PART NO. TODDA-EN-01

HITACHI

Reliable solutions

Technical Manual
Operational Principle

ZX
290LC-5B
290LCN-5B
Hydraulic Excavator

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TODDA-EN
Technical Manual (Troubleshooting)	: Vol. No.TTDDA-EN
Workshop Manual	: Vol. No.WDDA-EN
Engine Manual	: Vol. No.ETDCA-EN, EWDCA-EN

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Hydraulic Component

PUMP DEVICE	Drive Gear Ratio	Main Pump (P1, P2): 1.03, Main Pump (P3): 1, Pilot Pump: 1.11
MAIN PUMP	Type	Bent-Axis Type Variable Displacement Axial Plunger Pump
	Theoretical Displacement	118 cm^3/rev (7.2 in^3/rev)×3
	Rated Pressure	34.3 MPa (350 kgf/cm^2, 4980 psi)
REGULATOR	Type	Hydraulic Pressure Operated Type
PILOT PUMP	Type	Fixed Displacement Type Gear Pump
	Model	FS 11/16.8
	Theoretical Displacement	16.8 cm^3/rev (1.0 in^3/rev)
CONTROL VALVE	Type	Pilot Pressure Operated Type (4-Spools + 4-Spools + 4-Spools)
	Main Relief Set-Pressure	Normal: 34.3 MPa (350 kgf/cm^2, 4980 psi) at 170 L/min (44.9 US gpm)
		Power Digging: 38.0 MPa (388 kgf/cm^2, 5510 psi) at 170 L/min (44.9 US gpm)
	Overload Relief Set-Pressure	39.2 MPa (400 kgf/cm^2, 5690 psi) at 50 L/min (13.2 US gpm) (Boom, Arm, Bucket)

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Pump Control Circuit (Refer to COMPONENT OPERATION / Pump Device.)

- Pump Delivery Flow Rate Control by Pump Control Pressure Pi (23)
  1. Pilot pressure from the pilot valve is selected by shuttle valve (10) in signal control valve (11) so that pump 1 flow rate control valve (16), pump 2 flow rate control valve (14), or pump 3 flow rate control valve (13) in signal control valve (11) is shifted.
  2. Pilot pressure oil from pilot pump (26) is supplied to the regulator in pump 1 (20), pump 2 (22), or pump 3 (21) as pump control pressure Pi (23) by shifting pump 1 flow rate control valve (16), pump 2 flow rate control valve (14), or pump 3 flow rate control valve (13).
  3. The regulator controls the pump delivery flow rate in proportion to pump control pressure Pi (23).

NOTE: The boom lower pilot pressure is routed to pump 1 flow rate control valve (16) through control valve (17) with the track raised off the ground. The auxiliary 1 pilot pressure is routed to pump 1 flow rate control valve (16) through auxiliary flow combiner control solenoid valve (12) (optional).

Supplied to	Pilot Pressure is Supplied to
Pump 1 Flow Rate Control Valve (16)	Boom Raise (6), Boom Lower (5) Arm (4) Bucket (7) Travel (Right) (2) Auxiliary 1 (8)
Pump 2 Flow Rate Control Valve (14)	Boom Raise (6) Arm (4) Travel (Left) (1) Auxiliary 1 (8)
Pump 3 Flow Rate Control Valve (13)	Boom Raise (6) Swing (3) Positioning/Auxiliary 2 (9)

- Pump Control by Torque Control Solenoid Valve
  1. Pilot pressure from pilot pump (26) is controlled by pump 1, 2 torque control solenoid valve (25) and pump 3 torque control solenoid valve (18) and is supplied to the regulators in pump 1 (20), pump 2 (22), and pump 3 (21) as torque control pressure Ppc (19).
  2. The regulator controls the pump delivery flow rate in proportion to torque control pressure Ppc (19).

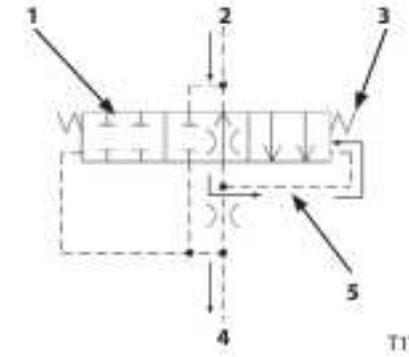
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Shockless Valve

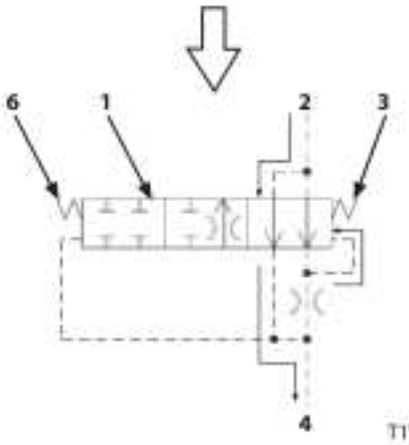
The shockless valve is provided in the boom raise circuit and functions during boom lowering operation or when stopping boom raise operation.

During boom raise operation

1. Boom raise pilot pressure is routed to spool (1) through port A (2).
2. Immediately after operation is started, low pilot pressure is routed to the spring B (3) chamber through clearance C between spool (1) and housing (7).In addition, pilot pressure is also routed to port 1 (4) through inner passage 2 (5) at the same time.
3. When pilot pressure increases, pressure in the spring B (3) chamber also increases. Spool (1) pushes spring A (6) and is moved to the left.
4. As spool (1) is moved, port A (2) is connected to port 1 (4) and pressure in the port 1 (4) increases, so that the control valve spool is moved.



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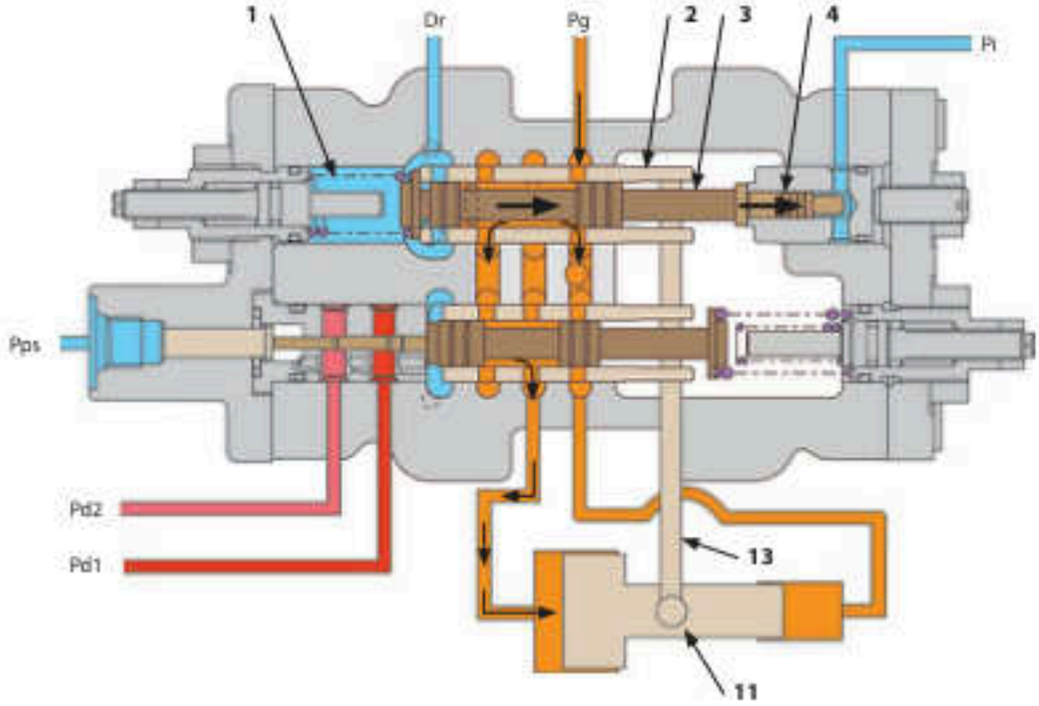


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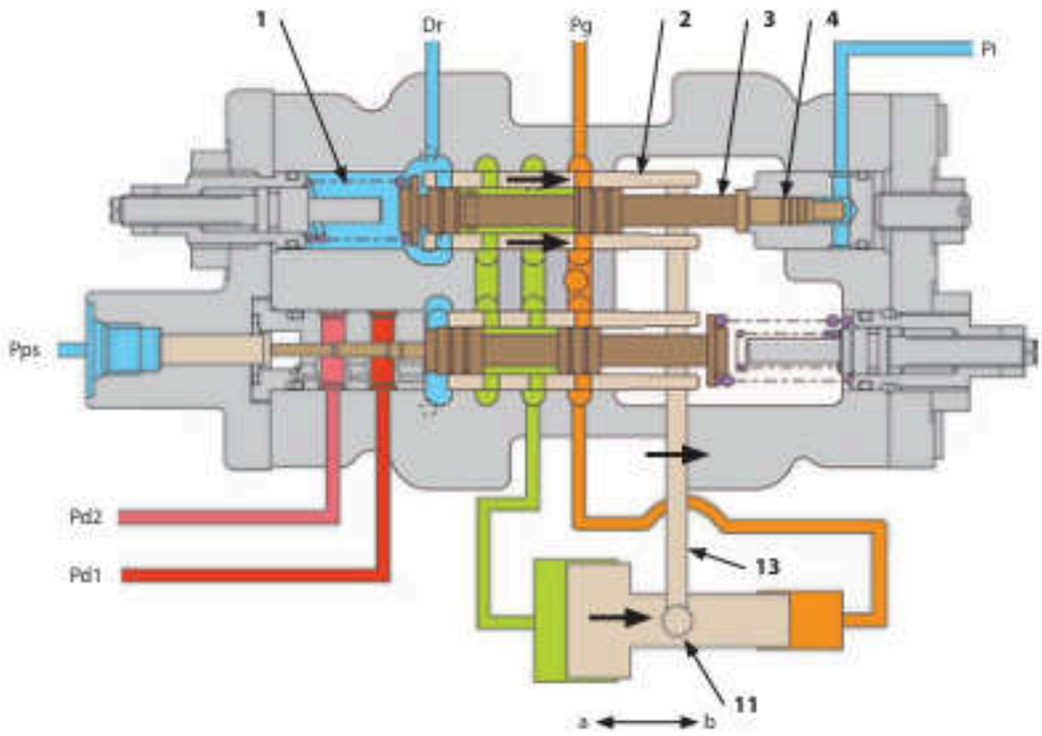
1- Spool
2- Port A
3- Spring B
4- Port 1
5- Inner Passage 2
6- Spring A

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NOTE: The illustration shows the pump1 regulator.



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TPPP-03-01-019

Pd1- Pump 1 Delivery Pressure
Pd2- Pump 2 Delivery Pressure

Dr- Returning to Hydraulic Oil Tank

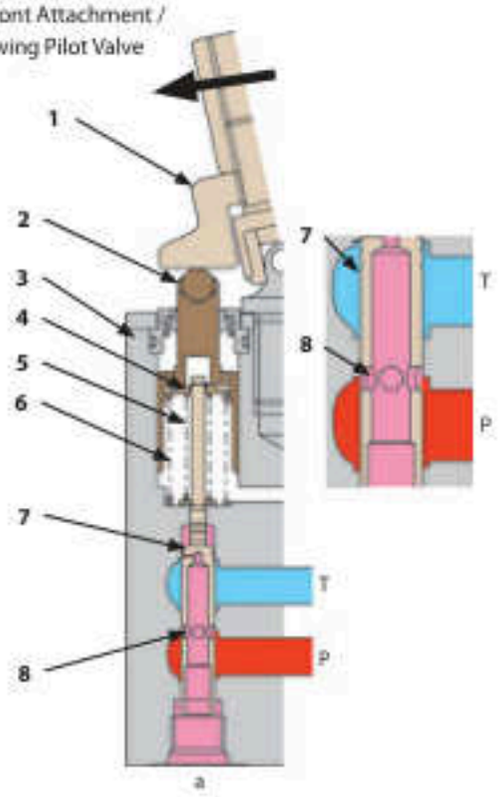
Pi- Pump Control Pressure
Pps- Torque Control Pressure

Pg- Primary Pilot Pressure (From Pilot Pump)

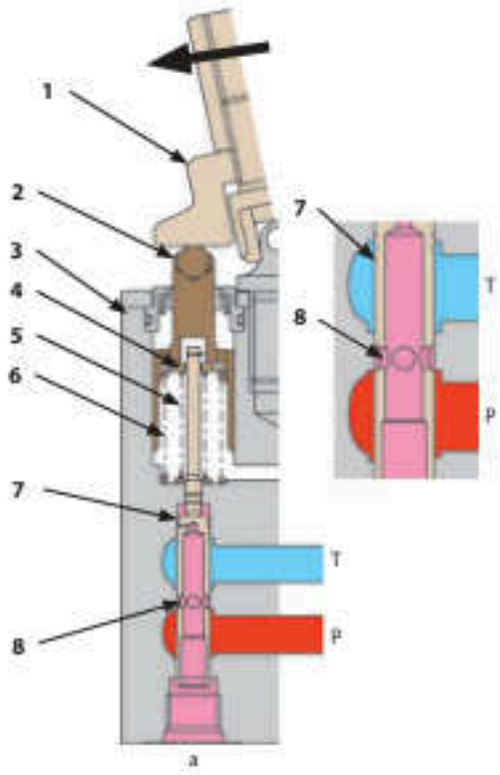
1- Spring
2- Sleeve A
3- Spool A
4- Piston
11- Servo Piston
13- Link

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Front Attachment / Swing Pilot Valve

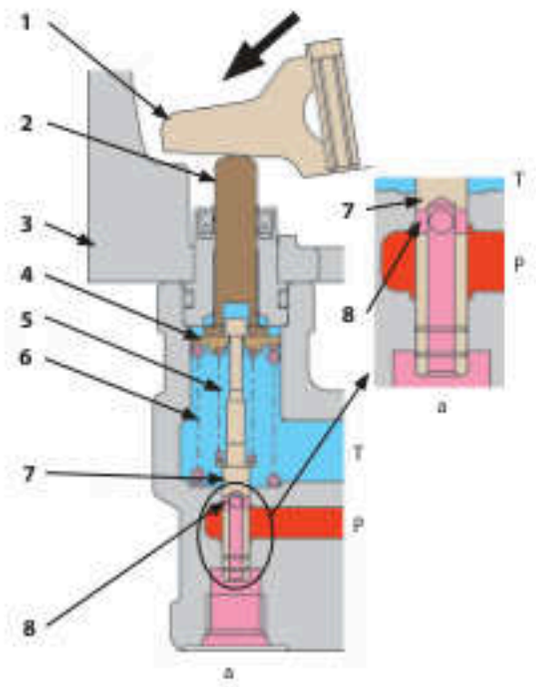


TPPP-03-04-007

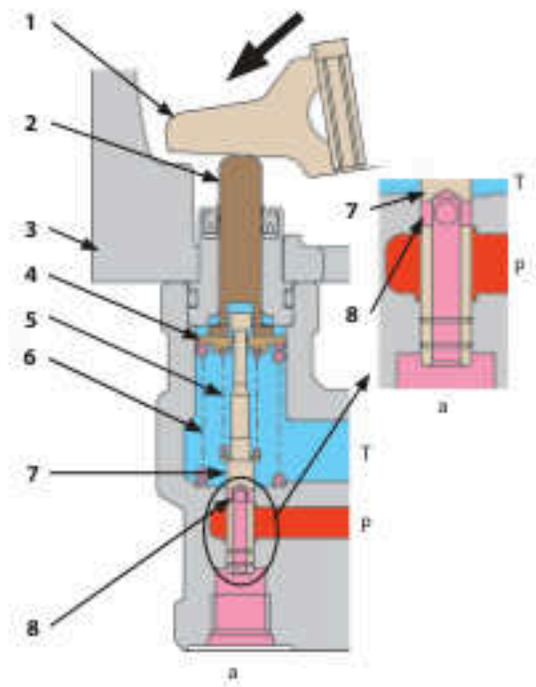


TPPP-03-04-008

Travel Pilot Valve



TPPP-03-04-012



TPPP-03-04-013

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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