Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

Over-wing Fuel Tank Vent Systems
(Including Early Cessna 180 Models)

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1. Applicability

Cessna 180 Series aeroplanes manufactured between 1953 and through 1955 and any aircraft equipped with single point dynamic air pressure fuel tank venting systems and flexible “rubber” bladder fuel tanks.

2. Purpose

To provide information outlining the dangers associated with the single point over-wing fuel vent systems and bladder tanks in early model Cessna 180 aircraft and allow operators of these aircraft and aircraft with similar systems, to conduct an informed risk assessment in regard to operating aircraft with this configuration.

3. Background

Some 35 years after the introduction of the Cessna 180 Series, the FAA issued AD 90-21-08 which identified fuel vent system design deficiencies following investigations into forced landings due to unanticipated fuel exhaustion.

The fuel loss was undetected and found to be caused by fuel siphoning out of the back of the over-wing vent tube to atmosphere when the impact air side of the vent tube became blocked with ice and stopped providing positive air pressure to keep the bladder tank conforming to its cavity.

The alternate vent hole in the back of the tube allowed the low air pressure field from the top of the wings to create a low pressure in the vent space in the fuel tank and to siphon fuel out of the back of the tube to atmosphere while the engine continued to operate and draw fuel from the tank.

These combined effects caused air pressure inside the tank to be lower than that outside the flexible rubber fuel tank bladder, causing the bladder to contract, typically lifting the bottom of the tank upwards, and to contact and lift the float of the fuel contents sender. This caused the fuel gauges to give erroneous readings, hiding the fuel quantity status from the pilot and resulting in fuel exhaustion.

The FAA AD mandated Cessna Service Kit SK180-6 and allowed affected aircraft to continue to fly with unmodified vent systems, provided that a placard reading:

"CAUTION, UNDETECTED FUEL LOSS AND ERRONEOUS FUEL QUANTITY INDICATION MAY OCCUR AFTER INADVERTENT OPERATION IN ICING CONDITIONS".

- was installed on the instrument panel within 100 flight hours. The FAA AD also required that the bladder tanks be modified with a new vent nipple "when next removed for any reason". Modification in accordance with Cessna Service Kit SK180-6 results in the now classic behind-the-lift-strut vents.

At the time the FAA AD was issued, CASA issued its own Type Certificates and was therefore not automatically obliged to issue State of Design ADs. CASA, in consideration of compliance costs and the apparent icing incident free service life of 35 years at the time the FAA AD was issued, decided not to mandate the FAA AD.

There were 14 affected Cessna 180 aircraft in Australia on the date the FAA AD was issued and Australia currently has a fleet of 111 C180's with 27 Cessna 180's in the affected S/N range identified by the FAA AD and which may not have had their fuel vent system modified. There is evidence to suggest that these early rubber bladder tanks and single point vent systems may still be in use.

While fuel vents being inadvertently blocked by ice in Australia may seem remote, this possibility should not be ignored. In addition, vents may become blocked just as effectively, and with the same outcomes, but without icing over.

The CASA SDR system shows cases where insects blocked pitot and other vent tubes while the aircraft was inactive (even while parked an overnight) either by crawling into the tube and staying there or by building a nest, as the case of the Australian mud-dauber wasp (Sceliphron laetum).

Further, aircraft with single point fuel system vents or vent systems which utilise dynamic air pressure to assist the flexible bladder fuel tank to remain conformed to the tank cavity is not limited to Cessna 180 aeroplanes.

4. Recommendations

Operators should survey their aircraft to determine the type of fuel tank installation and consider:

1. Using a close-fitting fuel vent cover while parked overnight, etc.; and removing the cover and carefully inspecting the vent for obstructions before the first flight of the day.

2. (a) For Cessna 180 owners where the original bladder tank and single point vent system is installed - installing the FAA AD placard, and

   (b) Implementing the design change offered by the Cessna Service Kit SK180-6 data whenever the left hand fuel tank is removed for any reason.

5. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address:

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or in writing, to:

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