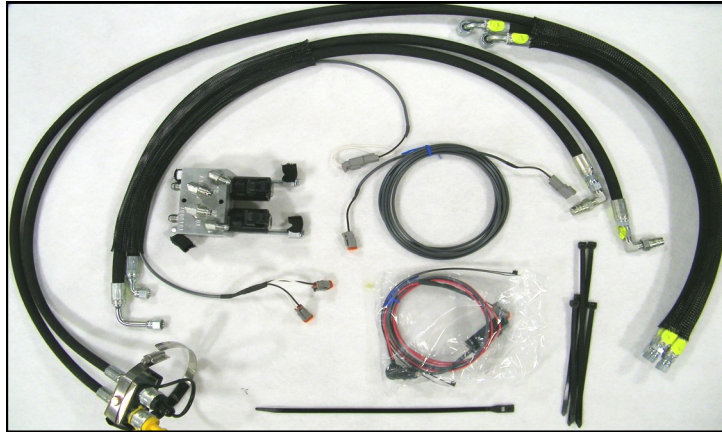




HYDRAULIC DIVERTER KIT
P/N: HDK-220R-PTL
(note: works with 220R MSL loader)
(note: fits with the John Deere Single Point Hydraulic Connector, but must also purchase kit p/n: HDK-120R-SPHA)




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

Register your new product quickly online at Artillian.com/product-registration/



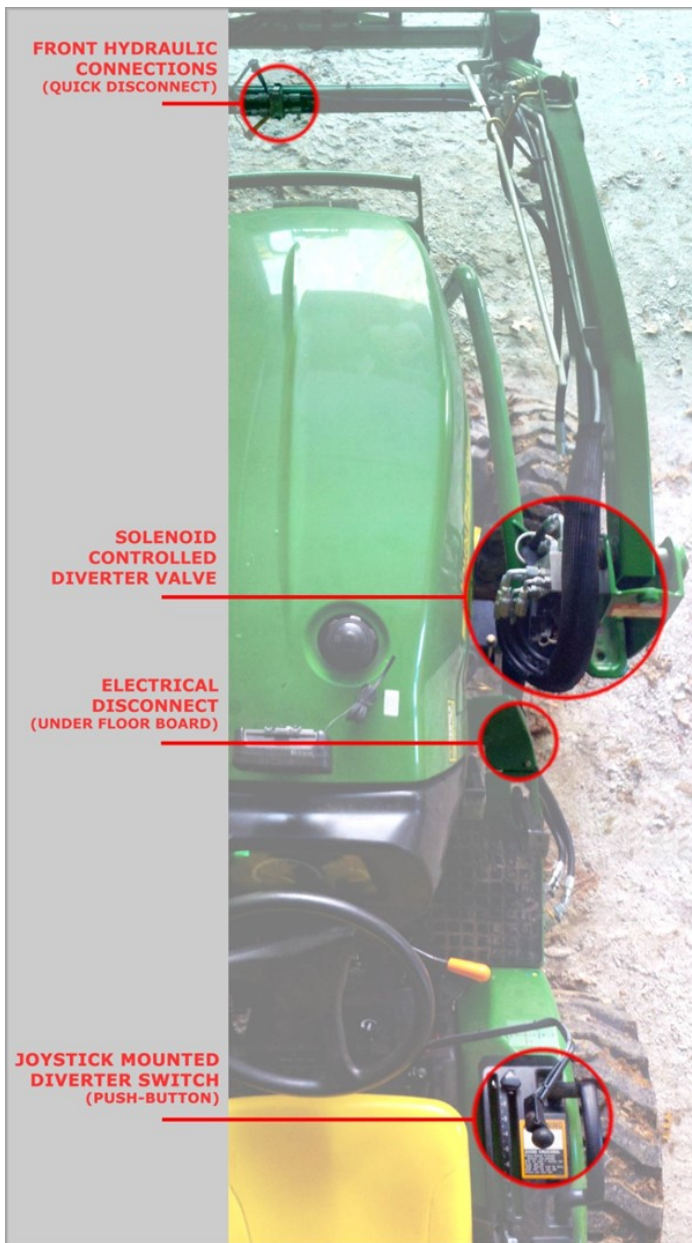
Artillian encourages all customers to register their Artillian products. However, failure to do so will not diminish right to warranty. Curtis Industries does not sell or share your information with anyone else.

Download a digital copy of your installation instructions online at Artillian.com/literature/



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

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

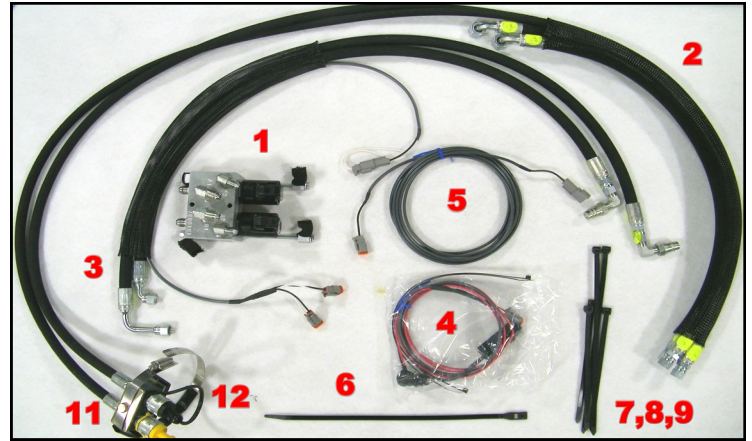
Tools Required

- 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

Valve Specifications

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

- 1 - Hydraulic Diverter Valve with Edge Clamp 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" 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 QD dust plug, yellow
- 12- John Deere QD dust plug, black



Hydraulic Connections

Note: for installation on the John Deere Single Point Hydraulic Connector, replace the quick disconnects found on the P1 and P2 hoses with the adapter fittings provided in kit p/n: HDK-120R-SPHA (sold separately).

Valve Port P1—Tractor QD (Black dust cap)

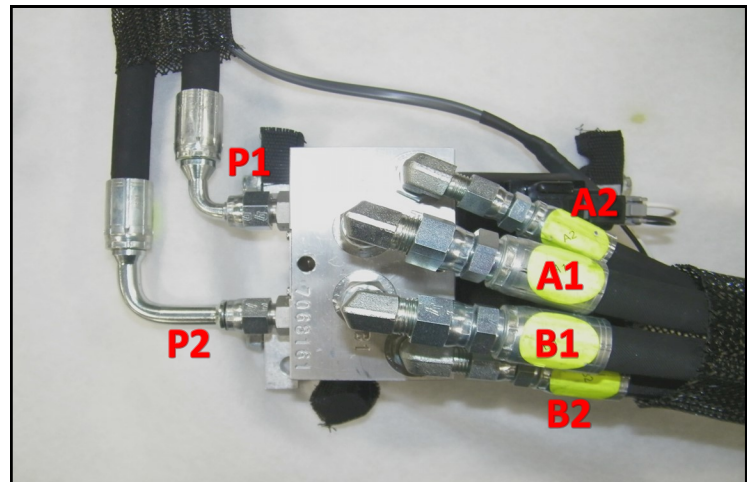
Valve Port P2—Tractor QD (Yellow dust cap)

Valve Port A1—Loader “Curl” hard line

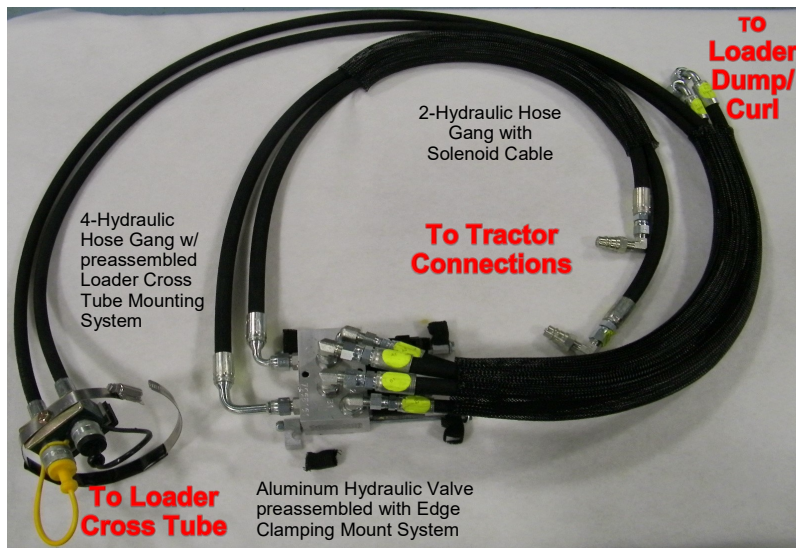
Valve Port B1—Loader “Dump” hard line

Valve Port A2—Loader front QD manifold (Black Plug)

Valve Port B2—Loader front QD manifold (Yellow Plug)



Hydraulic Connection Overview



1. Remove the factory dump/curl hoses (the existing loader hoses with yellow and black dust caps)

- 1.1 Turn off tractor. Settle loader to the ground. Actuate all hydraulic controls to relieve hydraulic pressure throughout the system.
- 1.2 Before cutting, note the position of the ends of the protector. Cut and remove the cable ties at both ends of the protective webbing on the loader.
- 1.3 Slide the upper end of the hosed protector back enough to access the two curl cylinders hose connections to the hard loader lines. These should be the two upper connections of the stack marked with black and yellow cable ties.
- 1.4 Separate the hard lines from their restraints on the loader arm just enough to access with a wrench.

CAUTION: BE CAREFUL NOT TO BEND, TWIST, OR OTHERWISE DEFORM ALUMINUM HARD LINES. THIS WILL DAMAGE LOADER FUNCTION.

- 1.5 Place an absorbent rag and/or basin beneath the hose connections to catch hydraulic fluid that will leak from lines.
- 1.6 Using a 7/8" wrench, carefully and slowly separate these connections. Once separated, bagging the ends of these lines is recommended to catch any excess fluid.
- 1.7 Disengage quick disconnects marked with Yellow and Black dust caps from the tractor.
- 1.8 Carefully remove the factory dust caps from factory hoses, these will be re-used on Artillian hoses.
- 1.9 Slide factory hoses out of the protective webbing. Cleanest method to do this is to pull the quick disconnects end through protective webbing. These hoses will not be re-used, but you may wish to store them for possible future use.
- 1.10 Install 8" cable ties at each end of the hose protector around the two remaining factory hoses. Be sure hose is covering blue and red marked factory hard lines still connected to tractor. DO NOT cover unconnected hard lines.



Installation



2. Install the Hydraulic Valve with preassembled edge Clamp Mounting System.

- 2.1 Orient hydraulic diverter valve as shown. With the longer 1/4-20 bolt located on the top. Note: Longer valve mounting screws have been provided to accommodate MSL (Mechanical Self-Leveling) loaders. It is up to the discretion of the installer to replace the valve mounting screws, as required.
- 2.2 Place diverter valve on inside of loader mast within the loop of hoses with the solenoids pointing towards the rear of the tractor.
- 2.3 Slide diverter valve up loader mast until it is level above the curve in mast. Be sure valve is as level as possible to retain clearance between Artillian hoses (when installed) and factory hoses on tractor.
- 2.4 Slide diverter valve forward on 1/4-20 bolts towards the front of the tractor and tighten hardware to secure edge clamps around loader mast.

CAUTION: TIGHTEN HARDWARE ONLY UNTIL IT HOLDS THE DIVERTER VALVE FIRMLY IN PLACE. OVERTIGHTENING WILL CAUSE BENDING AND MAY DAMAGE THE SOLENOIDS.

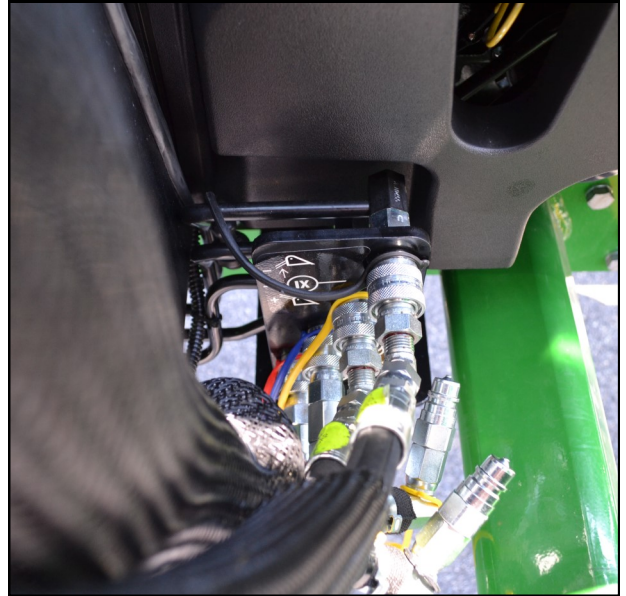


3. Install the Gang of 2 Hoses

- 3.1 Insert Gang of 2 Hoses through the loader hose guides and run gang alongside the existing loader hoses down to the tractor quick disconnect manifold.
- 3.2 Attach 2 hoses with elbows to diverter valve matching the numbered tags. Tighten these connections. Orient fittings down, if this causes them to come too close to vehicle tire, reverse them.

CAUTION: Do not overtighten fittings, this could lead to damaging fittings and cause leaks or air bubbles.

- 3.3 Route solenoid wire harness plugs under diverter valve to solenoids and connect one to each solenoid.
- 3.4 Install colored dust caps removed in Step 1.8 onto quick disconnect fittings on Artillian hoses . Black cap goes onto the P1 hose and Yellow cap onto the P2 hose.
- 3.5 Connect hoses to tractor and adjust so they flow smoothly alongside the existing hoses. Position electrical connector so it can be easily accessed when attaching and detaching loader.
- 3.6 Adjust hoses until satisfied with overall fit , use cable ties to secure to factory hose and away from hot surfaces and moving parts.



4. Install the Gang of 4 Hoses with Front Manifold

- 4.1 Locate the gang of 4 hoses that contains the front manifold. Unscrew and open up the band and wrap it around the loader front cross tube with the two hoses directed toward the right side of the loader. Set manifold on top of the protective cover of the loader cross tube as shown.
- 4.2 Insert the tail of the mounting clamp into the screw housing. Take up excess length, leave very loose.
- 4.3 Remove (2) 1/4" hoses from grouping and route them up the loader arm. Be sure to avoid any pinch points during routing. Reinsert into protective sheath once routed.
- 4.4 Secure 1/4" hoses loosely to the loader arm or hydraulic hard lines using 8" cable ties to help keep desired path.



NOTE: Leave them loose so lines are free to slide up or down while installing.



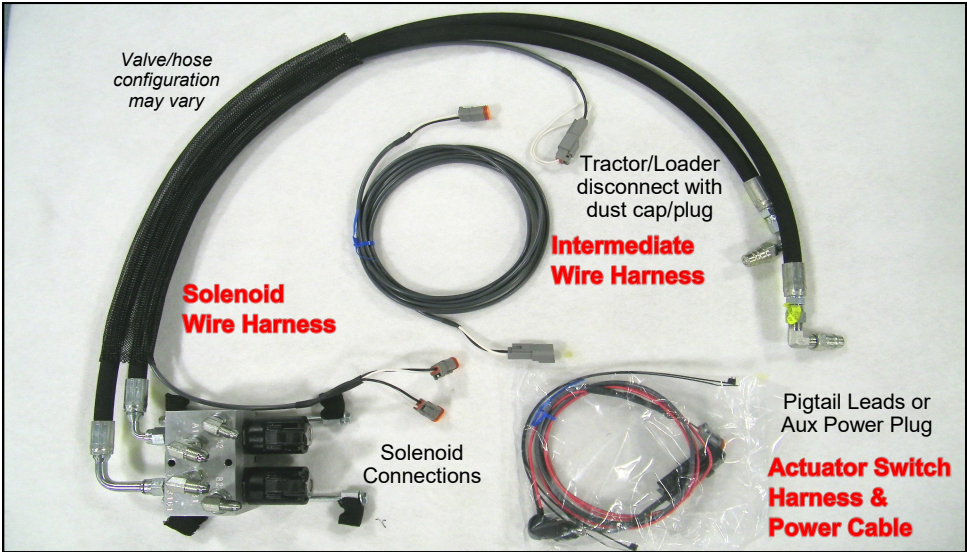
Installation



- 4.5 Route 1/4" and 3/8" hoses in protective sheath along path of vehicle hard lines and to Artillian Diverter Valve.
- 4.6 Connect fittings from gang of 4 hoses to the diverter valve by matching hose labels to labels on valve. Tighten each fitting securely as you go, **DO NOT OVERTIGHTEN.**
NOTE: Fittings should be installed in this order: A2, B2, A1, B1.
- 4.7 Connect the dump/curl hoses from ports A1 & B1 to the loader hard lines. Observe which hard line serves the CURL end of the cylinder (the LOWER port on the cylinder) and the DUMP end of the cylinder the UPPER port on the cylinder). Starting with the Lower of the two hard lines in the stack, match the labels on the hoses to the appropriate hard line. Be sure to tighten these fittings securely.

CAUTION: BE CAREFUL NOT TO BEND, TWIST, OR OTHERWISE DEFORM ALUMINUM HARD LINES. THIS WILL DAMAGE LOADER FUNCTION.
- 4.8 Return hard lines back to restraints on the loader arm.
- 4.9 Cover the hose connections with new hose protector and cable tie in place. Trim excess cable tie.
- 4.10 Making your way down the loader arm, straighten and align the two hoses leading to the front, tightening the cable ties and clipping off the excess as you go. Perform this all the way down to the Front QD Manifold.
- 4.11 Install the 16" cable tie on the loader cross tube as needed to secure the hoses to the cross tube.
- 4.12 Up near the diverter valve, use cable ties to pair the new hose gang to the existing hose gang. When finished, all hard line connections should be covered by webbing.
- 4.13 Tighten the Front QD Manifold clamp until the manifold is firmly secured on the loader cross tube. **DO NOT OVERTIGHTEN.**
- 4.14 Hydraulics are now installed. 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.

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.



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.

5. Install the Joystick Switch and Switch Cable

- 5.1 Set switch housing against the tractor joy stick where shown.

NOTE: See instructions on the next page for how to attach the switch to the tractor joystick.

- 5.2 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.
- 5.3 Once satisfied with fit, insert the included cable tie through switch and around the joystick. Tighten somewhat, until the switch will not fall but may still be rotated. **DO NOT TRIM TIES!**
- 5.4 Sit on tractor seat and orient the switch to the desired position for your comfort, then tighten the cable ties and trim away excess.
- 5.5 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. For this step, you may want to remove some of the cover panels from the operator station in the area of the joystick as the wiring going forward will be passing through this area.

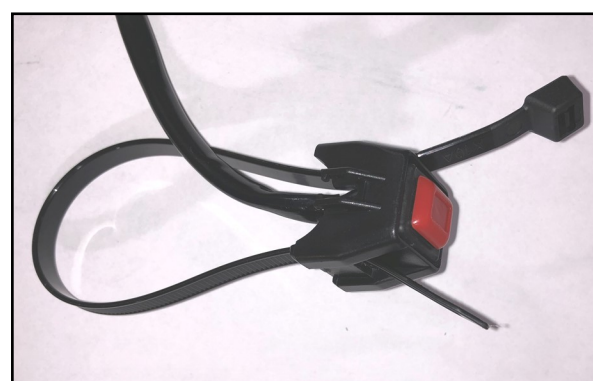
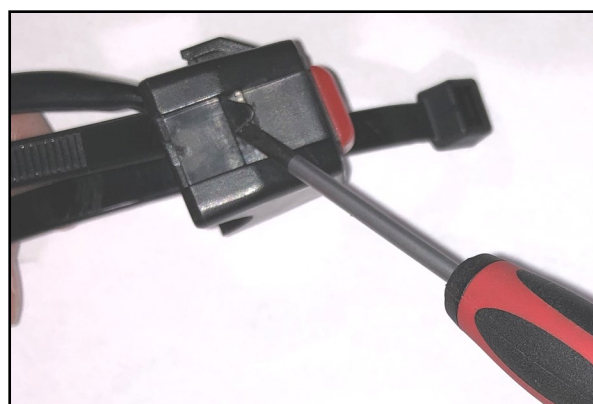
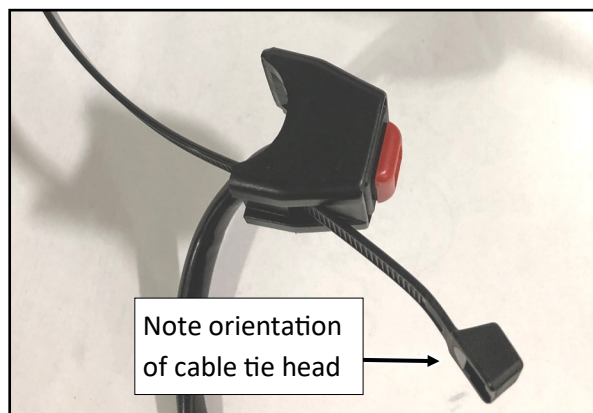


5a. Attach the Switch to the Tractor Joystick

- 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.
- 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.

- Place the switch over the tractor joystick, orient as desired then pull the cable tie loop tight.
- 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.



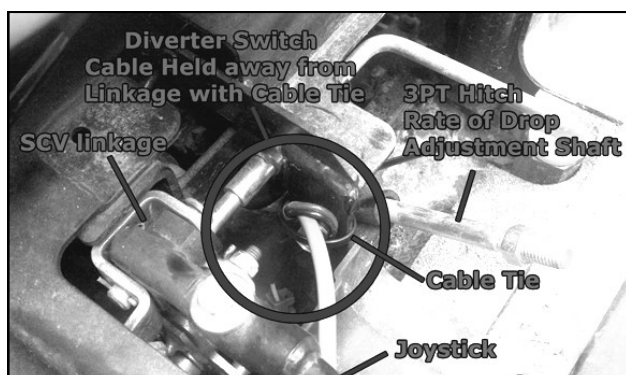
Installation



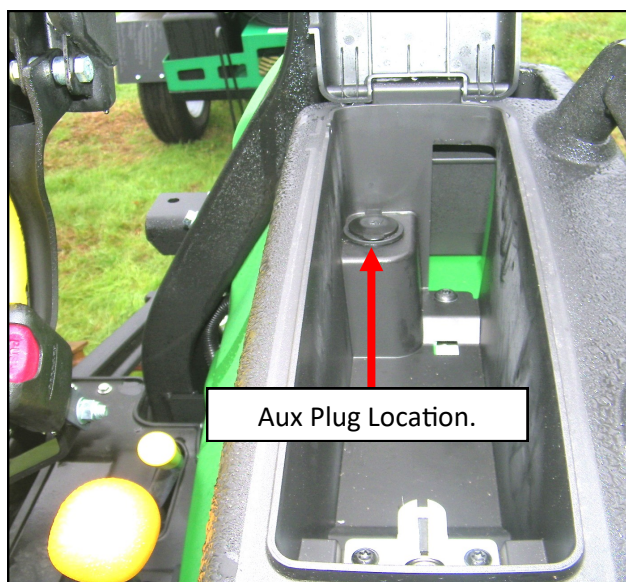
6. Install the Intermediate Cable and Connect to a 12V Power Source.

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

- 6.1 The intermediate is used to connect the Switch Cable to the Solenoid Cable. 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.
- 6.2 You may need to remove some of the covers from the operator station to determine the best path for wiring.



- 6.3 It is critical to remember that wires must not encounter moving parts. Use cable ties to secure wires. These parts include SCV linkage as shown. While performing the installation, it may be helpful to have someone actuate pedals and levers to observe what interferences may exist.
- 6.4 Diverter valve solenoids require 4 amps to 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.



- 6.5 If your diverter kit has the optional auxiliary power plug, wherever the Switch Cable passes through the tractor body, the power wire should branch off and be routed externally to the auxiliary power port on your tractor.

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.

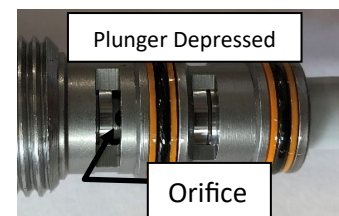
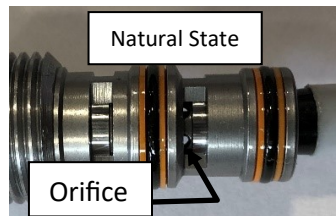
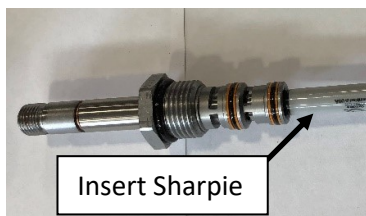
If this functionality is observed, the user should take note of how far they are able to move the joystick to the right before the Grapple jaws change from opening to closing, and then limit their joystick input when opening the Grapple. An alternative solution is to switch the Grapple hoses at the quick 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.



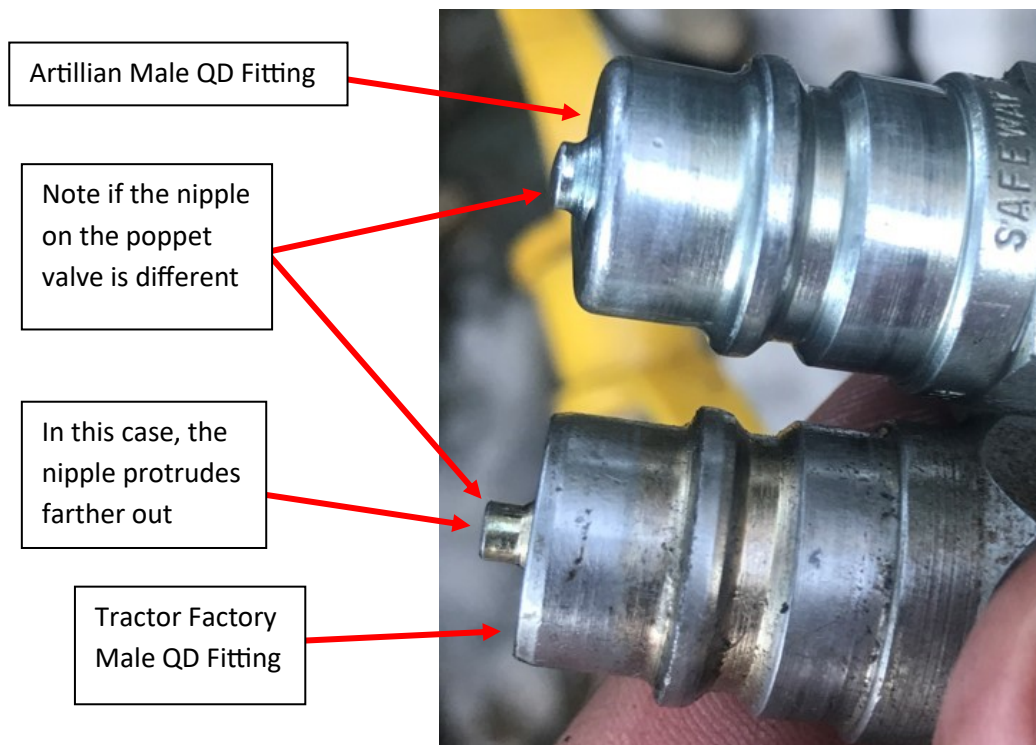
5. Depress the plunger several times. If it is sticking, gritty, or stuck, spray the internal components of the valve with WD40 and/or compressed air to dislodge the debris.
6. Clean the valve, then lubricate with fresh hydraulic oil.
7. Reinstall the solenoid onto the valve and energize to confirm functionality.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