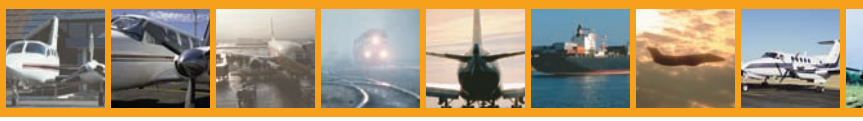
Australian Government
Australian Transport Safety Bureau

The Australian



QF32—a test of ATSB communications

In previous editions of *Flight Safety Australia*, I mentioned how the ATSB is committed to communicating investigation updates and findings in a timely and responsive manner.

Last November's uncontained engine failure of the Qantas Airbus A380 was a major test of this commitment.

During the early stages of our investigation, we received an intense level of interest from national and international media seeking regular updates. While this presented challenges, it also gave us opportunities to share important transport safety information with the general public.

The investigation also showcased our stronger focus on proactive communications. We provided regular updates through our internet site and released key information to the public as soon as it came to hand.

I'm pleased to say that this approach received positive feedback from media, industry and transport safety agencies from around the world.

This is something you will see more of. We will focus on updating the progress of our investigations as they unfold—not just when our investigation reports are released.

We will, of course, continue to work closely with directly involved parties to address any safety issues identified from investigations as soon as they become apparent. This will always be a major priority.

By being more proactive in our communications, we will also ensure all of industry has an early opportunity to become aware of and, where necessary, respond to relevant safety issues.

Martin Dolan
Chief Commissioner

Lock and load

ATSB investigation report AR-2010-044

A research report by the ATSB has highlighted the critical importance of adhering to systems and procedures when loading high-capacity aircraft. *Aircraft loading occurrences July 2003 to June 2010* describes the trends of the past seven years, identifying the most common errors and recounting notable incidents.

The most frequently reported loading occurrence was where cargo locks have not been raised, with 127 such instances notified to the ATSB between July 2003 and June 2010. Cargo locks are retractable latches that are integrated into the floor or wall of the aircraft; they are used to lock containers or pallets into place. The danger with cargo locks not being raised is that cargo can then move about in flight, affecting the aircraft's centre of gravity and controllability.

Mistakes in the loading of aircraft can cause serious problems. Overseas, there have been disastrous outcomes from such errors. In 2009, a Bulgarian-registered Airbus A320 sustained a tailstrike during takeoff from Verona, Italy, when all the cargo was located solely in the rear hold. In Britain, investigators believed that the shifting of cargo during taxiing or flight contributed to the 1999 death of two pilots in a Fokker F27. Fortunately, Australia has not experienced any comparable disasters resulting from loading. Nonetheless, loading occurrences in Australia are by no means uncommon, with 260 incidents reported to the ATSB between July 2003 and June 2010. Nearly all of these occurrences involved passenger-carrying operations, more than half of which were related to the securing of cargo.

The report provides a range of strategies to prevent loading occurrences, emphasising the importance of cross-checks by load personnel, load controllers and their computer software, and flight crew.

A copy of the report is available on the ATSB website at www.atsb.gov.au ■

Aviation Safety Investigator

No single fix for aircraft take-off errors

Aircraft take-off performance errors resulting from simple human data calculation or entry occur too frequently but can be avoided or detected, according to an ATSB research report.

The report examines Australian and international occurrences between 1 January 1989 and 30 June 2009 that involved the calculation and entry of erroneous take-off data. It reveals that take-off errors happen for many different reasons such as the wrong figure being used as well as data being entered incorrectly, not being updated, or being excluded.

Importantly, the report identifies that while no one is immune from these types of events, risk can be dramatically reduced through good operating procedures, aircraft automation systems and software design, and clear and complete flight documentation.

The consequences of these sorts of errors can range from aborted takeoffs through the tail of the aircraft scraping the runway and, in the extreme, collisions with the ground.

ATSB Chief Commissioner, Mr Martin Dolan, said that while there is no single solution to preventing take-off performance calculation and entry errors, good operating procedures will help to mitigate the risks associated with these errors.

'With each operator using different take-off calculation methods on different types of aircraft, there will never be one solution for eliminating these errors,' Mr Dolan said.

'Good standard operating procedures, such as cross checking all take-off calculations or verifying data using multiple sources, will help detect any errors before the aircraft leaves the gate.

'We advise operators to consider all the possible errors that could be introduced and then determine if the procedures in place will prevent these errors from occurring or provide opportunity to be detected.'

This ATSB research report expands on previous research by the Laboratory of Applied Anthropology, Boeing and Airbus by providing both an Australian and international perspective on these events. The report also explores why these events occurred by analysing the contributing safety factors.

A copy of the research report, *Take-off performance calculation and entry errors: A global perspective*, is available at www.atsb.gov.au. ■

Key tips for crew in avoiding take-off calculation and entry errors

- Ensure an independent calculation or cross-check of the take-off performance data is conducted by another crew member.
- Use multiple sources to verify the data.
- Check the values used to make the calculations as well as the values calculated when verifying the data.
- Ensure all procedures are strictly followed even if you have experienced delays or distractions.
- Restart the procedure or checklist if you have been interrupted and have doubts about what items have been completed.
- Take the time to check the values if discrepancies are identified—this includes both the input and output values.

Key tips for operators in avoiding take-off calculation and entry errors

- Ensure procedures are in place in case the primary aircraft system used to calculate take-off performance parameters is unavailable.
- Clearly define the roles and responsibilities of all crew members.
- Provide inbuilt reasonability checks in aircraft systems to help alert crew to the entry of erroneous data.
- Provide appropriate training for crew in performance software programs.

For more information on minimising take-off calculation and entry errors, read the ATSB report *Take-off performance calculation and entry errors: A global perspective* on the ATSB website www.atsb.gov.au

Investigation briefs

Water causes a flurry of false warnings

ATSB investigation AO-2009-004

An incident involving an Agusta Westland AW139 helicopter has prompted safety action from the aircraft manufacturer, the operator, CASA, and the Australian Government.

The investigation identified two technical problems: one associated with water and particulates corrupting the avionics system and the second related to the probable susceptibility of the air data system to turbulence. It also identified problems relating to workload and task management by the crew, and monitoring of the aircraft by air traffic services. This included the lack of an altitude deviation alert within the Australian Defence Air Traffic System (ADATS).

On 2 February 2009, the helicopter departed from Mackay Aerodrome after a night of heavy rain. Earlier, the crew had speculated whether they might experience erroneous cockpit indications, having heard of other operator crews experiencing problems after water ingress. During departure, two caution messages appeared on the crew alerting system (CAS). After consulting the emergency checklist and telephoning a maintenance engineer, the crew continued to Townsville.

Ten minutes later, other caution messages illuminated, including the repeated warning of a fire. After no fire was found, and another maintenance consultation, the flight continued.

When a large number of caution messages appeared on the CAS, the crew was too occupied by the emergency checklist to notice that the autopilot altitude hold function had, uncommanded, disengaged itself, and they were descending. The helicopter descended for over six minutes while flying towards an area of rising terrain, losing about 3,300 ft of altitude before air traffic services observed the descent and alerted the crew. The pilot initiated a climb, and they arrived at Townsville, landing safely.

As a result of the occurrence and the ATSB investigation, CASA, the helicopter manufacturer, and the operator implemented safety actions to address the issues. Also, a replacement for ADATS and the civilian air traffic system has been announced by the Government. ■

Cascading problems

ATSB investigation AO-2008-003

An electrical systems failure onboard a Boeing 747 aircraft near Bangkok on 7 January 2008 has prompted extensive safety actions from Qantas, Boeing and the United States Federal Aviation Administration (FAA). The aircraft lost electrical power to many of its onboard systems as a result of drain water entering units that control the distribution of electrical power.

The ATSB investigation report describes how a drain line heater had failed, causing an ice blockage that led to the drain line overflowing in the galley. The water flowed through a gap in the aircraft's floor, then through a dripshield and into three of the aircraft's four generator control units, causing them to malfunction and shut down. The loss of power affected the aircraft's cabin lighting and many of the aircraft's communication, navigation, instrumentation and flight guidance systems, including the autopilot. Many systems were subsequently powered by the aircraft's emergency batteries. The aircraft's engines, hydraulic system, and pneumatic systems were largely unaffected and it landed safely at Bangkok.

Safety actions in response to the occurrence included the reinforcing of protective dripshields above electrical equipment, improving maintenance practices and pilot training and installing advanced standby flight instruments in all Qantas 747 aircraft. The generator control unit manufacturer has increased its monitoring of returned units for signs of liquid contamination.

The ATSB found that the FAA's regulatory and guidance information did not fully address the potential harm to flight safety posed by liquid contamination of electrical system units in transport aircraft. In addition, the information provided to 747 400 flight crews regarding standby power operations was limited. The ATSB has made recommendations to the FAA and Boeing to address those safety issues.

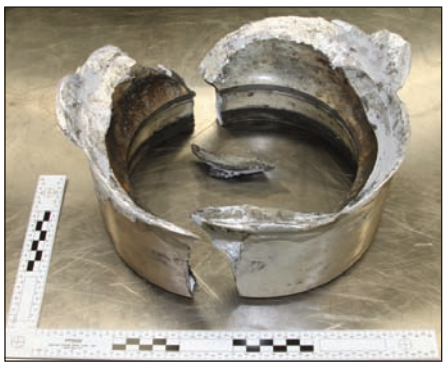
The ATSB has also released a Safety Advisory Notice reminding operators and flight crews about the need to respond immediately to battery discharge alerts. ■

Fleetwide wheel examination

ATSB investigation AO-2009-062

A landing gear failure at Melbourne Airport has prompted a fleet-wide examination of potentially-defective wheels to prevent a reoccurrence of the problem.

On 20 October 2009, the crew of a Boeing 737 reported that the aircraft was difficult to taxi, requiring more power and steering input than usual. A visual inspection revealed the number-4 wheel was at an angle to the axle. Following disassembly, it was discovered that the inner wheel hub and bearing mount had broken away from the wheel assembly. The inner hub had failed from fatigue cracking that had initiated in the area adjacent to the bearing cup.



Fatigue cracking of the inboard bearing cup bore was an emerging issue for the 737 wheel type at the time of the failure. In May 2009, the wheel manufacturer had issued a temporary revision to the Standard Practices Manual, with an updated inspection method for the susceptible area, and the aircraft manufacturer had issued a service letter in August 2009 with a periodic inspection requirement. The operator was in the process of reviewing and incorporating the changes into their own maintenance schedules at the time of the incident.

Immediately following the occurrence, the operator performed a fleet-wide examination, identifying those wheels potentially at risk of a similar failure.

Subsequently, ten wheels were removed from service for immediate inspection. The operator also implemented an ultrasonic inspection program for wheels with over 4,000 cycles at every tyre change.

The aircraft and wheel manufacturers both released updated information to operators and maintainers in early 2010, including a revision to the recommended inspection interval. ■

Airservices improves training

ATSB investigation AO-2009-056

Airservices Australia has modified its training curriculum for air traffic controllers after an ATSB investigation revealed gaps in a controller's competencies.

On 3 September 2009, two planes were flying in the vicinity of the MAXEM waypoint, located about 60 km south-east of Mildura. One plane, a Boeing 737, had departed Sydney for Adelaide, carrying seven crew and 143 passengers. It had been cleared by air traffic control to cruise at flight level (FL) 300. The other, a Boeing 777, was travelling from Melbourne to Singapore, carrying 17 crew and 276 passengers. Air traffic control had cleared the crew to climb to cruise at FL 300. On first contact with the controller, the crew of the 777 reported on climb to FL 300. The controller acknowledged the crew's transmission, but did not notice the potential conflict with the 737.

Over the next 18 minutes, the two planes drew closer to each other. Even as the controller completed the onwards coordination for both planes, providing their details to the next controllers to manage their flights, he did not observe the potential conflict between the aircraft.

Finally alerted to the situation by his display's short-term conflict alert function, the controller twice transmitted instructions to the 777 to turn right and descend the aircraft. However, there was no response from the crew.

After being interrupted by another controller, who was coordinating the movement of another aircraft, and then attempting a third call to the 777, the controller instructed the 737 to change course. The crew acknowledged, and turned their aircraft. The radar separation standard was compromised when it reduced to 9.1 km. The required separation was 9.3 km horizontal separation by radar, or 1,000 ft vertically. The controller then instructed the 737 crew to climb to FL 310. Radar separation continued to reduce and was 6.7 km before vertical separation was established. The controller then re-established communication with the crew of the 777. The controller handed over his duties to a relieving controller and was 'stood down'.

The subsequent ATSB investigation found that the controller's instructions had not been heard by the crew of the 777. Audio replay indicated that the controller's transmission of the callsign of the 777 was not clear and distinct.

A major part of any controller's training and development is the need to instil the practice of effective scanning of the controller's air situation display. Constant assessment and reassessment of the total air situation is essential to the safe and efficient management of air traffic. Although the controller had recently completed the air navigation service provider's approved training, his training records indicated an ineffective scanning technique and an inability to provide separation assurance during his on-the-job training. Further, he had not received any 'recovery from compromised separation events' instruction during final field training. However, Airservices advised that records indicated that the controller was provided with such training during the en route theory and simulator phases at the Airservices' Learning Academy.

As a result of the incident, Airservices Australia reviewed their assessment regime and, while there were no systemic issues, they have added refresher modules in compromised separation training to their curriculum, including in the final field training. ■

Aviation safety highlighted in bulletin

The importance of maintaining situational awareness and the risks of pilot distraction are two of the major safety lessons featured in the latest edition of the ATSB's investigation bulletin.

Situational awareness was a factor in air proximity events, breakdowns of separation, ground handling and wirestrikes. An example of a situational awareness issue occurred when a Pilatus PC-12/45 and Aeronautica MacchiAL60 passed within close proximity to each other while flying. This incident highlighted the need for aircrew to conduct diligent radio broadcasts and continual visual scaning to minimise the risk of collision.

The bulletin also identified how pilot distractions can affect the safety of aircraft operations. This was highlighted when the pilot of a Cessna 206 was distracted by other traffic operating in the area and consequently did not change the fuel tank selection. This resulted in an engine failure and subsequent forced landing.

Other safety lessons featured in the bulletin cover:

- the importance of pilots using all available resources to confirm clearances from the air traffic control
- the importance of not over-extending an aircraft glide after an engine failure
- the difficulties associated with managing an in-flight engine failure at low altitude
- the steps pilots can take to avoid wirestrikes, especially when flying in unfamiliar areas
- the techniques pilots can use to maintain separation from other aircraft.

Released quarterly, the bulletin provides a summary of the less complex factual investigation reports conducted by the ATSB. The results, based on information supplied by organisations or individuals involved in the occurrence, detail the facts behind the event, as well as any safety actions undertaken or identified. The bulletin also highlights important safety messages for the broader aviation community, drawing on earlier ATSB investigations and research.

A copy of *Level 5 factual investigations: 1 October 2010 to 31 December 2010* bulletin is available via the ATSB website at www.atsb.gov.au ■

Misaligned takeoff investigation

The ATSB recently released its investigation report into an 11 February 2009 occurrence involving a misaligned takeoff of a Bombardier Inc DHC-8-315 at Townsville airport.

The investigation found that:

- the flight crew were distracted by the need to manage the weather conditions on their departure track
- the runway line-up occurred at night and in reduced visibility—this diminished the contrast between the taxiway and ordnance loading area line markings and increased the crew's reliance on the available runway lighting
- the pilot in command did not line the aircraft up on the runway centreline
- the co-pilot did not monitor the aircraft's taxi path.

The report is available via the ATSB website at www.atsb.gov.au

Takeoff safety card

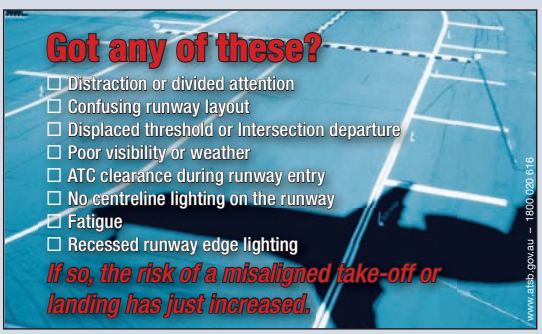
The ATSB has produced an information card to remind pilots of the factors that contribute to misaligned takeoffs at night.

These factors include:

- distraction or divided attention
- confusing runway layout
- displaced threshold or intersection departure
- poor visibility or weather
- air traffic control clearance during runway entry
- no centerline lighting on the runway
- crew fatigue
- recessed runway edge lighting.

The business-size card is based on a recent ATSB research report as well as the release of an investigation report into a misaligned take-off event.

You can access the research report, *Factors influencing misaligned take-off occurrences at night*, via the ATSB website at www.atsb.gov.au



REPCON briefs

Australia's voluntary confidential aviation reporting scheme

REPCON allows any person who has an aviation safety concern to report it to the ATSB confidentially. All personal information regarding any individual (either the reporter or any person referred to in the report) remains strictly confidential, unless permission is given by the subject of the information.

The goals of the scheme are to increase awareness of safety issues and to encourage safety action by those best placed to respond to safety concerns.

REPCON would like to hear from you if you have experienced a 'close call' and think others may benefit from the lessons you have learnt. These reports can serve as a powerful reminder that, despite the best of intentions, well-trained people are still capable of making mistakes. The stories arising from these reports may serve to reinforce the message that we must remain vigilant to ensure the ongoing safety of ourselves and others.

Operator push back requirements

Report narrative:

The reporter expressed concern that the operator's cabin crew were unable to meet the requirement to have all passengers seated prior to aircraft pushback on several flights. The reporter indicated that, on one flight, several passengers were still standing when the pushback commenced and several of them lost their footing when the tow vehicle stopped quickly. The reporter believes that the airline is under pressure to run on time.

Action taken by REPCON:

REPCON supplied the operator with the de-identified report and the operator advised that they have documented procedures to ensure the left number-one door is not closed until all of the passengers are on board and seated. The cabin crew are also instructed that 'on time pressure' is not a reason to ignore these procedures and compromise safety. A quality program of cabin audits operates to check cabin crew conformance to documented procedures. To date, this program has not seen any situations as reported in the REPCON brief. A check of the safety database did not reveal any reports of such an occurrence.

Nevertheless, the operator will accept the report and will work with cabin crew to ensure that procedures are followed and 'on time pressure' does not compromise safety.

REPCON supplied CASA with the de-identified report and a version of the operator's response. CASA provided the following response:

> CASA has reviewed the report and is satisfied with the response from the operator.

Flying instructor fatigue

Report narrative:

The reporter expressed concern that observed levels of fatigue in instructors who work for the flying school were the result of a new roster system introduced by the flying school operator. The roster is believed to rotate daily, with different start times and with no set days off each week. The reporter also expressed concern that the instructors are under pressure to fly in conditions unsuitable for the type of training for the students. Examples given (which are only to show that there may be systemic issues) include flights in low visibility for the first solo in the training area and 12 knot crosswind circuits prior to first solo.

The reporter believes that a risk assessment should be carried out to determine if the instructors' fatigue could be prevented by the use of the CASA CAO 48.1 roster.

Reporter comment:

> 'If the current roster continues a serious incident or accident may occur.'

Action taken by REPCON:

REPCON supplied the operator with the de-identified report and the operator advised a new roster had been introduced in 2009, following consultation and discussion with the instructor staff involved. The purpose of the new roster was to ensure that staff would be available to train and authorise students between the hours of 0630 and 2030 daily, with overlapping morning and afternoon shifts. The roster is based on a well-established airwork schedule, which was checked before adoption to ensure compliance with CASA duty and flight time regulations. Resulting duty and flight times are monitored continuously and actual hours remain well within CAO 48 limits. Staff morale is good and there are no fatigue indications.

Operator comment:

> 'As to instructors being pressured to fly with and to authorise solo in unsuitable weather conditions, we would not countenance this and have seen no evidence of its occurrence. The senior instructors are free to make their own judgment on what constitutes suitable conditions and trends, within guidelines set out in the Operations Manual, AIP, supported by Meteorological Forecast study and ATC consultation. Junior instructors are, in addition, required to check with senior staff if in any doubt. Errors are rare, with the odd abandonment or discontinuance of a sortie the only result. There is absolutely no company history of complaints by students or staff about any coercion to compromise safety.'

REPCON supplied CASA with the de-identified report and a version of the operator's response. CASA provided the following response:

> CASA has reviewed the report and is satisfied with the operator's response.

How can I report to REPCON?

Online: www.atsb.gov.au/voluntary.aspx

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Email: repcon@atsb.gov.au

Facsimile: 02 6274 6461

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