Australian Government

Australian Transport Safety Bureau

# Brake failure and fire involving DHC-8-202, VH-TQS

Sydney Airport, New South Wales, on 8 November 2022

**ATSB Transport Safety Report**

Aviation Occurrence Investigation (Short)

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**Addendum**

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# Executive summary

## What happened

On 8 November 2022, a De Havilland Canada DHC-8-202 aircraft, registered VH-TQS and operated by QantasLink, was conducting a passenger flight from Lord Howe Island to Sydney, New South Wales. During the descent, the flight crew noticed failures of the traffic alert and collision avoidance system, the ground proximity warning system as well as the radio altimeter.

During landing, the beta lockout system horn activated and then both engine manual warnings illuminated. With the engines in manual mode, the captain advanced the power levers to maintain the propeller speed above their restricted range. After stopping at a holding point about halfway through the taxi, the captain noticed a degradation in the braking performance. Braking performance continued to deteriorate as the aircraft was taxied and the brakes failed and ignited. The captain initiated an evacuation, during which no-one was injured.

## What the ATSB found

The ATSB found that the failure of the radio altimeter led to the subsequent failures of the traffic alert and collision avoidance system and the ground proximity warning system, as these systems rely on data from the radio altimeter. The radio altimeter failure also resulted in the beta lockout system relying solely on the weight on wheels sensors. This meant that, when the weight on wheels indicated a momentary ‘in-air’ indication during landing, the beta lockout was triggered. The beta lockout activation resulted in a dual engine manual condition. With the engines in manual mode, the captain had to manually advance the power levers to avoid the ground operating restricted range of the propellers. This increased the amount of wheel braking required, combined with a long taxi of over 5 km, resulted in the brakes overheating, failing and igniting.

Operational guidance contained in the Quick Reference Handbook did not adequately inform the flight crew of the flow-on implication of the radio altimeter failure on the beta lockout system. Nor did it adequately provide guidance on responding to a dual engine manual condition.

Although not contributory, it was also found that the Bromo Chloro di-Fluoromethane (BCF) fire extinguisher was used on the high temperature brake fire, potentially increasing the risk of exposure to hazardous by-products.

## What has been done as a result

QantasLink has advised they have made changes to both the DHC-8-200 Quick Reference Handbook and Flight Crew Operating Manual, including:

- providing further information about the beta lockout system
- new checklists for a radio altimeter failure and dual engine manual condition scenario.

The operator also published a technical advisory bulletin to DHC-8-200/300 flight crew outlining this event and learnings from this event.

## Safety message

This occurrence highlights the importance of appropriate operational guidance, particularly in modern aircraft with complex integrated systems. Procedures for managing an equipment failure should consider factors that may influence the performance of other operational systems. In this occurrence, the flow-on effects of the radio altimeter failure on the beta lockout system. Fortunately, the flight crew were able to successfully troubleshoot the system errors and carry on the flight safely. Increased safety margins in procedural documentation can also help ensure flight crew make appropriate decisions when managing unexpected events. In this case, even a one second change in the timing of retarding the power levers could have prevented the occurrence.

# The investigation

Decisions regarding the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation and the associated resources required. For this occurrence, a limited-scope investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

## The occurrence

### *Approach to Sydney*

On 8 November 2022, a QantasLink De Havilland Canada DHC-8-202 aircraft, registered VH-TQS departed Lord Howe Island on a scheduled passenger flight to Sydney, New South Wales with 3 crew and 23 passengers on board. The first officer (FO) was the pilot flying (PF)[1] and the captain was the pilot monitoring (PM).

At about 1658 local time, while descending through flight level (FL)[2] 175 on approach to Sydney (Figure 1), the flight crew were alerted to a failure of the traffic alert and collision avoidance system (TCAS)[3] as well as the ground proximity warning system (GPWS).[4] Shortly after, they noticed the radio altimeter (RadAlt) had also failed.

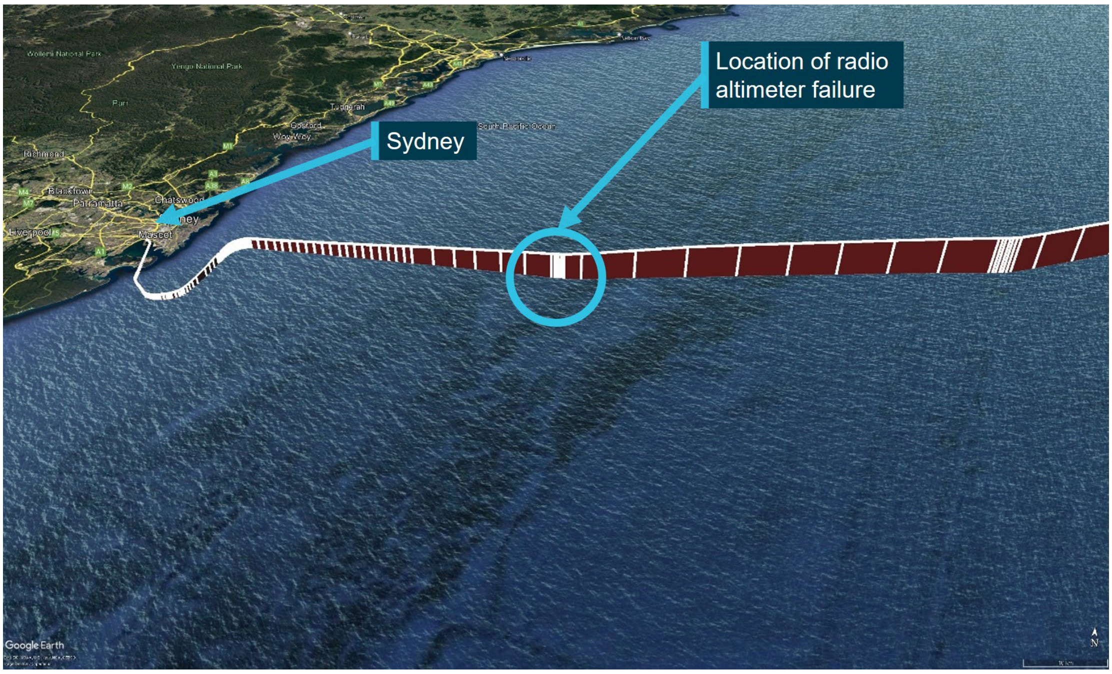
[1] Pilot flying (PF) and pilot monitoring (PM): procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances; such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF's actions and the aircraft's flight path.

[2] Flight level: at altitudes above 10,000 ft in Australia, an aircraft's height above mean sea level is referred to as a flight level (FL). FL 175 equates to 17,500 ft.

[3] Traffic alert and collision avoidance system: a type of airborne collision avoidance system (ACAS).

[4] Ground proximity warning system: a system designed to alert pilots if their aircraft is in immediate danger of flying into the ground or an obstacle.

**Figure 1: ADS-B[5] derived flight data showing the approximate location of the radio altimeter failure on approach to Sydney**




Source: FlightRadar24 and Google Earth, annotated by the ATSB

The FO continued flying the aircraft while the captain consulted the Quick Reference Handbook (QRH) for the GPWS, TCAS and RadAlt failure procedures. The flight crew then informed air traffic control of the TCAS failure, and the FO continued with a visual approach to runway 34R[6] at Sydney.

## *Landing and taxi*

After touching down, the FO retarded the power levers into beta range[7] to use the propellers to help slow the aircraft, as was standard procedure. When this happened, the beta lockout warning horn sounded. The power levers were brought forward to flight idle, which silenced the horn. Shortly after, the captain took over as PF as the aircraft's nose-wheel steering tiller is located on the left (captain's) side of the cockpit.

As they vacated the runway, the flight crew noticed that the GPWS and TCAS faults were resolved, but also identified that both the #1 and #2 engine manual caution lights were now illuminated, indicating that the electronic control units (ECU) of both engines were now in manual mode. The ECU normally controls the under-speed governing of the propellers during ground operations. However, when in manual mode, the power levers must be manually advanced by the flight crew to control the propeller speed and avoid the prohibited range[8] below 780 revolutions per minute (RPM). It also meant that reverse thrust would not be available to assist with slowing the aircraft during landing and the taxi.

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[5] ADS-B: Automatic dependent surveillance–broadcast is a surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked.

[6] Runway number: the number represents the magnetic heading of the runway. The runway identification may include L, R or C as required for left, right or centre.

[7] In beta range, the power lever directly controls propeller blade angle during ground operations. Beta range of operation consists of power lever positions from flight idle to maximum reverse.

[8] During ground operations, the propeller speeds must be maintained above 780 RPM to avoid resonance in the propellers, which can result in excessive airframe vibrations.

As the captain advanced the power levers to maintain the propeller speed above 780 RPM, they noted that additional wheel braking was required to maintain a normal taxi speed. While the captain was taxiing the aircraft, the FO consulted the QRH checklist for the engine manual warnings, however, the checklist was prescribed for only a #1 or #2 engine manual caution light, not both simultaneously.

After about 3.3 km of taxiing, the aircraft reached the bravo 8 holding point (Figure 2). The captain brought the aircraft to a stop as air traffic control had instructed them to hold. While stopped, the flight crew contacted engineering support seeking advice on the dual engine manual condition. However, engineering was unable to provide advice within the available timeframe.

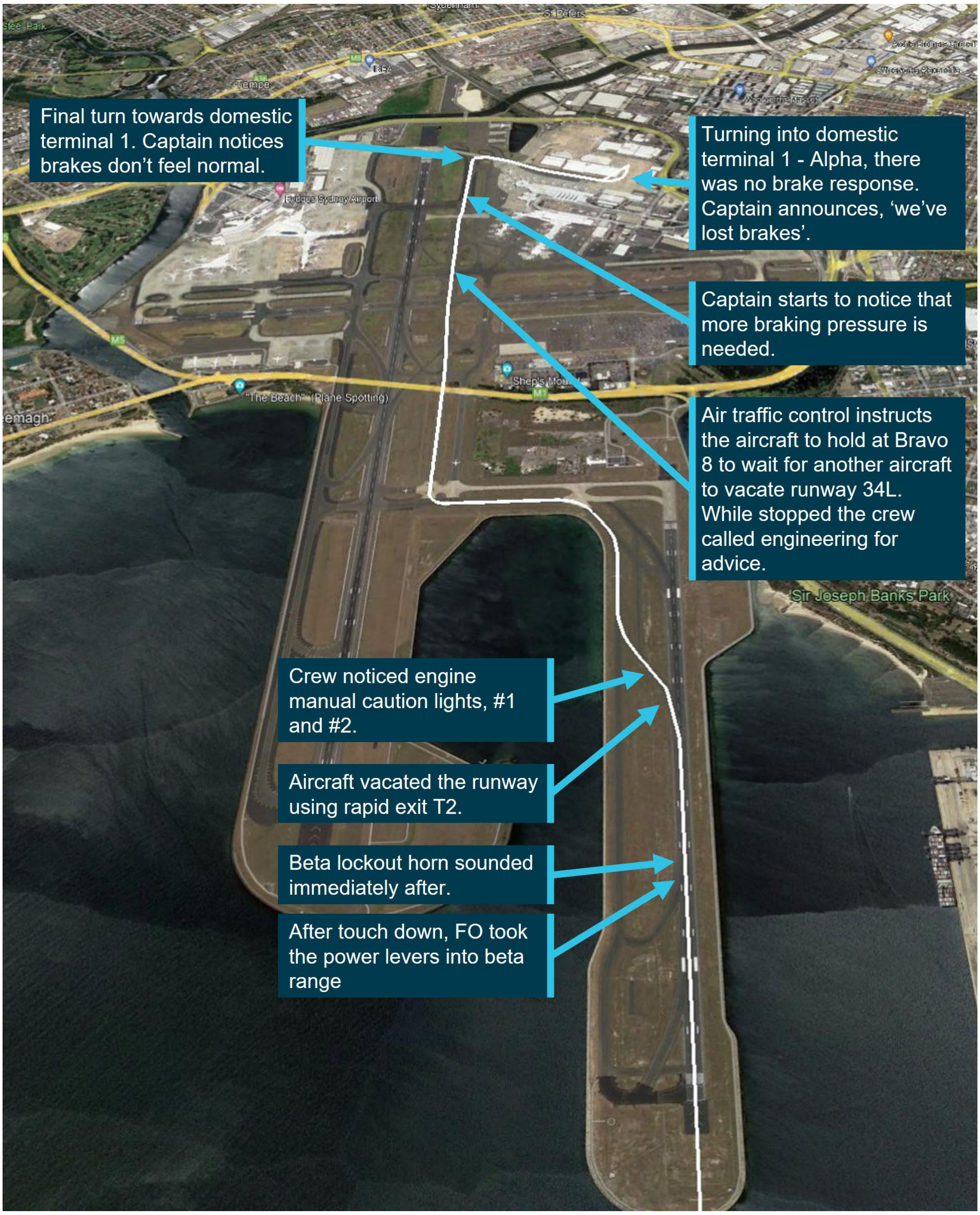
Once permitted, the taxi continued towards the domestic terminal. From this point, the taxi had a slight downhill slope and the captain started to notice the response from the brakes reducing. The braking performance continued to deteriorate, and during the final turn into the domestic 1A area (Figure 2), after about 5.5 km of taxiing, there was no braking response and the captain verbalised, ‘We’ve lost brakes’. The captain manoeuvred their aircraft to avoid colliding with another aircraft that was turning into a bay, and then brought the aircraft to a stop. At that time, the cabin crew reported via the interphone that there was fire, including visible flames, from both sides of the aircraft. The captain initiated an evacuation at which point the FO referenced the checklist in the QRH. They then exited the aircraft with the fire extinguisher. As the passengers disembarked, the FO went to both landing gear and attempted to extinguish the fires. A short time later, emergency services arrived and extinguished both fires using foam fire retardant.

No crew or passengers were injured during the evacuation.

## *Post-flight inspection*

Following the occurrence, the aircraft was inspected by maintenance personnel. That inspection identified that all 4 main wheels and brakes were heat affected. Several of the brake and wheel components were replaced as a result of the brake fires. Maintenance testing could not replicate the RadAlt fault and the reason for its failure remains unknown.

**Figure 2: ADS-B derived flight data showing the track of the aircraft on the ground at Sydney and the location of the brake failure**




Source: FlightRadar24 and Google Earth, annotated by the ATSB

## Context

### *Flight crew information*

The captain had been flying for over 10 years and had about 5,000 hours of aeronautical experience with 2,272 hours on DHC-8 aircraft. The FO had been flying for about 9 years and had about 2,400 hours of aeronautical experience, of which 1,734 were on the DHC-8.

## Aircraft information

### General

VH-TQS was a high-wing, pressurised aircraft manufactured by De Havilland Canada in 1995. It was powered by 2 Pratt & Whitney Canada PWC123D turboprop engines, each driving a Hamilton standard 14-SF-23 4-blade, feathering and reversible, constant speed propeller. QantasLink had been operating the aircraft since 2011.

### Radio altimeter

The aircraft was fitted with a radio altimeter (RadAlt). The RadAlt measures the height of the aircraft above terrain immediately below the aircraft, known as the radio altitude, and typically has an operating range of between 0 and 2,500 ft. The RadAlt system on the DHC-8-200 consists of a transmitter/receiver unit mounted under the cabin floor and 2 antennas on the underside of the fuselage. It is integral to the operation of the TCAS and GPWS, as well as the beta lockout system.

### Beta lockout system

The power levers on the DHC-8-200 operate in 2 zones, flight mode and beta mode. In flight mode, the levers control engine speed between flight idle and take-off power. While in beta mode, the power levers control propeller pitch directly. The beta range is used for ground operations such as slowing the aircraft after landing and for ground manoeuvring. While in beta range, the ECUs regulate power to provide under-speed governing of the propellers.

As the levers are retarded in the flight mode towards flight idle, a flight idle gate prevents unintentional movement of the levers into the beta region. The gate is overridden by raising gate release triggers, allowing the power levers to be moved further aft to the ‘DISC’ detent. At this point, the propeller blade angle is at +1.5° which is used to slow the aircraft after touchdown. For ground manoeuvring, the levers can be retarded further to maximum reverse, at which point the propeller angle reaches -11.0°.

To ensure the beta condition is not activated in-flight, the system is disabled by the beta lockout while the aircraft is airborne. The beta lockout system is disabled from ground to 50 ft above ground level by the radio altimeter, or from an on-ground indication from the weight on wheels (WoW) system. Both the RadAlt and WoW are interlinked to the beta lockout system to prevent activation of beta lockout in the event that the aircraft bounces slightly during landing.

### Weight on wheels system

The WoW system on the DHC-8-200 consists of proximity sensors on each of the landing gear and prevents the gear from retracting while on the ground. The proximity sensors register an on-ground condition when the suspension compresses due to the weight of the aircraft. The beta lockout system requires the consensus of the main landing gear sensors, whereas the flight data recorder requires the consensus of all 3 gear (both main and nose) to provide a WoW indication in the recorded flight data. Further, it is possible for a sensor to record an in-air condition due to a decompression of the landing gear suspension, even when the wheel remains in contact with the ground.

### Engine control unit

On the DHC-8-200, each aircraft engine is fitted with an ECU. The primary function of the ECU is for fuel flow regulation and torque management to optimise performance while protecting the engine from operational hazards such as exceedances of certain engine parameters, including temperature and RPM. In the event of a fault, the ECU will drop offline, and engine management will revert to manual control, as indicated by the illumination of the ECU manual light on the caution panel. In manual mode the flight crew must manually control fuel flow and there will normally be a difference between the 2 engine power lever positions for the same torque.

There are limitations on the use of lower power lever settings, particularly after landing, as the ECU normally controls the engine under-speed governor. With this, in manual mode, the flight crew must manually advance the power levers to maintain the propeller RPM above the ground operating restricted zone. Consequently, reverse thrust is no longer available for the affected engine.

## Operational information

### Landing procedures – power levers

The QantasLink Flight Crew Operating Manual (FCOM) contains landing procedures. Regarding the setting of the power levers during landing, the FCOM stated that:

> Set the power levers to disc after touchdown.

### Quick Reference Handbook guidance

The DHC-8-200 QRH did not have guidance in the event of a failure of the radio altimeter. Neither was there any information regarding the implications that the failure would have on the beta lockout system. There was some pertinent guidance available in other manuals. For example, the Operating Data Manual stated:

> If the RADALT is inoperative or scrolling ensure positive WOW prior to the selection of discing on touchdown

However, the flight crew would not be expected to access this manual during this phase of flight.

The QRH contained guidance on the GPWS and TCAS failures, but there was no reference to radio altimeter failures. In addition, the QRH contained no information for a dual engine caution condition, however, it did include guidance on an individual #1 or #2 engine manual caution.

### Evacuation procedures

Both the Aircrew Emergency Procedures Manual and the QRH contained guidance on actions and flight crew responsibilities in the event of an evacuation. Both documents required the FO to exit the aircraft with a fire extinguisher and torch.

### Fire extinguishers

The DHC-8-200 was fitted with a Chubb Bromo Chloro di-Fluoromethane (BCF) fire extinguisher. The Aircrew Emergency Procedures Manual, available in the flight crew's electronic flight bag, contained guidance on the use of the BCF, which was for general use on most fires except some burning metals. The manual specifically stated that:

> Warning: Some metals react adversely with BCF extinguishant (e.g. titanium and magnesium) however they need to [be] at extreme temperatures to react adversely, e.g. brake fire on the Q200/Q300).

The Chubb material safety data sheet stated that hazardous decomposition products:

> May evolve bromine, chlorine, fluorine, halogen acids and carbonyl halides when heated to decomposition.

In response to a draft of this report, the operator advised that their annual emergency procedures training for flight crew covers BCF extinguisher description, serviceability, operation and precautions. This included a discussion on the warning, as noted above, and that the extinguisher can be used on in-flight fires.

### *Flight crew comments*

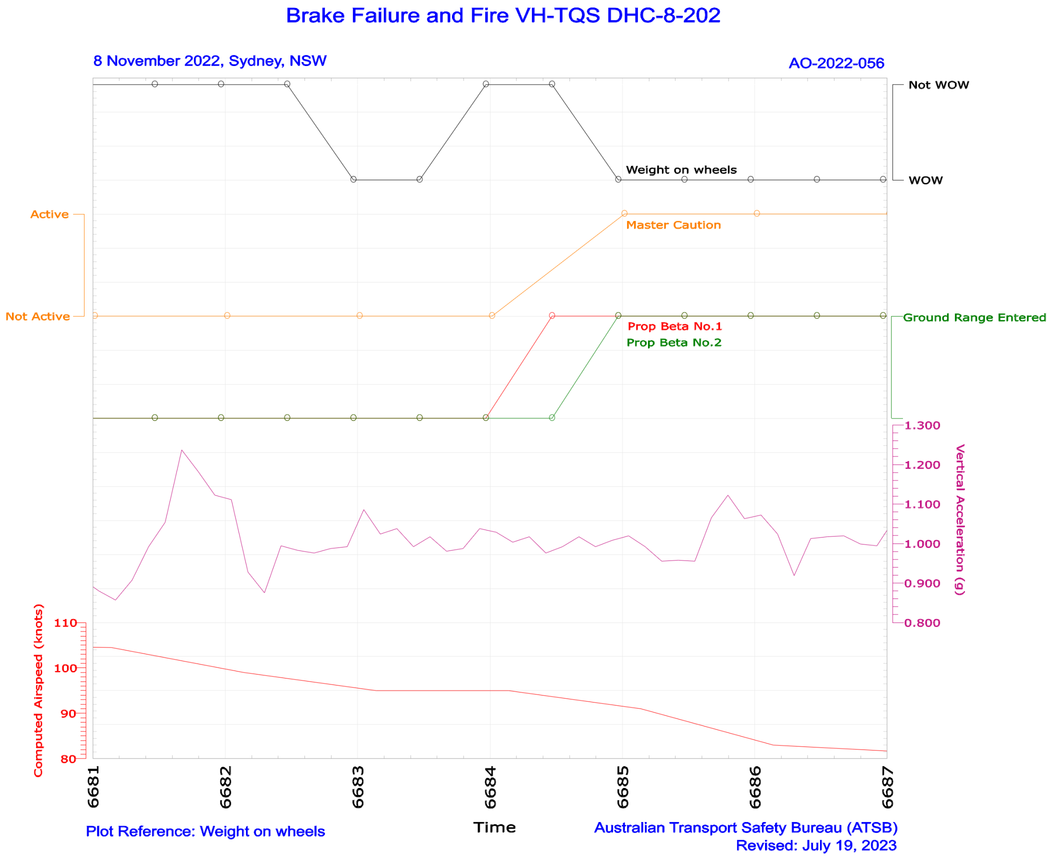
During interview, both flight crew stated that they had never used a BCF fire extinguisher before. Both recalled from their training that the BCF extinguisher should not be used on some metal fires. However, they could not recollect that they were not to be used on brake fires on the DHC-8-200 aircraft. After the evacuation, the FO considered whether to use the BCF extinguisher on the brake fires. Aware that passengers were evacuating, and as the response time of the emergency services was unknown at that point, they elected to deploy the extinguisher on both fires.

## *Recorded flight data*

The aircraft was fitted with an L3[9] FA2100 flight data recorder and L3 FA2100 cockpit voice recorder. Both units were transferred to the ATSB technical facilities in Canberra for download. Figure 3 shows a portion of the flight data recorded during the touchdown phase of the flight.

The data showed that the WoW system indicated an on-ground condition on initial touchdown (black track in Figure 3). One second later, the system recorded an in-air condition for one second, before returning to the on-ground condition for the remainder of the landing sequence. In that one second period in which the WoW returned to the in-air state, the data showed (red and green traces in Figure 3) that both propellers were placed into the beta mode. Coincident with this, the data showed the master caution (orange trace) activating.

**Figure 3: Recorded flight data showing the timing of weight on wheels indication in relation to when the propellers were placed into beta mode**




Source: ATSB

[9] L3: now L3Harris Technologies, Inc. Melbourne, Florida, USA.

## Safety analysis

### *Radio altimeter failure*

Both the TCAS and GPWS relied on data from the RadAlt. Thus, the failure of the RadAlt resulted in the subsequent failures of the TCAS and GPWS. Further, the beta lockout system was interlinked with both the RadAlt and WoW systems to prevent the beta range from activating in-flight. This meant that once the RadAlt had failed, the beta lockout system was relying solely on the WoW indication.

### *Weight on wheels*

The flight data showed that, in the same second the power levers were retarded to beta range, the WoW sensors recorded a momentary 'in-air' condition. With the system registering an 'in-air' condition while the power levers were in beta range, the beta lockout system activated. The activation of the beta lockout resulted in engine manual caution warnings for both engines as the ECUs reverted to manual mode. Consequently, as the ECUs were not providing the under-speed governing during ground operations, this meant that reverse thrust was not available to slow the aircraft during the landing and subsequent taxi.

### *Brake failure*

With both engines in manual mode and the requirement to avoid the ground operating restricted range, the flight crew had to manually advance the power levers on both engines to an increased propeller speed above 780 RPM. This subsequently increased the amount of wheel braking required.

The flight crew were able to safely stop the aircraft at the bravo 8 holding point, after about 3.3 km of taxiing. It was only after this point the braking performance deteriorated, eventually failing, igniting and initiating the evacuation. The combination of the additional burden placed on the brakes due to the increased thrust required to avoid the restricted propeller speed, as well as the length of the taxi with a downhill component, likely both contributed to the brakes overheating then failing, and igniting.

### *Operator guidance – engine manual warning and RadAlt*

After the failures of the GPWS, TCAS and RadAlt, the flight crew consulted the DHC-8-200 QRH finding guidance for the TCAS and GPWS failures, but none for the RadAlt failure. Had the QRH contained information regarding the flow on effects of the RadAlt failure on the beta lockout system, it was likely the flight crew would have delayed the movement of the power levers into beta range during the landing until weight on wheels was assured.

Similarly, when the flight crew observed the engine manual caution warnings on both engines, they again consulted the QRH, finding guidance for only a #1 or #2 engine manual warning. Had the QRH provided additional guidance on dual engine manual cautions, the flight crew could have safely terminated the taxi at the bravo 8 holding point, or at any point prior, likely avoiding the brake failure, fire, and subsequent evacuation.

### *Fire extinguisher usage*

Before evacuating the aircraft, the FO consulted the QRH and in accordance with the checklist exited the aircraft with the BCF fire extinguisher. Cognisant of the proximity of evacuating passengers, and unaware of the response time of the emergency services, the FO elected to deploy the BCF on both brake fires. Although no-one was adversely affected in this occurrence by the use of the BCF fire extinguisher, their use on high temperature metal fires (such as a brake fire on the DHC-8-200 as noted in the Aircrew Emergency Procedures Manual), can result in the production of a number of toxic fumes.

Guidance on the use of the BCF extinguisher was provided in the Aircrew Emergency Procedures Manual, however, it was unlikely that flight crew would review this manual during an emergency evacuation. This information was not covered in the QRH, which was reviewed by the flight crew immediately prior to the evacuation. While the FO exited with the extinguisher, they could not specifically recall that it was not to be used on this type of fire. Therefore, it was likely that, in this occurrence, additional guidance in the QRH could have prevented the use of the BCF on the high temperature brake fire.

# Findings

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

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

From the evidence available, the following findings are made with respect to the brake failure and fire involving DHC-8-202, VH-TQS, Sydney Airport, New South Wales, on 8 November 2022.

## *Contributing factors*

- The radio altimeter failure led to the beta lockout system relying solely on the weight on wheels to prevent the activation of the beta lockout system.
- During the touchdown, in accordance with standard operating procedures, the power levers were moved into the beta range. As this occurred when the weight on wheels sensors momentarily recorded an in-air condition, the beta lockout system and engine manual condition activated. This meant that reverse thrust would not be available to assist in decelerating the aircraft during the landing and taxi.
- The increased power setting required to avoid the restricted zone while in engine manual mode combined with the long taxi, increased the amount of wheel braking required, resulting in the brakes overheating, failing and igniting.
- The operator did not provide adequate guidance on how to respond to a dual engine control unit or radio altimeter failure on the de Havilland Canada DHC-8-200 aircraft, leaving flight crew without sufficient resources to appropriately deal with such failures.

## *Other factors that increased risk*

- During the evacuation of the aircraft, the Bromo Chloro di-Fluoromethane (BCF) fire extinguisher was used on a high temperature brake fire, increasing the risk of exposure to hazardous by-products.

## Safety actions

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

### *Safety action by QantasLink*

In response to this occurrence, on 4 October 2023, the ATSB was advised by QantasLink that the following actions had been undertaken:

- They published a technical advisory bulletin to DHC-8-200/300 flight crew outlining the event and learnings from the event, including relevant technical explanations, such as the radio altimeter failure and the flow-on implications with the beta lockout system.
- Further information about the beta lockout system will be added to the DHC-8-200/300 Flight Crew Operating Manual Section 4 in an upcoming amendment.
- A new QRH checklist is also being produced for a radio altimeter failure. This new QRH checklist will assist to identify a radio altimeter failure and will provide appropriate actions and considerations. In particular, it will include the following note from the De Havilland Operating Data Manual:

  > If the Radio Altimeter is inoperative or scrolling, ensure positive WOW prior to the selection of Discing on touchdown.

- They are developing a new QRH checklist for a '#1 ENG MANUAL and #2 ENG MANUAL (Caution Lights)' scenario. This new checklist will provide guidance in the event both engines operate in manual mode, including considerations such as maintaining propeller RPM outside the prohibitive range and limiting taxi duration, with consideration given to being towed to the bay (where possible). Specifically:

  > After landing, shutdown both engines as soon as practical. Taxi duration must be limited to avoid excessive braking caused by high power settings.

- Additional guidance regarding the use of brakes has been added to the Flight Crew Operating Manual.

# General details

## Occurrence details

| | | |
|---|---|---|
| Date and time: | 8 November 2022 – 1739 EDT | |
| Occurrence class: | Serious incident | |
| Occurrence categories: | Fire, landing gear/indication, avionics/flight instruments, emergency evacuation, propellers/rotor malfunction | |
| Location: | Sydney Airport, New South Wales | |
| | Latitude: 33.9461° S | Longitude: 151.1772° E |

## Aircraft details

| | | |
|---|---|---|
| Manufacturer and model: | De Havilland Inc. DHC-8-202 | |
| Registration: | VH-TQS | |
| Operator: | Eastern Australia Airlines Pty. Limited (QantasLink) | |
| Serial number: | 418 | |
| Type of operation: | Part 121 Australian air transport operations-Larger aeroplanes-Standard Part 121 | |
| Activity: | Commercial air transport-Scheduled-Domestic | |
| Departure: | Lord Howe Island Airport, New South Wales | |
| Destination: | Sydney Airport, New South Wales | |
| Persons on board: | Crew – 3 | Passengers – 24 |
| Injuries: | Crew - None | Passengers - None |
| Aircraft damage: | Minor | |

# Sources and submissions

## Sources of information

The sources of information during the investigation included:

- the flight crew
- QantasLink
- De Havilland Aircraft of Canada Limited
- recorded data from the flight data recorder
- audio recordings from the cockpit voice recorder
- ADS-B data from FlightRadar24.

## References

Gunston, B. (2004). *The Cambridge aerospace dictionary*. Cambridge University Press.

## Submissions

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

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

- the flight crew
- QantasLink
- De Havilland Aircraft of Canada Limited
- Civil Aviation Safety Authority
- The Transportation Safety Board of Canada
- Transport Canada.

Submissions were received from QantasLink. The submission was reviewed and, where considered appropriate, the text of the report was amended accordingly.

# Australian Transport Safety Bureau

## About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- 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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

## Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

## Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.