

MISFUELING EPIDEMIC

by TTCF Staff

In April of this year, one of our members who owned a 1975 421B survived a crash landing due to a dual engine failure in IMC. His airplane had been misfueled with Jet A. His accident was the third misfueling accident to occur since August of 2014. The other two were fatal, and one of them involved another 421.



Misfueling accidents in piston twins are often fatal. The owner of this 421 was lucky to walk away with minor injuries.

This was a problem that we all thought would be solved back in 1987 when the FAA issued AD 87-21-01 which mandated the installation of fuel restrictors on aircraft using avgas. The restrictor was designed to prevent the wide “duck bill” Jet A fuel nozzles from fitting into the fuel tank. Surely, this combined with clear labeling near the gas cap, would stop the rash of misfueling incidents, we all thought. Not so! The accident history shows there are multiple ways an aircraft can be misfueled. Here are a few:

AD 87-21-01 may not have been complied with. Our member’s aircraft did not have the fuel restrictors,

yet the AD had been signed off as complied with for the last 18 annuals! The most recent signoff was by a nationally known Twin Cessna shop (not one that advertises with us). No one ever looked to see if the restrictors were installed - they just looked at the paperwork which said the AD had been complied with. Who knows what happened 18 years ago when it was originally signed off?

The FBO may not have the proper fuel nozzles. There have been multiple instances of this. In the case of our member’s accident, the FBO had removed the duck billed nozzle and replaced with a smaller nozzle in order to make the refueling of military helicopters easier.

The lineman may not know what he’s doing. This has always been a problem. FBOs must provide training but it is often cursory. And for someone not intimately familiar with airplanes, telling the difference between a 421 and a 425 or King Air is challenging. In our member’s case, the lineman said he thought the 421 was a King Air. There have been instances where avgas airplanes with restrictors have been refueled with duck billed Jet A nozzles. You’d really have to work to make that happen and it illustrates that once a lineman decides your airplane takes Jet A, he will do what it takes to fuel your airplane with it.

The FBO may have misfueled its trucks. There have been instances of Jet A being

in an avgas truck. A twist on this theme is that many FBOs park their fuel trucks in special parking places but misfueling has occurred when the Jet A truck was mistakenly parked in the Avgas truck space. The lineman just grabs the truck in the avgas space and starts fueling.

“Just looking at a fuel sample is not enough:

AVGAS + JET A = BLUE!”

So how do we protect ourselves against misfueling? You may think the victims misfueling incidents didn’t sump and examine their fuel. Avgas is blue and Jet A is clear or “straw” colored, right? Here’s the kicker: a 50-50 mix of 100LL and Jet is also blue. It may be slightly paler but you would not be able to tell the difference unless you held it up to pure 100LL.

Just looking at a fuel sample is not enough: Avgas + Jet A = BLUE!

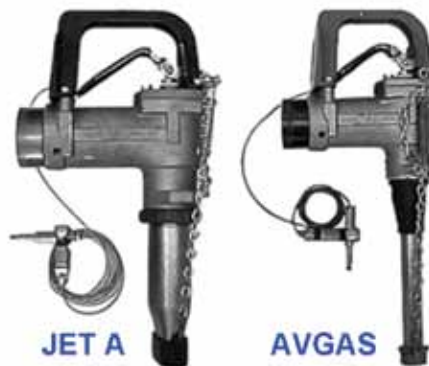
So if a visual inspection is not sufficient, what can we do to ensure we have the correct fuel? Here is a list of things in order of importance:

1. **Always smell your fuel.** Jet A has a distinctive kerosene odor that will be present even in low percentage mixes.
2. **Conduct the paper-staining test.** If you put a drop of avgas on a piece of white paper or a paper towel, within a few minutes it will evaporate completely leaving no stain whatsoever. If the sample has as little as 10% Jet A, it will leave a visible oily stain. If you see the stain, you’ve likely been misfueled.

If you use a GATS jar to sample your fuel, you can test for jet fuel contamination in the same sort of way by blowing on the screen after taking a fuel sample. Avgas will evaporate while avgas contaminated



Top: A Twin Cessna fuel tank with the Jet A fuel nozzle restrictor installed Bottom: The accident 421 without the restrictor. Is the restrictor installed on your airplane?



The jet fuel nozzle on the left has a wide “duck-bill” opening, a feature designed to prevent it from fitting into a fuel tank with the AD 87-21-01 restrictor installed.

with jet fuel will leave a film on the screen. See the instructions that came with your GATS jar for details.

- 3. Observe your aircraft being fueled.** If you fly under Part 135 regulations, this is required. It's good practice for Part 91 operators too. Of course if the avgas truck contains Jet A, this alone won't prevent misfueling which is why items #1 and #2 are so important.
- 4. Look at your fuel receipt.** If you are unable to observe the fueling, look at your receipt. Most FBOs produce receipts that specify the type of fuel you bought.
- 5. Consider buying "fuel tape."** This is tape that states your fuel type. You just rip off a piece and place it over the fuel cap so the lineman has to physically remove it to remove the fuel cap. Again, it's not foolproof but another layer of defense. Most linemen never see your permanent fuel placard. They often use a rubber mat that goes around the fuel opening and it completely covers up the placard.

In addition to the above, all owners of aircraft burning avgas should examine their fuel openings and make sure they have the restrictors installed as well as the proper fuel placards nearby. As history shows, this is not foolproof but they are important layers of defense.

Aircraft misfueling accidents are usually fatal because the mixture of avgas and Jet A allows the aircraft to be started and to takeoff without any indication of a problem. But as full power is applied, the engine temperatures begin to rise rapidly until destructive detonation occurs, usually after the aircraft is



Two essential steps to prevent misfueling are: 1) Always smell your fuel. Jet fuel has a distinctive "kerosene" odor and 2) Dip the fuel sample with a piece of paper. The picture on the left dipped into a 50-50 mix of avgas and jet fuel and the paper on the right dipped into pure 100 LL. After 60 seconds, the 100LL had evaporated completely, leaving no stain whatsoever. The contaminated fuel (left) leaves an oily stain that persists for a long time. All you need is paper and one minute. Any paper will do including a fuel receipt.

airborne. Once the engine starts to run rough, it's on the verge of failure and if airborne already you'll be faced with an off-airport dead-stick landing. Our member credited his simulator training for preparing him to dead-stick his 421 onto a highway and survive. Training for emergencies like this is the last line of defense. In his case, it saved his life.

(continued on next page)



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If you are like me, you may have been a little cavalier and trusting when it comes to fueling your airplane.

Join me in saying “no more.” From now on, at the very

As an extra precaution you can buy “fuel tape” from suppliers like Aircraft Spruce. It’s an extra layer of protection designed to get the lineman’s attention.

least, I’m smelling my fuel and doing the paper test on every refueling. I’ve also bought the fuel tape to use at unfamiliar FBOs.

Let’s eliminate this risk from our flying.



WHAT ABOUT GREEN FUEL?

On our Alaska trip, one of our members was surprised when he drained a sample of fuel from his 340 that was green, not blue. The FBO that just fueled the airplane had used 100LL, so the green fuel was obtained at a prior fuel stop which the owner was never able to identify.

None of us had ever had this happen before. 100/130 octane fuel is dyed green instead of blue. It was the fuel we used before the industry converted to 100 LL. It also has a slightly higher lead content. Our airplanes can run on either and most of our fuel placards specify this.



A discussion with several experts indicated that 100/130 is almost non-existent in the U.S. today. Fortunately the green fuel was in our member’s aux tanks so he was able to take off using the 100LL in the mains and burn the green fuel in cruise which he did with no problems.

One caution though: very stale 100LL (more than 1 year old) can also turn green in color. At this point, some of its additives have become ineffective so the fuel should not be used.

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