# Hydraulic Kit Installation

<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Part Number</th>
<th>Qty</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Hose, 1/2” x 60-8F ORFS x -8F ORFS 90</td>
<td>F451TC-JCJ9080808-60</td>
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<tr>
<td>2.</td>
<td>Hose, 3/8” x 60-6F ORFS x -8F ORFS 90</td>
<td>F451TC-JCJ9060806-60</td>
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<td>3.</td>
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<td>4.</td>
<td>Hose, 1/4” x 60” -4F ORFS x -4M ORFS</td>
<td>F451TC-JCJO040404-60</td>
<td>1</td>
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<tr>
<td>5.</td>
<td>Run Tee ORFS F-M-M -8</td>
<td>8_R6LO-S</td>
<td>4</td>
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<td>6.</td>
<td>Hose ID Cable Ties Kit</td>
<td>200-0467-01</td>
<td>1</td>
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<tr>
<td>7.</td>
<td>Install Guide</td>
<td>602-0349-01</td>
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Overview

High-Pressure Fluid Hazard
Read and understand the vehicle’s user manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

These instructions provide the procedure for installing the Steering Valve, hydraulic hoses, and other fittings to enable the supported vehicles to be controlled by the AutoSteer system. The Steering Valve allows the AutoSteer system to take over the steering of the vehicle by directly controlling the hydraulics of the vehicle’s steering system.

Note: Only trained professionals should attempt to install a Steering Valve on the vehicle. Incorrect installations can cause damage to the vehicle and/or AutoSteer systems. The installer takes responsibility for all risks from damage and injury when installing a Steering Valve on a vehicle.

Supported Vehicles

The following models have been confirmed to be compatible with this Hydraulic Installation Kit:

Note: * For the Ag Chem TerraGator 6203 and 8203 models, this kit only supports those built for the 2009 – 2010 model year with the ORFS connectors on the Orbitrol. Earlier models use a JIC connector on the Orbitrol and require a different kit. Some earlier produced vehicles for this model year may still have JIC connections. Always check the Orbitrol on these models to and verify which type of connectors they use before starting the installation.

Supported Make, Models, and Year Model was First Released

<table>
<thead>
<tr>
<th>Supported Make, Models, and Year Model was First Released</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag Chem TerraGator 6203 and 8203 (2009 -) *</td>
<td>3</td>
</tr>
<tr>
<td>Ag Chem TerraGator 6303 and 8303 (2010 -)</td>
<td>3</td>
</tr>
<tr>
<td>Ag Chem TerraGator TG7300 and TG8300 (2012 -)</td>
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</table>
Identify Steering Valve Access Ports

The Steering Valve has three access ports that may need to be opened and modified depending on the type of hydraulic installation. Two of these ports are accessed from the front of the valve and the third is accessed from the right side of the valve. They are labeled 13A, 13B, and 13C. Depending on the hydraulic system on the vehicle and the installation type, a plug, a 0.022” orifice, and/or a 0.031” orifice may need to be installed or removed from the various ports to restrict or allow oil movement inside the valve. Follow the instructions provided to determine how these ports are to be configured.

A spare 0.022” orifice, 0.031” orifice, and plug are supplied with the Steering Valve and are stored in the valve body for safe keeping and easy access. These parked orifices and plug can be removed from the front of the valve body and installed into the required access port when directed. Prior to inserting them, verify that they are clean and the orifice holes are not plugged.

Figure 1 shows the location of the 13B and 13C access ports and spare orifices and plug parked on the front of the Steering Valve. The Steering Valve cover must be removed to gain access to these ports. Figure 2 shows the location of the 13A port.
Table 1 shows the factory default positions of all the access ports and the positions they should be in for this installation. Prior to installing the Steering Valve, refer to this table and verify that all the access ports are configured properly. For this installation, the default configuration should be correct and no changes will need to be made.

**Table 1 Plug and Orifice Configuration Summary**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>13A</th>
<th>13B</th>
<th>13C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory Default Configuration</td>
<td>Plug</td>
<td>Open</td>
<td>Plug</td>
</tr>
<tr>
<td>Configuration for this Installation</td>
<td>Plug</td>
<td>Open</td>
<td>Plug</td>
</tr>
</tbody>
</table>
Configure Steering Valve Ports

Prior to installing the Steering Valve onto the vehicle, it is necessary to confirm the various ports identified above on the Steering Valve to match the conditions shown in Table 3. This procedure is much easier to perform before the Steering Valve is installed.

**Note:** Although the Steering Valve should come from the factory as shown, it is always a good practice to verify that each of the ports is configured properly.

1. Place the Steering Valve on a flat surface. Remove the four cover screws with a 3/16” Allen wrench.

2. Remove the front cover and screws and save them for the final reassembly after the Steering Valve has been installed on the vehicle and the Load Sense Pressure Relief Valve has been adjusted.
Install Steering Valve

The Steering Valve is installed under the vehicle on the chassis on the front left side. A flat Steering Valve Mounting Bracket is secured to an existing vehicle mounting location and the Steering Valve is attached to the bracket.

**Note:** Some vehicles may have optional sprayer equipment mounted on the vehicle that may appear different than the photos provided in this document. Modify the installation instructions to take these unexpected differences into account.

### Install Steering Valve

1. Locate the Steering Valve mounting area on the right side of the machine below the front corner of the cab.

2. Locate the existing bolt on the bracket that holds the fuel tank to the frame. This bolt will be used to attach the Steering Valve Bracket.

   **Note:** This next step requires the removal of two of the bolts holding the fuel tank to the frame. There are two other bolts that should hold the tank firm; however it is suggested to either brace the bottom of the fuel tank with blocks or a jack or perform this step this with the fuel tank close to empty tank to be safe.

3. Remove the two bolts of the fuel tank bracket with a 5/8” socket and ratchet and 5/8” wrench.
4. Attach the Steering Valve Mounting Bracket to the vehicle with the bolts that were just removed.

5. Tighten the bolt with a 5/8” socket and ratchet and 5/8” wrench.

6. Tighten the two 5/16” x 3/5” hex bolts shown with a 1/2” socket and ratchet to hold the cover firmly to the Steering Valve block while installing.
   
   **Note:** Prior to tightening the bolts, verify the cover is centered so that the other holes on the cover will allow a bolt to screw in easily.

7. Remove the other four 5/16” x 3/4” hex head bolts from the back of the Steering Valve cover.

8. Place the Steering Valve next to the Steering Valve Bracket and attach using the four 5/16” x 3/4” hex head bolts that were removed earlier.

9. Tighten the bolts with a 1/2” socket and ratchet.
   
   **Note:** The connectors should point to the front of the vehicle.
Identify Steering Valve Ports

The Steering Valve is attached to the various hydraulic ports to integrate the AutoSteer system with the steering system on the vehicle. The Steering Valve has eight ports that are referenced in these instructions. A diagram of the port locations are provided in Figure 3 and the description, function, and the hose adapter type and size for each port is provided in Table 2.

Figure 3  Steering Valve Ports

Table 2  Steering Valve Port Functions and Fitting Sizes

<table>
<thead>
<tr>
<th>Valve Label</th>
<th>Function</th>
<th>Fitting Type/Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESS</td>
<td>Provides pressurized oil to the Steering Valve</td>
<td>-8 ORFS</td>
</tr>
<tr>
<td>TANK</td>
<td>Releases oil back to the tank</td>
<td>-6 ORFS</td>
</tr>
<tr>
<td>LS ORBITROL</td>
<td>Load Sense line from Orbitrol for kick out detection</td>
<td>-4 ORFS</td>
</tr>
<tr>
<td>LS OUT</td>
<td>Load Sense line out to signal the pump to spool up</td>
<td>-4 ORFS</td>
</tr>
<tr>
<td>LEFT</td>
<td>Steering Line to turn vehicle Left</td>
<td>-6 ORFS</td>
</tr>
<tr>
<td>RIGHT</td>
<td>Steering Line to turn vehicle Right</td>
<td>-6 ORFS</td>
</tr>
<tr>
<td>GP</td>
<td>Diagnostics Port showing pressure at the Pressure Port</td>
<td>1/8&quot; Coupler Nipple (SAE J1502)</td>
</tr>
<tr>
<td>TRANS</td>
<td>Pressure Transducer for kick out</td>
<td>-4 SAE ORB</td>
</tr>
</tbody>
</table>
Hose Connection Overview

*Figure 4* shows all the hydraulic connections prior to attaching to the Steering Valve. Use this diagram to identify the hoses prior to removing them.

*Figure 5* shows an overview of how the hoses and fittings included with this kit are to be installed on the vehicle.

- The PRESS port is teed into the Pressure line at the Orbitrol.
- The TANK port is teed into the Tank line at the Orbitrol.
- The LEFT and RIGHT ports are teed into the corresponding Left and Right lines at the Orbitrol.
- The LS OUT port is connected to the existing hose that was originally connected to the Orbitrol Load Sense port.
- The LS ORBITROL port is connected to the Load Sense port at the Orbitrol.
The install kit provides colored cable ties that are used to identify the hoses in the install kit. Before attaching the hoses, use Table 3 to identify each of the hoses and then attach the proper colored cable tie to both ends of the hose. These cable ties can also be used to identify existing hoses on the machine. Use the Hose Number column from Table 3 to identify the hoses shown in Figure 5. If the number has a "- #" after it, it means that there are multiple hoses with the same length and fittings provided with the kit.

Table 3 Recommended Cable Tie Color to Identify Hydraulic Hoses

<table>
<thead>
<tr>
<th>Valve Port Hose</th>
<th>Color</th>
<th>Hose Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE</td>
<td>Red</td>
<td>1</td>
<td>Hose, 1/2&quot; x 54&quot; -8F ORFS x -8F ORFS 90</td>
</tr>
<tr>
<td>TANK</td>
<td>Green</td>
<td>2-1</td>
<td>Hose, 3/8&quot; x 54&quot; -6F ORFS x -8F ORFS 90</td>
</tr>
<tr>
<td>LS ORBITROL</td>
<td>Blue</td>
<td>3</td>
<td>Hose, 1/4&quot; x 54&quot; -4F ORFS x -4F ORFS</td>
</tr>
<tr>
<td>LS OUT</td>
<td>Gray</td>
<td>4</td>
<td>Hose, 1/4&quot; x 54&quot; -4F ORFS x -4M ORFS</td>
</tr>
<tr>
<td>RIGHT</td>
<td>Yellow</td>
<td>2-2</td>
<td>Hose, 3/8&quot; x 54&quot; -6F ORFS x -8F ORFS 90</td>
</tr>
<tr>
<td>LEFT</td>
<td>Orange</td>
<td>2-3</td>
<td>Hose, 3/8&quot; x 54&quot; -6F ORFS x -8F ORFS 90</td>
</tr>
</tbody>
</table>
Figure 6 identifies the position of the ports on a standard Orbitrol. Use this diagram to help identify the ports on the vehicle. Attach the correct colored cable tie to the hose prior to removing them to keep them straight. Use the color scheme provided in Table 3 so they match hoses used in the installation kit.

**Note:** The original hose connected to the Load Sense port on the Orbitrol should be labeled with a Gray cable tie in this installation as this hose will eventually be connected to a hose going to the LS OUT port on the Steering Valve. The actual Load Sense port on the Orbitrol can be marked with a Blue cable tie as this port will eventually be connected a hose going to the LS ORBITRO port on the Steering Valve.

**Note:** Always confirm that the ports shown Figure 6 are actually the same as the ones on the vehicle prior to performing the installation to avoid problems or system damage.
Attach Hoses and Hose Fittings

The hoses should be connected in the order provided in this installation manual to ensure that all the connections can be accessed and tightened properly. Refer to the hose diagram in Figure 5 and the information in Table 2 and Table 3 for information on connecting the correct hydraulic hose to the correct ports on the vehicle and Steering Valve.

**Note:** Verify all the hoses and fittings are in the correct orientation shown in the figures prior to tightening them. Failure to put them in the proper orientation may cause the hoses to be damaged or not reach the intended connection.

### Attach Hoses and Fittings

1. The Orbitrol for the steering wheel is located under the hood right in front of the cab.

2. Locate eight bolts holding the front side of the rear hood assembly onto the vehicle.

   **Note:** Only five of the eight are shown to the right. There are two on the left side of the engine compartment as well as one more on the right side down lower that need to be removed.

3. Remove the bolts with 7/32” Allen wrench.
4. Look underneath the hood near the front of the cab on both sides. There are two bungee clamps holding the rear side of the engine cover to the machine.

5. Disconnect both bungee clamps.

6. Lift the cover away from the vehicle to give you better access to the Orbitrol area.

**Note:** This may take two people as the hood is heavy and awkward to handle.

7. Locate the Orbitrol area.
8. Place an oil catch pan below the Orbitrol of the vehicle. When the hoses are disconnected, oil will leak from them. Be prepared for this.

   **Note:** Verify that the hoses have been properly marked prior to removing them to ensure they are reattached to the correct ports.

9. Carefully remove the four large hoses connected to the top of the Orbitrol with a 15/16” wrench.

10. Carefully remove the 1/4” hose from the Load Sensor port on the Orbitrol with an 11/16” wrench.

11. Attach the original Load Sense hose (gray) to the LS OUT hose (gray) provided with the kit.

12. Tighten the hoses together with two 11/16” wrenches.

13. Attach the supplied LS ORBITROL hose (blue) to the Load Sense port on the Orbitrol.

14. Tighten the connection with an 11/16” wrench.
15. Attach a -8 ORFS Run Tee to the Pressure, Tank, Left, and Right ports on the Orbitrol.

16. Adjust the geometry of the fittings as shown and then tighten all connections with a 3/4” and 15/16” wrenches.

**Note:** Picture shown may not match actual installation components.

17. Attach the original Right hose (yellow) to the end of the -8 ORFS Run Tee.

18. Attach the original Pressure hose (red) to the end of the -8 ORFS Run Tee.

19. Tighten all connections with a 3/4” and 15/16” wrenches.

**Note:** Picture shown may not match actual installation components.

20. Attach the original Tank hose (green) to the end of the -8 ORFS Run Tee.

21. Tighten all connections with a 3/4” and 15/16” wrenches.

**Note:** Picture shown may not match actual installation components.
### Attach Hoses and Fittings

22. Attach the 90 degree fitting of the supplied RIGHT hose (yellow) to the Tee connected to the Right port of the Orbitrol.

23. Adjust the hoses so that they point the same direction as the existing hoses and then tighten all connections with a 3/4” and 15/16” wrenches.

**Note:** Picture shown may not match actual installation components.

24. Attach the original Left hose (orange) to the end of the -8 ORFS Run Tee.

25. Attach the 90 degree fitting of the supplied LEFT hose (orange) to the Tee connected to the Left port on the Orbitrol.

26. Adjust the hoses so that they point the same direction as the existing hoses and then tighten all connections with a 3/4” and 15/16” wrenches.

**Note:** Picture shown may not match actual installation components.

27. Attach the 90 degree fitting of the supplied PRESSURE hose (red) to the Tee connected to the Pressure port of the Orbitrol.

28. Adjust the hose so it points the same direction as the existing hoses and then tighten all connections with a 15/16” and 3/4” wrenches.

**Note:** Picture shown may not match actual installation components.
29. Attach the 90 degree fitting of the supplied TANK hose (green) to the Tee connected to the Tank port on the Orbitrol.

30. Adjust the hoses so that they point the same direction as the existing hoses and then tighten all connections with a 15/16” and 3/4” wrenches.

Note: Picture shown may not match actual installation components.

31. Route the hoses from the Orbitrol down and back to the Steering Valve.
32. Attach the LS OUT (gray), TANK (green), and RIGHT (yellow) hoses to the Steering Valve.
33. Tighten the hoses with an 11/16” and 13/16” wrenches.

34. Attach the LS ORBITROL (blue), PRESS (red), and LEFT (orange) hoses to the Steering Valve.
35. Tighten the hoses with an 11/16”, 13/16”, and 15/16” wrenches.

36. Remove the plug from the TRANS port.
37. Tighten the Pressure Transducer with a stubby 3/4” wrench or a 22mm deep well socket and ratchet depending on the version of Pressure Transducer that is used in the kit.

**Note:** Do not over tighten.
38. Attach the Pressure Transducer Jumper Harness to the Pressure Transducer.

39. Coil the excess harness in between the valve body and the outer cover and secure with a cable tie. Cable tie the 4-pin and 10-pin connectors together.

40. Secure all the hoses with cable ties so that they will not be damaged by moving parts.

41. Verify that all the hose and fitting connections have been tightened and that any loose hoses have been properly secured to protect them from damage.
Post System Installation Procedures

After completing the rest of the AutoSteer installation, it is important to come back and perform the following steps prior to starting the vehicle or trying to calibrate and AutoSteer the vehicle.

**Note:** Always perform these steps after the complete installation or system damage may occur and/or poor performance may occur. **DO NOT START THE VEHICLE BEFORE PERFORMING A LEAK TEST.**

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**WARNING**

High-Pressure Fluid Hazard

Read and understand the vehicle’s user manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

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**WARNING**

Prior to starting the vehicle, verify all people and equipment are clear from around the vehicle and the AutoSteer system is powered down. The vehicle could move unexpectedly and cause injury or death to bystanders.

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**Note:** The following steps need to be performed after the complete AutoSteer system has been installed, the AutoSteer System powered up (BUT NOT THE VEHICLE), and the vehicle has been created in the AutoSteer system.

**Hydraulic Leak Test**

After the completion of the installation of the entire AutoSteer system, the system needs to be checked for leaks. Follow the procedure below to check for leaks.

**Note:** If an oil leak is noticed during any part of this test, immediately shut down the vehicle and repair the leak.

1. Clear any bystanders away from the vehicle.
2. Put the vehicle into Park and/or set the park brake to prevent the vehicle from moving.
3. Turn the vehicle over for a few seconds and if the vehicle starts, immediately shut it down.
4. Walk around the vehicle and check all the hydraulic fittings that were opened. Look for any oil leaks.
5. Once any leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.
6. Take the vehicle out of Park and/or remove the parking brake. Turn the steering wheel manually to the right and left stops two or more times to get any air out of the hoses.
7. Confirm the vehicle turns in the correct direction when the steering wheel is turned manually.
8. Confirm the steering system behaves the same as it did prior to installing the AutoSteer System. Measure the times it takes to manually turn the steering wheel from full left to right and full right to left and compare to the times recorded before the installation. If the times are different, determine why there is a difference and repair.

9. Put the vehicle back into Park and/or reset the parking brake. Shut down the vehicle, walk around it again, and check for any hydraulic leaks.

10. Once any leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.

11. Take the vehicle out of Park and/or remove the parking brake and leave the vehicle running.

12. Power up the AutoSteer system and navigate to the steering components test screen. If the safety screen requirements have been met, press the Continue or Accept button.

13. Press the Hard Right and the Hard Left buttons several times to force the Steering Valve to turn the steering wheels or steering mechanism to the full right and full left positions and get the air out of the lines.

14. Verify that the vehicle turns in the correct direction it is commanded. Measure the time it takes the AutoSteer System to turn the steering wheel from full left to right and full right to left and compare to the times recorded to the times for manual movement. It should not take more than 3 to 4 seconds to go from lock to lock.

**Note:** If the wheels turn in the wrong direction, the hoses were attached to the wrong ports on the Steering Valve or to the incorrect steer lines. The steer hoses need to be switched.

15. Power down the Display, put the vehicle into Park and/or reset the parking brake, and shut down the vehicle.

16. Once again check the vehicle for hydraulic leaks and repair any that are found.

**Load Sense Pressure Relief Valve Adjustment**

**Note:** Do not start the vehicle until after the Hydraulic Leak Test has been performed on the vehicle.

The Steering Valve has a built-in Load Sense Pressure Relief Valve that limits the maximum pump pressure when using the AutoSteer system. The Load Sense Pressure Relief Valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks.

**Note:** Always shut down the vehicle prior to adjusting the Load Sense Pressure Relief Valve adjustment screw.

**Note:** The Load Sense Pressure Relief Valve in Figure 8 is shown without the hydraulic hoses connected for ease of viewing and identifying the Load Sense Pressure Relief Valve and Pressure Gauge Test (GP) port. When actually adjusting the Load Sense Pressure Relief Valve, it must be performed with the valve mounted on the vehicle, the hydraulic hoses connected, and the rest of the AutoSteer system installed and operational.
1. Verify that the vehicle is still in Park and/or the park brake is set to prevent the vehicle from moving and the engine is off.

2. Clear any bystanders from around the vehicle to prevent anyone getting injured when the steering wheels are moved in the following steps.

3. Attach a short extension hose to the diagnostics port labeled GP on the Steering Valve. Attach a 5000 psi pressure gauge to the extension hose.

   **Figure 9 Pressure Gauge Attached to GP Port**

4. With a 1/2” wrench and 5/32” Allen wrench, loosen the jam nut holding the Load Sense Pressure Relief Valve adjustment screw as shown in Figure 10.

   **Note:** Figure 10 shows the Steering Valve with the hoses disconnected for clarity. The Steering valve must be fully connected to the vehicle to adjust the pressure relief valve.
5. Turn the adjustment screw counter-clockwise two turns.

6. Start the vehicle and leave the engine at a low idle.

7. Check the standby pump pressure shown on the pressure gauge. The standby pressure should be below 350 PSI (24 Bar).

**Note:** If the standby pump pressure is zero or less than 100 PSI (7 Bar), the Pressure and Return/Tank hoses may have been inverted. Confirm the hoses have been attached properly before continuing.

**Note:** If the standby pump pressure is above 1000 PSI (69 Bar), it is too high. Determine what is causing the pressure to spool up and repair before moving on. Two most likely causes are that some of the hoses have been inverted or an incorrect orifice or plug has been installed in the Steering Valve.

8. Record the actual standby pressure: _____________________________ PSI (Bar).

9. Power up the Display.

10. Follow the instructions in the Display user manual to navigate to the vehicle’s steering test screens, press the **Continue** or **Accept** button if the requirements have been met.

11. Press the **Hard Right** or **Hard Left** button to command the wheels to turn to the right or left. Allow the steering axle to reach the right stop and hold it there. Let the AutoSteer system continue to command a hard turn at the stop.

12. The maximum pump pressure allowed by the Steering Valve or Orbitrol will be displayed on the pressure gauge.

13. Check the pressure on the pressure gauge. The Load Sense Pressure Relief Valve will need to be adjusted until the pressure reads 2600 PSI (179 Bar) while the AutoSteer system is commanding a turn.

**Note:** If the Steering Valve's Load Sense Pressure Relief Valve is set too high, the internal Orbitrol’s pressure relief valve may cause the pressure to max out before the Load Sense Pressure Relief Valve starts to work. Continue lowering the adjustment screw on the Load Sense Pressure Relief Valve on the Steering Valve until the maximum pressure starts to decrease.
Note: Always turn off the engine before adjusting the Load Sense Pressure Relief Valve. Do not adjust the Load Sense Pressure Relief Valve with the engine running as there is a chance that a person could get injured if the steering wheels move while working on the Steering Valve.

Note: Turn the adjustment screw clockwise to increase the pressure and counter-clockwise to reduce the pressure.

14. Once the Load Sense Pressure Relief Valve has been adjusted properly, retighten the jam nut with a 1/2” wrench while holding the adjustment screw with a 5/32” Allen wrench to lock it into place.
15. Record the final maximum pressure the pressure relieve valve is set to: _____________________________ PSI (Bar).
16. Press the Stop button and confirm that the pressure drops back to the standby pressure within a second.
17. Shut down the Display, turn off the engine, and remove the pressure gauge from the Steering Valve by sliding the sleeve on the quick release coupler
18. Replace the Steering Valve cover on the Steering Valve and tighten the four Allen screws with 3/16” Allen wrench.