ENGINE BASE

SERVICE MANUAL

ISUZU
4JG2

HYUNDAI

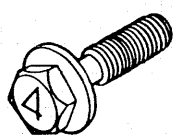
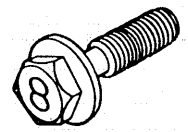
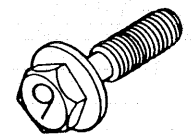
REFERENCE ONLY
- FORK LIFT(HDF20-30, -2 SERIES)

TIGHTENING TORQUE SPECIFICATIONS

The tightening torque values given in the table below are applicable to the bolts unless otherwise specified.

FLANGED HEAD BOLT

kg·m (lb.ft/N·m)

Bolt head marking / Nominal size (dia. x pitch)			
M6 × 1	0.5 ~ 0.9 (3.61 ~ 6.50/4.6 ~ 8.5)	0.6 ~ 1.2 (4.33 ~ 8.67/5.88 ~ 11.76)	———
M8 × 1.25	1.1 ~ 2.0 (7.95 ~ 14.46/10.78 ~ 19.61)	1.4 ~ 2.9 (4.33 ~ 8.67/5.88 ~ 11.76)	1.9 ~ 3.4 (13.74 ~ 24.59/18.63 ~ 33.34)
M10 × 1.25	2.3 ~ 3.9 (17.35 ~ 28.20/23.53 ~ 38.24)	3.6 ~ 6.4 (26.03 ~ 44.12/35.30 ~ 59.82)	4.3 ~ 7.2 (31.10 ~ 52.07/42.16 ~ 70.60)
*M10 × 1.5	2.3 ~ 3.8 (16.63 ~ 27.48/22.55 ~ 37.26)	3.5 ~ 5.8 (25.31 ~ 41.95/34.32 ~ 56.87)	4.1 ~ 6.8 (29.65 ~ 49.18/40.20 ~ 66.68)
M12 × 1.25	5.6 ~ 8.4 (40.50 ~ 60.75/54.91 ~ 82.37)	7.9 ~ 11.9 (57.14 ~ 86.07/77.47 ~ 116.69)	8.7 ~ 13.0 (62.92 ~ 94.02/85.31 ~ 127.48)
*M12 × 1.75	3.5 ~ 9.5 (37.61 ~ 56.41/50.99 ~ 76.49)	7.3 ~ 10.9 (52.80 ~ 78.83/71.58 ~ 106.89)	8.1 ~ 12.2 (58.58 ~ 88.24/79.43 ~ 119.64)
M14 × 1.5	8.5 ~ 12.7 (61.48 ~ 91.85/83.35 ~ 124.54)	11.7 ~ 17.6 (84.62 ~ 127.30/114.73 ~ 172.59)	12.6 ~ 18.9 (91.13 ~ 136.70/123.56 ~ 185.34)
*M14 × 2	7.6 ~ 11.5 (57.14 ~ 85.34/77.47 ~ 115.71)	11.1 ~ 16.6 (80.28 ~ 120.06/108.85 ~ 162.79)	11.8 ~ 17.7 (85.34 ~ 128.02/115.71 ~ 173.57)
M16 × 1.5	11.8 ~ 17.7 (85.34 ~ 128.02/115.71 ~ 173.57)	17.1 ~ 26.5 (125.85 ~ 189.50/170.63 ~ 256.93)	18.0 ~ 27.1 (130.19 ~ 196.01/176.52 ~ 265.76)
*M16 × 2	11.2 ~ 16.7 (81.00 ~ 120.79/109.83 ~ 163.77)	16.6 ~ 24.9 (120.06 ~ 180.10/162.79 ~ 244.18)	17.2 ~ 25.7 (124.40 ~ 186.61/168.67 ~ 253.01)

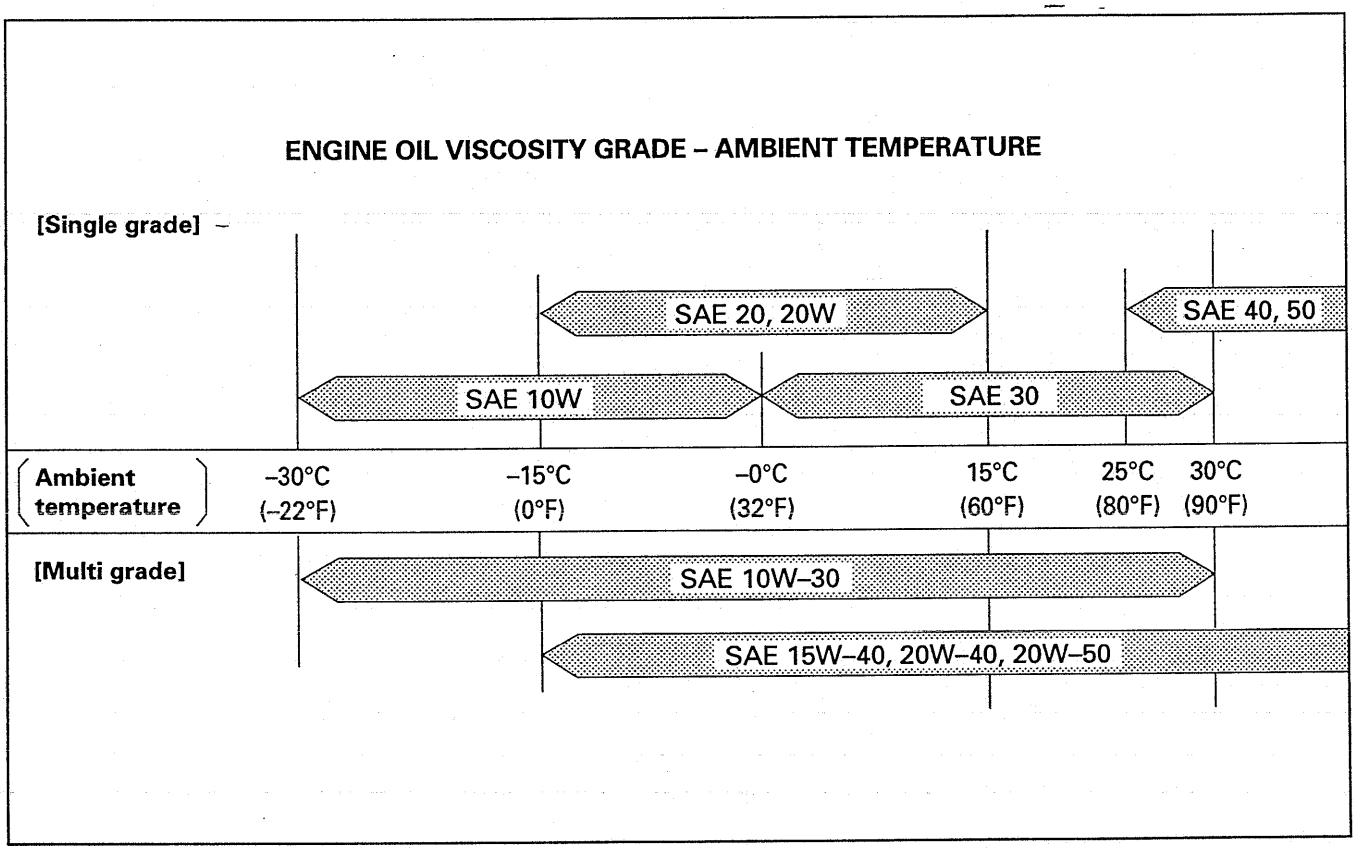
A bolt with an asterisk (*) is used for female screws of soft material such as cast iron.

MEMO

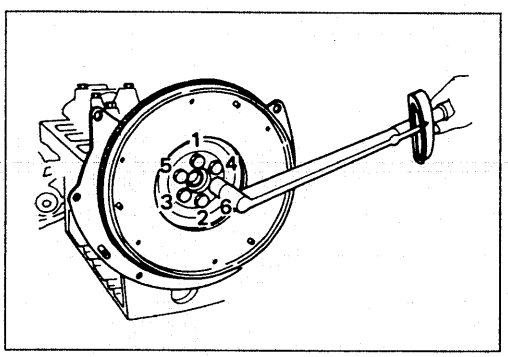
RECOMMENDED LUBRICANTS

ENGINE TYPE	TYPES OF LUBRICANTS
Without turbocharger	Diesel engine oil CC or CD grade

ENGINE OIL VISCOSITY CHART

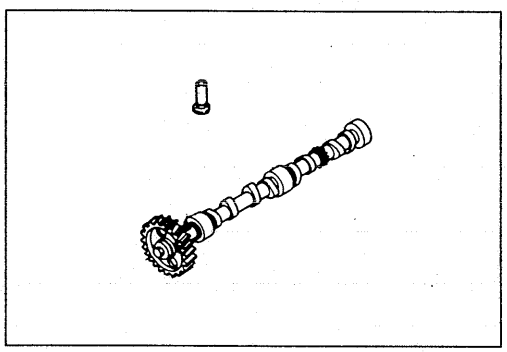


Important Operations (Disassembly Steps - 3)



3. Flywheel

1) Block the flywheel with a piece of wood to prevent it from turning.
2) Loosen the flywheel bolts a little at a time in the numerical order shown in the illustration.

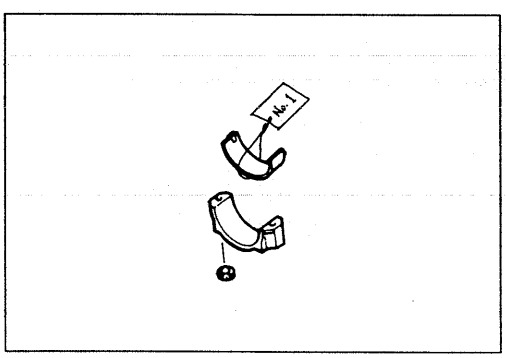


6. Camshaft with Camshaft Timing Gear and Thrust Plate

1) Remove the thrust plate bolts.
2) Pull the camshaft free along with the camshaft timing gear and the thrust plate.

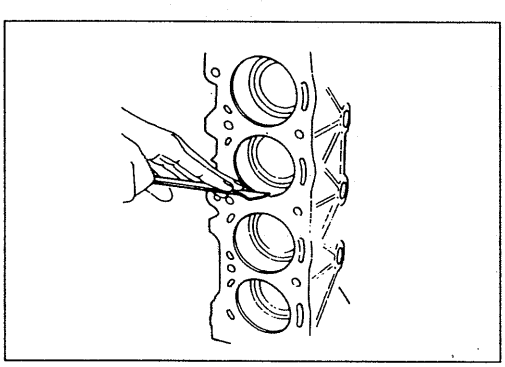
Note:

Be careful not to damage the camshaft journal, the cam, and the camshaft during the disassembly procedure.



8. Connecting Rod Cap with Lower Bearing

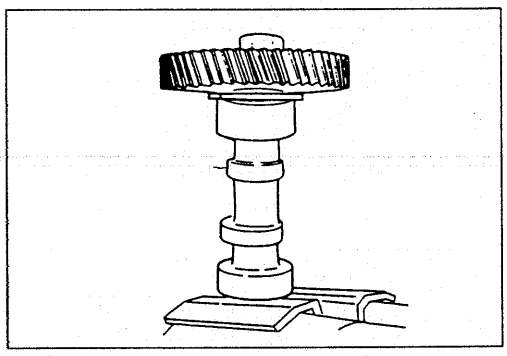
If the connecting rod lower bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



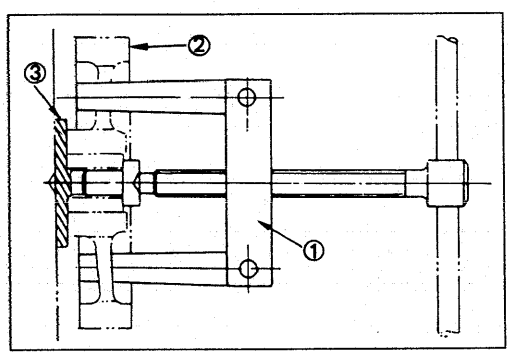
9. Piston and Connecting Rod with Upper Bearing

1) Remove carbon deposits from the upper portion of the cylinder wall with a scraper before removing the piston and connecting rod.
2) Move the piston to the top of the cylinder and tap it with a hammer grip or similar object from the connecting rod lower side to drive it out.

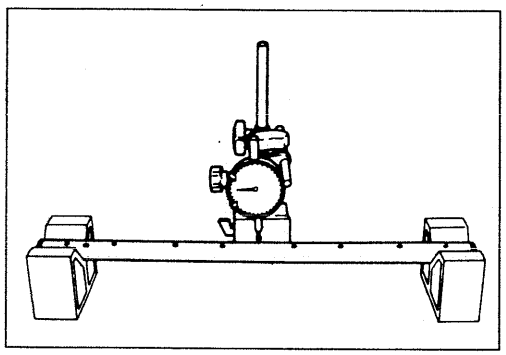
Important Operations



1. **Camshaft Timing Gear**
2. **Thrust Plate**
   1) Clamp the camshaft in a vise.
      Take care not to damage the camshaft.



2) Use the universal puller ① to pull out the camshaft timing gear ② .
   Universal Puller: 5-8840-0086-0
3) Remove the thrust plate ③ .



ROCKER ARM SHAFT AND ROCKER ARM

Rocker Arm Shaft Run-Out

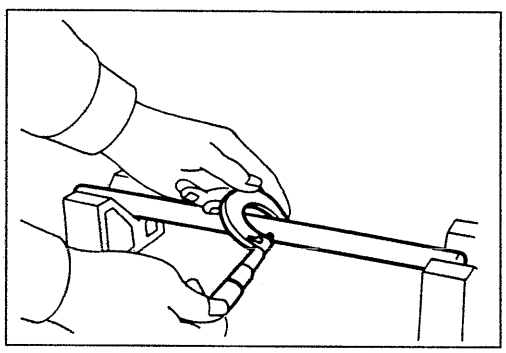
1. Place the rocker arm shaft on a V-block.
2. Use a dial indicator to measure the rocker arm shaft central portion run-out.

   If the run-out is very slight, correct the rocker arm shaft run-out with a bench press. The rocker arm must be at cold condition.

   If the measured rocker arm shaft run-out exceeds the specified limit, the rocker arm shaft must be replaced.

Rocker Arm Shaft Run-Out mm(in)

Standard	Limit
0.2 (0.008)	0.6 (0.024)



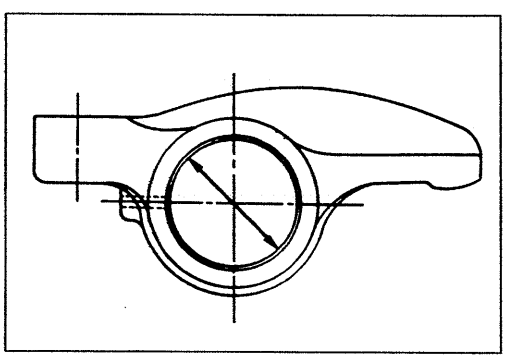
Rocker Arm Shaft Outside Diameter

Use a micrometer to measure the rocker arm fitting portion outside diameter.

If the measured value is less than the specified limit, the rocker arm shaft must be replaced.

Rocker Arm Shaft Outside Diameter mm(in)

Standard	Limit
18.98 – 19.00 (0.747 – 0.748)	18.85 (0.742)



Rocker Arm Shaft and Rocker Arm Clearance

1. Use either a vernier caliper or a dial indicator to measure the rocker arm bushing inside diameter.

Rocker Arm Bushing Inside Diameter mm(in)

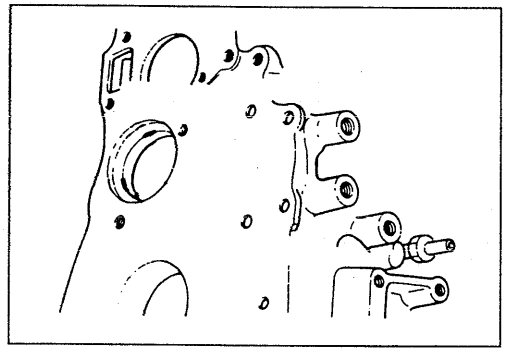
Standard	Limit
19.01 – 19.03 (0.748 – 0.749)	19.05 (0.750)

2. Measure the rocker arm shaft outside diameter.

   If the measured value exceeds the specified limit, replace either the rocker arm or the rocker arm shaft.

Rocker Arm and Rocker Arm Shaft Clearance mm(in)

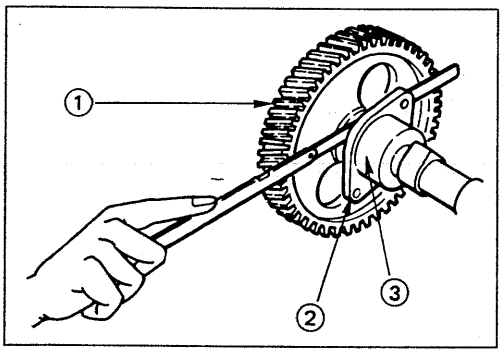
Standard	Limit
0.01 – 0.05 (0.0004 – 0.002)	0.2 (0.008)



Camshaft Bearing Installation

1. Align the bearing oil holes with the cylinder body oil holes.
2. Use the camshaft bearing replacer installer to install the camshaft bearing.

   Bearing Replacer: 5-8840-2038-0

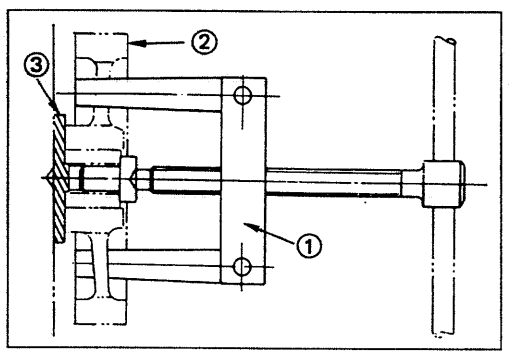


Camshaft End Play

1. Before removing the camshaft gear ①, push the thrust plate ② as far as it will go toward the camshaft gear.
2. Use a feeler gauge to measure the clearance between the thrust plate and the camshaft journal. If the measured value exceeds the specified limit, the thrust plate must be replaced.

Camshaft End Play mm(in)

Standard	Limit
0.050 – 0.114 (0.002 – 0.0044)	0.2 (0.008)

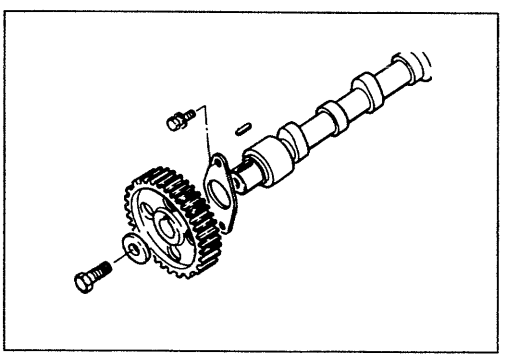


Thrust Plate Replacement

Thrust Plate Removal

1. Use the universal puller ① to remove the camshaft timing gear ② .

   Universal Puller: 5-8840-0086-0
2. Remove the thrust plate ③ .



Thrust Plate Installation

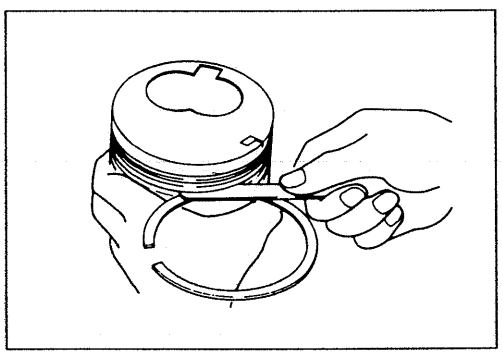
1. Install the thrust plate.
2. Apply engine oil to the bolt setting face and the bolt threads.
3. Install the camshaft gear.

Camshaft Gear Torque kg·m(lb.ft/N·m)

10.0 – 12.0 (72 – 87/98 – 118)

Piston Ring Gap mm(in)

	Standard	Limit
1st Compression Ring	0.2 – 0.35 (0.008 – 0.014)	1.5 (0.059)
2nd Compression Ring	0.37 – 0.52 (0.015 – 0.020)	
Oil Ring	0.2 – 0.4 (0.008 – 0.016)	



Piston Ring and Piston Ring Groove Clearance

Use a feeler gauge to measure the clearance between the piston ring and the piston ring groove at several points around the piston.

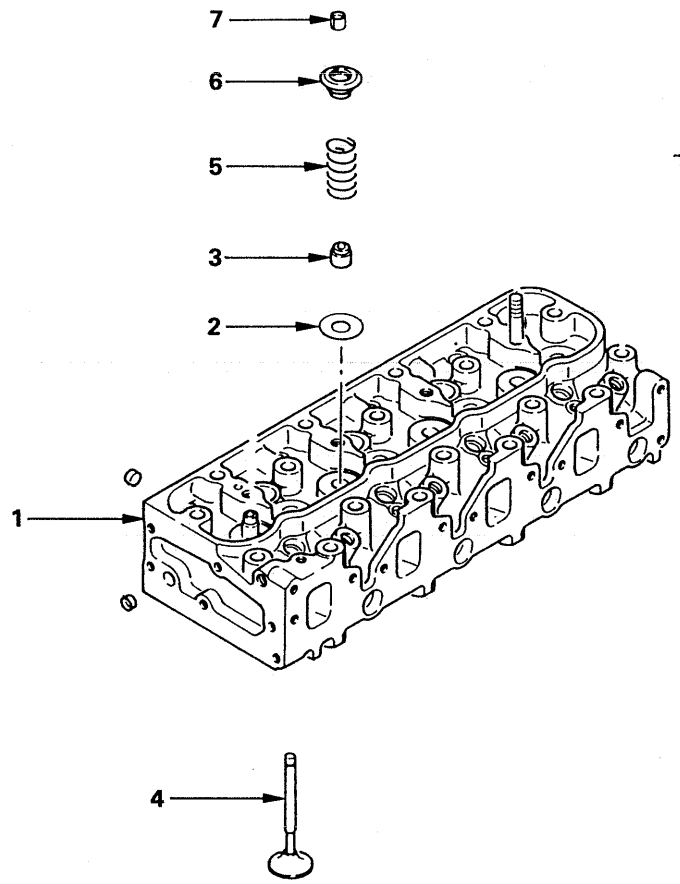
If the clearance between the piston ring and the piston ring groove exceeds the specified limit, the piston ring must be replaced.

Piston Ring and Piston Ring Groove Clearance mm(in)

	Standard	Limit
1st Compression Ring	0.09 – 0.130 (0.0035 – 0.0051)	0.15 (0.006)
2nd Compression Ring	0.05 – 0.090 (0.002 – 0.0035)	
Oil Ring	0.03 – 0.07 (0.0012 – 0.0028)	

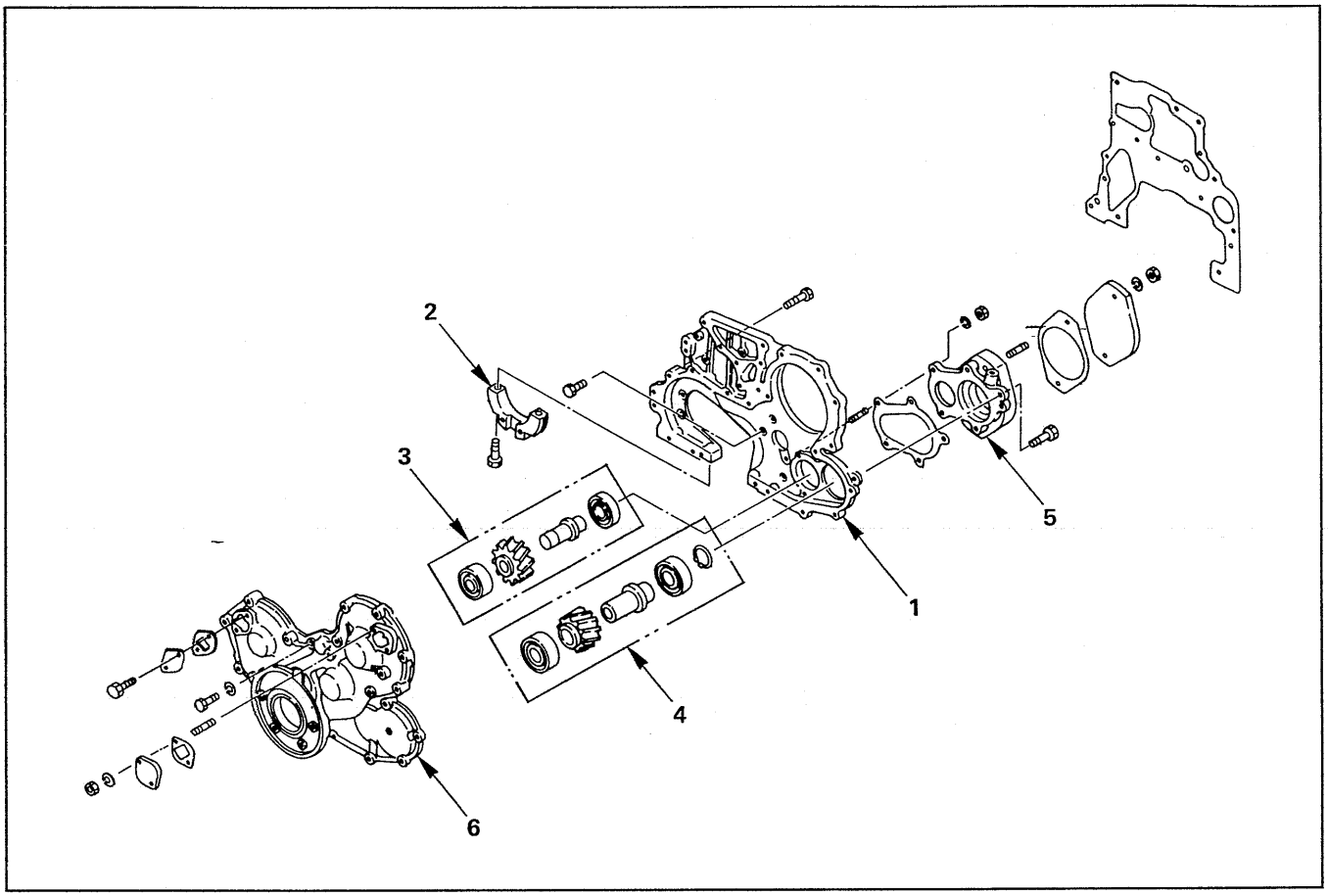
Visually inspect the piston. If a piston ring groove is damaged or distorted, the piston must be replaced.

CYLINDER HEAD



Reassembly Steps

1. Cylinder head
2. Valve spring lower seat
▲ 3. Valve stem oil seal
▲ 4. Intake and exhaust valve
▲ 5. Valve spring
6. Valve spring upper seat
▲ 7. Split collar



Reassembly Steps – 2a: Timing Gear Case PTO

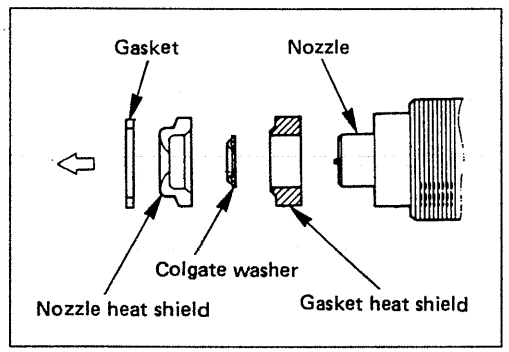
1. Timing gear case
2. Under plate
3. PTO Idle gear
4. PTO Gear
5. Adapter : PTO
6. Timing case cover

15. Glow Plug and Glow Plug Connector

1) Tighten the glow plugs to the specified torque.

Glow Plug Torque	kg·m(lb.ft/N·m)
1.5 – 2.0 (11 – 14/15 – 20)	

2) Install the glow plug connectors.



16. Injection Nozzle Holder

1) Install the heat shield washer and the heat shield to the cylinder head from the nozzle holder installation hole side. Lightly tap the flange into place with a brass bar.

   The heat shield flange side must be facing up.

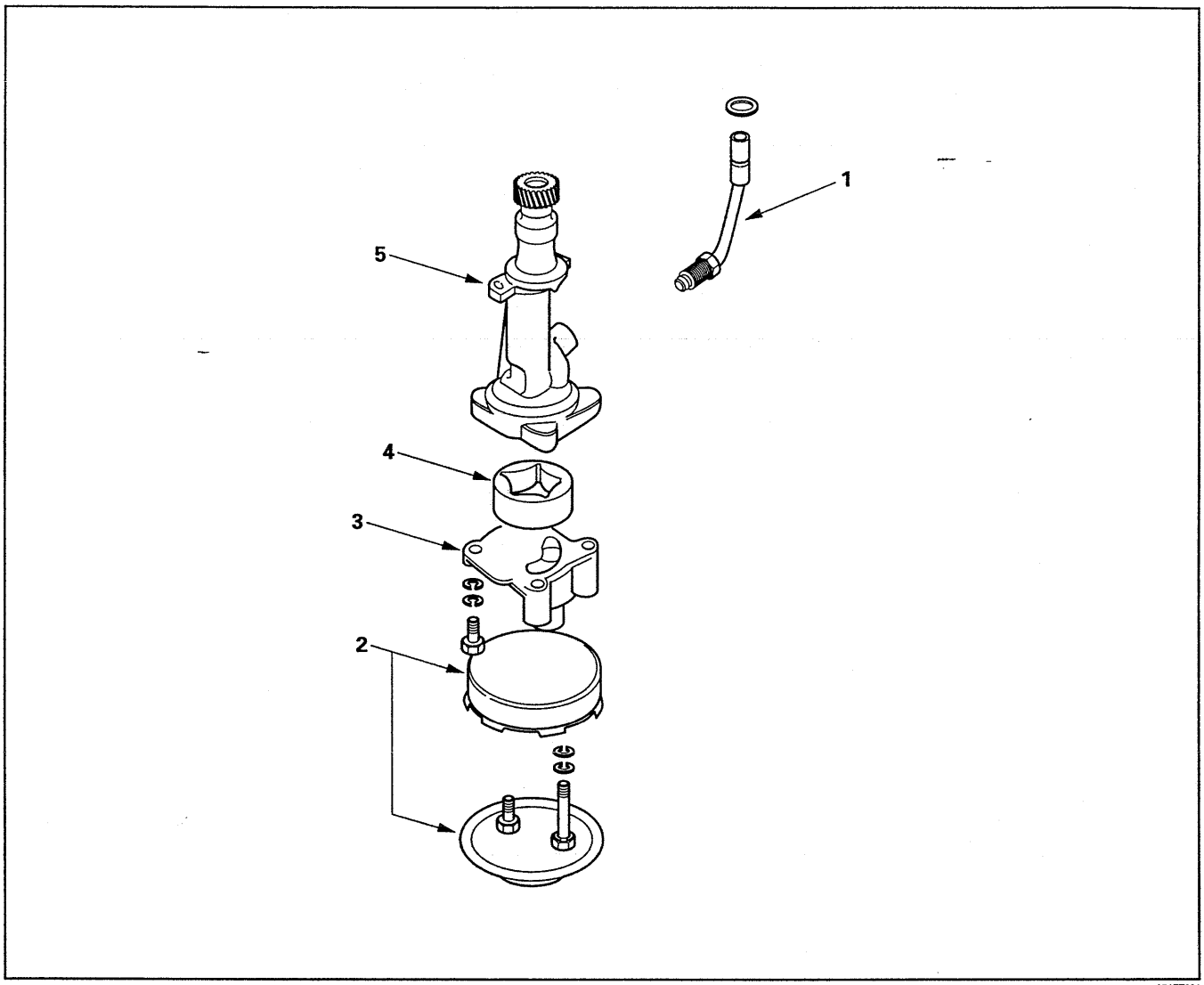
NOTE:
Always install a new heat shield. Never reuse the old heat shield.

2) Tighten the holder nut to the specified torque.

kg·m(lb.ft/N·m)
6.0 – 7.0 (43 – 51/59 – 69)

OIL PUMP

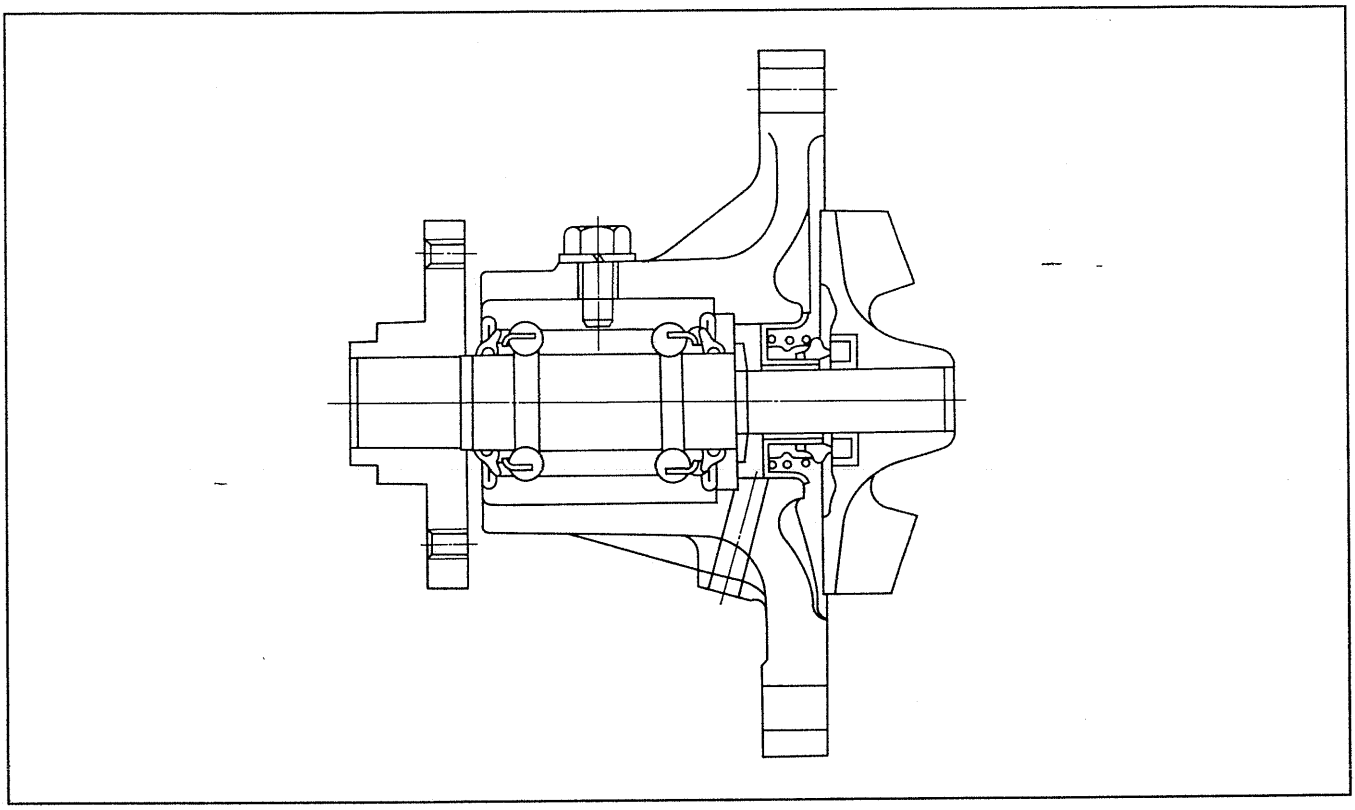
DISASSEMBLY



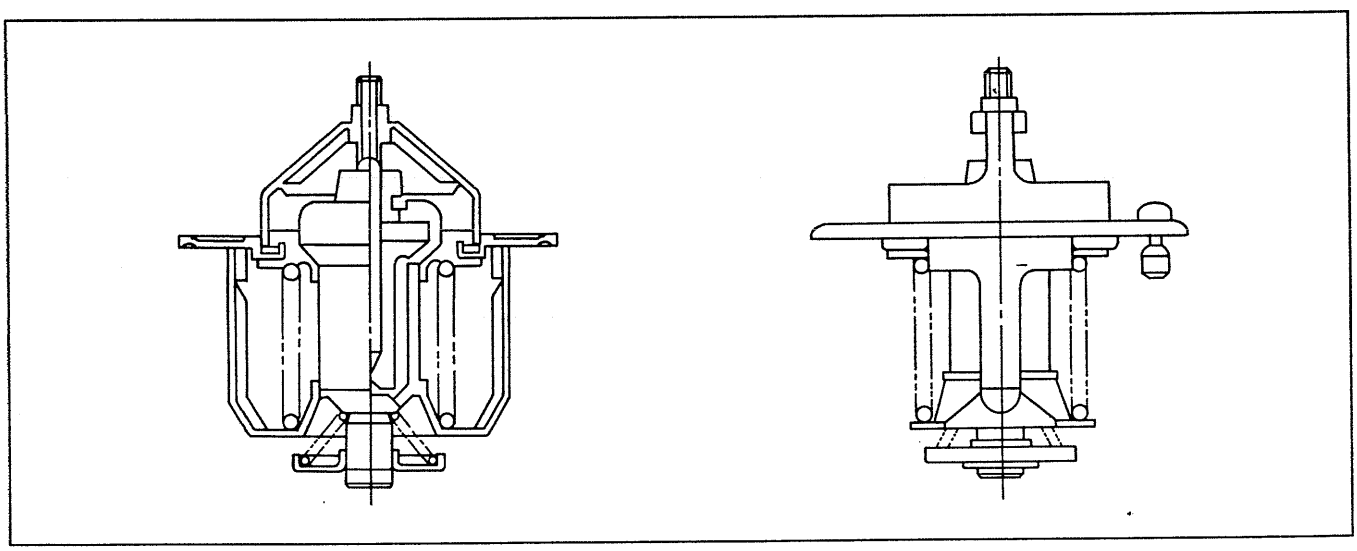
Disassembly Steps

1. Oil pipe
2. Strainer case
3. Pump cover
4. Vane
▲ 5. Pump body with rotor and pinion

WATER PUMP

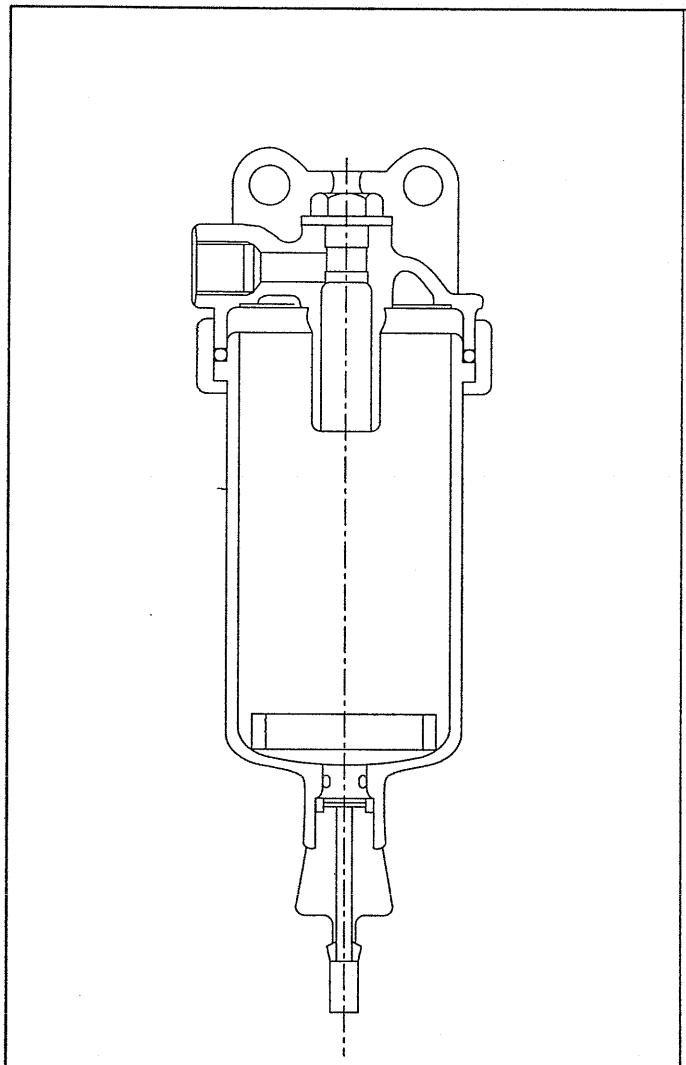


THERMOSTAT



A centrifugal type water pump forcefully circulates the coolant through the cooling system.
A wax pellet type thermostat is used.
The jiggle valve accelerates engine warm-up.

FUEL FILTER AND WATER SEPARATOR



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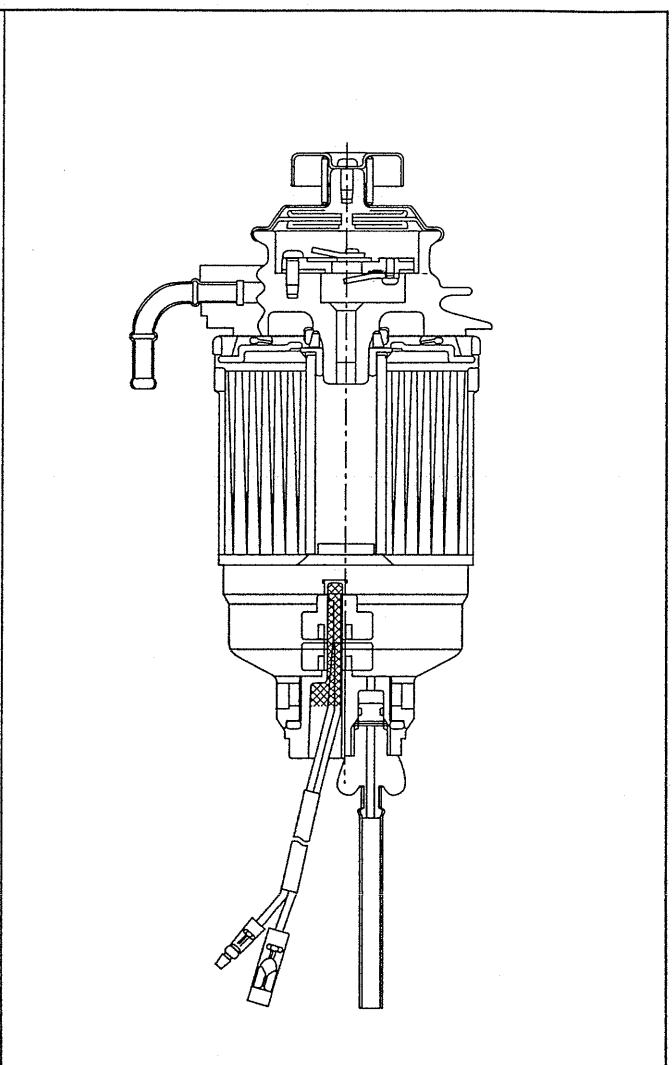


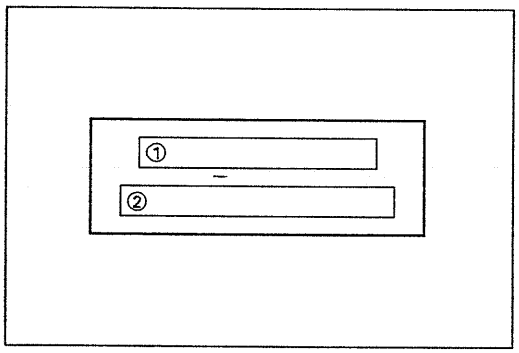
041ET004

A cartridge type fuel filter and a water separator are used.

As the inside of the injection pump is lubricated by the fuel which it is pumping, the fuel must be perfectly clean. The fuel filter and the water separator remove water particles and other foreign material from the fuel before it reaches the injection pump.

The water separator has an internal float. When the float reaches the drain level, remind you to drain the water from the water separator.

STARTER



STARTER IDENTIFICATION

NIPPON DENSO starter are identified by name plate attached to the yoke. (Illustration)

① Isuzu part number

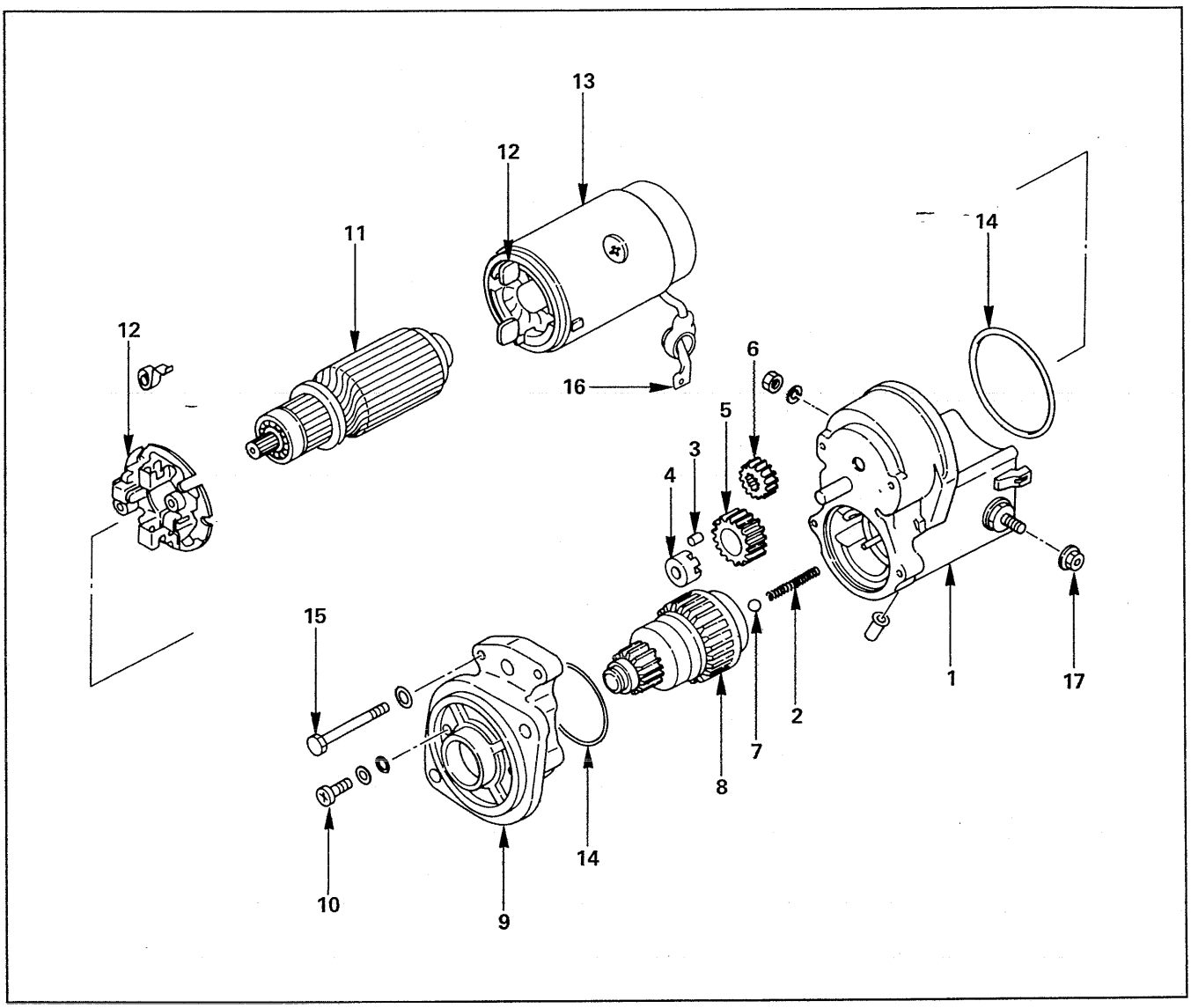
② NIPPON DENSO part number

Note:

Always check the identification number before beginning a service operation.

Applicable service data will vary according to the identification number. Use of the wrong service data will result in starter damage.

REASSEMBLY



Reassembly Steps

1. Magnetic switch body
▲ 2. Compression return spring
▲ 3. Clutch roller
▲ 4. Retainer
5. Idler gear
6. Starter pinion
7. Steel ball
8. Pinion clutch
9. Starter housing
10. Screw
11. Armature
▲ 12. Brush holder
▲ 13. Yoke
14. Starter seal
▲ 15. Through bolt
16. Connecting lead wire
17. Hexagon nut

4. Note the circuit tester reading.

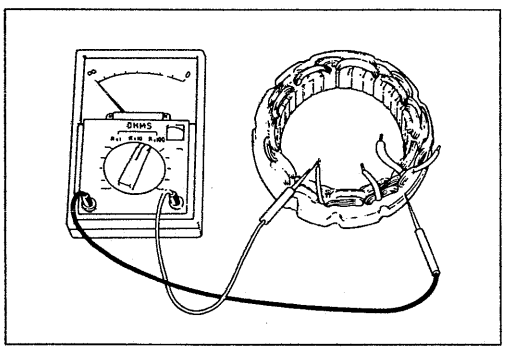
   If the two readings (Steps 2 and 4) are identical, the stator coil has continuity.

   If the two circuit tester readings are different, there is no stator continuity.

5. Check the neutral junction (arrow mark) for breaks.

   If breaks are found, repair and repeat the stator coil continuity test.

   If there is still no stator coil continuity, the stator must be replaced.



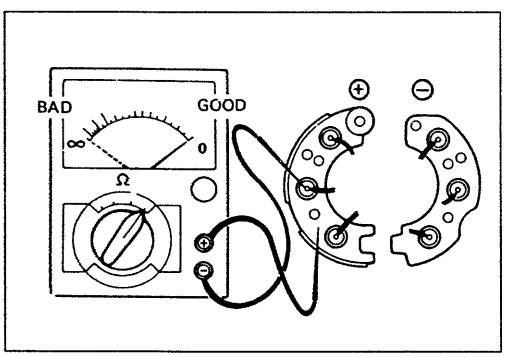
Stator Coil Ground Test

Use an circuit tester to test the stator coil for grounding.

1. Touch one circuit tester probe to the bear metal surface of the stator.
2. Touch the other circuit tester probe to a bare stator lead wire.
3. Note the circuit tester reading.

   The circuit tester should show infinity (no needle movement).

   If the circuit tester shows a value other than infinity (the needle moves), the stator is grounded and must be replaced.



RECTIFIER

Rectifier (Positive Diode) Continuity Test

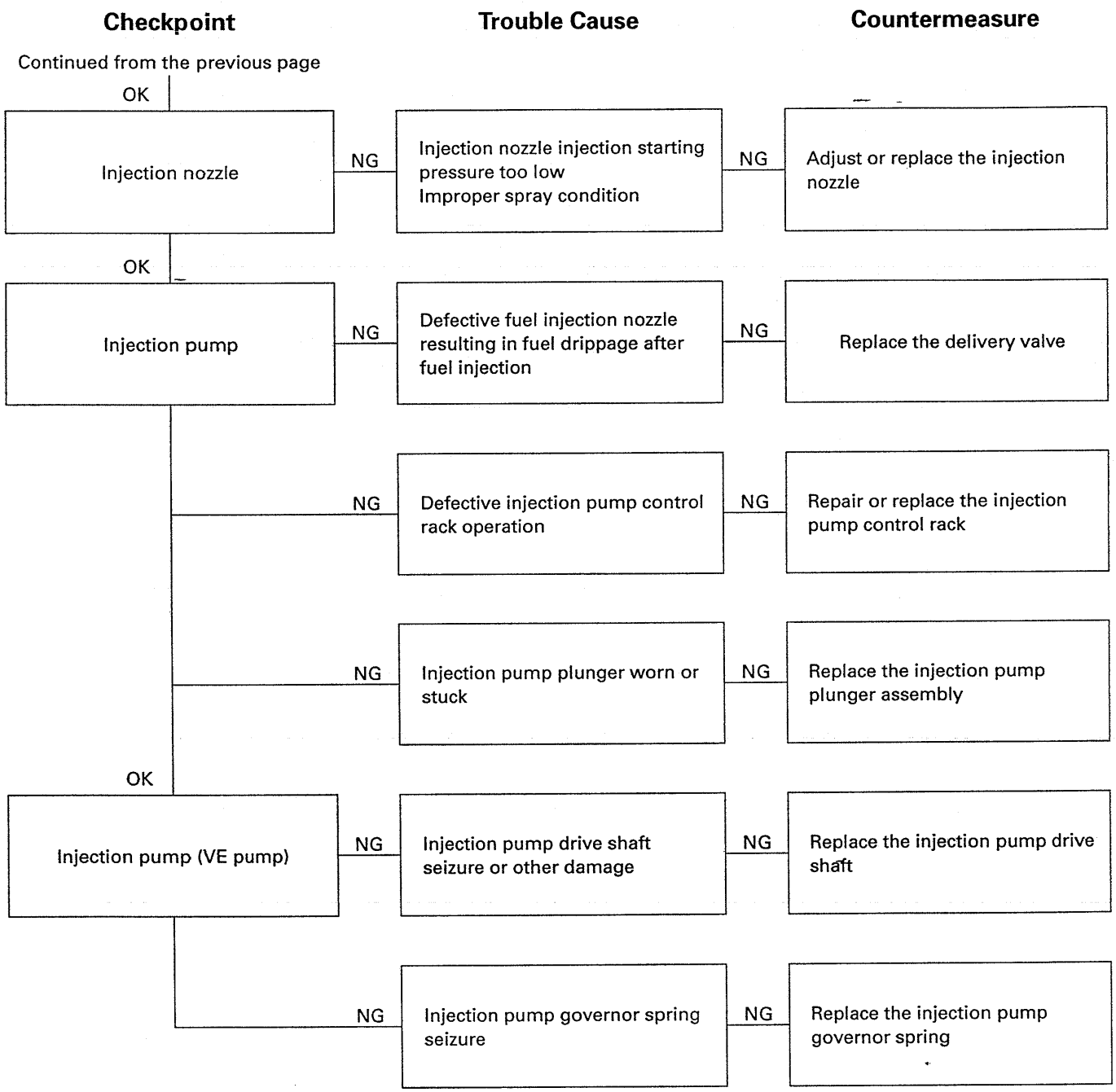
Use an circuit tester to test rectifier continuity.

1. Touch the circuit tester positive probe to the rectifier holder.
2. Touch the circuit tester negative probe to each of the diode terminals in turns.

1. HARD STARTING

3. ENGINE TURNS OVER BUT DOES NOT START

FUEL IS BEING DELIVERED TO THE INJECTION PUMP



5. EXCESSIVE OIL CONSUMPTION

Checkpoint		Trouble Cause		Countermeasure
Engine oil	NG	Engine oil unsuitable Too much engine oil	NG	Replace the engine oil Correct the engine oil volume
OK				
Oil seal and gasket	NG	Oil leakage from the oil seal and/or the gasket	NG	Replace the oil seal and/or the gasket
OK				
Air breather	NG	Clogged air breather	NG	Clean the air breather
OK				
Inlet and exhaust valves Valve seals	NG	Defective valve seals Worn valves stems and valve guides	NG	Replace the valve seals, the valves, and the valve guides
OK				
Piston rings	NG	Piston rings worn, broken or improperly installed	NG	Replace the piston rings or properly install
OK				
Cylinder liners	NG	Cylinder lines scored or worn	NG	Replace the cylinder liners

MEMO