

Written for *NZ Aviation News*

submitted 13.9.11

## **Air Crash Injustice**

### ***Aviation historian Rev Dr Richard Waugh outlines the ongoing injustice of a tragic airliner accident 50 years ago***

Wherever the Bay of Plenty Airways Aero Commander ZK-BWA flew, eyes gazed skyward. The high pitched barking sound and the shape of the most advanced small airliner in New Zealand was distinctive and always attracted attention. The pioneering airline was promoted by Captain Alf Bartlett and it was he who was flying the Aero Commander on a scheduled North Island service the day it crashed high on the north-east side of Mount Ruapehu. Subsequently the crash became one of New Zealand's most controversial air accidents.

#### **Mountain crash**

50 years ago on the morning of 21 November 1961 the 'sporty looking' twin engined Aero Commander was flying Flight 92 from Wellington to Rotorua and Tauranga. Its familiar shape and sound was spotted high over the slopes of Mount Ruapehu by several onlookers who saw the tragedy unfold. Roy Turner reported, "When I heard the Aero Commander I looked up as I usually did. Suddenly there was a scream of engine noise and the right wing separated and flew off by itself, the remainder barrel-rolled away with both parts disappearing from sight over the ridge." Tony Thrupp, working on the chairlifts, commented, "It seemed to be just behind the Pinnacles when I saw a cloud of white smoke appear. Then the right wing fell off and tumbled towards the ground with the engine attached. I heard an engine revving loudly. The plane dived, with flames and smoke pouring from it. After it had dropped out of sight I heard a loud report." Walter Imboden, a chairlift operator, reported the right wing falling from the aircraft before it plunged to the ground. Now resident near Whangarei, he recently recalled, "It was a fine day and I saw the aircraft turn over, belly-up, like it was shot down."

The shocking crash was headline news throughout New Zealand. Many Bay of Plenty people were stunned by the loss of well known pilot Captain Alf Bartlett,

aged 36. Passengers killed were Miss Marlene Boynton, aged 25, a (Maori) midwife returning to Murupara Hospital after a midwifery course in Christchurch, Scottish immigrant Mrs Nicholas Crook, aged 37, also of Murupara, and her young children Jeffrey (2 years) and Helen (8 months), and Mr Irvine Down, aged 41, of Wellington.

### **Airline Beginnings**

Bay of Plenty Airways had its beginnings in 1956 with Tauranga Air Services offering local charter flights and eventually regular services. Changing its name to express a wider constituency of support and with the financial backing of New Zealand Newspapers Ltd, the Aero Commander was purchased in the United States and flown on the long ferry flight to New Zealand in September 1958 by the airline's driving force, Captain Bartlett, a former RNZAF pilot in World War II.

Scheduled flights using the Aero Commander commenced on 11 October 1958 between Tauranga, Rotorua and Auckland. The aircraft was kept very busy with passengers and freight work. Services later expanded to Whakatane and Wellington.

The sophistication of the Aero Commander enabled Bay of Plenty Airways to play a pivotal part in the development of New Zealand's regional air services from visual flight only operations into scheduled all weather services. Pioneering single pilot IFR approval was gained for three of the Bay of Plenty Airways pilots by late 1959. Alistair McLeod who flew the aircraft recalled, "It was equipped with navigational equipment way ahead of other small airliners in New Zealand. To gain single pilot command approval in instrument meteorological conditions, Alf and I spent many flights under observation by CAA officer Eric Omundsen, using a two-stage amber process. An amber screen was placed over the windscreen and we wore blue goggles which allowed us to read the instruments but not see outside."

In early 1961 the airline experienced financial difficulties resulting in some restructuring. SPANZ tried to take it over but in due course NZ National Airways

Corporation (NAC) took up a one third shareholding. This was to be the only occasion when NAC took a shareholding in a small regional airline.

In the weeks following the Aero Commander accident it was initially thought the airline would continue in a restructured form. However with financial constraints, loss of morale after the accident, and the high cost of a new replacement aircraft, Bay of Plenty Airways was placed in liquidation in December 1961.

### **First Accident Report**

The air accident report was released three months later in February 1962. Despite acknowledged evidence of a substantial fatigue crack in the main spar cap (the load carrying structure) of the starboard wing, and the complete separation of the wing from the aircraft immediately before the crash, the report blamed Captain Bartlett for the accident.

The report suggested Bartlett had flown too close to the summit of Mount Ruapehu, and due either to turbulence or some pilot manoeuvre, the starboard propeller had struck a rock outcrop on the mountain bending the blade tips forward and causing vibration which weakened the wing and led to its rapid failure. The report also stated that "... the structural integrity of the Aero Commander 680S aircraft as a type is unquestioned."

### **Questions**

Professor Neil Mowbray of the University of Auckland became involved in the examination of four photographs taken from a camera used by Irvine Down who was sitting in the front right hand seat next to Captain Bartlett. The photographs show the approach to Mount Ruapehu, with the last photograph of the crater lake taken only a few seconds before the Aero Commander began to break up in the air. Air accident inspectors contended that the final photograph showed the Aero Commander below the mountain crest but Mowbray determined through photogrammetric analysis that the aircraft was not below the mountain crest at any time.

In 1969, a concerned group of aviation people, led by well known pilot John Stokes, considered the air accident report unprofessional, and approached Professor Les Erasmus of the Department of Mechanical Engineering at the University of Canterbury for assistance. Little did Professor Erasmus realise that his investigative and advocacy work for the Aero Commander accident would continue for the next 40 years! Professor Erasmus issued a series of reports as different components of the Aero Commander were located and examined, showing that the starboard wing had been defective, and that it could have separated, as a result of metal fatigue, at any time on or around the day of the accident, irrespective of any alleged air turbulence or action by the pilot.

### **Second Report**

In 1972, partly influenced by Professor Erasmus' work, the Chief Inspector of Air Accidents withdrew the original report and issued a new report, which was formalised in January 1984. Although this report accepted some of the Professor's findings, its main thrust was an attempt to justify the errors of the first report, and blame for the accident was still apportioned to the pilot.

Professor Erasmus continued his investigations through the 1970s and 1980s, attempting to simulate propeller impingement of fuselage sections and endeavouring to locate and use similar Aero Commander aircraft for camera angle and depression measurements from the right hand passenger seat.

### **New evidence**

In essence there are two main areas of disagreement between the second accident report and Professor Erasmus' findings.

The second accident report suggests photograph four shows that the aircraft turned to starboard and dived at the crater lake. As the pilot pulled out of the dive the starboard propeller struck snow only, bending the blade tips forward, but leaving no other damage. Then as the severed wing passed rearwards the corresponding part of each blade struck the horizontal stabilizer, producing the observed metal to metal contact.

By comparing photographs taken from the right hand seat of test aircraft with photograph four, Professor Erasmus was able to show that the camera depression and starboard rotation correspond to camera movement only, and that the aircraft's orientation was largely unchanged from its previous route when photograph four was taken.

In their reports the accident inspectors were not prepared to concede that the propeller blade tips would be bent forward as a result of the propeller striking the fuselage when the starboard wing pivoted forward during wing failure. This is despite mathematical (vector diagram) proof given in Professor Erasmus' reports

Also, the accident inspectors could not accept that an aircraft of this type might have a major design weakness which would initiate a fatigue crack in the wing spar and instead attributed the fatigue crack to possible previous hard landing damage and/or the aircraft coming into contact with the mountain peak.

Professor Erasmus argued that fatigue cracks take a long time to initiate, and once formed propagate continuously as a sequence of fine steps when under load, leading eventually to complete and final fracture. Any turbulence over the mountain was therefore only the final step in a prolonged failure which could have happened elsewhere and on a different occasion.

### **Australian Research**

In May 1995 Mr Steve Swift, Principal Engineer Fatigue Evaluation, Civil Aviation Authority of Australia, presented an extensive paper, *The Aero Commander Chronicle*, summarising the history of the Aero Commander design and the difficult lessons learned in the theory and practice of fatigue control. The paper begins by describing the Seattle meeting, initiated by the American FAA in June 1991, of seventeen senior engineers from the FAA, Australian CAA, and the Aero Commander manufacturer, to discuss the safety of Aero Commanders after further in-flight wing failures. Swift's paper, still accessible on the Australian CASA website (see <http://www.casa.gov.au/airworth/papers/AeroCommander.pdf>), argues that there was a major design weakness in the main spar of the Aero Commander. At that stage 24 Aero Commander accidents resulting from wing separation in flight, had occurred worldwide, of which Bay of Plenty Airways ZK-BWA was the

first. The report further relates how 35 wing spars had been found cracked during inspection, many requiring replacement of the spar caps. Fortunately Aero Commanders now fly safely, despite the design weakness, because better inspections now find cracks early, before they become dangerous.

Professor Erasmus commented in relation to Swift's report, "Much of this information must have been available to the Civil Aviation authorities in New Zealand to 1984, but was never revealed to anyone involved with the ZK-BWA investigation. Throughout the period 1970 to 1984 we had minimal co-operation from the Civil Aviation Authority or the Chief Inspector of Accidents, and generally had great difficulty extracting the parts of ZK-BWA which they had retained, and which they eventually 'lost.' The aircraft manufacturer, Rockwell-North American was equally unhelpful."

### **Intransigence**

The second aircraft accident report of 1984 continues to perpetuate an injustice on the circumstances of the accident, especially the reputation of Captain Alf Bartlett. Engineer Denis Little, who helped maintain the Aero Commander while working for TEAL, provides a helpful word on this air accident when he wisely reflected, "It is never too late to learn from past mistakes, nor should there be any shame in acknowledging them."

### **Professor Les Erasmus and Rev Dr Richard Waugh**

*Emeritus Professor Les Erasmus* has a long established reputation as a forensic and failure analysis consultant. He received the Henry Wigram Medal of the Royal Aeronautical Society in 1982 for his lecture and report on the Aero Commander accident, and in 1997 was awarded the New Zealand Science & Technology Medal "for outstanding contributions to metallurgical and materials engineering in New Zealand." *Rev Dr Richard Waugh* is an award winning aviation historian and organiser of aviation historical events. His 2003 book, *Taking Off – Pioneering*

*Small Airlines of New Zealand*, goes into more detail about the history of Bay of Plenty Airways and the Aero Commander accident. Richard is currently working on his 13<sup>th</sup> aviation publication.

## **50<sup>TH</sup> Anniversary Event**

A public commemorative 50<sup>th</sup> anniversary service will be held at 11am on Monday 21 November 2011 at the Classic Flyers Museum at Tauranga Airport. Dr Waugh will lead the bicultural service in his capacity as Hon. Chaplain of the Guild of Air Pilots and Air Navigators (NZ Region). A bronze plaque to commemorate the Aero Commander accident and remember the six victims will be unveiled, along with a permanent display about the airline, its aircraft and personnel, and the protracted air accident investigations. Lectures on the airline and accident investigation will be given after the service by Dr Waugh, Professor Erasmus and Mr Steve Swift (formerly CASA) from Australia. All welcome. More information contact Richard Waugh (Ph 09 5339400 Email: [rjw@ecw.org.nz](mailto:rjw@ecw.org.nz))

## **Photographs**

- 1) Scan colour photo in middle section of "Taking Off" book of ZK-BWA at Wellington in 1960. Caption and credit to read:  
  
Aero Commander ZK-BWA during a quick 20 minute turn-around at Wellington Airport in December 1960. The aircraft was the most advanced small airliner in New Zealand at the time. (Frank Johnson)
- 2) The Starboard mainplane of Aero Commander ZK-BWA on the north-eastern slopes of Mt Ruapehu the day after the accident, November 1961. (via Les Erasmus)
- 3) Propeller impinging on fuselage section during University of Canterbury tests. (via Les Erasmus)

