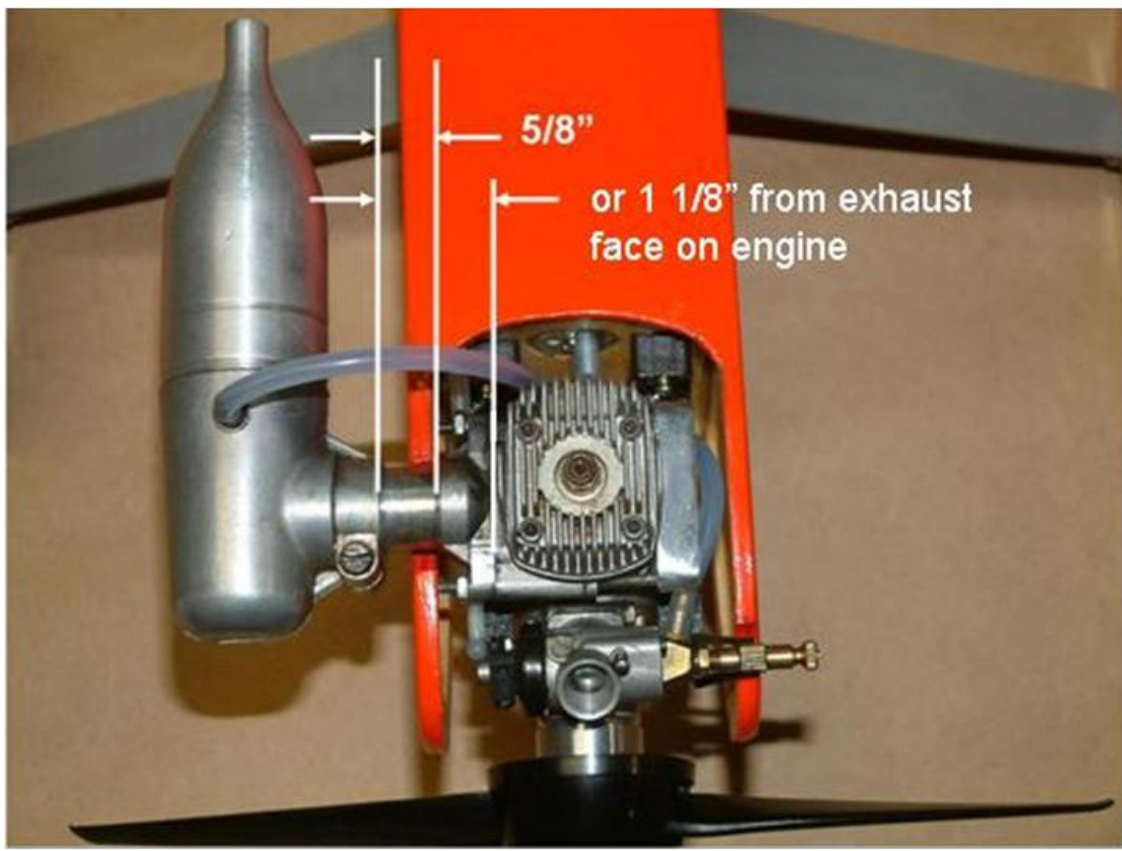


What makes a SIG Four-Star-40 FAST?

By Paul F. Geders Revised May 23, 2007

Decided to document everything I can think of that will make a SIG Four-Star 40 fly as fast as it can. Let's get started right at the nose.

- I use an OS type spinner nut. Some pilots like to use a 2 or 2 1/2" spinners to help with streamlining the front of the airplane. Your choice. I personally think it takes more horsepower to turn the spinner, or translate that to loss of RPM too, especially in the turns when you are fighting the gyroscopic effect of the spinner.
- The muffler that currently comes with the engine has a flat aft face and has been shown to be about 400 RPMs better than the one shown in the picture that is sometimes referred to as the "Coke bottle" muffler that came with earlier Italian made engines (This is not the economy muffler which will lose you about 1,000 RPM) You should have the inboard edge of the muffler, where it mounts on the exhaust extension tube, be 5/8" from the inboard end of the machined tube. In other words, 5/8" of exposed machined tube. Or, on some headers, due to machining differences, it is better to measure from the engine face. This dimension is 1 and 1/8". This is the optimum tuned position of the either muffler. See picture below.



- I use Cool Power 15% and K&B-1L plugs in all my engines. Castor based fuel such as Omega 15% has one benefit in an older engine. It has a little better sealing capability between the ring and the cylinder wall over Cool Power...thus slightly increasing the compression and power output. Exclusive use of a castor oil based fuel will slow your engine down over time, and is a little messier to clean off.
- The needle valve assembly must be properly aligned in the carburetor. To set/align it correctly, remove the high speed needle valve and then the 2 small screws that retain the brass needle valve body into the carburetor body. You will notice a slit in the brass needle valve body that is also shape like a football. This is the area that you want pointing directly down the center of the throat of the carburetor barrel to get the maximum mixture dispersal. When you reassemble the brass needle valve body back into the carburetor body ensure that the slit is centered and facing downstream of the incoming air. The fuel nipple (where the fuel line from the tank attaches) will point slightly down and point to the center of the cast-in-machined-off "G40" on the side of the crankcase. This will ensure that you are getting the most efficient fuel flow and dispersion of atomized fuel into the engine. Every little bit helps! Some will see a little RPM increase...some will not!
- Ensure that the carburetor barrel opens completely and is in-line with the carburetor body as if a hole was drilled the there wasn't a rotating barrel there. You don't want it to be ever so slightly closed or going the other way too far open. RPM's can also be gained right here. Anything that makes it easier for an engine to breath results in more power, hence speed. Remember, pylon racing is a "drag" race. It is the airplane that can come out of a turn (where the plane actually slows down) and accelerate the fastest to its top speed!
- The Super Tiger engine should be broken in with a 9 X 6 Master Airscrew propeller and taken to maximum RPM and then backed off 300 to 400 RPM and let it run the tank dry. You may see an increase in RPM while it is running. Then, VERY IMPORTANT, let the engine cool completely. Restart, and go to maximum RPM again and then back off 200 to 300 and let it run, with a few excursions from factory set idle to full RPM for another full tank. Let it cool completely. Now, refuel, restart and set the engine to maximum RPM and back off the needle 3 clicks...it should hold the same RPM within those 3 clicks. Set the idle mixture by bringing the throttle to the idle position and then start leaning out (turning the idle mixture screw clockwise) until the engine quits. Back out the idle mixture screw ½ turn, restart, and try some rapid transitions from idle to full power. If the engine hesitates briefly and quits it is too lean...back out the screw about a ¼ turn. Check it again for rapid transition from idle to full power. If the engine hesitates for a longer period, and then goes to full power it is a little rich and you need to lean it out a ¼ turn, or less. Once

you have a rapid throttle response, without any hesitation, you are now ready to put on a 10 X 6 Master Airscrew propeller. Remember, the above will give you a consistent idle so you can land with the engine running, every time.

- **Setting the engine for racing...** Here's how you do it! First, which muffler are you using? If you are using the flat aft face muffler, the do the following. Turn your needle valve in to maximum RPM, say it's 14,500. Now slowly back out a click at a time until you see 14,200. Now, slowly continue to turn the needle richer and watch the RPM. If **EVERYTHING IS SET UP RIGHT**, you should be able to turn out the needle, 2, 3, up to maybe even 5 clicks and not see a loss of RPM (14,200). Set it here and fly it. This is the rich side of the tuned muffler and when you get in the air it will really start to pick up. If it doesn't really get going on about the third lap then go only one, and no more than two clicks leaner on the next flight. You should be listening to the engine accelerate out of a turn if you are set right. If you are using the "Coke" bottle type muffler, turn your needle in to the maximum RPM and back off a couple of clicks, or until the RPM drops just 100 or 200 RPM. This should be the way you set the engine on race day...and leave it alone all day, unless a storm front is moving through, or you nick or break a propeller.
- **The propeller can be "twisted" to increase or decrease pitch to achieve either higher or lower RPMs when you start it. However, as soon as you launch it and make that first turn the prop will return to its original "un-twisted" pitch. If we were all taking off of the ground simultaneously this may be a slight advantage to get you into the lead...but it doesn't last...but if you can stay in the lead...! Since we do a "flying start there is no advantage. If you don't like the RPM your propeller is turning, try another one!**
- **The engine mounts, by our rules, are allowed to be lowered ¼" to reduce the chance of the engine cutting out in the turns...I think it is a good thing to do!**
- **The landing gear can only be chamfered and not have a full radius to be in accordance with the plans. No real advantage anyway.**
- **I like to seal the canopy by gluing (RC 56)/epoxy (5 minute) it all the way around, especially on the forward facing part of the windshield versus screwing on the canopy. I feel it is a cleaner, less drag installation.**
- **The fuel tank should be mounted in foam and have the clunk free to fall easily from one corner of the tank to the other without hitting the back of the tank...but as close to hitting as possible. Use a single vent tank and muffler pressure. Make sure the fuel lines are not pinched nor have pin holes in them. This will definitely affect the**

adjustment of the carburetor relative to number of clicks on the rich side of the muffler.

- **Some pilots don't fill their tanks all the way...to save weight. Lighter is faster when all else is equal. You can experiment with how much to put in if you want. All you have to do is figure out how long you will be in the air during mill time before the start of the race...go ten laps, and then land with the engine still running. Is it worth it...to me no, I just fill up and go for it.**
- **Since the aircraft are all built to the kit or the ARF version the next thing to check is to make sure you balance the aircraft correctly. I like mine to hang about an inch low in the tail. Yes, just a hair tail heavy...why? The airplane will turn faster, and tighter.**
- **Check to see if you have a heavy wing by setting the airplane on bench with the lower part of the rudder (in neutral) setting on a surface that allows you to pick up the airplane in a level pitch attitude by the propeller which is held off of compression and allowed to freely pivot. If a wing drops, add appropriate amount of weight to opposite wing so that the wing remains level while doing this. Now you are balanced in both pitch and roll and the airplane will be that much easier to fly.**
- **The rules state use the size wheels shown on the plans in both diameter and width. I use the lightest weight properly sized wheel and tire available.**
- **The wing has ailerons that are shown flush with the lower surface of the wing when they are in neutral. If you raise the ailerons on both sides and equal amount (about 1/8") you will go a little faster. It's a sailplane trick! You know...like re-flexed airfoils**
- **You should set up your controls/transmitter such that a full up elevator position gives you the tightest turn without slowing down, or buffeting.**
- **Last, but not least, find a way to get your airplane to weigh exactly on 4 and 3/4 lbs, that's 76 oz., without fuel. If you weigh more than this and everything else being equal the lighter airplane will accelerate to its top speed faster...Every little bit counts!**

I believe that covers everything that I can think of! Give it a try, and remember you still have to fly the course...but, with a properly set-up airplane it is so much easier to do.

If you can think of any other "speed tricks" let me know...I will add them to the above list and keep this posted on our web-site.