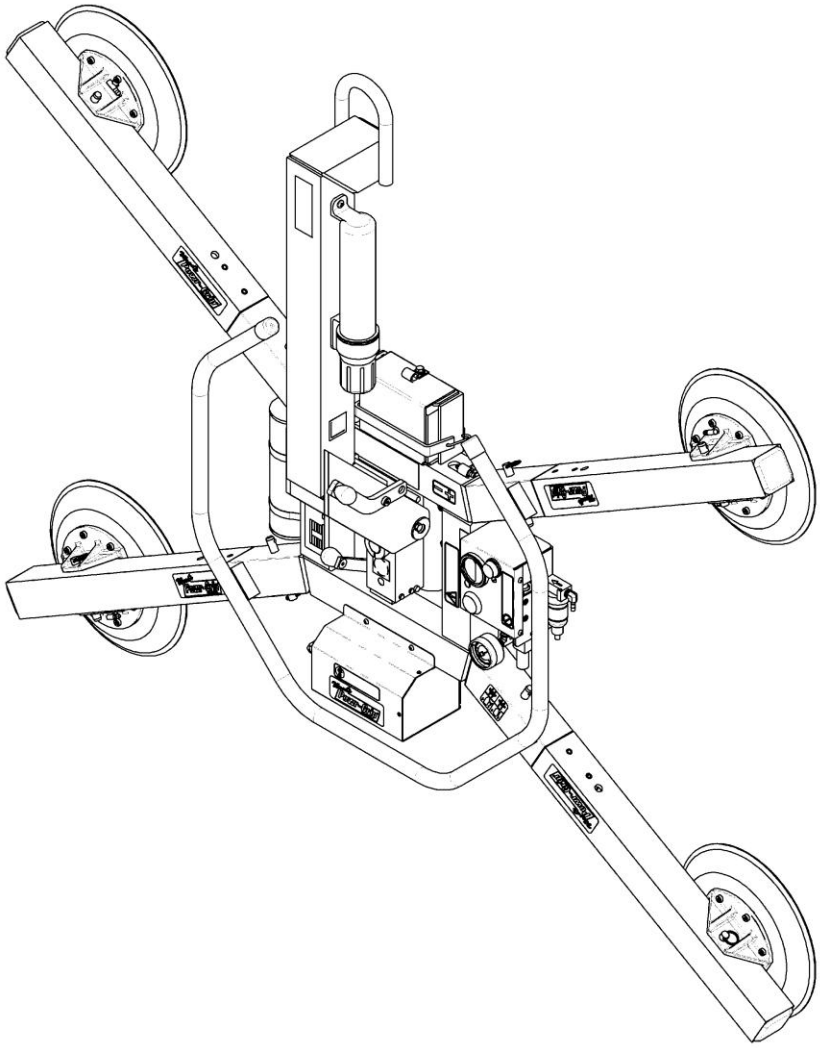
LEAK TEST PROCEDURE

MRT4-DC LIFTERS — SINGLE VACUUM SYSTEMS



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 gauge 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.

When you perform the vacuum test, we recommend that you note the time and leakage rate, such as "lost 5" [-17 kPa] in 10 minutes". 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, the indication is 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.

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 vacuum generating system 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**.

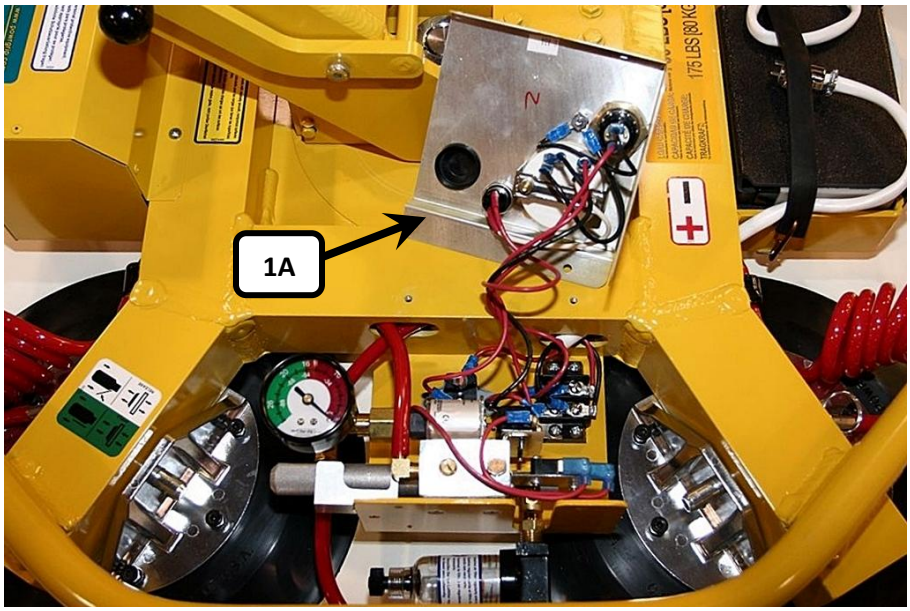

FIGURE 1

2) Remove the vacuum hose (**2A**) attached to the 45° barbed fitting, located on the vacuum gauge assembly. See **FIGURE 2.**
3) Cap the open end of the 45° barbed fitting (**2B**), to seal off the vacuum generating system from the pad system.
4) Reconnect the battery and activate the vacuum generating system (pull handle (**2C**) of control valve out to apply position).

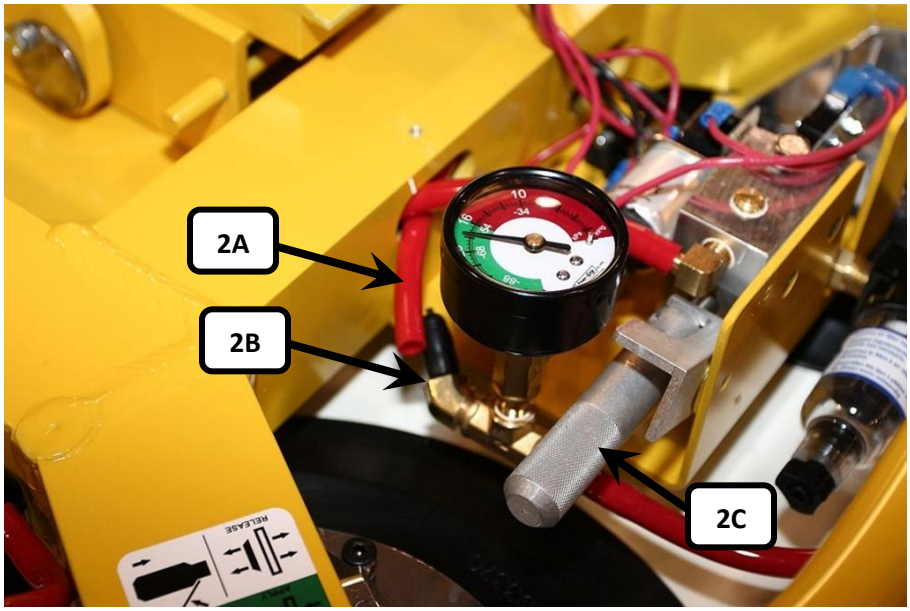

FIGURE 2

5) Allow the vacuum system to reach a suitable vacuum level or to shut off automatically and, with the valve handle (**2C**) still pulled out in apply position, disconnect the battery.
6) 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 Tests.
   - 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 a short additional piece of hose for connecting the ball valve to the lifter's vacuum lines and fittings.

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 gauge assembly and test these items as follows:

Test the check valve for leakage:

1) The check valve (**3A**) is located on the vacuum pump (1st fitting on the vacuum pump). See **FIGURE 3**.

   Remove hose (**3B**) from the vacuum pump (attached to the fittings with the check valve) that runs to the control valve.

2) Attach a short piece of hose to the end of the ball valve with the vacuum gauge (**3C**) and attach the other end of this hose to the vacuum pump. Attach the other end of the ball valve to the original hose that was removed from the pump in step 1.

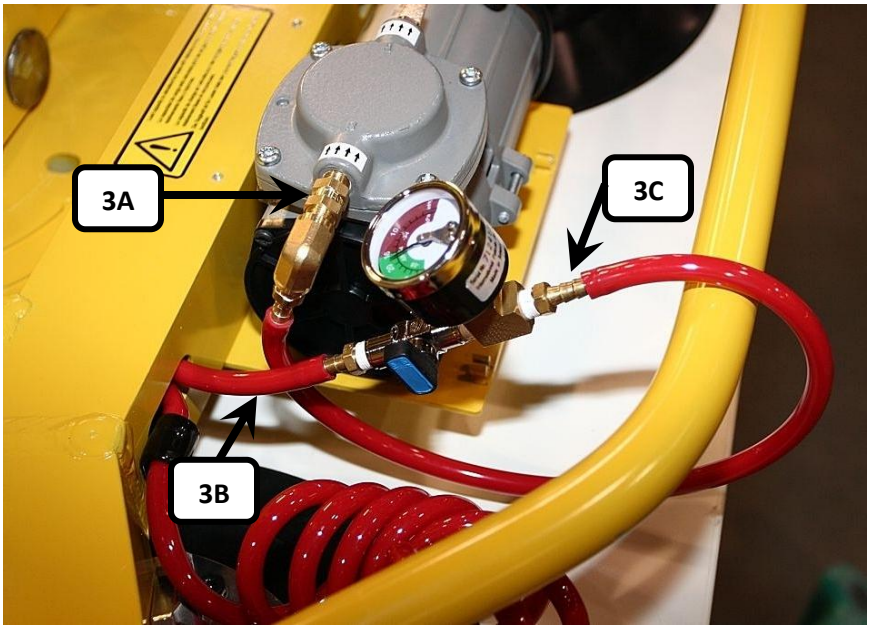

FIGURE 3

3) 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 the 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 reason the check valve is indicated if both vacuum gauges hold steady is 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 either the hose assembly leading from the vacuum pump to the tank & valve, the gauge assembly, or the control valve / filter assembly.

Test the hose assembly from the pump and vacuum tank to the valve assembly for leakage:

1) Remove the ball valve from the vacuum pump and reattach the original hose to the pump.
2) Remove the hose (**4A**) connecting the pump and tank to the valve, from the 90° hose nipple (**4B**), located above the valve handle.
3) Attach the end of the ball valve with the vacuum gauge to this hose and, using a short piece of hose, attach the other end of the ball valve to the 90° hose nipple. See **FIGURE 4.**
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).

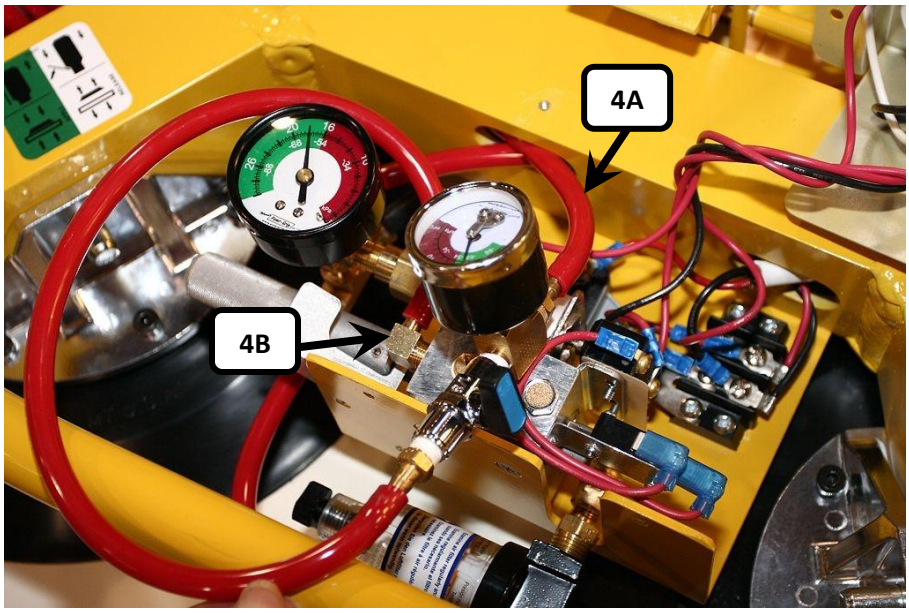

FIGURE 4

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 starts and continues to drop and the lifter's vacuum gauge holds steady, this indicates that the leak is located in the hose or fitting connecting the vacuum pump and tank to the valve assembly.

     Replace the hose and/or fitting. Note, on lifters built before 2004 (black hose) the fitting will be T-shaped; on lifters built after 2004 (red hose) the fitting will be Y-shaped. The design was changed to a Y fitting for easier access but either style works.
   - 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 gauge assembly or the control valve / filter assembly.

Test the control valve / filter assembly for leakage:

1) Remove the ball valve from the valve assembly and reattach the original hose to the valve's 90° hose nipple.
2) Remove the hose from the filter that connects it to the vacuum gauge assembly (**5A**).
3) Attach a short piece of hose to the end of the ball valve with the vacuum gauge, and attach this hose to the filter (**5B**). Attach the other end of the ball valve to the original hose that was removed from the filter assembly. See **FIGURE 5**.

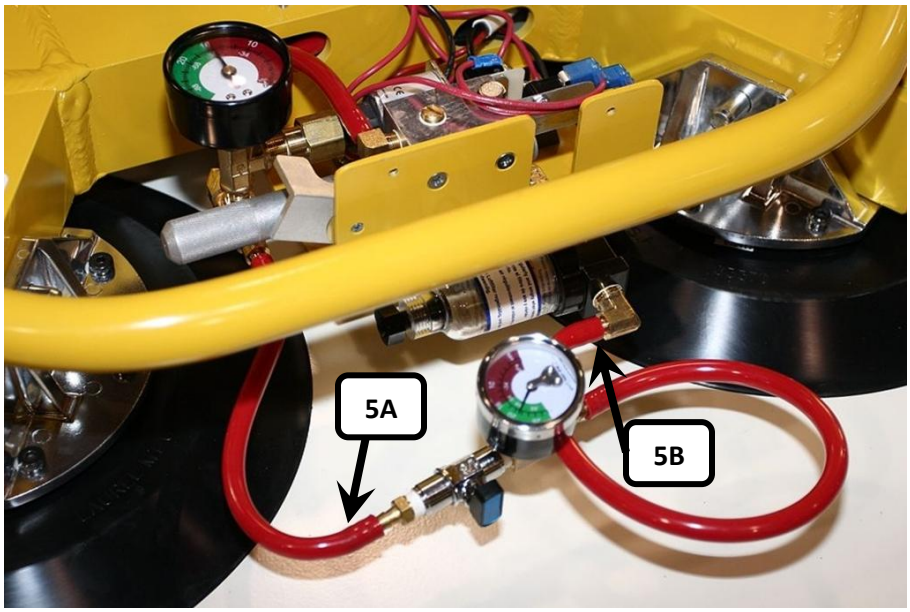

FIGURE 5

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 the 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 vacuum gauge assembly. Inspect or replace the assembly.
   - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop and 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 / filter assembly.

     Note, since the filter attaches directly to the valve assembly, there is no easy way to test these parts individually. Make certain the filter bowl is tight, and that there is no evidence of cracks or damage to the filter bowl or attached fittings, then retest.

     CAUTION: Do not use any tools to tighten the bowl; it should only be finger-tight.

     If the leak persists and the filter has been recently serviced, check that the o-ring seal between the filter bowl and housing (see the filter service procedure in the instruction manual) is clean, lubricated properly and seated properly. Reassemble or service the filter according to the filter maintenance section of the instruction manual and retest.

     If the leak is still present, the vacuum generating system should be serviced by the manufacturer or an authorized service center. Contact Wood's Powr Grip for further assistance.

PAD SYSTEM TESTS

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

1) Remove the cap from the filter's barbed fitting and reconnect the vacuum line to the pad system.
2) Remove each pad fitting (**6A**), disconnecting all the pads from the vacuum system.
3) Cap all the pad fittings to seal off the vacuum lines.

   See **FIGURE 6**.
4) 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.

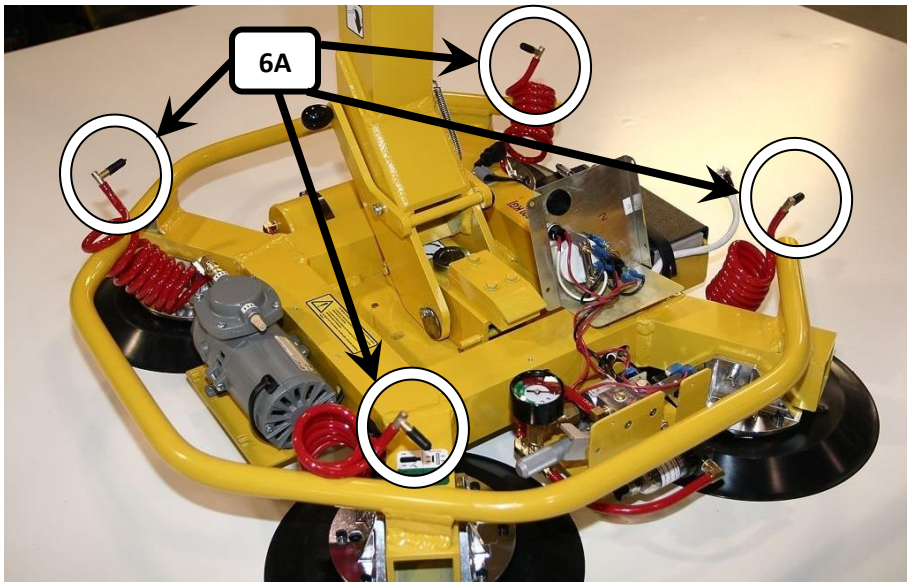

FIGURE 6

- If the vacuum level on the vacuum gauge 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 starts and continues to drop, this indicates the leakage is in the fittings or vacuum lines between the vacuum pads and the vacuum gauge assembly.

Note, the MRT4-DC vacuum hoses are routed through the pad frame itself.

The only fittings that can be accessed externally are the pad fittings and (on lifters with coiled red poly hose to vacuum pads) couplings that connect the coiled hoses to the (internal) straight hoses and fittings.

[*for lifters with coiled red poly hose to vacuum pads*]

1) Remove the hose clip covering the hose coupling (**7A**) that joins each of the 4 coiled hoses from the vacuum pads to the internal straight hoses.
2) Cap all the coupler fittings, to seal off the vacuum lines.
3) 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, disconnect the battery.

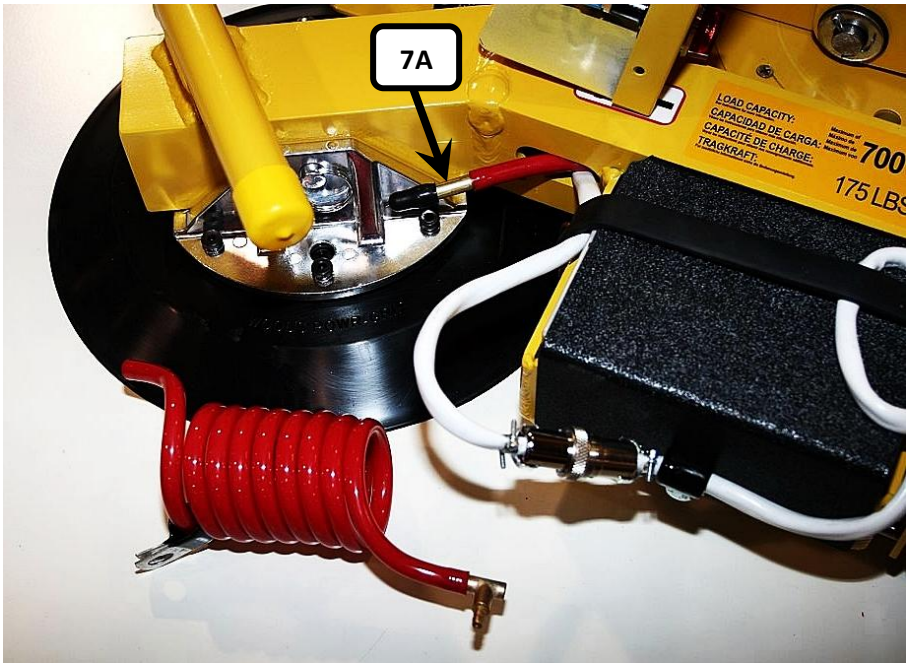

FIGURE 7

- If the vacuum level on the lifter's vacuum gauge holds steady and does not drop, this indicates the internal hoses and fittings do not leak and that the leak is in one or more of the pad fittings or the coiled hose. Proceed to step 5 to test these parts.
- If, with all the couplings capped off, the vacuum level on the vacuum gauge starts and continues to drop, the indication is that the leak exists in the internal hose sections.

  If this is the case, it is recommended that a drawing of the internal hose routing be obtained prior to proceeding further. Please contact Wood's Powr Grip Co. for additional assistance.

5) If it was determined that the leak is in one or more of the pad fittings or the coiled hose, reattach one section of coiled hose to its corresponding coupling, cap off the pad fitting and retest. Refer to **FIGURE 6** but reconnect only one section of coiled hose to a hose coupler at a time.
   - If, after adding back one section of coiled hose, the vacuum level on the lifter's vacuum gauge holds steady and does not drop, this indicates that neither the hose or pad fitting in the reattached assembly leak and this assembly can be left attached. Continue adding sections of coiled hose with fitting (one at a time) until all leaks are located.
   - If, after adding back one section of coiled hose, the vacuum level on the vacuum gauge starts and continues to drop, this indicates that either the coiled hose or pad fitting of the reattached assembly leak. In this circumstance remove the pad fitting (**8A**) from the coiled hose and, using a short piece of hose, attach the pad fitting to the end of the ball valve with the vacuum gauge. Attach the other end of the ball valve assembly to the coiled hose that the fitting was removed from. See **FIGURE 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).

  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 the valve) and disconnect the battery.

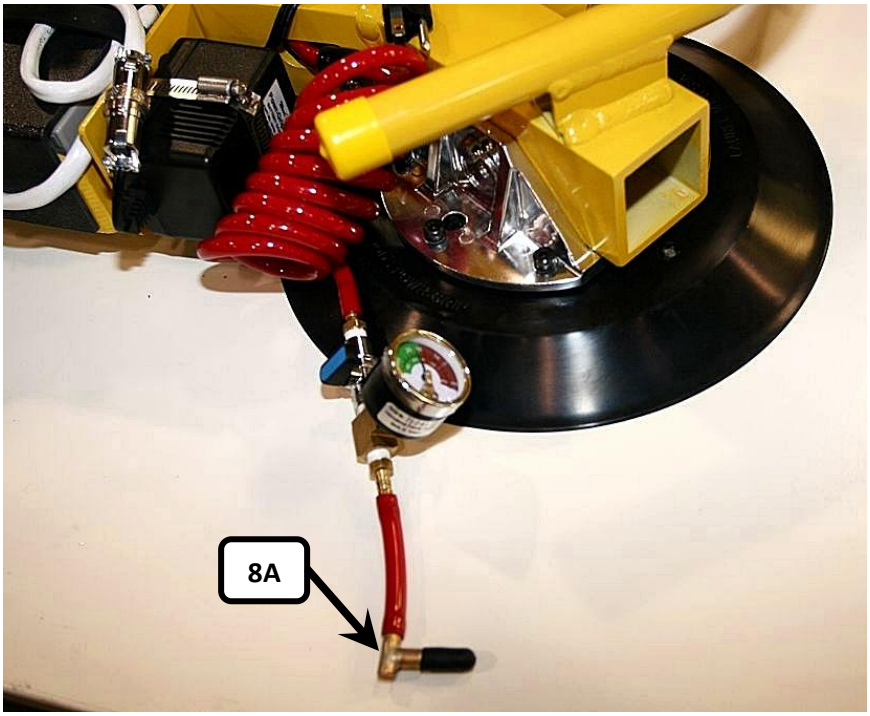

FIGURE 8

- If the vacuum gauge on the ball valve holds steady and the vacuum gauge on the lifter starts and continues to drop, this indicates the leakage is in the coiled hose. Replace the coiled hose.
- If the vacuum on the ball valve starts and continues to drop and the vacuum gauge on the lifter holds steady, this indicates the pad fitting leaks. Replace the pad fitting.

  Repeat this process for the remaining coiled hose assemblies that were determined to leak until all leaks are located and repaired.

[*for lifters with straight black hose (no coiled hoses)*]

1) Remove the pad fitting (**8A**) from the hose and, using a short piece of hose, attach the fitting to the end of the ball valve with the vacuum gauge and attach the other end of the ball valve assembly to the black hose that the fitting was removed from. See **FIGURE 8** above.
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).

   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 the valve) and disconnect the battery.

   - Any pad fitting that leaks will be indicated by a loss in vacuum on the ball valve's vacuum gauge. Test each pad fitting in this manner, replacing any that leak.
   - If all 4 pad fittings pass vacuum test, the indication is that the leak is located in the internal hoses or fittings. It is recommended that a drawing of the internal hose routing be obtained prior to proceeding further.

     Please contact Wood's Powr Grip Co. for additional assistance.

Individual hoses and fittings can be tested by using the ball valve assembly and plugs in the same manner as the pad fittings were shown being tested in **FIGURE 8**.

Continue until all fittings and lines are tested or the leak is located.

SYSTEM CONFIRMATION

Once the leak is identified and repaired, reassemble all parts of the lifter.

A vacuum test, as described in the instruction manual, should be performed following any repair or service to a vacuum lifter. All parts must be verified in relation to their function and the lifter must pass the vacuum test before returning 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:

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ALL LIFTERS MUST BE TESTED AFTER MAINTENANCE
SEE INSTRUCTION MANUAL