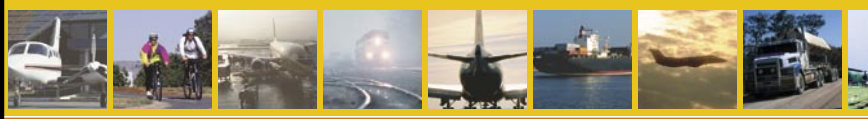
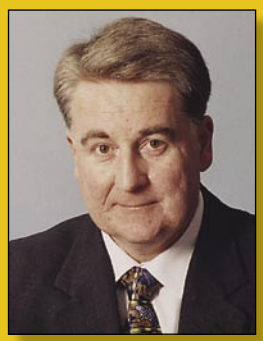
Australian Government
Australian Transport Safety Bureau

The Australian Air



Executive Director's Message

Emerging safety issues



In conformity with Annex 13 to the Chicago Convention, the ATSB's prime aviation role is to maintain and improve future industry and passenger safety through accident and incident investigations and research based on occurrence trends.

There has been an unusual level of locust activity in Australia this year, with a consequent increase in flying associated with their management. The ATSB is looking at this activity to assess the level of risk in this kind of operation. The nature of the work is different, and because locust work on a large scale generally happens infrequently, there is a risk that some of the pilots and the organisations involved will not have (or have lost) some of the experience necessary for safety.

There has been a number of wirestrike accidents during the locust campaign which the ATSB is investigating, including one fatal accident. The ATSB is also conducting research into the generic processes used to manage airborne campaigns in Australia, when large numbers of aircraft are required at short notice to conduct sometimes hazardous activities for the public good. The Bureau wants to identify if there is a potential to inadvertently inject hazards into these activities by the way that they are contracted and managed. The ATSB is working with bodies such as the AAAA and will be releasing a report when this research is completed and making any necessary suggestions to improve future safety. Any input to the research would be most welcome.

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An Aviation Self Reporting Scheme (ASRS) form can be obtained from the ATSB website or by telephoning 1800 020 505.

Low level stall after take off

Occurrence 200302847

ON 22 June 2003, a Cessna Aircraft Company 172M, registered VH-TUR, drifted to the right shortly after take off from runway 35 at Wedderburn airfield in NSW and impacted the ground to the north-east of the airfield. The aircraft was destroyed and the four occupants were fatally injured.

The pilot held a valid Private Pilot Licence (aeroplane) and current class 2 medical certificate. There was no evidence that any physiological or psychological factors had affected the pilot's performance.

A witness at the airfield videoed the aircraft as it took off. Examination of the video revealed that the aircraft became airborne after a take-off roll of about 500 m, with 10 degrees of wing flap extended. As it climbed, the aircraft drifted to the right, and entered a right-wing-low sideslip with a nose-up attitude. Witnesses at the airfield observed the aircraft, between gaps in the trees to the north-east of the airfield, banked to the right in a steep descent and then heard the sound of an impact.

The investigation found that the aircraft had been descending steeply in a right turn when it impacted the ground in a westerly direction. Data recovered from a global positioning system found in the wreckage supported other evidence, which indicated that the aircraft entered a spin during a right turn after take-off.

Examination of the wreckage revealed no evidence of pre-existing mechanical defects that may have contributed to the accident. The wing flaps were in the 10 degrees extended position at the time of the accident. The aircraft stall warning system was recovered from the wreckage, tested and found serviceable. The aircraft had sufficient fuel onboard for the planned flight.

An assessment of the aircraft weight indicated that it was approximately 30 kg above maximum allowable take-off weight, and the centre of gravity was calculated to have been towards the aft limit of its normal centre of gravity range. That extra weight would have increased the aircraft stall speed by 1.4 per cent (less than 1 kt), and reduced its climb performance slightly.

The wind was turbulent, coming from behind and to the left of the aircraft during take off. As the aircraft climbed above the shelter from surrounding trees, it would have encountered a momentary increase in tailwind which would have decreased its airspeed.

The aircraft was observed flying slowly during its climb after takeoff. If the aircraft's airspeed became sufficiently slow in a steady climb, the aircraft would stall. The circumstances were consistent with the aircraft having stalled in a right turn with insufficient height to recover before impacting the ground. The investigation identified a number of factors that may have contributed to the aircraft entering a stall. ■

Mareeba crash linked to possible pilot incapacitation

Occurrence 200304091

THE ATSB's final investigation report into the Piper Aztec accident which killed a family of five near Mareeba, Queensland on 1 October 2003, has found that the pilot was probably incapacitated as a result of a cardiac event.

The pilot, his wife and three children were conducting a private flight from Mareeba, to Roma, Queensland, in the Piper Aztec aircraft, registered VH-WAC. The ATSB was told that the family normally flew with one child in the front, and the pilot's wife and their other two children in the second row of seats. Witnesses reported that shortly after the aircraft took off from runway 28, it started to bank to the left. The left bank gradually steepened, after which the aircraft rapidly descended to the ground. Witnesses close to the aerodrome described engine noises consistent with normal operation. The aircraft was destroyed by impact forces and post-impact fire.

The accident site was 1.5 km west-south-west of Mareeba aerodrome. At the time of impact, the aircraft was inverted and in a nose-low, nearly vertical attitude. An intense post-impact fire resulted in significant melting and destruction of much of the aircraft structure and components. The examination of the wreckage by ATSB investigators did not identify any pre-existing defect that could have contributed to the accident.

At the time of the accident the weather at Mareeba was fine, with a gentle to moderate breeze from the north-north-east.

Post mortem examination of the pilot identified significant narrowing of the coronary arteries. Examination of the heart tissue identified an area of cellular damage, possibly resulting from a recent (within days or weeks) disruption of oxygen supply to the heart, and also identified possible long-standing ischaemic changes. A specialist aviation forensic pathologist who assessed the post-mortem reports on behalf of the ATSB concluded that it was `likely that the pilot was incapacitated during flight, given the extent of coronary artery disease present at autopsy'. There was no evidence that medication, alcohol, carbon monoxide or other toxic substances adversely affected the pilot at the time of the accident.

Examination of the pilot's kidneys identified changes that suggested mild hypertension (high blood pressure). The pilot's blood pressure was recorded as within limits during all aviation medical examinations dating back to 1991. His systolic blood pressure was consistently well below the acceptable upper limit stipulated by the Civil Aviation Safety Authority (CASA), whereas his diastolic blood pressure was only marginally below the upper limit during more recent aviation medical examinations. The pilot's diastolic blood pressure during a pre-employment medical on 21 March 2002 was 100 mmHg. This was slightly above the CASA upper limit of 95 mmHg.

The results of the pilot's blood tests conducted in November 1995 and June 2001 indicated marginally elevated cholesterol levels, or mild hyperlipidaemia.

Hypertension and hyperlipidaemia are risk factors associated with the development of coronary heart disease. The specialist commented that the identifiable risk factors for the development of coronary heart disease were sufficiently mild to only be significant in retrospect and with the addition of autopsy findings. The nature of incapacitation as a result of an ischaemic cardiac event could have ranged from chest pain and shortness of breath, to loss of consciousness and cardiac arrest.

Control of the aircraft was lost at a height from which recovery was not possible. The reason for the loss of control could not be conclusively established, however the circumstances of the accident and the available evidence was consistent with pilot incapacitation associated with coronary artery disease. Other possibilities, either individually or in conjunction with pilot incapacitation could not be excluded. ■

1 Defined by the Merriam-Webster Medical Dictionary as 'localised tissue anemia due to obstruction of the inflow of arterial blood (as by the narrowing of arteries by spasm or disease)'.

2 The systolic blood pressure is the peak arterial blood pressure during the cardiac cycle.

3 The diastolic blood pressure is the lowest arterial blood pressure during the cardiac cycle.

Safety briefs

Tyre deflation during departure

Occurrence 200305203

The crew of the de Havilland DHC-8 (Dash 8), registered VH-TQX, reported that, during taxi for departure, the left main landing gear tyre had deflated. During the return to the terminal, the crew advised that smoke had been seen coming from the wheel and requested that the Rescue and Fire Fire-fighting (RFF) service attend. The aircraft was stopped on the taxiway and the passengers were disembarked to a grass area on the southern side of the pavement. The aircraft remained disabled in that position until it could be towed away. RFF personnel advised they had not observed any smoke or fire.

An examination of the failed wheel found that an inner section of the bead seat had broken away from the rim, causing the tyre deflation. An area of fatigue cracking was identified at the centre of the fracture and had originated at the transition radius between the bead seat and rim body. A review of the wheel design found that the assembly had a history of fatigue cracking from the bead seat radius and as a result, the wheel manufacturer had introduced an improved design in late 1993.

In response to this occurrence, the wheel manufacturer revised the inspection requirements for the old design wheels – requiring that wheels that have accumulated 50 or more tyre changes undergo a full dye penetrant inspection at every tyre change thereafter. Steps were also implemented to accelerate the removal of the old design wheels from service and assistance given to the aircraft operator in improving the calibration and accuracy of their inspection techniques. ■

Helicopter strikes power cables

Occurrence 200404286

At about 0900 Eastern Summer Time on 1 November 2004, the pilot of a Bell Helicopter Company 47G-4A, registered VH-AHL, repositioned the helicopter for loading prior to departing his property airstrip for a locust spraying operation. That involved the sole occupant pilot air taxiing the helicopter around and behind another helicopter that had already been loaded, and was about to depart the designated loading area.

Mudgee Guardian

As the pilot air taxied abeam the loading area, the helicopter struck power cables that passed about 50 m from the airstrip, and at an estimated tree top height. The helicopter was destroyed by the resulting ground impact and post-impact fire. The pilot suffered minor injuries.

The power company owning the cables struck by the helicopter has installed overhead markers to the repaired power cables. In addition, that company is seeking to have input to the development of the Australian Standards affecting the mapping and marking of power cables and their supporting structures.

The Australian Transport Safety Bureau is examining the contractual structure and organisational interaction within aviation campaign operations similar to that affecting this occurrence. That examination will include the management of the unique risks inherent to those types of campaign, and seek to highlight risk mitigation options for consideration by future aviation campaign participants. ■

FMS problem on approach

Occurrence 200302433

During the inbound turn on a night instrument approach to runway 14 at Mackay, Queensland, the air traffic controller observed that the Boeing 717 aircraft had descended below the minimum altitude for that sector of the approach. The aircraft then climbed above the minimum sector altitude. Later, during the same approach, the controller observed the aircraft diverge right of the extended runway centreline when on final approach and instructed the aircraft to climb. During the missed approach, the aircraft flew an incorrect track but subsequently completed an uneventful landing from a second instrument approach.

The crew reported that they removed the altitude constraints in the aircraft's flight management system (FMS) to check the overhead Mackay altitude, and then reinserted the constraints. Investigation by the aircraft manufacturer revealed a likely sequence of entries to the active flight plan multi-function control and display unit (MCDU) page that had the effect of displacing the altitude constraints forward by one waypoint.

The final approach was flown in conditions of light to moderate rain. At about 800 ft altitude, the co-pilot called that the runway was to the right and the pilot in command turned the aircraft in that direction. A short time later, the controller noticed that the aircraft was off track and issued the climb instruction. A go-around was conducted from an altitude of 520 ft.

The operator amended the operations manual to require that editing of altitude constraints was to be via the vertical revision page for the particular waypoint. The airport operator installed runway threshold identification lights on runway 14. ■

Loss of hydraulic system

Occurrence 200304938

Shortly after selecting the landing gear up after departure on a flight from Brisbane to Barcaldine on 27 November 2003, the crew of the de Havilland Canada DHC-8-202 registered VH-SDA observed the number two hydraulic pump caution light illuminate followed by a zero hydraulic pressure indication. The crew carried out an air return and after extending the landing gear manually, made an uneventful landing. Loss of the hydraulic system was traced to the failure of a flexible hydraulic hose in the nose landing gear actuation system, allowing the loss of system pressure and fluid quantity.

The failed component was forwarded to the Australian Transport Safety Bureau in Canberra for examination. The ATSB found the hose had failed by localised rupture at the point of swaged connection to an end fitting. Associated with the rupture was evidence of fatigue cracking and breakage of the external reinforcing braid wires, with cracking also found to a lesser degree on the opposite side of the connection. There was no evidence suggesting that a manufacturing or material defect had contributed to the hose failure. Assembly diagrams showed the hose to have failed at the point of maximum flexure when the landing gear was extended or retracted.

In-service flexures of the hose and pressure cycles / pulsations inherent to the operation of the aircraft's hydraulic system were considered to be likely contributory factors. The evidence to hand suggests the flexible hydraulic hose failure was a distribution 'outlier'. Given that the reliability of the assembly is being managed by life limiting the susceptible component and the loss of a hydraulic system can be managed adequately using existing aircraft flight manual procedures, the maintenance philosophy applied to that system was considered appropriate. ■

Aviation research grant: erratum

In the story on the Aviation Safety Research Grant Scheme – Nov–Dec 2004 issue of *Flight Safety Australia*. Please note that the correct closing date is 25 February 2005.

Engine failure

Occurrence 200303633

On the morning of 15 August 2003, the pilot hired a Victa Ltd Airtourer, registered VH-MVP, to practice basic aerobatics. The pilot conducted a number of touch and go circuits prior to flying to the training area. During the climb after the fourth takeoff, the aircraft engine surged then stopped. Shortly after, witnesses saw the aircraft turn left and then heard it impact the ground. The pilot was fatally injured in the accident.

Examination of the aircraft fuselage, flight controls, engine and fuel components by the investigation found no explanation for the sudden loss of power observed by witnesses. Approximately 6.8L of fuel was removed from the aircraft fuel tank.

The investigation examined a similar model aircraft and fuel system. It was found that it is relatively easy to have the bottom (five imperial gallon) segment of the dipstick bend sideways, when the dipstick contacts the bottom of the tank, if the segments are not tensioned by releasing pressure on the tension button. This results in the dipstick over-reading by about 4–5 imperial gallons (18.2L-22.7L).

It is possible that the pilot's operation of the dipstick provided an erroneous reading which led the pilot to believe the aircraft's tank contained more fuel than it actually did. Additionally, an intermittent fuel gauge reading meant that the pilot may not have been able to check the fuel quantity by a secondary means.

In the takeoff climb the fuel pickup point in the tank was probably unported, interrupting the fuel flow to the engine thus causing it to lose power. After the loss of engine power, the pilot probably attempted a turn back to the runway with insufficient height to complete the manoeuvre. ■

Forced landing

Occurrence 200402049

On 4 June 2004, the pilot of a Cessna Aircraft Company U206A planned to conduct a private flight from Lakeside Airpark to Proserpine aerodrome and return, a total distance of 40 km. The pilot was the only occupant on the flight to Proserpine which he described as uneventful. Three passengers were boarded at Proserpine for the return flight via Laguna Whitsunday Resort, a diversion for sightseeing that added a few minutes flight time.

Shortly after passing the resort's marina, when the aircraft was flying straight and level and was over water at about 1,200 ft, the engine failed. The pilot selected the right half of the auxiliary fuel pump switch to LO and changed the fuel selector position from the right to left tank. There was no response from the engine so he changed the position of the fuel selector a number of times and selected the left half of the fuel pump switch to HI for short periods. The pilot glided the aircraft towards a flat area between the marina and the resort golf course. The aircraft landed heavily on a flat area about 20 m before a 1.4 m high embankment. The propeller dug into the bank and the aircraft overturned, resulting in substantial damage. Witnesses and resort staff attended the scene and helped the pilot and passengers out of the aircraft. Emergency services attended from Proserpine and treated the four occupants who were seriously injured.

An extensive examination of the aircraft including the fuel system, ignition system and engine did not reveal any defects that would have accounted for the accident. The aircraft fuel tanks contained approximately 50 L of aviation gasoline per side, which was about 1/3 of each tank's capacity.

The investigation found that the emergency procedures used by the pilot were generic and were not consistent with the aircraft manufacturer's instructions for an in-flight engine restart. It was likely that the sustained use of the auxiliary fuel pump, instead of the specified momentary use, provided fuel flow that exceeded the engine's requirements and prevented a restart. A mandatory procedure card that provided the aircraft manufacturer's instructions for in-flight engine restarting procedures was not available to the pilot. ■