Australian Government
Australian Transport Safety Bureau

Aviation Short Investigations Bulletin

Issue 53

Investigation

ATSB Transport Safety Report
Aviation Short Investigations
AB-2016-121
Final – 14 October 2016

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

Publishing information

Published by: Australian Transport Safety Bureau
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Pilot incapacitation involving Cessna 208, VH-NTQ

What happened

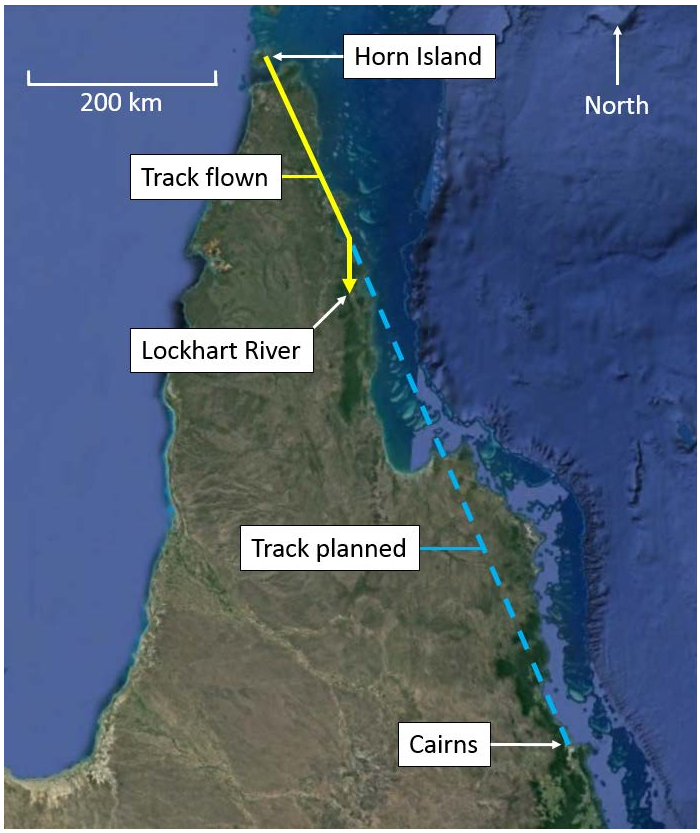
At 1446 Eastern Standard Time (EST) on 12 July 2016, a Westwing Aviation Cessna 208 aircraft, registered VH-NTQ (NTQ), departed Horn Island Airport, Queensland (Qld), for a scheduled passenger flight to Cairns, Qld, with a pilot and seven passengers on board.

As the aircraft climbed towards the planned cruising altitude of 9,000 ft, the pilot began to feel light-headed, dizzy and short of breath. The pilot levelled the aircraft at 9,000 ft and engaged the autopilot. They then attempted to identify a reason for the symptoms, selected air conditioning off, opened a fresh air vent and ate a snack. No reason for the symptoms could be identified. As the flight continued, the symptoms intensified, the pilot felt tingling in their hands and fingers, and large head movements caused severe nausea.

About 20 NM north of Lockhart River, the aircraft approached a significant over-water segment. The pilot assessed that the symptoms would not pass and elected to divert to Lockhart River (Figure 1).

The aircraft landed at Lockhart River without further incident, the pilot and passengers were not injured and the aircraft was not damaged.

Figure 1: Overview of planned flight



Source: Google Earth, modified by ATSB

Pilot comments

The pilot of NTQ provided the following comments:

- They were well rested and fit to fly prior to commencing the day's duties.
- Prior to departing Horn Island, they were well nourished and hydrated.
- While conditions were not perfect, they elected to conduct a visual approach as large head movements exacerbated their symptoms.
- They had no pre-existing conditions which may have contributed to the incident.
- After landing, the symptoms quickly subsided and have not recurred.

Operator comments

The operator of NTQ provided the following comments:

- An engineering inspection of NTQ identified no defects. The aircraft has returned to service with no abnormalities reported.
- The operator interviewed the passengers the following day. No passenger reported experiencing symptoms similar to the pilot.
- After landing, an inspection of passenger baggage and aircraft cargo identified no dangerous goods.

Medical examinations

The pilot underwent medical examinations after landing in Lockhart River and the following day in Cairns. No contributing irregularities were identified.

ATSB comment

While the pilot did not return to Horn Island at the onset of the symptoms, the pilot's decision to divert to an en route airport as the symptoms intensified rather than continuing to the intended destination demonstrates appropriate cautiousness in the face of uncertainty about their own ability to continue the flight.

Safety message

The ATSB safety education publication *Pilot incapacitation occurrences 2010–2014* (AR-2015-096) documents recent pilot incapacitation occurrences in high capacity air transport, low capacity air transport, and general aviation to help educate industry about the causes and risks associated with inflight pilot incapacitation.

The ATSB report *Pilot incapacitation: Analysis of medical conditions affecting pilots involved in accidents and incidents* examined medical conditions and incapacitation events between 1 January 1975 and 31 March 2006. This report concluded that the majority of pilot incapacitation events do not involve a chronic or pre-existing medical condition. They are largely unforeseeable events, often involving acute illnesses or injury. Many are not in themselves life-threatening, but are capable of impairing a pilot's performance to the extent that safe operation of the aircraft may be adversely affected.

General details

Occurrence details

Date and time:	12 July 2016 – 1455 EST	
Occurrence category:	Incident	
Primary occurrence type:	Flight crew incapacitation	
Location:	near Horn Island Airport, Queensland	
	Latitude: 10° 35.180’ S	Longitude: 142° 17.400’ E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 208	
Registration:	VH-NTQ	
Operator:	Westwing Aviation	
Serial number:	20800183	
Type of operation:	Air Transport Low Capacity – Passenger	
Persons on board:	Crew – 1	Passengers – 7
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Runway incursion involving Fairchild SA227, VH-HPE

What happened

On 7 June 2016, at 0418 Eastern Standard Time (EST), the pilot of a Fairchild SA227-DC, registered VH-HPE (HPE), departed Brisbane Airport, Queensland, for a flight to Mount Isa, Queensland. The flight included intermediate stops at Rockhampton and Richmond. The pilot was the only person on board the scheduled freight flight.

Prior to commencing the flight, the pilot reviewed the weather and NOTAM[1] information. The pilot noted there was no NOTAM information for Richmond Airport for the expected arrival time.

After completing the first leg of the flight, HPE departed Rockhampton for Richmond 30 minutes later than scheduled, at about 0615. The expected arrival time for Richmond was about 0810.

At about 0800, the aerodrome reporting officer (ARO) arrived at Richmond Airport with a work crew to undertake pre-planned work. The planned work was to remove plant growth from around the runway lights. The ARO conducted a pre-work safety briefing which included the work crew actions in the event of an aircraft arrival. The ARO then gave the two available hand-held VHF radios to the workers in the two works vehicles working within the runway strip. The ARO did not have a VHF radio in their vehicle and they were the only person qualified to broadcast on the common traffic advisory frequency (CTAF) used by aircraft, which uses VHF. All other works vehicles carried UHF radios.

At about the same time, the pilot of HPE broadcast on the Richmond CTAF advising they were 40 NM to the east and conducting a straight-in approach to runway 27. The pilot received a full response from the aerodrome frequency response unit (AFRU).[2]

After the brief, the workers undertook the required task in three groups. One group positioned at the eastern end of the runway and a second group at the western end of the runway while the ARO remained at a mid-point along the runway (Figure 1). While the work groups conducted the plant removal, the pilot of HPE activated the pilot activated lighting.[3] The workers in the groups at each end of the runway observed the lights illuminating and immediately began to vacate the runway strip.[4] The pilot made a further broadcast when 20 NM east of Richmond, and received only a short response from the AFRU.

At about 0815, as the aircraft joined a 5 NM final approach to runway 27, the pilot reported that they sighted a vehicle on the runway threshold moving clear of the runway strip. The pilot then broadcast on the Richmond CTAF and broadcast again passing 3 NM on final approach to the runway. They received no response to the broadcasts apart from the AFRU short response.

As HPE approached the runway, the pilot reported that they noticed vehicles and equipment at the far end of the runway and witches hats along the edge of the bitumen. As the vehicles and

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1 A Notice To Airmen (NOTAM) 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.

2 Aerodrome frequency response unit provides an automatic response when pilots transmit on the traffic frequency for that particular aerodrome. If no other transmissions have been received by the AFRU within the previous 5 minutes the AFRU will respond with a pre-recorded voice message comprising aerodrome identification followed by 'CTAF'. If a transmission has been received within the previous 5 minutes the AFRU will respond with only a short tone.

3 Pilot activated runway and taxiway lighting is activated by a series of timed transmissions using the aircraft's very high frequency radio, on either a discrete or the local airport communication frequency.

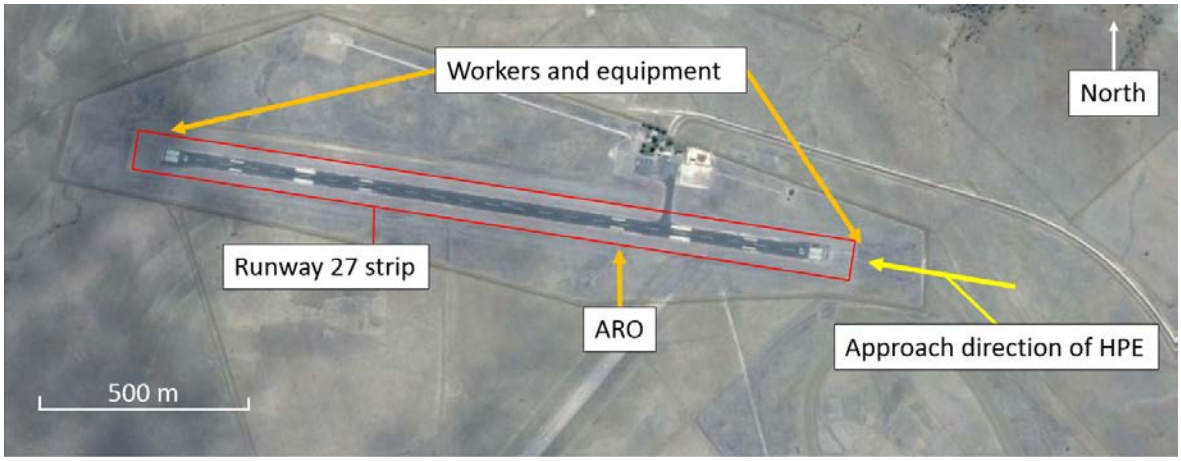
4 Runway strip is a prepared area provided around the runway to reduce risk of damage to an aircraft running off of a runway and also provide an obstacle-free area for aircraft using the runway during take-off and landing.

equipment had moved clear of the runway strip, the pilot continued the approach. At a height of about 100-200 ft above ground level, the pilot reported that they observed a person inside the runway strip near the bitumen of the runway and conducted a go-around.[5]

The pilot then re-joined the circuit, and observed that all workers and equipment were clear of the runway. The pilot conducted a second approach and landed without incident.

No persons were injured and the aircraft was not damaged in the incident.

Figure 1: Richmond Airport



Source: Google Earth, modified by the ATSB

Aerodrome reporting officer (ARO) comment

The aerodrome reporting officer provided the following comments:

- The works procedures for Richmond Airport require a NOTAM to be provided for all works within the runway strip exceeding 30 minutes duration. As the ARO did not expect the works to exceed 30 minutes duration, no NOTAM was provided.
- The ARO elected to conduct the works on a Tuesday, as no passenger service was scheduled for that day.
- The ARO receives no notification of the actual expected arrival time of the scheduled daily freight service, therefore they were not aware that the service was running late and did not check the airport movement log. Had the ARO checked the log they would have delayed the works until after the aircraft had departed.
- The work crews carried two hand-held VHF radios for communicating with aircraft. While broadcasts from aircraft further than 5 NM from Richmond Airport may not be heard, calls within 5 NM are generally received.
- The runway lights were activated about 15 minutes prior to the aircraft landing.
- HPE conducted a straight-in approach to runway 27. In the past, aircraft arriving overflew the airport prior to approaching to land which the ARO believes is a safer procedure.
- All workers and equipment were clear of the runway strip at the time HPE arrived. However, the workers and equipment positioned themselves just outside the runway strip. It may have appeared to the pilot that the workers and equipment were not clear.

Pilot comment

The pilot of HPE provided the following comments:

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[5] Go-around, the procedure for discontinuing an approach to land, is a standard manoeuvre performed when a pilot is not completely satisfied that the requirements for a safe landing have been met. This involves the pilot discontinuing the approach to land and may involve gaining altitude before conducting another approach to land.

- When approaching Richmond Airport an inbound radio broadcast was made. The AFRU provided a full response, which confirmed that their radio was working correctly and no radio broadcasts from other sources had been recently made within the Richmond CTAF.
- No radio call was received from the work crew before or after the incident.

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.

Airport operator

As a result of this occurrence, the airport operator has advised the ATSB that they are taking the following safety action:

Change to works procedure

Prior to conducting works within the runway strip, the flight log is to be reviewed to ensure no flights are scheduled to arrive while work is in progress.

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 identified concern is *Safety around non-controlled aerodromes*.

This incident shows the importance of communication and ensuring that the systems exist and are used to minimise the likelihood of communication break downs. Effective communication between all parts of the aviation system, along with robust systems in place to support the individuals, is essential for safe operations.

- The ATSB booklet, *A pilot's guide to staying safe in the vicinity of non-controlled aerodromes* provides information to assist pilots to safely operate around non-controlled aerodromes.
- The Airservices Australia document *An airside driver's guide to runway safety* provides information to assist ground personnel to operate safely at both controlled and non-controlled aerodromes.

General details

Occurrence details

Date and time:	7 June 2016 – 0820 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway Incursion	
Location:	Richmond Airport, Queensland	
	Latitude: 20° 42.12' S	Longitude: 143° 06.88' E

Aircraft details

Manufacturer and model:	Fairchild Industries SA227-DC	
Registration:	VH-HPE	
Serial number:	DC-823B	
Type of operation:	Air Transport Low Capacity - Freight	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Piston aircraft

Flap cable failure and ground strike involving Airparts NZ FU-24, VH-TTD

What happened

On 27 June 2016, the pilot of an Airparts (NZ) FU-24-950 aircraft, registered VH-TTD, was conducting agricultural operations from an airstrip about 50 km east-south-east of Tamworth Airport, New South Wales. The pilot was the only person on board the aircraft.

The airstrip elevation was about 3,200 ft and sloped downhill in the direction used for take-off, with a steep slope at the end of the runway. The surrounding terrain was below the elevation of the airstrip and the first obstacle in the take-off direction was a fence at the end of the runway.

At about 1130 Eastern Standard Time (EST), after having completed about 35 flights for that morning, the pilot started their next take-off run with the flaps[1] in the normal take-off setting of 20°. The aircraft handled normally until shortly after lift-off, when at an airspeed of about 60 kt, the pilot heard a 'bang'. The aircraft sank rapidly and the tail struck the runway surface. As the runway sloped steeply downhill, the aircraft became airborne again. Due to the proximity of the fence at the end of the runway, the pilot elected to continue the take-off and dump the fertiliser load. As the load was being dumped, the aircraft struck the fence, but continued to fly.

The pilot quickly detected that there was no response from the elevator[2] to their control inputs. They could move the control column fore and aft, but the aircraft pitch[3] did not respond. They also observed that the flap was fully retracted even though the cockpit flap lever was still set to 20°. The pilot elected to divert to Tamworth Airport, which was below the elevation of the airstrip. The pilot used engine power and elevator trim[4] to control the pitch of the aircraft.

The pilot contacted Tamworth air traffic control (ATC) and informed them that they had a 'bit of an issue'. They also advised that they had no elevator control, but still had the aircraft under control (Figure 1). ATC cleared the pilot to manoeuvre as required to approach and land on the main runway at Tamworth.

The pilot conducted a long and low straight-in approach to runway 12 left at Tamworth with the aircraft trimmed in the approach attitude, which was slightly nose up. At about 10 ft above the runway, the pilot reduced the throttle to idle for the landing. The aircraft then pitched nose down and the nose wheel contacted the runway first and burst the nose wheel tyre. The aircraft stopped on the runway with minor damage and the pilot was not injured.

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1 Movable surface forming part of trailing edge of wing, able to hinge downwards to alter wing camber to exert a powerful effect on low speed lift and drag.

2 Movable control surface for governing aircraft in pitch.

3 The term used to describe motion of an aircraft about its lateral (wingtip-to-wingtip) axis.

4 The elevator trim tab is a small hinged portion of the trailing edge of elevator control surface whose setting relative to the elevator surface is set by the pilot and whose effect is to hold the elevator in the desired position for trimmed flight.

Figure 1: VH-TTD flying towards Tamworth Airport on the incident flight

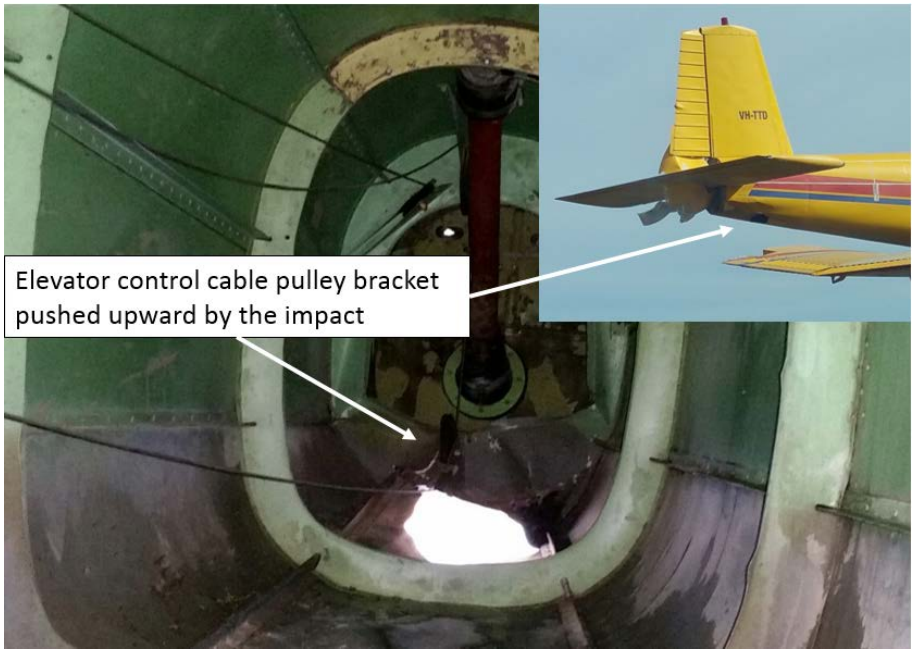
Source: BAE Systems Flight Training Tamworth

Repair organisation findings

The repair organisation that performed the post-incident inspection found damage to the propeller, tailplane and underside of aircraft consistent with impact with the runway and fence during the take-off. A detailed inspection inside the airframe revealed the following:

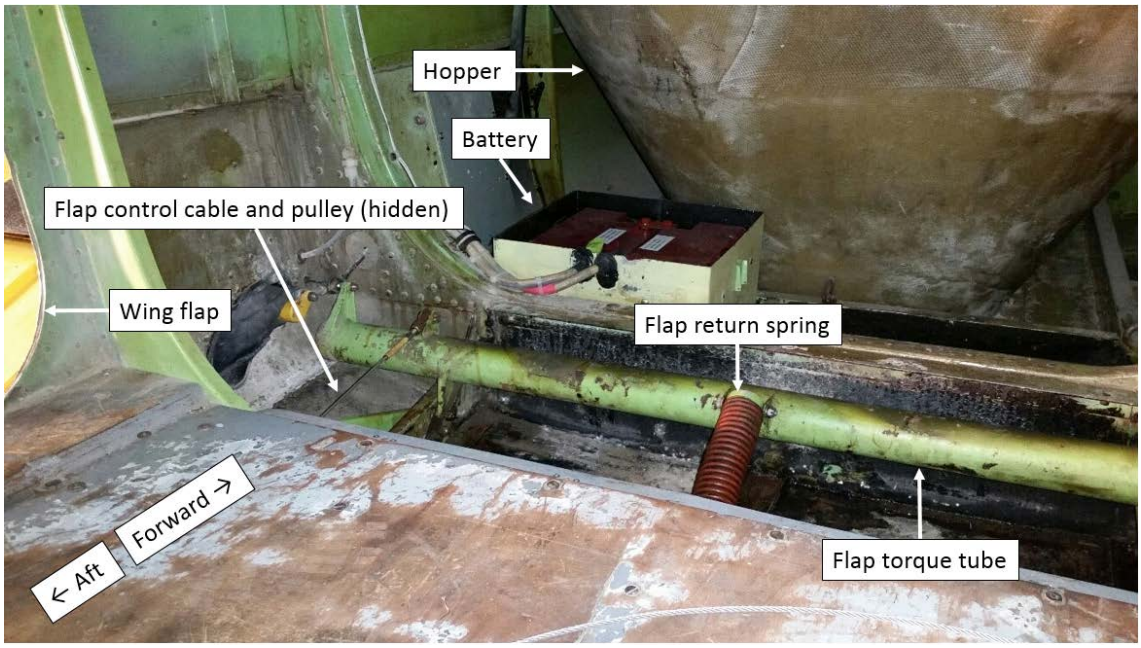
- The structural frame supporting the lower elevator control cable pulley was pushed up about 10 cm (Figure 2).
- The centre section just aft of the hopper (Figure 3) had about 12 mm of water in it and the drain hole for the centre section was blocked by fertiliser. The repair organisation assessed that the size of the drain hole was inadequate and that a larger hole with a removable bung would be preferable.
- The flap control cable had failed at the rear flap pulley and the failure appeared to be due to corrosion (Figure 4).

Figure 2: VH-TTD elevator control cable pulley



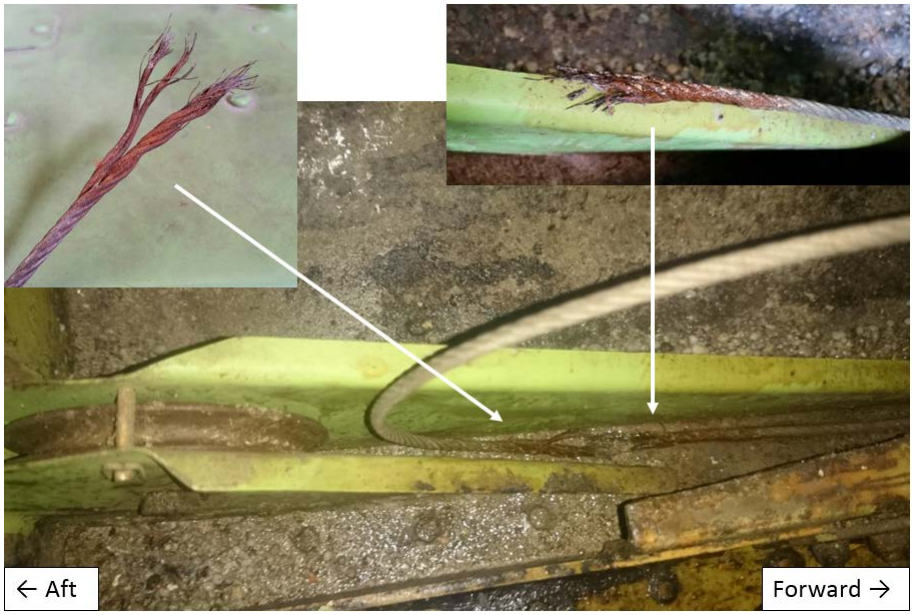
Source: Repair organisation and BAE Systems Flight Training Tamworth annotated by ATSB

Figure 3: VH-TTD centre section



Source: Repair organisation annotated by ATSB

Figure 4: VH-TTD broken flap cable



Source: Repair organisation annotated by ATSB

Maintenance schedule

The aircraft system of maintenance used was the Civil Aviation Safety Authority (CASA) Schedule 5 with 100-hourly periodic inspections. CASA Schedule 5 includes the following inspections relevant to this incident:

- Item 3 (j) for the airframe periodic inspection: 'inspect the control wheels, control columns, rudder pedals, control levers, control system bellcranks, push pull rods, torque tubes and cables.'

- Item 17 for the daily inspection: 'check that the drain holes are free from obstruction.'[5]

Previous maintenance inspections

The last 100-hourly periodic inspection was certified on 19 May 2016 in accordance with CASA Schedule 5. The previous periodic inspection was on 21 April 2016, and a corrosion inspection was performed on 23 November 2015, which included CASA Airworthiness Directive FU24/2: *structural component – corrosion – inspection*. No findings were recorded against the flap control cable for these inspections. During the periodic inspections, the flap cable was inspected by moving a cloth along the cable and no broken strands were detected, and there was no water present in the centre section of the aircraft aft of the hopper. However, the maintenance organisation indicated that they did not remove the flap cable for inspection, nor apply corrosion protection to the flap cable during the inspections.

Recommended practices

CASA Airworthiness Bulletin 27-001 issue 7 includes the following recommendation:

> …flight control cables should be periodically inspected in accordance with manufacturer's data and FAA AC 43-13-1B Chapter 7, AIRCRAFT HARDWARE, CONTROL CABLES AND TURNBUCKLES, section 8, paragraph 7.149d. To inspect all surfaces of a cable throughout its entire length for wear and fatigue (broken wires) usually requires that the cable be disconnected and removed...

United States Federal Aviation Administration Advisory Circular 43-13-1B chapter 7, section 8, paragraph 7.149 states that: 'deterioration, such as corrosion, is not easily seen, therefore, control cables should be removed periodically for a more detailed inspection and any cable with a broken strand in a critical fatigue area[6] must be replaced.' See Figure 5 below.

- Paragraph 7.149i states that: '**Areas especially conducive** to cable corrosion are battery compartments…etc.; where a concentration of corrosive fumes, vapours, and liquids can accumulate.'
- Paragraph 7.152 states that where control cables pass over pulleys: 'Provide corrosion protection for these cable sections by lubricating with a light coat of grease or general purpose, low-temperature oil.'

Figure 5: Cable inspection technique

Source: FAA AC 43.13-1B page 7-35

[5] The pilot indicated that they did not believe there were any drain holes in this section of the aircraft.

[6] A critical fatigue area includes the working length of a cable where the cable runs over, under, or around a pulley.

ATSB comment

The ATSB notes that the corrosion present on the flap control cable at the location of the failure takes a considerable amount of time to develop. The corrosion was confined to the working length of the cable that was in contact with the flap control system rear pulley, which is considered to be a critical fatigue area. The failed cable was comprised of woven steel wires plated with zinc or tin. The cable was confirmed to be the correct type for the application.

Over time, in the absence of a suitable lubricant, the plating can wear due to frictional contact with the pulley. This will render the cable susceptible to corrosive attack and elevate the likelihood of a fatigue failure. The flap control cable was not removed during the last periodic inspection, which could have detected the corrosion damage. Nor was grease applied to the working length of the cable, or the rear flap pulley, during the last few inspections to mitigate against the development of corrosion.

Entrapped water, fertiliser and potentially, the previous use of an unsealed lead-acid battery,[7] all contributed to a corrosive environment within the centre section of the aircraft, and corrosion of the flap cable.

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.

Maintenance organisation

As a result of this occurrence, the maintenance organisation has advised the ATSB that they are taking the following safety actions:

Maintenance practices

The FU-24 rear flap control system pulley will be removed during CASA Schedule 5 periodic inspections to facilitate inspection of the flap control cable.

Safety message

This incident highlights the need for maintenance organisations to periodically review the recommended practices published by both the manufacturer and the regulatory authorities. The Schedule 5 system of maintenance details what inspections are required, but does not prescribe how they should be performed. Reference to the relevant industry standard practices can improve the quality of maintenance conducted and ensure an organisation's practices remain up-to-date with the respective standards, which are periodically updated to incorporate new knowledge.

For further background information on flight control cables and terminals and their failure modes, refer to CASA Airworthiness Directive *Primary flight control cable assembly retirement* (AD/General/87).

[7] VH-TTD was previously fitted with an unsealed battery, which can vent corrosive fumes. A sealed battery was installed at the last periodic inspection.

General details

Occurrence details

Date and time:	26 June 2016 – 1130 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Flight controls	
Location:	50 km ESE of Tamworth, New South Wales	
	Latitude: 31° 14.23’ S	Longitude: 151° 20.38’ E

Aircraft details

Manufacturer and model:	Airparts (NZ) FU-24	
Registration:	VH-TTD	
Serial number:	186	
Type of operation:	Aerial Work – Aerial Agriculture	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Minor	

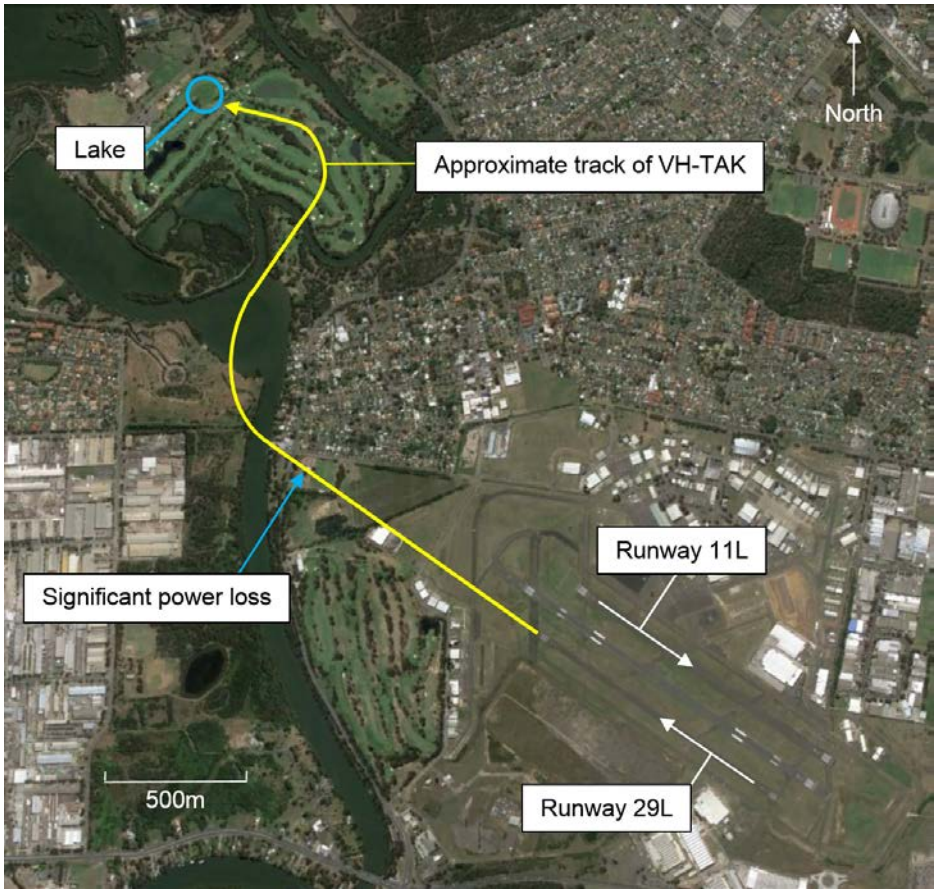
Engine power loss and forced landing involving Piper PA-28, VH-TAK

What happened

At about 1344 Eastern Standard Time (EST), on 21 July 2016, a Piper PA-28-161 aircraft, registered VH-TAK (TAK), departed from runway 29 Left (29L) at Bankstown Airport, New South Wales, for a post-maintenance test flight. On board the aircraft were a pilot, an engineer from the maintenance provider and a passenger.

As the aircraft climbed through about 300 ft above ground level (AGL), the pilot observed a slight loss of power produced by the engine. The pilot reported that at that time, the engine continued to run smoothly and TAK continued to climb. At a height of about 400 ft, the power loss increased (Figure 1), the engine was then producing about 1600 RPM[1] and the pilot reported that the engine was 'chugging'. The pilot made a right turn to attempt to return to Bankstown Airport to land on runway 11 Left (11L). The pilot broadcast a PAN[2] call and established TAK on a base leg for runway 11L.

Figure 1: Overview of accident flight



Source: Google earth, modified by ATSB

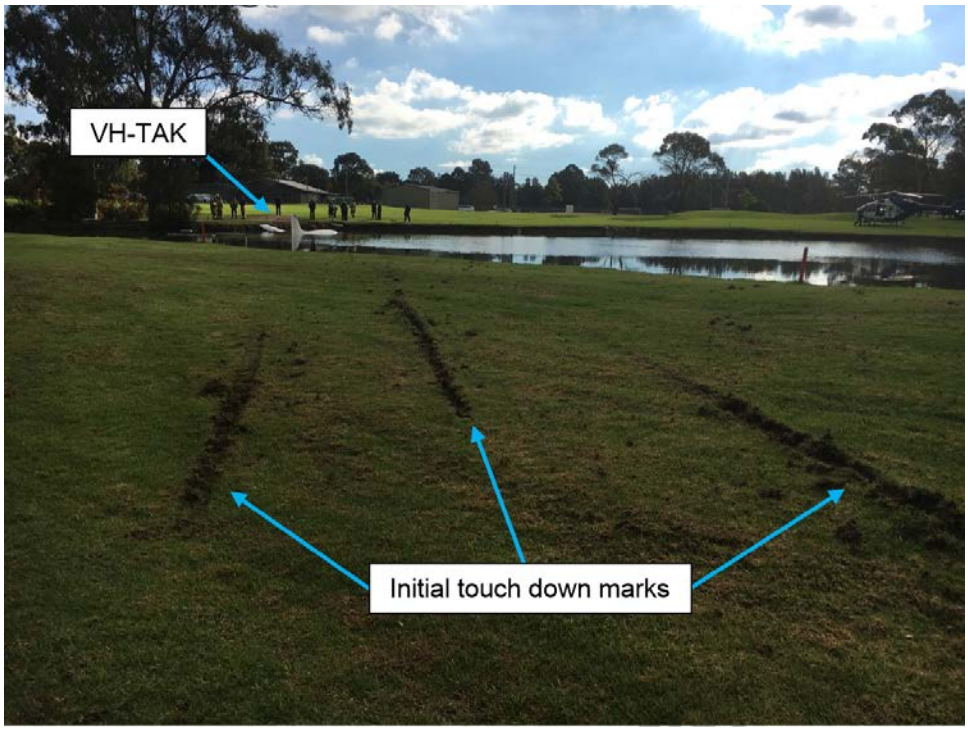
1 Normal RPM during the initial climb is about 2500.

2 PAN PAN is an internationally recognised radio broadcast announcing an urgency condition which concerns the safety of an aircraft or its occupants but where the flight crew does not require immediate assistance.

Once established on the base leg for runway 11L at an altitude of about 200 ft, the pilot assessed that the engine was not producing sufficient power to fly to runway 11L. At that time, the engine was vibrating considerably. The carburettor heat was then selected on, without effect. The pilot commented that they did not have sufficient time to change fuel tanks. The pilot observed a clear area within a golf course to the left of the aircraft and manoeuvred to land in that area. Due to the close proximity of the clear area, the pilot immediately reduced the power to idle and selected full flap.

TAK landed on the up slope of a mound at the edge of a small lake and bounced back into the air (Figure 2). The pilot then attempted to fly the aircraft over the lake, but soon assessed that it did not have sufficient speed or height to clear the lake, and directed the occupants to brace for impact. TAK landed in the lake on the main wheels. The nose of the aircraft struck the water and submerged momentarily, before returning to the surface. After the aircraft stopped, the occupants immediately exited the aircraft through the door on the right side. They climbed over the fuselage and along the left wing to the edge of the lake (Figure 3). The pilot and occupants were uninjured and the aircraft was substantially damaged.

Figure 2: Touch down point



Source: Pilot of VH-TAK

Engine and fuel system inspection

The ATSB did not conduct an inspection of the engine and fuel system as part of this investigation.

The aircraft insurer elected to write the aircraft off without conducting an investigation to determine the cause of the power loss.

Previous similar incidents involving VH-TAK

The ATSB received notifications of three recent similar incidents involving TAK prior to the accident.

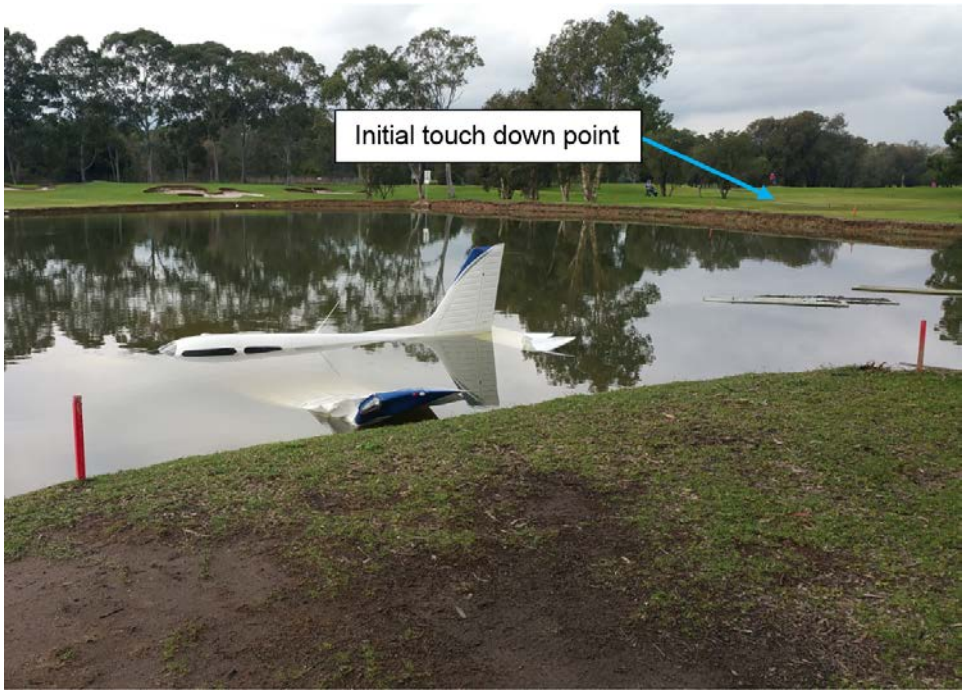
- 11 May 2016 – During the initial climb, the engine ran roughly and lost power. The pilot conducted a forced landing onto the reciprocal runway. An engineering inspection found a cracked engine cylinder.

- 28 May 2016 – During the initial climb, the engine partially failed. The aircraft returned to the airport. An engineering inspection found no fault with the engine. The engineer and pilot observed that conditions on that day were conducive to carburettor icing[3] and considered this the likely cause.
- 13 July 2016 – During the initial climb, the pilot reported the engine running slightly roughly for a short period before returning to normal.

As a result of the recurring issues, the maintenance provider undertook extensive troubleshooting and many engine components were removed for inspection and repair. After completion of the troubleshooting and repair, multiple test runs were conducted. The maintenance provider reported that they did not find any faults.

Prior to the accident flight, the pilot conducted a thorough pre-flight inspection of the aircraft and fuel system. Before take-off, the pilot also conducted an extensive test run of the engine and associated systems. The pilot reported that they did not find any faults. The pilot also reported that they had selected the left fuel tank before starting the engine. They then switched tanks before conducting the engine checks and departing using the right tank, as is required in their company procedures.

Figure 3: Final position of VH-TAK



Source: Pilot of VH-TAK

Chief engineer comment

The chief engineer of the maintenance organisation provided the following comments:

- Discussions after the accident with the operator identified that this power loss, and the three previous power loss incidents, occurred with the right fuel tank selected.
- The fuel system, including the fuel tank vents was not examined during troubleshooting inspection undertaken after the power loss incidents.

[3] Carburettor icing is the accumulation of ice within the induction system of an engine fitted with a carburettor. This ice forms as the decreasing air pressure and introduction of fuel reduces the temperature within the induction system. The temperature may reduce sufficiently for moisture within the air to freeze and accumulate. This build-up of ice restricts airflow to the engine, leading to a reduction in engine performance.

- The power loss may have occurred as a result of fuel starvation due to a blocked fuel tank vent.

Safety message

Partial engine power loss is more frequent and more complex than complete engine power loss. A partial engine power loss presents the pilot with more options than a complete power loss. The remaining power may also be inconsistent and unreliable.

The ATSB publication *Avoidable Accidents No. 3 – Managing partial power loss after take-off in single-engine aircraft*, provides information to assist pilots to prepare for a partial or complete engine power loss after take-off.

Pilots can significantly reduce risk following a partial or complete engine power loss using the following strategies:

- pre-flight decision making and planning for emergencies and abnormal situations for the particular aerodrome
- conducting a thorough pre-flight inspection and engine ground run to reduce the risk of a partial power loss occurring
- taking positive action and maintaining aircraft control either when turning back to the aerodrome or conducting a forced landing.

General details

Occurrence details

Date and time:	21 July 2016 – 1344 EST	
Occurrence category:	Accident	
Primary occurrence type:	Engine failure or malfunction	
Location:	3 km NW of Bankstown Airport, New South Wales	
	Latitude: 33° 53.970’ S	Longitude: 150° 59.300’ E

Aircraft details

Manufacturer and model:	Piper Aircraft Corporation PA-28	
Registration:	VH-TAK	
Serial number:	2842276	
Type of operation:	Private – Test & Ferry	
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

Low fuel and precautionary landing involving Cessna 172, VH-WKB

What happened

On 1 August 2016, at about 0830 Western Standard Time (WST), a Cessna 172 aircraft, registered VH-WKB (WKB), departed from Cape Leveque Aircraft Landing Area (ALA), Western Australia (WA). The pilot (owner) and one passenger were on board the private flight.

Prior to departure, the pilot had checked the amount of fuel in the aircraft's fuel tanks with a dipstick and estimated there was about 50 litres of fuel remaining. The pilot planned a one hour coastal sightseeing flight to Broome, using a five knot headwind component, at a fuel flow of 35 litres per hour.

Shortly after departure, the pilot noted the headwind component had increased from five knots to about 25 knots. About 45 minutes into the flight, the fuel gauges were indicating lower than the pilot had anticipated, so they initiated a climb to a higher altitude in an attempt to improve their flight range. About one hour and five minutes into the flight, the pilot heard the engine make a 'bit of a cough' and noticed the fuel gauges were indicating empty. Considering that their direct track to Broome Airport would require them to fly over water and a residential area, the pilot elected to conduct a precautionary landing.

The pilot identified a clear section of straight road ahead, broadcast a MAYDAY[1] call and landed the aircraft on the Manari road, about 30 kilometres north of Broome airport (Figure 1). The aircraft had been flying for about one hour and 10 minutes. There were no injuries and the aircraft was not damaged.

Following the landing, the pilot confirmed with Broome Air Traffic Control that they landed safely and cancelled their MAYDAY. Aviation fuel was transported by road, to where WKB had landed and it was refuelled. Two vehicles blocked a section of the road to allow WKB to depart for Broome and the aircraft landed at Broome without further incident.

Weather planning

The pilot checked the area forecast and the Broome airport aerodrome forecast (TAF)[2] before departure and elected to use the TAF wind of five knots because they planned to fly at about 500 feet. On arrival at Broome Airport, the pilot noted the wind speed on the Broome TAF had increased to 24 knots with gusts to 38 knots.

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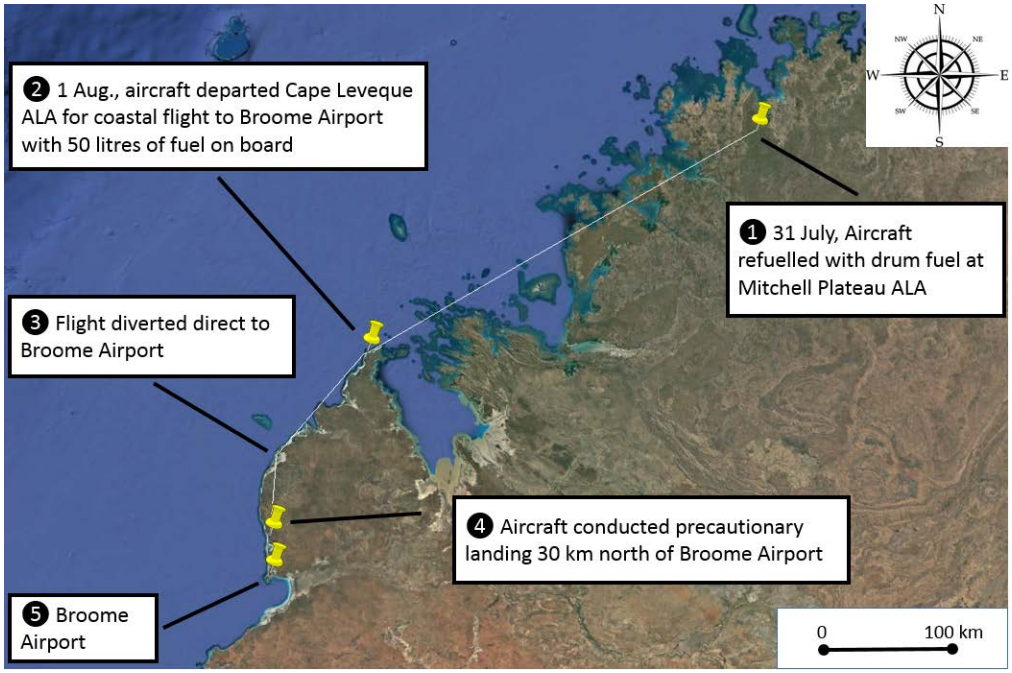
1 Mayday is an internationally recognised radio call for urgent assistance.

2 Aerodrome Forecasts are a statement of meteorological conditions expected for a specific period of time, in the airspace within a radius of 5 NM (9 km) of the aerodrome.

Figure 1: VH-WBK flight with key events



Source: Google earth, annotated by ATSB

Fuel consumption

In March 2015, the pilot flew the aircraft from Moorabbin Airport, Victoria, to Kununurra Airport, WA, and calculated the average fuel flow was 32 litres per hour. In June 2016, a periodic inspection was conducted, which included a calibration check of the fuel gauges and dipstick.

The day prior to the incident flight, the pilot flew the aircraft to Mitchell Plateau ALA, where it was refuelled with aviation fuel from a drum, and then onward to Cape Leveque (Figure 1). The use of fuel from a drum at Mitchell Plateau precluded an accurate fuel flow check by the pilot and there was no fuel stock available at Cape Leveque during their overnight stay.

Subsequent to the incident flight the pilot calculated the fuel flow had increased from 32 litres per hour to 37 litres per hour.

Safety message

This serious incident highlights how several factors, which on their own were not critical, combined on the day to result in a critical situation for the pilot. The fixed fuel reserve on board at the time of departure was less than the recommended 45 minutes for piston engine aircraft flights, as published in Civil Aviation Advisory Publication 234-1(1) – *Guidelines for aircraft fuel requirements*. Shortly after departure the headwind component increased and unknown to the pilot, the fuel consumption was greater than planned.

The pilot commented that they were not in a rush and probably too relaxed in their approach to the flight. Consequently, the effect of the change in wind speed on fuel reserves was not given the priority that it required. They also highlighted the importance of aircraft owners confirming fuel consumption after a periodic inspection is conducted.

General details

Occurrence details

Date and time:	1 August 2016 – 0950 WST	
Occurrence category:	Serious Incident	
Primary occurrence type:	Low fuel	
Location:	30 km north of Broome Airport, Western Australia	
	Latitude: 17° 40.92’ S	Longitude: 122° 13.67’ E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 172H	
Registration:	VH-WBK	
Serial number:	17256002	
Type of operation:	Private – pleasure / travel	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Wheels up landing involving Beech 58, VH-UZO

What happened

On 8 August 2016, at about 0700 Central Standard Time (CST), a Beech 58 aircraft, registered VH-UZO (UZO), departed Gove Airport, Northern Territory, for a flight to Elcho Island Airport, Northern Territory. On board were a pilot and four passengers.

During the initial climb, the pilot selected the landing gear up and noted the landing gear motor stopped after a shorter time interval than expected. At this time, the passengers reported hearing a crunching sound. The pilot observed that the landing gear unsafe light remained illuminated after the landing gear motor stopped.

Rather than continue the flight to Elcho Island, the pilot returned the aircraft to hold overhead Gove Airport while they attempted to ascertain the reason for the landing gear malfunction. The pilot noted that the circuit breaker for the landing gear had tripped, so reset the circuit breaker and selected the landing gear down. The landing gear unsafe light remained illuminated and the circuit breaker tripped again. The pilot then contacted the aerodrome reporting officer (ARO) and requested a visual confirmation of the position of the landing gear. The ARO reported that all landing gear appeared to be fully retracted.

Given that normal landing gear extension had been unsuccessful, the pilot elected to conduct an emergency landing gear extension. The Beech 58 emergency landing gear extension requires the pilot to engage a handle into the landing gear gearbox positioned behind the front seats. The handle is then turned counter clockwise to manually lower the landing gear. Fully extending the landing gear takes about 50 turns of the handle.

The pilot held the aircraft to the north of Gove Airport and engaged the autopilot while they conducted the emergency landing gear extension procedure. The pilot reported that no resistance was felt through the extension handle when attempting the landing gear extension, the handle felt like it was not connected. The pilot then flew back overhead Gove Airport for the ARO to again report on the position of the landing gear. The ARO reported that the landing gear remained retracted. The pilot then resumed holding, and calculated that they had sufficient fuel to continue to hold for a further two hours and 15 minutes. While holding, the pilot contacted the company chief pilot and engineer to assist with further troubleshooting the malfunction. The engineer examined the aircraft wiring diagram and another Beech 58 parked at the airport. The engineer then described several methods to isolate various parts of the electrical system to identify any problem which prevented the landing gear from extending. Over the next two hours, the pilot tried these methods along with multiple attempts of the emergency landing gear extension procedure. Despite the pilot's attempts, the landing gear remained retracted.

At about 0930, the pilot prepared for a wheels up landing. They briefed the passengers on the use of seatbelts, bracing position, emergency exit locations and actions to be taken after the landing. The ARO arranged for the emergency services to be in attendance. The pilot discussed with the chief pilot whether to land on the runway or adjacent dirt. As the runway provided a hard, smooth surface of known condition, the pilot elected to land on the runway. The chief pilot then briefed the emergency services on the intended actions of the pilot. The pilot reviewed the wheels up landing procedure in the pilot operating handbook (POH), and elected to conduct a flaps up landing to minimise damage.

At about 0945, the aircraft approached the runway. Just before the aircraft touched down, the pilot shut the engines down in accordance with the POH wheels up landing procedure. As the aircraft slid along the runway, smoke filled the cabin and the pilot selected the fuel off. Once the aircraft

came to a stop (Figure 1), the occupants immediately exited the aircraft. The pilot directed the passengers to a safe location behind the aircraft.

No persons were injured and the aircraft was substantially damaged in the accident.

Figure 1: VH-UZO after the wheels up landing

Source: Pilot

Pilot comments

The pilot of VH-UZO provided the following comments:

- To assist in troubleshooting the malfunction, multiple videos of the actions taken by the pilot and indications presented by the aircraft systems were sent to the engineer.
- The passengers were engaged to assist in the attempts to lower the landing gear. The passenger in the seat next to the pilot held the POH. Other passengers also attempted to wind the emergency landing gear handle.
- The passengers were directed to evacuate to the rear of the aircraft. The pilot has subsequently learned that the safer option is to direct passengers to the side of the aircraft and upwind, away from fuel vapours.

Engineering report

A post-accident examination of the landing gear system found that the gear box shaft bearing had fractured. This bearing secures and aligns the shaft worm drive, which attaches both the emergency handle mechanism and the electric motor to the gear box. Failure of the bearing allowed the shaft worm drive to disconnect from the gearing. The drive became jammed, causing further damage to the gear box. Damage to the gear box prevented normal operation and caused the electric motor to overload and trip the circuit breaker. The bearing failure also prevented the emergency handle from connecting to the gear box.

Safety message

Even though the operation was conducted single-pilot, this accident provides a good example of effective crew resource management techniques. The pilot quickly established that the available fuel endurance allowed ample time to carefully consider the circumstances and attempt to resolve the issue. They engaged company personnel, using multiple means, to provide as much information as possible and attempt to identify a solution to the malfunction and sought the assistance of the ARO to inspect the aircraft and to alert emergency services. Holding over an easily identifiable position, and using the passengers where appropriate to assist with

management of the emergency, also reduced pilot workload. The pilot also prepared the passengers for the wheels up landing, this minimised the risk of injury and ensured the evacuation was controlled and orderly.

General details

Occurrence details

Date and time:	8 August 2016 – 0945 CST	
Occurrence category:	Accident	
Primary occurrence type:	Landing gear / Indication	
Location:	Gove Airport, Northern Territory	
	Latitude: 12° 16.170’ S	Longitude: 136° 49.100’ E

Aircraft details

Manufacturer and model:	Beech Aircraft Corporation 58	
Registration:	VH-UZO	
Serial number:	TH-586	
Type of operation:	Charter - Passenger	
Persons on board:	Crew – 1	Passengers – 4
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Substantial	

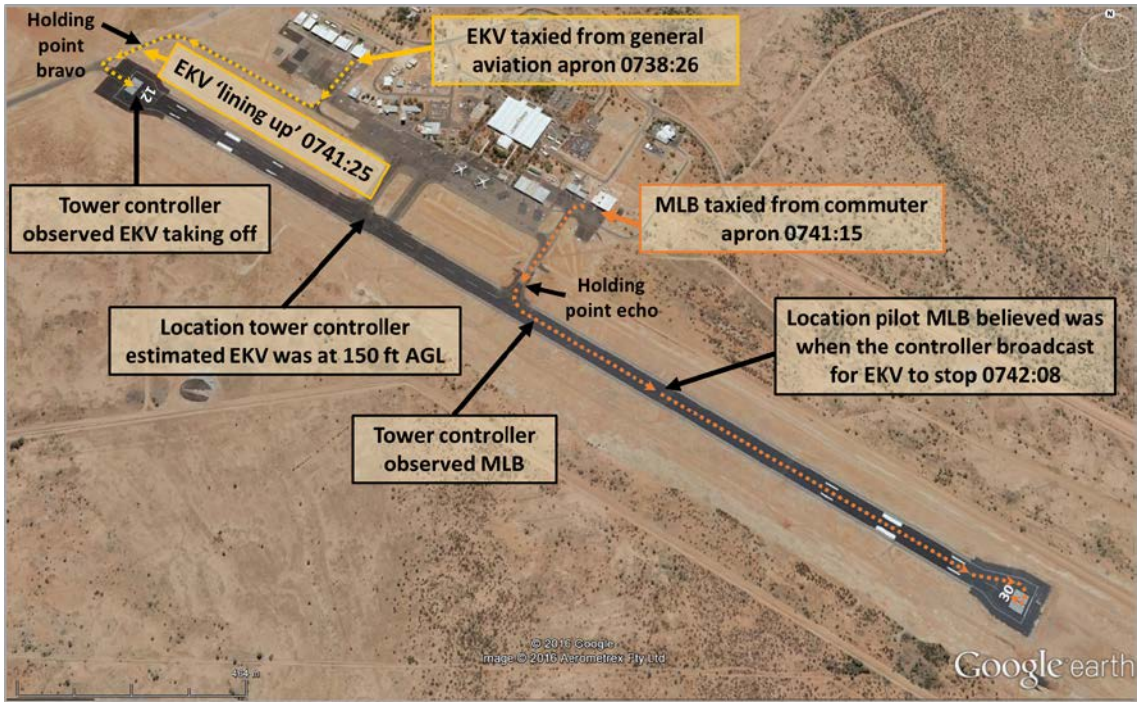
Separation issue due to runway incursion involving Cessna 172, VH-EKV, and Beech 58, VH-MLB

What happened

At about 0738 Central Standard Time (CST), a Cessna 172 aircraft, registered VH-EKV (EKV), taxied to depart from runway 12 at Alice Springs Airport, Northern Territory for Ayers Rock. The pilot and two passengers were on board the private flight. The air traffic control Tower was scheduled to open at 0800. At the time of departure, procedures for operating in the vicinity of non-controlled aerodromes applied at Alice Springs Airport. The airport has a common traffic advisory frequency (CTAF) when the Tower is closed.

The aircraft was located on the general aviation apron and taxied for holding point bravo for runway 12 (yellow line in Figure 1). The pilot of EKV broadcast a taxi call on the CTAF.

Figure 1: Alice Springs Airport showing the taxi routes and relevant locations of EKV (yellow line) and MLB (orange line)



Source: Google earth, modified by the ATSB

The transcripts of the relevant CTAF recordings are shown below, with the time, who made the broadcast, the transmission, and readability.[1]

Time	Source	Broadcast	Readability
0738:26	EKV	All stations EKV Cessna 172 taxiing for the runway 12 [AFRU[2] 'Alice Spring CTAF']	5. Perfectly readable

[1] As outlined in the Airservices aeronautical information publication (AIP), the readability scale is as follows: 1. Unreadable, 2. Readable now and then, 3. Readable but with difficulty, 4. Readable, 5. Perfectly readable.

[2] Alice Springs Airport has an aerodrome frequency response unit (AFRU) installed. The AFRU is to provide an automatic response to CTAF broadcasts to indicate to an operator that the correct radio frequency was selected and to

Following the broadcast by the pilot of EKV, several broadcasts were made on the CTAF where the airport rescue and firefighting service were conducting routine radio checks.

At 0741:15, the pilot of a Beech 58 aircraft, registered VH-MLB (MLB), broadcast a taxi call on the CTAF (the readability was 2, as the call was badly broken and very hard to understand). The aircraft was located on the commuter apron and taxied for holding point echo with the intention of then backtracking on the runway in preparation for a runway 30 departure (for a flight to Nyirripi) (orange line in Figure 1). The pilot and two passengers were on board the charter flight.

0741:15	MLB	Alice springs traffic MLB taxiing and backtracking runway 30 for Nirripi Alice Springs [AFRU tone]	2. Readable now and then

At 0741:25, the pilot of EKV broadcast that they were lining up on runway 12 (Figure 1).

0741:25	EKV	EKV lining up on 12 [No AFRU tone]	5. Perfectly readable

The pilot of MLB reported that they did not hear this broadcast from EKV, nor the earlier broadcast that they were taxiing for runway 12.

At 0741:30, the pilot of a Piper PA32 broadcast a taxi call (the readability was 3, with a loud squeal). The PA32 was located at the general aviation apron, close to where EKV had taxied earlier, and was taxiing for runway 12.

0741:30	PA32	Alice springs traffic [registration] taxiing runway 12 Alice Spring [AFRU tone]	3. Readable but with difficulty

The pilot of MLB responded to the broadcast by the pilot of the PA32, asking if they were happy for MLB to taxi (which included entering and backtracking the runway) for runway 30, and advised that they were ‘shortly to depart’.

0741:38	MLB	Aircraft taxiing runway 12 you happy for me to taxi runway 30 shortly to depart [No AFRU tone]	5. Perfectly readable

The pilot of the PA32 responded to that broadcast by indicating that they would hold short of runway 12.

0741:43	PA32R	Affirm [registration] will hold short [No AFRU tone]	4. Readable

The pilot of MLB responded, thanking the pilot of the PA32.

0741:47	MLB	MLB thank you [No AFRU tone]	5. Perfectly readable

Following this exchange between the pilot of the PA32 and the pilot of MLB, several broadcasts were made on the CTAF, where the airport fire and rescue service were conducting radio checks (at 0741:53, 0741:59, and 0742:02).

The pilot of MLB approached holding point echo and reported looking for other aircraft on approach or lined up on either runway (12 or 30). The pilot of MLB did not see any other aircraft and had not heard any other aircraft on the CTAF except for the PA32, so entered the runway and commenced backtracking runway 30 (orange line in Figure 1).

At about the same time, the pilot of EKV commenced take-off on runway 12. At about take-off speed, the pilot reported observing another aircraft enter the runway and start taxiing on runway

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confirm the operation of the radio’s transmitter and receiver, and the volume setting. If a broadcast has not been made on the CTAF in the preceding five minutes, and this transmission is over 2 seconds in length, a voice identification from the ARFU ‘Alice Springs CTAF’ is generated. If a broadcast has been made on the CTAF in the preceding five minutes, a 300-millisecond tone will be generated after each transmission over two seconds long.

12 (away from them). The pilot assessed that it would be more dangerous to stop, so continued with the take-off.

An air traffic controller arrived in the control tower (which was due to open at 0800) and observed a Cessna 172 aircraft (EKV) taking off on runway 12 and a Beech 58 aircraft (MLB) taxiing on the same runway, about half way down the runway (Figure 1). The controller advised the pilot of EKV to stop immediately.

0742:08	ATC	EKV stop immediately stop immediately [No AFRU tone]	5. Perfectly readable

The pilot of EKV reported not hearing the advice to stop immediately, but was busy with the take-off. The controller reported that EKV was airborne approximately 500 m before the position of MLB and passed overhead MLB at about 150 feet above ground level. The pilot reported banking the aircraft to the north at about 500 feet and two-thirds of the way down the length of the runway to avoid any possible conflict with the aircraft (MLB) on the runway.

The pilot of MLB heard the controller's advice to another aircraft to stop, but was not aware of the reason. During the turn at the end of the runway to line up on runway 30, the pilot noticed a Cessna 172 (EKV) in a left turn toward the north. The pilot broadcast on the CTAF for the aircraft in the Alice Springs circuit area to notify their intentions.

0743:57	MLB	Aircraft in circuit area at Alice Springs MLB just request your intentions [AFRU tone]	5. Perfectly readable

The pilot of EKV then gave a departure call at 0744:14 (readability was 4).

0744:14	EKV	EKV on climb to 3,000 departed time 14 [AFRU tone]	4. Readable

The pilot of MLB believed that the pilot of the Cessna 172 (EKV) had responded to their broadcast, and reported that the readability from the Cessna 172 was very poor. The pilot of MLB responded to the Cessna 172 at 0744:27, but that broadcast was over-transmitted by another aircraft making a taxi broadcast.

The next broadcast recorded from MLB was at 0747:19, where the pilot broadcast a departure call. The pilot reported having made lining-up and holding broadcasts, which may have been over-transmitted, and also making a rolling broadcast that was not recorded on the CTAF.

Both aircraft departed without further incident.

Pilot comment VH-EKV

The pilot reported generally operating at Alice Springs Airport when the tower was open, so would normally communicate with the tower controller. At the time of the occurrence, the Tower had not opened and the pilot reported hearing radio calls, but commented that radio calls from aircraft were not as clear as those made from the tower controllers. The pilot was aware that there was another aircraft departing to Nyirripi (destination of MLB).

Pilot comment VH-MLB

The pilot reported identifying the location of the PA32 as they approached holding point echo. The pilot commented that there were some white buildings in the distance behind the threshold of runway 12 that may have made it difficult to see EKV. The pilot indicated that the runway, although long, it is quite flat, and the whole runway was visible. The pilot also indicated that they were focused on known traffic. The pilot recognised the aircraft registration of the PA32 and the voice of the pilot, and confirmed the location of that aircraft before entering the runway.

The pilot reported that the winds were calm. They elected to use runway 30 as it was the most convenient runway for their departure.

Radio communication - Alice Springs airport

A study was conducted in 2010 by the Civil Aviation Safety Authority (CASA) to review the airspace classification above Alice Springs, *Aeronautical Study of Alice Springs (YBAS) January 2010, and is* available from the CASA website. The study consulted with stakeholders and did not identify any radio transmission 'black spots'.

ATSB comment

The relevant communication recordings for the Alice Springs CTAF were obtained by the ATSB from Airservices Australia and the relevant broadcasts were given a readability level by the ATSB using the standard in radiotelephony communications as published in the AIP. The communications recorded are not necessarily what a pilot hears in their respective aircraft.

The ATSB could not establish why the pilots of both aircraft did not hear the broadcasts from the other aircraft.

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 such concern is *Safety around non-controlled aerodromes*, which highlights that it is difficult for pilots to detect another aircraft through visual observation alone. The ATSB has identified that insufficient communication between pilots operating in the same area is the most common cause of safety incidents near non-controlled aerodromes.

This incident highlights the fundamental importance of effective communication, particularly during operations at a non-controlled aerodrome. The Civil Aviation Safety Authority (CASA) has produced several publications and resources that provide important safety advice related to operations in the vicinity of non-controlled aerodromes. Relevant guidance and explanatory material provided by CASA includes the following:

- CASA Civil Aviation Advisory Publication (CAAP) *CAAP 166-1(3) Operations in the vicinity of non-controlled aerodromes*,
- *CAAP 166-2(1) Pilots' responsibility for collision avoidance in the vicinity of non-controlled aerodromes using 'see-and-avoid'*,
- *Operations at non-towered aerodromes booklet*.

General details

Occurrence details

Date and time:	16 June 2016 – 0743 CST	
Occurrence category:	Incident	
Primary occurrence type:	Separation issue	
Location:	Alice Springs Airport, Northern Territory	
	Latitude: 23° 48.50' S	Longitude: 133° 54.05' E

Aircraft details – VH-EKV

Manufacturer and model:	Cessna Aircraft Company 172L	
Registration:	VH-EKV	
Serial number:	17260094	
Type of operation:	Private – Pleasure / Travel	
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details – VH-MLB

Manufacturer and model:	Beech Aircraft Corp 58	
Registration:	VH-MLB	
Serial number:	TH-1675	
Type of operation:	Charter - Passenger	
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

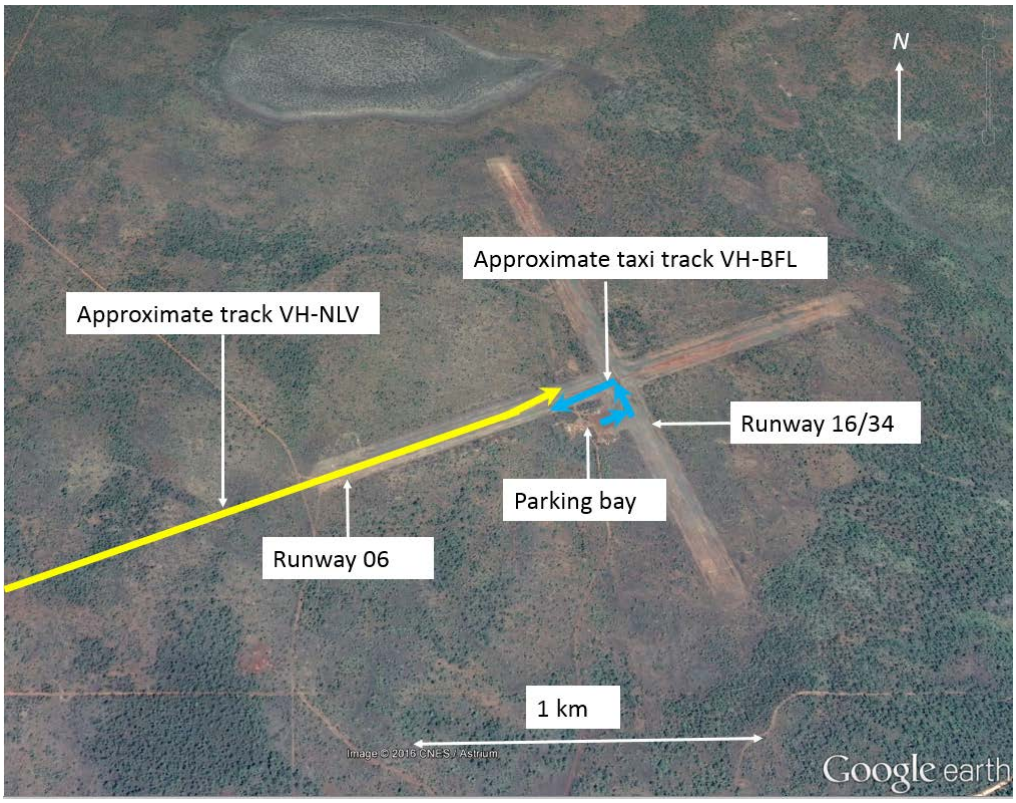
Separation issue due to runway incursion involving Gippsland Aeronautics GA-8, VH-BFL, and Cessna 210, VH-NLV

What happened

On 9 August 2016, at about 0930 Western Standard Time (WST), a Cessna 210N aircraft, registered VH-NLV (NLV), departed Kununurra Airport for a scenic charter flight to Mitchell Plateau aircraft landing area (ALA), Western Australia (WA), with a pilot and five passengers on board.

Shortly before 1100, after completing orbits overhead Mitchell Falls, about 9 NM south-west of Mitchell Plateau ALA, the pilot of NLV positioned the aircraft to track for a straight-in approach to runway 06 at Mitchell Plateau ALA (Figure 1).

Figure 1: Mitchell Plateau ALA showing approximate aircraft tracks



Source: Google earth – annotated by ATSB

At that time, the pilot of a Gippsland Aeronautics GA-8 aircraft, registered VH-BFL (BFL), prepared to taxi at Mitchell Plateau ALA, for a scenic charter flight to Kalumburu, WA, with four passengers on board. Prior to taxiing, the pilot of BFL selected a company frequency on the aircraft's radio and communicated with the pilot of another aircraft. After that communication, the pilot pressed the radio's frequency select button in an attempt to switch to the North Kimberley common traffic advisory frequency (CTAF). However, the pilot did not detect at that time that the CTAF had not been selected and the radio remained tuned to the company frequency.

When about 5 NM from the ALA, the pilot of NLV broadcast on the CTAF, advising they were on a 5-mile final for runway 06 at Mitchell Plateau, and did not receive a response. When about 3 NM from the runway, the pilot of NLV sighted an aircraft (BFL) on the parking bay at the ALA, with the beacon on, indicating that the aircraft's engine was running.

The pilot of BFL reported that they broadcast a taxi call and a call advising that BFL was entering runway 16/34 to taxi to runway 06, and subsequently broadcast prior to entering runway 06 to backtrack to the runway threshold. The pilot inadvertently made those broadcasts company frequency instead of CTAF and did not receive any response.

When at about 1 NM on final approach to runway 06, the pilot of NLV broadcast again on the CTAF and did not receive a response. From the aircraft's position, the parking bay and adjacent taxiway were obscured by a line of trees, and the pilot was unable to see BFL.

As the pilot of NLV flared the aircraft for landing, they sighted BFL turn left and taxi onto runway 06. The pilot of NLV assessed that if they conducted a go-around the aircraft may be unable to climb fast enough to avoid the aircraft on the runway and could not diverge from the runway direction due to the trees beside the runway, therefore the pilot elected to land. After landing, the pilot of NLV braked more heavily than normal and moved to the left of the runway to increase the separation between the two aircraft.

As BFL entered runway 06 to backtrack, the pilot sighted NLV in the landing roll and also moved to their left. The pilots assessed that the aircraft passed within 2 m of each other at taxi speed and neither aircraft moved outside the runway strip. The aircraft were not damaged and no injuries were sustained.

Pilot comments

Pilot of VH-NLV

The pilot of NLV commented that during the flare, they considered conducting a go-around, but assessed that due to the high outside temperature, the aircraft may not have adequate climb performance to pass at a safe height above BFL.

Pilot of VH-BFL

The pilot of BFL had been in the airport terminal for about 2 hours before the incident. They commented that as the CTAF covered a large area, normally they would have very good awareness of other aircraft operating there. As they had not been listening to the radio during the time in the terminal, they were not aware of NLV. The pilot recalled looking for aircraft as they taxied onto runway 06, but did not see NLV.

The pilot also commented that due to a delay on the ground, they were keen to get away, and that may have contributed to not noticing that the radio was still on the company frequency.

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.

Operator of VH-BFL

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

Flight crew briefing

The operator is proposing the following briefing for new flight crew regarding radio procedures:

- mentally confirm the required frequency

- visually confirm the required frequency is set as active, and the correct COM is selected on the audio panel
- aurally check by activating the squelch.

In addition, company pilots will be reminded to be mindful of the impact that stress (such as that due to delays) can have on their performance, to recognise the signs and symptoms of stress, and to return to the basics of good airmanship if/when they find themselves under stress and pressure.

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.

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:	9 August 2016 – 1100 WST	
Occurrence category:	Incident	
Primary occurrence type:	Airspace – Aircraft separation – Issues	
Location:	Mitchell Plateau (ALA), Western Australia	
	Latitude: 14° 47.42' S	Longitude: 125° 49.55' E

Aircraft details: VH-BFL

Manufacturer and model:	Gippsland Aeronautics GA-8	
Registration:	VH-BFL	
Serial number:	GA8-06-107	
Type of operation:	Charter – Passenger	
Persons on board:	Crew – 1	Passengers – 5
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-NLV

Manufacturer and model:	Cessna Aircraft Company 210	
Registration:	VH-NLV	
Serial number:	21063093	
Type of operation:	Charter – Passenger	
Persons on board:	Crew – 1	Passengers – 4
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Helicopters

Wirestrike involving Robinson R22, VH-HRL

What happened

On 27 July 2016, at about 0930 Eastern Standard Time (EST), the pilot of a Robinson R22 Beta helicopter, registered VH-HRL (HRL), completed mustering operations at a property about 33 km south of Blackall, Queensland. The helicopter then departed from the property on a ferry flight and tracked towards the pilot's home about 110 km to the west-northwest. The pilot was the sole occupant of the helicopter.

At about 1002, the pilot's GPS tracker indicated that the helicopter had stopped moving, about 41 km from its destination and on the helicopter's direct track. The helicopter had struck a powerline and subsequently collided with terrain. At about 1030, a local landowner notified the energy provider of a power outage. Two line workers from the energy provider later departed from Blackall to determine the source of the power outage.

At about 1500, while inspecting the powerlines in the area, the line workers located the wreckage of HRL. The windshield and right skid of the helicopter had struck the single wire, which was strung east-west across a cleared area, 4.8 m above the ground. The first point of impact of the helicopter was about 31 m beyond the powerline and it then collided with the ground inverted about 18 m further away. During that impact, it appeared that the pilot's seatbelt sheared through and the pilot was ejected from the helicopter sustaining serious injuries. The wire had been stretched about 30 m, two power poles broke off and another two were pulled out of the ground. The helicopter was destroyed (Figure 1).

The line workers called emergency services using a satellite phone, and remained with the pilot until police and paramedics arrived at about 1700.

Figure 1: Accident site showing damage to VH-HRL

Source: Queensland Police

Accident site

The helicopter struck the powerline in a clearing, mid-span between two power poles about 250 to 300 m apart. The helicopter was travelling across the direction of the powerline.

An aircraft warning marker may be installed on an overhead cable or its supporting structures to warn pilots of their presence. The powerline struck in this incident was not, and was not required to be, marked with aircraft warning markers according to the relevant Australian Standard (AS3891.1).

Based on the forward speed indicated by the distance of the wreckage from the wires, and the marks left in the ground by the helicopter main rotor blades, the helicopter engine was probably producing power at the time it struck the wire.

ATSB comment

Due to the injuries sustained in the accident, the pilot was unable to recall the event or provide any comments for the investigation.

Safety message

Low-level flight carries an increased risk of striking hazards, such as powerlines, many of which are difficult to see in flight. The ability of pilots to detect powerlines depends on many factors, including the physical characteristics of the powerline (such as the spacing of power poles and the orientation of the wire), prevailing weather and light conditions, and the nature of surrounding terrain and vegetation.

General details

Occurrence details

Date and time:	27 July 206 – 1002 EST	
Occurrence category:	Accident	
Primary occurrence type:	Operational – Terrain Collisions – Wirestrike	
Location:	63 km W of Blackall Airport, Queensland	
	Latitude: 24° 28.57' S	Longitude: 144° 48.57' E

Helicopter details

Manufacturer and model:	Robinson Helicopter Company R22	
Registration:	VH-HRL	
Serial number:	3490	
Type of operation:	Aerial Work – Test & Ferry	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1 (Serious)	Passengers – 0
Aircraft damage:	Destroyed	

Hot Air Balloons

Hard landing involving Kavanagh Balloons E-300, VH-LPG

What happened

On the morning of 16 July 2016, a Kavanagh Balloons E-300 hot-air balloon, registered VH-LPG, departed for a one-hour scenic flight from Irishtown, Western Australia (WA). On board were the pilot and 16 passengers.

The balloon departed at about 0700 Western Standard Time (WST), and reached a maximum altitude and speed of about 3,500 ft above mean sea level (AMSL) and 39 kt, respectively. The balloon tracked in a south-easterly direction. During the flight, the pilot instructed the ground crew to proceed to the racecourse at York, WA, to meet the balloon for the landing. After about 52 minutes of flight covering a distance of about 33 km, the pilot made an approach to a vacant paddock near York. The balloon made an initial ground contact with about 15 kt forward speed. When the balloon struck the ground, the pilot was ejected from the balloon basket. The basket was then dragged over the top of the pilot as the balloon envelope continued to deflate. The balloon envelope came to rest draped over trees and a fence with the basket lying on its side (Figure 1).

The pilot was seriously injured and air lifted to the Royal Perth Hospital. One passenger received a minor injury and the balloon sustained minor damage.

Figure 1: Final resting position of VH-LPG

Source: WAPOL

Weather

The weather forecast for the area (ARFOR)[1] predicted wind at 3,000 ft AMSL to be from the north-north-west at 40 kt. The closest recorded aerodrome forecast (TAF)[2] or regular report (METAR)[3] was Cunderdin, about 49 km to the north-east. The forecast wind at Cunderdin was from the

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1 An area forecast issues for the purposes of providing aviation weather forecasts to pilots. Australia is subdivided into a number of forecast areas.

2 Aerodrome forecasts are a statement of meteorological conditions expected for a specific period of time, in the airspace within a radius of 5 NM (9 km) of the aerodrome.

3 Routine aerodrome weather report issued at fixed times, hourly or half-hourly.

north-north-west at 10 knots. At 0630 the recorded wind was north-north-easterly at 12 kt and at 0700 from the same direction at 6 knots.

Kavanagh Balloons flight manual

The procedures for the security of the pilot and passengers for a Kavanagh Balloon are incorporated into the *Kavanagh Balloons flight manual*, Section 4 – *Normal Procedures*.

- Paragraph 4.11.10 Pilot restraint harness, states 'If a pilot restraint harness is fitted, it should be worn during take-off and for the duration of the flight including the landing... The restraining strap should be shortened to restrict the movement of the pilot within the compartment in preparation for the landing. This will maintain the correct pilot position during the landing.'
- Paragraph 4.12 Approach to landing, states 'When horizontal landing speed is expected, passengers should be made aware that the basket may tip forward and they should take a lower than normal landing position to avoid being thrown forwards out of the basket.'

Civil Aviation Regulation 251

Civil Aviation Regulation (CAR) 251 details the circumstances in which pilots and passengers must wear a seat belt or safety harness, which includes during take-off and landing.

Ballooning exemption

Civil Aviation Order 95.53 section 3 Exemption 3.1 (f) specifically exempts manned balloons engaged in charter operations from CAR 251. However, the Civil Aviation Safety Authority have indicated that the use of a pilot restraint in passenger transport balloons is a proposal under consideration, which is subject to consultation.

ATSB comment

The pilot of the balloon was seriously injured during this accident and therefore not able to participate in an interview. There was no pilot restraint harness fitted to the balloon on the incident flight.

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

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

Pilot safety harnesses

The operator has modified all their hot-air balloons and fitted them with pilot restraint harnesses.

Safety message

Landing with forward speed in a balloon poses the risk of personnel thrown forwards out of the balloon basket, which can then place them in the path of the basket. Passengers are briefed about this risk and are able to use both hands to secure themselves to a handhold for landing. However, the balloon pilot is required to continue using their hands to control the balloon throughout the landing sequence and is therefore exposed to a higher risk of being thrown out of the balloon basket.

Installation and use of a pilot restraint harness, in accordance with the balloon and harness manufacturers' recommendations, will reduce the risk of a pilot being thrown out of the balloon basket during landing.

General details

Occurrence details

Date and time:	16 July 2016 – 0752 WST	
Occurrence category:	Accident	
Primary occurrence type:	Hard landing	
Location:	Near York ALA, Western Australia	
	Latitude: 31° 52.42’ S	Longitude: 116° 47.42’ E

VH-LPG

Manufacturer and model:	Kavanagh Balloons E-300	
Registration:	VH-LPG	
Serial number:	E300-361	
Type of operation:	Charter - passenger	
Persons on board:	Crew – 1	Passengers – 16
Injuries:	Crew – 1 Serious	Passengers – 1 minor
Aircraft damage:	Minor	

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 53
AB-2016-121
Final – 14 October 2016