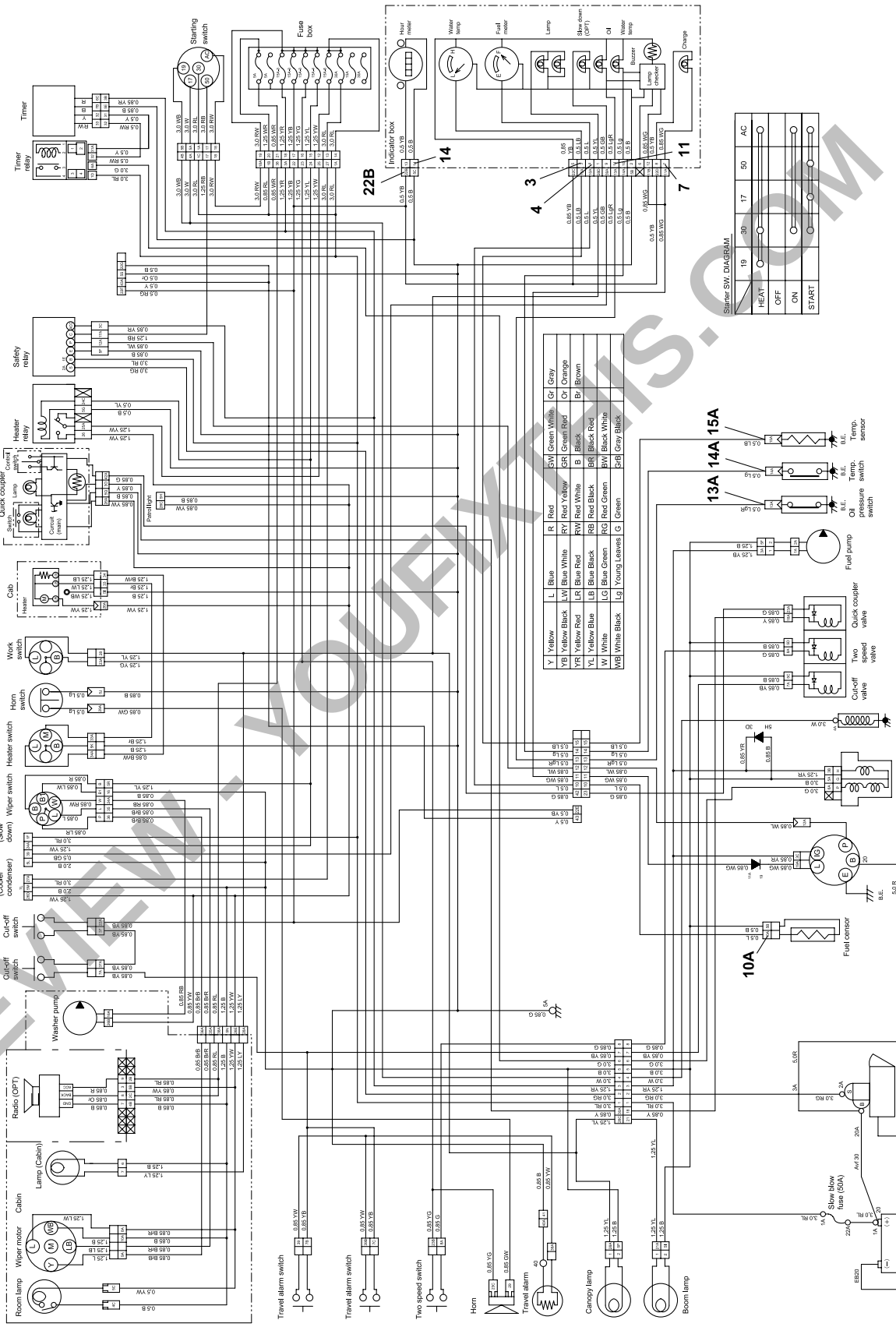
7-1-3 Wiring Diagram

1) Standard Specifications

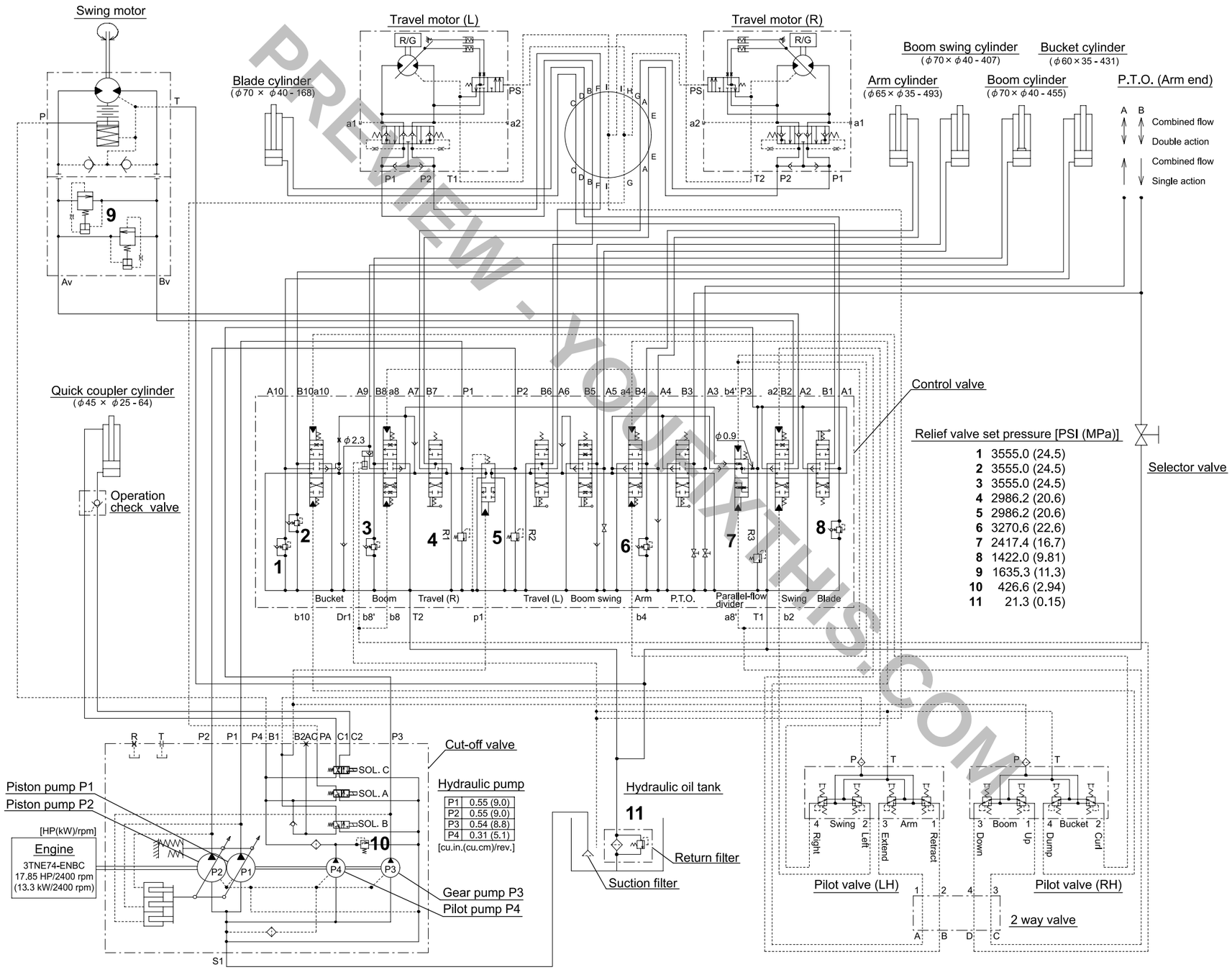


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5-2 Hydraulic Circuit Schematic

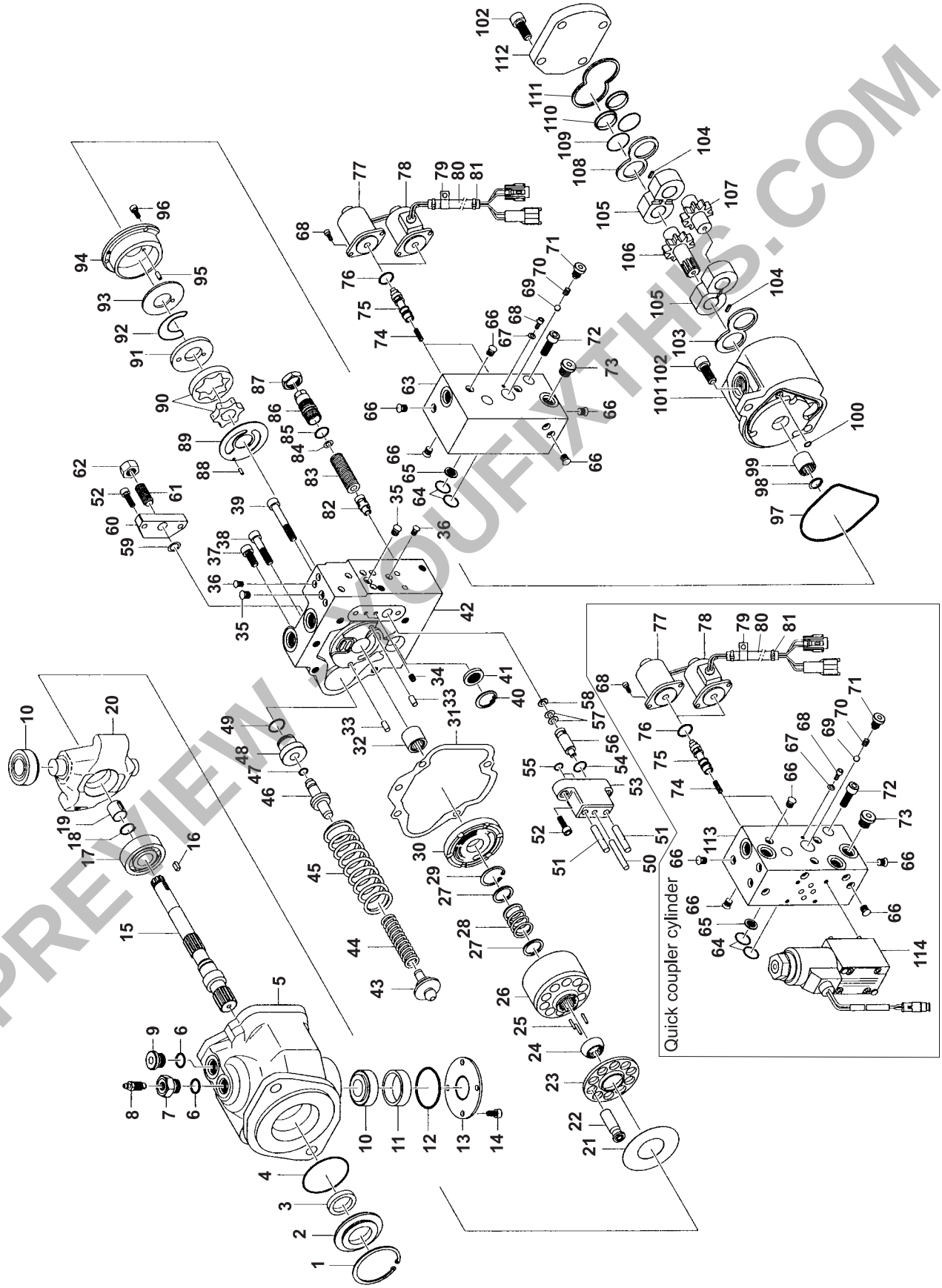
5-2-1 Quick Coupler



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3. Exploded View and Component Parts



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3. SERVICING STANDARDS

3-7 List of Tightening Torque

3-7-1 Machine

Unit : ft•lbf (N•m)

Applicable model:			ViO20		
Equipment			Thread size	Tightening torque	Adhesive
	No.	Tightening part			
Engine / Electrical equipment					

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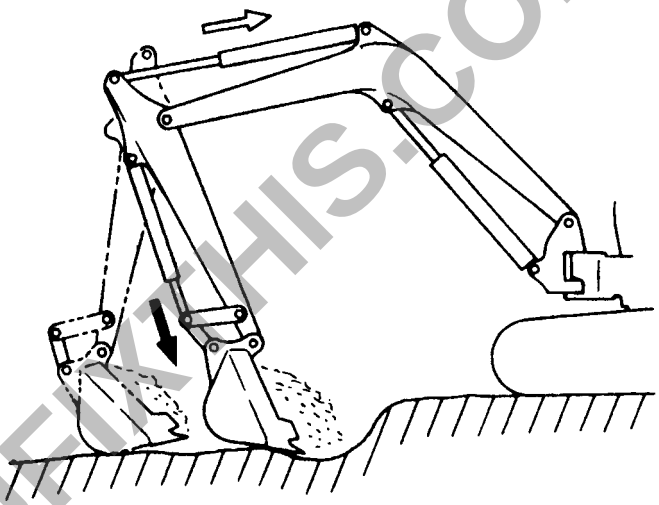
10. Troubleshooting

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.)

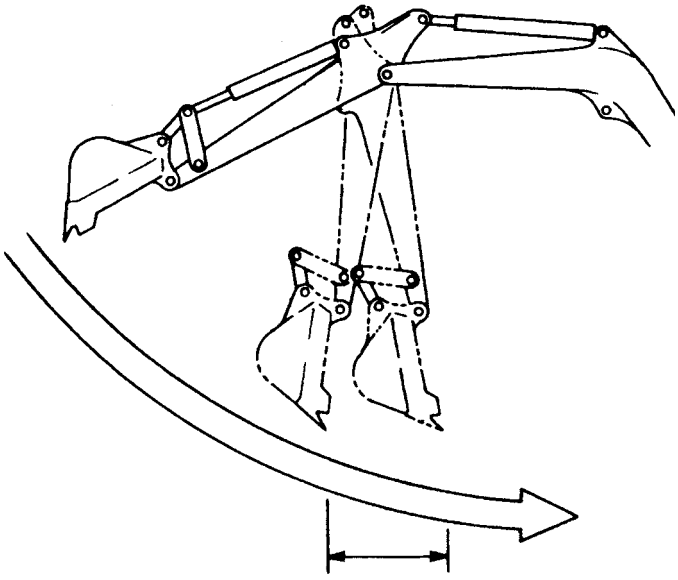
10-1-2 Discontinuous Arm Movement

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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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Note : *< > : W/O Quick coupler type*

Item	Unit	ViO20
Main specifications of machine		
Dimensions		

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3. SERVICING STANDARDS

3-2 Engine

1) Nominal and Allowable Values

ViO20

Applicable model				3TNE74-ENBV	
Item			Unit	Standard	Wear limit
Cylinder head					
Cylinder head distortion			in. (mm)	0.0020 (0.05) or less	0.0059 (0.15)
Valve seat angle	Intake		degrees (°)	120	–
	Exhaust			90	–
Valve seat width	Intake		in. (mm)	–	
	Exhaust			–	
Intake valve	Stem outside dia.		in. (mm)	Ø0.274 to 0.275 (Ø6.960 to 6.975)	0.272 (6.9)
	Guide inside dia.			Ø0.2757 to 0.2763 (Ø7.005 to 7.02)	0.279 (7.08)
	Oil clearance			0.0012 to 0.0024 (0.030 to 0.060)	–
Exhaust valve	Stem outside dia.		in. (mm)	Ø0.2734 to 0.2740 (Ø6.945 to 6.96)	0.272 (6.9)
	Guide inside dia.			Ø0.2757 to 0.2763 (Ø7.005 to 7.02)	0.279 (7.08)
	Oil clearance			0.0018 to 0.0030 (0.045 to 0.075)	–
Valve guide projection			in. (mm)	0.354 (9)	–
Valve sinkage	Intake		in. (mm)	0.016 to 0.024 (0.4 to 0.6)	
	Exhaust			0.030 to 0.037 (0.75 to 0.95)	
Valve head thickness	Intake		in. (mm)	0.039 to 0.051 (0.99 to 1.29)	0.02 (0.50)
	Exhaust			0.037 to 0.049 (0.95 to 1.25)	
Intake valve operating timing	Open	b. TDC	degrees (°)	7 to 17	–
	Close	a. BDC		35 to 45	–
Exhaust valve operating timing	Open	b. BDC		40 to 50	–
	Close	a. TDC		8 to 18	–
Valve spring	Free length		in. (mm)	1.472 (37.4)	–
	Inclination		in. (mm)	–	0.039 (1.0)
	Tension [0.0394 in. (1 mm) compressed]		lbs. (kg)	5.23 (2.37) / 4.12 (1.87)	
Intake / exhaust valve clearance			in. (mm)	0.006 to 0.01 (0.15 to 0.25)	–
Cylinder block					
Cylinder bore dia.			in. (mm)	2.9134 to 2.9146 (74.000 to 74.030)	2.921 (74.20)
Cylinder bore dia.		L mark		2.9142 to 2.9146 (74.020 to 74.030)	
		M mark		2.9138 to 2.9142 (74.010 to 74.020)	
		S mark		2.9134 to 2.9138 (74.000 to 74.010)	
Roundness of cylinder sleeve bore				0 to 0.00039 (0 to 0.01)	0.00118 (0.03)
Cylindricity of cylinder sleeve bore				0 to 0.00039 (0 to 0.01)	0.00118 (0.03)

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8. Periodic Inspection and Servicing

8-1 List of Periodic Inspection and Servicing

◇ : Check ○ : Supply ● : Replace □ : Adjust (clean) ■ : Oil & grease

Check & service items			Daily	Every 50	Every 100	Every 250	Every 500	Every 1000 hrs
General	Check falling off, breakage of parts		◇					
	Check loosened bolts & nuts, retighten		◇					
	Check engine condition		◇					
	Clean		□					
Lube oil	*Swing gear case oil	Check, resupply				○		
		Replace			● 1st time			●
	Travel reduction gear oil	Check, resupply				○		
		Replace			● 1st time			●
	*Transmission oil	Check, resupply	◇					
		Replace			● 1st time			●
	*Differential gear oil	Check, resupply			◇			
		Replace			● 1st time			●
Hydraulic system	Hydraulic oil	Check, resupply	◇					
		Replace						●
	Clean suction filter					□ 1st time		□
	Replace return filter					● 1st time	●	
	Check for abnormality of hydraulic pump		◇					
Grease	Check grease-up positions, grease		■					
	Greasing the swing gears and the swing bearings			■				
	Greasing the track gauge change cylinder and the link fulcrum			■				
Undercar-riage	Check, adjust track tension		◇					
	*Check air pressure, wear, flaw in tyres		◇					
Steering equipment	*Check performance, play of steering lever		◇					
	Check performance, play of travel lever		◇					
	*Check performance of speed change lever		◇					
	*Check performance of forward/reverse pedal		◇					
	*Check performance, play of steering wheel		◇					
	*Brake pedal	Stroke	◇					
		Performance	◇					
	*Parking brake	Stroke	◇					
		Performance	◇					
	Check performance of accel. level		◇					
Electric equipment	Check front & work lights, horn		◇					
	Check hourmeter function		◇					
	Check function of change, oil and pilot lamps		◇					
	Check wire breakage, short-circuits, loosened terminals, retighten		◇					
	Check, resupply battery fluid		◇					
	Check specific gravity of electrolyte						□ As required	
	Check function of OK monitor		◇					

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3-7-2 Engine

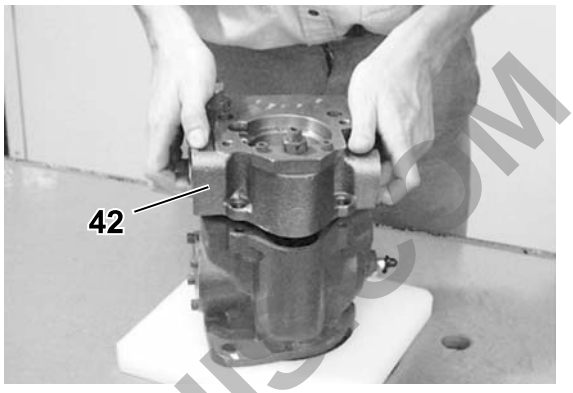
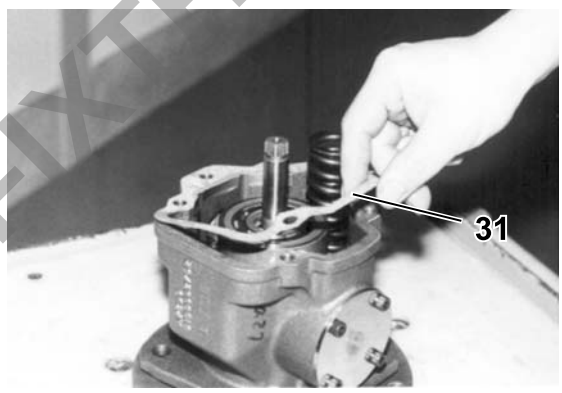
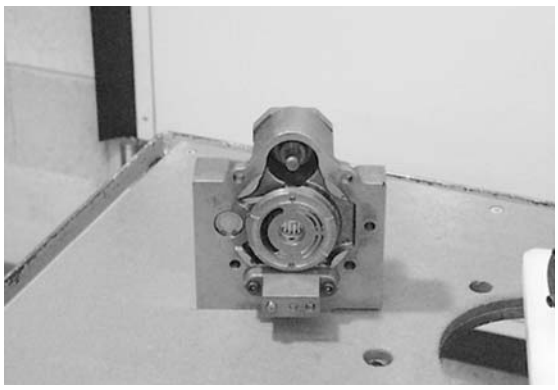
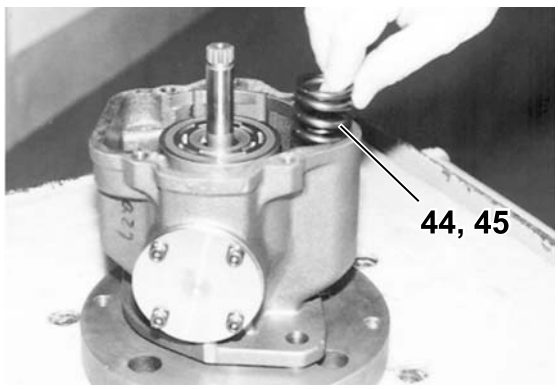
Tightening torque for major bolts and nuts

No.	Item	Thread size × Pitch	Tightening torque Unit : ft•lbf (N•m)	Lubricating oil
1	Cylinder head bolt (class 1)	M9 × 1.25	43.4 to 47.0 (58.8 to 63.7)	Yes
2	Connecting rod bolt (class 1)	M7 × 1.0	16.6 to 20.3 (22.5 to 27.4)	Yes
3	Flywheel mounting bolt	M8 × 1.25	57.9 to 65.1 (78.4 to 88.2)	Yes
4	Metal cap bolt	M8 × 1.25	57.9 to 65.1 (78.4 to 88.2)	Yes
5	Crankshaft pulley fastening bolt	M12 × 1.5	61.5 to 68.7 (83.4 to 93.1)	Yes
6	Fuel injection nozzle retainer clamp nut	M20 × 1.5	36.2 to 39.1 (49.0 to 52.9)	No
7	Glow plug	M10 × 1.25	10.9 to 14.5 (14.7 to 19.6)	No
8	Governor weight support nut	M12 × 1.25	50.6 to 54.3 (68.6 to 73.5)	Yes
9	High pressure pipe nut	M12 × 1.5	21.7 to 25.3 (29.4 to 34.3)	No

3-7-3 Tightening Torque for General Bolts and Nuts

Item		Thread size × Pitch	Tightening torque [Unit : ft•lbf (N•m)]	Remarks
Hexagon head bolt (7T) Nut	Coarse thread	M6 × 1	7.23 to 8.68 (9.8 to 11.8)	1) Apply 80% of tightening torque when tightened to aluminum. 2) Apply 60% of tightening torque for 4T bolts and lock nuts. 3) Use fine screw threads for engine only.
		M8 × 1.25	16.6 to 21.0 (22.6 to 28.4)	
		M10 × 1.5	32.6 to 43.4 (44.1 to 58.8)	
		M12 × 1.75	57.9 to 72.3 (78.5 to 98.1)	
		M14 × 2	86.8 to 108.5 (117.7 to 147.1)	
		M16 × 2	123.0 to 151.9 (166.7 to 205.9)	
		M18 × 2.5	173.6 to 209.8 (235.4 to 284.4)	
		M20 × 2.5	238.7 to 296.6 (323.6 to 402.1)	
	Fine thread	M14 × 1.5	94.0 to 108.5 (127.5 to 147.1)	
		M16 × 1.5	155.5 to 177.2 (210.9 to 240.3)	
PT plug		1/8	7.23 (9.8)	
		1/4	14.5 (19.6)	
		3/8	21.7 (29.4)	
		1/2	43.4 (58.8)	
Pipe joint bolt		M8	9.4 to 12.3 (12.7 to 16.7)	
		M12	18.1 to 25.3 (24.5 to 34.3)	
		M14	28.9 to 36.2 (39.2 to 49.0)	
		M16	36.2 to 43.4 (49.0 to 58.8)	

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Procedure	
(13) Remove the cover **42** keeping it level. ***Note :*** *Pay attention to the valve plate **30** installed on the back of the cover.* *If you find difficulty in removing it, tap the cover **42** with a plastic hammer.*	
(14) Remove the packing **31**.	
(15) Condition with the cover **42** removed.	
(16) Removal of the control spring section. Remove the inner spring **44** and the outer spring **45**.	

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5) Boom Swing Operation

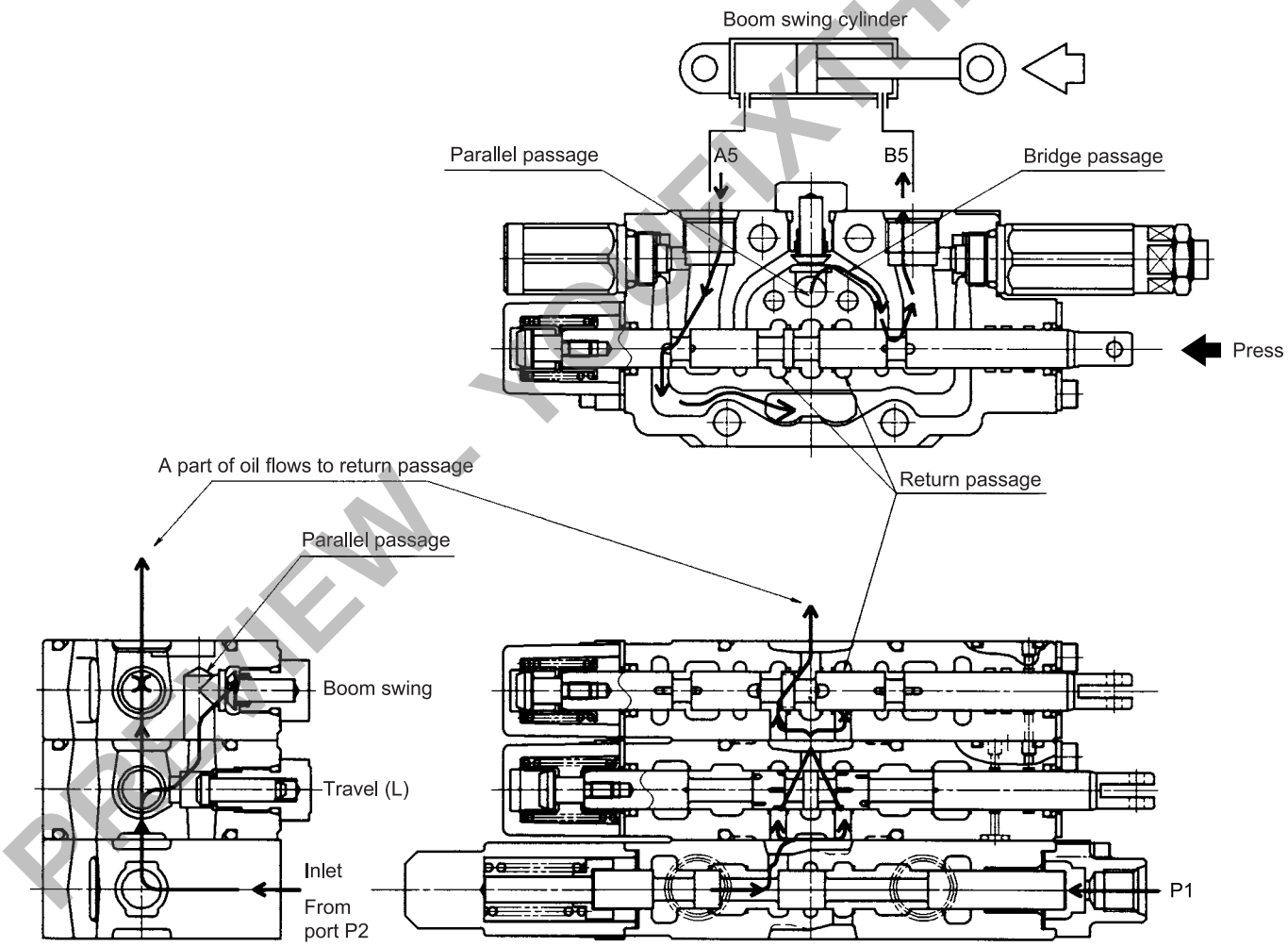
(1) Right boom swing operation

When the boom swing pedal is moved on the right, the spool of the boom swing section is pressed forward. The return passage is blocked by the boom swing spool as the spool has been moved, so that the oil from the port P2 flows to the parallel passage through the check valve installed at the upper part of the return passage of the left travel spool. (A part of oil flows to the tank passage through the notch in the boom swing spool.)

The passage between the port B5 and the bridge passage is opened as the boom swing spool has been moved, so that the oil flowed to the parallel passage flows through the load check valve and the bridge passage to the port B5 and is fed to the rod side of the boom swing cylinder.

Meanwhile, the return oil from the bottom side of the boom swing cylinder flows to the tank passage through the port A5 and the notch in the boom swing spool, which is opened to the tank passage as the spool has been moved.

Thus, the boom swing cylinder is retracted to swing the boom to the right.



Operation of boom swing section in boom swing operation

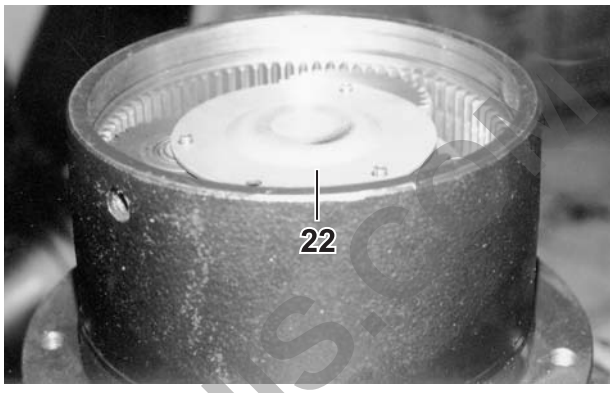
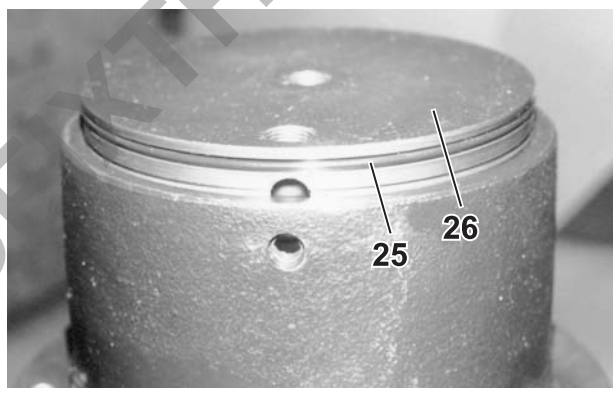
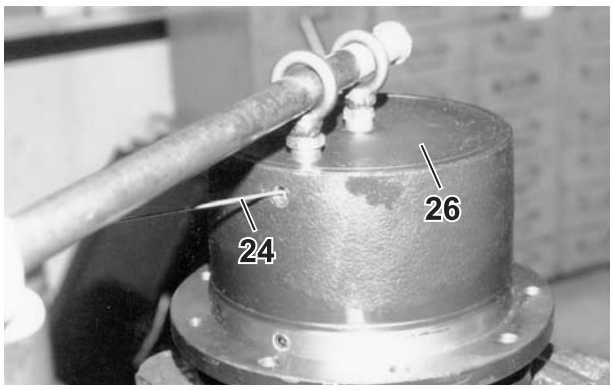
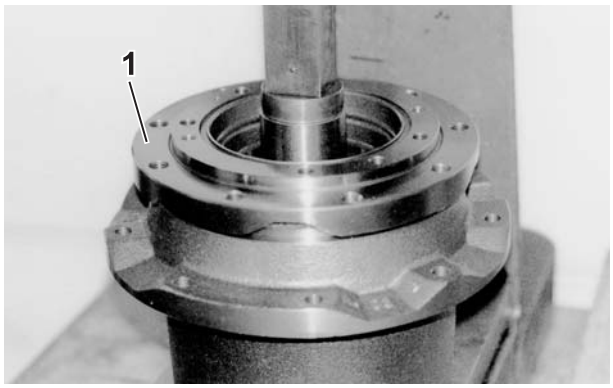
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Item	Description	Reference N°	Dimensions
1	Handle TT	07 213 322	
3	Lever kit	07 213 213	
4	Rubber boot	07 259 959	
7	Retaining plate	07 261 225	
8	Cardan kit composed of : 1 cardan + shims	07 213 399	
10	Plunger kit composed of : 4 plunger guides a 4 plain plungers b 4 spring rings c	07 213 396	

Item	Description	Reference N°	Dimensions
1	Handle ST with cable socket AMP	08 200 133	
2	Push button kit	07 213 314	
3	Lever kit	07 213 213	
4	Rubber boot	07 259 959	
7	Retaining plate	07 261 225	
8	Cardan kit composed of : 1 cardan + shims	07 213 399	
10	Plunger kit composed of : 4 plunger guides a 4 plain plungers b 4 spring rings c	07 213 396	

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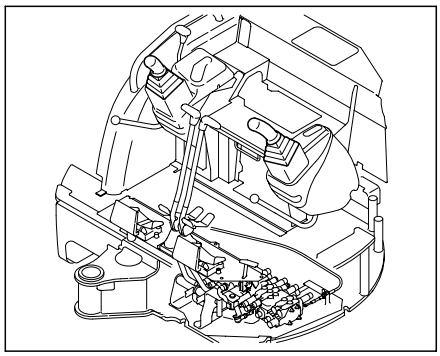
Procedure	
(13) Install the thrust plate **22**.	
(14) Apply grease to the O-ring **25** and install it to the cover **26**. Install the cover on the housing **6** with the U-groove aligned with the tapped hole for the plug **8** in the housing **6**.	
(15) Bend the end of the wire **24** by about 0.32 in. (8 mm) at an angle of 90 degrees and insert it into the tapped hole in the housing **6**. Turn the cover **26** to draw in the wire **24**. **Tools :** • Eye bolt (S-1) • Round rod (S-15) (16) Tighten the plugs **8**. Tightening torque : 5.06 to 6.51 ft·lbf (6.86 to 8.82 N·m) **Tools :** • Torque wrench 1 • Hexagon bit 6	
(17) Press-fit the oil seal **30** into the flange holder **1**. **Tool :** • Oil seal press-fitting jig (S-8)	

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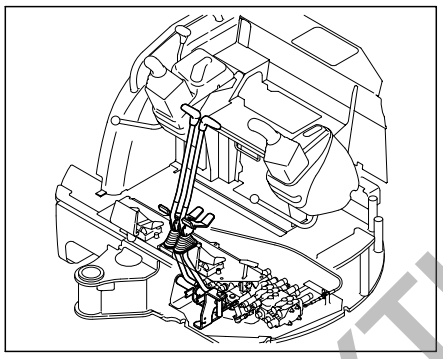
7-3 Controls

7-3-1 Control Train

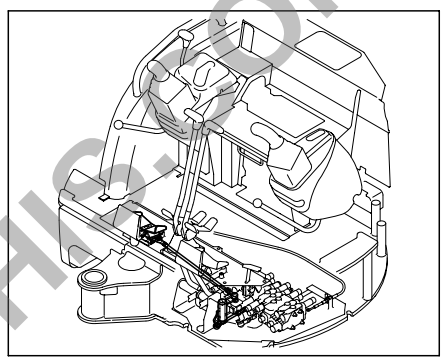
1) Control Lever (R)
Control Lever (L)



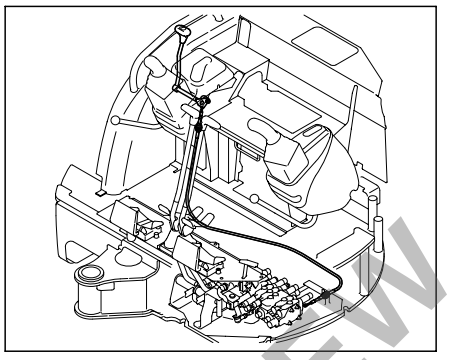
2) Travel Levers



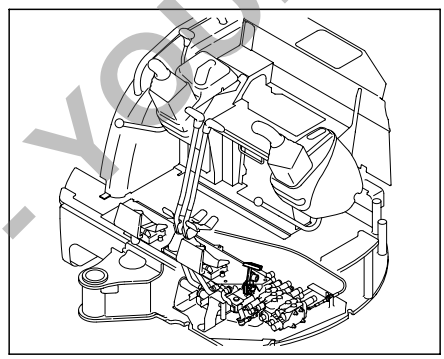
3) Boom Swing Pedal



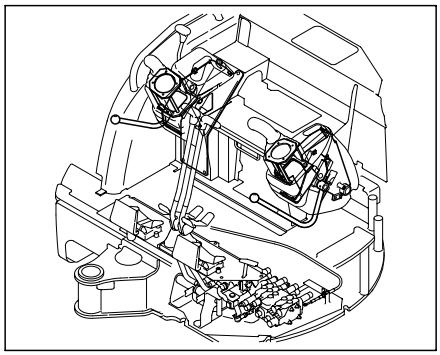
4) Blade Lever



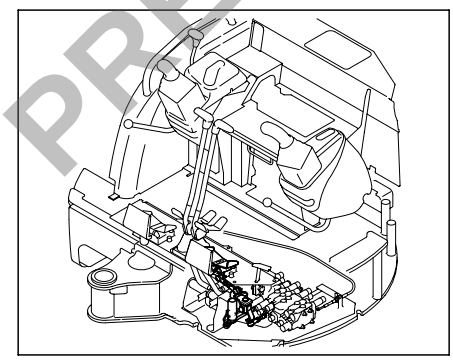
5) High-Speed Pedal



6) Lock Lever



7) P.T.O. Pedal

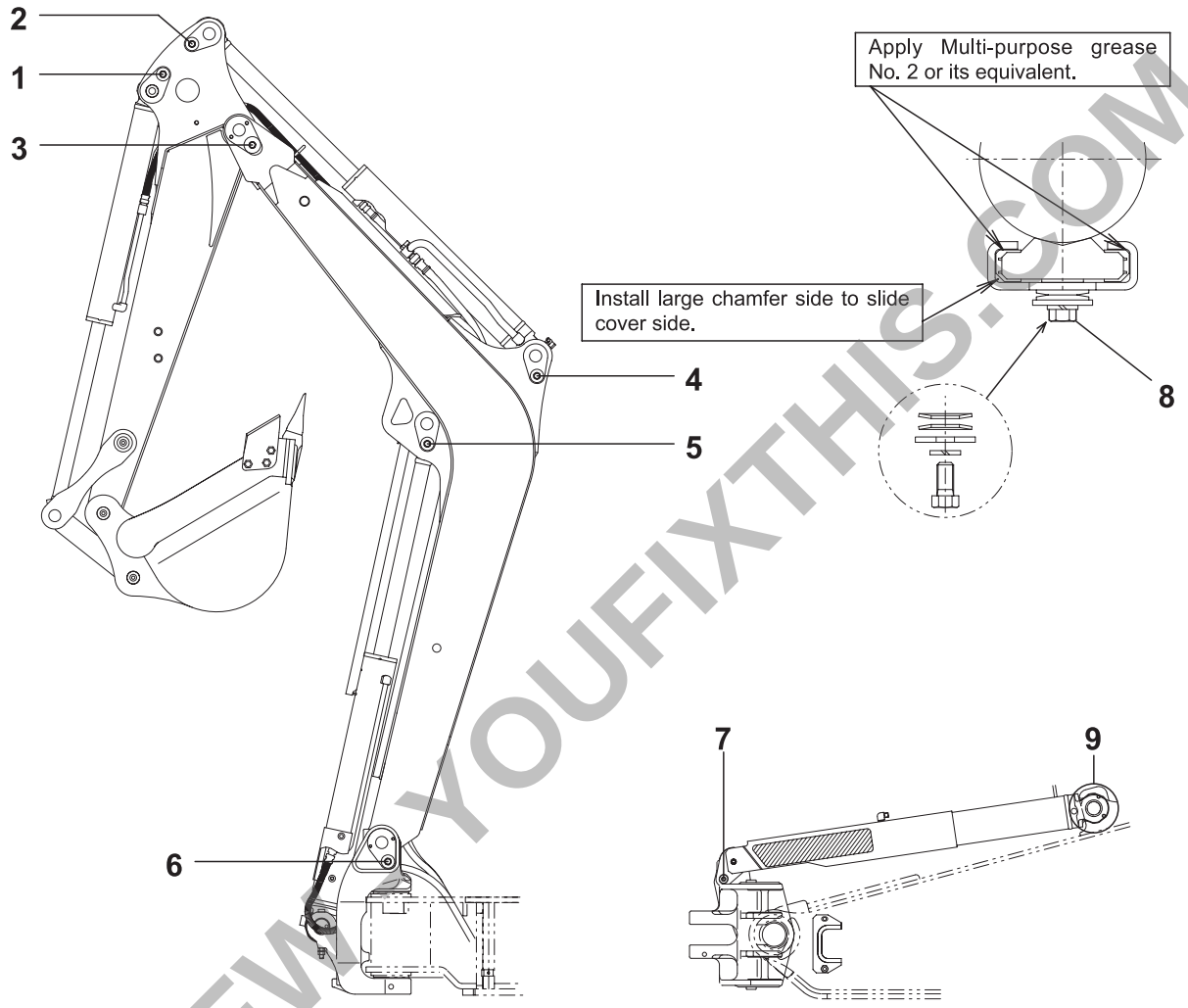


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7) Reinstallation

Reinstall the implement in the reverse order of the removal procedure.



Tightening torque and Adhesive

No.	Size	Tightening torque	Adhesive
1	M10	32.6 to 43.4 ft·lbf (44.1 to 58.8 N·m)	Apply Three Bond 1324 or its equivalent
2	M12	57.9 to 72.3 ft·lbf (78.5 to 98.1 N·m)	
3	M12		
4	M12		
5	M12		
6	M12		
7	M12		
8	M10	32.6 to 43.4 ft·lbf (44.1 to 58.8 N·m)	
9	M10		

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