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REF: Carburetor, Intake Manifold & Exhaust - Sub-01Z

How to adjust the Lake Injector for all throttle positions

- Tools needed: Screwdriver, #16 nail sharpened, small jar, syringe or breaker graduated in cc's or ounces, gloves, small wood throttle blocks (you'll make these), fire extinguisher rated for fuel.
- Instruments needed:¹⁾
- Manifold pressure gauge, EGT gauge or air/fuel ratio gauge.
- So you have followed the manufacturer's directions to adjust your POSA style carburetor but find that you still have rich or lean spots across the range of throttle and you're frustrated. The following procedures to set the carb correctly takes about 4 hours of measuring and tuning.²⁾
 1. The fuel in the tank should be half full (a full tank of fuel will make the carb run richer and an almost empty tank will run leaner). Remember that you are operating on .022 pound of pressure per inch of vertical fuel column. For simplicity say our tank is only 6" tall. If we have used a half a tank of fuel we now have used 3" of fuel and have a 9" drop to the carb. So, $9 \times .022 = .198$ lbs of fuel pressure. Less than a quarter of a pound.
 2. You need to pick 6 throttle positions and be able to repeat the positions. Use idle, 1500, 2000, 2500, 3000, and wide open throttle. With the carb set as best as you can get it, make a stop block that you can put in the throttle so you can accurately repeat each position. The rpm will change when you adjust the carb down the road. We simply need to be able to repeat the position. You can use a piece of wood that has a hole drilled through it that is the throttle shafts diameter. Split the piece of wood in the center of the hole. The length of the wood will vary for each throttle setting.
 3. At each throttle setting, use the needle to adjust the carb so the engine runs that absolute best at each station, regardless as to how it runs anywhere else. Make note of the manifold pressure and egt/or air fuel ratio when the carb is set for each station. Once you have a single station set perfectly with the needle, turn the fuel on and let fuel flow out of the carb in to the bowl for 1 minute. Measure the amount and record it next to the egt/air fuel ratio and manifold pressure reading.
 4. Repeat step 3 for all 6 stations, recording manifold pressure and rpm along with egt/air fuel ratio. Measure fuel flow for each individual station and record the measurement. Note: this process will consume about 1 gallon of fuel. You need to keep the fuel in the tank as close to a constant fuel level as possible.
 5. Now that you have made a chart that show the fuel flow out of the carb at each station where you set the carb so that the engine ran it's best, you need to set the needle so the carb runs

the best at idle. This will be the permanent setting for the needle. Idle position to about 1500 rpm is the most important throttle range.

6. Now go back to each throttle position using your blocks of wood and re-measure the fuel out of the carb. In most cases it will be less than you originally measured it. So to bring the fuel flow up the same level you make a vertical mark along the flat of the needle where the needle goes into the fuel orifice. Just use a black fine line marker to do this.
 7. Remove the needle. Now use the sharp nail and make a scratch mark along the horizontal axis of the needle 1/8" on both sides of the vertical mark. When satisfied with the depth, reinstall the needle and measure the fuel flow. You want it to be equal to what it was in steps #3 and 4.
 8. This is the trial and error time consuming part of the job. Be cautioned that a little scratch for starters is better than a deep one. It does not take a very deep mark to allow a lot more fuel to flow.
 9. When you are done with each station you will have a series of scratches that are not connected. You may find that in some areas of the needle you won't have to do much and in others you will have to have a deep scratches and you may need to connect the scratches with another scratch.
 10. The top and bottom ends are critical. For the top end or wide open throttle, this is where the egt comes in handy. At wide open throttle, the engine should run about 50 to 100 degrees rich of peak. When you throttle back to 75% power the egt should rise.
 11. When set correctly, you should be able to see a steady rise in the egt from idle to just before full power. At full power, the egt should dip slightly.
 12. Note: in the event that the needle is rich at the bottom end instead of lean over the range, you will have to go to the next smallest needle and start the procedure again. It is very difficult to make a needle leaner without adding material to the needle.
 13. On POSA style carbs (Revflow, AeroCarb) equipped with mixture control, set the mixture control so that is just shy of being full rich when doing the above needle work. In the event that you need to make the carburetor slightly richer, you can do so without having to go through the entire measure, scratch, measure, scratch scenario all over again. As you burn off fuel, the fuel pressure is less so you may need to go "over rich" to compensate for less pressure at the needle.
 - The air/fuel ratio meter should read as follows:
 - Cold start to warm idle 800 rpm
 - Idle 800-1000 rpm
 - Mid range 1000-2500 rpm
 - Cruise 2700-3300 rpm
 - Wide open throttle³⁾
- This type of fuel delivery is still being used in aircraft. However, it has now evolved into more of a fuel injector that you are probably used to in principle. Although it is similar in looks, it has a slightly negative pressurized TBI with constant feed aviation fuel. So, unless your setup for jet fuel, these won't work on Sportys.
 - This is from Ellison Fluid Systems:
 - The EPA has required the oil companies to add oxygenates to auto fuel in many parts of the country to reduce pollution in the winter months. In most areas this additive is alcohol which will damage aircraft fuel systems. In addition to possible chemical incompatibility, the high vapor pressure of auto fuel can be a problem when used in aircraft, as it is much more likely

to boil than aviation fuel. Unlike aviation fuel, the formula of auto fuel is altered as the seasons change, so winter grade fuel is even more likely to form vapor.

- Many of our customers have stated that they believe there is no chemical difference between aviation fuel and auto fuel. A dramatic difference can be demonstrated by pouring a sample of each into Styrofoam coffee cups. The aviation fuel will remain contained in the cup, but auto fuel will dissolve the cup and flow right through the bottom, as it will destroy rubber parts in the TBIs. ⁴⁾

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<http://www.greatplainsas.com/posacarb.pdf>

4)

<http://ellison-fluid-systems.com/man-section1.shtml#4>

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