PART NO. TOJBE91-EN-00

HITACHI

Reliable solutions

Technical Manual
Operational Principle

ZX870LC-5G
Hydraulic Excavator

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TOJBE91-EN
Technical Manual (Troubleshooting)	: Vol. No.TTJBE91-EN
Workshop Manual	: Vol. No.WJBE91-EN

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Hydraulic Component

PUMP DEVICE	Drive Gear Ratio	Pump1 and 2: 57/53 Fan Pump: 1 Pilot Pump: 1
MAIN PUMP	Type	Variable Displacement Swash Plate Tandem Plunger Pump
	Theoretical Displacement	270 cm^3/rev (18.3 in^3/rev)×2
	Rated Pressure	31.9 MPa (325 kgf/cm^2, 4627 psi)
REGULATOR	Type	Pump Control Solenoid Valve Operated Type
FAN PUMP	Type	Variable Displacement Swash Plate Plunger Pump
	Maximum Flow (Theoretical Value)	100.8 L/min (27 US gpm)
REGULATOR	Type	Pump Control Solenoid Valve Operated Type
PILOT PUMP	Type	SGP1A27F2H5-R693
	Model	Fixed Displacement Type Gear Pump
	Theoretical Displacement	27.8 cm^3/rev (1.7 in^3/rev)×2
CONTROL VALVE	Type	Pilot Pressure Operated Type (4-Spools + 5-Spools)
	Main Relief Set-Pressure	Normal: 31.9 MPa (325 kgf/cm^2, 4627 psi) at 365 L/min (96 US gpm)
		Increases Pressure: 34.3 MPa (350 kgf/cm^2, 4975 psi) at 500 L/min (132 US gpm)
	Overload Relief Set-Pressure	35.3 MPa (360 kgf/cm^2, 5120 psi) at 110 L/min (29 US gpm) (Boom, Arm, Bucket)
		33.3 MPa (340 kgf/cm^2, 4830 psi) at 110 L/min (29 US gpm) (Auxiliary Open , Auxiliary Close)

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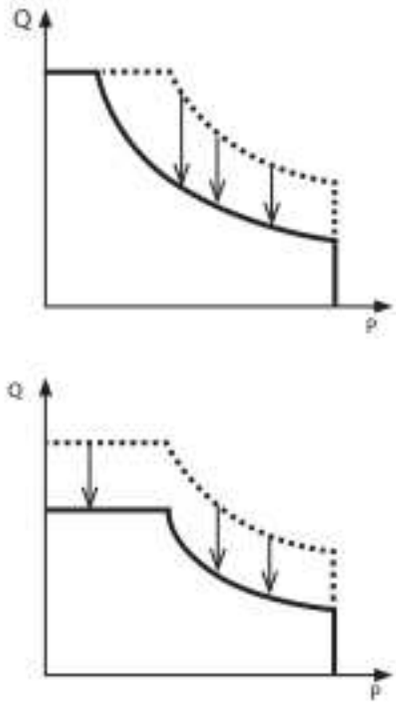
Overheat Prevention Control

Purpose:
The overheat prevention control reduces the maximum flow rate and the driving torque of the pump when coolant temperature and hydraulic oil temperature increase to the specified value or more in order to reduce the engine load and prevent the overheating.
It maximizes the fan pump delivery flow rate and the fan speed at the same time.
Operation:

1. MC (13) receives the signal from coolant temperature sensor (20) through monitor controller (15) and CAN (17).
2. When engine coolant temperature is 99 °C or more, MC (13) calculates the target pump displacement angle including the signals from pump 1 and pump 2 delivery pressure sensors ((22), (23)). In addition, MC (13) compares the actual pump displacement angle detected by pump 1 and pump 2 control pressure sensors ((27), (25)) with the target pump displacement angle.
3. MC (13) drives pump 1 control solenoid valve (26) and pump 2 control solenoid valve (24) in order to align the actual pump displacement angle with the target pump displacement angle so that the pump driving torque is reduced by 7%.
4. In addition, MC (13) receives the signal from hydraulic oil temperature sensor (1).
5. When hydraulic oil temperature is 100 °C or more, MC (13) calculates the target pump displacement angle including the signals from pump 1 and pump 2 delivery pressure sensors ((23), (23)). In addition, MC (13) compares the actual pump displacement angle detected by pump 1 and pump 2 control pressure sensors ((27), (25)) with the target pump displacement angle.
6. MC (13) drives pump 1 control solenoid valve (26) and pump 2 control solenoid valve (24) to the difference of pump displacement angle between the actual angle and the target angle so that the pump displacement angle is reduced and the pump driving torque is reduced by 7%.
7. MC (13) calculates the fan speed according to each input signal on temperature at the same time.
8. MC (13) sends the highest output signal of the calculated fan speed to fan pump control solenoid valve (35) and maximizes the fan pump delivery flow rate.
9. Consequently, the fan speed is controlled to maximum.

Overheat control completed condition:

- Coolant temperature: 95 °C or less
- Hydraulic oil temperature: 95 °C or less



P - Pressure Q - Flow Rate

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Hydraulic Circuit

Main Circuit

Pressure oil from pump 1 flows to each spool of travel (right), bucket, boom 1, and arm 2 at the 4-spool side of control valve.Pressure oil from pump 2 flows to each spool of swing, arm 1, boom 2, auxiliary, and travel (left) at the 5-spool side of control valve.

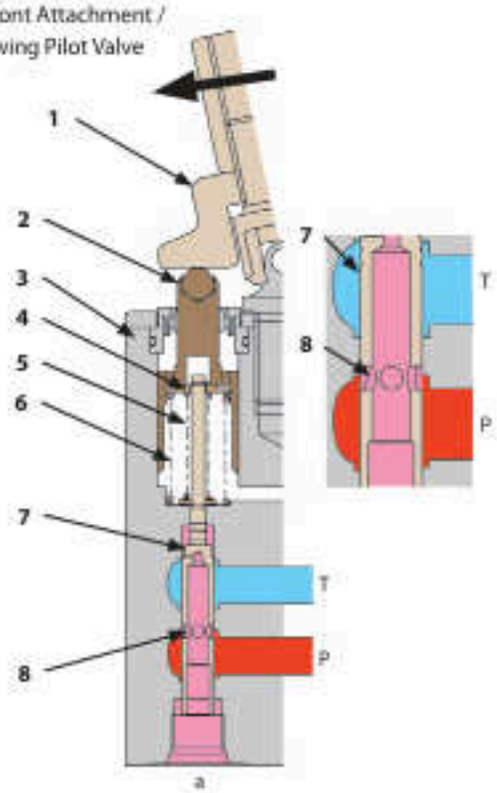
The parallel circuit is provided in each main circuit of pump 1 and pump 2, and makes the combined operation possible.
In addition, the flow combiner circuit is provided in both boom and arm circuits so that pressure oil from pump 1 and pump 2 are combined during a single operation.

The main relief valve (15) is provided in the main circuit (between the pump and the actuator). The main relief valve (15) prevents the pressure in the main circuit from exceeding the set pressure when the spool is operated (or when the control lever is operated).
The overload relief valves (6, 11, 19, 22 and 29) are provided in the actuator circuits (between the control valve and the actuator) of boom, arm, bucket, and auxiliary. The overload relief valve prevents surge pressure caused by external force in the actuator circuit does not exceed the set pressure when the spool is in neutral (with the control lever set in neutral).

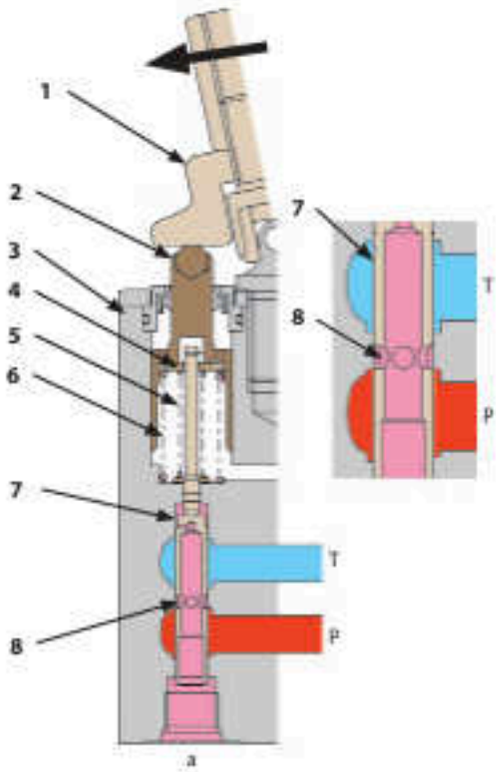
In addition, boom overload relief valve (low pressure) (22) is provided in the boom lower circuit.Boom overload relief valve (low pressure) (22) decreases the relief set pressure in the boom lower circuit and reduces vibration of the machine during boom lower operation.

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Front Attachment / Swing Pilot Valve

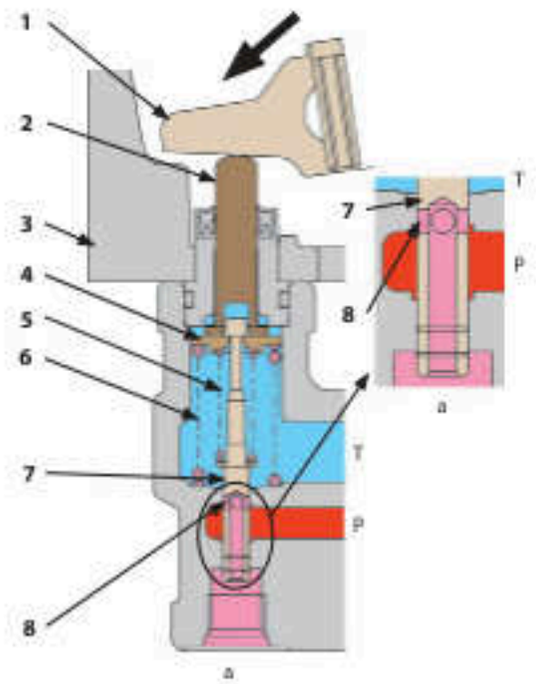


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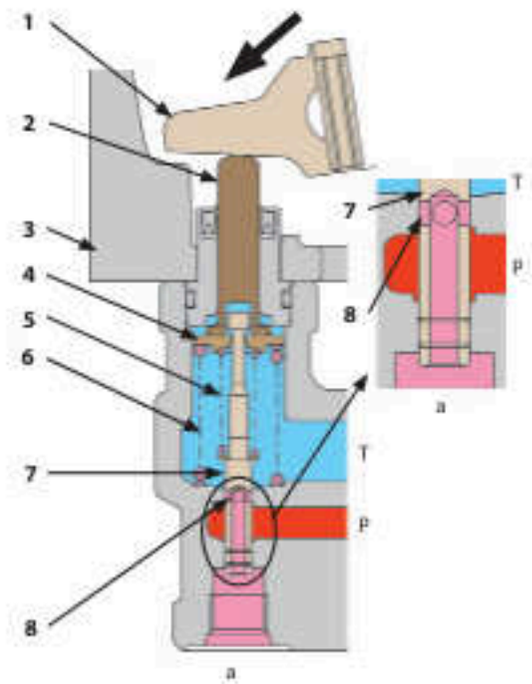


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Travel Pilot Valve



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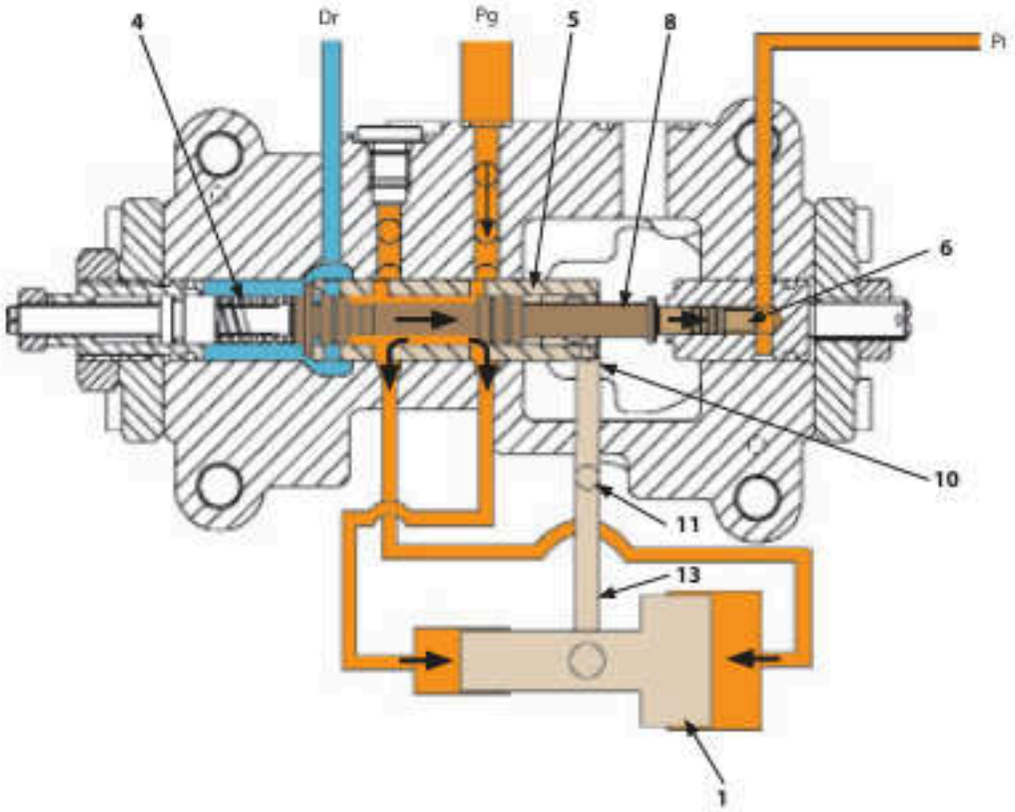


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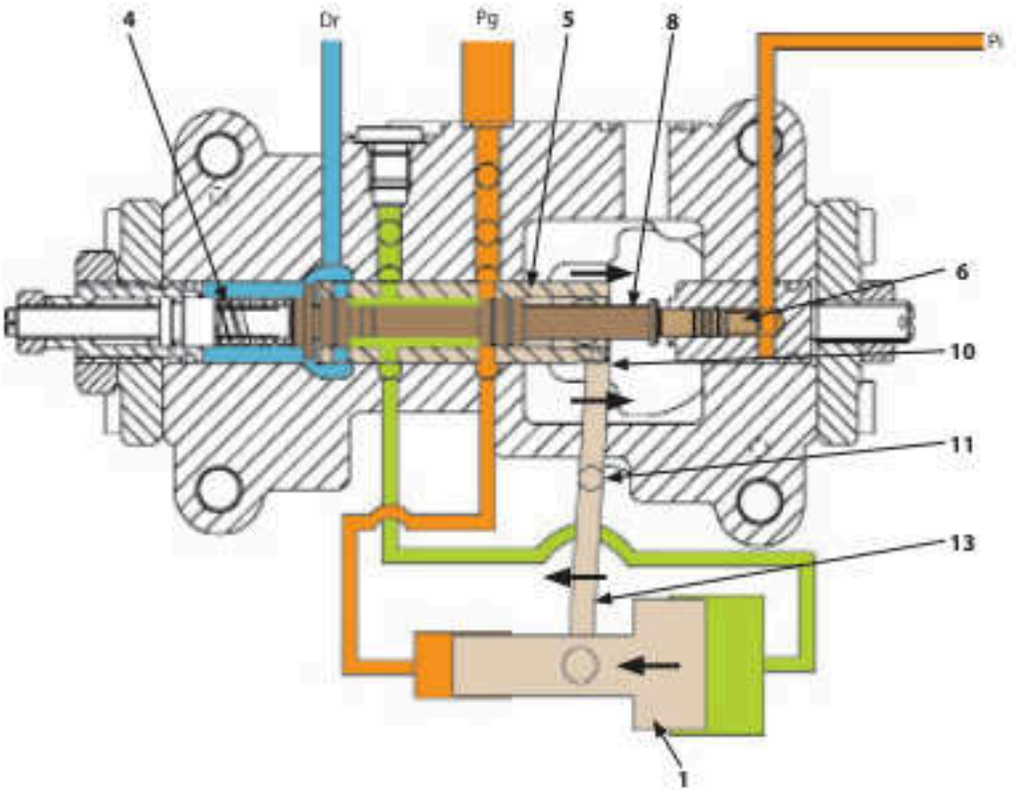
P- Port P
T- Port T
a- Output Port

1- Cam
2- Pusher
3- Casing
4- Spring Guide
5- Balance Spring
6- Return Spring
7- Spool
8- Hole

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Dr- Returning to Hydraulic Oil Tank
Pi- Flow Rate Control Pressure
Pg- Primary Pilot Pressure (From Pilot Pump)

1- Servo Piston
4- Spring
5- Sleeve
6- Piston
8- Spool
10- Pin
11- Pin
13- Link

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