AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:		CA18/2/3/10116	
Aircraft Registration	ZU-IKI	**Date of Accident**	10 February 2022			**Time of Accident**	1110Z
Type of Aircraft	Jabiru 430			**Type of Operation**		Private (Part 94)	
Pilot-in-command Licence Type	Private Pilot Licence (Aeroplane)			**Age**	64	**Licence Valid**	Yes
Pilot-in-command Flying Experience		**Total Flying Hours**		647.5		**Hours on Type**	59
Last Point of Departure	Robertson Aerodrome (FARS), Western Cape Province						
Next Point of Intended Landing	Morning Star Aerodrome, Western Cape Province						
Damage to Aircraft	Substantial						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Cape Point Nature Reserve Road, at Global Positioning System (GPS) co-ordinates determined to be 34°21'02.72''S 018°29'06.23''E at an elevation of 416 feet							
Meteorological Information	Wind velocity: 290° at 9kt; Temperature: 25°C; Dew Point: 16°C; Visibility: ≥10000m; Cloud: SCT 3500 ft; QNH: 1014 hPa						
Number of People On-board	1 + 1	**Number of People Injured**	2	**Number of People Killed**	0	**Other (On Ground)**	0

Synopsis

On 10 February 2022 at 0930Z, a pilot and a passenger on-board a Jabiru 430 aircraft with registration ZU-IKI took off on a private flight from Robertson Aerodrome (FARS) with the intention to land at Morning Star Aerodrome, located approximately 3 nautical miles (nm) north-east of Table View in the Western Cape province. The flight was conducted under visual flight rules (VFR) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended. The aircraft flew westward over Robben Island, then south towards the Cape Peninsula coastline at 1500 feet (ft) above ground level (AGL). Whilst flying over the Cape Peninsula, the propeller detached from the engine in-flight. As a result, the pilot executed a forced landing on the road in the Cape Point Nature Reserve.

The two occupants on-board the aircraft were injured during the forced landing sequence; they were taken to the hospital by ambulance. The aircraft sustained damage to the left wing, fuselage and undercarriage.

The investigation established that, although the maintenance requirements for the aircraft were required at annual/100 hours, the aircraft had other inspections conducted at 15, 35.5 and 86.4 hours, at which the torque settings would have been checked. Post-accident, the engine was examined, and it was found to be operating normally; the propeller was not recovered. The probability of the torque checks not being carried out at annual inspections would mean that the loss of tension in the bolts would have likely occurred in the last 17 hours (last 86.4 hours) before the accident. It could be speculated that the tools found inside the engine compartment could have contributed to the accident.

Probable Cause

The propeller detached from the engine in-flight, which caused the engine to rev exceedingly; this led to the pilot executing an unsuccessful forced landing on the road. The cause of the propeller detaching could be likely attributed to loss of tension in the bolts.

Contributing factor
Poor pre-flight inspection.

SRP Date	11 April 2023	Publication Date	14 April 2023

Occurrence Details

Reference Number	**:** CA18/2/3/10116
Occurrence Category	**:** Accident (Category 1)
Type of Operation	**:** Private (Part 94)
Name of Operator	**:** AJ Crook
Aircraft Registration	**:** ZU-IKI
Aircraft Make and Model	**:** Jabiru 430 (S/N:912)
Nationality	**:** South African
Registration	**:** ZU-IKI
Place	**:** Cape Point Nature Reserve
Date and Time	**:** 10 February 2022 at 1110Z
Injuries	**:** Serious
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 on 10 February 2022 at 1110Z. 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, Design and Manufacturer in accordance with CAR 2011 Part 12 and ICAO Annex 13 Chapter 4. The State of manufacture did not appoint an accredited representative and advisor. The investigator did not dispatch to the accident site for this occurrence.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Accident — this investigated accident
   Aircraft — the Jabiru 430 JAB4 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 AIID, which are reserved.

Table of Contents

Abbreviation	Description
°	Degrees
°C	Degrees Celsius
AP	Authorised Person
ASTM	American Society for Testing and Materials
ATC	Air Traffic Control
ATF	Authority to Fly
CAR	Civil Aviation Regulations
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CRS	Certificate of Release to Service
CVR	Cockpit Voice Recorder
EMS	Emergency Medical Services
FDR	Flight Data Recorder
FACT	Cape Town International Airport
FARS	Robertson Aerodrome
ft	Feet
GPS	Global Positioning System
hPa	Hectopascal
kt	Knots
LSA	Light Sport Aircraft
m	Metres
METAR	Meteorological Routine Aerodrome Report
MHz	Megahertz
MPI	Mandatory Periodic Inspection
nm	Nautical Mile
NTCA	Non-Type Certified Aircraft
PPL	Private Pilot Licence
PIC	Pilot-in-command
QNH	Barometric Pressure Adjusted to Sea Level
SAAF	South African Air Force
SACAA	South African Civil Aviation Authority
SAWS	South African Weather Service
TBO	Time Between Overhaul
UTC	United Time Coordinated
VFR	Visual Flight Rules
VHF	Very High Frequency
Z	Zulu (Term for Universal Co-ordinated Time – Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On 10 February 2022 at 0930Z, a pilot and a passenger on-board a Jabiru 430 with registration ZU-IKI took off on a private scenic flight from Robertson Aerodrome (FARS) with the intention to land at Morning Star Aerodrome, situated approximately 3 nautical miles (nm) north-east of Table View (next to the N7) in the Western Cape province. The flight was conducted under visual flight rules (VFR) by day and under the provisions of Part 94 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. The pilot reported that he conducted the pre-flight checks, as well as uplifted 73 litres of fuel at FARS. After take-off, the pilot and the passenger flew towards Cape Town central business district (CBD), then west towards Robben Island; thereafter, routed south along the coast towards the Cape Peninsula at 1500 feet (ft) above ground level (AGL). At approximately 1110Z, the pilot heard a loud bang from the aircraft engine, followed by a sudden loss of power and engine stoppage. The pilot could not restart the engine. He then turned the aircraft left towards the land, made a MAYDAY call on frequency 125.80-Megahertz (MHz) (Special Rules West Uncontrolled Airspace) and reported '*I am going down'*, whilst attempting to make a forced landing.

1.1.3. A South African Air Force (SAAF) helicopter that was flying in the vicinity at the time heard the MAYDAY transmission and enquired about the ZU-IKI's position and their intentions. The ZU-IKI pilot responded that they were approximately 6nm north of Cape Point and intended to execute a forced landing on the road inside the reserve. There was no further communication between the pilots of the SAAF helicopter and ZU-IKI.

1.1.4 The pilot then executed a forced landing on the road in the Cape Point Nature Reserve. During the landing roll, the left wing clipped the fynbos on the left-side of the road. The aircraft ground-looped (to the left) and came to rest with the nose tucked in the fynbos. The SAAF helicopter pilot flew towards the direction given by the pilot of ZU-IKI and spotted it from the air.

1.1.5 Civilians from two vehicles and a motorcyclist were at the scene assisting the occupants of ZU-IKI whilst the SAAF helicopter pilot landed on the road close by. The pilot and the passenger of ZU-IKI were injured; the emergency services personnel were notified of the accident and the pilot and the passenger were taken to a local hospital for medical care. The aircraft was substantially damaged during the landing sequence in which the propeller detached from the hub in-flight.

1.1.6 The SAAF pilot noticed fuel that was leaking from the wings of ZU-IKI; to prevent a possible post-impact fire, he opened the engine cowling and disconnected the battery. A cordless electric drill and a socket were found inside the engine bay. The aircraft sustained damage to the right wing, horizontal stabiliser, undercarriage, nose wheel, propeller and fuselage.

1.1.7 During the flight the propeller detached from the aircraft engine flange which caused the engine to over rev. Thus, the pilot executed an unsuccessful forced landing on a road.

1.1.8 The accident occurred during daylight in the Cape Point Nature Reserve at Global Positioning System (GPS) co-ordinates determined to be 34°21'02.72''S 018°29'06.23''E at an elevation of 416 feet (ft).

Figure 1: Aerial view of the Cape Point Nature Reserve where the accident occurred. (Source: Google Earth)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	1	-	1	2	-
Minor	-	-	-	-	-
None	-	-	-	-	-
Total	**1**	**-**	**1**	2	**-**

Note: Other means people on the ground.

1.2.1. The pilot and the passenger were injured whilst executing a forced landing. They were taken to the hospital for treatment.

1.3. Damage to Aircraft

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

Figure 2: The aircraft as it came to rest in the fynbos. (Source: EMS)

1.4. Other Damage

1.4.1. None.

1.5. Personnel Information

Nationality	South African	Gender	Male	Age	64
Licence Type	Private Pilot Licence				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	31 August 2022				
Restrictions	Corrective lenses				
Previous Accidents	None				

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

Flying Experience:

Total Hours	647.5
Total Past 24 Hours	1.5
Total Past 7 Days	9.9
Total Past 90 Days	28.9
Total on Type Past 90 Days	28.9
Total on Type	59

1.5.1. The pilot was initially issued a Private Pilot Licence (PPL) on 17 February 2021; he had undergone a competency evaluation on 22 January 2022 and was reissued the licence on the same day with an expiry date of 28 February 2024. The pilot had a Class II medical certificate that was issued on 3 August 2021 with an expiry date of 31 August 2022, and with a restriction to wear corrective lenses. The pilot regularly flew the accident aircraft as the owner, according to the entries in the flight folio.

1.6. Aircraft Information (Source: Jabiru website)

1.6.1. *The Jabiru J430 is a four-seat composite high-wing light sport aircraft with a fixed tricycle undercarriage. The airframe is manufactured using Fibre Reinforced Plastic (FRP) material. The aircraft is powered by a 3300-cc air-cooled flat six-cylinder engine.*

Airframe:

Manufacturer/Model	Shadow LITE cc	
Serial Number	912	
Year of Manufacture	2019	
Total Airframe Hours (At Time of Accident)	103.3	
Last Inspection (Date & Hours)	5 February 2022	94.3
Airframe Hours Since Last Inspection	9.0	
CRS Issue Date	5 February 2022	
ATF (Issue Date & Expiry Date)	15 December 2020	31 December 2022
C of R (Issue Date) (Present Owner)	5 March 2020	
Operating Category	Normal	
Type of Fuel Used	Avgas 100 LL	
Previous Accidents	N/A	

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

Engine:

Manufacturer/Model	Jabiru 3300
Serial Number	33A2759
Hours Since New	103.3
Hours Since Overhaul	TBO not reached

Propeller:

Manufacturer/Model	2 Blade Composite
Serial Number	371
Hours Since New	103.3
Hours Since Overhaul	TBO not reached

1.6.2. According to the propeller technical manual Document No. JPM0001-6 dated 16 August 2019, the propeller should have been overhauled at 1000 hours with inspections at 5 hours, 100 hours, annually and 500 hours.

1.6.3. The aircraft logbooks were reviewed to establish the service history of the engine and the

propeller, as well as the general maintenance. Also, there was no formal mention of the propeller maintenance since new, but records were found in the approved person (AP)/ aircraft maintenance organisation (AMO) job cards that were recorded after service and/or annual inspections were carried out on the propeller (if it could be found).

1.6.4. The Jabiru composite propeller is to be checked every 100 hours and or annually (see attached JPM0001-6 Jabiru Propeller Technical Manual dated 16 August 2019.) The last entry before the incident occurred is dated 5 February 2022 (05-02-2022) in the logbook. The flight folio records showed a service maintenance that was carried out, and the tyres and tubes that were changed. However, records did not show the time at which these were carried out.

1.6.5. The review of the flight folio also showed that the last maintenance prior to the accident flight was carried out at 94.3 hours. The accident occurred at 103 hours which meant that the aircraft was flown a further 9 hours since the last maintenance.

1.6.6 According to the JPM0001-6 Jabiru Propeller Technical Manual: The Approved Propeller & Engine Combinations:

4A482U0D propellers are approved for use on all variants of the Jabiru 2200 Aircraft Engine only. 4A484E0D propellers are approved for use on all variants of the Jabiru 3300 Aircraft Engine only.
All propellers discussed within this manual are for TRACTOR applications only.
Life
The propeller has a designed time between overhaul of 1,000 hours.
Refer to Section 5 for overhaul details.
Propeller components (except hardware) are assessed on condition. There are no items with a fixed life.

1.6.7 The following inspections were conducted on the propeller during the last 100-hour inspection:

I. The spinner: remove and visually inspect for cracking, fraying, corrosion, and other damage.
II. Spinner flange: visually inspect for cracking, fraying, corrosion, and other damage.
III. Spinner screws: check for loose, missing, corroded or damaged fasteners and hardware.
IV. Propeller: visually check the condition of the propeller, looking for damage to the leading-edge protection, last delamination and cracks, splits and crushing of the propeller timber.
V. Propeller bolts/nuts: check correct tension, retention if required.
VI. Leading edge tape (if fitted): check condition.
VII. Spinner tracking: check spinner tracking.
VIII. Propeller tracking: check propeller tracking .

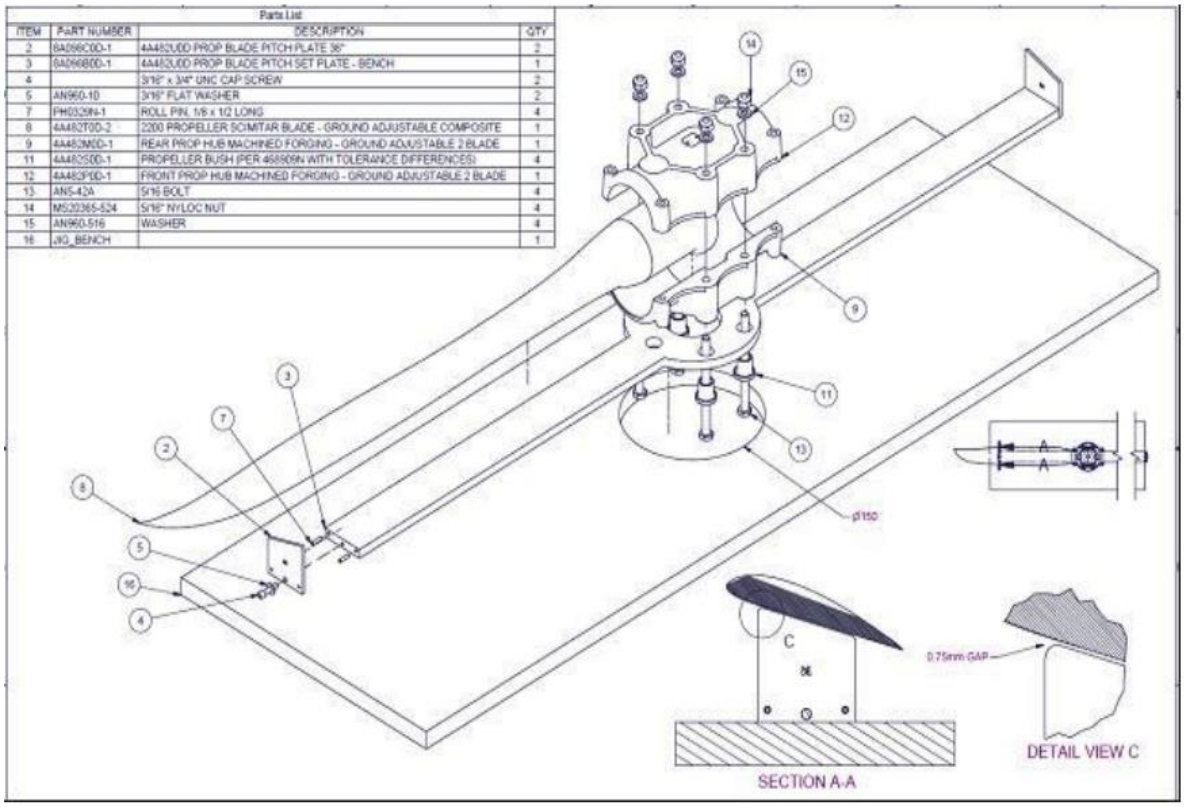

Diagram 1: The schematics of the propeller.

1.6.8 The propeller detached in-flight. A flight inspection post-accident was carried out by the manufacturer in the absence of the investigator. The flight inspection could not determine the cause of the propeller detaching in-flight.

1.6.9 According to the JPM0001-6 Jabiru Propeller Technical Manual *:Propeller Bolt Tension:*
If the propeller bolts loose tension the propeller may move and fret on the mounting flange of the engine. This will lead to damage to both the propeller and the engine.

•Propeller Balance. An out-of-balance propeller creates extra vibration which, over time will damage the propeller drive bushes, loosen the propeller attachment and potentially damage the engine.• Propeller Condition. A propeller with uneven pitch or one damaged blade creates extra vibration and uneven loading which can damage the propeller attachment and the engine.• Propeller Selection. Propellers must be selected to meet the limits given in the engine installation manual. Over-pitched, over-weight or otherwise non-compliant propellers can cause propeller or engine damage even if they meet all other requirements.• Propeller Maintenance.- Propeller maintenance is absolutely critical to the integrity of the engine and propeller combination. Many of the items on this list of risk factors can be addressed via good maintenance. The propeller manufacturer's maintenance instructions are the best guide– while also being aware of the additional maintenance requirements given below for non-approved propellers.- While wooden propellers generally give good performance, light weight and good vibration control they are susceptible to changes in temperature and humidity – which can have the effect of loosening the propeller attachment which can cause engine and propeller damage. Because of this phenomena, in Australia an Airworthiness Directive (AD/PFP/1 Amdt 3) exists and applies to all wooden fixed-pitch propellers used on VH registered aircraft (including Jabiru Approved propellers).
The AD requires1:1. Newly installed propellers: Check the hub bolt nuts for tightness after the first flight.2. All propellers – every 100 hours or 12 months, whichever is the sooner:(a) Check the propeller tracking.(b) Check the hub bolt nuts for tightness.(c) Inspect sheathing and tipping for looseness, separation of soldered joints, loose screws, cracks and corrosion.1 AD requirements have been re-formatted and paraphrased for use in this Bulletin. The original document is available from the CASA website – www.casa.gov.au. Details supplied current at the date of issue.

UNCONTROLLED COPY DATE: 12-02-damage the propeller drive bushes, loosen the propeller attachment and potentially damage the engine. (Source: Jabiru propeller technical manual)

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 10 February 2022 at 1100Z, recorded at Cape Town International Airport (FACT), located 6nm from the accident site.

Wind Direction	290°	Wind Speed	9 kt	Visibility	≥10000m
Temperature	25°C	Cloud Cover	SCT	Cloud Base	3500ft
Dew Point	16°C	QNH	1014hPa		

1.7.2. The weather conditions did not contribute to this 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 accident occurred at Cape Point Nature Reserve.

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 landed on the road in the Cape Point Nature Reserve. The left wing contacted the fynbos on the left side of the road and the aircraft ground-looped counter-clockwise and

came to rest 90° across the road. It sustained damage to the right wing, horizontal stabiliser, undercarriage, nose wheel and fuselage. The propeller was missing from the accident scene and was not recovered.

Figure 3: The aircraft post-accident. (Source: EMS)

1.13. Medical and Pathological Information

1.13.1. The two occupants on-board sustained injuries; they were treated at a local hospital.

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 accident was considered survivable as there was minimal impact force on the cockpit. Moreover, the pilot and the passenger had made use of the safety harnesses.

1.16. Tests and Research

1.16.1. The aircraft was transported to the Jabiru factory in George for analysis and repairs. The propeller was missing from the aircraft wreckage.

1.16.2. The propeller detached from the aircraft engine flange in-flight, which caused the engine to rev excessively. Subsequently, the pilot executed an unsuccessful forced landing on a road.

1.16.3. A cordless electric drill and a socket were found inside the engine bay. The propeller flange holes were found enlarged (Figure 4 and 5).

1.16.4. The JPM0001-6 Jabiru Propeller Technical Manual dated 16 August 2019 states that the Jabiru composite propeller is to be inspected every 5 hours, 100 hours, annually and 500 hours. The last annual inspection was carried out on 5 February 2022 at 94.3 airframe hours, according to the flight folio.

Figures 4 and 5: The aircraft post-accident. (Source: Jabiru)

1.16.5 A copy of the engine Job card 1575 dated 01-04-2022 from the manufacturer is read:

Propeller:
The propeller was not available to access. The only items accessed were the single prop bolt which had sheared and the propeller guide. There is evidence which can clearly be seen that the propeller bolt AN5-42 was loose and worn and this can also be seen in the propeller Bush. For reference of the two items refer to attached appendix E the Scimitar propeller installation diagram the AN5-42 propeller bolt would be number 6 and the propeller Bush would benumber 14 on the diagram.

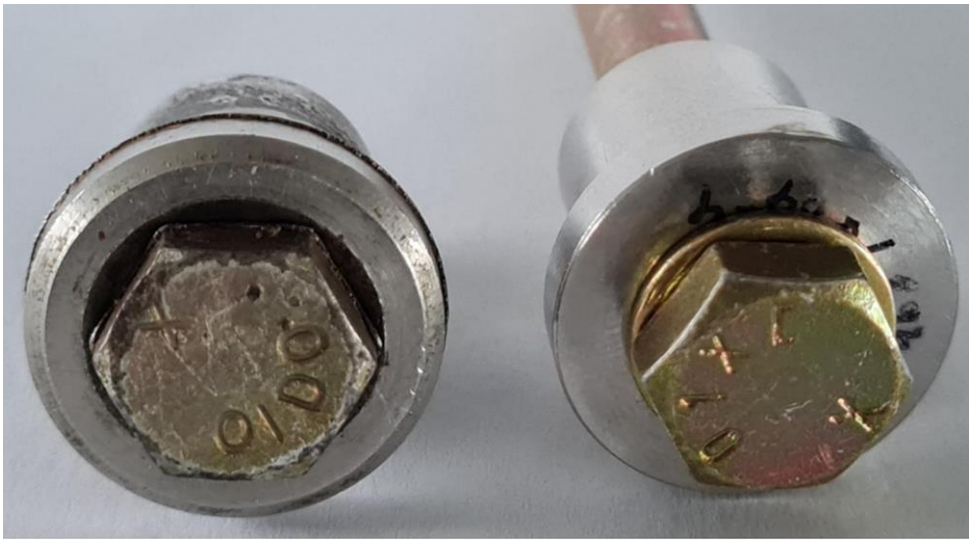

Figure 6: The AN5-42 bolt and the propeller bush from ZU-IKI (left), the new bolt and propeller bush (right).

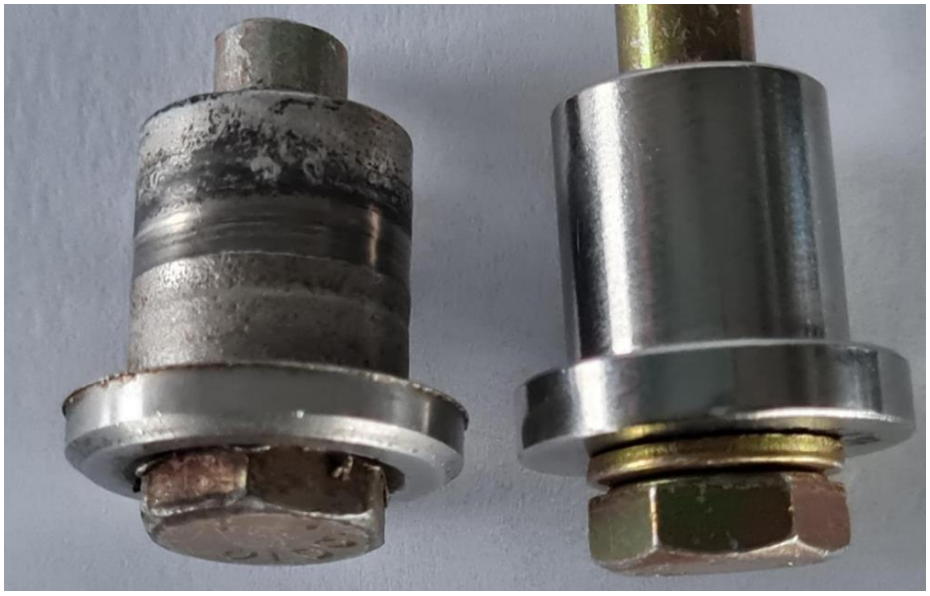

Figure 7: The head of the AN5-42 bolt from ZU-IKI (left) and the new item (right).

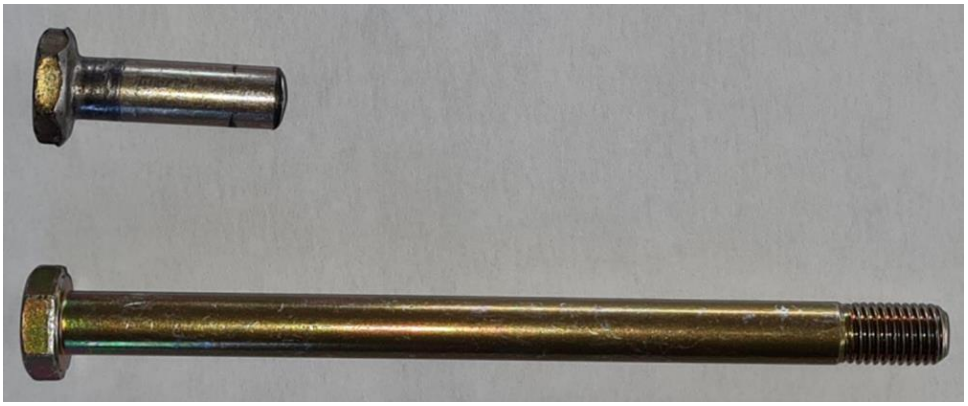

Figure 8: the AN5-42 bolt that was recovered (top) in comparison to the new bolt below (left).

Figure 9: The heads of the AN5-42 bolt. The sheared bolt from ZU-IKI is on the right, showing the worn head.

Figure 10: The AN5-42 bolt that had worn on the shank of the bolt as well as the head of the bolt which indicates movement.

Figure 11: The pictures above were taken from the top and side angle. The new propeller bush is on the left and the bush from ZU-IKI is on the right. The wear on the bush from the AN5-42 bolt movement is clearly visible.

Figure 12: The two pictures show the propeller bush shaft taken from the side profile. The new propeller bush is on the left and the bush from ZU-IKI is on the right. The bush has been moving in the propeller hub as indicated by the striations on the bush shank.

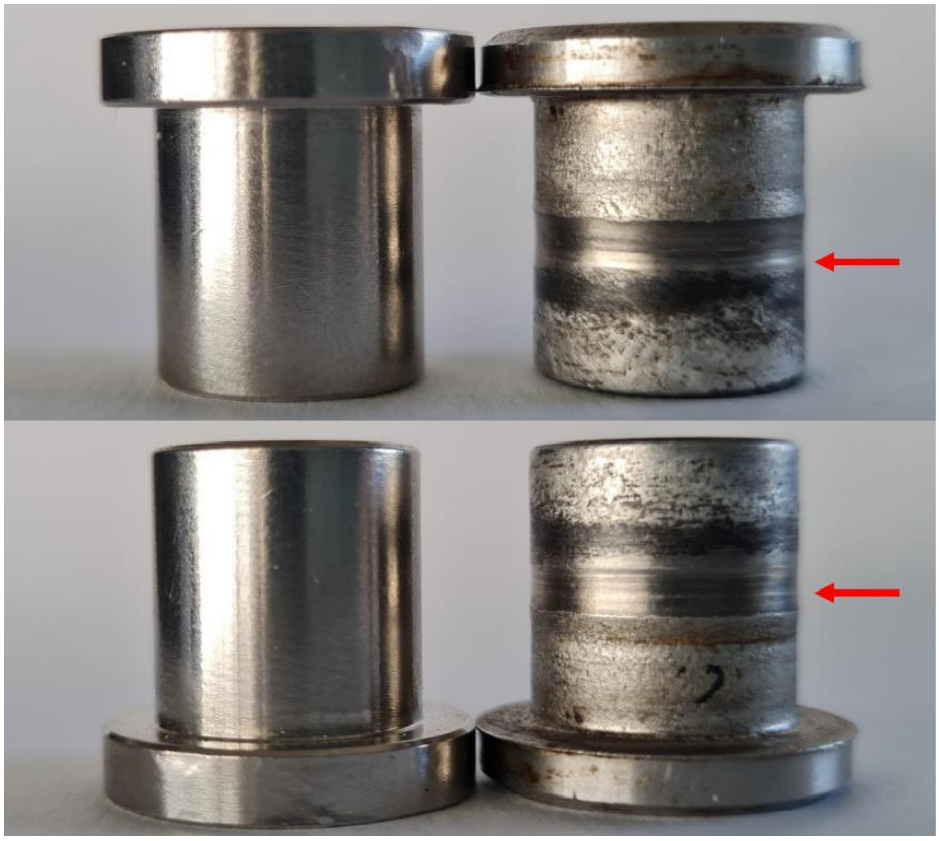

Figure 13: The two pictures show the propeller bush shaft taken from the side profile. The new propeller bush is on the left and the bush from ZU-IKI is on the right. It clear that the bush has been moving in the propeller hub as indicated by the striations on the bush shank.

The aircraft maintenance organisation (AMO), which is a South African agent in consultation with the manufacturer, established that the engine was normal with no anomalies and that comments would be speculative in terms of the propeller as it was not recovered. However, it is possible that the torque checks had been carried out at these annual inspections, and the loss of tension in the bolts has occurred in the last 9 hours (in the last 94.3 hours and at the time of the accident). The AMO and the manufacturer could only speculate that the foreign object found inside the engine compartment could have been a contributing factor in this accident. Although the maintenance requirement for this aircraft is required annually or at 100 hours, the aircraft had other inspections conducted at 15 hours, 35.5 hours and 94.3 hours at which torque settings should have been checked.

1.17. Organisational and Management Information

1.17.1. The aircraft was operated privately under the provisions of Part 94 of the CAR 2011 as amended. The pilot was the owner of the aircraft.

1.17.2. The aircraft was maintained by the AP who had an authorised AP certificate that was issued by the Regulator on 28 February 2022 with an expiry date of 27 February 2024.

1.17.3. The aircraft was recovered to their facility in George by the AMO (manufacturer agent) for inspections. The AMO was issued an approval certificate by the Regulator on 29 March 2021 with an expiry date of 31 March 2022.

1.18. Additional Information

1.18.1. None.

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. The aircraft took off from FARS at 0930Z to Morning Star Aerodrome, routing via Robben Island with the pilot and a passenger on-board. At approximately 1110Z (100 minutes) into the flight whilst routing along the Cape Peninsula at 1500 feet AGL, the pilot heard a loud bang followed by loss of engine power. He then made a MAYDAY call and initiated a forced landing on the road in the Cape Point Nature Reserve. The left-wing clipped fynbos on the left-side of the road during the landing roll. The aircraft ground-looped in a clockwise direction. The aircraft came to rest with the nose tucked in the fynbos. The pilot and the passenger sustained injuries during the landing sequence. The aircraft was substantially damaged.

2.2.2. The pilot had the required licence and rating to conduct the flight. He had a total of 647.5 flying hours of which 59 were on the aircraft type. The pilot regularly flew the aircraft. A cordless screwdriver and socket were discovered in the aircraft's engine bay which should have been removed during the pre-flight checks on the ground at FARS. It is not clear if these tools interfered with the engine performance. This shows poor pre-flight planning and negligence from the pilot.

2.2.3. The flight was conducted under VFR by day. The weather conditions on the day were favourable; the weather did not contribute to this accident.

2.2.4. The aircraft was registered under the pilot's name. The Authority to Fly (ATF) was issued on 15 December 2020 with an expiry date of 31 December 2022. The aircraft was issued a Certificate of Release to Service (CRS) on 5 February 2022 at 94.3 hours and underwent an annual inspection on 16 November 2021.

2.2.5. The investigation established that, although the maintenance of the aircraft required inspection annually or at 100 hours, additional inspections were to be conducted at 15 hours, 35.5 hours and 94.3 hours at which torque settings would have been checked. The engine was found to be operating normally with no anomalies detected. The propeller was not recovered and thus, no investigation could be conducted on it. However, there was no evidence that the torque checks had not been carried out at these annual inspections, and the loss of tension in the bolts could possibly have occurred in the last 9 hours (in the last 94.3 hour). It can only be speculated that the foreign objects found inside the engine compartment had contributed to the accident, and that the pilot had conducted a poor pre-flight inspections.

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 initially issued a Private Pilot Licence (PPL) on 17 February 2021. The pilot had undergone a competency evaluation test on 22 January 2022 and was reissued the licence on the same day with an expiry date of 28 February 2024. The pilot had a Class II medical certificate that was issued on 3 August 2021 with an expiry date of 31 August 2022 with a restriction to wear corrective lenses.

3.2.2. The aircraft was issued a Certificate of Registration (C of R) on 5 March 2020. The ATF was issued on 15 December 2020 with an expiry date of 31 December 2022. The aircraft was issued a CRS on 5 February 2022 at 94.3 hours with an expiry date of 31 December 2022 or at 200 airframe hours, whichever comes first. The last mandatory periodic inspection (MPI) on the aircraft was carried out on 16 November 2021 at 94.3 airframe hours. The aircraft was flown a further 9.0 hours after the last MPI.

3.2.3. The flight was conducted under VFR by day and under the provisions of Part 94 of the CAR 2011 as amended. The aircraft was force-landed on the road after the propeller detached in-flight. The pilot and the passenger sustained serious injuries during the accident sequence.

3.2.4. There was a cordless electric screwdriver and socket discovered in the engine bay post-accident.

3.2.5. The investigation established that, although the maintenance for this aircraft is required annually or at 100 hours, the aircraft had other inspections conducted at 15 hours, 35.5 hours and 94.3 hours at which the torque settings would have been checked. The engine operated normally with no anomalies after it was inspected. The propeller was not recovered and, thus, further investigation could not be conducted. The probability of the torque checks not being carried out at annual inspections would mean that the loss of tension in the bolts would have

likely occurred in the last 9 hours (last 94.3 hours) before the incident. It could be speculated that the foreign objects found inside the engine compartment could have contributed towards the accident, and that the pilot conducted poor pre-flight inspection.

3.3. Probable Cause/s

3.3.1. The propeller detached from the engine in-flight, which caused the engine to rev excessively; this led to the pilot executing an unsuccessful forced landing on the road. The cause of the propeller detaching could be likely attributed to loss of tension in the bolts.

3.4. Contributory Factor/s

3.4.1. Poor pre-flight inspection.

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. Operators and AMO/APs are encouraged to ensure that they check torque of the propellor bolts during the 100 hours in service in accordance with the requirements of maintenance inspections and in line with the manufacturers' manuals.

5. APPENDICES

5.1. None.

This report is issued by:

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