PART NO. TONEM50-EN-01

HITACHI

Reliable solutions

Technical Manual
Operational Principle

ZW250-6
Wheel Loader

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TONEM50-EN
Technical Manual (Troubleshooting)	: Vol. No.TTNEM50-EN
Workshop Manual	: Vol. No.WNEM50-EN

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service Manual | Publication TONEM50-EN-01

Order the manual at mid-west-tech.com >

SECTION 1

GENERAL

CONTENTS

Group 1 Specifications

Specifications T1-1-1
Weight of Main Components T1-1-2

Group 2 Component Layout

Main Component (Overview) T1-2-1
Main Component T1-2-2
Electrical System (Overview) T1-2-4
Air Cleaner / Radiator Assembly T1-2-5
Battery Box T1-2-7
Hydraulic Oil Tank T1-2-8
Fuel Tank T1-2-9
Drive Unit T1-2-10
Front Axle T1-2-11
Cab T1-2-12
Engine T1-2-19
Aftertreatment Device T1-2-20
Fan Valve T1-2-21
Pump Device T1-2-22
Multiple Control Valve T1-2-22
Manifold Valve T1-2-23
Parking Brake Solenoid Valve T1-2-23
Brake Charge Valve T1-2-23
2-Spool Solenoid Valve Unit T1-2-23
Steering Valve Block T1-2-24
Emergency Steering Pump T1-2-24
Flow Regulator Valve T1-2-24
DEF Tank T1-2-25
DEF Supply Module T1-2-25
Joystick Steering Hydraulic Component Layout ... T1-2-26
Joystick Steering Cab Components T1-2-28

Group 3 Component Specifications

Engine T1-3-1
Engine Accessories T1-3-5
Hydraulic Component T1-3-6
Electrical Component T1-3-12

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

SECTION 2

SYSTEM

CONTENTS

Group 1 Controller
Outline T2-1-1
CAN Circuit T2-1-2

Group 2 Control System
Outline T2-2-1
Engine Control (ECM) T2-2-6
Pump Control T2-2-37
Transmission Control (TCU) T2-2-42
Fan Control, Valve Control T2-2-61
Other Controls T2-2-71
Control by Electrical and Hydraulic Combined Circuit T2-2-95
JSS Control System T2-2-101

Group 3 Engine System
Outline T2-3-1
ECM System T2-3-2
Fuel Injection Control T2-3-4
Fuel Injection Volume Correction Control T2-3-12
EGR Control T2-3-14
Preheating Control T2-3-16
Variable Turbocharger Control T2-3-17
Alarm Control T2-3-18
Urea SCR System T2-3-19
Engine Output Restriction Control (INDUCEMENT) T2-3-30
Aftertreatment Device T2-3-36
Aftertreatment Device Regeneration Control T2-3-38

Group 4 Hydraulic System
Outline T2-4-1
Pilot Circuit T2-4-2
Main Circuit T2-4-34
Steering Control Circuit T2-4-36
Front Attachment Control Circuit T2-4-40
Fan Circuit T2-4-48
Emergency (Secondary) Steering Circuit T2-4-50
Joystick Steering Hydraulic System T2-4-53

Group 5 Electrical System
Outline T2-5-1
Main Circuit T2-5-2
Electric Power Circuit (Key Switch: OFF) T2-5-4
CAN Circuit T2-5-6
Accessory Circuit (Key Switch: ACC) T2-5-8
Starting Circuit (Key Switch: START) T2-5-10
Neutral Engine Start Circuit T2-5-12
Charging Circuit (Key Switch: ON) T2-5-14
Surge Voltage Prevention Circuit T2-5-18
Pilot Shut-Off Circuit (Key Switch: ON) T2-5-20
Auto Shut-Down (Idling Stop) Circuit T2-5-22
Engine Stop Circuit T2-5-24
Monitor Circuit T2-5-27
Steering Column Monitor Circuit T2-5-31
Head Light Circuit T2-5-32
Hazard Light Circuit (Key Switch: OFF) T2-5-38
Turn Signal Light Circuit T2-5-40
Horn Circuit (Key Switch: OFF) T2-5-42
Reverse Light/Buzzer Circuit T2-5-44
Brake Light Circuit T2-5-46
Parking Brake Circuit T2-5-48
Accessory Circuit T2-5-53
Work Light Circuit T2-5-54
Wiper Circuit T2-5-56
Cab Dome Light Circuit T2-5-62
JSS Electrical System T2-5-65
Outline T2-5-66
Joystick Steering Electrical Circuit T2-5-70
Forward/Reverse Switch Electrical Circuit T2-5-72

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

SECTION 3

COMPONENT OPERATION

CONTENTS

Group 1 Pump Device
Hydraulic Pump Outline T3-1-1
Main Hydraulic Pump T3-1-2
Regulator T3-1-4
Steering Priority Valve T3-1-20
Steering Main Relief Valve T3-1-21
Pilot Pump T3-1-22
Pump Delivery Pressure Sensor T3-1-22

Group 2 Control Valve
Outline T3-2-1
Hydraulic Circuit T3-2-6
Main Relief Valve T3-2-12
Overload Relief Valve (with Make-Up Function) T3-2-14
Anti-Drift Valve T3-2-18
Lift Arm Flow Rate Control Valve T3-2-22
Charge-Cut Valve in Ride Control Spool T3-2-26
Drain Plug T3-2-30
Pump Flow Rate Control Valve T3-2-32

Group 3 Cooling Fan System
Fan Pump T3-3-1
Fan Motor T3-3-2
Fan Control Valve T3-3-3

Group 4 Steering Pilot Valve
Outline T3-4-1
Structure T3-4-2
Operation T3-4-3

Group 5 Steering Valve
Outline T3-5-1
Operation T3-5-4
Steering Overload Relief Valve T3-5-6

Group 6 Pilot Valve
Outline (Fingertip Control Type Pilot Valve for Front Attachment) T3-6-1
Operation T3-6-2
Electromagnetic Detent T3-6-6
Outline (Joystick Type Pilot Valve for Front Attachment) T3-6-8
Operation T3-6-9
Electromagnetic Detent T3-6-16

Group 7 Brake Charge Valve / Manifold Valve
Outline T3-7-1
Brake Charge Valve T3-7-2
Manifold Valve T3-7-7
Pilot Relief Valve T3-7-8
Torque Control Solenoid Valve T3-7-9
Control Lever Lock Solenoid Valve T3-7-11
Service Brake Accumulator T3-7-12
Pilot Accumulator T3-7-13

Group 8 Drive Unit
Outline T3-8-1
Torque Converter T3-8-6
Transmission T3-8-10
Operation of Transmission T3-8-12
Transmission Control Valve T3-8-28
Drive Unit Circuit T3-8-30
Parking Brake Manual Release T3-8-31

Group 9 Axle
Outline T3-9-1
Differential T3-9-2
Torque Proportioning Differential (TPD) T3-9-6
Limited Slip Differential (LSD) (Option) T3-9-8
Service Brake T3-9-10
Final Drive Planetary / Axle Shaft T3-9-12

Group 10 Brake Valve
Outline T3-10-1
Operation T3-10-4

Group 11 Others
Propeller Shaft T3-11-1
2-Spool Solenoid Valve Unit T3-11-2
Parking Brake Solenoid Valve Unit T3-11-4
Parking Brake Solenoid Valve T3-11-6
Parking Brake Accumulator T3-11-8
Flow Regulator Valve T3-11-9
Steering Accumulator T3-11-12
Ride Control Accumulator T3-11-12
Torque Converter Cooler Check Valve T3-11-13
Stop Valve T3-11-14
Pilot Oil Filter T3-11-16
Emergency (Secondary) Steering Check Block T3-11-17
Emergency (Secondary) Steering Pump T3-11-18
Joystick Steering Control Valve T3-11-20

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

Hydraulic Component

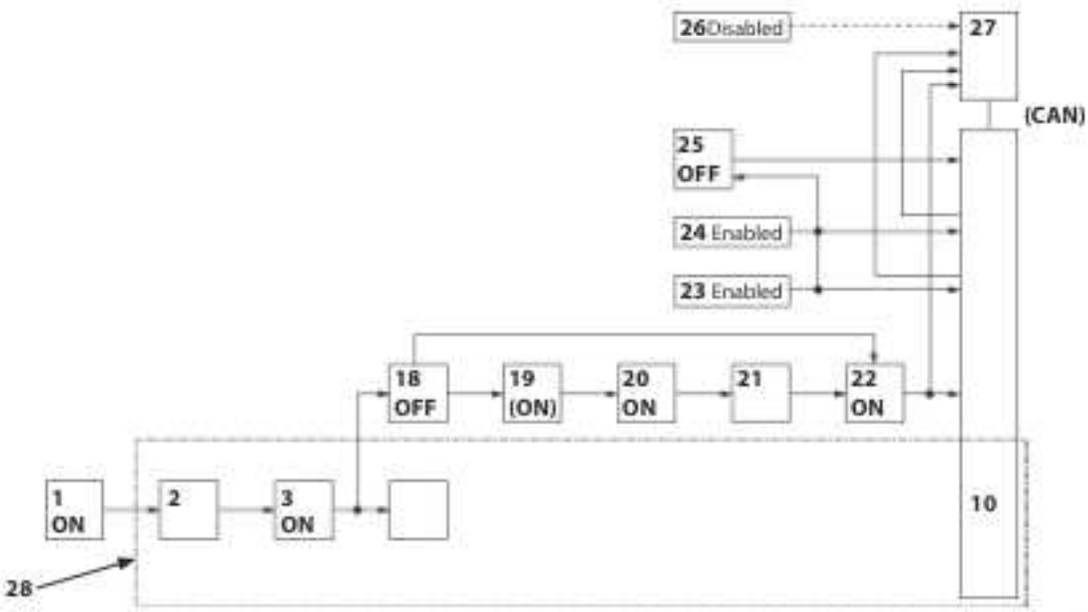
Hydraulic Pump	Drive Gear Ratio	Main Pump: 1, Pilot Pump: 1
Main Pump	Type	Variable Displacement Swash Plate Axial Plunger Pump
	Theoretical Displacement	125 cm^3/rev (7.6 in^3/rev)
	Rated Pressure	29.4 MPa (300 kgf/cm^2, 4264 psi)
Regulator	Type	Hydraulic Pressure Operated Type
Pilot Pump	Type	Fixed Displacement Type Gear Pump
	Theoretical Displacement	16.8 cm^3/rev (1.0 in^3/rev)
Priority Valve	Relief Set-Pressure	29.4 MPa (300 kgf/cm^2, 4264 psi) at 80 L/min (21.1 US gpm)
Multiple Control Valve	Type	Pilot Pressure Operated Type (2-Spool+1-Spool)
	Main Relief Set-Pressure	29.4 MPa (300 kgf/cm^2, 4264 psi) at 220 L/min (58 US gpm)
	Overload Relief Set-Pressure	36.3 MPa (370 kgf/cm^2, 5265 psi) at 50 L/min (13 US gpm) (Lift Arm Raise)
		32.3 MPa (330 kgf/cm^2, 4685 psi) at 50 L/min (13 US gpm) (Bucket)
	Low-Pressure Relief Valve Set Pressure	0.2 MPa (2.0 kgf/cm^2, 29 psi)
Loading Pilot Valve	Type	Two Direction Lever Type, 4-Port (With Electromagnetic Detent)
	Plunger Stroke	Ports 1, 2, 3, 4 : 5.7 mm (0.22 in)
	Type	Joystick Lever Type, 4-Port (With Electromagnetic Detent)
	Plunger Stroke	Ports 1, 2, 3, 4 : 10 mm (0.4 in)
Auxiliary Pilot Valve	Type	Two Direction Lever Type, 2-Port (Without Detent)
	Plunger Stroke	Ports 1, 2 : 4.8 mm (0.19 in)
Auxiliary Pilot Valve	Type	Joystick Lever Type, 4-Port (Without Detent)
	Plunger Stroke	Ports 1, 3 : 6.5 mm (0.26 in)
		Ports 2, 4 : 8.0 mm (0.32 in)

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

Forward/Reverse Switch Electrical Circuit

The forward/reverse switch electrical circuit makes the operation of either forward/reverse switches (23, 24) enabled/disabled.

- Armrest Switch 1 (3), Armrest Switch 2: ON
- Joystick Steering Selector Switch: ON
- Forward/Reverse Selector Switch (19): ON



TNEK-05-08-030

Electrical Component	2	3	18	19	20	21	22
JCU(10) (Terminal)	24V	ON Detection	OFF	ON Detection	ON (GND)	-	ON (GND)
	B-5/B-6	C-4	E-2	D-20	D-16	-	E-11

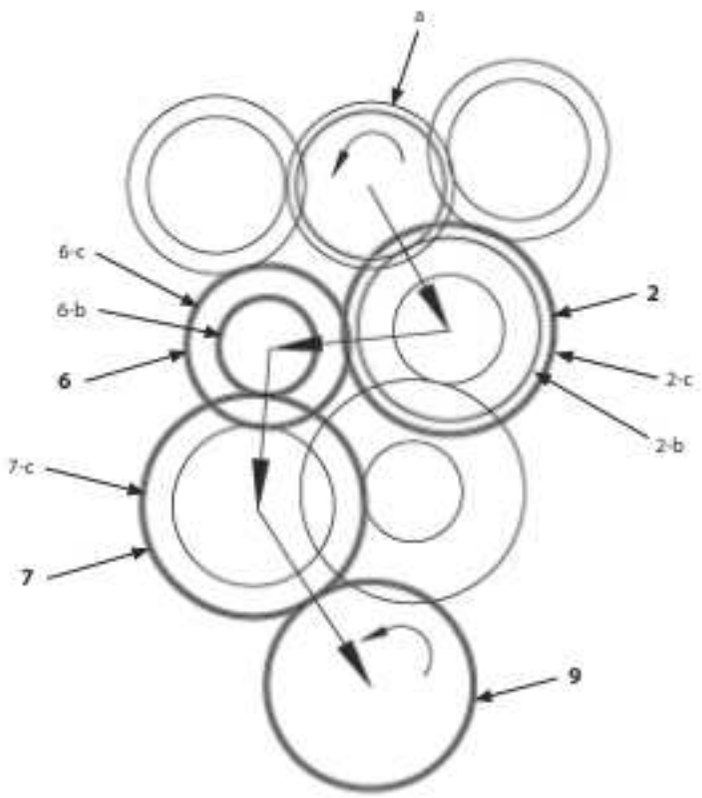
Electrical Component	23	24	25	26	27	28	1
JCU(10) (Terminal)	Enabled	Enabled	-	Disabled (Priority)	-	Enabled	ON
	D-1, 18, 19	C-16, 17, D-17	D-14	(TCU)	-	-	A-10

1- Key Switch
2- Fuse #20 (Fuse Box A)
3- Armrest Switch 1
10- JCU
18- FNR OFF Relay
19- Forward/Reverse Selector Switch
20- FNR ON Relay
21- Diode C
22- FNR Hold Relay
23- Forward/Reverse Switch (Left)
24- Forward/Reverse Switch
25- N Relay
26- Forward/Reverse Lever
27- TCU (Transmission Controller)
28- Joystick Steering Electrical Circuit

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

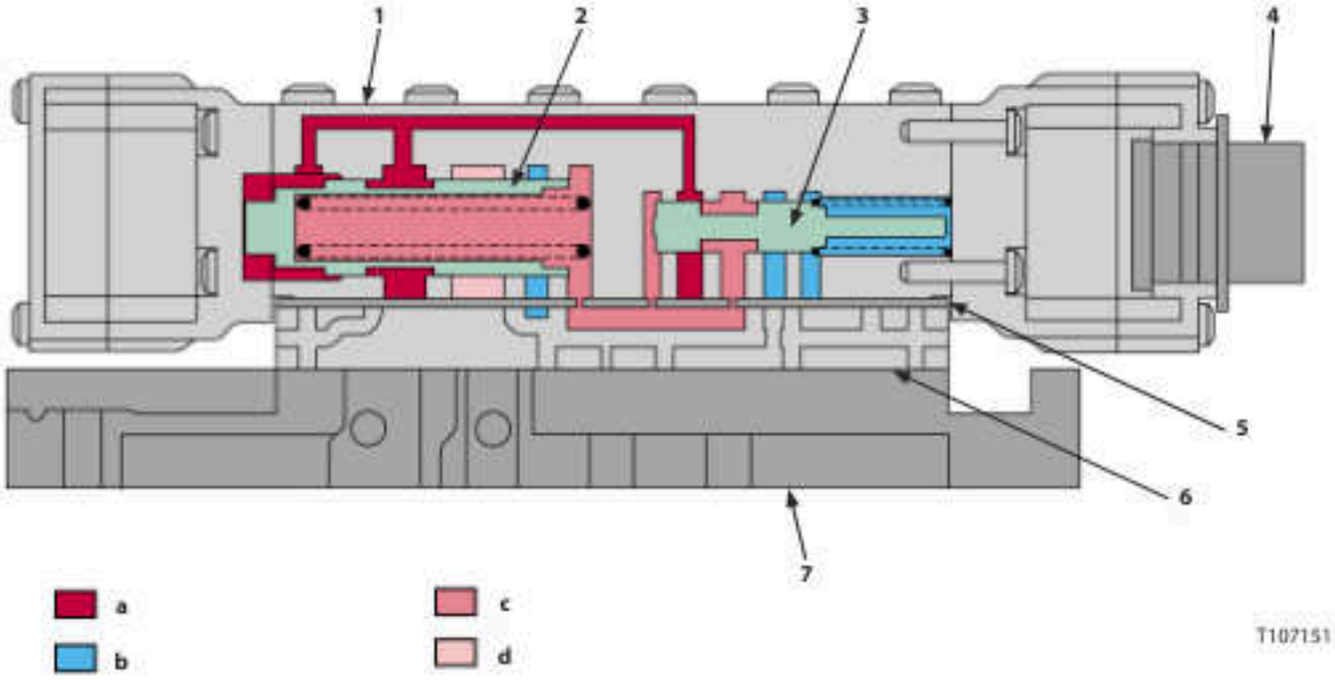
Forward Speed 3

1. In case of forward speed 3, high-speed forward clutch (2) and second speed clutch (6) are connected.
2. Torque (a) inputted from the torque converter is transmitted to output gear (6-c) of second speed clutch (6) through drive gear (2-b) of high-speed forward clutch (2) and output gear (2-c).
3. Torque is transmitted to drive gear (6-b) through output gear (6-c) of second speed clutch (6).
4. Torque from drive gear (6-b) of second speed clutch (6) is transmitted to output shaft gear (9) through output gear (7-c) of third speed clutch (7).

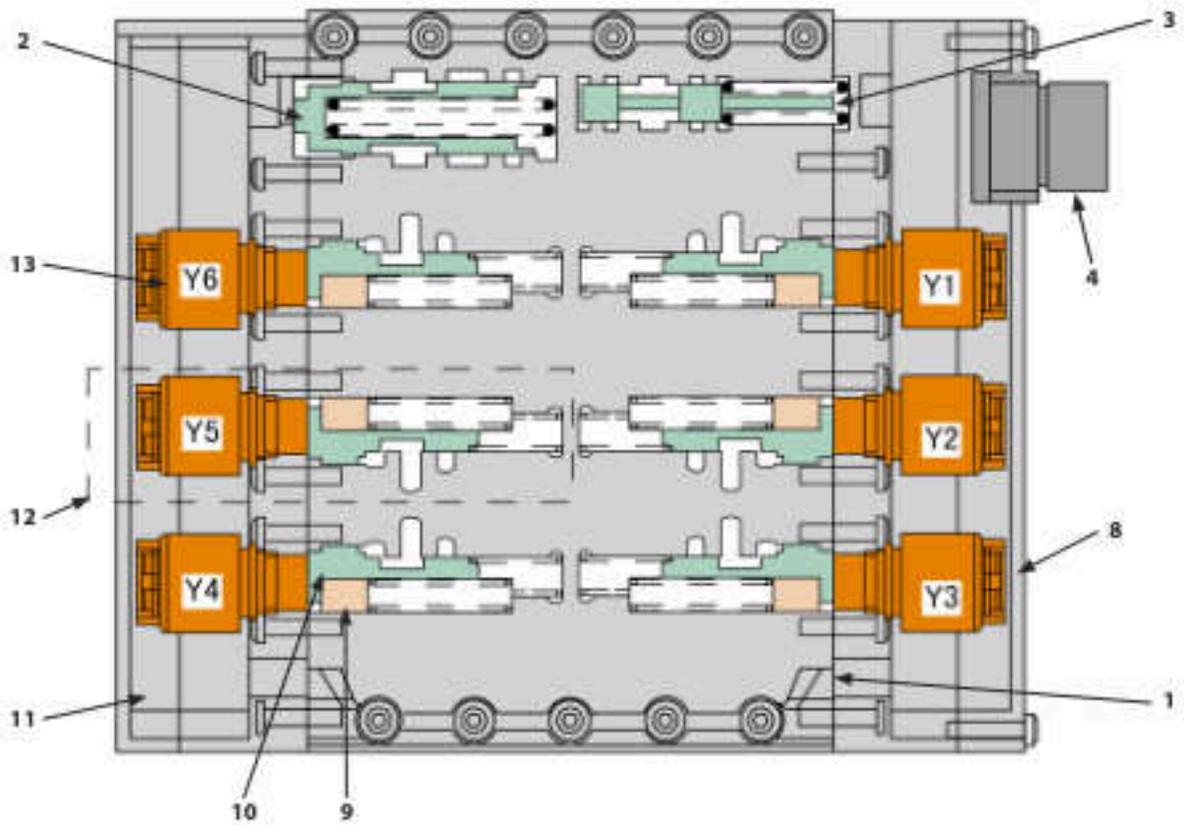


TNEE-03-08-003

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >



T107151



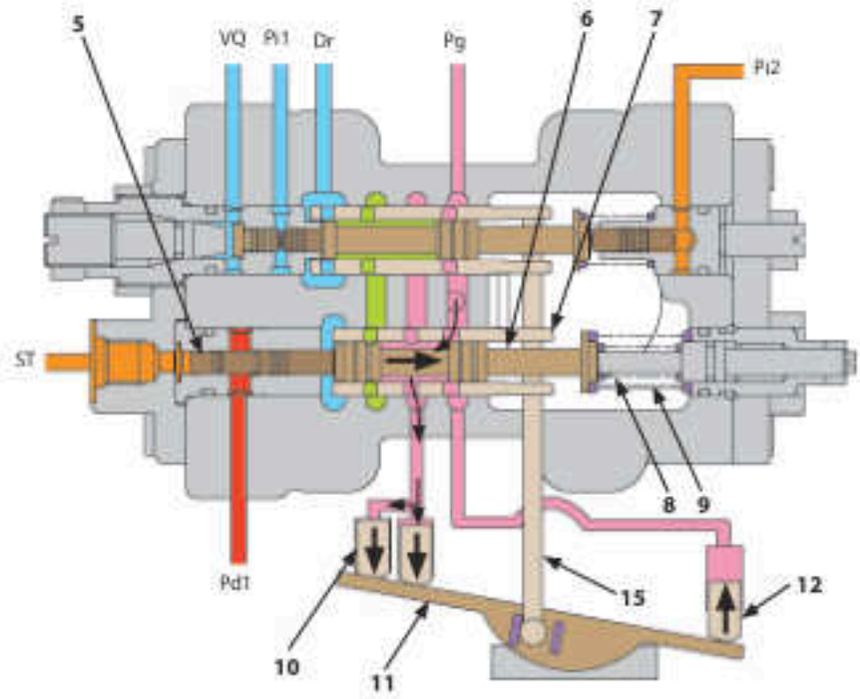
T107153

a- System Main Pressure Oil
b- Returning Oil
c- Reduced Pressure Oil
d- Converter Pressure Oil (Return Oil)

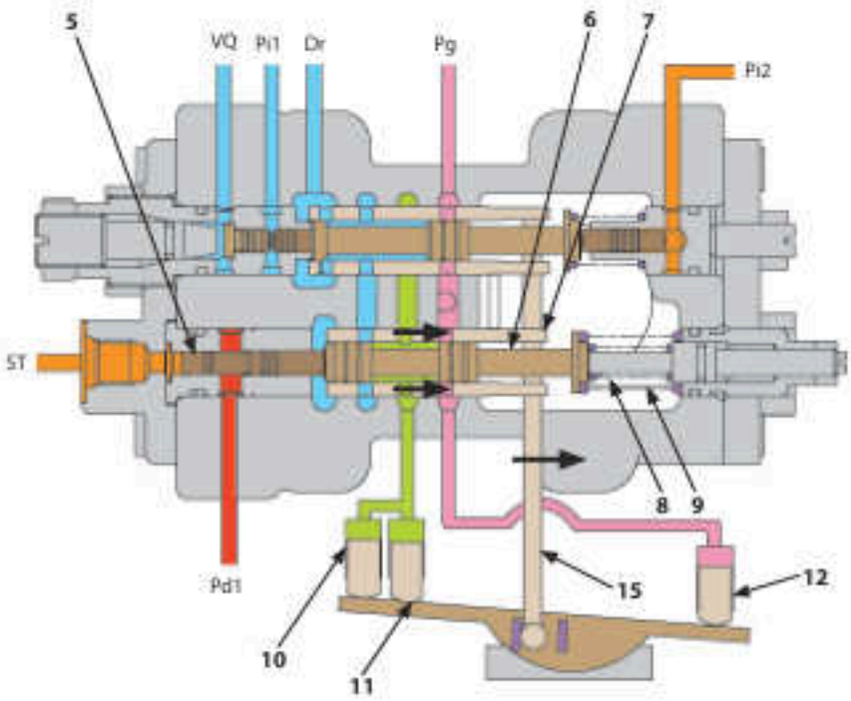
1- Valve Body
2- Pressure Control Valve
3- Pressure Reducing Valve
4- Connector
5- Middle Plate
6- Channel Plate
7- Plate
8- Cover
9- Damper Valve
10- Spool
11- Housing
12- Modulation Circuit
13- Proportional Solenoid Valve

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >

Pump Regulator



TNED-03-01-019



TNED-03-01-020

Pd1- Pump Internal Delivery Pressure
ST- Torque Control Pressure

5- Load Piston
6- Spool 2
7- Sleeve 2

Dr- Returning to Hydraulic Tank
Pi1- Pump Control Pressure 1
Pi2- Pump Control Pressure 2

8- Inner Spring
9- Outer Spring
10- Servo Piston 1

Pg- Primary Pilot Pressure (From Pilot Pump)
VQ- Bucket Dump Pilot Pressure

11- Swash Plate
12- Servo Piston 2
15- Feedback Lever Link

MidWestTech | Hitachi ZW250-6 Wheel Loader Operational Principle Technical Service... Order the manual at mid-west-tech.com >