PRELIMINARY ACCIDENT REPORT

Accident and Incident Investigations Division

Accident
- Preliminary Report -
AIID Ref No: CA18/2/3/9952

Figure 1: A filed picture of the ZS-XAT aircraft. (Source: Jet Photos)

Description:

On 4 February 2021 at approximately 0932Z, the AT-502B aircraft with registration ZS-XAT was destroyed on impact and by post-impact fire during an accident which occurred at Letsatsi Game Lodge. The aircraft, which was being ferried from Lanseria International Airport (FALA) to Hosea Kutako International Airport (FYWH) in Namibia, was operated under Visual Flight Rules (VFR) conditions, however, at the time of the accident, instrument meteorological conditions (IMC) prevailed around Millvale area in Rustenburg. The flight was conducted under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

INTRODUCTION

Reference Number	**:** CA18/2/3/9952
Name of Owner/Operator	**:** Xcalibur Resources (PTY) LTD
Manufacturer	**:** Air Tractor Inc
Model	**:** AT-502B
Nationality	**:** South African
Registration Marks	**:** ZS-XAT
Place	**:** Millvale, North West province
Date	**:** 4 February 2021
Time	**:** 0932Z

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 was notified to the Accident and Incident Investigations Division (AIID) on 4 February 2021 at approximately 1200Z. The investigators dispatched to Millvale on 4 February 2021 to conduct an on-site investigation. The investigators co-ordinated with all authorities on site by initiating the accident investigation process according to CAR Part 12 and investigation procedures. The AIID is leading the investigation as the Republic of South Africa is the State of Occurrence.

Notes:
1. Whenever the following words are mentioned in this report, they shall mean the following:

- *Accident — this investigated accident*
- *Aircraft — the AT-502B 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
AIID	Accident and Incident Investigations Division
AGL	Above Ground Level
AME	Aircraft Maintenance Engineer
AMO	Aircraft Maintenance Organisation
AOC	Air Operating Certificate
ATPL	Airline Transport Pilot Licence
C	Celsius
CAR	Civil Aviation Regulations
CVR	Cockpit Voice Recorder
CofA	Certificate of Airworthiness
CofR	Certificate of Registration
CRS	Certificate of Release to Service
DME	Distance Measuring Equipment
FARG	Rustenburg Airfield
FALA	Lanseria International Airport
FAMM	Mmabatho International Airport
FAMS	Morningside Farm Airfield
FDR	Flight Data Recorder
FM	Flight Manual
FT	Feet
FYWH	Hosea Kutako International Airport
GPS	Global Positioning System
H	Helicopter
hPa	Hectopascal
ILS	Instrument Landing System
Kt	Knot
L	Litre
m	Metre
METAR	Meteorological Aeronautical Report
MPI	Mandatory Periodic Inspection
ml	Millilitre
n/a	Not Applicable
nm	Nautical Mile
PAPI	Precision Approach Path Indicator
QNH	Query Nautical Height
SACAA	South African Civil Aviation Authority
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VOR	Very high Frequency Omni-directional Range
Z	Zulu

1. Factual Information

1.1. History of Flight

1.1.1 On 4 February 2021, two AT-502B aircraft with registrations ZS-XAT and ZS-XAS took off from Lanseria International Airport (FALA) on ferry flights to Hosea Kutako International Airport (FYWH) situated in Namibia. The flights were conducted under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2 The pilot of ZS-XAS stated that he took off at 0858Z after ZS-XAT aircraft. The two pilots were communicating via very high frequency (VHF) radio during the flight. He (ZS-XAS pilot) then routed right (Figure 2, blue line) of the planned flight path due to low-hanging clouds; and climbed to flight level 055 (FL055). Thereafter, he contacted ZS-XAT pilot, who responded and notified him that he was climbing to FL100 and was flying to the left (Figure 2, red line) of the planned flight path. The pilot of ZS-XAS flew towards north of Rustenburg and turned in a south-westerly direction due to the deteriorating weather conditions. He tried to contact ZS-XAT pilot to no avail. He then contacted Johannesburg (JHB) Information to get an update on the weather conditions. JHB Information advised that the weather was becoming more unfavourable to fly; and the ZS-XAS pilot made a decision to fly back to FALA.

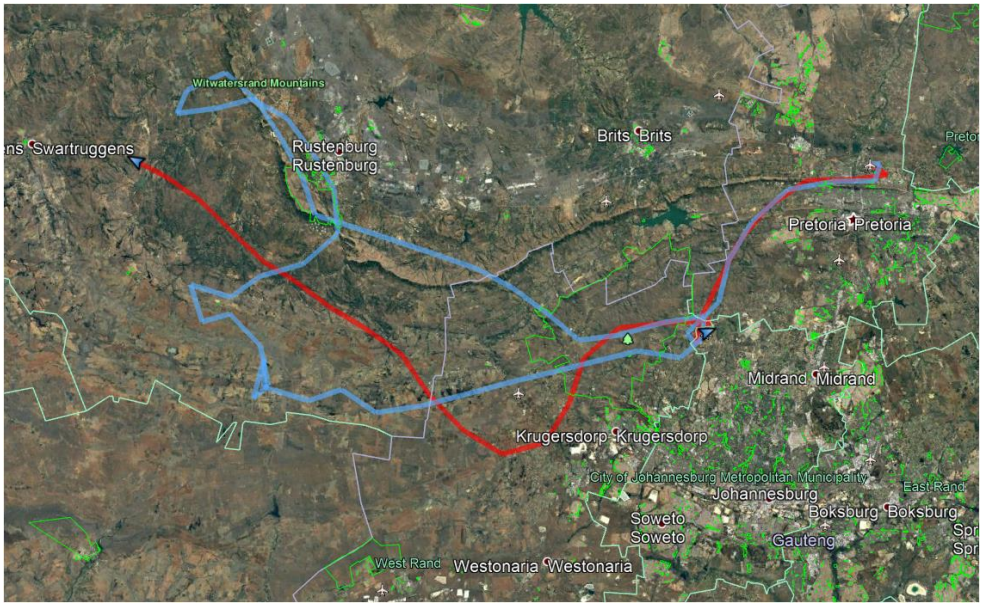

Figure 2: The flight path of both aircraft; red line, ZS-XAT and blue line, ZS-XAS. (Source: Operator)

1.1.3 Both aircraft had tracking devices installed on them and the operator was tracking both from Wonderboom Airport (FAWB).

1.1.3.1 Figure 3 shows the flight path relating to ZS-XAT: The red shaded area relates to the altitude of the accident aircraft (ZS-XAT). The aircraft took off from FAWB and made a descent to FALA where it landed without event. The aircraft then took off again to FYWH and climbed to 6000 feet (ft) above mean sea level (AMSL) approximately 50

miles from FALA; it again climbed to a maximum altitude of 10 344ft AMSL at 0932Z when it disappeared from the tracking device.

1.1.3.2 The blue shaded area (in Figure 3) relates to the speed of the ZS-XAT aircraft. The aircraft took off from FAWB and made a descent to FALA. It then took off again and climbed, reaching a speed of 165 miles per hour (mph) or 143 knots (kts) approximately 50 miles from FALA. Thereafter, the speed started to decrease until it reached 117mph (101 kts) at 0932Z and then disappeared from the tracking device.

1.1.3.3 The place where the aircraft was seen disappearing from the operator's tracking device and radar control of JHB Information was determined to be 1 nautical mile (nm) north-east of Morningside Airfield (FAMS).

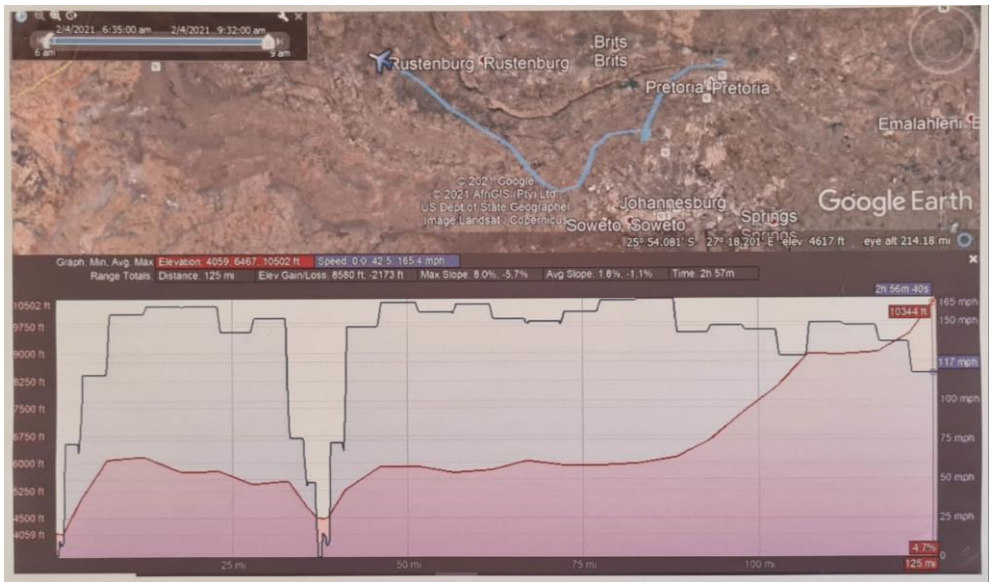

Figure 3: The flight path of ZS-XAT. (Source: Operator)

1.1.4 According to an eyewitness who was working at a (game) farm approximately 2.8 kilometres (km) south-east of the accident site, the aircraft was flying from the north-east direction and descended below the low clouds. The aircraft then turned right and disappeared from his view. He stated that from the sound of the aircraft's engine, it seemed as though it was speeding. A few seconds later, the aircraft's engine went quiet but soon after, he heard a loud bang. The eyewitness had, earlier that morning, noted that the clouds were hanging very low and that he could not see the peaks of the surrounding hills. A second witness who is a manager at Letsatsi Game Lodge where the accident occurred, stated that she heard the loud bang and, together with the farm workers, traced the source of smoke which led them to the aircraft (wreckage). They located the wreckage and notified the local fire-fighters that an aircraft was on fire. They then discovered that the pilot was trapped in the wreckage; he had succumbed to the injuries on impact.

1.1.5 The aircraft was destroyed by impact forces and a post-impact fire, and the pilot was fatally injured during the accident.

1.1.6 The accident occurred during daylight at Letsatsi Game Lodge in the North West province at Global Positioning System (GPS) co-ordinates determined to be: 25°40'4.0" South, 026°53'7.8" East, at an elevation of 4500 feet (ft) above mean sea level (AMSL).

1.2. Injuries to Persons

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

Note: Other means people on ground.

1.3. Damage to Aircraft

1.3.1 The aircraft was destroyed during the accident sequence and by post-impact fire.

Figure 4: The aircraft at the accident site.

1.4. Other Damage

1.4.1 Trees in proximity to the accident site.

1.5. Personnel Information

Nationality	South African	Gender	Male	Age	67
Licence Number	0270022155	Licence Type	CPL (Fixed Wing Aircraft)		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instructor Grade 3, Agricultural, Test Pilot Class 2				
Medical Expiry Date	31 July 2021				
Restrictions	Suitable Corrective Lenses				
Previous Accidents	To be discussed in the final report				

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

1.5.1 The pilot was not issued an instrument flight rating.

Flying Experience:

Total Hours	21 932.3
Total Past 24 Hours	2.8
Total Past 7 Days	2.8
Total Past 90 Days	54.4
Total on Type Past 90 Days	48.2
Total on Type	To be discussed in the final report

1.5.2 The pilot's logbook was not located at the time of completion of this preliminary report. The table (above) shows a summary of the pilot's total flight hours until 23 January 2021, as well as includes the flight of 4 February 2021. The hours were obtained from the logbook copies found in the pilot's file at the South African Civil Aviation Authority's (SACAA's) facility which were submitted for the pilot's annual licence renewal.

1.6. Aircraft Information

Airframe:

Manufacturer/Model	Air Tractor AT-502B	
Serial Number	502B-2968	
Year of Manufacturer	2014	
Total Airframe Hours (At Time of Accident)	3 762.0	
Last MPI (Date & Hours)	20 January 2021	3759.2
Hours Since Last MPI	2.8	
C of A (Issue Date)	15 November 2014	
C of A (Expiry Date)	30 November 2021	
C of R (Issue Date) (Present Owner)	18 September 2014	
Type of Fuel Used in the Aircraft	Jet A1	
Operating Categories	Standard Part 91	
Previous Accidents	To be discussed in the final report.	

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

Engine:

Manufacturer/Model	P&W, PT6A-34AG
Serial Number	PCE-PH1003
Hours Since New	3762.0
Hours Since Overhaul	TBO not reached

Propeller:

Manufacturer/Model	Hartzell HC0-B3TN-3D
Serial Number	BUA32947
Hours Since New	3762.0
Hours Since Overhaul	1185.7

1.6.1 The last maintenance inspection carried out on the aircraft prior to the accident flight was on 20 January 2021 at 3759.2 airframe hours. The aircraft was issued a Certificate of Release to Service (CRS) on 20 January 2021 with an expiry date of 19 January 2022 or at 3909.2 hours, whichever occurs first.

1.7. Meteorological Information

1.7.1 A weather report for 4 February 2021 at 0900Z was obtained from the meteorological aeronautical report (METAR) which was made available for Rustenburg Airfield (FARG), which is the closest weather station.

Wind Direction	270°	Wind Speed	1 knot	Visibility	unknown
Temperature	22°C	Cloud Cover	Broken	Cloud Base	2000-3000ft
Dew Point	20°C	QNH	1019hPa		

1.7.2 *ATTACHMENT C Sigwx chart valid 4 February 2021 at 0900Z (South African Weather Services)*

Red area is roughly the accident site.

It shows generally cloudy area with low-level stratocumulus and cumulus clouds ranging from 1500-3000ft above ground with tops up to 12000ft and also towering cumulus clouds with some light showery rain.

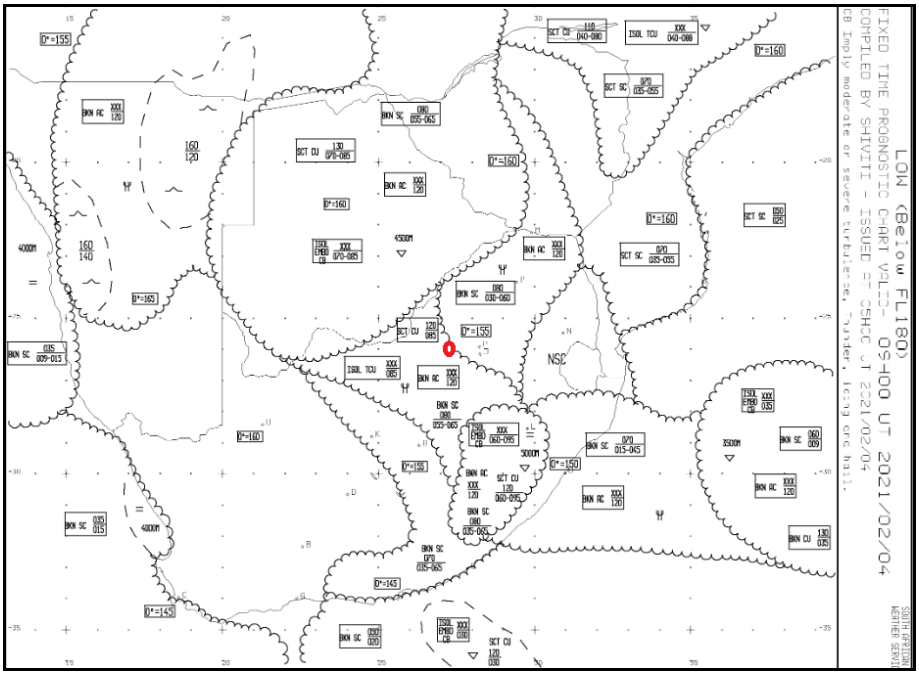

Figure 5: The cloud bases and tops at the time of accident.

1.7.3 The weather report for 4 February 2021 shows that the weather stations along the planned route – FALA, Hartbeespoort, Buffelspoort, FARG and FAMM – recorded broken cumulus at 2000-4000ft above ground level (AGL) with cumulonimbus clouds, towering cumulus at 4500ft AGL and overcast at 6000ft AGL. The grey cross in Figure 6 (below) represents the accident site.

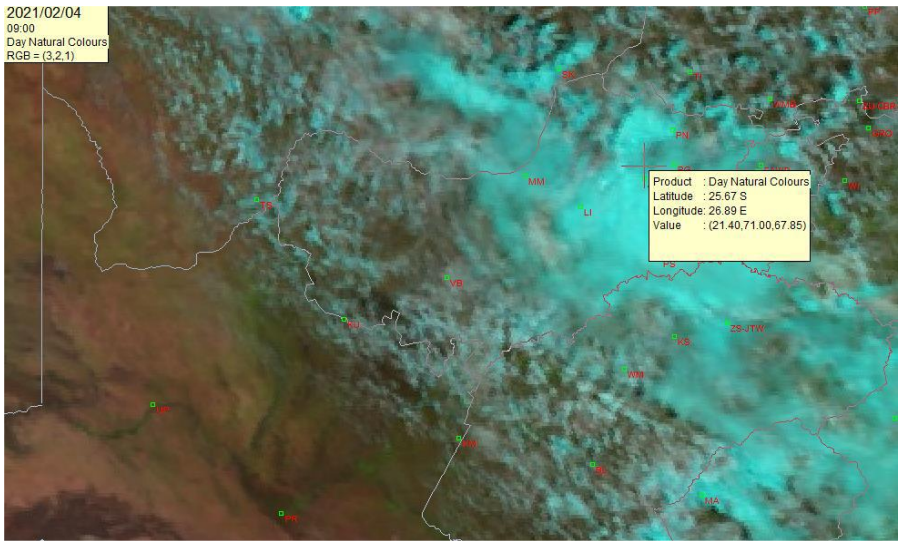

Figure 6: The cloud cover at the time of accident.

1.7.4 *CAR 2011 Part 91.06.21 Visual Flight Rules*

A VFR flight shall be conducted so that the aircraft is flown: *(a) With visual reference to the surface by day and to identifiable objects by night and at no time above more than three eights of cloud within a radius of 5 NM of the aircraft in flight.*

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 recorded defects with the navigational equipment prior to the flight.

1.9. Communication

1.9.1 The aircraft was equipped with standard communication equipment as approved by the Regulator. No defects that could render the navigation system unserviceable were recorded before the flight. The pilot was in communication with the ZS-XAS pilot on 124.8 megahertz (MHz) frequency until a few minutes before the accident.

1.10. Aerodrome Information

1.10.1 The accident occurred during daylight at Letsatsi Game Lodge in Millvale North West province at Global Positioning System (GPS) co-ordinates determined to be: 25°40'4.0" South, 026°53'7.8" East, at an elevation of 4500ft above mean sea level. Below is the nearest aerodrome to the accident site.

Aerodrome Location	Morningside Airfield (FAMS)
Aerodrome Status: Registered	Private
Aerodrome Co-ordinates	25°41'59" South, 026°54'45" East
Aerodrome Altitude	4251ft
Runway Headings	03/21
Runway Dimensions	1402m X 9m
Runway Used	n/a
Runway Surface	Asphalt
Approach Facilities	None
Radio Frequency	124.8 MHz

1.11. Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was it required by regulation to be fitted to this aircraft type.

1.12 Wreckage and Impact Information

1.12.1 The aircraft took off from FALA and climbed to 6000ft AMSL approximately 50 miles from FALA. It further climbed to 10 000ft AMSL approximately 1nm north-east of FAMS. The aircraft was then observed making a descent below the clouds; it turned right before descending towards the ground.

1.12.2 On-site inspection showed signs that the aircraft was in a high rate of descent in a steep angle. It approached from a south-easterly direction and flew in a straight left

bank through the trees, severing the ones on its right-side path (Figure 7). On impact, the tail section folded onto the cabin section and the aircraft skidded to the left, leaving behind the severed right wing (at impact point). A post-impact fire ensued and burnt the cabin, some parts of the left wing, engine and the trees on its left-side path (Figure 7). The black arrow (Figure 7) shows the impact direction; the red circle indicates the severed right wing; the yellow circle shows the severed undercarriage; and the orange circle indicates the rest of the wreckage.

Figure 7: The wreckage layout post-accident.

1.12.3 Parts of the left wing were found approximately 1km (behind) from the point of impact. Most of these parts were from the left-wing tip. The furthest part was found approximately 1km from the wreckage with the rest of the parts nearby. The red dots (1-9) in Figure 8 represent different locations where these parts were found. The black arrow indicates the flight path.

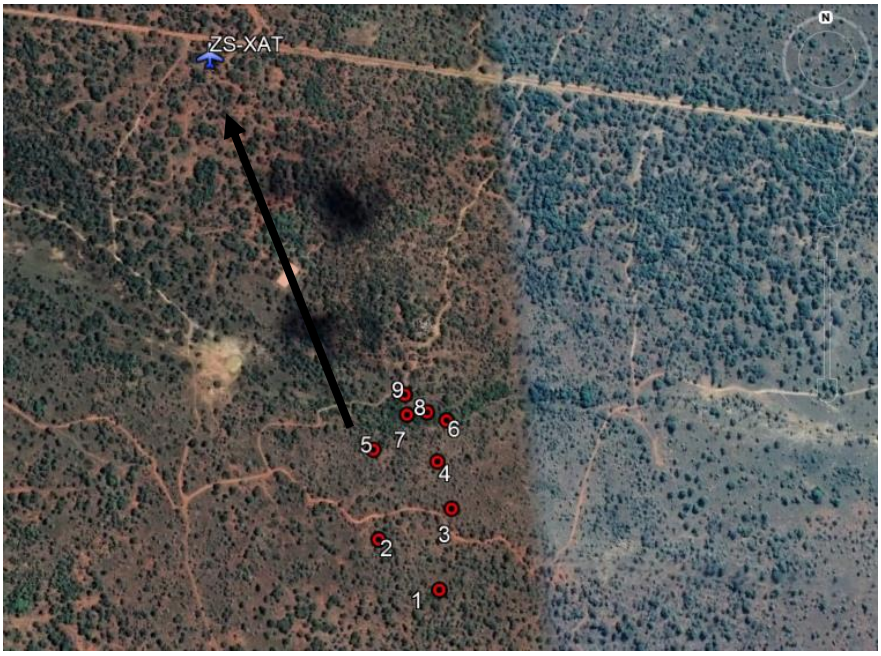

Figure 8: The wreckage distribution.

Figure 9: Parts of the left wing.

1.12.4 One of the left-wing aileron attachment together with a piece of left-wing main tank projected 15 metres (m) ahead of the wreckage when the aircraft impacted the ground.

Figure 10: The left-wing aileron attachment.

1.12.5 The engine was burnt by post-impact fire and the damage to the engine was due to impact forces.

Figure 11: The engine post-accident.

1.12.6 Two of the propeller blades were severed on impact and the third was still attached to the hub. All three blades showed signs of rotational signatures and damage caused on impact.

Figure 12: The propeller blades showing rotation signatures on the tips.

1.13 Medical and Pathological Information

1.13.1 To be discussed in the final report.

1.14 Fire

1.14.1 Shortly after the aircraft impacted the ground, a fire ensued around the engine compartment, cabin, right landing gear tyre and left wing. Some of the trees in the surround also caught fire.

1.15 Survival Aspects

1.15.1 The accident was considered unsurvivable due to the damage caused by impact and post-impact fire to the cabin and cockpit areas of the aircraft. The pilot was also trapped inside the wreckage due to the tail section folding onto the cabin section. The aircraft caught fire after impact, engulfing the cabin area.

1.16 Tests and Research

1.16.1 To be discussed in the final report.

1.17 Organisational and Management Information

1.17.1 The flight was conducted under the provisions of Part 91 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.17.2 The operator was issued an Air Operating Certificate (AOC) number CAA/G767D with endorsement of Part 135 by the Regulator (SACAA) on 4 March 2020. The operator of the aircraft held a Class G Certificate in accordance with the Civil Aviation Regulations.

1.17.3 The aircraft maintenance organisation (AMO) which certified the inspection was in possession of an AMO approval certificate that was issued by the SACAA on 11 August 2020 with an expiry date of 31 July 2021.

1.18 Additional Information

1.18.1 To be discussed in the final report.

1.19 Useful or Effective Investigation Techniques

1.19.1 To be discussed in the final report.

2. Findings

2.1 General

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

To serve the objective of this investigation, the following sections are included in the conclusions 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.

2.2

2.2.1 The pilot was issued a Commercial Pilot Licence on 3 February 2021 with an expiry date of 31 March 2022. The pilot's Class 1 aviation medical certificate was issued on 21 January 2021 with an expiry date of 31 July 2021, with a restriction to wear corrective lenses.

2.2.2 The pilot did not have an instrument flight rating.

2.2.3 The ferry flight was conducted under the provisions of Part 91 of the CAR 2011 as amended and in Visual Flight Rules (VFR) and Instrument Meteorological Conditions (IMC) by day.

2.2.4 The weather at the time of the accident was cloudy with low-level stratocumulus and cumulus clouds ranging from 1500-3000ft above ground with tops up to 12000ft and also towering cumulus clouds with some light rain. The last aircraft altitude recorded by radar control was at FL100 (10000ft) approximately 1nm north-west of FAMS.

2.2.5 The aircraft was originally issued a Certificate of Airworthiness on 15 November 2014 with an expiry date of 30 November 2021.

2.2.6 The aircraft was issued a Certificate of Registration on 18 September 2014.

2.2.7 The last Mandatory Periodic Inspection (MPI) was conducted on 20 January 2021 at 3759.2 airframe hours. The aircraft had flown a total of 2.8 hours since its last MPI. The aircraft was issued a Certificate of Release to Service (CRS) on 20 January 2021 with an expiry date of 19 January 2022 or at 3909.2 hours, whichever occurs first.

2.2.8 Both aircraft had tracking devices installed and the operator was tracking them from FAWB. According to the tracking device, ZS-XAT took off from FAWB and made a

descent to FALA without any event. It then took off again to FYWH, climbing to 6000ft AMSL approximately 50 miles from FALA; thereafter, it climbed to a maximum altitude of 10 344ft AMSL at 0932Z when it disappeared from the tracking device.

3. On-going Investigation

3.1 The AIID investigation is on-going and the investigator/s will be looking into other aspects of this occurrence which may or may not have safety implications.

This report is issued by:

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