IN THE CORONERS COURT OF VICTORIA
AT MELBOURNE

Court Reference: COR 2006 0950

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)
*Section 67 of the **Coroners Act 2008***

Inquest into the Death of: JOHN CHRISTOPHER HENDER

Delivered On:	5 June 2013
Delivered At:	Level 11, 222 Exhibition Street Melbourne 3000
Hearing Dates:	24, 25, 26, 27 and 28 October 2010
Findings of:	JANE HENDTLASS, CORONER
Representation:	Mr J. Rule appeared on behalf of the Civil Aviation Safety Authority
Police Coronial Support Unit	Senior Constable Remo Antolini, assisting the Coroner

I, JANE HENDTLASS, Coroner having investigated the death of JOHN CHRISTOPHER HENDER

AND having held an inquest in relation to this death on 24, 25, 26, 27 and 28 October 2010
at MILDURA
find that the identity of the deceased was JOHN CHRISTOPHER HENDER
born on 24 July 1956
and the death occurred 12 March 2006
at Block 3133, Riverside Avenue, Mildura 3500
from:

1 (a) INJURIES RECEIVED IN AVIATION ACCIDENT

in the following circumstances:

1. Christopher John ("Jack") Hender was 49 years old when he died. He lived at Old Diartmuk Road in Cardross with his wife Mary, their daughters, Elizabeth, Jessica, Jemima and Naomi, and their 10 year old son, Samuel.

2. Mr Hender's Medicare records indicate that he had consulted Dr Kanandalea Shetty on 27 November 2004 complaining of an eye irritation. He had no other recorded medical history.

3. Mr Hender was first issued a single engine pilot's licence in Israel in 1994 and a multiengine commercial pilot's licence from the United States was issued in 1995.

4. In 1999, the Civil Aviation Safety Authority ("CASA") relied on Mr Hender's existing pilot licences to issue a Special Pilot (Aeroplane) Licence endorsed with a Visual Flight Rules rating and a Flight Radiotelephone Operator Licence in Australia.

5. Mr Hender's Special Pilot (Aeroplane) Licence was valid until 26 March 2006.

6. Mr Hender flew an aircraft that he had built from a modified Stoddard-Hamilton Glasair-SH2RG light aircraft kit. The Glasair-SH2RG light aircraft is designed as a high performance sport aerobatic type aircraft.

7. Mr Hender had fitted his aircraft with an Atkins Rotary 13B engine[1] and a "Cessna 310 twin engine carburettor".[2] The aircraft had an easily recognisable sound.

8. On 18 April 2002, CASA issued a one year Special Certificate of Airworthiness (Experimental) for Mr Hender's aircraft with registration mark VH-IDF. The aircraft was expected to operate out of Mildura Aerodrome.

9. Mr Hender's Special Certificate of Airworthiness (Experimental) carried a number of limitations on his use of the aircraft. In particular:

- the aircraft was approved for visual flight rules operation only;
- no person could operate the aircraft other than to accomplish the flight test and operation outlined in the application;
- all flights for the first 40 hours operation were to be within 50 nautical miles of Mildura Airport;
- he was unable to carry passengers unless they were required for testing purposes.

10. Mildura Aerodrome is in uncontrolled or Class G Airspace. Therefore, as well as complying with the conditions of his Special Pilot (Aeroplane) Licence and his Special Certificate of Airworthiness (Experimental), Mr Hender was required to comply with Civil Aviation Rule 166 when he flew within 10 nautical miles of the airport.

11. Civil Aviation Rule 166 required Mr Hender to carry a radio capable of sending and receiving from the Mildura Common Traffic Advisory Frequency (CTAF). However, Mr Hender's radio was not required to and could not communicate with Air Traffic Control in Melbourne or hear automatic current weather transmissions issued from Mildura Aerodrome.

12. At the Mildura Air Show in 2003, Mr Hender described the performance of his aircraft including :

"First flight Mildura 18/04/02. Build time in excess of 2500 man hours over five year period (Very understanding wife). T/O RPM engine 7000. Prop 3225. IVO prop cockpit

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[1] This is a rebuilt 13B Mazda RX7 rotary engine.

[2] As defined by Mr Hender in his display at the Mildura Air Show in 2003.

adjust/able/carbon fibre 76 inch. Weight 1800 pounds. Gross/solo 1200 pounds. Top speed 250 plus miles per hour. Stall 50 miles per hour. Range 1600 plus miles. Fully aerobatic. Dual electronic ignition. Dual batteries through isolator switch. Basic IFR panel."

13. Further, evidence before me indicates that, in the two years before he died, Mr Hender had substantially modified his aircraft so that it would not necessarily have continued to meet the requirements for renewal of his Special Certificate of Airworthiness if he had made that application to CASA.

14. However, Mr Hender seems to have been unaware that his Special Certificate of Airworthiness (Experimental) had expired in 2003. By that time, he was already planning to visit his brother in Adelaide and to take Samuel with him to Broken Hill on his 10th birthday.

15. On 6 & 7 February 2006, Mr Hender attempted to vary the conditions of his Special Certificate of Airworthiness (Experimental). In the course of those conversations with the Civil Aviation Safety Authority ("CASA"), he was told that his Special Certificate of Airworthiness (Experimental) had expired and would not be renewed until his aircraft had undergone further inspection.

16. Despite becoming aware that his Special Certificate of Airworthiness (Experimental) had expired Mr Hender flew his aircraft to visit his brother, Michael Hender, in Adelaide on or about 15 February 2006. He completed this trip without a hitch.

17. On 11 March 2006, Mr Hender fully fuelled his aircraft and tied it down on the Mildura aerodrome ready to go to Broken Hill next day. It is 137 nautical miles from Mildura to Broken Hill. The fuel would have allowed a full four hours flying time with take off and landing.

18. On 12 March 2006, Mr Hender took Samuel with him to fly to Broken Hill to visit a friend, Pim De-Lijster. No one had ever flown with Mr Hender in his aircraft before that day. Mrs Hender felt powerless to prevent the trip.

19. Mr Hender and Samuel left Mildura by 8.30am and the flight took about 50 minutes with the wind behind them.

20. At about 6.40pm Adelaide time or 7.10pm Mildura time, Mr Hender and Samuel left Broken Hill to fly back to Mildura Aerodrome. Accordingly, Mr Hender expected that they would be home by 8.30pm.

21. Dr De-Lijster watched the aircraft leave Broken Hill and noticed that the aircraft was running very smoothly and there was nothing abnormal about the engine noise.

22. At about 7.30pm on 12 March 2006, the front of a severe weather change was approaching Mildura from the west. This cold front had created gusty winds and a dust storm at the airport.

23. On 12 March 2006, sunset in Mildura was at 7.55pm local time. By that time, the wind direction had changed from the north west to the south west associated with the passage of a surface trough through Mildura causing reduced visibility to 5500 metres. The cloud base was 140 feet. At about 8.00pm, the Bureau of Meteorology recorded that the mean air speed at Mildura Aerodrome was 19 knots gusting up to 30 knots.

24. The Qantas Link Dash 8-100 commercial aircraft undertakes routine Sunday afternoon flights between Melbourne and Mildura. This aircraft carried 36 passengers.[3]

25. At about 7.45pm on 12 March 2006, when he was 60-70 miles from Mildura, the pilot of the Dash 8, Steve Dawbin, notified other aircraft on the CTAF that he was preparing to land on runway 27 at Mildura Aerodrome.[4] Mr Hender heard this message and responded with questions about the approaching dust storm.

26. At 7.45pm, Rod Knight was also in his light aircraft approaching the Mildura Aerodrome. He expected to land about six minutes after the Dash 8.

27. Mr Knight told the Court that he could see the dust storm from about 25 to 30 miles out. He also heard the exchange between Mr Dawbin and Mr Hender and recognised Mr Hender's voice.

28. However, at 7.55pm, Mr Dawbin changed his flight plan. He notified pilots in the local area on Mildura CTAF that he was landing on the north/south runway 18. Mr Dawbin then landed

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[3] It has been replaced by the Qantas Link Dash 8-400 with 74 seats.

[4] Runway 27 is the longest runway at Mildura Airport and the easiest to manoeuvre from a Melbourne approach.

his commercial flight successfully at Mildura Aerodrome. He told the Court he changed his runway because the gusting wind change to a southerly had hit the airport.

29. At about 8.00pm, Mr Dawbin left the airport. It was already dark enough to use the headlights on his car.

30. Mr Knight also decided to use runway 18. He then broadcast this intention to land on runway 18 at Mildura Airport on the Mildura CTAF.

31. At about 8.05pm, Mr Knight completed a difficult landing on runway 18 in very gusty conditions.

32. Neither Mr Dawbin nor Mr Knight heard any further radio transmissions from Mr Hender. Therefore, I am confident that Mr Hender did not make any radio announcements on Mildura CTAF between 7.45pm and 8.05pm when he was approaching Mildura Aerodrome.

33. As he was leaving his aircraft, Mr Knight became aware of Mr Hender's aircraft when he heard the engine open up to full throttle. He looked up and saw Mr Hender's aircraft was about 50 feet off the ground travelling about half way down the flight line for runway 27 when he appeared to have aborted his landing.

34. By 8.05pm, Mr Knight's radio was turned off so I am unable to say whether Mr Hender made any radio broadcasts on CTAF indicating that he intended to land on runway 27 and/or he was aborting this landing attempt.

35. However, evidence from several witnesses who observed Mr Hender's approach to Mildura Aerodrome and flight path after his aborted landing attempt suggests that Mr Hender was unable to land on runway 27 because of a tail wind.

36. Therefore, Mr Hender seems to have decided to abort his landing and approach runway 18. Accordingly, he attempted to gain height and execute a 180 degree right hand turn to line up for a landing into the wind.

37. Mr Arnold told the Court he saw Mr Hender's aircraft :

"when I first seen him, he was straight and level....he climbed to the maximum height. And when he started falling, it then went into a nose up attitude.... Heading towards a stall. Slow

air speed, nose up. It was all indications of close on stall."

38. At 8.14pm, as Mr Hender's aircraft was still banking heavily to the right it flew over a big tree with its engine running at maximum power, it lost altitude and crashed into the roof of a shed and drying rack in Riverside Avenue. The aircraft then caught fire.

39. Mr Hender's body was found protecting Samuel's body in the wreckage of his aircraft. Its position indicates that he anticipated the crash landing.

40. Christopher John Hender was identified by matching with his dental records.

41. Autopsy determined the cause of Mr Hender' s death was injuries received in aviation accident. The forensic pathologist who performed the autopsy found he had suffered chest injuries including fractured ribs and sternum. No other injuries directly attributable to the impact were identified.

42. The presence of carbon material in the trachea suggests that Mr Hender was alive for at least a short time after impact. However, the period of post impact survival would not have been more than a few minutes duration based on the hydrogen cyanide level of 12%.

43. Accordingly, I find that Jack Hender died from injuries received in an aviation accident.

44. The Australian Transport Safety Bureau ("ATSB") did not investigate the incident and Mr Hender's aircraft was severely damaged by the fire that resulted from the crash. All documents in the aircraft were destroyed.

45. However, police investigators in Mildura undertook a thorough review of the issues that, from a general investigation perspective, may have contributed to failure of Mr Hender's aircraft to land safely at Mildura airport on 12 March 2006.

46. This finding will review the evidence before me in relation to the reasons that Mr Hender's aircraft failed to land successfully at Mildura Aerodrome on 12 March 2006 including:

- Weather at Mildura Aerodrome on 12 March 2006;
- Construction of Mr Hender's aircraft;
- Mr Hender's pilot licence;

- History of the incident in which Mr Hender and Samuel died; and
- Investigation of the aviation incident in which Mr Hender and Samuel died.

47. It will then comment and make recommendations intended to reduce the risk of other people dying in the circumstances that Mr Hender and Samuel died.[5]

Weather at Mildura Aerodrome on 12 March 2006

48. The Bureau of Meteorology also provides general advice about weather conditions at Mildura Aerodrome on its website. This advice includes the following information:

"Northwestern Victoria is prone to dust storms when conditions are dry.... Dust can occur with strong winds from any direction but by far the most common occurrence is in strong southwesterly winds following a cool change when reductions in visibility to less than 1000 metres can last for several hours. Spring and summer are the most likely time for dust to occur."

49. Further, Mr Dawbin told the Court he had previous experience with dust storms of the type encountered on 12 March 2006:

"Mainly in Mildura. I've been in Mildura now for almost 10 years and flying the whole time and I guess that we come across one of these probably once every 12 months. Some - it's hard to sort of put it into perspective. Some are probably less severe than the one on that particular night. There have been a couple of dust storms that have probably been worse since then"

50. Therefore, any pilot operating out of Mildura Aerodrome in March 2006 should have been aware of the risk that last light and the weather conditions could be influenced by onset a dust storm.

51. Mrs Hender told the Court that Mr Hender was not comfortable using computers and preferred to listen to weather reports and other information. However, he obtained a weather forecast in a telephone call before he left home on 12 March 2006. She told the Court:

[5] This Finding should be read in conjunction with the Finding of the death of Samuel Hender (Case No 953/06).

"From what I remember he made a phone call for the weather, because he was illiterate with the computer, he did make a phone call before he flew to get the condition."

52. At 8.00am on 12 March 2006, the Bureau of Meteorology was predicting good weather conditions with a cold front expected to cross Mildura Aerodrome at about 10.00pm that night. I presume this was the information conveyed to Mr Hender in the telephone briefing from a briefing officer at the Bureau of Meteorology.

53. The latest weather forecast for Mildura Aerodrome relevant to Mr Hender's return flight from Broken Hill was issued at 11.57am on 12 March 2006. On the basis of that weather forecast, Mr Hender expected or should have continued to expect clear weather until 10.00pm. At 4.46pm and 5.59pm, amended forecasts indicated changed temperatures but, otherwise, confirmed almost the same expected good weather conditions until 10.00pm.

54. Therefore, until he saw the front and dust storm from the air, Mr Hender could not have known that he would encounter a cold front with restricted visibility at about the time he expected to arrive at Mildura Aerodrome.

55. Mr Hender carried a radio that could receive and transmit on Mildura Common Traffic Advisory Frequency (CTAF). However, Mr Hender's radio was unable to pick up transmissions from the automatic aerodrome weather information service at Mildura Aerodrome or communicate with Melbourne area flight control operations.

56. At about 7.45pm, Steve Dawbin heard a pilot seeking information using the local CTAF radio frequency about the weather conditions at Mildura Aerodrome:

"Can you confirm for me what I'm looking at; is it a dust front, or is it a dust storm?"

This pilot said he was about 60 miles north of Mildura.

57. Mr Dawbin told the Court:

"... we were able to confirm that yes, it certainly was a dust storm. He also asked if there was any breaks in it and we indicated that as far as we could tell, no there wasn't."

58. Mr Dawbin also said that the tops of the storm were 7000 feet over the airport and Mr Hender replied he was climbing to 8000 feet. In response to a further question, Mr Dawbin told Mr Hender that visibility was still 8000 metres.

59. This would be the first available information that Mr Hender could access confirming the early approach of a cold front at Mildura Aerodrome.

60. At 7.55pm, Mr Dawbin notified the local area on Mildura CTAF that he was landing on runway 18 and landed his commercial flight successfully on the north/south runway 18 at Mildura Aerodrome. He told the Court he changed his runway because the wind change to a gusting southerly had hit the airport.

61. Accordingly, when Mr Dawbin left the airport at about 8.00pm, it was already dark enough to use the headlights on his car. He told the Court:

"(Ordinarily) *It would have been dusk but there would certainly have been enough light to have allowed a VFR pilot to have landed safety but with the dust coming through it really was very dark by the time we'd landed even, and Jack was certainly behind us, so he would have essentially been landing at night."*

62. At 7.45pm, Rod Knight was also approaching the Mildura Aerodrome in his light aircraft. Mr Knight told the Court that he could see the dust storm from about 25 to 30 miles out of Mildura.

63. Mr Knight also recognised Mr Hender's voice on the Mildura CTAF and heard his conversation with Mr Dawbin. Mr Knight believed that Mr Hender sounded concerned:

"I just sort of detected there was a little bit of a hint of emotion in his voice. He just sounded, you know, like he was concerned."

64. Mr Knight's wife, Marilyn Knight, also heard Mr Hender on the radio. She stated that:

"He seemed to have a sound of panic in his voice."

65. Mr Knight also heard Mr Dawbin say he was landing on runway 18 and interpreted this to mean that weather conditions had changed on the ground. Therefore, Mr Knight used the automatic weather service which is available on a different radio frequency to check the weather conditions and decided to also use runway 18. He then broadcast this intention to land on runway 18 at Mildura Aerodrome.

66. At about 8.05pm, Mr Knight completed a difficult landing on runway 18 in very gusty conditions. It was nearly dark and he was unable to see much outside the area lit by the lights of the airport.

67. This means that, by 8.10pm, when Mr Hender was attempting to land on runway 27 at Mildura Aerodrome, it was already quite dark.

68. Mr Dawbin had no warning of the change in weather conditions at Mildura Aerodrome until he saw the dust storm associated with the front:

"In fact I was quite shocked as well on descent into Mildura to be looking at what I was looking at. It was at least two hours ahead of what was forecast...

It's very unusual that we wouldn't be updated or alerted to the fact that that phenomena was much closer than what was indicated by the forecast but every now and again it does happen. I think whilst the Met people are pretty good it's not an exact science...

Well, certainly the only time in the 10 years that I've been flying, or operating out of Mildura, that it's happened, so - and I've been flying for 30, so yeah."

69. Mr Dawbin also told the Court that the front changed the visibility very quickly at Mildura Aerodrome that day.

"so late in the day with a dust front coming from the west, really it turned day into night very, very quickly."

70. Mr Knight also confirmed that, when he left New South Wales at about 4.00pm, he expected it to be fine weather in Mildura Aerodrome when he arrived with a light north/north easterly wind and good visibility, good conditions. He did not hear any updated weather forecast to change that expectation before he landed at about 8.00pm.

71. Therefore, I find that the weather conditions at Mildura Aerodrome on 12 March 2006 changed rapidly at about 7.45pm when a cold front forecast for 10.00pm arrived two hours early. Pilots had no reason to expect this early change in weather conditions until they saw the dust storm associated with the front when it was about 60km from Mildura.

72. Current weather conditions at Mildura Aerodome are recorded three ways:

- The Bureau of Meteorology has a manned observations office at Mildura Aerodrome. These reports are used to calculate and update weather forecasts as well as provide advice to telephone requests for information.

- They are transmitted automatically.

- They are observed by pilots and other witnesses on the ground and communicated through Melbourne Flight Control operations.

73. On 12 March 2006, current weather conditions were recorded manually at 30 minute intervals at Mildura Aerodrome from midnight to midday and from 4.00pm to 6.30pm. However, the manual records tendered to the Court do not include any data after 6.30pm for 12 March 2006.

74. This manual record indicates that minimum visibility dropped from 40 km at noon to 15km at 4.00pm on 12 March 2006. The height of the cloud base and the temperature dropped between 4.00pm and 5.00pm and then remained stable to 6.30pm.

75. Therefore, on one reading of the data, the changes that heralded a change in weather conditions at Mildura Aerodrome on 12 March 2006 had commenced between 4.00pm and 5.00pm.

76. However, in interpreting these records in Court, Mr Dawbin told the Court:

"Temperature changes are probably the only one that really has changed a great deal and that - that, to me, would start pointing me toward the fact that the change may come through a little bit earlier in that they've got a temperature change and the temperature was dropping just a little bit earlier than the previous TAF but it still doesn't suggest that you should have any concerns really, prior to 10 o'clock that evening, the TAF still reads pretty much the same as the previous one..."

77. Reginald Arnold lives near the eastern end of the east/west runway 27[6] at Mildura Aerodrome. He told the Court that, at 8.00pm, he heard an automatic weather report from the airport which indicated that the wind had turned from northerly to south westerly and was gusting at about 20 to 25 knots.

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[6] In his statement, Mr Arnold designates this runway 26 but I presume this is a mistake.

78. When analysed retrospectively, this automatic collection of weather data for 12 March 2006 shows that surface winds at Mildura Aerodrome remained northerly at 6.00pm local time and were generally of less strength than the winds to the south west of the trough. By 7.00pm local time, the surface trough was about 220 km north east of Mildura Aerodrome at Swan Hill. At 7.30pm, the wind at Mildura Aerodrome was still generally coming from the north between 5 and 15 knots with visibility of 40km.

79. This retrospective analysis of current weather conditions at and around Mildura Aerodrome also shows that the wind direction changed from the northwest to the southwest by 7.55pm. The change of wind direction was associated with the passage of a surface trough through Mildura causing reduced visibility. The cloud base was 140 feet.

80. At about 8.00pm, the automatic weather data showed that the cold front was passing through the Mildura Aerodrome. The wind was out of the south to south west. Visibility was less than 7 km because of the residual dust. The mean air speed was 19 knots gusting up to 30 knots.

81. By 8.23pm, the change had gone through Mildura Aerodrome. The wind was 15 knots gusting 25 knots from the south and visibility was up to 11km.

82. As an example of the third means of collecting and disseminating information about current and prospective weather conditions, at about 7.30pm on 12 March 2006, Mr Dawbin notified the Bureau of Meteorology about the changed weather conditions through Air Traffic Control in Melbourne. Accordingly, at 7.54pm, the Bureau of Meteorology issued a special report which indicated that the wind direction had changed from the north west to the south west at 16 knots associated with the passage of a surface trough through Mildura Aerodrome at that time causing reduced visibility to 5000 metres. The cloud base was 140 feet.

83. Therefore, I find the severe gusty dusty weather conditions that hit Mildura Aerodrome ahead of a cold front on 12 March 2006 were at their worst between about 7.45pm and 8.15pm on 12 March 2006. However, there was no information available to pilots which predicted the early arrival of the cold front until 7.54pm.

84. For this reason, even when he was leaving Broken Hill, Mr Hender could not have known he was likely to experience the gusting conditions and early onset of last light associated with early arrival of the cold front as he attempted to land at Mildura Aerodrome.

85. The Bureau of Meteorology explained that a pre-frontal trough is generally difficult to track across inland Australia because the speed at which it travels is difficult to estimate and often there is not the density of observation sites to establish its precise position in time. In the case of this incident at Mildura Aerodrome, the next observation site upstream of Mildura is Renmark in South Australia. Renmark is approximately 125 kilometres to the west of Mildura.

86. However, this does not explain the slow update of weather situation reports and forecasts when the cold front went through Swan Hill at 7.00pm and Mr Dawbin, Mr Knight and Mr Hender could all see the dust associated with the front at 7.30pm when it was only 20-30 miles or 30 to 40 kilometres from Mildura.

87. I am unable to say why the Bureau of Meteorology did not respond to the earlier than expected arrival of the cold front at Renmark. However, in the absence of manual weather updates feeding into the weather forecasts after 6.30pm, the Bureau did not seem to know or understand these changes at Mildura Aerodrome until they were notified by Mr Dawbin.

88. I note Mr Grandjean's evidence that a light aircraft may only cope with about 15 knots cross wind before it starts running out of rudder authority to maintain directional control.

89. Further, as Mr Knight's experience shows, any pilot of a light aircraft is likely to have experienced difficulty attempting to land at Mildura Aerodrome in the circumstances facing Mr Hender.

90. Therefore, I have formed the opinion that Mr Hender probably aborted his landing approach to runway 27 at about 8.15pm on 12 March 2006 because of his unexpected encounter with the southerly weather conditions that prevailed at the time.

91. However, in the absence of on-site expert analysis of the incident in which Mr Hender died, I am unable to say whether or to what degree the weather conditions at Mildura Aerodrome directly contributed to his death.

Construction of Mr Hender's aircraft

92. Mr Hender claimed to be well qualified as an aviation engineer and a pilot. In his application for a Special Flight Permit[7] on 6 March 2002, Mr Hender told CASA:

"I am a commercial pilot and an USA A&P certificate being experienced in all aspects of a/craft manufacture and maintenance."

93. Mr Hender's certification for building and maintaining his aircraft included:

- Rice Aviation Official Grade Transcript-Aviation Maintenance Technology indicating he had completed about 2000 hours study in general aircraft maintenance;
- Rice Aviation Certificate of Graduation in Aviation Maintenance Technology-Powerplant;
- Rice Aviation Certificate of Graduation in Aviation Maintenance Technology-Airframe;
- Rice Aviation and Staveley Instruments Inc Certificate indicating successful completion of 40 hours study in non-destructive testing;
- Houston Community College System Certificate of Completion of Aviation Maintenance Technology;
- Alexander Aeroplane Company Certificate of Completion of two days study of Fabric Covering;
- US Department of Transportation Certificate as a commercial pilot issued 7 September 1996 limited to multiengine instrument landing plane;
- US Department of Transportation Certificate as a mechanic issued 20 October 1995 limited to airframe power plant.

94. Mr Hender bought the kit for his Glasair SH-2RG single engine aircraft from Mission Aviation in the United States in 1996. He completed building it in 2001.

[7] This application was converted to an application for a Special Certificate of Airworthiness.

95. In building his aircraft, Mr Hender included a number of modifications to the Glasair SH-2RG single engine aircraft kit including use of an Atkins Rotary 13B engine[8] and a Cessna 310 twin engine carburettor.[9]

96. On 14 October 2001, Mr Hender applied to CASA for a Special Certificate of Airworthiness for his aircraft. In his application for a Special Certificate of Airworthiness, Mr Hender altered the Category/Designation/Purpose Requested from Kit Built to Amateur Built. Therefore, Mr Hender appears to have understood that the changes he made to the kit when assembling his aircraft may have meant that it was not now a kit aircraft but rather a combination of a kit and his own design.[10]

97. On 26 March 2002, Bob Prater, Senior Inspector Airworthiness at the Moorabbin office of CASA, insisted on undertaking a detailed inspection of Mr Hender's aircraft before he was prepared to issue a Special Certificate of Airworthiness. He also advised Mr Hender that he needed an independent inspection of the primary control systems by a licensed aircraft maintenance engineer or an experienced pilot.

98. Mr Prater advised Mr Hender to contact David Howse. Mr Howse was a Senior Airworthiness Inspector and CASA Authorised Person for Airworthiness Assessments.

99. On 18 April 2002, CASA accepted Mr Howse's advice and issued a Special Certificate of Airworthiness (Experimental) DX02-007 for Mr Hender's aircraft. Mr Hender's aircraft was registered with CASA as an experimental aircraft with registration mark VH-IDF. Its serial number was 550.

100. The face of the Special Certificate of Airworthiness (Experimental) indicated that it had an "Unlimited" expiry date. However, the Annexure to the Special Certificate of Airworthiness (the "Annexure") indicated that it would expire on 18 April 2003.

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[8] This is a rebuilt 13B Mazda RX7 rotary engine.

[9] As defined by Mr Hender in his display at the Mildura Air Show in 2003. All other records were lost in the incident in which Mr Hender and Samuel died.

[10] On 20 March 2002, Bob Prater raised this requirement for Mr Hender to make an election about the category of certificate he was applying for because they involved quite different requirements and processes.

101. Mr Coyne explained that the Annexure took precedence over the unlimited expiry date in Phase 1 of licensing of experimental aircraft. However, after the aircraft was issued with a Phase 2 certificate it was unlimited unless it underwent major modifications.

102. In the context of the notation on the front of the document that the Special Certificate of Airworthiness (Experimental) had an "Unlimited" expiry date, I am unable to say whether or to what degree Mr Hender understood the effect that the Annexure had on its tenure in 2002.

103. The Operating Limitations on this Certificate of Airworthiness (Experimental) also provided:

"4. No person shall operate this aircraft for other than the purpose of operating amateur-built aircraft to accomplish the operation and test flight operation in the applicant's letter dated 18/4/02 in accordance with CASR 21.193(d).

5. Only personnel essential for the conduct of the testing may fly on board the aircraft. The carriage of passengers is prohibited."

104. The Annexure also indicated that all flights for the first 40 hours of the aircraft operation were to be within 50 nautical miles of Mildura Aerodrome.

105. Mr Coyne told the Court:

"we wouldn't allow him to operate in say out of Essendon or Sydney Airport or wherever because it's a populated area. While there are commercial aircraft coming into Mildura it's a low traffic volume, it's not a greatly populated area, so that's why we allow people like amateur built aircraft to fly here. But in terms of its operation I don't see any difference from a standard Cessna or a Piper that's flying in using correct radio calls. I say it's the same."

106. In that process, Mr Hender was also advised that violent or aerobatic manoeuvres should not be attempted until sufficient flight experience had been gained to establish that the aircraft was satisfactorily controllable throughout the normal range of speeds and manoeuvres.[11]

107. Further, the Annexure indicated that the aircraft was approved for Visual Flight Rules operation only.

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[11] Civil Aviation Safety Authority Australia, "Amateur-built experimental aircraft-certification", AC 21.4(2), September 2000, p. 27.

108. Visual Flight Rules are imposed on pilots because, in the absence of sophisticated equipment and training in use of instrumentation, pilots can easily lose perspective of which way they are flying when they cannot see the horizon or focus on other clues which assist them to orientate themselves in space.

109. In the absence of training in non-visual flight rules, Mr Hender would have difficulty in orientating himself at Mildura Aerodrome at night after he lost sight of the runway lights and the horizon.

110. Mr Rule agreed:

"*Well, yes, I mean I suppose if there's an argument that there was a loss of control, a stall would be an obvious culprit in terms of the cause of the loss of control. But I think that we've seen in other statements that potentially he was in a steep bank at night, and he could potentially have simply flown into it* (the shed) *without even knowing it was there.*"

111. However, although it is quite possible that Mr Hender became disorientated and thought his aircraft was still banking when he hit the shed, his position after the incident indicates that he anticipated and was prepared for a crash landing. This is inconsistent with spatial disorientation causing the aircraft to crash.

112. Mr Coyne told the Court that issue of this Special Certificate of Airworthiness (Experimental) indicated that Mr Howse had inspected the aircraft and that the existing modifications had been accepted as part of that initial design. Then, during phase one operation of the aircraft, any modifications or changes to the design must be advised to CASA or the authorised person during that time.

113. Mr Coyne advised that reportable modifications included:

"Anything that's significant in terms of change in the weight of the aircraft, the centre of gravity of the aircraft, the weight and balance, any cutting through any major parts of the air frame. So anything that is considered to be a major piece of work....

doing anything to the engine would be considered major. So anything to the engine, to the structure, would be considered major. Adding a GPS probably would not be."

114. Also accompanying the Special Certificate of Airworthiness (Experimental) for Mr Hender's aircraft, Mr Howse sent a letter which indicated that Mr Hender must carry the Certificate of Airworthiness with him aboard the aircraft and that revision of the Certificate would be required if Mr Hender substantially altered his aircraft.

115. With respect to maintenance of Mr Hender's aircraft, the Operating Conditions of the Certificate of Airworthiness provided:

"9. No person shall operate this aircraft unless within the preceding 12 calendar months it has had a condition inspection performed in accordance with the Glasair Owners Manual and Mazda engine operating and Maintenance check sheets and has been found to be in a condition for safe operation.

10. The builder (John Hender) or an appropriate LAME may certify for condition inspections in accordance with any conditions entered on this special airworthiness certificate, and issue a Maintenance Release, pursuant to Instrument No. CASA 19/01 and 885/99.

11. Condition inspections shall be recorded in the aircraft maintenance records ....."

116. Accordingly, I find that Mr Howse accepted Mr Hender's qualifications were adequate to excuse him from independent review of further maintenance and modifications he performed on his aircraft.

117. On 2 July 2002, CASA recorded an incident reported by Mr Hender under Civil Aviation Regulation 51(4). This involved problems with the nose gear.

118. CASA responded that Mr Hender needed to organise an investigation of the defect and it needed to be reported to CASA if it may affect the safety of the aircraft or cause the aircraft to become a danger to persons or property.

119. Mr Hender did not report the defect to CASA. He had no further recorded contact with the Civil Aviation Safety Authority until 6 February 2006. No one checked that his problem with the nose gear was properly rectified. His Special Certificate of Airworthiness (Experimental) was never renewed.

120. Mr Hender claimed that, during construction of his aircraft, it was inspected by Stan Barrett, who had since died, and by Jack Cobden. Mr Cobden confirmed that he assisted Mr Hender with construction of his aircraft.

121. In particular, Mr Cobden was aware that, as well as using a non-recommended engine and carburettor, Mr Hender had modified the kit during its assembly to allow the wheels to fit in to the wings, shortened the nose wheel leg and removed the bulk head. Further, it had only one door on the left hand side of the aircraft and it always had a problem with over heating.

122. These modifications meant that that Mr Hender's aircraft would take longer distance and required greater speed to get the tail down to take off than would otherwise have been the case.

123. However, Mr Hender does not seem to have been aware of these issues when he was building and modifying his aircraft. For example, Mr Cobden told the Court:

"Later on he said, "How did you know" - after he'd done his first takeoff, "How did you know that it was going - it couldn't get off that runway?" But - so I explained it to him."

124. Further, Mr Hender's aircraft had a fuel tank in each wing. Mr Funnell and Mrs Hender agree that Mr Hender put a third fuel tank behind the firewall during construction of the aircraft, between the engine and the cockpit. However, it was not connected or operational.

125. Mr Hender's father observed this auxiliary tank when he inspected the aircraft about a month before Mr Hender died. He did not comment on whether or not it was operational

126. However, Mr Arnold told the Court he was aware that Mr Hender had recently fitted an extra fuel tank in the engine bay of his aircraft near the fire wall. He said in evidence:

"I was talking to him I think about three days beforehand when he said he was doing it (the fuel tank), but that's all I knew. Because I didn't know he'd actually fitted - he'd just said he was going to fit it at that stage. And he explained where he was going to put it. Now, whether he put it in that area, I'm not sure...

When I spoke to him, was probably - I'm only guessing - probably a week beforehand that he said he was putting it in."

127. I am unable to explain the inconsistencies between these different reports about when the extra fuel tank was placed in the engine bay of Mr Hender's aircraft near the fire wall. I am also unable to say whether it was operational on 12 March 2006.

128. In 2004, Mr Hender moved his aircraft to Jack Funnell's hangar at Mildura Aerodrome.

129. Mr Funnell is a commercial grade 1 flight instructor and operator of the Aviation Training School at Mildura Airport.

130. Mr Funnell provides a different perspective of Mr Hender's capacity to undertake the work required to build and fly his aircraft. Mr Funnell told the Court:

"I found Jack to be meticulous with everything he did on his aircraft. The work I have seen him do on my own plane is better than brand new."

131. However, although I have no doubt that Mr Hender had good technical skills, I have formed the opinion that he had an exaggerated opinion about his own capability in relation to building, maintaining and testing his aircraft. He also found it difficult to believe and did not always tell everyone the truth about his aircraft's limitations.

132. Accordingly, I am not convinced that Mr Hender was qualified or experienced in the many skills required to build and maintain his aircraft to the level of competence required for issue of a Special Certificate of Airworthiness (Experimental) without on-going independent assessment of his work.

133. In the year before he died, Mr Hender was still having problems with the engine of his aircraft. It was still over heating.

134. Mr Funnell explained these problems as arising from his use of an engine designed for a car. It is not possible to convert the rotary engine to air cooling as some of the engine cooling passages in the engine need to be cooled via water - antifreeze compound. The engine of a car has eight litres of coolant whereas the aircraft has only five litres of coolant.

135. Mr Funnell also said that Mr Hender had fixed the problem with the oil temperature by putting wider intakes in the radiators, repositioning the radiators on the side of the engine instead of at the front of the engine and putting the oil coolers under the fuselage about one metre forward of the tail with long aluminium pipes from the engine to the coolers.

136. However, on the basis of Mr Funnell's description of the changes Mr Hender made to his aircraft after CASA issued his Special Certificate of Airworthiness (Experimental), Mr Coyne formed the belief that the changes made to address the over heating problem were in the category of modifications that required re-assessment by CASA or its Authorised Person. Neither Mr Hender nor Mr Funnell made any effort to report them to CASA.

137. Accordingly, I find that Mr Hender had substantially modified his aircraft after CASA issued his Special Certificate of Airworthiness (Experimental). Therefore, on 12 March 2006, his aircraft did not meet the specifications that applied when the Special Certificate of Airworthiness (Experimental) was issued on 18 April 2002.

138. I am unable to say whether or not Mr Hender's aircraft would have been issued with a new Special Certificate of Airworthiness (Experimental) if it had been re-assessed after the modifications he made between 2004 and 2006.

139. Further, from about Christmas 2005, Mr Hender was planning to fly to Adelaide to visit his brother. He was also planning to visit his friend at Broken Hill and wanted to take Samuel with him on Samuel's birthday.

140. On 6 February 2006, Mr Hender contacted CASA requesting removal of his restrictions on flying at night and within 50 nautical miles of Mildura Aerodrome.

141. Then, on 7 February 2006, Mr Hender rang CASA again and asked for a temporary Certificate of Airworthiness so he could fly his aircraft from Mildura to Moorabbin for inspection. Again, CASA refused permission for Mr Hender to fly the aircraft without a current Certificate of Airworthiness and arrangements commenced to facilitate his application for a new Certificate of Airworthiness (Experimental).

142. On 6 & 7 February 2006, CASA further advised Mr Hender that the aircraft would need to be inspected by their inspectors, that there could be some delay in organising this inspection because they gave priority to commercial aircraft, and it might be easier to obtain a Certificate of Airworthiness (Experimental) through the Sport Aviation Association of Australia. On 7 February 2006, the Civil Aviation Safety Authority also told Mr Hender that his expired Special Certificate of Airworthiness could not be extended.

143. There is no record of Mr Hender communicating again with CASA or Sport Aviation Association of Australia.

144. I imply from the timing of these telephone conversations with CASA that they were intended to enable the planned trips to Adelaide and Broken Hill.

145. The phone call also indicates to me that, until 6 February 2006, Mr Hender believed that his Special Certificate of Airworthiness (Experimental) remained valid and the restrictions on flying during the day and within 50 nautical miles of Mildura Aerodrome remained in force.

146. The CASA employee who spoke to Mr Hender told him that his Special Certificate of Airworthiness (Experimental) had expired three years earlier and that he needed to make a further application before he could fly his aircraft.

147. Mrs Hender told the Court that she heard Mr Hender speaking to CASA on the telephone about changing the conditions on his Special Certificate of Airworthiness. Afterwards, Mr Hender told Mrs Hender that CASA had removed the restrictions on flying at night and further than 50 miles from Mildura Aerodrome.

148. Further, although he had not spoken to CASA about removing the limit on passengers in his aircraft, Mr Hender assured Mrs Hender that CASA had given him verbal approval to take a passenger.

149. Accordingly, I find that Mr Hender always knew that his aircraft remained subject to restrictions on flying during the day and within 50 nautical miles of Mildura Aerodrome. Further, on 6 February 2006, he became aware that his Special Certificate of Airworthiness (Experimental) had expired.

150. Therefore, I find that Mr Hender knew he was flying an aircraft without a current Special Certificate of Airworthiness and in breach of the requirements of his now expired Special Certificate of Airworthiness (Experimental) when he visited his brother in Adelaide on or about 15 February 2006 and when he took Samuel with him to Broken Hill on 12 March 2006.

151. Mr Funnell was also unaware that the Special Certificate of Airworthiness for Mr Hender's aircraft had expired or that Mr Hender had communicated with CASA about removing his visual flight rule requirement and flying further than 50 miles from Mildura Aerodrome.

152. Mr Funnell said that, if he had known that his Certificate of Airworthiness (Experimental) had expired, he would have told Mr Hender not to fly. He was confident that Mr Hender would have accepted his advice. I do not share Mr Funnell's confidence about Mr Hender's reaction to his advice. However, I am of the opinion that his awareness of Mr Funnell's probable response explains why he was not open with Mr Funnell about his dilemma.

153. Further, Mr Funnell told the Court that the changes that Mr Hender made to his aircraft kit during construction and after issue of his Special Certificate of Airworthiness made a substantial difference to the way his aircraft performed.

154. In particular, Mr Funnell had helped Mr Hender to ensure that his alterations did not adversely influence the centre of gravity of the aircraft. In his opinion:

"I think Jack had the overheating problem under control at last."

155. Mr Hender also told his brother and Mr Funnell that his aircraft was only developing 200 horsepower at 5000 rpm. He said that the true airspeed was 120 knots and the indicated stall speed was about 68mph.[12]

156. Mr Grandjean explained the relationship between power output, indicated stall speed and stall speed on banking:

"in a steep turn, which is considered to be 60 degrees, the load factor is two which means that the apparent weight of the aircraft and its occupants is twice the normal weight. And one of the things that we also teach during steep turns is that the stall speed of the aircraft increases by the square root of the load factor. And in this instance it's two for a 60 degree steep turn.

What's the square root of two, 1.44. So it is a general rule of thumb if the aircraft stalls at, say, 50 knots then you would add another 25 knots. And that's in a level steep turn."

157. Accordingly, as Mr Funnell explained, this lower power output would increase the risk of stalling on banking:

"This lower power output would also reduce the speed at which stalling occurred on banking. We know that if he was on a steep bank, he needed 90 knots. If he was exaggerating, or if the 90 was an underestimate, we would've been right on a stall."

158. The Glasair Super II RG aircraft has a specified indicated normal cruise speed[13] of 175 knots and an indicated stall speed of 65 knots when fitted with the recommended Lycoming IO-360-B1E (180hp) engine.[14]

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[12] 1 knot=1.15078mph.

[13] 65% power @8000ft.

159. However, Mr Hender's aircraft was fitted with an Atkins Rotary 13B engine.[15] This engine was expected to deliver 250 horsepower and a maximum speed of 155 knots.

160. The stall speed of fixed-wing amateur-built aircraft is not always easy to establish and flight test data does not always reflect the stall speed documented by the designer or manufacturer.[16]

161. Further, Glasair Super II RG aircraft Pilots Operating Handbook includes a prominent notice in red text:

WARNING

Any negative, slipping, or cross-controlling manoeuvres require an inverted fuel system to prevent unporting the fuel system. If an injector or pressure carburettor equipped engine is unported during flight, the engine will stall and quit under power.

162. However, Mr Hender used a Cessna 310 twin engine carburettor in his Glasair Super II RG aircraft kit. All Mr Hender's records were lost in the incident in which he and Samuel died. However, he referred to the carburettor in this way in his display at the Mildura Air Show in 2003.

163. The Cessna twin-engine 310 model aircraft has been out of production since 1980. Like the Glasair Super II RG aircraft, it had a twin tank fuel system integrated into the wings. Each fuel tank carried 20 gallons. There is also a header tank carrying 7 gallons of fuel.

164. On 25 July 1969, the United States Department of Transportation published an Airworthiness Directive for Cessna Model 310 and other aircraft which prohibits operation of the aircraft with less than five gallons of fuel in each main tank to prevent fuel starvation during high angle descent.

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[14] Glasair Super II RG Pilots Operating Handbook. This manual refers to Glasair Super IIRG aircraft (Model SH-2R) built according to the appropriate Instruction Manuals. Any modifications to the aircraft that deviate from the Instruction Manuals may alter the applicability of this manual.

[15] This is a rebuilt 13B Mazda RX7 rotary engine.

[16] DR Stanton & RP Taylor, "Amateur-built and experimental aircraft. Part 1: A survey of owners and builders of VH-registered non-factory aircraft, Australia Transport Safety Bureau Report No AR-2007-043, June 2009.

165. Mr Hender filled his aircraft to capacity on 11 March 2006. There is no evidence that he refuelled in Mildura.

166. Therefore, assuming the third fuel tank was not operational, Mr Hender's aircraft was carrying about 48 gallons of fuel when he left Mildura.

167. On the basis of test flights, Mr Funnell estimated that this would allow at least four hours flying including two take-offs and two landings.

168. Mr Hender's flight from Mildura to Broken Hill and back took about three hours. Therefore, before the aborted landing he could be expected to have of the order of 12 gallons of fuel remaining or six gallons in each tank, not allowing for the fuel in the header tank.

169. Accordingly, at the lowest estimates, Mr Hender would have had about five gallons of fuel in each of the main tank when he aborted his landing on runway 27 at Mildura Aerodrome.

170. As this quantity of fuel is at the margin of prohibited operation and the estimates are not accurate, I am unable to say whether or to what degree the amount of fuel in the fuel tanks of Mr Hender's aircraft after the trip to Broken Hill contributed to the engine spluttering and then stalling after he aborted his landing on 12 March 2006.

171. There have been several types of carburettor used in the Cessna 310 twin engine aircraft since their introduction. First, there was new pressure carburettor which was the equivalent of a single-point fuel injection system. This was followed by a carburettor with mechanical fuel injection.

172. I am unable to say which of these variations Mr Hender used in his aircraft because his records were lost in the incident in which he and Samuel died. However, both variations are within the category of carburettors that can cause a stall in a Glasair Super II RG aircraft under power.

173. Therefore, the carburettor from the Cessna 310 twin engine aircraft that Mr Hender installed as a modification of the Glasair kit during construction significantly increased the risk of it stalling when it ascended rapidly and/or banked sharply and/or there was less than five gallons of fuel in the tanks.

174. Accordingly, I find that the Cessna 310 twin engine carburettor Mr Hender used in his Glasair Super II RG aircraft contributed to the aircraft engine stall under power during the high angle ascent and banking sharply that led to his death.

175. The Federal Aviation Administration of the US Department of Transportation has published safety concerns about amateur built airplanes possessing high wing loading and stall speeds in excess of 61 knots.[17]

176. This US research has shown that aircraft operating under experimental airworthiness certificates have a large and disproportionate number of fatal accidents for their fleet size. In particular, a majority of these incidents occurred due to inadvertent stall/spins while at slower air speeds in home airport traffic patterns.

177. On 19 February 2002, CASA accepted Mr Hender's United States commercial pilot's licence as evidence sufficient to justify issue of a perpetual Special (Aeroplane) Pilot licence which was also endorsed for Visual Flight Rules and a perpetual Flight Radiotelephone Operator subject to bi-annual flight and medical reviews.

178. In effect, this Visual Flight Rules rating required Mr Hender to ensure that his visibility was at least 5000 metres, that he was at least 1500 metres horizontally and 1000 feet vertically distant from cloud and that he remained above 1000 feet before he approached an airport to land.

179. Mr Funnell performed Mr Hender's flight reviews on 21 July 2003 and 20 October 2005. They used Mr Funnell's aircraft because, as Mr Funnell understood Mr Hender's pilot licence, Mr Hender was restricted in the number of people he could carry in his aircraft.

180. Mr Hender's medical examinations were undertaken successfully on 7 March 2000, 25 March 2002, 17 June 2003 and 26 March 2004.

181. Therefore, Mr Hender's Special (Aeroplane) Pilot licence remained valid until 26 March 2006.

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[17] Federal Aviation Administration, US Department of Transportation, "Safety concerns about amateur-built experimental Lancair and other amateur built airplanes possessing high wing loading and stall speeds in excess of 61 knots" AFS-200, 3 September 2010.

182. Mr Hender's Special (Aeroplane) Pilot licence allowed him to fly any VH registered aircraft providing that aircraft was certified as airworthy and had a maintenance release. However, his aircraft was not registered, certified as airworthy and there is no record of a maintenance release.

183. Mr Funnell told the Court that he only gave perfunctory attention to Mr Hender's radio competency when he performed his bi-annual flight checks:

"they were very simple. There was only three - there was nobody else around, so ah, I just told him what to say, or the call sign of the aeroplane, which he didn't know. And to tell people what he was going to do, and ah, um, and then the runway he was going to use, and ah, that was about all. That was no problem. And also on takeoff to give his takeoff call. He's rolling on runway such and such, and then after that there was - if there's no traffic around, there was no need to talk any more."

184. Further, Civil Aviation Rule 139 requires a pilot to carry his pilot licence, his medical certificate, his certificate of registration and his maintenance release[18] with him when he flies his aircraft. There is no requirement for a private operator to keep any other documents with him.

185. On the contrary, the pilot's logbook and the maintenance log of the aircraft should not be in the aeroplane because they are the official record of what has happened. Olivier Grandjean from CASA told the Court:

"There is a regulatory requirement to enter information in those books. But there's no regulatory requirement to keep it in the aeroplane. So, yes, you must fill them out, but, no, you don't need to take it in the aircraft with you. There's no legal requirements to do so."

186. However, Mr Hender carried all records of his build and maintenance of his aircraft with him. Therefore, they were destroyed in the aircraft fire. He told his wife:

"The rules and regulations say you have to have them there. I have to follow the rules and regulation".

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[18] The maintenance release is a document issued to the aircraft certifying the aeroplane's ability to fly. It must be valid whilst you're flying the aircraft. It does not include maintenance records.

187. Other than provisions in relation to documentation and radio access, there is no provision in the Civil Aviation Regulations to distinguish between the requirements of a private pilot flying his aircraft from a private aircraft, a private pilot flying from a public airport and a commercial pilot flying from a public airport.

188. Further, Mr Hender's Special (Aeroplane) Pilot licence could not be used to fly under any conditions other than those stipulated or to undertake any training for another operational activity. Therefore, in order to change the conditions imposed by his licence, Mr Hender would have to first obtain a private pilot licence.

189. Before an Approved Testing Officer can issue a Private Instrument Flight Rules Rating and/or a Non Visual Flight Rules Rating, the Civil Aviation Rules require a pilot to perform a minimum of ten training hours flying, a syllabus of training and some oral examination, and a flight test.

190. Further, only an Approved Testing officer has delegation to issue a Private Instrument Flight Rules Rating and or a Non Visual Flight Rules Rating which would enable Mr Hender to fly at night.

191. The Authorised Training Officer who issued the new rating must also obtain a flight test number and there is no record of a flight test number being issued to Mr Hender.

192. Therefore, in the absence of evidence that any of these requirements were met before 12 March 2006, I find that Mr Hender's current pilot licence continued to require him to follow Visual Flight Rules. I also find that, even if he did not know about its continuing application to his Certificate of Airworthiness, Mr Hender continued to be aware of this limitation on his Special (Aeroplane) Pilot licence.

193. Accordingly, I find that Mr Hender misled his wife when he told her that he was no longer restricted to Visual Flight Rules operation of his aircraft.

194. Endorsement for Visual Flight Rules prohibits flying when visibility is less than eight kilometres or after last light which begins when the sun is six degrees below the visible horizon or visibility is less than eight miles. Phenomena such as dust storms, weather, cloud or hills to the west may bring the onset of last light at an earlier time.

195. Further, pilots are trained to prepare a flight plan which takes into account any limitations imposed on their Special (Aeroplane) Pilot licence:

"...it's basic elementary pilot training. It's part of the flight plan. You consider three things. You consider what the weather will be like, you consider what the visibility will be like and you would consider whether the wind may be such that a - the crosswind that is applicable on the day may exceed the crosswind capability of the aircraft."

196. Pilots with a licence endorsed with Visual Flight Rules are expected to plan to land their aircraft at least ten minutes before last light. In order to determine variability of last light, pilots must also ensure that the weather forecast they are relying on is valid 30 minutes prior to departure until 60 minutes after their arrival.

197. On 12 March 2006, sunset was expected at 7.55pm. Last light in good weather should have been about 25 minutes later at 8.20pm.

198. Therefore, I find that Mr Hender also knew or should have known, even if the weather remained perfect, leaving Broken Hill at 7.00pm Mildura time on 12 March 2006 was likely to cause him to breach the Visual Flight Rules endorsement of his Special (Aeroplane) Pilot licence and his Special Certificate of Airworthiness.

History of the incident in which Mr Hender died

199. At about 7.00pm Mildura time on 12 March 2006, Mr Hender and Samuel left Broken Hill to fly home. Dr De-Lijster watched the aircraft leave Broken Hill and noticed that the aircraft was running very smoothly and there was nothing abnormal about the engine noise.

200. At that time, there was no reason for Mr Hender to expect interference from the change in weather that was forecast for 10.00pm that night. However, he knew or should have known that he was likely to be landing at Mildura Aerodrome after last light.

201. Mildura Aerodrome is in uncontrolled or Class G Airspace. That means there is no tower control and Civil Aviation Regulation 166 comes into effect.

202. Civil Aviation Regulation 166 requires a pilot to monitor the CTAF, communicate with other pilots and obey the local rules in relation to approach to runways.

203. At about 7.45pm, when he was 60 miles north of Mildura, Mr Hender sought information using the local CTAF radio frequency about the weather conditions he could see as he approached Mildura. This is the first indication that Mr Hender had become aware of changed weather conditions on his flight path.

204. Mr Dawbin confirmed that there was a dust storm with no breaks approaching Mildura Aerodrome. The tops of the storm clouds were 7000 feet over the airport but visibility was still 8km. Mr Hender replied he was climbing to 8000 feet.

205. There is no record that Mr Hender had any further contact with any other aircraft or with the subsequent weather forecasts or condition reports.

206. At about 8.05pm, a number of witnesses saw or heard Mr Hender's aircraft as it approached Mildura Aerodrome. These witnesses do not always agree about the aircraft behaviour or the path that he took as he approached to land.

207. Witnesses from the ground and Mrs Knight saw Mr Hender's aircraft going up and down, up and down as it was buffeted by the wind near Irymple as it approached Mildura Aerodrome. Mr Cobden told the Court that this behaviour suggested that there was already something coming loose.

208. However, Mr Knight did not hear Mr Hender's aircraft approaching the airport until he heard the engine open up to full throttle when it was about 50 feet off the ground travelling about half way down the flight line for runway 27.

209. Accordingly, I accept Mr Grandjean**'s** opinion that the observed instability of Mr Hender's aircraft on his approach to Mildura Aerodrome was more likely to reflect Mr Hender's difficulty maintaining straight and level flight in the wind and turbulence he was experiencing than to have reflected structural changes in his aircraft.

210. After Mr Hender aborted his landing on runway 27 at Mildura Aerodrome, Mr Knight saw his aircraft lift and bank steeply to the right before it levelled out and started to fly straight towards the north.

211. Mr Knight told the Court that he was surprised by what he saw:

"When I said I was surprised at what I saw because the aircraft made a very steep turn, which in terms of any pilot is something that you wouldn't do at the height that he was. That was the first thing that I noticed, was that it was a very steep turn and the second thing I noticed was that the aircraft didn't appear to want to gain any altitude after it levelled out from the steep turn to the right or to the north, didn't want to level it out...

... it turned right and it made a very steep turn to the right and levelled the wings, but didn't gain altitude...

... the aircraft didn't raise its nose and it didn't commence the climb.."

212. Mr Arnold also told the Court that, at 8.10pm, he heard Mr Hender's aircraft approaching the north/south runway 27 from a northerly direction that seemed to him that he was trying to make a landing on the north/ south runway which would have given him a tail wind. When he was about 20 feet above the runway, Mr Arnold's impression was that the engine sounded clear and crisp.

213. Several other witnesses also saw or heard Mr Hender's aircraft approaching Mildura Airport:

- Vassallo Lucy said the aircraft's engine noise was fluctuating as it approached the airport. However, her friend, Rodney Higgins, could not hear the note of the engine at all. Mr Higgins saw the aircraft had its undercarriage down and wing tip lights on. He did not see any strobe light or landing lights. Ms Lucy and Mr Higgins watched the aircraft approach to about 50 feet above the runway intersection at the airport. It seemed to being buffeted up and down by the cross wind so that the aircraft was practically 90 degrees to its flight path. They lost sight of the aircraft behind trees as it approached the runway intersection: Mr Higgins was able to get another view of the aircraft just as the light on the wing tip went down. This was followed by an instantaneous fire ball.

- Richard Mason was at the airport when he saw Mr Hender's aircraft coming in from the east at about 100 feet. Mr Hender maintained the height down the length of the runway as if he was getting a feel of the wind and checking the wind sock. After he passed the intersection with the east/ west runway, Mr Hender's aircraft banked steeply to the right to the north without climbing and straightening up. This bank does not comply with normal circuit direction at Mildura Aerodrome. Mr Hender's aircraft then

banked again to the right and appeared to lose height.

- Michael Mather was also at the airport when he watched Mr Hender's aircraft approaching from the east for what appeared to be a right hand circuit on to runway 18 into the wind. The aircraft banked to the right and then increased the bank angle sharply before it sank rapidly behind trees.

- Colin Nicholson is an aeronautical engineer and aircraft designer. He heard Mr Hender's aircraft approaching Mildura Aerodrome. The engine sounded normal but the wind was extremely gusty and visibility was about one kilometre on the ground. Mr Nicholson believed that the pilot would have to be a very experienced pilot to get down in those conditions. He thought:

  "this guy is going to be lucky to get away with this."

- Shane O'Halloran watched Mr Hender's aircraft approaching Mildura Airport from a distance. Mr O'Halloran is the owner and manager of Mildura Aviation based at Mildura Airport. He had been flying for 28 years and would fly about 600 to 700 hours a year. Mr O'Halloran was of the opinion that the weather conditions did not create a threat to safe approach at the airport. However, he was concerned that:

  "Something did not fit right, seeing Jack's plane up at that time and the prevailing weather conditions. I drove out to the airport."

  Mr O'Halloran saw a plume of smoke as he drove towards the airport and went immediately to the crash site. He was able to identify the aircraft involved in the crash as that belonging to Mr Hender. It had hit a shed on a property next to the Mildura Aerodrome. From the distribution of wreckage, Mr O'Halloran was also able to conclude that the aircraft was not yet lined up on runway 18 when it hit the shed but it seemed to be still in the process of turning to line up.

- Ken Cobden is a retired pilot from Mildura. Mr Cobden assisted Mr Hender's father to reconstruct the events of the evening from his discussions with eye witnesses. Neither Mr Cobden nor Mr Hender's father was in Mildura on the night that Mr Hender died. Mr Cobden says that all the people he spoke to said that Mr Hender's aircraft made a steep turn left, banking at more than 60 degrees and attempted to land on runway 27 into the

north so that the cold front was cross wind. He then aborted that attempted landing and turned illegally to the left into the wind.

214. Having reviewed all this evidence, I have formed the opinion that Mr Hender approached the Mildura Aerodrome on 12 March 2006 with the intention of landing on the north/south runway 27. However, he aborted the landing about half way down and 50 feet above the runway.

215. Mr Hender attempted to gain height and banked steeply to the right. He probably intended to perform a go-around and approach the east/west runway 18 that had been used by Mr Dawbin and Mr Knight.

216. At 8.14pm on 12 March 2006, as Mr Hender's aircraft was still banking heavily to the right it flew over a big tree with it engine running at maximum power, it lost altitude and crashed into the roof of a shed and drying rack in Riverside Avenue. The aircraft then caught fire.

217. Witnesses who watched and/or heard Mr Hender's aircraft during his attempted and aborted landing at Mildura Aerodrome also differ in their interpretations of its mechanical behaviour at the time of the incident:

- Mr O'Halloran watched Mr Hender's aircraft circuit at about 800 to 1000 feet. He did not detect any abnormality in the sound of the engine, it was operating as normal.

- Colin Nicholson is an aeronautical engineer and aircraft designer. He heard Mr Hender's plane approaching the airport. The engine sounded normal. However, the wind was extremely gusty and visibility was low.

- Margaret O'Rourke and her friend, Ryan Stewart, heard the engine of Mr Hender's aircraft spluttering badly. They saw it approaching the east/west runway before banking sharply to the right, about 10 degrees off vertical and 100 feet off the ground before her view was obstructed by a shed. They said they continued to hear the noise for a very short time and it just stopped.

- Ken Kontrec heard Mr Hender's aircraft as it seemed to have engine problems. As it made a right hand turn across the Sturt Highway, the engine sounded as if it was missing or breaking down. As it crossed the highway, it seemed to get another burst of power and continued to turn back toward the airport. It then dropped straight to the ground.

- Deanne Kontrec noticed that the engine noise seemed to be intermittent and spluttering and the aircraft was struggling in the windy conditions. It appeared to be going really fast and she did not think it would make the runway so that she expected it to take off again. However, it continued to go down towards the ground until she lost sight of it and then saw an explosion.

- Murray Frost heard the aircraft engine noise which seemed to be relatively close and at low altitude. He saw it on a radical bank which was almost vertical and descending until his view was obscured by trees.

- Leigh Frost heard the engine noise of the aircraft which seemed to him to be in distress. He said the engine revs were racing and then dying down. It was banking radically and about 20 degrees towards the ground when it hit the shed on a property owned by Mrs Herbert adjacent to the airport.

- Anthony Keep heard the aircraft that sounded as if it was struggling. He saw it banking to the right about 30 feet off the ground and losing altitude. There was a dust storm associated with very high winds.

- Vincent Pollifrone was in his backyard near the Mildura Aerodrome when he heard a plane "screaming hard" near the airport. The plane was travelling at about 15 metres off the ground and was struggling to maintain its height. It then nose dived below the level of his grape vines. The wind was very strong and there was a huge dust storm that limited his visibility of the plane.

- Ian Kinleyside could hear the engine of Mr Hender's aircraft clearly as it began to bank towards the airport. It sounded as though it was missing or back firing. However, when he saw the aircraft drop, the engine was running quickly and very smoothly and travelling quite fast.

- Mr Arnold was concerned because he had just heard the weather forecast from the airport which indicated that the wind had turned from northerly to south westerly and was gusting at about 20 to 25 knots. He told the Court that, at 8.10pm, he did not hear Mr Hender's aircraft until it was about 20 feet above the north/south runway 27. Mr Arnold's impression was that the engine sounded clear and crisp before Mr Hender increased the throttle to abort his landing:

"In all the time that I heard his engine, it was running beautiful. It had a real crisp sound

to it. It never missed a beat at all."

Mr Arnold's impression was that Mr Hender's aircraft approached the north/south runway at reduced throttle.

218. The main distinction between these witnesses' different interpretations of the sound of Mr Hender's aircraft seems to reflect the time at which their observations were made.

219. Although the aircraft was buffeted by the strong winds, the evidence of engine distress seems to be restricted to the sound of the aircraft after its aborted attempt to land on north/south runway 27 at the Mildura Aerodrome, that is while Mr Hender was using full throttle in an attempt to climb with steep banking to the right towards the alternative approach path required to land on the east/west runway 18.

220. Mr Knight could see both the aircraft and its navigation lights while it was within the lights of the airport. The lights of the aircraft then dipped over the line of trees on the horizon before a series of two fireballs erupted.

221. I interpret this observation to mean that the fuel from the two tanks in the wings of Mr Hender's aircraft caught fire in the crash. Therefore, either the third fuel tank was not in operation or it was empty by the time the crash occurred.

222. Mr Arnold also watched Mr Hender's aircraft travel past the windsock at about 20 feet above the runway and then start to climb to about 60 to 100 feet. By the time he was over the end of the runway, Mr Hender's aircraft was already losing height so that he was only about 20 feet when he crossed the highway:

"...by the time he got to the end of the runway, he'd fallen down again to probably - oh, 20 or less. Cos I worked it out - if a truck had've been coming the other way with a pantech on, he would've went straight through it....

He was very low. At the rate he was losing height, I didn't expect him to make it as far as he did."

223. In Mr Arnold's opinion, the nose of Mr Hender's aircraft was unable to rise high enough to climb before it started to lose height and was close to stalling.[19]

224. This loss of power when Mr Hender attempted a steep climb and right hand bank is consistent with the known risks associated with the Cessna 310 twin engine carburettor he had installed as a modification of the Glasair kit and with low volumes in the fuel tanks.

225. Accordingly, I find that Mr Hender's aircraft stalled when he attempted to climb and bank steeply to the right after aborting his attempt to land on runway 27 at Mildura Aerodrome because he was attempting a manoeuvre that is known to cause stall in an aircraft fitted with a Cessna 310 twin engine carburettor.

226. I am unable to say whether or to what degree low fuel volumes in the two fuel tanks contributed to the stall of Mr Hender's aircraft.

Investigation of the aviation incident in which Mr Hender died

227. On 12 March 2006[20], the ATSB was notified on the incident in which Mr Hender and Samuel died. However, on 13 March, the ATSB notified relevant authorities that it would not be investigating.

228. On 16 August 2006, ATSB informed me that the incident in which Mr Hender died did not attract ATSB investigation because they had assessed it as a Category 5 accident in a hierarchy imposed by Commonwealth Government policy. [21] He said Category 5 accidents include:

"An accident (including with fatalities) or serious incident involving sport aviation aircraft unless foreign and required to be investigated under Article 26 of the Chicago Convention."

229. Further, on 13 August 2010, a further letter to the Coroners Court of Victoria from Ian Sangston, Director-Aviation Safety Investigations, ATSB, states that the primary reason that ATSB did not investigate was that the accident involved an amateur built experimental aircraft and there is a high level of risk accepted when engaged in flying these aircrafts.

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[19] The speed that the aircraft has to obtain before it gets lift. It is influenced by the degree of banking and angle of lift.

[20] A letter to the Coroners Court of Victoria from Ian Sangston, Director-Aviation Safety Investigations, ATSB, states they were notified on 12 March 2009 but I presume this is a mistake.

[21] Letter from George F Nadal, Team Leader, Information and Coordination, ATSB dated 16 August 2006.

230. Mr Sangston also said that, for ATSB to investigate a fatal accident involving an amateur built experimental aircraft, there must be additional information which suggests there is a wider safety issue that has not been brought to the industry's attention by a previous investigation.

231. However, the ATSB website indicates that the decision about whether to investigate is based on a broad hierarchy of operation types. Category 5 is allocated to "flying training" incidents in a seven level hierarchy. Category 7 in this version of investigation hierarchy is allocated to "High risk personal recreation/sports aviation/experimental aircraft operations".

232. This hierarchy makes no provision for including consideration of the circumstances and risks associated with the incident such as potential conflict with passenger aircraft on non-towered aerodromes.

233. Mr Sangston further advised me that the ATSB did not become involved in investigation of Mr Hender's death because they have no regulatory responsibility. He said CASA is responsible for safety issues associated with the operation of experimental aircraft in the vicinity of public aerodromes.

234. However, the Minister for Infrastructure and Transport published a Statement of Expectations for the ATSB for the period 1 July 2011 to 30 June 2013.

235. This Statement of Expectations included an expectation that the ATSB perform its functions in a manner that supports Government transport safety policy, including the National Aviation Policy White Paper (White Paper), by giving safety the highest priority.

236. Further, the White Paper adopted the recommendations of the Aviation Green Paper released for consultation in 2008. This document specifically differentiates and clarifies the roles of ATSB and CASA:

"CASA regulates the civil aviation industry to protect the travelling public, industry participants and the wider community. To do this, CASA needs to have the right structure, resources and legal framework. To achieve this, the Government will appoint a Board and strengthen CASA's capacity to take appropriate safety action, particularly in relation to foreign carriers operating into Australia.

The ATSB investigates incidents and accidents and recommends measures to improve the industry's safety performance. The Government will establish the ATSB as an independent

statutory agency to ensure it continues to conduct the most thorough investigations possible and foster appropriate safety action."

237. Further, in February 2010, the ATSB renewed its Memorandum of Understanding ("MoU") with CASA. The focus of this MoU is to ensure that there is an appropriate balance between the necessary independence of the ATSB and a level of dialogue, coordination and cooperation with CASA which is necessary to deliver the Government's safety objectives.

238. Further, clause 1.5 of the MoU states:

"The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through:

a) investigation of transport accidents and other safety occurrences;

b) safety data recording, analysis and research;

c) fostering safety awareness, knowledge and action."

239. Therefore, although one of CASA's safety-related functions specified in subsection 9(3) of the *Civil Aviation Act* is to cooperate with ATSB in relation to investigations under the *Transport Safety Investigation Act 2003* that relate to aircraft, Government policy dictates that ATSB has primary responsibility for investigating aviation incidents for the purposes of improving safety.

240. In 2007, the ATSB investigated the death of Colin Pay[22]. Mr Pay died when his experimental aircraft crashed into Lake Liddell in New South Wales while he was testing a water extraction process to be used to assist in fire bombing operation during bush fires.

241. ATSB concluded that the incident in which Mr Pay died was caused by his losing control when an experimental ski breached the surface of the water and caused substantial drag on the right side of the aircraft.

242. Accordingly, ATSB issued a safety recommendation to CASA in respect of the need to consider safety of third parties on the ground or water before issuing a Certificate of

[22] Col Pay is well known in aviation circles for restoring and flying WWII Spitfire aircraft.

Airworthiness. CASA also issued amendments to Advisory Circular 21-10-*Experimental Certificates* including advice for test pilots during experimental flight testing.

243. Further, the ATSB provided expert investigation for the Coroner investigating Mr Pay's death. He recommended amendment of the Civil Aviation Regulations if necessary to require the applicant for a Special Certificate of Airworthiness (Experimental) provide as part of that application a comprehensive risk identification and mitigation analysis of the proposed experimental use of the aircraft and development of policies and procedures to assist CASA officers responsible for issue of Special Certificates of Airworthiness (Experimental Certificates) to assist them to identify issues for consideration especially matters relating to safety arising from the use of the aircraft.

244. Mr Sangston also referred to recommendations by a New South Wales coroner that police investigators become trained in investigation of aviation incidents.

245. I accept that an aviation incident carries special needs for preservation of the scene and, in some cases, sample collection. I also understand that police who assist coroners in Victoria have, of necessity, become skilled in assisting ATSB in their investigation of aircraft accidents.

246. However, local police in communities with non-towered aerodromes are unlikely to have the expertise to adequately investigate an aviation incident to the level required for ATSB and the Coroner to determine all the lessons that can be learned in a systematic independent way.

COMMENTS

Pursuant to section 67(3) of the **Coroners Act 2008,** I make the following comments connected with the death:

1. On 12 March 2006, Christopher John ("Jack") Hender and his son, Samuel Hender, died from injuries received in an aviation accident when Mr Hender was attempting to land his amateur-built experimental aircraft on the non-towered public aerodrome at Mildura.

2. The *Coroners Act* 2008 requires me to investigate these deaths to determine if possible the circumstances of their deaths and to contribute to the reduction of the number of preventable deaths through my findings of the investigation of deaths and making of recommendations.

3. Although I am a trained investigator empowered with the authority of a Coroner, I am not an expert in investigation of aviation incidents. I expect those better qualified than me in aviation investigations to inform my investigation of the circumstances of Mr Hender's death and Samuel's death. Further, section 7 of the *Coroners Act* 2008 expressly requires me to avoid unnecessary duplication of investigation.

4. On 27 March 1977, 583 people died in Tenerife in a collision of two Boeing 747 aircraft on Los Rodeos Airport. This preventable incident caused the aviation industry to recognise the crucial influence of independent, no-blame, rigorous, systematic, adequately funded, specialist investigation on aviation culture and future safety.

5. Since 1977, the aircraft industry has developed a well-recognised reputation for professional examination of all fatal and serious aviation incidents and near-misses. The model investigation techniques that have been developed for aviation adverse events have been adopted by other industries as diverse as health and accounting.

6. The Australian Transport Safety Bureau (the "ATSB") is Australia's prime agency for the independent investigation of civil aviation accidents, incidents and safety deficiencies. The ATSB is governed by a Commission and is entirely independent of transport policy makers, industry operators and transport regulators such as the Civil Aviation Safety Authority (CASA).

7. The *Transport Safety Investigation Act 2003* requires all aviation incidents involving fatalities to be reported to ATSB as soon as is reasonably practical because specialist ATSB aviation investigators need to act as quickly as possible to preserve valuable evidence and to determine the systemic factors that led to the serious event.

8. Therefore, the aviation incident in which Mr Hender and Samuel died is within the scope of ATSB's statutory and practical role.

9. However, the circumstances of Mr Hender's and Samuel's deaths were not subjected to the independent, no-blame, rigorous, systematic, adequately funded, specialist examination by ATSB that would have occurred if more people had died in the incident or it had involved an international carrier.

10. The primary reason that ATSB did not investigate the incident in which Mr Hender and Samuel died was that it involved an amateur-built experimental aircraft. This led to its designation as Category 5 in a seven level list of priorities for whether or not the ATSB would allocate resources to its investigation.

11. The ATSB website confirms that the decision about whether to investigate an aviation incident is based on a broad hierarchy of operation types which has been developed to assist them in rational allocation of their finite resources.

12. This hierarchy identifies the primary focus of ATSB as enhancing safety with respect to fare paying passengers, and in particular, those transport safety matters that may present a significant threat to public safety and are the subject of widespread public interest. Category 5 is allocated to "flying training" incidents in a seven level hierarchy. Category 7 in this version of investigation hierarchy is allocated to "High risk personal recreation/sports aviation/experimental aircraft operations".

13. ATSB justifies its decision not to investigate incidents that it categorises at Categorises 5, 6 or 7 because there is a high level of risk accepted when pilots and passengers engage in flying aircraft in these categories.

14. This hierarchy based on 'operation type' imposed by the ATSB in deciding whether or not to investigate an aviation incident makes no provision for including consideration of the circumstances and wider safety issues associated with the incident such as potential conflict with passenger aircraft on regional non-towered aerodromes.

15. However, in implementing its well-recognised system of no-blame, rigorous, systematic, adequately funded, specialist root cause analysis of serious aviation events, the wider aviation industry recognised that each aircraft incident and near-miss represents creates an opportunity to understand and make changes to the system of aircraft safety before more people die.

16. The alignment of a sequence of identified predictable systems failures and human errors leading to a crash has been called the "Swiss cheese" model. Although each of these active failures and latent conditions has occurred before and will happen again without causing a

disaster, on this occasion, they have momentarily lined up like the holes in slices of Emmenthal cheese and caused the adverse event in which people died.[23]

17. This approach to investigating aviation incidents is justified within the understanding that each reported adverse event has multiple contributing factors that cannot be pre-determined by categorising the incident according to any one criterion. The potential severity of the consequences of any aviation event that occurs when the contributing factors align is as important as the frequency with which each individual factor is known to occur.

18. Further, Federal and State legislation and Government policies that govern the ATSB and coroners impose the same no-fault systematic approach to their investigations of aviation fatalities. Therefore, ATSB and coroners are uniquely placed to work cooperatively and maximise the lessons and safety outcomes that can arise from these aviation incidents.

19. Federal-State jurisdictional issues and sections 27, 53 and 66 of the *Transport Safety Investigation Act* 2003 now facilitate this cooperative relationship. However, they remain irrelevant when the ATSB categorises an amateur-built experimental aircraft incident as Category 5 and, accordingly, does not undertake an independent, no-blame, rigorous, systematic, adequately funded, specialist investigation.

20. In Australia, ATSB have relied on their own investigations, Sport Aircraft Association of Australia and coronial records aircraft accidents to determine that amateur-built aircraft have 5.5 times the fatal and serious injury accident rate of comparable factory-built aircraft conducting similar flight operations between 1988 and 2010.[24] Most of these accidents occurred in private operations. Nearly 60% of the aircraft involved were less than six years old.

21. Further and significantly, I note that Mr Hender was flying into a non-towered public aerodrome which is also used by commercial aircraft. The Qantas Link Dash 8-100 commercial aircraft from Melbourne landed within 15 minutes of Mr Hender's approach to

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[23] James Reason, The Contribution of Latent Human Failures to the Breakdown of Complex Systems, Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences (1990) 327 475–484; James Reason, Human error: models and management, BMJ. 320 (2000)768–770.

[24] DA Wilson, RP Taylor, DR Stanton & ST Godley, "Amateur-built aircraft: Analysis of accidents involving VH-registered non-factory-built aeroplanes 1998-2010, Australian Transport Safety Bureau, AR-2007-043(2), 26 March 2013.

the Mildura Aerodrome. Therefore, the incident in which he and Samuel died could easily have also placed the lives of the Dash 8-100 occupants at risk.

22. Although ATSB has investigated two subsequent incidents involving experimental aircraft in built up areas, the criteria for undertaking these investigations focussed on the population density at risk rather than the risk to other aircraft using public non-towered aerodromes.

23. There was no obvious reason for ATSB to exclude the likelihood of conflict between commercial and amateur-built experimental aircraft when it allocates priority for investigating incidents involving experimental aircraft at or near public non-towered aerodromes.

24. Accordingly, by including the circumstances and risks associated with the incident in which Mr Hender and Samuel died on 12 March 2006, such as potential conflict with passenger aircraft on non-towered aerodromes, the ATSB would have placed it within Categories 1 or 2 of the government mandated priorities for ATSB investigation. These categories would have required more senior members of the ATSB to consider the issues raised and could have led to an ATSB investigation.

25. This coronial investigation of the incident in which Mr Hender and Samuel died and the capacity for the aircraft industry to learn from their deaths was limited by ATSB allocation of the incident to Category 5 rather than Category 1 or 2 of their list of seven priorities used to decide whether or not they will investigate an incident.

26. ATSB can overcome this limitation arising from their existing hierarchy for investigating serious aircraft incidents in a manner consistent with Government policy by expanding the criteria they apply to allocation of their investigation resources to include incidents involving amateur-built experimental aircraft that occur at or near non-towered public aerodromes.
Recommendation 1

27. Local police investigators have provided me with a comprehensive general brief of the circumstances surrounding the deaths of Mr Hender and Samuel in an aviation incident at Mildura Aerodrome on 12 March 2006. These data have been supplemented by information obtained during the inquest and by coronial investigations.

28. My analysis of this information has attempted to identify the many factors that aligned themselves on 12 March 2006 to cause the deaths of Mr Hender and Samuel in Mr Hender's aircraft. I have categorised these issues under the following headings:

- Background,
- Weather,
- Modifications to Mr Hender's aircraft, and
- Registration arrangements for amateur-built experimental aircraft.

Background

29. Christopher John ("Jack") Hender was 49 years old when he died from injuries received in an aviation accident near Mildura Aerodrome on 12 March 2006. He lived in Cardross with his wife, Mary, their four daughters and their 10 year old son, Samuel.

30. Mr Hender had no known medical history that could have contributed to his death.

31. Mr Hender held a current Special Pilot (Aeroplane) Licence endorsed with a Visual Flight Rules rating and a Flight Radiotelephone Operator Licence.

32. Mr Hender was flying an amateur-built, experimental aircraft[25] that he had built from a Stoddard-Hamilton Glasair-SH2RG light aircraft kit. Mr Hender had fitted his aircraft with an Atkins Rotary 13B engine[26] and a Cessna 310 twin engine carburettor.[27]

33. On 18 April 2002, the Civil Aviation Safety Authority ("CASA") issued a Special Certificate of Airworthiness (Experimental) for Mr Hender's aircraft with registration mark VH-IDF. Its serial number was 550.

34. This Special Certificate of Airworthiness (Experimental) carried a number of limitations on Mr Hender's use of his aircraft including:

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[25] CASA defines an amateur-built and experimental aircraft as an aircraft of which at least 51% has been built by a amateur who undertook the construction project solely for their own education or recreation.

[26] This is a rebuilt 13B Mazda RX7 rotary engine.

[27] As defined by Mr Hender in his display at the Mildura Air Show in 2003.

- the aircraft was approved for Visual Flight Rules operation only;
- no person could operate the aircraft other than to accomplish the flight test and operation outlined in the application;
- all flights for the first 40 hours operation were to be within 50 nautical miles of Mildura Airport;
- no passengers unless they were required for testing purposes.

35. Mr Hender's Special Certificate of Airworthiness (Experimental) expired in 2003 and was not renewed.

36. Further, Mr Hender had substantially modified his aircraft in the two years before he died so that it would not necessarily have continued to meet the requirements for renewal of his Special Certificate of Airworthiness (Experimental) if he had made that application to CASA.

37. On 12 March 2006, Mr Hender and Samuel flew to Broken Hill to visit a friend. They left Broken Hill at about 7.00pm to return to Mildura. At about 8.10pm, Mr Hender attempted to land on runway 27 at Mildura Aerodrome.

38. Mildura Aerodrome is in uncontrolled or Class G Airspace. That means there is no control tower and Civil Aviation Regulation 166 comes into effect.

39. Civil Aviation Regulation 166 requires a pilot to monitor the local Common Traffic Advisory Frequency (CTAF), communicate with local air traffic and obey the local rules in relation to approach to runways.

40. Mr Hender approached Mildura Aerodrome at the same time as a severe dust storm and gusty winds associated with a front and wind change from northerly to south westerly.

41. Witnesses from the ground saw Mr Hender's aircraft porpoising as it approached Mildura airport. This behaviour is an expected result of the strong gusty conditions he was experiencing.

42. As Mr Hender's aircraft was half way down the north/south runway 27 at Mildura Aerodrome and about 50 feet above the ground, Mr Hender aborted his landing. He attempted to gain height and banked steeply to the right.

43. At 8.14pm on 12 March 2006, as Mr Hender's aircraft was still banking heavily to the right with its engine running at maximum power, it lost altitude and crashed into the roof of a shed and drying rack in Riverside Avenue. There were two sequential explosions as the aircraft then caught fire.

44. Mr Hender and Samuel died in the incident. The position of Mr Hender's body indicates that he anticipated the crash landing. He was identified by matching with his dental records.

Weather

45. There is no doubt that Mr Hender encountered particularly difficult weather conditions when he approached Mildura Aerodrome at 8.10pm on 12 March 2006. As a fellow pilot, Frank Cobden told the Court:

"In a front like that I'd get to billyo out of there. I'd land somewhere else. ...I wouldn't be near it, that's what I would do.... I'd go somewhere else where it was less turbulent... Well every pilot would know you'd dodge them like the plague."

46. Weather information is available to pilots through the internet, through the Air Services Australia website, through the AP fax system and through a phone information service provided by the Meteorological Service. They can obtain it in-flight. They can also obtain it through the Aerodrome Weather Information Service that is available through dialling a frequency on your radio and it gives an automated service at the airport telling the pilot what the weather conditions are like.

47. Mr Hender's pilot licence was endorsed with a Visual Flight Rules ("VFR") rating. In effect, this rating required Mr Hender to ensure that his visibility was at least 5000 metres, he was at least 1500 metres horizontally and 1000 feet vertically distant from cloud and he remained above 1000 feet before he approached Mildura Aerodrome to land. He could not fly after last light.

48. The time of last light is influenced by the time of sunset and by weather conditions which affect visibility.

49. To ensure continuing compliance with his VFR rating as he approached Mildura Aerodrome close to last light, Mr Hender's options were to seek an updated weather forecast from CTAF or to access the automated weather report from Mildura Aerodrome.

50. However, Mr Hender's radio was unable to access the frequencies of these transmissions.

51. Further, by the time Mr Hender or anyone else became aware of the change in weather conditions, his options were to turn back to Broken Hill or to try the closest alternate aerodromes which were Wentworth, Swan Hill and Robinvale. He could not have achieved any of these destinations within daylight hours or before the front arrived there too.

52. However, Mr Hender could have changed his immediate plan to land on runway 27 if he had been aware of the changes in landing determined by Mr Dawbin and Mr Knight and had understood their implications.

53. Civil Aviation Rule 166 requires pilots operating within 10 nautical miles of a non-towered aerodrome to maintain a continuous listening watch on the CTAF.

54. If I accept that Mr Hender decided to land on runway 27 because he understood from radio messages that that was Mr Dawbin's original choice, it follows that Mr Hender did not hear Mr Dawbin or Mr Knight announce on CTAF that they had changed their minds and that they intended to land on runway 18. By implication, it also follows that Mr Hender did not continue to monitor his CTAF radio frequency after he spoke to Mr Dawbin and, in so-doing, he breached Civil Aviation Rule 166.

55. Further, Mr Dawbin used the ATC radio to notify the Meteorological Service of the changed weather conditions and an amended forecast was issued and broadcast at 7.32pm in response to deteriorating weather conditions at Mildura Aerodrome. This forecast indicated that surface wind was freshening ahead of the trough forecast with patchy rain and thunderstorms and low cloud. Visibility was now 2000 metres and the reason for that deterioration in visibility was blowing dust.

56. Even if he was listening on the local frequency, Mr Hender's radio could not detect the frequency on which the updated forecast was broadcast. Further, his lack of sophistication with computers make it unlikely that he would attempt to change channels in the circumstances which faced him at about 8.00pm on 12 March 2009.

57. I find that Mr Hender's failure to monitor CTAF radio in the vicinity of Mildura aerodrome caused his aborted attempt to land on runway 27 at Mildura Aerodrome on 12 March 2006 and, accordingly, contributed to his and Samuel's deaths.

58. ATSB reported 200 incidents between 2003 and 2008 where this requirement to monitor CTAF has been breached by pilots due to communication problems or non-compliance with these procedures. These circumstances included radios tuned to the incorrect frequency, having the radio volume turned down, not making broadcasts, faulty radio equipment or other distractions.[28]

59. Therefore, it is important that pilot licences and Certificates of Airworthiness for aircraft using non-towered aerodromes include a requirement for competence and technology to access weather situation reports issued during flight.

60. CASA issued Mr Hender's Special Pilot (Aeroplane) Licence endorsed with a Visual Flight Rules rating and his Flight Radiotelephone Operator Licence on the basis of his Israeli and American pilot licences and endorsements.

61. Mr Hender's previous experience with radio did not include competency in the Australian aviation environment or across the spectrum of radio frequencies used to communicate weather and other information to pilots approaching non-towered local aerodromes. Further, Mr Hender's lack of computer skills seems to indicate that he was unwilling or unable to update his competency in the circumstances of new and evolving electronic environment.

62. Therefore, CASA cannot rely on overseas qualifications and experience in use of aviation radio technology to issue an Australian Flight Radiotelephone Operator Licence. **Recommendation 2.**

63. Further, CASA requires bi-annual flight checks to maintain the validity of a Special Pilot (Aeroplane) Licence. These flight checks should include assessment of the pilot's radio competency in the local environment.

64. Mr Funnell performed Mr Hender's bi-annual flight checks but he told the Court that he only gave perfunctory attention to Mr Hender's radio competency:

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[28] Australian Transport Safety Bureau, " A pilot's guide to staying safe in the vicinity of non-towered aerodromes", AR-2008-044(1), ATSB-Sept10/ATSB 123, Commonwealth of Australia 2010.

"they were very simple. There was only three - there was nobody else around, so ah, I just told him what to say, or the call sign of the aeroplane, which he didn't know. And to tell people what he was going to do, and ah, um, and then the runway he was going to use, and ah, that was about all. That was no problem. And also on takeoff to give his takeoff call. He's rolling on runway such and such, and then after that there was - if there's no traffic around, there was no need to talk any more."

65. This level of assessment does not compensate for CASA's failure to check competency before issue of Mr Hender's Australian Flight Radiotelephone Operator Licence. **Recommendation 3.**

Modifications to Mr Hender's aircraft

66. The number of registered non-factory amateur-built and experimental aircraft operating in Australia increased from 43 in 1974 to over 1000 in 2007.[29] This rapid increase has been associated with a change in the proportion of privately owned aircraft in the aviation fleet and an increase in the number of people building their own aircraft.

67. In the United States, amateur-built aircraft are involved in more than three times the number of fatal accidents involving matched factory-built aircraft. Further, a much higher proportion of these accidents occur early in the operational life of the aircraft. [30]

68. Further even before modification, the Glasair aircraft has a higher wing loading than most other amateur-built and experimental aircraft in Australia.[31]

69. Mr Hender reflected most owners of these registered non-factory amateur-built and experimental aircraft in that he built his aircraft from a kit for personal use and solely for his own education or recreation. [32]

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[29] DR Stanton & RP Taylor, "Amateur-built and experimental aircraft. Part 1: A survey of owners and builders of VH-registered non-factory aircraft, Australia Transport Safety Bureau Report no AR-2007-043, June 2009.

[30] National Transportation Safety Board, "The Safety of Experimental Amateur-Built Aircraft" Safety Study NTSB/SS-12/01, Washington DC, 2012.

[31] DR Stanton & RP Taylor, "Amateur-built and experimental aircraft. Part 1: A survey of owners and builders of VH-registered non-factory aircraft, Australia Transport Safety Bureau Report no AR-2007-043, June 2009, p. 47.

[32] DR Stanton & RP Taylor, "Amateur-built and experimental aircraft. Part 1: A survey f owners and builders of VH-registered non-factory aircraft, Australia Transport Safety Bureau Report no AR-2007-043, June 2009.

70. However, he was in a small minority of owners of non-factory amateur-built and experimental aircraft in the way he modified the Stoddard-Hamilton Glasair-SH2RG kit. Only one-third of his colleagues made major modifications to the plans during construction and, of these, only 25% made more than two modifications.[33]

71. Mr Hender's major modifications included using a different engine and carburettor from those recommended by the manufacturer of his kit, altering the fuel system, removing the middle bulkhead from the fuselage and introducing a third fuel tank behind the bulk head in the cockpit.

72. Further, Mr Hender's aircraft differed from most other registered non-factory amateur-built and experimental aircraft operating in Australia in that it had a Mazda rotary engine which was designed for cars rather than aeroplanes.

73. All these modifications were performed during the building process and were taken into account when the CASA Authorised Person issued a Special Certificate of Airworthiness (Experimental) on 18 April 2002.

74. This coronial investigation has found that the Cessna 310 twin engine carburettor Mr Hender used in his Glasair Super II RG aircraft contributed to the stall under power during high angle descent and when banking steeply that led to his death.

75. Therefore, it follows that Mr Hender's use of the Cessna 310 twin engine carburettor was a decisive factor in his and Samuel's deaths and placed other users of the non-towered public aerodrome at risk.

76. Accordingly, the process for regulating the registration of amateur-built and experimental aircraft is crucial in ensuring third party safety at non-towered public airports.

77. CASA is responsible for registration of amateur-built and experimental aircraft and issue of Special Certificates of Airworthiness (Experimental). This responsibility is exercised through Authorised Persons who are aviation engineers or other similarly expert qualified people.

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[33] DR Stanton & RP Taylor, "Amateur-built and experimental aircraft. Part 1: A survey of owners and builders of VH-registered non-factory aircraft, Australia Transport Safety Bureau Report no AR-2007-043, June 2009, pp. 63-5.

78. However, Civil Aviation Statutory Rule 21.195A requires CASA to issue a Special Certificate of Airworthiness for an experimental or amateur-built aircraft if it meets the prescribed conditions.

79. Therefore, CASA cannot relegate responsibility to their Authorised Person when it issues a Special Certificate of Airworthiness (Experimental) on the basis of his or her advice.

80. CASA must make better provision for regulating issue of Special Airworthiness Certificates for experimental or amateur-built aircraft when the aircraft kit has been modified in a way that is contrary to the provisions of the kit and/or the kit is contrary to the known idiosyncrasies of the modifications. **Recommendation 4**

81. James Coyne is a professional engineer and manager of the sport aviation office in CASA. Mr Coyne explained to the Court:

"There are no design standards for the thing that is very important to understand in that there are no design standards at all in experimental aircraft. I mean you can - quite literally if you want to build a flying carpet that's what you can do."

82. Therefore, with that approach to issue of Special Certificates of Airworthiness (Experimental), third party protection must come from regulating the places the registered aircraft can operate as well as the mechanical features of the aircraft.

83. This can only occur if aircraft with a Special Certificates of Airworthiness (Experimental) are prevented from using non-towered public airports, at least within the time periods that commercial passenger aircraft are scheduled to operate. **Recommendation 5**

Registration arrangements for experimental and amateur-built aircraft

84. Part III of the *Civil Aviation Act* 1988 prohibits flying an aircraft that is not registered with CASA or one of nine other organisations specified in the regulations where the regulations require the aircraft to be registered.[34]

85. Accordingly, Mr Hender could not legally fly his aircraft in Australian air space without a current Special Certificate of Airworthiness.

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[34] Mr Hender was registered with the SAAA as a builder of a Glasair 11S RG in 1996. His membership lapsed on 9 November 1997.

86. CASA is responsible for maintaining enhancing and promoting the safety of civil aviation with particular emphasis on preventing aviation accidents.

87. However, there is no requirement for CASA to be involved in the continuing airworthiness loop unless operation of the aircraft is assessed by CASA to be a danger to public safety. Further, there is no audit of continuing use when a Certificate of Airworthiness expires and no reminders are sent out when the Certificate of Airworthiness is due to expire. **Recommendation 6**

88. Further, in circumstances where the Certificate of Airworthiness has "Unlimited" on its face but is constrained by the Annexures, there is the possibility that a pilot would miss the one year limitation and interpret it as a perpetual certificate subject to the conditions of NFR and passenger restriction and 50 mile radius from the airport until otherwise altered. **Recommendation 7**

89. Mr Coyne is responsible for monitoring the CASA policy aspects of the operation and certification of experimental aircraft. He told the Court that CASA is informed about breaches of the Civil Aviation Act and its regulations in a number of ways:

"We get them from a number of sources; generally the people on the ground observing what's going on. They will phone CASA to tell them that somebody is doing something illegally; flying over the road, doing whatever it is, flying over their house. Other pilots, they talk to each other, they dob them in if you like, and we've heard evidence of that throughout the last couple of days of where pilots will tell other pilots off, which is good. But a lot of them will report that to CASA."

90. Complaints about VH-registered experimental aircraft are delegated to the CASA regional office for action. Operation of an aircraft subject to an experimental certificate is subject to regulatory surveillance in accordance with CASA's surveillance priorities. These priorities are determined within available resources and target credible information about unsafe or illegal practice provided by the public and other aviation.

91. Mr Grandjean also told the Court that CASA enforcement priorities are determined by intelligence that is likely to be detrimental to safety. They follow it up as the need arises. Action may include cancellation or suspension of pilot licences, certificates of airworthiness or referral to the Director of Public Prosecutions.

92. However, no examples of this targeted enforcement were presented to me.

93. Further, there is no priority given to random audit of aircraft for alterations that should attract review of the certificate or to target audit of aircraft where the certificate is not renewed to ensure that it is not flying on non-towered public aerodromes.

94. On the contrary, flying instructors, Mr O'Halloran and Mr Funnell, confirmed that they would not usually report breaches of Civil Aviation Rule 166 to CASA until all avenues of personal intervention had failed to change a pilot's behaviour at Mildura Aerodrome. Mr O'Halloran told the Court:

"I suppose if you can contact the person you would I suppose try and find out the reasons for the non-compliance with normal radio procedure, or whatever it might have been, and I suppose have a word to them about it.

Well there's probably nothing much you can do I don't suppose. Just inform them I suppose of what they're supposed to do. But yes look some people do take notice.

If it was serious enough he would report it to CASA but if it was serious enough probably yes, but I haven't had course to do that."

95. Accordingly, there is no evidence before me to suggest that CASA has operational arrangements in place for surveillance and enforcement which would deter pilots from flying an unregistered aircraft in and out of non-towered public aerodromes or breaching the conditions of pilot licences and/or Certificates of Airworthiness which it issues to members of the aviation industry. **Recommendation 8**

Use of Amateur-built experimental aircraft at non-towered public aerodromes

96. Non-towered aerodromes and the use of radio broadcasts by pilots to establish situational awareness have been and will continue to be a central component of the Australian airspace system.[35]

97. A 2004 review by ATSB of mid-air collisions between 1961 and 2003 found that 80% occurred in or near the circuit area with two thirds involving aircraft on final approach or the

[35] Australian Transport Safety Bureau, "A pilot's guide to staying safe in the vicinity of non-towered aerodromes", AR-2008-044(1), ATSB-Sept10/ATSB 123, Commonwealth of Australia 2010.

base to final turn. However, only one occurred at a non-towered aerodrome where radio carriage was required.

98. However, in September 2010, ATSB published "A Pilot's guide to staying safe in the vicinity of non-towered aerodromes".[36] In this report, ATSB acknowledged that a mixture of aircraft types, performance levels and operation types is a challenge to pilots using non-towered aerodromes.

99. CASA has also published two advisory documents for pilots. These documents note that the most common incidents at non-towered aerodromes include:

    i. Breakdowns in communication;

    ii. Missed approaches and go-arounds;

    iii. Avoiding action taken;

    iv. Potential runway incursions.[37]

100. Aircraft operations near non-towered aerodromes are governed by Civil Aviation Rule 166.

101. Civil Aviation Rule 166 required Mr Hender to carry a radio capable of sending and receiving on the Mildura Common Traffic Advisory Frequency (CTAF). However, Civil Aviation Rule 166 did not require Mr Hender's radio to be able communicate with Air Traffic Control in Melbourne or to hear automatic weather transmissions.

102. These regulations presume that the pilot has some control over the operation of his or her aircraft and that the weather follows the pattern predicted by the Bureau of Meteorology.

103. Mr Hender was unaware of the early arrival of the weather front with its associated gusty conditions and dust until he saw it from the air at about 7.30pm on 12 March 2006 and had it confirmed by Mr Dawbin in the Dash-8.

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[36] Australian Transport Safety Bureau, "A pilot's guide to staying safe in the vicinity of non-towered aerodromes", AR-2008-044(1), ATSB-Sept10/ATSB 123, Commonwealth of Australia 2010.

[37] Civil Aviation Safety Authority, "Operations in the vicinity of non-towered (non-controlled) aerodromes", CAAP 166-1(1), revised August 2012; Civil Aviation Safety Authority, "Pilots' responsibility for collision avoidance in the vicinity of non-towered (non-controlled) aerodromes using 'see-and-avoid'" CAAP 166-12(1), revised August 2012

104. By that time, the alternatives for Mr Hender were turn back to Broken Hill or try the closest alternate aerodromes which were Wentworth, Swan Hill and Robinvale. He could not have achieved any of these destinations within daylight hours or before the cold front arrived there too.

105. Mr Hender's next option was to seek an updated weather report from CTAF and to access the automated weather report from Mildura Aerodrome. Neither of these sources of information would have helped until the Bureau of Meteorology issued an amended weather report at 7.54 pm but his radio was unable to access their frequencies.

106. Further, Mr Hender's radio could not access the frequencies on which this information is transmitted and CASA does not require amateur-built experimental aircraft to carry equipment that can access weather and other information transmitted on radio frequencies other than those used by CTAF.

107. If he had heard the weather update at 7.54pm, Mr Hender may have decided to land directly on to runway 18 and avoided the need to abort his landing because of the changed weather conditions.

108. This inability to access available weather in flight could have contributed to his and Samuel's death. **Recommendation 9**

109. Further, Civil Aviation Rule 166 requires pilots operating within 10 nautical miles of a non-towered aerodrome to maintain a continuous listening watch on the CTAF.

110. However, ATSB reports 200 incidents between 2003 and 2008 where this requirement has been breached by pilots due to communication problems, or non-compliance with these procedures. These include radios tuned to the incorrect frequency, having the radio volume turned down, not making broadcasts, faulty radio equipment or other distractions. [38]

111. Mr Hender could have changed his immediate plan to land on runway 27 if he had been aware of the changes in landing determined by Mr Dawbin and Mr Knight and had understood their implications.

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[38] Australian Transport Safety Bureau, " A pilot's guide to staying safe in the vicinity of non-towered aerodromes", AR-2008-044(1), ATSB-Sept10/ATSB 123, Commonwealth of Australia 2010.

112. If I accept that Mr Hender decided to land on runway 27 because he understood from radio messages that that was Mr Dawbin's choice, it follows that Mr Hender did not hear Mr Dawbin or Mr Knight announce on CTAF that they landed on runway 18. By implication, this also suggests that Mr Hender did not continue to monitor his CTAF radio frequency after he spoke to Mr Dawbin.

113. Therefore, Mr Hender's failure to comply with Civil Aviation Rule 166 also contributed to his and Samuel's death.

Summary

114. Systems analysis of the aviation disaster on 27 March 1977 showed that a series of circumstances and adverse events aligned themselves in Tenerife. If any one of this series of circumstances had not occurred in the sequence that occurred leading up to that incident 583 people would not have died.

115. Similarly, Mr Hender and Samuel died because a series of adverse events and circumstances coincided to cause Mr Hender's aircraft to stall over Mildura Aerodrome on 12 March 2006.

116. These circumstances include:

- Mr Hender constructed his aircraft using a carburettor that was known to be subject to stall in steep climbs and banks;
- Mr Hender was not aware that his Certificate of Airworthiness (Experimental) had expired until 6 February 2006;
- Mr Hender failed to disclose to Mr Funnell or Mrs Hender that his Certificate of Airworthiness (Experimental) had expired;
- Mr Hender misled Mrs Hender about the current conditions and status of his Special (Aeroplane) Pilot licence and the Certificate of Airworthiness (Experimental) for his aircraft including his inability to carry passengers;
- Mr Hender took Samuel with him when he flew his aircraft from Mildura to Broken Hill to visit a friend on 12 March 2006;

- Mr Hender knew or should have known that, even if the weather remained perfect, he and Samuel were likely to arrive at Mildura Aerodrome unacceptably close to last light;
- Mr Hender's aircraft approached Mildura Aerodrome during an unexpected and earlier than predicted change in the weather conditions with gusty southerly winds and dust;
- Mildura Aerodrome is a public non-towered aerodrome in uncontrolled or Class G Airspace;
- Mr Hender's radio could receive and transmit communications through Mildura CTAF but was not required to and could not communicate with Air Traffic Control in Melbourne or hear automatic current weather transmissions issued from Mildura Aerodrome;
- Mr Hender failed to continually monitor the Mildura CTAF radio frequency during his approach to Mildura Aerodrome;
- Mr Hender approached Mildura Aerodrome to land on the north/south runway in adverse wind conditions; and
- Mr Hender aborted his attempted landing on the north/south runway and entering a steep climb and right hand bank which seems to have caused his aircraft to stall and crash.

117. Fuel issues may also have contributed to failure of Mr Hender's aircraft at 8.14pm on 12 March 2006.

118. If any one of this series of circumstances had not occurred in the sequence that occurred leading up to this incident on 12 March 2006, Mr Hender and Samuel would not have died.

119. Perversely, if Mr Hender had left Broken Hill in time to arrive at Mildura Aerodrome before last light at about 7.50pm on 12 March 2006, the weather conditions would have been worse than they were at 8.14pm and his attempted landing would have competed with the regular Qantas Link Dash 8-100 commercial service from Melbourne on Sunday evenings. This potential conflict could have placed many more lives at risk.

120. ATSB recognises that non-towered aerodromes and the use of radio broadcasts by pilots to establish situational awareness have been and will continue to be a central component of the Australian airspace system.[39]

121. Therefore, it is important for the safety of users of public non-towered aerodromes in Australia that all fatal aviation incidents that occur at or near a public non-towered aerodrome are subjected to systematic expert investigation to prevent further and greater loss of life.

RECOMMENDATIONS

Pursuant to section 72(2) of the **Coroners Act 2008**, I make the following recommendations connected with the death:

I recommend that:

1. The Australian Transport Safety Bureau reconsider the way in which it allocates its resources to examine aviation incidents to enable specialist professional independent investigation of incidents involving amateur-built experimental aircraft at or near non-towered regional aerodromes used by commercial aircraft.

2. The Civil Aviation Safety Authority require applicants for an Australian Flight Radiotelephone Operator Licence to demonstrate radio competency across the spectrum of radio frequencies used to communicate weather and other information to pilots approaching non-towered regional aerodromes in Australia.

3. The Civil Aviation Safety Authority require applicants for an Australian Flight Radiotelephone Operator Licence to undergo bi-annual review of their radio competency to access weather and other information transmitted on all radio frequencies used by other members of the aviation industry in their local area.

4. The Civil Aviation Safety Authority require applicants for issue of a Special Airworthiness Certificate (Experimental) for a modified, kit built, amateur-built experimental aircraft provide as part of that application a comprehensive risk identification and mitigation analysis of the aircraft which demonstrates that they have considered the likely influence of the modifications on the aircraft's behaviour in flight.

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[39] Australian Transport Safety Bureau, "A pilot's guide to staying safe in the vicinity of non-towered aerodromes", AR-2008-044(1), ATSB-Sept10/ATSB 123, Commonwealth of Australia 2010.

5. The Civil Aviation Safety Authority ensure the Annexures to Special Certificates of Airworthiness (Experimental) prohibit landing and take off from public non-towered public regional aerodromes within the time periods that commercial passenger aircraft are scheduled to operate.

6. The Civil Aviation Safety Authority notify owners of aircraft subject to time-limited Special Certificates of Airworthiness (Experimental) when their Certificate of Airworthiness is due to expire and remind them that they are not permitted to fly their aircraft without a current Special Certificate of Airworthiness (Experimental).

7. The Civil Aviation Safety Authority ensure that time-limited Certificates of Airworthiness (Experimental) do not have "Unlimited" printed on the front page.

8. The Civil Aviation Safety Authority actively target pilots of amateur-built experimental aircraft accessing public non-towered regional aerodromes as a general or specific deterrence to pilots flying an unregistered aircraft in and out of non-towered public regional aerodromes or breaching the conditions of pilot licences and/or Certificates of Airworthiness (Experimental).

9. The Government of Australia amend Civil Aviation Rule 166 to require amateur-built experimental aircraft to carry radio equipment capable of receiving weather and other information transmitted on all radio frequencies used by other members of the aviation industry in their local area.

I direct that a copy of this finding be provided to the following:

Mrs Mary Hender
Attorney General (Commonwealth)
Chief Commissioner of the Australian Transport Safety Bureau
Civil Aviation Safety Authority
Australian Bureau of Meteorology

Signature:

DR JANE HENDTLASS
CORONER
Date: **5 June 2013**