AIRCRAFT ACCIDENT INVESTIGATION BOARD

FINAL AIRCRAFT ACCIDENT REPORT FOR A BEECHCRAFT BARON 55, 9J – KMN THAT OCCURRED IN MUMBWA (CHUNGA AERODROME), ZAMBIA ON 10th JANUARY, 2020.

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INTRODUCTION

On 10th November, 2019 at about 17:10 hours local time, an accident involving a Beechcraft Baron aircraft was reported to the Director General, Civil Aviation Authority (CAA) by Staravia Air Charters, who immediately relayed the information to the Aircraft Accident Investigation Board (AAIB). The aircraft involved was a Beechcraft Baron 55, National Registration Marks 9J-KMN, Manufacturer's Serial Number TH-153, belonging to Staravia Air Charters, which was reported to have crashed at Chunga airstrip in Central Province.
The Interim Director Aircraft Accident Investigation Board immediately constituted an investigation team comprising 2 staff pertaining to the domains of operations and airworthiness to travel to the accident scene.

SYNOPSIS

On November 10, 2019, a Beechcraft Baron 55 operated by Staravia Air Charters departed from Kenneth Kaunda International Airport as a chartered Very Important Persons (VIP) flight to Chunga aerodrome. At about 16:50 Hours local time upon touchdown, the left main wheel collapsed, that led to the aircraft exiting the runway to the left until it hit into trees that stopped its motion. All passengers and crew exited the aircraft without injury but the aircraft was extensively damaged. No post-crash fire broke out. The investigation team concluded that the cause of the accident was due to the pilot misjudging his approach speed which was high as he came in to land. Further, other possible contributory and latent factors were identified.

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1. FACTUAL INFORMATION

1.1 History of the Flight

This aircraft was cleared to fly from Lusaka to Chunga at about 15:50 hours local time on 10th November, 2019 as a commercial flight. On board were one (01) pilot and four (04) passengers. At about 1650 hours local time the pilot approached Chunga airstrip from the south eastern direction and performed a normal airstrip inspection with a right teardrop heading to runway 080 degrees for landing. The flight was uneventful until the pilot came to the final approach. According to the pilot he made a normal landing but upon touchdown, the left main wheel collapsed and that led to the aircraft exiting the runway to the left. The pilot stated that he tried his level best to control the aircraft but he was unable as the left propeller started hitting the ground. At this point the pilot shutdown both engines. Unfortunately the aircraft went on to hit a number of trees which brought the aircraft to a stop. This happened at about 17:10 hours local time, all passengers and crew exited the aircraft without injury.

Meteorological flight conditions at the point of departure were focused as follows:

a) Surface wind: Calm
b) Temperature: +24 degrees
c) Weather: CAVOK (Ceiling and Visibility OK)
d) QNH: 1018 millibars

1.2 Personnel Information

The Pilot in Command (PIC) has a Commercial Pilot License issued by the Civil Aviation Authority. He has 1721.00 hours total time logged, out of which 227.00 hours are on piston twins. He has the following ratings:

Types in Group 1

a) PA 31/32
b) C150/152/172
c) PA 34
d) C 182
e) BE 200
f) JS 32
g) BE 55/58
h) BE 1900C/D
i) C 401/402
j) LET 410
k) BE 90

Types in Group 2

a) ATR 42
b) BE 33A
c) B737

1.3 Aircraft Information

The Beechcraft Baron S/N TH-153 is a twin engine aircraft with Teledyne Continental engines Type IO-520C with variable pitch propellers. It has dual controls.

The aircraft was issued with a Certificate of Airworthiness (C of A) on 12th August, 2019 and was confirmed airworthy.

This aircraft was flown by other pilots during the period of the C of A.

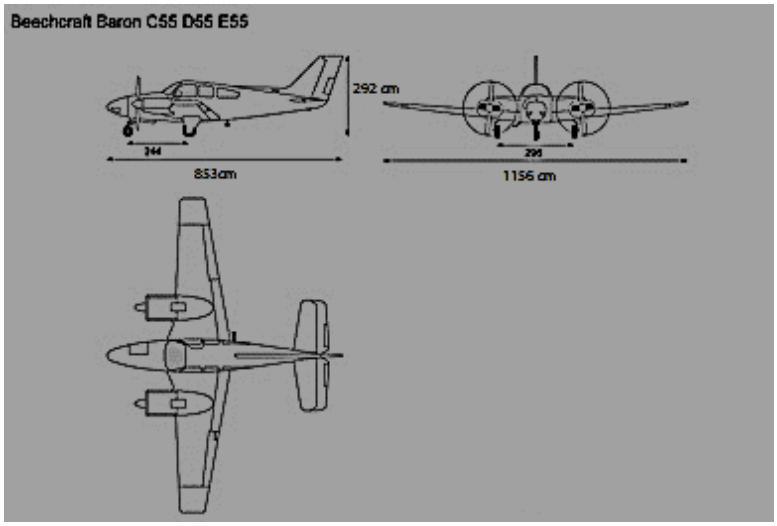
The aircraft had the following documents on board;

a) Aircraft checklist	
b) Flight manual	
c) Insurance certificate	Valid until August, 2020.
d) C of A	Valid until 11th August, 2020.
e) Radio license	Valid
f) Certificate of Registration	Valid
g) Tech Log	
h) Pilot license	Valid until 8th September, 2020.
i) First Aid Kit	
j) Fire Extinguisher	

The Beechcraft Baron 55, Registration number 9J-KMN, S/N TH-153 has the following Technical Specifications:

Exterior

- Exterior Height: 9ft 7in(292cm)
- Wing Span: 37ft 10in (1156cm)
- Length: 28ft 0in (853cm)



Interior

- Cabin Height: 4ft 2In(127cm)
- Cabin Width: 3ft 6In (107cm)
- Cabin Length: 11ft 9In(358cm)

Occupancy

- Crew: 1
- Passengers: 4-5

Operating Weights

- Max T/O Weight: 5100 Lb (2,313 kg)
- Max Landing Weight: 5100 Lb (2,313 kg)
- Operating Weight: 3263 Lb (1,480 kg)
- Empty Weight: 3236 Lb (1,468 kg)
- Fuel Capacity: 127 gal Lb
- Payload Useful: 1864 Lb (845 kg)

Range

- Max Range: 779 nm
- Service Ceiling: 19300 ft (5,883 m)

Distances

- Take off Distance: 1400 ft (427 m)
- Landing Distance: 1467 ft (447 m)

Performance

- Rate of Climb: 1690 fpm (515 m/min)
- Max Speed: 195 kts (361 km/h)
- Normal Cruise: 187 kts (346 km/h)

Power Plant

Engines: 2

LEFT	RIGHT
Type: IO-520C7B Manufacturer: Continental Serial Number: 1032840 Date of Manufacture: 30/08/2016 TBO: 1900 Hrs. TTD: 1533 Hrs.	Type: IO-520C7B Manufacturer: Teledyne Continental Serial Number: 1035310 Date of Manufacture: 2018 TBO: 1900 Hrs. TTD: 595 Hrs. 40 Mins.

Propellers: 2

LEFT	RIGHT
Type: PHC-J3YF-2UF Manufacturer: Hartzell Serial Number: ED-4565B Date of Manufacture: 07/02/2002 Number of Blades: 3 TBO: 2400 Hrs. or 6 Years TTD: 5390 Hrs. 45 Mins.	Type: PHC-J3YF-2UF Manufacturer: Hartzell Serial Number: ED-5367B Date of Manufacture: 18/02/2007 Number of Blades: 3 TBO: 2400 Hrs. or 6 Years TTD: 5213 Hrs. 00 Mins.

1.4 Injuries to Persons

There were no casualties. All passengers were transferred to a local game lodge.

1.5 Damage to the Aircraft

The aircraft was extensively damaged and is beyond economic repair.

a) Both propellers were damaged (Fig. 1.1;1.2)
b) Both left and right Landing gear broke off (Fig. 2.1; 2.2)
c) Left and Right wing damaged (Fig. 3.1; 3.2)
d) Flaps were damaged (Fig. 4.1; 4.2)
e) The nose section was damaged (Fig. 5)

1.6 Meteorological Information

The Meteorological information at Chunga Aerodrome was as follows;

a) Meteorological information – Clear sky, light winds
b) Aids to Navigation – Nil
c) Communications – Nil

1.7 Aerodrome Information – Chunga Airstrip

a)	Coordinates	S15.3.00” E026.0.0”
b)	Elevation	3670 Ft.AMSL
c)	Length	1200 Metres (1,000m Effective)
d)	Width	30 Meters
e)	Orientation	08/26
f)	Surface	Gravel
g)	ATM	Uncontrolled

The air field has no Navigation aids and therefore landing was purely on Visual Flight Rules (VFR).

1.8 Flight Recorders

The Beechcraft Baron 55 is not equipped with a flight data recorder and voice recorder.

1.9 Wreckage and Impact Information

The aircraft crashed three hundred and twenty meters from the beginning of the runway 080. There were no skid marks noted until the aircraft came to rest at some point. The left wing impact damage was between the wing root and the left engine. The left wing uprooted two trees that managed to slow down the aircraft (Fig. 7). The right wing also collided with two trees. The aircraft came to a stop when the aircraft nose wedged itself between two more trees (Fig.5 and Fig. 8).

1.10 Fire

There was no evidence of post-crash fire.

1.11 Survival Aspects

All on board survived the accident without any injuries at all and safely disembarked from the aircraft.

1.12 Examinations (Tests and Research)

The cockpit was critically analyzed. The left propeller lever was in the forward position while the other controls were in cutoff position. The right pedal was pushed forward.

1.13 Organization and Management

The PIC is an employee of Staravia Air Charters, which had an Air Operator Certificate (AOC) at the time of the accident. It was noted from the log book that the pilot was qualified on type. He had accumulated a total of 1722 hours 15 Minutes at the time of the accident.

1.14 Additional Information

The Investigating Team received additional information relating to this accident from one passenger and two witnesses who were at the airstrip awaiting the aircraft arrival.

According to a passenger on the aircraft, the pilot performed a normal pre landing overflight and it was apparent the airstrip was clear. On the final approach just as the aircraft cleared the trees, the aircraft suddenly dropped into the landing area. The initial contact with the ground was hard and it felt like the aircraft bounced at least twice. The left hand main wheel appeared to break off and the aircraft skewed to the left. Travelling at a considerable ground speed the aircraft was clearly despite their lack of visibility, coming off the airstrip and to the left. The aircraft veered off to the left at about 45 degrees angle and seemed to tilt and bounce on its left wing- “it felt like it might flip over and on one occasion the bouncing popped the rear and front right doors open.” From a passenger’s perspective the approach speed felt quite fast but it was the sudden drop and subsequent failure of the wheels that caused the hard landing.

The three (03) eye witnesses on the ground who were waiting for their passengers from the aircraft had this to say, in a written statement submitted to the Investigating Team.

Eye witness one (01) stated that he heard the aircraft coming on the final approach from the westerly direction and he heard the tone of the engines change and the pilot throttle back for landing- this was normal. About ten (10) seconds later he heard a loud bang and they all looked at each other in disbelief, as they knew instantly that the noise was not normal. He ran out onto the landing strip and saw a large cloud of dust at the western end of the airstrip.

Recognizing what had just happened they immediately scrambled one vehicle with fire extinguishers to the scene of the accident. Upon arrival they saw five (5) people walking away from the crash site. One of their rangers was tasked to attend to the passengers and the pilot. The rest of them inspected the wreckage to ensure that all electricals were off and there was no fuel leakages that could lead to a fire. The pilot despite being in shock had the presence of mind to do a final check of his aircraft and

recover all his relevant documents and other important items. Once the plane was secured, one of the passengers and him, traced the plane's tracks back to the point of landing. They discerned that the plane impacted the runway at the very edge of the runway. They saw the hydraulic fluid sprayed ahead of the point of impact. Further, they also saw that the port side wheel and some of the struts related to the same had become dismembered from the plane and were further down the runway. They also saw that the plane slid on its belly, leaning to the left and how the port side propeller had dug into the runway, as it revolved.

In addition the Investigating Team also interviewed, eye witness two (02). In his statement he said that though he was not an expert in aviation nor was he a pilot, he has for a long time observed what happens at the airstrip being a ranger himself. On this particular day all looked normal as they were waiting for the aircraft to arrive. The aircraft made a normal airstrip flyover and approached the runway from the west. However, as the aircraft was coming down he heard a strange noise and then a bang. From the bang they knew that the aircraft had crashed.

2. ANALYSIS

Information from the Technical Logbook indicates that the aircraft was serviceable at the time of departure as there were no defects entered in the log book. The flight was uneventful until the pilot commenced his approach.

According to the report by the pilot, the approach was normal. Upon touching down he experienced a sudden collapse of the left main landing gear. The pilot states that as soon as he noticed what was happening he proceeded to take measures to minimize damage to the aircraft. However, whatever measures he took, they did not prevent the aircraft from runway excursion and eventually colliding with trees way off the left side of the runway at about three hundred and twenty (320) metres from the touchdown point.

The Investigating Team observes two contradictory statements made by the pilot in (a) and (b) below;

a) The pilot states "I touched down" and later refers to "but due to the impact." This sentence is contradictory in that the impact and touchdown are not the same.

b) The pilot states that he pulled the throttles back to full idle, feathered both propellers ***but due to the impact*** was only able to feather the right propeller. The Team concludes that the aircraft did not touch down as supposed to, but instead impacted the ground resulting in the breaking off of both main landing gear. The failure to feather the left propeller was because the propeller impacted the ground, got bent and therefore failed to feather.

c) After impacting the ground at the edge of the turning circle, the aircraft immediately veered to the left. There was no time at which the aircraft was on the centre of the runway. There is no possibility that with both rear wheels

broken off, that the pilot can claim that he tried to keep the aircraft in the centre of the runway.

d) The pilot also claims that the aircraft veered to the left after about one hundred (100) metres and went off the runway and came to a stop. The above statement is not correct because the aircraft veered to the left immediately after impacting the ground at the turning circle. The aircraft momentum was reduced by the left wing colliding and uprooting two trees, before hitting head-on the third tree which stopped the aircraft completely.

A passenger on this aircraft stated that the approach speed was quite fast and there was a sudden drop as they came into the landing strip. The initial impact with the ground was hard and felt like the aircraft bounced at least twice. The left wheel appeared to break off and the aircraft veered to the left.

The above statement agrees with our observation in (a) and (b) above, that the aircraft impacted the ground and broke both main landing gears which the pilot did not report in his statement.

Contrary to the Pilot's statement that the aircraft touched down, according to eye witness one (01)'s statement above which reads as follows; "We heard the plane make its final approach from a westerly direction and we heard the tone of the engine change as the pilot throttled back for landing- this was normal. **About ten (10) seconds later, we heard a large bang**." A normal touchdown would not have produced a large bang. It therefore follows that the aircraft did not land normally contrary to what the pilot is claiming.

Eye witness two (02) who was at the airstrip on the day of the accident, stated that **he heard a strange noise and then a bang**. This implies that the strange noise was the first impact of the plane on the ground and the bang that followed was a result of the aircraft hitting the trees where it stopped.

Finally the Investigating Team noted that the aircraft was scrapping the ground from the point of impact all the way to the point where it was stopped by the trees. The pilot had totally lost control of the aircraft.

2.1 Observations by the Investigation Team

The Investigating Team analysed the pilot's personal log book and discovered that he had flown into Chunga Airstrip nine (9) times before this fateful day. This was his (10) tenth time.

However, on further analysis of the log book it was discovered that the pilot flew into Chunga airstrip seven (7) times between 26th March, 2018 and 17th May, 2018 on a single engine Cessna 210. Thereafter, he again flew two (2) times into the same airstrip six months later in a Cessna 210 in November. The last flight having been conducted on 29th November, 2018.

Exactly eleven months and nineteen days, that is between 29th November, 2018 and 10th November 2019 he was tasked to fly to Chunga airstrip in a twin engine aircraft the Beechcraft Baron 55.

There is no indication in the Standard Operating Procedures of the company as confirmed by the Chief Pilot relating to line training for aircrew transitioning from single engine operations to twin engine operations into short airstrips such as Chunga. It is the opinion of the Team that the pilot was not very comfortable with this operation. This was compounded by the fact that he was flying a high powered delegation of VIP nature for the first time into Chunga with a twin engine aircraft. Further, he had not been to Chunga for close to one year.

The runway at Chunga Airstrip is 1200 metres long East-West orientation. Of this length 200 metres is unusable. Only 1000 metres is usable. This runway is sufficient for take-off/landing for a Baron 55/58. The threshold clearway is sufficient for the approach of this type of aircraft.

3. CONCLUSION

The accident happened because the pilot misjudged his approach speed which was high as he came in to land. Further, the company did not have Standard Operating Procedures guiding crew transitioning from single engine operations to twin engine operations into short airstrips such as Chunga.

4. SAFETY RECOMMENDATIONS

It is hereby highly recommended that **serious consideration be urgently** given to;

4.1 Staravia Air Charters

AAIB/SR/2022/005
Staravia Air Charters management is recommended to ensure that the Pilot in Command is given two (2) hours of training at a bush airstrip (most preferably at Chunga Airstrip) in a twin engine aircraft to perform take off and landings by a qualified instructor.

AAIB/SR/2022/006
Staravia Air Charters management is recommended to ensure that they put in place adequate quality control measures for conversion training programs of pilots who transition from single engine to twin engine aircraft.

4.2 The Civil Aviation Authority

AAIB/SR/2022/007
The Civil Aviation Authority is recommended to carry out an ad-hoc audit of Staravia Air Charters quality control measures to ensure that conversion training programs for pilots who transition from single engine to twin engine aircraft are established and implemented.

AAIB/SR/2022/008
The Civil Aviation Authority is recommended to carry out regular ad-hoc audit of all Zambian based operators to ensure compliance with ZCARS part 8 subpart 8.10.1.26 (Supervised Line Flying-Pilots) in order to prepare pilots to land in different types of aerodromes.

Fig 1.1: Damaged Left Propeller

Fig. 1.2: Damaged Right Propeller

Fig. 2.1: Right Landing Gear

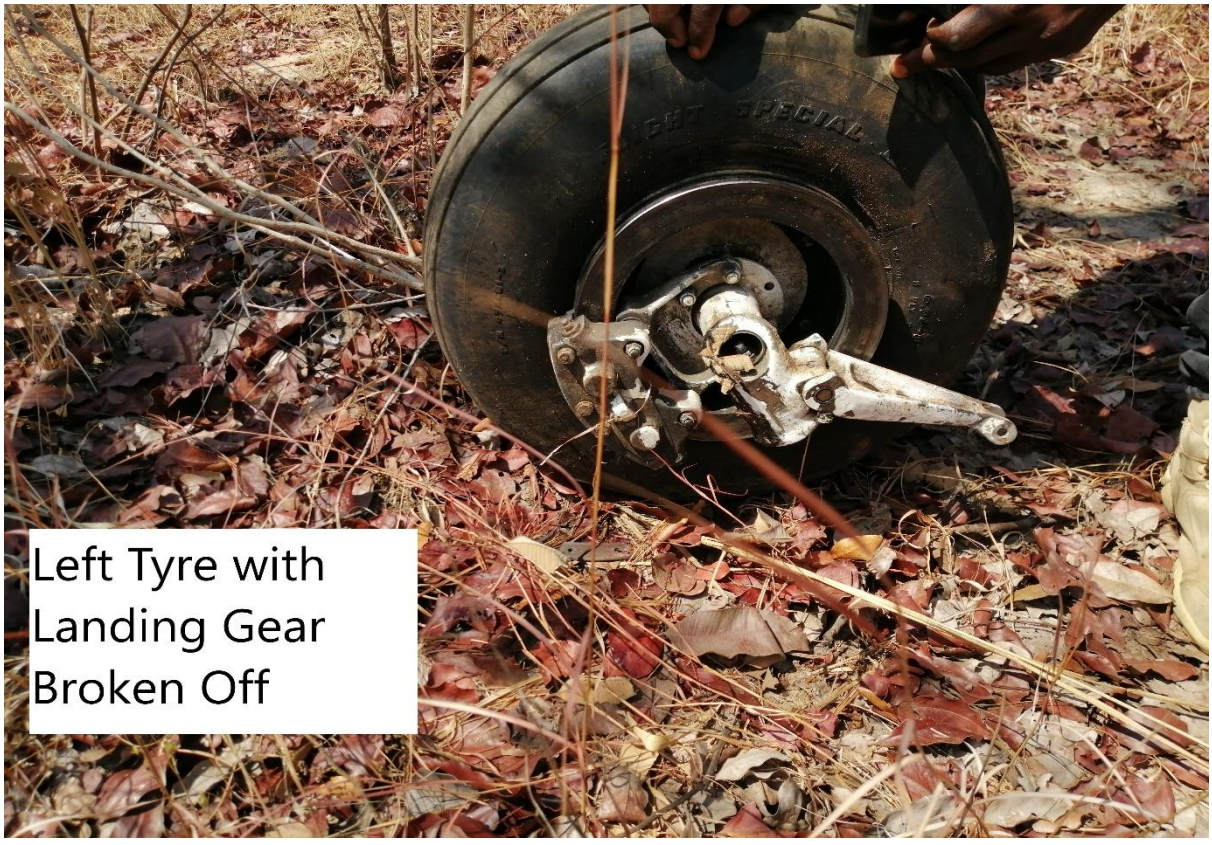


Fig. 2.2: Left Landing Gear

Fig. 3.1: Left Wing Damaged


Fig. 3.2: Right Wing Damaged

Fig. 4.1: Left Flap Damaged

Fig. 4.2: Right Flap Damaged

Fig. 5: Nose Section Damaged

Fig. 6: Piece from Landing Gear

Fig. 7: Trees Uprooted by Left Wing

Fig. 8: Rear View of Aircraft

APPENDIX A – GLOSSARY

AAIB – Aircraft Accident Investigation Board
AOC – Air Operator Certificate
ATNS – Air Traffic Navigation Services
ATPL – Airline Transport Pilot Licence
CAA – Zambia Civil Aviation Authority
CAVOK – Ceiling and Visibility OK
CPL – Commercial Pilot Licence
CRM – Crew Resource Management
Ft – Feet
Ft/m – Feet per minute
Hrs – hours
IATA – International Air Transport Association
IAS – Indicated Air Speed
Kg – kilograms
KKIA – Kenneth Kaunda International Airport
Kts – Knots
Lb – Pounds
M – Meters
MTOW – Maximum Take Off Weight
NM – Nautical Miles
PIC – Pilot in Command
PPL – Private Pilot Licence
TBO – Time Before Overhaul
TTD – Total Time Done
UTC – Universal Time Coordinated
VFR – Visual Flight Rules
ZACL – Zambia Airports Corporation Limited
ZCARs – Zambia Civil Aviation Regulations