

Equipment Inspection: Backhoe Loaders



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Case 580K

Introduction: A thorough inspection of most backhoe loaders takes under an hour. Following is the outline for quickly learning the condition of this type of machine. Wait to start the engine until these first few items, discussed just below, are performed.

First, raise the engine cover and lay your hand on the engine to ensure that it is cold and hasn't been running just prior to your arrival. Starting a cold engine lets you observe the exhaust stack for smoke and also shows how quickly the engine starts. Puffs of white smoke indicate that one or more cylinders may be low on compression, or that an injector is atomizing poorly.

If the engine is warm when you arrive, it may be only a coincidence. However, if this is a pre-purchase inspection, the seller may be trying to conceal poor engine starting. This is the sign of a faulty engine.

Proceed by lifting the radiator cap. Then, with a bright light, inspect the interior of the radiator's top tank. Notice any oily residue, a low coolant level, or a buildup of scale in the radiator tubes. Oil in the radiator's top tank will indicate a failed head gasket or a faulty engine oil cooler. A low coolant level may indicate poor maintenance or even a coolant leak; either internal or external to the engine.



Check the pH (level of acidity or alkalinity of the coolant) with pH tape that is available in most drugstores. Acidic coolant indicates the need for a cooling system conditioner, and may also indicate a faulty head gasket.

Next, check the strength of the antifreeze solution in the cooling system as shown. -30°F is adequate for most of the contiguous US.

However, much stronger protection is needed in colder climates. If you find inadequate antifreeze protection, it may be only an oversight, and usually shows poor maintenance practices. As a precaution after finding insufficient antifreeze protection, watch for cracks in the engine block and also for engine core plugs that are pushed outward in their bores.



Continue the cooling system inspection by checking the rubber gasket on the bottom of the radiator cap before installing it. This gasket should be soft, supple, and free of cracks. If not, make a note of it and recommend a replacement.

Finally, check all cooling system hoses for cracks and leaks. They should be soft when squeezed.



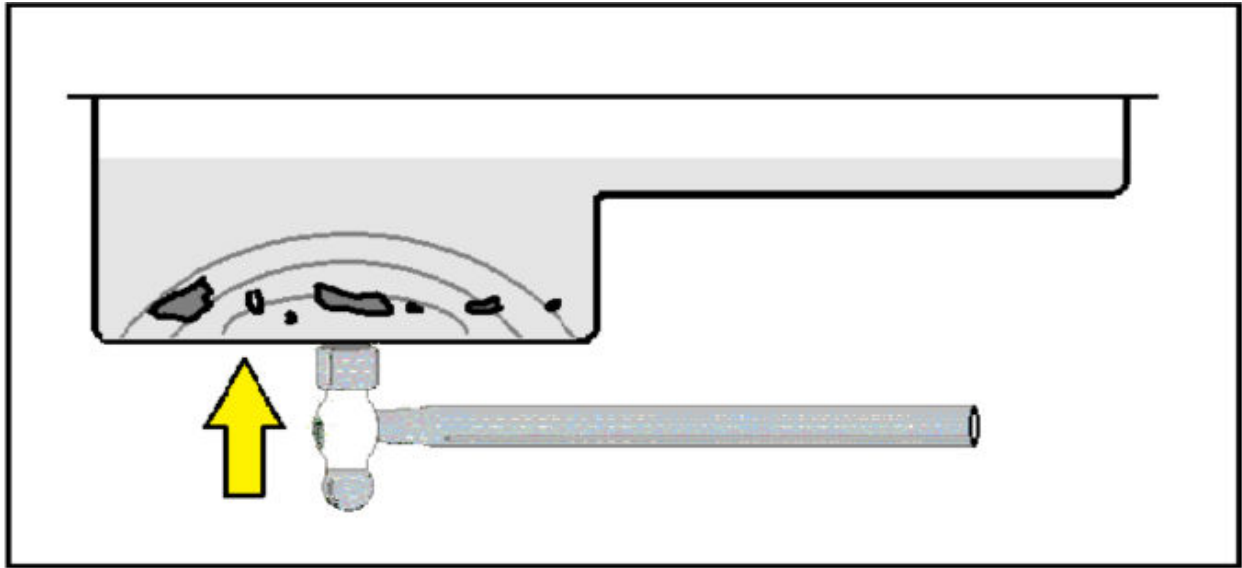
Proceed now to inspect all oil levels in the engine, transmission, hydraulic system, front axle and wheel ends (if all-wheel drive). Cloudy- or milky-looking oil indicates moisture in the oil. Watch for oil leaks around the inside of all wheels, which is the indication of a faulty seal.

Note: Diesel engine oil should always be black. This is usually a sign that the correct high detergent oil is being used. Light

tan-colored oil in a diesel engine indicates that cheap automotive oil has been used. The engine oil should also freely drip from the end of the dipstick. If it does not, this means there is too much soot in the oil; a sign of poor maintenance.

Further, lift the oil fill cap on the engine and inspect the interior of the opening. There should be no milky colored oil present. If present, this indicates water or coolant in the oil. Respond to this by loosening the engine oil drain plug and making note of whether the first drop of liquid you see is oil or water. The first drop must be oil. If it is water, then there is likely a cracked head, faulty head gasket or failed

engine oil cooler. After retightening the oil drain plug, perform the simple oil pan tap test.



Oil Pan Tap Test: Lightly tap the bottom of the oil pan with a hammer and listen for any material that bounces as a result. There should be no sound of loose material within the oil pan. If this is present, it can indicate a spun crankshaft main bearing or other serious damage.



Next, remove the engine oil filter and replace it with a high quality filter. Drain this filter, then using an oil filter cutter, open the filter and remove the inner filter cartridge.

Cut out a three-inch square section of the pleated filter media. Using a bench vise, squeeze the oil from the media. Stretch the filter media and inspect what was the outer surface as you watch for particles of metal caught in the media. Just a few particles are often seen; even on good engines. However, there should be no more than five



metal particles present. The presence of several particles indicates that further troubleshooting and oil analysis of the engine is required.

Next is the walk-around inspection of the machine. First, inspect the condition and obvious inflation levels of the tires. Fifty percent-tire tread depth or less is not necessarily a red flag, as many contractors prefer a less aggressive tread to avoid tearing up the finish grade on a new gravel road.

Looking left to right on the machine, the tires must be of the same size and tread type. With the tire valve stems below 9 o'clock and 3 o'clock positions, sticking a ballpoint pen in the tire fill valve will tell you whether the tires are filled with water based solution (ballast weight within the tire) for added traction. If liquid is leaking from the stem when you push it with the pen, this shows the presence of liquid ballast in the tires.

Inspect the battery and connections to the battery. The top of the battery must be clean to prevent discharge between the posts, and the terminals must be clean and free of corrosion.

Check all cylinders, including the steering cylinders, for oil leaks. Also, check the chrome cylinder rods for pitting. If pitting is present, it will eventually result in oil seal failure.

Light fixtures and bulbs should be intact with no obvious damage to their wiring.

Moving on now to the operator's platform, notice the function of the seat belt and the upholstery condition on the seat. Check that the operator's seat will easily turn 180° to enable convenient operation of the rear mounted hoe.

Check the emergency brake lever for proper function. Operate the differential lock pedal and verify that the 4WD shift lever works smoothly to change from 2 to 4WD. Step on the left and right side brake pedals individually and verify that they are at the same height.

Operate the throttle and shaft levers through their full range of positions.

Before starting the engine, verify that the transmission and reverser levers are in neutral and the emergency brake is set. Proceed to start the engine. Make note of the oil pressure, if there is a gauge. If there is no gauge, there will be an alarm buzzer that sounds when the key is switched on. If the oil pressure is sufficient, the buzzer will cease to sound when oil pressure comes on after starting.

Let the engine warm up for a few minutes, then raise the loader bucket to its full height. This will verify good operation. Then, lower the front bucket to lift the steering wheels off the ground while watching for excess slack in all of the pin bores on the front of the machine. Watch for a few minutes to see if there is leakage allowing downward movement of the front hydraulic cylinders.

Turn the seat backwards to enable operation of the outriggers and hoe. Lower the outriggers to raise the rear wheels off the ground and observe any obvious settling of these cylinders.

Now, operate the hoe from left to right, and fully extend the hoe and bucket to their full outward extension. Do this while watching for excess slack in each pin bore.

Next, with the engine running in the mid RPM range, apply down pressure to the hoe. If the pump is strong, it will begin to lift the rear of the machine off of the outriggers. If it does not lift the rear of the machine, the hydraulic pump is weak.

Raise the hoe off the ground a few inches and watch to see if it slowly settles to the ground.

Idle the engine back down and observe the gauges. The tachometer should be showing 500-600 RPM at idle. The coolant temp gauge should be showing temperature by now.

Next, with the emergency brake set and the transmission and reverser levers in neutral, climb off the machine and look under the machine and at each cylinder for any other obvious oil leaks.



Climbing back into the seat, let the machine back down on the ground and take it for a drive.

In 2-wheel drive, try all four transmission gears in turn, using both forward and reverse, while

steering fully left and right.

To test four wheel drive, shift it into 4WD and perform a sharp turn in first gear. If the 4WD system is working properly, the machine will surge and “buck” slightly as the machine turns. If the machine works smoothly with no surging in a tight turn, it’s likely that there is no power going to the front axle. If so, this will require further troubleshooting.

Call us today for an on-site inspection or appraisal of any of your machines, including any type of heavy equipment, truck, or diesel generator set. If your time is limited, we also offer virtual inspections via ZOOM at a reduced cost.