

PRELIMINARY ACCIDENT REPORT

Accident and Incident Investigations Division

Accident  
- Preliminary Report -  
AIID Ref No: CA18/2/3/10169



Figure 1: The file image of the helicopter. (Source: Avcom website)

Description:

On 5 June 2022 at approximately 1543Z, a pilot flying solo on-board an Alouette III helicopter with registration ZU-RFE took off on a private flight from Marlbank River Estate in Vanderbijlpark, Gauteng province, to Rand Aerodrome (FAGM), also in the same province. En route to FAGM whilst at 1000 feet (ft) above ground level (AGL) and overhead an established Boipatong residential area in Vanderbijlpark, all engine warning lights illuminated on the instrument panel, followed by an uncommanded engine shutdown. The pilot surveyed the surrounding area below and took note of an open field on the left-side of his flight path on which to conduct a forced landing. During autorotation whilst above the power lines, the helicopter yawed to the left and, subsequently, pitched its nose up before it crashed into a water channel. The pilot sustained serious injuries on his left arm, and the helicopter was substantially damaged during the accident sequence.

## Occurrence Details

<b>Aircraft Make and Model</b>	: SE3160 Alouette III
<b>Aircraft Registration</b>	: ZU-RFE
<b>Damage</b>	: Substantial
<b>Date and Time</b>	: 5 June 2022 at 1550Z
<b>Injuries</b>	: 1
<b>Name of Operator</b>	: CKTET Charter (PTRY) Ltd
<b>Nationality</b>	: South African
<b>Occurrence Category</b>	: Category 1
<b>Place</b>	: Boipatong, near Vanderbijlpark, Gauteng Province
<b>Reference Number</b>	: CA18/2/3/10169
<b>Registration Marks</b>	: ZU-RFE
<b>Type of Operation</b>	: Private (Part 94)

## 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 an Alouette III which occurred at Vanderbijlpark (Boipatong), Gauteng Province, on 5 June 2022 at 1550Z. The occurrence was classified as an accident according to the Part 12 of the CAR 2011 and ICAO STD Annex 13 definitions.

The AIID has appointed an investigator-in-charge and a co-investigator who dispatched to the accident site a day after the accident to commence with the full investigation. Notifications were sent to the State of Registry/Operator/Design/Manufacture in accordance with the Part 12 of the CAR 2011 and ICAO Annex 13 Chapter 4. The State of Manufacture, Bureau of Enquiry and Analysis for Civil Aviation Safety (France), has appointed an accredited representative and advisors. The AIID will lead the investigation and issue the final report of this accident in accordance with Part 12 of the CAR 2011 and ICAO Annex 13.

The information contained in this preliminary report is derived from the information gathered during the on-going investigation into the occurrence. Later, an interim or final report may contain altered information in case new evidence is found during the on-going investigation that requires changes to the information depicted in this report.

*The AIID reports are made available to the public at:*

<http://www.caa.co.za/Pages/Accidents%20and%20Incidents/Aircraft-accident-reports.aspx>

### Notes:

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

*Accident — this investigated accident*

*Helicopter — the SE 3160 Alouette III 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**

*This report is produced without prejudice to the rights of the SACAA, which are reserved.*

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<b>Abbreviation</b>	<b>Description</b>
'	Minutes
"	Seconds
°	Degrees
°C	Degrees Celsius
AGL	Above Ground Level
AIID	Accident and Incident Investigations Division
AMSL	Altitude Above Mean Sea Level
ATF	Authority to Fly
C of R	Certificate of Registration
CAVOK	Ceiling and Visibility OK
CRS	Certificate of Release to Service
FAGM	Rand Aerodrome
FAOR	O.R. Tambo International Airport
FAVV	Vereeniging Aerodrome
ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
kt	Knots
m	Metres
METAR	Meteorological Routine Aerodrome Report
NTCA	Non-Type Certified Aircraft
PPL	Private Pilot Licence
QNH	Query Nautical Height
SACAA	South African Civil Aviation Authority
SAPS	South African Police Service
SAWS	South African Weather Service
TBA	To be Announced/advised
VMC	Visual Meteorological Conditions
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

## 1. FACTUAL INFORMATION

### 1.1. History of Flight

- 1.1.1. On Sunday, 5 June 2022 at approximately 1543Z, a pilot flying solo on-board an Alouette III helicopter with registration ZU-RFE took off on a private flight from Marlbank River Estate in Vanderbijlpark, near the Vaal River, to Rand Aerodrome (FAGM) via Mittal Corridor. The flight was conducted under visual meteorological conditions (VMC) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.
- 1.1.2. The pilot stated that approximately 7 minutes into the flight whilst at a height of about 1 000 feet (ft) above ground level (AGL) and overhead an established Boipatong residential area in Vanderbijlpark, the warning lights illuminated on the instrument panel, followed by an uncommanded engine shutdown. Thereafter, the helicopter yawed to the left and the nose pitched up, followed by a violent shake. He then pushed the collective lever down, moved the cyclic forward and applied the right pedal, all this whilst the aircraft entered autorotation. The helicopter levelled off while it was above the power lines. The pilot felt there was no hydraulic system power as the cyclic was hard to move. Using his strength, he applied left cyclic, and the helicopter yawed to the left to avoid colliding with the power lines. The left cyclic manoeuvre had no effect on the lateral movement of the helicopter. Whilst getting closer to the ground, the pilot tried to pull back the collective to flare the helicopter to cushion the landing, but this had no effect as well. The helicopter crashed into a water channel with its tail cone first, followed by the left-side of the airframe. Once the helicopter came to rest, the pilot unbuckled the safety harness, switched off the engine and disembarked the helicopter unaided.
- 1.1.3. The helicopter was substantially damaged, and the pilot sustained serious injuries to his left arm. The pilot was transported in an ambulance to the nearby hospital. Following the crash, the South African Police Service (SAPS) personnel in Vanderbijlpark responded to the scene where they cordoned off the area. A private security unit guarded the scene overnight together with the SAPS personnel.
- 1.1.4. The accident occurred during daylight on an open field at Global Positioning System (GPS) determined to be S 26° 39' 51.4" E 027° 50' 26.8, at a field elevation of 4 736ft above mean sea level (AMSL).

### 1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	1	-	-	1	-
Minor	-	-	-	-	-
None	-	-	-	-	-
<b>Total</b>	<b>1</b>	-	-	<b>1</b>	-

Note: Other means people on ground.

- 1.2.1. The pilot sustained serious injuries on his left arm during the accident sequence.



### 1.3. Damage to Aircraft

1.3.1. The helicopter was substantially damaged during the accident sequence.



**Figure 4:** The helicopter after it was recovered.

### 1.4. Other Damage

1.4.1. None.

### 1.5. Personnel Information

Nationality	South African	Gender	Male	Age	47
Licence Type	Private Pilot Licence (PPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	30 November 2023 (Class 2)				
Restrictions	None				
Previous Accidents	None				

**Flying Experience:**

Total Hours	311.6
Total Past 24 Hours	0.3
Total Past 7 Days	0.3
Total Past 90 Days	11.6
Total on Type Past 90 Days	11.6
Total on Type	180.7

1.5.1. The pilot was initially issued a Private Pilot Licence (PPL) Helicopter by the Regulator (SACAA) on 9 February 2018. His licence currency renewal was issued on 28 March 2022 with an expiry date of 31 March 2023. His Class 2 medical certificate was issued on 22 November 2021 with an expiry date of 30 November 2023 with no medical waivers.

**1.6. Aircraft Information**

(Source: Aircraft Manual)

1.6.1. The SE3160B Alouette helicopter is an ex-military (South African Air Force) helicopter powered by a single Turbomeca Artouste IIIB turbine engine. The helicopter is designed to carry seven occupants on-board and may be quickly configured to accomplish other duties, such as casualty, cargo carrying, and so forth. The landing gear system comprises a tri-wheeled configuration.

**Airframe:**

Manufacturer/Model	Aerospatiale Industries / SE3160-Alouette III	
Serial Number	1027	
Year of Manufacture	1973	
Total Airframe Hours (At Time of Accident)	8 181.4 hours	
Last Inspection (Date & Hours)	19 August 2021	8 117.4 hours
Hours Since Last Inspection	64 hours	
CRS Issue Date	19 August 2021	
ATF (Issue Date & Expiry Date)	6 July 2021	31 July 2022
C of R (Issue Date) (Present Owner)	26 March 2021	
Type of Fuel Used	Jet A1	
Operating Category	Private (Part 94)	
Previous Accidents	TBA in the final report	

**Engine:**

Manufacturer/Model	Turbomeca Artouste IIIB1
Serial Number	764
Part Number	309283
Hours Since New	3 967
Hours Since Overhaul	683



**Main Rotor:**

Manufacturer/Model	Aerospatiale
Serial Numbers	14422; 14520; 14504
Part Number	319A62
Hours Since New	1 917.5
Hours Since Overhaul	Component life of 6 000 hours

**Tail Rotor:**

Manufacturer/Model	Aerospatiale
Serial Numbers	13721; 13722; 13723
Part Number	3160S66
Hours Since New	2 254.5
Hours Since Overhaul	Component life 2 500 hours

- 1.6.2. A review of the helicopter's maintenance documents such as logbooks (airframe and engine), flight folio and annual maintenance records is still on-going, and the findings will be discussed in the final report.
- 1.6.3. The helicopter had an Authority to Fly (ATF), issued by the Regulator on 6 July 2021 with an expiry date of 31 July 2022. The aircraft maintenance organisation (AMO) that maintained the helicopter had issued the helicopter a Certificate of Release to Service (CRS) on 19 August 2021 following an annual inspection at 8 117.4 which was due to lapse on 19 August 2022 or at 8 217.4 hours, whichever comes first or if the helicopter becomes unserviceable.
- 1.6.4. The AMO that carried out the maintenance on the helicopter was issued an AMO certificate by the Regulator on 10 June 2021 with an expiry date of 30 April 2022.

**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) on 5 June 2022 at 1500Z, recorded at Vereeniging Aerodrome (FAVV) which is located 8.5 nautical miles (nm) from the accident site.

Wind Direction	080°	Wind Speed	08kt	Visibility	CAVOK
Temperature	17°C	Cloud Cover	None	Cloud Base	None
Dew Point	M03°C	QNH	1034hPa		

- 1.7.2. According to the weather report, FAGM did not have a METAR report at 1500 and FAVV is an automated station and does not report on cloud coverage and weather.

FAGM 051600Z 10007KT CAVOK 13/M05 Q1031  
 FAOR 051500Z 08010KT CAVOK 15/M04 Q1031 NOSIG

## 1.8. Aids to Navigation

- 1.8.1. The helicopter was equipped with standard navigational equipment as approved by the Regulator. There were no records indicating that the navigation system was unserviceable prior to the accident.

## 1.9. Communication

- 1.9.1. The helicopter 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 helicopter accident occurred 8.5 nautical miles (nm) from FAVV on an open field at a GPS co-ordinates determined to be S 26° 39' 51.4" E 027° 50' 26.8, at a field elevation of 4 736ft AMSL.

Aerodrome Location	Republic of South Africa – Vereeniging FAVV
Aerodrome Coordinates	GPS S 26°34'15.48" E 027° 57'32.38"
Aerodrome Elevation	4862 feet (AMSL)
Runway Designations	03/12 and 15/33
Runway Dimensions	1605m X 22m and 1135m X 16m
Runway Used	N/A
Runway Surface	Tar
Approach Facilities	None

## 1.11 Flight Recorders

- 1.11.1 The helicopter 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 helicopter type.

## 1.12 Wreckage and Impact Information

- 1.12.1 The helicopter crashed into a water channel located in an established Boipatong residential area, approximately 80 metres (m) from the regional road. The area around the accident site had obstacles such as an uneven surface area and high-tension electrical power lines. A video footage filmed by one of the residents at the accident site revealed that the accident scene was tampered with. The tail boom was moved from its location by some people who were at the crash site. It was found positioned perpendicular to the main wreckage and towards the left-side of it.



**Figure 5:** The rear view of the helicopter and the electrical lines running parallel to the water channel.

1.12.2 The initial impact marks on the ground indicated that the helicopter contacted the ground with its tail section first at a high nose-attitude and in a slightly tilted angle towards the left, followed by the fuselage impacting the ground with its left-side; hence, the helicopter's substantial damage on the left. The equipment compartment detached from the mounting point and was destroyed. The left cockpit and cabin doors had also detached from the mounting points. The windshield was partially damaged towards the left-side.



**Figure 6:** The left-side view of the wreckage after it was removed from the water channel.

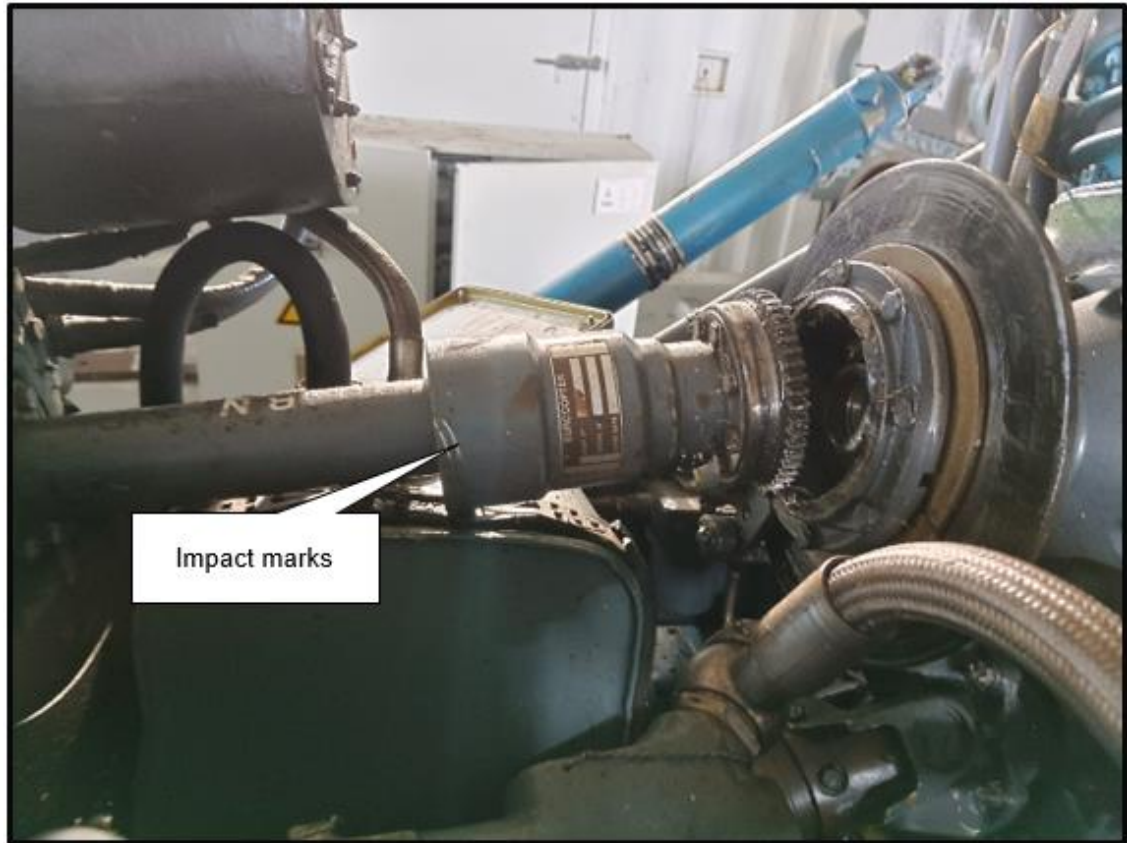


1.12.3 Damage on the main rotor blades indicated low-energy impact with the ground. One of the main rotor blades struck the tail boom; moreover, two of the three main rotor blades sustained substantial damage, whilst the third was found intact. The left-side seats had moved to the front during the accident sequence. The cabin section had compression load damage towards the left-side.



**Figure 7:** The damaged tail rotor.

1.12.4 During impact, the three tail rotor blades came into contact with the ground and broke off midsection, and all three pieces of the tail rotor blades scattered in different directions. The nearest blade tip was found within a 15m radius of the accident site, towards the left of the wreckage. The tail rotor drive shaft broke off during the impact sequence.



**Figure 8:** The decoupled engine gearbox drive shaft.

1.12.5 All flight control tubes and cables were accounted for. The collective control lever was found broken towards the point where it attaches to the cross tube and was found stuck in the up position. The overall condition of the engine was intact with no visible damage observed. The engine rotated freely when tested by hand. The main drive shaft decoupled during the impact sequence. The main drive shaft also exhibited scar marks sustained during the accident sequence, consistent with impact with an object whilst not turning. The investigators' wreckage assessment was consistent with the pilot's statement.

### 1.13 Medical and Pathological Information

1.13.1 None.

### 1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

### 1.15 Survival Aspects

1.15.1 The helicopter accident was considered survivable. Damage to the cockpit structure was more pronounced on the left-side. Also, the pilot had made use of the lap strap seatbelt/shoulder harness during flight, which performed effectively.

## 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 helicopter was privately operated under the provisions of Part 94 of the CAR 2011 as amended and under Non-Type Certified Aircraft (NTCA).

1.17.2 The AMO that carried out the maintenance on the helicopter had an AMO certificate issued by the Regulator on 10 June 2021 with an expiry date of 30 April 2022.

## 1.18 Additional Information

1.18.1 To be discussed in the final report.

## 1.19 Useful or Effective Investigation Techniques

1.19.1 None.

## 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 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 Findings

2.2.1 The pilot was initially issued a PPL Helicopter by the Regulator on 9 February 2018. His licence currency renewal was issued on 28 March 2022 with an expiry date of 31 March 2023. His Class 2 medical certificate was issued on 22 November 2021 with an expiry date of 30 November 2023 with no medical waivers.

2.2.2 The aircraft was issued an Authority to Fly (ATF) by the Regulator on 6 July 2021 with an expiry date of 31 July 2022.

2.2.3 The AMO that carried out the maintenance on the helicopter had an AMO certificate issued by the Regulator on 10 June 2021 with an expiry date of 30 April 2022.

- 2.2.4 The helicopter was privately operated under the provisions of Part 94 of the CAR 2011 as amended and under NTCA.
- 2.2.5 The weather at the time of the accident was considered not a factor.
- 2.2.6 Following the accident, the engine was recovered and sent to an AMO where a teardown examination would be conducted. The results will be presented in the final report.

### **3 ON-GOING INVESTIGATION**

- 3.1 The AIID investigation is on-going and the investigators 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**