



Midair Collision

Cessna 152 - VH-FMG/Liberty XL2 - VH-XLY

Casula, NSW

18 December 2008

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal Bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and, where applicable, relevant international agreements.

ATSB investigations are independent of regulatory, operator or other external bodies. It is not the object of an investigation to determine blame or liability.

© Commonwealth of Australia 2009

This work is copyright. In the interests of enhancing the value of the information contained in this publication you may copy, download, display, print, reproduce and distribute this material in unaltered form (retaining this notice). However, copyright in the material obtained from non-Commonwealth agencies, private individuals or organisations, belongs to those agencies, individuals or organisations. Where you want to use their material you will need to contact them directly.

Subject to the provisions of the *Copyright Act 1968*, you must not make any other use of the material in this publication unless you have the permission of the Australian Transport Safety Bureau.

Please direct requests for further information or authorisation to:

Commonwealth Copyright
Administration, Copyright Law Branch
Attorney-General's Department
Robert Garran Offices
National Circuit
BARTON ACT 2600

www.ag.gov.au/cca

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608
Australia
1800 020 616
+61 2 6257 4150 from overseas
www.atsb.gov.au

INFRA-08400

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Abstract

On 18 December 2008, a Cessna 152 aircraft and a Liberty XL2 aircraft collided in midair over Casula, NSW, in the proximity of the 2RN reporting point, south-west of Bankstown Airport. The Liberty remained flyable and landed at Bankstown approximately 6 minutes later, while the Cessna descended to the ground and was destroyed. Both occupants of the Cessna were fatally injured. The investigation is continuing.

FACTUAL INFORMATION

The information contained in this preliminary report is derived from initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may become available that alters the circumstances as depicted in this report.

History of the flight

On 18 December 2008, at approximately 1125 EDT¹, a Cessna 152 (Cessna) aircraft, registered VH-FMG, and a Liberty XL2 (Liberty) aircraft, registered VH-XLY, collided in midair in the proximity of the 2RN reporting point (2RN), south-west of Bankstown Airport, NSW. The Cessna was

painted white with red stripes and the Liberty was predominantly white. The Liberty departed Bankstown Airport at approximately 0930 to conduct a flight test for the issue of a Private Pilot Licence. On board were a student pilot under test and a Civil Aviation Safety Authority (CASA) approved testing officer (ATO). Following departure, the Liberty tracked north via the 'lane of entry'² and flew to the Aeropelican area before diverting to Warnervale to conduct approximately 10 minutes of airwork. Following the airwork, the Liberty tracked south to the Somersby area for a further 5 minutes of airwork, before tracking to Brooklyn Bridge and then the lane of entry southbound.

At approximately 1030, the Cessna departed Bankstown Airport to conduct a local training flight in the training area to the west of Bankstown. On board were a student pilot and an instructor.

At 1103, the Liberty passed Prospect Reservoir and tracked south towards the Bringelly area before entering the Camden Common Traffic Advisory Frequency (CTAF) area.

As the Cessna was returning to Bankstown from the training area, a review of recorded radar data showed that the Liberty aircraft had departed Camden and maintained runway heading of 060

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Daylight-saving Time (EDT), as particular events occurred. Eastern Daylight-saving Time was Coordinated Universal Time (UTC) + 11 hours.

2 Lanes of entry are established to permit passage to and from a general aviation airport procedure (GAAP) control zone without entering an adjacent civil or military control zones.

degrees into the training area and tracked to the north-east towards 2RN. Shortly after, the Liberty was observed to conduct a turn to the left through 180°, followed by a turn to the right through 180°. The Liberty then flew in a northerly direction and overflowed the Cessna which was approximately 600 ft below. The Liberty continued to track north for a short time, then turned to the right and descended and tracked towards 2RN (Figure 1).

Radar data showed that both aircraft were tracking on converging courses towards 2RN and the radar returns merged approximately 900 m to the south of 2RN. In the minute before the returns merged, the Liberty averaged a groundspeed of 110 kts and the Cessna 87 kts. One radar return disappeared and the other return continued on and indicated that this aircraft landed at Bankstown. The radar return that disappeared represented the Cessna, which descended almost vertically and impacted the rear of a house in an adjacent suburb. Both occupants of the Cessna were fatally injured. The ATO on board the Liberty sustained minor injuries.

Witnesses

At least 12 people witnessed either the collision between the two aircraft, or the events immediately after the collision. All but two of those witnesses were located within 1 km of the collision position.

One witness reported seeing a white aircraft with red stripes flying towards the city. The witness reported then seeing a second aircraft approaching the first aircraft from behind at an angle of about 45 degrees and that it was travelling faster than the first aircraft. That witness reported observing both aircraft for about 30 seconds before the collision and reported that 'the nose of the second plane just collided in the left side of the tail of the first plane'. Another witness reported that they 'saw the tail of the red and white plane hit the front bottom part of the right hand side of the nose of the other plane'.

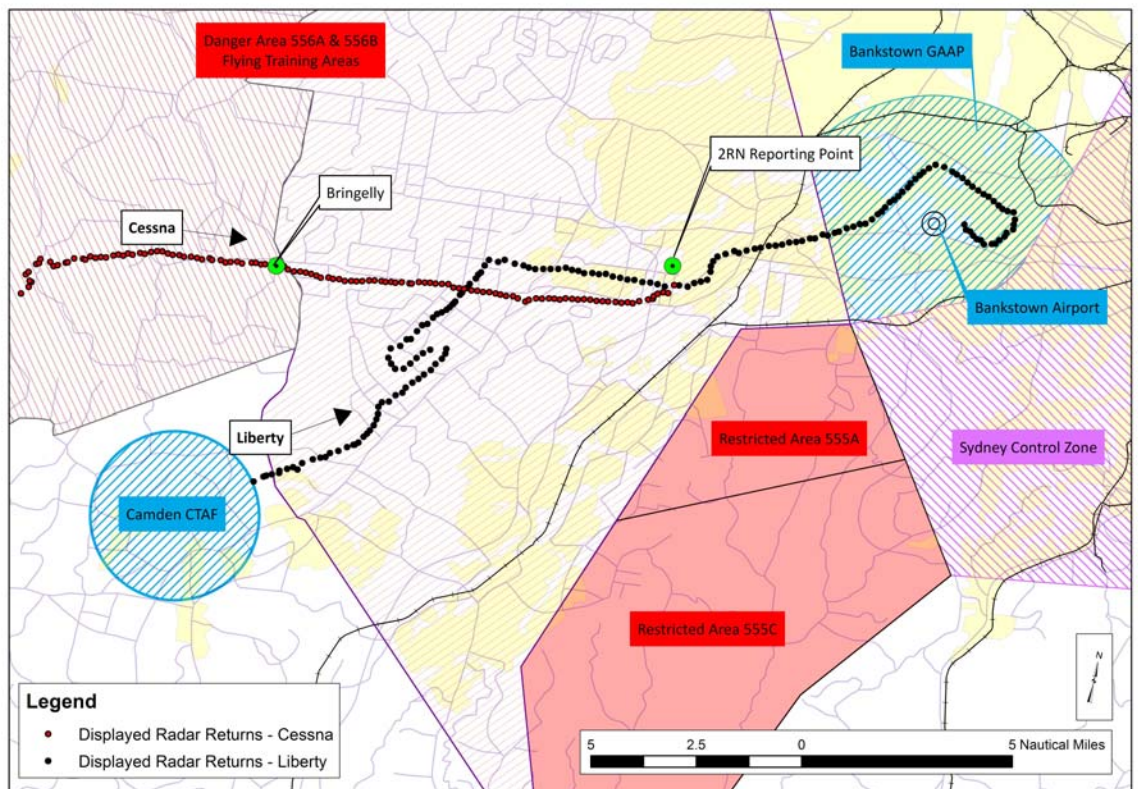


Figure 1: Displayed radar returns of both aircraft

The witnesses that observed the collision reported that neither aircraft appeared to be manoeuvring or took evasive action prior to the impact. The witnesses reported that both aircraft appeared to be flying in a straight line and that their wings were level.

Following the collision, the witnesses described the Cessna pitching nose-down to a vertical attitude and that the tail of the aircraft had broken off, but remained attached by what appeared to be cables. It was reported that the tail appeared to be rotating rapidly behind the Cessna as it descended vertically to the ground.

Weather conditions

The student pilot and the ATO reported that the weather conditions were adequate for visual flight rules (VFR) flight with a visibility in excess of 10 km and a cloud base of approximately 3,500 ft. The Bureau of Meteorology forecast weather was consistent with the observations of the pilots in the Liberty.

Recollection of events - Liberty pilots

Student under test

The student reported that the flight tracked north via the lane of entry and continued north towards Aeropelican. A diversion was given to him by the ATO to track to Warnervale, where they conducted a practice forced landing and circuits before departing for Somersby. They conducted a precautionary search and landing at Somersby and then tracked to Brooklyn Bridge. After passing this point, the student reported that the ATO asked him to conduct some instrument flying under an instrument hood³ as he flew down the lane of entry. He reported removing the hood in the Prospect Reservoir area and then was asked to identify his position and track to Camden and to enter the CTAF area.

He reported that he entered the Camden circuit and conducted a cross-wind touch and go on runway 06 before departing on the upwind leg of the circuit back into the training area. He climbed the Liberty to 1,300 ft until clear of the Camden area, then climbed to 2,500 ft. The ATO then

asked him to conduct steep turns at 45 degrees angle of bank to the left and then the right. After this was completed, a stall recovery manoeuvre was undertaken and then the ATO asked him to track to 2RN and return to Bankstown Airport.

As they turned towards 2RN, the student reported that the ATO told him there was traffic on the right at 45 degrees to the nose. He reported that he could not see the traffic initially, but when he did sight it, it seemed to be higher than the Liberty, and appeared to be turning.

The student then reported that he tuned the radio to the Bankstown automatic terminal information service (ATIS) frequency, noted the appropriate information and then made a radio call to Bankstown tower at 2RN. He reported that the air traffic control (ATC) response to the radio call was not what he was expecting and he was about to ask the controller to repeat the response, when he saw the flash of an aircraft tail fin in the lower right corner of the front windscreen, followed almost immediately by a loud bang.

The student reported that the ATO then took control of the aircraft, while he searched for the other aircraft. He reported seeing it descending almost vertically with the tail detached. He then reported that the ATO made a radio call and that the ATO flew the aircraft back to Bankstown.

Approved testing officer

The ATO reported that the flight had proceeded as previously described by the student up to Brooklyn Bridge. He reported that he asked the student to divert to Camden from Brooklyn Bridge.

After the student had tracked down the lane of entry and to Camden via Bringelly, the ATO asked the student to conduct a touch and go on runway 06 and then to depart to the training area for the remainder of the flight test.

The ATO reported that the student departed the Camden CTAF area correctly and then they tracked to an area between Mayfield and Warragamba Dam (to the north-west of Camden) and climbed to an altitude of 3,000 ft. At this altitude, the ATO reported that he asked the student to carry out steep turns and stall recovery, before conducting instrument flying during the descent and return to Bankstown via 2RN. He reported that during this time, he only sighted one aircraft, a Cessna, in the training area.

3 An instrument flying hood is used to simulate instrument flying conditions to allow a pilot to practice flying by instrument reference only.

The ATO reported that the student correctly obtained the ATIS for Bankstown and then made the correct radio call at 2RN. He reported that the call was responded to by Bankstown Tower and that they were cleared to enter the control zone on the crosswind leg of the circuit for runway 29 right. He reported that there were no other inbound radio calls heard on the tower frequency.

The ATO then reported that almost immediately after, they collided with a Cessna aircraft. The Cessna had appeared in his 2 o'clock high position, at an angle of 45 degrees to the right of the nose, descending at an angle of about 15 degrees to the horizon while in a turn to the left. He further reported that the impact 'was nearly a head-on collision'.

He reported taking control of the aircraft from the student and conducting a controllability check of the flight controls before making a MAYDAY⁴ transmission to Bankstown Tower. He then flew the aircraft to Bankstown.

Recorded radar data

The original radar and audio recordings were obtained from Airservices Australia by the Australian Transport Safety Bureau (ATSB) and the radar data recordings were then processed via a computer-based program that replicated the Australian Advanced Air Traffic System (TAAATS) radar system. Replay of the TAAATS radar data provided the ATSB with displayed flight paths for each aircraft (Figure 1).

Recorded Air Traffic Control transmissions

Cessna aircraft

Examination of the recorded ATC tape for the Bankstown tower frequency of 132.80 MHz, revealed that the only transmission from the Cessna was associated with its departure to the training area approximately 1 hour before the collision. There were no inbound transmissions recorded from the Cessna prior to the collision.

Subsequent examination of the damaged radio from the Cessna revealed that the active frequency was selected to 132.80 MHz (Bankstown Tower) and the standby frequency

was selected to 120.90 MHz (Bankstown ATIS). This was the only radio fitted to the Cessna.

Liberty aircraft

The first recorded inbound transmission on the Bankstown tower frequency of 132.80 MHz from the Liberty was the MAYDAY call from the ATO following the collision. The ATO reported that a correct inbound call had been made by the student, that it was acknowledged and that they were cleared to enter the circuit on the crosswind leg. The student reported that he made a radio call, but the response was not what he was expecting and he was about to make a call asking for clarification when the collision occurred.

Examination of the recorded air traffic control tape for the Bankstown ground frequency of 119.90 MHz revealed that the inbound call from the Liberty was made on this frequency and that the controller had advised the student that he was broadcasting on the Bankstown ground frequency and he should contact the tower on 132.80 MHz.

The Liberty aircraft was equipped with two communications radios as part of its avionics suite. Examination of the upper communications radio revealed that the active frequency was 132.80 MHz (Bankstown tower) and the standby frequency was 124.55 MHz (Sydney Radar - South). The lower communications radio had 119.90 MHz (Bankstown ground) selected as the active frequency and 120.90 MHz (Bankstown ATIS) as the standby frequency.

Damage to property and wreckage trail

A house was damaged as a result of the impact from the Cessna (Figure 2). A pergola attached to the rear of the house was destroyed, along with its contents. A number of houses surrounding the impact site also sustained damage to roofing tiles, internal roofing structures and guttering.

A search of the surrounding area recovered small fibreglass and metal fragments which were later identified as coming from the Cessna. The rear navigation light of the Cessna was recovered from a field approximately 140 m west of the main ground impact position of the Cessna. All other components of the Cessna were accounted for at the main wreckage location.

4 The international radio call for urgent assistance.

Wreckage description⁵

Cessna

The Cessna was a high-wing aircraft, painted white with large red stripes on its fuselage that extended to the lower section of the tail area. The vertical fin was painted white with a red and black accent on each side and a red leading edge. The aircraft rudder was painted white.

The Cessna impacted the ground in a vertical nose-down attitude. The damaged tail section remained attached by the flight control cables and was located on the bottom of the fuselage after the aircraft came to rest. There was significant compression damage to the leading edges of both wings, consistent with impact with the structure of the house and the ground.

Cessna's left wing had damage consistent with impact with a house to the east of the impact location.

The tail of the Cessna had separated approximately midway between the cabin and tail. The separation exhibited signs of tension overload failure along the rivet line on the left side with compression of the structure on the right side. The rudder, elevator and trim control cables had remained intact, allowing the separated section to remain connected to the main wreckage following the collision.

Control continuity to all flight controls was confirmed and initial investigation revealed no apparent abnormalities with the engine of the Cessna. The wing flaps were in the retracted position.

Figure 2: Cessna wreckage and house damage



A detached section of vertical fin from the Cessna had come to rest between two houses in an upright position after impacting the roof of a house to the west of the impact location. The

Examination of the vertical fin of the Cessna revealed impact damage on the left side of the fin that was consistent with contact with another aircraft.

⁵ Damage to both aircraft is described as being viewed while seated in the cockpit of the respective aircraft looking forward.

Later examination revealed that this damage was consistent with impact from the exhaust pipe of the Liberty aircraft. A single tyre mark was located

on the left side of the Cessna's vertical fin (Figure 3).

There were no mechanical abnormalities observed with the Cessna at the accident site that would have prevented normal operation prior to the collision.

Liberty XL2

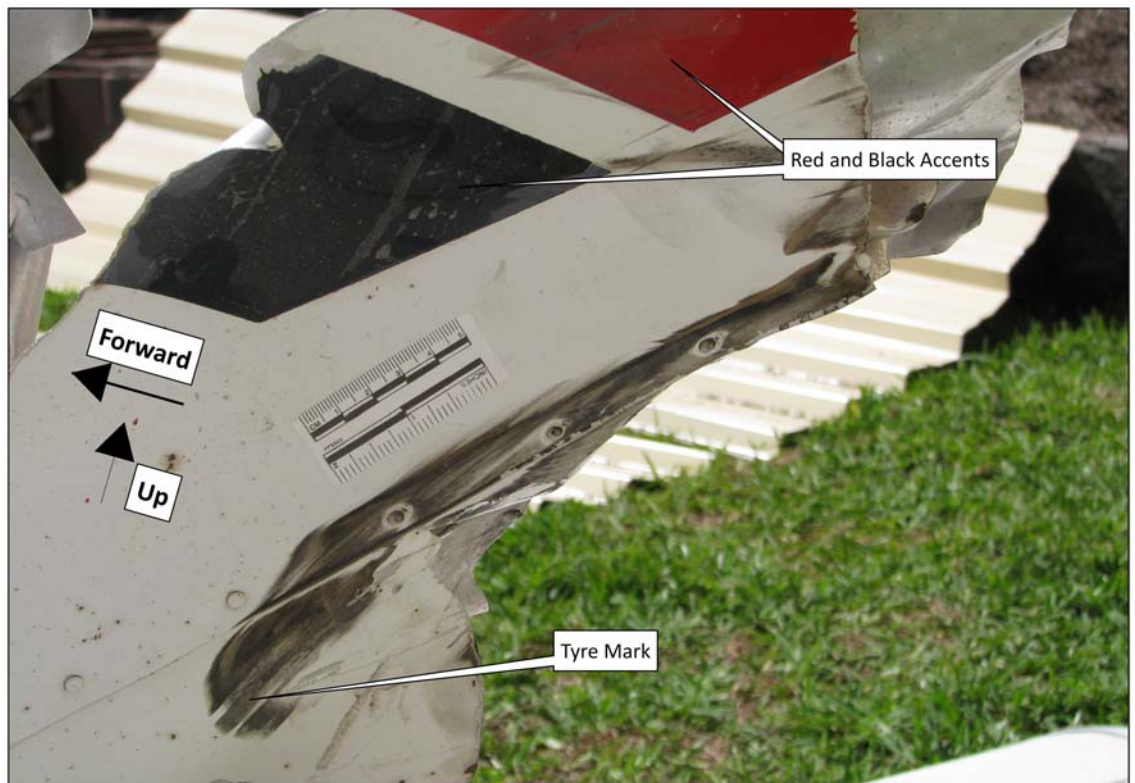
The Liberty was a low-wing aircraft, painted white with light blue, grey and aqua accents located along the fuselage. The propeller was painted white with red tips and black trailing surface.

Examination of the damage to the right side of the nose cowling revealed red paint transfer at the front of the cowling, with additional crush damage and white paint transfer towards the rear of the cowling.

Inspection of the exhaust pipe revealed that the top section had been partially crushed and it also exhibited white paint transfer.

The nosewheel had been displaced to the left of the aircraft centreline. There was red paint transfer present on the right side of the nosewheel leg. Examination of the nosewheel tyre

Figure 3: Tyre mark on Cessna vertical fin



After landing at Bankstown, the Liberty was secured by the NSW Police Force. Damage to the Liberty consisted of impact damage to the right side of the nose cowling and crushing impact damage to the exhaust pipe located on the lower right side of the engine cowling (Figure 4.) There was damage to the right side of the nosewheel, paint smearing on the leading and trailing surfaces of the propeller, along with impact damage. There was also a break in the cockpit windscreen on the lower right side. There was additional damage to the underneath surface of the left wing tip.

revealed that there was rubbing damage to the left side, consistent with it coming into contact with the nose wheel fork structure.

The damage to the lower surface of the left wing consisted of impact damage that appeared to have been the result of contact with a structure that had pierced the wing surface and wing tip fairing. That damage was later found to be consistent with the Cessna's tail navigation light that had been recovered from a field to the west of the impact site of the Cessna.

There were no mechanical abnormalities observed with the Liberty aircraft that would have prevented normal operation.

Figure 4: Damage to Liberty nose cowling and paint transfer



Injuries to persons

The student and the instructor of the C152 were fatally injured.

The student of the Liberty did not report any injuries as a result of the accident. The ATO reported that he had a cut to the thumb on his right hand and some bruising to his left knee.

There were no reported injuries to any person on the ground.

Pilot information

Cessna pilots

The student pilot was 18 years old and held a Student Pilot Licence and a current Class 2⁶ medical certificate, with a restriction that distance vision correction was required while exercising the privileges of the licence. It was reported that the student wore contact lenses to meet this requirement. The student pilot had 24.2 hours of aeronautical experience.

The instructor was 20 years old and held a Commercial Pilot Licence with a current grade 3 instructor rating. She held a current class 1⁷ medical certificate with no restrictions. She had 423.9 hours of aeronautical experience, with 127.2 hours instructor experience.

Liberty pilots

The student under test was 25 years old and held a Student Pilot Licence and a current class 1 medical certificate with no restrictions. He had 88.2 hours aeronautical experience.

The ATO was 89 years old and held a Commercial Pilot Licence and a current class 1 medical certificate, with a restriction to wear distance and reading correction while exercising the privileges of the licence. The ATO reported that he was complying with this restriction during the flight. The ATO held a current grade 1 multi-engine instructor rating and also held a number of testing delegations from CASA. The ATO had

6 A class 2 medical certificate allows the holder to exercise the privileges of a private pilot licence.

7 A Class 1 medical certificate allows the holder to exercise the privileges of a commercial or higher pilot licence.

approximately 27,000 hours aeronautical experience.

As a result of his age, the ATO was required to undergo more stringent individualised medical examinations on a yearly basis to renew his medical certificate. CASA had endorsed his medical certificate as 'Renew by CASA only' which meant that all the medical examination results had to be forwarded to CASA to allow them to determine the medical fitness of the ATO to exercise the privileges of his licence.

The medical examinations consisted of consultation, examination and testing by a specialist cardiologist and a specialist aviation ophthalmologist, in addition to consultation and examination by a specialist aviation medical examiner. The ATO had complied with those requirements and CASA had issued him with a class 1 medical certificate on 8 September 2008.

To exercise the privileges of his delegation as a CASA ATO, the ATO reported that he was required to undergo 6-monthly competency assessments with another nominated senior ATO and to renew his instructor rating every 2 years with a CASA flying operations inspector (FOI). The ATO reported that he last underwent a competency assessment with a senior ATO on 3 December 2008.

Pilot histories

Examination of the 72 hours leading up to the accident for all four pilots involved, did not reveal the existence of any problems related to sleeping, eating or pre-existing personal issues.

Aircraft details

C152

<i>Manufacturer</i>	Cessna Aircraft Company
<i>Model</i>	C152
<i>Serial Number</i>	15283511
<i>Registration</i>	VH-FMG
<i>Year of manufacture</i>	1979
<i>Certificate of airworthiness</i>	Issue date 28/1/1992
<i>Certificate of registration</i>	Issue date 11/7/1979

<i>Maintenance Release</i>	A67693 - Valid to 8395.0 hours or 23/11/2009
----------------------------	--

<i>Total airframe hours</i>	8376.1 hours at 17/12/2008
-----------------------------	----------------------------

Liberty XL2

<i>Manufacturer</i>	Liberty Aerospace Inc
---------------------	-----------------------

<i>Model</i>	XL-2
--------------	------

<i>Serial Number</i>	0112
----------------------	------

<i>Registration</i>	VH-XLY
---------------------	--------

<i>Year of manufacture</i>	2008
----------------------------	------

<i>Certificate of airworthiness</i>	Issue date 30/7/2008
-------------------------------------	----------------------

<i>Certificate of registration</i>	Issue date 25/7/2008
------------------------------------	----------------------

<i>Certificate of airworthiness</i>	MRR18/2008
-------------------------------------	------------

<i>Maintenance Release</i>	A85282 valid to 30/7/2009
----------------------------	---------------------------

<i>Total airframe hours</i>	208.3 at 5 Dec 2008
-----------------------------	---------------------

Ongoing investigation activities

The investigation is continuing and will cover:

- analysis of recorded radar data
- analysis of aircraft collision geometry
- analysis of respective aircraft cockpit visibility
- analysis of inconsistencies between recollections and other sources of information including recorded data and physical evidence
- analysis of midair collision data at GAAP aerodrome reporting points
- review of both aircraft serviceability and maintenance.

SAFETY ACTION

The Australian Transport Safety Bureau has been advised that the following safety action has been initiated by the Civil Aviation Safety Authority (CASA):

- CASA has formed a General Aviation Airport Procedures (GAAP) Training review team, which has been tasked to review the provision of training in GAAP procedures at all flying training organisations that are located at or within the vicinity of GAAP aerodromes. This review will cover all aspects of the provision of training, including all published advisory material.
- The CASA Office of Airspace Regulation is also conducting a review of GAAP airspace and procedures.