

# Part #60

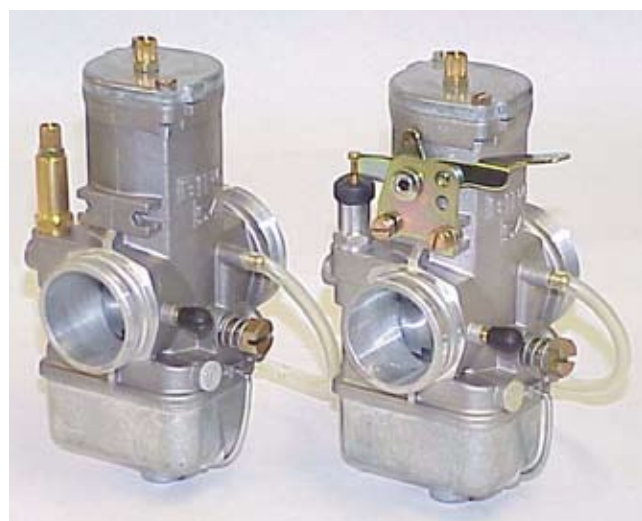
## Using Choke in Carburetor Tuning

*By Mike Stratman*

*You pull up to the hangar with daylight a few minutes old. The heat of the day is already making itself known and the humidity.....man, it's going to be one of those days. You taxi out and do your preflight run-up. The engine bogs and sputters when you open the throttle. Everything was fine last time out. What's going on??*

*Sound familiar? This type of thing should not be a big problem if you are a smart operator that knows how to read weather and make the appropriate changes to your powerplant. I am astounded by the number of operators who call for tech assistance that have no idea of what to do when flying conditions require minor changes to the carb jetting.*

*This month we'll discuss how to diagnose problems as soon as they start to appear. Understanding some real simple principles of how your carb functions will take the guess work out of your tuning chores.*



*Figure #1 – Bing Model 54 Slide Carbs come with either cable actuated (left) or Lever actuated (right) Enrichener circuits. Plan ahead and be sure to specify which you prefer when ordering new powerplants or replacement carbs.*

*The Basics: Two cycle engines require the fuel/air mixture to be supplied precisely matching the rpm demands of the engine. The Bing Carb with the proper jetted installed is excellent at supplying this mixture. Too rich and the engine will run too cool and foul plugs. Too lean and EGT temps will start to soar and run rough. In either case the engine will respond poorly to throttle changes and/or bog and sputter. What we need is a quick way to verify what side of the problem we are experiencing.*

*The Enrichener Circuit: All Bing Model 54 Carbs should have a “Choke” circuit. The work “Choke” found on the lever is in reality an Enrichener circuit that when opened allows an extra rich blast of fuel to enter the venturi. When the plunger is lifted far enough a passage opens from the bottom of the float chamber to the venturi area **after the slide**. See figure #2. Nearly raw fuel is drawn thru the passage by the low pressure created in the venturi. While this circuit is designed to allow the engine to run extra rich during initial start up, we can use this device to quickly troubleshoot any engine problem. Because this is a bypass circuit, it works at any throttle*

setting. Armed with this simple device we can now diagnose most any engine problem right from the seat.

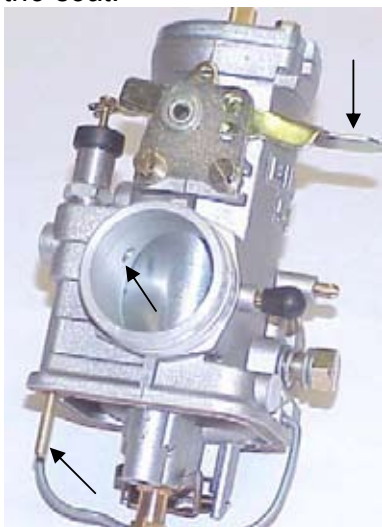


Figure #2 - Depressing the lever will open a passage for fuel to travel up the small brass tube extending into the float bowl and into the venturi area just beyond the slide. Note arrow showing the small orifice to left of slide.

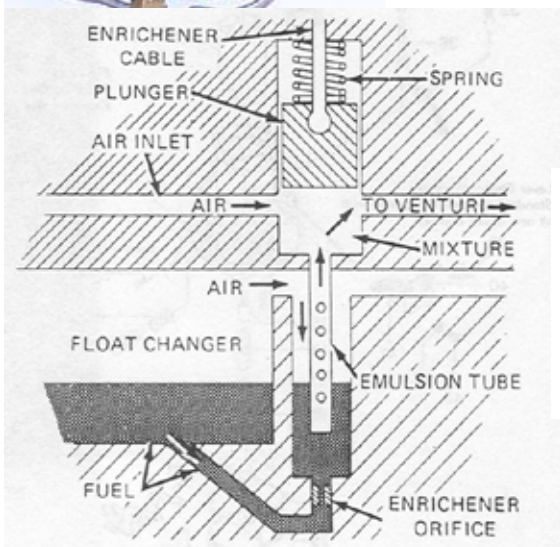


Figure #3 – Shows a cross sectional drawing of the Enrichener circuit. Note how the plunger must be extracted fully for the passage to open at all.

*Give it a shot:* Knowing that we are taking the engine to a richer place when we introduce choke we can note the reaction of the engine. When your problem occurs, hit the choke. If your engine is suffering from too rich a mixture the situation will likely get worse. If your engine is too lean to start with opening the choke should produce an improvement. If nothing happens we can likely expect that it could be an electrical problem (fouled plugs, poor continuity, etc.) or something unrelated to fuel mixture. Now that we know what the problem is and more importantly what side of the problem we are on making jet changes is no longer a guessing game. Also, because the Enrichener is a bypass circuit it works independently of the slide opening. So at any point in the throttle opening we can perform our test. To see what jets are working at any given throttle setting see chart in figure #9.

*Remote Actuation:* As simple as this sounds I can't believe the number of operators that use the excuse, "well I can't apply choke from the seat" or "I don't have a choke" (highly unlikely) and then want to discuss if it's not carb jetting could it be electrical. No, let's make this simple. If you don't have remote access to this circuit chances are there will come a time when you wished you did. Being able to actuate choke during flight is what every smart operator should want to have. Having the ability to work each carb separately can further pinpoint the problem. Today's dual carb engines are almost like tuning two engines as each carb supplies one cylinder only. One lever for each carb choke is obviously the way to go. While most every aircraft will differ in what

parts you need to make this happen, the parts are readily available to handle most any application.

*Lever Actuation:* If you are lucky enough to reach the carbs from the seat a lever choke shown on the left in Figure #1 is as simple as it gets. Push the lever down and the plunger is fully extracted and stays open until you're ready to close the circuit. These parts are available in a kit that threads right into the carb body. See figure # 3.



Figure #4 – Lever style chokes are the simplest type of actuator that is pretty much self contained. Being able to reach this safely in flight is essential to diagnose problems. Order Part #7658 for this kit.

*Cable Actuators:* In most cases you will need a cable system to open the circuit from the cockpit. You will need the parts that go inside the carb plus a pull cable and an actuator level. Again, it is best to it as two separate systems to allow you to work each carb separately. Use the same inner cable (#7407 – 120" with #7417 swage on one end only) with small barrel swage you use inside the carb slide plus the same outer housing used for throttle cabling cut to the length you need for your particular application.



Figure #5 – The kit at the right is Rotax #995-665 which includes all the parts inside the cable to open the Enrichener circuit with a remote cable.

To actuate this cable it's best to use a lever or flip switch that has sufficient travel to make sure the plunger is pulled all the way up. Remember the circuit will not function at all unless the plunger is fully extracted. See Figure #3. We prefer the dual direction lever shown in figure #6 which has plenty of travel and works in either direction. The center screw controls the handle tension so you can pull the choke on and it stays there until your ready to close the circuit.

A Deco Switch can also be used but requires special cable ends and must be adjusted precisely to get full travel. See figure #7. Some users managed to break this type of plastic switch if it was forced open when not properly adjusted.

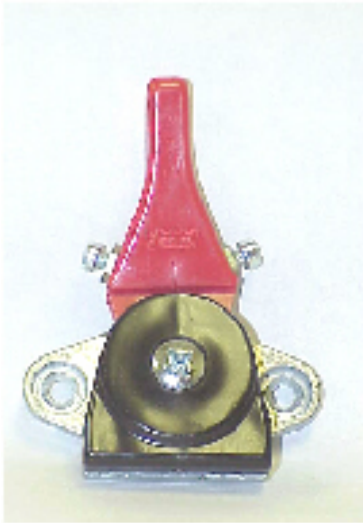


Figure #6 – This compact control lever is ideal for cockpit choke operation. Works with cable coming from either direction and has plenty of travel to open circuit completely. Part #7113.



Figure # 7 – Deco or Flip Switch can also be used to actuate chokes. Requires special cable ends plus must be adjusted precisely to get full travel.

**Safety:** It should go without saying that whirling props are nearly invisible killers. They can chop flesh into small pieces that even the most skilled surgeon with not be able to reattach. If actuating the choke puts you in near proximity of the prop, do what you have to protect yourself. Cable actuation is a good investment in safety. Risking contact with the prop is a real bad idea when doing any type of carb tuning.

**Primer Plunger:** Most operators install a plunger primer system to aid in cold starting. Rather than just grind the starter system down until fuel reaches the float bowl and primer plunger is a great addition that puts fuel right into the intake for easier starting. These devices are cheap and easy to install but they are in no way a device that can be counted on in place of the Enrichener circuit. It is a crude device that can't be expected to function as a diagnostic tool.



Figure #8 – A Plunger Primer is a great addition to aid in cold starting but in no way can be used as a diagnostic tool.



*Other uses for a choke: Besides diagnosing as we have outlined, being able to apply the Enrichener can cool a perilously high EGT, help start a cold blooded engine, and smooth idle during the first few minutes of cold operation.*

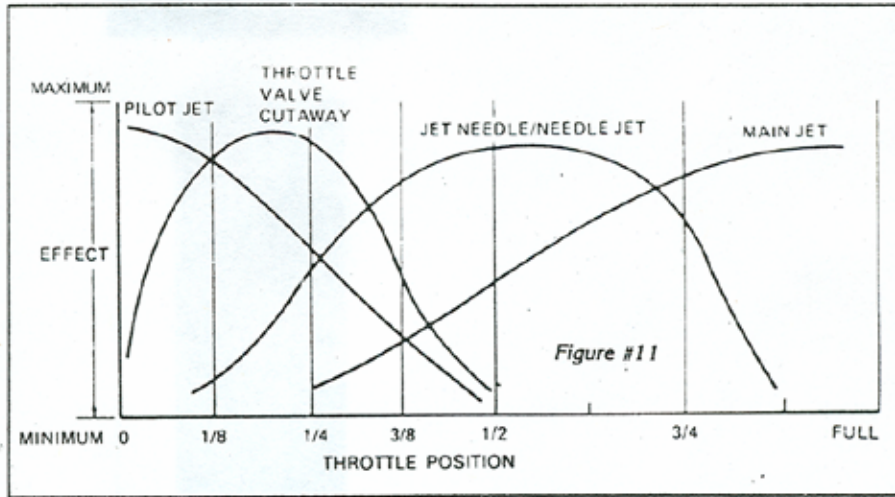


Figure #9 – This chart show the relative effective work range of each carb circuit in the Bing Carb. Note how changes to main jet covers most situations near full throttle opening.

*Summary: Going back to our situation outline in the first paragraph the operator should have anticipated that flying conditions had changed substantially. The hotter the temperature the thinner the air will become. Humidity also replaces air with water vapor and does much the same as heat to increase the density altitude. Our fictional operator should have known that hot humidity conditions were going to require a main jet change before he even got started. Using the choke circuit can quickly confirm this. As you can see the Choke circuit is a great tool for pinpoint trouble and knowing what you need to do to get the problem solved. END*

*This information is current as on November 2005 and subject to change without notice.*



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