

Vacuum System 68-82 Corvette

(Vettetworks - J. Myers)

Okay, lets journey through the Vacuum system and some of its components. There is obviously enough stuff in print, which goes into great depth about the vacuum system on 68-82 Corvettes. Unfortunately, many don't have it. Those that do hate getting descriptions that goes on and on and on. Maybe they should come out with a "Corvette Vacuum Systems For Idiots". Lets see if we can simplify some of it for you.

The tools you use to identify or troubleshoot the vacuum system can vary. You may want to use a vacuum gauge to read the overall pressure and to measure leaks. Using a gauge is a sure way of being able to monitor your progress. Another handy tool is a hand pump vacuum kit, which is more commonly used to bleed brakes. This kit has a hand pump with gauge, several small hoses, a plastic jar and fittings for various bleed ports on brakes and other systems. This kit contains a manual, which explains its use for troubleshooting numerous systems related to brakes, vacuum, ignition etc. Another useful tool is a household vacuum. You can actually use it to apply vacuum to any of the lines in the system. This way you can get a visual indication of what's actually happening and whether or not vacuum pressure opens or closes the particular door/valve. **IF YOU USE A VACUUM, DO NOT SEAL THE CONNECTION TO GET FULL SUCTION IN THE SYSTEM. TO TEST A PARTICULAR LINE, SIMPLY HOLD IT BETWEEN YOUR THUMB AND INDEX FINGER WITH THE END OF THE LINE IN THE VACUUM NOZZLE. USING THE REST OF YOUR FINGERS AND HAND, APPLY ENOUGH SEAL ON THE VACUUM TIP TO GET THE SUCTION NEEDED TO OPERATE THAT PART OF THE SYSTEM.**

The primary vacuum system consists of 24 different lines, which are color coded Red, Green, White, Yellow, Blue and Black. Your colors may not be visible but this is what they started out as. This system controls the headlights and wiper door assembly on the car. In addition to the primary system, there is an environmental vacuum system, which controls the ductwork, which directs AC, and Heating air depending on the setting selected by the driver at the center shift console AC/Heating control panel.

In the primary system we have three actuators which are each controlled by a relay valve, which is, supplied vacuum pressure from the main vacuum tank. All three main supply lines are large yellow lines which connect to the center of each relay valve. One goes to the wiper door actuator, while the other two go to each of the forward relay valves located under the skin of your front end. Your Cross Flag emblem is an excellent way to find where this is. They are under it. The relay valve for the wiper door is located on the firewall to the left of the distributor. (From drivers seat). They are all the same thing and operate the same way.

Here's what a relay valve does...

First of all, there is always suction at the center inlet waiting to go out one of the other two ports. It will either go out the upper or lower port. The thing that makes this determination is the vacuum introduced to the cap on the relay valve. Your light switch, the two manual override switches under your steering column and a wiper door solenoid behind your Tachometer are all that's used to control input to the ports on the caps of the relay valves. Because of the small size of the sliding valve inside the proportioning valves, they are fed vacuum pressure through small black lines directly from the manifold. This begins at the little filter located near your brake booster. It's the smaller of the two black lines. The other is the main supply going to the vacuum tank. This suction is introduced to the cap ports of the prop. valves depending on the position of the light switch, solenoid and manual override switches.

THE ENTIRE CONTROL OF THE VACUUM SYSTEM IS ACCOMPLISHED BY DIRECTING MANIFOLD PRESSURE INDEPENDENT OF THE MAIN VACUUM RESERVOIR OR SYSTEM SUPPLY. MANIFOLD PRESSURE CONTROLS, WHILE RESERVOIR PRESSURE DOES THE WORK. THIS MANIFOLD PRESSURE IS TAPPED DIRECTLY FROM THE MANIFOLD AND IS DIRECTED TO THE SWITCHES AND SOLENOID WHICH "CONTROL" THE HEADLIGHTS AND WIPER DOOR. IT BEGINS AT THE SMALLER OF THE TWO PORTS ON THE LITTLE ROUND FILTER ABOVE YOUR LEFT VALVE COVER. THE OTHER PORT SUPPLIES VACUUM TO THE VACUUM SYSTEM RESERVOIR THROUGH A SLIGHTLY LARGER LINE. (Black)

Headlights

Turning on your light switch not only completes the electrical circuit for the lights, it also cuts off the "control" vacuum which would have continued through your manual headlight override switch to the relay valves for each headlight door. This lack of pressure will allow the relay valves to seat (Under spring pressure), redirecting the pressure to the lower of the three ports on the "Prop" valve. The sliding valve within the relay valve has moved downward, blocking off the upper port while opening the lower. This action allows main vacuum pressure to continue its route to the forward port on the main headlight door actuators. Remember, this main pressure comes from the large yellow line entering the center port of the relay valve. Your headlights should now open. When pressure to the tops of the relay valves is introduced by turning OFF the light switch, the valve shafts will slide upward, directing the pressure entering the center ports - to the upper ports. Main pressure from the yellow lines will now be directed to the upper ports of the relay valves and towards the aft ports of the headlight actuators.

Main vacuum supply connections are not really important when troubleshooting the vacuum system. Reversing the action of the actuators is simply a matter of swapping the upper or lower lines on the relay valve. Leaks are your primary concern. Second to this is the physical condition of the components in the system. You will automatically figure out whether the connections are right depending on the action of that part of the system.

Wiper door

Considering that this system has exactly the same components as the headlight system, we won't duplicate the relay valve details. The difference here is the electrical triggering of the wiper door solenoid. This switch allows vacuum to flow while in the "off" position. As we continue towards the wiper door actuator, we get to the manual override switch/valve. This too allows vacuum to flow in the "off" position. Yes "OFF"....but open. Vacuum is then routed to the center of the three ports on the wiper actuator safety switch ("Interlock") located under the right hand wiper arm base. The next place the vacuum arrives at is the top cap of the relay valve. Here, it pulls the diaphragm against the spring pressure within the cap, moving the sliding valve upwards, blocking the bottom port and allowing "Main" supply pressure from the center port to be applied to the upper port. The last place in this journey is the forward inlet at the wiper door actuator. Here, it pulls the actuator arm forward, closing...or keeping closed...the wiper door. Turning the wiper switch "on" closes the entire path from the solenoid to the upper port on the cap of the relay valve. The diaphragm then returns to its resting place, moving the sliding valve down and opening the lower main supply port leading to the opposite side of the wiper door actuator. Now it opens.

Wiper safety switch Interlock

We don't want the wiper door to close before the wipers have a chance to "Park". The base of the right hand wiper arm pushes down on a piston/valve when parked. This action allows vacuum to continue its path to the upper cap of the wiper door relay valve, keeping the door closed. If the wiper arm does not push down enough, the door will remain open, creep open or close slower than normal. When the wiper switch is turned on, vacuum pressure is cut off completely from the safety switch. The proportioning valve diaphragm returns under spring pressure and the 'main supply' vacuum pressure is routed to the aft side of the actuator diaphragm through the upper port of the relay valve. This causes the actuator shaft to get sucked back, opening the wiper door.

Manual override switches

Right smack between of your tachometer and speedometer is a "T" fitting which is fed directly from the filter mentioned in bold capital letters above. Yes, this is the first branch of the manifold pressure supplying the controlling mechanisms of the system. One side of the "T" feeds your headlight switch. The other feeds the wiper door solenoid controlled by the electric wiper switch. The manual override switches at the bottom of the dash interrupt the continuation of vacuum pressure to the upper caps on the relay valves for the headlight and wiper doors. Pulling them down cuts off pressure, allowing the corresponding relay valve to re-seat.

AC/Heater

The vacuum supporting this system is tapped off of Line #10. While troubleshooting the main system, always isolate it from the A/C and heating system. Disconnect and cap this line at the "T" prior to it going through the firewall.

Hoses:

- 1.) Medium Black 4" - Intake manifold fitting to Plastic filter
- 2.) Medium Black 20" - Plastic filter to metal valve (near manifold connection)
- 3.) Small Black 30" - Metal Valve to "T" connector under dash
- 4.) Small Yellow 11" - "T" connector to wiper door solenoid
- 5.) Small Black 18" - "T" connector to headlight switch
- 6.) Small Blue 18" - Headlight switch to headlight manual override valve
- 7.) Small Blue 16" - Wiper solenoid to manual override valve (Wiper door)
- 8.) Small White 52" - Wiper manual override valve to wiper arm safety valve (under wiper)
- 9.) Small White 100"- Manual headlight valve to "T" between headlight relay valve caps.
- 10.) Large Yellow 13"- "T" connection near reservoir to middle port on wiper door relay valve.
- 11.) Small Black 15"- Wiper safety valve upper port. (Vent line).
- 12.) Small White 36" - Wiper door relay valve cap to bottom port on wiper safety switch.
- 13.) Large Green 28" - Bottom port on wiper relay valve to wiper door actuator rear.
- 14.) Large Red 31" - Upper port on wiper door relay valve to front of wiper door actuator.
- 15.) Medium Black 17" - Plastic filter to vacuum tank. (Reservoir supply)
- 16.) Large Yellow 77" - Reservoir to left headlight relay valve center port. (Supply)
- 17.) Large Yellow 84" - "T" near reservoir to right headlight relay valve center port (Supply)
- 18.) Small White 14" - "T" connector between headlights to RHT headlight relay valve cap.
- 19.) Small White. 14" - "T" connector between headlights to LFT headlight relay valve cap.
- 20.) Large Red 23" - Top port of RHT relay valve to rear of RHT headlight actuator.
- 21.) Large Red 23" - Top port of LFT relay valve to rear of LFT headlight actuator
- 22.) Large Green 16" - Bottom port on RHT relay valve to FWD port on RHT light actuator.
- 23.) Large Green 16" - Bottom port on LFT relay valve to FWD port on LFT light actuator.
- 24.) Large Black 9" - Vacuum reservoir to "T" near reservoir. (About 9" away near fender)