

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A04Q0041



CONTROL DIFFICULTY

AIR CANADA JAZZ

DHC-8-300 C-GABP

QUÉBEC/JEAN LESAGE INTERNATIONAL AIRPORT, QUÉBEC

31 MARCH 2004

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.

Aviation Investigation Report

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Summary

An Air Canada Jazz DHC-8-300 (registration C-GABP, serial number 257), operating as Flight JAZZ8710, was proceeding from Montréal, Quebec, to Québec, Quebec, with three crew members and three passengers on board. After take-off, at about 3000 feet above sea level, the aircraft banked left and force had to be applied on the steering wheel to keep the wings level. The checklist for a runaway aileron trim tab was completed, which corrected the situation. However, the flight crew found that the trim tab indication, which was fully to the right, was not normal. Emergency services were requested and the aircraft continued on its flight to Québec. On final approach for Runway 24 at Québec, the crew was advised by the controller that the airline required it to not continue with the approach. A missed approach was executed and it was suggested to the captain that he come back for a no-flaps landing. The aircraft came back and landed with no flaps without incident at 1052 eastern standard time.

Ce rapport est également disponible en français.

Other Factual Information

The flight crew was certified and qualified for the flight in accordance with existing regulations. Weather conditions were suitable for visual flight and there is no evidence that weather was a contributing factor in this occurrence. The aircraft records indicate that it was certified, equipped and maintained in accordance with existing regulations and approved procedures.

The aircraft was authorized to fly in accordance with minimum equipment list (MEL) 27-1 because of a defective aileron trim tab indicator. In this situation, the trim tab must be checked visually from the outside prior to each departure and a placard must be placed near the indicator. The investigation established that there was no check as required by the MEL and there was no placard in place. It could not be determined whether a placard had ever been posted or whether it fell off after a period of time. The flight crew on the previous flight had completed the MEL procedure prior to departure from Québec. During their flight, the previous crew had no problems with the trim tab and it was not necessary to use it.

The occurrence flight was the third flight of the day for the crew, but the first on aircraft C-GABP. The departure from Montréal was scheduled for 1000 eastern standard time.¹ Prior to departure, the first officer read the flight plan, which mentioned the defective indicator and the reference to MEL 27-1. He informed the captain of it. The captain paid little attention to the reported deficiency, since those indicated in the flight plan do not always match those indicated in the aircraft logbook. The captain intended to review the deficiencies reported in the logbook after boarding the aircraft. On arriving at the aircraft, he carried out the external inspection and noted no deficiencies. However, he did not check the trim tab as required by the MEL because he had not yet read the logbook, which would have referred him to the MEL and the procedure to follow.

After boarding, the crew was informed by maintenance personnel that the crew on the previous flight had reported a "severe" airframe vibration. The captain was surprised and concerned about the level of vibration reported. A propeller balancer was installed in the cockpit and the crew read the operating instructions for it.

The maintenance personnel left the aircraft with the logbook to make the necessary entries. The logbook is made up of two documents, which are referred to as Part 1 and Part 2. The two parts are fastened together between plates of aluminum. Deficiencies are recorded in Part 2 of the logbook. Because Part 2 was full, a new Part 2 was added so that the entry about the vibration could be made. The logbook therefore was made up of Part 1 and two Part 2s when it was returned to the captain a few minutes before departure. The captain noted the entry about the vibration but did not note the defective trim tab indicator, which was in the old Part 2, underneath the new Part 2.

The investigation could not determine whether the trim tab had required adjustment on the pre-flight checks. However, the information received indicates that the indicator was centred prior to the take-off roll. The aircraft commenced taxiing at 0953 and took off at 0958. The first officer was at the controls and the captain was performing the tasks of the pilot not flying. The

¹ All times are eastern standard time (Coordinated Universal Time minus five hours).

take-off was normal. When the aircraft was placed in level flight at 3000 feet above sea level (asl), the first officer noted that the aircraft had a tendency to bank left and that the indicator was fully to the right. He advised the captain, who took the controls and confirmed that the aircraft tended to roll.

It was agreed that the trim tab was a runaway, and the appropriate checklist was completed. Without looking at the indicator, the captain activated the trim tab to the right and pulled the circuit breaker. After the checklist was completed, the indicator was fully deflected to the right and the tendency to roll to the left had disappeared. Since the crew had control of the aircraft and the checklist did not require an immediate landing, the crew decided to continue to destination. While en route, checks made from the cockpit did not establish why such a large deflection was required. The crew concluded that the vibration reported by the previous crew resulted from a panel on the upper surface of the wing that was poorly fastened and had separated on departure from Montréal, which would account for the absence of severe vibrations. The crew felt that the absence of the panel was now creating resistance, requiring that the trim tab be fully deflected. However, the aircraft was flying straight and it was not necessary to apply rudder or aileron.

The captain radioed the maintenance coordinator at the flight dispatch centre to advise that he was experiencing control problems. He explained that the trim tab was fully deflected to the right in order to keep the wings level, and that he thought he had lost a panel, but he was not specific about this. At that time, the aircraft was about halfway to destination. The maintenance coordinator advised the flight dispatcher, who advised the assistant chief dispatcher and air traffic control (ATC). ATC was informed to have the emergency equipment on standby for the landing.

Feeling that the situation could result in a major or catastrophic accident, the flight dispatcher initiated a category C emergency message through the fan-out notification system. This type of message is sent to certain members of management so they can prepare for their respective tasks in the event of a major or catastrophic accident. After receiving the emergency message that the aircraft was experiencing control problems, the director of flight operations and four other persons went to the office of the assistant chief dispatcher, which is located in the flight dispatch centre room.

The flight dispatch centre room is divided into three sectors. Each sector has a flight dispatcher and a maintenance coordinator among others. The office of the assistant chief dispatcher is located at the other end of the same room. To monitor flights, the airline uses radar screens located in each sector and in the office of the assistant chief dispatcher. Therefore, it was possible to monitor the position, speed and altitude of the aircraft during the course of this occurrence. However, there is a time lag in the transmission of information, which means that the information displayed on the radar does not represent the aircraft's position in real time.

Since he did not know the exact nature of the control problem, the director of flight operations asked the assistant chief dispatcher to advise the crew not to continue with the approach. More time was needed to determine how serious the problem was and provide adequate suggestions for the pilots. The assistant chief dispatcher phoned the Québec control tower to have the information transmitted to the crew. By that time, the aircraft had commenced a visual approach for Runway 24. When the crew received the message not to continue the approach, it was less

than two miles from the runway threshold and about 665 feet above ground level (agl). Since the aircraft was under control and configured for the landing, the crew decided to continue with the approach.

Meanwhile, the flight dispatcher also was in contact with the tower in order to be kept advised of the progress of the landing. That is when the controller advised him that there was someone else from the airline, on another telephone line, who was demanding that the aircraft execute a missed approach. Questioning the assistant chief dispatcher about this, the flight dispatcher realized that, without his knowledge, the tower and the assistant chief dispatcher were in contact. That is when he was ordered to advise the crew to execute a missed approach. When this last instruction was received by the crew, the aircraft was at an altitude of approximately 65 feet agl.

The crew executed a missed approach, during which the aircraft descended to less than 50 feet above the runway. Afterwards, the captain called the airline to request an explanation for the order to execute a missed approach. The loss of a panel reported by the captain gave the director of flight operations the impression that the aircraft may have lost an aileron. Therefore, he felt it was safer to land without flaps and at higher speed so the remaining aileron would be more effective. The aircraft came back around and made an uneventful no-flaps landing.

The defective indicator had been reported for the first time on 26 March 2004. It was worked on in the ensuing days, during which the indicator was replaced and some electrical connections were repaired, which solved the problem but only temporarily. Some troubleshooting notes indicated that the problem with the indicator was intermittent and that it occurred only in flight. When it was malfunctioning, the indicator was fully deflected to the right, indicating that the trim tab was fully down.

The trim tab on the DHC-8-300 is located on the right aileron. It can be deflected through a maximum of 40 degrees, that is up 20 degrees and down 20 degrees. It is activated electrically by a rocker switch mounted on the centre console. After the occurrence, it was observed that the trim tab was centred. However, it was adjusted incorrectly; deflection was only 15 degrees downward instead of 20 degrees. In such a case, the trim tab would retain its maximum deflection capability of 40 degrees. However, it is 25 degrees upward and 15 degrees downward.

This faulty adjustment gives rise to two possible scenarios. If the potentiometer is correctly adjusted but the actuator or the push-rod is not correctly adjusted, the indicator, if it is working properly, will show the actual position of the trim tab. If the actuator or push-rod and the potentiometer are not correctly adjusted, the trim tab indicator will not show the actual position of the trim tab. The indicator will be centred while the trim tab is actually deflected five degrees upward.

Analysis

Two elements indicate that the tendency to roll encountered on departure from Montréal was caused by the aileron trim tab being up: the procedure for a runaway trim tab corrected the situation, and it was in the neutral position on arrival at Québec. However, it is difficult to say why the trim tab was deflected upward. Because the previous flight crew ensured that the trim

tab was centred and it was not used during the flight, it can be concluded that it was centred when the aircraft arrived at Montréal. It is possible that the trim tab was actuated accidentally on the pre-flight checks or when the propeller balancer was installed. Having forgotten the indicator malfunction, and considering that it may have been working properly that day, the crew probably used it as a reference to align the trim tab before take-off. However, incorrect adjustment of the trim tab during previous maintenance may have contributed to an incorrect indication in the cockpit, leading the pilots to believe that the trim tab was correctly aligned when it was in fact deflected five degrees upward.

Entries in the flight plan and in the logbook were defence mechanisms to advise the pilots of the indicator malfunction. The arrangement of the logbook given to the captain (that is, the fact that there were two Part 2s) made it less clear that there was an entry stating that the indicator was defective. Despite the fact that the logbook was given to the pilot only a few minutes before departure, he had enough time to review it properly since the aircraft left the ramp seven minutes before the scheduled departure time. The absence of a placard failed to advise the pilots of the indicator malfunction before departure.

When the tendency to roll left occurred, the crew should have noticed the inconsistency between the position of the indicator and the tendency to roll. It was not normal that a runaway trim tab to the right caused a tendency to roll left. A placard would have revealed that inconsistency. However, the runaway trim tab procedure corrected the roll tendency.

The indication of maximum trim tab deflection led the captain to believe that resistance was created by the loss of a panel. This conclusion was based on the absence of the severe vibrations that had been reported to him and on the false indication provided by the defective indicator. Here again, the presence of a placard would have enabled the pilots to not take into account the indicator in their analysis of the observed anomaly. Other elements would have helped them realize that the trim tab was not fully deflected as they believed it to be. It was possible to visually check the position of the trim tab from the cabin, which was not done. Also, the position of the ball on the turn indicator would have enabled them to understand more clearly what was happening. If the aileron trim tab had been fully deflected to the right as indicated, the crew would have had to apply rudder to keep the ball in the centre, which was not the case.

The flight dispatcher and the maintenance coordinator knew that the indicator was defective. It could not be determined why they did not recall that it was defective. In such a case, they could have passed this information on to the pilots and the director of flight operations, which would have allowed them to make a more accurate assessment of the situation.

When the crew received the first instruction to not continue the approach, they were in full control of the aircraft. The aircraft was configured for landing and the approach was stabilized. But the situation still seemed abnormal, which made them uncomfortable with the idea of executing a missed approach. However, on receiving the second instruction to go around, the crew decided to comply. Although the final decision is up to the pilot-in-command, it is possible that he felt he had to comply.

During the course of this occurrence, the assistant chief dispatcher went from the role of supervisor to that of flight dispatcher unbeknownst to the actual flight dispatcher. It is possible that his actions were influenced by the presence of people in his office. The flight dispatcher had a better overall view of the situation and should have been involved in the decision-making process leading to the missed approach. This would have avoided the confusion that was created surrounding the telephone calls with the control tower. This confusion contributed to a delay in the last transmission of the instruction to the pilots to execute a missed approach, which placed the crew in a precarious situation, that is, a missed approach at low altitude.

The decision to order a missed approach provided more time for management personnel to diagnose the problem and find a solution. However, it would have been preferable to take into consideration the lack of precision in the aircraft position provided by radar. The aircraft was closer to the ground than they thought, and it executed a missed approach at very low altitude. Considering that the landing is a critical phase of flight and that many accidents occur during the landing phase, it can be concluded that the risk associated with the missed approach close to the ground was high.

Findings as to Causes and Contributing Factors

1. The aileron trim tab was improperly aligned, which contributed to the tendency of the aircraft to roll on departure from Montréal.
2. The absence of a placard near the indicator and the arrangement of information in the logbook contributed to the crew being unaware of the defective aileron trim tab indicator.

Findings as to Risk

1. Poor task distribution between the assistant chief dispatcher and the flight dispatcher created confusion in the telephone conversations with the tower controller, which delayed transmission of the second order to execute a missed approach, resulting in a missed approach at very low altitude.
2. The trim tab had been improperly adjusted during prior service; an incorrect indication of the position of the aileron trim tab in the cockpit might have resulted if the indicator had been serviceable.

Safety Action

As part of its safety management system, Air Canada Jazz initiated an internal investigation to draw lessons from this occurrence in order to use them for cockpit resource management training.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 25 April 2005.

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