Australian Government
Australian Transport Safety Bureau

Aviation Short Investigations Bulletin

Near collision special edition

Issue 51

Investigation

ATSB Transport Safety Report
Aviation Short Investigations
AB-2016-085
Final – 8 September 2016

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

Publishing information

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Near Collision

Introduction

The ATSB remains concerned about the number of reports it receives each year relating to near collisions in the vicinity of non-controlled aerodromes. The issue continues to be one of the ATSB's *SafetyWatch* priorities. To highlight this issue further, the ATSB has compiled this investigation bulletin containing near collisions between February 2016 and May 2016. These were some of the more serious separation incidents that were reported to the ATSB during this period.

These investigations have highlighted a number of issues which pilots should be aware of when operating in the vicinity of non-controlled aerodromes.

As a pilot operating to/from or near a non-controlled aerodrome, ensuring that the following actions are completed will help avoid a repeat of the near collision incidents documented in this Bulletin:

- Effective pre-flight planning:
  - Ensure you have reviewed the Aeronautical Information Publication (AIP) and CASA publications so you are aware of mandatory (and recommended) communication requirements.
  - Know which frequencies you will be using.
  - Know where the local training areas are and if you will be transiting a training area.
  - Plan when the CTAF should be selected to allow you, and any aircraft operating in the vicinity, enough time to plan for your arrival.

- Effective communication:
  - Ensure your radio is turned on, and is transmitting and receiving.
  - Ensure the radio is selected to the appropriate frequency and at a suitable volume.
  - If the frequency selected has an aerodrome frequency response unit, a beep-back or recorded voice message will verify the correct frequency and whether any other aircraft have recently broadcast on that frequency.
  - Broadcasts should provide a clear understanding of the location of your aircraft and your intentions using standard phraseology as recommended in the AIP.
  - When broadcasts are heard, you should assess where the other aircraft is in relation to your own aircraft and if there is a possible conflict, alert the other pilot to your location and intentions to ensure that adequate separation is maintained.

- Dealing with a mix of aircraft and the different knowledge and experience of those crews:
  - Pilots operating under the instrument flight rules (IFR) are encouraged to reference physical features, waypoints or an easily understandable position such as a distance and bearing from the aerodrome when making broadcasts at non-controlled aerodromes as this will allow other pilots to gain a clear understanding of where other, potentially larger or faster aircraft will be.
  - Pilots of IFR flights are also encouraged to familiarise themselves with the types of operations that may be occurring at a non-controlled aerodrome such as gliding, parachuting and training operations.
  - Operators at non-controlled aerodromes are encouraged to make themselves aware of the scheduled arrival and departure times of RPT aircraft.

See the ***ATSB SafetyWatch*** webpage for more tips and other references to help keep safe around non-controlled aerodromes.

Near collision

Near collision involving SAAB 340, VH-ZLA, and Glaser-Dirks DG-800B glider, VH-IGC

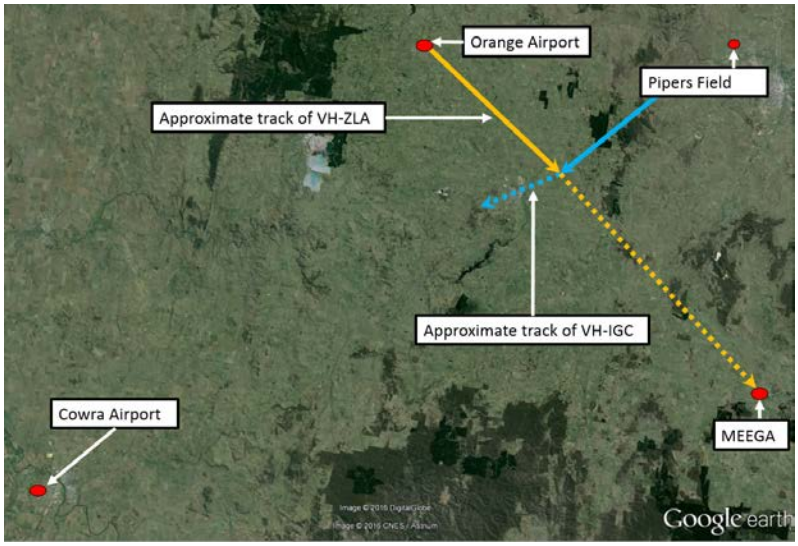
What happened

On 21 February 2016, the pilot of a Glaser-Dirks DG-800B glider, registered VH-IGC (IGC), was participating in a coaching flight with a second glider and pilot from Pipers Field aerodrome, New South Wales (NSW) (Figure 1). The glider pilots planned to track towards Cowra, and to remain outside a 10 NM radius of Orange Airport, both also in NSW. The gliders climbed to about 8,000 ft above mean sea level (AMSL) as they departed Pipers Field, descended to about 7,100 ft at 9 NM south-west of Pipers Field, climbed to 9,100 ft and then descended again. Not long after they departed Pipers Field, the glider pilots both selected their radio (each glider was fitted with one VHF radio) to a discrete glider frequency 122.9. The pilot of the following glider reported being at the same level and about 1,000 m behind IGC.

At about 1420 Eastern Daylight-saving Time (EDT), a Regional Express SAAB 340B aircraft, registered VH-ZLA (ZLA), taxied at Orange Airport, for a scheduled passenger service to Sydney, NSW. The flight crew consisted of a first officer, who was the pilot flying for the sector, and a captain, who was the pilot monitoring.[1] The flight crew broadcast on the Orange common traffic advisory frequency (CTAF) when taxiing and again when rolling on runway 11.

As the aircraft climbed through 2,000 ft above ground level, the first officer initiated a slight right turn onto the departure track of 123° to track towards the waypoint 'MEEGA'. The captain broadcast a departure call on the CTAF and then contacted air traffic control (ATC) on Melbourne Centre frequency, and in response received a clearance to enter controlled airspace. The lower limit of Class E airspace in this area was 8,500 ft AMSL.

Figure 1: Approximate aircraft tracks and relevant locations



Source: Google earth – annotated by ATSB

[1] Pilot Flying (PF) and Pilot Monitoring (PM) are procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF's actions and aircraft flight path.

When climbing through about 6,000 ft AMSL, the first officer saw a build-up of cumulus cloud ahead, and asked the captain to request a clearance to track 5 NM right of track to remain clear of it. As the captain started to read back the amended clearance from ATC, the aircraft was climbing through about 7,500 ft. The captain sighted the glider (IGC) ahead, just below the cloud base, and assessed there was a risk of collision. The captain immediately took control of the aircraft from the first officer, disconnected the autopilot and lowered the nose of the aircraft to ensure it passed below the glider. The flight crew estimated that the glider passed within about 100 m of the aircraft.

The glider IGC was descending through 8,560 ft AMSL, and 11 NM from Orange Airport, when the pilot of IGC sighted ZLA in their 3 o'clock position and climbing towards them. The pilot of the following glider also alerted the pilot of IGC to the aircraft on their discrete glider frequency. The pilot of IGC assessed that while ZLA was on a direct track towards IGC, due to its climb rate there was no risk of collision, and elected to continue on their current track. The pilot of IGC estimated that ZLA passed about 200 m below the glider.

The pilot of the glider following IGC reported that ZLA passed between the two gliders, below IGC but at about the same altitude as the following glider. The flight crew of ZLA did not see the second glider at any stage, nor did either glider appear on the aircraft's traffic alert and collision avoidance system (TCAS).

Notice to airmen (NOTAM)[2] and Advisory Note

The flight crew of ZLA had reviewed the NOTAMs prior to commencing the first sector of the day from Sydney to Orange. NOTAM C0002/16 referred to increased glider activity due to gliding championships at Narromine, NSW, from 14 to 21 February 2016. The NOTAM advised that glider pilots would be on the CTAF 126.7 within 10 NM of the aerodrome (Narromine), otherwise on either frequency 122.7 or 122.9.

The Gliding Federation of Australia had also issued a Significant Gliding Activity Advisory Note, which included a significant gliding event from 6 to 12 February 2016, with 20 gliders within a 500 km radius of Narromine (which includes the Orange area), and that the associated gliding frequencies were 122.025 and the CTAF 126.7. The advisory note was sent by email to 'regular airspace users', which included Regional Express.

The gliders involved in the incident were not operating in association with the championships.

The Gliding Federation of Australia commented that the Advisory Note was intended to alert flight crews to gliders operating in the vicinity of the Orange CTAF (as Orange was within the 500 km radius). On the day of the incident, the gliders operating as part of the championships were north-west of the Orange CTAF.

Company procedures for Regional Express

Regional Express had special procedures to assist in maintaining separation with gliders for aircraft operating in the vicinity of Bathurst, NSW, and Narromine, but at the time of the incident, not for Orange. Orange had not been identified as a gliding location, unlike Bathurst and Narromine. These were published in the company's route manual, which detailed normal and special requirements of every aerodrome they operate into. The waypoints and tracks used for approaches to Bathurst, the location of Pipers Field aerodrome, and tracks to be avoided were published in the En Route Supplement Australia entry for Bathurst under Flight procedures.

The special procedures for Bathurst advised of a large amount of glider activity in the Pipers Field area. It stated that the VHF frequency the gliders use was 122.7. It included a map depicting preferred tracking from Bathurst to avoid Pipers Field, and which tracks to be avoided.

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[2] A Notice To Airmen advises personnel concerned with flight operations of information concerning the establishment, condition or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to safe flight.

These also included a recommendation that on departure from Bathurst to Parkes, flight crew broadcast on the glider frequency 122.7 prior to taxiing at Bathurst, which was the frequency most commonly used by glider pilots in the area.

There was no mention of glider frequency 122.9, which the glider pilots had selected on the incident flight.

Flight data

The aircraft operator provided the ATSB with the flight data for the incident flight. The flight data showed that as ZLA climbed through about 8,000 ft, the autopilot was disengaged, and the captain applied a nose-down elevator control deflection and the aircraft pitched down about 3 to 4°.

Pilot comments

Captain of ZLA

Due to workload, it was not always possible to broadcast on the specified glider frequency – they were required to monitor CTAF and ATC frequencies, and the aircraft was fitted with two VHF radios. In several years of broadcasting the recommended calls, the captain could not recall ever having received a response from any glider pilot to a call broadcast on the glider frequency. Due to terrain shielding, the glider pilots may not hear a broadcast from the ground at either Bathurst or Parkes.

Fundamental to the incident was a lack of communication between ZLA and the glider/s. There was no situational awareness between the aircraft. If the glider pilot had broadcast on the CTAF, they could have avoided the near collision.

Later in the day of the incident flight, the flight crew broadcast on the Narromine glider frequency when on descent into Dubbo. The responses received from glider pilots on the frequency were unhelpful and potentially distracting.

First officer of ZLA

The first officer reported that they had never encountered a glider in the vicinity of Orange before, particularly through the centreline of an active runway. The climb is a busy stage of flight – they were configuring the aircraft, and making radio calls on Melbourne Centre ATC. If they had been on descent, they would have descended through the cloud straight on top of the gliders, and the glider pilots were not on the same radio frequency as they were.

If there is a specified glider frequency active, they select that prior to broadcasting a taxi call on the CTAF and ask whether there are any gliders in the area. Once they have selected the CTAF, they remain on it (with Melbourne Centre ATC selected on the other radio).

Pilot of IGC

The pilot of IGC provided the following comments:

- The gliding club had a procedure for pilots to assist in maintaining separation with Regional Express flights out of Bathurst, but not for Orange. The procedure was documented and circulated via email to members of the gliding club. Associated maps and information were also prominently displayed in the gliding clubhouse, and reiterated to pilots at pre-flight briefings.
- As they were not going to enter the Orange CTAF, the two glider pilots switched to the gliding frequency 122.9 departing Pipers Field. They normally broadcast when entering a CTAF and then monitor the frequency, but they were not going into the Orange CTAF, so did not select that frequency at any stage of the flight.
- If they heard a broadcast from a Regional Express crew, they would only respond if they anticipated a risk of collision.

- The proximity between the aircraft and glider was closer than was comfortable but they did not think there was a risk of collision.
- It was a common route for the gliders tracking from Pipers Field to Cowra via Blayney as they had identified a number of sites suitable for an outlanding[3] if required.
- When outside the CTAF but within the identified zones of increased collision conflict, it would be good to be on a common frequency.

Class E Airspace

Class E Airspace is controlled for IFR flights, and uncontrolled for VFR flights. The Gliding Federation of Australia Airways and Radio Procedures for Glider Pilots stated that 'Gliders are encouraged, but not required, to monitor the area frequency when operating in Class E Airspace'.

Pipers Airfield Airspace Procedures

Following the incident, an email was sent to members of the Bathurst Soaring Club to advise them of the incident, and it contained a copy of the existing procedures for members to read. The procedures included the following instructions.

- Keep a good lookout at all times.
- Study and understand the map of the Regional Express flight paths and the radio frequency you should be on.
- Monitor 119.0 MHz (which was the Orange CTAF) in the vicinity of the Regional Express flight paths to/from Orange as shown on the map.
- Monitor 119.0 MHz in the vicinity of Orange Airport and keep a good lookout especially for traffic from/to Bathurst, Sydney, Parkes and Dubbo.
- Make sensible calls on the CTAF when within 10 NM of the aerodrome to alert traffic in those areas where you are and what your intentions are.
- When operating outside the normal 10 NM but on the likely track to or from Sydney, act as if in the vicinity (i.e. within 10 NM). Recent incidents have shown that operational profiles for Regional Express flights have them much higher than we would normally expect. Do not assume that you should not respond because you believe you are too high.

ATSB comment

The separation issue in this case may have been avoided if the glider pilot had been monitoring and broadcasting on the CTAF. The crew of ZLA were monitoring and broadcasting on the Melbourne Centre ATC frequency and CTAF, and the glider pilot was monitoring a discrete glider frequency. Even if the flight crew of ZLA had broadcast on, or had been monitoring, the nominated glider frequency of 122.7, neither of the glider pilots were monitoring, or broadcasting on, that frequency, so this would have been an ineffective means of alerting the glider pilots of their intentions.

The advisory for Regional Express pilots to make an additional broadcast on a glider frequency will not necessarily reach the glider pilots targeted.

Operating under the visual flight rules, and the exemption to CAO 95.4 Instrument 2011, there was no specific requirement for the glider pilot to monitor or broadcast on the area frequency. Regional Express commented to the effect that in accordance with this exemption, separation between a glider and other aircraft is dependent on see-and-avoid only. Regional Express aircraft are fitted with VHF radios and TCAS. However, these are not capable of alerting the crew to a glider that is not fitted with a transponder and where the glider pilot is not listening or broadcasting on the same frequency as the Regional Express crew.

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[3] Landing somewhere other than the home airfield.

The crew of ZLA broadcast their position and intentions on the CTAF, but the pilot of IGC was not monitoring that frequency.

The requirement to monitor a CTAF is subject to a level of interpretation, particularly with respect to the altitude above an airfield at which the requirement applies. The Aeronautical Information Package requires a pilot to broadcast on the CTAF when they enter the vicinity of a non-controlled aerodrome. The AIP goes on to describe the vicinity of a non-controlled aerodrome as being:

> *…within 10 nm of the aerodrome and at a height above the aerodrome that could result in conflict with operations at the aerodrome.*

The glider pilots were not monitoring the CTAF because they did not believe they were 'in the vicinity' of Orange Airport, or of inbound or outbound aircraft.

Existing forums and processes (managed by the Civil Aviation Safety Authority (CASA) and Airservices Australia) allow airspace users to influence the manner in which airspace is managed and propose changes to relevant documents (such as the En Route Supplement Australia). Where changes have the potential to improve safety, operators are encouraged to present proposals for consideration, using those forums and processes. One relevant forum for proposing airspace-related safety improvements is the CASA Regional Airspace and Procedures Advisory Committee.

Aircraft proximity events review

At the Regional Aviation Safety Forum in March 2012, a representative from Regional Express expressed their concerns about close proximity encounters with gliders. Along with the use of radios, avoiding known departure tracks, and the use of see-and-avoid principles, the compulsory fitment and operations of transponders to gliders was discussed. CASA's Safety Systems Office advised that it would undertake an analysis of aircraft proximity (airprox) events.[4]

In 2012, the Civil Aviation Safety Authority (CASA) commenced a safety review into the level of risk from gliders in aircraft proximity events in uncontrolled airspace. In response to discussions at a Regional Aviation Safety Forum in 2013, and following advice from the ATSB of an increase in the number of airprox events across all categories of operations, CASA established an Industry Airprox Working group to examine ways to reduce airprox events and enhance safety. Regional Express and industry groups including the Gliding Federation of Australia, were members of this group.

The working group concept was subsequently dropped, and CASA has since developed a process to assess the risk of complex safety issues. The ATSB was provided with a draft of CASA's *Safety Risk Profile – Aircraft Separation (Airprox)* report. Note that these have not yet been finalised and may change when the final version is published.

The stated objectives of the Safety Risk Profile, were:

- to identify the current controls for managing the threat of aircraft on a collision course
- to identify and, if appropriate, recommend additional treatments, and assign accountabilities, to control risk.

The risk profile analysed Australian data from the ATSB aviation safety incident reports, and from the UK Airprox Board.

The findings of CASA's safety risk profile included:

- That the limitations of see-and-avoid are well documented and only through continued education and training will this be an effective risk control measure.

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[4] Note that the ATSB no longer uses the term 'airprox', but now uses 'near collision' which is defined as 'where an aircraft comes into such close proximity with another aircraft either airborne or on the runway strip,…where immediate evasive action was required or should have been taken'.

- On-board communications i.e. the use of radios will assist in pilot awareness and upgrade see-and-avoid to alert-and-avoid, this being a more effective risk control. Treatments have been identified in the areas of carriage and use of radios, English language standards, human factors training.
- Hardware was identified as an effective recovery measure. Since its introduction, airborne collision avoidance systems (such as TCAS) have been a proven risk control in the prevention of mid-air collision. Other hardware technologies are used and emerging which offer varying degrees of protection depending on design and intended application.

The report quoted a European Aviation Safety Agency research project, *Scoping Improvements to 'See and Avoid' for General Aviation (SISA)*, which reviewed initiatives taken (in Europe) to mitigate the limitations of see-and-avoid. The project assessed currently available systems to augment pilots' visual observation including anti-collision devices. They classified and compared the systems, and assessed their relative suitability for general aviation aircraft including gliders. The use of anti-collision devices was not mandatory in Europe, but several systems were already widely used that help the pilot to identify other traffic.

Proposal for the adoption of amended standards for aircraft dependent surveillance – broadcast (ADS-B) fitment in visual flight rules (VFR) aircraft

At its 21st Surveillance Technologies Working Group Meeting in February 2016, the Australian Strategic Air Traffic Management Group drafted a proposal to CASA recommending the adoption of amended standards for ADS-B fitment in VFR aircraft. The Gliding Federation of Australia has a representative in the working group. Fitment of ADS-B technology in VFR aircraft enables awareness of other aircraft traffic, thereby improving aviation safety. The working group suggested that adopting appropriate standards and simplifying the installation process would encourage (voluntary) fitment of ADS-B technology in general aviation aircraft.

The proposal stated that if VFR aircraft were equipped with ADS-B OUT equipment, to the nominated standards, safety and efficiency would be significantly improved, because these aircraft would be visible to:

- aircraft with TCAS or other traffic advisory system;
- all aircraft with ADS-B IN; and
- air traffic control, when within line of sight coverage of ADS-B ground station.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following safety action in response to this occurrence.

Bathurst Soaring Club

Bathurst Soaring Club amended its airspace procedure so that glider pilots are to use 122.7 or the CTAF frequencies and not any other frequency within a 40 NM radius of Pipers Field.

Regional Express – operator of VH-ZLA

As a result of this occurrence, Regional Express has advised the ATSB that they have taken the following safety actions:

Notice to flight crew

Regional Express distributed the following notice to flight crew:

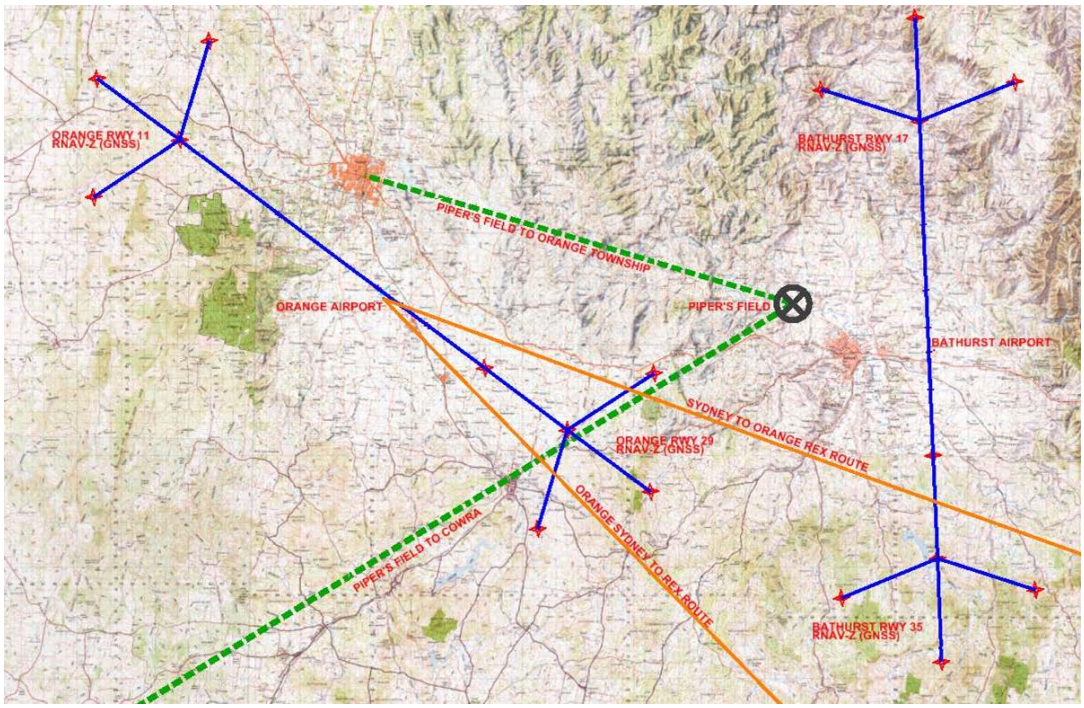
> *Due to increased glider traffic to the East of Orange it is recommended that if operationally possible a broadcast on 122.7 be made prior to top of descent and/or prior to taxi at Orange.*

Communications between Regional Express and Bathurst Soaring Club

Regional Express produced a number of charts showing approach and departure routes from Bathurst and Orange, including Figure 2, and made the following comments to the Bathurst Soaring Club:

> *On arrival at Orange our flight crew would typically call on the CTAF frequency at around 30 miles from the airport or at top of descent or around 6.5 minutes from the field. In most cases where they are able to use Runway 29 to land they will track to join a straight-in final at 5 miles.*
>
> *On departure from Orange they would be making all the necessary calls on the CTAF frequency i.e. taxiing, entering the runway, etc.*
>
> *It would be very helpful if the gliders could maintain a listening watch on the Orange CTAF frequency when in the vicinity of the possible areas of conflict, so that we could have 'alerted see and avoid' separation.*

Figure 2: Regional Express Orange and Bathurst tracks relative to Pipers Field



Source: Regional Express

The Gliding Federation of Australia

The Gliding Federation of Australia is conducting a series of National Safety Seminars for glider pilots, which will include:

- highlighting the importance of alerted see-and-avoid in improving situational awareness
- flight planning including awareness of the airlines' operational routes
- the importance of monitoring and broadcasting on CTAF frequencies.

In response to this incident, the Federation included an article titled *'Conflicts with non-glider traffic'* in the Gliding Australia magazine, which depicted the Regional Express track to Orange.

Safety message

Pilots are encouraged to 'err on the side of caution' when considering when to make broadcasts and whether specific frequencies should be monitored, particularly noting the fundamental importance of communication in the effective application of the principles of see-and-avoid. The

ATSB report *Limitations of the See-and-Avoid Principle* outlines the major factors that limit the effectiveness of un-alerted see-and-avoid.

Insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes.

A search for other traffic is eight times more effective when a radio is used in combination with a visual lookout than when no radio is used.

In areas outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots use both alerted and un-alerted see-and-avoid principles. Pilots should never assume that an absence of traffic broadcasts means an absence of traffic.

The use of transponders greatly enhances safety in non-controlled airspace. The AIP states that pilots of aircraft fitted with a transponder must activate it at all times during flight. Transponders can be detected by aircraft equipped with TCAS, allowing them to detect other aircraft and initiate avoidance action. The use of ADS-B provides additional information to equipped aircraft.

Alerting technologies can be used as a 'last line of defence' to warn pilots of aircraft in their vicinity. The available technologies include:

- Portable TCAS, which can be plugged into a cigarette lighter or hardwired, however, these are not suitable for gliders due to their high power draw.
- Power FLARM is low power and short range so suited to gliders, but does not appear on an aircraft TCAS such as that fitted to ZLA.
- Cheaper ADS-B solutions which must have TSO approval. CASA currently does not mandate ADS-B for gliders but is examining the possibility of encouraging the voluntary use of ADS-B for all VFR aircraft if a low cost solution is available.

The following publications provide information that may assist pilots avoid airprox events:

- Staying clear of other aircraft in uncontrolled airspace
- CAAP 166-1(3) provides advice in relation to making radio broadcasts to reduce the risk of coming in close proximity with other aircraft.

General details

Occurrence details

Date and time:	21 February 2016 – 1423 EDT	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	near Orange Airport, New South Wales	
	Latitude: 33° 33.27' S	Longitude: 149° 14.33' E

Aircraft details: VH-IGC

Manufacturer and model:	Glaser-Dirks DG-800B
Registration:	VH-IGC
Serial number:	8-8B1
Type of operation:	Gliding – Check & Training

Aircraft details: VH-ZLA

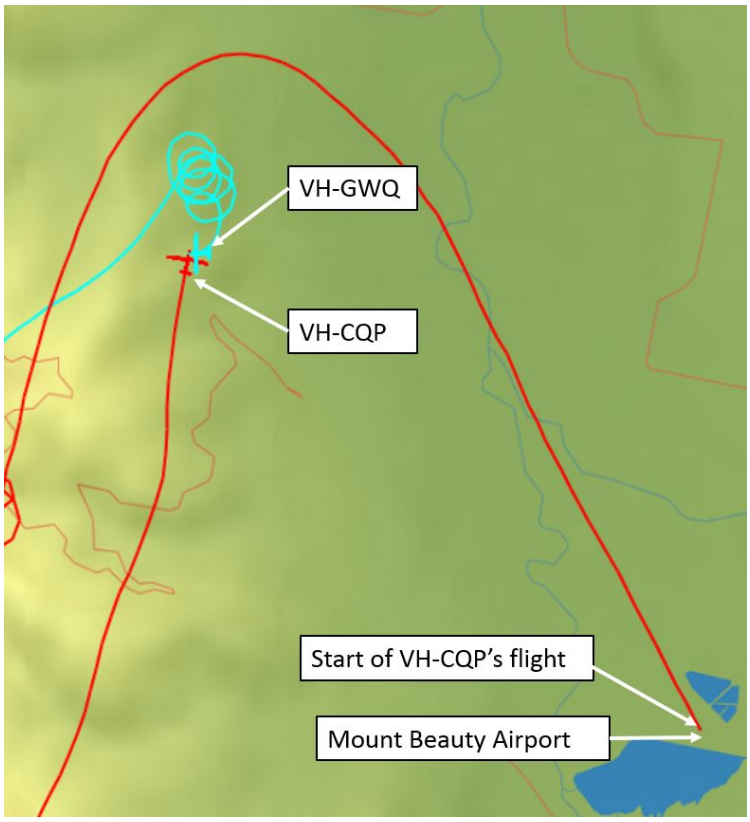
Manufacturer and model:	SAAB Aircraft Company 340B
Registration:	VH-ZLA
Operator:	Regional Express
Serial number:	340B-371
Type of operation:	Air transport low capacity - Passenger

Near collision between Schempp-Hirth Janus glider, VH-GWQ, and Rolladen-Schneider LS3-A glider, VH-CQP

What happened

On 28 March 2016, at about 1306 Eastern Daylight-saving Time (EDT), a Schemp-Hirth Janus glider, registered VH-GWQ (GWQ) launched from Porepunkah Airfield, Victoria, for a pleasure flight. On board were two pilots. The pilot seated in the rear seat was the pilot in command for the flight. The glider tracked over Simmons Gap, to a ridge about 3 km north-west of Mount Beauty Airport (Figure 1). The pilots could hear and see other gliders being towed onto the ridge. They joined a thermal[1] and climbed in tight orbits ('thermalling') in a clockwise direction.

Figure 1: Relative tracks of gliders VH-GWQ and VH-CQP and positions at 1355:02



Source: Gliding Federation of Australia

At about 1335, the pilot of a Rolladen-Schneider LS3-A glider, registered VH-CQP (CQP), launched from Mount Beauty Airport, Victoria, for a pleasure flight. At about 1355, the glider was 3 to 4 km north-west of the airfield and descending through about 4,000 ft, when the pilot heard an alarm sounding, but did not identify it as issuing from the FLARM collision avoidance system (see *FLARM* below) fitted to the glider. The glider was tracking to the north, and the pilot reported that

[1] An ascending current of air caused by local heating, used by glider pilots to attain height.

they had been keeping a lookout for other gliders but were not aware of any in the vicinity at the time.

The pilot tried to identify the source of the alarm inside the cockpit, which diverted their attention from looking outside. As the pilot became stressed by the noise, particularly as it became 'quite shrill', the cockpit fogged up, further reducing the pilot's ability to see outside.

At that time, GWQ was thermalling and in a right bank at about 40–45°, and had completed four orbits. The front seat pilot sighted a glider approaching from the opposite direction at about the same altitude. They assumed that the glider would join the thermal behind them, in the same direction, and on the opposite side of the orbit, in accordance with normal procedures. The front seat pilot asked the rear seat pilot whether they could see the glider, who responded 'no'. The FLARM fitted to their glider indicated that there was another glider in close proximity and the rear seat pilot looked outside to see where it was.

The front seat pilot assessed that the approaching glider was not going to manoeuvre to join the thermal or to avoid a collision, so took control of the glider and pushed the stick forwards to descend rapidly. The other glider (CQP) passed overhead.

The pilot of CQP sighted a glider pass below, and estimated there was less than 100 ft vertical separation. Both gliders continued their flight for about another hour after which GWQ landed at Porepunkah and CPQ landed at Mount Beauty without further incident.

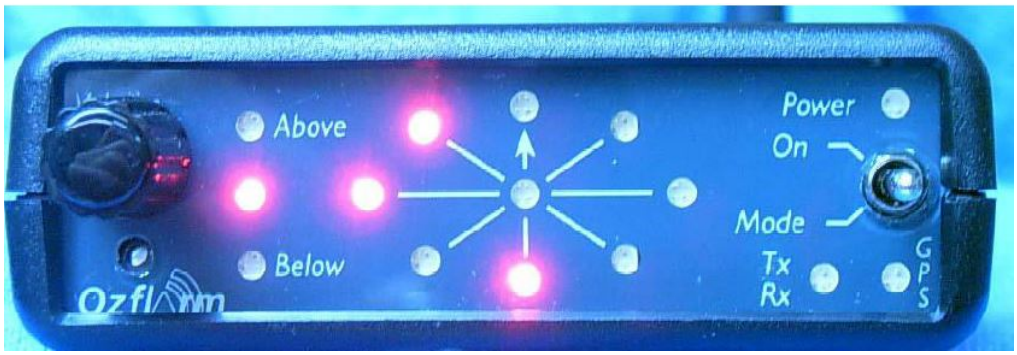
Flight data

According to the flight data recorded by the gliders' flight logger, at 1354:58, CQP was at 3,606 ft and GWQ at 3,523 ft. Four seconds later as the gliders' paths crossed, CQP was at 3,605 ft and GWQ had descended to 3,458 ft.

FLARM

FLARM is a collision avoidance system that shows other similarly equipped aircraft in the vicinity. The display shows the approximate direction of detected traffic and whether it is above, below or at about the same level (Figure 2).

Figure 2: OZflarm display



Source: OZflarm

According to the FLARM website,

> *Each FLARM device determines its position and altitude with a highly sensitive state of the art GPS receiver. Based on speed, acceleration, heading, track, turn radius, wind, altitude, vertical speed, configured aircraft type, and other parameters, a very precise projected flight path can be calculated. The flight path is encoded and sent over an encrypted radio channel to all nearby aircraft at least once per second.*
>
> *At the same time, the FLARM device receives the same encoded flight path from all surrounding aircraft. Using a combination of own and received flight paths, an intelligent motion prediction algorithm calculates a collision risk for each received aircraft based on an*

integrated risk model. The FLARM device communicates this, together with the direction and altitude difference to the intruding aircraft, to the connected FLARM display. The pilots are then given visual and aural warnings and can take resolutive action.

Pilot comments

Pilot of VH-CQP

The pilot of CQP reported that they had flown gliders fitted with FLARM for 7–8 years and had never heard it make a noise before. This may have been because they had never been close enough to another glider to trigger the alarm before. They were briefed and had a briefing note circulated by the gliding club when they were first installed. The pilot did not think there were any other gliders in the vicinity, and did not associate the alarm with FLARM.

The pilot had a VHF radio with the local area frequency selected, but did not make or hear any broadcasts regarding GWQ.

Pilots of VH-GWQ

The pilot in the front seat of GWQ reported that there were some radio broadcasts at the time, mainly from the glider tug pilots in the circuit at Mount Beauty and Porepunkah. They had not made any broadcasts, and had not heard any from CQP.

The pilot in the rear seat commented that the head and shoulders of the pilot in the front seat obscured their vision immediately ahead at the same level. When the FLARM sounded, rather than looking at the display, they looked outside for the other glider.

The pilot in the rear seat further reported that the FLARM unit in CQP had recently been upgraded to a PowerFlarm. This may have included a new display, and also may have been indicating ADS-B transmissions. Changes to display and aural warnings of the FLARM fitted to CQP may have been confusing for the pilot of CQP.

Safety message

The glider pilots reported that see and avoid was the usual means of maintaining separation from other gliders. It was not uncommon to be in close proximity to other gliders, particularly when thermalling. They did not normally broadcast their position or intentions when thermalling, and expected other glider pilots to adhere to standard procedures.

Avoidance systems such as FLARM can enhace safety in non-controlled airspace by detecting conflicting aircraft also fitted with a compatible system. These assist in alerting pilots to the presence of other aircraft and directing them where to look. The ATSB report *Limitations of the See-and-Avoid Principle* outlines the major factors that limit the effectiveness of un-alerted see-and-avoid. Insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes.

It is essential that when equipment is installed in an aircraft, pilots have an understanding of its operation and are familiar with its characteristics.

The following publications provide valuable and relevant references for glider pilots:

- Operational Safety Bulletin (OSB) 02/12 - *Lookout for Glider Pilots*
- Operational Safety Bulletin (OSB) 02/14 - *See and Avoid for Glider Pilots*

General details

Occurrence details

Date and time:	28 March 2016– 1355 EDT	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	3 km NW of Mount Beauty (ALA), Victoria	
	Latitude: 36° 42.63' S	Longitude: 147° 08.90' E

Aircraft details: VH-GWQ

Manufacturer and model:	Schempp-Hirth Flugzeugbau Janus	
Registration:	VH-GWQ	
Serial number:	24	
Type of operation:	Gliding – Pleasure/Travel	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-CQP

Manufacturer and model:	Rolladen-Schneider Flugzeugbau LS3-A	
Registration:	VH-CQP	
Serial number:	3467	
Type of operation:	Gliding – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Glaser-Dirks DG-1000 glider, VH-NDQ, and Jabiru J170, 24-7750

What happened

On 13 April 2016, an instructor and student of a Jabiru J170-D aeroplane, registered 24-7750 (7750), conducted a local training flight from Bathurst Airport, New South Wales. At about 1442 Eastern Standard Time (EST), as they were returning to Bathurst, the instructor broadcast on the Bathurst common traffic advisory frequency (CTAF) that they were inbound from the south-west, and added that they were estimating arrival in the circuit at 1446. As they subsequently arrived in the circuit, the instructor broadcast that they were joining the circuit on an early downwind for runway 17, for a full-stop landing.

The wind was from the east-south-east. Powered aircraft were operating on runway 17 and gliders (and towing aircraft) were operating on runway 08. Bathurst aerodrome elevation is 2,435 ft above mean sea level (AMSL) (Figure 1).

About a minute after broadcasting their arrival in the circuit, the pilot of 7750 asked Glider Ground[1] how many gliders were in the air. Glider Ground advised that there were 'two gliders, NGH and NDQ, just thermalling,[2] at 4,000 ft off the threshold of runway 26.' The pilot of 7750 confirmed sighting two gliders.

Meanwhile, a student pilot of a Glaser-Dirks DG-1000S glider, registered VH-NDQ (NDQ) was conducting a solo flight at Bathurst. The student had been briefed prior to the flight to make a downwind call, stay close to the runway in use by the gliders, and to keep a good lookout. At about 1449, about 90 seconds after the pilot of 7750 had communicated with Glider Ground regarding glider traffic in the air, the pilot of NDQ broadcast on the Bathurst CTAF that they were on left downwind for runway 08.

Immediately following the downwind call by the pilot of NDQ, the pilot of 7750 broadcast that they were on left base for runway 17, and soon after, broadcast that they were on final approach to runway 17 for a full stop landing. The pilot of NDQ reported hearing both those broadcasts, but did not make any broadcasts or directed radio calls in response.

After 7750 touched down on runway 17, about 100 m before the intersection with runway 08, the pilot sighted a glider (NDQ) on short final for runway 08, at an estimated 100 ft above ground level. The pilot assessed that they did not have sufficient time to stop before the intersection of runway 08, so applied full power to cross runway 08 as quickly as possible.

When at about 500 ft above ground level and on final approach to runway 08, the pilot of NDQ sighted 7750 their 10 o'clock[3] position at about the same altitude. As 7750 landed, the pilot of NDQ assessed that there was the potential for a collision, closed the glider's airbrakes[4] and initiated a climb to pass over 7750. As the glider passed over 7750 near the intersection of the two

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1 A duty gliding instructor operates Glider Ground on the CTAF when there are a large number of low-hour solo students gliding. The duty instructor maintains an oversight of the gliding operations, and provides information on glider positions where required to enhance situational awareness for the pilots of gliders and other aircraft.

2 Thermalling refers to the use of a column of rising air by gliders as a source of energy.

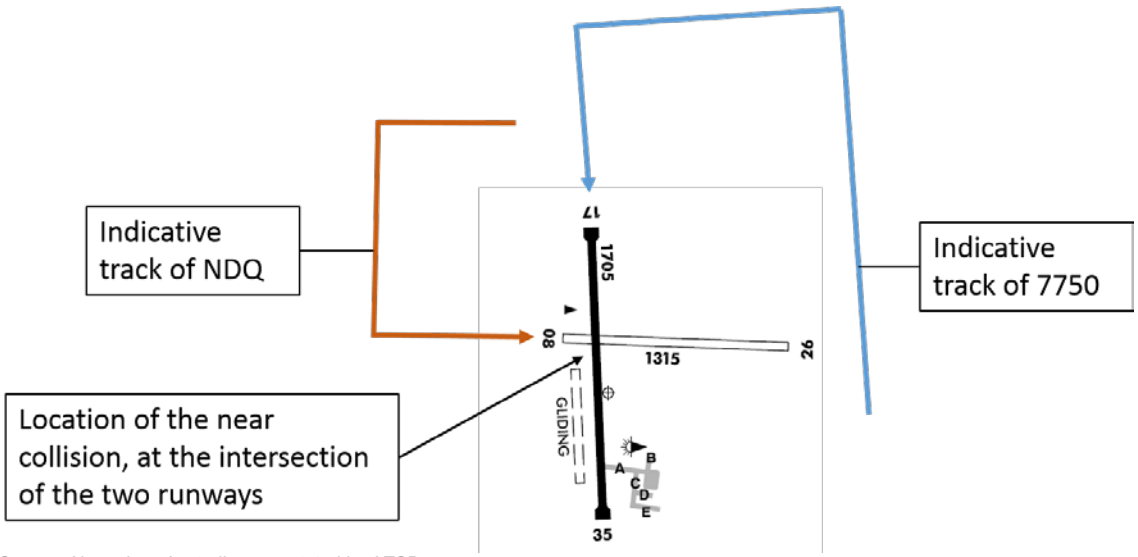
3 The clock code is used to denote the direction of an aircraft or surface feature relative to the current heading of the observer's aircraft, expressed in terms of position on an analogue clock face. Twelve o'clock is ahead while an aircraft observed abeam to the left would be said to be at 9 o'clock.

4 Closing the airbrakes improves the aerodynamic efficiency of the glider.

runways, the pilot of NDQ heard the aircraft's engine increase power. The glider then landed ahead on runway 08 (Figure 1).

The instructor in 7750 lost sight of NDQ as it passed overhead. As 7750 accelerated with a high power setting, the instructor elected to continue the take-off. The pilot of 7750 then conducted a circuit before landing safely.

Figure 1: Layout of Bathurst aerodrome showing indicative tracks of 7750 and NDQ



Source: Airservices Australia – annotated by ATSB

Pilot comments - Pilot of 24-7750

The pilot of 7750 commented that the circuit was very busy at the time of the incident. They were maintaining a good lookout and listening intently to the CTAF for positional information from the gliders, noting that gliders would have 'right of way' over powered aircraft. During final approach to runway 17, the instructor was communicating with the student in 7750 for teaching purposes.

The pilot also commented that they now discuss operational intentions with the glider operator at the commencement of each day's operations.

Safety message

Simultaneous operations on crossing runways can be problematic, particularly where the volume of traffic is high and where the nature of the potentially conflicting operations are dissimilar (such as powered flight and gliding operations). Organisations responsible for the coordination and conduct of such activities are encouraged to carefully assess and manage the risks involved. This is particularly important when operations are likely to involve instructional flights and relatively inexperienced pilots, where workload and the potential for pilot distraction may be elevated.

This incident highlights the importance of effective communication. The primary purpose of communications on the CTAF is to ensure the maintenance of appropriate separation through mutual understanding by pilots of each other's position and intentions. Where a pilot identifies a risk of collision, that pilot should alert others as soon as possible to allow a coordinated and effective response.

Civil Aviation Advisory Publication 166-1(3) stated that 'whenever pilots determine that there is a potential for traffic conflict, they should make radio broadcasts as necessary to avoid the risk of a collision'.

General details

Occurrence details

Date and time:	13 April 2016 – 1450 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	Bathurst Airport, New South Wales	
	Latitude: 33° 24.57' S	Longitude: 149° 39.12' E

Aircraft details: VH-NDQ

Manufacturer and model:	Glaser-Dirks DG-1000	
Registration:	VH-NDQ	
Serial number:	10-223S142	
Type of operation:	Gliding – Training solo	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: 24-7750

Manufacturer and model:	Jabiru Aircraft J170	
Registration:	24-7750	
Serial number:	308	
Type of operation:	Flying training – Training dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Pacific Aerospace CT4, VH-YCO, and Piper PA-28, VH-WJZ

What happened

On 15 April 2016, the instructor and student of a Pacific Aerospace CT/4B aircraft, registered VH-YCO (YCO), conducted a dual (military) training flight under the instrument flight rules.[1] The aircraft departed from Tamworth Airport, and tracked to Narrabri Airport, before commencing the area navigation (RNAV) runway 11 approach to Gunnedah Airport, all in New South Wales.

Prior to commencing the approach, the instructor of YCO contacted the military radar controller (see *Military radar control*), who advised that they were not aware of any other aircraft in the area. The instructor reported that they broadcast on the Gunnedah common traffic advisory frequency (CTAF), when 18 NM from the aerodrome, advising that they were going to conduct the RNAV runway 11 approach, and stating their estimated time at the airport (Figure 1). The crew reported hearing a voice-back response from the aerodrome frequency response unit,[2] indicating that no one else had transmitted on the CTAF in the previous 5 minutes, and no response from any other aircraft on the CTAF.

At that time, an instructor and student pilot of a Piper PA-28-181 aircraft, registered VH-WJZ (WJZ), were conducting a local dual training flight from Gunnedah Airport. The instructor reported that they were broadcasting on and monitoring the CTAF.

At about 1450 Eastern Standard Time (EST), YCO was 13 NM north-west of Gunnedah on the RNAV approach for runway 11, and at 4,500 ft above mean sea level (AMSL), when they were alerted by the aircraft's traffic collision avoidance device[3] of another aircraft. The device indicated that the other aircraft was 200 ft below them and 2 NM away. The instructor looked south and within 20 seconds sighted WJZ at the same level. The instructor took control of the aircraft from the student, and conducted a 60° angle of bank turn to the left to avoid WJZ.

The instructor of WJZ sighted YCO when about 13 NM north-west of Gunnedah aerodrome at about 4,000 ft AMSL. YCO was then to their north in their 2 o'clock[4] position. The instructor of WJZ conducted a left turn and reported sighting YCO commence a left. The aircraft passed at the same level about 150 to 200 m horizontally apart.

The instructors of the two aircraft subsequently communicated on the CTAF. The instructor of WJZ reported that they had not heard any relevant calls on the CTAF leading up to the incident.

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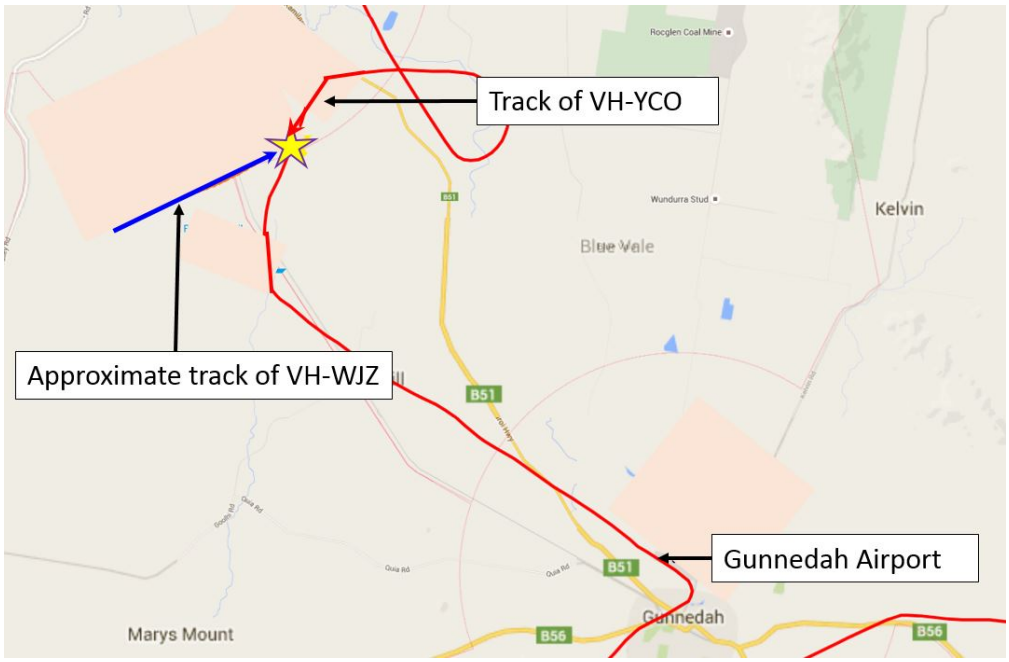
1 Instrument flight rules permit an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules. Procedures and training are significantly more complex as a pilot must demonstrate competency in IMC conditions, while controlling the aircraft solely by reference to instruments. IFR-capable aircraft have greater equipment and maintenance requirements.

2 An aerodrome frequency response unit (AFRU) assists in indicating selection of the correct VHF frequency at non-towered aerodromes by automatically responding with either a pre-recorded voice message if no transmission has been received in the last five minutes or otherwise a 'beep-back', on the CTAF.

3 Traffic collision avoidance device is an aircraft collision avoidance system. It monitors the airspace around an aircraft for other aircraft equipped with a corresponding active transponder and gives warning of possible collision risks.

4 The clock code is used to denote the direction of an aircraft or surface feature relative to the current heading of the observer's aircraft, expressed in terms of position on an analogue clock face. Twelve o'clock is ahead while an aircraft observed abeam to the left would be said to be at 9 o'clock.

Figure 1: Recorded track of VH-YCO, approximate track of VH-WJZ, and approximate location of near collision



Source: Instructor of VH-YCO – annotated by ATSB

Military radar control

The ADF established and operated a radar system in the vicinity of Tamworth to provide directed traffic information (DTI) to pilots operating CT4B aircraft in the Tamworth training areas. This was an interim measure to treat the risk of separation breakdown in the Tamworth training areas while those training areas and associated procedures underwent redesign and other systems were established. The DTI was provided on a discrete frequency monitored only by ADF aircraft. Directed traffic information was an advisory only service and controllers did not provide control or direction to pilots, but gave information aimed at increasing their situational awareness.

The military controller did not report any conflicting traffic before or during the incident.

Traffic collision avoidance device

YCO was fitted with a traffic collision avoidance device (TCAD), which warns of the presence of threat aircraft if the other aircraft is fitted with a functioning transponder that is being interrogated by a radar transmitter. The TCAD detects Secondary Surveillance Radar (SSR) transponders in aircraft within a certain proximity.

The TCAD displays threats detected within a predetermined volume of airspace known as a shield. The shield setting for the TCAD during the incident flight was +/- 1,000 ft in altitude and 2 NM. When a detected aircraft enters the pre-set shield, the pilot is alerted via aural and visual indications.

The TCAD system will not detect a threat aircraft that is not equipped with a transponder, the transponder is inoperative, or the transponder is operating but not being interrogated by either an SSR or a TCAS fitted aircraft. The TCAD is designed as an aid to situational awareness and should not be relied on for traffic separation.

In this incident, the TCAD identified WJZ as a threat and alerted the pilots of YCO.

Pilot comments

Instructor of VH-WJZ

The instructor of WJZ commented that the other aircraft was conducting military training and they have a radar in the Gunnedah training area, to provide them with traffic warnings. The military radar service did not identify any conflicting traffic, however, YCO's TCAD identified WJZ, which indicated that WJZ's transponder was functioning.

The instructor reported that there was some distortion in the broadcasts from YCO heard after the incident.[5]

The instructor further commented that in future, they would broadcast their position in the training area every 15 minutes; even if there were no broadcasts to indicate there may be nearby aircraft.

Instructor of VH-YCO

The instructor of YCO commented that if pilots of aircraft conducting instrument approaches broadcast their aircraft's position with reference to a compass, this may assist visual flight rules' pilots to assess whether there could be a conflict.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following safety action in response to this occurrence.

Operator of VH-WJZ

As a result of this occurrence, the operator of VH-WJZ has advised the ATSB that they are taking the following safety actions:

Airspace procedure

As the instrument approach lies within the Gunnedah training area, student pilots are required to remain below 3,000 ft when within 5° of the approach path. Additional risk assessments were conducted at the other company flying school locations and a similar hazard was found at Scone, where similar de-conflicting provisions have been made.

Safety message

The ATSB report *Limitations of the See-and-Avoid Principle* outlines the major factors that limit the effectiveness of un-alerted see-and-avoid. In this occurrence, un-alerted see-and-avoid did lead to the instructor of one aircraft sighting the other. However, insufficient communication between pilots operating in the same area is the most common cause of safety incidents outside controlled airspace and near non-controlled aerodromes. A broadcast that does not provide a clear understanding of the location of an aircraft, or the intentions of the pilot, is often ineffective in directing other pilots where to focus their lookout.

[5] The instructor of YCO responded to this comment that they had not had any issues with their radios during the flight.

General details

Occurrence details

Date and time:	15 April 2016 – 1450 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	24 km WNW of Gunnedah aerodrome, New South Wales	
	Latitude: 30° 49.07' S	Longitude: 150° 03.68' E

Aircraft details: VH-YCO

Manufacturer and model:	Pacific Aerospace CT4	
Registration:	VH-YCO	
Serial number:	087	
Type of operation:	Flying training - dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-WJZ

Manufacturer and model:	Piper Aircraft Corporation PA-28	
Registration:	VH-WJZ	
Serial number:	28-8090006	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Piper PA-28, VH-BYE, and Cessna 152, VH-CRP

What happened

On 15 April 2016, at about 1400 Western Standard Time (WST), the student pilot of a Piper PA-28-181 aircraft, registered VH-BYE (BYE), departed from Jandakot Airport on a solo navigation training flight to Bunbury Airport, Western Australia. At about 1500, when about 10 NM north of Bunbury Airport, the pilot broadcast on the common traffic advisory frequency (CTAF) that they were inbound for a straight-in approach to runway 07.

At the time, a Cessna 152 aircraft, registered VH-CRP (CRP), was conducting circuit training at Bunbury Airport. On board CRP were an instructor and a student pilot. The active runway at Bunbury was 07, and the crew were broadcasting on the CTAF when on the downwind, base and final legs of the circuit.

The instructor of CRP heard the pilot of BYE broadcast inbound at 10 NM to the north. About 5 minutes later, the instructor heard the pilot of BYE broadcast they were joining a long final approach for a straight-in approach to runway 07. CRP was then on final approach for runway 07 and expected BYE to be behind them, but the pilots did not see BYE. The pilot of BYE heard the student pilot of CRP broadcast they were on final approach for runway 07, but also did not see the aircraft at that time.

After completing a touch-and-go landing, CRP was upwind of runway 07, at about 300 ft above ground level, when the student sighted an aircraft ahead and alerted the instructor. The instructor sighted BYE on a reciprocal track – on short final for runway 25, and took control of the aircraft from the student. The instructor of CRP took avoiding action, turning right, and BYE passed about 50 to 100 ft below and to their left.

When on final approach, at about 400 ft above ground level, the pilot of BYE sighted the numbers marked on the runway threshold, and realised they were approaching runway 25 instead of 07. At the same time, the pilot saw CRP pass to their left. The pilot of BYE conducted a slight right turn and commenced a climb to 1,500 ft.

After the incident, both aircraft landed on runway 07.

Pilot comments – pilot of VH-BYE

This was the pilot's first solo navigation exercise. The pilot had done one touch-and-go at Bunbury about 4 weeks prior to the incident. The pilot had a briefing with their instructor prior to departing Jandakot, and discussed options for joining the circuit at Bunbury. The pilot had initially intended to join on the downwind leg of the circuit for runway 07, and could not recall why they amended the plan to make a straight-in approach.

ATSB comment

Pilots are encouraged to carefully consider options for joining the circuit during operations at non-towered aerodromes. With respect to straight-in approaches, Airservices Australia Aeronautical Information Package *En Route 1.1 – 49.6 Straight-in Approach* stated that 'Straight-in approaches, whilst not prohibited, are not a recommended standard procedure'.

Straight-in approaches often limit the opportunity for a pilot to sight other circuit traffic, and join the circuit in a manner that avoids inconveniencing other traffic. Importantly, straight-in approaches also limit the opportunity for a pilot to effectively assess the aerodrome conditions and the status of movement areas, and identify any unexpected hazards.

Safety message

Following receipt of a broadcast from another aircraft in the vicinity, pilots should carefully assess the significance of the information in the context of their own intentions. In the event that potentially conflicting traffic cannot be visually identified, pilots should communicate accordingly and adopt a conservative course of action.

This incident highlights the importance of thorough pre-flight planning and preparation. The *Flight planning kit – always thinking ahead*, available from CASA's online store, can assist pilots in preparing for flight.

General details

Occurrence details

Date and time:	15 April 2016 – 1500 WST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	Bunbury Airport, Western Australia	
	Latitude: 33° 22.68' S	Longitude: 115° 40.62' E

Aircraft details: VH-BYE

Manufacturer and model:	Piper Aircraft Corporation PA-28	
Registration:	VH-BYE	
Serial number:	28-7790582	
Type of operation:	Flying training – solo	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-CRP

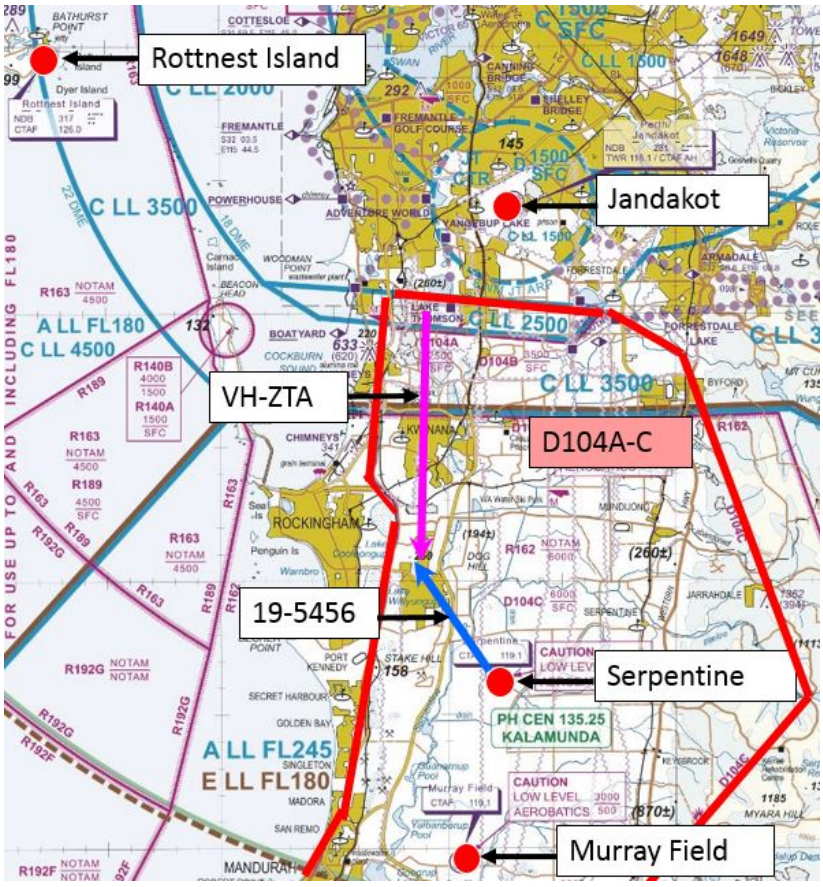
Manufacturer and model:	Cessna Aircraft Company 152	
Registration:	VH-CRP	
Serial number:	15283363	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Morgan Cheetah, 19-5456, and Grob G115, VH-ZTA

What happened

On 15 April 2016, an instructor and student of a Grob G115C2 aircraft, registered VH-ZTA (ZTA), were conducting a local training flight in the training area south of Jandakot Airport, Western Australia. The training area was marked as a danger area[1] on the Perth Visual Terminal Chart (Figure 1). It was the student's first flight in the training area, and the instructor was briefing the student and identifying landmarks including the two aerodromes situated in the training area – Serpentine and Murray Field. The two aerodromes shared a common traffic advisory frequency (CTAF), and the instructor advised the student to broadcast on the CTAF stating the aircraft's position and intentions when approaching 10 NM from either aerodrome, again when at 5 NM and also overhead.

Figure 1: Perth Visual Terminal Chart showing approximate aircraft tracks



Source: Airservices Australia – annotated by ATSB

When ZTA was north-west of Serpentine aerodrome and tracking south, the instructor broadcast that they were 10 NM from Serpentine at 2,500 ft and intended to pass abeam the aerodrome tracking south. The instructor then heard the pilot of another aircraft broadcast that they were departing Murray Field tracking north at 3,000 ft, and another pilot broadcast that they were near

[1] Danger areas D104A-C were specified in En Route Supplement Australia due to flying training.

Serpentine conducting airwork. The instructor again broadcast ZTA's position and their intentions, while looking for the aircraft that was departing Murray Field and on a reciprocal track. The instructor did not sight the aircraft.

At about that time, a Morgan Cheetah aircraft, registered 19-5456 (5456), departed Serpentine for a private flight to Rottnest Island with a pilot and one passenger on board. The pilot reported that they made the following broadcasts on the CTAF: taxiing at Serpentine for runway 23; entering and rolling on runway 23 for a departure to Rottnest Island; and when departing overhead the aerodrome at 1,500 ft climbing to 3,000 ft heading to Rottnest via Carnac.

The pilot then changed the aircraft's only VHF radio from the CTAF to the area frequency about 5 NM out from Serpentine. The aircraft was then climbing through about 2,800 ft and tracking north-west when the pilot sighted an aircraft (ZTA) about 10–15 ft above, on a reciprocal track and about 100 m away. The pilot of 5456 immediately turned left and descended.

The student pilot of ZTA sighted an aircraft (5456) in close proximity and alerted the instructor. The instructor saw 5456 making a steep left turn at about the same height as ZTA, took control of the aircraft from the student, and also conducted a left turn to increase separation between the two aircraft. The aircraft passed at the same level and about 20 to 30 m horizontally from each other.

The pilot of 5456 then contacted air traffic control, advised that they had just had a 'close call' with another aircraft and requested any traffic in the area. The air traffic controller responded that they could not verify 5456's position or altitude as it was not equipped with a transponder.

Pilot comments

Instructor of VH-ZTA

The instructor reported that they did not hear any departure call from 5456 on the CTAF. Where possible, ATC will issue safety alerts when they identify the threat of a near collision in the training area. However, as 5456 was not fitted with a transponder, its height and accurate position could not be verified.

ATSB comment

- Civil Aviation Advisory Publication (CAAP) 166-1(3) – *Operations in the vicinity of non-controlled aerodromes*, stated that an aircraft is 'in the vicinity of a non-controlled aerodrome if it is within airspace other than controlled airspace;
- a horizontal distance of 10 NM from the aerodrome (reference point); and
- a height above the aerodrome (reference point) that could result in conflict with operations at the aerodrome.'

The CAAP further stated that when departing or arriving at non-controlled aerodromes, pilots should monitor their radios and broadcast their intentions as necessary on the published frequency.

Safety message

A search for other traffic is eight times more effective when a radio is used in combination with a visual lookout than when no radio is used. In areas outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots use both alerted and un-alerted see-and-avoid principles.

Pilots are encouraged to 'err on the side of caution' when considering when to make broadcasts and whether specific frequencies should be monitored, particularly noting the fundamental importance of communication in the effective application of the principles of see-and-avoid. The ATSB report *Limitations of the See-and-Avoid Principle* outlines the major factors that limit the effectiveness of un-alerted see-and-avoid.

Insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes. CAAP 166-1(3) provides advice in relation to making radio broadcasts to reduce the risk of coming in close proximity with other aircraft.

General details

Occurrence details

Date and time:	15 April 2016 – 1000 WST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	15 km NW of Serpentine (ALA), Western Australia	
	Latitude: 32° 18.22' S	Longitude: 115° 45.52' E

Aircraft details: 19-5456

Manufacturer and model:	Morgan Aero Works Cheetah	
Registration:	19-5456	
Serial number:	06	
Type of operation:	Private – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-ZTA

Manufacturer and model:	Grob-Burkhart Flugzeugbau G115	
Registration:	VH-ZTA	
Serial number:	82048/C2	
Type of operation:	Flying training - dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Robinson R22, VH-MFH, and Lancair, VH-XCG

What happened

On 22 April 2016, an instructor and student were conducting flight training in a Robinson R22 helicopter, registered VH-MFH (MFH), at Ballina Byron Gateway (Ballina) Airport, New South Wales (NSW). The lesson involved practising transitioning from hovering to forward flight.

On the same morning, the pilot of a Lancair aeroplane, registered VH-XCG (XCG), was conducting a private flight under the instrument flight rules (IFR),[1] from Wedderburn Airport, NSW, to Ballina Airport, with one passenger on board.

At about 1006 Eastern Standard Time (EST), the instructor of MFH broadcast on the Ballina common traffic advisory frequency (CTAF) that they were established on runway 24 and would be conducting low-level operations on the runway for the next 15 minutes.

At about the same time, XCG was approaching Ballina via an area navigation (RNAV) approach to runway 24. The pilot reported that their attention was focused on the newly installed electronic instrumentation and associated navigation system. When the aircraft was descending through about 500 ft on final approach, the pilot sighted a helicopter (MFH) ahead on the runway threshold, and realised they had omitted to select the CTAF and to broadcast an inbound call.

At about 1012, MFH was stationary on the threshold of runway 24, facing along the runway to the south-west. The instructor of MFH communicated with the pilot of another helicopter operating at the aerodrome to arrange mutual separation. Soon after, the pilot of the other helicopter broadcast 'the plane coming in on runway 24, your intentions?' There was no response to this transmission.

That call alerted the instructor of MFH to the aeroplane approaching runway 24 (XCG). The instructor looked out of the helicopter door, and sighted XCG, which was behind them on final approach to runway 24, and estimated the aircraft to be about 200 to 500 m away. The instructor immediately took control of the helicopter from the student and vacated the runway to the grassed area north of the runway.

After initially sighting MFH on the runway, the pilot of XCG considered conducting a go-around, but then observed MFH lift off and move to the grass area north of the runway. The pilot of XCG elected to continue the approach, and landed on runway 24.

Safety message

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is safety around non-towered aerodromes.

Pilots are encouraged to prioritise their attention carefully and appropriately as they near non-towered aerodromes. An effective lookout for other aircraft, supported by communication with traffic in the vicinity, should be a high priority.

The ATSB report *Limitations of the See-and-Avoid Principle* outlines the major factors that limit the effectiveness of un-alerted see-and-avoid. Insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes.

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[1] Instrument flight rules permit an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules. Procedures and training are significantly more complex as a pilot must demonstrate competency in IMC conditions, while controlling the aircraft solely by reference to instruments. IFR-capable aircraft have greater equipment and maintenance requirements.

Most occurrences reported to the ATSB at non-towered aerodromes involve conflicts between aircraft, or between aircraft and ground vehicles. In particular, active runways should be approached with caution. The ATSB publication *A pilot's guide to staying safe in the vicinity of non-towered aerodromes*, stated that a large number of the conflicts between aircraft involved:

- ineffective communication between pilots operating in close proximity
- the incorrect assessment of other aircraft's positions and intentions
- relying on the radio as a substitute for an effective visual lookout
- failure to follow published procedures.

General details

Occurrence details

Date and time:	22 April 2016 – 1015 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	Ballina Byron Gateway Airport, New South Wales	
	Latitude: 28° 50.03' S	Longitude: 153° 33.75' E

Aircraft details: VH-XCG

Manufacturer and model:	Amateur Built Aircraft Lancair IV	
Registration:	VH-XCG	
Serial number:	LIV-188	
Type of operation:	Private – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Helicopter details: VH-MFH

Manufacturer and model:	Robinson Helicopter Company R22 Beta	
Registration:	VH-MFH	
Serial number:	2266	
Type of operation:	Flying training – Dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Cessna 177, VH-OOJ, and Cessna 172, VH-VSO

What happened

On 15 April 2016, the pilot of a Cessna 172 aircraft, registered VH-VSO (VSO), was conducting a solo navigation training flight from Ballarat to Warrnambool, Portland, Hamilton and return to Ballarat, Victoria.

On the same day, two pilots, both instructors, were conducting a local training flight in a Cessna 177RG aircraft, registered VH-OOJ (OOJ), from Ballarat Airport. At about 1648 Eastern Standard Time (EST), while tracking south-east about 12 NM from Ballarat Airport, and at about 3,800 ft, the pilot in command, who was the pilot-not-flying and in the left seat, sighted VSO out of the right window about 100 to 200 ft below. The pilot in command then took control of the aircraft from the other pilot and commenced a steep climb. VSO then passed beneath OOJ. Shortly after, the pilots of OOJ heard the pilot of VSO broadcast on the common traffic advisory frequency, 10 NM west of Ballarat and inbound to the airport.

The pilot of VSO reported that they could not recall their altitude when about 12 NM west of Ballarat, but would normally be between 3,500 and 4,500 ft on descent. The pilot reported scanning the sky to look out for other aircraft, and maintaining a listening watch on the area and Ballarat common traffic advisory frequencies. The pilot did not hear any broadcasts from the pilots of OOJ and did not observe any aircraft in close proximity during the flight.

Pilot comments

Pilot in command of VH-OOJ

The pilot in command of OOJ reported both pilots were maintaining a general lookout for other aircraft. However, at a moment when the other pilot was pointing to one of the aircraft instruments, the pilot in command sighted VSO out of the right window. The pilot in command commented that while it is important to understand the instruments during endorsement training, this should not detract from the lookout for other aircraft.

Operator comments

Operator of VH-OOJ

The operator of OOJ commented that Ballarat is a very busy training airport with the training area to the west. Therefore, if pilots of aircraft arriving from the west broadcast prior to 10 NM from the airport, this may increase the situational awareness of pilots of other aircraft in the training area.

Safety message

This incident highlights the importance of using both un-alerted and alerted see-and-avoid principles and maintaining a vigilant lookout at all times.

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is safety around non-controlled aerodromes.

Research conducted by the ATSB found that, between 2003 and 2008, 181 occurrences of reduced separation in the vicinity of non-towered aerodromes were reported, of which 55 were near mid-air collisions (aircraft proximity events). Insufficient communication between pilots and breakdowns in situational awareness were the most common contributors to safety incidents.

General details

Occurrence details

Date and time:	15 April 2016 – 1648 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	20 km W of Ballarat Airport, Victoria	
	Latitude: 37° 28.58' S	Longitude: 143° 33.90' E

Aircraft details: VH-VSO

Manufacturer and model:	Cessna Aircraft Company 172S	
Registration:	VH-VSO	
Serial number:	172S10923	
Type of operation:	Flying training – Training solo	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-OOJ

Manufacturer and model:	Cessna Aircraft Company 177RG	
Registration:	VH-OOJ	
Serial number:	177RG0857	
Type of operation:	Flying training – Training dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Robinson R22, VH-JKH, and Cessna 182, VH-YKM

What happened

On 22 April 2016, at about 1440 Eastern Standard Time (EST), an instructor and student were conducting circuit training in a Robinson R22 helicopter, registered VH-JKH (JKH), at Ballina Byron Gateway Airport, New South Wales. The helicopter was positioned about two thirds of the way down runway 06 (Figure 1) when the crew broadcast on the common traffic advisory frequency (CTAF) that they were rolling for take-off on runway 06.

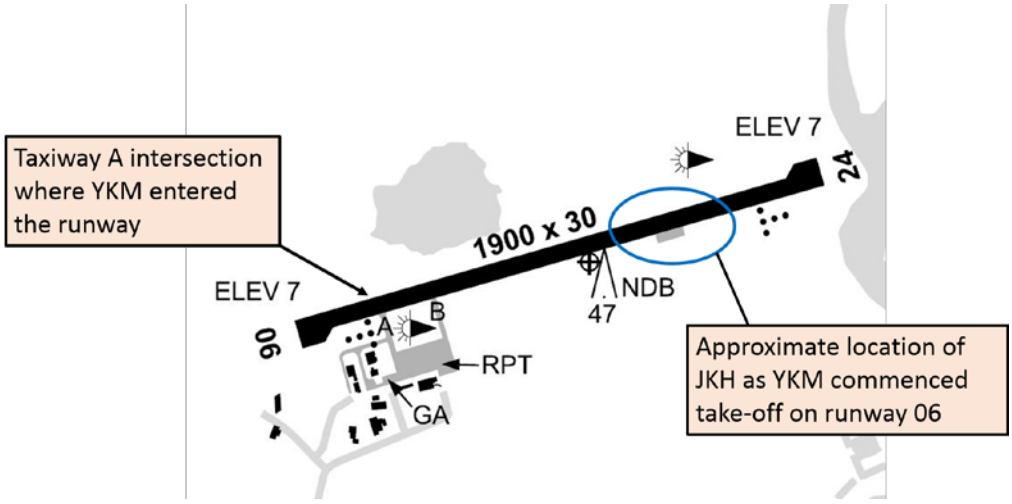
Very soon after that broadcast, the pilot of another helicopter operating at the aerodrome alerted the crew of JKH that there was an aircraft rolling for take-off on runway 06 behind them, and suggested that JKH expedite clearing the runway.

A Cessna 182 aeroplane, registered VH-YKM (YKM), had entered the runway at the intersection of taxiway A (Figure 1), and was taking-off on runway 06, towards the helicopter (which was still on the runway). The instructor in JKH took control of the helicopter from the student, rejected the take-off and vacated the runway to the northern grass, as the aircraft continued its take-off run.

Although the pilot of YKM was unaware at the time, their broadcasts on the CTAF prior to commencing take-off had not been successfully transmitted. As the aeroplane climbed through about 400 ft above ground level, the pilot sighted the helicopter (JKH) to their left over the grass.

The pilot of YKM later found that although the aircraft radio was on, and was set to the CTAF, the radio microphone was not fully plugged in. In this condition, none of their broadcasts on the CTAF had been successfully transmitted.[1] The pilot of YKM had not heard any broadcast from JKH and did not see the helicopter on the runway, despite checking to see that the runway was clear before entering.

Figure 1: Ballina Byron Gateway Airport diagram



Source: Airservices Australia – annotations by the ATSB

[1] An ATSB review of CTAF recording suggested that there was a number of attempted transmissions around six minutes prior to the incident. These transmissions were little more than a momentary carrier wave or microphone 'click', and they were followed by a 'beep-back' response from the aerodrome frequency response unit (AFRU). The ATSB could not ascertain if those transmissions were attempts by the pilot of YKM to broadcast on the CTAF.

Operator comment

The operator of JKH commented that after the event, they checked from the position on the taxiway where YKM entered the runway to verify if they could see where the helicopter would have been. They established that they could – but advised that this needs to take into consideration that they knew what they were looking for.

ATSB comment

The pilot of the helicopter who alerted the crew of JKH to the aircraft rolling for take-off on runway 06 is commended for their situational awareness, and speaking up when the potential for a collision became apparent. That pilot may have played an important role in averting a more serious occurrence.

Safety message

Pilots are encouraged to check the performance of radio communications systems as part of their pre-flight procedures. Aerodrome frequency response units at non-towered aerodromes allow pilots to confirm that they have the correct frequency selected, and that their radio communications system is transmitting. Nonetheless, as this incident highlights, an AFRU does not necessarily provide an indication to a pilot that their transmissions are inaudible or otherwise ineffective. Additionally, this incident highlights the importance of a thorough lookout prior to entering a runway. Not hearing any broadcasts on the CTAF does not necessarily mean that other aircraft are not operating in the area.

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is safety around non-towered aerodromes.

Most occurrences reported to the ATSB at non-towered aerodromes involve conflicts between aircraft, or between aircraft and ground vehicles. In particular, active runways should be approached with caution. The ATSB publication *A pilot's guide to staying safe in the vicinity of non-towered aerodromes*, stated that a large number of the conflicts between aircraft involved:

- ineffective communication between pilots operating in close proximity
- the incorrect assessment of other aircraft's positions and intentions
- relying on the radio as a substitute for an effective visual lookout
- failure to follow published procedures.

General details

Occurrence details

Date and time:	22 April 2016 – 1440 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	Ballina Byron Gateway Airport, New South Wales	
	Latitude: 28° 50.03' S	Longitude: 153° 33.75' E

Aircraft details: VH-YKM

Manufacturer and model:	Cessna Aircraft Company 182	
Registration:	VH-YKM	
Serial number:	18281374	
Type of operation:	Private – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Helicopter details: VH-JKH

Manufacturer and model:	Robinson Helicopter Company R22 Beta	
Registration:	VH-JKH	
Serial number:	1086	
Type of operation:	Flying training – Dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Near collision involving Piper PA-32, VH-NKA, and Cessna 210, VH-SQT

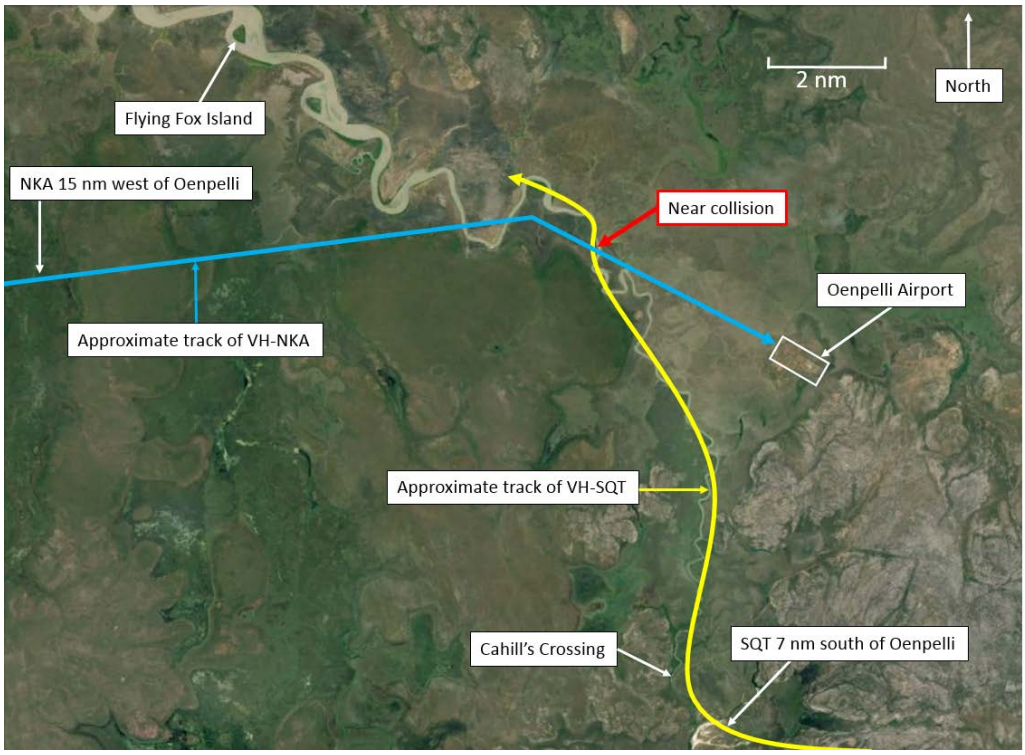
What happened

At 0856 Central Standard Time (CST) on 25 May 2016, a Piper PA-32, registered VH-NKA (NKA), departed Darwin Airport, Northern Territory (NT) for a business flight to Oenpelli Airport, NT. On board were a pilot under supervision, a supervising pilot and two passengers. The pilot under supervision was the pilot flying (PF), with the supervising pilot acting as pilot monitoring (PM),[1] observing the flight and providing assistance.

At 0926, a Cessna 210, VH-SQT (SQT), departed Jabiru Airport, NT, for a scenic flight over Kakadu National Park and the East Alligator River, NT. On board were the pilot and five passengers. SQT initially proceeded in an easterly direction before progressing north along the river (Figure 1).

At about 0930, the PF in NKA assessed the expected weather conditions at Oenpelli and elected to make a straight-in[2] approach to runway 12. At this time, the PF made an inbound broadcast on the Jabiru-Oenpelli common traffic advisory frequency (CTAF), advising their position as 50 NM west of Oenpelli. The PF then descended the aircraft from the cruising altitude of 9,500 ft and made a further broadcast on the Jabiru-Oenpelli CTAF as the aircraft reached 15 NM from Oenpelli. The pilots of NKA received no response to these broadcasts.

Figure 1: Overview of incident location



Source: Google Earth, annotated by ATSB

[1] Pilot Flying (PF) and Pilot Monitoring (PM) are procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF's actions and aircraft flight path.

[2] An approach directly to the runway from the present position of the aircraft without joining the standard approach circuit or overflying the aerodrome.

As SQT reached Cahill's Crossing, 7 NM south of Oenpelli Airport, the pilot broadcast on Jabiru-Oenpelli CTAF, advising that they would be tracking north via the East Alligator River towards Flying Fox Island and operating not above 800 ft. The pilot did not receive a response to this broadcast.

At 0952, the PF in NKA established the aircraft on a 5 NM final approach leg to the runway at Oenpelli Airport at an altitude of 1,000 ft and configured the aircraft for landing. At the same time, the pilot of SQT continued to follow the East Alligator River north making continuous shallow turns left and right to maximise their passenger's view. As SQT began a right turn, the pilot observed the shadow of another aircraft (subsequently determined to be NKA) tracking towards the shadow of their own aircraft. The pilot of SQT continued the right turn and assessed the position of the sun in relation to the shadow on the ground to establish the position of NKA. The pilot of SQT sighted NKA in close proximity and instinctively descended the aircraft to avoid a collision.

At this time, the PM in NKA, observing the high workload of the PF, elected to broadcast advising they were 4 NM from Oenpelli conducting a straight-in approach for runway 12.

At about the same time, the pilot of SQT broadcast on the CTAF to establish contact with NKA and advise of the near collision. The pilots of each aircraft communicated without difficulty following the incident.

The pilot of SQT estimated that the aircraft passed at the same altitude and a distance less than 100 m at the closest point. The pilots of NKA did not see SQT.

The pilots and passengers of both aircraft were not injured in the incident and the aircraft were not damaged.

Pilot Comment

The pilot of VH-NKA:

The supervising pilot of NKA provided the following comments:

- No radio calls were heard from the pilot in SQT prior to the incident, despite having experienced no communication difficulties prior to, or after the incident.
- Their view of SQT would have been obscured by the aircraft's right wing as SQT approached their aircraft.
- The change to the Jabiru-Oenpelli CTAF was made slightly later than the usual distance of about 70 NM from Oenpelli Airport. This may have led to the pilots missing the departure call from the pilot in SQT.
- The pilot in command expressed concern at the planning of a low-level scenic flight through the extended centreline[3] of an aerodrome at a distance of 3 NM.

The pilot of VH-SQT:

The pilot of SQT provided the following comments:

- No radio calls were heard from the pilots in NKA prior to the incident despite hearing calls from other aircraft. The radio in use was tested immediately afterward and found serviceable.
- The incident occurred at the point they would normally make a radio call for transiting abeam Oenpelli Airport. The pilot spotted the shadow of NKA just as they were about to make the call.
- The avoiding action required was forceful, inducing slight negative 'G'.[4] Had the pilot taken no avoiding action the two aircraft would have collided.

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[3] A theoretical line drawn out from and in line with the runway. The aircraft is required to be aligned along this extended centreline at a point no less than 3 nm from the runway threshold during a straight-in approach.

- The pilot did not expect an aircraft on approach to Oenpelli airport at a distance of 4 NM from the runway to be as low as 800 ft.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Operator of VH-SQT

As a result of this occurrence, the operator of SQT has advised the ATSB that they have taken the following action:

Communications procedure

The communication procedures for scenic flights using this route have been changed. They will now include a broadcast when the aircraft are 3 NM from Oenpelli Airport, stating that the aircraft will be passing through the extended centreline of runway 12, operating at not above 800 ft.

Safety message

This occurrence highlights the importance of effective communications. Where this effectiveness is compromised, pilot lookout becomes increasingly important. The ATSB publication *Limitations of the See-and-Avoid Principle* provides information on developing effective lookout techniques.

The Civil Aviation Safety Authority (CASA) publication *CAAP 166-2(1) Pilots' responsibility for collision avoidance using 'see-and-avoid'* provides information which can increase the probability of sighting traffic.

Fly neighbourly advice

ERSA - GEN - SP contains a fly neighbourly advice for pilots operating in the Kakdau National Park. Pilots intending to fly over Kakadu National Park should obtain, read and comply with the Kakadu *Fly Neighbourly Agreement*.

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[4] The unit of measurement for measuring vertical acceleration within an aircraft. 1 G is equal to the force of gravity at the earth's surface. In flight, g load values represent the combined effects of flight manoeuvring loads and turbulence. This can be a positive or negative value.

General details

Occurrence details

Date and time:	25 May 2016 – 0952 CST	
Occurrence category:	Serious incident	
Primary occurrence type:	Near Collision	
Location:	7 km WNW of Oenpelli Airport, Northern Territory	
	Latitude: 12° 17.92’ S	Longitude: 132° 57.14’ E

Aircraft details – VH-NKA

Manufacturer and model:	Piper Aircraft Corp – PA-32-301	
Registration:	VH-NKA	
Serial number:	3246164	
Type of operation:	Business	
Persons on board:	Crew – 2	Passengers – 2
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details – VH-SQT

Manufacturer and model:	Cessna Aircraft Company – 210M	
Registration:	VH-SQT	
Serial number:	21062874	
Type of operation:	Charter - Passenger	
Persons on board:	Crew – 1	Passengers – 5
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

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 identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, 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.

About this Bulletin

The ATSB receives around 15,000 notifications of Aviation occurrences each year, 8,000 of which are accidents, serious incidents and incidents. It also receives a lesser number of similar occurrences in the Rail and Marine transport sectors. It is from the information provided in these notifications that the ATSB makes a decision on whether or not to investigate. While some further information is sought in some cases to assist in making those decisions, resource constraints dictate that a significant amount of professional judgement is needed to be exercised.

There are times when more detailed information about the circumstances of the occurrence allows the ATSB to make a more informed decision both about whether to investigate at all and, if so, what necessary resources are required (investigation level). In addition, further publically available information on accidents and serious incidents increases safety awareness in the industry and enables improved research activities and analysis of safety trends, leading to more targeted safety education.

The Short Investigation Team gathers additional factual information on aviation accidents and serious incidents (with the exception of 'high risk operations), and similar Rail and Marine occurrences, where the initial decision has been not to commence a 'full' (level 1 to 4) investigation.

The primary objective of the team is to undertake limited-scope, fact gathering investigations, which result in a short summary report. The summary report is a compilation of the information the ATSB has gathered, sourced from individuals or organisations involved in the occurrences, on the circumstances surrounding the occurrence and what safety action may have been taken or identified as a result of the occurrence.

These reports are released publically. In the aviation transport context, the reports are released periodically in a Bulletin format.

Conducting these Short investigations has a number of benefits:

- Publication of the circumstances surrounding a larger number of occurrences enables greater industry awareness of potential safety issues and possible safety action.
- The additional information gathered results in a richer source of information for research and statistical analysis purposes that can be used both by ATSB research staff as well as other stakeholders, including the portfolio agencies and research institutions.
- Reviewing the additional information serves as a screening process to allow decisions to be made about whether a full investigation is warranted. This addresses the issue of 'not knowing what we don't know' and ensures that the ATSB does not miss opportunities to identify safety issues and facilitate safety action.
- In cases where the initial decision was to conduct a full investigation, but which, after the preliminary evidence collection and review phase, later suggested that further resources are not warranted, the investigation may be finalised with a short factual report.
- It assists Australia to more fully comply with its obligations under ICAO Annex 13 to investigate all aviation accidents and serious incidents.
- Publicises ***Safety Messages*** aimed at improving awareness of issues and good safety practices to both the transport industries and the travelling public.

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report
Aviation Short Investigations
Aviation Short Investigations Bulletin Issue 51
Near collision special edition
AB-2016-085
Final – 8 September 2016