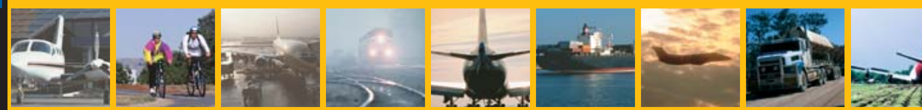
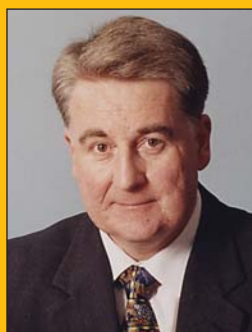
Australian Government
Australian Transport Safety Bureau

The Australian Air



Reflecting on the ATSB's aviation outputs in 2004–05



In 2004-05 the ATSB's aviation activities benefited considerably from the funding boost for aviation investigations and aviation database replacement that was provided in the May 2004 Federal Budget. During the year, the Bureau recruited and commenced training 12 extra aviation safety investigators, instigated 109 aviation occurrence investigations and released 98 aviation investigation reports, up from around 60 in previous years. The Bureau received 6047 notifications of accidents and incidents, and finished the financial year with 86 ongoing occurrence and technical investigations on hand.

High profile aviation safety investigation reports released in 2004-05 included reports on investigations into a fatal Cessna C404 aircraft accident at Jandakot Airport, WA, a fatal Emergency Medical Services (EMS) helicopter accident near Mackay, Qld, and a Boeing 737 terrain proximity warning near Canberra. The Bureau also released ten aviation safety research reports including on pilot behaviour in adverse weather, power loss related accidents, and a survey of pilot's flying experiences.

During 2004-05 the ATSB issued 19 aviation safety recommendations and two safety advisory notices and successfully negotiated valuable safety actions by regulators, operators, manufacturers and other safety stakeholders. The Bureau also completed Stage 1 of the Safety Investigation Information Management System (SIIMS) aviation database replacement project, which involved developing ATSB user requirements and the trial of software tools to support the improved management of safety investigations. In the ATSB's 2004-05 training activities, fifteen staff completed the Diploma of Transport Safety Investigation course and a further 30 are progressing through the course.

Following the 15-fatality Metroliner aircraft accident near Lockhart River, Queensland, in May 2005, the Bureau commenced its major investigation into the causes of the tragedy and released a preliminary factual report in June 2005.

The ATSB looks forward to working with stakeholders to enhance transport safety during 2005-06 and beyond.

Kym Bills, Executive Director

Corrigendum
The Lochart River aircraft accident involved the most fatalities in an Australian commercial aircraft accident in over 35 years. This is a correction to the introduction of the Executive Director's message in the May/June edition.

Power loss related accidents involving twin-engine fixed wing aircraft

A number of serious accidents occurred during the years 2001 to 2004 involving twin-engine fixed-wing aircraft following a loss of some or all engine power. This study of the 63 twin-engine fixed-wing aircraft power loss accidents (11 fatal) during the period 1993 to 2002 identifies common themes of these accidents. The study was limited to power loss accident data .

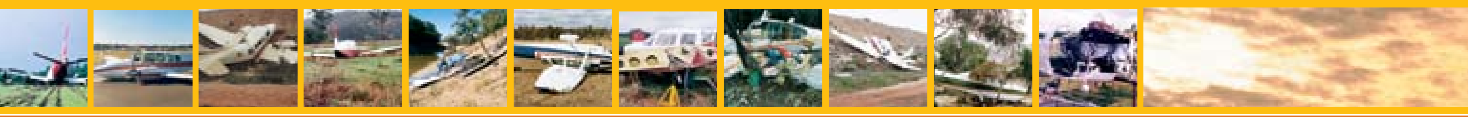
To obtain an overall view of the risk of twin-engine fixed-wing power loss accidents, twin- and single-engine fixed-wing power loss accident and fatal accident rates were compared. The twin-engine fixed-wing power loss accident rate was found to be almost half of the rate for single-engine fixed-wing aircraft. However, a power loss accident in a twin-engine fixed-wing aircraft was more likely to be fatal than a power loss accident in a single-engine fixed-wing aircraft. Without comprehensive power loss incident data it is not possible to determine the actual risks of an accident or incident resulting from a power loss event for both single- and twin-engine fixed-wing aircraft.

Ten of the 11 fatal accidents subsequent to a power loss in twin-engine fixed-wing aircraft were the result of an in-flight loss of control. In contrast, the majority of non-fatal accidents subsequent to a power loss were primarily the result of degraded aircraft performance and resulted in aircraft being forced landed.

When a twin-engine fixed-wing aircraft sustains a loss of power, the resulting power output can produce a power condition that is either asymmetric or non-asymmetric. The twin-engine fixed-wing power loss accidents were grouped based on whether the aircraft was being powered asymmetrically or non-asymmetrically when the accident occurred.

The analysis of the data showed that:

- Just over one-third of power loss accidents in twin-engine fixed-wing aircraft occurred during a non-asymmetric power loss. The majority of these were related to fuel management, and no benefit was derived from the presence of a second engine.
- The vast majority (86 per cent) of non-asymmetric power loss accidents occurred following a power loss in either the en route or approach phases and resulted in aircraft being forced landed.
- Almost two-thirds of power loss accidents in twin-engine fixed-wing aircraft occurred during an asymmetric power loss. The reasons for these power losses were more varied than those in the non-asymmetric power loss group, with fuel management, fuel system problems, engine and propeller malfunctions, perceived power losses, simulated engine failures and power losses for undetermined reasons all identified as causes of power loss.
- More accidents (46 per cent) occurred following an asymmetric power loss in the take-off phase than in any other phase of flight.



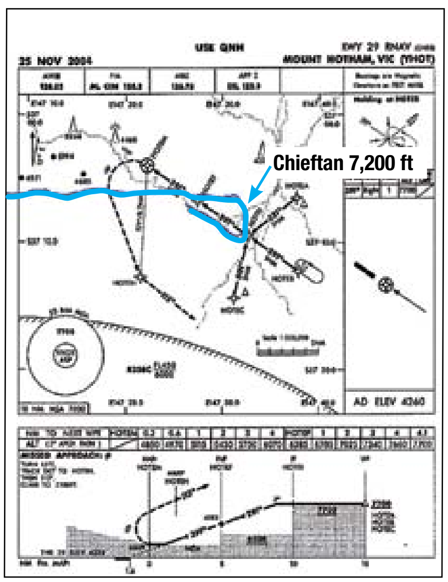
Preliminary Report on Mount Hotham Fatal Accident

On 8 July 2005, the pilot of a Piper PA31-350 Navajo Chieftain submitted a flight plan to air traffic control for a flight from Essendon to Mount Hotham, Victoria. The plan indicated that the flight would be conducted in accordance with visual flight rules (VFR) and that two passengers would be on board.

While taxying at Essendon, the pilot notified air traffic control that due to adverse weather conditions at Mount Hotham, he now required an amended airways clearance to a new destination, Wangaratta, Victoria. He added that this was because Mount Hotham was '...all socked in'. The Chieftain departed Essendon at 1629 Eastern Standard Time (EST).

At 1647 the pilot changed his destination to Mount Hotham. At 1648 the pilot contacted Flightwatch1 and requested that the operator telephone the Mount Hotham airport manager and advise an anticipated arrival time of approximately 1719. The airport manager, who was also an accredited meteorological observer, stated that in the existing weather conditions the aircraft would be unable to land. He also indicated to the Flightwatch operator that prior to the aircraft departing Essendon he had twice spoken to the pilot about rapidly deteriorating weather conditions at Mount Hotham. The pilot responded to the Flightwatch operator that '...our customer is keen to have a look at it'.

The pilot had access to the area forecast and aerodrome forecast for Mount Hotham. Each predicted icing conditions in the Mount Hotham area. During the two discussions with the airport manager prior to departing Essendon, the pilot was advised of actual weather conditions, which included information about low



cloud, poor visibility and snow showers in the vicinity of the aerodrome. The Chieftain was not equipped for flight into forecast or known icing conditions.

A short time later, the pilot reported to air traffic control that the aircraft was overhead Mount Hotham. He requested a change of flight category to instrument flight rules (IFR) in order to conduct a Runway 29 Global Navigation Satellite System (GNSS) approach. Air traffic control acknowledged the transmission.

At 1725 the pilot broadcast on the Mount Hotham Mandatory Broadcast Zone (MBZ) frequency that the aircraft was on final approach for runway 29 and requested that the airport manager activate the runway lights. At 1727 the airport manager attempted to advise the pilot that the runway lights had been activated. There was no response and no further transmissions were heard from the aircraft.

Due to hazardous weather conditions over the following two days, the search for the aircraft was primarily conducted on foot and on horseback. A helicopter engaged in the search for the aircraft located it at 1030 on 11 July. The Chieftain was found on a tree covered ridge, partially covered in snow, approximately 5 km south-east of the aerodrome at an elevation of 4,060 ft above mean sea level.

All occupants had been fatally injured and an intense post-impact fire destroyed most of the fuselage, including the instrument panel and avionics. Damage to the engines and propellers was consistent with both engines delivering power at the time of impact. The landing gear was extended, but its pre-impact position could not be confirmed. The wing flaps were fully retracted.

Although the aircraft was fitted with an emergency locator transmitter (ELT), AusSAR2 did not receive any signal. The ELT was recovered, but was severely damaged by heat.

During the day, Bombardier Dash 8 and Cessna Citation aircraft had attempted Runway 29 GNSS approaches. As the crews were unable to establish visual reference at the cloud and visibility minima, the aircraft diverted to alternate aerodromes. No anomalies with the global navigation satellite system were detected during the period that any of the aircraft were in the vicinity of Mount Hotham. Radar and other data also showed that although the pilot had advised his intention to conduct the Runway 29 GNSS approach, he did not follow the published procedure. ■

Safety briefs

Failure of cooling turbines

Occurrence 200404823

On 6 December 2004, a Fokker Services B.V. F28 Mk0100 (Fokker F100) aircraft, registered VH-FWI, was being prepared for a flight from Townsville, to Brisbane, Queensland, when the ground crew notified the flight crew of a rumbling noise coming from the left airconditioning system. No fault indications were present on the flight deck, so the flight crew elected to depart for Brisbane with both airconditioning systems operating

During cruise at 35,000 ft, the crew noticed a burning smell and a loud noise coming from the airconditioning system. Based on the earlier report from the ground crew, the flight crew shut down the left airconditioning system. The noise continued, so the left system was switched back on and the right system was shut down.

Seven minutes later, the left airconditioning pack produced similar symptoms and was shut down by the crew. With both systems shut down, the aircraft's pressurisation system was rendered inoperative. The crew donned oxygen masks, commenced an emergency descent to 10,000 ft and notified air traffic control. The flight continued to Brisbane without further incident.

A subsequent engineering examination found that the cooling turbines, in both left and right airconditioning systems, had failed due to operation in a speed range beyond the original design of the components. Failure of bleed air supply regulating valves and prolonged operation of anti-ice systems outside the normal range of operation contributed to the failure of the cooling turbines.

As a result of this and other similar occurrences, the aircraft manufacturer and the operator implemented additional maintenance requirements for the affected components to prevent a recurrence. ■

Fractured landing gear struts

Occurrence20042243

At about 0630 EST on 21 June 2004, a MD Helicopters MD520N helicopter, registered VH-MPI, took off from Gladstone, Queensland, to transport a marine pilot to the deck of a bulk carrier ship that was preparing to enter Gladstone harbour. During the landing on the ship, the right landing gear struts fractured. The helicopter collapsed onto its right side and the main rotor blades struck the ship's deck. The helicopter was substantially damaged and the pilot and passenger exited the helicopter uninjured.

Both front and rear right landing gear strut legs had failed in gross outward bending overload. The rear strut failure was due to fatigue cracking within the rear strut drag brace lower connection hole and the loads sustained during a firm deck landing. The failure of the right front strut was consistent with the additional load it would have carried following the failure of the right rear strut during the landing.

The rear drag brace bushing was a non-standard component that did not resemble any of the approved parts for the application. The machining of the strut to accommodate the os bush produced a rough finished hole surface. The stress-raising influence of the rough machining, in combination with the elevated hoop stresses from the (prescribed) interference fit bush installation, were suspected as being prime factors contributing to the initiation of fatigue cracking. There was no evidence in the helicopter's maintenance paperwork of any maintenance carried out to indicate when the non-standard bushing was fitted to the helicopter. ■

Fatigue cracking of stabiliser tube

Occurrence 200402215

On 15 June 2004, a Hiller Aviation UH-12E helicopter, registered VH-HMT, crashed during an agricultural operation, after the pilot reported a loss of tail rotor authority. The pilot was not injured in the accident. The horizontal stabilizer was found about 150 m from the wreckage site, indicating that it had separated from the helicopter in-flight. The operator reported that damage to the stabiliser and the tail rotor blades was consistent with the separated stabiliser coming into contact with the tail rotor blades as it was still connected to the helicopter by the tail light wiring. The operator reported that an engineering examination found no evidence of tail rotor system failure.

The horizontal stabiliser spar tube failed in the area where the tube passes through a collar in the doubler attached to the inner stabiliser rib.

The helicopter was manufactured in 1978 and had accumulated 6,903.50 hours time in service at the time of the accident. In September 2002, at 6,386.25 hours in service, it sustained major damage following a sudden main rotor stoppage. The helicopter was rebuilt and had since accumulated approximately 517.20 hours in service. It was maintained in accordance with the maintenance requirements applicable at the time and had a valid Maintenance Release. It had flown approximately 31 hours since the last periodic inspection, a 100 hourly inspection completed in May 2004.

A detailed examination of the failed spar tube indicated that it fractured as a result of fatigue cracking. The crack initiation occurred at a number of locations where the tubing had been reduced in wall thickness by wear. It was apparent that the wear of the tubing was associated with small scale repeated movement between the stabiliser tube and the doubler attached to the stabiliser inner rib. ■

R22 clutch shaft failure – Prelimary report

Occurrence 200501655

On 13 April 2005, at 0930 EST, the pilot of a Robinson Helicopter Company model R22 Beta, registered VH-HXU, was conducting cattle mustering operations near Mareeba, Qld, when he felt a significant airframe vibration and elected to immediately land the helicopter. Following a safe landing and during engine shut-down, the clutch shaft that transfers drive through to the main rotor gearbox failed. The pilot, the sole occupant of the helicopter, was not injured.

The helicopter maintenance provider reported the failure to the Civil Aviation Safety Authority (CASA), through the Service Difficulty Reporting system. A representative from CASA subsequently notified the Australian Transport Safety Bureau (ATSB) of the failure, because of its apparent similarity to a failure sustained by R22 helicopter VH-UXF on 28 September 2003 that resulted in two fatalities and the destruction of the aircraft.

The failed clutch shaft, yoke, flex-plates and sprag clutch assembly were obtained by the ATSB. Laboratory examination of the clutch assembly confirmed the fracture of the clutch shaft (part number A166-1) at the connection to the yoke (part number A907-4) that transferred drive to the main rotor gearbox. The fracture had resulted from the growth of torsional fatigue cracking from an origin within the first bolt hole between the yoke and shaft end. Fracture of the clutch shaft results in the loss of all drive to the helicopter main rotor.

As a result of the September 2003 accident, CASA published airworthiness directive AD/R22/51, requiring the one-off disassembly of yoke-to-shaft connections and the inspection for cracking and bolt hole fretting damage. Maintenance documentation indicated AD/R22/51 was carried out on VH-HXU in August 2004.

The investigation is continuing and includes the investigation of the clutch shaft to yoke assembly, the maintenance history of the clutch shaft to yoke assembly, and the condition of the components and whether they comply with manufacturer's specifications. ■

Tail strike during takeoff

Occurrence 200403868

On 1 October 2004, a Boeing Company 737-86Q (737) aircraft, registered VH-VOF, was being operated on a scheduled passenger service from Perth, WA, to Sydney, NSW. The copilot was the handling pilot for the flight.

During the departure climb, the cabin crew alerted the flight crew to a possible tail strike during the takeoff. The pilot in command assumed control of the aircraft and elected to return to Perth. Engineering inspection confirmed that the aircraft had

sustained a tail strike during the takeoff.

The Perth automatic terminal information service advised the crew with of the existence of crosswind conditions on runway 03. The copilot initiated the rotation at V1 takeoff decision speed, which was 5 kts before the scheduled VR speed. There was a lack of change in airspeed at V1, which was indicative that the aircraft had encountered a wind gust, consistent with the crosswind conditions. The rotation was continued when the gust was encountered, and the aircraft was at a nose up pitch of 13.2 degrees at lift off. Despite the early rotation, it was conducted at a pitch rate of about 3 degrees per second.

The application of left control wheel during the takeoff was sufficient to deploy flight spoiler panels 3 and 4. That reduced the lift coefficient, and consequently, the tail clearance was reduced as the aircraft became airborne.

This occurrence highlights that during the take-off manoeuvre, tail clearance margins will reduce to the point where a tail strike will probably occur if rotation is below the scheduled VR speed, and/or rotation is beyond target lift off attitude, and/or excessive control wheel is applied which results in the deployment of flight spoilers. ■

Unforecast weather conditions

Occurrence 200401270

On 6 April 2004, at about 0625 EST, an Airbus A330-301 aircraft landed on runway 34L at Sydney airport in weather conditions that were below the landing minima. The aircraft, registered VH-QPC, was being operated on an IFR scheduled passenger flight from Perth to Sydney. During the latter stage of the flight unforecast fog developed at Sydney aerodrome, which resulted in the deterioration of visibility to below the landing minima.

After commencing the descent, the crew used weather information provided by controllers and from the onboard data-link when making decisions in response to the deteriorating visibility at Sydney aerodrome. However, during the latter stage of the flight the crew did not receive all of the weather information that was available to Air Traffic Control (ATC). This reduced the crew's situational awareness of the effects of the rapid progression of fog across the runway complex. While information was available via the onboard data-link, the crew were busy setting up for the approach into Sydney and would have had an expectation that ATC would advise of any significant deterioration in the weather conditions.

The crew initially required an Instrument Landing System approach to runway 16R based on Runway Visual Range information which did not reflect the actual visibility conditions. After being advised of a report from another aircraft, the crew of QPC then decided to conduct an approach to runway 34L. However, while the crew were manoeuvring the aircraft for the approach, the fog moved across the threshold of runway 34L. The crew then conducted an autoland onto that runway.

The occurrence highlights the significant safety issue that unforecast weather conditions present to aircraft when these conditions occur during the latter phase of flight. The occurrence also highlights the need for information sharing on a timely basis between flight crews and air traffic controllers so that the situation awareness of crews and controllers is maintained at a high level and the decision making of crews is optimised in dynamic weather situations. ■