SOUTH AFRICAN CIVIL AVIATION AUTHORITY

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

LIMITED SERIOUS INCIDENT INVESTIGATION

Reference Number	CA18/2/3/1396										
Classification	Serious Incident	**Date**	13 April 2022	**Time**	1538Z						
Type of Operation	Training (Part 141)										
Location											
Place of Departure	Wonderboom Aerodrome (FAWB), Gauteng Province		Place of Intended Landing	Wonderboom Aerodrome (FAWB), Gauteng Province							
Place of Incident	Wonderboom Aerodrome (FAWB) on the apron outside the operator's hangar										
GPS Co-ordinates	Latitude	25˚39'.00" S	Longitude	028˚13'.00" E	Elevation	4095 feet					
Aircraft Information											
Registration	ZS-SCE										
Model/Make	Cessna 172M (Serial Number: 17263043)										
Damage to Aircraft	Substantial		Total Aircraft Hours	3536.2							
Pilot-in-command											
Licence Type	Commercial Pilot Licence (CPL)		Gender	Male	Age: 23						
Licence Valid	Yes										
Total Hours on Type	600		Total Flying Hours	1209.2							
People On-board	2 + 0	Injuries	0	Fatalities	0	Other (on ground)	0				
What Happened											

On 13 April 2022, a Cessna 172M aircraft with registration ZS-SCE, operated by Eagle Air Flying School, was scheduled for a night flight training when the incident occurred at Wonderboom Aerodrome, Gauteng province. On-board the aircraft were the instructor and the student pilot. The flight was intended to be conducted under the provisions of Part 141 of the Civil Aviation Regulations (CAR) 2011 as amended.

The instructor and the student pilot pulled out the aircraft from the operator's hangar and onto the apron to conduct pre-flight inspections and start-up procedures. The aircraft was cranked several times during start-up and, later, a bystander who was a distant away from the aircraft observed smoke emanating from the bottom of the engine compartment, followed by flames after engine-start. Thereafter, the bystander ran towards the aircraft, gesturing to the instructor and the student pilot to get their attention to alert them of the smoke and the fire. After they had been alerted, the instructor and the student pilot switched off the engine and disembarked the aircraft. Both were

unharmed. The fire extinguisher was used to extinguish the fire. The aircraft sustained fire damage to the engine compartment.

According to https://www.boldmethod.com/learn-to-fly/aircraft, *during a cold engine-start, you have to prime the engine. When you prime an engine, you are putting fuel into the cylinders (or the intake manifold) so that the engine can fire. Pilots tend to over-prime the engine by priming too much or too many times (we're guilty of it too). In contrast, there are very few people who prime too little.*

Figure 1: The aircraft after the fire was put out. (Source: Pilot)

Figure 2: A close-up picture showing the black residue caused by the fire. (Source: Pilot)

What was found:

- The nose engine cowlings, spinner paint and landing light were damaged.
- The gaskets and plunger were damaged due to heat from the fire.
- The air-filter and the front baffle rubbers on the carb heat box were damaged.
- The carburettor was removed and inspected by the aircraft maintenance organisation (AMO), and it was found undamaged.
- The aircraft's maintenance records were up to date; they revealed that the aircraft was maintained in accordance with (IAW) the manufacturer's specifications and existing procedures.
- The aircraft had a Certificate of Release to Service which was issued on 23 February 2022 with an expiry date of 23 February 2023 or at 7184.20 hours, whichever occurs first.
- The aircraft had a valid Certificate of Registration which was issued to the current owner on 29 July 2021.

- The aircraft was issued a Certificate of Airworthiness on 13 July 2015 with an expiry date of 31 July 2022.

- The aircraft had undergone a mandatory periodic inspection (MPI) on 23 February 2022 at 7084.20 airframe hours. It was flown a further 65.1 hours since the last MPI.

- The pilot was initially issued a Commercial Pilot Licence (CPL) on 2 April 2019 with an expiry date of 31 July 2022. His Class I medical certificate was issued on 18 May 2021 with an expiry date of 31 May 2022.

- The AMO had a valid AMO Certificate issued on 24 May 2021 with an expiry date of 31 May 2022.

- There were no defects recorded in the defect logs with either the navigational or communication systems prior to the accident flight.

The information below is an extract from the Pilot's Operating Handbook — Cessna 172:

Engine fire during start on ground

1) Cranking--Continue, to get a start which would suck the flames and accumulate fuel through the carburettor and into the engine.

<u>If the engine starts</u>

2) Power--1700 RPM for a few minutes.

3) Engine--SHUTDOWN and inspect for damage.

<u>If the engine fails to start</u>

4) Throttle--FULL OPEN

5) Mixture--IDLE CUT-OFF

6) Cranking--CONTINUE for two or three minutes.

7) Fire Extinguisher--OBTAIN (have ground attendants to obtain if not installed).

8) Engine--SECURE.

a. Master Switch--OFF.
b. Ignition Switch—OFF
c. Fuel Shutoff Valve—OFF

9) Fire—EXTINGUISH using fire extinguisher, seat cushion, wool blanket, or dirt. If practical, try to remove carburetor air filter if it is a blaze.

10) Fire Damage—INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

After the incident, all damaged parts were replaced with new parts — the carb heat box baffle rubbers were replaced, and the carb heat box was inspected to ensure it operated as expected; the cowling and spinner were repaired and re-painted; the carburettor was re-installed with new gaskets and the carb heat box was refitted with a new air filter; the aircraft was ground-run and all systems were within the parameters.

Probable cause

The engine was over-primed during start-up, resulting in excess fuel catching fire and damaging the engine compartment.

Safety Action/s

None.

Safety Message and/or Safety Recommendation/s

None.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, 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****.*

About this Report

Decisions regarding whether to investigate, and the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, no 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 brief report. The report has been compiled using information supplied in the initial notification, as well as follow-up information 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 accident.

This report provides an opportunity to share safety message/s in the absence of an investigation.

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.

Disclaimer

This report is issued by:

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