

## F2D News - November 2010

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This month's column begins with some very sad news. World-renown F2D mechanic "Big" Andrey Kudinov passed away earlier this month. Andrey was a superbly skilled and dedicated mechanic, intense competitor, and big-hearted guy, whose presence will be dearly missed. The last time we were in Novomoskovsk, he was very kind and helpful to me, and I was very much looking forward to the next time we would meet. Unfortunately that chance will not come. My condolences go out to those who were close to him.

In keeping with Andrey's spirit as a mechanic, I've decided to make this month's column about engines. I get asked from time to time to review tips about engine starting, tuning, and maintenance, so this seemed like a good time to do it.

First is maintenance. To keep your engines running strongly and reliably, it is important to take good care of them. Perhaps it goes without saying, but most importantly you should never run (or even crank) an engine which you suspect in any way may have dirt or any other kind of foreign object (such as a detached glow plug element) inside it. If you suspect that the engine is dirty, then, while it is still on the model, loosen the plug, then loosen the head, then remove the engine from the mounts. It is important to loosen the plug and the head while the engine is still mounted, otherwise you may not have enough leverage to loosen them in your hand. Once the engine is off, remove the backplate and the head and inspect the inside thoroughly. Look for dirt on the back of the crankshaft, on the rod, and on top of the piston. If you see anything, you will need to wash it out. Then remove the cylinder and the piston and check inside the piston for dirt. Note that most F2D engines have a slot in the flange of the liner which keys onto a pin in the case. When it's time to reassemble the engine, this will make sure you get it back in with the right orientation. Look for any scratches running up and down the piston and/or liner. If there are deep scratches, then you will probably need to replace the piston and/or liner. Before doing so, however, try to ascertain the origin of the scratches and any foreign material found inside the engine. If the pieces look like metal, are they fragments from a blown plug? Have you been blowing a lot of plugs? Inspect the main bearing carefully. If the bearing starts to go bad, small bits of metal may come off of the balls and lead to blown plugs and piston/liner damage. In this case, change the bearing immediately. Also, inspect the top surface of the piston and combustion chamber of the head. Do they have a sandblasted, rough appearance? If so, this could be an indication that your head clearance is too low (see below). This roughness can degrade performance, but can be smoothed out with careful polishing.

While the engine is apart, look to see if there is a thick brown/black buildup on the sides of the piston, near the top of the liner, and/or in the head. If you are using a lot of castor oil in your fuel, it is likely that such build-up will occur. Such build-up can slow an engine down, and cause plugs to blow. Carefully removing this buildup can help restore an engine's performance. If you have let it build up for too long, however, this build-up could have grown to the point where it is maintaining the compression of your engine. In this case, removing all of it may lead to a loss of compression, which will eventually return after many runs. However, this situation indicates that the piston and liner are worn out, and probably should be changed.

Regarding performance, there are a few more things to keep your engines running well. First, always make sure your bearings are in good shape. The whole job of your engine is to turn, fast. If the bearings are shot, you're not giving it a chance to do its job properly. Front bearings, which can be obtained for example from Boca Bearings ([www.bocabearings.com](http://www.bocabearings.com)), are straightforward to change, and barely more expensive than a plug. There's really no reason not to keep them fresh. Head clearance is also key to getting the best performance out of your engine. For more on this, please see the detailed guide about head clearances that I have posted in the "Resources" section of the F2DNews website ([F2DNews.homestead.com/Resources](http://F2DNews.homestead.com/Resources)).

Assuming that everything is in working order, it's time to start your engine. How can you make sure that it's going to go? First, make sure your starting battery is well-charged. Take a plug and glow it with the battery. When the battery is set-up properly, the element should glow a dull-to-solid orange. If it barely lights up or doesn't light up at all, turn up the battery or get a different one. If it glows very bright orange or white, the battery is too hot and you may damage your plugs. In this case turn down the battery (if you don't currently have control over it, you may need to add a small resistor into your circuit). Next, before connecting the battery to the engine, flip it over one or two times to feel what's going on inside it. Is it hydro-locking from too much

fuel already inside? If the engine is flooded, try to blow out the excess fuel by turning the prop to a position where both the intake and exhaust ports are open, and blow air either into the venturi or exhaust. If the engine is dry, let a few drops in from the bladder, or squeeze a few drops into the exhaust from a syringe or priming bottle. Point the top of the cylinder towards the ground and flip the engine over a few times. The purpose of this step is to get the fuel up to the combustion chamber, where it needs to be in order for the engine to fire. It's very easy to get yourself in the situation where the engine has too much fuel in the bottom of the case, but actually still not enough in the chamber to light up. If this happens, you could flip for days and it will never go.

When the engine is ready to go, you should feel a "bump" when you turn it over by hand with the battery connected. If there is no bump, chances are that the engine is not ready to go. Note that, as a general rule, more prime is needed when it is cold outside, than when it is hot. As a last resort, if you get stuck and cannot figure out why your engine is not starting, you can purposefully flood it by letting fuel from the bladder run into the venturi (with crankshaft open) for a couple seconds. It sounds crazy, I know, but the point is that once you've done this, you know *exactly* what your starting point is. The engine is flooded. Now, blow it out, tip the head towards the ground, flip it over a few times, then try again. If you practice this trick a few times, you will get a very good intuition about how to proceed from this starting point. It might feel weird or against your nature at first, but never be afraid to use this trick (even in a match) if you're not sure what's happening with the engine.

When the day's flying is done, and you're sure that your engine is clean, connect the starting battery and flip the prop to burn out any residual fuel that may be left in the case. Then, after removing the battery, put several drops of oil (e.g. 3-in-1 oil) down the venturi, and down the exhaust, and flip the engine over a few times to make sure that the oil coats the inside well. Remove the prop and the thrustwasher, and put a few drops of oil in the front bearing. The last thing you want is a rusty bearing. If the thrustwasher will not come off, tip the crank towards the ground and try to get a few drops of oil to go in the crack between the thrustwasher and the case, and hopefully run up to the bearing.

Alright, I hope this was helpful. Winter is coming. Stay warm.