

**AVIATION OCCURRENCE REPORT**

**LOSS OF SITUATIONAL AWARENESS**

**HELIJET AIRWAYS INC.  
SIKORSKY S-76A (HELICOPTER) C-GHJL  
VICTORIA AIRPORT, BRITISH COLUMBIA  
13 JANUARY 1996**

**REPORT NUMBER A96P0006**

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

Helijet Airways flight 721 (JBA721) departed Vancouver on a scheduled flight to the Victoria Harbour helipad, British Columbia, with 2 pilots and 11 passengers on board. While en route, the pilots were advised that the Victoria Harbour weather was below landing limits.

The pilots then chose to divert to the Victoria airport, where they conducted the "ILS/DME" (instrument landing system/distance measuring equipment) instrument approach to runway 09. At 1252 Pacific standard time (PST) they initiated the published missed approach procedure at the decision height, because of poor visibility in fog. The first officer, who was flying the helicopter at the time, had unintentionally allowed the airspeed to gradually reduce to about 40 knots during the latter stages of the approach; when he applied power to begin the missed approach climb straight ahead, the helicopter smoothly turned about 100 degrees to the right. This turn was not immediately detected by either pilot, and the helicopter continued on the climb out on the incorrect heading for about 30 seconds until the captain saw the heading deviation and instructed the first officer to correct course to the left, back to the published heading. The Victoria Terminal air traffic controller also noted the heading discrepancy and issued the pilot radar vectors to prevent a loss of separation with another aircraft on the same ILS approach to runway 09 at Victoria. The helicopter then continued to Vancouver and landed without further incident.

*Ce rapport est également disponible en français.*

### Other Factual Information

The published ILS/DME approach to runway 09 at Victoria, dated 14 September 1995, was a conventional precision instrument approach procedure which incorporated a 3-degree glide path, an inbound track of 085 degrees magnetic, and a decision height of 255 feet above sea level (asl), 200 feet above ground level (agl). The missed approach procedure required an aircraft to climb straight ahead on the localizer to 5 DME from the airport, before turning left and climbing to 3,000 feet asl. By design, this flight path traversed mostly open water and some low-elevation islands. The approach procedure document used by the pilots at the time of the incident was correct and appropriate for the approach to runway 09. The instrument approach procedures and profile were not contributing factors in this incident.

The pilots were certified and qualified for the flight in accordance with existing regulations, and their work schedules and rest periods were in accordance with the approved company operations manual limitations. On this flight, the captain, although he was the pilot-in-command, was acting as the non-flying pilot in the left-hand seat. This division of flight deck duties is a common industry practice and, through appropriate crew resource management techniques, provides acceptable levels of competence during flight. The captain remains unequivocally in command at all times.

Before joining Helijet, the captain had accumulated about 4,500 hours of helicopter flight time engaged primarily in bush work and *ab initio* student instruction in smaller helicopters. Shortly after receiving his initial class 4 instrument rating qualification in 1992, he began flying as a first officer on the S-76 with Helijet, and he was upgraded to captain status in April 1995. Since joining the operator, the pilot had gained about 1,800 hours of flying experience on the S-76.

The first officer had a strong background in military helicopter operations, which included about 7 years in an instrument flying environment, and he had gained about 2,500 flight hours in both medium and large size helicopters. He had joined Helijet as a first officer in early 1995, and had accumulated about 500 hours on the S-76 since then.

The 1233 PST Victoria terminal weather observation was reported as 100 feet scattered, measured ceiling of 800 feet broken, 2,800 feet overcast, with 3 miles visibility in light rain and fog. At 1300 PST, 10 minutes after the incident, the only change to the weather was reported as 2,700 feet overcast.

At the time of the incident, Helijet had a Transport-Canada-approved, non-precision Loran approach procedure into the Victoria Harbour, which incorporated a step-descent profile leading to a missed approach point at 380 feet asl. The latter stages of this approach were usually flown at 60 to 70 knots indicated airspeed (KIAS), and the final segment of the approach to the missed approach point was conducted in straight and level flight. This approach profile had

been used successfully in the past by the Helijet pilots flying into Victoria Harbour in conditions of limited visibility. The incident crew had recently flown the Loran approach to Victoria Harbour successfully, and both pilots had done so on other occasions.

The operator had established approved training and recurrency programmes which, in part, provided training, critique, and examination of several types of instrument approaches, including the Loran step descent to Victoria Harbour, and the ILS precision approaches to either Vancouver or Victoria airports.

Helijet regularly flew in the Vancouver area, and the pilot's traditional proficiency, operational, and examination flying included ILS approaches which terminated at the designated missed approach point for the specific procedure. Because the airspace where the ILS approaches were established was so active, air traffic control (ATC) operational circumstances required the crews to expedite their ILS approaches at airspeeds which caused minimal disruption to larger, commercial aeroplanes, sometimes flying in the order of 140 KIAS. As a consequence of the ILS approaches being flown at these higher airspeeds, the S-76 pilots were rarely exposed to ILS profiles at the lower, more conventional helicopter airspeed of 70 KIAS. The handling characteristics of the helicopter at 140 KIAS are significantly different from those at 70 KIAS; however, both these high and low in-flight speeds are well within the certificated flight envelope of the helicopter. Neither pilot had flown an ILS in the S-76 at 70 knots.

The traditional procedure of practising sequential instrument approaches incorporated, by necessity, the practice of executing the missed approach procedure at each decision point; not often, therefore, did the helicopter proceed past the decision point with the intention of landing, and continue with the approach to touchdown.

This often repeated practice of truncated approaches did not expose pilots to the flight characteristics of the S-76 in the slow speed regime during instrument approaches.

During the in-flight approach briefing, the pilots discussed the circumstances of the approach profile and, because of the marginal weather conditions at the time, decided to conduct the ILS at a reduced airspeed of 60 to 70 KIAS, in similar fashion to their recent successful Loran approach to Victoria Harbour. This decision was based on the premise that the slower airspeed would allow them more opportunity to acquire the required visual references at the missed approach point, and then to proceed in visually for landing. Once established on the localizer, the pilot-flying began to reduce airspeed to the discussed 70 knots; the helicopter, however, began to climb on the glide path because of the higher nose attitude required to slow down. In an attempt to regain the glide path, the pilot reduced collective pitch to descend, and the rate of descent increased to about 800 feet per minute.

At this stage the pilot-flying began to fixate on the glide-slope indicator, to the exclusion of the other cockpit instruments. The

captain observed the low airspeed and cautioned the pilot-flying to move the cyclic forward to regain airspeed. The helicopter then arrived at the missed approach point height, and the captain called for the missed approach procedure to be carried out. The pilot-flying acknowledged, applied climb power, and began the transition into the climb. It was at this stage that the aircraft turned right about 100 degrees without the pilots realizing it. The airspeed then began to increase, and, during the initial stages of the climb, the captain continued his pilot-not-flying duties. At 60 KIAS, he retracted the landing gear, and transmitted their intentions to ATC. During the initial part of the missed approach, however, the pilot-flying had not yet resumed his instrument scan and was disoriented. As a result, the captain chose to talk him through the procedure and provide constant feedback and direction.

About 30 seconds after the helicopter had turned right, the captain became aware of the heading deviation and instructed the pilot-flying to turn left to regain the correct missed approach heading. About 50 seconds later, ATC issued radar vectors to JBA721 to ensure continued separation from another arriving aircraft.

### **Analysis**

While both the incident pilots had seen and experienced the 70 KIAS Loran step-descent approach in the S-76, they had not experienced an ILS approach at that same airspeed. The most significant difference between the approach profiles is that the ILS is a descending flight path; the missed approach, therefore, is a constant-speed transition from descending flight to climbing flight.

Aggravating the pilot's workload was the significant torque-related force turning the helicopter to the right as a result of the increase in collective pitch to begin the climb.

It is most likely that the pilot began to lose situational awareness as a result of his unfamiliarity with the low speed ILS approach profile. A combination of the high rate of descent, low airspeed, large power application, and significant nose attitude change led to aircraft handling characteristics that the pilots had not previously experienced. As a result, when the instrument scan of the pilot-flying broke down, he lost directional control and the helicopter turned right. The turn itself was not detected by either of the pilots, most likely because the effect was masked by other attitude changes and the lack of external visual references. The delay in the captain's detection of the heading error resulted from his preoccupation with the missed approach vital actions, and his having to talk the pilot-flying through the missed approach and recovery of his instrument scan.

### **Findings**

1. The pilot-flying lost situational awareness and unknowingly allowed the helicopter to turn 100 degrees away from the published missed approach procedure heading.
2. The helicopter continued on the incorrect missed approach

heading for about 30 seconds, until the captain realized the error and issued recovery instructions to the pilot-flying.

3. The incident pilots had not previously flown ILS approaches at low airspeeds of about 70 knots.
4. The operator had not included practice flying ILS approaches at low speed during in-flight training.

#### **Causes and Contributing Factors**

The helicopter flew off the published missed approach procedure because the pilot-flying lost situational awareness. Contributing to the incident was the crew's lack of low-speed ILS experience.

#### **Safety Action Taken**

Immediately after the incident, Helijet withdrew both pilots from flying duties, and had the pilots complete an instrument flying training, reassessment, and recertification programme. Following successful retesting by a Transport Canada air carrier inspector, both pilots returned to line flying.

Shortly after the incident, the Flight Safety unit at Helijet conducted a crew resource management (CRM) training seminar for all company pilots, during which the circumstances of this incident were used as a primary training module.

The Helijet training programme was modified to specifically include practising ILS approaches at both high and low airspeeds, and continuing approaches past the missed approach point more often. In addition, Helijet's standard operating procedures (SOPs) were modified to require a minimum airspeed of 75 knots on instrument approaches.

Helijet also introduced an additional annual instrument training flight for all company pilots to supplement the annual recurrent training already in place. This additional flight concentrates on basic and essential instrument flying skills, and aircraft handling and instrument scanning techniques.

*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 12 February 1997.*