

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A03C0029



COLLISION WITH TERRAIN

BEARSKIN LAKE AIR SERVICE

BEECH 99 C-GHVI

PIKANGIKUM, ONTARIO 2 NM NW

29 JANUARY 2003

Canada

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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Summary

Bearskin Flight 359, a Beech 99, C-GHVI, serial number U153, with two pilots and three passengers on board was departing Pikangikum, Ontario, at 1838 central standard time on a night visual flight rules flight to Poplar Hill. The captain, who was the pilot flying (PF) and sitting in the right-hand seat, completed a normal take-off. The flight took off from Runway 27, over a lake. About 400 feet above ground level, the PF began a climbing right turn en route. During the turn, the PF had difficulty seeing the artificial horizon and concentrated on the aircraft's bank angle. The first officer called that the aircraft was in a 2000-feet-per-minute descent and took control. The aircraft struck the frozen surface of the lake, bounced, and became airborne again. The first officer retained control, and the captain attempted to feather the damaged right propeller. The first officer, believing that both propellers had sustained damage, force-landed the aircraft on the lake surface. The aircraft sustained substantial damage. No one was injured.

Ce rapport est également disponible en français.

Other Factual Information

During a series of scheduled flights operating to small communities in the area of Red Lake, Ontario, by Bearskin Lake Air Service, the first officer became ill. To complete the schedule, a relief pilot was flown to Red Lake as a replacement. On arrival, the relief pilot became the aircraft captain, based on seniority within the company. The original captain, who was now to act as the first officer, had flown the first series of scheduled flights in the left seat, and the cockpit was configured to accommodate him. When the new captain arrived, it was convenient for the new captain to fly from the right seat. The *Bearskin Lake Air Service Operations Manual* permits a left-seat qualified pilot who receives annual right-seat training to operate the aircraft from the right seat. The captain had never received right-seat training as a captain with the company.

The captain and the first officer both held valid airline transport pilot licences. Records indicate that their pilot proficiency checks and required training were current. The captain had accumulated about 4800 hours of flight time in nine years of flying and had been a Beech 99 aircraft captain for two years. The first officer had been flying for eight years and had about 4200 hours of flight time. The first officer had also been a Beech 99 aircraft captain for two years.

After the crew change, Flight 359 continued to Pikangikum in night visual meteorological conditions. During the flight, the first officer, the pilot flying (PF) for this flight, adjusted the cockpit instrument lighting for both crew members. The captain, the non-flying pilot, found the lighting selection too bright and re-adjusted the instrument lighting on the right side of the cockpit to a lower setting. Flight 359 landed at Pikangikum, and passengers and baggage were offloaded. Three passengers and baggage were loaded for the flight to Poplar Hill. During this time, the crew were working in the brightly lit area of the ramp. After the aircraft was loaded, the crew took their positions, with the captain, the PF for the departure from Pikangikum, in the right seat. The PF did not change the lighting selection on the right side of the cockpit from the selections made during the flight into Pikangikum.

The PF taxied to the runway, executed a normal take-off, and established the aircraft in a climb at 1500 feet per minute. After the first officer called positive rate, the PF called for the landing gear to be selected up. Approximately 15 seconds after take-off, the first officer made the required 400-foot call. The PF called for flaps up and, after the first officer confirmed that flaps were selected, called for climb power and the after-take-off checks. The first officer acknowledged, and the captain indicated starting a turn toward Poplar Hill.

The first officer was setting climb power as the PF started the turn. The PF intended to establish the aircraft in a bank angle of 20° to 25°. However, the PF was unable to see the artificial horizon clearly. Although the aircraft was banked to one of the marks on the artificial horizon, the PF was uncertain of the bank angle that was reached. The PF concentrated on the artificial horizon, even leaning forward trying to identify the bank angle displayed. The PF was completing the roll-out of the turn when the first officer told the PF that the aircraft was descending at 2000 feet per minute. The PF pulled back on the control column. When the first officer saw the frozen surface of the lake approaching rapidly (visible because one landing light was still on), the first officer also grasped the control column and pulled back. However, the combined effort of both pilots did not prevent the aircraft from striking the frozen surface of the lake. The aircraft struck the frozen surface in a wings-level attitude with the landing gear retracted and bounced

airborne. The aircraft was equipped with a belly pod, which absorbed a large amount of the impact forces during landing. The frozen surface of the lake was covered with a layer of snow about two feet deep, which also reduced the force of the impact.

The captain noted that the right propeller was slowing and attempted to feather it. The crew agreed that the best option was to land immediately on the frozen surface, and the first officer completed a forced landing about 1.5 nautical miles from the departure end of Runway 27. The aircraft slid to a stop in about 300 feet on the frozen, snow-covered surface. The crew used the aircraft radios to contact company staff at the airstrip, and the passengers and the crew were transported to the terminal in a short period of time.

The aircraft was examined at the accident site. Damage was confined to the engines and the propellers and to the underside of the fuselage, wings, and flaps. Inspection of the airframe, flight controls, and engines revealed no pre-impact anomalies. The flaps were found in the take-off position, and the landing gear was retracted. The starboard wing fuel system had leaked, and the starboard inboard tank had drained. There was no internal damage in the cockpit or the cabin. The flight instruments from both sides of the instrument panel were removed and tested. No unserviceabilities were found. The aircraft was equipped with a digital cockpit voice recorder, which was played at the TSB Engineering Laboratory. The cockpit voice recorder had recorded the cockpit conversations for approximately two hours before aircraft power was turned off shortly after the accident.

The aircraft was subsequently raised by company maintenance staff to allow the landing gear to be lowered, and the aircraft was then towed to the airstrip. About three weeks after the accident, after repairs and re-installation of the flight instrumentation, the aircraft was ferried out.

The aircraft's weight and balance at the time of the accident were calculated and found within limits.

Canadian Aviation Regulation 602.115 outlines the requirements for night visual flight rules (VFR) flight in uncontrolled areas:

- No person shall operate an aircraft in VFR flight within uncontrolled airspace unless
- (a) the aircraft is operated with visual reference to the surface;
- (b) where the aircraft is operated at or above 1,000 feet AGL
 - (i) during the day, flight visibility is not less than one mile,
 - (ii) during the night, flight visibility is not less than three miles, and
- ...

The 1824 central standard time¹ special weather report for Red Lake, 46 nautical miles south of Pikangikum, was as follows: wind 210° at 15 gusting to 25 knots; visibility 12 statute miles in light snow and drifting snow; ceiling 2500 feet broken; and temperature -15°C. The weather at Pikangikum was reportedly similar. The moon was in the last phase of waning, and there was no moonlight; it was a very dark night.

¹ All times are central standard time (Coordinated Universal Time minus six hours).

Analysis

The take-off and departure were initiated in accordance with the company's standard operating procedures.

The aircraft captain, the PF, had completed currency requirements for the left seat but had not completed the required annual right-seat training to operate the aircraft from the right seat. Consequently, the aircraft captain was not current to operate the aircraft from the right seat.

There are indications that the flaps were selected "UP" on take-off, but after the accident, the flaps were found in the take-off position. It could not be determined whether the flaps were indeed selected up or if they were selected up and then to the take-off position before the crash.

The ramp was brightly lit, and there was no problem seeing the instrument panel, so the captain did not adjust the lighting illuminating the artificial horizon before taking off. However, once the aircraft was airborne, the lighting was too dim to allow the captain to see the artificial horizon clearly. The PF concentrated on the bank angle, but did not cross-check the climb angle or other instruments, and a high sink rate rapidly developed. When the first officer called the descent, the captain was unable to re-establish situational awareness, and the first officer correctly took control. The damage to the propellers and the engines was such that a forced landing on the lake surface was the only option.

The aircraft took off over a lake, and there were no ground lights under or around the aircraft after it left the airport area. The lack of ground and celestial lighting created conditions that made flight with visual reference to the surface very difficult, if not impossible.

With adequate outside visual references, a pilot, unsure of the aircraft attitude, would certainly look outside to regain his or her situational awareness. The ambient (outside) lighting conditions after take-off on the accident flight would have provided little or no help to this crew in orienting the aircraft. It is highly probable that the PF was referencing only the aircraft instruments, and they were not bright enough to ascertain the aircraft attitude. In essence, this flight was not being conducted in accordance with VFR.

Findings as to Causes and Contributing Factors

1. The captain chose to fly the aircraft from the right seat during a night departure when not current to operate the aircraft from the right seat.
2. The captain did not set the instrument lighting correctly for the night take-off and was unable to use the artificial horizon effectively, resulting in the loss of situational awareness after take-off and the subsequent loss of control of the aircraft.

Other Findings

1. The flight was filed as a visual flight rules flight whereas, in essence, it was operating under instrument flight conditions.

Safety Action

After the accident, Transport Canada met with company officials. The company agreed to Transport Canada's recommendation that the company amend its standard operating procedures to state that after take-off no turns will be performed below 1000 feet above ground level unless instructed to do so by air traffic control. Subsequent to the accident, Transport Canada completed a scheduled routine conformance audit of the company. The company is addressing issues arising from the audit.

This report concludes the TSB's investigation into this occurrence. Consequently, the Board authorized the release of this report on 08 October 2003.