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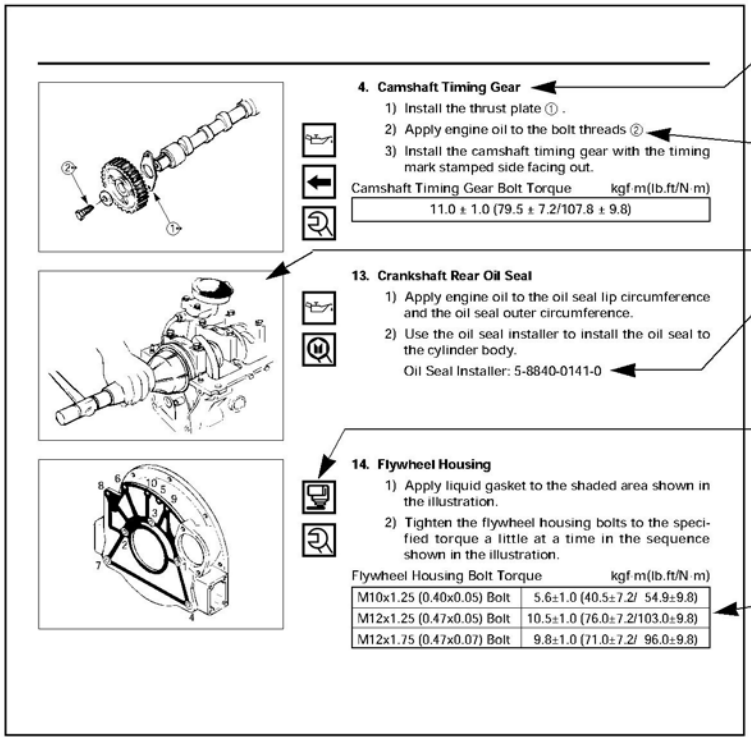
7. Below is a sample of the text of the Workshop Manual.



4. Camshaft Timing Gear

1) Install the thrust plate ① .
2) Apply engine oil to the bolt threads ②.
3) Install the camshaft timing gear with the timing mark stamped side facing out.

Camshaft Timing Gear Bolt Torque — kgf·m(lb.ft/N·m)

11.0 ± 1.0 (79.5 ± 7.2/107.8 ± 9.8)

13. Crankshaft Rear Oil Seal

1) Apply engine oil to the oil seal lip circumference and the oil seal outer circumference.
2) Use the oil seal installer to install the oil seal to the cylinder body.
   Oil Seal Installer: 5-8840-0141-0

14. Flywheel Housing

1) Apply liquid gasket to the shaded area shown in the illustration.
2) Tighten the flywheel housing bolts to the specified torque a little at a time in the sequence shown in the illustration.

Flywheel Housing Bolt Torque — kgf·m(lb.ft/N·m)

M10x1.25 (0.40x0.05) Bolt	5.6±1.0 (40.5±7.2/ 54.9±9.8)
M12x1.25 (0.47x0.05) Bolt	10.5±1.0 (76.0±7.2/103.0±9.8)
M12x1.75 (0.47x0.07) Bolt	9.8±1.0 (71.0±7.2/ 96.0±9.8)

This is the item shown in the illustration. It is marked with a triangle (▲) on the Major Components page.

Letters and numbers contained in a circle refer to the illustration.

Special tools are identified by the tool name and/or number.

The illustration shows how the special tool is to be used.

Symbols indicate the type of service operation or step to be performed. A detailed explanation of these symbols follows.

Service data and specifications are given in this table.

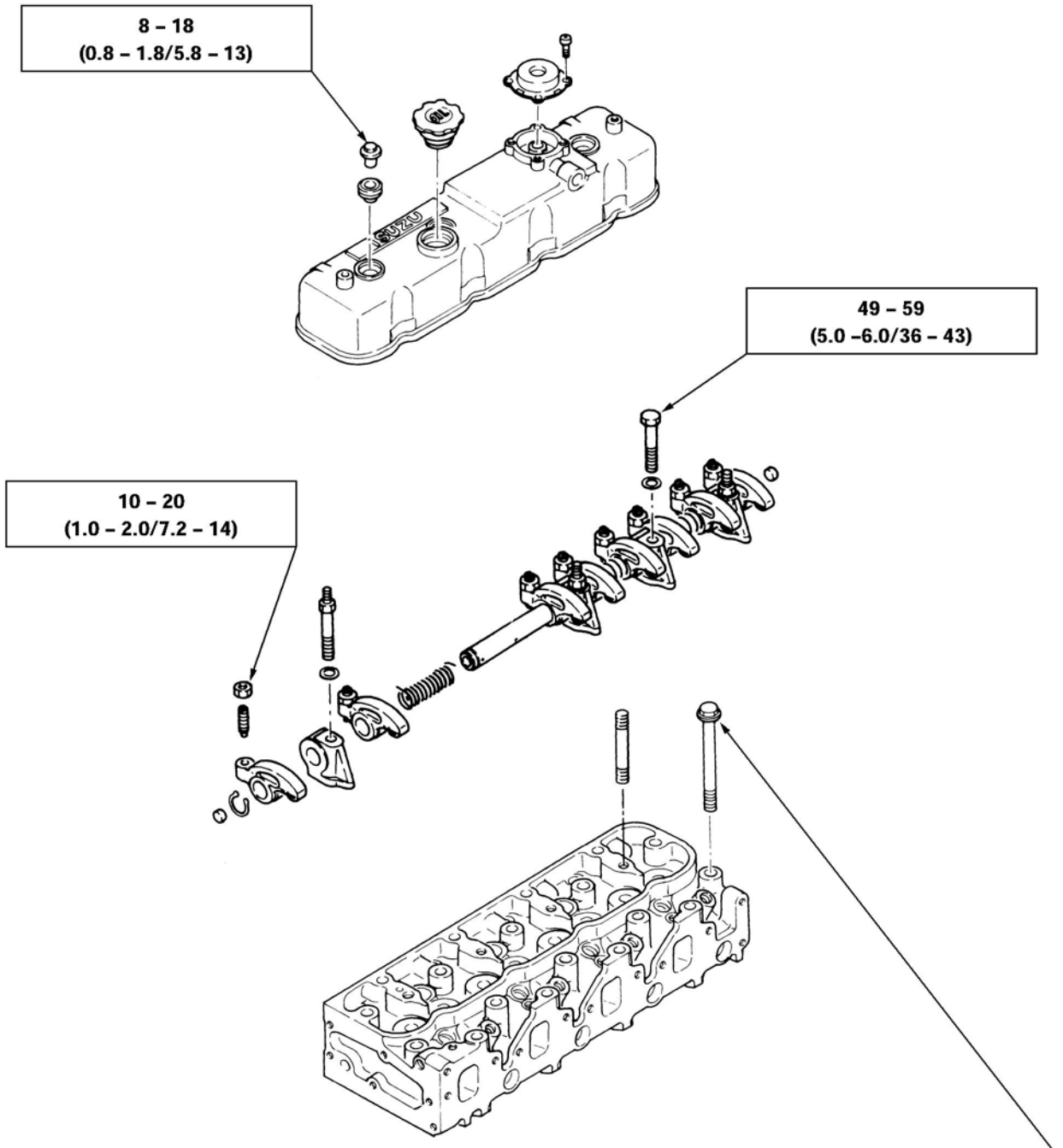
8. The following symbols appear throughout this Workshop Manual. They tell you the type of service operation or step to perform.

....	Removal	....	Adjustment
....	Installation	....	Cleaning
....	Disassembly	...	Important operation requiring extra care
....	Reassembly	....	Specified torque (tighten)
....	Alignment (marks)	....	Special tool use required or recommended(Isuzu tool or tools)
....	Directional indication	....	Commercially available tool use required or recommended
....	Inspection	....	Lubrication (oil)
....	Measurement	....	Lubrication (grease)
		....	Sealant application

SPECIAL PARTS FIXING NUTS AND BOLTS

Cylinder Head Cover, Cylinder Head, and Rocker Arm Shaft Bracket

N·m (kgf·m/lb.ft)

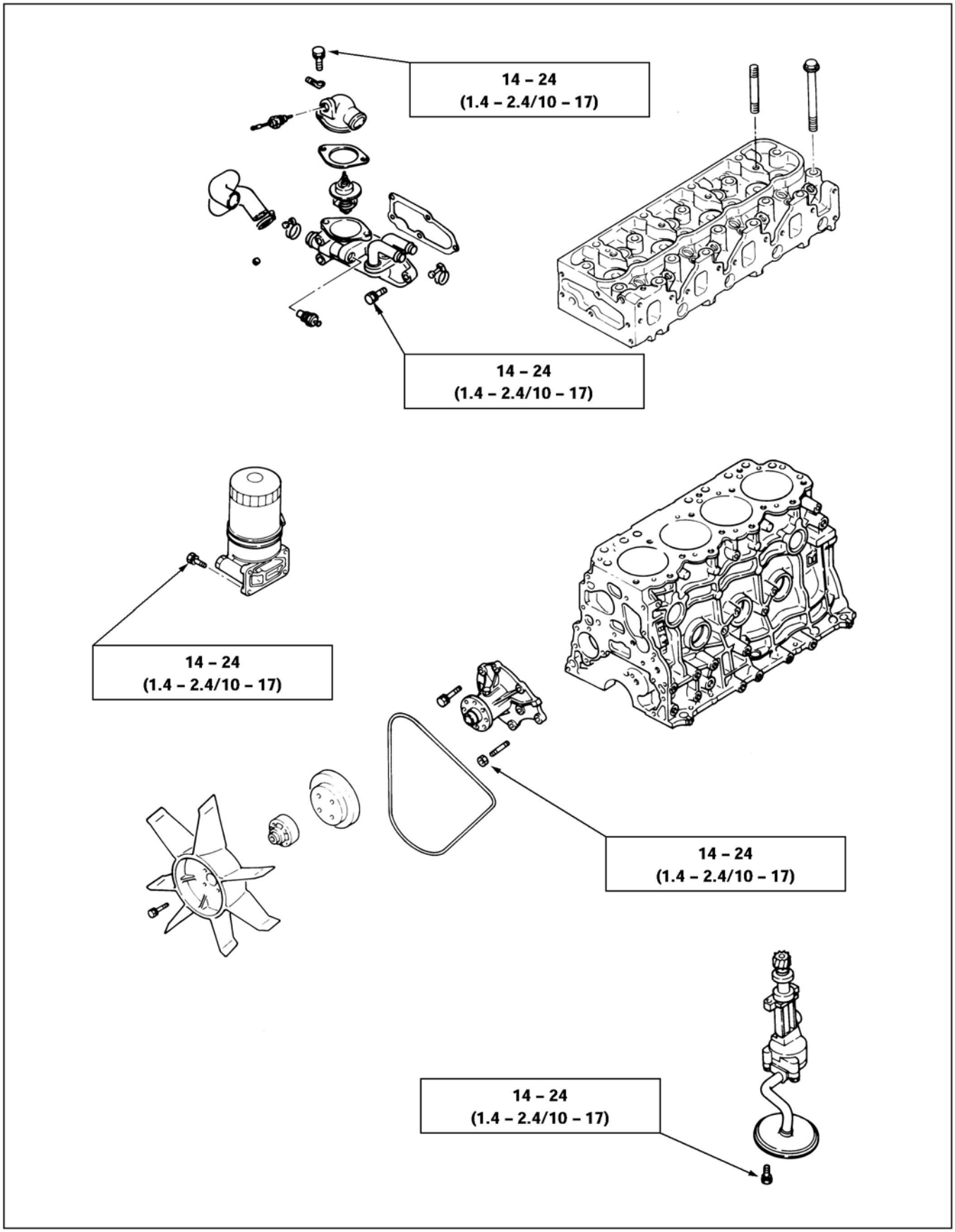


1st Step	2nd Step	3rd Step
44 – 54 (4.5 – 5.5/33 – 40)	60 – 75°	60 – 75°

Apply engine oil to thread portion

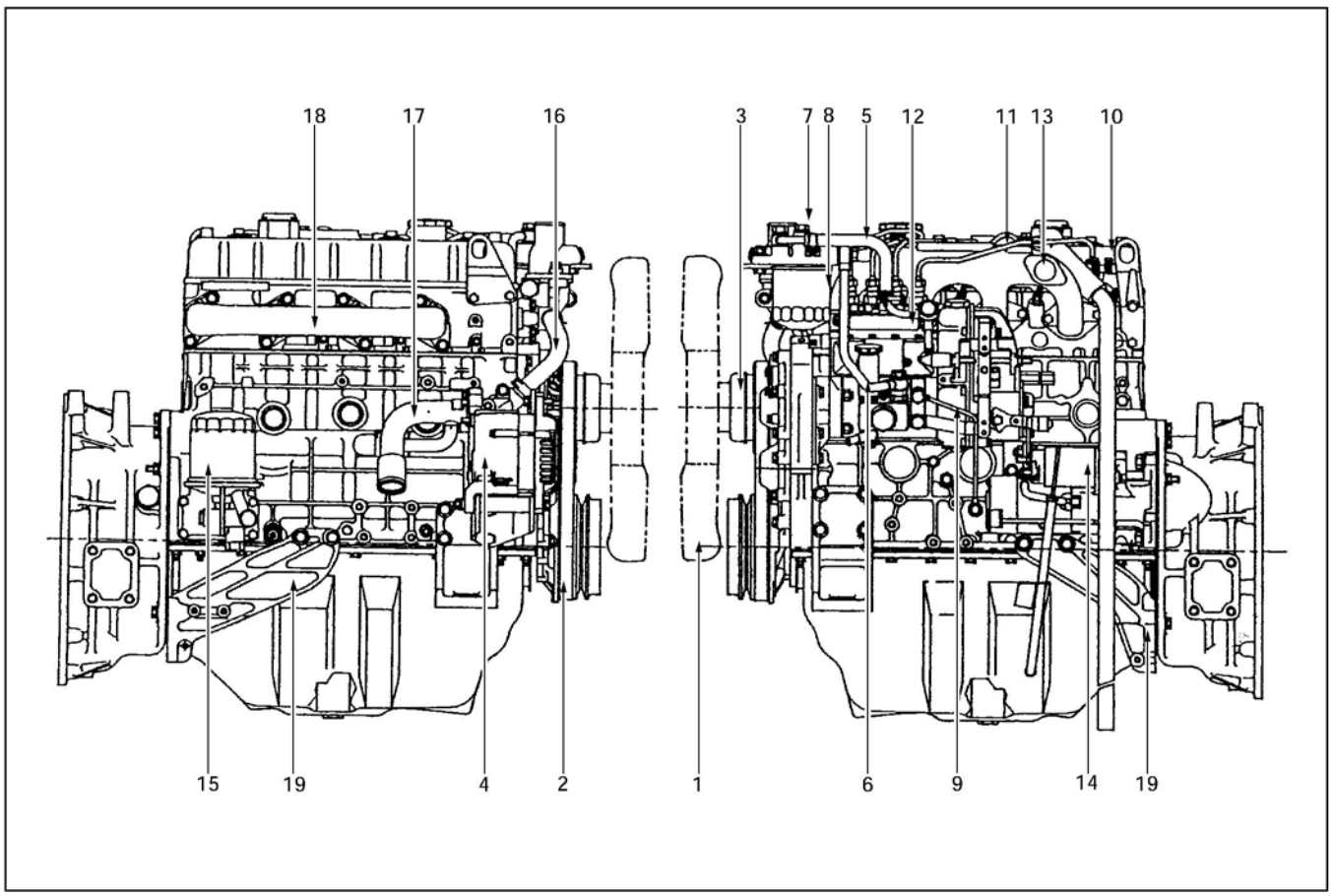
Cooling and Lubricating System

N·m (kgf·m/lb.ft)



DISASSEMBLY

These disassembly steps are based on the A-4JG1 engine.



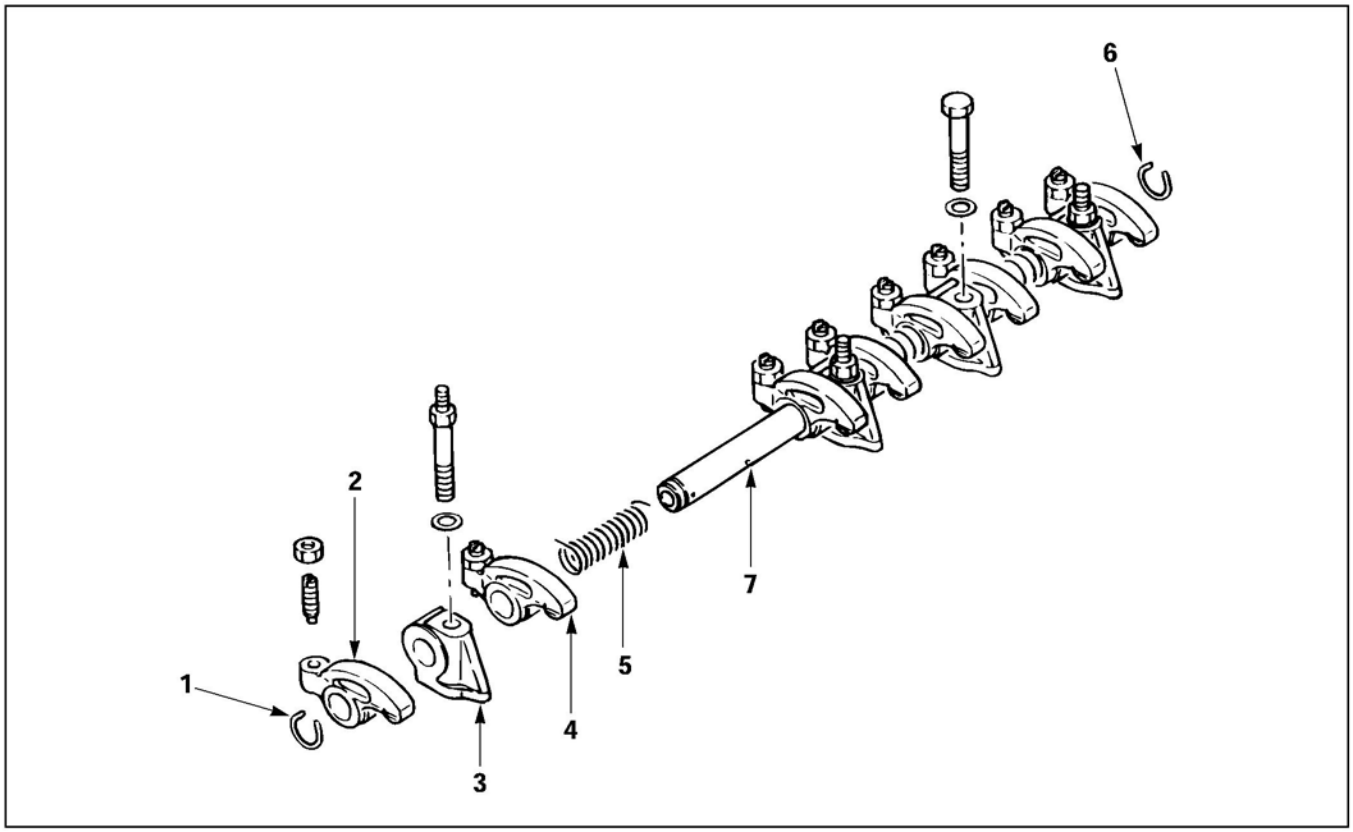
Disassembly Steps - 1

1. Cooling fan and spacer
2. Cooling fan drive belt
3. Cooling fan drive pulley
4. Alternator and adjusting plate
5. Fuel pipe (Fuel filter to injection pump)
6. Fuel pipe (Fuel filter to feed pump)
7. Fuel pipe (Fuel filter leak off)
8. Fuel filter
9. Oil pipe (Injection pump to cylinder body)
10. Fuel leak off pipe
- ▲ 11. Fuel injection pipe with clip
- ▲ 12. Injection pump
13. Intake manifold
14. Starter
15. Oil filter
16. Cooling water rubber hose
17. Cooling water intake pipe
- ▲ 18. Exhaust manifold
19. Stiffner (RH & LH)

DISASSEMBLY

SINGLE UNIT

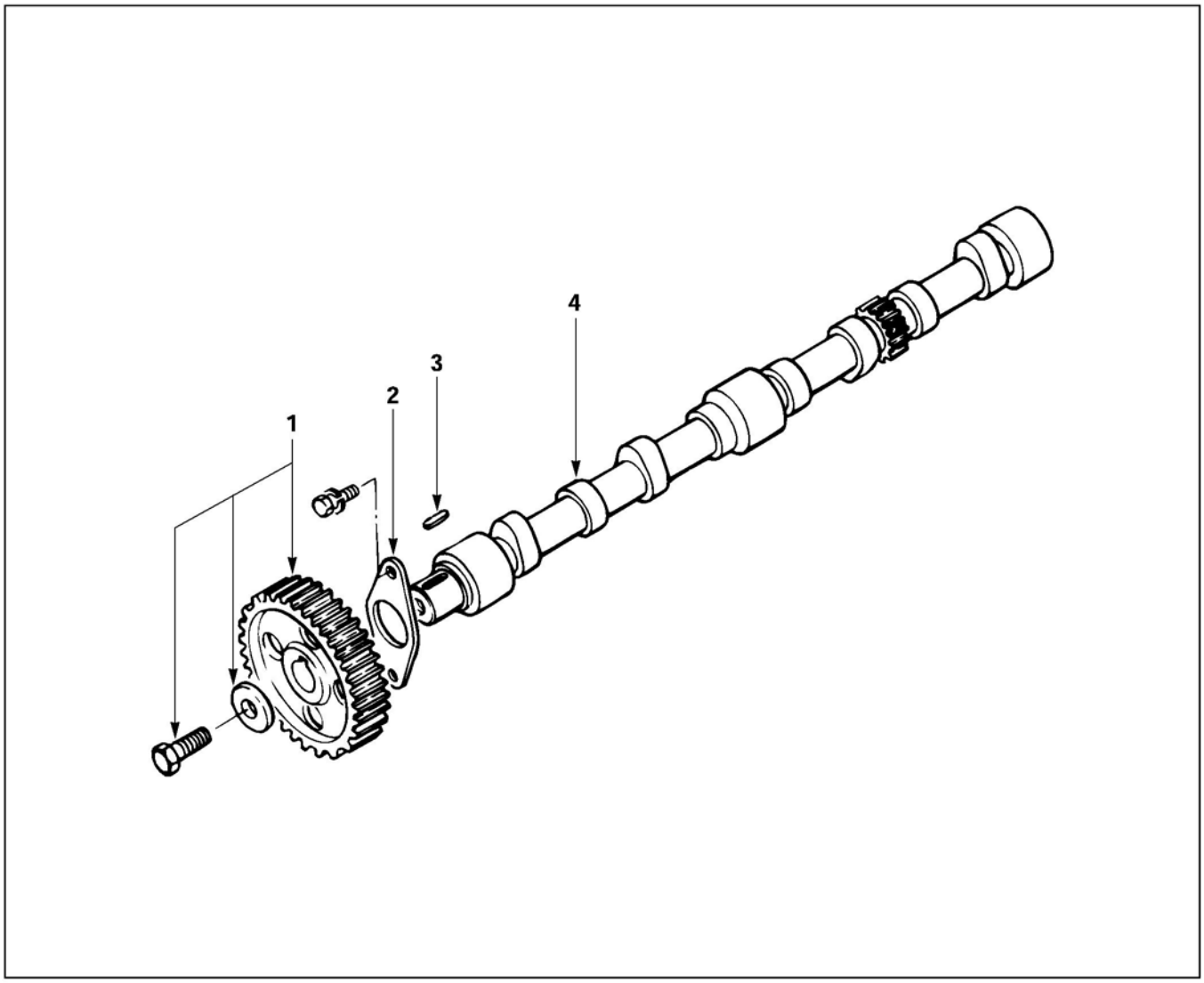
ROCKER ARM SHAFT AND ROCKER ARM



Disassembly Steps

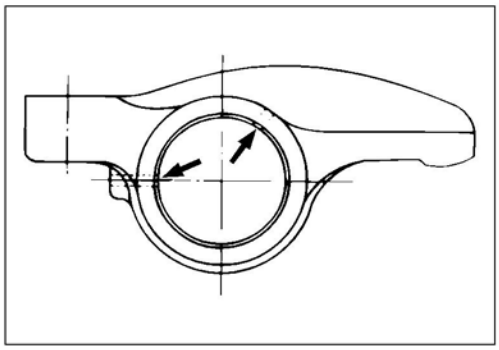
- ▲ 1. Rocker arm shaft snap ring
- ▲ 2. Rocker arm
- ▲ 3. Rocker arm shaft bracket
- 4. Rocker arm
- 5. Rocker arm shaft spring
- 6. Rocker arm shaft snap ring
- 7. Rocker arm shaft

CAMSHAFT, CAMSHAFT TIMING GEAR, AND THRUST PLATE



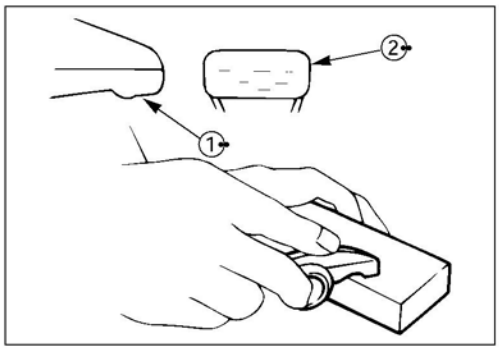
Disassembly Steps

▲ 1. Camshaft timing gear
▲ 2. Thrust plate
3. Feather key
4. Camshaft



3. Check that the rocker arm oil port is free of obstructions.

   If necessary, use compressed air to clean the rocker arm oil port.



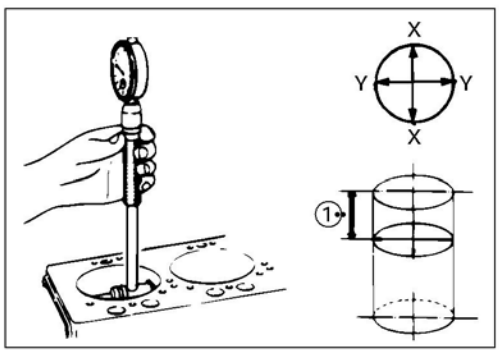
Rocker Arm Correction

Inspect the rocker arm valve stem contact surfaces for step wear ① and scoring ② .

If the contact surfaces have light step wear or scoring, they may be honed with an oil stone.

If the step wear or scoring is severe, the rocker arm must be replaced.

CYLINDER BODY



Cylinder Liner Bore Measurement

Use a cylinder indicator to measure the cylinder bore at measuring point ① in the thrust X – X and axial Y – Y directions of the crankshaft.

Measuring Point ① : Maximum wear portion

[11 – 15 mm (0.43 – 0.59 in)]

If the measured value exceeds the specified limit, the cylinder liner must be replaced.

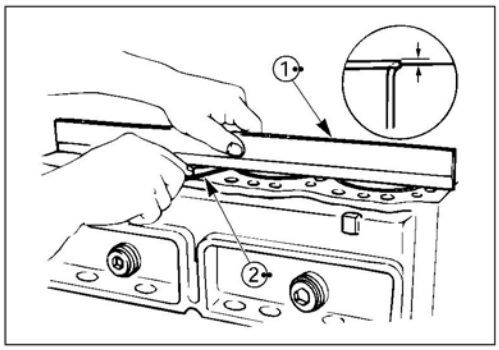
Cylinder Liner Bore mm(in)

Standard	Limit
95.421 – 95.460 (3.7567 – 3.7583)	95.5 (3.7598)

Note:

The inside of the dry type cylinder liner is chrome plated. It cannot be rebored or honed.

If the inside of the cylinder liner is scored or scorched, the cylinder liner must be replaced.



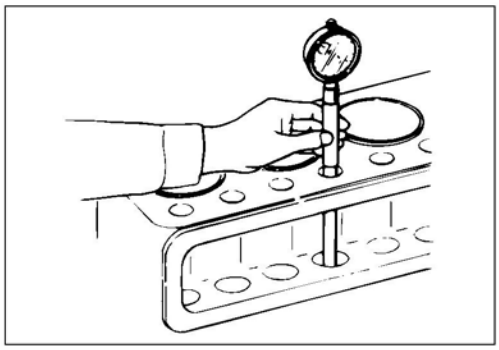
Cylinder Liner Projection Inspection

1. Hold a straight edge ① along the top edge of the cylinder liner to be measured.
2. Use a feeler gauge ② to measure each cylinder liner projection.

Cylinder Liner Projection mm(in)

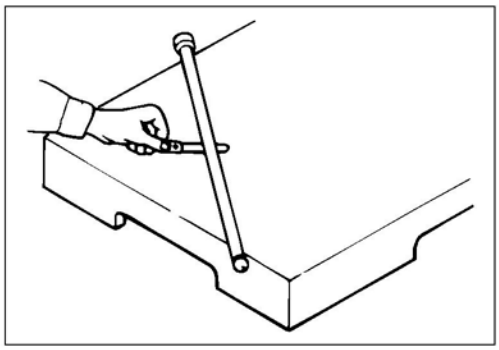
Standard
0 – 0.10 (0 – 0.0039)

The difference in the cylinder liner projection height between any two adjacent cylinders must not exceed 0.03 mm (0.0012 in).



Tappet and Cylinder Body Clearance mm(in)

Standard	Limit
0.03 (0.0012)	0.1 (0.0039)



Push Rod Curvature

1. Lay the push rod on a surface plate.
2. Roll the push rod along the surface plate and measure the push rod curvature with a thickness gauge.

   If the measured value exceeds the specified limit, the push rod must be replaced.

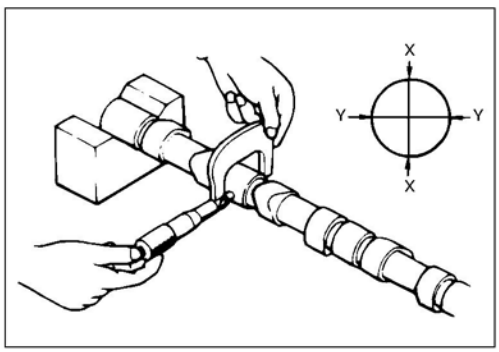
Push Rod Curvature mm(in)

Limit
0.3 (0.012)

3. Visually inspect both ends of the push rod for excessive wear and damage. The push rod must be replaced if these conditions are discovered during inspection.

CAMSHAFT

Visually inspect the journals, the cams, the oil pump drive gear, and the camshaft bearings for excessive wear and damage. The camshaft and the camshaft bearings must be replaced if these conditions are discovered during inspection.

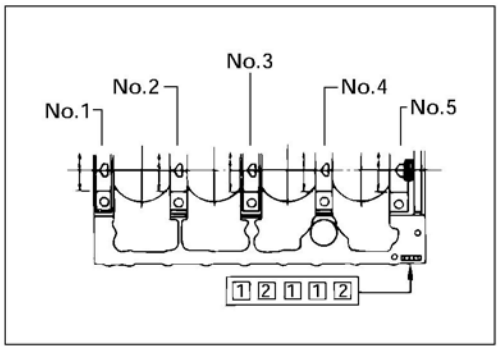


Camshaft Journal Diameter

Use a micrometer to measure each camshaft journal diameter in two directions ((X – X) and (Y – Y)). If the measured value is less than the specified limit, the camshaft must be replaced.

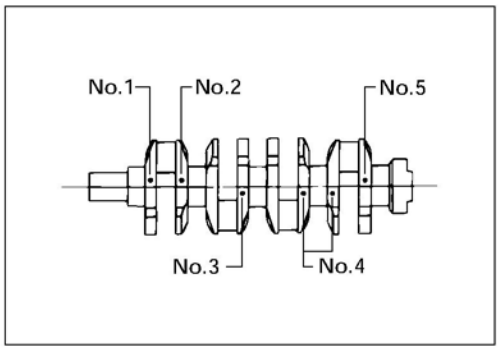
Camshaft Journal Diameter mm(in)

Standard	Limit
49.945 – 49.975 (1.9663 – 1.9675)	49.60 (1.953)

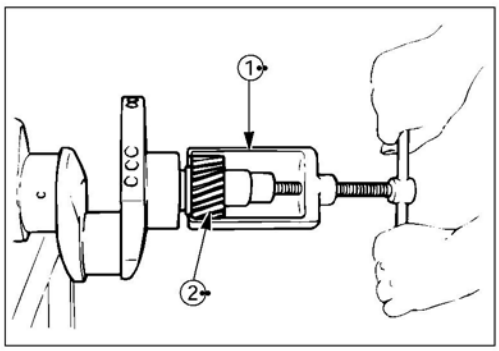


CRANKSHAFT BEARING SELECTION

When installing new crankshaft bearings or replacing old bearings, refer to the slection table below.
Select and install the new crankshaft bearings, paying close attention to the cylinder body journal hole diameter size mark and the crankshaft journal diameter size mark.



Main Bearing Bore Diameter mm(in.)		Crankshaft Main Journal Diameter mm(in.)		Crankshaft Bearing Size Mark	Oil Clearance mm (in.)
Size Mark	Inside Diameter	Size Mark	Outside Diameter		
1	73.987 ~ 74.000 (2.9129 ~ 2.9134)	1 or -	69.927 ~ 69.932 (2.7530 ~ 2.7532)	Black	0.035 ~ 0.061 (0.0014 ~ 0.0024)
		2 or - -	69.922 ~ 69.927 (2.7528 ~ 2.7530)	Blue	0.032 ~ 0.058 (0.0013 ~ 0.0023)
		3 or - - -	69.917 ~ 69.922 (2.7526 ~ 2.7528)		0.037 ~ 0.063 (0.0015 ~ 0.0025)
2	73.975 ~ 73.987 (2.9124 ~ 2.9129)	1 or -	69.927 ~ 69.932 (2.7530 ~ 2.7532)	Green	0.031 ~ 0.056 (0.0012 ~ 0.0022)
		2 or - -	69.922 ~ 69.927 (2.7528 ~ 2.7530)		0.036 ~ 0.048 (0.0014 ~ 0.0019)
		3 or - - -	69.917 ~ 69.922 (2.7526 ~ 2.7528)	Black	0.033 ~ 0.058 (0.0013 ~ 0.0023)

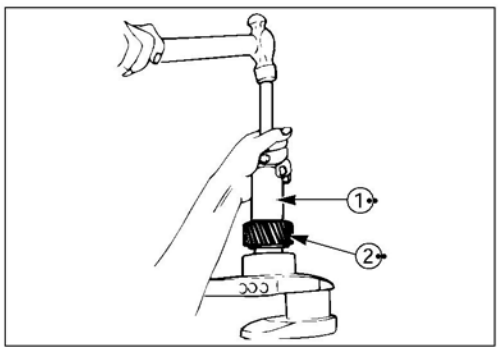


Crankshaft Timing Gear Replacement

Crankshaft Timing Gear Removal

1. Use the crankshaft gear remover ① to remove the crankshaft gear ② .
2. Remove the crankshaft feather key.

   Crankshaft Timing Gear Remover: 9-8840-2057-0

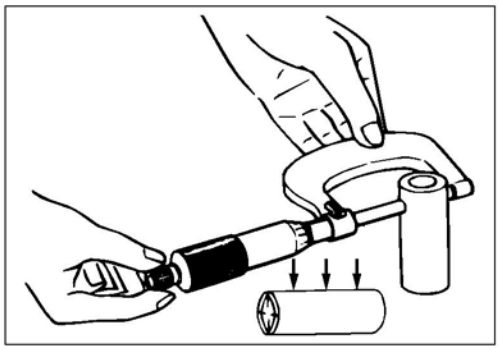


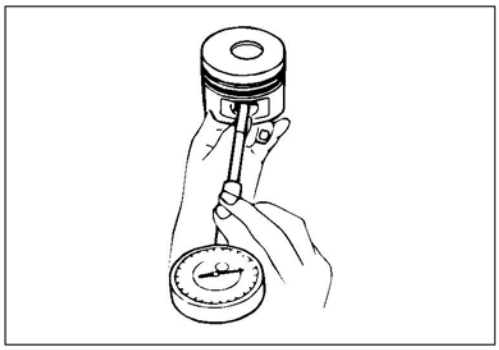
Crankshaft Timing Gear Installation

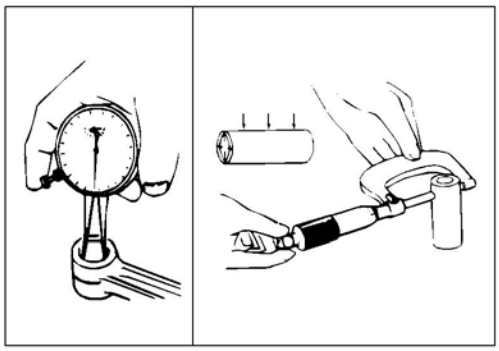
1. Install the crankshaft gear.
2. Use the crankshaft gear installer ① to install the crankshaft gear ② .

   The crankshaft gear timing mark ("X – X") must be facing outward.

   Crankshaft Gear Installer: 9-8522-0020-0







PISTON PIN

Piston Pin Diameter

Use a micrometer to measure the piston pin outside diameter at several points.
If the measured value is less than the specified limit, the piston pin must be replaced.

Piston Pin Diameter mm(in)

Standard	Limit
33.995 – 34.000 (1.3384 – 1.3386)	33.97 (1.3374)

Piston Pin and Piston Clearance

Use an inside dial indicator to measure the piston pin hole (in the piston).

Piston Pin Hole mm(in)

Standard
34.004 – 34.012 (1.3387 – 1.3391)

Piston Pin and Piston Pin Hole Clearance mm(in)

0.004 – 0.017 (0.0002 – 0.0007)

Piston Pin and Connecting Rod Small End Bushing Clearance

Use a caliper calibrator and a dial indicator to measure the piston pin and connecting rod small end bushing clearance.

If the clearance between the piston pin and the connecting rod small end bushing exceeds the specified limit, replace the piston pin and/or the connecting rod bushing.

Piston Pin and Connecting Rod Small End Bushing Clearance mm(in)

Standard	Limit
0.008 – 0.020 (0.0003 – 0.0008)	0.05 (0.002)

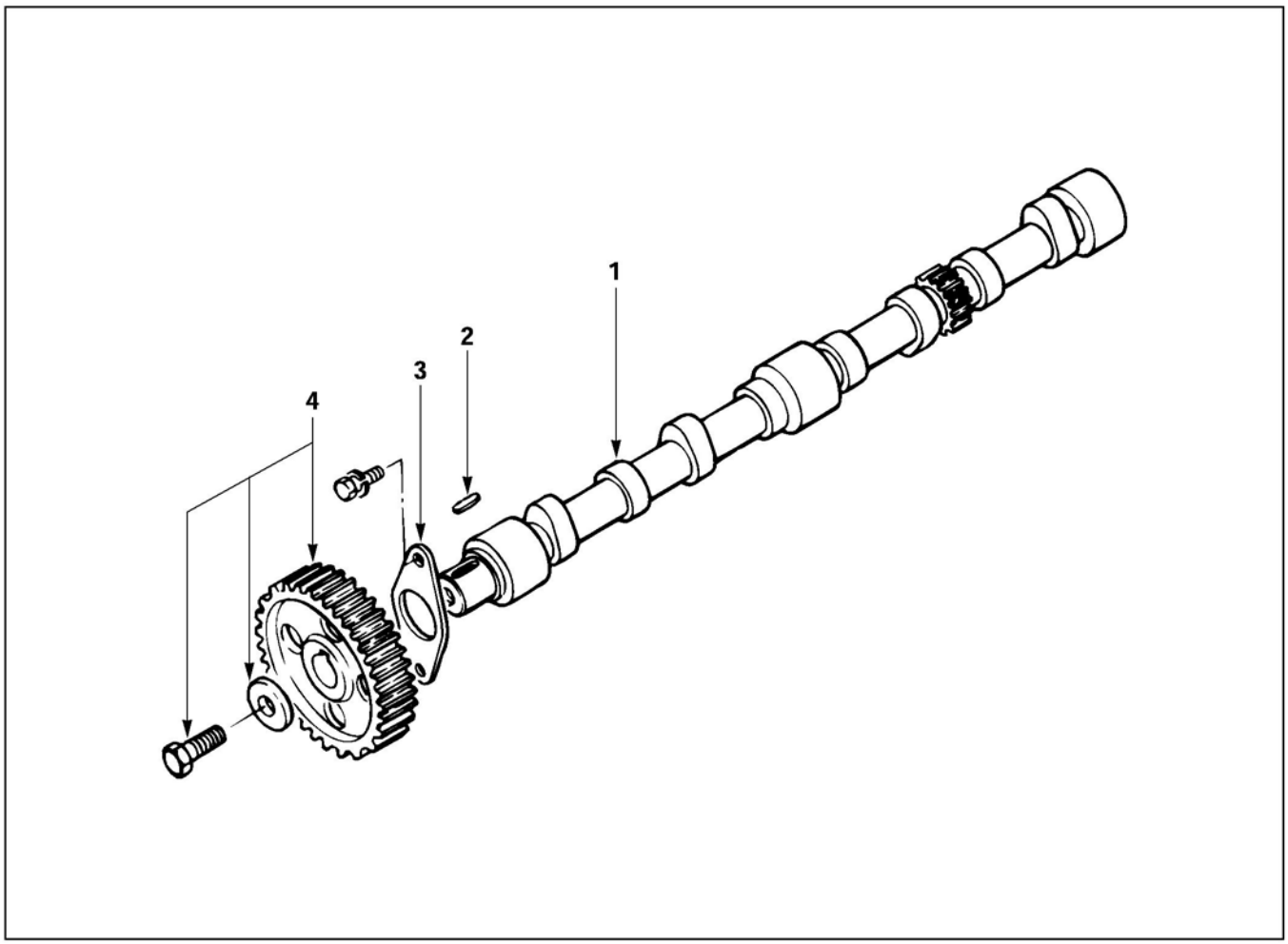
Connecting Rod Bushing Replacement

Connecting Rod Bushing Removal

1. Clamp the connecting rod in a vise.
2. Use the connecting rod bushing remover to remove the connecting rod bushing.

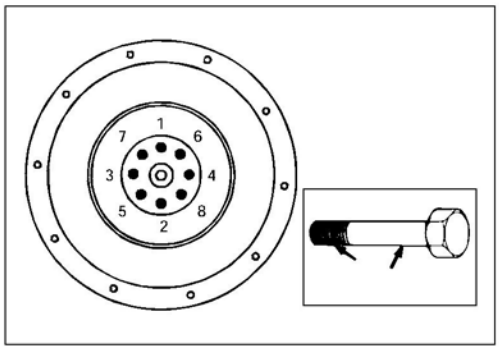
Connecting Rod Bushing Replacer

CAMSHAFT, CAMSHAFT TIMING GEAR, AND THRUST PLATE



Reassembly Steps

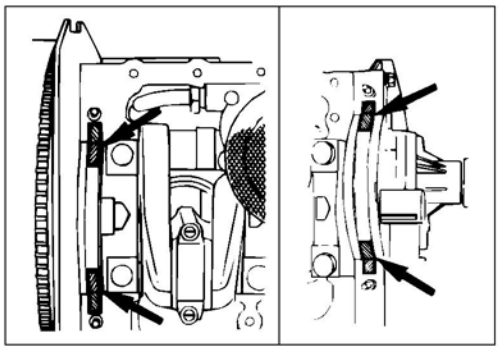
1. Camshaft
2. Feather key
3. Thrust plate
▲ 4. Camshaft timing gear



14. Flywheel

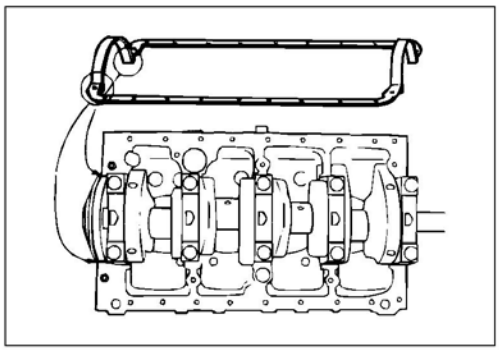
1) Block the flywheel with a piece of wood to prevent it from turning.
2) Apply a coat of engine oil to the threads of the flywheel bolts.
3) Tighten the flywheel bolts in the numerical order shown in the illustration.

Flywheel Bolt Torque	N·m(kgf·m/lb.ft)
113 – 123 (11.5 – 12.5/83 – 90)	



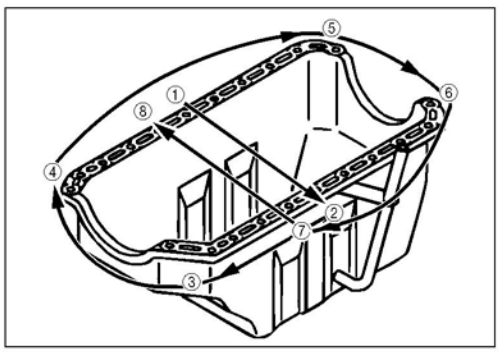
15. Oil Pan

1) Apply sealant TB – 1207B or equivalant to the No. 5 bearing cap arches, the bearing grooves, and the timing gear case arches at the positions shown in the illustration.



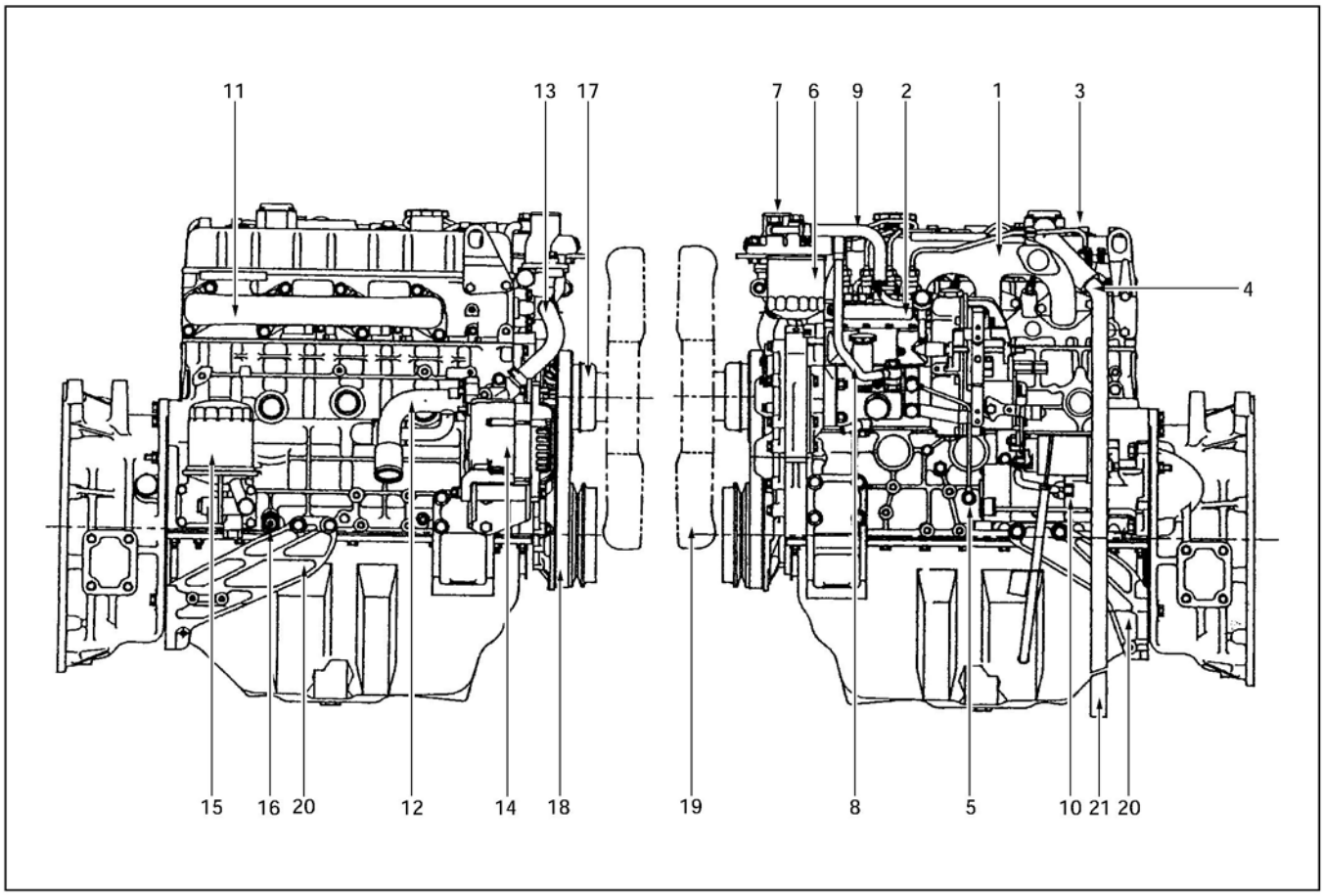
2) Fit the gasket rear lipped portion into the No. 5 bearing cap groove.

   Be absolutely sure that the lipped portion is fitted snugly in the groove.



3) Tighten the oil pan bolts to the specified torque a little at a time in the sequence shown in the illustration.

Oil Pan Bolt Torque	N·m(kgf·m/lb.ft)
14 – 24 (1.4 – 2.4/10 – 17)	

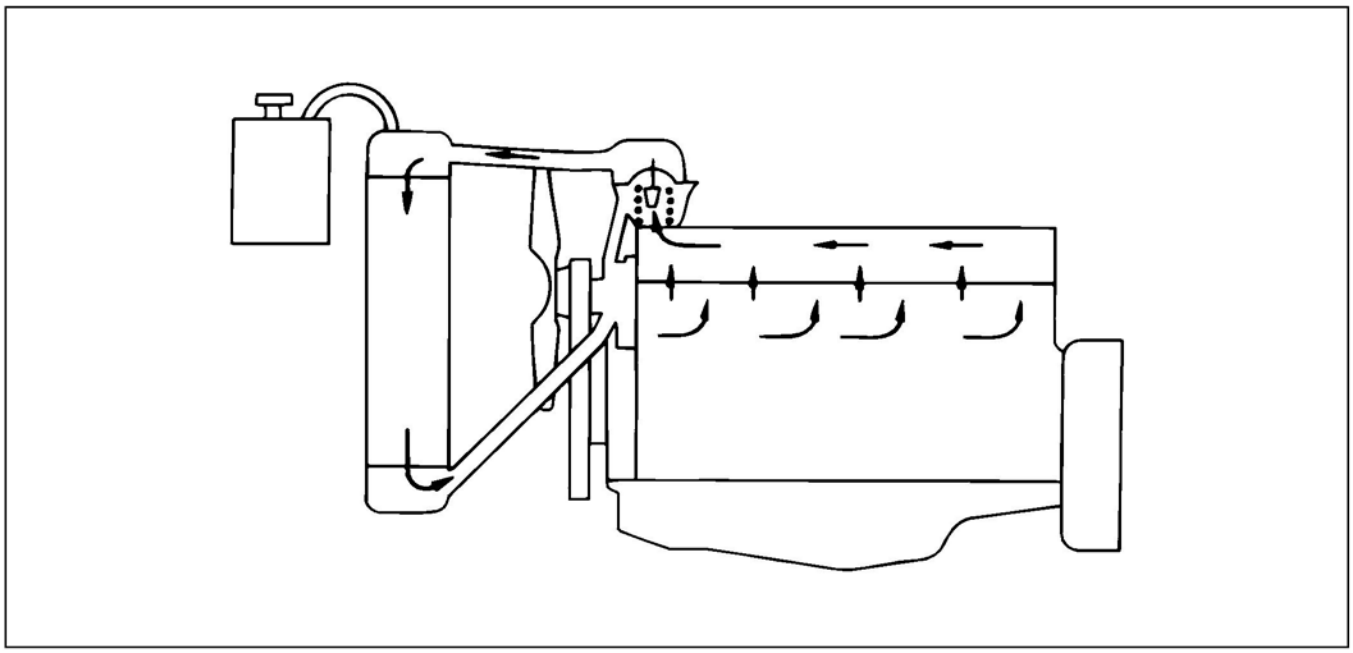


Reassembly Steps – 3

- ▲ 1. Intake manifold
- ▲ 2. Injection pump
- ▲ 3. Fuel injection pipe with clip
- 4. Fuel leak off pipe
- 5. Oil pipe (Injection pump to cylinder body)
- 6. Fuel filter
- 7. Fuel pipe (Fuel filter to leak off)
- 8. Fuel pipe (Fuel filter to feed pump)
- 9. Fuel pipe (Fuel filter to injection pump)
- ▲ 10. Starter
- ▲ 11. Exhaust manifold
- 12. Cooling water intake pipe
- 13. Cooling water rubber hose
- ▲ 14. Alternator and adjusting plate
- ▲ 15. Oil filter
- 16. Oil pressure switch
- 17. Cooling fan drive pulley
- 18. Cooling fan drive belt
- 19. Cooling fan and spacer
- 20. Stiffner (RH & LH)
- 21. Air breather hose

GENERAL DESCRIPTION

COOLANT FLOW



The engine cooling system consists of the radiator, the water pump, the cooling fan, and the thermostat.

To quickly increase cold engine coolant temperature for smooth engine operation, the coolant is circulated by the water pump and thermostat through the by-pass hose and back to the cylinder body. The coolant does not circulate through the radiator.

When the coolant temperature reaches 82°C (180°F), the thermostat will begin to open and a gradually increasing amount of coolant will circulate through the radiator.

The thermostat will be fully open when the coolant temperature reaches 95°C (203°F). All of the coolant is now circulating through the radiator for effective engine coolant.