



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

| | | | | | | |
|--|---------------|---|--------------|-----------------------------|-------------------------|-------|
| | | | | Reference | CA18/2/3/8663 | |
| Aircraft Registration | ZS-PNZ | Date of accident | 10 June 2009 | | Time of accident | 1155Z |
| Type of Aircraft | King Air 200C | Type of Operation | | Mercy | | |
| Pilot-in-command Licence Type | | Airline Transport | Age | 24 | Licence Valid | Yes |
| Pilot-in-command Flying Experience | | Total Flying Hours | 2 650 | | Hours on Type | 200 |
| Last point of departure | | Cape Town International Aerodrome, Western Cape Province (FACT) | | | | |
| Next point of intended landing | | East London Aerodrome, Eastern Cape Province (FAEL) | | | | |
| Location of the accident site with reference to easily defined geographical points (GPS readings if possible) | | | | | | |
| On runway 06R at Lanseria Aerodrome (FALA) at an elevation of 4 339 ft (GPS co-ordinates: S 25° 56.43' E 027° 55.537') | | | | | | |
| Meteorological Information | | Visibility not good, temperature 13°C, wind calm, cloud overcast, cloud base 800 ft | | | | |
| Number of people on board | 2 + 2 | No. of people injured | 0 | No. of people killed | 0 | |
| Synopsis | | | | | | |
| <p>On 10 June 2009, the SACAA was informed of a King Air 200 aircraft that had just diverted from East London Aerodrome to Lanseria Aerodrome because of a faulty undercarriage. The SACAA investigators were dispatched to FALA before the aircraft could land. The aircraft was cleared to execute a flyby over the runway in order to have the status of the landing gear checked by observers on the ground. The observers witnessed the condition of the aircraft undercarriage during its flyby at 100 ft above the runway, and the nose undercarriage was declared unsafe. The aircraft was cleared to execute an emergency landing on runway 06R. The aircraft landed and during the landing roll, approximately 350 m after touchdown, the aircraft nose wheel slowly collapsed. The aircraft skidded on its nose and propellers.</p> <p>The crew and passengers were not injured during the accident. The aircraft suffered minor damages on the undercarriage doors, pitot tubes, propellers and the radome. The nose retract shaft internal threads were found to have worn out, which restricted the nose gear actuator retraction.</p> | | | | | | |
| Probable Cause | | | | | | |
| <p>The nose gear actuator failed.</p> <p>Contributory remark: The retract shaft internal threads were worn out.</p> | | | | | | |
| IARC Date | | | | Release Date | | |



AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Aerocare
Manufacturer : Beech Aircraft Corporation
Model : King Air 200C
Nationality : South African
Registration Marks : ZS-PNZ
Place : Lanseria Aerodrome (FALA)
Date : 10 June 2009
Time : 1155Z

All times given in this report is co-ordinated universal time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus two hours.

Purpose of the Investigation:

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997), this report was compiled in the interests 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:

1.1 History of Flight:

- 1.1.1 The crew, accompanied by two passengers, were on an instrument flight rules (IFR) flight from Cape Town International aerodrome (FACT) to East London aerodrome (FAEL). On their approach to FAEL, the crew selected the undercarriage down and only two landing gear green lights illuminated in the cockpit. The crew noted that although the landing gear selector was in the 'DOWN' position, only two green lights illuminated, indicating that only the main landing gear was down and locked, and they became suspicious of the nose gear. The landing gear selector was recycled and only the main landing gear responded. The crew attempted a manual gear extension but the nose gear did not extend.
- 1.1.2 The crew took a decision to divert to FALA for an emergency landing because their maintenance facility was in FALA. The pilot-in-command handed control to the first officer whilst he referred to the emergency checklist as the aircraft was en-route to FALA. On approach at FALA, the crew declared an emergency and the air traffic controller (ATC) cleared them to execute a flyby 100 ft above the runway so that the ATC personnel and the SACAA investigators could check the status of the undercarriage. The nose gear was confirmed unsafe.
- 1.1.3 A subsequent flyby and a normal circuit and approach were flown, during which the passengers were briefed of the situation. The aircraft was cleared to execute an emergency landing on runway 06R. The captain took control of the aircraft. Touchdown was normal. The first officer shut down the engines and feathered the propellers, but

as the aircraft speed decreased during landing roll, the nose gear slowly collapsed. The aircraft skidded on its nose, with both propellers making ground contact, for approximately 110 m. The crew and the two passengers exited the aircraft via the rear door and no injuries were sustained by either passengers or crew.

- 1.1.4 Damage to the aircraft was limited to the nose landing gear doors, pitot tubes, propellers and the radome.
- 1.1.5 The aircraft was recovered from the runway to an aircraft maintenance organisation (AMO) for further investigation. To recover the aircraft, the nose landing gear was pulled out and secured in a down position. The aircraft was towed to the hanger.

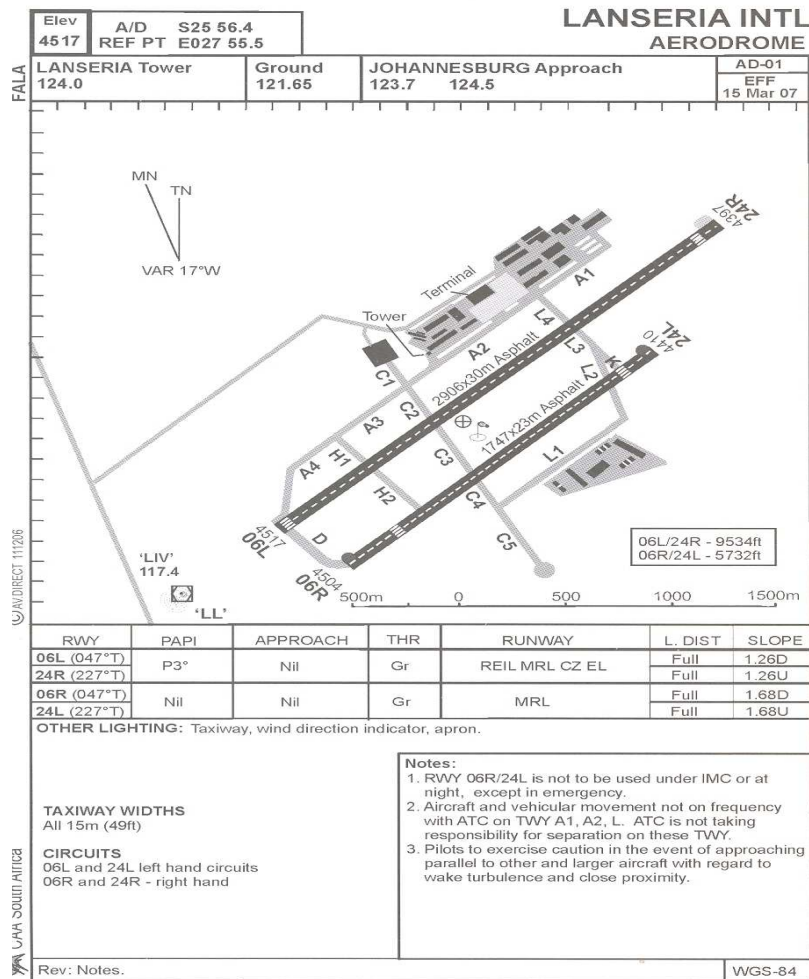


Figure 1: FALA aerodrome

1.2 Injuries to Persons:

| Injuries | Pilot | Crew | Pass. | Other |
|----------|-------|------|-------|-------|
| Fatal | - | - | - | - |
| Serious | - | - | - | - |
| Minor | - | - | - | - |
| None | 2 | - | 2 | - |

1.3 Damage to the Aircraft:

- 1.3.1 The damage to the aircraft was limited to the nose landing gear doors, pitot tubes, the two propellers and the radome.



Figure 2: The aircraft as it came to rest after executing the emergency landing

1.4 Other Damage:

- 1.4.1 None.

1.5 Personnel Information:

- 1.5.1 Pilot-in-command (captain):

| | | | | | |
|---------------------|--|---------------|-------------------|-----|----|
| Nationality | South African | Gender | Male | Age | 24 |
| Licence Number | ***** | Licence Type | Airline Transport | | |
| Licence Valid | Yes | Type Endorsed | Yes | | |
| Ratings | Night Rating; Instrument Rating; Instructor Grade 3 Rating | | | | |
| Medical Expiry Date | 16 July 2018 | | | | |
| Restrictions | None | | | | |
| Previous Accidents | None | | | | |

- 1.5.2 Captain's Flying Experience:

| | |
|----------------------------|-------|
| Total Hours | 2 650 |
| Total Past 90 Days | 200 |
| Total on Type Past 90 Days | 200 |
| Total on Type | 200 |

1.5.3 First Officer:

| | | | | | |
|---------------------|--|---------------|------------|-----|----|
| Nationality | South African | Gender | Male | Age | 25 |
| Licence Number | ***** | Licence Type | Commercial | | |
| Licence valid | Yes | Type Endorsed | Yes | | |
| Ratings | Night Rating; Instrument Rating; Instructor Grade 3 Rating | | | | |
| Medical Expiry Date | 14 August 2018 | | | | |
| Restrictions | None | | | | |
| Previous Accidents | None | | | | |

1.5.4 First Officer's Flying Experience:

| | |
|----------------------------|-------|
| Total Hours | 1 540 |
| Total Past 90 Days | 110 |
| Total on Type Past 90 Days | 110 |
| Total on Type | 650 |

1.6 Aircraft Information:

1.6.1 Airframe:

| | | |
|--|----------------------------|-------------|
| Type | Beech 200C | |
| Serial No. | BL-8 | |
| Manufacturer | Beech Aircraft Corporation | |
| Date of Manufacture | 1991 | |
| Total Airframe Hours (At Time of accident) | 22 970.3 | |
| Last Phase Inspection (Hours & Date) | 22 881.5 | 16 May 2009 |
| Hours Since Last Phase Inspection | 88.8 | |
| C of A (Issue Date) | 10 August 2007 | |
| C of A (Expiry Date) | 09 August 2009 | |
| C of R (Issue Date) (Present Owner) | 13 February 2009 | |
| Operating Categories | Standard | |

Note: The aircraft nose gear actuator, serial number 445-N-83, was overhauled by a CAA approved AMO and was fitted on 5 September 2005 at 21.534 undercarriage cycles. The accident occurred at 23.033 undercarriage cycles, and had operated for 45 months, 1 499 undercarriage cycles since installation. The approved overall cycle of the actuator for this aircraft type is 8 000 cycles.

1.6.2 Number 1 Engine:

| | |
|----------------------|-----------------|
| Type | Pratt & Whitney |
| Serial No. | PC-E80159 |
| Hours Since New | 11 798.13 |
| Hours Since Overhaul | 3 372.13 |

1.6.3 Number 2 Engine:

| | |
|----------------------|-----------------|
| Type | Pratt & Whitney |
| Serial No. | PC-E80154 |
| Hours Since New | 12 289.0 |
| Hours Since Overhaul | 3 674.9 |

1.6.4 Number 1 Engine Propeller:

| | |
|----------------------|-----------|
| Type | Hartzell |
| Serial No. | BUA-28573 |
| Hours Since New | 1758 |
| Hours Since Overhaul | 831.5 |

1.6.5 Number 2 Engine Propeller:

| | |
|----------------------|-----------|
| Type | Hartzell |
| Serial No. | BUA-23595 |
| Hours Since New | 1 976.7 |
| Hours Since Overhaul | 1 494.4 |

1.7 Meteorological Information:

As provided by the pilot-in-command:

| | | | | | |
|----------------|------|-------------|----------|------------|---------|
| Wind Direction | Calm | Wind Speed | Calm | Visibility | 3 000 m |
| Temperature | 13°C | Cloud Cover | Overcast | Cloud Base | 800 ft |
| Dew Point | 17°C | | | | |

1.8 Aids to Navigation:

1.8.1 The aircraft was fitted with a standard navigational equipment system.

1.9 Communications:

1.9.1 The aircraft was fitted with standard communication equipment.

1.9.2 The pilot had communicated with FALA ATC on frequency 124.0 MHz and had declared an emergency and his intentions.

1.10 Aerodrome Information:

| | | |
|------------------------|--|----------------|
| Aerodrome Location | 22 nm NW of OR Tambo International Aerodrome | |
| Aerodrome Co-ordinates | S 25° 56' 14" E 027° 54' 48.86" | |
| Aerodrome Elevation | 4 517 ft | |
| Aerodrome Status | Licensed | |
| Runway Designations | 06L/24R | 2 910 m x 30 m |
| Runway Dimensions | 06R/24L | 1 760 m x 23 m |
| Runway Used | 06R | |
| Runway Surface | Asphalt LCN 65 | |
| Approach Facilities | NDB, ILS, VOR, DME | |

1.11 Flight Recorders:

1.11.1 The aircraft was not fitted with either a flight data recorder (FDR) or a cockpit voice recorder (CVR), and neither was required by regulations.

1.12 Wreckage and Impact Information:

1.12.1 Following a faulty nose landing gear indication, the pilot flew over the runway and was subsequently cleared to execute an emergency landing on runway 06R.

1.12.2 The aircraft approached, descended and touched down, and after approximately 350 m of landing roll, the nose landing gear slowly collapsed. Both propellers and the nose section made contact with the runway surface. As a result, the propellers, pitot tubes, the nose landing gear doors and the random were damaged.

1.13 Medical and Pathological Information:

1.13.1 Both pilots and passengers survived without any injuries.

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 no damage to the cabin/ cockpit area and because both pilots and passengers were properly restrained. The emergency personnel were already on standby next to the runway when the aircraft landed.

1.16 Tests and Research:

- 1.16.1 After securing the nose gear in the down position, the aircraft was towed to the hanger in the presence of SACAA investigators. The nose of the aircraft was jacked off the ground, and the gear assembly and the actuator were removed from the aircraft.
- 1.16.2 The nose gear retract chain was found serviceable and intact. The nose gear assembly was removed. The nose gear actuator was removed, inspected and function tested. During function testing and inspection of the actuator, it was noted that the retract shaft internal threads were worn beyond limits.



Figure 3: Nose gear actuator

1.17 Organisational and Management Information:

- 1.17.1 This was a mercy flight.
- 1.17.2 The last annual inspection that was carried out on the aircraft prior the accident was certified on 16 May 2009 by an AMO, at 22 881.5 airframe hours.

1.18 Additional Information:

- 1.18.1 A description of the landing gear system follows:

The landing gear is operated by a split-field series wound motor, mounted on the forward side of the centre-section main spar. One field is used to drive the motor in each direction. To prevent over-travel of the gear, a dynamic brake relay simultaneously breaks the power circuit to the motor and makes a complete circuit through the armature and the unused field winding. The motor then acts as a generator and the resultant electrical load on the armature stops the gear. The main gear actuators are driven by torque shafts that carry torque from the gear box. The nose gear actuator is driven by a duplex chain that attaches to a sprocket on the gear box torque shaft. A spring-loaded friction clutch between the gear box and the torque shaft protects the motor in the event of mechanical malfunction.

The main gears are held in the down-lock position by a hook and lock plate arrangement on each main gear drag brace. The nose gear is held in the down-lock position by the slight over-centre positioning of the nose gear drag brace. The drag brace is locked in position by the actuator. The jackscrew in each actuator holds the main and nose gears in the retracted position.

An alternate extension jack mounted between the pilot and co-pilot seats provides a means of landing gear extension in the event of a landing gear motor or electrical system malfunction. The usage instructions are in the emergency procedures section of the King Air 200 pilot's operating handbook.

A landing gear control switch on the pilot's inboard sub-panel actuates the retract-and-extend circuitry of the landing gear. A solenoid-operated down-lock latch prevents the switch from being actuated while the airplane is on the ground. Should it become necessary, the latch can be overridden by depressing the red down-lock release switch. To prevent accidental retraction of the landing gear while the airplane is on the ground, a safety switch mounted on each of the main gears cuts power to the control circuit when the shocks are compressed.

CAUTION: Pilots should never rely on the safety switch to keep the gear down. The landing gear control switch must be in the down position.

1.18.2 Operation:

The King Air 200 (serial number BB-37) is fitted with a mechanical landing gear system that is controlled through a pilot-operated selector switch located in the cockpit on the right side of the pilot's sub-panel. When the switch is selected to either extend or retract the gear, an electric motor drives the landing gear box assembly.

The main landing gear actuators are driven by torque tubes from the gear box. The nose gear is driven by a duplex chain from a sprocket on the gear box torque shaft. Four support bearings in total retain the left and right main landing gear torque tubes. Each outboard torque tube is coupled to a pinion gear within the main landing gear actuator housing.

A spring-loaded clutch between the gearbox and the torque shaft protects the system in the event of a mechanical malfunction. A 60 A circuit breaker protects the system from an electrical overload.

Emergency manual extension and retraction of the landing gear is controlled by a floor-mounted lever centrally located between the left and right pilot seats. When the lever is manually operated, the landing gear electric motor and gear box drive mechanisms are overridden, thus allowing extension or retraction of the landing gear system.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None.

2. ANALYSIS:

- 2.1 It was overcast and raining in the area at the time of the accident. The prevailing weather conditions were not considered to have had any bearing on the accident.
- 2.2 The aircraft was properly maintained and no documented evidence was found to indicate a defect or possible malfunctioning prior to the flight, which could have contributed to or have caused the accident.
- 2.3 Both pilots held valid pilot licences as well as valid aviation medical certificates, which were issued by an SACAA-accredited medical examiner.
- 2.4 The pilot-in-command had flown a total of 200 hours on the aircraft type and 2 650 total flying hours. It was the aircraft's return flight from Cape Town International Aerodrome and the second flight of the day when the accident happened. The first officer had flown a total of 650 hours on the aircraft type and 1 540 total flying hours.
- 2.5 During the return flight from Cape Town International Aerodrome to East London Aerodrome, the pilots noticed a nose gear down lock indication problem. The crew attempted to extend the landing gear manually but it did not extend. They subsequently diverted to Lanseria Aerodrome. The crew declared an emergency and the aircraft was cleared to execute an emergency landing on runway 06R. The captain took control of the aircraft during approach.
- 2.6 Touchdown was normal and during the landing roll, as the aircraft speed decreased, the nose gear slowly collapsed. The aircraft was recovered to the hanger with the help of the AMO for further investigation.
- 2.7 A retraction test on the undercarriage was not considered necessary. The nose gear assembly was removed. The nose gear actuator was removed, inspected and function tested. During function testing and subsequent inspection, it was noted that the actuator retract shaft internal threads were worn down, which restricted the nose gear extension and locking capabilities. No further tests were done or found necessary.

3. CONCLUSION:

3.1 Findings:

- 3.1.1 The captain held a valid airline transport pilot licence, and the aircraft type was endorsed in his logbook.
- 3.1.2 The captain held a flight instructor rating grade 3, an instrument rating and a night rating.
- 3.1.3 The first officer held a commercial licence, and the aircraft type was endorsed in his logbook.
- 3.1.4 The first officer held a flight instructor rating grade 3, an instrument rating and a night rating.
- 3.1.4 The aircraft was maintained in accordance with the approved maintenance schedule, with the last inspection prior to the accident being certified on 16 May 2009.

- 3.1.5 The aircraft had flown a total of 88.8 hours since the last annual inspection was certified.
- 3.1.6 Shortly after landing, the aircraft nose gear slowly collapsed.
- 3.1.7 The crew were properly licensed for the type of operation they conducted.
- 3.1.9 With the exception of the landing gear system, no other anomalies were noted with the aircraft systems.
- 3.1.10 It was overcast and raining at the time when the accident happened.

3.2 Probable Cause/s:

- 3.2.1 The nose gear actuator failed.

3.3. Contributory Factor/s:

- 3.3.1 The retract shaft internal threads were worn beyond limits.

4. SAFETY RECOMMENDATIONS:

- 4.1 None.

5. APPENDICES:

- 5.1 None.

Report reviewed and amended by the Advisory Safety Panel 30 October 2009
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