



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Occurrence Investigation – AO-2008-035

Final

Collision with terrain

83 km NE Georgetown, Qld

15 May 2008

VH-IDM

Cessna Aircraft Company 210L



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Postal address: PO Box 967, Civic Square ACT 2608
Office location: 62 Northbourne Ave, Canberra City, Australian Capital Territory
Telephone: 1800 020 616; from overseas + 61 2 6257 4150
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117; from overseas + 61 2 6247 3117
E-mail: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

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Abstract

At about 0650 Eastern Standard Time on 15 May 2008, the pilot and sole occupant of a Cessna Aircraft Company C210L aircraft, registered VH-IDM, departed Karumba Airport, Qld, to conduct a low-level geophysical survey flight, under the visual flight rules. The aircraft was due back at Karumba at 1115. At approximately 1000, Australian Search and Rescue (AusSAR) detected an Emergency Locator Transmitter transmission and initiated a search. At approximately 1300, the wreckage of the Cessna 210 was located and the pilot was found to be fatally injured.

Recorded data showed the pilot conducted a series of planned east-west survey lines at an altitude of 260 ft above ground level. As planned, the pilot initiated a left turn to track to the north. During the left turn, the aircraft lost altitude, and increased bank angle and speed. The on-site information indicated that the aircraft's initial impact was in a steep left-wing-down attitude, consistent with a loss of control.

The investigation found the loss of control was probably due to pilot loss of consciousness as a result of an irregularity of heart rhythm associated with either focal scarring or chronic inflammation of the heart muscle.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal bureau within the Australian Government Department of Infrastructure, Transport, Regional Development and Local Government. ATSB investigations are independent of regulatory, operator or other external organisations.

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 enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, 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 proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports: How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

History of the flight

On 15 May 2008, the pilot of a Cessna Aircraft Company C210L aircraft, registered VH-IDM, was conducting a low-level geophysical survey flight under the visual flight rules (VFR). The aircraft departed Karumba Airport, Qld, at about 0650 Eastern Standard Time¹ and tracked to the east to position for a series of parallel survey lines that were orientated in an east-west direction.

The pilot intercepted and flew a number of pre-programmed survey lines at 260 ft above ground level (AGL) using electronic track and height guidance. The pilot completed five survey lines that were between 100 and 200 km long without any apparent problems. It was planned that at the end of the fifth survey line, the pilot would fly the aircraft north for approximately 40 km before flying a final 200 km survey line to the west. The aircraft was due to return to Karumba at 1115.

At about 1000, Australian Search and Rescue (AusSAR) detected an Emergency Locator Transmitter (ELT) transmission and initiated a search. At approximately 1300, the wreckage of the aircraft was located about 83 km north-east of Georgetown (Figure 1) and the pilot was found to be fatally injured.

Figure 1: Survey area and accident location



Satellite photograph courtesy of Google Earth Note: The red area depicts the survey region

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

An onboard device transmitted the aircraft's location, altitude, heading and speed information at 10-minute intervals to a central recording location via satellite. That information was also monitored by the aircraft operator. The last transmitted data, recorded at 0957, showed the aircraft to be on-track near the end of the fifth line. The aircraft wreckage was located about 6 km from that position, outside the survey area. A button on the device enabled the pilot to declare an emergency, which would notify the operator and increase the frequency of data transmissions. The operator reported that they did not receive any notification of an emergency by this means.

The weather at the time of the accident was reported to have been fine with scattered² cloud and light east and north-easterly winds. At 1200 on the day of the accident, the temperature recorded in Georgetown was 23^oC.

Aircraft information

Manufacturer	Cessna Aircraft Company
Model	210L
Serial Number	21060331
Registration	VH-IDM
Year of manufacture	1974
Certificate of airworthiness	Issue date 9 September 1999
Certificate of registration	Issue date 7 April 2008
Maintenance Release	Valid to 3,541.1 hours / 14 May 2009
Total airframe hours	3,447.8

The aircraft was powered by a Continental Motors IO-520-L engine and fitted with a constant-speed, three-blade, McCauley MMS4-1AN propeller. The engine was fitted to the aircraft on 18 April 2008 at 3,270 total airframe hours and had accumulated 68 engine hours at that time. The propeller was fitted new to the aircraft on 16 August 2008.

The most recent maintenance conducted on the aircraft was a 100-hour inspection that was completed at Ingham on the day before the accident. The Civil Aviation Safety Authority (CASA)-approved maintenance provider reported that the inspection was routine and that the only additional work conducted was the replacement of the: vacuum, pitot and static hoses; park brake shaft and tube; and the right main landing gear wheel rim. The pilot's push-to-talk switch was also repaired and a new maintenance release was issued. The aircraft was subsequently flown from Ingham to Karumba by the pilot involved in the accident, with no reported problems.

² Cloud amounts are reported in oktas. An okta is a unit of sky area equal to one-eighth of total sky visible to the celestial horizon. Few = 1 to 2 oktas, scattered = 3 to 4 oktas, broken = 5 to 7 oktas and overcast = 8 oktas.

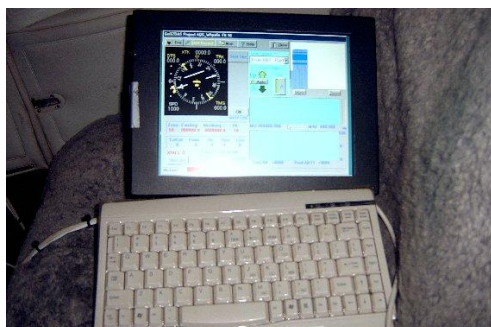
Geophysical survey equipment

The geophysical survey equipment fitted to the aircraft comprised of a carbon composite stinger detector boom that was attached to the rear fuselage, two carbon composite crystal packs positioned behind the front two seats, and various acquisition, data recording, computer and operating equipment located in the aircraft cabin.

A system-monitoring Liquid Crystal Display (LCD) screen and operating keyboard were located on the front right seat, next to the pilot's position. The LCD screen had a hinge and removable pin that allowed it to be positioned on the seat. Another electronic display was positioned on the glareshield of the aircraft, directly in front of the pilot to provide track and height guidance (Figure 2).

Figure 2: Location of the LCD screen and keyboard on the front right seat and the location of the glareshield-mounted electronic display

Front right seat



Track and height guidance display



Note: These pictures are of a similarly equipped aircraft.

The electrically-powered aircraft equipment had to be configured in such a way as to not interfere with the integrity of the survey data. The configuration was detailed on a pre-survey checklist and included that all lights were to be off while the survey equipment was in operation.

Fuel quantity and quality

On the morning of the accident, the pilot refuelled the aircraft at Karumba with 218 L of 100 low-lead aviation gasoline (AVGAS). It was reported that the pilot's practice was to operate with full fuel tanks on survey operations. The Cessna 210L fuel tanks have a capacity of 341 L and a usable fuel quantity of 337 L. As a result of the accident, the aircraft fuel tanks were significantly disrupted, so the fuel quantity and quality at the time of the accident could not be determined. However, there were no reports of any problems with other aircraft using fuel obtained from the same source at Karumba.

The operator had modified the aircraft's fuel system by installing a fuel selector with a dual-feed option. It was the operator's practice to select the dual-feed system when conducting survey flights to remove the need for the pilot to switch fuel tanks in flight. The fuel selector was examined by Australian Transport Safety Bureau (ATSB) investigators and found to be in the dual-feed position.

Pilot information

The pilot held a Commercial Pilot (Aeroplane) Licence, issued in March 1992. He had an Agricultural rating Grade 1 and a Night VFR Agricultural rating. His Class 1 medical certificate was valid until September 2008. The pilot also held a Commercial Pilot (Helicopter) Licence issued in March 2007.

The pilot's flying logbook had entries up to 31 March 2008. The logbook showed that the pilot had approximately 9,700 flying hours of mainly agricultural flying. Between 21 January 2008 and 16 March 2008, the pilot had flown about 90 hours in the Cessna 210 aircraft type. That flying was related to low-level geophysical survey operations.

The pilot was employed by the aircraft operator in January 2008 as an agricultural pilot and relief survey pilot. As part of the operator's normal training procedures, he flew 50 hours in the Cessna 210 aircraft type under supervision. The Chief Pilot flew with the pilot for the first 17 hours of supervised flying and reported that the pilot was competent, experienced, and quickly picked up both the operational aspects of flying the Cessna 210 aircraft and the use of the survey equipment.

The pilot had arrived in Karumba on 9 May 2008, to operate the aircraft for a week as a relief pilot. On the first 3 days, the pilot flew survey operations, and on 12 May 2008, he flew the aircraft to Ingham for scheduled maintenance. He spent the following day in Ingham at the maintenance facility and on 14 May 2008, the day prior to the accident, he returned the aircraft to Karumba.

On the night prior to the accident, the pilot was reported to have returned to his motel room at around 2000. He travelled out to the airport at about 0530 on the morning of the accident. The pilot was reported to be fit, healthy and in good spirits.

Medical information

A post-mortem examination of the pilot identified focal scarring and chronic inflammation of the heart muscle. The report stated that:³

...although unprovable, the presence of scarring and chronic inflammation of [the] heart muscle raises the realistic possibility that an irregularity of heart rhythm associated with either condition may have lead to a loss of consciousness during the flight.'

No drugs or alcohol were detected in the pilot's system.

At the pilot's last aviation medical examination in September 2007, he was reported as being fit and healthy. An electrocardiogram (ECG) was performed and in the Designated Aviation Medical Examiner's (DAME's) opinion, it indicated the pilot had a normal heart rhythm at the time of the test. The pilot was reported to be a non-smoker and to have exercised regularly.

³ Queensland Pathology and Scientific Services.

Accident site information

The location of some parts of the wreckage, ground marks and damage to trees indicated that the aircraft impacted a tree at a steep bank angle, while heading in a northerly direction (Figure 3). The left wingtip and aileron separated as a result of the impact and were located on the right side of the wreckage trail (Figure 4).

The aircraft then felled a substantial tree, located about 35 m beyond the initial tree impact, propelling some sections of the tree up to a distance of 75 m. There was evidence of propeller strike marks on the tree and tree impact damage to the left wing and right wing root (Figure 5).

Six metres further on, the aircraft impacted the ground inverted in a steep nose-down attitude. There was evidence of the right wingtip contacting the ground on the left side of the accident trail. The tail assembly separated from the fuselage and was located against a tree, 42 m from the ground impact.

The fuselage and most of the wing structure came to rest approximately 66 m from the ground impact point, with the engine found nearby (Figure 6). The fuselage was upright and facing back in the direction of approach. Damage to the forward fuselage was severe and the wing structure had detached from the upper fuselage.

One main landing gear was extended, but not locked, consistent with it being dislodged during the accident sequence. There was no evidence found of an impact with a bird, or of a bird carcass.

Figure 3: Likely bank angle of the aircraft when it impacted the initial tree

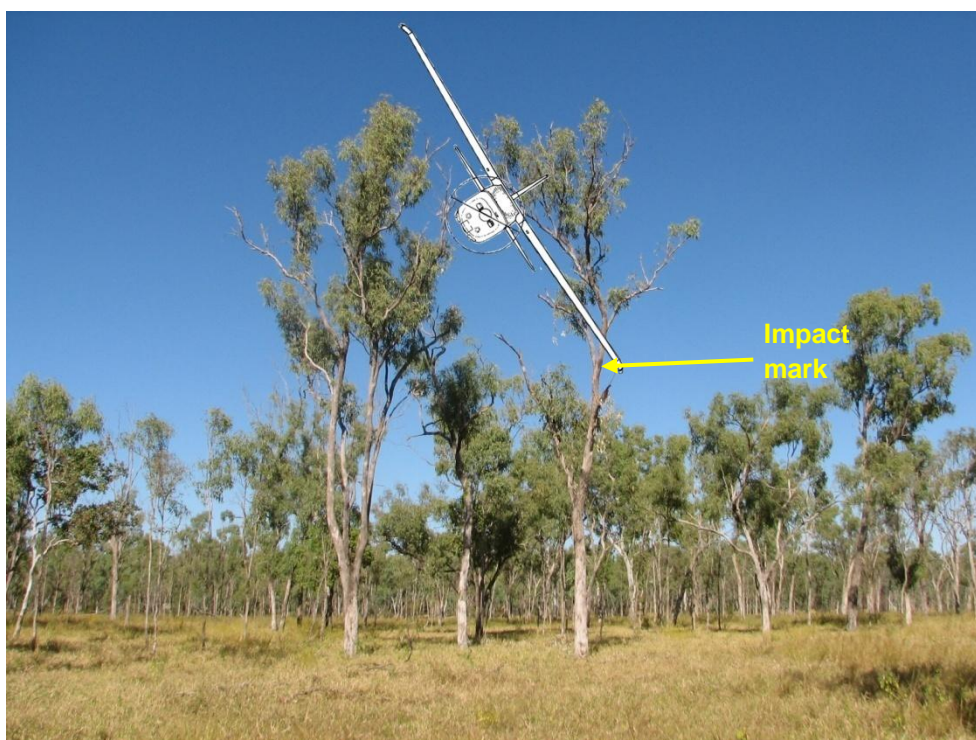
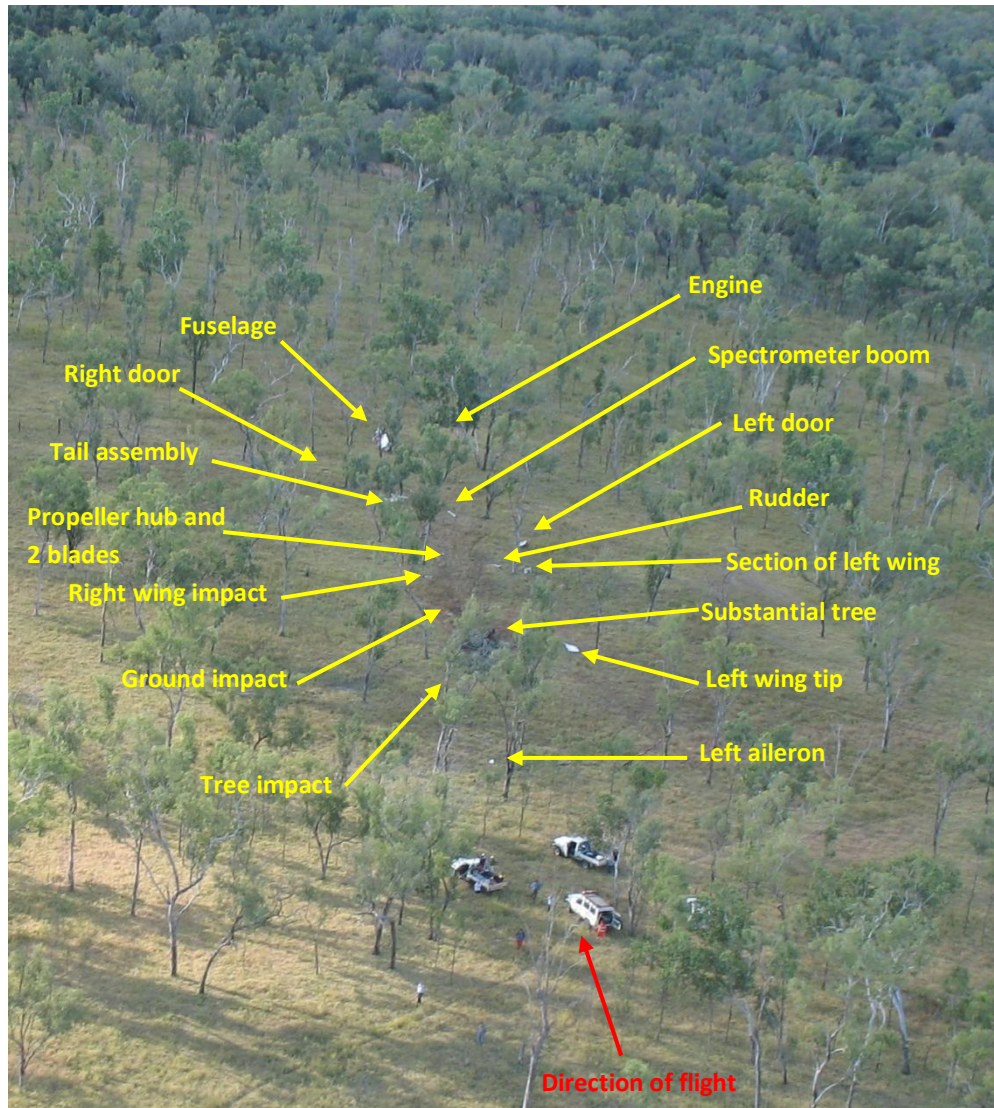


Figure 4: Aerial view of accident site

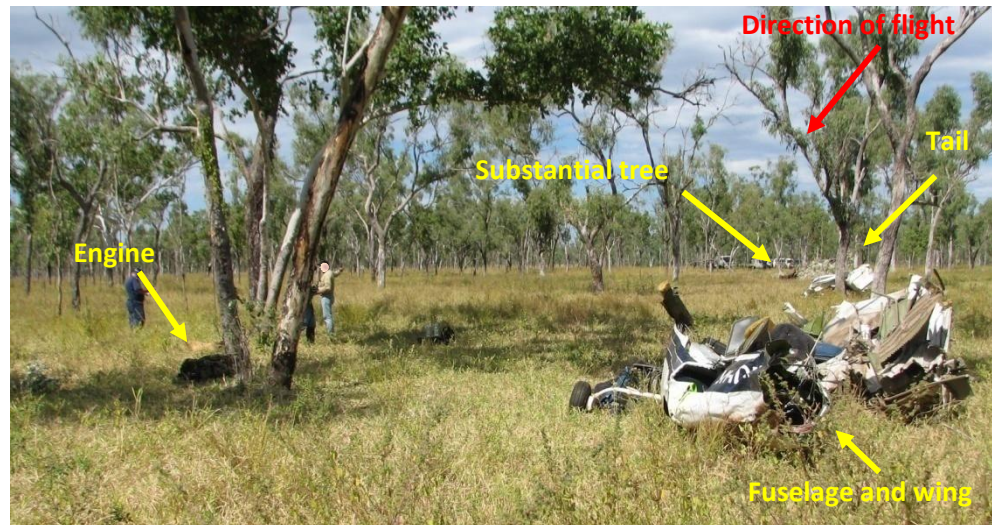


Aerial photograph courtesy of Queensland Police

Figure 5: Orientation of wing and tail pieces (inverted)



Figure 6: Accident site and aircraft wreckage



Wreckage examination

Flight controls

All flight control surfaces were accounted for and control system continuity was established. All damage to the control cables and control surfaces was consistent with impact damage. The location of the wing flap actuator indicated that the flaps were retracted at the time of impact.

Engine and propeller examination

The engine was removed from the accident site and examined at a CASA-approved engine overhaul facility under the supervision of the ATSB. There was no evidence of an internal failure that would have contributed to the accident. Due to impact damage, the engine accessories could not be functionally tested. There was evidence of engine rotation at the time of the impact with terrain.

The propeller had been sheared off the mounting flange and one blade had separated from the hub. The tip of one blade had fractured by bending over-stress. The damage to the propeller blades was indicative of the engine developing power at the time of the accident.

Autopilot examination

The aircraft was fitted with an Aircraft Radio Corporation Navomatic (Model C-420A) autopilot. An examination of aircraft maintenance records showed that on 30 April 2008, during routine maintenance, the shear pin in the roll actuator was found to be broken. This resulted in the autopilot and roll actuator not being capable of supplying inputs to the ailerons. The Licensed Aircraft Maintenance Engineer (LAME) who conducted the servicing, indicated that the pitch actuator operated correctly. A placard was placed on the face of the autopilot, stating that the system was unserviceable. The maintenance paperwork for the next routine maintenance, which was carried out on 14 May 2008, stated that the autopilot was still unserviceable. The LAME reported that he discussed the use of the autopilot with the pilot. The pilot informed the LAME that he never used the autopilot.

The pitch and roll actuators and the autopilot controller were examined at a CASA-approved maintenance facility under the supervision of the ATSB. Evidence of electrical arcing was found in the pitch actuator. The location of the arcing indicated that electrical power was being supplied to the autopilot at the time of the accident. However, there was no evidence of electrical power being supplied to the roll actuator or the autopilot controller. Both the pitch and roll actuators were found to be operational. The electromagnetic clutches on both the pitch and roll actuators were tested and found to engage and disengage correctly.

The actuators were equipped with slip clutches that were designed to allow a pilot to overpower an autopilot command. The slip clutches from both the pitch and roll actuators were tested and found to operate correctly. The shear pins on both actuators were broken and were consistent with the correct part.

Onboard recorded data

Engine data management system data

The aircraft was equipped with an Engine Data Management computer (EDM), which monitored and recorded engine parameters for use by the pilot during flight and engine trend monitoring. The EDM was downloaded by the component manufacturer in the US under the supervision of the US National Transportation Safety Board (NTSB) on behalf of the ATSB.

The engine parameters, fuel flow and fuel used were recorded at 18-second intervals from engine start. The last recorded data was at 3 hours 15 minutes and 36 seconds after engine start, when all of the data recording stopped. The recorded Exhaust Gas Temperature (EGT) from cylinder 5 stopped recording 51 minutes and 36 seconds into the flight. However, the corresponding Cylinder Head Temperature (CHT) remained stable throughout the flight. Other than the EGT data loss, there were no anomalies in the recorded data.

The last recorded data point indicated that the aircraft engine had consumed 192 L of fuel from engine start, which was less than the recorded fuel uplift, and consistent with normal engine operation up to that time.

Geophysical survey data

The onboard geophysical survey equipment recorded the aircraft's location and altitude at half-second intervals. The data was downloaded by the equipment manufacturer for the ATSB and indicated that the pilot had accurately completed the survey lines prior to the accident. Approximately 13 seconds prior to the last recorded survey data, the pilot had completed the most southerly planned survey line and commenced a left turn to the north (Figure 7). During the turn, at about 8 seconds prior to the last recorded data, the aircraft began to lose altitude (Figure 8). The last recorded data was captured a few metres prior to the impact with the substantial tree. The survey data recorded for a total of 3 hours 12 minutes and 4.5 seconds.

Figure 7: Aircraft track recorded by the survey equipment

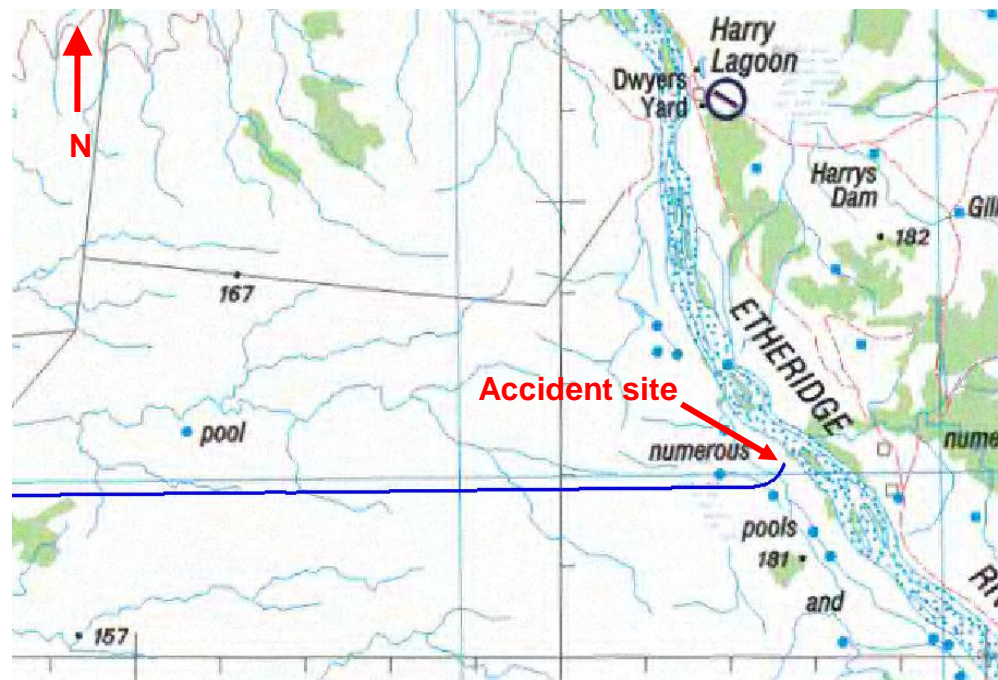
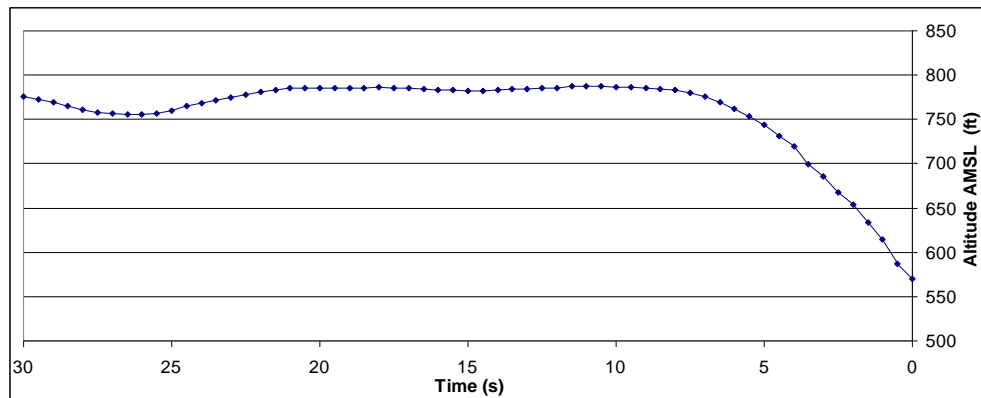


Figure 8: Recorded aircraft altitude over time

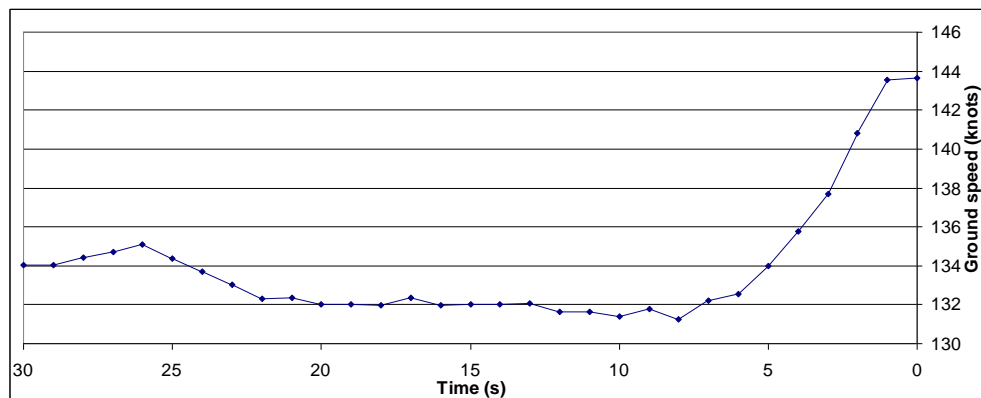


The ground level at the accident site was about 545 ft above mean sea level (AMSL).

Note: The altitude scale is not referenced to zero.

The aircraft's groundspeed was derived from the recorded data. During the last survey line, the aircraft groundspeed averaged approximately 133 kts. During the turn and descent, the groundspeed increased to a maximum of 143 kts (Figure 9). The airspeed indicators from the aircraft's instrument panel were examined and one showed evidence that the aircraft had been travelling at about 145 kts at the time of the impact.

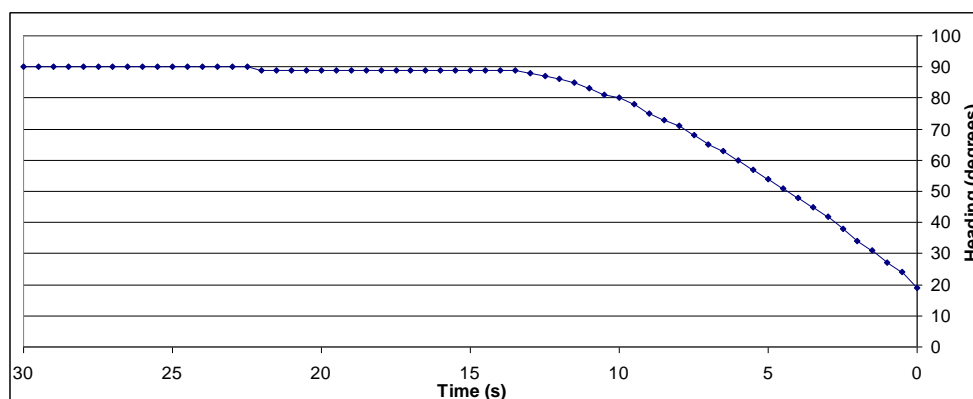
Figure 9: Derived aircraft groundspeed over time



Note: The groundspeed scale is not referenced to zero.

The aircraft's bank angle was calculated from the recorded data, including the ground speed and aircraft heading (Figure 10). The bank angle was found to have increased during the turn to reach a maximum of approximately 50° left-wing low.

Figure 10: Recorded aircraft heading over time



Organisational information

Operator safety management

The aircraft operator conducted both aerial agricultural and aerial geophysical survey operations. Aerial geophysical survey operations were commenced in 2007 and two Cessna 210 aircraft were equipped for survey operations.

The operator had a Safety Management System (SMS) detailing the responsibilities of management and employees in regard to safety. One of the methods of disseminating information on risks was safety meetings. The last safety meeting prior to the accident occurred in Karumba on 24 April 2008. There was nothing recorded in the minutes of that meeting that was relevant to the conduct of the survey flight.

The operator was a member of the International Airborne Geophysical Safety Association (IAGSA). As part of their membership, the operator was required to comply with IAGSA guidelines. IAGSA required the company to complete a Job Safety Assessment and Plan prior to conducting aerial geophysical survey.

Karumba-based survey operation

The operator was contracted to conduct the geophysical survey operation by a national geoscience research and geospatial information organisation in conjunction with a state geoscience organisation. The operator had completed other jobs for the national organisation and was on a panel of preferred survey providers.

Before conducting the Karumba-based survey, the operator completed a job safety assessment and job safety plan. Those documents included a risk assessment for the survey task and discussed risk mitigation strategies. The risks identified included flying at 80 m (+/- 10 m) AGL with a moderate level of bird activity.

One of the other pilots, employed by the operator, who had flown survey flights in the region, commented that there were large birds in the area, and that there were more birds in the survey area than on other surveys he had flown. A wetland was located on the recorded aircraft track close to the accident site. During the on-site investigation, ATSB investigators observed a number of large birds in the vicinity of the accident site, including brolgas.

It was the operator's practice to include a list of property owners over whose land the survey would be conducted in the contacts section of their job safety plans. On this occasion, the job safety plan only included the contact details for the national geoscience research and geospatial information organisation. For this particular survey, the contracting organisations were responsible for notifying landowners of the survey operations.

The state geoscience organisation wrote to the relevant land owners over which the survey was occurring and advertised the survey in local and state newspapers, as well as on local radio stations. The state geoscience organisation's letter encouraged landowners to contact that organisation if they had concerns about the survey operation. The organisation received one reply, from a landowner who was concerned the survey could conflict with their planned aerial mustering operations. The organisation responded to the landowner and notified the operator, so the operator could directly coordinate with the concerned landowner.

Some local landowners commented that they were not informed of the survey flights and routes, that survey aircraft did not use their radios and that they were concerned about the risk of collision with mustering helicopters. There were no reports of other aircraft flying in the vicinity of the accident site at the time of the accident.

The operator encouraged pilots to keep a look out as much as possible, and had set up the reference equipment for the survey lines on the glareshield to assist pilots' lookout.

The operator's procedures were for pilot's to monitor traffic on the local very high frequency (VHF) area frequency and on the applicable common traffic advisory frequency (CTAF). While VHF transmissions by the survey pilot could interfere with the survey data, the operator reported that pilots could transmit if necessary. Mustering helicopters generally operated on an ultra high frequency (UHF) frequency.

ANALYSIS

The aircraft's collision with terrain at a high bank angle was consistent with the pilot losing control of the aircraft after the initiation of a turn at low altitude. In the analysis following, a number of potential factors are considered: flight control malfunction, environmental conditions, bird strike, mishandling, fatigue and pilot incapacitation.

The aircraft's flight control systems were examined at the accident site and there was no evidence of any defects or anomalies likely to have contributed to a loss of control. Specialist examination of the autopilot components found that the pitch actuator motor may have been powered at the time of impact, but that there was no evidence that the other components were electrically powered. In the context of the survey flight, there was no reason for the autopilot to be engaged, the autopilot controller was labelled unserviceable and the pilot reported that he never used the autopilot. It is possible that the ON/OFF switch on the autopilot controller was impacted during the accident sequence, energising the pitch actuator. Irrespective of whether the autopilot components were powered or not, the roll actuator was not capable of controlling the ailerons and the pitch actuator slip-clutch would have allowed the pilot to override any spurious autopilot inputs.

The investigation did not identify any environmental conditions that may have contributed to a loss of control. The weather was reported to be good, with light winds and scattered clouds.

With sightings of large birds in the survey area, there was the potential for a bird strike. However, there was no evidence of a bird strike on the aircraft or a large injured bird or carcass in the vicinity of the accident site. The possibility of a bird-avoidance manoeuvre by the pilot could not be ruled out. That was, however, considered unlikely due to the pilot's experience in operating at low-level in areas with a high bird hazard.

With regard to aircraft mishandling, the pilot was very experienced, particularly in low-level agricultural flying, and had over 90 hours flying the Cessna 210 aircraft type on geophysical survey operations. That made it unlikely that the pilot lost control of the aircraft during normal operations. While it was possible that the pilot may have been attempting an aerobatic manoeuvre, it was unlikely that an experienced pilot would attempt such a manoeuvre, at such a low altitude.

The investigation also could not rule out the pilot being fatigued, falling asleep and losing control of the aircraft. However, given that the pilot appeared well rested and had a low workload on the days preceding the accident, and the relatively early time of the accident in the pilot's flying day, the investigation did not believe this was likely to have occurred.

At the pilot's aviation medical examination that was conducted about 8 months prior to the accident, there were no signs or symptoms of a heart condition. There were also no reports from family or colleagues of ill-health. However, post-mortem examination of the pilot identified focal scarring and chronic inflammation of the heart muscle. The pathologist's report indicated that, while unprovable, there was the realistic possibility that due to the pilot's medical condition, an irregular heart rhythm could have lead to a loss of consciousness. The increasing angle of bank, and progressive descent into terrain, is consistent with a loss of consciousness.

The investigation concluded that, in the absence of any supporting evidence for other factors, the most likely explanation for the collision with terrain is pilot incapacitation.

FINDINGS

From the evidence available, the following findings are made with respect to the loss of control and collision with terrain of the Cessna 210 registration VH-IDM and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- During a left turn after completing a survey line, the aircraft lost altitude, increased bank angle and speed, and impacted terrain in a steep left-wing down attitude, seriously damaging the aircraft and fatally injuring the pilot.
- The pilot probably lost consciousness during the left turn as a result of an irregularity of heart rhythm associated with either focal scarring or chronic inflammation of the heart muscle.

APPENDIX A: SOURCES AND SUBMISSIONS

Sources of information

The sources of information for this investigation included:

- the Bureau of Meteorology (BoM)
- the Civil Aviation Safety Authority (CASA)
- the operator of VH-IDM
- the aircraft maintenance organisation
- the manufacturers of the survey equipment
- the manufacturer of the aircraft tracking equipment
- the manufacturer of the engine data management equipment
- the US National Transportation Safety Board (NTSB)
- the Office of the State Coroner (Queensland)
- the colleagues of the pilot
- a number of pilots flying in the area at the time of the accident
- the pilot's Designated Aviation Medicine Examiners (DAME)
- the Queensland Police Service
- Queensland Health, Forensic and Scientific Services
- the Transport Safety Board (TSB) of Canada
- organisations contracting the survey operations.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

A draft of this report was provided to the aircraft operator, CASA, the Queensland Health, Forensic and Scientific Services, the organisations contracting the survey operations, the Queensland Police Service, the Office of the State Coroner (Queensland), the pilot's DAMEs, and the pilot's next of kin.

Submissions were received from the aircraft operator and CASA. The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.