

### HYDRAULIC DIVERTER KIT P/N: HDK-300/305/H160/H165-APP & -PTL



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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**Download** a digital copy of your installation instructions online at <u>Artillian.com/literature/</u>



Artillian strives to continuously improve our products, technical documentation, etc. Therefore, the installation manual for this product may have been updated after your product was packaged. The latest revision of the installation manual can always be found at the website above.

The contents of this envelope are the property of the owner. Leave with the owner when installation is complete.



### **Installation Outline**

Installation time approximately 1-2 hours (not including electrical power connection).

- Drill mounting holes in loader parking stand
- Remove factory dump/curl hoses from
- loader
- Mount diverter valve on parking stand
- Install new hydraulic hoses on loader
- Install the joystick switch & wiring harnesses
- Connect to a 12V power source

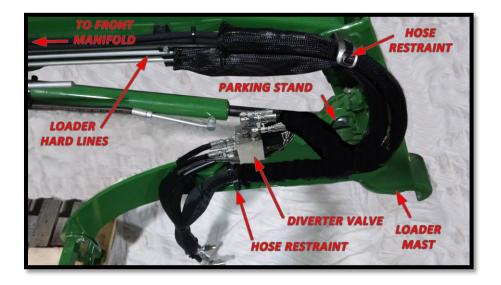
### **Tools Required**

Measuring Tape & Permanent Marker
Hammer & Center punch
Electric drill, 1/8" and 5/16" drill bits
Open end wrench assortment, 7/16" thru
7/8"
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 (not included)

### **Valve Specifications**

Maximum Valve Flow: 10 GPM Maximum Pressure: 3000 PSI Solenoid Voltage: 12 VDC Electrical Current Draw: 4A Max

### **Hydraulic Installation Overview & Key Terms**



### **Contents**

- 1- Diverter Valve with Loader Stand Mounting System
- 2- Gang of 4 Hoses with Front Manifold
- **3** Gang of 2 Hoses with Solenoid Wire Harness
- **4** Actuator Switch Harness & Power Cable, with pigtail leads or aux power plug (depending on kit)
- 5- Intermediate Wire Harness
- 6-16" (or longer) cable tie, 1
- 7-11" cable ties, 11
- 8-8" cable ties, 18
- 9-4" cable ties, 11
- 10- Electrical Tape (not included)
- 11- John Deere dust plug, yellow, 1
- 12- John Deere dust plug, black\*, 1
- \*color may vary depending on tractor/loader combination

### 11,12

### **Valve Connections**

Port P1- Tractor QD (Black\* dust cap)

Port P2- Tractor QD (Yellow dust cap)

Port A1- Loader "curl" hard line

Port B1- Loader "dump" hard line

Port A2- Loader front QD manifold (Black\* plug)

Port B2- Loader front QD manifold (Yellow plug)

\*color may vary depending on tractor/loader combination

### **Hydraulic Connection Overview**

Refer to the image to the right for an overall understanding of the hydraulic connections.



### **Before Starting Installation - IMPORTANT**

### **Hose Layout**

Be sure to **note the path of the hoses on your loader**. To help ensure a proper kit installation, consider marking the protective hose sheath with tape where the hoses pass through restraints. Also, mark the hoses where the sheath ends. Consider taking some photographs of the existing setup for reference.

### Are your hoses in the correct position?

The hoses should be routed smoothly to minimize the effects of repetitive flexing. If your hoses have slipped down through their fastening points over time and are sagging down by the ground, they are no longer in the proper position. Work them back up until there is an even amount of flexibility in all sections and bends (with the hoses connected to the tractor). This is a correct hose layout. Upon installing this diverter kit, the hoses should follow along this original path. Hydraulic hoses should never be subjected to stretching, twisting, kinking, buckling, etc. Remember, there may be up to 3000 psi of oil in them! The less they must flex, the longer they will last.

### Dry fit the Diverter Valve in place on the parking stand

Before beginning any installation work, confirm the mounting location of the valve. Dry fit the valve body in place on the parking stand to ensure there are no interferences with other parts, e.g. tractor, loader cylinder, etc.

### Detach the loader from the tractor

Once your hoses have been checked as above, detach the loader from the tractor for this installation. When detaching the loader, be sure to **curl the bucket back fully**. Upon separating the loader, **raise the loader masts up as high as they will go**. Later, when you uninstall the factory dump/curl hoses, the loader may want to settle a bit. That reserve height will be helpful when re-attaching the loader to the tractor. Ideally, support the weight of the loader if possible to minimize pressure on the hydraulics.

### **Hose Fitting Addition- IMPORTANT:**

Before installation, fittings will need to be added to the gang of 2 hoses which differ depending on which model of loader is on the tractor. The 305/D160 model loader kit comes with completely different fittings, disregard following tables and see bottom of this page for installation.

Use following tables to determine which fittings to install onto the hoses depending on your tractor and loader models:

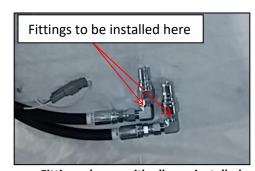
### #8 ORB Male X #6 JIC Male 90° Elbow Fitting (P/N: HYD-00037):

Loader(s)	Tractor(s)
420	4x00, 4x10
460, 430	4300, 4310, 4400, 4410
300CX, H165	3x20, 4x00, 4x10, 4105, 30xxR, 970, 1070, 990
300X, H160	855, 955, 870, 3x20, 30xxR, 4x00, 4x10
300	3203

### #8 ORB Male X #6 JIC Male Straight Fitting (P/N: HYD-00036):

Loader(s)	Tractor(s)	
420	870, 855, 955	
440	870, 970, 1070	
460, 430	970, 1070, 4x00, 4x10	
300CX, H165	4005	
300	770, 790, 3005	

Fittings are to be installed onto the gang of 2 hoses on the end in which there is one connector as seen to the right.



Fittings shown with elbows installed

### 305/D160 Loader models:

This loader kit comes with different fittings from other kits, all 4 of which are to be used. First install the #6 male JIC X #6 female JIC 90° elbows (P/N: HYD-00028) onto the gang of 2 hoses on the end with one electrical connector, as noted in picture above. Then install 3/8" ORFS female swivel X 3/8" JIC straight connectors (P/N: HYD-00038) onto the elbows, hoses are now ready to be installed onto tractor.

### **Mounting Kit-IMPORTANT:**

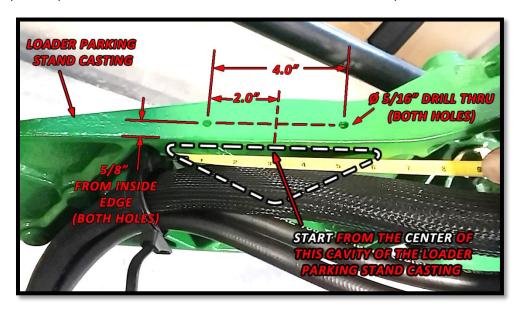
Hydraulic diverter mounting kit needed differs depending on loader model; mounting kit needed is as follows.

Loader model(s): 420, 430, 440, 460 300, 300X, H160 300CX, H165 305, D160 Mounting Kit:
None required, attach with ¼-20 x 3.5" screw provided
Required, installation diagram on page 12
Required, installation diagram on page 13
None required, installation diagram on page 14

### Installation

### Drill the Diverter Valve mounting holes in the loader parking stand

1. Drill two 5/16" holes through the top surface of the parking stand casting as shown. Be sure to perform this on the side of the loader where the hydraulic hoses are routed. You may find it easier to use the included paper template to mark the holes. See the instructions on the template.



2. Touch up the holes with paint to protect the resulting bare metal, if desired.

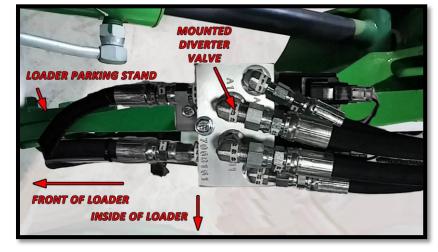
### Remove the factory dumping/curling hoses (the two hoses with yellow and black dust caps)

- 1. Carefully unstrap the hose restraints holding the hoses to the loader (See Hydraulic Installation Overview at the top of page 2.)
- 2. Clip and remove the cable ties at the ends of the protective sheath on the factory loader hoses. Before cutting, note their positions along the hoses for later.
- 3. Slide the upper end of the sheath back enough to get access to the connections of the two curl cylinder hoses. These should be the two top hard lines in the stack, which can be verified by tracing back from the ports of the curl cylinders.

- 4. Carefully free the hard lines from their mounts on the loader arm. BE CAREFUL NOT TO BEND, TWIST, OR OTHERWISE DEFORM THE HARD LINES.
- 5. Place an absorbent rag and/or basin beneath the hose connections to catch hydraulic fluid. An insignificant amount will likely bleed out, but it will make a mess!
- Use wrenches to carefully and slowly separate these connections.
   DO NOT TO BEND, TWIST, OR OTHERWISE DEFORM THE
   ALUMINUM HARD LINES. Once separated, you may want to bag the open connections to contain leaking fluid.
- 7. Slide the two hoses out of the protective sheath.
- 8. Remove (unscrew) both male quick disconnect fittings from the hoses to be re-used on the new hoses.
- 9. Remove the factory dust caps from the two hoses to be re-used on the new hoses. The original hoses will not be needed any longer. They can be stored away for possible future use.
- 10. Install new 8" cable ties at each end of the protective sheath around the two remaining hoses and return the ends of the sheath back to their original locations along the remaining hoses. Tighten and trim the cable ties.
- 11. Leave the loader hose restraints open for now.



- If installing the mounting block, remove black rubber tape from back of Diverter Valve (do not discard), install mounting block to valve in configuration needed for tractor model. Then apply removed black tape to mounting block.
- Position the Diverter Valve on top of the parking stand by passing the screws through the two 5/16" holes in the parking stand, then add the washers and self-locking nuts from

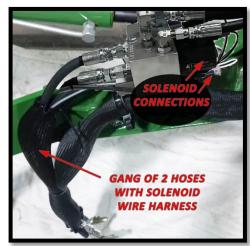


underneath and tighten using wrenches until the valve is held securely to the parking stand. The valve fittings should be facing the **INSIDE** of the loader. The two

black solenoids should face the **REAR** of the loader.

### Attach the Gang of 2 Hoses with Solenoid Wire Harness (For installation on 305/D160 Loaders see page 15)

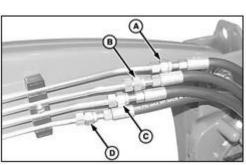
 Connect the Gang of 2 Hoses with Solenoid Wire Harness by matching up the numbered labels on the hose ends with the labels on the valve ports. **DO NOT OVERTIGHTEN.** Be sure to orient the hoses so that the male quick disconnect nipples at the other end of the hoses face the same direction as the



- ends on the factory hoses (they should be facing the rear of the loader).
- 2. Route the Solenoid Wire Harness connectors under the valve and into the two solenoids on the diverter valve until the locking tabs engage.
- 3. Install the male quick disconnect fittings from the original hoses onto the tractor end of the new hoses.
- 4. Install the dust caps from the original hoses on the new hoses according to the label(s) on the hoses.
- 5. Position the protective sheath to protect the hoses from touching the parking stand. Fasten in place by tightening the cable ties and trim the ends.
- 6. Once satisfied with overall fit, pair the new hose gang next to the factory hoses using a moderately tightened cable tie or two.

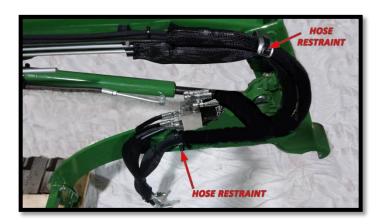
### Install the Gang of 4 Hoses with Front Manifold

- Locate the Gang of 4 Hoses with Front Manifold. Starting at the front of the loader, feed the open ends
  of the hoses up along the loader hard lines, avoiding any pinch points and existing
  hardware/brackets/etc.
- 2. Attach the four hoses to the diverter valve in sequential order according to the labels. **DO NOT OVERTIGHTEN.**
- 3. Connect the two short hoses to the loader hard lines according to the labels on the hoses. Verify which hard line is from the **CURL** end of the cylinders (the rod end of the cylinder) and which comes from the **DUMP** end of the cylinders (the head end of the cylinder). Starting with the **LOWER** hard line in the stack, match the labels on the hoses to the appropriate hard line. **Tighten these fittings securely. DO NOT TWIST OR BEND THE HARD LINES.**



Key	Port	Plug/Cap Color	Hydraulic Function
A	1	Black	Bucket Cylinder—Rod End
В	2	Yellow	Bucket Cylinder—Head End
C	4	Blue	Lift Cylinder—Head End
D	3	Red	Lift Cylinder—Rod End

- 4. Return the hard lines back into their restraints on the loader arm.
- 5. Cover the joints with the protective sheath. Tighten the cable ties and trim at both ends of the sheath.
- 6. Use cable ties to pair the new hose gang to the factory hoses. These cable ties should be moderately tightened.
- 7. Secure all hoses back into the restraints on the loader.
- 8. Using a few 8" cable ties, secure the two ¼" hydraulic hoses to one or more of the hydraulic hard lines along the loader arm down to the front of the loader.



- At the front of the loader, spread the Front Manifold open, pass it around the loader cross tube. Position the Manifold on top of the flat cover of the cross tube. Insert the tail of the mounting clamp into the screw housing. Take up excess length, but leave it loose.
- 10. Install the 16" cable tie on the loader cross tube as needed to secure the hoses to the cross tube.
- 11. Tighten the Front Manifold mounting clamp until the Manifold is firmly secured on the loader cross tube. **DO NOT OVERTIGHTEN.**



### THE HYDRAULIC COMPONENTS ARE NOW INSTALLED

### **CHECK YOUR WORK**

Now is a good time to clean everything, attach the loader to the tractor, and run the loader through all of its functions, raise and lower, curl and dump.

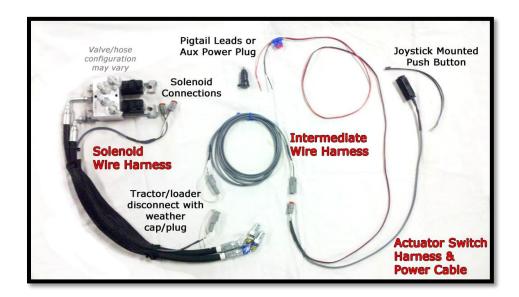
Check all fittings for leaks as you operate the system.

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 bucket, observe the moving parts on the loader arms. Be sure nothing is pinching the hoses going to the Front Manifold.

Once satisfied, check your hydraulic fluid sight glass and replace fluid as necessary.



### **Electrical Overview**



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.

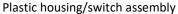
The 3 configurations shown below from left to right are:

- 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.







Rubber switch w/o a plastic housing

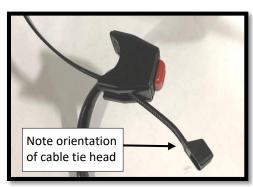
For suggestions on mounting configuration 3 (the square plastic housing with red button), see the next page.

### Install the Actuator Switch Harness

- Note where build-up might be needed to support the switch housing.
   Using electrical tape, cut strips to length and roll it around the joystick base.
- Insert a large cable tie through the slot on the side of the switch, from
  the switch side with the head facing the switch. 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.

- 3. Place the switch over the tractor joystick, orient as desired then pull the cable tie loop tight until the switch won't fall but may still be rotated. <u>Do not trim ties!</u>
- 4. Feed wire harness through opening at the base of the joystick.
- 5. Sit on the tractor seat and orient the switch to the desired position for your comfort. Loop the free end of the cable tie back around the joystick shaft, opposite the switch. Feed the end through the cable tie head and pull tight. Trim the excess from the cable tie.
- 6. 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.









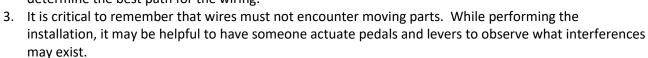




### Install the Intermediate Wire Harness and connect Power Cable to a 12V Source

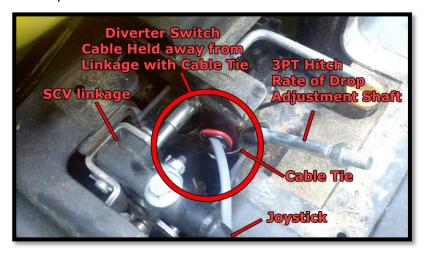
### Remaining electrical routings are up to your discretion. Here are a few points to mention:

- 1. The Intermediate Wire Harness is used to connect the Actuator Switch Harness to the Solenoid Wire Harness. It should be routed under the tractor operator station. Once the connection is made, any excess cable can be bundled up and fastened in a safe place under the floorboard using cable ties.
- You may need to remove some of the covers from the operator station to determine the best path for the wiring.



- 4. Use cable ties to help keep wires away from any moving parts, such as the SCV linkage, as shown below.
- 5. The diverter valve solenoids require 4 amps of electrical current at 12VDC. The power wire is protected by a 10 amp fuse. If your kit has an aux power plug, an 8 amp barrel fuse is in the plug.

6. If your system has the optional auxilliary power plug, wherever the Switch Cable passes through the tractor body, the power wire should branch off and be routed externally to the auxilliary power port on your tractor.





### **System Operation**

The loader dump/curl circuit will function 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 valve will redirect the fluid to the Front Manifold. Something needs to be attached to the Front 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 there is an attachment connected to the Front 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 Manifold **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 the diverter valve, it is best to engage the push button while the joystick is in the neutral position, i.e. fluid is **NOT** moving through the valve. Pressing the button while fluid is moving through the valve will not harm the hydraulic system, but may result in erratic behavior of your attachments.

### Regen Mode (refer to your tractor Owner's Manual for more information)

If your tractor hydraulic system has Regen Mode (fast dumping), your hydraulic loader attachment may behave differently than the loader curl cylinders, such as faster or slower movement than anticipated.

If your attachment uses single acting cylinders (such as on some plow angling systems), entering Regen Mode will cause the system to freeze, causing the hydraulic system to dead head. If this occurs, simply exit out of Regen Mode.

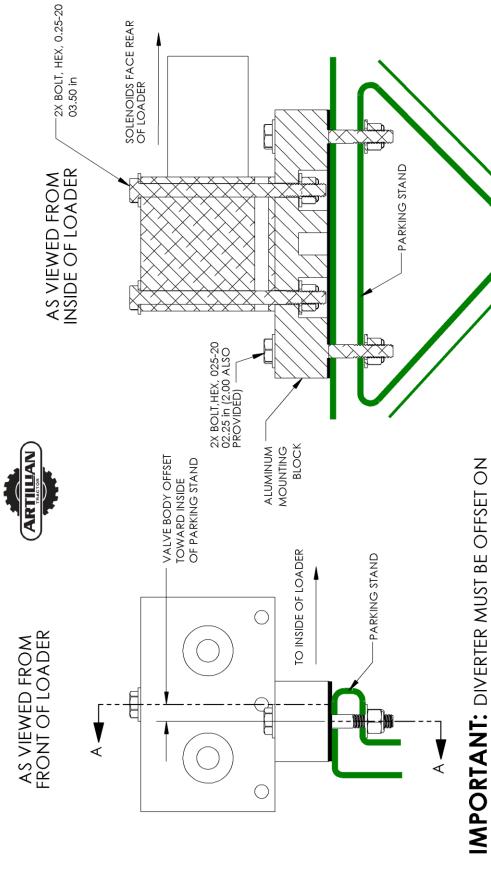
Congratulations and Thank you for choosing Artillian!

**CROSS SECTION A-A** 

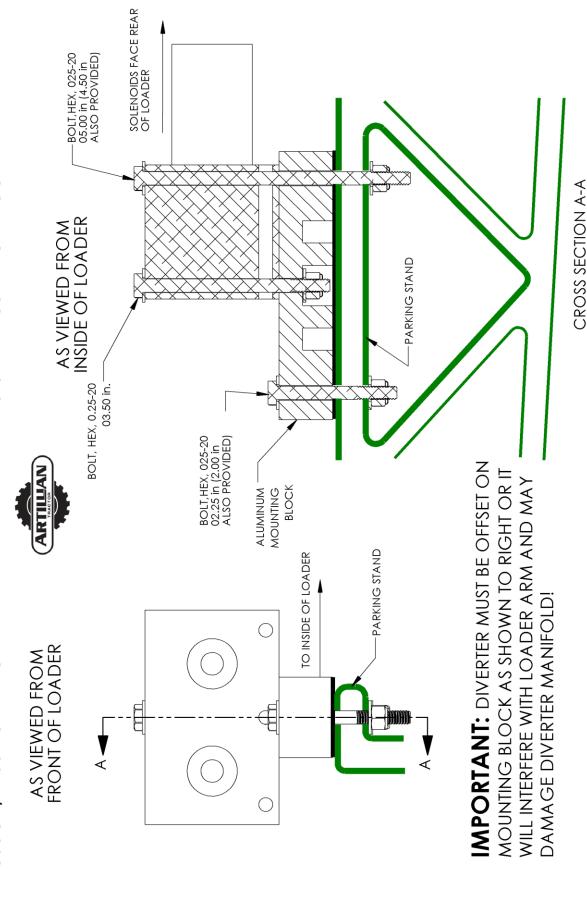
MOUNTING BLOCK AS SHOWN ABOVE OR IT WILL INTERFERE WITH LOADER ARM AND MAY

DAMAGE DIVERTER MANIFOLD!

# 300, 300X, H160 LOADERS - DIVERTER VALVE PARKING STAND SURFACE MOUNT



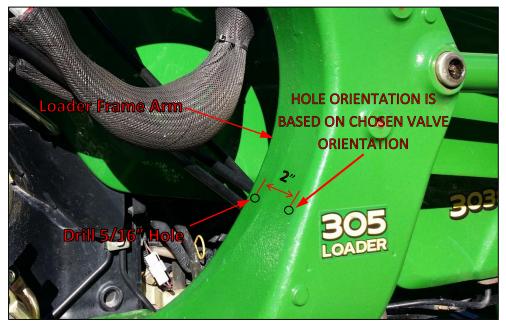
## 300CX,H165 LOADERS - DIVERTER VALVE PARKING STAND SURFACE MOUNT



### 305/D160 LOADERS - VALVE MOUNTING

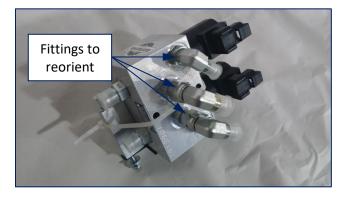
- 1. Hold valve up against loader frame on right side of the vehicle as shown in diagram to the right. Move valve around to find optimum manifold orientation. Be sure to check for clearance around solenoids and any moving parts or possible debris, and check to make sure all hoses will not kink once installed. (Figure is shown with solenoids oriented away from vehicle; this is not necessarily the orientation to be chosen.)
- 2. Drill two 5/16" holes through the side surface of loader frame where marked in the diagram below. Be sure to perform this on the right side of the loader where the hydraulic hoses are routed.





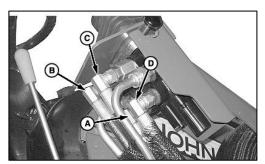
Hole locations are approximate, use diverter to choose optimum location.

- 3. Mount diverter to frame by using (2) %-20 x 3-1/2" bolts, %" ID x 5/8" OD washer, and %-20 nylon locking nuts provided . Feed bolts through washers then the valve block and holes drilled in frame arm, add a washer on opposite end and secure with nylon locking nut.
- 4. Loosen and reorient fittings on valve block to best fit hose routing to the diverter valve if needed. Be sure hose routing is free of all moving parts and pinch points. Default alignment shown to right.



### 305/D160 LOADERS – ATTACH THE GANG OF 2 HOSES AND SOLENOID WIRE HARNESS

- 1. Connect the Gang of 2 Hoses with Solenoid Wire Harness by matching up the numbered labels on the hose ends with the labels on the valve ports. **DO NOT OVERTIGHTEN.**
- 2. Route the Solenoid Wire Harness connectors under the valve and into the two solenoids on the diverter valve until the locking tabs engage.
- 3. Disconnect the dump and curl hoses traveling from the 2 Function control lever to the loader arm.



Key	Port	Plug/Cap Color	Hydraulic Function
A	1	Black	Bucket Cylinder—Rod End
В	2	Yellow	Bucket Cylinder—Head End
С	4	Blue	Lift Cylinder—Head End
D	3	Red	Lift Cylinder—Rod End

- 4. Connect the other end of the gang of 2 hoses to the 2 function control lever outlets according to the labels on the hoses. Verify which outlet fitting is for the **CURL** end of the cylinders (the rod end of the cylinder) and which comes for the **DUMP** end of the cylinders (the head end of the cylinder). Starting with the **LOWER** outlet in the group, match the labels on the hoses to the appropriate outlet. **Tighten these fittings securely.**
- 5. If you are having difficulty connecting all the line, you may want to move the elbows connected to the gang of 2 hoses from the hose end connected to the 2 function control lever to that connected to the diverter.
- 6. Position the protective sheath to protect the hoses from touching the parking stand. Fasten in place by tightening the cable ties and trim the ends.
- 7. Once satisfied with overall fit, pair the new hose gang next to the factory hoses using a moderately tightened cable tie or two.

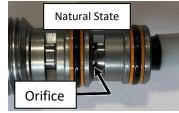


### **Troubleshooting**

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 sharple marker (or equivalent) into the end of the valve. Observe the orifice moving from the far groove to the near groove.





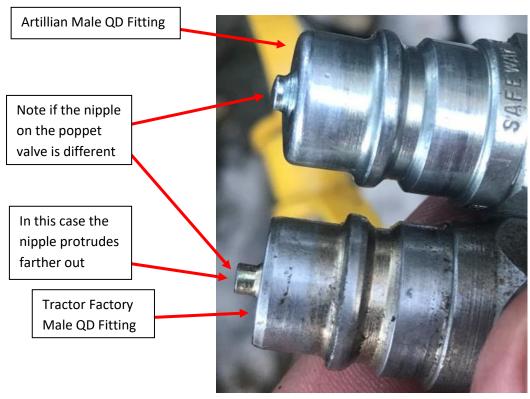


- 5. Depress the plunger several times. If it is sticking, gritty, or stuck, spray the internal components of the valve with WD40 and/or compressed air to dislodge the debris.
- 6. Clean the valve, then lubricate with fresh hydraulic oil.
- 7. Reinstall the solenoid onto the valve and energize to confirm 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.



Artillian, LLC warrants to the original purchaser that this product will be free from defects in material and workmanship for a period of 90 days from the date possession taken by the original purchaser for use with Artillian hydraulic products and used as intended and under normal service and conditions for personal use. If not purchased for use with Artillian hydraulic products (e.g. Grapple, Plow Adapter, etc.), the warranty period is limited to 30 days.

Finishes (coatings, labels, & decals) are not inclusive. Artillian, LLC reserves the right to inspect items claimed to be defective in material or workmanship. Artillian LLC's obligation under this warranty is limited to repair or replacement with a nearest similar part.

This Warranty will not apply to any part or product which in Artillian LLC's judgment shall have been misused or damaged by accident, abuse, misapplication, fire, negligence, or lack of normal maintenance or care, or which has been altered or repaired in a way which adversely affects its performance or reliability, or which has been used for a purpose for which the product is not designed.

Artillian, LLC's obligations under this warranty, to the extent allowed by law, is in lieu of all warranties, implied or expressed, including implied warranties of merchantability and fitness for a particular purpose and any liability for incidental and consequential damages with respect to the sale or use of the product warranted. In any event, liability on behalf of Artillian LLC is limited to the original purchase price.