

Australian Government Australian Transport Safety Bureau

Runway incursion involving a SAAB 340B, VH-ZRH

Carnarvon Airport, Western Australia, on 31 August 2020

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Addendum

Page	Change	Date

Safety summary

What happened

On 31 August 2020, a Regional Express (REX) SAAB 340B, registered VH-ZRH, and a Shine Aviation Piper PA-31, registered VH-ITF, were both being prepared for their respective passenger transport flights at Carnarvon, Western Australia.

At about 1704 local time, VH-ZRH entered runway 22 just after VH-ITF had commenced its takeoff roll on the same runway. The pilot of VH-ITF immediately advised the crew of VH-ZRH that they were rolling and then rejected the take-off. VH-ZRH stopped just inside the runway strip.

What the ATSB found

The ATSB found that, although the crews of both aircraft were aware that they were mutual traffic, their expectations led to an incorrect understanding of the other's position and/or intentions. This situation led to them not recognising the potential conflict and therefore not directly communicating with each other.

The lookout conducted by the flight crew of VH-ZRH prior to entering the runway was not effective and likely to have been influenced by the crew's expectation that VH-ITF had already departed.

What has been done as a result

REX advised that the incident was discussed amongst its checking and training organisation for future training events. The operator also published related policy items in an operations notice to highlight the requirements for operating in non-controlled environments. REX also reviewed its human factors and non-technical skills training specifically in relation to communication.

Shine Aviation planned for the incident to be used as a learning tool in order to promote discussion of behaviours and best practice with respect to communications in CTAF environments.

Safety message

This incident highlights the potential effects that expectations can have on how a flight crew perceives information. It is important that flight crew remain vigilant while maintaining situational awareness to counter any expectation bias. Pilots should not hesitate to contact another aircraft if there is any uncertainty as to their position and/or intentions.

The ATSB's SafetyWatch highlights the broad safety concerns that come out of the bureau's investigation findings and from occurrence data reported by industry. One of those safety concerns is that insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes. The ATSB booklet *A pilot's guide to staying safe in the vicinity of non-controlled aerodromes* outlines many of the common problems that occur at non-controlled aerodromes.

The Civil Aviation Safety Authority has also produced important safety advice for <u>Radio</u> procedures in non-controlled airspace.

The investigation

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 investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

The occurrence

On 31 August 2020, a Regional Express (REX) SAAB 340B, registered VH-ZRH, and a Shine Aviation Piper PA-31, registered VH-ITF, were both being prepared for their respective passenger transport flights at Carnarvon, Western Australia. VH-ITF was flying to Geraldton with one pilot and two passengers. VH-ZRH was flying to Perth with three crew (two pilots and one flight attendant) and 30 passengers. Both flights were being conducted under instrument flight rules (IFR).

At 1659:10 Western Standard Time,¹ the pilot of VH-ITF contacted Melbourne centre air traffic control and advised them that they were taxiing at Carnarvon for runway 22 (Figure 1). Melbourne centre advised the pilot that there was no other IFR traffic. Shortly after, the pilot broadcast on the Carnarvon common traffic advisory frequency (CTAF) that they were taxiing for runway 22. At about 1700, the pilot broadcast on the CTAF that they were entering and backtracking runway 22.²

While on the aerodrome apron, the flight crew of VH-ZRH observed VH-ITF taxi past. The first officer was outside the aircraft conducting external inspections and the captain was on the flight deck at the time. The CTAF was not yet being monitored (nor was it required to be at that stage), and therefore VH-ITF's radio calls during this period were not heard by the pilots of VH-ZRH.

At 1702:51, the crew of VH-ZRH contacted Melbourne centre to advise taxi details. Melbourne centre advised the crew to stand by. While waiting for Melbourne centre, the captain directed the first officer to broadcast on the CTAF that they were about to taxi. Although the pilot of VH-ITF heard this taxi call, they did not respond, nor was there any other response to VH-ZRF's CTAF broadcast. The crew of VH-ZRH then commenced taxiing for runway 22.

At 1703:16 Melbourne centre advised the crew of VH-ZRH that IFR traffic for them was VH-ITF. Melbourne centre stated that VH-ITF was taxiing at Carnarvon for Geraldton and had planned the same route (as VH-ZRH) at 9,000 ft. The crew of VH-ZRH acknowledged the traffic information at 1703:36.

At 1703:44 Melbourne centre contacted the pilot of VH-ITF to confirm they had received the information about VH-ZRH taxiing. The pilot of VH-ITF confirmed they had. At this time, VH-ITF was approaching the threshold of runway 22 and about to turn around and line up. VH-ZRH was approaching the holding point³ for runway 22. The flight crew of VH-ZRH subsequently reported that they did not hear the exchange between Melbourne centre and the pilot of VH-ITF.

As they approached the holding point, the crew of VH-ZRH completed a lookout for traffic. The first officer stated they were not able to see left (towards the runway threshold) due to their seat position and the aircraft window configuration and therefore they only cleared to the right and

¹ Western Standard Time (WST) is Universal Coordinated Time (UTC) + 8 hours.

² The recorded transmissions from the Carnarvon CTAF were not timestamped, however, the ATSB was able to approximate their timings relative to the recorded air traffic control communications which were accurately timestamped.

³ A holding point signifies the entry to the runway environment. It is set back by a clear area around the physical runway but still crossing the holding point is considered entering the runway.

front. The captain cleared to the left and front, observing the runway, runway threshold and approach areas. The captain stated that they did not see VH-ITF on the runway.

At about this time, the pilot of VH-ITF broadcast on the CTAF they had lined up and were rolling on runway 22. The flight crew of VH-ZRH did not hear this transmission. Since they believed the runway to be clear, the first officer of VH-ZRH broadcast that they were entering and backtracking runway 22, just prior to passing the holding point at about 1704.

By this time the pilot of VH-ITF had advanced the throttles to about three quarters (of full travel) and they had commenced the take-off roll. The pilot heard and observed VH-ZRH enter the runway and they immediately advised VH-ZRH they were rolling on runway 22. Shortly after, the Carnarvon aerodrome reporting officer (ARO) also advised the crew of VH-ZRH that VH-ITF was on the runway. The pilot of VH-ITF subsequently rejected their take-off and commenced backtracking on runway 22.

The flight crew of VH-ZRH did not hear the pilot VH-ITF's full transmission but did realise what had occurred and immediately stopped a few metres past the holding point (Figure 1) and prior to crossing the edge of the runway. They then advised the pilot of VH-ITF that their transmissions were readability two⁴ and quite scratchy.

The flight crew of VH-ZRH then vacated runway 22, repositioned on taxiway alpha and advised VH-ITF that they would hold short of runway 22. VH-ITF then departed before VH-ZRH continued with their flight.



Figure 1: Aircraft positions at the time of the runway incursion

Source: Google Earth, annotated by the ATSB

⁴ The radio transmission readability scale used in aviation is 1 to 5, where 1 is unreadable and 5 is perfectly readable.

Context

Personnel information

The captain of VH-ZRF had a total of 3,088 flight hours, with 2,851 hours on type. They commenced with REX in 2015 and had been a captain since mid-2019.

The first officer had a total of 1,976 flight hours, with 577 hours on type. They had previously worked as a flight instructor and charter pilot (single and multi-engine aircraft) before commencing flying at REX in 2019.

The pilot of VH-ITF had a total of 1,476 flight hours, with 265 hours on type. Their previous experience included flight instruction and charter flying with about 15 months flying multi-engine aircraft.

All three pilots indicated that they were not tired or fatigued prior to commencing their flights.

Aircraft information

VH-ZRH was a SAAB 340B, serial number 340B-392. The SAAB was a twin turboprop engine aircraft capable of carrying up to 36 passengers. It is normally crewed by two pilots and a flight attendant.

VH-ITF was a Piper PA-31 Navajo, serial number 31-7812014. The Navajo was a twin pistonengine aircraft capable of carrying up to 8 passengers. It is normally operated by a single pilot.

Operations at non-controlled aerodromes

Civil Aviation Regulation 166 C (*Responsibility for broadcasting on VHF radio*) stated that, when operating at non-controlled aerodromes, a pilot was to make a broadcast whenever 'it is reasonably necessary to do so to avoid a collision, or the risk of a collision'. A civil aviation advisory publication⁵ provided further guidance on this as follows:

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 or an Airprox event. Pilots should not be hesitant to call and clarify another aircraft's position and intentions if there is any uncertainty

Both aircraft had been provided traffic advice by Melbourne centre, which clearly indicated that the other aircraft was taxiing at Carnarvon at the same time. Considering the aerodrome configuration (Figure 2), it was reasonable to assume that a potential conflict existed.

Although the crews of both aircraft made appropriate common traffic advisory frequency (CTAF) broadcasts of their position and intentions, they did not communicate directly with one other.

⁵ Civil Aviation Advisory Publication 166-01(v4.2) Operations in the vicinity of non-controlled aerodromes



Figure 2: Carnarvon aerodrome chart

Source: Airservices Australia, annotated by the ATSB

Traffic awareness

Although the crew of VH-ZRH had acknowledged the traffic information provided by Melbourne centre, both pilots did not realise that VH-ITF was still taxiing at Carnarvon.

Both pilots believed that VH-ITF had already departed by the time they were ready to taxi. They stated that this belief was due to multiple factors, including:

- The pilots estimated at least 10 minutes elapsed between observing VH-ITF taxi past and the incident. They believed this should have been more than sufficient time for VH-ITF to have already departed. Based on the recorded radio transmissions, the ATSB estimated that the incident occurred at about 1704, 5 minutes after VH-ITF's taxi call to Melbourne centre and about 1 minute after VH-ZRH commenced taxiing.
- They did not receive a response to their CTAF taxi call at 1703 from VH-ITF's pilot.
- They did not observe any traffic on their aircraft's traffic collision avoidance system (TCAS). The operator subsequently conducted an operational check of the aircraft's TCAS and no technical faults were identified.

When VH-ITF taxied past them on the apron, the flight crew of VH-ZRH were not yet monitoring the CTAF, nor were they required to do so at that point. The crew were using COM 1 for company communications and COM 2 was not used until ground power was connected, which was sometime after VH-ITF had taxied past. ATSB estimated that this was likely to be after VH-ITF had commenced backtracking on runway 22. Therefore, the crew of VH-ZRH would not have heard VH-ITF's taxi call or entry/backtracking call on the CTAF and were not able to maintain awareness of VH-ITF's position.

When providing traffic information to the crew of VH-ZRH, the Melbourne centre clearly stated that the VH-ITF was 'taxiing at Carnarvon for Geraldton'. The crew of VH-ZRH advised that, in their experience, ATC will provide the same information about another aircraft until they receive a departure call from that aircraft, which can occur sometime after the aircraft has become airborne.

The crew of VH-ZRH did not hear Melbourne centre pass traffic information to VH-ITF, nor did they hear VH-ITF's CTAF transmission that they were lining up and rolling. The crew stated that, at about the same time as those transmissions, they were confirming the assigned transponder code. Due to an error in the initial readback, the code had to be read back again, which delayed the code's input. This possibly diverted their attention long enough to not hear the transmissions.

The pilot of VH-ITF believed that VH-ZRH was aware of their position on the runway and would hold short until they had departed. This belief was developed because they had heard Melbourne centre providing VH-ZRH with traffic information. It was then reinforced once VH-ITF had turned around on runway 22 and they had VH-ZRH visual, and thus assumed the crew of VH-ZRH also had them visual.

Visibility from taxiway alpha holding point

Although the captain of VH-ZRH did not see VH-ITF prior to entering the runway, immediately after the incident the captain and first officer were able to see VH-ITF. Upon repositioning at the holding point, the captain noted that the background buildings and terrain made it difficult to identify VH-ITF on the runway threshold.

The ATSB reviewed images of the runway threshold from the holding point on taxiway alpha. Although the images did support the captain's view of potential difficulty in identifying an aircraft on the threshold, it was noted that the aerodrome reporting officer (ARO), who was positioned on the apron adjacent to taxiway alpha, had VH-ITF in sight.

The pilot of VH-ITF stated that there were no impediments to visibility and, although they were looking from the opposite direction, had VH-ZRH in sight.

VHF transmission quality

The flight crew of VH-ZRH recalled that the transmissions from VH-ITF were faint and quite scratchy. This was supported by the ARO. The ATSB reviewed the CTAF recording and noted that VH-ITF's transmissions were distinctly weak in comparison to those from VH-ZRH or the ARO but they were still audible and understandable. There was no indication that VH-ITF's transmissions to Melbourne centre were degraded in any way.

Following the incident, Shine Aviation noted a history of issues relating to VH-ITF's VHF radio COM 1, all of which were in 2018 and had been already actioned. On 30 September 2020 (after this incident), VH-ITF again experienced an issue with VHF radio COM 1 and maintenance action was commenced to ascertain the cause. The ATSB noted that COM 1 was being used for CTAF transmissions at the time of the incident on 31 August 2020.

VH-ITF's initial CTAF transmissions were not heard by the crew of VH-ZRH since they were not yet monitoring the CTAF. VH-ITF's lining up and roll call was probably missed by the crew of VH-ZRH due to a combination of VH-ITF's weak CTAF transmission and VH-ZRH's crew having diverted their attention to transponder code confirmation and entry. However, the ATSB noted that the crew of VH-ZRH also did not perceive the exchange between VH-ITF and Melbourne centre, which was on a radio for which no communications difficulty was identified.

While the crew of VH-ZRH described VH-ITF's transmissions as faint and difficult to hear, the ATSB noted that, immediately after the incident, communications between VH-ITF and VH-ZRH were established and continued without issue.

There were multiple radio transmissions regarding the movement of VH-ITF, between various parties, over two radio channels (COM 1 and COM 2). It was evident that the crew of VH-ZRH had received (and acknowledged) at least one of these communications advising that VH-ITF was

traffic for them, so it was reasonable to assume that a potential conflict existed. Considering the crew's diverted attention towards their transponder code input at the time of these communications, VH-ITF's weaker transmissions alone were not considered contributory to the incident.

Safety analysis

In this incident, the crews of both aircraft were provided with sufficient information to aid their situational awareness and be alerted to traffic relevant to them. However, the pilots did not fully comprehend the traffic picture and/or did not recognise the potential conflict that existed.

Although the flight crew of VH-ZRH believed VH-ITF to have departed, the traffic information provided to them by Melbourne centre clearly stated that VH-ITF was still taxiing at Carnarvon. Although it is possible that a controller could provide such information in cases where an aircraft had departed and the crew had not yet made a departure call, the statement that VH-ITF was taxiing (and was therefore a potential conflict) should have been assumed to be true until the crew could confirm otherwise.

Expectations strongly influence where a person will search for information and what they will search for (Wickens and McCarley 2008), and they also influence the perception of information (Wickens and others 2013). In simple terms, people are more likely to see or hear what they expect to see or hear, and less likely to see or hear things they do not expect. Expectations are more likely to have an influence when some of the available cues are not salient. In this case, the flight crew had developed an expectation that VH-ITF had already departed, and it is likely that this expectation then strongly influenced their perception of subsequent information.

In particular, this expectation bias likely influenced the flight crew's ability to visually scan for traffic prior to entering the runway. As they were not expecting traffic to be there, the captain looked but did not see VH-ITF on the threshold. The ATSB notes that although the background potentially masked VH-ITF from the captain's scan, the ARO was able to see VH-ITF from a similar position.

The pilot of VH-ITF was fully aware that VH-ZRH was taxiing and, having heard all of that crew's transmissions, assumed they were equally aware of VH-ITF. The pilot expected VH-ZRH would hold short and, therefore, a potential conflict did not exist. Consequently, the pilot did not believe there was a need for direct radio contact with the other crew to clarify their intentions.

As the pilot of VH-ITF had VH-ZRH visual, they were able to quickly reject the take-off when VH-ZRH entered the runway.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition, 'other findings' may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the runway incursion involving a SAAB 340B, VH-ZRH at Carnarvon Airport, Western Australia, on 31 August 2020.

Contributing factors

- The flight crew of VH-ZRH were not aware, as they entered the runway, that VH-ITF had commenced its take-off roll. As a result, a potential conflict existed that required the pilot in command of VH-ITF to reject their take-off.
- The lookout conducted by the flight crew of VH-ZRH before entering the runway was not effective in identifying VH-ITF on the runway threshold. This was likely influenced by the crew's expectation that VH-ITF had already departed.
- Although both flight crews were aware that they were mutual traffic, they both had an incorrect understanding of the other's position and/or intentions, which led to them not recognising the potential conflict and therefore not directly communicating with each other.

Safety actions

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.

Safety action by Regional Express

Regional Express (REX) reported that the flight crew had been debriefed on all aspects of the incident. The incident was also discussed amongst the REX checking and training organisation for consideration in future training outcomes.

REX also published an operations notice (for pilots) that included related policy items to highlight the requirements for operating in non-controlled environments. It also reviewed its human factors and non-technical skills training specific to communication.

REX advised that operations at non-towered aerodromes continues to be a focus of its safety promotion activities, with recent articles being published in its September 2021 Group Safety Newsletter.

Safety action by Shine Aviation

Shine Aviation's internal investigation recommended this incident be used as a learning tool to promote discussion of behaviours and best practice with respect to communications in CTAF environments.

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the flight crew of VH-ZRH
- the pilot of VH-ITF
- Regional Express
- Shine Aviation
- the Carnarvon Shire Council
- the Civil Aviation Safety Authority
- Airservices Australia.

References

Wickens CD, Hollands JG, Banbury S & Parasuraman R 2013, *Engineering psychology and human performance*, 4th edition, Pearson Boston, MA.

Wickens, CD & McCarley, JS 2008, Applied attention theory, CRC Press, Boca Raton, FL.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- the captain and first officer of VH-ZRH
- the pilot of VH-ITF
- Regional Express
- Shine Aviation
- the Civil Aviation Safety Authority.

Submissions were received from:

- the captain of VH-ZRH
- the first officer of VH-ZRH
- Regional Express.

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

General details

Occurrence details

Date and time:	31 August 2020 – 1704 WST		
Occurrence category:	Incident		
Primary occurrence type:	Runway incursion		
Location:	Carnarvon Aerodrome		
	Latitude: 24º 52.8300' S	Longitude: 113º 40.3320' E	

Aircraft 1 details

Manufacturer and model:	Piper Aircraft Corp PA-31	
Registration:	VH-ITF	
Operator:	CHRISHINE NOMINEES PTY LTD	
Serial number:	31-7812014	
Type of operation:	Charter - Passenger	
Activity:	Commercial air transport - Non-scheduled - Passenger transport charters	
Departure:	Carnarvon, Western Australia	
Destination:	Geraldton, Western Australia	
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	None	

Aircraft 2 details

Manufacturer and model:	S.A.A.B. Aircraft Co 340	
Registration:	VH-ZRH	
Operator:	REGIONAL EXPRESS PTY LTD	
Serial number:	340B-392	
Type of operation:	Air Transport Low Capacity - Passenger	
Activity:	Commercial air transport - Scheduled - Domestic	
Departure:	Carnarvon, Western Australia	
Destination:	Perth, Western Australia	
Persons on board:	Crew – 3	Passengers – 30
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	None	