Australian Government
Australian Transport Safety Bureau

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

near Orange Airport, New South Wales, 21 February 2016

ATSB Transport Safety Report
Aviation Occurrence Investigation
AO-2016-015
Final – 8 September 2016

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

Publishing information

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

Addendum

Page	Change	Date

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

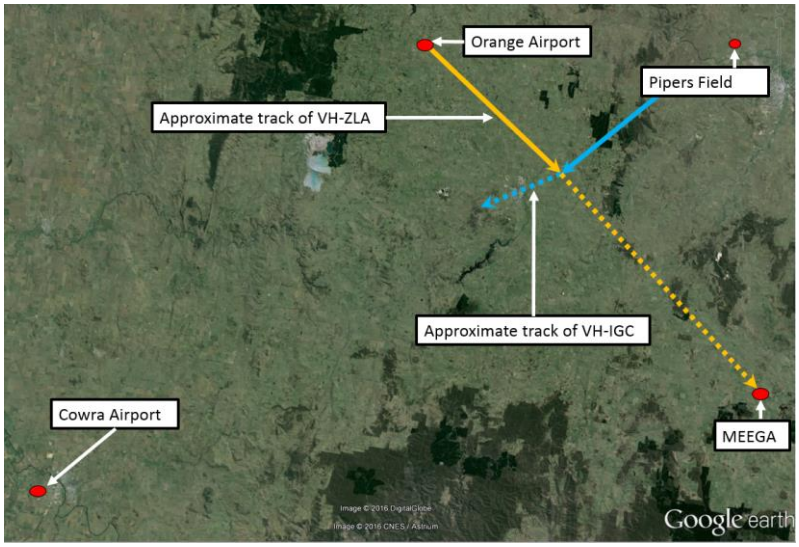
What happened

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

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

[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.

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.

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.

---

[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.

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.

[3] Landing somewhere other than the home airfield.

- 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.

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.
- 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

[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'.

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.

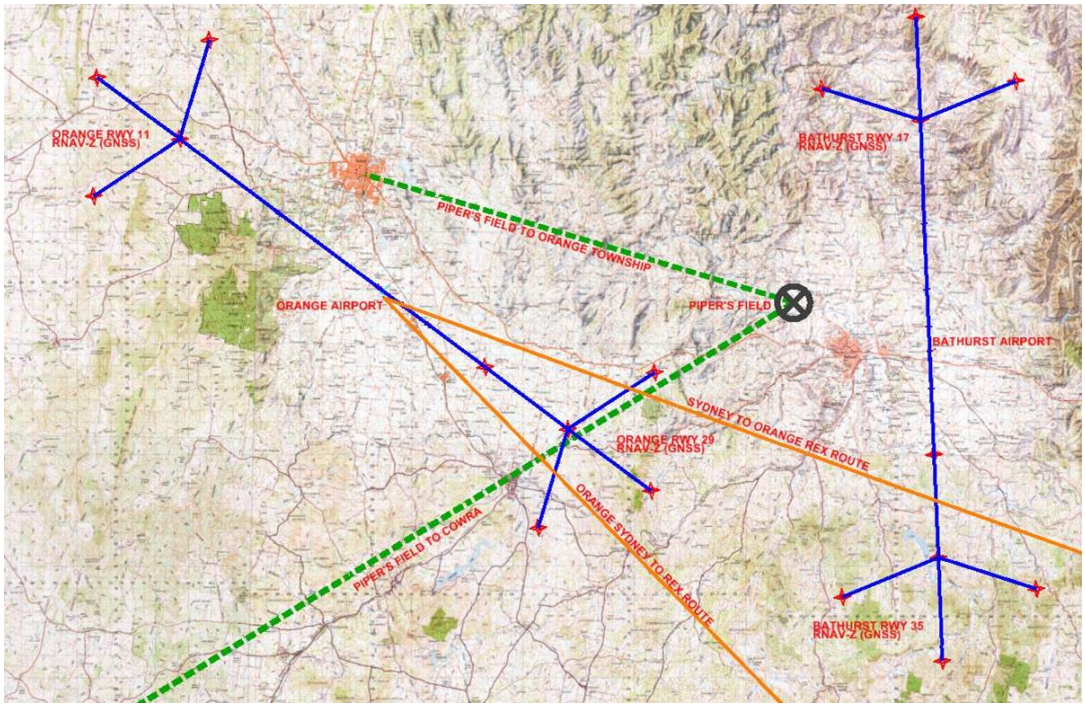
Communications between Regional Express and Bathurst Soaring Club

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

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB 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; and 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 operations involving the travelling public.

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.

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.

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 report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.