

Carburetor Adjusting 101

Here's a scenario: Pilot takes off, plane's engine sounds great. After several minutes of flying, engine seems to lose power, sounds kinda "thin", pilot keeps flying. Engine continues to sag, now full throttle is very weak, pilot now understands that maybe this isn't gonna clear up. Engine dies (what a shock!), pilot calls for deadstick landing overshoots, tears off landing gear, etc. Never seen this at your field, right?

Here's the way that *I* set mixture on non-airbleed carbed engines (90% of the engines out there fit this category, but the theory is similar for air-bleed carbs). First of all, understand that the high speed needle has its main effect from 3/4 to full throttle, and the low speed needle controls everything from idle up to 3/4 throttle. It thus makes sense to me to spend the biggest majority of my tuning time adjusting the needle that controls the largest portion of engine running, right? Also, remember that there is a proper air to fuel ratio (mixture) that allows the engine to run properly. Too much fuel is rich, and too little fuel is lean. We "richen" the mixture by adding more fuel (turning the needle out, or counter-clockwise), and we "lean the mixture out" by decreasing the fuel (turning the needle valve in, or clockwise).

I start the engine give it full throttle, and lean it to it's highest rpm (peak), then richen it by maybe a quarter turn. Then with the glow plug igniter still attached, I slowly close the throttle to an idle rpm. At the lowest rpm that the engine will still reliably run, I then remove the glow igniter. If the engine dies immediately, I know it's too rich, and I then lean out the LOW SPEED NEEDLE by 1/8th of a turn (don't touch the high speed needle). Start the engine again, (and this is important) give FULL throttle briefly to clear out excess fuel, then slowly close the throttle again. Remove the glow igniter, and this time it may run a little longer before it dies, so lean the low speed another 1/8th turn. Re-fire the engine, give a burst of full throttle to clear it out, and slowly close the throttle again. remove the glow igniter and now notice that the rpm DROPPED a bit when you removed the glow igniter, but the engine kept running. We're getting there. It's still too rich, and you'll prove that by opening up the throttle and hearing the engine "blubber" then die. That's because excess fuel has collected in the crankcase during the rich idle, and when you opened up the throttle, the excess was pulled into the cylinder, making it WAY too rich. Supposed you were on a landing approach, and decided to go around, you throttle up but the engine "blubbers" and then dies (another thing we haven't seen, right?). Yep, the LOW SPEED needle was still too rich, allowing excess fuel to collect in the crankcase, just WAITING on you to try to go around so it could "LOAD UP", blubber, and die!

Keep leaning the low speed needle down until it idles well, but now, when you open up the throttle, it HESITATES instead of BLUBBERS. When this happens, you've lean it down too far, so richen it up 1/16th of a turn and try again. You know you've got the LOW SPEED needle right when you can fire it up, remove the the glow igniter, and the rpm doesn't change AT ALL, and you can open the throttle up, and it doesn't blubber or

hesitate, it just runs!

The final thing you do is re-adjust the HIGH SPEED NEEDLE, leaning it to it's highest rpm (peak) and then richening it up maybe 1/8th turn to give it a slightly rich mixture. We also know that the fuel mixture will change in flight when you point the nose up (harder for fuel to travel uphill) and also as the fuel level in the tank changes. In both cases, a leaner mixture results, so we actually need to set the mixture a bit further on the rich side to account for this. While the engine is running at full throttle, CAREFULLY pick the model up and raise the nose to at least a 45 degree angle while listening to the engine. If the engine sags a bit, then you'll need to richen up the high speed needle 1/16th turn. Try it again, and when you can point the nose up and the engine doesn't sag, but maybe shows a slight GAIN in rpm, you know you've got it right.

Now the engine will be happy, and chances are will reward you with reliable running. If you've got one of the few engines with an air bleed adjustment for low speed adjustment, the theory is the same, just refer to your manual to see how to richen and lean the low speed mixture.

Gotta go rest my typing fingers!

Tim