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NO.	DESTINATION
1	AC GND
2	BLOWER SIG.
3	AC 24V
4	REVERSE FAN
5	AC CONTROLLER B+
6	AC COMP
7	AC CONDENSOR FAN
8	ILLUMINATION

AIR-CON HARNESS

1	CLUSTER_TX
2	CLUSTER_RX
3	SHIELD
4	CLUSTER_GND
5	CLUSTER_IG
6	CLUSTER_BATT.24V
7	ECONO SW_COM
8	ECONO SW_NO
9	P_SUMP(SERVICE CONN.)
10	QUICK COUPLER SW_NO
11	OVERLOAD SW_COM
12	OVERLOAD SW_NO
13	ILLUMINATION
14	HOUR METER SIG.
15	RS232 RX(SERVICE CONN.)
16	RS232 TX(SERVICE CONN.)
17	GND(SERVICE CONN)
18	WIPER CONT_BATT.24V
19	WIPER CONT_WASHER P/P DRIVE
20	CAN_H(SERVICE CONN)
21	CAN_L(SERVICE CONN)
22	CAN SHIELD
23	CAMERA_2
24	WIPER IG
25	SPARE
26	GND
27	CIGAR LIGHTER_IG
28	DC-DC CONVERTER 24V
29	SW_COM(IG)
30	GND
31	GND
32	NC
33	BEACON SW_COM(IG)
34	CABIN LIGHT
35	START KEY SW_START
36	START KEY SW_COM
37	CAMERA_3
38	CABIN LIGHT
39	REVERSE FAN AUTO
40	REVERSE FAN MANUAL
41	RS232 RX(GPS)
42	RS232 TX(GPS)
43	NC
44	NC
45	NC
46	CASSETTE RADIO_BATT.24V
47	CASSETTE RADIO_IG
48	CASSETTE RADIO_GND
49	SWITCH PANEL_HEAD LIGHT
50	SWITCH PANEL_WORK LIGHT
51	CAMERA GND
52	CAMERA SIG.
53	CAMERA SHIELD
54	SWITCH PANEL_PREHEAT
55	SWITCH PANEL_CABIN LAMP
56	SWITCH PANEL_TRAVEL ALARM
57	SWITCH PANEL_IG
58	SWITCH PANEL_GND
59	START SW_ACC
60	START SW_BR

1	PROPORTIONAL 5V
2	PROPORTIONAL RETURN
3	PROPORTIONAL TILT SIG.
4	AIR SEAT POWER
5	BREAKER SW POWER
6	BREAKER SW
7	GND
8	HORN BUTTON(GND SIG)
9	N02 BUTTON
10	N02 BUTTON
11	N01 BUTTON
12	N01 BUTTON
13	ILLUMINATION
14	ACCEL DIAL 5V
15	ACCEL DIAL SIG
16	ACCEL DIAL GND

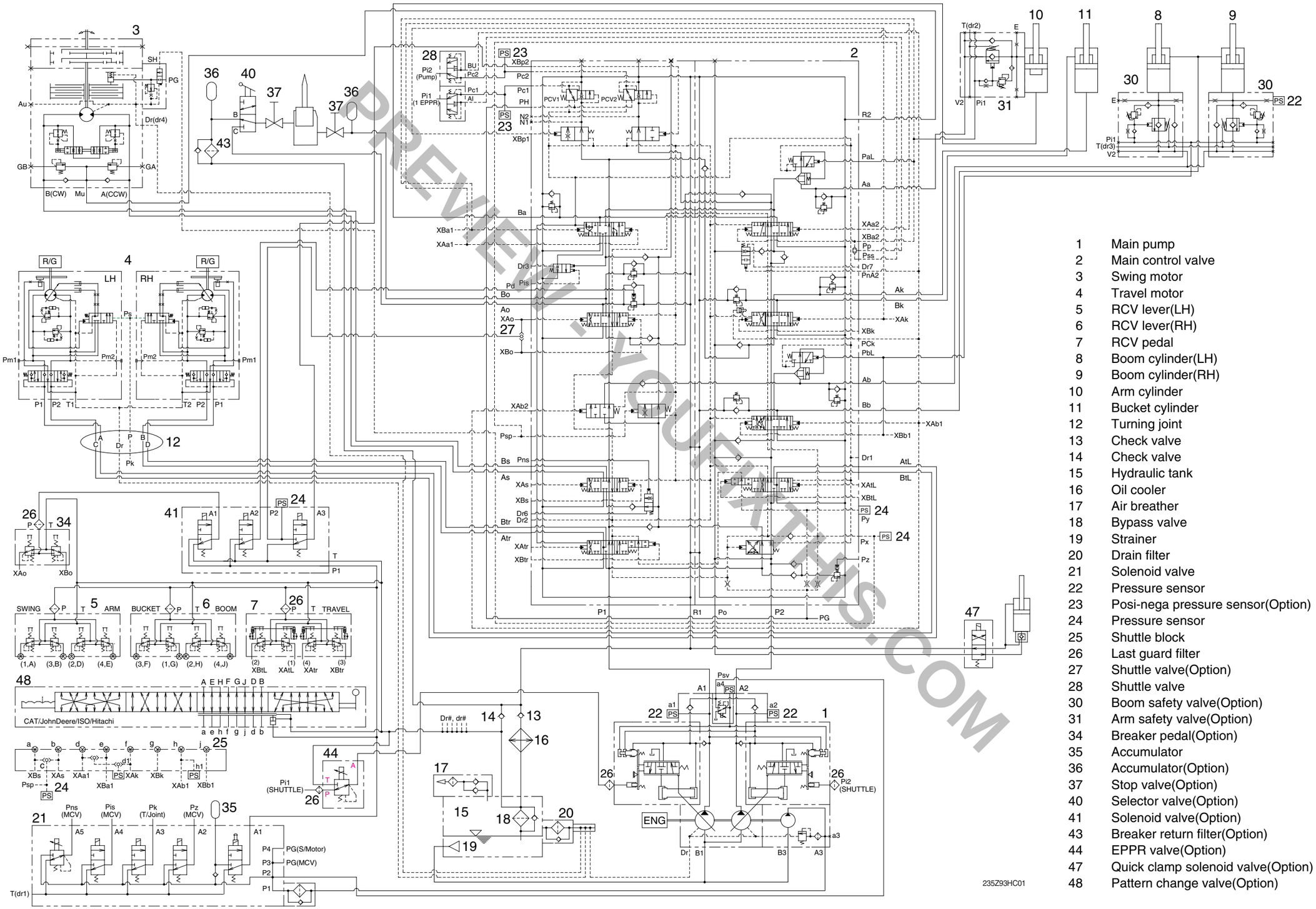
1	PROPORTIONAL 5V
2	PROPORTIONAL RETURN
3	PROPORTIONAL ROTATE SIG
4	SPARE SW
5	POWER MAX SIG
6	POWER MAX BUTTON
7	DECEL SIG
8	DECEL BUTTON
9	No2 BUTTON
10	No2 BUTTON
11	No1 BUTTON
12	No1 BUTTON
13	SPARE SW
14	SAFETY SW.COM
15	SAFETY SW.NC
16	SAFETY SW.NO

RH CONSOLE HARNESS

1	SPARE SW
2	SWITCH GND
3	SPARE SW
4	NC
5	SPARE SW
6	NC
7	SPARE SW
8	SWITCH POWER
9	SPARE SW
10	SPARE SW
11	SPARE SW
12	AIR COMP SW
13	AIR COMP SW
14	SPARE SW
15	SPARE SW

LH CONSOLE HARNESS

GROUP 1 HYDRAULIC CIRCUIT



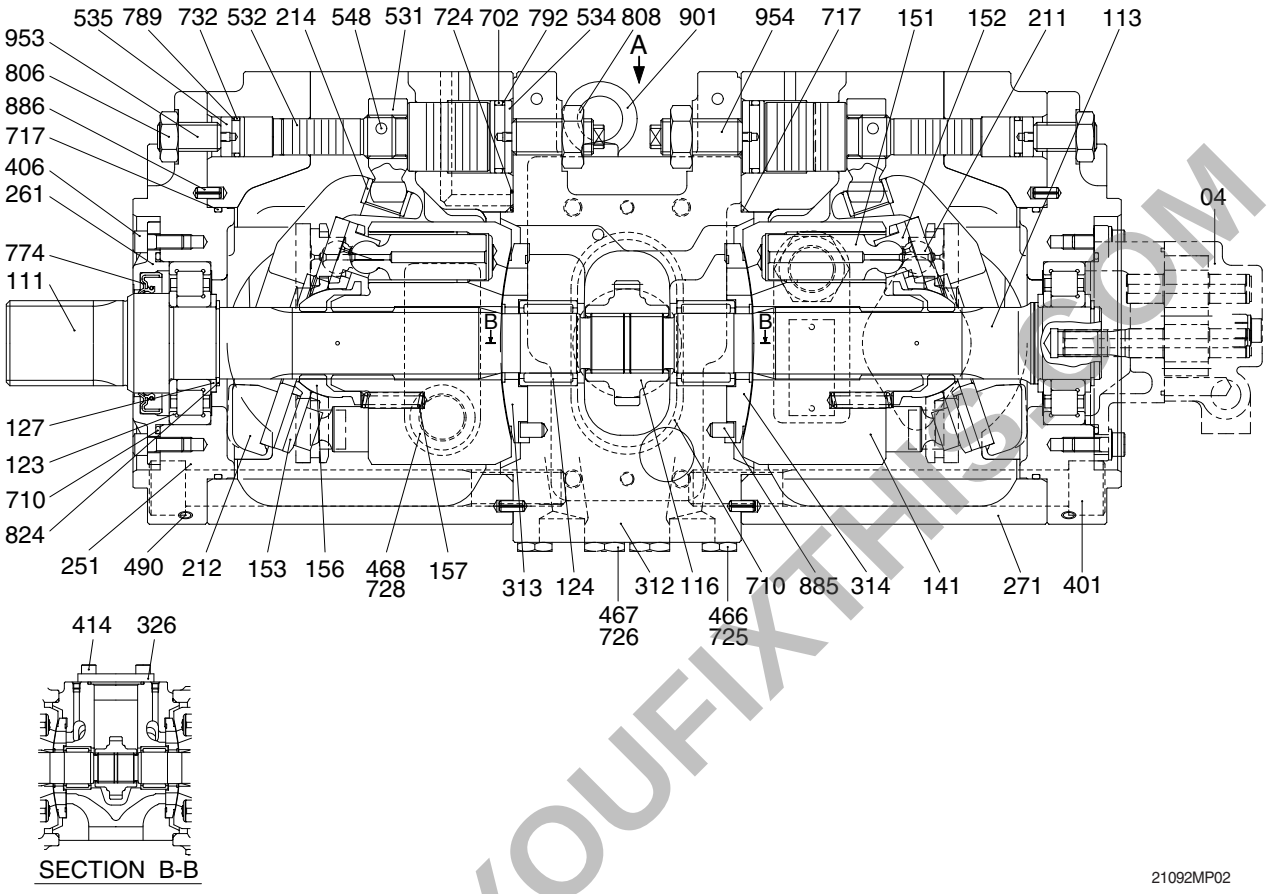
1 Main pump
2 Main control valve
3 Swing motor
4 Travel motor
5 RCV lever(LH)
6 RCV lever(RH)
7 RCV pedal
8 Boom cylinder(LH)
9 Boom cylinder(RH)
10 Arm cylinder
11 Bucket cylinder
12 Turning joint
13 Check valve
14 Check valve
15 Hydraulic tank
16 Oil cooler
17 Air breather
18 Bypass valve
19 Strainer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

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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	271	Pump casing	710	O-ring
111	Drive shaft (F)	312	Valve block	717	O-ring
113	Drive shaft (R)	313	Valve plate (R)	724	O-ring
116	Gear	314	Valve plate (L)	725	O-ring
123	Roller bearing	326	Cover	726	O-ring
124	Needle bearing	401	Hexagon socket bolt	728	O-ring
127	Bearing spacer	406	Hexagon socket bolt	732	O-ring
141	Cylinder block	414	Hexagon socket bolt	774	Oil seal
151	Piston	466	VP Plug	789	Back up ring
152	Shoe	467	VP plug	792	Back up ring
153	Set plate	468	VP Plug	806	Hexagon head nut
156	Bushing	490	Plug	808	Hexagon head nut
157	Cylinder spring	531	Tilting pin	824	Snap ring
211	Shoe plate	532	Servo piston	885	Pin
212	Swash plate	534	Stopper (L)	886	Spring pin
214	Bushing	535	Stopper (S)	901	Eye bolt
251	Support	548	Pin	953	Set screw
261	Seal cover (F)	702	O-ring	954	Set screw

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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 (engine-bracket)	M12 × 1.75	10.0 ± 1.0	72.3 ± 7.2
2		Engine mounting bolt (bracket-frame, FR)	M20 × 2.5	55 ± 3.5	398 ± 25
3		Engine mounting bolt (bracket-frame, RR)	M20 × 2.5	55 ± 3.5	398 ± 25
4		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Coupling mounting socket bolt	M18 × 2.5	32 ±1.0	231 ±7.2
6		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
7	Hydraulic system	Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	34.7 ± 2.v
8		Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
9		Main control valve mounting nut	M12 × 1.75	12.3 ± 1.3	89.0 ± 9.4
10		Hydraulic oil tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
11		Turning joint mounting bolt, nut	M12 × 1.75	12.3 ± 1.3	89.0 ± 9.4
12	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 5.8	419 ± 42
13		Swing bearing upper part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
14		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
15		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
16		Sprocket mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
17	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
18		Track roller mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
19		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
20		Track shoe mounting bolt, nut	M20 × 1.5	78 ± 8.0	564 ± 57.9
21		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
22	Others	Counterweight mounting bolt	M36 × 3.0	340 ± 10	2460 ± 72.3
23		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
24		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

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

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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	Overload pressure sensor data above normal range.
	1	Overload pressure sensor data below normal range.
	2	Overload pressure sensor data error.
	4	Overload 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.

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

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

- Hydraulic tank quantity : 160 ℓ

(6) Remove socket bolts (25) and disconnect pipe (7, 8).

(7) Disconnect pilot line hoses (2, 3, 4, 5, 6, 7).

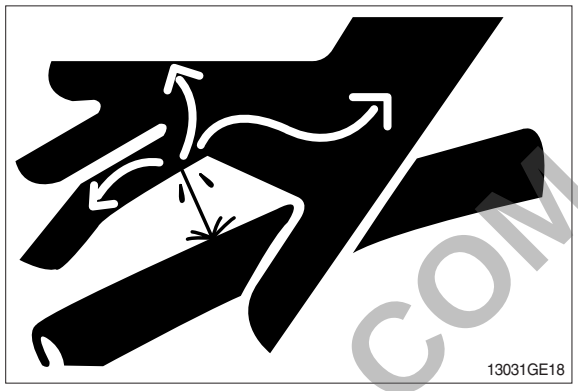
(8) Remove socket bolts(24) and disconnect pump suction tube (1).

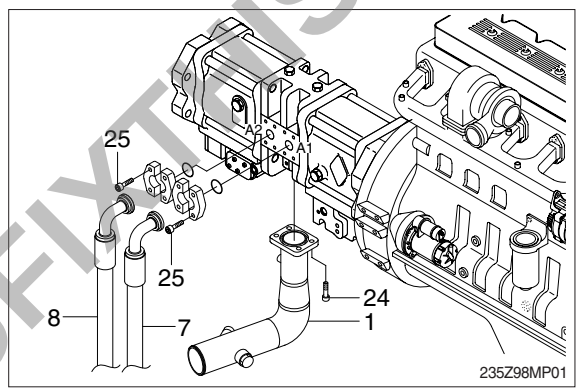
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

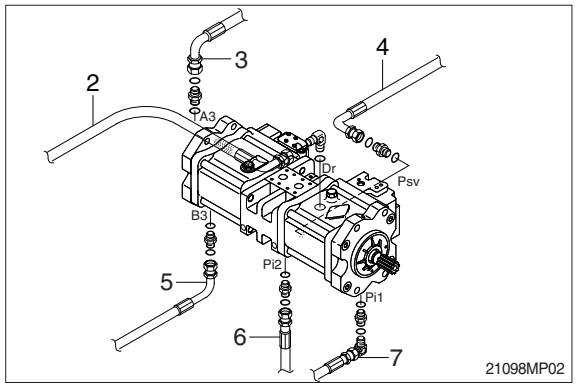
(9) Sling the pump assembly and remove the pump mounting bolts.

- Weight : 140 kg (310 lb)

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







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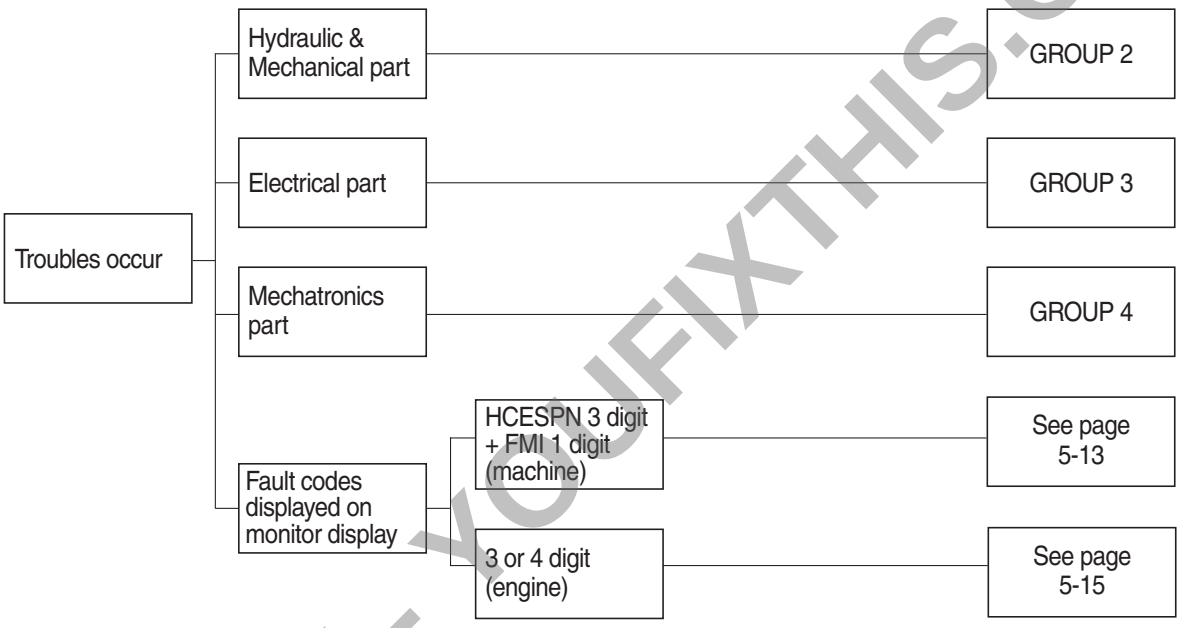
GROUP 1 BEFORE TROUBLESHOOTING

1. INTRODUCTION

When a trouble is occurred in the machine, this section will help an operator to maintain the machine with easy.

The trouble of machine is parted Hydraulic & Mechanical system, Electrical system and Mechatronics system. At each system part, an operator can check the machine according to the troubleshooting process diagram.

※ **Before carring out troubleshooting procedure, check monitoring menu in the cluster.**



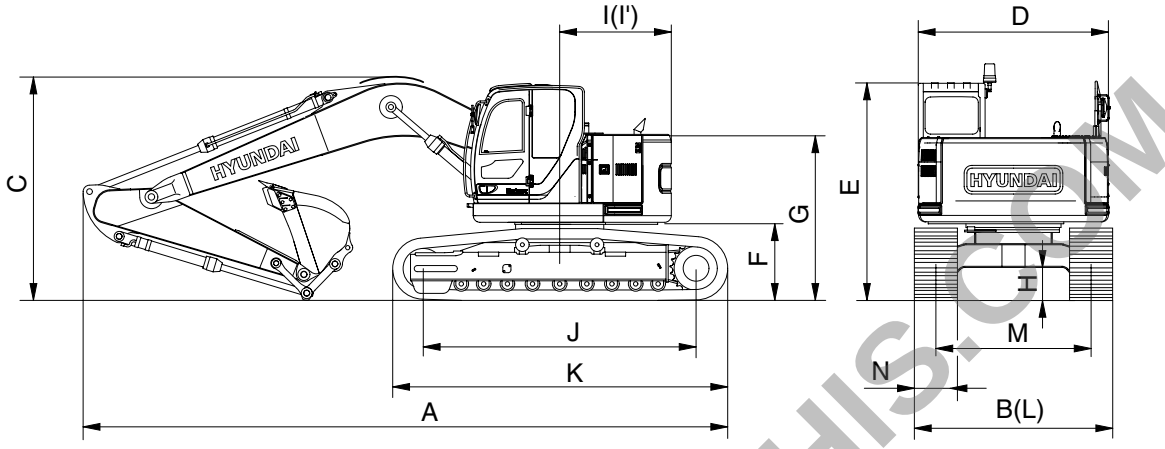
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2. SPECIFICATIONS

1) R235LCR-9

· 5.68 m (18' 8") BOOM and 2.92 m (9' 7") ARM



235Z92SP02

Description		Unit	Specification
Operating weight		kg (lb)	23800 (52470)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.8 (1.05)
Overall length	A	mm (ft-in)	8910 (29' 3")
Overall width, with 600mm shoe	B		2990 (9' 10")
Overall height	C		3020 (9' 11")
Superstructure width	D		2980 (9' 9")
Overall height of cab	E		2950 (9' 8")
Ground clearance of counterweight	F		1060 (3' 6")
Engine cover height	G		2385 (7' 10")
Minimum ground clearance	H		480 (1' 7")
Rear-end distance	I		1680 (5' 6")
Rear-end swing radius	I'		1680 (5' 6")
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	12.0
Gradeability		Degree (%)	35 (70)
Ground pressure (600 mm shoe)		kgf/cm^2 (psi)	0.51 (7.25)
Max traction force		kg (lb)	21100 (46500)

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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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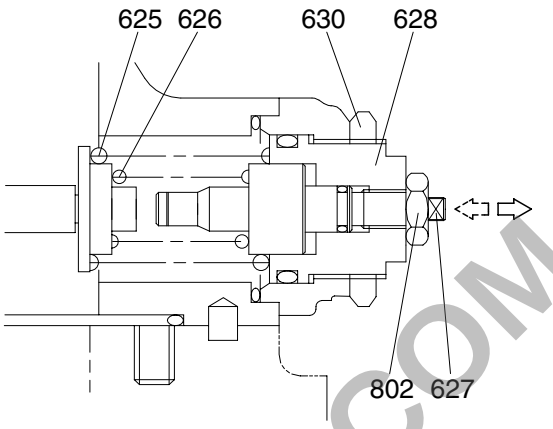
b. Adjustment of inner spring

Adjust it by loosening the hexagon nut (802) and by tightening (or loosening) the adjusting stem C (627).

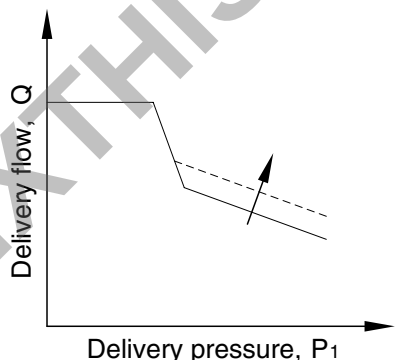
Tightening the screw increases the flow and then the input horsepower as shown in the figure.

※ Adjusting value

Speed	Adjustment of input horsepower		
	Tightening amount of adjusting stem (C) (627)	Flow change amount	Input torque change amount
(min $^{-1}$)	(Turn)	(ℓ /min)	(kgf·m)
1900	+1/4	+11.3	+4.7



2107A2MP08



21092MP18

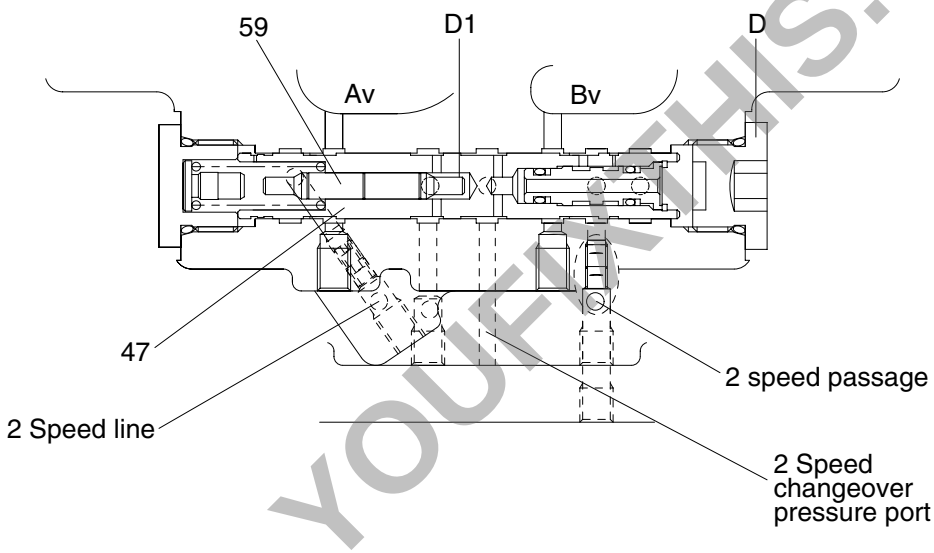
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2.6 Working description of automatic switch (at high speed)

At normal speed, once the hydraulic oil which is through the inner path of spool (47) flows into high speed switching pressure port (the pressure of external pilot : Pi = 35 kgf/cm^2) spool(47) moves from right to left.

At high speed, turning pressure of motor (D1) is over 250 kgf/cm^2, when the power forcing to spool (59) (Pressure, P1) is stronger than spool (47) and spool (59) is pushed out, after then spool (47) moves from left to right. So it is switched.



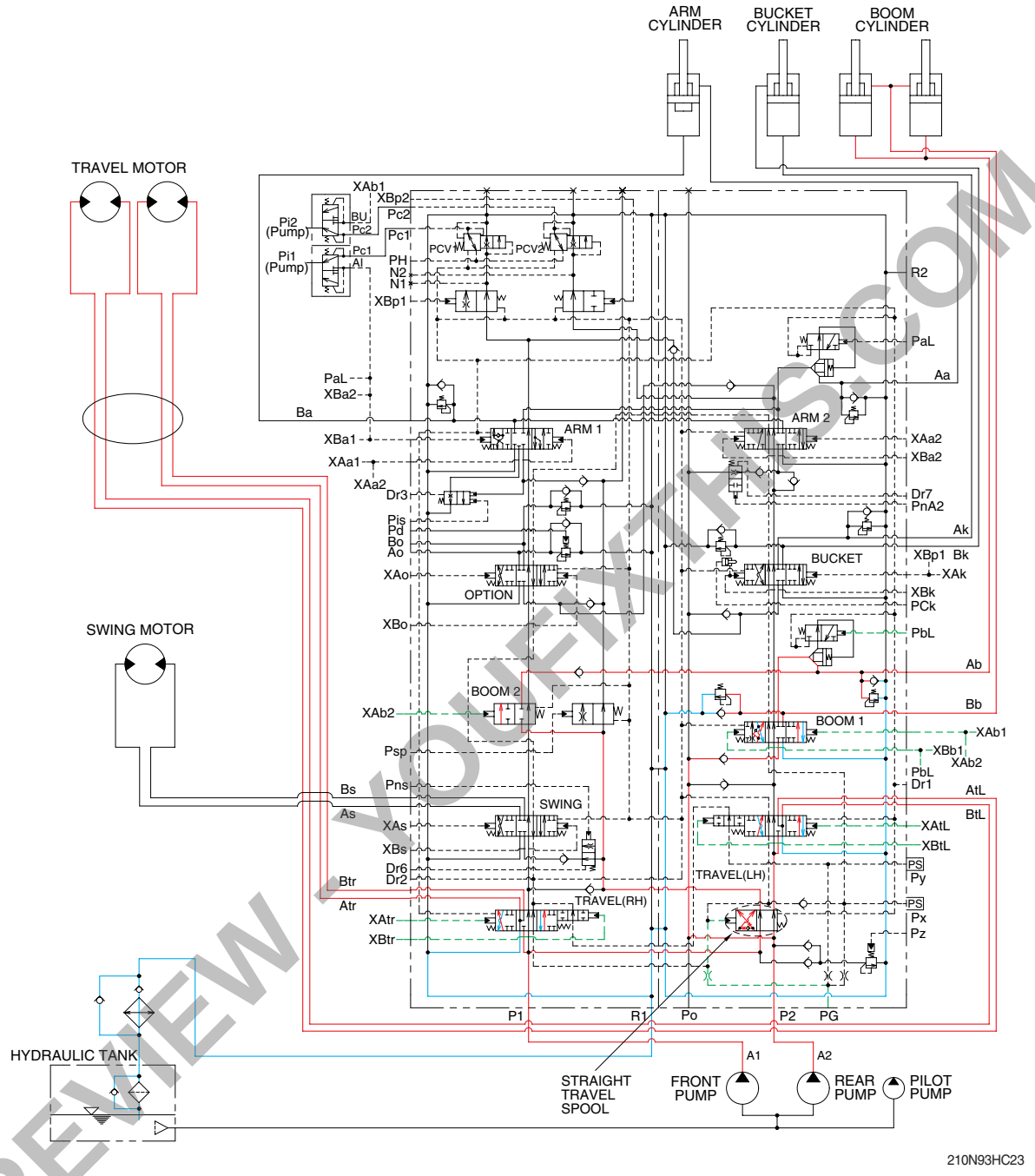
(High speed)

21078TM10

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6. COMBINED BOOM AND TRAVEL OPERATION



When the boom and travel functions are operated, simultaneously the boom spools 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 straight travel spool is pushed to the right by the oil pressure from pilot pump.

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

The oil from the rear pump flows into the boom cylinders through the boom 2 spool and boom 1 spool via the parallel and confluence oil passage in case boom up operation. Also, the oil from the rear pump flows into the travel motors through the LH travel spool via the check valve and orifice in the straight travel spool.

The boom is operated and the machine travels straight.

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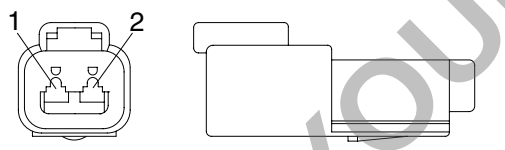
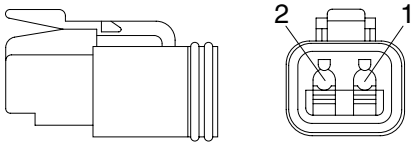
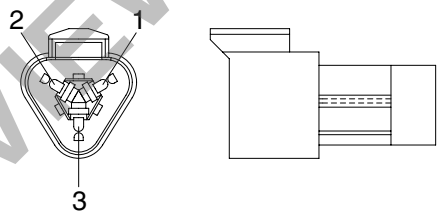
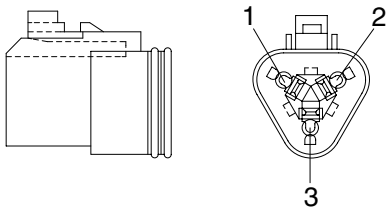
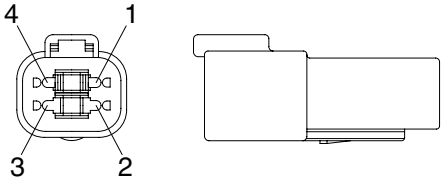
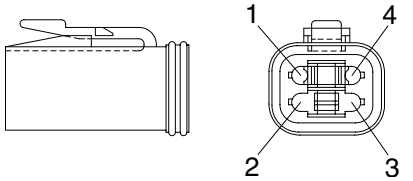
14) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★★★

- ★★★★ : Modifications (see below)
- 3S : Number of contacts (P : Pin, S : Socket)
- 06 : Receptacle, 06 : Plug
- DT : Deutsch connectors

※ Modification

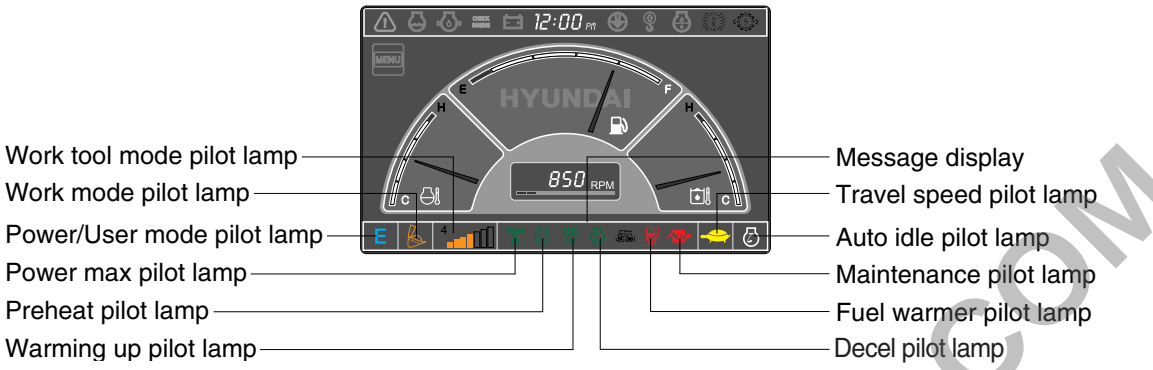
E003 : Standard end cap - gray
E004 : Color of connector to be black
E005 : Combination - E004 & E003
EP04 : End cap
EP06 : Combination P012 & EP04
P012 : Front seal enhancement - connectors color to black for 2, 3, 4 & 6pin

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 DT06-2S	 DT04-2P
3	 DT06-3S	 DT04-3P
4	 DT06-4S	 DT04-4P

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4) PILOT LAMPS



21093CD09

(1) Mode pilot lamps

No	Mode	Pilot lamp	Selected mode
1	Power mode	P	Heavy duty power work mode
		S	Standard power mode
		E	Economy power mode
2	User mode	U	User preferable power mode
3	Work mode		General operation mode
			Breaker operation mode
			Crusher operation mode
4	Travel mode		Low speed traveling
			High speed traveling
5	Auto idle mode		Auto idle
6	Work tool mode	4	Oil flow level of breaker or crusher mode
7	Message display	M	"Setting is completed" display after selection

(2) Power max pilot lamp



21093CD38

① The lamp will be ON when pushing power max switch on the LH RCV lever.

② The power max function is operated maximum 8 seconds.

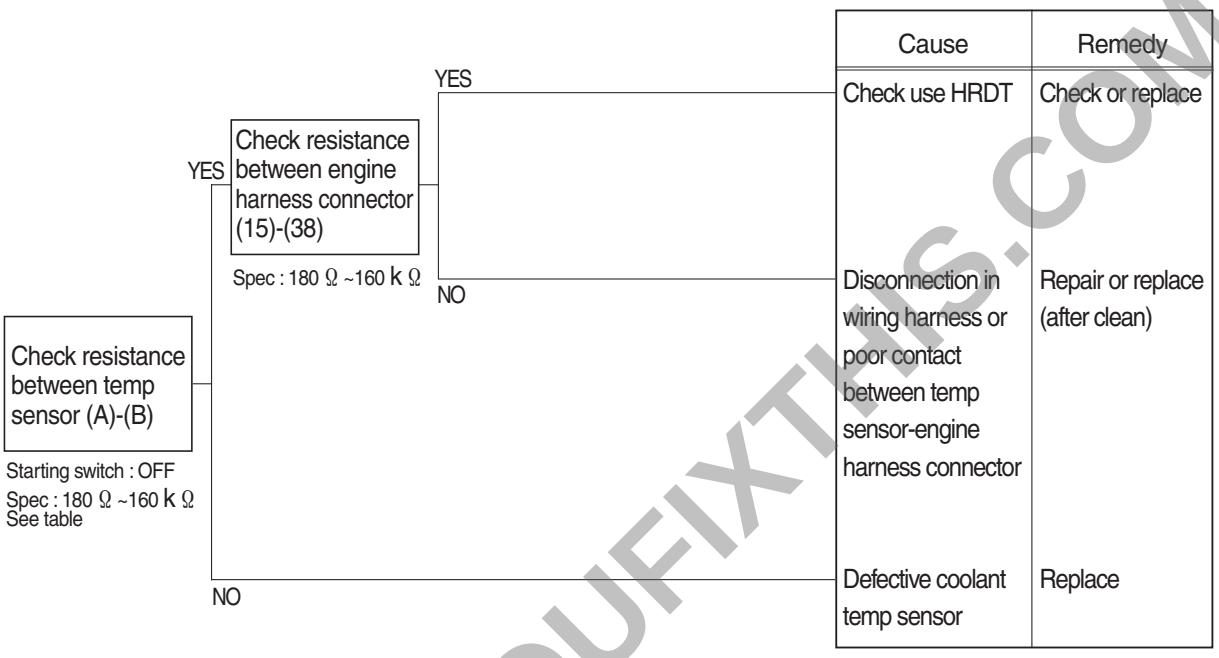
※ **Refer to the operator's manual page 3-26 for power max function.**

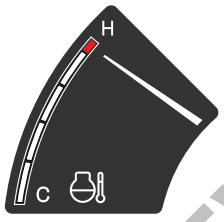
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8. WHEN COOLANT TEMPERATURE GAUGE DOES NOT OPERATE (HCESPN 304, FMI 3 or 4)

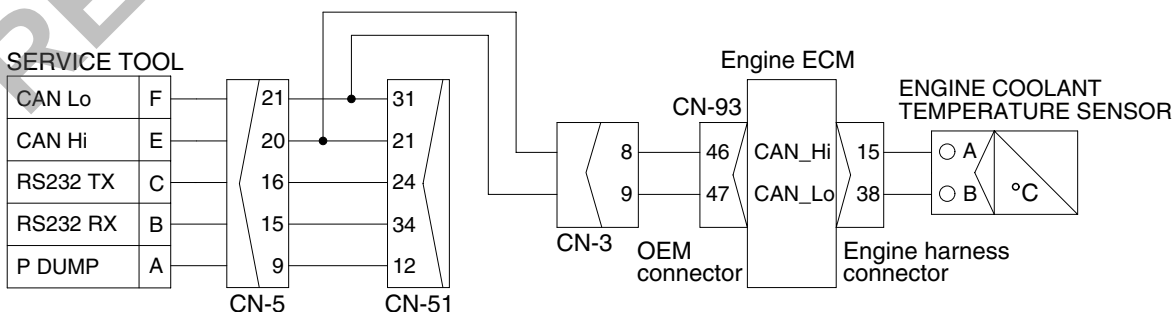
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.





Check Table

Temperature (˚C)	0	25	50	80	95
Resistance (kΩ)	30~37	9.3~10.7	3.2~3.8	1.0~1.3	0.7~0.8



21096ES04

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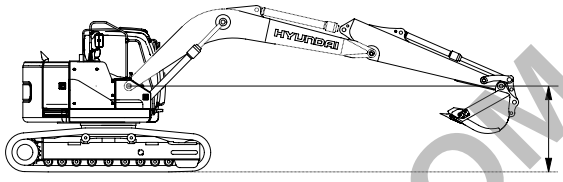
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7) SWING FUNCTION DRIFT CHECK

(1) Measure the swing drift on the bearing outer circumference when stopping after a 360° full speed swing.

(2) Preparation

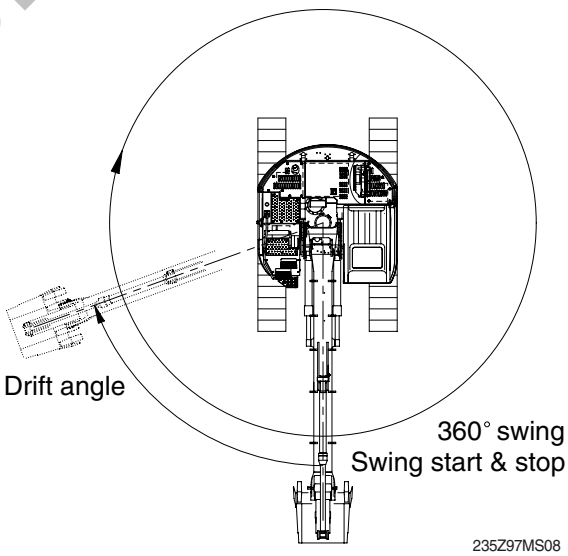
① Check the lubrication of the swing gear and swing bearing.
② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.
③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.
④ Make two chalk marks: one on the swing bearing and one directly below it on the track frame.
⑤ Swing the upperstructure 360˚.
⑥ Keep the hydraulic oil temperature at 50±5˚C.



235Z97MS07

(3) Measurement

① Conduct this test in the M mode.
② Select the following switch positions.
· Power mode switch : P mode
③ Operate the swing control lever fully and return it to the neutral position when the mark on the upperstructure aligns with that on track frame after swinging 360°
④ Measure the distance between the two marks.
⑤ Align the marks again, swing 360° , then test the opposite direction.
⑥ Repeat steps ④ and ⑤ three times each and calculate the average values.



235Z97MS08

(4) Evaluation

The measured drift angle should be within the following specifications.

Unit : Degree

Model	Power mode switch	Standard	Maximum allowable	Remarks
R235LCR-9	P mode	90 below	157.5	

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(2) Tightening torque

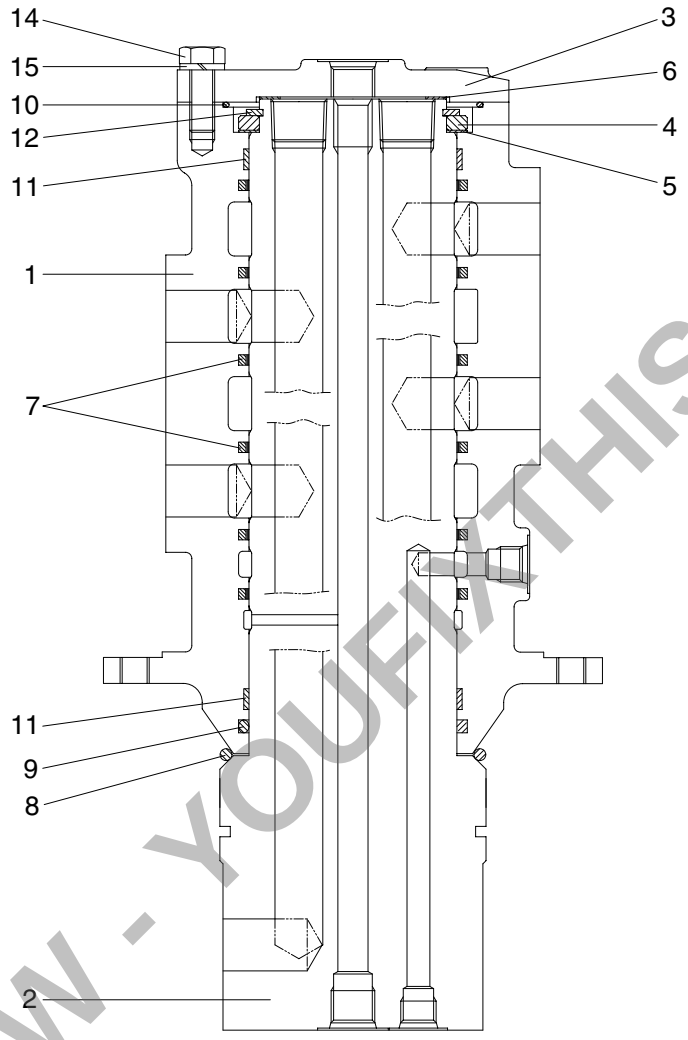
Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (Material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	116	0.47	12
	M16	24.0	174	0.55	14
	M18	34.0	246	0.55	14
	M20	44.0	318	0.67	17
PT Plug (Material : S45C) ※ Wind a seal tape 1 1/2 to 2 turns round the plug	PT1/16	0.7	5.1	0.16	4
	PT 1/8	1.05	7.59	0.20	5
	PT 1/4	1.75	12.7	0.24	6
	PT 3/8	3.5	25.3	0.31	8
	PT 1/2	5.0	36.2	0.39	10
PF Plug (Material : S35C)	PF 1/4	3.0	21.7	0.24	6
	PF 1/2	10.0	72.3	0.39	10
	PF 3/4	15.0	109	0.55	14
	PF 1	19.0	137	0.67	17
	PF 1 1/4	27.0	195	0.67	17
	PF 1 1/2	28.0	203	0.67	17

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2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



21098TJ01

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

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