

EXPLORING EQUIPMENT

Maintaining Hydraulic Systems

By Tom Brink

Hydraulic systems make mower operation quicker and easier. To keep these systems in good operating order, it's necessary to use good operating procedures, follow recommended service schedules, and keep complete, accurate records of all service and repairs. Proper maintenance eliminates many common problems and makes other problems easier to diagnose.

Safety First

This first step with any equipment is to think safety. Follow all standard safety practices.

An added area of concern with hydraulic systems is high-pressure fluids. Escaping fluid under pressure can penetrate the skin and cause serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinhole leaks or leaks at connectors, which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do *not* use your hands.

If *any* fluid is injected into the skin, it *must* be surgically removed within a few hours by a doctor familiar with this type of injury, or gangrene may result.

Check the System

All crew members who operate the equipment should be familiar with the hydraulic functions. Establish regular pre-operational checklists to ensure that the equipment is functioning properly and to catch any problems in the early stages of development.

Cleanliness Vital

The most important rule in hydraulic maintenance is to keep everything absolutely clean. Keep everything except hydraulic fluid out of the system. Even small, soft items can score valves, clog orifices, gunk up controls and seize pumps. These contaminants may keep equipment from operating and cause expensive damage.

Use clean hydraulic fluid, poured from clean cans through clean filters.

Wipe dirt from the surrounding area before removing any cover, plug or part. Use safe solvent or steam-clean if necessary. This is as important when checking the fluid level, removing the filter cap or installing new filters, as it is when removing a line or component.

Cover breather caps, vents and dipstick holes before cleaning with steam or solvent so moisture, solvent and dirt can't enter the system. Cover the ends of disconnected lines with plugs and cover openings exposed when parts are removed.

Use extreme caution when cleaning precision parts. Prevent one part from nicking the finely machined surface of another. Use safe chemical solvents to clean metal parts. Don't allow these chemicals to contact seals, gaskets or other nonmetal parts.

Rinse off solvent before assembling. Dry all parts with compressed air. Then coat them with oil to prevent rust.

Fluid and Filter Maintenance

Hydraulic fluid holds contaminants in suspension so they are trapped in filters. Most hydraulic fluids also contain additives that help slow the formation of sludge and acids.

However, the additives in hydraulic fluid will lose their effectiveness after a certain time. It's then necessary to drain and refill the system. Hydraulic fluid filters also need maintenance. Filter elements collect contaminants until they're saturated. When saturated, they must be replaced or cleaned.

Change or Add Fluid Correctly

Clean around the dipstick and the filter cap first. Use lint-free cloths. Pull the dipstick and check the condition of the fluid. Adding oil will not remove contamination. If service records or contamination in fluid on the dipstick indicate that fluid should be changed, drain the system, service the filters and fill to the correct level with clean, new hydraulic fluid. Don't overfill. Overfilling causes foaming in some systems.

Fluid Maintenance

It's especially necessary to drain and change the hydraulic fluid in compact machines if a pump fails and dumps contamination in the system or the system is overheating. The only positive way to assure fluid is free of contaminants is to drain the system and refill with clean fluid.

If components are sticking, draining and flushing will often correct the problem. Flushing may wash out residual contamination that a simple fluid change would leave in the system. Flush a hydraulic system by changing the fluid twice.

First, run the engine and operate the hydraulic components to warm up fluid and get air out of the system. Open the drain plug and drain the fluid. Clean sediment off the drain plug. Clean or replace all the filters. Clean around the filler cap and wipe off the hydraulic fluid container. Fill the reservoir to the proper level with the recommended hydraulic fluid.

Chemical solvents and cleaners are not recommended for flushing systems. Even a trace of these cleaners left in the system can break down the lubrication ability of hydraulic oil.

Operate the machine to circulate the new oil through the system. It's important to operate all of the system valves to pump new oil through the entire system. Bleed cylinders to get air out of the system.

To flush, repeat the drain and fill procedures. Drain the flush oil, replace or clean the filter(s), and refill the reservoir with the recommended hydraulic oil.

Operate the system again until it is functioning properly or until it is obvious that the system will have to be disassembled and cleaned.

Filter Maintenance

Compact equipment hydraulic filters may be a screen that can be cleaned or replaced — or may be a spin-on filter that must be replaced. Hydraulic oil screens

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are detached by removing cap screws on a cover plate and sliding out the filter screen. The screen can then be washed in solvent and dried with compressed air.

Leaks

External leaks drain fluid from the system, reduce power, create a fire hazard and cause slippery footing. Internal leaks don't drain fluid from the system, but they reduce power and create heat.

A thin film of oil around moving parts is a form of internal leakage that is needed to lubricate control valves and pistons. However, excessive leakage is a malfunction. Leaking fluid will return to the reservoir and not show up as a drip or spot. However, internal leaks will erode tight-fitting parts and produce heat by friction that will break down hydraulic oil, hoses, seals and packing.

Although internal leaks are difficult to detect, some symptoms are sluggish action, creeping or drifting, and localized hot spots. If these symptoms occur, find out why before they get worse. Components must be removed and disassembled and parts replaced to cor-

rect internal leaks. Follow the manufacturer's disassembly steps precisely.

Signs of external leaks include dirty, oil spots. A small leak may be the first indication that a hydraulic line is about to rupture. When a hydraulic line ruptures, it not only puts the equipment out of order but also can cause physical injury to the operator.

Proper maintenance eliminates many common problems.

Every joint and seal in a system is a potential leak point. Only constant attention and routine inspection can detect leaks before they cause major damage.

If fluid must be added repeatedly, look for leaks around seals, gaskets, bolts and piston bores. The rubber surface covering of flexible hoses may crack and split without leaking. It's the depth of a crack that determines whether the hose leaks. Replace hoses that have deep cracks if they show any sign of oil dampness.

Leaks in suction lines are very difficult to locate. They can quickly damage a system by sucking in air. Clean the suction line carefully when the equipment is stopped. Dry the cleaned hose completely. Then start the machine. Squirt a little oil over the hose. Then watch closely. If the oil is drawn into the hose through a hole, replace the hose. There may be a change in sound as the oil is drawn in.

Leaks in concealed lines are hard to find. One technique is to install a pressure gauge to see if the pressure equals the pressure specified in the technical manual. Install the pressure gauge exactly as recommended. Both mechanical damage and personal injury may result from an improper connection.

If connections in lines are leaking, tighten them only until the leak stops. Use two wrenches to tighten connections so they don't twist. If the connection will not stay tight or the leak persists, disconnect and check carefully for stripped threads or a cracked flare.

Recheck the system after correcting the leak. Fill the system to the correct level with the recommended fluid. Start the equipment and warm up the system fluid. Check all the connections to be sure one connection wasn't loosened while another was tightened.

Air in Oil

Air in the system will result in "spongy" action, chattering in the system, noisy pump operation or stopping of the pump. Air collects in the reservoir if the fluid level is too low. Air can also enter the system through a leak in a suction line.

Use the following methods to keep air out of the system. Be sure the fluid in the reservoir is maintained at the correct level. Repair or replace leaking suction lines. Tighten suction line connections that leak, making sure not to overtighten. Cycle the system after draining and refilling the reservoir. Recheck the fluid level in the reservoir after each cycling. Bleed air from remote cylinders after attaching them to the system.

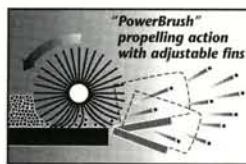
Attention to detail pays. Monitoring hydraulic systems before and during operation and performing proper maintenance as or more frequently as recommended by the manufacturer minimizes equipment downtime. □

Editor's note: Tom Brink is product service coordinator at the John Deere Lawn & Ground Care Division's Horricron Works in Horricron, WI.

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