# AIRCRAFT ACCIDENT SHORT REPORT

**CA18/2/3/9751: The aircraft's engine experienced a power loss during a climb.**

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| **Date and time** | **:** 18 November 2018, 0743Z |
| **Aircraft registration** | **:** ZS-BUA |
| **Aircraft manufacturer and model** | **:** DE Havilland Aircraft Company, DH-82a Tigermoth |
| **Last point of departure** | **:** Krugersdorp Aerodrome (FAKR), Gauteng Province |
| **Next point of intended landing** | **:** Krugersdorp Aerodrome (FAKR), Gauteng Province |
| **Location of accident site with reference to easily defined geographical points (GPS readings)** | **:** GPS coordinates: 26°5'24.5" South, 027°42'37.89" East |
| **Meteorological Information** | **:** Surface wind: 330° at 11kts; temperature: 29°C; dew point: 9°C; QNH: 1023 |
| **Type of operation** | **:** Private (Part 91) |
| **Persons on board** | **:**1 + 0 |
| **Injuries** | **:** Nil |
| **Damage to aircraft** | **:** Substantial |

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

**Purpose of the Investigation:**

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (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.***

**Disclaimer:**

*This report is produced without prejudice to the rights of the South African Civil Aviation Authority (SACAA) which are reserved.*

## 1. SYNOPSIS

1.1 On 18 November 2018, the aircraft took-off from Krugersdorp Aerodrome (FAKR) with only the pilot on- board for circuit flights at the same aerodrome. The pilot stated that shortly after take-off from Runway 08 at a height of approximately 150 feet (ft) above ground level (AGL), the engine ran rough and its power dropped from 2050 revolutions per minute (rpm) to 1800 rpm.

1.2 At this point, the pilot broadcasted an emergency. After realising that he could not land on the terrain ahead, he decided to turn onto downwind leg for Runway 08. He further stated that he suspected carburettor icing as a cause of the engine power loss. He decided to move the throttle backwards to clear the ice in the carburettor. He then opened the throttle to maximum again in order to climb so as to reach Runway 08 and the RPM gauge reading rose to a maximum of 2000. On the base leg, the engine RPM dropped to 1400rpm. The aircraft was continuously losing height as the pilot was attempting to restore the engine power and during the three turns to the left in an attempt to reach Runway 08. After realising that the aircraft will not reach Runway 08, the pilot decided to turn the aircraft to a south-westerly direction and cut off the fuel, switched off the magnetos and closed the throttle for an emergency landing. The aircraft landed on a rocky terrain and rolled for approximately 75 metres (m) before colliding with a rocky ridge. It rolled again for a further 10m before nosing over and coming to rest in an inverted position.

1.3 The aircraft was substantially damaged; however, the pilot was not injured.

1.4 The investigation revealed that the aircraft's engine lost power during a climb and the pilot could not restore the engine power resulting on a loss of height and the subsequent forced landing. The aircraft nosed over during the landing roll on a rocky terrain. The cause of the engine power loss could not be determined.

## 2. FACTUAL INFORMATION

2.1 On 18 November 2018, the ZS-BUA aircraft took-off for left-hand circuits on Runway 08 FAKR. The pilot stated that after take-off, from runway 08, at a height of approximately 150 feet, the engine ran rough and its power dropped.

2.2 At this point, the pilot broadcasted an emergency. After realising that he could not land on the terrain ahead, he decided to turn onto downwind leg for Runway 08. He further stated that he suspected carburettor icing as a cause of the engine power loss. He decided to move the throttle backwards to clear the ice in the carburettor. He then opened the throttle to maximum again in order to climb so as to reach Runway 08 and the RPM gauge reading rose to a maximum of 2000. On the base leg, the engine RPM dropped to 1400rpm. The aircraft was continuously losing height as the pilot was attempting to restore the engine power and during the three turns to the left in an attempt to reach Runway 08. After realising that the aircraft would not reach Runway 08, the pilot decided to turn the aircraft to a south-westerly direction and cut off the fuel, switched off the magnetos and closed the throttle for an emergency landing. The aircraft landed on a rocky terrain and rolled for approximately 75 metres (m) before colliding with a rocky ridge. It rolled again for a further 10m before nosing over and coming to rest in an inverted position.

2.3 The accident occurred during daylight conditions at geographical position determined to be S26°5’24.5” E027°42’37.89” at an elevation of 5 300ft above mean sea level (AMSL).


**Figure 1:** Flight path from take-off to accident site


**Figure 2:** The aircraft as it came to rest

2.4 The temperature at the time of accident was 29°C and dew point was 9°C which equates to a dew point depression of 20°C. The probability of icing would have been light at cruise and descent power and the relative humidity would be 29%.

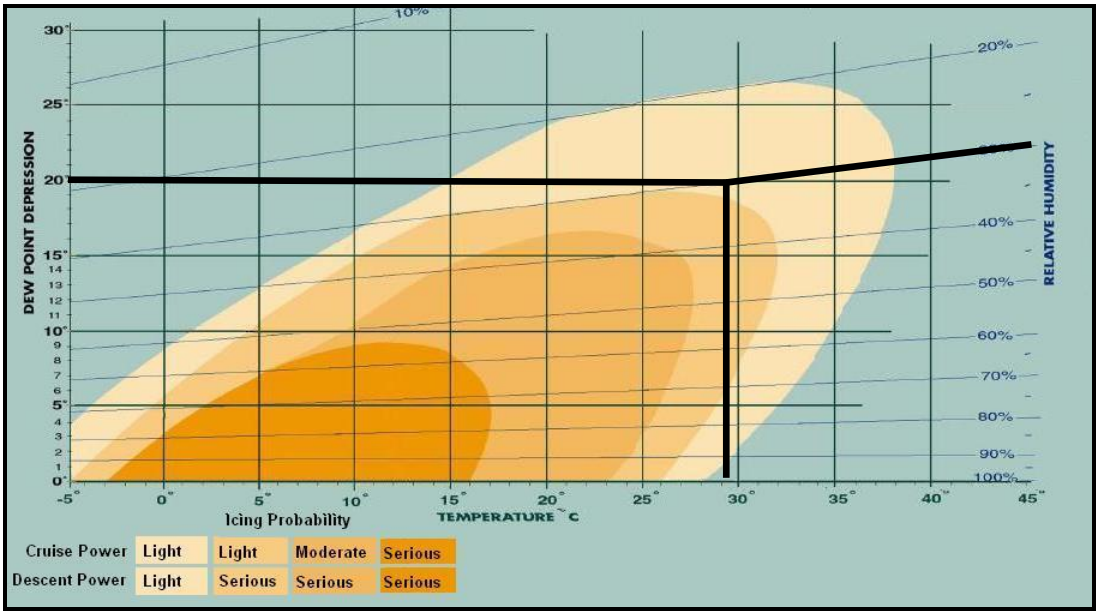


**Figure 3:** Carb icing probability chart

2.5 The flight folio showed that fuel used on this aircraft was a mixture of AVGAS/MOGAS. The pilot stated that he uplifted a mixture of 30% AVGAS to 70% MOGAS into the aircraft.

2.6 The United Kingdom (UK) Civil Aviation Authority (CAA) released an information sheet (CAP1700) on 6 September 2018 which stated that, *"The CAA recommends Unleaded MOGAS should not be used in Gipsy Major powered aircraft due to it containing octane enhancers, notably ethanol, which can cause damage to your engine, particularly non-metallic components including the carburettor floats, rubber pipework, seals etc.". See appendix 1.*

*Source:http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8639*

2.7 The aircraft had flown 4.3 hours from its last annual inspection until the time of accident. The following was done during inspection: Spark plugs were cleaned; magneto timing was checked; and tappet clearance was checked.

## 3. Findings:

3.1 The pilot had a private pilot licence (PPL) which was issued on 26 October 2018, with an expiry date of 31 October 2019. The pilot conducted his last competency check on 7 October 2018 at FAKR. The pilot was endorsed to operate the aircraft.

3.2 The pilot's aviation medical certificate was valid with the restriction of wearing corrective lenses. The medical licence was issued on 19 October 2018, with an expiry date of 31 October 2019.

3.3 The aircraft's last annual inspection was carried out on 20 June 2018 at 1259.2 airframe hours. Spark plugs were cleaned; magneto timing was checked; and tappet clearance was checked.

3.4 The aircraft had a total of 1263.38 airframe hours at the time of the accident and had flown 4.18 hours since its last inspection.

3.5 The aircraft had a valid authority to fly which was issued on 20 June 2018, with an expiry date of 19 June 2019.

3.6 The private flight was conducted under visual flight rules (VFR) by day.

3.7 The weather at the time of the accident was as follows: wind 330°11KT; temperature 29°C; dew point 9°C; QNH: 1023.

3.8 The pilot had suspected that the cause of the engine losing power could have been carburetor icing, but after considering the weather conditions at the time of the accident, the investigation team concluded that there was a small probability of carburetor icing. The pilots operating handbook (POH) does not have warning of carburetor icing and, considering the temperature at that time and altitude of the aerodrome, there was no reason for the pilot to suspect carburetor icing.

3.9 The fuel used on the aircraft was a mixture of AVGAS/MOGAS which, according to the UKCAA information sheet (CAP1700), was not suitable for use on the Gipsy Major engine.

3.10 The investigation revealed that the aircraft's engine lost power during a climb and the pilot could not restore the engine power resulting on a loss of height and the subsequent forced landing. The aircraft nosed over during the landing roll on a rocky terrain. The cause of the engine power loss could not be determined.

## 4. PROBABLE CAUSE

4.1 Engine power loss during climb, resulting in a loss of height and the subsequent forced landing. The cause of engine power loss could not be determined.

## 5. REFERENCES USED IN THIS REPORT

5.1 *United Kingdom UKCAA information sheet (CAP1700).*

## 6 SAFETY RECOMMENDATION

6.1 None.

# Appendix 1

**Civil Aviation Authority**

**CAP1700: Preventing Gipsy Major Engine Failures - Information Sheet**

Please find below details of the CAA Publication you have selected. Dependent on availability, you are able to download the file, or purchase a printed copy.

Civil Aviation Authority

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Please note that, in the event of the UK leaving the EU without a negotiated agreement, some CAA website content and application forms may continue to carry the EASA logo or reference the EU or EASA rather than the UK CAA in the short term. These will be updated in due course following the UK's departure from the EU. In the meantime, the guidance provided and the application forms accessed via the CAA website portal will continue to be valid.

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| **Reference:** | CAP1700 |
| **Title:** | Preventing Gipsy Major Engine Failures - Information Sheet |
| **Description:** | The intention of this information sheet (CAP1700) was to raise awareness of an increase in the rate of technical occurrence reports submitted related to this engine type; which prompted further investigation to better understand if any underlying themes could be identified.<br><br>The information provided on the type of fuel available was based on reported evidence and expert opinion, our intention was not to endorse one type of fuel over another, simply informing the community on the available evidence.<br><br>The advice being that before you take any action if you have any questions relating to the performance of your engine or the use of a particular fuel is to speak with your engine maintenance provider.<br><br>The CAA is not suggesting there is any safety issue relating to the Gipsy Major engine, but rather advocating the provision of quality maintenance.<br><br>In all cases our ability to analyse industry trends is governed to a greater extent by the wider aviation community engaging with us in an open and transparent way, ideally through occurrence reporting. We welcome collaboration in the spirit of aviation safety and ultimately the more this happens, the better our collective understanding of safety issues will become.<br><br>Related materials: Two posters are available to support this information sheet. |
| **Status:** | Current |
| **Review Comment:** | None |
| **Version:** | 1 |
| **Date:** | 6 September 2018 |
| **View File:** | Open document in new window 262kb |
| **Purchase Copy:** | Printed copy not available for purchase |

# Preventing Gipsy Major Engine Failures

## Are you checking your engine?

After analysis, the CAA have identified information that suggests the use of AVGAS (100LL) fuel in these engines could cause reliability problems particularly with cylinder heads, valves and valve seats, especially where bronze cylinder heads have not been modified to incorporate stainless steel valve seats and result in a reduction of component life.

- UL91 is the most appropriate fuel to be used by your Gipsy Major engine.
- AVGAS (100LL) can be used, but this may affect the longevity of the components
- **The CAA recommends Unleaded MOGAS should not be used in Gipsy Major powered aircraft** due to it containing octane enhancers, notably ethanol, which can cause damage to your engine, particularly non-metallic components including the carburettor floats, rubber pipework, seals etc.

For more details on the above points please reference the engine technical manual.

Whilst the CAA recognises that a rough running engine or engine failure can be caused by a multitude of factors, one remedial action is to ensure the most appropriate fuel is used where available and that the engine is regularly checked by a qualified engineer.

It is recommended that ALL operators (whether on National Certificate of Airworthiness or Permit to Fly) of Gipsy Major engines ensure routine checks on these engines are carried out by a company/person experienced on this engine type. To ensure the engines are in a good and serviceable condition you should also have your engine properly checked if the:

- **Engine is found to be running rough, or**
- **Low compression is noticed when turning the propeller by hand.**

As ever, good maintenance is the key for a reliable engine.
The Gipsy Major engine is a widely used engine found in a variety of aircraft including Tiger Moths, Chipmunks and Austers. The engine is generally simple and reliable and with the right amount of care should provide operators with hours of trouble free use.

## Have fun and fly safe!

CAP1700