

AVIATION OCCURRENCE REPORT

VFR FLIGHT INTO ADVERSE WEATHER

RUSTY MYERS FLYING SERVICE

BEECH D18S C-FBGO

SIOUX LOOKOUT, ONTARIO 35 nm SE

06 JULY 1996

REPORT NUMBER A96C0126

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

A Rusty Myers Flying Service float-equipped Beech D18S, C-FBGO, serial No. CA-215, departed Fort Frances, Ontario, with the pilot and four passengers on a visual flight rules (VFR) flight to Granite Lake. The weather was overcast with good visibility on departure. However, about one-half of the way to Granite Lake, just north of Ignace, the pilot encountered an area of increasing rain and decreasing visibility. The pilot made several course deviations to find a route through the poor weather, but eventually could find neither a way out of the poor weather nor a lake with suitable conditions for landing. While manoeuvring at low level and with heavy rain obscuring the horizon, the pilot reported that the engines lost partial power because of carburettor icing. The pilot applied carburettor heat but was unable to restore engine power or sustain aircraft altitude. The pilot attempted to keep the aircraft level, and in a matter of seconds, the aircraft descended into the trees. The aircraft travelled approximately 500 feet through the trees; the left wing was torn off and a fuel-fed fire broke out almost immediately. All occupants survived the crash with minor injuries and exited the aircraft. The passenger occupying the co-pilot seat received burns to his upper body. The crash site was overflown about 15 minutes later by a second company pilot who transmitted a Mayday. The occupants were picked up by helicopter about one hour later.

Ce rapport est également disponible en français.

Other Factual Information

The company operates float-equipped aircraft from its main water base in Fort Frances and provides transportation services to many outpost camps in northwestern Ontario. The terrain is typical of the Canadian Shield, rugged with many lakes. The operation is conducted under VFR, which permits the pilots to operate with a minimum of one mile flight visibility and clear of cloud. There is no minimum en route altitude. Pre-flight and en route weather is predominantly acquired from other pilots and camp operators. The pilots tend to fly over-water routes to the camps so that they can land in case of an in-flight emergency or to wait out marginal weather.

At about the time C-FBGO took off, a second Rusty Myers' Beech D18S departed the Fort Frances area on approximately the same over-water route to another fishing camp located about 10 miles from Granite Lake. The second aircraft was a few minutes ahead of C-FBGO. The two pilots were in radio communication with each other, and the pilot of C-FBGO expected that the other pilot would be further along the over-water route for the entire flight and would provide weather information. The two pilots did pass weather and position reports to each other; however, the second aircraft deviated around the marginal weather area that C-FBGO subsequently entered and was, in effect, behind C-FBGO for a period of time. The subsequent manoeuvring of both aircraft then resulted in the second aircraft being again ahead of C-FBGO on an alternate over-water route to the destination. Just prior to the occurrence, the pilot of C-FBGO was in communication with the pilot of the second aircraft and knew that the other aircraft was ahead and in better weather. However, the pilot of C-FBGO was not fully aware of how the relative positions of the aircraft had changed during the weather deviations. Some 30 seconds after the last communication between the two pilots, C-FBGO descended into the trees. The second pilot was unaware that C-FBGO had crashed, but in subsequent manoeuvring around marginal weather saw the smoke from the crash site and after overflying the site called the Mayday.

At the time of the accident, the reported weather at Sioux Lookout, about 35 miles north and the closest weather reporting station, was 300 feet overcast, visibility two miles in drizzle and fog, and temperature and dew point 12.6 degrees Celsius. Just prior to the occurrence, the pilot had flown into an area of heavy rain that obscured the horizon. The heavy rain and lack of horizon were confirmed by the passenger occupying the co-pilot's seat.

The aircraft was being operated on a mixture of 25% 100 low lead aviation gasoline and 75% automotive fuel (MOGAS). The Aeronautical Information Publication (AIP), paragraph AIR 2.3, contains a carburettor icing chart which indicates that at a temperature and dew point of 12.6 degrees Celsius, serious carburettor icing can occur at any power setting. A note to the chart states the following:

This chart is not valid when operating on MOGAS [automotive fuel]. Due to its higher volatility, MOGAS is more susceptible to the formation of carburettor icing. In severe cases, ice may form at OATs [outside air temperatures] up to 20°C higher than with AVGAS.

The carburettor heat technique recommended by the company chief pilot was to apply full carburettor heat before entering precipitation and leave it on. His technique was motivated by a desire to reduce the number of actions required in poor weather and thus enable the pilot to concentrate on navigation. Other company pilots also used this technique. The occurrence pilot was aware of the chief pilot's recommended procedure; however, she preferred to use a different technique learned on other aircraft and applied the carburettor heat only when areas of precipitation were entered or carburettor ice occurred.

The Airplane Flight Manual applicable to the Beechcraft D18S aircraft states the following with regard to carburettor icing: "There is a minimum of 120°F heat rise available at 30°F OAT when using 75% METO [maximum except take-off power]. It is not recommended that heat be used unless the engine starts to get rough or there is a drop in manifold pressure."

The aircraft was previously owned by the Royal Canadian Air Force (RCAF) and was designated as an Expeditor. The flight manual used by the company, and accepted by Transport Canada inspectors for company use, is EO 05-45B-1, *Pilot's Operating Instructions - Expeditor*, issued 1 July 1957 by the RCAF. Under the heading AFTER TAKE-OFF, CLIMB AND DURING FLIGHT is the following paragraph: "72. When icing conditions prevail, use manifold heat as necessary to maintain the carburettor air temperature outside the icing range. (Recommended range +5°C to +10°C). Manifold heat is effective as an ice preventative, hence should be used continuously to prevent ice rather than periodically to remove it. In severe icing conditions frequently move the throttle levers so that they will not become frozen in any one position."

The AIP in paragraph AIR 2-4 provides information with respect to flight in rain. The AIP states that a refraction error can occur because of rain on the windshield, which causes the terrain ahead of the aircraft to appear to be lower than it is. The AIP gives an example indicating that terrain about one-half mile ahead of the aircraft could appear to be approximately 260 feet lower than it actually is. The AIP states further that, "Pilots should remember this additional hazard when flying in conditions of low visibility in rain and should maintain sufficient altitude and take other precautions, as necessary, to allow for the presence of this error."

There was no evidence found that indicated company management personnel pressured pilots to accomplish revenue flights in poor weather. The pilot indicated that she had experienced such pressure from time to time from customers. The company did, however, approve of pilots flying low, based on their own judgement, to see if a clear horizon existed below the cloud base if deteriorating weather conditions were encountered en route.

After the crash, the pilot and passengers abandoned the aircraft, and the pilot attempted to grab the first aid kit. However, it was mounted in such a way that the pilot could not remove it quickly under the pressure of the post-crash fire. The survival kit was stowed as required, but access to it was blocked by baggage. Because of the intensity of the fire, neither the pilot nor passengers could return to the aircraft to retrieve the survival kit.

Analysis

Investigators did not visit the accident site because witnesses provided enough information to be able to determine the nature of the accident. Weather information from Sioux Lookout helped to confirm the kind of weather that the pilot encountered. The remoteness of the site made ground access difficult; however, the site was overflown by investigators and examined from the air. Photographs taken by Ministry of Natural Resources employees were reviewed to complement witness reports. Consequently, this analysis will not include the discussion of technical issues other than carburettor icing.

When deteriorating weather conditions were encountered in the vicinity of Ignace, the pilot attempted to look for better weather by staying at low altitude and looking for a clear horizon beneath the cloud base. Because the pilot did not fully understand how the other aircraft had diverted around the marginal weather area, the pilot was expecting to find better weather ahead. Influenced by the perception that another pilot was in better weather on a different over-water route, the occurrence pilot flew across a land area towards the over-water route. However, the weather conditions rapidly deteriorated and the horizon disappeared in heavy rain. There was then no option of landing on a suitable lake and waiting out the weather.

The chart in the AIP indicates that in heavy rain at the ambient temperature/dew point existing at the time of the accident, a risk of serious carburettor icing is present at any power setting. The fuel mixture of 100 low-lead aviation gasoline and MOGAS significantly increased this risk. Consequently, the engines' near simultaneous partial power loss was probably caused by carburettor ice, as reported by the pilot.

The pilot's technique for the application of carburettor heat differed from the recommended company procedure; the pilot did not apply carburettor heat as a precautionary measure prior to entering the area of marginal weather. When the heavy rain was encountered, the pilot then had to contend with the increased workload of restoring engine power and flying in the rain at low level with no horizon, until power could be restored. When the pilot did apply carburettor heat, there was not sufficient time to clear the carburettor ice and restore engine power before contact with the trees. It is possible that the refraction effect of the rain on the windscreen led the pilot to believe that the aircraft was higher than it actually was and consequently, the pilot flew at an altitude that left no margin for dealing with emergency situations.

The mounting of the first aid kit prevented the pilot from removing it quickly from the aircraft when the survivors abandoned the aircraft. The location of the survival kit behind the baggage prevented the survivors from removing the kit when exiting the aircraft and the kit was destroyed in the post crash fire.

Findings

1. Records indicate that the pilot was certified and qualified for the flight.
2. While on a VFR flight, the pilot continued flight into adverse weather and lost all reference to the horizon.
3. The pilot had been exchanging weather and position information with another company pilot and believed that the weather conditions would improve.
4. The pilot deviated from the company practice of either staying on an over-water route or landing and waiting out the weather.
5. The pilot may have been at a lower level than anticipated because of the refraction effect of rain on the windshield.
6. The temperature and dew point at the time of the accident were conducive to serious carburettor icing at any power setting.
7. The aircraft fuel mixture consisted of aviation gasoline and MOGAS and hence was more susceptible to carburettor icing than aviation fuel alone.
8. The pilot's technique in attempting to eliminate carburettor ice was not as recommended by the company.
9. The engines lost partial power, likely because of carburettor ice.
10. There was insufficient time to recover from the partial power loss effects of carburettor icing.
11. The location of the first aid and survival equipment prevented their quick removal during the rapid egress from the aircraft.

Causes and Contributing Factors

The pilot continued the flight into adverse weather at low level and force-landed the aircraft into trees when the engines experienced a partial power loss that was probably caused by carburettor icing.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 09 May 1997.