



NEW SOUTH WALES STATE CORONER

Name of Deceased: Shane John O'Donoghue
And
Nicholas David Costin

File Number: 2673/09 (O'Donoghue)
2674/09 (Costin)

Hearing Dates: 29 November – 2 December 2010
28 February – 4 March 2011
7,9,10,14,15 June 2011
24-26 October 2011

Location of Inquest: NSW State Coroner's Court, Glebe

Date of Finding: 24 April 2012

Coroner: Magistrate W Brydon, Coroner.

Representations:

Mr C Hoy, SC, with Ms G Wright (Counsel Assisting) instructed by Ms R Fraser, (Crown Solicitor's Office)

Mr I Harvey instructed by Mr M Roser of Blake Dawson Solicitors on behalf of the Civil Aviation Safety Authority.

Mr DP O'Dowd instructed by Ms N Dunn, Ward Keller, Solicitors for the O'Donoghue Family.

Mr P Hornby, Solicitor, on behalf of The Australian Transport Safety Bureau.

Mr R Wilkinson on behalf of The Australian Warbirds Association Limited.

Mr Michael Costin on behalf of the Costin Family.

Recommendations

1. That the Civil Aviation Safety Authority (“CASA”) or the Australian Warbirds Association Limited (“AWAL”), when issuing Special Certificates of Airworthiness for limited category aircraft make it a mandatory condition of the issuance of that Certificate that aircraft engaged in adventure flights have approved protocols in place to monitor the departure and return of each adventure flight together with Search and Rescue procedures in the event of the non-return of the aircraft from the adventure flight within an appropriately considered timeframe.
2. That AWAL amend the Flight Operations Audit Checklist, contained within its current ESAM, to incorporate the auditing of base monitoring of the departure and return of adventure flights together with Search and Rescue and next of kin notification protocols.
3. That AWAL amend the Adventure Flights Guidance Material (AF-GM) and exposition for adventure flights by limited category aircraft to incorporate the requirement of base monitoring of departure and return of adventure flights and Search and Rescue notification protocols.
4. That CASA, or its delegate, on granting a Special Certificate of Airworthiness for limited category aircraft make it a mandatory condition of the Certificate that the pilot and passenger carry an Emergency Position Indicating Radio Beacon (EPIRB) during any flight.
5. That CASA consider making it mandatory for limited category aircraft with a Special Certificate of Airworthiness that engage in adventure style operations have fitted to the aircraft an Emergency Locator Beacon (ELB).

6. That CASA instigate such legislative amendments that are necessary to withdraw all exemptions from having an Emergency Locator Beacon fitted to any limited category aircraft engaged in adventure style operations.
7. That the Air Ambulance Service of NSW and the NSW Department of Health make provision for the installation of winch facilities for the CareFlight helicopter operating in conjunction with Orange Base Hospital and/or in the Central West Region of NSW.
8. In conjunction with Recommendation 7 above, that the Air Ambulance Service of NSW and the NSW Department of Health fund and provide proper and appropriate training to those personnel based in Orange and/or in the Central West region of NSW who are tasked to operate the helicopter winch service.
9. That CASA refer to the Maintenance Review Board for consideration, both in general and in particular, amendments to Service Procedure 1137 and NDT/STR/3 that in preparation for Non-Destructive Testing (NDT) – Eddy Current Testing, the area for such testing is to have all coatings removed.
10. That CASA, on a nominated annual date, initiate contact with the existing manufacturers of limited category aircraft, or in the event of the manufacturer no longer existing, the international or national association of the subject type of limited category aircraft, seeking disclosure of any information that has arisen since the last enquiry as it relates to the safe life and safe operation of the subject type or a particular aircraft within the subject type, including any variation of any fatigue measurement factors.

Findings

Mr Shane John O'Donoghue died between 12.20pm and 12.45pm on 5 October 2006 in the vicinity of the Turon State Forest, north east of Bathurst as a result of multiple injuries sustained when the Strikemaster aircraft in which he was travelling broke up in flight and impacted with the ground.

Mr Nicholas David Costin died between 12.20pm and 12.45pm on the 5 October 2006 in the vicinity of the Turon State Forest, north east of Bathurst as a result of multiple injuries sustained when the Strikemaster aircraft in which he was travelling broke up in flight and impacted with the ground.

Introduction

On 5 October 2006 Mr Shane O'Donoghue in company with his wife Lisa and their two children attended Bathurst airport. Mr O'Donoghue had been given an adventure flight in a Strikemaster 167 jet aircraft as a surprise 50th birthday present.

Mr Nicholas Costin was the pilot and operated the Strikemaster jet aircraft registration VH-AKY through his company, Jet Fighter Flights Pty Limited.

After an extensive briefing Mr O'Donoghue in company with Mr Costin took to the skies. It was an exciting time for Mr O'Donoghue and his family. Sadly after some period the plane suffered difficulties and crashed into heavy bushland. Death would almost certainly have been instantaneous to those onboard.

A fire developed at the crash site located within the Turon State Forest approximately 15 kilometres north east of Bathurst.

The aircraft being flown by Mr Costin was an ex-Republic of Singapore Air Force jet operating adventure style flights under the limited category provisions of the Civil Aviation Regulations ('CAR's').

Following this accident many questions were asked by the family of the deceased and other flying enthusiasts as to how the accident could have occurred.

An inquest was held to determine a number of statutory requirements as well as considering potential safety issues as they affect in particular the operation of the limited category aircraft operations in New South Wales.

The inquest was commenced at the Coroner's Court sitting at Orange on 29 November 2010. The formal evidence has taken 17 sitting days, which were dispersed in block periods concluding on 26 October 2011. Thereafter written submissions were received as to possible recommendations which were to be made arising from the evidence and the inquest findings.

The inquest considered a substantial volume of physical material and received evidence from over 40 witnesses. Representatives of both deceased's family spoke with dignity of their loved ones lost as well as commenting on the Inquest process.

Role of the Coroner

Under Section 21 of the Coroners Act, 2009, the court has jurisdiction to hold an inquest into the death of a person if it appears to the Coroner that the person's death is a reportable death¹.

A reportable death is defined to occur where a person dies of a sudden death, the cause of which is unknown, or dies an unnatural death or in unusual circumstances².

¹ Section 21 (1a) of the Coroners Act 2009.

² Section 6(a) and (b) Coroners Act 2009

The questions surrounding the cause of these men losing their lives made their death reportable to the Coroner.

Under section 81 of the Coroners Act, 2009, I am required as Coroner to make certain formal determinations or “findings” in relation to their deaths.

They include:-

- (a) the identity of the deceased
- (b) the date and place of death
- (c) the cause of death and
- (d) the manner in which death took place.

The focus of an inquest is not about attributing blame or apportioning liability in a criminal or civil sense. However, it is about determining the circumstances in which the process of death is brought about with a view to reducing the likelihood of a death occurring again from similar circumstances.

Apart from evaluating the evidence and making formal findings, a Coroner also has the discretion to make recommendations to appropriate persons, bodies or ministers on matters that arise from an inquest³. This includes recommendations that may go to the issue of public health and safety.

I believe that, following the examination of the evidence and consideration of the helpful submissions from representatives of the persons granted leave to appear, it is appropriate to make a number of recommendations aimed towards improving particular areas of public safety. The recommendations are outlined above and will be discussed further in these findings.

³ Section 82 of the Coroner’s Act.

Formal issues

Identity

No issue has been taken by any represented party as to the identity of the two deceased men. In my view there is ample evidence to confirm that Mr Nicholas Costin and Mr Shane O'Donoghue sadly perished in the aircraft disaster.

Mr Nicholas Costin was the proprietor and chief pilot of the company called Jet Fighter Flights Pty Limited. On 5 October 2006, a jet fighter adventure low level strike mission was booked to fly from Bathurst Airport, where the aircraft registration VH-AKY was hangared and maintained. Mr Costin, who resided in Sydney, boarded a Cessna aircraft at Bankstown Airport and departed for Bathurst at approximately 9.50am. That was the last time he was seen by his then girlfriend, Ms Simone Mohrlök who was also the administration manager of the company based at Bankstown⁴.

Mr Christopher Smith, the Senior Aerodrome Groundsmen and Reporting Officer for Bathurst Airport had known Mr Costin for approximately 5 years through the fighter jet operation that Mr Costin conducted at Bathurst Airport. On 5 October 2006 he spoke to Mr Costin and was aware of a planned adventure flight for that day. He later saw Mr Costin assisting a male passenger into one of Mr Costin's strikemaster jet aircraft. He also assisted Mr Costin by escorting the passenger's wife and two children from the tarmac apron area prior to the jet departing.

⁴ Statement of Simone Mohrlök Tab 46 Volume 1 Exhibit 2

Mrs Lisa O'Donoghue confirmed ⁵ that her husband Shane, son Trent and daughter, Haley, attended Bathurst Airport on the 5 October 2006 at about 10.15am for the purpose of her husband undertaking a surprise adventure flight. She was met by a man in khaki green flight suit who introduced himself as "Nick".

"Nick" pointed out the fighter jet aircraft on the tarmac and the parties then went into a presentation room for a briefing.

Mr O'Donoghue, during the course of a briefing, was handed and asked to read a document which appeared to Mrs O'Donoghue as a form of disclaimer⁶. He read and signed the document.

After Mr O'Donoghue had changed into a flight suit he was given a comprehensive briefing by Mr Costin.

Mrs O'Donoghue suggested that during the course of the briefing a man came in and spoke to "Nick" ⁷. That person was Mr Peter Hanneman, a pilot who often flew with Mr Costin's company. He confirmed that on that day he spoke briefly with Mr Costin whilst he was in the middle of a flight briefing ⁸.

Mr O'Donoghue then left the briefing room and moved with Mr Costin towards the aircraft. Mrs O'Donoghue watched as her husband got into the passenger or right hand side of the jet while Mr Costin after carrying out final preparations climbed into the left hand or pilots side of the jet.

Nick Costin told Mrs O'Donoghue that a groundsman "Chris Smith" would escort them off the tarmac. Shortly thereafter, Chris Smith arrived and Mrs O'Donoghue and her family took up a position just outside a security fence. She watched as the jet aircraft with her husband and "Nick" taxied to the

⁵ Statement of Lisa O'Donoghue Tab 17 Volume 1 Exhibit 2

⁶ See Passenger Agreement Waiver Release and Acknowledgement dated 5 October 2006 Tab 18 Volume 1.

⁷ Paragraph 24 of Statement of Lisa O'Donoghue Volume 2 Tab 17

⁸ Paragraph 18 Volume 1 Tab 47 Statement of Peter Hanneman

southern end of the runway before commencing to take off. The jet banked left before moving out of sight.

The aircraft took off at around 12.15pm according to Mrs O'Donoghue.

The briefing, the entry into the plane by Mr O'Donoghue and Mr Costin as well as the take off, were captured on video by Mr O'Donoghue's son, Trent. The video and a transcript of what was said during the course of the briefing are exhibited in the Inquest⁹.

It is clear that both Mr Shane O'Donoghue and Mr Nicholas Costin were on board the aircraft when it departed Bathurst Airport.

Whilst DNA analysis from the accident scene was not conducted, the direct evidence prior to take off placed both Mr Costin in the pilot's seat and Mr O'Donoghue in the passenger seat. Two bodies were located at the accident site. Post mortem dental examination and radiographs were confirmed as belonging to Mr Costin. Mr O'Donoghue's spectacles were found at the crash site.

It is clear on the evidence that both Mr Shane O'Donoghue and Mr Nicholas Costin were on board the aircraft when it departed Bathurst Airport and were within the aircraft when it impacted with the ground. The evidence establishes the identity of the deceased persons were that of Shane O'Donoghue and Nicholas Costin.

Date and Place of Death

There is no doubt that registered aircraft, "VH-AKY", left Bathurst Airport shortly after midday on the 5 October 2006. There is ample evidence to confirm the date and the approximate time.

⁹ Exh. 2 Volume 5 Tab 10 and 15.

Time and date observations were made independently by Ms Lisa O'Donoghue and Mr Chris Smith.

AV DATA records used by Bathurst Council to report airport radio traffic particularly landing and departure calls, record Mr Costin using the call sign "Razor" indicating that he was taxiing VH-AKY at 1204.58 on the day in question¹⁰.

Mrs O'Donoghue watched as the aircraft departed from Bathurst. She then entered the terminal building where she made an observation from an internal clock indicating 12.15pm¹¹.

Mr Smith believed that the flight took off at about 12.15 to 12.20pm¹². It was anticipated that the scheduled flight would take approximately 25 minutes before returning to Bathurst Airport. Recollections and observations as to the precise time may not be entirely accurate and it is more likely that the AV DATA is closer to the correct time of actual take off.

The course of flying to be undertaken during the low level adventure flight was a pre-determined route with a projected number of aerial manoeuvres. Mr Costin in his briefing to Mr O'Donoghue said "all flights follow the same profiles we don't just go out and randomly do stuff"¹³.

A number of witnesses gave evidence of either seeing or hearing the jet in flight on the day in question. None however, saw the aircraft break up in flight nor impact with the ground.

The timing of their observations were varied which is perhaps a reflection of the lack of need at that time to turn their minds with any precision as to this observation. For many it was just another jet aircraft flying overhead in their

¹⁰ Statement of Wayne Sartori Volume 6 Tab 1 Annexure A, Exh. 2

¹¹ Paragraph 32 Statement of Mrs O'Donoghue Volume 1 Tab 17 Exh. 2

¹² Paragraph 16 Statement of Christopher Smith Volume 1 Tab 20 Exh. 2

¹³ Transcript of pre flight briefing tab 15 Volume 5 Exh. 2

area where they were used to seeing both RAAF jet fighters and the “Bathurst jets” doing aerial manoeuvres.

Mr Christopher Schofield believed that he heard the jet flying in the Palmers Oakey Creek area between 12.45 and 12.50pm. Whilst not having sighted the plane he believed it was unlikely to have been as early as 12.30pm¹⁴.

Joy Ferguson sighted the jet overhead between 12.15 and 12.30pm¹⁵.

Colin Ferguson heard the sound of the aircraft and gave a guesstimate in terms of the time as 12.15 to 12.30pm¹⁶.

Matthew Toole saw the aircraft doing certain manoeuvres and said it was about 12.30 “give or take half an hour or something like that”¹⁷.

Mr & Mrs Cliff and Jillian Tipper believed it was some time after 1pm that they made their observations of the jet aircraft in the air¹⁸.

Forests NSW recorded a report of a fire in the general line of sight of an observation tower towards Turon State Forest at 12.40pm on 5 October 2006. It would appear that this observation related to another fire which was not connected with the aircraft crash. However, a 000 call was received at 1.01pm from Mr Colin Ferguson. He had been travelling from his home towards Bathurst when he saw black billowing smoke to the east of his location. That would be consistent with the direction of the crash site from where he was located¹⁹.

Mr Ferguson watched as the smoke changed to a greyish colour which he described was more like a normal bush fire. He contacted Mr Alex Thompson, the local Palmers Creek Bush Fire captain to inform him of his

¹⁴ Page 6 Transcript 30 November 2010

¹⁵ Volume 1 Tab 23, Transcript 30 November 2010. Exh. 2

¹⁶ Transcript Page 11-12 30 November 2010 Volume 1 Tab 24

¹⁷ Volume 1 Tab 22

¹⁸ Volume 1 Tab 28 and Volume 1 Tab 29 respectively

¹⁹ Transcript of logged 000 call Volume 1 Tab 24 and Volume 5 Tab 16 and 17.

observations of the fire. Mr Thompson then in turn contacted the National Parks and Wildlife Service.

At first, Forests NSW thought that there was only one fire burning in the local area. An aerial inspection was carried out at 2.10pm and it became apparent that there were two fires, a grass fire on a private property and another bush fire in the area of the Turon State Forest (now known to be the aircraft crash site). Resources were directed by Forests NSW to immediately commence “bucketing” the crash site fire within the Turon State Forest. At that stage the cause of that bush fire was unknown to Forests New South Wales²⁰.

Prior to 5 October 2006 adventure flight operators such as Mr Costin were under no obligation to lodge flight plans or profiles with any aviation authority. Notwithstanding that, it would appear that the specific nature of the flights and their profiles and durations were known to those within Mr Costin’s organisation and generally known to those associated with the aircraft’s maintenance at Bathurst Aerodrome.

The aircraft itself did not carry, nor was it required to carry, any flight data or Emergency Locator Beacon. The evidence would seem to suggest that a Personal Emergency Position Indicating Radio Beacon (“EPIRB”) was probably worn by Mr Costin and may have been worn by Mr O’Donoghue. Mr Daniel Duggan, a pilot who flew the Strikemaster jets on adventure flights with Mr Costin’s company said that EPIRBs were issued and worn by both pilots and passengers. He described how references were usually made in the briefing as to their use and they were generally carried in the light pocket of the flight suits worn²¹.

No reference was made to the issuance or use of EPIRBs during the flight during the transcript of the briefing with Mr O’Donoghue,. Ms Mohrlak was of the view that at least the pilot carried an EPIRB²².

²⁰ See Statement of Grant Johnson Volume 1 Tab 34.Exh. 2

²¹ Transcript Page 34 Line 43 - 2 December 2010.

²² Transcript Page 15 Line 30 -1 December 2010.

Even if the personal EPIRBs were worn they required personal activation. No evidence of any distress beacon having been commissioned was obtained. This is perhaps consistent with the violent and immediate episode of chaos in which the pilot and passenger found themselves at the moment trouble struck the aircraft.

In the pre-flight briefing Mr Costin discussed the flight profile they were about to embark on. The low level flying component within the valleys of the mountainous terrain was to take place in the latter portion of the flight schedule. The aerobatic component had already been concluded according to those witnesses who observed the flight from the ground.

Accepting that the flight had been underway for approximately 15-20 minutes prior to the accident it is more likely that the accident occurred sometime between 12.20 and 12.35pm.

Emergency personnel from Australian Search and Rescue were notified sometime around 2pm that the aircraft was missing. Enquiries were made with Mr Smith at Bathurst Aerodrome to confirm that the plane had not returned and had limited fuel on board.

A CareFlight helicopter from the Central West Base in Orange was tasked by Australian Search and Rescue to assist in searching for the aircraft. An area within the Turon State Forest, about 15 miles north east of Bathurst, was nominated.

Mr Ken Vote, the pilot of the CareFlight helicopter, with a medical crew on board, arrived at the scene at approximately 3.45pm. Mr Vote's crew made a positive identification of aircraft wreckage on the ground.

Australian Search and Rescue were notified of the coordinates of the finding of the wreckage and the observation that the accident appeared to be unsurvivable²³.

Mr Vote's helicopter was not winch-equipped and was therefore unable to put medical crew on the ground in the immediate vicinity of the wreckage. A landing position for the helicopter could not be achieved due to the heavy bushland, steep topography and a brush bush fire nearby. He indicated that the nearest landing position was several kilometres away. Accordingly, he contacted the CareFlight services at Westmead in Sydney to send a winch-equipped helicopter.

At 4.50pm CareFlight Helicopter One from Westmead arrived on scene. Paramedic Bryan Jordan was winched to the ground close to the wreckage. He confirmed the existence of plane wreckage but was unable to locate any survivors. Due to the nature of the surrounding bush fire he was promptly removed from the danger. The coordinates of the main portion of the damage on the ground were S33.16, E149.48²⁴.

I propose to discuss the issue of the lack of winch facilities in the Central West helicopter further under the heading of recommendations.

Due to the severe nature of the impact with the ground the evidence is clear that the impact was unsurvivable. Mr Jordan made that assessment despite his limited opportunity to view up close the nature and extent of the wreckage.

I am satisfied from the evidence provided at the Inquest that the date of death was 5 October 2006, taking place within the Turon State Forest, north east of Bathurst, between the hours of 12.20pm and no later than 12.45pm.

²³ Statement of Ken Vote Volume 1 tab 38 Paragraph 6 Exh. 2

²⁴ Statement of Bryan Jordan Tab 39 Volume 1

Cause of Death

Dr M M Orde, Forensic Pathologist, conducted post mortems on both bodies found at the wreckage site. Whilst a precise cause of death could not be ascertained, Dr Orde was able to conclude that the cause of death for each was “consistent with multiple injuries” having been occasioned.

The finding made by Dr Orde is entirely consistent with the level of trauma which one would have expected from the impact of the crash following an uncontrollable and swift descent after a mid-air break up, as asserted in the conclusions of the Australian Transport Safety Bureau (ATSB) in their final report ²⁵.

The plotted location of the wreckage is consistent with an aircraft travelling at significant speed at a time when the plane commenced to break up until the ultimate final point of impact.

Manner of Death

Manner of death relates to the circumstances under which death is brought about and is a broad concept that requires a detailed examination as to why the aircraft broke up in flight and impacted with the ground. This caused the Inquest to consider the maintenance operation and control of the plane as set against a background of the physical elements applicable during its time of flight.

The Aircraft

The subject aircraft, VH-AKY, was a BAC 167 Strikemaster jet. It had been delivered new from the British Aircraft Corporation (BAC, later to become BAE

²⁵ ATSB Report, Vol 2 Tab 57, Page 8 Exh.2

Systems) to the Republic of Singapore Air Force (RSAF) in October 1970. It was designed for basic and advanced military flight training duties as well as a weapons trainer. The aircraft was retired from active service in November 1986²⁶.

Mr Roysten Steven Ferris through his company, International Air Parts (IAP), a company specialising in the purchase and re-sale of used aircraft and aircraft spare parts, had won a competitive tender to purchase 16 retired BAC Strikemaster jets, spare parts and tooling from the Singapore Government. The subject aircraft was one of five Strikemaster jets to arrive in Australia.

The subject aircraft was first registered on 7 October 1992 and given an Australian registration VH-AKY. Following its restoration by Winreye Aviation Pty Limited, a test flight permit was granted by the Civil Aviation Authority (CAA). The aircraft won the best post 1950 Warbird at an Australian Warbird presentation that year. The aircraft was then issued with a series of historic and ex-military (H and EM) permits to fly by the CAA. Those permits enabled the plane to fly under quite specific and restricted conditions. A System of Maintenance (SOM) that was originally approved by the CAA was an adaptation from the Republic of Singapore Air Force SoM and the manufacturer, British Aerospace (BAE Systems) SoM. By 1995 a further SoM was developed through the Australian Warbirds Association. That SoM adopted many features of the Royal New Zealand Air Force SoM. By 1997 VH-AKY was subject to the new SoM referred to as The Australian Warbirds BAC 167 System of Maintenance.

On 4 April 2001 Nicholas Costin made an application for a Special Certificate of Airworthiness in respect of the aircraft VH-AKY. That application was considered by Mr Stephen Dines, a person authorised by the Civil Aviation Safety Authority (CASA), to issue Special Certificates of Airworthiness to limited and experimental category aircraft. On 9 April 2001 such a Special Certificate of Airworthiness for a limited category aircraft was issued to VH-

²⁶ ATSB Final Report Page 2

AKY, together with an Annexure to the Certificate that contained a significant number of restrictions applicable to the aircraft's use.

At that time the aircraft was operating out of Bankstown airport where Mr Costin's business, Jet Fighter Flights Pty Limited, was located. In June 2002, Mr Costin after discussions with CASA, decided to move his operation from Bankstown airport and the Annexure to his Certificate of Airworthiness was subsequently amended. Thereafter the aircraft was maintained and based at Bathurst Aerodrome and conducted adventure flights from that destination and other approved locations.

The Pilot

Mr Nicholas Costin was a very experienced aviator. "He held an Australian Commercial Pilot's license issued by CASA endorsed for Strikemaster jet aircraft and was approved for low level aerobatic flights to a minimum of 500 feet above ground level. He held a valid Class 1 Civil Aviation Medical Certificate"²⁷ and had accumulated approximately 2,220 total hours of aeronautical experience. Those who flew with him, particularly Mr Hanneman and Mr Duggan, both pilots of extensive aviation experience, described Mr Costin as a skilful and experienced pilot ²⁸.

Mr Nicholas Costin had an association with this particular aircraft VH-AKY dating back to the early 90's. He had been directly involved in overseeing its maintenance by various licensed aircraft maintenance engineers (LAMEs). There appears to be a thoroughness and discipline about his application to flying, further reflected in the video of the briefing with Mr O'Donoghue and the video of the flight undertaken with Mr Moulden two weeks earlier²⁹. Ms Mohrluk suggested that he was not one who sought to impress passengers.

²⁷ ATSB Final Report Page 1

²⁸ Evidence of Mr Peter Hanneman Transcript Page 57 Line 40-48, 1 December 2010 and Daniel Duggan Transcript Page 20 2 December 2010.

²⁹ Vol 5 Tab14

He was also described as someone who did not push the boundaries and gave respect to the concept of flying³⁰.

He was an Australian Champion Aerobatics pilot who had competed around the world. He was also no stranger to this type of aircraft. His own company had four ex-military Strikemaster jets and one Jet Provost as well as two civilian aircraft. He had operated each jet as part of the business³¹.

The prevailing conditions on 5 October 2006

1) Weather

On the morning of 5 October 2006 Mr Costin was still in Sydney. He attended the corporate office of Jet Fighter Flights at Bankstown Airport and then flew a company Cessna to Bathurst. He departed Bankstown at about 9.50am.

Prior to leaving, Ms Mohrlök, the administration manager to the company, obtained for Mr Costin a NAIPS (National Aeronautical Information Processing System) location briefing for the area known as Area 21, which incorporated the Bathurst area. This was a forecast over a 24 hour period from 23:16 hours on 4 October 2006 to 23:16 hours on 5 October 2006³², as provided by Air Services Australia.

The NAIPS incorporated a thermal area forecast (TAF) and current notice to airmen (NOTAMS) information. A copy of the NAIPS for area 21 was found in the Cessna aircraft flown to Bathurst by Mr Costin that morning³³.

The NAIPS suggested that there would be occasional moderate turbulence below 8,000 feet to the east of Bathurst applying along the line of mountains (being the Blue Mountains) extending north and south along New South

³⁰ Transcript Page 24, 1 December 2011.

³¹ Statement of Simone Mohrlök Vol 1 Tab 46 Paragraph 7 Exh. 2

³² Exhibit 3

³³ Statement of Detective Senior Constable Ian Nightingale Paragraph 29 Volume 1 Tab 15 Exh. 2.

Wales³⁴. The wind was to increase to 15 knots by midday from 340 degrees with the ceiling and visibility clear.

Mr Howard, an experienced pilot, who was conducting aerial photography on the day in the outer parts of Sydney assessed the NAIPS and its information as being “nothing really out of the ordinary” only that the expectation was that the wind would increase later in the day. He observed the winds to be northwesterly with no cloud of note³⁵. Mr Howard was leaving Bathurst airport as the Strikemaster jet was taxiing for takeoff. The wind on the ground had increased to probably 15 knots but again there was nothing of concern as regards the prevailing weather conditions according to Mr Howard³⁶.

Another source of weather information to pilots was available through the Aerodrome Weather Information Service (AWIS). This was a service that provided automatic weather broadcasts based on sensor data generated from the aerodrome concerned. The available data included wind speed, wind direction, current temperature, current QNH pressure. These reports were valid for a period of 15 minutes and were constantly updated by contacting a designated channel on the radio prior to landing or departing. Whilst the AWIS provided valuable local information there is just no evidence as to whether or not it was accessed by Mr Costin coming into or going out of Bathurst Airport, nor was there any requirement for him to do so.

A certified extract of the weather data from the Bureau of Meteorology was obtained for the 5 October 2006³⁷. There was no suggestion that Mr Costin had access to such a document. The extract for the relevant day indicates five significant meteorological warnings (sigmets) were issued suggesting severe turbulence for Area 21. Area 21 is a particularly large area extending from the Blue Mountains east of Bathurst down to Corryong south of Mt Kosciusko. It would appear that the severe weather warnings related to the

³⁴ Transcript Pg 65, 30 November 2010

³⁵ Transcript Page 69 Line 27,30 November 2010.

³⁶ Transcript Page 72 Lines 42-49, 30 November 2010

³⁷ Exhibit 4.

areas well south of Bathurst from Goulburn down to the southeast corner of the State³⁸.

Both Mr Hanneman and Mr Duggan who had both flown the subject Strikemaster jet, were asked to consider the weather information for the 5 October 2006. Neither considered that the conditions on the information provided to them would have prevented them from proceeding with the adventure flight. Mr Hanneman who had been at the airport on the day opined that there was nothing extraordinary about the weather. He said that the conditions were well within the parameters of flight to the Strikemaster jet³⁹.

Mr Duggan was shown the NAIPS⁴⁰ during the course of his evidence. It was his view that it “wouldn’t really alarm him too much”⁴¹ Pilots Hanneman Duggan and Howard came to the view that a pilot has to make an assessment on the day based on what they are seeing and what type of aircraft they are flying.

The evidence certainly suggested that the wind strength was perhaps higher than forecast and turbulence for some pilots was a significant issue particularly as one travelled east closer to the Blue Mountains.

Mr Costin had the benefit of seeing the weather conditions first hand from his flight from Bankstown to Bathurst. He arrived only an hour and a half before commencing the adventure flight in the Strikemaster jet. During that time the weather conditions had not significantly changed. I have no doubt that he would have ample knowledge as to the state of the weather and the effect of the wind speed especially when he was no stranger to low level flight and the effects of turbulence on the Strikemaster jet.

³⁸ Transcript Page 77-78 of Mr Howard 30 November 2010.

³⁹ Transcript Page 47,1 December 2010

⁴⁰ Exhibit 3

⁴¹ Transcript Page 31 Line 7, 2 December 2010

Mr Costin had the latest NAIPS available to the location where the adventure flight was to take place. The weather conditions did not reveal anything sinister from the pilot's perspective and the Strikemaster jet was more than capable in flying in these prevailing conditions. Accordingly there is nothing established about the weather which suggests to me that the flight should not have been undertaken.

2) Turbulence

A number of pilots who were flying in the vicinity of Bathurst were called to give evidence about the flying conditions applicable to the area on 5 October.

Mr Anthony Howard described experiencing "quite severe" turbulence as he travelled in his Cessna 421 aircraft in the Winburndale area just east of Bathurst. He was forced to lower his plane's undercarriage in an attempt to slow the plane to below what was described as the "Turbulence Penetration Speed" of 160 knots. A "Turbulence Penetration Speed" is considered to be speed that is calculated to minimize structural damage during turbulent flight⁴². Severe turbulence can be quite extreme. Mr Howard gave an analogy of hitting a pothole at high speed in a motor vehicle.

He said it would have been mainly "mechanical turbulence" as the wind passed over the ridges, which caused a disrupted airflow effect⁴³. According to Mr Johnson, a Forests NSW helicopter pilot who was water bucketing the fire, the turbulence would have been worse in an aeroplane rather than a helicopter and would have been more pronounced at a higher altitude than at the level he was operating at which was about 100 feet from the ground⁴⁴.

⁴² Statement of Anthony Howard Page 7 Volume 1 Tab 30. Exh.2

⁴³ Transcript Page 95 30 November 2010.

⁴⁴ Transcript Page 95-96 30 November 2010.

A search and rescue form completed by the CareFlight Westmead team described the wind conditions on the day as being 15-25 knots from the direction 270 degrees with turbulent conditions⁴⁵.

Based on this evidence I conclude that there was severe turbulence in the general area surrounding Bathurst on the day in question, more particularly so in the mountainous areas where Mr Costin was last seen flying. That mechanical turbulence was caused from the wind rushing over the ridges and into the valleys and would have had a negative impact on the management of the aircraft at low level.

Mr Costin recognised the likelihood of turbulence when giving his instructions to Mr O'Donoghue during the course of the briefing. At page 9 of the transcript Mr Costin is recorded as saying "low down (referring to the height at which the plane was travelling) it will be a bit bumpy, bounce around a little. Not as bad as the little aeroplane that you flew but bouncing a little. More bumps there like speed humps." The existence of this mechanical turbulence is apparent in the video taken when Mr Costin was flying low in the gullies two weeks earlier with Mr Robert Moulden, which appears similar to what was described to Mr O'Donoghue in the briefing⁴⁶.

Mr Costin had the benefit of flying from Sydney that morning in the prevailing winds over the Blue Mountains. I have no doubt that he was aware of the conditions and had an expectation that turbulence may have been applicable in the area of flight.

Mr Hanneman confirmed Mr Costin's view that the effect of turbulence would not be as apparent in a Strikemaster jet as it would be in a Cessna or a lighter framed plane as flown by other pilots that day. This was due to the higher wind loading and higher turbulence penetration speed applicable to the Strikemaster jet⁴⁷.

⁴⁵ Annexure to Statement of Bryan Jordon Volume 1 Tab 39. Exh. 2

⁴⁶ DVD Volume 5 Tab 14. Exh. 2

⁴⁷ Transcript Page 48 Lines 20-28 1 December 2010.

Mr Duggan maintained that if you were travelling in the range of 150-250 knots the Strikemaster jet should be able to handle a good amount of turbulence safely⁴⁸. Of course the Strikemaster aircraft itself had been designed to participate in low-level flight missions.

Did the Strikemaster aircraft VH-AKY break up in flight?

Initial investigations carried out by the Police on the day of the accident suggest that wreckage had been strewn over a large area⁴⁹. Investigations were not able to be commenced on the ground until 9 October, following subsidence of the bush fires started by the crash. It became apparent to Detective Nightingale and others that the main fuselage of the plane had travelled in a steep angle through the tree canopy until contact with the ground⁵⁰. The Australian Transport Safety Bureau (ATSB) investigators carried out an inspection of the wreckage on the same day. In their final report they concluded that “during the low level simulated strike mission, the aircraft broke up in flight” before impacting with the ground⁵¹. The wreckage was located on the north-eastern side of the Woolpacks feature and in the valley floor distributed over a distance of 800 metres of a “sloping, treed terrain”⁵². The wreckage location pattern identified to the ATSB investigators suggested a clear direction of flight above the valley floor towards this Woolpack terrain feature⁵³.

The first item found in the wreckage trail was the rudder mass balance weight. This item was not located by the ATSB investigators but by Mr Michael Costin, brother of the deceased Nicholas Costin. He, with a group of friends conducted their own search, with permission of the Police officer in charge, four months after the accident. Apart from this significant discovery he also located five other important items which included the right and left tailplanes,

⁴⁸ Transcript Page 33 Lines 32-33, 2 December 2010.

⁴⁹ Statement of Detective Nightingale, Volume 1 Tab 15 paragraph 17.

⁵⁰ Paragraph 91 Volume 1 Tab 15

⁵¹ ATSB Final Report page 6

⁵² Page 5 ATSB Final Report

⁵³ See Map Exhibit 6A

the right and left elevators, and the upper rudder. Mr Michael Costin plotted each finding by way of a reference to global positioning system (GPS) coordinates that assisted the ATSB to determine a sequence of break up of the aircraft.

The rudder mass balance weight which had previously been attached to the upper rudder was charted by the ATSB as being approximately 120 metres prior to other empennage items⁵⁴. This was significant information for it confirmed the view held that there was an in-flight break up of the aircraft and ultimately that the tailplane had separated first from the body of the aircraft whilst in flight.

Two possible in-flight break up sequences were considered by the ATSB in their investigations. They were firstly, the right wing had separated from the aircraft first, leading to a separation of the tail surface area and secondly, the tail surface of the plane separated first leading to the separation of the right wing (which had been weakened due to pre-existing fatigue cracking).

Although there was supportive evidence of both scenarios it was the opinion of the ATSB, based on the majority of the evidence, that the fatal event was consistent with an in-flight break up (initiated by the separation of the tail surfaces leading to a separation of the weakened wing)⁵⁵.

Mr Paul Ballard, Senior Transport Investigator with the ATSB said that the fact that the rudder mass balance, being an item which would project furthest in flight by virtue of its bullet like shape and weight, was found first in time in the wreckage trail suggested that it must have separated first in time. The aircraft continued in flight for some short distance before there was a significant increase in loads on the tail section until such time as it fractured and separated from the aircraft.

⁵⁴ Page 5 Final Report ATSB

⁵⁵ Page 43 Final Report ATSB

From the conclusion of the ATSB Report it is clear that something happened in flight which caused the plane to break up making any attempt to control it impossible. I shall discuss these causes further in the Inquest findings.

The Break-up sequence

As indicated earlier in these findings, the ATSB concluded that having examined the two possible break-up scenarios in detail, the break-up pattern was consistent with a separation of the tail surface leading to a separation of the weakened right wing⁵⁶. Mr Ballard having considered all the available evidence described the event sequence as follows:-

The rudder mass balance was “prised off” in a vertical fashion up and over the rudder which caused the rudder to move backwards. This in turn caused the elevators to be forced in a downward fashion which then loaded up the tailplane in an upward load. The tailplane subsequently broke off under that load. He suggested that the breaking off of the tailplanes then caused the aircraft to pitch over in a downward fashion towards the ground. That pitching process was sufficient to break the right wing off from the fuselage of the aircraft. The break up sequence is graphically shown in figures 48-52 of the ATSB Final Report.

Mr Ballard confirmed that he observed bending in the fin and tailplane that was not consistent and was in fact opposite with what he would have expected to have observed in the wing first separation scenario⁵⁷.

Although there were a number of reasons proffered as to why the rudder mass balance detached first, therefore explaining the significant evidence of downward and upward bending of the tailplane, the most likely causes were either the influence of flutter or pilot induced control oscillation. I will discuss these further in the findings. All the evidence, clearly in my view, establishes that the break-up of the aircraft occurred whilst the aircraft was still in flight.

⁵⁶ Page 43 ATSB Final Report.

⁵⁷ Transcript Page 49 Line 30-47 9 June 2011.

Once the break-up commenced it would have made the ability to control the aircraft impossible leading to the impact with the ground in the manner described by Detective Nightingale making death almost instantaneous to those onboard.

The Flight Path

No flight plans were required to be approved or filed on the issuance of a special certificate of airworthiness for limited category aircraft engaged in adventure flights. The flight profiles of the type of manoeuvres to be undertaken also did not have to be identified other than in general terms. Under the adventure style operation, acrobatics, acrobatic training, exhibition and mock combat fell within the terms of approval⁵⁸.

Mr Costin appeared to engage in a standard route which was replicated with each adventure flight. He told Mr O'Donoghue he was going to follow the same profile as he always flew. Mr Hanneman and Mr Duggan told the Inquest of the nature of the operation referred to as a low-level strike mission.⁵⁹ Mr Hanneman outlined the flight route on a topographical map⁶⁰. Also there was evidence obtained from Mr Costin himself in the briefing to Mr O'Donoghue as captured in the video material⁶¹. Mr Costin described the nature of the profile to be flown. He would commence by flying to 10,000 feet and then undertake what he described as some 'G' (gravitational force) workout. He indicated that there would be some rolls, some loops a four-point roll and a figure eight⁶². He described then undertaking a mock attack whereby the jet would be flying at very low levels through the mountains using the mountains and the ridges as shielding from attack and radar detection⁶³. He told Mr O'Donoghue that the aircraft would fly over the ranges around the

⁵⁸ See Special Certificate of Air worthiness dated 9 April 2001 and Tab 22 of the Statement of Stephen Dines Volume 7 16 November 2010

⁵⁹ Transcript Page 39 1 December 2010

⁶⁰ See Exhibit 6A

⁶¹ Volume 5 tab 10

⁶² Transcript of briefing Volume 5 Tab 15 page 8-10 Exh. 2

⁶³ Page 11 of the Transcript of the briefing

corner through a valley and we'll see a big dam....."go over the top of the dam."

The dam identified by Mr Costin was the Winburndale Dam which was one of the aiming points as part of the mission. It was located further south of the debris path of the wreckage and towards the end of the adventure flight sequence⁶⁴.

Mr Hanneman gave a similar flight description to that given by Mr Costin in his briefing to Mr O'Donoghue. He positioned on the map, Exhibit 6a, the general location where the high and medium level aerobatic manoeuvres were to take place before the plane flew south east at a reduced altitude of approximately five hundred feet to commence the low level component of the strike mission. Mr Hanneman described three different routes through the rugged terrain of the Turon State Forest where the plane would track along valleys before coming towards the Winburndale Dam⁶⁵. Mr Daniel Duggan another pilot who flew with Mr Costin's company gave similar evidence of the flight path used and the manoeuvres undertaken. He described the technical names of those manoeuvres being an Immelmann, Roll off the top, a split S, a Cuban 8 or bowtie loop and four point turn. He confirmed that Mr Costin had a "general standard route" which he flew and told them of that location⁶⁶. He described flying down the valleys then cruising back at low altitude towards the airport at a speed of approximately 250km per hour. Mr Hanneman also described the low level component as taking approximately 10-12 miles at 250knots.

Simone Mohrlök, the administration manager and herself an experienced pilot, confirmed the sequence of demonstration in the low-level strike mission. She also referred to the low-level flight component being conducted at about 500 feet above ground level⁶⁷.

⁶⁴ Transcript Page 43 and 44 1 December 2010 Exhibit 6A

⁶⁵ Transcript Page 43 1 December 2010.

⁶⁶ Transcript Page 16 2 December 2010 Line 23.

⁶⁷ Transcript Page 18 1 December 2010

It was apparent that all pilots were aware of a particular flight pattern in both speed and altitude that would have allowed a sufficient glide path in the event of engine failure. The course appeared to be structured in such a way that allowed the aircraft with its glide capability to return to Bathurst Airport or at least provide for a safe ejection in the event of engine failure.

The evidence strongly supports the conclusion that a defined flight pattern was established and adhered to by Mr Costin both as to the location and type of aerobatic manoeuvres moving to the low level component of the adventure flight mission. There is no suggestion that he departed from his expressed route as was set out in the briefing with Mr O'Donoghue. Nor does the evidence support any suggestion that he was flying in the location of the valleys of Turon State Forest in circumstances where it was either unsuitable or unfamiliar to him. There is nothing to support the proposition that he was flying inappropriately as part of the adventure flight profile.

Altitude of flight sequence

A number of witness residents of the Limekiln area, being a geographic location closest to the Turon State Forest, made observations of the aircraft prior to its entering the State Forest. Some describe the aircraft as flying at low altitude. When examined about their observations some of the witnesses conceded that the aircraft may have been higher than perhaps first described. In making that observation I draw no criticism upon the witnesses who had no real ability of being able to accurately measure height from ground. By way of example only, Mr Jerome Carberry gave evidence of a "guesstimation" of the aircraft being 150-200 metres above "Wilson's Hill" which was 1,048 metres above sea level⁶⁸. Upon further examination it was conceded that as he was looking at an aircraft located beyond the subject hill the altitude could actually be greater than he first perceived⁶⁹. Similarly Mr Thompson in his statement suggested that the aircraft was flying at about 50 feet above ground level. On reflection in his evidence, he believed it may have been a couple of hundred

⁶⁸ Transcript Page 34 30 November 2010

⁶⁹ Transcript Page 35 Lines 45-50 30 November 2010.

feet or a footy field – 300 feet⁷⁰. He accepted that it was “very hard to tell” actual distance above the ground⁷¹.

Mr Colin Ferguson, whilst not observing the aircraft on the 5 October, had on one previous occasion seen it at what he described as “zero” feet, “on the deck”⁷²]. When asked to explain that position he equated it to three times the size of a telegraph pole. He too echoed caution that heights were “terribly hard to judge”⁷³ when the jet was travelling at speed. Mrs Ferguson did not think that the “Bathurst jets” flew as low as the RAAF, which she had seen in the area⁷⁴.

On the other hand, Mr Christopher Schofield thought that the jet aircraft on 5 October whilst not actually seeing it sounded high⁷⁵. Another witness Jillian Tipper, said that when the jet came over her property it did not appear to be low and was definitely “not dangerously low”⁷⁶. Mr Toole in his statement said that he had never seen the planes terribly low⁷⁷.

It is apparent from all the evidence that Mr Costin’s plane was travelling from the acrobatic component to the west of the Limekiln area and moving towards the Turon State Forest area for the purposes of the commencement of the low level component of the flight mission. I have no doubt that an observer from the ground would think that the aircraft was travelling low and fast. However, little weight can be placed in the actual distance described from the ground as expressed by those subjective observations. Apart from the observations made on this day, it is more difficult to attribute the manner of flying to Mr Costin where other pilots had been used in his operations and other jets had flown in the area prior to that particular day. I am unable to conclude from this evidence that his flight height was anything other than planned and there is no

⁷⁰ Transcript Page 77 Line 49, 29 November 2010.

⁷¹ Transcript Page 73, 29 November 2010.

⁷² Transcript Page 13 Line 49, 30 November, 2010

⁷³ Transcript Page 14 Line 46 30 November, 2010

⁷⁴ Transcript Page 19, 30 November 2010.

⁷⁵ Transcript Page 4, 30 November 2010

⁷⁶ Transcript Page 47,30 November 2010.

⁷⁷ Record of Interview Page 14, Tab 22 Volume 1

evidence that supports any “aggressiveness” in the manner in which he carried out that mission. This is consistent in my view with the evidence of Mr Carberry who had no concerns about the aircraft’s height and the manner of flight observed on other occasions⁷⁸. It is also consistent with Mrs Tipper’s view that she enjoyed watching the jets perform their manoeuvres and had no concerns as to the manner in which the plane was operated on 5 October 2006 set against a background of those other flight occasions.

Some investigation was undertaken during the course of the Inquest as to the speed at which the plane was flying during the course of the low level flight mission. Both Mr Hanneman and Mr Duggan said that the subject mission was flown at a target airspeed of 250 knots. All manoeuvres could be carried out at that speed.

The aircraft had a maximum speed of 425 knots so the operational speed was considered to be well within the limits of the aircraft⁷⁹. Mr Hanneman described there being no point in exceeding the operational speed as the passenger wouldn’t get anything further from it. Mr Duggan confirmed that CASA had a restriction as to speed of 250knots when flying below 10,000 feet. Also, the practice of flying within “economical air speeds” had been a concern, which had been raised by Mr Costin with all pilots of his aircraft⁸⁰.

Confirmation was given by both Mr Duggan and Mr Hanneman that from their respective observations Mr Costin flew his aircraft within the speed limits applicable⁸¹.

Mr Duggan flew with Mr Costin as a passenger from Newcastle to Bathurst in VH-AKY on 1 October 2006 only days before the subject accident. He observed nothing about the aircraft in its flight that caused him any concern.

⁷⁸ Transcript Page 36 30 November 2010

⁷⁹ Transcript Page 45 1 December 2010

⁸⁰ Transcript Page 20 2 December 2010

⁸¹ Transcript Page 20 2 December 2010 (Duggan), Transcript Page 45 1 December 2010 (Hanneman)

He further made observations that Mr Costin's procedures in the management of the aircraft were described as absolutely proficient and correct⁸².

I am satisfied on the evidence of those who flew with Mr Costin that he was a well-regarded and capable aviator who would comply with the speed restrictions applicable to his operation. There is nothing of substance which would suggest that the aircraft was being flown in an inappropriate manner at or near to the time of the accident.

Accident causation issues

1. Separation of rudder mass balance.

As previously noted the ATSB formed the view that it was likely that the rudder mass balance separated first in time from the aircraft VH-AKY. An examination of the tailplane found "local compression damage in the tailplane stringers which may have been caused by an alternating upward and downward bending at the root of the tailplane"⁸³.

It was thought the force of the alternating loads on the tailplane may have been so great that it caused the rudder mass balance to separate from the top of the rudder⁸⁴.

The view held by the ATSB was that either of two scenarios existed which would have caused the rudder mass balance to separate:-

- i) The presence of flutter or
- ii) Pilot induced control oscillation.

⁸² Statement Paragraph 10 Volume 1 Tab 48

⁸³ ATSB Final Report Page 37

⁸⁴ ATSB Final Report Page 37

i) Flutter

Flutter is described as “an oscillation of definite period but unstable character set up in any part of an aircraft by a momentary disturbance and maintained by a combination of aerodynamic inertial and elastic characteristic of the member itself” (AUDEL’s New Mechanical Dictionary 1972)⁸⁵.

Some type of significant flutter event appears to have taken place according to Mr Ballard from the ATSB based on the physical signs he observed on the tailplane’s horizontal surfaces. There was evidence of a “large or increasing upward and downward bending deflection” in the tailplane. This could have lead to the rudder mass balance moving in a downward and then upward direction with it then prizing itself off in an upward and vertical plane over the top of the rudder.

Mr Ballard observed some scratching on the underside of the lower surface of the rudder mass balance (as shown in Figure 19 of the ATSB Report) which may have corresponding although not exact markings in the vertical stabiliser (fin)⁸⁶. However, an examination could not establish with any precision as to how and when the scratching as observed occurred on the under surface of the rudder mass balance. The ATSB accept that it is no more than a possible explanation as to how the rudder mass balance was dislodged⁸⁷.

ii) Pilot induced control oscillation

Pilot induced control oscillation relates to the management by the pilot of the plane in response to the actions of a plane in any given event. It can occur by either an intentional or unintentional control of the aircraft. An avoidance procedure or increased speed could also cause a degrading or reduction of the stiffness within the airframe. However there is no evidence of any cracking of the surface other than the fractured surface which were consistent

⁸⁵ ATSB Final Report Page 37

⁸⁶ Transcript Page 56-57, 7 June 2011

⁸⁷ Transcript Page 57-58, 7 June, 2011 Evidence of Mr Paul Ballard.

with a single overload event. Unfortunately due to flight control systems not being in-situ after the accident the ATSB were unable to make any conclusions as to the pilot operation at the time of the separation of the rudder mass balance. Mechanical records for the plane would suggest that the cabling was the subject of relatively recent review in March 2006⁸⁸.

While the evidence suggests there were two scenarios as potential explanation to how the rudder mass balance came to be separated, I do not find either conclusive as to the causative basis for its removal.

There was no evidence of any physiological event or condition suffered by the pilot or passenger that may have impacted in relation to the control of the aircraft.

Tailplane Repair

A possible explanation raised on behalf of the O'Donoghue family for the separation of the rudder mass balance during flight, was a suggested defective repair to the top of the rudder carried out in 2003. Repairs were undertaken to an area of damage to the top of the rudder, which had been occasioned when VH-AKY was being pushed into the Bathurst Aero Club hangar and the top of the rudder came into contact with a steel plate hanging down from where the doors of the hangar met. This collision resulted in a crease in the top of the rudder. Mr Costin arranged for a new skin to be designed and fitted. Mr Stewart Palmsley, Mr Costin's aircraft maintenance engineer, carried out that repair. This involved removing the damaged fairing, trimming a new skin to suit and riveting it back into place⁸⁹.

Mr Camilleri, a licensed aircraft maintenance engineer ("LAME") gave instructions to Mr Palmsley on the carrying out of the repair and inspected inside the rudder prior to fitting the new skin. The repair was carried out to Mr Camilleri's satisfaction. Mr Hanneman on the day following the repair noted a

⁸⁸ Air Maintenance Logs Vol. 3, Tab 8, Exh.2

⁸⁹ Statement of Mr Palmsley Volume 2 Tab 54 paragraph 26.

maintenance release had been issued for the repair. He made a visual inspection of the area and then flew the aircraft⁹⁰. The flight embarked upon was of 20 minutes duration, during which no adverse change in the handling or operation of the aircraft was observed⁹¹.

At the time of that repair the aircraft had flown 5,049 hours. By the 29 September 2006 the aircraft had flown 5,082 hours. No complaint had been registered by any pilot who had flown the aircraft to suggest that the repair had an adverse flutter effect or in any way impeded the handling of the aircraft. Mr Camilleri expected that any flutter apparent from any defect in the repair would have been clearly apparent to a pilot of Mr Costin's experience.

Mr Duggan flew the same aircraft on a number of missions in Newcastle the weekend prior to the accident and experienced nothing that would suggest some aerodynamic interference arising from the repair.

Mr Ballard provided a presentation on the likely impact that the repair would have had on the rudder fin flutter⁹². He failed to see any evidence of side to side movement of the rudder fin consistent with a flutter event, which had the rudder mass balance as its cause. He was persuasive in his evidence that the rudder tip was not considered to have influenced the flutter and subsequent break up of the rudder and tailplane⁹³. I agree completely with those conclusions.

Bird Strike

The ATSB in their Final Report said "although a possibility, there is no evidence from the aircraft wreckage that the aircraft had encountered a bird strike."⁹⁴ Mr Ballard considered that only flutter or pilot induced oscillation

⁹⁰ Transcript Page 56, 1 December 2010.

⁹¹ Transcript Page 57, 1 December 2010

⁹² Volume 2 Tab 78 Exh. 2

⁹³ Volume 2 Tab 78 Figure 7, Transcript Page 64 7 June 2011 Lines 39-40

⁹⁴ ATSB Final Report page 38

were particularly applicable hypotheses for the causation of the tailplane break-up.

Yet there were clear concerns being demonstrated by both Mr Costin and Mr Duggan about the prospects of bird strikes being a potential cause for aircraft malfunction⁹⁵.

Mr Costin when discussing possible emergencies that may be encountered during the course of a flight said of all the possibilities a bird strike is the most likely. Mr Duggan who flew Strikemaster jets in the accident area proffered two hypotheses for the accident. The first being a bird strike whilst flying at low altitude and the second the aircraft being subjected to low-level turbulence⁹⁶.

Mr Carberry, a local farmer, described it as a common occurrence to see eaglehawks and eagles in the area although he did not notice any particular birds on that day⁹⁷. However, Detective Nightingale did. Whilst travelling in a police helicopter on the afternoon of 5 October he observed a large eaglehawk flying at a similar altitude to the police helicopter. He described the bird as hovering in the area “protecting its space”. The police helicopter had to fly around the bird as it did not appear to move from its position⁹⁸.

The following day Mr Jonathan Grahame noted “an unusual amount” of eaglehawk activity on his return flight from Mudgee to Bathurst⁹⁹,

I accept no forensic evidence was found specifically indicating a bird strike. But it is clear that eaglehawks were in the area at the time and striking a moveable object may account for no obvious indentation in the metal mass rudder balance. Any physical evidence of contact may well have been lost having regard to the fact that the rudder mass balance lay exposed on the

⁹⁵ Transcript Page 6 of the briefing between Mr Costin and Mr O’Donoghue. Statement of Mr Duggan, Para 13, Volume 1 Tab 48. Exh.2

⁹⁶ Volume 1 Tab 48 Paragraph 13

⁹⁷ Transcript Page 39 30 November 2010

⁹⁸ Paragraph 25 Statement of Detective Ian Nightingale, Volume 1 Tab 15

⁹⁹ Paragraph 9 Tab 33 Volume 1

ground for four months before it was located by Mr Michael Costin's search party.

Despite this lack of forensic evidence, I can not discount that bird strike is a plausible explanation as to why the rudder mass balance was prised vertically and in a rearward direction as suggested. It also provides a possible explanation for a potential avoidance procedure undertaken by the Mr Costin, if that was required.

Separation of the right wing

Investigators from the ATSB found two points of fatigue cracking in the right wing upper attachment lug¹⁰⁰.

It is suggested that these cracks existed prior to the commencement of flight on 5 October 2006. The inquest looked at what role these cracks played in the mid air break-up and whether they compromised the flight on the day in question.

Mr Blyth, an internal technical consultant with the ATSB provided an engineering analysis on the way in which the right wing came away from the aircraft. He had been tasked with looking at the two cracks which were identified in the upper right main spar attachment lug. The first crack (referred to as crack A) is depicted on Slide 9 of the document presentation in Volume 2 at Tab 76.¹⁰¹ Crack A is located within the inner surface bore of the lug. The striations on the crack surface were characteristic of fatigue cracking.

The second crack (referred to as crack B) is shown in Figure 10 Page 57 of the ATSB Final Report. It is described as appearing on the top surface of the lug in an area adjacent to a repaired area which had previously been carried

¹⁰⁰ See Figures 11 & 12 Page 16 of the ATSB Final Report

¹⁰¹ See also Figure 10 Page 57 of the ATSB Final Report

out by the Republic of Singapore Air Force. The aircraft log book shows that the repair was carried out on 10 September 1984¹⁰².

The repair was carried out by a process called “blending” which involved grinding over the crack itself until evidence of the cracking was removed. Both cracks had been the subject of some testing consistent with the system of maintenance applicable to the aircraft. Cracking in the upper wing spar attachment lug had been specifically identified by British Aerospace through the issuance of a Company Service Instruction, CSI/Strikemaster/50. The last issue of that Company Service Instruction dated 22 March 1996 prescribed a non-destructive testing technique to be undertaken. CASA adopted the requirements of the Company Service Instruction through the issuance of an Airworthiness Directive AD/Strikemaster/4 and required appropriate compliance¹⁰³.

The instructions in AD/Strikemaster/4 required the removal of the wing for the purposes of examination. In addition to the Airworthiness Directive there was a further requirement under the System of Maintenance being a Service Procedure 1137 which also required examination of the wing mainplane spar upper attachment lugs. This procedure was also designed to detect cracks which may have progressed either from the lug bore to the outer surface or on the lug itself. However, Service Procedure 1137 did not require the removal of the wing.

An examination of the maintenance log book for VH-AKY suggests that testing in compliance with AD/Strikemaster/4 was noted as having taken place on 15 October 2003 with “nil defects found”. I have some doubt as to whether in fact that testing was appropriately undertaken. Mr Stewart Palmsley who assisted in the 2003 annual inspection indicated in his evidence that he did not remove the wing from the plane prior to inspection by the licensed aircraft maintenance engineer nor did he see it presented in that way¹⁰⁴. In addition,

¹⁰² Volume 3 Tab 9 Exh. 2

¹⁰³ ATSB Final Report P.91-92

¹⁰⁴ Transcript Page 7 3 March 2011

no NDT inspection report has been identified or located certifying that such testing took place.

Despite this failing in the System of Maintenance inspection of the lug bore, it would appear that later testing was in fact carried out which did not detect either crack A or crack B. What was clear from the evidence of Mr Blyth was that the morphology of crack A and its physical appearance suggested an extended period of comparative slow growth. He referred to crack A as having the appearance of high cycle low stress cracking¹⁰⁵ meaning that there was a higher number of likely low magnitude stress cycles existing. Mr Blyth suggested an anecdotal estimate of growth was over several hundred hours for this crack¹⁰⁶. The NDT procedure would only have identified the crack if it had extended to the outer surface of the bore. It was unlikely that traditional methods would have detected it within the bore whilst the bore was covered by a sleeve.

According to the logbook maintenance entry, there is a suggestion that the NDT testing in accordance with Service Procedure 1137 was also carried out on 27th September, 2005 yet Mr Neil Joiner points out that it was actually done on 16 July 2005. Mr Camilleri explained that maintenance carried out on an aircraft may take some time to complete and it is only on completion that the maintenance records are finalised. The aircraft VH AKY did not fly during the period that the maintenance was being undertaken in accordance with the schedule of maintenance between July and September 2005.

There was no evidence of any cracking found in the upper attachment lug when tested by Mr Joiner. This is significant because the testing is said to have been carried out 14.4 flight hours before the next servicing on 22 September, 2006.

A finding by Mr Blyth that at least crack A had existed for potentially several hundred hours raises concerns about the accuracy of the testing process (see

¹⁰⁵ Page 26 9 June 2011

¹⁰⁶ Transcript Page 26 & Page 61 9 June 2011

Recommendations). Despite crack B being in a position close to the outer surface of the lug the NDT testing did not detect its presence. Neither did Mr Camilleri see crack B under magnification when he undertook a visual inspection whilst the wing was off in September 2006¹⁰⁷.

Questions were raised about the frequency of the examination of these areas of the attachment lug particularly having regard to the existence of a previously blended repair being carried out in 1984. The Singaporean Air Force log book noted that, following the repair, the service interval for the lug examination was reduced from 100 hours to 25 hours. Mr Blankenstein from the ATSB was unable to establish the basis for the significant reduction in the service interval to 25 hours¹⁰⁸. The reduced inspection period for the upper attachment lug was not incorporated into the maintenance schedule of the System of Maintenance when the aircraft was placed onto the Australian Register but should have been identified before the aircraft received a Certificate of Airworthiness and a Certificate of Registration.¹⁰⁹ At the time of the aircraft's registration, the Civil Aviation Authority (CAA) was not required by the legislation to review the System of Maintenance that existed prior to the aircraft becoming registered.

In any event, the Service Procedure 1137 was incorporated from the Royal New Zealand Air Force (RNZAF) maintenance regime¹¹⁰ which required an inspection every 50 hours where the maximum blend measurement was 0.6 inches (across the top face) and 0.3 inches (down the side face) or less. Mr Blyth noted that whilst the actual dimensions of the crack were unknown the actual blended area was such that 50 flying hour inspections through the use of non-destructive testing was appropriate¹¹¹.

It is unclear if there was compliance with the 50-hour check prior to the last inspection carried out in July 2005. According to the maintenance records of

¹⁰⁷ Transcript Page 25 Lines 25 –30 4 March 2011

¹⁰⁸ Transcript 14 June 2011 Page 29

¹⁰⁹ Transcript Page 15 Line 20 14 June 2011

¹¹⁰ Volume 4 Tab 4 Exh.2

¹¹¹ Transcript 9 June 2011 Page 60

18 April 2002 SP1137 testing was carried out at 5,004 hours. The next record of it being carried out was in September 2005 where the hours were noted as 5,068 which would suggest a gap of 64 hours. Despite this suspected non-compliance with the service hours it is clear that only approximately 15 hours passed from the last testing until the accident itself.

I have not been able to determine why crack B was not detected using the recommended testing process. Limitations as to non-destructive testing techniques were identified particularly where the presence of excessive paint or sealant may cover the crack. Mr Joiner maintained that despite the presence of some paint coating the crack still should have been detected¹¹².

Unfortunately the use of NDT techniques was not capable of detecting the crack within the bore (crack A) unless such a crack extended to the outer surface of the lug itself. As indicated this is particularly so where a sleeve remained in-situ during the attempted testing process.

Examination of the right wing lower main-plane spar connection failed to find any evidence fatigue cracking or pre-existing defect which may have contributed to the separation of the wing. The surface morphology of this area “was consistent with a rapid ductile fracturing under tensile or combined tensile/bending loads.”¹¹³ The bending apparent in the fasteners along the aircraft would suggest that the failure occurred under downward bending loads which was consistent with the observations on the upper lug itself.

In considering whether the fatigue cracking was likely to have led to a material failure during normal operational limits the ATSB investigated two incidents where cracking had been observed in a similar area on aircraft in two other air forces. The first related to a Strikemaster jet in the Royal Saudi Air Force which broke up and crashed in 1984. The second related to a Royal New Zealand Air Force Strikemaster jet that had sustained significant cracking which was detected during routine maintenance. In the first case despite the

¹¹² Page 73 Transcript 3 March 2011

¹¹³ ATSB Final Report Page 60

existence of upper attachment lug cracking the manufacturer found that the cracking had not contributed to the accident. In that case the size of the cracking was said to have been fingernail size.

The ATSB reported that the cracking to the upper attachment lug in the Royal New Zealand Air Force aircraft had probably been subjected to negative load manoeuvres before the defect had been discovered not unlike the present situation. The most significant crack had initiated at the bore surface. Despite the extent of the cracking that existed in this Royal New Zealand Air Force jet there was no failure of the lug itself during normal operational limits.

Conclusion on right wing failure

The right wing failure occurred at points of structural connection between the wing and the fuselage. It occurred following the application of mainly downward bending loads being applied to the wing consistent in my view with the left rolling manoeuvre that followed, after the pitching over from the loss of the tailplane. The fractures were associated with ductile failure in an overstressed condition. I accept the finding of the ATSB that whilst the cracking in the upper attachment lug “was detrimental to the strength of the wing connection”[REF?] the cracks themselves had not developed to such a magnitude that it was likely to produce a failure of the lug itself under normal wing loads associated with the certified limits of the operation of the aircraft.

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I further accept that the separation of the wing was brought about by what has been described as a “significant in-flight manoeuvre or event” [REF?] being the separation of the tailplane first, which in my opinion caused the plane to become completely uncontrollable.

¹¹⁴ ATSB Final Report Page 64

Maximum “G” limit for VH-AKY

During the inquest an issue was raised as to the manner in which aircraft VH-AKY was operated during the last 36 hour of its airframe life. During this period, on ninety occasions a +5G reading was recorded on the fatigue meter within the aircraft.

The observation of the registration of “G” (Gravity) forces as applied to the aircraft, appears to have been made during routine servicing of the aircraft rather than after the completion of each flight. Therefore, it is difficult to ascribe the particular application of high “G” readings to a particular flight or time. However the application of high “G” readings would not generally be applied to any passenger related adventure flights. This was due to the uncomfortable sensation that such forces were likely to induce such as nausea, particularly in a person unfamiliar with the application of high “G” forces upon them.

There is nothing to indicate who was flying VH-AKY when these high “G” manoeuvres were being undertaken or when or where they were undertaken. Mr Costin however was an experienced and accomplished aerobatic pilot. It is clear from the evidence that this aircraft was used for aerial shows and demonstrations. Mr Hanneman did not consider it unusual that such high plus five readings had been obtained because of those air shows and the demonstration use of the plane¹¹⁵. Mr Crocker, the CEO of AWAL accepted that prior to any air shows it would be extremely prudent to practice routines for the air show “until you know it backwards”¹¹⁶.

It was common for aerobatic pilots to regularly practice their routines prior to any air show. He noted that it was extremely important never to change a routine because accidents occurred when people decided halfway through a routine to change it.

¹¹⁵ Transcript Page 74 1 December 2010

¹¹⁶ Transcript Page 74 15 June 2011.

The master maintenance schedule¹¹⁷ indicates that the maximum of 5.5G applies to the use of the subject aircraft. However, Mr Hanneman and Mr Duggan suggested that the aircraft was capable of 6G manoeuvres.¹¹⁸ During his briefing of Mr O'Donoghue, Mr Costin indicated that the aircraft had a 6G limit for manoeuvres but a 12G structural limit itself¹¹⁹.

All pilots who flew the Strikemaster jet suggested that the flights involving passengers would not exceed 4G, which was well within the capacity of the aircraft. Beyond that point it was said to interfere with passenger comfort

Mr Dines had expressed some concern over the number of occasions where high 'G' applications that had been recorded. That was particularly so if a passenger had been subjected to those limits. Whilst conceding he was not a display pilot he would nonetheless take into account such an application of the aircraft's usage if he was being asked to certify the plane. I found that there was no support for the assertion that the aircraft was being flown in excess of its G capacity on the date of the air disaster. Nor does the recording of a large quantum of +5G readings necessarily suggest that the jet was flown beyond its capability or capacity or under the control of Mr Costin, inappropriately. I accept Mr Costin was an exhibitor at air shows and demonstrations and as such he may have pushed the aircraft to its operational limits but in doing so it could not be said to have been beyond the aircraft's capacity.

Aircraft Fatigue Life

Another aspect which the inquest considered was whether the aircraft VH-AKY had exhausted its fatigue life at the date of the crash. The manufacturer of the Strikemaster jet published the service instructions and schedules which defined the fatigue limits of various components within the aircraft. A fatigue index (FI) was fixed by the manufacturer for certain principal components

¹¹⁷ Volume 4 Tab 2, 1-3-5

¹¹⁸ Transcript Page 54 1 December 2010 and Transcript Page 2 on 2 December 2010 respectively.

¹¹⁹ Volume 5 Tab 15.

such as the wings and airframe, as being 100FI. A fatigue index meter was fixed within the aircraft, which measured the usage of fatigue on the aircraft based on the nature of its use and stress effect of that use on the structural components. Once the fatigue life reduced to its maximum the structure would have to be taken out of service or replaced.¹²⁰

Mr Punshon from CASA suggested that a structure is retired or replaced at the expiration of its safe life to prevent “the structure from developing fatigue cracks.” Other components within the plane had their safe life measured by performance hours. For example the tail section of the plane had a fatigue life measured by a maximum of 10,000 hours. At the time of the accident the plane had only flown a little over 5082 hours¹²¹.

When VH-AKY was placed onto the Australian register it had a FI of approximately 52 out of a total of 100. On 26 September 2006, shortly before the accident, the calculated FI was 59.

Mr Barry Pover, Aviation Consultant, was engaged by the Costin family to assist the family in identifying a cause for the accident. As part of his investigation he raised with the ATSB the fact that a multiplication factor of 1.9 had been applied to the FI of Strikemaster jets by their manufacturer (BAC now BAE Systems).

To his knowledge this multiplication factor was first introduced by the manufacturer in 1995. If applied, it had the effect of significantly shortening the fatigue life of many Strikemaster jets.

Mr Pover produced to the Inquest a body of correspondence, which made reference to the application of a 1.9 multiplication factor to the FI. From that documentation it is apparent that BAE published a Company Service Instruction (CSI/Strikemastetr/19) in October 1995 in which the company identified reports from some operators of finding cracking emanating from the

¹²⁰ Statement of David Punshon Paragraph 30

¹²¹ ATSB Final Report

bolt holes located in the inbound areas of the port end starboard mainframe lower spar boom. The UK Civil Aviation Authority (UKCAA) issued a Mandatory Permit Directive for Strikemaster jets in the United Kingdom that led to CASA adopting the UK requirements in the form of an Airworthiness Directive AD/Strikemaster 3¹²².

The effect of that Directive meant that once the Strikemaster jet had reached 70 FI, maximum 'G' restrictions were imposed and the aircraft had to have a series of modifications carried out to its wings. If those modifications were not completed and duly inspected when 72 FI was reached, the aircraft had to be grounded.

The relevance of the 1.9 multiplication factor suggested by Mr Pover was highly significant to VH-AKY. If the multiplication applied to the life of the aircraft then it would have recorded 112 FI, clearly exceeding the 100 FI operational limit. It also placed it well in excess of the 72 FI for which the wing modifications were required. However, if the multiplication factor was to apply only from the date it came into civilian service as has been suggested, then a total of only 64.6 FI would have been recorded.

A review of the documentation from BAE Systems suggests that the multiplication factor was first applied in 1995 to the Botswana Defence Force as it related to an ex-Kenyan Defence Force Strikemaster jet. That determination indicated that the multiplication factor of 1.9 should apply to the life of the plane. In a letter sent from British Aerospace to a civilian operator dated 8 December 1998, it was noted

*“the formula for calculation of FI for Strikemaster aircraft is relatively simple and was based on “G” meter counts and a generic sortie profile reflecting the proposed usage of the aircraft. After significant in service experience had been gained, this formula was refined, by the application of the 1.9 factor. This factor is now applicable to **all** (my*

¹²² Copy attached DP 4 to the Statement of Mr Punshon

*emphasis) Strikemaster flying and you should apply it to flying in South Africa as well as ensuring that it was applied in Botswana*¹²³.

Despite the suggested generic imposition of the multiplication factor it would seem that British Aerospace were prepared to adjust the application of the factor in circumstances where a review of the historical sortie mission documentation and engineering records would suggest a readjustment of the FI was warranted. In each case where a historical review warranted such a readjustment the full multiplication factor was nonetheless still to be applied from the date of such a review¹²⁴.

In 2011 both the Crown Solicitor's Office, on behalf of the Coroner, and CASA wrote to BAE Systems seeking a clarification of the application of the multiplication factor. In a response to the Crown Solicitors letter, BAE Systems confirmed that

*“based on in service data obtained from refinements which had been carried out by mid 1990's in and around 1995 BAE Systems advised military operators of Strikemaster aircraft to apply a generic multiplication factor of 1.9 to the fatigue index figures derived from the fatigue metre formula. So far as we have ascertained the application of this multiplication factor was a general recommendation to all military operators although a lower factor was in some instances recommended by BAE Systems if we had been tasked by individual military operators to analyse relevant aircraft fatigue records*¹²⁵.

No notification was forwarded to the Republic of Singapore Air Force as the Strikemaster fleet had been retired from military service in November 1986.

CASA specifically sought clarification as to whether the multiplication factor was applicable to ex- Republic of Singapore Air Force aircraft. In a response

¹²³ Annexure DP 5 to the Statement of David Punshion.

¹²⁴ AAN 28958 Statement of David Punshon Annexure DP 5.

¹²⁵ Exhibit 15

dated 21 October 2011 BAE Systems indicated that whilst no fatigue multiplication factor was actually applied to ex-Republic of Singapore Air Force jets, there had never been any assessment of the Singaporean records, therefore they suggested that CASA may wish to apply the “default” multiplication factor of 1.9¹²⁶.

Notwithstanding this general position, BAE Systems did review a Republic of Singapore Air Force Strikemaster jet that was the subject of a permit to fly application in June 2005¹²⁷.

As part of its deliberation for that particular aircraft, BAE Systems considered that the multiplication factor should only apply to future usage following those investigations being undertaken.

There is no evidence in these proceedings that Mr Costin or those persons who carried out maintenance on this aircraft had any knowledge of the existence of a 1.9 multiplication factor to be applied to the FI. Neither did Mr Dines who issued the Special Certificate of Airworthiness on 9 April 2001.

At no stage did BAE Systems issue any Company Service Instruction or Company Service Bulletin regarding the generic application of the multiplication factor of 1.9. This in my view is very significant because BAE Systems had issued a Company Service Instruction, which required certain modifications to be undertaken at 70 FI. It is clear that if the multiplication factor were to be applied it would significantly bring forward the necessity for carrying out those modifications or in the event of not doing so the aircraft had to be grounded. Whilst I recognise BAE Systems’ apparent contractual obligations was to those military operators to whom it supplied aircraft and not the later civilian operators, nonetheless the notification of the multiplication factor was so significant that it should have been brought to the attention of those persons who thereafter flew the aircraft or were charged with their continued maintenance, through the issuance of a Company Service Instruction. I propose to discuss this matter further under Recommendations.

¹²⁶ Volume 6 Tab 13.

¹²⁷ Annexure DP 5 Statement of Mr Punshon.- UKAAN 28959

Since the commencement of the Inquest there have been a number of attempts by CASA to obtain some clarification of the FI for ex Singapore and New Zealand Strikemaster jets. Unfortunately, there was no momentum prior to the Inquest to try to resolve this issue. I acknowledge that CASA has now released Airworthiness Bulletin No 3 on 7 September 2011, which recognises that the application of the multiplication factor should be applied.

Regulatory oversight of limited category aircraft

Aircraft VH-AKY was subject to the regulatory oversight of the Civil Aviation Regulations 1988 (“CAR”) and the Civil Aviation Safety Regulations 1998 (“CASR”).

The history of the aircraft’s importation and registration has been set out earlier in these findings. It is suffice to briefly restate that the aircraft was purchased from the Republic of Singapore Air Force and later imported into Australia by Mr Ferris’ company, International Air Parts. It was first registered in Australia on 7 February 1992¹²⁸. The aircraft had been restored by Mr Michael Chadwick through his business, Winreye Aviation. Initially a System of Maintenance (SoM) was developed by Winreye based on the combined Republic of Singapore Air Force and British Aerospace Systems. That SoM was not particularly suitable as it was initially designed on maintenance scheduling where military jets were likely to undertake 400 - 500 flight hours per annum,¹²⁹ whereas the expected use of civilian warbird aircraft was more likely to be 50 flight hours per annum. Eventually a new SOM was written by Winreye Aviation for the Australian Warbirds Association Limited. This incorporated the master maintenance schedule and maintenance manual adopted by the Royal New Zealand Air Force (RNZAF) for BAC 167 aircraft. That SoM was approved on 16 May 1995 and between 1996 and 1997 that system was formally adopted for use by aircraft VH-AKY.

¹²⁸ Volume 7 Tab 8 Exh.2

¹²⁹ Statement of Michael Chadwick Volume 2 Tab 51

Between October 1992 and February 2001 permits to fly were issued by CASA/CAA to the Certificate of Registration holder for VH-AKY allowing specific use of the plane largely for air shows, demonstrations and maintenance use.

An application was made by Mr Costin for the issue of a Special Certificate of Airworthiness in April 2001.

On 9 April 2001 Mr Dines issued a Special Certificate of Airworthiness to the limited category aircraft VH-AKY, owned by Mr. Costin. An Annexure to the Certificate was issued setting out certain restrictions on the use of the aircraft. Some of those restrictions recited the operational limitations set out in CAR 262AM and were to be considered in conjunction with both CAR 262AN and CASR 21.189.

CASR 21.189 sets out the special purpose operations under which an applicant for a Special Certificate of Airworthiness may apply. These include, amongst others, operating historic and ex-military aircraft in adventure style operations, mock combat, aerobatic flights and any other operations in which the only use of the aircraft is to carry people taking part in a recreational activity, which is intrinsically hazardous.

CAR 262AM requires that the operator or pilot in command must ensure that each passenger is given a warning about the restrictive nature of the Certificate of Airworthiness. The passenger must be told that the design, manufacture and airworthiness of the aircraft are not required to meet any standard recognized by CASA and that CASA does not require the aircraft to be operated to the same degree of safety as an aircraft on a commercial passenger flight. Finally, the passenger must be informed they fly in the aircraft at their own risk¹³⁰.

¹³⁰ CAR 262AM (4)(b)

This advice is to be given to the passenger, if he or she is the one paying the operator for the flight at the time of payment, and in the event he or she is not the person who is paying, then before the passenger boards the aircraft ¹³¹.

In addition to the abovementioned warning prior to boarding, the operator must have a warning placard displayed within the aircraft in such a way that it is conspicuous and can be easily read by each persons within the aircraft. The warning on the placard is prescribed by CAR 262AM [6] to read: “persons fly in this aircraft at their own risk. This aircraft has been designed for special operations and is not operated to the same safety standards as normal commercial passenger flight.” In issuing the Special Certificate of Airworthiness Mr Dines satisfied himself that such a placard had been put in place in the aircraft VH-AKY.

Certain other limitations are provided by some CAR 262AM (7) They include: that the pilot in command must be appropriately qualified; that the aircraft is required to depart and return from the same aerodrome without landing elsewhere and that each passenger acknowledged in writing that they have been told about the limitations of the design standard and that they were flying at their own risk.

Under CASR 262AN CASA could approve an organisation to administer limited category aircraft provided that that organisation was suitable in terms of qualified personnel to ensure the administration and airworthiness assessment were carried out properly, and that the organization had suitable practices and procedures in place to ensure the operational and airworthiness activities were conducted in a safe manner. It was also an approval requirement that such an organisation engaged a chief executive who had the authority and responsibility to ensure that the activities carried out by the organisation were done with a reasonable degree of care and diligence.

¹³¹ CAR 262AM (4)(b)

Importantly, under CASR 262AN(3) an operator had to operate their limited category aircraft only in accordance with the manual produced by an approved organisation. CASA could however exempt an operator from compliance with a manual if approval was otherwise given. No organisation had been approved by CASA prior to 5 October 2006. To obviate the need to comply with a manual from such an approved organisation, on 1 October 2004 CASA issued a general exemption by way of instrument 475/04, from compliance with that provision.

The above conditions and restrictions as imposed were no doubt designed to provide some information and protection to users of adventure flight operations. Clearly, it was envisaged there be some oversight of limited category aircraft by a competent approved body. Unfortunately the lack of approval meant that the degree of supervision envisaged was not forthcoming. Again this is significant because neither CASA nor the Commonwealth could be held liable for negligence or any loss or damage under CASR 201.003 arising from safety issues in limited category aircraft. That responsibility it would seem lay solely upon the operator of the aircraft.

With regard to issues of maintenance, for the purposes of the issuance of a Special Certificate of Airworthiness, CASR 21.189 required that CASA or an authorized person (in this case, Mr Dines) be satisfied that the aircraft had met the airworthiness requirements for the issue of the Certificate of Airworthiness. That is, the aircraft was of a type manufactured for the requirements of and accepted for use by an armed forces operator, the aircraft had a satisfactory history of operation, the aircraft was in a good state of preservation and repair, and in such a condition for safe operation.

Mr Dines satisfied himself that the aircraft VH-AKY had an approved system of maintenance, being the Australian Warbirds Association SoM for BAC 167. He confirmed that the maintenance on the aircraft was up-to-date and at the aircraft had been previously approved for flight operation.

As indicated above, it was the registered operator's responsibility under CAR41 to ensure that all maintenance had been carried out in accordance with the maintenance schedule. The registered operator could engage a maintenance organisation to maintain or service the aircraft and if they did that organisation was bound to report any major defect they became aware to the Certificate of Registration holder as well as CASA. Equally, if the Certificate of Registration holder becomes aware of a maintenance issue then (s)he was also required under CAR 51(4) to investigate it and if the defect was major then he is required to report it to CASA.

Mr Dines noted that when he was considering issuing the Special Certificate of Airworthiness he was not required to consider the appropriateness of the maintenance schedules or the SoM other than the fact that they had been previously approved and whether there appeared to be apparent compliance.

I have no doubt that CASA thought Australian Warbirds Association intended to become an approved organisation for limited category aircraft for the purposes CAR 262AN. However, by October 2004 such approval had not been obtained. As a result, CASA issued Instrument No. 475/04 which exempted operators of limited category aircraft from flying in accordance with a manual prescribed by an organisation approved under CAR 262AN. It did so because no such organisation had by that stage been approved¹³². Apart from statutory obligations cast upon the registered operator and their maintenance organisation, there was thereafter no direct organisational oversight as envisaged by CAR 262AN until after the air disaster in October 2006. I propose to comment further on this oversight further in these findings.

¹³² Letter from CASA 22nd of December 2006, Volume 7 Tab 30

Was the warning given to Mr O'Donoghue adequate?

Mrs Lisa O'Donoghue paid for the adventure flight in early April 2005¹³³ and was issued with a receipt that did not contain any warning of the nature that is envisaged under CAR 262AM.

This flight was a surprise 50th birthday gift. It was a very expensive gift and there appears to have been significant family secrecy over what was to happen on 5 October. It was therefore unlikely that even if a disclaimer or warning had accompanied the receipt, it would have been raised with Mr. O'Donoghue prior to his arrival at the airport.

It would appear that this is not an uncommon practice of persons other than the passenger paying for an adventure flight. That is consistent with the wording of CAR 262AM where it provides for two scenarios, firstly, where the passenger on paying for the flight, is to be provided with information concerning the dangers of participation in adventure flight; and secondly, in the event that he is not the purchaser of the flight, the passenger is to receive the warning before he boards the aircraft. The provision makes it clear that by the time the passenger boards the aircraft he has been told about the aircraft limitations and the risk involved.

Following arrival at Bathurst Airport on the morning of 5 October 2006 Mr. O'Donoghue was provided with a document entitled "Passenger Agreement Waiver Release and Acknowledgement"¹³⁴." The evidence suggests that he read and signed that document in the presence of Mrs. O'Donoghue who witnessed his signature.

There was a suggestion that there may have been some notation on the rear of the Passenger Agreement, but the original document has not been located. Nor has generic copy been provided from the records of the company. I do not

¹³³ Receipt issued 6.4.2006 Vol. 1 Tab 19

¹³⁴ Tab 18 Vol.1, Exh. 2.

draw any adverse conclusion from the non-production of the original document as I am satisfied as to the content of the copy provided¹³⁵.

In my opinion the Passenger Agreement adequately addresses each of those statutory requirements that the passenger was required to be advised about under CAR 262AM. I also find that the warning was comprehensive enough for Mr O'Donoghue to understand that a risk to death and injury was a real one.

The passenger in an adventure flight is also given further notification of the risks attached to adventure flight in an ex-military aircraft through the presence of a placard within the aircraft. This identifies the nature of the jet and the risks, which a person must accept for the flight to continue. Mr Dines sighted the placard at the time he issued the special certificate of airworthiness. There is no evidence suggesting its removal. I note that Mr. Costin was disciplined in his approach to flying and I would see no reason as to why the placard would be removed from the aircraft.

I accept that there was little time for Mr O'Donoghue to consider the nature of the warning before he signed the Passenger Agreement. But that does not mean that he did not understand or consider its nature. I believe that he did. Mr O'Donoghue did not display any reluctance to participate in this flight as depicted during the lengthy and comprehensive briefing. I am satisfied that he was adequately informed of the nature of the flight he was to embark upon, including that the degree of safety was not the same as could be contemplated in a commercial passenger flight. I am satisfied and find that the warning given prior to and after boarding the aircraft complied with CAR262AM.

¹³⁵ Volume 1 Tab 18

Was there any oversight of holders of Special Certificates of Airworthiness of limited category aircraft prior to the air crash?

CAR 262AN clearly envisaged a need to have an approved organisation that could administer the operation of limited category aircraft engaged in special purpose operations like Mr Costins' Jet Fighter Flights operation. Correspondence from the CASA to AWAL on 22 December 2006 inferred that "over many year" issues were being discussed that may have allowed AWAL to be the approved organisation as it related limited category aircraft. CASA asserted a "lack of progress" on AWAL's part that led to AWAL not being able to achieve CASA approval as an approved organisation¹³⁶. The membership of AWAL had a close relationship with ex-military and historic aircraft and if considered capable, it was CASA's view that AWAL should have been best placed to administer such aircraft operations.

Because an organisation had initially not been approved, CASA took steps to remove the stipulation requiring limited category operations only in accordance with a manual produced by an approved organisation. This was a significant step in the reduction of appropriate supervision of the Certificate of Registration holders of such aircraft.

An approved organisation under regulation 262AN was required to have suitable and qualified personnel for the administration of such aircraft operations who could assess the airworthiness procedures being undertaken by these operators. It was understood that suitable practices, procedures, and limitations would be put in place to control their operations so that their operational and airworthiness activities could be conducted safely. It was also envisaged that a chief executive officer would be appointed to the approved organisation who would bear the responsibility of ensuring that the activities of the approved organisation were carried out with a reasonable degree of care and diligence.

¹³⁶ Volume 7 Tab 30, Exh. 2

No other body was appointed as an approved organisation.

CASA did not appoint a particular person or body from within its own organisation who would stand in the stead of an “approved organisation”. No administrative protocols or practises were developed by CASA to ensure aircraft operation and continuing airworthiness assessments were to be carried out.

I accept that statutory obligations were cast upon the Certificate of Registration holder as to the continued maintenance of their limited category aircraft and compliance with the terms of the Special Certificate issued. I also accept that maintenance organisations and licensed aircraft maintenance engineers (LAMEs), who dealt with the aircraft carried obligations and liabilities to properly carry out maintenance and bring defects in maintenance to the attention of the registered holder and CASA.

The system in place following the issue of a Special Certificate of Airworthiness relating to limited category aircraft in my view clearly lacked a proper auditing process to determine compliance by the Certificate of Registration holder of both the administrative and the maintenance obligations and requirements¹³⁷.

Unlike the procedures relating to an “approved organisation” there was no requirement in place to determine whether the registered operator was compliant with those matters, particularly as contained within CAR 262AM. In addition and as pointed out by Mr Dines, there appeared to be no formal process by way of audit to determine whether there had been compliance with the maintenance schedules or any process of review as to whether those maintenance schedules remained adequate, despite rules (CAR 42) anticipating that they should¹³⁸.

¹³⁷ CAR 51

¹³⁸ Statement of Mr Dines date 16th November 2010 Para. 40 Vol 7

Following the air crash involving VH-AKY a sharp focus was directed at limited category aircraft operations. It must have been apparent that there was a significant gap in oversight of their operations because the response from CASA was to suspend the exemption from operating other than in accordance with a manual produced by an approved organisation under CAR262AN. This effectively grounded the limited category air fleet and they remained so until appropriate assurances and proposals were prepared and submitted by AWAL.

On 1 May 2007 CASA formally revoked the exemptions to CAR262AN and formally approved AWAL to administer the operation of limited category aircraft as an approved organisation pursuant to that regulation.

I accept that the appointment of AWAL was a positive step forward for the intended compliance and safety of those persons who operate limited category aircraft. Hopefully it will provide some assurance to the community that proper oversight can and is being given to operators engaged in the adventure style flights.

Have changes been made to regulatory oversight since the incident?

As indicated previously, following the air disaster CASA wrote to AWAL expressing their concern at the lack of progress that had been made in an attempt for that organisation to seek to self-administer of the operation of limited category aircraft under CAR 262AN. CASA expressed an intention to revoke the concession which had been given allowing limited category certificate of registration holders to operate other than through an approved organisation.

Mr William Hamilton, who was assisting AWAL at the time, arranged for the revocation of the exemption, to be suspended pending further submissions being made to CASA. Mr Hamilton, Mr Merton and Mr Dines put together a proposal for AWAL to undertake self-administration. That document was

completed in January 2007. On 11 May 2007 CASA advised AWAL that it had approved AWAL as an organisation to administer limited category aircraft involved in special purpose operations pursuant to the Civil Aviation Regulations¹³⁹.

During the course of the Inquest, Mr Stephen Crocker, Chief Executive Officer (CEO) of AWAL gave evidence in relation to the progress being made and the procedures that had been adopted since the subject approval was granted by CASA. He gave evidence of the preparation of an Exposition and Self-Administration Manual (ESAM) setting out the guideline material and procedures to be adopted by AWAL¹⁴⁰. This document was a significant development upon the original proposals forwarded to CASA in 2007. He also pointed out that it was a developing document which was used to address issues as they arose.

One of the key aspects of the ESAM document was the requirement to conduct audits of those operators of adventure flights. Mr Crocker indicated that as at the date of his evidence in June 2011 there were around 35 adventure flight operators of which “around 20” had been the subject of what he described as a “hard audit”¹⁴¹. Mr Camilleri, the Director of Self Administration (DSA) for AWAL and its sole auditor, thought that as at October 2011 there were about 40 operators in relation to whom he had completed “pretty close to half” of the audits¹⁴².

A hard audit involved the attendance upon the operator by the auditor and a physical carrying out of certain inspections. A checklist for such inspections is set out in the ESAM under the heading Flight Operations Audit Checklist¹⁴³. It did not include an auditing of the maintenance records but at times may have included an inspection of a current and valid maintenance release, which would demonstrate that the maintenance was at least up to date. The

¹³⁹ Volume 7 Tab 33 Exh. 2

¹⁴⁰ See Exhibit 19

¹⁴¹ Transcript Page 12, 15 June 2011

¹⁴² Transcript Page 52 Line 46, 24 October 2011

¹⁴³ Page 55 of ESAM - Exhibit 19

maintenance records were generally held by the LAME who performed the work. The LAME and the approved maintenance organisation were of course subject to their own audit process by CASA¹⁴⁴.

Mr Crocker indicated that further personnel were to be interviewed (and employed) for the purposes of ongoing audits and he expected as at June 2010 that another auditor would be employed “shortly” to carry out that task¹⁴⁵.

The ESAM has been implemented since 2007. It is unclear when the specific audit provisions were drafted, although it is noted as being at least by March 2009.

It is therefore disappointing that despite the concerns expressed by CASA as to the lack of operational oversight of limited category aircraft in 2006 there remains a significant number of adventure flight operators who are yet to be subject to a “hard audit”. I acknowledge that Mr Camilleri, as DSA, was the only auditor at that time and the financial resources of AWAL were limited. Nonetheless, it is incumbent upon both CEO and the organisation itself pursuant to CASA’s approval granted in May 2007, that they have suitably qualified and competent personnel to carry out their functions and that the CEO ensures that AWAL performs those functions in an efficient and effective manner.

In AWAL’s letter to the Inquest of 21 February 2012, I noted that extra funding had been made available by its Board for the provision of an additional auditor and in fact an additional auditor has been appointed in Queensland where further audits have now been completed. Despite these positive steps and any suggested agreement with CASA¹⁴⁶, it remains unsatisfactory that in 2012 this audit tasking has not been completed. It is important that expedition be given to this specific process so as to ensure that at least as a starting point

¹⁴⁴ Statement of Roger Chambers Volume 6 Tab 13

¹⁴⁵ Transcript Page 16 Line 8-10, 15 June 2010

¹⁴⁶ Transcript Page 17 Line 5-35, 15 June 2011

all operators are found to meet appropriate standards for the safe operation in their fare paying endeavours.

As part of the Inquest hearing, the application of a possible 1.9 multiplication factor to the BAC 167 Strikemaster jet was examined. In part, the Inquest was concerned as to how AWAL, as the administrator of limited category aircraft, would respond to the receipt of such information. This of course is important because AWAL under its delegated authority has power to issue to Special Certificates of Airworthiness in relation to limited category aircraft¹⁴⁷ of which the Strikemaster aircraft was one. It is acknowledged in Australia that there are a limited number of registered Strikemaster jets and that by the conclusion of evidence in this Inquest it may be that none are in fact engaged in adventure flight operations¹⁴⁸.

Mr Camilleri became aware, following the air disaster, that some suggestion had been made as to the application of a multiplication factor to the fatigue index of the Strikemaster aircraft. Reference was made in the Final Report by CASA in 2008 to the issue of whether a multiplication factor applied¹⁴⁹. No referral was made by AWAL to either CASA or the Maintenance Review Board to consider the technical issue despite the fact that such a variation may affect the airworthiness limitation as it applied to a system of maintenance of an aircraft for which a Special Certificate of Airworthiness may have already been granted or may arise in the future. Nor was any inquiry made specifically of BAE Systems as it impacted on the fleet of Strikemaster aircraft registered in Australia.

Letters were eventually sent by AWAL to the registered operators of each of the Strikemaster aircraft advising them of the existence of a possible application of the multiplication factor. The letter dated 21 April 2011¹⁵⁰ was sent to the registered owners for their “deliberation” on a number of

¹⁴⁷ ESAM 5.2 Exhibit 19

¹⁴⁸ Transcript Evidence of Mr Camilleri 24 October 2011. Statement by Mr Hall Volume 2 Tab 86.Exh. 2

¹⁴⁹ ATSB report Page 26

¹⁵⁰ Volume 2 Tab 83 Attachment to Statement of Mr Camilleri

documents, which had been provided by Mr Pover to the Inquest. The forwarding of this letter appears to have been come about following a suggestion by Senior Counsel Assisting during Mr Camilleri's examination in February 2011. The letter leaves it to the operator's discretion to make their own enquiries. I believe this was an inadequate response. Mr Camilleri thought it was the operator's responsibility. That may have been so, but equally if this was a matter that affected the maintenance limitations for safe operation of a limited category aircraft then it is incumbent upon AWAL to positively respond. If AWAL believed that this was a matter in which it could not intervene then they should have referred the matter to CASA for its consideration.

Mr Crocker, on becoming aware of the possibility of the application of the multiplication factor, contacted three Strikemaster jet operators. No formal recording of those discussions was made. Those operators told him that the multiplication factor did not apply to them although no documentation appears to have been produced to confirm that was the case. The reasoning proffered for why it did not apply was because those Strikemaster aircraft operators were operating New Zealand Air Force maintained Strikemaster jets. He also confirmed from the Australian register that the other Strikemaster aircraft were in fact all of New Zealand origin.

Mr Pover's material sourced from BAE Systems, and the most recent response to CASA's enquiries, do not make it clear that the Royal New Zealand Air Force Strikemaster jets were completely exempt from the application of the multiplication factor. Accordingly, it is my view that it is incumbent upon AWAL to take a more immediate and pro-active role in either obtaining information from BAE Systems or immediately referring the matter to CASA or the Maintenance Review Board for their investigation.

A further issue that AWAL needs to properly guard against is the difficult position that collective enthusiasts of historic and ex-military aircraft find themselves in when faced with conflicting administrative responsibilities. An example of this is when Mr Crocker was contacting a number of Strikemaster

aircraft operators to determine whether the multiplication factor applied. This was done on an informal basis with no records kept on an issue that could have potentially led to the grounding of an aircraft. Having regard to the serious responsibility bestowed upon the corporate office bearers and executive position holders within AWAL towards their fellow members and greater community a more formal and accountable approach should be taken.

CASA continues to monitor Recreational Aviation Administration Organisations (RAAO's) within Australia, of which AWAL is one. CASA approved the ESAM when it was first introduced in 2007 and the current ESAM in January 2009. Under Chapter 6 of the ESAM a quality programme providing for auditing is set out. Part of that responsibility of AWAL is to provide half yearly reports to CASA on the issue of industry profile and safety matters. It also participates in corporation audits conducted by CASA. Audits were conducted in July 2009 and 31 December 2010. Both functional and corporate audits are undertaken by CASA. Corporate audits focus on how AWAL is performing against its ESAM and the Deed of Agreement with the functional audit being carried out on the members within the organisation and CASA's oversight of how that auditing process takes place.

Of the audits undertaken of CASA to date no adverse finding has been made.

Recommendations:

Section 82 Coroners Act 2009.

Following the conclusion of oral evidence I received the benefit of helpful submissions from each of the parties who were represented during the course of the Inquest. The matter was then adjourned from 26 October 2011 for further submissions to be made as to the nature and terms of recommendations that should be made arising from the evidence.

As a prelude I sought and was provided with a resume of proposed recommendations from Senior Counsel Assisting. This provided a template

for commentary and submissions from all other parties. On some of those issues raised by Senior Counsel Assisting there was clear consensus that a recommendation should be made. On other issues it was submitted that recommendations were inappropriate. I have considered each of the submissions that have been forwarded.

From the outset I note that commentary from the representatives of CASA in their submissions at paragraph 61, where it is suggested that under section 82(4) of the Coroners Act, 2009, “it appears that the Act does not contemplate recommendations being made directly to a statutory authority established otherwise than in New South Wales”.

Implicitly this is suggesting I cannot therefore make a recommendation to a Federal Minister or authority such as those charged with the oversight of aviation within the Commonwealth of Australia.

I do not agree, with respect, to that interpretation. In my view I am empowered under section 82 (4) to make whatever recommendations I consider relevant to public health and safety to any person or body or minister that administers legislation, or who is responsible for a body or person to whom the recommendation refers.

I am enforced in this view in that it seems only sensible that as leave has been granted to CASA to appear and contribute (as they have) in this Inquest I am not precluded from making recommendations to them or the relevant Federal Minister if I consider it appropriate to do so. Indeed as stated by Muir J in *Doomadgee v Clements* [2005] QSC 357 at (30)-(33):

“The expressions “connected with” and “relates to” are of wide import and connote a connection or relationship between one thing and another. The closeness of the connection or relationship is to be “ascertained by reference to the nature and purpose of the provision in question and the context in which it appears” (cf PMT Partners Pty Ltd. (in liq.) v Australian National Parks and Wildlife Service (1985) 184 CLR 301 at 313). The expressions are “capable of including matters occurring prior to as well as subsequent to or consequent upon” as

long as a relevant relationship exists (see Claremont Petroleum NL v Cummings (1992) 110 ALR 239 at 280).

The purpose of section 46 (1) (c) is self explanatory. The purpose of the other two paragraphs of the subsection is to empower the Coroner to address the topic specified in them with a view to exposing failing, deficiency or wrong and/or suggesting measures which may be implemented for the public benefit. Section 46(1), being remedial in nature should be construed liberally (cf PMT Partners Pty Limited (in liq) v Australian National Park and Wildlife Service at 313).

Any matter, on which comment is made, as well as having the requisite relationship, must be connected with the death under investigation. But as Counsel for the Attorney General pointed out in the course of their submissions, there is no warrant for reading “connected with” as meaning only “directly connected with”. Something connected with a death may be as diverse as the breakdown of a video surveillance system, the reporting of the death, a police investigation into the circumstances surrounding the death, and practices at the police station or watch house concerned.”

Section 46(1) of the Coroners Act 2003 (Queensland) is in similar terms to Section 82 of the Coroners Act 2009 and I therefore consider the analogy to be apt.

Accordingly, it seems to me that I am not constrained or confined to making recommendations only to any person, body and/or Minister within New South Wales.

Turning now to the recommendations. They are identified under the appropriate headings.

a) Notification about flight - Contingency plans - Family and emergency services.

No one can fully understand the sense of isolation and helplessness that must have been suffered by the family of Mr O'Donoghue as they waited for the return of their husband and father from what was intended to be an opportunity of a lifetime, to fly in a fighter jet.

As time passed beyond the intended 20-25 minute flight there was no system in place within the operation of Mr Costin's company to ensure appropriate notifications for search and rescue and/or to provide comfort or information to the family of a passenger within the aircraft.

Whilst persons were present at Bathurst Airport who were aware of the intended flight and who had some association with Mr Costin and his aircraft, no one was charged with the responsibility of ground support in the event of the aircraft not returning within the allotted time frame.

Evidence was given by Mr Hanneman ¹⁵¹ that when he flew with Mr Costin's operation at Bathurst, he was never alone and there was generally someone who could time the flight. However, he was not privy to any contingency plan in the event of the plane not returning on time. Similarly, Mr Duggan, another pilot who flew from time to time for Mr Costin, suggested that there was always someone on the ground during those flights and after 30 minutes someone would start asking questions¹⁵².

Ms Mohrlök, the company Administration Manager had not been shown any particular procedure to be followed in the event of a flight not returning within the assigned time frame. However, she said that usually there was someone else at the airfield. She acknowledged that this was a clear operational deficiency¹⁵³.

From the briefing given by Mr Costin to Mr O'Donoghue it was apparent (at page 8 of the transcript) that Mr Costin held the view that "Charlie", who one can presume to be Charlie Camilleri, would monitor the flight and "raise the alarm" should the plane not return on time. Mr Camilleri was present at the airport on the morning. However, it would seem that responsibility was not communicated to Mr Camilleri. He of course is also the appointed DSA from AWAL.

¹⁵¹ Transcript Page 54 1 December 2010

¹⁵² Transcript Page 34 2 December 2010

¹⁵³ Transcript Page 20 – Line 20-47 1 December 2010.

The current Guidance Material for Adventure Flight raises only for consideration the issue of the appropriateness of having ground crew who have the ability to raise an alert in the case of a problem¹⁵⁴. In my view something stronger than this is required. Approved protocols for base monitoring Adventure Flights should be specifically incorporated in the certification process.

The current ESAM ¹⁵⁵ of AWAL does not provide in its “Flight Operations Audit Checklist” for an appropriate check on the existence and compliance with safety protocols as they relate to time monitoring of flights by ground personnel and the urgent attendance upon appropriate search and rescue agencies and notification to family or friend of those within the aircraft. It seems to me highly appropriate that a recommendation be made in this circumstance.

- 1. Accordingly, I recommend that the Civil Aviation Safety Authority (CASA) or the Australian Warbirds Association Limited (AWAL), when issuing special certificates of airworthiness for limited category aircraft make it a mandatory condition of the issuance of that certificate that aircraft engaged in adventure flights have approved protocols in place to monitor the departure and return of each adventure flight together with search and rescue and next of kin notification procedures in the event of non-return of the aircraft from an adventure flight within an appropriately considered timeframe.**

- 2. I further recommend that AWAL amend the Flight Operations Audit Checklist contained within its current ESAM to incorporate the auditing of base monitoring of departure and return of adventure flights together with search and rescue and next of kin notification protocols.**

¹⁵⁴ Adventure Flight – Guidance Material Volume 6, Tab 5, page 9, Exh. 2

¹⁵⁵ Exhibit 19

3. ***I recommend that AWAL amend the Adventure Flights Guidance Material (AF-GM) and the exposition for adventure flights by limited category aircraft to incorporate requirements of base monitoring of departure and return of adventure flights together with search and rescue and next of kin notification protocols.***

b) Personal Rescue Beacons and Emergency Locator Beacons

Sometime between 12.20 and 12.30pm the plane VH-AKY suffered an in-flight break up of catastrophic proportions. Despite an ejection protocol being discussed during the course of the briefing neither pilot nor passenger had time to eject from the aircraft before it crashed. At the time of their departure from Bathurst Airport it is unclear whether either or both were in possession of a personnel emergency position indicating radio beacon (EPIRB). If they did it would appear that because of the nature of the aircrafts' rapid descent neither were physically able to activate them.

This led to a significant delay in notifying authorities of the need for a search and rescue operation.

Mr Duggan suggested that when he had flown with Mr Costin's company EPIRB's were worn as standard procedure¹⁵⁶. Mr Hanneman said that the EPIRB's were supplied to passengers who were "fully briefed"¹⁵⁷ on their use. Yet no reference was made in the briefing between Mr Costin and Mr O'Donoghue on 5 October 2006 as to the supply and use of a personal EPIRB.

It appears that there was no specific requirement apart from good practice for personal beacons to be carried during adventure flights. The aircraft, despite its commercial operation, was not required to be fitted with an Emergency

¹⁵⁶ Transcript Page 34 Lines 43-49

¹⁵⁷ Transcript Page 53 1/12/10

Locator Beacon (ELB). In fact the aircraft VH-AKY, being a turbo-powered aircraft, was specifically exempt from carrying such a device¹⁵⁸.

I accept that there was no direct evidence in the Inquest as to the costing of these devices and as submitted by AWAL there may well be issues as to the survivability of an emergency locator beacon in the event of a crash impact. However the benefits to the occupants of any crash may far outweigh those issues of cost. If an EPIRB or ELB had operated it would have immediately triggered an appropriate search and rescue response. Rescue services would have been better equipped to respond. Rather than send a helicopter that was incapable of accessing the area for several kilometres, satellite imagery of the suggested location could have been accessed which would have demanded that a winch-equipped helicopter was needed.

It was some four days before access to the location was possible. Perhaps if the impact point had of been identified more promptly the resulting fire may have been contained. Again access to the crash site itself may have been more accessible. This crash site was identified through the observation of smoke in a remote area. By the time action was taken a fire of some magnitude had developed and quickly spread.

Had the pilot and/or passenger been able to eject from the aircraft then, depending on their state of consciousness an EPIRB could also have been activated and perhaps led to their early recovery. The absence of these devices impact on safety issues arising from the crash. Accordingly I make the following recommendation that: -

- 4. CASA or its delegate on granting a Special Certificate of Airworthiness for limited category aircraft make it a mandatory condition of the Certificate that the pilot and passenger carry an Emergency Position Indicating Radio Beacon (EPIRB) during any flight.**

¹⁵⁸ See CAR 252A

5. ***CASA consider making it mandatory for limited category aircraft with Special Certificates of Airworthiness that engage in adventure style operations to have fitted to the aircraft an Emergency Locator Beacon (ELB).***

6. ***That CASA instigate such legislative amendments that are necessary to withdraw all exemptions from having an Emergency Locator Beacon fitted to any limited category aircraft engaged in adventure style operations.***

c) Provision of winch capabilities to rescue helicopters

Mr Ken Vote, the senior helicopter pilot with CareFlight Central West, based in Orange, New South Wales, was alerted at approximately 3pm that an aircraft had gone down in an area of state forest approximately 15 miles north east of Bathurst airport ¹⁵⁹.

At 3.25pm the helicopter launched from Orange and arrived at the scene of a scrub fire, thought to be the accident site, by 3.35pm. Despite the fact that a medical crew with a doctor were on board there was no winch facilities on this rescue helicopter so as to safely and swiftly place those personnel near to the accident site. The nearest point where the helicopter could land was several kilometres away with no reasonable prospect of access on foot to the accident site.

A second helicopter from Westmead with winch facilities was summonsed. That CareFlight helicopter arrived at 4.50pm. SCAT paramedic Bryan Jordan was winched to the ground and examined the wreckage for survivors. Due to his proximity to the fire that was underway in bushland around the wreckage he was unable to undertake a comprehensive search. No survivors were located at the scene. The Orange-based helicopter remained on site to assist the CareFlight helicopter. It then returned to Orange.

¹⁵⁹ Volume 1 Tab 38 Exh. 2

A significant amount of time was lost in not being able to place a medical team on the ground of the crash site because of a lack of winch facilities in the Orange-based helicopter. No doubt substantial costs were also incurred by having to fly more suitably equipped (and second) helicopter from Westmead in Sydney to the accident site.

Mr Vote pointed out that despite the nature of the break up of the aircraft as he observed of the wreckage he still held the view that someone may have possibly survived. He was anxious to get personnel down on the ground but was precluded from doing so because of the lack of winch facilities on his helicopter.

The helicopter service based in Orange in my view should be provided with winch facilities to enable such contingencies as were apparent on 5 October 2006 to be dealt with more efficiently. This Central West helicopter operation services an approximate 180 kilometres circumference from Orange and even further if refuelling can take place¹⁶⁰. Despite the passage of time and changes to a larger helicopter, winch facilities have still not been provided.

Mr Ellis, an intensive care paramedic also attached to Orange Helicopter base, shared his frustrations to the Inquest about the inability of the helicopter to be fully functional without the addition of winch facilities¹⁶¹.

In the circumstances of this Inquiry it was clear that time was of the absolute essence in attempting to locate survivors. The inability of the Orange base helicopter to properly respond when medical personnel were available to assist, demands that a recommendation be made to the New South Wales Ambulance Service and the New South Wales Department of Health for the provision of winch facilities to the Orange Base helicopter. Accordingly, I make the following recommendations: -

¹⁶⁰ Transcript Page 8 Line 10-35, 28 February 2011.

¹⁶¹ Transcript Pages 15 – 18, 28 February 2011.

- 7. That the Air Ambulance Service of New South Wales and the New South Wales Department of Health make provision for the installation of winch facilities for the CareFlight helicopter operating in conjunction with Orange Base Hospital and/or in the Central West region of New South Wales.**
- 8. In conjunction with the recommendation 7 above, that the Air Ambulance Service of New South Wales and the Department of Health fund and make proper and appropriate training available to those personnel based at Orange and/or the Central West region of New South Wales who are tasked to operate the helicopter winch service.**

d) Non-Destructive Testing (NDT) Procedures

In assessing the cause of the break up in flight of aircraft VH-AKY, the ATSB considered a number of structural issues that may have contributed to the accident. The Final Report identified two pre-existing fatigue cracks that were located in separate areas of the right wing upper attachment lug.

Those two cracks were identified as crack A and crack B. Crack A was depicted on slide 9 of the document V2/76 of the Coronial Brief¹⁶² as well as within the ATSB Final Report¹⁶³. Crack A was located only on the inner surface of the bore of the lug. It had not progressed to the outer surface of the lug.

Crack B was identified as appearing on the top surface of the lug in an area adjacent to where a previously identified crack had been repaired on 10 September 1984 by a process known as “blending”¹⁶⁴. Mr Blyth from CASA

¹⁶² Volume 2 Tab 76 Exhibit 2

¹⁶³ Figure 10 Page 57.

¹⁶⁴ Volume 3 Tab 9 Exh.2

described the process as “a physical grinding and removal of material around the crack to the point where the crack itself is literally ground away”¹⁶⁵.

The area of the upper attachment lug was identified by BAE Systems as an area susceptible to fatigue cracking. As a result they released a Company Service Instruction CSI/Strikemaster/50 that required non-destructive testing of the lug top surface.¹⁶⁶ A similar service procedure was incorporated in the RNZAF System of Maintenance being SP 1137.

The non-destructive testing of these lugs required a process using an eddy current technique with a device similar to an oscilloscope which was used to measure the development of eddy currents that are induced around areas of cracking.

The protocol for carrying out eddy current testing is set out in NDT/STR/3 as part of the service requirement. The test area is to be prepared in such a way that it is supposed to be free of any loose and cracking paint. The test procedure then calls for the scanning of the surface in a zigzag pattern. If a defect was detected then the area should be stripped of paint and re-tested¹⁶⁷.

Mr Neil Joiner gave evidence of carrying out the NDT testing on the upper attachment lug in 2005. No crack was detected. However Mr Blyth raised a note of caution in relation to the testing process. He pointed out that whilst accepting that eddy testing was capable of detecting cracks beneath a shallow layer of material such as paint, if the material covering the crack was sealant or anything more substantial then it would interfere with the accuracy of the testing process¹⁶⁸.

¹⁶⁵ Transcript Page 21, 9 June 2011 from Line 33

¹⁶⁶ Page 66 - ATSB Final Report Volume 4 Tab 4. Exh. 2

¹⁶⁷ NDT/STR/3 Page 71 of the ATSB Final Report

¹⁶⁸ Transcript 9 June 2011, Lines 32-39.

Mr Joiner's testing took place when the aircraft had flown 5,068 hours.¹⁶⁹ At the time of the accident the plane had flown approximately 5,082 hours suggesting only a further 14.4 hours additional flight time. On a metallurgical assessment by Mr Blyth of crack 'A' it would appear that that crack had been in existence for more than 50 hours if not "several hundred hours"¹⁷⁰.

There was no evidence of the existence of any sealant or excessive paint from which one can draw conclusions as to the inappropriateness of the testing procedure, however it nonetheless begs the question as to why the NDT testing failed to pick up crack B or assist in detecting crack A. If the thickness of paint or sealant can interfere with the effectiveness of a testing process then perhaps it is more appropriate that all coatings be removed from the area the subject of investigation.

In my view this calls for a review of the service procedures of SP 1137 and NDT/STR/3 as well as the testing technique as an investigative tool in general. Accordingly I make the following recommendation:-

9. That CASA refer to the Maintenance Review Board for consideration, both in general and in particular, amendments to Service Procedure 1137 and NDT/STR/3 that in preparation for Non-Destructive Testing (NDT) – Eddy Current Testing, the area for such testing is to have all coatings removed.

e) Compulsory Insurance

On behalf of the O'Donoghue family I have been asked to consider making a recommendation that personal injury liability coverage insurance be mandated to those operators of adventure style flights. Under Section 41 of the Civil Aviation (Carriers Liability) Act 1959, a person must not engage in passenger carrying operations unless an acceptable contract of insurance in relation to

¹⁶⁹ Log Book Statement Aircraft Section Volume 3 Tab 8 Exh.2

¹⁷⁰ Transcript Page 26, 9 June 2011 Line 20-26.

the operations is in force. ¹⁷¹ But that responsibility to hold personal injury liability coverage only relates to operations covered by Air Operators Certificates¹⁷².

Despite this, there appears to be an anomaly in the legislation which allows operators of limited category aircraft engaged in adventure style flights to not be required to hold compulsory insurance. As a result of those inconsistencies in the legislation Mr Costin was not required to and apparently did not hold personal injury or death liability insurance coverage in relation to his operations.

Following the aircraft accident, Mr Dines on behalf of AWAL considered the question of whether compulsory insurance for limited category aircraft could be implemented. Sadly, when that was initially embarked upon, estimates of \$100 per flight insurance coverage costs were considered too expensive and at that time a recommendation to AWAL was not adopted of it being a condition of the issuance of limited category operators certificates.

When considering whether a recommendation should be made, the Coroner must have regard to whether such a recommendation as sought, arises from any matter “connected with” the death with which the Inquest is concerned ¹⁷³.

The Coroner’s Act 2009 is concerned with issues concerning public health and safety. Whilst the issue of inconsistency in legislation regarding two apparent types of commercial operations is obvious, this aspect of insurance was never fully ventilated nor was the issue raised through Senior Counsel Assisting in this Inquest. The issue as to whether Mr Costin’s company should have held insurance were not a subject of investigation. They did not go to an issue or assertion as to the manner in which the sad deaths of Mr O’Donoghue and Mr Costin came about. Nor did the issue of insurance touch

¹⁷¹ Section 41E (1) Civil Aviation (Carriers Liability) Act 1959

¹⁷² Section 28B Civil Aviation Act

¹⁷³ Section 82(1) Coroners Act 2009

upon any aspects of safety of operations of an aircraft under the Special Certificate of Airworthiness provisions.

In my view the question whether personal injury liability insurance should be mandated is an operational matter for CASA as the regulator and for AWAL as a self-administering body to determine for themselves. For those reasons I do not propose to make a recommendation for the implementation of insurance conditions.

I do believe however it is appropriate to make comment that in my view, operators of adventure style flights should hold such insurance or at least should make it clear on their “warning” documentation that in addition to the fact that the passenger flies at his own risk, that risk also extends to the fact that no insurance coverage is provided in the event of any accident.

I have received some comfort on this question of insurance through the further submissions provided by AWAL. In its recent letter of 21 February 2012 AWAL advised that:-

“It is now resolved to make it mandatory that any operator engaged in adventure flights involving fare paying passengers will be required to hold compulsory insurance.”

This is a welcome development in these proceedings and a responsible step taken by AWAL on behalf of its members and those parties who wish to participate in historic aviation. Perhaps CASA will also consider a review of the legislation with a view to incorporating the stance taken by AWAL.

f) Access to manufacturer information on the safe life issues

Some focus was levelled during the course of the Inquest as to whether a 1.9 multiplication factor applied to the aircraft VH-AKY at the date of the air crash. The significance of this information was that some evidence raised the possibility that the 1.9 multiplication factor applied to the entire life of the

aircraft in which case its fatigue life would have expired prior to the air crash and the aircraft should have been grounded.

This aspect of the evidence raised the difficulties of non-military owners of ex-military aircraft obtaining information from manufacturers.

The ATSB in their Final Report ¹⁷⁴ note that “there is no avenue for civilian operators of retired military aircraft to obtain access from military aircraft manufacturers in establishing a system of continued airworthiness of their particular aircraft”.

This difficulty was evident from attempts to source information from BAE Systems regarding the application of a 1.9 multiplication factor to the fatigue index of specific planes. There was a general reluctance in my view to provide information to individuals or their representatives. It was obvious from the response of BAE Systems in its letter of 3 August 2011 to the solicitors representing CASA that it would prefer to deal with CASA directly rather than through legal representatives¹⁷⁵. Importantly, however BAE Systems did confirm that it would provide assistance to CASA direct.

Mr Camilleri as Director of Self-Administration, when asked about obtaining information from manufacturers on fatigue issues such as the 1.9 multiplication factor said, “CASA may be the only organisation in Australia to have any chance of getting that information”¹⁷⁶. He had experienced similar difficulty with obtaining general information from another manufacturer of an ex-military aircraft, the L39.

I accept Mr Camilleri’s view that organisations such as AWAL were considered by manufacturers as civil organisations and were unlikely to receive appropriate responses. It is also clear that AWAL is not the only recreation aviation administration organisation (RAAO) that operates limited

¹⁷⁴ Page 40 ATSB Final Report

¹⁷⁵ Annexure Tab 8 to Statement of Mr Punshon containing Letter from BAE Systems dated 3rd August 2011

¹⁷⁶ Transcript 24 October 2011 Lines 22-23

category aircraft. It is therefore likely that there may be other organisations that suffer from a lack of response from manufacturers.

It would clearly be beneficial that any inquiries as to safe life operations of limited category aircraft be made by an organisation such as CASA as the regulator of air safety for all aircraft in Australia. It presumably has appropriate governmental and aviation gravitas and anything less may result in existing manufacturers who have no commercial responsibility to the owners of ex-military aircraft dismissing requests for assistance or disseminating information which may affect the safe life and operation of these aircraft.

The increase in the fatigue index of an aircraft and its application in full or in part to an aircraft such as the BAC 167 Strikemaster jet is an important safety issue. It substantially affects the life of the aircraft and when safety inspections and modifications would need to be undertaken. For example BAE Systems issued a Company Service Instruction CSI/Strikemaster/19 advising operators of cracking around bolt holes in the inboard area of the main-plane lower spar boom of the BAC 167 Strikemaster. That instruction led CASA to issue an Airworthiness Directive AD/Strikemaster/3. But the applicability of that Directive was to aircraft that had reached 70 FI. That Directive had application from October 1996. Any increased application by virtue of a 1.9 multiplication factor would have significantly advanced in time the need to carry out such modifications as were required for continued flying beyond a further 2 FI as mandated by the Directive.

The fact that this contention concerning the application of a FI multiplier had only apparently come to light after the investigation into the crash is a clear matter of concern. CASA was not advised by BAE Systems of the potential for the application of a 1.9 multiplication factor either directly or by Company Service Instruction. Neither did the United Kingdom Civil Aviation Authority (UKCAA) notify CASA by way of a Mandatory Permit Directive. The UKCAA although knowing through their issuances of Airworthiness Approval Notes (AANs) of the application of a multiplication factor to some Strikemaster jets

did not see it as necessary to issue a Mandatory Permit Directive because “as these aircraft are ex-military they do not qualify for International Civil Aviation Organisation (ICAO) certificates of airworthiness and there was no routine passage of information on them between ICAO national authorities”¹⁷⁷.

It was also suggested during the course of the Inquest that one of the best sources of information about issues relating to Systems of Maintenance comes from those owners themselves. If they become aware of matters which may affect a System of Maintenance they are required to bring that to the attention of the Director of Self Administration (DSA) of AWAL or CASA as the regulator. Despite the suggested closeness of such enthusiasts and the international interchange of aircraft knowledge none of the Australian owners of Strikemaster jets were apparently aware or raised the potential issue of multiplication factor as being applicable to their aircraft.

Any internet enquiry of the UK Airworthiness Approval Notes (AANs) should have detected at least two cases where the multiplication factor had been specifically raised for Strikemaster BAC 167 jet aircraft.

The apparent absence of knowledge about the application of the 1.9 multiplication factor demonstrates a clear gap in the reception of important safety life information as it applies to limited category aircraft. The gap needs to be closed by the pro-active enquiry of those manufacturers of ex-military aircraft, or in their absence international type organisations, which may bring to the attention of the regulators and administrators of Systems of Maintenance that all applicable information to be considered and so applied.

In its final written submission CASA repeated its position that there is “no practical utility in writing to manufacturers (where still in existence) of ex-military aircraft, to make, periodically, general and non-specific enquiries as to whether the manufacturer is aware of and would care to convey information in

¹⁷⁷ Annexure 6 to the Statement of Mr Punshon 12 October 2011.

relation to any “safety of flight” issue that may affect a specific aircraft or aircraft of a kind flown in Australia.”

Sadly in my view, this position ignores the difficulties being experienced by Certificate of Registration holders in obtaining information from manufacturers. It fails to recognise that BAE Systems if asked about fatigue indexes earlier than 2011 may have alerted Australian regulatory authorities to the specific existence of this 1.9 multiplication factor and its application to some aircraft. Clearly UKCAA knew so there was no need to suggest that BAE would not have responded to a variation in fatigue index or hours question. CASA also fails to recognise that “myriads of networks” as referred to in its submissions as presently existing between owners also failed to detect such an important issue.

The most appropriate organisation to carry out such inquiries should be the national regulator, CASA. It is the national organisation with the most prestige, imprimatur and gravitas that is likely to receive an appropriate response. For example BAE Systems acknowledged that it was prepared to assist CASA with their inquiries. Mr Coyne and Mr Punshon from CASA agree that it would be helpful if ongoing inquiries were made with the manufacturers where they existed¹⁷⁸.

It was disappointing that both CASA and AWAL, through their respective representatives, Messrs Coyne and Camilleri, seemed to suggest that because the manufacturers were not committed to ongoing support of these warbird aircraft in civilian hands it was unlikely that any meaningful response to safe life issues would be received¹⁷⁹. It was also submitted that there would be significant difficulties drafting appropriate generic questions as to the structural integrity or fatigue life that a manufacturer would be able to respond to.

¹⁷⁸ Evidence of Mr Coyne Page 47, 24.10. 2011 and Mr Punshon Page 9 Line 16-20, 25.10.2011.

¹⁷⁹ Coyne Page 47, 24.10. 2011

I do not accept that view. CASA was able to formulate such a request in their letter of 1 November 2011 (a copy of which was attached to CASA's written submissions). Once the regulator CASA has a response from the manufacturer it would then be a case of what to do with that information. If there was any doubt about the nature of the response the matter could be forwarded to the Maintenance Review Board for its proper consideration. The application of this 1.9 multiplication is an apt example. Whilst the present response from the manufacturer BAE System dated 21 October 2011 may be considered vague in its terms as to whether and from when a multiplication factor applies to ex-Singapore Air Force Strikemaster aircraft like VH-AKY at least BAE Systems have acknowledged the existence of such a multiplication factor.

There was nothing to suggest that any enquiry of BAE Systems as to the fatigue life of Strikemasters in the past would not have yielded some information about the application of a multiplication factor. Of course, what CASA and AWAL as regulators and administrators of the applicable legislation do with such information is a matter for their informed judgment.

This inquiry is not restricted to just Strikemaster aircraft. It has application to all warbird type planes and would aid those operators with information they may be unable to obtain from their own enquiries.

- 10. Accordingly, I recommend that CASA, on a nominated annual date, initiate contact with existing manufacturers of limited category aircraft or in the event of the manufacturer no longer existing, the international or national association of the subject type of limited category aircraft, seeking disclosure of any information that has arisen since the last enquiry as it relates to the safe life and safe operation of the subject type of a particular aircraft within the subject type, including any variation of any fatigue measurement factors.**

Conclusions

Mr Nicholas Costin and Mr Shane O'Donoghue lost their lives when the aircraft they were flying broke up in flight, became uncontrollable and crashed. This terrible event took place at approximately 12.30pm on 5 October 2006 in the Turon State Forest area northeast of Bathurst New South Wales.

The focus of the inquest was the reason for the break-up in flight and whether there were organisational failures that led to the plane being unsafe to fly.

The inquest found that the rudder mass balance was prised back over the top of the rudder causing the rudder mass balance and part of the rudder itself to separate from the plane. This event then led to the separation of the tailplane and resulted in the plane nosediving towards the ground.

The right wing experiencing a significant overload event following the loss of the tail section then detached from the aircraft at a point of the previously structurally weakened upper main spar attachment lug. The management of flight at this point was irrecoverable and the plane crashed almost immediately thereafter at high velocity. There was sadly no chance of survival.

The Inquest was unable to determine the actual cause of the rudder mass balance separation. In my view three possible determinations were available they being, flutter induced from turbulence in the crash area, pilot induced control oscillation and lastly, bird strike. An examination of the wreckage of the VH-AKY found cracking in the right wing upper main spar attachment lug. The Inquest concluded that the cracking had been in existence for many flight hours prior to the accident during which time non-destructive testing should have detected at least one of the cracks but didn't. Whilst noting the structural deterioration of the lug itself I found that it was not causative of the tailplane brake-up.

Accepting that the non-destructive testing was properly carried out one can only conclude that it was hampered by the presence of a coating over crack B and that prevented the crack detection.

The regulatory oversight of the limited category aircraft involved in adventure flights such as VH-AKY prior the accident was in my view demonstrated to be deficient. There was no supervisory role undertaken on Mr Costin or his operation of adventure flights so as to ensure compliance with the Certificate of Registration holder's obligations under the relevant legislation. Having said that there is no evidence to support a finding that Mr Costin did not comply with his obligations under CAR 262AM or his maintenance obligations for his aircraft.

There is a suggestion that a 1.9 multiplication factor should have been applied to the subject aircraft. The evidence before me is not conclusive that the 1.9 multiplication factor applied to the entire life of the aircraft. In any event the evidence is conclusive of the fact that at the time of the accident, CASA, AWAL and those immediately associated with the management and maintenance of VH-AKY, were not aware of the suggestion of any application of a multiplication factor to be applied to the aircraft's fatigue index.

I consider it appropriate that a number of recommendations should be made in the interest of improved health and safety for those engaged in aviation flight as well as from those issues that directly arose from the inquest.

Findings

Mr Shane John O'Donoghue died between 12.20pm and 12.45pm on 5 October 2006 in the vicinity of the Turon State Forest, north east of Bathurst as a result of multiple injuries sustained when the Strikemaster aircraft in which he was travelling broke up in flight and impacted with the ground.

Mr Nicholas David Costin died between 12.20pm and 12.45pm on the 5 October 2006 in the vicinity of the Turon State Forest, north east of Bathurst as a result of multiple injuries sustained when the Strikemaster aircraft in which he was travelling broke up in flight and impacted with the ground.

Acknowledgments

I thank each of the interested parties in their patience in awaiting these Findings. I again express my sincere and heartfelt sympathies to the family of both Mr Shane O'Donoghue and Mr Nick Costin. The families of each have shown great strength, compassion and interest throughout this extended Inquest. Other family members and friends generously supported them, which was ample evidence of the regard in which these men and their immediate families were held. I thank them for their presence and their support to those in their care.

I would like to extend my sincere thanks to those who have been directly involved in the preparation and presentation of the voluminous amount of evidence that was placed before this Inquest. Retired Detective Senior Constable Ian Nightingale and more recently Detective Senior Constable Robert Newman have undertaken a thorough police investigation. Both have tirelessly pursued the myriad of enquiries asked of them and performed their duty with distinction.

Mr Stephen Dines deserves a special mention. He greatly assisted my Senior Counsel Assisting and has made himself available to assist on any technical issue that arose. His independence, expertise and balance were appreciated in my resolving and understanding of a number of complex issues. I would specifically like to express my thanks to those members of the ATSB who both diligently investigated and presented their expert evidence in a meaningful and constructive fashion. Again their input in relation to assisting me to understand some of the issues was greatly appreciated.

Lastly I wish to express my sincere appreciation and admiration for the legal team assisting me in this Inquiry. Ms Robyn Fraser, Solicitor from the Crown Solicitor's Office, Ms Georgina Wright of Counsel and ably being led by Mr Chris Hoy of Senior Counsel. I thank them for their tireless application and attention to detail. In particular, Mr Hoy for his highly competent and balanced examination of the witnesses and other technical issues and for his preparation of detailed summation of which specific references have been relied upon for the purposes of my Findings. I am in his debt for his professional assistance.

William Brydon
Coroner.