12.1.1 Wiring diagram

For B-type instrument panel



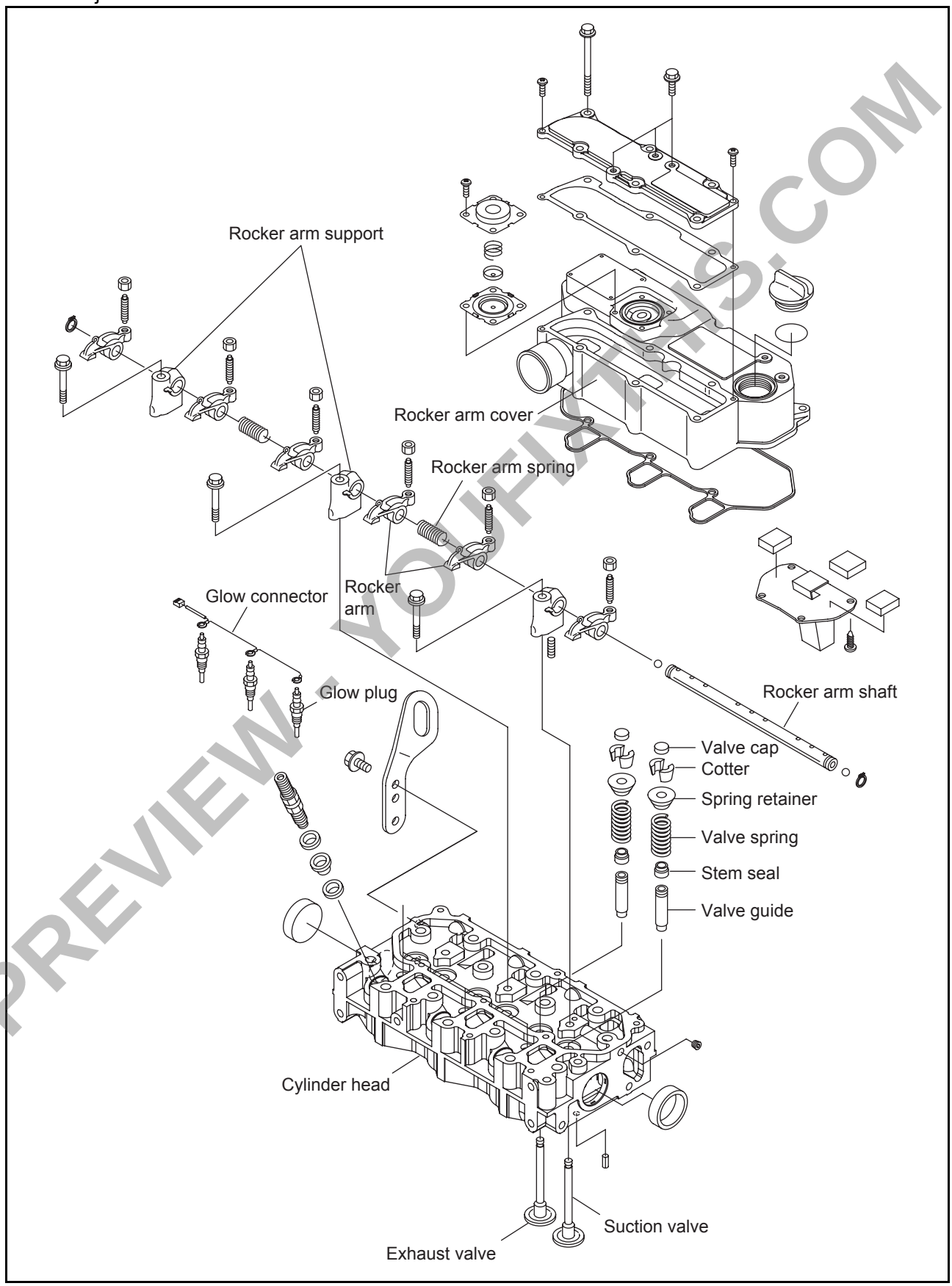
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5.2 Cylinder head

The cylinder head is of 3-cylinder integral construction, mounted with 14 bolts. Special alloy stellite with superior resistance to heat and wear is fitted on the seats, and the area between the valves is cooled by the water jet.



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14. Tightening torque for bolts and nuts

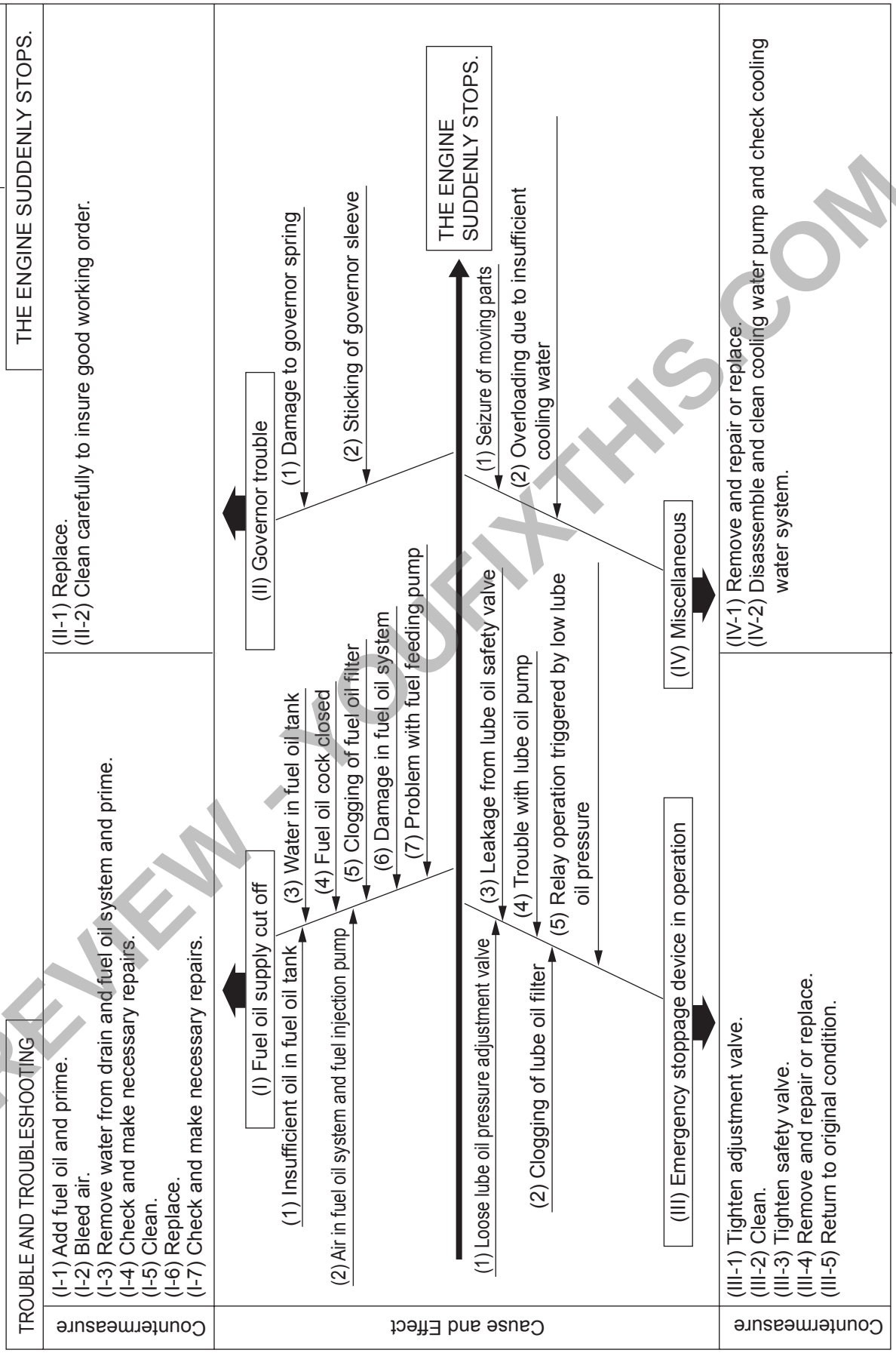
14.1 Main bolt and nut

		Thread diameter	Lube oil application	Torque

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2. Inspection and adjustment

2.1 Periodic maintenance schedule

The engine periodic inspection timing is hard to determine as it varies with the application, load status, qualities of the fuel and lubricating oils used and handling status. General rules are described here.

○ : User-maintenance ◎ : Parts replacement ● : Shop-inspection

System	Item		Before starting	*2 Initial 50hrs. or one month	*2 Every 50hrs. or one month	*2 Every 100 hrs. or six months	*2 Every 150 hrs. or one year	*2 Every 250 hrs. or one year	*2 Every 1000 hrs. or 4 years
Whole	Visual inspection of engine outside		○						
Fuel system	Check the fuel level, and refill		○						
	Drain the fuel tank			○				○	
	Drain the fuel filter				○				
	Replace the fuel filter							◎	
	Check the injection timing								●
	Check the injection spray condition								●*1
Lubricating system	Check the lube oil level	Crankcase	○						
		Marine gear	○						
	Replace the lube oil	Crankcase		◎			◎		
		Marine gear		◎			◎		
		Sail drive		◎		◎			
	Replace the engine lube oil filter.			◎				◎	
Cooling system	Seawater outlet		○ During operation						
	Check cooling water level		○						
	Check the impeller of the cooling water pump (seawater pump)							○	◎
	Replace the fresh water coolant		Every year When long life coolant of a specified type is used, replacement period of two years can be obtained.						
	Clean & check the water passages								●

*1 For EPA requirements see also 1.5 in chapter 1.

*2 Whichever comes first

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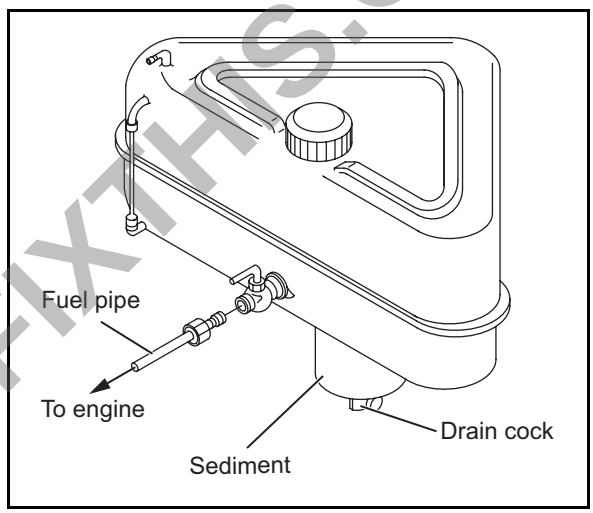
2.2.2 inspection after initial 50 hours or one month operation

Be sure to check the following points after initial 50 hours or one month operation, whichever comes first.

No.	Inspection Item
(1)	Drain the fuel tank
(2)	Replace the engine lube oil and the lube oil filter
(3)	Replace the marine gear & sail drive lube oil
(4)	Adjust the tension of the alternator driving belt
(5)	Adjust the intake/exhaust valve clearance
(6)	Check/adjust the remote control operation
(7)	Adjust the propeller shaft alignment

(1) Drain the fuel tank

1) Put a pan under the drain cock to catch the fuel.
2) Open the drain cock and drain off any water or dirt collected.
3) When the water and dirt are drained off and the fuel comes out, close the drain cock.



(2) Replace the engine lube oil and the lube oil filter.

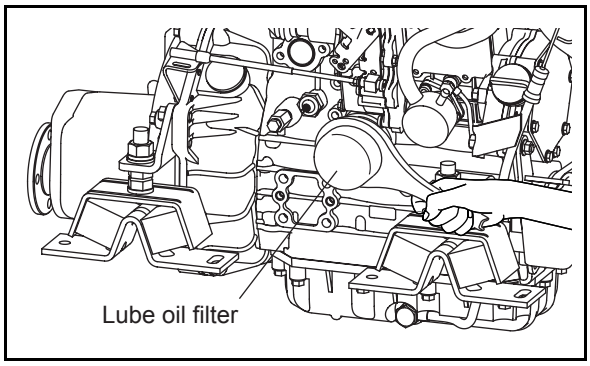
During the operation of an engine, the oil is quickly contaminated due to the initial wear of internal parts. The lube oil must therefore be replaced early. It is easiest and most effective to drain the engine lube oil after operation while the engine is still warm.
Replace the lube oil filter at the same time.

⚠ CAUTION Beware of oil splashes if extracting the Lube oil while it is hot

1) Remove the lube oil dipstick and also the oil filler cap at the top of the rocker arm cover. Attach the oil drain pump to the dipstick guide and drain off the lube oil.

[Notice]
For easier draining, remove the oil filler cap (yellow) at the top of the rocker arm cover.
When lube oil is absorbed without removing a oil filler cap, negative pressure grows big in the crankcase and it may cause the rubber of the diaphragm cracked.

2) Turn the lube oil filter counter-clockwise using a filter wrench to remove it.



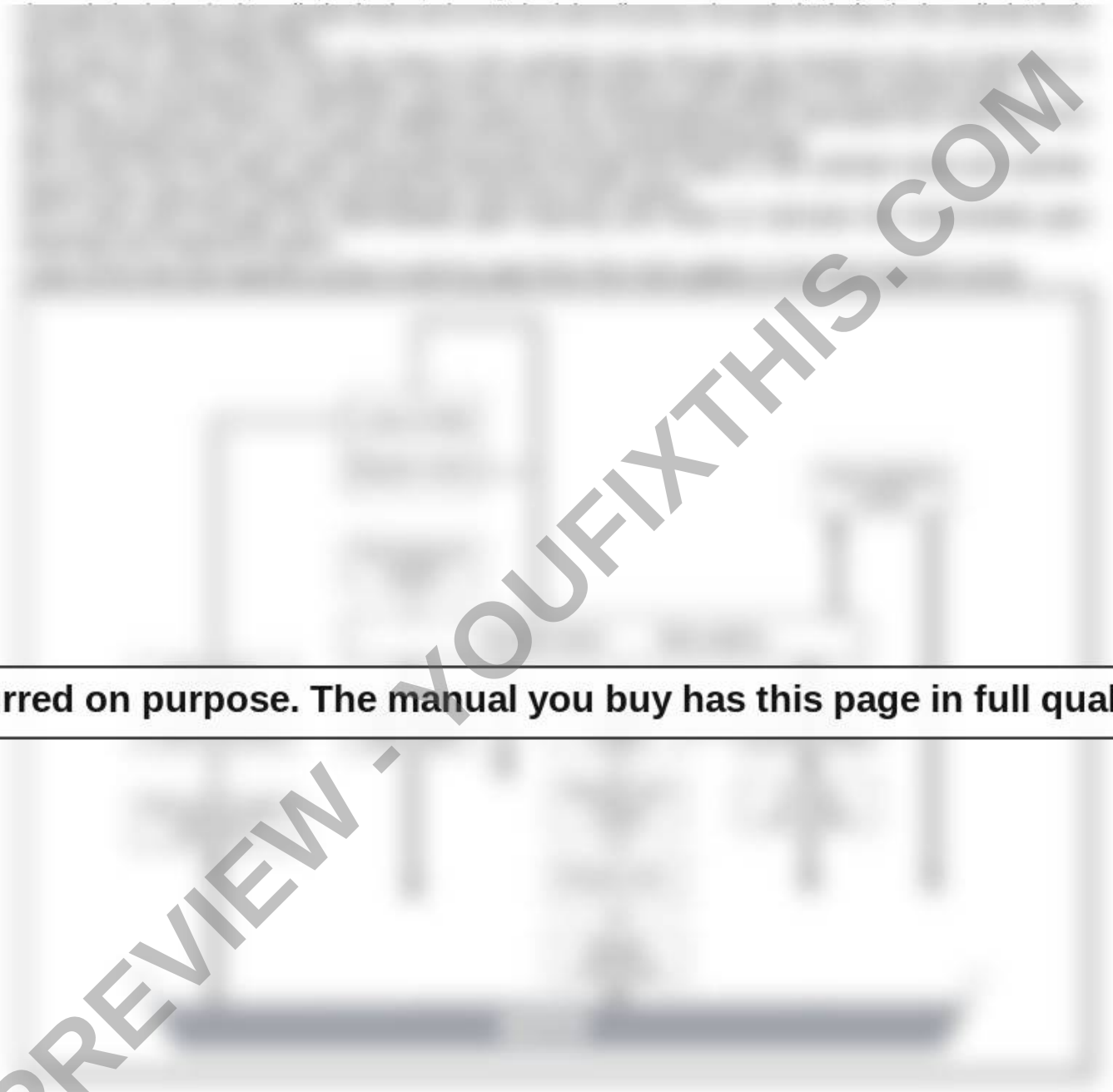
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8. Lubrication system

8.1 Lubrication system

The lube oil in the oil pan is pumped up through the intake filter and intake piping by the lube oil pump,



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FOR SAFETY

1. SAFETY LABELS

- Most accidents are caused by negligence of basic safety rules and precautions. For accident prevention, it is important to avoid such causes before development to accidents.
  Please read this manual carefully before starting repair or maintenance to fully understand safety precautions and appropriate inspection and maintenance procedures.
  Attempting at a repair or maintenance job without sufficient knowledge may cause an unexpected accident.

- It is impossible to cover every possible danger in repair or maintenance in the manual. Sufficient consideration for safety is required in addition to the matters marked ⚠ CAUTION . Especially for safety precautions in a repair or maintenance job not described in this manual, receive instructions from a knowledgeable leader.

- Safety marks used in this manual and their meanings are as follows:

⚠ DANGER	**DANGER**-indicates an imminent hazardous situation which, if not avoided, WILL result in death or serious injury.
⚠ WARNING	**WARNING**-indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.
⚠ CAUTION	**CAUTION**-indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

- **NOTICE** - indicates that if not observed, the product performance or quality may not be guaranteed.

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1.2 Specifications

Official engine model name	unit	3YM30		3YM20	
Company internal model name	-	3YM30	3YM30C	3YM20	3YM20C
Marine gear model	-	KM2P-1	SD20	KM2P-1	SD20

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4.3.2 Reassembly

(1) Clean all parts

Clean all parts using by the cloth and diesel oil (or cleaning agent) before reassembly.

NOTE:

1) If the dust remain with the parts, engine may cause the seizing or damage.
2) The cleaning agent removes even carbon adhering to disassembled parts.

(2) Putting the cylinder block upside down

Place a wood block on the floor and put the cylinder block upside down (with the cylinder head mounting surface facing down).

(3) Inserting the tappets

Coat the inside of the cylinder block tappet holes and the outside circumference of the tappets with engine oil, and insert the tappets in the cylinder block.

NOTE:

Separate the tappets to make sure that they are reassembled in the same cylinder No. and intake/ exhaust side as they came from.

(4) Mounting the crankshaft

1) The crankshaft and the crankshaft gear are shrink fitted. If the crankshaft and the crankshaft gear have been disassembled, they have to be shrink fitted [heat the crank shaft gear to 180- 200 deg. C in the hot oil and press fit to the crankshaft].
2) Coat the crank journal part of the cylinder block and the upper main bearing metal with oil and fit the upper main bearing metal onto the cylinder block.

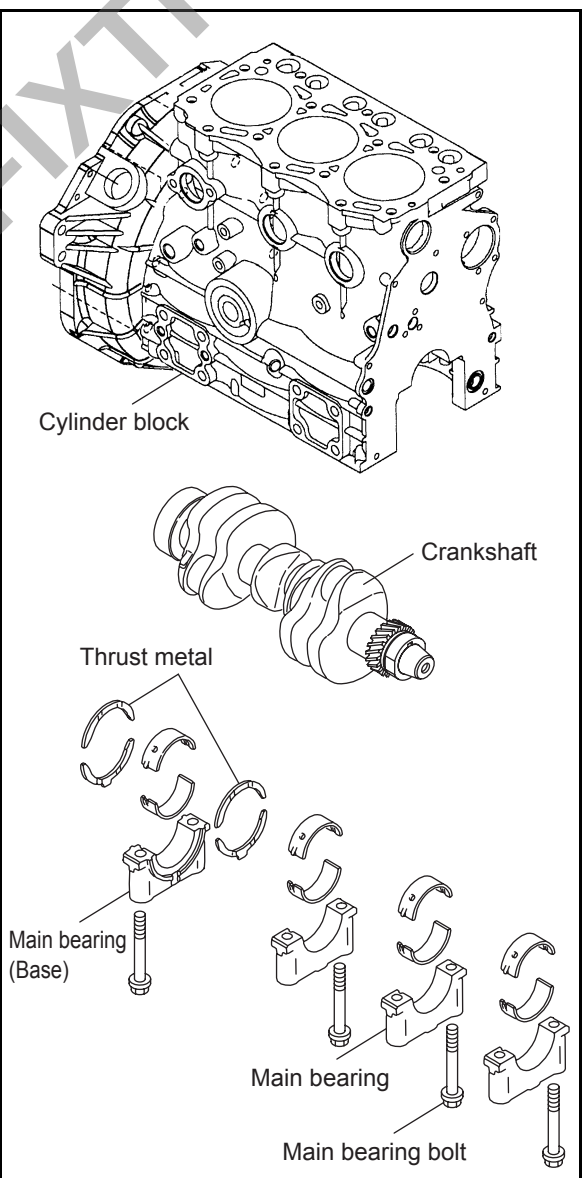
NOTE:

1) Be sure not to confuse the upper and lower main bearing metals. The upper metal has an oil groove.
2) When mounting the thrust metal, fit it so that the surface with the oil groove slit faces outwards, crankshaft side.

3) Coat the crankpins and the crank journals of the crankshaft with engine oil and place it on the upper main bearing metals.

NOTE:

1) Position so that the crankshaft gear is on the gear case side.
2) Be careful not to let the thrust metal drop.



(Removing main bearing and crankshaft)

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