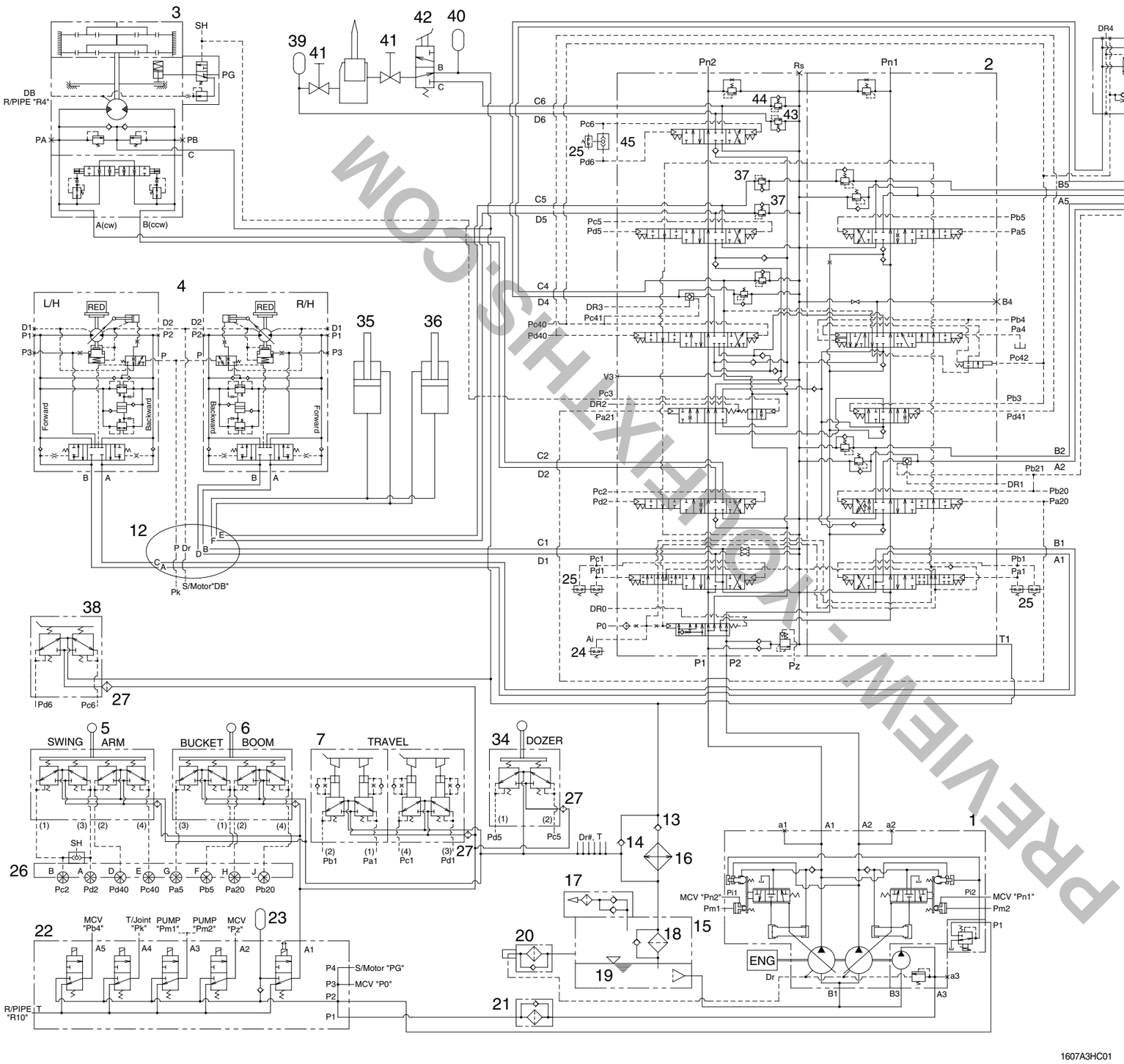
GROUP 1 HYDRAULIC CIRCUIT



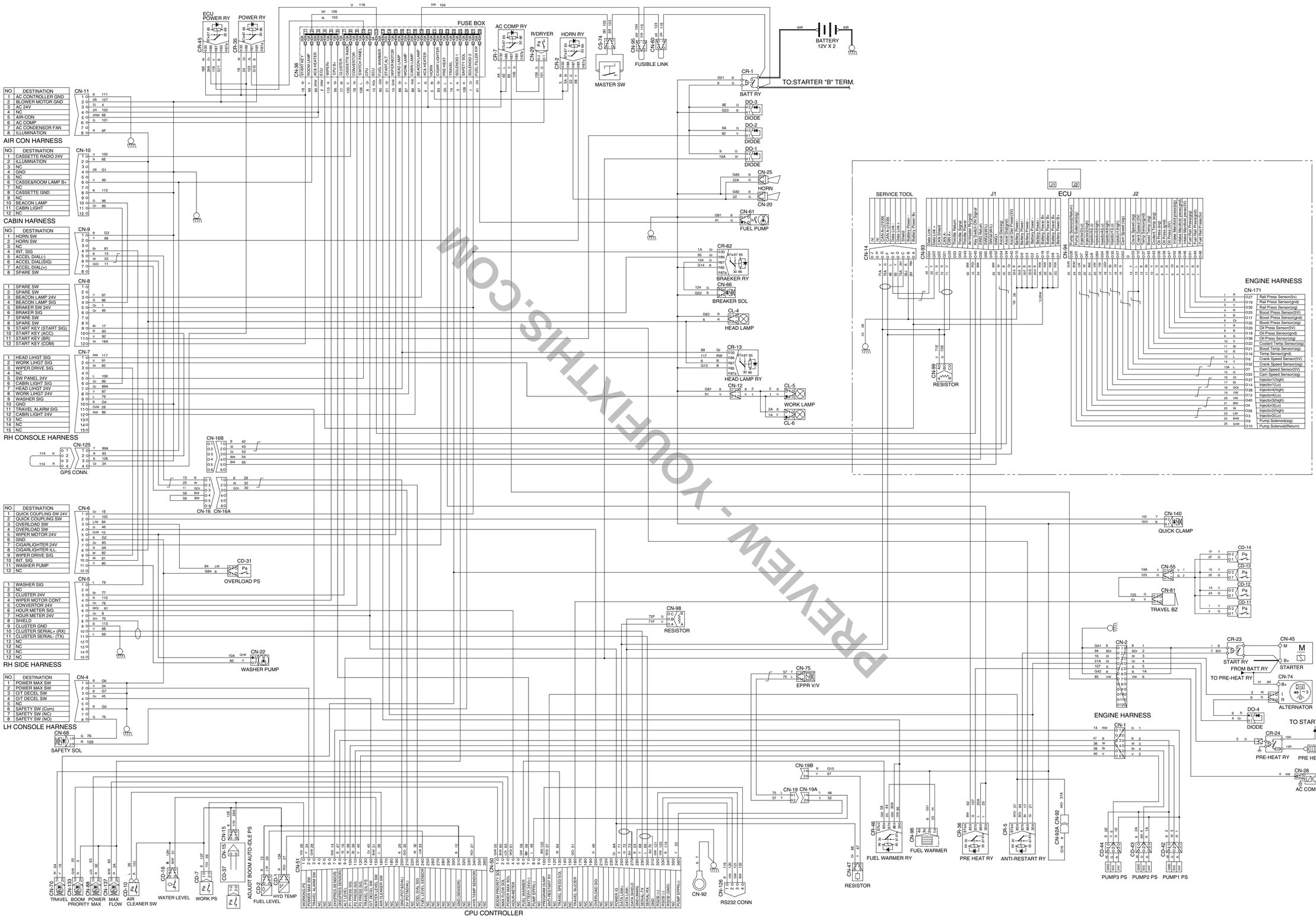
1607A3HC01

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 Spin filter
21 Line filter
22 Solenoid valve
23 Accumulator(Option)
24 Pressure switch
25 Pressure switch(Option)
26 Terminal
27 Last guard filter
30 Boom safety valve(Option)
31 Arm safety valve(Option)
32 Pressure switch(Option)
33 Shut off valve(Option)
34 RCV lever(Dozer, option)
35 Dozer cylinder(LH, option)
36 Dozer cylinder(RH, option)
37 Port relief valve(Option)
38 Breaker pedal(Option)
39 Accumulator(Option)
40 Accumulator(Option)
41 Stop valve(Option)
42 2 way selector valve(Option)
43 Port relief valve(Option)
44 Port relief valve(Option)
45 2 way shuttle valve(Option)

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GROUP 2 ELECTRICAL CIRCUIT



NO.	DESTINATION
1	AC CONTROLLER GND
2	BLOWER MOTOR GND
3	AC 24V
4	NC
5	AIR-CON
6	AC COMP
7	AC CONDENSOR FAN
8	ILLUMINATION

AIR CON HARNESS

NO.	DESTINATION
1	CASSETTE RADIO 24V
2	ILLUMINATION
3	NC
4	GND
5	NC
6	CASSE&ROOM LAMP B+
7	NC
8	CASSETTE GND
9	NC
10	BEACON LAMP
11	CABIN LIGHT
12	NC

CABIN HARNESS

NO.	DESTINATION
1	HORN SW
2	HORN SW
3	NC
4	INT. SIG
5	ACCEL DIAL(-)
6	ACCEL DIAL(SIG)
7	ACCEL DIAL(+)
8	SPARE SW

1	SPARE SW
2	SPARE SW
3	BEACON LAMP 24V
4	BEACON LAMP SIG
5	BRAKER SW 24V
6	BRAKER SIG
7	SPARE SW
8	SPARE SW
9	START KEY (START SIG)
10	START KEY (ACC)
11	START KEY (BR)
12	START KEY (COM)

1	HEAD LIHGT SIG
2	WORK LIHGT SIG
3	WIPER DRIVE SIG
4	NC
5	SW PANEL 24V
6	CABIN LIGHT SIG
7	HEAD LIHGT 24V
8	WORK LIHGT 24V
9	WASHER SIG
10	GND
11	TRAVEL ALARM SIG
12	CABIN LIGHT 24V
13	NC
14	NC
15	NC

RH CONSOLE HARNESS

NO.	DESTINATION
1	QUICK COUPLING SW 24V
2	QUICK COUPLING SW
3	OVERLOAD SW
4	OVERLOAD SW
5	WIPER MOTOR 24V
6	GND
7	CIGARLIGHTER 24V
8	CIGARLIGHTER ILL
9	WIPER DRIVE SIG
10	INT. SIG
11	WASHER PUMP
12	NC

1	WASHER SIG
2	NC
3	CLUSTER 24V
4	WIPER MOTOR CONT.
5	CONVERTOR 24V
6	HOUR METER SIG
7	HOUR METER 24V
8	SHIELD
9	CLUSTER GND
10	CLUSTER SERIAL+ (RX)
11	CLUSTER SERIAL- (TX)
12	NC
12	NC
12	NC
12	NC

RH SIDE HARNESS

NO.	DESTINATION
1	POWER MAX SW
2	POWER MAX SW
3	O/T DECEL SW
4	O/T DECEL SW
5	NC
6	SAFETY SW (Com)
7	SAFETY SW (NC)
8	SAFETY SW (NO)

LH CONSOLE HARNESS

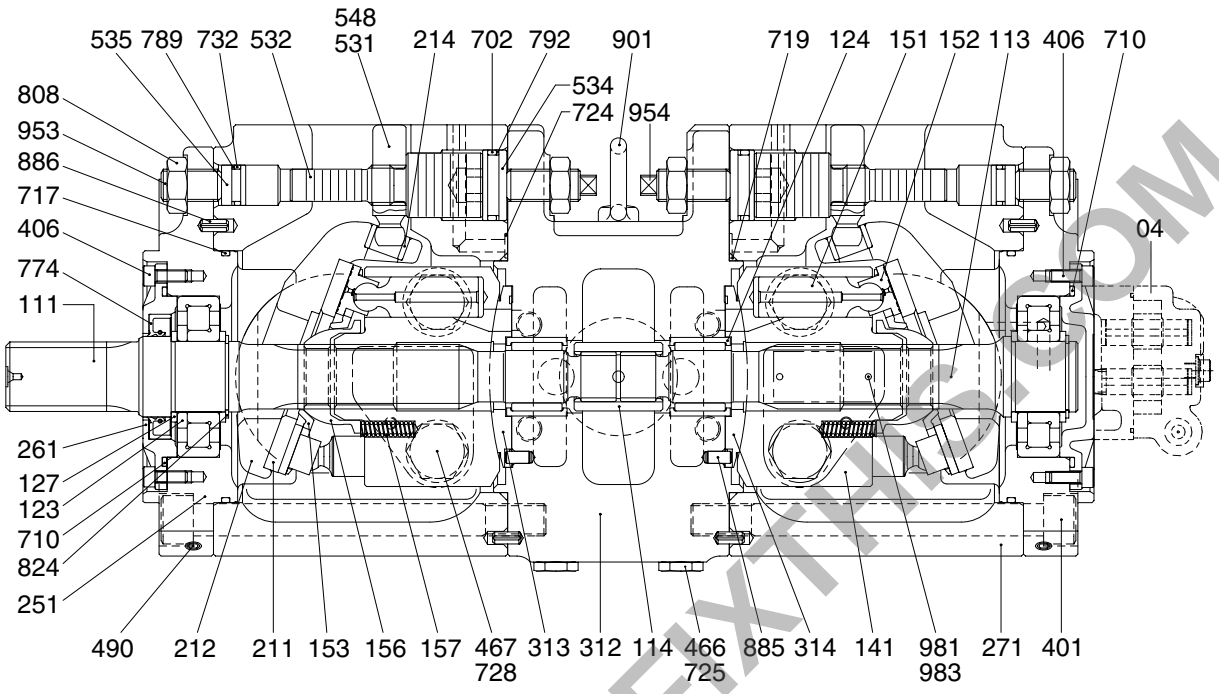
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1607A4CI01

1) MAIN PUMP(1/2)

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



1607A2MP02

04	Gear pump	271	Pump casing	719	O-ring
111	Drive shaft(F)	312	Valve block	724	O-ring
113	Drive shaft(R)	313	Valve plate(R)	725	O-ring
114	Spline coupling	314	Valve plate(L)	728	O-ring
123	Roller bearing	401	Hexagon socket bolt	732	O-ring
124	Needle bearing	406	Hexagon socket bolt	774	Oil seal
127	Bearing spacer	466	VP Plug	789	Back up ring
141	Cylinder block	467	VP Plug	792	Back up ring
151	Piston	490	Plug	808	Hexagon head nut
152	Shoe	531	Tilting pin	824	Snap ring
153	Set plate	532	Servo piston	885	Pin
156	Bushing	534	Stopper(L)	886	Spring pin
157	Cylinder spring	535	Stopper(S)	901	Eye bolt
211	Shoe plate	548	Pin	953	Set screw
212	Swash plate	702	O-ring	954	Set screw
214	Bushing	710	O-ring	981	Plate
251	Support	717	O-ring	983	Pin
261	Seal cover(F)				

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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(Bracket-Frame, FR)	M16 × 2.0	30±3.5	217±25.3
2		Engine mounting bolt(Bracket-Frame,RR)	M20 × 2.5	55±3.5	398±25.3
3		Engine mounting bolt(Engine-Bracket)	M12 × 1.75	10.0±1.0	72.3±7.2
4		Radiator mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
5		Coupling mounting bolt	M16 × 2.0	22.0±1.0	159±7.2
6	Hydraulic system	Main pump housing mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1
7		Main pump mounting bolt	M16 × 2.0	22.5±0.5	163±3.6
8		Main control valve mounting bolt	M12 × 1.75	12.2±1.3	88.2±9.4
9		Fuel tank mounting bolt	M20 × 2.5	45±5.1	325±36.9
10	Power train system	Hydraulic oil tank mounting bolt	M20 × 2.5	45±5.1	325±36.9
11		Turning joint mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
12		Swing motor mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
13		Swing bearing upper mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
14		Swing bearing lower mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
15	Under carriage	Travel motor mounting bolt	M16 × 2.0	23±2.5	166±18.1
16		Sprocket mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
17		Carrier roller mounting bolt, nut	M20 × 2.5	54.7±6.0	396±43.4
18		Track roller mounting bolt	M20 × 2.5	54.7±6.0	396±43.4
19		Track tension cylinder mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
20		Track shoe mounting bolt, nut	5/8-18UNF	42±4	304±28.9
21	Others	Track guard mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
22		Counterweight mounting bolt	M30 × 3.5	199±30	1439±217
23		Cab mounting bolt, nut	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

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3. ERROR CODES TABLE

Error code No.	Description
1	Short circuit in accel actuator system
2	Potentiometer circuit is shorted to Vcc(5V) or battery +
3	Short circuit in pump EPPR valve system
4	Short circuit in boom down EPPR valve system
5	Short circuit in travel speed solenoid system
6	Short circuit in power boost solenoid system
7	Short circuit in max flow solenoid system
10	Short circuit in hour-meter system
11	Accel dial circuit is shorted to Vcc(5V) or battery +
12	P1 pressure sensor circuit is shorted to power supply(24V) line
13	P2 pressure sensor circuit is shorted to power supply(24V) line
14	P3 pressure sensor circuit is shorted to power supply(24) line
15	Boom down pressure circuit is shorted to power supply(24V) line
16	Accel actuator circuit is open or shorted to ground
17	Potentiometer circuit is open or shorted to ground
18	Pump EPPR valve circuit is open or shorted to ground
19	Boom down EPPR valve circuit is open or shorted to ground
20	Travel speed solenoid circuit is open or shorted to ground
21	Power boost solenoid circuit is open or shorted to ground
22	Max flow solenoid circuit is open or shorted to ground
25	Hour-meter circuit is open or shorted to ground
26	Accel dial circuit is open or shorted to ground
27	P1 pressure sensor circuit is open or shorted to ground
28	P2 pressure sensor circuit is open or shorted to ground
29	P3 pressure sensor circuit is open or shorted to ground
30	Boom down pressure sensor circuit is open or shorted to ground
31	Engine preheater circuit is open or shorted to ground
32	Travel alarm buzzer circuit is open or shorted to ground
33	Alternator circuit is open or shorted to ground
34	Controller input voltage is below 18V
35	Controller input voltage is over 38V
36	Communication error with cluster
37	Engine speed sensor circuit is open or shorted to ground
38	Anti-restart relay circuit is open or shorted to ground
39	Accel actuator does not stop at a target position
40	There is more than 500rpm difference between target speed and actual speed

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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 : 160 ℓ (42.2 U.S.gal)

(5) Remove socket bolts (74) and disconnect pipe (9).

(6) Disconnect pilot line hoses (48, 49, 55, 58, 64, 69, 71, 78).

(7) Remove socket bolts (72) and disconnect pump suction tube (3).

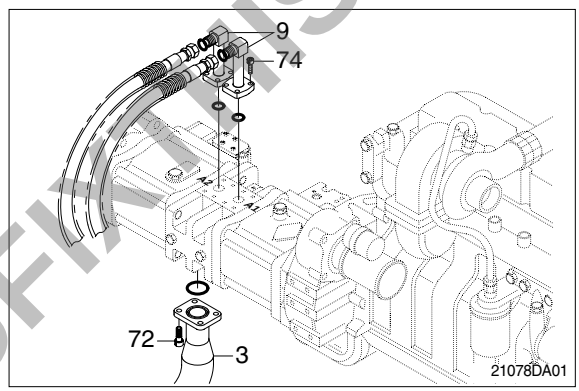
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

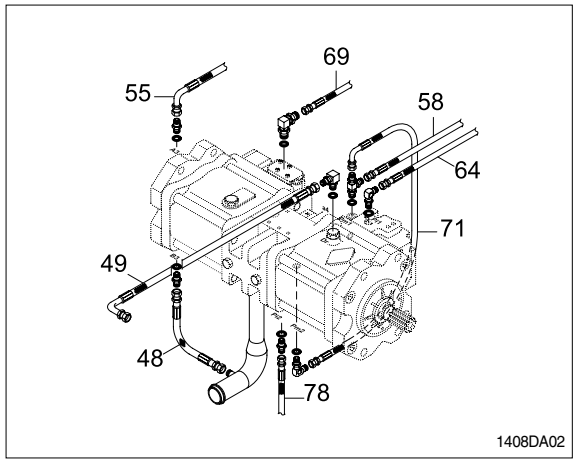
(8) Sling the pump assembly and remove the pump mounting bolts.

- Weight : 90kg (200lb)

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



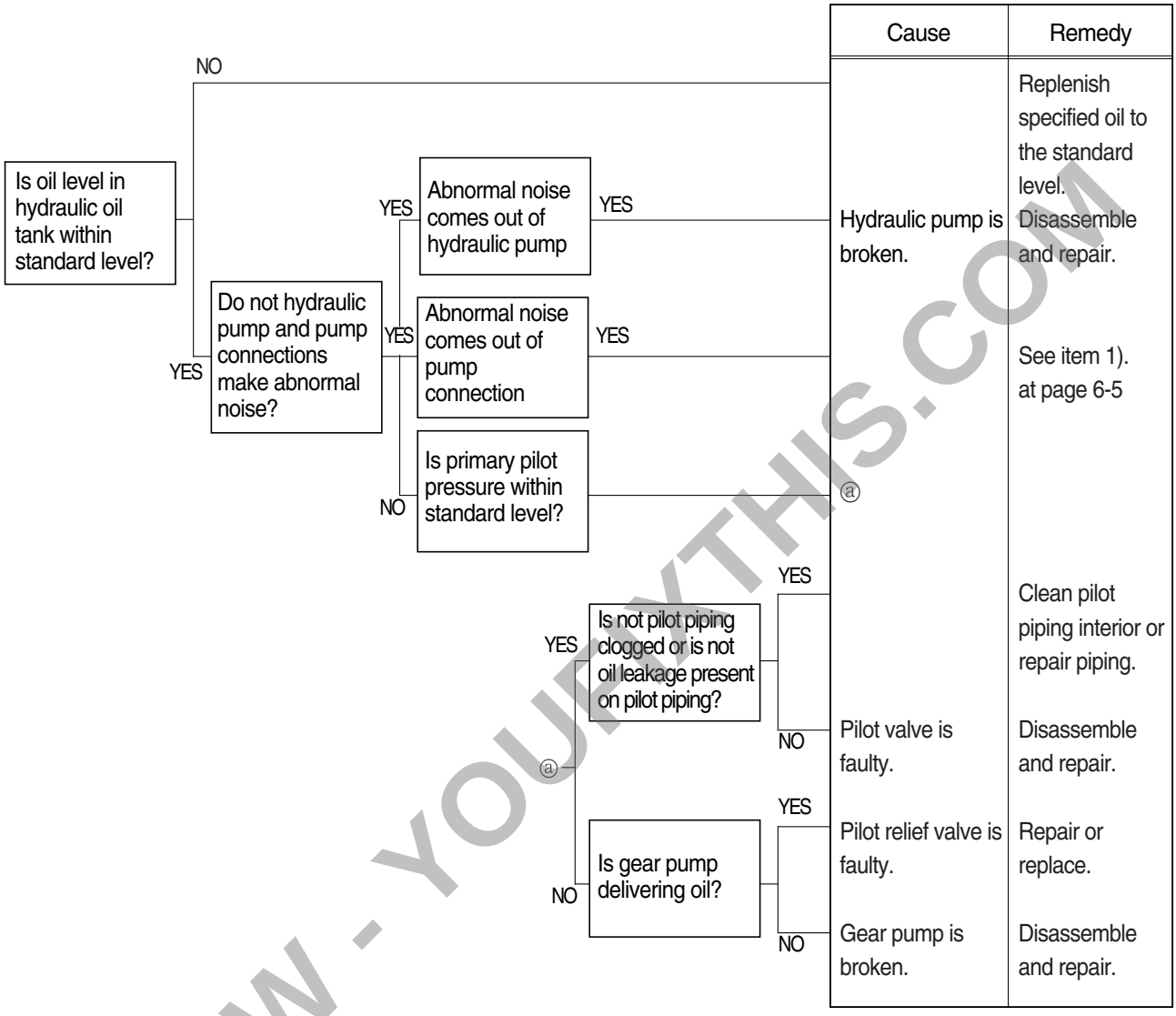




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2) ENGINE STARTS BUT MACHINE DOES NOT OPERATE AT ALL

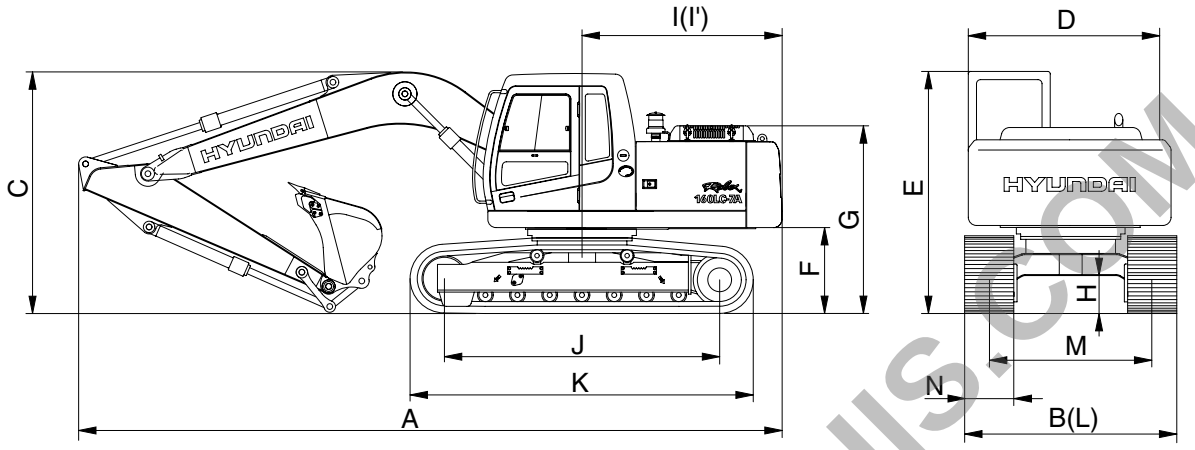


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2. SPECIFICATIONS

1) 5.1m(16' 9") MONO BOOM, 2.6m(8' 6") ARM



1607A2SP02

Description		Unit	Specification
Operating weight		kg(lb)	17400(38360)
Bucket capacity(SAE heaped), standard		$m^3(yd^3)$	0.70(0.92)
Overall length	A	mm(ft-in)	8600(28' 3")
Overall width, with 600mm shoe	B		2590(8' 6")
Overall height	C		2910(9' 7")
Superstructure width	D		2475(8' 1")
Overall height of cab	E		2915(9' 7")
Ground clearance of counterweight	F		1035(3' 5")
Engine cover height	G		2295(7' 6")
Minimum ground clearance	H		460(1' 6")
Rear-end distance	I		2530(8' 4")
Rear-end swing radius	I'		2480(8' 2")
Distance between tumblers	J		3190(10' 6")
Undercarriage length	K		3980(13' 1")
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)	3.7/5.6(2.3/3.5)
Swing speed		rpm	11.3
Gradeability		Degree(%)	30(58)
Ground pressure(600mm shoe)		$kgf/cm^2(psi)$	0.42(5.97)

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2. HOW TO READ THE SERVICE MANUAL

Distribution and updating

Any additions, amendments or other changes will be sent to HYUNDAI distributors.
Get the most up-to-date information before you start any work.

Filing method

1. See the page number on the bottom of the page.
   File the pages in correct order.
2. Following examples shows how to read the page number.
   Example 1

   2 - 3
   - 2: Item number(2. Structure and Function)
   - 3: Consecutive page number for each item.

3. Additional pages : Additional pages are indicated by a hyphen(-) and number after the page number. File as in the example.

   10 - 4
   10 - 4 - 1 ┐
   10 - 4 - 2 ┘ Added pages
   10 - 5

Revised edition mark(①②③…)

When a manual is revised, an edition mark is recorded on the bottom outside corner of the pages.

Revisions

Revised pages are shown at the **list of revised pages** on the between the contents page and section 1 page.

Symbols

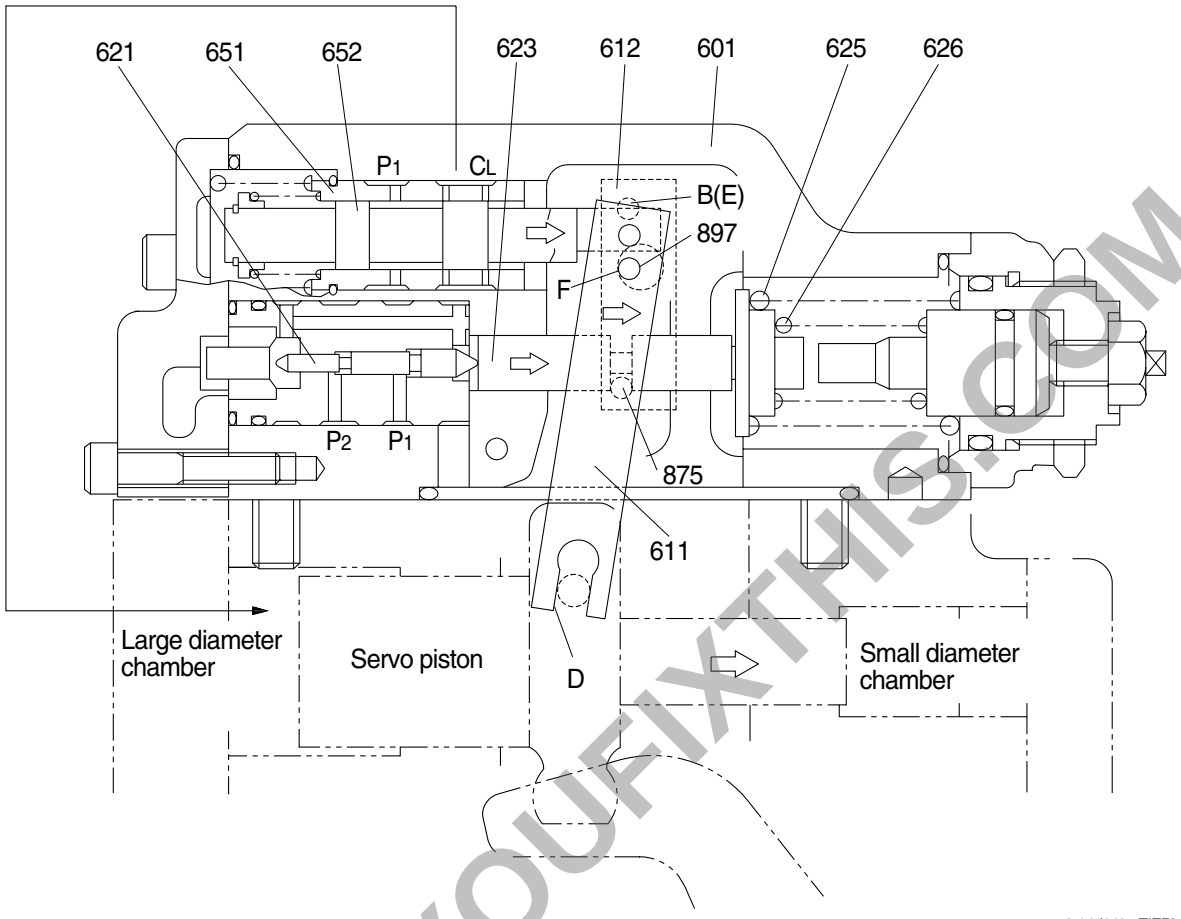
So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

Symbol	Item	Remarks
⚠	Safety	Special safety precautions are necessary when performing the work.
		Extra special safety precautions are necessary when performing the work because it is under internal pressure.
※	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.

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① Overload preventive function



2-14 (140-7TIER)

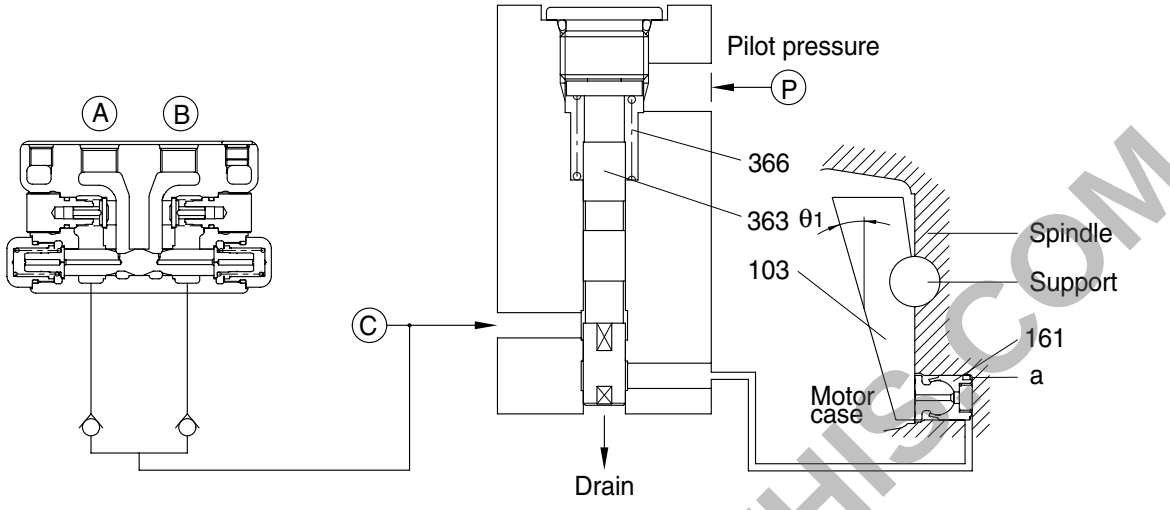
When the self pump delivery pressure P1 or the companion pump delivery pressure P2 rises, it acts on the stepped part of the compensating piston(621). It presses the compensating rod(623) to the right till the force of the outer spring(625) and inner spring(626) balances with the hydraulic force. The movement of the compensating rod is transmitted to lever 1(612) via pin(875).
Lever 1 rotates around the pin(875) (E) fixed to the casing(601).
Since the large hole section(F) of lever 1 contains a protruding pin(897) fixed to the feedback lever(611), the feedback lever rotates around the fulcrum of point D as lever 1 rotates, and then the spool(652) is shifted to the right. As the spool moves, the delivery pressure P1 is admitted to the large diameter section of the servo piston via port CL, causes the servo piston move to the right, reduces the pump delivery, flow rate, and prevents the prime mover from being overloaded.
The movement of the servo piston is transmitted to the feedback lever via point D. Then the feedback lever rotates around the fulcrum of point F and the spool is shifted to the left. The spool moves till the opening between the spool(652) and sleeve(651) is closed.

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(4) High/low speed changeover mechanism

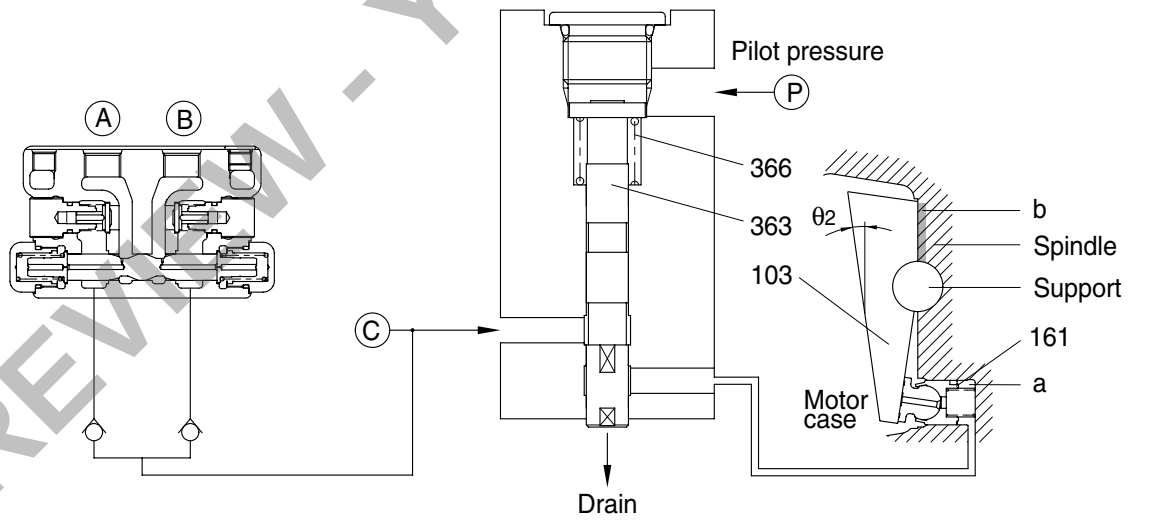
① **At low speed** - At pilot pressure of less than 20kgf/cm²(1.96Mpa)



25032TM09

When the pilot pressure is shut off from port , valve(363) is pressed upward by the force of spring(366), the pressurized oil supply port is shut off, and oil in chamber ⓐ is released into the motor case through the valve(363). Consequently, swash plate(103) is tilted at a maximum angle(θ_1) and the piston displacement of hydraulic motor becomes maximum, thus leading to low-speed operation.

② **At high speed** - At pilot pressure of 20kgf/cm²(1.96Mpa) or more



25032TM10

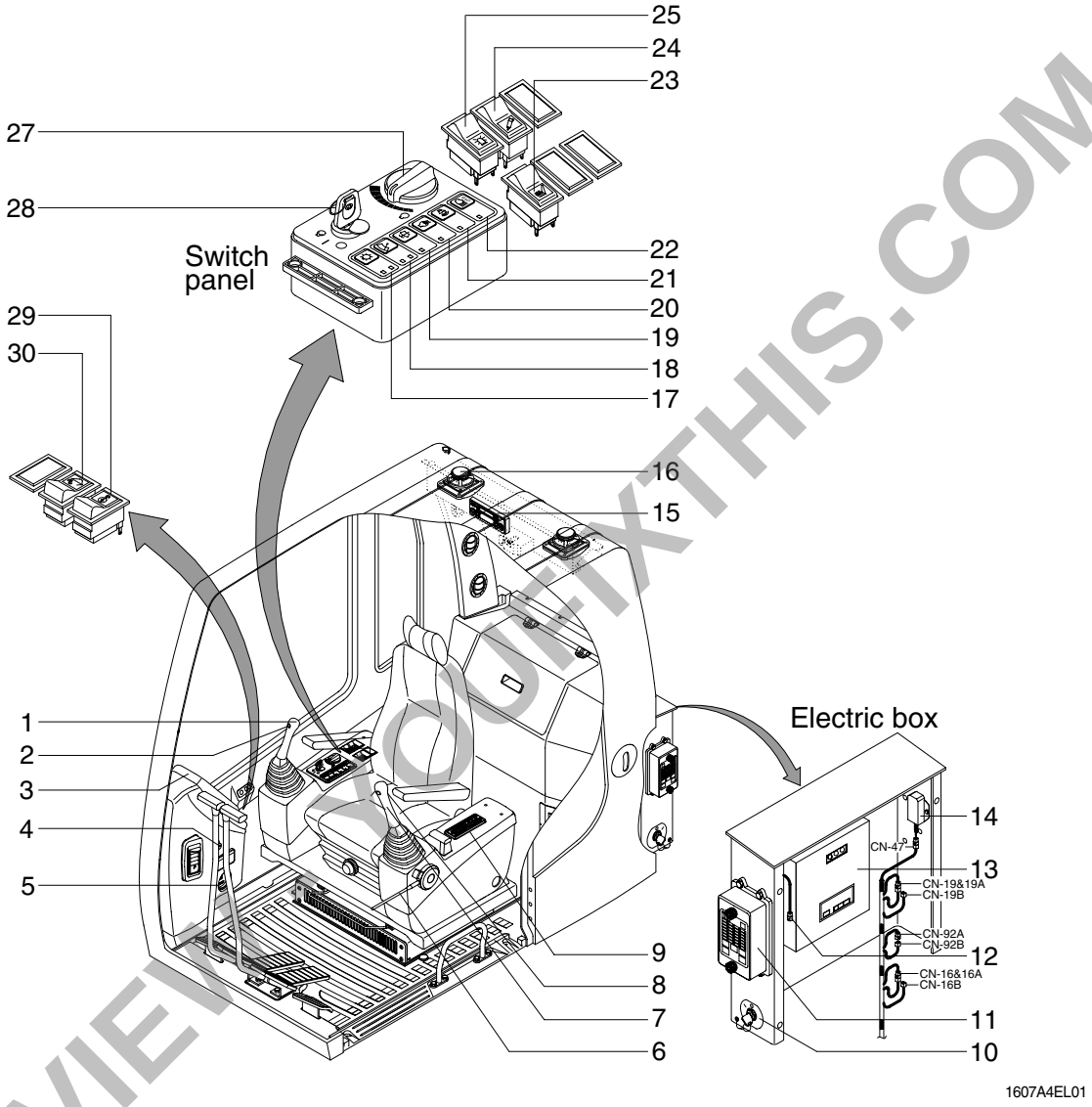
When a pilot pressure supplied from port (At a pressure of 20kgf/cm²(1.96Mpa) or more), the pressure overcomes the force of spring(366) and valve(363) is pressed downward. The pressurized oil supply port is then introduced into chamber ⓐ through the valve(363). Piston (161) pushes up swash plate(103) until it touches side ⓑ of the spindle. At this time, swash plate(103) is tilted at a minimum angle(θ_2) and the piston displacement of hydraulic motor becomes minimum, thus leading to high-speed operation.

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GROUP 1 COMPONENT LOCATION

1. LOCATION 1

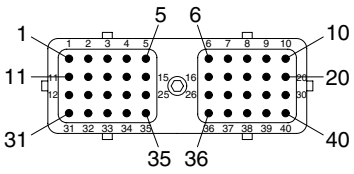
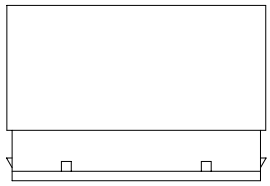


1	Horn switch	11	Fuse box	21	Preheat switch
2	Breaker operation switch	12	RS232 serial connector	22	Travel alarm switch
3	Cluster	13	J1939 serial connector	23	Cab light switch
4	Cigar lighter	14	Machine control unit	24	Heated seat switch
5	Hour meter	15	Prolix resistor	25	Breaker selection switch
6	Safety lever	16	Cassette radio	26	Beacon switch
7	Power max switch	17	Speaker	27	Accel dial
8	One touch decel switch	18	Main light switch	28	Start switch
9	Air conditioner switch	19	Wiper switch	29	Overload switch
10	Master switch	20	Washer switch	30	Quick clamp switch

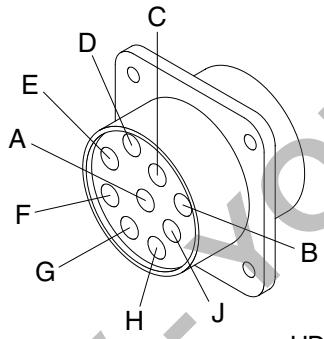
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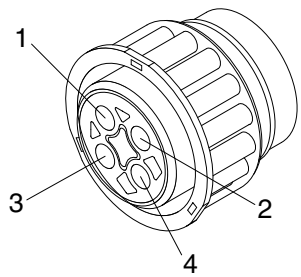
21) DEUTSCH DRC CONNECTOR

No. of pin	Receptacle connector(Female)	Plug connector(Male)
40	  DRC18-40SAE	

22) DEUTSCH SERVICE TOOL CONNECTOR

No. of pin	Receptacle connector(Female)	Plug connector(Male)
9	 HD10-9-96P	

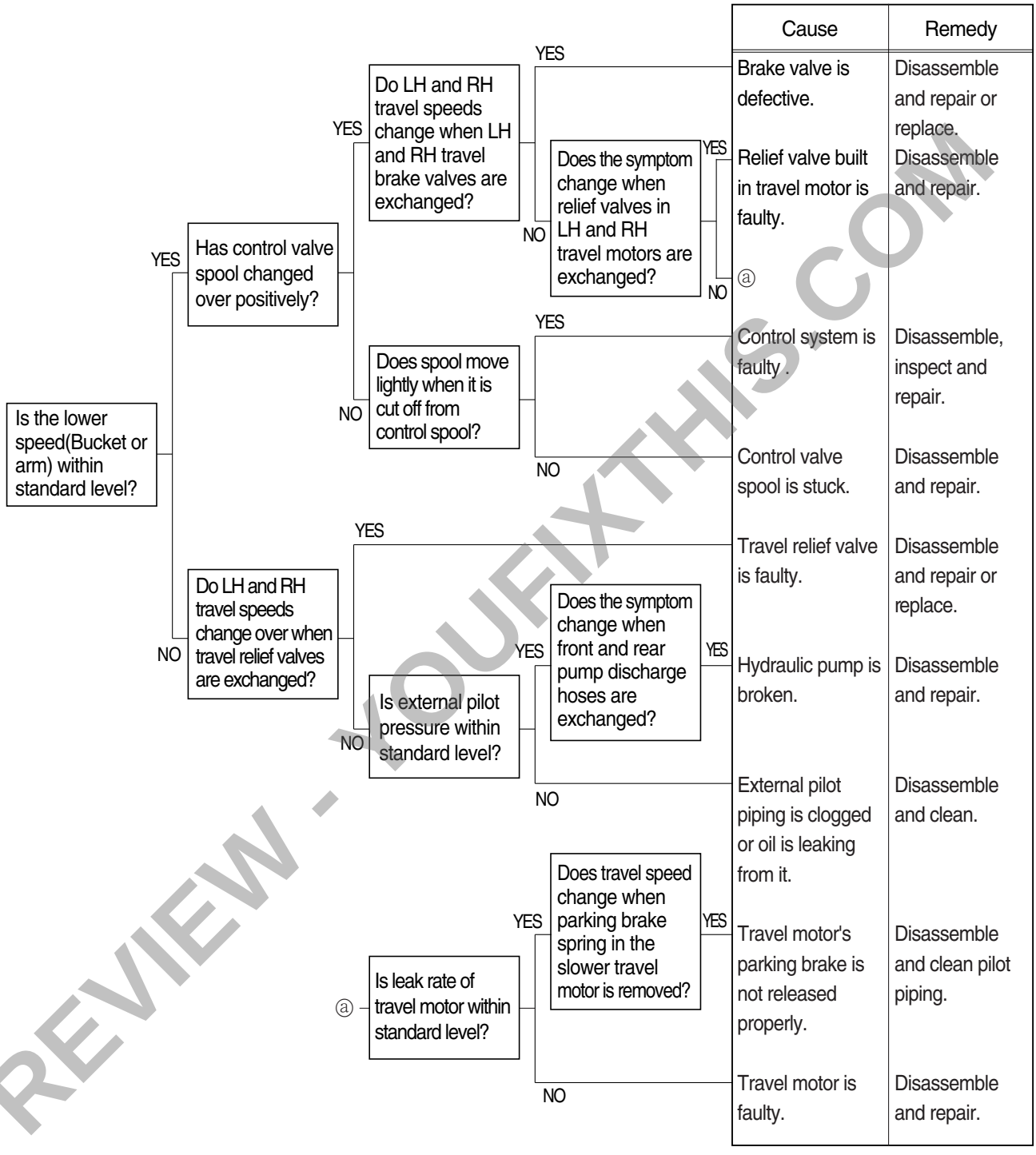
23) DELPHI CONNECTOR

No. of pin	Receptacle connector(Female)	Plug connector(Male)
4	 2-967325-3	

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2) SPEED ON ONE SIDE FALLS AND THE MACHINE CURVES



Cause	Remedy
Brake valve is defective.	Disassemble and repair or replace.
Relief valve built in travel motor is faulty.	Disassemble and repair.
Control system is faulty .	Disassemble, inspect and repair.
Control valve spool is stuck.	Disassemble and repair.
Travel relief valve is faulty.	Disassemble and repair or replace.
Hydraulic pump is broken.	Disassemble and repair.
External pilot piping is clogged or oil is leaking from it.	Disassemble and clean.
Travel motor's parking brake is not released properly.	Disassemble and clean pilot piping.
Travel motor is faulty.	Disassemble and repair.

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10) DIG FUNCTION DRIFT CHECK

(1) Measure dig function drift, which can be caused by oil leakage in the control valve and boom, standard arm, and standard bucket cylinders, with the loaded bucket.
When testing the dig function drift just after cylinder replacement, slowly operate each cylinder to its stroke end to purge air.

(2) Preparation

① Load bucket fully. Instead of loading the bucket, weight(W) of the following specification can be used.

- $W=M^3 \times 1.5$

Where :

M^3 = Bucket heaped capacity(m^3)

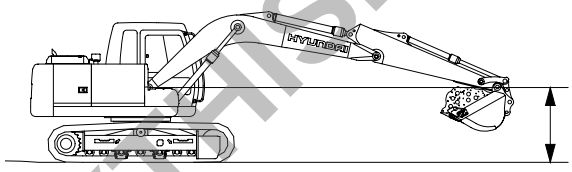
1.5 = Soil specific gravity

② Position the arm cylinder with the rod 20 to 30㎜ extended from the fully retracted position.

③ Position the bucket cylinder with the rod 20 to 30㎜ retracted from the fully extended position.

④ 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.

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



160LC7MS11

(3) Measurement

① Stop the engine.

② Five minutes after the engine has been stopped, measure the changes in the positions of the boom, arm and bucket cylinders.

③ Repeat step ② three times and calculate the average values.

(4) The measured drift should be within the following specifications.

Unit : mm / 5min

Model	Drift to be measured	Standard	Maximum allowable	Remarks
R160LC-7A	Boom cylinder	10 below	20	
	Arm cylinder	10 below	20	
	Bucket cylinder	40 below	50	

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(11) Remove lever(1, 612). Do not draw out pin(875).

(12) Draw out pilot piston(643) and spool(652).

(13) Draw out piston case(622), compensating piston(621) and compensating rod(623).

※ Piston case(622) can be taken out by pushing compensating rod(623) at opposite side of piston case.

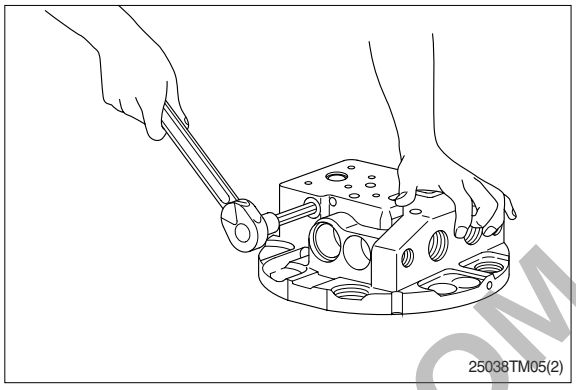
This completes disassembly.

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(4) Removal inner parts of the rear flange assembly

① Remove the two plugs(380) from rear flange(301).



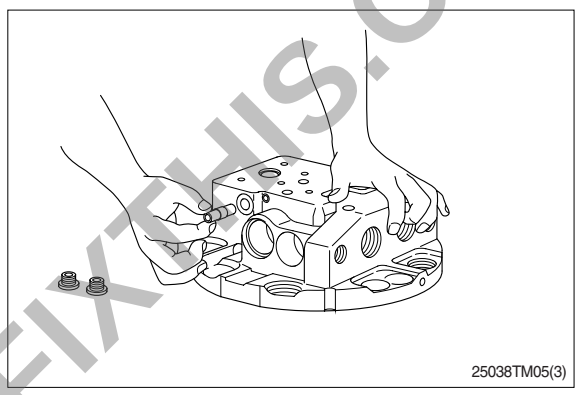
② Remove the two O-rings(359) from each plug(380).

③ Take out piston(381) from rear flange (301).

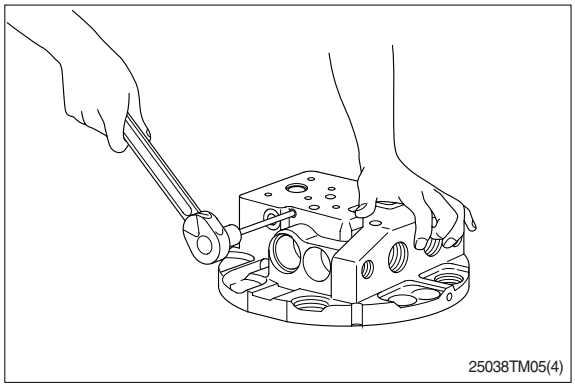
※ Do not reuse removed the O-rings(359).

※ Be careful not to scratch the outer surface of the piston(381) and the sliding surface of the rear flange(301).

※ Piston(381) is selectively fitted to rear flange(301). When replacing either of them, therefore, the rear flange kit should be replaced.



④ Removed the two plugs(382) from rear flange(301).



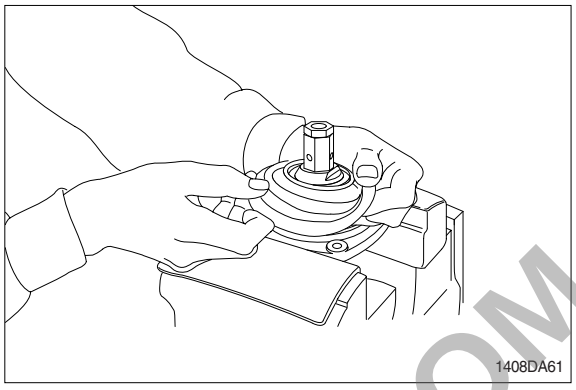
⑤ Take out each two O-rings(383, 384) from each plug(382).

※ Do not reuse removed O-rings(383, 384).

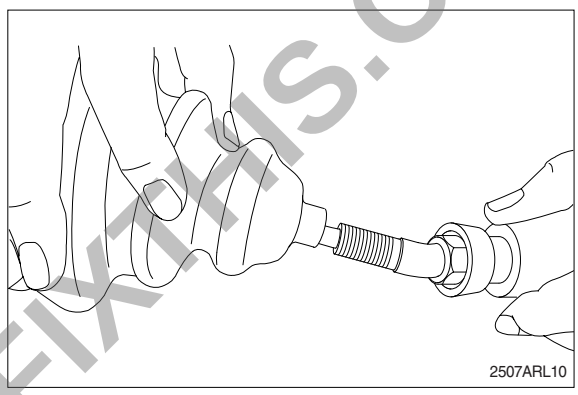
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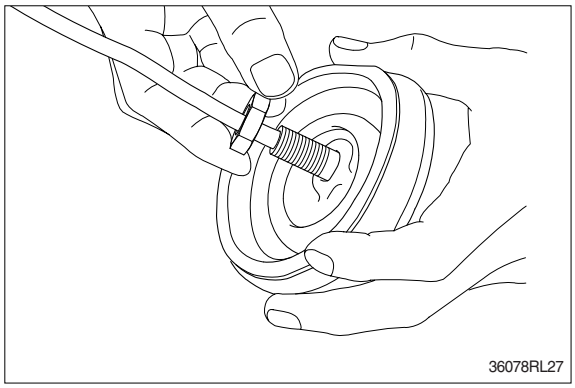
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(14) Fit boot(20) to plate.

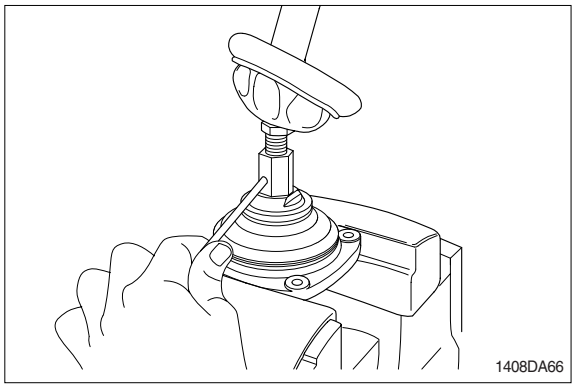


(15) Fit boot(26) and lock nut(22), and handle subassembly is assembled completely.





(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.



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