KOBELCO

SERVICE MANUAL

ISUZU INDUSTRIAL DIESEL ENGINE

K904 II
K905LC II

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4BD1

IDE-2041-00 02/87

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ISUZU

WORKSHOP MANUAL INDUSTRIAL DIESEL ENGINE 4B·6B SERIES

4BB1·4BD1·6BB1·6BD1·6BG1 4BD1T·6BD1T·6BG1T MODELS

FOREWORD

This Workshop Manual is designed to help you perform necessary maintenance, service, and repair procedures on applicable Isuzu industrial engines.

Information contained in this Workshop Manual is the latest available at the time of publication.

Isuzu reserves the right to make changes at any time without prior notice.

The Table of Contents at the right hand side of this page shows you the general arrangement of the material in this Workshop Manual. A more detailed Table of Contents precedes each individual section.

The black spot at the right hand side of some pages indicates the first page of a given section.

This Workshop Manual is applicable to 1986 and later models.

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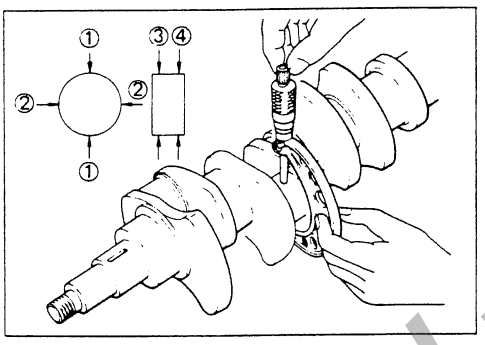
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CRANKSHAFT

Crankshaft and Bearing Inspection

1. Inspect the crankshaft journal surfaces and the crank pin surfaces for excessive wear and damage.
2. Inspect the oil seal fitting surfaces of the crankshaft front and rear ends for excessive wear and damage.
3. Replace or repair the crankshaft if any excessive wear or damage is discovered.
4. Inspect the crankshaft oil ports for obstructions.
5. Use high pressure air to clean the oil ports if necessary.



Crankshaft Journal and Crankpin Outside Diameter

1. Use a micrometer to measure the crankshaft journal outside diameter across points ① — ① and ② — ② .
2. Use the micrometer to measure the crankshaft journal outside diameter at the two points (③ and ④).
3. Repeat steps 1 and 2 to measure the crankshaft outside diameter.

   If the measured crankshaft journal diameter and/or the crankpin outside diameter are less than the standard value, the crankshaft must be reground.

mm(in)

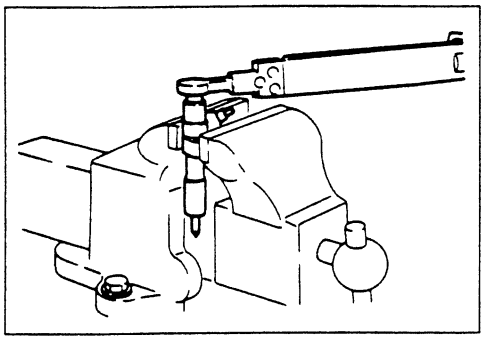
6B Engines only	Position at	Standard
Crankshaft Journal Diameter	Center Bearing Only	79.905 — 79.925 (3.1483 — 3.1490)
	Other Bearings	79.919 — 79.939 (3.1488 — 3.1496)

mm(in)

4B Engines only	Position at	Standard
Crankshaft Journal Diameter	All Bearings	79.905 — 79.925 (3.1483 — 3.1490)

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11. Nozzle Holder Cap Nut

kg·m(lb.ft)

Cap Nut Torque	4.5 ± 0.5 (32.5 ± 3.6)

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9. Measurement criteria are defined by the terms "standard" and "limit".

   A measurement falling within the "standard" range indicates that the applicable part or parts are serviceable.

   "Limit" should be thought of as an absolute value.

   A measurement which is outside the "limit" indicates that the applicable part or parts must be either repaired or replaced.

10. Components and parts are listed in the singular form throughout the Manual.
11. Directions used in this Manual are as follows:

    Front

    The cooling fan side of the engine viewed from the flywheel.

    Right

    The injection pump side of the engine.

    Left

    The exhaust manifold side of the engine.

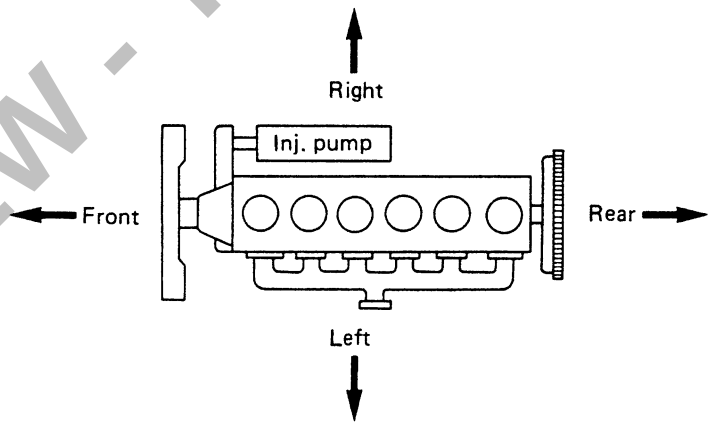
    Rear

    The flywheel side of the engine.

    Cylinder numbers are counted from the front of the engine.

    The front most cylinder is No. 1 and rear most cylinder is No. 4 or No. 6.

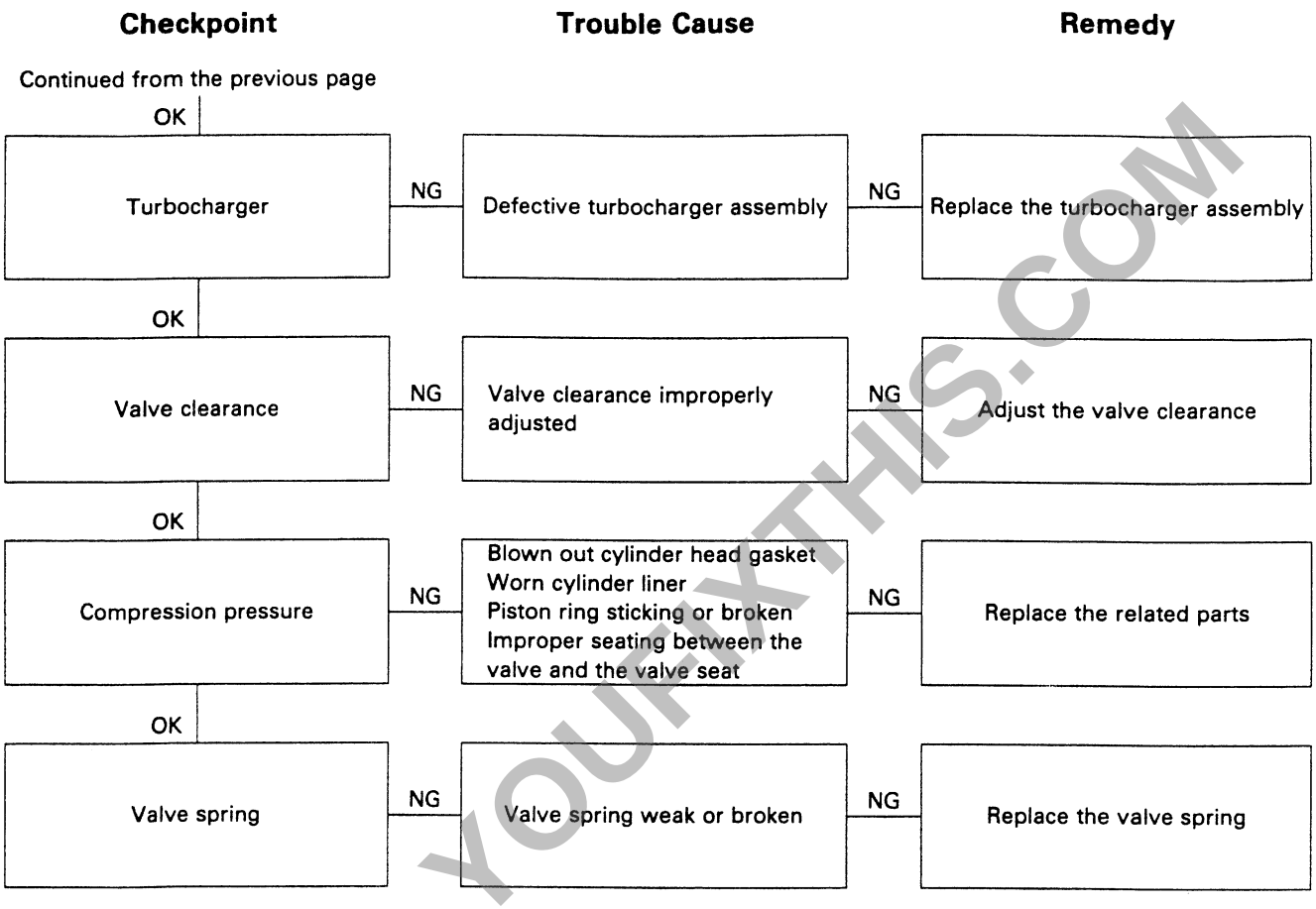
    The engine's direction of rotation is counterclockwise viewed from the flywheel.



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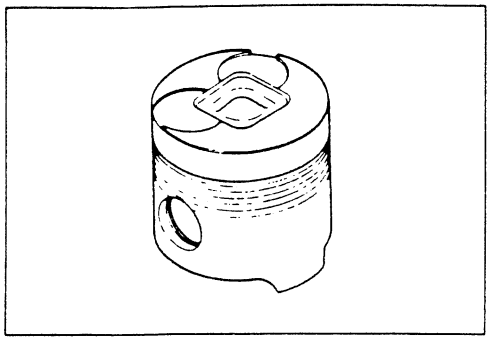
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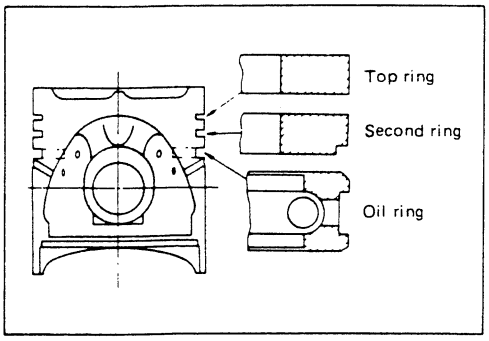
EXCESSIVE FUEL CONSUMPTION



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4) Pistons

The tapered slipper pistons are constructed from Low-ex aluminum alloy.

The piston skirt is cut at a right angle to prevent side thrust from being applied to the piston flank. This also reduces piston weight and friction area.

The head of the piston forms a square combustion chamber. Ideal combustion is provided at all engine operating speeds.

Turbocharged B series and 6BG1 engines have a special ring trigger cast into the top piston ring groove. This improves the ring groove's anti-wear characteristics.

Each piston has two compression rings and one oil ring.

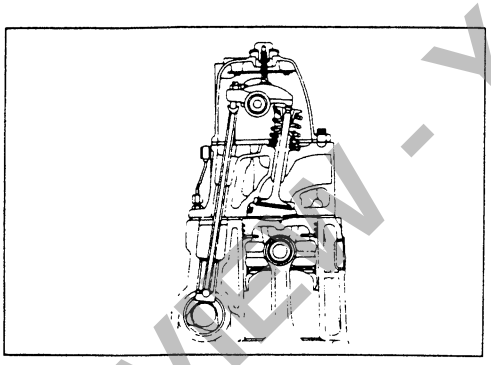
The compression rings have an mark at the top to indicate direction of installation.

The piston rings are made of special cast iron which provides superior durability.

The top compression ring has hard chrome plated on the top, bottom, and back surfaces. The ring is not chamfered.

The second compression ring is tapered and continuously undercut.

The oil ring has a coil expander.



5) Valve Mechanism

All engines use a standard overhead valve configuration.

6B series engines have six bearings supporting the camshaft and 4B series engines have four.

The bearings pressed into the camshaft holes in the cylinder body.

An oil pump drive gear is installed to the camshaft center.

Tappets are made of special cast iron. The tappet driven surface has a chilled layer coated with phosphate film. This provides superior initial conforming.

Rocker arms are also made of special cast iron with a chilled rocker surface layer.

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FUEL FILTER

MAIN OIL FILTER

WATER SEDIMENTOR

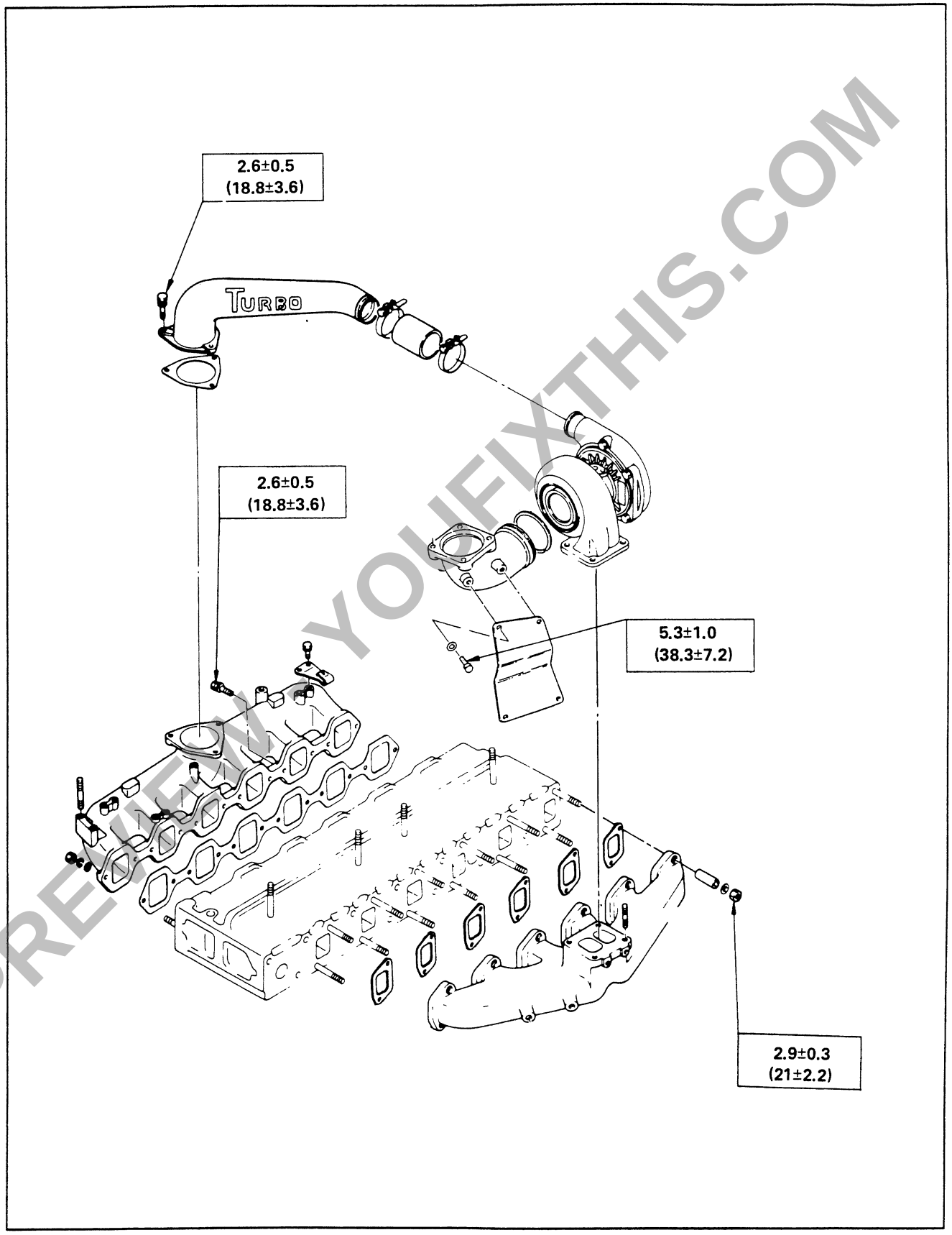
Refer to "FUEL SYSTEM" on Page 2-3, 4 of the "MAINTENANCE" Section of this Workshop Manual.

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Intake and Exhaust Manifold

kg·m(lb.ft)



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ENGINE SHOP MANUAL

WORKSHOP MANUAL

4BD1

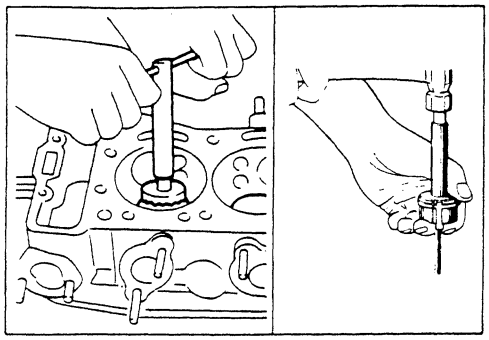
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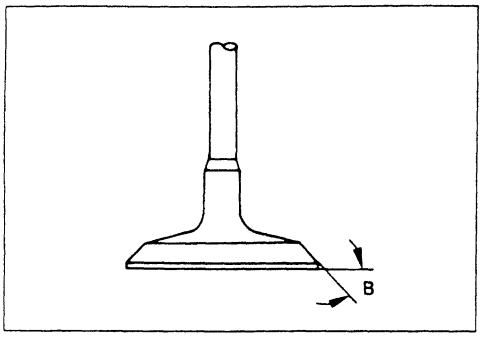


Angle Location	Standard
Intake Valve Seat Angle Ⓑ	45°
Exhaust Valve Seat Angle Ⓑ	45°

Note:

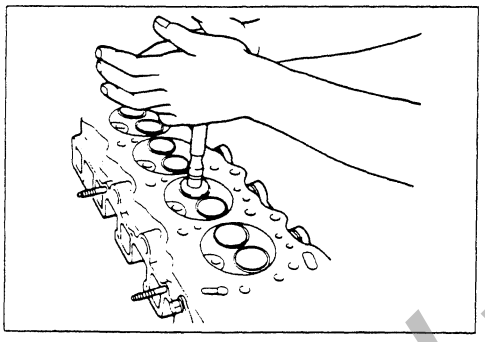
Use an adjustable valve cutter pilot.

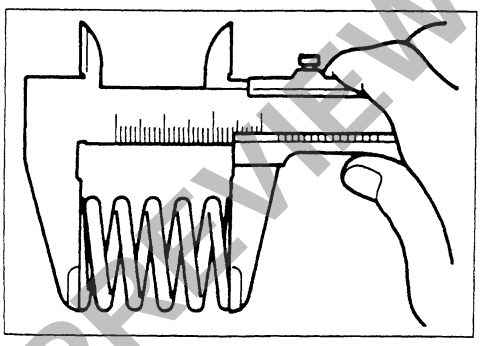
Do not allow the cutter pilot to wobble inside the valve guide.



3. Apply abrasive compound to the valve seat insert surface.
4. Insert the valve into the valve guide.
5. Hand lap the valve and the valve seat with a lapping cup.

   This will provide optimum valve and valve seat contact for effective gas sealing.
6. Check that the valve contact width is correct.
7. Check that the valve seat insert surface is in contact with the entire circumference of the valve.





VALVE SPRING

Valve Spring Free Length

Use a vernier caliper to measure the valve spring free length.

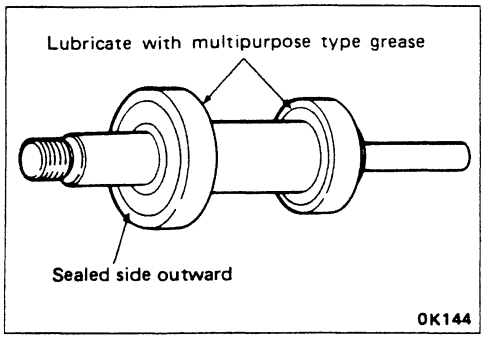
If the measured value is less than the specified limit, the valve spring must be replaced.

mm(in)

	Standard	Limit
Exhaust and Intake Valve Spring Free Length	49.0 (1.930)	47.0 (1.852)

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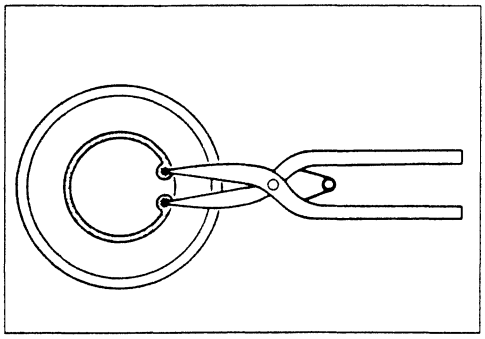


Important Operation

1. Spindle, Bearing, and Spacer

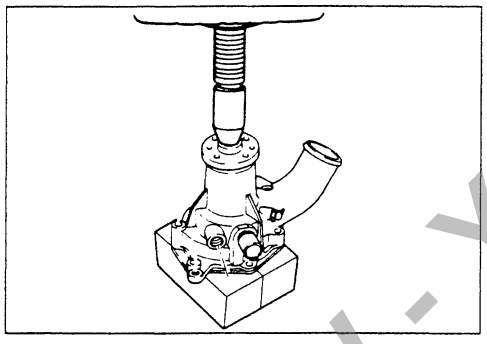
Lubricate the bearing with multipurpose grease.

Use a bench press to install the spindle, the bearing and the spacer.



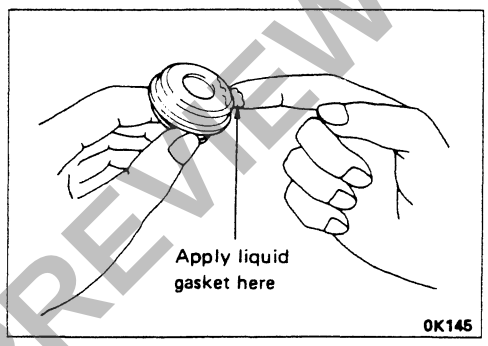
2. Snap Ring

Use a pair of snap ring pliers to install the snap ring.



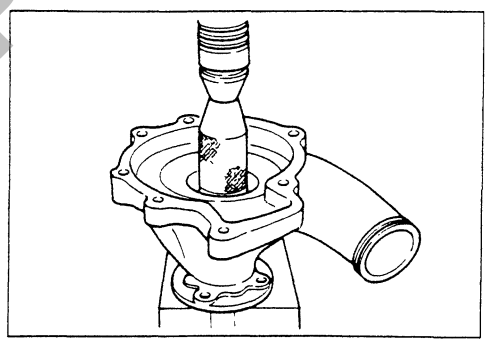
4. Pulley Center

Use a bench press and a bar to install the pulley center.



5. Seal Unit, Washer and Seal

1) Apply a thin coat of liquid gasket to the seal unit outer periphery before installation.



2) Use a bench press and a bar to install the seal unit into the pump body.

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