

HOW DO I DRAIN MY HYDRAULIC SYSTEM?

That depends on which model of tractor you have because the location of the hydraulic reservoir changed over the years.

Scroll down and find your tractor series

Models 130/180, 150/190, 155/195 and ALL Colts

The trans-axle housing on the above models also acts as the hydraulic reservoir.

Find the drain plug on the underside of the trans-axle and remove it. Allow the oil to drain into a CLEAN container capable of holding 12 quarts of fluid.

What that oil looks like will dictate what you do next. If it looks like oil should look and is perhaps just a bit dirty, then proceed with the following steps. If water was the first liquid to leave the drain hole when you removed the plug or if the oil is whitish or grayish (two new words I made up) in colour, then you have contaminated oil. Skip to the “contaminated oil” section that follows.

If there are no signs of water contamination, allow the oil to drain until it stops. Then, carefully remove the steel line that goes between the hydraulic pump and the trans-axle. It is wise to use open end wrenches and loosen both ends of the line initially and then undo the fittings after they have been loosened.

With that line totally removed, use either a box-end wrench or an impact socket along with an impact wrench to loosen the large hex fitting that the steel line threaded into at the trans-axle. On the other end of this fitting is a long suction screen designed to keep large debris (such as a chunk of steel from a broken gear) from reaching the hydraulic pump. The screen is part of the fitting you are undoing from the front of the trans-axle so work with care.

All too often, past owners rarely service this screen. Over time, the screen can begin to plug up and cause the pump to starve for oil. When that happens, the pump suffers from lack of lubrication and starts to wear rapidly. In addition, starvation can also cause the oil to foam and foamy oil will not perform properly because it can be compressed. That is why it is important for you to pull this screen out for inspection and cleaning.

Wash the screen in a solvent and then use a magnifying glass to inspect the holes to make sure they are totally clean. If the holes are varnished over, then you must use something else such as true carburetor cleaner to dissolve the varnish. You have this screen out so don't reinstall it unless it's 100% clean.

The amount of oil remaining in the cooler, pump, motor, lines and valves is usually less than one quart and is not normally worth going after unless there are signs of contamination. Clean the threads of the screen fitting and the threads in the trans-axle with Brake Clean and then coat the fittings threads with a good quality pipe thread compound before installing it in the trans-axle.

Put everything back together carefully making sure all fittings are tight. Then remove the plug in the top cover of the trans-axle and refill with 15W40 or 20W50 or straight grade 30 to one inch from the underside of the top cover. See the other FAQ that discusses the issue of hydraulic oil choices for more information.

CONTAMINATED OIL

Of all the contaminants, water is most certainly the worst short of a major amount of dirt/grit in the system. If you have signs of serious water contamination, then the wisest move is to do whatever is necessary to remove it from the system as completely as possible.

In order to do this, you need to remove the top cover from the trans-axle. Purchase several gallon containers of clear solvent such as Varsol or equivalent Stoddart solvent. Varsol is a product trade name owned by Mobil/Exxon.

Also purchase a couple gallons of the cheapest 10 weight motor oil you can find. These items will be used to flush and clean your hydraulic system and then disposed of later. The alternative to the Varsol is to use regular diesel fuel.

With a drain pan under the trans-axle's drain hole, use a suitable parts cleaning brush along with some solvent to clean all the slime off of the gears and insides of the housing. The cleaner you get this area right now, the better. When you feel that you've got as much as possible, then replace the screen, hydraulic line and drain plug. Pour new solvent into the trans-axle until it is half full. Now add at least one quart of that cheap 10 weight oil. Put the tractor up on jack-stands or solid blocks

that will get the rear wheels off the ground but still allow them to spin. With the trans-axle in Neutral, start the engine and let it idle. The solvent will get sucked into the pump along with the motor oil and get circulated through the lines, cooler and back to the trans-axle. After one minute, push the travel control lever to cause this mixture to flow through the drive motor and lines.

If you have the optional implement lift cylinder, then operate it to full travel in both directions several times to flush all the contaminated oil out of it. Do these things for several minutes because it does take some time for the solvent to dissolve the slimy oil. Then shut down the engine and drain the trans-axle. Depending on how nasty the solvent/oil mixture looks, you may want to repeat this process one or two more times. Each time you do it, the mixture colour will tell you how clean the system is becoming. When you're satisfied that this next go-round will be the last solvent flush, then put the trans-axle lever into low range before starting the engine.

After working the implement lift cylinder a few times, slowly push the travel lever forward so that it causes the trans-axle gears to rotate. This will help remove slime from areas you could not reach with the brush. Once again, let the colour of the mixture guide your decision as to when to stop and whether another flush is dictated. If you are reasonably satisfied that you have removed as much of the contaminated oil as possible, then drain the trans-axle again.

This time, refill it with 3 quarts of the cheapo oil only and repeat the process of starting the tractor, operating the travel and lift levers. Now, you're trying to remove as much of the solvent/oil mixture as you can. After a few minutes of running, shut down the engine and drain out the oil.

At this point, you should be in pretty good shape. The cheap oil will have diluted the solvent substantially. If you feel that the colour of the oil indicates another flush is needed, then go for it. But if not, then close up the drain hole and refill the trans-axle with 30 weight motor oil or 15W40 or 20W50 multi-grade to within one inch of the underside of the cover plate. Either obtain a new gasket for the cover plate or clean the mating surfaces with alcohol or brake cleaner sprayed onto a clean rag so that you can use a silicone-based gasket replacement that comes in a tube. . See the FAQ section that deals with the correct oil to use if you are unsure on this issue.

An annual oil change is cheap insurance against pump and drive motor failure. Every time you change out the oil, you continue to reduce the percentage of contaminated oil remaining in the system.

200, 400, 3000, 4000, 3100 & 4100 series

Beginning in 1969, the 200 and 400 series were introduced and were fitted with a separate steel hydraulic reservoir tank under the hood just behind the grille. When 1975 rolled around, all of the Kohler powered 200 and 400 tractors had the hydraulic reservoir moved to the area underneath the battery in the early part of the 1976 production run. The same held true for the Onan powered 446 for 1976.

To drain the hydraulic oil, the procedure is quite simple.

- remove the mowing deck
- clean the underside of the travel/lift valve that is located directly below the checker-plate floorboard between the dash tower and the seat pedestal

- locate and remove the drain plug from the underside of the travel/lift valve. This is a pipe thread plug with a hex shaped recess in it designed for an Allen wrench. SEE NOTE BELOW
- slide a clean drain pan under that drain hole that is capable of holding 8 quarts of fluid.
- Start the engine at idle speed and watch the oil exit the drain. The instant the oil begins to sputter, shut the engine off.
- re-install the Allen drain plug preferably with some thread compound.
- refill the steel front-mounted reservoir with new motor oil to two inches below the top of the tank
- refill the under-battery tank with new motor oil to six inches below the top of the filler neck
- run the tractor and use all hydraulically powered devices
- check for leaks.
- shut off the engine and check the level of oil in the tank
- top up if needed.

NOTE: I cannot stress enough that you get one chance to remove that drain plug. Therefore it is imperative that you clean out the hex hole 100 percent and then insert a decent Allen key all the way into that hole so you get maximum turning power. If your well-worn Allen key spins in that pipe plug and ruins the hex, then you just created a big problem for yourself.

For those who have the optional rear mounted hydraulic PTO valve, you can drain your hydraulic system by just removing the quick coupler from the end of the hose and then placing the open end of the hose into a clean bucket.

Start the engine at an idle while holding the hose in the bucket. The second the oil begins to spit and spurt, turn off the engine. Remove the hose from the bucket and install the quick coupler using pipe thread compound to seal it. Refill the reservoir with new motor oil and top up as per above.

CONTAMINATED OIL

Fortunately, the possibility of serious water contamination of the hydraulic fluid was greatly reduced when Case stopped using the trans-axle as the reservoir. However, by draining your oil into a clean pail, you have the opportunity to size up the level of contamination that is present. If the oil is slimy with white streaks or grey in colour then water contamination is present.

The method to clean the hydraulic system is similar to the one I outlined above for the old 100 series.

- drain the old oil out
- fill the reservoir with a half-quart of cheap 10 weight oil and the balance with a clear solvent such as Varsol
- with the trans-axle in neutral, start the engine and let it idle to circulate the solvent.
- if you have a hydraulic implement lift, move it back and forth full travel at least five times
- if your tractor is fitted with a three-point hitch, then you need to operate it at least five times to try and clean it too.
- push the travel lever forward fully to allow the solvent to clean the lines and motor
- drain the system again and examine what came out

- repeat this process until you are satisfied with the clarity of the mixture being drained out
- flush one more time using el cheapo straight 10 or 20 weight and drain
- then refill the tank with straight 30, 15W40 or 20W50 motor oil
- see the FAQ that deals with the best oil to use
- drain and refill your hydraulic system once each year

To get an idea where you are at with cleaning up your hydraulic system, try this test. Get a couple of clean glass jars from your recycling bin. Fill one with new, clean oil to the half-way level. Then steal your wife's turkey baster from the kitchen and suck out enough oil from the reservoir to fill the other glass half-way. Hold both jars up to strong light and side by side so that you can make a visual comparison between the two regarding colour and clarity. If you can see a major difference, then you still have an oil problem. In truth, you cannot see contaminants with the naked eye but oil colour can indicate overheating of the oil.

Keeping Your Oil CLEAN

Since all of the older models never came equipped with an oil filter on the hydraulic system, you may be wondering what you can do to extend the life of the oil in your hydraulic system and further protect the major components. One method is to purchase an after-market oil filter and housing from a hydraulics supply house such as Northern Tool. These are not expensive to buy as you can see if you go to <http://www.northerntool.com> and type (hydraulic filter) into their search box.. Item 4020 is a return line filter capable of flowing up to 20 GPM, which is double what most of our pumps

produce at full throttle. The current price is only \$19.95 for the housing and the filter.

These are often available at local shops that specialize in hydraulics such as Princess Auto in Canada or Tractor Supply in the USA.. The filter will remove all particulate down to 10 microns and it has a built-in bypass valve to prevent flow from being interrupted for any reason. Just make sure you observe the markings on the housing that indicate the direction of oil flow.

This filter should be installed in the RETURN line leading to the oil cooler from the OUT port on the travel/lift valve. Do not install it in the suction line leading to the pump. Do not install it on any high pressure line either because the filters gasket will fail or the filter can will blow apart. If you install one of these, then you can safely extend your hydraulic oil change to three full years. The only thing that would negate this would be the oil pump breaking apart, water contamination or deliberate sabotage by someone putting material into the reservoir.

There is a second method but I tell you that you must exercise **EXTREME CAUTION** when using it.

For those of you who own a tractor equipped with the optional hydraulic PTO on the rear, here is a method to filter your oil from at timely intervals.

Buy the filter and housing mentioned above. Find a quick coupler set that matches the ones being used on your hydraulic PTO. For those with a 3000/4000/3100/4100 model with the PTO valve below the seat and just quick couplers on the back of

the tractor, you will need a short length of 1/2 inch high pressure hose to make a loop to connect the filter housing.

On the regular PTO valve that is mounted behind the seat, remove the quick coupler that is currently on the end of the PTO loop hose. Place the hose end in a bucket. Start the tractor and let it run at idle.

Move the PTO lever in one direction. If oil comes shooting out of the hose, then you now know that moving the lever in that direction makes the hose the supply line. Turn off the tractor and put the coupler back on the hose. It is essential that you do something to record the direction of the PTO handle because it is bad news to move it the other way once the filter is hooked up.

Using what you just learned about lever direction, select one of the new quick coupler halves that mates with the coupler you removed from the end of the hose and screw that coupler onto the filter housing's INLET port and then install the other coupler half into the OUTLET port of the housing. Use a high quality paste-type pipe sealant on the threads. I don't like Teflon tape. It works most of the time but pieces of tape have been known to end up in the hydraulic system and cause problems.

The idea here is for you to be able to install this filter into your system TEMPORARILY by making use of the PTO lines. **You must pass the oil through the filter in the correct direction every single time.** Therefore, you must mark your PTO lever in some way that will remind you which way to move it whenever you want to filter your oil.

If that should happen, you would be back-washing all the crud captured by your filter, into your system again. Use the quick couplers to hook the filter into the PTO system.

THIS PART IS SUPER IMPORTANT SO PLEASE PAY ATTENTION.

Once hook up the filter and you start your tractor, you CANNOT move it so much as one inch nor can you raise or lower the three-point or sleeve hitch or operate any hydraulic device on the tractor. The tractor must sit outside and run for a half-hour or so at half-throttle to allow the oil a chance to circulate through the filter several times. Make sure that the PTO lever is in the correct position to push the oil through the filter in the proper direction. If you leave the lever in the center position, no filtering will take place. Make sure that there is no one around that might mess with your tractor.

Keep in mind that the filter has been inserted into a spot where high pressures from the pump will be created if ANY hydraulic device is actuated. Oil filters will burst open at about 100 psi. If you try to move your tractor an inch, the oil pressure will easily exceed 100 psi in an instant. Your system is capable of generating 2100 PSI under full load and full throttle so I cannot stress this enough. Oil under high pressure can hurt you or others around you. While this is an excellent method of cleaning up your oil, it also comes with certain extreme cautions that MUST be observed.

Think of this as dialysis for your tractor. Just as soon as the half hour has been completed, throttle the tractor back to idle, let it run for a few minutes at that speed and then shut it off. IMMEDIATELY disconnect the oil filter out of the system. Don't

put that off or you might forget that the filter is still in place or someone else may decide to use or move the tractor.

Oil is the lifeblood of the hydraulic system. All dirt, metal particulate and moisture that get into the system are circulated by the pump. The only protection the pump, motor and other items have is clean oil as a result of timely oil changes or constantly filtered oil. Oil is the cheapest item you will buy for your hydraulic system and the easiest to replace. Neglect the oil and you will pay the price down the road with damaged parts and labour costs.

600, 6000 and 7000 series

Because these tractors are fitted with multiple hydraulic cylinders, you have to consider the following possibilities.

If this tractor is new to you and you have no maintenance history for it, then the best thing to do is to go with the worst-case scenario.

The worst-case scenario is that the hydraulic oil has never been changed or if it has been changed, the wrong oil was installed. Either way, you want to get the maximum amount of that bad oil out of the tractor, the least expensive way. The cylinders hold a substantial amount of oil. To try and flush that out using fresh oil multiple times would prove to be very costly. Emptying every cylinder first is the way to go along with draining the system in the same fashion as draining the non-loader garden tractors.

Here's what that entails.

- First thing.... if you have a deck under the tractor, remove the deck and set it aside.

No matter what, it's a messy job. You need to do this in a clean location but you will invariably get oil landing on the floor and possibly on your clothing. Therefore, dress accordingly. Have lots of old rags around along with kitty litter to absorb spills quickly. If you are worried about your floor, then go buy a cheap plastic tarp for twenty bucks or less and spread it on the floor first before placing the tractor on top of it.

- run the tractor until fully warmed up and then use the loader and other hydraulic functions several times to circulate warm oil into the cylinders. Warm oil drains faster and easier than stone cold oil does.
- if you happen to have a steel 55 gallon drum around, raise the loader in the air and then lower the bottom of the bucket onto the drum. This will support the loader arms in a position that allows easy removal of the cylinders. You can use other items to do the same thing if you do not have a drum.
- shut the tractor off
- clean off the travel/lift valve under the floor board of the tractor and find the Allen (hex socket) drain plug
- remove that plug completely after sliding a CLEAN drain bucket capable of holding 14 quarts under the valve. SEE NOTE BELOW – regarding drain plug removal.

- Start the engine at an idle and watch the oil stream leaving the drain hole. As soon as it starts to spurt air, shut the engine off.
-
- if you have an implement lift, then remove the hydraulic hoses from the lift valve
- clamp a pair of Visegrips onto the implement rockshaft and rotate it full travel in both directions while making sure that the ends of the hoses are close enough to the bucket that the oil is going into the bucket
- when you are satisfied that the implement lift cylinder is empty, reconnect the hoses for it.
- if the tractor has a three-point hitch, then remove those hoses at the valve and then empty the hitch cylinder by raising and lowering the lower lift links
- when this cylinder is empty, reconnect the hoses
- the same must be done with the two loader lift cylinders and the bucket cylinder. To drain these cylinders properly, you have to remove the rod end of the cylinder where it attaches to the loader frame. This will allow you to swing the rod end free of the loader and then push the rod all the way in and then pull it all the way out again to empty the cylinder. Do this pumping action a couple of times before installing the rod end back on the loader frame.

- when all the cylinders are emptied, reconnect all hoses, install any drain plugs
- fill the reservoir tank with fresh oil of the correct type and grade> see the FAQ concerning oil type
- start the tractor, lift only the loader arms in the air and remove the 55 gallon drum
- lower the loader to the floor and then raise it full height before lowering it a second time
- refill the reservoir
- now operate the bucket cylinder, the three-point and implement lift cylinders back and forth
- refill the reservoir
- you are free to operate all hydraulic functions including moving the tractor back and forth
- check the level in the reservoir and top up as needed

NOTE: I cannot stress enough that you get one chance to remove that drain plug. Therefore it is imperative that you clean out the hex hole 100 percent and then insert a decent Allen key all the way into that hole so you get maximum turning power. If your well-worn Allen key spins in that pipe plug and ruins the hex, then you just created a big problem for yourself.

Buying and installing an hour-meter is a good way to keep track of when you did certain service procedures. It gives you a benchmark to go by if you keep a service log to record what you did and when you did it along with the hour-meter reading.

The above procedure allowed you to get rid of almost all the old oil but more than quart of that old oil was left behind in items you could not drain. It would be a wise move to use the tractor for twenty to fifty hours and then conduct a normal oil change and leave the cylinders alone.

Those of you with 648's, 6000 and 7000 series tractors all have oil filters that must be changed at the same time and prior to refilling the system with clean oil.

All materials on this site, including articles, pictures, and the like are protected by Copyright laws and may not be reproduced, distributed, transmitted, displayed, or otherwise published without the prior written permission of Tom Arnold(CaseColtIngersoll.com) As long as you do not remove the Copyright or other notices you may download and print one copy for your personal non-commercial use. You may not transmit or store the content of this site in any other website or other form of electronic retrieval system without the prior written consent of CaseColtIngersoll.com.

Website disclaimer. The information contained in this website is provided by CaseColtIngersoll.com as a public service and while we attempt to provide accurate and up to date information, we make no representations or warranties of any kind, express or implied, about the completeness, accuracy,

reliability, suitability or availability with respect to the information contained on the website. Under no circumstances shall we be liable for any loss or damage, direct, indirect or consequential arising out of the use of the information found in this website. Within this website you may be able to link to a number of websites that are not under the control of Casecoltingersoll.com. Casecoltingersoll. Com has no control over the content found in those links, and their inclusion does not imply an endorsement of the information or views expressed in them.

casecoltingersoll.com