



ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT INVESTIGATION PRELIMINARY REPORT AIC-11-1010

**Forced landing
P2-MCJ
Bombardier DHC- 8-103
33 km south east of Madang
13 October 2011**

Factual information

The information contained in this preliminary report is derived from initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may become available that alters the circumstances as depicted in the report.

History of the flight

On 13 October 2011, the flight crew of P2-MCJ (MCJ), an Airlines PNG DHC-8-103 aircraft, lodged a Regular Public Transport (RPT) flight plan at Jackson's International Aerodrome Briefing Office for the scheduled CG1600 flight to Nazdab, Morobe Province and Madang, Madang Province, Papua New Guinea (PNG) (Figure 1).

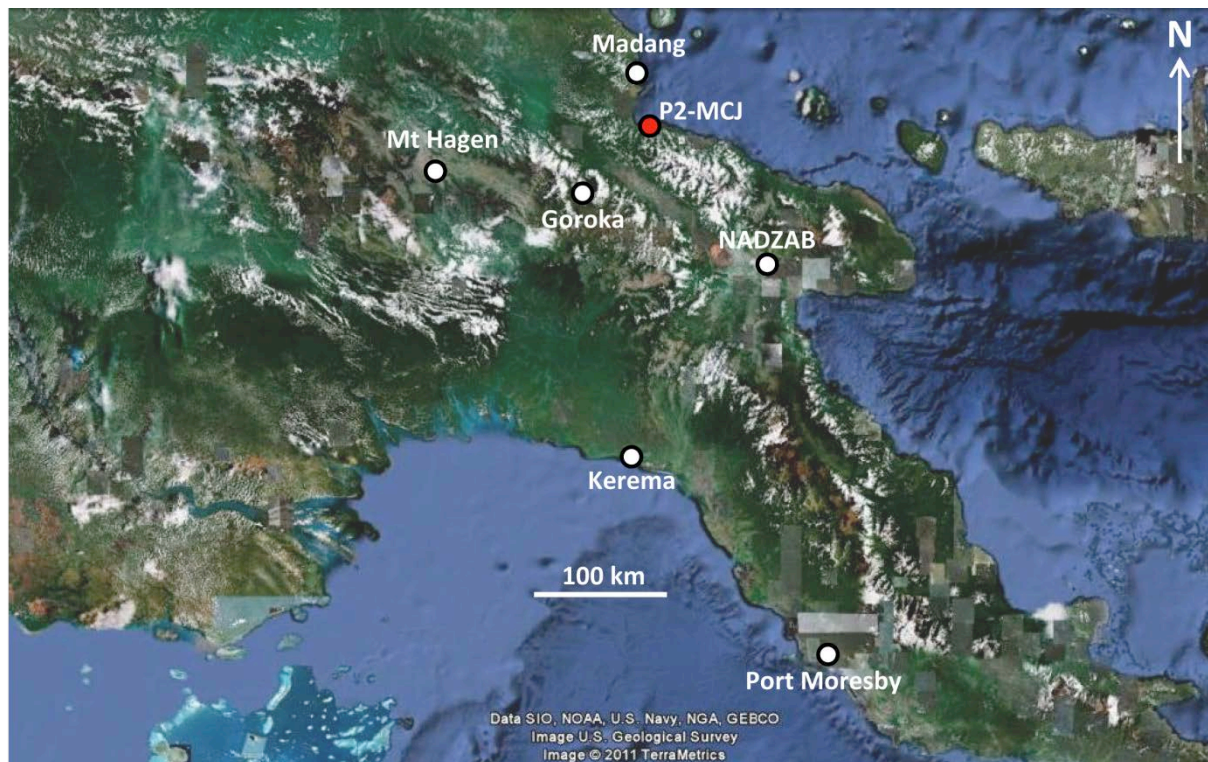


Figure 1: General view of the accident flight area.

The aircraft departed Port Moresby and landed at Nazdab without recorded incident.

While the aircraft was on the ground Nazdab, it was refuelled in preparation for the flight to Madang. The aircraft departed NADZAB at 1647 LMT¹ and tracked 284 degrees while climbing to flight level 160 (Figure 2); its estimated arrival time at Madang was 1717.

¹ The 24-hour clock is used in this report to describe the local time of day, Local Mean Time (LMT), as particular events occurred. Local Mean Time was Coordinated Universal Time (UTC) + 10 hours.

The flight progressed normally and MCJ was transferred to Madang Air Traffic Control (ATC) at 1710 with on descent into Madang. The descent profile on this sector was steep because of the proximity of the Finisterre Ranges to Madang and the pilot-in-command (PIC), who was the handling pilot, was hand-flying the aircraft because the autopilot was unserviceable. He was manoeuvring the aircraft visually to avoid cloud and thunderstorms. At 1712, in response to a request from Madang Tower, the flight crew stated the aircraft was 24 NM from Madang, leaving 13,000 feet on descent.

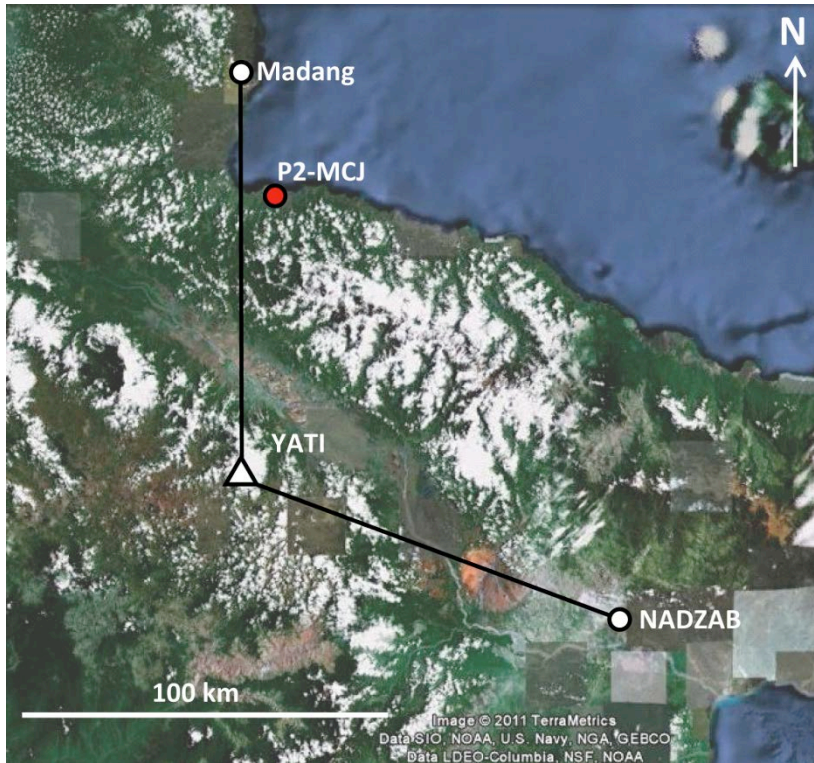


Figure 2: Flight-planned track from NADZAB to Madang and accident site location.

At approximately 1715, the aircraft's overspeed warning horn sounded. Very shortly afterwards, both propellers simultaneously oversped and exceeded their maximum permitted revolutions per minute (rpm) by in excess of 60 percent. Witnesses on the ground reported hearing a loud 'bang' as this occurred.

At 1717, the crew made a MAYDAY call to ATC and indicated that they were experiencing an in-flight emergency and that both engines had stopped. Madang Tower declared a DISTRESS SAR PHASE, believing the aircraft was about to ditch in the ocean.

The aircraft force-landed on sparsely timbered terrain on the northern side of the Buang River, 33 km south east of Madang township. During the impact sequence, it was severely damaged while colliding with trees and the ground, and an intense fuel-fed fire began.

Villagers who had heard and witnessed the aircraft in the final stages of its descent proceeded to the crash site to find the fuselage severely disrupted and engulfed in flames. They assisted the four survivors and took them to the nearest first-aid post.

Injuries to persons

The PIC sustained injuries to his right leg during the accident. The First Officer and the Flight Attendant sustained minor injuries. One passenger survived with severe burns. Twenty-eight passengers were fatally injured during the impact and subsequent fuel-fed fire.

Wreckage and impact information

The aircraft impacted sparsely wooded flat and rocky terrain, adjacent and parallel to a river bed. The wreckage trail was approximately 300 m long, oriented on a magnetic bearing of 175 degrees. Evidence from the tree and ground witness marks indicated the aircraft struck the terrain in a controlled state in a shallow angle of descent.

The outboard section of the left wing was located at the beginning of the wreckage trail, followed by numerous other elements of the left wing structure and its components. The left engine sustained a significant impact which separated it into two sections. The empennage (tail section) separated from the fuselage and was found adjacent to the main fuselage section. The remainder of the aircraft, which included the main fuselage, right wing, and right engine were situated at the end of the wreckage trail (Figure 3).

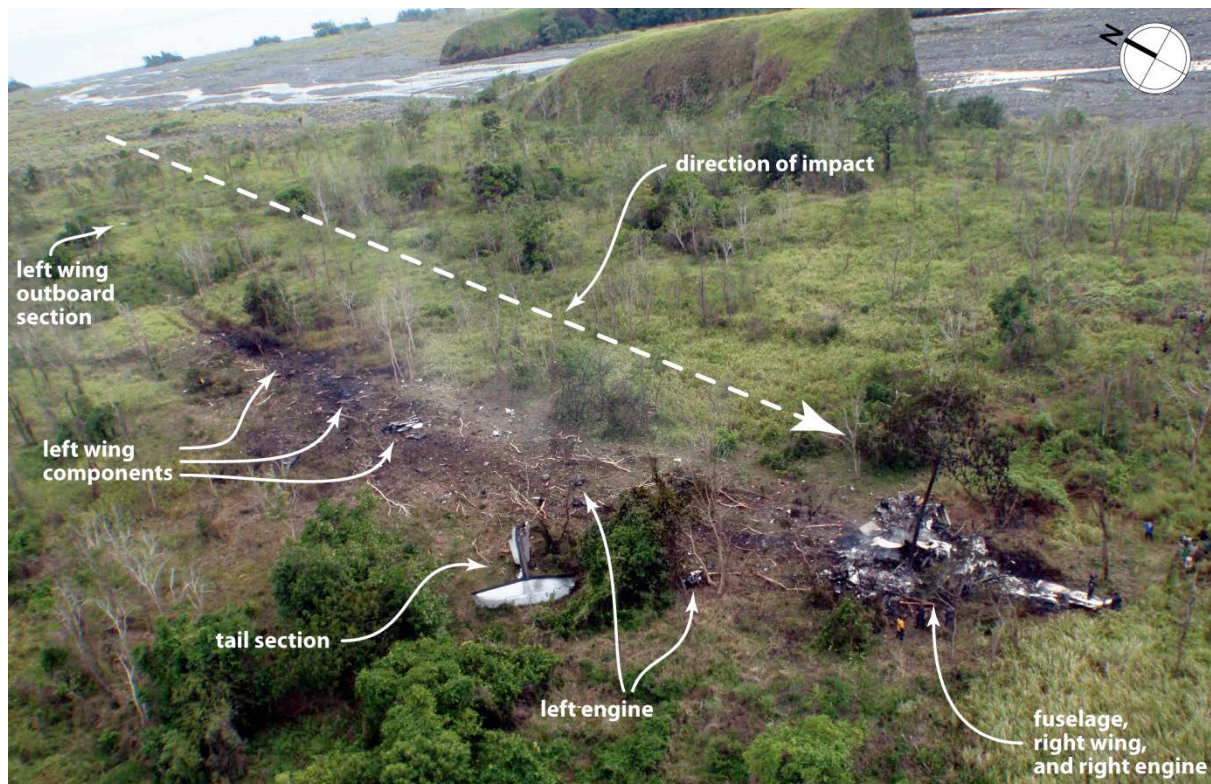


Figure 3: Aircraft wreckage overview

Thermal damage to aircraft parts and foliage indicated that a post-impact fuel-fed fire began when the aircraft was about halfway along the wreckage trail. When the aircraft finally came to rest, the fire intensified and totally consumed most of the aircraft.

On-site examination of the wreckage revealed that the aircraft was configured with the flaps and landing gear in the fully retracted position. Both engines and propellers were examined

externally on-site. The left engine had separated from the left wing and had broken into two sections (Figure 4). The left propeller hub was still attached to the reduction gearbox; however, three of the four propeller blades had separated from the hub during the impact sequence. The left propeller actuator was noted to be in the feathered position, indicated the propeller blade angles at the time of the accident.



Figure 4: Left engine (after sectioning at the accident site)

The right engine was still attached to the right wing. It had sustained considerable thermal damage in the post-impact fire. The reduction gearbox outer case had completely disintegrated. The right propeller blades were noted to be in the fully feathered position (Figure 5).

Both engines and propellers were removed from the accident site so that a detailed disassembly and inspection could be conducted.



Figure 5: Right engine and propeller assembly

Flight crew

Pilot in command

The PIC was 64 years old at the time of the accident. He had about 18,200 hours flying experience, of which about 500 hours were on the DHC-8. He held a valid PNG Airline Transport Pilot Licence (ATPL) number P21393, issued on 4 July 2011, without revocation or suspension notices. He held a Class 1 aviation medical certificate, valid until 2 December 2011, and issued with the condition that he wear correcting lenses while flying.

First Officer

The First Officer was 40 years old at the time of the accident. He had about 2750 hours flying experience, of which about 410 hours were on the DHC-8. He held a valid PNG ATPL number P21362, issued on 30 May 2011, without revocation or suspension notices. He held a Class 1 aviation medical certificate, valid until 29 March 2012.

Flight attendant

The Flight Attendant was 28 years old at the time of the accident. He held a valid PNG Certificate number 601/2008 issued on 28TH March 2008. He had approximately 2500 hours flying experience, all of which with the aircraft operator.

Aircraft information

The Bombardier DHC-8-103 is a high wing, twin turboprop, pressurised, retractable tricycle undercarriage aircraft. MCJ was operated with a seating capacity of 36 passengers. Aircraft information is summarised in Table 1.

Table 1: MCJ aircraft information summary

Aircraft manufacturer	Bombardier Inc.
Aircraft type	DHC-8-103
Aircraft serial number	125
Aircraft Registration	P2-MCJ
Aircraft hours /cycles before last flight	38,421.3 hours / 48,093
Aircraft year of manufacture	1988

Meteorological information

The area weather forecast covering the flight from NADZAB to Madang issued by the Bureau of Meteorology for the period 0800 to 2200 LMT on 13 October 2011 indicated there were generally south easterly winds with isolated cumulonimbus clouds between 1,600 and 45,000 feet, with areas of broken stratus between 800 and 3,000 feet with precipitation.

Middle-level cloud was forecast to be areas of scattered cumulus cloud between 1,500 and 15,000 feet, with tops up to 25,000 feet, and scattered stratocumulus cloud between 2,500 and 8,000 feet associated with areas of rain and drizzle. Upper-level cloud was forecast to be altocumulus/altostratus, with embedded cumulonimbus.

The general forecast was for thunderstorms, rain, and thunderstorms in rain and drizzle with visibility reduced to 8,000 metres in showers.

The Madang Aerodrome METAR² issued at 1618 LMT by ATC indicated the wind was calm, visibility was greater than 10 km, and there was smoke in the vicinity of the aerodrome.

Recorded information

The aircraft was fitted with a cockpit voice recorder (CVR) and a separate flight data recorder (FDR). The CVR (P/N S-100-0080-00 & S/N 02501) and FDR (P/N S800-20000-00 & S/N 00973) were both solid-state units manufactured by L3 Communications. The CVR and FDR were located in the aircraft's tail section and had not sustained any damage from the accident and post-impact fire. Both recorders were recovered from the accident site and transported to Port Moresby under the control of the AIC.

From Port Moresby, accompanied by an ATSB officer, both recorders were transported to the ATSB's facilities in Canberra for examination and data download. They were received on 16 October 2011.

² Aviation routine weather report.

The CVR records the total audio environment in the cockpit area. This can include crew conversation, radio transmissions, aural alarms and engine/propeller noises. The CVR that was installed in MCJ retained the last 30 minutes of information, operating on an endless-loop principle.

The CVR was downloaded and examination of that download showed that the audio from the accident flight had been successfully recorded. The 30-minute recording covered the period commencing during the climb after takeoff at NADZAB until power was disrupted during the forced landing.

The FDR system comprised the FDR, a Teledyne flight data acquisition unit (FDAU), aircraft sensors and a triaxial accelerometer. The programming of the FDAU determined what parameters were recorded. For MCJ, the recorded parameters included:

- pressure altitude
- indicated airspeed
- magnetic heading
- pitch attitude
- roll attitude
- control surface positions (aileron, elevator, spoiler, flap and pitch trim)
- accelerations (lateral, longitudinal and vertical)
- outside air temperature
- engine parameters (propeller RPM, torque, NH³, and propeller feathered (i.e. solenoid valve opened or closed)
- autopilot engaged or disengaged
- yaw damper engaged or disengaged
- radio transmitters keyed or not keyed
- weight on wheels (i.e. airborne or on ground)

The data that was recovered from the FDR contained 53 hours of aircraft operation covering the accident flight and 33 previous flights.

A preliminary CVR transcript, sound spectrum plot, FDR plots and data listings have been supplied to the investigation team.

Analysis of the CVR and FDR data is ongoing and will include:

- detailed analysis of all the recorded parameters from the accident flight
- comparison with FDR data recorded during previous flights
- a sound spectrum (frequency) analysis of CVR audio particularly relating to propeller/engine operation.

On-going investigation activities

The investigation is continuing and will include further examination and analysis of the:

- engine and propeller assemblies
- recorded information
- maintenance documentation and procedures

³ NH represents the rotational speed of the high pressure turbine.

- operations documentation and procedures
- components of the power lever quadrant.

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2ND November 2011