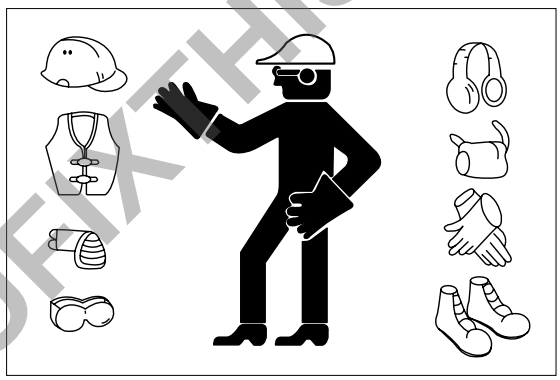
GROUP 1 SAFETY HINTS

FOLLOW SAFE PROCEDURE

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

WEAR PROTECTIVE CLOTHING

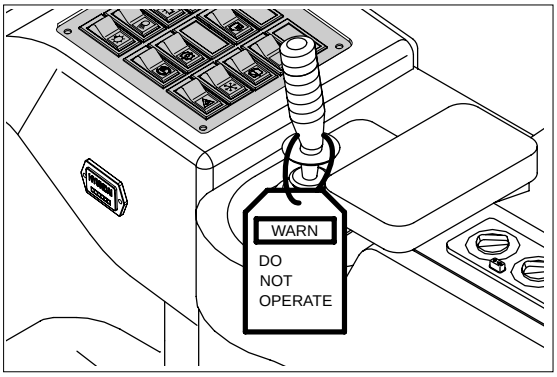
Wear close fitting clothing and safety equipment appropriate to the job.



WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the wheel loader, attach a 「**Do Not Operate**」 tag on the right side controller lever.

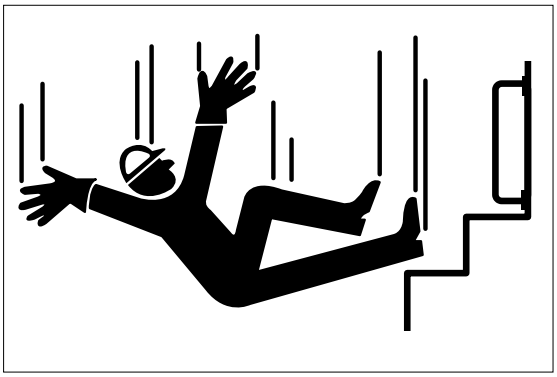


USE HANDHOLDS AND STEPS

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.

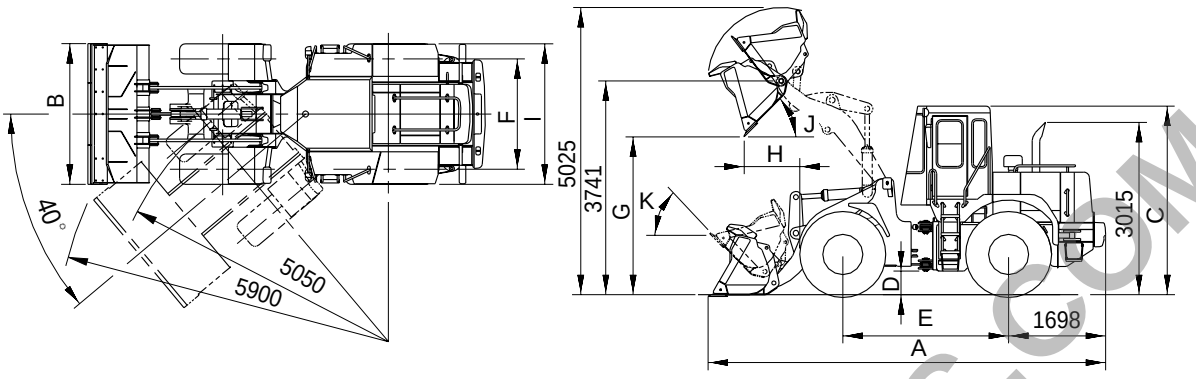


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2. SPECIFICATIONS

1) WITHOUT TOOTH AND CUTTING EDGE TYPE BUCKET

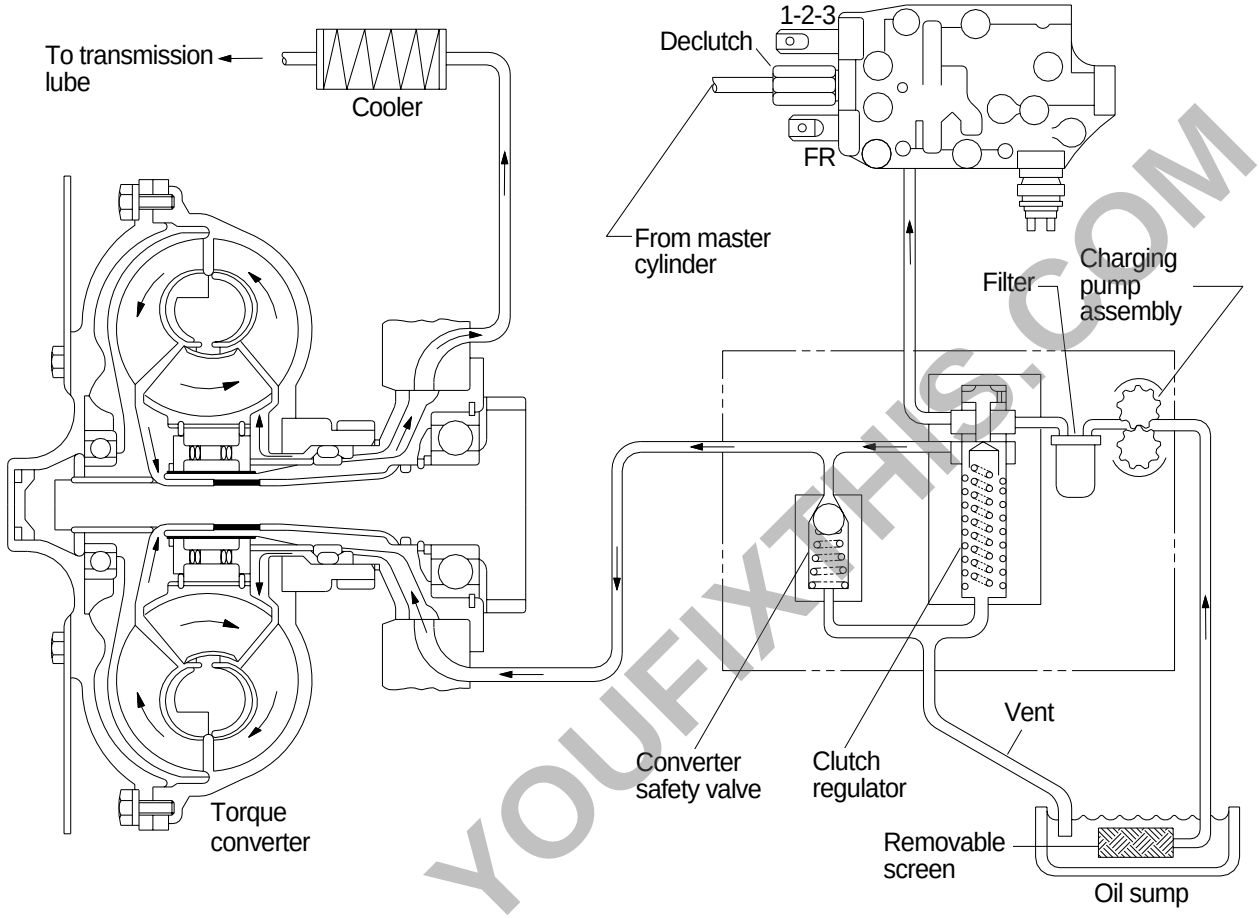


Description			Unit	Specification
Operating weight			kg(lb)	12645(27819)
Bucket capacity		Struck	$m^3(yd^3)$	1.9(2.5)
		Heaped		2.2(2.9)
Overall length		A	mm(ft-in)	6885(22' 7")
Overall width		B		2600(8' 6")
Overall height		C		3300(10' 10")
Ground clearance		D		412(1' 4")
Wheelbase		E		2900(9' 6")
Tread		F		1930(6' 4")
Dump clearance at 45°		G		2828(9' 3")
Dump reach		H		942(3' 1")
Width over tires		I		2460(8' 1")
Dump angle		J	Degree (°)	45
Roll back angle(Carry position)		K		46.3
Cycle time		Lift(With load)	sec	6.4
		Dump(With load)		1.2
		Lower(Empty)		3.2
Maximum travel speed			km/hr(mph)	39(24.3)
Braking distance			m(ft-in)	12(39' 4")
Minimum turning radius				5.9(19' 4")
Gradability			Degree (°)	30
Travel speed	Forward	First gear	km/hr(mph)	6.2(3.8)
		Second gear		13.0(8.1)
		Third gear		26.0(16.3)
		Fourth gear		39.0(24.3)
	Reverse	First gear		6.2(3.8)
		Second gear		13.0(8.1)
		Third gear		26.0(16.3)

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HYDRAULIC SCHEMATIC

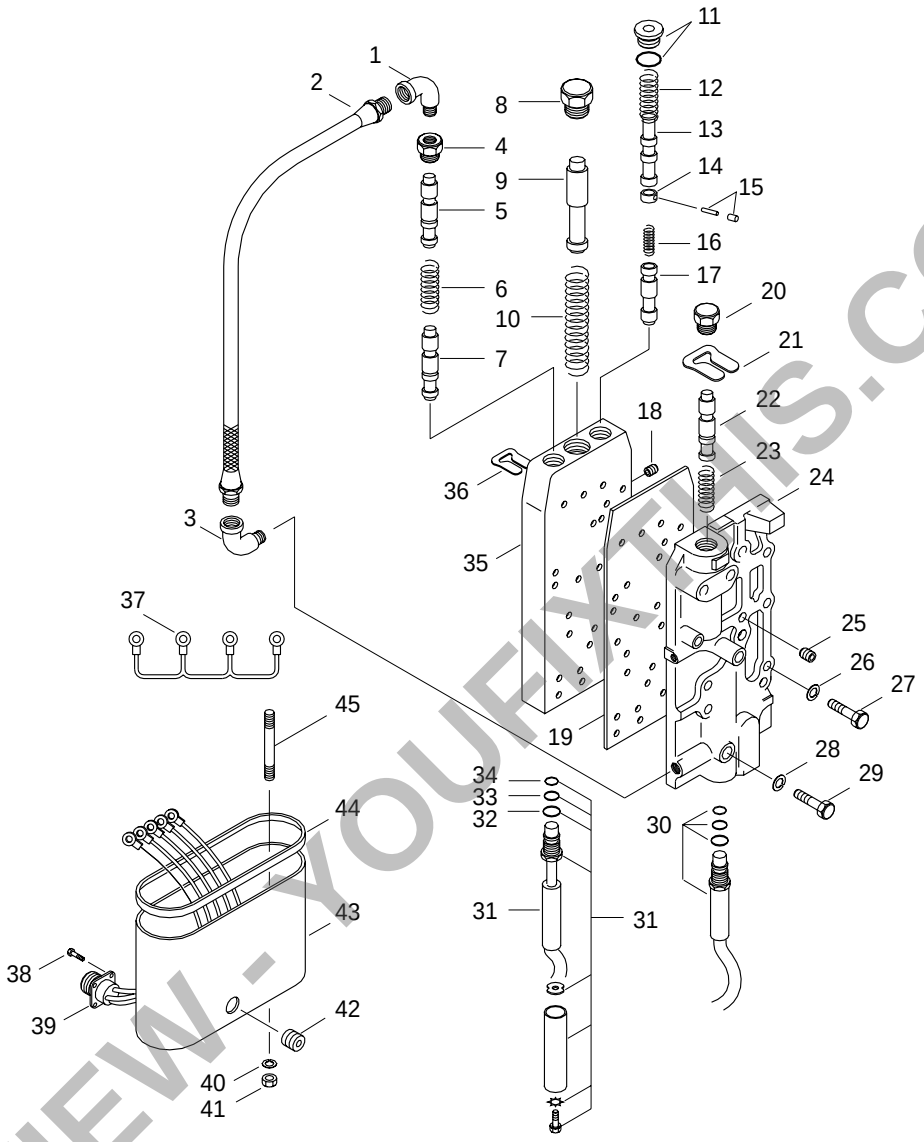


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2. CONTROL VALVE

1) STRUCTURE



1	Elbow	16	Spring	31	Solenoid coil
2	Tube assy	17	Shift spool	32	O-ring
3	Elbow	18	Pipe plug	33	O-ring
4	Valve plug	19	Gasket	34	O-ring
5	Shift spool	20	Plug	35	Control valve housing
6	Spring	21	Spool stop	36	Spool stop
7	Shift spool	22	Spool	37	Ground wire harness
8	Plug	23	Spring	38	Screw
9	Valve spool	24	Valve body	39	Receptacle & wire assy
10	Spring	25	Pipe plug	40	Lock washer
11	Plug & O-ring	26	Lock washer	41	Nut
12	Spring	27	Screw	42	Grommet
13	Shift spool	28	Lock washer	43	Dust cover
14	Spool stop	29	Screw	44	Dust cover seal
15	Roll pin & plug stop	30	Shuttle valve solenoid	45	Mounting stud

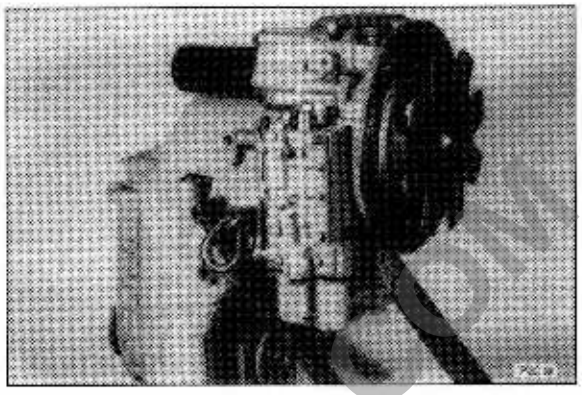
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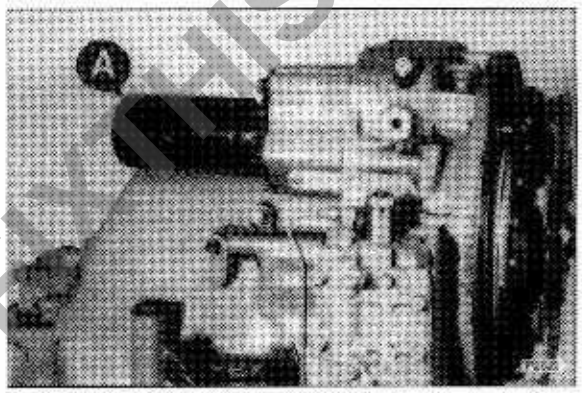
1. TRANSMISSION

1) 4 SPEED TRANSMISSION DISASSEMBLY

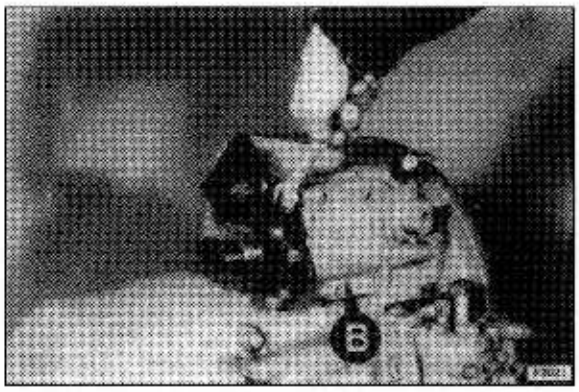
(1) It is recommended that a locally made stand is used to support the transmission as shown during disassembly.



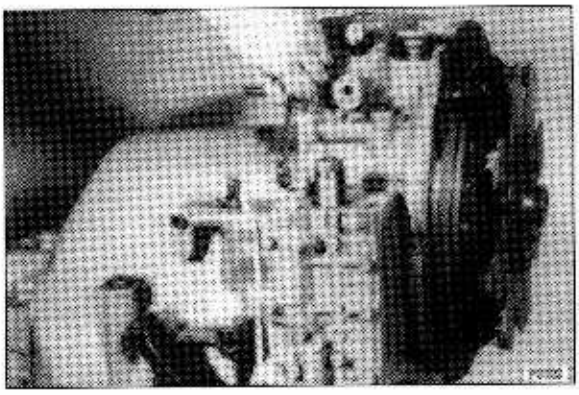
(2) Remove the filter cartridge **A** and dipstick/filler tube(Not shown).



(3) Remove the charge pump **B** and the main hydraulic pump(Not shown).



(4) Remove the cross-over pipe.



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2. TROUBLESHOOTING

1) TRANSMISSION

※ **Diagnose malfunction charts are arranged from most probable and simplest to verify, to least likely, more difficult to verify. Remember the following steps when troubleshooting a problem :**

Step 1. Operational check out procedure(see group 3 in section 1.)
Step 2. Operational checks(see group 2.)
Step 3. Troubleshooting(see group 2.)
Step 4. Tests and / or adjustments(see group 3.)

Problem	Cause	Remedy
Transmission slippage	Low oil level	Fill to proper level.
	Wrong oil grade	Change oil.
	Low clutch pressure	Refer to "low clutch pressure".
	Leak in transmission control valve or gasket	Remove valve and inspect gaskets.
	Low transmission pump flow due to worn pump	Do transmission pump flow test. Refer to "low charging pump flow".
	Weak or broken pressure regulating valve spring	Do transmission system pressure test.
Low clutch pressure	Low oil level	Fill to proper level.
	Clutch pressure regulating valve spool stuck open.	Clean valve spool and housing.
	Faulty charging pump	Replace pump.
	Broken or worn clutch shaft or piston sealing ring	Replace sealing ring.
	Modulator spool orifice blocked.	Clean spool orifice.
Low charging pump flow	Low oil level	Fill to proper level.
	Suction screen plugged	Clean suction screen. Also, check the filter. If suction screen is clogged pump may be noisy.
	Air leaks at pump intake hose and connections or collapsed hose	Tighten all connections or replace hose if necessary.
	Defective oil pump	Replace pump.

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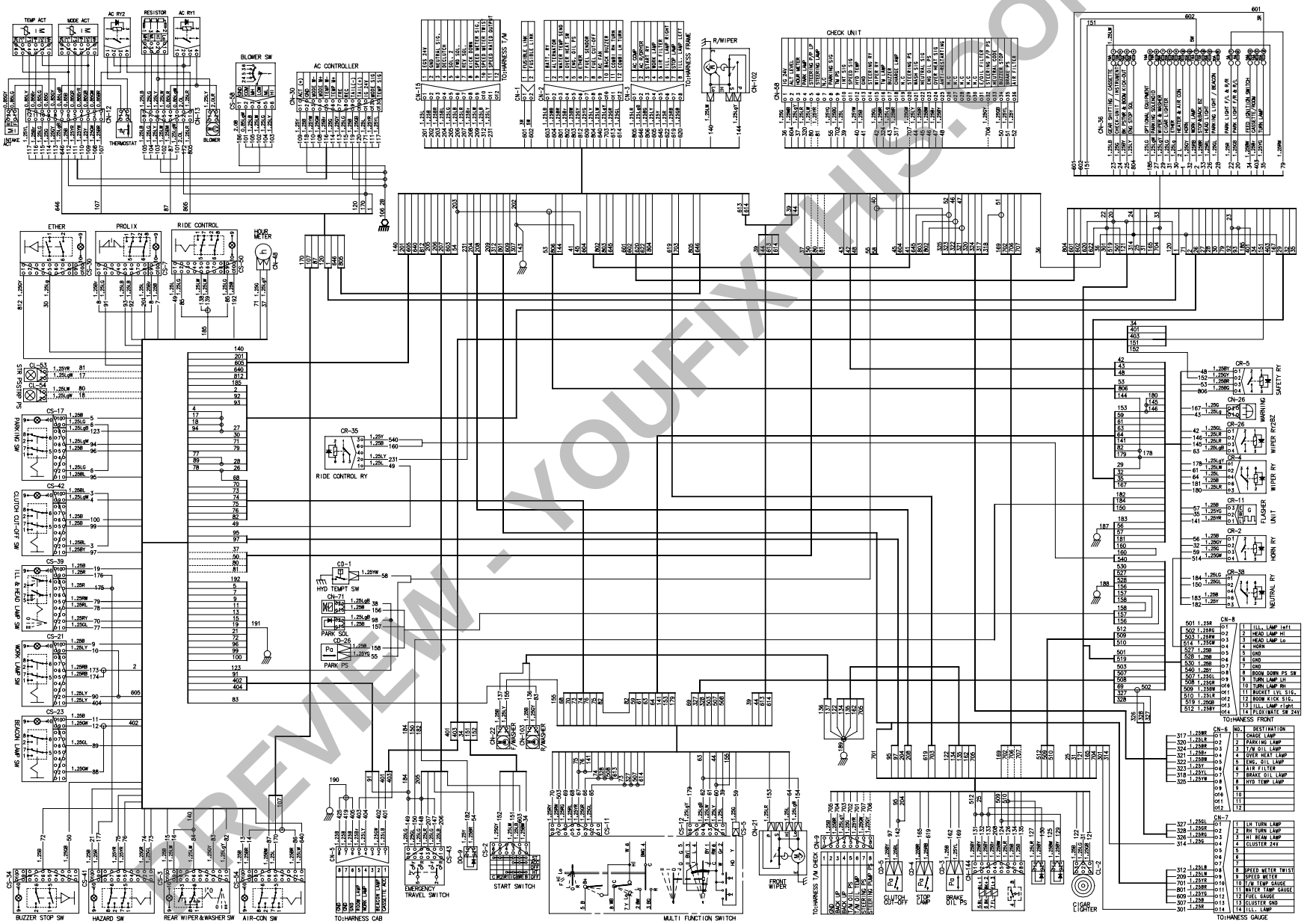
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5. TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Items		Size	kg · m	lb · ft
1	Engine	Engine mounting bolt, nut	M10×1.5	6.9 ± 1.4	50 ± 10
2		Radiator mounting bolt, nut	M12×1.75	12.3 ± 2.5	89 ± 18
3	Hydraulic system	Main pump housing mounting bolt	1/2-13UNC	19.6 ± 2.9	142 ± 21
4		Main control valve mounting socket bolt	M10×1.5	6.9 ± 1.4	50 ± 10
5		Orbitrol valve mounting bolt	M10×1.5	5 ± 1	36 ± 7.2
6		Priority valve mounting bolt	M 8×1.25	2.5 ± 0.5	18 ± 3.6
7		Brake valve mounting bolt	M 8×1.25	2.5 ± 0.5	18 ± 3.6
8		Cut off valve mounting bolt	M 8×1.25	2.5 ± 0.5	18 ± 3.6
9		Cushion valve mounting bolt	M 8 ×1.25	2.5 ± 0.5	18 ± 3.6
10		Fuel tank mounting bolt	M20×2.5	57.9 ± 8.7	419 ± 63
11		Hydraulic oil tank mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
12		Air tank mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
13	Power train system	Transmission mounting bolt	3/4-10UNC	45 ± 7.3	325 ± 52.8
14		Front axle mounting bolt	M20×2.5	57.9 ± 8.7	419 ± 63
15		Rear axle support mounting bolt, nut	M27×2.0	135 ± 15	976 ± 108
16		Tire mounting nut	M22×1.5	60 ± 2	434 ± 15
17		Drive shaft joint mounting bolt, nut	3/8-24UNF	6 ± 0.8	43 ± 5.8
18	Others	Counterweight mounting bolt	M30×3.0	199 ± 29.9	1439 ± 216
19		Operator's seat mounting bolt	M 8×1.25	3.4 ± 0.8	25 ± 5
20		ROPS Cab mounting bolt(12EA)	1-14UNS	86	620
		ROPS Cab mounting bolt(4EA)	1 1/4-12UNF		

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Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

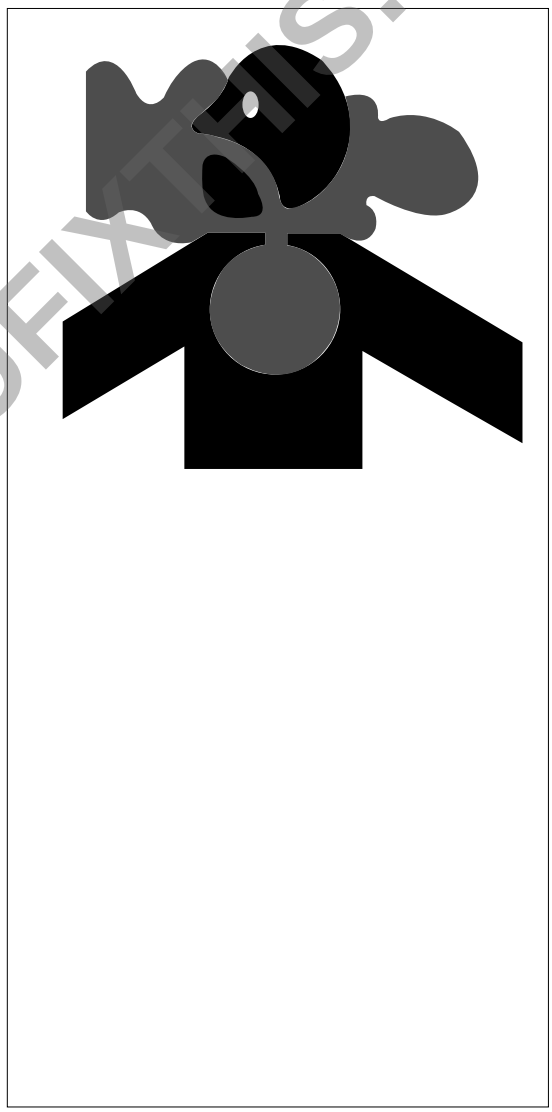
Do not store oily rags ; They can ignite and burn spontaneously.



BEWARE OF EXHAUST FUMES

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in a building, be positive there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.



REMOVE PAINT BEFORE WELDING OR HEATING

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating :

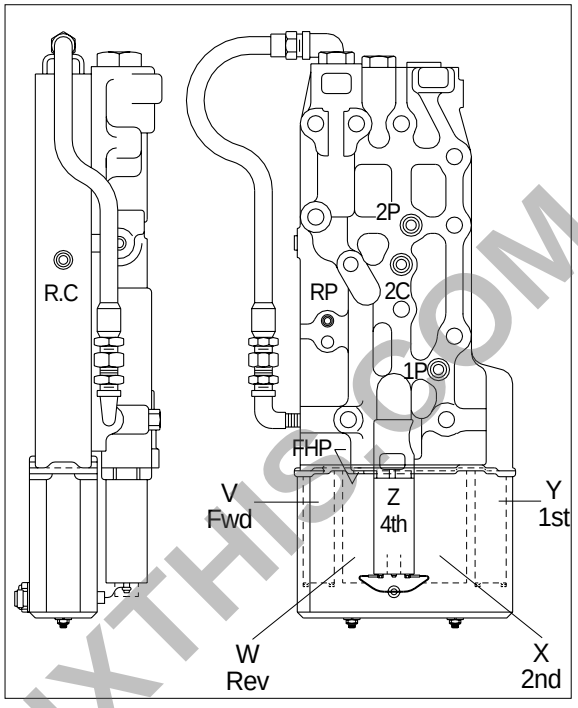
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

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4) ELECTRIC SOLENOID CONTROL

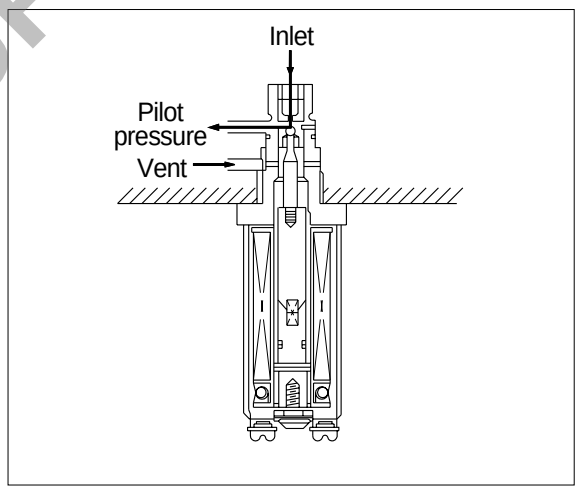
Direction & speed	Solenoids energized	Clutches pressurized
Forward 1st	V X Y	Forward & 1st
Forward 2nd	V X	Forward & 2nd
Forward 3rd	V	Forward & 3rd
Forward 4th	V Z	4th & 3rd
Reverse 1st	W X Y	Reverse & 1st
Reverse 2nd	W X	Reverse & 2nd
Reverse 3rd	W	Reverse & 3rd



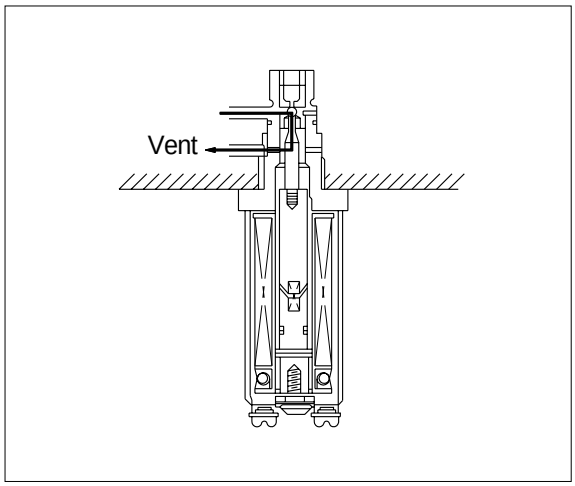
Pilot and clutch pressure check points

1P 1st pilot
2P 2nd pilot
2C 2nd clutch
4P(FHP) 4th clutch
RP reverse pilot
RC reverse clutch

· **Energized**



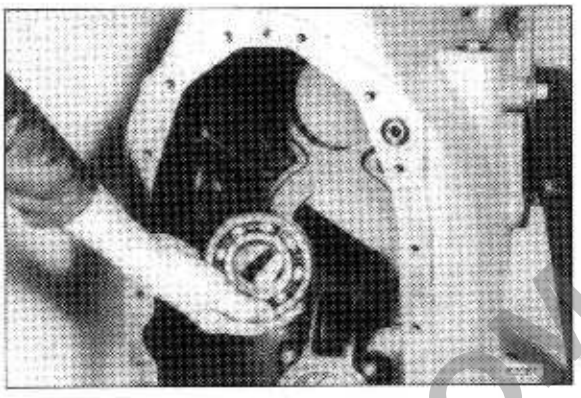
· **De-energized**



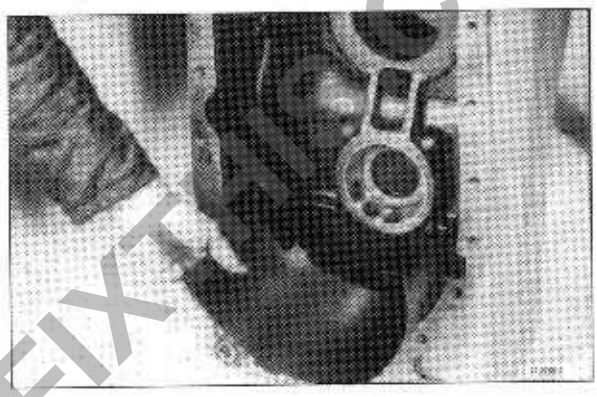
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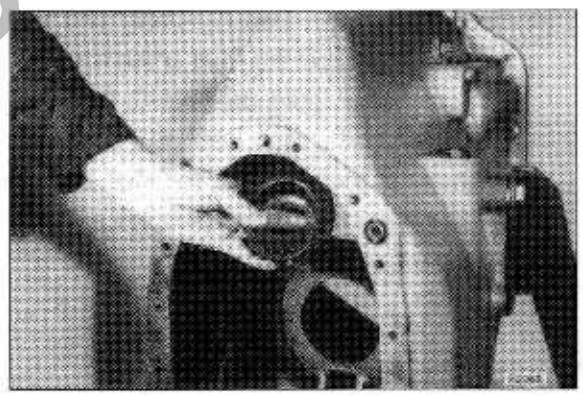
(45) Remove the idler shaft front bearing.

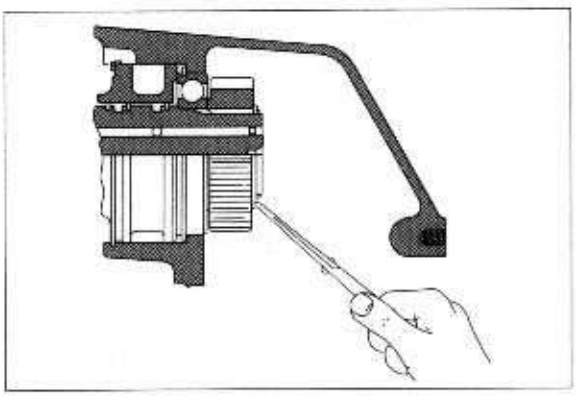


(46) Remove the oil sump baffle.



(47) Remove the forward shaft gear circlip and gear from the forward clutch shaft.

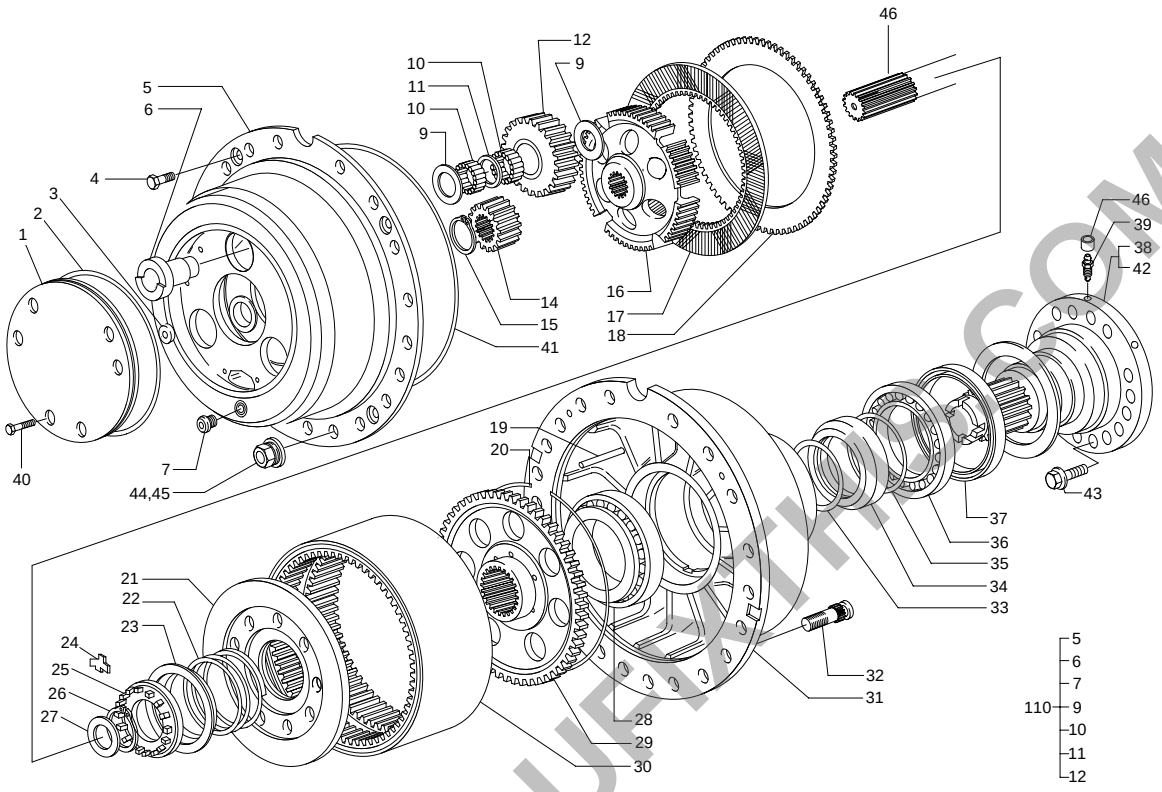




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DISASSEMBLING SIDE FINAL DRIVES



(2) Remove O-ring seal(2).

(3) Pull out axle shaft backing plate(3) using puller screw.

(4) Undo screws(4) fixing side gear carrier(5) to wheel hub(31).

(5) Suitably support side gear carrier(5), pry it off to separate carrier from wheel hub(31).

(6) Pull out side gear carrier assy(5).

(7) Remove lockring(15) retaining sun gear(14) on wheel shaft(46).

(8) Pull out sun gear(14).

(9) Remove disk carrier hub(16) along with thrust washer(27) resting against wheel hub sleeve.

(10) Remove solid and lined disks(17,18) of brake.

(11) Remove wheel shaft(46).

(12) Pull out lockring(26), securing ring nut(25) and lock plates(24).

(13) Remove lock plates(24).

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2) OPERATION

(1) Purpose

The pressure switches are used to visually or audibly warn the driver of the pressure within the system.

(2) Make contact / circuit closer

The pressure switch can be fitted in the braking system or directly on one of its components.
The system pressure acts on an absorption area within the switch, making an electrical contact as the pressure on that area is increased. The resulting current is used to activate a warning facility, for instance.

(3) Break contact / circuit breaker

The pressure switch can be fitted in the braking system or directly on one of its components.
The system pressure acts on a absorption area within the switch, breaking an electrical contact as the pressure on that area is increased. The current is now broken, e.g. to deactivate a warning facility.

(4) Installation requirements

No special measures need to be taken.

(5) Maintenance of the pressure switch

No special maintenance beyond the legal requirements is necessary.
When using high-pressure cleaners on the machine, please make sure that the water jet is not directed at the pressure switch(Corrosion of contacts).

(6) Repair work

△ **When working on the braking system, always make sure that there is absolutely no pressure in the system. Even when the engine is switched off there will be some residual pressure in the system.**

※ **When doing repair work, make sure your environment is very clean.**
Immediately close all open ports on the components and on pipes using plugs.

※ **For safety reasons the pressure switch needs to be replaced as a whole if damaged.**

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Problem	Cause	Remedy
Steering valve locks up	Large particles of contamination in steering valve.	Inspect hydraulic filter for contamination. Repair cause of contamination. Flush hydraulic system.
	★ Thermal shock	Do priority valve LS port flow test in group 5. This oil flow provides a warm -up flow to steering valve when not using the steering.
	Worn or damaged steering valve.	Repair or replace valve.
Abrupt steering wheel oscillation	Improperly timed gerotor gear in steering valve.	Time gerotor gear.
Steering wheel turns by itself	Lines connected to wrong port.	Reconnect lines.
	Worn or damaged steering valve.	Repair or replace valve.
Vibration in steering system or hoses jump	High priority valve setting.	Do priority valve pressure test in group 3.
Neutral position of steering wheel cannot be obtained, i.e. there is a tendency towards "motoring"	Steering column and steering unit out of line.	Align the steering column with steering unit. Adjust the play and, if necessary, shorten the splines journal.
	Too little or no play between steering column and steering unit input shaft.	Contact the nearest service shop.
	Pinching between inner and outer spools.	Replace leaf springs.
"Motoring" effect. The steering wheel can turn on its own	Leaf springs are stuck or broken and have therefore reduced spring force.	Clean steering unit or contact the nearest service shop.
	Inner and outer spools pinch, possibly due to dirt.	Reduce return pressure.
	Return pressure in connection with the reaction between differential cylinder and steering unit too high.	
Backlash	Cardan shaft fork worn or broken.	Replace cardan shaft.
	Leaf springs without spring force or broken.	Replace leaf springs.
	Worn splines on the steering column.	Replace steering column.
Jerky steering	LS port orifice missing.	Inspect orifice.
	Orifice in top end of priority valve spool missing.	Disassemble and inspect.

★ Thermal stock is caused by a large temperature differential(Approx 30℃, 50℉) between the steering valve and hydraulic oil. If the steering is not operated for a long period of time and the orifice in the bottom of the priority valve spool is plugged, the steering valve may bind up when the steering is operated if the hydraulic oil is hot enough.

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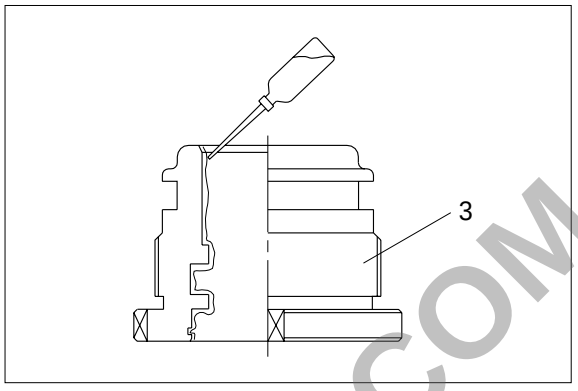
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4) ASSEMBLY

(1) Assemble gland assembly

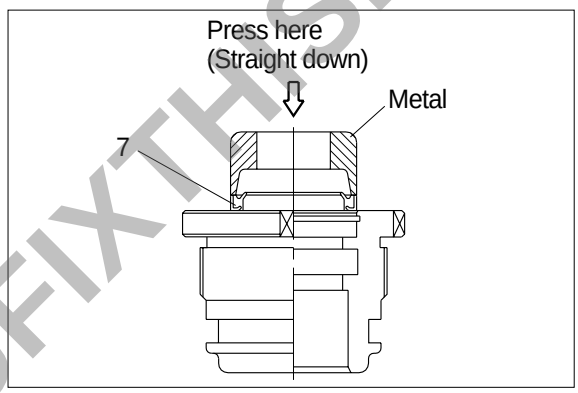
※ Check for scratches or rough surfaces if found smooth with an oil stone.

① Coat the inner face of gland(3) with hydraulic oil.



② Coat dust wiper(7) with grease and fit dust wiper(7) to the bottom of the hole of dust wiper.
At this time, press a pad metal to the metal ring of dust seal.

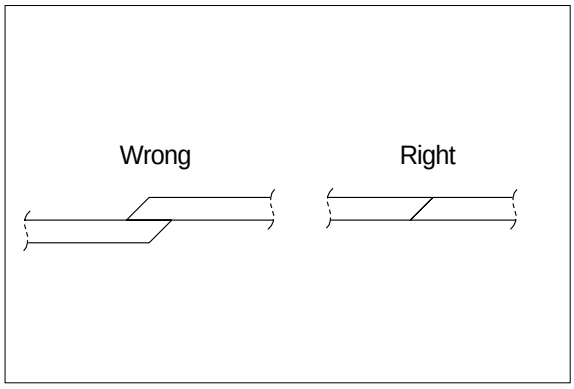
③ Fit snap ring(8) to the stop face.



④ Fit back up ring(6) and rod seal(5) to corresponding grooves, in that order.

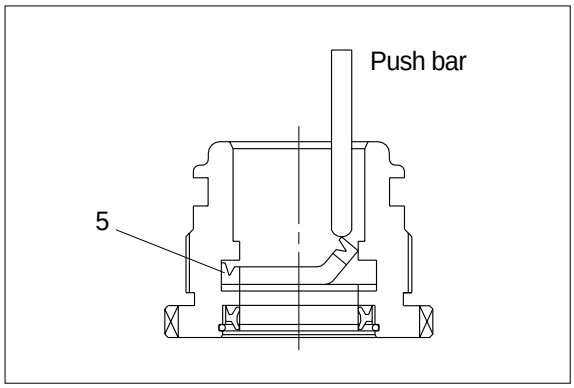
※ Coat each packing with hydraulic oil before fitting it.

※ Insert the backup ring until onside of it is inserted into groove.



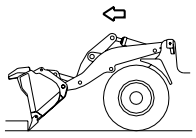
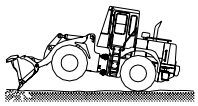
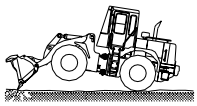
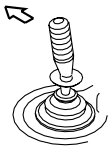
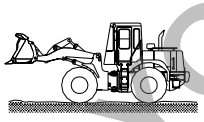
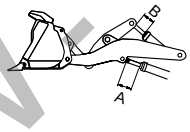
※ Rod seal(5) has its own fitting direction. Therefore, confirm it before fitting them.

※ Fitting rod seal(5) up side down may damage its lip. Therefore check the correct direction that is shown in fig.



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Item	Description	Service action
Bucket rollback circuit relief valve check	 Position bucket at a 45° angle against an immovable object. Engage transmission in 3rd speed forward. **LOOK :** Bucket angle must not change.	**OK** Check complete. **NOT OK** Replace boom lower check valve.
Bucket dump circuit relief valve low pressure check	 Raise front of machine which bucket at 45° angle. Backdrag with bucket while observing bucket angle. **LOOK :** Bucket must not rollback	**OK** Go to next check. **NOT OK** Do loader system and circuit relief valve test at page 6-53.
Pilot control valve float check Run engine at low idle.	  With the bucket partially dumped, lower boom to raise front of machine. Push control lever to the float detent position and release lever. **LOOK** : Front of machine lower to the ground and valve must remain in float position when lever is released.	**OK** Check complete. **NOT OK** Do pilot control valve pressure test in group 3.
Boom cylinder and bucket cylinder drift check Heat hydraulic oil to operating temperature.	  Set the boom and bucket horizontal, then stop the engine. Stop the engine, wait for 5 minutes, then start measuring. Measure the amount the lift and dump cylinder rods retract during 15 minutes.(Unloaded bucket) A : Retraction of boom cylinder rod B : Retraction of bucket cylinder rod Boom cylinder must drift less than 40mm Bucket cylinder must drift less than 40mm	**OK** Check complete. **NOT OK** Go to next check.

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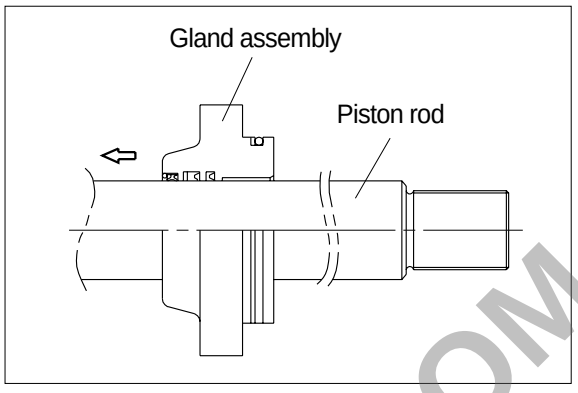
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(3) Install piston and gland

① Fix the piston rod assembly to the work bench.

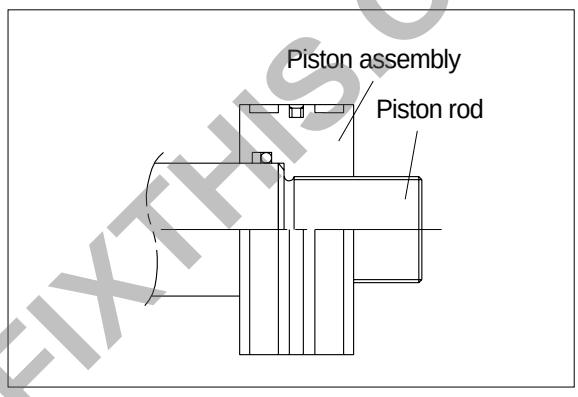
② Apply hydraulic oil to the outer surface of piston rod(2), the inner surface of piston and gland.

③ Insert gland assembly to piston rod(2).



⑤ Fit pistion assembly to piston rod.

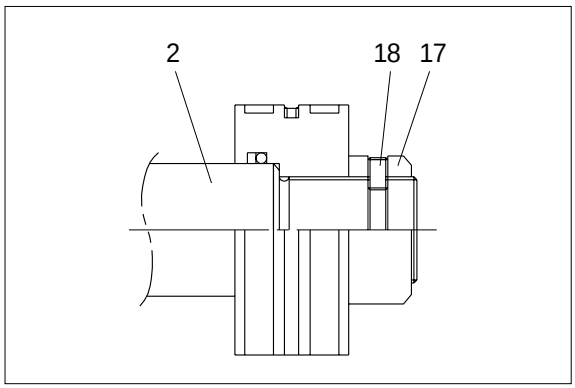
· Tightening torque : 100±10kgf · m
(723±72lbf · ft)



⑤ Tighten piston nut(16) and screw(17) to piston rod(2).

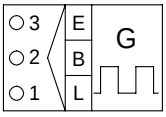
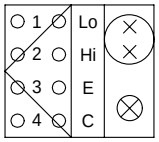
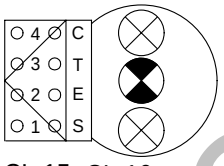
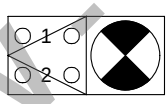
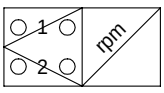
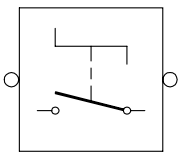
· Tightening torque

Item	kgf · m	lbf · ft
17	150 ± 15	1085 ± 109
18	4.5 ± 0.5	33 ± 3.6



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Part name	Symbol	Specifications	Check
Flasher unit	 CR-11	24V 85 ~ 190 C/M 50dB	-
Head lamp	 CL-3 CL-4	24V 75W/70W (H4 TYPE) 24V 4W (T4W)	※ Check disconnection Normal : A few Ω
Combi lamp	 CL-15 CL-16	24V 5W (R5W) 2×24V 21W (P21W)	-
Turn lamp	 CL-24 CL-25	24V 21W (P21W)	-
Transmission speed sensor	 CD-27	-	※ Internal resistance 1480 Ω ±7.5%
Master switch		Continuous Capacity : 180Amp Push in capacity : 1000Amp	-

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