

LO206 Carburetor Tuning

To get your best on track LO206 performance, you need to tune your carburetor for optimal engine performance. While by rules you cannot change the jets, there are a number of items you can legally adjust to tune the carburetor for optimal performance:

- Setting the float height
- Setting the float drop
- Adjusting the c-clip position on the needle
- Opening idle mixture screw (air bleed)
- Correctly setting the idle stop
- Properly aligning the intake manifold
- Getting the carburetor level - as best as possible
- Orienting air filter and make sure it is clean and breaths well

This article discusses these in more detail. Use the above list as a checklist when you are setting up your kart for your next race.

The Briggs LO206 engine utilizes a Walbro PZ-22 carburetor. To obtain optimal LO206 performance you need to have the right air to fuel ratio. Air density will affect what is the optimal setting. This can change my track altitude or weather conditions that day. This makes it is somewhat of an art.

- The LO206 will run best on the **bottom end when it is rich**. Conversely, it will run best on the **top end when it is lean**.
- Given this behavior, you may want to adjust for whatever track you are running. Short tight tracks running a little rich, tracks dominated with long straights running a little lean.
- Typical way to check to see if your engine is running rich or lean is to look at your spark plug. The center electrode should be pure white. The outer metal ring typically will be black. A dark electrode is a sign you are running too rich.
- Sometimes plugs can be hard to read and you may get false readings if you let the engine idle for a long period of time.
- Another very good approach is to use a cylinder head temperature sensor. **Normal range for the LO206 is 375-400 degrees**. If you are running above this you are likely too lean, below too rich. You should adjust accordingly. Temperatures below will cause a loss of HP and temperatures above will cause ring and spring life reductions and cylinder head warpage. Cylinder head warpage will cause head gasket failure and loss of compression. You always want to be careful not to run too hot, well over 400 degrees to prevent engine damage.
- It is against the rules to cut off the compression ring from the spark plug. Some folks will do this when running a temp sensor. It is desirable to get the plug electrode deeper into the cylinder. My suggestion would be to do testing or practice with the temp sensor to tune your carb. Once you have done this remove it to run the race for best performance.



Another approach is to observe how your engine is running as an indicator

- Symptoms of a rich mixture are:
 - Black smoke or popping in the exhaust
 - A “flat” running engine or dull sound
 - Runs worse as engine warms
- Symptoms of a lean mixture are:
 - High cylinder head or exhaust temperature
 - Backfire/popping from the carburetor
 - Runs better with partial choke
 - Surging or cutting out
 - Pinging or rattling sound from engine under load
- A cool tool can be found at <https://airdensityonline.com/us-track-list/> This website will give current air density at most tracks across the U.S. It should be possible to track air density and come up with appropriate carb setup for these conditions. Probably the best tuning is done with the float height, as you can not adjust jets.

Now let’s first look at the various adjustments on a PZ-22 Carburetor

- Idle mixture and idle speed screws
- Jet needle – this controls the flow of fuel at 10% to 75% throttle
- You have two jets: main jet and pilot jet.
- The pilot jet is very small and controls the fuel flow at idle.
- The main jet controls fuel flow at all other levels
- The main jet is controlled by the jet needle when going from partial to full throttle

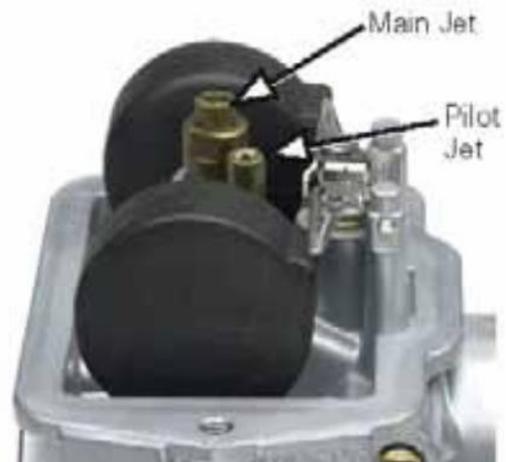
There are four factors that can influence whether the carb will be rich or lean

- First, the float height. Correct float height is required. Too low of a float level will cause the engine to be starved for fuel at the end of a long straight away. Too high of a float level will flood the engine with too much fuel and cause a rich condition that could caused the engine to bog.
- Second are the jet sizes. However, running with Briggs LO206 by rules, both the main jet and pilot jet are restricted in size. The **main jet must be #95**, hole size is .0380” and the **pilot jet must be #32**, hole size is .0130”. No adjustments can be made. For almost all conditions the stock jets will be adequate for good performance.
- The third is the needle clip. This will raise or lower the inlet needle and adjust the carb to be slightly richer or leaner.
- Forth is the idle mixture screw.

Normal recommended starting point settings for an LO206 carb:



- **Float height = .860 / .880 inch**
- **Float drop = 1.050 inch**
- Idle air bleed screw = one and half turn out
- **C- clip needle setting in middle slot (#3 slot)**
The PZ-22 is designed to control the air/fuel mixture at three different engine speed ranges, low, mid, and full throttle



Idle and Low speed Tuning

- For idle and low speed the fuel mixture is controlled primarily by the pilot jet. However, because we can not change the pilot jet on a LO206, the only low speed adjust is the idle mixture screw. The **idle mixture screw is an air bleed**. So, it is likely opposite to what you might think. You are controlling air, not fuel like on most carbs. Closing or turning clockwise will limit the air flow and richen the mixture. Where opening/turning counter clockwise will increase the air bleed and result in a lean mixture. To set the idle mixture properly you are looking to set it at the spot where the engine will idle at its highest RPM. To get an initial starting point turn it clockwise and completely close, then turn counter clockwise one and half turns. From that point, you will need to run the engine and make small adjustments until you find the location that gives you the most RPMs.
- **An approach that can be taken is to not worry about how well an engine runs at idle.** Nobody ever won a race by having a good idling engine. Your goal is to tune for mid and full throttle performance. **Screwing the idle screw out as far as you can will allow more air into the engine. This can be counter balanced by moving the clip on the needle to allow more fuel.** You may want to put some lock tight on it to keep it from falling out. **This approach has shown to give an on-track performance advantage at midrange and high speed,** even though it may run a little rough at idle.

Midrange Tuning

- The main jet needle controls fuel flow between 10% and 75% throttle opening.
- The needle has five notches. A C-clip determines the position/height of the needle in the slide. By varying the height of the needle in relation to throttle opening, the amount of taper of the needle in the main nozzle will change the fuel mixture.
- Standard position is in the middle (#3 slot)
- **RAISING THE NEEDLE IN THE SLIDE (moving down in picture on left) = RICHER MIXTURE**
- **LOWERING THE NEEDLE IN THE SLIDE (moving up in picture on left) = LEANER MIXTURE**



Location of C-clip on jet needle determines mid-range fuel mixture.

High Speed (Full Throttle) Tuning

- The air/fuel mixture at fuel throttle is almost completely controlled by the size of the main jet. Since by rule we can't change the size of the main jet, there is not a great deal we can do to change the mixture.
- Adjustment can be made by adjusting the float height. This can impact the fuel mixture. I would experiment with different settings. **Recommended is .860**. If you want to run leaner go to .900. Opening up the idle mixture can bring a little more air in which means you can fuel in as well. So, with this opened up you might be able to go to almost .820 and get better performance. When testing only change float height in very small increments or you risk flooding the engine on tight corners or starving the engine at the end of a straightaway.
- Keep checking the current air density when doing testing and note your results by using a temperature gauge. You may want to move the needle clip up or down based on changing conditions.
- Keep in mind you will typically see denser air in the morning and thinner air in the late afternoon.

Setting the idle:

- It is critical to correctly set the throttle cable. You want to ensure that you are getting full throttle when the gas pedal is pressed.
- You want to **set the idle at or just under 2000 RPMs**. Best performance on bottom end you want to be at 1800 when the engine is warm.
- **There are two ways of setting the idle.** You can use idle set screw. The idle screw goes through the body and hits the carb slide. Winding it in or out will move the slide up or down. Essentially doing the same thing as pulling the throttle, opening or closing it. You can also just use the throttle cable. This may be the best approach, if you have opened up the air bleed to get better on track performance and it runs a little rough.



A few other things to consider:

- When adjusting the needle clip make sure the clip is installed correctly. It **needs to be pushed all the way down** or the needle will be too high and make it too rich.
- **Make sure the manifold is aligned correctly.** One side of the manifold is slotted to help alignment. You can use a flashlight to look through and make sure it is not blocked.
- **Refresh your carb gaskets.** You can purchase a kit that has new gaskets for your carb. If you have been running your engine for a while, it is a good idea to freshen up your carb to get optimal performance.



Be sure the V-shaped jet needle retaining clip is in place and will hold the jet needle securely in the slide.

