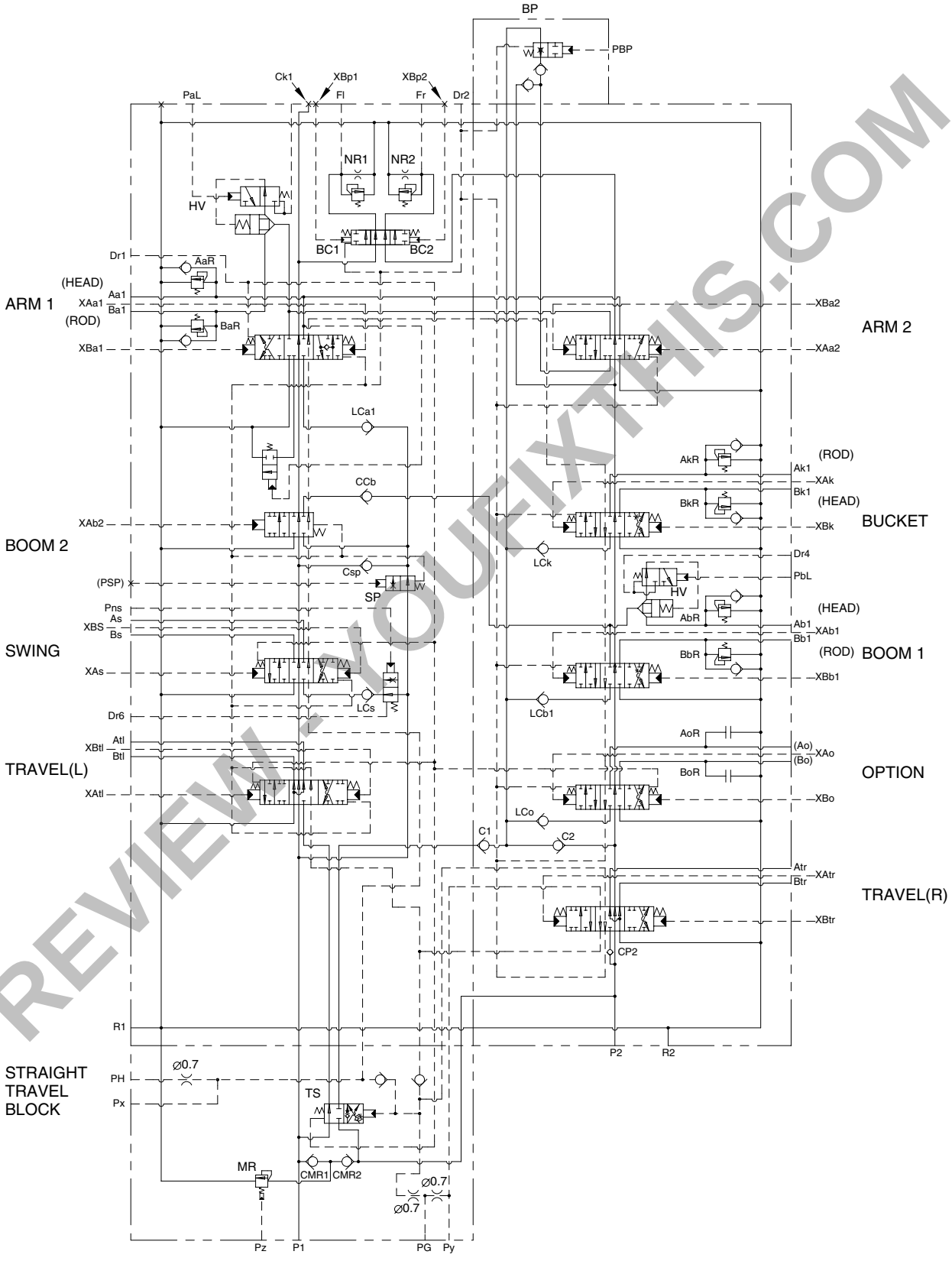
2. HYDRAULIC CIRCUIT



21072MC24

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1. REMOVAL AND INSTALL

1) REMOVAL

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

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping

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

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

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

- Hydraulic tank quantity : 180 ℓ

(5) Remove socket bolts(74) and disconnect pipe(1, 2).

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

(7) Remove socket bolts(72) and disconnect pump suction tube(3).

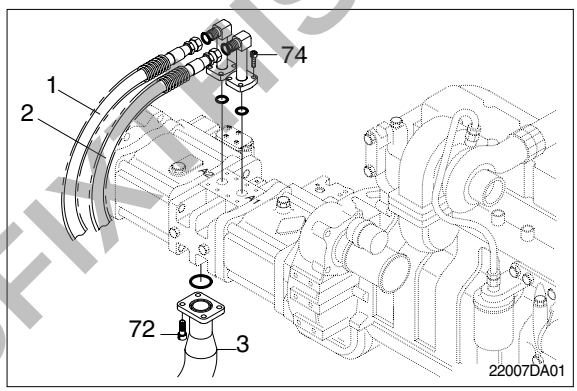
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

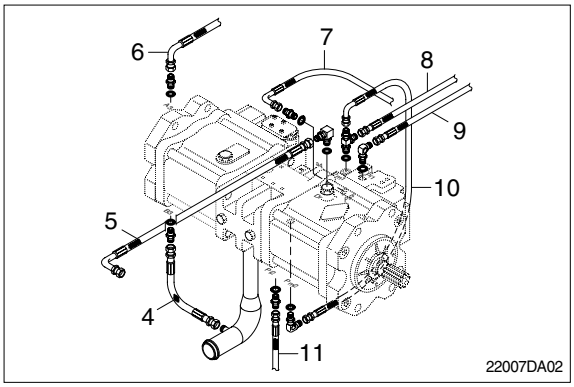
(8) Sling the pump assembly and remove the pump mounting bolts.

- Weight : 120kg(265lb)

※ 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	M24 × 3.0	90 ± 7.0	651 ± 51
2		Radiator mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
3		Coupling mounting socket bolt	M18 × 2.5	32 ± 1.0	231 ± 7.2
4		Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	34.7 ± 2.2
5	Hydraulic system	Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
6		Main control valve mounting nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
7		Fuel tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
8		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
9		Turning joint mounting bolt, nut	M12× 1.75	12.3 ± 1.3	88.9 ± 9.4
10	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
11		Swing bearing upper part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
12		Swing bearing lower part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
13		Travel motor mounting bolt	M16 × 2.0	23 ±2.5	166 ± 18.1
14		Sprocket mounting bolt	M16 × 2.0	26 ±4.0	188 ± 28.9
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	23 ±2.5	166 ± 18.1
16		Track roller mounting bolt	M20 × 2.5	54.7 ± 5.0	396 ± 36.2
17		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
18		Track shoe mounting bolt, nut	M20 × 1.5	78 ± 8.0	564 ± 57.9
19		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
20	Others	Counter weight mounting bolt	M36 × 3.0	297 ± 33	2148 ± 239
21		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
22		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 each component disassembly and assembly.

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5. ERROR CODES TABLE

Fault code No.	Description
1	Short circuit in governor motor 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	Governor motor 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

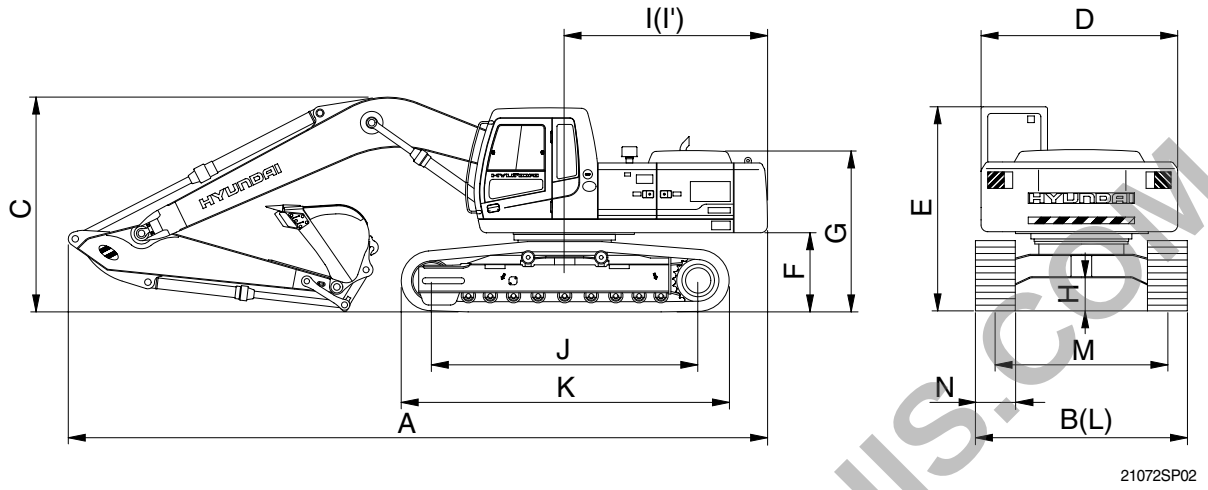
Group 1 Before Troubleshooting ····· 6-1
Group 2 Hydraulic and Mechanical System ····· 6-4
Group 3 Electrical System ····· 6-24
Group 4 Mechatronics System ····· 6-40

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2. SPECIFICATIONS

1) ROBEX 210LC-7H



Description		Unit	Specification
Operating weight		kg(lb)	21500(47400)
Bucket capacity(SAE heaped), standard		$m^3(yd^3)$	0.92(1.20)
Overall length	A	mm(ft-in)	9520(31' 3")
Overall width, with 600mm shoe	B		2990(9'10")
Overall height	C		2990(9'10")
Superstructure width	D		2700(8'10")
Overall height of cab	E		2920(9' 7")
Ground clearance of counterweight	F		1060(3' 6")
Engine cover height	G		2320(7' 7")
Minimum ground clearance	H		480(1' 7")
Rear-end distance	I		2770(9' 1")
Rear-end swing radius	I'		2830(9' 3")
Distance between tumblers	J		3650(12' 0")
Undercarriage length	K		4440(14' 7")
Undercarriage width	L		2990(9'10")
Track gauge	M		2390(7'10")
Track shoe width, standard	N		600(24")
Travel speed(Low/high)		km/hr(mph)	3.4/5.3(2.1/3.3)
Swing speed		rpm	12.5
Gradeability		Degree(%)	35(70)
Ground pressure(600mm shoe)		$kgf/cm^2(psi)$	0.46(6.54)

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SECTION 1 GENERAL

Group 1 Safety Hints 1-1
Group 2 Specifications 1-9

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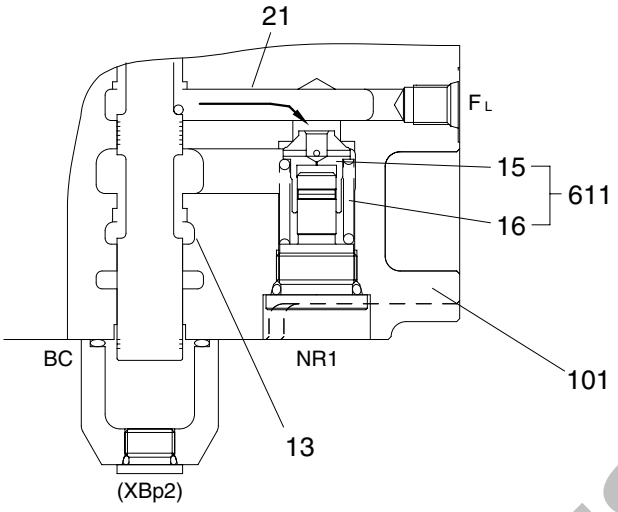
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SECTION 2 STRUCTURE AND FUNCTION

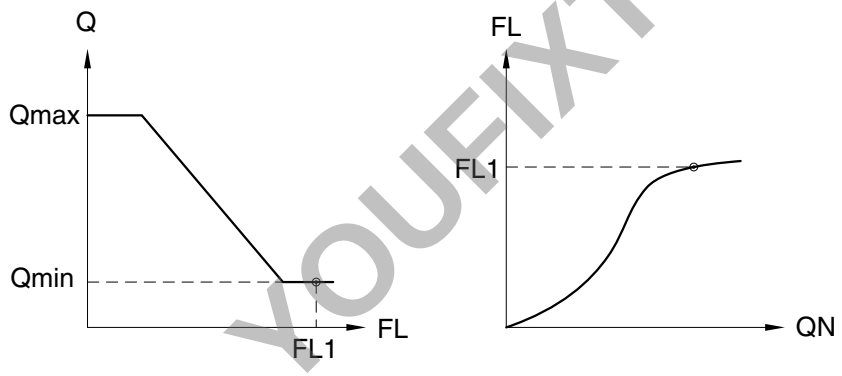
Group 1 Pump Device ····· 2-1
Group 2 Main Control Valve ····· 2-21
Group 3 Swing Device ····· 2-51
Group 4 Travel Device ····· 2-60
Group 5 RCV Lever ····· 2-67
Group 6 RCV Pedal ····· 2-74

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21072MC30



21072MC31

The negative control relief valve(611) consists of poppet(15), spring(16) and casing(101). When the hydraulic fluid in the center bypass increases to the level that the pressure in the path(3) reaches the set pressure of the spring(16), the hydraulic fluid in the path(3) pushes open the poppet (15) and escapes into the return path(13).

In the unloaded state, the hydraulic fluid of the pump P1(28) entirely flows to the tank through the path(21), orifice(9) and the return path(13). Therefore the pressure FL in the path(3) becomes maximum(FL1) because all the discharge is reduced by the orifice(9) which in turn destrokes the pump P1(28) so as to minimize the tilting angle and consequent discharge of the pump P1(28). (Qmin)

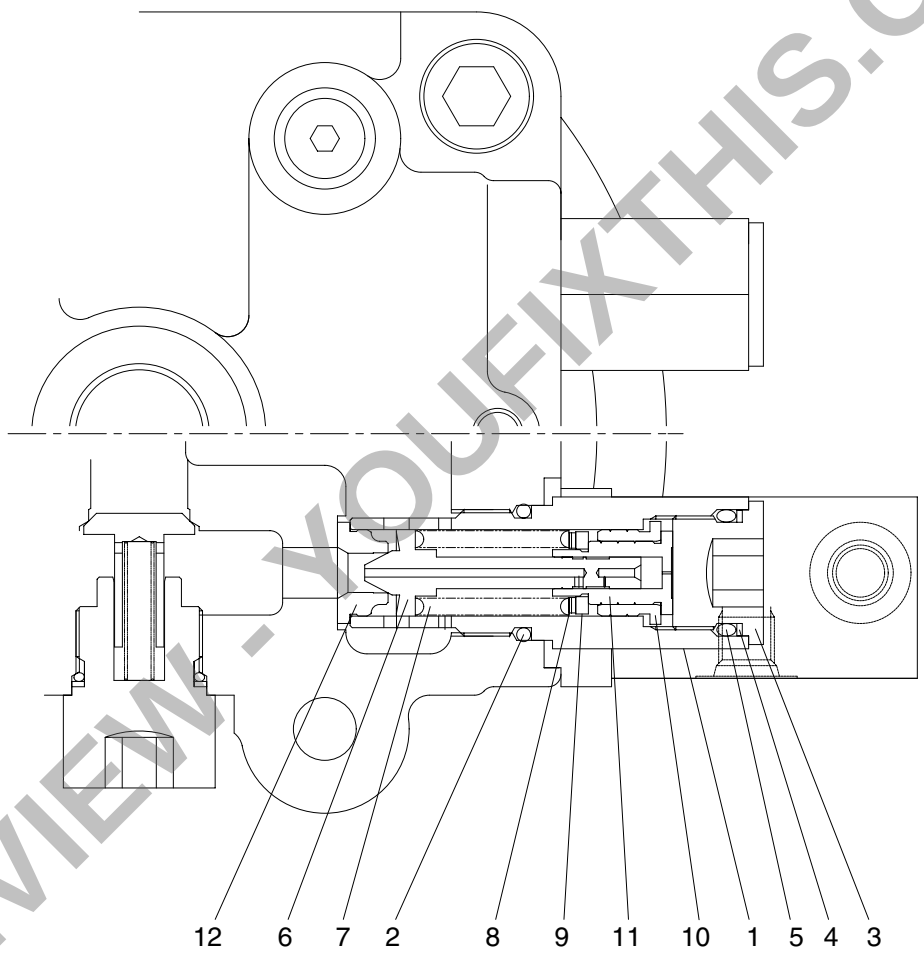
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2.4 Make up check valve

In case of rapid rotation which is faster than the amount of supplied oil to swing motor entrance, mounted make up check valve supplies working oil to prevent cavitation according to the shortage of supplying oil.

In the event of sudden stop of the operating excavator, supplying working oil to entrance of swing motor is stopped. However, by means of inertia of rotation, swing motor will be stopped after more rotation. In that time, make up check valve is opened and supplies working oil according to the pressure of hydraulic oil line to the entrance of the motor, which is lower than working oil awaiting in a make up check valve port.



220072SM10

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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(6) works on this spool to determine the output pressure.

The change the deflection of this spring, the push rod(14) is inserted and can slide in the plug(21).

For the purpose of changing th displacement of the push rod through the cam(27) and adjusting nut(32) are provided the pedal that can be tilted in any direction around the fulcrum of the cam(27) center.

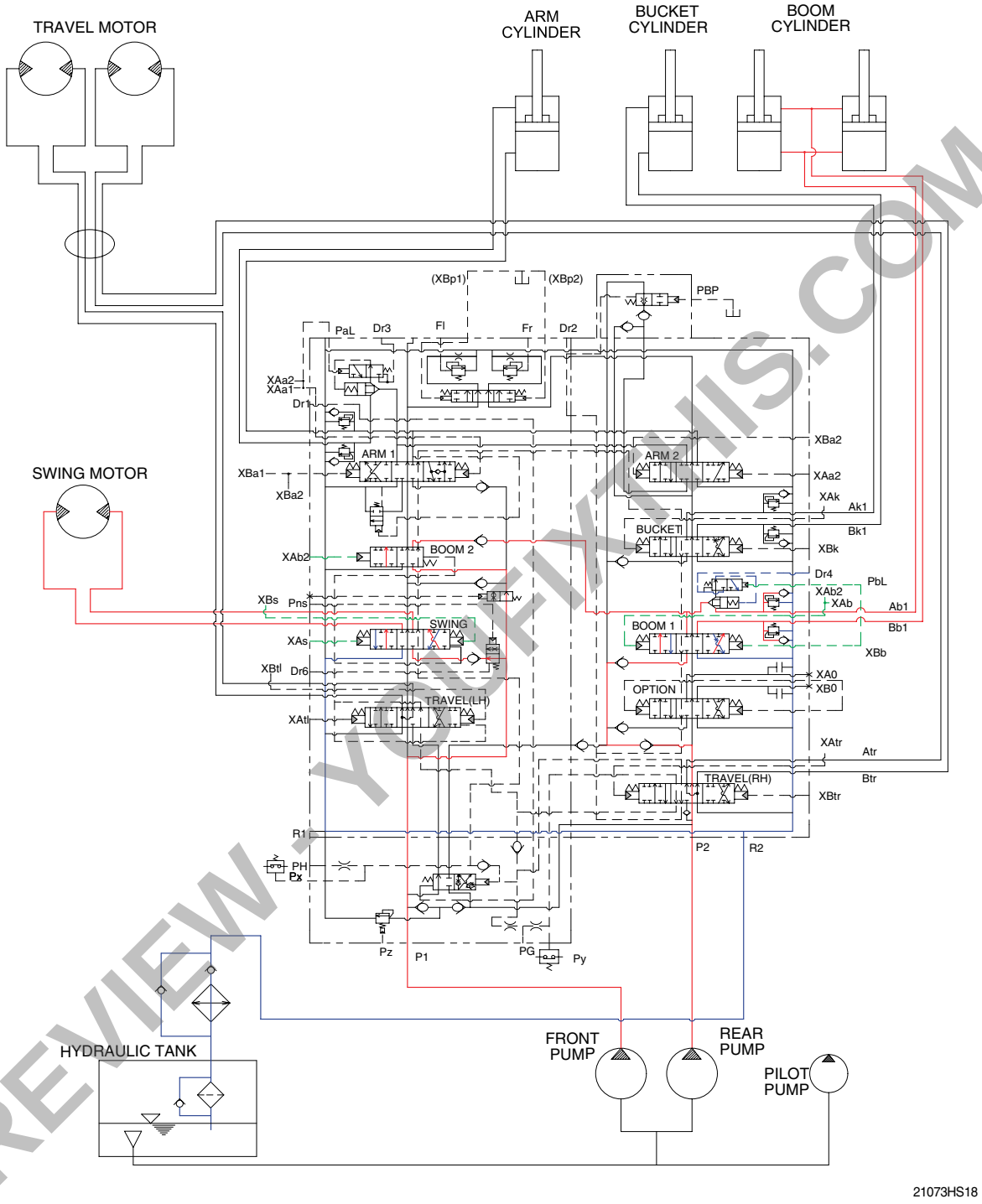
The spring(10) works on the casing(1) and spring seat(7) and tries to return the push rod(14) to the zero-displacement position irrespective of the output pressure, securing its resetting to the center position.

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

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2. COMBINED SWING AND BOOM OPERATION



21073HS18

When the swing and boom functions are operated, simultaneously the swing spool and boom spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve.

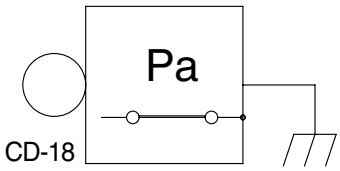
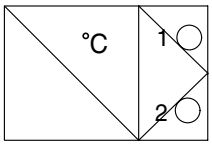
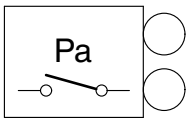
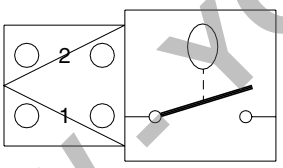
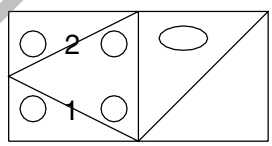
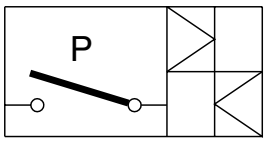
The oil from the front pump flows into the swing motor through swing spool and the boom cylinder through boom 2 spool.

The oil from the rear pump flows into the boom cylinders through the boom 1 spool in the right control valve.

The superstructure swings and the boom is operated.

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Part name	Symbol	Specification	Check
Pressure switch (For engine oil)	 CD-18	0.5 kgf/cm² (N.C TYPE)	※ Check resistance Normal : 0 Ω (CLOSE)
Temperature sensor	 CD-1	-	※ Check resistance 50° C : 804 Ω 80° C : 310 Ω 100° C : 180 Ω
Air cleaner pressure switch	 CD-10	Pressure: 635mmH₂O (N.O TYPE)	※ Check contact Normal : ∞ Ω
Coolant level sensor	 CD-16	24V 0.5A	※ 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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SECTION 5 MECHATRONICS SYSTEM

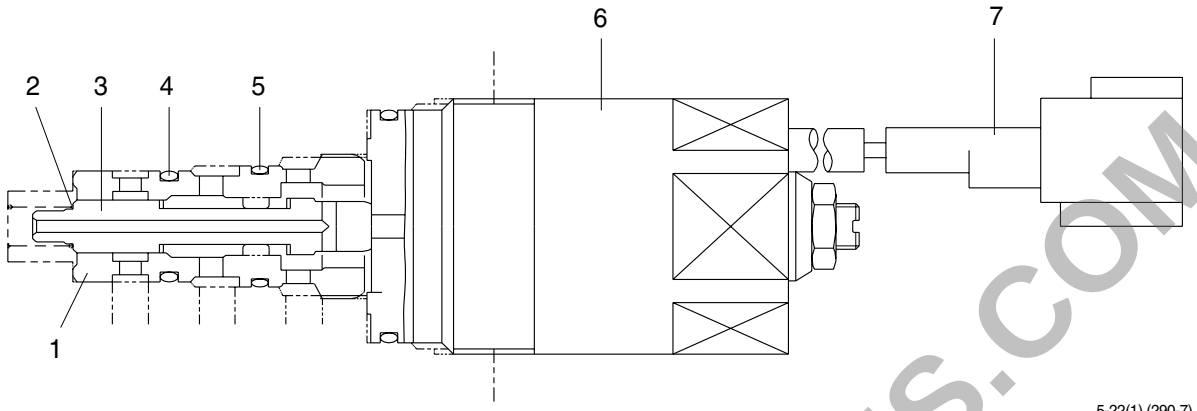
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Group 2 Mode Selection System 5-3
Group 3 Automatic Deceleration System 5-6
Group 4 Power Boost System 5-7
Group 5 Travel Speed Control System 5-8
Group 6 Automatic Warming Up Function 5-9
Group 7 Engine Overheat Prevention Function 5-10
Group 8 Anti-Restart System 5-11
Group 9 Self-Diagnostic System 5-12
Group 10 Engine Control System 5-20
Group 11 EPPR(Electro Proportional Pressure Reducing) Valve 5-27
Group 12 Monitoring System 5-30

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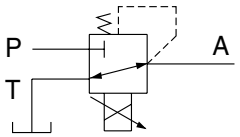
2. OPERATING PRINCIPLE

1) STRUCTURE



5-22(1) (290-7)

1	Sleeve	4	O-ring	6	Solenoid valve
2	Spring	5	O-ring	7	Connector
3	Spool				

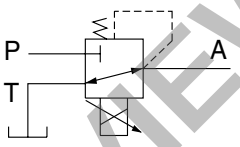


5-22A (290-7)

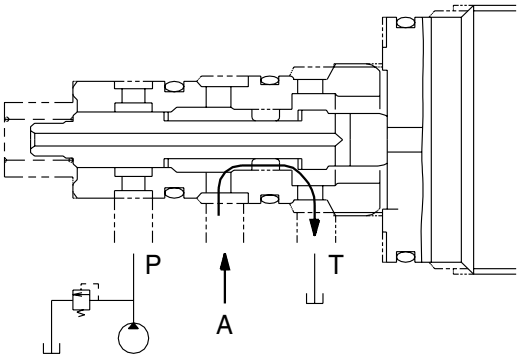
P	Pilot oil supply line(Pilot pressure)
T	Return to tank
A	Secondary pressure to flow regulator at hydraulic pump

2) AT H MODE

Pressure line is blocked and A oil returns to tank.

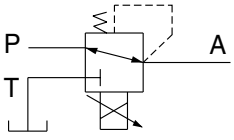


5-22B (290-7)

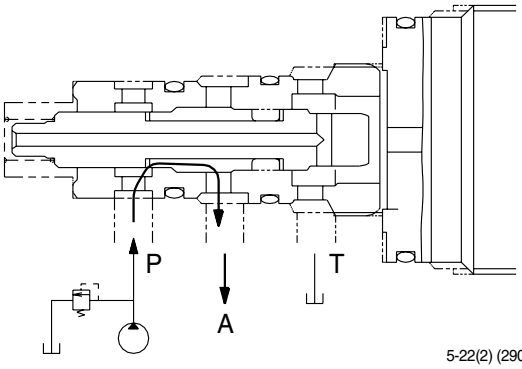


3) AT S MODE

Secondary pressure enters into A.



5-22C (290-7)

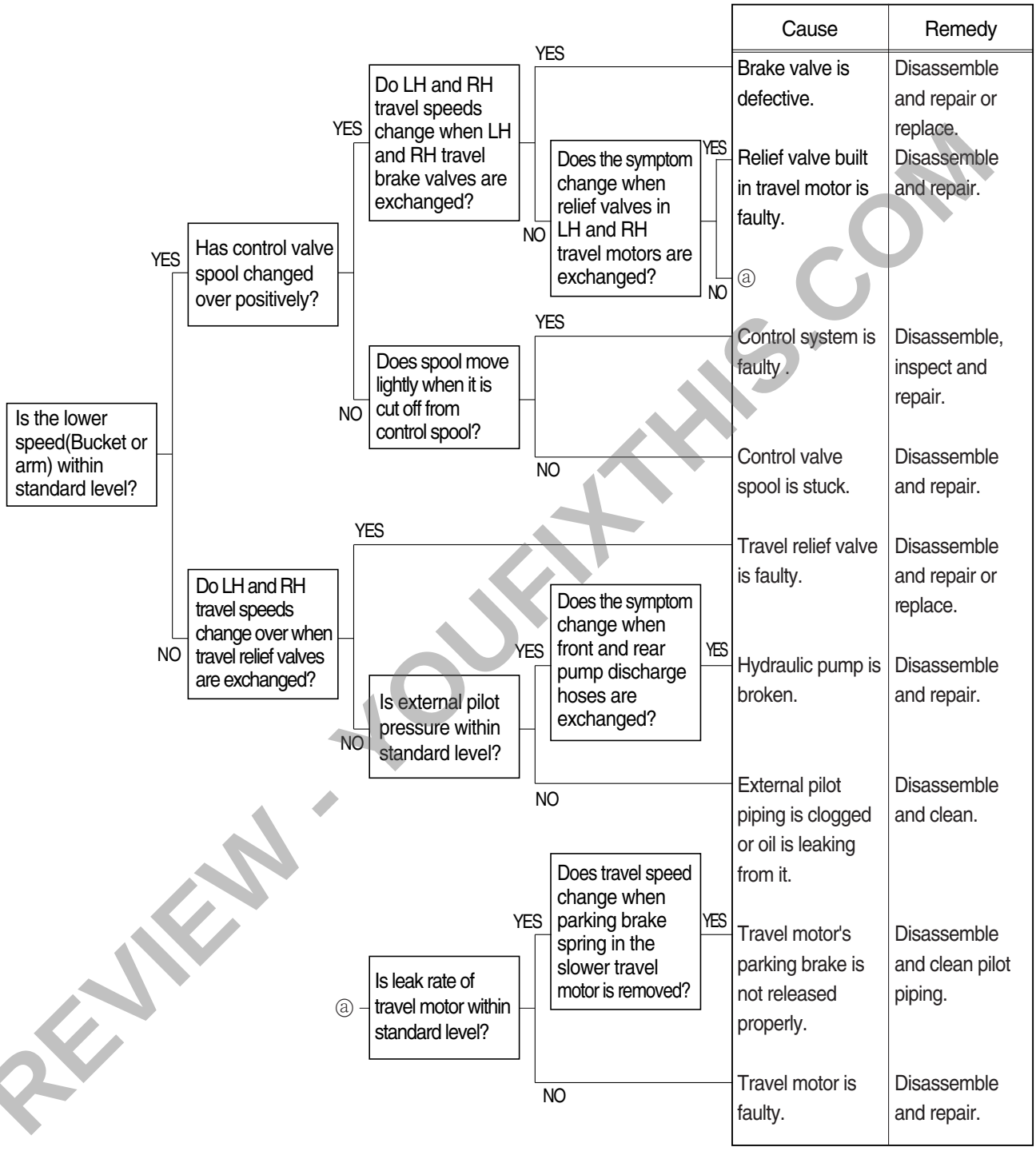


5-22(2) (290-7)

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2) SPEED ON ONE SIDE FALLS AND THE MACHINE CURVES



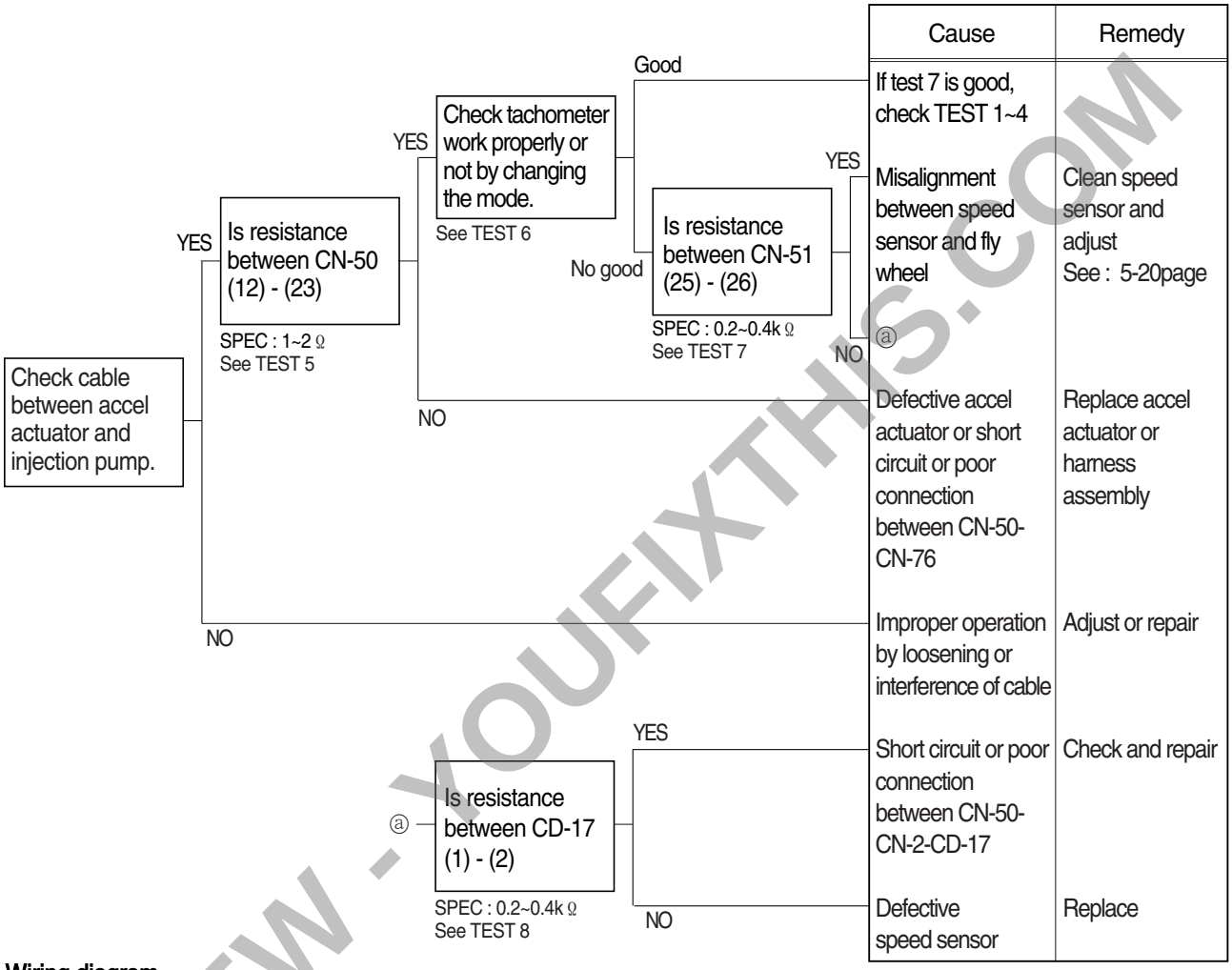
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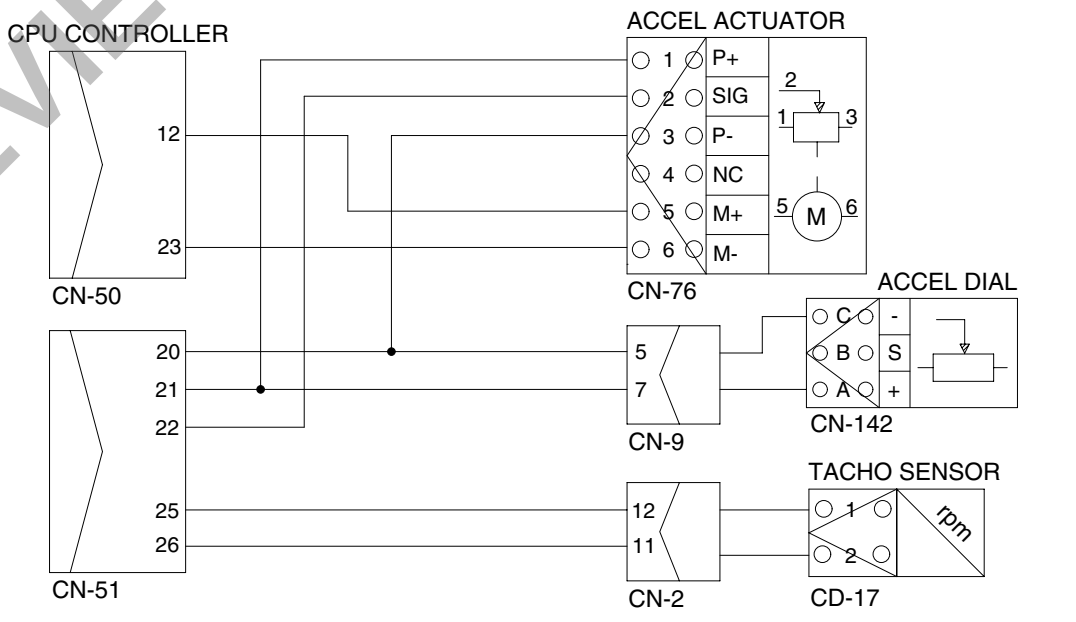
2. ENGINE SPEED IS SLOW AT ALL MODE

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

1) INSPECTION PROCEDURE



Wiring diagram



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12) CONTROL LEVER STROKE

(1) Measure each lever stroke at the lever top using a ruler.

※ When the lever has play, take a half of this value and add it to the measured stroke.

(2) Preparation

Keep the hydraulic oil temperature at 50±5°C.

(3) Measurement

① Stop the engine.

② Measure each lever stroke at the lever top from neutral to the stroke end using a ruler.

③ Repeat step ② three times and calculate the average values.

(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm

Model	Kind of lever	Standard	Maximum allowable	Remarks
R210LC-7H	Boom lever	87±10	109	
	Arm lever	87±10	109	
	Bucket lever	87±10	109	
	Swing lever	87±10	109	
	Travel lever	142±10	178	

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2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Remove the suction strainer and clean it.

(3) Replace return filter with new one.

(4) Remove breather and clean it.

(5) After adding oil to the hydraulic tank to the specified level.

(6) Bleed the air from the hydraulic pump.
① Remove the air vent plug(2EA).
② Tighten plug lightly.
③ Start the engine, run at low idling, and check oil come out from plug.
④ Tighten plug.

(7) Start the engine, run at low idling(3~5 minutes) to circulate the oil through the system.

(8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

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3) DISASSEMBLY

The figure in ( ) shown after the part name in explanation sentence shows its number in the construction figures.

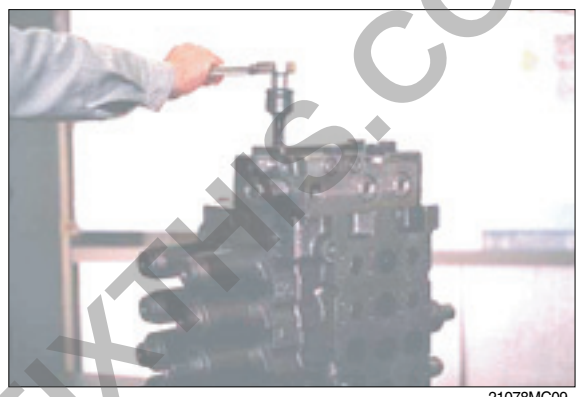
(1) Place control valve on working bench

※ Disassemble the valve in a clean and dry environment and pay careful attention not to damage the sealing flange faces.

(2) Travel straight valve block

Loosen hexagon socket head bolts to and remove straight travel valve block(103) in its assembled state.

· Hexagon wrench : 14㎜



21078MC09

(3) Main spool

① Loosen hexagon socket head bolts(273) and remove spring cover(201, 203).

· Hexagon wrench : 6㎜



21078MC10

② Remove spool, springs, stopper, spring seats and spacer bolt in spool assembly condition from casing.

※ When extracting each spool assembly from its casing, pay attention not to damage the casing.

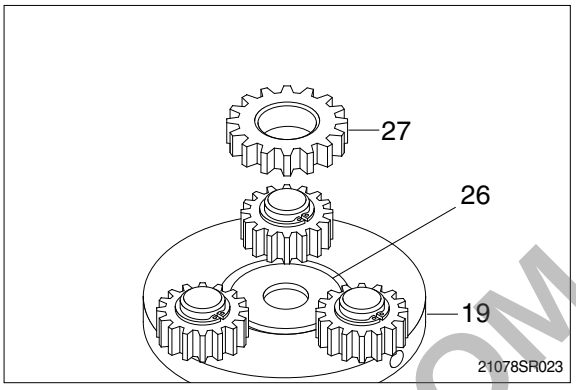


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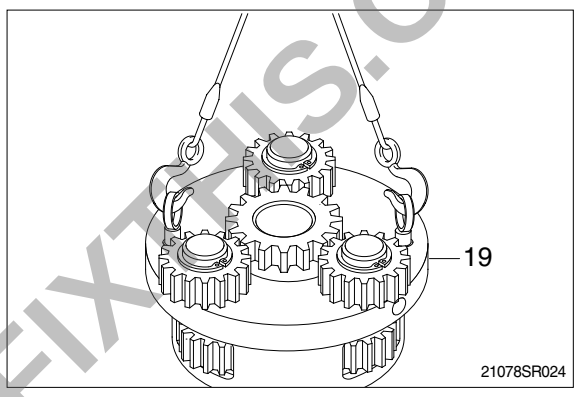
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(8) Install sun gear1(27) onto the side plate3 (26).



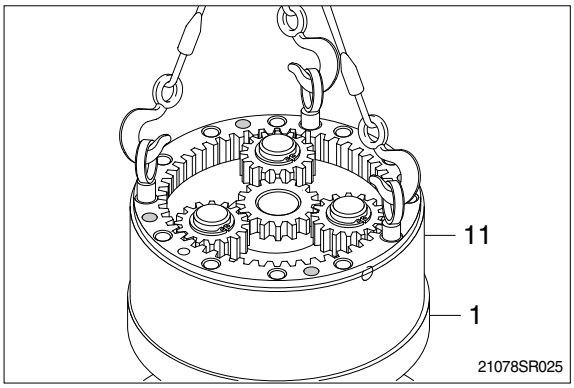
(9) Assemble carrier1(19) assembly onto the carrier2 assembly.



(10) Apply loctite to the tapped holes of casing (1).

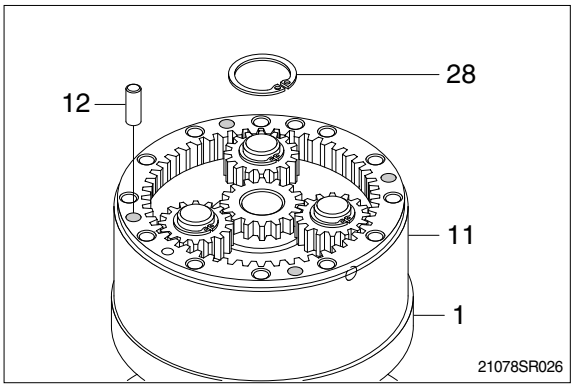
(11) Tighten 3 M16 eye bolts to the ring gear(11) and lift up and then assemble it onto the casing(1).

※ Don't fail to coincide the knock pin(12) holes.



(12) Hammer 4 knock pins(12) around the ring gear(11).

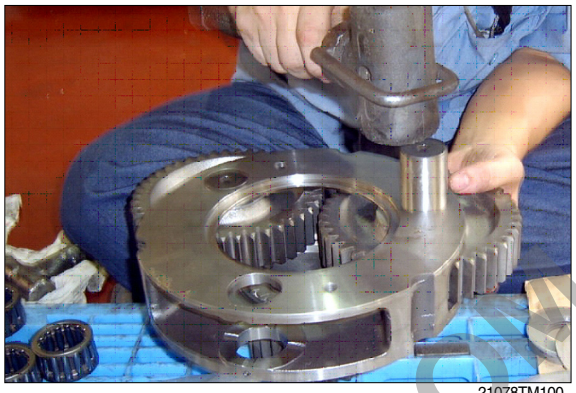
(13) Assemble stop ring(28) to the drive shaft of the swing motor.



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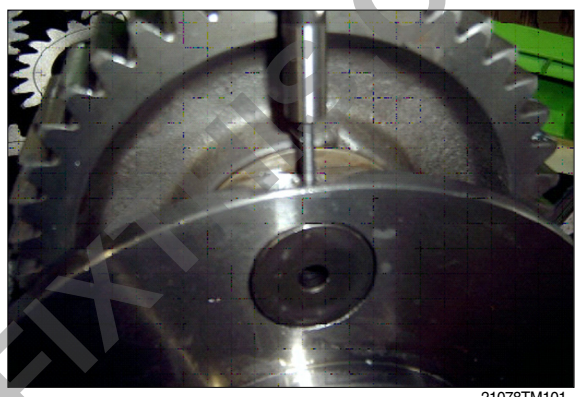
(3) Install No.1 pin(91-5) into No.1 carrier where the holes for No.1 pin(91-5) are to be in line with those of No.1 carrier, and then, install spring pins into the holes.



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(4) Caulk carrier holes as shown on the picture.

(5) Assembly ring thrust(90-7) into carrier.

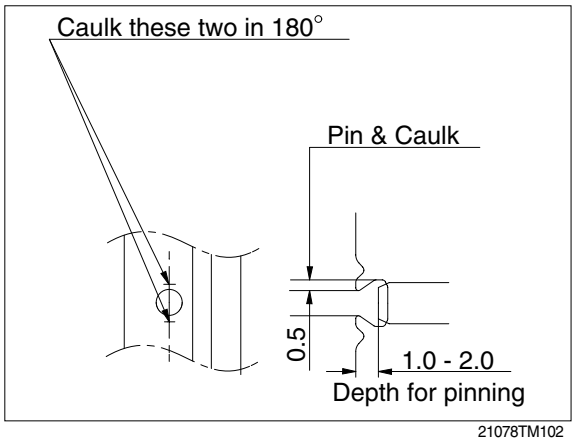


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2) Assembling No.2 carrier

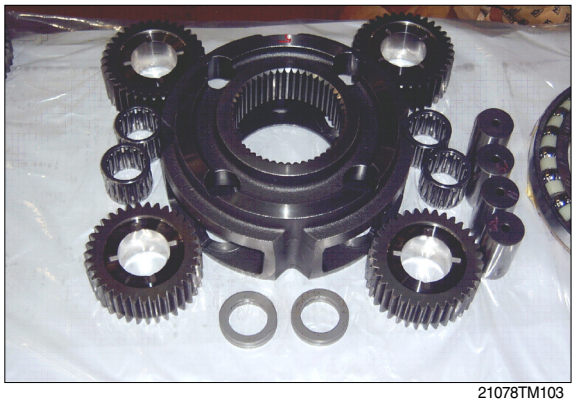
(1) Put No.2 carrier(90-1) on a flat place.

(2) Install No.2 needle bearing(90-3) into No.2 planetary gear(90-2), put 2EA of No.2 thrust washer(90-4) on both sides of bearing, and then, install it into carrier.



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(3) Install No.2 pin(90-5) into No.2 carrier where the holes for No.2 pin(90-5) are to be in line with those of No.2 carrier, and then, install spring pins into the holes.



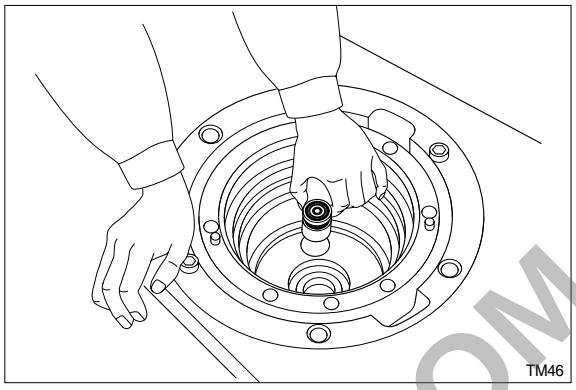
21078TM103

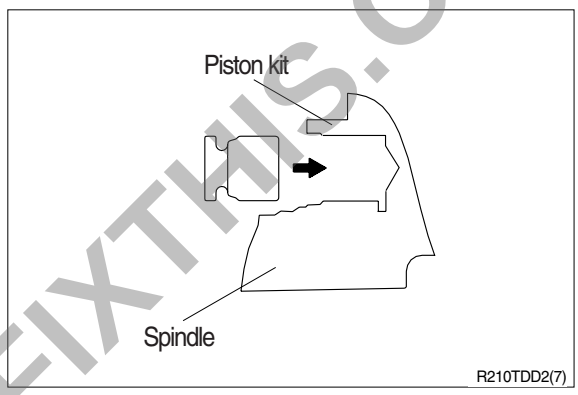
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(8) Assembly of the piston assembly (161, 162)

① Mount the piston assembly(161, 162) in the piston hole of the spindle(2).



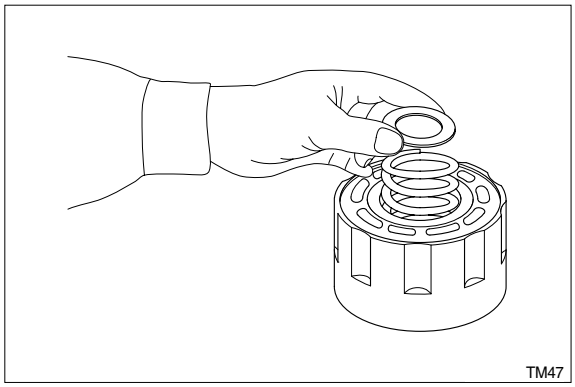


(9) Assembly of the pivot(167)

① Mount the two parallel pin(168) and two pivot(167) in the pivot hole of the spindle(2).

(10) Assembly of cylinder block section

① Insert washer(110), spring(114), washer(110) and snap ring(145) in that order, into the shaft bore of cylinder block(104).



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GROUP 8 TURNING JOINT

1. REMOVAL AND INSTALL

1) REMOVAL

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

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

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

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

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(4) Disconnect all hoses.

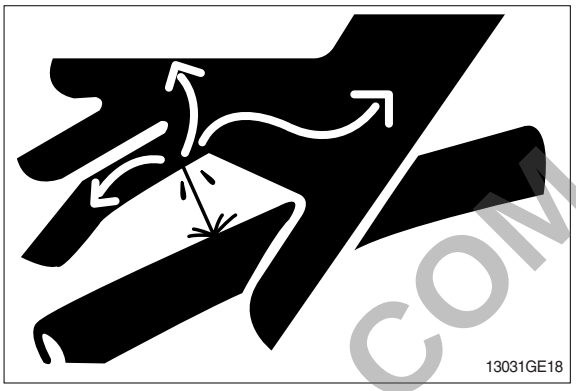
(5) Sling the turning joint assembly (1) and remove the mounting bolt(2).

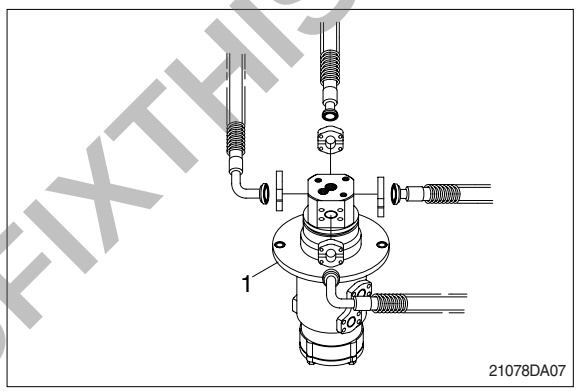
· Weight : 54kg(119lb)

· Tightening torque : 12.3± 1.3kgf · m
(88.9± 9.4lbf · ft)

(6) Remove the turning joint assembly.

※ When removing the turning joint, check that all the hoses have been disconnected.





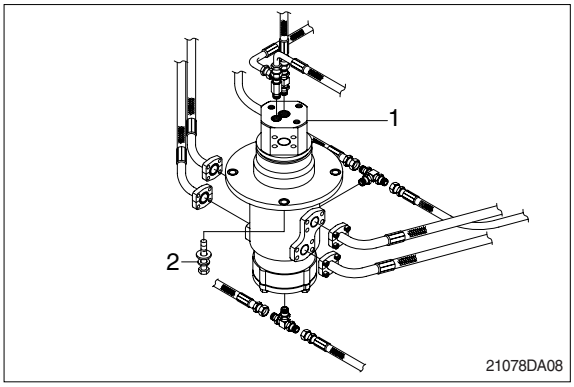
2) INSTALL

(1) Carry out installation in the reverse order to removal.

※ Take care of turning joint direction.

※ Assemble hoses to their original positions.

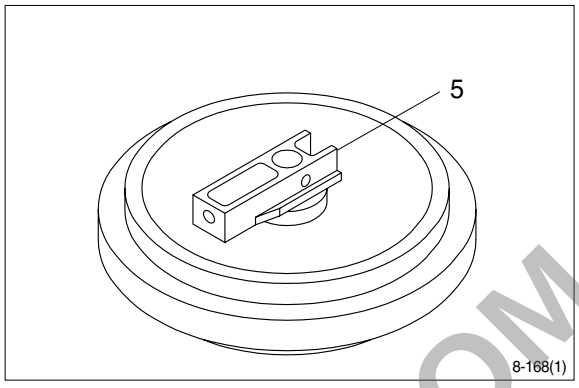
※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.



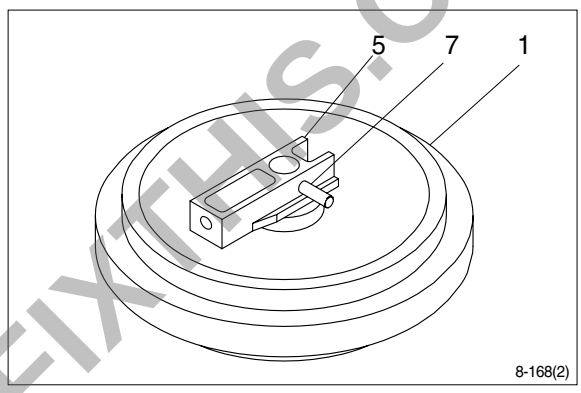
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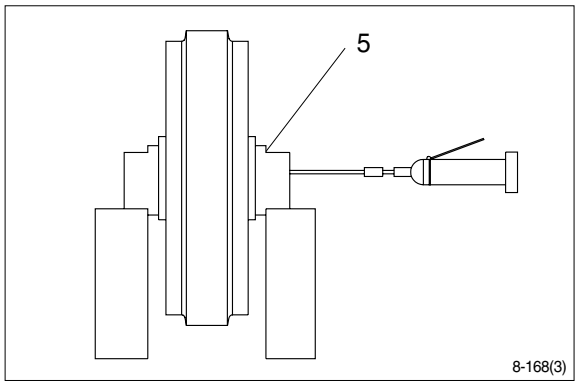
⑥ Install bracket(5) attached with seal(3).



⑦ Knock in the spring pin(7) with a hammer.



⑧ Lay bracket(5) on its side.
Supply engine oil to the specified level, and tighten plug.



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