



## Installation Instructions

### Electric Vacuum Pump Kit

Item # VP001B, VP001C, VP002

1. The Leed Brakes electric vacuum pump kit is designed to supply your power brake booster with a steady 18"-24" Hg supply of vacuum. This will insure proper operation of any standard power brake system. This unit is **not** designed to run other vacuum operated devices and should **never** be used in a crankcase evacuation system.
2. The pump is a stand-alone system and should **not** be connected to engine vacuum of any kind.
3. If your vehicle has a hard brake pedal due to engine vacuum below 15" the pump will supply your power brake booster with proper vacuum to improve your brake pedal feel. If you have a soft or low brake pedal or a hard brake pedal due to improperly matched brake components the pump will not correct those issues. Confirm your braking issues are vacuum related before beginning your installation.
4. Before installing the pump, we recommend testing your power brake booster to confirm it is operating correctly. This is best accomplished with a handheld manual vacuum pump with a gauge connected directly to the brake booster check valve.
5. Use the hand pump to draw the booster down to 20" of vacuum and confirm it holds for 5 minutes without dropping. Next push down on the brake pedal and hold it in the depressed position. The gauge should drop down to approximately 15" and then hold steady.
6. If your booster leaks down during the 5 minutes or will not hold vacuum with the pedal depressed it is faulty and needs to be replaced or rebuilt. Trying to use it will cause the pump to run excessively or constantly, overheating the pump.
7. The maximum vacuum level that the pump can reach will vary by your altitude. As altitude increases atmospheric pressure decreases and the pump must work harder to build vacuum. Please see **Diagram A** for expected vacuum output by altitude. In general, the pump will only perform as intended at or below **3500 feet above sea level**. If you will be driving above this altitude regularly, we do not recommend proceeding with the installation.
8. The first step of installation is to find a suitable mounting location. The pump assembly can be mounted horizontal, vertical or at any angle in between. The pump can be mounted anywhere on the vehicle including in the trunk. If the pump will be mounted too far from the brake booster to be connected with the supplied hose, we suggest using 3/8" metal hard line with a short section of rubber hose at each end for your final connections. This avoids the possibility of rubber hose collapsing and affecting the performance of the pump.
9. We strongly recommend the unit is mounted to a frame rail or other solid mounting location. While this pump is very quiet and smooth-running, mounting it to a thin flexible sheet metal panel is likely to amplify the sound and vibration.

10. Make sure the pump will be clear of any belts and pulleys and avoid mounting it close to any hot exhaust manifolds or headers. Likewise, if the pump is mounted under the vehicle make sure it is not in a location that could be submerged in water.
11. If you are installing a pump with a canister remove the steel mounting bracket from the canister and use it to mark and drill your mounting holes. The kit is supplied with both nuts and bolts as well as self-tapping screws for mounting. It is recommended that you use the nuts and bolts whenever possible. Be sure to place the rubber washers between the mounting bracket and the mounting surface on the vehicle. With the bracket secured reinstall the canister onto the bracket and tighten the mounting bolts.
12. If you are installing the naked pump, use the template on the last page of the instructions to mark and drill your holes. Take note that the head of the vacuum pump sits below the bottom of the bracket. If you are mounting the pump over a large flat surface, you may need to space the bracket off the surface with washers or spacers to insure the head of the pump clears the mounting surface.
13. Next use the rubber vacuum hose supplied to connect the vacuum pump directly to the power brake booster. Be sure to keep the hose away from any moving parts and any hot surfaces such as headers or exhaust manifolds. The hose clamp supplied is for the hose connection at the pump, but if the connection at your power brake booster is not tight you may need to add a clamp.
14. The pump has a short pigtail coming out of the canister and the kit includes a plug-in extension harness. Connect the plug-in harness and determine your wire routing for a ground to the chassis and 12 volt **switched** power. The harness can be shortened if needed, but if you shorten the red power wire it must be after the inline fuse holder.
15. The pump should never be connected directly to the battery or a circuit that has power when the ignition key is off. Likewise, never connect the pump to the ignition coil or any other electrical component in the ignition system or charging system. Confirm the circuit you choose can support 15 amps, has full battery voltage, and only has power when the ignition key is in the on position. The circuit should not have power when the key is turned off and removed.
16. Use the crimp on ring terminal supplied to connect the black wire to chassis ground. Be sure the ring terminal on the wire is securely fastened to a clean surface on the chassis. A good ground will not be made if there is rust or paint under the ring terminal. Likewise, the screw or bolt used to secure the terminal must be tight. If the terminal moves the ground can be broken. Without a good ground the pump will not run.
17. Next connect the red wire to 12 volt **switched** power. This means a circuit that does **not** have power when the key is off. If you connect the pump to constant power, it will be free to run anytime even when the car is not running. This will cause unnecessary wear to the pump and drain your vehicle battery.
18. Make sure the circuit you choose can support the additional 15 amp draw when the vacuum pump is running.
19. With the key off the pump will not turn on. If it does you have not selected a switched power source. Turn the ignition key to the on position. If the pump does not immediately turn on depress and release the brake pedal until the pump turns on. Stop pushing the brake pedal and wait for the pump to turn off. If the pump fails to turn on or off double check your wiring and then proceed to the troubleshooting guide if needed.

# Solutions Guide

## If pump will not run or runs slowly

1. If your pump runs but seems sluggish or runs slowly you need to check the volts and amps supplied to the plug connection on the pump wiring harness using a multi meter. With the engine running you need a minimum of 12.4 volts and when the pump turns on it should draw 10-12 amps. If your electrical system cannot supply these specs the pump will not run correctly. If it does meet these specs move on to step 4.
2. If your pump does not run at all you will need a 12-volt test light to check for power and ground. When checking for power the clamp needs to be connected to battery negative. When checking for ground the clamp needs to be connected to battery positive.
3. Disconnect the extension harness at the plug and check for power and ground. If both are present continue to step 4. If one or both are not present repair the connections at the end of the extension harness and or replace fuse and re-test.
4. Remove the pump from the canister. Turn on the ignition and check for 12-volt power at the red wire on the pump and at terminal #2 on the relay. If power is present continue to step 5 if not check all power connections leading to the relay and re-test
5. Disconnect the molded plug from the relay. Connect 12 volts to the red wire from the pump and ground the black wire from the pump. If the pump runs continue to step 6. If it does not run the pump itself is bad and needs to be replaced.
6. Re-connect the plug at the relay. Remove the single wire connector from the top of the metal t-shaped vacuum switch and touch it to the base of the switch using a jumper wire. If the pump turns on the switch needs to be replaced. If the pump does not run continue to step 7
7. Using the test light check for ground at the switch body. If no ground is present, check and repair connections until switch is grounded.
8. Once ground is achieved try to restart the pump. If the pump does not run continue to step 9
9. Check for ground at the wire going from the top of the vacuum switch to terminal #1 of the relay. Be sure to check at the switch terminal as well as at the relay terminal. If terminal #1 is not grounded repair the connection as needed and try to start the pump. If terminal #1 is grounded and the pump still will not run continue to step 10.
10. Check for ground at terminal #3 of the relay. Repair connection as needed. If pump still will not run the relay needs to be replaced.

## If pump will not shut off

1. In most cases a pump that fails to shut off is caused by a vacuum leak. If you did not test your power brake booster prior to installing the pump begin by performing that test.
2. This is best accomplished with a handheld manual vacuum pump with a gauge connected directly to the brake booster check valve.
3. Use the hand pump to draw the booster down to 20" of vacuum and confirm it holds for 5 minutes without dropping. Next push down on the brake pedal and hold it in the depressed position. The gauge should drop down to approximately 15" and then hold steady.
4. If your booster leaks down during the 5 minutes or will not hold vacuum with the pedal depressed it is faulty and needs to be replaced or rebuilt. Trying to use it will cause the pump to run excessively, or constantly overheating the pump.

5. If the booster tested good the next step is to check how much vacuum the pump is creating. This must be tested by using a T fitting to install a vacuum gauge between the pump and the power booster. The pump cannot be tested correctly by connecting a gauge directly to the pump.
6. Turn the key on and let the pump run for 15 seconds. Note the vacuum reading and then turn the key off to stop the pump. If the vacuum does not leak down continue to step 7. If the vacuum starts to leak down the issue is related to a vacuum leak in the system. Find and repair the source of the leak and retest the pump.
7. Remove the pump from the canister so you can access the electrical components. Turn on the ignition and remove the single wire connector from the top of the vacuum switch. If the pump does not shut off there is damage to a ground wire causing a short or the relay is bad and needs to be replaced. If the pump does shut off continue to step 8.
8. Reconnect the wire to the vacuum switch and let the pump run for 15 seconds. If the gauge reads 20" or more the switch needs to be replaced. If it reads less than 20" of vacuum check the rubber elbow at the pump to confirm vacuum isn't leaking directly at the pump. If the elbow is in good condition the pump will need to be sent in for testing and or repair.

### Diagram A

<b>The Effect of Atmospheric Pressure on Vacuum Level</b>					
<b>Altitude Above Sea Level (feet)</b>	<b>Altitude Above Sea Level (meters)</b>	<b>Atmospheric Pressure (psi)</b>	<b>Maximum Vacuum Level Attainable (inches Hg)</b>	<b>Vacuum Level Loss at Altitude</b>	<b>Maximum Vacuum Level Possible at this Altitude</b>
<b>0</b>	<b>0</b>	<b>14.7</b>	<b>24.50</b>	<b>–</b>	<b>–</b>
<b>1000</b>	<b>305</b>	<b>14.16</b>	<b>23.69</b>	<b>3.40%</b>	<b>96.60%</b>
<b>2000</b>	<b>610</b>	<b>13.66</b>	<b>22.12</b>	<b>7.10%</b>	<b>92.90%</b>
<b>3000</b>	<b>914</b>	<b>13.16</b>	<b>20.04</b>	<b>10.40%</b>	<b>89.60%</b>
<b>4000</b>	<b>1219</b>	<b>12.68</b>	<b>17.61</b>	<b>13.80%</b>	<b>86.20%</b>
<b>5000</b>	<b>1524</b>	<b>12.22</b>	<b>15.08</b>	<b>16.80%</b>	<b>83.20%</b>
<b>6000</b>	<b>1829</b>	<b>11.77</b>	<b>12.58</b>	<b>19.80%</b>	<b>80.20%</b>
<b>7000</b>	<b>2134</b>	<b>11.33</b>	<b>10.25</b>	<b>22.80%</b>	<b>77.20%</b>
<b>8000</b>	<b>2438</b>	<b>10.91</b>	<b>8.14</b>	<b>25.90%</b>	<b>74.10%</b>
<b>9000</b>	<b>2743</b>	<b>10.5</b>	<b>6.33</b>	<b>28.60%</b>	<b>71.40%</b>
<b>10,000</b>	<b>3048</b>	<b>10.1</b>	<b>4.82</b>	<b>31.30%</b>	<b>68.70%</b>
<b>11,000</b>	<b>3353</b>	<b>9.71</b>	<b>3.60</b>	<b>33.90%</b>	<b>66.10%</b>
<b>12,000</b>	<b>3658</b>	<b>9.34</b>	<b>2.64</b>	<b>36.50%</b>	<b>63.50%</b>
<b>13,000</b>	<b>3962</b>	<b>8.97</b>	<b>1.90</b>	<b>39.00%</b>	<b>61.00%</b>
<b>14,000</b>	<b>4267</b>	<b>8.62</b>	<b>1.34</b>	<b>41.40%</b>	<b>58.60%</b>
<b>15,000</b>	<b>4752</b>	<b>8.28</b>	<b>0.93</b>	<b>43.60%</b>	<b>56.40%</b>

