Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation – AO-2008-010
Interim Factual

Mid-air collision
54 km NNW of Gascoyne Junction, WA
13 February 2008
VH-OUS
Piper PA-18 Super Cub
VH-ZDP
Robinson Helicopter Company R44 Raven

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Mid-air collision - 54 km NNW of Gascoyne Junction, WA - 13 February 2008 - VH-OUS, Piper PA-18 Super Cub / VH-ZDP, Robinson Helicopter Company R44 Raven

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Acknowledgements

Figure 1: Airservices Australia

Figure 4: USAF Pilot Training Class 55-I Association web site, http://pilotclass55india.org/

Abstract

On 13 February 2008, a Piper Aircraft Corporation Super Cub aeroplane and a Robinson Helicopter Company R44 Raven helicopter collided in midair during feral goat culling operations. The aeroplane impacted the ground at a steep angle, fatally injuring the two occupants. The helicopter, though damaged, was safely landed.

The investigation is continuing.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

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. ATSB investigations are independent of regulatory, operator or other external organisations.

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, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

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

Purpose of safety investigations

The object of a safety investigation is to enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

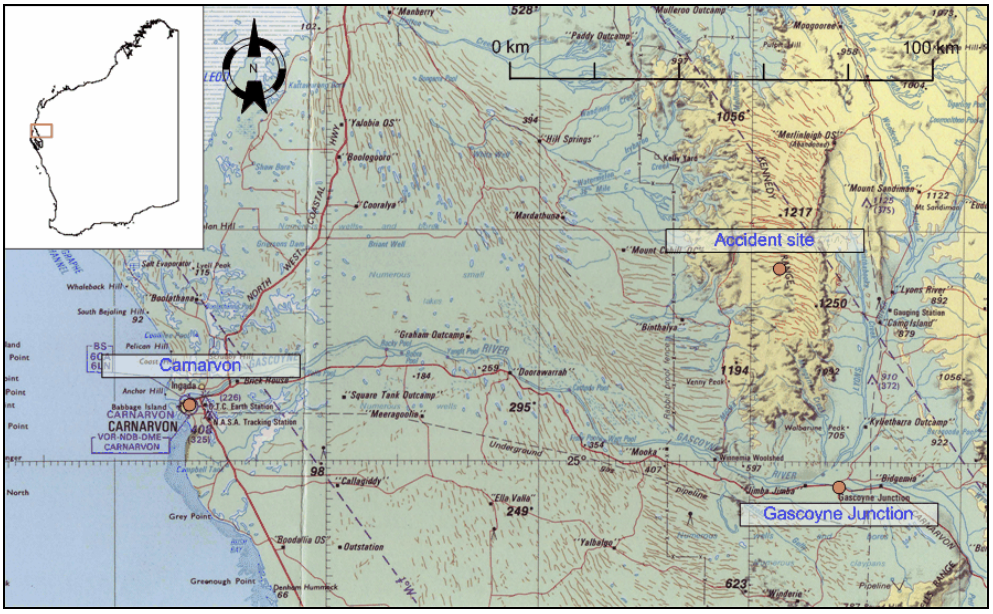
***Note**: The information contained in this interim factual report is derived from initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may come to light that alters the circumstances as depicted in this report.*

History of the flight

On 13 February 2008, a Piper Aircraft Corporation PA-18 Super Cub (Cub) aircraft, registered VH-OUS, and a Robinson Helicopter Company R44 Raven (R44) helicopter, registered VH-ZDP, were engaged in feral goat culling operations in the Kennedy Range National Park, WA. The two aircraft were operating under the Visual Flight Rules (VFR) from Gascoyne Junction airstrip (Figure 1) and had completed two similar culling flights prior to the accident flight.

At about 1805 Western Daylight-saving Time[1], the two aircraft departed together from Gascoyne Junction. On board the R44 were the pilot and a shooter. On board the Cub were the pilot and a spotter. The primary role of the Cub's occupants was to assist the R44 pilot to locate feral goats for culling.

Figure 1: Area map



The operation proceeded without incident until about 1914, when the R44 pilot and shooter observed the Cub flying towards them at the same height, estimated to be about 300 ft above ground level (AGL) (Figure 2). The pilot of the R44 reported that the Cub diverged slightly right, putting it on the left side of the R44. At about the time the aircraft passed each other, the R44 pilot entered a climbing left turn, intending to take up a reciprocal heading to continue the search for goats, while

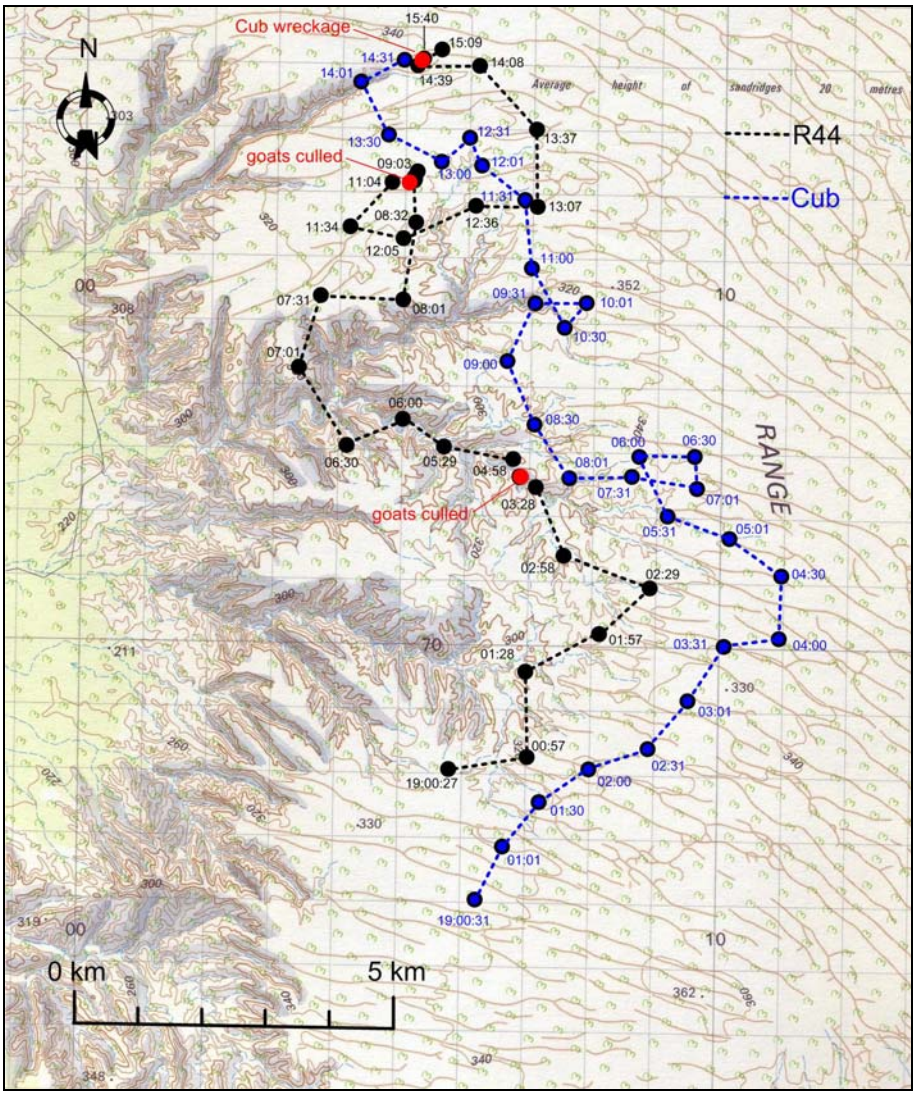
1 The 24-hour clock is used in this report to describe the local time of day, Western Daylight-saving Time, as particular events occurred. Western Daylight-saving Time is Coordinated Universal Time (UTC) + 9 hours.

keeping the Cub in sight. The R44 pilot reported that, during the turn, the right wing of the Cub rose quickly and that, in response, he manoeuvred the helicopter in an attempt to remain clear.

The two aircraft collided at about 400 ft AGL. The right wing of the Cub detached from the fuselage and the aircraft impacted the ground inverted in a steep, nose-down attitude. The pilot of the R44 retained sufficient control of the helicopter to conduct an initial approach to a low hover. On visually identifying the location of the Cub, the pilot of the R44 hover taxied to the vicinity of the wreckage before landing to render assistance to the occupants.

The R44 pilot and shooter established that both occupants of the Cub had been fatally injured. The R44 pilot and shooter were uninjured.

Figure 2: GPS track data for both aircraft[2]



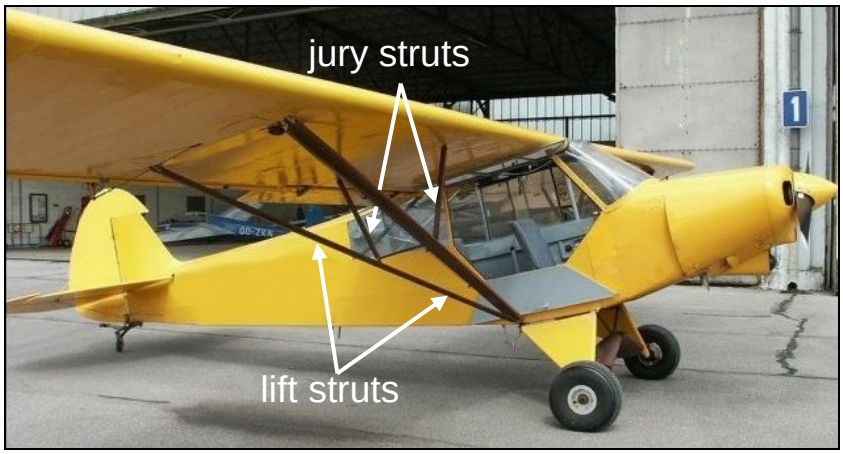
2 Both aircraft's onboard GPS units recorded their respective aircraft's position at 30 second intervals. The lines between those recorded points approximate the aircrafts' movement and do not accurately reflect any turns by the aircraft – for example, the turn described by the R44 pilot prior to the collision.

Aircraft information

Piper PA-18 Super Cub

The Piper PA-18 Super Cub is a high-wing, tailwheel aeroplane that combines a metal structure with resin-impregnated fabric skin (Figure 3). The aircraft has provision for two occupants, seated in tandem, both with access to flight controls. In VH-OUS, the spotter was seated behind the pilot and the rear control stick had been removed, leaving only rudder pedals and engine throttle control.

Figure 3: Example Piper PA-18 Super Cub



R44 Raven

The R44 Raven is a four-person, single main rotor helicopter powered by a six-cylinder piston engine and equipped with skid-type landing gear.

The helicopter's main rotor comprises two all-metal rotor blades with stainless steel leading edges and blade skins.

Weight and balance

Weight and balance calculations that were undertaken by the investigation indicated that both the Cub and R44 were operating within their respective maximum allowable gross weight and centre of gravity limits at the time of the accident.

Meteorological information

Weather conditions

The area forecast[3] for the flight predicted isolated thunderstorms and showers, and associated cloud with a base of 2,000 ft above mean sea level (AMSL).

3 For the purposes of providing aviation weather forecasts to pilots, Australia is sub-divided into a number of forecast areas. The occurrence flight was contained in Area 65.

There were no direct observations of the weather conditions in the vicinity of the accident site. However, the observed temperature at Gascoyne Junction[4] at 1500 was 40.2°C. Although the temperature at the time of the accident was not recorded, the R44 pilot's recollection of the temperature at that time was consistent with the 1500 Gascoyne Junction observation.

A Bureau of Meteorology (BoM) after-flight analysis stated that the observed weather conditions were consistent with those forecast. Specifically, radar imagery of rainfall echoes and detected lightning strikes in the vicinity of Binthalya, about 27 km south-west of the accident site, were consistent with the forecast thunderstorms and showers.

The BoM report stated that the likely wind conditions at the time of the accident were light and variable. However, the presence of thunderstorms may have produced significant variations in wind speed and direction.

Natural light conditions

The position of the sun at the reported time of the accident was determined from the Geoscience Australia website. The sun's azimuth[5] at that time was 259°32'59" and its altitude[6] 9°53'12".

The R44 pilot reported that the position of the sun did not affect his ability to identify the Cub flying towards him. The wreckage trail of the Cub, and reports from the occupants of the R44 suggested that the collision occurred while the aircraft were tracking to the north-east, placing the sun directly to the rear of both aircraft at that time.

Wreckage and impact information

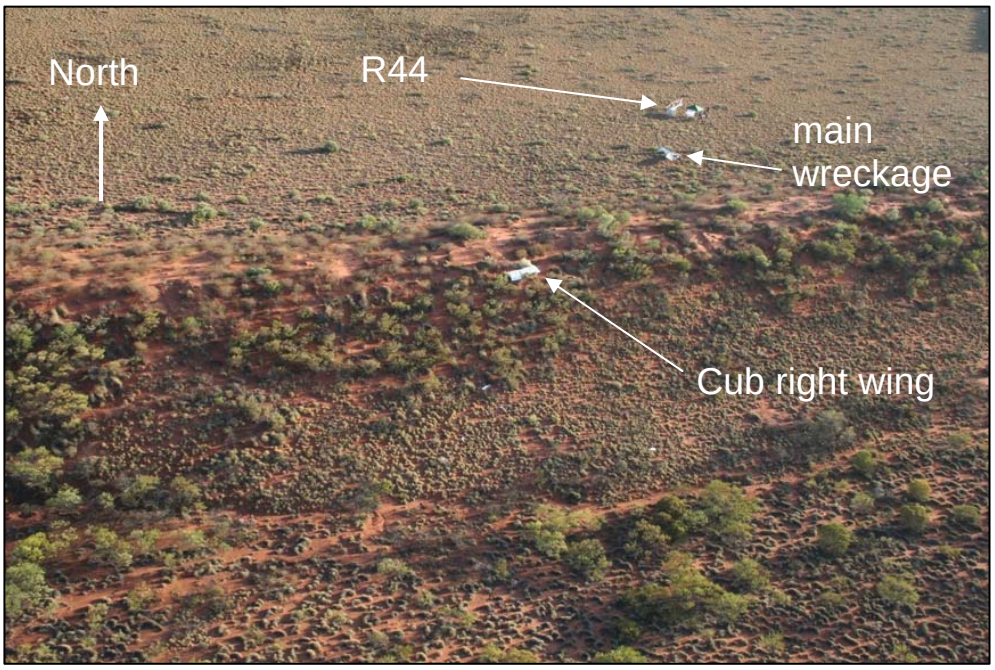
The accident occurred over relatively flat terrain, characterised by regular sand ridges 20 m high and orientated approximately east to west (Figure 4). The elevation of the accident site was about 1,150 ft.

4 Gascoyne Junction was about 54 km south-south-east of the accident site.

5 The clockwise horizontal angle from the sun to true north, measured in degrees, minutes and seconds.

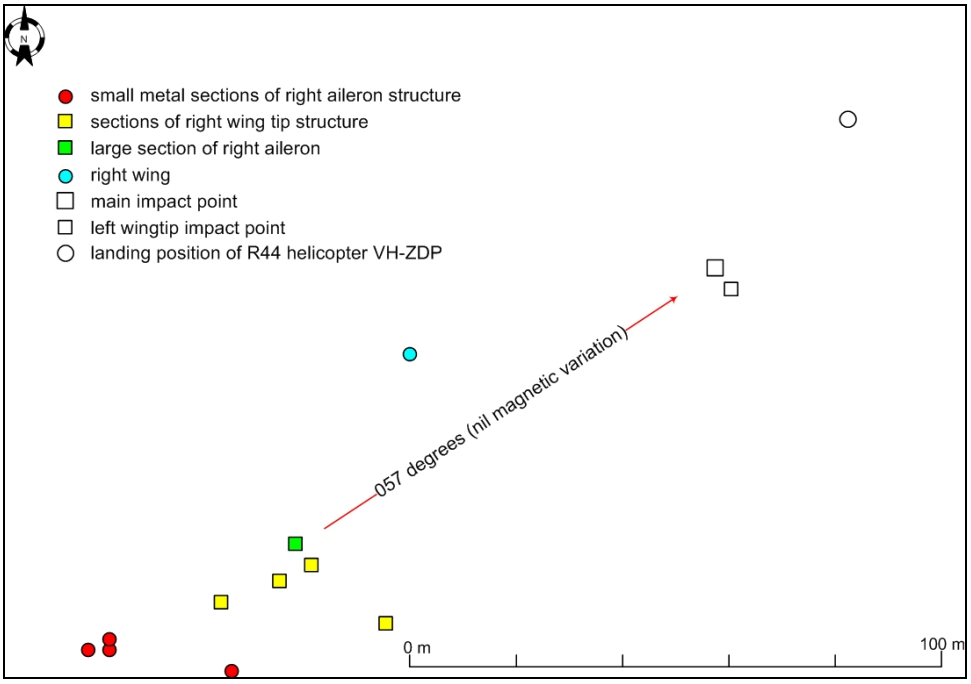
6 The vertical angle to the sun from an ideal horizon, measured in degrees, minutes and seconds.

Figure 4: Accident site



The wreckage trail of the Cub was orientated about 057 degrees and extended about 130 m across a sand ridge. The wreckage trail comprised the right wing and associated aileron and wing tip structure, and the main wreckage (Figure 5).

Figure 5: Cub wreckage trail

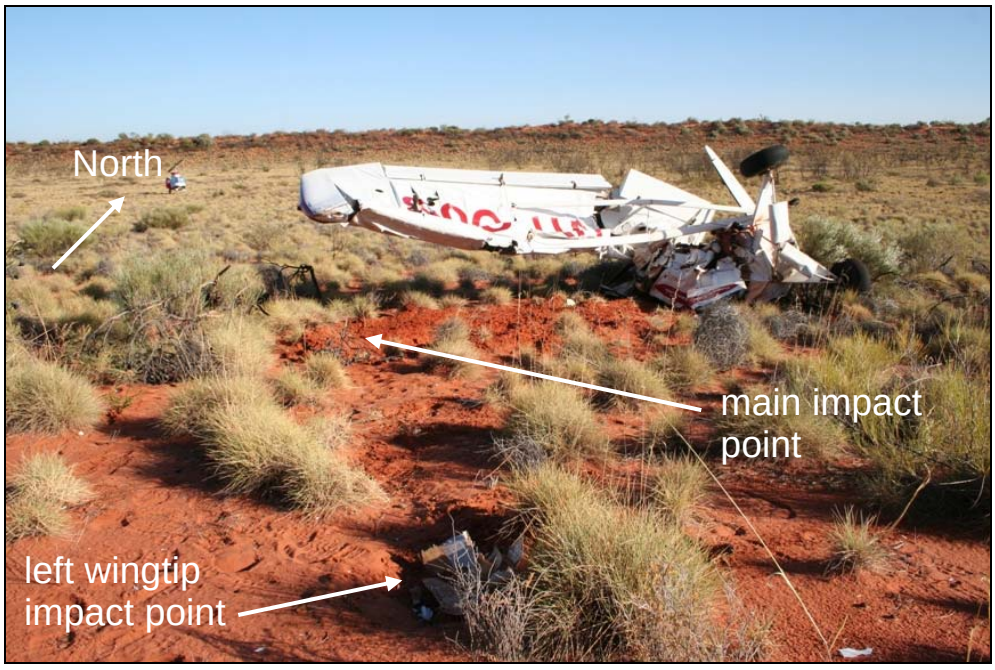


Wreckage examination

Cub

The aircraft impacted the ground inverted in a steep, nose-down attitude. Following the initial impact, it rotated to the right before coming to rest inverted, a short distance from the initial impact point (Figure 6).

Figure 6: Piper Super Cub wreckage



The contact damage to the Cub was limited to the right wing and associated support struts, with the R44 main rotor blades severing both wing lift struts and impacting the wing rear spar, aileron and wing tip (Figures 7 and 8). The wing was fractured at the inboard attachment fittings and had detached from the fuselage.

Figure 7: Wing and lift strut damage

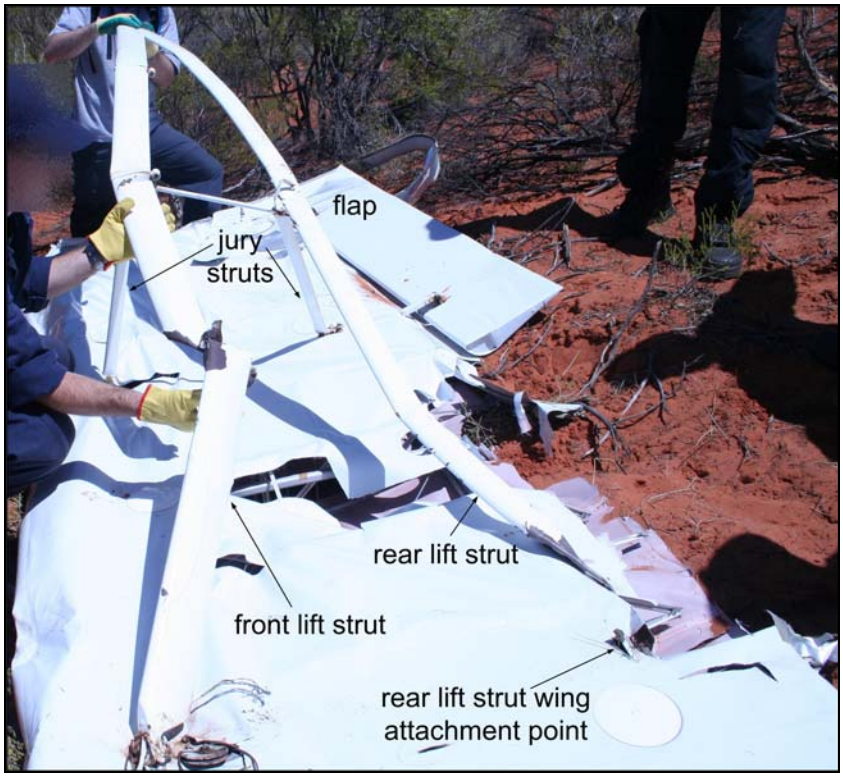
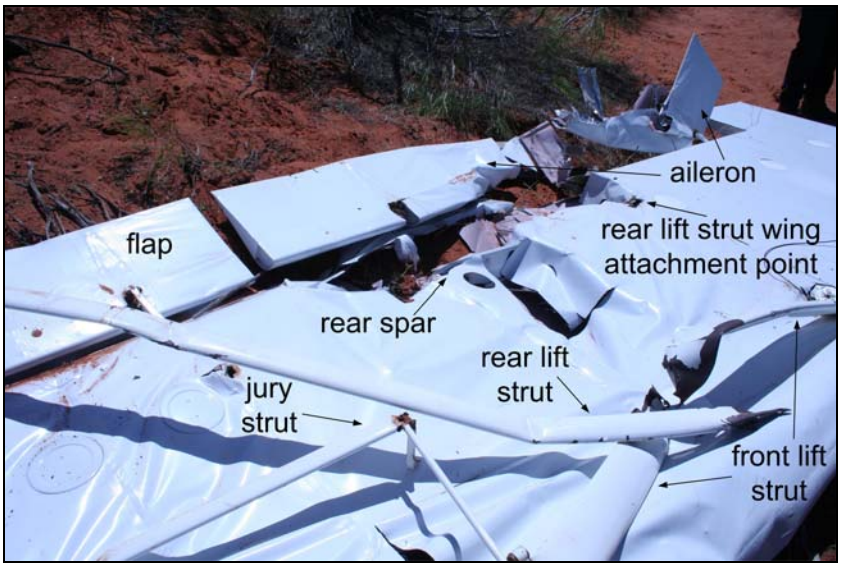


Figure 8: Wing and aileron damage



All components of the Cub were accounted for at the accident site and the continuity of all of the aircraft's flight controls was confirmed.

The Cub engine and propeller were removed from the accident site for disassembly and technical examination.

R44

There was substantial damage to one of the main rotor blades, consistent with the mid-air collision (Figure 9). A section of the blade's skin and honeycomb structure was forced upwards between the leading edge spar and the trim tab, with part of the Cub's wing fabric retained within the blade. In addition, the blade tip had a section of the skin and honeycomb missing at the trailing edge. Both main rotor blades showed paint transfer along the majority of their length, and there were creases on the lower surface of the blades' skin.

There was also evidence of contact with the Cub (paint transfer) on the lower left area of the chin bubble (Figure 10).

Figure 9: Main rotor blade damage

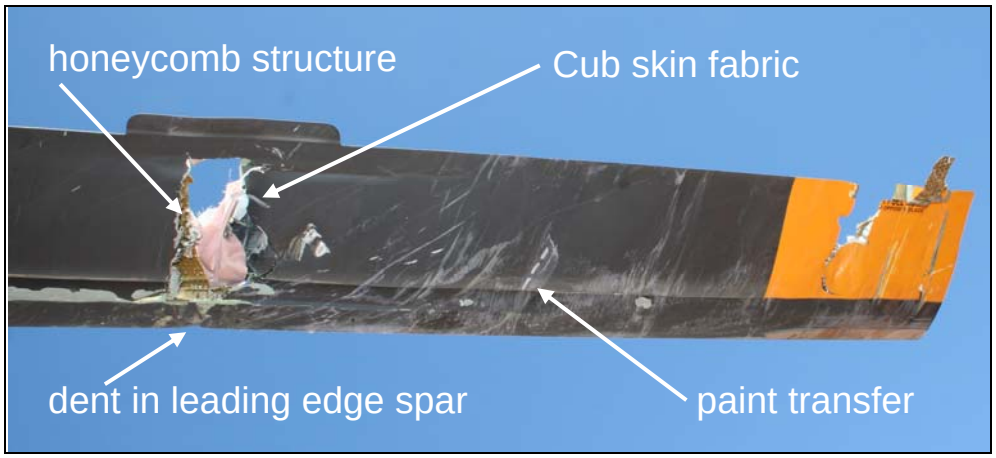


Figure 10: Chin bubble paint transfer

Examination of recovered components – Cub engine

Disassembly of the engine cylinders identified one broken piston compression ring in one cylinder. That broken ring was retained within the relevant piston groove. There was no scoring or other associated damage to the cylinder wall or piston grooves that may have prevented normal engine operation.

The engine disassembly and inspection did not reveal any defect or anomaly that would have prevented the engine from operating normally.

Further investigation

The investigation is continuing and will examine the following:

- the visibility from the cockpit of both aircraft
- involved party procedures affecting the conduct of aerial spotting/culling
- the training and qualifications of the involved personnel.