



AIRCRAFT INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/1023	
Aircraft Registration	ZS-NFO	Date of Incident	28 November 2013		Time of Incident	14:30Z
Type of Aircraft	Beech F90 King Air		Type of Operation		International flight (Private)	
Pilot-in-command Licence Type		Commercial Pilot Licence (CPL)	Age	33	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	4803.20		Hours on Type	68.25
Last point of departure		Beira Airport- FQBR (Mozambique)				
Next point of intended landing		Lanseria International Airport - FALA (Gauteng province, South Africa)				
Location of the Incident site with reference to easily defined geographical points (GPS readings if possible)						
About 20 miles north-west of Lanseria airport						
Meteorological Information		Surface wind: variable; Temperature: 22 °C; Dew point: 14°C; Cloud: overcast with hail and thunderstorm.				
Number of people on board	1 + 0	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>The pilot reported that while he was flying to Lanseria Airport he was routed by Radar Control to HBV (VOR station: Hartebeestpoortdam), then LIV (VOR station: Lanseria). The pilot further stated that he was using the weather radar in the aircraft and he flew towards the west in order to try to fly around the thunderstorm. However he did not go far enough as he miscalculated the size of the storm and turned too soon towards LIV. The pilot then tried to turn away but he was too late and the aircraft was hit by hail.</p> <p>Once the aircraft was out of the storm, the pilot advised Radar Control that his aircraft had suffered hail damage. The pilot then requested permission to divert to OR Tambo Airport as the hail at Lanseria was getting worse. The aircraft landed safely at OR Tambo Airport.</p> <p>The aircraft sustained damage to the leading edges, wing, exhaust, tail light and the fuselage. The pilot sustained no injuries during the incident.</p>						
Probable Cause						
<p>The aircraft was hit by hail during flight.</p>						
IARC Date				Release Date		

**AIRCRAFT INCIDENT REPORT**

Name of Owner : National Airway Corporation (Pty) Ltd
Name of Operator : Private
Manufacturer : Beech Aircraft Corporation
Model : F90
Nationality : South African
Registration Marks : ZS-NFO
Place : About 20 miles north-west of Lanseria Airport
Date : 28 November 2013
Time : 14:30Z

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.

Purpose of the Investigation:

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation Incidents or incidents and not to establish legal liability.

Disclaimer:

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

1. FACTUAL INFORMATION**1.1 History of Flight**

- 1.1.1 The pilot was engaged on a private international, IFR by day flight from Beira Airport in Mozambique to Lanseria International Airport (FALA) in South Africa when the incident occurred.
- 1.1.2 The pilot stated that while he was flying to Lanseria Airport he was routed by Radar Control to HBV, then LIV. At HBV the pilot requested to maintain his heading of 240° because of the thunderstorm between HBV and LIV. The pilot was cleared to maintain his heading and to descend flight level (FL) 110 and turn right towards LIV when able.

- 1.1.3 The pilot then flew west for about 15 miles and then requested to route direct LIV. The pilot thought that he had gone past the thunderstorm, but instead, he flew too close and the aircraft experienced heavy wind shear and hail. Once the aircraft was out of the thunderstorm, the pilot advised Radar Control that his aircraft had suffered hail damage.
- 1.1.4 The pilot then requested permission to divert to OR Tambo International Airport (FAOR) as the hail was becoming worse. The aircraft landed safely at FAOR.
- 1.1.5 The pilot sustained no injuries. The aircraft sustained damage to the leading edges, spinners, wing, exhaust, tail light and fuselage.

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

- 1.3.1 The aircraft sustained damage to the leading edges, spinners, exhaust, wing, fuselage and tail lights.



Figure 1: damage to the aircraft

1.4 Other Damage

1.4.1 None

1.5 Personnel Information

Nationality	British	Gender	Male	Age	33
Licence Number	0270469703	Licence Type	Commercial Pilot Licence (CPL)		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night and Instrument rating				
Medical Expiry Date	28 February 2014				
Restrictions	None				
Previous Incidents	None				

Flying Experience:

Total Hours	4803.20
Total Past 90 Days	48.15
Total on Type Past 90 Days	48.15
Total on Type	68.25

1.6 Aircraft Information

Airframe:

Type	F90	
Serial Number	LA-51	
Manufacturer	Beech Aircraft Corporation	
Date of Manufacture	1981	
Total Airframe Hours (At time of Incident)	9710.50	
Last MPI (Date & Hours)	1 May 2013	9646.50
Hours since Last MPI	64	

C of A (Expiry Date)	24 May 2014
C of R (Issue Date) (Present owner)	25 July 2013
Operating Categories	Standard Part 135

Engine number 1:

Type	P&W PT6A-135
Serial Number	PCE92135
Hours since New	9701.8
Hours since Overhaul	2557

Engine number 2:

Type	P&W PT6A-135
Serial Number	PCE92136
Hours since New	9701.8
Hours since Overhaul	2557

Propeller number 1:

Type	HARTZELL HL-B4TN-3B
Serial Number	EAA-1362
Hours since New	9646.5
Hours since Overhaul	804

Propeller number 2:

Type	HARTZELL HL-B4TN-3B
Serial Number	EAA-1361
Hours since New	9646.5
Hours since Overhaul	804

1.7 Meteorological Information

1.7.1 The weather report was obtained from the pilot Incident/incident questionnaire.

Wind direction	Variable	Wind speed	40 knots	Visibility	Unknown with thunderstorm and hail
Temperature	22°C	Cloud cover	Overcast	Cloud base	Unknown
Dew point	14°C				

Note: The definition of hail:

“Hail is a form of solid precipitation. It consists of balls or irregular lumps of ice, each of which is called a hailstone. Unlike graupel, which is made of rime, and ice pellets, which are smaller and translucent, hailstones consist mostly of water ice and measure between 5 millimetres (0.2 in) and 15 centimetres (6 in) in diameter.”

Source: <http://en.wikipedia.org/wiki/Hail>

1.17.2 The aircraft was equipped with weather radar and the pilot utilised that system during his IFR flight. He indicated that he acquired the weather information prior to departure. The ATC also communicated the weather information to the pilot during flight.

1.17.3 Several electronic media provided information about the weather on the day of the incident especially around Lanseria Airport; the media indicated very heavy rain and hail in the area of the aerodrome. Below is one of the electronic weather sources that were available.

Weather History for Lanseria, South Africa

Thursday, November 28, 2013 — [View Current Weather Conditions](#)

« Previous Day November 28 2013 View Next Day »

Daily [Weekly](#) [Monthly](#) [Custom](#)

	Actual	Average	Record
Temperature			
Mean Temperature	18 °C	-	
Max Temperature	24 °C	-	- ()
Min Temperature	12 °C	-	- ()
Degree Days			
Heating Degree Days	1		
Growing Degree Days	14 (Base 50)		
Moisture			
Dew Point	14 °C		
Average Humidity	79		
Maximum Humidity	100		
Minimum Humidity	53		

	Actual	Average	Record
Precipitation			
Precipitation	0.0 mm	-	- ()
Sea Level Pressure			
Sea Level Pressure	1021.94 hPa		
Wind			
Wind Speed	21 km/h ()		
Max Wind Speed	65 km/h		
Max Gust Speed	104 km/h		
Visibility	9.1 kilometers		
Events	Rain , Hail , Thunderstorm		
T = Trace of Precipitation, MM = Missing Value			Source: Averaged Metar Reports

Source: <http://www.wunderground.com/history/airport/FALA/2013/11/28/DailyHistory.html>

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with a TRI 40 Digital indicator and a TRA 3500 Altimeter unit. There were no recorded defects to navigational equipment prior to the flight.

1.9 Communications.

1.9.1 The aircraft was equipped with VHF transmitter communication equipment as per the equipment list approved by the Regulator. There were no recorded defects to communication equipment prior to the flight.

1.10 Aerodrome Information

1.10.1 The incident occurred in the air about 20 miles north-west of Lanseria Airport.

1.11 Flight Recorders

1.11.1 The aircraft was not fitted with a Flight Data Recorder (FDR) or with a Cockpit Voice Recorder (CVR), nor were these required by the regulator.

1.12 Wreckage and Impact Information

1.12.1 The aircraft was hit by hail while flying to FALA. The aircraft sustained damage to the leading edges, spinners, wing, exhaust, tail light and fuselage.



Figure 2: damage to the exhaust

1.13 Medical and Pathological Information

1.13.1 The pilot sustained no injuries.

1.13.2 The pilot was a holder of a valid medical certificate.

1.14 Fire

1.14.1 There was no pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The incident was considered survivable because there was no damage to the cabin area. The pilot flew the aircraft and landed safely at OR Tambo International Airport.

1.16 Tests and Research

1.16.1 None.

1.17 Organizational and Management Information

1.17.1 This was a private international flight.

1.17.2 According to available records the Aircraft Maintenance Organisation (AMO) that certified the last MPI on the aircraft prior to the Incident was in possession of a valid AMO approval.

1.18 Additional Information

1.18.1 The following information was taken from the training presentation on Airborne-Weather- Radar- interpretation by Ian Gilbert (www.gapau.org).

Goals of the Radar:

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- (1) Find the distance to an object (often called a radar target).
- (2) To find the direction to the target.
- (3) To determine the target's reflection characteristics.

The following are general safety rules provided in the presentation:

- i. Do not accept a vector from ATC into convective weather. Always ask for an alternative route. When you refuse a vector, always try to give ATC adequate warning time so they can plan for aircraft-spacing adjustments. Thus, try to avoid last-minute decisions.
- ii. Do not plan a course between two closely-spaced thunderstorms (storms with less than 40 NM between them)
- iii. Do not land or take-off in the face of a thunderstorm that is in the projected flight path. A sudden wind shift or low-level turbulence could cause loss of control.
- iv. Do not attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence under the storm could be severe.
- v. Do not fly over thunderstorms. Turbulence above a storm can be severe.
- vi. Avoid, by at least 20 NM, any thunderstorm identified as severe or giving an intense radar echo. This distance rule includes the anvil of a large cumulonimbus cloud.
- vii. Clear the visual top of a known or suspected severe thunderstorm by at least 10,000 feet. If that exceeds the capability of the aircraft, go around the storm by a wide safety margin on the upwind side.
- viii. Remember that vivid and frequent lightning indicates a severe thunderstorm.
- ix. Regard as severe any thunderstorm with tops 35,000 feet or higher regardless of how you locate it: visually, by radar or from a report.
- x. Evaluate weather scenarios from a distance and always plan an escape route at the top of a descent.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 Man

- 2.1.1 The pilot was engaged on an IFR private international flight when the incident occurred. His licence and medical certificate were valid for the flight. His licence had night and instrument rating.
- 2.1.2 Although the aircraft was equipped with weather radar and the pilot utilised it, he miscalculated the size of the storm and turned too soon. Although he tried to turn away, he was too late and the aircraft was hit by hail.
- 2.1.3 The pilot made a decision to divert when he realised that the thunderstorm was becoming worse and he landed safely at FAOR. The pilot miscalculated the size of the storm and turned too soon towards LIV where the aircraft was hit by hail. This could have happened because the pilot could not evaluate the weather scenarios properly, from a distance, and could not plan an escape route: he then went into the hail.

2.2 Machine

- 2.2.1 The aircraft was maintained according to the existing regulations. All aircraft systems were serviceable and working as designed throughout the approach and landing. The aircraft landed safely at OR Tambo International after the hail incident. Therefore, a mechanical malfunction did not contribute to this incident.

2.3 Environment

- 2.3.1 The weather conditions were poor as the aircraft approached Lanseria International Airport, with hailstorm and windshear.
- 2.3.2 The pilot was flying IFR by day in instrument meteorological conditions (IMC). He flew west of his path for about 15 miles and then requested permission to route direct to LIV. However he turned straight into the storm. He then turned to the right hand side to try and escape but he experienced heavy wind shear and hail. The aircraft was hit by hail; however the pilot flew and landed safely at FAOR.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was a holder of a valid Commercial Pilot Licence and had the aircraft type endorsed in his logbook.
- 3.1.2 The pilot was in possession of a valid medical certification.
- 3.1.3 The aircraft was maintained in accordance with the approved maintenance schedule and was in possession of a valid Certificate of Airworthiness.

3.1.4 The aircraft was hit by hail during flight.

3.1.5 The pilot diverted to FAOR due to bad weather at FALA.

3.2 Probable Cause/s

3.2.1 The aircraft was hit by hail during flight.

4. SAFETY RECOMMENDATIONS

4.1 None.

5. APPENDICES

5.1 None.