SECTION 1 GENERAL

Group 1 Safety Hints 1-1
Group 2 Specifications 1-10

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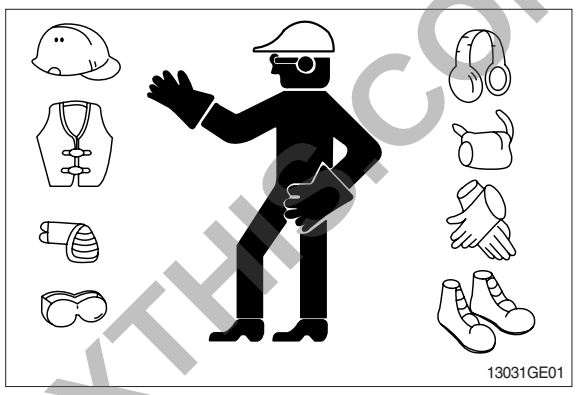
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work; Do not attempt shortcuts.

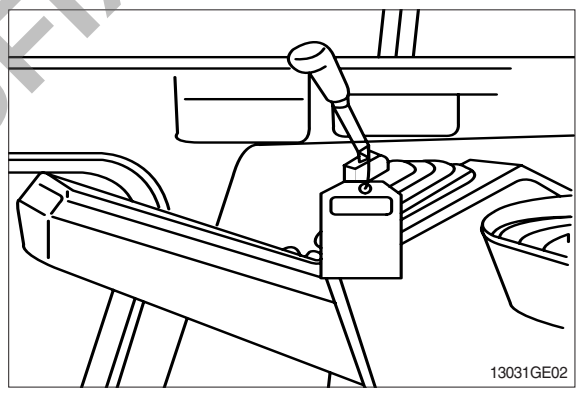
WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.



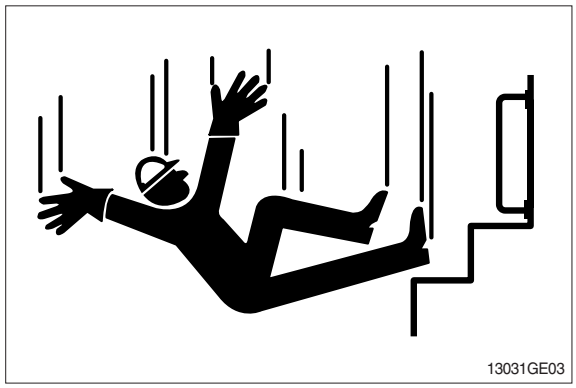
WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.
Before performing any work on the excavator, attach a 「**Do Not Operate**」 tag on the right side control lever.



USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.
When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.
Never jump on or off the machine. Never mount or dismount a moving machine.
Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

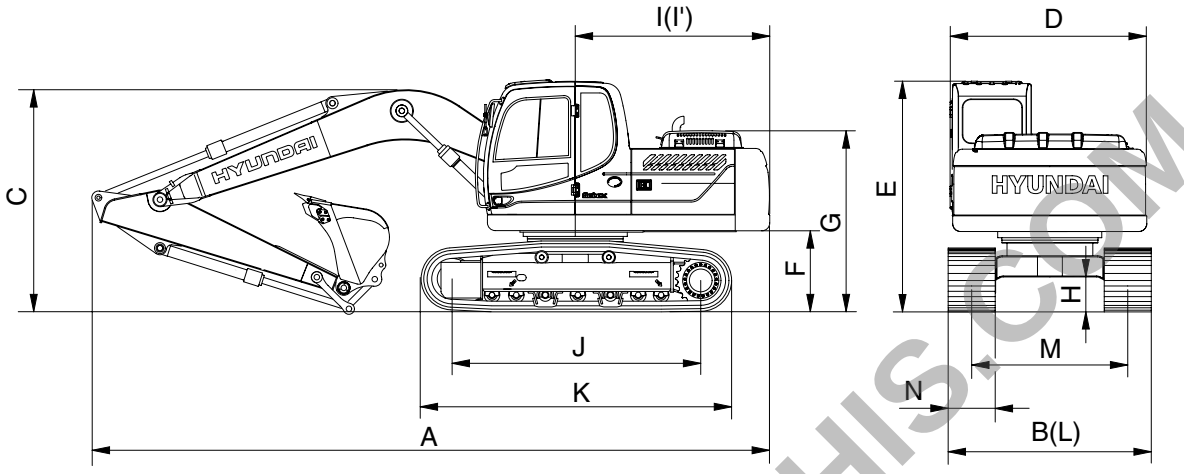


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2. SPECIFICATIONS

1) R160LC-9

· 5.1 m (16' 9") BOOM and 2.6 m (8' 6") ARM



16092SP02

Description		Unit	Specification
Operating weight		kg (lb)	17800 (39240)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.70 (0.92)
Overall length	A	mm (ft-in)	8650 (28' 5")
Overall width, with 600 mm shoe	B		2590 (8' 6")
Overall height	C		2990 (9' 10")
Superstructure width	D		2475 (8' 1")
Overall height of cab	E		2980 (9' 9")
Ground clearance of counterweight	F		1055 (3' 6")
Engine cover height	G		2315 (7' 7")
Minimum ground clearance	H		460 (1' 6")
Rear-end distance	I		2480 (8' 2")
Rear-end swing radius	I'		2530 (8' 4")
Distance between tumblers	J		3170 (10' 5")
Undercarriage length	K		3960 (13' 0")
Undercarriage width	L		2590 (8' 6")
Track gauge	M		1990 (6' 6")
Track shoe width, standard	N		600 (24")
Travel speed (low/high)		km/hr (mph)	3.2/5.5 (2.0/3.4)
Swing speed		rpm	11.3
Gradeability		Degree (%)	30 (58)
Ground pressure (600 mm shoe)		kgf/cm^2(psi)	0.43 (6.11)
Max traction force		kg (lb)	17000 (37478)

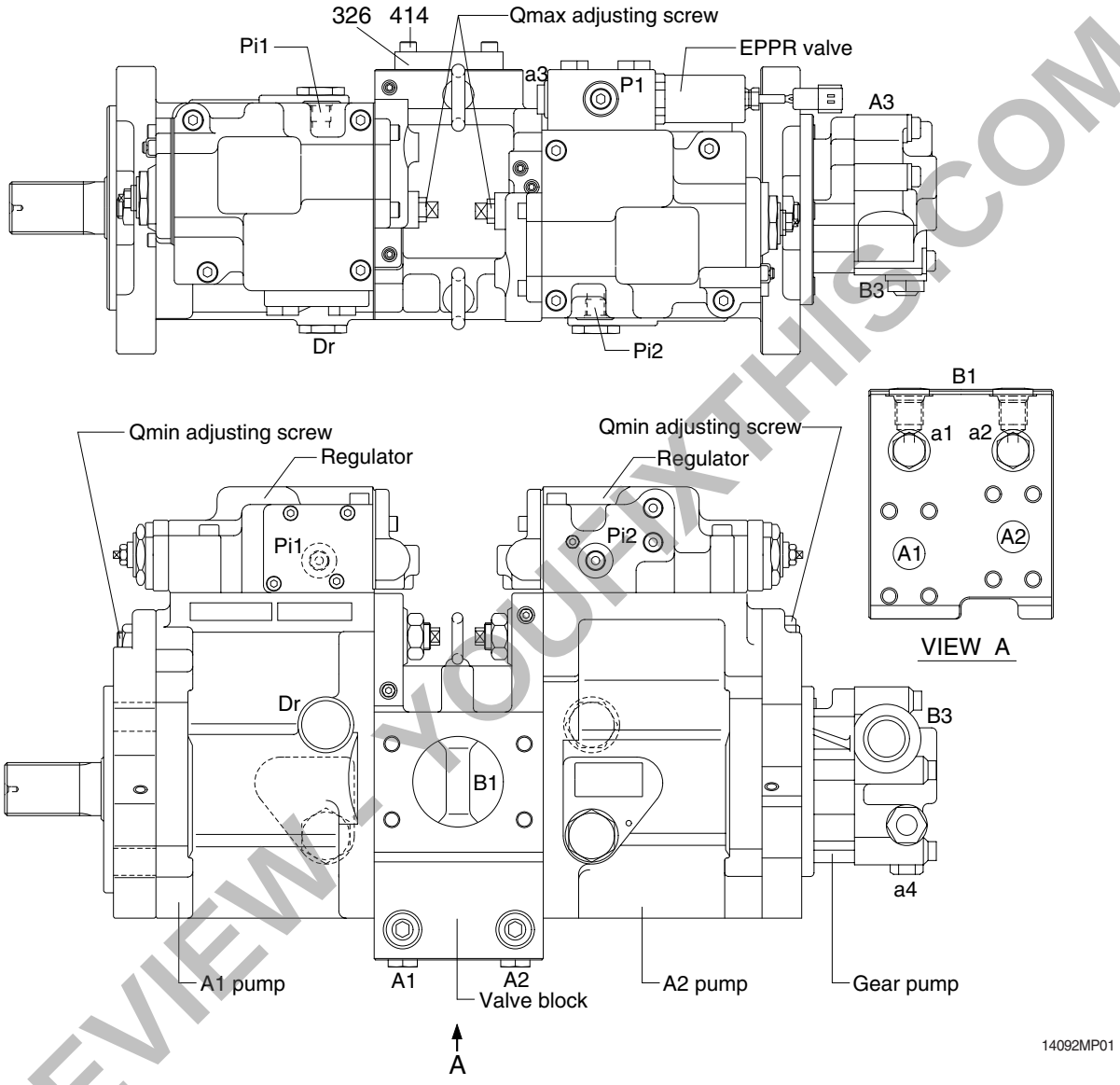
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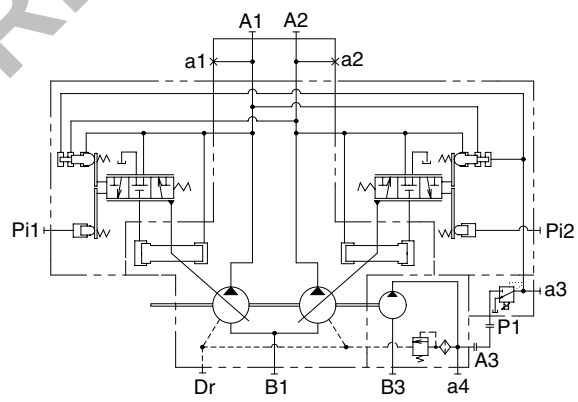
GROUP 1 PUMP DEVICE

1. STRUCTURE

The pump device consists of main pump, regulator and gear pump.



14092MP01

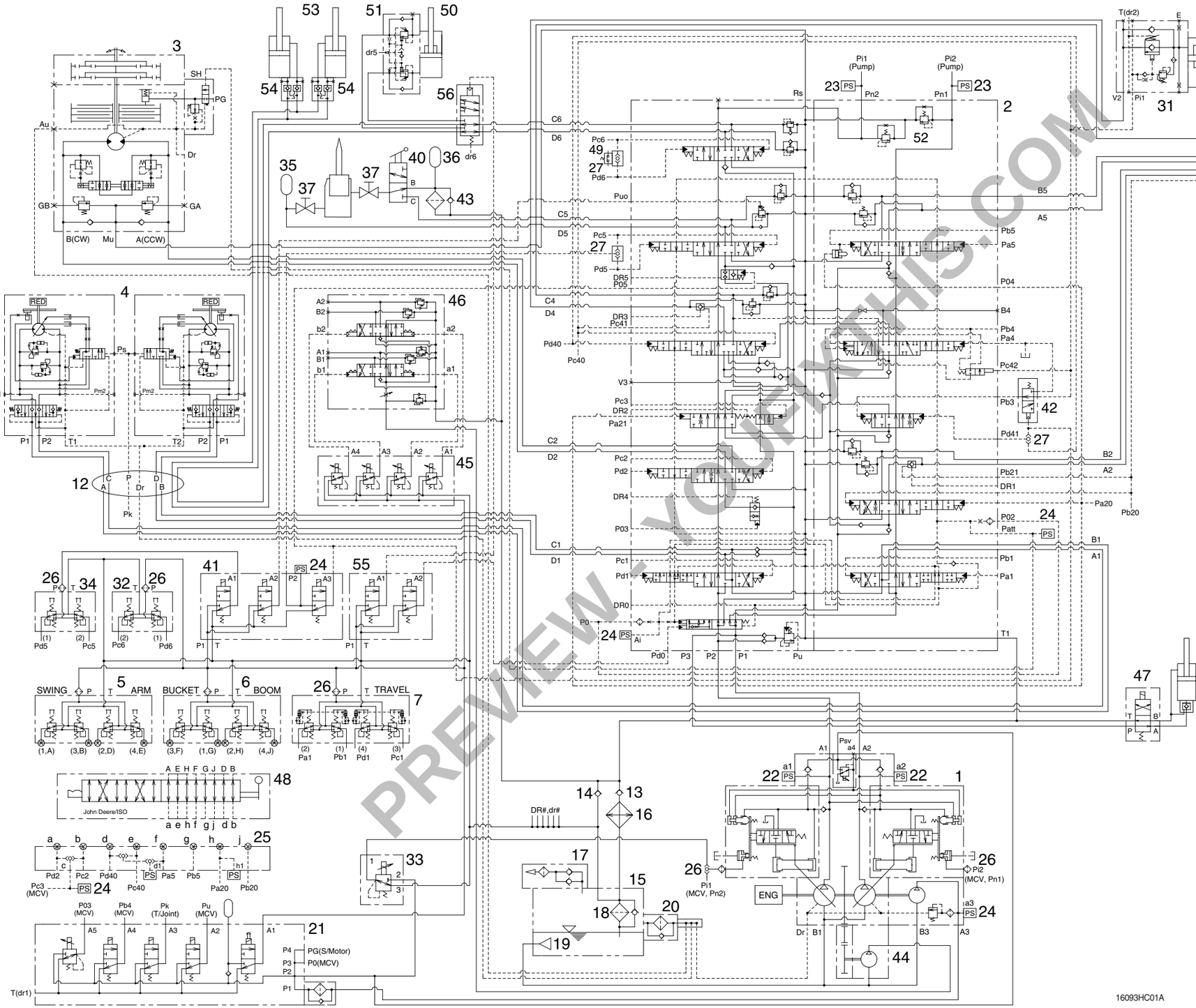


Port	Port name	Port size
A1, A2	Delivery port	SAE6000 psi 3/4"
B1	Suction port	SAE2500 psi 2 1/2"
Dr	Drain port	PF 1/2 - 19
Pi1, Pi2	Pilot port	PF 1/4 - 15
P1	EPPR port	PF 1/4 - 15
a1, a2, a3	Gauge port	PF 1/4 - 15
a4	Gauge port	PF 1/4-14
A3	Gear pump delivery port	PF 1/2 - 19
B3	Gear pump suction port	PF 3/4 - 20.5

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GROUP 1 HYDRAULIC CIRCUIT

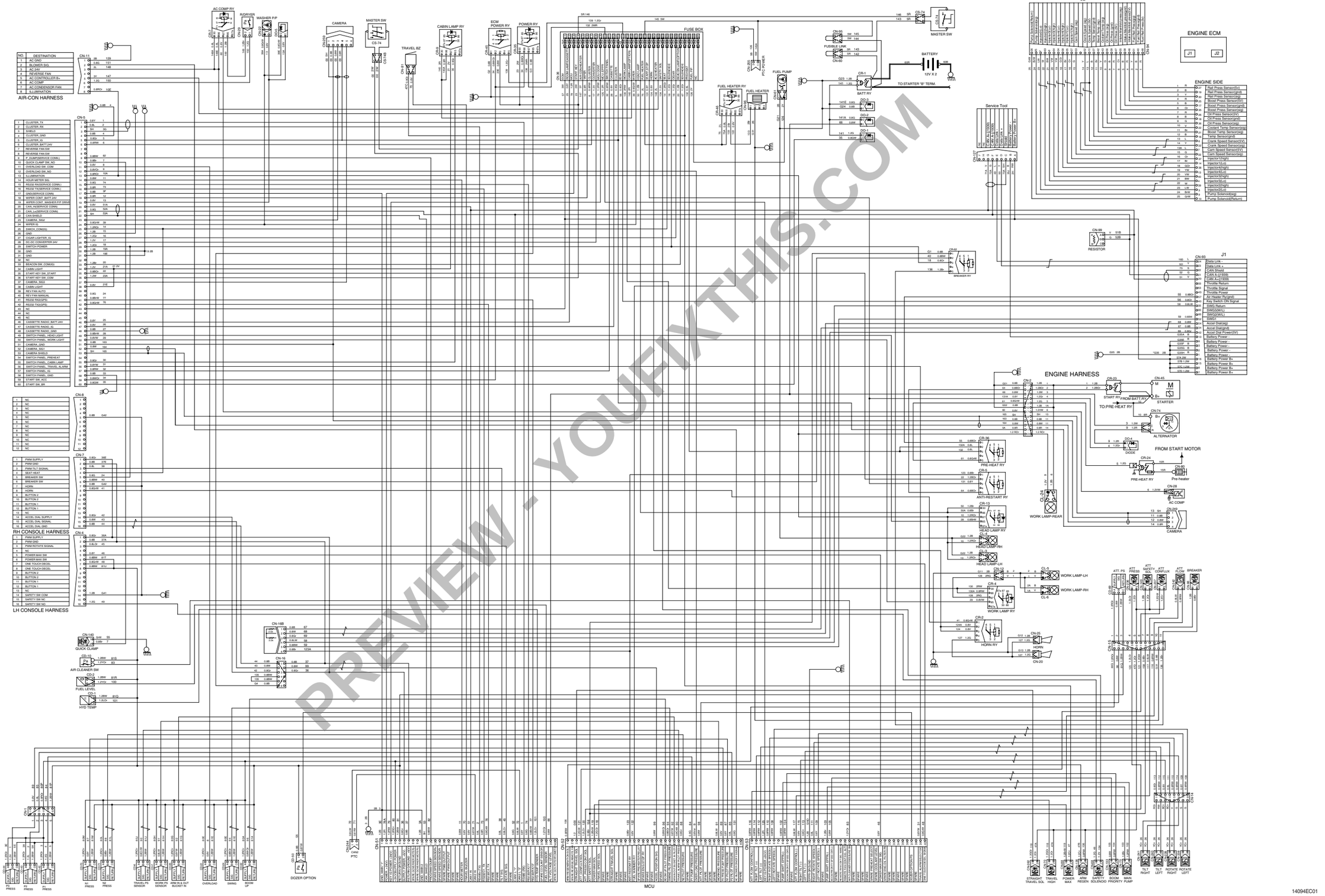


1 Main pump
2 Main control valve
3 Swing motor
4 Travel motor
5 RCV lever(LH)
6 RCV lever(RH)
7 RCV pedal
8 Boom cylinder(LH)
9 Boom cylinder(RH)
10 Arm cylinder
11 Bucket cylinder
12 Turning joint
13 Check valve
14 Check valve
15 Hydraulic tank
16 Oil cooler
17 Air breather
18 Bypass valve
19 Strainer
20 Drain filter
21 5 cartridge valve
22 Pressure sensor
23 Pressure sensor
24 Pressure sensor
25 Shuttle block
26 Last guard filter
27 Shuttle valve(Option)
30 Boom safety valve(Option)
31 Arm safety valve(Option)
32 RCV dozer lever(Option)
33 EPPR valve(Option)
34 Breaker pedal(Option)
35 Accumulator(Option)
36 Accumulator(Option)
37 Stop valve(Option)
40 Selector valve(Option)
41 Solenoid valve(Option)
42 Selector valve(Option)
43 Breaker return filter(Option)
44 Aux pump(Opt, rotating & tilt bucket)
45 EPPR valve(Opt, rotating & tilt bucket)
46 Aux control valve(Opt, rotating & tilt bucket)
47 Quick clamp solenoid valve(Option)
48 Pattern change valve(Option)
49 Pressure switch(Option)
50 Adjust boom cylinder(Option)
51 Adjust boom safety valve(Option)
52 Port relief valve(Option)
53 Dozer cylinder(Option)
54 Double pressure check(Opt, dozer)
55 Solenoid valve(Opt, dozer & adjust)
56 Selector valve(Opt, dozer & adjust)

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GROUP 2 ELECTRICAL CIRCUIT(1/2)



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

1	CLUSTER_TX
2	CLUSTER_RX
3	SHIELD
4	CLUSTER_GND
5	CLUSTER_IG
6	CLUSTER_BATT.24V
7	REVERSE FAN SW
8	REVERSE FAN SW
9	P_SUMP(SERVICE CONN.)
10	QUICK CLAMP 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_SIG2
24	WIPER IG
25	SWICH_COM(IG)
26	GND
27	CIGAR LIGHTER_IG
28	DC-DC CONVERTER 24V
29	SWITCH POWER
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_SIG3
38	CABIN LIGHT
39	REV FAN AUTO
40	REV 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_SIG1
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	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

1	PWM SUPPLY
2	PWM GND
3	PWM TILT SIGNAL
4	SEAT HEAT
5	BREAKER SW
6	BREAKER SW
7	HORN
8	HORN
9	BUTTON 2
10	BUTTON 2
11	BUTTON 1
12	BUTTON 1
13	NC
14	ACCEL DIAL SUPPLY
15	ACCEL DIAL SIGNAL
16	ACCEL DIAL GND

1	PWM SUPPLY
2	PWM GND
3	PWM ROTATE SIGNAL
4	NC
5	POWER MAX SW
6	POWER MAX SW
7	ONE TOUCH DECEL
8	ONE TOUCH DECEL
9	BUTTON 2
10	BUTTON 2
11	BUTTON 1
12	BUTTON 1
13	NC
14	SAFETY SW COM
15	SAFETY SW NC
16	SAFETY SW NO

1	Rail Press Sensor(5v)
2	Rail Press Sensor(gnd)
3	Rail Press Sensor(sig)
4	Boost Press Sensor(5V)
5	Boost Press Sensor(gnd)
6	Boost Press Sensor(sig)
7	Oil Press Sensor(5V)
8	Oil Press Sensor(gnd)
9	Oil Press Sensor(sig)
10	Coolant Temp Sensor(sig)
11	Boost Temp Sensor(sig)
12	Temp Sensor(gnd)
13	Crank Speed Sensor(5V)
14	Crank Speed Sensor(sig)
15	Cam Speed Sensor(5V)
16	Cam Speed Sensor(sig)
17	Injector1(high)
18	Injector1(Lo)
19	Injector4(high)
20	Injector4(Lo)
21	Injector3(high)
22	Injector3(Lo)
23	Injector2(high)
24	Injector2(Lo)
25	Pump Solenoid(sig)
26	Pump Solenoid(Return)

1	Data Link -
2	Data Link +
3	CAN Shield
4	CAN A-(J1939)
5	CAN A+(J1939)
6	Throttle Return
7	Throttle Signal
8	Throttle Power
9	Air Heater Relay(gnd)
10	Key Switch ON Signal
11	SW5 Return
12	SW5(SW4L)
13	SW5(SW4L)
14	SW5(1
15	Accel Dial(sig)
16	Accel Dial(gnd)
17	Accel Dial Power(5V)
18	Battery Power -
19	Battery Power -
20	Battery Power -
21	Battery Power -
22	Battery Power -
23	Battery Power B+
24	Battery Power B+
25	Battery Power B+
26	Battery Power B+

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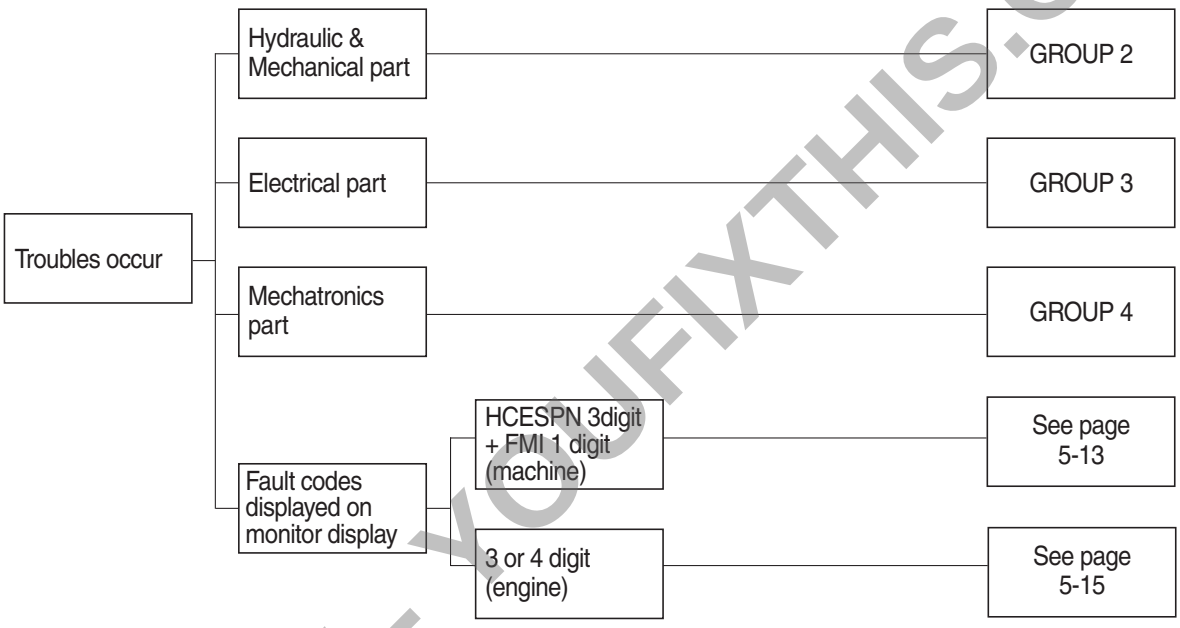
GROUP 1 BEFORE TROUBLESHOOTING

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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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 : 124 ℓ (32.8 U.S. gal)

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

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

(7) Remove socket bolts (12) and disconnect pump suction pipe (4).

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

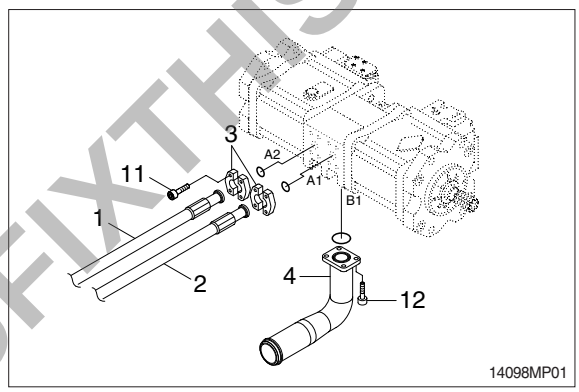
(8) Sling the pump assembly and remove the pump mounting bolts.

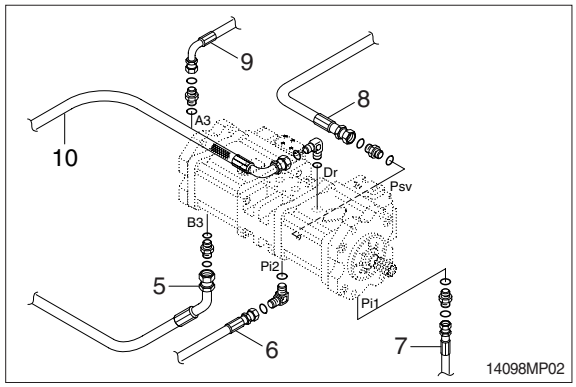
· Weight : 100 kg (220 lb)

※ 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 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 ± 1.0	72.3 ± 7.2
2		Engine mounting bolt (bracket-frame, FR)	M20 × 2.5	55 ± 3.5	398 ± 25.3
3		Engine mounting bolt (bracket-frame, RR)	M20 × 2.5	55 ± 3.5	398 ± 25.3
4		Engine fan clutch mounting bolt	M10 × 1.5	4.4 ± 0.5	31.8 ± 3.6
5		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
6		Coupling mounting socket bolt	M16 × 2.0	22 ± 1.0	159 ± 7.2
7		Main pump housing mounting bolt	M10 × 1.5	6.0 ± 1.5	43.4 ± 10.8
8	Hydraulic system	Main pump mounting socket bolt	M16 × 2.0	22 ± 1.0	159 ± 7.2
9		Main control valve mounting bolt	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
10		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
11		Hydraulic oil tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
12		Turning joint mounting bolt, nut	M12 × 1.75	12.3 ± 1.3	88.9 ± 9.4
13	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
14		Swing bearing upper part mounting bolt	M20 × 2.5	58 ± 6.3	420 ± 45.6
15		Swing bearing lower part mounting bolt	M20 × 2.5	58 ± 6.3	420 ± 45.6
16		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
17		Sprocket mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
18	Under carriage	Carrier roller mounting bolt, nut	M20 × 2.5	57.9 ± 8.7	419 ± 31.8
19		Track roller mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
20		Track tension cylinder mounting bolt	M16 × 2.0	21.9 ± 3.3	158 ± 23.9
21		Track shoe mounting bolt, nut	5/8 - 18UNF	42 ± 4	304± 28.9
22		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419± 62.9
23	Others	Counterweight mounting bolt	M30 × 3.0	199 ± 30	1439 ± 217
24		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
25		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

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

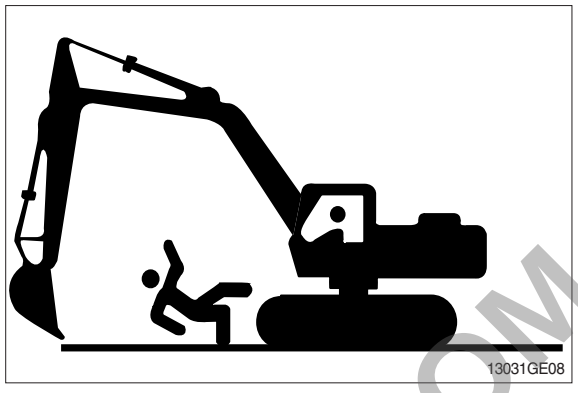
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KEEP RIDERS OFF EXCAVATOR

Only allow the operator on the excavator. Keep riders off.

Riders on excavator are subject to injury such as being struck by foreign objects and being thrown off the excavator. Riders also obstruct the operator's view resulting in the excavator being operated in an unsafe manner.

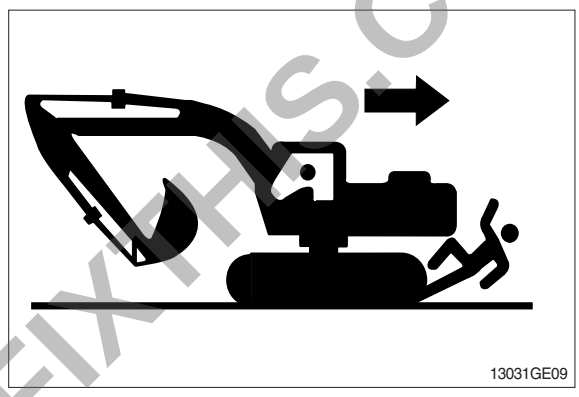


MOVE AND OPERATE MACHINE SAFELY

Bystanders can be run over. Know the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in working condition. It warns people when the excavator starts to move.

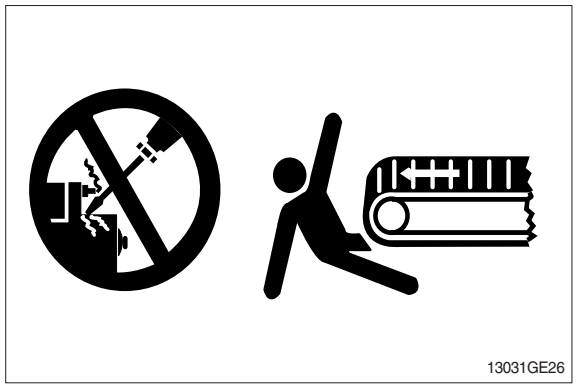
Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the excavator.



OPERATE ONLY FORM OPERATOR'S SEAT

Avoid possible injury machine damage. Do not start engine by shorting across starter terminals.

NEVER start engine while standing on ground. Start engine only from operator's seat.



PARK MACHINE SAFELY

Before working on the machine:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto idle switch off.
- Run engine at 1/2 speed without load for 2 minutes.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Move pilot control shutoff lever to locked position.
- Allow engine to cool.

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4. WEIGHT

Item	R180LC-9		R180LCD-9		180NLC-9	
	kg	lb	kg	lb	kg	lb
Upper structure assembly	7880	17370	←		←	
Main frame weld assembly	1470	3240	←		←	
Engine assembly	420	930	←		←	
Fan clutch assembly	45	100	←		←	
Main pump assembly	100	220	←		←	
Main control valve assembly	140	310	←		←	
Swing motor assembly	250	550	←		←	
Hydraulic oil tank assembly	165	360	←		←	
Fuel tank assembly	130	290	←		←	
Counterweight	2900	6390	←		←	
Cab assembly	500	1100	←		←	
Lower chassis assembly	7670	16910	8670	19110	7580	16710
Track frame weld assembly	2130	4700	2370	5230	1980	4370
Swing bearing	260	570	←		←	
Travel motor assembly	300	660	←		←	
Turning joint	60	130	←		←	
Track recoil spring	140	310	←		←	
Idler	160	350	←		←	
Carrier roller	20	45	←		←	
Track roller	40	90	←		←	
Track-chain assembly (600 mm standard triple grouser shoe)	1180	2600	←		←	
Front attachment assembly (5.1 m boom, 2.6 m arm, 0.76 m^3 SAE heaped bucket)	3020	6660	←		←	
5.1 m boom assembly	1040	2290	←		←	
2.6 m arm assembly	540	1190	←		←	
0.76 m^3 SAE heaped bucket	570	1260	←		←	
Boom cylinder assembly	155	340	←		←	
Arm cylinder assembly	180	400	←		←	
Bucket cylinder assembly	125	260	←		←	
Bucket control link assembly	120	265	←		←	
Dozer blade assembly	-	-	715	1575	-	-
Dozer blade cylinder assembly	-	-	-	-	-	-

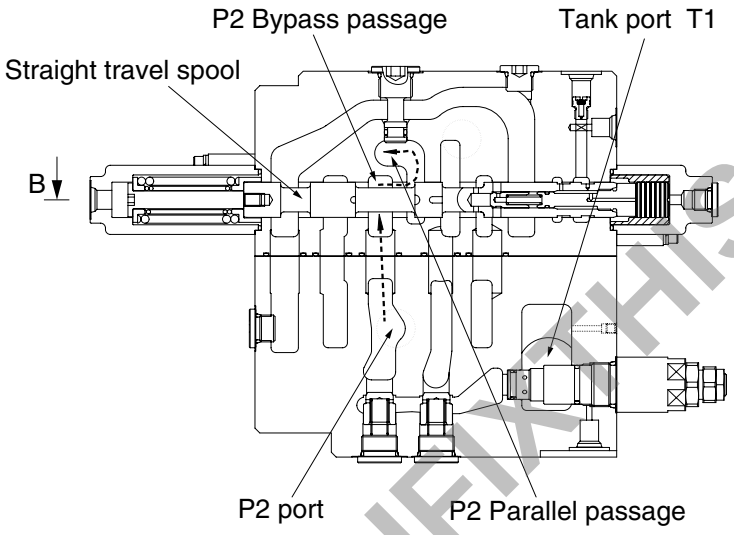
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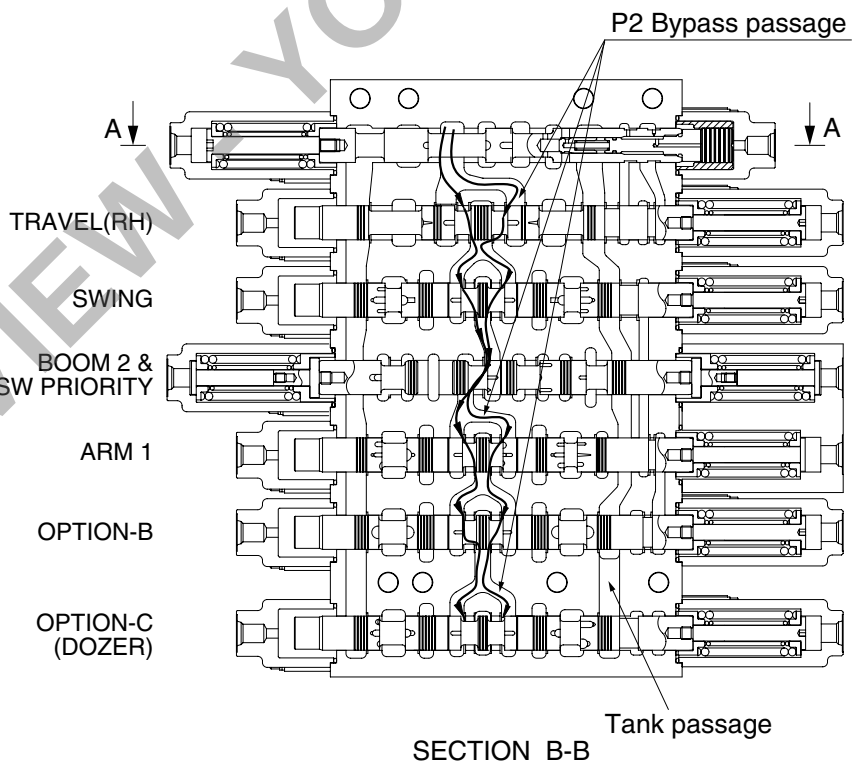
(2) P2 SIDE

The hydraulic fluid from pump A1 flows into the main control valve through the inlet port "P2", into the P2 bypass passage and P2 parallel passage.

The hydraulic fluid from the pump A1 is directed to the tank through the bypass passage of spools : travel right, swing, boom 2 & swing priority, arm 1, option "B" and option "C" (dozer), the negative relief valve of P2, tank passage and the tank port "T1".



SECTION A-A



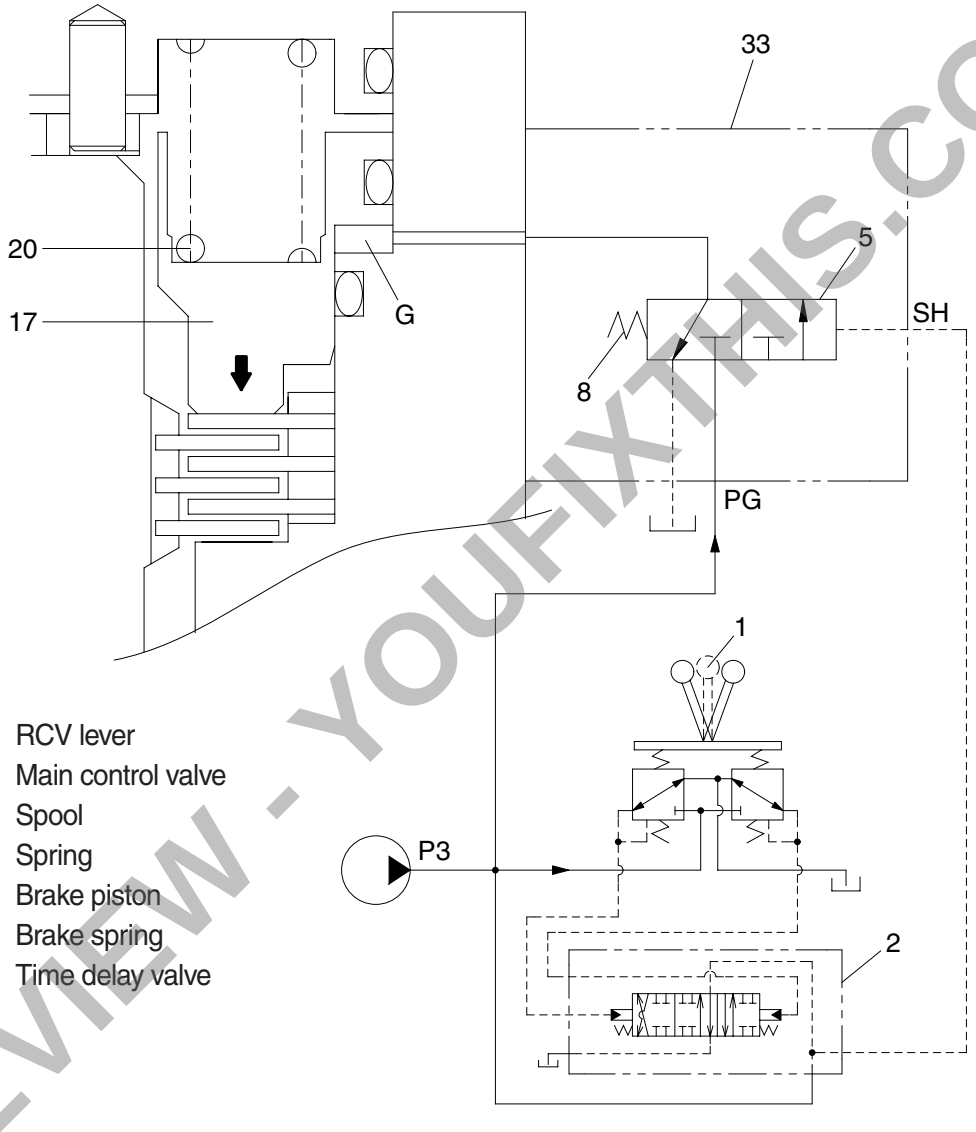
SECTION B-B

14092MC12

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b. When all of the RCV lever (1) are set the neutral position, the spool (5) returns to right.
Then, the brake piston (17) is moved lower by spring force and the return oil from the chamber G flows back to tank port.
At this time, the brake works.



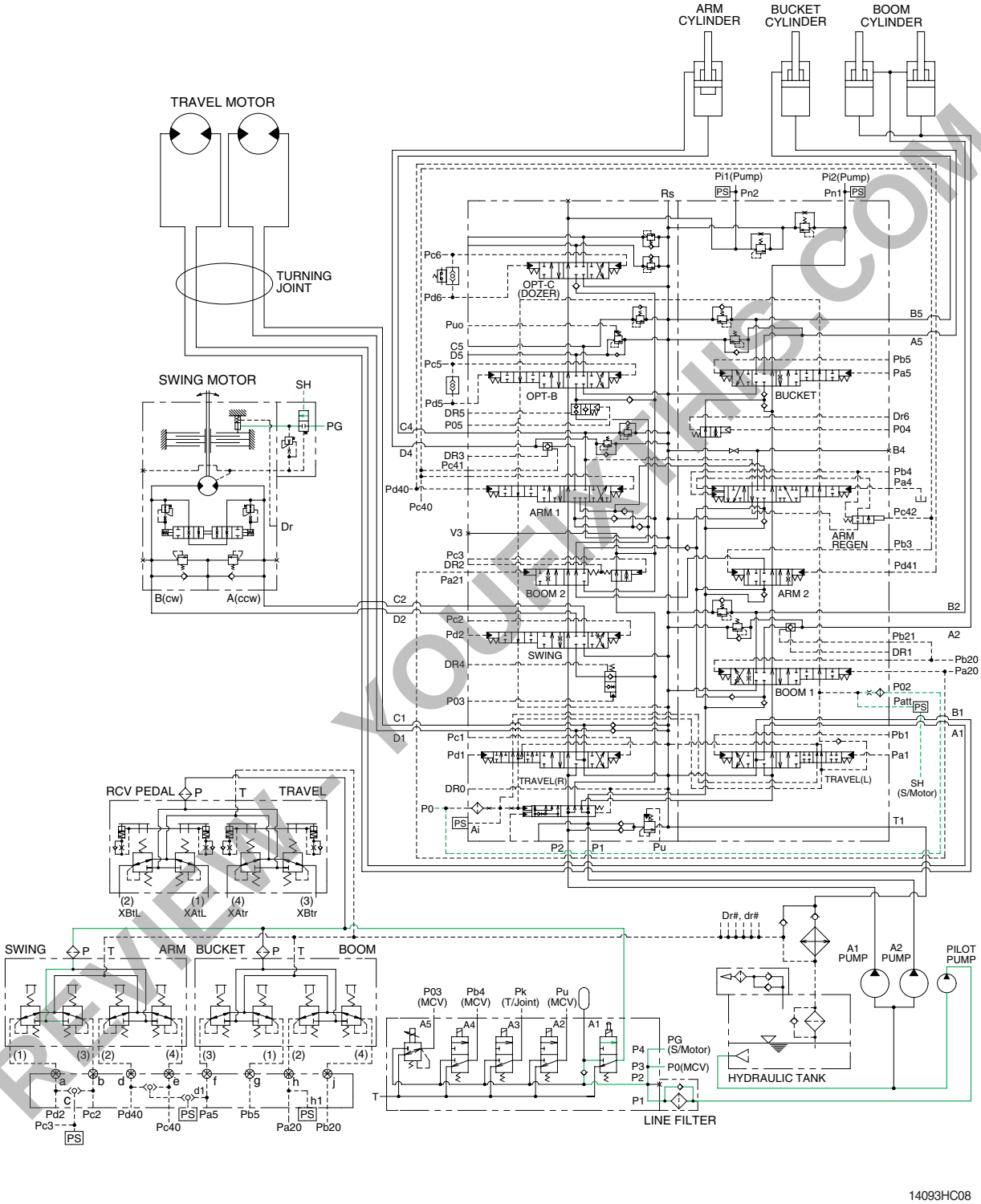
1 RCV lever
2 Main control valve
5 Spool
8 Spring
17 Brake piston
20 Brake spring
33 Time delay valve

16092SM17

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7. SWING PARKING BRAKE RELEASE



14093HC08

When one of the RCV lever (except travel lever) is tilted, the pilot oil flows into SH port through main control valve.

This pressure moves spool so, discharged oil from pilot pump flows into swing motor PG port.

This pressure is applied to swing motor disc, thus the brake is released.

When all of the RCV lever are set in the neutral position, oil in the swing motor disc cylinder is drained, thus the brake is applied.

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4. HEAD AND WORK LIGHT CIRCUIT

1) OPERATING FLOW

Fuse box (No.18) → Head light relay [CR-13 (30,86)]
Fuse box (No.15) → Work light relay [CR-4 (30,86)]

(1) Head light switch ON

Head light switch ON [CN-116 (1)] → I/conn [CN-5 (49)] → Head light relay [CR-13 (85) → (87)]
- → Head light ON [CL-3 (1)] , [CL-4 (1)]
- → I/conn [CN-11 (8)] → AC & Heater controller illumination ON [4]
- → I/conn [CN-5 (13)]
  - → Remote controller illumination ON [CN-245 (9)]
  - → Cigar light [CL-2]
  - → USB & Socket illumination ON [CN-246 (7)]
  - → Radio & CD/MP3 player illumination ON [CN-27 (9)]

(2) Work light switch ON

Work light switch ON [CN-116 (2)] → I/conn [CN-5 (50)] → Work light relay [CR-4 (85) → (87)]
→ I/conn [CN-12 (1)] → Work light ON [CL-5 (2), CL-6 (2)]

2) CHECK POINT

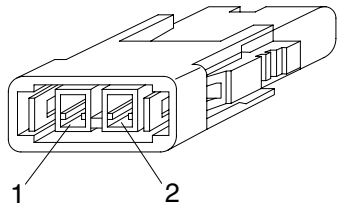
Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power output) ③ - GND (head light relay) ④ - GND (head light) ⑤ - GND (fuse box) ⑥ - GND (switch power output) ⑦ - GND (work light relay) ⑧ - GND (work light)	20~25V

※ GND : Ground

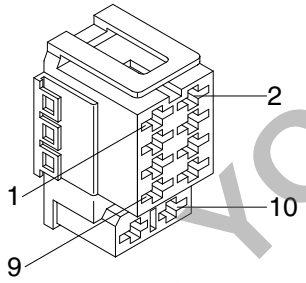
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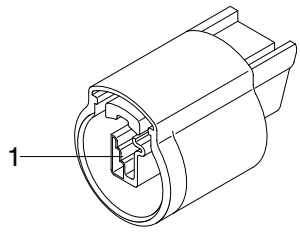
15) MOLEX 2CKTS CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 35215-0200	

16) ITT SWF CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
10	 SWF593757	

17) MWP NMWP CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 NMWP01F-B	

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2) CLUSTER CHECK PROCEDURE

(1) Start key : ON

① Check monitor

a. Buzzer sounding for 4 seconds with HYUNDAI logo on cluster.

※ If the ESL mode is set to the enable, enter the password to start engine.

② After initialization of cluster, the operating screen is displayed on the LCD. Also, self diagnostic function is carried out.

a. Engine rpm display : 0 rpm
b. Engine coolant temperature gauge : White range
c. Hydraulic oil temperature gauge : White range
d. Fuel level gauge : White range

③ Indicating lamp state

a. Power mode pilot lamp : E mode or U mode
b. Work mode pilot lamp : General operation mode (bucket)
c. Travel speed pilot lamp : Low (turtle)

(2) Start of engine

① Check machine condition

a. RPM display 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 : E mode or U mode
e. Travel speed pilot lamp : Low (turtle)

② When warming up operation

a. Warming up pilot lamp : ON
b. After engine started, engine speed increases to1000rpm.

※ Others same as above.

③ When abnormal condition

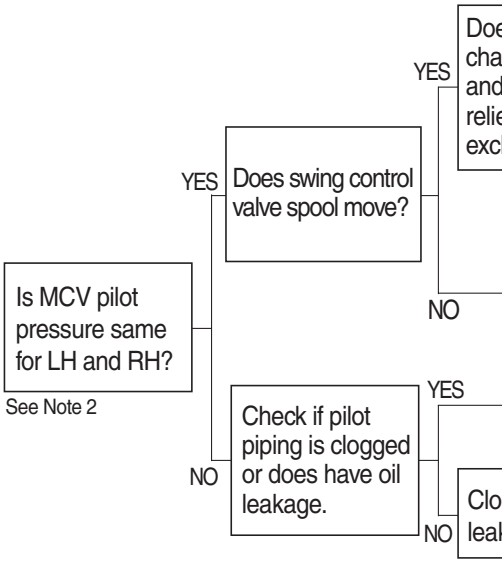
a. The warning lamp lights up and the buzzer sounds.
b. If BUZZER STOP switch is pressed, buzzer sound is canceled but the lamp warning lights up until normal condition.

※ The pop-up warning lamp moves to the original position and blink when the select switch is pushed. Also the buzzer stops.

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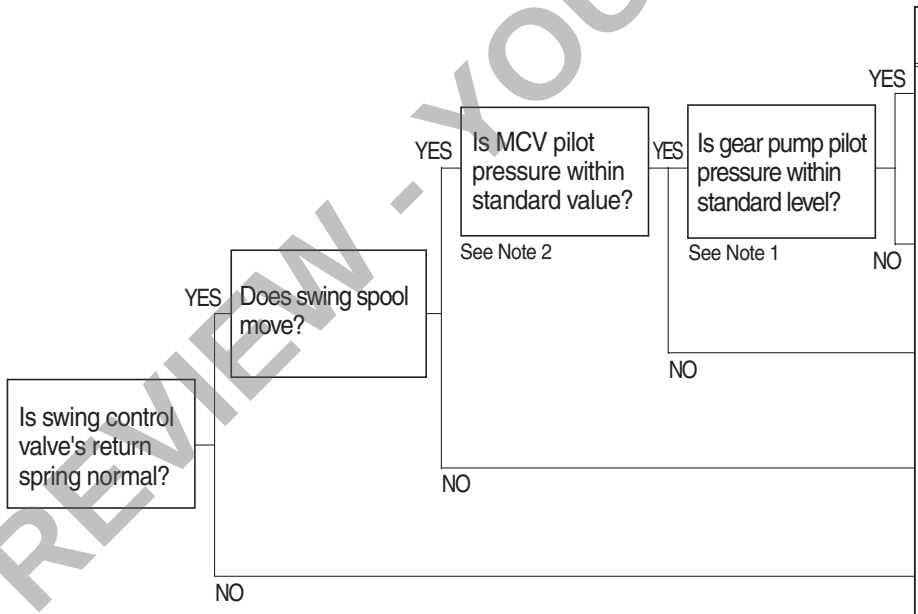
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3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



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.

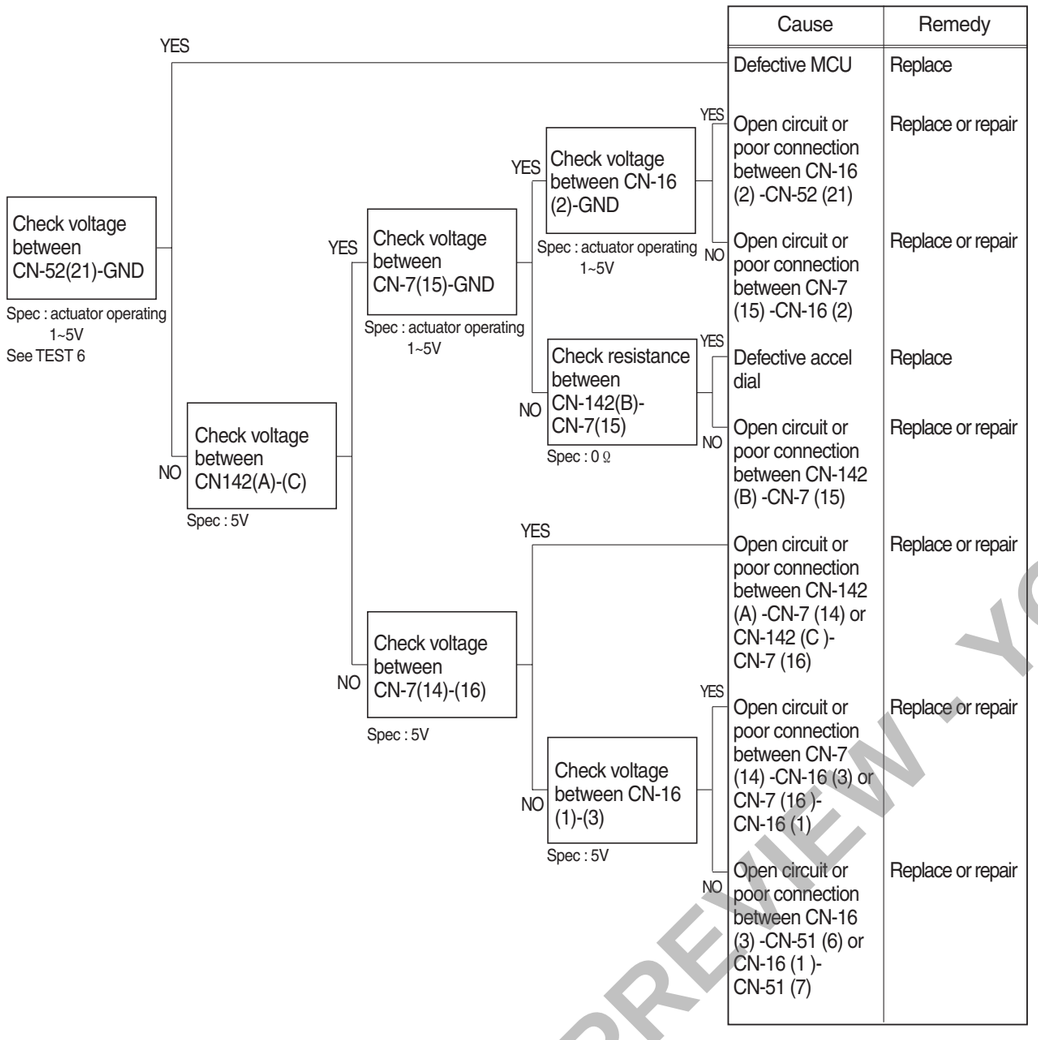
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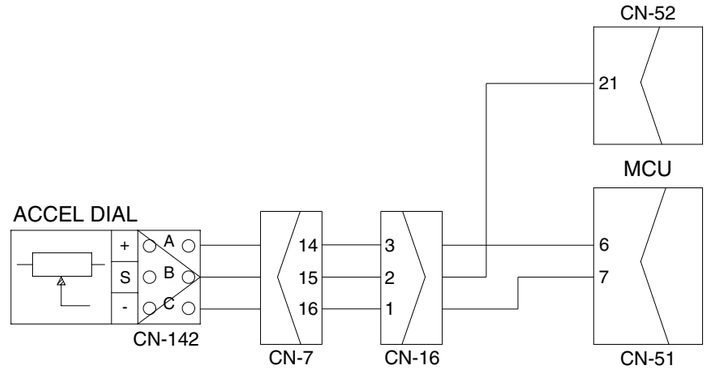
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4. MALFUNCTION OF ACCEL DIAL

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

1) INSPECTION PROCEDURE





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6) SWING SPEED

(1) Measure the time required to swing three complete turns.

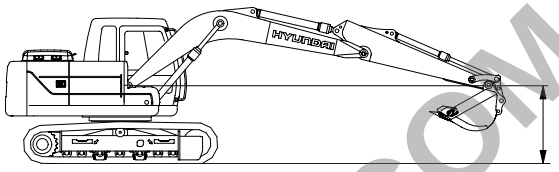
(2) Preparation

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



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(3) Measurement

① Select the following switch positions.

· Power mode switch : P mode

② Operate swing control lever fully.

③ Swing 1 turn and measure time taken to swing next 3 revolutions.

④ Repeat steps ② and ③ three time and calculate the average values.

(4) Evaluation

The time required for 3 swings should meet the following specifications.

Unit : Seconds / 3 revolutions

Model	Power mode switch	Standard	Maximum allowable
R160LC-9	P mode	15.9±1.5	18.6
R180LC-9	P mode	15.9±1.5	18.8

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(6) Inspection after disassembly

Clean all disassembled parts with clean mineral oil fully, and dry them with compressed air. Then, place them on clean papers or cloths for inspection.

① Control valve

a. Check whole surfaces of all parts for burrs, scratches, notches and other defects.
b. Confirm that seal groove faces of body and block are smooth and free of dust, dent, rust etc.
c. Correct dents and damages and check seat faces within the body, if any, by lapping.
※ Pay careful attention not to leave any lapping agent within the body.
d. Confirm that all sliding and fitting parts can be moved manually and that all grooves and path's are free foreign matter.
e. If any spring is broken or deformed, replace it with new one.
f. When a relief valve does not function properly, repair it, following it's the prescribed disassembly and assembly procedures.
g. Replace all seals and O-rings with new ones.

② Relief valve

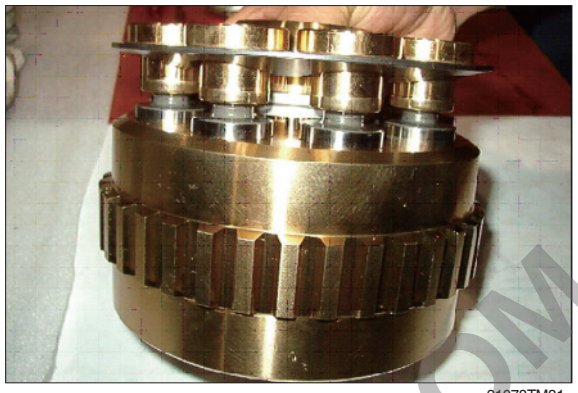
a. Confirm that all seat faces at ends of all poppets and seats are free of defects and show uniform and consistent contact faces.
b. Confirm manually that main poppet and seat can slide lightly and smoothly.
c. Confirm that outside face of main poppet and inside face of seat are free from scratches and so on.
d. Confirm that springs are free from breakage, deformation, and wear.
e. Confirm that orifices of main poppet and seat section are not clogged with foreign matter.
f. Replace all O-rings with new ones.
g. When any light damage is found in above inspections, correct it by lapping.
h. When any abnormal part is found, replace it with a completely new relief valve assembly.

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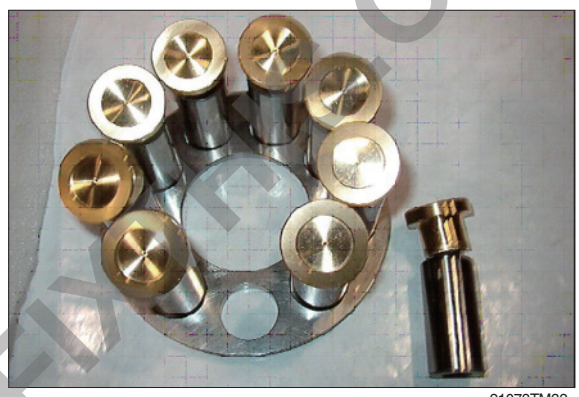
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■ **Disassemble cylinder sub.**

9) Disassemble cylinder block assembly, piston assembly (9) and seat plate (M).

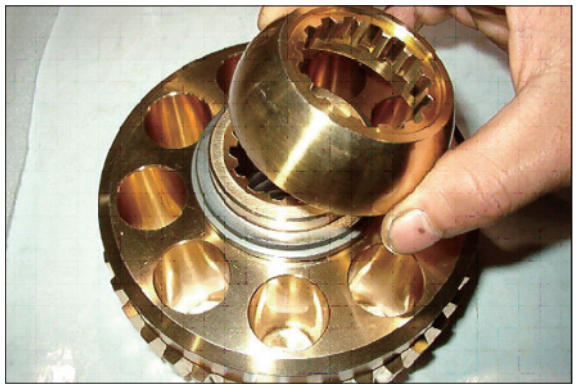


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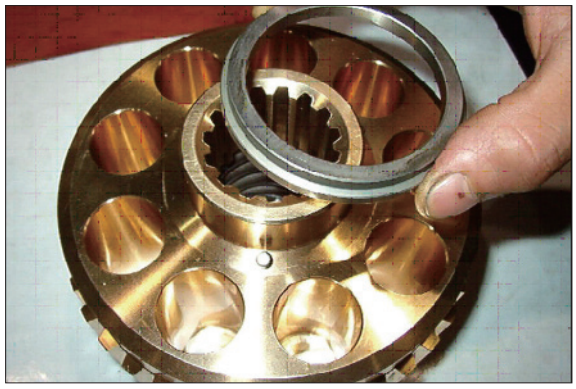


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10) Disassemble ball guide (16), ring and pin (15) from cylinder block, respectively.



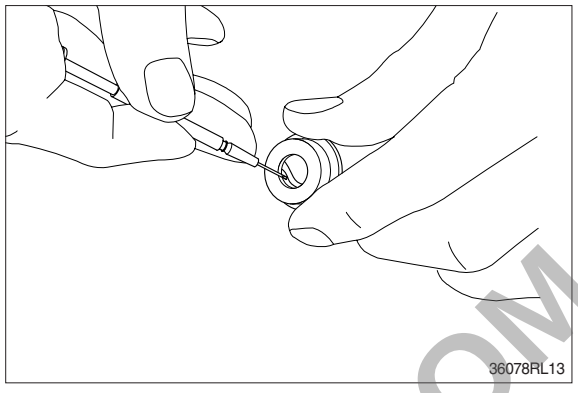
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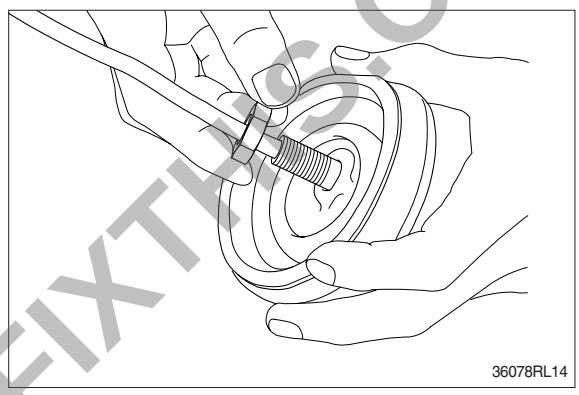
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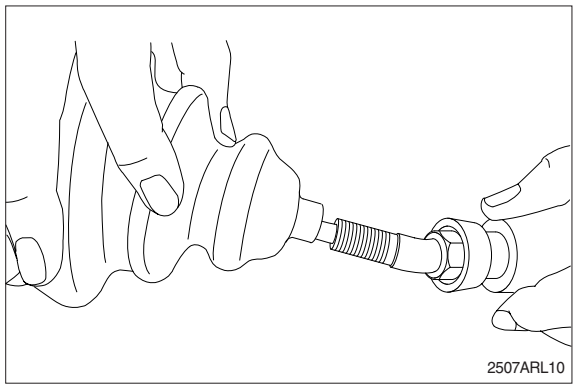
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(16) Remove lock nut (22) and then boot (26).



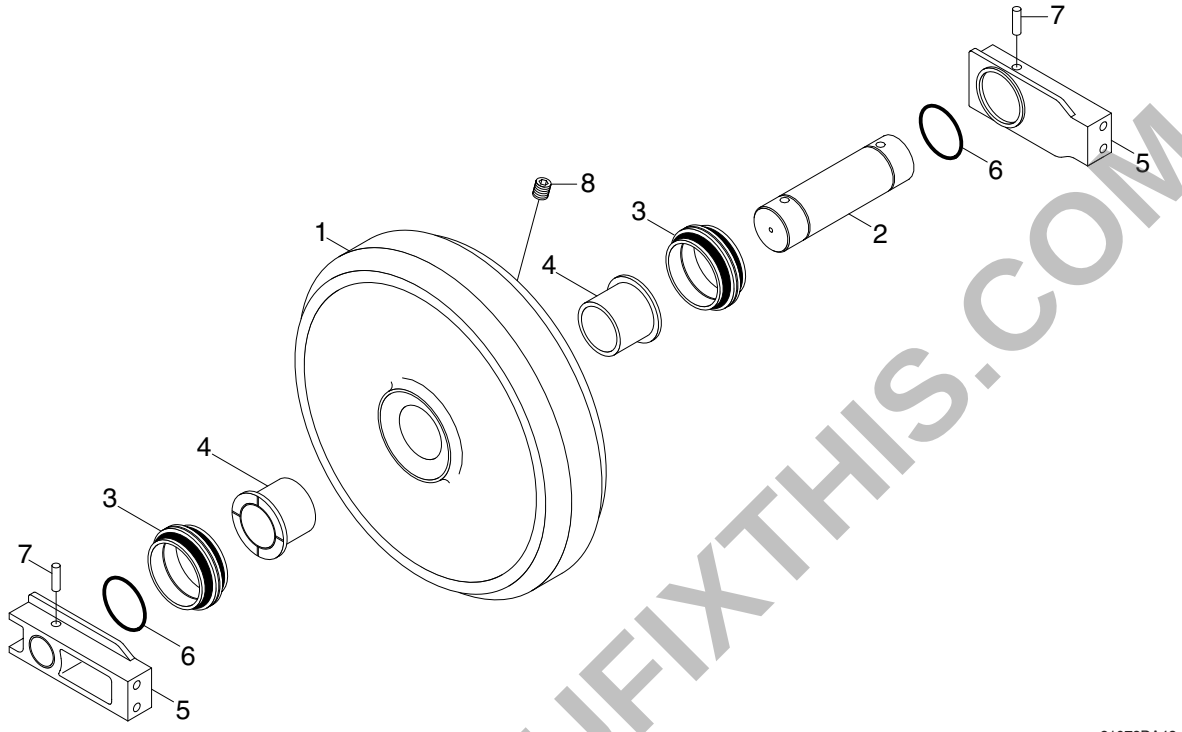


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3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure



1	Shell	4	Bushing	7	Spring pin
2	Shaft	5	Bracket	8	Plug
3	Seal assembly	6	O-ring		

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