Interagency Aviation

Lessons Learned

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Subject: **Interagency Aviation Lessons Learned**

Area of Concern: **Aviation Flight and Maintenance Operations**

Distribution: **To All Aviation Users**

FY 07 ANC07LA077 **Cessna 185 (floats)**

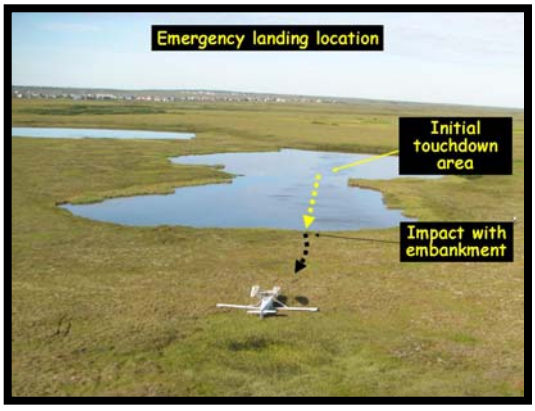
What Happened.

A recent accident investigation revealed an improper maintenance procedure and some good ideas from the pilot to reduce risks in any aviation operation.

Narrative: Following a 100-hour/annual inspection the DOI fleet aircraft received a post-maintenance run-up by two qualified government aircraft mechanics (no deficiencies noted). The aircraft was moved from the hangar to a small lake adjacent to the airport where the mishap pilot pre-flighted the aircraft for a short (5 mile) re-positioning flight to a larger lake where the aircraft could be re-fueled for the post-maintenance test flight . The pilot recognized that the left wing fuel gauge was just above empty and that the right wing fuel gauge indicated less than ¼ tank. Due to the short distance between the lakes and the need to be as light as practical to take off from the small lake the pilot accepted the low fuel gauge indications without physically checking the fuel quantity (dipping the tanks).

The pilot performed a proper run-up, received a take-off clearance, adjusted the fuel selector lever to the "both' position, and took off to the north. In order to avoid inbound traffic the pilot elected to fly at 500' above the surface and, while avoiding built up areas, to fly as directly as practical to the point of intended landing. Within three minutes after take off the engine failed. The pilot attempted to re-start the engine but was unsuccessful.

The pilot made an emergency landing on a small pond, but due to the size of the pond after touchdown the aircraft left the pond, hit an embankment became briefly airborne and flipped over.

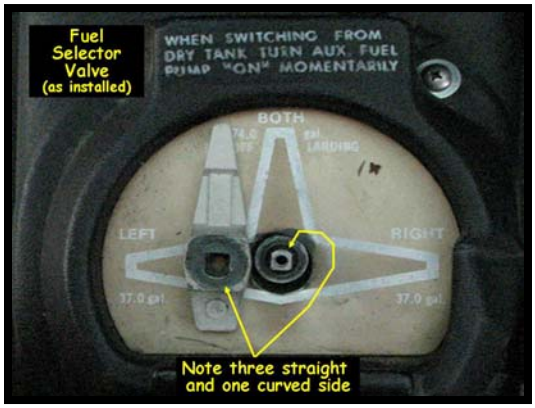


The pilot was properly restrained, and although he was not wearing (nor was he required to wear) a flight helmet he was able to egress by himself and use his cell phone to summon help.

The investigation determined that rather than fuel exhaustion due to lack of fuel quantity, the engine actually failed due to fuel starvation as a result of the improper installation of the fuel selector lever during the 100-hour inspection.

Narrative (con't): Although the mechanics had used the appropriate checklist, the manufacturer's maintenance manual, and good cross-checking of each other's work, the fuel selector lever was installed 180 degrees out of phase so that when the pilot selected "both" he actually had turned off all fuel from the wing tanks.

The fuel selector valve assembly is designed to prevent improper installation (dog house shape). However, the assembly on this aircraft was worn enough that it easily permitted the lever on this aircraft to be improperly re-installed. Inspections of other fleet aircraft revealed no similar excessive wear or improper installation of this assembly. The NTSB is coordinating with Cessna to follow-up on this flight hazard.



Lesson Learned. This was the second fuel exhaustion / starvation event involving a Cessna aircraft in under a month. In this case the engine failed due to a human performance failure on the part of one of the mechanics.

Predisposition / framing can cause errors even when you follow the checklist. The mechanic who made the error was properly qualified, conscientious, thorough, and well-intentioned. He followed the checklist, used the maintenance manual, and had another mechanic check his work. Despite all of these precautions he installed the fuel selector valve 180 degrees out of phase. The investigation believes that because the mechanic "knew" the valve would only fit on the shaft one way he assumed that when it "fit" it was installed properly and did not visually check it with a flashlight. Wear on the valve handle and shaft combined with the mechanic's experience and mental "framing" defeated the system and resulted in the fuel starvation accident.

Lessons Learned. The pilot involved in this accident, though not responsible for the engine failure, offered the following three excellent suggestions that pilots of all types of aircraft should consider on every flight.

Ensure that you have the appropriate amount of fuel, not just "enough" fuel. The pilot knew that the takeoff lake was small and he wanted to be as light as possible. The pilot felt that he had enough fuel for the intended flight. Don't forget that FAR 91.151(a) requires a 30-minute fuel reserve for all VFR flights in airplanes. One of the truest axioms of aviation addresses the worthlessness of "fuel not in the tank".

Don't bet your life on your fuel gauges, visually check the fuel level by "dipping" all tanks. Some aircraft models have notoriously unreliable fuel gauges. Always visually ensure the fuel quantity of all tanks before takeoff and take a conservative response in flight when determining fuel remaining. Remember, it's safer to act as if there is less fuel available, than to think you have more fuel than you actually do and get an unpleasant surprise.

Given a choice between flying lower or higher… fly higher. To avoid traffic inbound to the airport the mishap pilot chose to stay low (500'AGL) and fly a more direct route to his destination. When the engine failed the pilot lost altitude and decreased his choice of emergency landing areas while attempting to restart the engine. In retrospect, the pilot said that he could have just as easily extended his initial heading gaining altitude and flying behind the inbound aircraft. A second axiom of aviation addresses the uselessness of "altitude above you".

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