ZW370-G WHEEL LOADER TECHNICAL MANUAL TROUBLESHOOTING

PART NO. TTNHB-E-00

HITACHI

Technical Manual
Troubleshooting

ZW 370-G
Wheel Loader

Hitachi Construction Machinery
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Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TONHB-E
Technical Manual (Troubleshooting)	: Vol. No.TTNHB-E
Workshop Manual	: Vol. No.WNHB-E

Cautions Regarding Troubleshooting

● Important points

The important points for troubleshooting is to carefully read the operation manual and shop manual to get enough information on the operation, circuits, structure, and function of each component. If you have enough knowledge of each component and system, you can easily determine the cause of the problem.

There may be various causes for each problem, therefore experience will be needed to determine which is the actual cause of the problem.

it is necessary to know the normal operation of each component. In addition, it is also important to know the abnormal condition when a problem occurs. This chapter shows various examples of past problems, and describes possible causes and remedies for each problem.

● Before starting troubleshooting

To prevent incorrect diagnosis, talk with the persons concerned, particularly with the operator, to get enough information on the problem. If possible, check the machine by repeating the symptom.

If the problem cannot be repeated, do not provide any repair service.

For instance, assume that the operator complains that the boom power is low, and the rim-pull is also low. In this case, there are two possible causes ; low hydraulic power and low rim-pull. The remedies against both causes are much different from each other.

If you hastily determine the wrong cause without checking the actual condition of the problem, it will take too much time and expense to solve the problem. As a result, you will not be trusted by the user.

The following questions will be helpful in determining of the cause. Answer the questions to prevent an incorrect diagnosis.

1. Did the problem occur suddenly?
2. When did the operator notice the problem?
3. Is there any past problem that may be the cause of this problem?
4. When the problem occurred, what kind of work was the operator doing?
5. Has the machine had the same kind of problem before?
6. Has the machine been repaired or inspected recently?
7. Does the machine have any other problem?

● Troubleshooting

- Check before determination of cause

  A problem may be caused by poor daily maintenance, such as lack of grease, low or improper oil or a clogged filter. Be sure to check the machine for oil level, appearance, unpleasant odor, etc. to prevent time loss due to other unnecessary tests.

- Inspection procedure

  As a rule, check the easy-to-be-repaired system first (excluding the cases where the cause can be easily determined based on the past experiences).

  This machine is controlled by electrical, hydraulic, and mechanical systems. The most easy-to-be-repaired system is the electrical system. Check the electrical system first. If no problem is detected in the electrical system, check the hydraulic system, and then the mechanical system.

8. Machine moves reverse when starting to climb up on a slope using inching brake

Possible cause	Symptoms/check point: After pedal release, too much time is required to turn off the controller LED"I" indicator	Solution
Large time lag in clutch engagement		Refer to description of time lag
Delay in resetting inching pressure switch	○	Switch replacement

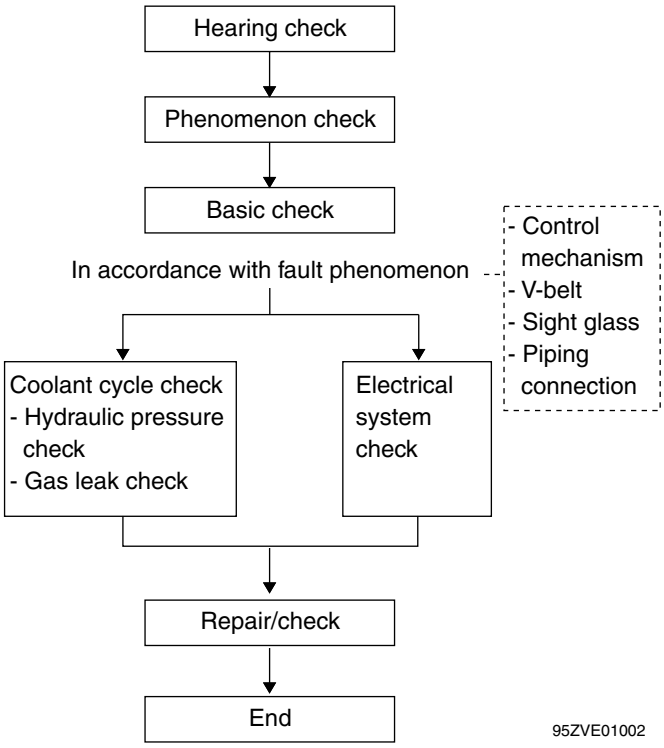
8. Abnormal noise in hydraulic system

Possible cause	Pump emits a shrieking sound	Increasing the engine speed emits a whining sound-Hydraulics slow	Noise may vary with engine speed or circuit being used									Solution
Air drawn into pump suction line	○		○									Hose band tightening and inspection
Internally broken pump		○										Disassembly & repair
High-pressure hose contact with chassis - loose sheet metal			○									Hose clamp check and repair
Suction hose pinched or internally defective	○	○										Inspect or replace hose
Suction line or strainer restricted	○	○										Drain & inspect tank

Operator Station Group

1. Air conditioner

<Fault diagnosis procedure>



<Basic check>

1) Check of control mechanism

Operate the switch arranged on the control panel, to check that it is operable smoothly and securely.

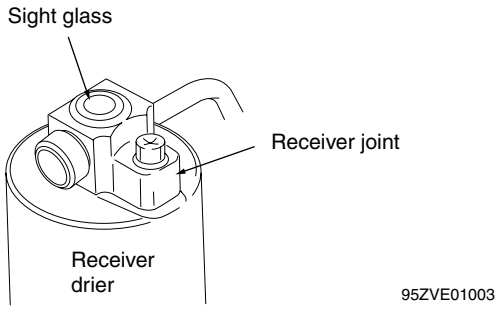
2) Check of V-belt

Check that the V-belt is tensioned properly, and that it is not damaged.

3) Check of coolant level through sight glass

When the air bubble is observed a lot through sight glass, the coolant is probably insufficient.

In such a case, therefore, perform the checking, using a gauge manifold.



4) Check of piping connection

At the piping connection where the oil stain is seen, there is probably a coolant leakage.

In such a case, remove the stain, and then check for gas leakage.

Item				Standard measurement values for performance check		Remarks
System	Measurement item			STD	Saving	
Brake	Performance of service brake	Shift lever position	2nd speed reverse	Slowly increase the engine speed, and check that the machine does not move at the maximum engine speed.		
		Engine speed	Maximum (HI)			
	Performance of parking brake	Shift lever position	3rd speed reverse 2nd speed forward (For North American machine)	↑		Before brake check, be sure to disconnect the cable connector of parking brake solenoid valve.
		Engine speed	Maximum (HI)			
	Brake line setting pressure MPa (kgf/cm²) (psi)	Unloader valve setting pressure	Off (Cut-out)	11.8 ± 0.5 (120 ± 5) (1,706 ± 71)		
			On (Cut-in)	6.9 ± 1.0 (70 ± 10) (995 ± 142)		
		Low-pressure alarm switch setting pressure (For brake accumulator circuit)		3.9 ± 0.5 (40 ± 5) (569 ± 71)		
		Brake line reducing pressure		12.3 (125) (1,778)		
		Auto brake reducing pressure		3.5 (36) (512)		
	Accumulator charge time (sec)	Engine speed (LI)	The time from the low-pressure alarm is turned off till the unloading valve cuts off pressure	16		
	Number of brake pedal applications	Run engine 1 minute high idle, then stop the engine. (Turn key switch "ON" with engine off.) Step on the brake pedal and release, and check the number of times until the low-pressure alarm is turned on.		at least 11 times		Repeat stepping on the brake pedal as follows: On: 5 sec. Off: 5 sec.
	Declutch engagement (cm) (in)	Engine: Maximum speed / Inching pedal: Quick release (Distance the loader rolls back before moving forward)		15 (6) or less		1/5 slope (approx. 11°), unladen, 1st speed

Stall speed measurement procedure

⚠ WARNING

Unexpected movement of the machine for abnormal brake performance may cause an accident resulting in injury or death.
Before measuring, make sure that the machine has sufficient brake performance.

IMPORTANT

In the stall mode, the torque converter oil temperature rises rapidly. Therefore, long stall operation may damage the seals, and the damaged seal may cause oil leakage.
This is why stall test should be limited to 20 seconds. The torque converter oil temperature should not be exceeded 120°C (250°F).
To repeat the stall operation, be sure to wait more than 10 seconds with medium engine speed before next stall operation so that the torque converter oil is cooled enough.

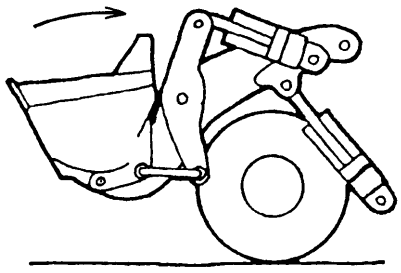
1) Lower the boom to the lowest limit. Roll back the bucket fully until the bucket contacts to the stopper.
2) Set the parking brake to the "ON" position.
3) Set the clutch cut off switch to OFF.
4) Press the brake pedal all the way to the floor, and then set the transmission shift lever to the maximum forward speed position ("4").
   Note : Cancel the auto shift mode.
   As a result the transmission shift lever "A" position works as "4" position.
5) Gradually increase the engine speed. Measure the engine speed when the accelerator pedal is fully pressed down.
6) Record the engine speed at T/C stall.
   (During stall speed measurement, do not operate the steering system, boom, bucket, etc.)

Engine speed measurement procedure in multiple control valve relief mode

IMPORTANT

When the relief valve is activated, the oil temperature rises rapidly. Therefore, long relief operation may damage the seals or cause the spool to stick inside the valve.
This is why relief operation should be limited to 10 seconds.
To repeat the relief operation, be sure to wait more than 10 seconds with medium engine speed before next relief operation, and cool the inside of the valve.
Using this cycle safely warms up cold oil.

1) Lower the boom to the lowest limit. Roll back the bucket fully until the bucket contacts to the stopper.
2) Set the parking brake to the "ON" position.
3) Set the engine speed to HI.
4) Place the bucket control lever in roll back position. Measure the engine speed.



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3. Measuring loading line overload relief pressure

1) Attach the pressure gauge to the port ③
2) Adjust the main relief valve pressure to 24.5 MPa (3,555 psi) + 1/4 additional turn, so the pressure is above the overload relief pressure.

Bucket cylinder bottom side :

(1) Lower the boom to the lowest limit.
(2) Move the bucket control lever to the roll back position.
(3) Keep the engine speed at low idle.
(4) Hold the bucket control lever at the roll back position and record the pressure.

Bucket cylinder rod side :

(1) Keep the boom horizontal.
(2) Move the bucket control lever to the dump position, hold and then measure and record the pressure.

Adjusting overload relief pressure :

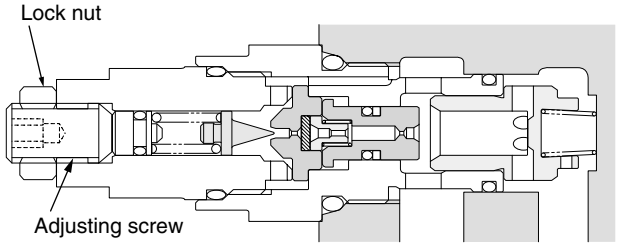
Loosen the lock nut and adjust the pressure by the adjusting screw.

Turn clockwise the adjusting screw to raise the set pressure, or turn counterclockwise the adjusting screw to lower the set pressure.

IMPORTANT

At the completion of check and adjustment of overload relief valve pressure, be sure to reset the main relief valve to the original condition.

Overload relief valve



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4. Measuring pilot line pressure

⚠ WARNING

Trapped pressure in brake circuit could cause serious injury when the plug is removed.
Fully release all residual accumulator pressure before servicing.

1) Attach the pressure gauge to the port (④).
2) Keep the engine speed at low idle (when the brake line pressure is normal) and then measure and record the pressure.

Adjusting pilot line pressure :

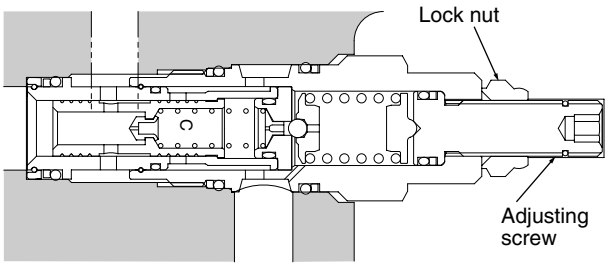
Loosen the lock nut and adjust the pressure by the adjusting screw.

Turn clockwise the adjusting screw to raise the pilot line pressure.

IMPORTANT

After the completion of the adjustment of the pilot line pressure, be sure to tighten the lock nut.

Reducing valve



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Checking Brake Performance

Service brake performance check

1) Method 1

⚠ WARNING

Separate the test course by using rope etc. and keep persons away from the test course, or else an accident resulting in injury or death may occur. In addition, post persons in several positions near the course to warn others and avoid an accident while checking the service brake performance.

- Condition

(1) Test course
Level, straight, dry and the paved ground.

(2) Run the machine and depress the brake pedal at 35 km/h (22 mph).
Measure and record the braking distance.

- Standard measurement valve
Braking distance·····20 m (22 1/4 yd) or shorter

- Possible causes of extremely long braking distance

Possible cause	Solution
Low brake line pressure	Check and repair
Friction plate wear	Check and repair
Brake valve malfunction	Check and repair

Note: The brake performance check methods 1 and 2 are based on the law and the regulation in Japan.
When checking the service brake performance, follow the law and/or local regulation in your country.

2) Method 2

If no test course available as described "Method 1", carry out the following method.

IMPORTANT

The following method is easy and simple, however it is not an accurate way, because the braking force and rim-pull may vary on each machine. Confirm engine & transmission performance via using a stall test. See page 03-12. Reconfirm the brake performance by the method 1 as soon as possible.

⚠ WARNING

Unexpected movement of the machine may cause an accident resulting in injury or death.
Before starting brake performance check, be sure to observe the following items:
- Place the machine on level ground.
- Check that there is enough clearance for brake performance check around the machine.
- During performance check, prohibit any person to walking near the machine.
- Confirm safe conditions around the machine

(1) Lower the boom to the lowest limit, and roll back the bucket fully until the bucket contacts to the stopper.
(2) Set the parking brake switch to the "OFF" position.
(3) Set the T/M (transmission) cut-off switch to OFF, and then depress the brake pedal all the way to the floor.
(4) Set the shift lever to 2nd reverse speed.
(5) Gradually increase the engine speed. The machine should not move at the maximum engine speed.

- Possible cause of machine moving during brake performance check.

Possible cause	Solution
Low brake line pressure	Check and repair
Friction plate wear	Check and repair
Brake valve malfunction	Check and repair