Australian Government

Australian Transport Safety Bureau

Wheels-up landing involving Beech Aircraft Corporation B200, VH-ODI

Mount Gambier Airport, South Australia, on 8 December 2018

ATSB Transport Safety Report
Aviation Occurrence Investigation
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Addendum

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Safety summary

What happened

On 8 December 2018, a Desert-Air Safaris Beech Aircraft Corporation B200, registered VH-ODI operated a charter flight from Adelaide Airport to Mount Gambier Airport, South Australia with a pilot and seven passengers on board. One of the passengers held a commercial pilot licence and acted in an observer role from the right flight deck seat, but was not a member of the flight crew.

During the landing at Mount Gambier, the aircraft touched down with the landing gear retracted, with the propellers contacting the runway twice before the pilot initiated a go-around. During the go-around, the left engine failed. The aircraft then landed without further incident.

What the ATSB found

The ATSB found that upon reaching the minimum descent altitude for an approach to Runway 18 at Mount Gambier, the pilot had not yet obtained visual reference with the runway. He therefore commenced a go-around and retracted the landing gear. After retracting the landing gear, the pilot sighted the runway and decided to continue the approach, but inadvertently did not re-extend the landing gear.

During the continued approach, the pilot likely did not detect the retracted landing gear due to an expectation that it was already extended. This was possibly also compounded by the now-increased workload.

Further, the ATSB found that the pilot's decision to conduct a go-around after the wheels-up landing stemmed from his misunderstanding of the situation, and an assessment that a runway overrun was imminent.

Safety message

This accident highlights the hazards of spontaneous decision-making, particularly during a high-workload phase of flight in a complex aircraft. The Civil Aviation Safety Authority Resource booklet and video *Decision Making* provides the following tips to improve the quality of decision making, mitigate the possibility of errors and ensure a considered approach in resolving issues or problems:

- You cannot improvise a good decision, you must prepare for it. You will make a better and timelier final decision if you have considered all options in advance. This is why good briefings are important.
- Use decision-making aids—operational checklists—to ensure you have not forgotten anything important.
- Always have reserve capacity for reacting to unexpected events.
- Delegate your load to other team members (if multi-crew) when time is critical.
- Keep the big picture in mind rather than focusing on one aspect of a problem.

The occurrence

On the morning of 8 December 2018, the pilot of a Desert-Air Safaris Beech Aircraft Corporation B200, registered VH-ODI (ODI), prepared to conduct a charter flight from Adelaide, South Australia to Mount Gambier, South Australia with seven passengers on board. One of the passengers occupied the right flight deck seat as an observer. This observer held a commercial pilot licence, but was not a member of the flight crew.

At about the scheduled departure time of 1000 Central Daylight-saving Time,[1] the pilot reviewed the weather forecast for Mount Gambier Airport which provided the following information:

- A southerly wind of 10-14 kt throughout the forecast period.
- Visibility greater than 10 km for the forecast period, with light rain showers until 1230.
- A broken[2] cloud base of 712 ft above mean sea level (AMSL) (500 ft above aerodrome level (AAL)) until 1130.
- From 1130, the broken cloud base would remain, but rise to 1,212 ft AMSL (1,000 ft AAL).
- From 1230, the cloud coverage was forecast to reduce to scattered and the cloud base rise further to 1,712 ft AMSL (1,500 ft AAL), with an overlying broken layer at 2,212 ft AMSL (2,000 ft AAL).

The pilot also contacted the Mount Gambier Airport aerodrome reporting officer. The aerodrome reporting officer advised that the observed cloud ceiling was about 300 feet above the aerodrome level and that a scheduled flight from Adelaide to Mount Gambier had delayed their departure due to the low cloud. The pilot of ODI noted that the forecast indicated conditions would improve, and he elected to delay the departure, until 1100.

At 1109, the flight departed Adelaide Airport. During the flight to Mount Gambier, the pilot prepared for the arrival. He anticipated conducting an area navigation (RNAV) instrument approach to Runway 18 (see the section titled *Operation*) (Figure 1). The pilot also determined an estimated time for the commencement of the approach of 1157. Air traffic control advised that another aircraft would be commencing an RNAV approach to Runway 18 at Mount Gambier at 1155. The pilot of ODI therefore elected to slow the aircraft to allow the preceding aircraft to conduct their approach.

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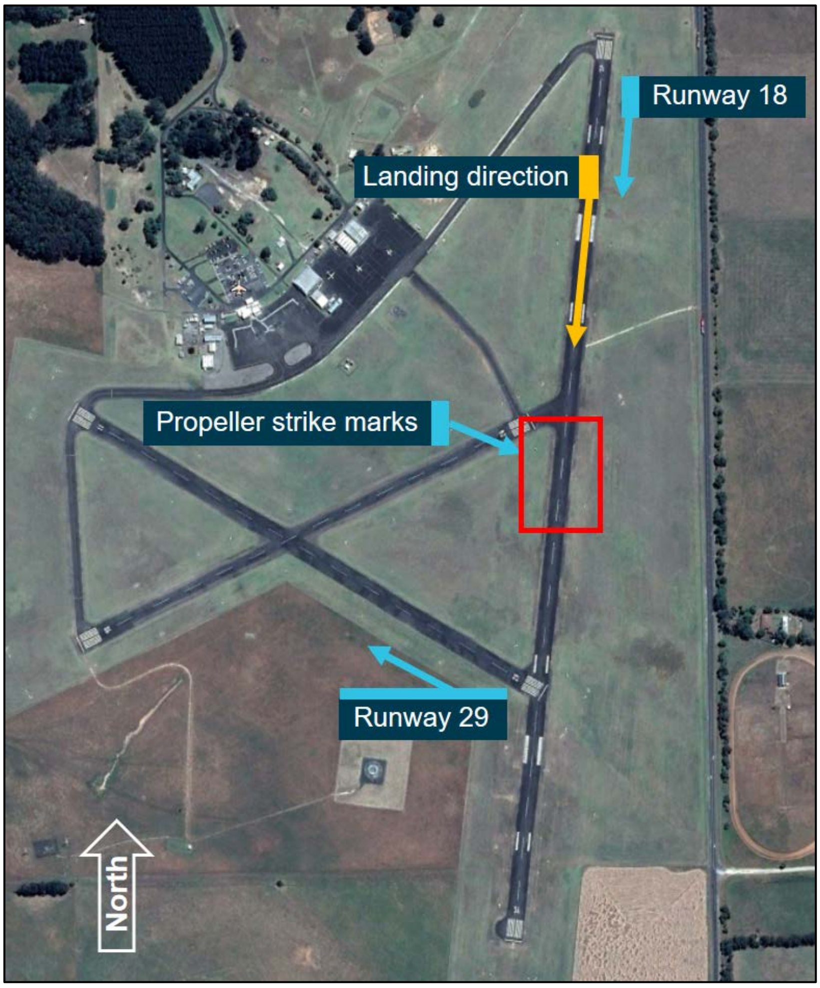
1 Central Daylight-saving Time (CDT): Coordinated Universal Time (UTC) +10.5 hours.

2 Cloud cover: in aviation, cloud cover is reported using words that denote the extent of the cover – 'few' indicates that up to a quarter of the sky is covered, 'scattered' indicates that cloud is covering between a quarter and a half of the sky, 'broken' indicates that more than half to almost all the sky is covered, and 'overcast' indicates that all the sky is covered.

Figure 1: Mount Gambier Airport overview



Source: Google Earth, annotated by ATSB.

During the flight, the pilot also received a Special Weather Report (SPECI).[3] This observation reported overcast cloud at 512 ft AMSL, below the approach minimum descent altitude (MDA) of 730 ft AMSL. The SPECI also reported visibility greater than 10 km and a southerly wind of 11 kt.

At 1200, ODI commenced the Runway 18 RNAV approach behind the preceding aircraft. As the preceding aircraft continued the approach, the flight crew of that aircraft received an alert indicating the loss of the Global Navigation Satellite System[4] receiver autonomous integrity monitoring (RAIM)[5] and conducted a go-around.

Despite not receiving a similar alert, the pilot of ODI also elected to conduct a go-around. He climbed the aircraft to an altitude of 5,000 feet and proceeded with the missed approach procedure to waypoint[6] MTGNE to commence another approach. The other aircraft then advised that they would hold at waypoint MTGND while ODI conducted another approach.

At 1215, ODI commenced a second approach to Runway 18 from waypoint MTGNE.

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3 A SPECI is a special report of surface meteorological information at an aerodrome. These are issued when specific criteria are met. At the time of the occurrence, a routine SPECI was being issued for Mount Gambier every 30 minutes due to the low cloud base.

4 Global Navigation Satellite System: The global navigation service provided by satellites constellations such as GPS.

5 Receiver Autonomous Integrity Monitoring is a process whereby the GNSS receiver makes use of redundant satellite information as a check on the integrity of the navigation solution, before and during an approach.

6 Waypoint: A defined position of latitude and longitude coordinates, primarily used for navigation.

During the flight and approaches, the observer contributed to the operation of the aircraft by:

- Monitoring the operation of the aircraft (with autopilot engaged) while the pilot briefed the passengers.
- Calculating RAIM availability.
- Calling out operational checklists.
- Providing details of the instrument approach to the pilot, including the upcoming waypoints, tracks between waypoints and descent altitudes.
- Communicating to the pilot the details of external radio broadcasts.
- Monitoring the approach and calling out excursions from the target altitude.

The approach chart indicated that a normal descent profile should position the aircraft at 980 ft, 2 NM prior to the missed approach point at MTGNM. As the aircraft crossed this point, the pilot announced that the aircraft was 'too fast by far' and 'high'.

On multiple occasions throughout the approach, the pilot questioned and corrected information provided by the observer and educated her on the operation of the flight.

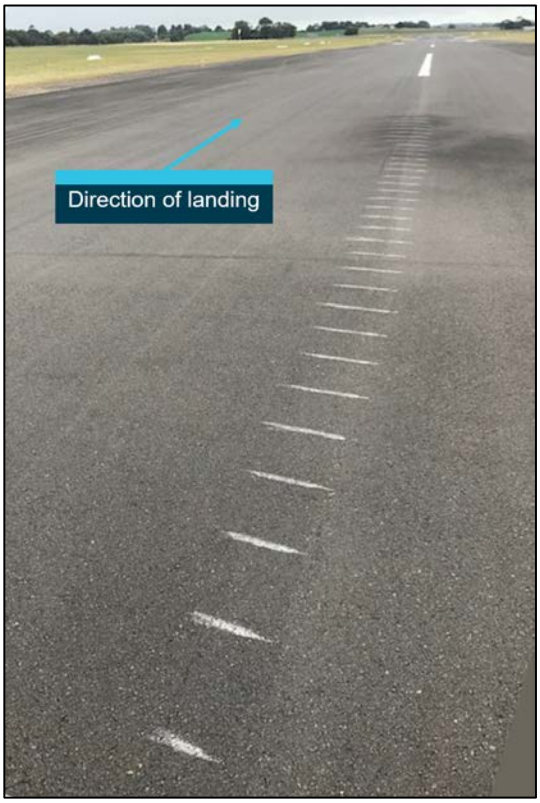
As the aircraft descended to 730ft, the observer announced that they had reached the MDA. Upon reaching the MDA, the pilot could see the ground directly beneath the aircraft, but could not see the runway ahead. He then announced that he would conduct a go-around and retracted the landing gear, without announcing that he had done so. The observer was unaware that the landing gear had been retracted. After the pilot announced the go-around, the engine power level did not increase.

Nine seconds after the landing gear was retracted, the pilot and observer sighted the runway. The pilot then reduced power and selected full flap to continue the approach. He noted that the required approach profile from that position was 'very steep'.

At that time, the landing gear warning tone activated. As the approach continued, the ground proximity warning system (GPWS) 'check gear' aural alert also activated. In response, the pilot incorrectly announced that the landing gear was extended. The approach continued, and 5 seconds later the GPWS alert 'pull up' also activated. The observer announced that the 'pull up' warning had activated. The pilot acknowledged this call, announced 'I've got it' and continued the approach. One second later, the 'pull up' and 'check gear' alerts ceased, but the landing gear warning tone continued (the pilot and observer both later recalled not hearing the landing gear warning tone or GPWS 'check gear' alerts).

At 1222, the aircraft briefly touched down on the propellers and bounced (Figure 2). Two seconds later, the propellers again contacted the runway. The pilot, believing the landing gear was down and the aircraft had landed on the runway, twice attempted unsuccessfully to engage reverse thrust.

Figure 2: Left propeller strike marks



Source: Airport operator, annotated by ATSB.

The aircraft continued flying above the runway at low level and began to drift right toward the runway edge. The pilot, believing the aircraft to be rolling on the landing gear and not responding to brake inputs, assessed that it could not be stopped in the remaining runway and elected to conduct a go-around. He then increased engine power and observed good initial response from both engines followed shortly after by failure of the left engine.

The pilot completed the initial engine failure actions and announced ‘gear up, flap up’ and the landing gear warning tone then ceased operating, consistent with flap retraction (see the section titled *Aircraft details*). Following the flap retraction, the stall warning activated intermittently for 16 seconds.

The pilot shut down and secured the left engine and assessed that the right engine was performing as expected. He then conducted a visual left circuit at an altitude of about 600-650 ft AMSL, and at 1224 the aircraft landed on Runway 18 and vacated on to Runway 29 where it was shut down (Figure 1).

The observer assisted with passenger disembarkation onto Runway 29 and escorted them clear of the runway. No persons were injured during the accident however, the aircraft was substantially damaged.

Context

Pilot and observer information

Pilot

The pilot held an Air Transport Pilot Licence (Aeroplane) and a Class 1 aviation medical certificate. He also held pressurisation system, retractable undercarriage and gas turbine engine ratings along with an instrument rating applicable to multi-engine aircraft and instrument approach procedure ratings for both two-dimensional and three-dimensional approaches.

At the time of the accident flight, the pilot had over 14,200 hours of aeronautical experience, of which about 2,460 hours were on the B200.

The investigation found no indicators that increased the risk of the pilot experiencing a level of fatigue known to have affected performance.

Following the accident, the Civil Aviation Safety Authority (CASA) suspended the pilot's licence.

Observer

The observer held a Commercial Pilot Licence (Aeroplane), an instructor rating and a Class 1 aviation medical certificate.

The observer had not held a flying role for a number of years and was observing the operation to re-familiarise herself with flying operations. She had acted in that role on the B200 over the preceding 4 months. At the time of the accident flight, the observer had about 440 hours of aeronautical experience, of which none were on the B200.[7]

The pilot commented that the interactions between himself and the observer did not increase his workload, were not distracting, and reinforced his actions.

Operation

The flight was a passenger charter flight from Adelaide to Mount Gambier and had been arranged the previous day. The company typically operated such flights as single-pilot operations, often with an observer, as was the case for the accident flight.

The observer was not a member of the flight crew and her role was not defined in operational documentation. Typically flight crew roles are defined as 'Pilot Flying' and 'Pilot Monitoring.' The Pilot Flying does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The Pilot Monitoring carries out support duties and monitors the Pilot Flying's actions and the aircraft's flight path.

The pilot was also the Chief Pilot and owner of the company; he defined the observer role as purely an observational role with limited participation in the operation of the flight. He did describe the observer taking on some operational support duties such as recording operating parameters and providing instrument approach information to the pilot. The observer understood the role not to include any flying or radio broadcasts, but to observe the operation of the flight, act as a support to the pilot during flight and to assist with ground duties.

There was no evidence that the observer made radio broadcasts or manipulated the flight controls during the accident flight.

Mount Gambier Runway 18 RNAV-Z approach

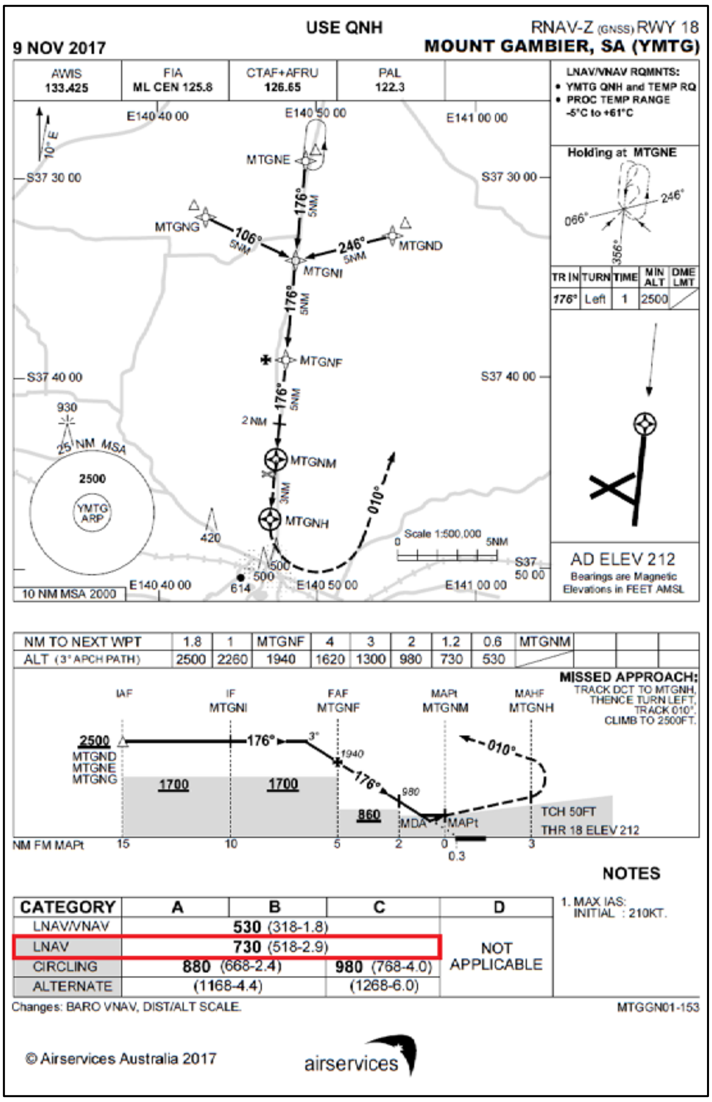
Runway 18 at Mount Gambier was provisioned with an area navigation (RNAV) straight-in approach. The approach was flown along a path of GNSS waypoints. The passage of each

[7] The B200 observation flights did not meet the requirements of aeronautical experience.

waypoint allowed a pilot to descend in accordance with segment minimum safe altitudes and, after passing the final approach waypoint (MTGNF), descend to the MDA.

The MDA was 730 ft AMSL,[8] which was 518 ft AAL (Figure 3). Upon descending to the MDA, further descent must not be made unless the pilot is able to proceed visually.

Figure 3: Mount Gambier RNAV-Z Runway 18 approach



Source: Airservices Australia, modified by ATSB

The Airservices Australia publication, *Aeronautical Information Publication* (AIP) section ENR 1.5, paragraph 1.8.2, provided the following requirements to be met to allow descent below an MDA during a straight-in approach:

> Descent below the straight-in MDA may only occur when:
>
> visual reference can be maintained;
>
> all elements of the meteorological minima are equal to or greater than those published for the aircraft performance category; and

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8 If local atmospheric pressure information (QNH) was available, the MDA could be lowered by 100ft. QNH was available at the time via the Mount Gambier Aerodrome Weather Information Service. However the pilot later reported that the minima used for the accident approach was 730 ft, and this was consistent with the cockpit voice recording.

> the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal flight manoeuvres that will allow touchdown to occur within the touchdown zone of the runway of intended landing.

Section ENR 1.5, paragraph 1.10.1 (relevant sections only), further instructed:

> A missed approach must be executed if:
>
> c. visual reference is not established at or before reaching the missed approach point from which the missed approach procedure commences; or
>
> d. a landing cannot be effected from a runway approach

Workload

In the context of aviation, workload has been described as 'reflecting the interaction between a specific individual and the demands imposed by a particular task. It represents the cost incurred by the human operator in achieving a particular level of performance' (Orlady & Orlady, 1999). A person experiences workload differently, based on their individual capabilities and the local conditions at the time.

Research on unexpected changes in workload during flight has found that pilots who encounter abnormal or emergency situations experience a higher workload with an increase in the number of errors compared to pilots who do not experience these situations (Johannsen & Rouse, 1983). Additionally, Harris (2011) states that:

> 'The underlying concept is that cognitive workload is a product of competition for limited information processing resources.' Wickens and others (2016) add that when workload becomes excessive, 'people may shed tasks in a non-optimal fashion, abandoning those that should be performed.'

In particular, the task of monitoring the state of important items in the cockpit can be one of the tasks shed by a single pilot. The United Kingdom Civil Aviation Authority publication *Monitoring Matters* provides the following information regarding monitoring:

> …whilst you are ahead of the game, concentrating on the next event, keeping an eye on all the flight parameters, system modes etc everything runs fairly smoothly. But as soon as something draws your attention away and you become out of the loop it becomes difficult to play catch up.

While it is possible to attend to more than one task using selective attention techniques, there is a limit to cognitive capacity. If tasks consume this capacity, task shedding will occur. This publication further advises that under high workload, especially during approach and descent, attention capacity diminishes. This includes the ability to detect when the configuration of the aircraft is not correct, even when there is an aural or visual alert, particularly in the case in single pilot operations as:

> …the processes and procedures will be equivalent to multi crew operation except there will only be one person in the cockpit and the systems may be less automated. Hence the need to monitor the flight profile, flight instruments, fuel state, engines, radio, etc. diligently. The instrument scan must be carried out very frequently, especially during departure and approach in order to monitor the aircraft state and planned profile.

Aircraft details

The Beech 200 is a pressurised, twin-engine turboprop aircraft with retractable landing gear and was approved for single-pilot operation. VH-ODI was manufactured in 1980 and was configured with two flight deck and 11 passenger cabin seats (Figure 4). One of the flight deck seats was also available for passenger use.

Figure 4: VH-ODI

Source: Mike Didsbury, modified by ATSB

Operational warning systems

The aircraft was fitted with a landing gear warning system. This system is designed to help prevent a pilot from landing with the landing gear retracted. The system in ODI was designed to activate when the flaps were selected to the ‘full’ position and the landing gear was not down and locked. When activated, the system emitted a warning tone through the flight deck speaker and illuminated red lights within the landing gear position selector handle (Figure 5).

Figure 5: Exemplar landing gear control lever and warning light extinguished (left) and illuminated (right) (see note)

Source: Aircraft maintainer Note: the image is only intended to illustrate the handle warning light. It is not intended to represent the landing gear configuration at the time of the occurrence.

The aircraft was also equipped with a ground proximity and warning system (GPWS). This system was designed to alert a pilot if an unsafe aircraft terrain closure rate or aircraft configuration was detected. When activated, the system emitted aural spoken word alerts through the pilot and observer's headsets.

The aircraft was fitted with a stall warning system to provide the pilot with aural warning of an imminent aerodynamic stall. The stall warning system senses angle of attack through a lift transducer actuated by a vane mounted on the leading edge of the left wing. Depending on aircraft configuration and flight condition, the stall warning system will activate between 5-14 kt prior to a stall occurring.

Damage

The aircraft sustained damage to both propellers, the left engine and the fuselage (Figure 6). The damage resulted in fragments of the left propeller penetrating the left side of the fuselage and a significant oil leak from the left propeller shaft (Figure 7). The damage to the left engine led to the failure of that engine upon the application of power for the go-around.

Figure 6: Forward fuselage damage

Source: Airport operator.

The right propeller sustained less severe damage. The pilot and observer did not detect any deterioration in performance from the right engine and were not aware of the damage to this propeller until after landing.

Figure 7: Propeller and engine damage

Source: Airport operator.

Recorded data

Cockpit voice recorder

The aircraft was equipped with a Fairchild Model A100S cockpit voice recorder (CVR). The recorder captured the final 22 minutes of the flight. The aircraft was not required to be, and was not, fitted with a flight data recorder.

Table 1 is a list of key events captured by the CVR during the accident flight. Events marked with inverted commas (‘’) are automated voice alerts from the ground proximity warning system.

Table 1: Cockpit voice recorder key events

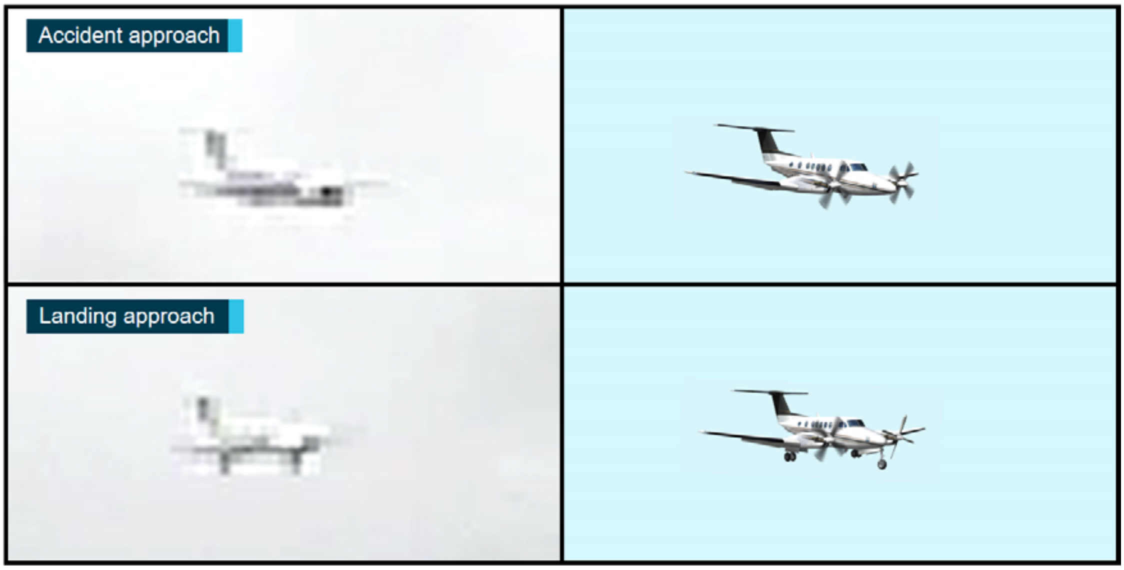
Time	Event
1215:19	Commencement of accident approach
1218:55	Pilot announces commencement of approach descent
1218:59	Sound of landing gear extension
1221:18	Observer announces that the minimum descent altitude has been reached
1221:27	The pilot announces that a go-around will be conducted
1221:31	Sound of landing gear retraction
1221:34	GPWS alert - 'check gear, check gear, check gear'
1221:40	Both the pilot and observer announce that the runway is in sight
1221:40	Engine power reduces
1221:40 – 1222:17	Landing gear warning tone commences and activates continuously for this period
1221:49	GPWS alert - 'check gear, check gear, check gear'
1221:50	The pilot announces that the landing gear is down
1221:50	GPWS alert - 'pull up, pull up'
1222:03	Sound of first propeller contact
1222:05	Sound of second propeller contact
1222:10	Observer announces that an engine has failed
1222:14	Pilot announces landing gear and flap retraction. (No landing gear retraction sound is audible.)
1222:17	Landing gear warning tone ceases activating
1222:19 – 1222:35	Stall warning activates intermittently during this period
1224:05	Sound of landing gear extension
1224:34	Sound of touch-down

Security camera footage

A Mount Gambier Airport security camera overlooking the apron area of the airport captured ODI during the occurrence approach and the subsequent landing approach (Figure 8).

The magnification of the footage led to a reduction in image quality. However, the footage showed the landing gear as dark objects beneath the aircraft during the landing approach. The dark objects were absent in the footage of the occurrence approach, consistent with the retracted landing gear.

Figure 8: Mount Gambier Airport CCTV captures of ODI and representative images of a B200



Source: Airport operator and ATSB.

Similar occurrence

ATSB investigation AO-2016-072 (VH-ETW)

On 4 July 2016, a Piper PA31-325 aircraft, registered VH-ETW, arrived at Birdsville Airport, Queensland. At the end of the downwind leg of the circuit, the pilot selected the landing gear handle down and noted that the landing gear selector moved out more easily than normal. During the turn onto the base leg, the pilot felt something against his right knee and found that the landing gear selector handle had become partially detached. The pilot inserted the handle back into the landing gear selector lever and retracted and extended the landing gear to ensure that it operated correctly. The landing gear subsequently retracted without the pilot's knowledge.

The aircraft touched down with the landing gear retracted and the pilot assessed that the safest option was to conduct a go-around. The pilot then conducted a circuit and landed without further incident. The pilot and passengers were uninjured and the aircraft had minor damage to the propellers.

Safety analysis

During an approach to Runway 18 at Mount Gambier in poor weather conditions, the aircraft touched down with the landing gear retracted, with the propellers contacting the runway twice before the pilot initiated a go-around. The following analysis will consider the development of the occurrence and the subsequent decision to conduct a go-around.

Continued approach and non-detection of retracted landing gear

Upon reaching the minimum descent altitude, the pilot could see ground directly below the aircraft, but could not obtain visual reference with the runway ahead. Therefore, he appropriately elected to conduct a go-around and retracted the landing gear. However, prior to beginning to climb the aircraft, the pilot sighted the runway and elected to continue the approach, but inadvertently did not re-extend the landing gear.

In response to the landing gear configuration, a number of automated aural and visual alerts activated. However, neither the pilot nor observer recognised that the landing gear was retracted.

It has been well-demonstrated that people are more likely to detect targets when they are expected and less likely to detect targets when they are not (Wickens & McCarley, 2008). This lack of detection occurs even when targets are salient, important and in an area to which a person is looking (known as inattentional blindness) (Chabris & Simon 2010).

When considering expectancy, a range of conditions may have influenced the pilot not detecting that the landing gear remained retracted (despite the automated alerts), including:

- He retracted the landing gear during a time of high task loading associated with obtaining visual reference with the runway environment, which may have precluded the recollection that it was actually retracted.
- The pilot was likely highly focussed on the landing at the time.
- Errors of omission are often difficult to detect by the people who make them (Sarter & Alexander 2000).

In summary, the pilot's ability to detect the retracted landing gear was likely reduced by his expectation that it was extended. In addition, he retracted the landing gear during a high task loading time which could have precluded the recollection that this was its latest state. This, combined with the high task loading during the continued approach in a complex aircraft, possibly meant that the task of confirming the configuration of the aircraft was shed.

Although the observer was also a pilot, she did not have the defined responsibility of monitoring the operation of the aircraft and was not assigned a 'pilot monitoring' role as is the norm in a formal multi-crew operation. In addition, the pilot did not announce that the landing gear had been retracted, further reducing her ability to detect the landing gear position.

She later recalled not hearing the landing gear-related aural alerts, although the cockpit voice recorder captured that she did emphasise to the pilot the 'pull up' EGPWS alerts. However, when these alerts were emphasised, the pilot announced that he would continue the approach. Therefore, a similar call regarding the landing gear may also have gone unheeded, as evidenced by the pilot's reaction to the GPWS 'check gear' alert.

Go-around after the wheels-up landing

Prior to the wheels-up landing, the pilot understood the landing gear to be extended and stated so in response to the GPWS 'check gear' alert. This misperception of the landing gear position persisted through the two touch-downs and go-around.

The pilot, believing that the aircraft had bounced twice on the landing gear, that it was not responding to wheel brake inputs and that he could not engage reverse thrust, assessed that a runway overrun was imminent. This indicated that he was also very likely unaware of the substantial airframe damage sustained and why he assessed a low-level go-around clear of cloud as the safest option.

Findings

From the evidence available, the following findings are made with respect to the wheels-up landing involving Beech Aircraft Corporation B200, VH-ODI that occurred at Mount Gambier Airport, South Australia on 8 December 2018. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- The pilot elected to continue the approach after initially deciding to conduct a go-around. The pilot's expectation of the landing gear position, possibly coupled with the effects of the now increased workload, probably led to him not detecting the retracted landing gear before the aircraft contacted the runway.

Other findings

- After the wheels-up landing, the decision to conduct a go-around resulted from the pilot's misunderstanding of the situation and assessment that a runway overrun was imminent.

General details

Occurrence details

Date and time:	8 December 2018 – 1222 CDT	
Occurrence category:	Accident	
Primary occurrence type:	Wheels-up landing	
Location:	Mount Gambier Airport, South Australia	
	Latitude: 37° 44.73’ S	Longitude: 140° 47.12’ E

Pilot details

Licence details:	Air Transport Pilot Licence (Aeroplane)
Endorsements:	Tail-wheel Undercarriage, Manual Propeller Pitch Control; Retractable Undercarriage; Multi-engine Centreline Thrust, Pressurisation System, Gas Turbine Engine
Ratings:	Single Engine Aircraft, Multi Engine Aircraft, DC3, Instrument Rating Multi Engine Aircraft, Instrument Approach Procedure 3D, Instrument Approach Procedure 2D
Medical certificate:	Class 1, valid to March 2019
Aeronautical experience:	Approximately 14,200 hours
Last flight review:	November 2018

Aircraft details

Manufacturer and model:	Beech Aircraft Corporation 200	
Registration:	VH-ODI	
Operator:	DESERT-AIR SAFARIS	
Serial number:	BB-634	
Type of operation:	Charter - passenger	
Departure:	Adelaide, South Australia	
Destination:	Mount Gambier, South Australia	
Persons on board:	Crew – 1	Passengers – 7
Injuries:	Crew – Nil	Passengers – Nil
Aircraft damage:	Substantial	

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the aircraft operational documents
- the pilot/aircraft operator
- the observer
- the maintainer
- the Civil Aviation Safety Authority
- Airservices Australia
- the Bureau of Meteorology
- the air traffic radio recordings
- the airport operator

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Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act 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 pilot's next of kin,[9] the observer and the Civil Aviation Safety Authority (CASA).

Submissions were received from the pilot's next of kin and CASA. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

[9] The pilot was fatally injured in unrelated circumstances during the course of this investigation.

Australian Transport Safety Bureau

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

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Terminology used in this report

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Contributing factor: a factor that, had it not occurred or existed at the time of an occurrence, then either:

(a) the occurrence would probably not have occurred; or

(b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or

(c) another contributing factor would probably not have occurred or existed.

Other factors that increased risk: a safety factor identified during an occurrence investigation, which did not meet the definition of contributing factor but was still considered to be important to communicate in an investigation report in the interest of improved transport safety.

Other findings: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.