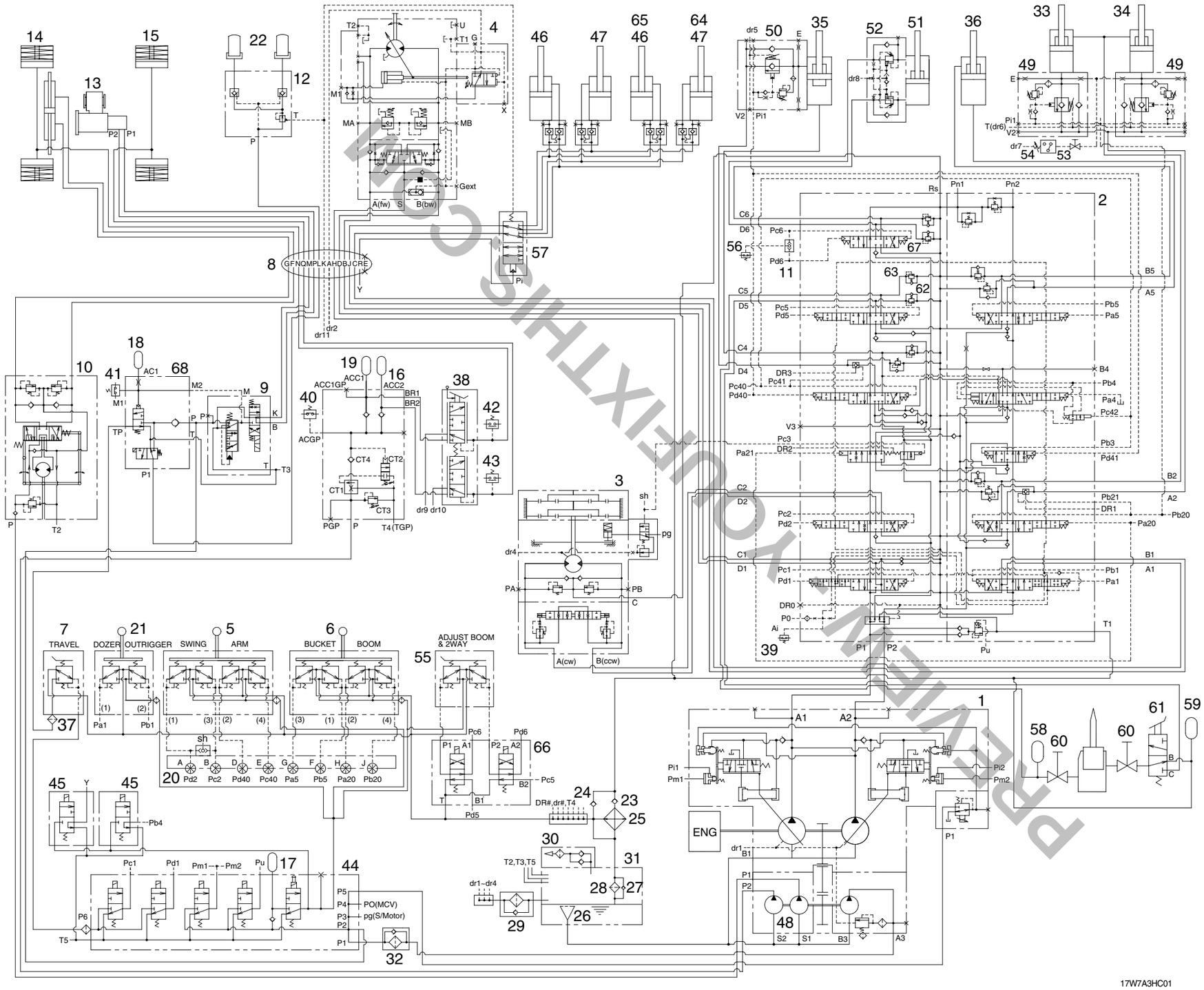
GROUP 1 HYDRAULIC CIRCUIT

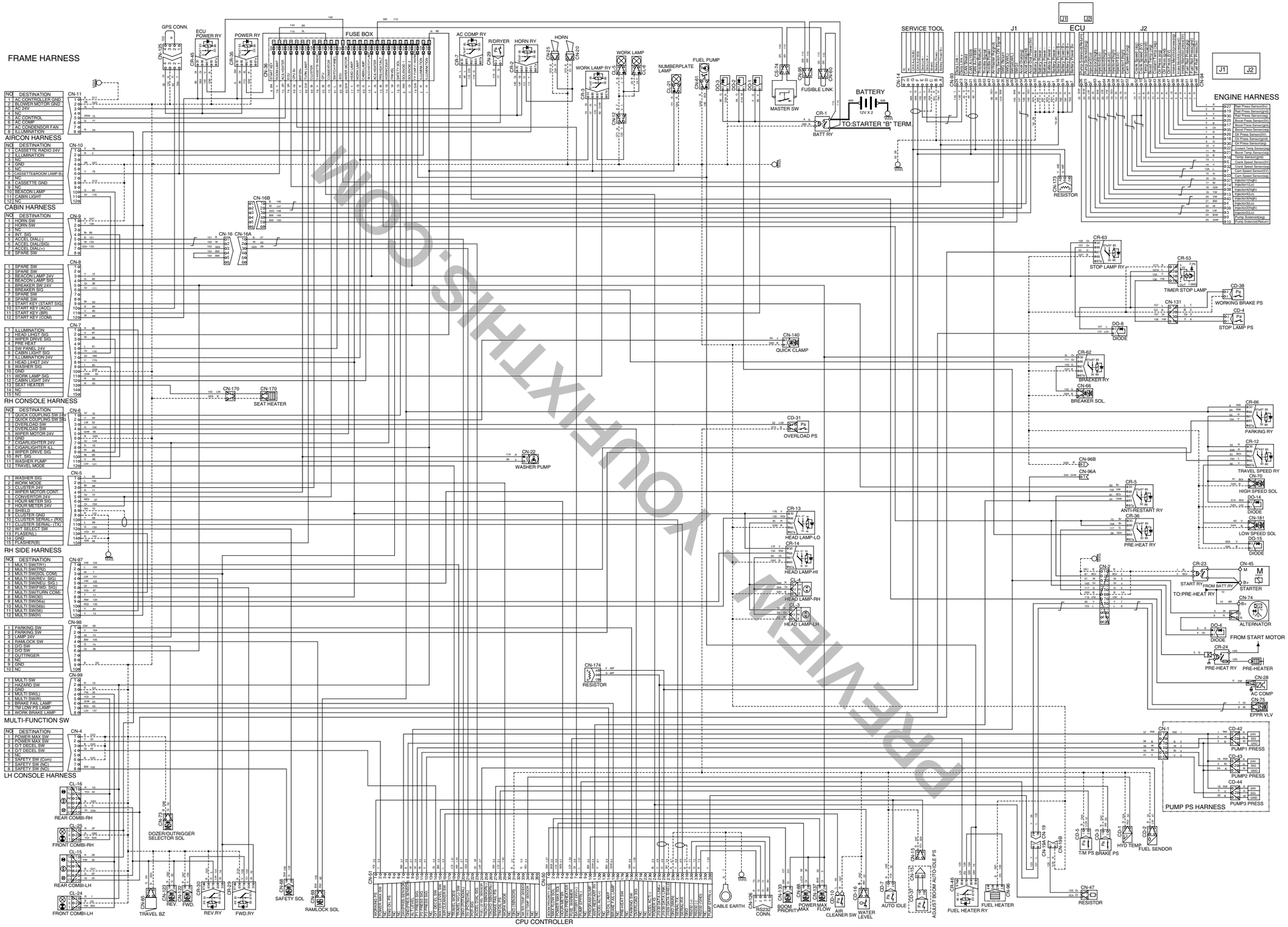


17W7A3HC01

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	Turning joint
9	Travel control valve
10	Steering valve
11	2 way shuttle valve(option)
12	Locking valve
13	Transmission
14	Front axle
15	Rear axle
16	Brake supply valve
17	Accumulator(option)
18	Accumulator(option)
19	Accumulator(option)
20	Terminal assy
21	RCV dozer(option)
22	Oscillating cylinder
23	Check valve
24	Check valve
25	Oil cooler
26	Strainer assy
27	Bypass check valve
28	Return filter
29	Spin filter
30	Air breather
31	Hydraulic tank
32	Line filter
33	Boom cylinder(LH)
34	Boom cylinder(RH)
35	Arm cylinder
36	Bucket cylinder
37	Last guard filter
38	Brake valve
39	Pressure switch(option)
40	Pressure switch(option)
41	Pressure switch(option)
42	Pressure switch(option)
43	Pressure switch(option)
44	5 solenoid valve
45	1 solenoid valve
46	Outrigger cylinder(RH, option)
47	Outrigger cylinder(LH, option)
48	Gear pump
49	Safety lock valve(option)
50	Safety lock valve(option)
51	Adjustable boom cylinder(option)
52	Safety lock valve(option)
53	Shut off valve(option)
54	Pressure switch(option)
55	Option pedal(option)
56	Pressure switch(option)
57	Selector valve(option)
58	Accumulator(option)
59	Accumulator(option)
60	Stop valve(option)
61	3 way selector valve(option)
62	Port relief valve(option)
63	Port relief valve(option)
64	Dozer cylinder(LH, option)
65	Dozer cylinder(RH, option)
66	Selector solenoid valve(option)
67	Port relief valve(option)
68	Travel control valve

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GROUP 2 ELECTRICAL CIRCUIT (1/2)

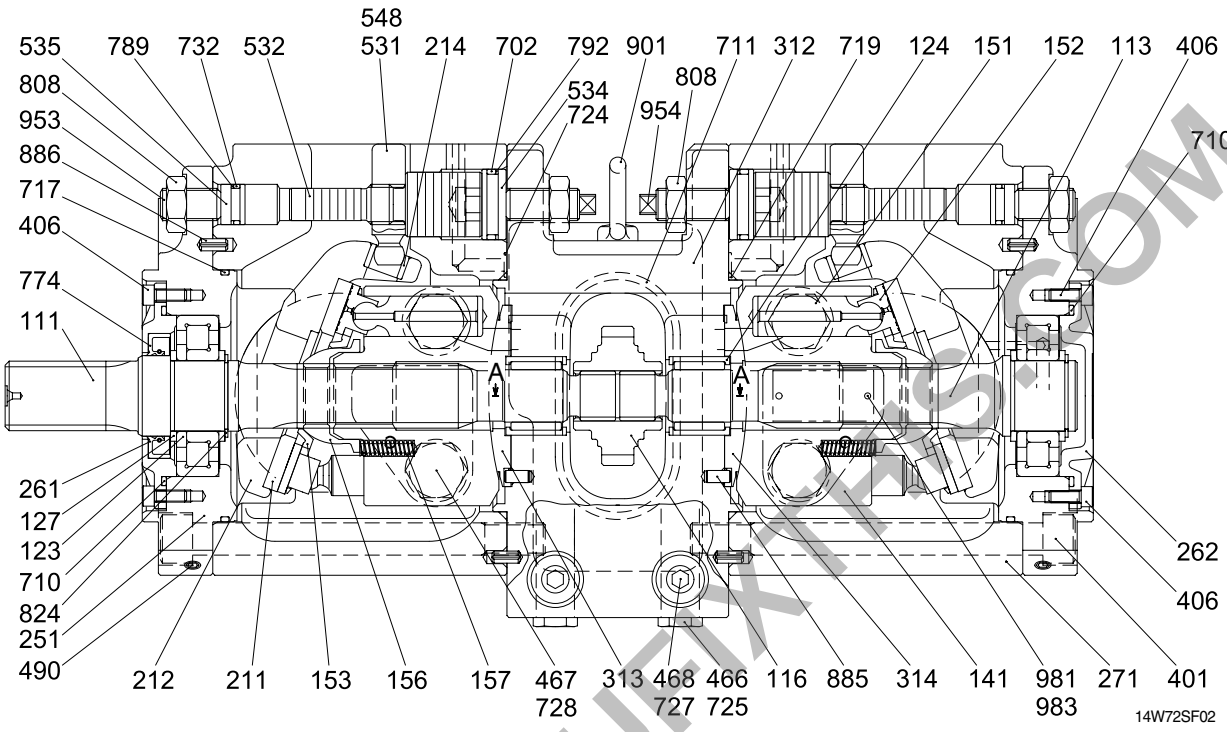


14W7A4CI01

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1) MAIN PUMP(1/2)

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



111	Drive shaft(F)	312	Valve block	724	O-ring
113	Drive shaft(R)	313	Valve plate(R)	725	O-ring
116	Gear	314	Valve plate(L)	727	O-ring
123	Roller bearing	401	Hexagon socket bolt	728	O-ring
124	Needle bearing	406	Hexagon socket bolt	732	O-ring
127	Bearing spacer	466	VP Plug	774	Oil seal
141	Cylinder block	467	VP Plug	789	Back up ring
151	Piston	468	VP Plug	792	Back up ring
152	Shoe	490	Plug	808	Hexagon head nut
153	Push-plate	531	Tilting pin	824	Snap ring
156	Bushing	532	Servo piston	885	Pin
157	Cylinder spring	534	Stopper(L)	886	Spring pin
211	Shoe plate	535	Stopper(S)	901	Eye bolt
212	Swash plate	548	Pin	953	Set screw
214	Bushing	702	O-ring	954	Set screw
251	Support	710	O-ring	981	Name plate
261	Seal cover(F)	711	O-ring	983	Pin
262	Seal cover(R)	717	O-ring		
271	Pump casing	719	O-ring		

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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		Travel motor mounting bolt	M16 × 2.0	29.6±3.2	214±23.1
10		Fuel tank mounting bolt	M20 × 2.5	45±5.1	325±36.9
11		Hydraulic oil tank mounting bolt	M20 × 2.5	45±5.1	325±36.9
12		Turning joint mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
13	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
14		Swing bearing upper mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
15		Swing bearing lower mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
16		Rear axle mounting bolt, nut	M20 × 1.5	58±6.3	419±45.5
17		Transmission bracket mounting bolt	M20 × 2.5	44±2.0	318±14.4
18		Transmission mounting bolt	M20 × 2.5	29.6±3.2	214±23.1
19		Oscillating cylinder mounting bolt	M22 × 1.5	83.2±9.2	602±66.5
20		Oscillating cylinder support mounting bolt	M16 × 2.0	29.6±3.2	214±23.1
21		Wheel nut	M20 × 1.5	60^{0}_{-5}	$434^{0}_{-36.2}$
22		Front drive shaft mounting bolt, nut	M10 × 1.25	5.9±0.6	42.7±4.3
23		Rear drive shaft mounting bolt, nut	M10 × 1.25	5.9±0.6	42.7±4.3
24	Others	Counterweight mounting bolt	M36 × 4.0	280±30	1439±217
25		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92.6±21.7
26		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 each components disassembly and assembly.

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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 : 124 ℓ (32.7 U.S. gal)

(5) Remove socket bolts (13) and disconnect hoses (1,2).

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

(7) Remove socket bolts 14) 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.

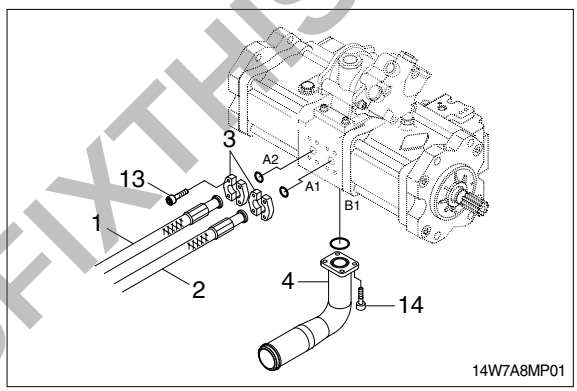
(8) Sling the pump assembly and remove the pump mounting bolts.

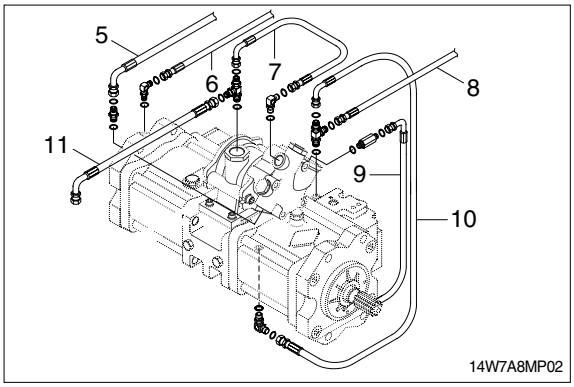
· Weight : 91kg (200lb)

※ Pull out the pump assembly from housing.

When removing the pump assembly, check that all the hoses have been disconnected.





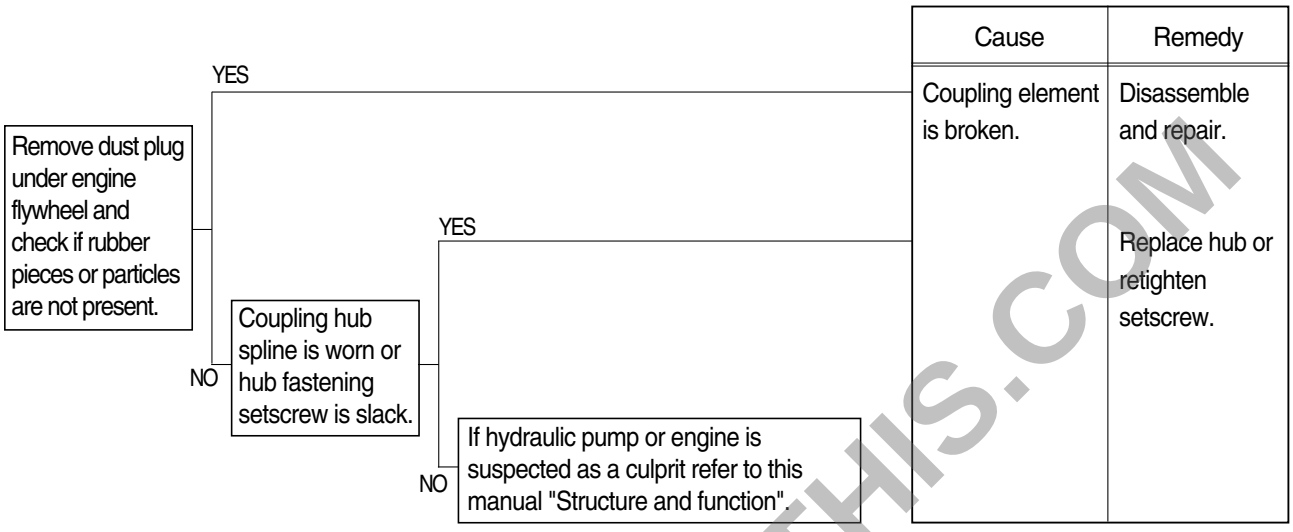


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2. DRIVE SYSTEM

1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



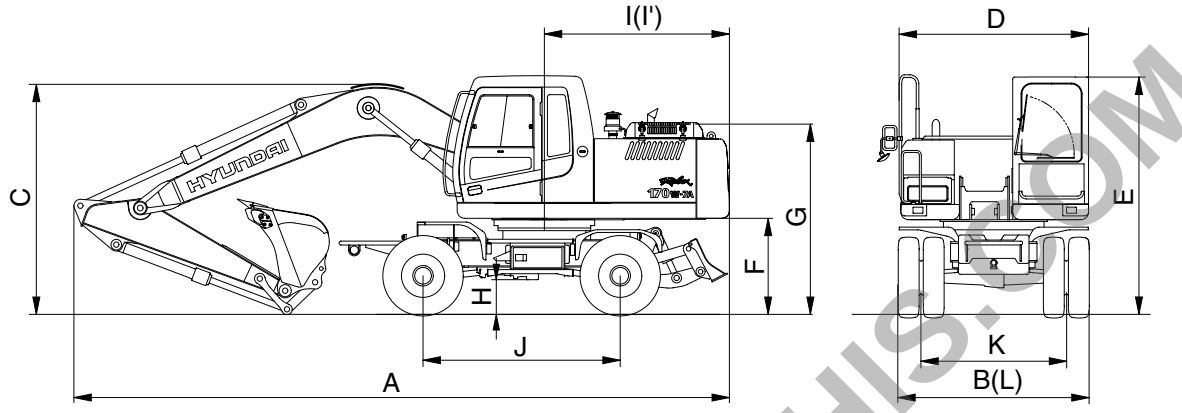
Cause	Remedy
Coupling element is broken.	Disassemble and repair.
	Replace hub or retighten setscrew.

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2. SPECIFICATIONS

1) 5.1m(16' 9") ONE PIECE BOOM, 2.2m(7' 3") ARM AND REAR DOZER BLADE



17W7A2SP02

Description		Unit	Specification
Operating weight		kg(lb)	16400(36160)
Bucket capacity(SAE heaped), standard		$m^3(yd^3)$	0.76(0.99)
Overall length	A	mm(ft-in)	8610(28' 3")
Overall width	B		2500(8' 2")
Overall height	C		3040(10' 0")
Upperstructure width	D		2475(8' 1")
Cab height	E		3150(10' 4")
Ground clearance of counterweight	F		1270(4' 2")
Engine cover height	G		2532(8' 4")
Minimum ground clearance	H		375(1' 3")
Rear-end distance	I		2480(8' 2")
Rear-end swing radius	I'		2530(8' 4")
Wheel base	J		2600(8' 6")
Tread	K		1914(6' 3")
Dozer blade width	L		2490(8' 2")
Travel speed	Low	km/hr(mph)	9.5
	High		30
Swing speed		rpm	11.5
Gradeability		Degree(%)	30(58)

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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.

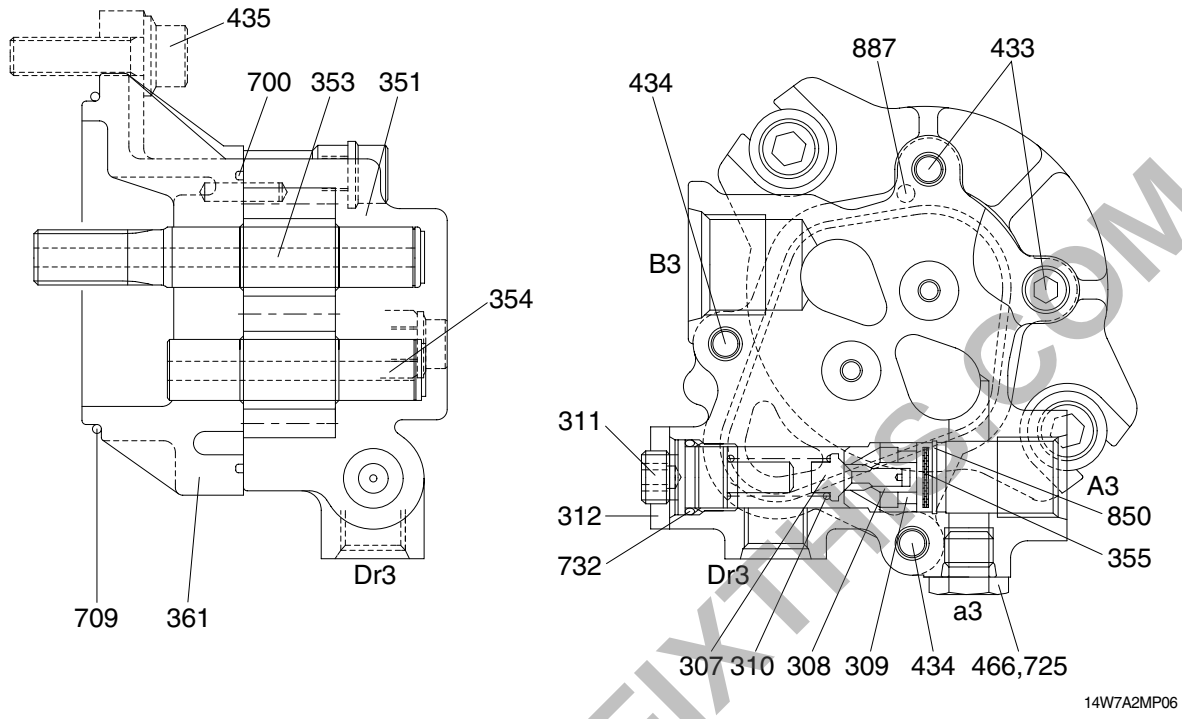
SECTION 9 COMPONENT MOUNTING TORQUE
This section shows bolt specifications and standard torque values needed when mounting components to the machine.

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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3) GEAR PUMP



307	Poppet	353	Drive gear	466	Plug
308	Seat	354	Driven gear	700	Ring
309	Spring seat	355	Filter	709	O-ring
310	Spring	361	Front case	725	O-ring
311	Adjust screw	433	Flange socket	732	O-ring
312	Lock nut	434	Flange socket	850	Snap ring
351	Gear case	435	Flange socket	887	Pin

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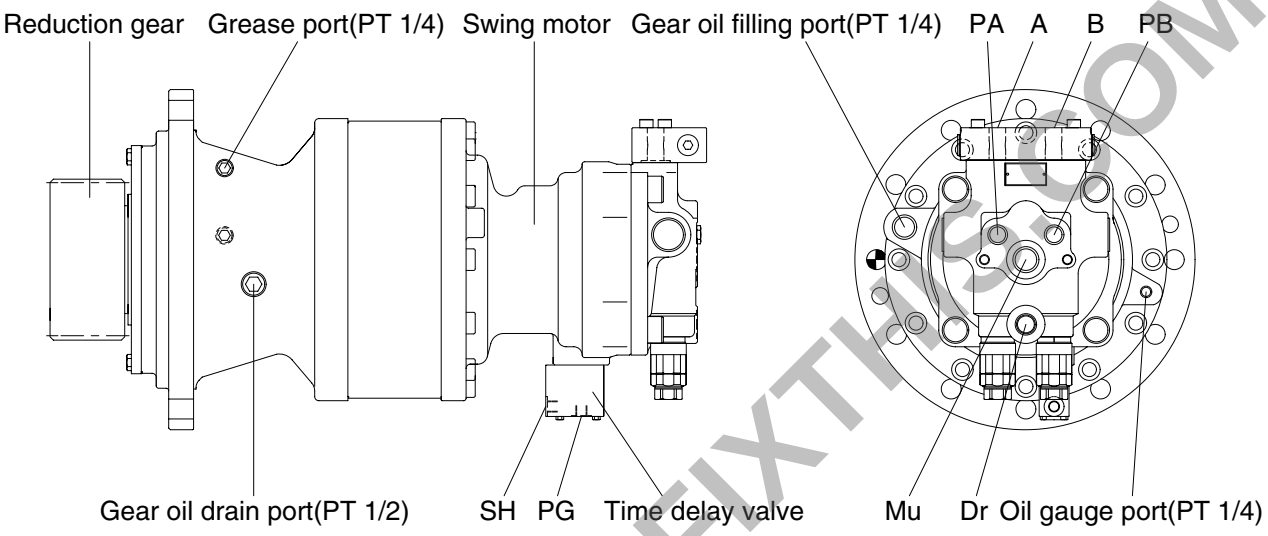
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GROUP 3 SWING DEVICE

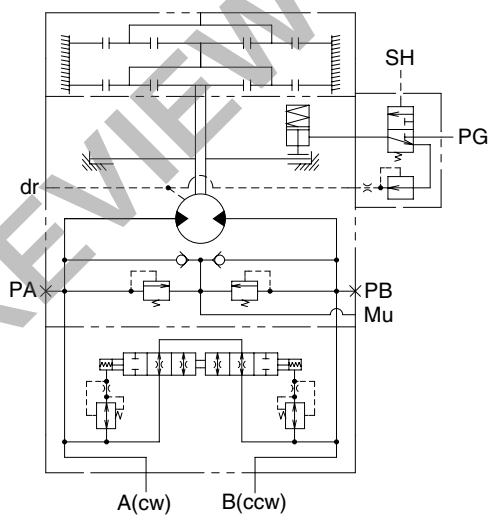
1. STRUCTURE

Swing device consists swing motor, swing reduction gear.

Swing motor include mechanical parking valve, relief valve, make up valve and time delay valve.



1607A2SM01



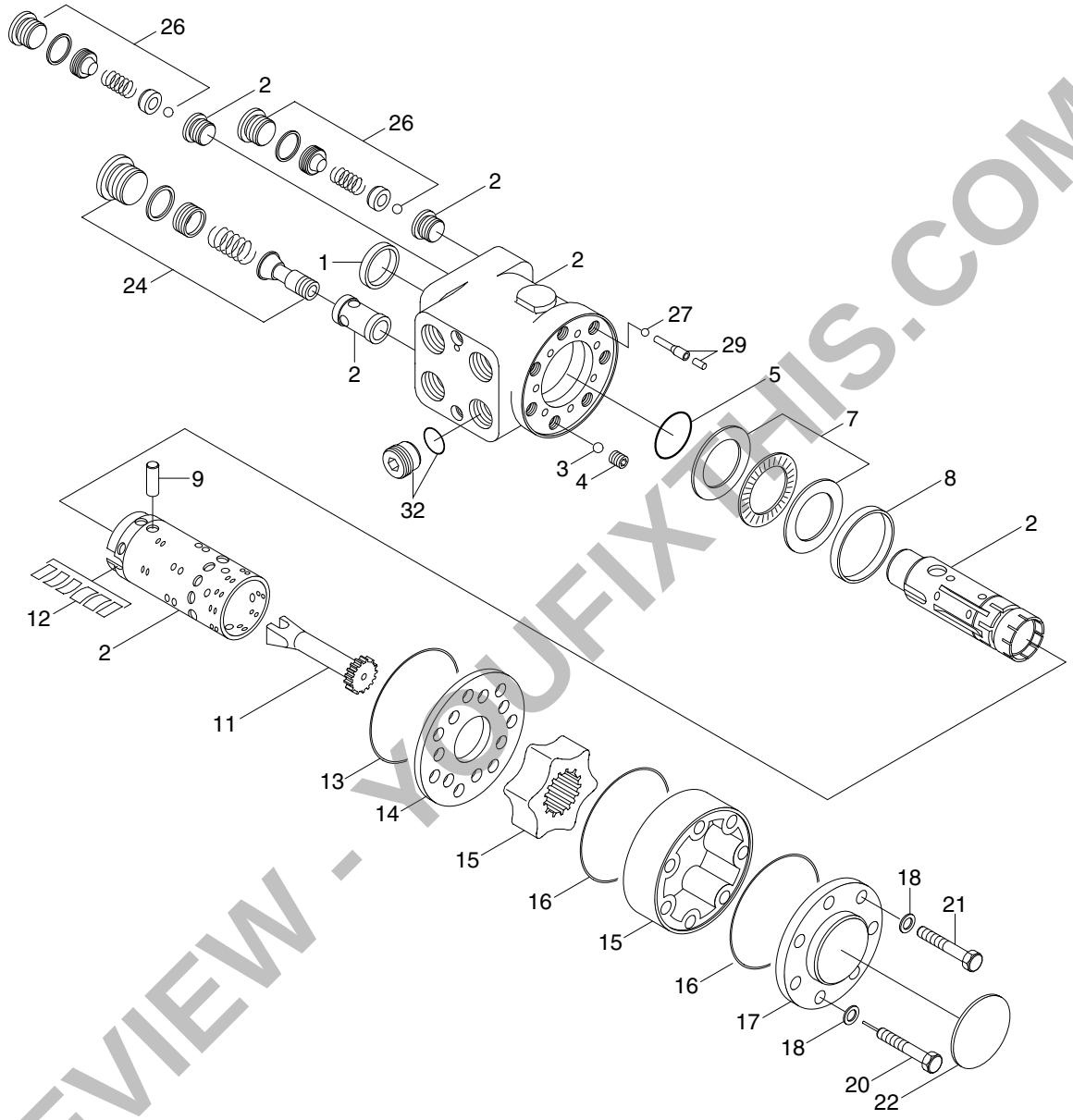
Hydraulic circuit

Port	Port name	Port size
A	Main port	SAE PF 3/4
B	Main port	SAE PF 3/4
Dr	Drain port	PF 1/2
Mu	Make up port	PF 1
PG	Brake release port	PF 1/4
SH	Brake pilot port	PF 1/4
PA,PB	Gage port	PF 1/4

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2. COMPONENTS



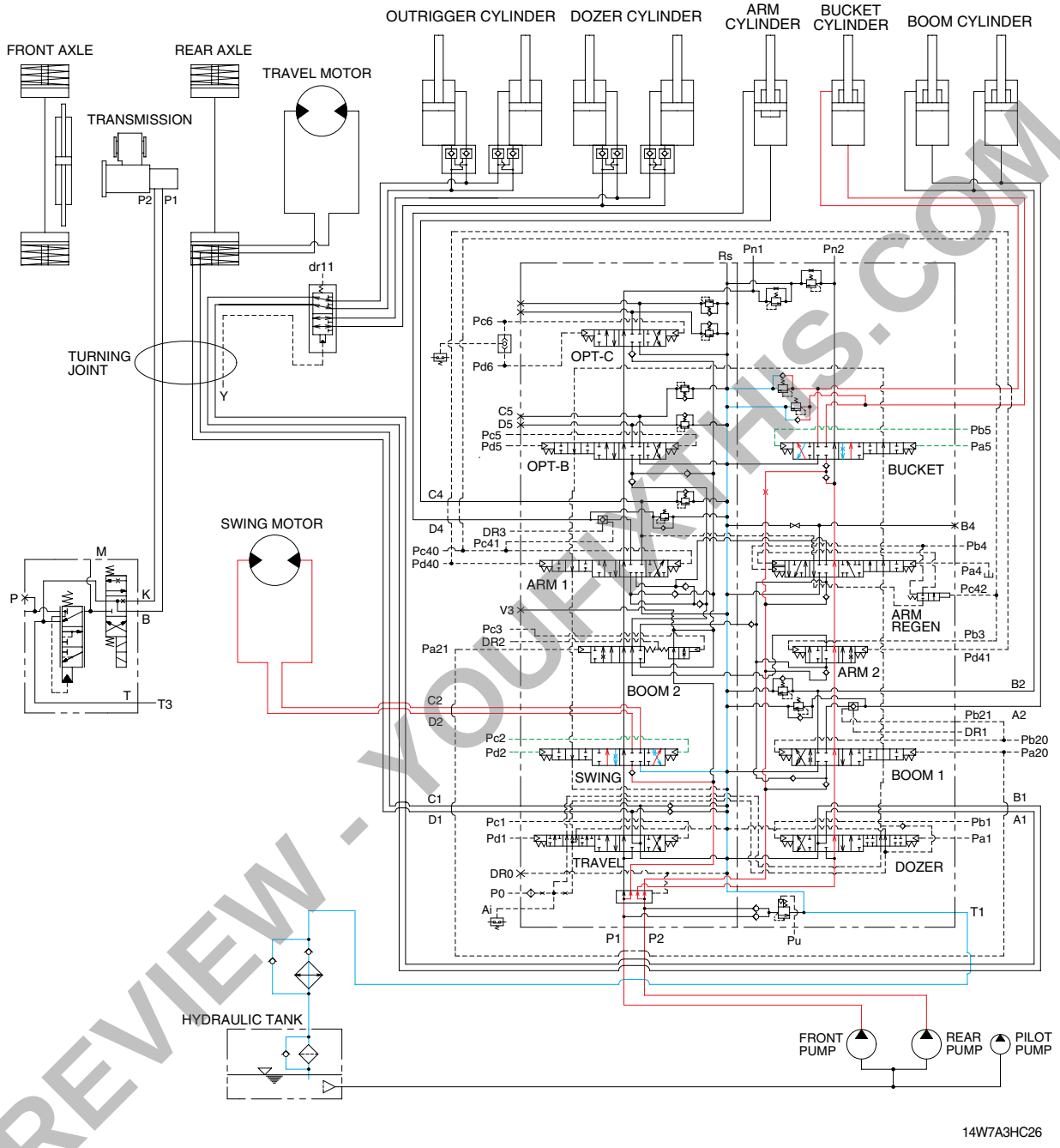
14W7A2STV02

1	Dust seal	11	Shaft	20	Pin screw
2	Housing, spool, sleeve	12	Spring set	21	Screw
3	Ball	13	O-ring	22	Name plate
4	Bushing	14	Distributor plate	24	Pressure relief valve
5	O-ring	15	Gear wheel set	26	Shock valve
7	Bearing assy	16	O-ring	27	Ball
8	Ring	17	End cover	29	Bushing
9	Cross pin	18	Washer	32	Check valve

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4. COMBINED SWING AND BUCKET OPERATION



When the swing and bucket functions are operated, simultaneously the swing spool and bucket spool 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 front pump flows into the swing motor through the swing spool in the left control valve.

The oil from the rear pump flows into the bucket cylinder through the bucket spool in the right control valve.

The superstructure swings and the bucket is operated.

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6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

(1) Key switch ON

Fuse box (No.12) → I/conn [CN-7(5)] → Switch panel [CN-116(6)]

Fuse box (No.6) → I/conn [CN-5(4)] → I/conn [CN-17(5)] → Wiper motor controller [CN-141(7)]

I/conn [CN-17(5)] → Wiper motor [CN-21(4)]

I/conn [CN-5(4)] → Washer pump [CN-22(2)]

Fuse box (No.14) → I/conn [CN-6(5)] → I/conn [CN-17(4)] → Wiper motor controller [CN-141(6)]

(2) Wipe switch ON : 1st step(Intermittent)

Wiper switch ON [CN-116(15)] → I/conn[CN-9(4)] → I/conn[CN-6(10)] → I/conn[CN-17(8)] → Wiper motor controller [CN-141(10) → (3)] → Wiper motor intermittently operating [CN-21(6)]

(3) Wiper switch ON : 2nd step(Low speed)

Wiper switch ON [CN-116(4)] → I/conn [CN-7(3)] → I/conn [CN-6(9)] → I/conn[CN-17(2)] → Wiper motor controller [CN-141(2) → (4)] → Wiper motor operating [CN-21(2)]

(4) Washer switch ON

Washer switch ON [CN-116(12)] → I/conn [CN-7(9)] → I/conn [CN-5(1)] → I/conn [CN-17(7)] → Wiper motor controller [CN-141(9) → (8)] → I/conn [CN-17(6)] → I/conn [CN-6(11)] → Washer operating [CN-22(1)]

Wiper switch ON [CN-116(4)] → I/conn [CN-7(3)] → I/conn [CN-6(9)] → I/conn[CN-17(2)] → Wiper motor controller [CN-141(2) → (4)] → Wiper motor operating [CN-21(2), Low speed]

(5) Auto parking(When switch OFF)

Switch OFF [CN-116(4)] → Wiper motor parking position by wiper motor controller

2) CHECK POINT

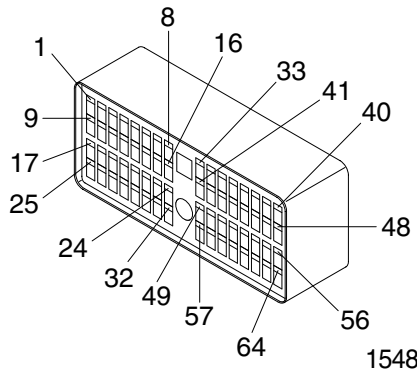
Engine	Start switch	Check point	Voltage
STOP	ON	① - GND(Fuse box) ② - GND(Switch power input)	24V
		③ - GND(Switch power output) ④ - GND(Wiper Power input)	0~5V
		⑤ - GND(Wiper power output)	24V
		⑥ - GND(Wiper motor)	0 or 24V

※ GND : Ground

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24) DEUTSCH ENGINE ECM CONNECTOR

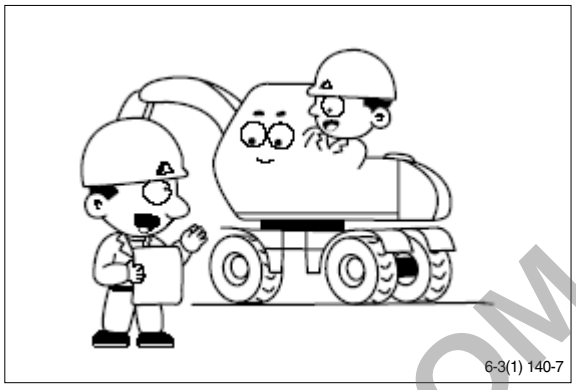
No. of pin	Receptacle connector(Female)	Plug connector(Male)
64		

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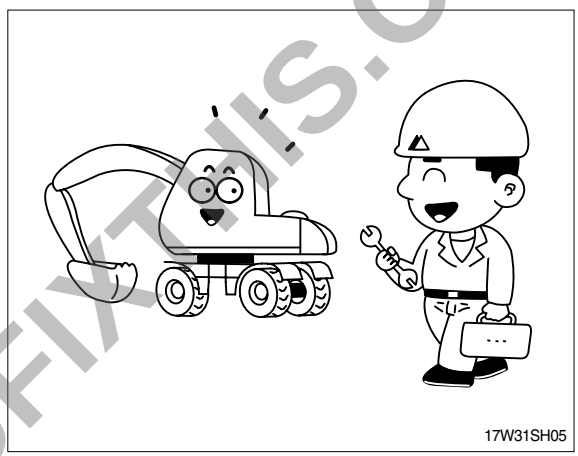
STEP 4. Inspect the trouble actually on the machine

In case that some trouble cannot be confirmed, obtain the details of the malfunction from the operator.
Also, check if there are any in complete connections of the wire harnesses are or not.



STEP 5. Perform troubleshooting

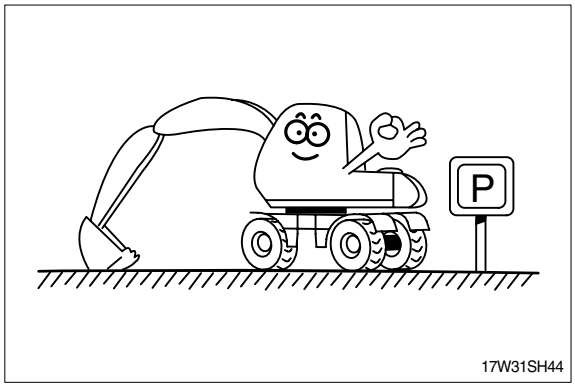
According to where the trouble parts are located, hydraulic & mechanical system part or electrical system part or mechatronics system part, perform troubleshooting the machine refer to the each system part's troubleshooting process diagram.



STEP 6. Trace a cause

Before reaching a conclusion, check the most suspectible causes again. Try to trace what the real cause of the trouble is.

Make a plan of the appropriate repairing procedure to avoid consequential malfunctions.



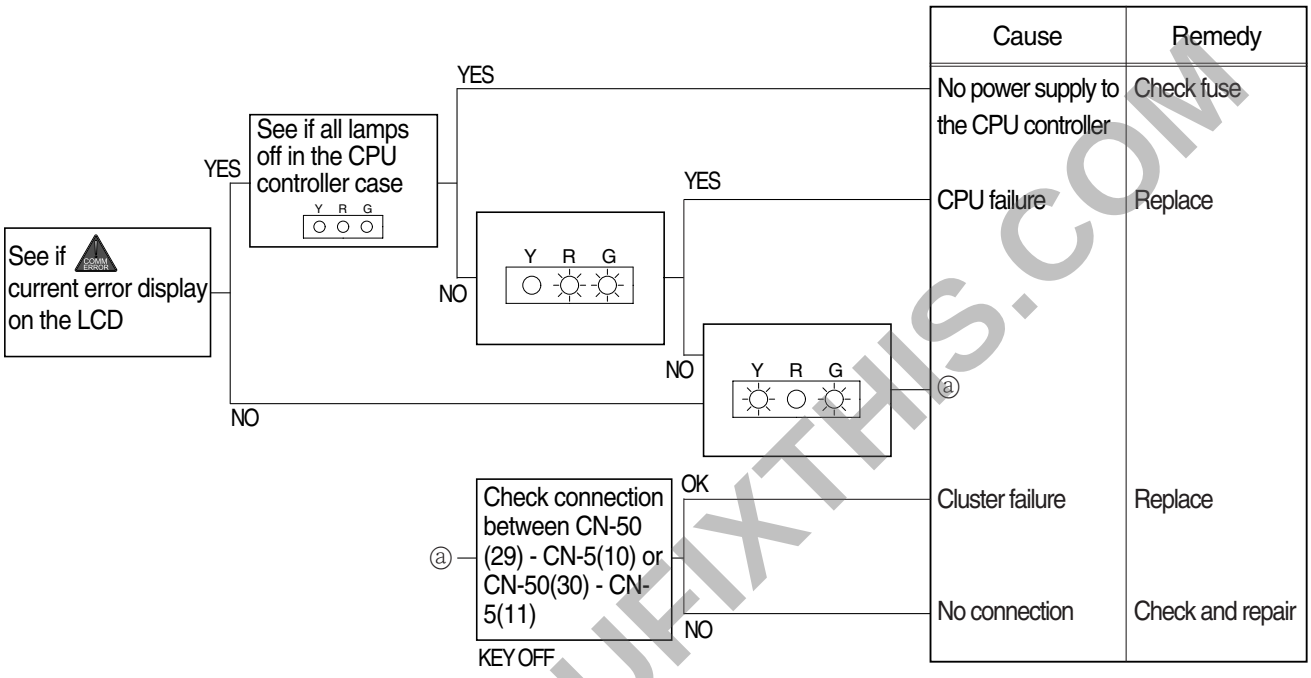
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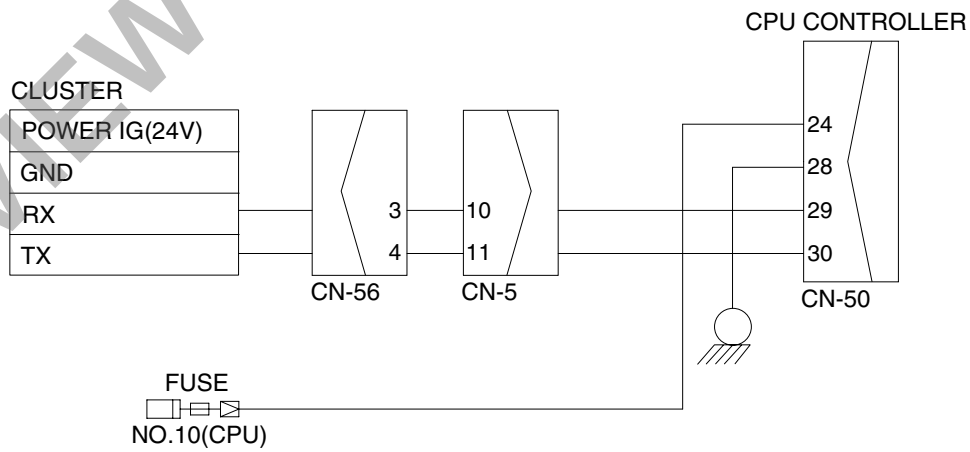
3. MALFUNCTION OF CLUSTER OR MODE SELECTION SYSTEM

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

1) INSPECTION PROCEDURE



Wiring diagram



14W7A6MS02

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3. COMPLETING WORK

1) If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the water level again.
2) If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
3) If the piping or hydraulic equipment, such as hydraulic cylinders, pumps, or motors, have been removed for repair, always bleed the air from the system after reassembling the parts.
4) Add the specified amount of grease(Molybdenum disulphied grease) to the work equipment related parts.

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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

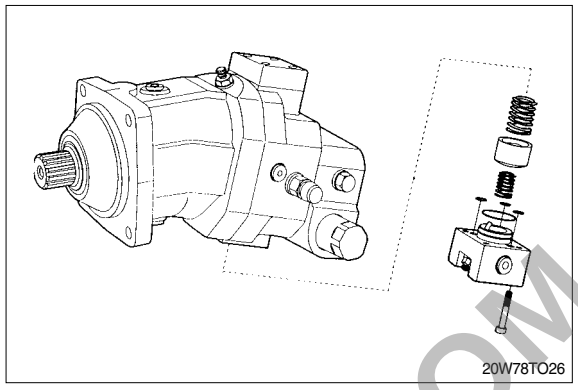
a. Confirm that all seat faces at ends of all poppets and seats are free of defects and show uniform and consistent contact faces.
b. Confirm manually that main poppet and seat can slide lightly and smoothly.
c. Confirm that outside face of main poppet and inside face of seat are free from scratches 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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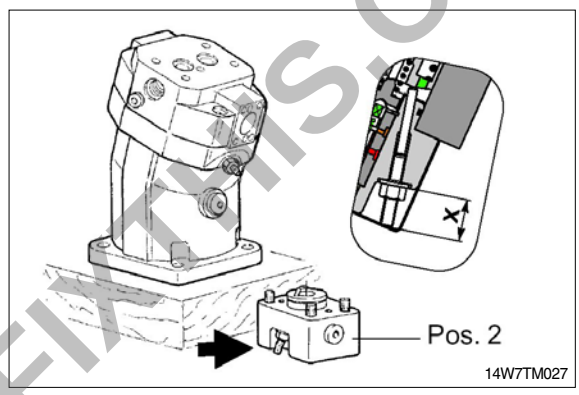
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(2) Disassembly position : Remove cover 2.

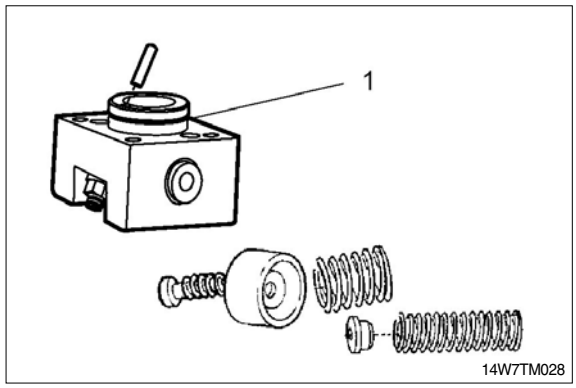
※ Attention spring load.



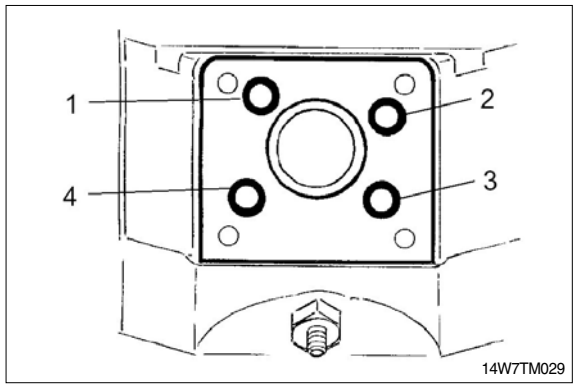
※ Dimension X : Note dimension(Begin of regulation)



1 Check of O-ring



1 O-ring / High pressure-small control position side
2 O-ring / Control pressure
3 O-ring / High pressure-check valve
4 O-ring / High pressure-check valve



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2. GENERAL INSTRUCTIONS

1) GENERAL WORKING INSTRUCTIONS

(1) This manual has been developed for the skilled serviceman, trained by the ZF-Passau.

(2) During all operations, pay attention to cleanliness and skilled working.
Therefore, axle removed from the machine, must be cleaned prior to open them.

(3) We assume that the special tools, specified by ZF, will be used.
The special tools are available from ZF-Passau.

(4) After the disassembly, all components must be cleansed, especially corners, cavities and recesses of housing and covers.

(5) The old sealing compound must be carefully removed.

(6) Check lubricating holes, grooves and pipes for free passage. They must be free of residues, foreign material or protective compounds.

(7) The latter refers especially to new parts.

(8) Parts which have been inevitably damaged in a disassembly operation, must be generally replaced by new ones, e.g. rotary seal rings, O-rings, U-section rings, cap boots, protective caps etc..

(9) Components such as roller bearings, thrust washers, synchronizing parts etc. which are subject to normal wear in automotive operation, must be checked by the skilled Serviceman.
He will decide if the parts can be reused.

(10) For the heating of bearings etc., hot plates, rod heaters or heating furnaces must be used.

(11) Never heat parts directly with the flame. An auxiliary solution would be to immerse the bearing in a vessel filled with oil, which is then heated with the flame.
In this way, damage to the bearings could be avoided.

(12) Ball bearings, covers, flanges and parts like that must be heated to about 90 to 100° C.

(13) Hot-mounted parts must be reset after cooling in order to assure a proper contact.

(14) Before pressing shafts, bearings etc. in position, both parts must be lubricated.

(15) During to reassembly, all specified adjustment values, testing specifications and tightening torque must be respected.

(16) After the repair, units are filled up with oil.

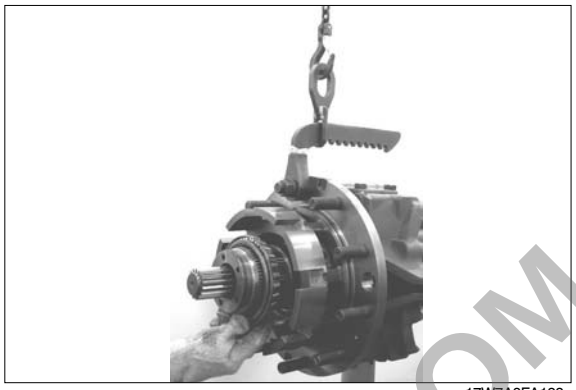
(17) After the oil filling, the oil level plugs and oil drain plugs must be tightened to the specified tightening torque.

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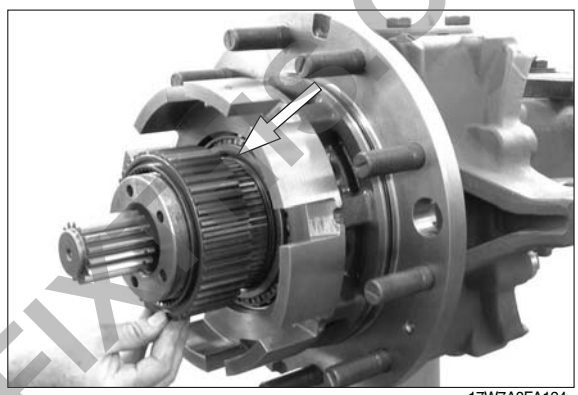
(28) Install preassembled hub until contact is obtained and fix with heated outer bearing inner ring

(S) Lifting bracket 5870 281 043



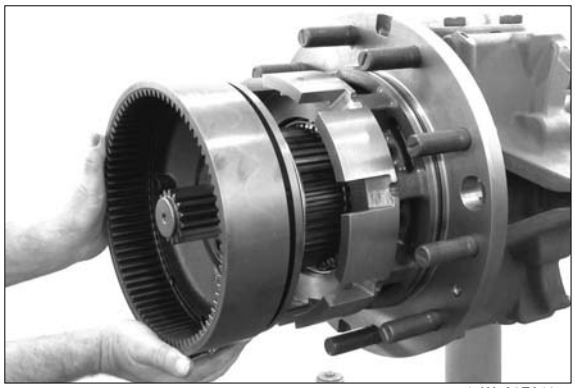
17W7A8FA133

(29) Oil O-rings and locate in annular groove (arrow) of knuckle housing.
Then install disc carrier.



17W7A8FA134

(30) Bring hub bearing into contact position (figure-FA135~FA137) :
Install ring gear (without sealing elements).



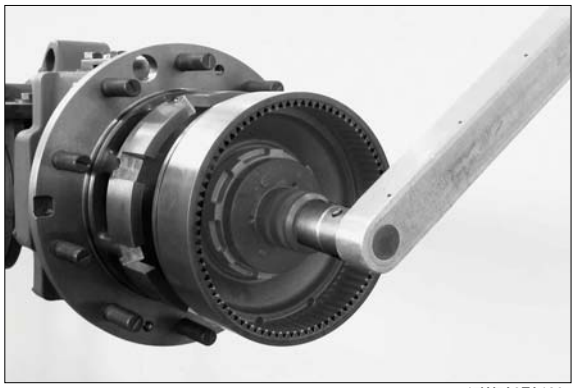
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(31) Bring hub bearing into contact position - for this purpose tighten slotted nut with a tightening torque of max. 1400Nm.

※ Apply lubricant to thread - knuckle housing / slotted nut.

※ While tightening the slotted nut rotate hub in both directions several times - roller setting.

(S) Socket spanner 5870 656 097



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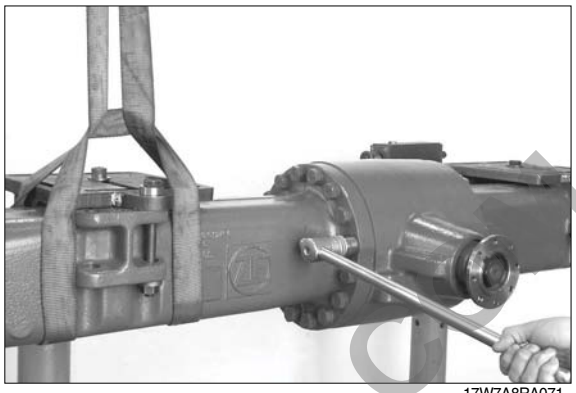
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5) INPUT

(1) Loosen the threaded joint of the axle housing half on the crown wheel side. Carefully separate the axle housing half.

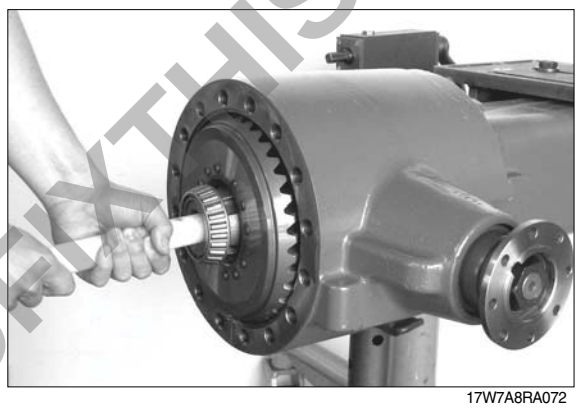
※ Pay attention to releasing differential.

(S)Lifting strap 5870 281 026



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(2) Move the differential assy out of the axle drive housing.

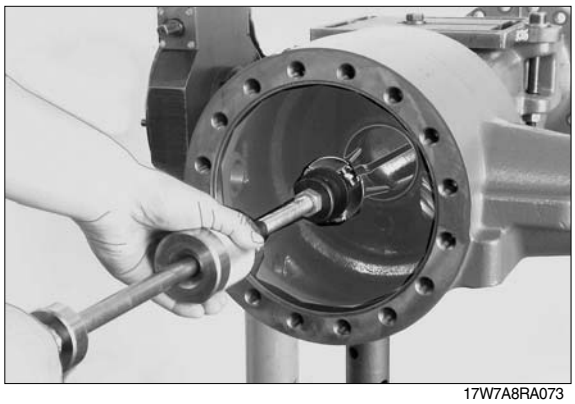


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(3) Use a striker to pull the bearing outer ring out of the hole and remove the shim behind (backlash).

※ Mark the shim (installation position / bearing allocation) - assembly aid.

(S) Striker 5870 650 004

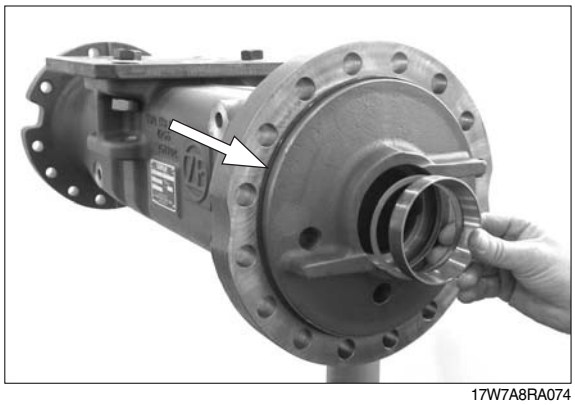


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(4) Remove the bearing outer ring and the shim behind (rolling torque differential bearing) from the second axle housing halve.

※ Mark the shim (installation position / bearing allocation) - assembly aid!

Remove the O-ring (arrow).

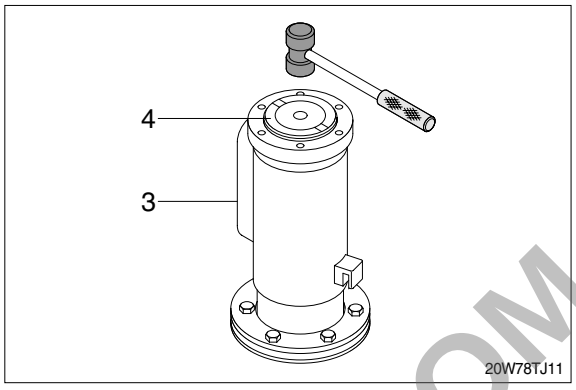


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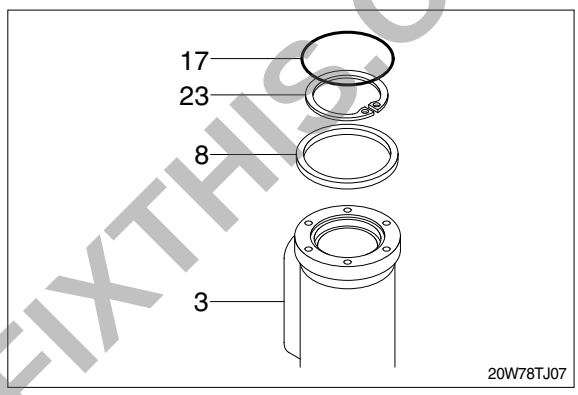
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(5) Set shaft (4) of turning joint upside on block, tap hub (3) with a plastic hammer to install.

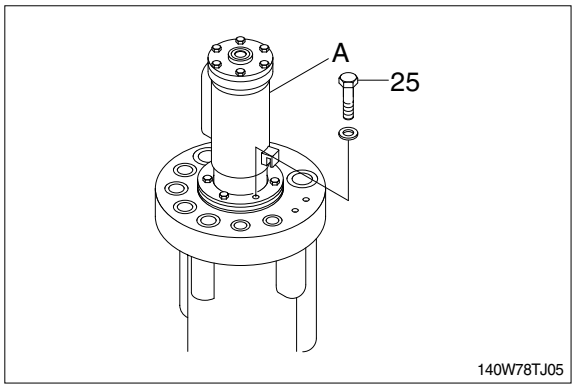


(6) Fit spacer (8) and retainer ring (23) to shaft (4).

(7) Fit O-ring (17) to hub (3).

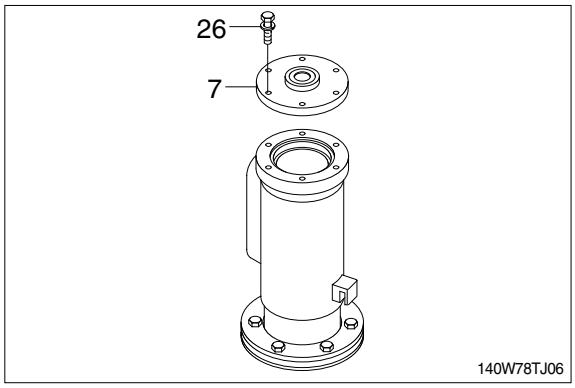


(8) Set turning joint upside (A) on downside, tighten bolts (25).
- Torque : 3.5±0.4kgf · m (25.3±2.9lbf · ft)



(9) Fit O-ring (17) to hub (3).

(10) Install cover (7) to hub and tighten bolts (26).
- Torque : 2.35±0.35kgf · m
  (17.0±2.5lbf · ft)



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