

# All about the Holding Valve

## 1. What is the history of the Case Holding Valve?

### ANSWER:

Owners of these hydraulically driven tractors found that whenever they were descending inclines, the tractor would pick up speed in an uncontrolled manner. It would also make a “growling noise” while doing so. This could be a frightening experience in the least and a dangerous one at the worst.

Part of the problem was connected to the reluctance of the male species to read Operator’s Manuals. Those who actually studied the Op Manual were told how to control their tractor on slopes. Admittedly, the Op Manual for the early tractors made in 1972 or so, did not do a very good job but they did have this to say. “NOTE: The travel control lever quadrant has an anti-over-run detent on each side of the neutral detent, See figure 15. Put the lever in these positions when a very slow speed is desired or when operating on an incline to prevent the tractor from over-riding the oil flow, and running away.”

On the next page, they follow that up with the following. “The travel control lever can be used in lieu of the brake pedal to control the tractors ground speed on hillside operation. Remember, however, that if the brake is applied, the speed control lever will be automatically returned to neutral. Again, keep in mind that the travel lever can be moved into forward or reverse while your foot is still on the brake.”

Op Manuals printed near the end of the 70’s worded things differently.

“9. TO USE RETARD TRAVEL – Hillside Operation.

The “RETARD” position on the travel control lever must be used when the tractor moves down a hill.

“RETARD” is the hydraulic braking position for the travel control lever.

For correct retard action, follow the operation procedure below.

- a. Run the engine at full throttle (3600 RPM).
- b. Select the “LOW” range in the dual range transaxle. LOW range must be used for all hillside operation.
- c. Put the travel control lever in the “RETARD” position before the tractor moves down the hill.
- d. Select the full speed position of the flow control valve (if equipped).

#### 10. TO ACTUATE BRAKES – Hillside Operation

Hold the travel control lever in the retard position, then push on the brake pedal.

When you actuate the brake, the travel control lever will return to the “NEUTRAL” position unless you hold the lever in the “RETARD” position.

The travel control lever can be moved (but the lever must be held) while the brake is actuated. END QUOTE.

As you can see, there are a lot more instructions in the later manual than in the early one. They failed to tell people about keeping the engine wide open while using the retard feature in the early manual. Oops. Big mistake. Unless the pump is circulating the oil rapidly, then the procedure will not work.

**(add basic procedure from manual)** *See above*

Presumably, the ever-growing product liability issue pushed Case into finding a solution that needed no Operator input to prevent runaway. The first time a Holding Valve Kit was shown as an Attachment in Case Planning Guides seems to be for the 1979 or 1980 model year.

It was an OPTION that could be bought from the dealer and retrofitted to some of the earlier tractors by the owner of the tractor or by the local dealer. When buying a new tractor, the customer could specify this option and the factory would install it on the assembly line. I’m sure that some dealers

brought new tractors into their showrooms and inventory with this valve in place as a factory installed option if they were located in a hilly part of America.

## **2.What is a holding valve and what does it do?**

Colt, Case and Ingersoll garden tractors use a patented hydraulic drive system that differs from what everyone else uses. The simple explanation is this. The engine is connected directly to a gear-type hydraulic pump. Oil is held in a reservoir and then delivered to the inlet of the pump. The spinning gears move the oil to a valve body that may have one or two control spools in it. Those spools allow the oil to pass right through the valve unless the Operator moves one of the levers next to the steering wheel.

If no levers are moved, then the oil leaves the valve and continues to the oil cooler to remove excess heat before it returns to the reservoir for another trip through the system. In other words, as long as the engine is running, the oil is in constant motion.

If a lever is moved, then a portion of the circulating oil is diverted to either the travel motor or the hydraulic cylinder that raises and lowers attachments. The more the lever is moved away from the neutral position, the greater the percentage of diverted oil. Essentially the same amount of oil diverted to a device will be returned to the valve doing the diverting. That oil is added to the oil stream heading to the oil cooler and eventually the reservoir.

The holding valve stops oil from entering or leaving the drive motor of the tractor, effectively placing a hydraulic lock on the motor that prevents it from rotating. This lock is in place all the time unless the operator moves the Travel Lever away from neutral. When that is done, oil is sent to one side or the other of the Holding Valve. The initial pressure exerted by this incoming oil causes a pilot valve inside the Holding Valve to move and in turn, the pilot valve opens up the larger valves that were blocking the oil flow. This happens so quickly that the operator is unable to sense it.

This valve is a bit more complex than valves commonly used to lock hydraulic cylinders from moving. You cannot substitute one of those valves for this application. The purpose of this valve is to stop the hydraulic oil from cavitating. Cavitation is something that many power-boat owners are

familiar with, especially with outboard engines that are hand-steered. A rapid change in direction of the engine causes air to be introduced into the water around the propeller. When that happens, the propeller cannot develop the thrust needed to push the boat forward. To put a stop to the cavitation, the throttle must be backed off to an idle to allow the air to dissipate before the power can be rolled back on again to push the boat forward once more.

## **1. What does a Holding Valve kit consist of and what does it look like?**

### **ANSWER:**

Here are two photos of a complete holding valve kit. You will notice that there are 3 custom bent steel hydraulic lines, the cast iron valve body and one double-ended hydraulic fitting that acts as a union between the drive motor and the valve body. These kits have been discontinued for some time now. Ingersoll does not have any in stock. Whether any dealers or regional distributors still have any is hard to say and Ingersoll has no mechanism in place to determine what these independent businesses have on their shelves. All the steel lines are also discontinued from production and last time I checked, they had only one of the steel lines in stock. When the last one of those is sold, that will be the end of any availability from Eastman/Ingersoll for these lines.

PHOTOS INSERTED HERE

Used kits do appear on e-Bay but you must be careful. I advise you to not buy a kit that is not complete with all three steel lines and the double-ended fitting. Yes, it is possible to have hoses made up in lieu of the lines but that is not inexpensive to do and it makes for a sloppy installation by comparison. There is one more problem you need to be aware of. See the next question

## **1. Was there more than one Holding Valve Kit?**

## **ANSWER:**

Yes... There were 4 kits:

L-7 Holding Valve Kit was designed for most 200 series Hydriv models

L-9 Holding Valve Kit was designed for most 400 series Hydriv models with the short wheelbase.

LL-9 Holding Valve Kit was designed for the 644, 646 and 648 series models

M-9 Holding Valve Kit was designed for all 400 series Hydriv models with the long wheelbase.

The difference between the kits is in the length and bends in the two tubes that join the Holding Valve to the Travel Control Valve because the double-ended fitting and the steel line that join the drive motor to the holding valve remain the same for all four kits. It is wise, when considering the purchase of a used valve kit, to ask the Seller for the model and serial number so you can check whether that kit will work on your tractor or not.

## **2. When did the Holding Valve become standard on tractors?**

### **ANSWER**

This did not happen until after Case sold the division to John Ingersoll and it did not happen immediately. Ingersoll developed a new travel and lift valve that incorporated the holding feature right in a single casting. This new combo valve began to be phased in on some models in 1985 but not until 1986 on others. If we are to believe the production year/serial number chart, then this is what the data says:

In 1985, Ingersoll built 694 of the 446 models before switching to the combo valve beginning with PIN 14074315

In 1985, Ingersoll built 618 of the 448 models before switching to the combo valve beginning with PIN 14075995

In 1985, Ingersoll built 325 of the 224 models before switching to the combo valve beginning with PIN 14070796

In 1986, Ingersoll built 83 of the 222 models before switching to the combo valve beginning with PIN 14069687

In 1986, Ingersoll began the year building 226's with the combo valve beginning with PIN 14093640

In 1986, Ingersoll began the year building 220's with the combo valve beginning with PIN 14090930

In 1986, Ingersoll began the year building 444's with the combo valve beginning with PIN 14094620

**1. What does the combo travel/lift/holding valve look like compared to the former travel/lift valve without the holding feature?**

**ANSWER**

As you can see in the photos, the travel/lift/holding valve has a large, long bump in the casting right above the travel spool. This bump has the large work ports on it to accept the traditional fittings for ½ inch lines whereas the lift spool work ports are much smaller to accept fittings for ¼" lines.

The older travel/lift valve with no holding capabilities is fairly flat on the work port side compared to the valve with the holding feature. Therefore, it's pretty difficult to confuse the two.

INSERT PHOTOS

# 1. Is it possible to put one of the newer combo valves into my tractor?

## ANSWER

Yes it can be done but the procedure is subject to some minor variances that have to do with which tractor model you have and what model of tractor the valve came off of. Whenever possible, it is a good move to purchase the valve with the motor lines and the linkage rods that connect to the travel and lift levers.

The conversion process is fairly simple to carry out.

Drain the hydraulic system. Remove your old valve and motor lines. Test fit the new combo valve by hooking up the linkage rods to the control levers. Those who have done this swap report that they drilled two new mounting holes for the combo valve anywhere from 5/8" to 7/8" rearward from the old holes.

The second issue involved some gentle heating of the two motor lines to make them adjust to the location of the work ports on the new valve. Gentle heat is accomplished with careful use of either a MAPP torch or an oxy/acet torch. Slow, even heat is applied to the area that needs adjusting until it reaches a dull red color. Then slow, gentle force is applied to re-form the tube accordingly. Patience is key. Total attention is essential to prevent the tubing from kinking or distorting or collapsing.

Operating the torch at too high a heat is not a good idea. You want to feed it just enough fuel to get the tubing a dull, dark cherry shade and keep it there. You want just enough heat to soften the steel slightly to make it easier to reshape the bends. The linkage to the dash levers is unchanged.

Keep in mind that all the 400 series tractors gained two inches between the seat pedestal and the dash pedestal some time in late 1979 when the 448 first went into production. Therefore, all 448's are long wheelbase tractors. If you own a 444 or 446, then just make the following measurement to figure out which wheelbase it is. The short wheelbase models measure 13" between the

two pedestals but the long wheelbase model measures 15". If you are converting an earlier 200 series, then a combo valve from a 3000 Series Ingersoll or post-1985 200 Series Ingersoll should have shorter motor lines on it and that valve and lines might also work well on the short wheelbase 444's and 446's. That may negate the need for any reforming of the motor lines. No matter what, go slow. Check and recheck what you are doing before drilling any new holes so that you get them right the first time you drill them. There is some wiggle room for margin of error but not a lot. That wiggle room is found in the adjustability of the rods that connect the spools to the control lever. You should not throw caution to the wind and rely on that adjustment to save your butt.

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