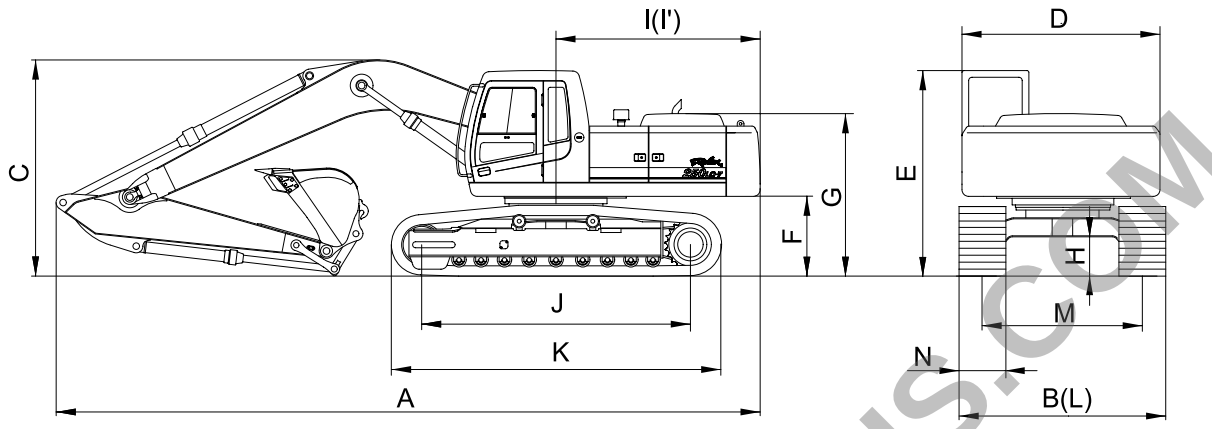
2. SPECIFICATIONS

1) R250LC-7



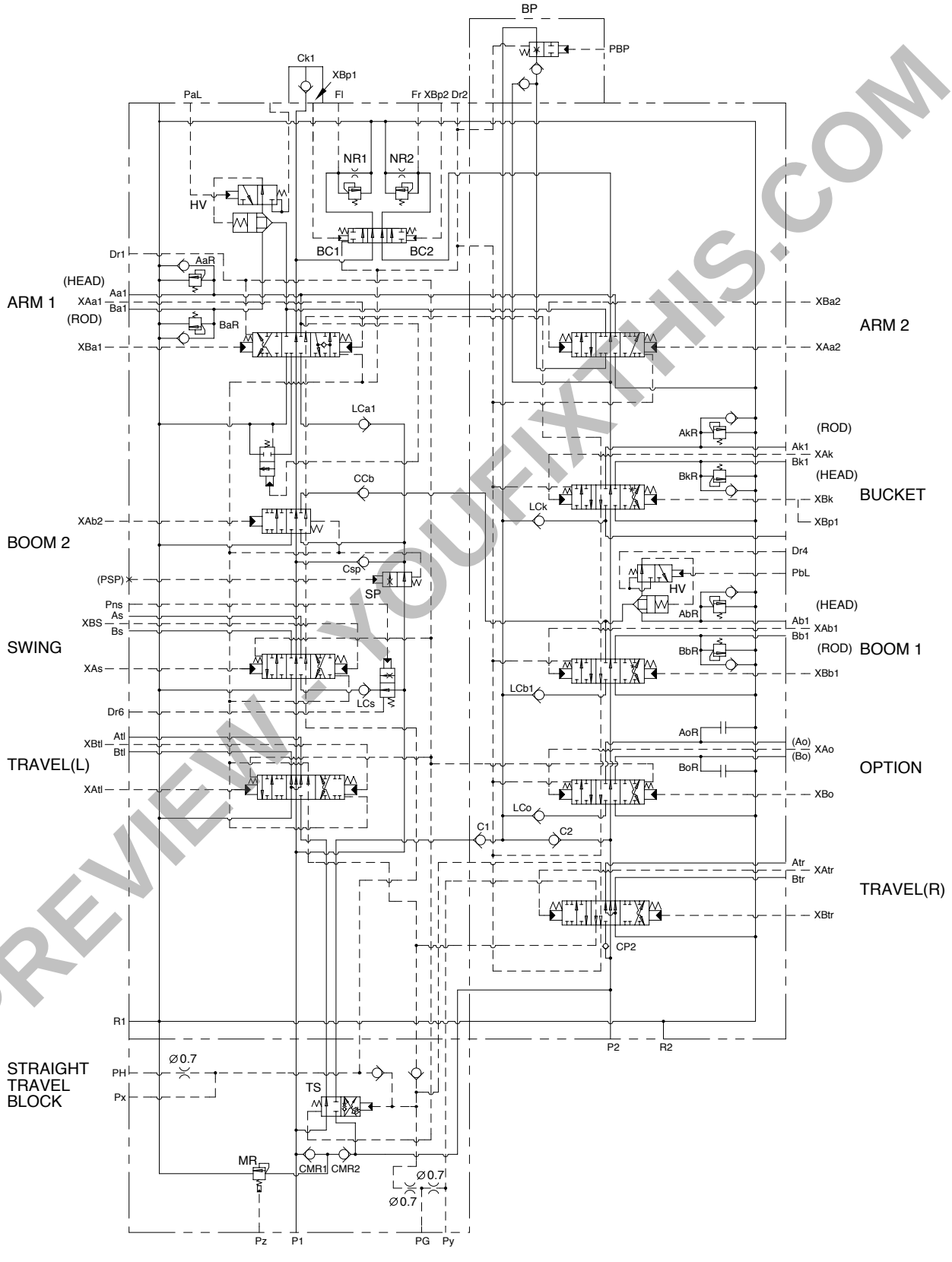
25072SP01

Description		Unit	Specification
Operating weight		kg(lb)	25200(55600)
Bucket capacity(SAE heaped), standard		$m^3(yd^3)$	1.08(1.41)
Overall length	A	mm(ft-in)	9920(32' 7")
Overall width, with 600mm shoe	B		3180(10' 5")
Overall height	C		3220(10' 7")
Superstructure width	D		2840(9' 4")
Overall height of cab	E		2990(9' 10")
Ground clearance of counterweight	F		1115(3' 8")
Engine cover height	G		2427(7' 12")
Minimum ground clearance	H		480(1' 7")
Rear-end distance	I		2870(9' 5")
Rear-end swing radius	I'		2965(9' 9")
Distance between tumblers	J		3830(12' 7")
Undercarriage length	K		4640(15' 3")
Undercarriage width	L		3180(10' 5")
Track gauge	M		2580(8' 6")
Track shoe width, standard	N		600(24")
Travel speed(Low/high)		km/hr(mph)	3.5/5.5(2.2/3.4)
Swing speed		rpm	12.6
Gradeability		Degree(%)	35(70)
Ground pressure(600mm shoe)		$kgf/cm^2(psi)$	0.51(7.25)

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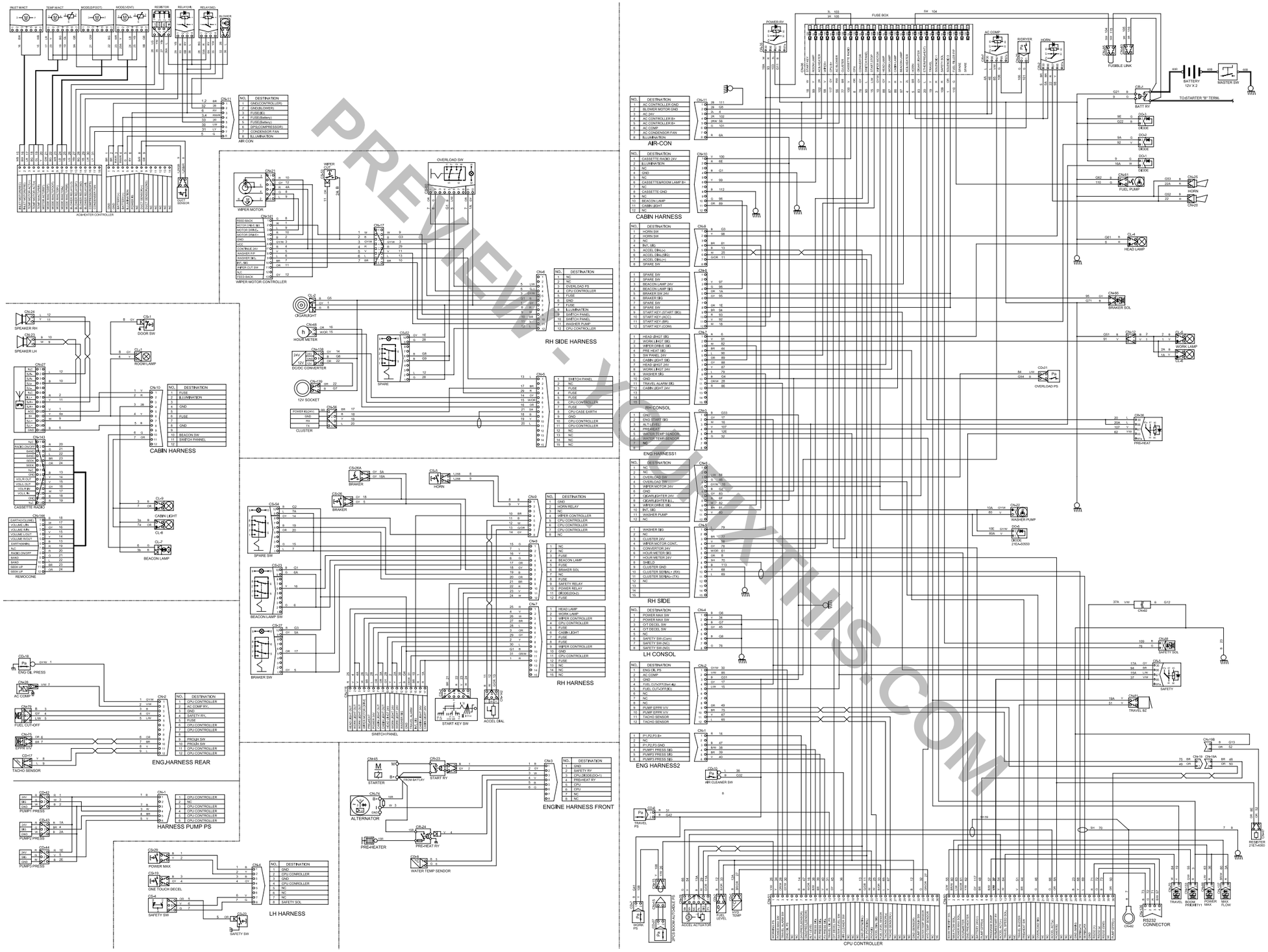
2. HYDRAULIC CIRCUIT



29072MC24

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25074EL03

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

(3) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.

· Hydraulic tank quantity : 190 ℓ

(4) Remove bolts(13) and disconnect pipe (1,2).

(5) Disconnect pilot line hoses(4, 5, 6, 7, 8, 9, 10, 11).

(6) Remove bolts(12) and disconnect pump suction tube (3).

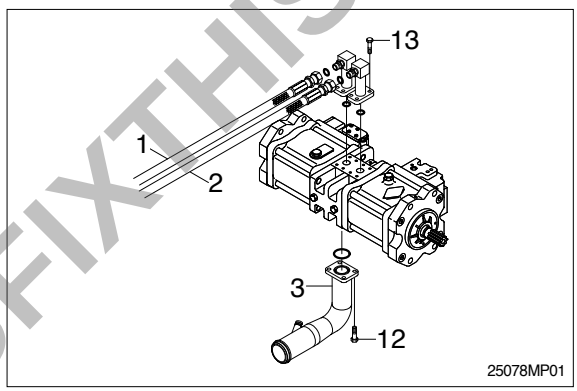
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

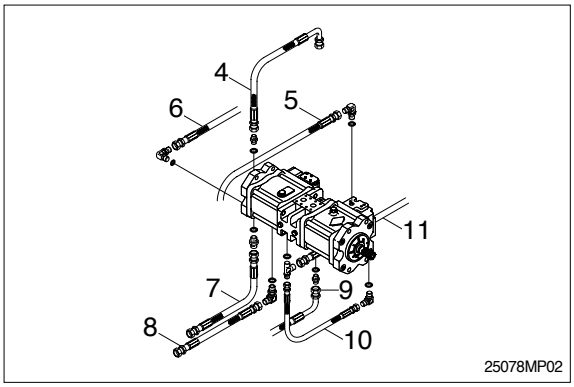
(7) Sling the pump assembly and remove the pump mounting bolts.

· Weight : 120kg(260lb)

※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.







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GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut(FR)	M20 × 2.5	55 ± 3.5	398 ± 25
2		Engine mounting bolt, nut(RR)	M24 × 3.0	90 ± 7.0	651 ± 51
3		Radiator mounting bolt	M18 × 2.5	32 ± 1.0	231 ± 7.2
4		Coupling mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 33
5		Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	29 ± 2.2
6	Hydraulic system	Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
7		Main control valve mounting nut	M12 × 1.75	12.3 ± 1.3	88.2 ± 9.4
8		Fuel tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 37
9		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 37
10		Turning joint mounting bolt, nut	M12 × 1.75	12 ± 1.3	86.8 ± 9.4
11	Power train system	Swing motor mounting bolt	M24 × 3.0	97.8 ± 10	707 ± 72.3
12		Swing bearing upper part mounting bolt	M22 × 2.5	77.4 ± 8.0	560 ± 57.8
13		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
14		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18
15		Sprocket mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18
16	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	23 ± 2.5	166 ± 18
17		Track roller mounting bolt	M20 × 2.5	54.7 ± 5.0	396 ± 36.1
18		Track tension cylinder mounting bolt	M16 × 2.0	29.7± 4.5	215 ± 32.5
19		Track shoe mounting bolt, nut	M20 × 1.5	78 ± 8.0	564 ± 57.8
20		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
21	Others	Counterweight mounting bolt	M36 × 3.0	297 ± 33	2148 ± 239
22		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
23		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

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6. ERROR CODES TABLE

Error code No.	Description
1	Short circuit in accel actuator system
2	Potentiometer circuit is shorted to Vcc(5V) or battery +
3	Short circuit in pump EPPR valve system
4	Short circuit in boom down EPPR valve system
5	Short circuit in travel speed solenoid system
6	Short circuit in power boost solenoid system
7	Short circuit in max flow solenoid system
10	Short circuit in hour-meter system
11	Accel dial circuit is shorted to Vcc(5V) or battery +
12	P1 pressure sensor circuit is shorted to power supply(24V) line
13	P2 pressure sensor circuit is shorted to power supply(24V) line
14	P3 pressure sensor circuit is shorted to power supply(24) line
15	Boom down pressure circuit is shorted to power supply(24V) line
16	Accel actuator circuit is open or shorted to ground
17	Potentiometer circuit is open or shorted to ground
18	Pump EPPR valve circuit is open or shorted to ground
19	Boom down EPPR valve circuit is open or shorted to ground
20	Travel speed solenoid circuit is open or shorted to ground
21	Power boost solenoid circuit is open or shorted to ground
22	Max flow solenoid circuit is open or shorted to ground
25	Hour-meter circuit is open or shorted to ground
26	Accel dial circuit is open or shorted to ground
27	P1 pressure sensor circuit is open or shorted to ground
28	P2 pressure sensor circuit is open or shorted to ground
29	P3 pressure sensor circuit is open or shorted to ground
30	Boom down pressure sensor circuit is open or shorted to ground
31	Engine preheater circuit is open or shorted to ground
32	Travel alarm buzzer circuit is open or shorted to ground
33	Alternator circuit is open or shorted to ground
34	Controller input voltage is below 18V
35	Controller input voltage is over 38V
36	Communication error with cluster
37	Engine speed sensor circuit is open or shorted to ground
38	Anti-restart relay circuit is open or shorted to ground
39	Accel actuator does not stop at a target position
40	There is more than 500rpm difference between target speed and actual speed

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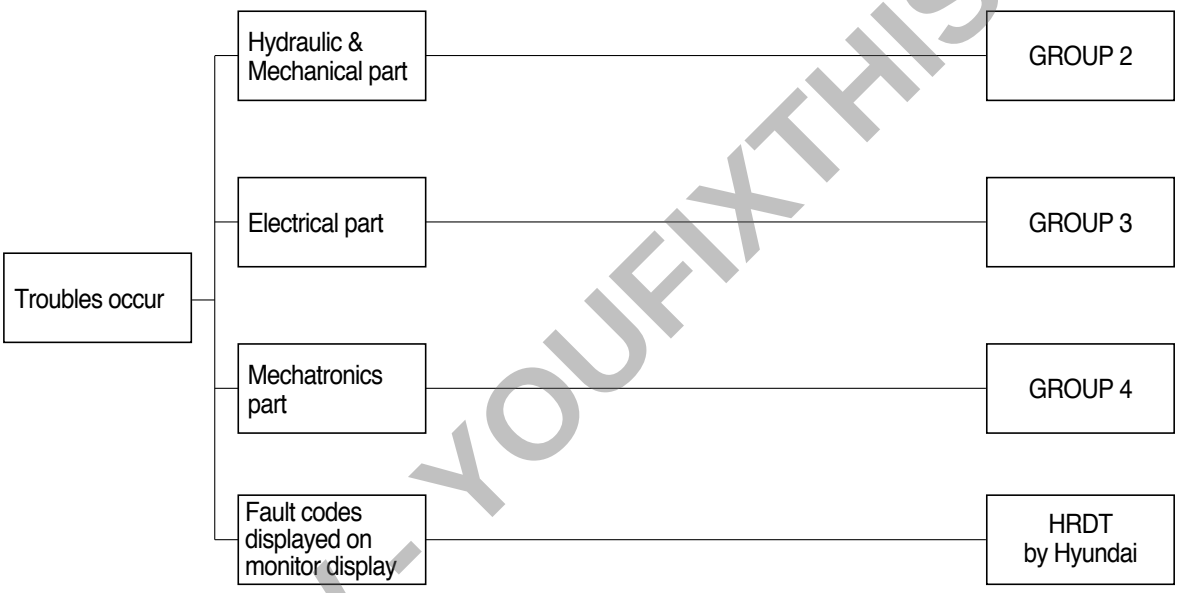
SECTION 6 TROUBLESHOOTING

GROUP 1 BEFORE TROUBLESHOOTING

1. INTRODUCTION

When a trouble is occurred in the machine, this section will help an operator to maintain the machine with easy.

The trouble of machine is parted Hydraulic & Mechanical system, Electrical system and Mechatronics system. At each system part, an operator can check the machine according to the troubleshooting process diagram.



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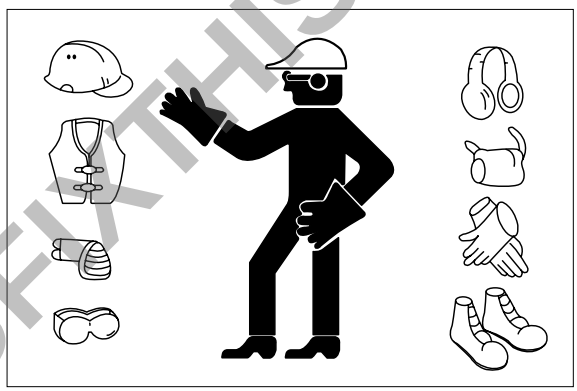
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work; Do not attempt shortcuts.

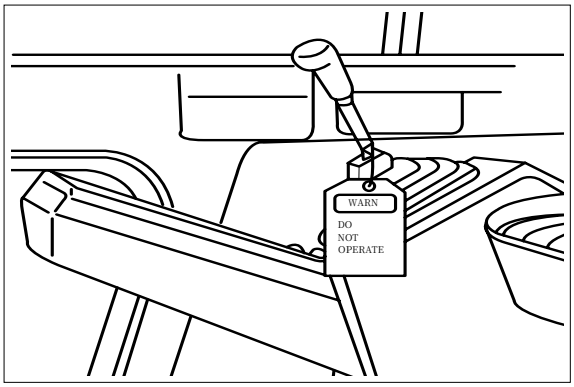
WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.



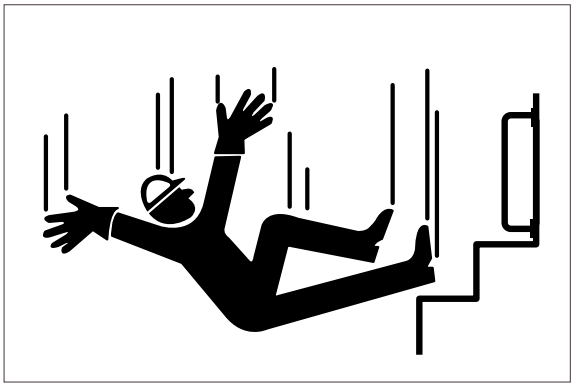
WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.
Before performing any work on the excavator, attach a 「**Do Not Operate**」 tag on the right side control lever.



USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.
When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.
Never jump on or off the machine. Never mount or dismount a moving machine.
Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

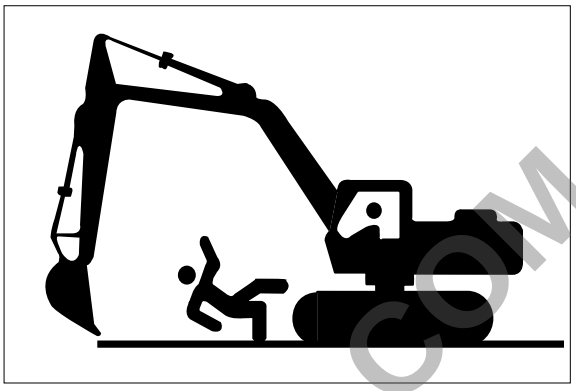


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KEEP RIDERS OFF EXCAVATOR

Only allow the operator on the excavator. Keep riders off.

Riders on excavator are subject to injury such as being struck by foreign objects and being thrown off the excavator. Riders also obstruct the operator's view resulting in the excavator being operated in an unsafe manner.

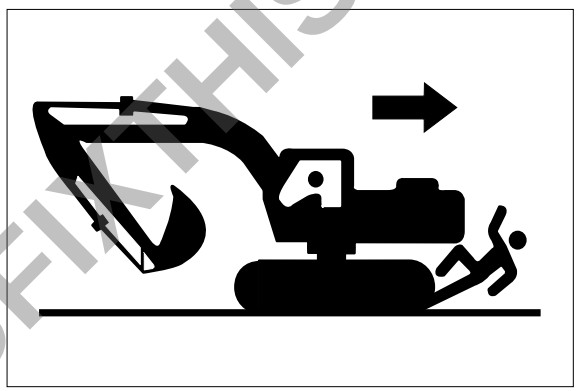


MOVE AND OPERATE MACHINE SAFELY

Bystanders can be run over. Know the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in working condition. It warns people when the excavator starts to move.

Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the excavator.



OPERATE ONLY FORM OPERATOR'S SEAT

Avoid possible injury machine damage. Do not start engine by shorting across starter terminals.

NEVER start engine while standing on ground. Start engine only from operator's seat.



PARK MACHINE SAFELY

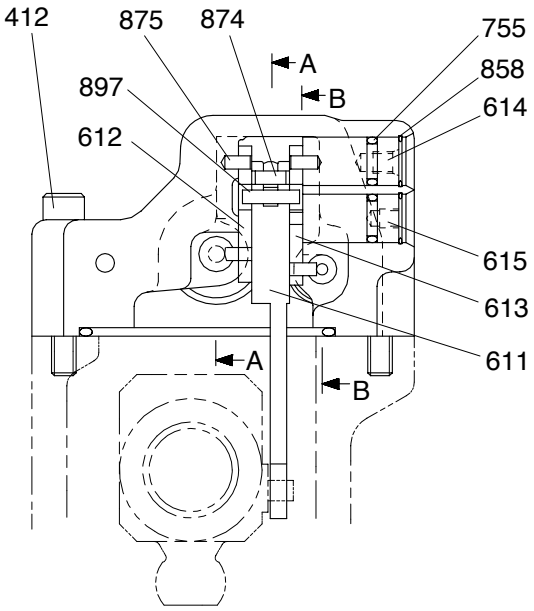
Before working on the machine:

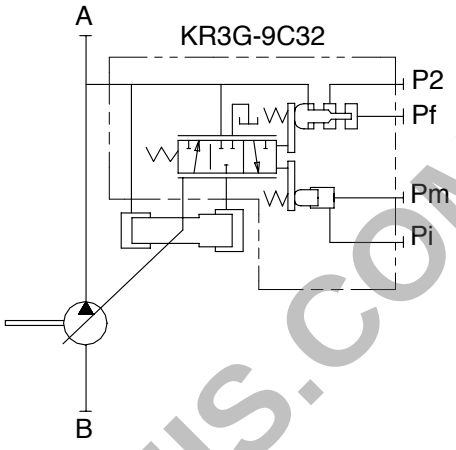
- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto idle switch off.
- Run engine at 1/2 speed without load for 2 minutes.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Move pilot control shutoff lever to locked position.
- Allow engine to cool.

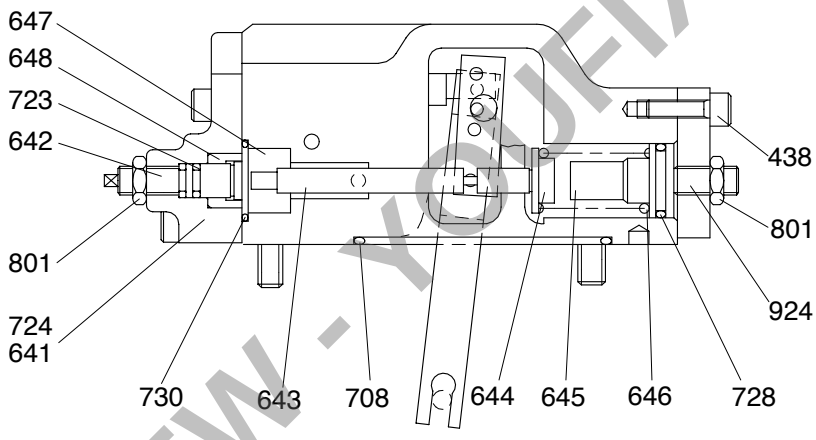
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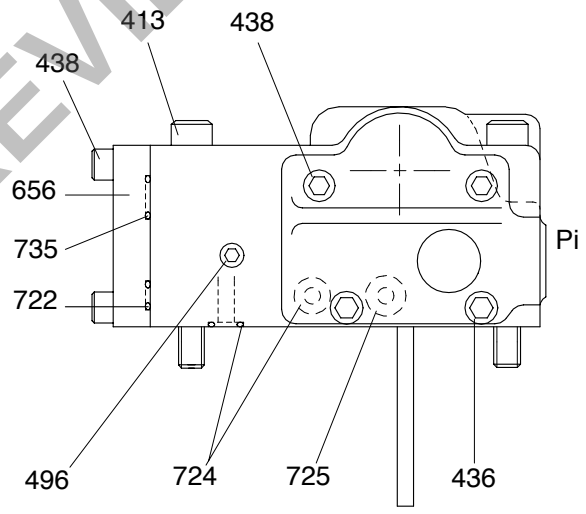
2) REGULATOR(1/2)







SECTION B-B



VIEW C

Port	Port name	port size
A	Delivery port	3/4"
B	Suction port	2 1/2"
Pi	Pilot port	PF 1/4-15
Pm	Qmax cut port	PF 1/4-15

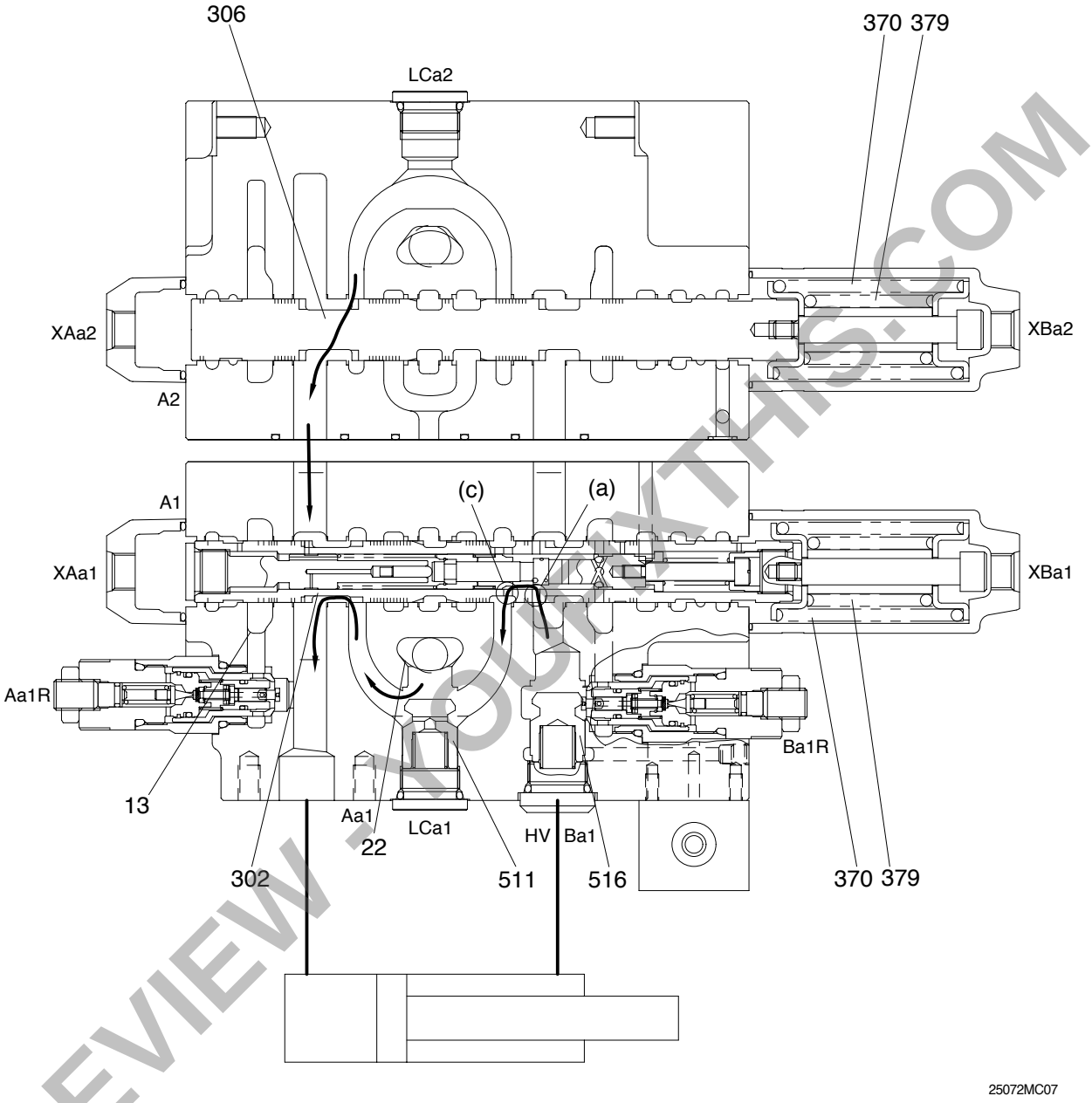
25072RE01

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② **Arm roll in operation**

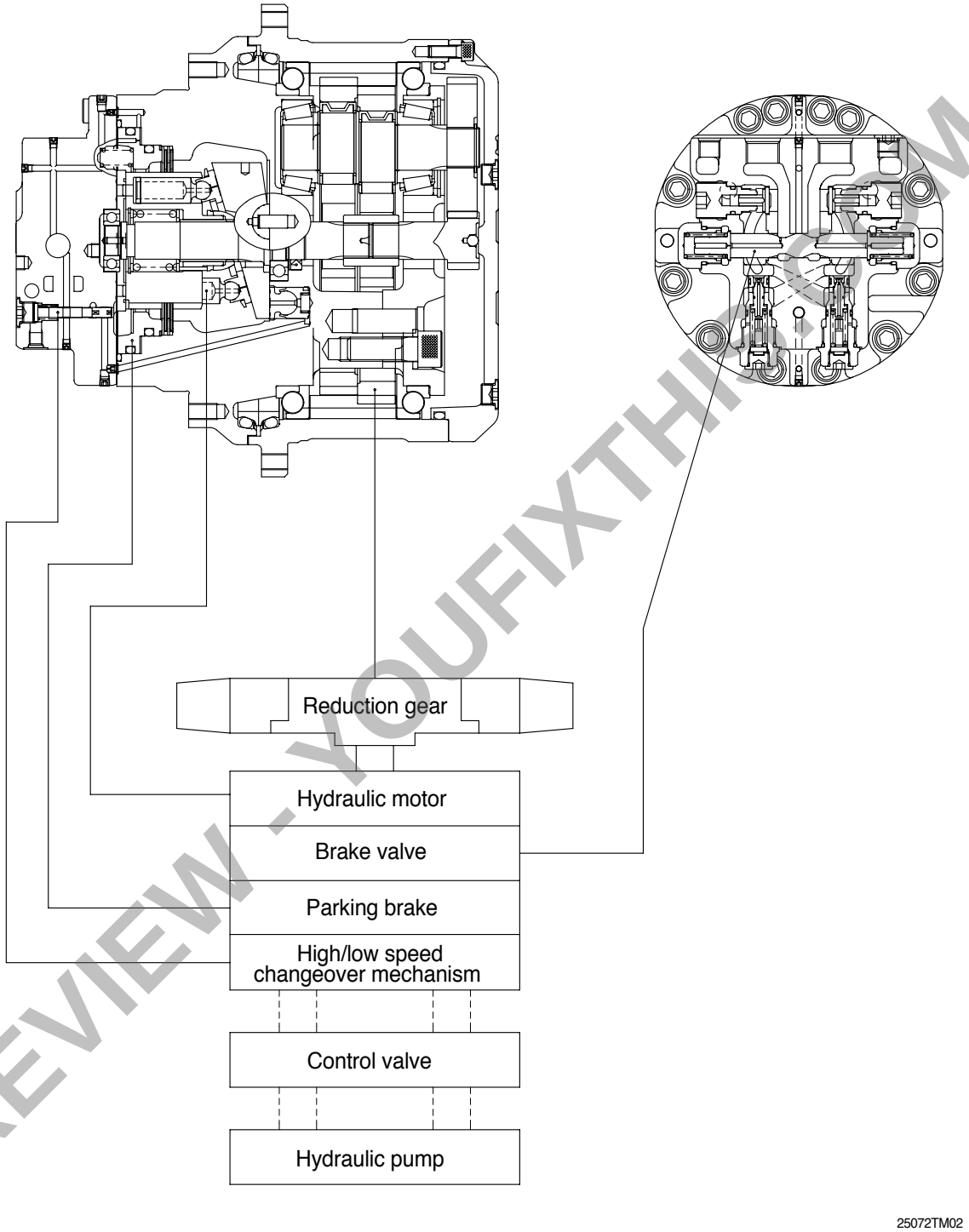
· **During light load only**



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1) BASIC STRUCTURE



25072TM02

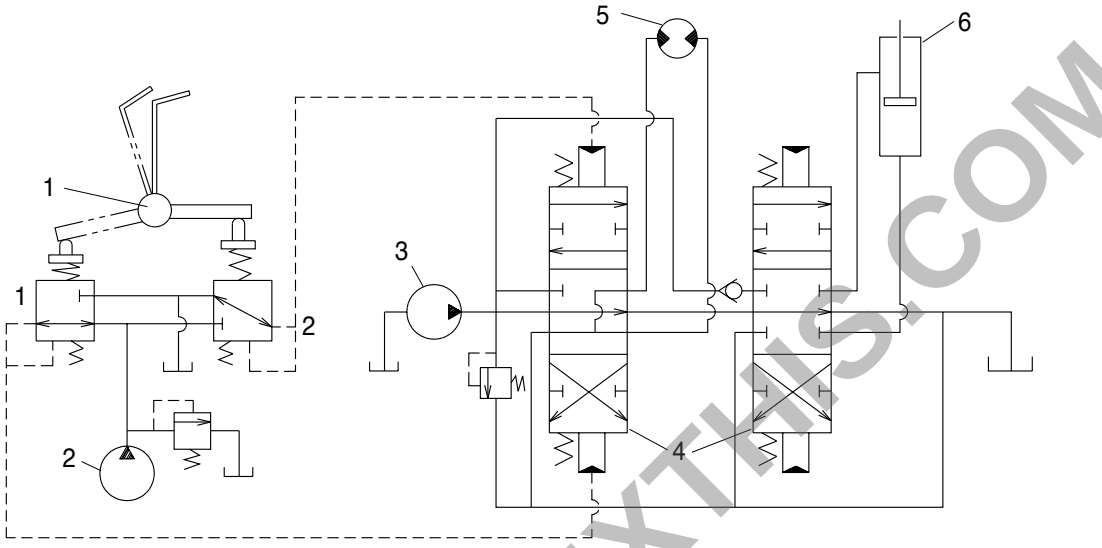
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3) OPERATION

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below ant the attached operation explanation drawing.

The diagram shown below is the typical application example of the pilot valve.



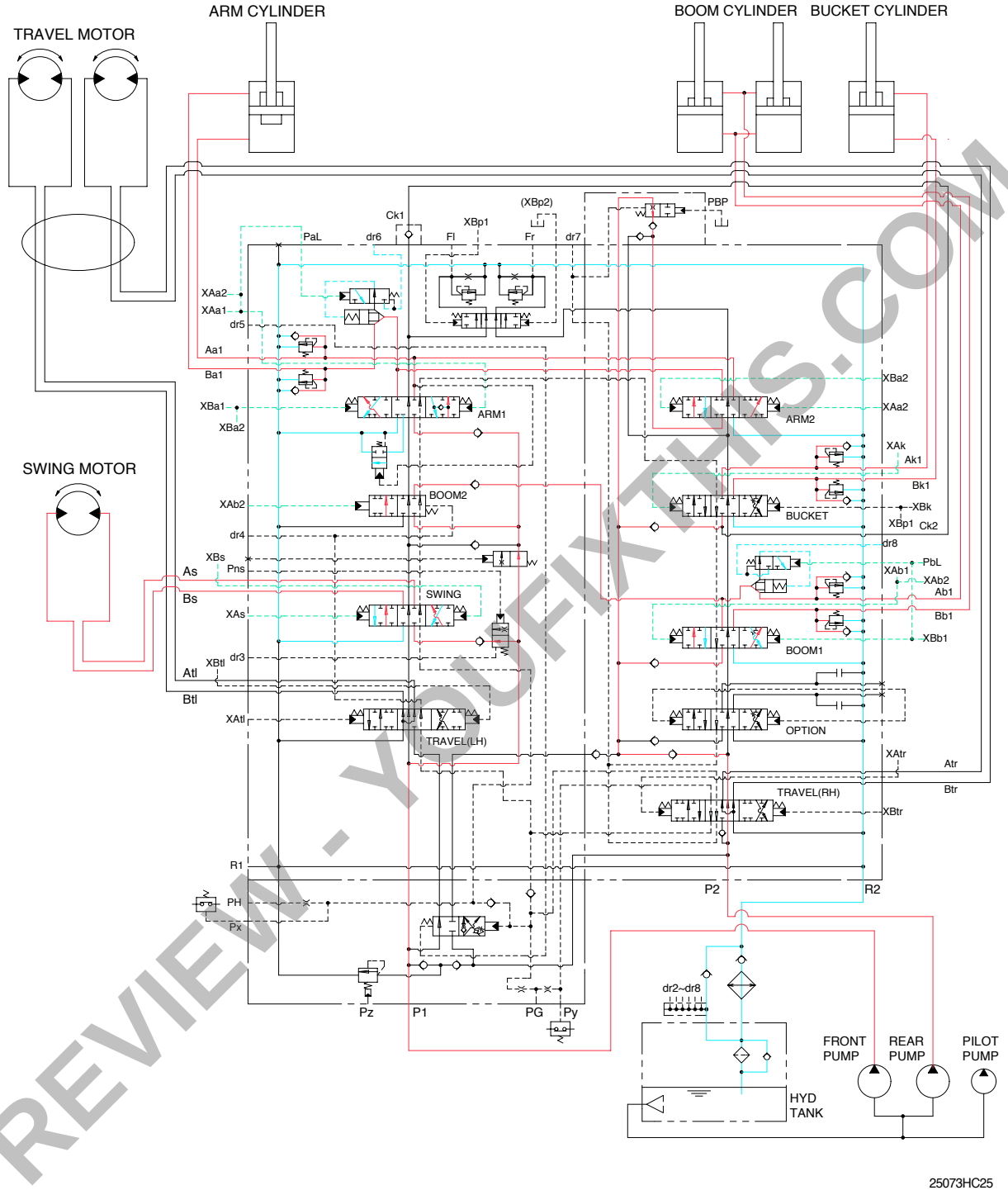
(290LC-7) 2-76

1	Pilot valve	3	Main pump	5	Hydraulic motor
2	Pilot pump	4	Main control valve	6	Hydraulic cylinder

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5. COMBINED SWING, BOOM, ARM AND BUCKET OPERATION



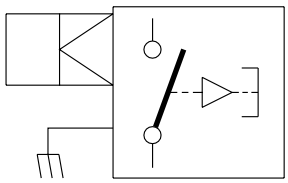
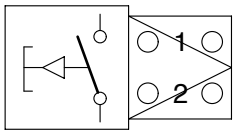
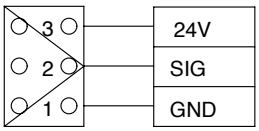
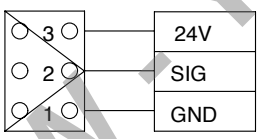
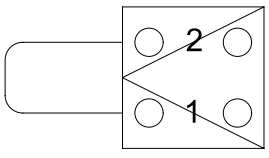
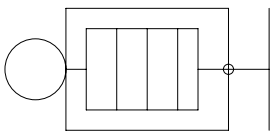
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When the swing, boom, arm and bucket functions are operated, the each spools of the main control valve changed.

The oil flows from rear pump through arm2, boom1 and bucket section to boom, arm and bucket cylinders. The oil flows from front pump through swing, boom2 and arm1 section to swing motor, boom and arm cylinder. Then the functions to each actuators.

According to the state of each actuators functioning, the oil flows from front and rear pump through the confluence oil passage to the each actuators.

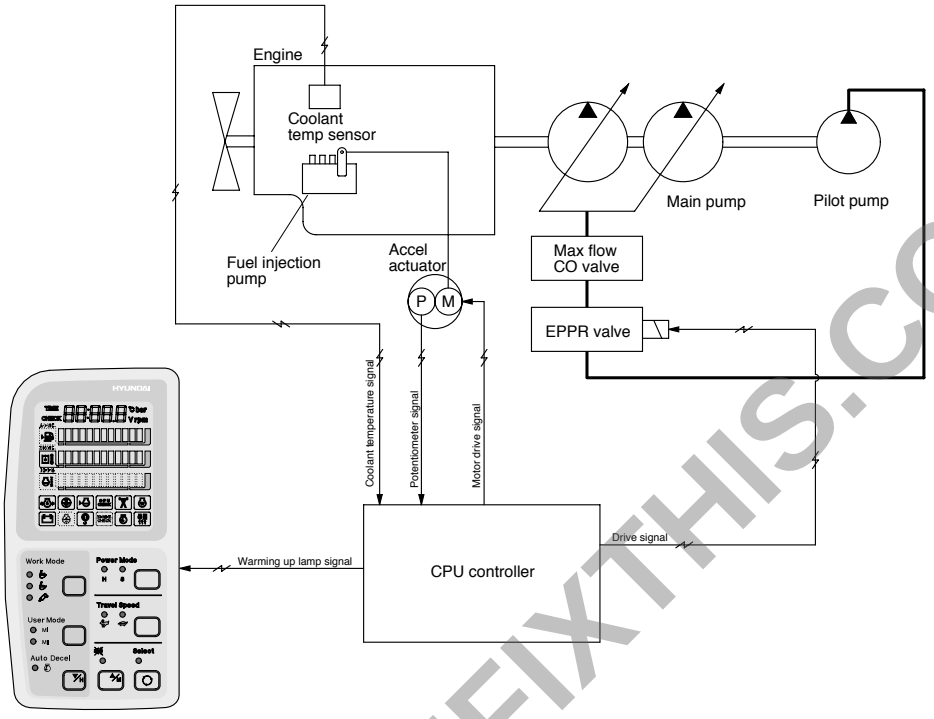
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Part name	Symbol	Specifications	Check
Door switch	 CS-1	24V 2W	※Check resistance Normal : About 5MΩ
Switch (Power max, one touch decal, horn, braker)	 CS-5 CS-19 CS-26 CS-29	24V 6A	※Check resistance Normal : ∞Ω
Transducer	 CD-42 CD-43	500bar	0bar : 1V(For terminal 1-2) 500bar : 5V(For terminal 1-2)
Transducer	 CD-44	50bar	0bar : 1V(For terminal 1-2) 50bar : 5V(For terminal 1-2)
Fusible link	 CN-60 CN-95	60A	※Check disconnection Normal : 0Ω (Connect ring terminal and check resist between terminal 1 and 2)
Pre-heater		24V 200A	※Check resistance : 0.25 - 0.12Ω

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GROUP 6 AUTOMATIC WARMING UP FUNCTION



21075MS08

1. CPU controller reads engine coolant temperature through the temperature sensor, and if the coolant temperature is less than 30°C, it increases the engine speed from key start rpm to 1200rpm. At this time the mode does not change.
2. In case of the coolant temperature increases up to 30°C, the engine speed is decreased to key start speed. And if an operator changes mode set during the warming up function, the CPU controller cancels the automatic warming up function.

3. LOGIC TABLE

Description	Condition	Function
Actuated	- Coolant temperature : Less than 30°C(After engine run) - Accel dial position is under **3**	- Mode : Default(**S** mode) - Warming up time : 10 minutes(Max) - Warming up lamp : ON
Canceled	- Coolant temperature : Above 30°C - Warming up time : Above 10 minutes - Changed mode set by operator - Increase engine speed by rotating accel dial clockwise ※ If any of the above conditions is applicable, the automatic warming up function is canceled	- Default mode - Default mode - Changed mode
Warming up lamp	- Coolant temperature : Above 30°C	- Warming up lamp : OFF

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SECTION 6 TROUBLESHOOTING

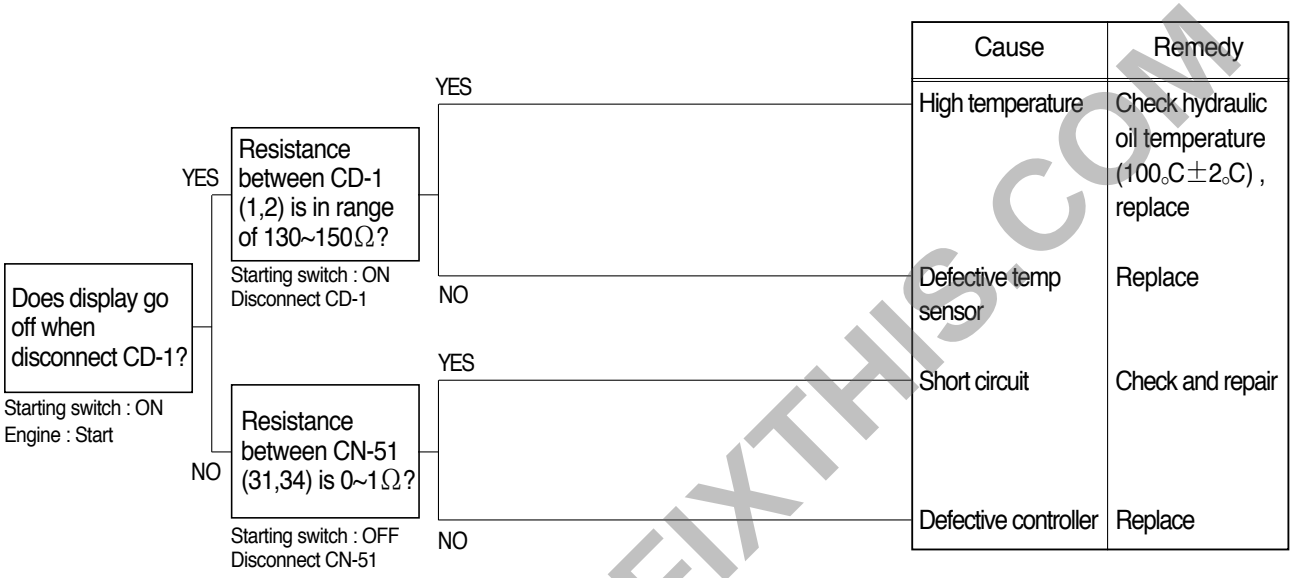
Group 1 Before Troubleshooting ---------- 6-1
Group 2 Hydraulic and Mechanical System ---------- 6-4
Group 3 Electrical System ---------- 6-24
Group 4 Mechatronics System ---------- 6-40

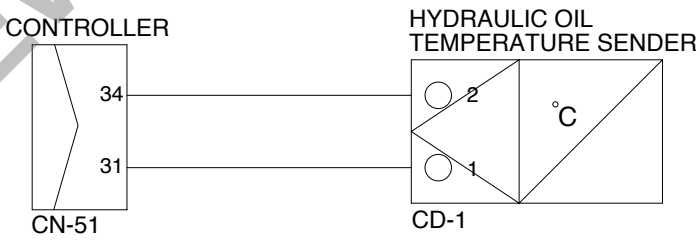
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7. WHEN HYDRAULIC OIL TEMPERATURE WARNING LAMP LIGHTS UP(Engine is started)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.





29076ES04

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3. OPERATION FOR PERFORMANCE TESTS

1) Observe the following rules in order to carry out performance tests accurately and safely.

(1) The machine

Repair any defects and damage found, such as oil or water leaks, loose bolts, cracks and so on, before starting to test.

(2) Test area

① Select a hard, flat surface.

② Secure enough space to allow the machine to run straight more than 20m, and to make a full swing with the front attachment extended.

③ If required, rope off the test area and provide signboards to keep unauthorized personnel away.

(3) Precautions

① Before starting to test, agree upon the signals to be employed for communication among coworkers. Once the test is started, be sure to communicate with each other using these signals, and to follow them without fail.

② Operate the machine carefully and always give first priority to safety.

③ While testing, always take care to avoid accidents due to landslides or contact with high voltage power lines. Always confirm that there is sufficient space for full swings.

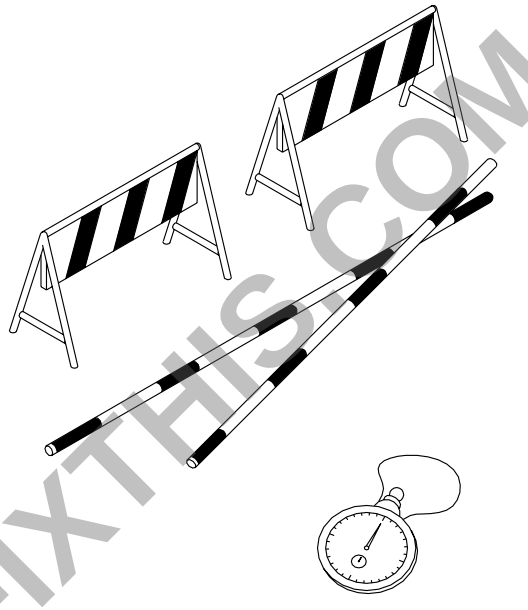
④ Avoid polluting the machine and the ground with leaking oil. Use oil pans to catch escaping oil. Pay special attention to this when removing hydraulic pipings.

(4) Make precise measurements

① Accurately calibrate test instruments in advance to obtain correct data.

② Carry out tests under the exact test conditions prescribed for each test item.

③ Repeat the same test and confirm that the test data obtained can be procured repeatedly. Use mean values of measurements if necessary.

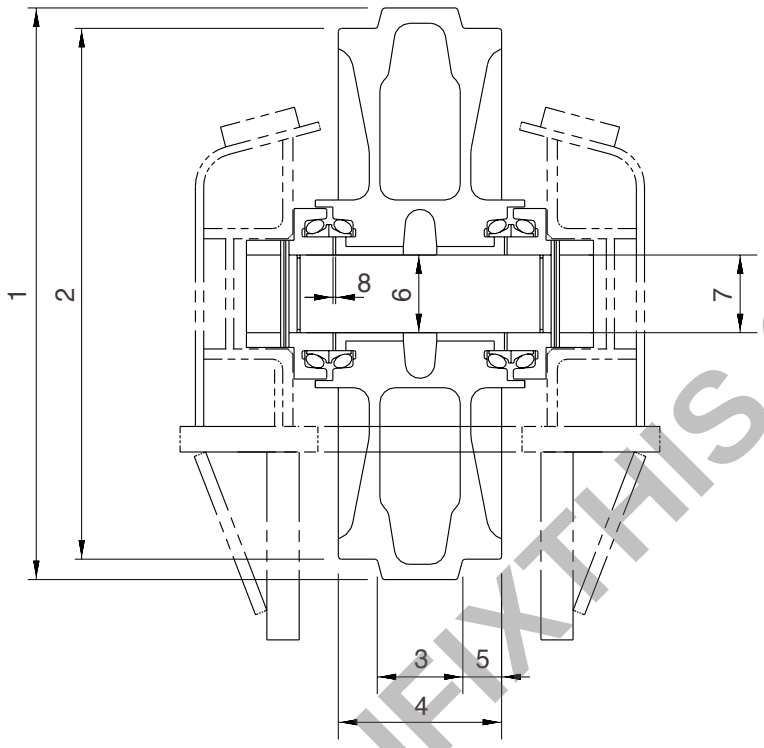


(290-7TIER) 7-3

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3) IDLER



21037MS03

Unit : mm

No.	Check item	Criteria				Remedy
1	Outside diameter of protrusion	Standard size		Repair limit		Rebuild or replace
		Ø560		-		
2	Outside diameter of tread	Ø520		Ø514		
3	Width of protrusion	84		-		
4	Total width	160		-		
5	Width of tread	38		44		
6	Clearance between shaft and bushing	Standard size & tolerance		Standard clearance	Clearance limit	Replace bushing
		Shaft	Hole			
		Ø75 $^{0}_{-0.03}$	Ø75.35 $^{+0.05}_{0}$	0.35 to 0.43	2.0	
7	Clearance between shaft and support	Ø75 $^{0}_{-0.03}$	Ø75 $^{+0.07}_{+0.03}$	0.03 to 0.1	1.2	Replace
8	Side clearance of idler (Both side)	Standard clearance		Clearance limit		Replace bushing
		0.4 to 1.2		2.0		

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4) ASSEMBLY

(1) For assembly, reverse disassembly procedures, but pay attention to the following items.

① Always repair parts that were scored at disassembly.
Get replacement parts ready beforehand.

② Mixing of foreign matter will cause malfunction.
Therefore, wash parts well with cleaning oil, let them dry with jet air and handle them in clean place.

③ Always tighten bolts, plugs, etc. to their specified torques.

④ Do not fail to coat sliding surfaces with clean hydraulic oil before assembly.

⑤ Replace seals such as O-ring with new ones as a rule.

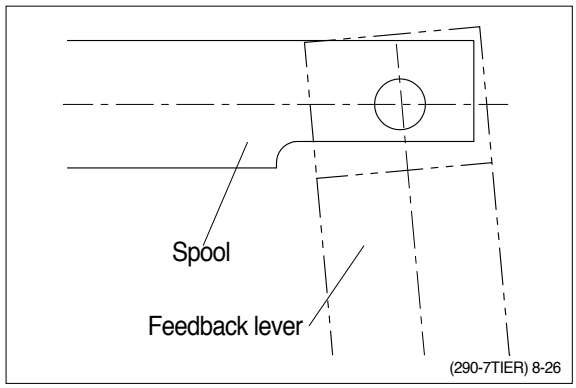
(2) Put compensating rod(623) into compensating hole of casing(601).

(3) Put pin force-fitted in lever(1, 612) into groove of compensating rod and fit lever (1) to pin force-fitted in casing.

(4) Fit spool(652) and sleeve(651) into hole in spool of casing.

※ Confirm that spool and sleeve slide smoothly in casing without binding.

※ Pay attention to orientation of spool.



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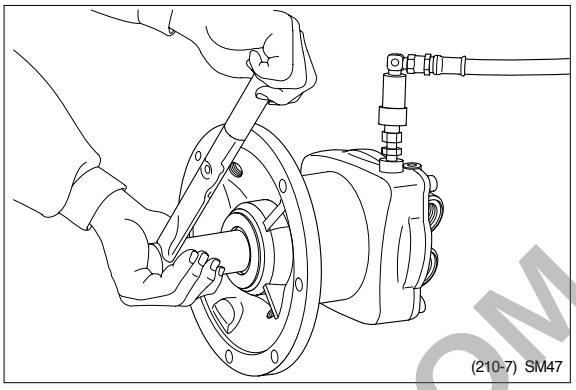
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(21) Check of assembly

Load pilot pressure of 30kgf/cm² to brake release port after opening inlet and outlet port.

Check if output shaft is rotated smoothly around torque of 4kgf · m.

If not rotated, disassemble and check.


(210-7) SM47

This completes assembly.

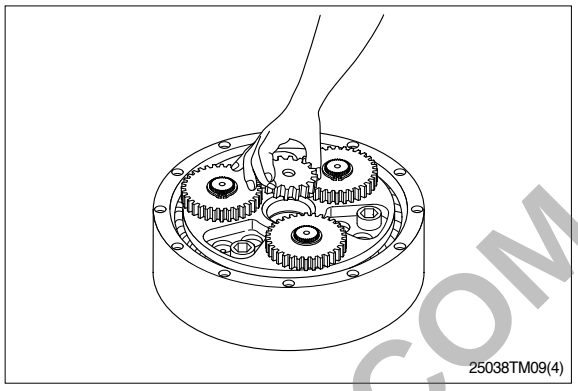
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5) DISASSEMBLY OF REDUCTION GEAR

(1) Disassembly of Input gear

① Remove steel ball(36) and input gear(6) from coupling(15).

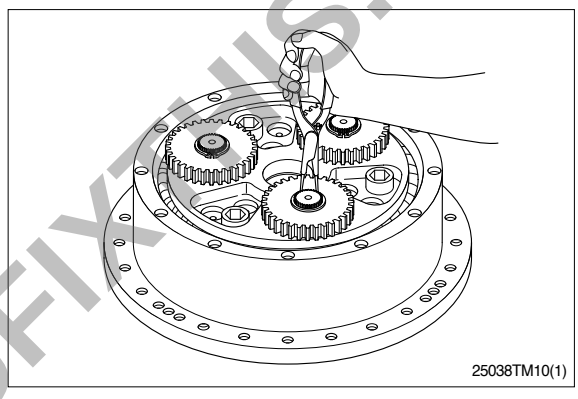


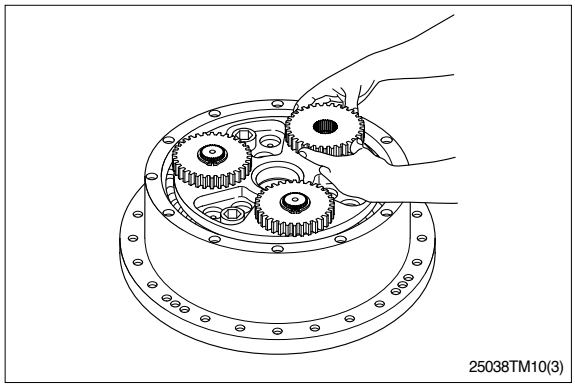
(2) Disassembly of Spur gear

① Remove the three snap rings(25) from each crank shaft(9).

② Remove the three spur gears(7) from each crank shaft.

※ Take notes when removing the snap ring with a snap ring plier, the snap ring will spring out form its groove.





(3) Disassembly of Coupling

① Remove coupling(15) from shaft(102).

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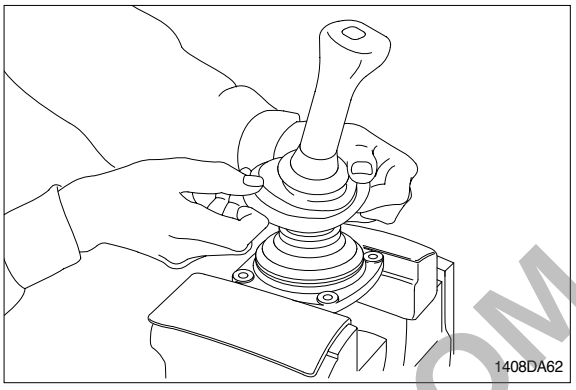
3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

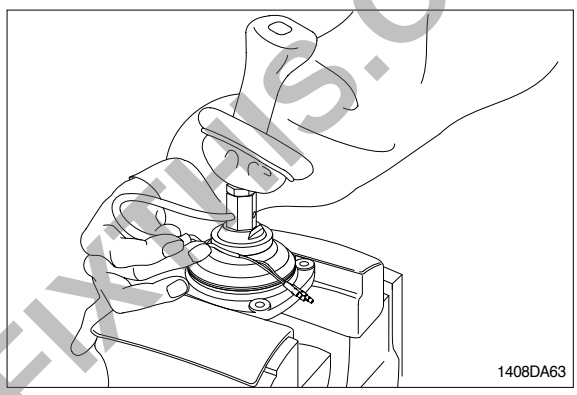
※ Put blind plugs into all ports

(2) Fix pilot valve in a vise with copper(or lead) sheets.

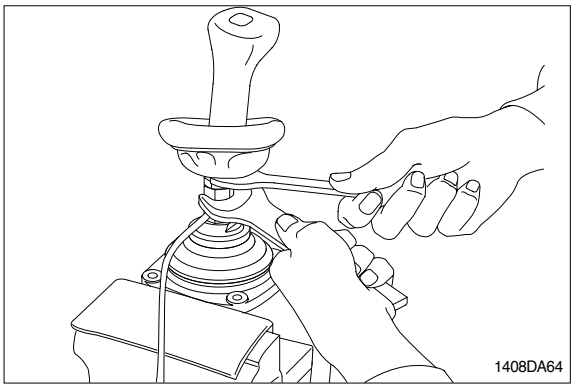
(3) Remove end of boot(25) from case(1) and take it out upwards.



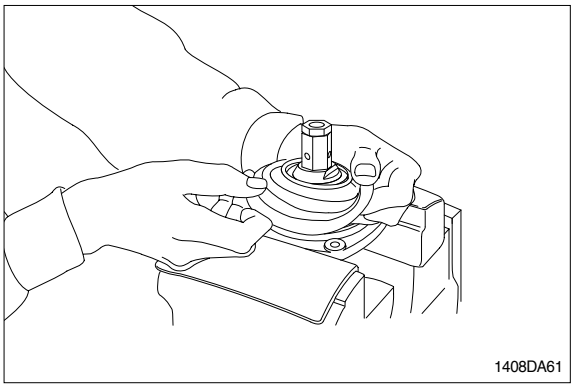
※ For valve with switch, remove cord also through hole of casing.



(4) Loosen lock nut(20) and adjusting nut(19) with spanners on them respectively, and take out handle section as one body.



(5) Remove the boot(40)



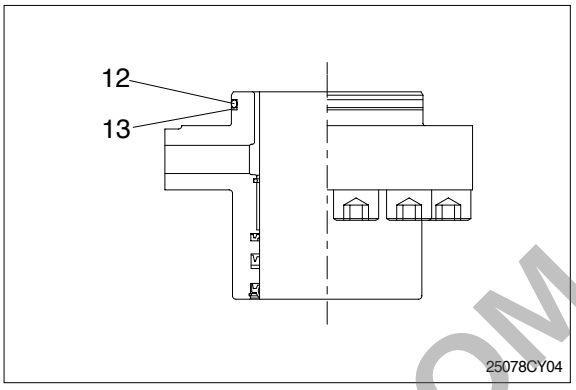
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⑤ Fit back up ring(13) to gland(3).

※ Put the backup ring in the warm water of 30~50$_{\circ}$C.

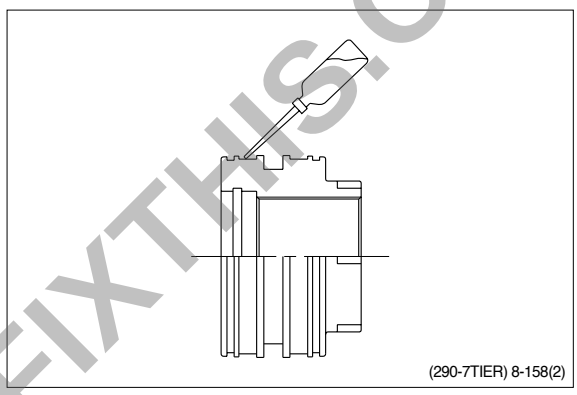
⑥ Fit O-ring(12) to gland(3).



(2) Assemble piston assembly

※ Check for scratches or rough surfaces. If found smooth with an oil stone.

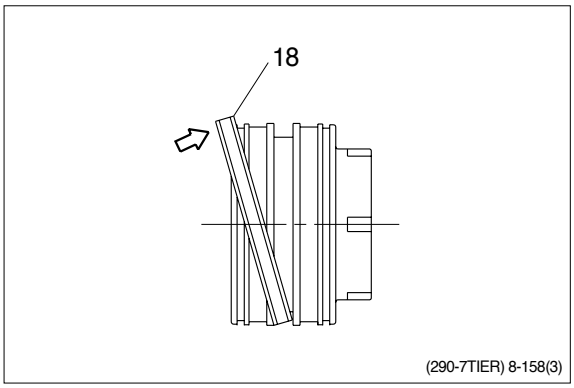
① Coat the outer face of piston(15) with hydraulic oil.



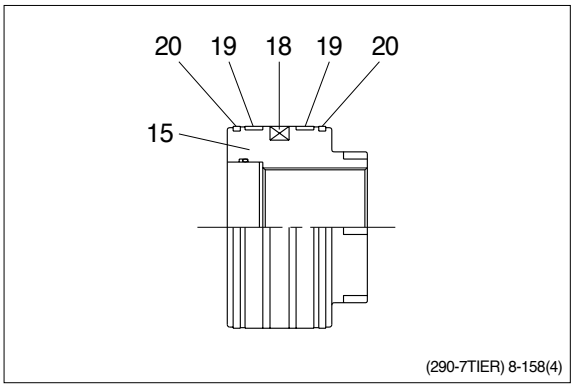
② Fit piston seal(18) to piston.

※ Put the piston seal in the warm water of 60~100$_{\circ}$C for more than 5 minutes.

※ After assembling the piston seal, press its outer diameter to fit in.



③ Fit wear ring(19) and dust ring(20) to piston(15).



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