



The Dead Stick Flyer

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Tech Corner:

Tuning 2 Stroke Gas Engines: My method, by Ron Lazzeri

At the request of several members, it has been suggested that a 2 stroke RC gas engine tuning article would be helpful for flyers that aren't sure how to approach this topic. Here is the method I follow and it works very well for me. There are several members in the club that are very good at tuning engines so reach out to them as well if you need further assistance. This is a do & learn process and there is no real magic formula.

Here are some tips for smooth and consistent running engines:

- Use fresh gas on a monthly basis. Mix only what you need for a month. Stale gas can lead to poor performance. If you can get Ethanol free gas that would be even better as Ethanol damages carb gaskets and internal parts.
- Use a good quality Synthetic or Conventional 2 Stroke Oil mix.
 - Just a note: I use Red Line 2 Stroke Racing Oil mixed at a ratio of 40:1.
- Once you get your engine tuned, be consistent with the gas and oil mix. It really helps!

Engine Tuning Procedure I use.

- Step 1: Think about what you are going to do. Get a buddy to help hold your plane and use a plane hold down so an accident does not happen. You will be running your engine up to full throttle during this process.
- Step 2: You will need a small screw driver to adjust the High and Low Speed needle jets and a tachometer to determine the engine RPMs as you tune the engine. Note: the Low End Needle is always closer to the engine. There should be an H and L designation on the side of the carb as well to guide you.



High Speed Needle

Low End Speed Needle

- **Step 3:** Now that you are all ready to tune your engine, start the engine and let it warm up for 3-5 minutes. After you feel it is warmed up, test run the engine at higher rpms and at idle to get an idea of how it is running before you adjust anything. Note: it is always easier to tune engines with the cowls removed.
 - Note: if your engine is really running poorly and you want to reset the needles back to factory settings, here is an approximate setting for a good starting point. With the engine off, close the needles by turning them in clockwise but do not over tighten the screws at the end point as this will damage the needle seats. After closing or turning the needles in all the way, open the needles up counter clockwise as follows:
 - High Speed needle: 1 1/4 turns
 - Low Speed needle: 1 1/8 turns
- **Step 4: High Speed Needle Adjustment:**
 - **Step 4.1:** After the engine is warmed up and you have the plane in a hold down and a buddy helping to hold the plane, accelerate the engine to full throttle slowly, stopping and backing the throttle down if the engine starts to bog down. Set the throttle as fast as you can before it bogs down then proceed to adjust the High Speed Needle to get the maximum rpm possible at that throttle setting. Slowly close the High Speed Needle clockwise. The engine should begin to pick up rpms. Continue closing the needle slowly until the engine gets to its highest rpm until it starts to slow down, then immediately open the High Speed Needle back up counter clockwise until the engine reaches its highest rpm again. You have just found the High Speed Needle sweet spot.
 - **Step 4.2:** Now you are ready to advance the throttle to its fullest setting and repeat the procedure you did in Step 4.1. After you find the highest rpm sweet spot at full throttle, open the High Speed Needle up counter clockwise about 1/8 turn to be sure the setting is not too lean. Let the engine run at full throttle for about 1 minute to make sure it runs OK at this setting. Then decrease the throttle to low rpms and get ready to set the Low Speed Needle.
- **Step 5: Low Speed Needle Adjustment:**
 - **Step 5.1:** Setting the Low Speed Needle is similar to the High Speed Needle procedure except it is done at lower rpms. Using a tachometer, set the throttle so the engine is running at 3,000 rpm. Now adjust the Low Speed Needle to get the highest rpm by opening or closing the Low Speed Needle clockwise or counter clockwise, whatever it takes. If done correctly and the engine responds accordingly, the engine should be running higher than 3,000 rpm.
 - **Step 5.2:** Using a tachometer, adjust the throttle setting again so the engine is running at 3,000 rpm. Repeat the procedure in step 5.1 to make sure you have found the initial Low Speed Needle sweet spot. After completing this procedure, slowly reduce the throttle to idle to see if the engine runs smoothly. Then advance the engine to full throttle to see if the full throttle setting still seems OK.
 - **Step 5.3:** Repeat Steps 4 and 5 as needed to get the engine running at its best performance.

- **Step 6: Testing Engine Performance:**
 - Now that you have adjusted the engine's High and Low Speed Needles, it is time to see how the engine performs with several idle to full throttle run ups. If the engine goes from idle to full throttle smoothly and without any hesitation or sluggishness you are done. If the engine seems to bog down or sputter then follow Steps 6.1, 6.2, and 6.3.
 - **Step 6.1:** If the engine bogs down and quits when advancing the throttle to full throttle, then you need to open up the Low Speed Needle about 1/8 turn counter clockwise and retest the engine. Repeat this procedure until the engine advances to full throttle smoothly without hesitation. The Low Speed Needle was set too lean.
 - **Step 6.2:** If the engine sputters a bit but then advances to full throttle, then you need to close the Low Speed Needle 1/8 turn clockwise and retest the engine. Repeat this procedure until the engine advances to full throttle smoothly without hesitation. The Low Speed Needle was set too rich.
 - **Step 6.3:** One last step I do is to advance the throttle to full throttle and then slowly reduce the throttle one click at a time to see if the engine sputters as the rpms are reduced to idle. If at any time while you are reducing the throttle one click at a time and the engine sputters or "4 Cycles", then at that throttle setting adjust the Low Speed Needle, ever so slightly in or out, to tune out the sputter.
 - Once the engine is properly tuned it should hold an idle smoothly without quitting and advance to full throttle without any hesitation. A good idle rpm setting is around 1,800-1,900 rpm. If the idle is set too high, your plane may not slow down enough on landing.