

Tuning A Walbro Carb

Walbro Carb TUNE UP & Illustrated Guide

by M. B. Fuess



Walbro carbs aren't too difficult to tune up if you know what you're doing. First of all, you need to know how the carb works and how the settings interact with each other. About 95% of all the gas airplanes I've seen at the field are somewhat out of tune. How can I tell this? Simple, at some point the engines "four cycle" in flight. Two Cycle engines are not supposed to "four cycle" PERIOD. This is caused by a rich mixture that is forcing the sparkplug to intermittently miss making it sound like a four stroke. This is not good. HOWEVER the good news is; gasoline two stroke engines are very tolerant of rich settings (most of the time) and will run fine.

You'll just consume a little more gasoline than necessary, and create a little more oil mess on your plane. You may eventually foul your spark plug as well. So why do so many people leave their engines tuned like this? Simple answer, the engine will start much easier when it's cold AND there's little or no warm up time needed prior to flying. Those are pretty good reasons! But the fact is... the engine is not running like it's supposed to.

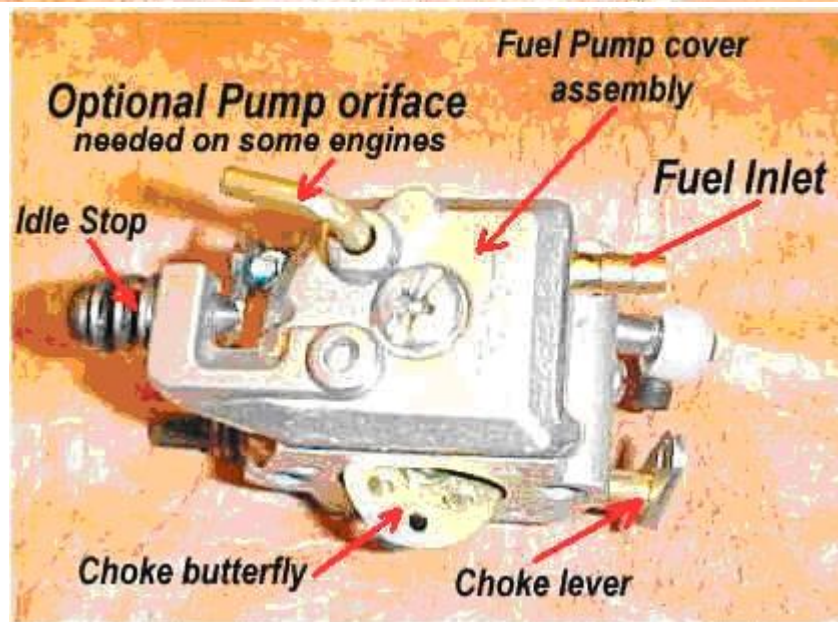
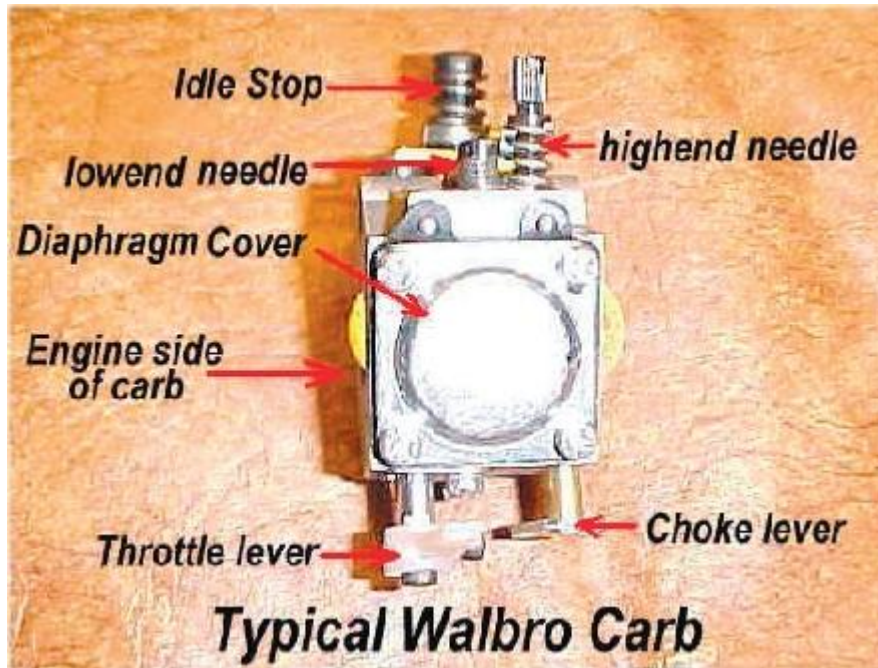
LET'S BEGIN:

All Walbro carbs have their own fuel pump, a needle & seat controlled by a float diaphragm, a high-end and lowend needle set, and some have chokes, some don't. There are so many variations of Walbro carbs, it's ridiculous. I will restrict this editorial to the more common carbs found on airplane gasoline engines. This will include the WA, WB, WG, WT, WL, WS, WTL and a few others. While there's a substantial difference in these carbs, they share a common tune-up procedure.

FIRST and foremost, you need to know how the carb works and how the settings affect the running. Then you also need to know how to make the adjustments. You also need to know what is a correct tune, and what isn't. After that, it's free sailing!

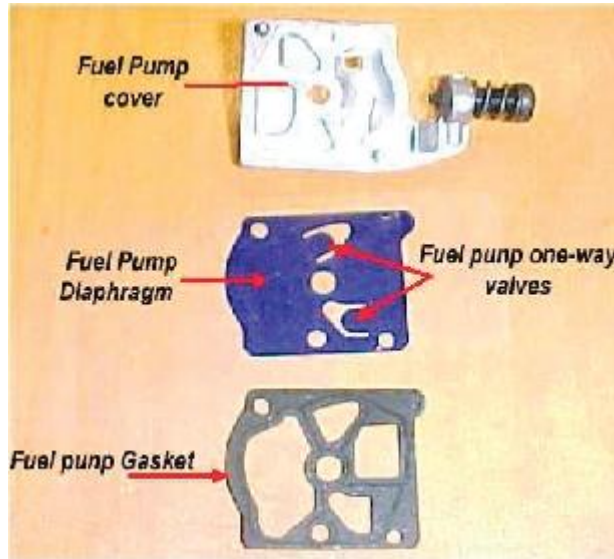
Before you make any adjustments, you need to consider what's really going on and what part of the carb is being used at that time. There are a lot of functions going on within the carb and one or more functions can make the carb act strange. What could sound like a rich lowend needle setting could actually, and easily be a float setting on the needle & seat! A stiff diaphragm will make it run rich too. It could also make it run lean. The high-end and lowend needles interact throughout the entire throttle range. So if you adjust one needle, you will likely need to adjust the other.

Let's begin with looking at the components of the carb:

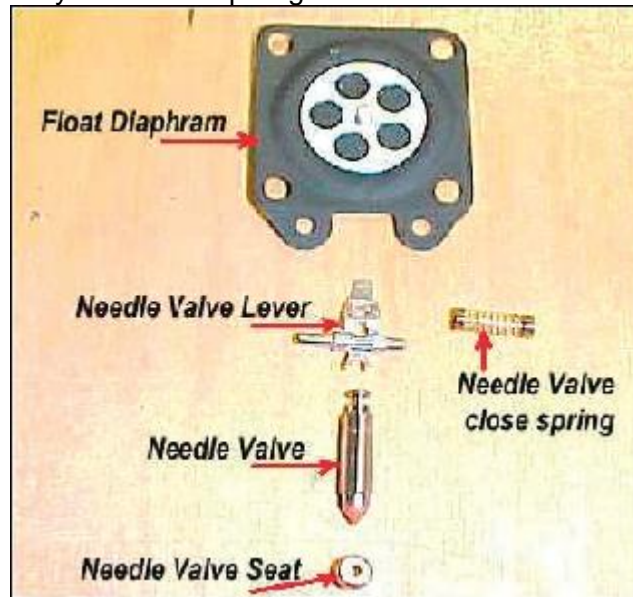


Starting from the gas tank, the fuel is pumped to the carb through the inlet. The fuel works its way through the fuel pump through a little diaphragm pump which is controlled by 2 one way valves (little flaps). The fuel then passes through a needle & seat that is controlled by the “float” diaphragm. The “float” diaphragm manages how much fuel is available for the idle, low-speed, and high-speed throttle positions, by opening & closing a passage utilizing a small lever attached to the needle. The fuel is then “standing by” in the float cavity area waiting for a

vacuum signal at the various jets. The lever setting is very critical since it controls the available fuel to the jets. If the lever is too low, the engine will run lean; if the lever is too high, the engine will run very rich and will likely flood out at idle.



The fuel starts its journey through the pump assembly first... Then the fuel is regulated by the float diaphragm that controls the needle & seat.



All of these parts reside in the float cavity area as well as the fuel ready to be fed through the jets as needed. The amount of fuel available in the cavity is regulated by the lever and its relationship to the float diaphragm. So it's critical that the lever be set properly. Within the cavity,



there are distribution holes that are managed by the low-end and high-end needles. Plus the idle circuit, which is a fixed size.

SPECIAL NOTES:

- (1) The low-end needle is ALWAYS the one closest to the engine; the high-end needle is the closest one to the intake/choke.
- (2) There is no fuel adjustment for idle fuel, only air feed set by the idle stop or servo.
- (3) Both low-end AND high-end needles feed the top-end fuel supply.

Let's tune up a Walbro!

Set the low-end & high-end needles to about 1 3/4 to 2 turns each. Choke the carb or prime it, until the carb is wet. Fire up the engine and let it warm up. Let's set the top-end first since it's the easier of the two. Go to full throttle. Adjust the top-end needle for peak RPM. Leave it wide open for about a minute to see if it changes any.

Should the engine go lean, open the low-end needle slightly, if this doesn't work... you will have to adjust the needle valve inside the carb. (I will explain this later) If the top-end runs OK, then slowly pull the throttle down until the engine begins to "four cycle" hold the throttle there. Adjust the low-end needle until the "four cycling" barely stops. Now lower the throttle more until it "four cycles" again, and adjust the low-end again. Keep doing this until you reach full idle. Now, from full idle begin to throttle up until the engine starts to bog or hesitate.

Open up the low-end needle just enough to eliminate the bog or hesitation. When this is done right, you will be able to set the throttle in any position and it won't four cycle, plus you will be able to transition from idle to full power without any hesitation at all. Now, for easy starting it's best to have the low-end a little rich and it will four-stroke a little..

TYPICAL PROBLEMS encountered in Walbro carbs:

The float diaphragm will go bad occasionally and reap havoc on tuning, especially the low-end and idle.

The internal needle valve WILL leak when they get old or worn out. If you notice gas dripping from your carb, or if the idle gets unreliable, replace the needle valve and adjust the lever even with (or slightly below) the carb housing if you don't have a gauge.

The fuel pump membrane gets stretched and/or sometimes hardens from the gas. It needs to be replaced occasionally. If your pump doesn't pump properly,

- (1) it will be hard to start
- (2) it will tend to run lean, and opening the needles won't help much if any.

Erratic idle, or no idle is often traced to a bad internal needle valve, bad float diaphragm, bad pump, and most common... crap in the carb. You may also have an air leak!

Things to know...

There are three types of fuel pump membranes available.

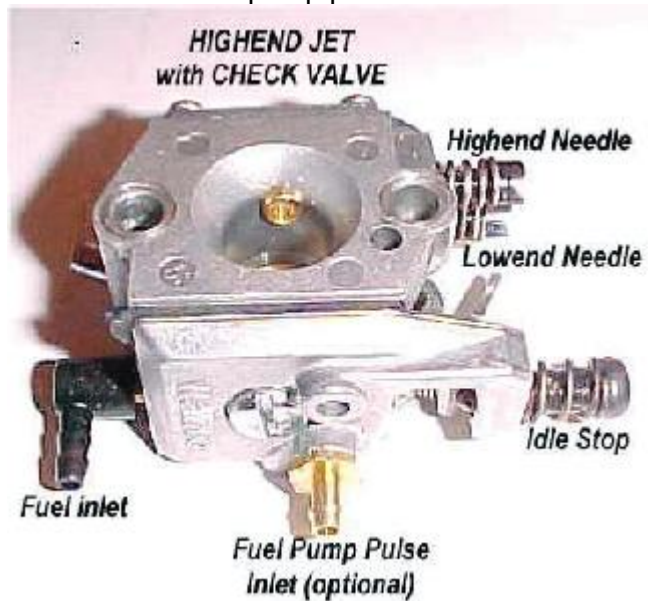
A. The black one is the rubberized fiber, the Beige one is fiberglass based, and the blue one is Acetate. They all work well, but the black one moves more gas than the others but it wears out the fastest.

B. The Beige one works best if you use methanol fuel and is reasonably durable.

C. The Blue Acetate is the most durable but pumps the least fuel.

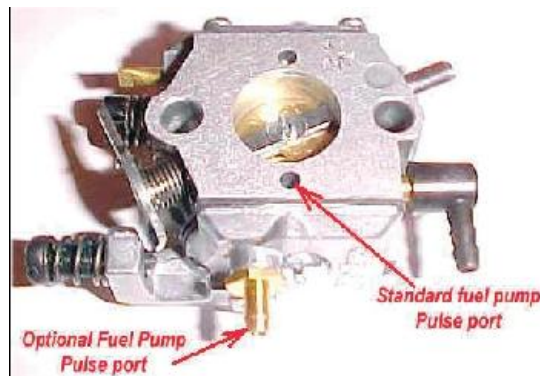
All Walbro carbs will run in any position, but they tune “best” as a side-draft carb. The down draft position tends to run a little rich at idle, and the updraft tends to run a little lean at idle. No big deal though, it’s easily tuned none the less.

This photo depicts one of Walbro’s premier carbs, having a large bore and equipped with a high-speed check valve and external fuel pump pulse inlet.



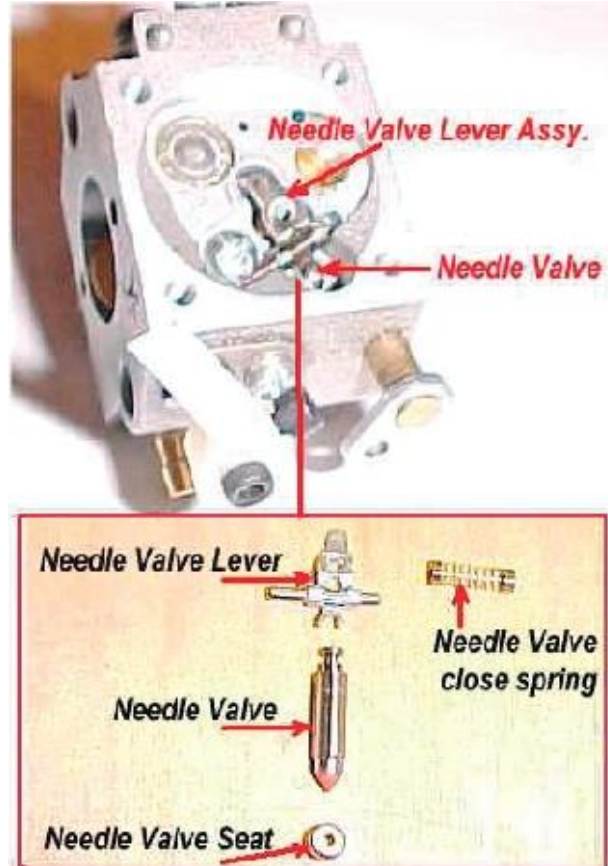
This carb is typically found on 50cc to 65cc engines.

Now let’s talk about the pulse signal for the fuel pump...



Your ENGINE will determine which pulse inlet type you need! If the engine “carb base” has a hole drilled into the crankcase you will use the STANDARD pulse port and the optional (if you have it) port must be closed off. If there’s no hole drilled, you will find a fitting located somewhere on your crankcase. Use a piece of fuel line to connect the crankcase fitting to the fitting on the optional pulse inlet. There’s no need to block off the standard port, as it’s already blocked off by the engine mounting.

The carb must get a pulse signal from the engine! This signal “pushes and pulls” on the pump diaphragm which feeds the carb fuel. Now let’s check out the “float needle & seat” setting.



This is the single most critical setting on a Walbro carb! Walbro offers a “setting gauge” to properly set the height of the lever for your particular carb. If you don’t have one, the setting will be a trial & error adjustment and a real pain in the butt since you have to open up the carb to make the adjustment. For general purposes, the lever will be almost perfectly parallel to the carb base. This will get you close. If the lever is too high, your engine will tend to run a little erratic at idle. If the lever is too low, your idle will be OK but it will tend to run lean on midrange and high-end. It may also run the float cavity “dry” at full throttle and die, regardless of your high-speed /low speed needle settings.

The needle valve seat is pressed into the carb base, and you should not remove this without having the correct tools and setting gauges. Do not remove it!

TYPICAL PROBLEMS

The engine stalls when accelerated

Four strokes as fast idle, mid RPM

Engine goes lean in flight

Engine goes rich in flight.

Engine runs good, but no idle at all.

Carb leaks fuel when not running.

My engine four cycles momentarily

The fuel leaks back into the gas tank

POSSIBLE SOLUTIONS

High-end needle way too lean, or lowend needle slightly lean.

Low-end needle too rich, float diaphragm needle lever slightly too high

High-end needle slightly lean & lowend needle is rich, float needle lever may be set too low

This is a special problem with cowled in engines. the float diaphragm cover vent will need work (see NOTE 1)

There's crap in the idle jets, the carb will have to be removed and cleaned. You may also have an air leak at the base of the carb. The throttle butterfly could be damaged or worn out.

Float needle is bad or has crap stuck in it, or the float lever setting may be too high, or the float diaphragm is bad.

This is perfectly normal for carbs NOT equipped with a "check valve" when I back off the throttle, then high-speed jet. If you do have the check valve, then your float needle runs normal setting is slightly too high, or your float needle is leaking a little.(see NOTE 2)

Bad fuel pump membrane, or an air leak in the fuel line at the carb when it isn't running



NOTE 1:

A very common problem with cowled in engines is, the air pressure in flight changes the “natural” pressure on the float diaphragm. This causes the engine to run rich in flight. There are several possible fixes available. Most of the time you can simply tune your engine for flight by trial & error. However, the easiest fix is to open up the cowling around the carb area to lower the air pressure. You may also rotate the cover to different positions to see if that works. The “BEST” fix is to solder a piece of brass tubing where the vent is, and route the vent line to a better location. I normally route it into the fuse going through the firewall. It works perfectly every time! Plus, your ground tune doesn’t change in flight!



NOTE 2

Carbs equipped with the high-speed check valve are greatly superior for flying aerobatics, or flying whereby the throttle will be used extensively. The check valve prevents jet dripping when you back off the throttle. That’s all it does...

Straight through (non-check valved) jets always drip a little fuel while the throttle is being backed off, and causes a momentary four stroking of the engine until the jet stabilizes to the new air flow rate. This is completely normal.

Converting a Walbro carb from gasoline to methanol:

Most Walbro carbs will tolerate methanol without modification as long as you keep the nitro content low, less than 10%. If it doesn’t tune properly, some modifications will be necessary. The fuel flow rate within the carb will have to be increased. The float needle & seat needs work first. Bore out the seat 25% larger than its existing size and raise the float lever up about .040 inch. Try the carb out. If it still doesn’t take a steady tune, then bore out the lowend & high-end



needle orifices 25% larger than its original size. This should do the job. The flow-rate of methanol is much higher than gasoline.

*** * * SPECIAL NOTES * * ***

(1) I would like to note at this time, that a properly tuned bottom-end will not “kill” the engine when the carb is pulled to 100% closed. This is typical for Walbro’s as most (but not all) Walbro’s have an air-bleed notch or vent hole in the butterfly. You can solder the vent closed if you want carb kill capability.

(2) The diaphragm (needle & seat) setting is critical. If you are not familiar with this setting, leave it alone!

(3) I would also like to cover two other possibilities that would make your carb “APPEAR” to be out of tune. One is carb size. If the carb is too big for the prop/engine combination, it will not tune up properly and be erratic and un-reliable. The other is engine timing! IF your timing is too low it will make the carb appear out of tune! This is often over-looked and will cause you to tinker with the carb and you’ll never get it running right. I’ve found that 30 to 32 degrees works best for bigger carbs and or bigger props.

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