

**Aviation Safety Investigation Report
199504222**

**Beech Aircraft Corp
Bonanza**

16 December 1995

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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: 199504222 **Occurrence Type:** Accident
Location: 0.5km N Stawell, Aerodrome
State: VIC **Inv Category:** 3
Date: Saturday 16 December 1995
Time: 1935 hours **Time Zone:** ESuT
Highest Injury Level: Serious
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	0	1	0	0	1
Ground	0	0	0	0	0
Passenger	0	2	1	0	3
Total	0	3	1	0	4

Aircraft Manufacturer: Beech Aircraft Corp
Aircraft Model: V35B MK II
Aircraft Registration: VH-ILO **Serial Number:** D9100
Type of Operation: Non-commercial Pleasure/Travel
Damage to Aircraft: Destroyed
Departure Point: Stawell Vic
Departure Time:
Destination: Stawell Vic

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Private	6.0	110

Approved for Release: Tuesday, September 3, 1996

History of the flight

The pilot conducted a scenic flight of approximately one hour duration from Stawell around the Grampians with three passengers on board. At the end of the flight, the pilot approached Stawell from the west and joined the circuit via an upwind leg to the south, then a right circuit for a landing on runway 18. In the area of late downwind/early base the engine stopped. The pilot continued turning right towards the aerodrome but it became obvious that the aircraft was not going to reach the aerodrome without engine power. He performed some checks but was unable to restore engine power.

There was no area suitable for a forced landing between the aircraft and the aerodrome because the area had moderate tree cover. The pilot positioned the aircraft towards a clump of small trees and warned his passengers of the impending impact. The aircraft stalled into the trees and ignited on impact with the ground. All occupants escaped, but three received serious burns. The aircraft was destroyed by impact forces and fire.

The engine

Although most of the fuselage and right-wing area were consumed by fire, the engine was not fire damaged. The firewall was intact and the engine cowl, although heat affected, was not burnt. The engine was recovered and subjected to a thorough examination which was unable to determine any reason for the engine failure or why the engine was not capable of producing full power.

The pilot

The pilot was checked in this aircraft by an instructor two weeks prior to the accident. The check involved a check on the aircraft type, a constant speed propeller endorsement and a retractable landing gear endorsement. Prior to this check the pilot had flown the aircraft once with the owner occupying the right seat as pilot in command. The instructor who conducted the check flight reported that the pilot handled the aircraft well and was knowledgeable on its systems. After the check flight, the pilot did not fly the aircraft again until the day of the accident.

Fuel considerations

Calculations were made of estimated fuel usage against time flown since the aircraft was last known to have had full tanks. The result was that at most there was a total of 45 litres remaining in the tanks when the engine failed. The distribution of the fuel remaining could not be determined. If evenly distributed, there would have been 22.5 litres per tank. The pilot said he had the selector on the left tank which by gauge indication had the higher quantity of fuel. Fire damage at the scene indicated that the right tank probably contained more fuel than the left.

Other evidence

The pilot's operating handbook for the aircraft type warns about taking off with less than 13 US gallons (49 litres) in each main fuel tank. If a main fuel tank contains less than 49 litres, there is a possibility that a tank outlet will be uncovered (i.e. no fuel available at the outlets and air will be sucked into the fuel lines) during a tight turn while taxiing. If such a turn is executed immediately prior to takeoff, it is possible for the engine to fail during takeoff. It is also possible for a tank outlet to be uncovered during unbalanced flight and accordingly the pilot's operating handbook contains time limits for "maximum slip duration" consisting of 20 seconds for aircraft fitted with unbaffled fuel tanks and 30 seconds for aircraft fitted with baffled tanks.

The pilot advised that when he made the right turn to join the downwind leg of the circuit, he and his passengers were watching a preceding aircraft land. To facilitate this he kept the bank angle low and applied right rudder to complete the turn. This would have resulted in an unbalanced turn.

If the engine stops due to fuel starvation, the procedure for restarting involves selecting the tank which contains the most fuel, retarding the throttle and turning the boost pump on. Even with these actions correctly taken, it can take a considerable time to restart the engine. In a recent case involving a similar aircraft, the pilot of that aircraft reported that it took 20-25 seconds to restart the engine with the boost pump set in the on position. In the present case the pilot completed a series of checks to determine the cause of the engine failure but did not turn the boost pump on. He believed he positioned the throttle to one quarter open because that was what he had been trained to do. When the wreckage was examined the throttle was found in the fully open position. The propeller and mixture controls were also in the full forward position.

The severity of the post-impact fire was discussed with an experienced fire investigator. His advice was that a fire of the intensity that had occurred could have been fuelled with less than 45 litres of aviation gasoline.

The post-accident fire damage to the right wing and fuselage precluded any assessment of loss of fuel in flight via a leak somewhere in the system. The left wing was largely undamaged by fire and there was no evidence of any fuel leakage from that wing.

Analysis

Examination of the engine found no reason why the engine stopped. Calculations of time flown against fuel usage showed that at the time the engine failed there was probably a total of no more than 45 litres of fuel in the tanks. Fuel distribution could not be determined. The pilot believed that the left tank contained more fuel than the right tank but the post-impact fire damage suggested that there was more fuel in the right tank.

Immediately prior to the engine failure, the pilot made an unbalanced turn to the right with the left fuel tank selected. With the amount of fuel remaining in the tanks, this probably uncovered the outlet in the left tank and starved the engine of fuel. After the engine failed, the pilot did not turn the boost pump on and may not have correctly positioned the throttle, as recommended in the pilot's operating handbook, in order to restart the engine. However, even if the pilot had performed all actions correctly, it may not have been possible to achieve a restart in the time available.

Conclusions

Findings

1. The pilot was correctly licensed and qualified to fly the aircraft.
2. The pilot had low total flying experience and low experience on type.
3. When the aircraft approached Stawell at the end of the flight, it was calculated that there was no more than 45 litres of fuel remaining in the aircraft fuel tanks.
4. Shortly after completing a 180-degree turn onto the downwind leg of the circuit, the engine stopped.

5. In the limited time available, the pilot was unable to determine the cause of the engine failure or achieve a restart.
6. The aircraft was unable to reach the aerodrome from the position at which the engine failed.
7. The area between where the engine failed and the aerodrome was unsuitable for a forced landing.
8. A thorough examination of the engine found no fault or any reason why the engine was not capable of producing full power.
9. The pilot's operating handbook, in the limitations section relating to fuel management, warns against taking off when the fuel quantity gauges indicate in the yellow band or with less than 13 US gallons (49 litres) of fuel in each main tank. The same section also specifies maximum slip durations for baffled and unbaffled tanks.

Significant Factors

1. When the aircraft approached its destination it was calculated that there was no more than 45 litres of fuel remaining in the aircraft fuel tanks.
2. The pilot made a 180-degree unbalanced right turn onto the downwind leg of a circuit. It is probable that the turn resulted in the outlet of the left fuel tank being uncovered.
3. The engine failed over an area that was unsuitable for a forced landing.
4. The pilot was unable to restart the engine.