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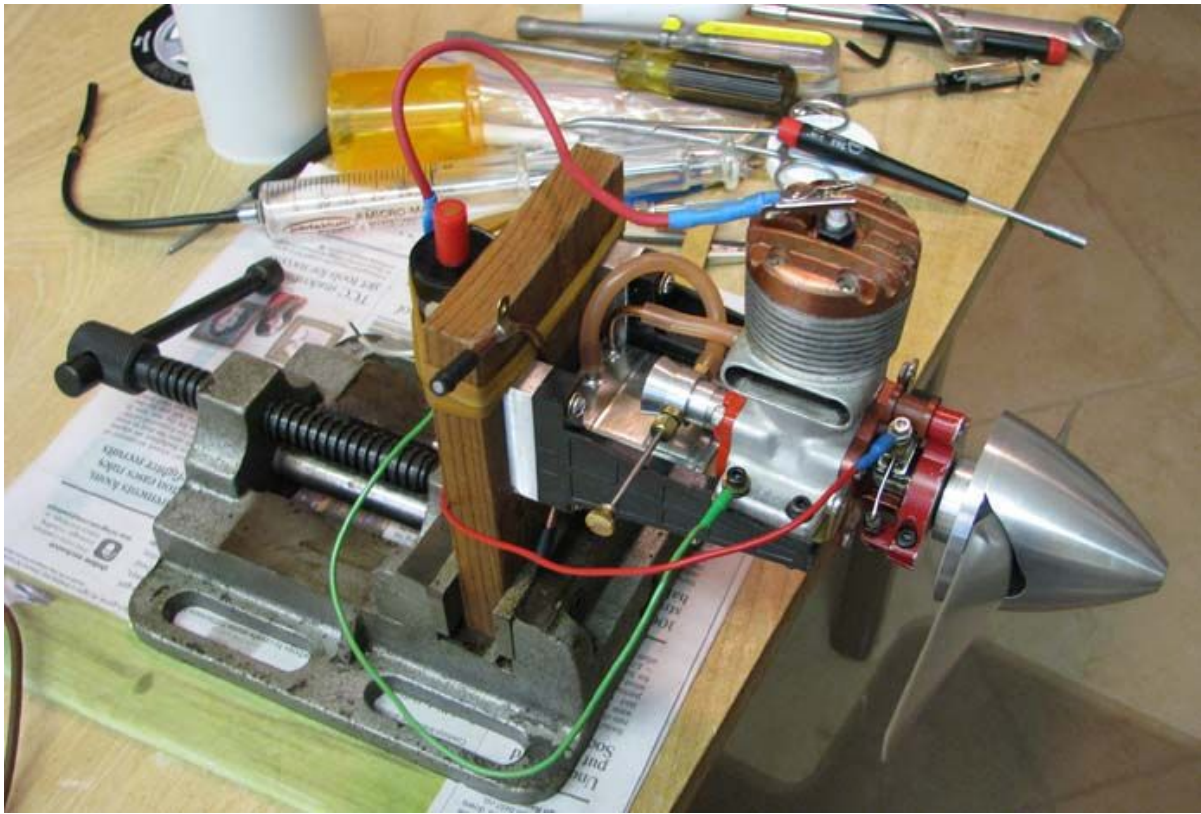
Subject: 2010 Flt Test Prgm - 28 Sailplane's Fuel Feed Investigation

2010 Flight Test Program

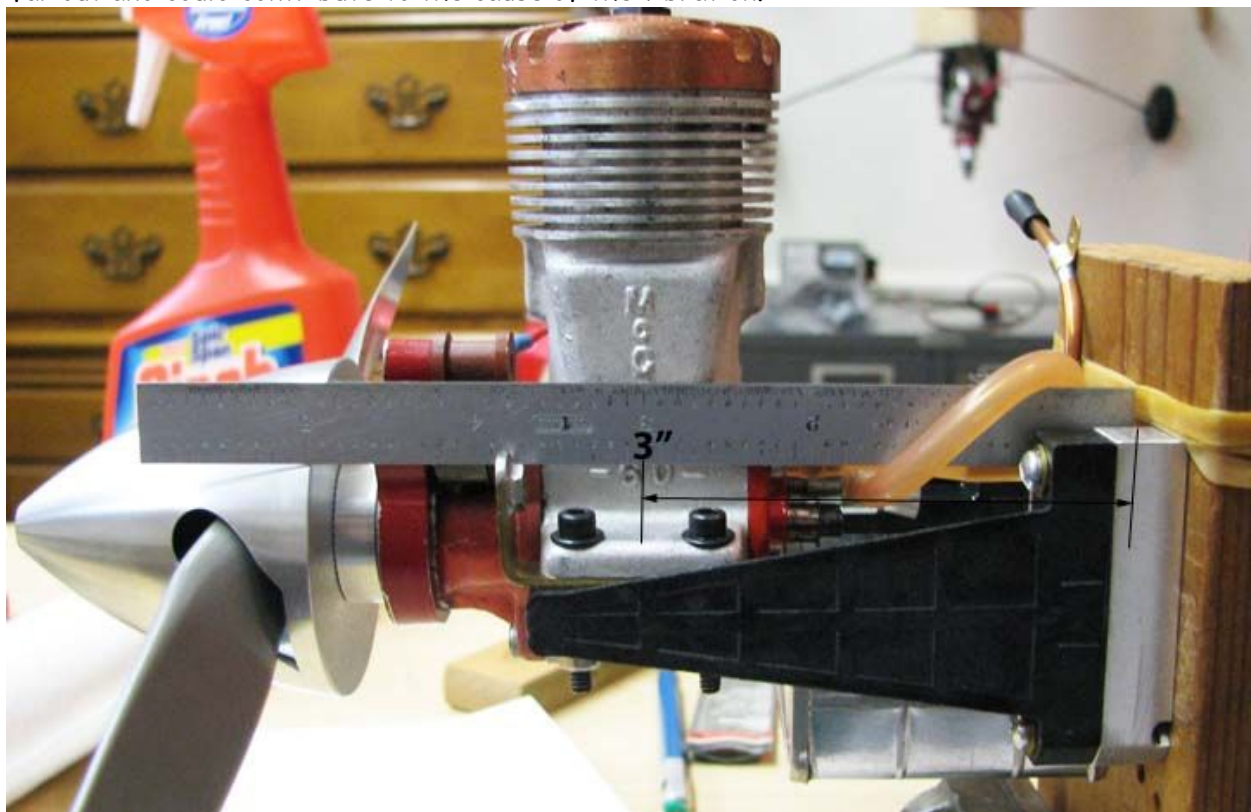
In yesterday's Sailplane flight tests, considerable air bubbles were observed in the fuel line to the spray bar. This was causing the McCoy 60 to not needle well and it failed to ever reach achieve max rpm. Furthermore, the engine kept quitting during the power climb. This morning I removed the engine/tank assembly from the Sailplane fuselage. Then I removed the tank and flushed it out good with alcohol. I also flushed out the fuel side of the spray bar and checked to see that the pressure fitting in the crankcase was tight. It was. Next I plugged all of the tank's tubes except for the fuel pick up tube. I connected a syringe to the fuel pick up tube and submerged the tank and its plugged tubes under water as shown below. I plunged the syringe down and held it there, which pressurized the tank with air. It was pressurized under water for at least a minute and no leaking air bubbles were observed.



I mounted the engine/tank assembly to a piece of 1 X 4 plank, which was securely clamped in a large drill press vise as shown below. Notice the coil and transistorized ignition system rubber banded to the back of the wooden plank. I was not able to check the balance of the 12 X 4 APC prop used on the Sailplane because the center hole in the hub was too large for the cones on my prop balancer. So I replaced the prop with the 12 X 4 APC prop that was on the big Bomber already successfully test flow.



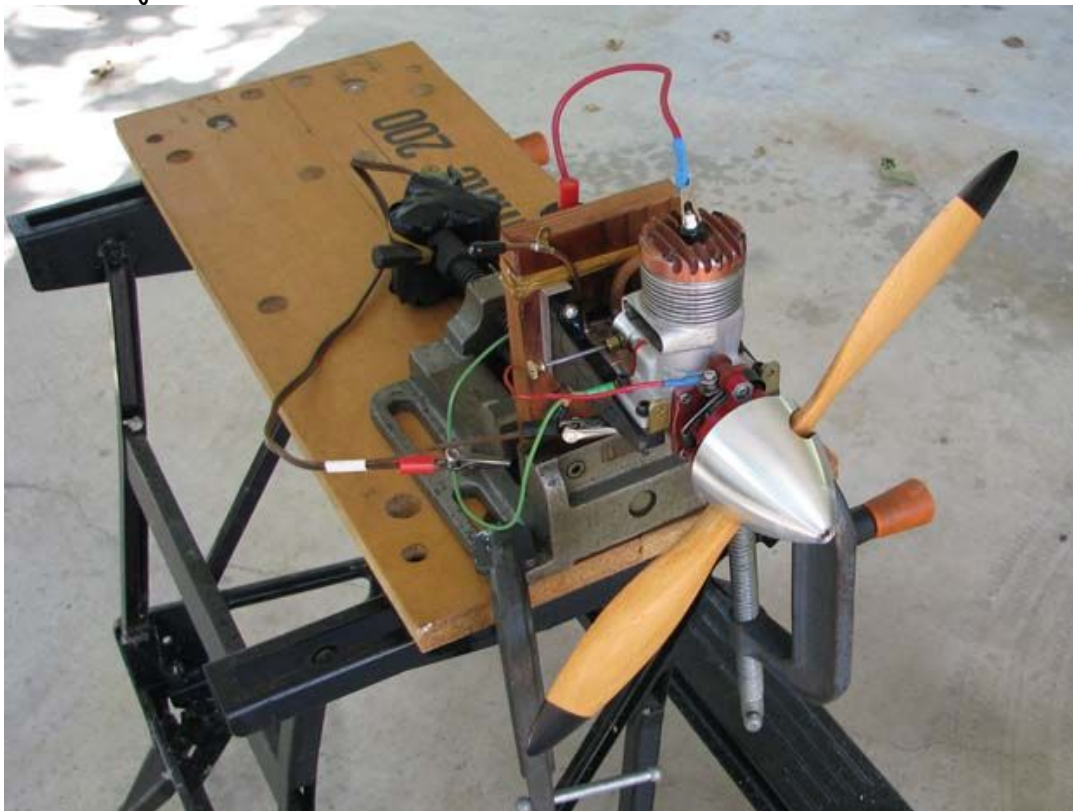
The center of the engine is 3" out from the firewall to make room for the metal tank as shown below. This is pretty far out and could contribute to the cause of the vibration.



I took the engine and booster batteries out under the carport and mounted them to my Black & Decker Workmate as shown below. After all is 104 degrees here in north Texas right now. I fired up the McCoy 60 and immediately started reproducing the air bubbles in the fuel line causing the engine to run erratically just as it had in the Sailplane %\$#*&. I guess it really is engine vibration causing the problem.

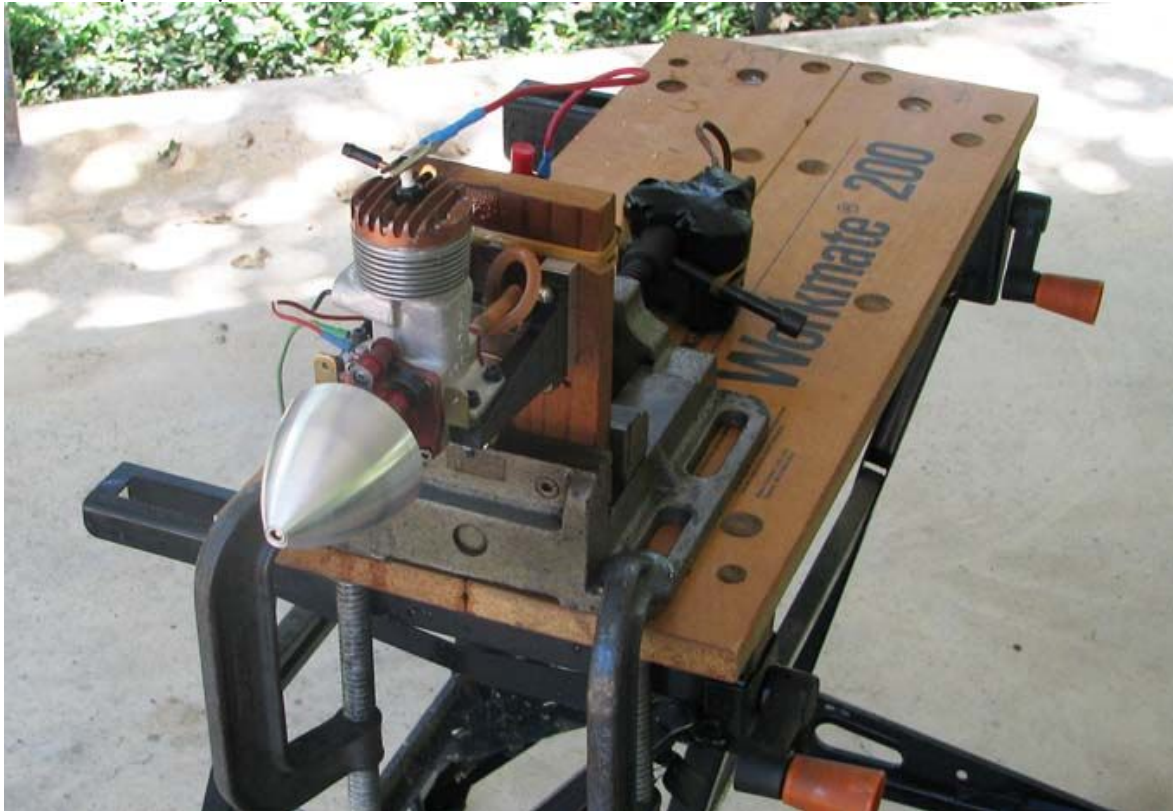


I needed to change the set up in some way. So the easiest thing to change was the prop! I put on the 13 X 5 Y&O prop that I had made for the Sailplane's Concour's display as shown below. Again I fired up the McCoy 60 and again the air bubbles appeared in the fuel line causing the engine to run erratically just as before. Well *BARF!* I came in the house to get a drink of water and cool off before dismantling the engine's bench set up and bringing everything in. While I was setting there in model room looking at the engine installation in big Bomber hanging on the wall and wondering why all of a sudden this McCoy was running so poorly when I had not changed a thing, a thought suddenly occur to me. I had changed something! I had replaced the McCoy's needle valve with a longer after market needle valve to extend out through the Sailplane's Cowl. So I removed the McCoy needle valve in Bomber's McCoy and installed it in the engine on the test bench. I fired up the McCoy 60 and adjusted the needle valve.

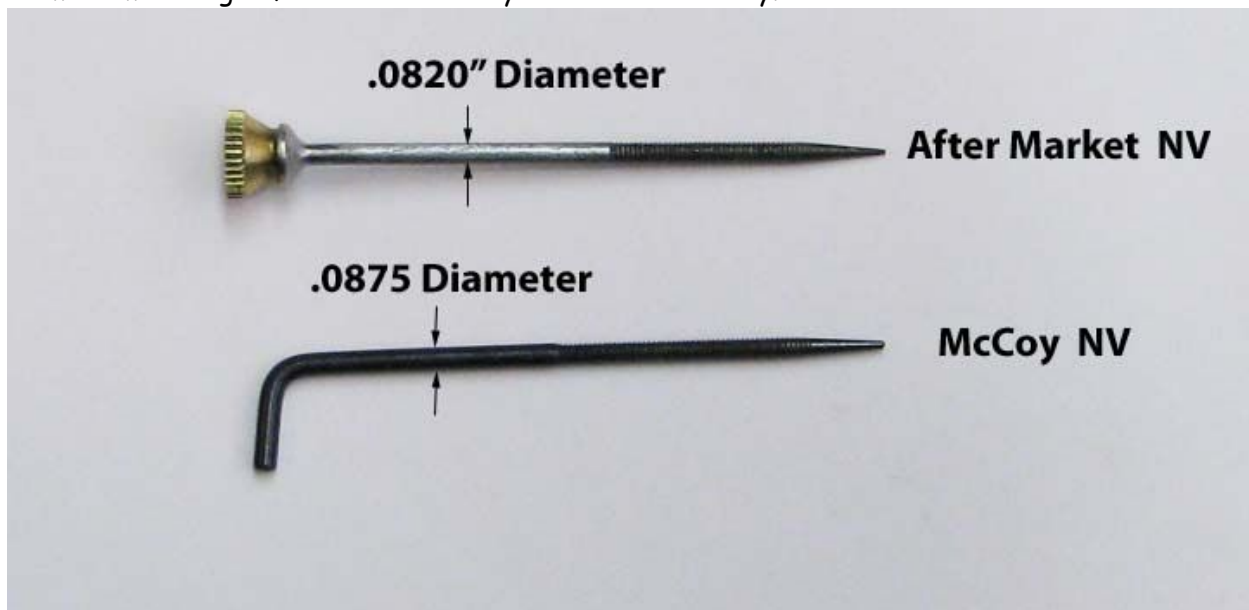


The engine peaked right in and ran screaming at max rpm as shown below. The entire tank of fuel was run out

without a single miss fire! The smoking gun is the needle valve, not engine vibration! Just to duplicate the performance, I filled the tank and ran a complete second tank of fuel through the engine screaming at max rpm for a repeat performance. I did notice a few bubbles in the fuel line to the spray bar now and then, but they didn't affect the engine's performance at all. Vibration and fuel foaming, while undesirable, had nothing to do with the Sailplane's problem.



After I got every thing taken down and put away, I took this picture of the two needle valves side by side for comparison. The taper on the points are slightly different and McCoy's tip is slightly blunter. I checked the diameters of the needle valve bodies and the McCoy needle valve body is .0055" larger in diameter. Seems like such a small difference for such a dramatic improvement in engine performance. I hope you guys give me some thought feed back on today's unusual discovery.



Tomorrow I will start putting the McCoy 60 back into the Sailplane and hopefully flight test again on Friday morning, if George is available.....Tandy