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Enquiries: T. Shilongo **Our Ref: 3/48** **Date:** 03 April 2017

To : Minister of Works and Transport

From : Director: Aircraft Accident Investigation

RE: CIVIL AIRCRAFT ACCIDENT REPORT

Please find attached the final report on the above subject accident. In accordance with the International Civil Aviation Organization Annex 13 – Aircraft Accident and Incident Investigation – Standard 6.13, final reports shall be published as soon as possible in the interest of accident prevention.

It is recommended that copies of these final reports be made available to the public and other interested parties upon request. Your approval is therefore sought to release the said reports.

Erickssón M. Nengola 03/03/2017
DIRECTOR: AIRCRAFT ACCIDENT INVESTIGATION

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FOREWORD

This report presents the factual information, data analysis, conclusions, and safety recommendations reached during the investigation. The purpose of the investigation was to establish the circumstances surrounding this accident.

In accordance with the provisions of Annex 13 to the convention on International Civil Aviation Organization, and Aviation Act, (Act No. 6 of 2016), the accident's analysis, conclusions, and safety recommendations contained therein are intended neither to apportion blame nor to single out any individual or group of individuals. The main objective was to identify the systematic deficiencies and draw lessons, from the occurrence, which might help to prevent accidents and incidents in the future. To this end, many a time, the reader may be interested in whether or not an issue was a direct cause of the accident (that has already taken place), whereas the investigator is mainly concerned with the prevention of future accidents/incidents.

As a result, usage of this report for any purpose other than (the latter and spirit of Annex 13 and Aviation Act, (Act No. 6 of 2016 or other relevant statutes) prevention of similar occurrences in the future might lead to erroneous interpretations and applications.

ABBREVIATIONS

ACCID	-	Accident
AD	-	Airworthiness Directives
AMO	-	Approved Maintenance Organization
AOC	-	Air Operating Certificate
ATC	-	Air Traffic Controller
°C	-	Degrees Celsius
C. of .A	-	Certificate of Airworthiness
C. of .R	-	Certificate of Registration
CPL	-	Commercial Pilot License
CSU	-	Constant speed unit
CVR	-	Cockpit Voice Recorder
DAAI	-	Directorate of Aircraft Accident Investigation
FDR	-	Flight Data Recorder
ICAO	-	International Civil Aviation Organization
MHz	-	Mega Hertz
MPI	-	Mandatory Periodic Inspection
NAM-CARS	-	Namibia Civil Aviation Regulations
N/A	-	Not Applicable
NCAA	-	Namibia Civil Aviation Authority
NM	-	Nautical Miles
PPL	-	Private Pilot License
RPM	-	Revolution per minute
SACAA	-	South African Civil Aviation Authority
SB	-	Service Bulletin
UTC	-	Universal Time Coordinated
VFR	-	Visual Flight Rules

Ministry of Works and Transport

ACCID/080516/01-05

DIRECTORATE OF AIRCRAFT ACCIDENT INVESTIGATIONS
ACCIDENT REPORT – EXECUTIVE SUMMARY

Aircraft Registration	V5-JET	**Date of Accident**	05 August 2016		**Time of Accident**	15:40 UTC	
Type of Aircraft	CESSNA 210L		**Type of Operation**		Charter		
Pilot-In-Command License Type		CPL	**Age**	40	**License Valid**	Yes	
Pilot-In-Command Flying Experience		Total Flying Hours	5039.55		Hours on Type	1171.55	
Last point of departure	Dorro Nawas (FYDN)						
Next point of intended landing	Swakopmund (FYSM)						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
12 NM in the Skeleton Coast Park north east of Henties Bay. S22° 01' 17.0" E014° 24' 09.4"							
Meteorological Information	Wind: Southerly, Wind speed: ±15 kts, Visibility: <10 km, Temperature: 30°C, Cloud cover: Nil, Cloud base: Nil, Dew point: Not given						
Number of people on board	1 + 0	**No. of people injured**	0		**No. of people killed**	0	

Synopsis

On the 5th of August 2016 at around 15:40 UTC, a Cessna 210L registration number V5-JET made an emergency landing, approximately 12 NM in the Skeleton Coast Park northeast of Henties Bay while it was on a repositioning flight from Dorro Nawas (FYND) to Swakopmund (FYSM). The pilot was the sole occupant and was not injured during the accident.

The accident was reported to the Directorate of Aircraft Accident Investigation (DAAI) and to the local police in the area. The investigation was organized and conducted by the Directorate of Aircraft Accident Investigation in the Ministry of Works and Transport. No accredited representatives were appointed or invited to take part in the investigation. The report was released by the Directorate of Aircraft Accident Investigation (DAAI).

The weather at the time of the accident was fine with unrestricted visibility.

The pilot was a holder of a Commercial Pilot License with instrument and night ratings. The pilot's medical certificate was valid with no restrictions. The aircraft type was endorsed in the pilot license.

The last Mandatory Periodic Inspection (MPI) was certified on 12 May 2016 at 8576.4 (3673.9 Hobbs) airframe hours. At the time of the accident, the aircraft had accumulated a further 93.9 hours since the last MPI was certified.

According to the records, the Aircraft Maintenance Organization (AMO) that certified the last MPI on the aircraft prior to the accident was in possession of a valid AMO Approval No. 066 with the expiry date of 21 August 2016. The Regulatory Authority conducted an audit on the AMO at Swakopmund Airport on the 27th June 2014 and no discrepancies were identified. Although the Regulatory Authority issued AMO No. 066's approvals since the audit of the company in 2014, there was no any other audit conducted except for the extension letters that were issued since the last AMO audit on the 27th June 2014.
The next AMO audit was scheduled to take place in the month of August 2016 but it was extended to October 2016 as per the request of the company owner who could not be available during the month of August 2016.

Cessna 210 was type accepted in Namibia before 21 March 1990. All Airworthiness Directives (AD) and Service Bulletins (SB) were complied with as certified in the last MPI dated 12 May 2016.

Probable Cause

The pilot lost situational awareness resulting in an unintentionally controlled flight into terrain.

Contributing Factors

The investigation also concluded that the factors contributing to this accident are as follow:

1. Inadequate monitoring of safe height above terrain.
2. Disregard for Standard and Safe Regulatory Operating Procedures.
3. Error in Judgement with relation to the ground or obstacle clearance.

AIRCRAFT ACCIDENT REPORT

Name of Owner	: Botha Aircraft Hire CC
Operator	: Scenic Air (Pty) Ltd
Manufacturer	: Cessna Aircraft Company
Model	: Cessna 210L (1976)
Nationality	: Namibian
Registration Marks	: V5-JET
Place	: In the desert, approximately 12NM north east of Henties Bay.
Date	: 05 August 2016
Time	: 15:40 UTC

All times given in this report are Co-ordinated Universal Time (UTC).

Disclaimer:

This report was/is produced without prejudice to the rights of the Directorate of Aircraft Accident Investigations, which are reserved.

Purpose of the Investigation :

In terms of the Aviation Act (Act No.6 of 2016) and ICAO Annex 13, 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 establish legal liability****.*

This report contains fact relating to aircraft accidents or incidents which have been determined at the time of issue. The report may therefore be revised should new and substantive facts be made available to the investigator(s).

1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 The first flight originated from Swakopmund to Eros Airport 4th of August 2016 and to Ongava, Hosea Kutako International Airport (HKIA) and to Wolve Danc where the pilot overnight.

1.1.2 On the 5th of August 2016, the pilot took off from Wolve Danc (FYWD) at around 09:25 UTC, to Swakopmund (FYSM). At Swakopmund, the pilot picked up a passengers at 11:53 UTC who were destined to Hoanib Lodge and from there she proceeded to Dorro Nawas (FYDN) where she stopped to uplift 85 litres of fuel.

1.1.3 At around 14:58 UTC, the plot took of from Dorro Nawas and the accident happened at around15:40 UTC while on a repositioning flight back to Swakopmund when the pilot made an emergency landing 12 NM in the Skeleton Coast Park north east of Henties Bay.

1.1.4 The pilot was about to commence a descent from 3000 feet to Swakopmund when the accident happened.

1.1.5 Before executing an emergency landing, the pilot stated she heard a massive bang that was followed by a propeller stoppage while the engine was still under power.

1.1.2 The pilot reported that the aircraft started a severe vibration and later the propeller started turning very slowly before proceeded with executing an emergency landing on an unprepared surface at the Skeleton Coast Park and the aircraft came to a halt facing southeasterly direction.

1.1.3 After the aircraft stopped, the pilot contacted Walvis Bay ATC telephonically and told them about the position where she made an emergency landing.

1.1.4 The pilot who was the lone occupant on the aircraft survived the incident without sustaining any injuries.

1.1.5 The weight was within the prescribed limit.

1.1.6 Weather was fine with an unrestricted visibility at the time of the accident.

1.1.7 The pilot filed a flight plan which indicated the intended routes for her flights from Swakopmund to Eros Airport, through several places and to Dorro Nawas and back to Swakopmund.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	0	0	0

1.3 Damage to Aircraft

1.3.1 The aircraft sustained serious damage to its propeller, the two right hand (R/H) engine mountings, a broken antenna on the belly, as well as to the right hand engine cowlings. The right hand exhaust tail pipe was also found missing.

1.4 Other Damage

1.4.1 There were no other damages apart from the marks on the ground.

1.5 Personnel Information

Nationality		Namibian			
Licence No	CA0663	Gender	Female	Age	40
Licence valid		Yes	Type Endorsed	Yes	
Ratings		Instrument and Night Rating			
Medical Expiry Date		31 August 2016			
Restrictions		None			
Previous Accidents		A Propeller strike in 1994. Forced landing due to engine failure in 1996.			

Flying Experience:

Total Hours	5039.55
Total Past 90 Days	182.25
Total on Type Past 90 Days	182.25
Total on Type	1171.55

1.6 Aircraft Information

Airframe :

Type	Cessna 210L	
Manufacturer	Cessna Aircraft Company	
Aircraft Serial Number	210-61057	
Year of Manufacture	1976	
Total Airframe Hours (At time of Accident)	8670.3 Hrs (3673.9 Hobbs)	
Last Annual Inspection (Date & Hours)	12 May 2016	8576.4 Hrs
Hours since Last Annual Inspection	93.9 Hrs	
C of A (Issue Date)	28 June 2007	
C of A (Expiry Date)	09 November 2016	
C of R (Issue Date) (Present owner)	16 Jun 2015	
Operating Categories	Standard	

Note: As per flight folio page 18875, fuel on board the aircraft after departing Dorro Nawas was 160 litres. Fuel remained on board was 120 litres which indicated that only 40 litres were used from the time the aircraft took off from Dorro Nawas to the time of the accident.

Engine:

Type	Teledyne Continental IO-520-L
Engine Serial Number	295379-R
Hours since New	4514.6
Hours since Overhaul	480.8

Propeller :

Type	Hartzell PHC-J3YF-1RF
Propeller Serial Number	FP7259B
Hours since New	2486.3
Hours since Overhaul	362.7

1.7 Meteorological Information

1.7.1 The following weather information was obtained from the pilot's questionnaire.

Wind direction	Southerly	Wind speed	±15 kts	Visibility	< 10 km
Temperature	30°C	Cloud cover	Nil	Cloud base	Nil
Dew point	Not given				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigation equipment and no difficulties with Navigation Aids were reported.

1.9 Communications.

1.9.1 The aircraft was equipped with standard communication equipment required for that type. The pilot was transmitting on unmanned frequency of 124.8 Mhz. There was no communication problem reported.

1.10 Aerodrome Information

1.10.1 Not applicable.

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with Flight Data Recorder (FDR) or Cockpit Voice Recorder (CVR) nor was it required by the regulation.

1.12 Wreckage and Impact Information

1.12.1 The first impact point was discovered at a distance of 2.11 km from where the aircraft came to a halt and the first blade contact point.

1.12.2 There were nine (9) blade marks visible after which the fuselage (belly) contacted the ground. This whole area was approximately 18 meters long.

1.12.3 The right hand exhaust tail pipe which was missing was found at 125 meters from the initial impact point.

1.12.3 According to the calculation based on the distance between the blades impact marks, the aircraft might have hit the ground at a speed of approximately 138 kts.

1.12 4 The aircraft impacted the ground in a steep mode with the propeller first followed by the bally before the pilot pitched up and executed an emergency landing on an unprepared surface in the Skeleton Coast Park about 12 NM northeast of Henties Bay.

1.12.5 The aircraft was not wrecked but suffered substantially damages to its propeller blades, both two right hand (R/H) engine mountings broken off, and the right hand exhaust tail pipe was found missing. There was also a broken antenna and some metal folding as well as some dents and scratch marks on the belly of the aircraft and the right hand engine cowlings were also damaged.

Figure 1. The photo shows where V5-JET came to a halt after an emergency landing, at GPS reading S22° 01' 17.0" E014° 24' 09.4".

Figure 2. The photo shows the front view of the aircraft and the damages to the propeller blades.

Figure 3. A photo showing the broken rear R/H engine mounting.

Figure 5. A photo shows the broken antenna on the aircraft belly.

Figure 6. Metal folding and some scratch marks that can be seen on the belly of the aircraft.

Figure 7. The photo shows how the R/H engine cowlings were damaged during the accident.

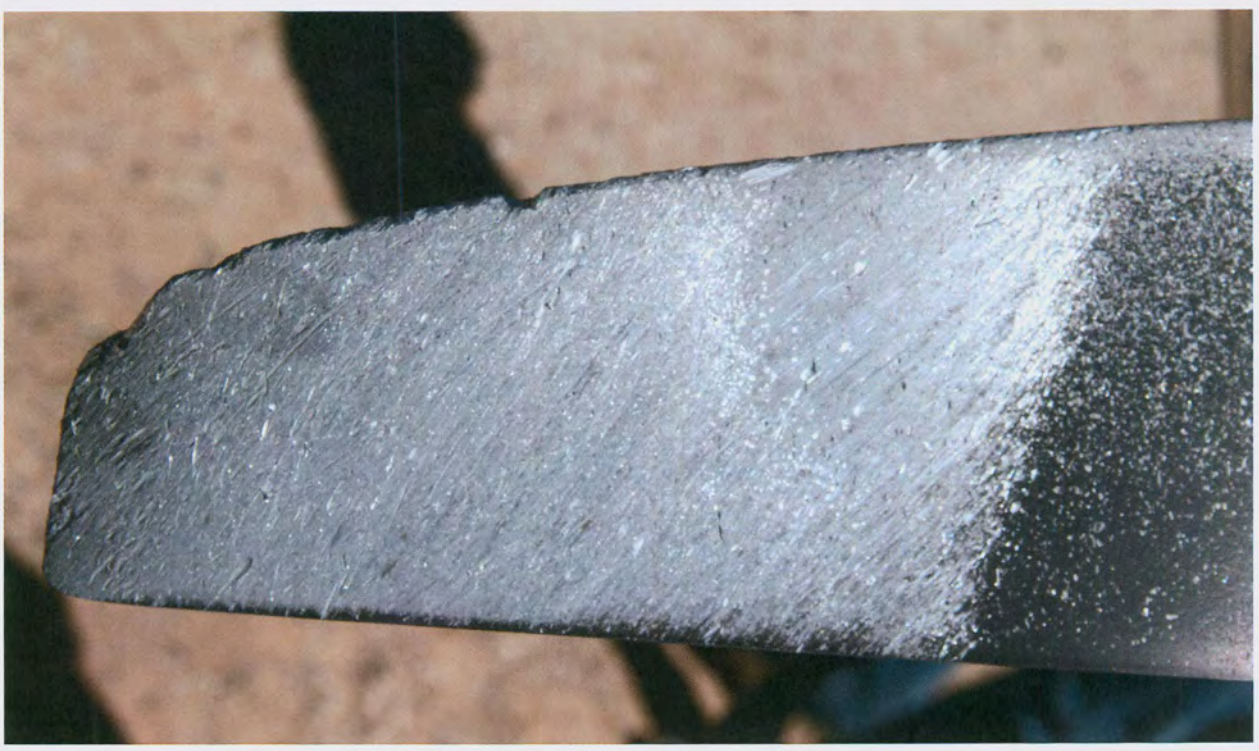

Figure 8. A close view of one of the damaged propeller blade.

1.13 Medical and Pathological Information

1.13.1 The pilot's Medical Certificate was valid and the aircraft type endorsed on her license at the time of the accident. Reports from two independent Medical Doctors and a clinical Psychologist who examined the pilot on her own and her employer's request after the accident indicated that the pilot was fit to perform her duties as a Commercial Pilot.

1.14 Fire

1.14.1 There was no pre- or post impact fire.

1.15 Survival Aspects

1.15.1 This was a survivable accident.

1.16 Tests and Research.

1.16.1 V5-JET's engine was dismantled and inspected for damage following the propeller strike. Apart from the normal replacement parts for a sudden stop inspection, the following parts were replaced:

Crankshaft – due to severe cracks
Crankcase – due to de-formed No 1 bearing boss , and
The 4 counter weights – due to cracks

1.16.2 The engine was reassembled and installed back in V5-JET. A ground run and a test flight was carried out and the aircraft released back into service.

1.17 Organizational and Management Information

1.17.1 This was a charter flight.

1.17.2 The aircraft owned by Botha Aircraft Hire CC. and operated by Scenic Air (Pty) Ltd.

1.17 3 Both Certificates (C of A and C of R) were valid at the time of the accident.

1.17.4 The Last Mandatory Periodic Inspection was carried out by an approved local AMO at Swakopmund Airport and was in possession of a valid AMO Approval No: 066 with an expiry date of 21 August 2016.

1.17.5 The Air Operator Certificate (AOC) No. 00076 which was issued by the Regulatory Authority under reference No: NCAA/AOC/013/2013 on 30 June 2016 was valid until the 30th June 2017.

1.18 Additional Information

1.18.1 During the investigation, the pilot was asked several questions to list the sequence of events about the accident but could not remember hitting or impacting anything prior to touch down.

1.18.2 The right hand exhaust tail pipe which was missing was found at 125 meters from the initial impact point.

1.18.3 Fuel found on board the aircraft at the site was 120 litres in total while the engine oil shows a total of 8.8 quarts which was not a factor contributing to the accident.

1.18.4 The aircraft had a total of 3673.9 Hobbs and 0927.0 on its Tachometer at the time of the accident.

1.18.5 The damaged propeller was removed and replaced with a serviceable one at the accident site.

1.18.6 The aircraft was restarted and the engine was run at minimum speed without showing any problem.

Figure 9. V5-JET's first propeller impact point which was followed by the fuselage, at GPS reading of S22° 00' 08.9" E014° 29' 15.9".

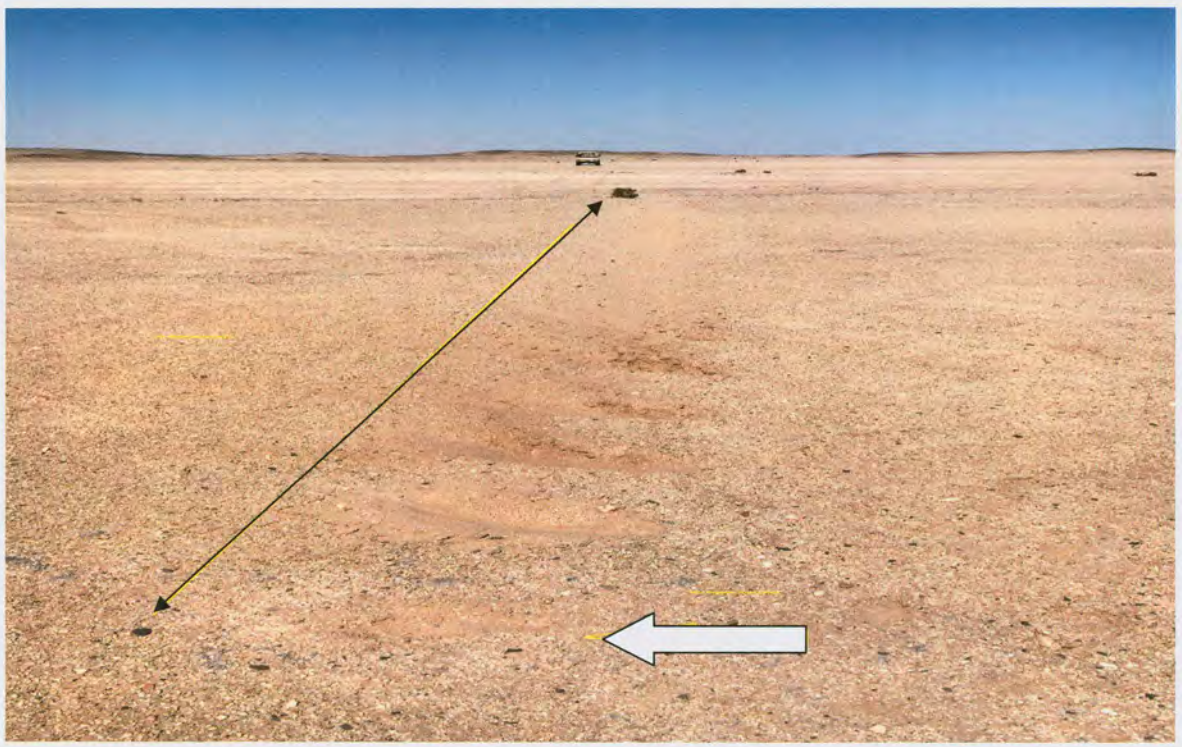

Figure 10. Another view showing the first propeller impact mark and that of the fuselage when contacted with the ground. This area is approximately 18 meters long.

Figure 11. The right hand (R/H) exhaust pipe was found at GPS reading S22° 00' 14.4" E014° 29' 09.4".

Figure 12. The first contact marks with the landing gear extended was found at GPS readings S22° 01' 07.3" E014° 29' 08.0".

Figure 13. A photo showing the broken forward R/H engine mounting taken after the removal of the engine from the aircraft.

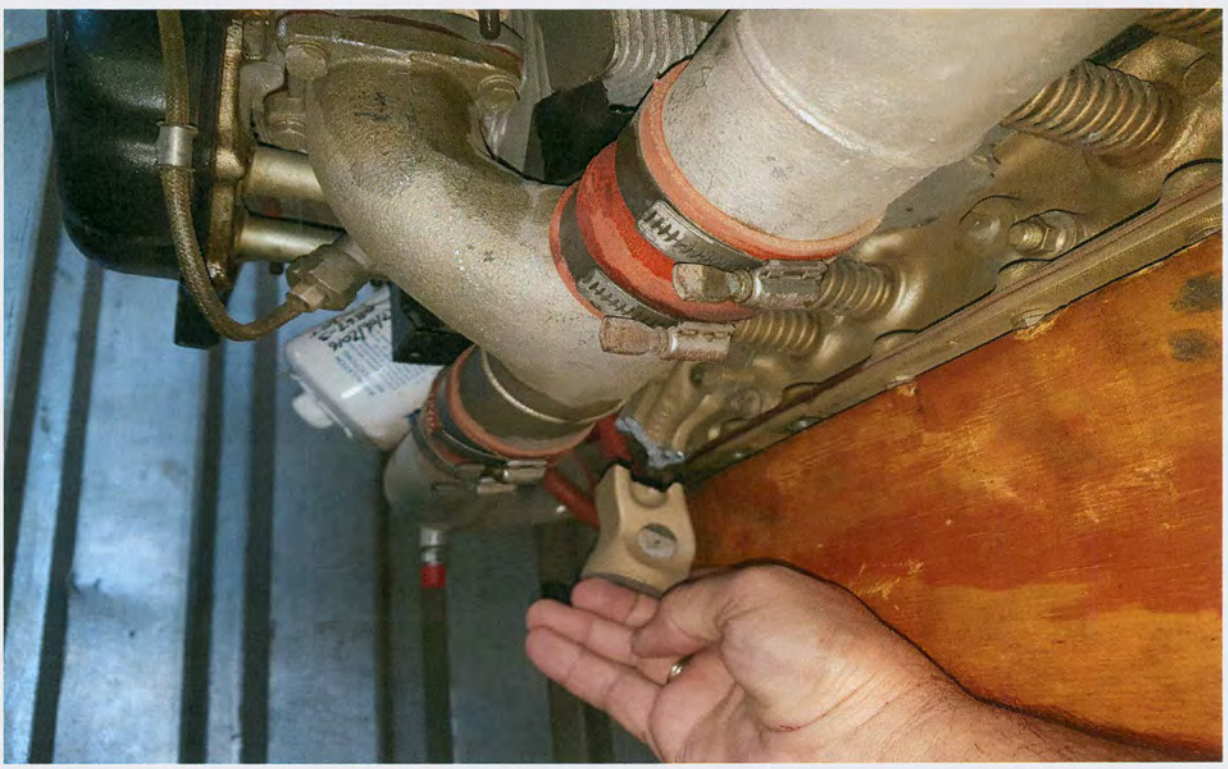

Figure 14. A close view of the broken rear R/H engine mounting.

1.19 Useful or Effective Investigation Techniques

1.19.1 The below formula was used to estimate the speed of the aircraft at the time of first impact on the ground;

$$S = \frac{V}{RPM \times 30 \times 60}$$

where S= distance between the first two blade strike marks (m) 0.55 meter
V= speed of the aircraft (m/sec) 16

V= SxRPMx3x60
V= 0.55x2450x3x60
V= 242 KM/HR (128 kts which is approximately 138 kts ground speed.

2 ANALYSIS

2.1 The pilot was on a charter flight from Dorro Nawas to Swakopmund when the accident happened.

2.2 The flight originated from Swakopmund to Eros Airport 4th of August 2016 and to Ongava, Hosea Kutako International Airport (HKIA) and to Wolve Danc where the pilot overnight.

2.3 The aircraft departed Wolve Danc at around 09:25 UTC on the 5th of August 2016 to Dorro Nawas where the pilot uplifted about 85 litres of fuel and was on a repositioning flight back to (FYSM) Swakopmund.

2.4 The accident happened 12 NM in the Skeleton Coast Park northeast of Henties Bay while the pilot was about to commence a descent from 3000 feet to Swakopmund and the aircraft was found facing on the southeasterly.

2.5 The pilot reported heard a massive bang that was followed by a propeller stoppage while the engine was still under power.

2.6 The aircraft started a severe vibration and later the propeller started turning very slowly.

2.7 After the accident, the pilot contacted Walvis Bay ATC telephonically and told them about the position she made a forced landing.

2.8 From where the aircraft touched down with the landing gear extended, there were no any prop strike marks corresponding to the damages sustained by the aircraft.

2.9 The damages sustained by the aircraft indicated that the aircraft impacted the ground very hard without the landing gear extended while the engine was still under power.

2.10 Although the pilot was asked several questions to list the sequence of events about what happened during the flight from Dorro Nawas on the way to Swakopmund, she did not disclose where the aircraft initially impacted the ground and only stated that she has no recollection of hitting or impacting anything prior to touched down.

2.11 The initial impact point was discovered at a distance of 2.11 km from where the aircraft came to a halt and the where first blades contact point were.

2.12 The aircraft impacted the ground with the propeller first, followed by the fuselage (belly). Evidence on the ground indicated that the first impact was done without the landing gear extended.

2.13 The distance from the first impact point with the propeller and the belly is approximately 18 meters long and had about nine (9) blade marks visible.

2.14 The right hand exhaust pipe was found at 125 meters from the initial impact point.

2.15 The aircraft came to a halt at a distance of 358 meters from where it touched down with the landing gear extended.

2.16 The damaged propeller was removed and replaced with a serviceable one and the aircraft was restarted at the accident site and was running normal without any problem.

2.17 Weight and balance was within the prescribed limit.

2.18 The weather was fine with an unrestricted visibility.

2.19 The pilot filed a flight plan with a flight level of 4500 ft VFR which indicated the route from Swakopmund, Eros Airport and through several places up to Dorro Nawas and back to Swakopmund.

2.20 The last Mandatory Periodic Inspection (MPI) was carried out by an Approved local Aircraft Maintenance Organization (AMO) and the aircraft was airworthy.

2.21 The Air Operator Certificate (AOC) was valid until the 30th June 2017.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot's licence was valid at the time of the accident.

3.1.2 The pilot's medical certificate was valid.

3.1.3 The aircraft's Certificate of Airworthiness (C of A) and Certificate of Registration (C of R) were all valid at the time of the accident.

3.1.4 The pilot was on a charter flight from Dorro Nawas to Swakopmund.

3.1.5 The weather was fine with a very unrestricted visibility.

3.1.6 Weight and balance was within the prescribed limit.

3.1.7 The pilot did not disclose where the aircraft initially impacted the ground.

3.1.8 The pilot made a forced landing in the Skeleton Coast Park, about 12 NM northeast of Henties Bay.

3.1.9 There was no indication of a prop strike where the aircraft touched down with the landing gears extended.

3.1.10 The initial impact was discovered at a distance of about 2.11 km from where the aircraft came to a halt.

3.1.11 During the onsite investigation, the engine was restarted run at minimum power and did not indicating any abnormalities.

3.1.12 The investigation revealed that the damages on the aircraft were resulted from the high impact forces.

3.1.13 Although the pilot's Medical Certificate was not expired, she request to go for another medical examination on her own.

3.2 Probable Cause/s

The investigation concluded that:

3.2.1 The pilot lost situational awareness resulting in an unintentionally controlled flight into terrain.

3.3 Contributory Factors

The investigation also concluded that the factors contributing to this accident are as follow:

1. Inadequate monitoring of safe height above terrain.
2. Disregard for Standard and Safe Regulatory Operating Procedures.
3. Error in Judgement with relation to the ground or obstacle clearance.

4. SAFETY RECOMMENDATIONS

4.1 It is recommended that pilots should be alert and maintain a safe altitude as per NAMCARS Part 10.71(3) (a-d).

4.2 It is also recommended that operators should encourage their pilots to keep a voluntary reporting system culture that is non-punitive and to report all accidents or incidents happened during flight without any victimization so that they cannot delay the investigation process.

Compiled by :

.....
T. Shilongo
Investigator-in-charge

Date : 03/04/2017

Released by:

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Alpheus G. !Naruseb, MP
MINISTER: MINISTRY OF WORKS AND TRANSPORT

Ministry of Works and Transport
06 APR 2017
Office of the

Date : 2017/04/06