

**Aviation Safety Investigation Report
199600453**

**Beech Aircraft Corp
Queen Air**

12 February 1996

Readers are advised that the Australian Transport Safety Bureau investigates for the sole purpose of enhancing transport safety. Consequently, Bureau reports are confined to matters of safety significance and may be misleading if used for any other purposes.

Investigations commenced on or before 30 June 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with Part 2A of the Air Navigation Act 1920.

Investigations commenced after 1 July 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with the Transport Safety Investigation Act 2003 (TSI Act). Reports released under the TSI Act are not admissible as evidence in any civil or criminal proceedings.

NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

Occurrence Number: 199600453 **Occurrence Type:** Accident
Location: Cannington, (ALA)
State: QLD **Inv Category:** 3
Date: Monday 12 February 1996
Time: 1004 hours **Time Zone** EST
Highest Injury Level: Serious
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	0	0	2	0	2
Ground	0	0	0	0	0
Passenger	0	2	5	0	7
Total	0	2	7	0	9

Aircraft Manufacturer: Beech Aircraft Corp
Aircraft Model: 65
Aircraft Registration: VH-PCQ **Serial Number:** LD495
Type of Operation: Charter Passenger
Damage to Aircraft: Substantial
Departure Point: Cannington Station QLD
Departure Time: 0959 EST
Destination: Townsville QLD

Crew Details:

		Hours on	
Role	Class of Licence	Type	Hours Total
Pilot-In-Command	ATPL	1023.0	3758
Co-Pilot/1st Officer	Commercial	276.0	634

Approved for Release: Friday, March 14, 1997

FACTUAL INFORMATION

History of the flight

The aircraft was engaged on a charter flight for the BHP Cannington mine, and departed from Townsville at 0630 EST. The flight was uneventful and the aircraft landed at Cannington at 0840. The aircraft was refuelled and at about 0945 seven passengers and baggage were loaded. The aircraft was started and taxied for runway 36. During this time the necessary checks were completed. The takeoff was commenced, and after the aircraft became airborne and was accelerating with a positive rate of climb, the landing gear was selected up.

While the gear was still in transit, there was a sudden power loss from the left engine. The pilot described a simultaneous height loss, roll, pitch, and yaw accompanied by a sound similar to a buzz saw from the left engine. The pilot immediately recognised that the left engine had failed and attempted to maintain speed and directional control. Power was reduced on the right engine to maintain directional control, and it was the pilot's intention to land the aircraft with gear retracted beyond the end of the runway. However, the left wingtip struck a steel fence post, and this spun the aircraft to the left. The aircraft struck a low earth bank while travelling sideways and rearwards. When the aircraft came to rest, all windows were obscured and the pilot believed the aircraft was on fire. The pilot tried unsuccessfully to open the main cabin door, and the passengers were then evacuated through the emergency exit.

Wreckage examination

The fuselage was structurally intact, but both wings were distorted at the attachment points. Both engines were ripped from their mounts, and both main wing fuel tanks were ruptured. All passenger seats failed in side load, which was the basic cause of most injuries sustained by the occupants. On-site examination of the left engine revealed that both spark plugs in number four cylinder had been damaged. The damage was indicative of a foreign object being present in the cylinder during engine operation. Visual inspection of the piston and bore also revealed extensive damage. No foreign object was recovered from the cylinder during this inspection.

Strip examination of the left engine revealed that:

1. The propeller was physically disconnected from the engine. Examination of the propeller reduction gearbox revealed that all four attachment bolts of the stationary gear assembly had failed.
2. The stationary gear assembly appeared to have excessive backlash between the plate and gear. Disassembly of this item revealed excessive wear on the mating spline teeth of the two components.
3. There was significant fretting present on the mating surfaces of the stationary plate and reduction gearbox housing.
4. Number 4 cylinder was extensively damaged. A foreign object had entered the cylinder and severely peened the piston. The spark plug points were peened over, effectively closing the gap to zero.
5. The supercharger impeller was severely damaged, with the intake section of the vanes being machined off by an unknown object. Additionally, a segment of an impeller vane had been broken off. No foreign objects or remains of the supercharger impeller were found in the intake system.

Meteorological information

The weather was fine. The wind was 090 degrees at 15 kts, and the temperature was 30 degrees Celsius.

Weight and balance

The aircraft was loaded within prescribed weight and balance limitations.
Takeoff weight (TOW) was 3908 kg. Maximum allowable TOW was 3992 kg.

Aircraft performance

The pilot said that the aircraft had accelerated to 85 kts when he raised the nose to the takeoff attitude, and the aircraft became airborne at approximately 88 kts. The takeoff weight chart showed that takeoff safety speed was 86 kts. Takeoff safety speed is the speed which ensures that adequate control can be maintained under all conditions, including turbulence and sudden and complete engine failure during the climb after take-off. When the failure occurred, the pilot said he applied full right rudder, right aileron, and lowered the nose attitude. To maintain directional control, he reduced power on the right engine. There was then no alternative but to land straight ahead.

ANALYSIS

There were three distinct failures on the left engine. The stationary gear assembly was disconnected from the propeller reduction gearbox housing. The number 4 cylinder was not producing power as an unknown foreign object had damaged the spark plugs. The supercharger impeller had been severely damaged by the ingestion of an unknown foreign object.

Of these failures, only the failure of the stationary gear assembly would have resulted in the complete loss of power reported by the flight crew.

The disconnection of the stationary gear assembly was attributed to the fatigue failure of its four attaching bolts. In turn, the fatigue failure of these bolts can be attributed to a markedly reduced fatigue life resulting from increased cyclic loading. This loading resulted from excessive backlash between the mating spline between the stationary gear and its attachment plate.

The pilot stated that after the failure he was unable to control the yaw and roll that occurred and elected to land the aircraft wheels up straight ahead. The effect of the sudden and complete loss of power from the left engine above the takeoff safety speed should not normally have rendered the aircraft uncontrollable. However, in this case, as distinct from an engine failure, the propeller had disconnected from the engine and was windmilling at high RPM and producing far more drag than it would have done after normal engine failure.

This had the effect of rolling and yawing the aircraft to the left. In addition, there was a 15-kt crosswind from the right, which presented an adverse environment for control inputs required to keep the aircraft straight. The pilot assessed that he may not be able to maintain control in the few seconds available, and he closed the throttles and landed the aircraft.

SIGNIFICANT FACTORS

- 1 The retaining bolts for the propeller gearbox stationary gear assembly failed when the aircraft had just become airborne.

- 2 The pilot was unable to maintain directional control and landed the aircraft with landing gear retracted.

SAFETY ACTION

As a result of the investigation into this occurrence, the Bureau of Air Safety Investigation issued Safety Advisory Notice SAN960154 to the Civil Aviation Safety Authority. The notice highlighted deficiencies in the left engine propeller gear box and provided copies of the detailed engineering reports for evaluation.