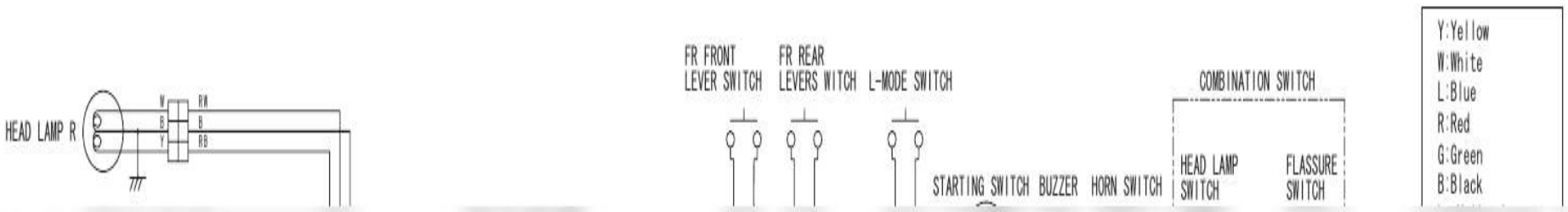
2. TECHNICAL DATA

2-5 Electric Wiring Diagram



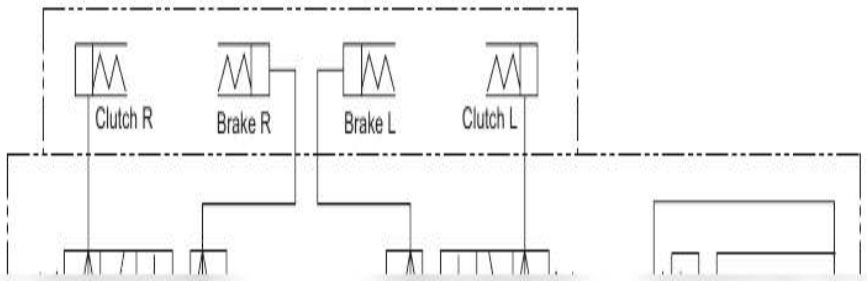
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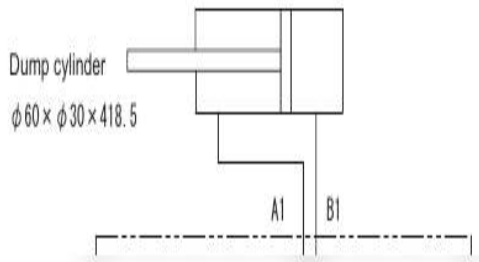
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2. TECHNICAL DATA

2-4 Hydraulic Circuit Diagram





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4-4-2 Cylinder Head

1) Components



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3-8 List of Tightening Torque

3-8-1 Machine

Unit : ft•lbf (N•m)

Applicable model:			C30R-2		
Equipment No.	Tightening part		Thread size	Tightening torque	Adhesive
Engine / Electrical equipment					

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4-2 Troubleshooting

4-2-1 Quick Reference Table for Troubleshooting

The following table summarizes the general trouble symptoms and their causes. If ant trouble symptom occurs, take corrective action before it develops into a serious problem so as not to shorten the engine service life.

	Trouble symptom / Cause	Starting failure: Engine does not start	Starting failure: Engine starts but stops soon: Exhaust smoke: None	Starting failure: Engine starts but stops soon: Exhaust smoke: Little	Starting failure: Engine starts but stops soon: Exhaust smoke: Much	Insufficient engine output: Exhaust color: Ordinary	Insufficient engine output: Exhaust color: White	Insufficient engine output: Exhaust color: Black	Poor exhaust color: During work: White	Poor exhaust color: During work: Black	High knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting: During idling	Hunting: During work	Large engine vibration	Difficulty in returning to low speed	Excessive fuel consumption	Lubricating oil: Excessive consumption	Lubricating oil: Dilution by fuel oil	Lubricating oil: Mixture with water	Lubricating oil: Low L.O. pressure	Much blow-by gas	Cooling water: Overheat	Cooling water: Low water temperature	Air intake: Pressure drop	Air intake: Pressure rise	Exhaust temperature rise		Corrective action
Engine system	Improper clearance of intake/exhaust valve	○	○			○						○														○		○		Adjust the valve clearance.
	Compression leakage from valve seat					○		○		○		○						○					○			○		○		Lap the valve seat.
	Seizure of intake/exhaust valve	○			○	○		○		○		○		○	○					○			○			○				Correct or replace.
	Blowout from cylinder head gasket					○															○			○						Replace the gasket.
	Seized or broken piston ring	○			○		○		○			○		○		○			○	○			○	○				○		Replace the piston ring.
	Worn piston ring, piston or cylinder	○			○		○		○										○	○			○							Perform honing and use oversize parts.
	Seized crankpin metal or bearing	○	○									○		○	○	○							○							Repair the replace.
	Improper arrangement of piston ring joints		○				○												○				○							Correct the ring joint positions.
	Reverse assembly of piston rings						○		○										○				○							Reassemble correctly.
	Worn crankpin and journal bearing					○						○		○	○	○						○								Measure and replace.
	Loosened connecting rod bolt											○				○						○								Tighten to the specified torque.
	Foreign matter trapped in combustion chamber	○										○							○				○							Disassemble and repair.
	Excessive gear backlash											○																		Adjust gear meshing.
	Worn intake/exhaust valve guide						○												○				○							Measure and replace.
	Defective governor		○											○	○	○	○													Make adjustment.
	Improper open/close timing of intake/exhaust valves	○					○	○	○	○		○																		Adjust the valve clearance.

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9. FUEL, LUBE OIL AND GREASE RECOMMENDED

9. Fuel, Lube Oil and Grease Recommended

Item	Type
Fuel	Grade No.2-D, No.3-D fuel
Engine oil	SAE10W30, SAE15W40, CF class or better
Hydraulic fluid	ISO VG46
Transfer case oil	BP Tractran UTH, BP Tractran 9

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4-3-12 Periodic Maintenance Schedule

The engine periodic inspection timing is hard to determine as it varies with the application, load status, qualities of the fuel and lubricating oils used and handling status. General rules are described here.

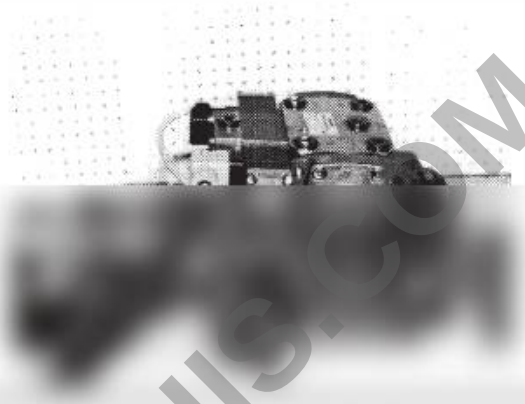
○ : Inspection ◇ : Parts replacement

Classification	Item	Daily	Maintenance period				
			Every 50 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
Fuel oil system	Fuel tank level check and fuel supply	○					
	Fuel tank draining		○				
	Water separator draining (Option)		○ Every 100 hours				
	Water separator cleaning (Option)				○		
	Fuel filter element replacement				◇		
Lube oil system	Lube oil level check	○					
	Lube oil replacement		◇ 1st time	◇ 2nd time and there after			
	Lube oil filter replacement						
Cooling water system	Cooling water level check and replenish	○					
	Radiator fin cleaning			○			
	Cooling fan V-belt tension check	○					
	Cooling water replacement					◇	
	Cooling water path flushing and maintenance					○ within one years	
Fuel oil, lube oil and cooling water leakage check		○					
Rubber hose	Fuel pipe and cooling water pipe inspection and maintenance						○
Air intake system	Air cleaner cleaning and element replacement			○	◇		
	Turbocharger blower cleaning					○	
Electrical system	Warning lamp & instruments function check	○					
	Battery electrolyte level check and battery recharging	○					
Cylinder head	Intake/exhaust valve head clearance adjustment					○	
Fuel injection pump and valve	Fuel injection valve pressure inspection					○	
	Fuel injection timing inspection						○

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3) Disassembly

Procedure	
(1) Appearance of hydraulic pump.	

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2. TECHNICAL DATA

2. Technical Data

2-1 Specifications

Item	Unit	C30R-2
Main specifications of machine		
Dimensions, weight		

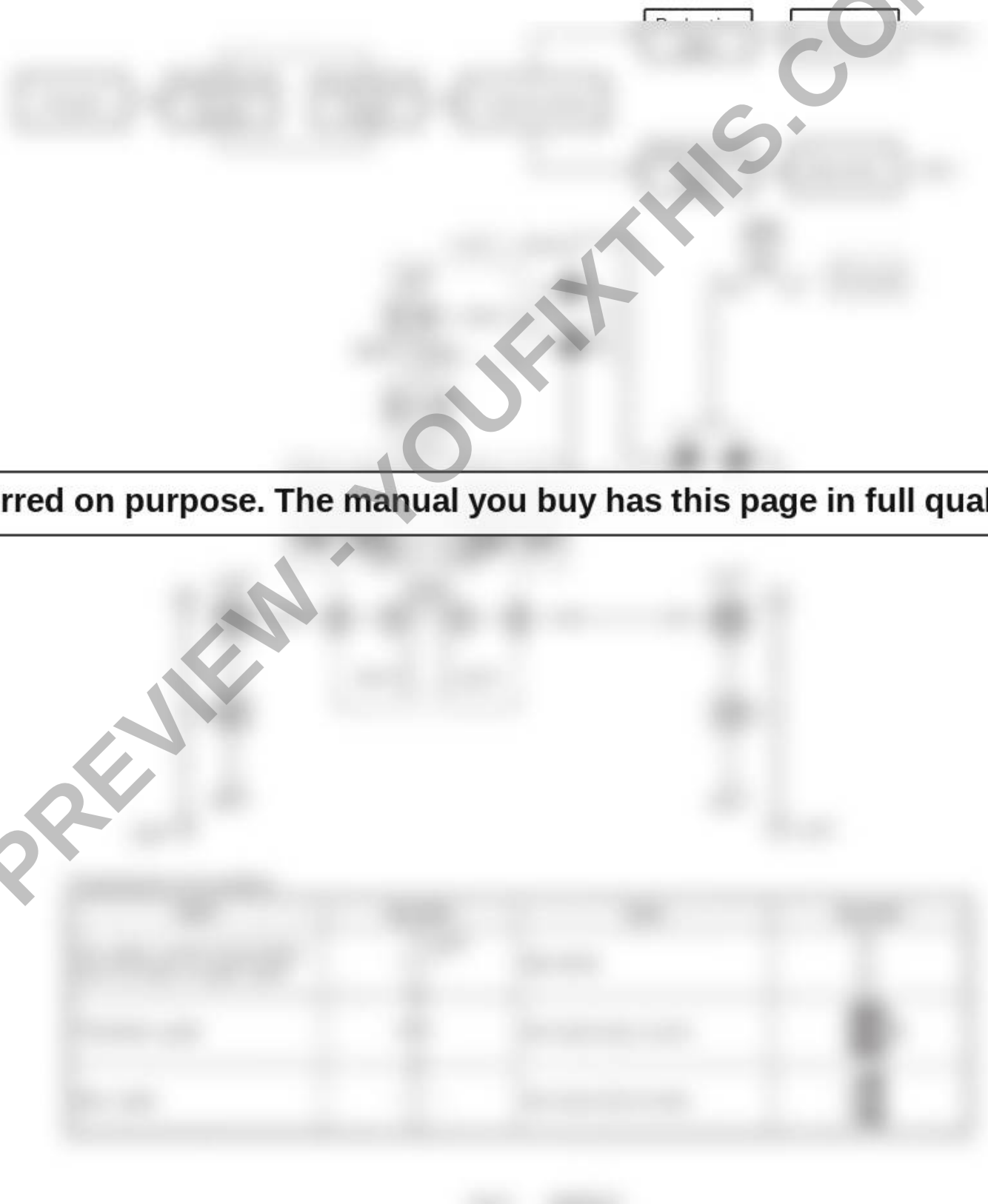
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5-2 Power Transmission Mechanism

The engine drives the hydraulic pump and the oil discharged from the pump drives the hydraulic motor. The return oil from the hydraulic motor is directly returned to the hydraulic pump. Thus, a closed circuit is composed.
The transmission is connected directly to the hydraulic motor, and the sprockets are driven through the reduction gears connected to the transmission. In this way, the crawler is rolled.



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Unit : ft•lbf (N•m)

Applicable model:			C30R-2		
Equipment No.		Tightening part	Thread size	Tightening torque	Adhesive
Travel device					
	1	Idler screw plug	PT 1/8	6.6 to 7.2 (8.8 to 9.8)	Loctite 572
	2	Nipple valve	M16	36.2 (49)	
	3	Sprocket	M14 × 35	116 to 151 (157 to 206)	Three Bond 1324
	4	Idler	Nut M24	254 to 325 (343 to 441)	Three Bond 1324
	5	Track roller	Nut M24	290 to 325 (393 to 441)	Loctite 262
	6	Rocking shaft	Nut M24	290 to 325 (393 to 441)	Loctite 262
Controls					
	1	Knob R × Steering lever	M4 × 6 (Binding head screw)	1.3 to 1.8 (1.8 to 2.5)	Three Bond 1324
	2	Plug 12	M12	58 to 72 (79 to 98)	Three Bond 1324
	3	F/R lever	M6 × 20	8.7 to 12 (12 to 16)	Three Bond 1324
	4	F/R lever × F/R lever knob	Nut M10	19 to 23 (25 to 32)	
Hydraulic equipment					
	1	CF coupling	Hexagon socket head bolt M12 × 40	62 to 67 (84 to 92)	Three Bond 1324
	2	Pump	M12 × 40	58 to 72 (79 to 98)	Three Bond 1324
	3	Motor	M12 × 40	58 to 72 (79 to 98)	Three Bond 1324
	4	Line filter	M8 × 20	9.4 to 12 (13 to 16)	
	5	Suction filter	PT 1/2	29 to 36 (40 to 49)	
	6	Oil level gauge	M10 × 30	11 to 12 (15 to 16)	Loctite 572
	7	Hydraulic oil tank	M10 × 25	58 to 72 (79 to 98)	Three Bond 1324
	8	Hose clip 16		1.6 to 1.8 (2.2 to 2.5)	
	9	Hose clip 22		1.6 to 1.8 (2.2 to 2.5)	
	10	Hose clip 35		1.6 to 1.8 (2.2 to 2.5)	

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Point 6

Disassemble :

- Install a bolt as a handle in the hole at the end face of the flywheel and remove carefully so as not to damage the ring gear.

  Reassemble : Flywheel mounting bolt T = 61.5 to 65.1 ft•lbf. (83.3 to 88.2 N•m), apply lube oil

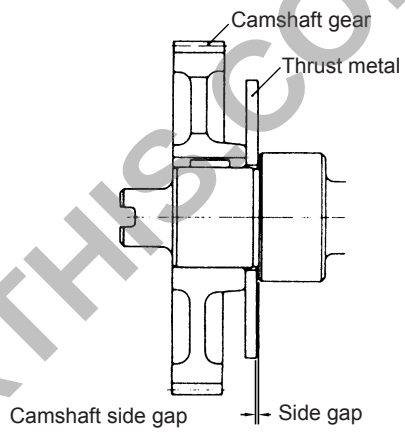
Point 7

Disassemble :

- Measure the camshaft side gap.

in. (mm)

	Standard	Limit
Side gap	0.002 to 0.0079 (0.05 to 0.20)	0.0118 (0.30)



- If the measured side gap exceeds the limit, replace the thrust metal.

Disassemble :

- Since the camshaft gear is shrink-fit, heat it to 356 to 392°F (180 to 200°C) for extraction.
- For camshaft removal, raise the engine with its mounting flange at the bottom. After removing the thrust metal mounting bolt from the camshaft gear hole, extract the camshaft carefully so as not to damage the bearing bushing.
- Rotate the camshaft a few turns before extracting it to prevent the tappet from being caught by the cam.
- After removing the camshaft, set the engine horizontal and fix it on the base.

⚠ CAUTION

Unforeseen injury may arise due to falling of slipping when raising the engine vertically or returning it to the horizontal position. Proceed carefully so as not to lose balance.

Point 8

Reassemble :

- Do not forget to install the oil pan mounting bolts on the bottom side when installing the gear case.
- Apply sealant (code No.977770-01212) and install the gear case by matching the two dowel pins.

Point 9

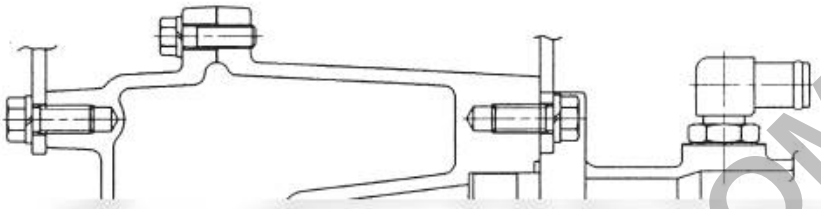
Reassemble :

- Replace the oil seal whenever disassembled.
- Apply lithium grease at the time of assembly.

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Transmission mechanism for forward travel

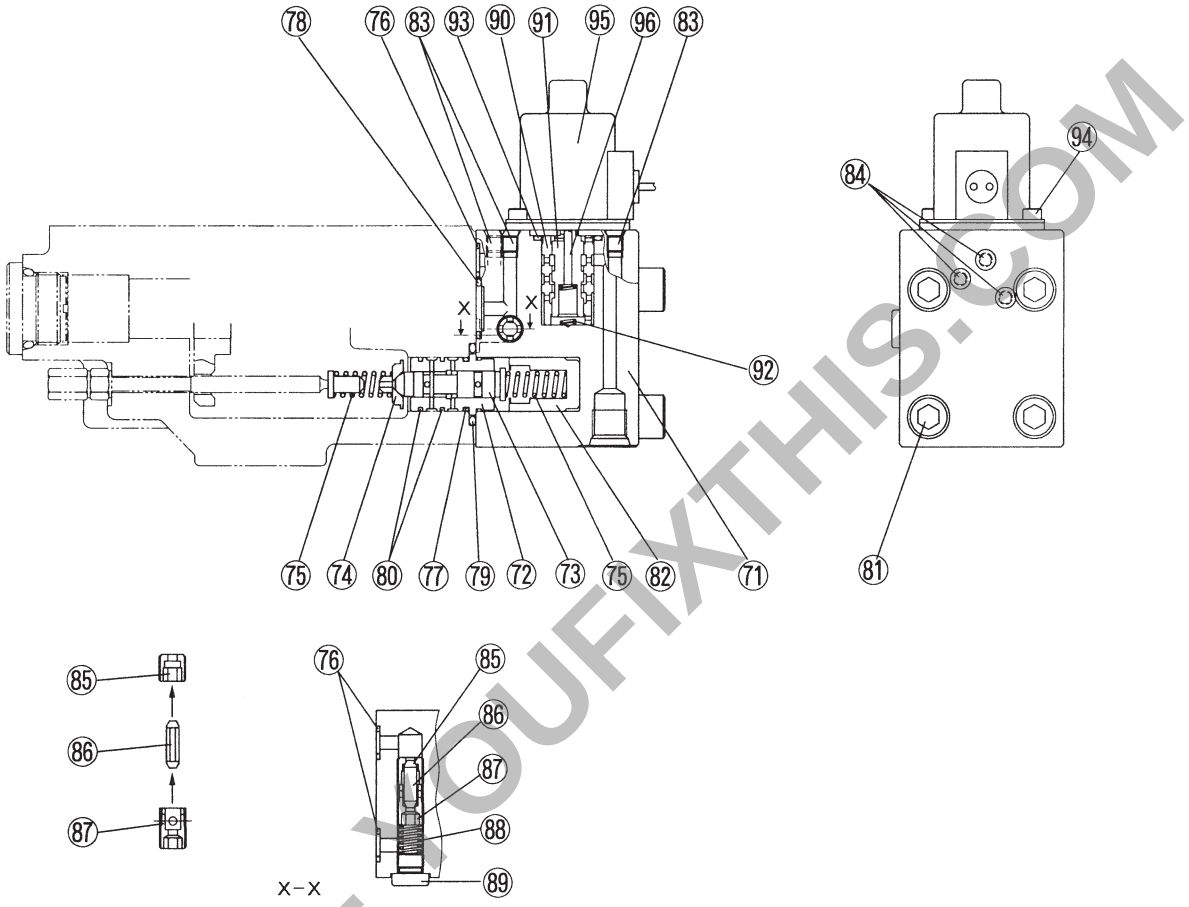


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3) Control unit

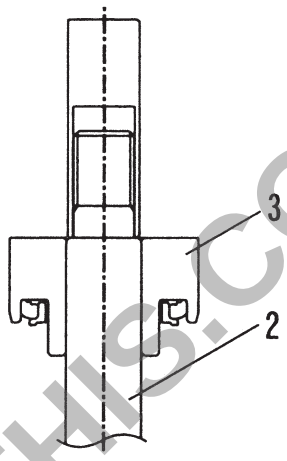
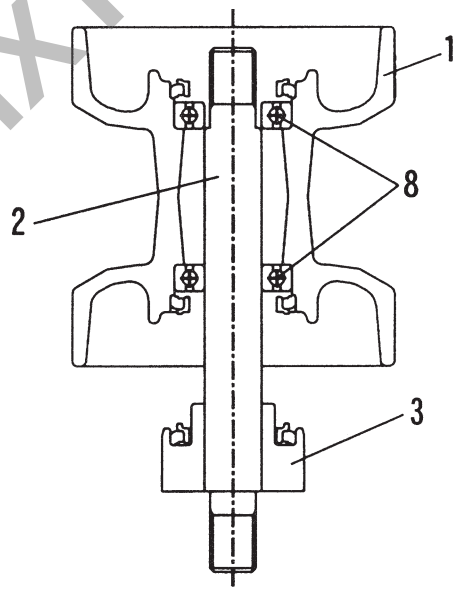
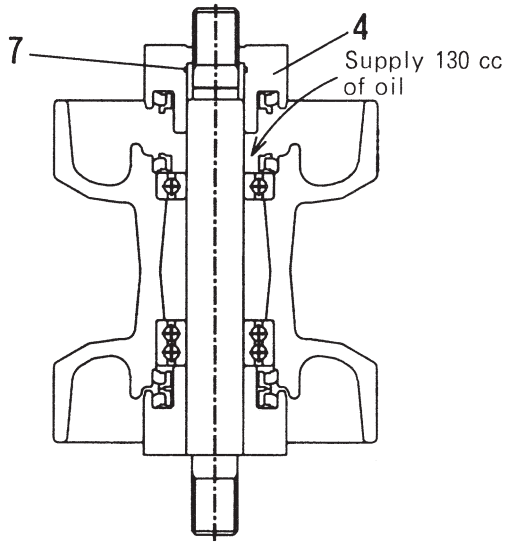


No.	Part	Q'ty	No.	Part	Q'ty
71	Cover	1	84	Plug	2
72	Barrel	1	85	Guide	1
73	Spool	1	86	Poppet	1
74	Spring seat	1	87	Guide	1
75	Spring	2	88	Spring	1
76	O-ring	3	89	Plug	1
77	O-ring (NBR, HS90)	1	90	Guide	1
78	O-ring (NBR, HS90)	1	91	Spool (J)	1
79	O-ring (NBR, HS90)	1	92	Spring	1
80	Piston ring	2	93	O-ring	1
81	Hexagon socket head bolt M10×75	4	94	Hexagon socket head bolt M4×10	2
82	Piston	1	95	Solenoid (DC12V)	1
83	Plug	2	96	Bush pin	1

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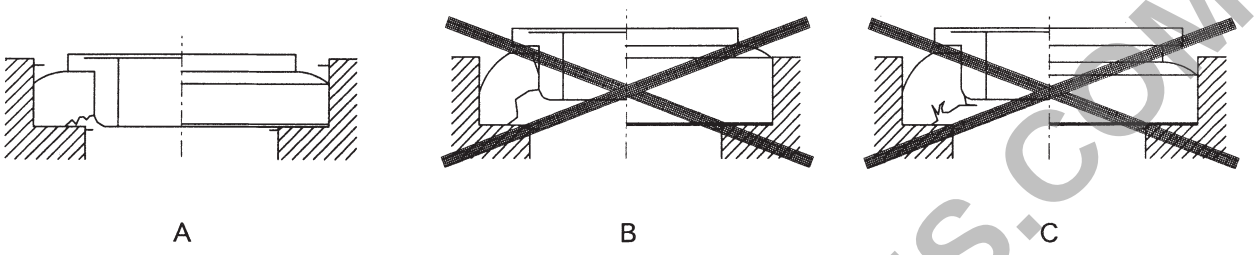
4) Reassembly

Procedure	
(1) Install roller seal cover A **3** onto roller shaft **2** with the jig for the track roller shaft.	
(2) Install bearings **8** into track roller **1** on both sides. (3) Install seals **5** into track roller **1** and roller seal cover A **3** with the jigs for installing the seals) (4) Install roller shaft **2** into track roller **1**. ***Note :*** • *Wipe the seat surface with paper and apply engine oil #30 lightly there.* • *Do not press the seat surface strongly. or it may be broken.*	
(5) After applying engine oil #30 to O-ring **7**, install it into seal cover B **4**. ***Note :*** *Take care not to put dust.* (6) After supplying a specified quantity of oil into the roller, press-fit seal cover B **4** (with the jig for the shaft) • Oil quantity : 130 cc • Oil type : Engine oil SAE30 (Class CC)	

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(6) After removing the insertion jig and the guide jig, check that the sliding surface is not inclined and that the packing is not twisted.



A B C

A : Correctly installed
B : Packing twisted
C : Only packing pressed

(7) Wipe the sliding surface with clean paper and apply oil to it.

(8) Install the driving wheel shaft into the final case without making the sliding surface contact strongly.

Check

- After putting oil into the final case, turn the driving wheel shaft two or three times manually to form oil film on the sliding surface.
- At that time, check that the torque is not excessively high and that there is no oil leak.

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