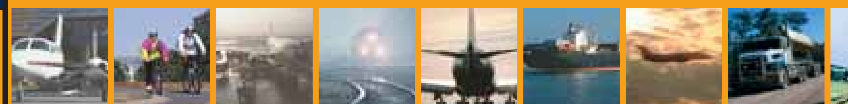
Australian Government
Australian Transport Safety Bureau

The Australian



Executive Director's Message

Safety Investigation Information Management System (SIIMS)

In the May 2004 Budget, the Government provided $6.1 million over four years to replace the ATSB's aviation investigation database. The new Safety Investigation Information Management System (SIIMS) will record and maintain information on civil aircraft accidents and incidents, support safety investigations, and generate investigation reports as required by Legislation. It will also support trend monitoring of occurrences and contributing safety factors, facilitate safety research to improve aviation safety, and enhance the ATSB's publicly available information.

SIIMS will improve the effectiveness and efficiency of ATSB investigations and safety research and analysis. It features a simplified occurrence data model to ensure greater consistency of data entry and improved statistical analysis, and more accurate reporting to external parties, including to the public. Investigations will be managed as formal projects using tools to ensure greater transparency of workload and cost. Investigators will work within 'collaborative workspaces' to ensure appropriate access to related investigation information, and to improve document and evidence management and tracking.

The new system will enhance consistency and rigour of investigation analysis through ongoing training and the use of analysis tools to ensure a clearer path between investigation analysis, findings and safety actions. Efficiencies gained from additional electronic data capture and through secure access to information within the database (to the extent that legislation allows) will improve information flow with internal staff and external partners.

The project is well underway with the database and supporting investigation tools currently being built to specifications. The ATSB has recruited extra staff to undertake the necessary manual recoding of historical data. The Bureau expects to implement the new system during March 2007. Recoding tasks will continue till the end of the 2007 calendar year and training in the use of a project management tool for investigations is expected to be completed before the end of June 2007.

The ATSB is continuing to liaise with the Canadian Transportation Safety Board who are currently progressing a similar project in order to share best-practice ideas.

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Australian Government Department of Transport and Regional Services

Preliminary report on the Strikemaster ex-military jet crash near Bathurst

At about 1215 EST on 5 October 2006, the pilot of a British Aircraft Corporation 167 Strikemaster aircraft took off from Bathurst, NSW, for a 25-minute joy flight with one passenger. The flight was briefed to include high-level aerobatics followed by a low-level simulated strike mission. During the low-level phase of the flight, the aircraft's right wing separated from the fuselage and the aircraft broke up. The remaining sections of the aircraft subsequently impacted the ground and were substantially damaged by impact forces and a post-impact fire. The ground impact ignited a large bushfire, which took several days to contain and destroyed most of the aircraft wreckage. The pilot and passenger were fatally injured.

The pilot held a Commercial Pilot (Aeroplane) Licence endorsed for the Strikemaster aircraft type and was approved for low-level aerobatic flight to a minimum height of 500 ft above ground level. He held a Class 1 civil aviation medical certificate and, according to his Pilot's Logbook, he had accumulated about 2,220 hours total aeronautical experience, about 835 hours on the aircraft type and about 2 hours in the last 30 days.

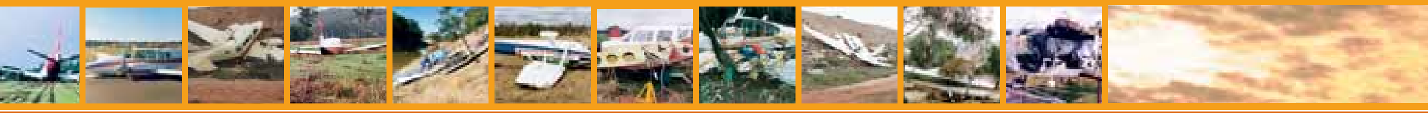
An on-site examination of the wreckage revealed that: the engine was producing significant power at the time of impact; the wing flaps and landing gear were retracted; the right wing had separated in-flight, and the tail components had separated from the aircraft in overload as a consequence of separation of the right wing.

The separation of the right wing had initiated from the upper wing main spar attachment lug under downward bending conditions. The investigation found two areas of pre-existing fatigue cracking in the wing attachment lug, the larger of which had an origin at the lug bore surface. The smaller area appears to have initiated from an area of prior surface/corner blending, which had possibly been carried out for previous defect removal purposes.

The investigation is continuing and will include a review of: the servicing history and Non-Destructive Inspection (NDI) examinations conducted on the aircraft, the service information provided to detect wing attachment lug cracks in Strikemaster aircraft, the system of dissemination of service information to operators of Strikemaster aircraft, and operational issues.

SAFETY ACTION

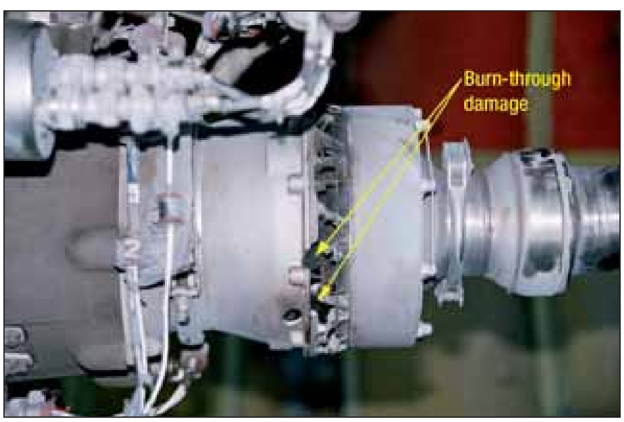
As a result of this occurrence, the ATSB briefed the Civil Aviation Safety Authority (CASA) on preliminary findings relating to the wing failure. CASA released Airworthiness Bulletin AWB 02-018 Issue 1 on 10 October 2006 and subsequently, Airworthiness Bulletin AWB 02-018 Issue 2 on 20 October 2006. The bulletins were applicable to all BAC 167 Strikemaster and Jet Provost aircraft. ■



Aircraft evacuation at Hobart airport

On 17 May 2005, a Boeing 717-200 aircraft, registered VH-VQI, was scheduled to operate a regular public transport flight from Hobart, Tas, to Sydney, NSW, departing at 0600 Eastern Standard Time, with six crew and 26 passengers. During the starting of the right engine at 0606, the aircraft dispatcher noticed sparks on the outer right side of the engine cowl and informed the pilot in command (PIC) to shut down the right engine as there was a fire. The sparks were due to a failure of the right engine air turbine starter during the engine start sequence. As the right engine was spooling down, the dispatcher noticed that the amount of sparks and smoke was still increasing and he told the PIC 'we'll have to get everyone off'. The PIC replied 'Do you want me to do an evacuation?' which the dispatcher confirmed. The PIC then immediately made a public address system (PA) announcement 'This is your captain, evacuate, evacuate, evacuate'.

The investigation found that the flight crew were engaged in conversations not confined to the engine start process or other operational matters during both engine start sequences. The operator's sterile flight deck policy for flight crew did not commence until after the engines were started. There was some misinterpretation of information between the aircraft dispatcher and PIC due to a lack of standard phraseology and no evacuation awareness education for aircraft dispatchers.



Twenty three seconds after the PIC made the evacuation PA announcement, he called for flaps 25. Eight seconds later, at the PIC's direction, the copilot started to read the 'Passenger Evacuation Checklist' from the checklist card they had been using for earlier checks. The evacuation occurred while the morning was still in darkness. As a result of the PIC calling for the passengers to evacuate the aircraft before the Passenger Evacuation Checklist was initiated: the wing flaps were not set to the extended position while passengers were exiting the aircraft (as is necessary when using overwing exits); the emergency lights in the dark tail section of the aircraft were not illuminated during the evacuation; and the copilot was still completing the checklist with the PIC in the cockpit up to the time all passengers had evacuated and so could not direct the evacuation from the ground. As a further result, the cabin crew evacuated themselves from the aircraft without making any contact with the flight crew and the flight deck door remained closed and locked. All three of the floor level exits were opened by cabin crew. The forward Door Right 1 escape slide fell to the ground uninflated when the door was opened. It is probable that the door was incorrectly armed before the evacuation. The Door Right 1 flight attendant was unaware that this door's girt bar had a fixed floor bracket rather than two spring latches and therefore differed from the forward Door Left.

A number of ground personnel ran to the front of the aircraft and helped 22 passengers off the forward Door Left 1 slide and directed them towards the terminal. Four passengers exited by the Door 2 slide at the rear of the aircraft and ran into the middle of the apron. Given the passenger load, the overwing exits were not opened. Although all 26 passengers sucessfully exited the aircraft in less than 64 seconds, 11 reported receiving minor injuries.

As a result of the occurrence, a number of safety actions were taken by the aircraft operator, the starter manufacturer and the Australian Transport Safety Bureau.

As a result of this occurrence and the fact that the Australian B717 fleet are currently in the process of being transferred to another Australian operator, the Australian Transport Safety Bureau (ATSB) intends to brief the new operator on the safety issues identified during this investigation.

Copies of this investigation report have been forwarded to all high capacity regular public transport operators in Australia as well as being published on the ATSB website. ■

Safety briefs

Lightning strike

Occurrence 200506780

At approximately 1620 CST on 17 December 2005, a Fokker 100 series aircraft, registered VH-FWI, with 14 passengers and a crew of 5 was returning to Darwin on a charter flight from the Indonesian port of Kupang.

On approach to Darwin, the crew were instructed by air traffic control to hold approximately 50 NM to the south of Darwin due to thunderstorms at the airport. The crew reported that, while holding in instrument meteorological conditions at approximately 16,000 ft above ground level, and between 6 and 8 NM from any storm cells, the aircraft was stuck by lightning.

While the aircraft was still holding, approximately 20 minutes after the lighting strike, the number-2 hydraulic system low quantity warning light illuminated and the number-1 hydraulic system quantity was observed to be reducing. The aircraft was then immediately tracked for a landing on runway 29 at Darwin.

The number-1 hydraulic system low quantity warning light illuminated when the crew selected the landing gear and flap, early on final approach to land. The landing was continued and the aircraft was able to be taxied to the gate.

An engineering examination found that two of the hydraulic return lines to the elevator boost unit and a hydraulic union and attaching line were damaged, due to electrical arcing as a result of the lightning strike. The examination also found at least two strike holes to the forward and mid-section of the aircraft fuselage. There were approximately 90 other strike related damage zones along the underside of the fuselage, landing gear doors and on the trailing edges of the wings and tailplane. During subsequent scheduled maintenance, further melting damage was found to the elevator flight control cables.

The aircraft operator reported that the aircraft was repaired and returned to service. ■

Collision with Terrain

Occurrence 200601509

On 26 March 2006, at about 1800 Eastern Daylight-saving Time, a Cessna 188B Agwagon aircraft, registered VH-ZIP, was reported to have taken off from a field adjacent to a local water-ski area, about 59 km south of Narrandera, NSW, with the pilot as the sole occupant. The following morning at about 0900, the aircraft wreckage was found by a passer-by at a position 55 km south of Narrandera and about 8 km from the departure area.

There was no evidence that the pilot experienced any physiological condition which could have contributed to the accident.

The pilot was reported to have been known to conduct 'high-risk' aerial activities, including aerobatic flight in agricultural aircraft. A number of photographs taken shortly before the final flight showed him conducting low passes over the water-ski site with the aircraft's main wheels in contact with the surface of the water. During the accident flight he was reported to have conducted very low passes over a departing vehicle, more low passes over the water with the main wheels in contact with the water's surface and what was described to be manoeuvres consistent with aerobatic flight.

The investigation concluded that the pilot was probably conducting an aerobatic flight manoeuvre from which collision with terrain could not be prevented. ■

Flight control problems

Occurrence 200504340

On 1 September 2005, the crew of an Embraer (Bandeirante) VH-OZF, was conducting a private flight under the visual flight rules from Bankstown Airport to Camden, NSW. At 1343 Eastern Standard Time, on the initial climb from runway 11 Left (11L), the pilot in command (PIC) experienced excessive nose down pitch control forces.

The PIC attempted to correct the pitch force with the manual elevator trim wheel and electric trim, but the trim did not move. The copilot assisted by applying back pressure to his control column and observed that the elevator trim wheel was in the full nose down position. The pilots were unable to maintain altitude and the aircraft descended from approximately 470 to 150 ft.

The investigation found that the left yoke-mounted trim switch did not return to the neutral position, when operated and released, due to a sticky substance binding the levers. It also found that the elevator electric trim servo mechanical clutch did not release at the specified setting.

The circumstances of this event were consistent with an electric trim runaway occurring during or shortly after take-off. The investigation established that the trim runaway was probably due to the non return of the switch from the nose down position or an unidentified electrical fault.

As a result of the investigation the operator and manufacturer initiated a number of safety actions. ■

Cessna 188B Agwagon aircraft, VH-ZIP at water-ski area. Note left main wheel contacting water surface (inset)

Analysis of in-flight passenger Injuries and medical conditions

Occurrence B2006/0171

Approximately 1.5 to 2 billion passengers fly on the world's civil aircraft each year. As the population ages, the number of air travellers increases and longer routes are flown by bigger aircraft, the number of medical events involving passengers is anticipated to increase.

The purpose of this study was to determine the prevalence, nature, type and extent of medical problems and injuries occurring in passengers on board civil registered aircraft. The aim, in particular, was to determine the most common in-flight medical problems in passengers, and what proportion of these events result in an aircraft diversion.

A search of the Australian Transport Safety Bureau's accident and incident database was conducted for medical conditions and injuries in passengers between 1 January 1975 and 31 March 2006. There were 284 passenger medical events and injuries (defined as 15 accidents, one serious incident and 268 incidents). These events accounted for only 0.18 of a percentage point of all the occurrences listed on the Australian Transport Safety Bureau's database. In-flight deaths accounted for only 3 per cent of the total passenger injury events.

The most common cause of in-flight death, at 44 per cent, was heart attack. Serious injuries accounted for slightly more than a third of reported occurrences. Minor injuries accounted for the majority of cases, at 53 per cent. The most common medical event in passengers was minor musculoskeletal injury (26 per cent of cases). Ninety-five flights were diverted (33 per cent). Of the known medical conditions, heart attack was the most common reason for an aircraft diversion (33 cases out of 95), followed by a fitting episode (in six cases).

The results of this study are consistent with other published international experience. There is a low risk of passengers sustaining either an injury or a medical event as a consequence of travel on a civil aircraft.

Passengers can also do their part to reduce the risks of injury. Wearing seat belts during all phases of flight, as instructed by the cabin crew, and taking particular care with opening overhead lockers can help to prevent or minimise the possibility of some of the more common injuries suffered on aircraft. ■

In-flight engine fuel leak

Occurrence 200505952

While on a scheduled passenger flight from Brisbane, Australia, to Los Angeles, US, the crew of the Boeing Company 747-438 aircraft, registered VH-OJD, observed excessive fuel use by the number-three engine. After confirmation that the engine had a fuel leak, the flight crew conducted an in-flight engine shut-down and diverted the aircraft to Sydney. Inspection of the engine found a fuel manifold drain line had fractured. Detailed examination of the drain line revealed that it had been subjected to high cycle fatigue (HCF), which led to its failure. The HCF was attributed to harmonic resonance from a combustor rumble of unknown origin. As a result of extensive testing of the engine, the manufacturer redesigned the drain line and reviewed its attachment (clipping) arrangements.

As a result of this investigation, the engine manufacturer re-designed the fuel manifold drain line for replacement on all applicable engines under a service bulletin (RB211-SB71-F152) released on 4 August 2006. This service bulletin also provides more detailed information to operators regarding fuel line clipping arrangements on these engines.

After the incident the operator conducted a fleet-wide inspection of the welded joints on the drain lines for evidence of cracking. No defects were found. The operator also subjected the incident engine to extensive testing with the engine manufacturer to identify the underlying cause of the combustor rumble. However, at the time of releasing this report, no determination had been made. On completion of the testing, the engine was scheduled to undertake a full refurbishment before being returned to service.

The operator also indicated that it would incorporate the manufacturer's service bulletin and replace all drain lines within their fleet on receipt of the new parts. ■

Engine failure

Occurrence 200501189

Boeing Company 717-200 aircraft, VH-VQB, was operating a scheduled passenger service from Launceston, Tasmania to Melbourne, Victoria when the right (number-2) engine failed during the climb to cruise altitude. After securing the failed engine, the flight crew declared a PAN condition and continued the flight to Melbourne where the aircraft landed uneventfully.

Examination of the failed BR715-A1-30 engine by the operator's maintenance staff and subsequently by the engine manufacturer under the supervision of a representative of the German Federal Bureau of Aircraft Accident Investigation (BFU), confirmed a mechanical failure within the engine high-pressure turbine section. The failure was traced to the fatigue fracture and loss of a single stage-1 high-pressure turbine blade, with the resultant cascading mechanical damage to the downstream turbine elements and the initiation of a high-temperature titanium metal fire within the high-pressure compressor stages.

Characteristics of the failed turbine blade fracture surfaces indicated that a high-cycle (vibratory) loading environment had contributed to the development of the fatigue cracking that led to the blade loss. A significant contributor to the magnitude of the vibratory blade loading was the extent of trailing edge erosion and metal loss exhibited by the turbine nozzle guide vanes (NGV). Those vanes progressively degrade in service due to the effects of oxidation and thermal cycling and are typically removed from service once the erosion and damage exceeds serviceable limits. While not evident during the examination, it was suspected that pre-existing blade mechanical damage may have acted in concert with the vibratory loads to initiate cracking.

Following the investigation, the manufacturer implemented several changes to the maintenance regime for the BR715 engine, including monitoring of the P30 engine parameter that reflects the level of NGV erosion and the mandatory replacement of eroded NGV segments that may otherwise have been repaired and returned to service. ■