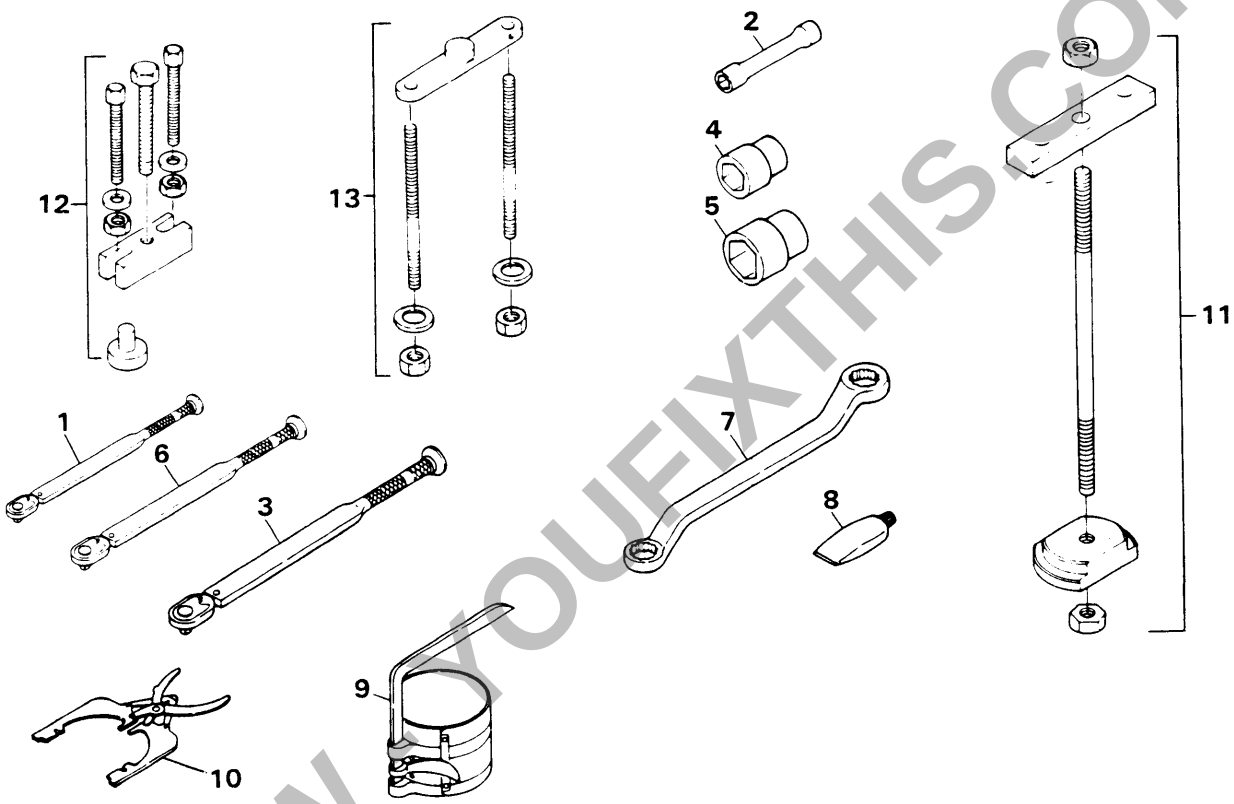
6-2 Workshop Tools

For more important overhaul work, use the tools specified by YANMAR or the equivalent. YANMAR engines are designed so that even untrained local mechanics can usually check and maintain them with tools for general use, without using any special disassembly tools. However, workshops which undertake major overhauling work for TM-series engines should be furnished with at least the following tools.



WORKSHOP TOOLS LIST

No.	Yanmar Part No.	Description	No.	Yanmar Part No.	Description
1	123340-92600	Torque wrench 230 QLK 0.7 ~ 2.3 kg-m for F.O. injectionvalve	7	28160-190220	Eye wrench 19 × 22 for F.O. injection
2	123340-92620	Socket B = 12 for F.O. inj. valve torque wrench	8	97775-500050	Paste type lubricant containing MOS_2 (MOS_2 = Molibdenum disulfide) for injection valve etc. 50 gr.
3	123340-92630	Torque wrench 2,800 QLK 6 ~ 28 Kg-m for bearing cap bolt.	9	95550-002476	Piston with ring insert tool 2476N
4	12330-92640	Socket B = 19 VS4190 for con-rod bolt	10	95550-002468	Piston ring removal & insertion tool 2467C
5	123340-92650	Socket B = 22 VS6620 for head nut, bearing cap bolt	11	723340-93590	Cylinder liner remover assy.
6	123340-92670	Torque wrench 1,800 QLK Max. 18 Kg-m for head, con-rod bolt	*12	723210-92530	Clutch spline metal puller assy.
			*13	723210-92540	Reverse gear box puller assy.

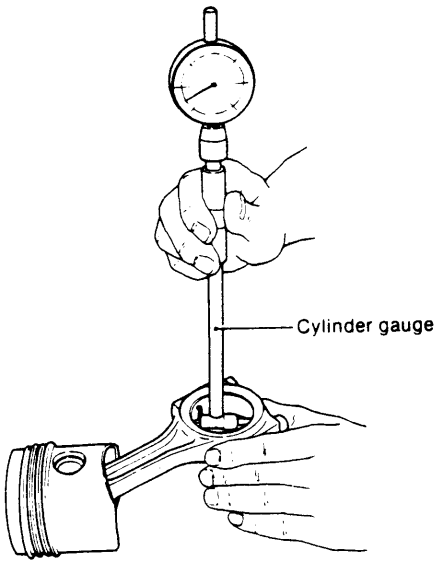
Note: * Reverse gear box puller and clutch spline metal puller are only used for 2 & 3TM series.

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5-3.1 Crank pin bushing inside diameter

Tighten the large end of the connecting rod to the prescribed torque with the connecting rod bolts, and measure the inside diameter of the crank pin bushing. Replace the bushing if the inside diameter or the clearance at the crank pin part exceed the wear limit.



mm (in.)

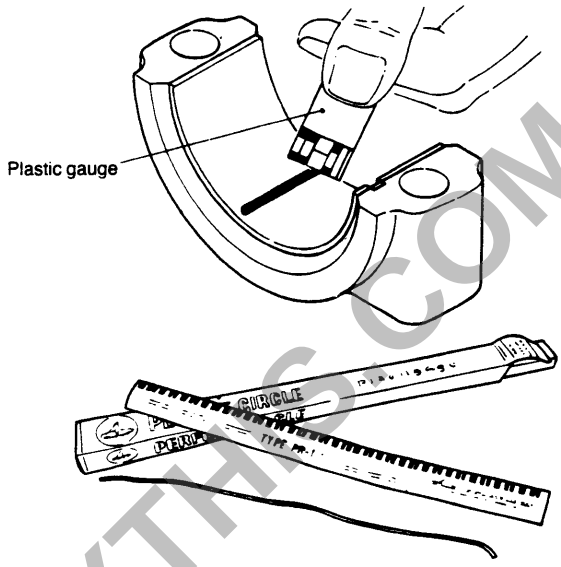
	Maintenance standard	Wear limit
Crank pin bushing inside diameter	Ø62.00 ~ 62.045 (Ø2.4409 ~ 2.4427)	Ø62.12 (Ø2.4457)
Crank pin and bushing oil clearance	0.036 ~ 0.095 (0.00142~0.00374)	0.2 (0.0079)
Connecting rod bolt tightening torque	10 kg-m (72.41 ft-lb)	

NOTE: The crank pin bushing inside diameter must always be measured with the connecting rod bolts tightened to the prescribed torque.

5-3.2 Crank pin and bushing clearance (oil clearance)

Since the oil clearance affects both the durability of the bushing and lubricating oil pressure, it must always be the prescribed value. Replace the bushing when the oil clearance exceeds the wear limit.

(1) Measurement
1) Thoroughly clean the inside surface and crank pin section of the crank pin bushing.
2) Install the connecting rod on the crank pin section of the crankshaft and simultaneously fit a plastic gauge on the inside surface of the crank pin bearing.



3) Tighten the connecting rod bolt to the prescribed tightening torque.
Connecting rod tightening torque: 10.0kg-m (72.41 lb-ft)
4) Loosen the connecting rod bolt and slowly remove the connecting rod big end cap, then measure the crushed plastic gauge with a gauge.
5) The crank pin and bushing clearance (oil clearance) may also be measured with a micrometer, in addition to measurement with a plastic gauge. This method is used to measure the outside diameter of the crankshaft crank pin section and the inside diameter of the connecting rod's big end bushing, when the connecting rod bolt has been tightened to the prescribed torque and the difference between the large end bushing inside diameter and crank pin outside diameter is set as the oil clearance.
6) Under size bushing

(2) Measurement precautions
1) Be careful that the plastic gauge does not enter the crank pin oil hole.
2) Be sure that the crankshaft does not turn when tightening the connecting rod bolt.

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Name of tool	Shape and size	Application
		
		

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2. Specifications

2−1 Engine

Model name	2TM (G,GG)	3TM (G,GG)	4TM (G,GG,GGG)
Type	4−cycle, vertical, natural aspirated diesel engine		

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2TM,3TM,4TM

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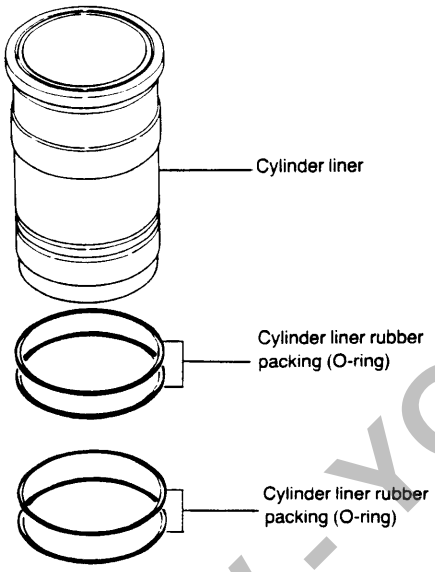
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2. Cylinder Liner

2-1 Construction

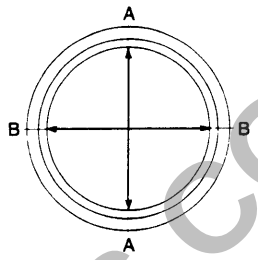
High-quality special high-phosphorous cast iron wet type cylinder liners are used. The outside of the cylinder liner is machined to a uniform thickness to prevent local heat expansion and improve durability. Four O-rings (rubber packing) are installed at the cylinder liner neck and skirt to prevent cylinder liner deformation and distortion, and to keep cooling water from leaking into the crankcase.

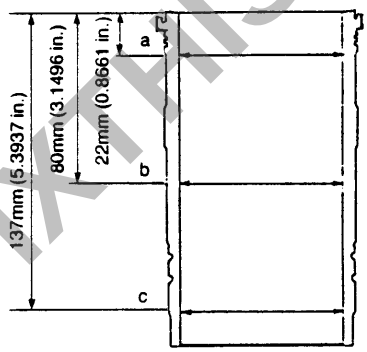


Since the piston and piston rings constantly slide against the cylinder liner while the engine is in operation, and side pressure is applied to the cylinder liner by the movement of the crankshaft, eccentric wear occurs easily.
Also, if lubrication and cooling are insufficient, the inner surface will be damaged or rusted. Inspect the inner surface and replace the cylinder liner if the surface is noticeably damaged or rusted.

2-2.1 Cylinder liner bore diameter measurement

Measure the bore diameter of the cylinder liner with a cylinder gauge at the positions shown in the figure.
Replace the cylinder liner when the measured value exceeds the wear limit.

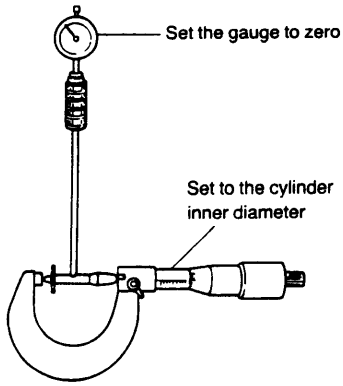


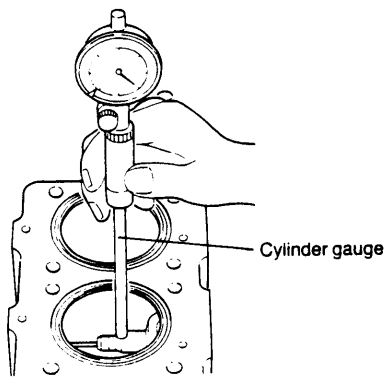


mm (in.)

	Standard	Wear limit
Cylinder liner	Ø100.00~100.03 (Ø3.9370~3.9382)	Ø99.8 (Ø3.9291)

NOTE: Be sure to measure A-A, B-B and a,b and c.





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6-2.3 Main bearings

(1) Inspecting the main bearing
Check for flaking, seizure or burning of the contact surface and replace if necessary.

(2) Measuring the inner diameter of the metal
Tighten the cap to the specified torque and measure the inner diameter of the metal.

NOTE: When assembling the bearing cap, keep the following in mind.
1) The lower metal (cap side) has no oil groove.
2) The upper metal (cylinder block side) has an oil groove.
3) Check the cylinder block alignment No.
4) The "FW" on the cap lies on the flywheel side.

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4. Fuel Injection Nozzle

4-1 Construction

When fuel oil pumped by the fuel injection pump reaches the injection nozzle, it pushes up the nozzle valve (held down by a spring), and is injected into the combustion chamber at high

4-3 Functioning

Fuel from the fuel injection pump passes through the oil port in the nozzle holder, and enters the nozzle body reservoir.
When oil reaches the specified pressure, it pushes up the

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4. Reassembly

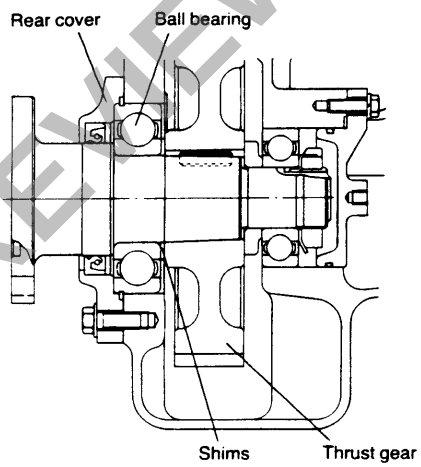
Reverse disassembly steps described on the preceding pages. Note the reassembly instructions below.

(1) If any oil is left on the friction surfaces, thoroughly clean.
(2) If removed, replace any paper packing.
(3) Note torque specifications below.

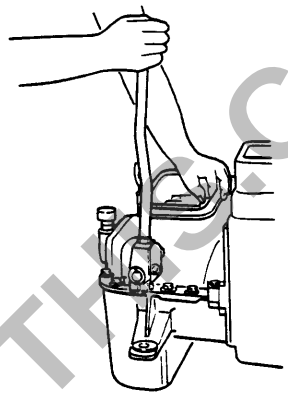
		kg-m (ft-lb)
Clutch housing cover-to-front Clutch housing half nuts	w3/8	4.5~5.5 (32.63~39.88)
Spline metal retaining bolt		13.5 (97.88)
Reversing gear shaft-to-clutch housing cover bolts	w3/8	4.5~5.5 (32.63~39.88)
Reversing gear shaft lock nut		25 (181.25)
Thrust shaft lock nut		25~28 (181.25~203)
Thrust shaft rear cover retaining bolts	M10	4.5~5.0 (32.63~36.25)
Lower case-to-oil pan and cylinder block bolts	M10	4.5~5.0 (32.63~36.25)
Upper case-to-lower case bolts	M10	4.5~5.0 (32.63~36.25)
Upper case-to-cylinder block bolts	M10	4.5~5.0 (32.63~36.25)
Reversing gear shaft bearing housing retaining bolts	M10	4.5~5.5 (32.63~39.88)

(4) Bend over any lock washer after tightening the locknut.
(5) Be sure the thrust gap of the thrust shaft is 0.138 ~ 0.392mm (0.00543 ~ 0.01543 in.).

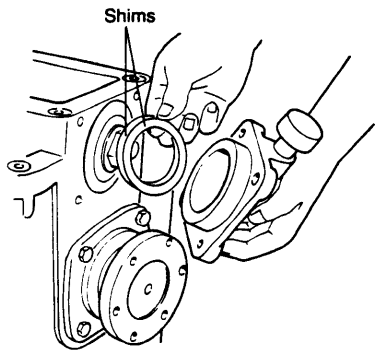
NOTE: Remove or attach shims between the rear bearing and thrust gear to adjust the thrust gap.



(6) Be sure the thrust gap of the reversing gear shaft is 0.2 ~ 0.4mm (0.008 ~ 0.016 in.).



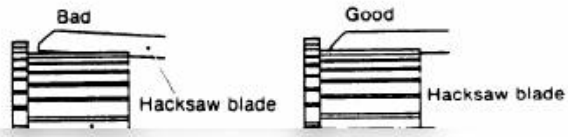
NOTE: Removing or attaching shims between the bearing and bearing case.



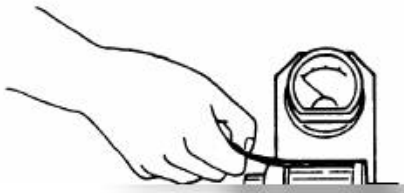
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(2) Mica undercut
Check the mica undercut, correct with a hacksaw blade when the undercut is too shallow.



Checking armature windings for insulation defects.



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