SOUTH AFRICAN CIVIL AVIATION AUTHORITY

Section/division **Accident and Incident Investigations Division** Form Number: CA 12-57

LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10479						
Classification	Accident	**Date**	18 August 2024		**Time**	0950Z	
Type of Operation	Private (Part 91)						
Location							
Place of Departure	Margate Airport (FAMG), KwaZulu-Natal Province	Place of Intended Landing	Virginia Airport (FAVG), KwaZulu-Natal Province				
Place of Occurrence	On the grass near the hangar at FAMG						
GPS Co-ordinates	Latitude	30° 51' 34.98" S	Longitude	030° 20' 33.43" E	Elevation	480 ft	
Aircraft Information							
Registration	ZS-EGZ						
Make; Model; S/N	Cessna Aircraft Company; C150F (Serial Number:150-63463)						
Damage to Aircraft	Substantial	Total Aircraft Hours	8 528.55				
Pilot-in-command							
Licence Type	Private Pilot Licence (PPL)	Gender	Male	Age	26		
Licence Valid	Yes	Total Hours	185.4	Total Hours on Type	47.6		
Total Hours 30 days	6.7	Total Flying on Type Past 90 days	25.9				
People On-board	1+0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**	0

What Happened

On Sunday morning, 18 August 2024, a pilot on-board a Cessna 150F aircraft with a registration ZS-EGZ was preparing for departure from Margate Airport (FAMG) in KwaZulu-Natal province to Virginia Airport (FAVG) in the same province. The private flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that on the morning of 18 August 2024, he departed FAVG on a private flight to FAMG and landed on Runway 23 at approximately 0900Z. Clear weather conditions prevailed in the morning. After landing, the pilot taxied the aircraft and parked on the grass near the aircraft owner's hangar. He then disembarked from the aircraft and went to breakfast at a restaurant in the airport.

At approximately 0950Z, the pilot returned to the aircraft to conduct a pre-flight inspection in preparation to return to FAVG; no anomalies were detected on the aircraft. The aircraft was refuelled with 14 litres (l) of Aviation Gasoline 100 Low Lead (AVGAS 100LL), bringing the total fuel on-board to 59l. After refuelling, the pilot boarded the aircraft. He reported that he first primed the engine twice, following standard operating procedures. During an attempt to start the engine, it only cranked, but did not start. The pilot made two additional start attempts without success. The pilot stated that during the third attempt, he performed a hot start procedure, and he observed smoke coming out from the engine cowlings.

The pilot immediately disembarked from the aircraft and proceeded to the airport's fire department to request assistance. Upon his return a few minutes later, the pilot and the firefighting team discovered that the aircraft was on fire. The firefighting personnel were able to extinguish the fire. The pilot confirmed that a portable fire extinguisher was on-board, but he did not use it. The aircraft sustained burn damages primarily at the forward engine cowlings section.

The weather conditions provided by the pilot through form CA-12-03 pilot questionnaire were as follows:

Wind direction: 160°; Wind Speed: 5kt; Visibility: 9999; Air Temperature: 21°C; Dew Point: 13°C
Clear weather conditions prevailed in the area.

Figure 1: A view of where the aircraft was parked. (Source: Google Earth)

Figure 2: The aircraft at the time the firefighters extinguished the fire. (Source: Pilot)

Figure 3: Damage in the engine section. (Source: Pilot)

Starting the Engine Procedure: (Source: Cessna 150 Pilot Operating Handbook [POH]).

The fuel is supplied to the engine from two tanks, one in each wing. From these tanks, fuel flows by gravity through a fuel shutoff valve and fuel strainer to the carburetor.

Ordinarily, the engine starts easily with one or two strokes of primer in warm temperatures to six strokes in cold weather, with the throttle open approximately ¼ inch. In extremely cold temperatures, it may be necessary to continue priming while cranking.

Weak intermittent explosions followed by puffs of black smoke from the exhaust stack indicate over-priming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure: Set the mixture control in full lean position, throttle fully open, and crank the engine through several revolutions with the starter. Repeat the starting procedure without any additional priming.

If the engine is under-primed (most likely in cold weather with a cold engine) it will not fire at all, and additional priming will be necessary. As soon as the cylinder begins to fire, open the throttle slightly to keep it running.

After starting, if the oil gauge does not begin to show pressure within 30 seconds in the summertime and about twice that long in very cold weather, stop the engine and investigate. Lack of oil pressure can cause serious engine damage. After starting, avoid the use of carburetor heat unless icing conditions prevail.

Findings

1. The pilot had a Private Pilot Licence (PPL) that was initially issued by the Regulator on 1 November 2017. The licence was reissued on 25 August 2023 with an expiry date of 31 August 2024. The pilot had a Class 2 aviation medical certificate that was issued on 30 July 2022 with an expiry date of 30 July 2027 with no restrictions.

2. The pilot was rated on the aircraft type, and it was endorsed on his licence. He had a total of 185.4 hours of which 47.56 hours were accumulated on the aircraft type.

   The pilot's qualification, experience and medical fitness were in line with the requirements of the Regulator's standard for the safe operation of the aircraft.

3. The aircraft had a Certificate of Airworthiness (C of A) that was issued by the Regulator on 28 November 2023 with an expiry date of 30 November 2024. The aircraft was registered to the current owner on 4 August 2023.

4. The mandatory periodic inspection (MPI) of the aircraft was conducted after which a Certificate of Release to Service (CRS) was issued on 15 November 2023 at 8 495.91 airframe hours with an expiry date of 14 November 2024 or at 8 595.91 airframe hours, whichever comes first.

5. The aircraft had a total of 8 528.55 airframe hours at the time of the accident. It accumulated a further 32.64 hours after the last maintenance inspection. There were no anomalies noted with any of the aircraft's systems at the time of the flight and no anomalies were recorded in the maintenance books.

6. The failure to start the engine despite multiple attempts and the observation of smoke suggests that the engine may have been flooded. The pilot's decision to attempt a hot start procedure which is standard, did not resolve the issue. According to the Pilot's Operating Handbook (POH), under normal conditions, the engine should start with one or two strokes of primer in warm temperatures, or up to six strokes in cold weather.

7. The POH outlines that to clear the excess fuel from the combustion chambers, the following procedure should be conducted: The pilot should set the mixture control to full lean position, open the throttle fully, and crank the engine through several revolutions with the starter. This procedure should be repeated without additional priming. The pilot did not follow the recommended procedure for clearing a flooded engine as outlined in the POH, which might have prevented or mitigated the start of the fire and the severity of the damage. The excess fuel from flooding came into contact with the engine's hot section and ignited, which caused the fire.

8. The fire damage was exacerbated by failure to use the on-board fire extinguisher.

Probable Cause(s)

The aircraft's engine was flooded with fuel during the priming procedure which led to fuel overflooding. A subsequent hot start procedure without clearing the flooded engine led to the eruption of the fire.

Contributing Factor(s)

Improper starting procedure.

Safety Action(s)

None.

Safety Message and/or Safety Recommendation/s

Safety message: Pilot's must remember to use the fire extinguisher (safety equipment) when a fire erupts.

The following recommendations are required to be standardised by both Approved Training Organisations (ATOs) and private flight operators in the General Aviation sector to equip pilots with the necessary skills for safe flight operations and emergency flight responses:

- Ensure that pilots are familiar with and follow the complete engine start and recovery procedures as detailed in the POH. Emphasise the importance of adjusting the mixture control and throttle settings in the event of over-priming.

- Conduct recurrent training on handling engine flooding and the proper use of on-board fire extinguishers. Simulate scenarios involving over-priming and engine fires to reinforce quick and effective response measures.

- Ensure pre-flight briefings include protocols for handling engine issues and the availability of emergency equipment. Post-incident procedures should include checking the functionality of on-board fire extinguishers.

- Encourage the immediate use of fire extinguishers in the event of on-board fires, even if external help is available. Train pilots to use on-board fire extinguishers effectively before evacuating the aircraft.

About this Report

The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

Disclaimer

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Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa