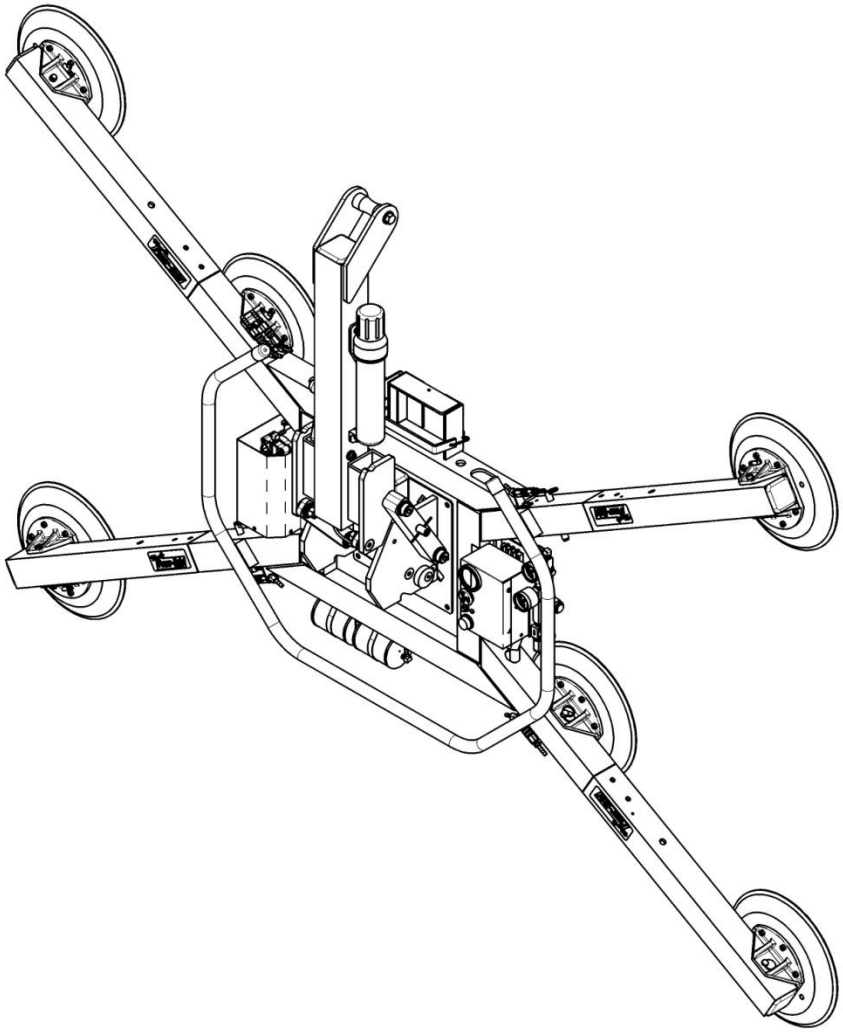
LEAK TEST PROCEDURE

MRTA6-DC LIFTERS

APPLICABLE TO SERIAL NUMBERS UP TO #20140615



TESTING AND MAINTENANCE MUST BE DONE BY A QUALIFIED PERSON

KEEP FOR FUTURE REFERENCE

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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 and the (red) low vacuum warning light 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.

Note: This lifter is equipped with quick connect couplings to each vacuum pad. The initial leak test should be performed with all pads attached to verify the condition of the vacuum pads and all system components. A second vacuum test should then be performed with all the quick connects disconnected to verify that the quick connects will seal properly when disconnected. This will verify the integrity of the lifter's vacuum system with all possible configurations. Additionally, testing the lifter both ways (with all vacuum pads connected and, alternatively, with all quick connects disconnected) may provide helpful information, should a vacuum leak be noted.

If the vacuum lifter did not leak when all the pads were attached but did leak when the quick connects were disconnected, this indicates that one or more of the quick connects leak when disconnected. Conversely, if the lifter did leak when all the pads were attached, but did not leak when the quick connects were disconnected, this indicates that one or more of the vacuum pads or the connection from the vacuum pads to the quick connects are the cause of the leak.

In both of the examples above, the vacuum leak is located in the vacuum pad system and not the vacuum generating system. If this is the case, please read the remaining information provided in this section and then proceed to the Pad System Test for information on testing either the quick connects or vacuum pads.

If the vacuum lifter leaked under both circumstances (with all pads connected and also with all quick connects disconnected), the Preliminary Test shown in the following section will need to be performed.

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". If both the red and green circuits of the lifter's vacuum system are leaking, 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 or more vacuum leak elsewhere in the system.

If the rate of leakage 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, 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, 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 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, and extra vacuum hose. 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 our sales staff 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 valve enclosure cover. Since wiring is connected to components in the cover, gentle removal is recommended so as not to damage the attached wiring.

Note: When removing a hose from a fitting, take care to avoid damaging the barbs of the fitting the hose is attached to. 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 ¼" [6 mm] off the end of the hose before reinstalling it on the fitting, in order to remove damaged hose ends.

PRELIMINARY TEST

This test determines whether leakage is located in the vacuum generating system or the pad system.

CAUTION: Disconnect the battery before removing the vacuum generating system cover.

1) Carefully remove the valve enclosure cover (**1A**) and lay it to one side, so that exposed wire terminals do not touch any conductive material, as shown in **FIGURE 1**.

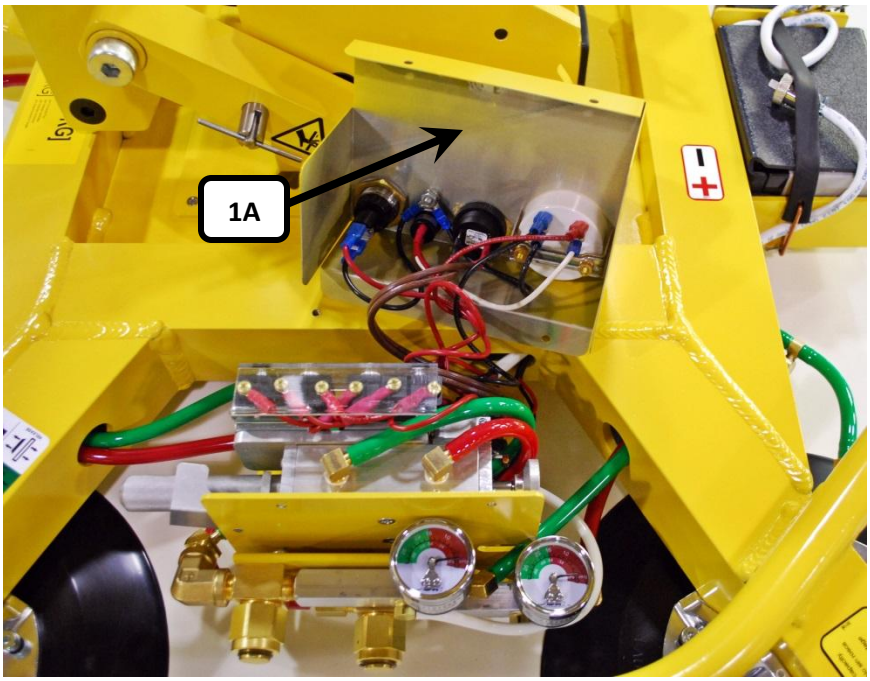

FIGURE 1

2) Remove the hose from the fitting on the vacuum gauge side of the vacuum filter manifold assembly for the affected circuit (**2A** green or **2B** red).

3) Cap the open end of the 45° barbed fitting (**2A**), to seal off the vacuum generating system from the green pad circuit and/or the 90° barbed fitting (**2B)** to seal off the vacuum generating system from the red pad circuit. The gauges for both circuits (green and red) are shown capped off in **FIGURE 2**.

   Note: If only one filter assembly is capped off, disconnect the quick connects to the all the vacuum pads of other pad circuit, so the vacuum system will seal during testing.

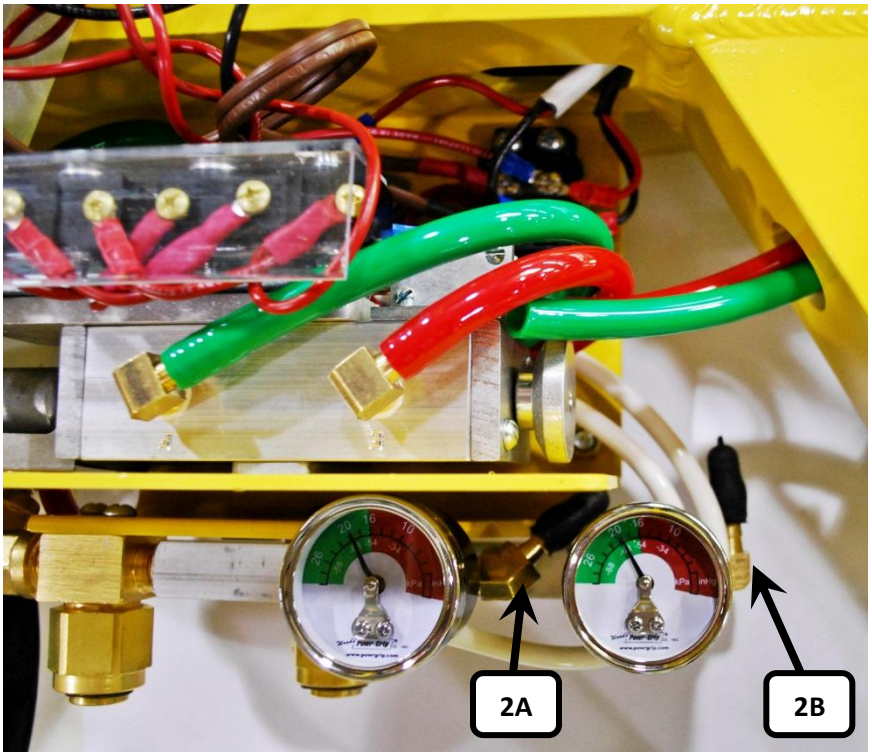

FIGURE 2

4) Reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).
5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, disconnect the battery.

   Observe the vacuum gauge to locate the general area of leakage.

   - If the vacuum level on the vacuum gauge starts and continues to drop, this indicates the vacuum generating system does leak. Proceed to the Vacuum Generating System Test.

     Note: If, when the general Vacuum Test (as described in the Maintenance section of the instruction manual) was performed, both gauges indicated a vacuum leak, but now, when testing only the vacuum generating system, only one gauge is indicating a leak, this indicates that the one circuit (green or red) that currently shows a leak is leaking in the vacuum generating system and the other circuit, that is now holding, is leaking in the pad system. When this is the case, the leak in the vacuum generating system should be dealt with before continuing on to the Pad System Test.
   - If the vacuum level on the vacuum gauge holds steady and does not drop, this indicates the vacuum generating system does not leak; therefore the leak is located in the pad system. Proceed to the Pad 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 for connecting the ball valve to the lifter's vacuum lines and fittings.

Note: If you are testing only one of the two circuits, disconnect the quick connects to the vacuum pads of the remaining circuit so the vacuum system will seal during testing.

The most likely leak points in the vacuum generating system are the check valve, the filter assembly, or the control valve. Leave the vacuum line to the pad system sealed off at the vacuum filter and test these items as follows:

Test the check valve for leakage:

1) The check valves (**3A** – one per circuit) are located on each of the vacuum tanks.
   See **FIGURE 3**.

   The check valves connect to the vacuum tanks and are located between the two tanks. The 90° fitting on the opposite end of each vacuum tank connects the vacuum tank to the control valve.

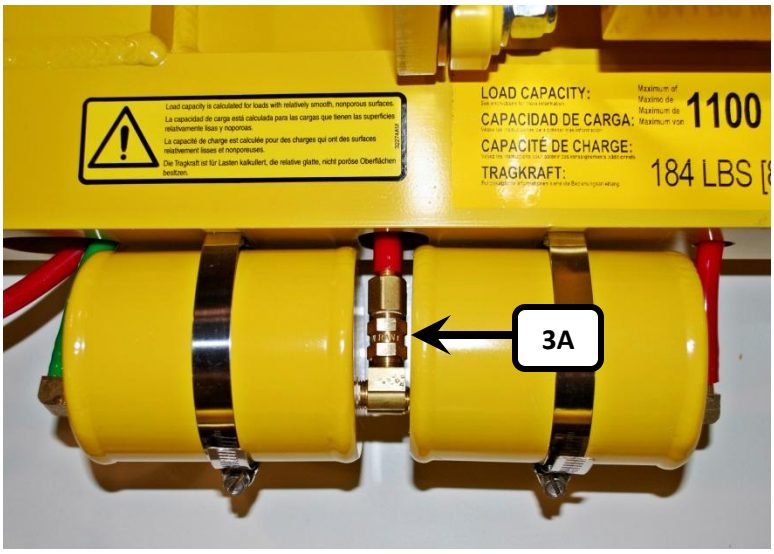

FIGURE 3

2) Remove the hose (**4A**) from the 90° fitting (**4B**) connected to the circuit (red or green) that is leaking. See **FIGURE 4**.

   Note: Since this requires the use of the ball valve assembly, each circuit is being tested individually.

   In **FIGURE 4** the green circuit is shown being tested.

3) Attach a short piece of hose to the end of the ball valve with the vacuum gauge (**4C**) and attach this hose to the 90° fitting (**4B**) of the vacuum tank circuit being tested, as shown in **FIGURE 4**.

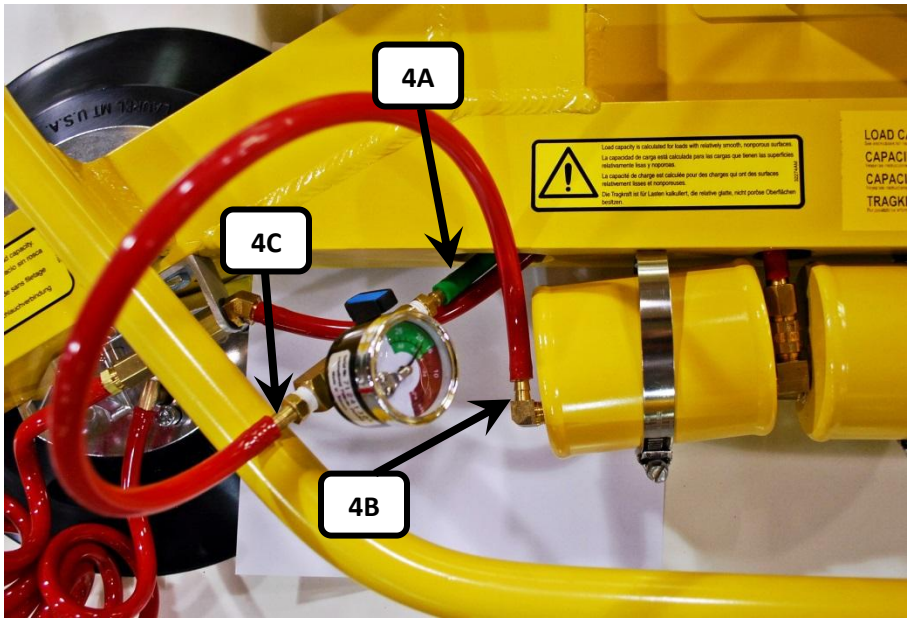

FIGURE 4

Attach the other end of the ball valve to the original hose (**4A**) that was removed from the vacuum tank. With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).

4) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.

5) Observe the vacuum gauges on the ball valve and lifter to locate the area of leakage.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, and the lifter's vacuum gauge holds steady, **OR** if both vacuum gauges hold steady, this indicates the check valve is the source of the leak. Replace the check valve.

  Note: The check valve is indicated if both vacuum gauges hold steady because the check valve may leak intermittently, whereas a leak in the control valve or filter assembly will always continue to leak until repaired.

- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, and the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located in the control valve assembly or the vacuum gauge / filter assembly.

Test the control valve and filter assembly for leakage:

1) Remove the ball valve from the vacuum tank and reattach the original hose to the 90° fitting.

2) Remove the hose from the (top) 90° fitting of the control valve (**5A** green circuit or **5B** red circuit) that connects it to the vacuum filter of the section that is leaking.

3) Attach a short piece of hose to the end of the ball valve with the vacuum gauge and attach the other end of this hose to the 90° fitting of the control valve. Attach the other end of the ball valve to the original hose (**5C**) that was removed from the control valve. See **FIGURE 5** (green circuit shown being tested).

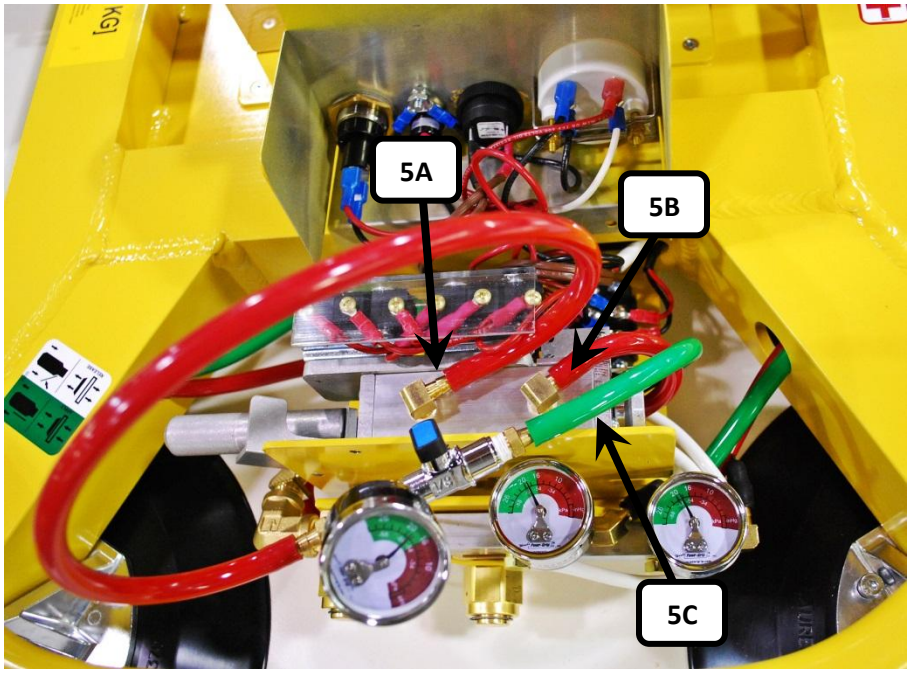

FIGURE 5

4) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).

5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.

6) Observe the vacuum gauges on the ball valve and lifter to locate the area of leakage.

- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, and the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located in the filter assembly (see **FIGURE 6**). Make certain the filter cap (item 4) is tight and, if the filter has been recently disassembled for cleaning, that the cap seal (item 3) is in place, not damaged (scratched or bent) and lubricated. Check the fittings and vacuum gauge of the assembly for indications of cracks or damage. If leakage persists, service the filter according to the filter maintenance section of the instructions manual or replace the filter assembly.

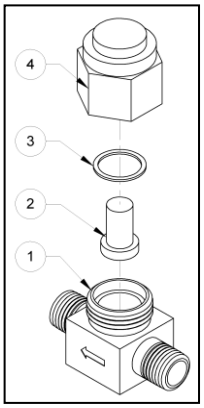

FIGURE 6

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, and if the vacuum level on the lifter's vacuum gauge holds steady and does not drop, this indicates that the leak is located in the control valve assembly. In this instance the vacuum generating system should be serviced by the manufacturer or an authorized service center.

  Contact Wood's Powr-Grip for further assistance.

  Note: Should the vacuum level of both gauges start and continue to drop, leaks in both the control valve and filter are indicated and the vacuum system should be serviced.

Note: Leaks in the vacuum generating system should be repaired prior to performing repairs to the pad system. Once the vacuum generating system is confirmed to hold (no apparent leaks), go to System Confirmation and retest the vacuum system as described.

PAD SYSTEM TEST

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

If the Preliminary Test was performed, remove the cap from the filter's barbed fitting and reconnect the vacuum line to the pad system.

To determine where to begin testing, identify which previous test indicated the pad system to be the cause of the leak.

Condition A:

If, during the initial vacuum test of the whole lifter, it was determined that the lifter's vacuum system did leak when all the vacuum pads were connected but it did not leak when all the quick connects were disconnected, go to *Isolating vacuum pads and pad line fittings*.

The conclusions that can be made based on the results of the test as described above are:

a) The vacuum generating system does not leak.
b) The internal vacuum lines of the vacuum pad system do not leak up to the quick connects.
c) The quick connects do not leak when disconnected.

Condition B:

If, during the initial vacuum test of the whole lifter, it was determined that the lifter's vacuum system did not leak when all the vacuum pads were connected but it did leak when all the quick connects were disconnected, go to *Isolating quick connects and internal vacuum fittings*.

The conclusions that can be made based on the results of the test as described above are:

a) The vacuum generating system does not leak.
b) The internal vacuum lines of the vacuum pad system do not leak up to the quick connects.
c) The quick connects do not leak when connected.
d) Neither the vacuum pads nor the line running from the quick connects to the vacuum pads leak.

Note: If, per the Preliminary Test, you have determined that the vacuum generating system does not leak and if, when the lifter is vacuum tested as a whole, the lifter's vacuum system did leak when all the vacuum pads were connected and continued to leak when all the quick connects were disconnected, begin testing the pad system at *Isolating quick connects and internal vacuum fittings*.

Isolating quick connects and internal vacuum fittings:

This section will deal with vacuum testing the internal hose fittings and the quick connects when they are disconnected from the vacuum pads. It assumes that the vacuum generating system has been verified to not leak.

Begin by testing the individual quick connects (disconnected from the male portion) as follows.

1) Remove the hose (**7A**) attached to one quick connect. Attach a short piece of hose to the end of the ball valve with the vacuum gauge (**7C**) and attach the other end of this hose to the quick connect (**7B**). Connect the other end of the ball valve to the hose removed from the quick connect.

   See **FIGURE 7.** The quick connect for the green circuit is shown being tested.

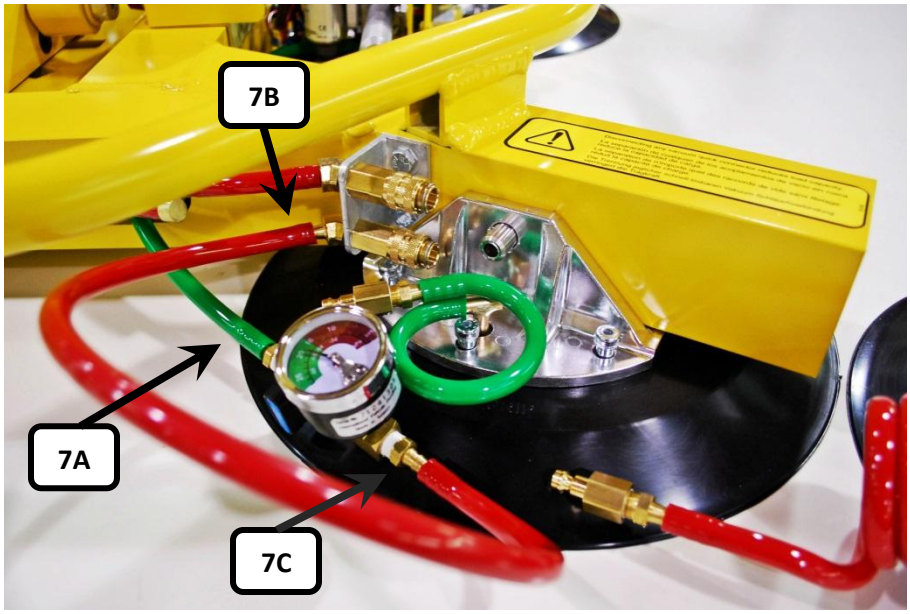

FIGURE 7

2) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).
3) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.
   - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, this indicates that this quick connect does not leak.
   - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates the quick connect does leak and will need to be replaced.
4) Continue checking each quick connect of the leaking circuit (red or green).

   Once all the quick connects have either been verified to not leak or have been replaced, perform a vacuum test with all quick connects disconnected.
   - If the vacuum level on the lifter's vacuum gauge holds steady and does not drop, this indicates that all leaks up to the quick connects have been repaired. Attach the vacuum pads to the quick connects and retest with all pads attached. If the vacuum level now starts and continues to drop, go to *Isolating vacuum pads and pad line fittings* to isolate the leak.
   - If the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that there is a leak between the quick connects and vacuum generating system. This will require you to check the internal hoses and fittings.

The following text will provide information on how to test the individual fittings. However, if it becomes necessary to replace internal hoses, it is recommended that a drawing of the internal hose routing be obtained prior to proceeding further, in order to understand how the hoses are routed. Please contact Wood's Powr-Grip Co. for additional assistance.

Note, MRTA6 lifters built after January 2012 have been built using Y-fittings to rout the internal hoses. Lifters built prior to 2012 used a manifold valve (located next to the battery) to rout the internal hoses.

Testing Y-fittings:

1) Disconnect the hoses from the Y-fitting (**8A**).
2) Using a short piece of hose, connect the end of the ball valve with the vacuum gauge to one of the Y-fitting connections and cap off the other two connections.
3) Identify which hose is your vacuum supply (if you run the pump, you should feel vacuum when the end of the hose is covered by your finger) and connect the other end of the ball valve (**8B**) to this hose. See **FIGURE 8.**

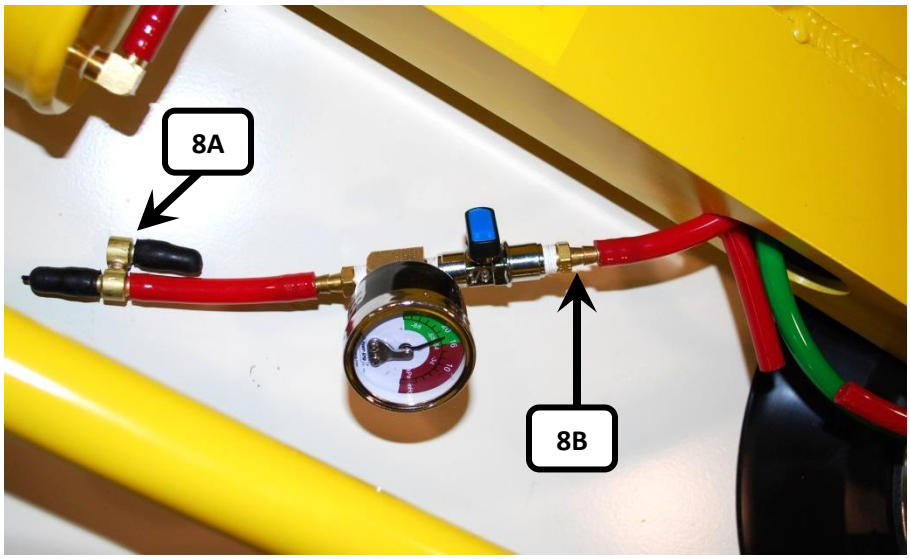

FIGURE 8

4) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).
5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.
    - If the vacuum level on the ball valves vacuum gauge holds steady and does not drop, this indicates that the Y-fitting does not leak.
    - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates that the Y-fitting does leak and will need to be replaced.
    - Verify all the Y-fittings in this manner.

Note: This same method can be used to check a manifold assembly or any other individual part.

By attaching the ball valve to an active vacuum source and attaching the part to be tested to the gauge end of the ball valve assembly, all parts can be tested and leaks identified and repaired.

Isolating vacuum pads and pad line fittings:

Note: This section assumes that you have verified that the lifter does not leak when the quick connects are disconnected.

1) Connect the vacuum pads of the leaking circuit to their respective quick connect.
2) Remove each pad fitting from the vacuum pads of the leaking circuit (**9A** green circuit or **9B** red 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 9**. Note, both the red and green circuits are shown capped off.

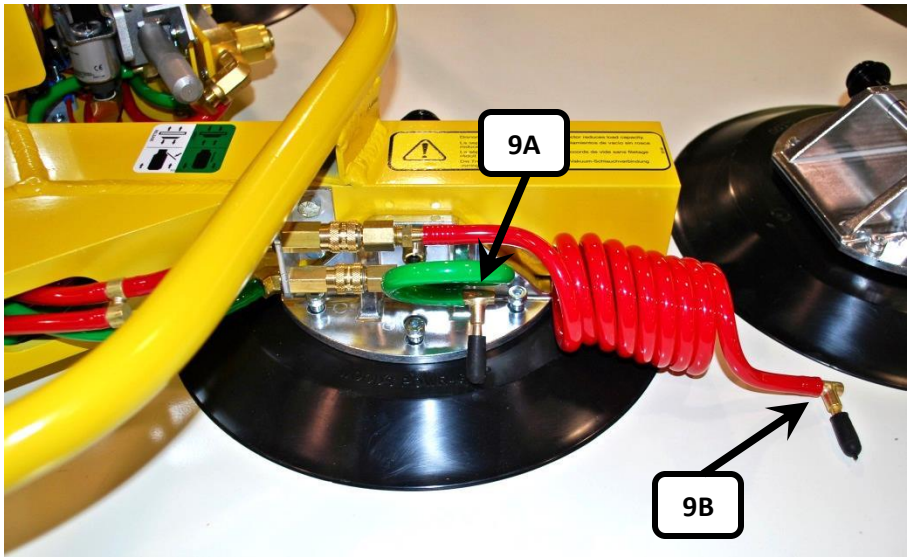

FIGURE 9

4) With the vacuum pads of the circuit being tested capped off, activate the vacuum generating system (pull handle of control valve out to apply position).
5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, disconnect the battery.
   - If the vacuum level on the vacuum gauge of the circuit (red or green) that is being tested holds steady and does not drop, this indicates the leakage is in one or more pads. 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 replaced.
   - If the vacuum level on the vacuum gauge of the circuit (red or green) that is being tested starts and continues to drop, this indicates the leakage is in the fittings or vacuum lines between the quick connects of that section and the vacuum pads.
6) The MRTA6 lifter has three vacuum pad lines connected to each (red and green) circuit. Since, at this point, you should have determined that the lifter did not leak with the quick connects disconnected and that the leak is present when the vacuum pad fittings are capped off, disconnect two of the vacuum pad lines from the quick connect of the leaking circuit, leaving only one vacuum pad line connected.

   Repeat the test above with just one vacuum pad line attached. If the vacuum level on the vacuum gauge of the circuit (red or green) that is being tested holds steady and does not drop, this vacuum line is not the cause of the leak. If the vacuum level on the vacuum gauge of the circuit (red or green) that is being tested starts and continues to drop, this vacuum line does leak and will need to be repaired.

   Repeat this process for each vacuum pad line of the affected circuit, one line at a time. Once all the vacuum pad line assemblies that leak are identified, effect repairs as follows.

7) Remove the pad fitting (**10A**) from the coiled hose (**10B**) of the vacuum pad line to be tested. Attach a short piece of hose to the end of the ball valve with the vacuum gauge and attach the other end of this hose to the pad fitting. Attach the other end of the ball valve to the coiled hose as shown in **FIGURE 10**.

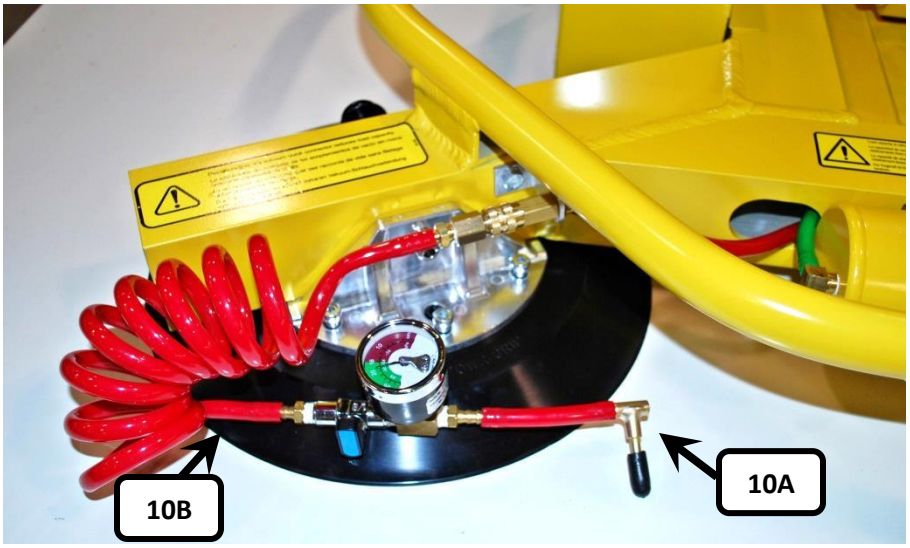

FIGURE 10

8) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).

9) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.

- If the vacuum level on the lifter's vacuum gauge holds steady and does not drop, and the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates that the leak is located in the pad fitting. Replace the pad fitting.
- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, and the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located in either the coiled hose or the connected quick connect. Proceed as follows.

10) Remove the ball valve from the coiled hose and reinstall the (capped) pad fitting. Remove the coiled hose from the hose nipple of the male quick connect (**11A**) and install the end of the ball valve with the vacuum gauge in this end of the coiled hose. Using a small piece of hose connect the other end of the ball valve to the quick connect.

See **FIGURE 11**

11) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).

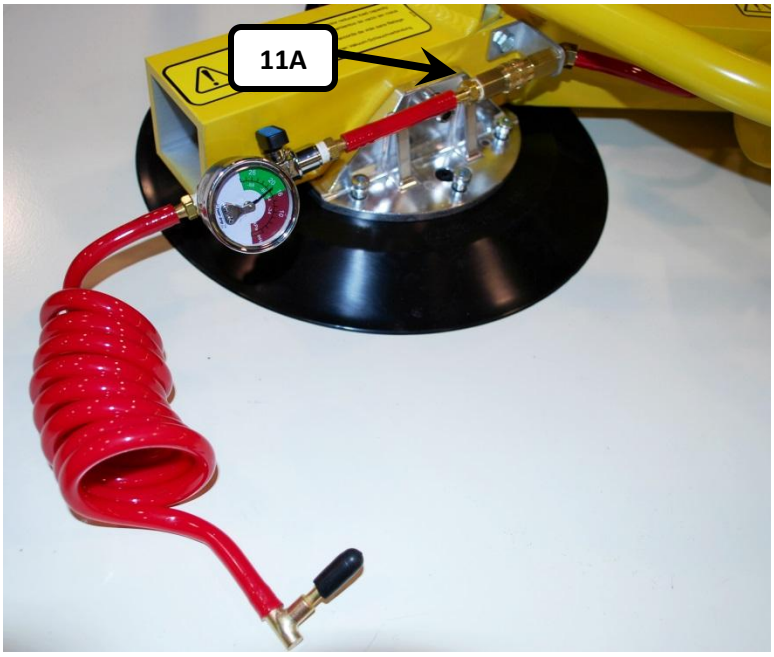

FIGURE 11

12) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.

- If the vacuum level on the lifter's vacuum gauge holds steady and does not drop, and the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates that the leak is located in the coiled hose. Replace the coiled hose.
- If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop, and the vacuum level on the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located in the connected quick connect.

13) If additional verification of the quick connect is desired, remove the coiled hose from the ball valve and remove the ball valve from the male quick connect. Cap off the hose nipple of the male quick connect (**12A**). Remove the hose from the female portion of the quick connect (**12B**). Using a short piece of hose, attach the end of the ball valve with the vacuum gauge to the female portion of the quick connect and attach the other end of the ball valve to the hose that was removed from the quick connect. See **FIGURE 12**.

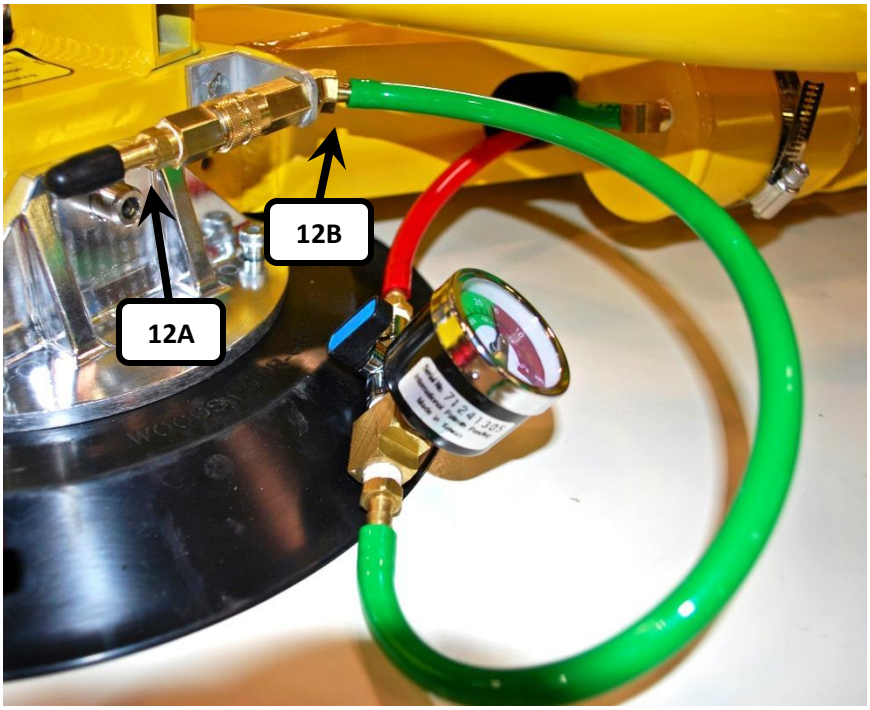

FIGURE 12

14) With the ball valve in the open position (handle in line with the valve), reconnect the battery and activate the vacuum generating system (pull handle of control valve out to apply position).

15) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle still pulled out in apply position, close the ball valve (turn handle perpendicular to valve) and disconnect the battery.

- With the male portion of the quick connect attached to the female quick connect, based on the previous test, the vacuum level on the ball valve's vacuum gauge should drop.
- Disconnect the male quick connect and repeat the test. The vacuum level on the ball valve's vacuum gauge should now hold steady.

  If a quick connect leaks when connected, the cause is typically due to damage to the male portion of the quick connect. However, the damaged male connector can also cause damage to the internal sealing ring of the female portion of the quick connect.

  Due to this, it is recommended that both halves (male and female portions) of the quick connect be replaced.

SYSTEM CONFIRMATION

Once all leaks are 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 all 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 or 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)
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ALL LIFTERS MUST BE TESTED AFTER MAINTENANCE
SEE INSTRUCTION MANUAL