AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		**CA18/2/3/10152**	
Aircraft Registration	**ZS-AWX**	**Date of Accident**	3 May 2022			**Time of Accident**	0647Z
Type of Aircraft	Piper PA-25-235			**Type of Operation**		Agricultural (Part 137)	
Pilot-in-command Licence Type	Commercial Pilot Licence (CPL)			**Age**	25	**Licence Valid**	Yes
Pilot-in-command Flying Experience		**Total Flying Hours**		1232.9		**Hours on Type**	288.0
Last Point of Departure	Clan Airfield, KwaZulu-Natal Province						
Next Point of Intended Landing	Clan Airfield, KwaZulu-Natal Province						
Damage to Aircraft	Substantial						

Location of the accident site with reference to easily defined geographical points (GPS readings if possible)

Open field at Global Positioning System (GPS) co-ordinates determined to be 29°26'9.90" South, 030°27'15.16" East, at an elevation of 2132ft

Meteorological Information	Wind: 360° at 0kt, Temperature: 14°C, Dew Point: 14°C, CAVOK, QNH: 1023 hPa						
Number of People On-board	1 + 0	**Number of People Injured**	0	**Number of People Killed**	0	**Other (On Ground)**	0

Synopsis

On 3 May 2022, a pilot on-board a Piper PA-25-235 (Pawnee) aircraft with registration ZS-AWX took off on a crop-spraying operation from Clan Airfield in KwaZulu-Natal province to a private farm in Albert Falls, also in the same province. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that after completing the fifth swath line of spraying the crops at the farm and was on the climb to line up for the sixth swath line, he made a left turn to line up the aircraft at approximately 100 feet (ft) above ground level (AGL). At this time, the engine started to run rough, and the aircraft experienced abnormal vibrations. The pilot also noted that the aircraft's engine had lost power. He then turned right towards an open field in the vicinity to perform a forced landing. During the (right) turn, he heard loud noises which sounded like spluttering emanating from the engine compartment. Therefore, he leaned the mixture and turned on the carburettor heat to remedy the situation, but this was in vain. However, the pilot successfully forced-landed the aircraft on the open field and continued to roll on the ground for approximately 60 metres (m) before the propeller blades impacted a perimeter fence and the aircraft flattened it when it rolled over to the other side of the fence. The aircraft ground-looped and impacted some bushes before it came to a stop. The pilot was not injured during the accident sequence; however the aircraft was substantially damaged.

Probable Cause/s and/or Contributory Factors

In-flight engine power loss as a result of the left magneto drive gear failure due to a worn out drive gear shaft which led to advanced engine timing and, hence, the subsequent forced landing.

Contributing Factor:
Improper maintenance.

SRP Date	13 June 2023	Publication Date	15 June 2023

Occurrence Details

Reference Number	**:** CA18/2/3/10152
Occurrence Category	**:** Category 1
Type of Operation	**:** Aerial Work Operations (Part 137)
Name of Operator	**:** Natal Aerial Spray (PTY) LTD
Aircraft Make and Model	**:** Piper PA-25-235
Nationality	**:** South African
Registration Mark	**:** ZS-AWX
Place	**:** Albert Falls
Date and Time	**:** 3 May 2022 at 0647Z
Injuries	**:** None
Damage	**:** Substantial

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.

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.

Investigation Process

The Accident and Incident Investigations Division (AIID) of the South African Civil Aviation Authority (SACAA) was notified of the occurrence involving a Piper PA-25-235, which occurred at Albert Falls, KwaZulu-Natal province, on 3 May 2022 at 0647Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and ICAO STD Annex 13 definitions. Notifications were sent to the State of Registry, Operator and Manufacturer in accordance with CAR 2011 Part 12 and ICAO Annex 13 Chapter 4. The State of Manufacturer appointed an accredited representative and advisor. The investigator was dispatched to the accident site for this accident.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Accident — this investigated accident
   Aircraft— the Piper PA-25-235 involved in this accident
   Investigation — the investigation into the circumstances of this accident
   Pilot — the pilot involved in this accident
   Report — this accident report

2. *Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows, or lines.*

Disclaimer

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Abbreviation	Description
°	Degrees
°C	Degrees Celsius
AGL	Above Ground Level
AIID	Accident and Incident Investigations Division
AMO	Aircraft Maintenance Organisation
AOC	Air Operator Certificate
CAR	Civil Aviation Regulations
CAVOK	Cloud and Visibility OK
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CPL	Commercial Pilot Licence
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
DME	Distance Measuring Equipment
FAPM	Pietermaritzburg Airport
FDR	Flight Data Recorder
ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
ICAO	International Civil Aviation Organisation
LTD	Limited
m	Metre
METAR	Meteorological Aerodrome Report
MHz	Megahertz
PAPI	Precision Approach Path Indicator
PTY	Proprietary
QNH	Barometric Pressure Adjusted to Sea Level (Query Nautical Height)
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
TBO	Time Between Overhaul
UTC	Co-ordinated Universal Time
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omnidirectional Radio Range
Z	Zulu (Term for Universal Coordinated Time – Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On 3 May 2022, a pilot on-board a Piper PA-25-235 aircraft with registration ZS-AWX took off on a crop-spraying operation from Clan Airfield in KwaZulu-Natal province to a private farm in Albert Falls in the same province. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. The pilot stated that prior to the flight, pre-flight and ground checks were completed, and no anomalies were observed. The pilot stated that after completing five swath lines of crop-spraying at the farm and was on the climb to line up for the sixth swath line, he made a left turn to line up the aircraft at approximately 100 feet (ft) above ground level (AGL). At this time, the engine started to run rough whilst the aircraft experienced abnormal vibrations. The pilot also noted that the aircraft's engine had lost power. He then turned right towards an open field in the vicinity to perform a forced landing. During the (right) turn, he heard a loud noise which sounded like spluttering, emanating from the engine compartment. The pilot leaned the mixture and turned on the carburettor heat to remedy the situation, but this was in vain. He then committed to land on an open field ahead of his flight path. The aircraft touched down and continued to roll on the ground for approximately 60 metres (m) before the propeller blades impacted a perimeter fence and the aircraft flattened it when it rolled to the other side of the fence. It then ground-looped and impacted some bushes before it came to a stop.

1.1.3. The pilot was not injured during the accident sequence, and the aircraft was substantially damaged.

1.1.4. The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 29°26'9.90" South, 030°27'15.16" East at an elevation of 2 132ft.

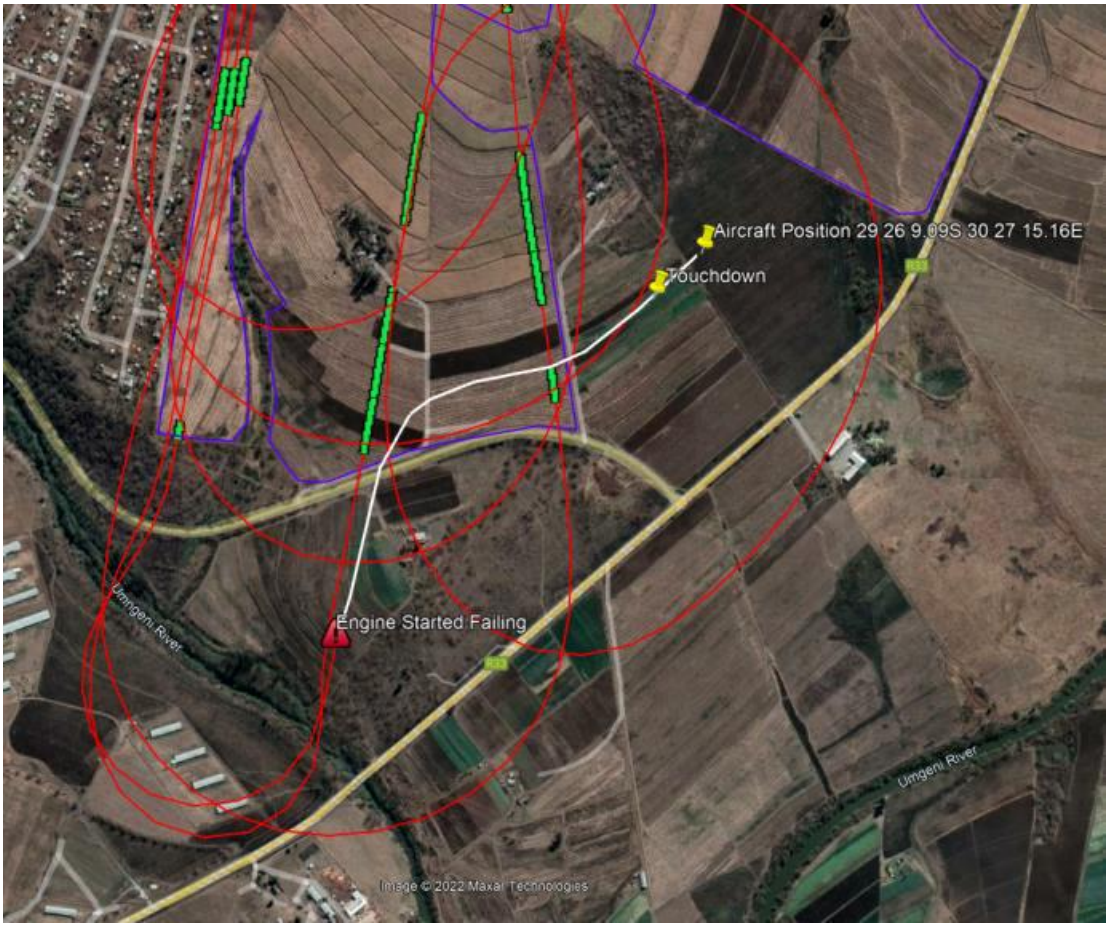

Figure 1: The red lines indicate the completed swath lines. The white line shows the flight path of the aircraft from the point the engine started to run rough to the point it came to a stop on the ground. (Source: Pilot)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	1	-	-	1	-
Total	**1**	**-**	**-**	**1**	**-**

Note: Other means people on the ground.

1.3. Damage to Aircraft

1.3.1. The aircraft sustained damage to the propeller, undercarriage, leading edge on both wings, left elevator, spinner and the spray system equipment.

Figure 2: The aircraft at the accident site.

1.4. Other Damage

1.4.1. The aircraft impacted a perimeter fence and flattened it.

Figure 3: The perimeter fence (brown line) constructed from wood poles and barbed wire with the aircraft on the top-left corner of the picture.

1.5. Personnel Information

Nationality	South African	Gender	Male	Age	25
Licence Type	Commercial Pilot Licence (CPL) Aeroplane				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instrument, Tug and Agricultural Pilot				
Medical Expiry Date	31 March 2023				
Restrictions	None				
Previous Accidents	None				

Note: Previous accidents refer to past accidents the pilot was involved in, when relevant to this accident.

Flying Experience:

Total Hours	1232.9
Total Past 24 Hours	0.6
Total Past 7 Days	8.3
Total Past 90 Days	127.0
Total on Type Past 90 Days	127.0
Total on Type	288.0

1.5.1. The pilot was issued a Commercial Pilot Licence (CPL) Aeroplane (A) on 13 March 2022 with an expiry date of 31 March 2023. The pilot's hours in the above table are as per the hours submitted by the pilot through the pilot questionnaire and logbook.

1.5.2. The pilot was issued a Class 1 medical certificate on 2 March 2022 with an expiry date of 31 March 2023 with no restrictions.

1.5.3. The pilot was issued a Piper PA-25-235 aircraft rating on 14 October 2021 to act as pilot-in-command.

1.6. Aircraft Information

1.6.1. Piper PA-25 Pawnee (Source: Piper Aircraft Corporation)

The Piper PA-25 Pawnee was manufactured by Piper Aircraft as an agricultural aircraft and introduced in August 1959. The Pawnee was produced from 1959 to 1981 and continues to serve its purpose in agricultural spraying. It was also utilised as a tow plane, or tug, used for launching gliders or for towing banners.

In the same year, two pre-production models were built and in May 1959, aircraft production began. The initial production version was designated as PA-25-150 Pawnee. In 1962, the PA-25-235 Pawnee B was built. It was powered by a Lycoming O-540-B2B5 engine rated at 235 horsepower and showcased a larger hopper, enhanced dispersal gear, and increased payload of 540 kg. In 1967, the PA-25-235 and PA-25-260 Pawnee C were introduced. It was an enhanced variant of the previous Pawnee B fitted with a 235 horsepower or 260 horsepower high-compression type of the Lycoming O-540 engine. It also featured a fixed-pitch or a constant-speed propeller. The PA-25-235 and PA-25-260 Pawnee D with fuel tanks located in the outer wings were also built.

Airframe:

Manufacturer/Model	Piper Aircraft Corporation, PA-25-235	
Serial Number	25-2528	
Year of Manufacture	1959	
Total Airframe Hours (At Time of Accident)	3185.0	
Last Inspection (Date & Hours)	4 March 2022	3119.7
Hours Since Last Inspection (MPI)	65.3	
CRS Issue Date	4 March 2022	
C of A (Issue Date & Expiry Date)	24 November 2018	30 November 2022
C of R (Issue Date) Present Owner	28 November 2017	
Type of Fuel Used	AVGAS 100LL	
Operating Category	Part 137	
Previous Accidents	None	

Note: Previous accidents refer to past accidents the aircraft was involved in, when relevant to this accident.

1.6.2 The aircraft was first registered to the present owner on 28 November 2017.

1.6.3 The last mandatory periodic inspection (MPI) that was carried out on the aircraft prior to the accident was on 4 March 2022, and was certified at 3119.7 airframe hours. The aircraft was issued a Certificate of Release to Service (CRS) on 4 March 2022 with an expiry date of 3 March 2023 or at 3287.7 hours of flight time, whichever occurs first.

Engine:

Manufacturer/Model	Lycoming O-540-B2B5
Serial Number	L-7039-40
Hours Since New	8034.9
Hours Since Overhaul	921.1

1.6.4 The engine was last overhauled at 7113.8 hours and was in operation for 921.1 hours since the last overhaul. The next engine overhaul was due at 8613.8 engine hours; and the engine was at 8034.9 hours at the time of the accident, with 578.9 hours remaining until the next engine overhaul.

Propeller:

Manufacturer/Model	McCauley/ 2A200-FA8452
Serial Number	103337
Hours Since New	3252.2
Hours Since Overhaul	563.3

1.6.5 The last inspection conducted on the aircraft prior to the accident flight was a 50-hour inspection on 18 April 2022, and was certified at 3176.8 airframe hours. The left and right magnetos were removed for a 500-hour inspection in accordance with (IAW) the Maintenance Manual number S-20/S-200 Series X42002. Both magnetos were inspected

and cleaned, and a function check was conducted; they were both found in a satisfactory condition. The aircraft accident occurred on 3 May 2022 and both magnetos had accumulated 8.2 hours in operation since their last inspection.

Magnetos:

	LEFT	RIGHT
Make/Model	Bendix, S6LSC-21	Bendix, S6LSC-204
Serial Number	D13LA156R	E13HA040R
Part Number	BL-500516-2	BL-600646-1
Hours Since Inspection	8.2	8.2

1.6.6 Piper Pawnee (PA-25-235) Warm-up and Ground Check:

WARM-UP AND GROUND CHECK

As soon as the engine starts, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble.

Warm up the engine at 800 to 1000 RPM for not more than two minutes in warm weather, four minutes in cold weather. The magnetos should be checked at 1800 RPM, the drop not to exceed 125 RPM. The engine is warm enough for take-off when the throttle can be opened without the engine faltering.

If installed, the constant speed prop control should be moved through its complete range to check for proper operation and then placed to increase RPM for take-off.

Carburetor heat should be checked during the warm up to insure the correct operation of the control and the availability of heat if needed.

1.7. Meteorological Information

1.7.1. The weather information below was obtained from the Meteorological Aerodrome Report (METAR) that was issued by the South African Weather Service (SAWS), recorded on 3 May 2022 at 0700Z at Pietermaritzburg Airport (FAPM), which is located 10 nautical miles (nm) from the accident site.

FAPM 030700Z AUTO 00000KT CAVOK 14/14 Q1023=

Wind Direction	360°	Wind Speed	Nil	Visibility	9999m
Temperature	14°C	Cloud Cover	CAVOK	Cloud Base	CAVOK
Dew Point	14°C	QNH	1023hPa		

1.7.2. In the table above, the temperature is 14°C and dew point is also 14°C, equating to a dew point depression of 0° and a relative humidity of 97%. Mapping these values on the carb-icing chart resulted in a serious probability icing at both cruise and descent powers.

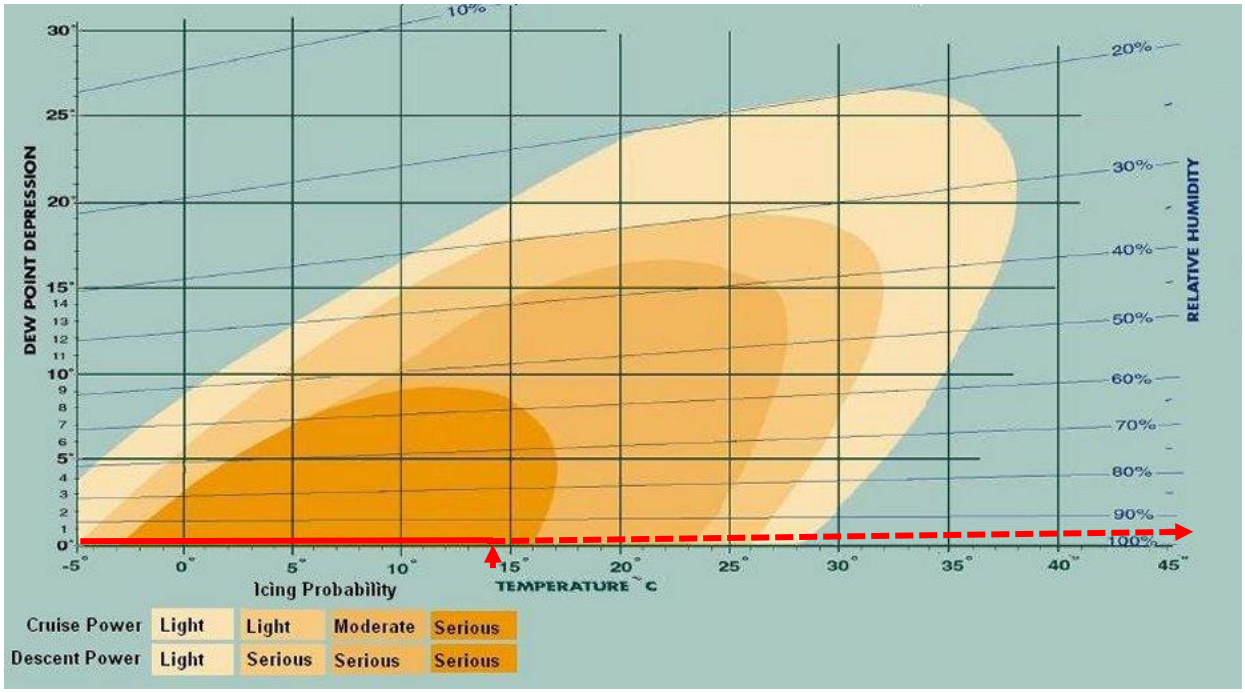

Figure 4: The carb-icing probability chart indicating weather conditions at the time of the accident.

1.8. Aids to Navigation

1.8.1. The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no records indicating that the navigational equipment was unserviceable prior to the accident.

1.9. Communication

1.9.1. The aircraft was equipped with a standard communication system as approved by the Regulator. There were no recorded defects with the communication system prior to the accident.

1.10. Aerodrome Information

1.10.1. The closest aerodrome to the accident site was Pietermaritzburg Airport (FAPM).

Aerodrome Location	Pietermaritzburg, KwaZulu-Natal
Aerodrome Status	Licensed
Aerodrome GPS coordinates	29°39'0.47" South, 30°23'58.78" East
Aerodrome Elevation	2423 ft
Runway Headings	16/34
Dimensions of Runway	30m x 1537m
Surface of Runway	Asphalt
Approach Facilities	VOR, DME, PAPI
Radio Frequency	122.0 MHz

1.11. Flight Recorders

1.11.1. The aircraft was neither equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by regulation to be fitted to the aircraft type.

1.12. Wreckage and Impact Information

1.12.1. The aircraft touched down on an uneven terrain after the forced landing and rolled for approximately 60m before the propeller blades impacted a perimeter fence, followed by the aircraft flattening it. The aircraft continued to roll to the other side of the fence, ground-looped and made an approximate 90° turn. It then impacted some bushes before it came to a stop with the nose facing south-east.

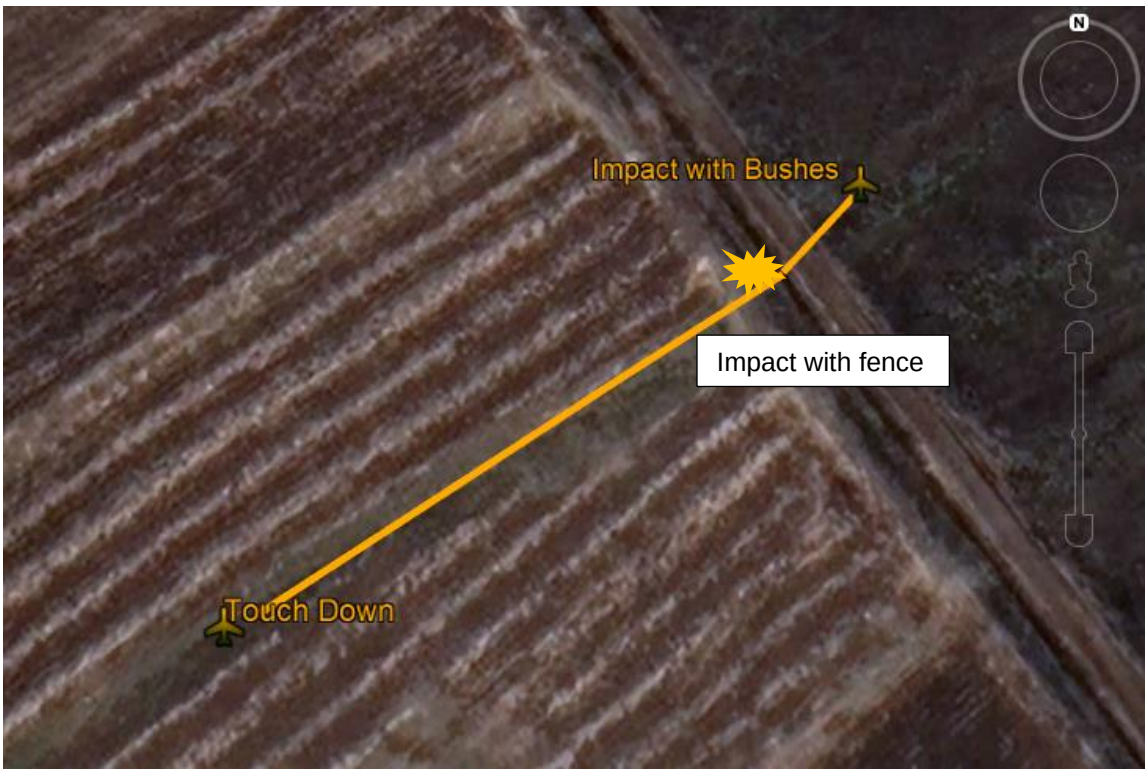

Figure 5: The path of the aircraft after touchdown. (Source: Google Earth)

1.12.2. The Fuselage:

The fuselage was fairly intact with signs of damage on the leading edge of both wings after impacting the perimeter fence. The left elevator and left-wing leading edge sustained greater impact damage as the aircraft's left-side and the spray system equipment impacted the bushes.

Figure 6 and 7: Damage to the left elevator (left); and left-side wing tucked in the bushes (right).

1.12.3. The engine and propeller:

The engine was intact, it was found still attached to the cradle with no sign of oil or fuel spillage. Both propeller blades were still attached to the hub with no signs of rotational signatures. One blade was found lodged firmly into the ground.

Figure 8: The condition of the engine compartment as it was observed at the accident site.

Figure 9: The final position of the propeller.

1.13. Medical and Pathological Information

1.13.1. Not applicable.

1.14. Fire

1.14.1. There was no pre- or post-impact fire that erupted during the accident sequence.

1.15. Survival Aspects

1.15.1. The accident was considered survivable as the cabin structure was still intact and the pilot was safely harnessed during the flight. The aircraft skidded on the ground and bled off some speed before it impacted the perimeter fence.

1.16 Tests and Research

1.16.1 The Lycoming engine with serial number L-7039-40 and two magnetos were stripped at the aircraft maintenance organisation (AMO) facility on 2 June 2022. The findings are listed below:

- *The engine accessory housing was removed to gain access to the gear train and all the gears were found unserviceable (crankshaft gear, both crankshaft idler gears and left magneto drive gear).*

- *One of the left magneto drive gear teeth was found broken (figure 9).*
- *The crankshaft idler gear was found damaged where the magneto drive gear meshes with it (Figure 10).*

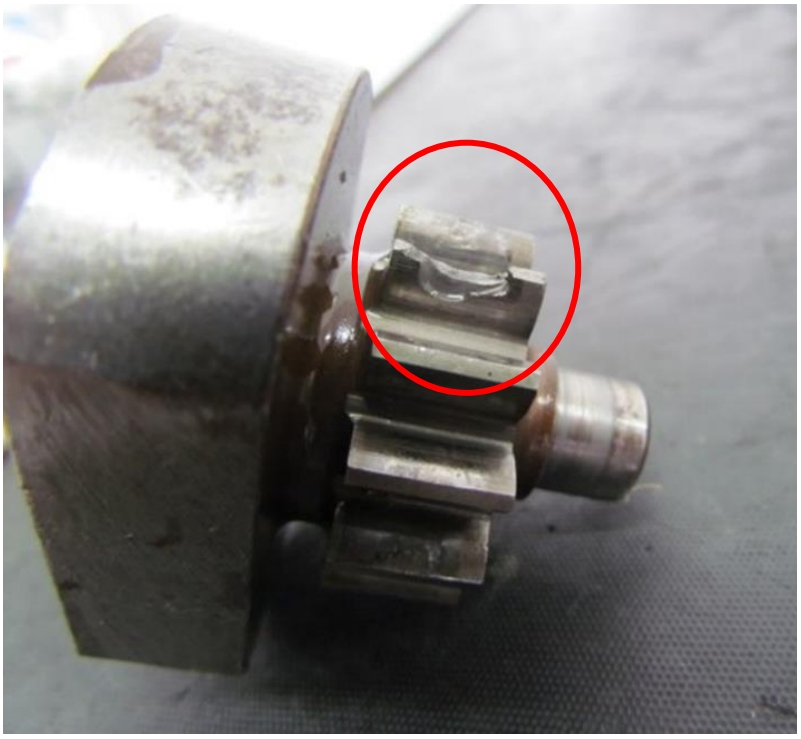

Figure 10: The left magneto drive gear indicating one of the broken teeth. (Source: AMO)

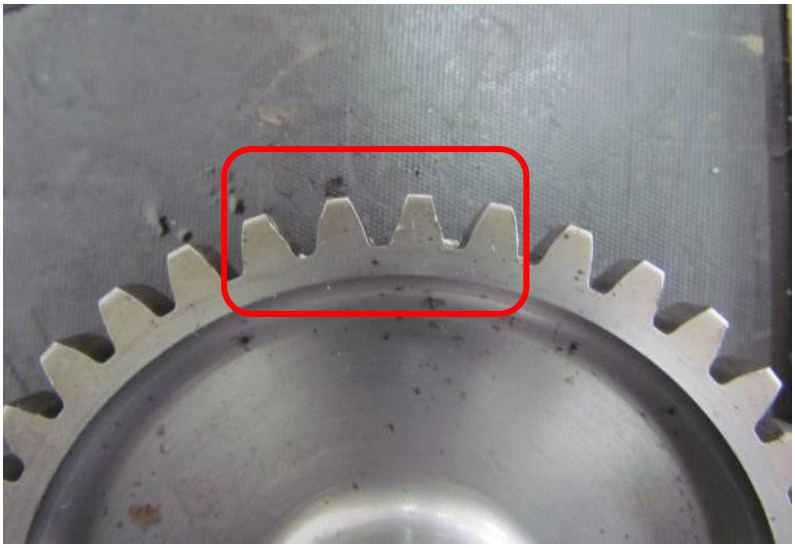

Figure 11: The crankshaft idler gear with wear on teeth. (Source: AMO)

- *In conclusion, when the left magneto drive gear failed, it resulted on the internal timing to be shifted, this resulting in the engine misfiring and would have vibrated badly eventually ending with an engine power loss*.

1.16.2 Further inspection of the left and right magneto drive gears indicated wear on the magneto drive gear shaft that is inserted into the engine via a bearing. It was also noted that during the engine strip, the magneto drive gear could easily be removed by hand from the bearing. The component is press-fit onto the engine and, therefore, should not be easily removed.

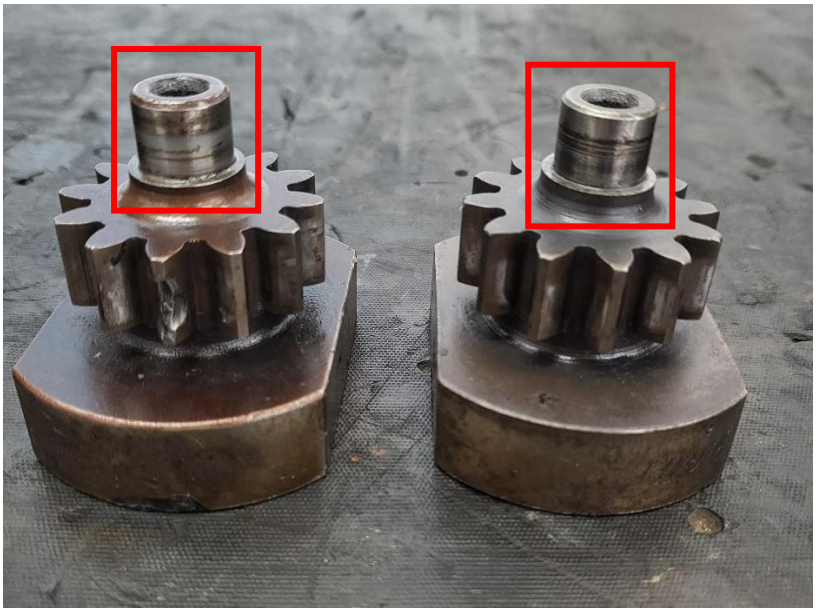

Figure 12: The left and right magneto drive gear shaft indicating wear on the shaft.

1.16.3 Illustration 1 below is an extract from the Lycoming O-540-B, -E and -G series parts catalogue. It indicates the ignition system in which the magneto drive gear assembly (7,9,11) is inserted into the bearing (8,10,12).

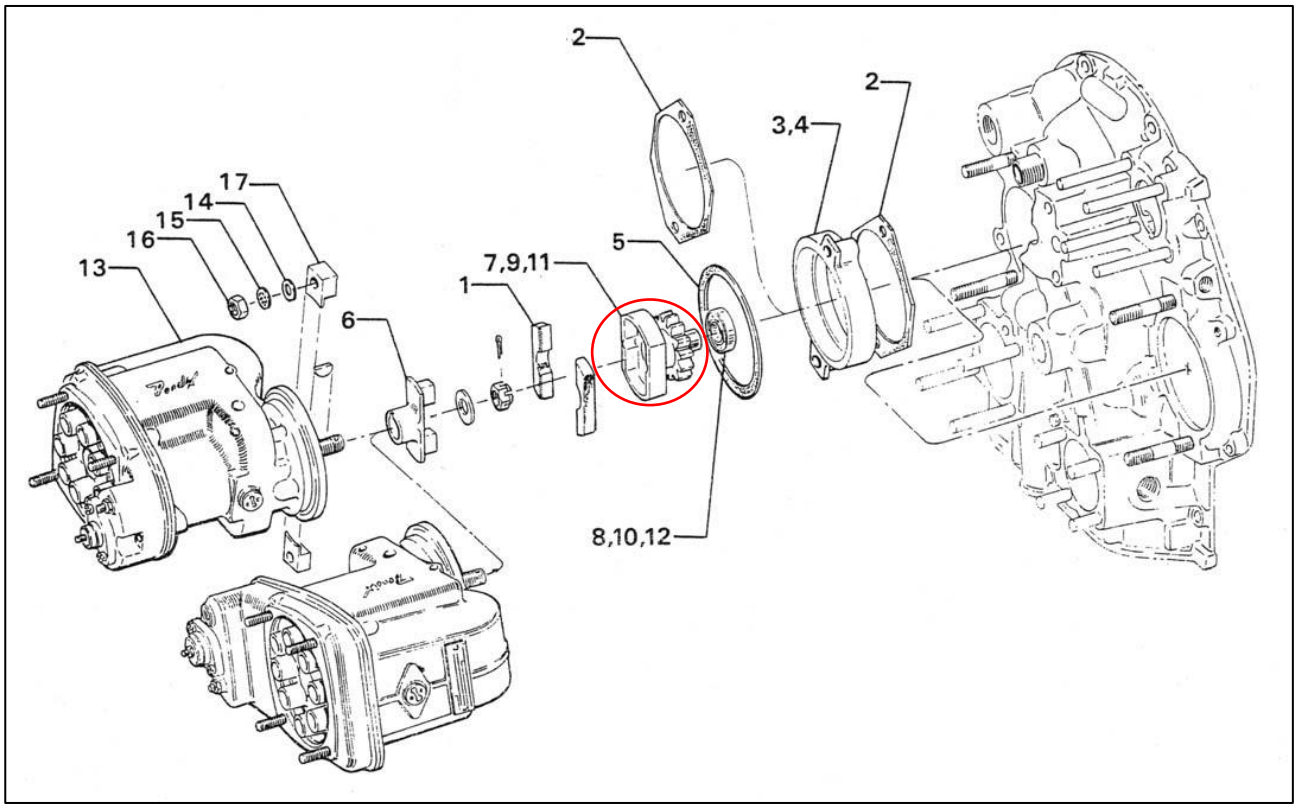

Illustration 1: The ignition system indicating the magneto drive gear (red circle).
(Source: Lycoming O-540 Parts Catalogue)

1.17 Organisational and Management Information

1.17.1 The flight was conducted under the provisions of Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.17.2 The operator was issued an Air Operating Certificate (AOC) with an endorsement of Part 137 by the Regulator (SACAA) on 5 October 2021 with an expiry date of 31 October 2022. The operator of the aircraft had a Class G certificate that was issued in accordance with the Civil Aviation Regulations.

1.17.3 The AMO that certified the last MPI had an AMO approval certificate that was issued by the SACAA on 11 August 2021 with an expiry date of 31 July 2022.

1.18 Additional Information

1.18.1 Carburettor icing (Source: Pilot Institute.com)

It is not only the airframe exterior that is susceptible to ice. Air and fuel are vital for an airplane engine to keep running. If either of these key ingredients are blocked and restricted, it could have bad consequences. According to the NTSB, carb icing has accounted for at least 250 accidents in ten years. But you can do things to prevent it and minimize the risk. Today we will take a detailed look at carburettor icing and how you can prevent it. Carburettor icing forms as a result of a drop in temperature in the carburettor. The temperature loss is caused by the evaporation of fuel, combined with a pressure drop. If the carburettor is restricted or blocked, this can lead to fuel and air starvation in the engine, causing a restriction in available power or the engine stopping completely.

Carb icing is most likely to occur at low power settings. Particularly in the descent or periods of slow flight. The answer is to increase the power occasionally. In a long descent, you may want to level off for a time and increase the power. A good tip is to cycle the carb heat while you do this to ensure that there is no ice before continuing on your way down.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this accident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

2.2.1. Weather

Fine weather conditions prevailed at the time of the flight; therefore, the weather was not a contributory factor to the accident. Even though the carb-icing chart indicated a probability of icing, carburettor icing could not be attributed to the accident as crop-spraying flights are normally conducted at high-power settings. The pilot also applied the carburettor heat to remedy the situation (if there was carburettor icing).

2.2.2. Pilot

The pilot was certified to act as a pilot-in-command for the aircraft type and had a valid CPL, Class 1 medical certificate and agricultural rating, therefore, the pilot was qualified for the crop-spraying operation flight. The pilot performed ground checks prior to take-off and there were no anomalies i.e., excessive RPM drop during the magneto drop test. When the engine lost power, the pilot was able to locate an open field and land the aircraft.

2.2.3. Aircraft

During a crop-spraying operation whilst on a climb after a swath spray, the engine ran rough, lost power, and the aircraft vibrated before it was forced-landed on an open field. Post-accident engine investigation revealed that one of the magneto drive gear teeth had sheared which caused the advancement of the internal timing. The off timing caused the engine to vibrate and, eventually, led to engine power loss. The engine stoppage was evidenced by both the propeller blades having no signs of rotational signatures at the accident site.

Further investigation of the left and right magneto drive gears indicated wear on the magneto drive gear shaft. The wear on the left magneto drive gear shaft was considerable enough that when the drive gear was removed from the point where it is flushed with the bearing, the removal could be carried out by hand. This component is press-fit into the engine and, therefore, it should not be easily removed by hand in a normal operation. This indicated that the drive gear was unserviceable and, during flight, caused some play between the drive gear and the crankshaft idler gear. These two gears should mash into each other and, if not, teeth will be knocked out as observed in the left magneto drive gear.

It is probable that after the last magneto inspection when the left and right magneto were refitted onto the engine, the condition of both magneto drive gears was not inspected. This component is on-condition, but it is recommended that in future it should be inspected when the magneto is removed or/and when it is refitted.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this accident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings —** are statements of all significant conditions, events, or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.
- **Causes —** are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- **Contributing factors —** are actions, omissions, events, conditions or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident occurring, or would have mitigated the severity of the consequences of the accident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2. Findings

3.2.1. The pilot was issued a CPL on 13 March 2022 with an expiry date of 31 March 2023. The pilot's Class 1 medical certificate was issued on 2 March 2022 with an expiry date of 31 March 2023 with no restrictions.

3.2.2. The pilot had the agricultural rating, and the aircraft type was endorsed on his licence.

3.2.3. The flight was conducted under the provisions of Part 137 of the CAR 2011 as amended and under VMC by day. Fine weather conditions prevailed at the time of the flight.

3.2.4. The aircraft was originally issued a Certificate of Airworthiness on 24 November 2018 with an expiry date of 30 November 2022.

3.2.5. The Certificate of Registration was issued to the present owner on 28 November 2017.

3.2.6. The last mandatory periodic inspection (MPI) was carried out on 4 March 2022 and was certified at 3119.7 airframe hours. The aircraft was issued a Certificate of Release to Service (CRS) on 4 March 2022 with an expiry date of 3 March 2023 or at 3287.7 hours of flight time, whichever occurs first unless the aircraft is involved in an accident or becomes unserviceable.

3.2.7. On 18 April 2022 at 3176.8 airframe hours, the left and right magnetos were removed from the engine and a 500-hour inspection was conducted; both were found in satisfactory condition. The accident occurred on 3 May 2022 and both magnetos had accumulated 8.2 hours in operation since their last inspection.

3.2.8. During a right turn whilst crop-spraying, the engine lost power and the aircraft was forced-landed on an open field.

3.2.9. During a post-accident engine strip, it was found that the crankshaft gear, both crankshaft idler gears and left magneto drive gear were unserviceable.

3.2.10. It is probable that the magneto drive gear shaft was warn (out of limit) and was refitted to the engine which resulted in damage to the magneto drive gear.

3.3. Probable Cause/s

3.3.1. In-flight engine power loss as a result of the left magneto drive gear failure due to a worn out drive gear shaft which led to the advanced engine timing and, hence, the subsequent forced landing.

3.4. Contributory Factor/s

3.4.1. Improper maintenance.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2. Safety Message

4.2.1. The AMOs and aircraft maintenance engineers (AMEs) are advised to inspect the fitment security of the magneto drive gear shaft and bearing before the magneto is refitted to the engine.

5. APPENDICES

5.1. None.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa