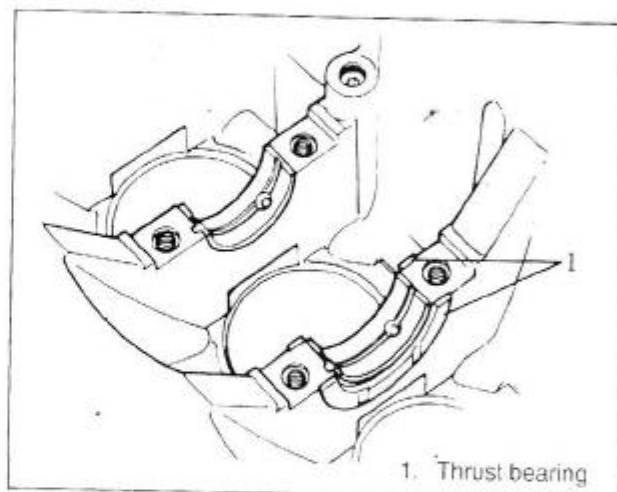


FIG. 1A — 101 THRUST BEARING

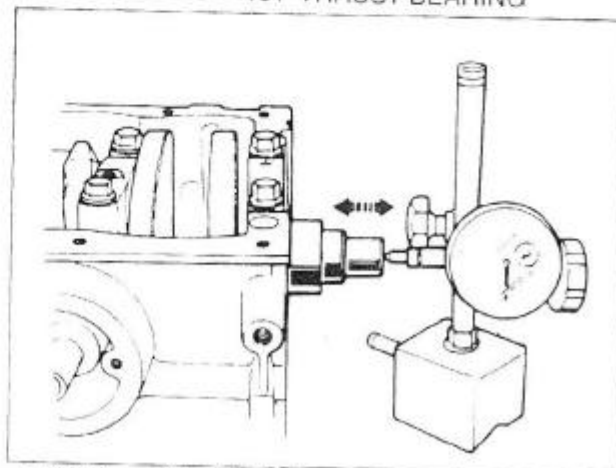


FIG. 1A — 102 MEASURING THE THRUST END PLAY OF CRANKSHAFT

Out of round and taper(uneven wear) of journals

Measure the fluctuations of journal diameter in the axial and right angle direction of crankshaft and confirm the condition of uneven wear. If some serious damage is found, or the deviation and partial deviation exceeds the limit, replace the crankshaft or repair it by polishing.

Limit on out of round and taper (mm)	0.01
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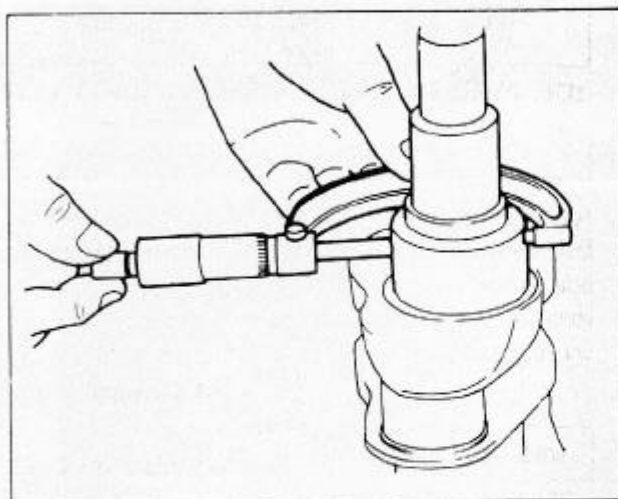


FIG. 1A — 103 CHECKING PARTIAL ABRASION

Crankshaft Bearing

Check the surface in contact for wear, burn, scratch, etc. and if necessary, replace it.

CAUTION

Never use scraper to repair bearings.

Measure the oil clearance with plastigauge

- Cut the plastigauge to the length equal to the width of the bearing and place it axially on the journal, avoiding the oil hole.
- Install crankshaft bearing and bearing cap, and tighten it to the specified torque. Do not rotate the crankshaft at this moment.

Tightening torque(kg · cm)	550 — 600
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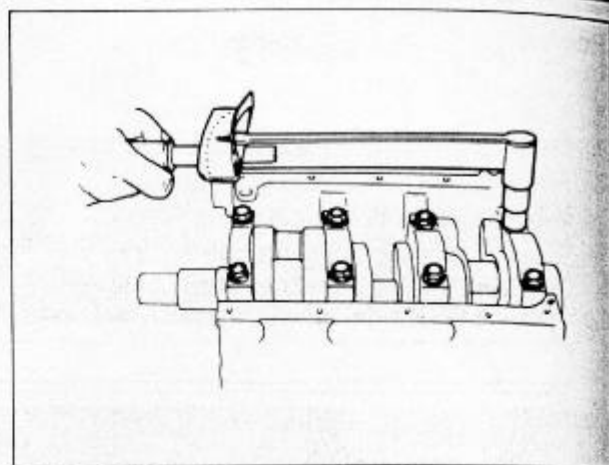


FIG. 1A — 104 TIGHTENING TO THE SPECIFIED TORQUE

- Remove the caps and measure the width of plastigauge with the scale marked on the plastigauge case. This measurement must be taken at the widest part of the compression and attention should be also paid to the different values measured at the both ends of the plastigauge. If the oil clearance exceeds the limit, replace the bearing.

Oil clearance for crankshaft bearings(mm)	Standard	Limit
	0.020 — 0.040	0.065

CAUTION

Be sure to use the specified bearing when installing new crankshaft.

Item	Standard
Outer diameter of crank journal(mm)	43.982 — 44.000

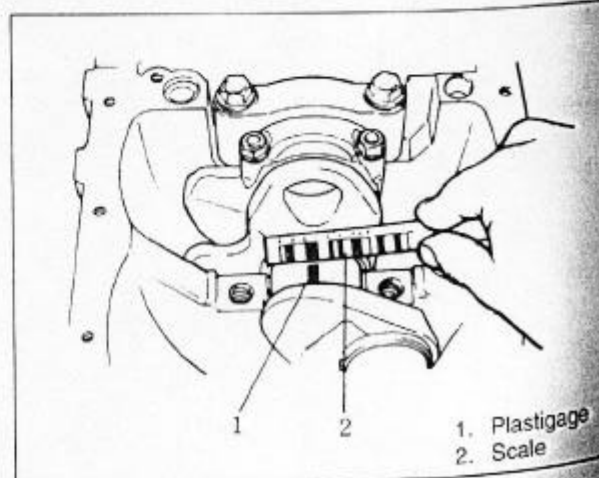


FIG. 1A — 105 MEASURING THE OIL CLEARANCE BETWEEN THE MAIN BEARING

Rear Oil Seal

Inspect the oil seal lips for wear, damage, and mixture of foreign material. Replace the deteriorated.

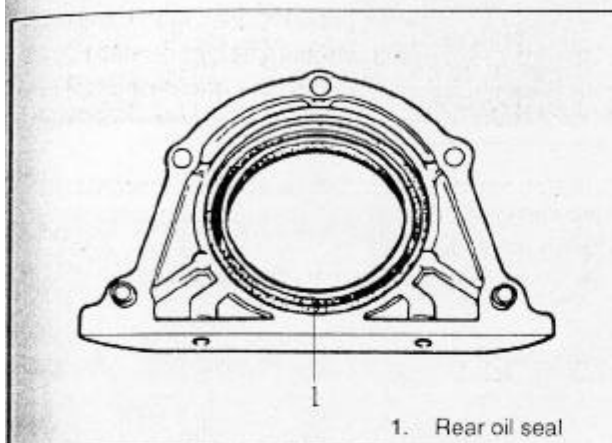


FIG. 1A — 106 REAR OIL SEAL

Flywheel

- Inspect it for damage, crack and abnormal wear at the ring gear part, or at the contacting surface to the clutch plate. Replace the flywheel if necessary.
- Measure runout of the flywheel using block and dial gauge, and replace it if runout exceeds the limit.

Limit on runout(mm)	0.2
---------------------	-----

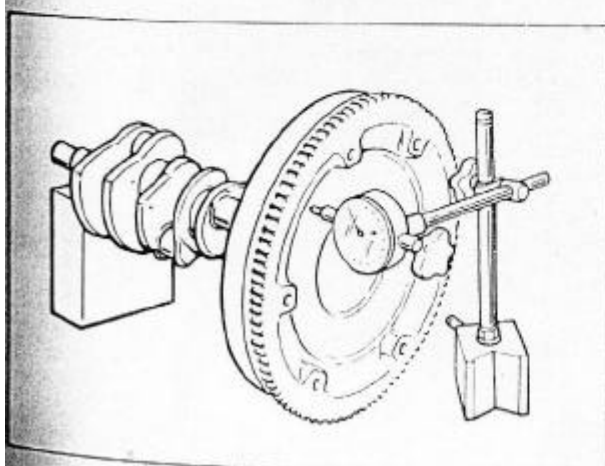


FIG. 1A — 107 MEASURING THE DEVIATION OF FLYWHEEL

Cylinder Block

Measuring the Distortion of the Gasket Surface(flatness)

Measure 6 different places using thickness gauge and straight scale in the same method as for the cylinder head. Polish and repair it, if the distortion, bent or twist exceeds the limit. If polishing needs more than 0.15mm, replace it with new one.

Pay attention to the flatness on the surface between combustion chambers.

Limit of cylinder distortion(mm)	0.05
Standard flatness(mm)	0.03

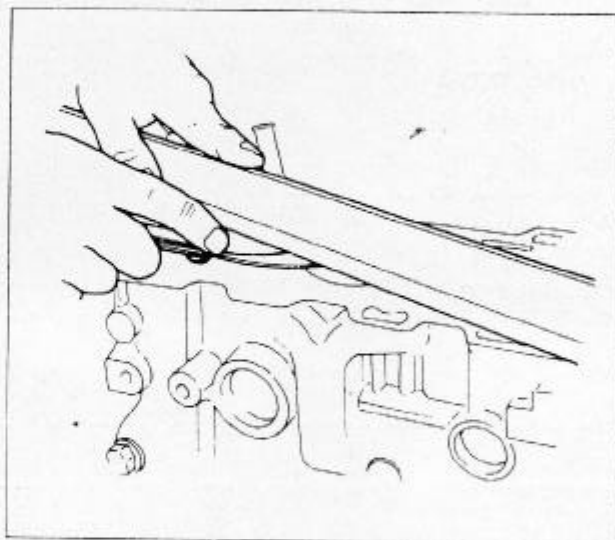


FIG. 1A — 108 MEASURING FLATNESS

- After installing oil seal housing, if the gasket edges are bulged, cut it with scraper to make them flush.

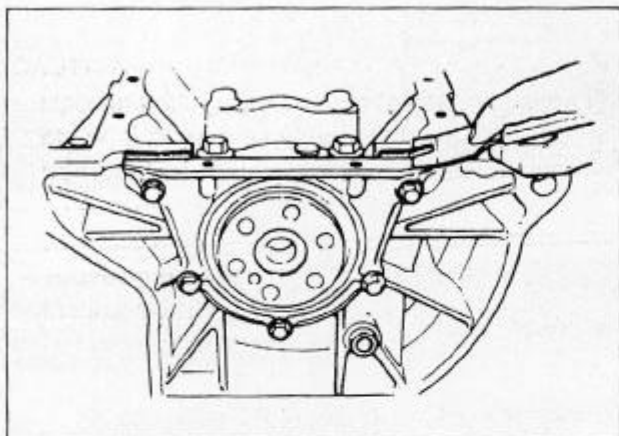
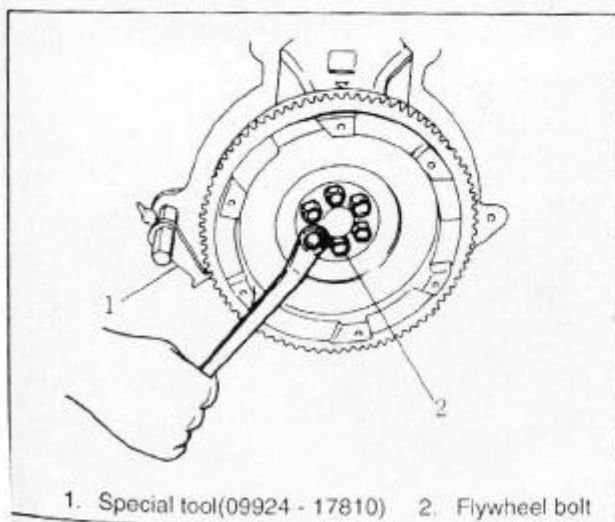


FIG. 1A — 112 CUTTING THE GASKET EDGE

- Refer to the oil pump section to install oil pump
- Tighten the flywheel to the specified torque with the special tool.



1. Special tool(09924 - 17810) 2. Flywheel bolt

FIG. 1A — 113 FLYWHEEL

Tightening torque for flywheel
bolt(kg • cm)

400 — 450

- Install piston (refer to preceding page).
- Install oil pump strainer and oil pan.
- Install cylinder head assembly on cylinder block.

CAUTION

- Upon installing cylinder head on a new cylinder block, tighten the cylinder bolts in sequence from center to outer part, with tightening torque 50% to the specified first, then tighten it with 80% and release it. And tighten it again in the above sequence with 50% and finally 100% of the specified torque.

Tightening torque(kg • cm)

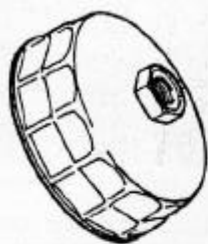
650 — 700

- Install crankshaft timing belt pulley, camshaft timing belt pulley, water pump pulley.
- Refer section 2B to install clutch on flywheel.
- Mounting the engine on the car body(refer to preceding page).

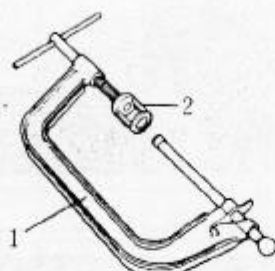
TIGHTENING TORQUE

Tightening parts	Torque(kg · cm)
Cylinder head bolt	650 — 700
Spark plug	200 — 300
Intake-exhaust manifold and nut	180 — 280
Camshaft timing pulley bolt	500 — 600
Valve adjusting screw nut	150 — 200
Timing belt cover bolt, nut	90 — 120
Crankshaft pulley bolt	650 — 750
Connecting rod bearing cap nut	310 — 350
Crankshaft main bearing cap bolt	550 — 600
Flywheel bolt	400 — 450
Oil pressure switch	120 — 150
Oil filter	120 — 160
Oil filter stud	200 — 250
Oil pan bolt	90 — 120
Oil drain plug	300 — 400
Cylinder head cover bolt	90 — 120
Rocker arm shaft bolt	90 — 120
Carburetor attaching bolt	180 — 220
Oil pump strainer	90 — 120
Oil pump case bolt	90 — 120
Oil pump rotor plate screw	90 — 120
Timing belt tensioner bolt	150 — 230
Timing belt tensioner stud	90 — 120
Water pump bolt	90 — 120
Crankshaft oil seal housing bolt	90 — 120
Engine mounting nut	350 — 450
Engine mounting bracket	300 — 500
Engine cooling fan switch	120 — 150

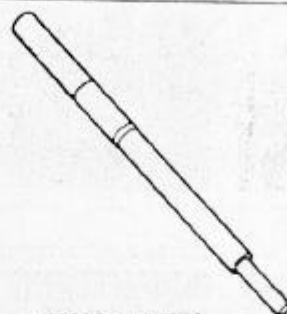
SPECIAL TOOLS



09915 — 47341
Oil filter wrench



1. 09916 — 14510 Valve lifter
2. 09916 — 48210 Attachment



09916 — 44910
Valve guide remover



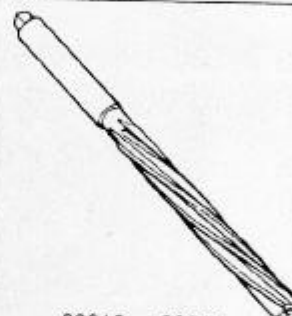
09917 — 88220
Valve guide installer
attachment



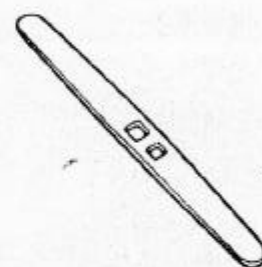
09916 — 58210
Valve guide installer handle



09916 — 37320
Reamer(5 mm)



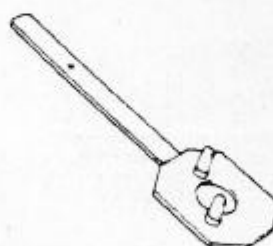
09916 — 38210
Reamer(11mm)



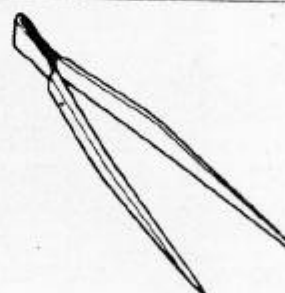
09916 — 34541
Reamer handle



09927 — 56020
Crankshaft pulley holder



09917 — 68220
Camshaft pulley holder



09916 — 84510
Pincette



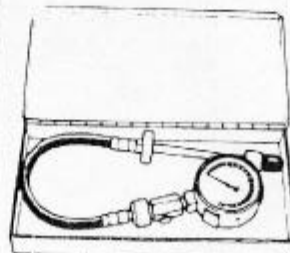
09900 — 00410
Hexagon wrench set



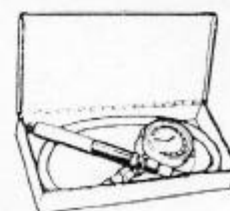
09918 — 08210
Vacuum gauge hose joint



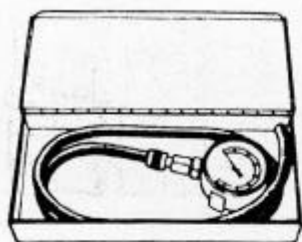
09926 — 18210
Oil seal guide(vinyl resin)



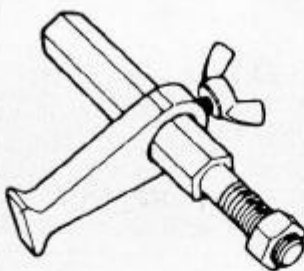
09915 — 64510
Pressure gauge



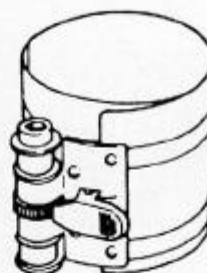
09915 — 77310
Oil pressure gauge



09915 — 67310
Vacuum gauge



09924 — 17810
Flywheel holder



09916 — 77310
Piston compressor