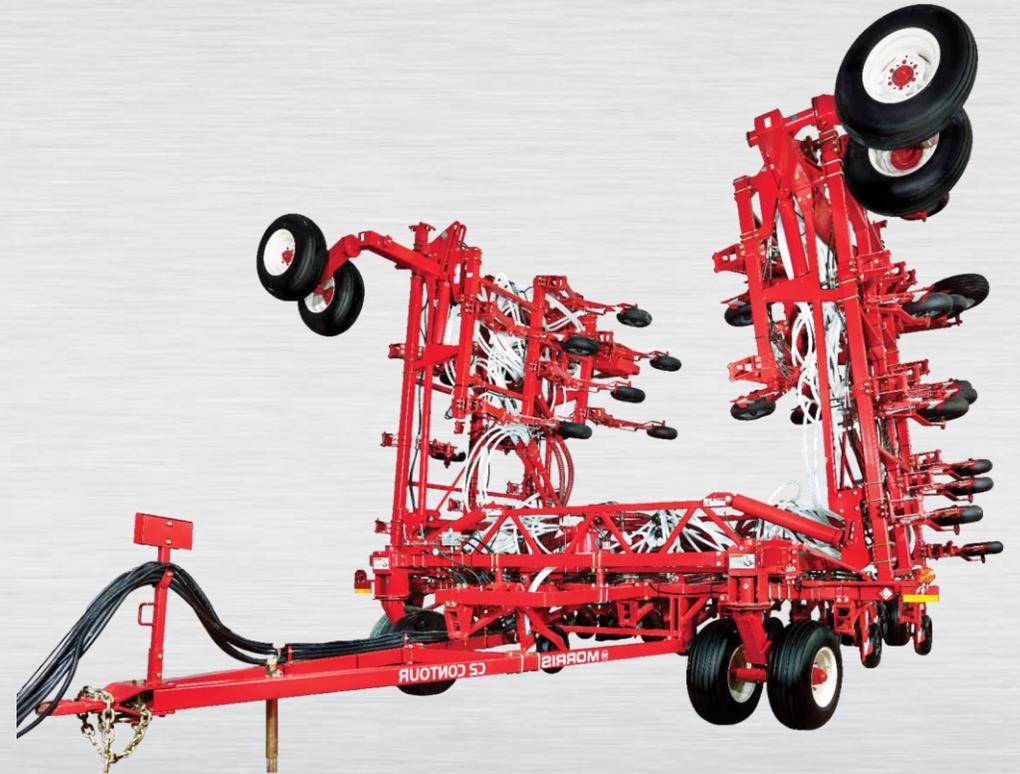


M MORRIS
C2 CONTOUR



C2 DRILL TRAINING
Module 2 : Hydraulic Troubleshooting

PREFACE

- **Important note that this troubleshooting guide also applies to Contour 1 Drills produced in 2011 and 2012.**

1A – ALL OPENERS WILL NOT LOWER

Method 1:

1. Check that the opener lock/transport valve is in the open position.
2. Check that the hydraulic ends on the raise/lower hoses are in good condition and are operating.
3. Ensure the hydraulic ends are fully engaged into the tractor couplers.
4. If the openers still do not lower, follow the **next method**.
5. Gauges can be installed in the lift and lower lines for positive readings if required. **Picture Right**



1A – ALL OPENERS WILL NOT LOWER

Method 2:

1. Does the lower hydraulic hose stiffen when the tractor hydraulics are activated to lower the openers?
2. This indicates that oil is entering the hose and building pressure.
3. Does the raise hydraulic hose stiffen when the tractor hydraulics are activated to lower the openers?
4. If the raise hose stiffens, this indicates the return oil is not able to get back into the tractor.
5. Check the hydraulic coupler and connection.
6. If only the lower hose stiffens and the raise hose remains limp, check the pressure on the gauge located near the manifold block. This gauge is connected to the hydraulic line that goes to the accumulator and reads system pressure.



1A – ALL OPENERS WILL NOT LOWER

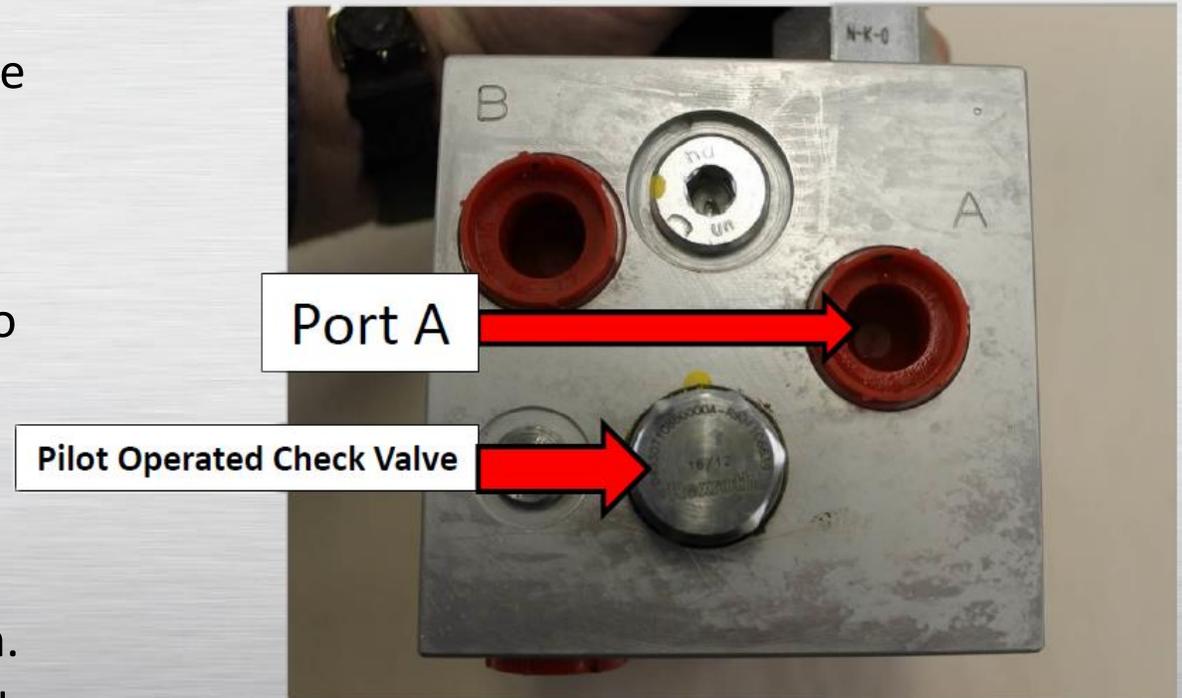
Method 2 Continued:

7. If the reading on the gauge does not rise when the lower hydraulics are activated then a problem exists in the manifold block.
8. Ensure that the case drain line is open and clear.
9. If the case drain line is not hooked to zero return port on tractor or is blocked, the pressure build up in the case drain line will lock-up the pressure/reducing valve rendering it inoperable.
10. Place the tractor hydraulics in the float position to relieve system pressure, adjust the pressure/reducing valve out (counter clockwise) 2 to 4 turns.
11. The pressure/reducing valve may not unseat if the unit has not been operated for some time.

1A – ALL OPENERS WILL NOT LOWER

Method 2 Continued:

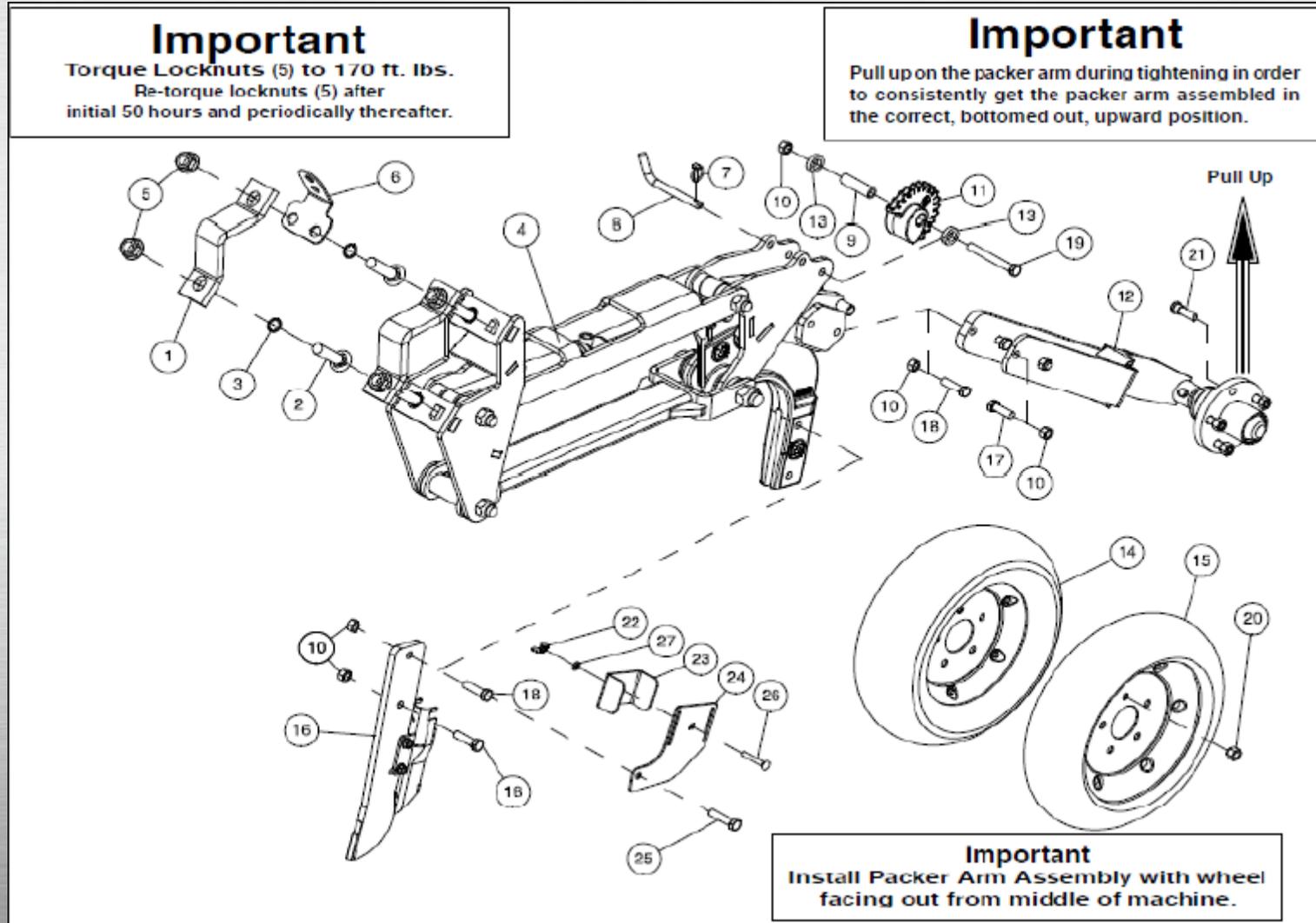
12. Cycling the hydraulic system raise/lower several times will generally unseat the valve. Then cycle the hydraulic raise/lower circuit.
13. If the openers still do not lower and there is no pressure reading on the gauge, again put the hydraulics in the float position to relieve all system pressure. Ensure that the gauge pressure returns to zero.
14. If it does not, turn out (counter clockwise) the operating valve 2 turns. This will allow all pressure to release when the tractor hydraulics are in the float position.
15. Remove the pressure/reducing valve for inspection.
16. Also remove the pilot operated check valve located near **Port "A"** on the manifold and inspect it.



1B – ONE OR MORE OPENERS WILL NOT LOWER

1. The majority of the openers lower, but 1 or more will not lower at all or fully, this indicates a mechanical problem.
2. The system pressure will rise and maintain its setting.
3. Check the locknuts on the openers to ensure they are set correctly.
4. Refer to **illustrations on the next pages** for correct torque and gap settings.

1B – ONE OR MORE OPENERS WILL NOT LOWER



2A – ALL OPENERS WILL NOT RAISE

Method 1:

1. Check that the opener lock/transport valve is in the open position.
2. Check that the hydraulic ends on the raise/lower hoses are in good condition and are operating.
3. Ensure the hydraulic ends are fully engaged into the tractor couplers.
4. If the openers still do not raise, follow the next method.
5. Gauges can be installed in the lift and lower lines for positive readings if required.



2A – ALL OPENERS WILL NOT RAISE

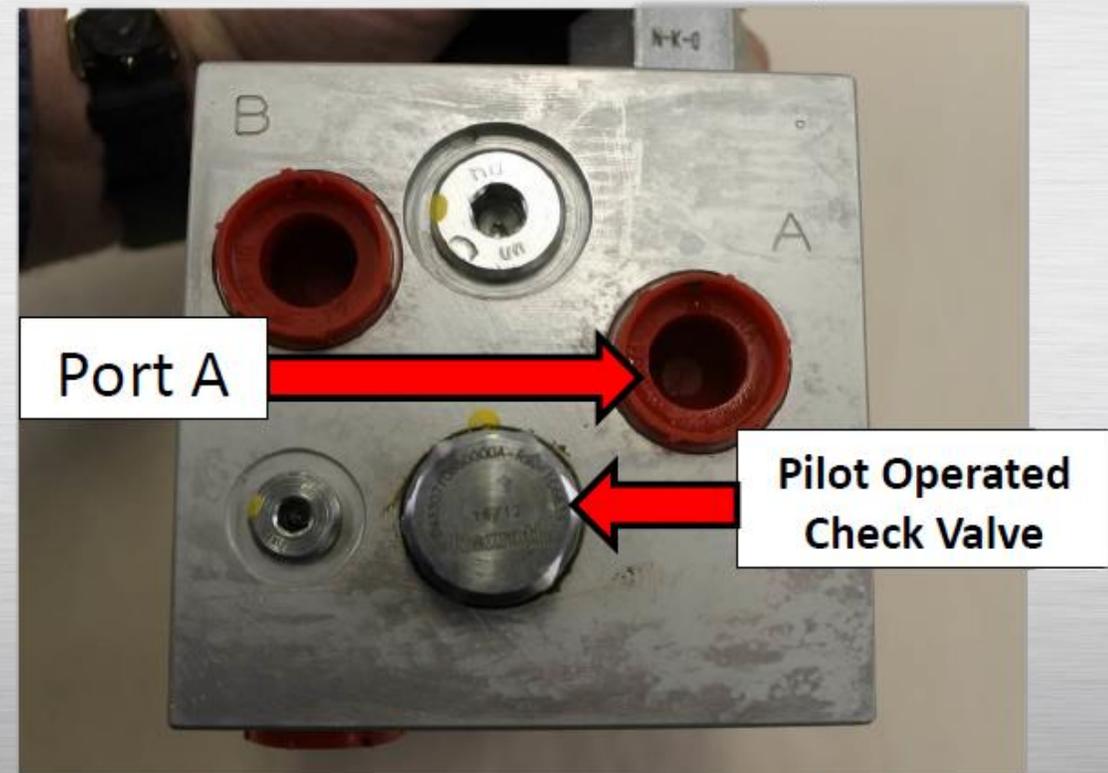
Method 2:

1. Does the lower hydraulic hose stiffen when the tractor hydraulics are activated to raise the openers?
2. This indicates that oil is entering the hose and building pressure.
3. Does the lower hydraulic hose stiffen when the tractor hydraulics are activated to raise the openers?
4. If the lower hose stiffens, this indicates the return oil is not able to get back into the tractor.
5. Check the hydraulic coupler and connection.
6. If only the raise hose stiffens when the hydraulics are activated to raise the openers and the lower hose remains limp then a problem is indicated in the manifold.

2A – ALL OPENERS WILL NOT RAISE

Method 2 Continued:

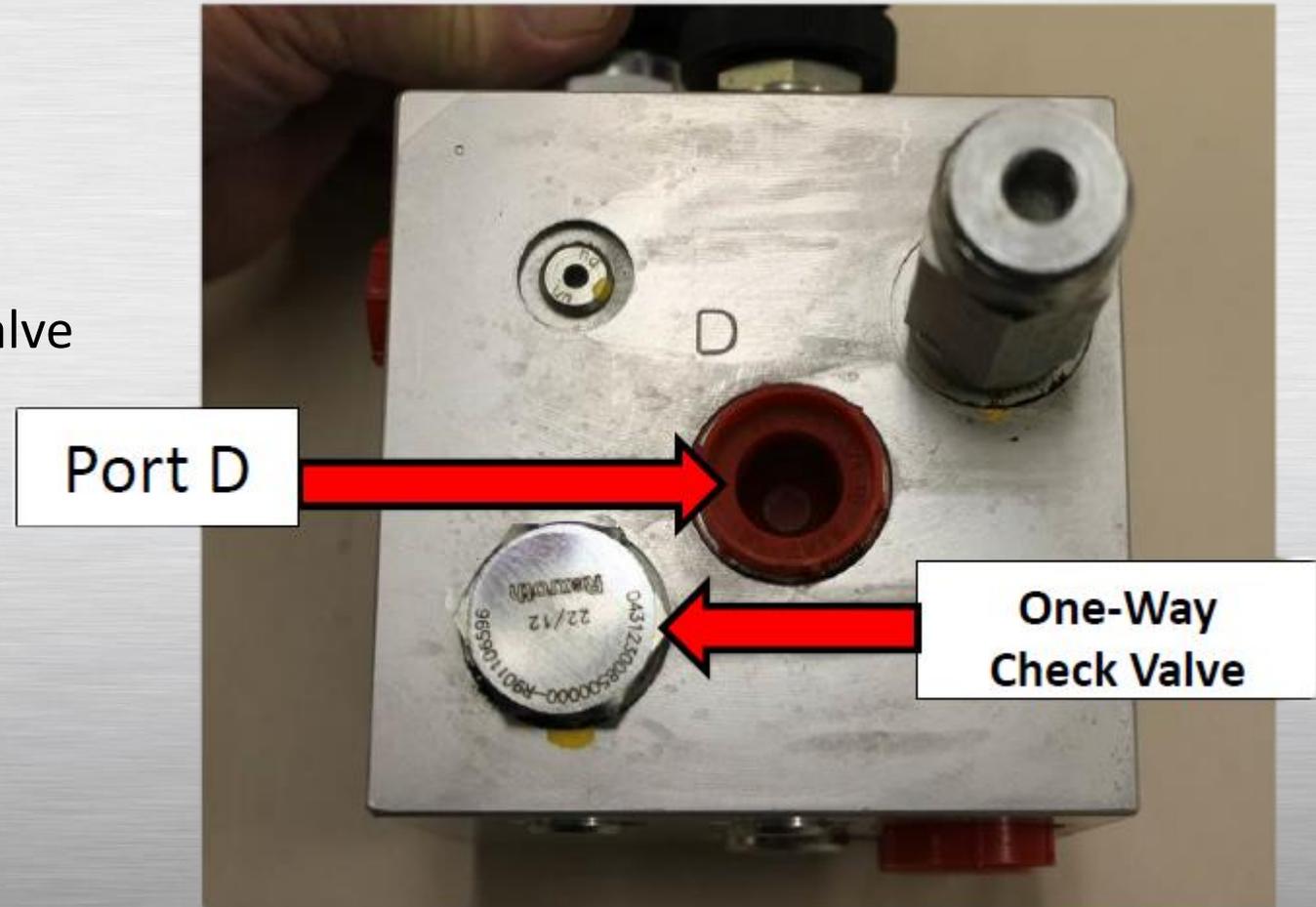
7. If the openers still do not raise, again put the hydraulics in the float position to relieve all system pressure. Ensure that the gauge pressure returns to zero. If it does not, turn out (counter clockwise) the operating valve 2 turns. This will allow all pressure to release when the tractor hydraulics are in the float position.
8. Remove the pilot operated check valve near Port “A” for inspection.



2A – ALL OPENERS WILL NOT RAISE

Method 2 Continued:

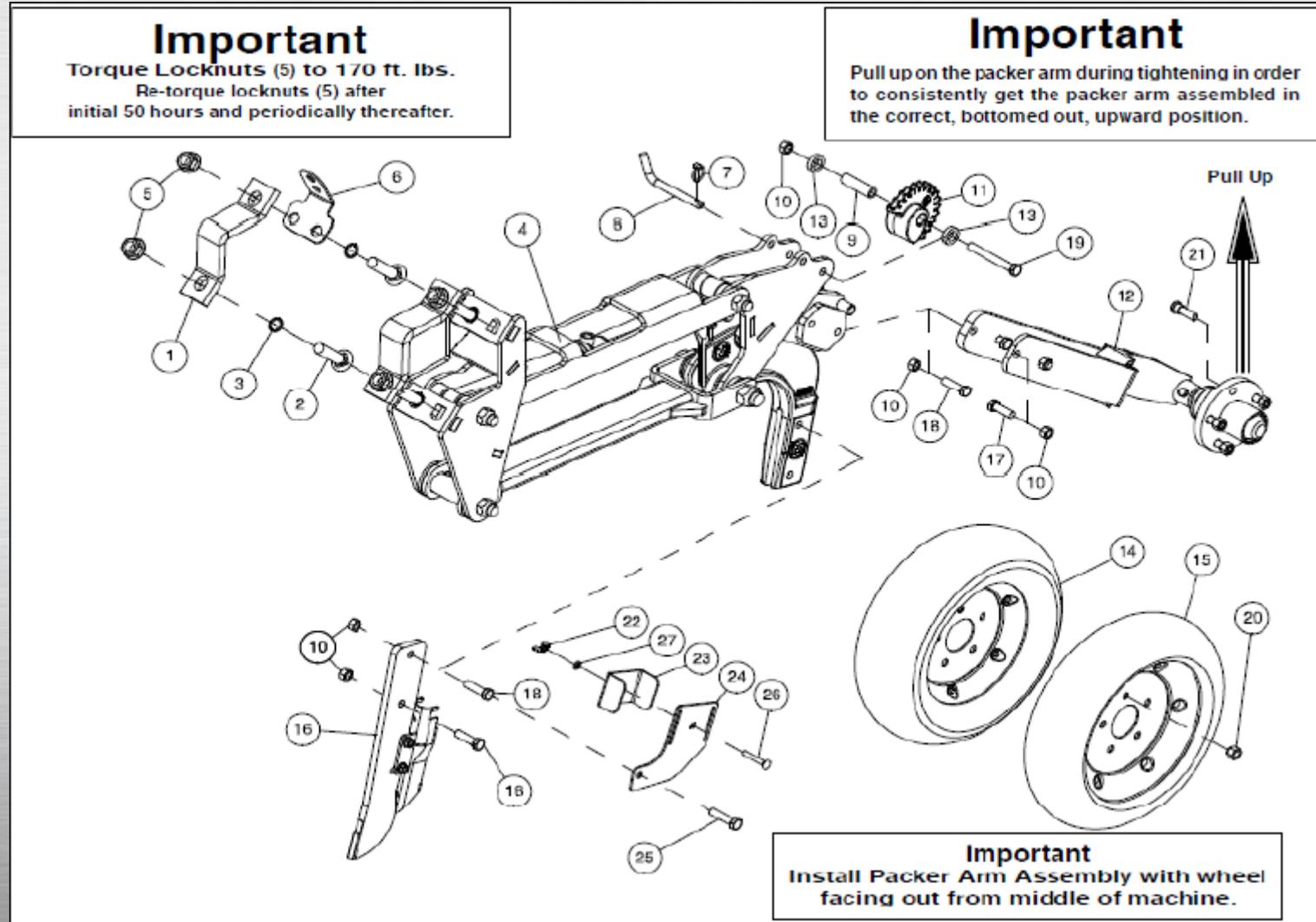
9. Also remove the one way check valve near Port "D" for inspection.



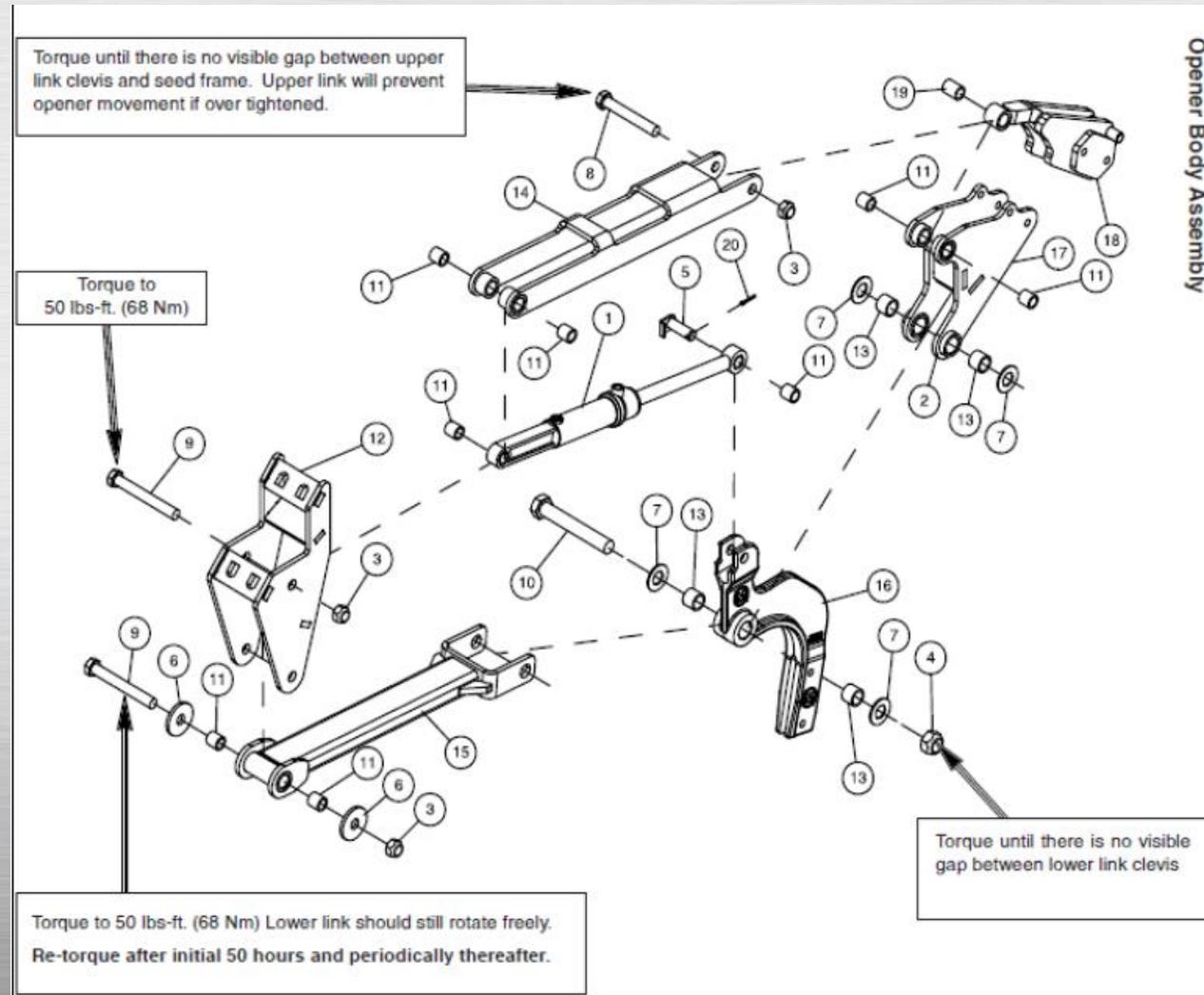
2B – ONE OR MORE OPENERS WILL NOT RAISE

1. The majority of the openers raise, but 1 or more will not raise at all or fully, this indicates a mechanical problem.
2. The system pressure will rise and maintain its setting.
3. Check the locknuts on the openers to ensure they are set correctly.
4. Refer to **illustrations on the next pages** for correct torque and gap settings.

2B – ONE OR MORE OPENERs WILL NOT RAISE

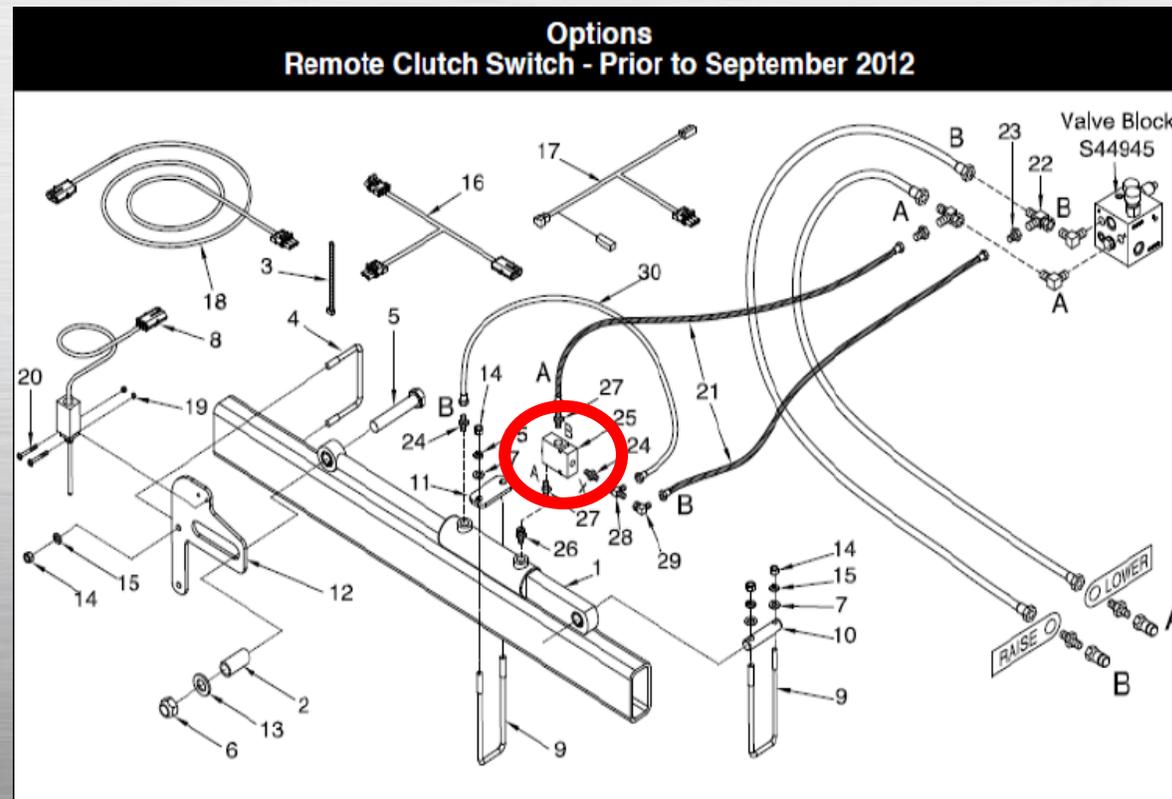


2B – ONE OR MORE OPENERS WILL NOT RAISE



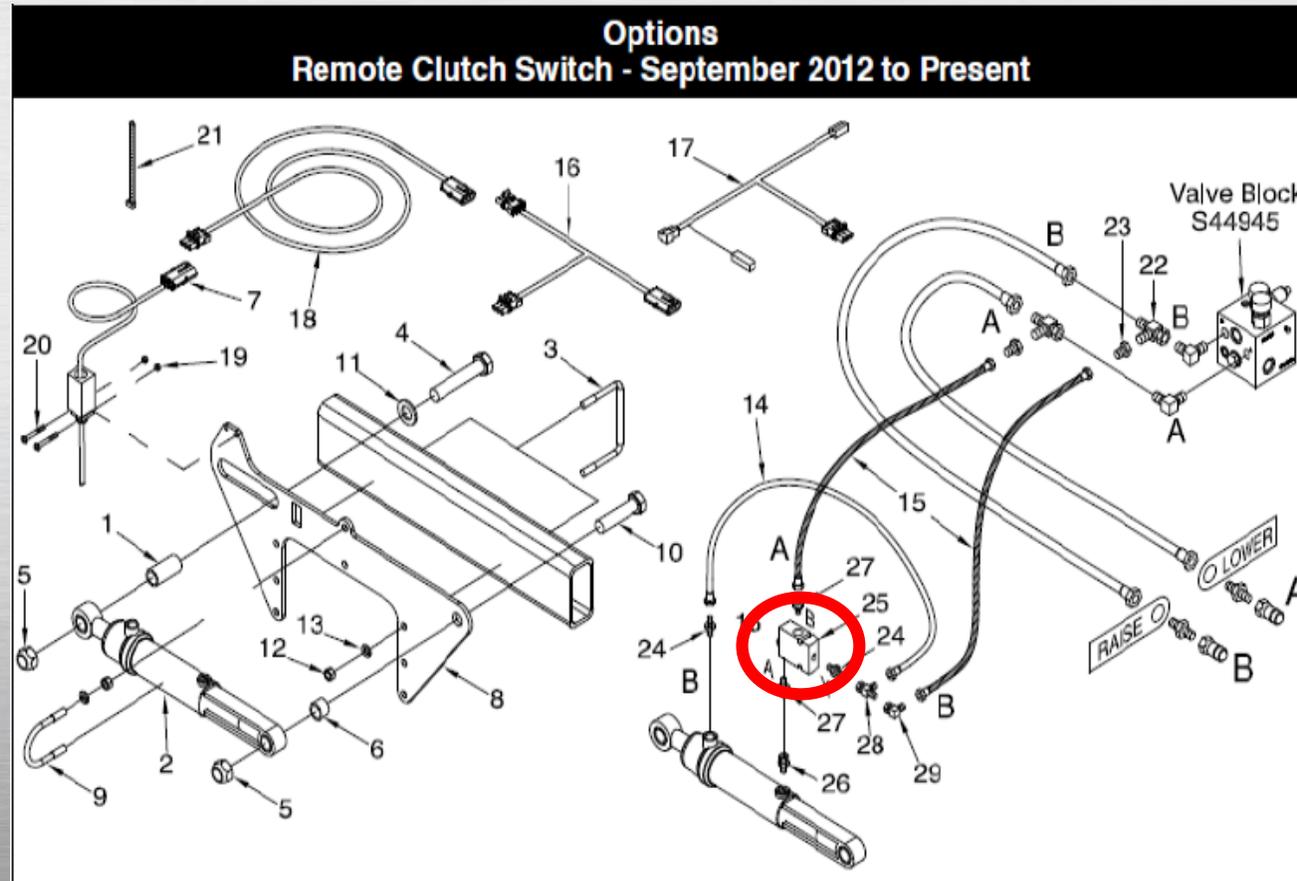
3 - OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

1. Prior to any diagnostics, check your hydraulic system for the presence of this **check valve** as shown in the **Illustrations**. If this check valve is present it, will have to be removed from the system prior to proceeding.



3 - OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

1. Illustration 2 September 2012-Present



3 – OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

2. The check valve must be removed as it can leak across internally and act the same as an opener cylinder with bad seals, leaking across internally.
3. Once the check valve has been removed the lines can be hooked back up as shown in the **drawing on the next page**.

3 – OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

4. Bleed or purge the hydraulic system as per the **following instructions**:

Opener Maintenance - Continued

Bleeding Hydraulic System

If hydraulic system has been serviced air will need to be bleed out of system as follows:

To bleed hydraulic system of air:

- Lift openers up and lock tractor remote in lift position.
- With tractor hydraulics operating, open bleed-off ball valves on end of drill wings.
- Allow oil to cycle for a few minutes then change direction of tractor remote to lower openers and cycle for a few more minutes.
- Close bleed-off ball valves and lift openers up.
- Repeat above procedure for a second time.
- Close bleed-off ball valves and lift openers up.
- Lock “Openers” valve and check to see that openers stay firmly in position.
- If openers are spongy repeat procedure until air is gone.

Warning



HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.

Important

Turn “Operating” valve out to “Bleed Off/Service” position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components.

Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere)



3 – OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

5. Use the **following method** for diagnosing the hydraulic system further:
6. After the check valve has been removed and hydraulic system bled, raise openers and lock in transport position. Observe the openers to see if they stay in the raised position.

Opener Hydraulic System Trouble Shooting

If pressure can not be maintained in the hydraulic system, or openers drop rapidly from transport position, a leaky hydraulic cylinder (bypassing oil across the piston seal) may be present. To locate a hydraulic leak in the Contour Air Drill hydraulic system, the following procedure can be used:

Method 1

1. Put "SYSTEM" ball valve in "Bleed Off/Service" position and remove pressure from the hydraulic system.
2. Check the drill frame and hoses to make sure that the leak is not external (leaking oil out of the circuit).
3. Lift the contour openers into their raised position.
4. Put "OPENERS" ball valve in "Locked" position.
5. Watch the openers carefully across the drill and locate the first opener(s) to visibly drop down from the raised position (NOTE: this is the general area of the leaking cylinder, but the first opener to drop is not always the leaking cylinder).
6. Unlock the "OPENERS" hydraulic ball valve and lift the openers to the raised position and lock the hydraulic remote in the raised position to apply flow to the circuit for about five minutes.
7. Let the hydraulic remote go back to neutral, shut off the tractor, and then go and check the temperature of the opener cylinders by feeling the cylinder barrels. Start at the group of cylinders that were located in step 5) and then work from the outer openers in to center until a "hot" cylinder is located.
8. Under normal conditions the cylinders should remain cool (ambient temperature or slightly above); the opener with a "hot" cylinder barrel has the leaky seal and should be serviced or replaced.

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Warning



HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.

3 – OPENERS WILL NOT STAY IN THE RAISED/TRANSPORT POSITION

Opener Hydraulic System Trouble Shooting - Continued

Method 2

(Refer to hydraulic diagram next page).

1. Put "SYSTEM" ball valve in "Service" position and remove pressure from the hydraulic system.
2. Isolate 1st rank of cylinders by disconnecting end hoses, item(s) A, and capping tees with 1/4" cap nuts (on 1st rank only).

Important: Always plug disconnected hydraulic lines to avoid contamination of hydraulic system.

3. Disconnect hoses on 2nd and 3rd ranks at adapters, item(s) B, and cap adapters with 1/4" cap nuts.
4. Once cap nuts are tightened, cycle 1st rank openers repeatedly and then lift openers and put "OPENERS" ball valve in "Locked" position.
5. If openers remain solid for a period of at least 5 minutes and are still solid when manually pushed downwards, the problem cylinder(s) are not in the front rank.
6. If front rank drops within 5 minutes (or the openers are spongy when manually pushed downwards), use cap nuts to isolate the left side of the machine from the right side and repeat steps (3) and (4) on either side until the problem side is found (openers are spongy or drop quickly after being locked up).
7. At this stage you may be able to lift up the leaky rank, hold hydraulic pressure on it and push down on the openers individually to find the one that is easy to push down; if this doesn't work, move to step (8).
8. On the leaking rank, starting from the outside of the drill and moving towards center, disconnect individual opener cylinders and cap their tees and repeat steps (3) and (4) until the openers remain solid; the disconnected cylinder should be the leaky one.
9. Repeat the process by rank until all of the damaged/faulty cylinders are found.
10. Reconnect the circuit back to Assembly Manual specifications.
11. Bleed air from hydraulic circuit before resuming operation.

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Caution

Ensure all hydraulic fittings have been retightened before applying hydraulic pressure.

Important

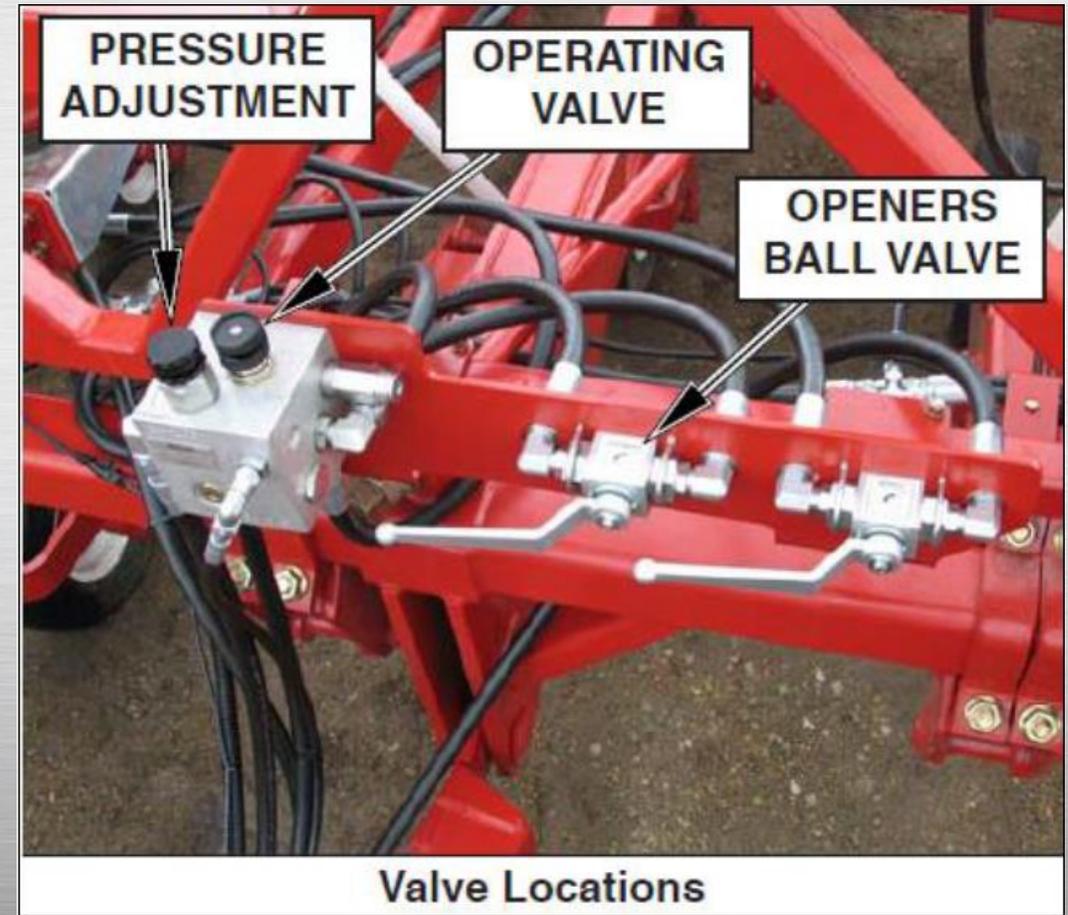
Put ball valve in "Service" position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components.

Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere)

Note: All hydraulic cylinders have a natural leakage rate. The openers on the contour drill will

4 – SOP WILL NOT STAY AT SET PRESSURE

1. The Contour Air Drill uses a passive hydraulic system (no constant flow is needed from the tractor during seeding). Maximum pressure is set using the reducing valve on the hydraulic block mounted to the frame.



4 – SOP WILL NOT STAY AT SET PRESSURE

2. Set “Pressure” valve pressure 100 - 150 psi above the desired working pressure in order to allow for pressure drop from accumulator cooling and valve hysteresis. System pressure will level off and hold after approximately 1 minute. It is normal for the pressure to drop 50 to 150 PSI from the initial set point. If the pressure continues to drop quickly, check the machine for a cylinder, fitting, or hydraulic line leak. If there are no external leaks and the system pressure does not stabilize then the above procedure for testing a leaking cylinder should be used.

4 – SOP WILL NOT STAY AT SET PRESSURE

2. Set “Pressure” valve pressure 100 - 150 psi above the desired working pressure in order to allow for pressure drop from accumulator cooling and valve hysteresis. System pressure will level off and hold after approximately 1 minute. It is normal for the pressure to drop 50 to 150 PSI from the initial set point. If the pressure continues to drop quickly, check the machine for a cylinder, fitting, or hydraulic line leak. If there are no external leaks and the system pressure does not stabilize then the above procedure for testing a leaking cylinder should be used.
3. To view operation practices for Pressure Adjustment under Normal and On-The-Go operation, read pages 5-21 – 5-25 in the C2 Operator’s manual found here:
http://www.morris-industries.com/media/application/media/C2_Operators_S50150-02.pdf

5 – HYDRAULIC ACCUMULATOR SYSTEM

1. The accumulator used on the Contour Air Drills is generally trouble free. It should be checked periodically for the proper precharge pressure. The precharge pressure is different between the Contour Air Drill and the Contour 2 Air Drill.

Technical Support Bulletin

No	355
Date	September 18, 2012
Machine	Contour Air Drills C1 and C2

Reference: Opener Operating Pressure

There is distinct difference between the C1 and C2 Contour Openers in regards to required operating pressure. The C2 Opener develops approximately 33% more shank trip force than the C1 Opener at any given display pressure. Due to this operating pressure difference, the C2 accumulator only requires 350 psi nitrogen pre-charge versus the C1 accumulator pre-charge of 500 psi

Below are the charts for determining operating range and shank trip out force. Note the difference in operating pressure between the two openers to achieve the same trip out force.

Note: Minimum Display Pressure must be 100 psi higher than nitrogen pressure to provide enough oil reserve for openers to follow the land contours.

C1 Contour

Shank trip force (lbs) is calculated by dividing the display pressure by 2
(ex. 800 psi display pressure = 400 lbs shank trip force).

Packing force is proportional to shank trip out force and is roughly 1/3 of the shank trip force (ex. 500 lbs shank trip force would give approximately 167 lbs of packing force).

C1 Accumulator Operating Range		
Nitrogen Pre-charge Pressure	Display Pressure	
	Minimum	Maximum
500 psi (3445 kPa)	600 psi (4137 kPa)	1200 psi (8274 kPa)

* Maximum system hydraulic pressure is 1200 psi or 4 times the pre-charge pressure, whichever is the lower number.

5 – HYDRAULIC ACCUMULATOR SYSTEM

2. If there is no or little precharge pressure in the accumulator the system the following symptoms may occur.
3. The system operating pressure may drop rapidly from its initial setting. It may also drop more than 150-200 PSI.

Technical Support Bulletin

No	355
Date	September 18, 2012
Machine	Contour Air Drills C1 and C2

Reference: Opener Operating Pressure

C2 Contour

Shank trip force (lbs) is calculated by dividing the display pressure by 1.5 (ex. 600 psi display pressure = 400 lbs shank trip force).

Packing force is proportional to shank trip out force and is roughly 1/3 of the shank trip force (ex. 500 lbs shank trip force would give approximately 167 lbs of packing force).

C2 Accumulator Operating Range		
Nitrogen Pre-charge Pressure	Display Pressure	
	Minimum	Maximum
350 psi (2413 kPa)	450 psi (3102 kPa)	1200 psi (8274 kPa)

* Maximum system hydraulic pressure is 1200 psi or 4 times the pre-charge pressure, whichever is the lower number.

Note: The shank trip out pressure needs to be determined by the Operator for each field. Shank trip out pressure is generally set at the minimum pressure that keeps the shanks solid in the vertical position and prevents them from repeatedly "tripping out", while still providing adequate packing.

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5 – HYDRAULIC ACCUMULATOR SYSTEM

4. As there is no cushion/relief being provided by the precharge pressure in the accumulator opener cylinders cannot trip and shank breakage may occur. It is recommended that if shank breakage has occurred, the accumulator precharge pressure be checked.
5. If there was some precharge pressure and the unit is operating with a system pressure that is also low, there may be some openers that operate at different field depth settings.
 - This is due to the low precharge pressure not being able to apply sufficient force on the opener cylinder to keep it in place.
 - With this condition some openers may trip/drag back and be slow or not able to return to the operating position.

5 – HYDRAULIC ACCUMULATOR SYSTEM

6. If the accumulator pre-charge pressure is excessive, then no or little oil will be placed in the accumulator when the system pressure is applied by lowering the openers to their operating position.
7. Symptoms may include openers operating at different depth settings. As the drill moves over the ground the packer wheel follows the contour of the land. If the packer wheel has to travel down in some areas the opener requires oil to extend the cylinder down to allow the packer wheel to follow the contour of the land. As there is little or no oil in the accumulator the opener/packer wheel cannot follow the contour and will operate at a different depth setting.

5 – HYDRAULIC ACCUMULATOR SYSTEM

8. Accumulator Pressure Reduction

Accumulator Pressure Reduction

1. Locate drill to level area and lower wings.
2. Place operating valve in service/bleed off position by turning counter clockwise 2 turns from fully operating (valve turned in and seated).
3. Using the tractor hydraulics lower the openers fully.
4. Place the tractor valve in the float position.
5. With tractor hydraulic valve control in float position, check hydraulic pressure gauge at drill valve block to ensure all hydraulic pressure in the system has been bled back to the tractor.
6. Shut tractor off and remove hydraulic lines from tractor.
7. Remove protective cap and sealing cap from accumulator.
8. Make sure that the bleed valve (B) is fully closed and that the inflation valve (A) is in the fully raised position by turning the handwheel in an counter-clockwise direction.
9. Attach Gas Valve assembly to the accumulator.
10. Open inflation valve (A) by turning the handwheel in a clockwise direction.
11. Slacken the bleed valve (B) to vent nitrogen from the accumulator until, after stabilization, the desired pressure is registered. Nitrogen vents into the air.
12. Tighten the bleed valve (B) once the desired filling pressure of 350 psi (2413 kPa) is reached.



Pressure Gauge



Protective Caps

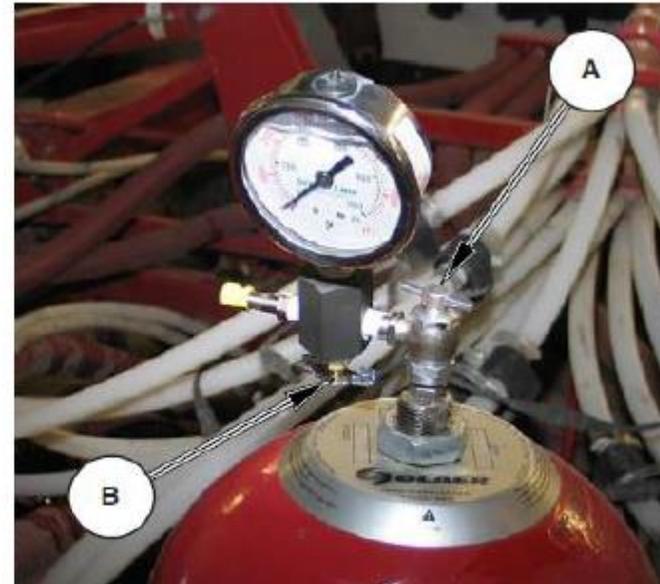
5 – HYDRAULIC ACCUMULATOR SYSTEM

8. Accumulator Pressure Reduction

13. Screw the handwheel (A) counter-clockwise to close the accumulator gas valve.
14. Slacken the bleed valve (B) to release pressure in the Gas Valve assembly.
15. Unscrew the Gas Valve assembly from the accumulator.
16. Install sealing cap and protective cap on accumulator.

Warning – Stabilization

The process of filling or discharging an accumulator with nitrogen causes a temperature change which is transmitted to the surrounding air as the temperature of the accumulator stabilizes. To allow for the effects of temperature transfer, the accumulator should be allowed to stand for a minimum of 15 minutes to allow the temperature to stabilize before a final reading of the precharge pressure is taken.



Gas Valve Assembly

