PART NO. TO1J1-E-00

HITACHI

Technical Manual

Operational Principle

ZAXIS

450-3
450LC-3
470H-3
470LCH-3
500LC-3
520LCH-3

Hydraulic Excavator

Service Manual consists of the following separate Part No;

Technical Manual (Operational Principle)	: Vol. No.TO1J1-E
Technical Manual (Troubleshooting)	: Vol. No.TT1J1-E
Workshop Manual	: Vol. No.W1J1-E

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- Pump Control
  - Pump Flow Rate Control
    Delivers oil required for the actuator according to the control lever stroke from the main pump.
  - Speed Sensing Control
    Controls the pump flow rate in response to engine speed changes due to variations in load so that the engine output can be utilized more efficiently. (Engine stall is prevented when the machine operates under adverse conditions such as operating at high altitude.)
  - E Mode Control
    Decreases the pump suction torque to 85 % in order to reduce the engine load and improve fuel consumption rate. Engine stall is prevented when inferior fuel is used or the machine operates under adverse conditions such as operating at high altitude.
  - Horsepower Control
    Controls delivery flow rate of each main pump and uses engine power effectively so that sum of pump torques divided to two main pumps and fan pump does not exceed the engine output torque.
  - Relief Flow Rate Reducing Control
    Controls hydraulic energy loss and prevents hydraulic oil temperature from rising. (Flow Rate Reducing Control (Relief Cut Off))
  - Swing Horsepower Reducing Control
    Decreases delivery flow rate of main pump 2 including the swing circuit, increases delivery flow rate of main pump 1 and uses the engine power effectively when the swing control lever is operated and the pressure sensor (swing) detects swing pilot pressure.
  - Overheat Prevention Control
    Reduces maximum flow rate and suction torque of the main pump, reduces the engine load and prevents overheating when temperature of coolant or hydraulic oil increases beyond the specified level.
  - Attachment Mode Control (Optional)
    Limits the upper of maximum flow rate of pump 2 and controls the appropriate flow rate for the attachment when operating the attachment with the work mode in attachment mode.
  - Counterweight Removal and Installation Control (Optional)
    Applies back-pressure to the main relief valve, increases main relief pressure and the hoist / lower power improves. Or, Controls pump delivery flow rate and makes fine operation easy.
  - Fan Pump Flow Rate Control
    Controls delivery flow rate of the fan pump according to boost temperature (intake air temperature passing by the intercooler), coolant temperature, hydraulic oil temperature and intake air temperature), and controls fan rotation speed in order to make temperature of oil cooler, radiator and intercooler appropriate.
  - Pump Learning Control
    Detects pressure, which is necessary to pump control, when the pump control solenoid valve is activated.

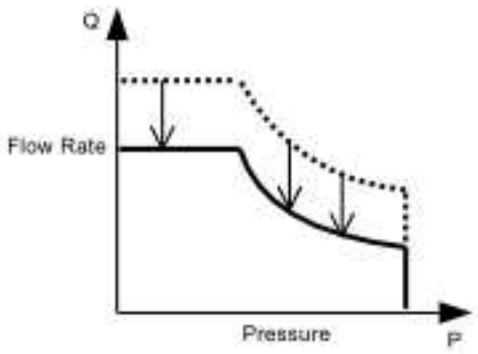
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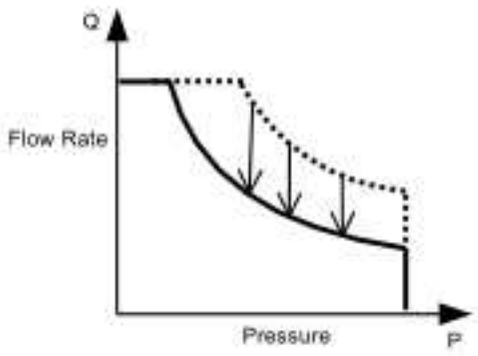
Overheat Prevention Control

Purpose: Prevents the engine from overheating by reducing the main pump maximum flow rate and pump torque, reducing the load applied to the engine when coolant and hydraulic oil temperatures increase beyond the specified level.

Operation:

1. The signal from coolant temperature sensor is sent to MC via ECM and CAN.
2. When coolant temperature is 99 °C (210 °F) or higher, MC calculates the target pump displacement angle according to the signal from the pump delivery pressure sensor. MC compares the actual pump displacement angle detected by the pump regulator pressure sensor with the target pump displacement angle.
3. MC activates the pump control solenoid valve in order to compensate the difference between the actual and target displacement angels, and decreases 7 % of pump torque.
4. The signal from the hydraulic oil temperature sensor is sent to MC
5. When coolant temperature is 100 °C (212 °F) or higher, MC calculates the target pump displacement angle according to the signal from the pump delivery pressure sensor. MC compares the actual pump displacement angle detected by the pump regulator pressure sensor with the target pump displacement angle.
6. MC activates the pump control solenoid valve in order to compensate the difference between the actual and target displacement angels, and decreases maximum flow rate and 7 % of pump torque.





Completion Condition for Overheat Control

- Coolant temperature 95 °C (203 °F) or lower
- Hydraulic oil temperature: 95 °C (203 °F) or lower

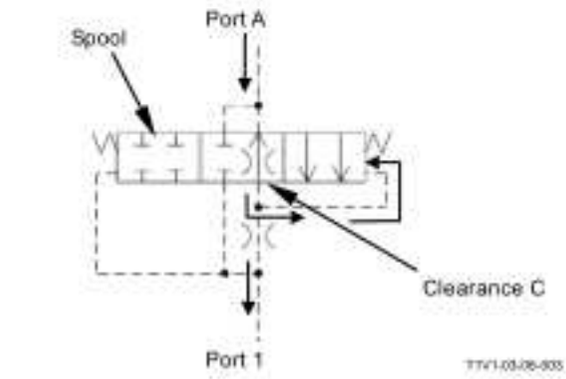
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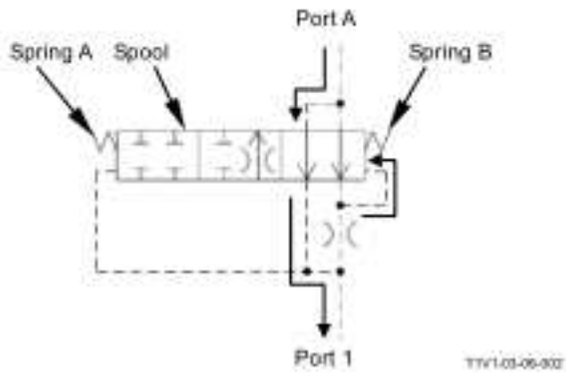
SHOCKLESS VALVE

The shockless valve is provided in the boom raise circuit and functions when returning the boom raise control lever suddenly.

During Boom Raising Operation

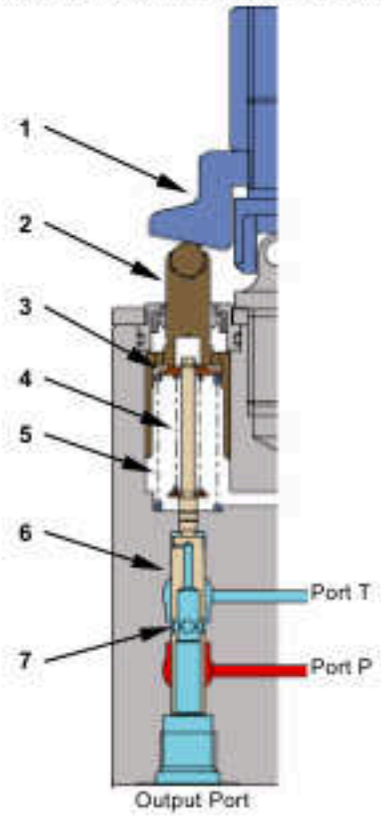
1. Boom raise pilot pressure is routed into port A and acts on the spool.
2. Immediately after operation is started, low pilot pressure flows into the spring B chamber through clearance C between spool and housing. At the same time, pilot pressure flows to port 1 through inner passage 2.
3. When pilot pressure increases, pressure in the spring B chamber increases, and the spool pushes spring A and moves to the left.
4. As the spool is moved, port A is connected to port 1 and pressure in port 1 increase, so that the spool in control valve is moved.

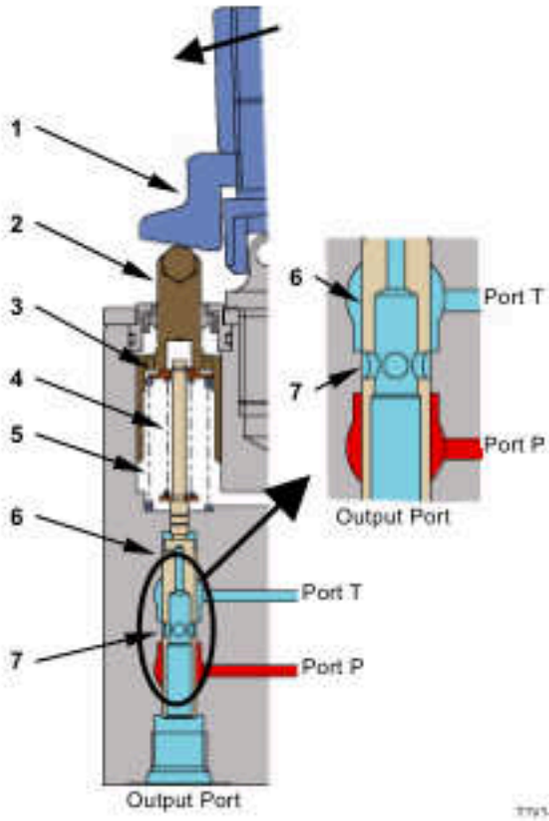




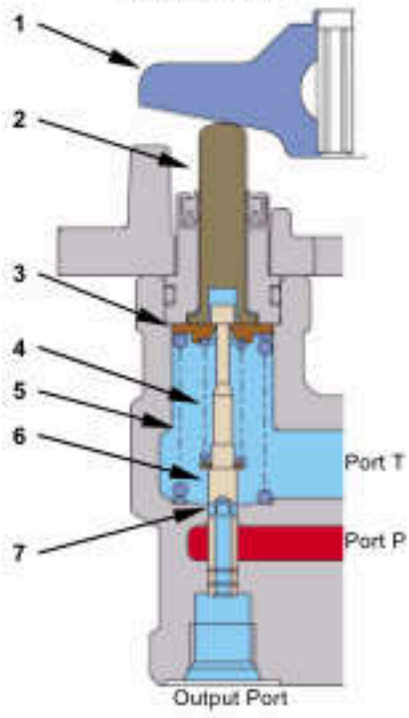
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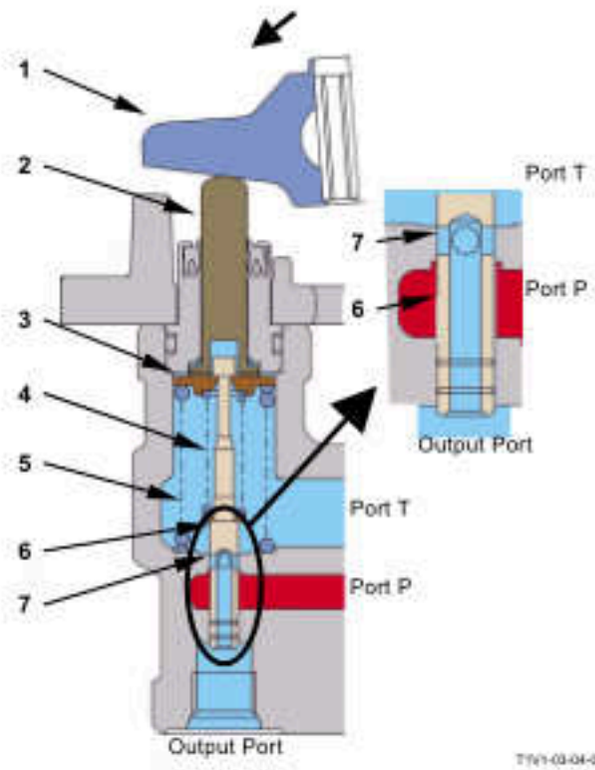
Front Attachment / Swing Pilot Valve





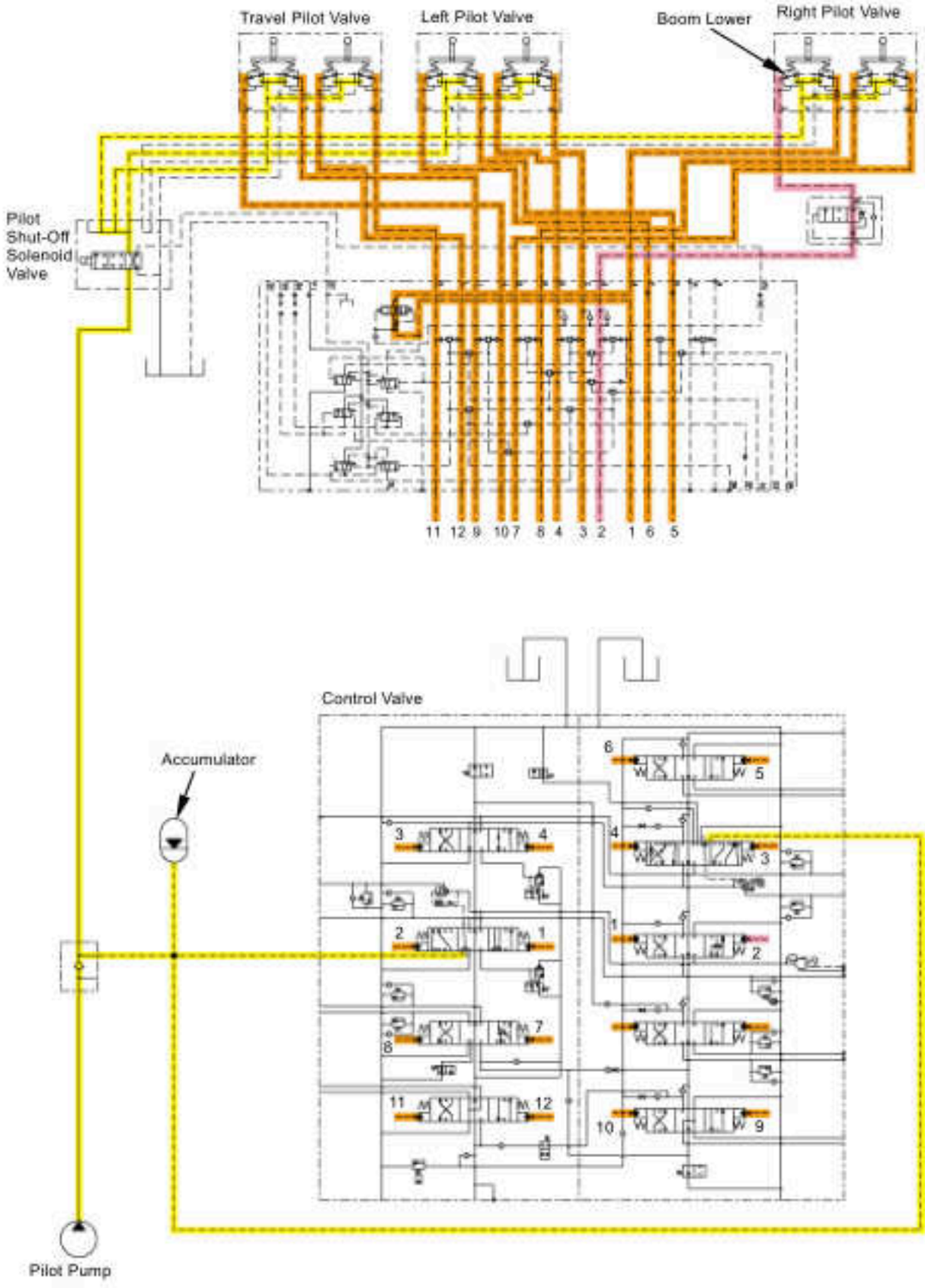
Travel Pilot Valve





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

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