PART NO. TONGE40-EN-00

HITACHI

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Technical Manual
Operational Principle

ZW

330-6
Wheel Loader

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TONGE40-EN
Technical Manual (Troubleshooting)	: Vol. No.TTNGE40-EN
Workshop Manual	: Vol. No.WNGE40-EN

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Engine

Cooling System	Cooling Fan	Dia. 850 mm (33.5 in), 5 blades
	Thermostat	Cracking temperature at atmospheric pressure : 82 °C (180 °F) Full open : 94 °C (201 °F)
Lubrication System	Lubrication Pump Type	Gear pump
	Oil Filter	Plastic fiber, spin-on type
	Oil Cooler	Water cooled type
Starting System	Motor	Electromagnetic pinion shift type
	Voltage/Output	24 VDC/7.8 kW (10.5 HP)
Preheat System	Preheating Method	Grid air heater (24 V, 100 A)
Engine Stop System	Stop Method	Fuel shut-off (electronic control)
Alternator	Type	AC type, brushless
	Voltage/Output	24 V/95 A
Intake Air Charging System	Type	Exhaust-turbocharger type
Fuel System	Injection Pump	High pressure common rail (HPCR) type
	Governor	Electronic all speed control
	Injection Nozzle	Electrical multi-hole injector
	Fuel Filter	Plastic fiber, spin-on type

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Torque Decrease Control While Dumping Bucket

Purpose:
The torque decrease control while dumping bucket (hydraulic load reduction) feature reduces pump oil flow and load so that the power from the engine can be applied to forward movement of the machine.

Operation:

1. When all of the items under the topic below of "Conditions" exist, Main Controller (MC) (3) judges that machine is digging and sets the target torque 399 N·m (294 lbf·ft).

NOTE: The target torque should be 349 N·m (257 lbf·ft) only when driving at 2nd speed with power mode OFF.

Conditions:

- Torque Converter Rotation Speed Ratio: Below specified value (Reference: 15 % or less)
- Forward/Reverse Lever (23) or Switch (27): Forward Position (24)
- Pump Delivery Pressure: High Pressure (Reference: 20 MPa (204 kgf/cm², 2900 psi) or more)

2. MC (3) receives a signal from lift arm angle sensor (48), and increases the target torque to obtain the optimum torque for the lift arm angle.

3. MC (3) sends a signal to torque control solenoid valve (30) depending on the target torque.

4. Torque control solenoid valve (30) adjusts the hydraulic oil flow delivery rate at the regulator relative to the electrical signal it receives from the MC (3).

5. When any of the following "Deactivation Conditions" exists, the Torque Decrease Control While Dumping Bucket is deactivated.

Deactivation Conditions:

- Torque Converter Rotation Speed Ratio: Above specified value (Reference: 40 % or more)
- Forward/Reverse Lever (23) or Switch (27): Neutral Position (25) or Reverse Position (26)
- Pump Delivery Pressure: Low Pressure (Reference: 9.8 MPa (100 kgf/cm², 1421 psi) or less)

NOTE: Torque Decrease Control While Dumping Bucket is activated by the signal from forward/reverse switch (27) when it is in use on the machine.

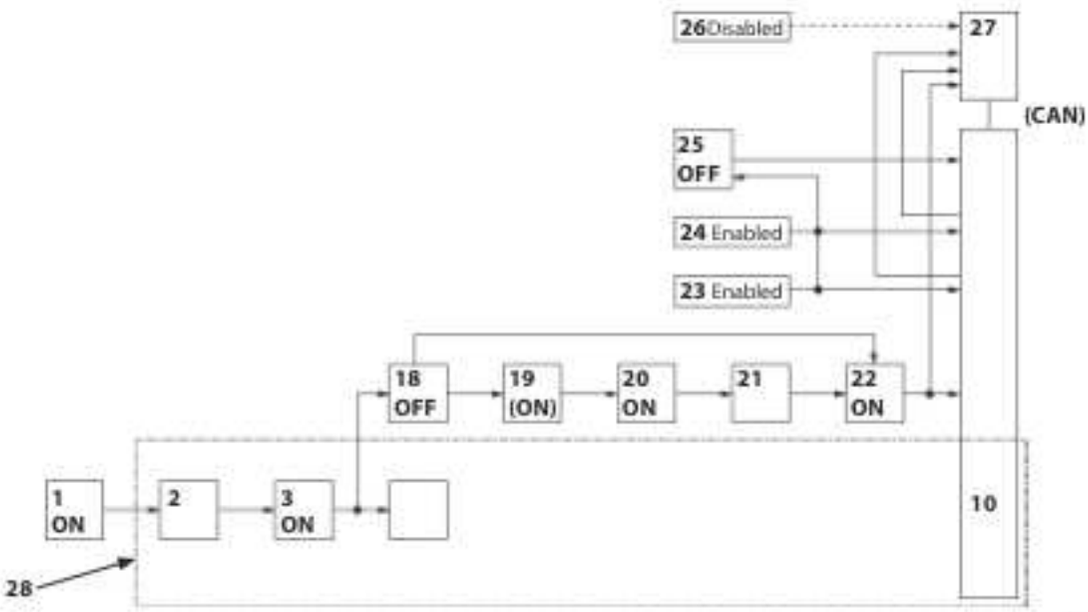
NOTE: When the power mode selector switch (35) is ON, the engine speed is controlled according to the lift arm angle, and there is a case where the Torque Decrease Control While Dumping Bucket is deactivated.

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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



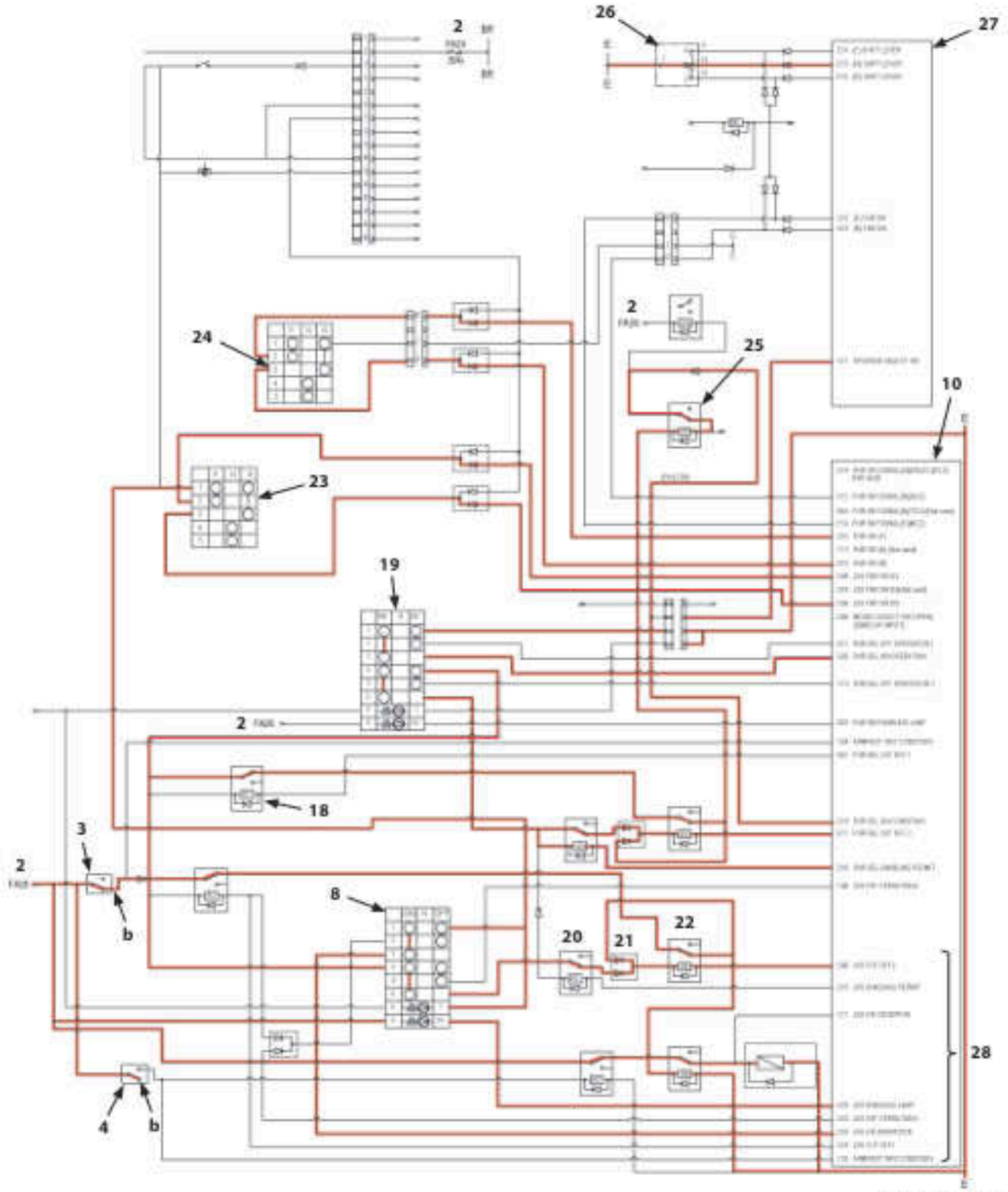
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Electrical Component	2	3	18	19	20	21	22
JCU(10) (Terminal)	24V	ON Detection	OFF	ON Detection	ON (GND)	-	ON (GND)
	B-5/B-6	C-4	E-2	D-20	D-16	-	E-11

Electrical Component	23	24	25	26	27	28	1
JCU(10) (Terminal)	Enabled	Enabled	-	Disabled (Priority)	-	Enabled	ON
	D-4, 5	D-12, 17, 21	D-13	(MC)	-	-	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- 24 V/GND Conversion Relay
26- Forward/Reverse Lever
27- MC (Main Controller)
28- Joystick Steering Electrical Circuit

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b- Left Console: Operation Position

2- Fuse #20 (Fuse Box A)
3- Armrest Switch 1
4- Armrest Switch 2
8- Joystick Steering Selector Switch
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- 24 V/GND Conversion Relay
26- Forward/Reverse Lever
27- MC
28- Joystick Steering Electrical Circuit

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Torque Converter (Lock-Up)

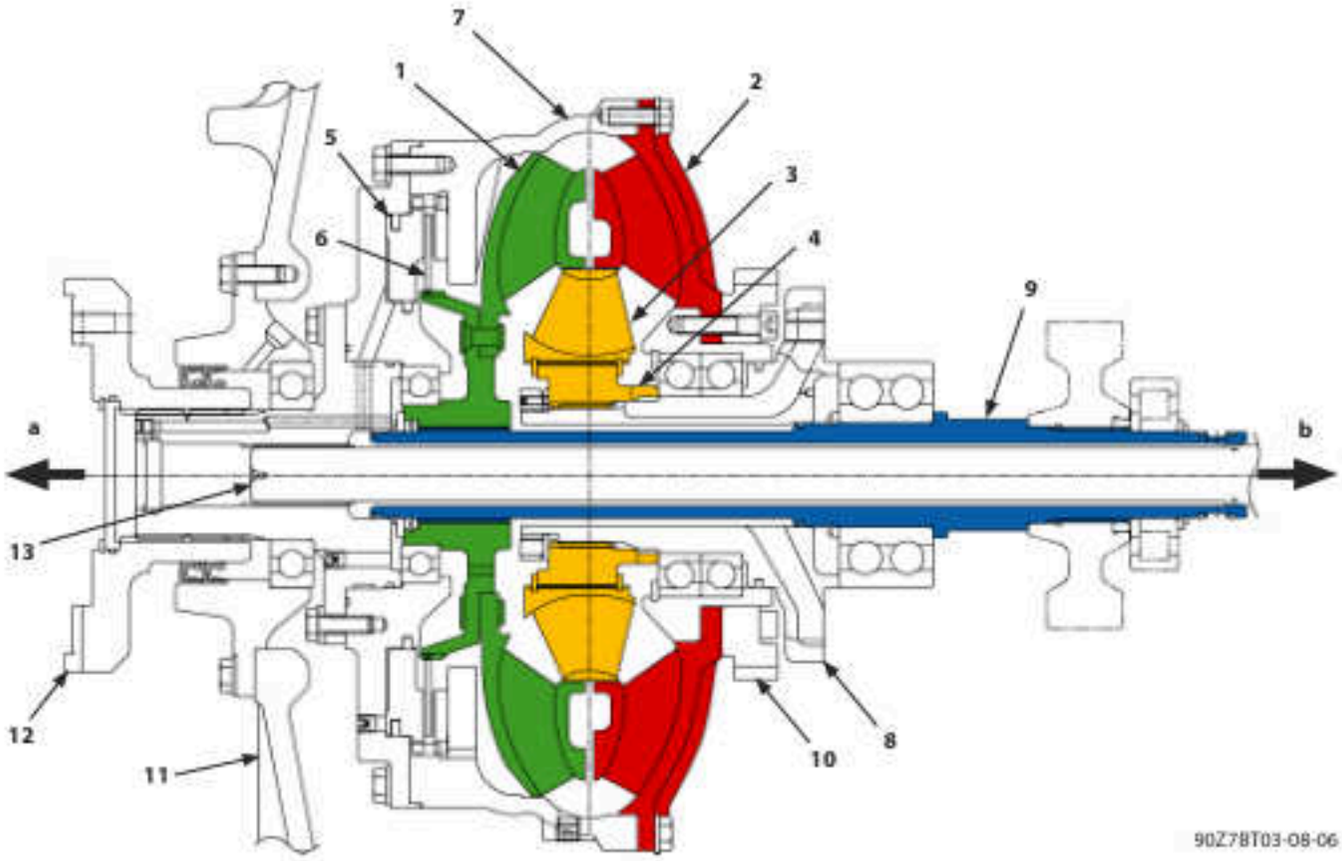
The torque converter is between the first propeller shaft and transmission.

The torque converter consists of turbine impeller (1), pump impeller (2), and stator (3), all in torque converter case (11) filled with oil.

The pump is connected to the first propeller shaft, and rotates together with the shaft. The turbine is connected to the torque converter output shaft to transmit the power to the transmission.

1. Hydraulic oil is supplied from the charging pump to torque converter drive cover (7).
2. The area of the impellers is filled with oil. When the engine is started, pump impeller (2) rotates, therefore the oil will circulate to rotate turbine impeller (1) (circulation order: pump --> turbine --> stator --> pump).
3. Oil is redirected by fixed stator impeller (3) back to pump impeller (2).
4. When turbine impeller (1) rotates, the power will be transmitted to the output shaft (9).

NOTE: If the engine speed/pump impeller speed stays the same, the turbine impeller speed is reduced due to the transmission load, output torque is increased. This is "torque multiplication".



a- First Propeller Shaft Side
b- Main Pump Side

1- Turbine Impeller Assy
2- Pump Impeller
3- Stator
4- Stator Hub
5- Lock-Up Piston
6- Friction Plate
7- Drive Cover
8- Stator Shaft
9- Turbine Shaft
10- PTO Drive Gear
11- Torque Converter Case
12- Flange (for First Propeller Shaft)
13- Main Pump Drive Shaft

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