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| AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY |
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|--|----------|--|--------------------------|-----------------------------|-------------------------|-------|
| | | | | Reference: | CA18/2/3/9170 | |
| Aircraft Registration | ZS-KLL | Date of Accident | 11 May 2013 | | Time of Accident | 1300Z |
| Type of Aircraft | Beech 58 | | Type of Operation | Private flight | | |
| Pilot-in-command Licence Type | | Commercial | Age | 23 | Licence Valid | Yes |
| Pilot-in-command Flying Experience | | Total Flying Hours | 1374,4 | | Hours on Type | 160,1 |
| Last point of departure | | Wonderboom Airport (FAWB) | | | | |
| Next point of intended landing | | Wonderboom Airport (FAWB) | | | | |
| Location of the accident site with reference to easily defined geographical points (GPS readings if possible) | | | | | | |
| Runway 06 at FAWB on the GPS: S25 39 19.10 E028 13 16.83 | | | | | | |
| Meteorological Information | | Surface wind: North-Easterly at 17 knots. Temperature 17 °C. Visibility: >10 km. | | | | |
| Number of people on board | 1 + 3 | No. of people injured | 0 | No. of people killed | 0 | |
| Synopsis | | | | | | |
| <p>The pilot, accompanied by three passengers, took off from FAWB (Wonderboom airport) for a local private flight. During the landing back at FAWB the propellers struck the ground and the nose wheel sunk in before the aircraft came to a halt. The nose gear may not have been properly down and locked during the landing.</p> <p>The nose gear is only held up by tension on the nose gear retract mechanism. No physical uplock hooks assist in holding the gear up. With the aft retract rod broken, the nose gear should have extended, but not locked by gravity. It is concluded that the nose gear doors jammed, preventing the nose gear from extending.</p> <p>The investigations revealed that the nose gears jammed preventing the nose gear from extending.</p> | | | | | | |
| Probable Cause | | | | | | |
| Landing gear failure | | | | | | |
| IARC Date | | | | Release Date | | |



AIRCRAFT ACCIDENT REPORT

Name of Owner : Stefanutti and Bressan (PTY) LTD
Name of Operator : Private
Manufacturer : Beech Aircraft Corporation
Model : 58
Nationality : South Africa
Registration Marks : ZS-KLL
Place : Runway 06 at FAWB
Date : 11 May 2013
Time : 1300Z

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 accidents or incidents and **not to establish legal liability**.

Disclaimer:

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

1. FACTUAL INFORMATION Sequence of events!!!

1.1 History of Flight

1.1 According to the pilot, on 11 May 2013 he was accompanied by three passengers on a local private flight from FAWB (Wonderboom aerodrome). During the landing back at FAWB, the pilot felt the main undercarriage touching the ground, followed by the nose wheel. The pilot does not recall seeing the three greens. The pilot elected to shut down the aircraft, and on inspection he found that the main undercarriage had partially sunk in and the nose undercarriage was not extended. The main was not fully extended.

1.2 Injuries to Persons

| Injuries | Pilot | Crew | Pass. | Other |
|----------|-------|------|-------|-------|
| Fatal | - | - | - | - |
| Serious | - | - | - | - |
| Minor | - | - | 3 | - |
| None | 1 | - | - | - |

1.3 Damage to Aircraft

1.3.1 The aircraft sustained damage to the propeller, nose cone and the undercarriage.



Figure 1: Wreckage of the aircraft.

1.4 Other Damage

1.4.1 None.

1.5 Personnel Information

| | | | | | |
|---------------------|----------------------|---------------|------------|-----|----|
| Nationality | South African | Gender | Male | Age | 23 |
| Licence Number | 0272224916 | Licence Type | Commercial | | |
| Licence valid | Yes | Type Endorsed | Yes | | |
| Ratings | Night and Instrument | | | | |
| Medical Expiry Date | 30 April 2014 | | | | |
| Restrictions | None | | | | |
| Previous Accidents | None | | | | |

Flying Experience:

| | |
|----------------------------|--------|
| Total Hours | 1374,4 |
| Total Past 90 Days | 67,3 |
| Total on Type Past 90 Days | 21,9 |
| Total on Type | 160,1 |

1.6 Aircraft Information

Airframe:

| | | |
|--|----------------------------|--------|
| Type | BE58 | |
| Serial Number | TH-1161 | |
| Manufacturer | Beech Aircraft Corporation | |
| Year of Manufacture | 1980 | |
| Total Airframe Hours (At time of Accident) | 5480,3 | |
| Last MPI (Date & Hours) | 22 March 2013 | 5479.1 |
| Hours since Last MPI | 1,2 | |
| C of A (Issue Date) | 20 November 2011 | |
| C of R (Issue Date) (Present owner) | 12 July 1984 | |
| Operating Categories | Standard Part 91 | |

Engines:

| | |
|----------------------|-------------|
| Type | Continental |
| Serial Number | 298858-R |
| Hours since New | 2520,5 |
| Hours since Overhaul | 819,5 |

| | |
|----------------------|-------------|
| Type | Continental |
| Serial Number | 299058-R |
| Hours since New | 2234,2 |
| Hours since Overhaul | 384,5 |

Propellers:

| | |
|----------------------|----------|
| Type | Hartzell |
| Serial Number | ED 4557B |
| Hours since New | Unknown |
| Hours since Overhaul | 1,0 |

| | |
|----------------------|----------|
| Type | Hartzell |
| Serial Number | ED 5467B |
| Hours since New | Unknown |
| Hours since Overhaul | 1,0 |

1.7 Meteorological Information

1.7.1 Weather information as obtained from the pilot's questionnaires:

| | | | | | |
|----------------|----------------|-------------|----------|------------|--------|
| Wind direction | North Easterly | Wind speed | 17 knots | Visibility | >10 km |
| Temperature | 17 °C | Cloud cover | None | Cloud base | None |
| Dew point | Unknown | | | | |

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigation instruments as per the manufacturer's design. None were reported unserviceable prior to or during the accident.

1.9 Communications

1.9.1 The aircraft was equipped with standard communication equipment as required by the regulator. There were no recorded defects to communication equipment prior to the flight.

1.10 Aerodrome Information

| | | |
|------------------------|------------------------|-----------|
| Aerodrome Location | FAWB | |
| Aerodrome Co-ordinates | S253943.82 E0281258.47 | |
| Aerodrome Elevation | 4070 | |
| Runway Designations | 06 | 24 |
| Runway Dimensions | 1280 x 22 | 1280 x 22 |
| Runway Used | 06 | |
| Runway Surface | Asphalt | |
| Approach Facilities | PAPI | |

1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR). Neither was required by regulation to be fitted to this aircraft type.

1.12 Wreckage and Impact Information

1.12.1 The aircraft touched down with the main undercarriage as normal. The propeller struck the ground and the gear doors jammed preventing the nose wheel from extending before the aircraft came to a halt.



Figure 2 View of the aircraft from the site

1.13 Medical and Pathological Information

1.13.1 The pilot and the passengers sustained no injuries.

1.14 Fire

1.14.1 There was no pre or post-impact fire.

1.15 Survival Aspects

1.15.1 The occupants were properly restrained with the safety harnesses, and due to the low impact force associated with the accident it was considered survivable.

1.16 Tests and Research

1.16.1 A walkaround inspection by the aircraft maintenance organisation (AMO) revealed the following:

- Nose wheel not extended
- Both propellers bent
- Nose cone chafed at the base
- Main landing gear only extended approximately $\frac{1}{4}$ of the way and not locked minor chafing on the right-hand wingtip light lens
- Left-hand and right-hand inboard main landing gear doors severely chafed on the

- bottom edges due to their still being extended during landing
- Skid marks from the main landing gear tyres along the runway, but no nose tyre marks

The aircraft was lifted and the landing gear was manually extended using the emergency extension crank. The main gear extended fully, but the nose gear did not extend at all. The main gear tyres were found to be chafed at an angle between the sidewalls and running surfaces.

Inspection of the nose gear area after lifting the nose revealed that the doors were in the closed position and that the face sides of the gear doors were chafed, not the edges. The chafing was so extensive the right-hand nose gear drag brace attachment bracket was chafed through approximately a third of the way.

To extend the nose gear the doors had to be pried open with considerable effort. Once the doors were open, the nose gear assembly dropped easily to the down position. The nose gear extension bellcrank on the landing gear actuator was found to be bent and cracked, and the aft nose gear extension rod was broken at the rod end. The chafing on the drag brace, the attachment bracket and the attachment bolt lined up with the drag in the up position. No further damage was found at that stage.

The following findings show that the aircraft landed with the nose gear not extended:

- The chafing marks on the nose landing gear doors as well as the drag brace and attachment bracket indicate that the nose gear doors were closed during landing. If the doors had been open, they would have been chafed on the edges. The nose gear is only held up by tension on the nose gear retract mechanism. No physical uplock hooks assist in holding the gear up. With the aft retract rod broken, the nose gear should have extended but not locked by gravity. This shows that the nose gear doors jammed, preventing the nose gear from extending.
- Landing with the nose gear partially extended would most likely have caused damage to the torque links and trunnion assembly. The gear doors would also have been open with the gear in any position other than up.
- The main gear was partially extended during landing. Had the main gear been extended after landing, the main gear retract rods would have been bent and the outboard main gear doors would have been damaged, amongst others.
- The chafing marks on the tyre sidewalls and the skid marks on the runway indicate that the main landing gear collapsed gradually under the weight of the aircraft bearing down on the partially extended gear as the airspeed and lift gradually decreased.
- Extending the gear too close to the ground would have caused damage to all three landing gear retract rods, not just the nose gear retract rod, as the design of the landing gear extension and retraction system would not have allowed any of the gear to extend or retract individually. The force and speed of the extension system would have been extremely unlikely to cause damage to an individual retraction rod system while touching down.

1.17 Organisational and Management Information

1.17.1 This was a private flight.

1.18 Additional Information

1.18.1 Landing Gear – General – Description and Operation Landing Gear System

The landing gear system is operated through adjustable linkage connected to an electromechanical actuator assembly mounted behind the forward spar carrier-through. The actuator assembly is driven by a 14 or 28 volt electric motor controlled by the landing gear position switch mounted near the lower center of the instrument panel. The limit switches are mounted adjacent on the left-hand side of the actuator assembly. The dynamic brake relay is mounted to the right side of the gear actuator. There are two ground safety switches, one located on each main landing gear strut assembly. The landing gear motor, dynamic brake relay, limit switches and actuator assembly are accessible by removing the front seats and UP or DOWN. The landing gear can also be lowered manually by tripping the landing gear motor circuit breaker, extending the hand crank located on the actuator assembly and then turning it clockwise (average 50 turns to full down and locked). This should be done in an emergency only. The landing gear circuit consists of the landing gear position switch, UP and DOWN limit switches, two ground safety switches, resettable circuit breaker, drive motor and a dynamic brake relay.

When the landing gear switch is moved into the UP position and the aircraft is airborne. The two safety switches become latched the dynamic brake is activated applying power to terminal 1 of the relay, which applies power to the UP windings of the drive motor and arms the braking circuit in the relay. As the landing gear UP limit switch is tripped, the dynamic brake power relay relaxes and applies a ground to the opposite winding through terminal 2 of the dynamic relay to the drive motor. This creates a braking action within the drive motor.

The landing gear retract mechanism is a complex system with very small clearances between working parts.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 On 11 May 2013 the pilot, accompanied by three passengers, took off from FAWB (Wonderboom airport) on a local private flight. During the landing back at FAWB the pilot felt the main undercarriage touching the ground, followed by the nose and the propellers. The nose gear is only held up by tension on the nose gear retract mechanism. No physical uplock hooks assist in holding the gear up. With the aft retract rod broken, the nose gear should have extended but not locked by gravity. It is concluded that the nose gear doors jammed, preventing the nose gear from extending.

- 2.2 According to available maintenance records, the aircraft was properly maintained. The mandatory periodic Inspection was conducted as per regulations. No defect or malfunction was observed that could have contributed to or caused the accident.
- 2.3 The available information revealed that fine weather conditions prevailed at the time of the accident. Therefore it is concluded that weather was not a contributory factor.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot had a valid licence and was properly rated for the aircraft type.
- 3.1.2 The pilot had a valid medical certificate was valid until 30 April 2014.
- 3.1.3 According to available records the aircraft was properly maintained. The mandatory periodic inspection was conducted as per regulations.
- 3.1.4 Weather was not a contributory factor to the accident.
- 3.1.5 The pilot could not confirm seeing three greens.

3.2 Probable Cause/s

- 3.2.1 The nose gear doors jammed, preventing the nose gear from extending.

4. SAFETY RECOMMENDATIONS

- 4.1 None.

5. APPENDICES

- 5.1 None.