

## Report Details

- Mode: Aviation
- Investigation Number: 2010-010
- Abstract: On 30 September 2010 a Bombardier DHC-8-311 aeroplane (often referred to as a Q300 or Dash 8) departed from Wellington International Airport on a scheduled flight to Nelson Aerodrome. The aeroplane diverted to Woodbourne Aerodrome (Blenheim) because of poor weather at Nelson. There were 2 pilots, one flight attendant and 43 passengers on board.

When the pilots moved the landing gear selector lever to DOWN, the left and right main landing gear legs extended normally, but the nose landing gear stopped before it had fully extended, probably because debris within the hydraulic fluid blocked a small orifice in the hydraulic ram (actuator) that extended and retracted the nose landing gear.

The primary system that indicated the status of the landing gear showed the pilots that the landing gear was "unsafe", that the nose landing gear was not down and locked, and that the nose landing gear forward doors were open.

The pilots began working through a checklist to troubleshoot the problem. The checklist directed them to an independent verification system designed to show whether the individual landing gear legs were locked down. That system showed the pilots 3 green lights, which verified that all the landing gear was down and locked, in spite of the other indications that the nose landing gear was not.

The pilots assumed that there was a fault in one of the landing gear sensors and continued the approach to land at Woodbourne in the expectation that all of the landing gear was locked down. On the final approach the landing gear warning horn sounded when the pilots began to configure the aeroplane for landing by selecting the wing flaps to 15 degrees. This warning horn was designed to alert the pilots that the landing gear was not safe. A short time later the ground proximity warning system also alerted the pilots that the landing gear was not locked down. The pilots ignored both of these warnings in the belief that they had been generated from a single sensor that they assumed was faulty and had given them the original unsafe nose landing gear indications.

When the aircraft touched down and the pilot lowered the nose, the nose landing gear was pushed into the wheel well and the aeroplane completed the landing roll skidding on the nose landing gear doors. Damage to the aeroplane was minimal and no-one was injured.

The Transport Accident Investigation Commission (Commission) found that other events involving the same nose landing gear in the weeks preceding this incident had probably been caused by the same condition that prevented the normal extension, debris within the hydraulic fluid, but that that condition had not been identified as the cause of those previous events. The Commission also found that the primary landing gear indication system had shown

correctly that the nose landing gear was not locked down, but the pilots had been misled by the verification system. The verification system was found to be unreliable. The Commission found that the pilots ought to have heeded the aural warnings, which sounded on the final approach, and should have abandoned that landing attempt until the actual position of the nose landing gear had been determined. Additional findings related to crew resource management (CRM).

The operator, Air Nelson Limited, and the aeroplane manufacturer, Bombardier, took a number of safety actions to address issues raised in this report. However, one safety issue had not been resolved, so the Commission made a recommendation to the Director of the New Zealand Civil Aviation Authority to work with the Canadian authorities to require the manufacturer to improve the reliability of the landing gear verification system.

Key lessons arising from this inquiry were:

- when critical systems begin intermittently to malfunction or behave abnormally, this is often a precursor to total failure. For this reason the diagnosis of these problems should be exhaustive and multifaceted
  - the more a pilot knows about aircraft systems, the better armed they will be to deal with emergency and abnormal situations.
  - aircraft warning systems are designed to alert pilots to abnormal conditions. Alerts should not be dismissed without considering all other available information
  - pilots must retain sufficient knowledge of aircraft systems to deal with situations not anticipated by Quick Reference Handbooks.
- A Link to the Report: [2010-010](#)