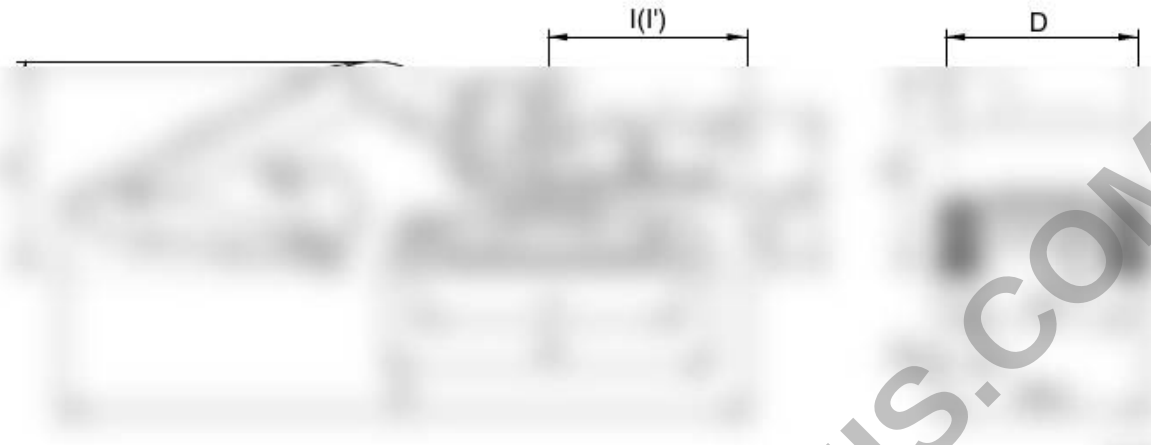
2. SPECIFICATIONS

1) R305LC-7



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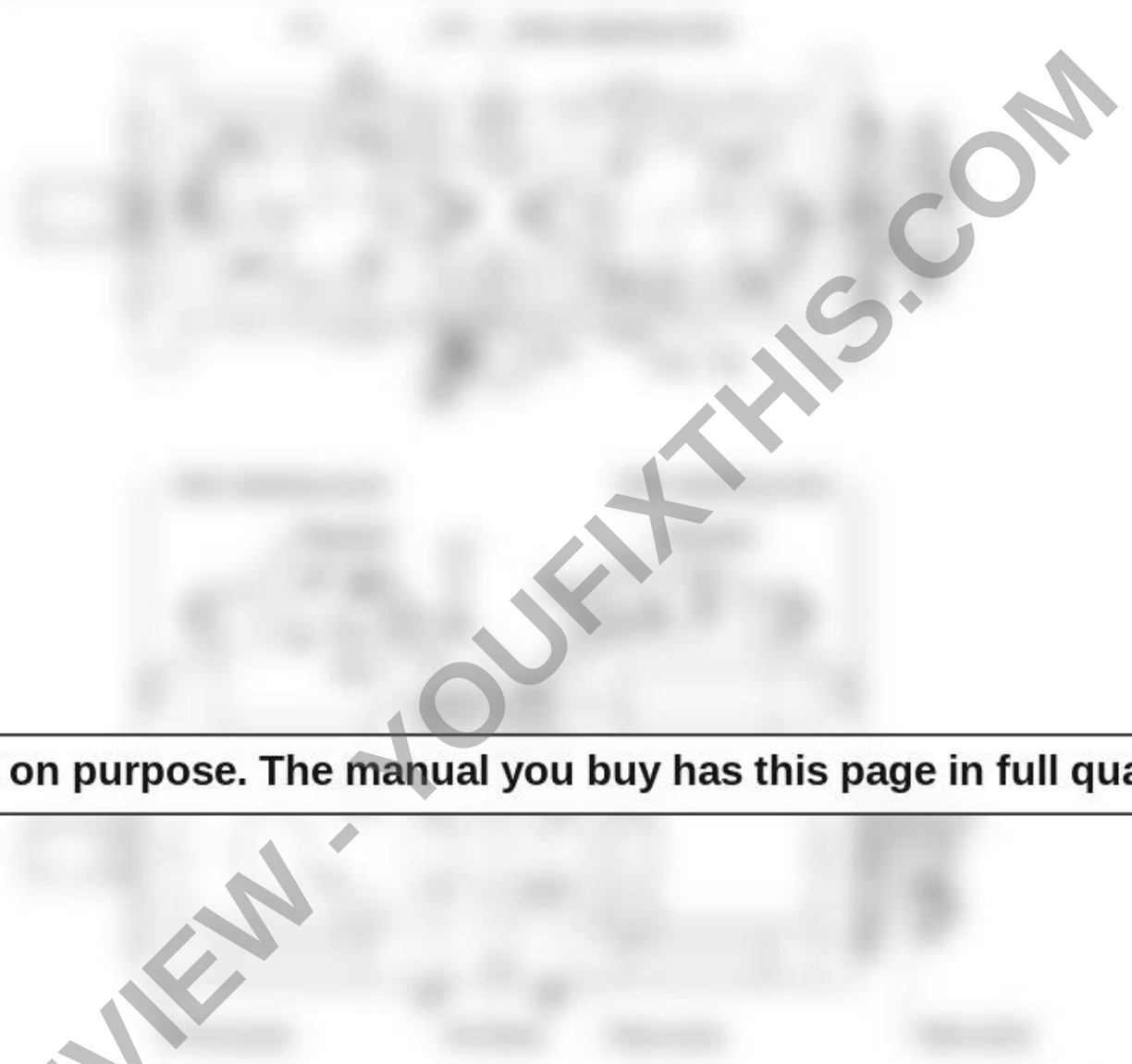
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SECTION 2 STRUCTURE AND FUNCTION

GROUP 1 PUMP DEVICE

1. STRUCTURE

The pump device consists of main pump, regulator and gear pump.





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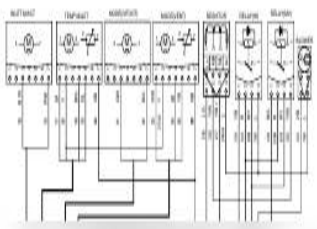
2. HYDRAULIC CIRCUIT

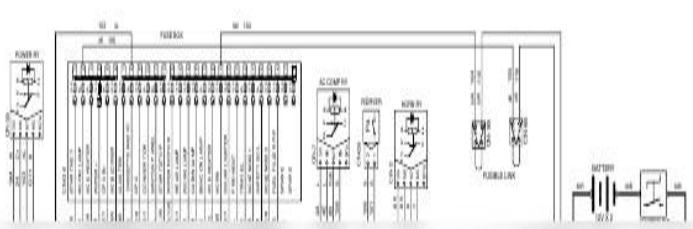


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6. ERROR CODES TABLE

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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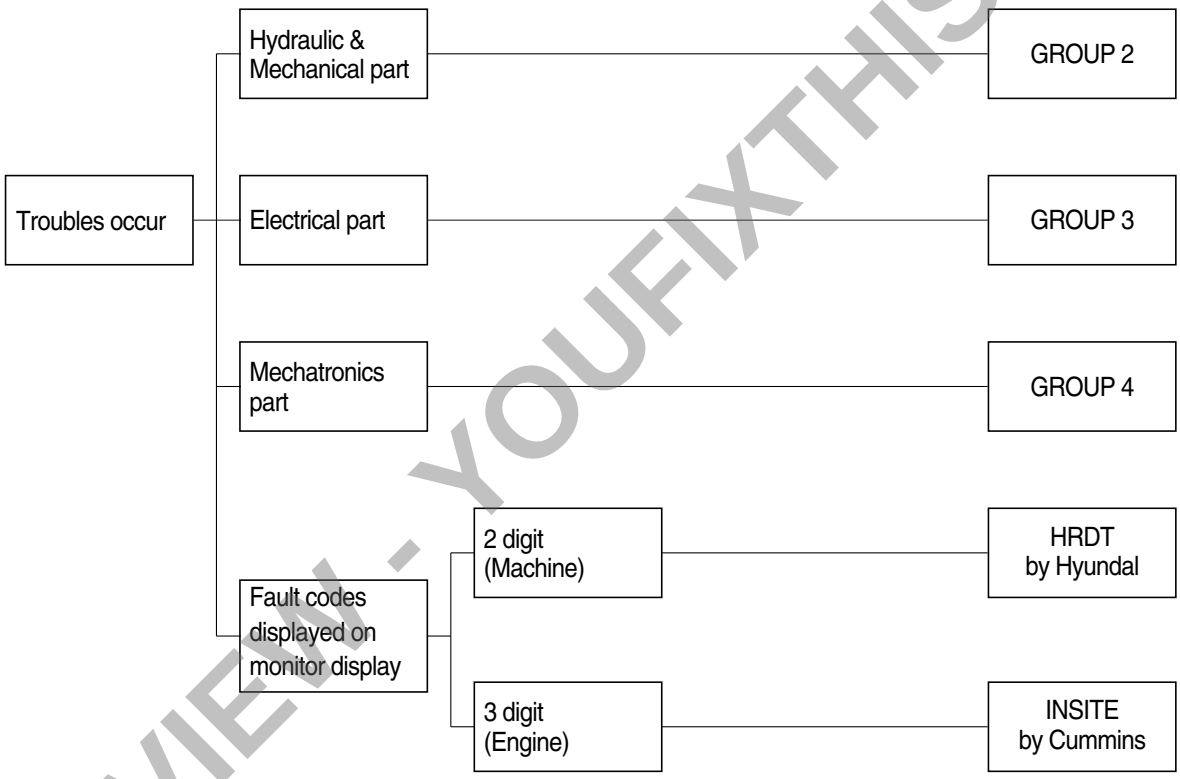
SECTION 6 TROUBLESHOOTING

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.



※ If fault codes (2 or 3 digits) are displayed on the monitor, please contact Hyundai or Cummins.

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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 : 210 ℓ

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

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

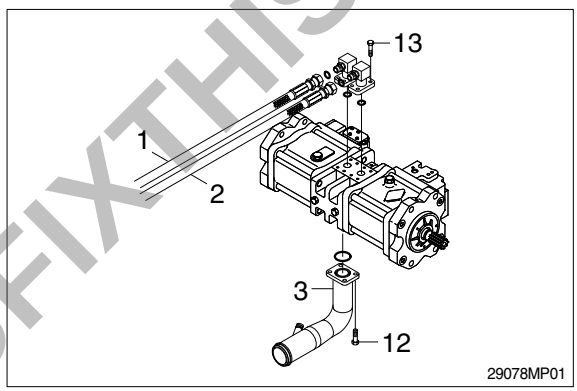
(6) Remove bolts(12) and disconnect pump suction tube (3).

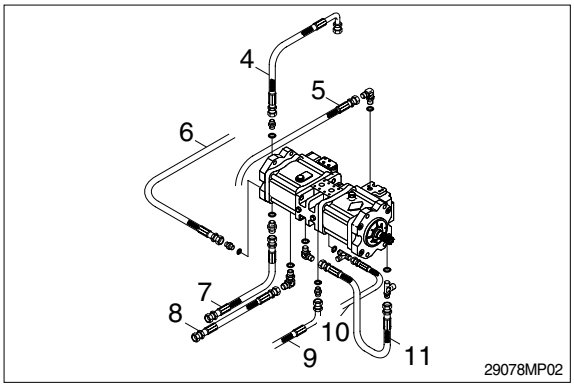
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(7) Sling the pump assembly and remove the pump mounting bolts.
- Weight : 155kg(342lb)

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







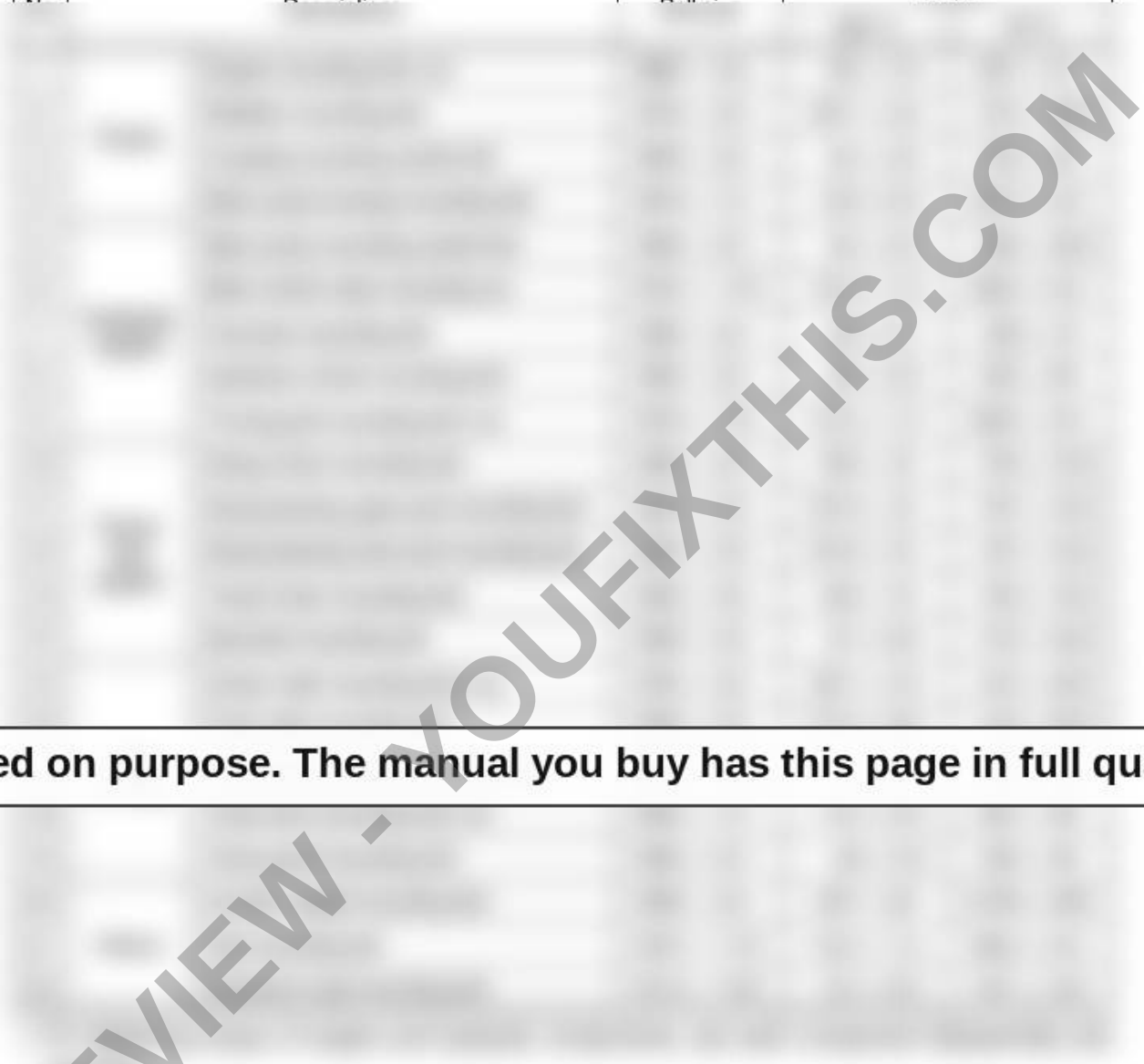
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GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Description	Bolt size	Torque



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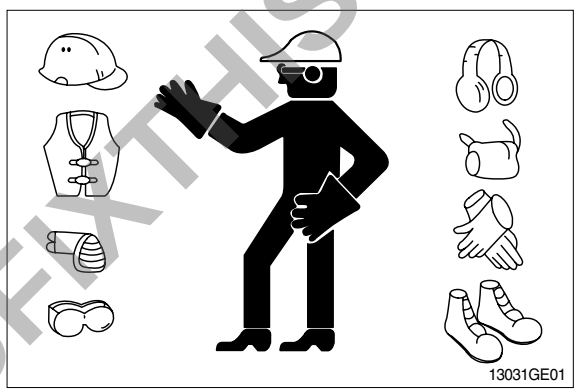
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

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

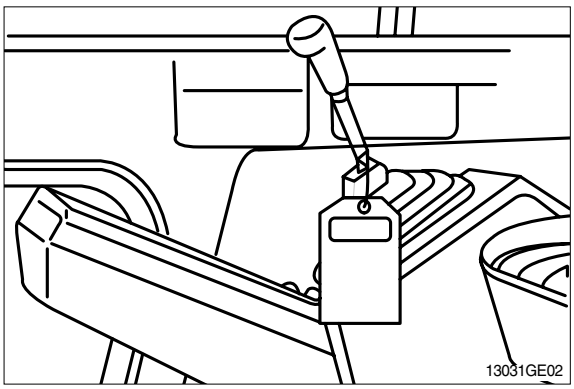
WEAR PROTECTIVE CLOTHING

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



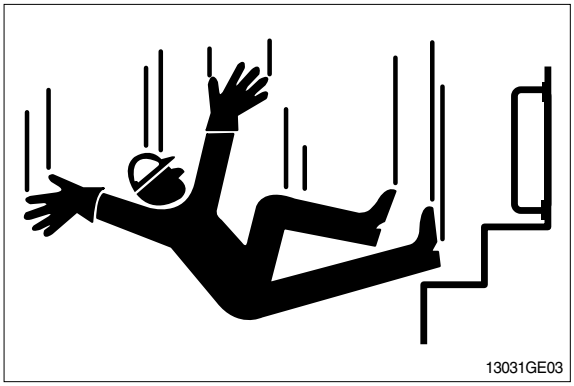
WARN OTHERS OF SERVICE WORK

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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9. RECOMMENDED OILS

Use only oils listed below or equivalent.
Do not mix different brand oil.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature °C (°F) -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	19(5.0)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	11(2.9)	SAE 85W-140
Final drive		9.5×2 (2.5×2)	
Hydraulic tank	Hydraulic oil	Tank; 190(50.2) System; 320(84.5)	ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	480(126.8)	ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease	As required	NLGI NO.1 NLGI NO.2
Radiator (Reservoir tank)	Mixture of antifreeze and water 50 : 50	50(13.2)	Ethylene glycol base permanent type

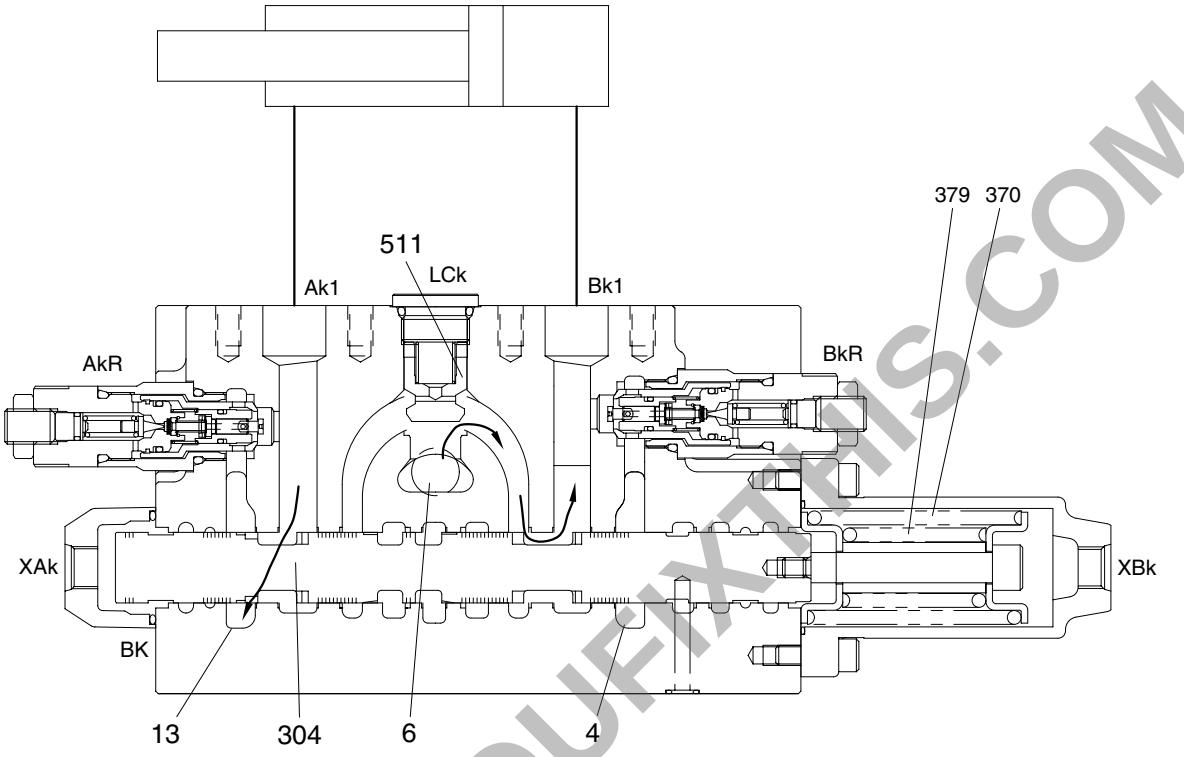
SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

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(3) Bucket control

① Bucket roll in operation



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During the bucket roll in operation, the pilot pressure from the pilot control valve is supplied to port XBk and shifts the bucket spool(304) in the left direction against the springs (370) and (379).

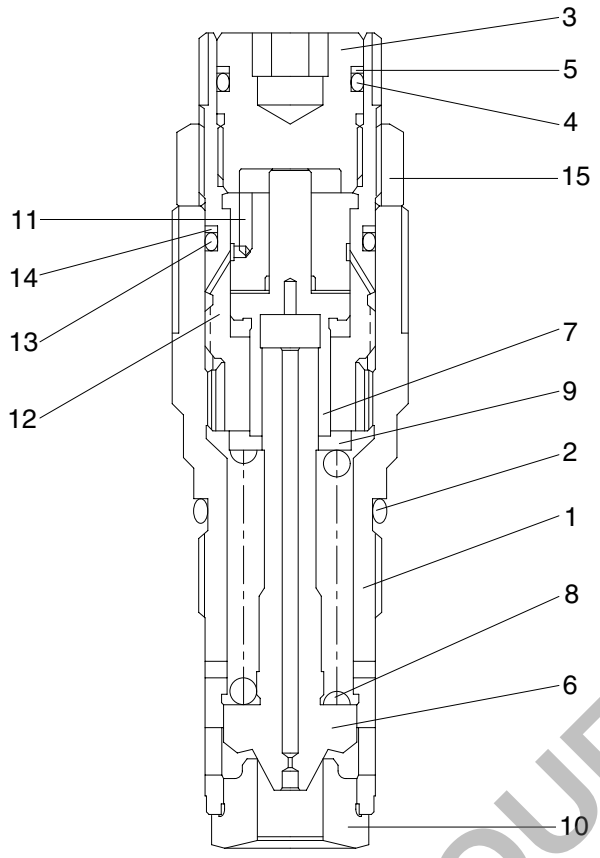
The hydraulic fluid from the pump P2 enters the parallel path(6) and is directed to the port Bk1 through the load check valve LCk(511). Following this it flows into the head side of the bucket cylinder.

The retutn flow from the rod side of the bucket cylinder returns to the bucket spool(304) through the port Ak1. Thereafter it is directed to the return port R2 through path(13).

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3) RELIEF VALVE



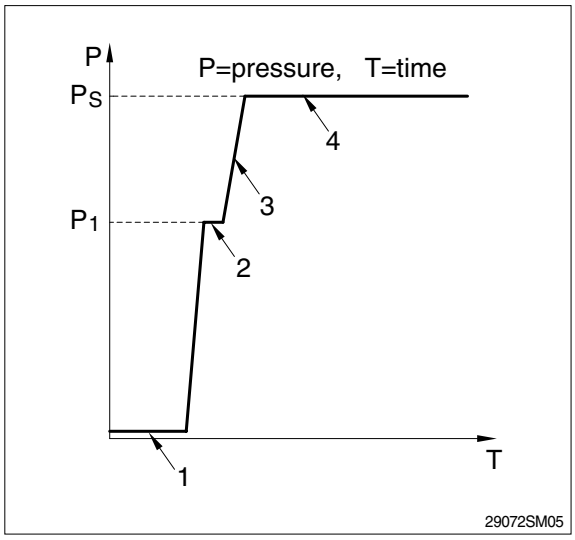
1 Body
2 O-ring
3 Plug
4 O-ring
5 Back up ring
6 Plunger
7 Piston
8 Spring
9 Seat spring
10 Seat
11 Sleeve
12 Adjust plug
13 O-ring
14 Back up ring
15 Nut

(1) Construction of relief valve

The valve casing contains two cartridge type relief valves that stop the regular and reverse rotations of the hydraulic motor. The relief valves relieve high pressure at start or at stop of swing motion and can control the relief pressure in two steps, high and low, in order to insure smooth operation.

(2) Function of relief valve

Figure illustrates how the pressure acting on the relief valve is related to its rising process. Here is given the function, referring to the figure following page.



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2. FUNCTION

1) FUNDAMENTAL FUNCTIONS

The pilot valve is a valve controls the spool stroke, direction, etc of a main control valve. This function is carried out by providing the spring at one end of the main control valve spool and applying the output pressure(Secondary pressure) of the pilot valve to the other end.

For this function to be carried out satisfactorily, the pilot valve is composed of the following elements.

(1) Inlet port(P) where oil is supplied from hydraulic pump.

(2) Output port(1, 2, 3 & 4) to apply pressure supplied from inlet port to ends of control valve spools.

(3) Tank port(T) necessary to control the above output pressure.

(4) Spool to connect output port to inlet port tank port.

(5) Mechanical means to control output pressure, including springs that work on the above spools.

2) FUNCTIONS OF MAJOR SECTIONS

The functions of the spool(8) are to receive the supply oil pressure from the hydraulic pump at its port P, and to change over oil paths to determine whether the pressure oil of port P is led to output ports 1, 2, 3 & 4 or the output spool to determine the output pressure.

The spring(11) works on this spool to determine the output pressure.

The change the deflection of this spring, the push rod(19) is inserted and can slide in the plug(14).

For the purpose of changing th displacement of the push rod through the cam(6) and adjusting nut(22) are provided the pedal(2) that can be tilted in any direction around the fulcrum of the cam(6) center.

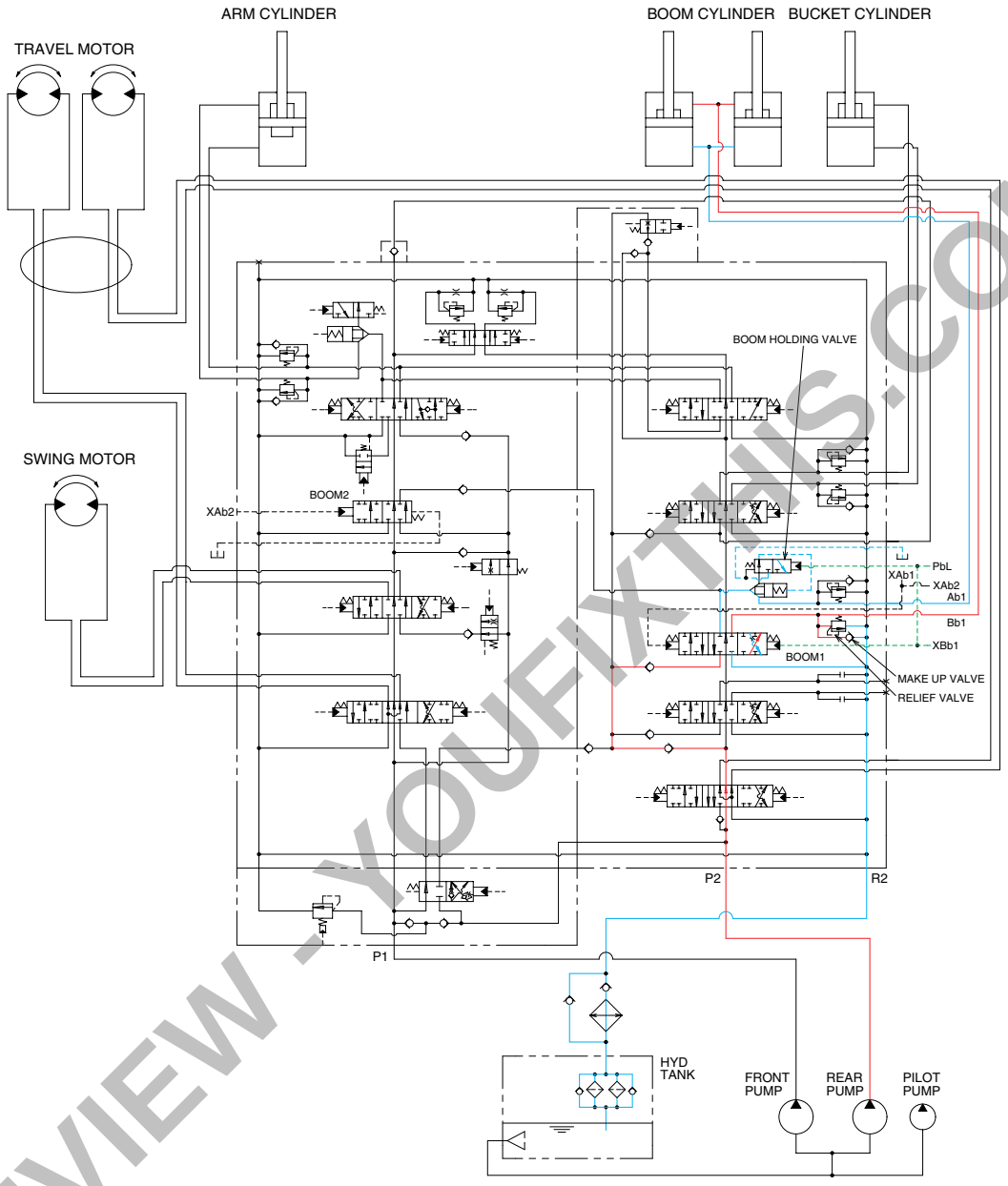
The spring(18) works on the casing(1) and spring seat(12) and tries to return the push rod(19) to the zero-displacement position irrespective of the output pressure, securing its resetting to the center position.

This also has the effect of a reaction spring to give appropriate control feeling to the operator.

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2. BOOM DOWN OPERATION



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When the RH control lever is pushed forward, the boom spools in the main control valve are moved to the down position by the pilot oil pressure from the remote control valve.

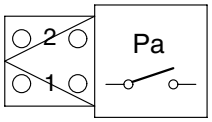
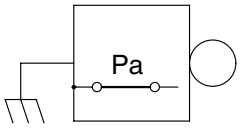
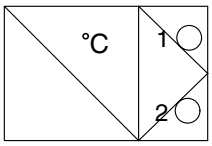
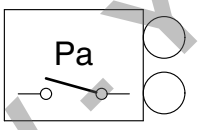
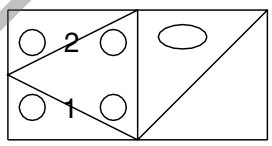
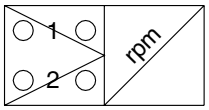
The oil from the rear pump flows into the main control valve and then goes to the small chamber of boom cylinders. At the same time, the oil from the large chamber of boom cylinders returns to the hydraulic tank through the boom spool in the main control valve.

When the down speed of boom is faster, the oil returned from the large chamber of boom cylinder combines with the oil from the rear pump, and flows into the small chamber of the boom cylinder.

This prevents cylinder cavitation by the negative pressure when the rear pump flow can not match the boom down speed. And the excessive pressure in the boom cylinder rod end circuit is prevented by the relief valve.

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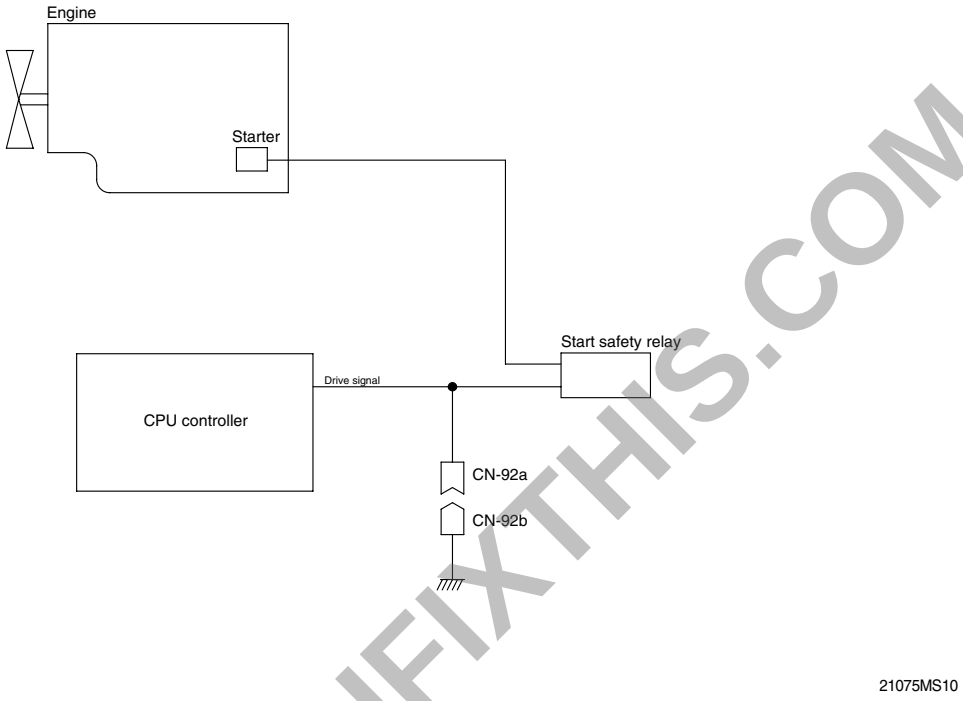
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Part name	Symbol	Specifications	Check
Pressure switch (For overload)	 CD-31	3~6kgf/cm² (N.O TYPE)	※ Check contact Normal : ∞ Ω
Pressure switch (For engine oil)	 CD-18	0.5kgf/cm² (N.C TYPE)	※ Check resistance Normal : ∞ Ω (CLOSE)
Temperature sensor (Coolant, Hydraulic)	 CD-1 CD-8	-	※ Check resistance 50°C : 804 Ω 80°C : 310 Ω 100°C : 180 Ω
Air cleaner pressure switch	 CD-10	-	※ Check contact High level : ∞ Ω Low level : 0 Ω
Fuel sender	 CD-2	-	※ Check resistance Full : 50 Ω 6/12 : 350 Ω 11/12 : 100 Ω 5/12 : 400 Ω 10/12 : 150 Ω 4/12 : 450 Ω 9/12 : 200 Ω 3/12 : 500 Ω 8/12 : 250 Ω 2/12 : 550 Ω 7/12 : 300 Ω 1/12 : 600 Ω Empty warning : 700 Ω
Tacho sensor	 CD-17	-	※ Check resistance Normal : 300 Ω (For terminal 1-2)

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GROUP 8 ANTI-RESTART SYSTEM



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1. ANTI-RESTART FUNCTION

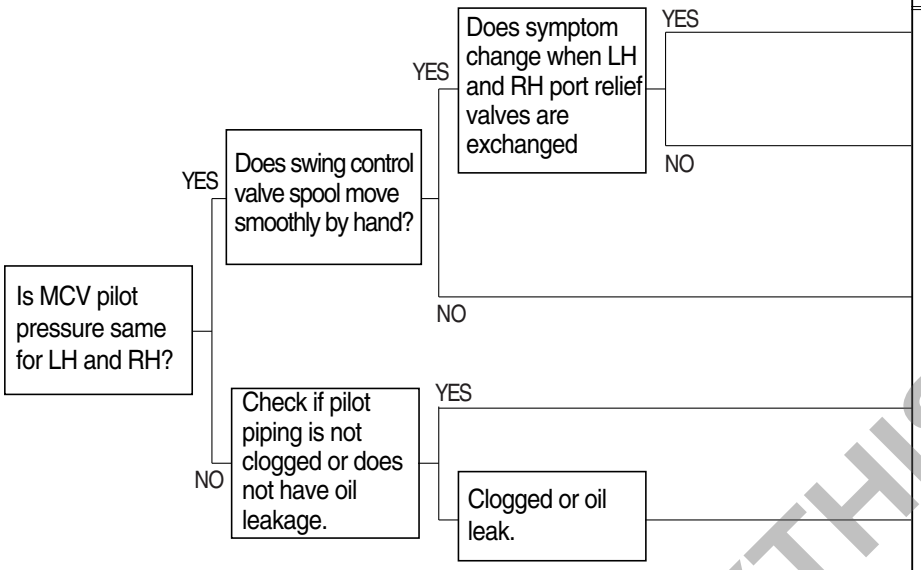
After 10 seconds from the engine starts to run, CPU controller turns off the start safety relay to protect the starter from inadvertent restarting.

2. When a replacement or taking-off of the CPU controller is needed, connect CN-92a and CN-92b to ensure the engine start without the CPU controller.

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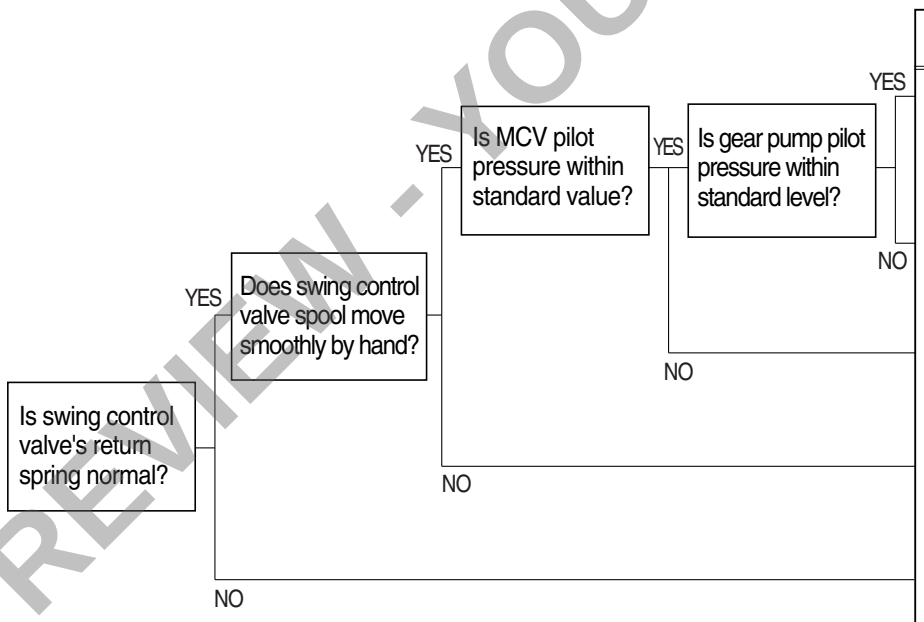
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3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



Cause	Remedy
Swing port relief valve is faulty.	Disassemble and repair.
Shuttle valve is faulty.	Disassemble and repair.
Swing control valve spool is stuck.	Disassemble and repair.
Pilot valve is faulty.	Disassemble and repair.
	Clean pilot piping interior or repair piping.

4) MACHINE SWINGS BUT DOES NOT STOP



Cause	Remedy
Pilot relief valve is faulty.	Disassemble and repair or replace.
Gear pump is broken.	Disassemble and repair.
Pilot valve is faulty.	Disassemble and repair.
Swing control valve spool is stuck.	Disassemble and repair.
Return spring is faulty.	Disassemble and replace.

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5. AUTO DECEL SYSTEM DOES NOT WORK

※ Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE

Check resistance between CN-51 (1)-GND and CN-51(13)-GND

SPEC :
Actuator operating : 11~13V
Actuator stop :0~2V
See TEST 13
See TEST 14

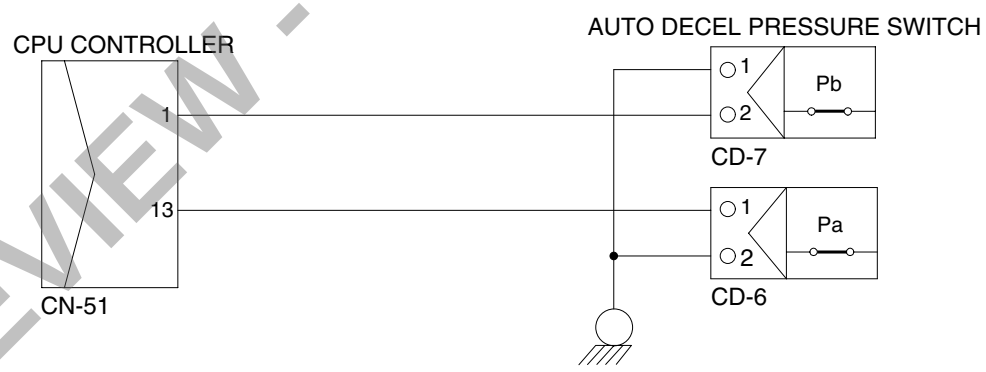
YES

NO

NO

Cause	Remedy
Defective CPU controller	Replace
Short circuit or poor connection vetween CN-51(1), (13)- pressure switches	Replace or repair
Defective auto decel pressure switch	Replace

Wiring diagram

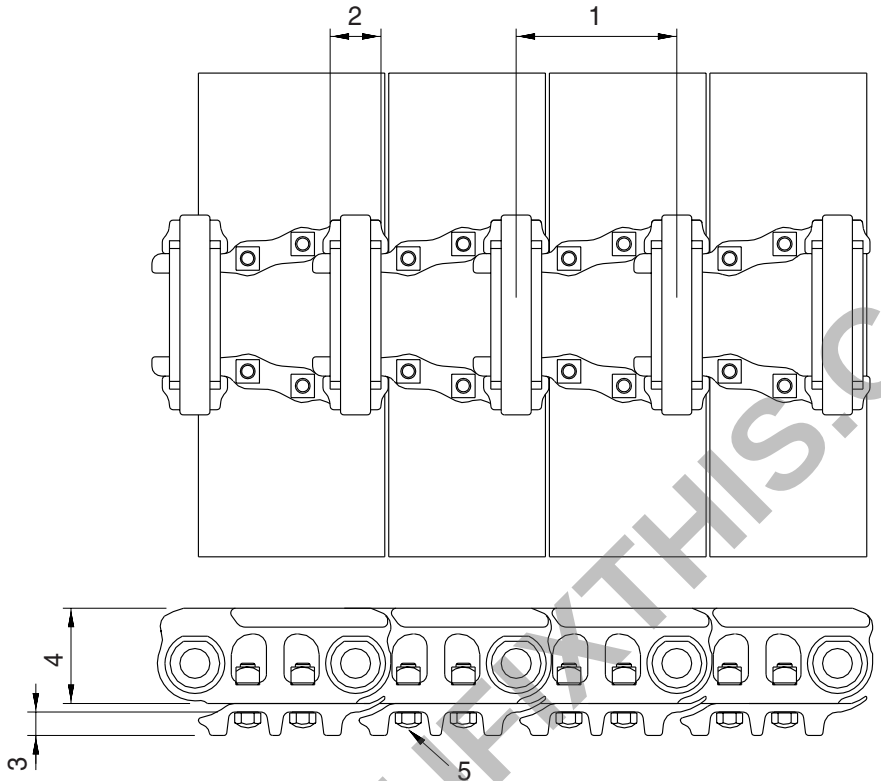


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4) TRACK



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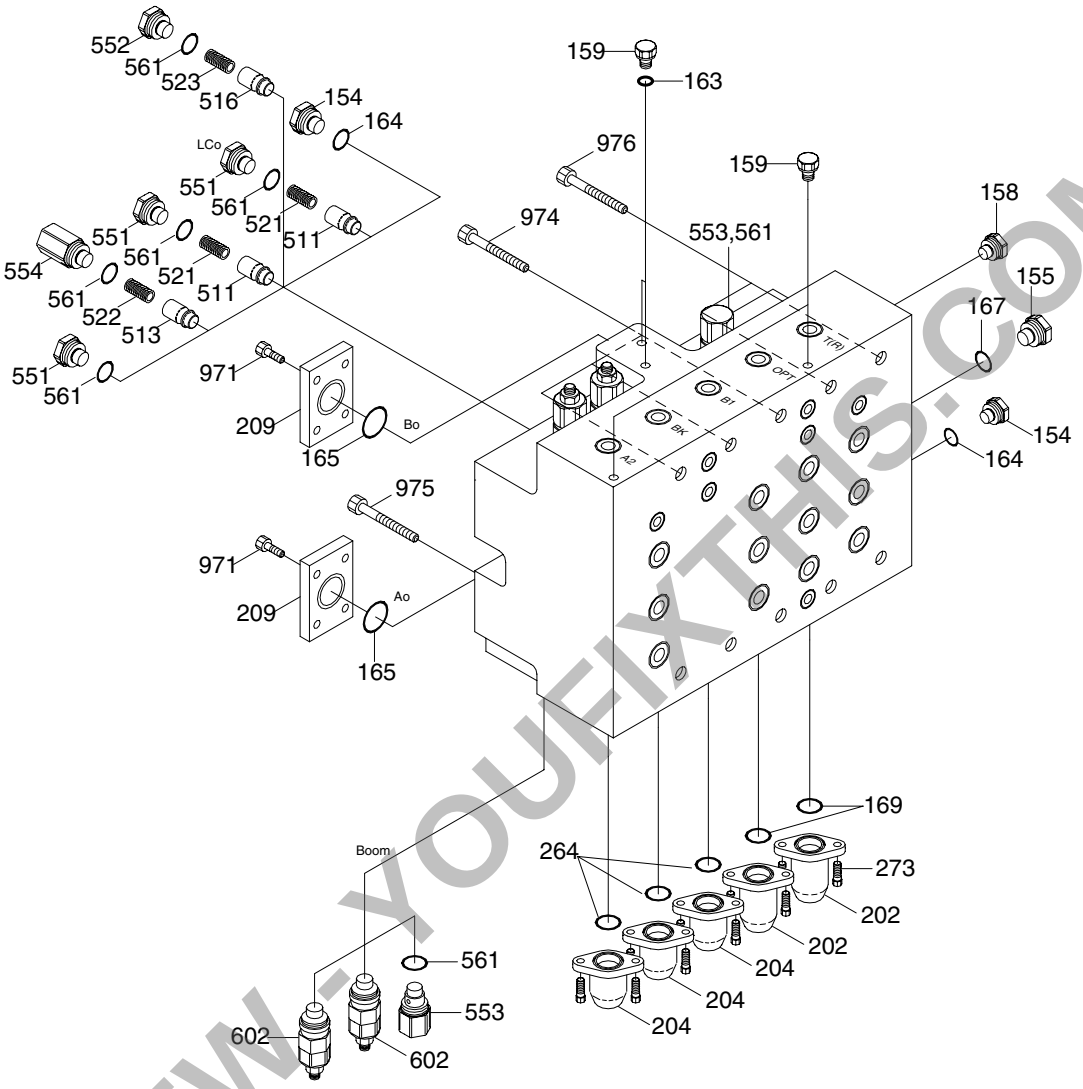
Unit : mm

No.	Check item	Criteria		Remedy
1	Link pitch	Standard size	Repair limit	Turn or replace
		216	221	
2	Outside diameter of bushing	ø 66.5	ø 60.9	Rebuild or replace
3	Height of grouser	30	23	
4	Height of link	116	111	
5	Tightening torque	Initial tightening torque : 115± 5kgf · m		Retighten

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STRUCTURE(5/5)



154	Plug	204	Cover	551	Plug
155	Plug	209	Flange	552	Plug
158	Plug	264	O-ring	553	Plug
159	Plug	273	Socket screw	554	Plug
163	O-ring	551	Poppet	561	O-ring
164	O-ring	513	Poppet	602	Port relief valve
165	O-ring	516	Poppet	971	Screw
167	O-ring	521	Spring	974	Screw
169	O-ring	522	Spring	975	Screw
202	Cover	523	Spring	976	Screw

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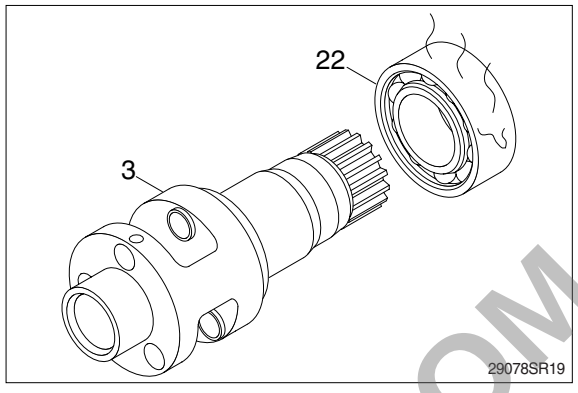
3) ASSEMBLY

(1) Assembling drive shaft assembly.

① Soak the roller bearing(22) in boiled oil (80~100℃) and then take out and install it to the drive shaft(3).

※ Confirm assembly coincidence.

② Put pinion shaft of drive shaft(3) downwards.

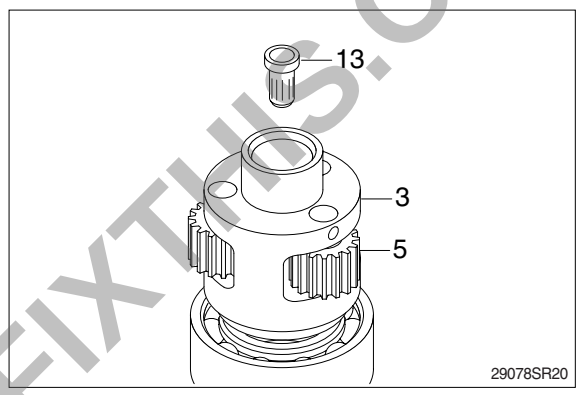


③ Assemble thrust button(13) into the drive shaft(3) hole.

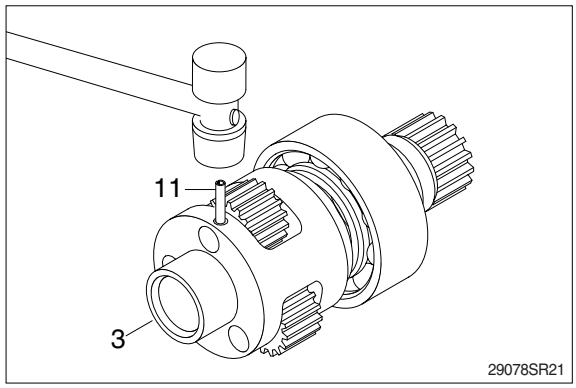
※ Depth from the drive shaft(3) outer section to the thrust button(13) is 135㎜.

※ Take care not to damage oil seal.

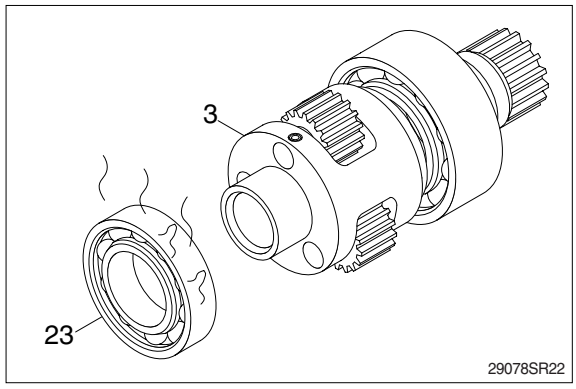
④ Assemble bush2(32) and two thrust washers(12) to the planet gear2(5) and then install them to the drive shaft(3).



⑤ Assemble pin2(11) to the drive shaft(3) and then press the spring pin(28) into the pin2(11) by hammering.



⑥ Heat the roller bearing(23) in the boiled oil and the take out and assemble it to the drive shaft(3).



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(14) Disassemble cylinder sub.

① Disassemble set plate(25) and piston(26) sub.



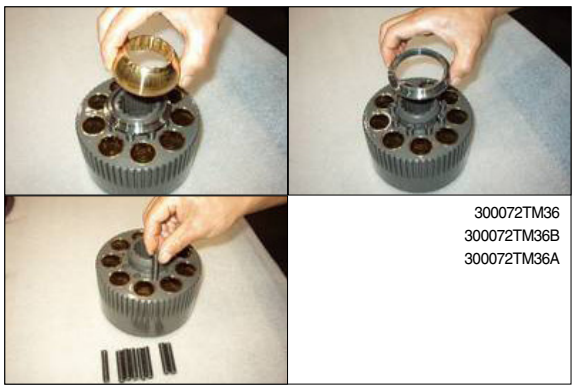
300072TM34

② Disassemble friction plate(27) and lee plate(28) in cylinder block(21).



300072TM35

③ Dismantle ball guide(24), spacer(23), and cylinder spring(22).

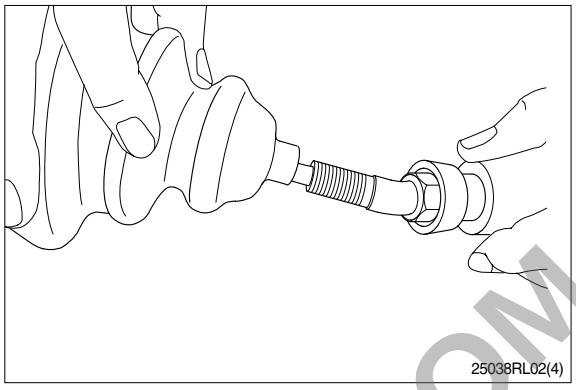


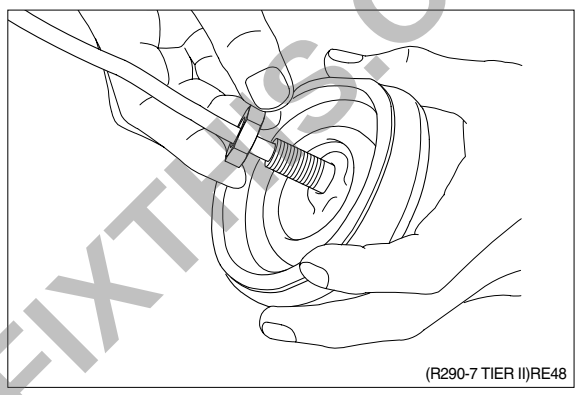
300072TM36
300072TM36B
300072TM36A

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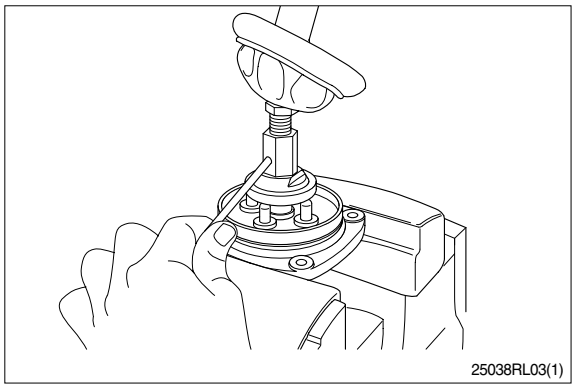
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(14) Fit boot(25) and lock nut(20), and handle subassembly is assembled completely.



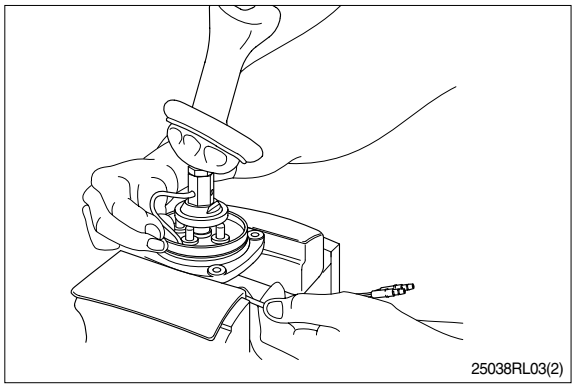


(15) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.



(16) Assemble bushing(16) to plate and pass cord and tube through it.

※ Provide margin necessary to operation.



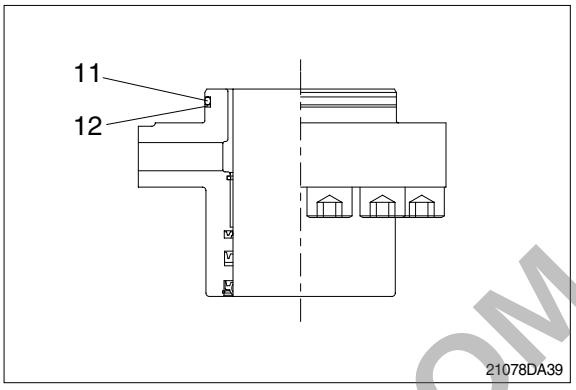
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⑤ Fit back up ring(12) to gland(3).

※ Put the backup ring in the warm water of 30~50℃.

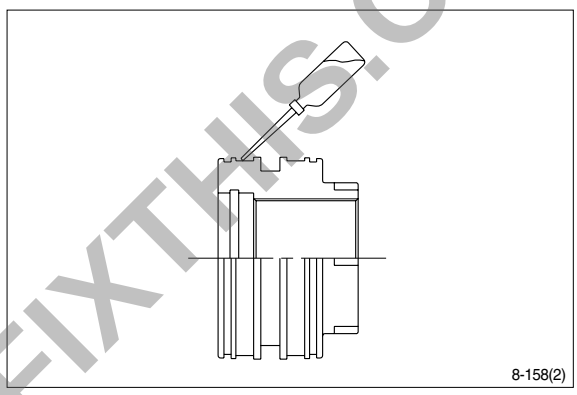
⑥ Fit O-ring(11) to gland(3).



(2) Assemble piston assembly

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

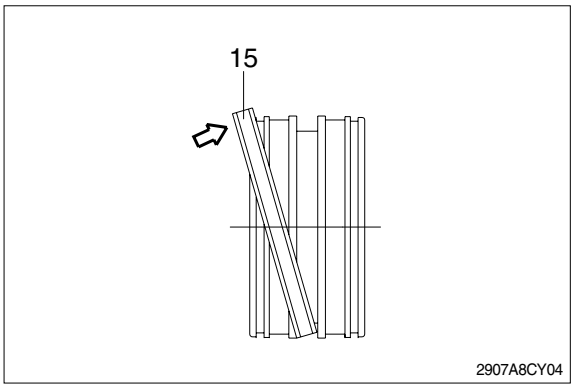
① Coat the outer face of piston(14) with hydraulic oil.



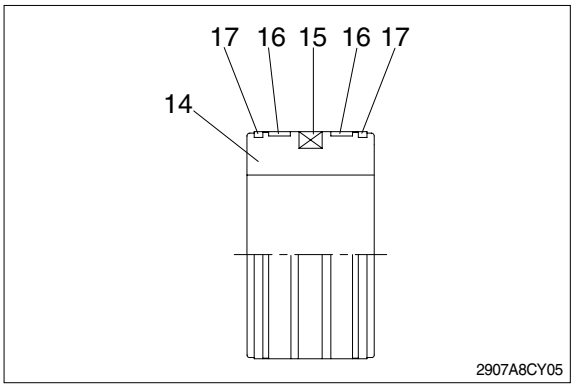
② Fit piston seal(15) to piston.

※ Put the piston seal in the warm water of 60~100℃ for more than 5 minutes.

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



③ Fit wear ring(16) and dust ring(17) to piston(14).



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