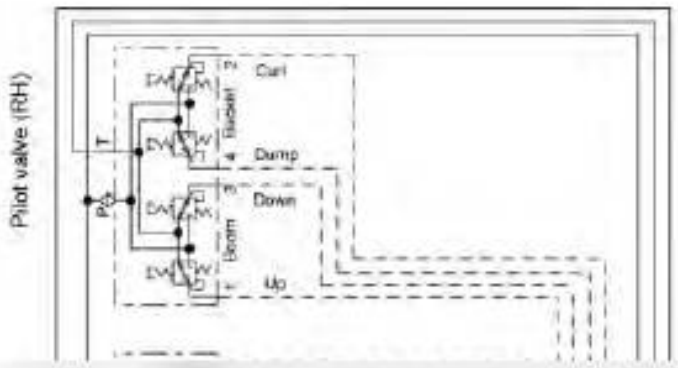
6. HYDRAULIC SYSTEM

6-2 Hydraulic Circuit Schematic



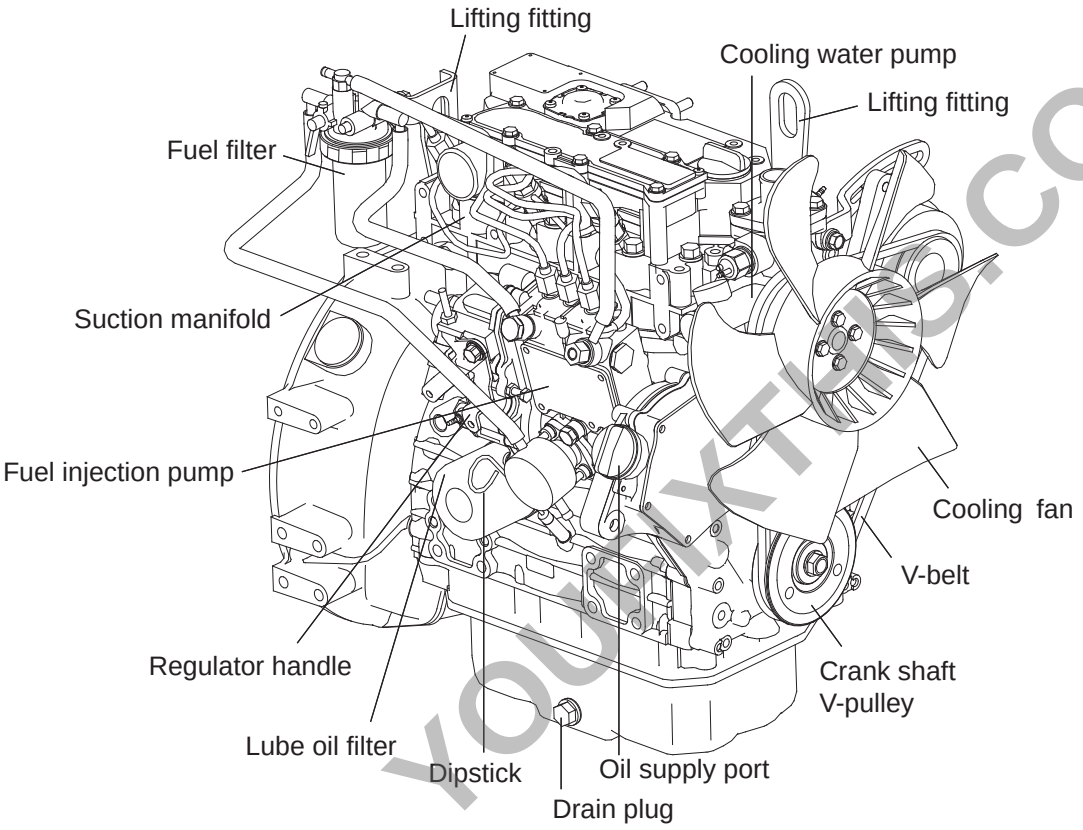
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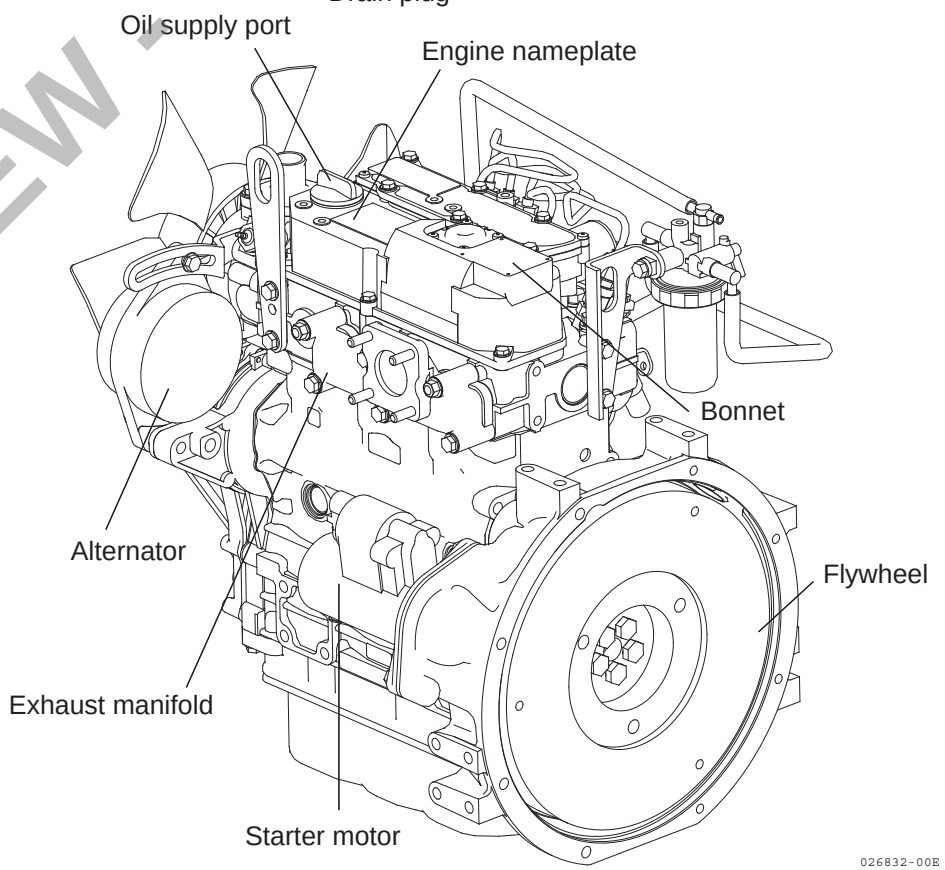
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4. Engine

4-1 Exploded View (General layouts of major engine components)





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3. SERVICING STANDARDS

3-7-2 Engine

Tightening torque for major bolts and nuts

No.	Item	Thread size × Pitch	Tightening torque [Unit :N•m]	Lubricating oil
1	Cylinder head bolt	M9 × 1.25	53,9 to 57,9	Yes
2	Connecting rod bolt	M7 × 1.0	22,6 to 27,5	Yes
3	Flywheel mounting bolt	M10 × 1.25	80,4 to 86,4	Yes

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7. ADJUSTMENT AND REPAIR

7-1 Engine of machine

7-1-1 Removal and Reinstallation of Engine

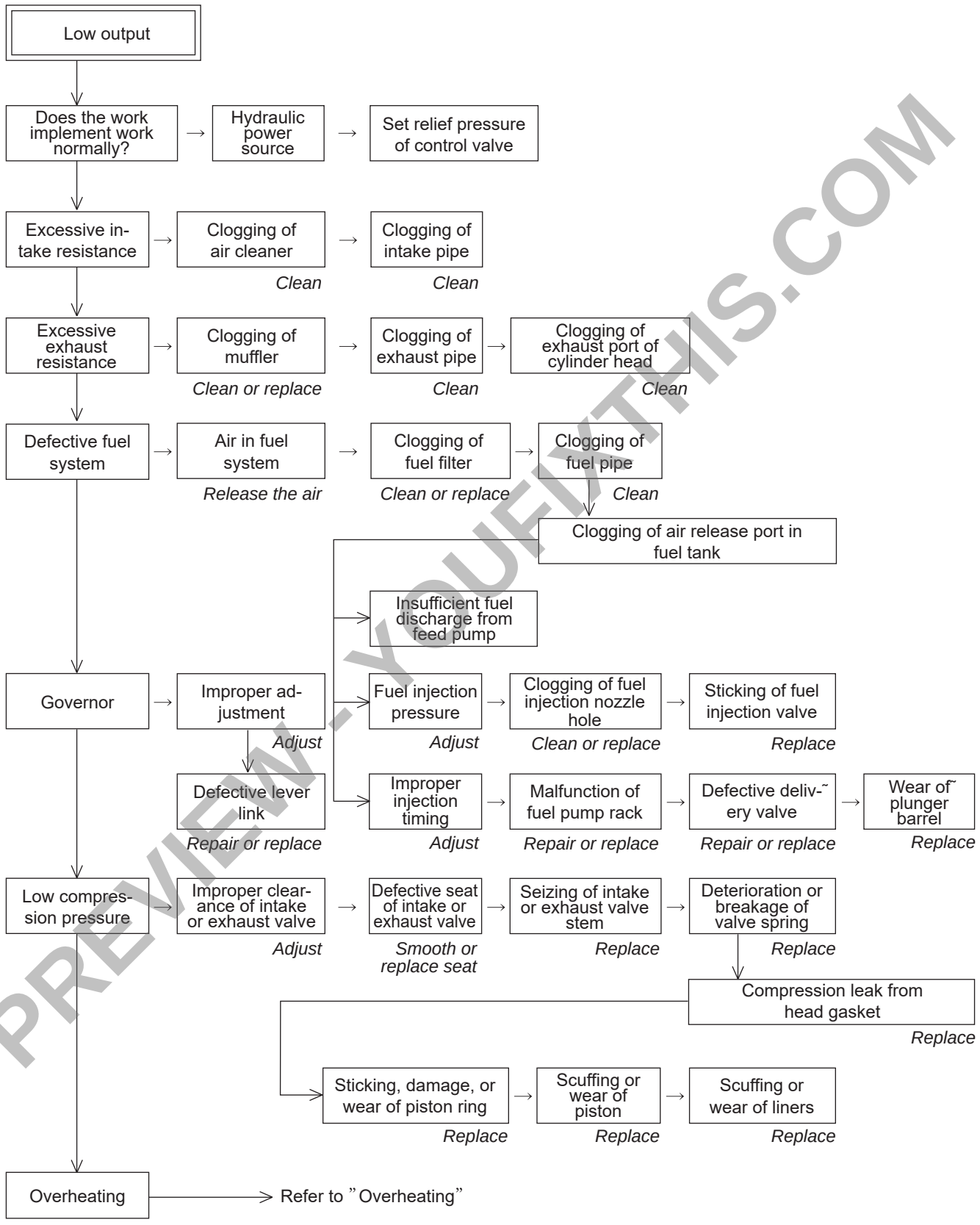
1) Preparation

Procedure	
(1) Swing the upperstructure so that the hydraulic oil tank **1**	

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item	Unit	ViO12-2A
Main specifications of machine		
Dimensions		
Overall length (Transportation position)	mm	3040

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8. Periodic Inspection and Servicing

8-1 List of Periodic Inspection and Servicing

○: Verification and adjustment ●: Replacement □: Cleaning ■: Greasing

Parts & Operations		Daily	Every 50h	Every 250h	Every 500h	Every 1000h / Every year	Every 2000h / Every two years
General.	Missing or broken parts	○					
	Tightening of nuts and bolts	○					
	Motor state	○					
	Machine	□					
Transmissions	Oil for travel gears		● 1st time		○	●	
Hydraulic circuit	Hydraulic oil	○				●	
	Aspiration filter					□	
	Hydraulic oil return filter		● 1st time		●		
	Operation of the accumulator	○					
Greasing	Greasing points	■					
	Rotation pin and crown		■				
	Track spacing piston		■				
Chassis	Bearing rollers and bearings, idler wheels	○				■	
	Track tension	○					
Electrical equipment	Headlights, horn, travel alarm	○					
	Dashboard and indicators	○					
	System state	○					
Engine	Water separator	○					
	GO filter			●			
	Air filter (dusty atmosphere every 250 h)				●		
	Engine oil	○	● 1st time		●[6]		
	Oil filter		● 1st time		●[6]		
	Cooling fluid	○					●
	Belt	○				●	
	Radiator vents	○			□		
	Fuel hose, coolant hose						●
	Intake and exhaust valves					○	
	Injectors and injection pressure						○

6. Every 500h / Every year

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3. SERVICING STANDARDS

Applicable model			ViO12-2A	
Item	Measuring condition	Unit	Standard	Allowance
Machine performance				
	Machine position			

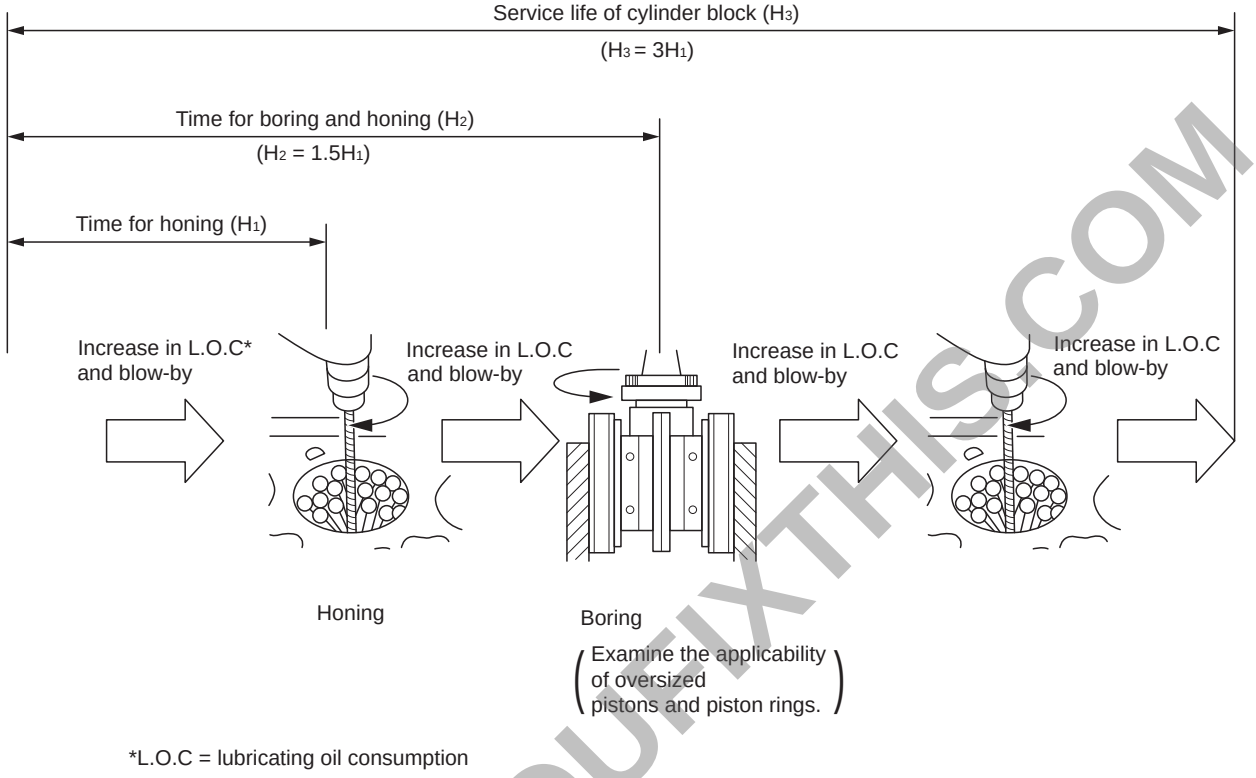


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4) Overhaul of Cylinder (Reference)



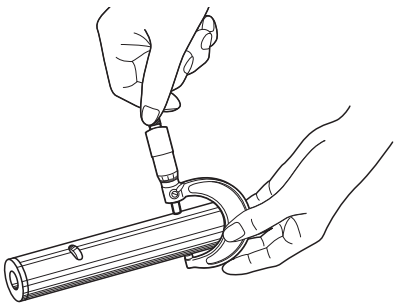
*L.O.C = lubricating oil consumption

4-3-3 Valve Rocker Arm

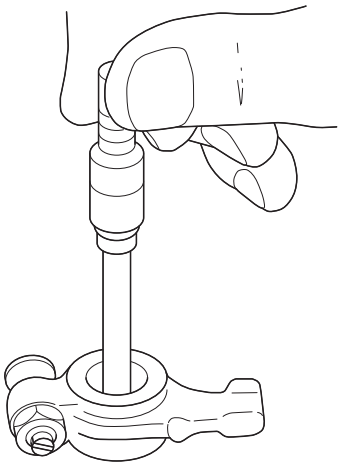
1) Measuring the Rocker Arm Shaft Outside Diameter and the Rocker Arm Bush Inside Diameter

Oil clearance is the difference between the rocker arm bush inside diameter measured with a cylinder gauge and the rocker arm shaft outside diameter measured with a micrometer. If the oil clearance is near the wear limit, replace the rocker arm shaft and the rocker arm with new ones.

		Standard	Wear limit
Intake / exhaust valve rocker arm	Shaft outside dia.	Refer to Section "3-2 1) Nominal and Allowable Values".	
	Bush inside dia.		
	Oil clearance		



Measuring the rocker arm shaft outside diameter



Measuring the rocker arm busu inside diameter

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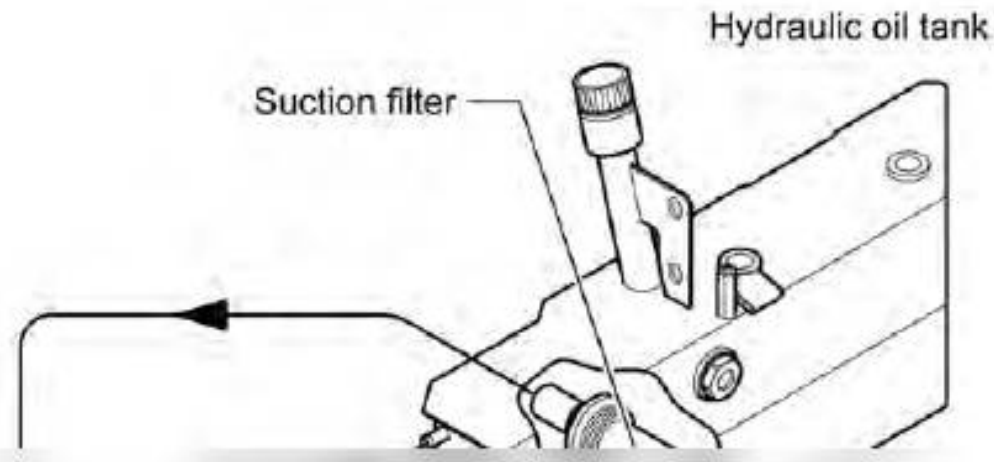
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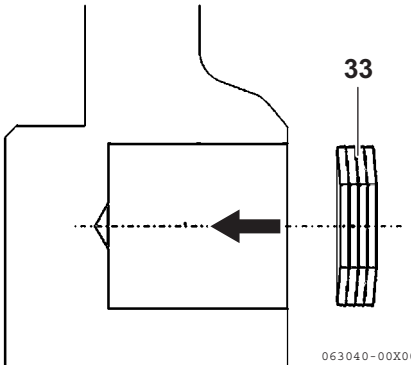
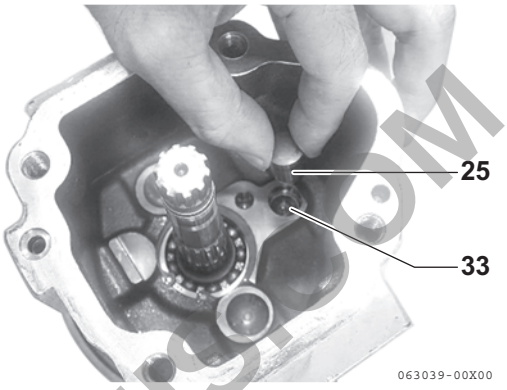
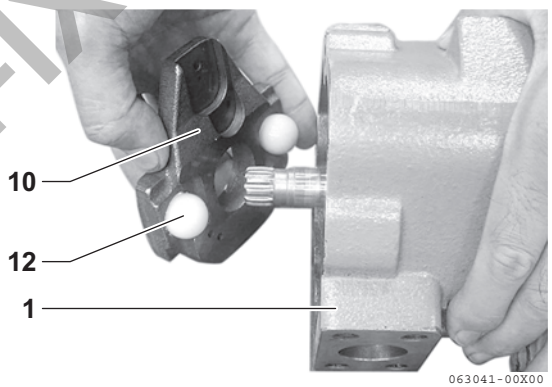
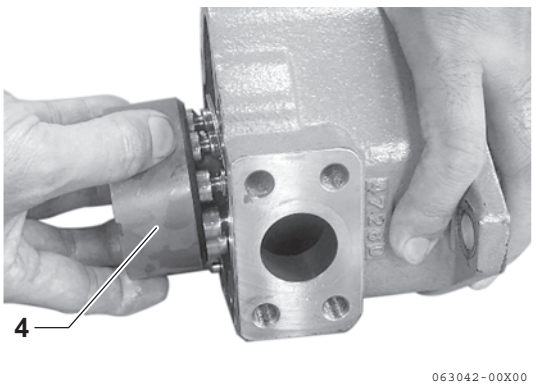
6. HYDRAULIC SYSTEM



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Procedure	
(5) Install four cone springs **33** and stopper pin A **25**. ***Note :*** *Pay attention to correct direction of cone springs **33**.* 	
(6) Attach pivot pins **12** in spherical hollows on swash plate **10** and install it on body S **1** after coating grease on pivot pins **12**.	
(7) Install cylinder barrel kit **4**.	

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6. HYDRAULIC SYSTEM

4. Disassembly and reassembly

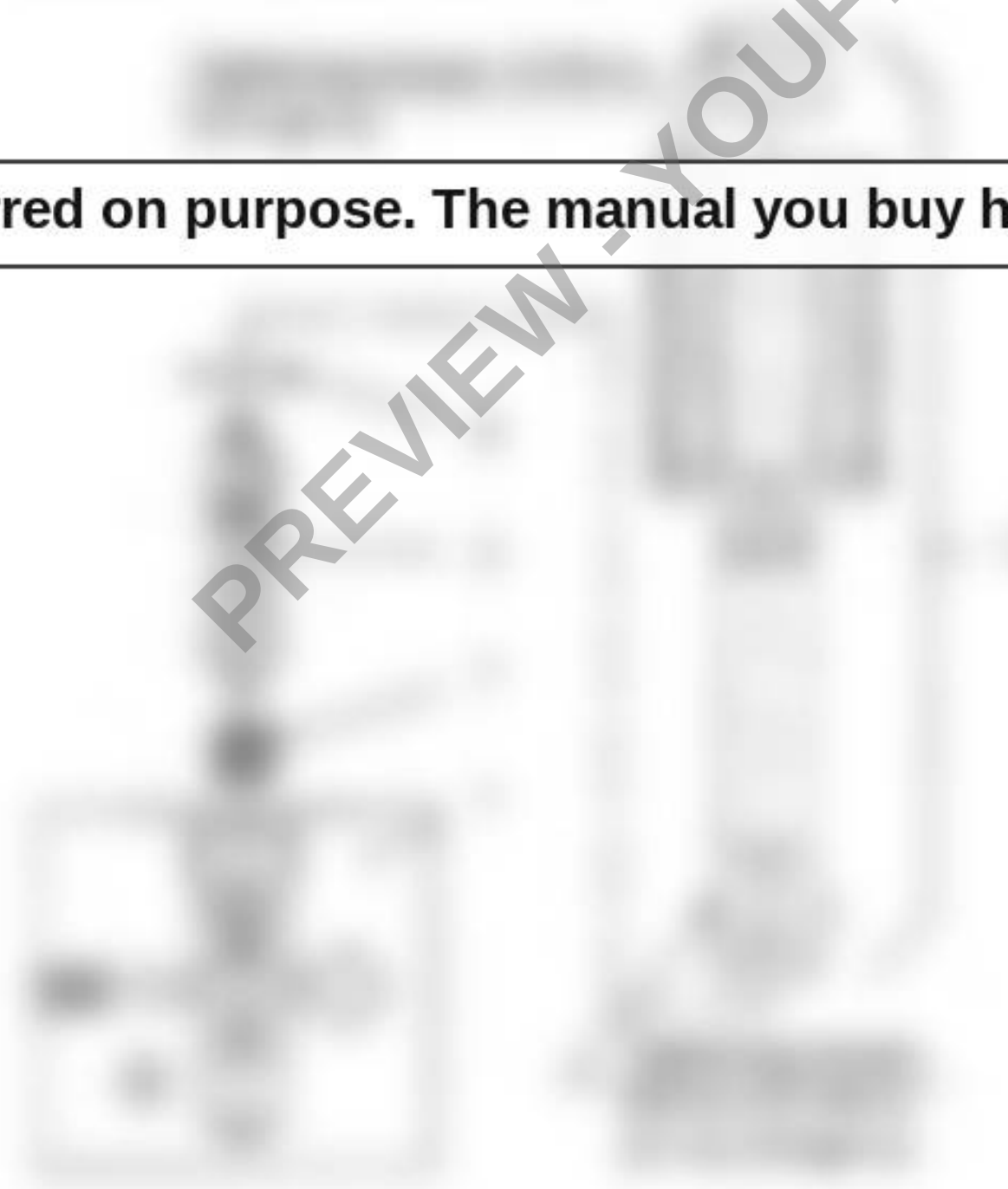
1) Precautions for disassembly and reassembly

(1) Be careful not to damage O-rings or other parts during disassembly and keep the disassembled parts with due care.

(2) Replace any damaged O-rings with new ones

(3) Be sure to install all parts in the correct orientation.

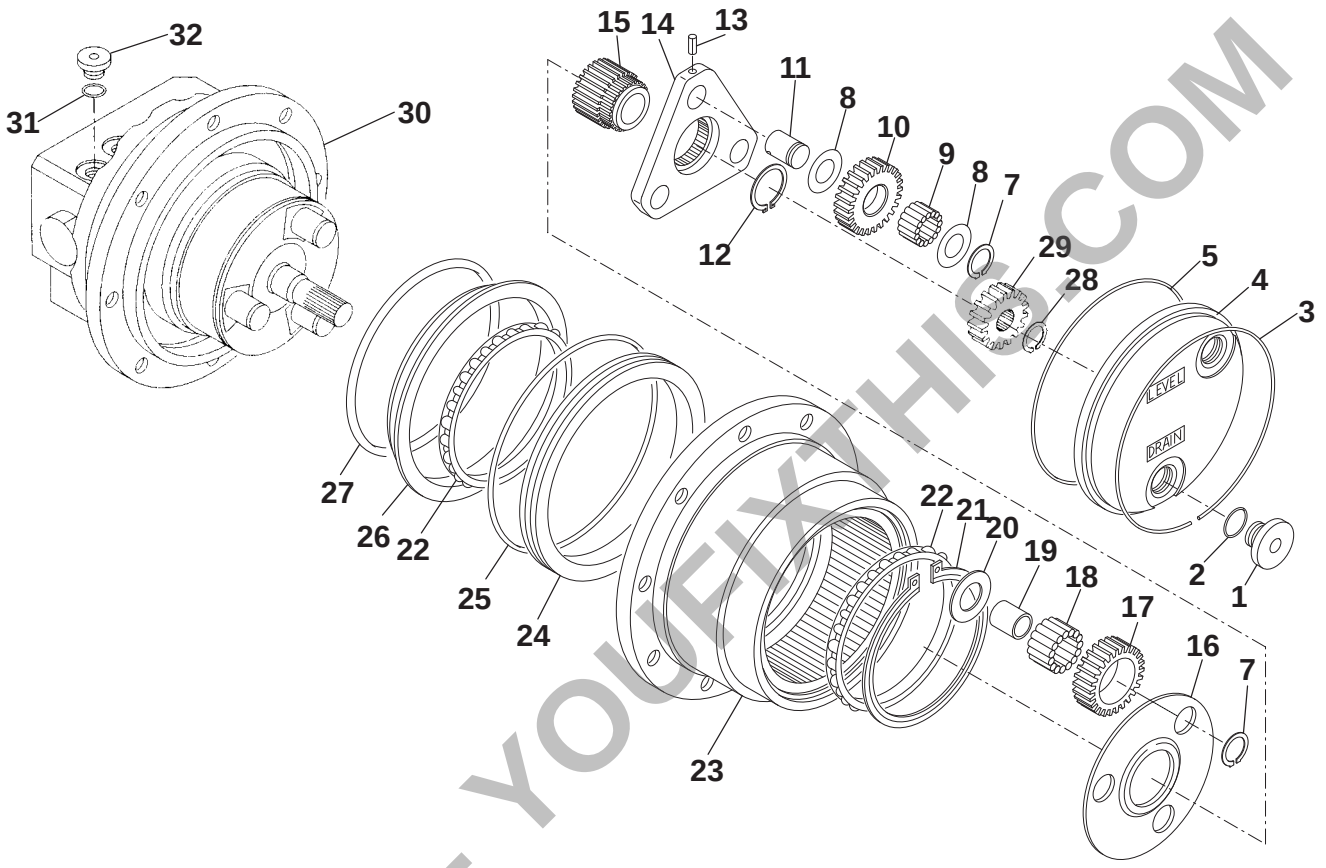
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4)-5 Exploded View and Component Parts
(Reduction Gear Section)



No.	Part	Q'ty	No.	Part	Q'ty
1	Plug	2	17	Gear b1	3
2	O-ring 1BP14	2	18	Needle bearing	3
3	O-snap ring	1	19	Ring	3
4	Cover	1	20	Thrust washer	3
5	O-ring AS568-248-70 or its equivalent	1	21	Snap ring	1
6	-	-	22	Angular bearing 90BVV11S2G	2
7	Snap ring	6	23	Body	1
8	Thrust washer	6	24	Seal ring	1
9	Needle bearing	3	25	O-ring 1AG130	1
10	Gear b2	3	26	Floating seat	1
11	b2 pin	3	27	O-ring	1
12	External snap ring 26	1	28	External snap ring 13	1
13	Spring pin 3 × 12	3	29	Gear S2	1
14	Carrier 2	1	30	Body 2 (Hydraulic motor)	1
15	Gear S1	1	31	O-ring 1BP11	1
16	Thrust plate	1	32	Plug	1

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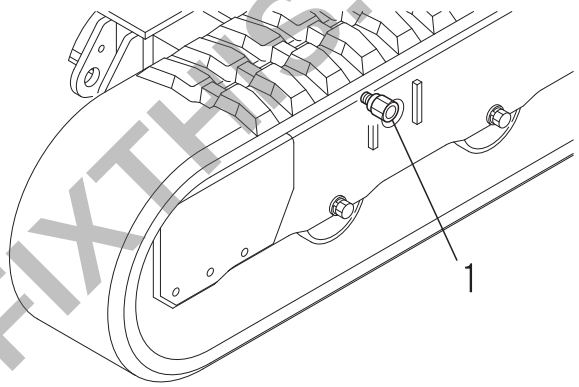
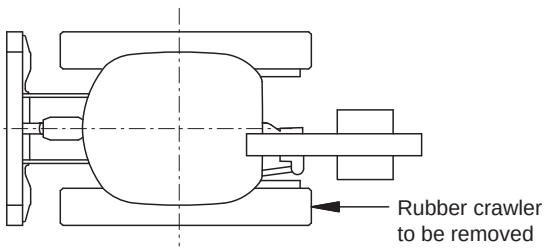
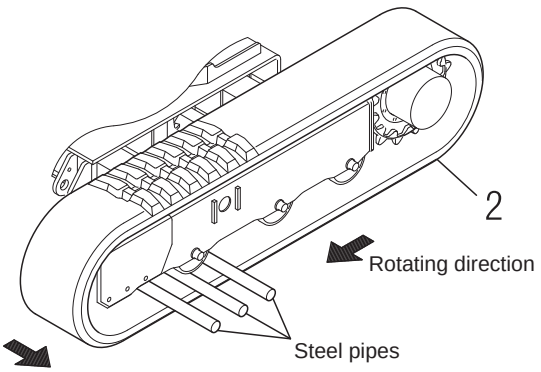
7-2-3 Removal and Reinstallation of Crawler

⚠ When raising the machine, support it with safety blocks of sufficient strength.

⚠ When loosening or removing the nipple valve **1**, the high internal pressure could cause grease to eject or the nipple valve to blow. Do not bring your face close to the nipple valve **1**.

1) Removal of Rubber Crawler

⚠ Handle the rubber crawlers with great care, because they are heavy.
Rubber crawler : 59 kg each

Procedure	
(1) Lower the bucket to the ground. Loosen the nipple valve **1** and discharge the grease from the grease cylinder to loosen the rubber crawler tension. ***Note :*** *Move the machine back and forth if the grease is not discharged smoothly.*	
(2) Swing the upperstructure to position the implement on the side of the rubber crawler to be removed, and raise the machine slightly with the implement.	
(3) Insert steel pipes between the crawler frame and the rubber crawler **2**, as shown in the figure at the right, and turn the sprocket in the reverse direction. Slide the rubber crawler off when the rubber crawler is separated from the idler by the steel pipes.	

2) Reinstallation of Rubber Crawler

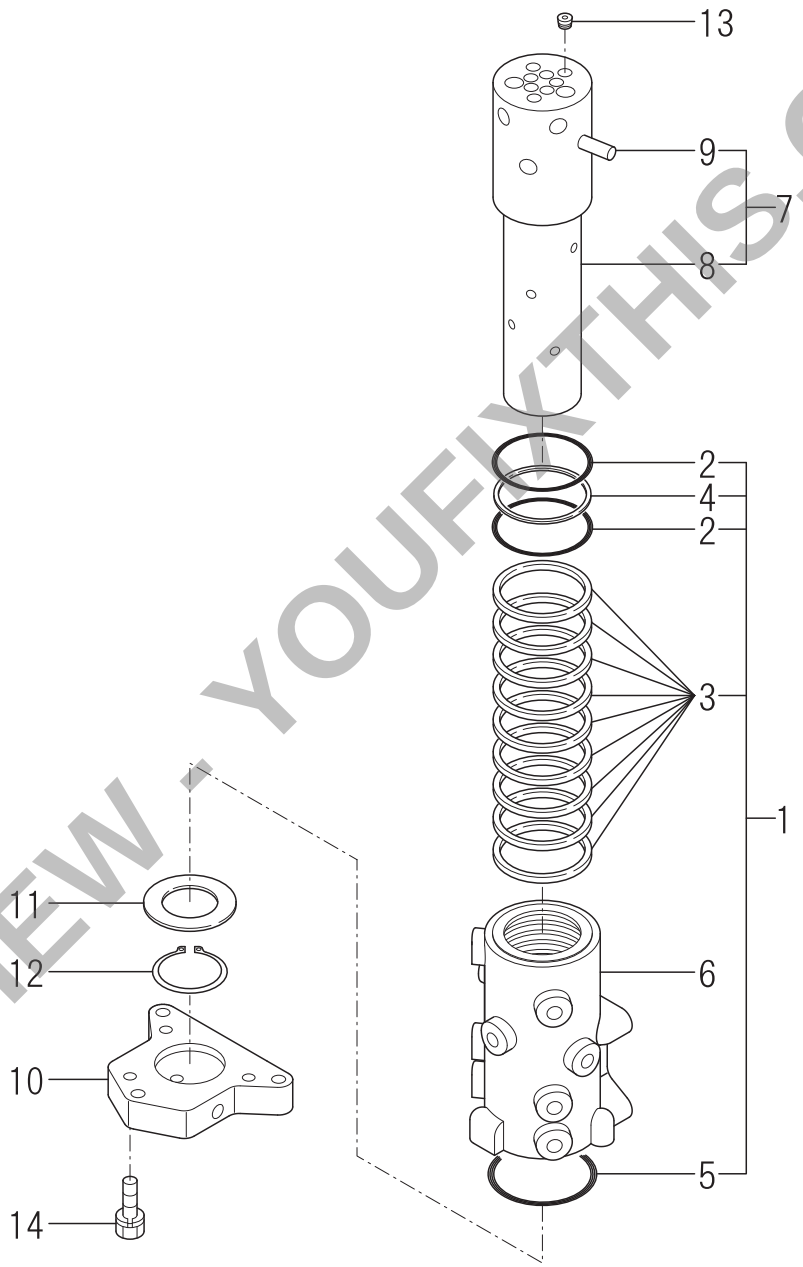
Install the rubber crawler in the reverse order of the removal procedure.

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7-5-5 Disassembly and Reassembly of Swivel Joint

1) Structure and Component Parts

The swivel joint is used to prevent the hydraulic piping from twisting when the upperstructure swings. The swivel joint consists of a shaft, a hub, a seal kit and other parts. The shaft and hub have holes and grooves, and the oil which flows in from the port of the shaft, passing through the hub groove, is fed to the actuators of the undercarriage.



No.	Part	Q'ty	No.	Part	Q'ty
1	Swivel seal kit	1	8	Swivel shaft	1
2	O-ring 55.76×5.7	2	9	Dowel pin 10×25	1
3	Swivel seal	9	10	Swivel flange	1
4	Back-up ring EL	1	11	Thrust washer 40×66×2.5	1
5	O-ring 1A G70.0 NBR	1	12	External snap ring C40	1
6	Swivel hub	1	13	Screw plug R (PT) 1/8	8
7	Swivel shaft	1	14	Bolt (with spring washer) 8×35	3

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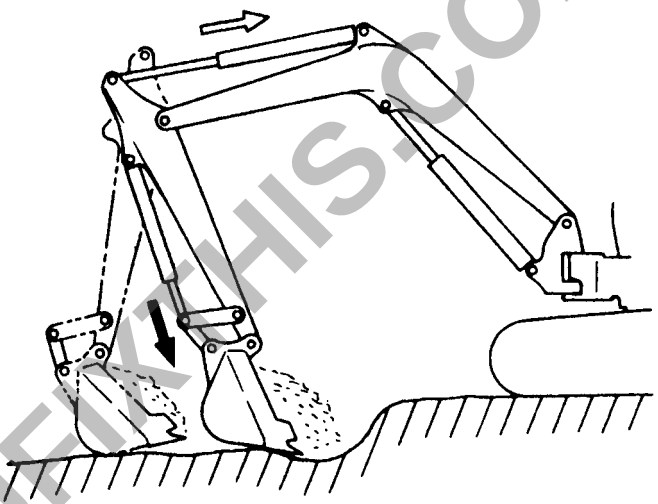
10. Troubleshooting

10-1 Non-Breakdowns

10-1-1 Natural Release of Bucket

Phenomenon

When the arm is extended while scooping with the bucket, the scooping side of the bucket is restricted by the arm and causes back pressure because oil cannot be supplied to the bucket cylinder in time.
When the boom is raised immediately in this condition, the bucket is released naturally because of the back pressure in the piston side of the cylinder



Operation

This problem can be solved by using a sequence of three actions of bucket scooping, arm extension and boom raising.
(For the models that cannot make the triple sequence actions, extend the arm after raising the boom.)

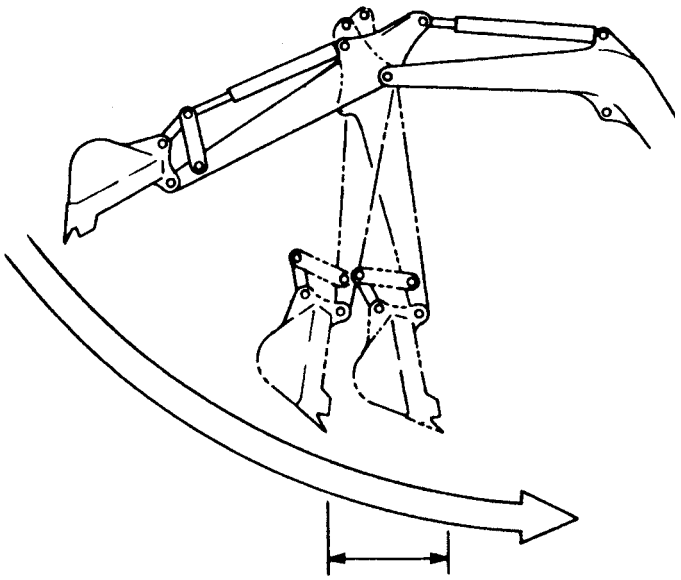
10-1-2 Discontinuous Arm Movement

When scooping with the arm, the arm tends to move slower as it draws near to the perpendicular and it may stop momentarily.

Reason

This may happen because the oil supply cannot catch up with the cylinder extension speed. This is a characteristic of hydraulic equipment.

Specifically, this phenomenon appears when the engine speed is in the low to medium speed range.
Advise your users fully that this will happen in hydraulic equipment and that this is not a breakdown.



Discontinuous phenomenon appears in this range.

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