SECTION 1 GENERAL

Group 1 Safety Hints ---------- 1-1
Group 2 Specifications ---------- 1-9

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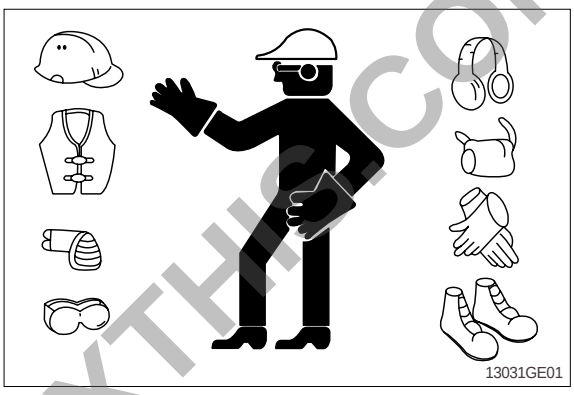
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

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

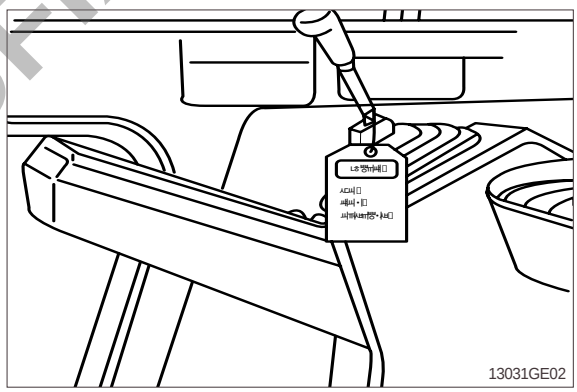
WEAR PROTECTIVE CLOTHING

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



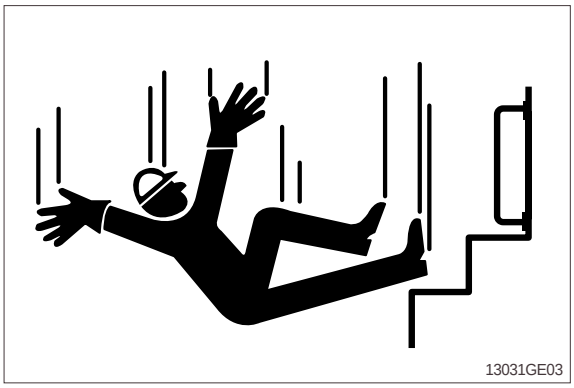
WARN OTHERS OF SERVICE WORK

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.

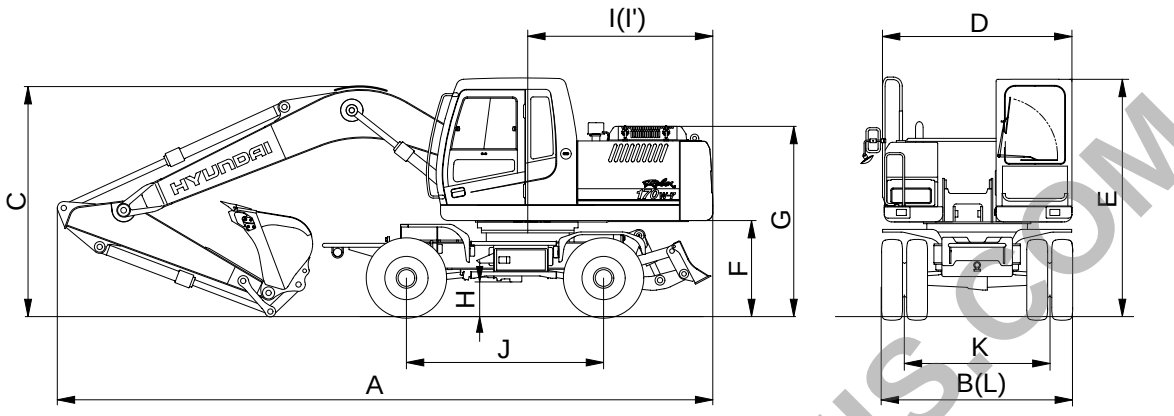


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2. SPECIFICATIONS

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



17W72SP02

Description		Unit	Specification
Operating weight		kg(lb)	16200(35710)
Bucket capacity(SAE heaped), standard		m^3(yd³)	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

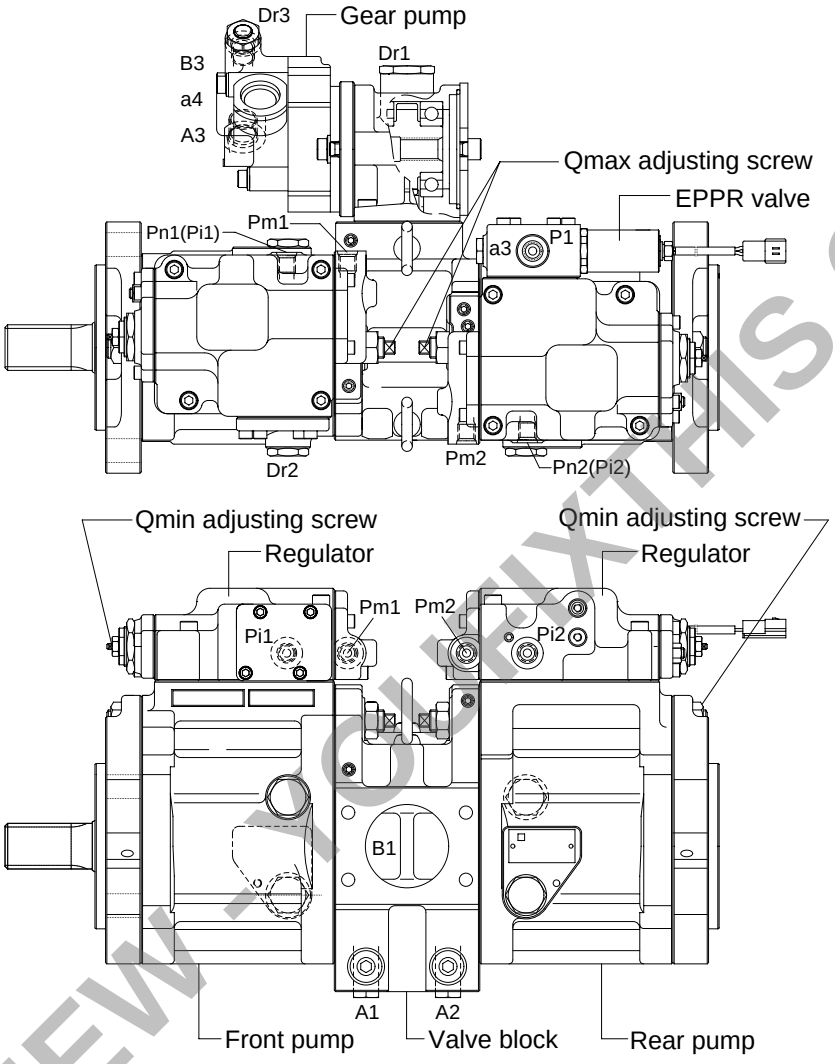
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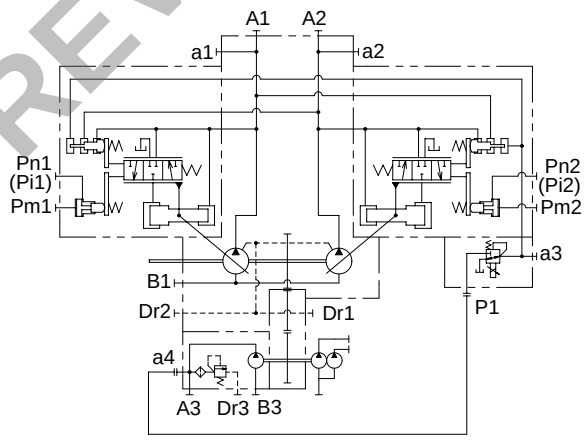
GROUP 1 PUMP DEVICE

1. STRUCTURE

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



17W72MP01



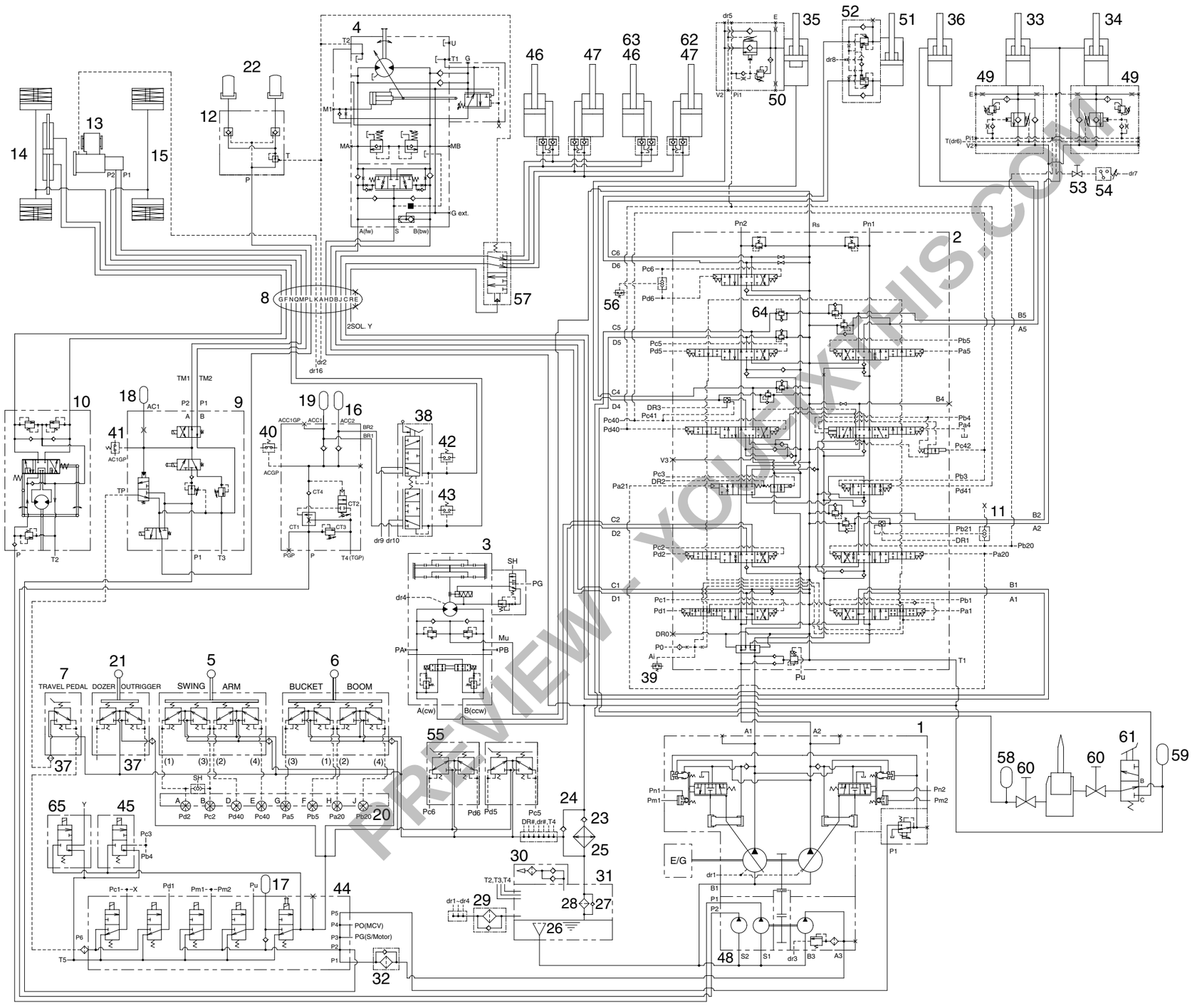
Hydraulic circuit

Port	Port name	Port size
A1,2	Delivery port	SAE6000psi 3/4"
B1	Suction port	SAE2500psi 2 1/2"
Dr1	Drain port	PF 3/4 - 20
Dr2	Drain port	PF 1/2 - 19
Dr3	Drain port	PF 3/8 - 15
Pn1,Pn2	Pilot port	PF 1/4 - 15
Pm1,Pm2	Qmax cut port	PF 1/4 - 15
P1	EPPR valve primary port	PF 1/4 - 15
a1,2,3	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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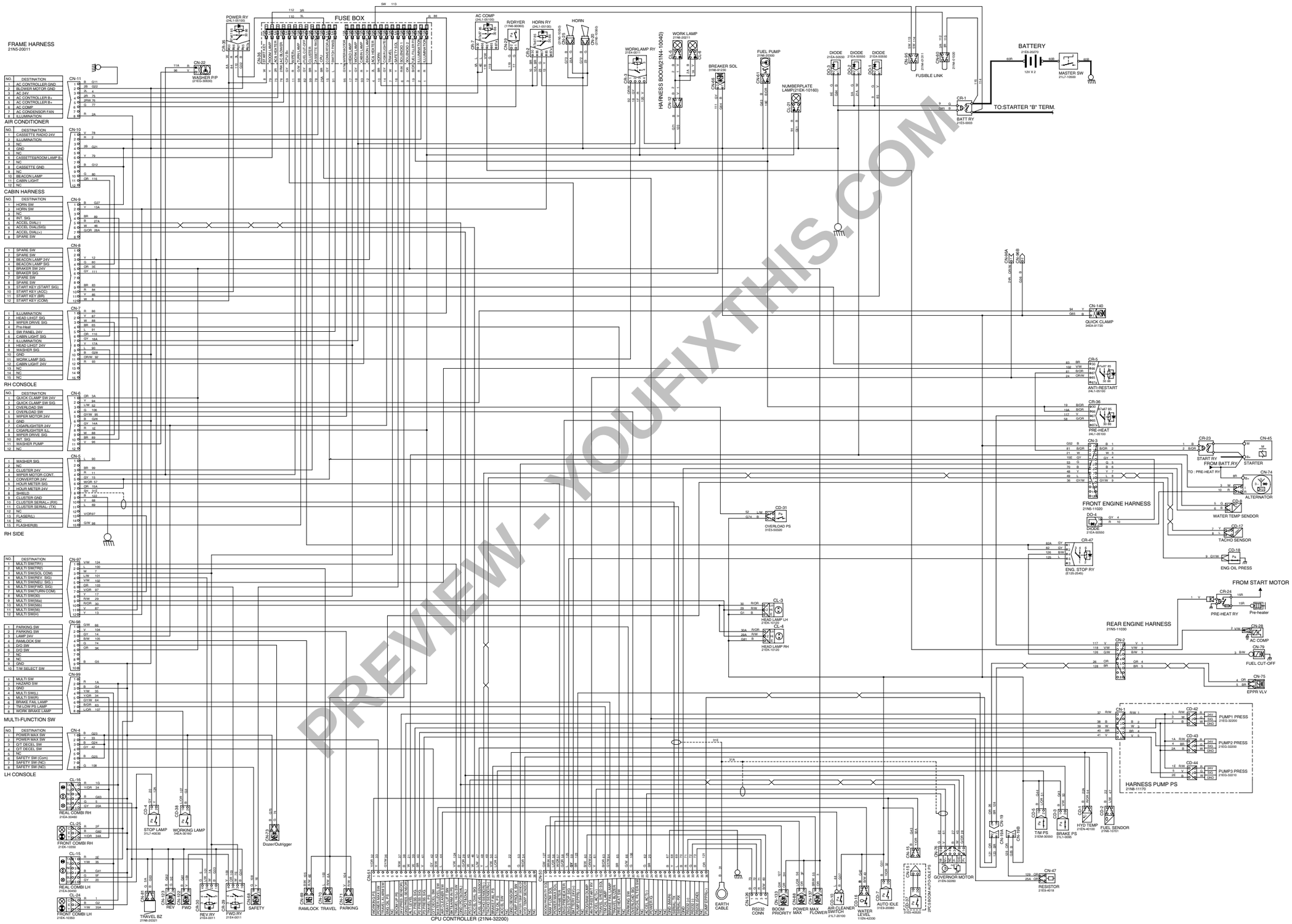
GROUP 1 HYDRAULIC CIRCUIT



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 Turning joint
9 Transmission control valve
10 Steering valve
11 Shuttle valve
12 Locking valve
13 Transmission
14 Front axle
15 Rear axle
16 Brake supply valve
17 Accumulator
18 Accumulator
19 Accumulator
20 Terminal assy
21 RCV dozer
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
40 Pressure switch
41 Pressure switch
42 Pressure switch
43 Pressure switch
44 5 solenoid valve
45 Arm regeneration solenoid valve
46 Outrigger cylinder(RH)
47 Outrigger cylinder(LH)
48 Gear pump
49 Safety lock valve
50 Safety lock valve
51 Hydraulic adjustable boom cylinder
52 Safety lock valve
53 Shut off valve
54 Pressure switch
55 Option pedal
56 Pressure switch
57 Selector valve
58 Accumulator
59 Accumulator
60 Stop valve
61 Selector valve
62 Dozer cylinder(LH)
63 Dozer cylinder(RH)
64 Port relief valve
65 Dozer/Outrigger select solenoid valve

17W73HC01

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17W74EL03

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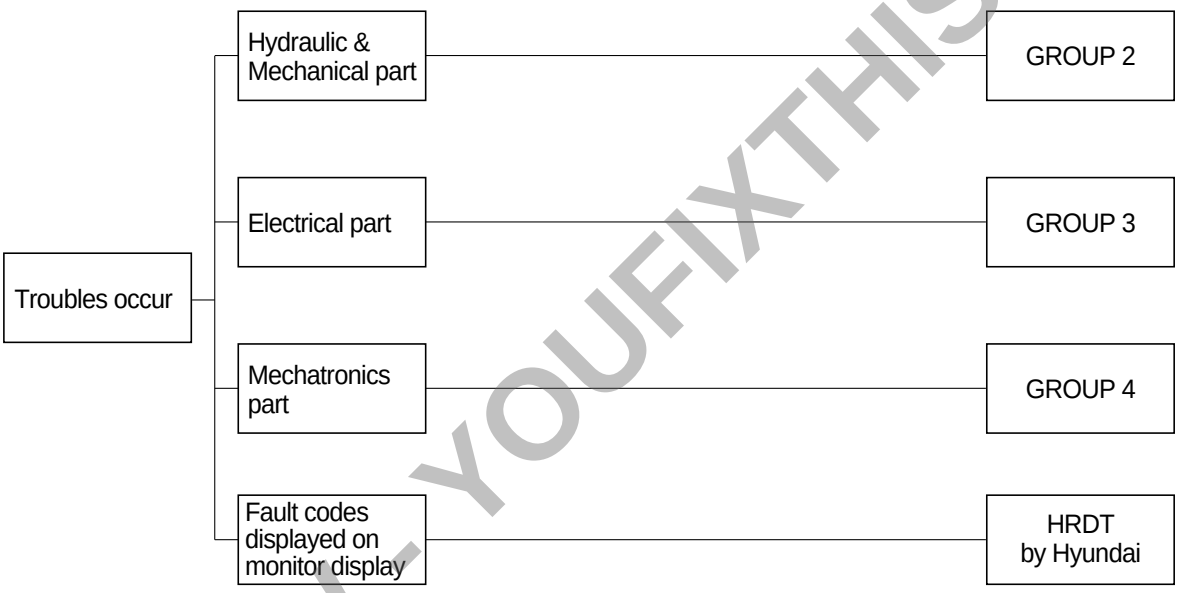
SECTION 6 TROUBLESHOOTING

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.



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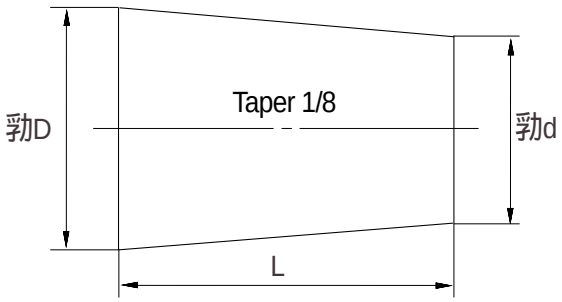
SECTION 8 DISASSEMBLY AND ASSEMBLY

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

1) Lower the work equipment completely to the ground.
   If the coolant contains antifreeze, dispose of it correctly.
2) After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
3) When draining oil, prepare a container of adequate size to catch the oil.
4) Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
5) To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors.
6) Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
7) Check the number and thickness of the shims, and keep in a safe place.
8) When raising components, be sure to use lifting equipment of ample strength.
9) When using forcing screws to remove any components, tighten the forcing screws alternately.
10) Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.
11) When removing hydraulic equipment, first release the remaining pressure inside the hydraulic tank and the hydraulic piping.
12) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Dimensions		
	D	d	L
06	6	5	8
08	8	6.5	11
10	10	8.5	12
12	12	10	15
14	14	11.5	18
16	16	13.5	20
18	18	15	22
20	20	17	25
22	22	18.5	28
24	24	20	30
27	27	22.5	34



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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 ± 0.5	72.3 ± 3.6
2		Engine mounting bolt(Bracket-Frame)	M20 × 2.5	30 ± 3.5	253 ± 25.3
3		Radiator mounting bolt, nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
4		Coupling mounting bolt	M16 × 2.0	22.1 ± 2.4	159 ± 17.3
5	Hydraulic system	Main pump mounting bolt	M16 × 2.0	22.1 ± 2.4	159 ± 17.3
6		Main control valve mounting bolt	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
7		Travel motor mounting bolt	M16 × 2.5	29.6 ± 3.2	214 ± 23.1
8		Fuel tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
9		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
10		Turning joint mounting bolt, nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
11	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
12		Swing bearing upper mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
13		Swing bearing lower mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
15		Front axle mounting bolt, nut	M16 × 2.5	29.6 ± 3.2	214 ± 23.1
16		Rear axle mounting bolt, nut	M20 × 1.5	58 ± 6.3	419 ± 45.5
17		Transmission mounting bolt	M20 × 2.5	44 ± 2.0	318 ± 14.4
18		Oscillating cylinder mounting bolt	M22 × 1.5	83.2 ± 9.2	602 ± 66.5
19		Oscillating cylinder support bolt	M16 × 2.0	29.6 ± 3.2	214 ± 23.1
20		Wheel nut	M20 × 1.5	60 ± 0.5	434 ± 3.6
21		Front drive shaft mounting bolt, nut	M10 × 1.25	5.9 ± 0.6	42.7 ± 4.3
22		Rear drive shaft mounting bolt, nut	M10 × 1.25	5.9 ± 0.6	42.7 ± 4.3
23	Others	Counter weight mounting bolt	M36 × 2.0	215 ± 33	1555 ± 241
24		Cab mounting bolt, nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
25		Operator's seat mounting bolt	M 8 × 1.25	1.17 ± 0.1	8.5 ± 0.7

※ For tightening torque of engine and hydraulic components, see each components disassembly and assembly.

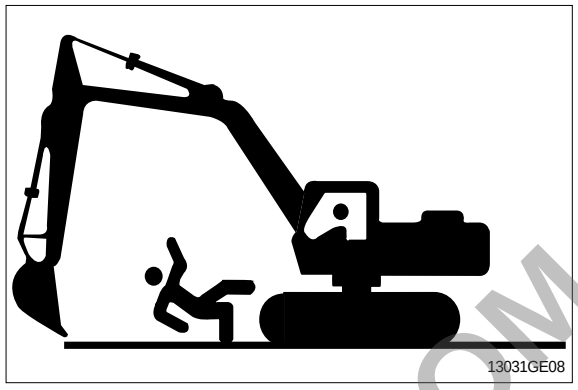
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KEEP RIDERS OFF EXCAVATOR

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.

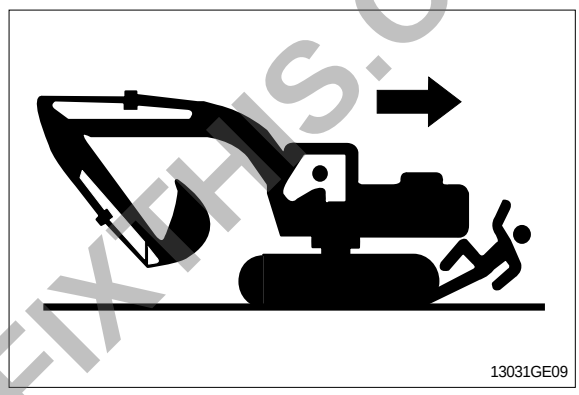


MOVE AND OPERATE MACHINE SAFELY

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.

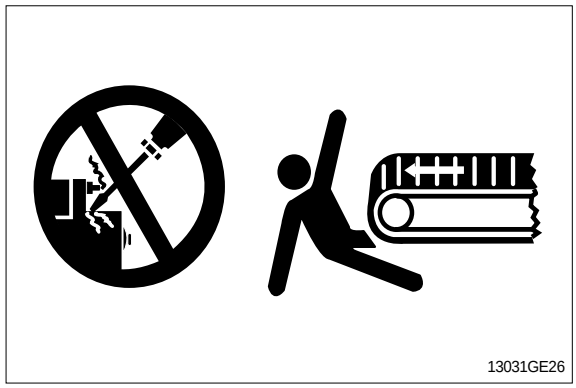
Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the excavator.



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

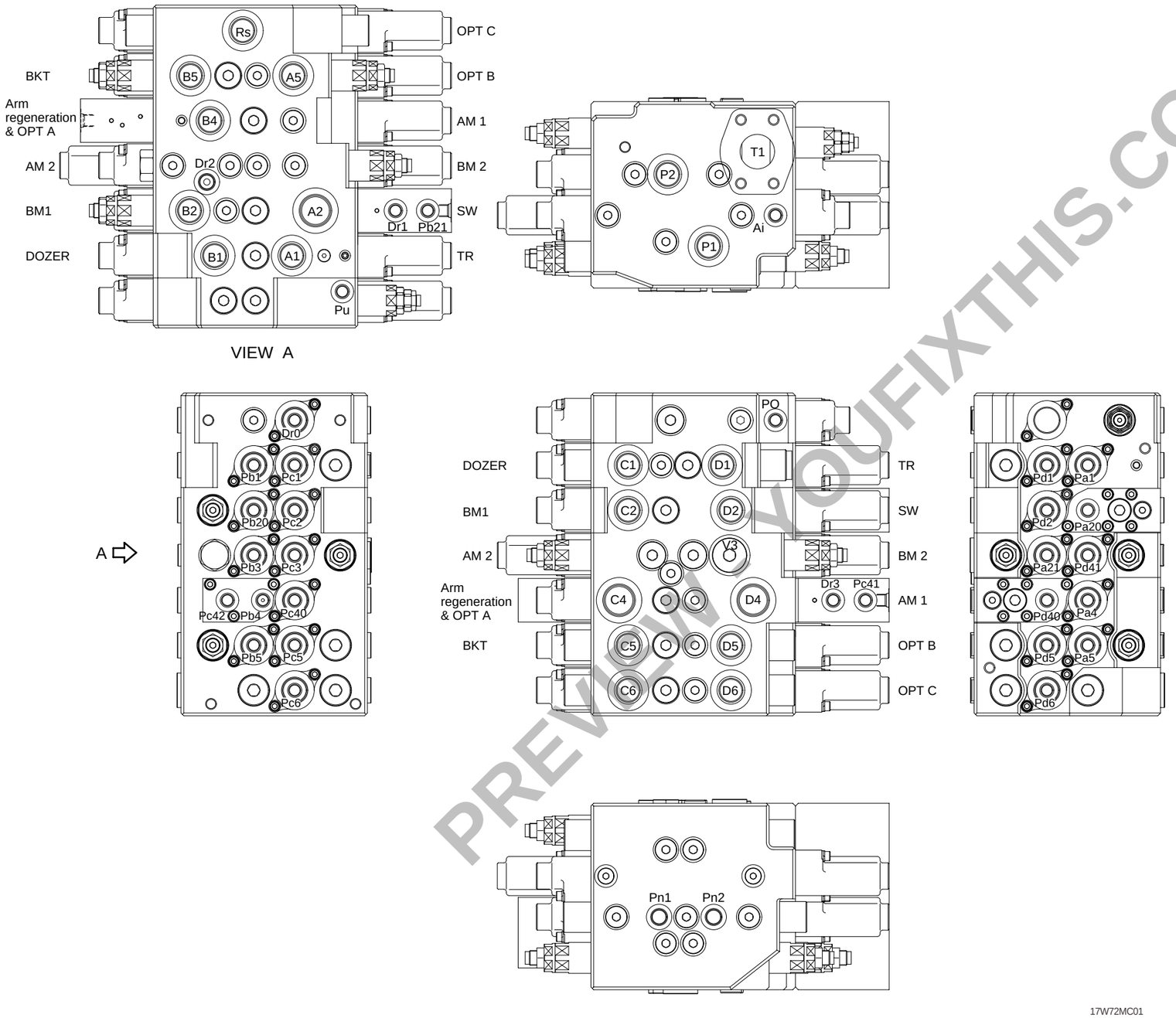
Before working on the machine:

- 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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1. STRUCTURE



Mark	Port name	Port size	Tightening torque
Rs	Make up for swing motor	G1/4	3.5~3.9kgf¡ /m (25.3~28.2lbf¡ /ft)
Pa1	Dozer down pilot port		
Pb1	Dozer up pilot port		
Pc1	Travel pilot port(BW)		
Pd1	Travel pilot port(FW)		
Pa20	Boom up pilot port		
Pa21	Boom up confluence pilot port		
Pb20	Boom down pilot port		
Pb21	Lock valve pilot port(Boom)		
Pc2	Swing pilot port(RH)		
Pd2	Swing pilot port(LH)		
Pb3	Arm in confluence pilot port		
Pc3	Swing priority pilot port		
Pa4	Option A pilot port(Breaker)		
Pb4	Arm in regeneration cut port		
Pc40	Arm in pilot port		
Pc41	Lock valve pilot port(Arm)		
Pc42	Arm in regen-cut signal selector port		
Pd40	Arm out pilot port		
Pd41	Arm out confluence pilot port		
Pa5	Bucket in pilot port		
Pb5	Bucket out pilot port		
Pc5	Option B pilot port		
Pd5	Option B pilot port		
Pc6	Option C pilot port		
Pd6	Option C pilot port		
PO	Pilot pressure port		
Pu	Main relief pressure up		
Ai	Auto idle signal port		
Dr0	Drain port(Travel straight)		
Dr1	Drain port(Boom holding valve)		
Dr2	Drain port(Boom2 & swing priority)		
Dr3	Drain port(Arm holding valve)		
Pn1	Negative control signal port(P1 port side)		
Pn2	Negative control signal port(P2 port side)		
A1	Dozer down port	G3/4	15~18kgf¡ /m (109~130lbf¡ /ft)
B1	Dozer up port		
C1	Travel motor port(BW)		
D1	Travel motor port(FW)		
B2	Boom rod side port		
C2	Swing motor port(LH)		
D2	Swing motor port(RH)		
B4	Option A port(Breaker)		
A5	Bucket head side port		
B5	Bucket rod side port		
C5	Option B port		
D5	Option B port		
C6	Option C port		
D6	Option C port		
P1	Pump port(P1 side)		
P2	Pump port(P2 side)		
A2	Boom head side port	G1	20~25kgf¡ /m (115~180lbf¡ /ft)
C4	Arm head side port		
D4	Arm rod side port		
T1	Return port	SAE3000, 1 1/2 (M12)	8.5~11.5kgf¡ /m (61.5~83.1lbf¡ /ft)

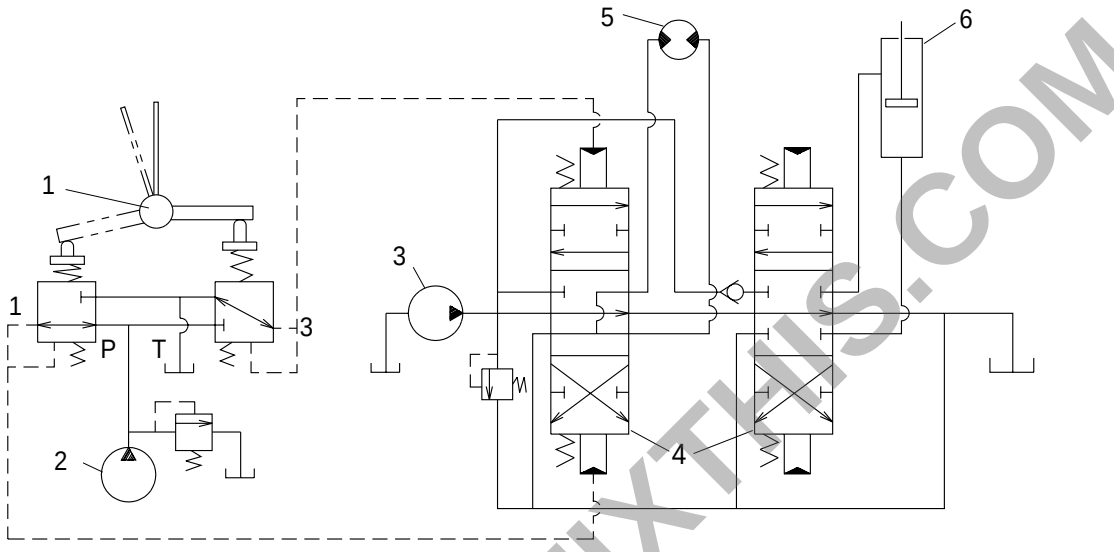
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3) OPERATION

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below and the attached operation explanation drawing.

The diagram shown below is the typical application example of the pilot valve.



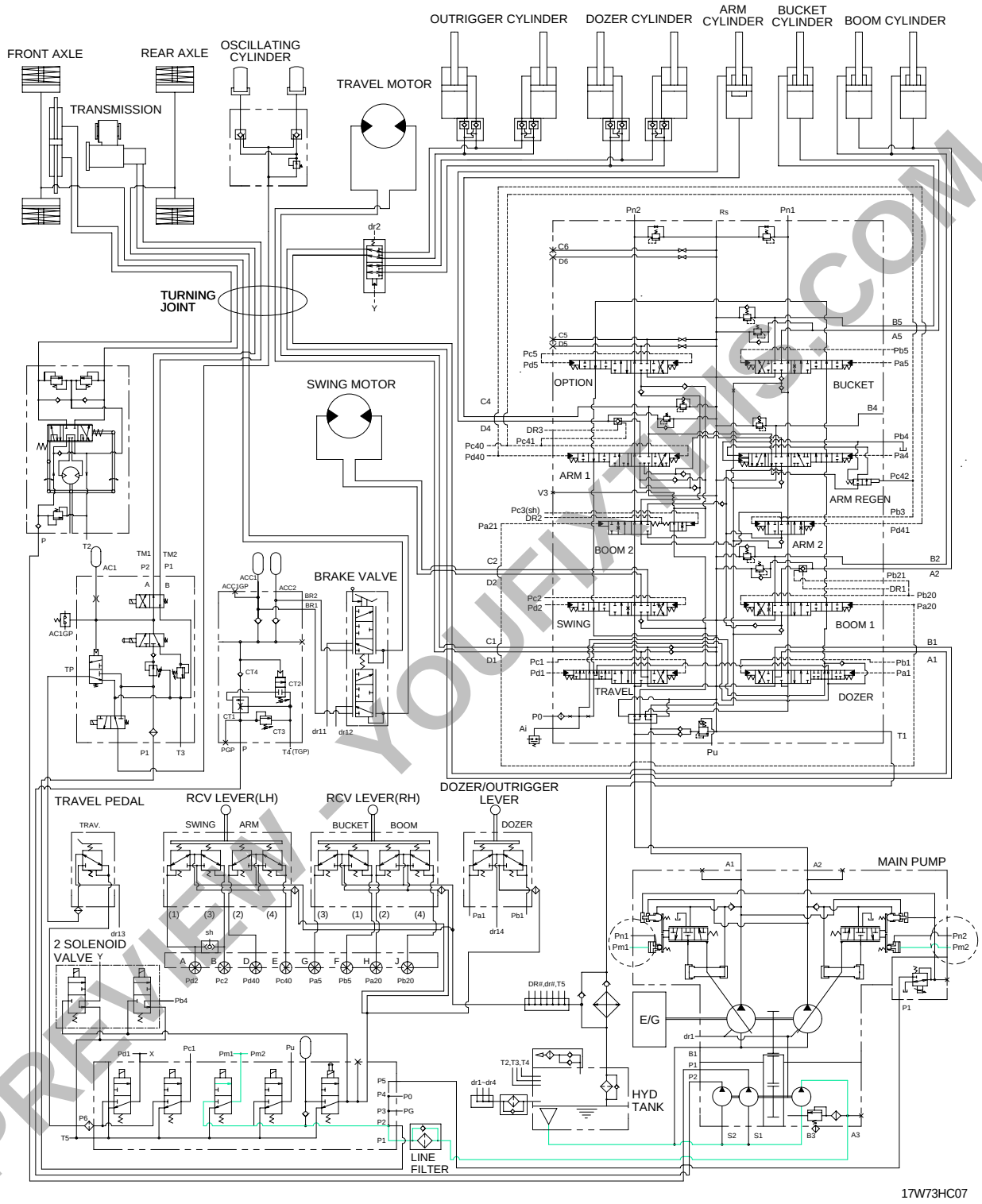
2-70 (210-7)

1	Pilot valve	3	Main pump	5	Hydraulic motor
2	Pilot pump	4	Main control valve	6	Hydraulic cylinder

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6. MAX FLOW CUT OFF SYSTEM

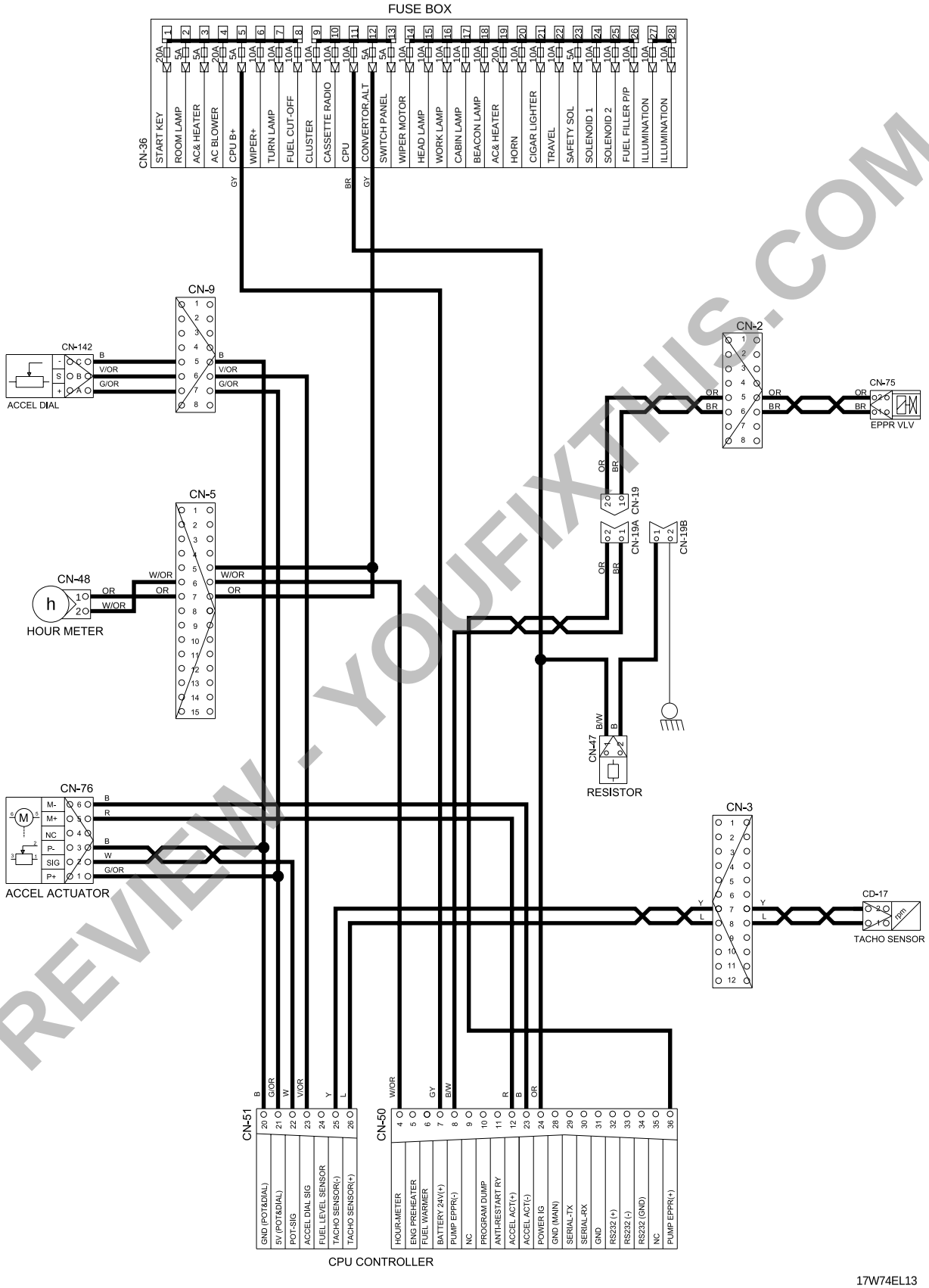


When the breaker operation mode is selected on the cluster, max flow cut off solenoid valve actuates automatically.

Thus pilot pressure(Pm1,2) is sent to the regulator and pump discharge volume is decreased.

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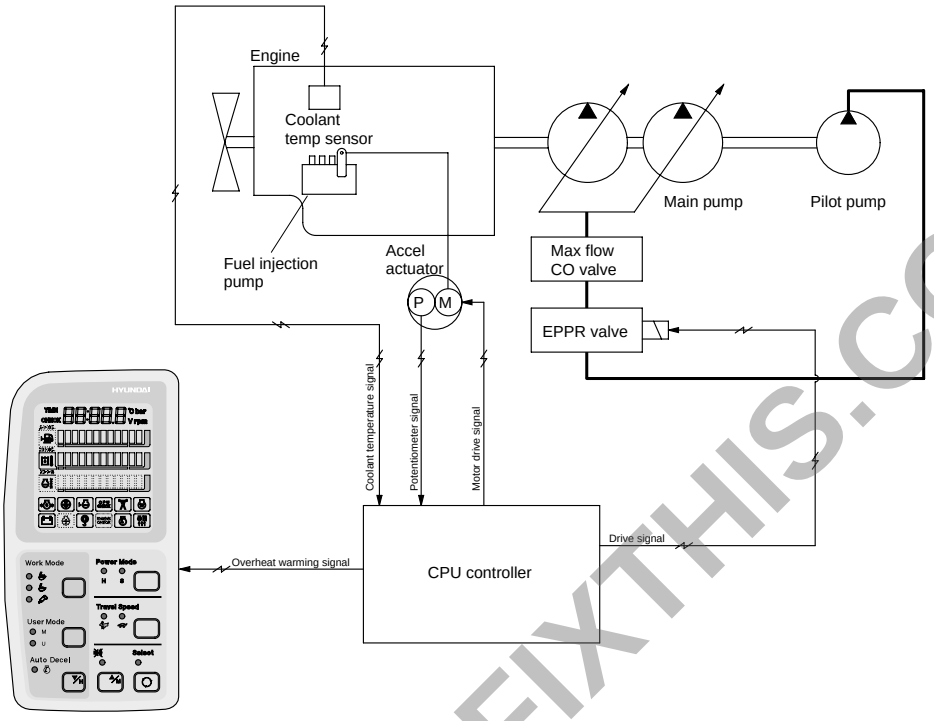
CONTROLLER CIRCUIT



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GROUP 7 ENGINE OVERHEAT PREVENTION FUNCTION



140W75MS09

1. CPU controller reads engine coolant temperature through the temperature sensor and when the engine coolant boils up to 110℃, it sends overheat warning signal to the cluster and decrease the engine speed same as accel dial **7** position.
2. If the coolant temperature drops less than 100℃, the CPU controller returns the mode to the mode set before. And if mode set is changed during the function, the CPU controller cancels the function. Even if the overheat prevention function is canceled by mode change, the overheat warning lamp turns OFF only when the coolant temperature is less than 100℃.

3. LOGIC TABLE

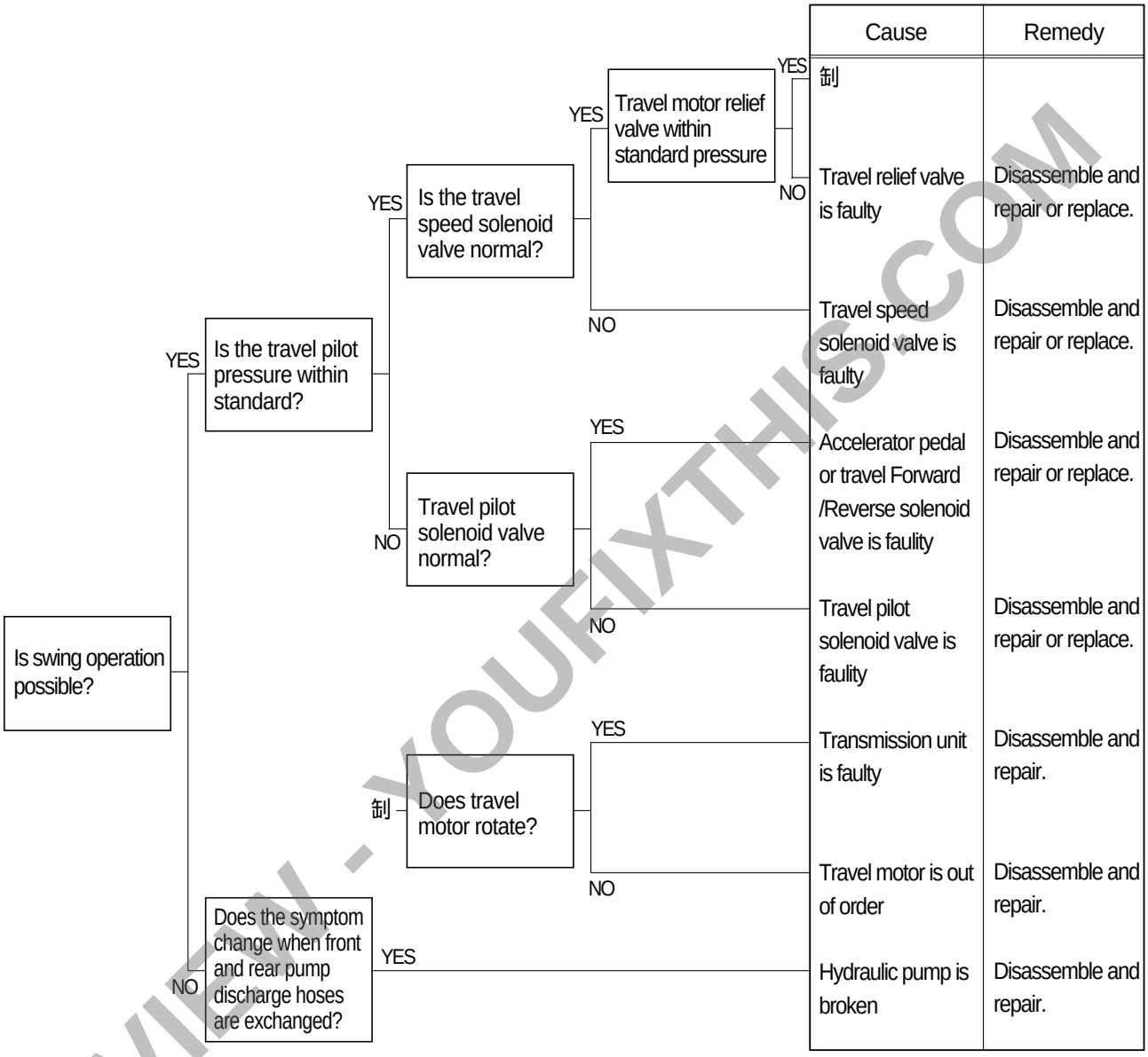
Description	Condition	Function
Actuated	- Coolant temperature : Above 110℃ - Accel dial set : Above **8**	- Engine rpm drop to accel dial 7 position - Overheat warning lamp & buzzer : ON
Canceled	- Coolant temperature : Less than 100℃ - Changed mode set by operator ※ If any of the above conditions is applicable, engine overheat prevention function is canceled	- Return to the mode and accel dial set before - Hold on the changed set
Overheat warning lamp	- Coolant temperature : Less than 100℃	- Overheat warning lamp : OFF

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5. TRAVEL SYSTEM

1) TRAVEL DOES NOT FUNCTION AT ALL ON ONE SIDE



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SECTION 7 MAINTENANCE STANDARD

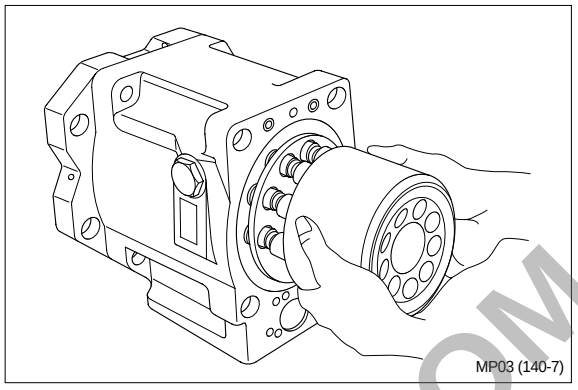
Group 1 Operational Performance Test ---------- 7-1
Group 2 Major Components ---------- 7-19
Group 3 Work Equipment ---------- 7-28

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(7) Pull cylinder block(141) out of pump casing(271) straightly over drive shaft (111). Pull out also pistons(151), set plate (153), spherical bush(156) and cylinder springs(157) simultaneously.

ど Take care not to damage sliding surfaces of cylinder, spherical bushing, shoes, swash plate, etc.

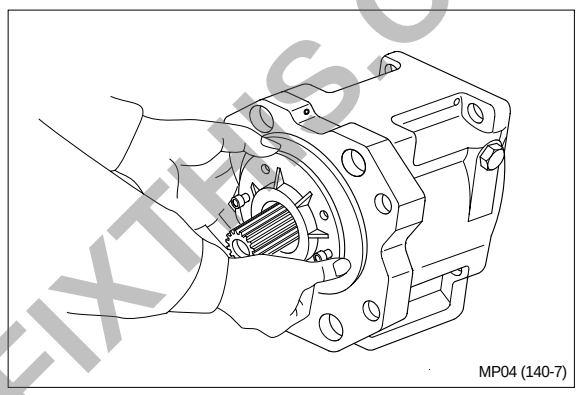


MP03 (140-7)

(8) Remove hexagon socket head bolts(406) and then seal cover(F, 261).

ど Fit bolt into pulling out tapped hole of seal cover(F), and cover can be removed easily.

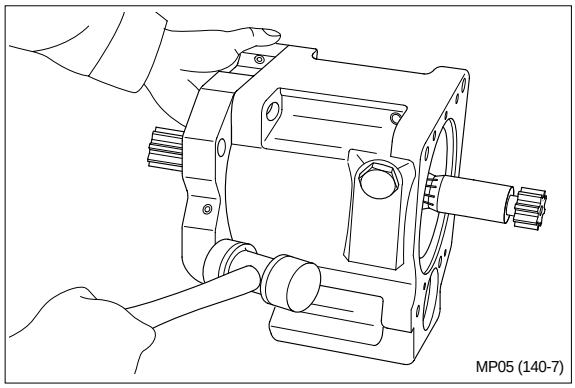
ど Since oil seal is fitted on seal cover(F), take care not to damage it in removing cover.



MP04 (140-7)

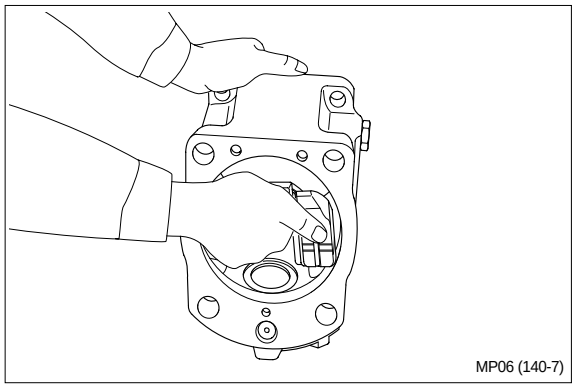
(9) Remove hexagon socket head bolts(408) and then seal cover(R, 262).
In case fitting a gear pump, first, remove gear pump.

(10) Tapping lightly fitting flange section of swash plate support(251) on its pump casing side, separate swash plate support from pump casing.



MP05 (140-7)

(11) Remove shoe plate(211)and swash plate(212) from pump casing(271).

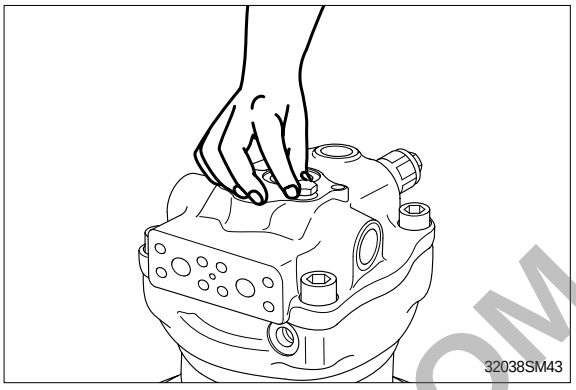


MP06 (140-7)

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(20) Tighten the plug(468) to valve casing(303) with O-ring(487) and tighten the plug(464) to casing(301) with O-ring(485).



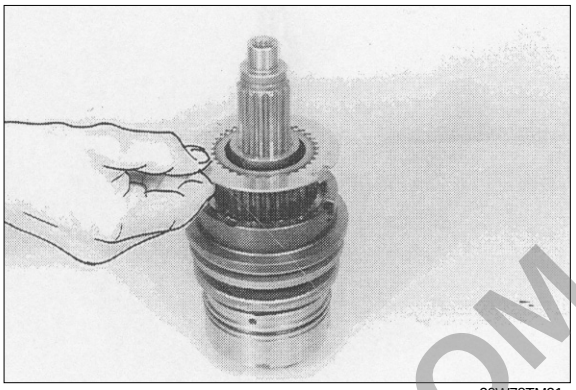
(21) Connect the valve casing(303) with the casing(301).

This completes assembly.

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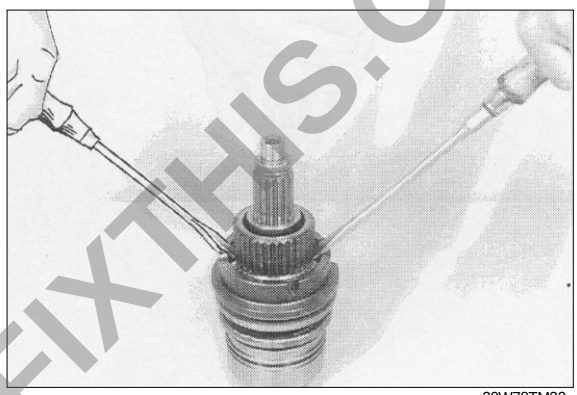
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(21) Remove plate.



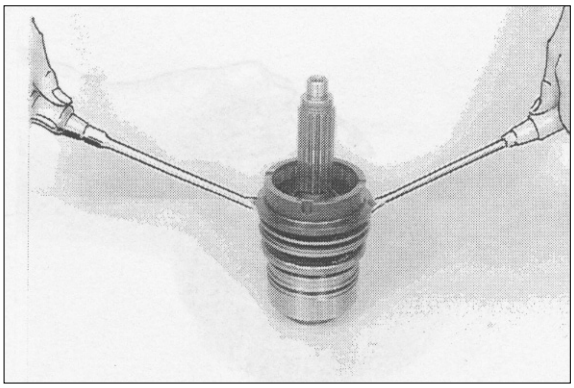
20W78TM21

(22) Pry inner plate carrier out of the piston.



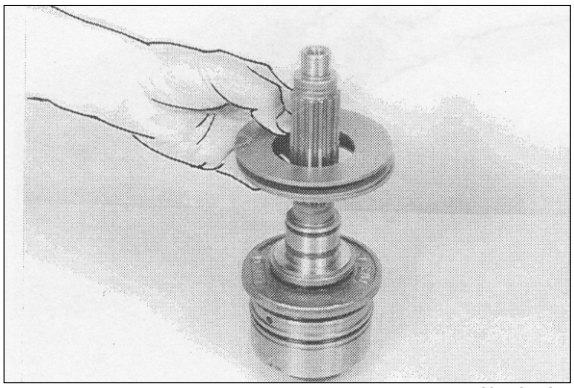
20W78TM22

(23) Pry off piston from the drive shaft.



20W78TM23

(24) Remove cup spring pack.



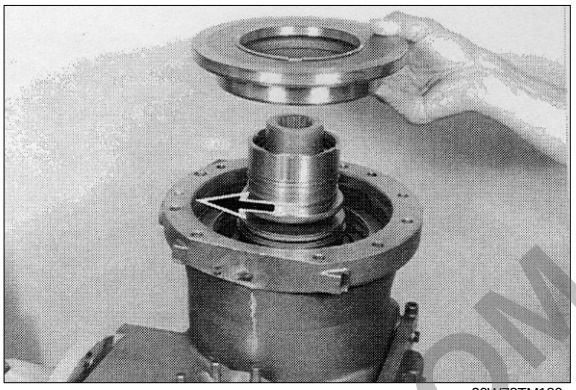
20W78TM24

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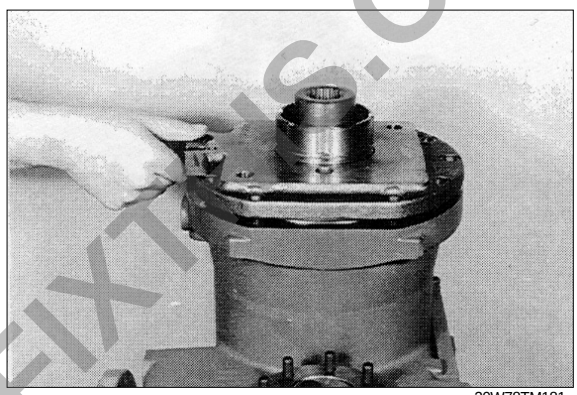
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(12) Insert back-up ring and seal ring in the ring groove of the housing(Arrow) and oil them.

Assemble piston and place it evenly against shoulder, using measuring cover as well as socket head screws. Now, remove measuring cover again.



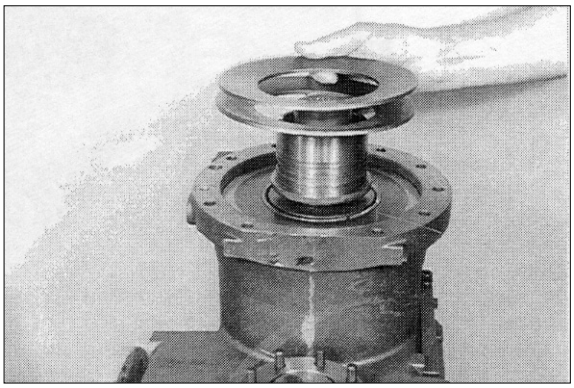
20W78TM180



20W78TM181

(13) Insert the two cup springs and align them centrically.

ど Pay attention to the installation position.

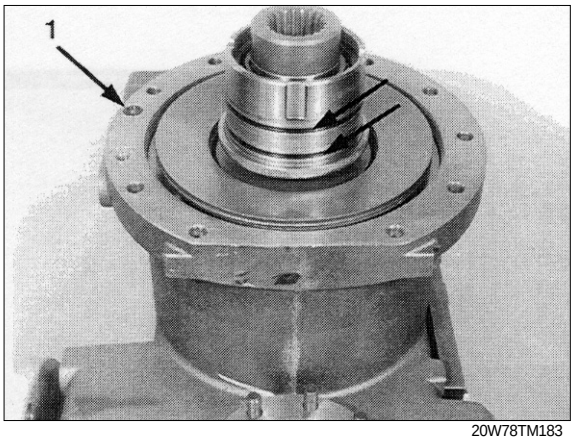


20W78TM182

7) INSTALL DRIVE CASING

(1) Insert O-ring(Arrow 1) in the countersinking. Insert the two O-rings in the ring grooves of the guide sleeve, see Arrows.

ど Grease O-rings.



20W78TM183

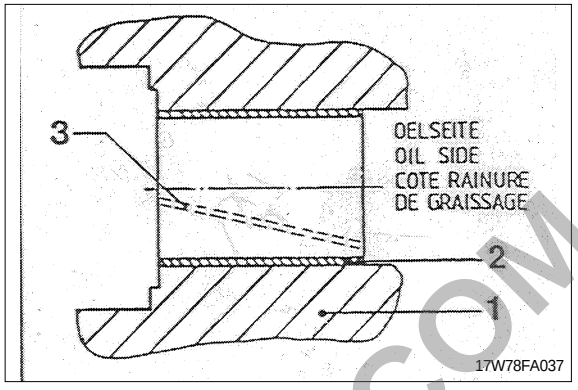
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2) REASSEMBLY

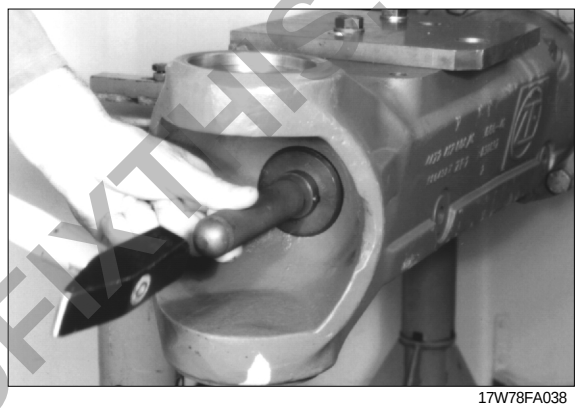
(1) Axle housing and double-joint shaft

罰 Reference Draft
(Sectional position vertical)
1 Axle housing
2 Sleeve
3 Lubricating groove

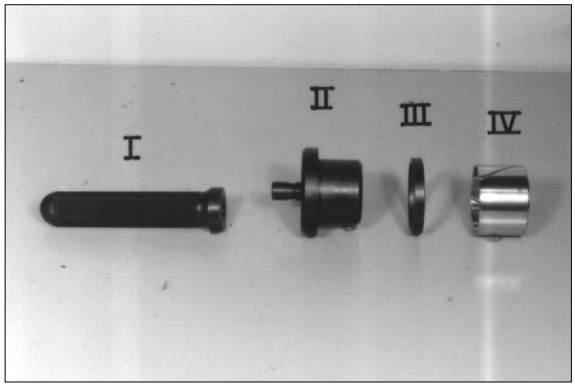


17W78FA037

刻 Drive in the sleeve - inner lubricating groove(3) showing downward towards the axle center - until it is flush(see also Draft 罰).

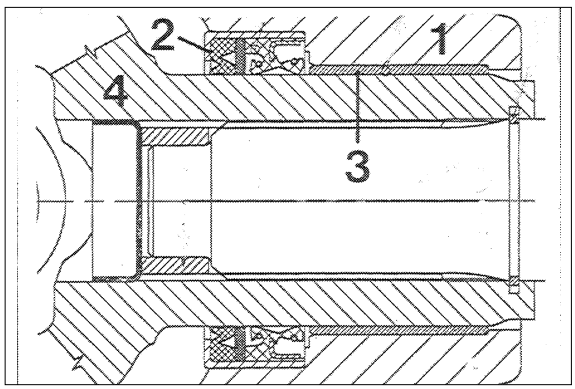

17W78FA038

1 Handle
2 Driver
3 Ring
4 Sleeve



17W78FA039

剴 Reference Draft
1 Axle housing
2 Shaft seal
3 Sleeve
4 Double-joint shaft



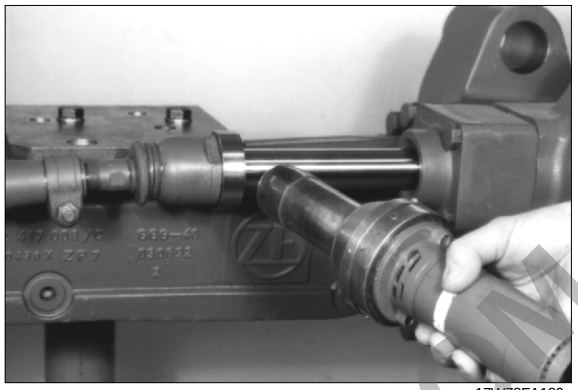
17W78FA040

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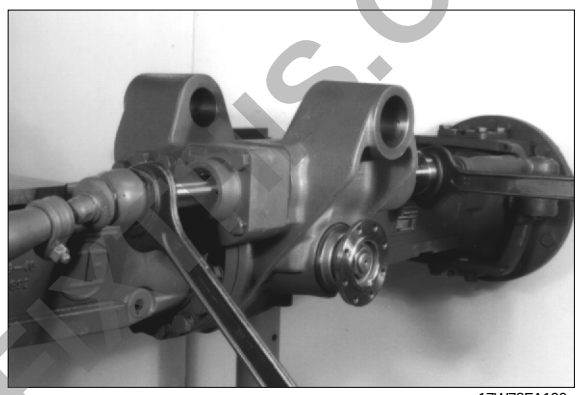
Version-tie rod "with" stop ring for the steering lock

劆 Heat piston rod in the zone of the bolting piston rod / thrust bearing.



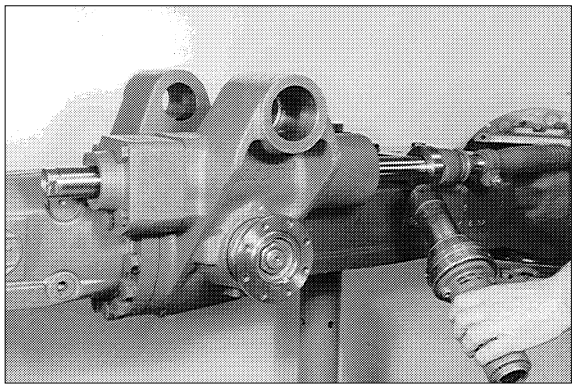
17W78FA189

剹 Loosen bolting and separate the complete tie rod from the piston rod. Now, pull off stop ring.



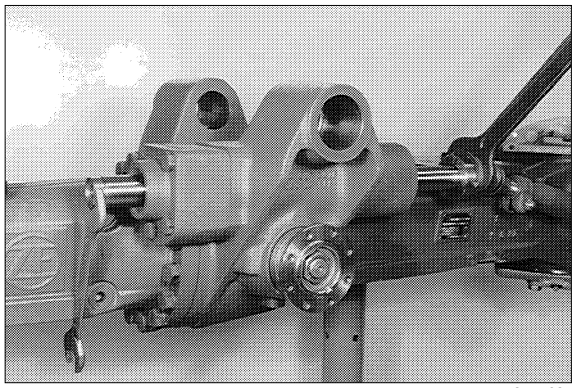
17W78FA190

劇 Heat the second bolting of piston rod / axial joint.



17W78FA191

劑 Remove second tie rod and stop ring.



17W78FA192

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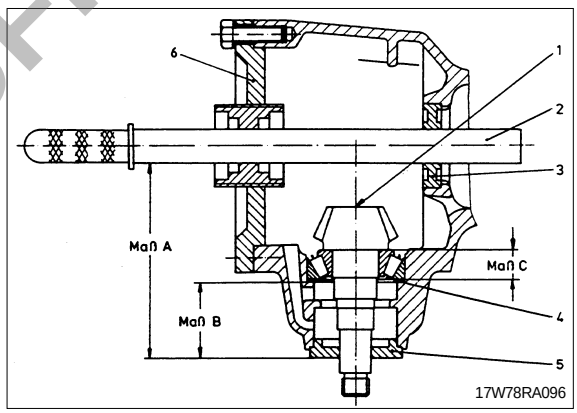
2) REASSEMBLY

Drive pinion

- If crown wheel or drive pinion are damaged, both parts must be renewed as a set. If a new complete crown wheel set is installed, pay attention that crown wheel and drive pinion have the same mating numbers.
  If crown wheel set or axle housing are renewed, pay attention to the Draft.
  Determine shim thickness to obtain a correct contact pattern following (2) to Example "H".
- Carry out the following measuring operations with utmost care.
  Inexact measurements result in a faulty contact pattern-another correction on the installed drive pinion becomes necessary.

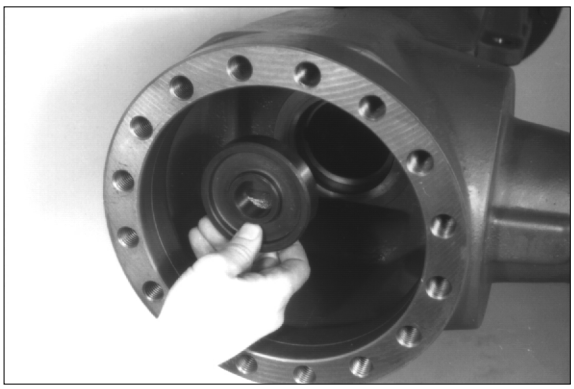
(1) Reference Draft(special tool)
- 1 Dimension and No. of drive pinion
- 2 Measuring shaft
- 3 Adjusting piece
- 4 Shim
- 5 Gauge ring
- 6 Measuring cover, Centering ring

- For a better understanding of the Draft, the measuring operation is illustrated again in steps.



17W78RA096

(2) Insert adjusting piece(3) into the bore of the axle housing I(differential bearing).


17W78RA097

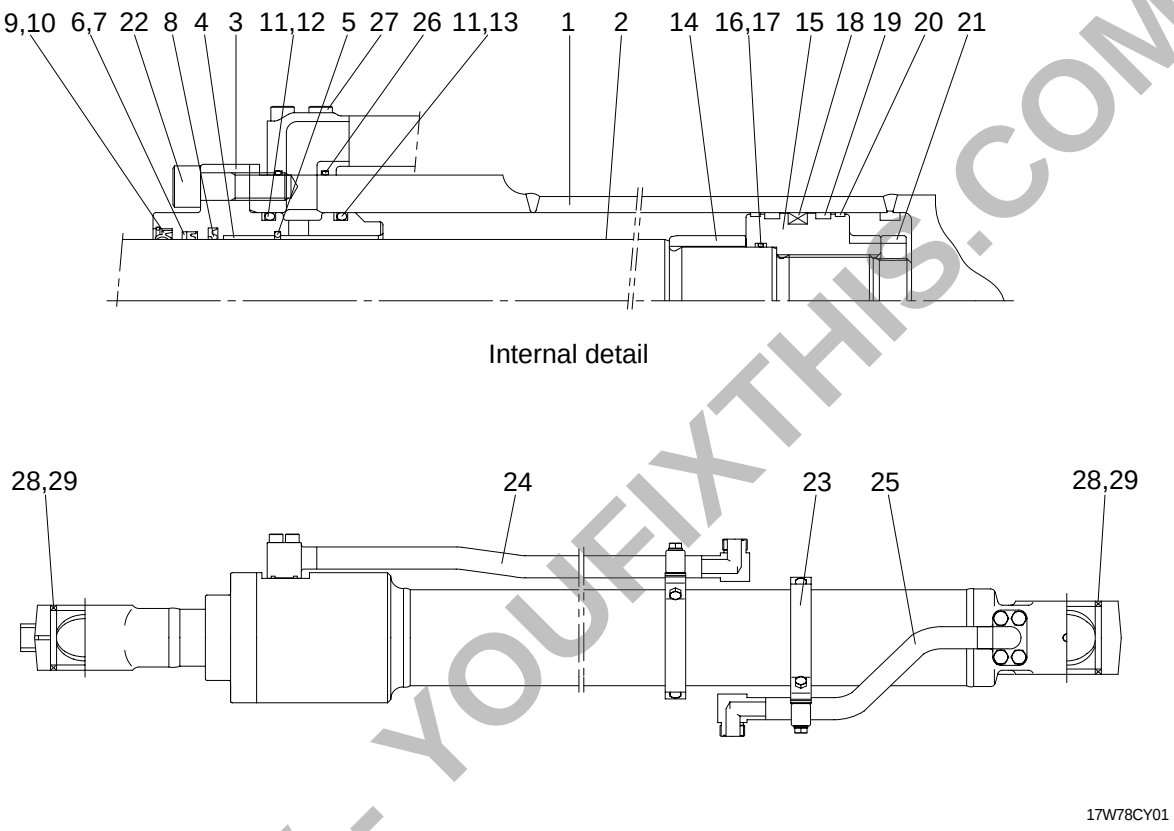
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2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

(1) Bucket cylinder



1	Tube assembly	11	O-ring	21	Lock nut
2	Rod assembly	12	Back-up ring	22	Socket head bolt
3	Gland	13	Back-up ring	23	Band assembly
4	DD2 bushing	14	Cushion ring	24	Pipe assembly(R)
5	Snap ring	15	Piston	25	Pipe assembly(B)
6	Rod seal	16	O-ring	26	O-ring
7	Back-up ring	17	Back-up ring	27	Socket head bolt
8	Buffer ring	18	Piston seal	28	Pin bush
9	Dust wiper	19	Wear ring	29	Dust seal
10	Snap ring	20	Dust ring		

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