

2 Stroke Carburetor adjustment procedure for off-road motorcycles

These instructions are intended to be followed by an experienced mechanic whom has a thorough knowledge of off road motorcycles, carburetor assembly, and tuning techniques. If this does not describe you please stop and seek professional help as engine damage and serious injury can result from improperly assembled and tuned carburetors.

Do not attempt to fine tune the jetting on a fresh engine. Break it in first with ½ to 1 hour of easy riding. As the rings seat in and power improves the fuel requirements will change.

Reading the spark plug

- **Jet more by “feel” more than plug color on a two stroke.** Two strokes make the best power at low engine temperatures and that combined with oil in the fuel and cold heat range spark plugs makes for a good plug reading that is **darker** than most would expect to see. Your main jet should be rich enough that it is just a size or two below the “sputter” point when pulling at full throttle in the higher gears.



- **Always watch for detonation.** Look at your spark plug closely with a magnifying glass. Detonation (even slight) will show up as tiny speckles on the spark plug insulator (see picture). It appears like tiny metallic balls when magnified. It is easiest to see evidence of detonation on a new spark plug before it becomes coated with darker deposits.



Float Level Adjustment;

You should check the float level first to insure that it is correct. The fuel level in the float bowl will affect the flow rate of fuel through the jets and into the carburetor venturi.

**No smoking and don't work next to the hot water heater, furnace, or any other source of flame!!
Work in a well ventilated area.**

- You will need to remove the carburetor from the bike or at least get it into a position where you can tilt it and get the float bowl off.
- With the float bowl off and the carburetor in the normal upright position, connect the fuel line to the gas tank, hold the float up and turn the gas on.
- Slowly let the float down until you can observe the gas just beginning to trickle out of the inlet needle. Then push the float back up to the exact point where the flow is stopped. This should be at a position when the float "tank" is 1/8" to 1/16" before touching the carburetor body above the float tank. Bend the inlet needle arm to adjust the float level as needed.
- This will be the correct fuel level. You may get some dripping out of the carburetor overflow tube when revving the bike on the starting line, etc. but this is OK as long as it is not overflowing at an idle or when sitting level and the engine is not running.

To adjust the low speed mixture;

- Start with a fully warmed up engine at normal operating temperature.
- High performance 2 stroke engines are very inefficient at low RPM and therefore it is usually best not to set them to idle. You will find that the idle speed adjustment and the required low speed mixture setting will change drastically from a warmed up engine in the pits to a hot engine several laps into the race. It is best to set the slide position (idle speed screw) so that the engine will return to a low RPM for a few seconds and then die. In actual use while riding this has proven to work acceptably.
- Initially adjust the low speed mixture screw to approx 3 turns out from all the way in. On two stroke carburetors this is an **air** screw so don't forget turning the screw out is a **leaner** mixture.
- Using the throttle, keep the engine at a low RPM, just above stall RPM. Use the throttle to slightly increase and decrease the RPM. Turn the air screw **in** ¼ turn at a time until the engine sounds heavy and rich like the choke is on and the throttle response is slow (don't forget that you are only twisting the throttle slightly). Then go back out with the air screw until the engine sound just cleans up. (it should still sound very slightly rich but it should respond and clean out instantly when the throttle is opened ¼ to ½ open)
- Your final setting on the low speed mixture screw should be between 1/2 and 3 turns out from completely in. If you are less than 1/2 turn, you need 2 sizes larger pilot jet. If you are more than 3 turns, you need a pilot which is 2 sizes smaller.

Main Jet;

- Start out with a new spark plug! Used plugs can have deposits which will produce a misfire under load and give you a false indication of mixture.
- Install a main jet that is most likely too rich for safety sake.
- You will need to load the engine in the top gears on flat terrain. This is best done on a long, flat, and smooth area (not on the race track). Perform full throttle "drag strip" runs through the gears reaching the top gear and pulling for a few seconds in that gear (don't go to top speed at this point just in case you are too lean). You want to keep going richer on the main jet until the engine obviously sputters at full throttle in the top couple of gears. Then go one or two sizes leaner on the main jet until it cleans up.

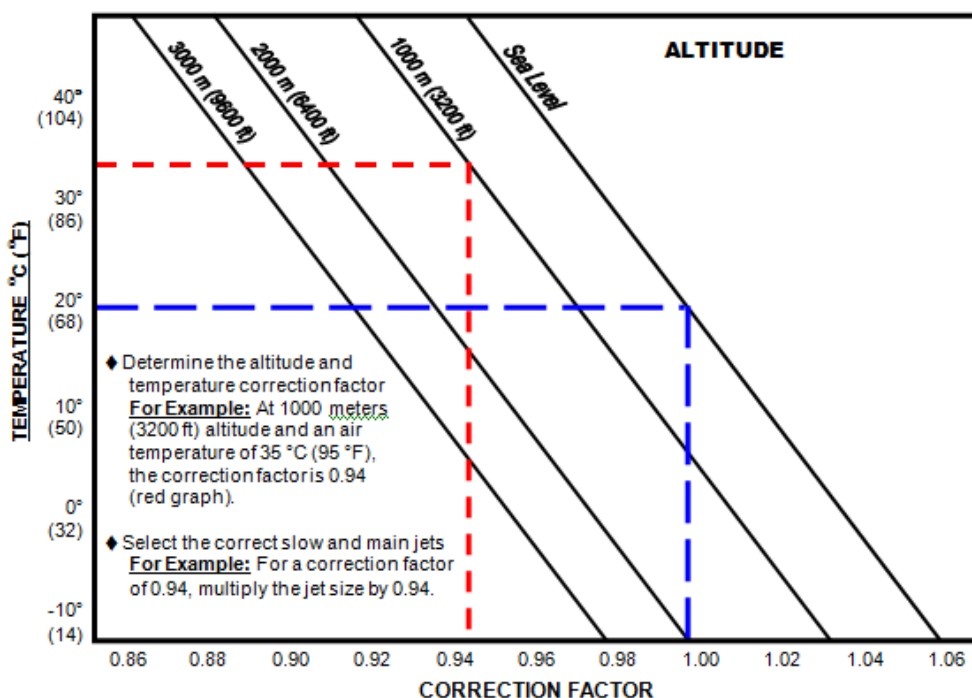
- This will be the correct main jet for the weather conditions at that time. You will need to adjust your jet size for changes in altitude and temperature. (see chart below)
- Keep in mind that it is better to be too rich rather than too lean. **Race engines need as much fuel as they can swallow without sputtering!** Clean running engines belong on the street, not the race track! A well jetted 2 stroke using a high quality synthetic oil will have evidence of oil at the rear of the exhaust system. The only time that it will be clean is under constant high load situations such as an expert level rider on a sand track where the exhaust system can retain enough heat to burn off the oil residue.

Needle clip position:

- This can be tricky, but the same rule of ample fuel applies.
- A clip position that is set too rich is much easier to recognize than one that is set too lean. So once again we must find the setting that is too rich for the engine and then lean out slightly.
- To check the needle position you must ride the bike in the lower gears. Slowly accelerate keeping the engine under a *light* load (**you will only be opening the throttle to 1/2 or so**) If the needle is set too rich you will hear a sputtering like the choke is on and the acceleration will be slow. If the clip position is too lean the engine will sound quiet and have a “dead” feeling possibly hesitating. A needle that is set in a clip position that is too lean will also cause hesitation or “bogging” when full throttle is quickly applied.
- You will need to double check this needle setting by riding the bike under track conditions to confirm that there is no bogging or sputtering under most conditions. Keep in mind that a 2 stroke will never run “clean” like a 4 stroke and a good running 2 stroke will have situations where it sounds too rich. This is OK as long as it cleans out instantly when throttle is applied and there is no hesitation or bogging.

Temperature and Altitude Correction Chart

The following chart illustrates the adjustments required for changes in temperature and altitude. Once you have determined the correct jetting for your engine make a note of the temperature and altitude of your location at that time. You should then convert your jetting to the baseline 1.00 condition of jet sizes on the chart. (for example if you determined your correct main jet to be a #188 at 95 degrees F and 3200 ft altitude which is a correction factor of 0.94, that would convert to a #200 at the standard 1.00 condition. $188/.94=200$) You can then use the chart to predict the correct jetting changes according to anticipated weather conditions.



Correction Factor Applied to Jet Needle and Air Screw					
Correction Factor	1.06 or above	1.06 – 1.02	1.02 – 0.98	0.98 – 0.94	0.94 or below
Jet Needle Setting	Lower clip one position	Same	Same	Same	Raise clip one position
Air Screw Opening	One turn in	½ turn in	Same	½ turn out	One turn out

Carburetor Circuits and Jet function:

The following chart illustrates the function and effective throttle opening range of each jet in the carburetor.

Carburetor Circuit Function

