ERA19LA159
As submitted by the pilot, owner of N61PG

N61PG Fuel System Overview

The fuel system for this aircraft consists of two leading edge wing tanks of 8 gallons each and one 8 gallon header tank. In flight, the header tank supplies the fuel to the twin Rotax 912 Bing carburetors. There is a fuel sight gauge consisting of a vertical clear fuel line on the instrument panel that clearly shows how much fuel is in the header tank. When the fuel level gets down to about 5 gallons as shown by the gauge, the pilot switches on one of the wing tank fuel pumps to begin refilling the header tank. There is an electric Facet automotive fuel pump and switch for each wing tank located in the cockpit. The wing tank typically fills the header in about 5-6 minutes. The Rotax 912 ULS burns about 5 gallons/hour in cruise so filling of the header is something that is usually done about every 25-30 minutes. I usually fill from the left wing tank first when I'm flying solo (which is most of the time) to distribute weight from the left side (where I'm also sitting) more evenly.

I did fill the header tank from the left wing tank about 10 minutes before the engine starting acting up on Saturday. I wonder if there may have been some bad fuel or debris in there but of course that could be just coincidence. FYI, I do still have one fuel can remaining in my hangar of that same batch of fuel that I bought and put into the left wing tank for the flight.

There is also an electric Facet fuel pump that's used for starting and to back up the engine's main mechanical fuel pump for takeoff and landing. This electric pump is usually off in cruise although as noted in the report I did turn it on when I started developing engine trouble.

Rotax recommends and I use a high octane (93) automotive fuel for the 912 ULS engine. I buy this gas from the service station next to 78NC because it also sells a non-ethanol version of this fuel which is better for the engine. I spot check this gas with an ethanol tester and have never found ethanol yet in the gas. I also add fuel stabilizer ('Stabil") to the fuel in the 5 gallon cans that I transport it in to help ensure that it is still good if I don't use it for several weeks. If I haven't used it by that time, it goes into my truck and I buy fresh gas for the airplane. I use a filtered fuel funnel that I bought from Aircraft Spruce when I fuel the airplane from the 5 gallon gas cans since auto gas is not as carefully regulated as 100LL. I sump all 3 tanks to look for water as part of my pre-flight inspection. I have never found water in these tanks. Likewise, I occasionally drop the bowls on the carburetors looking for any debris in them but have never found any.

Related Maintenance

Fuel Hose Replacement -

Last August I replaced all fuel lines from the wing tanks, in the cockpit, and thru the fire wall. This is because these lines were not part of the 5 year rubber replacement that Total Flight Solutions did in December 2016 which was done primarily for engine lines. I did this because the lines I replaced were older automotive fuel hoses and I wanted aviation grade hoses which was the "Super-Flex" hose that I purchased from Aircraft Spruce…

https://www.aircraftspruce.com/catalog/appages/parkersuperflex.php

I was also concerned about a faint fuel smell in the cockpit that I attributed to the older hoses which went away once the new hoses were in place.

Ignition Module Repair –

Also in August, the airplane began to have a problem with starting to the point where it would not start at all. After consulting with the Rotax-Owner.com forum, it appeared that one or both of my ignition modules had gone south. I decided to send them to Carmo Electronics in the Netherlands which is the only company that I could find that can rebuild these modules. They had them for about 3 weeks and had to rebuild both of them. Once I reinstalled the repaired modules, the engine started up immediately and ran great. I'm sorry to say that I did not make a log book entry for this repair. No excuses, I simply forgot. Here is a link to Carmo if you're interested. They do a LOT of this work…

https://www.carmo.nl/index.php?main_page=cdi_ecu_tci_revisie_reparatie

Fuel Filter Replacement –

I also replaced the in line fuel filter in October since the existing one was at least a year old. Since this fuel filter has a check valve, if there was any serious debris in the fuel, maybe it's still trapped in this filter and would be easy to see since it's a clear plastic filter. This is the filter I used bought from California Power Systems…

https://www.cps-parts.com/catalog/pdf/05-14958.pdf

All of this is documented in the N61PG engine and air frame log books (except the ignition modules) and I will attach pictures of those entries which are the same pix I gave to the insurance adjuster recently.

Throttle Linkage Rods/Rod Ends –

One maintenance item that also was not in the log book yet because I just completed it a couple of days before my flight was replacement of the throttle linkage rods. The replacement was made because the new rods facilitated finer in place adjustment of the rod length without requiring removal of the rod from the linkage assembly like the old rods did. This is turn leads to better synchronization of the twin Bing carburetors for a smoother performing engine. These new rods were installed with all parts (including jam nuts), provided by the vendor, Speedway Motors. As an extra precaution, every though the vendor said it was unnecessary, I also (blue) loctited the jam nuts in place as I did not want the rods to rotate out of position. Looking at these rods yesterday with the insurance inspector there, I saw that they had indeed not moved and that the Loctited jam nuts were still in place.

However, I did notice that the starboard rod was bent (see attached picture). I hope that was because the aircraft went inverted, busted the engine mount, and bent it (and a lot of other stuff). If the rod somehow was defective and was bent before the accident, that might explain the rough running engine. I'm just speculating at this point. These rods are designed for throttle assemblies so I would hope that it bent after the accident. Here is a link for these rods…

https://www.speedwaymotors.com/Swedged-Aluminum-Throttle-Linkage-Tubes-3-16-Inch-10-32-Thread,3944.html

This is all the related maintenance that I can think of right now. Please let me know if you need anything else. I appreciate any sleuthing y'all can do so we can figure this one out.