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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Note : *< > : at minimum track gauge*

Item				Unit	TC08 Variable track gauge type
Main specifications of machine					
Dimensions					
Overall length (Transportation position)				mm	2600
Canopy	Overall height		Transportation position	mm	2200 <2300>
			Traveling position	mm	2200 <2300>
	Overall width		Full machine width	mm	840 <680>
Cabin	Overall height		Transportation position	mm	-
			Traveling position	mm	-
	Overall width		Full machine width	mm	-
Tumbler center distance				mm	900
Track gauge				mm	660 <500>
Minimum ground clearance				mm	130 <230>
Traveling performance					
Travel speed	Steel crawler		Low speed (Forward/Reverse)	km/hr	-
			High speed (Forward/Reverse)	km/hr	-
	Rubber crawler		Low speed (Forward/Reverse)	km/hr	1.8 / 1.8
			High speed (Forward/Reverse)	km/hr	-
Climbing ability				degrees	-
Permissible water depth limit				mm	290
Work performance					
Bucket	Width (Standard)			mm	350
	(Standard. JIS heaped capacity)			cu.m	0.022
	Number of teeth / Installation method			pcs.	3 / Weld
Maximum digging depth	With blade raised			mm	1500
	With blade on the ground			mm	1620
Maximum depth of vertically digging				mm	1260
Maximum dumping height				mm	1950
Minimum front swing radius (with boom in front)				mm	1180
Minimum front swing radius (at 90 degrees right boom swing)			Canopy	mm	950
			Cabin	mm	-
Rear swing radius				mm	710

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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	M8 × 1.25	34 to 39	Yes
2	Connecting rod nut	M7 × 1.0	21 to 25	No
3	Flywheel mounting bolt	M10 × 1.25	73 to 78	No
4	Bearing holder upper and lower tightening	M8 × 1.25	20 to 25	No
5	Bearing holder and cylinder block	M8 × 1.25	25 to 29	No
6	Crankshaft pulley tightening nut	M18 × 1.5	88 to 98	No
7	Fuel injection nozzle tightening	M20 × 1.5	59 to 69	No
8	Glow plug	M8 × 1.0	8 to 15	No

Tightening Torque for General Bolts and Nuts (Engine)

Thread size	Class	Coarse thread			Fine thread		
		Thread pitch	Tightening torque		Thread pitch	Tightening torque	
			ft•lbf	N•m		ft•lbf	N•m
M5	4T, 4.8	0.8	2.07 - 2.95	2.8 - 4.0	—	—	—
	7T, 8T, 8.8		3.61 - 5.09	4.9 - 6.9			
	10T, 11T		4.94 - 6.93	6.7 - 9.4			
M6	4T, 4.8	1.0	3.61 - 5.09	4.9 - 6.9			
	7T, 8T, 8.8		6.12 - 8.33	8.3 - 11.3			
	10T, 11T		8.85 - 11.8	12 - 16			
M8	4T, 4.8	1.25	9.59 - 12.5	13 - 17	1.0	11 - 15	15 - 20
	7T, 8T, 8.8		17.0 - 20.7	23 - 28		19 - 25	26 - 34
	10T, 11T		20.7 - 26.6	28 - 36		22 - 30	30 - 40
M10	4T, 4.8	1.5	18.4 - 24.3	25 - 33	1.25	21 - 27	28 - 36
	7T, 8T, 8.8		32.5 - 41.3	44 - 56		36 - 46	49 - 63
	10T, 11T		39.8 - 51.6	54 - 70		43 - 55	58 - 74
M12	4T, 4.8	1.75	27.3 - 34.7	37 - 47	1.25	32 - 41	43 - 55
	7T, 8T, 8.8		48.7 - 61.2	66 - 83		55 - 69	75 - 94
	10T, 11T		67.9 - 85.6	92 - 116		73 - 94	99 - 127
M14	4T, 4.8	2.0	46.5 - 59.0	63 - 80	1.5	52 - 64	70 - 87
	7T, 8T, 8.8		76.7 - 97.4	104 - 132		86 - 109	117 - 148
	10T, 11T		103 - 129	139 - 175		110 - 136	149 - 184
M16	4T, 4.8	2.0	63.5 - 81.1	86.1 - 110	1.5	67 - 84	91 - 114
	7T, 8T, 8.8		110 - 136	149 - 185		116 - 142	157 - 192
	10T, 11T		151 - 188	205 - 255		163 - 198	221 - 269
M18	4T, 4.8	2.0	83.3 - 104	113 - 141	1.5	97.4 - 119	132 - 162
	7T, 8T, 8.8		145 - 174	196 - 236		170 - 206	231 - 279
	10T, 11T		203 - 246	275 - 333		220 - 271	298 - 367
M20	4T, 4.8	2.5	106 - 133	144 - 180	1.5	127 - 155	172 - 210
	7T, 8T, 8.8		177 - 214	240 - 290		203 - 246	275 - 333
	10T, 11T		268 - 325	363 - 441		293 - 358	397 - 485

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4. Engine

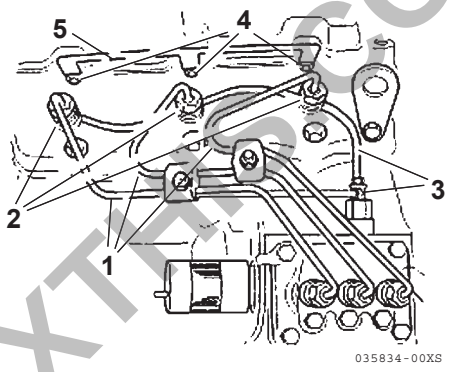
4-1 Disassembly of Engine

The following disassembly procedures apply to both two-cylinder and three-cylinder engines.

4-1-1 Removing the Nozzle and Glow Plug

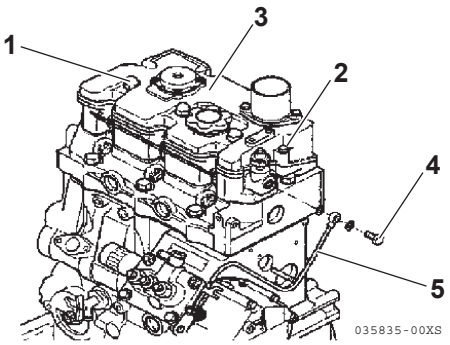
Note:
Clean the engine to remove dirt and debris before disassembly.

(1) Remove the high pressure pipes **1**.
(2) Disconnect the fuel return pipes **3**.
(3) Remove the injection nozzle assemblies **2**.
(4) Disconnect the connector **5** and remove the glow plugs **4**.



4-1-2 Removing the Cylinder Head Cover

(1) Remove the cap nuts **1** and bolts **2** and then remove the cylinder head cover **3**.
(2) Remove the eyebolt **4**.

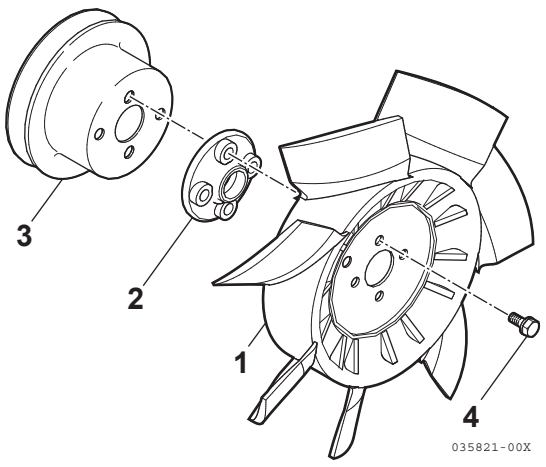


4-1-3 Removing the Oil Pipe

Remove the oil pipe **5** and the two gaskets.

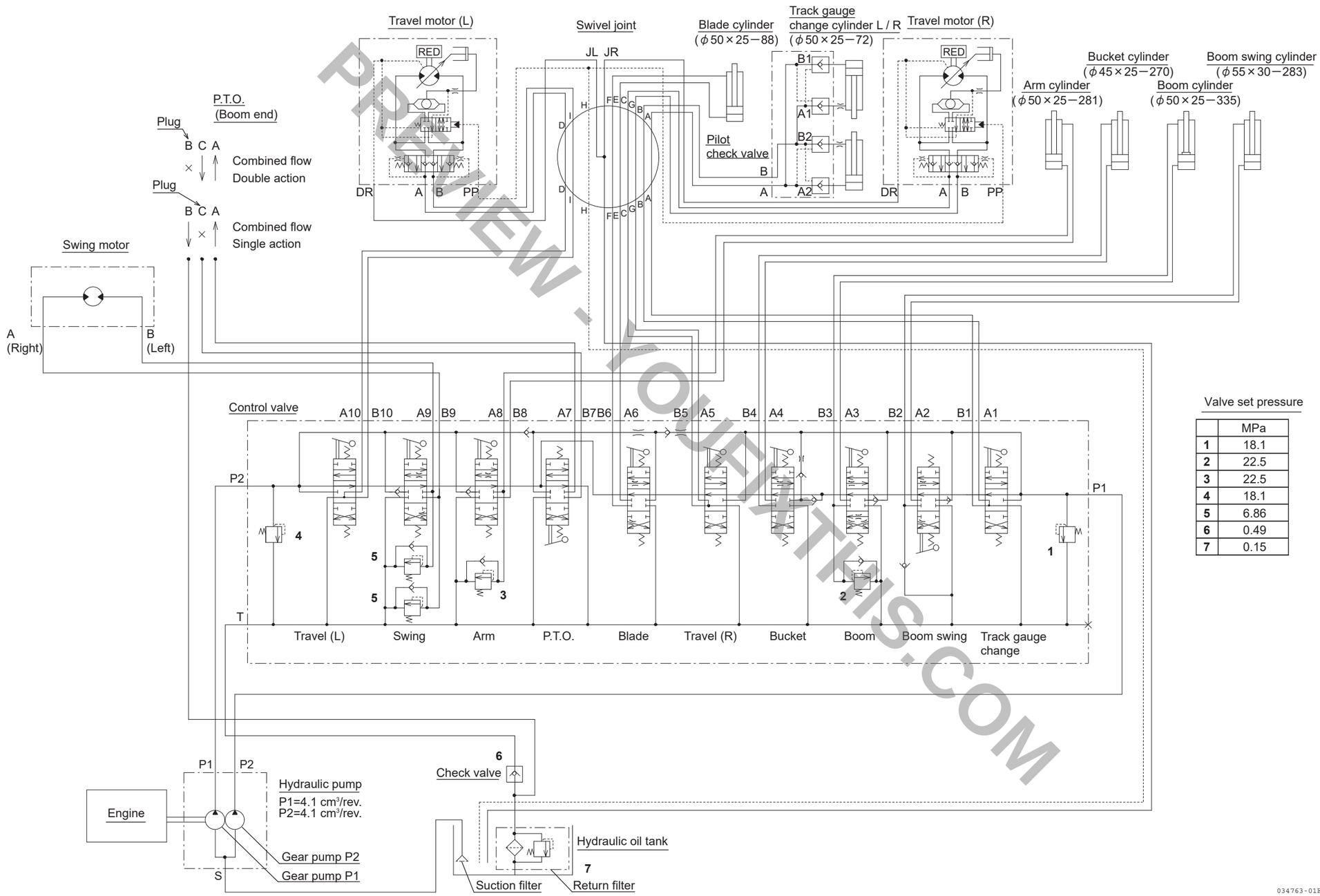
4-1-4 Removing the Water Pump Assembly

(1) Remove the bolts **4** and then remove the fan **1**, holder **2** and pulley **3**.



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5-2 Hydraulic Circuit Schematic

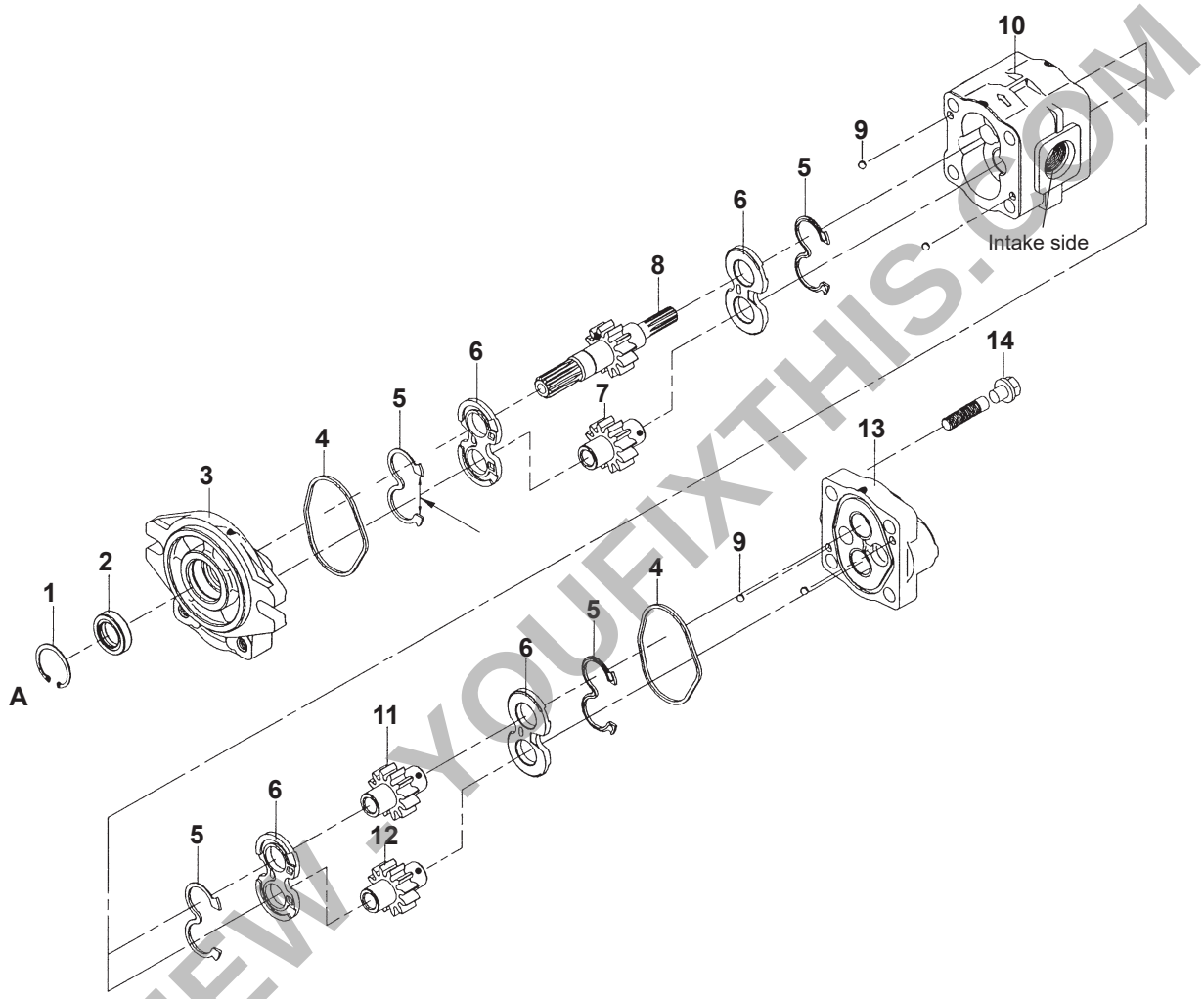


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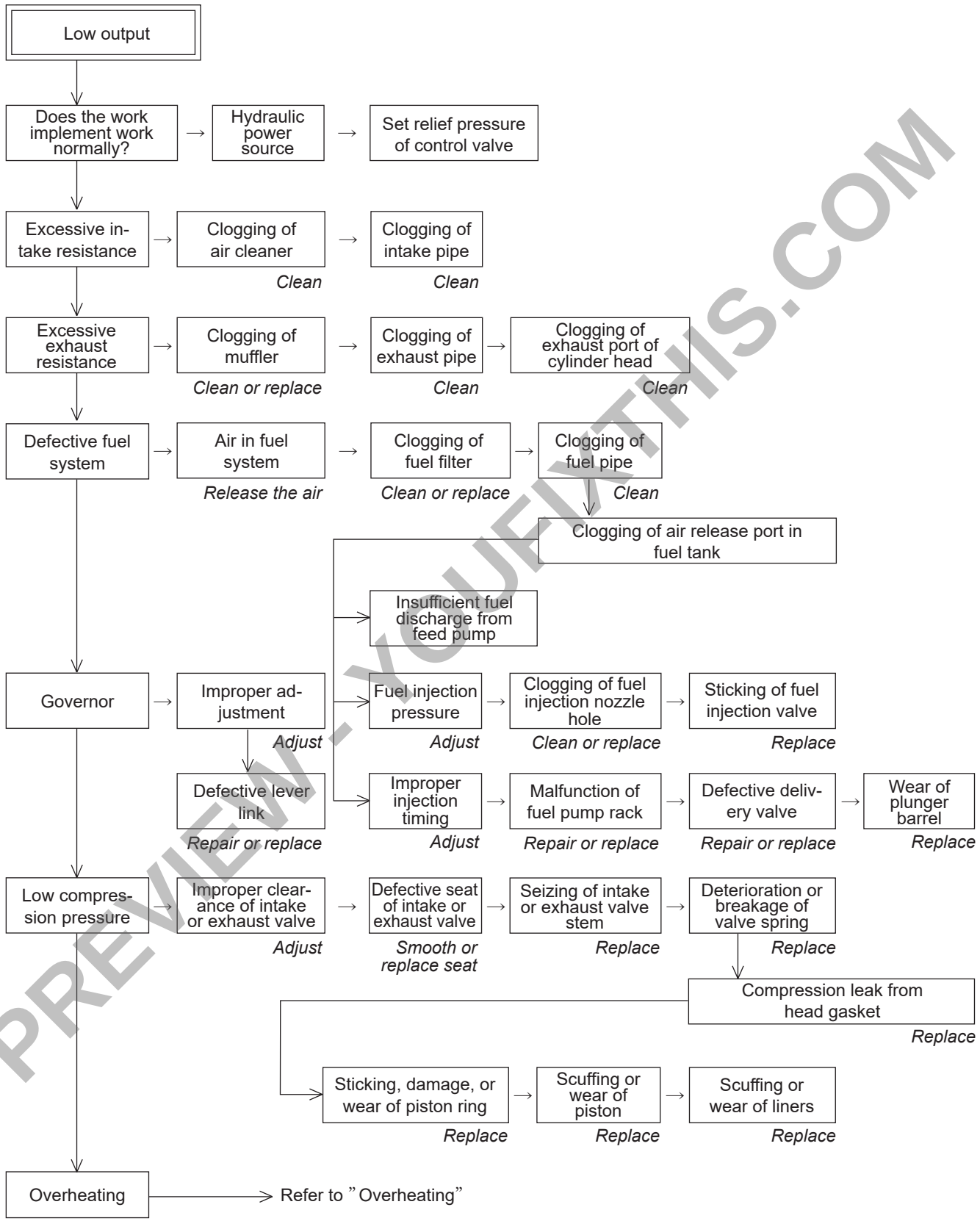
3. Exploded View and Component Parts

This exploded view is for the hydraulic pump which rotates counterclockwise when viewed from the side A.



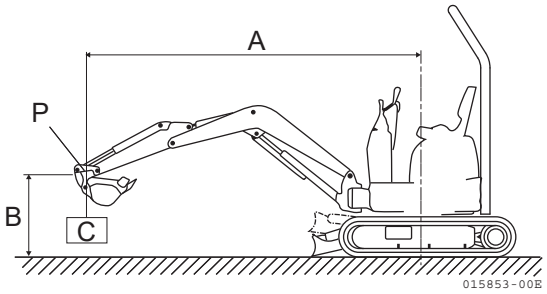
No.	Part	Q'ty	No.	Part	Q'ty
1	Internal snap ring C	1	8	Driving gear No.1	1
2	Oil seal	1	9	Steel ball	4
3	Front cover (with bushes)	1	10	Body (with bushes)	1
4	Gasket	2	11	Driving gear No.2	1
5	3-shaped gasket	4	12	Driven gear No.2	1
6	Side plate	4	13	Rear cover (with bushes)	1
7	Driven gear No.1	1	14	Washer faced hexagon head bolt	4

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2-4 Lifting Capacity List



With:
(☐ Cabin■ Canopy) Type
(☐ Steel ■ Rubber) Crawler
Bucket width : 350 mm
W/O Bucket
Track gauge : Maximum

A : Reach from swing center line [m]
B : Load point height [m]
C : Lifting load [kg]
P : Load point
: Rating over front
: Rating over side or 180 degrees

Blade on ground

Unit : kg

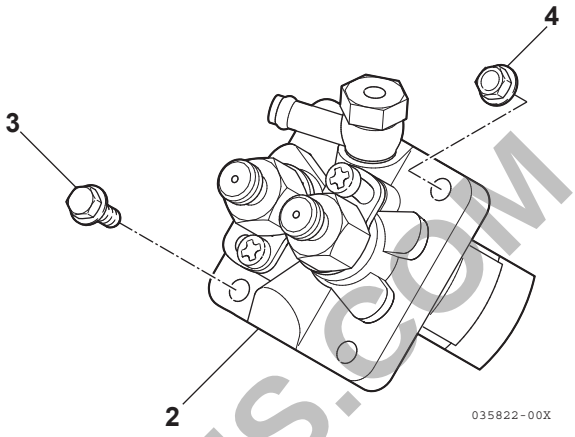
A m / B m	Max.		2.0		1.5		Min.	
2.0	–	*220	–	–	–	–	–	–
1.5	–	*220	–	*220	–	*270	–	–
1.0	–	*230	–	*260	–	*350	–	*490
0.5	–	*240	–	*300	–	*470	–	*590
0	–	*240	–	*320	–	*480	–	*630
-0.5	–	*260	–	*280	–	*430	–	–
-1.0	–	*230	–	–	–	–	–	–

Note :

The lifting load with the asterisk (*) mark is limited by hydraulic lifting capacity rather than tipping. The lifting capacity shown in the above list is based on the ISO Standard No. 10567 and represents either 87 % of hydraulic lifting capacity or 75 % of tipping load, which is smaller.

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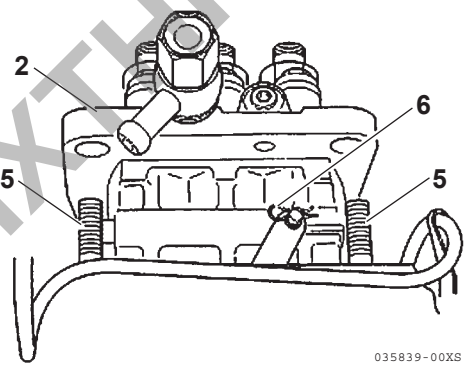
(2) Remove the two bolts **3** and two nuts **4** securing the injection pump **2**.



(3) Slowly lift the injection pump **2** up along the length of the stud bolts **5**, remove the snap pin **6** to separate the pump from the link and then remove it.

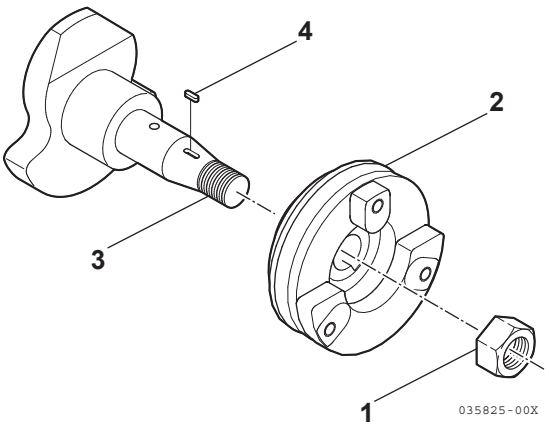
Note:

- *Be sure to check the number and thickness of the injection timing adjustment shims installed between the injection pump and the mounting surface.*
- *Be careful not to let the pump rack get caught in the cylinder block when removing the injection pump. (Pull out the pump while moving the stop lever or the rack through the solenoid mounting hole.)*



4-1-10 Removing the Crankshaft Pulley

(1) Remove the nut **1** and then remove the crankshaft pulley **2**.
(2) Remove the key **4** from the crankshaft **3**.



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4. Reassembly and Adjustment

Reassemble in the reverse order of the disassembly procedures with observing the following instructions.

(1) Fill or coat grease on the following parts.

Greasing points		Grease
a	Front sleeve bearing	MULTEMP #6129
b	Rear sleeve bearing	MULTEMP #6129
c	Reduction device (Armature shaft gear, Internal gear, Planetary gear)	MULYKOTE RAG-650
d	Overrunning clutch and lever friction part	MULTEMP #6129
e	Gear shaft spline and pinion friction part	MULYKOTE RAG-650
f	Ball	MULYKOTE RAG-650

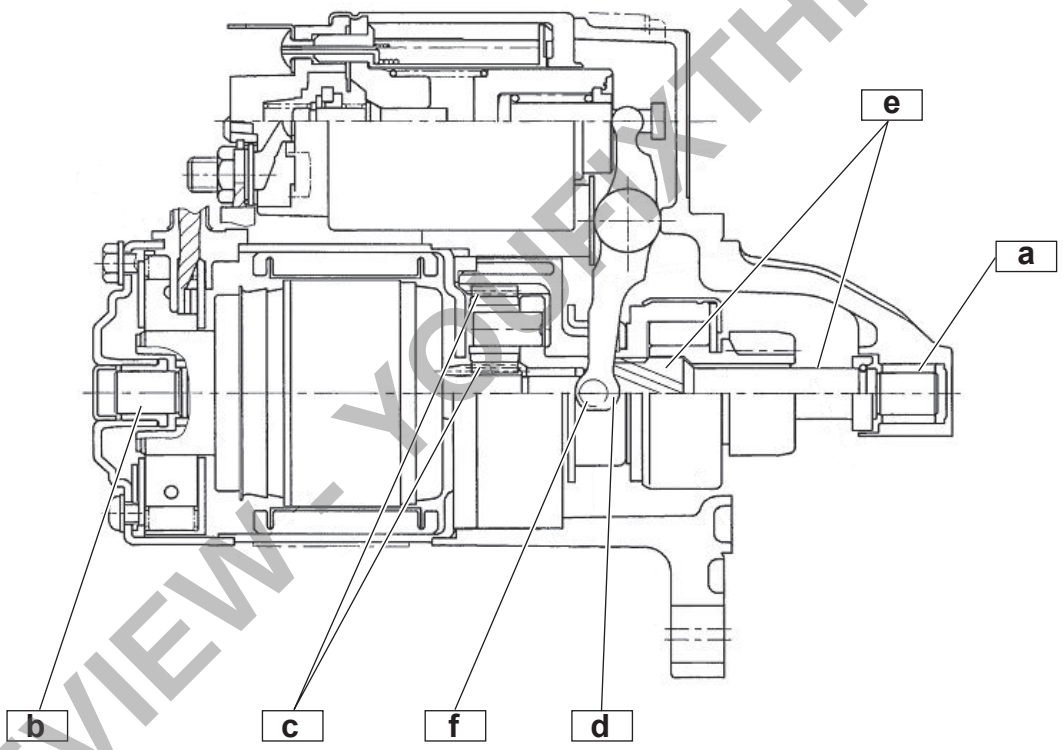


Fig.2

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5-3-9 Hydraulic P.T.O.

The P.T.O. pedal is linked to the spool of the P.T.O. section through L-balls and a rod.

1. P.T.O. Combined Flow / Single Acting Actuator
Oil Flow from Hydraulic Pump

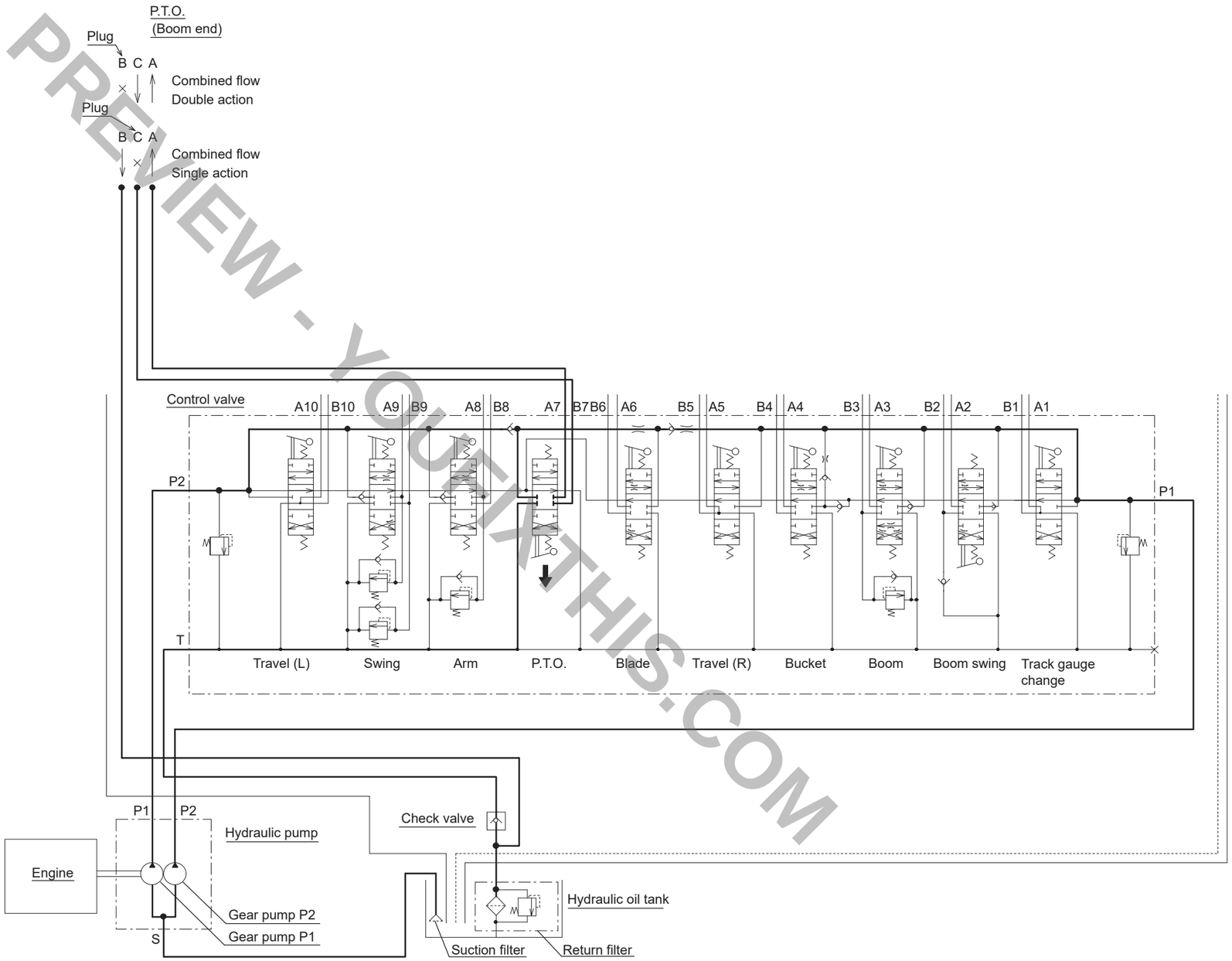
When the P.T.O. pedal is moved on its front side, the spool of the P.T.O. section is pulled.
The oil from the hydraulic pump P1 and that from the hydraulic pump P2 each flow through the parallel passage to the P.T.O. section, in which they are combined. The combined oil flows through the port A7 of the P.T.O. section to A of the P.T.O..
The return oil from B of the P.T.O. flows back to the hydraulic oil tank through the return filter.

2. P.T.O. Combined Flow / Double Acting Actuator

To use the double acting actuator, exchange the hose connection between B (blue) and C (white) at frame end.

Oil Flow from Hydraulic Pump

When the P.T.O. pedal is moved on its front side, the spool of the P.T.O. section is pulled.
The oil from the hydraulic pump P1 and that from the hydraulic pump P2 each flow through the parallel passage to the P.T.O. section, in which they are combined. The combined oil flows through the port A7 of the P.T.O. section to A of the P.T.O..
The return oil from C of the P.T.O. flows back to the hydraulic oil tank through the ports B7 and T of the control valve, and returns to the hydraulic oil tank through the check valve and return filter.
When the P.T.O. pedal is moved on its back side, the spool of the P.T.O. section is pressed.
The oil from the hydraulic pump P1 and that from the hydraulic pump P2 each flow through the parallel passage to the P.T.O. section, in which they are combined. The combined oil flows through the port B7 of the P.T.O. section to A of the P.T.O..
The return oil from A of the P.T.O. flows back to the hydraulic oil tank through the ports A7 and T of the control valve, and returns to the hydraulic oil tank through the check valve and return filter.



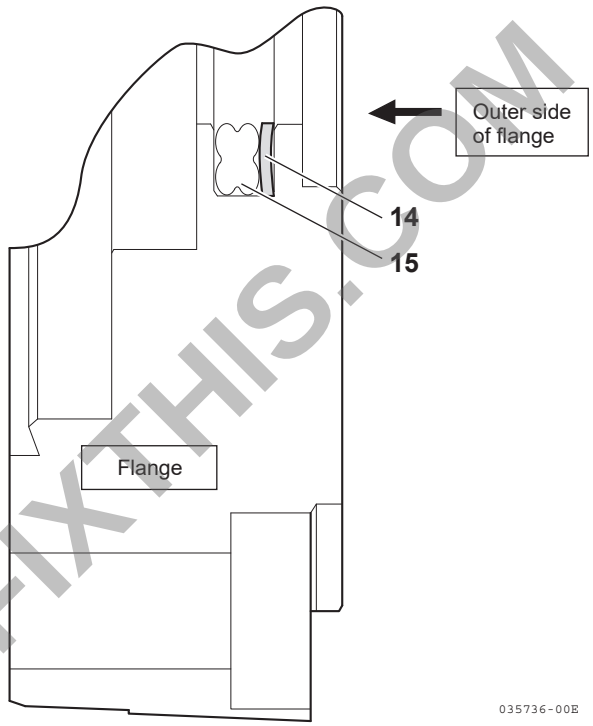
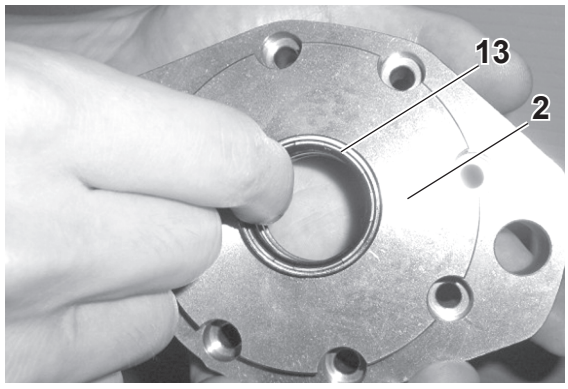
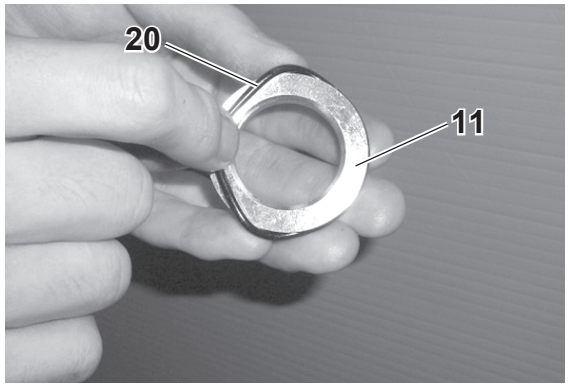
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7. Troubleshooting

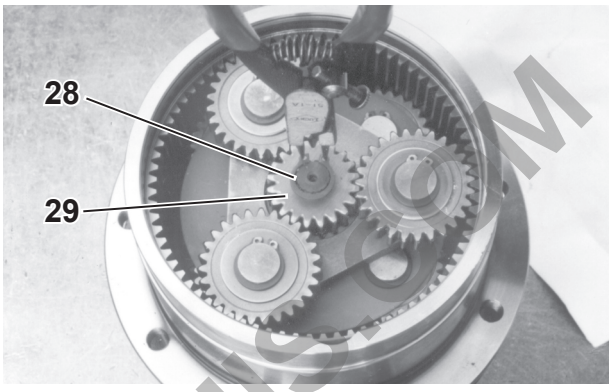
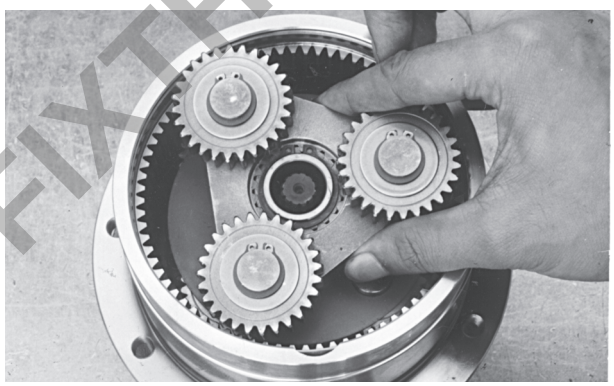
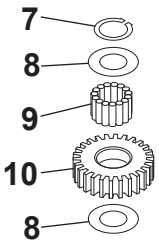
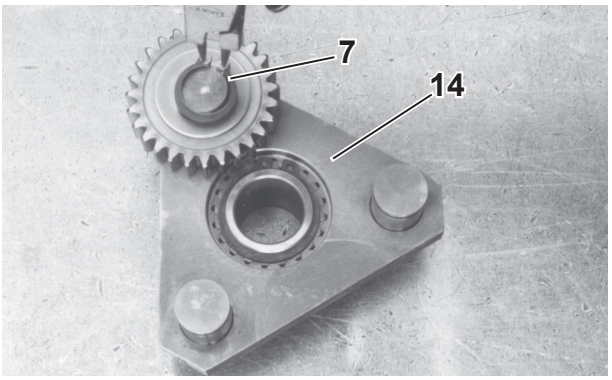
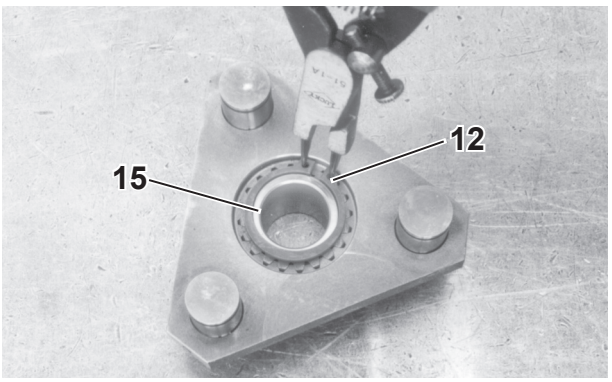
Trouble	Cause	Measure
1. Oil leak from oil seal	(1) Reverse rotation (2) Too high pressure on the intake side (3) Broken oil seal lip due to dust or the like (4) Damaged or worn shaft in the area contacted with the seal (5) Incorrect centering of the shaft	(1) Find the cause of the reverse rotation or the too high pressure on the intake side to remove it. (2) Replace the oil seal. (3) Center the shaft correctly. (4) Replace the pump.
2. Oil leak from joint of cover, body or other parts	(1) Loosened bolt, or broken cover or body (2) Deteriorated sealing performance or damage of the seal due to the external leakage prevention gasket hardened by heat	(1) Remove vibration or too high pressure that causes looseness of the bolt or breakage of the cover or the body. (2) Replace the gasket. (3) Replace the pump.
3. Oil leak from port	(1) Loosened or broken port joint (2) Broken joint sealing member (3) Broken port	(1) Remove vibration or too high pressure that causes looseness or breakage of the joint. (2) Replace the joint sealing member. (3) Replace the pump.
4. Decrease in oil discharge volume or insufficient oil pressure	(1) Insufficient oil quantity in hydraulic oil tank (2) Increased internal leakage due to too high temperature or improper viscosity of the hydraulic oil (3) Deteriorated pump performance due to contaminated hydraulic oil (4) Cavitation due to excessive negative pressure (5) Broken internal part (6) Reverse rotation	(1) Supply the specified kind of hydraulic oil to the proper level or replace the cooling system. (2) Replace the contaminated hydraulic oil. (3) Review the length and thickness of the intake pipes or replace the filter to prevent excessive negative pressure. (4) Replace the pump.
5. Abnormal temperature rise of pump or hydraulic oil	(1) Abnormal heat due to frequent operation of relief valve (2) Inadequate capacity or failure of the cooling system (3) Broken internal part	(1) Adjust the set pressure to a proper value. (2) Replace the cooling system. (3) Replace the pump.
6. Abnormal sound and vibration	(1) Improper installation (2) Cavitation (3) Air sucked in (4) Resonance of the piping, the mounting flange or others (5) Chattering of the relief valve	(1) Correct the centering or retighten the mounting parts. (2) Review the length and thickness of the intake pipes or replace the filter to prevent excessive negative pressure. (3) Find the cause of the shortage of oil quantity or the air mixed in the piping to remove it. (4) Reinforce the piping or the mounting flange to prevent resonance. (5) Replace the relief valve.

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Procedure	
*Positions of X-ring **15** and back-up ring **14** in flange **2**	
(6) Install oil seal **13** onto flange **2**.	
(7) Install O-ring **20** onto seal collar **11**.	

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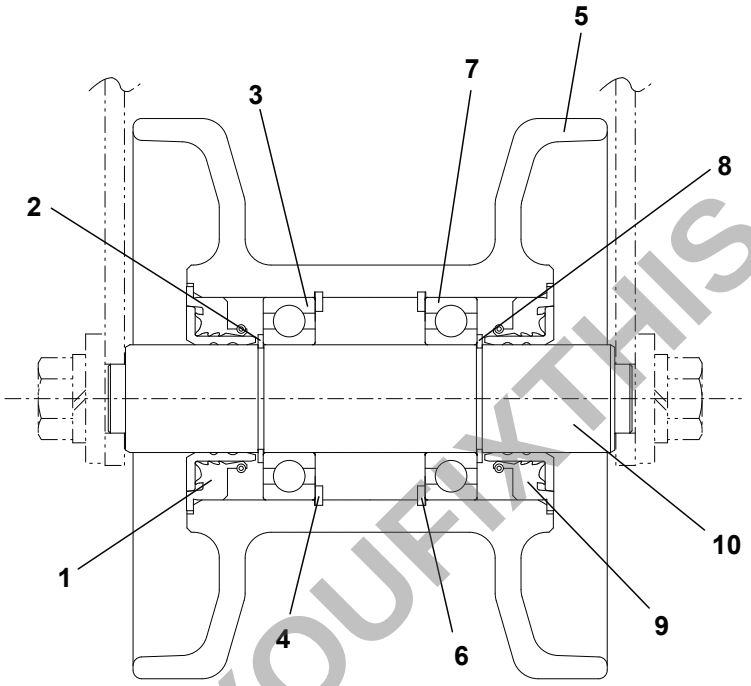
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Procedure	
(5) Remove external snap ring **28**, and then remove gear S2 **29**. ***Note :*** *Replace external snap ring **28** with a new one in reassembly.*	
(6) Remove the carrier **2** assembly from the body.	
(7) After removing snap ring **7** from carrier 2 **14**, • remove thrust washer **8**, • needle bearing **9**, • gear b2 **10** and thrust washer **8** in this order. 	
(8) Remove external snap ring **12**, and then, remove gear S1 **15**. ***Notes :*** • *The b2 pins, which are press fitted into the carrier 2, cannot be removed.* • *Replace the external snap ring **12** with a new one in reassembly.*	

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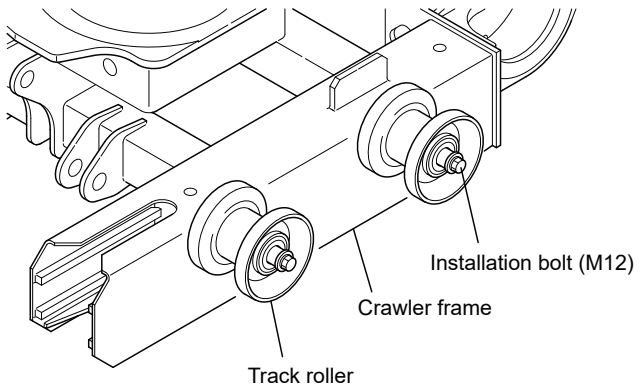
7-2-4 Disassembly and Reassembly of Track Roller

1) Structure and Part Names



No.	Part	Q'ty	No.	Part	Q'ty
1	Seal TW25 47 16	1	6	Internal snap ring C 47	1
2	External snap ring C 25	1	7	Bearing 6005	1
3	Bearing 6005	1	8	External snap ring C 25	1
4	Internal snap ring C 47	1	9	Seal TW25 47 16	1
5	Track roller	1	10	Shaft	1

2) Disassembly

Procedure	
(1) Loosen the adjust bolt to loosen the rubber crawler. (2) Remove the track roller from the crawler frame.	

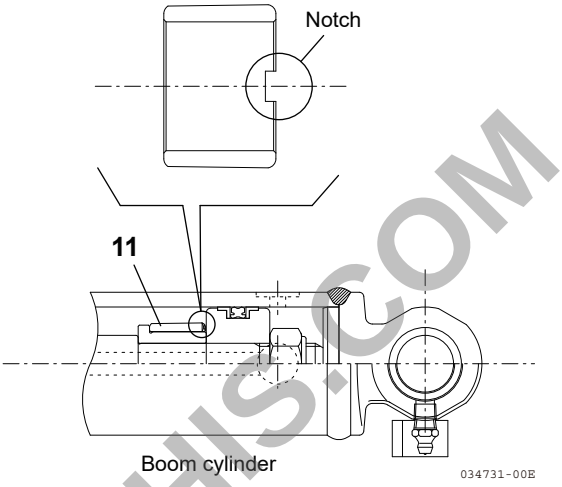
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4) Reassembly

Reassemble the hydraulic cylinder in the reverse order of the disassembly procedure.

Notes :

- *Take care not to install the cushion ring **11** of the boom cylinder in the wrong direction.*
- *Replace the O-rings, packings and seals with new ones.*



List of tightening torque for U-nut

Item	U-nut size	U-nut tightening torque	Adhesive
Boom	M18	206 to 235 N·m	Three bond 1324 or its equivalent
Arm			
Bucket			
Boom swing	M20	294 to 343 N·m	
Blade	M18	206 to 235 N·m	
Track gauge change			

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CHAPTER 10

TROUBLESHOOTING

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