



Australian Government

Australian Transport Safety Bureau

Collision on runway between Extra EA-300 aeroplane, VH-EXR and Guimbal Cabri G2 helicopter, VH-LTO

Caloundra Airport, Queensland, on 18 September 2020

ATSB Transport Safety Report

Aviation Occurrence Investigation (Short)

AO-2020-051

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Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, ACT 2601
Telephone: 1800 020 616, from overseas +61 2 6257 2463
Accident and incident notification: 1800 011 034 (24 hours)
Email: atsbinfo@atsb.gov.au
Website: www.atsb.gov.au

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Addendum

Page	Change	Date

Safety summary

What happened

On 18 September 2020, an Extra EA-300 aeroplane, registered VH-EXR, was conducting circuits at Caloundra Airport, Queensland. A Guimbal Cabri G2 helicopter, registered VH-LTO, joined the circuit ahead of VH-EXR and conducted a stop-and-go on the active runway. VH-EXR landed on the runway and collided with the rear of the hovering helicopter during the landing roll, resulting in substantial damage to both aircraft but fortunately no injuries.

What the ATSB found

The ATSB found that the pilots of VH-EXR did not expect the helicopter to join the 1,000 ft circuit pattern and did not assimilate the helicopter pilot's radio calls. As a result, they were unaware of the helicopter ahead of them in the circuit.

It was also identified that, on the final leg of the circuit, the pilots of VH-EXR were focused on an additional aircraft ahead of the helicopter. Although a visual inspection of the runway was carried out by the pilots prior to landing, the focus on the additional aircraft, in conjunction with the pilots of VH-EXR not being aware of the helicopter's presence, resulted in them not sighting the helicopter and continuing the approach to the runway. The nose-high attitude of EXR during the landing manoeuvre prevented visual identification of the hovering helicopter until immediately before the ground collision, leaving no time for avoiding action.

Safety message

This occurrence highlights the importance of having an awareness of the circuit procedures for differing types of aircraft. Multiple options are available to helicopter traffic at non-towered airports including the active 1,000 ft circuit pattern. A helicopter performing a stop-and-go will usually require significantly more time to clear the runway compared to an aeroplane performing a touch-and-go.

The accident also illustrates that, even for experienced pilots, visual identification of unknown traffic is difficult. The alerting provided by circuit-related radio broadcasts greatly assists the process of sighting traffic that may be a collision risk. Safety around non-towered airports is one of the ATSB's [SafetyWatch](#) priorities.

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 18 September 2020, at 1215 Eastern Standard Time,¹ the student pilot of a Guimbal Cabri G2 helicopter registered VH-LTO (LTO), departed Redcliffe Airport, Queensland, for a navigation training flight via Caloundra Airport, Queensland. The student pilot was the only person on board.

At about 1230, an Extra EA-300 aeroplane, registered VH-EXR (EXR), taxied for runway 12 at Caloundra Airport to conduct a series of circuits. On board were two pilots. The pilot in command (PIC) occupied the front seat and a second pilot occupied the rear seat for the purpose of a check flight.

At 1236, a Sling aircraft (Aircraft 3), already conducting circuits on runway 12 at Caloundra, contacted EXR on the Caloundra Common Traffic Advisory Frequency (CTAF) for the purpose of traffic separation between themselves and EXR. EXR acknowledged the transmission.

At approximately 1237, the rear seat pilot of EXR broadcast on the CTAF that they were rolling on runway 12 for circuits. The rear seat pilot conducted the take off and approximately two minutes later, contacted Aircraft 3 on the CTAF to request a radio check. Aircraft 3 confirmed EXR's radio transmission and EXR responded that they were reading Aircraft 3 clearly.

At 1240, the student pilot in LTO made an inbound call on the CTAF reporting that they were 2 NM east of Roy's Orchard² and on climb to 1,500 ft. The student pilot recalled listening to the CTAF for the active runway in use. At 1242, the student pilot reported that they were now 3 NM to the south of Caloundra Airport at 1,500 ft and would be overflying to descend on the non-active side of the runway (see the section titled *Circuit procedures* and Figure 4). The pilot of LTO then proceeded to overfly the airport at 1,500 ft and descended to 1,000 ft on the non-active side. LTO then joined the downwind leg of the active circuit pattern, via midfield crosswind, and broadcast a joining the circuit call.

The student pilot of LTO reported that, at the time of joining the circuit, they visually identified EXR on the upwind leg and Aircraft 3 on the base leg of the circuit. LTO entered the circuit ahead of EXR and then proceeded on the downwind leg of the circuit at a speed of about 80 kt and at a height of 1,000 ft.

On the downwind leg of the collision circuit, the PIC of EXR reported taking control of the aircraft, including radio transmissions, from the rear seat pilot for the purpose of demonstrating the approach and landing technique.

At 12:45:48, the student pilot of LTO made a broadcast that they 'were turning a right base runway 12 for a stop-and-go³. 39 seconds later, at 12:46:27, the PIC of EXR broadcast that they 'were turning base runway 12 for a touch-and-go⁴ number two'. The student pilot of LTO recalled that hearing 'number two', provided confirmation that the pilot of EXR had visually identified them and was aware of their intentions.

¹ Eastern Standard Time (EST): Coordinated Universal Time (UTC) + 10 hours

² A common inbound reporting point for Caloundra Airport, approximately 5 NM to the south.

³ A circuit procedure where the helicopter is transitioned into a hover over the runway, the engine temperatures and pressures are checked, and then the helicopter is transitioned back into forward flight.

⁴ A circuit procedure in which the aircraft lands on the runway and takes off again without coming to a complete stop.

During final approach the pilot of LTO reduced speed continually by 10 kt for every 100 ft of descent until the aircraft entered a hover at a height of about 7 ft over the runway. The pilots of EXR looked down the runway and identified Aircraft 3 airborne on upwind and elected to continue the approach for a touch-and-go. The PIC of EXR reported that just after landing and prior to advancing the throttle to take off again, LTO appeared 'directly over the top of the propeller'. The PIC of EXR recalled not having any time to manoeuvre to avoid LTO.

The student pilot of LTO felt and heard a bang as EXR passed underneath. The student pilot maintained control of LTO and landed adjacent to the runway. The student pilot then broadcast a MAYDAY⁵ call over the CTAF which Aircraft 3 relayed to Brisbane Air Traffic Control. The rear seat pilot shut EXR down before the aircraft came to a stop on the runway.

LTO sustained multiple propeller strikes underneath the cabin and separation of the right landing skid (Figure 1).

Figure 1: Propeller strike mark and skid damage to VH-LTO



Source: Aeropower, annotated by the ATSB

The propeller of EXR was destroyed by the impact with the fuselage and landing skid of LTO (Figure 2). The right landing skid of LTO punctured the leading edge and fuel tank of the right wing of EXR (Figure 3). The rear seat pilot reported that the after impact the canopy of EXR was covered in fuel. There were no injuries.

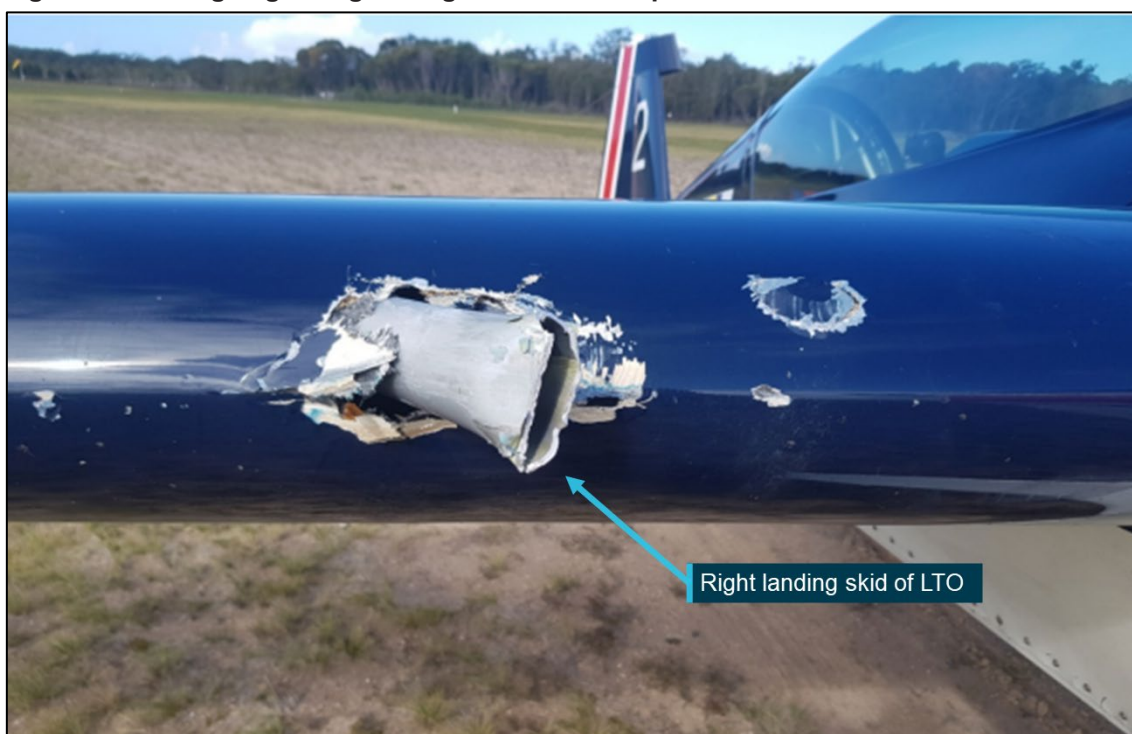
⁵ MAYDAY: an internationally recognised radio call announcing a distress condition where an aircraft or its occupants are being threatened by serious and/or imminent danger and the flight crew require immediate assistance.

Figure 2: Damaged propeller of VH-EXR



Source: Aeropower, annotated by the ATSB

Figure 3: Leading edge wing damage and fuel tank puncture of VH-EXR



Source: Aeropower, annotated by the ATSB

Context

Pilot information

The PIC of EXR held a Civil Aviation Safety Authority (CASA) Commercial Pilot Licence (Aeroplane) that was issued in March 2015. The pilot also held a current flight instructor rating in spin training, aerobatics training, and design feature training⁶. At the time of the occurrence, the pilot had accrued a total flying time of 2,896.3 hours with 455.1 hours on an Extra EA-300.

The rear seat pilot of EXR reported that they held a CASA Air Transport Pilot Licence (Aeroplane), a Multi Engine Command Instrument rating, and a Grade 1 Flight Instructor rating. At the time of the occurrence, the pilot had accrued a total flying time of approximately 16,000 hours.

The student pilot of LTO was undertaking a Commercial Pilot Licence (Helicopter) course that had commenced in January 2020. At the time of the occurrence the student pilot had accrued a total flying time of 65 hours.

Aircraft information

The Extra EA-300, VH-EXR, was manufactured in Germany in 1989 and first registered in Australia in May 2007. It was fitted with a Lycoming AEIO-540-L1B5 reciprocating engine. The fuselage comprises a welded steel tube covered with aluminium and fabric and contains a tandem seating configuration. The wing has a carbon fibre composite spar and carbon composite skins. The landing gear is a fixed taildragger style with composite main legs and fibreglass wheel pants.

The Guimbal Cabri G2, VH-LTO, was manufactured in France in 2014 and first registered in Australia in October 2018. It was fitted with a Lycoming O-360-J2A reciprocating engine. The Cabri G2 has two side by side seats, a three-bladed fully articulated main rotor and a Fenestron type tail rotor. It has skid style landing gear and an all composite monocoque fuselage.

Circuit procedures

The Caloundra entry in the En Route Supplement Australia (ERSA)⁷ stated that right circuits were to be flown on runway 12 as part of the noise abatement procedure. This applied to both aeroplane and helicopter operations.

In addition, the CASA Visual Flight Rules Guide stated the following in regard to helicopter circuit operations at non-controlled airports such as Caloundra:

Helicopter pilots can choose to fly a circuit similar to a fixed-wing aircraft, but may also fly a circuit either in or contra to the circuit direction at a height of at least 500 ft above the aerodrome elevation and closer to the runway. This can only be done if the associated landing site is outside the runway strip in use; the non-standard circuit does not cross the extended centreline of the runway in use and pilots broadcast their intentions. Check the relevant ERSA for any noise abatement procedures.

The Visual Flight Rules Guide also stated the following in regard to a recommended circuit join at non-controlled airports:

Overfly or circle the aerodrome at least 500 ft above the circuit altitude, which may be 2000 ft or more above the aerodrome elevation. When you have determined the circuit direction position the aircraft to a point well clear (normally the non-active side of the circuit) before descending to a circuit altitude that equates to the aircraft's performance.

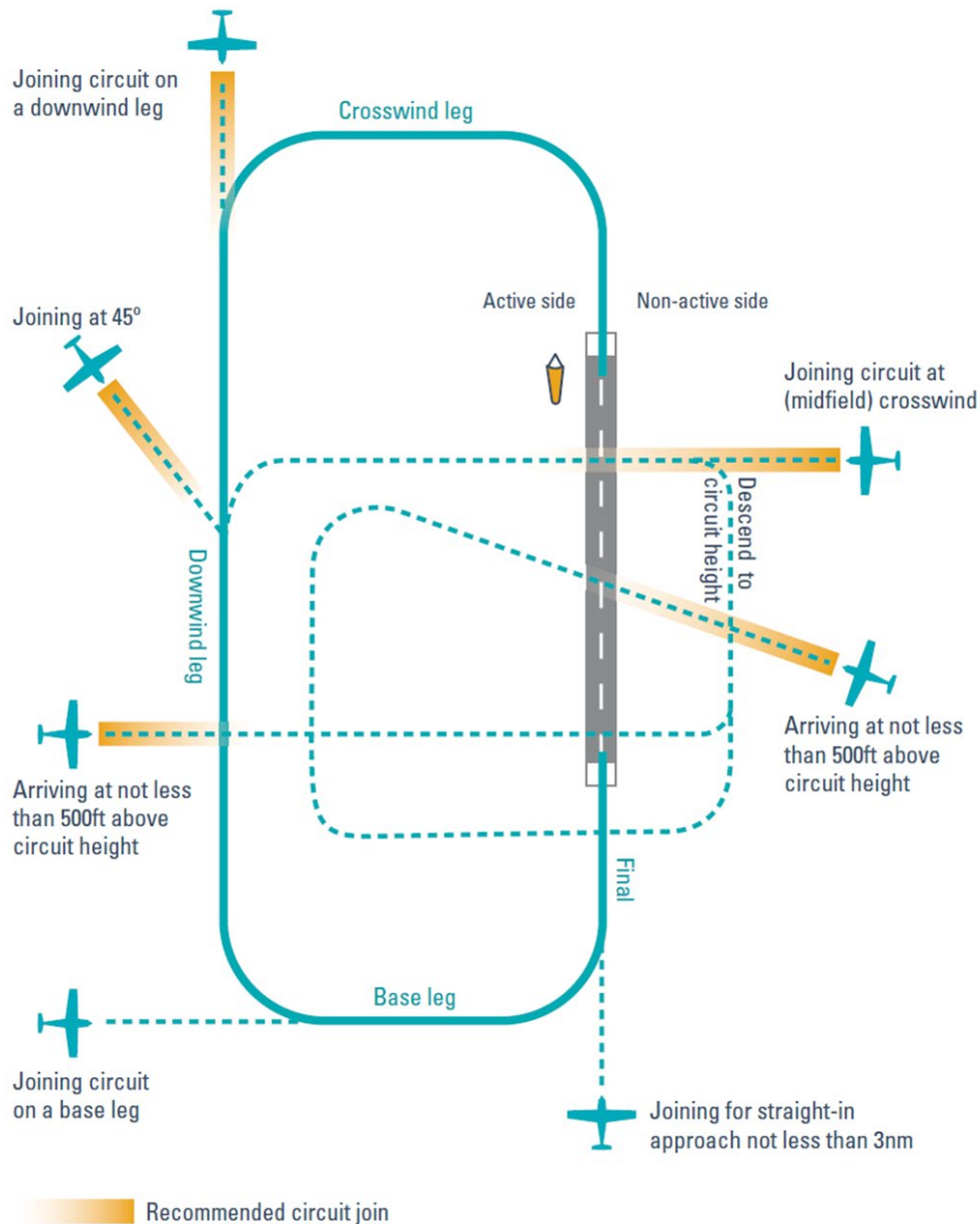
VH-EXR can be classified as a high performance aircraft as it is capable of a downwind speed of greater than 150 kt. The recommended circuit height for a high performance aircraft in the CASA Visual Flight Rules Guide is 1,500 ft.

⁶ Flight Instructor Rating Design Feature endorsement: allows the instructor to instruct and endorse for any design feature they hold such as tailwheel undercarriage and manual propeller pitch control.

⁷ En Route Supplement Australia (ERSA): a directory for Australian aerodromes that includes details of an aerodrome and details of available air traffic and ground services, navigation aids and public facilities and any special procedures.

The student pilot of VH-LTO overflow Caloundra Airport at 1,500 ft above the airport elevation prior to descent on the non-active side of the circuit. On this occasion, that arrival height was appropriate as the pilots of VH-EXR were conducting circuits at 1,000 ft.

Figure 4: Arrival procedure for a non-controlled airport (left direction circuit). The circuit direction was right at Caloundra.



Circuit naming convention and arrivals procedure for a left turning circuit.
Source: CASA Visual Flight Rules Guide

Recorded information

Avdata⁸ recorded all VHF transmissions made on the Caloundra CTAF (Table 1). These recordings were obtained by the ATSB and captured relevant transmissions leading up to the occurrence. These included:

- A total of six radio calls broadcast from the pilot of LTO, including two calls prior to LTO's arrival over Caloundra Airport

⁸ Avdata: A service which records all VHF transmission at an airport for billing purposes.

- The circuit calls made by the pilot/s of EXR and Aircraft 3, including the conversation regarding separation from each other
- The MAYDAY call broadcast by the pilot of LTO after the collision.

Table 1: Caloundra CTAF transcript

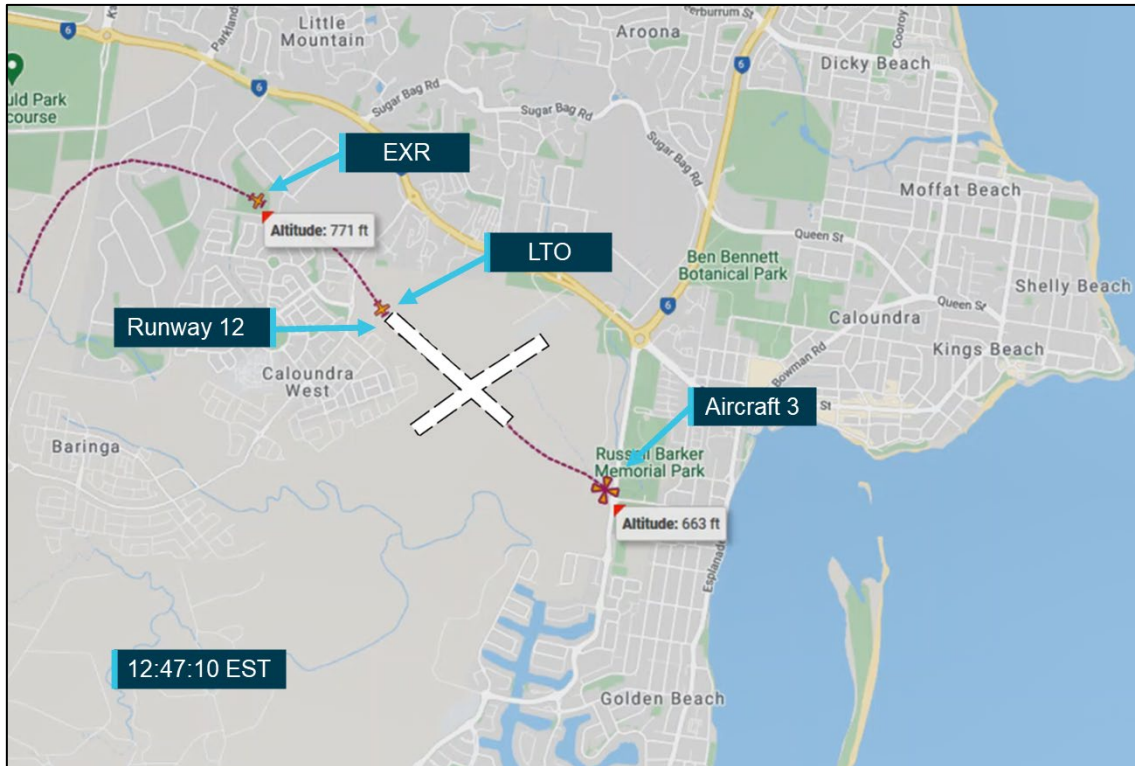
Time	Callsign	Broadcast
12:30:18	EXR	Caloundra Traffic, Extra ECHO XRAY ROMEO taxiing from the fuel bowser runway 12 for circuits. All stations Caloundra.
12:31:25	EXR	Caloundra Traffic. Extra ECHO XRAY ROMEO entering and backtracking runway 05, holding short of 12. All stations Caloundra
12:33:46	Sling 7788 (Aircraft 3)	Traffic Caloundra, Sling 77, turning base runway 12, touch and go, traffic Caloundra
12:35:41	EXR	Traffic Caloundra, Extra ECHO XRAY ROMEO, entering and backtracking runway 12 for circuits, traffic on upwind sighted, traffic Caloundra
12:35:55	Aircraft 3	Sling 7788 to Extra ECHO XRAY ROMEO, you can just go around us. Do whatever you need to..... you can just circle us and go around us. We will keep an eye out for you.
12:36:02	EXR	You're on upwind are you? Copy, thanks.
12:36:02	Aircraft 3	Yep. I've got my eye on you
12:37:27	EXR	Caloundra Extra ECHO XRAY ROMEO rolling runway 12 for circuits
12:39:04	Aircraft 3	Caloundra Traffic Sling 7788 turning base runway 12 for touch and go Caloundra traffic
12:39:15	EXR	Traffic Caloundra, Extra ECHO XRAY ROMEO request radio check with the sling
12:39:19	Aircraft 3	Yeah, I got you 5
12:39:19	EXR	OK I can hear you 5 by 5 now
12:39:27	LTO	Caloundra Traffic, helicopter LIMA TANGO OSCAR is 2 miles east of Roy's orchard at one thousand two hundred on climb to one thousand five hundred, inbound Caloundra.

12:40:05	EXR	Traffic Caloundra, Extra ECHO XRAY ROMEO is late downwind runway 12 for touch and go, sling on final sighted
12:41:08	EXR	Caloundra traffic, Extra ECHO XRAY ROMEO is final runway 12
12:41:44	EXR	Extra ECHO XRAY ROMEO going around, in an early right turn for downwind runway 12
12:42:09	LTO	Caloundra Traffic Helicopter LIMA TANGO OSCAR is 3 miles south of the field at 1500, inbound with intent to descend on the dead side of runway 12 for a midfield crosswind join. Caloundra Traffic
12:42:27	EXR	Caloundra traffic ECHO XRAY ROMEO is late downwind of runway 12 touch and go
12:43:04	EXR	Traffic Caloundra ECHO XRAY ROMEO base runway 12 touch and go
12:43:48	LTO	Caloundra Traffic Helicopter LIMA TANGO OSCAR is overhead the field 1500 descending on the deadside for a midfield crosswind join runway 12 Caloundra Traffic
12:44:51	LTO	Caloundra Traffic Helicopter LIMA TANGO OSCAR joins the circuit midfield crosswind runway 12
12:45:00	Aircraft 3	Caloundra Traffic Sling 7788 non-standard glide approach 12 touch and go Caloundra
12:45:48	LTO	Caloundra Traffic helicopter LIMA TANGO OSCAR turning right base runway 12 for a stop-and-go, Caloundra Traffic
12:46:27	EXR	Caloundra Traffic Extra ECHO XRAY ROMEO turns base for touch and go. runway 12 number 2
12:48:23	LTO	MAYDAY MAYDAY MAYDAY Helicopter LTO is at Caloundra runway 12 has been contacted by aircraft MAYDAY MAYDAY MAYDAY

Airservices Australia WebTrak⁹ data recorded the movements of EXR, LTO, and Aircraft 3 at the time of the occurrence. A snapshot of the data prior to the collision (Figure 5) showed:

- Aircraft 3 was airborne and departing runway 12
- LTO on late final for runway 12
- EXR on early final for runway 12

Figure 5: WebTrak data snapshot with aircraft positions prior to collision at 12:47:10



Source: Airservices Australia and Google Earth, annotated by the ATSB

Radio serviceability

The ATSB conducted transmission and receiving tests of the radio and intercom system in EXR, including testing of the helmet and headset that were used during the occurrence flight. No faults were identified. The Avdata receiver at Caloundra Airport was also tested with no faults identified. The radio in LTO was unable to be tested as it had been removed for access during repair of the aircraft.

The rear seat pilot of EXR conducted a radio check with Aircraft 3 just after take-off at 12:39:15. The pilot did not recall the reason for the radio check but stated that they 'sometimes carry out a radio check to have confidence in the serviceability of the radio'.

Awareness of helicopter

The PIC of EXR reported that a series of circuits were planned for the purpose of a check flight for the rear seat pilot.

Aircraft 3 was conducting circuits on runway 12 prior to being joined in the circuit by EXR. The PIC of Aircraft 3, cognisant that the much faster EXR would be joining them in the circuit, initiated a conversation over VHF radio stating that EXR could go around them if they needed to and that they would monitor their location (Table 1).

⁹ WebTrak: An information service provided by Airservices Australia that displays aircraft movements and noise monitoring data.

The rear seat pilot controlled EXR whilst also operating the radio for the first two circuits. Both circuits resulted in a go-around¹⁰. During the first go-around the rear seat pilot recalled hearing a broadcast from LTO. The pilot further recalled that the transmission was possibly a downwind joining call, but they did not recall hearing any further radio transmissions from LTO. On the downwind leg of the collision circuit, the front-seat PIC of EXR took control of the aircraft, including operation of the radio, to demonstrate a circuit to the rear seat pilot. The PIC of EXR recalled that they did not hear any of the radio transmissions from LTO.

The rear seat pilot further went on to state that due to their expectation for a helicopter to be conducting a 500 ft above ground level circuit to a helipad, the radio call did not require their immediate attention as they expected there would be no conflict and that LTO would make another broadcast.

On the collision circuit, the PIC of EXR made a radio broadcast while turning onto the base leg, stating that they were number two for landing. The PIC recalled that this was due to visually identifying Aircraft 3 ahead on late final. During the subsequent turn onto the final leg of the circuit, both pilots of EXR stated that a visual check of the runway was conducted and noted that Aircraft 3 was airborne and on the upwind leg of the circuit (Figure 5).

The PIC of EXR stated that due to the cockpit visibility limitations of EXR while on final, they performed a side slip to visually check the runway. At this time, the PIC of EXR commented to the rear seat pilot that Aircraft 3 was going to interfere with their next circuit due to inadequate spacing. The PIC of EXR also assessed that the spacing was sufficient to carry out a touch and go. Neither pilot of EXR visually identified LTO prior to landing. Webtrak data recorded that no avoidance manoeuvring was carried out by EXR prior to the collision.

The student pilot of LTO recalled that, when they were on the final leg of the circuit for their stop-and-go, they heard EXR broadcast number two for landing and that this gave them an understanding that the pilots of EXR were aware of LTO's presence.

In discussing the presence of LTO, the PIC of EXR commented to the ATSB that 'I think we must not have heard the helicopter's joining the circuit call, and then we haven't seen them on the runway'. They further stated, 'helicopters approach Caloundra Airport regularly, but most remain clear of the circuit'. The rear seat pilot of EXR commented that 'I've never known helicopters to be hovering over runways and that helicopters will usually fly lower and keep out of the way of circuit traffic'.

Safety analysis

At about 1236, Aircraft 3 contacted EXR on the Caloundra CTAF for the purpose of establishing separation, as they were aware that the faster EXR would be joining them in the circuit. EXR responded to Aircraft 3 over the CTAF, indicating that both aircraft's radios were serviceable. A subsequent radio check requested by EXR to Aircraft 3 confirmed this serviceability. Additionally, testing was carried out after the accident on EXR's radio transmission and receiving functions and Caloundra Airport's Avdata equipment, with no faults found.

The student pilot of LTO broadcast six radio calls on the CTAF. These calls were all recorded by Avdata, indicating the serviceability of LTO's transmissions. The student pilot also recalled hearing CTAF transmissions, while inbound to Caloundra, indicating the serviceability of the receiving function of LTO's radio.

The rear seat pilot reported hearing a broadcast from the pilot of LTO that may have contained information that they were joining downwind however the pilot could not recall the exact content of the broadcast. This call was likely the broadcast at 12:42:09 (Table 1). The rear seat pilot of EXR was conducting a go-around at this time. The rear seat pilot also reported an expectation that helicopters would generally remain clear of circuit traffic. The PIC of EXR reported not hearing any

¹⁰ Go around: a flight path taken by an aircraft after an aborted approach to landing.

of the calls made by the pilot of LTO and observed that, while helicopters regularly flew into Caloundra Airport, the majority remained clear of the circuit. This indicated that both the pilots of EXR were not expecting helicopter traffic in the active 1,000 ft circuit and that, possibly in combination with focussed attention on their own flight activity, led to the pilots not assimilating the radio calls made by the pilot of LTO.

As a result, both pilots were unaware that the helicopter had joined the 1,000 ft circuit. The PIC of EXR made a base call stating that they were number two, recalling that this was due to visually identifying Aircraft 3 on late final and not LTO which was also ahead of them. The student pilot of LTO heard this call and interpreted it as meaning that they had been sighted by the pilots of EXR. Consequently, they believed that separation between their helicopter and EXR had been established.

The pilots of EXR recalled visually clearing the runway prior to landing and only sighting Aircraft 3 on upwind, identifying that it would likely interfere with their next circuit. This focus on the position of Aircraft 3 hampered the visual identification of LTO ahead of them on the runway. Believing the runway was clear, the PIC of EXR then continued the approach and landing. The nose-high attitude of EXR during the landing manoeuvre prevented visual identification of the hovering helicopter until immediately before the ground collision.

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 collision on the runway between, aeroplane: Extra EA 300 VH-EXR and helicopter: Guimbal Cabri G2 VH-LTO.

Contributing factors

- The pilots of the Extra did not assimilate the helicopter pilot's radio calls, probably due to an expectation that the helicopter would not join the 1,000 ft circuit pattern.
- The pilots of the Extra were unaware of the presence of the helicopter in the 1,000 ft circuit pattern and did not sight the helicopter prior to landing, resulting in a collision on the runway.

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the pilots of VH-EXR
- the student pilot of VH-LTO
- Caloundra Airport (Sunshine Coast Regional Council)
- Aeropower Pty Ltd
- Airservices Australia
- Civil Aviation Safety Authority

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 pilots of VH-EXR
- the student pilot of VH-LTO
- Aeropower Pty Ltd
- Civil Aviation Safety Authority

Submissions were received from:

- the pilots of VH-EXR

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

General details

Occurrence details

Date and time:	18 September 2020 12:49 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision on runway	
Location:	Caloundra Airport, Queensland	
	Latitude: 26° 48.1200' S	Longitude: 153° 6.3180' E

Aeroplane details

Manufacturer and model:	Extra EA-300	
Registration:	VH-EXR	
Operator:	Sunshine Coast Flying School	
Serial number:	010	
Type of operation:	Flying Training - Training Dual	
Activity:	General aviation - Instructional Flying - Instructional flying - dual	
Departure:	Caloundra Airport, Queensland	
Destination:	Caloundra Airport, Queensland	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

Helicopter details

Manufacturer and model:	Helicopteres Guimbal Cabri G2	
Registration:	VH-LTO	
Operator:	Aeropower Pty. Ltd.	
Serial number:	1071	
Type of operation:	Flying Training – Training Solo	
Activity:	General aviation - Instructional Flying - Instructional flying - solo	
Departure:	Redcliffe Airport, Queensland	
Destination:	Redcliffe Airport, Queensland	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	