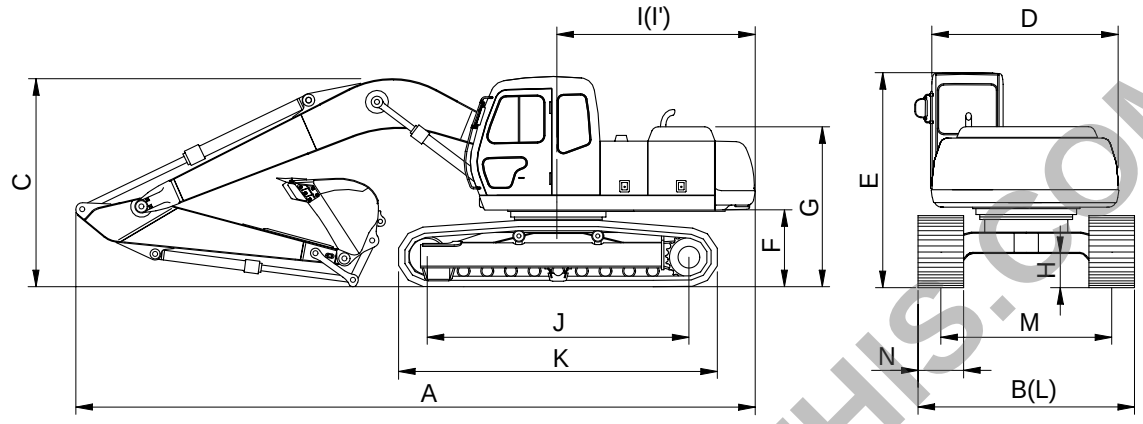
2. SPECIFICATION

1) ROBEX 250-3

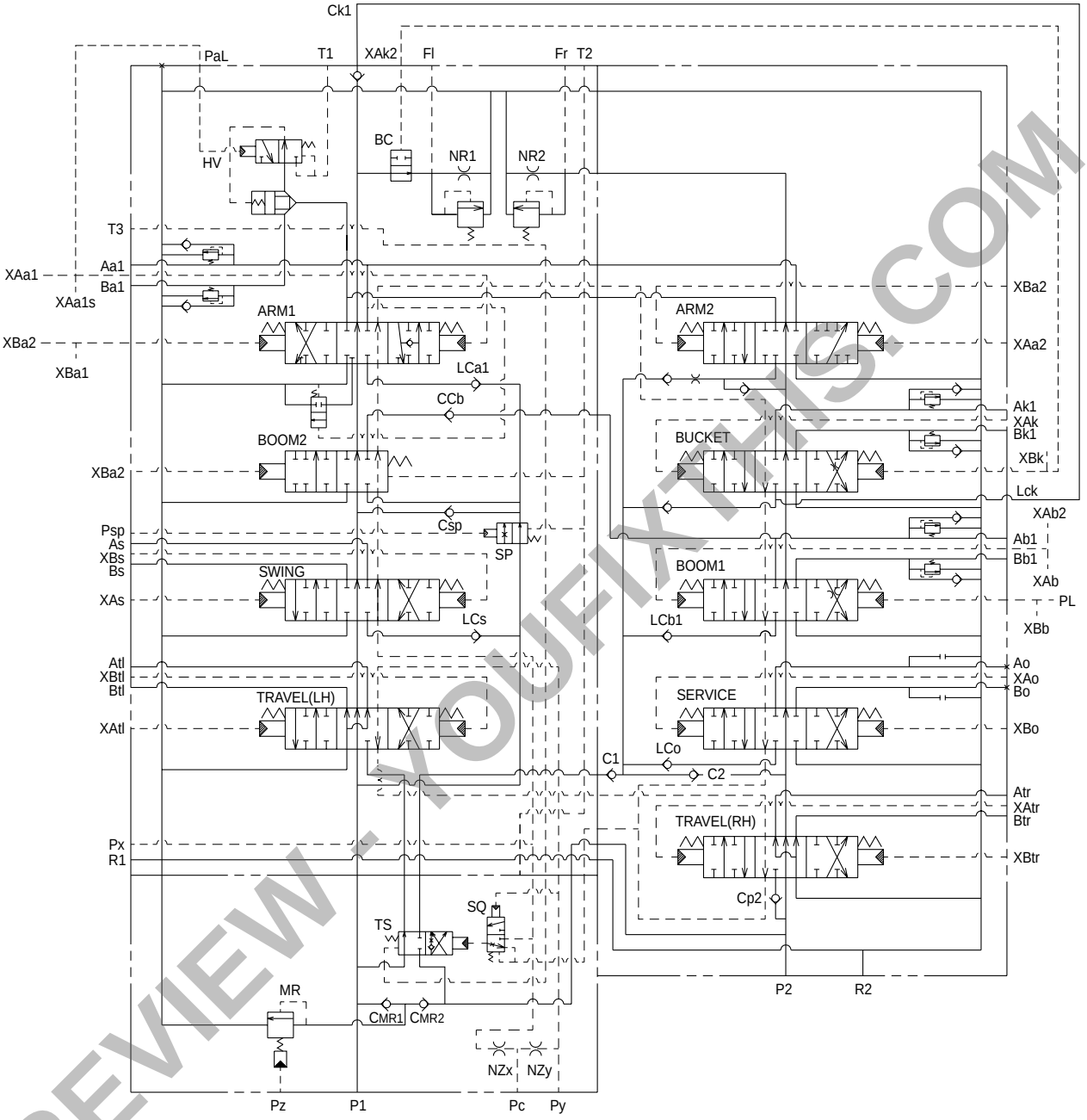


Description		Unit	Specification
Operating weight		kg(lb)	23600(52000)
Bucket capacity(PCSA heaped), standard		$m^3(yd^3)$	1.08(1.41)
Overall length	A	mm(ft-in)	9980(32' 9")
Overall width, with 600mm shoe	B		3180(10' 5")
Overall height	C		3180(10' 5")
Superstructure width	D		2840(9' 4")
Overall height of cab	E		2940(9' 8")
Ground clearance of counterweight	F		1070(3' 6")
Engine cover height	G		2290(7' 6")
Minimum ground clearance	H		470(1' 7")
Rear-end distance	I		2890(9' 6")
Rear-end swing radius	I'		2930(9' 7")
Distance between tumblers	J		3445(11' 4")
Undercarriage length	K		4250(13'11")
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)	3.4/5.3(2.1/3.3)
Swing speed		rpm	12.6
Gradeability		Degree(%)	35(70)
Ground pressure(600mm shoe)		$kg/cm^2(psi)$	0.53(7.54)

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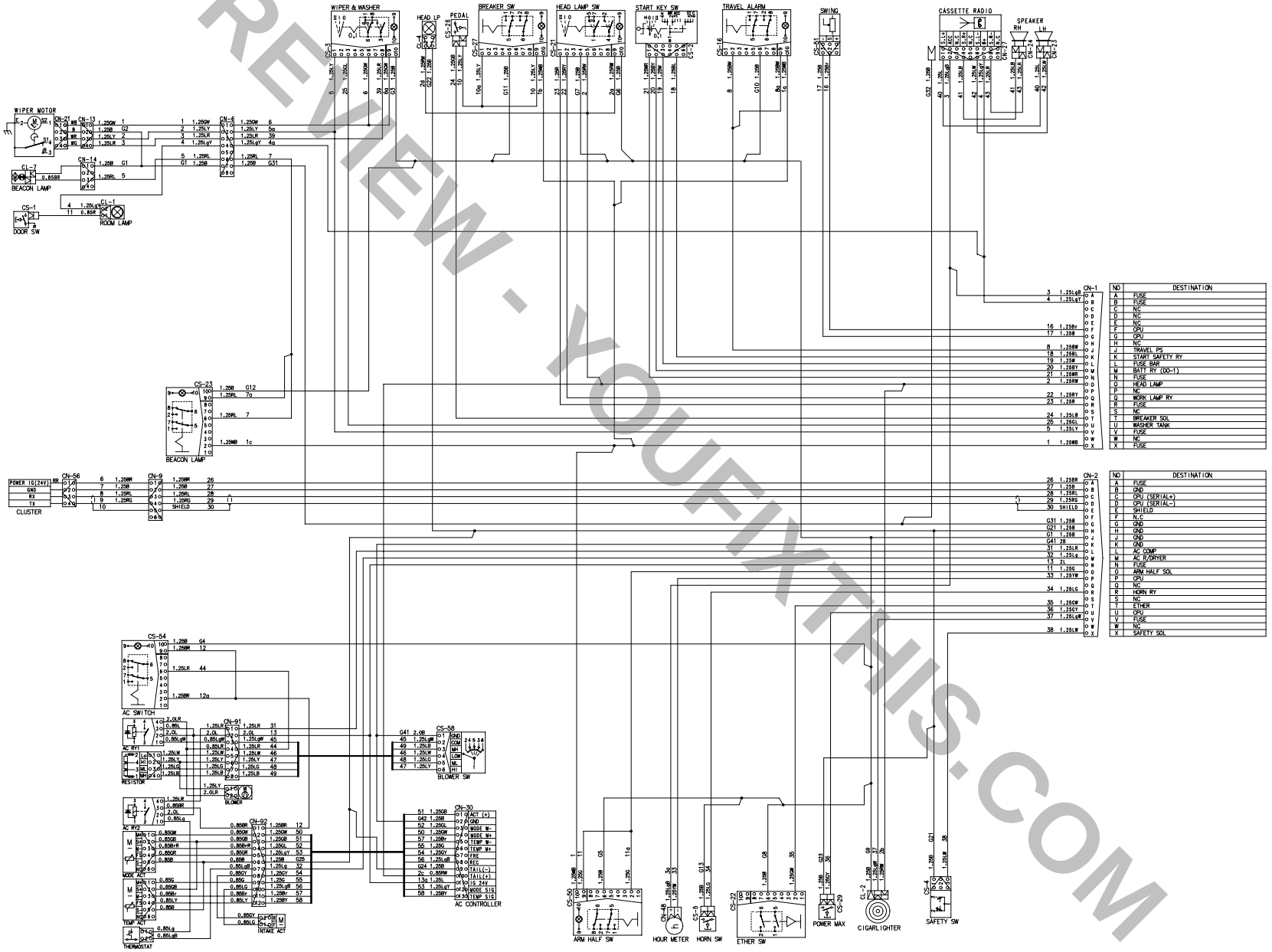
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2. HYDRAULIC CIRCUIT



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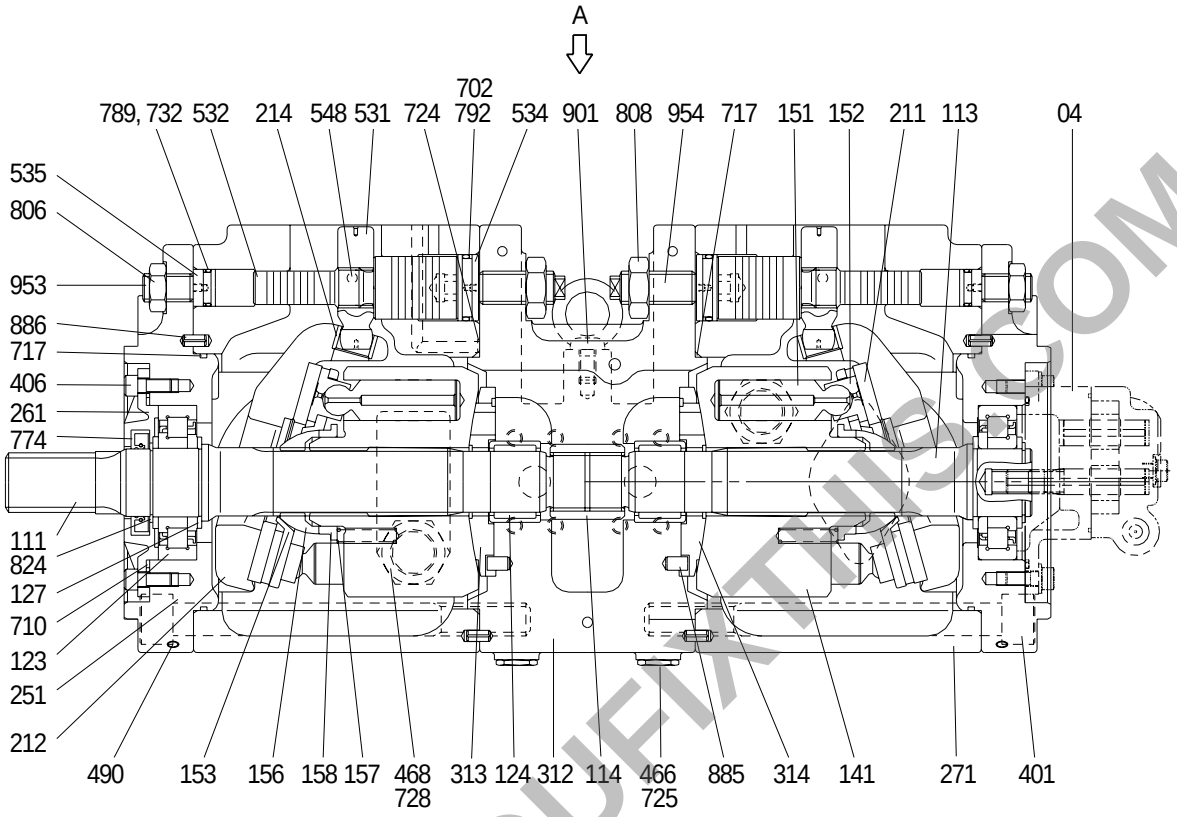


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1) MAIN PUMP(1/2)

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



04	Gear pump	251	Support	710	O-ring
111	Drive shaft(F)	261	Seal cover(F)	717	O-ring
113	Drive shaft(R)	271	Pump casing	724	O-ring
114	Spline coupling	312	Valve block	725	O-ring
123	Roller bearing	313	Valve plate(R)	728	O-ring
123	Needle bearing	314	Valve plate(L)	732	O-ring
127	Bearing spacer	401	Hexagon socket bolt	774	Oil seal
141	Cylinder block	406	Hexagon socket bolt	789	Back up ring
151	Piston	466	VP Plug	792	Back up ring
152	Shoe	468	VP Plug	806	Hexagon head nut
153	Set plate	490	Plug	808	Hexagon head nut
156	Bushing	531	Tilting pin	824	Snap ring
157	Cylinder spring	532	Servo piston	885	Pin
158	Spacer	534	Stopper(L)	886	Spring pin
211	Shoe plate	535	Stopper(S)	901	Eye bolt
212	Swash plate	548	Pin	953	Set screw
214	Bushing	702	O-ring	954	Set screw

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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 : 240 ℓ

(5) Remove bolts(11) and disconnect pipe (1, 2).

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

(7) Remove bolts(10) and disconnect pump suction tube (3).

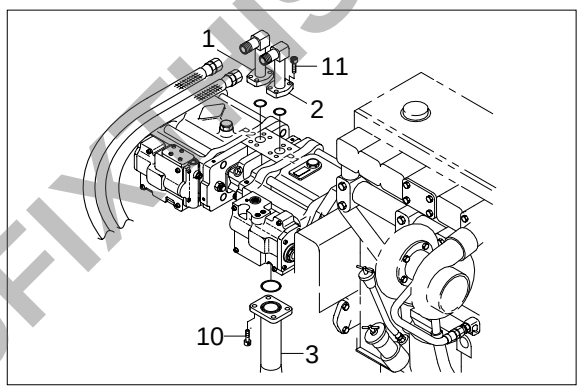
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

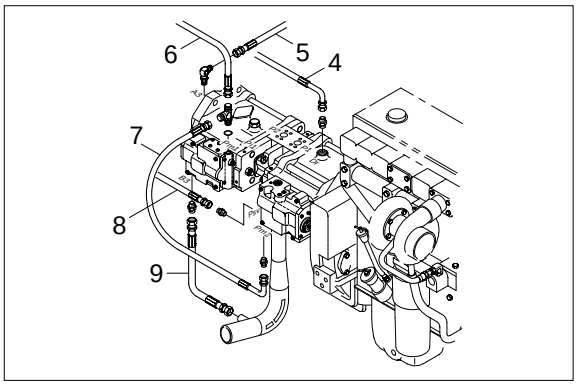
(8) Sling the pump assembly and remove the pump mounting bolts.

- Weight : 120㎏(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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SECTION 6 TROUBLESHOOTING

GROUP 1 HYDRAULIC AND MECHANICAL SYSTEM

1. INTRODUCTION

1) MACHINE IN GENERAL

(1) If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration.
Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring. Keep in mind that a fault results from a combination of different causes.

(2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the coming troubleshooting and repair.

(3) When carrying out troubleshooting, do not hurry to disassemble the components.
It will become impossible to find the cause of the problem.

(4) Ask user or operator the following.
① Was there any strange thing about machine before failure occurred?
② Under what conditions did the failure occur?
③ Have any repairs been carried out before the failure?

(5) Check before troubleshooting.
① Check oil and fuel level.
② Check for any external leakage of oil from components.
③ Check for loose or damage of wiring and connections.

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5. ERROR CODES TABLE

Display		Problems
Current error	Recorded error	
Err : 00	TIME Err : 00	No problem
Err : 01	TIME Err : 01	Short circuit in governor motor 2 lines
Err : 02	TIME Err : 02	Potentiometer is shorted to Vcc(5V) or battery(+)
Err : 03	TIME Err : 03	Short circuit in pump EPPR valve 2 lines
Err : 04	TIME Err : 04	Short circuit in swing EPPR valve 2 lines
Err : 05	TIME Err : 05	Short circuit in travel solenoid 2 lines
Err : 06	TIME Err : 06	Short circuit in power max solenoid 2 lines
Err : 07	TIME Err : 07	Short circuit in max flow solenoid 2 lines
Err : 08	TIME Err : 08	Short circuit in cut off cancel solenoid 2 lines
Err : 09	TIME Err : 09	Short circuit in swing lock solenoid 2 lines
Err : 10	TIME Err : 10	Short circuit in hourmeter 2 lines
Err : 12	TIME Err : 12	P1 pressure sensor is shorted to battery(+)
Err : 13	TIME Err : 13	P2 pressure sensor is shorted to battery(+)
Err : 14	TIME Err : 14	P3 pressure sensor is shorted to battery(+)
Err : 16	TIME Err : 16	Governor motor circuit is open or shorted to ground
Err : 17	TIME Err : 17	Potentiometer circuit is open or shorted to ground
Err : 18	TIME Err : 18	Pump EPPR valve circuit is open or shorted to ground
Err : 19	TIME Err : 19	Swing EPPR valve circuit is open or shorted to ground
Err : 20	TIME Err : 20	Travel solenoid circuit is open or shorted to ground
Err : 21	TIME Err : 21	Power max solenoid circuit is open or shorted to ground
Err : 22	TIME Err : 22	Max flow solenoid circuit is open or shorted to ground
Err : 23	TIME Err : 23	Cut off cancel solenoid circuit is open or shorted to ground
Err : 24	TIME Err : 24	Swing lock solenoid circuit is open or shorted to ground
Err : 25	TIME Err : 25	Hourmeter circuit is open or shorted to ground
Err : 26	TIME Err : 26	Swing speed dial circuit is open or shorted to ground
Err : 27	TIME Err : 27	P1 pressure sensor circuit is open or shorted to ground
Err : 28	TIME Err : 28	P2 pressure sensor circuit is open or shorted to ground
Err : 29	TIME Err : 29	P3 pressure sensor circuit is open or shorted to ground
Err : 32	TIME Err : 32	Battery power input circuit is open
Err : 33	TIME Err : 33	No alternator voltage input
Err : 34	TIME Err : 34	Controller input voltage is less than 18V
Err : 35	TIME Err : 35	Controller input voltage is greater than 38V
-	TIME Err : 36	Error in data receiving from cluster
Err : 37	TIME Err : 37	Engine speed sensor circuit is open or shorted to ground or sensor signal is less than 1V
Err : 38	TIME Err : 38	Anti-restart relay circuit is open or shorted to ground
Err : 39	TIME Err : 39	Governor motor does not stop at a target position
Err : 40	TIME Err : 40	There is more than 500rpm difference between target speed and actual speed
Err : 41	TIME Err : 41	Hydraulic oil temperature sensor circuit is shorted to ground
Err : 42	TIME Err : 42	Fuel level sensor circuit is shorted to ground
Err : 43	TIME Err : 43	Coolant temperature sensor circuit is shorted to ground
Err : 45	TIME Err : 45	Hydraulic oil temperature sensor circuit is open or shorted to battery(+)
Err : 46	TIME Err : 46	Fuel level sensor circuit is open or shorted to battery(+)
Err : 47	TIME Err : 47	Coolant temperature sensor circuit is open or shorted to battery(+)

※ Every machine may not have all of the above error codes. For example, machines not equipped pressure sensors will not have the error codes 12, 13, 14, 27, 28, 29.

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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	M22 × 2.5	48 ± 2.0	347 ± 14.4
2		Radiator mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
3		Coupling mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 33
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	44 ± 6.6	318 ± 48
6		Main control valve mounting nut	M12 × 1.75	10 ± 1.5	72.3 ± 10.8
7		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 37
8		Hydraulic oil tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 37
9		Truning joint mounting bolt, nut	M16 × 2.0	29.6 ± 3.2	214 ± 23
10	Power train system	Swing motor mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
11		Swing bearing upper mounting bolt	M22 × 2.5	77.4 ± 8.0	560 ± 57.9
12		Swing bearing lower mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
13		Travel motor mounting bolt	M16 × 2.0	25.7 ± 4.0	186 ± 29
14		Sprocket mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.6 ± 3.2	214 ± 23
16		Track roller mounting bolt	M18 × 2.5	41.3 ± 5.0	299 ± 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	81 ± 4.0	586 ± 28.9
19		Track guard mounting bolt	M18 × 2.5	41.3 ± 5.0	299 ± 36.2
20	Others	Counter weight mounting bolt	M36 × 4.0	280 ± 30	2025 ± 217
21		Cab mounting bolt, nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
22		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 each components disassembly and assembly.

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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

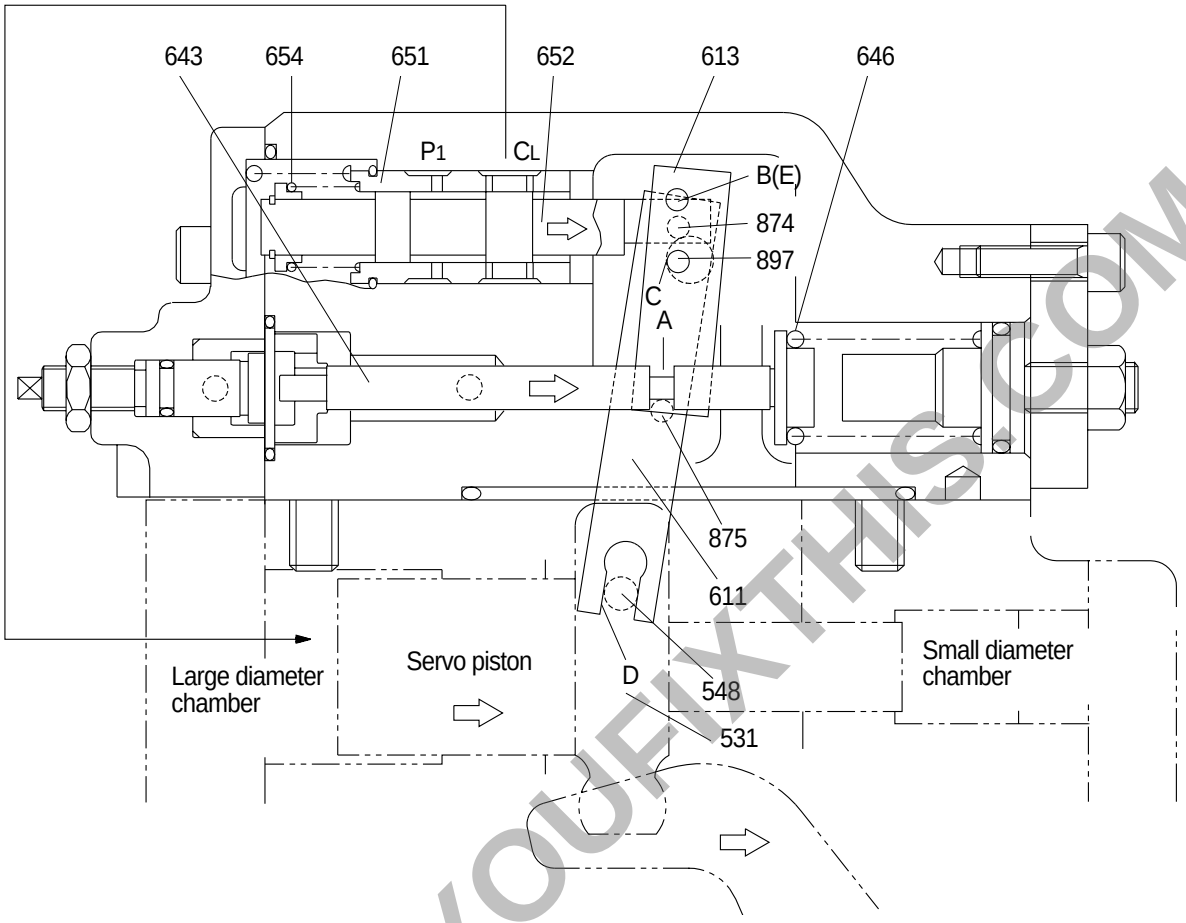
1kg = 2.2046lb

	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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① **Flow reducing function**



As the pilot pressure Pi rises, the pilot piston(643) moves to the right to a position where the force of the pilot spring(646) balances with the hydraulic force.

The groove(A) in the pilot piston is fitted with the pin(875) that is fixed to lever 2(613). Therefore, when the pilot piston moves, lever 2 rotates around the fulcrum of point B [fixed by the fulcrum plug(614) and pin(875)]. Since the large hole section(C) of lever 2 contains a protruding pin(897) fixed to the feedback lever(611), the pin(897) moves to the right as lever 2 rotates. Since the opposing-flat section(D) of the feedback lever is fitted with the pin(548) fixed by the tilting pin(531) that swings the swash plate, the feedback lever rotates around the fulcrum of point D, as the pin(897) moves.

Since the feedback lever is connected with the spool(652) via the pin(874), the spool moves to the right.

The movement of the spool causes the delivery pressure P1 to connect to port CL through the spool and to be admitted to the large diameter section of the servo piston. The delivery pressure P1 that is constantly admitted to the small diameter section of the servo piston moves the servo piston to the right due to the area difference, resulting in decrease of the tilting angle.

When the servo piston moves to the right, point D also moves to the right. The spool is fitted with the return spring(654) and is tensioned to the left at all times, and so the pin(897) is pressed against the large hole section(C) of lever 2.

Therefore, as point D moves, the feedback lever rotates around the fulcrum of point C, and the spool is shifted to the left. This causes the opening between the sleeve(651) and spool(652) to close slowly, and the servo piston comes to a complete stop when it closes completely.

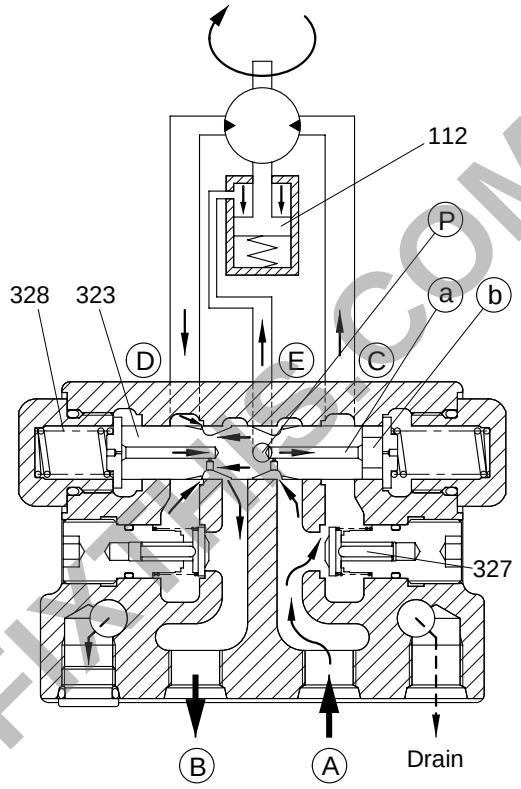
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(2) Brake valve

① **Brake released**(Starting / Running)

When the pressurized oil supplied from port Ⓐ, the oil opens valve(327) and flows into port Ⓒ at the suction side of hydraulic motor to rotate motor. At the same time, the pressurized oil passes through pipe line ⓐ from a small hole in spool(323) and flows into chamber ⓑ. The oil acts on the end face of spool(323) which is put in neutral position by the force of spring(328), thus causing spool(323) to side to the left. When spool(323) slides, port Ⓓ on the passage at the return side of hydraulic motor, which is closed by the spool groove during stoppage, connected with port Ⓑ at the tank side and the return oil from the hydraulic motor runs into the tank. In consequence, the hydraulic motor rotates. Moreover, sliding of spool(323) causes the pressurized oil to flow into ports Ⓟ.

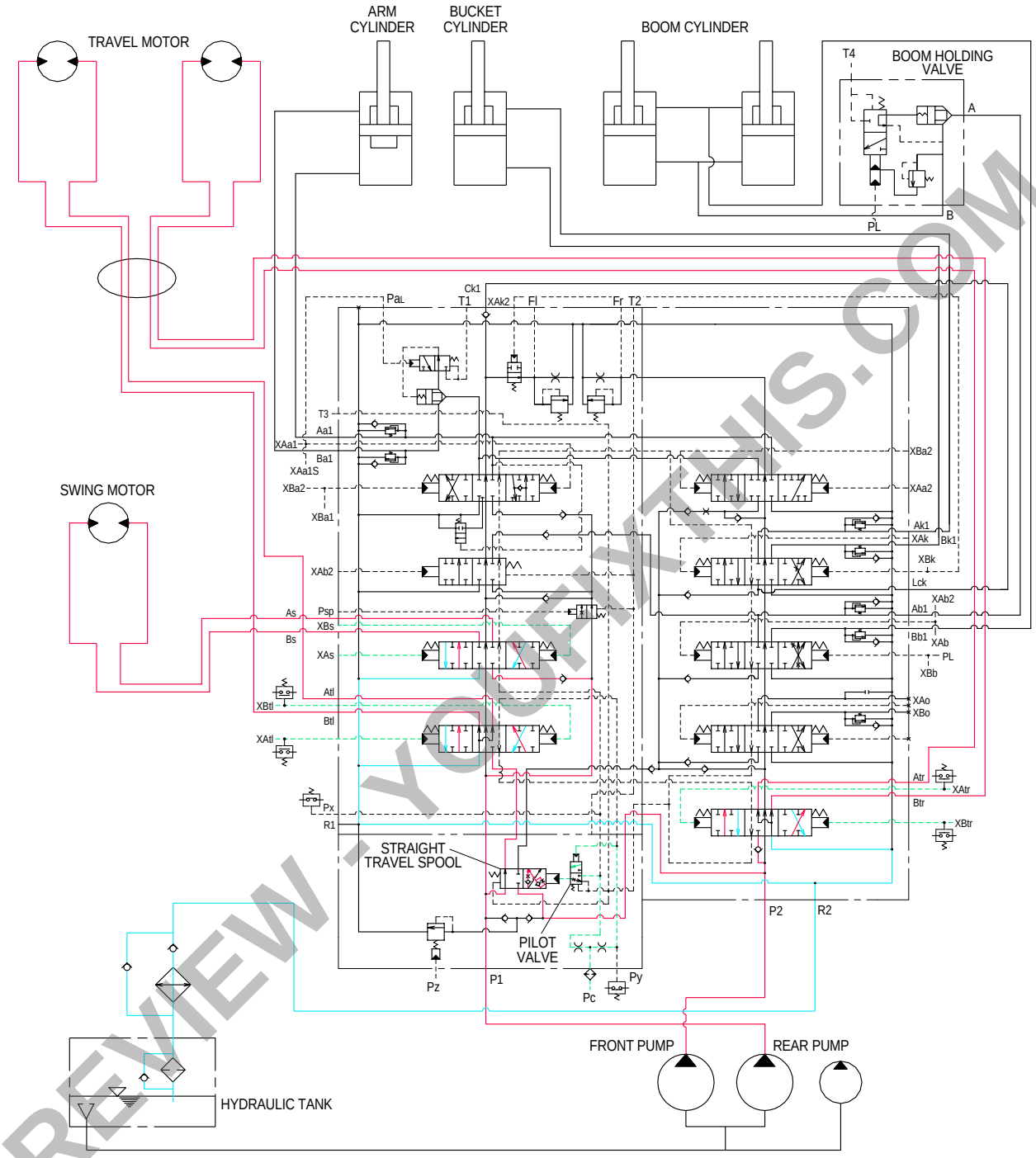
The pressurized oil admitted into port Ⓟ activates piston(112) of the parking brake to release the parking brake force. (For details, refer to description of the parking brake.) When the pressurized oil is supplied from port Ⓑ, spool(323) move reversely and the hydraulic motor also rotates reversely.



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6. COMBINED SWING & TRAVEL OPERATION



When the swing and travel functions are operated, simultaneously the swing spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve and the spool of pilot valve for straight travel is pushed to the downward by the pilot oil pressure from the pilot pump.

At the same time, the straight travel spool is pushed to the left by the oil through the pilot valve for straight travel.

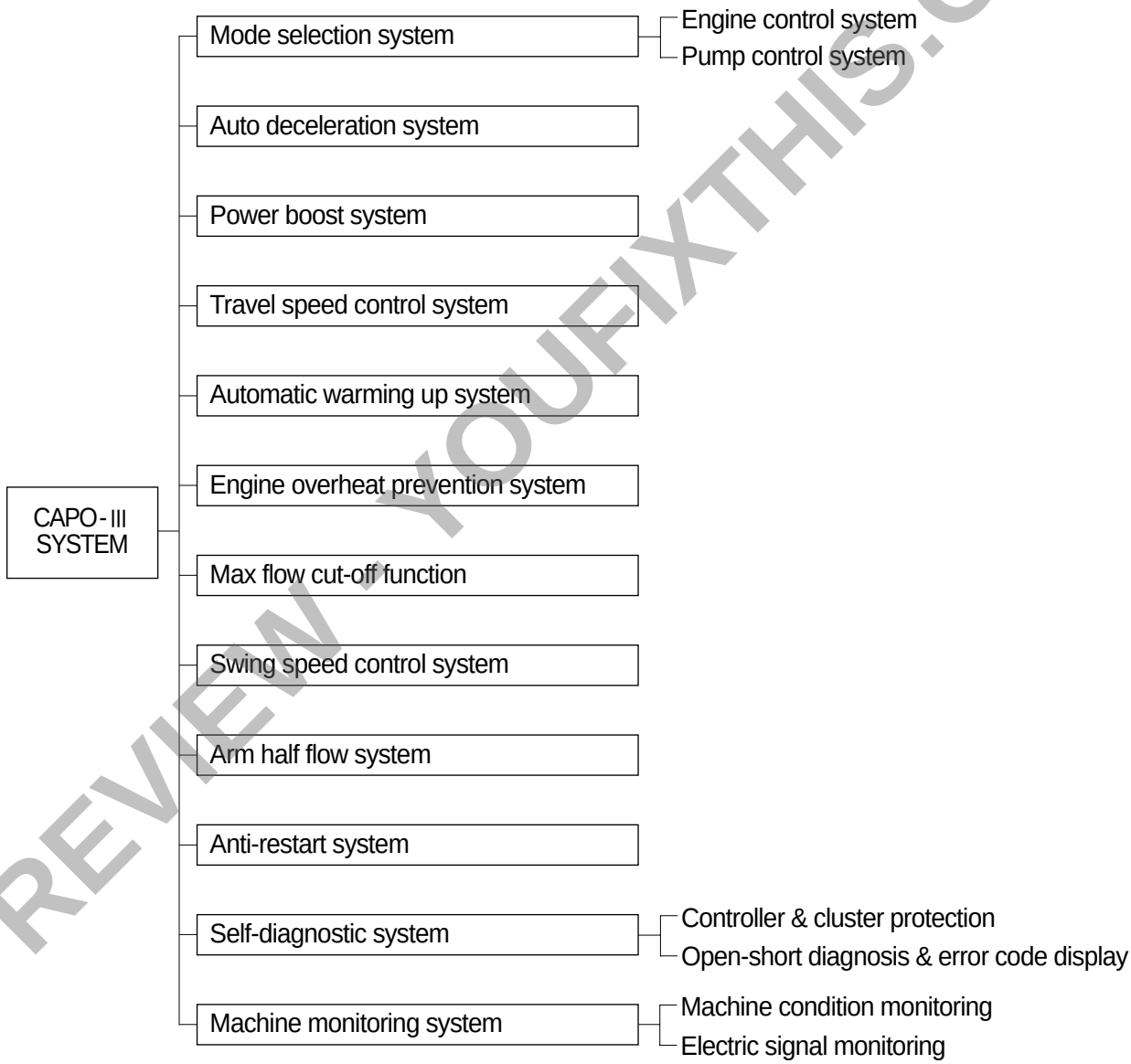
The oil from the rear pump flows into the swing motor through the swing spool. The oil from the front pump flows into the travel motor through the RH travel spool of the right control valve and the LH travel spool of the left control valve via the straight travel spool.

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SECTION 5 MECHATRONICS SYSTEM

GROUP 1 OUTLINE

The CAPO(Computer Aided Power Optimization)-III system controls engine and pump mutual power at an optimum and less fuel consuming state for the selected work by mode selection, auto-deceleration, power boost function, etc. It monitors machine conditions, for instance, engine speed, coolant temperature, hydraulic oil temperature, and hydraulic oil pressure, etc.
It consists of a CPU controller and a cluster, an accel actuator, an EPPR valve and other components. The CPU controller and the cluster protect themselves from over-current and high voltage input, and diagnose malfunctions caused by short or open circuit in electric system, and display error codes on the cluster.

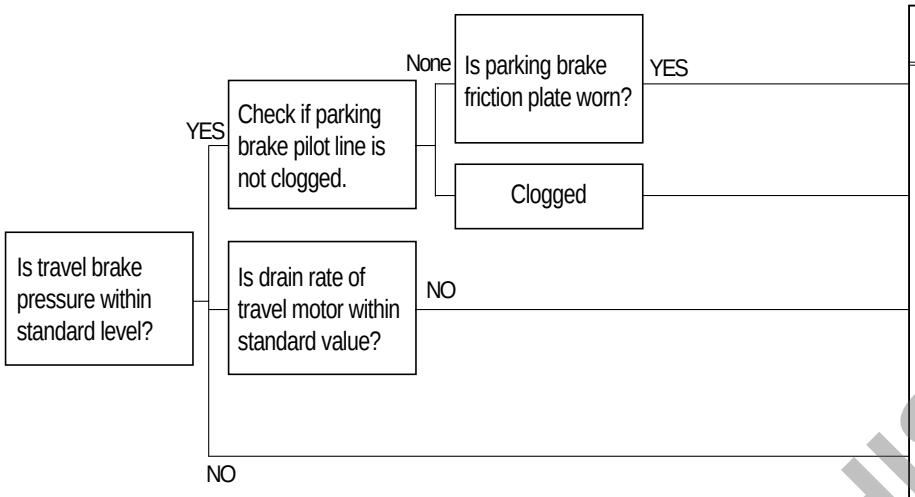


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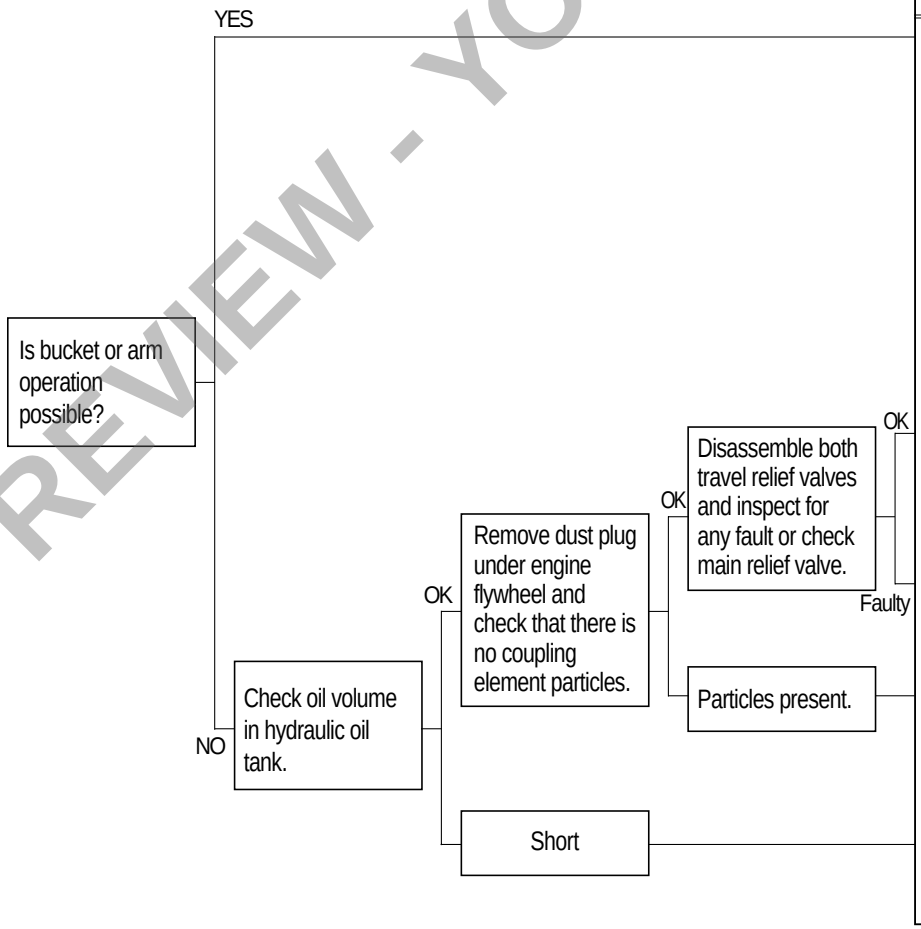
3) MACHINE DOES NOT STOP ON A SLOPE

Machine is pulled forward as sprocket rotates during digging operation.



Cause	Remedy
Friction plate is faulty.	Disassemble and repair.
Clogged	Disassemble and clean pilot piping.
Travel motor is defective or drain line is clogged.	Disassemble and repair.
Brake release valve is faulty or pilot relief valve is abnormal.	Disassemble and repair or replace.

4) LH AND RH TRAVEL MOTIONS ARE IMPOSSIBLE



Cause	Remedy
	Inspect according to the procedure "Travel does not function at all on one side." However, a case where both LH and RH travel motions are disabled is extremely seldom statistically.
Hydraulic pump is faulty.	Disassemble and repair.
Travel relief valve is faulty.	Disassemble and repair or replace.
Coupling at pump connection is broken.	Disassemble and repair.
	Replenish hydraulic oil.

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4) TRACK REVOLUTION SPEED

(1) Measure the track revolution cycle time with the track raised off ground.

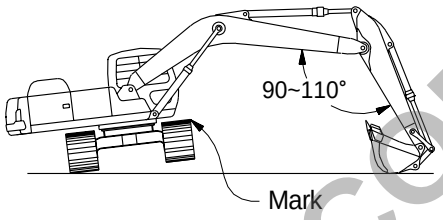
(2) Preparation

① Adjust the tension of both side tracks to be equal.

② On the track to be measured, mark one shoe with chalk.

③ Swing the upperstructure 90° and lower the bucket to raise the track off ground. Keep the boom-arm angle between 90 to 110° as shown. Place blocks under machine frame.

④ Keep the hydraulic oil temperature at 50±5℃.



(3) Measurement

① Select the following switch positions.

- Travel mode switch : 1 or 2 speed
- Mode selector : H mode
- Auto decel switch : OFF

② Operate the travel control lever of the raised track in full forward and reverse.

③ Rotate 1 turn, then measure time taken for next 3 revolutions.

④ Raise the other side of machine and repeat the procedure.

⑤ Repeat steps ③ and ④ three times and calculate the average values.

(4) Evaluation

The revolution cycle time of each track should meet the following specifications.

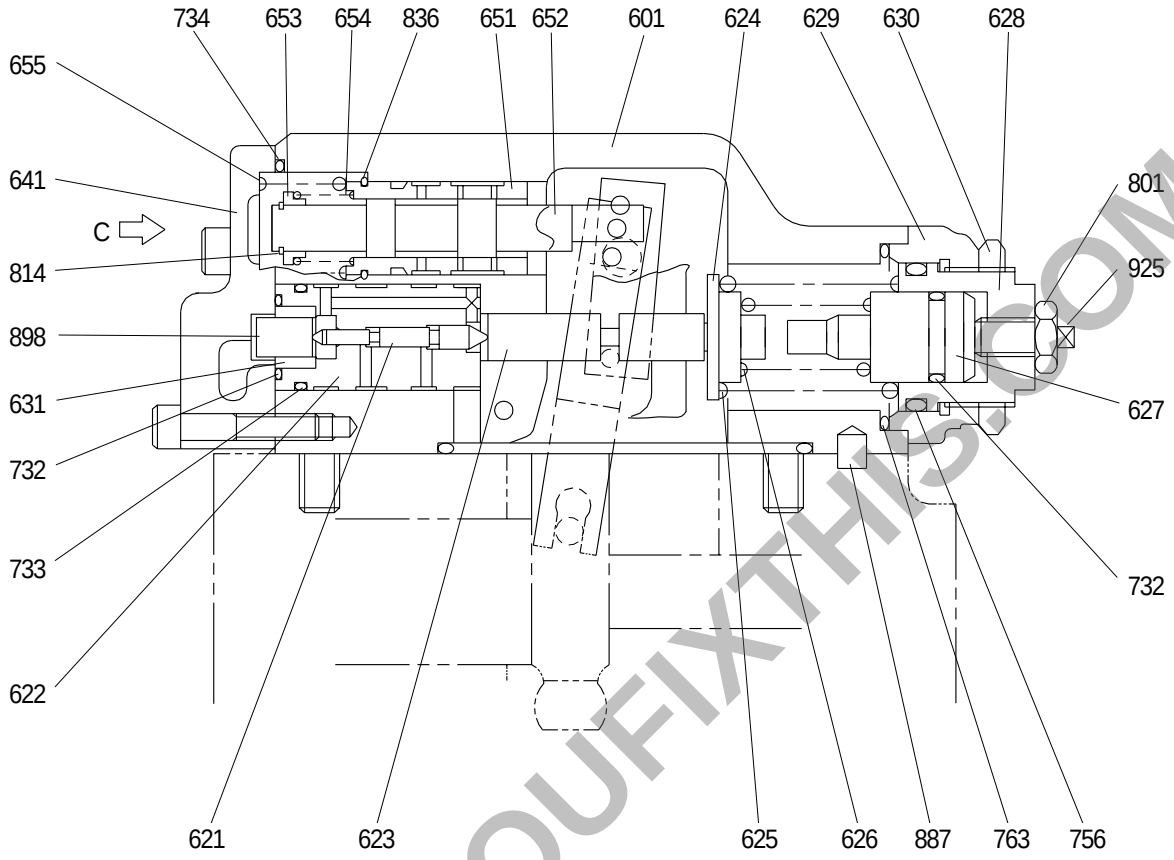
Unit : Seconds / 3 revolutions

Model	Travel speed	Standard	Maximum allowable
R250LC-3	1 Speed	29.0±2.0	37.7
	2 Speed	19.0±2.0	24.7

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REGULATOR(2/2)



SECTION A-A

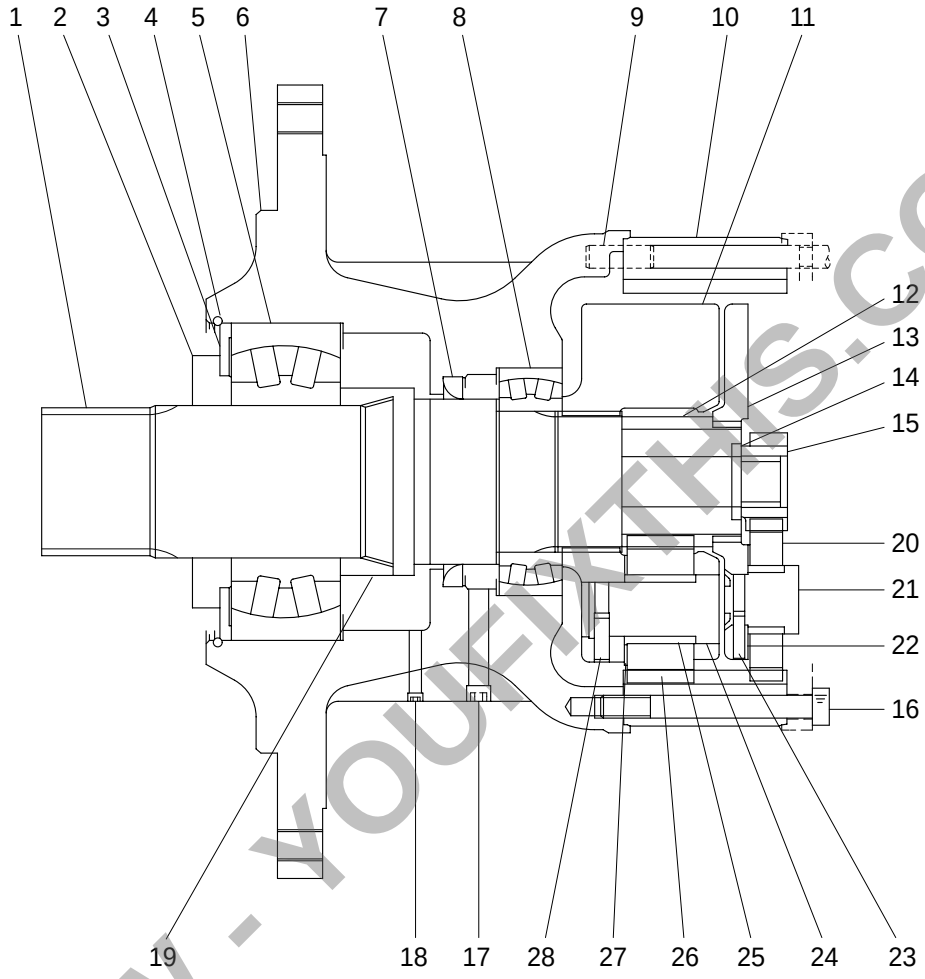
412	Hexagon socket screw	630	Nut	728	O-ring
413	Hexagon socket screw	631	Sleeve	730	O-ring
436	Hexagon socket screw	641	Pilot cover	732	O-ring
438	Hexagon socket screw	642	Pilot cover(QMC)	733	O-ring
496	Plug	643	Pilot piston	734	O-ring
601	Casing	644	Spring seat(Q)	735	O-ring
611	Feed back lever	645	Adjust stem(Q)	755	O-ring
612	Lever(1)	646	Pilot spring	756	O-ring
613	Lever(2)	647	Stopper	763	O-ring
614	Fulcrum plug	648	Piston(QMC)	801	Nut
615	Adjust plug	651	Sleeve	814	Snap ring
621	Compensator rod	652	Spool	836	Snap ring
622	Piston case	653	Spring seat	858	Snap ring
623	Compensator rod	654	Return spring	874	Pin
624	Spring seat(C)	655	Set spring	875	Pin
625	Outer spring	656	Block cover	887	Pin
626	Inner spring	708	O-ring	897	Pin
627	Adjust stem(C)	722	O-ring	898	Pin
628	Adjust screw(C)	724	O-ring	924	Set screw
629	Cover(C)	725	O-ring	925	Adjust screw(Q)

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4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) STRUCTURE



1	Pinion shaft	11	Holder 2	20	Planetary gear 2
2	Collar	12	Planetary gear 4	21	Shaft 1
3	Plate	13	Holder 1	22	Thrust plate 1
4	Snap ring	14	Thrust plate	23	Spring pin
5	Roller bearing	15	Sun gear	24	Shaft 2
6	Gear casing	16	Lock bolt	25	Bushing 2
7	Oil seal	17	Plug	26	Planetary gear 5
8	Roller bearing	18	Plug	27	Thrust plate 2
9	Pin	19	Collar	28	Spring pin
10	Ring gear				

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GROUP 7 RCV LEVER

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 socket bolt(2).

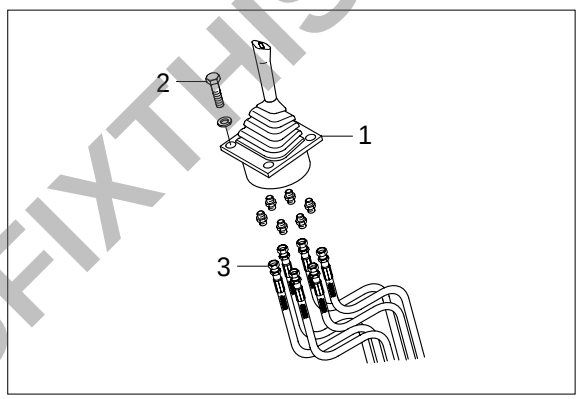
(5) Remove the cover of the console box.

(6) Disconnect pilot line hoses(3).

(7) Remove the pilot valve assembly(1).

※ When removing the pilot valve assembly, check that all the hoses have been disconnected.





2) INSTALL

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

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

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