

## **GENERAL REPAIR INSTRUCTIONS**

1. Before performing any service operation with the engine mounted, disconnect the grounding cable from the battery.  
This will reduce the chance of cable damage and burning due to short circuiting.
2. Always use the proper tool or tools for the job at hand.  
Where specified, use the specially designed tool or tools.
3. Use genuine ISUZU parts.
4. Never reuse cotter pins, gaskets, O-rings, lock washers, and self locking nuts. Discard them as you remove them. Replace them with new ones.
5. Always keep disassembled parts neatly in groups. This will ensure a smooth reassembly operation.  
It is especially important to keep fastening parts separate. These parts vary in hardness and design, depending on their installation position.
6. All parts should be carefully cleaned before inspection or reassembly.  
Oil ports and other openings should be cleaned with compressed air to make sure that they are completely free of obstructions.
7. Rotating and sliding part surfaces should be lubricated with oil or grease before reassembly.
8. If necessary, use a sealer on gaskets to prevent leakage.
9. Nut and bolt torque specifications should be carefully followed.
10. Always release the air pressure from any machine-mounted air tank(s) before dismantling the engine or disconnecting pipes and hoses. To not do so is extremely dangerous.
11. Always check and recheck your work. No service operation is complete until you have done this.

## **NOTES ON THE FORMAT OF THIS MANUAL**

This Workshop Manual is applicable to ISUZU industrial engine or engines which is or are stated in the title.

When more than two engine models are dealt in the manual, such engines have common parts and components as well as data and specifications, unless otherwise specified.

1. Find the applicable section by referring to the Table of Contents at the beginning of the Manual.
2. Common technical data such as general maintenance items, service specifications, and tightening torques are included in the "General Information" section.  
The section ENGINE ASSEMBLY is an exception. This parts are divided in three sections to facilitates indexing.
3. Each section is divided into sub-sections dealing with disassembly, inspection and repair, and reassembly.

## MAIN DATA AND SPECIFICATIONS

Engine Model	4JG2
Item	
Engine type	Water cooled, four-cycle, in-line, overhead valve
Combustion chamber type	Swirl chamber
Cylinder liner type	Dry
No. of cylinders - Bore x Stroke	4 - 95.4 x 107 (3.76 x 4.21)
Total piston displacement	3,059 (187)
Compression ratio (To 1)	20.1
*Engine dimensions	710 x 555 x 733 (28.0 x 21.9 x 28.9)
Length x Width x Height	
*Engine weight (Dry)	244 (538)
Fuel injection order	1 - 3 - 4 - 2
*Fuel injection timing (B.T.D.C.)	6
Specified fuel	Diesel fuel
Injection pump	Bosch VE type
Governor	Mechanical, type
*Low idle speed	675 - 725
Injection nozzle	Throttle type
Injection starting pressure	14.7 (150/2,130)
Fuel filter type	Cartridge paper element
Water sedimentor (if so equipped)	Sediment/water level indicating type
Compression pressure	2.94 (30/427)
Valve clearance (at cold)	0.40 (0.016)
Intake	
Exhaust	0.40 (0.016)
Lubrication method	Pressurized circulation
Oil pump	Trochoid type
Main oil filter type	Cartridge paper element, full flow
Partial oil filter	Not equipped
*Lubricating oil volume	7.5 (1.98)
Oil cooler (if so equipped)	Water cooled built in oil filter
Cooling method	Pressurized forced circulation
Coolant volume (engine only)	4.5 (1.19)
Water pump	Belt driven impeller type
Thermostat type	Wax pellet type
*Alternator	V-A 12 - 35
*Starter	V-KW 12 - 2.2

Specifications marked with an asterisk (\*) will vary according to engine application.

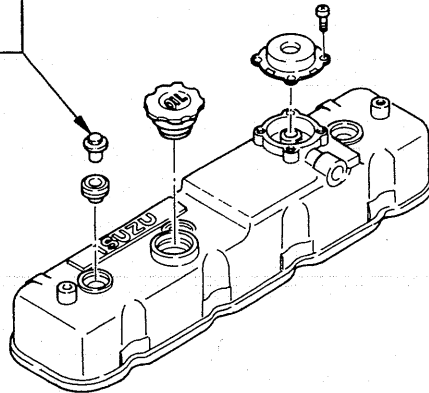


**SPECIAL PARTS FIXING NUTS AND BOLTS**

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

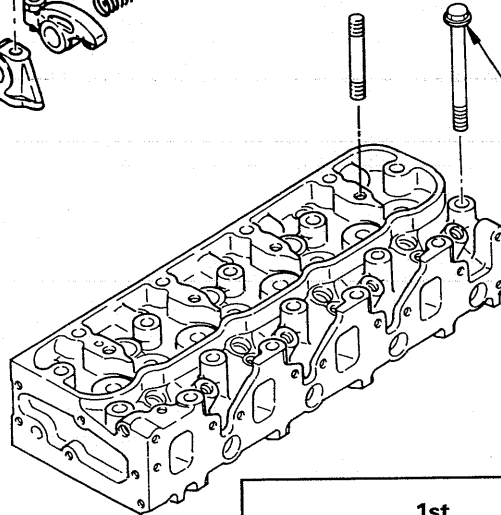
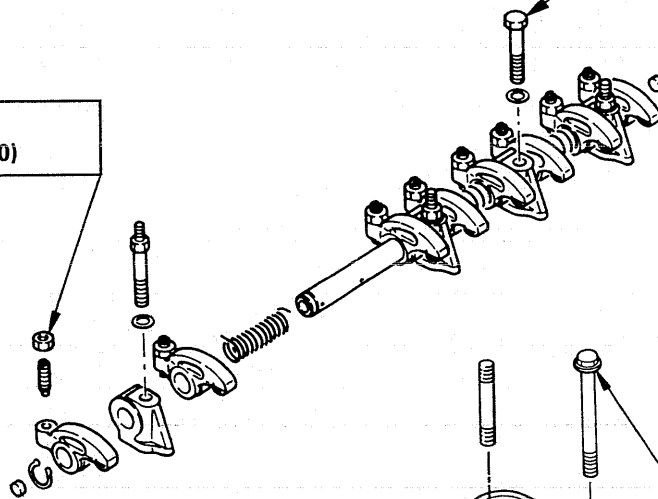
kg·m(lb.ft./N·m)

0.8 - 1.8  
(5.8 - 13.0/8 - 18)



5.0 - 6.0  
(36 - 43/49 - 59)

1.0 - 2.0  
(7 - 14/10 - 20)

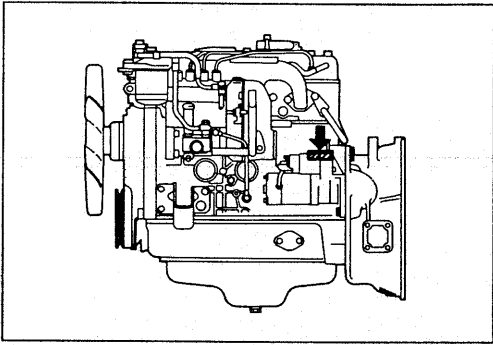


1st	2nd	3rd
4.5 - 5.5 (33 - 40/44 - 54)	60 - 75°	60 - 75°

Apply engine oil to thread portion

## MAINTENANCE

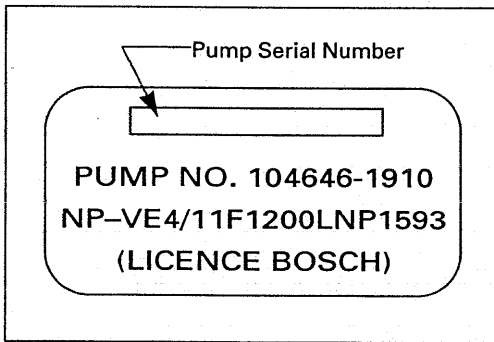
Servicing refers to general maintenance procedures to be performed by qualified service personnel. Maintenance interval such as fuel or oil filter changes should be referred to "INSTRUCTION MANUAL".



### MODEL IDENTIFICATION

#### Engine Serial Number

The engine number is stamped on the rear left hand side of the cylinder body.



### INJECTION PUMP IDENTIFICATION

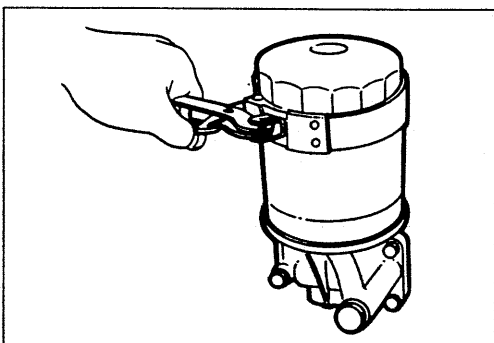
Injection volume should be adjusted after referring to the adjustment data applicable to the injection pump installed.

The injection pump identification number (A) is stamped on the injection pump identifications plate.

#### 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 reduced engine performance and engine damage.



### LUBRICATING SYSTEM

#### Main Oil Filter

##### Replacement Procedure

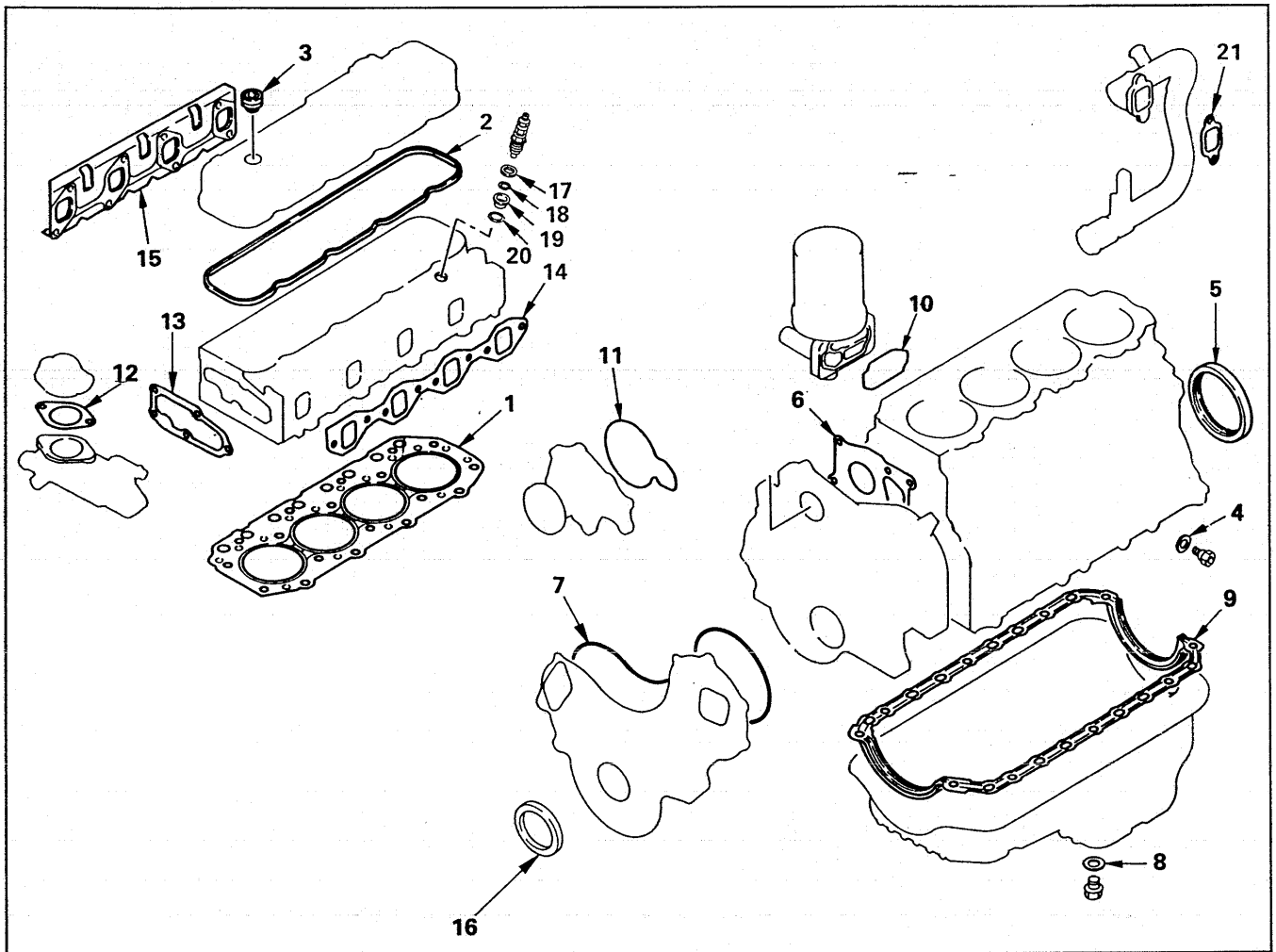
1. Loosen the drain plug to drain the engine oil.
2. Wait a few minutes and then retighten the drain plug.
3. Loosen the used oil filter by turning it counterclockwise with a filter wrench.

Filter Wrench

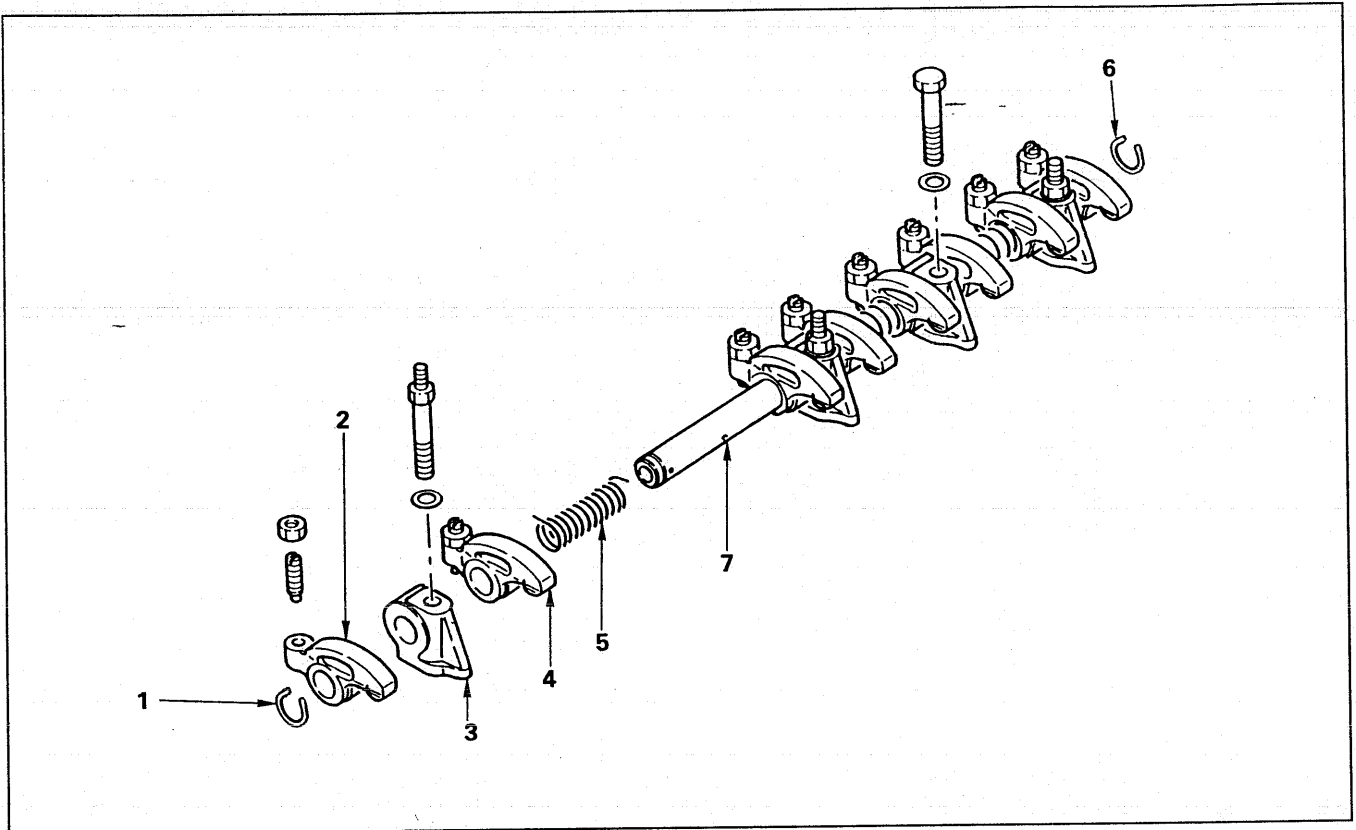


## ENGINE REPAIR KIT

All of the numbered parts listed below are included in the Engine Repair Kit.



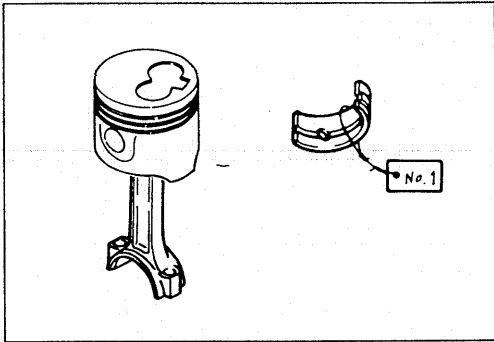
- |                               |                               |
|-------------------------------|-------------------------------|
| 1. Cylinder head gasket       | 11. Water pump gasket         |
| 2. Cylinder head cover gasket | 12. Water outlet pipe gasket  |
| 3. Head cover cap nut gasket  | 13. Thermostat housing gasket |
| 4. Drain cock gasket          | 14. Intake manifold gasket    |
| 5. Crankshaft rear oil seal   | 15. Exhaust manifold gasket   |
| 6. Gear case gasket           | 16. Crankshaft front oil seal |
| 7. Gear case cover gasket     | 17. Nozzle holder washer      |
| 8. Oil pan drain plug gasket  | 18. Corrugated washer         |
| 9. Oil pan gasket             | 19. Heat shield               |
| 10. Oil filter gasket         | 20. Heat shield washer        |
|                               | 21. Cyl. block side gasket    |

**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

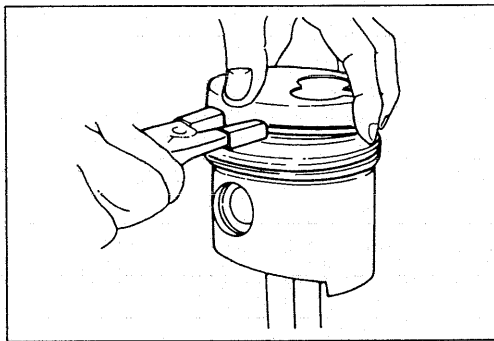


**Important Operations**



**1. Connecting Rod Bearing**

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



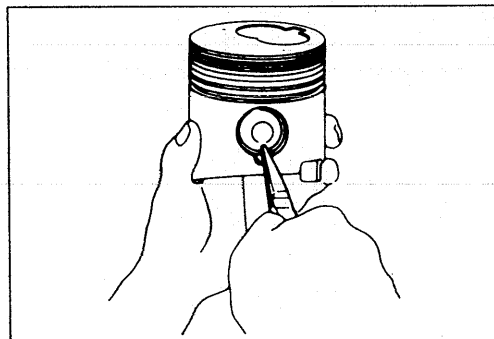
**2. Piston Ring**

- 1) Clamp the connecting rod in a vise.  
Take care not to damage the connecting rod.
- 2) Use a piston pin replacer to remove the piston rings.



Piston Ring Replacer

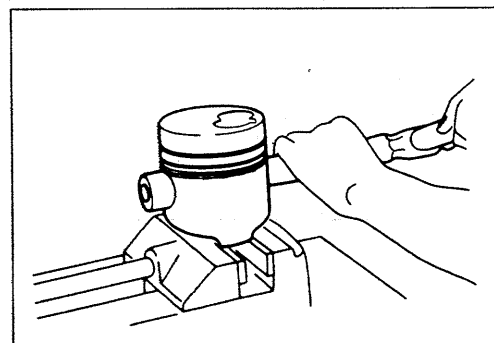
Do not attempt to use some other tool to remove the piston rings. Piston ring stretching will result in reduced piston ring tension.



**3. Piston Pin Snap Ring**

**4. Piston Pin**

Use a pair of snap ring pliers to remove the piston pin snap rings.

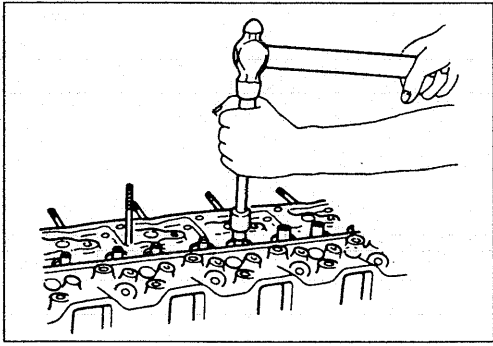


**5. Connecting Rod**

**7. Piston**

Tap the piston pin out with a hammer and a brass bar.

If the pistons are to be reinstalled, mark their installation positions by tagging each piston with the cylinder number from which it was removed.



**Valve Guide Installation**

1. Apply engine oil to the valve guide outer circumference.
2. Attach the valve guide replacer to the valve guide.
3. Use a hammer to drive the valve guide into position from the cylinder head upper face.

Valve Guide Replacer: 9-8523-1212-0



4. Measure the height of the valve guide upper end from the upper face of the cylinder head.

Valve Guide Upper End Height (H)

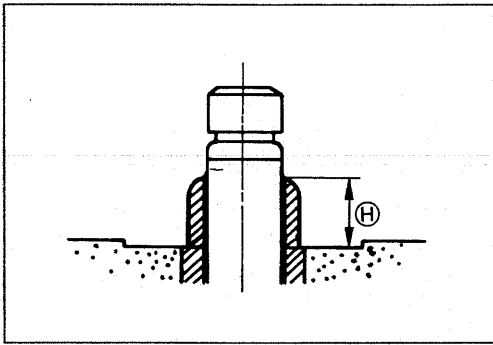
(Reference)

mm(in)

13.0 (0.51)
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**Note:**

If the valve guide has been removed, both the valve and the valve guide must be replaced as a set.



**VALVE AND VALVE SEAT INSERT**

**Valve Stem Outside Diameter**

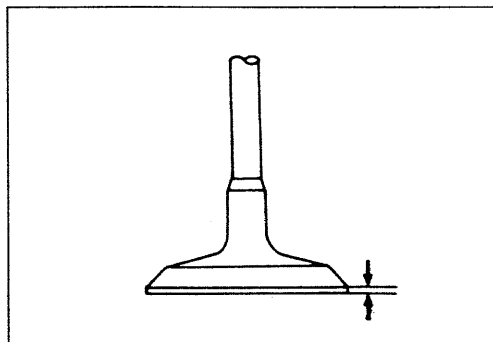
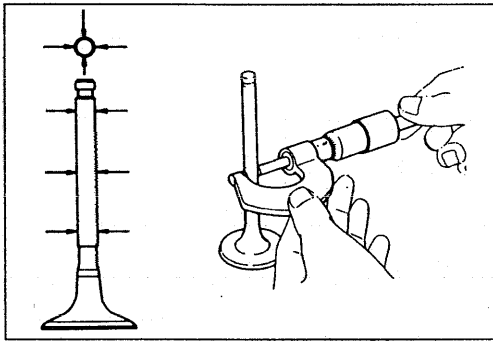
Measure the valve stem diameter at three points.

If the measured value is less than the specified limit, the valve and the valve guide must be replaced as a set.

Valve Stem Outside Diameter

mm(in)

	Standard	Limit
Intake Valve	7.946 – 7.961 (0.3128 – 0.3134)	7.88 (0.3102)
Exhaust Valve	7.921 – 7.936 (0.3118 – 0.3124)	7.850 (0.3099)



**Valve Thickness**

Measure the valve thickness

If the measured value is less than the specified limit, the valve and the valve guide must be replaced as a set.

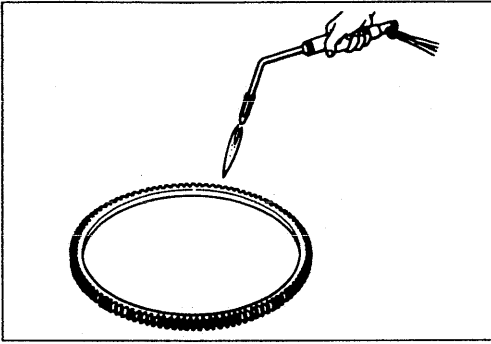
Intake and Exhaust Valve Thickness

mm(in)

	Standard	Limit
Inlet	1.41	1.1 (0.043)
Exhaust	1.39	1.1 (0.043)







### Ring Gear Installation

1. Heat the ring gear evenly with a gas burner to invite thermal expansion.

Do not allow the temperature of the gas burner to exceed 200°C (390°F).

2. Install the ring gear when it is sufficiently heated.

The ring gear must be installed with the chamfer facing the clutch.

#### Note:

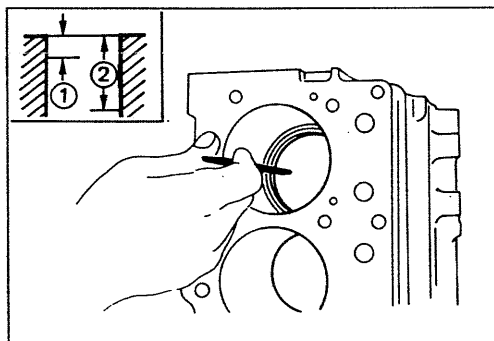
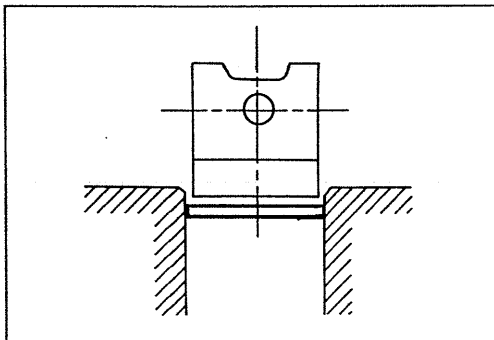
Another method of heating the ring gear to invite thermal expansion is to soak a rag in diesel fuel, wrap the diesel fuel soaked rag around the rim of the ring gear, and then light the rag.

## PISTON

### Piston Grade Selection and Cylinder Liner Bore Measurement



Refer to the Section "CYLINDER BODY", Item "Cylinder Liner Bore Measurement" for details on piston grade selection and cylinder or liner bore measurement.



## PISTON RING

### Piston Ring Gap

1. Insert the piston ring horizontally into the cylinder liner.
2. Use a piston inserted upside down to push the piston ring into the cylinder liner until it reaches either measuring point ① or measuring point ②. Cylinder liner diameter is the smallest at these two points.

Do not allow the piston ring to slant to one side or the other. It must be perfectly horizontal.

3. Use a feeler gauge to measure the piston ring gap.

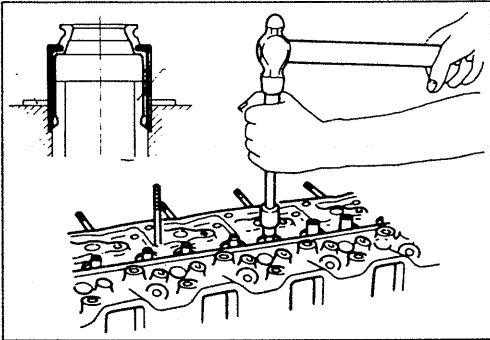
Measuring Point ① : 10 mm (0.39 in) or  
Measuring Point ② : 120 mm (4.72 in)

If the piston ring gap exceeds the specified limit, the piston ring must be replaced.





## Important Operations



### 3. Valve Stem Oil Seal

- 1) Apply a coat engine oil to the oil seal inner face.
- 2) Use an oil seal installer to install the oil seal to the valve guide.

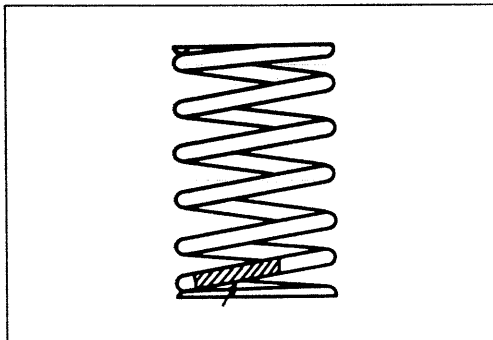
Oil Seal Installer: 5-8840-2033-0

### 4. Intake and Exhaust Valve



- 1) Apply a coat of engine oil to valve stem.
- 2) Install the intake and exhaust valves.
- 3) Turn the cylinder head up to install the valve springs.

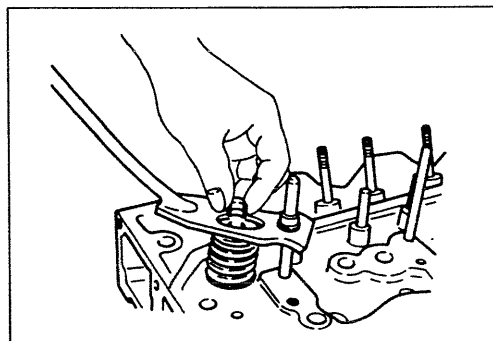
Take care not to allow the installed valves to fall free.



### 5. Valve Spring

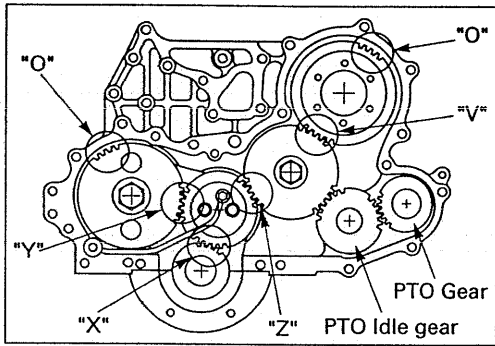
- 1) Turn the cylinder head up to install the valve springs.
- 2) Install the valve springs with the fine pitched end (painted pink) facing down.

Take care not to allow the installed valves to fall free.

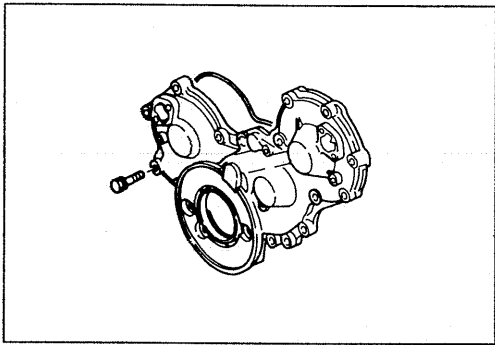


### 7. Split Collar

- 1) Use the spring compressor to push the valve spring into position.  
Spring Compressor: 9-8523-1423-0
- 2) Install the split collar to the valve stem.
- 3) Set the split collar by tapping around the bead of the collar with a rubber hammer.



**3. Idler Gear "B" and PTO Gear**



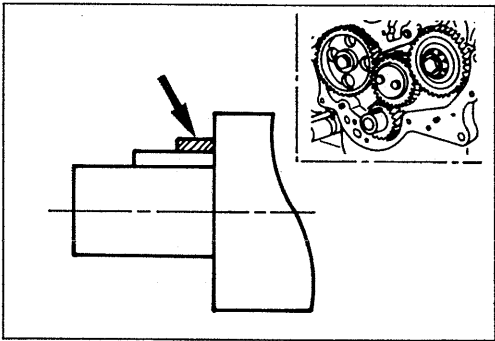
**5. Timing Case Cover**

- 1) Before installing the timing gear case, apply a 3 mm x 5 mm (0.12 in x 0.20 in) strip of sealant to the portion of the feather key indicated by the arrow in the illustration.
- 2) Check that the timing case cover O-ring is firmly inserted into the gear case groove.
- 3) Tighten the timing case cover bolts to the specified torque.



Timing Case Cover Bolt Torque kg·m(lb.ft/N·m)

M 8x1.25 (0.31x0.05) Bolt	1.4 – 2.4 (10 – 17/14 – 24)
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**7. Crankshaft Damper Pulley**

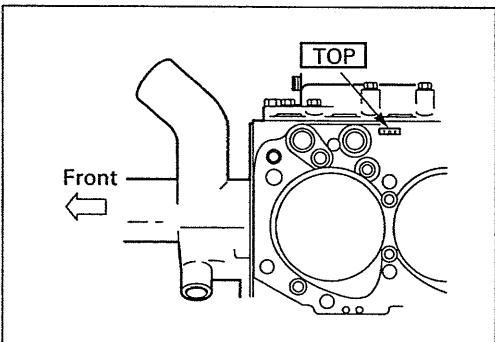
- 1) Block the flywheel ring gear with a piece of wood to prevent it from turning.
- 2) Tighten the crankshaft damper pulley to the specified torque.



Crankshaft Damper Pulley Bolt Torque kg·m(lb.ft/N·m)

20.1 – 24.5 (145 – 177/197 – 240)
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Take care not to damage the crankshaft damper pulley boss.



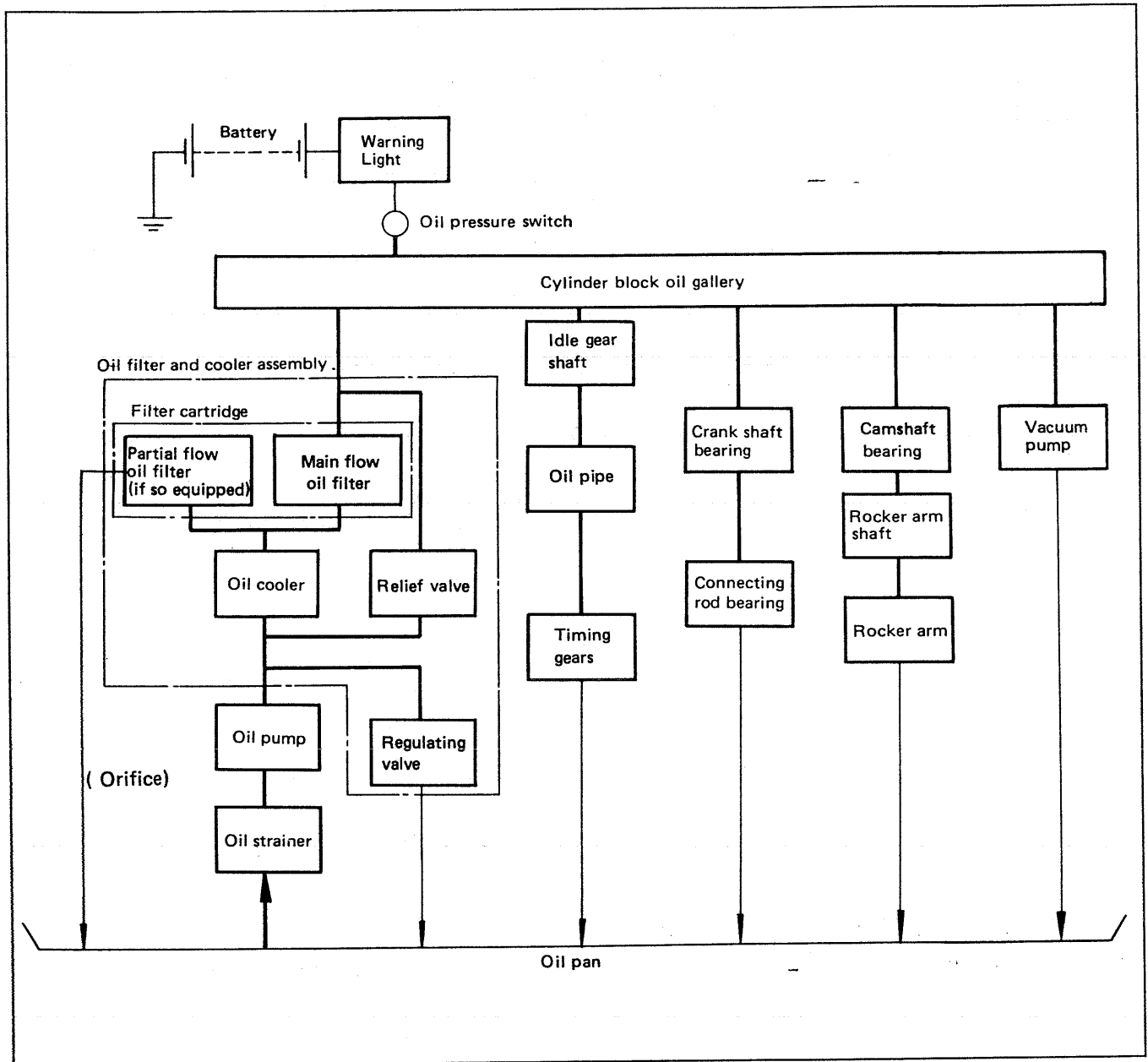
**8. Cylinder Head Gasket**

The cylinder gasket "TOP" mark must be facing up.  
Use the head gasket of the thickness 1.65 mm.  
(Part No. 897066-1970)



## GENERAL DESCRIPTION

## LUBRICATING OIL FLOW

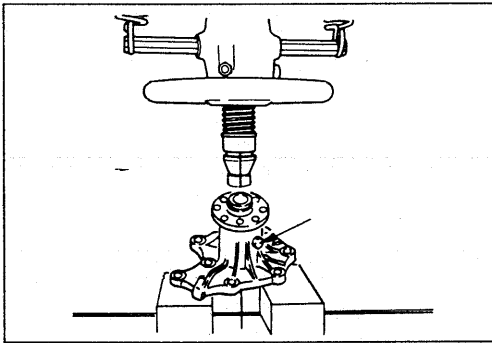


The 4J Series engine lubricating system is a full flow type.

Lubricating oil is pumped from the oil pump to the cylinder body oil gallery through the oil cooler and the oil filter. It is then delivered to the vital parts of the engine from the cylinder body oil gallery.



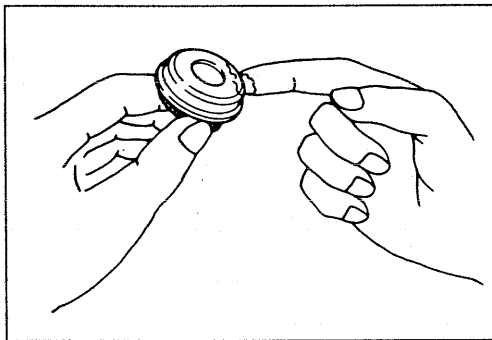
**Important Operations**



**3. Bearing Unit**

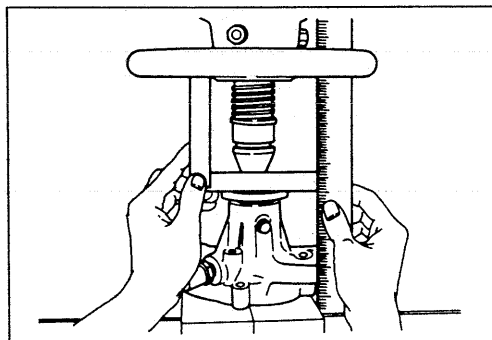
**4. Set Screw**

- 1) Align the bearing set screw hole with the pump body set screw hole.
- 2) Press the bearing unit into place.
- 3) Secure the bearing with the set screw.



**5. Impeller and Seal Unit**

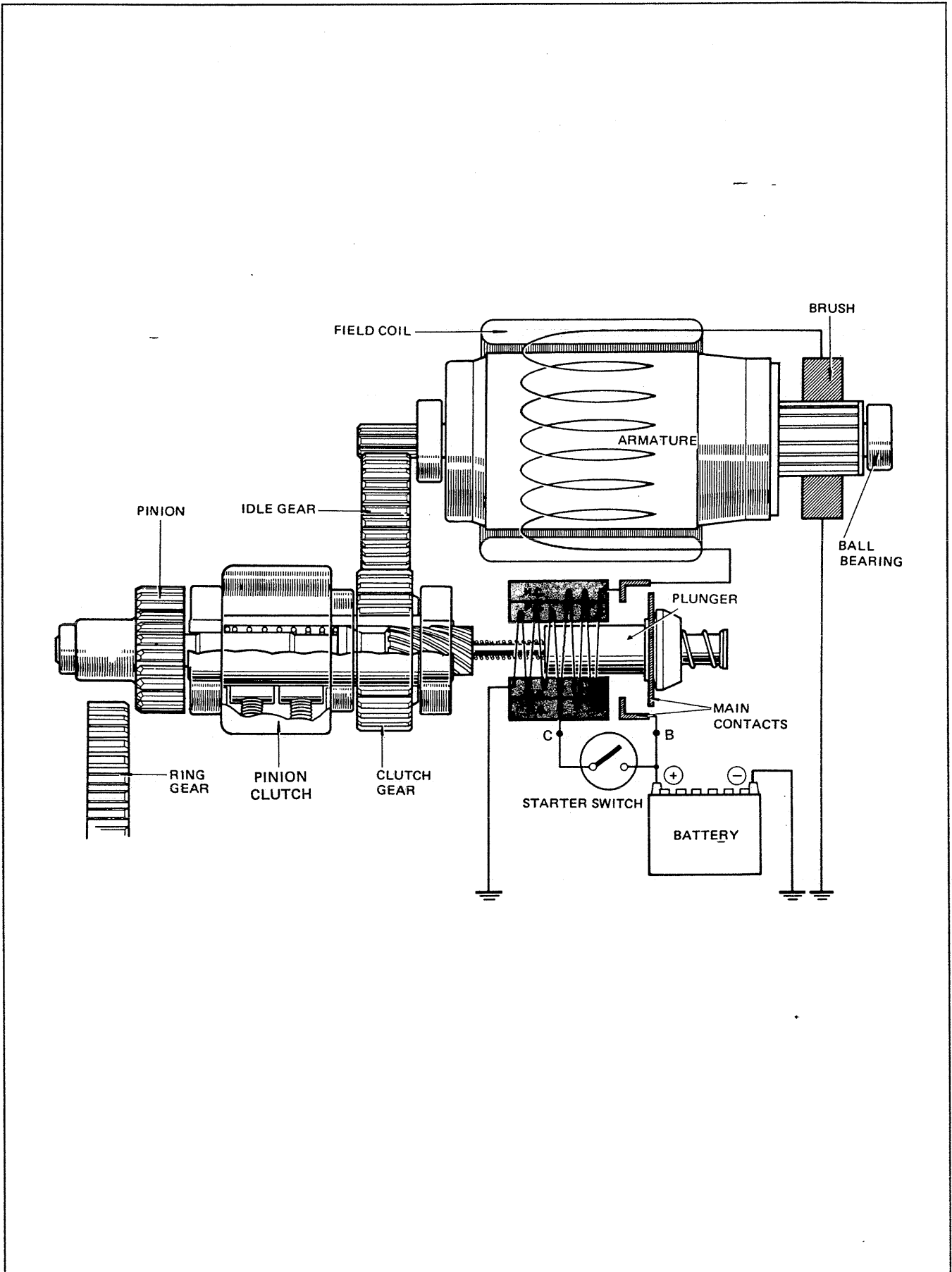
- 1) Apply a thin coat of liquid gasket to the seal unit outer periphery.
- 2) Install the seal unit.



**Note:**

1. The fan center and the impeller are installed to the water pump shaft with a press.  
Never attempt to remove and reinstall the fan center and the impeller a second time. Replace the entire water pump assembly.  
Removing and reinstalling the fan center and the impeller a second time may result in the breakdown of the water pump during engine operation and subsequent serious overheating problems.
2. The water pump assembly must be replaced whenever the fan center and impeller pressure force falls below 200 kg.
3. Do not attempt to strike the bearing into position with a hammer or similar object. Damage to the bearing will result.

CIRCUIT ARRANGEMENT



AREA

SQUARE INCHES TO SQUARE CENTIMETERS

in <sup>2</sup>	0	1	2	3	4	5	6	7	8	9	in <sup>2</sup>
	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	cm <sup>2</sup>	
—		6.452	12.903	19.355	25.806	32.258	38.710	45.161	51.613	58.064	—
10	64.516	70.968	77.419	83.871	90.322	96.774	103.226	109.677	116.129	122.580	10
20	129.032	135.484	141.935	148.387	154.838	161.290	167.742	174.193	180.645	187.096	20
30	193.548	200.000	206.451	212.903	219.354	225.806	232.258	238.709	245.161	251.612	30
40	258.064	264.516	270.967	277.419	283.870	290.322	296.774	303.225	309.677	316.128	40
50	322.580	329.032	335.483	341.935	348.386	354.838	361.290	367.741	374.193	380.644	50
60	387.096	393.548	399.999	406.451	412.902	419.354	425.806	432.257	438.709	445.160	60
70	451.612	458.064	464.515	470.967	477.418	483.870	490.322	496.773	503.225	509.676	70
80	516.128	522.580	529.031	535.483	541.934	548.386	554.838	561.289	567.741	574.192	80
90	580.644	587.096	593.547	599.999	606.450	612.902	619.354	625.805	632.257	638.708	90
100	645.160	651.612	658.063	664.515	670.966	677.418	683.870	690.312	696.773	703.224	100

SQUARE CENTIMETERS TO SQUARE INCHES

cm <sup>2</sup>	0	1	2	3	4	5	6	7	8	9	cm <sup>2</sup>
	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	in <sup>2</sup>	
—		0.155	0.310	0.465	0.620	0.775	0.930	1.085	1.240	1.395	—
10	1.550	1.705	1.860	2.015	2.170	2.325	2.480	2.635	2.790	2.945	10
20	3.100	3.255	3.410	3.565	3.720	3.875	4.030	4.185	4.340	4.495	20
30	4.650	4.805	4.960	5.115	5.270	5.425	5.580	5.735	5.890	6.045	30
40	6.200	6.355	6.510	6.665	6.820	6.975	7.130	7.285	7.440	7.595	40
50	7.750	7.905	8.060	8.215	8.370	8.525	8.680	8.835	8.990	9.145	50
60	9.300	9.455	9.610	9.765	9.920	10.075	10.230	10.385	10.540	10.695	60
70	10.850	11.005	11.160	11.315	11.470	11.625	11.780	11.935	12.090	12.245	70
80	12.400	12.555	12.710	12.865	13.020	13.175	13.330	13.485	13.640	13.795	80
90	13.950	14.105	14.260	14.415	14.570	14.725	14.880	15.035	15.190	15.345	90
100	15.500	15.655	15.810	15.965	16.120	16.275	16.430	16.583	16.740	16.895	100

VOLUME

CUBIC INCHES TO CUBIC CENTIMETERS

in <sup>3</sup>	0	1	2	3	4	5	6	7	8	9	in <sup>3</sup>
	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	cm <sup>3</sup> (cc)	
—		16.387	32.774	49.161	65.548	81.935	98.322	114.709	131.097	147.484	—
10	163.871	180.258	196.645	213.032	229.419	245.806	262.193	278.580	294.967	311.354	10
20	327.741	344.128	360.515	376.902	393.290	409.677	426.064	442.451	458.838	475.225	20
30	491.612	507.999	524.386	540.773	557.160	573.547	589.934	606.321	622.708	639.095	30
40	655.483	671.870	688.257	704.644	721.031	737.418	753.805	770.192	786.579	802.966	40
50	819.353	835.740	852.127	868.514	884.901	901.289	917.676	934.063	950.450	966.837	50
60	983.224	999.611	1015.998	1032.385	1048.772	1065.159	1081.546	1097.933	1114.320	1130.707	60
70	1147.094	1163.482	1179.869	1196.256	1212.643	1229.030	1245.417	1261.804	1278.191	1294.578	70
80	1310.965	1327.352	1343.739	1360.126	1376.513	1392.900	1409.288	1425.675	1442.062	1458.449	80
90	1474.836	1491.223	1507.610	1523.997	1540.384	1556.771	1573.158	1589.545	1605.932	1622.319	90
100	1638.706	1655.093	1671.481	1687.868	1704.255	1720.642	1737.029	1753.416	1769.803	1786.190	100

CUBIC CENTIMETERS TO CUBIC INCHES

cm <sup>3</sup> (cc)	0	1	2	3	4	5	6	7	8	9	cm <sup>3</sup> (cc)
	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	
—		0.0610	0.1220	0.1831	0.2441	0.3051	0.3661	0.4272	0.4882	0.5492	—
10	0.6102	0.6713	0.7323	0.7933	0.8543	0.9153	0.9764	1.0374	1.0984	1.1594	10
20	1.2205	1.2815	1.3425	1.4035	1.4646	1.5256	1.5866	1.6476	1.7086	1.7697	20
30	1.8307	1.8917	1.9527	2.0138	2.0748	2.1358	2.1968	2.2579	2.3189	2.3799	30
40	2.4409	2.5020	2.5630	2.6240	2.6850	2.7460	2.8071	2.8681	2.9291	2.9901	40
50	3.0512	3.1122	3.1732	3.2342	3.2952	3.3563	3.4173	3.4783	3.5393	3.6004	50
60	3.6614	3.7224	3.7834	3.8444	3.9055	3.9665	4.0275	4.0885	4.1496	4.2106	60
70	4.2716	4.3326	4.3937	4.4547	4.5157	4.5767	4.6377	4.6988	4.7598	4.8208	70
80	4.8818	4.9429	5.0039	5.0649	5.1259	5.1870	5.2480	5.3090	5.3700	5.4310	80
90	5.4921	5.5531	5.6141	5.6751	5.7362	5.7972	5.8582	5.9192	5.9803	6.0413	90
100	6.1023	6.1633	6.2243	6.2854	6.3464	6.4074	6.4684	6.5295	6.5905	6.6515	100