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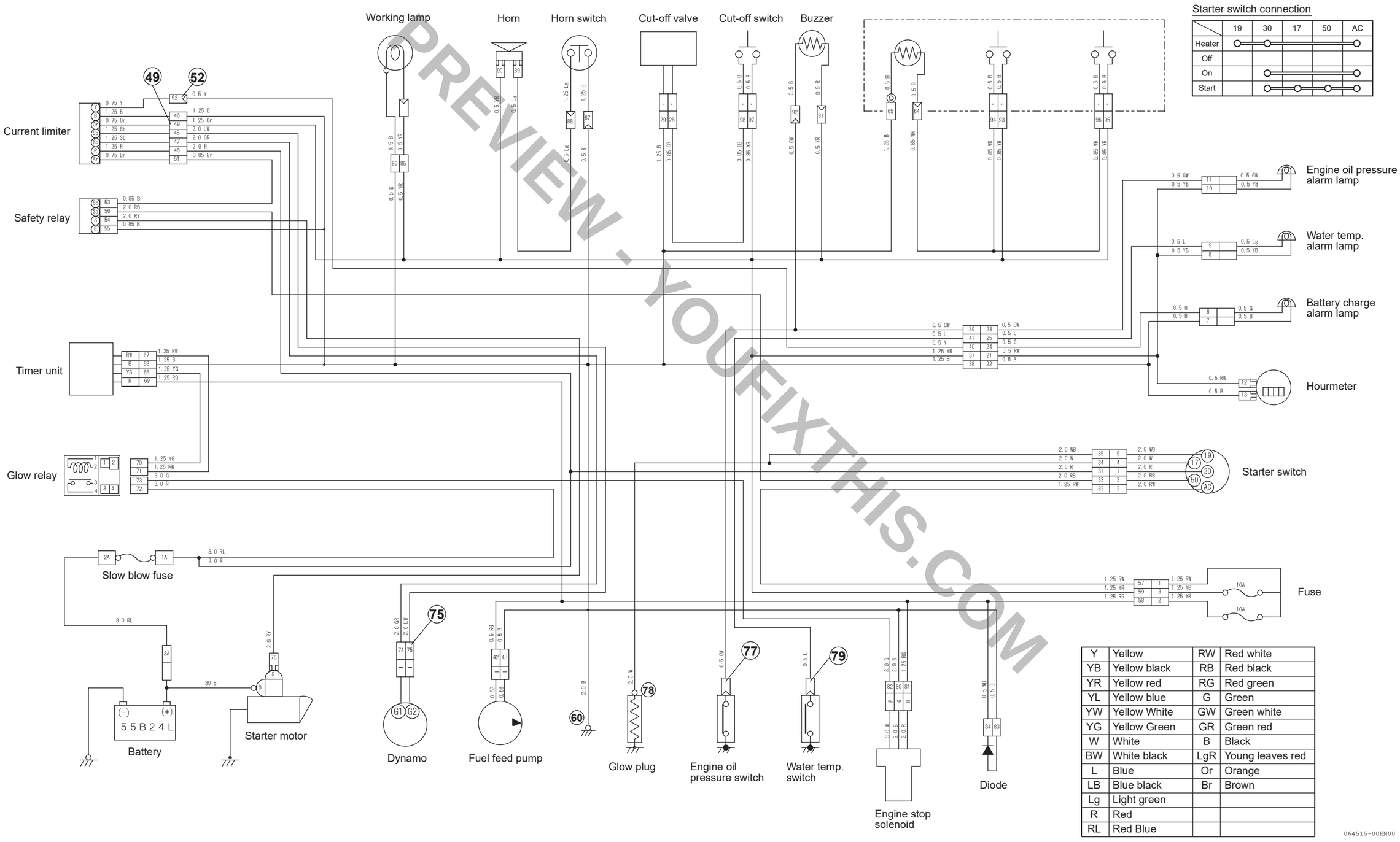
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7-1-3 Wiring Diagram



Y	Yellow	RW	Red white
YB	Yellow black	RB	Red black
YR	Yellow red	RG	Red green
YL	Yellow blue	G	Green
YW	Yellow White	GW	Green white
YG	Yellow Green	GR	Green red
W	White	B	Black
BW	White black	LgR	Young leaves red
L	Blue	Or	Orange
LB	Blue black	Br	Brown
Lg	Light green		
R	Red		
RL	Red Blue		

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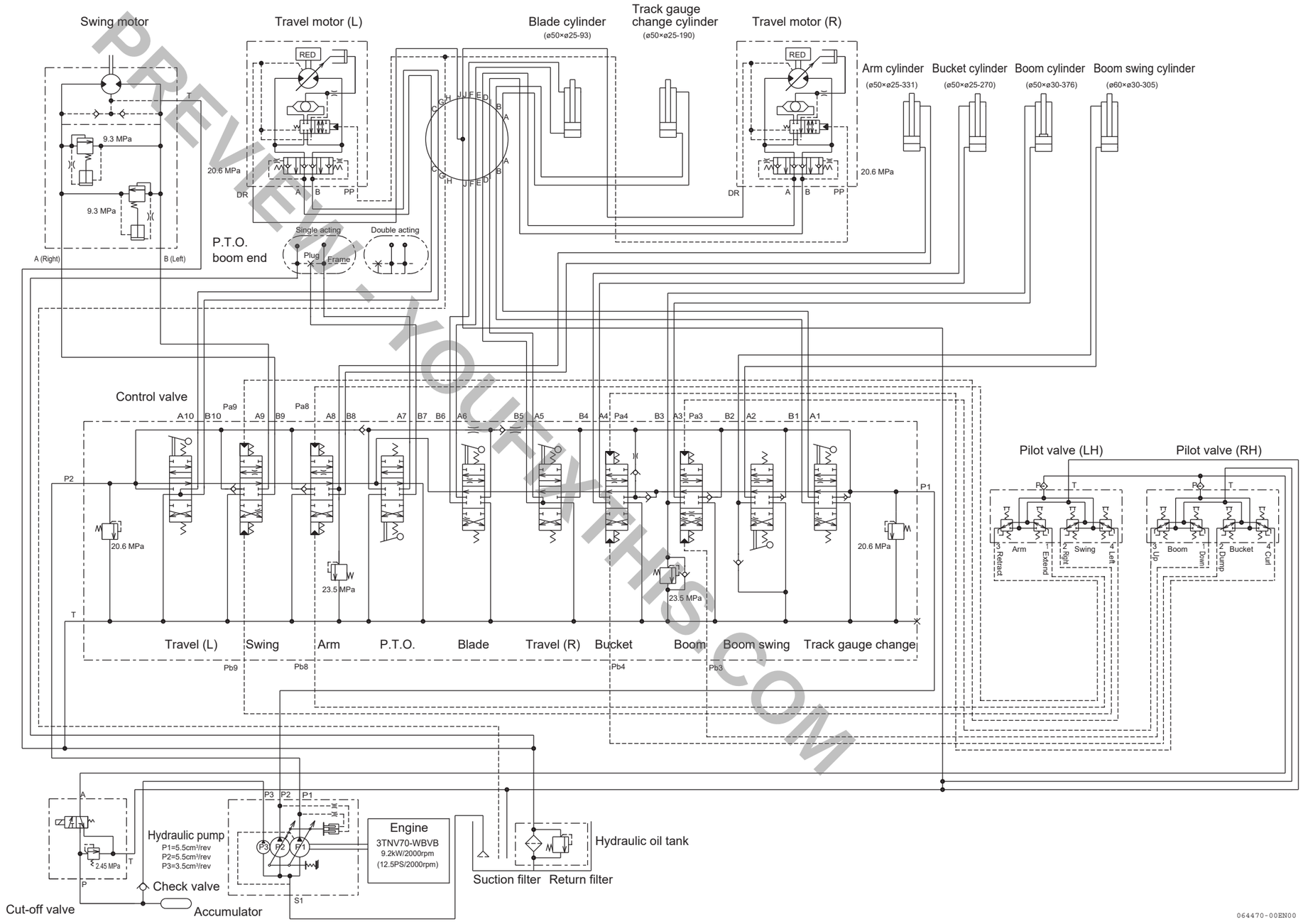
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5. HYDRAULIC SYSTEM

5-2 Hydraulic Circuit Schematic

5-2-1 For Standard Type Machines

S/N 22644 and before

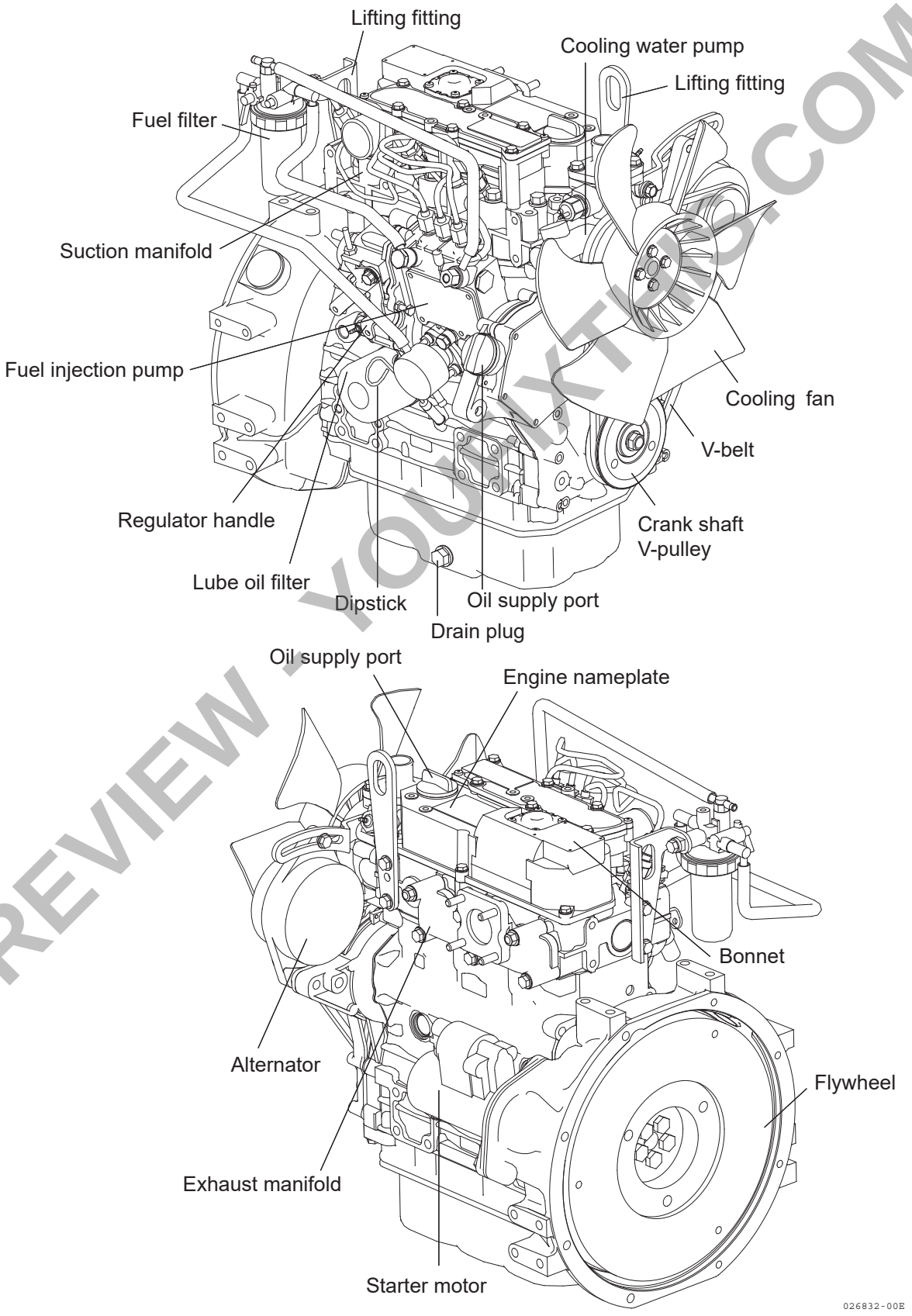


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4. Engine

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



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3-7 List of Tightening Torque

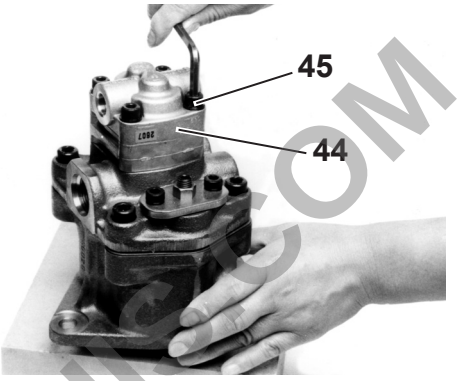
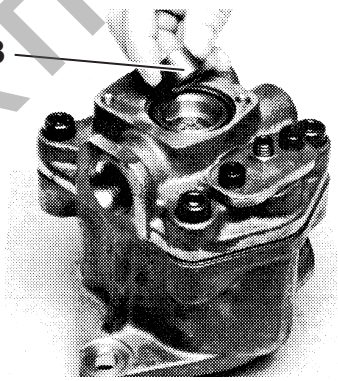
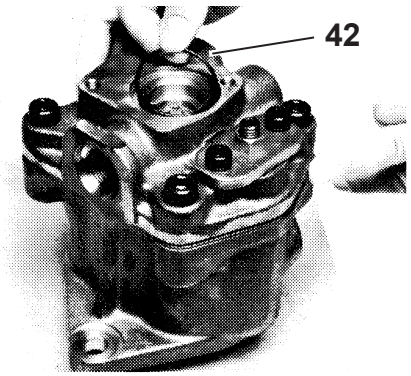
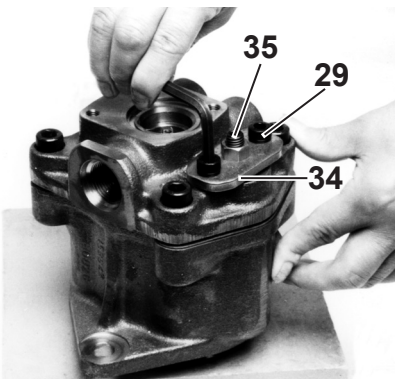
3-7-1 Machine

Unit : N•m

Applicable model:			TC10Z			
Equipment			Thread size	Tightening torque	Adhesive	Remarks
	No.	Tightening part				
Engine / Electrical equipment						
	1	Engine bracket	M10	44.1 to 58.8	Three Bond 1324 or its equivalent	Fan side
	2	Engine mount vibroisolating rubber	Nut M10	24.5 to 32.3		Radiator side
	3	Engine mount vibroisolating rubber	M14 (fine)	68.6 to 83.3		Flywheel side
	4	Engine stopper	M10	44.1 to 58.0	Three Bond 1324 or its equivalent	2 places
	5	Radiator vibroisolating rubber	Nut M8	12.7 to 16.7		
	6	Radiator hose band	32, 38	2.9		
	7	Air cleaner hose	Hose clip 60	2.0 to 2.9		
	8	Fuel tank band (Upper side)	Flanged nut M10	2.9		
Travel device						
	1	Track roller	M12	78.4 to 98.0	Three Bond 1324 or its equivalent	
	2	Sprocket	Hexagon socket head bolt M10	44.1 to 58.8	Three Bond 1324 or its equivalent	
	3	Idler	M12	78.4 to 98.0	Three Bond 1324 or its equivalent	
	4	Idler fork	Plug R1/8	8.8 to 9.8	Loctite 262 or its equivalent	
	5	Nipple valve	M16	49.0		
	6	Nut (Stopper)	M16	166.6 to 205.8	Three Bond 1324 or its equivalent	
	7	Blade	M10	44.1 to 58.8	Three Bond 1324 or its equivalent	
Controls						
	1	Control lever grip	Binding head screw M4	2.0 to 2.9	Three Bond 1324 or its equivalent	
	2	Blade lever fulcrum	M8	22.5 to 28.4	Three Bond 1324 or its equivalent	
	3	Boss in blade lever shaft section	M8	22.5 to 28.4	Three Bond 1324 or its equivalent	
	4	Lock lever R	M6	11.8 to 16.7	Three Bond 1324 or its equivalent	
	5	L-ball, link-ball 8 (male screw)	M8	12.7 to 16.7		
	6	L-ball, link-ball 8 (female screw)	M8	7.8 to 9.8		
	7	L-ball, link-ball 6 (male screw)	M6	7.8 to 9.8		
	8	L-ball, link-ball 6 (female screw)	M6	4.9 to 6.9		
	9	Support	M12	108 to 127	Three Bond 1324 or its equivalent	

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3) Disassembly

Procedure	
(1) Remove two hexagon socket head bolts **45** to take gear pump **44** off.	
(2) Remove coupling **43.**	
(3) Remove O-ring **42.**	
(4) Remove two hexagon socket head bolts **29** to remove plate **34** for adjustment of spring **32.** ***Note :*** *Do not loosen hexagon nut **35**, or the output characteristics will be changed.*	

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5-3-4 Swing

1) Right Swing

(1) Pilot oil flow

When the swing control lever is moved to the right, the oil from the pilot pump P3 flows through the port A of the cut-off valve and the port 2 of the pilot valve (LH) to the port b9 of the swing section to move its spool.

(2) Oil flow from hydraulic pump

The oil from the piston pump P2 flows through the port P2 of the inlet section, the parallel passage and the port B9 of the swing section to the port A of the brake valve, so that the swing motor is rotated.

The return oil from the port B of the brake valve flows back to the hydraulic oil tank through the port A9 of the swing section, the port T of the control valve and the return filter.

2) Left Swing

(1) Pilot oil flow

When the swing control lever is moved to the left, the oil from the pilot pump P3 flows through the port A of the cut-off valve and the port 4 of the pilot valve (LH) to the port a9 of the swing section to move its spool.

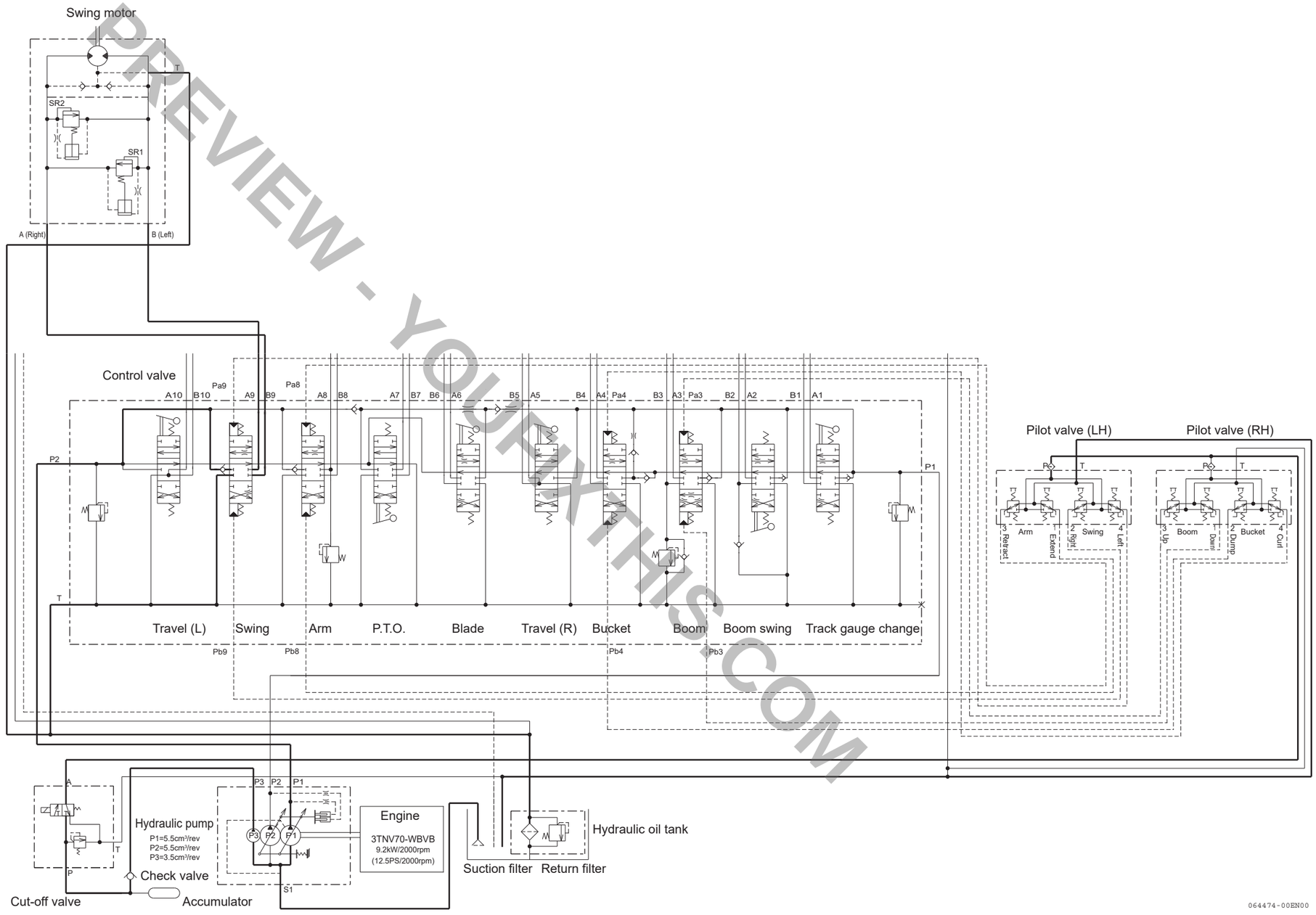
(2) Oil flow from hydraulic pump

The oil flows in the opposite direction to the oil flow in the right swing operation with regard to the swing motor.

3) Swing Motor Hydraulic Brake Operation

When the swing control lever is released (i.e., returned to the neutral position), the oil flow to the swing motor is blocked and the pressures at the ports A and B of the brake valve become equal and consequently the brake is applied. However, the swing motor continues to rotate through inertia in a short time. This causes the motor to act like a pump and increase the circuit pressure on the port B side in case of rotation for the right swing operation. The brake valve is of a shockless type. The increased pressure opens the relief valve SR1 to let the oil on the higher pressure side escape to the line on the port A side, so that the circuit pressure is absorbed and cavitation is prevented on the port A side.

The port T of the swing motor has the drain function and a circuit which directly takes in the return oil flowing from the port T of the control valve to the hydraulic oil tank to prevent negative pressure in the swing motor.



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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item				Unit	TC10Z
Main specifications of machine					
Dimensions					
Overall length (Transportation position)				mm	3010
Cabin	Overall height	Transportation position		mm	-
		Traveling position		mm	-
	Overall width	Full machine width		mm	-
Canopy	Overall height	Transportation position		mm	1420
		Traveling position		mm	1420
	Overall width	Full machine width (Maximum/Minimum)		mm	1000 / 830
Tumbler center distance				mm	1120
Track gauge (Maximum/Minimum)				mm	820 / 650
Minimum ground clearance				mm	140
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	2.1 / 2.1
		High speed (Forward/Reverse)		km/hr	4.0 / 4.0
Theoretical climbing ability				degrees	30
Permissible water depth limit				mm	290
Work performance					
Bucket	Width (Standard)			mm	400
	(Standard. JIS heaped capacity)			cu.m	0.03
	Number of teeth / Installation method			pcs.	3 / rubber pin lock type
Maximum digging depth	With blade raised			mm	1800
	With blade on the ground			mm	1900
Maximum depth of vertically digging				mm	1500
Maximum dumping height				mm	2260
Minimum front swing radius (with boom in front)				mm	1300
Minimum front swing radius (at 75 degrees right boom swing)			Cabin	mm	-
			Canopy	mm	1040
Rear end swing radius				mm	500
Boom swing angle		Cabin	Left	degrees	-
			Right	degrees	-
		Canopy	Left	degrees	50
			Right	degrees	90
Maximum digging force		Bucket		kN	13.7
		Arm		kN	6.6
Maximum tractive force (Oil pressure force) (rubber)				kN	12.1
Maximum swing inclination angle (with standard bucket)				degrees	20 (at loading)

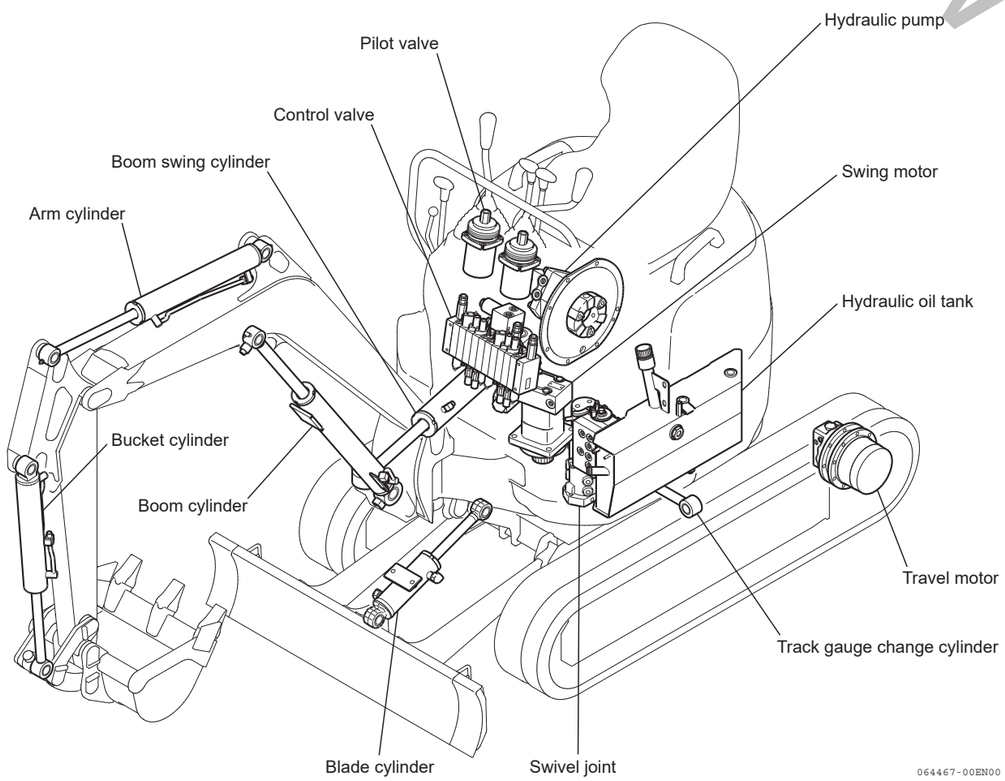
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5. HYDRAULIC SYSTEM

5. Hydraulic System

5-1 Outline

The hydraulic system consists of an engine, variable displacement piston pumps, a control valve, a boom cylinder, an arm cylinder, a bucket cylinder, a boom swing cylinder, a blade cylinder, a swing motor, a swivel joint, a track gauge change cylinder, two travel motors and a hydraulic oil tank. The oil discharged from the variable displacement piston pumps flows to the actuators through the control valve.
The hydraulic pilot control system comprises a pilot pump, a cut-off valve and two pilot valves. The oil discharged from the pilot pump flows into the pilot ports of the control valve through the cut-off valve and the pilot valves to control the valve spool movement in proportion to the pressure at the port.



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5. HYDRAULIC SYSTEM

1) Hydraulic Pump

The variable displacement piston pumps and the pilot pump are linked to the flywheel of the engine through the coupling. The number of revolutions of each hydraulic pump is identical to the engine speed.

Discharge volume of each pump

cu. cm / rev

No.	Pump		Discharge volume
1	Piston pump	P1	5.5
2	Piston pump	P2	5.5
3	Pilot pump	P3	3.5

2) Oil Flow

(when the lock lever is in the unlock position)

(1) Piston pumps P1 and P2

(when the lock levers are in the unlock position)

The pumps take in oil through the suction filter from the hydraulic oil tank and discharge it. The discharged oil flows to the ports P1 and P2 of the control valve and returns from the port T to the hydraulic oil tank through the return filter. This circulation is repeated.

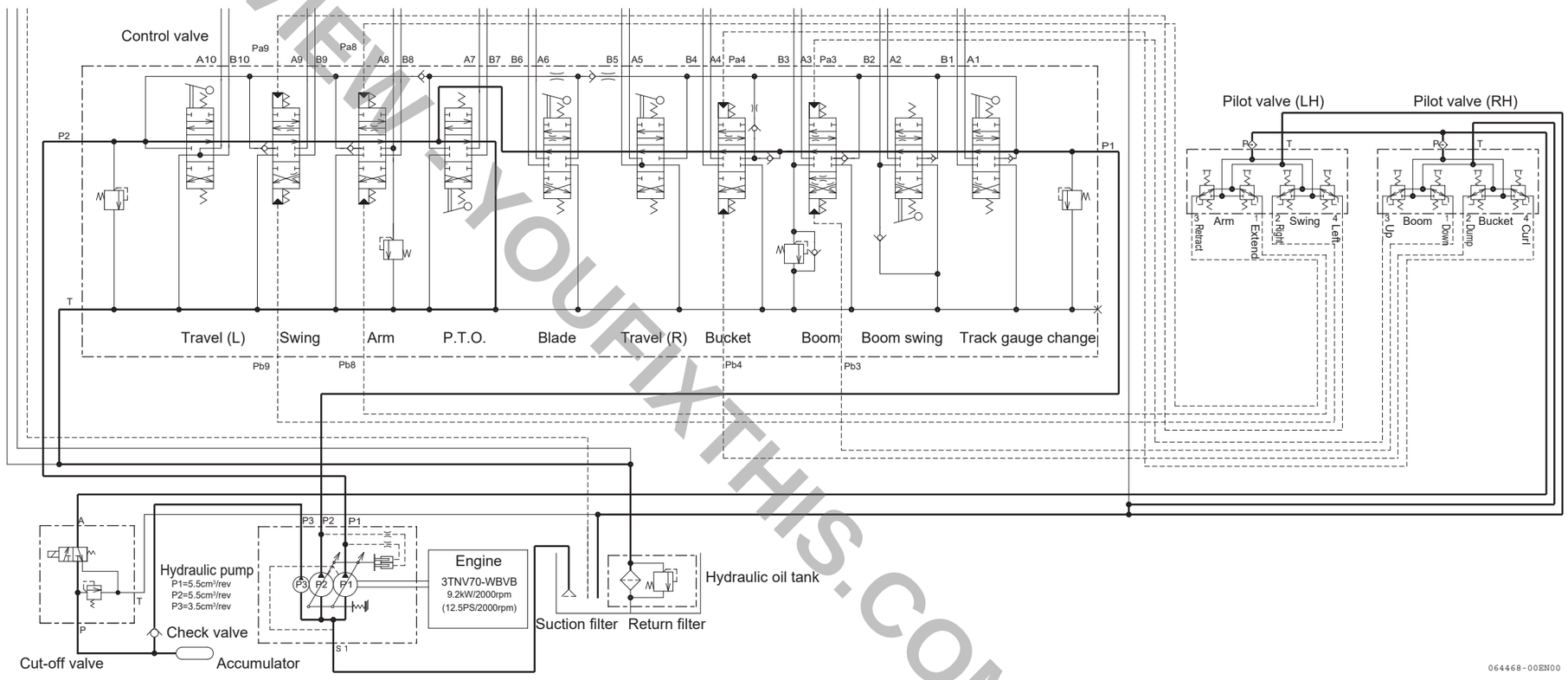
The bypass valve in the return filter opens at a differential pressure of 0.147 MPa.

(2) Pilot pump P3

The oil from the pilot pump P3 flows back to the hydraulic oil tank through the port A of the cut-off valve and the pilot valves.

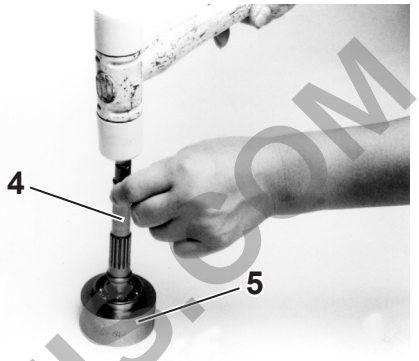
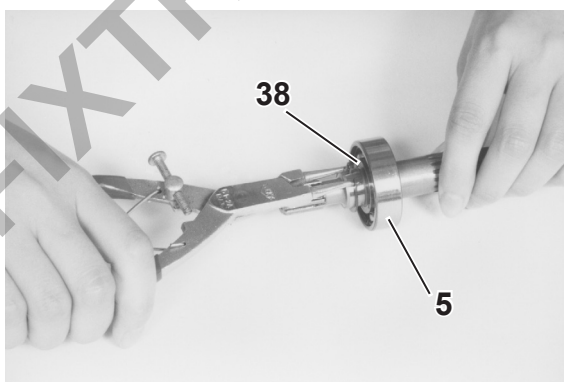
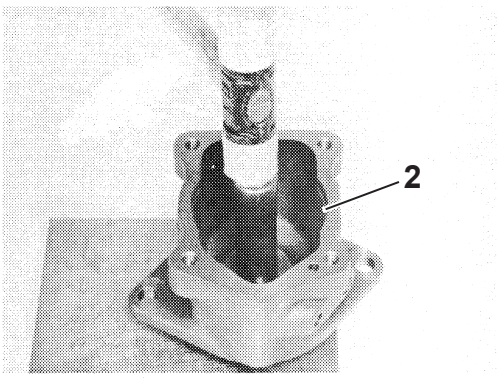
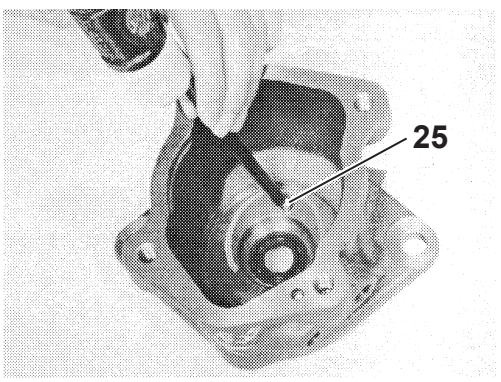
3) System Relief Valve

The system relief valves R1 and R2 of the control valve control the discharge pressure of the pumps.



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4) Reassembly

Procedure	
(1) Use bearing **5** as a stand to install shaft **4** into the bearing by tapping the shaft on its end with a plastic hammer.	
(2) Install external snap ring **38** onto the shaft to hold bearing **5.**	
(3) Install oil seal **28** straight into housing **2**, using the oil seal installation jig and a plastic hammer. ***Note :*** *Apply silicon to the lip of the oil seal before installing it.*	
(4) Install dowel pin **25** for positioning into the housing, using a special jig and a plastic hammer.	

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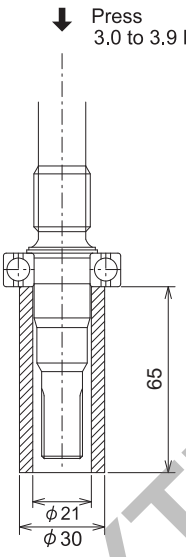
6) Troubleshooting

Trouble	Cause	Measure
1. Oil leak from spool	(1) Damaged oil seal (2) Damaged spool surface (3) Foreign substances on spool surface	(1) Replace oil seal. (2) Replace spool. (3) Remove foreign substances.
2. Spool does not work smoothly or return to neutral position.	(1) Foreign substances caught inside (2) Bent spool (3) Off-center of control valve linkage (4) Excessive tightening of tie rod (5) Too high temperature of hydraulic oil	(1) Clean hydraulic circuit and valves. (2) Replace spool. (3) Check and adjust linking condition of linkage. (4) Retighten tie rod at specified tightening torque. Tightening torque: 13.7 to 14.7 N•m (5) Keep oil temperature within specified range.
3. Actuator does not operate or operates slowly (at low pressure).	(1) Spool stroke is not full. (2) Foreign substances caught between regulating valve and seat surface. (3) Improper set pressure, or sticking or breakage of relief valve	(1) Check and adjust link portion. (2) Disassemble and clean parts. (3) Adjust set pressure, disassemble and clean parts or replace relief valve.
4. Actuator does not operate or operates slowly (at high pressure).	(1) Overload (2) High resistance of piping	(1) Relieve load. (2) Replace piping with proper sized one.
5. Oil pressure can not be maintained in neutral position of spool.	(1) Neutral position of spool is not in right place. (2) Oil leak from clearance between spool and body (3) Internal leakage of hydraulic cylinder	(1) Adjust neutral position of spool. (2) Replace spool or valve section. (3) Repair or replace hydraulic cylinder.
6. Oil pressure lowers when spool is moved from neutral position.	(1) Dust or foreign substances caught between load check valve and seat surface. (2) Sticking or breakage of poppet. (3) Damaged seat surface.	(1) Disassemble and clean parts. (2) Replace poppet. (3) Replace valve section.

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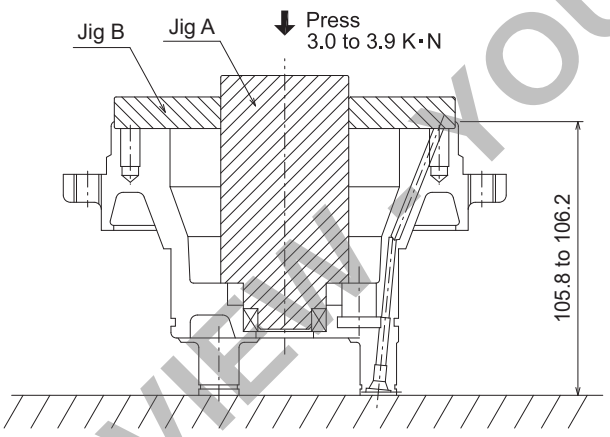
2) Special Tools

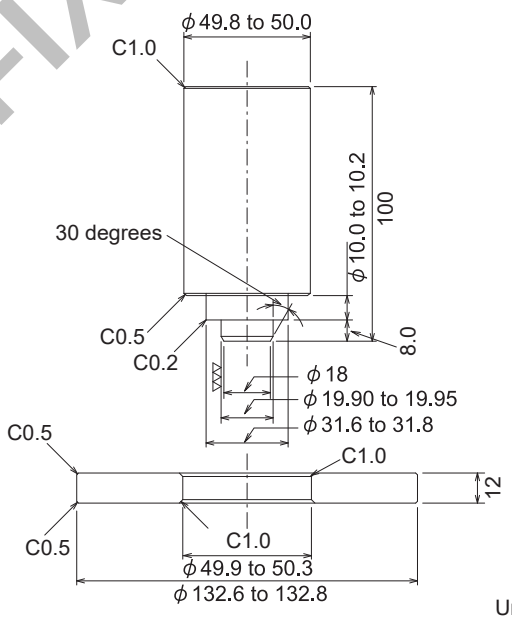
1. Bearing (for shaft) press-fitting jig



Unit : mm

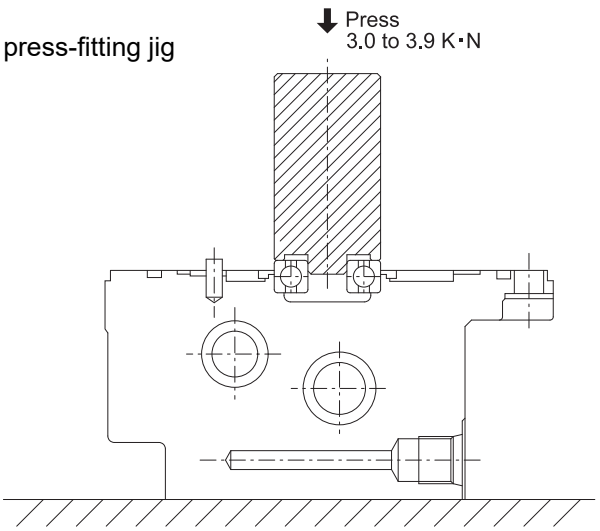
2. Oil seal press-fitting jigs

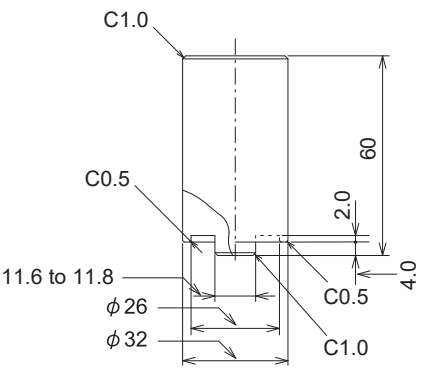




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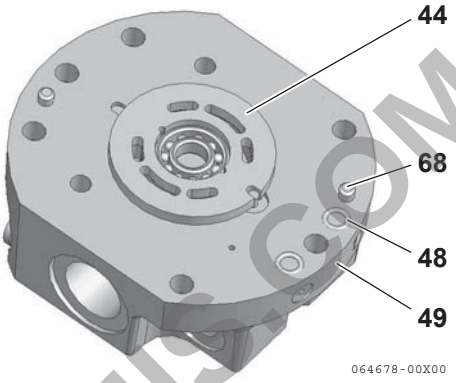
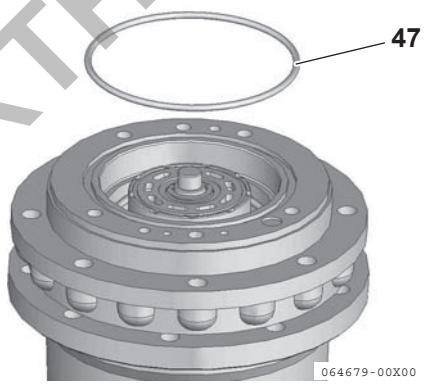
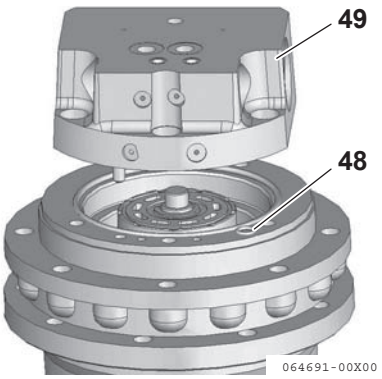
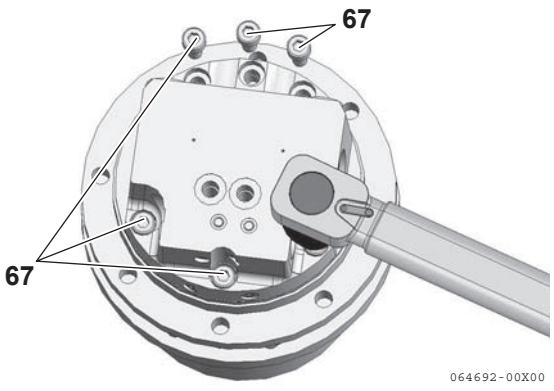
3. Bearing (for body 1) press-fitting jig





Unit : mm

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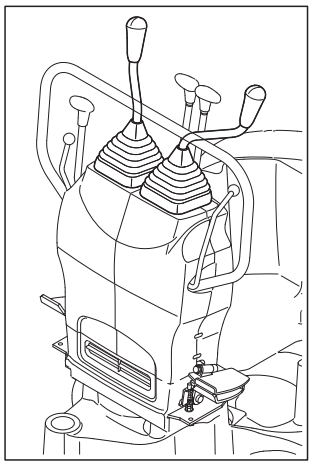
Procedure	
(25) Apply grease to rear face of valve plate **44** and install it onto base plate **49** as well as pins **68** and O-rings **48**.	
(26) Coat grease on O-ring **47** and install it on flange holder **1**.	
(27) Install base plate **49** assembled at step (25) and O-ring **48** onto flange holder **1**. ***Note:*** *Take care not to come off O-ring **48** and valve plate **44** from base plate **49** when installing.*	
(28) Tighten hexagon socket head bolts **67**. Tools: Torque wrench Hexagon bit Tightening torque: 35.1 to 38.9 N·m ***Note:*** *Tighten all bolts little by little so as for fastening force of every bolt to be equal.*	

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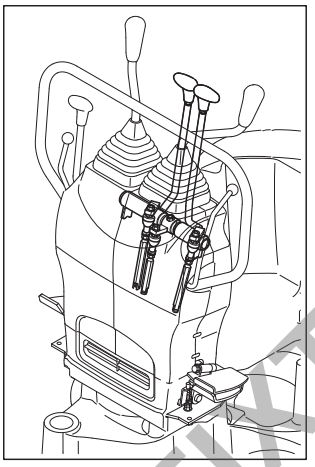
7-3 Controls

7-3-1 Control Train

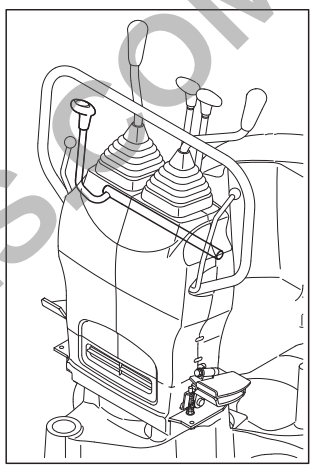
1) Control lever (R) : Boom and Bucket
Control lever (L) : Arm and Swing



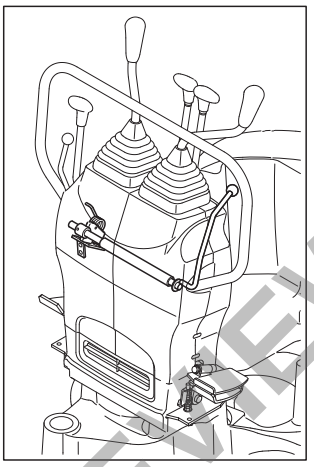
2) Travel levers



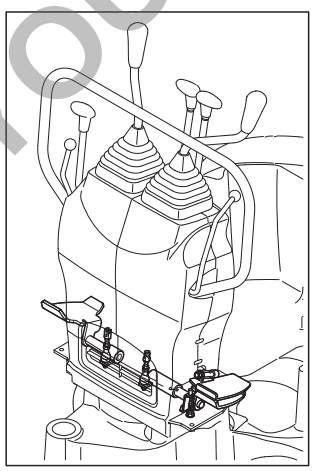
3) Blade lever



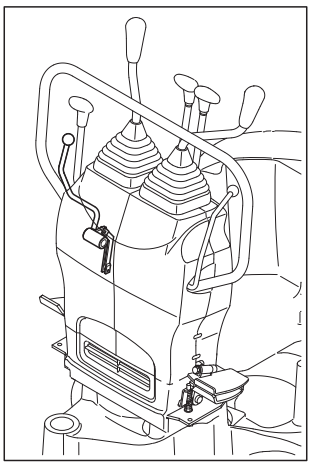
4) Lock lever



5) Pedal (R) : Boom swing
Pedal (L) : P.T.O.

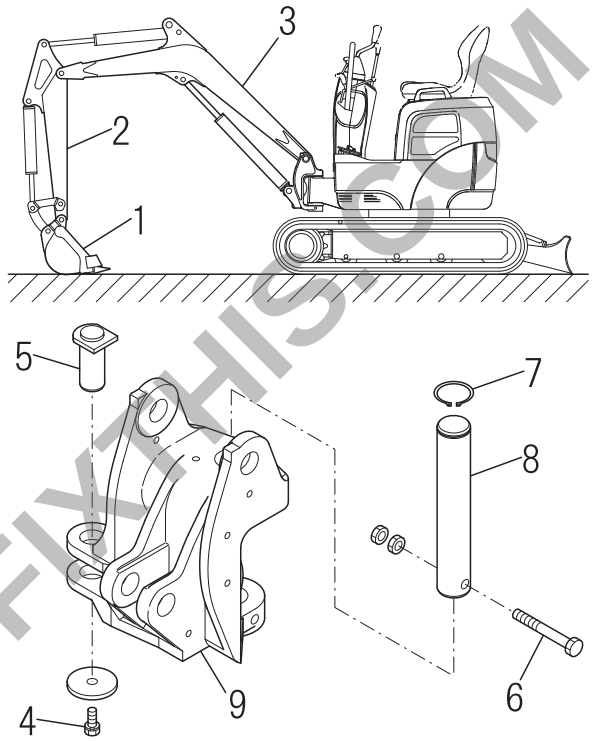


6) Track gauge change lever



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5) Removal of Boom Bracket

Procedure	
(1) Remove the bucket **1**. Refer to Section "7-6-1 1) Removal of Bucket". (2) Remove the arm **2**. Refer to Section "7-6-1 2) Removal of Arm". (3) Remove the boom **3**. Refer to Section "7-6-1 3) Removal of Boom". (4) Remove the bolt **4** (M12) and pull out the pin **5** (for the boom swing cylinder). (5) Remove the bolt **6** (M12) and the snap ring C **7**, and pull out the pin **8**. Then remove the boom bracket **9**. ***Note :*** *Rope the boom bracket and remove it using a lifting device.*	

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