

## **GAS ENGINE SET UP AND RUNNING RECOMMENDATIONS** **(48cc Poulan engine for Airboat, but most are applicable to all two stroke engines.)**

1. A 48cc engine will run approximately 10 minutes at full throttle on a 16 oz. fuel tank. So when used at varying throttle settings, a 16 oz to 24 oz tank will last quite a while in a model and is sufficient. Get one at a hobby shop, and be sure to get a **gasoline proof stopper** for the tank, and some Tygon fuel line. Regular silicone fuel line such as used for glow engines cannot be used with gasoline; it will dissolve it. Discard the fuel line that comes with the new fuel tank, and the stopper.
2. Get a felt type fuel filter pickup such as is used on weed eaters, leaf blowers, chainsaws, etc. and use it inside the fuel tank. Walmart, Home Depot, Lowes, Ace Hardware, etc. usually have these, or any small engine repair shop.
3. I recommend a 3 line fuel system. (See attached drawing.) Secure all fuel line fittings with either very small nylon tywraps, or safety wire wrapped double and twisted tight. You should also use “fuel barbs” on each connection. (Available at the hobby shop.) Another trick is to use 1/8” brass ferrules for copper tube compression unions, soldered onto the brass tubes coming from the fuel tank to help the fuel line seal and stay in place. They are cheap and can be found at the hardware store. Use ferrules or hose barbs on the connections inside the fuel tank as well. **ANY** air/fuel leak at any of your fuel line connections will cause the fuel pump to not pump fuel, and make you crazy trying to figure out why the engine either won’t run, or won’t run properly. Use a filter on your fueling setup to filter the fuel as it goes into the tank. A dedicated fuel can with another of the felt filters is a good setup.
4. Fuel tank location is not important as the carb has a built in fuel pump.
5. Use premium fuel, and if possible, use fuel without ethanol added. (Hard to find.) Store your unused fuel in a dark, cool, and dry place. Leave about a half a tank of fuel in the tank of the airboat when you are done playing, and cap off the vent line from the tank. If you ran it out of gas on the last run, I would start it again, rev it to full throttle, and choke the engine to kill it. This provides extra lubrication in the engine for storage, and also makes sure the carb is full of fuel for storage which helps the diaphragms inside last longer. This would be extra important in an airboat, as it is exposed to water and the extra lubrication in the engine for storage is important.
6. Use a high quality non-synthetic oil such as “**Pennzoil for Air Cooled Engines**” at a mixing ratio of 32:1 for the first two gallons of gasoline used in the engine. (A 32:1 ratio is 4 ounces of fuel to a gallon of gas.) Do not use mixed fuel that is more than 2 weeks old. Do not use a “multi-purpose” oil and do not use a “marine” two stroke oil. The correct Pennzoil can be located from numerous sources on the internet. After the first two gallons, you can switch to a 40:1 ratio if you like, and you can also switch to a good synthetic two stroke oil like “**Stihl Ultra HP**” or “**Redline Racing Oil**”. Use these at 40:1 ratio as well. Do not mix fuel with different oils together as it can cause problems. You will find many, many opinions on all this; but these have served me and others well for many years, and no “blown” engines. You can’t go wrong with what I have outlined.

7. Yours is a magneto ignition engine, and your kill switch setup is very important. There is a spade terminal on the magneto coil. You run a wire from this terminal to a good quality switch, located well away from the propeller but in a very easy to access spot.. From the other side of the switch, run a wire to the engine and connect it firmly to any metal part of the engine. Now this is important to remember; when the switch is **“ON”**, that **KILLS** the engine. When that terminal on the coil is **connected** to the engine, or grounded, it kills the engine. So if your switch is labeled, you must remember to reverse the label so that when the switch is turned in the direction that allows electricity to flow, that is **“OFF”** for the engine. You don't want to confuse this issue and either have an engine that won't start because you've labeled things wrong, or have an engine that is **“HOT”**, or ready to start when you think it is off.

8. Magneto engines can be difficult to hand start, so I recommend coming up with an electric starter. A standard starter and 12 volt battery for normal glow engine model airplane use will not start a 48cc gas engine. Not enough power. The cheapest and easiest way is to use a battery powered **18 volt** drill. These can be bought at Harbor Freight Tools for around 25 bucks. Then buy a starter cone, “Tower Hobbies” **#LXL403**, and the rubber insert for it, **#LXL404**. Pick up a 3” long grade five 3/8” bolt, two “star” washers, and a 3/8” nut. Drill out the center hole in the starter cone to fit the 3/8” bolt. Insert the bolt into the cone with a star lock washer on each side, and then tighten the nut firmly. Install the rubber insert into the cone with the cone side inward. (The cone side is used for propeller spinners on airplanes.) You can then chuck the bolt/starter cone assembly into the drill, and you have a great starter. This will cost far less than any hobby starter and battery that you could buy that will start this size engine, and you have a drill that you can use for other things as well! The drill starter works very well, better than most hobby starters in fact. Just remember that when facing the propeller, your engine turns counter-clockwise, so you have to run the drill in reverse to start your engine.

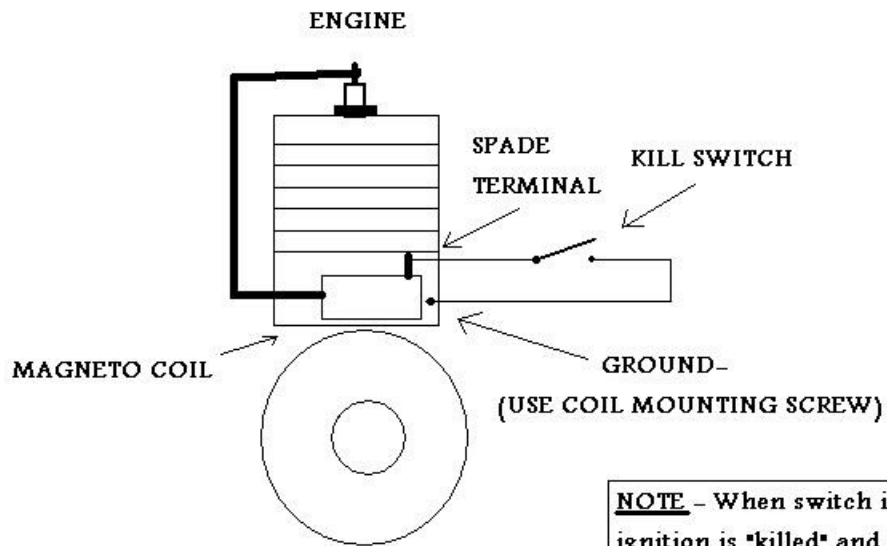
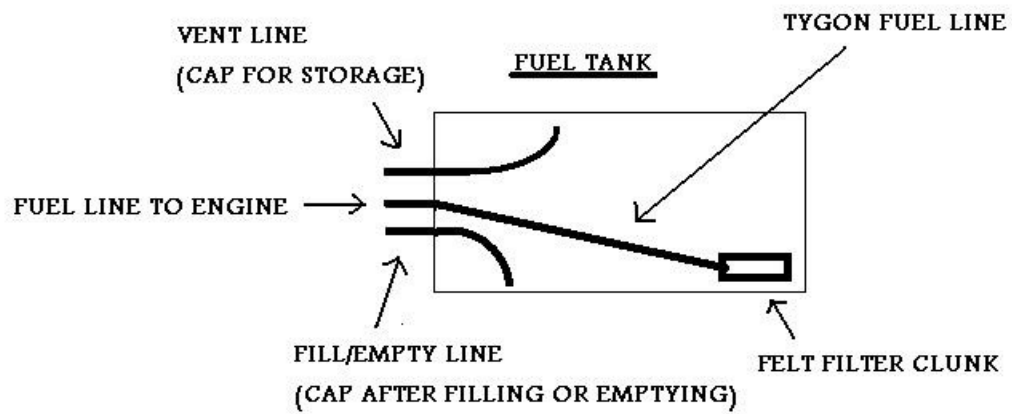
9. Your engine has been test run and the carburetor mixtures set. However, you will need to fine tune it for your particular fuel, oil, prop, atmospheric conditions, temperature, altitude, etc. This is true of any engine a person buys; they must be fine tuned by you, the user. To start the engine the first time or any time it has been run out of fuel, choke the engine by hand. It works best if you hold your finger or thumb over the carb velocity stack, open the throttle fully, and flip the prop over by hand until you see the fuel in the fuel line reach the carb. **MAKE SURE THE MAGNETO SWITCH IS OFF WHILE YOU DO THIS, AND IT IS ALWAYS BEST TO HAVE SOMEONE ASSIST YOU** WHEN STARTING THE ENGINE! It might be even better to remove the spark plug wire. (Remember, if you lose continuity in your kill circuit on a magneto engine, the engine will start!) Once the fuel reaches the carb, flip it with your finger still over the velocity stack about three or four more times. This should fill the carb with fuel. Then set the throttle at about 1/8 open, open the choke all the way, turn the mag switch on, and use the electric starter to spin the engine over. If it does not start within several seconds of cranking, stop and close the choke. With the throttle still about 1/8 open and the choke firmly closed, crank the engine again and listen for it to briefly start and quit, or “pop”. (Listen for a sound from the engine and/or smoke from the exhaust. Some engines will start and run for a brief moment on the choke, others will only make a “pop” or “burble” sound.) Then stop cranking and open the choke. Now when you crank it over, it will start and keep running. If it starts and runs for a bit and quits, you might need to do the choke process once again. This will usually only occur if it is cold out, or

if your low speed needle is a touch lean. If you are happy with how the engine has been running, I would leave the low speed needle alone, and just accept that it sometimes will need choked twice to keep running the first run of the day. On subsequent starts on the same day, always try to start the engine without the choke. If it won't start, then go ahead and choke it, crank it till it pops or runs a bit and stops, then open the choke, start it again, and you are "good to go".

10 Let the engine warm up fully. This will take at least two minutes, and maybe longer if it is cold out. After the first minute or so, you can give it some short (3 second) full throttle blasts to help it warm up. Once it is fully warmed up, you can adjust the mixture needles. When doing so, always make small adjustments, and give the engine some time to stabilize at the new setting. The high speed needle is best adjusted with a tachometer, but can be done by ear if you are careful. The high speed needle has an "H" right next to it, and is the one I have put a brass extension on for adjusting it by hand. It is really tough to adjust the high speed needle with a screwdriver with the engine screaming and vibrating away, and dangerous to do so as well. Thus the hand adjuster I added to the high speed needle. Set the engine at full throttle, and adjust that high speed needle for maximum rpms, then open it, (counter-clockwise), about 1/16 of a turn. To set the low speed needle, which has an "L" right next to it, bring the engine down to a low idle, and listen to it. If it idles dead smooth, it might be a touch lean. Try quickly advancing the throttle. If the engine immediately hesitates abruptly or dies, then the low speed needle is in fact lean. Adjust the needle 1/8 turn, (no more) open, and try again. What you want to achieve is the leanest low speed mixture you can that still provides good throttle response. If when you listen to the engine at idle and it idles just a bit rough or with an occasional burble, it might be at a good setting. Let it idle like that for a bit, and see if it begins to slow down and/or smoke more. If so, it is too rich at idle. Another sign of a rich idle is a slow, smoky and burbling acceleration, especially after the engine has idled for a bit. In this case, lean the idle, (low mixture screw turned inwards), a little at a time until you get that hesitation on acceleration, then richen it until the hesitation goes away. Once you're done with the idle, you will need to re-check the high speed mixture, as changes in the low speed mixture will affect the high speed mixture. Be sure to re-check the high speed setting before using the engine. Lean runs kill engines, rich runs only kill mosquitoes. (Excess smoke.) Also note that if you have been idling the engine rich for a bit, you will need to do a full throttle blast to clear out the engine before you can go back and set the idle mixture effectively. It pays to take the time to adjust the engine properly, but the good news is that once done, the settings won't change unless you change the propeller type or size, or the fuel or oil type or ratios. It will hold the settings and you will not have to constantly re-adjust as is common with glow engines.

That, along with the drawings I have provided, is about it. Keep in mind that a model engine is different from an engine used in a weedeater, leaf blower, chainsaw, etc. and this is because it is always "loaded" (turning the prop), while other engines run free until you actually put them to work. This is why the tuning and starting procedures differ and are so important.

Enjoy your new engine. If you take care of it, it will outlast **you!**



**NOTE** - When switch is closed,  
ignition is "killed" and engine is off.

MAGNETO KILL SWITCH WIRING





