

## **Written by Pat Roy (RC Universe - Tired Old Man)**

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### **Tuning of Petrol Engines with Walbro Carburetors**

Below is a copy of a PM I sent to a person at another site. It's not engine specific because they all work pretty much the same way. RCS/ZDZ also has a good engine tuning procedure on their website.

I'll start with a link to Pe Reivers site which provides excellent engine tuning info that differs a little from mine. Equally effective though.

<http://www.prme.nl/forum/viewtopic.php?t=10>

Two items important to remember with any engine. The needle settings required to get most any engine started is between 1-1/2 to 2 turns open on both needles. The second is never try to tune or adjust a cold engine. They must be warm for a needle or idle setting to be effective. Otherwise the effects of changed settings alter as an engine warms up.

I prefer to start with the high needle. Others prefer starting with the low. Start and warm up the engine then run it up to peak rpm. Now adjust the high needle for max rpm. Not a little lean or a little rich, but peak. Now bring the engine back to idle and let it cool off. You may want to shut down for a little while for more cooling.

Next run the engine somewhere between 2,500 and 3,000 rpm. Hold it there and adjust the low needle so that the engine increases rpm until it falls off. Back the low needle up until the engine again increases rpm, then falls off because it got too rich. Adjust the low needle back to the point on max rpm. All of that with the engine at that initial throttle position required to obtain the 2,500 to 3,000. You do not want to be using the throttle when adjusting the low needle.

Run the engine up to max rpm with the throttle to clear it out, then once again peak the high needle at max rpm. then back to idle for a few moments for cooling. Shut it down and let it cool.

After a cooling period start the engine and let it idle for a few seconds. Now quickly advance the throttle. Did it bog or sag? Adjust any of that out using the low needle. Now go fly and note any fine tuning that may be needed during the flight.

Sags on a long upline? Take a little off the high needle. Really fat and burbling in mid throttle level flight? Adjust the low a little leaner. Very small adjustments on either needle for flight adjustments.

Bear in mind that a couple of engines will burbal no matter what you do.

## **Break-In Procedure**

On to break in. You can't really break an engine in until you have it tuned. Sloppy rich does not break in an engine. What you want to do is perform heating and cooling cycles without reaching excessively high cylinder temps. By excessively high I mean above about 300f. They can handle that just fine if you don't keep it that high. Preferable would be about 250f-275f. Anyone tells you their gas engine runs fine at temps below 200f doesn't know what they are talking about. You can't build a fire without increasing heat output.

A temp gun almost the most useless piece of equipment you can have in a flight box. The most useless would be a glow driver in a gasser field box. They make you think you are seeing an accurate temperature. Wrong!! That temp can be off 100 degrees or more, especially if the gun is being used just after landing to check an engine. Accuracy comes with expense. You need a thermocouple and a data logger. Use one on the ground with the cowl off if you want but expect a lack of accuracy. Never use one with a cowl over the engine. Aim it at the base of the spark plug for about the best reading you will get.

So tune the engine. Now run the engine in 10 to 15 minute time periods, cycling the engine between a high idle rpm of about 2,000, running up to peak rpm for a few moments long enough to warm it up. Then back it down to cool. Do this for about a tank of gas. Now if you're a realist you'll be able to figure out that what's going on here closely approximates what takes place in every flight. Those people will tune their engine on the ground then go fly for the break in. They just won't be doing any hovering, torque rolls, or long verticals until they have a few gallons of gas through the engine. Those will also be the smart people.

## **Oil Ratios**

There's only one reason for running lean oil ratios. You're effin lazy and don't like cleaning the bottom of your plane. Why would anyone want to use less lubrication when more has always been better? I suppose there are other activities best done wet that you would like to try dry as well...She will hate you for it.

50-1 is about as lean as you want to go. The engine still stays relatively clean and cool when tuned correctly. Lean oil mixis do strange things to the chemical makeup of oils when they get hot. Hard carbon, ash, glazing, all kinds of things you don't want or need. 32 to 50-1 works for everything. They run smoother, cleaner, stronger, and last longer.

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