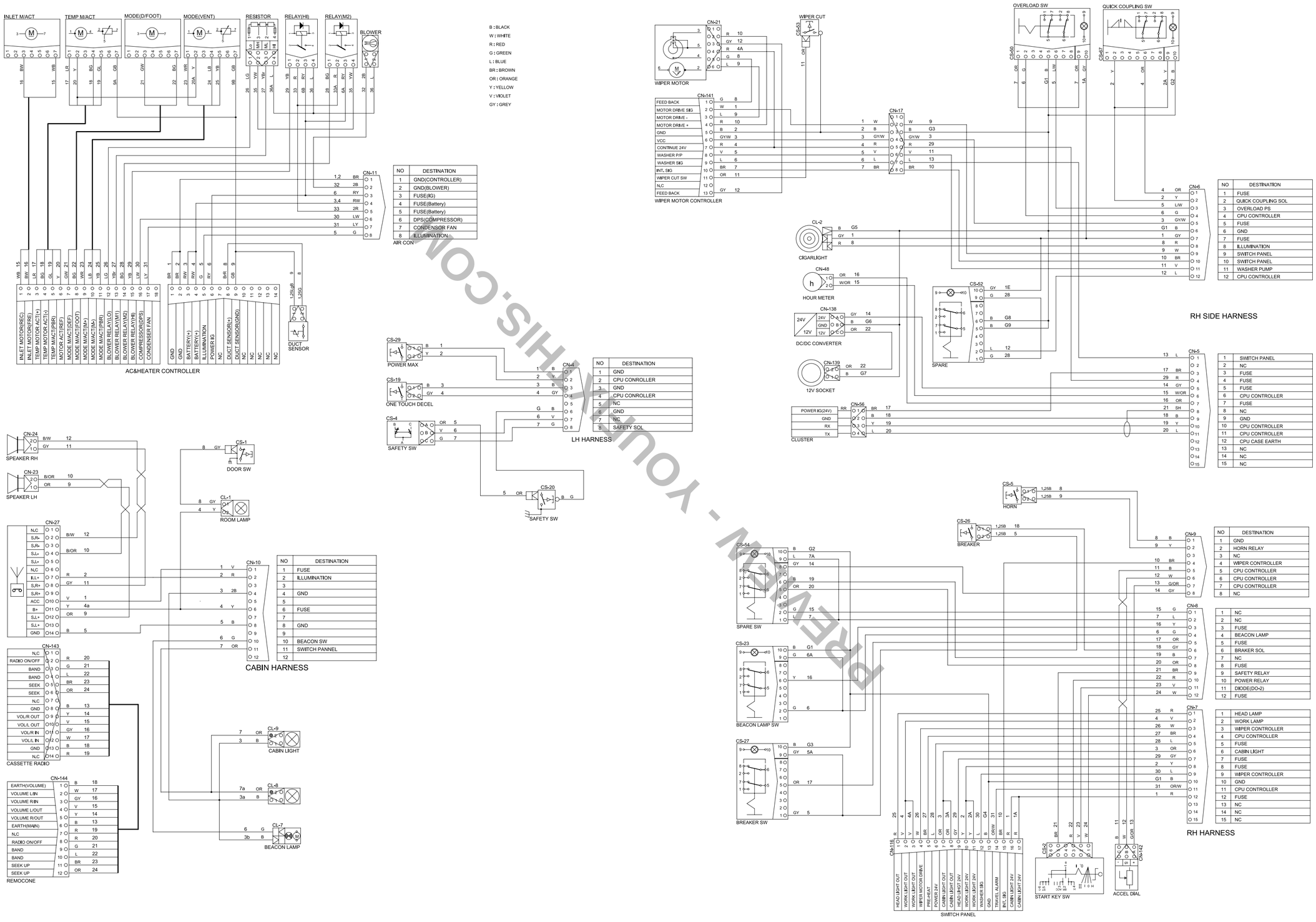
· ELECTRICAL CIRCUIT(1/2)

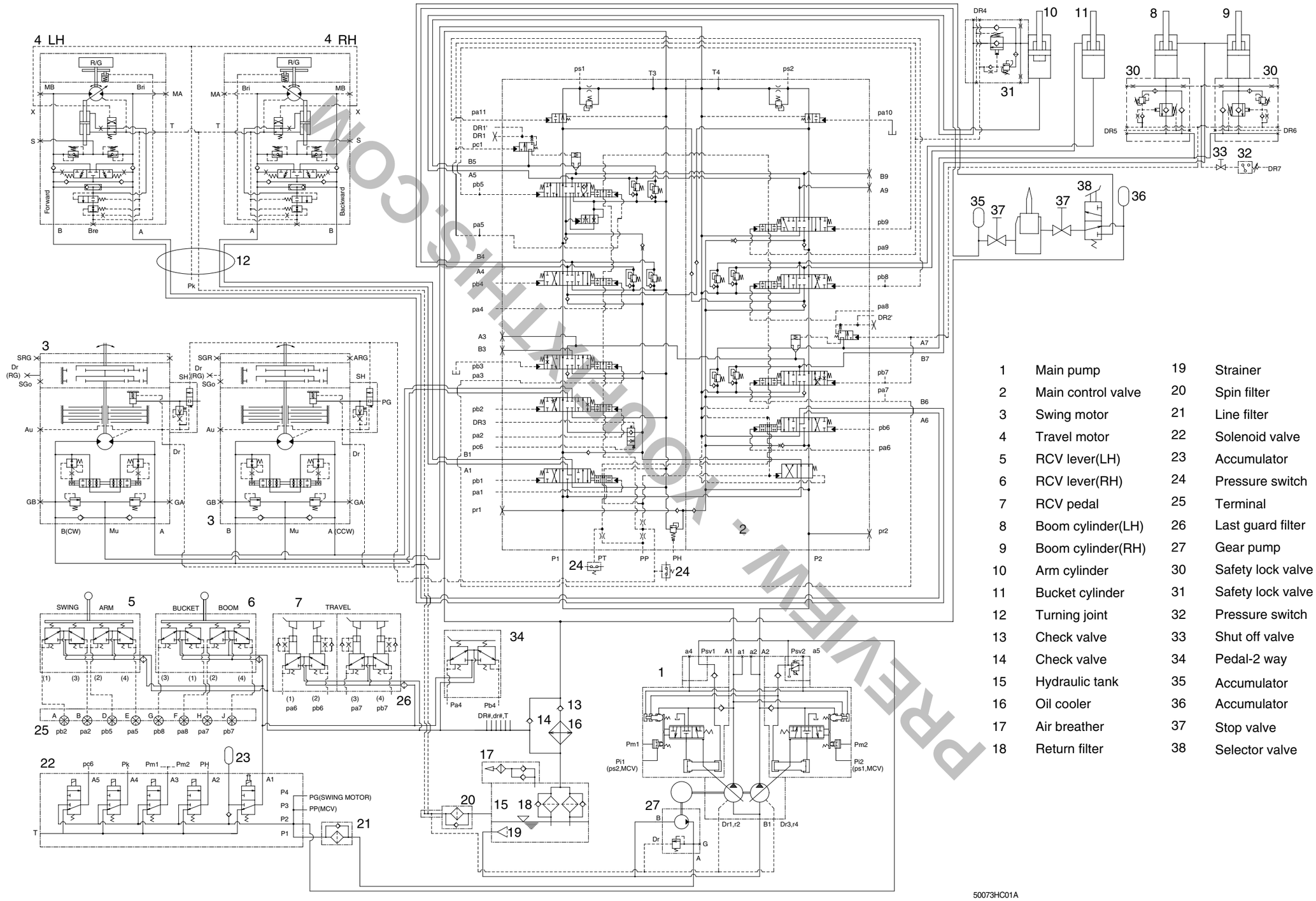


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GROUP 1 HYDRAULIC CIRCUIT



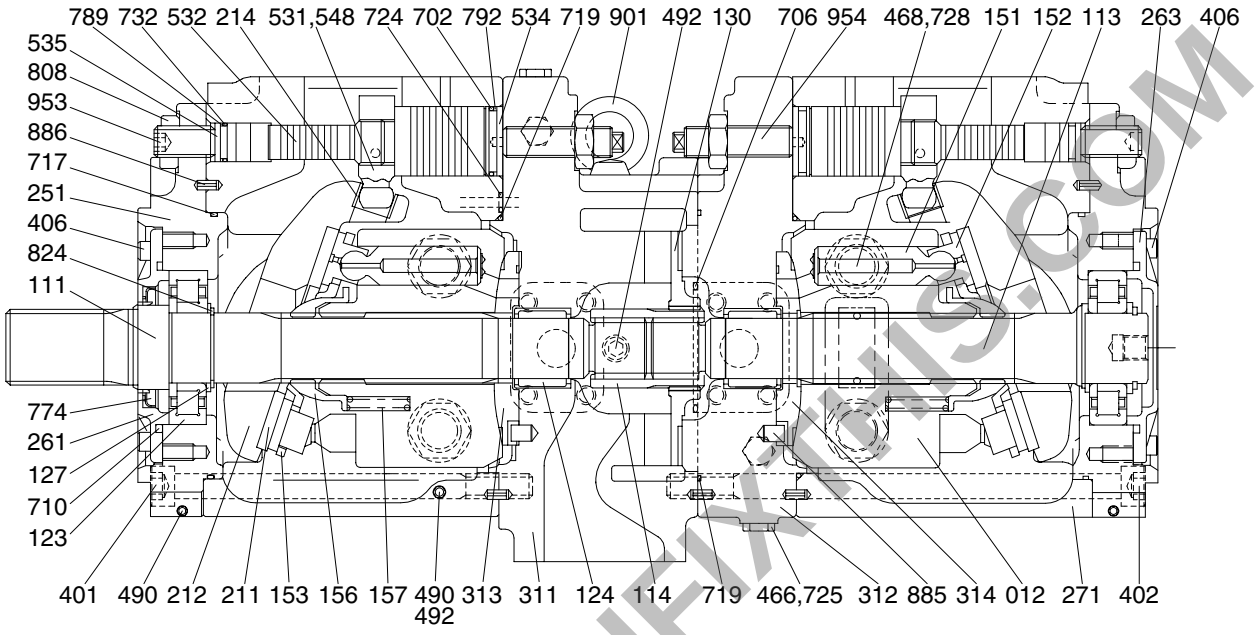
1	Main pump	19	Strainer
2	Main control valve	20	Spin filter
3	Swing motor	21	Line filter
4	Travel motor	22	Solenoid valve
5	RCV lever(LH)	23	Accumulator
6	RCV lever(RH)	24	Pressure switch
7	RCV pedal	25	Terminal
8	Boom cylinder(LH)	26	Last guard filter
9	Boom cylinder(RH)	27	Gear pump
10	Arm cylinder	30	Safety lock valve
11	Bucket cylinder	31	Safety lock valve
12	Turning joint	32	Pressure switch
13	Check valve	33	Shut off valve
14	Check valve	34	Pedal-2 way
15	Hydraulic tank	35	Accumulator
16	Oil cooler	36	Accumulator
17	Air breather	37	Stop valve
18	Return filter	38	Selector valve

50073HC01A

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1) MAIN PUMP(1/2)

The main pump consists of two piston pumps(front & rear) and valve block.



470072MP02

012	Cylinder block	271	Pump casing	710	O-ring
111	Drive shaft(F)	311	Valve cover(F)	717	O-ring
113	Driven shaft(R)	312	Valve cover(R)	719	O-ring
114	Coupling	313	Valve plate(R)	724	O-ring
123	Roller bearing	314	Valve plate(L)	725	O-ring
124	Needle bearing	401	Hexagon socket bolt	728	O-ring
127	Spacer	402	Hexagon socket bolt	732	O-ring
130	Booster	406	Hexagon socket bolt	774	Oil seal
151	Piston	466	VP Plug	789	Back up ring
152	Shoe	468	VP Plug	792	Back up ring
153	Plate	490	VP Plug	808	Hexagon head nut
156	Bushing	492	VP Plug	824	Snap ring
157	Cylinder spring	531	Tilting pin	885	Pin
211	Shoe plate	532	Servo piston	886	Spring pin
212	Swash plate	534	Stopper(L)	901	Eye bolt
214	Bushing	535	Stopper(S)	953	Set screw
251	Support plate	548	Feed back pin	954	Set screw
261	Seal cover(F)	702	O-ring		
263	Seal cover(R)	706	O-ring		

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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	M20 × 2.5	46.4 ± 4.6	336 ± 33
2		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
3		Coupling mounting socket bolt	M10 × 1.5	4.6 ± 1.0	33 ± 7.9
4		Main pump housing mounting bolt	M10 × 1.5	4.6 ± 1.0	33 ± 7.9
5	Hydraulic system	Main pump mounting bolt	M20 × 2.5	4.4 ± 0.6	318 ± 47.7
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 ± 36.8
8		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.8
9		Turning joint mounting bolt, nut	M16 × 2.5	29.7 ± 4.5	215 ± 32.5
10	Power train system	Swing motor mounting bolt	M20 × 2.5	58.4 ± 6.4	422 ± 46.2
11		Swing bearing upper part mounting bolt	M24 × 3.0	94.5 ± 10.5	683 ± 75.9
12		Swing bearing lower part mounting bolt	M24 × 3.0	94.5 ± 10.5	683 ± 75.9
13		Travel motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
14		Sprocket mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 1.5	31.3 ± 4.7	226 ± 33.9
16		Track roller mounting bolt	M22 × 2.5	83.2 ± 12.5	601 ± 90.4
17		Track tension cylinder mounting bolt	M16 × 2.0	76 ± 8	550 ± 58
18		Track shoe mounting bolt, nut (-#0041)	M22 × 1.5	105 ± 5.0	760 ± 36
19		Track shoe mounting bolt, nut (#0042-)	M24 × 1.5	140 ± 5.0	1012 ± 36
20	Others	Counterweight mounting bolt	M42 × 3.0	390 ± 40	2821 ± 289
21		Center frame support & lower track mounting bolt	M33 × 3.5	220 ± 20	1591 ± 145
22		Cab mounting bolt	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
23		Operator's seat mounting bolt	M 8 × 1.25	2.5 ± 0.5	18.1 ± 3.6

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

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5. 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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3) DISASSEMBLY

(1) Select place suitable to disassembling.

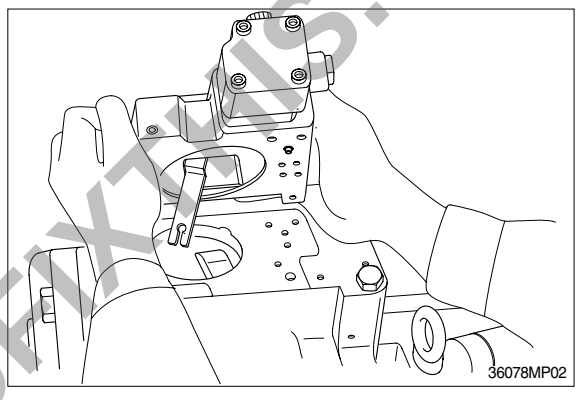
※ Select clean place.

※ Spread rubber sheet, cloth or so on on overhaul workbench top to prevent parts from being damaged.

(2) Remove dust, rust, etc, from pump surfaces with cleaning oil or so on.

(3) Remove drain port plug(468) and let oil out of pump casing(Front and rear pump).

(4) Remove hexagon socket head bolts(412, 413) and remove regulator.



(5) Loosen hexagon socket head bolts(401) which tighten swash plate support(251), pump casing(271) and valve cover(F, 311).

※ If gear pump and so on are fitted to rear face of pump, remove them before starting this work.

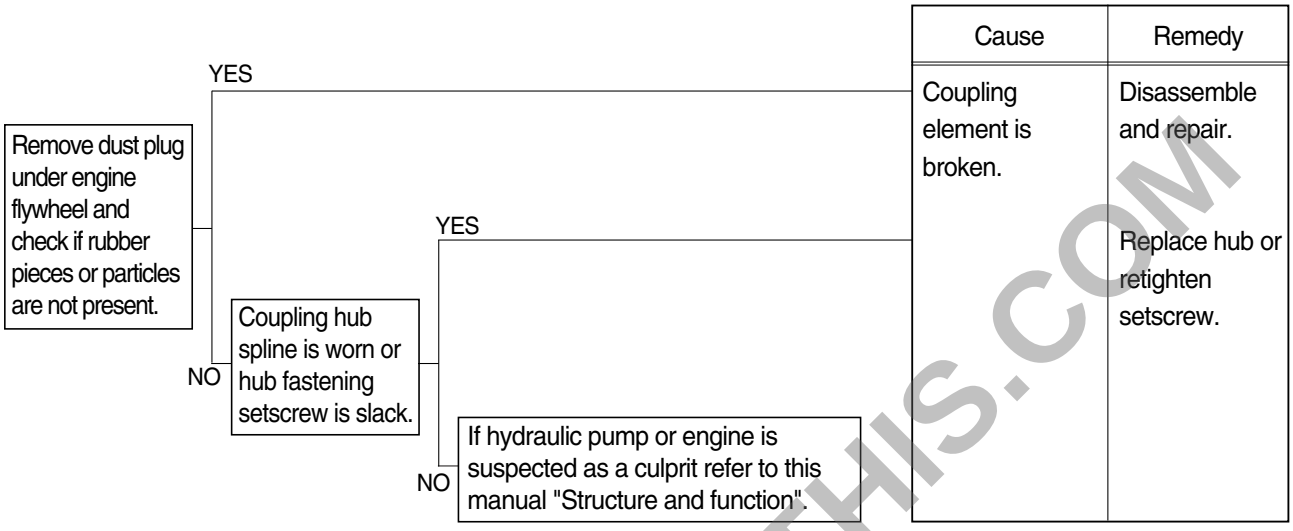
(6) Loosen hexagon socket head bolts(402) which tighten swash plate support(251), pump casing(271) and valve cover(R, 312).

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2. DRIVE SYSTEM

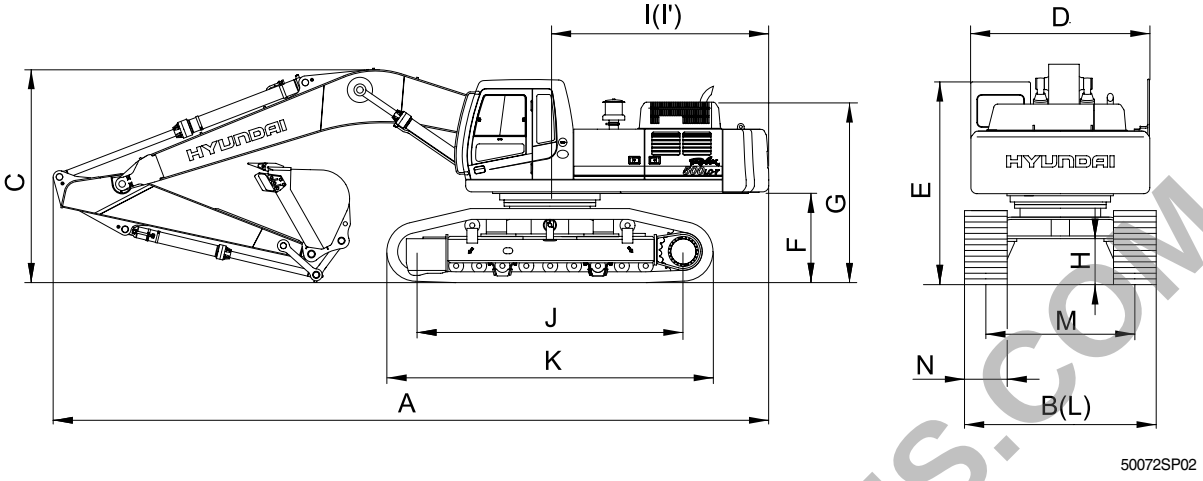
1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



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2. SPECIFICATIONS



Description		Unit	Specification
Operating weight		kg(lb)	48800(107580)
Bucket capacity(SAE heaped), standard		$m^3(yd^3)$	2.15(2.81)
Overall length	A	mm(ft-in)	11980(39' 4")
Overall width, with 600mm shoe (Transport position/Working position)	B		2990/3540(9'10"/11'7")
Overall height	C		3670(12' 0")
Superstructure width	D		2980(9' 9")
Overall height of cab	E		3390(11' 1")
Ground clearance of counterweight	F		1500(4'11")
Engine cover height	G		3015(9'11")
Minimum ground clearance	H		770(2' 6")
Rear-end distance	I		3665(12' 0")
Rear-end swing radius	I'		3720(12' 2")
Distance between tumblers	J		4470(14' 8")
Undercarriage length	K		5460(17'11")
Undercarriage width (Transport position/Working position)	L		2990/3540(9'10"/11' 7")
Track gauge (Transport position/Working position)	M		2380/2940(7'10"/ 9' 8')
Track shoe width, standard	N		600(24")
Travel speed(Low/high)		km/hr(mph)	3.3/5.2(2.0/3.2)
Swing speed		rpm	10.0
Gradeability		Degree(%)	35(70)
Ground pressure(600mm shoe)		$kgf/cm^2(psi)$	0.86(12.2)

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Millimeters to inches

1mm = 0.03937in

	0	1	2	3	4	5	6	7	8	9
0		0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to Pound

1kg = 2.2046lb

	0	1	2	3	4	5	6	7	8	9
0		2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.5.	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

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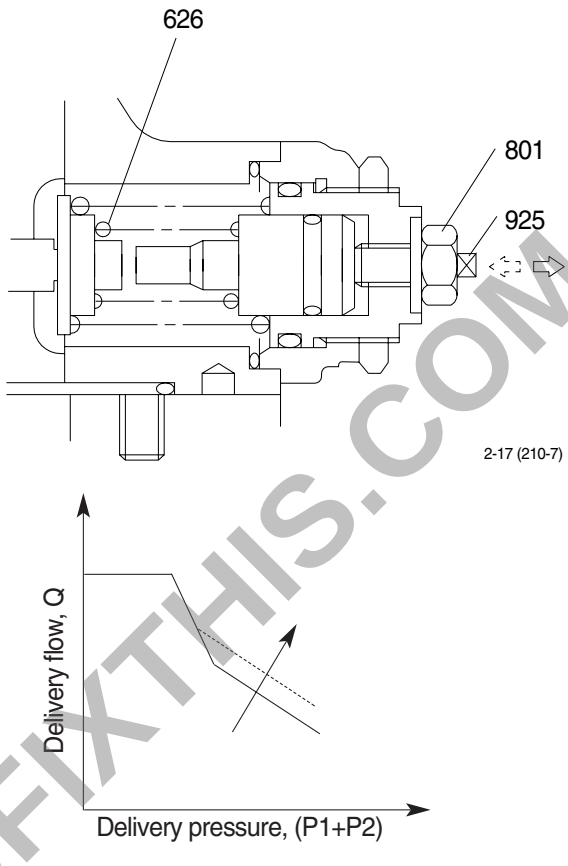
b. Adjustment of inner spring

Adjust it by loosening the hexagon nut (801) and by tightening(or loosening) the adjusting screw QI(925).

Tightening the screw increases the flow and then the input horsepower as shown in the figure.

※ Adjusting valves are shown in table.

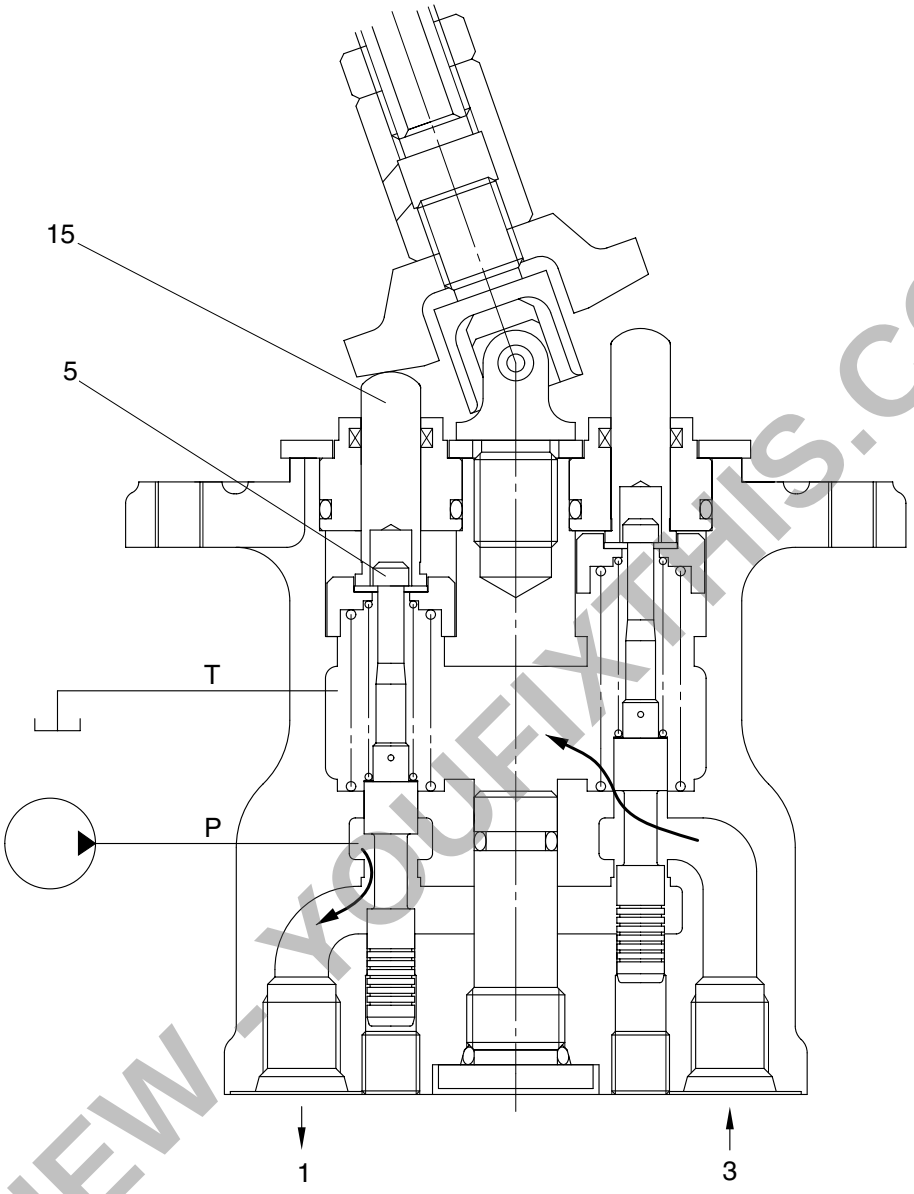
Speed	Adjustment of inner spring		
	Tightening amount of adjusting screw(QI) (925)	Flow change amount	Input torque change amount
(min $^{-1}$)	(Turn)	(lpm)	(kgf · m)
1900	+1/4	+16.4	+8.6



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(2) Case where handle is tilted

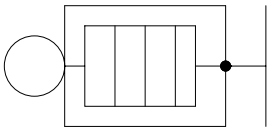
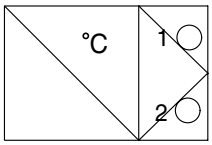
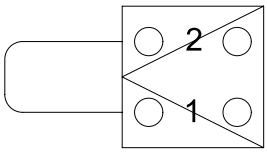
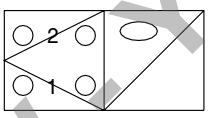
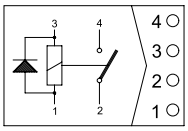
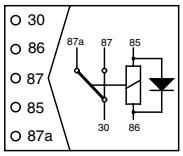


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When the push rod(14) is stroked, the spool(5) moves downwards.
Then port P is connected with port(1) and the oil supplied from the pilot pump flows through port(1) to generate the pressure.
When the pressure at port(1) increases to the value corresponding to the spring force set by tilting the handle, the hydraulic pressure force balances with the spring force. If the pressure at port(1) increases higher than the set pressure, port P is disconnected from port(1) and port T is connected with port(1). If it decreases lower than the set pressure, port P is connected with port(1) and port T is disconnected from port 1.
In this manner the secondary pressure is kept at the constant value.
Besides, in some type, when the handle is tilted more than a certain angle, the upper end of the spool contacts with the inside bottom of the push rod and the output pressure is left to be connected with port P.

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Part name	Symbol	Specifications	Check
Glow plug	 CN-80	24V 200A	※ Check resistance 0.25 ~ 0.12 Ω
Temperature sensor (Hydraulic)	 CD-1	-	※ 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
Fuel filter relay	 CR-46	24V 20A	※ Check resistance Normal : About 200 Ω (For terminal 1-3) 0 Ω (For terminal 2-4)
Relay	 CR-2 CR-5 CR-7 CR-35 CR-36	24V 16A	※ Check resistance Normal : About 160 Ω (For terminal 85-86) 0 Ω (For terminal 30-87a) ∞ Ω (For terminal 30-87)

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2) CLUSTER CHECK PROCEDURE

(1) Start key : ON

① Check monitor initial 5 seconds

a. All lamps light up.
b. Buzzer sound.

② Check monitor after 5 seconds : Indicate cluster version and machine condition

a. Cluster program version : CL : 2.0 ← Indicates program version 2.0 for 2 seconds.
b. Tachometer : 0rpm
c. Fuel gauge : All light up below appropriate level
d. Hydraulic temperature : All light up below appropriate level
e. Engine coolant temperature gauge : All light up below appropriate level
f. Warning lamp
※ During start key **ON** the engine oil pressure lamp and battery charging lamp go on, but it is not abnormal.
※ When engine coolant temperature below 30°C, the warming up lamp lights up.

③ Indicating lamp state

a. Work mode selection : General work
b. Power mode selection : S mode
c. User mode selection : No LED ON
d. Auto decel LED : ON
e. Travel speed pilot lamp : Low(Turtle)

(2) Start of engine

① Check machine condition

a. Tachometer indicates at present rpm
b. Gauge and warning lamp : Indicate at present condition.
※ When normal condition : All warning lamp OFF
c. Work mode selection : General work
d. Power mode selection : S mode
e. User mode selection : No LED ON
f. Auto decel LED : ON
g. Travel speed pilot lamp : Low(Turtle)

② When warming up operation

a. Warming up lamp : ON
b. 10 seconds after engine started, engine speed increases to1000 rpm(Auto decel LED : ON)
※ Others same as above ①.

③ When abnormal condition

a. The lamp lights up and the buzzer sounds.
b. If **BUZZER STOP** switch is pressed, buzzer sound is canceled but the lamp light up until normal condition.

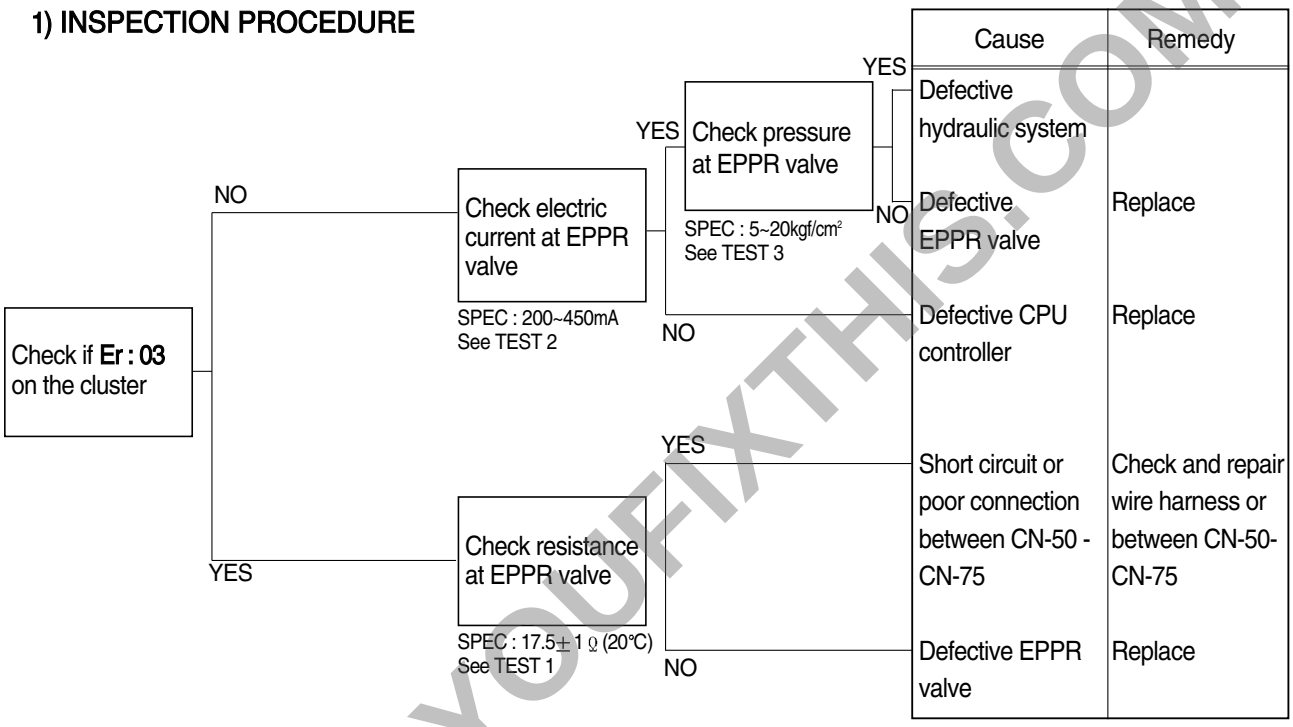
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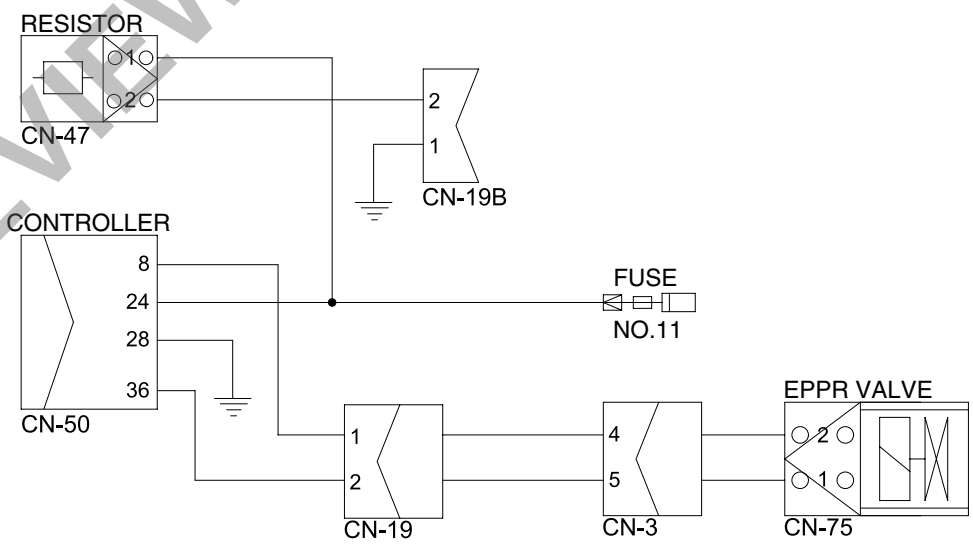
1. ALL ACTUATORS SPEED ARE SLOW

※ Boom, Arm, Bucket, Swing and travel speed are slow, but engine speed is good.
※ Spec : M-mode 1950±50rpm H-mode 1850±50rpm S-mode 1750±50rpm
※ Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE



Wiring diagram



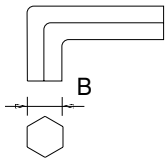
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2) TOOLS AND TIGHTENING TORQUE

(1) Tools

The tools necessary to disassemble/reassemble the pump are shown in the follow list.

<table>
<tr><th colspan="2">Tool name & size</th><th colspan="4">Part name</th></tr>
<tr><td rowspan="6">Allen wrench

</td><td>B</td><td>Hexagon socket head bolt</td><td>PT plug (PT thread)</td><td>PO plug (PF thread)</td><td>Hexagon socket head setscrew</td></tr>
<tr><td>4</td><td>M 5</td><td>BP-1/16</td><td>-</td><td>M 8</td></tr>
<tr><td>5</td><td>M 6</td><td>BP1/ 8</td><td>-</td><td>M10</td></tr>
<tr><td>6</td><td>M 8</td><td>BP-1/ 4</td><td>PO-1/4</td><td>M12, M14</td></tr>
<tr><td>8</td><td>M10</td><td>BP-3/ 8</td><td>PO-3/8</td><td>M16, M18</td></tr>
<tr><td>17</td><td>M20, M22</td><td>BP-1</td><td>PO-1, 1 1/4, 1 1/2</td><td>-</td></tr>
<tr><td rowspan="6">Double ring spanner, socket wrench, double(Single) open end spanner

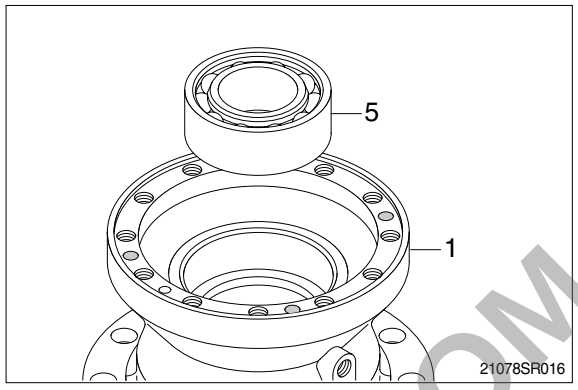
</td><td>-</td><td colspan="2">Hexagon head bolt</td><td colspan="2">Hexagon head bolt
VP plug (PF thread)</td></tr>
<tr><td>19</td><td colspan="2">M12</td><td colspan="2">M12
VP-1/4</td></tr>
<tr><td>24</td><td colspan="2">M16</td><td colspan="2">M16
-</td></tr>
<tr><td>27</td><td colspan="2">M18</td><td colspan="2">M18
VP-1/2</td></tr>
<tr><td>30</td><td colspan="2">M20</td><td colspan="2">M20
-</td></tr>
<tr><td>36</td><td colspan="2">-</td><td colspan="2">-
VP-3/4</td></tr>
<tr><td colspan="2">Adjustable angle wrench</td><td colspan="4">Medium size, 1 set</td></tr>
<tr><td colspan="2">Screw driver</td><td colspan="4">Minus type screw driver, Medium size, 2 sets</td></tr>
<tr><td colspan="2">Hammer</td><td colspan="4">Plastic hammer, 1 set</td></tr>
<tr><td colspan="2">Pliers</td><td colspan="4">For snap ring, TSR-160</td></tr>
<tr><td colspan="2">Steel bar</td><td colspan="4">Steel bar of key material approx. 10×8×200</td></tr>
<tr><td colspan="2">Torque wrench</td><td colspan="4">Capable of tightening with the specified torques</td></tr>
</table>

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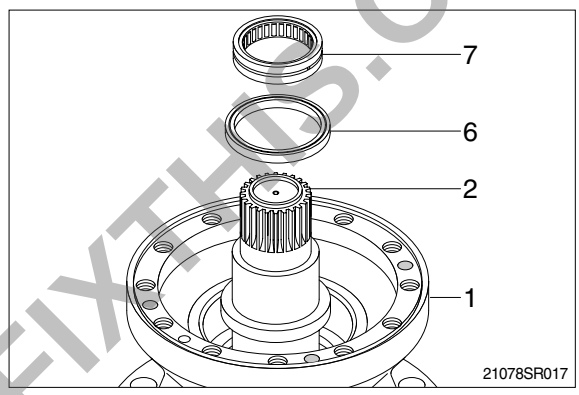
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3) ASSEMBLY

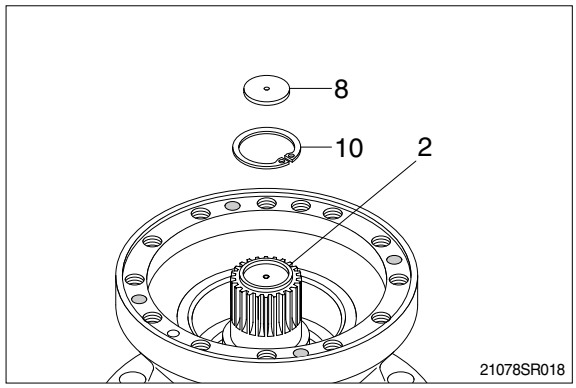
(1) Assemble roller bearing(5) inside the casing(1).



(2) Assemble the drive shaft(2) into the casing(1) and then install oil seal(6) and roller bearing(7).



(3) Install stop ring(10) and thrust plate 3(8) on top of drive shaft(2).



(4) Assembling carrier2(9) assembly.

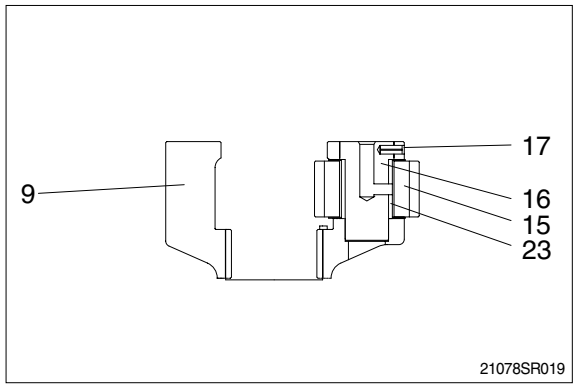
① Install thrust washer(14) inside the carrier2 (9).

② Install bush2(23) inside the planet gear2 (15) and then assemble them to the carrier2(9).

③ Assemble the pin2(16) to the carrier2(9) and then press the spring pin(17) by hammering.

④ Punch 2 points of the spring pin(17) lip.

※ Take care not to mistake the matching marks of each part.



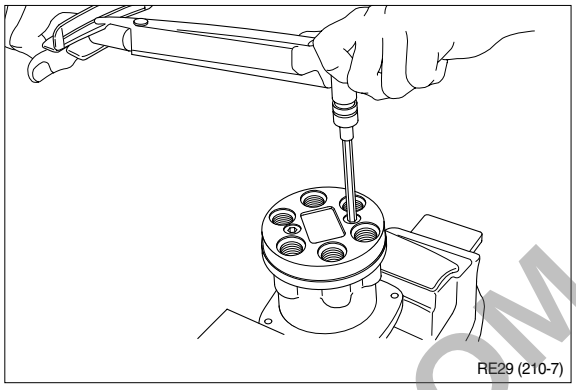
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4) ASSEMBLY

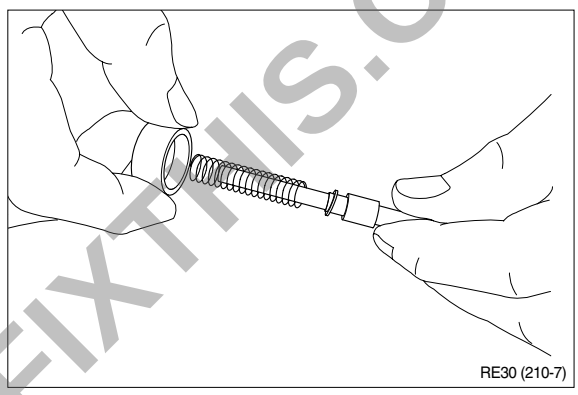
(1) Tighten hexagon socket head plug(2) to the specified torque.

※ Tighten two bolts alternately and slowly.



RE29 (210-7)

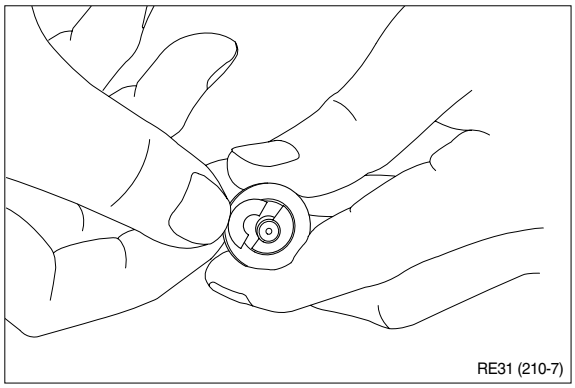
(2) Put shim(6), springs(7, 29) and spring seat(8, 30) onto spool(5) in this order.



RE30 (210-7)

(3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper(9) on spring seat without piling them on.

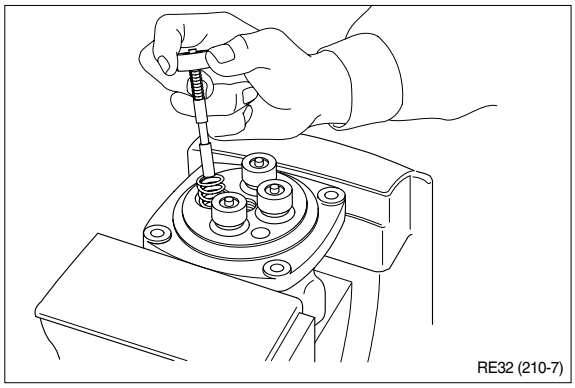
※ Assemble stopper(9) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6mm.



RE31 (210-7)

(4) Assemble spring(10) into casing.
Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.



RE32 (210-7)

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