

International aircraft accidents: Air NZ A320 Airbus crash Perpignan, France, 28 November 2008

In the previous edition of *The Legal Lounge* I provided an overview of the international legal framework governing international aircraft search and rescue or recovery operations, and international aircraft incident and accident investigations.

In this article I outline the application of these legal protocols during the investigation into the crash of the Air NZ A320 Airbus off the coast of Perpignan, France, at 0446 hrs on 28 November 2008 (NZT) or 1646 hrs on 27 November 2008 (local time). While details about the accident and the conclusions of the investigation into the aircraft crash are included for context, this article is **not** purporting to provide a critique of the accident investigation, or the conclusions of the final report into the accident. A full analysis of the accident investigation process and the conclusions reached, can be viewed in the final published report, available on the French BEA website.

The accident flight

In late November 2008 a pilot and engineers from Air New Zealand and the New Zealand Civil Aviation Authority travelled to France to complete the certification process for the return of an Air New Zealand owned A320 Airbus back to the New Zealand operator, and its entry back onto the New Zealand aircraft register. The aircraft had been leased for two years to XL Airways in Germany. After being ferried to Perpignan early in November 2008 for light maintenance and repainting into the Air NZ livery, the aircraft was due to be released to service on 27 November 2008. The lease agreement required a series of in-flight checks prior to the aircraft handover. This was scheduled to take place in Perpignan in the early afternoon of 27 November 2008. After this the aircraft was to be returned to Frankfurt/Main, and from there flown back to Auckland by the Air NZ pilot.

The Operational Flight Check (OFC) had been delayed from 1330hrs (local time) by approximately 2 hours, awaiting final ground checks and release to service. Once completed, the OFC commenced at approximately 1544 hours, with a German pilot and co-pilot as flight crew. The Air NZ pilot had specific operator approval for such flight checks and been nominated as an observer by Air NZ. It had been agreed he would be seated in the flight deck. The three Air NZ engineers and a Civil Aviation Authority engineer were also carried during the flight.

After about an hour of flight the aircraft returned to the departure aerodrome airspace and was cleared to carry out an ILS procedure followed by a go around and a departure towards Frankfurt/Main in Germany. A short time after overlying the initial approach point, the aircraft was witnessed flying at low speed, before control of the aircraft was lost and it crashed into the sea.

Post accident response and constitution of Accident Investigation team

As discussed in my last article, Articles 25 and 26 of the Chicago Convention vest primary authority and responsibility for the search and rescue (SAR) or recovery phase, and any subsequent aircraft accident investigation or inquiry process, to the State which has sovereignty over the territory in which the aircraft incident or accident has occurred (the State of Occurrence).

The French BEA was informed of the accident on 27 November 2008 at around 1600hrs, and launched a technical investigation into the aircraft crash in accordance with EC directives and the French Civil Aviation Code. A BEA investigator arrived on site that evening, with others arriving the following morning to begin their site investigation and scope the search and recovery effort.

In accordance with Chapter 4 and 5 of Annex 13, affected states were also notified, and Accredited Representatives from Germany were appointed to the investigation team, to represent its interests as the State of Registry and Operator of the Aircraft. The United States was also given rights to assist the investigation as the state of design of the aircraft engines. As the passengers were of New Zealand nationality, the BEA also accepted the participation of New Zealand in the investigation. The New Zealand Transport Accident Investigation Commission was the NZ Accredited Representative, and sought the assistance of the AAIB in the United Kingdom, to represent and advise it during various stages of the investigation process. Representatives from Airbus also participated in the investigation.

Search and recovery operation

Debris from the aircraft, including a visible section of the tail plane with the Air NZ livery, was left floating on the surface. It was evident from the break-up of the aircraft on impact that the crash was not survivable. French Authorities launched an extensive search using French Naval resources, to locate the aircraft's critical components and to recover the bodies.

From the location of the visible debris, naval vessels using sonar technology were able to map the wreckage zone, which stretched some 650 metres long by 400 meters wide, at a depth of between 38 to 40 metres. The Cockpit Voice Recorder and Flight Data Recorder were recovered on 29 and 30 November 2008 (local time). Special detection equipment and naval diving teams were also used to extensively photograph and map other items on the sea bed. From this, the investigators were able to identify the main parts of the aeroplane including the cockpit zone, engine zone, forward fuselage zone, landing gear zone and partial wing zone.

Data from the CVR and FDR was initially unreadable, but after being sent to the United States and re-examined as part of a judicial commission in January 2009, short circuits on the cards were identified and eliminated and complete readings of the data were retrieved. Based on the information obtained from the FDR, priority was given to searching for the three angle of attack sensors, all located in the forward sections of the aircraft; recovery of the engines; and recovery of other elements that were identified as allowing confirmation of the aeroplane's configuration at the moment of impact.

Chapter 3 of Annex 13 deals with the protection of evidence and the responsibility of the State of Occurrence for the custody and removal of the aircraft, and the final report details extensively the processes undertaken to retrieve, clean, treat and preserve all of the aircraft components.

Aircraft accident investigation process and objectives

International/foreign aircraft accidents are investigated and report according to the Annex 13 mandate, which is not to apportion blame, but to establish the causes of an accident or incident to try and identify safety improvements so as to prevent the same thing happening again.

This “non-blame” philosophy is also endorsed in the EC directive and the French Civil Aviation Code, and underpinned the approach to this investigation and the published report.

Investigation processes are spelled out in Chapter 5 of Annex 13 and include the processes for disclosure and examination of records, appointing the investigator in charge, coordinating with judicial authorities, conducting autopsy examinations, and the gathering, recording and analysis of all relevant information.

During the course of this investigation, working groups were established focusing on sea searches, operations, maintenance documentation, flight recorders, systems, ATM data, witness testimony, human factors, and the angle of attack sensors.

Interim report

An interim or preliminary report is generally issued once it is considered that all of the key factual information that identifies the relevant circumstances and ascertainable facts about an accident scene and accident flight are established. The interim report may also identify any possible causes that could be eliminated, and matters that require more extensive investigation. In some cases, a safety recommendation can be made at this stage, although this may not necessarily be indicative of the cause of a particular accident or incident under investigation.

On 24 February 2009, the French BEA published its interim report into this accident.

Accident sequence

The interim report identified that after departing at 15 h 44 min, it was confirmed through exchanges with ATC that the program of planned checks could not be performed in general air traffic, so the intended flight was shortened. The crew returned towards Perpignan at approximately 16 h 12 min and after carrying out some planned checks, they were cleared for an ILS approach to runway 33 at around 16 h 40 min.

At this time the Air NZ pilot spoke to the Captain for around 40 seconds, describing the actions to take to perform a low speed check. After exchanges with ATC and after being instructed to reduce speed to 180kt and descend to 5,000 ft, the Captain indicated to the Air NZ pilot that the low speed check should be made later or during the flight to Frankfurt, or possibly not at all.

At 16 h 43 min the Captain announced he was passing under the cloud layer and disengaged the auto pilot, and asked the Air NZ pilot what he wanted. The Air NZ pilot instructed him to go slowly and described the necessary actions for the slow speed check.

Amidst this discussion and activity, the aircraft was put into landing configuration and the co-pilot confirmed to ATC their intentions to make a go-around and continue towards Frankfurt. At 14 h 44 min the Captain stabilised the aircraft at 3,000 ft.

In the next thirty-five seconds, the aircraft speed went from 136 to 99 kt and the horizontal stabiliser went to the pitch-up stop, triggering the stall warning, at a pitch angle of slightly below 19 degrees. The speed continued to drop to 92.5 kt then began to increase. The airplane rolled slightly to the left, then right. The Captain countered these movements.

Over the next two minutes, the flight control laws of the aircraft changed from “normal law” to “direct law” and later to “alternate”. During this sequence the crew lost control of the aircraft, with the bank angle and pitch of the aircraft swinging wildly from left to right, and repeated stall warnings sounding. The air speed was recorded as descending to below 40 kt, before ascending rapidly in the final seconds of the flight. The last recorded values at 16 h 46 min 0.68s were a pitch of 14° nose down, bank angle of 15° to the right, a speed of 263 kt and altitude of 340 ft, with impact into the sea less than a second later.

Further investigations

The interim report outlined the operational procedures of Air NZ and XL Airways in particular with respect to Operational Flight Checks and low speed checks; what if any crew training was provided by the operators for these types of flights; the maintenance checks that had been performed prior to the accident flight; and provided information about the flight control laws and angle of attack protections in the Airbus A320 aircraft. The report indicated that the investigation would focus on all of these aspects in its continuing investigation.

Safety recommendations

Research from the NTSB identified that, in the preceding ten year period, 25% of accidents to turbine airplanes occurred during non-revenue flights, such as ferry and position flights. It attributed these to two main factors: failure to respect standard operating procedures, or failure to respect the airplane’s limitations. In December 2008 the US issued a safety alert to operators recommending that they review FDR data from non-revenue flights to ensure that operating procedures and aircraft limitations were being followed during such flights.

The interim report noted that the Air NZ/XL Airways flight checks were based on an Airbus programme used for delivery/acceptance of a new airplane to a customer, which are performed by Airbus acceptance pilots and engineers. However, the investigation highlighted a great diversity in the procedures adopted for such flights and the level of training required, and that there is a lack of regulatory standards for such flights both in EU and non-EU countries. In essence, the BEA concluded that it was mostly left to operators to define for themselves their own flight plans and operational requirements for such checks. The BEA concluded that this could lead to improvising the performance of tests, or to performing tests or checks in inappropriate parts of airspace and/or during flight phases with a high workload.

The BEA accordingly issued safety recommendations to EASA, that the EU develop specific procedures for adoption by operators for such flight checks, which should include preparation, programme and operational framework, as well as the qualification and training of crew.

Final report

After further investigation, the final report was distributed for comment and published by the French BEA on 16 September 2010 in accordance with Chapter 6 of Annex 13 and EC directives.

The investigation concluded that the accident was caused by loss of control of the airplane following improvised demonstration of the functioning of the angle of attack protections.

The investigation also established that the angle of attack sensors had been blocked due to incorrect procedures followed during the maintenance work performed prior to release to service. Specifically, during the process of stripping and rinsing the aeroplane, angle of attack sensors were not protected and water penetrated two of the angle of attack sensors and remained there at the time of the accident. The crew were not aware of the blockage of the angle of attack sensors and awaited the triggering of these sensors, while allowing the speed to fall to that of a stall. The crew also did not take into account the speeds recommended in the programme of checks available to them and did not stop the demonstration before the stall.

Contributing factors also centred on the decision to carry out the demonstration at a low height; lack of action by the crew or knowledge of the crew in conducting the low speed checks, or identifying and countering the pitch-up position of the horizontal stabiliser; and having to manage the low speed flight during a stage of increased workload. The report also concluded that an atypical team composed of three airline pilots in the cockpit, and possible flight crew fatigue leading to loss of awareness of information relating to the state of the aircraft systems, may also have contributed to the accident.

The final report reiterated the interim recommendations, and made further recommendations relating to the certification, installation and maintenance procedures for angle of attack sensors; that EASA undertake a study with a view to improving the certification standards of warning systems for crews during reconfigurations of flight control systems; and that improvements be made to the training of crews in identifying such changes and their immediate operational consequences for a flight, and to training techniques relating to approach-to-stall to ensure control of the aeroplane in the pitch axis.

The sharing of such information is considered vital to accident prevention. ICAO operates a computerised database known as the Accident/Incident Data Reporting (ADREP) system to facilitate the exchange of safety information among ICAO states. This captures the key information and recommendations generated by interim and final aircraft accident and serious incident reports.

In the next edition of *The Legal Lounge*, I will outline the international processes initiated in response to the accidental shooting of the Malaysian civilian aircraft flight MH17 over Ukraine, and following the disappearance of and ongoing search for Malaysian airlines flight MH 370, in 2014.

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