



Australian Government

Australian Transport Safety Bureau

Executive Director's Message

With the preparation of the ATSB's 2008 Annual Review, I have taken the opportunity to look over the Bureau's accomplishments and challenges of the past financial year. In many respects, 2007-08 was a watershed year. The ATSB received approximately 15,218 occurrence notifications, with 8,299 recorded as aviation incidents and accidents.



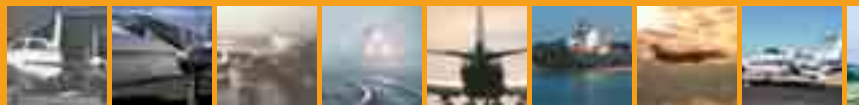
It can be difficult to select up to 80 investigations from these occurrences, and inevitably parties associated with some occurrences on the decision margins may not agree with the selection. There are also competing priorities between investigating fatal general aviation accidents to a level sought by state and territory coroners (and the further resources needed in any ensuing inquests), and doing more investigation of fare-paying passenger regular public transport incidents where there may be more future safety value. There is often a further trade-off between numbers of new investigations and timeliness.

Last financial year, the ATSB initiated 77 new aviation investigations and completed 73 aviation investigations. The drop in reports released was the result of: the diversion of resources to provide input to coronial inquests, including into the Lockhart River 15-fatality accident; resignations and the associated recruitment and training overhead for new investigators; and ongoing training and familiarity in the use of our new database and its associated investigation and analysis tools. At 30 June 2008, the ATSB was continuing 91 aviation safety investigations.

The ATSB prefers to encourage early and positive safety action following an accident or incident, and to record such action in its final investigation reports if this is possible, negating the need to issue formal safety recommendations. However, the ATSB will make recommendations when it believes that insufficient safety action may have been taken. In 2007-08, 43 different aviation occurrence investigations resulted in 131 separately-identified safety actions by aviation stakeholders. Also, the ATSB issued 23 aviation safety recommendations and two safety advisory notices to aviation stakeholders. The Bureau also released 11 aviation safety research reports.

Kym Bills, Executive Director

The Australian



Reporting trends in airline operations

The reporting of aviation safety occurrences enables the ATSB to investigate accidents and incidents, and monitor safety through the analysis of trends. On 1 July 2003, reporting obligations changed with the introduction of the *Transport Safety Investigation Act 2003* (TSI Act). For the first time, the types of occurrences that need to be reported to the ATSB were prescribed. Those occurrence types are referred to as reportable matters, and are defined as either immediately reportable matters (IRMs) or routine reportable matters (RRMs). A research report released by the ATSB in December 2007 examined trends in IRMs involving regular public transport (RPT) operations.

The study examined the period from mid 2001 – before the introduction of the TSI Act – to mid 2006. The aim was to inform the aviation community of any important safety trends, and to provide the travelling public with a better appreciation of the types of occurrences that are reported to the ATSB.

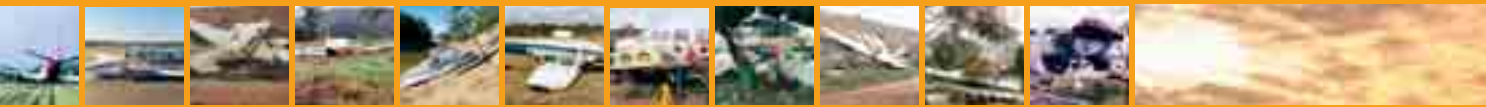
The study found that high-capacity RPT operations dominated air transport activity, and consequently dominated the reports of IRM occurrences. Furthermore, activity for high-capacity RPT operations, measured by flying hours and movements, increased over the period studied. However, despite an increase in activity, the number of IRM occurrences remained stable or declined, depending on the IRM category. When measured in relation to airline activity, the trend rate was generally downwards.

Violations of controlled airspace reduced over the period while occurrences involving a fire, explosion or fumes and crew injuries or incapacitation also decreased, but only marginally. Other IRM categories such as uncontained engine failures and fuel exhaustion events were rare, or absent. The exception was breakdowns of separation (BOS) and airprox events, where occurrence numbers went up. However, the rate did not increase statistically relative to the number of movements, suggesting that the increase was largely linked to increased activity.

The study also confirmed that accidents in RPT operations are extremely rare, with only one fatal accident recorded over the reporting period. Unfortunately, this one accident resulted in 15 fatalities. This review highlighted the consistent reporting culture of the air transport sector and the air traffic service provider, and provided encouraging data concerning the general state of safety in RPT operations.

In addition to this report, the ATSB is conducting a follow-on study that looks at the other component of the air transport sector in Australia, charter operations. This report is expected to be released later this year. ■

Aviation Safety Investigator



Airprox event

On 17 May 2007, a de Havilland Dash-8, registered VH-TQP, was approaching Port Macquarie Aerodrome, NSW, in class G airspace from the south under the instrument flight rules (IFR). A Beechcraft Baron D55, registered VH-ILS, was also approaching the aerodrome under the IFR from the south-west, to conduct an area navigation global navigation satellite system (RNAV (GNSS)) non-precision approach to runway 03.

At the same time, the pilot of an Aeroprakt A22 Foxbat, registered 24-4422, was taxiing towards the runway with the intent of taking off from runway 21 to conduct circuits. The Foxbat was being operated under the visual flight rules (VFR). The pilot of a Cessna C152, registered VH-VHF, was also taxiing towards runway 03, with the intent of conducting a navigational flight. A number of other aircraft were flying in the vicinity, but were not relevant to the occurrence. Port Macquarie was designated as having CTAF(R) procedures.

The ATSB examined recordings of the transmissions made on the Port Macquarie CTAF. That examination revealed that the pilot of the C152 commenced a departure broadcast, but was over-transmitted 2 seconds later by another broadcast from the pilot of the Foxbat, making both broadcasts almost incomprehensible. The pilot of the C152



stopped transmitting first and, when both transmissions had finished, the crew of the Dash-8 broadcast advice of the over-transmission and asked for a repeat by both pilots. Only the pilot of the C152 repeated the departure broadcast. The Dash-8 was overflying the aerodrome to join the circuit for runway 03 as the Foxbat was lining up on runway 21 and the Baron was on final approach for runway 03. The crew of the Dash-8 had observed the Foxbat and advised the pilot of the Baron of the Foxbat's position as the Foxbat commenced a take-off roll on runway 21. The pilot of the Baron initiated a go-around from short final approach for runway 03 as the Foxbat took off from runway 21.

The crew of the Dash-8 modified their approach to join the circuit for runway 21 and subsequently conducted a go-around from final as the pilot of the Foxbat also turned onto final for runway 21 in front of the Dash-8. The go-around by the Dash 8 was the first time that the pilot of the Foxbat became aware of

other aircraft in the circuit. He conducted a touch-and-go landing on runway 21, broadcast his intention and then flew a few miles to the north of the aerodrome to fault-find his radio system away from any circuit traffic. The pilot of the Foxbat did not find a fault with his radio system. He subsequently broadcast his intention to return to the aerodrome to join the circuit for runway 21, and landed without further incident.

A club instructor inspected the Foxbat's radio after engine shutdown and found that the radio volume was at a low setting. In addition, the pilot of the Foxbat advised the ATSB that he subsequently believed that there was an intermittent fault with the Foxbat's radio. While he had an awareness of the aerodrome frequency response unit's (AFRU) operation, the pilot had not fully considered the implications of a lack of response from the AFRU.

The issue of pilots not being fully aware of the significance of hearing (or not hearing) the transmissions of an AFRU at non-towered airports, has been identified in previous ATSB investigations (e.g. see ATSB investigation 200700231 available at www.atsb.gov.au). The safety issue does not only relate to members of Recreational Aviation Australia and, accordingly, the ATSB issued Safety Advisory Notice AO-2007-006-SAN-037 to the broader aviation industry. ■

ATSB Investigation Report 200703100

Investigation briefs

Fumes event

Occurrence 200704876

On 5 August 2007 at 1415 EST, a Saab Aircraft AB 340B, registered VH-RXX, with a crew of three and 20 passengers, was being operated on a scheduled passenger service from Sydney to Albury, NSW. It was the aircraft's first flight of the day.

An odour, which had been apparent inside the aircraft during the preflight procedure and taxi, and which was described as 'similar to curry', became much stronger from just before rotation until about 2 minutes after takeoff. Believing the fumes were caused by compressor wash fluid and would dissipate, the flight crew elected to continue the flight.

The Saab 340B has no specific checklist to be actioned in response to fumes in the cockpit. The flight crew donned their oxygen masks after performing the after-takeoff checks.

At approximately 60 km from Sydney, the intensity of the fumes had diminished considerably, but they were still present and the flight crew elected to remain on oxygen as a precaution.

The flight crew decided to divert to Wagga Wagga, NSW, where the operator had engineering support and where it would be possible to replenish the oxygen system. They remained on oxygen until they landed.

On the next sector, icing conditions were encountered during the descent. As part of their normal procedure in icing conditions, the flight crew turned on the high pressure engine bleed valves and the odour again intensified.

The manufacturer of the compressor wash fluid confirmed that, when heated, it would produce an odour similar to curry.

The operator reported that their compressor wash procedure had been followed, and was unable to explain the subsequent ingress of fumes to the cockpit. Routine use of that modified compressor wash procedure by the operator has not resulted in any problem involving fumes either before or since the incident. ■

Hydraulic system event

Occurrence 200706490

At 0715 Coordinated Universal Time on 20 October 2007, a Boeing Company 747-438 aircraft, registered VH-OJB, departed Los Angeles International Airport, USA, on a scheduled passenger flight to Brisbane, Australia. There were four flight crew, 14 cabin crew, and 406 passengers on board the aircraft. As the aircraft became airborne, a tyre on the left body landing gear disintegrated and a section of tyre debris impacted a line of the number-1 hydraulics system in the left body landing gear well. That caused fluid and pressure loss from that system. A short time later, the electronic indicating and crew alerting system (EICAS) screen in the cockpit advised that the number-1 hydraulics system had failed and a report was received from the cabin crew that a 'bang' was heard in the vicinity of the left main landing gear shortly before the aircraft became airborne.

The crew completed the appropriate checks and were advised by air traffic control that tyre debris, but no other material, had been recovered from the runway. The crew also checked other aircraft systems that had the potential to be affected by the tyre failure, including flight controls, pressurisation, engines, and fuel. The crew confirmed that all other aircraft systems were functioning normally and, after considering the status of the aircraft and the option of dumping fuel and returning for a night landing at Los Angeles, decided to proceed towards the planned destination, while closely monitoring the aircraft's systems and fuel usage. A check with the operator's maintenance control home base advised concurrence with the crew's intention.

The flight crew completed checklist items and the flight continued uneventfully to Brisbane.

The operator found some inconsistencies in the aircraft manufacturer's documentation relating to hydraulics failures. The aircraft manufacturer has noted those and will examine them as part of its ongoing standardisation program. ■

In-flight engine failure

Occurrence 200700356

At 1200 EST, on 3 February 2007, after departing Sydney Airport and while in a climb at approximately 4,000 ft above ground level, the flight crew of a Boeing 747-438 aircraft, registered VH-OJM, heard several loud bangs and felt vibration through the aircraft structure. Observing an increase in the exhaust gas temperature indication for the number-3 engine, the crew following the non-normal checklist, shut down the engine, dumped excess fuel and returned the aircraft to Sydney Airport.

A subsequent examination of the engine found that it had sustained a high pressure compressor (HPC), stage 1, blade failure. The mode of failure was known to the engine manufacturer, who had attributed it to blade tip rubbing, due to distortion of the engines high pressure case (module 41). To address the problem, the engine manufacturer had introduced service bulletin (SB), SB72-F002. The engine did not have the service bulletin embodied at the time of the failure. Although the exact time of the blade tip rubbing and subsequent cracking could not be determined, the engine manufacturer believed that crack initiation to blade failure took approximately 50 cycles.

During the investigation, the aircraft operator experienced a subsequent failure, bringing the total number of failures of this type for the operator to five. Similar failures were reported by another aircraft operator, with 16 similar failures reported in total. Although only two operators experienced the failures, they represented 49 per cent of the world fleet of RB211 engines. The conditions that led to the failures and why only two operators had experienced these failures has not yet been identified, but may be attributed to a combination of operational and engine/airframe specific elements.

As a result of the incident, the operator accelerated its modification embodiment program and expects to have all installed engines modified by early 2010. ■

In-flight engine failure

Occurrence 200702219

On 11 April 2007, shortly after takeoff from Wagga Wagga Airport, NSW, the crew of a de Havilland Dash 8 aircraft registered VH-TQY, noticed an unusual popping sound, followed by a slight vibration through the power levers. On passing 3,800 ft there was a significant drop in torque on the left engine, with associated popping noise. The crew shut down the engine and returned to Wagga Wagga Airport. After initial inspection on the wing, the engine was removed and sent to the manufacturer for disassembly and examination.



The examination found that the engine's number-5 bearing, the high pressure (HP) turbine disc and stub-shaft had failed. Those components were sent to the ATSB for further examination. That examination determined the number-5 bearing had failed at its roller cage through fatigue cracking, the stub-shaft had failed under overload and the HP turbine disc had suffered blade tip rubbing. Most of the cage pockets had been enlarged, with evidence of the rollers skewing and rotating up to 90 degrees within some pockets

The operator had experienced a previous number-5 bearing failure on another of its engines. That bearing displayed the same failure pattern of its roller cage and was consecutively serial numbered to the VH-TYQ engine's number-5 bearing.

The ATSB found that, while the precursors to roller instability could not be identified, early identification of number-5 bearing distress can reduce the likelihood of an in-flight engine failure. Both failed bearings had consecutive serial numbers and were possibly from the same manufacturing batch. As a result of this investigation, the engine manufacturer identified a batch of 15 bearings required replacement and introduced procedures to minimise the risk of further bearing failures. ■

In-flight engine malfunction

Occurrence 200605620

On 24 September 2006, during a scheduled passenger service from Darwin, NT, to Denpasar, Indonesia, the left engine of a Boeing Co 737-400 series aircraft sustained a mechanical failure within the first-stage low-pressure turbine (LPT) section. After reducing the engine thrust to minimise vibration and further damage, the flight crew returned the aircraft to Darwin.

The turbine blade failures were characteristic of a cascading rupture, where an initiating blade failure or event triggers multiple consequent blade-forced failures because of impact with debris confined within the turbine space. The investigation was unable to identify the exact event that precipitated the turbine failure, however there was no evidence that fatigue cracking or other local blade defects had contributed.

Following an analysis overseen by the ATSB, the engine manufacturer found that it was likely that thermally-induced microstructural creep damage had contributed to the blade failure and subsequent damage to the turbine stage. An examination of the engine maintenance and operating records did not reveal any instance/s of hot-starting or significant take-off exhaust-gas temperature exceedance that may have contributed to the premature failure.

A total of seven related LPT stage-one failures had been identified by the engine manufacturer, including two from the subject Australian operator. While the engine manufacturer is continuing work towards a better understanding of the issue, a range of stage-1 LPT blade production batches were identified as possibly being predisposed to premature failure. The engine manufacturer has recommended that LPT blades from the identified batches be removed from service and quarantined at the next maintenance opportunity, pending its further investigation and assessment of the issue. ■

Main rotor blade skin separation

Occurrence 200701625

At approximately 1500 EST on 15 March 2007, a student helicopter pilot and accompanying flight instructor were conducting an instructional flight test in a Robinson Helicopter Company (RHC) model R22 Beta II helicopter, registered VH-HPI. They noted an unusual mechanical noise, followed by the onset of severe vibrations from the main rotor system. After immediately landing the helicopter, it was found that the skin from the underside of one main rotor blade had disbonded from the leading edge spar over a length of approximately 450 mm from the blade tip.



The skin separation was found to be associated with abrasion and loss of the rotor blade leading edge paint across the bond line between the skin and leading edge spar. Erosion along the bond line had produced an undercutting effect and a feathering of the skin edge. Associated with random voids and pores in the adhesive that filled the gap between skin and spar recess edges, it was probable that the erosion had produced localised stresses within the adhesive joint, promoting the lifting of the feathered edges and the subsequent peeling separation of the skin.

As a result of a number of similar failures in both R22 and R44 main rotor blades, the helicopter manufacturer published a series of safety alerts, service letters and service bulletins, recommending the regular inspection of the blades for evidence of skin disbonding and the refinishing of blades showing abrasion of the leading edge paint to, or beyond, the skin bond line. Airworthiness directives from the US Federal Aviation Administration and CASA subsequently mandated the initial and repeat inspection of R22 and R44 main rotor blades for this issue. ■

REPCON briefs

Australia's voluntary confidential aviation reporting scheme

REPCON is a voluntary confidential reporting scheme for aviation. REPCON allows any person who has an aviation safety concern to report it to the ATSB confidentially while protecting the reporter's identity. This could include a self-report about something the reporter was directly involved in. REPCON would like to hear from you if you have a safety concern 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 and well-meaning 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. REPCON will also accept third-party reports where the reporter has a safety concern about, for example, training, cabin safety, flight operations, air traffic services, crew scheduling or maintenance practices.

Note: please check the REPCON information on the ATSB website at <www.atsb.gov.au> first before making a report as the confidentiality requirements cannot be applied to reports of a serious and imminent threat to a person's health, or life or reports of serious crimes.

Recreational Aviation Australia (RA-Aus) aircraft propellers

R20080001

Report narrative:

The reporter expressed concerns that carbon propellers which the reporter believes are safer and more reliable than the standard wooden propellers used on RA-Aus certified aircraft, have not been approved for use.

REPCON comment:

REPCON contacted the RA-Aus and supplied them with the de-identified report. The RA-Aus responded that they had provided information to members about this issue in the President's report of the May issue of *Recreational Aviation Australia* magazine. The President's

report contained the following:

Changing gears (props) now. You should all be aware that if you fly a factory built certified aircraft no changes are allowed to the manufacturer's parts and specifications. In other words if it came with "x" brand prop with "y" pitch that is what you have to replace it with; even if Bill tells you that "z" brand with a "s" pitch would make your aircraft climb and cruise faster. We have had many representations from owners saying that their original prop only gives marginal performance and fitment of a "z" brand would enhance safety. Unfortunately CASA make the rules, we only administer them, and in CASA's view the only way anything can be changed on a certified aircraft is to have a CAR 35 engineer draw up the paperwork and approve the mod for that specific airframe.

Obviously RA-Aus would be remiss if we did not try to find a solution for our members who wish to deviate from manufacturers specifications on perceived safety grounds. We have been working with CASA to find a solution, but unless the manufacturer is willing to re-certify the aircraft with a new prop, the CAR 35 route is the only way to go if you want to maintain the certification status. CASA has presented us with an option where the owner may take the aircraft out of certified status and place it in the experimental category (19 prefix) and play around with the airframe to their hearts content with no comeback at CASA or the manufacturer. What is not clear is whether the aircraft could ever return to the certified category which may result in lessening the resale value.

RA-Aus only permits certified aircraft to be used in our Flight Training Schools and therefore school aircraft must not be modified in any way from that which was certified by the factory. We will be continuing to try and find solutions to the propeller question for our members

when and if other avenues become available.

Operator maintenance human factors training

R200800035

Report narrative:

The reporter expressed concerns about the operator's engineering human factors training. The refresher training is conducted on-line using a training package with an assessment test. Individuals are required to conduct the training in their own time and it is expected to take approximately 2 hours to complete. The reporter was informed that the training is required to comply with European standards (EASA 145) and the soon to be introduced Australian legislation, CASR 145.

The reporter claims to have observed a range of shortcuts being taken during the assessment test including: the test being conducted by a different person to that recorded as having completed the test; sharing of answers; and the test being completed without reading the training material. In addition, the reporter claims that some managers indicated they did not care how the training was completed as long as it was recorded as being completed. The reporter is also concerned that the training can be completed without reference to company policy.

The reporter expressed concerns that computer-based training for human factors is inappropriate, and the lack of adequate time allocated to complete the training means that shortcuts might/will be taken. On the other hand, a classroom situation allows for questions to be asked and important areas to be highlighted. Also, the reporter believes that the assessment test needs to be supervised to ensure proper compliance.

Reporter comment: The human factors training needs to be carried out again in a class room situation otherwise the whole

training package has been a 'box ticking' process.

REPCON comment:

REPCON contacted the operator and supplied them with the de-identified report. The operator responded that the on-line training of this type - for refresher and updating purposes - is commonly used in engineering as a training delivery method. This method is used for a range of technical training. Human factors training outcomes have benefits for the business, but also for the individual. The operator agreed that this method of delivery does rely on the honesty and integrity of the individual, however, it is not in the individual's best interests to shortcut or cheat the process. While conceding that computer-based training is not as good as face-to-face classroom training, the operator pointed out that all of the people conducting the computer-based training had attended an engineering 2-day classroom human factors course within the past 2 years and the recurrent training package is intended to provide new information to supplement the classroom package. The next round of recurrent training is planned to be carried out in a classroom.

The operator indicated that it is not unusual to expect employees to do this training in their 'spare' time - being time for which they are being paid but where they have no other allocated work, including the option to complete the training package in several parts rather than all at once.

Engine failure during takeoff

R200800041

Report narrative:

The reporter expressed concerns about a Cessna 404 aircraft that experienced a series of engine failures during attempts to take off at [Location]. The reporter claims that during the aircraft's first attempt to take off, an engine failed shortly after lift-off and the aircraft settled back onto the runway. After the engine was restarted, the aircraft was taxied back to the threshold. A further four attempts to take off were made with similar results. The reporter indicated that no checks were conducted to determine why the engine had failed.

Reporter comment: The engine failures should be investigated including the obvious disregard for the flight crew and passenger safety.

REPCON comment:

REPCON contacted the operator and supplied them with the de-identified report. The operator responded that an investigation was conducted. The engine that failed was carefully assessed by the pilot and was deemed to be operating normally. The aircraft subsequently departed without any further problems. The operator stated that there was only one aborted takeoff and the engine was thought to have experienced vapour lock in the fuel line due to the unusually hot day, resulting in a phenomenon called 'bogging down'. There had been no indication prior to takeoff that there was a problem.

The operator also provided the following information: The phenomenon of bogging down in the early phase of takeoff for this type of aircraft is not uncommon. Sometimes it can occur with the auxiliary fuel pumps ON (low pressure) as suggested by the manufacturer and sometimes it will occur with the auxiliary fuel pump in the OFF position. The reporter stated that the pros and cons of having the fuel pump on or off during the takeoff, has been the subject of widespread debate by pilots since the Cessna 404 aircraft was introduced into Australia about 30 years ago. Some say bogging down or failure to accelerate is caused by over fuelling where then pumps are selected to the low pressure ON position. Others say if you don't have the pumps on, this will cause the same symptoms - lack of engine acceleration.

Helicopter operation at a caravan park

R200800071

Report narrative:

The reporter expressed concerns that a helicopter was operating from within the grounds of a caravan park in WA. The helicopter was located within a 180cm high mesh fence with small trees located very close on three sides.

Reporter comment: This does not appear to be a safe area for landing and takeoff, particularly when the landing area is

located within the grounds of a caravan park.

REPCON comment:

REPCON contacted the operator and supplied them with the de-identified report. The operator responded that the helicopter was conducting spray operations in the area and parked at the caravan park when not engaged in spraying operations so that the helicopter would have better security. The operator had gained permission from the owner of the caravan park and evaluated the site for safe operations prior to using the area to safely house the helicopter. The helicopter only approached and departed the caravan park over uninhabited and cleared land. As the helicopter was located within a 180cm high secure mesh fence, it was secure from anyone approaching while the helicopter was departing. ■

REPCON reports received

| | |
|---------------------|-----|
| Total 2007 | 117 |
| First quarter 2008 | 27 |
| Second quarter 2008 | 31 |
| July/August 2008 | 23 |

What happens to my report?

| | |
|-----------------------------|----|
| For Your Information issued | |
| Total 2007 | 58 |
| First quarter 2008 | 16 |
| Second quarter 2008 | 31 |

Alert Bulletins issued

| | |
|---------------------|---|
| Total 2007 | 1 |
| First quarter 2008 | 4 |
| Second quarter 2008 | 7 |
| July/August 2008 | 0 |

Who is reporting to REPCON?#

| | |
|---|-------|
| Aircraft maintenance personnel | 34.0% |
| Air Traffic controller | 4.0% |
| Cabin crew | 2.0% |
| Facilities maintenance personnel /ground crew | 1.0% |
| Flight crew | 25.0% |
| Passengers | 6.0% |
| Others* | 28.0% |

29 Jan 2007 to 30 June 2008

* examples include residents, property owners, general public

How can I report to REPCON?

On line: ATSB website at <www.atsb.gov.au>
Telephone: 1800 020 505
by email: repcon@atsb.gov.au
by facsimile: 02 6274 6461
by mail: Freepost 600,
PO Box 600, Civic Square ACT 2608
For further information on REPCON, please visit our website <www.atsb.gov.au> or call REPCON on: 1800 020 505.