

GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

1. OPERATIONAL CHECKS

The operation checks can be used to find leakage in the system. They can also be used to find a bad valve or pump. The speed of rod movement when the cylinders move can be used to check the condition of the cylinders and the pump.

The oil in the hydraulic system must be at operating temperature of 50°C(122°F).

The control valves have a parallel circuit arrangement. The hydraulic pump and the pressure relief valve are common to all circuits. Each valve section has a check valve to help prevent cylinder drift when the valve spool is first moved.

Relief valves help protect system components from too much pressure.

1. Watch the cylinder as it is extended and retracted. Movement must be smooth and regular.
2. Listen for noise from the pump.
3. Listen for the sound of the relief valve. It must not open except when the cylinders are fully extended or retracted.

The pressure setting of the relief valve can lower the performance of the machine. A high pressure setting will cause a reduction in the life of hoses and other parts of the system.

4. Allow the each cylinder to travel full stroke in each direction.
5. Put each control valve in HOLD while dozer blade is off the ground. Watch for excessive cylinder rod drift.

Each cylinder drift caused by leakage past cylinder piston seals, control valve seals, check or makeup valves and/or too much spool to valve body clearance.

If you need additional information, read **Structure and function**, Group 1.

A location will be required which is level and has adequate space to complete the checks.

If verification is needed, you will be given next best source of information:

Chapter 2 : Troubleshooting

Group 3 : Tests and adjustments

※ MEASURING DOZER BLADE CYCLE TIME

1. MEASUREMENT CONDITION

- Coolant temperature : Inside operating range
- Steering position : Neutral
- Hydraulic temperature : 38~54°C(100~130°F)
- Dozer blade : Unloaded
- Engine speed : High idling

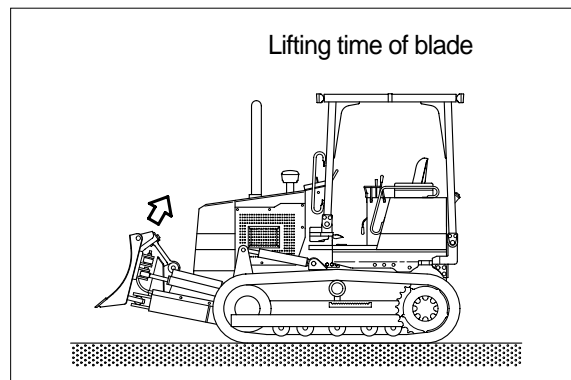
2. MEASURING TOOL

- Stop watch(1 EA)

3. MEASURING PROCEDURE

1) LIFTING TIME OF BLADE

Set the dozer blade at the lowest position on the ground. Lift the blade and measure the time taken for blade to reach the maximum height.



2. TROUBLESHOOTING

※ Diagnose malfunction charts are arranged from most probable and simplest to verify, to least likely, more difficult to verify. Remember the following steps when troubleshooting a problem :

Step 1. Operational checks(In this group)

Step 2. Troubleshooting

Step 3. Tests and adjustments(See group 3)

Problem	Probable cause
The temperature of the oil is too hot	<ol style="list-style-type: none">1. The viscosity of the oil is wrong in hot weather.2. Relief valve opens at low oil pressure.3. The pump has too much wear.4. There is restriction in an oil passage.5. The load of the system is too high.6. Air in oil.7. Low oil level. <p>※ If the problem is because of air in the oil, it must be corrected before the system will operate at normal temperatures. There are two things that cause air in the oil(Aeration).</p> <ol style="list-style-type: none">A. Return oil to the tank goes in above the level of the oil in the tank.B. Air leaks in the oil suction line between the pump and the tank.
Hydraulic pump makes unusual noise	<ol style="list-style-type: none">1. The viscosity of the oil is wrong or low oil level.2. The suction line clogged or restricted.3. Air in oil.4. The pump has too much wear.
Output of the hydraulic pump is low	<ol style="list-style-type: none">1. The viscosity of the oil is wrong.2. Low level of oil in the hydraulic tank.3. The pump has too much wear.
No pump pressure	<ol style="list-style-type: none">1. Hydraulic system low on oil.2. Pump or pump drive has failed.

Problem	Probable cause
A large amount of air in the oil	<ol style="list-style-type: none"> 1. A leak in the oil line between the tank and the pump. 2. Failure to correctly bleed the hydraulic system after assembly, inspection or testing. 3. Relief valve constantly opens and closes. 4. Leakage in and around cylinder seals.
The pressure of the oil is low	<ol style="list-style-type: none"> 1. The relief valve opens at low oil pressure. 2. The pump has too much wear. 3. The failure of an O-ring seal in the system. 4. The control valve and valve spool have a large amount of wear.
One cylinder response is too slow	<ol style="list-style-type: none"> 1. Lever linkage or travel is restricted. 2. Wrong control valve installed in valve housing. 3. Bad control valve.
Dozer blade drifts when control lever is shifted from HOLD to LIFT	<p>Load check valve not closing.</p> <ol style="list-style-type: none"> A. Weak or broken spring. B. Dirt or debris in valve.
All hydraulic circuits are unstable	<ol style="list-style-type: none"> 1. Hydraulic oil in system is too thick. Warm oil to operating temperature. 2. Hydraulic pump is bad.
Any cylinder moves with control lever in hold position	<ol style="list-style-type: none"> 1. Control valve and valve spool have a large amount of wear. 2. Seals in cylinder piston have failed or are worn. 3. Bad check valve. 4. A leak in a connection between the control valve and the cylinders. 5. A check valve not closing because of dirt or a worn seat.
Effort needed to move control lever is too high	<ol style="list-style-type: none"> 1. Lever linkage is restricted or has interference. 2. Wrong control valve installed in valve housing. 3. Sticking or bad flow control spool in control valve. Remove valve spool. Check to see if chrome finish on spool is rough or burred.
Cylinder response is too fast	<ol style="list-style-type: none"> 1. Wrong control valve installed in valve housing. 2. Control valve is bad.

※ **Followings are general precautions for the hydraulic system and equipment.**

- 1) Every structure has its limit of strength and durability. The relief valve is installed to limit the pressure on the hydraulic equipment and protect various parts of the dozer from possible damage. Therefore, never change the preset pressure of the relief valve unless absolutely necessary.
- 2) Since the hydraulic equipment is built with precision, the presence of only the slightest amount of dust and/or other particles in the hydraulic circuit might cause wear and/or damage, resulting in unstable functions and/or damage, resulting in unstable functions and/or unexpected accidents. Therefore, always keep hydraulic oil clean. Periodically, check the hydraulic oil filter in the circuit and replace the element as necessary.
- 3) Extract about 200cc of hydraulic oil from the tank as a sample every 6 months. If possible, have it analyzed by a specialist to confirm that the oil can still be used. Never extract the oil for sampling until the oil temperature has become the normal operating temperature. Replacement period, refer to **Operator's manual** and change oil.
- 4) Should the equipment get damaged due to the presence of metal particles and/or foreign matter in the circuit drain out the hydraulic oil and carry out flushing. Also, replace the hydraulic oil filter and clean the hydraulic tank. Change the hydraulic oil entirely.
- 5) When checking the filter, if found metal particles in the element, drain out the hydraulic oil entirely, flush the whole circuit, and then fill with new oil. The presence of metal particles may indicate internal damage to the equipment. In such a case, check carefully before flushing, and repair or replace as required.
- 6) To add and/or change the hydraulic oil, always use recommended oil.(Refer to the list of recommended oils and lubricants at page 1-20, **Recommended lubricants**.) Never mix oil of different makes of kinds.
- 7) To change the hydraulic oil, use a clean vessel and funnel for pouring it into the tank. Never use cloth because it might cause the presence of lint in the circuit.
- 8) When removing the hydraulic equipment, be sure to put plugs or caps on hoses, tube lines and ports. Also, enter mating marks for later identification.
- 9) Disassemble and/or assemble the hydraulic equipment only in a clean place free of dust. When disassembling, be careful about the interchangeability of parts, and clean the disassembled parts with pure and clean mineral cleansing oil. Clean the internal passages as well. After the parts have dried, wipe them off with a clean lint-free cloth.
- 10) When overhauling the hydraulic equipment replace all O-rings, backup rings, etc. with new ones. Assemble O-rings with grease or vaseline applied.
- 11) After installing the equipment, add more hydraulic oil to make up for that lost during disassembly.
- 12) Tighten joints correctly. Loose joints will cause the hydraulic oil to leak. If the oil leaks, the tank oil level drops and air gets sucked in, so the pump will break down. Also loose joints in suction lines will take air in and might cause abnormal noise, malfunction or damage to pumps.