



HYDRAULIC DIVERter KIT
P/N: HDK-300E-PTL
(fits John Deere 300E and D160)



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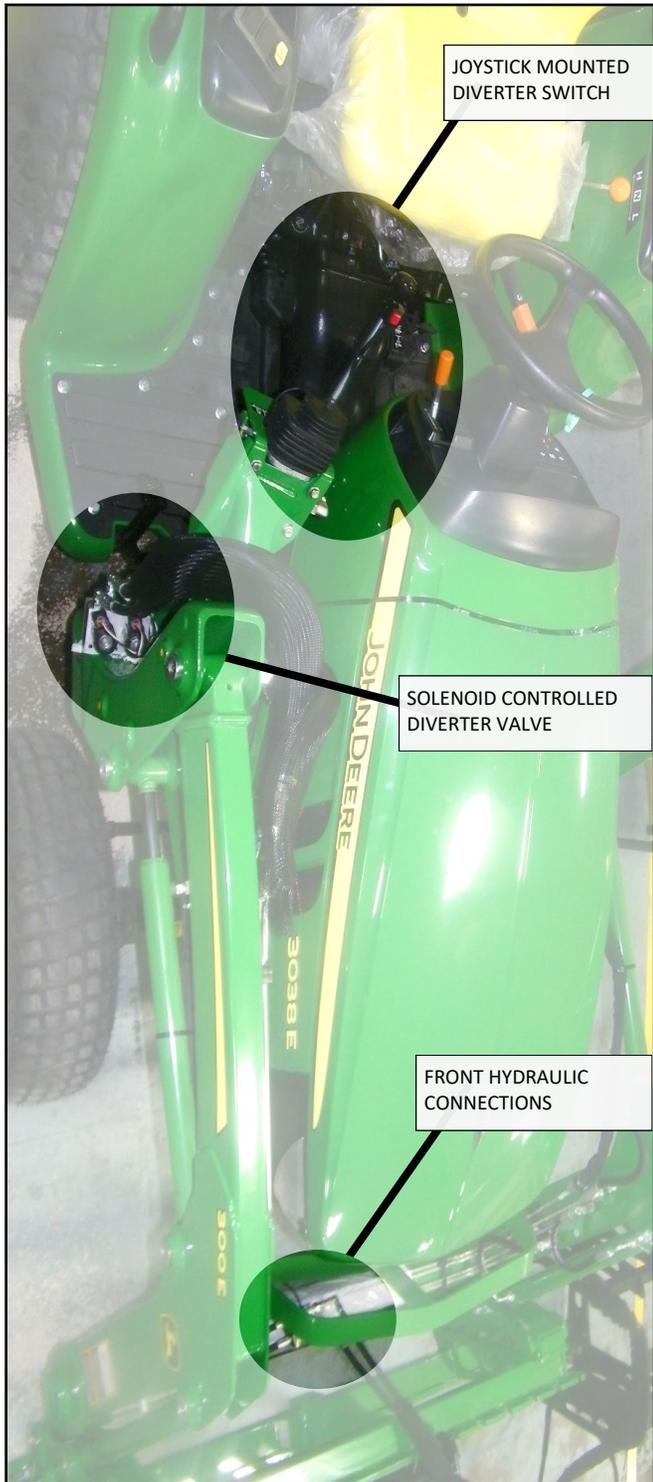
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Artillian strives to continuously improve our products, technical documentation, etc. Therefore, the installation manual for this product may have been updated after your product was packaged. The latest revision of the installation manual can always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



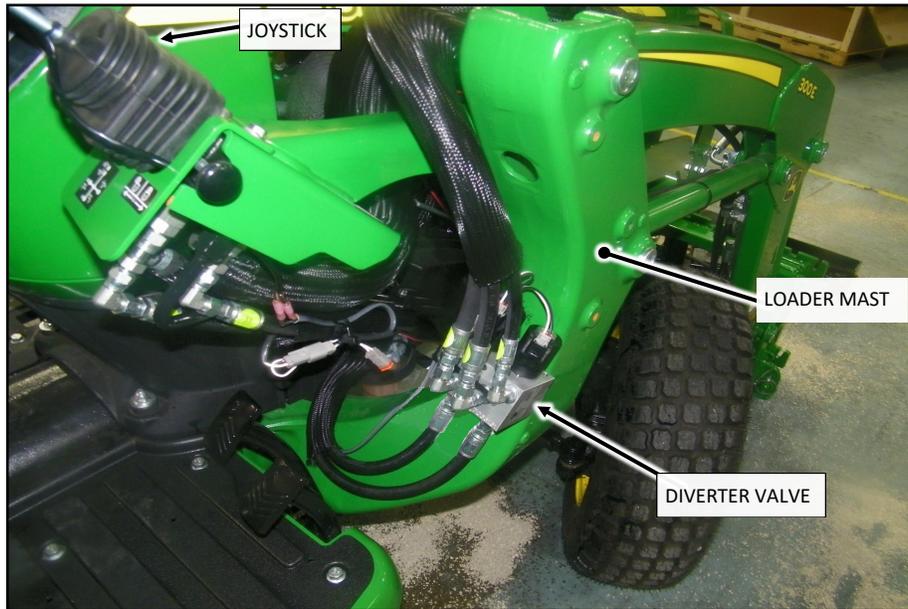
Installation Overview

- Drill mounting holes in loader parking stand
- Remove factory lift/lower 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

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
Electrical Tape (not included)

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

Hydraulic Installation Overview & Key Terms



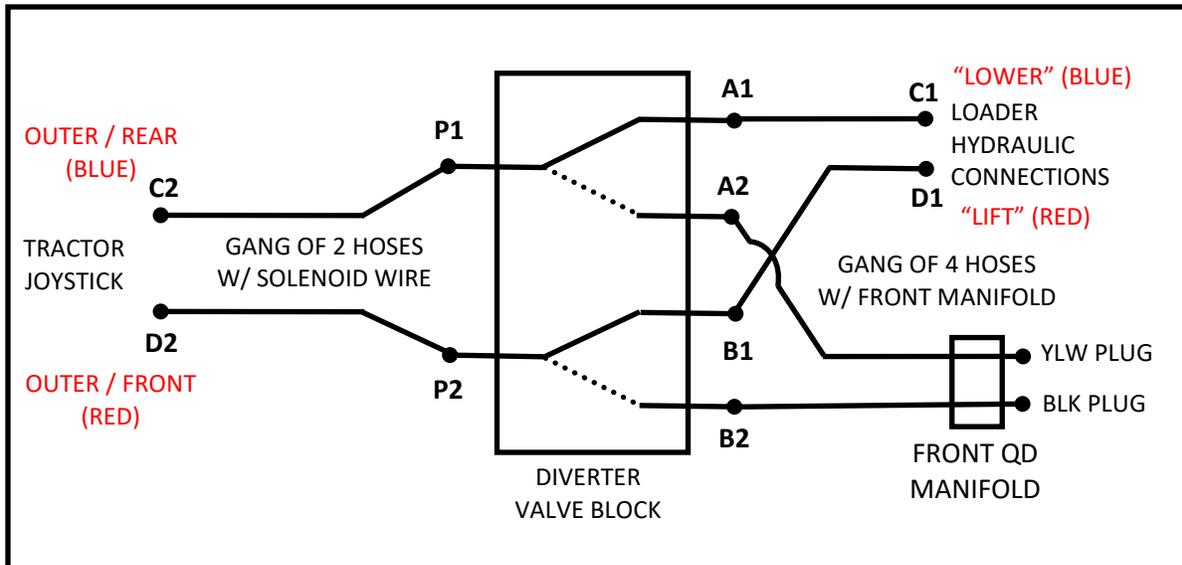
Contents

- 1- Diverter Valve with Loader Stand Mounting System
- 2- Gang of 2 Hoses with Solenoid Wire Harness
- 3- Gang of 4 Hoses with Front Manifold
- 4- Actuator Switch Harness & Power Cable, with pigtail leads
- 5- 16" (or longer) cable tie, 1
- 6- 11" cable ties, 11
- 7- 8" cable ties, 18
- 8- 4" cable ties, 11
- 9- John Deere dust plug, yellow, 1
- 10- John Deere dust plug, black, 1



Valve Connections

- Port P1- Tractor Joystick (Outer-Rear, Blue Hose)
- Port P2- Tractor Joystick (Outer-Front, Red Hose)
- Port A1- Loader "lower" (Blue) hard line
- Port B1- Loader "lift" (Red) hard line
- Port A2- Loader front QD manifold (Yellow plug)
- Port B2- Loader front QD manifold (Black plug)



Refer to the image above 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.

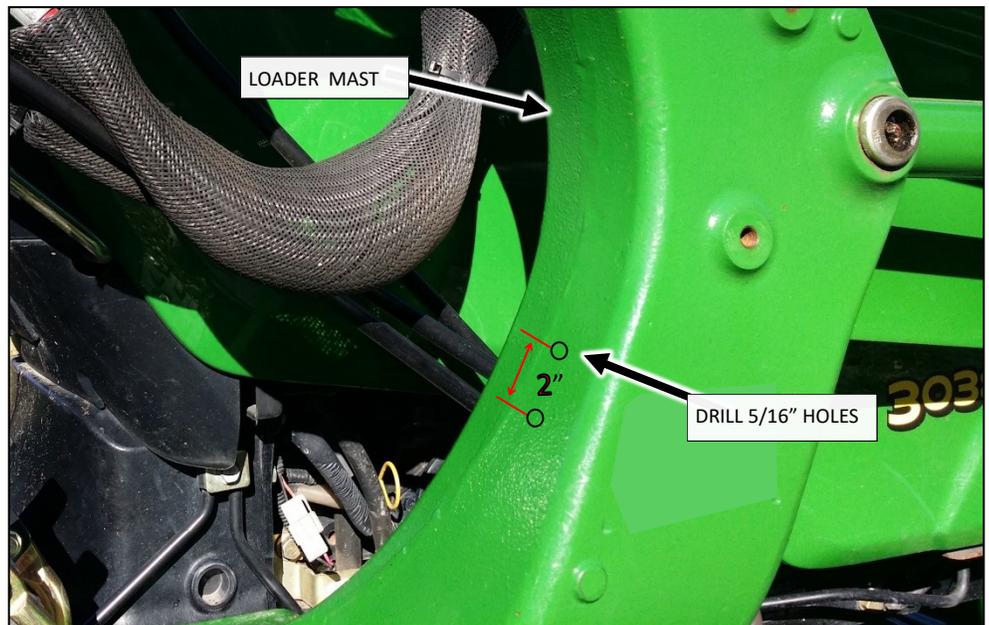
- **Mount the Diverter Valve to the Loader Arm**

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. (Recommended orientation is with solenoids on the top side of the block; this is not necessarily the orientation to be chosen.)

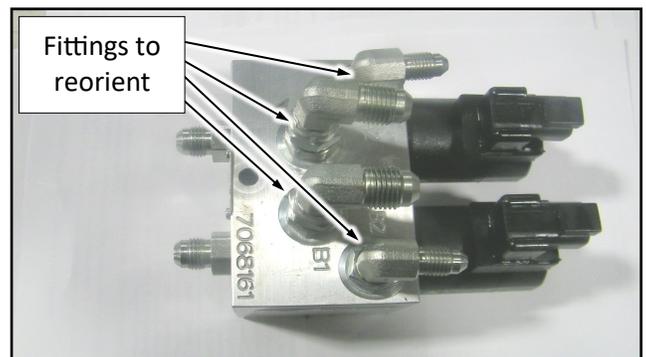


2. Drill two 5/16" holes 2" apart through the side surface of loader mast where marked in the diagram below. Be sure to perform this on the right side of the loader where the hydraulic hoses are routed.

3. Mount diverter to frame by using (2) ¼-20 x 3-1/2" bolts, ¼" ID x 5/8" OD washer, and ¼-20 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.



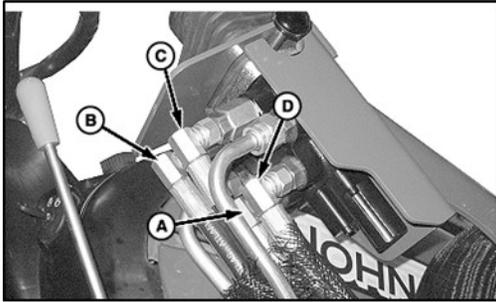
- **Remove the factory Lift/Lower hoses (the two hoses with red and blue bands)**

1. 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.
2. Slide the upper end of the sheath back enough to get access to the connections of the two lift cylinder hoses. These should be the two lower hard lines in the stack, which can be verified by tracing back from the ports of the lift cylinders.
3. Carefully free the hard lines from their mounts on the loader arm. **BE CAREFUL NOT TO BEND, TWIST, OR OTHERWISE DEFORM THE HARD LINES.**
4. 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!
5. 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.
6. Remove (unscrew) both hoses from the underside of the loader joystick. These should be the outer two hoses marked with red and blue bands
7. Slide the two hoses out of the protective sheath. The original hoses will not be needed any longer. They can be stored away for possible future use.



- **Attach the Gang of 2 Hoses with 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, P1 and P2. **DO NOT OVERTIGHTEN.**
2. Route the Solenoid Wire Harness connectors under the diverter valve and into the two solenoids on the diverter valve until the locking tabs engage.



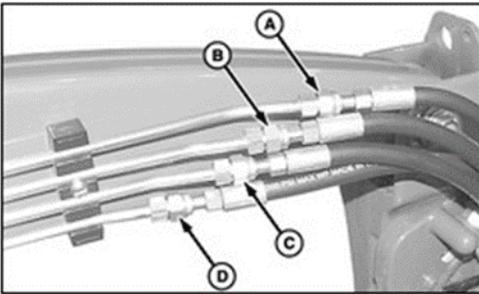
Key	Port	Marking Color	Hydraulic Function
A	1	Black	Bucket Cylinder—Rod End
B	2	Yellow	Bucket Cylinder—Head End
C	3	Blue	Lift Cylinder—Head End
D	4	Red	Lift Cylinder—Rod End

3. Connect the other end of the gang of 2 hoses to the 2 function control lever outlets according to the labels on the hoses: C2 to C and D2 to D. Verify which outlet fitting is for the **LOWER** end of the cylinders (the rod end of the cylinder) and which comes for the **LIFT** end of the cylinders (the head end of the cylinder). Starting with the lowest outlet in the group, match the labels on the hoses to the appropriate outlet. **Tighten these fittings securely.**
4. If you are having difficulty connecting all the lines, 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.
5. Position the protective sheath to protect the hoses from touching the loader. 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

1. 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 **LOWER** end of the cylinders (the rod end of the cylinder) and which comes from the **LIFT** end of the cylinders (the head end of the cylinder). Starting with the lowest 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	Marking Color	Hydraulic Function
A	1	Black	Bucket Cylinder—Rod End
B	2	Yellow	Bucket Cylinder—Head End
C	3	Blue	Lift Cylinder—Head End
D	4	Red	Lift Cylinder—Rod End

4. Cover the joints with the protective sheath. Tighten the cable ties and trim at both ends of the sheath.
5. Use cable ties to pair the new hose gang to the factory hoses. These cable ties should be moderately tightened.
6. 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.



7. At the front of the loader, open the clamp on 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.
8. Install the 16" cable tie on the loader cross tube as needed to secure the hoses to the cross tube.
9. Tighten the Front Manifold mounting clamp until the Manifold is firmly secured on the loader cross tube. **DO NOT OVERTIGHTEN.**
10. Tighten the diverter valve fittings (see Step 4 on Page 4).



THE HYDRAULIC COMPONENTS ARE NOW INSTALLED

CHECK YOUR WORK

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

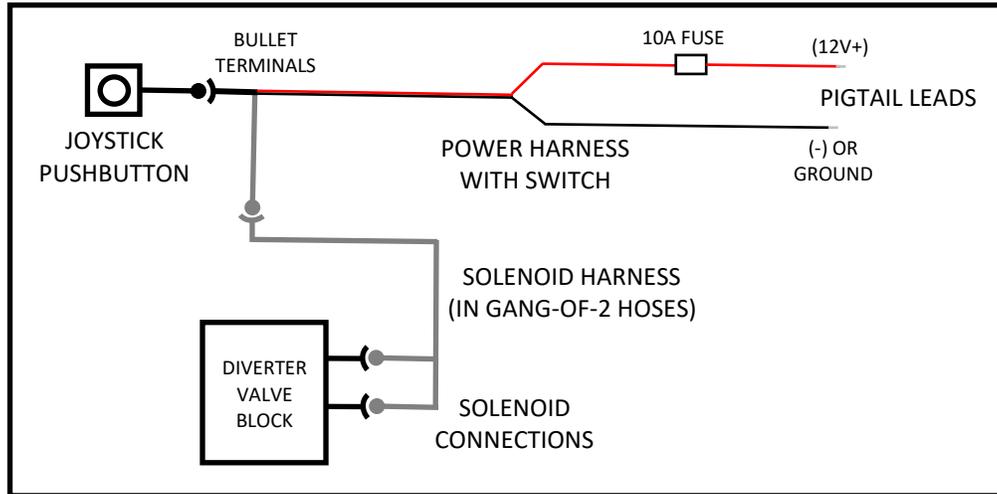
Check all fittings for leaks as you operate the system.

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



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.



1

2

3

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

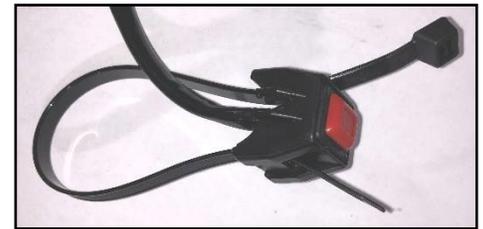
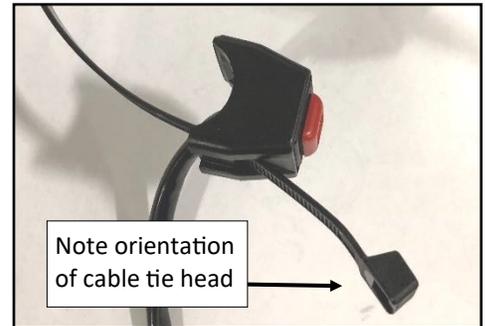
For suggestions on mounting configuration 3 (the square plastic housing with red button), see the next page.

• Install the Actuator Switch Harness

1. 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.
2. 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. Do not trim ties!
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.

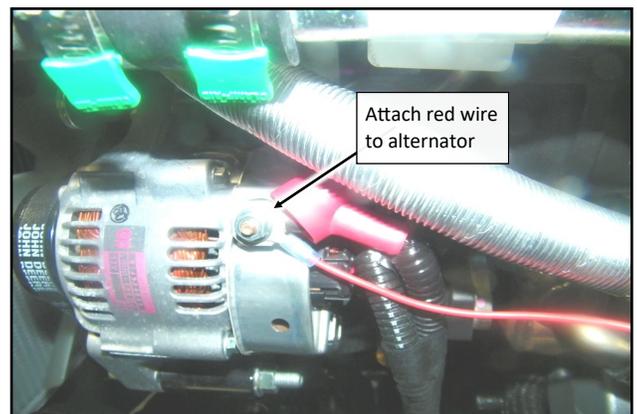
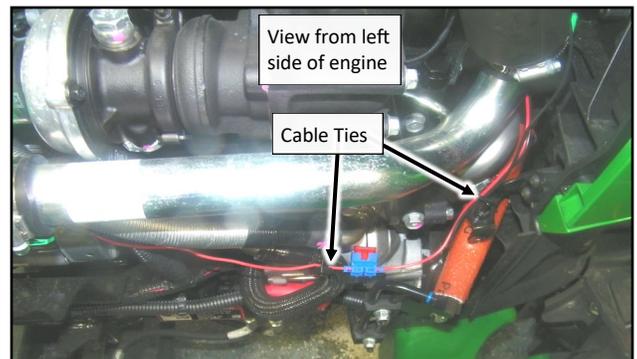
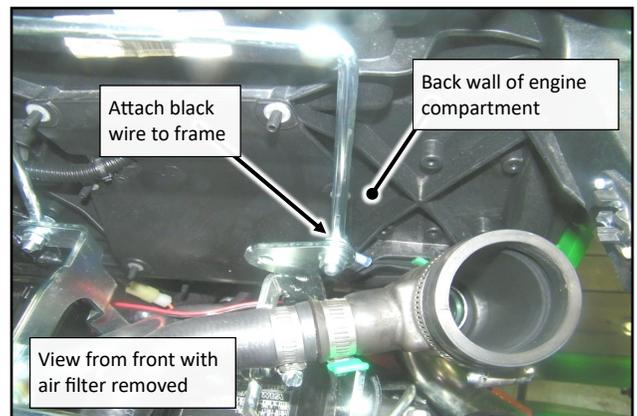
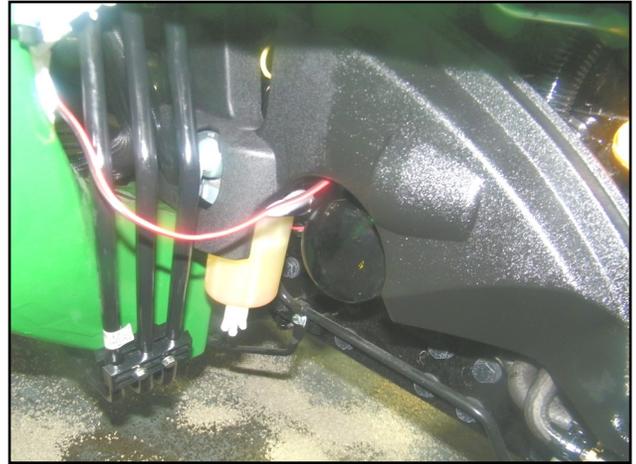


• Connect Power Cable to a 12V Source

- It is critical to remember that wires must not encounter moving parts. While performing the installation, it may be helpful to have someone actuate pedals and levers to observe what interferences may exist.
- Use cable ties to help keep wires away from any moving parts.
- The diverter valve solenoids require 4 amps of electrical current at 12VDC. The power wire is protected by a 10 amp fuse.
- Recommended path for wiring for the 3E family of tractors:
 1. Remove the side shrouds from both sides of the tractor engine compartment. Remove the lower black plastic shroud from the left side of the engine. Remove the air filter housing from the back of the engine compartment.
 2. Route the power harness under the lower side shroud, above the oil filter, then across the back of the engine compartment toward the left side of the tractor.
 3. Attach 5/16" ring terminals (not provided) to the pigtails on the power harness.
 4. Connect the black wire to a grounded frame bolt as shown to the right.

NOTE: The air cleaner may need to be temporarily removed to allow access to frame bolts. It may be helpful to check the bolt for ground to the battery with a multi meter.

5. Connect the red wire to the power terminal on the alternator, as shown to the right.



System Operation

The loader lift/lower 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 lift 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.

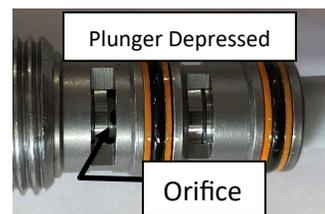
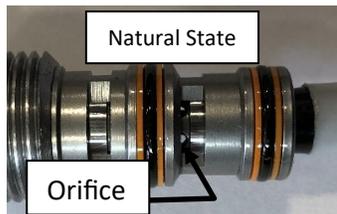
When there is an attachment connected to the Front Manifold, whenever you **BOTH**, A) Press the joystick push button, **AND, B)** move the joystick to the lift or lower, fluid will be diverted to the Front Manifold **WHILE** you continue to press the button. If you release the joystick push button at any time, fluid flow will return to the normal lift/lower 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.

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.



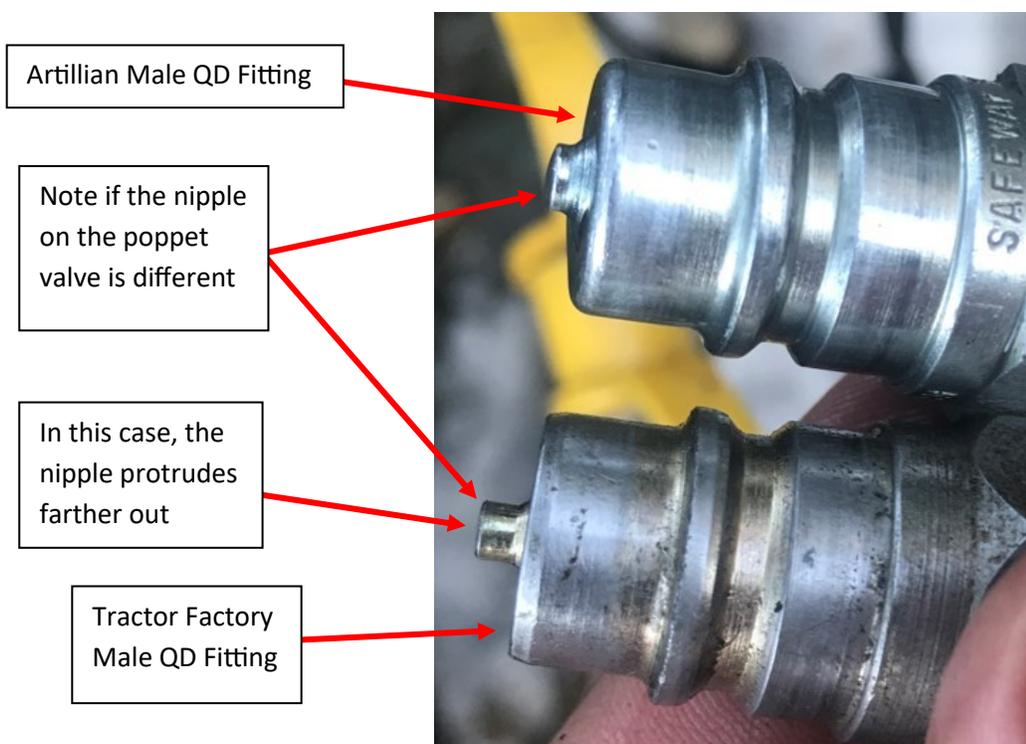
5. Depress the plunger several times. If it is sticking, gritty, or stuck, spray the internal components of the valve with WD40 and/or compressed air to dislodge the debris.
6. Clean the valve, then lubricate with fresh hydraulic oil.
7. Reinstall the solenoid onto the valve and energize to confirm functionality.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

Warranty

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.

Congratulations and Thank you for choosing Artillian!