

## HOW TO PROPERLY SET YOUR O.S. PUMPER ENGINE'S CARBURETOR

These instructions describe the proper procedures for adjusting the carburetor of the following O.S. pumped engines:

O.S.- .46SF-P  
O.S.- .46SF ABC-P  
O.S.- .61SF-P  
O.S.- .61SF ABC-P  
O.S.- .61RF ABC-P  
O.S.- FS-120 Surpass w/pump

*The O.S. .61 RF ABC Hanno and FS-120 Surpass SP (supercharged) have their own special instructions.*

These are all high-performance, top-of-the-line engines. They are all designed to give maximum performance. Because of this, O.S. recommends that you use only a premium 2-stroke fuel with 10% or 15% Nitro. The fuel must contain high-quality lubrication or your engine may become damaged. 2-stroke fuel must be used in all of the engines listed above, even the FS-120 Surpass. Your O.S. pumper engine must have its carburetor correctly set if you are to get the proper performance from the engine. If the carb is incorrectly set, you will have difficulty achieving a good transition and reliable idle.

First, make sure the engine has the correct propeller. An incorrect propeller will cause the engine's full-throttle RPM to be too high or too low. The goal is to get the full-throttle RPM within a specific range. Any propeller that will give you that RPM on the ground, and give you proper flight performance is correct. The actual diameter and pitch is irrelevant if the engine is being run correctly. Listed below are the RPM ranges to use, and the props we use to bench-test the engines. The bench-test props are also good props to use as a starting point in finding the best flight prop.

| Engine         | RPM Range    | Bench Test |
|----------------|--------------|------------|
|                |              | Propeller  |
| .46 SF-P       | mid 11,000's | 11x7, 11x8 |
| .46 SF ABC-P   | mid 11,000's | 11x7, 11x8 |
| .61 SF-P       | mid 11,000's | 12x7, 12x8 |
| .61 SF ABC-P   | mid 11,000's | 12x7, 12x8 |
| .61 RF ABC-P   | mid 11,000's | 12x7, 12x8 |
| FS-120 Surpass | mid 9,000's  | 15x8       |

To start the engine when the carb is not set, gently close the high-speed needle all the way. Open it about 1 to 1-1/4 turns. Choke the engine as necessary, and then start it at around 1/2 throttle or below. Allow it to warm up about 30 seconds, then smoothly advance the throttle to full speed.

Once the engine is at full throttle, you can begin to lean the high-speed mixture. Use a tachometer as you make this adjustment. If you do not use a tach, you will have difficulty finding the correct setting.

At full throttle, lean the engine carefully and slowly. As the RPM increases, there will be a bit of lag between the time you adjust the needle and the response of the engine. Allow 10 to 15 seconds for the RPM to stabilize. Lean until you see no increase in RPM. At this point, lean the engine ONE click at a time, with a pause to allow the RPM to stabilize. Continue, one click at a time, until you see the first drop in RPM, then richen one click. Your engine should now be at the maximum RPM setting you had before the RPM dropped. This is the correct high-speed needle setting.

Now, drop the engine to 1/2 throttle, then bring it back up to full. It should reach the same top RPM.

If your engine has not been run much, it may not accept being leaned. If the engine will not come up to the proper RPM range as it is leaned, but instead sags in RPM rather quickly as it is leaned, the engine may need more break-in time. Your engine should be broken-in according to O.S.'s instructions.

If an engine that is broken-in will not come into the RPM range shown, you may have to try a different propeller. Being slightly over or under the range is O.K. Modelers at high elevations may not be able to get their engines to reach the target RPM range with the suggested propellers because of the low air density. High altitude will cause significant power loss.

Once the full-throttle RPM and mixture are set, the idle mixture can be adjusted. Slowly retard the throttle. Once the engine is below ½ throttle, the idle mixture adjustment will have effect. When the throttle is retarded below 1/2, use the idle mixture adjustment to keep the engine running properly. It should **NEVER** have to be moved very far from the center position. Once the idle RPM is reached, the engine should be able to idle indefinitely, with an occasional clearing by “goosing” the throttle a bit. Idle RPM ranges are approximate, and will vary with propeller, fuel and the type of exhaust system being used (muffler, tuned pipe, etc).

| Engine         | Idle RPM Range |
|----------------|----------------|
| .46 engines    | 2,600 to 2,800 |
| .61 engines    | 2,600 to 2,800 |
| FS-120 Surpass | 2,400 to 2,600 |

After the idle mixture is set to give a good idle, run the engine slowly to full throttle and then back again. If the transition is rich, lean the idle a small amount. If the transition is lean, richen the idle a bit. The engine should be able to accelerate smoothly from low to high throttle, and then smoothly come back down as you move the throttle. If you can operate the throttle smoothly or quickly, everything is set correctly.

After the carb is set, fly the model and carefully monitor the engine. As the propeller unloads in the air, the full-throttle mixture may change a bit, and the high-speed needle may need to be adjusted a click or two, richer or leaner.

Once the carb is set, use this procedure to start your engine:

- 1) DO NOT change any carb settings.
- 2) Open throttle to FULL.
- 3) Choke as necessary (starter battery is NOT attached at this time).
- 4) Rotate engine backwards to clear any possible hydraulic lock.
- 5) Close throttle to idle, attach the starter battery, and fire it up.
- 6) Allow the engine to warm up about 20 second, at 1/3 to ½ throttle.
- 7) Advance to full throttle and check RPM.

Readjust the high-speed mixture only if the RPM is not where it should be. The high-speed setting should change very little, if at all, from day to day. If the weather has had a major change (hot and humid to cool and dry), or you make a change in fuels (10% to 15% Nitro), or change something else that is major (from a muffler to a tuned pipe, prop size, field elevation, etc.), then your engine will need to be reset. Otherwise, you should not change the carb settings much at all. Of course, you must continually monitor your engine so that it's not being run too lean in the air.

If, after all of the above, you cannot get your engine to operate in the proper RPM range, and you are not operating at high field elevations your engine is probably in need of repair. At high field elevations you may have difficulty with low-speed adjustments. You will probably have to live with a higher idle speed. The carb does not have a lot of adjustment range at the low end, and therefore you may not be able to lean the low end enough to get an extremely slow idle. If, not matter what you do, you cannot get your engine to run properly, first check a few things: Make sure you are using fresh, good-quality 2-STROKE FUEL with 10% or 15% Nitro; a good-quality glow plug (R/C long for 2-cycle engines, or O.S. “Type F” 4-cycle plug for the FS-120); and that there are no problems with the fuel system (no debris, no air leaks, etc.). If all else fails, you should have your engine serviced. It may be defective, damaged, or worn, depending upon circumstances.

Your engine should give many hours of reliable operation and be virtually trouble-free if you spend the necessary time to adjust it correctly and keep it properly maintained.

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