1. STRUCTURE

This service manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.
This service manual mainly contains the necessary technical information for operations performed in a service workshop.
For ease of understanding, the manual is divided into the following sections.

SECTION 1 GENERAL
This section explains the safety hints and gives the specification of the machine and major components.

SECTION 2 STRUCTURE AND FUNCTION
This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

SECTION 3 HYDRAULIC SYSTEM
This section explains the hydraulic circuit, single and combined operation.

SECTION 4 ELECTRICAL SYSTEM
This section explains the electrical circuit, monitoring system and each component. It serves not only to give an understanding electrical system, but also serves as reference material for trouble shooting.

SECTION 5 MECHATRONICS SYSTEM
This section explains the computer aided power optimization system and each component.

SECTION 6 TROUBLESHOOTING
This section explains the troubleshooting charts correlating **problems** to **causes**.

SECTION 7 MAINTENANCE STANDARD
This section gives the judgement standards when inspecting disassembled parts.

SECTION 8 DISASSEMBLY AND ASSEMBLY
This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

SECTION 9 COMPONENT MOUNTING TORQUE
This section shows bolt specifications and standard torque values needed when mounting components to the machine.

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your HYUNDAI distributor for the latest information.

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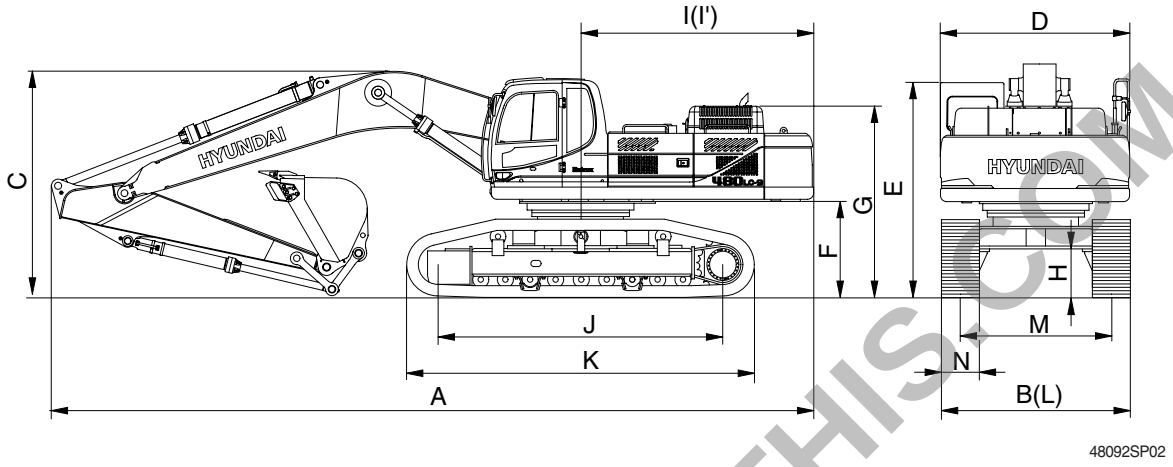
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2. SPECIFICATIONS

1) ROBEX 480LC-9

· 7.06 m (23' 2") BOOM, 3.38 m (11' 1") ARM

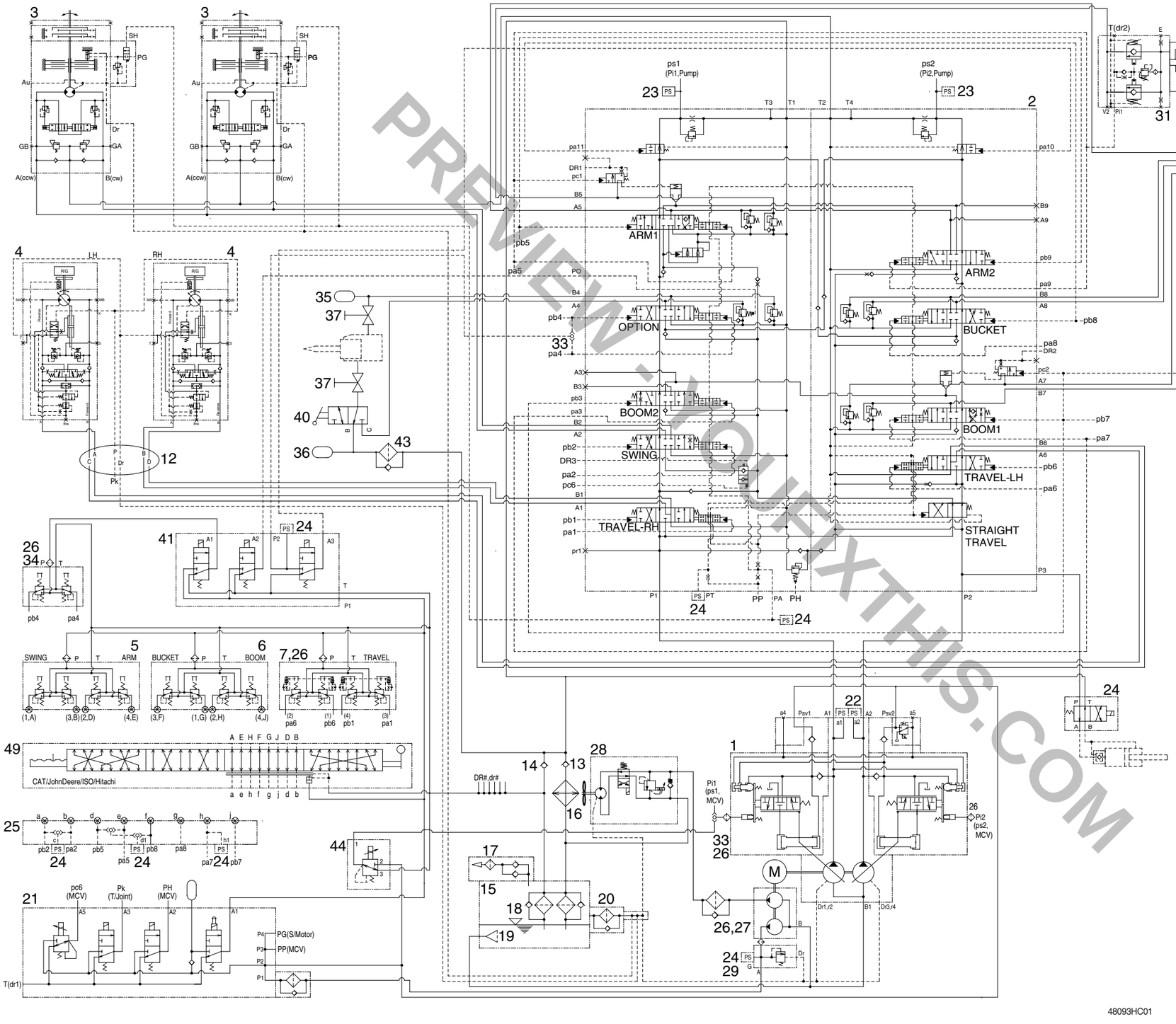


Description		Unit	Specification
Operating weight		kg (lb)	48100 (106040)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	2.15 (2.81)
Overall length	A	mm (ft-in)	12060 (39' 7")
Overall width, with 600 mm shoe	B		3340 (10' 11")
Overall height	C		3730 (12' 3")
Superstructure width	D		2980 (9' 9")
Overall height of cab	E		3190 (10' 6")
Ground clearance of counterweight	F		1295 (4' 3")
Engine cover height	G		2770 (9' 1")
Minimum ground clearance	H		555 (1' 10")
Rear-end distance	I		3695 (12' 1")
Rear-end swing radius	I'		3750 (12' 4")
Distance between tumblers	J		4470 (14' 8")
Undercarriage length	K		5462 (17' 11")
Undercarriage width	L		3340 (10' 11")
Track gauge	M		2740 (8' 12")
Track shoe width, standard	N		600 (24")
Travel speed (low/high)		km/hr (mph)	3.2/5.0 (2.0/3.1)
Swing speed		rpm	9.0
Gradeability		Degree (%)	35 (70)
Ground pressure (600 mm shoe)		kgf/cm^2 (psi)	0.83 (11.80)
Max traction force		kg (lb)	38500 (84800)

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GROUP 1 HYDRAULIC CIRCUIT

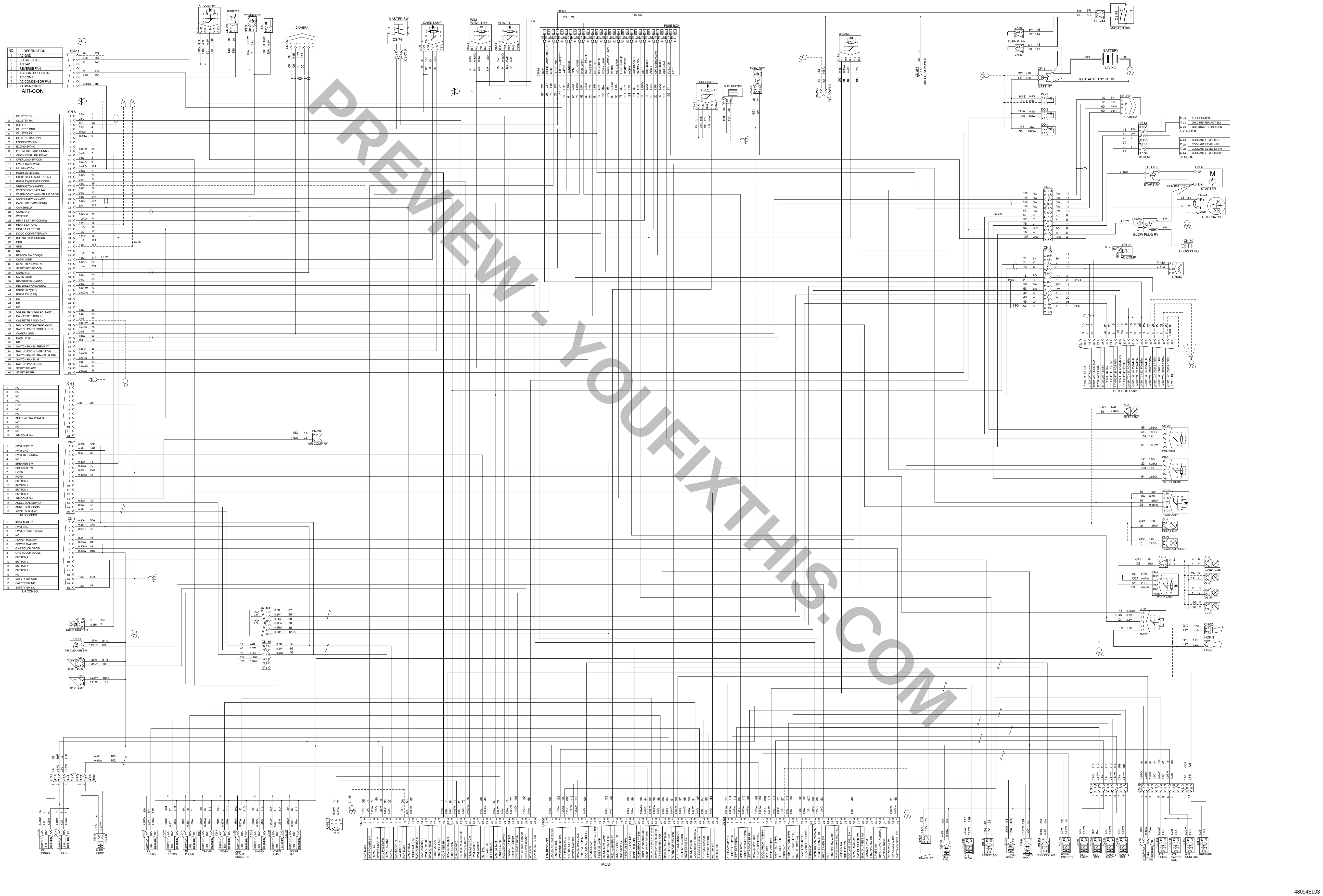


1 Main pump
2 Main control valve
3 Swing motor
4 Travel motor
5 RCV lever(LH)
6 RCV lever(RH)
7 RCV pedal
8 Boom cylinder(LH)
9 Boom cylinder(RH)
10 Arm cylinder
11 Bucket cylinder
12 Turning joint
13 Check valve
14 Check valve
15 Hydraulic tank
16 Oil cooler
17 Air breather
18 Bypass valve
19 Strainer
20 Drain filter
21 Solenoid valve
22 Pressure sensor
23 Pressure sensor
24 Pressure sensor
25 Shuttle block
26 Last guard filter
27 Remote fan pump & filter
28 Remote fan motor
29 Relief valve
30 Boom safety valve(Option)
31 Arm safety valve(Option)
32 Pressure sensor(Option)
33 Shuttle valve
34 Breaker pedal(Option)
35 Accumulator(Option)
36 Accumulator(Option)
37 Stop valve(Option)
40 Selector valve(Option)
41 Solenoid valve(Option)
43 Breaker return filter(Option)
44 EPPR valve(Option)
48 Solenoid valve(Option)
49 Pattern change valve(Option)

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· ELECTRICAL CIRCUIT (1/2)



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3. MACHINE ERROR CODES TABLE

Error code		Description
HCESPN	FMI	
101	3	Hydraulic oil temperature sensor circuit - Voltage above normal, or shorted to high source.
	4	Hydraulic oil temperature circuit - Voltage below normal, or shorted to low source.
105	0	Working pressure sensor data above normal range.
	1	Working pressure sensor data below normal range.
	2	Working pressure sensor data error.
	4	Working pressure sensor circuit - Voltage below normal, or shorted to Low source.
108	0	Travel oil pressure sensor data above normal range.
	1	Travel oil pressure sensor data below normal range.
	2	Travel oil pressure sensor data error.
	4	Travel oil pressure sensor circuit - Voltage below normal, or shorted to low source.
120	0	Main pump 1 (P1) pressure sensor data above normal range.
	1	Main pump 1 (P1) pressure sensor data below normal range.
	2	Main pump 1 (P1) pressure sensor data error.
	4	Main pump 1 (P1) pressure sensor circuit - Voltage below normal, or shorted to low source.
121	0	Main pump 2 (P2) pressure sensor data above normal range.
	1	Main pump 2 (P2) pressure sensor data below normal range.
	2	Main pump 2 (P2) pressure sensor data error.
	4	Main pump 2 (P2) pressure sensor circuit - Voltage below normal, or shorted to low source.
122	0	Overhead pressure sensor data above normal range.
	1	Overhead pressure sensor data below normal range.
	2	Overhead pressure sensor data error.
	4	Overhead pressure sensor circuit - Voltage below normal, or shorted to low source.
123	0	Negative 1 pressure sensor data above normal range.
	1	Negative 1 pressure sensor data below normal range.
	2	Negative 1 pressure sensor data error.
	4	Negative 1 pressure sensor circuit - Voltage below normal, or shorted to low source.
124	0	Negative 2 Pressure sensor data above normal range.
	1	Negative 2 Pressure sensor data below normal range.
	2	Negative 2 Pressure sensor data error.
	4	Negative 2 Pressure sensor circuit - Voltage below normal, or shorted to low source.
125	0	Pilot pump (P3) pressure sensor data above normal range.
	1	Pilot pump (P3) pressure sensor data below normal range.
	2	Pilot pump (P3) pressure sensor data error.
	4	Pilot pump (P3) pressure sensor circuit - Voltage below normal, or shorted to low source.
127	0	Boom up pilot pressure sensor data above normal range.
	1	Boom up pilot pressure sensor data below normal range.
	2	Boom up pilot pressure sensor data error.
	4	Boom up pilot pressure sensor circuit - Voltage below normal, or shorted to low source.
133	0	Arm in/out & bucket in pilot pressure sensor data above normal range.
	1	Arm in/out & bucket in pilot pressure sensor data below normal range.
	2	Arm in/out & bucket in pilot pressure sensor data error.
	4	Arm in/out & bucket in pilot pressure sensor circuit - Voltage below normal, or shorted to low source.

※ Some error codes are not applied to this machine.

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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 : 250 ℓ

(4) Remove the wirings for the pressure sensors and so on.

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

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

(7) Remove bolts (4) and disconnect pump suction tube (3).

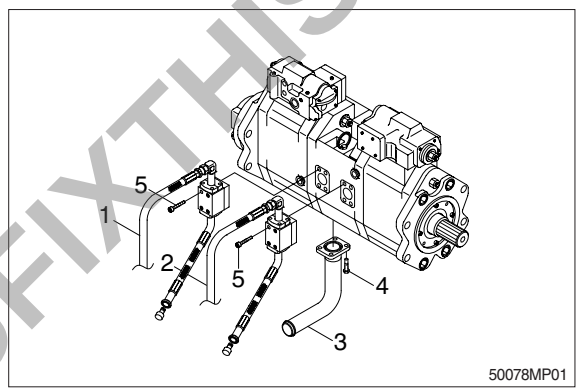
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

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

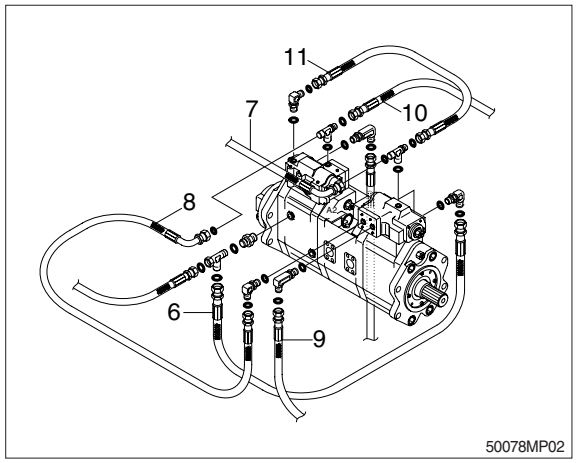
· Weight : 180 kg (400 lb)

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


13031GE18



50078MP01



50078MP02

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GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

· R480LC-9

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut	M20 × 2.5	46.4 ± 4.0	336 ± 29
2		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
3		Coupling mounting socket bolt	M20 × 2.5	46 ± 2.0	333 ± 14.5
4		Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	35 ± 2.2
5	Hydraulic system	Main pump mounting bolt	M20 × 2.5	44 ± 6.6	318 ± 47.7
6		Main control valve mounting nut	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
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 × 2.0	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	100 ± 10	723 ± 72.3
12		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
13		Travel motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
14		Sprocket mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
15	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
16		Track roller mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
17		Track tension cylinder mounting bolt	M22 × 1.5	87.2 ± 12.5	631 ± 90
18		Track shoe mounting bolt, nut	M24 × 3.0	140 ± 5.0	1012 ± 36
19		Track guard mounting bolt	M24 × 3.0	100 ± 15	723 ± 108
20	Others	Counterweight mounting bolt	M42 × 3.0	390 ± 40	2821 ± 289
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

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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

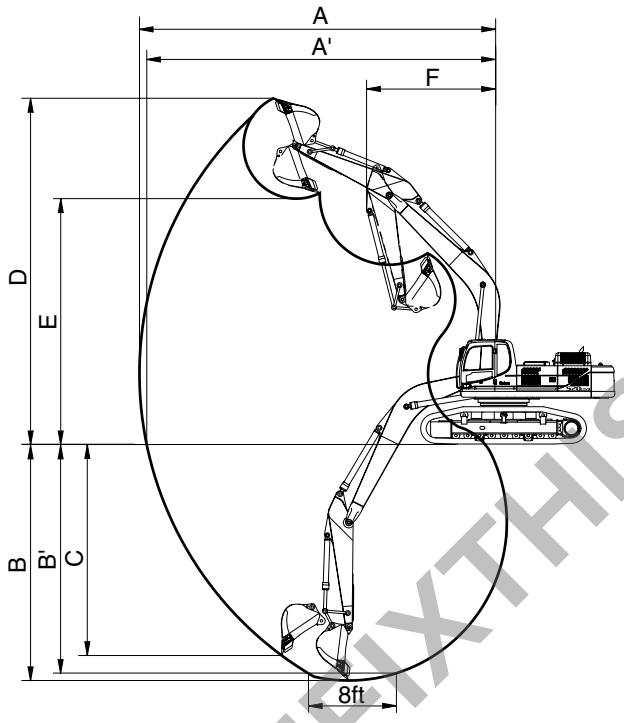
	0	1	2	3	4	5	6	7	8	9
0		2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.5.	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	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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6) ROBEX 520LC-9

· 9.00 m (29' 6") BOOM



48092SP05

Description		5.85 m (19' 2") Arm
Max digging reach	A	16280 mm (53' 5")
Max digging reach on ground	A'	16100 mm (52'10")
Max digging depth	B	11380 mm (37' 4")
Max digging depth (8ft level)	B'	11280 mm (37' 0")
Max vertical wall digging depth	C	10070 mm (33' 0")
Max digging height	D	13930 mm (45' 8")
Max dumping height	E	10530 mm (34' 7")
Min swing radius	F	5940 mm (19' 6")
Bucket digging force	SAE	212.8 kN
		21700 kgf
		47840 lbf
	ISO	251.1 kN
		25600 kgf
		56440 lbf
Arm crowd force	SAE	107.9 kN
		11000 kgf
		24250 lbf
	ISO	110.8 kN
		11300 kgf
		24910 lbf

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2. FUNCTION

1) MAIN PUMP

The pumps may classified roughly into the rotary group performing a rotary motion and working as the major part of the whole pump function: the swash plate group that varies the delivery rates: and the valve cover group that changes over oil suction and discharge.

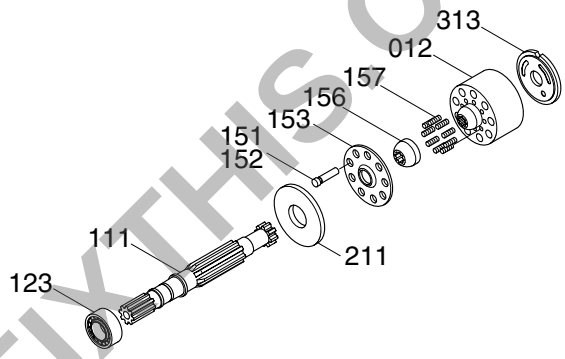
(1) Rotary group

The rotary group consists of drive shaft (F)(111), cylinder block (012), piston shoes (151,152), set plate (153), spherical bush (156), and cylinder spring (157).

The drive shaft is supported by bearing (123,124) at its both ends.

The shoe is caulked to the piston to from a spherical coupling. It has a pocket to relieve thrust force generated by loading pressure and the take hydraulic balance so that it slides lightly over the shoe plate (211). The sub group composed by a piston and a shoe is pressed against the shoe plate by the action of the cylinder spring via a retainer and a spherical bush.

Similarly, the cylinder block is pressed against valve plate (313) by the action of the cylinder spring.



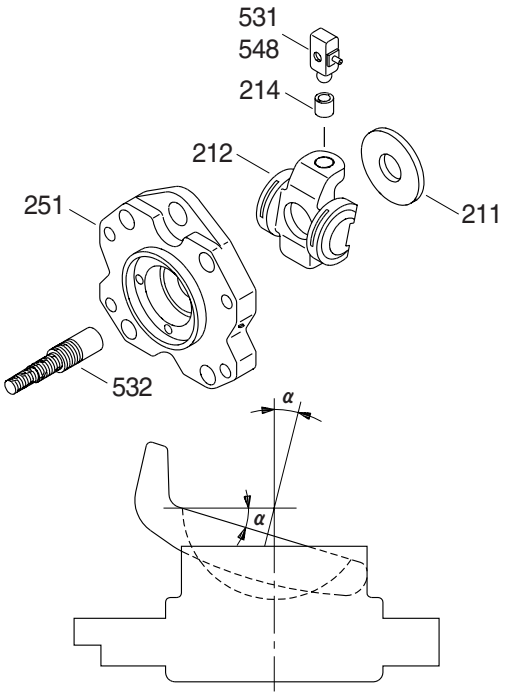
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(2) Swash plate group

The swash plate group consists of swash plate (212), shoe plate (211), swash plate support (251), tilting bush (214), tilting pin (531) and servo piston (532).

The swash plate is a cylindrical part formed on the opposite side of the sliding surface of the shoe and is supported by the swash support.

If the servo piston moves to the right and left as hydraulic force controlled by the regulator is admitted to hydraulic chamber located on both sides of the servo piston, the swash plate slides over the swash plate support via the spherical part of the tilting pin to change the tilting angle (α)



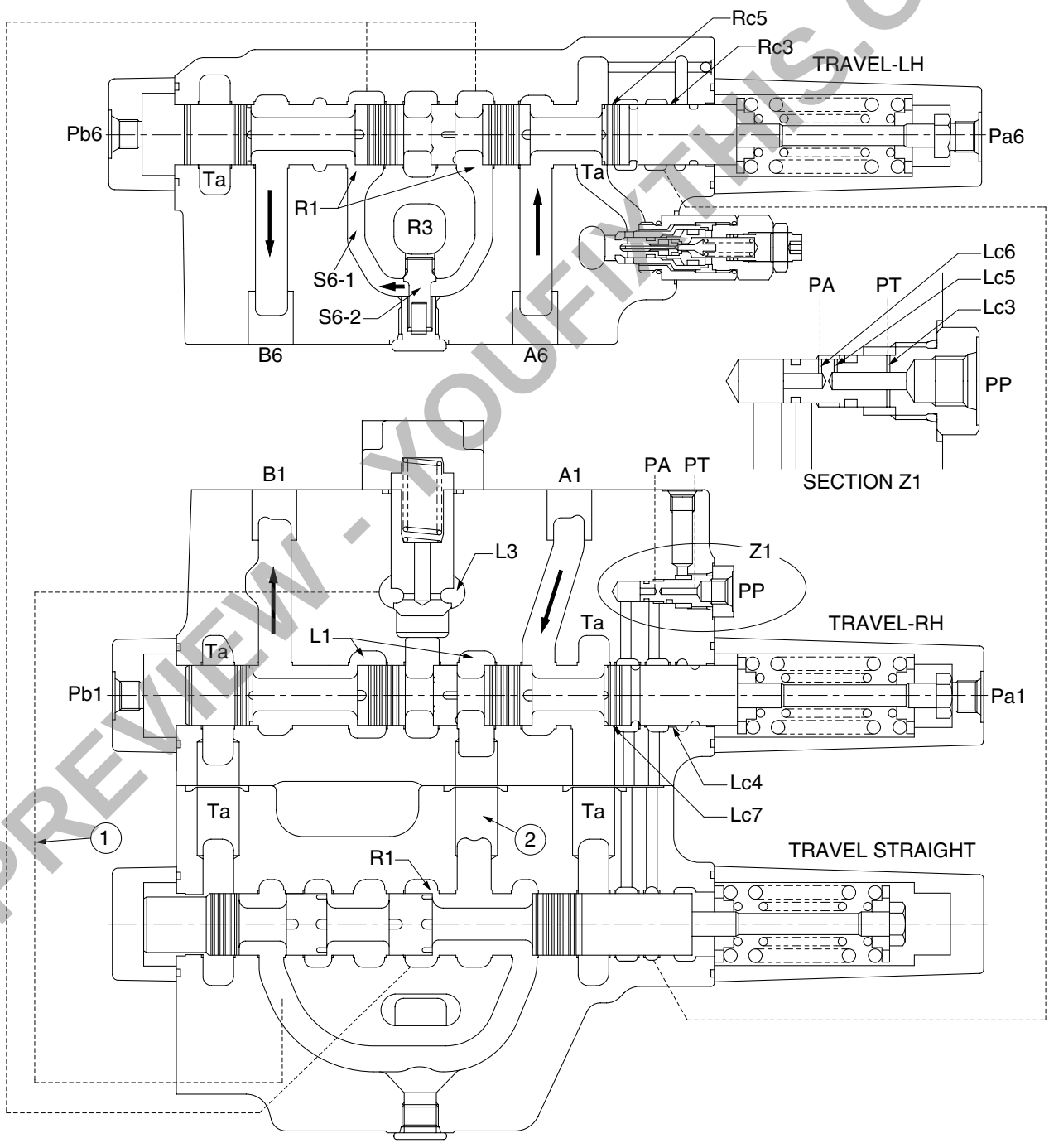
2-7 (210-7)

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② When the straight travel spool is operated, the oil discharged from port P1 flows into RH travel section through the neutral passage (L1) and also flows into LH travel section via the neutral passage (R1) and passage (②). The oil discharged from port P2 flows into the parallel passage (L3) via passage (①).

③ In case the load pressure of the section except travel is higher than that of the RH travel section, the partial oil of discharged from port P2 pushes open the poppet (S6-2) and flows together into the passage (S6-1) through the orifice at the edge of poppet. The travel (LH, RH) is operated by the discharged oil from port P1 and the other actuators are operated by the discharged oil from port P2. Thus, when travel and front attachment functions are operated simultaneously, keeps the straight travel.

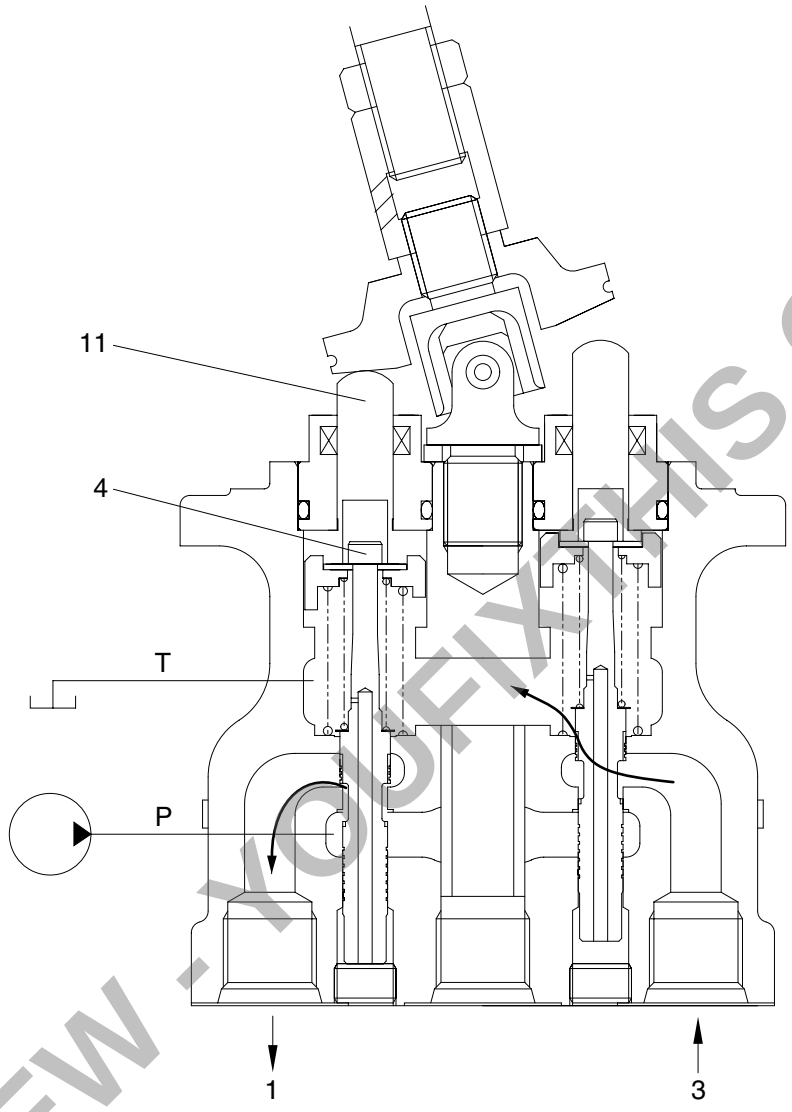


48092MC17

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(2) Case where handle is tilted



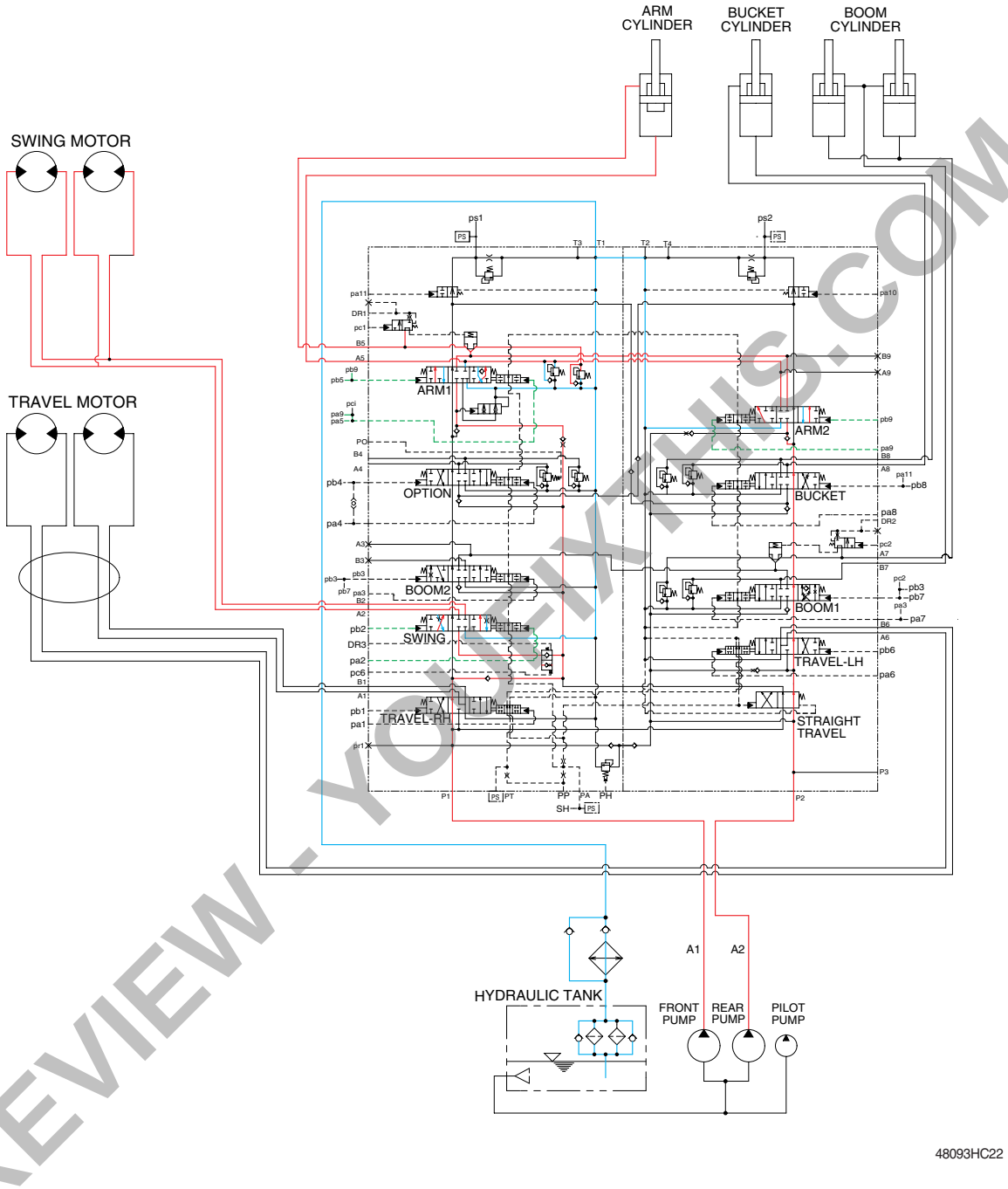
21092RL04

When the push rod (11) is stroked, the spool (4) 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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3. COMBINED SWING AND ARM OPERATION



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

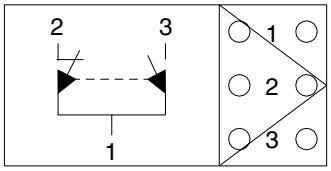
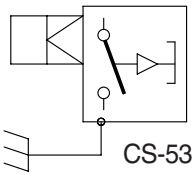
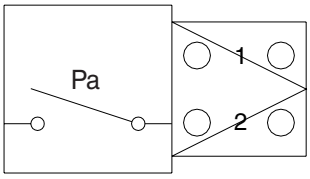
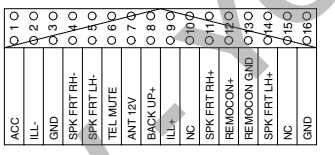
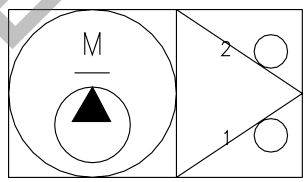
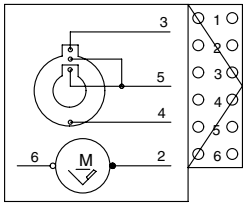
The oil from the A1 pump flows into the swing motor through swing spool and the arm cylinder through arm 1 spool.

The oil from the A2 pump flows into the arm cylinder through the arm 2 spool of the right control valve. The upper structure swings and the arm is operated.

Refer to page 2-35 for the swing operation preference function.

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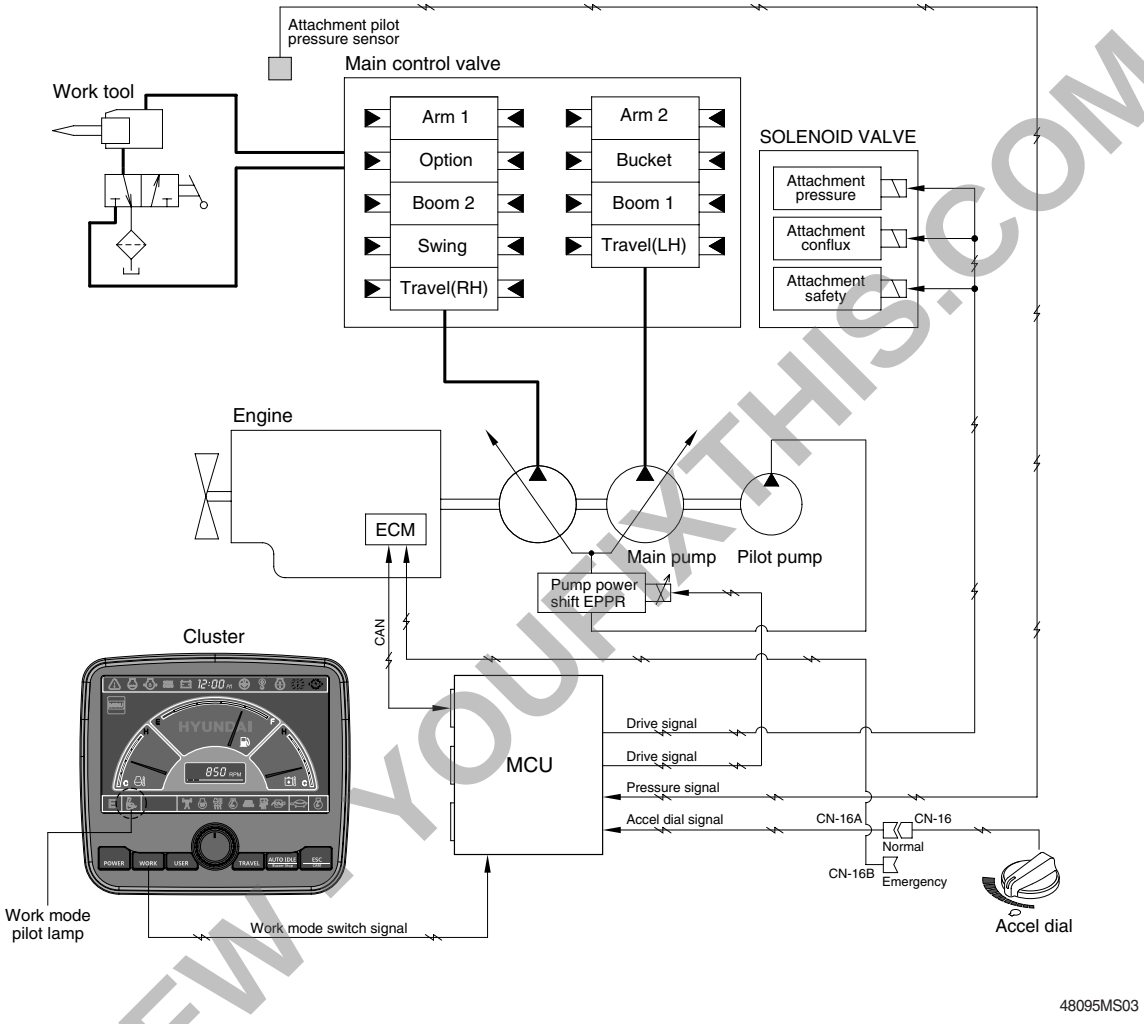
Part name	Symbol	Specifications	Check
Safety switch	 CS-4	24V 15A (N.C TYPE)	※Check contact Normal : 0 Ω (for terminal 1-2) ∞ Ω (for terminal 1-3) Operating : ∞ Ω (for terminal 1-2) 0 Ω (for terminal 1-3)
Wiper cut switch	 CS-53	24V (N.O TYPE)	※Check contact Normal : 0 Ω (one pin to ground)
Receiver dryer	 CN-29	24V 2.5A	※Check contact Normal : ∞ Ω
Radio & CD/MP3 player	 CN-27	24V 2A	※Check voltage 20~25V (for terminal 1-3, 3-8)
Washer pump	 CN-22	24V 3.8A	※Check contact Normal : 10.7 Ω (for terminal 1-2)
Wiper motor	 CN-21	24V 2A	※Check disconnection Normal : 7 Ω (for terminal 2-6)

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2. WORK MODE SELECTION SYSTEM

Work mode consists of the general operation (bucket) and the optional attachment (breaker, crusher).



1) GENERAL WORK MODE (bucket)

This mode is used to general digging work.

2) ATT WORK MODE (breaker, crusher)

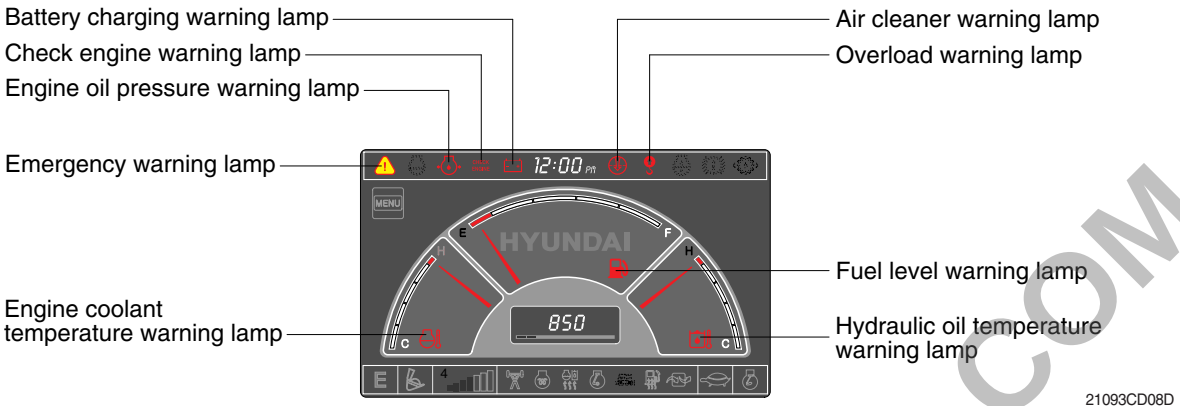
It controls the pump flow and system pressure according to the operation of breaker or crusher.

Description	General mode	Work tool	
	Bucket	Breaker	Crusher
Attachment safety solenoid	OFF	ON	ON
Attachment pressure solenoid	OFF	OFF	ON
Attachment conflux solenoid	OFF	OFF	ON/OFF
Attachment flow EPPR current	100 mA	100~700 mA	100~700 mA

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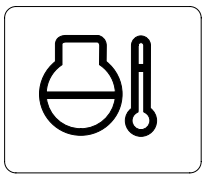
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3) WARNING LAMPS



※ **Each warning lamp on the top of the LCD pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and blinks when the select switch is pushed. And the buzzer stops.**
Refer to page 5-43 for the select switch.

(1) Engine coolant temperature

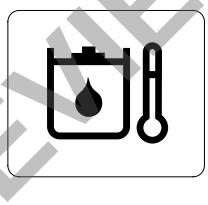


① Engine coolant temperature warning is indicated two steps.
- 100˚C over : The lamp blinks and the buzzer sounds.
- 105˚C over : The lamp pops up on the center of LCD and the buzzer sounds.

② The pop-up lamp moves to the original position and blinks when the select switch is pushed. Also, the buzzer stops and lamp keeps blink.

③ Check the cooling system when the lamp keeps ON.

(2) Hydraulic oil temperature



① Hydraulic oil temperature warning is indicated two steps.
- 100˚C over : The lamp blinks and the buzzer sounds.
- 105˚C over : The lamp pops up on the center of LCD and the buzzer sounds.

② The pop-up lamp moves to the original position and blinks when the select switch is pushed. Also, the buzzer stops and lamp keeps blink.

③ Check the hydraulic oil level and hydraulic oil cooling system.

(3) Fuel level



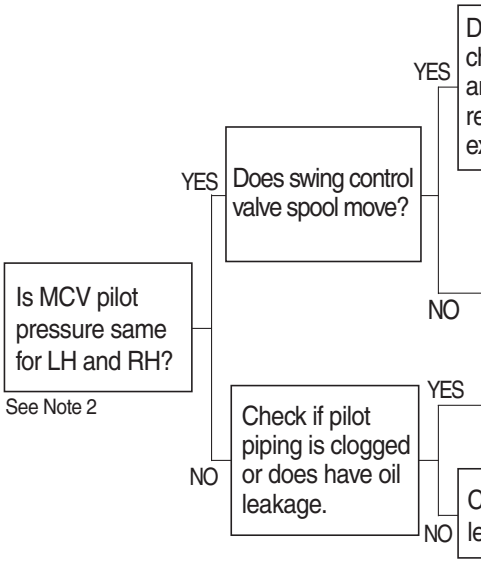
① This warning lamp blinks and the buzzer sounds when the level of fuel is below 61 ℓ (16.1 U.S. gal).

② Fill the fuel immediately when the lamp blinks.

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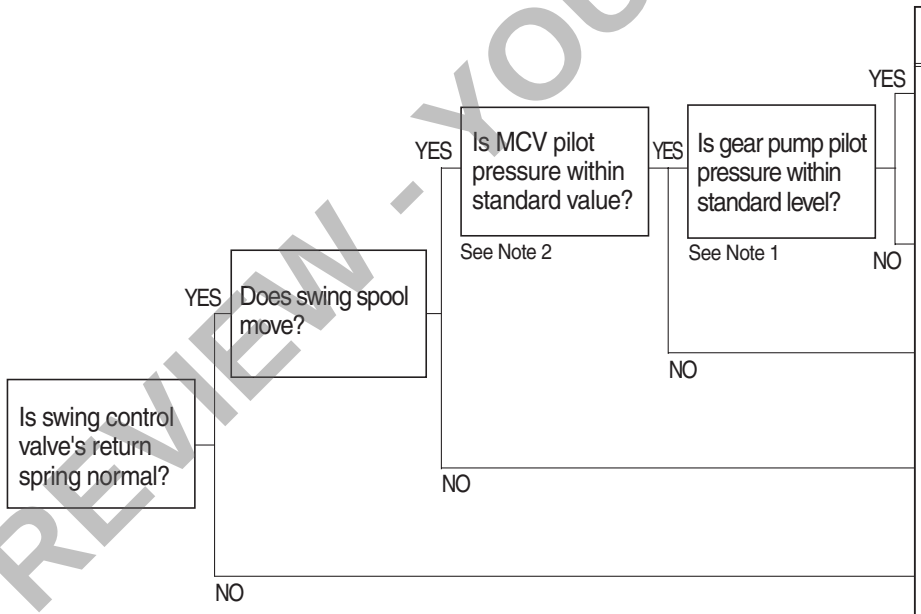
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3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



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.
RCV 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.
RCV is faulty.	Disassemble and repair.
Swing spool is stuck.	Disassemble and repair.
Return spring is faulty.	Disassemble and replace.

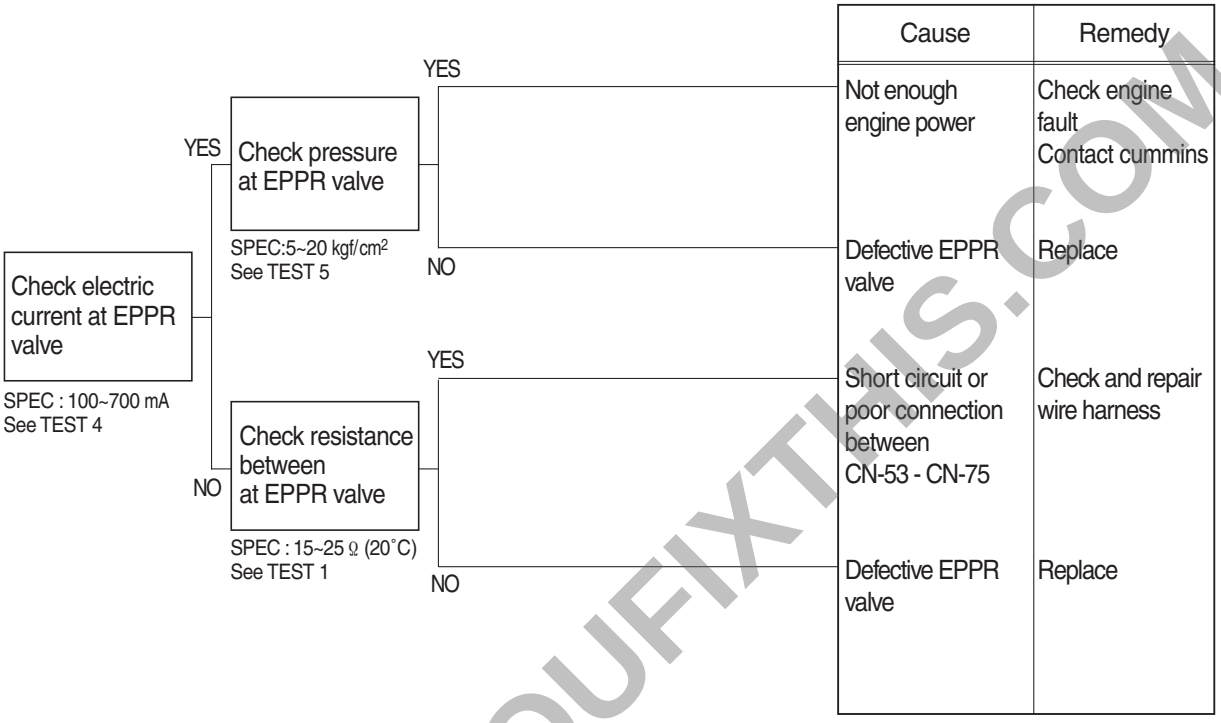
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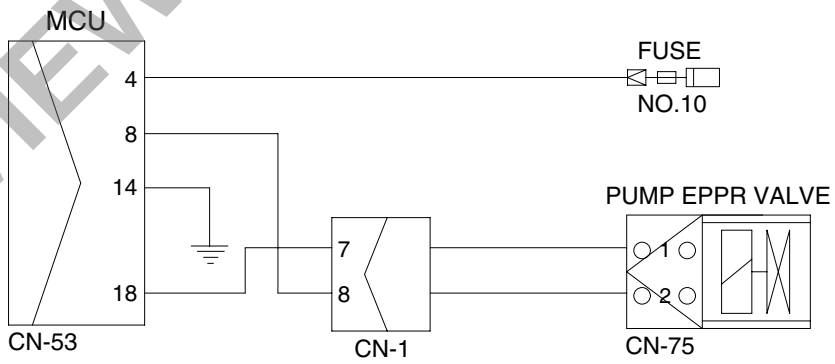
2. ENGINE STALL

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

1) INSPECTION PROCEDURE



Wiring diagram



21096MS01

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3) TRAVEL SPEED

(1) Measure the time required for the excavator to travel a 20 m test track.

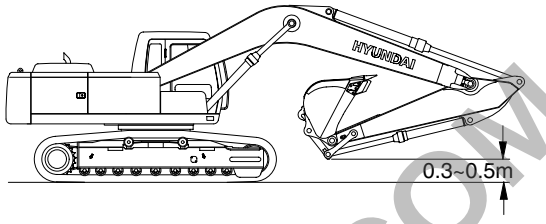
(2) Preparation

① Adjust the tension of both tracks to be equal.

② Prepare a flat and solid test track 20 m in length, with extra length of 3 to 5 m on both ends for machine acceleration and deceleration.

③ Hold the bucket 0.3 to 0.5 m above the ground with the arm and bucket rolled in.

④ Keep the hydraulic oil temperature at 50±5˚C.



21097MS04

(3) Measurement

① Measure both the low and high speeds of the machine.

② Before starting either the low or high speed tests, adjust the travel mode switch to the speed to be tested, then select the following switch positions.

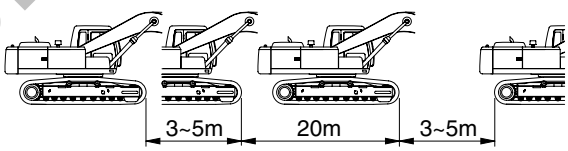
· Power mode switch : P mode

③ Start traveling the machine in the acceleration zone with the travel levers at full stroke.

④ Measure the time required to travel 20 m.

⑤ After measuring the forward travel speed, turn the upperstructure 180° and measure the reverse travel speed.

⑥ Repeat steps ④ and ⑤ three times in each direction and calculate the average values.



21077MS05

(4) Evaluation

The average measured time should meet the following specifications.

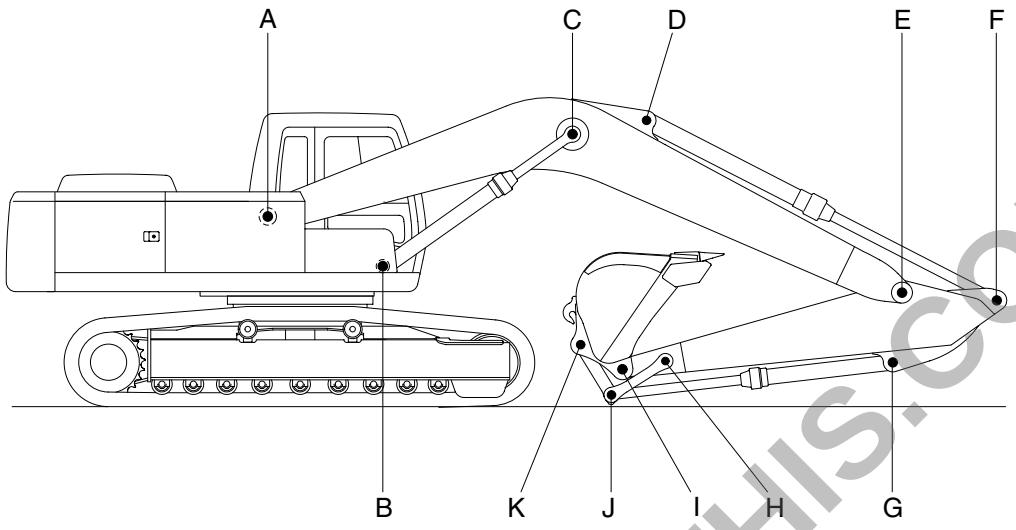
Unit : Seconds / 20 m

Model	Travel speed	Standard	Maximum allowable	Remarks
R480LC-9 R520LC-9	1 Speed	23.2±2.0	29	
	2 Speed	14.7±1.0	18.3	

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2. WORK EQUIPMENT



21077MS20

Unit : mm

Mark	Measuring point (Pin and Bushing)	Normal value	Pin		Bushing		Remedy & Remark
			Recomm. service limit	Limit of use	Recomm. service limit	Limit of use	
A	Boom Rear	125	124	123.5	125.5	126	
B	Boom Cylinder Head (R450LC-7A)	100	99	98.5	100.5	101	
	Boom Cylinder Head (R500LC-7A)	120	119	118.5	120.5	121	
C	Boom Cylinder Rod (R450LC-7A)	110	109	108.5	110.5	111	
	Boom Cylinder Rod (R500LC-7A)	120	119	118.5	120.5	121	
D	Arm Cylinder Head (R450LC-7A)	110	109	108.5	110.5	111	
	Arm Cylinder Head (R500LC-7A)	120	119	118.5	120.5	121	
E	Boom Front	125	124	123.5	125.5	126	
F	Arm Cylinder Rod (R450LC-7A)	110	109	108.5	110.5	111	
	Arm Cylinder Rod (R500LC-7A)	120	119	118.5	120.5	121	Replacement
G	Bucket Cylinder Head (R450LC-7A)	100	99	98.5	100.5	101	
	Bucket Cylinder Head (R500LC-7A)	110	109	108.5	110.5	111	
H	Arm Link	100	99	98.5	100.5	101	
I	Bucket and Arm Link (R450LC-7A)	100	99	98.5	100.5	101	
	Bucket and Arm Link (R500LC-7A)	120	119	118.5	120.5	121	
J	Bucket Cylinder Rod (R450LC-7A)	100	99	98.5	100.5	101	
	Bucket Cylinder Rod (R500LC-7A)	110	109	108.5	110.5	111	
K	Bucket Link (R450LC-7A)	100	99	98.5	100.5	101	
	Bucket Link (R500LC-7A)	120	119	118.5	120.5	121	

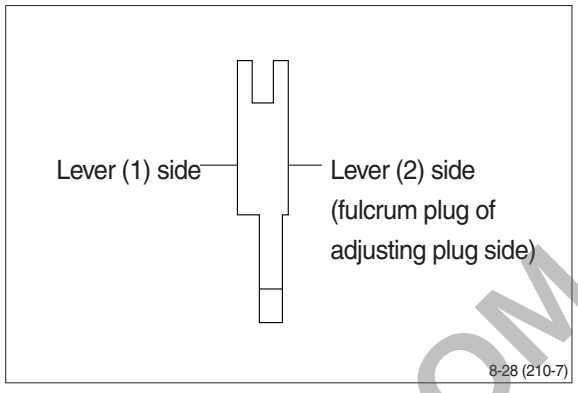
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(5) Fit feedback lever (611), matching its pin hole with pin hole in spool.
Then insert pin (874).

※ Insert pin in feedback lever a little to ease operation.

※ Take care not to mistake direction of feedback lever.

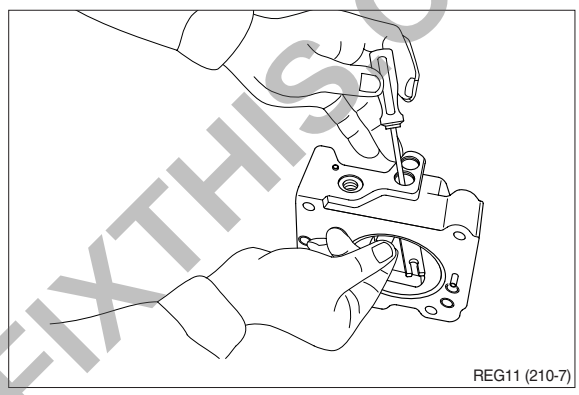


8-28 (210-7)

(6) Put pilot piston (643) into pilot hole of casing.

※ Confirm that pilot piston slides smoothly without binding.

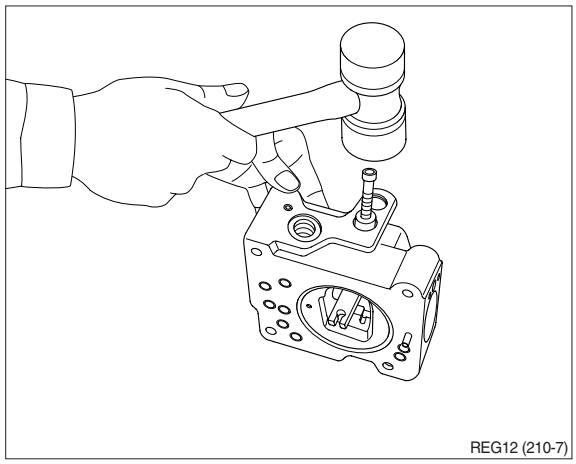
(7) Put pin force-fitted in lever 2 (613) into groove of pilot piston.
Then fix lever (2).


REG11 (210-7)

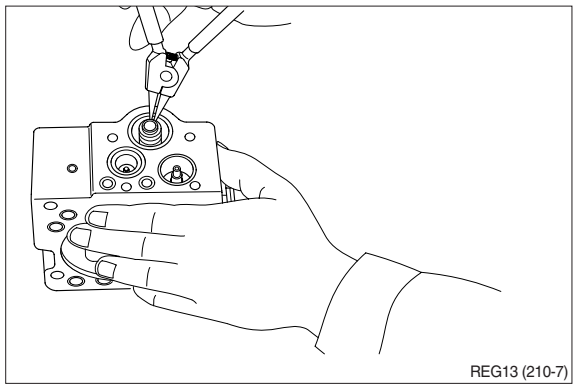
(8) Fit fulcrum plug (614) so that pin force-fitted in fulcrum plug (614) can be put into pin hole of lever 2.
Then fix locking ring (858).

(9) Insert adjusting plug (615) and fit locking ring.

※ Take care not to mistake inserting holes for fulcrum plug and adjusting plug.
At this point in time move feedback lever to confirm that it has no large play and is free from binding.


REG12 (210-7)

(10) Fit return spring (654) and spring seat (653) into spool hole and attach snap ring (814).

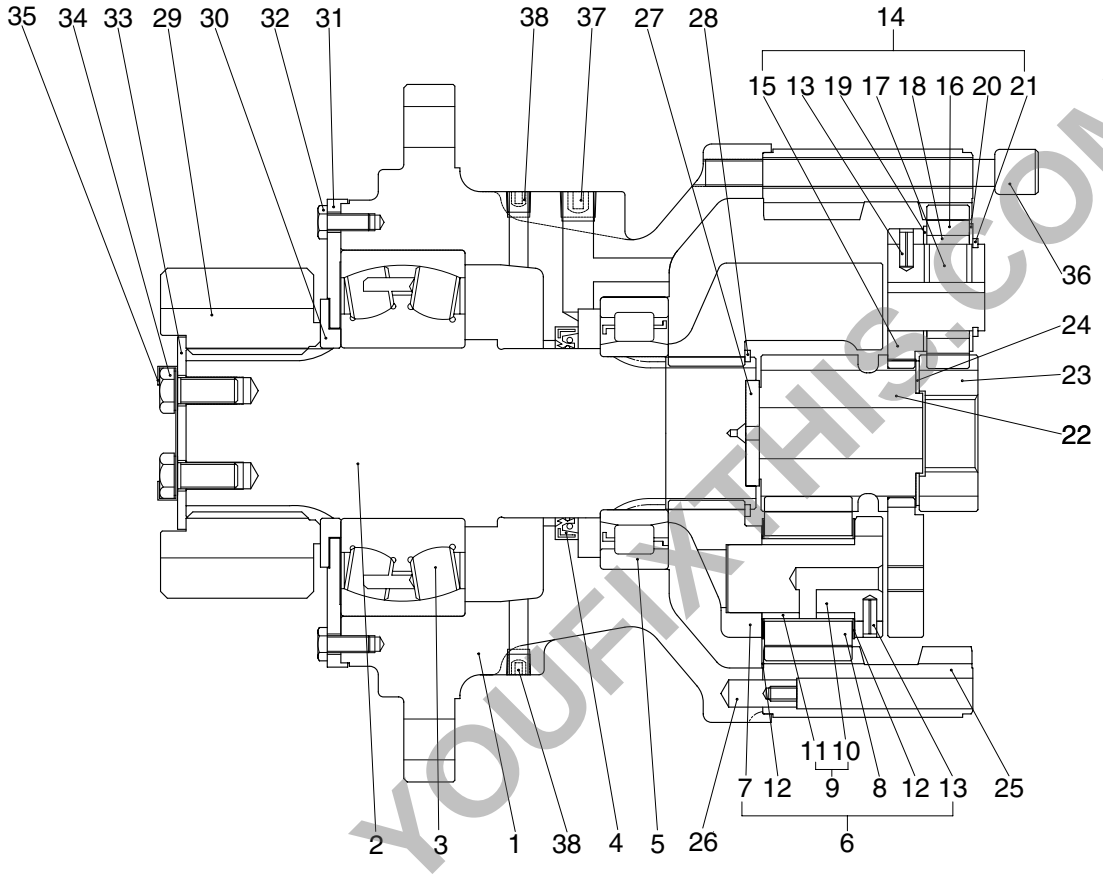

REG13 (210-7)

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4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) STRUCTURE

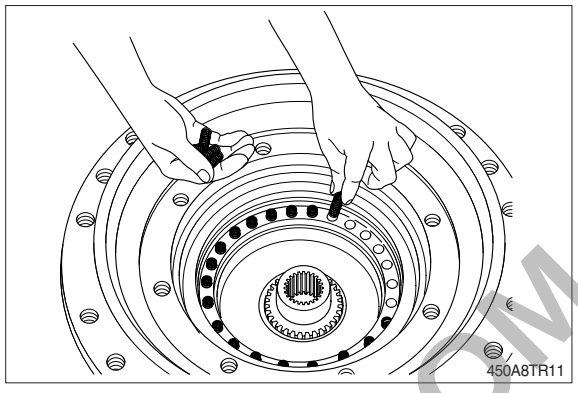


1	Casing	14	Carrier assy 1	27	Thrust plate 3
2	Drive shaft	15	Carrier 1	28	Stop ring
3	Roller bearing	16	Planet gear 1	29	Pinion gear
4	Oil seal	17	Pin 1	30	Spacer
5	Roller bearing	18	Needle cage	31	Cover plate
6	Carrier assy 2	19	Side plate 1	32	Hexagon bolt
7	Carrier 2	20	Side plate 2	33	Lock plate
8	Planet gear 2	21	Stop ring	34	Hexagon bolt
9	Pin assy 2	22	Sun gear 2	35	Lock washer
10	Pin 2	23	Sun gear 1	36	Socket bolt
11	Bush 2	24	Side plate 3	37	Plug
12	Thrust washer	25	Ring gear	38	Plug
13	Spring pin	26	Knock pin		

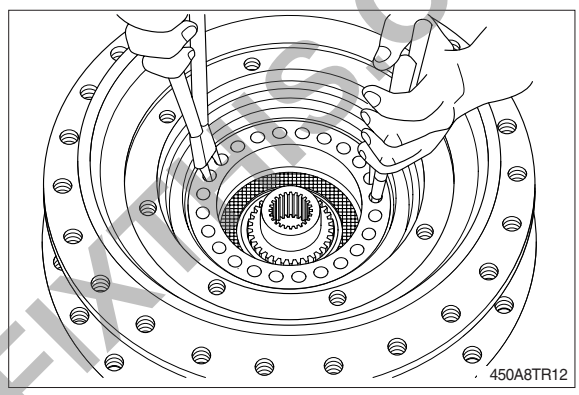
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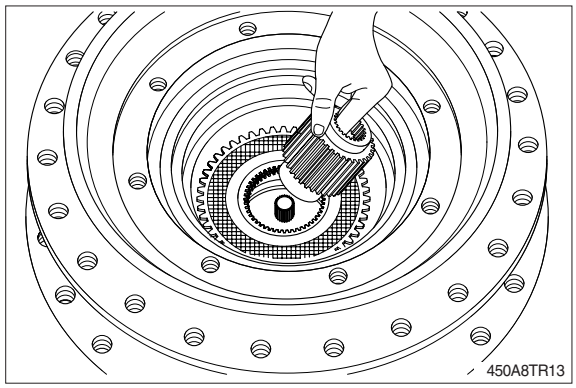
(8) Remove the springs (28) from their groves.



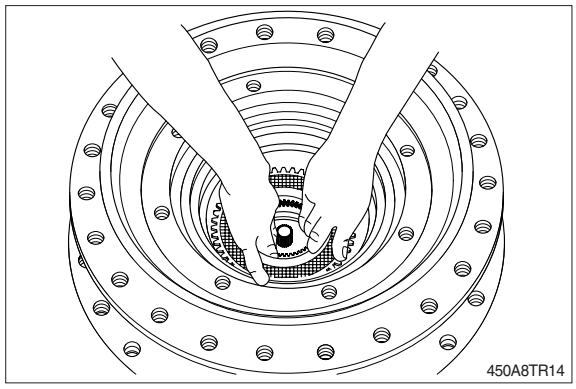
(9) Using pliers remove the brake piston (27).
※ To get it easier, pumping compressed air into the brake port hole.



(10) Remove the brake shaft (19).



(11) Remove brake discs pack (21, 22).

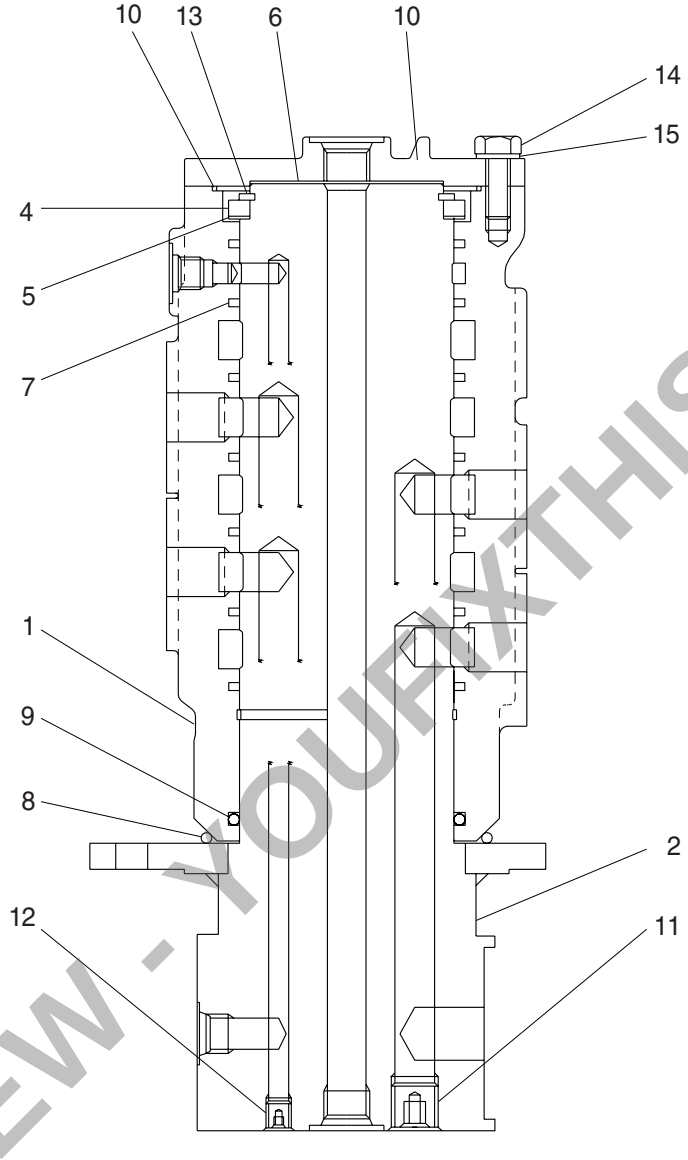


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2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



R210TJT2

1	Hub	6	Shim	11	Plug
2	Shaft assembly	7	Slipper seal	12	Plug
3	Cover	8	O-ring	13	Retaining ring
4	Spacer	9	O-ring	14	Hexagon bolt
5	Shim	10	O-ring	15	Spring washer

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