

AVIATION OCCURRENCE REPORT

CONTROLLED FLIGHT INTO TERRAIN

**CESSNA T210M CENTURION C-GPID
FLIN FLON AIRPORT, MANITOBA 1.5 mi S
10 JANUARY 1996**

REPORT NUMBER A96C0002

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

On 10 January 1996 at 2108 central standard time (CST), the pilot of a Cessna 210 aircraft radioed The Pas Flight Service Station (FSS) to advise them that he was ready to taxi for take-off on a visual flight rules (VFR) flight from Flin Flon to Lynn Lake, Manitoba. The Pas FSS acknowledged his transmission and gave him Flin Flon's current wind information and The Pas's altimeter setting. At 2110 CST, the pilot indicated that he would call airborne after take-off from runway 18. There was no further communication with the pilot. At 2123 CST, The Pas FSS contacted the Flin Flon RCMP detachment and told them that they had lost radio contact with the aircraft. The RCMP conducted a preliminary ground search of the airport and surrounding area, but could not locate the aircraft. At 2224 CST, the Search and Rescue Satellite (SARSAT) picked up an ELT signal in the vicinity of the Flin Flon airport, and the Canadian Armed Forces Rescue Control Centre (RCC) tasked Search and Rescue (SAR) Winnipeg with the search mission. The Flin Flon RCMP organized a ground search party and began a search of the surrounding area with the use of snowmobiles. The aircraft was located at 0200 CST, approximately 1 1/2 mile from the end of runway 18; the pilot was transported to hospital where he was pronounced dead.

Ce rapport est également disponible en français.

Other Factual Information

The aircraft had arrived in Flin Flon from Saskatoon, Saskatchewan, earlier in the day. After arrival, the pilot filed a VFR flight plan with The Pas FSS for a 2050 CST departure to his home base in Lynn Lake. The pilot estimated that the trip would take one hour and indicated that he had four hours of fuel available on board the aircraft. Witnesses in a cottage south of the airport saw the lights of an aircraft departing the airport at approximately 2110 CST. The aircraft was approximately 1/8 mile off the end of runway 18 and about 400 to 500 feet above ground level. The aircraft reportedly looked and sounded normal as it flew past the cottage.

The Flin Flon/Lynn Lake area was under the influence of an upper trough which was oriented on a line southward from Lynn Lake toward Grand Rapids. Ceilings along the proposed route of flight were forecast to be 1,000 feet above ground level (agl) with visibilities between four and six miles in light snow. The top of the low overcast cloud layer was at 6,000 feet above sea level (asl); a second layer of scattered clouds was located above, between 10,000 and 12,000 feet asl. Light to moderate rime icing was expected in cloud. At the time the aircraft took off, the surface wind at Flin Flon was from 200 degrees true at six knots; the temperature was measured to be -10 degrees Celsius. There was no report of freezing precipitation in the Flin Flon area on the night of the accident.

The Flin Flon aerodrome is located in a relatively remote northern community. There are very few ground lights southwest of the aerodrome, and at the time of the accident, there was little or no illumination from either the lights of the community or from the night sky.

The aerodrome is situated in controlled airspace; flights through controlled airspace may be conducted either under visual flight rules or instrument flight rules (IFR). Visual flight, at night or otherwise, is governed by the *Air Regulations*, which state that "when operating in accordance with Visual Flight Rules, aircraft shall be flown with visual reference to the ground or water...." Weather minima for flight in controlled airspace are outlined in the *Air Navigation Orders*; a ceiling of 1,000 feet agl and a flight visibility of three statute miles are required. The Flin Flon airport has a designated control zone extending outwards to five miles from the airport. Any VFR aircraft that is operating within this zone must remain at least 500 feet below cloud, and must operate at a minimum

height of 500 feet agl.

The crash site was located on the frozen surface of Athapapuskow Lake, approximately 1 1/2 miles off the end of runway 18. The aircraft struck the ice in a slight right-wing-low, shallow pitch attitude, and at high speed, on a heading of 240 degrees magnetic. The aircraft broke apart as it travelled approximately 800 feet across the frozen lake surface before coming to rest. Due to the extreme aircraft destruction, the accident was non-survivable.

Examination of the wreckage revealed no evidence of a powerplant, flight control, or aircraft system failure that would have contributed to the occurrence. Damage to the propeller blades was consistent with a high engine power setting at impact. The landing gear was retracted; however, the main gear doors were open. It could not be determined if the gear doors opened as a result of the impact, or because the landing gear was in an intermediate stage of operation. The flaps were retracted. Light bulb analysis confirmed that the instrument and electrical systems were being powered at the time of impact. An examination of the flight instruments confirmed that they were operating at impact. Marks on the attitude gyro indicated an approximate 15-degree nose down, near wings-level attitude at impact. The horizontal situation indicator (HSI) card indicated a heading of 240 degrees, consistent with the wreckage trail heading.

The pilot held a valid private pilot licence and a night rating; he had approximately 1,600 hours of flying experience. In 1991, he attempted to obtain an instrument rating for his licence but was unsuccessful on four separate attempts before finally achieving his rating in May of 1992. Two years later, he failed a routine instrument re-test conducted by a Transport Canada inspector, and his instrument rating was revoked. Weak departure procedures and altitude control were identified as being below the standard required for the instrument rating.

Toxicological and pathological examinations completed following the accident provided normal results, and gave no indication of pilot incapacitation prior to impact. The severe trauma, induced during the accident, would have caused immediate unconsciousness and death within minutes of the accident. A review of the pilot's personal records provided no evidence of medical issues that would have adversely affected the pilot's performance.

The aircraft was a 1978 Cessna T210M Centurion with a turbocharged engine and retractable landing gear. The aircraft was privately registered and was being maintained on a 100-hour annual inspection schedule. The last inspection was completed on 13 April 1995 at an airframe time of 2,309.9 hours. At the time of the occurrence, the aircraft had accrued approximately 30 hours since the last inspection. The aircraft's last recorded unserviceability occurred during a trip to Saskatoon approximately four days prior to the accident. The aircraft experienced an electrical problem attributed to a broken alternator belt. The alternator belt was replaced and the battery was serviced. There was no known problem with the aircraft on the return flight from Saskatoon to Flin Flon.

Sensory illusions can cause spatial disorientation which can have a strong influence on pilot behaviour and performance. Disorientation is defined as the false perception and/or interpretation of aircraft attitude with regard to horizontal and gravitational references. Pilots with limited instrument flight time are particularly susceptible to spatial disorientation when they are confronted with no external visual attitude references.

The Cessna T210 Centurion has a relatively fast acceleration profile. High acceleration during take-off and initial climb can cause an illusion of increasing pitch. Somatogravic illusion is an erroneous sensation of pitch (rotation in the vertical plane) caused by linear acceleration. Under normal conditions this sensation can be recognized and corrected by visual means; however, when a take-off is being made on a very dark night, and toward an area that provides few visual references, this illusion will remain a powerful influence. A pilot's normal response to this pitch-up illusion is to apply forward pressure to the control column, and to reduce the aircraft's angle of climb.

Certain flight conditions can also create a lack of situational awareness. The achievement and maintenance of situational awareness can become degraded whenever the pilot needs to simultaneously diagnose faults or situations that were not predicted and cope with the consequences.

Analysis

Because of the low ceiling and normal VFR control zone procedures, the pilot would have been required to climb to approximately 500 feet agl after take-off before commencing his turn towards the north to pass abeam the airport. Witness accounts of the aircraft's profile after take-off indicate that the pilot was likely following normal VFR control zone departure procedures.

The aircraft struck the frozen surface of Athapapuskw Lake approximately 1 1/2 miles from the departure end of runway 18, indicating that the aircraft descended after take-off. The wreckage trail was oriented on a heading of 240 degrees magnetic, indicating that, just prior to the crash, the pilot was likely initiating a shallow turn to the right, on course towards the north.

An examination of the wreckage after the occurrence could find no evidence of a powerplant, flight control, or aircraft system failure that would have contributed to the occurrence. However, given the extent of the damage, the possibility cannot be ruled out that some unidentified fault or unexpected situation diverted the pilot's attention from the task at hand. Toxicological and pathological examinations completed following the accident provided normal results, and gave no indication of pilot incapacitation prior to impact.

A night departure from a remote northern aerodrome can be a challenging task. Even in VFR weather conditions, this type of departure requires the pilot to place increased reliance on available visual references and on basic instrument flying skills. This pilot had shown consistently poor IFR flight test results relating to altitude control and procedural errors and had failed his last instrument flight re-test.

In the area of the accident, there was little or no illumination from either the lights of the community or from the night sky. At night, particularly with overcast ceiling conditions, a lack of external visual references caused by inadequate ground and sky illumination, coupled with the requirement to use cockpit lighting to illuminate the instrument panel, could have adversely affected the pilot's ability to maintain required visual reference with the ground during the initial climb, and may have required the pilot to rely on instrument flying skills. Any distraction during flight under these conditions would have further compounded the pilot's workload,

making the maintenance of situational awareness very difficult.

The forward acceleration of the Cessna 210 aircraft is sufficient to produce a powerful illusion of increasing pitch attitude. Under the prevailing dark night conditions and with restricted outside visual references, a somatogravic illusion could have caused the pilot to erroneously perceive an increase in the aircraft pitch attitude. This illusion would be intensified by a quicker than normal aircraft acceleration associated with a shallow departure climb. If the illusion went unrecognized, the pilot may have responded inappropriately by pushing the control column forward, causing the aircraft to descend after take-off and contact the ice surface.

The following Engineering Branch report was completed:

LP 10/96 - Instrument and Light Bulb Examination.

Findings

1. Weather at the time of the departure from Flin Flon was VFR, with an overcast cloud ceiling at about 1,000 feet agl.
2. There are very few ground lights southwest of the Flin Flon aerodrome and, in the area of the accident, there was little or no illumination from either the lights of the community or from the night sky.
3. Poor ground and sky illumination may have prevented the pilot from maintaining adequate visual reference with the ground and likely required the pilot to rely on instrument flying skills, especially during the initial climb portion of the flight.
4. The pilot had shown consistently poor IFR flight test results relating to altitude control and procedural errors and had failed his last instrument flight re-test.
5. Examination of the wreckage revealed no evidence of a powerplant, flight control, or aircraft system failure that would have contributed to the occurrence.

6. Given the extent of the damage, the possibility cannot be ruled out that some unidentified fault or unexpected situation diverted the pilot's attention from the task at hand.
7. Toxicological and pathological examinations completed following the accident provided normal results, and gave no indication of pilot incapacitation prior to impact.
8. The accident was non-survivable because of the severe aircraft destruction.
9. Somatogravic illusion may have adversely affected the pilot's performance during the acceleration stages of the take-off and initial climb.

Causes and Contributing Factors

The pilot likely lost situational awareness and inadvertently flew the aircraft into the ice surface while in controlled flight because of the combined effects of the lack of external visual references and his weak instrument flying skills. The effects of somatogravic illusion may have contributed to the pilot's disorientation.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, Benoît Bouchard, and members Maurice Harquail and W.A. Tadros, authorized the release of this report on 14 August 1996.