

SAV/ACC/28/75

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT

Report on the Accident to Beech 95-D55  
Aircraft Registration Number 5Y-AKF  
which occurred on 12th September, 1975  
at Arusha Airport, Tanzania.

EAST AFRICAN COMMUNITY

MINISTRY OF COMMUNICATIONS AND TRANSPORT
10 APR 1976
M. ES SALAM

ACCIDENT INVESTIGATION BRANCH  
CIVIL ACCIDENT REPORT CAV/ACC/28/75

AIRCRAFT TYPE & REG: BEECH 95-D55, 5Y-AKF  
ENGINES: TWO CONTINENTAL IO-520-C  
OWNER: KENYA AIR CHARTERS  
OPERATOR: KENYA AIR CHARTERS  
PILOT: CAPT. W. VAN DER STRUYT, UNINJURED  
PASSENGERS: TWO PASSENGERS, UNINJURED  
PLACE OF ACCIDENT: ARUSHA AIRPORT, TANZANIA  
DATE & TIME: 12TH SEPTEMBER, 1975, AT 1215 HOURS

ALL TIMES IN THIS REPORT ARE G.M.T.

---

SUMMARY:

The aircraft was on a charter flight from Wilson Airport, Nairobi to Arusha, Tanzania. It carried three people. The flight to Arusha was routine. However, on landing all the three landing gears collapsed. The aircraft skidded on the runway for approximately 100 metres before it stopped. It ended up at the edge of the runway, resting on its bottom fuselage with the undercarriage retracted.

The aircraft sustained damage to the lower fuselage, front section and to the propeller blades.

The pilot and the two passengers escaped without injuries.

Inspection of the aircraft after the accident revealed that the landing gear motor circuit breaker was tripped. In addition, the nose gear actuating rod end had sheared off at the motor arm.

The report concludes that the probable cause of the accident was that the aircraft landed when the undercarriage was not fully extended and locked in the down position.

1. INVESTIGATIONS:

1.1 History of the Flight

The aircraft took off from Wilson Airport, Nairobi at 1125 hours on a VFR commercial flight to Arusha, Tanzania. There were three people on board including the pilot. On reaching Arusha, the aircraft was cleared to land on Runway 09.

According to the pilot, a normal landing approach was made after which the aircraft touched down and rolled for approximately 250 metres. Thereafter the starboard landing gear collapsed followed by the port and nose landing gears. The aircraft skidded for approximately 100 metres swinging slightly to the right and came to a halt, lying on its belly, at the edge of the runway. The pilot and passengers disembarked uninjured.

1.2 Injuries to Persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Others</u>
Fatal	-	-	-
Non-fatal	-	-	-
None	1	2	-

1.3 Damage to Aircraft

The aircraft sustained damage to the undercarriage system and to the lower fuselage section. The nose gear actuating rod end sheared off at the motor arm. The main gear doors and undercarriage actuating rods were bowed and distorted.

1.4 Other Damage

There was superficial damage to the runway surface.

1.5 Crew Information

The pilot, Capt. W. Van Der Struyf born on 25th November, 1936, in Alkmaar Netherlands, holds an East African Commercial Pilot's Licence (CPL) No. 1598 (K.1432) issued on 13th May, 1975, and valid until 6th May, 1976. The licence is rated in Group 1 for Cessna 150, 172 and 182; Piper PA-31 and 32, and Beechcraft D.55/E.55. He also holds an East African Instrument Rating and East African Radio Telephony Operators Licence No. 2932 (K.2291) issued on 13th May, 1975 and kept current in line with his CPL described above. Capt. Struyf was issued with the East African CPL on the strength of his Dutch CPL No. 70-95 dated 1st December, 1970.

Experience: At the time of the accident, he claimed 3000 hours total flying experience with 20 hours flying experience on Beechcraft D55 type aircraft.

1.6 Aircraft Information

5Y-AKF a Beech Baron D55 Serial No. TE763 powered by two Continental IO-520-C engines, was manufactured by Beech Aircraft Corporation, Wichita, Kansas, U.S.A. in 1969. The aircraft arrived in East Africa in possession of FAA Export Certificate of airworthiness No. 91949 dated 1st November, 1969. On arrival an East African Certificate of Airworthiness No. 583 was granted on 24th November, 1969, to expire on 23rd November, 1970. This certificate was renewed and has since been kept current to the present period of validity which expires on 14th January, 1976.

Maintenance History

The aircraft has been maintained by Wilken Aviation Limited to their Approved Maintenance Schedule Reference KAC/BEECH/95-55/58 Issue 1. All maintenance required by the schedule was up-to-date.

At the time of the accident the following hours had been recorded:

Airframe total hours since manufacture	2712.40
" " " " last check III	1052.40
" " " " " " II	199.15
" " " " " " I	19.10
Engine (Port) total hours since overhaul	1169.55
" (Starboard)" " " manufacture	1254.40
Propeller (Port) " " " overhaul	358.20
" (Starboard)" " " "	491.35

In addition, all FAA Airworthiness Directives and DCA Notices applicable to the aircraft, its engines, propellers and equipment had been complied with.

1.7 Meteorological Information

At 1200 hours on 12th September, 1975, the weather at Arusha Airport was reported as partly cloudy with visibility 20 nautical miles. Wind was given as 130<sup>o</sup>/08 knots, and temperature 22<sup>o</sup>C.

1.8 Aids to Navigation

Not applicable.

1.9 Communications

Communications were normal between the aircraft and ground control facilities.

1.10 Aerodrome and Ground Facilities

Runway 09 used for the landing is 1594 metres long by 40 metres wide. It has a field elevation of 1387 metres (4550 ft.). The hard surface runway is bitumen covered with a + 0.82<sup>o</sup> slope.

1.11 Flight Recorder

Not fitted and none required.

1.12.1 Wreckage

An inspection was carried out at the site, a day after the accident. The aircraft had by then been moved off the runway to a place approximately 25 metres to the right. It was, at the time, lying on its belly and it appeared to have suffered no additional damage while it was moved. Nor was its attitude changed on change of location.

The initial signs of impact were several blade strike indentations on Runway 09 approximately 200 metres from the runway threshold. They were caused by the starboard propeller blade tips. Approximately 20 metres further down, on the runway, similar cuts, made by the port propeller blade tips, were observed. Then followed continuous abrasion and skid marks, extending for a further 100 metres down the runway.

The aircraft swung slightly to the right as it skidded and came to a halt at the edge of the runway.

The undercarriage motor circuit breaker was found in the tripped position. The aircraft was lifted ~~and~~ supported on jacks. Extensive abrasion damage was observed to the bottom fuselage and the outer portion of the starboard wing. The left main undercarriage inboard door was badly scraped and distorted. The inboard door, for the right main landing gear, was completely torn off. There was considerable abrasion damage to the cabin step, engine cowls and the exhaust tail pipes.

Both main landing gears were found partially extended. The nose landing gear was in a retracted position with the gear doors closed. The doors were forced open and the nose gear "free fell".

Access panels, to the undercarriage actuating mechanism, were removed and the components inspected. The undercarriage motor arm was found rotated in the anti-clockwise direction from "GEAR UP" position through an arc of approximately 40 degrees towards "GEAR DOWN" position. The nose gear actuating rod end had sheared off at the motor arm. Both main gear doors and actuating rod assemblies were found bowed and distorted. The door connecting rods were found detached at the door ends.

#### 1.12.2 Tests & Research

With the aircraft on jacks the damaged undercarriage actuating rods were removed and the landing gear motor manually actuated to the gear DOWN position. It took 36 full turns of the emergency handle to rotate the motor arm from the position it was found in, to the fully DOWN position. Approximately 50 turns are needed to fully extend the undercarriage from the UP position.

Electrical supply was then connected and the undercarriage "safety" warning system was checked and found operating correctly. The gear UP warning horn was audible when throttles were moved towards the closed position at approximately 14 inches Manifold Pressure reading.

The main undercarriage actuating rods were re-connected and the motor circuit breaker re-set. The main landing gears were then extended and retracted through approximately half their normal range of travel. The motor operation appeared normal within the selected range. It showed no tendency to coast or to over-ride its selection. Neither did the motor circuit breaker trip. Due to the bent actuating rods, it was not possible to carry out complete retraction cycles.

#### 1.13 Fire

There was no fire.

#### 1.14 Survival Aspects

The pilot and the two passengers survived the accident without injuries.

#### 1.15 Medical Aspects

Not relevant to this accident.

## 2. ANALYSIS AND CONCLUSIONS

### 2.1.1 Analysis

o All the three landing gears are reported to have collapsed on landing after what appeared to the pilot to be a normal landing approach. Skid marks extended for approximately 100 metres.

During the approach the pilot apparently noticed no indication for landing gear system malfunction. In his report, he stated that the required pre-landing checks were all completed without incident. He claimed observing the green light indication for the landing gear FULLY DOWN position.

When the undercarriage system was inspected after the accident, the main gears were found partially extended. The nose gear appeared to be in a retracted position with the gear doors closed. The nose gear actuating rod had however, sheared. Had the nose gear actuating rod sheared before or after the undercarriage was fully DOWN then only the nose gear would have been affected. The main landing gears would have fully extended and remained in that position. No defect has been found to account for the claimed collapse of the main gears.

The length of the skid path and the nature and extent of the damage to the aircraft, suggest that the aircraft had considerable forward speed when it started skidding on its belly.

Had the aircraft initially rolled for some 250 metres prior to the gears collapsing, as indicated by the pilot, it appears unlikely that the resultant skid path and the damage would have been as extensive as found. In addition, the landing gear strut assemblies and the gear outboard doors would then most likely have come into contact with and got damaged by the runway surface as the gears folded while the aircraft was still moving forward. However, no traces of abrasion or scuff marks were observed on the landing gear struts and tyres, and the gear outboard doors were found unmarked.

The findings appear not to support the pilot's claim that there was a green light indication for the gear DOWN AND LOCKED position prior to the landing. It should be noted that in his report, the pilot did not refer to the nose gear position mechanical pointer. The pointer, clearly visible from the pilot's seat, is situated at the base of the nose wheel well bulkhead and shows the position of the nose gear at all times. Attention should also be drawn to the fact that the microswitch controlling the green light indicator is triggered according to the position of the gear motor arm. It is not attached to the landing gear struts, but located adjacent to the motor.

Judging from the damage to the aircraft and the skid marks on the runway, it is difficult not to conclude that the aircraft made a belly landing. The landing approach could have been made with the gears not DOWN AND LOCKED and a gear DOWN selection probably made at the last moment when the aircraft was already too low and about to settle on the runway.

This would result in the gear motor tending to extend the undercarriage against the weight of the aircraft. The stresses and overload conditions thus generated would have caused the nose gear actuating rod to shear and the motor circuit breaker to trip.

2.1.2 Loading

The aircraft was properly loaded. The gross weight and centre of gravity were within the prescribed limits. There were three people on board and no luggage.

2.2 Conclusions:

(a) Findings:

- 1 - The documentation of the aircraft was in order
- 2 - The aircraft had been properly maintained
- 3 - The pilot was properly licenced
- 4 - The aircraft was properly loaded and its centre of gravity was within the prescribed limits.
- 5 - The accident occurred on landing after a routine 50-minute flight.
- 6 - No undercarriage system malfunction was detected prior to landing.
- 7 - The landing gears were not DOWN AND LOCKED on landing.
- 8 - The nose gear actuating rod had sheared and the landing gear motor circuit breaker tripped.

(b) Cause:

The probable cause of the accident was that the aircraft made a landing with the landing gears not fully extended.



K.R. GRANT  
for CHIEF INSPECTOR OF ACCIDENTS