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# HYDRAULIC DIVERTER KIT P/N: HDK-L105E–PTL

(fits Massey Ferguson L105E)



An electrically operated hydraulic valve system to divert hydraulic fluid from the loader dump/curl circuit to a forward auxiliary connection for loader attachments, requiring momentary hydraulic power, such as the Artillian Grapple, Hydraulic Plow, etc.

### Approximate Installation Time

Experienced Dealer Technician – 2 Hours

Average Dealer Technician – 4 Hours

Do-It-Yourself - 6 Hours

Approximate Product Specifications

Weight: 12.0 lbs.

Max. Pressure: 3,000 PSI

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# **Installation Overview**

- Install the Diverter Valve on the loader
- Adapt factory dump/curl hoses to Diverter Valve
- Install new hydraulic hoses on loader
- Connect to a 12V power source

# **Tools Required**

- Open-end wrench assortment, 1/2" thru 3/4"
- Adjustable wrenches (optional)
- SAE socket set (Optional)
- Flat screwdriver
- Pliers
- Cut off pliers
- Absorbent rags and/or drain pan
- Electrical wiring tools (for pigtail kits)
- Electrical Tape
- Drill and 5/16" drill bit

### **Valve Specifications**

- Maximum Valve Flow: 10 GPM
- Maximum Pressure: 3000 Psi
- Solenoid Voltage: 12VDC
- System Current Draw: 4 Amps Max

# **Contents**

- 1 Hydraulic Diverter Valve
- 2 Gang of 4 Hoses with Front Manifold
- 3 Expandable Braided Sleeving, 26"
- 4 Solenoid Wire Harness
- 5 Actuator Switch Harness & Power Cable
- 6 Mounting Kit
- 7 4" cable ties, 11
- 8 8" cable ties, 18
- 9 11" cable ties, 11
- 10 16" cable tie, 1
- 11 QD dust plug, yellow
- 12 QD dust plug, black





## **Hydraulic Connections**

Valve Port P1—Tractor QD (4) "Curl" Valve Port P2—Tractor QD (3) "Dump" Valve Port A1—Loader (4) "Curl" hose Valve Port B1—Loader (3) "Dump" hose Valve Port A2—Loader front QD manifold (Black Plug) Valve Port B2—Loader front QD manifold (Yellow Plug)

# **Hydraulic Connection Overview**



### Before starting installation—IMPORTANT

**Detach the loader from the tractor** to allow access to the inside face of the loader mast to install the Diverter Valve.

Place an absorbent rag and/or basin beneath the hose connections to catch hydraulic fluid that will leak from lines.

### 1. Install the Hydraulic Diverter Valve onto Loader Mast

- 1.1 Mount the Diverter Valve as shown in Figure 1.1, with a bolt through the rear hole in the valve block, and mark the loader arm through the hole in the valve block.
- 1.2 Drill one 5/16" hole through the loader mast where marked in step 1.1.
- 1.3 Touch up the hole with paint to protect the resulting bare metal.
- 1.4 Attach the Diverter Valve to the loader mast using (2) 1/4-20 x 3.25" long bolts with washers through the two holes in the valve and the two holes in the loader mast then add the washers and self-locking nuts on the inside of the loader mast. Tighten using wrenches until the valve is held securely to the loader mast. The valve fittings should be facing the **FRONT** of the loader. The two black solenoids should face the **REAR** of the loader.
- CAUTION: Tighten hardware only until it holds the diverter valve firmly in place.
- WARNING: The Diverter Valve is held in place with bolts and nuts that protrude to the inside of the Loader Mast. Use caution when attaching the Loader onto the tractor's loader mounting frame, to avoid damage to these bolts, to the tractor, or to the loader.



Fig. 1.1—Install Diverter Valve Block

# 2. Attach the factory dump/curl hoses to the Diverter Valve

- 2.1 Using a 3/4" wrench, remove the #3 and #4 quick disconnect hoses from the loader.
- 2.2 Locate and unroll the Solenoid Wire Harness. Place the harness along the set of 2 factory hoses, with the single-end with cap at the quick-disconnect end.
- 2.3 Per Fig. 2.3, slide the section of braided, expandable sleeving over the set of 2 hoses and wire harness, to keep the wire harness constrained.
- TIP: For best results, hold the hoses vertically with the quickdisconnect end down and work the sleeving over the smaller fittings and downwards. This will help minimize the amount of hydraulic fluid that may drip onto the sleeving.
- 2.4 Connect the factory hoses to the Diverter Valve Block per Fig. 2.4:

#3 factory hose to valve block port P2 #4 factory hose to valve block port P1

- 2.5 Connect the wire harness double connector end to the Diverter Valve solenoids, then remove any slack between the harness and the factory hoses.
- 2.6 Feed the hose bundle through the loop on the loader arm and alongside the #1 and #2 factory hoses. The quick-disconnect ends of all four hoses should be approximately lined up.



Fig. 2.3—Factory Hoses w/ Harness & Sleeving



Fig. 2.4—Factory Hoses w/ Harness & Sleeving

### 3. Install the gang of 4 Hoses with Front Manifold

- 3.1 Locate the gang of 4 hoses that contains the front manifold. Remove the set of two hoses attached to the front manifold from the gang of 4 hoses, leaving the braided sleeving with the shorter set of 2 hoses.
- 3.2 Per Figure 3.2, feed the set of 2 hoses through the loop on the loader. Route the hoses up along the loader toward the diverter valve.
- 3.3 Tighten the Front QD Manifold clamp until the manifold is firmly secured on the loader cross tube as shown in Fig. 3.2. DO NOT OVERTIGHTEN.
- 3.4 Feed the free end of the hoses through the sleeving with the other 2 hoses from step 3.1 with the "A1", "B1" end of the shorter hoses lined up with the free end of the hoses from the manifold.
- 3.5 Using an 11/16" wrench, loosen the nuts on the A1, A2, B1 and B2 fittings to allow the fittings to rotate.
- 3.6 Per Fig. 3.6, route the gang of 4 hoses through the loop on the loader arm, then attach the 2 hoses from the manifold to the diverter valve, matching A2 and B2.
- 3.7 Tighten the hoses to fittings securely with a 9/16" wrench, then tighten the nuts for the fittings.
- 3.8 Using an 11/16" wrench, attach the shorter 2 hoses to the diverter valve, matching A1 and B1. Tighten the hoses to the fittings then the nuts for the fittings with an 11/16" wrench.
- 3.9 Per Fig. 3.9, attach the other end of the shorter hoses to the factory fittings on the loader arm:

D1 to factory fitting #3 C1 to factory fitting #4

- 3.10 Secure the hoses from the front manifold to the factory hoses with an 11" cable tie as shown in fig. 3.2, through the hole in the loader arm and around the set of 4 factory hoses per Fig. 3.10.
- 3.11 Hydraulics are now installed. Check your connections to make sure all hydraulic fittings on the loader and diverter valve are tight.



Fig. 3.2—Front Manifold and Hoses



Fig. 3.6—Diverter Valve and Hoses



Fig. 3.9—Connection to Factory Fittings



Fig. 3.10—Secure Hoses

### **Electrical Overview**



Refer to the image above for an overall understanding of the electrical connections.

# NOTE: Your kit has one of the following 3 switch configurations. Mount your switch to your loader joystick per your discretion. Suggested guidelines are provided below.

The 3 configurations shown below from left to right are:

- 1) Rectangular plastic housing/switch assembly with black button.
- 2) Rubber switch without a plastic housing.
- 3) Square plastic housing with red button.



Attach configuration 1 to the joystick using two cable ties thru the provided openings near the ends of the plastic housing (see below left). If your joystick has a bend close to the knob, such that the plastic switch housing will not fit, depress the 4 tabs on the plastic housing to open it, exposing the rubber switch inside. Discard the plastic housing and mount the rubber switch (configuration 2) with two cable ties located close together as shown below and to the right.



Plastic housing/switch assembly



Rubber switch w/o a plastic housing

For suggestions on mounting configuration 3 (the square plastic housing with red button), see the next page.

### 4. Install the Joystick Switch and Switch Cable

- 4.1 Disconnect the switch from the power harness. Set switch housing against the tractor joy stick where shown.
- 4.2 Wrap electrical tape or friction tape around the tractor joystick just below the knob to build up the diameter closer to the contour of the switch.
- 4.3 Insert the supplied cable tie through the slot on the side of the switch, from the switch side, with the head facing the switch. See fig. A.
- 4.4 Feed the cable tie through the slot on the other side of the switch to form a loop in the cable tie. NOTE: A small screwdriver may be needed to start the tip of the cable tie through the slot. See figures B and C.
- 4.5 Place the switch over the tractor joystick, orient as desired. See fig. D.Pull the pointed end of the cable tie tight until the switch is snug to the joystick.
- 4.6 Loop the pointed end of the cable tie back around the joystick shaft, opposite the switch (overlapping the existing cable tie loop). Feed the pointed end through the cable tie head. See fig. E. Pull the cable tie tight.
- 4.7 Feed the switch cable through the lower right corner of the opening at the base of the Joystick. See fig. F.
- 4.8 Using the 4" cable ties provided, secure the switch cable to the joystick shaft all the way to the bottom of the joystick shaft. Tighten and trim the cable ties once satisfied with fit.













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### 5. Connect to a 12V Power Source.

- 5.1 Reconnect the power harness to the switch harness underneath the joystick boom on the tractor. Polarity of the terminals on this connection does not matter.
- 5.2 Route the power harness along the hydraulic hoses and along the side of the engine compartment as shown.Make sure the connector on the power harness will reach the Solenoid wire harness when the loader is re-attached to the tractor.
- 5.3 Connect the power harness to the battery with 5/16" ring terminals (not included); black to negative then red to positive. Secure wires with cable ties.
- **CAUTION:** It is critical to remember that wires must not encounter moving parts. Use cable ties to secure wires. While performing the installation, it may be helpful to have someone actuate pedals and levers to observe what interferences may exist.
- **NOTE:** Diverter valve solenoids require 4 amps of electrical current at 12VDC. The power wire is protected by a 10 amp fuse.
- 5.4 Re-install the loader onto the tractor and connect the solenoid wire harness to the power harness.
- 5.5 Start the engine and check your connections. Run the loader through all of its functions. Lift your loader all the way up and observe the new hoses to make sure nothing is being stretched or kinked. When dumping and curling the loader, observe the moving parts attached to the loader arms. Be sure nothing is pinching the new hoses going to the Front QD Manifold. Check your hydraulic fluid and replace as necessary.







# **System Operation**

The loader dump/curl circuit functions normally when the joystick push button is not depressed. Dumping and curling your loader should behave exactly the same as before the diverter system was installed.

When the joystick push button is depressed, instead of fluid traveling to the loader dump/curl cylinders, the electric solenoids will redirect the fluid to the Front QD Manifold. Something needs to be attached to the Front QD Manifold for the diverter system to demonstrate functionality. Otherwise, the tractor hydraulics will simply "dead head" and open the tractor's internal pressure relief valve.

When an attachment is connected to the Front QD Manifold, whenever you **BOTH**, A) Press the joystick push button, **AND**, **B**) move the joystick to the left or right, fluid will be diverted to the Front QD Manifold and to your attachment **WHILE** you continue to press the button. If you release the joystick push button at any time, fluid flow will return to the normal dump/curl functionality.

When using your tractor with the diverter valve, it is best to **NOT** engage the joystick push button **WHILE** fluid is moving through the valve. It is best to either curl/dump your loader **OR** divert to the Front QD Manifold.

### **Troubleshooting**

Some tractors have a regenerative flow circuit on the dump function of the loader control valve (sometimes referred to as "fast dump"). This is usually actuated by moving the joystick to the far right position.

By design, the jaws on the Artillian Grapple are opened by pressing the hydraulic diverter kit button while moving the joystick to the right (corresponding with the dump function of the loader). However, if the joystick is moved to the far right regenerative flow circuit, this will result in the Grapple jaws closing. Some users may not realize that their tractor has a regenerative flow circuit and interpret this behavior as a malfunction of either the Grapple or hydraulic diverter valve. This is not the case. Due to the nature of a regenerative flow circuit, this is expected behavior.

If this functionality is observed, the user should take note of how far they are able to move the joystick to the right before the Grapple jaws change from opening to closing, and then limit their joystick input when opening the Grapple. An alternative solution is to switch the Grapple hoses at the quick disconnect manifold. This, of course, will invert the functionality of the Grapple. Moving the joystick to the left will now cause the Grapple jaws to open, while moving it to the right will cause the jaws to close. This will, however, allow the user to move the joystick to the far right position, without exhibiting the behavior described above.

Congratulations and Thank you for choosing Artillian!

## **Troubleshooting**

Small dirt particles and debris can cause the hydraulic valves to stick and not function properly. Below are the steps to troubleshoot this problem. The whole process should take around 10 minutes or less.

- 1. Disconnect the power connector from one of the valves and press the joystick button (with tractor key in "ON" position if wired to OEM fuse block). You should hear an audible click.
- 2. Repeat for the opposite valve. No sound could mean the valve is stuck.
- 3. Once the malfunctioning valve is identified, remove the valve from the valve block. 7/8" and 1" wrenches required. You may want to reinstall the solenoid onto the valve and energize while it is out of the valve block to confirm malfunction.
- 4. Manually depress the plunger by inserting a fine point sharpie marker (or equivalent) into the end of the valve. Observe the orifice moving from the far groove to the near groove.







- 5. Depress the plunger several times. If it is sticking, gritty, or stuck, spray the internal components of the valve with WD40 and/or compressed air to dislodge the debris.
- 6. Clean the valve, then lubricate with fresh hydraulic oil.
- 7. Reinstall the solenoid onto the valve and energize to confirm functionality.
- 8. Reinstall into the valve block and test for functionality. Repeat on the other valve if required.

Continued on next page.

The male quick disconnect (QD) fittings on the Artillian Hydraulic Diverter Kit P1 & P2 hoses may not engage properly with some OEM female quick disconnect fittings. This could allow fluid to flow into the hydraulic hoses, but not return to the tank on the tractor. Symptoms may include:

- Grapple (or other attachment) opening / closing for a short period of time and then "locking up"
- Grapple not functioning at all
- Tractor dump / curl operation working for a short period of time and then "locking up"
- Tractor dump / curl operation not functioning at all
- 1. Compare the male QD fittings from the Artillian HDK P1 & P2 hoses with the male QD fittings on the original dump / curl hoses removed from the tractor.



- 2. If the nipple on the tractor factory QD fitting poppet valve protrudes farther out then it does on the Artillian QD fitting, then the Artillian HDK kit may not function properly.
- 3. Remove the male QD fittings from the Artillian P1 & P2 hoses and from the tractor factory dump / curl hoses.
- 4. Replace the male QD fittings on the Artillian P1 & P2 hoses with the male QD fittings removed from the tractor factory dump / curl hoses. Reattach the P1 & P2 hoses to the appropriate female QD fittings on the tractor.
- 5. The grapple (or other attachment) and the tractor dump curl functions should now be working properly.

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