Initial Setup and Break In For Ringed Engines

Gently turn the high speed needle clockwise until it stops. Do not tighten it. Then open 3 turns. Do not worry about setting the idle mixture screw at this time because it has been set at the factory.

Turn on Tx & Rx and fully open the throttle. Place a finger over the intake and turn the propeller over a few times (counterclockwise) without the glow charger attached. Watch the fuel line. You will see the fuel come up to the carburetor. Once the fuel reaches the Carb., turn the propeller 2 more revolutions. Remove your finger from the intake, and briskly flip the propeller to work the fuel into the engine.

Attach the glow charger.

Close the throttle to 1/2 to 1/3 open.

If using a chicken stick to start the engine, flip the propeller counterclockwise using quick flips. If the engine fails to start after 10 flips it may not have enough fuel in the engine. Remove the glow charger and repeat the choking process.

If the propeller becomes difficult to rotate, it is flooded with fuel. If flooded, remove the glow plug, turn the plane upside down, and flip the propeller backwards a few times, allowing the excess fuel to drain out. Reinstall the glow plug , attach the glow charger and try starting the engine again.

If using an electric starter, do not attempt to start a flooded engine as it can damage the connecting rod.

The engine should start and stay running, although it may be slightly rough at this time. This is normal. Allow the engine to warm up for 15 to 20 seconds before removing the glow charger. Let the engine run at this throttle setting for 30 seconds and then open the throttle fully.

The engine should be running at full throttle but somewhat rough, with alot of oil being discharged from the muffler. This is because the engine is running very rich. Run the engine at this setting for 5 minutes.

After five minutes, you can start leaning out the mixture by turning the high speed needle clockwise. **Never turn the needle more than 1/8 turn at this point.**

To determine if the engine will accept a leaner mixture, give the fuel line a quick pinch and release...just pinch the fuel line and let go. You should hear the engine RPM increase a bit.

If the engine increases in RPM, you can lean 1/8 of a turn. Allow the engine to run 1 minute at this setting.

Now give the fuel line a quick pinch and release. Wait thirty seconds and do this again. Do this five times.

If the RPM increases all 5 times, lean the high speed needle 1/8 of a turn. Wait one minute and start the pinch and release series again. If the engine doesn't increase in RPM when you pinch and release, wait one minute before you try the pinch and release again.

Don't lean the high speed needle until you get an increase in the RPM every time you pinch and release the fuel line.

Keep repeating the pinch and release method until the engine does not change RPM when you pinch the fuel line.

You've leaned the engine as far as possible. Do not ever lean the engine to the point the the Rpm's go down when you pinch the fuel line. For flying you want to set the mixture so that you get an increase in RPM when you point the plane up or pinch the fuel line. If you hear the Rpm's decrease when you pinch the fuel line, Immediately open the high speed needle 1/4 turn and try again.

At this point you can adjust the idle setting.

Initial Setup and break In For ABC Engines

The ABC engine break in process is similar the the ring engines with one major difference. The ABC engines are not run as rich as the ringed engines in the early process.

Choke and start your ABC engine in the same manner as detailed above in the Ringed Engine section.

Let it warm up for 30 seconds and advance the throttle to full open.

Now slowly lean out the mixture while you listen to the engine. As you lean the engine, you will hear it increase in RPM. At some point, you will hear the engine sound like it is jumping up and down in RPM. The exhaust note will be jumping up and down in pitch. You want to continue to lean the engine until it is running at mostly the higher pitch sound, with just an occasional break to the lower pitch sound. Let the engine run at this setting for 5 minutes.

After 5 minutes of running, lean the engine using the pinch and release method as detailed in "Initial Break In" (ringed engines).

Idle Mixture Setting

The idle mixture is adjusted with the brass screw that's located in the center of the throttle arm. It operates in the same manner as the high speed needle. Clockwise leans it out and counterclockwise rich-ins it up. It needs to be open at least 1/2 turn.

The basic adjustment of the idle needle has been set at the factory and should require little adjustment, if any. Use the same pinch and release method to determine if the idle mixture can be leaned out. You may have to hold the pinch a little longer because the fuel flow is less at lower RPM ranges.

The best way to adjust the idle mixture is to have the engine running at full throttle, and slowly decrease the throttle to less than 1/2 open.

Once the engine has been throttled back to less than 1/2 throttle, try the pinch and release method. The engine should increase in RPM slightly. This means you can lean the idle mixture a bit, about 1/8 of a turn.

Reduce the throttle a little more and repeat.

You should be able to work down to a nice slow idle.

Engine Overhauls

1. When you take the engine apart and you want to get those nasty varnished in place cylinders and bearings out to clean or replace just put the crankcase (with the stuck parts) in the oven on the bottom with the oven set to a high "baking" setting. Must be baking so the lower heat element is hot.

Do not put parts that have rubber or silicone parts; i.e. carb, O-rings, gaskets in the oven.

Bake for 3 to 6 minutes. Pull the crankcase out with vise grips or burn your hands, your choice. Watch that the bearings or cylinder do not fall out when removing the engine. If they do not come out easily bang the back of the case on a block of wood and they should fall right out. If not try heating longer.

2. Nasty, dirty and varnished engines tend to run hot. High temperatures will reduce engine power and life. To clean the crankcase and cylinder head of vanish first remove all parts, i.e. crank, piston, liner, bearings and anything else that is loose. Take the crankcase and cylinder head and wash oil and lose dirt off with hot water and soap, "This will not hurt the cast aluminum parts". Then dry with a rag and soak in a jar of good old paint stripper from a hardware or paint store. Use a fine stiff acid brush or an old tooth brush to remove stubborn varnish.

CAUTION! DO NOT GET THE STRIPER ON SKIN, IT'S PRETTY CAUSTIC! USE RUBBER KITCHEN GLOVES AND EYE PROTECTION. (This is a serious warning I used some of the commercial cleaner sold for cleaning engines. It did not seem all that bad, did not burn my hands or anything, so I did not use gloves two days later my hands looked like they had been sun burned and most of the first layer of skin pealed off. Editor)

Also in time the tooth brush will melt if you don't wash the stripper out frequently. After you have got all the varnish off the engine rinse all the stripper away with water and dry the part with a rag then coat with a good after run oil. I use air tool oil and it works fine. (NOTE: the reason you want to use air tool oil is that it will not attack the o rings and other silicone parts in the engine like normal oil will. Don't forget most of our engines are designed to burn alcohol not oil based gasoline.: Editor)

3. To install a new rear main bearing, drill a hole in a hard wood block large enough to put the threaded end of crank in. While inserting the crank through the case (with rear bearing in place on the crankshaft)

then use a long punch or dowel through the back of the crank and tap with a hammer until the bearing is seated.

The Pinch Test

If you pinch the fuel line and the engine speeds up, it is on the rich side of the adjustment. HOW MUCH is speeds up shows how close you are. If it speeds up a lot, you are rich. If it speeds up just a little, you are just right. If it doesn't speed up, you are just going lean. If it slows down, you are LEAN

This test temporarily starves the engine for fuel ,and is reliable to test for a too-lean condition. At full throttle, quickly pinch the fuel supply line. The engine should momentarily increase RPM's before starting to die. It it starts to die immediately, then it's already too lean and should be adjusted.

How to adjust the top end

1. Close needle valve, then open 2 full turns.
2. Make sure you have a good glow plug.
3. Start engine, and run at full throttle.
4. Slowly close needle valve to lean the engine.
5. Pinch the fuel line briefly between every couple of clicks to see if the RPM will rise any further.
6. If the engine picks up RPM, continue leaning.
7. A properly adjusted engine will pick up just a little when you briefly pinch the fuel line.
8. If the engine immediately dies when you pinch it, it is to lean.
9. As a final check, hold airplane vertical to ensure the engine will not lean out.

How to adjust the low end:

1. The procedure resembles that of adjusting the top end.
2. Close low end needle or screw, and then open 2-3 turns.
3. Start engine and run at full throttle for at least 10 seconds.
4. Bring engine to idle (about 2500 RPM) and let idle for 10 seconds.
5. Pinch fuel line and hold.
6. If the engine speeds up and then dies, the low end is to rich.
7. If the engine slows down and then dies, the low end is to lean.
8. Turn needle or screw 1/4 turn in the direction required and repeat process.
9. Ideally when you pinch and hold the fuel line while the engine is idling, the engine will not gain or loose any RPM before it dies.
10. When you get close to this, make smaller adjustments to really dial it in close.
11. In some cases, you will have to readjust the top end while adjusting the low end. Always make sure the top end is properly adjusted before adjusting the low end.

Air Bleed Screws:

When adjusting air-bleed carburetors (the ones with the little hole in the front), a good rule to remember is the word “richen”. Split this word in half (rich-en), and when you want the carburetor **rich**, turn the screw **in**. Of course leaning the carburetor would be turning the screw out.