Bypass Valve, Rebuild and Adjustment

This article is a follow-on to the Temperature Compensator adjustment article I wrote last year. For some morbid reason, I continue to study the carburetor in an attempt to understand its functions, and adjustments. Like the Temperature Compensator adjustment, this article falls into the category of fine tuning, so if you have black spark plugs, or plumes of tailpipe smoke, look elsewhere. My car has been running much better since the Temperature Compensator adjustment without the plumes of smoke during hard acceleration, and nice tan spark plugs. The engine also feels much more peppy. There is another small device on the side of the carb called the Bypass Valve which is the subject of this article. The Bypass Valve opens during hard deceleration and leans out the mixture. This has two effects, to provide engine braking, and to eliminate exhaust popping. Run your car up to about 50MPH in third gear, and abruptly take your foot off the gas. It should slow down noticeably (engine braking), without popping or backfiring. Mine did not Pop, but my engine braking was weak. In fact, my car felt like it would just keep on rolling. I always thought this was odd, but not a problem worthy of researching a solution.

My previous owner had paid a mechanic to rebuild the carbs twice within a 12 month period. Knowing this, I usually suspect that problems I find should be minor adjustments rather than hard failures. I am beginning to suspect that some mechanics do a basic rebuild of the carb, pre-set all of the settings to provide a rich mixture, and send the customer on his way. This makes some sense, because adjusting the carbs properly involves making minor adjustments, test drives, checking the spark plugs, lather, rinse, repeat. Most people would not be willing to pay for the time involved in having someone do this fine tuning for them. One interesting fact I also discovered along the way is that the parts to rebuild the Bypass Valve are not included in any of the standard rebuild kits, and so I suspect that mine, as well as many others have never been rebuilt. The adjustment on mine was also cranked completely closed, which is the standard starting point after a rebuild.

The Bypass Valve is a pressure sensitive valve which is designed to open during high levels of engine vacuum experienced during hard deceleration. During hard deceleration, the throttles close, but the engine is still turning at high rpms and pulling large amounts of air through the mostly closed carb, increasing the intake vacuum to peak levels. The process causes unneeded fuel to be drawn from the shutdown carb. At these times, the Bypass Valve senses the high vacuum and opens to allow air to bypass the throttle directly from the intake manifold. This reduces the airflow through the throttle, and leans out the fuel mixture until the rpms and the vacuum return to normal levels. The leaner mixture reduces popping and backfire. Since the engine has less fuel, it provides less push, adds more drag which we know as engine braking. There is a rubber diaphragm inside, and if defective will leak vacuum resulting in similar symptoms as any vacuum


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leak such as a too high idle, or an unstable idle that will wander up and down. The parts for the rebuild were about $25, and the whole thing can be done in an hour or two. The bypass valves are simply screwed onto the side of the carburetor, and can be easily removed for rebuild. The carbs stay in place, and there’s no need to touch the linkages. Hooray!! As always, never adjust anything on the Carbs unless the ignition system has been checked out, and verified to be in good order. Many ignition issues can send you off chasing your tail with carb adjustments. Check/change plugs, points, rotor, cap, wires and timing. When you are sure everything else is perfect, then look at the carbs.

Rebuild Process
When looking at the regulator head on, seven screws are observed (see photo). The three with the Flat Tip head attach Philips (Posi-drive) heads, hold together, and the one in the Check the photo, and remove valve to the side of the screwdriver. There is a gasket carb, so don’t lose it. I always things one at a time so that in you have an untouched one to will come in handy is a flexible screwdriver, since the rear carb access is made difficult by the presence of the front carb. A right angle screwdriver is handy here, and you may need to move the throttle linkage (as when accelerating) to access one of the screws. Make sure you have a tool that will reach all of the screws before you start.

Take the valve into the house, and spread out the newspaper on the kitchen table. This is a good project for a day when your wife is out shopping. Remove the remaining three screws taking care not to lose the spring. Once it’s apart, clean all the parts well with carb cleaner, outdoors.

There is a small rubber ring seal inside the protrusion where the adjustment screw seats, and the only way to get at it is to remove the retaining washer off the head of the adjustment screw. I did this by reaching under it with a fine screwdriver, and slowly prying it off a little at a time working my way around and around (left photo). The Valve in the right photo is a different design, there is a brass cap over the adjustment screw which I had to pierce with an Awl, and pry out. These parts are all soft brass, so be gentle, and work slowly. Once the washer is off, the whole screw assembly will drop out, and the rubber seal should be obvious. I had to pull mine out of the tube with a small hook probe. I don’t believe the retaining washer is essential, the spring will hold the screw in place as it does on the second design, so if it gets damaged, you can leave it off. This is
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also a good time to lube the adjustment screw so it turns easily. I used a dab of silicone grease on the threads. The rubber seal adds significant drag to the adjustment screw and I found a few drops of WD40 made the screw turn much more easily. The rubber diaphragm is sandwiched between the two identical gaskets, and the valve is re-assembled, don’t forget the spring. The photo above shows the order of assembly. The kit does contain extra gaskets, so don’t worry if there are parts left over, just match the new ones to the ones you remove, and make sure they go in the same way. Before you re-install on the carb, spin the adjustment screw fully CCW compressing the spring and closing the valve. Lastly, remember to install the gasket between the valve and the carb. My diaphram was ancient, filthy, and probably torn, but since I was replacing it anyway, I didn’t spend much time inspecting. Repeat for the second Carb.

Adjustment Process
The adjustment is fairly simple. Warm up the engine. Remove the vacuum hose from the retard unit on the distributor, and plug the hose. This should increase your idle speed noticeably to about 1300 rpm. Adjust the valves one at a time, turn the Bypass Valve adjustment screw CW until there is a noticeable increase in idle speed to about 2000-2500rpm. The valve has a total adjustment range of about 11 turns, and mine took about 4-5 turns before the speed increased. At this point the valve is open or floating as they call it. Turn the valve back CCW slowly ½ to 1 turn until the idle settles back down to 1300. Rev the engine a few times and make sure it settles back down to 1300 each time. You may need to turn it a bit more CCW to get the valve to close completely and return to idle properly. Repeat for the second valve. Replace the Vacuum line on the Retard unit, and put your tools away. You can do some further fine tuning by doing some test drives. Drive the car and see how strong the engine braking is. CCW will reduce engine braking, and CW will increase. Too much CW and the valve will open at idle preventing the idle from returning to normal when revving. Too much CCW and the valve will stay closed except during the most extreme deceleration, reducing engine braking and encouraging popping.

My engine braking is significantly better than before. I believe that the valves were left in the initial position of fully CCW which leaves them fully closed all of the time. One last consideration, you may need to adjust your fuel mixture slightly after this rebuild. In my case since the valves were fully closed, the engine was running rich during the rapid deceleration phase. Once the valves were properly adjusted, the plugs got lighter, and I was able to richen the mixture slightly to get the color right again. This improved my cold idle and performance until the engine warms up. I’m no expert, but my experience has been that my engine barely runs when cold unless the choke is pulled out. I believe that if your car runs well when cold with the choke in, your mixture is probably set too rich. Don’t be afraid to make some adjustments, know what you are adjusting, adjust in small increments, know which direction does what, and verify changes in performance or in plug color. If you keep a log of what you change, you can always go back.