LEAK TEST PROCEDURE

MRTALPCH611LDC – REMOTE READY LIFTERS W/ 3 BUTTON CONTROL

APPLICABLE TO LIFTERS WITH
SERIAL NUMBERS GREATER THAN # 20100742

TESTING AND MAINTENANCE MUST BE DONE BY A QUALIFIED PERSON

KEEP FOR FUTURE REFERENCE

SYMPTOMS OF VACUUM LEAK

Severe leakage is evidenced by a lifter's inability to draw full vacuum while attached to a clean, smooth, nonporous surface. In such cases, the vacuum pump will run continuously and the vacuum level shown on the vacuum gauges will be less than 16" Hg [-54 kPa], the red zone of the vacuum gauge.

Moderate leakage is indicated by intermittent cycling of the vacuum pump during a lift. If the vacuum generating system turns on more than once every 10 minutes, leakage is serious enough to warrant repairing the lifter's vacuum system.

To determine if your lifter has a vacuum leak, perform the Vacuum Test as described in the Maintenance section of your instruction manual.

When you perform the vacuum test, we recommend that you note the time and leakage rate, such as "lost 5" Hg [-17 kPa] in 10 minutes". Note that, if both the blue/green and red circuits of the lifter's vacuum system are leaking, you should record this information for each circuit. This information can assist in diagnosing the location of the leak because there may be more than one component leaking vacuum. For example, when you are performing maintenance, if an isolated section tests positive for a leak, but the leakage rate is less than that of the whole lifter, this indicates that there is still one vacuum leak or more elsewhere in the system.

Note: The vacuum test, as described in the instruction manual, is performed with the power switch in the off (O) position. However, due to the unique design of this vacuum system, the situation may arise where, with the power turned on (I), the vacuum pump may cycle repeatedly but the vacuum level, as shown on the vacuum gauges, does not drop, giving no indication of a vacuum leak.

Due to this, it is recommended that an additional vacuum test be performed with the power switch on (I). In this test, if you do not see a drop in vacuum as indicated on either of the vacuum gauges, but the vacuum pump does cycle more than once in 10 minutes, a specific section of the vacuum generating system is indicated as being the problem. Review the remaining information in this section and then proceed to the Vacuum Generating System Test, step 10.

If, when tested in the off (O) position, the vacuum level, as shown on the gauges, does begin and continue to drop and the rate of leakage, as shown on the vacuum gauge(s), is sufficient to warrant repair, proceed as follows:

To locate the cause of leakage, begin by inspecting the vacuum pads, fittings and hoses of the entire vacuum system. Look for contamination, cuts or abrasions on pad faces and cracking at the suction stem, cracks, abrasions or cuts in hoses, damaged fittings and loose hoses at connection points. If leakage is severe, the cause is often a visibly damaged part.

Do not apply soapy water to fittings or vacuum hoses in an attempt to find leaks, since it will only be drawn inside the vacuum system.

If the source of leakage is not immediately evident, the various sections of the entire vacuum system must be systematically isolated and tested to determine the leakage point. The process to accomplish this is described in the tests to follow.

Please note that the information gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools you use are capable of completely sealing the isolated parts of your system when tested. Recommended tools, in addition to an appropriate test surface, are plugs for hoses and fittings, a ball valve with vacuum gauge attached, push-in and barbed hose adapters and extra vacuum hose of the required sizes. This procedure is written with the assumption that you have access to the appropriate tools.

If needed, test equipment is available from Wood's Powr-Grip Co. To find out what is available, contact a WPG Technical Sales Representative for additional information.

A set of screwdrivers may also be needed if the valve enclosure or pump cover needs to be removed. Note: Always proceed with caution when removing the covers. Since wiring and hoses may be connected to components in the cover, gentle removal is recommended so as not to damage the attached components.

When removing a hose from a barbed fitting, take care to avoid damaging the barbs of the fitting to which the hose is attached. Cuts or nicks in fitting barbs can create a leak that did not previously exist. Additionally, if a hose is removed from a barbed fitting, cut approximately 1/8"-1/4" [3-6 mm] off the end of the hose before reinstalling it on the fitting, in order to remove damaged hose ends.

For push-in fittings, the hose end must be cut square and straight to seal properly. To remove a hose from a push-in fitting press the locking collar in towards the fitting and pull out on the hose. If a hose is removed from a push-in fitting, cut approximately 1/8" [3 mm] off the end of the hose before reinstalling it on the fitting, in order to remove damaged hose ends and to provide a fresh point of contact for the locking collar. When installing a hose in a push-in fitting, push the hose in firmly and then gently pull outward on the hose to ensure that it is fully secured (the hose should not pull out). Additionally, when a hose is installed in a push-in fitting, it needs to run reasonably straight out from the fitting, with minimal sideways pressure on the hose locking collar, to reduce the chance of a vacuum leak.

Note: The vacuum system of this model lifter provides release using a "blow off" feature. This is where the pressure side of the vacuum pump is plumbed to the control valve and pumps air into the pad system when release mode is engaged, to help speed the release of the vacuum pads. When testing the lifter for leaks, it is often necessary to seal off the system in some manner (cap off or plug fittings and/or plug lines). Due to this, the use of the release function is not recommended during the repair process, as it will cause pressure to build in the sealed-off section and may damage components.

PRELIMINARY TEST

This test determines whether leakage is located in the vacuum generating system or the pad system. This test should be performed if, during the overall test, the lifter's vacuum gauges indicated a leak sufficient to warrant repair. Note: The following assumes that you have access to suitable plugs, a ball valve with vacuum gauge, and additional hose and adapter fittings for connecting the ball valve to the lifter's vacuum lines and fittings.

Note: Since the vacuum tanks are part of the pad system, any leakage will appear to be faster than seen in the overall test, due to the reduced system volume.

1) Remove the 4 screws (**1A**) that attach the valve cover (**1B**) to the channel. Note, there are no components attached to this cover, so it can be removed and set aside.
2) This will expose the 2 filters (**2A**) shown in **FIGURE 2**.

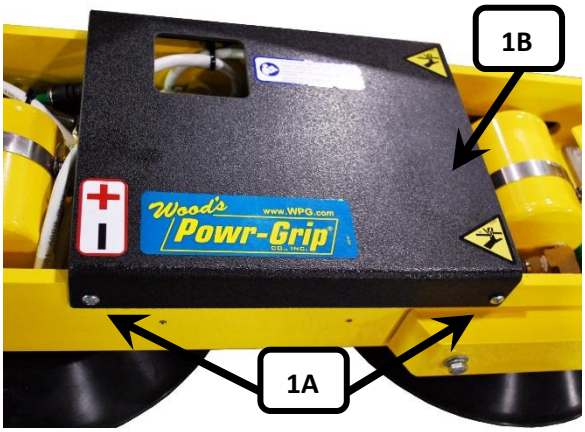


FIGURE 1

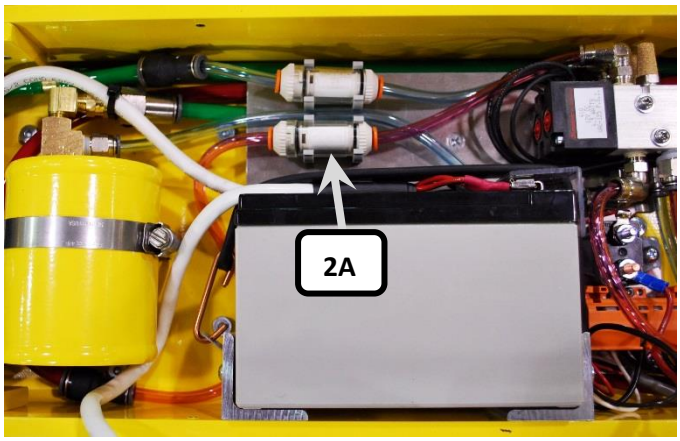
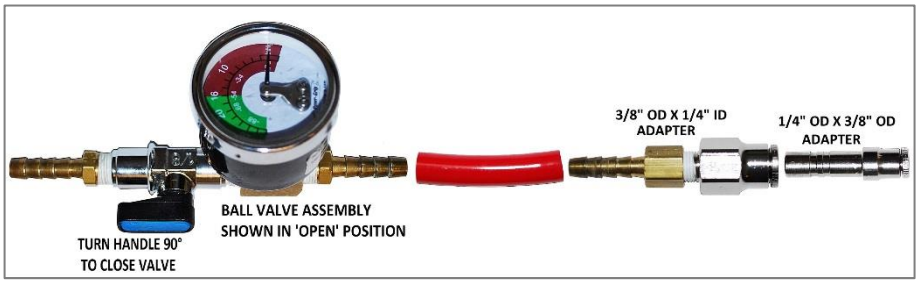


FIGURE 2

3) Since the vacuum gauges are connected to the pad system, it will be necessary to use a ball valve with vacuum gauge, fitted with an adapter for the push-in hose, as shown below, to perform the following test. Also, when using a single ball valve assembly, if, during the overall test of the lifter, it was determined that both circuits (red and blue/green) leak, you will have to test each circuit individually.



4) Remove the 1/4" o.d. hose (**3A**) from one of the filters (**3B**), that connects the filter to the pad line. Using an additional piece of 1/4" o.d. hose, connect the end of the ball valve with the vacuum gauge to the filter. Close the ball valve (turn handle perpendicular to valve body). See **FIGURE 3**, where the red circuit is shown being tested.

FIGURE 3

5) Note, since only one of the two circuits (red or blue/green) is being tested, the lifter will need to be attached to a smooth, clean, non-porous surface for the other circuit to seal.

6) Switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

7) Switch the power to off ( ) and observe the vacuum gauge of the ball valve to determine the area of the leak.

- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, the indication is that this circuit (red or blue/green) does not leak between the check valve and the filter.

  If, during the overall test of the lifter, a leak was indicated in both circuits (red and blue/green), remove the ball valve from the circuit being tested and repeat the process for the other circuit.

  Once it has been verified that neither circuit (red or blue/green) of the vacuum generating system leaks, proceed to Pad System Tests.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, the indication is that this circuit of the vacuum generating system does leak.

  If, during the overall test of the lifter, a leak was indicated in both circuits (red and blue/green), remove the ball valve from the circuit being tested and repeat the process for the other circuit. This is to determine if the leak in this circuit is also in the vacuum generating system.

  Once both circuits (red and blue/green) of the vacuum generating system have been checked and the condition of each is known, proceed to Vacuum Generating System Test.

VACUUM GENERATING SYSTEM TEST

Note: The following assumes that you have access to suitable plugs, a ball valve with vacuum gauge, and additional hose and adapter fittings for connecting the ball valve to the lifter's vacuum lines and fittings.

Note: If you are testing only one of the two circuits, the lifter will need to be attached to a clean, smooth surface for the remaining section to seal to during testing.

The most likely leak points in the vacuum generating system are the check valve, the hose connections to the filters, the control valve or vacuum tank/check valve assembly. Leave the filter disconnected and test these items as follows:

Isolate the filter from the control valve / check valve assembly:

1) Remove the ball valve from the filter. Disconnect the 1/4" o.d. hose (**4A**) from the port (**4B**) of the solenoid valve that connects to the filter. Connect the end of the ball valve with the vacuum gauge to this port of the solenoid valve. See **FIGURE 4**.

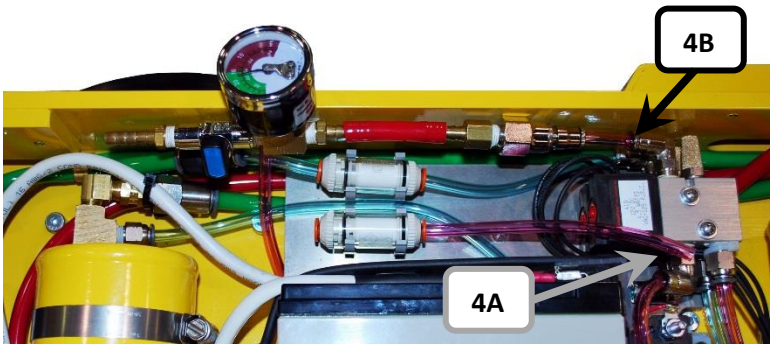


FIGURE 4

2) With the ball valve in the closed position (handle turned perpendicular to the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

3) Switch the power to off ( ) and observe the vacuum gauge of the ball valve to determine the area of the leak.

- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, the indication is that the filter is the source of the leak.

  Verify that the O-ring seal of the filter cap is in good shape, that the cap is tight and that the filter housing is clean. Check the filter and the ends of the hose attached to the filter. Cut approximately 1/8" [3 mm] from the ends of the hoses, ensuring that the cuts are straight and square. Reattach the hoses to the filter in the same manner as done in the Preliminary Test and retest the lifter as shown in the Preliminary Test. If the lifter continues to leak, replace the filter and or hoses.

  Note: When the filter is installed in its holder, it is critical that the hoses be positioned so that there is minimum sideways pressure on the filter hose.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, the indication is that the leak is located in either the solenoid valve assembly or the check valve. Proceed to next step.

4) Remove the ball valve from the solenoid. Using a piece of 1/4" O.D. hose, cap off the end of the hose to create a fitting plug, as shown in the picture at right. Use the capped hose to cap off the port of the solenoid that connected the filter. See picture for how to create the fitting plug and **FIGURE 5** for how used.

Note, the yellow caps shown at right can be used to create a fitting plug for any fitting using hose sizes 1/4" O.D. and smaller.

5) The capped port of the solenoid is item **5A**. This is the port that was connected to the filter. Disconnect the 1/4" o.d. hose (**5B**) from the solenoid of the affected circuit that connects to the vacuum tank assembly. The red hose shown (**5B**), loops around the battery and back to the vacuum tank assembly on the left; the blue/green circuit is more direct. Connect the end of the ball valve without the vacuum gauge to the hose from the vacuum tank. Using an additional piece of hose, connect the end of the ball valve with the vacuum gauge to the port (**5C**) of the solenoid assembly.

See **FIGURE 5**.

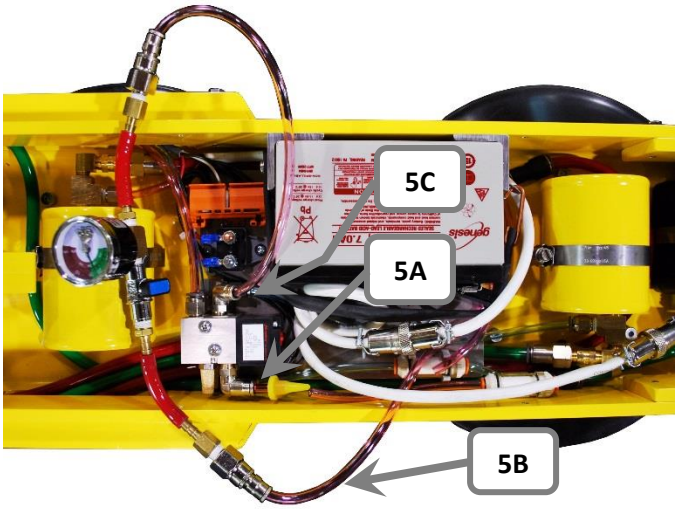


FIGURE 5

6) With the ball valve in the open position (handle in line with the valve), switch the power on (|), and activate the vacuum generating system by pressing the apply ( ) push button.

7) Close the ball valve (turn handle perpendicular to the valve), switch the power to off (○) and observe the vacuum gauge of the ball valve to determine the area of the leak.

- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, the indication is that the check valve, located on the vacuum tank assembly, or the connecting hose, is the cause of the leak.

  Check the ends and overall condition of the hose connected to the tank assembly. If needed, cut approximately 1/8" [3 mm] from each end, ensuring that the cuts are straight and square.

  If there are no visible problems with the hose, remove the tank assembly of the affected circuit (blue/green or red) and check the fittings for any indications of damage. If neither the hose nor fittings appear to be the cause, replace the check valve.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates that the solenoid assembly is the cause of the leak. Remove the solenoid assembly of the affected circuit (blue/green or red) and check the fittings for any indications of damage. If the fittings do not appear to be the cause, replace the solenoid valve.

8) Once all leaks, for both the red and blue/green circuit, have been located and repaired, reassemble the vacuum generating system. If needed, repeat the preliminary test, where the ball valve was attach to each circuit's filter, to confirm that the vacuum generating system no longer leaks.

Once the vacuum generating system is confirmed to not leak, reattach the pad lines to the filters and repeat the original vacuum test with all parts attached and the power in the off (O) position.

- If the vacuum level, as shown on the lifter's vacuum gauge(s), starts and continues to drop, this indicates that there is still a leak present in the pad system. Proceed to the Pad System Tests.
- If the vacuum level as shown on both of the lifter's vacuum gauges holds steady and does not drop, the indication is that there are no leaks in the vacuum system between the check valves and the vacuum pads. Proceed to next step.

9) Repeat the vacuum test with all parts attached and the power switch left in the on (I) position.

- If the vacuum level, as shown on both of the lifter's vacuum gauges, holds steady and does not drop and the lifter does not cycle during the second test with the power switch on, proceed to System Confirmation.
- If, during the second test with the power switch on (I), the lifter cycles, but there is no indication of a leak, as shown on the lifter's vacuum gauges, the indication is a special circumstance unique to this lifter design. Proceed as follows.

10) The following deals with a specific issue, where, if during a vacuum test of the whole lifter, the vacuum pump cycles regularly but the system's vacuum level does not drop (no leak indicated by either vacuum gauge), the indication is that a leak exists between the vacuum pump and the check valve(s).

If either the solenoid valve that seals off the vacuum pump to the vacuum system, the vacuum switch, or the connections from the pump to the vacuum switch or vacuum tank(s) were to develop a leak, but the check valves sealing the main vacuum circuits still seal properly, the result is that the pump will recycle regularly even though the vacuum level on the vacuum gauges does not indicate a leak. This is caused by the fact that the area the vacuum switch is located in is sealed via the pump valve and, if a leak were to exist in this section, the vacuum switch would sense the leak and cycle the system to maintain its set vacuum level. However, since the vacuum gauges are located in the individual vacuum circuits, which are sealed via their respective check valves, there would be no loss of vacuum shown on either vacuum gauge if the check valves continue to keep the pad system sealed. If this is the situation, proceed as follows.

11) The vacuum tanks are connected to the pump by the 3/8" O.D. hose connected to the 45° barbed fitting (**6A**), of the pump solenoid. Note, the valve shown is for lifters with serial numbers before 20161736. If your lifter has serial number 20161736 or greater, there will be a digital vacuum switch attached to the valve. The test is the same for either configuration.

Note, to provide easier access to the connected hose, the hose cover (shown in **FIGURE 13**) was removed from the channel and hose **6A** pulled out of the frame slot before performing the test shown in **FIGURE 7**.

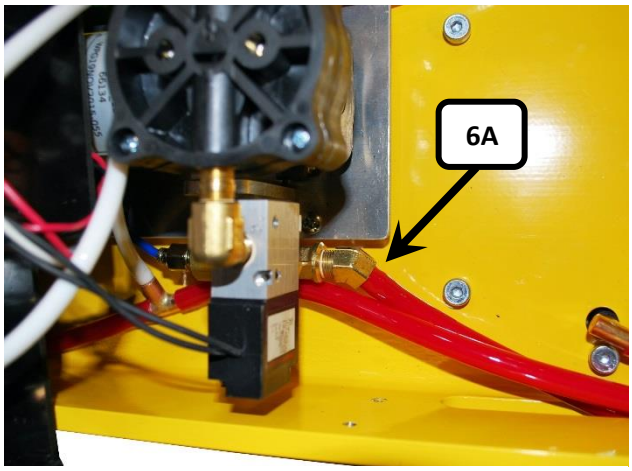


FIGURE 6

12) Begin by separating the tank line from the pump/control box assembly. Disconnect the hose (**7A**) from the 45° barbed fitting, connected to the pump solenoid. Attach the end of the ball valve assembly with the vacuum gauge to this hose. Using an additional piece of hose, attach the other end of the ball valve to the 45° barbed fitting.

See **FIGURE 7**.

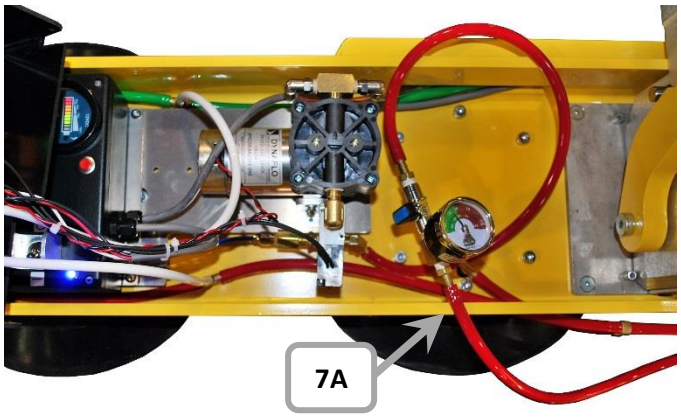


FIGURE 7

13) With the ball valve in the open position, (handle in line with the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

14) Close the ball valve (turn handle perpendicular to the valve) but leave the power turned on (I).

Note, it is possible for both the following conditions to exist. If so, then perform the tests in the order listed.

- If the vacuum pump cycles during the test, the indication is that the pump solenoid, the vacuum switch or the hose connections between these parts, is the cause of the leak. Switch the power off (O) and proceed to next step.
- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, the indication is that the hose connection to the vacuum tanks is the cause of the leak. Proceed to step 30.

15) Remove the ball valve from the tank line and solenoid valve. Using a short piece of hose (**8A**), connect the end of the ball valve with the vacuum gauge directly to the pump solenoid. With the gauge end of the ball valve connected to the 45° barbed fitting of the solenoid valve, close the ball valve (turn handle perpendicular to the valve), as shown in **FIGURE 8**.

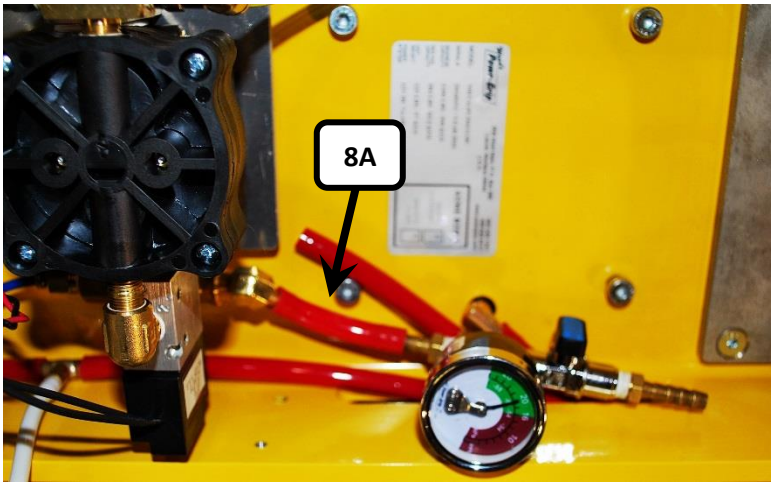


FIGURE 8

16) With the ball valve in the closed position (handle perpendicular to the valve), switch the power on (I) and activate the vacuum generating system by pressing the apply ( ) push button.

17) Switch the power to off (O). If the vacuum level of the ball valve's vacuum gauge starts and continues to drop, a leak does exist in this section of the pump/vacuum switch assembly.

18) Note: Lifters with serial number 20161736 or greater, have been fitted with the digital vacuum switch. Proceed to next step for these lifters.

Lifters with serial numbers before 20161736, will have an analog vacuum switch mounted inside the control enclosure. Proceed to step 20 for these lifters.

19) If a leak existed when the valve with digital vacuum switch, shown in **FIGURE 9**, was tested, there is no convenient way to isolate the vacuum switch from the valve.

In this case, since the digital vacuum switch is not prone to leak, the likely cause is the solenoid or an attached fitting. Check the fittings for any indication of damage or cracks. If there is no indication of damaged fittings, replace the solenoid.

FIGURE 9

20) For lifters using the analog vacuum switch:

The next test will require the ball valve to be set up to use on the 5/32" O.D. hose. As shown in the following graphic.

21) Remove the ball valve from the solenoid and cap off the 45° barbed fitting, (**10A)** in **FIGURE 10**. See inset for close-up view.

22) The vacuum switch is located inside the control box. Disconnect the 5/32" O.D. hose (**10B**) from the control box (**10C**) that connects to the solenoid assembly. Note, this hose may be blue or black.

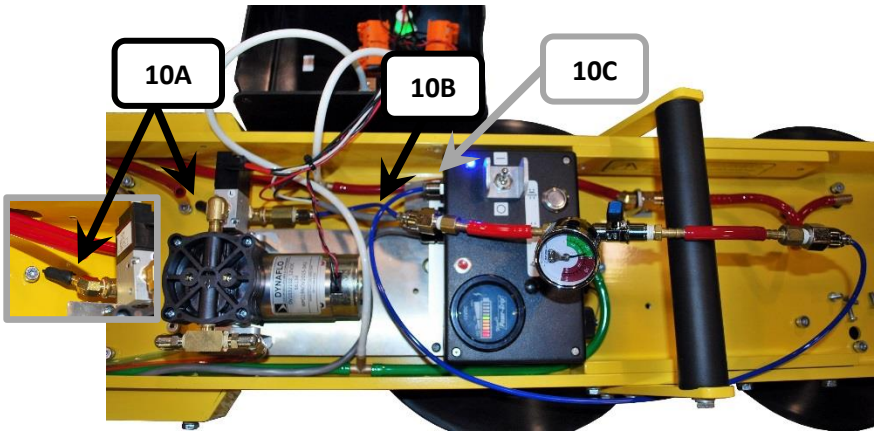


FIGURE 10

23) Attach the end of the ball valve with the vacuum gauge to the hose removed from the control box that connects to the solenoid assembly. Using an additional piece of hose, attach the other end of the ball valve to the control box. See **FIGURE 10**.

24) With the ball valve in the open position (handle in line with the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

25) Close the ball valve (turn handle perpendicular to the valve) but leave the power on (I). Note, both of the following conditions may exist; effect repairs as needed.

- If the vacuum level of the ball valve's vacuum gauge starts and continues to drop, the indication is that the pump solenoid is the cause of the leak.

  Examine the fittings attached to the solenoid assembly and, if there is no indication of damaged fittings, replace the solenoid.

- If, during the test, the pump cycles, the indication is that the vacuum switch or the hose connections between the solenoid and the vacuum switch are the cause of the leak. Note, if the pump does begin to run, it will not shut off with the ball valve closed. Check the hoses that connect the vacuum switch to the pump solenoid.

  Note, there are two hoses used: one (**11A**) from the solenoid assembly to the control box external connection and one (**11B**) from the control box internal connection to the vacuum switch (**11C**) See **FIGURE 11**.

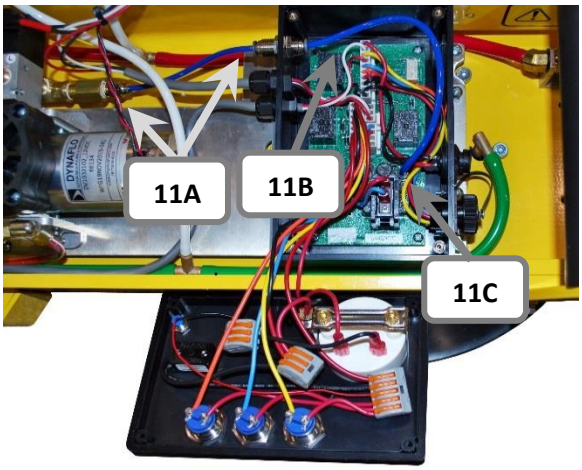


FIGURE 11

26) Remove the ball valve. Disconnect the hoses from the push-in fittings and cut approximately 1/8" [3 mm] from the ends of each hose. Check that the hose connection to the vacuum switch is secure; if it pulls off easily, recut this hose end as well. Reattach the hose (**12A**) from the pump solenoid to the control box. Attach the other hose (**12B**) to the end of the ball valve with the vacuum gauge. Using an additional piece of hose, attach the other end of the ball valve to the inside box connection. See **FIGURE 12**.

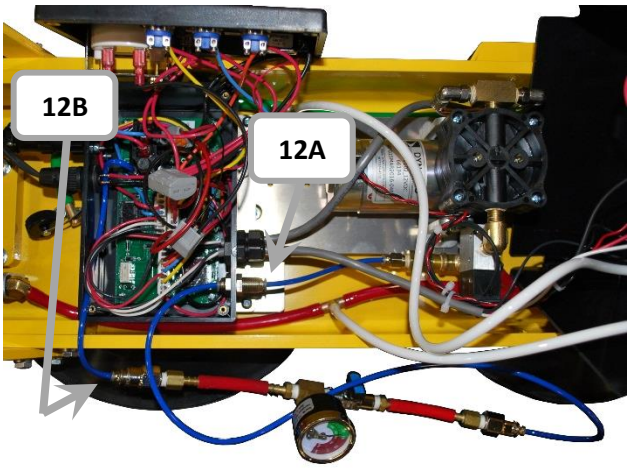


FIGURE 12

27) With the ball valve in the open position (handle in line with the valve), switch the power on (|), and activate the vacuum generating system by pressing the apply ( ) push button.

28) Close the ball valve (turn handle perpendicular to the valve) and switch the power off ( ).

- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, the indication is that the vacuum switch leaks. Check the hose connection to the vacuum switch and, if it is easily removed, replace the hose and repeat the test to see if the leak stops. If the hose connection appears and feels secure to the fitting, replace the vacuum switch.
- If the vacuum level, as shown on the ball valve's vacuum gauge, holds steady and does not drop, the indication is that the leak exists in either the hose used to connect the vacuum switch to the pump solenoid or the connection to the push-in fittings. Replace the hose to the pump solenoid.

29) Repeating the test shown in step 15, where the gauge end of the ball valve was connected directly to the pump solenoid's 45° fitting (**FIGURE 8**), if the vacuum level, as shown on the ball valve's vacuum gauge, holds steady and does not drop, this verifies that this section of the pump/control box assembly no longer leaks.

30) If, in step 14, the indication was that the hose connection to the vacuum tanks leak, proceed as follows.

The hose runs from the solenoid valve and through the slot to the outer surface of the channel, where it is split with a Y-fitting to provide a connection to each vacuum tank; the hoses are guarded by the hose cover shown in **FIGURE 13**. If the cover is still attached, remove the two 1/4-20 bolts (**13A**) securing the cover to the channel in order to access the hoses and fittings.

FIGURE 13

31) The components involved will be the hose running from the 45° fitting of the pump solenoid (**14A**) to the Y-fitting (**14B)** and the green and red hoses (**14C**) running from the Y-fitting to their respective vacuum tank connection. See **FIGURE 14.**

FIGURE 14

NOTE: THE GRAPHIC ABOVE WAS SPLIT TO BETTER SHOW THE LOCATIONS OF THE PARTS DISCUSSED

32) Check the connection of the 3/8" O.D. red (**15A**) and green (**15B**) hose to the push-in fitting of the vacuum tanks, shown in **FIGURE 15**. Cut approximately 1/8" [3 mm] from the end of each hose, taking care to keep the cuts square and straight, and reattach them to the vacuum tanks.

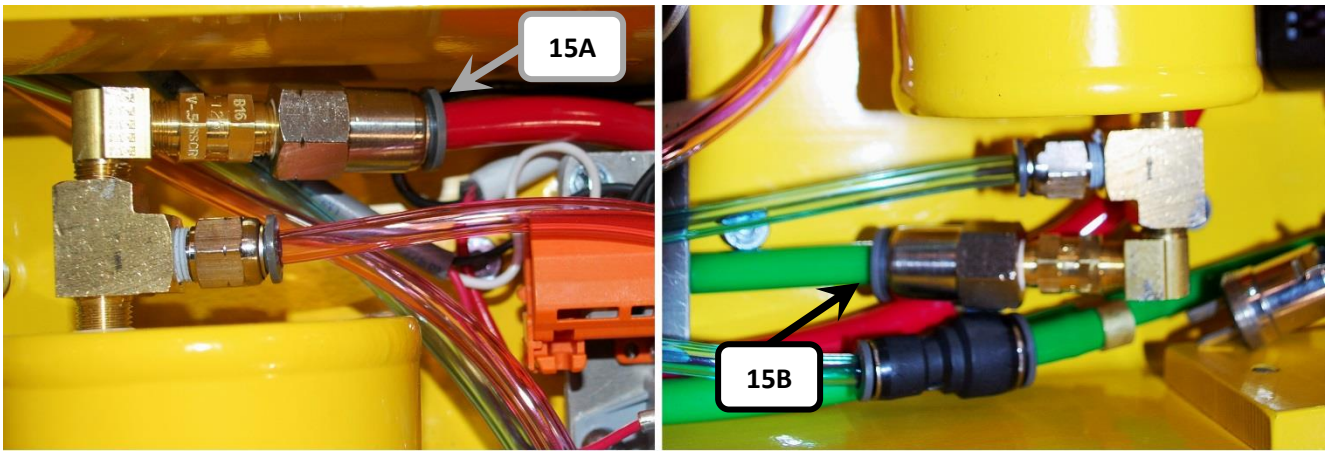


FIGURE 15

33) Repeat the vacuum test (steps 12 through 14) shown in **FIGURE 7**.

- If the vacuum level of the ball valve's vacuum gauge now holds steady and does not drop, the indication is that the leak to the vacuum tanks has been repaired. Once all identified leaks have been repaired, proceed to System Confirmation.
- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, this indicates that the leak in the vacuum tank connections still exists. Proceed as follows.

34) Remove the ball valve from the pump solenoid and reconnect the tank hose to the solenoid.

35) Remove the hose from the Y-fitting that connects to the pump solenoid, leaving the tank lines connected.

Note: Use caution when removing a hose from the Y-fitting shown in **FIGURE 16**. These fittings have only a single barb on each hose connection. Remove the hose carefully so as not to damage the single barb of the fitting.

FIGURE 16

36) Using an additional piece of hose, connect the end of the ball valve with the vacuum gauge to the Y-fitting. Connect the other end of the ball valve to the hose connected to the pump solenoid. See **FIGURE 17**.

37) With the ball valve in the open position (handle in line with the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

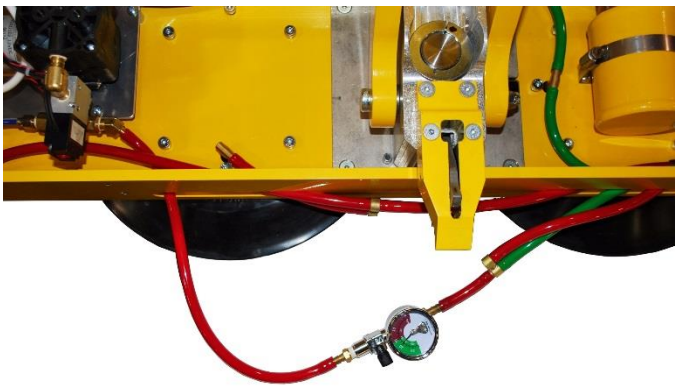


FIGURE 17

38) Close the ball valve (turn handle perpendicular to the valve), switch the power to off (O) and observe the vacuum gauge of the ball valve to determine the area of the leak.

- If the vacuum level, as shown on the ball valve, holds steady and does not drop, the indication is that the hose from the pump solenoid leaks. Replace the hose from the Y-fitting to the pump solenoid. Repeating the test shown in **FIGURE 7** can be used to confirm that the leak is repaired.
- If the vacuum level, as shown on the ball valve, starts and continues to drop, this indicates that the leak is located between the Y-fitting and the tank connections. Proceed as follows.

39) Disconnect the two hoses, one red and one green, from the Y-fitting that connect to the vacuum tanks, taking care to not damage the fitting barbs. Examine the barbs of the Y-fitting to determine if there are any large nicks in the barbs that could allow a hose to leak. If the barbs are not damaged, cap off the barbs as shown in **FIGURE 18**.

FIGURE 18

40) With the ball valve in the open position (handle in line with the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

41) Close the ball valve (turn handle perpendicular to the valve), switch the power to off (O) and observe the vacuum gauge of the ball valve.

- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, the indication is that the Y-fitting leaks. Replace the Y-fitting. Reconnect the hoses and confirm by repeating the test shown in **FIGURE 7**. If the leak continues, proceed to next step to test the individual tank lines.
- If the vacuum level of the ball valve's vacuum gauge holds steady and does not drop, the indication is that one or both of the hoses connected to the vacuum tanks is the cause of the leak. Proceed as follows.

42) Remove one of the caps from either barb of the Y-fitting and reconnect one tank line. **FIGURE 19** shows how to test either the red or green tank lines.

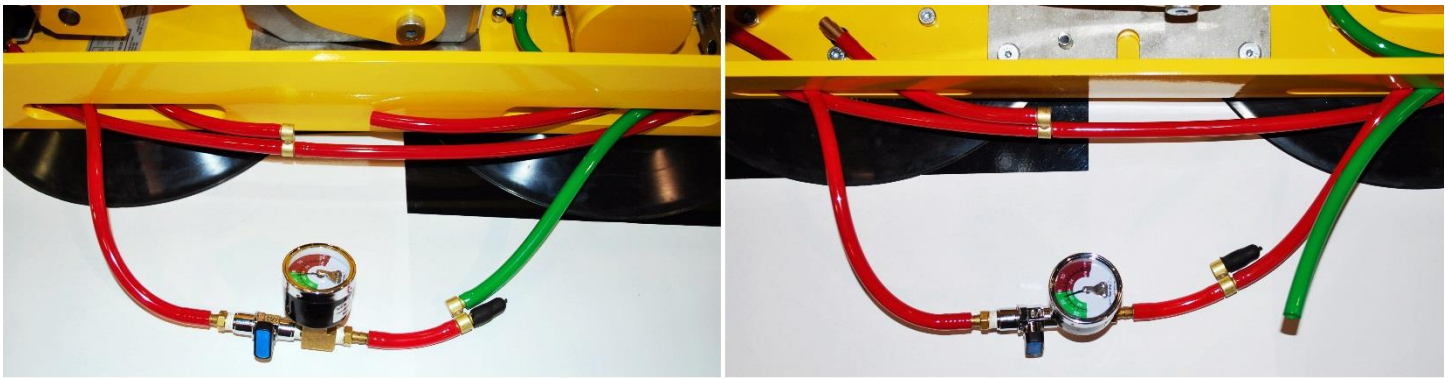


FIGURE 19

43) With the ball valve in the open position (handle in line with the valve), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.

44) Close the ball valve (turn handle perpendicular to the valve), switch the power to off (O) and observe the vacuum gauge of the ball valve.

- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, the indication is that the hose to the tank connection (**20A**) leaks. Replace this hose and repeat the test to verify that the leak has been repaired. If the leak continues, examine the area where the check valve is attached to the push-in fitting, circled in **FIGURE 20,** for any indication of cracks.

  If there are no indications of damage to the threads of the check valve, replace the push-in fitting of the vacuum tank (**20A**) that connects to the 3/8" O.D. hose (the red tank connection is shown in **FIGURE 20**).

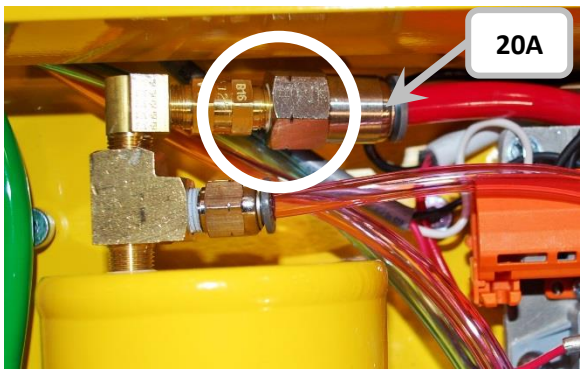


FIGURE 20

- If the vacuum level of the ball valve's vacuum gauge holds steady and does not drop, the indication is that this hose does not leak. Leave this hose attached (since it was confirmed to not leak) and attach the other tank hose to the other barb of the Y-fitting.

45) Repeat the test with both hoses attached, using the criteria above, to determine whether there are any problems with the last connected, unverified hose.

46) Once it has been verified that there are no longer any leaks present in the section between the pump and check valves, proceed to System Confirmation.

PAD SYSTEM TESTS

Note: This section assumes it was determined that either the vacuum generating system does not leak or that any existing leaks in the vacuum generating system have been repaired up to the filter connections.

Note: The following assumes that you have access to suitable plugs, a ball valve with vacuum gauge, and additional hose and adapter fittings for connecting the ball valve to the lifter's vacuum lines and fittings.

Note: If you are testing only one of the two circuits, the lifter will need to be attached to a clean, smooth surface for the remaining section to seal during testing.

Isolate the vacuum pads, fittings and vacuum line sections until the leak point can be located, as follows:

1) If not already attached, reattach the filter lines to reconnect the vacuum generating system to the pad system.
2) Remove each pad fitting from the vacuum pads of the affected (leaking) circuit, disconnecting the pads of this circuit from the vacuum system.
3) Cap the pad fittings of the disconnected pads, to seal off the vacuum lines. See **FIGURE 21**, where all 6 pad fittings are shown capped off; red circuit shown in top views and green circuit shown in bottom views.

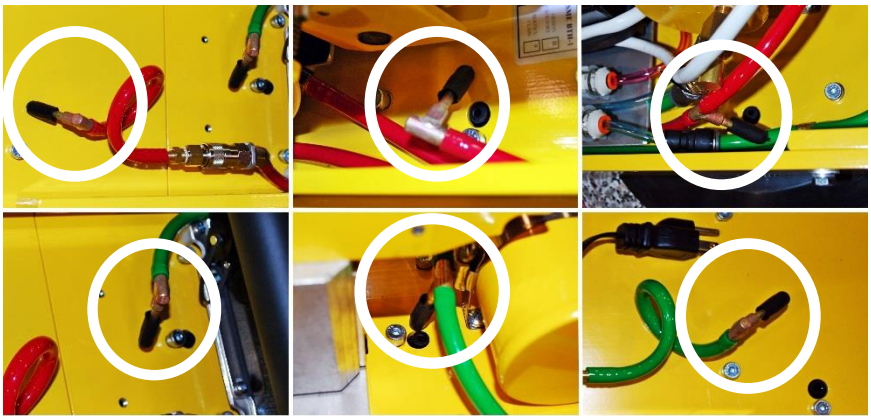


FIGURE 21

Note: If only one set of pads (green or red circuit) is capped off, the lifter will need to be attached to a clean, smooth surface for the remaining section to seal during testing.

4) With the vacuum pads capped off (all or just one set of pads), switch the power on (I), and activate the vacuum generating system by pressing the apply ( ) push button.
5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically, then switch the power to off (O) and observe the lifter's vacuum gauge(s) to determine the area of the leak.
   - If the vacuum level shown on the lifter's vacuum gauge for the circuit (red or green) that is being tested holds steady and does not drop, this indicates the leak is in one or more pads of that circuit. Reconnect one pad to its vacuum line and retest. If indications of leakage resume, replace that pad. Continue testing until all pads have been reconnected and all defective pads have been identified and replaced.
   - If the vacuum level shown on the lifter's vacuum gauge for the circuit (red or green) that is being tested starts and continues to drop, this indicates the leak is located in the fittings, quick connects, or vacuum lines between the vacuum pads and the filter.

     If it is determined that the leak is between the pads and the filters, continue testing as follows. Note, the pad fittings should still remain capped off for the following tests.

6) Vacuum line sections and included fittings may be tested by moving up each line (toward the vacuum generating system) to the next fitting, removing the hose and plugging it at the fitting, or by installing the ball valve assembly (with the gauge end towards the section that the lifter's gauge has been separated from) into the line.

7) Each circuit (red and green) has one vacuum pad connected by a quick connect, shown in **FIGURE 22** below. Disconnect the quick connect and repeat the vacuum test.

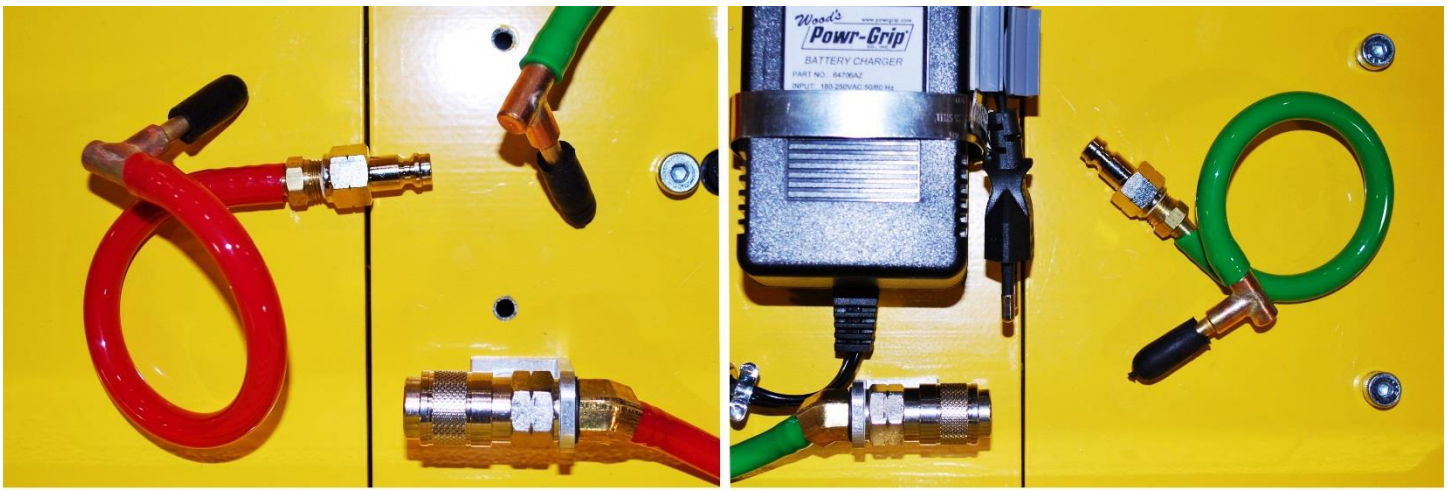


FIGURE 22

- If, with the quick connect disconnected, the vacuum level, as shown on the lifter's vacuum gauge, still indicates a leak (vacuum level drops), proceed to step 10.
- If, with the quick connect disconnected, the vacuum level, as shown on the lifter's vacuum gauge, now holds steady and does not leak, the indication is that the leak is located in the section that was removed. This would be the pad fitting, hose, the quick connect plug assembly, or that the quick connect leaks when connected. Proceed as follows.

8) Remove the hose from the barbed fitting of the male quick connect plug and cap off the barbed fitting. Connect the male plug to the female quick connect coupler. See **FIGURE 23**. Repeat the vacuum test.

FIGURE 23

- If the leak resumes, examine the threads of the barbed fitting for indication of cracks. If the fitting itself does not appear damaged, replace the quick connect. Note, the O-ring that seals the male portion of the quick connect to the female half when they are attached is part of the female coupler, due to this it is recommended that both the male and female quick connect be replaced.
- If the vacuum level, as shown on the lifter's vacuum gauge, continues to hold steady and does not drop, the indication is that the quick connect does not leak when connected. Continue to next step.

9) After confirming that the quick connect does not leak, remove the cap from the barbed fitting. Remove the pad fitting from the hose and reattach the hose to the quick connect. Attach the end of the ball valve without the vacuum gauge to the hose of the quick connect and, using an additional piece of hose, attach the end of the ball valve with the vacuum gauge to the pad fitting. See **FIGURE 24**.

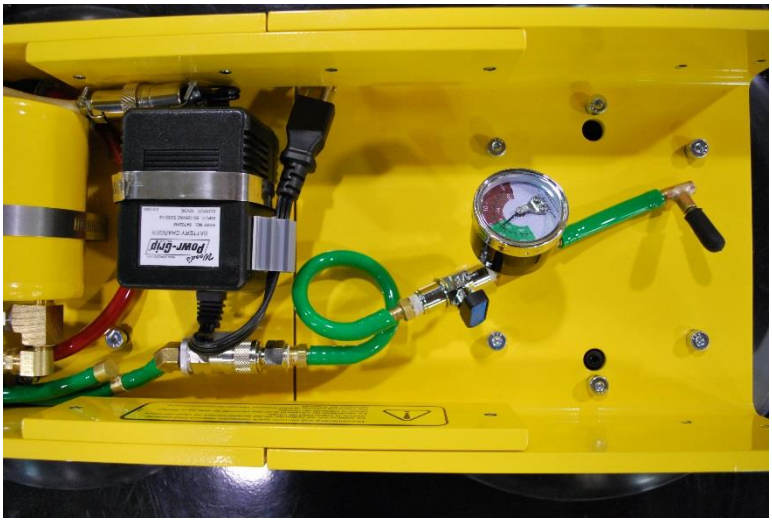


FIGURE 24

Repeat the vacuum test.

- If the vacuum level, as shown on the ball valve's vacuum gauge, starts and continues to drop, replace the pad fitting.
- If the vacuum level on the lifter's vacuum gauge starts and continues to drop, replace the hose to the quick connect.

10) If, in step 7, it was determine that the leak continued when the quick connects were disconnected, this indicates that the leak is not caused by the connected quick connect, the hose attached to the male quick connect or the pad fitting. It will exist between the quick connect and the filter connection of the circuit being tested.

11) Test the quick connect by itself when disconnected. Remove the hose from the barbed fitting of the female quick connect coupler. Attach the end of the ball valve without the vacuum gauge to this hose. Using an additional piece of hose, attach the end of the ball valve with the vacuum gauge to the barbed fitting of the quick connect. See **FIGURE 25**. Note that the quick connect assembly was unbolted from the channel to provide easier access to the hose and fitting.

FIGURE 25

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates that the quick connect leaks when disconnected. Examine the threads of the barbed fitting for indication of cracks. If the barbed fitting itself does not appear damaged, replace the quick connect.
- If the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located further back, towards the filter connection. Continue to next step.

12) Vacuum line sections and included fittings may be tested by moving up each line (toward the vacuum generating system) to the next fitting, removing the hose and plugging it at the fitting, or by installing the ball valve assembly into the pad line, which provides access to an additional vacuum gauge when needed.

Individual parts and fittings can be tested in the same manner as the pad fitting is shown being tested in **FIGURE 24**, where the capped off fitting was connected to the end of the ball valve with the vacuum gauge, and the other end of the ball valve connected to an active vacuum line. Vacuum was applied with the ball valve in the open position (handle in line with the valve) and then the ball valve was closed (handle turned perpendicular to the valve) and the lifter turned off.

If the assembly or fitting being tested leaks, it will be indicated by a drop in the vacuum level of the ball valve's vacuum gauge. If the vacuum level holds steady the fitting does not leak.

13) The following will describe the various methods used.

In **FIGURE 23** the quick connect is shown with the male connector attached and the barbed fitting of the male plug capped off. In this scenario, if the leak, as indicated on the lifter's vacuum gauge, were to stop, this indicates that the leak exists in the section (hose or fittings) that was disconnected from the quick connect. If the leak continues, the indication is that the leak exists between the capped barb and the filter connection. The next step would be to move to the next fitting in the pad line, remove the hose leading from it to the quick connect, cap off the fitting and repeat the test. If the leak continues, continue to work back towards the filter connection to locate the leak. When the leak stops, it will be located within the last section that was disconnected from the section being tested.

To test individual parts or assemblies, use the ball valve with the vacuum gauge. This is shown in **FIGURE 25**, where only the female quick connect coupler is shown being tested; in **FIGURE 24** where a single pad fitting is being tested; and in **FIGURE 18**, where a Y-fitting is being tested.

Attach the part to be tested to the end of the ball valve with the vacuum gauge, cap off any open barbs, and attach the other end of the ball valve to an active vacuum line. Apply (↕) vacuum with the ball valve in the open position (handle in line with the valve) and then close the ball valve (handle turned perpendicular to the valve) then switch the lifter to off (○).

If the assembly or fitting being tested leaks, it will be indicated by a drop in the vacuum level of the ball valve's vacuum gauge. If the vacuum level holds steady, the part being tested does not leak.

14) The ball valve assembly can also be used in place of a plug, as shown in **FIGURE 26**. The gauge end of the ball valve was connected to an additional piece of hose. The pad line hose was removed from the reducing fitting, connected to the filter hose. Vacuum was applied (↕) with the ball valve in the closed position, then the power switched off (○). If a leak were to be indicated by a drop in vacuum, it will exist in either the reducer fitting or the hose between the reducer and the filter.

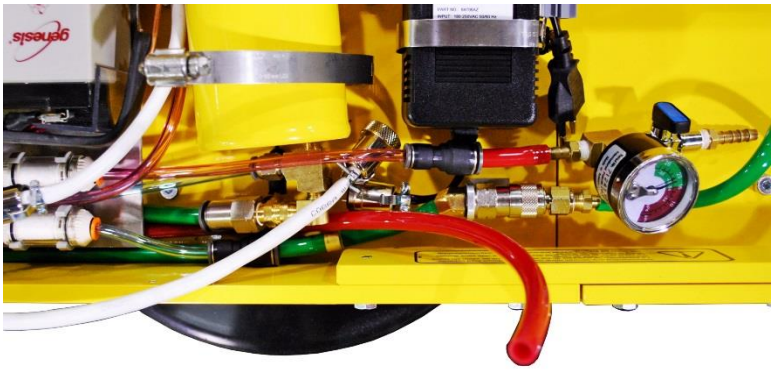


FIGURE 26

To determine which, first check the hose. The ends should be square and straight; if needed, recut each end, reinstall the hose and repeat the test. If this does not resolve the leak, disconnect the reducing fitting and, using the hose adapters, attach the ball valve to the ¼" O.D. filter hose. See **FIGURE 27**.

FIGURE 27

In **FIGURE 27**, the reducer fitting has been removed and the ball valve (with hose adapters for 1/4" O.D. hose) has been attached directly to the filter hose.

If the leak continues, replace the hose, and if this does not resolve the issue, replace the filter.

If the vacuum level of the vacuum gauge holds steady and no longer indicates a leak, this indicates that the leak was in the reducer fitting, since this is the only part that has changed since the previous test. Replace the reducer fitting.

15) The final use of the ball valve is to install it in a line so the lifter's vacuum gauge provides a reading for one section of the circuit being tested and the ball valve's vacuum gauge provides a reading for the remainder of the circuit. This is shown in **FIGURE 28,** where the ball valve is being used to check the connection to the lifter's vacuum gauge.

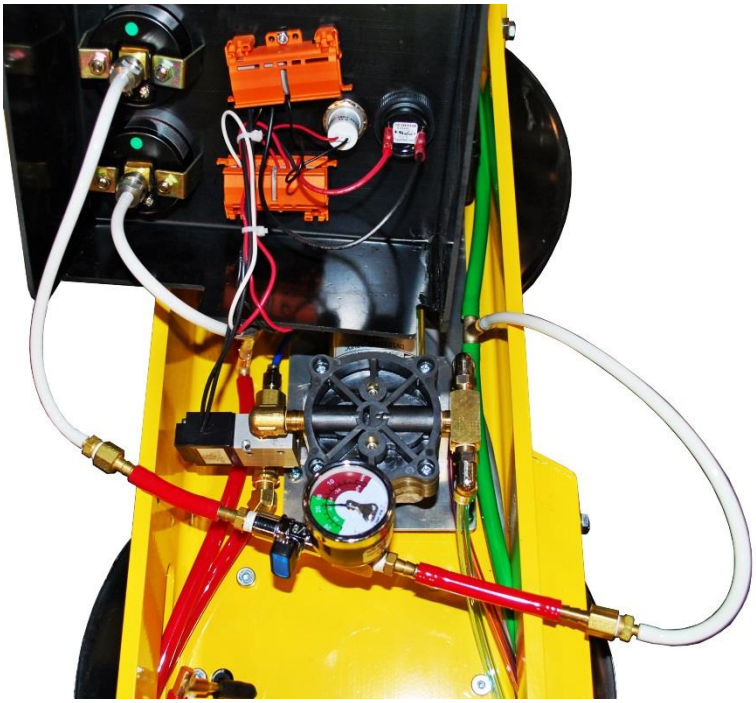


FIGURE 28

The vacuum gauge is connected with (white) 1/8" I.D. hose. An adapter fitting is used to connect the end of the ball valve without the vacuum gauge to the hose attached to the lifter's vacuum gauge. A second adapter fitting is used, along with additional 1/8" I.D. hose, to connect the end of the ball valve with the vacuum gauge to the Tee fitting located in the pad line.

With the ball valve in the open position (handle in line with the valve), apply (↕) the lifter.

Allow the lifter to shut off and then close the ball valve (handle turned perpendicular to the valve) then switch the lifter to off (O).

Observe the vacuum gauges to locate the cause of the leak. Note, it is possible for both the following two conditions to exist.

- If the vacuum level of the lifter's vacuum gauge starts and continues to drop, this indicates that the leak exists in either the hose to the gauge, the fitting attached to the gauge or the vacuum gauge itself.

  Examine the hose and gauge fitting for any indication of damage. If the attached parts do not appear damaged, replace the vacuum gauge.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop the indication is that a leak exists between the ball valve and the filter connection.
- If the vacuum level of either vacuum gauge holds steady and does not drop, the indication is that the isolated section does not leak. In this instance, if the lifter's vacuum gauge held, this would verify that the lifters gauge, attached fitting and hose do not leak. In the same respect, if the ball valve's vacuum gauge held, this would verify that the section between it and the filter connection do not leak.

15) Continue testing, using the various processes described for eliminating sections and parts, until any and all leaks can be located and repaired.

16) Once all parts have been reassembled and all leaks have been identified and repaired, proceed to System Confirmation and retest the vacuum system as described.

SYSTEM CONFIRMATION

Once all leaks have been identified and repaired, reassemble all parts of the lifter.

The Vacuum Test, as described in the instruction manual, should be performed following any repair or service to a vacuum lifter. Note: On lifters such as this one, with quick connects installed, a second vacuum test should be performed with the quick connects disconnected. All parts must be verified in relation to their function and the lifter must pass the Vacuum Test before returning the lifter to operation.

ADDITIONAL INFORMATION

NOTES:

1) When requesting information on a particular lifter, please have the model number and serial number available, in order for us to properly identify components.
2) **CAUTION:** Always proceed with caution when opening enclosures containing electrical wiring. Wiring is often connected to components in the cover, as well as the enclosure itself.
3) In some cases a leak may be identified to be in an assembly (such as a filter or valve assembly) but the actual cause is not apparent (neither the filter nor the valve itself are the cause). In these cases, the leak may be caused by a cracked fitting. Cracks in fittings may be visible but are often virtually impossible to locate except under factory test conditions. They may appear as dark lines along the seam of female fittings, along the hex nut section of female hose nipples, or at the base of the threads on male fittings. If a leak is traced to an assembly and the cause is not visibly apparent, it may be best to simply replace the whole assembly rather than a single component.
4) If any metal fittings are disassembled during testing, ***always*** apply thread sealant (Teflon tape or similar product) to the male threads prior to reassembly, in order to avoid vacuum leaks.

   For plastic fittings use only Teflon tape; liquid sealants must not be used because they may damage plastic parts.
5) When assembling fittings, do not over-tighten. After first applying adequate thread sealant or tape, the fitting should be finger-tightened as much as possible.

   A straight fitting should be tightened no more than two additional revolutions with a wrench.
   An elbow fitting should be tightened no more than one and one-half additional revolutions with a wrench.
   Once an elbow or tee fitting is tightened with a wrench, the fitting should be aligned in the clockwise direction with a wrench.
6) Please note: The information that is gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools you use are capable of completely sealing your system.

If needed, test equipment is available from Wood's Powr-Grip Co.

There are various ways to approach testing vacuum lifters.

For further suggestions or information, please contact our staff at:

Wood's Powr-Grip Co., Inc.
908 West Main
Laurel, Montana 59044
800.548.7341
406.628.8231
406.682.8354 (fax)
www.WPG.com

ALL LIFTERS MUST BE TESTED AFTER MAINTENANCE
SEE INSTRUCTION MANUAL